

AIRBUS

A380



FLIGHT CREW OPERATING MANUAL

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TRANSMITTAL LETTER

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This is the FLIGHT CREW OPERATING MANUAL at issue date 03 NOV 11 for the A380 and replacing last issue dated 12 JUL 11

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FILING INSTRUCTIONS

Please incorporate the revision as follow:

Localization Subsection Title	Remove	Insert Rev. Date
PRO-NOR-SOP-180 **Precision Approach**	ALL	03 NOV 11
PRO-NOR-SOP-AIL-00000029 **CAT II and CAT III APPROACH**	ALL	03 NOV 11
PRO-NOR-SOP-190-20 **NPA Flown with FLS Function**	ALL	03 NOV 11
PRO-NOR-SOP-190-30 **NPA Flown without FLS Function**	ALL	03 NOV 11
PRO-NOR-SOP-240 **Parking**	ALL	03 NOV 11
PRO-NOR-SCO **Standard Callouts**	ALL	03 NOV 11
LIM-10 **General Limitations**	ALL	03 NOV 11
LIM-22-30 **Automatic Approach, Landing, and Roll-Out**	ALL	03 NOV 11

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	LIM-49-10	**Auxiliary Power Unit**	06 JUL 11
	LIM-49-20	**Operational Envelope**	06 JUL 11
	LIM-70	**Engines**	06 JUL 11
	PER-OPS	**Operating Speeds**	06 JUL 11

M(1)	Localization	Subsection Title	Rev. Date
	PER-OPD-GEN	General	06 JUL 11
	PER-OPD-AMISC	ATMO Module Interface (Speed conversions)	25 JUL 11
	PER-OPD-AMITA	ATMO Module Interface (True altitude for high altitude use)	06 JUL 11
	PER-OPD-AMILA	ATMO Module Interface (Low altitude temperature corrections)	25 JUL 11
	PER-OPD-CDTSC	Conditions (Speed conversions)	25 JUL 11
	PER-OPD-CDTTA	Conditions (True altitude for high altitude use)	06 JUL 11
	PER-OPD-SDSC	Specific Data (Speed conversions)	06 JUL 11
	PER-OPD-SDTA	Specific Data (True altitude for high altitude use)	06 JUL 11
	PER-OPD-SDLA	Specific Data (Low altitude temperature corrections)	25 JUL 11
	PER-OPD-ATR	Atmosphere Results	25 JUL 11
	PER-LOD-DEF	Definitions	25 JUL 11
	PER-LOD-GEN	General	06 JUL 11
	PER-LOD-LAR	Loadsheet Application Interface (Reduced Mode)	25 JUL 11
	PER-LOD-LAD	Loadsheet Application Interface (Detailed Mode)	25 JUL 11
	PER-LOD-LAI-ACRO	Aircraft Configuration (Reduced Mode Only)	25 JUL 11
	PER-LOD-LAI-ACDO	Aircraft Configuration (Detailed Mode Only)	25 JUL 11
	PER-LOD-LAI-ACRD	Aircraft Configuration (Reduced Mode plus Detailed Mode)	25 JUL 11
	PER-LOD-LAI-PRM	Payload (Reduced Mode)	25 JUL 11
	PER-LOD-LAI-PDM	Payload (Detailed Mode)	25 JUL 11
	PER-LOD-LAI-FUL	Fuel	25 JUL 11
	PER-LOD-LAO	Loadsheet Application Results	25 JUL 11
	PER-LOD-LAE	Loadsheet Application Reports	25 JUL 11
	PER-LOD-FDC	Fuel Data Computation	25 JUL 11
	PER-LOD-ACS	Aircraft Status	06 JUL 11
	PER-THR-NRM-MTO	Maximum Takeoff	06 JUL 11
	PER-THR-NRM-DTO	Derated Takeoff	06 JUL 11
	PER-THR-NRM-FTO	Flexible Takeoff	06 JUL 11
	PER-THR-NRM-MGA	Maximum Go-Around	06 JUL 11
	PER-THR-NRM-MCT	Maximum Continuous	06 JUL 11
	PER-THR-NRM-MCL	Maximum Climb	06 JUL 11
	PER-THR-NRM-DCL	Derated Climb	25 JUL 11
	PER-THR-NRM-MCR	Maximum Cruise	06 JUL 11
	PER-THR-NTF	N1 To Fly	25 JUL 11
	PER-TOF-GEN	General	06 JUL 11
	PER-TOF-TOI	T.O PERF Initialization	25 JUL 11
	PER-TOF-TOC-RWY	Airport/Runway	25 JUL 11
	PER-TOF-TOC-OCD	Outside Conditions	25 JUL 11
	PER-TOF-TOC-ACS	Aircraft Configuration - Single Results	25 JUL 11
	PER-TOF-TOC-ACM	Aircraft Configuration - Multiple Results	25 JUL 11
	PER-TOF-TOC-AFS	Aircraft Status	25 JUL 11
	PER-TOF-TOR-SRS	Single Results - SINGLE RWY COMPUTATION	25 JUL 11

M(1)	Localization	Subsection Title	Rev. Date
	PER-TOF-TOR-SRM	**Single Results - MULTIPLE RWY COMPUTATION**	25 JUL 11
	PER-TOF-TOR-MRS	**Multiple Results - SINGLE RWY COMPUTATION**	25 JUL 11
	PER-TOF-TOR-MRO	**Multiple Results - MULTIPLE RWY COMPUTATION - One Step**	25 JUL 11
	PER-TOF-TOR-MRT	**Multiple Results - MULTIPLE RWY COMPUTATION - Two Steps**	25 JUL 11
	PER-TOF-THR-TGA	**TOGA**	06 JUL 11
	PER-TOF-THR-FLX	**FLEX Takeoff**	06 JUL 11
	PER-TOF-THR-DRT	**Derated Takeoff**	06 JUL 11
	PER-TOF-CTA	**Runway Contamination**	25 JUL 11
	PER-IFT-FPL-GEN	**General**	06 JUL 11
	PER-IFT-FPL-MRF	**Minimum Recommended Fuel Requirements**	25 JUL 11
	PER-IFT-FPL-FMI	**PLAN Module Interface**	25 JUL 11
	PER-IFT-FPL-CDT	**Conditions**	25 JUL 11
	PER-IFT-FPL-FLD	**Flight Data**	25 JUL 11
	PER-IFT-FPL-ICZ-GEN	**General**	06 JUL 11
	PER-IFT-FPL-ICZ-ECI	**ECON (CI) - AEO**	06 JUL 11
	PER-IFT-FPL-ICZ-FSP	**Fixed Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ICZ-LRC	**LRC Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ICZ-GDS	**Green Dot Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ICZ-TBS	**Turbulence Speed - AEO**	06 JUL 11
	PER-IFT-FPL-FLT-GEN	**General**	06 JUL 11
	PER-IFT-FPL-FLT-ECI	**ECON (CI) - AEO**	06 JUL 11
	PER-IFT-FPL-FLT-FSP	**Fixed Speed - AEO**	06 JUL 11
	PER-IFT-FPL-FLT-LRC	**LRC Speed - AEO**	06 JUL 11
	PER-IFT-FPL-FLT-GDS	**Green Dot Speed - AEO**	06 JUL 11
	PER-IFT-FPL-FLT-TBS	**Turbulence Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ALT-GEN	**General**	06 JUL 11
	PER-IFT-FPL-ALT-ECI	**ECON (CI) - AEO**	06 JUL 11
	PER-IFT-FPL-ALT-FSP	**Fixed Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ALT-LRC	**LRC Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ALT-GDS	**Green Dot Speed - AEO**	06 JUL 11
	PER-IFT-FPL-ALT-TBS	**Turbulence Speed - AEO**	06 JUL 11
	PER-IFT-FPL-FPR	**PLAN Results**	25 JUL 11
	PER-IFT-CLB-GEN	**General**	06 JUL 11
	PER-IFT-CLB-CMI	**CLB Module Interface**	25 JUL 11
	PER-IFT-CLB-CDT	**Conditions**	25 JUL 11
	PER-IFT-CLB-CBD	**Climb Data**	25 JUL 11
	PER-IFT-CLB-OCI	**Open (CI) - AEO**	25 JUL 11
	PER-IFT-CLB-SSP	**Selected Speeds - AEO**	25 JUL 11
	PER-IFT-CLB-BRT	**Best Rate - AEO**	06 JUL 11
	PER-IFT-CLB-BAN	**Best Angle - AEO**	06 JUL 11
	PER-IFT-CLB-TBL	**Turbulence - AEO**	25 JUL 11

M(1)	Localization	Subsection Title	Rev. Date
	PER-IFT-CLB-CBR	Climb Results	25 JUL 11
	PER-IFT-CRZ-GEN	General	25 JUL 11
	PER-IFT-CRZ-CMI	CRZ Module Interface	25 JUL 11
	PER-IFT-CRZ-CDT	Conditions	25 JUL 11
	PER-IFT-CRZ-CRD	Cruise Data	25 JUL 11
	PER-IFT-CRZ-ECI	ECON (CI) - AEO	25 JUL 11
	PER-IFT-CRZ-FSP	Fixed Speed - AEO	06 JUL 11
	PER-IFT-CRZ-LRC	LRC Speed - AEO	06 JUL 11
	PER-IFT-CRZ-GDS	Green Dot Speed - AEO	06 JUL 11
	PER-IFT-CRZ-TBS	Turbulence Speed - AEO	06 JUL 11
	PER-IFT-CRZ-MSP	Maximum Speed - AEO	06 JUL 11
	PER-IFT-CRZ-CRR-CRF	Fuel	25 JUL 11
	PER-IFT-CRZ-CRR-CRA	Altitude	25 JUL 11
	PER-IFT-CRZ-CRR-CRS	Speed	25 JUL 11
	PER-IFT-CRZ-CRR-CRD	Detailed Results	25 JUL 11
	PER-IFT-DES-GEN	General	06 JUL 11
	PER-IFT-DES-DMI	DES Module Interface	25 JUL 11
	PER-IFT-DES-CDT	Conditions	25 JUL 11
	PER-IFT-DES-DSD	Descent Data	25 JUL 11
	PER-IFT-DES-ECI	ECON (CI) - AEO	25 JUL 11
	PER-IFT-DES-STD	STANDARD - AEO	25 JUL 11
	PER-IFT-DES-GVS	GIVEN V/S - AEO	25 JUL 11
	PER-IFT-DES-EMG	EMERGENCY - AEO	06 JUL 11
	PER-IFT-DES-DSR	Descent Results	25 JUL 11
	PER-IFT-HLD-GEN	General	06 JUL 11
	PER-IFT-HLD-HMI	HLD Module Interface	25 JUL 11
	PER-IFT-HLD-CDT	Conditions	25 JUL 11
	PER-IFT-HLD-HLD	Holding Data	25 JUL 11
	PER-IFT-HLD-HLS	Holding Speeds	06 JUL 11
	PER-IFT-HLD-HDR	Holding Results	25 JUL 11
	PER-IFT-OEI-GEN	General	06 JUL 11
	PER-IFT-OEI-SVI	Severe Icing	06 JUL 11
	PER-IFT-OEI-OBS-BLW	EO Below EO MAX Altitude	06 JUL 11
	PER-IFT-OEI-OBS-ABV	EO Above EO MAX Altitude	06 JUL 11
	PER-IFT-OEI-STD-BLW	EO Below EO MAX Altitude	06 JUL 11
	PER-IFT-OEI-STD-ABV	EO Above EO MAX Altitude	25 JUL 11
	PER-IFT-OEI-STD-ICZ	PLAN - In Cruise	06 JUL 11
	PER-IFT-OEI-HLD	Holding	06 JUL 11
	PER-IFT-OEI-ALT	PLAN - Alternate	06 JUL 11
	PER-IFT-TEI-GEN	General	06 JUL 11
	PER-IFT-TEI-SVI	Severe Icing	06 JUL 11

M(1)	Localization	Subsection Title	Rev. Date
	PER-IFT-TEI-STD	**STANDARD Strategy**	06 JUL 11
	PER-IFT-TEI-HLD	**Holding**	06 JUL 11
	PER-IFT-ACS	**Aircraft Status**	25 JUL 11
	PER-IFT-IFF	**In-Flight Failures (ECAM Alerts)**	25 JUL 11
	PER-LND-GEN	**General**	06 JUL 11
	PER-LND-LDI	**LDG PERF Initialization**	25 JUL 11
	PER-LND-LCD-RWY	**Airport/Runway**	25 JUL 11
	PER-LND-LCD-OCD	**Outside Conditions**	25 JUL 11
	PER-LND-LCD-ACC	**Aircraft Configuration**	25 JUL 11
	PER-LND-LCD-AFS	**Aircraft Status**	25 JUL 11
	PER-LND-LCF-RWY	**Airport/Runway**	25 JUL 11
	PER-LND-LCF-OCD	**Outside Conditions**	25 JUL 11
	PER-LND-LCF-ACC	**Aircraft Configuration**	25 JUL 11
	PER-LND-LCF-AFS	**Aircraft Status**	25 JUL 11
	PER-LND-LRD-DSR	**Dispatch Mode - Single Runway**	25 JUL 11
	PER-LND-LRD-DMR	**Dispatch Mode - Multiple Runway**	25 JUL 11
	PER-LND-LRF-FSR	**In Flight Mode - Single Runway**	25 JUL 11
	PER-LND-LRF-FMR	**In Flight Mode - Multiple Runway**	25 JUL 11
	PER-LND-LFF-GEN	**General**	06 JUL 11
	PER-LND-LFF-IOI	**Impacts on Interface**	25 JUL 11
	PER-LND-LFF-CMT	**Computation Method**	06 JUL 11
	PER-LND-CTA	**Runway Contamination**	25 JUL 11
	OEB-000	**Introduction**	06 JUL 11
	OEB-OEB13	**FCU - Erroneous Barometric Reference after FCU Reset**	08 AUG 11

(1) Evolution code : N=New, R=Revised, E=Effectivity, M=Moved

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This table gives, for each delivered aircraft, the cross reference between:

- The Manufacturing Serial Number (MSN).
- The Fleet Serial Number (FSN) of the aircraft as known by AIRBUS S.A.S.
- The registration number of the aircraft as known by AIRBUS S.A.S.
- The aircraft model.

M[(1)]	MSN	FSN	Registration Number	Model
	0035		HL7611	380-861
	0039		HL7612	380-861
	0059			380-861
	0068			380-861
	0075			380-861

(1) Evolution code : N=New, R=Revised

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M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T62521		03 AUG 10	INDICATING/RECORDING - Head Up Display - INSTALL A SINGLE HUD (LH side)
	Applicable to: ALL			
	T78703		05 APR 11	FLIGHT CONTROLS - ELECTRICAL FLIGHT CONTROL SYSTEM (EFCS) - Install FCGU P9, SEC S9 and FCDC F9 softwares for batch3
	Applicable to: ALL			
	T61379		03 AUG 10	EQUIPMENT/FURNISHING - COCKPIT SEATS INSTALL A WALL-MOUNTED 5TH OCCUPANT SEAT
	Applicable to: ALL			
	T60394		03 AUG 10	Air Conditioning-Supplemental Cooling-Installation of Avionics Compartment Ground Cooling
	Applicable to: ALL			
	T71998		03 AUG 10	Markings Replace METRIC Units by US ones (Length, Weights optional units) for avionic Systems in cockpit
	Applicable to: ALL			
	T77504		08 JAN 11	AUTO FLIGHT - FLIGHT MANAGEMENT (FM) ? Install new FMS Standard L2 Software
	Applicable to: ALL			
	T81151		05 APR 11	INFORMATION SYSTEMS-PORTABLE ONBOARD INFORMATION TERMINAL-INSTALL MIDDLEWARE IN THE BACKUP LAPTOP AT STANDARD ILG5 (NSS 2B+)
	Applicable to: ALL			
	T78697		03 AUG 10	INFORMATION SYSTEMS-PORTABLE INFORMATION TERMINALS - INSTALL NEW F/O AND CAPT LAPTOP HARDWARE STD 5 AND ITS OPERATING SYSTEM DUE TO STD 4 OBSOLESCENCE
	Applicable to: ALL			
	T78591		03 AUG 10	INFORMATION SYSTEMS - MAINTENANCE APPLICATION - INSTALL E-LOGBOOK 6.15 ON POST EIS2B
	Applicable to: ALL			
	T64813		03 AUG 10	Communications ? Data transmission Activate HFDL
	Applicable to: ALL			
	T81152		05 APR 11	INFORMATION SYSTEMS-PORTABLE ONBOARD INFORMATION TERMINAL-INSTALL NEW MIDDLEWARE IN F/O AND CAPT LAPTOPS AND PLATEFORM SAGEM AT STANDARD ILG5
	Applicable to: ALL			
	T71193		03 AUG 10	TEFO)
	Applicable to: ALL			
	T69832		03 AUG 10	Lights ? Exterior Lights ? Modify exterior light adjustment and functional logic
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T65799		05 APR 11	FUEL - QUANTITY INDICATING - Install FQMS and FQDC Software Standard S4.1
	Applicable to: ALL			
	T78497		03 AUG 10	INDICATING/RECORDING SYSTEMS-FLIGHT WARNING SYSTEM (FWS)-ACTIVATE THE ECAM TEMPORARY CODE ETC N?24 RELATED TO ALTERNATE AND EMERGENCY BRAKE FAILURE.
	Applicable to: ALL			
	T78651		08 JAN 11	INDICATING/RECORDING SYSTEMS - GENERAL - FLIGHT WARNING SYSTEM (FWS) - Install FWS Software : Standard L51
	Applicable to: ALL			
	T77588		03 AUG 10	INFORMATION SYSTEMS - FLIGHT CREW APPLICATION - INSTALL EFF-FFU STD V3 ON THE 3 LAPTOPS OF NSS OPERATION DOMAIN
	Applicable to: ALL			
	T81119		03 AUG 10	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING SYSTEM (FWS)-ACTIVATE THE ETC N? 36 RELATED TO VZBI JUMP AFTER IR FAILURE AND ATT HDG SWITCH ROTATION.
	Applicable to: ALL			
	T76602		03 AUG 10	NAVIGATION -AIRCRAFT ENVIRONMENT SURVEILLANCE SYSTEM((AESS)): Define and install new AESS standard H04S05
	Applicable to: ALL			
	T76484		03 AUG 10	INDICATING/RECORDING SYSTEMS GENERAL-FLIGHT WARNING SYSTEM (FWS)- Define and Install FWS Software : Standard L41
	Applicable to: ALL			
	T71614		03 AUG 10	INFORMATION SYSTEMS - FLIGHT CREW APPLICATION - INSTALL ELECTRONIC FLIGHT FOLDER AND FLIGHT FOLLOW-UP (EFF/FFU) SOFTWARE V2.2 IN THE 3 LAPTOPS
	Applicable to: ALL			
	T76485		03 AUG 10	INDICATING/RECORDING SYSTEMS GENERAL- FLIGHT WARNING SYSTEM(FWS)- Define and Install new ATQC 'summer' for EIS
	Applicable to: ALL			
	T78399		03 AUG 10	Cockpit Informations Systems - Air Traffic and Information Systems (ATIMS) - Components and Interfaces (ATC) - Install new ATC standard CLA3.1
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T69911		03 AUG 10	OXYGEN - FLIGHT CREW PORTABLE OXYGEN DEVICES - INSTALL COCKPIT PBE ALTERNATE EQUIPMENT (SFE)-B/E AEROSPACE ISG, LENEXA
	Applicable to: ALL			
	T65711		03 AUG 10	LANDING GEAR - STEERING - LANDING GEAR-STEERING-STEERING CONTROL SYSTEM- INTRODUCTION OF BATCH 6.1 S/W
	Applicable to: ALL			
	T77684		08 JAN 11	COMMUNICATIONS - GENERAL - COCKPIT VOICE RECORDER (CVR) - INSTALL NEW POWER SUPPLY WIRING (28VDC) FURTHER TO THE NEW FAA REGULATION
	Applicable to: ALL			
	T76643		03 AUG 10	F/O LAPTOPS
	Applicable to: ALL			
	T71800		03 AUG 10	AIR DATA/INERTIAL REFERENCE SYSTEM (ADIRS)-CERTIFY THE A380 ADR MONITORING FUNCTIONS
	Applicable to: ALL			
	T62346		08 JAN 11	MISCELLANEOUS - RFC KAL03L001I - EXTEND ENVIRONMENTAL ENVELOPE DOWN TO OAT -78 DEG C IN CRUISE CONDITIONS
	Applicable to: ALL			
	T69330		03 AUG 10	INDICATING / RECORDING SYSTEMS ? Control and Display System (CDS) Activate the RISING RUNWAY symbol ON PFD
	Applicable to: ALL			
	T77492		03 AUG 10	Information Systems - Flight Crew Applications - Install Flight Crew Applications in ANSU-OPS for Post EIS2b (MIS 6.x)
	Applicable to: ALL			
	T76556		03 AUG 10	AUTO FLIGHT - GENERAL - Activate hard pin prog to use Landing Gear antenna for autoland.
	Applicable to: ALL			
	T77417		03 AUG 10	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING SYSTEM (FWS)- Activate ETC n? 9 of ATQC to modify alert procedures linked to APU SHUT DOWN in Flight.
	Applicable to: ALL			
	T76701		03 AUG 10	FLIGHT CONTROLS - ELECTRICAL BACKUP - Swap BCM wiring from inboard elevators to outboard elevators.
	Applicable to: ALL			
	T78686		08 JAN 11	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING SYSTEM (FWS)-)- ACTIVATE THE ETC

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
				N?31 RELATED TO ALERT ENG X OIL MONITORING FAULT (RELATIVE TO E.A)
	Applicable to: ALL			
	T68621		03 AUG 10	AIRBORNE AUXILIARY POWER - Evolution of ECB software
	Applicable to: ALL			
	T76559		03 AUG 10	NAVIGATION - On board Airport Navigation System - Define and install OANS Software operational:standard A5
	Applicable to: ALL			
	T81101		08 JAN 11	F/O LAPTOPS FOR NSS 2B ENHANCED
	Applicable to: ALL			
	T81100		08 JAN 11	INFORMATION SYSTEMS - FLIGHT CREW APPLICATION - INSTALL FOCT APPLICATION V3.3 ON BACK-UP LAPTOP FOR NSS 2B ENHANCED
	Applicable to: ALL			
	T71760		03 AUG 10	Indicating / Recording System -Integrated Control Panels (ICP)- Modify wiring between ICP07 and Eye Reference
	Applicable to: ALL			
	T77351		03 AUG 10	INFORMATION SYSTEMS - FIXED ONBOARD INFORMATION TERMINALS (OIT) - INSTALL NEW OIT (-1002) TO LIMIT THE IMPACT OF KEYBOARD AND ACD FREEZE
	Applicable to: ALL			
	T77352		03 AUG 10	INDICATING/RECORDING SYSTEMS GENERAL-FWS-Activate ETC n?7 of ATQC to correct the anomaly linked to SFCC1 in electrical emergency configuration.
	Applicable to: ALL			
	T76694		03 AUG 10	ELECTRICAL POWER - AC MAIN GENERATION (GGPCU) - UPDATE RESIDENT SOFTWARE OF GENERATOR AND GROUND POWER CONTROL UNITS (GGPCU) TO STD A380G17
	Applicable to: ALL			
	T78485		03 AUG 10	ELECTRICAL POWER - PRIMARY POWER DISTRIBUTION (PEPDC) - INSTALL OPERATIONAL SOFTWARE STANDARD 7 ON SUPPLEMENTAL COOLING SYSTEM RCCBM
	Applicable to: ALL			
	T73428		03 AUG 10	Navigation-MULTIMODE RECEIVER (MMR): Activate optional GLS function by discrete Pin Programming on MMR.
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T78190		08 JAN 11	E/F-CURTAINS AND PARTITIONS/ELECTRICAL CLASS DIVIDERS-DEFINE PRIVACY DOOR MODULE WITH MECHANICAL LOCKING DEVICE
	Applicable to: ALL			
	T70234		03 AUG 10	COMMUNICATIONS - WIRELESS AIRPORT COMMUNICATION SYSTEM - INSTALL WACS CONTROLLER UNIT AND WACS ANTENNA.
	Applicable to: ALL			
	T78906		03 AUG 10	EQUIPMENT/FURNISHINGS - CURTAINS AND PARTITIONS/ELECTRICAL CLASS DIVIDERS - DEFINE EPDLS FOR PRIVACY DOOR MODULE
	Applicable to: ALL			
	T76969		03 AUG 10	Lights - Lighted Signs - Install a Lavatory vacant/occupied indicator in cockpit
	Applicable to: ALL			
	T73183		03 AUG 10	AUTO FLIGHT - AUTOPILOT/FLIGHT DIRECTOR (AP/FD) ENGAGEMENT - DEFINE AND INSTALL BRAKE TO VACATE FUNCTION (BTV)
	Applicable to: ALL			
	T62545		03 AUG 10	NAVIGATION - ADF - INSTALL ROCKWELL COLLINS SINGLE ADF
	Applicable to: ALL			
	T76477		03 AUG 10	INDICATING / RECORDING SYSTEMS - Control and Display System - Define and Install CDS software Standard L4.1
	Applicable to: ALL			
	T73377		03 AUG 10	ELECTRICAL POWER - DCGS - INTRODUCE NEW DCGS ARCHITECTURE.
	Applicable to: ALL			
	T71727		03 AUG 10	Indicating / Recording System -Integrated Control Panels (ICP) Update ICP02B standard definition
	Applicable to: ALL			
	T74757		03 AUG 10	CABIN SYSTEMS - CIDS - DEFINE AND INSTALL CIDS SOFTWARE STANDARD 5.0
	Applicable to: ALL			
	T77518		03 AUG 10	INDICATING/RECORDING SYSTEMS GENERAL-FLIGHT WARNING SYSTEM (FWS)- Define and Install FWS Software : Standard L50
	Applicable to: ALL			
	T62330		03 AUG 10	MISCELLANEOUS - DESIGN BALANCE CRITERIA - CENTRE OF GRAVITY LIMITS - INTRODUCE RESULTS OF LOADABILITY STAGE 2 STUDY.
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T77487		03 AUG 10	INFORMATION SYSTEMS-PORTABLE ONBOARD INFO TERMINAL-INSTALL LMF CONFIG IN LAPTOPS AT STANDARD ILG4 WITH WACS AND "BACKUP LAPTOP CONNECTED" OPTIONS
	Applicable to: ALL			
	T81521		05 APR 11	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING SYSTEM (FWS)-Activate the ETC N?39 relative to the alert ELEC GEN 1(2)(3)(4)FAULT.
	Applicable to: ALL			
	T71226		03 AUG 10	OMS-ACMS-ACTIVATION OF A VIRTUAL DIGITAL ACMS RECORDER (VDAR) FUNCTION.
	Applicable to: ALL			
	T60165		03 AUG 10	EQUIPMENT/FURNISHINGS-MAIN DECK COMPARTMENT-FLIGHT CREW REST DESIGN AND INSTALL TWO SINGLE FLIGHT CREW REST COMPARTMENTS ON MAIN DECK FWD OF DOOR M1R
	Applicable to: ALL			
	T77489		03 AUG 10	INFORMATION SYSTEMS-PORTABLE ONBOARD INFORMATION TERMINAL-INSTALL OS, BASIC SERVICES AND APPLICATION SERVICES IN F/O AND CAPT LAPTOPS AT STANDARD ILG4
	Applicable to: ALL			
	T60163		03 AUG 10	EQUIPMENT/FURNISHINGS - LOWER DECK COMPARTMENT - DEFINE A CABIN CREW REST COMPARTMENT IN THE AFT CARGO COMP. T-SHAPE, WITH 12 BUNKS
	Applicable to: ALL			
	T78678		03 AUG 10	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING SYSTEM (FWS)-DEFINE AND INSTALL NEW ATQC V5 L50.
	Applicable to: ALL			
	T77443		03 AUG 10	INDICATING/RECORDING SYSTEMS - Control and Display System (CDS) - Define and install CDS software Standard (L5.0)
	Applicable to: ALL			
	T81214		08 JAN 11	OIL - INDICATING - REPLACE ADHESIVE MATERIAL OF OFDP SENSOR ON EA GP7200 ENGINE
	Applicable to: ALL			
	T60420		03 AUG 10	CABIN SYSTEMS - LANDSCAPE CAMERA SYSTEM - INSTALL LANDSCAPE CAMERA
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T73389		03 AUG 10	Information System - General - Air Traffic and Information Management System - Component and interface (ATC) - Install standard CLA 2.2b. for ATC
	Applicable to: ALL			
	T60412		03 AUG 10	Cockpit Door Surveillance System - Cockpit Door Area (Aisle) Video System
	Applicable to: ALL			
	T78737		03 AUG 10	INDICATING/RECORDING SYSTEMS - FLIGHT WARNING SYSTEM (FWS)-ACTIVATE ETC N? 32 RELATIVE TO THE ALERT : AIR ENG 1(2)(3)(4)BLEED FAULT.
	Applicable to: ALL			
	T71799		03 AUG 10	ELECTRICAL POWER - GENERAL - MODIFY POWER SUPPLIES FROM EEPDC TO BE COMPLIANT WITH ATA 24 TLSRD ON GROUND CONFIGURATION (BAT ONLY)
	Applicable to: ALL			
	T76662		03 AUG 10	HYDRAULIC POWER - GENERAL - INSTALL HSMU STD 5 WITH MODIFIED PUSH-BACK AND SIMULATED FLIGHT FUNCTIONS
	Applicable to: ALL			
	T78734		03 AUG 10	INFORMATION SYSTEMS-PORTABLE INFORMATION TERMINALS - INSTALL NEW BACKUP LAPTOP HARDWARE STD 5 AND ITS OPERATING SYSTEM DUE TO STD 4 OBSOLESCENCE
	Applicable to: ALL			
	T73386		03 AUG 10	AUTO FLIGHT - AUTOPILOT/FLIGHT DIRECTOR (AP/FD) - CERTIFY AUTO PILOT TCAS MODE
	Applicable to: ALL			
	T77508		03 AUG 10	INFORMATION SYSTEMS-PORTABLE ONBOARD INFORMATION TERMINAL-CONNECT THE BACKUP LAPTOP WITH ITS NEW CABLE TO THE NSS FLIGHT OPERATIONS DOMAIN
	Applicable to: HL7611, HL7612, MSN 0059-0068			
	T78730		08 JAN 11	AUTO FLIGHT - AUTOPILOT/FLIGHT DIRECTOR (AP/FD) ENGAGEMENT - DEFINE AND INSTALL BRAKE TO VACATE FUNCTION step2
	Applicable to: ALL			
	T76723		03 AUG 10	FUEL - QUANTITY INDICATING- INSTALL FQMS AND FQDC SOFTWARE STANDARD S4.0
	Applicable to: ALL			
	T77509		03 AUG 10	FLIGHT CONTROLS - GENERAL - INSTALL FCGU P8, SEC S8 AND FCDC F8 SOFTWARES FOR BATCH 2
	Applicable to: ALL			

M(1)	MODIFICATION	Linked SB	Incorp. Date	Title
	T78618		08 JAN 11	INDICATING/RECORDING SYSTEMS - Control and Display System (CDS)-Update CDS software Standard (L5.1)
	Applicable to: ALL			
	T72671		03 AUG 10	Partitions/Electr. Class Div. - Define and Install Cockpit Door Module Cabin decompression Flap Release Mechanism (FRM)
	Applicable to: ALL			
	T81246		08 JAN 11	INDICATING/RECORDING SYSTEMS-FLIGHT WARNING SYSTEM(FWS)-ACTIVATE THE ETC N?37 RELATIVE TO THE ALERT FUEL TRIM TK XFR FAULT.
	Applicable to: ALL			
	T77435		03 AUG 10	OMS-A/C COND MONITORING SYS (ACMS)- INSTALL OPERATIONAL SOFTWARE FOR ACMS LD11 (pEIS2b) ON CDAM AND ANSU
	Applicable to: ALL			
	T78660		08 JAN 11	Communications -Cockpit Voice Recorder- Segregate CVR and CDAM power supply
	Applicable to: MSN 0059-0075			
	T63873		03 AUG 10	Equipment/Furnishing - Emergency - Installation of Automatic ELT with Control Panel in Cockpit
	Applicable to: ALL			
	T78669		03 AUG 10	AUTO FLIGHT - GENERAL - Extend autoland certification up to 9200 ft
	Applicable to: ALL			
	T60409		03 AUG 10	AIR CONDITIONING-LOWER DECK FWD CARGO COMPARTMENT INSTALLATION OF VENTILATION AND TEMP. CONTROL SYSTEM (COOLING AND HEATING)
	Applicable to: ALL			
	T78666		03 AUG 10	INFORMATION SYSTEMS-PORTABLE ONBOARD INFO TERMINALS-INSTALL NEW ANTI VIRUS SOFTWARE V6 IN F/O CAPT LAPTOPS AND ARU-AFMR OPERATING SYSTEM FOR ILG 4.7
	Applicable to: ALL			
	T77430		03 AUG 10	Flight Controls - Flap Actuation - Introduce new Slat/Flap Control Computer standard 3.4
	Applicable to: ALL			
	T81205		05 APR 11	AUTO FLIGHT - GENERAL - ACTIVATE NAV IN GO-AROUND MODE
	Applicable to: ALL			

(1) Evolution code : N=New, R=Revised, E=Effectivity

GENERAL INFORMATION

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GEN-PLP PRELIMINARY PAGES

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MAIN FCOM CHANGES

Applicable to: ALL

INTRODUCTION

PURPOSE

The purpose of the Main FCOM Changes is to provide general information about this FCOM revision and to highlight the main changes.

Note: *In addition, each Documentary Unit (DU) provides highlights with the reason(s) for change and uses revision bars to indicate the revised sections.*

TIMEFRAME

The Main FCOM Changes are defined on a monthly basis, regardless of the revision cycle that is applicable to each Operator.
The subjects in the Main FCOM Changes are categorized by month, but include revision information from the preceding 6 months only.

JULY 2011

INTRODUCTION OF A TEMPORARY ABNORMAL BEHAVIOR CHAPTER RELATED TO THE FMS L2 STANDARD

Due to a misbehavior of the FMS L2 standard, the managed speed mode will revert to the selected speed mode 5 s after sequencing the MAP (Missed Approach Point), if the Vapp is the one computed by the FMS.
This misbehavior does not occur if, before sequencing the MAP (e.g during descent preparation), the flight crew manually enters the Vapp on the APPR panel of the FMS PERF page.

DECOMPRESSION DECELERATION DEVICE (DDD)

A caution is added in the cockpit door description chapter to highlight that the DDD should not be touched, to avoid damage to the device.

JUNE 2011

INTRODUCTION OF OEB 13: ERRONEOUS BAROMETRIC REFERENCE AFTER FCU RESET

If the Flight Control Unit (FCU) is switched OFF then ON, the barometric reference can erroneously initialize, at FCU power-up, to the default mode and value QNH 1013.

This erroneous barometric reference can appear on:
- One EFIS CP only, or
- Both EFIS CPs simultaneously.

In the case of FCU reset via the FCU brightness knob, the flight crew should check the barometric reference on both EFIS CPs, and set the appropriate mode and value if erroneously displayed.

INCREASE OF MAXIMUM CROSSWIND FOR LANDING (EA ENGINES)

The maximum certified crosswindat landing is increased from 35 kt to 40 kt. (30 kts for Korean air)

MAY 2011

No main FCOM change in May.

INTRODUCTION OF ATQC L50 V12 - ETC 39 (MP T81521)

Integration of the FCOM temporary information, associated with the ATQC database L50 V12 / ETC n° 39 (MP T81521).
In the case of an intermittent short-circuit, the GEN reset may result in the GEN recovery. An intermittent short-circuit may trigger several ELEC GEN 1(2)(3)(4) FAULT or the ELEC APU GEN A(B) FAULT alerts with the recovery of the GEN at each reset.
A GEN reset on intermittent short-circuits may result in an overvoltage or an overcurrent in the electrical network leading to potential damage on the equipment supplied by this power source.
Because at the time the ELEC GEN 1(2)(3)(4) FAULT or the ELEC APU GEN A(B) FAULT alert triggers the flight crew cannot identify whether the short-circuit is permanent or intermittent, they should not reset the GEN.
Therefore, ETC n°39 modifies the ELEC GEN 1(2)(3)(4) FAULT and the ELEC APU GEN A(B) FAULT alert to remove the GEN A(B) reset.

LOSS OF FMS VERTICAL FUNCTIONS WHEN PRESETTING THE QNH

Integration of a FCOM temporary DU on the preset of the QNH on the EFIS CP.
If the flight crew presets a QNH value equal to the lower(upper) limit, i.e. 745 hPa (22.00 inHg) or 1 100 hPa (32.48 inHg), the vertical functions on the master FMS side are lost.
Therefore, the flight crew should not preset a QNH limit value, i.e. 745 hPa (22.00 inHg) or 1 100 hPa (32.48 inHg)..
As soon as the flight crew changes the preset QNH value to another value, all FMS vertical functions are recovered.

MARCH 2011

INTRODUCTION OF A TEMPORARY FCOM DU RELATED TO THE FMS L2 STANDARD

Due to a misbehavior of the FMS L2 standard, the BARO/RADIO MINIMUM inserted on the APPR panel of the FMS ACTIVE/PERF and SEC/PERF pages is automatically rounded off to the nearest ten feet (e.g. 222 ft becomes 220 ft, 225 ft becomes 230 ft, and 240 ft stays 240 ft, etc.).
The APPR Panel of the FMS PERF pages and the PFD then display the rounded off BARO/RADIO MINIMUM value. The FWS also uses the rounded off BARO/RADIO MINIMUM value to trigger automatic callouts.
To cover this misbehavior, if the BARO/RADIO MINIMUM value is not a multiple of ten, the flight crew should insert on the APPR panel of the FMS PERF pages a BARO/RADIO MINIMUM value rounded up to the nearest ten feet. For example, if the MINIMUM is equal to 91 ft, the flight crew should insert '100 ft' on the APPR panel.
The SOP / Descent Preparation / FMS section is temporarily revised to reflect this recommendation.

INTRODUCTION OF ATQC L50 V11

Integration of the FCOM temporary information, associated with the ATQC database L50 V11 (MP T81448):

ETC n°0038 (MPT81449)

Several seals of aileron servocontrols (excluding EHAs) have defective seals, that can lead to a hydraulic leak. The leak has no impact as single failure, and does not lead to the loss of the associated hydraulic system. However, if the leak is combined with the loss of the associated hydraulic system, the servocontrol may lose the damping mode.
Therefore, if several failures affecting hydraulic system, PRIM, EHA, and ailerons are combined, and if the aircraft is flying at Mach 0.85, or above, undamped oscillation surface may occur.

To avoid the undamped surface oscillation from occurring, for aircraft with affected servocontrols, ETC n° 38 updates the following procedures:
- ELEC DC 1 BUS FAULT
- ELEC DC 2 BUS FAULT
- F/CTL L(R) OUTR AILERON FAULT
- F/CTL PRIM 1(2)(3)FAULT
- HYD G(Y) SYS PRESS LO
- HYD G+Y SYS PRESS LO

Overweight Landing

The Overweight Landing procedure requests to target VLS at the runway threshold. However, there are two cases in which the speed should not be reduced to VLS in the case of an overweight landing:

- If the flaps are locked, the approach speed is increased to ensure a sufficient tailstrike margin
- In the case of a double elevator fault, the approach speed is increased to ensure adequate manoeuvrability during the flare.

With ATQC L50 V11, the Overweight Landing procedure is updated to take into account these two cases.

INTRODUCTION OF TEMPORARY INFORMATION RELATED TO CAT 2 INOP STATUS

A CAT 2 message may appear on the INOP SYS section of the STATUS page, with no associated alert. This may happen in the case of a departure from a runway with no ILS, following a FMS reset.
The message should disappear if the flight crew temporarily tune an ILS on the POSITION / NAVAIDS page of the MFD.
The SOP / After Start section, and the Supplementary Procedures / Computer Resets / FMC A(B)(C) reset procedure are revised to reflect the above recommendation.
The FMS L2 Standard will cancel the OEB that requests FMC reset before each flight.
Therefore, the TDU SOP / After Start will be cancelled for aircraft with the FMS L2 Standard.

STANDARD OPERATING PROCEDURES (SOPs)

In the FMS Initialization chapter of the cockpit preparation, deletion of the recommendation to use the XCHECK WITH AVNCS function in order to check to performance data. At that stage of the flight preparation, the check of the takeoff weight may not be correct if refuel is not finished.

LIMITATIONS

Deletion of the ATA 32/Nose wheel steering offset limitation because this limitation is addressed in the MMEL.

INTRODUCTION OF BTV STEP 2 (MOD/MP 70408/T78730)

BTV step 2 introduces the availability of the Runway Overrun Warning and Runway Overrun Protection (ROW/ROP) when landing without autobrake.
BTV step 2 removes the operational limitations related to the selection of an exit less than 300 m from the runway end (150 m for CAT II/CAT III approaches).
BTV step 2 removes the limitation related to runways with a descending slope of more than 1.5%.

The alert BRAKES RWY OVERRUN PROT LOST is replaced by the alert SURV ROW/ROP LOST.

INTRODUCTION OF FWS STANDARD L51 (MOD 70027/MP T78651)

The FWS standard L51 introduces several minor changes on various procedures (e.g. changes in INOP SYS, in flight phases inhibition, wording, annunciations, actions).

It also introduces major procedural changes:

- NAV UNRELIABLE AIR SPEED INDICATION: The ECAM displays the entire NAV UNRELIABLE AIR SPEED INDICATION procedure without referring to the QRH
  A QRH revision will be issued before end of may 2011 to remove the Unreliable Air Speed procedure from the QRH.
- NAV ALL AIR DATA DISAGREE: The ECAM displays the entire NAV ALL AIR DATA DISAGREE procedure without referring to the QRH
- The ELEC EMER CONFIG procedure is updated:
  - Addition of a GENs reset procedure with BUS TIE off when the first GENs reset was not successful
  - Update of the APU CONSIDER display logic and wording, based on the aircraft current flight level when the alert triggers and based on the current maximum restricted flight level.
- Addition of the following alerts to the takeoff configuration test logic (If at least 3 GENs are concerned):
  - ELEC DRIVE 1(2)(3)(4) DISCONNECTED
  - ELEC GEN 1(2)(3)(4) FAULT
  - ELEC GEN 1(2)(3)(4) OFF.
- The ENG RELIGHT IN FLIGHT procedure is updated to take into account single or multiple engine relights (eg following a successful engine relight in an all engine flameout situation).

INTRODUCTION OF FGCU P9, SEC S9, AND FCDC F9 SOFTWARE STANDARDS (MOD 70683/MP T78703)

In the case of loss of segregation of the AC, or DC busbars, the display of CAT 3 SINGLE, or CAT 3 DUAL was not frozen below 200 ft. The FCDC F9 standard corrects this deviation.
In addition, these software standards of Flight Controls Computers introduce minor logic improvements (e.g. A/THR soft mode is deactivated below VLS).

INTRODUCTION OF 'NAV IN GO-AROUND' OPTION (MOD 70854/T81205)

In order to reduce the flight crew workload, this option enables to keep the NAV mode engaged, or to automatically arm the NAV mode, at the initiation of the go-around. The flight crew does not need to push the HDG/TRK knob immediately after go-around.
The Aircraft System / 22-Flight Guidance / AP/FD Modes / Go-Around is modified for aircraft having this option.

DECEMBER 2010

NEW FMS L2 STANDARD (MP T77504)

This FCOM revision introduces the following improvements of the new FMS L2 standard:

Cancellation of one Abnormal Behavior of the FMS EIS Standard: Erroneous Triggering of the STEP DELETED IN TMPY/SEC1(2)(3) Message

If the flight crew performs a direct to with abeam, an existing step is not deleted. However the FMS EIS standard erroneously triggered the STEP DELETED IN TMPY/SEC1(2)(3) message. This abnormal behavior is corrected with the FMS L2 standard.

FUEL&LOAD Page: MIN FUEL AT DEST

The FUEL&LOAD page is modified to enable the flight crew to manually enter a MIN FUEL AT DEST value. The SOPs / Cockpit Preparation / MFD FMS initialization / Fuel and Load are modified to give to the flight crew the ability to insert the MIN FUEL AT DEST during cockpit preparation.

PERF Page: PACKS and ANTI-ICE Fields

The organization of the T.O panel of the PERF page is changed in order to add two new settings: PACKS and ANTI-ICE. The SOPs / Cockpit Preparation / MFD FMS initialization / Takeoff Performance are modified to reflect these modifications.

AIRWAYS Page

For the FMS EIS standard, the flight crew can only enter a sequence of airways on the AIRWAYS page. For the FMS L2 standard, the flight crew can enter a sequence of airways and waypoints on the AIRWAYS page.

HOLD Page

For the FMS L2 Standard, in order to compute the time to exit the HOLD, the FMS considers an EXTRA fuel = 0 at the primary destination (instead of an EXTRA fuel = 0 at the alternate destination for the FMS EIS standard). As a consequence, on the HOLD page, the message LAST EXIT (FOR EXTRA FUEL=0 AT ALTN) is replaced by LAST EXIT (FOR EXTRA FUEL=0).

COMPANY T.O DATA REQUEST and RECEIVED COMPANY T.O DATA Page

The layout of the COMPANY T.O DATA REQUEST and RECEIVED COMPANY T.O DATA pages is modified.
On the RECEIVED T.O DATA page, the TOW received from the company is crosschecked with the TOW computed by the FMS. For the FMS L2 standard, if the received TOW is outside an acceptable margin, the received TOW appears in amber on the RECEIVED

COMPANY T.O DATA page. When in addition the received runway matches the runway selected on the active flight plan, the UPLINK/ACTIVE TOW DISAGREE message also appears on the RECEIVED COMPANY T.O DATA page (instead of the CHECK T.O DATA message for the FMS EIS standard) .

Data Entry Format for LAT/LONG

The format XDD°MM.M or DD°MM.MX is now a possible entry format for latitudes.
The format YDDD°MM.M or DDD°MM.MY is now a possible entry format for latitudes.
In addition, the following note related to LAT/LONG entry is no longer applicable:

Note: *The flight crew cannot enter only the degrees. If the flight crew enters, for example, N12/W120, the FMS will read this as N0012.0/W00120.0.*

With the FMS L2 standard, if the flight crew enters, for example, N12/W120, the FMS will read this as N12°00.0/W120°00.0.

SID Display on ND

For the FMS L2 Standard, the SID name (if the SID exists in the flight plan) appears on the ND during departure.

FLS anchor point display on ND

For the FMS L2 standard, the ident of the FLS anchor point is the ICAO code of the airport, followed by the threshold runway identifier (e.g. LFBO33L). For the FMS EIS standard, the ident of the FLS anchor point is RWYxxx, where xxx is the ident of the runway threshold (e.g. RWY33L).

Display of the Safety Height in QFE on VD (if QFE option installed)

The safety heights are now displayed on the VD when the QFE barometric setting is selected.

LOC Beam on ND

The LOC beam is displayed on the ND when an ILS, LOC or BAC approach is selected in the active flight plan. The LOC beam appears as a dotted magenta line.

NORMAL PROCEDURES/SOPs/COCKPIT PREPARATION

- In the SEC F-PLN part of the FMS Initialization, addition of the recommendation to erase the SEC data from the previous flight before creating a new SEC flight plan
- The chapter associated with the MFD ATC COM is moved before the flight crew obtains the ATC Clearance (instead of after they obtain the ATC clearance) in order to cover the case where the ATC clearance is obtained via datalink.

  That chapter contains:
  - A new action to erase all CPDLC messages from the previous flight before starting a new flight, in order to avoid confusing messages from the previous flight
  - The action to check that the ADS is armed if ADS services are expected. The action to check the ADS connected ground stations is deleted because the ground stations are usually not connected when the aircraft is on ground.

  The associated tasksharing table is modified accordingly.

INTRODUCTION OF THE FADEC 10.6 STANDARD APPLICABLE TO ROLLS ROYCE T900 ENGINE TYPE (MP T81353 - SB 73-8011)

The new FADEC standard 10.6 introduces a new engine protection to ensure that the Intermediate Pressure (IP) turbine remains contained in the case of an IP shaft failure between the compressor and the turbine.
In the case of a IP shaft failure, the FADEC automatically shutdowns the engine to prevent the IP turbine from reaching an overspeed that would lead to an uncontained IP turbine. Associated with the automatic engine shutdown, the FADEC triggers the ENG 1(2)(3)(4) FAIL - SHAFT FAILURE ECAM alert.

ADDITION OF A NOTE IN THE TRANSFORMER RECTIFIER (TR) 1(2)(ESS) RESET PROCEDURE

Addition of the note to inform that the flight crew should not pull the TR reset button more than 5 s during a TR reset, to avoid latching the ELEC TR 1(2) (ESS) FAULT alert.

NOVEMBER 2010

INTRODUCTION OF AN FMS TEMPORARY FCOM DU

When the flight crew tries to enter a reference ident in REF1(2) field on the EQUI-TIME POINT page, the FMS may erroneously reject the entered ident and display the NOT ALLOWED message in the FMS Message Area.

Two FCOM Temporary DUs - one per FMS standard - are issued to introduce this FMS misbehavior:

- For the FMS EIS (Entry Into Service) standard, the FMS misbehavior may occur after a manual or an automatic clear of REF1(2) field
- For the FMS L2 standard, the FMS misbehavior may occur only after an automatic clear of REF1(2) field. The anomaly is corrected for the manual clear of REF1(2) field.

NEW FMS L2 STANDARD (MP T77504): CANCELLATION OF FMS MISBEHAVIORS

The new FMS L2 standard cancels the following misbehaviors of the FMS EIS standard:

Erroneous Deletion of the Alternate Airport and Alternate Flight Plan

For the EIS standard, the FMS erroneously deleted the alternate flight plan when the flight crew activates the EOSID.

Erroneous Deletion of the Wind at Destination

For the EIS standard, the FMS erroneously deleted the wind at destination values, if the flight crew performs a go-around during an approach that has no associated missed approach.

Erroneous Display of the Cruise Wind Direction and Velocity

For the EIS standard, the FMS erroneously displayed the wind direction and velocity when the flight crew entered twice the same altitude in the altitude entry field.

Erroneous Display of the Offset Trajectory

For the EIS standard, for small offset values and at high speed, the FMS may not correctly display a part of the offset trajectory.

Erroneous Speed Label on the PERF Page in Engine-Out

For the EIS standard, the CLB panel of the PERF page displayed an erroneous managed speed target label in engine-out and when the aircraft was in level flight.

Erroneous Predictions when Flying a Holding Pattern in Lateral Selected Mode

For the EIS standard, the FMS may compute erroneous flight plan predictions when the aircraft flies a hold, and the NAV mode is not engaged.

Loss of Predictions After a Minor FMC Reset

For the EIS standard, after a minor FMC reset, the flight plan predictions may be lost.

Automatic FMC Reset At Access to the WIND Page

For the EIS standard, when the flight crew tried to access the WIND page, an automatic reset of the onside FMC occurs. Afterwards, the flight crew could no longer consult or change the winds on the WIND page.

Speed Change Indicator Not Displayed for CMS in HDG/TRK

For the EIS standard, in HDG/TRK mode and when the managed speed mode is active, the ND did not display the speed change indicator for a Constant Mach Segment (CMS).

Cancellation of ETC n°10

For the EIS standard, if one of the two alerts FQI FAULT, or FQMS 1+2 FAULT was triggered, the flight crew had to disregard the FMS fuel predictions, because the FMS fuel predictions were based on the FOB and GW from WBBC and their accuracy was degraded. For the L2 standard, the FMS computes its own FOB and GW based on Fuel Used, in the case of FQI FAULT or FQMS 1+2 FAULT. The accuracy of this computation is much better and allows to remove the FMS FUEL PRED DISREGARD line from the ECAM in the case of an FQMS 1+2 or FQI FAULT.

NEW FMS L2 STANDARD (MP T77504): VERT REV PAGE IMPROVEMENT

This FCOM revision introduces the following improvements of the new FMS L2 standard:

RTA Panel

The RTA panel of the VERT REV page is modified in order to provide a better layout of the RTA speed:
- The "ECON-RTA" label is replaced by the "RTA SPD" label
- The "ACTIVE MODE" line is deleted.

STEP ALTs Panel

The STEP ALTs panel of the VERT REV page is modified in order to provide a better layout of the OPTIMUM STEP POINT area:
- The label of the SELECT/UPDATE button is replaced by NEW SEARCH/INSERT AS OPT label
- The message "NO OPTIMUM STEP POINT" is replaced by "NO OPTIMUM STEP FOUND"
- If an optimum step already exists and no better optimum step is found after a NEW SEARCH, the NO NEW OPTIMUM STEP FOUND label appears
- During the optimum step point computation, the values of the distance/time predictions and fuel/time savings are now dashed. In the FMS EIS standard, the optimum step point area displays the NO OPTIMUM STEP POINT message instead of the distance/time predictions and fuel/time savings.

FCOM PURPOSE

Applicable to: ALL

The FCOM is the support documentation for flight crews. It provides them with all the necessary information about the operational, technical, procedural, and performance characteristics of the A380 aircraft, to ensure safe and efficient operations of the aircraft during normal and abnormal/emergency situations, that may occur on ground, or in flight.
The manual is not designed to provide basic jet aircraft piloting techniques, or information, that are considered as basic airmanship for trained flight crews that are familiar with that type of aircraft and with its general handling characteristics.

The FCOM is intended to be used:
- Directly as flight crew operating manual or to provide operators with a basis for their development of a customized airline operations manual, in accordance with applicable requirements
- As a comprehensive reference guide during initial and refresher flight crew training
  Practical and training-oriented information is addressed in the Flight Crew Training Manual (FCTM). *Refer to FCTM/OP-10 Introduction*. Moreover, the FCOM is not intended to be used for teaching basic piloting skills.

The Flight Crew Operating Manual (FCOM) complements the Approved Flight Manual (AFM).
If the data contained in this manual differs from the data in the AFM, the AFM remains the reference.
Airbus encourages all manual holders and users to submit any FCOM question and suggestion to:
E.MAIL: fltops.A380std@airbus.com
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FLIGHT OPERATIONS SUPPORT AND SERVICES
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FCOM CONTENTS

Applicable to: ALL

The contents of the FCOM are organized in the following four parts:
- System Descriptions (organized by ATA)
- Procedures (normal, abnormal/emergency, supplementary, and special operations)
- Limitations
- Performance (organized by phase of flight).

FCOM USE AND ORGANIZATION

Applicable to: ALL

DEFINITIONS OF WARNINGS, CAUTIONS, AND NOTES

WARNING	Provides operating procedures, techniques, or information that, if not applied, may result in injury or loss of life.
CAUTION	Provides operating procedures, techniques, or information that, if not applied, may result in damage to equipment.
NOTE	Provides operating procedures, techniques, or information that are considered essential to emphasize. A note may also contain safety related information.

INFORMATION TYPES AND LAYERS

The FCOM has technical information that may be used for:
- Flight crew operations in flight, or on ground
- Airlines operations on ground
- Training.

To take the above-noted objectives into account, the FCOM is organized in three layers as follows:
- Layer 1: "Need to know"
  Layer 1 presents information that is necessary in the cockpit.
- Layer 2: "Nice to know"
  Layer 2 presents information that is used as a reference, in order to fully understand the logic of the aircraft and pilot interfaces.
- Layer 3: Detailed information.
  Layer 3 provides more detailed explanations, that are not necessarily needed in flight.

HOW TO USE THE FCOM

Refer to DSC-46-20-50-10 How to Start the OPS LIBRARY .

FCOM REVISIONS

Applicable to: ALL

FCOM REVISIONS

FCOM revisions are issued to add, update, or revise information. The Operator determines the revision periodicity.

When necessary, a revision may be issued in between the defined periodicity (e.g. need for urgent update).
A vertical white bar appears to the left of all revised parts of the manual. The flight crew can display the reason for the change by clicking on the white bar.

L2 If the change is significant, the reason for the change is in bold.

L1 The FCOM also has a list of revisions. The list provides:
- A link to the applicable parts of the manual
- The technical reason for each revision.

TEMPORARY INFORMATION

Some FCOM sections may need a temporary update (e.g. to explain a system behavior that will be modified by a future standard). In such cases, the applicable FCOM section is changed to a Temporary Documentary Unit (TDU).
However, the initial content of the FCOM remains available, and can be accessed from the TDU .
Refer to DSC-46-20-50-10 How to Use Temporary Documentary Units .

OPERATIONS ENGINEERING BULLETINS

Operations Engineering Bulletins (OEB) are issued, when it is necessary to rapidly transmit technical and procedural information.
Refer to OEB-000 Introduction .
The OEB chapter provides a list of all applicable OEB s.

ABBREVIATIONS

Applicable to: ALL

A

Abbreviation	Term
A	Ampere
A.FLOOR	Alpha Floor
A/C	Aircraft
A/THR	Autothrust
A623	ARINC 623 format for FANS A+
AAP	Additional Attendant Panel
ABB	Abbreviation
ABSELV	Alternate Brake Selector Valve
ABV	Above
ABN	Abnormal
ABN PROC	Abnormal Procedure

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Abbreviation	Term
AC	Alternating Current
ACARS	Aircraft Communication Addressing and Reporting System
ACC	Active Clearance Control, Acceleration
ACCEL	Acceleration, Accelerate
ACCELMTR	Accelerometer
ACCU	Accumulator
ACCUR	Accuracy
ACD	Additional Control Device
ACFT	Aircraft
ACM	Air Cycle Machine
ACMF	Aircraft Condition Monitoring Function
ACMS	Aircraft Condition Monitoring System
ACP	Audio Control Panel
ACQ	Acquisition
ACR	Avionics Communication Router
ACUTE	AIRBUS Cockpit Universal Thrust Emulator
ADCU	Automatic Deployment Control Unit
ADF	Automatic Direction Finder
ADIRS	Air Data/Inertial Reference System
ADIRU	Air Data/Inertial Reference Unit
ADK	Activate/Dialing Key
ADL	Automatic Data Loading
ADR	Air Data Reference
ADS	Air Data System, Automatic Dependent Surveillance
ADV	Advisory
AEO	All Engine Operative
AES	Automatic Extension System
AESS	Aircraft Environment Surveillance System
AESU	Aircraft Environment Surveillance Unit
AFDX	Avionics Full Duplex Switched Ethernet
AFM	Airplane Flight Manual
AFN	ATS Facilities Notification
AFS	Automatic Flight System
AGL	Above Ground Level
AGP	Alternate Gauging Processor
AGT	Auto Ground Transfer
A-ICE	Anti-Ice
AICU	Anti-Ice Control Unit
AIP	Attendant Indication Panel
AIR COND	Air Conditioning

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Abbreviation	Term
ALL ENG FF	All Engine Fuel Flow
AIV	ACM Isolating Valve
ALD	Actual Landing Distance
ALT	Altitude
ALT CRZ	Altitude Hold of the Cruise Flight Level
ALT CRZ*	Altitude Capture of the Cruise Flight Level
ALT CST	Altitude Constraint Hold Mode
ALT CST*	Altitude Constraint Capture Mode
ALT RPTG	Altitude Reporting
ALT*	Altitude capture Mode
ALTN	Alternate, Alternative
AM	Amplitude Modulation
AMI	Airline Modifiable Information
AMM	Aircraft Maintenance Manual
AMU	Audio Management Unit
ANS	Airport Navigation System
ANSA	At Nearest Suitable Airport
ANSU	Aircraft Network Server Unit
AOA	Angle-Of-Attack
AOC	Airline Operational Control
AP	Autopilot
APP	Approach
APPR	Approach
APPU	Asymmetry Position Pick Off Unit
APT	Alternate Pressure Transmitter
APU	Auxiliary Power Unit
ARM	Airworthiness Review Meeting
ARPT	Airport
ARS	Auto Retraction System
ARU	Aircraft Router Unit
ARV	Alternate Refill Valves
ASD	Accelerate Stop Distance
ASDA	Accelerate Stop Distance Available
ASELV	Alternate Selector Valve
A-SKID	Antiskid
ASPSU	Autonomous Standby Power Supply Unit
ASV	Alternate Servo Valve
ATA	Air Transport Association, Active Turbulence Alleviation
ATC	Air Traffic Control
ATIS	Airbus Technical Information System

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Abbreviation	Term
ATIS	Automatic Terminal Information Services
ATM	Air Traffic Management
ATQC	Airbus Temporary Quick Change
ATS	Air Traffic Services
ATT	Attitude
AUTO	Automatic
AUTO BRK	Autobrake
AVAIL	Available, Availability
AV	Altitude Valve
AVNCS	Avionics
AVS	Avionics Ventilation System
AZIM	Azimuth

B

Abbreviation	Term
B/C	Back Course
BARO	Barometric
BAT	Battery (Electrical)
BBAND	Broadband
BCM	Backup Control Module
BCS	Brake Control System
BEA	Bureau d'Enquêtes et d'Analyses
BFO	Beat Frequency Oscillator
BITE	Built-in Test Equipment
BKUP	Backup
BLG	Body Landing Gear
BLW	Below
BPS	Backup Power Supply
BRG	Bearing
BRK	Brake
BRT	Bright, Brightness
BSCS	Brake and Steering Control System
BSU	Beam Steering Unit
BTAC	Belly Taxi Aid Camera
BTC	Bus Tie Contactor
BTL	Bottle
BTMS	Brake Temperature Monitoring System
BTV	Brake To Vacate
BUSS	Back Up Speed Scale
BWS	Body Wheel Steering

C

Abbreviation	Term
C/B	Circuit Breaker
C/L	Check List
CAB	Cabin
CAM	Cabin Area Microphone
CAM	Cabin Assignment Module
CAN	Controller Area Network
CAPT	Captain
CAS	Calibrated Air Speed
CAT	Category, Clear Air Turbulence
CAUT	Caution
CCD	Cursor Control Device
CCOM	Cabin Crew Operating Manual
CCRC	Cabin Crew Rest Compartment
CDAM	Centralized Data Acquisition Module
CDL	Configuration Deviation List
CDLCU	Cockpit Door Lock Control Unit
CDLS	Cockpit Door Locking System
CDS	Control and Display System
CDSS	Cockpit Door Surveillance System
CF	Cost of Fuel
CFP	Computerized Flight Plan
CG	Center of Gravity
CHR	Chronometer
CHRO	Chronometer
CI	Cost Index
CIDS	Cabin Intercommunication Data System
CKPT	Cockpit
CL	Coefficient of Lift, Climb Detent on Thrust Levers
CLB	Climb
CLR	Clear
CLS	Cargo Loading System
CM1	Crewmember (Left Seat)
CM2	Crewmember (Right Seat)
CMS	Constant Mach Segment, Cabin Management System, Central Maintenance System
CMV	Concentrator and Multiplexer for Video
CNS	Communication, Navigation and Surveillance
CO RTE	Company Route
COC	Cabin Operational Center
COM	Communication

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Abbreviation	Term
COND	Condition, Conditioned, Conditioning
CONF	Configuration
CONFIG	Configuration
CP	Control Panel
CPA	Closest Point of Approach
CPC	Cabin Pressure Controller
CPCS	Cabin Pressure Control System
CPDLC	Controller/Pilot Datalink Communication
CPIOM	Core Processing Input/Output Module
CPNY	Company
CRC	Continuous Repetitive Chime
CRG	Cargo
CRS	Course
CRZ	Cruise
CST	Cabin Service Trainer
CSTR	Constraint
CT	Cost of Time
CTL	Control
CVMS	Cabin Video Monitoring System
CVR	Cockpit Voice Recorder
CVRS	Cockpit Voice Recorder System
CWY	Clearway
CWS	Cabin Work Station

D

Abbreviation	Term
DA	Decision Altitude
DAR	Digital ACMS Recorder
DC	Direct Current
DCT	Direct To
DDD	Decompression Deceleration Device
DDRMI	Digital Distance and Radio Magnetic Indication
DECEL	Decelerate, Deceleration Point
DEP	Departure
DEPS	Door Emergency Power Supply
DES	Descend, Descent
DEST	Destination
DET	Detection, Detector
DEV	Deviation
DFDR	Digital Flight Data Recorder

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Abbreviation	Term
DH	Decision Height
DIR	Direction, Direct, Director
DIRTO	Direction To
DISA	Deviation from ISA law
DISC	Disconnection, Disconnect, Disconnected
DIST	Distance
DLCS	Data Loading Configuration System
DME	Distance Measuring Equipment
DOC	Direct Operating Cost
DOCG	Dry Operating Center of Gravity
DOW	Dry Operating Weight
DSMCU	Door and Slides Control Unit
DSMS	Doors and Slides Management System
DTO	Derated Take-off Thrust
DU	Display Unit
DY	Day

E

Abbreviation	Term
EASA	European Aviation Safety Agency
EBCU	Emergency Brake Control Unit
EBHA	Electrical Backup Hydraulic Actuator
EBPTU	Emergency Brake Pedal Transmitter Unit
EC	Engine Control
ECAM	Electronic Centralized Aircraft Monitoring
ECAS	Emergency Crew Alerting System
ECB	Electronic Control Box
ECON	Economy, Economic
ECP	ECAM Control Panel
ECU	Electronic Control Unit
EDP	Engine Driven Pump
EEC	Engine Electronic Controller
EFB	Electronic Flight Bag
EFF	Electronic Flight Folder
EFIS	Electronic Flight Instrument System
EFOB	Estimated Fuel on Board
EGT	Exhaust Gas Temperature
EHA	Electro-Hydrostatic Actuator
EIPM	Engine Interface Power Management
ELEC	Electric, Electrical, Electricity

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Abbreviation	Term
ELEV	Elevation, Elevator
ELEVN	Elevation
ELMU	Electrical Load Management Unit
ELT	Emergency Locator Transmitter
EMER	Emergency
EMP	Electric Motor Pump
EMU	Engine Monitoring Unit
ENG	Engine
ENMU	Electrical Network Management Units
ENT	Entry
EO	Engine Out
EOSID	Engine Out Standard Instrument Departure
EP	End Point
EPSU	Emergency Power Supply Unit
EPU	Emergency Power Unit, Estimated Position Uncertainty
ESC	Escape
ESS	Essential
ET	Elapsed Time
ETA	Estimated Time of Arrival
ETACS	External and Taxiing Aid Camera System
ETD	Estimated Time of Departure
ETP	Equal Time Point
ETT	Estimated Takeoff Time
ETRAC	Electrical Thrust Reverser Activation Controller
ETRAS	Electrical Thrust Reverser Activation System
EVAC	Evacuate, Evacuation
EWD	Engine and Warning Display
EXT	External Generator, External

F

Abbreviation	Term
F	Minimum Flap Retract Speed
F/C	Flight Crew
F/CTL	Flight Control
F/O	First Officer
FAA	Federal Aviation Administration
FADEC	Full Authority Digital Engine Control
FAF	Final Approach Fix
FANS	Future Air Navigation System
FAP	Final Approach Point, Flight Attendant Panel, Forward Attendant Panel

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Abbreviation	Term
FAR	Federal Aviation Regulations
FCDC	Flight Control Data Concentrator
FCGU	Flight Control and Guidance Unit
FCOM	Flight Crew Operating Manual
FCRC	Flight Crew Rest Compartment
FCTM	Flight Crew Training Manual
FCU	Flight Control Unit, Fuel Control Unit
FD	Flight Director
FDIU	Flight Data Interface Unit
FDRS	Flight Data Recording System
FDU	Fire Detection Unit
FE	Flight Envelope
FF	Fuel Flow
FFCM	Free Fall Control Module
FG	Flight Guidance
F-G/S	FLS Guide Slope, FLS Guide Slope Track Mode
F-G/S*	FLS Guide Slope Capture Mode
FIN	Functional Identification Number
FL	Flight Level
FLEX	Flexible
F-LOC	FLS Localizer, FLS Localizer Track Mode
F-LOC*	FLS Localizer Capture Mode
FLRS	Flap Load Relief System
FLS	FMS Landing System
FLT	Flight
FLX	Flexible
FM	Flight Management, Frequency Modulation
FMA	Flight Mode Annunciator
FMC	Flight Management Computer
FMS	Flight Management System (FMCS and AFS sensors)
FMV	Fuel Metering Valve
FO	Fully Open
FOB	Fuel On Board
FOCT	Flight Operation Consultation Tool
FOD	Foreign Object Damage
FOHE	Fuel Oil Heat Exchanger
FPA	Flight Path Angle
F-PLN	Flight Plan
FPMU	Fuel Properties Measurement Unit
FPPU	Feedback Position Pick-off Unit

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Abbreviation	Term
FPV	Flight Path Vector
FQDC	Fuel Quantity Data Concentrator
FQI	Fuel Quantity Indicating
FQMS	Fuel Quantity and Management System
FREQ	Frequency
FTAC	Fin Taxi Aid Camera
FTO	Flexible Take-off Thrust
FU	Fuel Used
FWC	Flight Warning Computer
FWD	Forward
FWF	Flight Warning Function
FWS	Flight Warning System
FSM	Flight System Message

G

Abbreviation	Term
G/S	Glide Slope
G/S*	Glide Slope Capture Mode
GA	Go-Around
GA TRK	Go-Around Track Mode
GCU	Ground Control Unit
GD	Green Dot
GDOT	Green Dot
GEN	Generator
GES	Ground Earth Station
GGPCU	Generator and Ground Power Control Unit
GLS	GNSS Landing System
GND	Ground
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GPIRS	GPS IRS
GPWS	Ground Proximity Warning System
GRVTY	Gravity
GS	Ground Speed
GSE	Ground Support Equipment
GW	Gross Weight
GWCG	Gross Weight Center of Gravity

H

Abbreviation	Term
HA	Holding Pattern to an Altitude Termination
HCF	Heading Control Function
HCU	Head-Up Combiner Unit
HDG	Heading
HESU	Head-End Server Unit
HF	High Frequency
HH	Hour (entry format)
HI	High
HID	High Intensity Discharge
HLD	Hold
HM	Holding Pattern with a Manual Termination
HMI	Human Machine Interface
HMU	Hydromechanical Metering Unit, Hydromechanical Unit
HP	High Pressure
HPA	High Power Amplifier
HPU	Head-Up Projection Unit
HR	Hour
HSDU	High Speed Data Unit
HSMU	Hydraulic System Monitoring Unit
HUD	Head-Up Display
HUDC	Head-Up Display Computer
HYD	Hydraulic

I

Abbreviation	Term
IAS	Indicated Airspeed
IATA	International Air Transport Association
IBLC	Inter-Bus Line Contactor
ICAO	International Civil Aviation Organization
IDENT	Identification, Identifier, Identify
IFE	In-Flight Entertainment
IFPA	In-Flight Performance Application
IFR	Instrument Flight Rules
IGN	Ignition
IGV	Inlet Guide Vane
ILS	Instrument landing System (LOC and G/S)
IMA	Integrated Modular Avionics
IMC	Instrument Meteorological Conditions
IN-BND	In-Bound

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Abbreviation	Term
INFO	Information
INIT	Initial(ization)
INOP	Inoperative
INR	Inner
INT	Interphone
INV	Inverter
IOM	Input/Output Module
IP	Intermediate Pressure
IPCU	Ice Protection Control Unit
IR	Inertial Reference
IRS	Inertial Reference System
IRU	Inertial Reference Unit
ISA	International Standard Atmosphere
ISIS	Integrated Standby Instrument System
ISPSS	In-Seat Power Supply System
IVS	Inertial Vertical Speed

J

Abbreviation	Term
JAA	Joint Aviation Authorities
JAR	Joint Aviation Requirements

K

Abbreviation	Term
KBD	Keyboard
KCCU	Keyboard and Cursor Control Unit
KOZ	Keep Out Zone

L

Abbreviation	Term
L	Left
L/G	Landing Gear
LAF	Load Alleviation Function
LAND	Landing
LAT	Latitude, Lateral
LCD	Liquid Crystal Display
LDA	LOC type Directional Aid
LDC	Local Door Controller
LDCG	LanDing Center of Gravity
LDG	Landing

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Abbreviation	Term
LDPA	Landing Performance Application
LED	Light Emitting Diode
LEHGS	Local Electro-Hydraulic Generation System
LGCIS	Landing Gear Control Indication System
LGERS	Landing Gear Extension and Retraction System
LH	Left Hand
LIM	Limit, Limitation, Limiting, Limiter
LL	Latitude/Longitude
LL XING	Latitude/Longitude Crossing
LMC	Last Minute Changes
LO	Low
LOC	Localizer, Localizer Track Mode
LOC B/C	Localizer Back Course Track Mode
LOC B/C*	Localizer Back Course Capture Mode
LOC*	Localizer Capture Mode
LONG	Longitude
LP	Low Pressure
LRC	Long Range Cruise
LS	Landing System, Low Speed, Loudspeaker
LSELV	Locking Selector Valve
LSK	Line Selection Key
LT	Light
LVR	Lever
LW	Landing Weight

M

Abbreviation	Term
MABH	Minimum Approach Breakoff Height
MAC	Mean Aerodynamic Chord
MAG	Magnetic
MAN	Manual
MAP	Missed Approach Point
MASPS	Minimum Aircraft System Performance Standards
MAX	Maximum
MC	Master Caution
MCD	Magnetic Chip Detector
MCDU	Multipurpose Control& Display Unit
MCL	Maximum Climb Thrust
MCPU	Motor Control and Protection Unit
MCR	Maximum Cruise Thrust

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Abbreviation	Term
MCT	Maximum Continuous Thrust
MDA	Minimum Decision Altitude
MDH	Minimum Descent Height
MEA	Minimum En Route Altitude
MECH	Mechanic, Mechanical, Mechanism
MEL	Minimum Equipment List
MET	Meteorological
METAR	Meteorological Airport Report
METOTS	Modified Engine Take-off Thrust Setting
MEW	Manufacturer's Empty Weight
MFD	Multi Function Display
MFP	MultiFunction Probe
MGA	Maximum Go-around Thrust
MIN	Minimum
MIP	Maintenance Information Printer
MIXIRS	Mixed IRS
MKR	Marker (radio) Beacon
MLG	Main Landing Gear
MLS	Microwave Landing System
MLW	Maximum Landing Weight
MM	Middle Marker, Minutes (entry format)
MMEL	Master Minimum Equipment List
MMO	Maximum Operating Mach
MMR	Multi-Mode Receiver
MORA	Minimum Off Route Altitude
MRA	Recommended Turbulence Penetration Mach Number
MRP	Map Reference Point
MSA	Minimum Safe Altitude
MSG	Message
MSL	Mean Sea Level
MSLW	Maximum Structural Landing Weight
MSN	Manufacturer Serial Number
MSTOW	Maximum Structural Takeoff Weight
MTO	Maximum Takeoff Thrust
MTOW	Maximum Takeoff Weight
MW	Master Warning
MZFW	Maximum Zero Fuel Weight

N

Abbreviation	Term
N1	Engine Fan Speed, Low Pressure Rotor Speed
N2	Engine Intermediate Pressure Rotor Speed
N3	Engine High Pressure Rotor Speed
NADP	Noise Abatement Departure Procedure
NAV	Navigation
NAVAID	Navigation Aid
NAVAIDS	Navigation Aids
NBPT	No Break Power Transfer
NBPTU	Normal Brake Pedal Transmitter Unit
NBSELV	Normal Brake Selector Valve
NCD	Non Computed Data
ND	Navigation Display
NDB	Non-Directional Beacon
NLG	Nose Landing Gear
NORM	Normal
NPA	Non-Precision Approach
NPT	Normal Pressure Transmitter
NSELV	Normal Selector Valve
NSS	Network Server System
NSV	Normal Servo Valve
NTSB	National Transportation Safety Board
NW	Nose Wheel
NWS	Nose Wheel Steering

O

Abbreviation	Term
OANS	Onboard Airport Navigation System
OAT	Outside Air Temperature
OCED	Operator Customized ECAM Database
OEB	Operations Engineering Bulletins
OEI	One Engine Inoperative
OEW	Operational Empty Weight
OHDU	OverHeat Detection Unit
OIS	Onboard Information System
OIT	Onboard Information Terminal
OMS	Onboard Maintenance System
OMT	Onboard Maintenance Terminal
OOOI	Out-Off-On-In
OP	Open

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Abbreviation	Term
OPC	Operational Program Configuration
OP CLB	Open Climb
OP DES	Open Descent
OPMS	Oleo Pressure Monitoring System
OPS	Operations
OPT	Optimum, Optional
OPV	Overpressure Valve
OSCU	Oxygen System Control Unit
OUT-BND	Out-Bound
OUTR	Outer
OVHT	Overheat
OVRD	Override
OXY	Oxygen

P

Abbreviation	Term
P.POS	Present Position
P/N	Part Number
PA	Passenger Address
PAPI	Precision Approach Path Indicator
PARK	Parking
PAX	Passenger
PB	Place/Bearing, Pushbutton
PB-SW	Pushbutton-Switch
PBD	Place/Bearing/Distance
PBE	Protective Breathing Equipment
PBSELV	Parking Brake Selector Valve
PCT	Probe Compensator and Temperature
PD	Place/Distance
PDB	Performance Data Base
PDLCU	Privacy Door Lock Control Unit
PDLS	Privacy Door Lock System
PDU	Power Drive Unit
PED	Portable Electronic Device
PERF	Performance
PERS	Personal
PF	Pilot Flying
PFD	Primary Flight Display
PFQ	Preselected Fuel Quantity
PFTU	Pedal Feel and Trim Unit

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Abbreviation	Term
PIN PROG	Pin Programming
PLS	Primary Locking System
PM	Pilot Monitoring
PMA	Permanent Magnetic Alternator
PMAT	Portable Multipurpose Access Terminal
PMP	Pump
POB	Power-Off Brake
PPOS	Present Position
PR	Pressure
PRED	Prediction
PRED W/S	Predictive Windshear
PRESS	Pressure, Pressurization, Pressurize
PREV	Previous
PRIM	Primary Flight Control and Guidance Computer
PRM	Precision Runway Monitor
PROC	Procedure
PROG	Program, Programming
PSI	Pound per Square Inch
PTA	Passive Turbulence Alleviation
PTT	Push-to-Talk
PURS	Purser
PWR	Power
PWS	Predictive Windshear
PWSP	Potable Water Service Panel

Q

Abbreviation	Term
QAR	Quick Access Recorder
QFE	Field Elevation Atmospheric Pressure
QFU	Runway Heading
QNH	Sea Level Atmospheric Pressure
QRH	Quick Reference Handbook

R

Abbreviation	Term
R	Right
RA	Radio Altimeter, Radio Altitude, Resolution Advisory
RAD	Radio
RAM	Random Access Memory
RAT	Ram Air Turbine

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Abbreviation	Term
RCDR	Recorder
RCL	Recall
RDC	Remote Data Concentrator
REC	Recommended
RED	Reduction
REF	Reference
REGUL	Regulation
REV	Revise, Revision, Reverse
RFCF	Runway Field Clearance Floor
RH	Right Hand
RLD	Required Landing Distance
RMP	Radio Management Panel
RNAV	Area Navigation
RNP	Required Navigation Performance
ROC	Rate of Climb
ROD	Rate of Descent
ROP	Runway Overrun Protection
ROW	Runway Overrun Warning
RPTG	Reporting
RQRD	Required
RST	Reset
RTA	Required Time of Arrival
RTD	Required Time to Destination
RTE	Route
RTO	Rejected Takeoff
RTOW	Runway Takeoff Weight
RTU	Radar Transceiver Unit
RUD	Rudder
RVR	Runway Visual Range
RVSM	Reduced Vertical Separation Minimum
RWY	Runway, Runway Mode
RWY TRK	Runway Track Mode

S

Abbreviation	Term
S	Minimum Slat Retract Speed, South
S/C	Step Climb
S/D	Step Descent
SAT	Static Air Temperature
SATCOM	Satellite Communication

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Abbreviation	Term
SC	Single Chime
SCI	Secure Communication Interface
SCS	Steering Control System, Supplemental Cooling System
SD	System Display
SDF	Smoke Detection Function, Simplified Directional Facility
SDU	Satellite Data Unit
SEC	Secondary Flight Control Computer, Secondary Flight Plan
SEL	Select, Selected, Selector, Selection
SELCAL	Selective Calling
SEPDC	Secondary Electrical Power Distribution Center
SFC	Specific Fuel Consumption
SFCC	Slat Flap Control Computer
SFD	Standby Flight Display
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
SIRU	Secure Interface Router Unit
SND	Standby Navigation Display
SOP	Standard Operating Procedure
SP	Space, Sampling
SPD	Speed
SPD LIM	Speed Limit
SPDB	Secondary Power Distribution Box
SPEC	Specification
SPECIF	Specification
SPLR	Spoiler
SPLY	Supply
SQWK	Squawk
SR	Specific Range
SRS	Speed Reference System
SS	Sky/Shading
SSA	Side Slip Angle
SSB	Single Side Band
STAR	Standard Terminal Arrival Route
STAT	Static
STBY	Standby
STD	Standard
STL	System Torque Limiter
STRG	Steering
STS	Status
SURV	Surveillance, Surveillance System

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Abbreviation	Term
SVCE	Service
SW	Switch
SWY	Stopway
SYS	System

T

Abbreviation	Term
T-P	Turning Point
T.O	Takeoff
T/C	Top of Climb
T/D	Top of Descent, Touchdown
TA	Traffic Advisory
TAC	Taxiing Aid Camera
TACS	Taxiing Aid Camera System
TACAN	Ultra-high Frequency Tactical Air Navigation Aid
TAD	Terrain Awareness and Display
TAF	Terminal Aerodrome Forecast
TAS	True Airspeed
TASOV	Trim Air Shut-Off Valves
TAT	Total Air Temperature
TAU	Estimated Time to Intercept
TAV	Trim Air Valve
TAWS	Terrain Awareness and Warning System
TBC	To Be Confirmed
TBD	To Be Defined
TBV	Transient Bleed Valve, Turbine Bypass Valve
TCAS	Traffic Alert and Collision Avoidance System
TCC	Turbine Case Cooling
TCF	Terrain Clearance Floor
TCM	Thrust Control Malfunction
TCS	Temperature Control System
TCV	Temperature Control Valve
TDU	Temporary Documentary Unit
TEI	Two Engines Inoperative
TEL	Telephone
TEMP	Temperature
TERR	Terrain
TFLEX	Flex Temperature
THR	Thrust
THS	Trimmable Horizontal Stabilizer

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Abbreviation	Term
TK	Tank
TLS	Tertiary Locking System
TMPY	Temporary
TO	Takeoff
TOCG	TakeOff Center of Gravity
TOD	Takeoff Distance
TODA	Takeoff Distance Available
TOGA	Takeoff/Go-Around
TOPA	TakeOff Performance Application
TOR	Takeoff Run
TORA	Takeoff Run Available
TOW	Takeoff Weight
T-P	Turn Point
TPIS	Tire Pressure Indicating System
TPR	Turbofan Power Ratio
TR	Transformer Rectifier
TRAF	Traffic
TRANS	Transition
TREF	Reference Temperature, Flat-Rating Temperature
TRGT	Target
TRK	Track (angle)
TROPO	Tropopause
TRPU	Trust Reverser Power Unit
TSP	Tanks Signal Processor
TURB	Turbulence, Turbulent
TWLU	Terminal Wireless LAN Unit

U

Abbreviation	Term
USB	Universal Serial Bus
UTC	Universal Time Coordinated

V

Abbreviation	Term
V/S	Vertical Speed
V1	Decision Speed, Critical Engine Failure Speed
V2	Takeoff Safety Speed
VAPP	Approach Speed
VASI	Visual Approach Slope Indicator
VCS	Ventilation Control System

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Abbreviation	Term
VD	Vertical Display
VDAR	Virtual Digital ACMS Recorder
VDEV	Vertical Deviation
VENT	Ventilation
VERT	Vertical
VERT DEV	Vertical Deviation
VERT REV	Vertical Revisor
VFE	Maximum Flap Extended Speed
VFG	Variable Frequency Generator
VFR	Visual Flight Rules
VHF	Very High Frequency
VIGV	Variable Inlet Guide Valve
VLE	Maximum Landing Gear Extended Speed
VLO	Maximum Landing Gear Operating Speed
VLOF	Lift-off Speed
VLR	Very Long Range
VLS	Lowest Selectable Speed
VMAX	Maximum Allowable Speed
VMAXOP	Maximum Operating Speed
VMC	Visual Meteorological Conditions
VMCA	Minimum Control Airspeed in Flight
VMCG	Minimum Control Airspeed on Ground
VMCL	Minimum Control Airspeed for Landing
VMCL-2	Minimum Control Airspeed for Landing with two engines inoperative
VMO	Maximum Operating Speed
VMU	Minimum Unstick Speed
VOR	VHF Omnidirectional Range
VORTAC	Collocated VOR and TACAN beacon
VR	Rotation Speed
VRA	Recommended Turbulence Penetration Airspeed
VREF	Landing Reference Speed
VS1g	Stall Speed with a Load Factor of 1g
VSI	Vertical Speed Indicator
VIVG	Variable Stator Vanes
VTIRE	Maximum Tire Speed
VV	Velocity Vector
VQAR	Virtual Quick Access Recorder

W

Abbreviation	Term
W/S	Windshear
WADU	Weather Antenna Drive Unit
WARN	Warning
WBA	Weight and Balance Application
WBBC	Weight and Balance Backup Computer
WD	Warning Display
WLG	Wing Landing Gear
WPT	Waypoint
WQAR	Wireless Quick Access Recorder
WR	Weighing Report, Weather Radar
WTB	Wing tip brake
WX	Weather Mode
WXR	Weather Radar

X

Abbreviation	Term
XFR	Transfer
XING	Crossing
XPDR	Transponder
XTK	Crosstrack

Y

Abbreviation	Term
Y	Year

Z

Abbreviation	Term
ZF	Zero Fuel
ZFCG	Zero Fuel Center of Gravity
ZFW	Zero Fuel Weight
ZFWCG	Zero Fuel Weight Center of Gravity
ZP	Pressure Altitude

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AIRCRAFT SYSTEMS

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M(1)	Localization	DU Title	DU identification	DU date
	DSC-22-FG-80-40	**FCU Brightness Knobs**	00022764.0001001	14 JAN 10
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00017142 FCU Brightness Knobs*			
	Reason for issue: *When the flight crew adjusts the FCU brightness knob, they can inadvertently switch off the FCU. In this case, if they immediately switch it back to on, the FCU erroneously detects a power supply failure, and the AFS CP is lost for the remainder of the flight. The flight crew should wait at least 3 s to switch back to on the FCU.* *The H5.0 FCU standard will correct this issue.*			
	DSC-22-FMS-10-40-30	**Start and Update of Predictions**	00016865.0001001	11 SEP 07
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00007400 Start and Update of Predictions*			
	Reason for issue: *The flight plan predictions may be lost after a single FMC reset.*			

	DSC-22-FMS-20-30	**EQUI-TIME POINT page**	LG00079	
	DSC-22-FMS-20-30	**EQUI-TIME POINT page - Reference Ident**	00023579.0002001	04 NOV 10
	Criteria: T77504, DD **Applicable to: ALL** *Impacted DU: 00016694 EQUI-TIME POINT page - Reference Ident*			
	Reason for issue: *Due to a misbehavior of the FMS , the reference ident may be still kept in the FMS memory after an automatic clear (e.g. following the activation of a secondary flight plan) of REF 1(2) field on the EQUI-TIME POINT page.* *The consequence is that in some cases, the FMS may consider that the reference ident is already selected in the other reference entry field and therefore reject the entered reference ident and display the NOT ALLOWED message.*			

	DSC-22-FMS-20-30	**INIT Page**	LG00084	
	DSC-22-FMS-20-30	**INIT page - FROM TO entry fields**	00019651.0001001	11 SEP 07
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00003510 INIT page - FROM TO entry fields*			
	Reason for issue: *The flight plan re-initialization, by entering the city-pair again, does not clear the performance data.*			

M(1)	Localization	DU Title	DU identification	DU date
	DSC-23-10-20-20	**Cockpit handset description**	LG01649	
	DSC-23-10-20-20	**Cockpit Handset**	00023043.0001001	05 MAR 10
	Criteria: T74757 **Applicable to: ALL** *Impacted DU: 00016492 Cockpit Handset* *Reason for issue:* *This TDU is issued in order to inform the flight crew that the communication between the cockpit and the Flight Crew Rest Compartment (FCRC) via the cockpit handset is not be possible.* *In order to call the FCRC , the flight crew must use the PILOT REST pb on the overhead CALL panel.* *The CIDS software standard 6.0 will correct this issue.*			
	DSC-23-10-30-10	**HF**	00023570.0001001	05 OCT 10
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00002316 HF* *Reason for issue:* *When the HF 1(2) is in data mode, and the ECAM triggers the COM HF 1(2) DATALINK FAULT alert, most of the time, the HF 1(2) should automatically recover from its failure. The HF 1(2) should become operative again, and the ECAM alert should disappear.* *However, if the HF 2 fails in data mode, the HF 2 never recovers from its failure.* *Therefore, if the flight crew wants to use the HF in data mode, the flight crew should preferably use the HF 1 in data mode.* *A future RMP standard will correct this misbehavior.*			
	DSC-23-20	**RMP Overview**	LG00139	
	DSC-23-20	**Internal Communication Transmission Keys and Reception Knobs**	00023122.0001001	16 JUN 10
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00002883 Internal Communication Transmission Keys and Reception Knobs* *Reason for issue:* *When the cabin crew makes a priority call, a buzzer sounds one time in the cockpit, instead of three times.* *However, the priority call still has priority over a normal call.* *This will be corrected by the CIDS software standard 6.0.*			

M(1)	Localization	DU Title	DU identification	DU date
	DSC-31-20-50	**EFIS Control Panel**	LG01538	
	DSC-31-20-50	**Barometric Reference**	00024027.0001001	01 APR 11

Criteria: DD
Applicable to: ALL
Impacted DU: 00000371 Barometric Reference

Reason for issue:

If the flight crew presets a QNH value equal to the lower(upper) limit, i.e. 745 hPa (22.00 inHg) or 1 100 hPa (32.48 inHg), the vertical functions on the master FMS side are lost:

- *If the flight crew presets the QNH limit value on the same side as the engaged AP (e.g. value of 1 100 hPa is preset on CM2 side and AP 2 is ON), on the master FMS side (e.g. CM2 side):*
  - *The predictions, the managed speed target and vertical mode targets are no more computed*
  - *A red scale appears on the VD*
  - *The managed speed target reverts to the selected speed target*
  - *The CLB(DES) mode reverts to OP CLB(VS/ FPA) mode.*
- *If the flight crew selects the QNH limit value on the opposite side of the engaged AP (e.g. pre-set value of 1 100 hPa is set on CM2 side and AP 1 is ON), on the master FMS side (e.g CM1):*
  - *The predictions, the managed speed target and vertical mode targets are no more computed*
  - *A red scale appears on the VD*
  - *If in managed speed mode, the airspeed target on the PFD is erroneous*
  - *If in managed vertical mode, the FD (FPV) may indicate erroneous orders.*

Therefore, the flight crew should not preset a QNH limit value, i.e. 745 hPa (22.00 inHg) or 1 100 hPa (32.48 inHg).. The above behavior is reversible, as soon as the flight crew changes the preset QNH limit value by another value, all FMS vertical functions are recovered.
A future ADIRU standard will correct this issue.

	DSC-46-10-20-70	**ATC MSG pb**	00023312.0001001	16 JUN 10

Criteria: T78399
Applicable to: ALL
Impacted DU: 00011365 ATC MSG pb

Reason for issue:
Due to a misbehavior of the new CLA3.1 ATC standard, the ATC MSG pb may not flash and the associated RING aural alert may not sound when a reminder appears in the ATC mailbox.
This misbehavior will be fixed in the next ATC standard.

	DSC-46-10-40	**How to Manage a Report Message**	00023313.0001001	16 JUN 10

Criteria: T78399
Applicable to: ALL
Impacted DU: 00018548 How to Manage a Report Message

Reason for issue:
Due to a misbehavior of the new CLA3.1 ATC standard, the ATC MSG pb may not flash and the associated RING aural alert may not sound when a reminder appears in the ATC mailbox.
This misbehavior will be fixed in the next ATC standard.

M(1)	Localization	DU Title	DU identification	DU date
	DSC-46-10-40	**How to Manage a Deferred Clearance Message**	00023314.0001001	16 JUN 10
	Criteria: T78399 **Applicable to: ALL** *Impacted DU: 00018549 How to Manage a Deferred Clearance Message* *Reason for issue:* *Due to a misbehavior of the new CLA3.1 ATC standard, the ATC MSG pb may not flash and the associated RING aural alert may not sound when a reminder appears in the ATC mailbox.* *This misbehavior will be fixed in the next ATC standard.*			

	DSC-46-20-50-50	**How to Load Data with the LOAD BOX**	LG02100	
	DSC-46-20-50-50	**Load Data via a USB Device**	00023385.0003001	03 SEP 10
	Criteria: T77588, T78666 **Applicable to: ALL** *Impacted DU: 00022220 Load Data via a USB Device* *Reason for issue:* *SB 46-8041 instals a new antivirus software on laptops fitted with OIS 2B standard. This new antivirus significantly increases the time necessary to load items via the LOAD BOX. Therefore, it is recommended to avoid uploading heavy items (e.g. operational manuals) by using the LOAD BOX.* *This behavior is corrected by the future OIS 2B+ standard.*			

	DSC-49-10	**System Architecture**	LG00411	
	DSC-49-10	**APU Starter**	00021434.0001001	14 NOV 08
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00001759 APU Starter* *Reason for issue:* *This TDU is issued to ask flight crews to monitor the APU flap position before APU start. The flight crew must switch the APU START pb to ON when the APU flap is fully open (FLAP OPEN indication is displayed on the APU SD page).* *This will be corrected by a future APU ECB standard, that will monitor the flap position before starting the APU.*			

(1) Evolution code : N=New, R=Revised, E=Effectivity

AIRCRAFT SYSTEMS

20 - AIRCRAFT GENERAL

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DSC-20-20-10 Main Dimensions

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FUSELAGE ..... B
WING C
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DSC-20-20-20 Antenna Locations

Antenna locations ..... A

DSC-20-20-30 Unpressurized Areas

Unpressurized Areas ..... A

DSC-20-30 Ground Handling

Taxiing ..... A
Service Point Locations ..... B

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OVERVIEW

Applicable to: ALL

The aircraft is a Very Long Range (VLR), subsonic, civil transport aircraft that has two passenger decks.

COCKPIT

The cockpit has two seats, designed for a two-member flight crew, and has three additional seats for observers.

CABIN

The passenger seating layout may vary, depending on Operator requirements. The certified maximum number of passengers is 853.
The two passenger decks offer a wide range of cabin arrangement possibilities. Each deck can either be serviced from the main deck only, or from both decks simultaneously.

CARGO

There are three cargo compartments under the main deck:
- Forward cargo compartment
- Aft cargo compartment
- Bulk cargo compartment

CREW REST COMPARTMENT

The aircraft has a:
- Flight crew rest compartment
- Lower cabin crew rest compartment.

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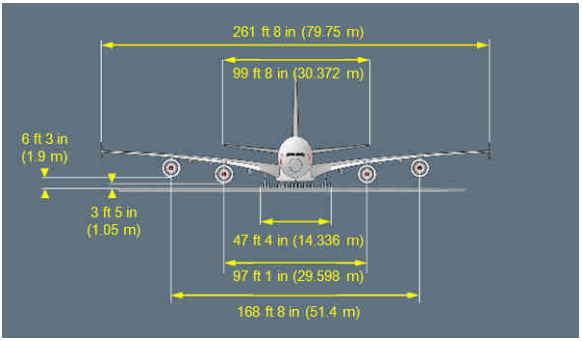
MAIN DIMENSIONS

Applicable to: ALL

Front Dimensions

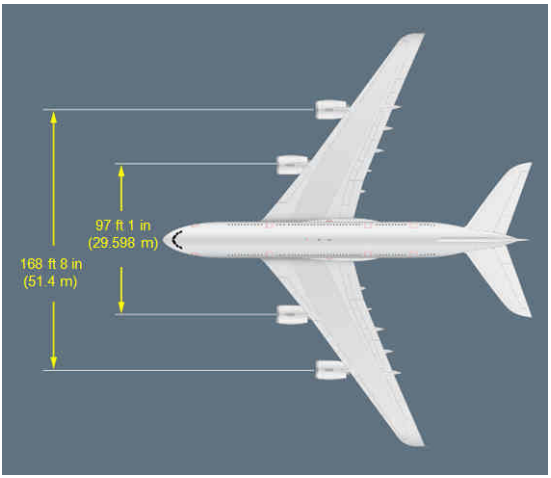


Note: *The height of the engines above the ground is displayed for MTOW.*

Side Dimensions



Top Dimensions



FUSELAGE

Applicable to: ALL

The aircraft has a full-length, double-deck fuselage, with a main and upper deck. The cockpit is between these two decks. Both decks can be accessed via cabin stairs, and galley lifts.

Each deck can have up to:
- 10 seats abreast in each row of the main deck
- 8 seats abreast in each row of the upper deck.

The aircraft has 8 pairs of large passenger doors. Five of these are on the main deck, and three on the upper deck.

WING

Applicable to: ALL

The wing has four engine pylons and supports the wing main landing gear.
L2 It has an area of 9 104 ft² and spans 261 ft 8 in.

L1 Each half-wing has the following moving surfaces:
- 3 ailerons that are used at low speeds. Some can be inhibited, depending on aircraft speed
- 8 moving surfaces that are used in various combinations as lift dumpers, spoilers, or speed brakes
- 8 slat surfaces for high-lift configurations
- 3 single-slotted flap surfaces for high-lift configurations.

The wing is also used as a fuel tank.

TAIL

Applicable to: ALL

VERTICAL STABILIZER

The vertical stabilizer has two rudder elements.

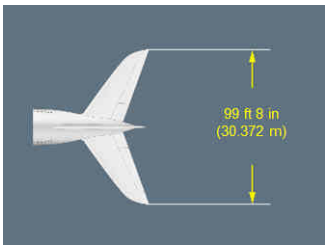
Tail left



HORIZONTAL STABILIZER

The horizontal stabilizer:
- Has two elevators, each of which is split into two parts
- Is used as a fuel tank.

HORIZONTAL STABILIZER



L2 DIMENSIONS

Vertical Stabilizer	Horizontal Stabilizer
Area = 1 316.4 ft²	Area = 2 206.6 ft²

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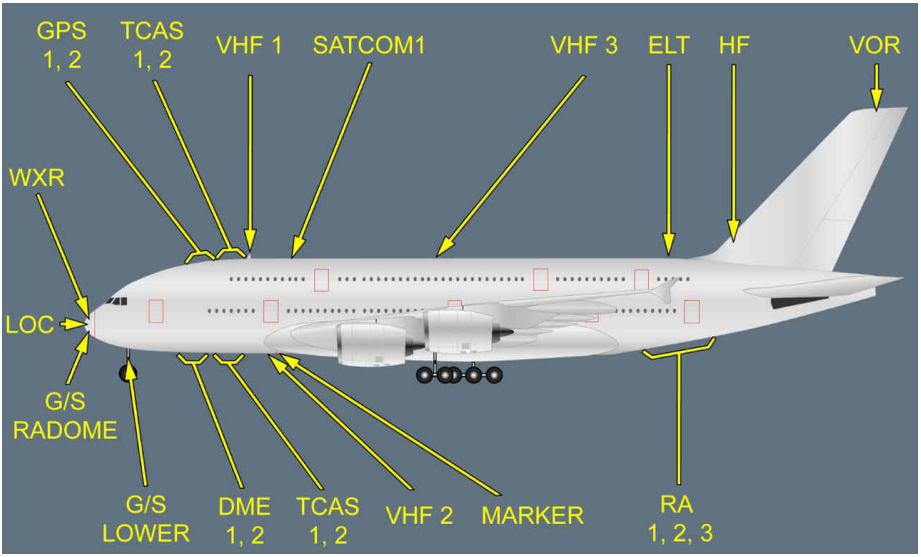
ANTENNA LOCATIONS

Applicable to: ALL

Antenna Locations



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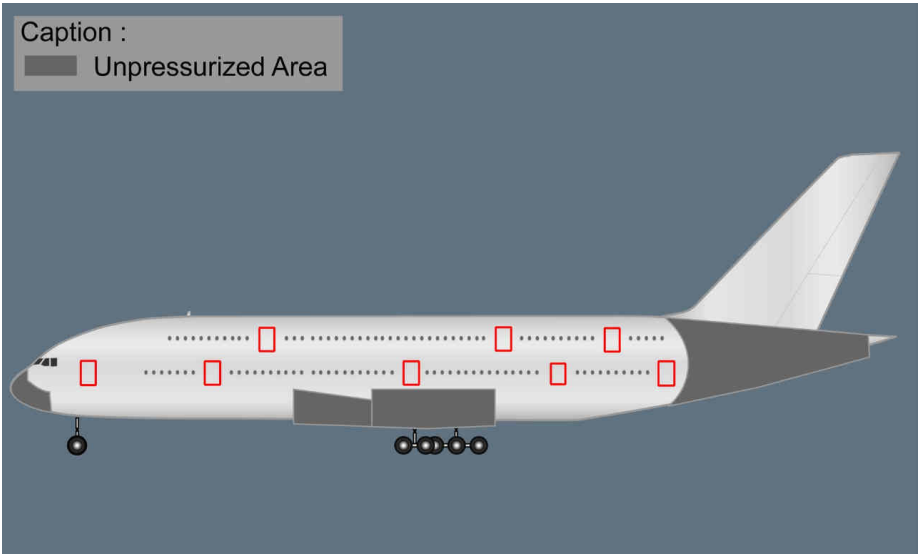
UNPRESSURIZED AREAS

Applicable to: ALL

Unpressurized Areas



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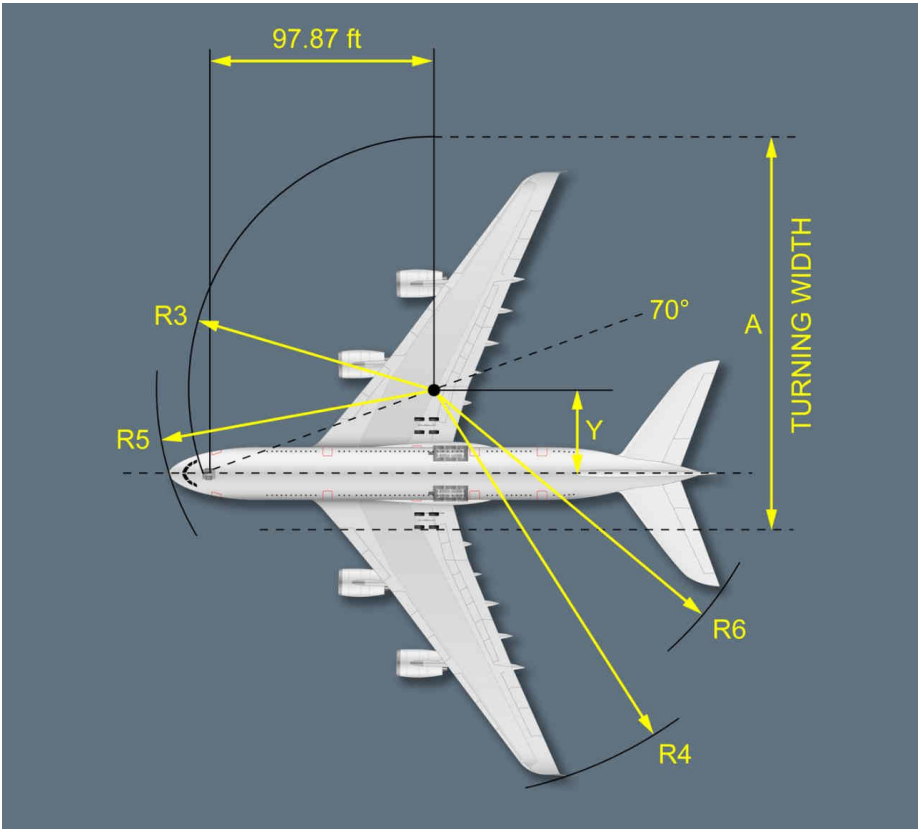
TAXIING

Applicable to: ALL

Taxiing



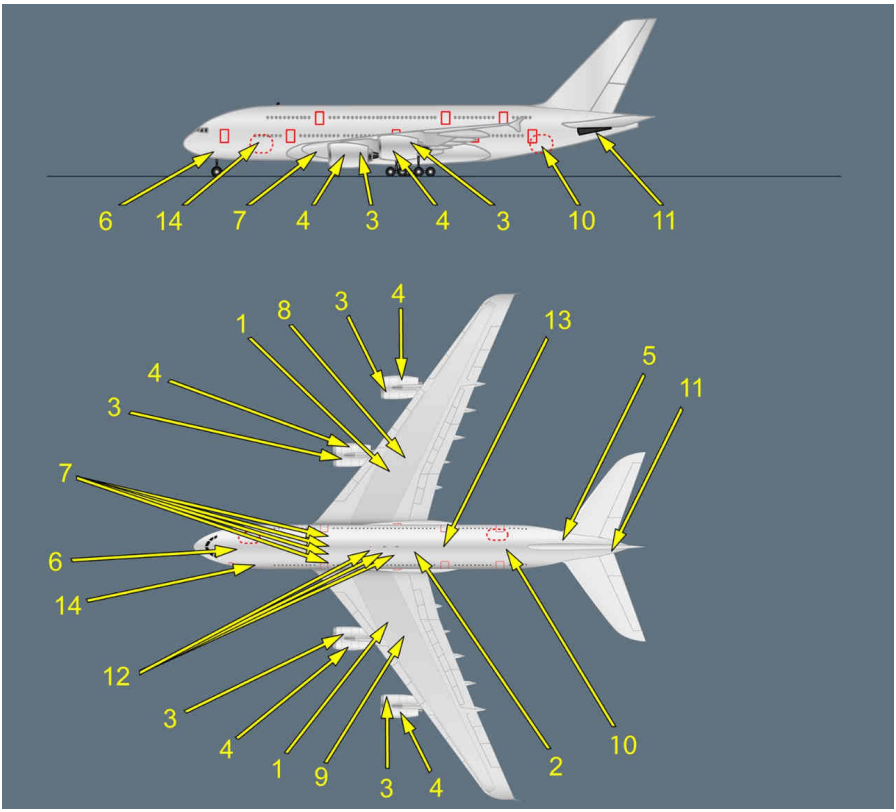
Steering angle	Effective steering angle	Y	A	R3	R4	R5	R6
70 °	69.5 °	11.08 m	50.91 m	32.66 m	53.76 m	36.52 m	46.01 m

SERVICE POINT LOCATIONS

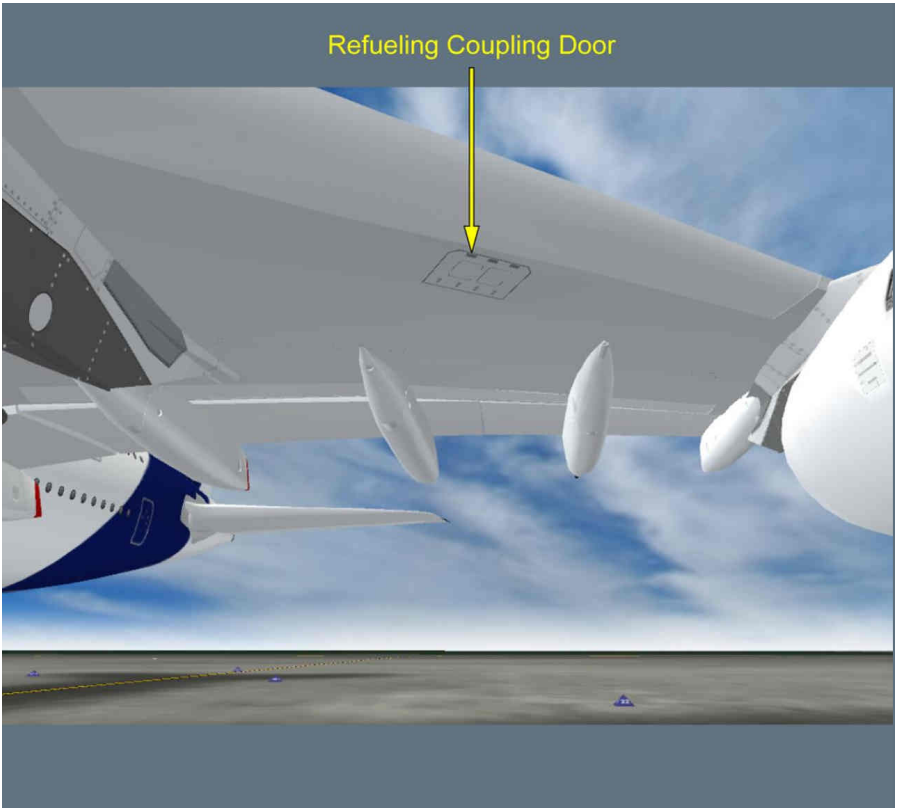
Applicable to: ALL

SERVICE POINT LOCATIONS

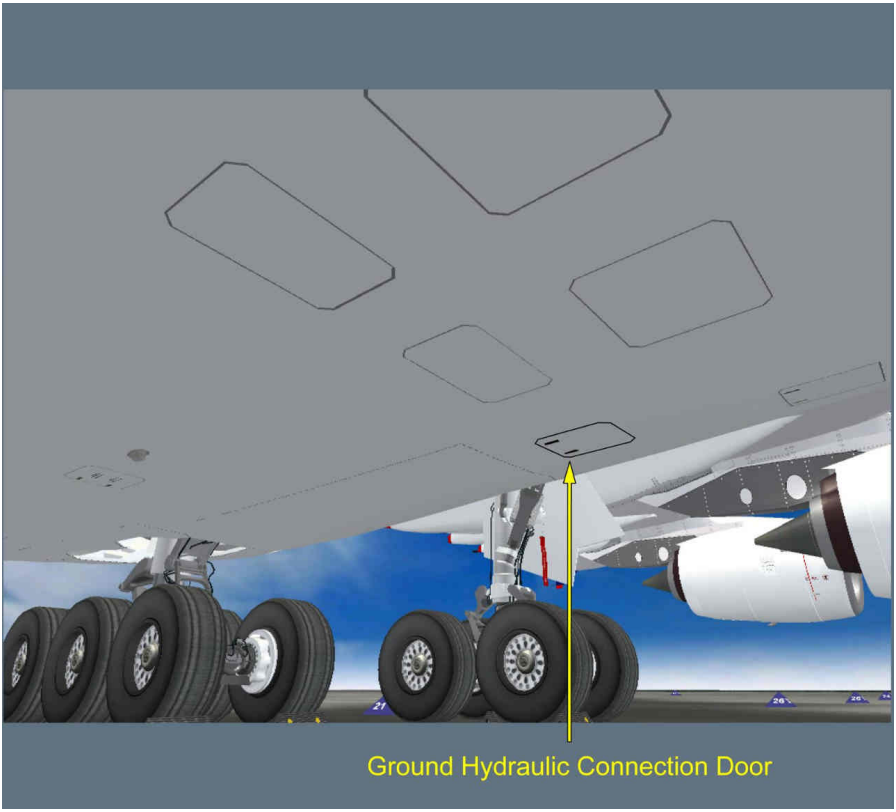
Service Point Locations



L2 1. PRESSURE REFUEL CONNECTORS



L2 2. HYDRAULIC RESERVOIR SERVICING PANEL (RESERVOIR FILLING AND RESERVOIR PRESSURIZATION)



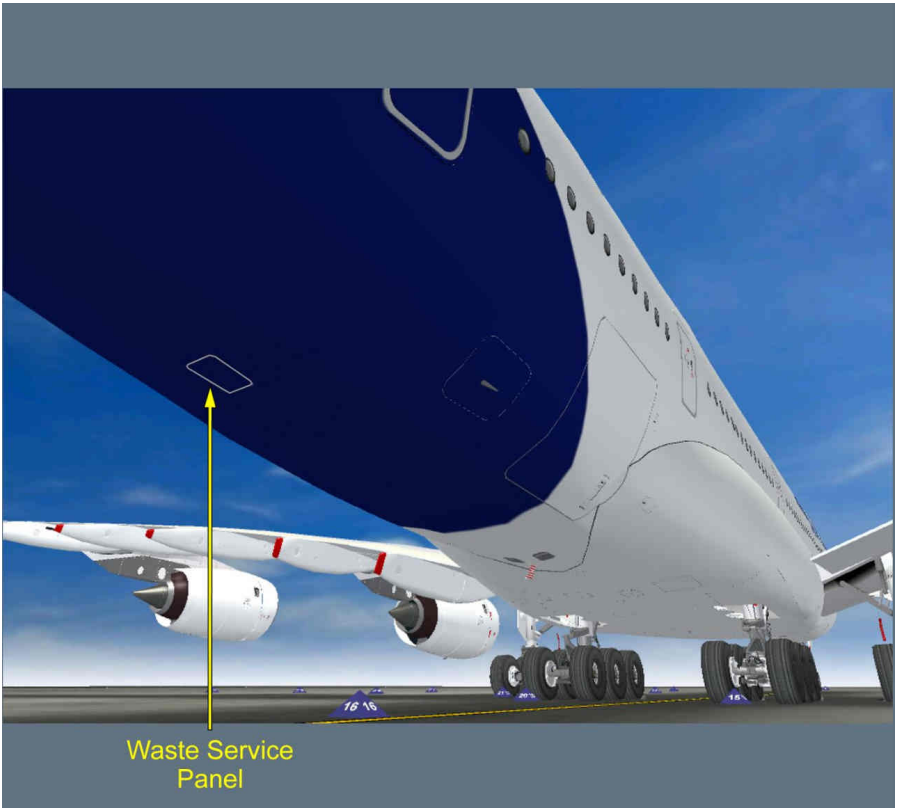
L2 3. ENGINE OIL FILLING



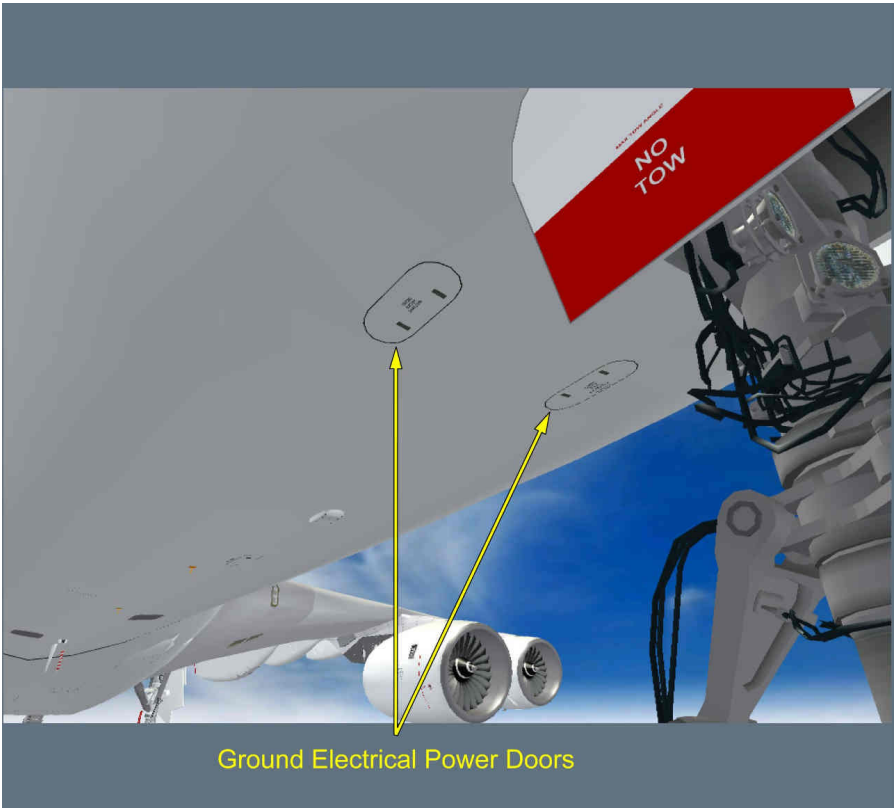
L2 4. ELECTRICAL ENGINE GENERATOR OIL FILLING



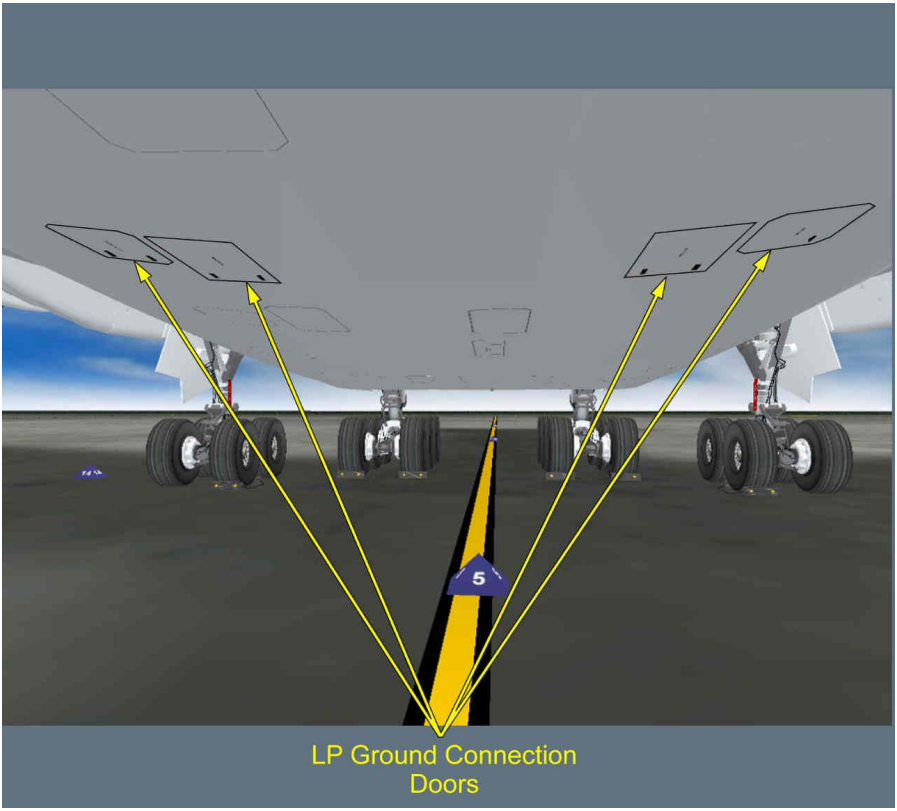
L2 5. WASTE SERVICE PANEL



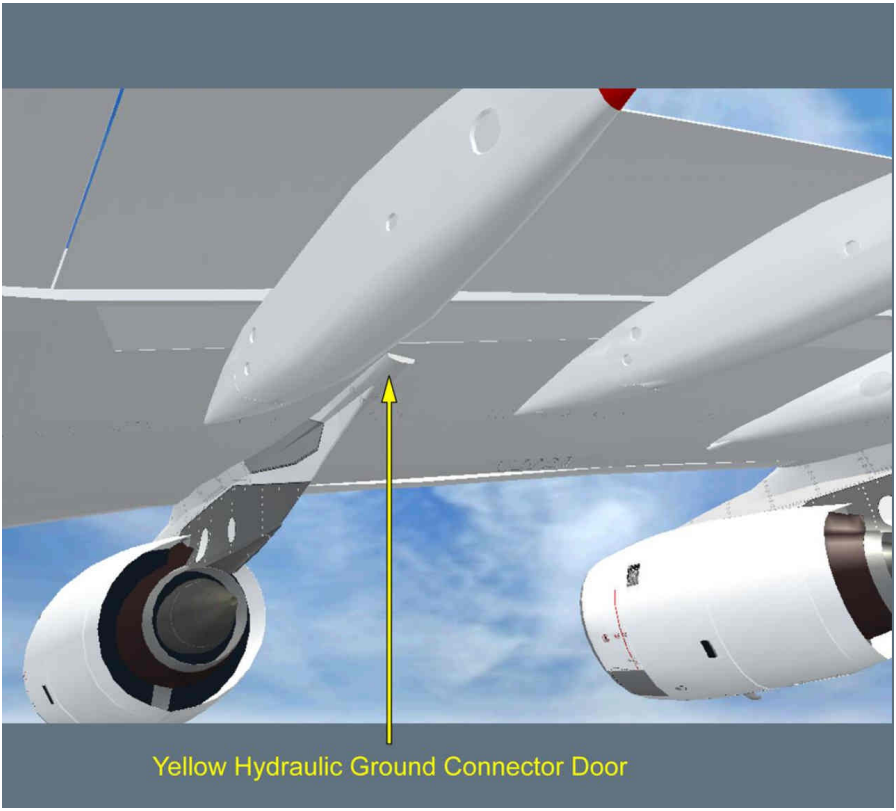
L2 6. GROUND ELECTRICAL POWER



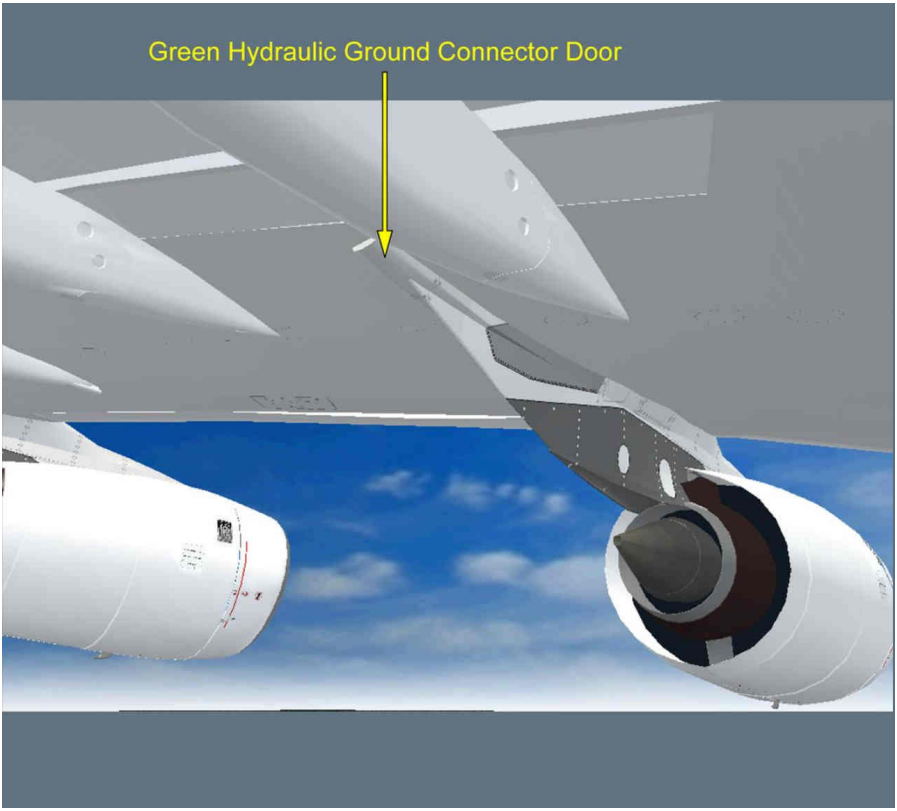
L2 7. LP GROUND CONNECTION



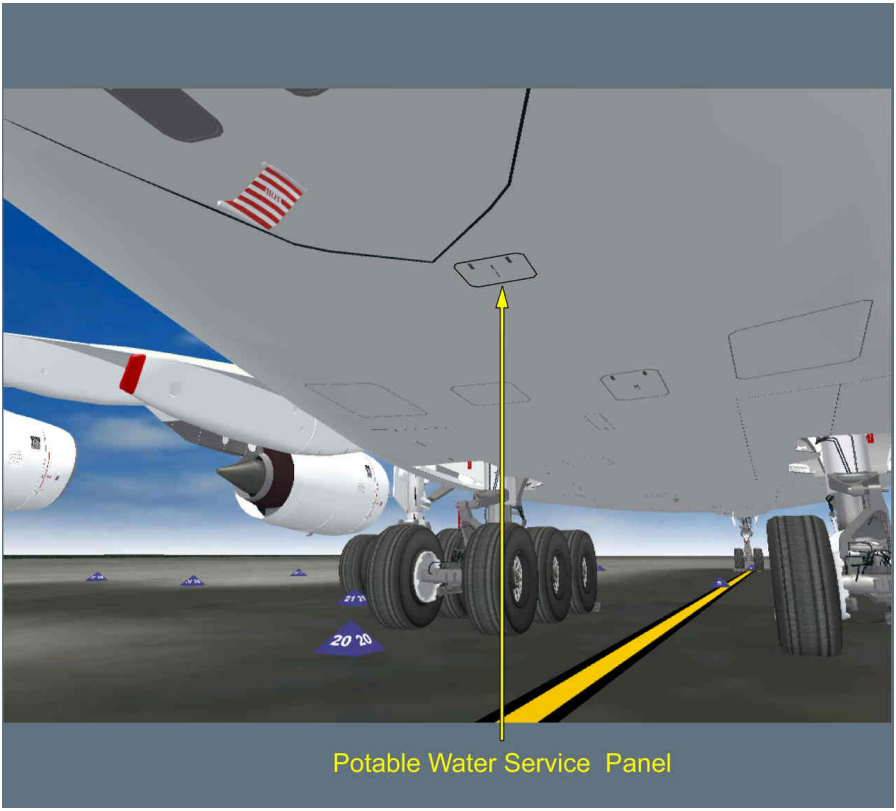
L2 8. YELLOW HYDRAULIC GROUND CONNECTOR



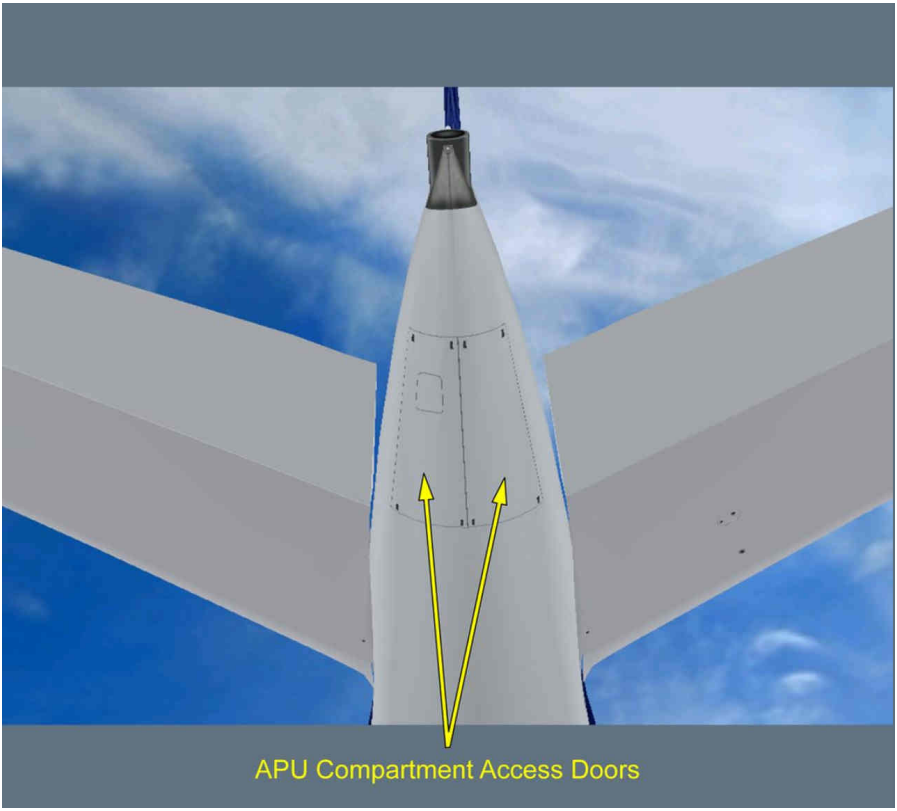
L2 9. GREEN HYDRAULIC GROUND CONNECTOR



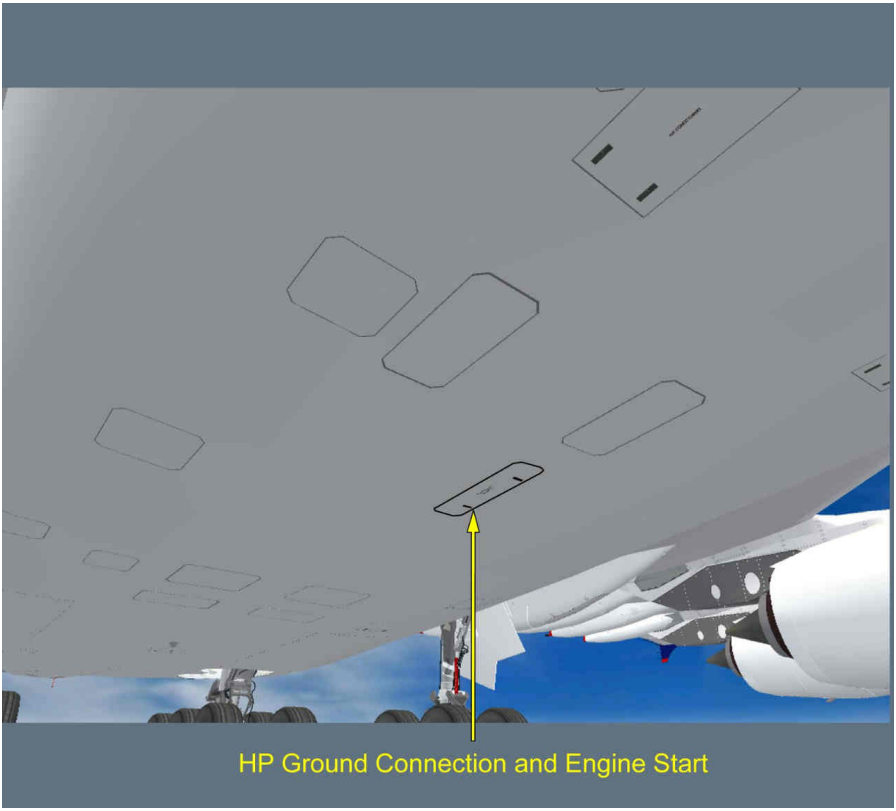
L2 10. POTABLE WATER SERVICE PANEL



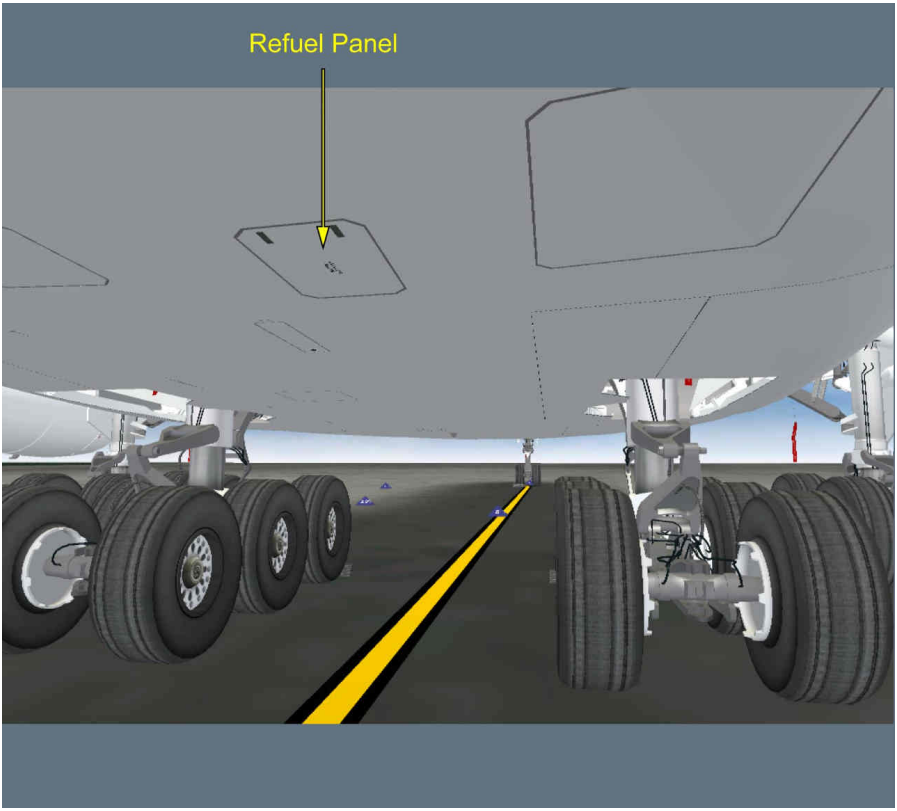
L2 11. APU OIL FILLING



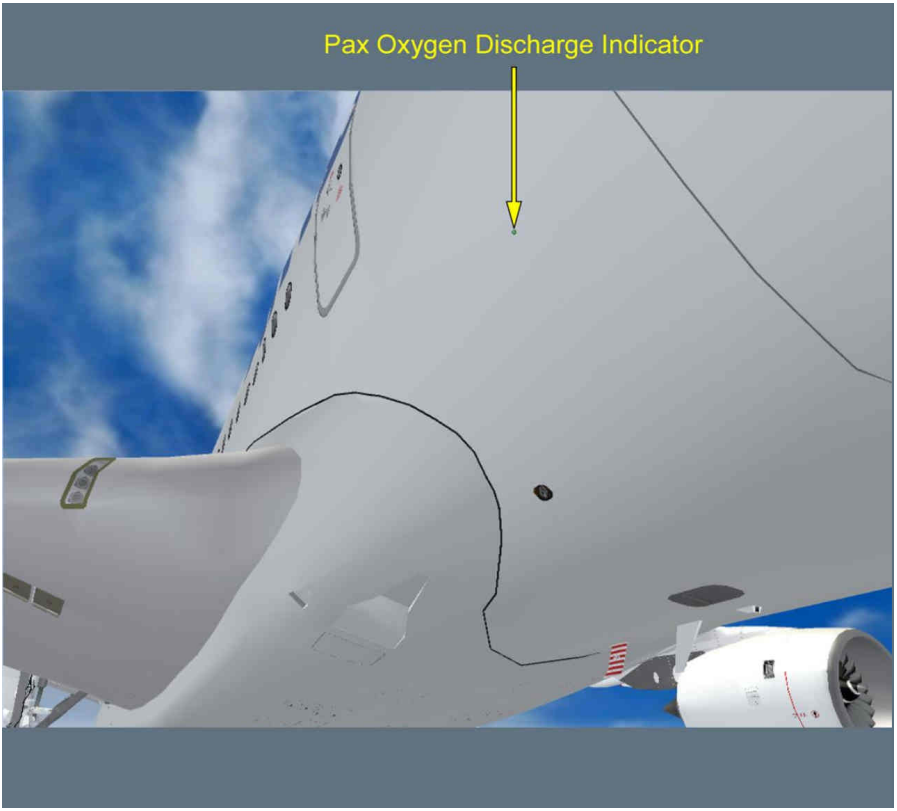
L2 12. HP GROUND CONNECTION AND ENGINE START



L2 13. REFUEL/DEFUEL CONTROL PANEL



L2 14. OXYGEN SYSTEM



AIRCRAFT SYSTEMS

21 - AIR CONDITIONING

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Trim Air System C
Emergency RAM Air ..... D

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BULK Cargo ..... B
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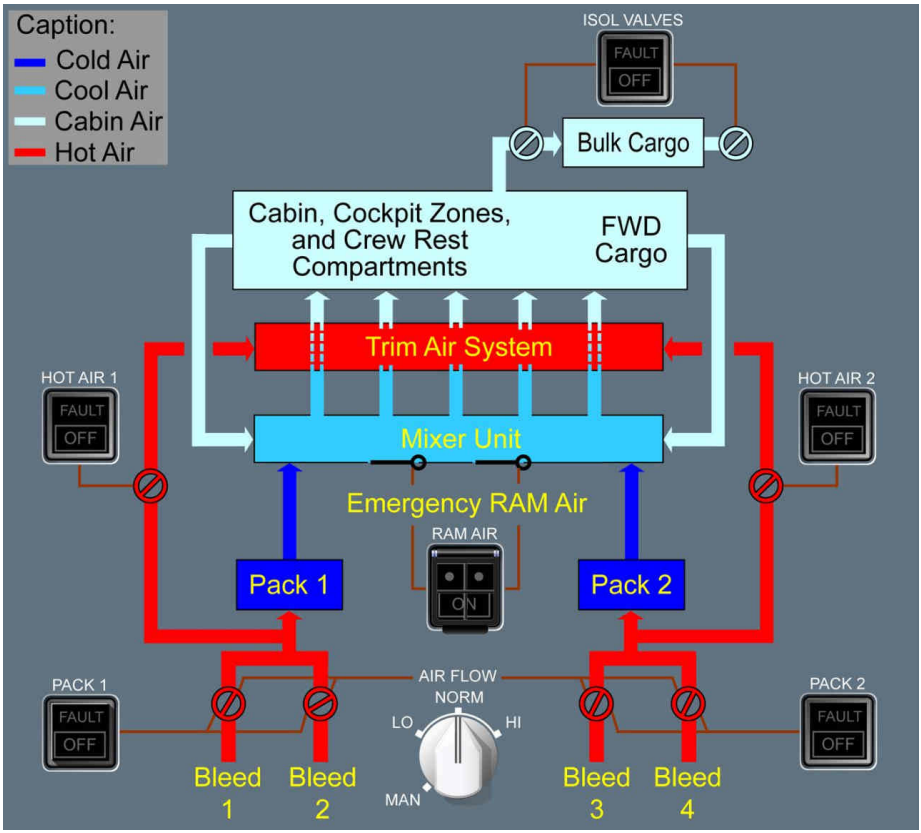
OVERVIEW

Applicable to: ALL

The air-conditioning system is fully automatic. It provides continuous air renewal, and maintains a constant selected temperature in the cockpit, cabin zones, and in the crew rest compartments.
Air from the air-conditioning system is also used for cargo ventilation.
The bleed air system supplies two aircraft packs, with air from the engines, the APU , or the ground air connectors. This air is cooled in the packs.
This cooled air then flows out of the packs, and is combined with recycled cockpit and cabin air in the mixer unit.
Then, hot air from the bleed system is added to the mixed air, to obtain the selected temperature throughout the cockpit and cabin.
There are temperature selectors on the overhead panel, and in the cabin on the Flight Attendant Panels (FAP s).
In case both packs fail, the mixer unit can directly receive air from outside the aircraft, through the emergency RAM air inlets.

Note: *It is recommended not to exceed 30 min without air conditioning, with passengers on board: The lack of fresh air supply will reduce the quality of cabin air.*

Overview


Caption:
Cold Air
Cool Air
Cabin Air
Hot Air
ISOL VALVES
FAULT
OFF
Bulk Cargo
Cabin, Cockpit Zones, and Crew Rest Compartments
FWD Cargo
Trim Air System
Mixer Unit
HOT AIR 1
HOT AIR 2
Emergency RAM Air
RAM AIR
ON
Pack 1
Pack 2
PACK 1
PACK 2
AIR FLOW
NORM
LO
HI
MAN
Bleed 1
Bleed 2
Bleed 3
Bleed 4

PACKS

Applicable to: ALL

The packs provide cold air by cooling hot bleed air.
There are two packs, and they operate automatically and independently of each other.
Each pack has one heat exchanger, two cooling units (also referred to as REGUL A and REGUL B or Air Cycle Machines (ACM s)), and one pack controller.
In the event both ACM s fail, bleed air is cooled by the heat exchanger only: The pack operates in bypass mode (*Refer to DSC-21-10-30 Air Cycle Machine (ACM) Failures*).
The pack controllers each have two independent channels, and each of these channels can control the entire pack.
In the event a pack controller fails, the associated pack is lost.
For each pack, there are two pack valves. They regulate the quantity of hot bleed air that flows into each pack. The pack valves are automatically controlled by the pack controller, in accordance with the AIR FLOW selector position.

L2 A pack valve will automatically close, if there is not sufficient upstream pressure, or if the FIRE pb of the associated engine is pressed, and the appropriate crossbleed valves are closed.

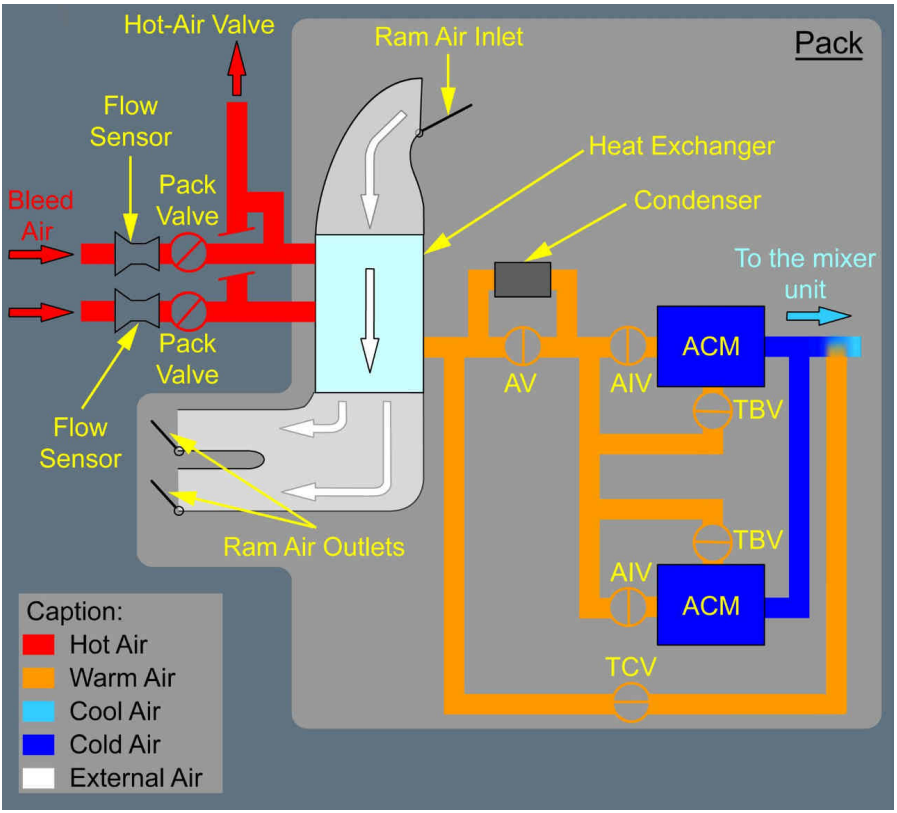
Both pack valves of a pack will automatically close, if:
- The associated PACK pb is set to OFF , or
- The associated pack overheats, and the aircraft is on ground, or
- One onside engine starts, and the crossbleed valves are closed.

All pack valves (of both packs) will automatically close, if:
- The DITCHING pb-sw is set to ON , or
- One door (or more) is opened, and at least one engine is running, or
- Any engine starts, and the crossbleed valves are opened, or
- The FIRE pb of any engine is pressed, and the crossbleed valves are opened.

L3 PACK DESCRIPTION

The hot bleed air flows into each pack, via the two pack valves, then enters the heat exchanger. This heat exchanger precools the air using external air. This external air enters through a ram air inlet door, and is then discharged overboard through two ram air outlet doors.

Pack



The cooled bleed air then enters the two ACM s for further cooling.

- Below FL 290 , a condenser dries the air before it enters the ACM , to prevent ice damage to the ACM . An Altitude Valve (AV) closes to redirect air to the condenser.
- Above FL 290 , the air is sufficiently dry. Therefore, the AV opens, and air goes directly to the ACM .

If an ACM fails, the associated ACM Isolating Valve (AIV) will close to isolate the failed ACM . A Temperature Control Valve (TCV) adjusts the pack outlet temperature, by adding air from the heat exchanger to the pack outlet flow.

If the temperature in the ACM is too low, an assigned bypass valve, in the ACM , will open to increase the temperature. This bypass valve is also referred to as the Turbine Bypass Valve (TBV).

For pack operation, the pack controller controls all the above-mentioned valves.

MIXER UNIT

Applicable to: ALL

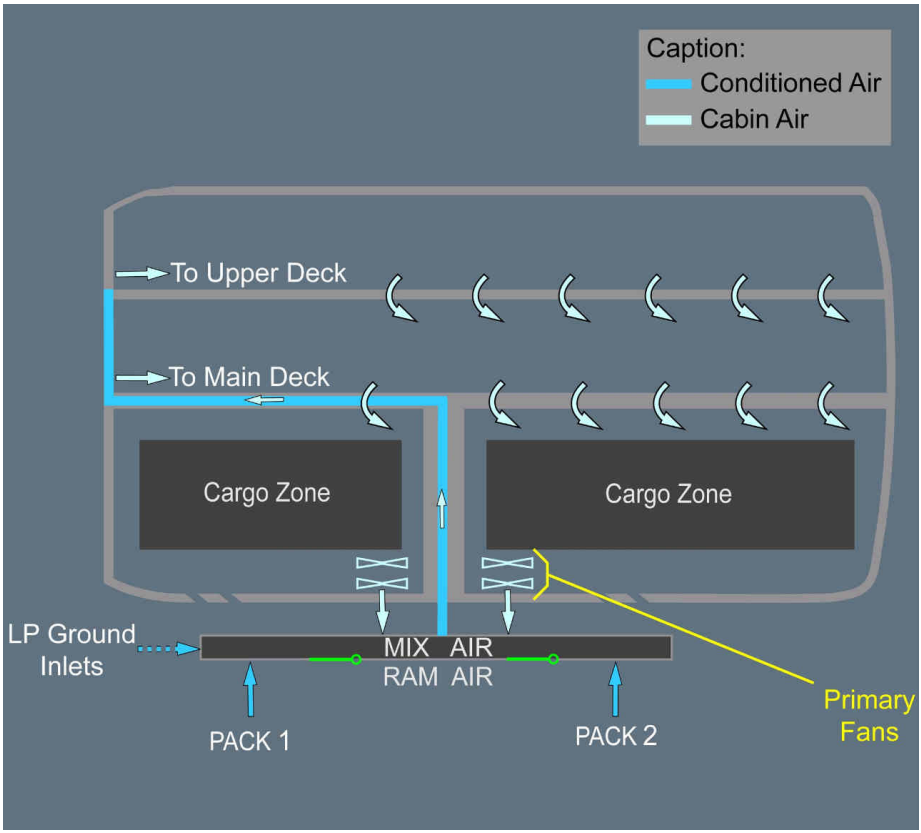
A mixer unit combines cold air from the packs with recycled air from the cockpit and cabin.

L2 The cockpit and cabin air recirculates to reduce the bleed air demand from the packs.

L1 There are four ventilation fans that recirculate cabin air to the mixer unit. These fans are also referred to as primary fans.

L2 There are also some secondary fans that recirculate air from the upper deck to the upper and to the main deck. For more information about cabin air recirculation, *Refer to DSC-21-20-30 Cabin Air Recirculation* .

Mixer Unit



L3 The fans are in the underfloor area of the main deck.
Two of the fans are controlled by the forward ventilation controller, and two by the aft ventilation controller.

L1 On ground, when the packs are off, the mixer unit can obtain cold air through the Low Pressure (LP) ground inlets that are connected to the ground carts.
In case both packs fail, the mixer unit can obtain external air through two emergency RAM air inlets (*Refer to DSC-21-10-10-20 Emergency RAM Air*).

TRIM AIR SYSTEM

Applicable to: ALL

The trim air system adjusts the temperature of the air in each cockpit and cabin zone. Temperature is adjusted by adding hot air from the bleed system to air from the mixer unit. Hot air is added via two hot-air valves and several trim air valves.

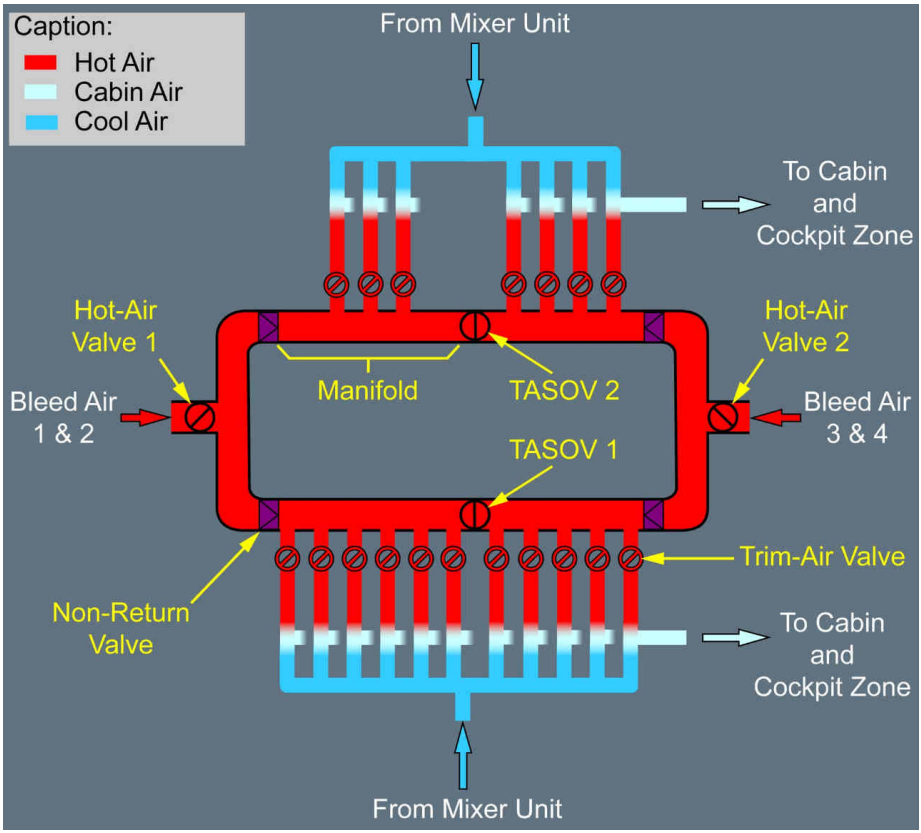
L3 The hot-air valves regulate the hot-air pressure in the trim air system.

Distribution to the cockpit and cabin is made via:

- Four hot-air manifolds
  Each hot-air valve feeds two of the manifolds.
  All of the manifolds are interconnected by two Trim Air Shut-Off Valves (TASOV s) and four trim air non-return valves.
  The TASOV s are normally closed, but they open, in case one trim air valve or one hot-air valve fails (*Refer to DSC-21-10-30 Trim Air Valve Failure*).
- Trim air valves
  There is one trim air valve for each one of the cockpit and cabin zones. There are two trim air valves assigned to the forward cargo compartment. Each trim air valve adds hot bleed air, from the four hot-air manifolds, to the air that comes from the mixer unit, to obtain the selected temperature in its assigned cockpit, cargo, and cabin zone.

There is one temperature controller, that has two independent channels.
Each independent channel the temperature controller can control the entire trim air system.
The temperature controller is hosted on the CPIOM B.

Trim Air System



EMERGENCY RAM AIR

Applicable to: ALL

Two emergency RAM air inlets ventilate the cockpit and cabin, in the event that both packs fail.

L3 The emergency RAM air inlets are controlled by the forward ventilation controller.

L1 The RAM AIR pb on the AIR panel activates the emergency RAM air. When set to ON, air from outside the aircraft flows through two emergency RAM air inlets, directly to the mixer unit, to continue ventilating and cooling both the cockpit and cabin.

L3 The two RAM air inlets are on the belly fairing.

L1 The RAM air inlets only open, if differential pressure is less than one psi.

L3 If differential pressure is greater than one PSI, two non-return valves, downstream of the emergency RAM air inlets, will not open. Therefore, no air will be supplied to the mixer unit.

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CABIN, COCKPIT ZONES, AND CREW REST COMPARTMENTS

Applicable to: ALL

CABIN AND COCKPIT

TEMPERATURE REGULATION

The flight crew can:
- Select the cockpit temperature with the COCKPIT selector on the AIR panel
- Select the cabin temperature with the CABIN selector, if the temperature of each cabin zone cannot be selected from the Flight Attendant Panels (FAPs)
- Set the CABIN selector to PURS SEL. In this case, the cabin crew can directly select the temperature of each cabin zone.

L2 The temperature selection ranges from 18 °C to 30 °C.

L3 The pack controller automatically controls the pack outlet temperature to set the temperature of the mixer unit to the lowest cabin temperature demand. Therefore, the cabin zone with the lowest heating demand does not receive any trim air.

The pack controller regulates the outlet temperature of its associated pack by adjusting:
- The Temperature Control Valve (TCV)
- The ram air inlet
- Both ram air outlets
- The Turbine Bypass Valves (TBVs).

Each trim air valve adjusts the temperature of its assigned cockpit and cabin zone.

L1 FLOW REGULATION

The flight crew can use the AIR FLOW selector on the AIR panel to adjust the flow of cold air from the packs, and recirculated air from the cabin/cockpit.

L2 If only one pack operates, or if the APU supplies bleed air, the pack controller automatically adjusts the airflow to high(HI) demand, regardless of the selection on the AIR FLOW selector.

L1 Automatic Mode

When the flight crew sets the AIR FLOW selector to NORM, the airflow in the cabin/cockpit is automatically controlled, depending on the number of passengers entered on the MFD, the aircraft flight level, and the temperature regulation selection on the CARGO AIR COND panel.

L2 The airflow in the cockpit and cabin is automatically controlled by:
- The pack controllers, that control the pack valves
- The ventilation controllers, that control the rotation speed of the cabin fans.

L1 Manual Mode

When the flight crew sets the AIR FLOW selector to one of the following positions, the airflow in the cockpit/cabin is manually selected:
- AIR FLOW selector set to MAN: The pack airflow is a default value
- AIR FLOW selector is set to LO: The pack airflow is 80 % of the MAN default value
- AIR FLOW selector set to HI: The pack airflow is 120 % of the MAN default value.

L2 When in manual mode:
- The airflow calculation does not take into account the number of passengers entered on the MFD, nor the aircraft flight level
- The airflow calculation depends on the temperature regulation selection on the CARGO AIR COND panel
- The rotation speed of the primary fans remains constant.

L1 **CREW REST COMPARTMENTS**

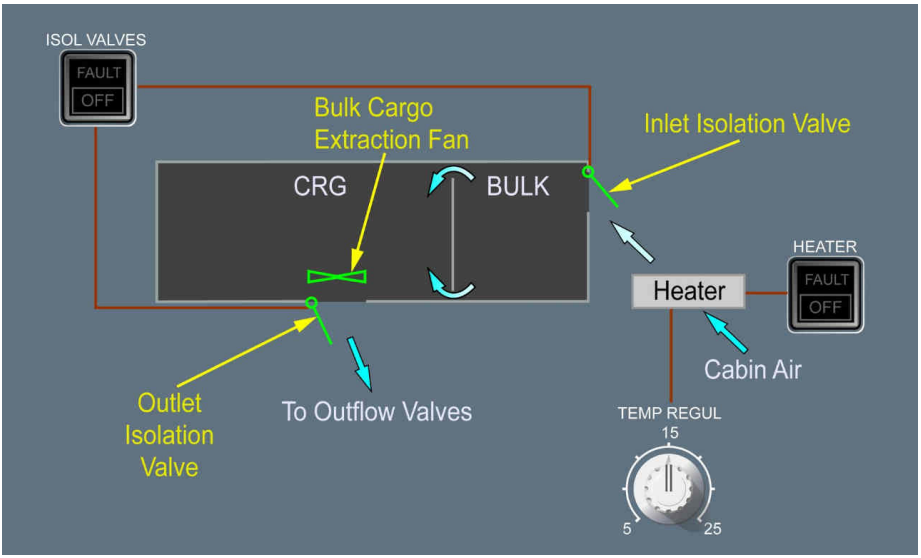
The flight(cabin) crew can adjust the temperature in the flight(cabin) crew rest compartments, with the dedicated temperature selector in each compartment.

BULK CARGO

Applicable to: ALL

The bulk cargo compartment has a temperature regulation system.
L2 The aft ventilation controller controls this system.
L1 Some air from the cabin recirculates into the bulk cargo compartment for ventilation and temperature regulation. This air is extracted by the bulk cargo extraction fan.
The TEMP REGUL selector on the cargo AIR COND panel controls the air temperature in the bulk cargo compartment.
If necessary, to obtain the desired temperature, an electrical heater heats the air that flows into the bulk cargo compartment.
Two isolation valves (one inlet and one outlet isolation valve) permit the isolation of the bulk cargo compartment. These valves are manually controlled using the BULK ISOL VALVES pb-sw on the CARGO AIR COND panel.

Bulk Cargo



FWD CARGO

Applicable to: ALL

The forward cargo compartment has a temperature regulation system, that uses air from the air conditioning system.

L2 The forward ventilation controller controls this system.

L1 Some air from the air-conditioning system flows into the forward cargo compartment for ventilation and temperature regulation. This air is extracted by the forward cargo extraction fan.

L2 The temperature of the forward cargo compartment is regulated with air from the:

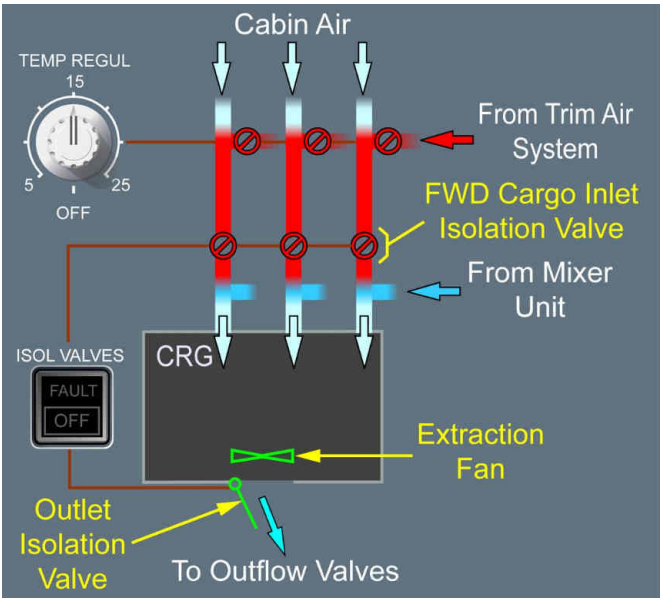
- Cabin
- Mixer unit
- Trim air system.

  Two trim air valves are assigned to the forward cargo compartment.

L1 The flight crew selects the temperature of the forward cargo compartment with the FWD TEMP REGUL selector on the CARGO AIR COND panel.

If necessary (e.g. if smoke is detected in the cargo area), it is possible to isolate the forward cargo compartment, by closing the four isolation valves (three inlet isolation valves and one outlet isolation valve) of the forward cargo via the FWD ISOL VALVES pb-sw on the CARGO AIR COND panel.

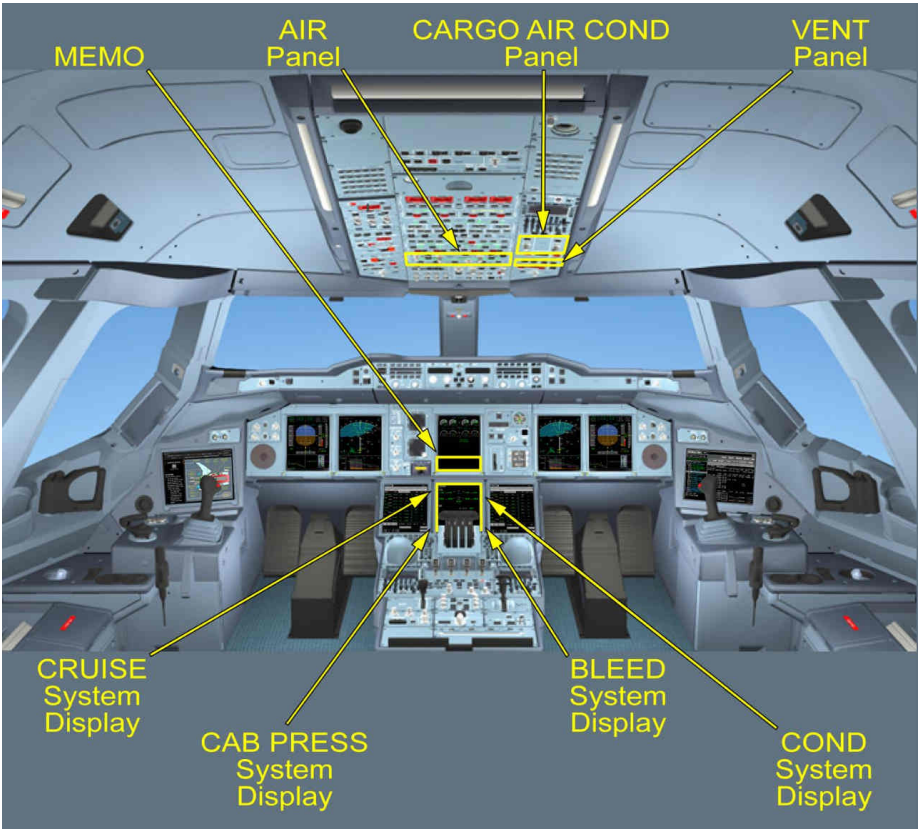
FWD Cargo


Cabin Air
TEMP REGUL
15
5
25
OFF
From Trim Air System
FWD Cargo Inlet Isolation Valve
From Mixer Unit
ISOL VALVES
FAULT
OFF
CRG
Extraction Fan
Outlet Isolation Valve
To Outflow Valves

COCKPIT VIEW

Applicable to: ALL

Cockpit View

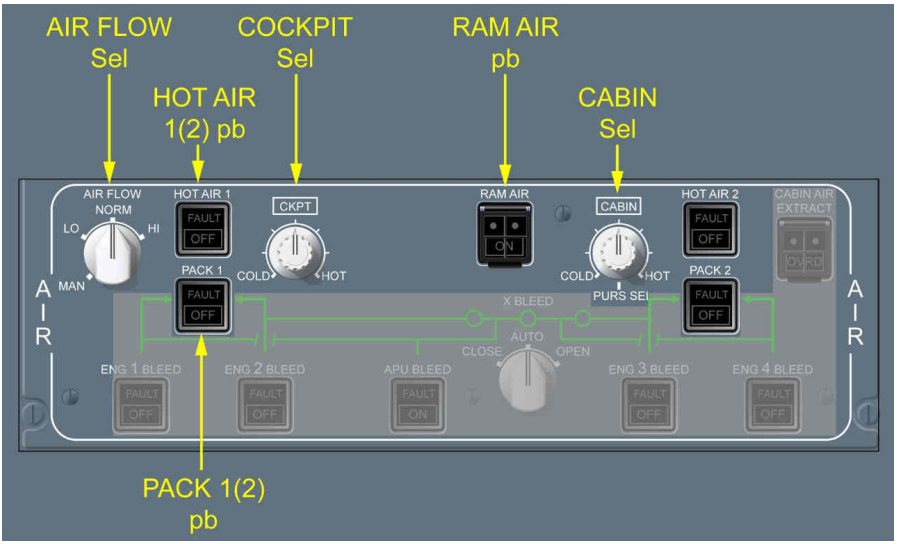


AIR PANEL

Applicable to: ALL

AIR PANEL

AIR Panel



Air Flow selector



The airflow in the cabin/cockpit is automatically controlled.
For additional information, *Refer to Flow Regulation / Automatic Mode* .



The airflow in the cabin/cockpit is in manual mode.
The pack airflow is a default value.
For additional information, *Refer to Flow Regulation / Manual Mode* .



The airflow in the cabin/cockpit is in manual mode.
The pack airflow is 80 % of the MAN default value.



The airflow in the cabin/cockpit is in manual mode.
The pack airflow is 120 % of the MAN default value.

PACK 1(2) PB



The pack is on, and automatically regulated.



The pack is off.

L12



Comes on:

- When any pack valve position disagrees with the requested position

  Associated with the following ECAM alert:
  - AIR PACK 1(2) VLV 1(2) FAULT (*Refer to procedure*)

- Or when the pack overheats

  Associated with the following ECAM alert:
  - AIR PACK 1(2) OVHT (*Refer to procedure*)

  The FAULT light goes off, when the overheat disappears.

- Or when the pack is failed.
  Associated with one of the following ECAM alerts:
  - AIR PACK 1(2) FAULT (*Refer to procedure*)
  - AIR PACK 1+2 FAULT (*Refer to procedure)*

- Or when there is a bleed leak on one pack.
  Associated the following ECAM alert:
  - AIR PACK 1(2) LEAK (*Refer to procedure)* .

HOT AIR 1(2) pb



The hot-air valve operates, and is automatically-controlled.



The hot-air valve is closed.

L12

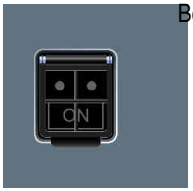


An overheat is detected in the applicable duct.

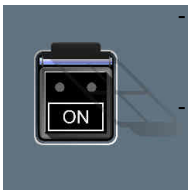
Associated with the following ECAM alerts:
- COND HOT AIR 1(2) FAULT (*Refer to PRO-ABN-ECAM-10-21-10-150 COND HOT AIR 1(2) FAULT*)
- COND DUCT OVHT (*Refer to PRO-ABN-ECAM-10-21-10-190 COND DUCT OVHT*).

The FAULT light goes off, when the temperature decreases below 70 °C , and the HOT AIR 1(2) pb is set to OFF .

RAM AIR PB



Both RAM air inlets are closed.



- When the differential pressure is lower than 1 PSI, and provided the DITCHING pb, on the CAB PRESS panel, is not set to ON: The RAM air inlets will open, and each outflow valve will open to approximately 50 %.
- If the differential pressure is higher than, or equal to, 1 PSI: Each outflow valve will continue to operate normally. The RAM air inlets remain closed.

Cockpit selector



The cockpit temperature is 24 °C.
Each gradation corresponds to 2 °C.

Note: Any selection change makes the system blow colder, or hotter air into the cockpit. This may result in temporary discomfort for the flight crew. To reach a stabilized temperature in the cockpit, the air conditioning system needs approximately 20 min: 10 min are necessary for cockpit temperature adjustment, and 10 min are necessary to compensate heat dissipation from the cockpit systems. After selecting a temperature value, wait until the cockpit temperature stabilizes, before selecting a new temperature.

CABIN selector



The cabin temperature is 24 °C.
Each gradation corresponds to 2 °C.

Note: *Any selection change makes the system blow colder, or hotter air into the cabin. This may result in temporary discomfort for the passengers. To reach a stabilized temperature in the cabin, the air conditioning system needs approximately 20 min: 10 min are necessary for cabin temperature adjustment, and 10 min are necessary to compensate heat dissipation from the cabin systems. After selecting a temperature value, wait until the cabin temperature stabilizes before selecting a new temperature.*



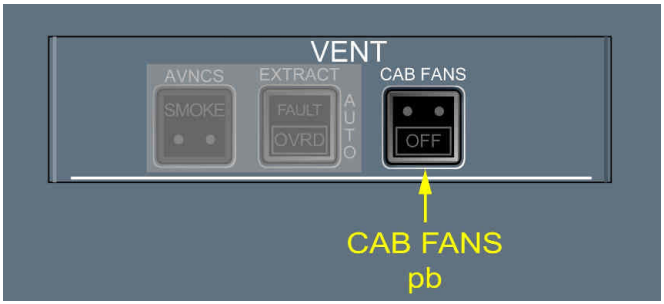
Cabin temperature regulation is only controlled from the Flight Attendant Panel (FAP).

VENT PANEL

Applicable to: ALL

VENT PANEL

VENT Panel



CAB FANS pb-sw



All cabin fans operate.

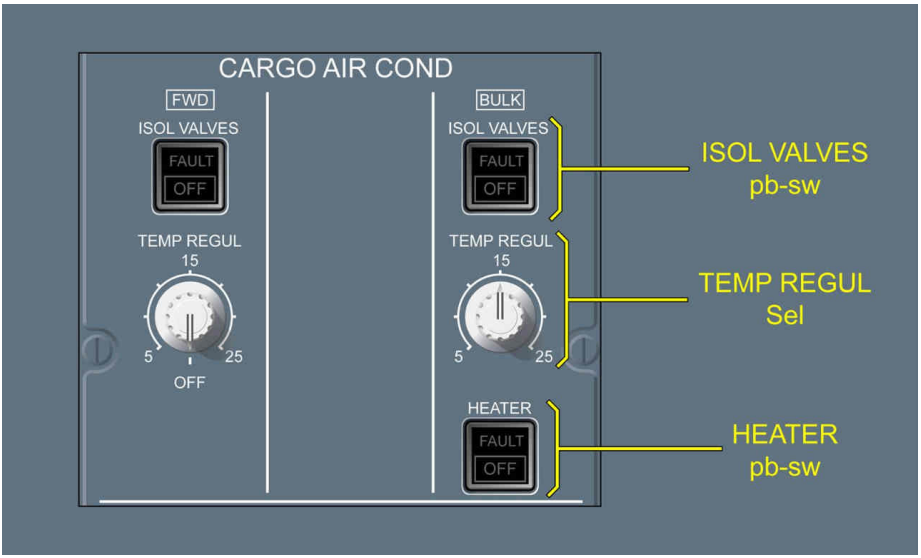


All cabin fans are off.

CARGO AIR COND PANEL

Applicable to: ALL

CARGO AIR COND Panel



BULK(FWD) ISOL VALVES PB-SW



The bulk (forward) cargo isolation valves are open.



The bulk (forward) cargo isolation valves are closed, and the bulk cargo extraction fan stops.

L12



The bulk (forward) cargo isolation valves are failed.

Associated with the following ECAM alerts:
- BULK CARGO ISOL FAULT (*Refer to procedure)*
- BULK CARGO VENT FAULT (*Refer to procedure)*
- FWD CARGO ISOL FAULT (*Refer to procedure*)
- FWD CARGO VENT FAULT (*Refer to procedure)* .

TEMP REGUL SELECTOR



Used to select the desired temperature in the bulk cargo compartment.
The selected bulk cargo temperature is 15 °C.

HEATER pb-sw



Normal position: The bulk cargo heater automatically operates.



The bulk cargo heater is off.

L12



The bulk cargo heater is failed.

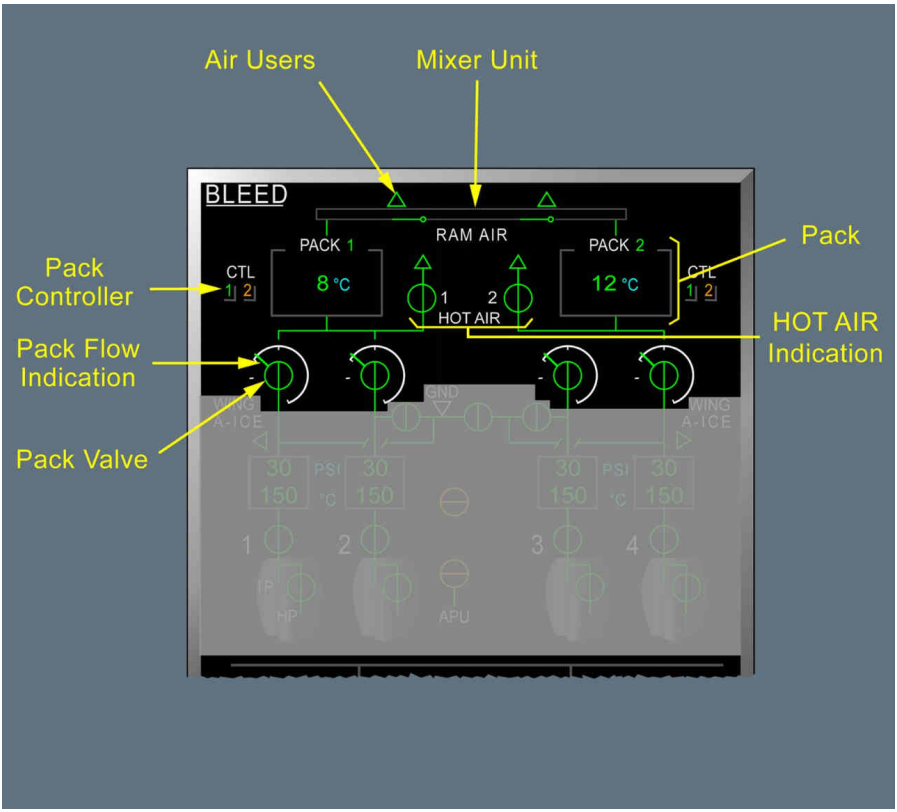
Associated with the following ECAM cautions:
- COND BULK CARGO DUCT OVHT (*Refer to procedure).*
- COND BULK CARGO HEAT FAULT (*Refer to procedure).*

BLEED SYSTEM DISPLAY

Applicable to: ALL

BLEED SYSTEM DISPLAY

BLEED System Display



PACK VALVE

The pack valve is open.

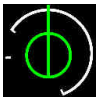
The pack valve is closed.



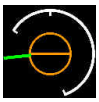
The pack valve is failed open.

PACK FLOW INDICATION

The needle indicates the airflow through the pack valve.



The pack flow is normal.



There is no flow rate. The pack valve is closed.

PACK

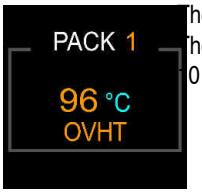
L12



The pack is operating.
The pack outlet temperature is 22 °C .

Note: The indicated temperature is the highest temperature of both ACMs of the pack.

L12



The pack is overheating.
The pack is overheating when the outlet temperature is above 88 °C for at least 10 s.



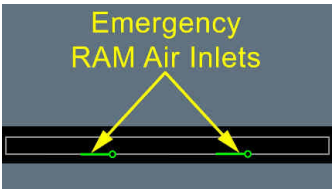
Pack regulation is lost or degraded, or
The pack is in bypass mode.



he pack is inoperative.

MIXER UNIT

Mixer Unit





The emergency RAM air inlet is closed.



The emergency RAM air inlet is open.



The emergency RAM air inlet is abnormally open.



The emergency RAM air inlet is abnormally closed.

AIR USERS



Air is supplied to cabin and cockpit, either from the packs, or via the RAM air valves.



No air is supplied to cabin and cockpit (e.g. packs are off).

PACK CONTROLLER

Nothing appears, when both channels of the pack controller operate.

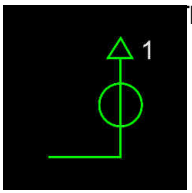


Channel 2 of the pack controller is failed. Channel 1 of the pack controller operates.
There is no operational impact.

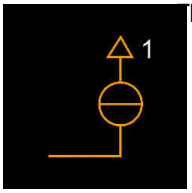


The pack controller is inoperative: Both channels are failed.

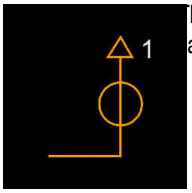
HOT AIR INDICATION



The hot-air valve of the trim air system is open.



The hot-air valve of the trim air system is closed.



The hot-air valve of the trim air system is open, and the pack valves on the same side are closed.

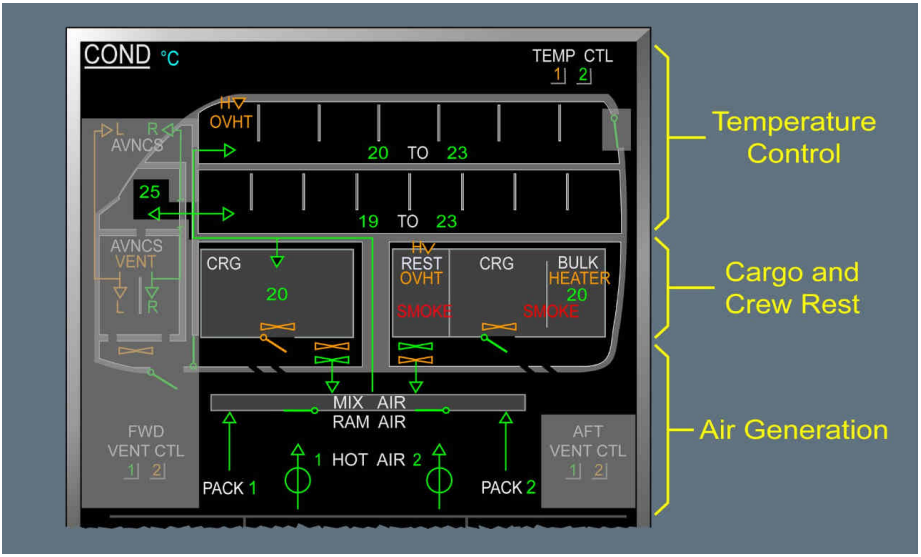


The hot-air valve of the trim air system is closed, and the pack valves on the same side are open.

COND SYSTEM DISPLAY

Applicable to: ALL

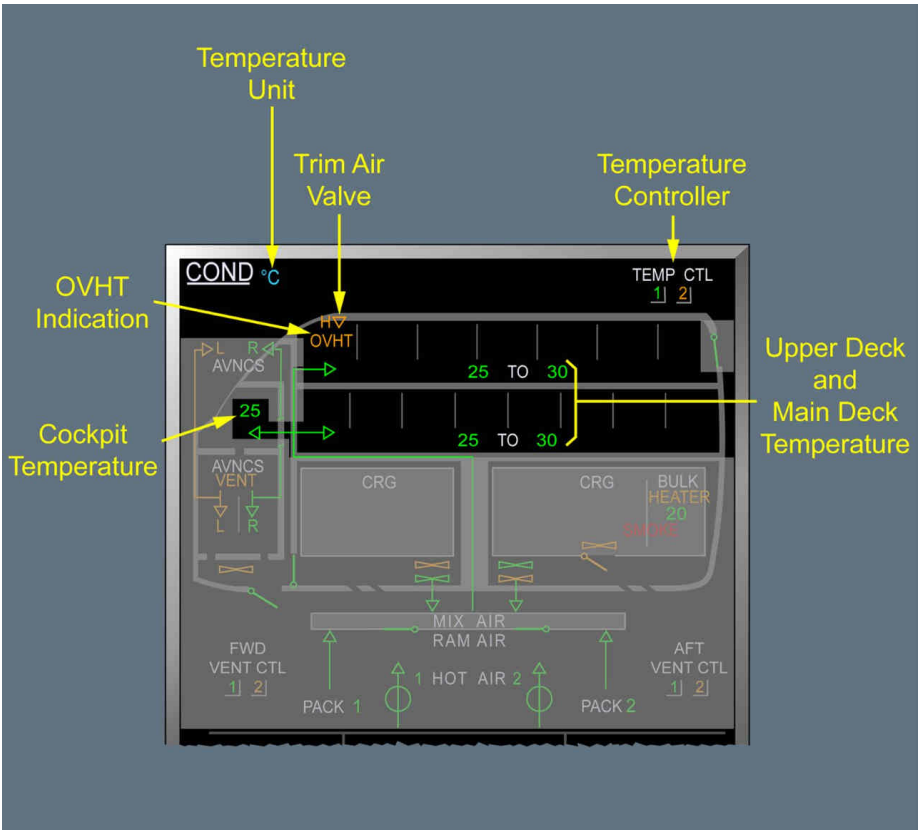
COND System Display



TEMPERATURE CONTROL

Applicable to: ALL

Temperature Control



TEMPERATURE CONTROLLER

Nothing appears, if both channels of the temperature controller operate.



Channel 1 of the temperature controller is failed. There is no operational impact.



Both channels 1 and 2 of the temperature controller are failed. Temperature may be abnormally low in some cabin and cockpit zones.

TEMPERATURE UNIT

°C — All the temperatures displayed on the COND system display are in Deg. C.

UPPER DECK AND MAIN DECK TEMPERATURE



Indicates the lowest temperature and the highest current temperature (in Deg. C) in the upper deck and main deck.

COCKPIT TEMPERATURE



Indicates the current temperature in the cockpit (in Deg. C).

OVHT INDICATION



There is a duct overheat in the indicated cockpit or cabin zone.

TRIM AIR VALVE



The trim air valve in the indicated cockpit or cabin zone is failed.

CRUISE SYSTEM DISPLAY

Applicable to: ALL

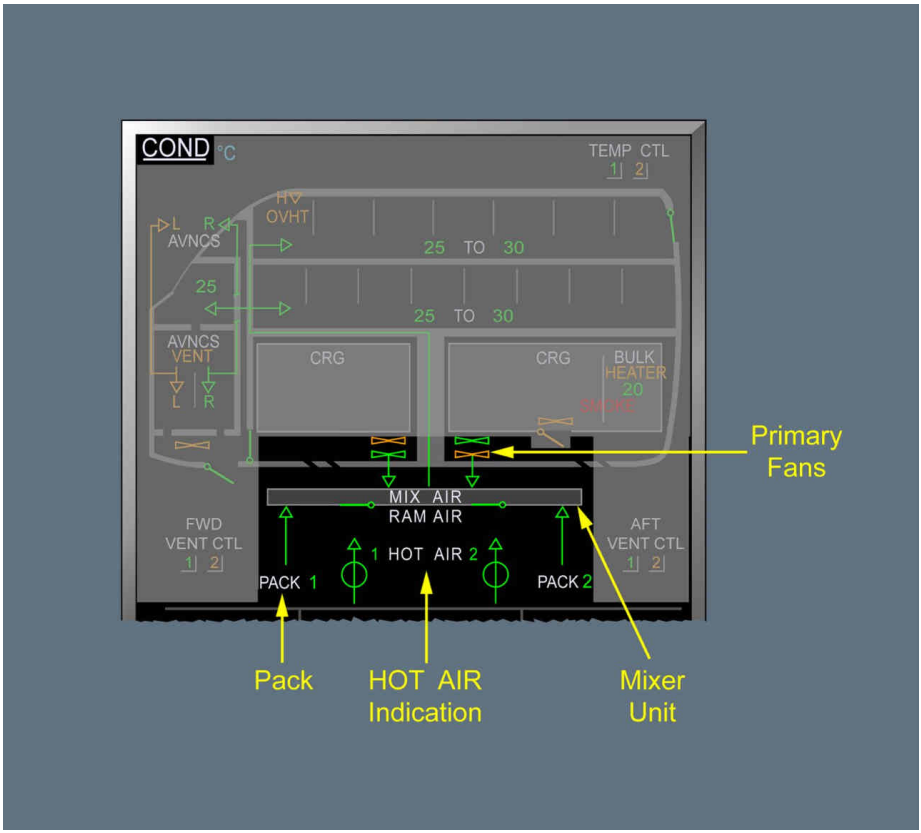
CRUISE SYSTEM DISPLAY

The current temperatures (in Deg. C.) of the cockpit, main and upper deck, and bulk cargo compartment are also displayed on the CRUISE system display.

AIR GENERATION

Applicable to: ALL

Air Generation



PACK



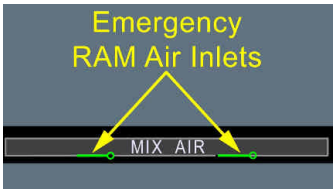
The pack operates.



The pack is failed, or not supplied with bleed air.

MIXER UNIT

Mixer Unit





The emergency RAM air inlet is closed.



The emergency RAM air inlet is open.



The emergency RAM air inlet is abnormally closed.



The emergency RAM air inlet is abnormally open.

HOT AIR INDICATION



The hot-air valve is open.



The hot-air valve is abnormally open.

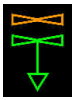


The hot-air valve is closed, with both associated pack valves closed.



The hot-air valve is closed, with at least one of the two associated pack valves open.

PRIMARY FANS

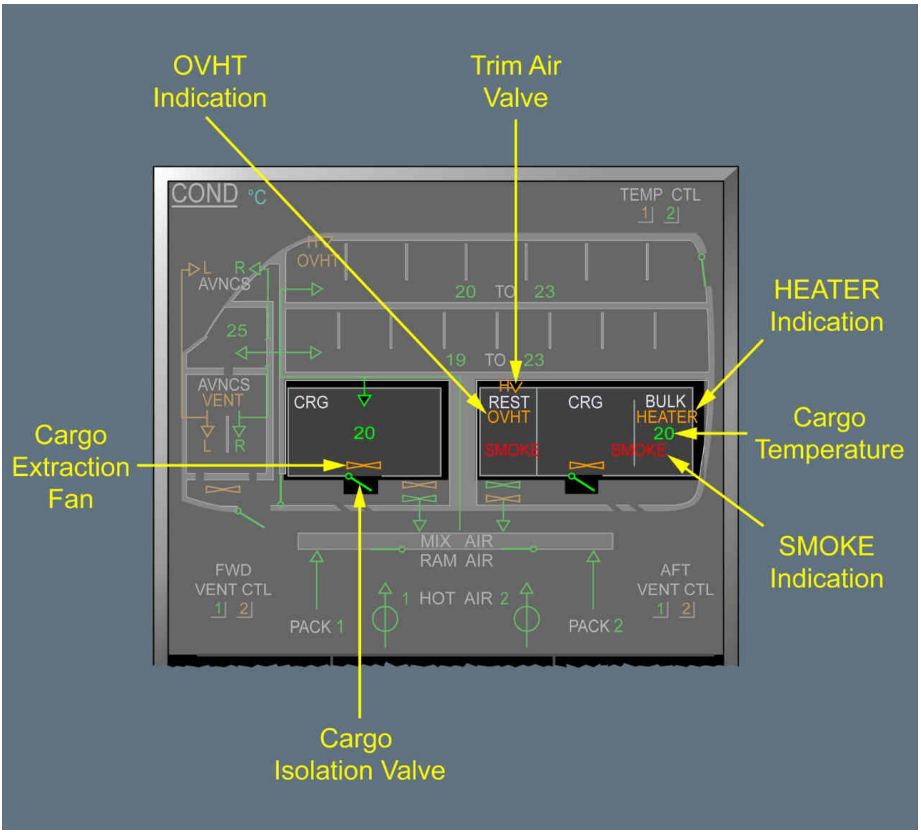


Nothing appears, when all primary fans operate.
The amber primary fan is failed.

CARGO

Applicable to: ALL

Cargo



BULK (FWD) CARGO TEMPERATURE

22

Indicates the current temperature in the bulk (forward) cargo compartment (in Deg. C).

BULK (FWD) CARGO EXTRACTION FAN

Nothing appears, when the bulk (forward) cargo fan operates.



The bulk (forward) cargo fan is failed.

BULK (FWD) CARGO ISOLATION VALVE



The bulk (forward) cargo outlet isolation valve is open.



The bulk (forward) cargo outlet isolation valve is abnormally open.



The bulk (forward) cargo outlet isolation valve is closed.

HEATER INDICATION



Nothing appears, when the bulk cargo heater operates.
The bulk cargo heater is failed, and the temperature in the bulk cargo compartment cannot be regulated.

SMOKE INDICATION



Smoke is detected in the indicated area (aft and bulk cargo compartment).

OVHT INDICATION



There is a duct overheat in the indicated cargo compartment.

TRIM AIR VALVE



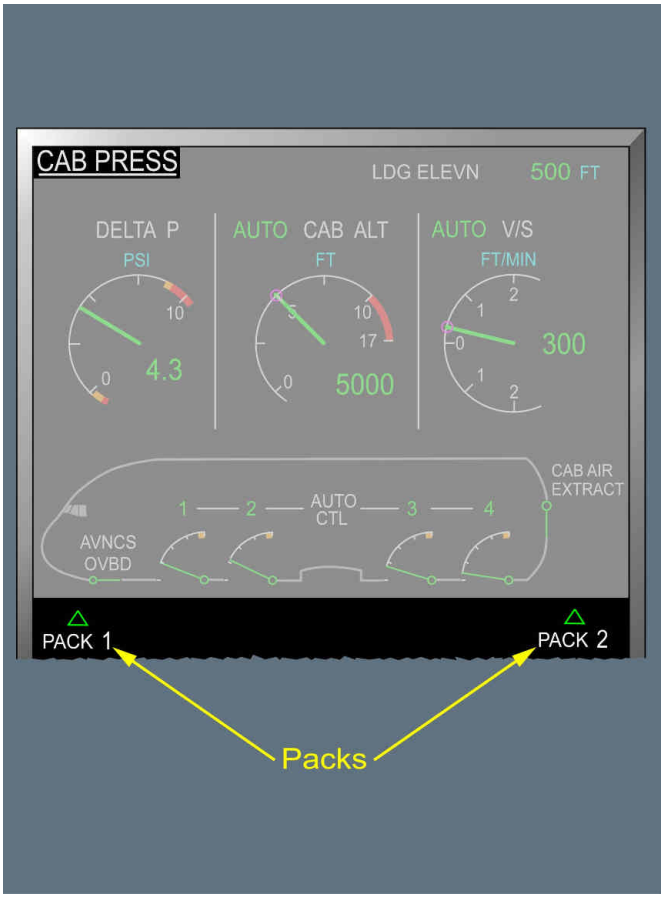
The trim air valve in the indicated cargo compartment is failed.

CAB PRESS SYSTEM DISPLAY

Applicable to: ALL

CAB PRESS SYSTEM DISPLAY

CAB PRESS System Display



PACKS



The pack valves associated with the pack are open.



The pack valves associated with the pack are closed.

MEMO

Applicable to: ALL

MEMO

RAM AIR : The emergency RAM air inlets are open, and the aircraft is on ground with no engine running.

RAM AIR : The emergency RAM air inlets are open, in all other cases.

AIR CYCLE MACHINE (ACM) FAILURE

Applicable to: ALL

- In the case one ACM of a pack fails, the other ACM continues to operate. The pack is still available, and there is no operational impact.

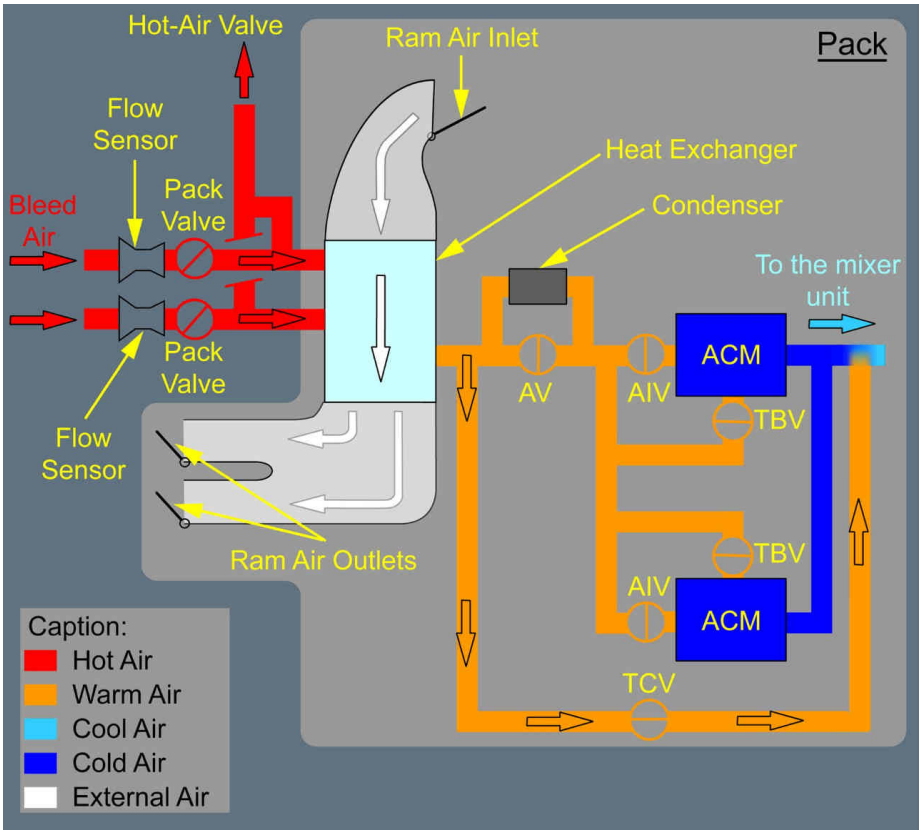
L2 *Note:* *The pack outlet temperature displayed on the BLEED SD page is the highest temperature of both ACM s. Refer to DSC-21-10-20-40 BLEED System Display . As a result, if one ACM of a pack fails, the indicated temperature may be the temperature of the failed ACM . In this case, the pack outlet temperature of the affected pack may be higher than the pack outlet temperature of the not affected pack.*

L1 - In the case both ACM s of a pack fail, the pack operates in bypass mode. Only the heat exchanger is used to cool the air from the bleed system.

In this configuration:

- Below FL 290: The pack must be set to OFF .
- Above FL 290: The pack can be used but pack performance is degraded.

Above FL 290 – Bypass Mode



TRIM AIR VALVE FAILURE

Applicable to: ALL

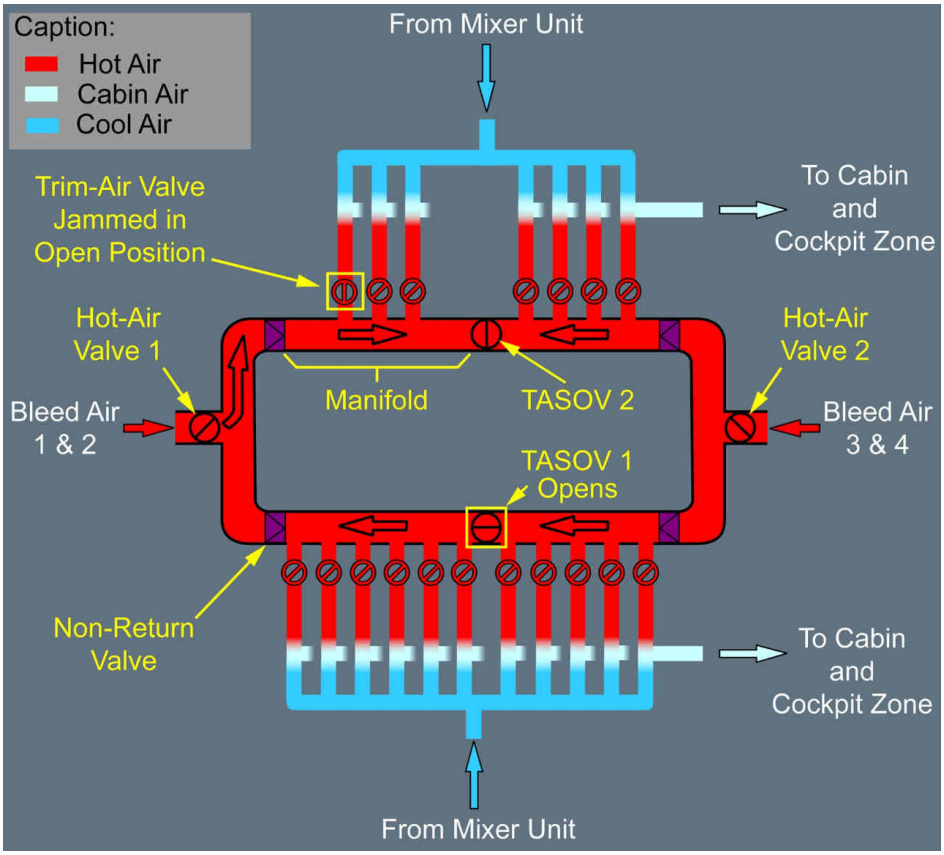
- If one TAV is jammed in closed position: Optimized temperature regulation will be lost in the affected zone.

L2 The affected zone is indicated on the COND system display (*Refer to DSC-21-10-20-50 Trim Air Valve (TAV)*).

L1 - If one TAV is jammed in open position: Temperature regulation in some cabin zones may be slightly degraded.

L3 The following graphic shows the trim air system with one trim air valve jammed in open position.

Trim Air Valve Jammed Open



In this example, the temperature controller:

- Opens TASOV 1,
- Controls the hot-air valve 2 to regulate the airflow of hot-air in the not affected manifolds
- Controls the hot-air valve 1 to regulate the airflow of hot air in the affected manifold. This airflow will depend on the heating demand of the affected cabin zone.

ECAM ALERTS

Applicable to: ALL

AIR PACK 1(2) CTL 1(2) FAULT (*Refer to procedure*)

AIR PACK 1(2) CTL DEGRADED (*Refer to procedure*)

AIR PACK 1(2) CTL REDUNDANCY LOST (*Refer to procedure*)

AIR PACK 1(2) FAULT (*Refer to procedure*)

AIR PACK 1(2) OFF (*Refer to procedure*)

AIR PACK 1(2) OVHT (*Refer to procedure*)

AIR PACK 1(2) REGUL FAULT (*Refer to procedure*)

AIR PACK 1(2) VLV 1(2) FAULT (*Refer to procedure*)

AIR PACK 1+2 FAULT (*Refer to procedure*)

AIR PACK 1+2 REGUL REDUNDANCY FAULT (*Refer to procedure*)

COND ALL PRIMARY CABIN FANS FAULT (*Refer to procedure*)

COND BULK CARGO DUCT OVHT (*Refer to procedure*)

COND BULK CARGO HEATER FAULT (*Refer to procedure*)

COND BULK CARGO ISOL FAULT (*Refer to procedure*)

COND BULK CARGO VENT FAULT (*Refer to procedure*)

COND DUCT OVHT (*Refer to procedure*)

COND FWD CARGO ISOL FAULT (*Refer to procedure*)

COND FWD CARGO TEMP REGUL FAULT (*Refer to procedure*)

COND FWD CARGO VENT FAULT (*Refer to procedure*)

COND HOT AIR 1(2) FAULT (*Refer to procedure*)

COND MIXER PRESS REGUL FAULT (*Refer to procedure*)

COND ONE PRIMARY CABIN FAN FAULT (*Refer to procedure*)

COND PURSER TEMP SEL FAULT (*Refer to procedure*)

COND RAM AIR 1(2) FAULT (*Refer to procedure*)

COND TEMP CTL 1(2) FAULT (*Refer to procedure*)

COND TEMP CTL FAULT (*Refer to procedure*)

COND TEMP CTL REDUNDANCY LOST (*Refer to procedure*)

COND THREE PRIMARY CABIN FANS FAULT (*Refer to procedure*)

COND TWO PRIMARY CABIN FANS FAULT (*Refer to procedure*)

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Pack Controller	Pack 1 Channel 1	DC 1 and AC ESS
	Pack 1 Channel 2	DC ESS and AC 2
	Pack 2 Channel 1	DC ESS and AC ESS
	Pack 2 Channel 2	DC 2 and AC 4
Temperature Controller	Temperature Controller Channel 1	AC 2, DC 1 and DC ESS
	Temperature Controller Channel 2	AC 4, DC 2, and DC ESS
Pack Valves Closure		DC ESS
RAM Air Inlet		DC ESS
Primary Fans	Primary Fan 1	AC 1
	Primary Fan 2	AC 2
	Primary Fan 3	AC 3
	Primary Fan 4	AC 4

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AIRCRAFT SYSTEMS

21 - VENTILATION

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DSC-21-20-PLP PRELIMINARY PAGES

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OVERVIEW

Applicable to: ALL

The aircraft has a fully automatic ventilation system that ventilates:

- The avionics bays
- The cockpit and cabin zones
- The IFE center
- The pack bays
- The bulk and aft cargo compartment.

Two ventilation controllers (forward and aft) control and monitor the ventilation systems of:

- The cockpit and cabin zones
- The IFE center
- The pack bays
- The bulk and aft cargo compartment.

Each ventilation controller has two redundant channels.

The ventilation system of the avionics bays has an assigned controller.

L3 The avionics ventilation system is independently controlled by an assigned function of the CPIOM B.

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AVIONICS VENTILATION DESCRIPTION

Applicable to: ALL

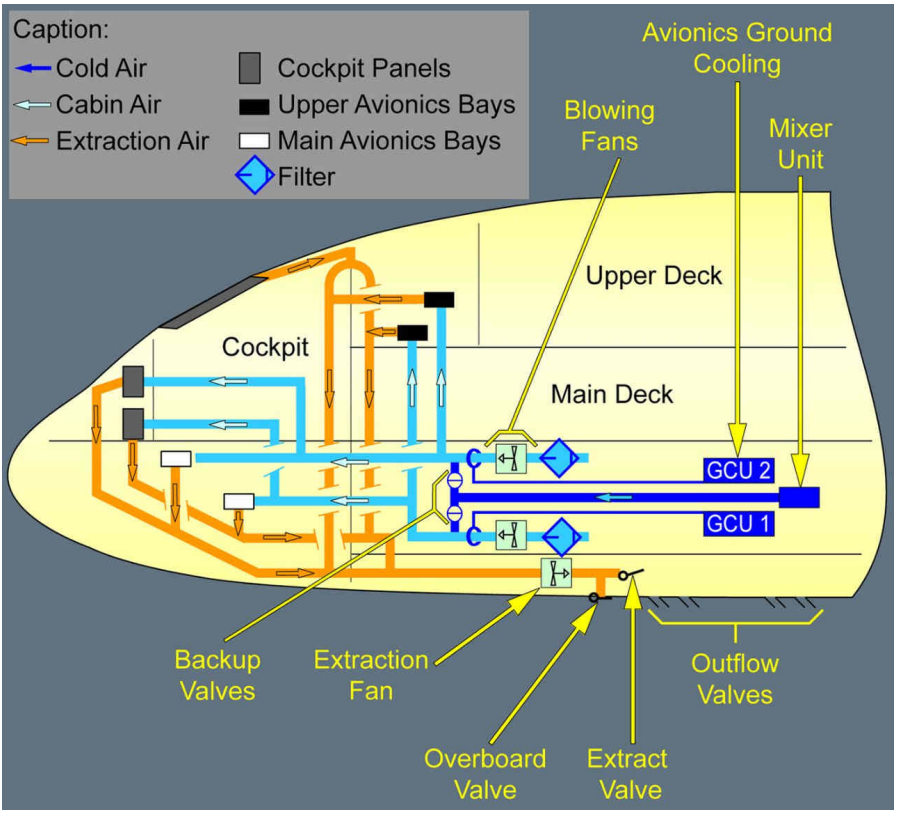
MAIN AND UPPER AVIONICS VENTILATION

The avionics ventilation system cools the electrical and electronic equipment within the electronic bays and the cockpit panels.
There are two avionics ventilation circuits: The left (L) and the right (R). Both the L and R circuits ventilate the cockpit panels, the main avionics bay, and the upper avionics bay.
On ground, the avionics ground cooling cools the air that is blown in the two ventilation circuits.

The avionics ventilation system:
- Uses air that is recirculated from the cabin
- Ventilates the various cockpit panels and equipment racks with this air
- Then extracts this air, and discharges it overboard.

L3 The batteries are ventilated in flight by cabin air that is extracted and discharged overboard via differential pressure.

MAIN and UPPER Avionics Ventilation



L1 **AFT AVIONICS BAY**

Cabin air, extracted then discharged overboard by the cabin air extraction system, ventilates the aft avionics compartment (*Refer to DSC-21-20-30 Lavatory and Galleys Air Extraction*).

L2 **BLOWING FANS**

There are two blowing fans, that blow recirculated air from the cabin into the various cockpit panels and equipment racks. Each avionics ventilation circuit has one blowing fan.

L3 For both avionics ventilation circuits, the air is first filtered, before it enters the blowing fan.

L2 Both blowing fans automatically operate, when the aircraft is electrically-powered. They are monitored and controlled by the avionics ventilation controller.

The air flow and temperature in both avionics ventilation circuits are automatically monitored and controlled.

AVIONICS GROUND COOLING

On ground, the avionics ground cooling system cools the air that is blown into the avionics bays and cockpit panels. The ground cooling system has two units, one for each avionics ventilation circuit.
The two units operate independently.
When the COOLG pb-sw is set to AUTO, the ground cooling system will activate automatically if the temperature of the blown air is high enough, and the air conditioning is OFF.

L3 For this to occur, air temperature from the blowing fan must be greater than 27 °C.

L1 The avionics ground cooling system uses the same cooling circuits, as those used to provide supplemental cooling to the galley.

L3 Each cooling unit is controlled by its own controller. The cooling unit controllers are located in the CPIOM A.

L2 BACKUP VALVES

Each ventilation circuit has one backup valve.
If the blowing fans cannot correctly ventilate the avionics, the backup valve of the affected circuit automatically opens. This enables air, added from the air conditioning system, to ventilate the avionics systems.

L3 The backup valve opens in case:

- The associated blowing fan fails.
- The associated filter is clogged.

The air from the air conditioning system comes directly from the mixer unit.

L2 Cabin and cockpit air conditioning and ventilation continue to operate normally.

EXTRACTION FAN

An extraction fan extracts air from the avionic bays and cockpit panels, either through the extract valve, or through the overboard valve.
The extraction fan operates, when the aircraft is electrically-powered. The extraction fan is monitored and controlled by the avionics ventilation controller.

L2 The avionics ventilation controller also:

- Monitors all ECAM alerts associated to the avionics ventilation system, and
- Displays the indications related to the avionics ventilation system on the COND SD page.

OVERBOARD VALVE AND EXTRACT VALVE

Ventilated air is discharged overboard through the overboard valve, or through the extract valve.

OVERBOARD VALVE

L3 Air is discharged overboard through the overboard valve by the extraction fan, or by differential pressure.

L1 The overboard valve opens:

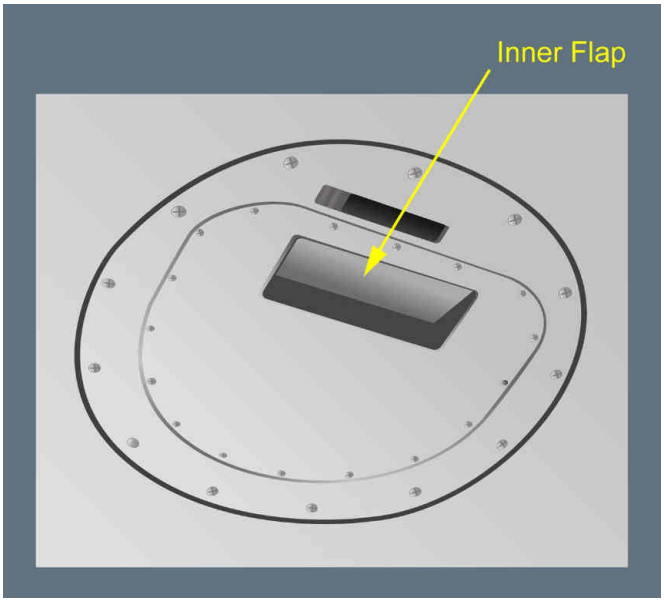
- Automatically, on ground, with the engines not running.

L3 The overboard valve closes, when both inner engines are started.

L1 - Manually, in flight, with some abnormal avionics ventilation cases, when the EXTRACT pb-sw on the VENT panel is set to OVRD (For more information on this configuration, *Refer to DSC-21-20-20-20 Override Configuration*). In such cases, the valve partially opens.

L3 The overboard valve partially opens, when its inner flap opens.

Overboard Valve Partially Open



L1 ### EXTRACT VALVE

When the overboard valve is closed, the extract valve opens.

L3 Air is discharged overboard by the extraction fan through the extract valve, then through the outflow valves.

L1 *Note:* *In case the DITCHING pb-sw is set to ON , the overboard valve will close, regardless of the EXTRACT pb-sw selection (Refer to DSC-21-30-40 Ditching).*

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OVERRIDE (OVRD) CONFIGURATION

Applicable to: ALL

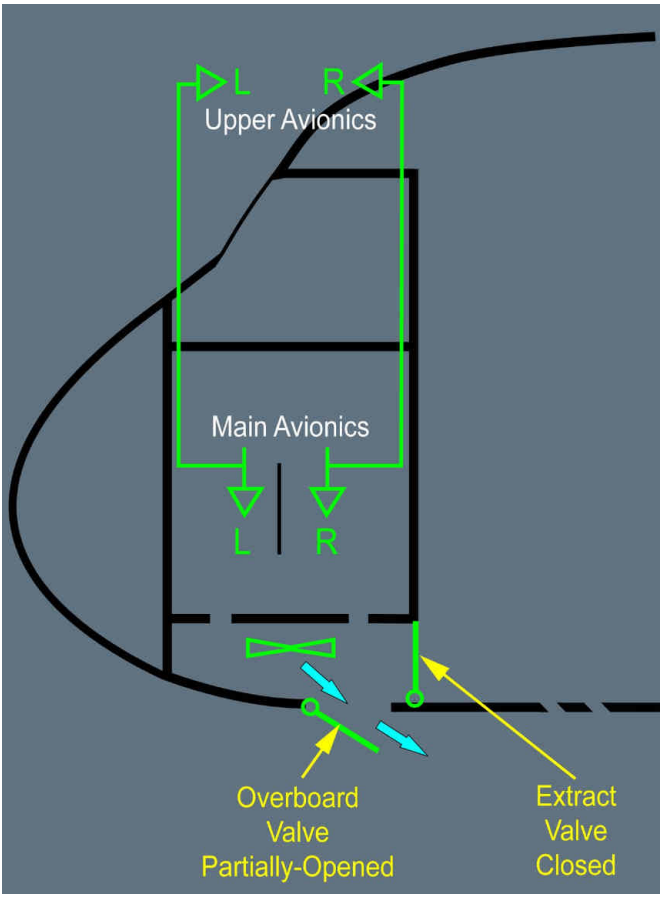
In flight, when the EXTRACT pb-sw on the VENT panel is set to OVRD:

- The overboard valve partially opens.
- The extract valve automatically closes.
- Air is extracted and discharged through the overboard valve, via differential pressure.

L2 The ECAM requests the flight crew to set the EXTRACT pb-sw to OVRD , in case:

- The VENT EXTRACT FAULT caution triggers on the ECAM
- The FIRE SMOKE/FUMES warning triggers, when smoke is detected in the avionics bay or the cockpit.

Override (OVRD) Configuration



CABIN AIR RECIRCULATION

Applicable to: ALL

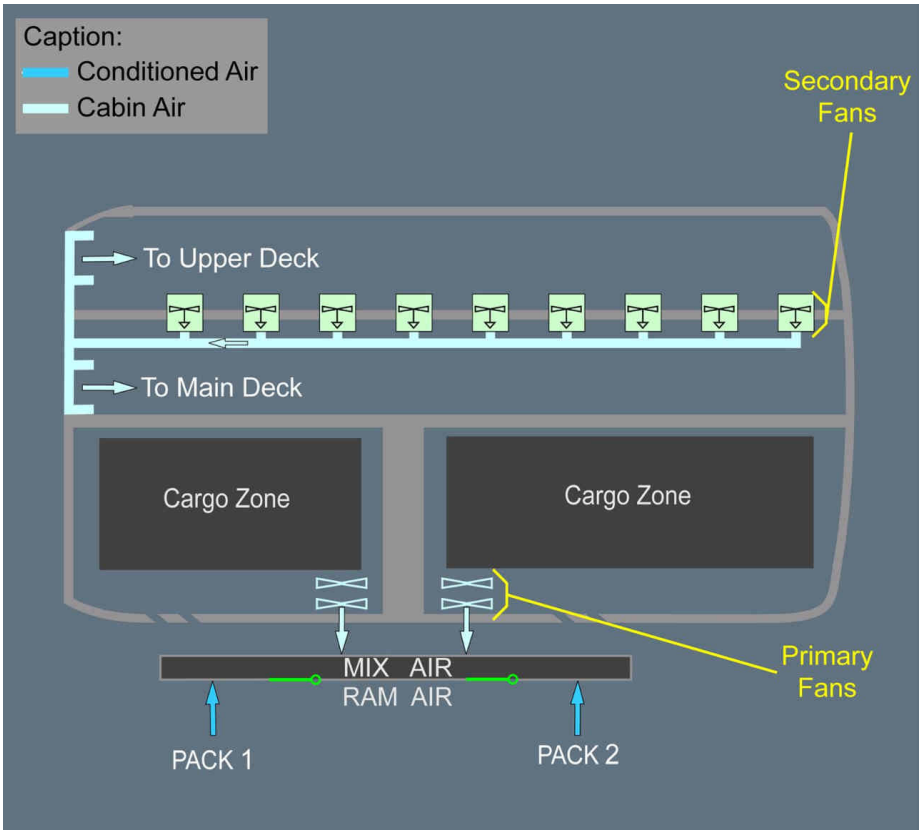
The primary fans recirculate the cabin air to the mixer unit (*Refer to DSC-21-10-10-20 Mixer Unit*). In addition, the secondary fans blow air from the upper deck, and recirculate it in the upper and main decks.

L2 The secondary fans are controlled by the ventilation controllers.

L3 There are 9 secondary fans, and they are in the upper deck of the cabin.

- 5 are controlled by the forward ventilation controller.
- 4 are controlled by the aft ventilation controller.

Cabin Air Recirculation



LAVATORY AND GALLEYS AIR EXTRACTION

Applicable to: ALL

In some cabin areas (e.g. lavatories, galleys, the aft avionics compartment) air is extracted, and then directly discharged overboard.

L3 On ground, or when the differential pressure is less than 1 PSI:

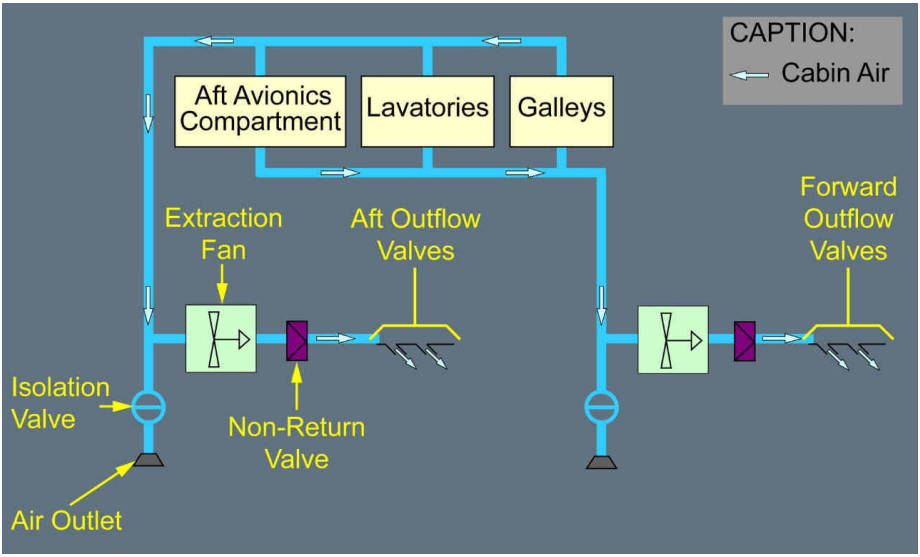
- Two extraction fans extract the air.
- The air is discharged overboard via the outflow valves.

In flight, when the differential pressure is greater than 1 PSI:

- The air is discharged directly overboard through two assigned outlets, via differential pressure.
- The two extraction fans automatically stop.

Each outlet has one isolation valve. When the aircraft is in flight, and the differential pressure is greater than 1 PSI, both isolation valves open.
One outlet is on the skin of the forward part of the aircraft.
The other outlet is on the skin of the aft part of the aircraft.
Either ventilation controller (forward or aft ventilation controller) can control the cabin air extraction system.

Cabin Air Extraction



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IN-FLIGHT ENTERTAINMENT (IFE) BAY VENTILATION

Applicable to: ALL

The In-Flight Entertainment (IFE) bay has a ventilation system that cools its electronic equipment. This ventilation system is fully automatic.

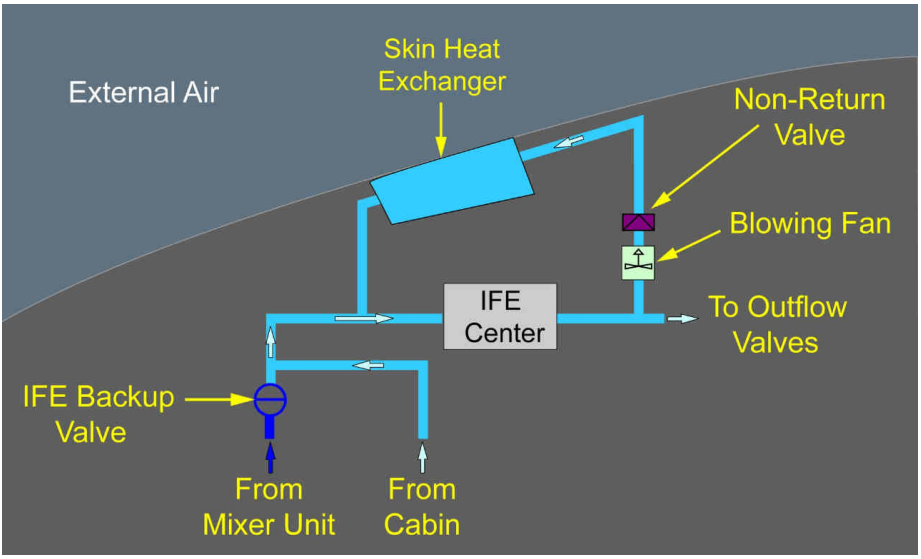
L2 It is controlled by the forward ventilation controller.

L3 The IFE bay is in the upper avionics bay.

The IFE bay is ventilated by air from the cabin, or by air from the air conditioning mixer unit:

- In flight, the IFE bay is normally ventilated by air from the cabin, that is blown into the IFE bay by a blowing fan. An aircraft-skin heat exchanger cools this air.
- On ground, or in some abnormal situations in flight (e.g. blowing fan failure, aircraft-skin heat exchanger failure), the IFE bay is ventilated by air from the mixer unit.

IFE Bay Ventilation



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PACK BAY VENTILATION

Applicable to: ALL

A ventilation system cools the two pack bays, and is fully automatic.

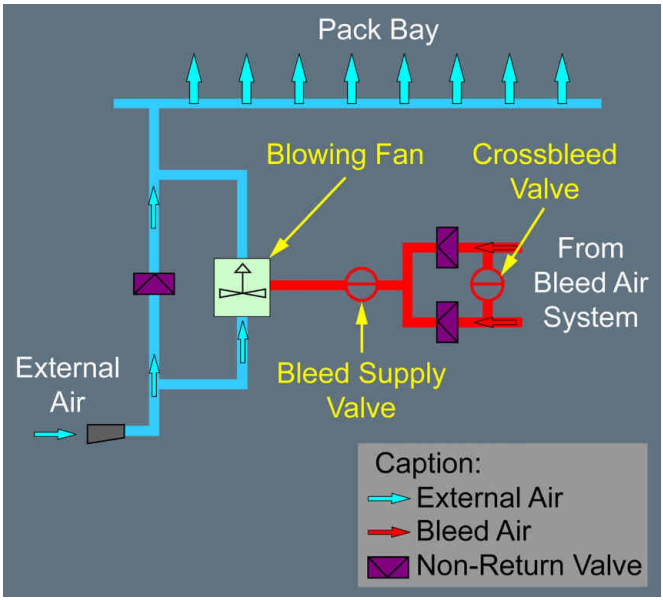
L3 The pack bay areas are ventilated by external air.

- In flight, external air flows into each pack bay area, through an air inlet. Both air inlets are in the belly fairing.
- On ground, two blowing fans ventilate both pack bay areas. These blowing fans are pneumatically-operated.
  Bleed air, from any available bleed supply, flows through two supply valves and drives both fans.
  The pack controller controls the blowing fans.

Air is discharged overboard, through 7 air outlets:

- Three in the belly fairing
- Four in the wing root.

Pack Bay Ventilation



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SUPPLEMENTAL COOLING SYSTEM

Applicable to: ALL

There are two independent cooling systems, that cool the galleys.

Each cooling system has:
- One cooling unit that cools the fluid of the system.
- One circuit that distributes this coolant fluid to all the galleys.

If one cooling system fails, the other one is sufficient to cool all the galleys.
Both supplemental cooling systems operate simultaneously, when the aircraft is electrically powered, and provided that COOLG pb-sw is set to AUTO.

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THS BAY VENTILATION

Applicable to: ALL

The Trimmable Horizontal Stabilizer (THS) bay is cooled by an assigned ventilation system. This ventilation system is fully automatic.

L2 It is controlled by the aft ventilation controller.

The THS bay is ventilated on ground, when the aircraft is electrically powered.

L3 The THS bay is ventilated with external air, that is blown by a blowing fan into the THS bay.

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BULK AND AFT CARGO VENTILATION

Applicable to: ALL

The bulk and aft cargo compartments are automatically ventilated.

L2 Some of the air that recirculates from the cabin flows into the bulk cargo compartment, via an inlet isolation valve.

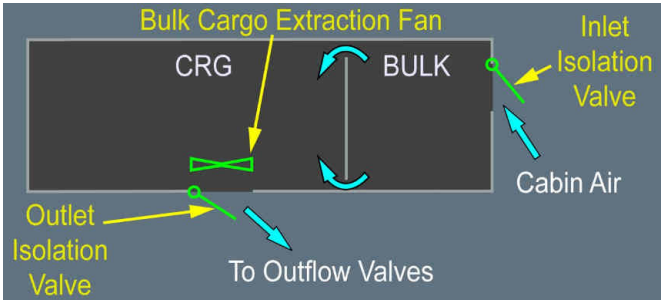
Air from the bulk cargo compartment is then used to ventilate the aft cargo compartment before this air is extracted outside.

An extraction fan then extracts air, via an outlet isolation valve, and discharges this air overboard through the outflow valves. This extraction fan is in the aft cargo compartment.

L1 Temperature regulation is possible for the bulk cargo compartment only (*Refer to DSC-21-10-10-30 Bulk Cargo*).

If necessary (e.g. if smoke is detected in the cargo area), it is possible to isolate the bulk and aft cargo compartments, via the BULK ISOL VALVES pb-sw on the CARGO AIR COND panel (*Refer to DSC-21-10-20-30 ISOL VALVES pb-sw*).

Bulk and Aft Cargo Ventilation



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FWD CARGO VENTILATION

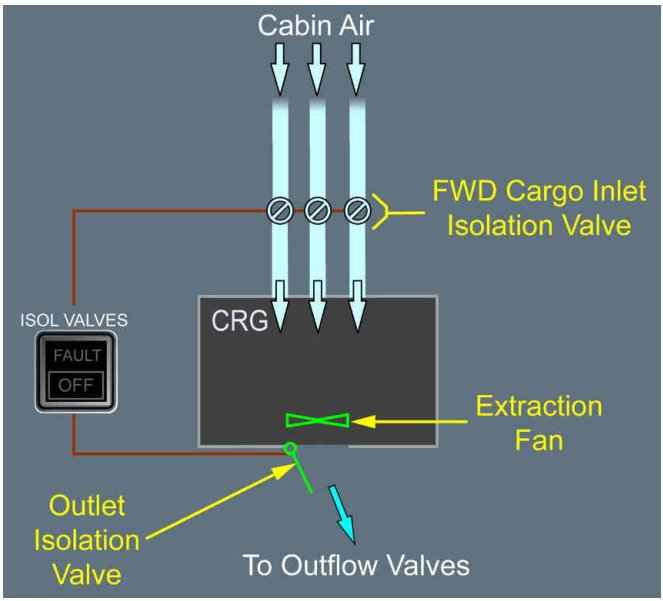
Applicable to: ALL

The forward cargo compartment is automatically ventilated, with air from the air-conditioning system.

L2 Air flows into the forward cargo compartment, via three forward cargo inlet isolation valves.
An extraction fan then extracts this air, via an outlet isolation valve, and discharges this air overboard through the outflow valves.

L1 If necessary (e.g. smoke is detected in the cargo area), it is possible to isolate the forward cargo compartment, via the FWD ISOL VALVES pb-sw on the CARGO AIR COND panel.
The forward cargo compartment has a temperature regulation system: For more information about the forward cargo temperature regulation system, *Refer to DSC-21-10-10-30 FWD Cargo* .

FWD Cargo



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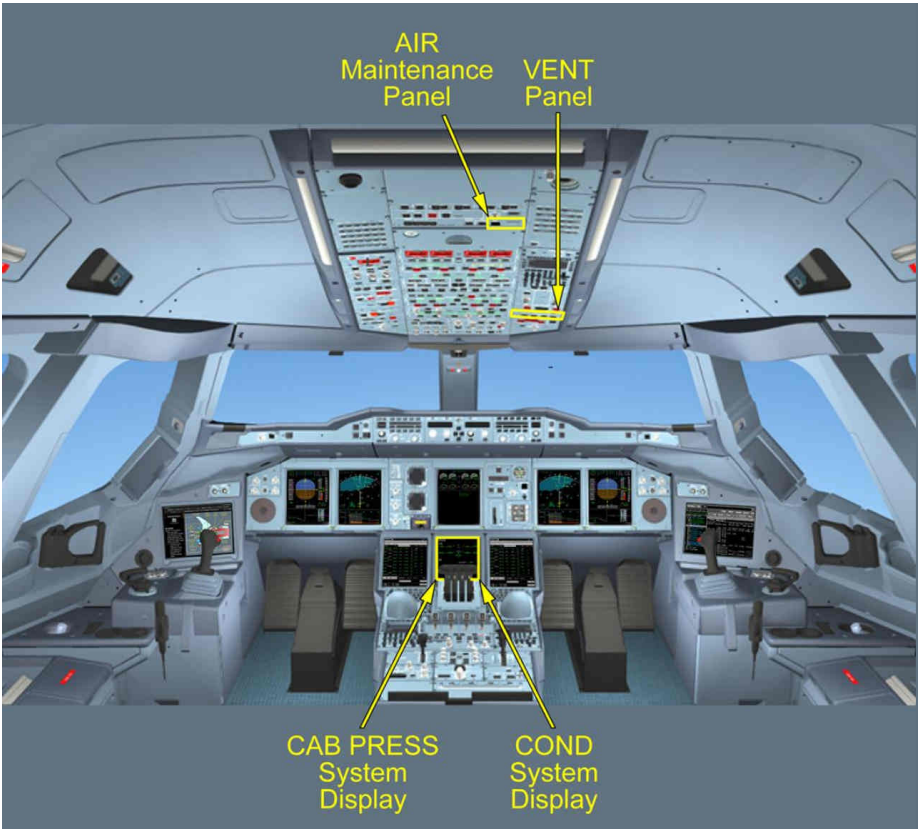
COCKPIT VIEW

Applicable to: ALL

General

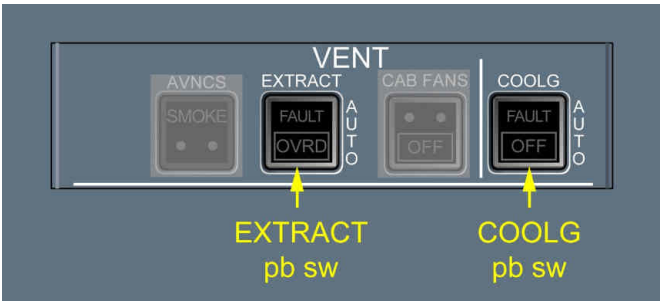


VENT PANEL

Applicable to: ALL

VENT PANEL

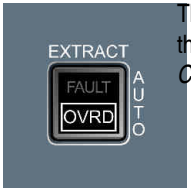
VENT Panel



EXTRACT PB SW



The overboard and extract valves operate automatically, to ensure ventilation of the avionic bays and the cockpit panels.



The overboard and extract valves are in override configuration, provided that the DITCHING pb-sw is not set to ON (*Refer to DSC-21-20-20-20 Override Configuration*).

L12



A low ventilation flow is detected in any avionics compartment.

Associated with the following ECAM alerts:
- VENT AVNCS EXTRACT FAULT (*Refer to procedure*)
- SMOKE / FUMES (*Refer to procedure*).

The FAULT light goes off, when the flight crew sets the EXTRACT pb-sw to OVRD .

COOLG PB SW



Normal operation of the supplemental cooling system.



The supplemental cooling system is off.

L12



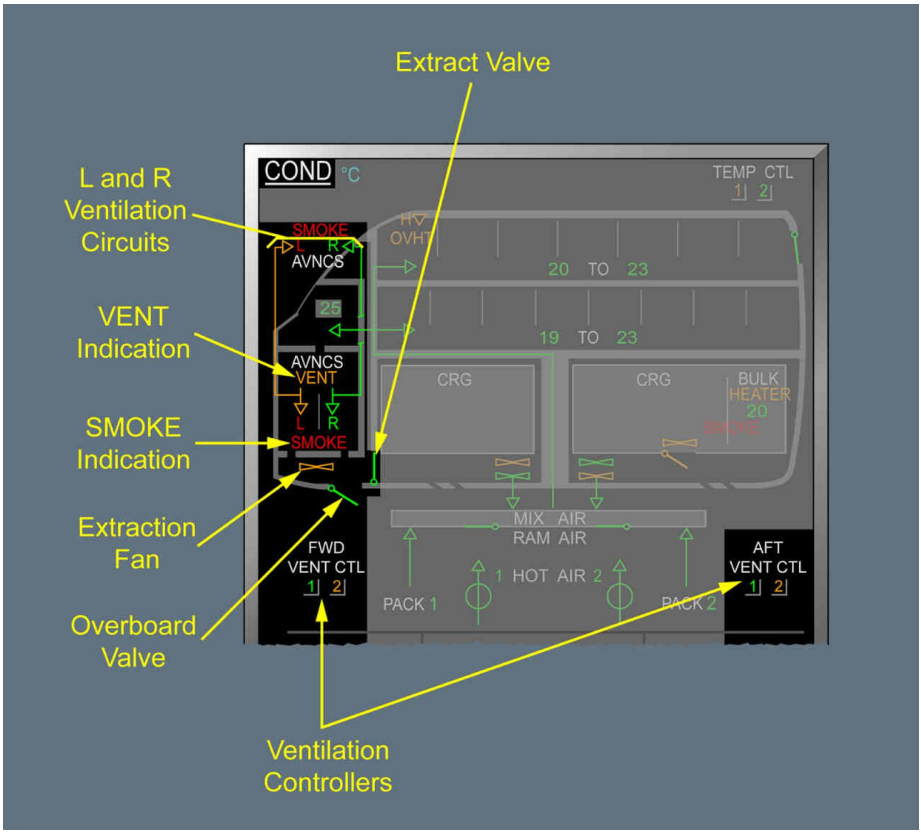
The supplemental cooling system is failed.

Associated with the following ECAM alerts:
- VENT COOLG SYS 1(2) OVHT (*Refer to procedure*).
- VENT COOLG SYS PROT FAULT (*Refer to procedure*).

COND SYSTEM DISPLAY

Applicable to: ALL

COND System Display



OVERBOARD VALVE



The overboard valve is closed.



The overboard valve is open.



The overboard valve is partially open.



The overboard valve is abnormally closed.



The overboard valve is abnormally open.



The overboard valve is abnormally partially open.

EXTRACT VALVE



The extract valve is open.



The extract valve is closed.



The extract valve is abnormally open.



The extract valve is abnormally closed.

VENT INDICATION



Avionics ventilation is operating normally.



Ventilation flow is low, on at least one avionics ventilation circuit. The L and R circuit ventilation indications show the affected circuit.

EXTRACTION FAN

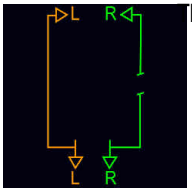
Does not appear when the extraction fan operates normally.



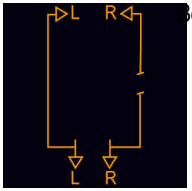
The extraction fan is failed.

L AND R VENTILATION CIRCUITS

Does not appear, when the L and R avionics circuits are ventilated.



The L avionics circuit is no longer ventilated. The R avionics circuit is ventilated.



Both L and R avionics circuit are no longer ventilated.

VENTILATION CONTROLLERS

Does not appear, when both channels of both ventilation controllers operate.

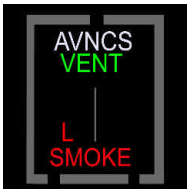


The channel 1 of the aft ventilation controller is failed. The aft ventilation controller continues to operate.



Both channels of the forward ventilation controller are failed. The forward ventilation controller no longer operates.

SMOKE INDICATION



Smoke is detected in the L circuit of the main avionics bay.



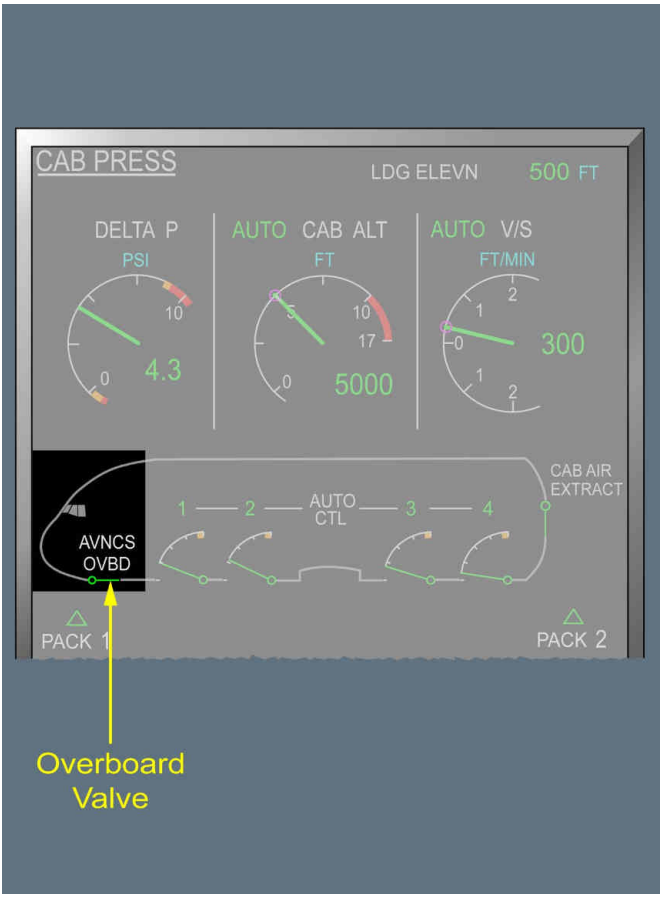
Smoke is detected in the L circuit of the upper avionics bay.

CAB PRESS SYSTEM DISPLAY

Applicable to: ALL

CAB PRESS SYSTEM DISPLAY

CAB PRESS System Display



OVERBOARD VALVE



The overboard valve is closed.



The overboard valve is open.



The overboard valve is partially open.



The overboard valve is abnormally closed.



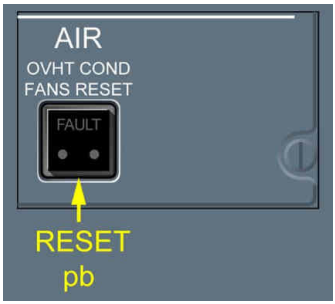
The overboard valve is abnormally open.



The overboard valve is abnormally partially open.

AIR MAINTENANCE PANEL

Applicable to: ALL



RESET pb

In the case of overheat of a ventilation system fan, the affected fan automatically stops. The Maintenance personnel uses this pushbutton to restart the fan.



No overheat is detected.

L12



One or several fans of the ventilation system failed due to overheat.
The FAULT light is not always associated with an ECAM alert, depending on the location and the number of the affected fan(s). For example:

- If one primary cabin fan fails, the ECAM alert COND ONE PRIMARY CABIN FAN FAULT triggers
- If one cabin air extraction fan fails, no ECAM alert triggers. There is no operational impact.

When pressed, resets the affected fan(s). When the reset is completed and successful, the FAULT light goes off.

ECAM ALERTS

Applicable to: ALL

COND AFT VENT CTL 1(2) FAULT (*Refer to procedure*)

COND AFT VENT CTL DEGRADED (*Refer to procedure*)

COND AFT VENT CTL FAULT (*Refer to procedure*)

COND AFT VENT CTL REDUNDANCY LOST (*Refer to procedure)*

COND AVNCS VENT CTL FAULT (*Refer to procedure*)

COND FWD VENT CTL 1(2) FAULT (*Refer to procedure*)

COND FWD VENT CTL DEGRADED (*Refer to procedure*)

COND FWD VENT CTL FAULT (*Refer to procedure*)

COND FWD VENT CTL REDUNDANCY LOST (*Refer to PRO-ABN-ECAM-10-21-20-130 COND FWD VENT CTL REDUNDANCY LOST*

COND PART SECONDARY CABIN FANS FAULT (*Refer to procedure*)

COND SECONDARY CABIN FANS FAULT (*Refer to procedure*).

VENT AVNCS BLOWING FAULT (*Refer to procedure*)

VENT AVNCS EXTRACT FAULT (*Refer to procedure*)

VENT AVNCS L (R) BLOWING FAULT (*Refer to procedure*)

VENT AVNCS OVBD VLV FAULT (*Refer to procedure*)

VENT COOLG SYS 1(2) OVHT (*Refer to procedure*)

VENT COOLG SYS PROT FAULT (*Refer to procedure*)

VENT IFE BAY ISOL FAULT (*Refer to procedure*)

VENT IFE BAY VENT FAULT (*Refer to procedure*)

VENT LAV & GALLEYS EXTRACT FAULT (*Refer to procedure*)

VENT PACK BAY 1(2) VENT FAULT (*Refer to procedure*)

VENT PACK BAY 1+2 VENT FAULT (*Refer to procedure*)

VENT THS BAY VENT FAULT (*Refer to procedure*)

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Secondary Cabin Fans	5 Secondary Cabin Fans	AC 1
	4 Secondary Cabin Fans	AC 4
Ventilation Controller	Aft Ventilation Controller	DC 2
	Forward Ventilation Controller	DC 1
IFEC Fan		AC 1
Cargo	Bulk Cargo Extraction Fan	AC 4
	Bulk Cargo Isolation Valve	DC 2
Avionics Ventilation Fan	Left Avionics Blowing Fan	AC 1
	Right Avionics Blowing Fan	AC 3
	Extraction Fan	AC 4
THS Bay Ventilation	THS Bay Blowing Fan	AC 3

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AIRCRAFT SYSTEMS

21 - PRESSURIZATION

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DSC-21-30-PLP PRELIMINARY PAGES

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ECAM Alerts ..... A

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OVERVIEW

Applicable to: ALL

In normal operation, the pressurization system does not require any action by the flight crew: Cabin air pressure is automatically-regulated to provide maximum passenger comfort.

The cabin pressure regulation is performed via the automatic control of the outflow valves during all flight phases, from takeoff to landing.

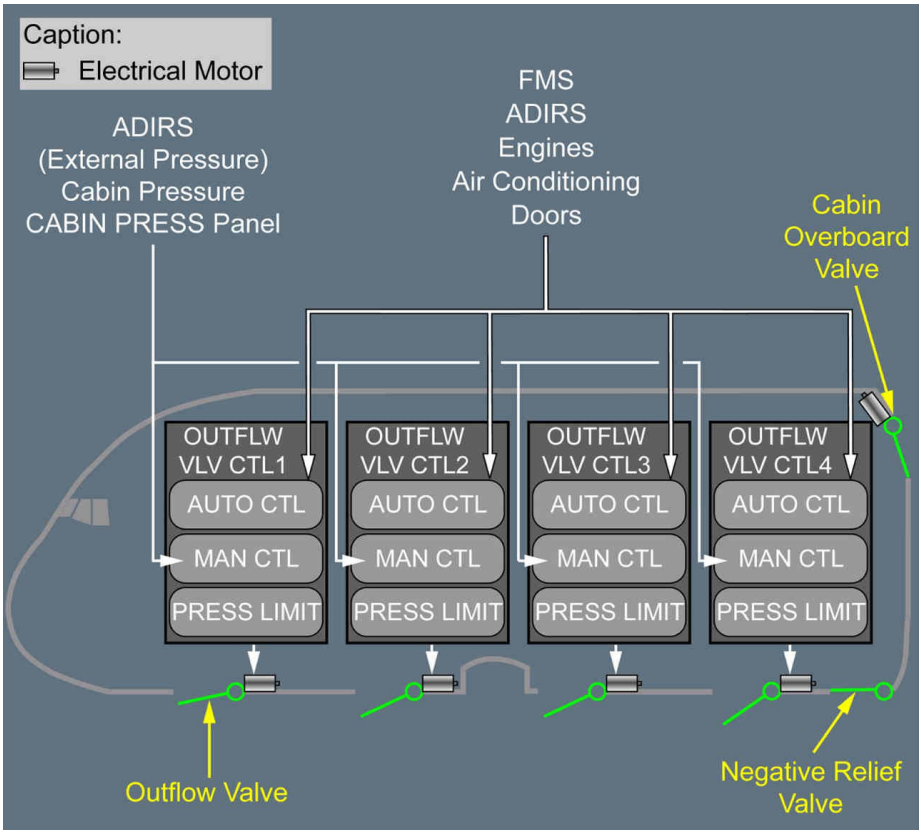
L2 During cruise the cabin altitude is regulated not to exceed 7 500 ft.

L1 If necessary, the flight crew can manually operate the cabin air pressurization system, by selecting the cabin altitude target, and/or the cabin vertical speed.

ARCHITECTURE

Applicable to: ALL

System Description



OUTFLOW VALVE CONTROLLERS

There are four outflow valve controllers. Each outflow valve controller automatically controls one outflow valve.

If one outflow valve controller fails, its assigned outflow valve automatically closes, and there is no operational impact.

L3 The CPIOM B hosts four redundant applications (the Cabin Pressure Control System (CPCS) applications), to operate the outflow valve controllers.

L1 **AUTOMATIC CONTROL MODE**

In automatic mode (when the CABIN ALT MODE pb-sw and CABIN V/S MODE pb-sw are set to AUTO), the four outflow valve controllers automatically control the cabin altitude target, and the cabin vertical speed.
The automatic control system of one outflow valve controller is sufficient to control the entire automatic system.
For more information on the normal operation of the pressurization system, *Refer to DSC-21-30-30-10 Automatic Operation* .
In order to automatically control cabin air pressurization, each outflow valve controller uses the FMS flight plan (including the landing field elevation), together with current outside air pressure, actual flight phase and air conditioning system status.

L2 Each outflow valve controller receives data from the following systems:
- The Flight Management System (FMS)

L3
- Destination QNH or QFE
- Cruise flight levels
- Landing field elevation
- Time to top of climb
- Time to top of descent
- Time to arrival
- Time to destination

L2 - The navigation systems (ADIRS)

L3
- Static pressure
- Barometric correction
- Dynamic air pressure

L2 - The landing gear

L3
- Landing gear on ground status

L2 - The engines

L3
- Engines running
- Engines at takeoff power

L2 - Air conditioning system

L3
- Pack valves status
- Pack flow
- Pack flow demand

L2 - The doors

L3
- Doors closed status.

This data is received via the avionics network, and the CPIOM B.

L1 **MANUAL CONTROL MODE**

If the automatic control systems of the four outflow valve controllers fail, the flight crew can manually control the cabin air pressure.

L2 In manual mode (when the CABIN ALT MODE pb-sw , or the CABIN V/S MODE pb-sw are set to MAN), the pressure controllers use cabin pressure from an assigned pressure sensor, and the external pressure from the ADIRS .

L1 Cabin vertical speed and/or cabin altitude target can be selected by the flight crew on the CAB PRESS panel.

Refer to DSC-21-30-40 Manual Operation

PRESSURE LIMITER FUNCTION

L3 Each outflow valve controller has an independent pressure limiter function, that operates in both automatic and manual mode, to:

- Prevent the differential pressure from going too high or too low.
  If the differential pressure exceeds 9 PSI , the pressure system limiter will open the four outflow valves.
  If the differential pressure goes below -0.725 PSI , the negative relief valves will open.
- Prevent the cabin altitude from going too high.
  The pressure limiter will close the four outflow valves in the event the cabin altitude exceeds 22 000 ft .

  Note: *However, if the cabin altitude exceeds 9 550 ft , the ECAM will trigger the CAB PRESS EXCESS CAB ALT warning on the EWD .*

OUTFLOW VALVES

There are four outflow valves:
- Two are in the forward part of the aircraft
- Two are in the aft part of the aircraft.

L2 The outflow valves are below the flotation line.

L1 The outflow valves control the cabin air pressure, by regulating cabin air outflow .

L3 Each outflow valve is driven by a single electrical motor. The outflow valve automatically-closes due to the differential pressure between the cabin and the external air, if its assigned motor is not electrically-supplied.

L2 *Note: When the RAM AIR pb is set to ON, and the differential pressure is lower than 1 PSI, the system automatically opens the outflow valves to approximately 50 %.*

L2 NEGATIVE RELIEF VALVES

There are two negative relief valves, that operate mechanically with differential pressure. The negative relief valves prevent the differential pressure from going too low.

L3 Both negative relief valves mechanically-open, if the differential pressure goes below –0.725 PSI.

L2 They are in the aft part of the aircraft above the flotation line.

CABIN AIR EXTRACT VALVE

Two independent cabin air extract valves automatically prevent cabin air pressure from going too high or too low, in the event that the pressurization system fails.

L3 These valves are controlled by the aft ventilation controller. They will automatically open, in the event that the pressurization limiter function fails to maintain the differential pressure between –0.725 PSI and 9.2 PSI.

L1 If necessary, these valves can be manually controlled via the CABIN AIR EXTRACT pb-sw (e.g. during smoke removal procedures).

L2 These valves are located in the aft pressure bulkhead.

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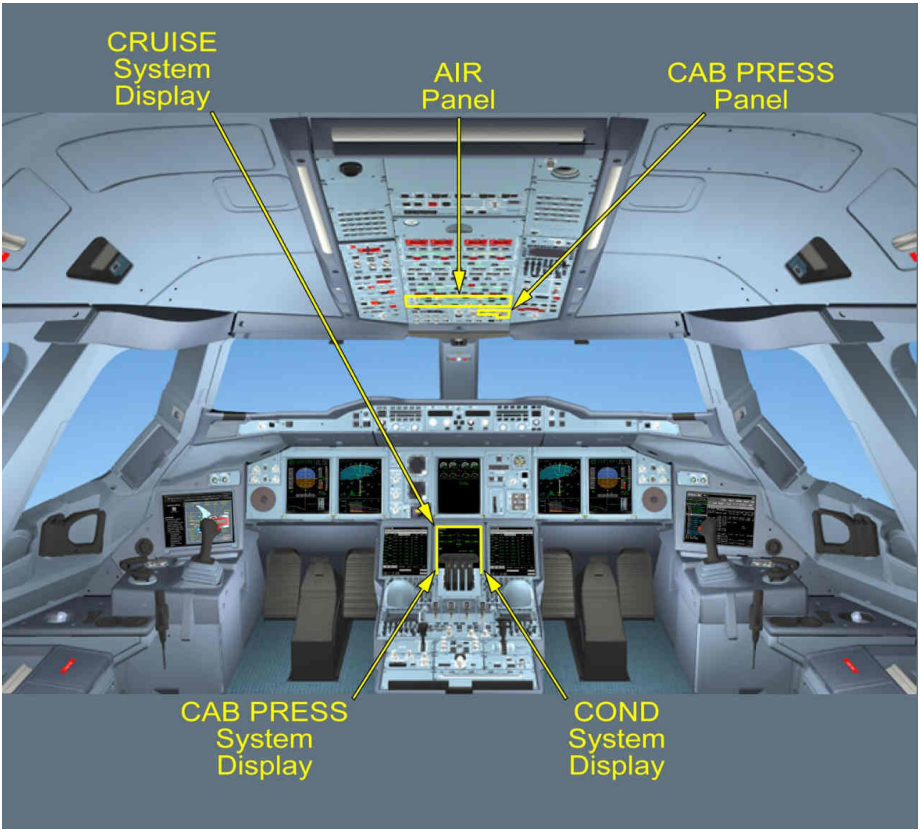
COCKPIT VIEW

Applicable to: ALL

General



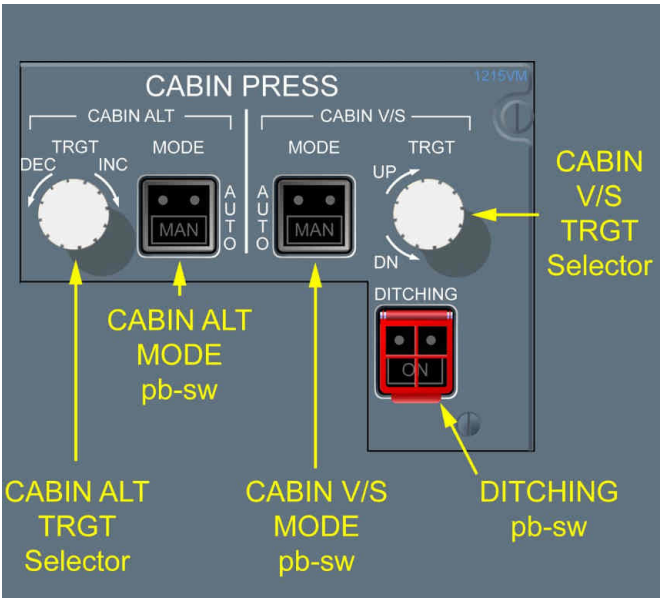
CABIN PRESS PANEL

Applicable to: ALL

CABIN PRESS PANEL

The CABIN PRESS panel is only used, when pressurization has to be controlled in manual mode, or in the event of a ditching.

CABIN PRESS Panel



CABIN ALT MODE pb-sw

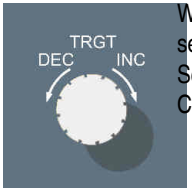


Cabin altitude is automatically regulated.



Cabin altitude is manually controlled: The cabin altitude target must be manually selected via the CABIN ALT TRGT selector.
The cabin altitude target remains steady at the current value until the flight crew manually selects a new cabin altitude target.

CABIN ALT TRGT selector



When the CABIN ALT MODE pb-sw is set to MAN, the flight crew uses the selector to manually select the cabin altitude target.
Selected cabin altitude target is displayed on the CAB PRESS, and on the CRUISE page of the SD.

L2 The cabin altitude selection has a range of –2 000 ft to 15 000 ft.

CABIN V/S MODE pb-sw

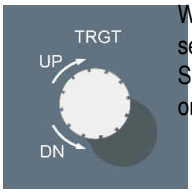


Cabin vertical speed is automatically regulated according to the flight profile and the cabin altitude target.



Cabin pressure vertical speed is manually controlled. The vertical speed must be manually selected via the CABIN V/S TRGT selector.

CABIN V/S TRGT selector



When the CABIN V/S MODE pb-sw is set to MAN, the flight crew uses the selector to manually select the cabin pressure vertical speed.
Selected cabin pressure vertical speed is displayed on the CAB PRESS, and on the CRUISE page of the system display.

L2 The cabin vertical speed selection has a range of –1 500 ft/min to +2 500 ft/min.

DITCHING PB-SW



Normal position.



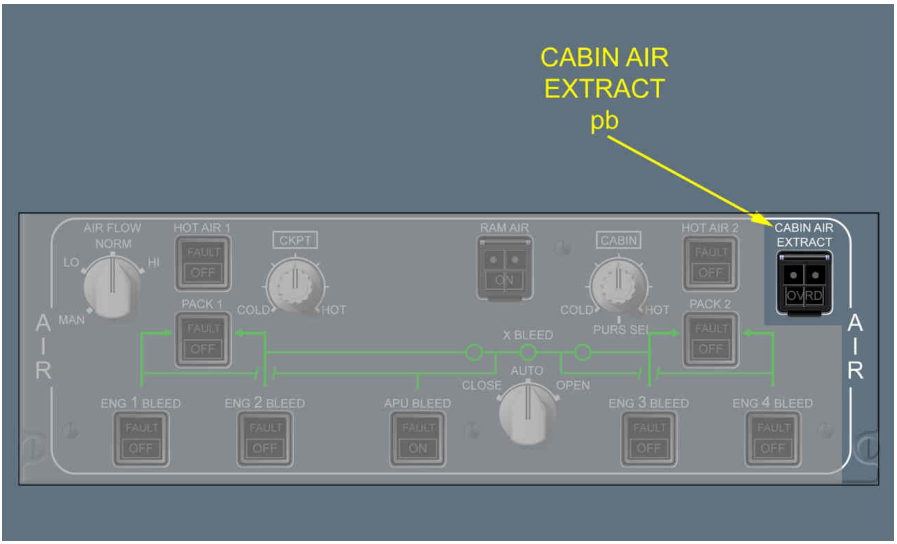
All valves are forced closed: The pressurization system is ready for ditching (*Refer to DSC-21-30-40 Ditching*).

AIR PANEL

Applicable to: ALL

AIR PANEL

AIR Panel



CABIN AIR EXTRACT pb-sw



Both cabin overboard valves are closed.



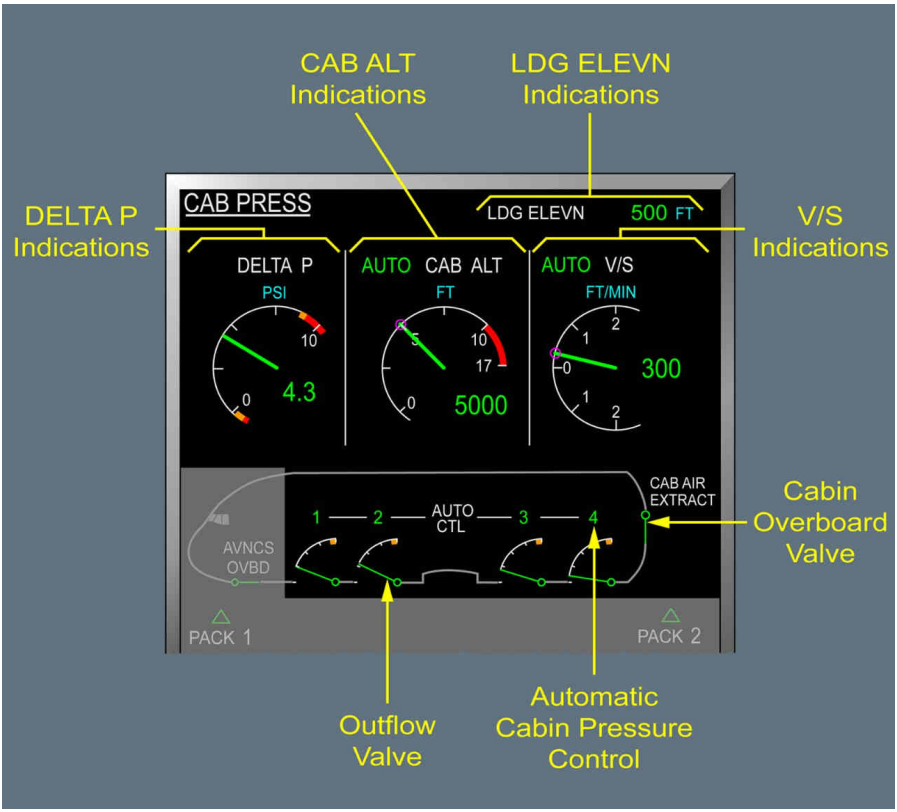
Both cabin overboard valves are open.

CAB PRESS SYSTEM DISPLAY

Applicable to: ALL

CAB PRESS SYSTEM DISPLAY

CAB PRESS System Display



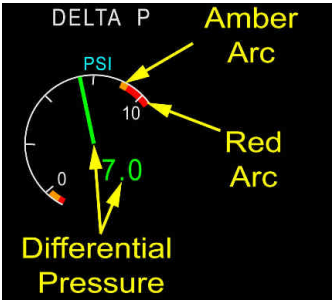
LDG ELEVN INDICATIONS



The landing elevation is 500 ft.

DELTA P INDICATIONS

DELTA P Indication



L2 Differential pressure display ranges from –1 PSI to 10.5 PSI.

L12



Differential pressure is normal.
The pressure is normal from -0.2 PSI to 8.92 PSI.
The green needle pulses during final approach, when the differential pressure is from 1.5 PSI to 8.92 PSI. It stops pulsing, when it goes below 1 PSI.

L12



Differential pressure is abnormal.
The amber arc indicates abnormal differential pressure from –0.72 PSI to -0.2 PSI, or from 8.92 PSI to 9.2 PSI.

L12



ifferential pressure is abnormal.
he red arc indicates abnormal differential pressure from –1 PSI to –0.72 PSI ,
r from 9.2 PSI to 10.5 PSI.

CAB ALT INDICATIONS

L2 The cabin altitude display ranges from –625 ft to +10 625 ft.

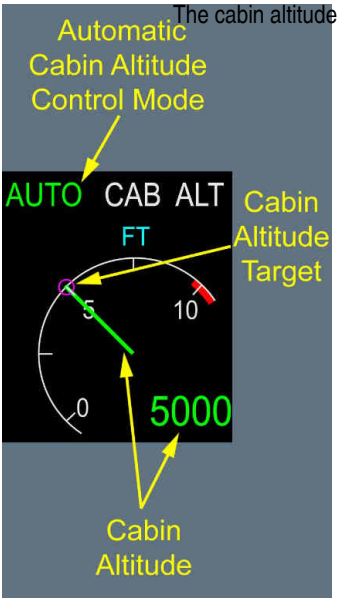
The cabin altitude needle pulses in green, if:
- The cabin altitude is higher than 8 300 ft, and lower than 9 550 ft.

The needle stops pulsing, if:
- The cabin altitude goes below 8 100 ft.

The red arc indicates the cabin altitude from 9 550 ft to 10 625 ft.

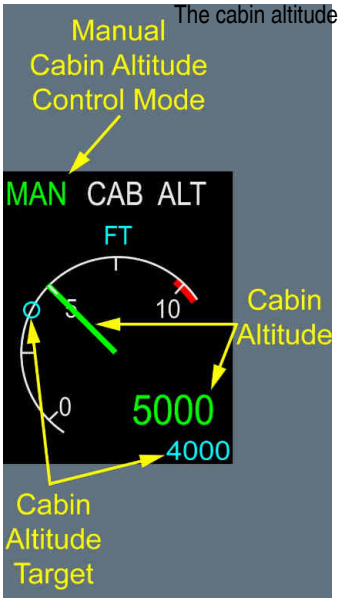
L1 AUTOMATIC CONTROL MODE

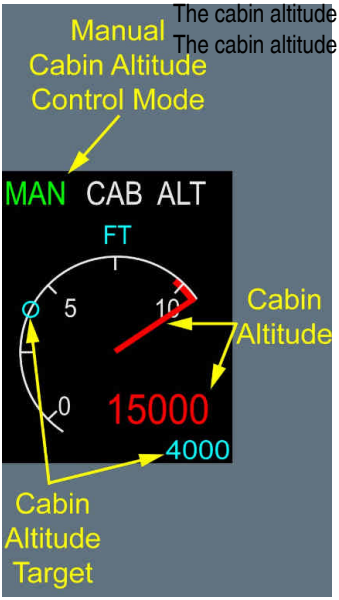
The cabin altitude control is in automatic mode.



MANUAL CONTROL MODE

The cabin altitude control is in manual mode.





The cabin altitude is in manual mode.
The cabin altitude is abnormal.

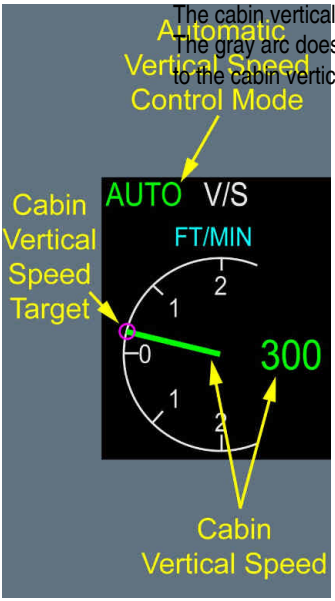
V/S INDICATIONS

L2 The cabin vertical speed display ranges from –2 500 ft/min to +2 500 ft/min.

The cabin vertical speed needle pulses in green, if:
- The cabin vertical speed is greater than 1 800 ft/min, and less than 6 350 ft/min.

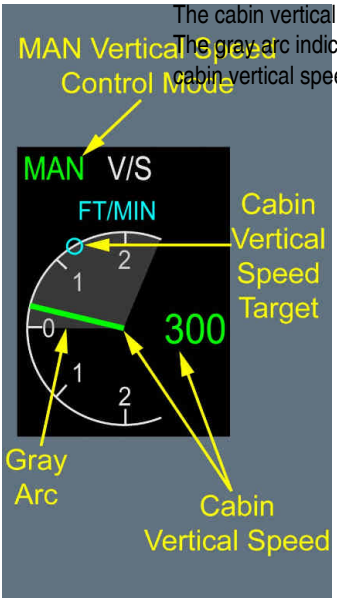
The needle stops pulsing, if:
- The cabin vertical speed becomes less than 1 600 ft/min, and is greater than –6 350 ft/min.

L1 AUTOMATIC MODE

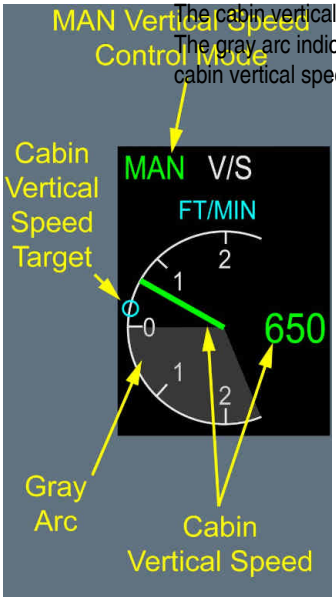


The cabin vertical speed is automatically controlled.
The gray arc does not appear, when the cabin vertical speed target is equal to the cabin vertical speed.

MANUAL MODE



The cabin vertical speed is manually controlled.
The gray arc indicates that the cabin vertical speed target is greater than the cabin vertical speed.



The cabin vertical speed is manually controlled.
The gray arc indicates that the cabin vertical speed target is lower than the cabin vertical speed.

CABIN AIR EXTRACT VALVE



The cabin air extract valves are closed.



The cabin air extract valves are open.



At least one cabin air extract valve is abnormally closed.



At least one cabin air extract valve is abnormally open.

OUTFLOW VALVE

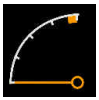


The outflow valve is normally open to regulate the cabin pressurization.

L12

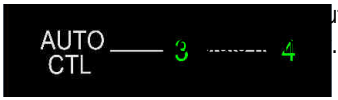


The outflow valve is fully open, and the aircraft is in flight.
Appears if the outflow valve is open by more than 95 %.



The outflow valve is abnormally closed.

AUTOMATIC OUTFLOW VALVE CONTROL



utflow valve control (e.g. AUTO CTL 3 and AUTO CTL 4)
.



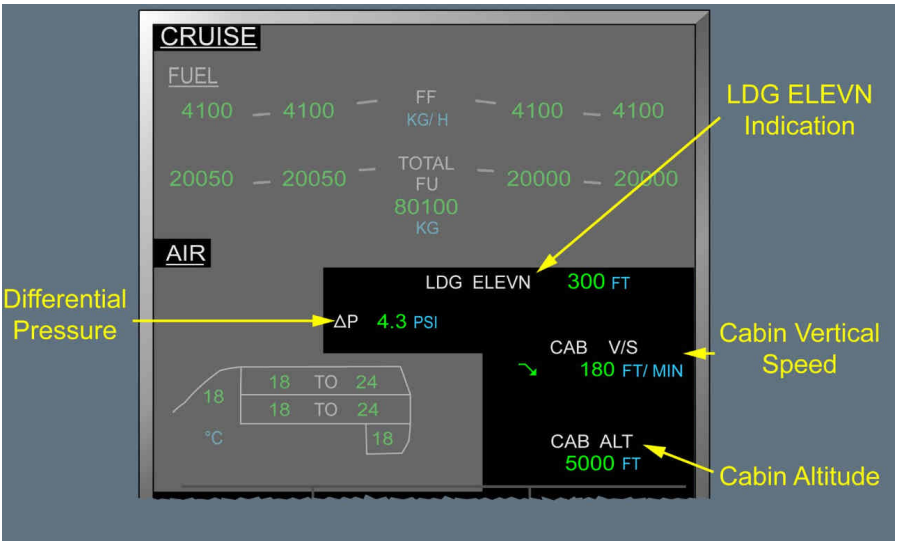
outflow valve control 4 operates normally.
outflow valve control 3 is failed.

CRUISE SYSTEM DISPLAY

Applicable to: ALL

CRUISE SYSTEM DISPLAY

CRUISE System Display



DIFFERENTIAL PRESSURE

L12



Differential pressure is normal.
Differential pressure is normal from –0.2 PSI to 8.92 PSI.

The differential pressure value pulses, when:
- The differential pressure is from 1.5 PSI to 8.92 PSI, and
- The aircraft is in final approach.

The differential pressure stops pulsing, when:
- The differential pressure goes below 1 PSI, or
- The aircraft is no longer in final approach.

L12



The differential pressure is abnormal.

The value of the differential pressure appears amber, if:
The differential pressure is from –0.72 PSI to –0.2 PSI
- The differential pressure is from 8.92 PSI to 9.2 PSI.

L12



The differential pressure is abnormal.

The value of the differential pressure appears red, if:
The differential pressure is lower than –0.72 PSI, or
- The differential pressure is greater than 9.2 PSI.

LDG ELEVN INDICATION



Appears in automatic operation.

CABIN VERTICAL SPEED

AUTOMATIC OPERATION

L12



The cabin vertical speed is automatically controlled.

The cabin vertical speed arrow:
Points up, when the cabin vertical speed is greater than 25 ft/min.
- Points down, when the cabin vertical speed is lower than –25 ft/min.
- Does not appear , when the cabin vertical speed is from –25 ft/min to 25 ft/min.

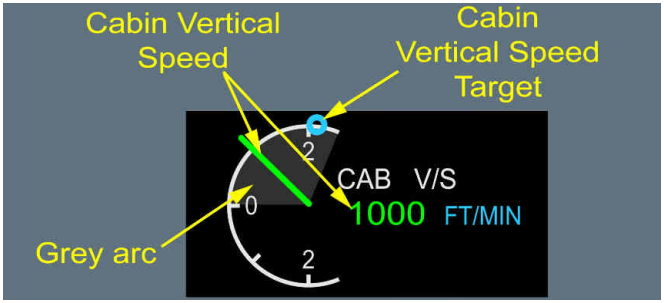
The cabin vertical speed value ranges from –6 350 ft/min to 6 350 ft/min.

The cabin vertical speed arrow, and the CAB V/S indication pulse, if:
- The cabin vertical speed ranges from -6 350 ft/min to –1 800 ft/min, and is lower, or equal to –1 600 ft/min for more than 5 s.
- The cabin vertical speed ranges from 1 800 ft/min to 6 350 ft/min, and is greater, or equal to 1 600 ft/min for more than 5 s.

The cabin vertical speed needle stops pulsing, when it ranges from –1 650 ft/min to 1 650 ft/min.

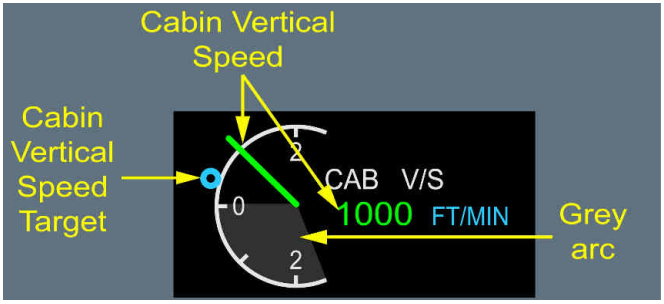
MANUAL OPERATION

Cabin Vertical Speed



The cabin vertical speed is manually controlled.
The gray arc indicates that the cabin vertical speed target is greater than the current cabin vertical speed.

Cabin Vertical Speed



The cabin vertical speed is manually controlled.
The gray arc indicates that the cabin vertical speed target is lower than the cabin vertical speed.
The gray arc does not appear when the cabin vertical speed is equal to the current cabin vertical speed.

L2 The cabin vertical speed display ranges from –2 500 ft/min to 2 500 ft/min.

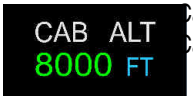
The cabin vertical speed needle, and the CAB V/S indication pulse, if:

- The cabin vertical speed ranges from -6 350 ft/min to –1 800 ft/min, and is lower, or equal to –1 600 ft/min for more than 5 s.
- The cabin vertical speed ranges from 1 800 ft/min to 6 350 ft/min, and is greater, or equal to 1 600 ft/min for more than 5 s.

The cabin vertical speed needle stops pulsing, when it ranges from –1 650 ft/min to 1 650 ft/min.

CABIN ALTITUDE

L12



Cabin altitude is normal.
Cabin altitude is normal from 2 000 ft to 9 550 ft.

L12



Cabin altitude is abnormal.
Cabin altitude is abnormal, when it is greater than 9 550 ft, with a landing field elevation lower than 9 550 ft.

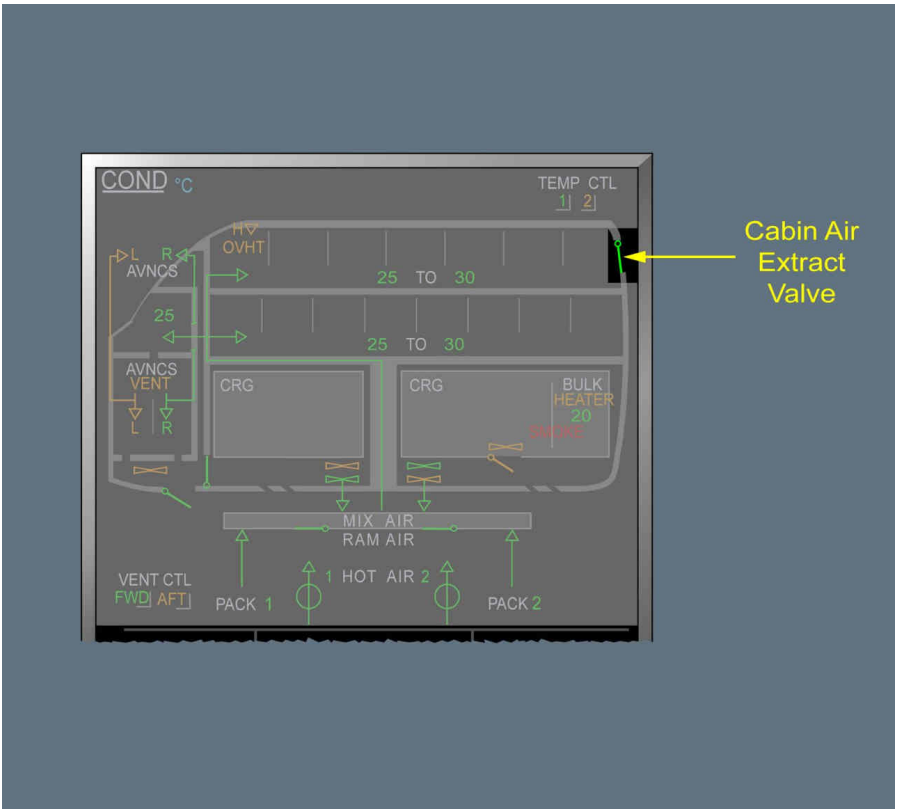
L2 The cabin altitude value ranges from 9 950 ft to 43 000 ft.
The CAB ALT indication pulses, if the cabin altitude value ranges from 8 300 ft to 9 550 ft, for more than 5 s. The CAB ALT indication stops pulsing, when the cabin altitude is lower than 8 100 ft.

COND SYSTEM DISPLAY

Applicable to: ALL

COND SYSTEM DISPLAY

COND System Display



CABIN AIR EXTRACT VALVE



The cabin air extract valves are closed.



The cabin air extract valves are open.



At least one cabin air extract valve is abnormally closed.



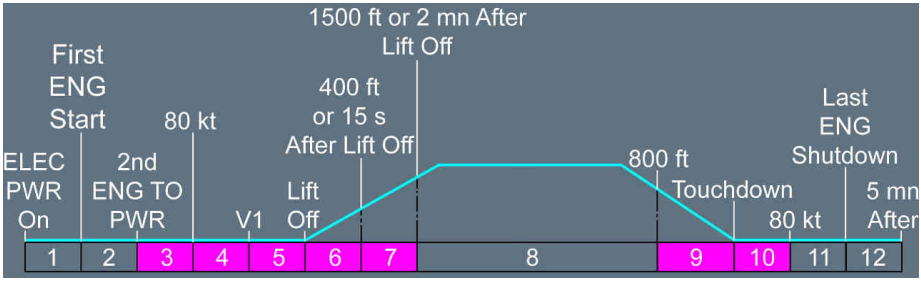
At least one cabin air extract valve is abnormally open.

MEMO

Applicable to: ALL

HI ALT AIRPORT The landing field elevation is above 8 550 ft . At least one flight crew member must don an oxygen mask.
For additional information on high altitude airport operation, *Refer to PRO-SPO-HAO High Altitude Airport Operation* .

Flight Phase Inhibition



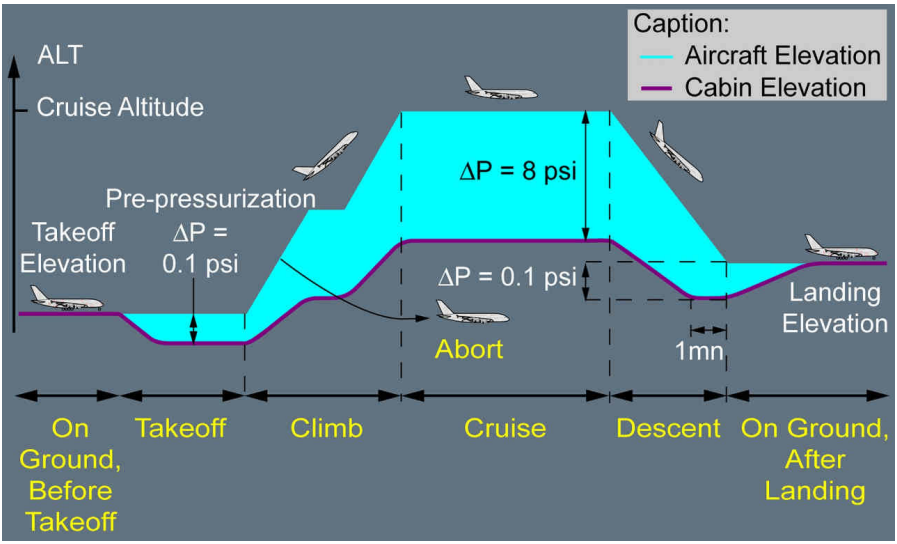
AUTOMATIC OPERATION

Applicable to: ALL

When the cabin pressurization system is automatically controlled (CAB ALT MODE pb-sw and CABIN V/S MODE pb-sw are both set to AUTO), the outflow valve controllers operate at the same time to automatically control cabin air pressurization, as follows:

PRESSURIZATION FLIGHT PROFILE

Pressurization Flight Profile



ON GROUND, BEFORE TAKEOFF

Before takeoff, all outflow valves open, to ensure there is no differential pressure between the air inside the aircraft and the external air.

TAKEOFF

During takeoff, the four pressure controllers pre-pressurize the aircraft to provide a smooth variation of the cabin vertical speed at liftoff.
The aircraft is pre-pressurized at a rate of –300 ft/min: This ensures a differential pressure of 0.1 PSI at liftoff.

L2 In addition, the aft outflow valves close during takeoff up to an altitude of 1 000 ft AGL.

L3 Closing the aft outflow valves is necessary to meet ditching requirements (e.g. ditching occurs just after takeoff).

L12

Note: *On ground, if at least one door is not closed and locked at takeoff power application: The four cabin pressure controllers will prevent cabin pressurization, by maintaining the four outflow valves open.*
In addition, the pack controller will keep both pack valves closed.

PRESSURIZATION TAKEOFF PHASE

The pressurization takeoff phase occurs, when:
- All doors are closed,
- The main landing gear is compressed, and
- At least three engines are at takeoff power.

CLIMB

During climb, when NAV mode is engaged, the cabin pressure is optimized for passenger comfort: The cabin vertical speed is determined to reach the scheduled cabin altitude at the top of climb defined by the FMS cruise FL.
During climb, when HDG mode is engaged, the cabin vertical speed is determined to reach a cabin altitude value, computed from the current aircraft altitude and vertical speed.

L2 The cabin vertical speed is limited to 1 000 ft/min.

Note: *When switching from NAV mode to HDG mode in climb, the cabin vertical speed computation logic changes (i.e. FMS flight plan data are not considered anymore). Therefore negative cabin V/S can be temporarily experienced during the transition.*

L3 **PRESSURIZATION CLIMB PHASE**

The pressurization climb phase occurs at liftoff (main landing gear no longer compressed).

CRUISE

During cruise, the cabin altitude is regulated not to exceed 7 500 ft.

L2 This corresponds to a differential pressure of approximately 8 PSI between the cabin air and the external air.

L3 **PRESSURIZATION CRUISE PHASE**

The pressurization cruise phase occurs, when:
- The cabin altitude is lower than 8 000 ft,
- The cabin altitude is 5 000 ft higher than the cabin altitude at takeoff, and
- The rate of climb of the aircraft is lower than 50 ft/min for at least 32 s.

DESCENT

During descent, the cabin vertical speed is controlled, to ensure that the cabin altitude reaches an altitude slightly below the landing field elevation prior to landing.

L2 The cabin pressure reaches the landing field pressure + 0.1 PSI, 1 min before landing.
This ensures that the aircraft is still pressurized at landing, and provides a smooth variation in cabin altitude if a go around is performed.
The aft outflow valves close at an altitude of 1 000 ft AGL, and remain closed until touchdown.

L3 Closing the aft outflow valves is necessary to meet ditching requirements (e.g. ditching occurs just after touchdown).

L2 The cabin descent rate is limited to 300 ft/min.

L3 PRESSURIZATION DESCENT PHASE

The pressurization descent phase occurs, when the aircraft rate of descent is greater than 150 ft/min.

ON GROUND, AFTER LANDING

At touchdown, all outflow valves open, to remove the residual differential pressure.

L3 Residual differential pressure removal takes less than 90 s.

PRESSURIZATION GROUND PHASE

The pressurization ground phase occurs, when the aircraft touches down (main landing gear compressed).

L2 ABORT

If the aircraft does not climb after takeoff, the cabin altitude will automatically stop climbing.
The cabin pressure is set back to the takeoff altitude pressure + 0.1 PSI.

L3 PRESSURIZATION ABORT PHASE

The pressurization abort phase occurs, when:

- The aircraft is at takeoff, and
- The aircraft altitude is lower than 8 000 ft, or the aircraft altitude is 5 000 ft higher than the aircraft altitude at takeoff,
- The aircraft rate of descent is greater than 250 ft/min.

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MANUAL OPERATION

Applicable to: ALL

If the automatic pressurization system fails, the flight crew can control the cabin air pressure, by using the manual pressurization system.

The manual pressurization system operates independently of the automatic pressurization system.

L2 To obtain the desired cabin altitude and vertical speed, the manual pressurization system uses external pressure from the ADIRS, as well as cabin pressure.

L1 There are two manual pressurization modes:

- The cabin altitude manual pressurization mode, that is activated by setting the CABIN ALT MODE pb-sw to MAN, and/or
- The vertical speed manual pressurization mode, that is activated by setting the CABIN V/S MODE pb-sw to MAN.

When any manual pressurization mode is activated, if no altitude or cabin vertical speed is selected on the CAB ALT TRGT selector or the V/S TRGT selector:

- The cabin altitude remains steady, and
- The cabin vertical speed is set at 0 ft/min.

CABIN ALTITUDE TARGET MANUAL PRESSURIZATION MODE

The flight crew selects the cabin altitude target on the CAB ALT TRGT selector.

If the vertical speed manual pressurization mode is not activated, the default vertical speed to reach the selected cabin altitude is:

- In descent: –300 ft/min
- In climb: 500 ft/min.

CABIN VERTICAL SPEED MANUAL PRESSURIZATION MODE

If the cabin vertical speed is selected on the CAB V/S TRGT selector(between –1 500 ft/min and +2 500 ft/min), the cabin altitude will change in accordance with the selected vertical speed, until the cabin altitude target is reached.

Note: The cabin altitude selection has priority over the selected vertical speed.

DITCHING

Applicable to: ALL

To prepare for ditching, the flight crew sets the DITCHING pb-sw on the CAB PRESS control panel to ON. This closes all the valves located below the flotation line.

L2 - The four outflow valves close.
- The overboard valve closes.

- All the cargo isolation valves close.
- The two pack valves close.
- The pack ram air inlet and outlets close.
- The two emergency RAM air inlets close.
- All the cabin fans stop.

In addition, when the DITCHING pb-sw is set to ON, the following functions are inhibited:
- The automatic inflation of escape slide at the M3 doors
- The automatic deployment of slide extension at the M1 doors.

ECAM ALERTS

Applicable to: ALL

CAB PRESS EXCESS CAB ALT (*Refer to procedure*)

CAB PRESS EXCESS DIFF PRESS (*Refer to procedure*)

CAB PRESS EXCESS NEGATIVE DIFF PRESS (*Refer to procedure*)

CAB PRESS EXCESS RESIDUAL DIFF PRESS (*Refer to procedure*)

CAB PRESS AUTO CTL FAULT (*Refer to procedure*)

CAB PRESS CTL REDUNDANCY LOST (*Refer to procedure*)

CAB PRESS DIFF PRESS HI (*Refer to procedure*)

CAB PRESS DIFF PRESS LO (*Refer to procedure*)

CAB PRESS INHIBITED BY DOORS (*Refer to procedure*)

CAB PRESS MAN CTL FAULT (*Refer to procedure)*

CAB PRESS OUTFLW VLV CTL 1(2)(3)(4) FAULT (*Refer to procedure*)

CAB PRESS OUTFLW VLV CTL FAULT (*Refer to Procedure*)

CAB PRESS SENSORS FAULT (*Refer to procedure*)

CAB PRESS SYS FAULT (*Refer to procedure)*

COND CABIN AIR EXTRACT VLV FAULT (*Refer to procedure)*

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Outflow Valve Controllers	Outflow Valve Controller 1	DC 1 or DC ESS
	Outflow Valve Controller 2	DC 1 or DC ESS
	Outflow Valve Controller 3	DC 2 or DC ESS
	Outflow Valve Controller 4	DC 2 or DC ESS

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AIRCRAFT SYSTEMS

22-27 - FLIGHT ENVELOPE

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VS1G

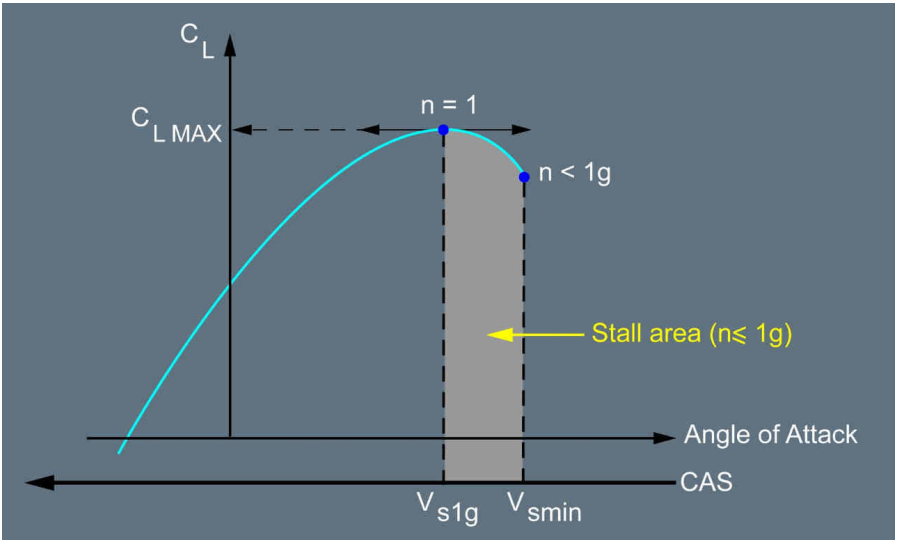
Applicable to: ALL

DEFINITION

Vs1g is the stall speed of the aircraft with a load factor of 1g, and idle thrust.
Vs1g is used as reference speed for the computation of other operational speeds (VLS, S, F, VREF).

L3 For conventional aircraft, the reference stall speed, Vsmin, corresponds to the conventional stall (i.e. when the lift suddenly collapses). At this moment, the load factor is always smaller than 1. This results in a Vsmin, which is lower than Vs1g.

Vs1g



Because of the high angle of attack protection (that the flight crew cannot override), the Airworthiness Authorities have reconsidered the definition of stall speed. It has been agreed that Vsmin = 0.94 * Vs1g.

L1 DISPLAY

Vs1g is not displayed.

L2 COMPUTATION

Vs1g is computed by the PRIMs.

It is a function of:
- slats / flaps position
- aircraft weight & CG
- aircraft altitude
- landing gear position

It is also computed by the FMS, for performance prediction, and characteristic speeds displayed on the MFD.

VLS

Applicable to: ALL

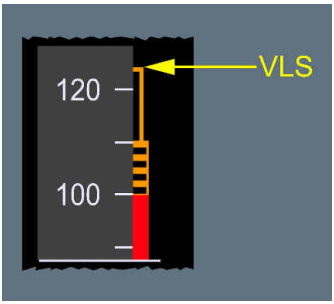
DEFINITION

VLS is the lowest selectable speed.
The speed target on the speed scale cannot be set below VLS .
VLS provides a margin against stall at low speeds, and towards buffet at high Mach number.

DISPLAY

VLS is displayed on the airspeed scale on the PFD .

VLS



VLS is displayed in flight only.

L3 VLS appears three seconds after liftoff and disappears at touchdown.

L1 *Note: The FMS also computes the VLS . It is displayed on the APPR panel of the FMS PERF page . (Refer to page)*

L2 COMPUTATION

VLS is computed by the PRIM s.

It is a function of:
- Vs1g
- The flight phase (takeoff, after takeoff, cruise, landing or go-around)
- The speed brake position

DURING TAKEOFF

VLS is the greater of:
- 1.15 * Vs1g, or
- The minimum of V2 /1.05 or 1.05 * VMCA

DURING ALL OTHER FLIGHT PHASES

As soon as the flaps configuration changes (crew action on lever or activation of the ARS), the computation of the VLS becomes the following:
- In CONF 1, after flaps auto retraction, VLS is the greater of:
  - 1.18 * Vs1g
  - VMCL (or VMCL-2 when two engines are inoperative on the same wing)
- In all other configurations, VLS is the greater of:
  - 1.23 * Vs1g

    Note: *1.19 * Vs1g in the case slats or flaps are jammed or failed.*

  - VMCL (or VMCL-2 when two engines are inoperative on the same wing)

SPEED BRAKE EFFECT

When the speed brakes are extended, VLS increases.
This increase is a function of the slats/flaps configuration and the speed brakes extension.
For full speed brakes extension, the following is added to VLS .

CONF	VLS increase
0	25 kt
1	25 kt
1+F	7 kt
2	10 kt
3	10 kt
FULL	8 kt

For speed brakes extension between 0 and full, the VLS increase is determined by linear interpolation.

GREEN DOT

Applicable to: ALL

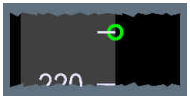
DEFINITION

Green dot is an optimized speed. It is an approximation of the best lift to drag ratio.
Flying at green dot speed provides the best climb performance.

Green dot is:
- The final takeoff speed
- The target speed in managed mode, when in CONF 0, when the approach phase of the FMS is active
- The drift down speed, in case of an engine failure.

DISPLAY

Green dot speed is displayed on the airspeed scale of the PFD .



Green dot speed is displayed in flight, when the FLAPS lever is at 0.

Note: The FMS also computes the green dot speed. It is displayed on the T. O, APPR, and GA panels of the FMS PERF page (Refer to page).

L2 COMPUTATION

Green dot speed is computed by the PRIM s.

It is a function of:
- The aircraft altitude
- The aircraft gross weight.

S

Applicable to: ALL

DEFINITION

S is:
- At takeoff or go-around: The minimum recommended speed at which the slats may be retracted from CONF 1+F or CONF 1 to CONF 0
- During approach: The target speed in managed mode, when in CONF 1 or CONF 1+F.

DISPLAY

S is displayed on the airspeed scale of the PFD .



S is displayed in flight, when the FLAPS lever is at 1.

L3 If the takeoff is performed in CONF 1+F, S appears three seconds after liftoff.

L1 *Note: The FMS also computes S . It is displayed on the T. O, APPR, and GA panels of the FMS PERF page (Refer to page).*

L2 **COMPUTATION**

S is computed by the PRIM s.

AT TAKEOFF

$S = 1.21 * Vs1g_{CONF\ 0}$

IN APPROACH

$S = \min [\max (1.21 * Vs1g_{CONF\ 0} ; VMCL + 20\ kt) ; VFE_{CONF\ 2} - 5\ kt]$

F

Applicable to: ALL

DEFINITION

F is:

- At takeoff or go-around: The minimum recommended speed at which the flaps may be retracted from CONF 2 or 3 to CONF 1+F after takeoff
- During approach: The target speed in managed mode, when in CONF 2 or CONF 3.

DISPLAY

F is displayed on the airspeed scale of the PFD .



F is displayed in flight, when the FLAPS lever is at 2 or 3.

L3 If the takeoff is performed in CONF 2 or 3, F appears three seconds after liftoff.

L1 *Note: The FMS also computes F . It is displayed on the T. O, APPR, and GA panels of the FMS PERF page (Refer to page).*

L2 **COMPUTATION**

F is computed by the PRIM s.

AT TAKEOFF

F = max (1.18 * $Vs1g_{CONF\ 1+F}$; VMCL + 5 kt)

IN APPROACH IN CONF 2

F = min [max (1.44 * $Vs1g_{CONF\ 2}$; VMCL + 15 kt) ; VFE_{CONF3} – 5 kt]

IN APPROACH IN CONF 3

F = min [max (1.32 * $Vs1g_{CONF\ 3}$; VMCL + 10 kt) ; $VFE_{CONF\ FULL}$ – 5 kt]

V ALPHA PROT

Applicable to: ALL

DEFINITION

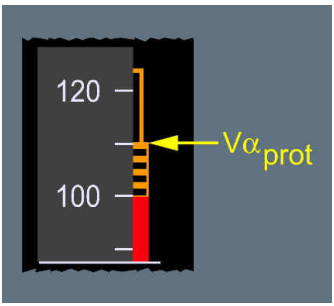
$V\alpha_{prot}$ is the speed at which the angle of attack is α_{prot}.
α_{prot} is the angle of attack at which the angle of attack protection becomes active.
For more information: *Refer to DSC-22-27-20 High Angle of Attack Protection*.

Note: In case of dynamic maneuvers, angle of attack protection may be active at a speed greater than $V\alpha_{prot}$.

DISPLAY

$V\alpha_{prot}$ is displayed on the airspeed scale of the PFD.

$V\alpha_{prot}$



$V\alpha_{prot}$ is displayed in flight, in normal law.

L3 $V\alpha_{prot}$ appears three seconds after liftoff and disappears at touchdown.

L2 COMPUTATION

$V\alpha_{prot}$ is computed by the PRIM s.

It varies with:
- The aircraft weight
- The altitude
- The Mach
- The slats/flaps configuration
- The speedbrake position.

V ALPHA MAX

Applicable to: ALL

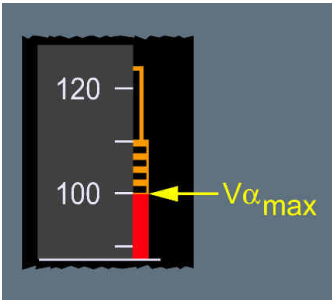
DEFINITION

$V\alpha_{max}$ is the speed at which the angle of attack is α_{max}.
α_{max} is the maximum angle of attack that can be reached in normal law.

DISPLAY

$V\alpha_{max}$ is displayed on the airspeed scale of the PFD.

$V\alpha_{max}$



$V\alpha_{max}$ is displayed in flight, in normal law.
L3 $V\alpha_{max}$ appears three seconds after liftoff and disappears at touchdown.

L2 COMPUTATION

$V\alpha_{max}$ is computed by the PRIMs.

It varies with:
- The aircraft weight
- The altitude
- The Mach
- The slats/flaps configuration
- The speedbrake position.

V ALPHA SW

Applicable to: ALL

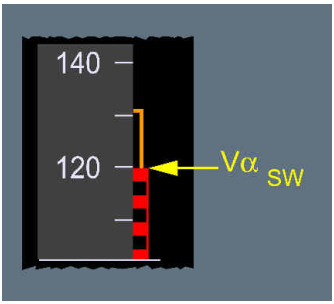
DEFINITION

$V\alpha_{sw}$ is the speed at which the angle of attack is α_{sw}.
α_{sw} is the angle of attack at which the stall warning is triggered.

DISPLAY

$V\alpha_{sw}$ is displayed on the airspeed scale of the PFD.

$V\alpha_{sw}$



$V\alpha_{sw}$ is displayed in flight, in alternate or direct law.

L3 $V\alpha_{sw}$ appears three seconds after liftoff and disappears at touchdown.

L2 COMPUTATION

$V\alpha_{sw}$ is computed by the PRIMs.

It varies with:
- The aircraft weight
- The altitude
- The Mach
- The slats/flaps configuration
- The speedbrake position.

Note: *The FWC computes the stall warning, independently of the computation of $V\alpha_{sw}$. If all PRIMs fail, $V\alpha_{sw}$ is lost, but the stall warning remains available.*

VMAX

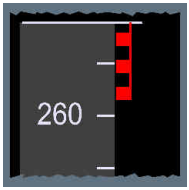
Applicable to: ALL

DEFINITION

VMAX is the maximum allowed speed.

DISPLAY

VMAX is displayed on the airspeed scale of the PFD .



VMAX is displayed in flight.

L3 VMAX appears three seconds after liftoff and disappears at touchdown.

L2 COMPUTATION

VMAX is determined by the PRIM s.

VMAX is equal to:

- In clean configuration, gear up : VMO / MMO
  Refer to LIM-13 Maximum Operating Speed VMO/MMO

  Note: The display of the VMAX does not take reflect the maximum speed displayed by the ECAM , if any (for example in direct law)

- In clean configuration, gear down : VLE / MLE
  Refer to LIM-13 Maximum Speeds with the Landing Gear Extended

  In clean configuration gear down revenue flight : VMO / MMO $_{\text{revenue flight}}$

  Note: Maintenance action is required before the revenue flight, to dispay VMO / MMO $_{\text{revenue flight}}$ instead of VMO / MMO .

  In high lift configuration, gear up : VFE
  Refer to LIM-13 Maximum Flaps/Slats Speeds

  In high lift configuration gear down : min (VFE , VLE / MLE)

When all PRIM s are failed, VMAX is equal to VMO / MMO , whatever the aircraft configuration (landing gear or slats/flaps).

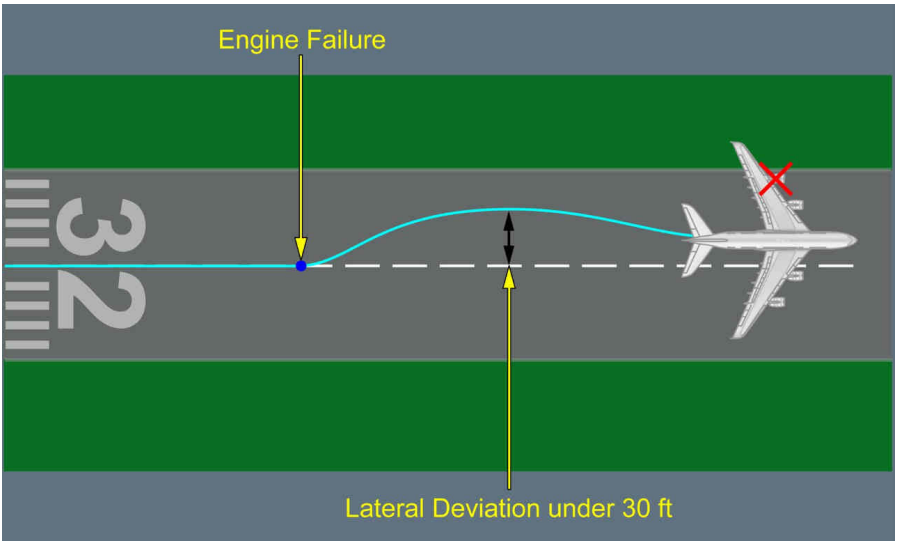
VMCG

Applicable to: ALL

DEFINITION

VMCG is the minimum speed on the ground during takeoff, at which the aircraft can be controlled by the use of primary flight controls only, after a sudden failure of the critical engine, the other engines remaining at takeoff power.
During the recovery maneuver, the path of the aircraft may not deviate from the runway center-line by more than 29.5 ft .

VMCG



DISPLAY

VMCG is not displayed.

L2 COMPUTATION

VMCG is not computed. It is determined during flight tests.
VMCG is used for takeoff speed computation. *Refer to PER-TOF-TOR-SRS Takeoff Speeds*

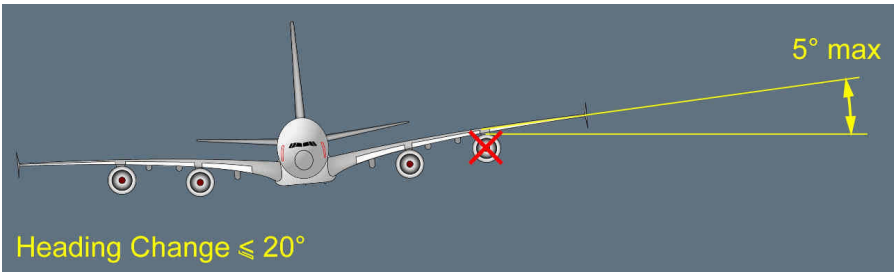
VMCA

Applicable to: ALL

DEFINITION

VMCA is the minimum speed in flight, at which the aircraft can be controlled with a maximum bank angle of 5 ° , after a sudden failure of the critical engine, the other engines remaining at takeoff power, with the gear up and the flaps in takeoff position.
During the recovery maneuver, the heading change may not exceed 20 ° .

VMCA



DISPLAY

VMCA is not displayed.

L2 COMPUTATION

VMCA is not computed. It is determined during flight tests.
VMCA is used for takeoff speed computation. *Refer to PER-TOF-TOR-SRS Takeoff Speeds*

VMCL

Applicable to: ALL

DEFINITION

VMCL is the minimum speed in flight, at which the aircraft can be controlled with a maximum bank angle of 5 ° , after a sudden failure of the critical engine, the other engines remaining at go-around power, with the gear up and the flaps in go-around position.

DISPLAY

VMCL is not displayed.
However, VLS is limited by VMCL .

L2 **COMPUTATION**

VMCL is not computed. It is determined during flight tests. *Refer to LIM-13 Minimum Control Speeds*

VMCL-2

Applicable to: ALL

DEFINITION

VMCL-2 is the minimum speed in flight, at which the aircraft can be controlled with a maximum bank angle of 5 ° , after two engines fail on the same wing, the other engines remaining at go-around power, with the gear up and the flaps in go-around position.

DISPLAY

VMCL-2 is not displayed.
However, when two engines are inoperative on the same wing, VLS is limited by VMCL-2 .

L2 *Note: If three engines are failed, VLS is not limited by VMCL-2 .*

COMPUTATION

VMCL-2 is not computed. It is determined during flight tests. *Refer to LIM-13 Minimum Control Speeds*

VMU

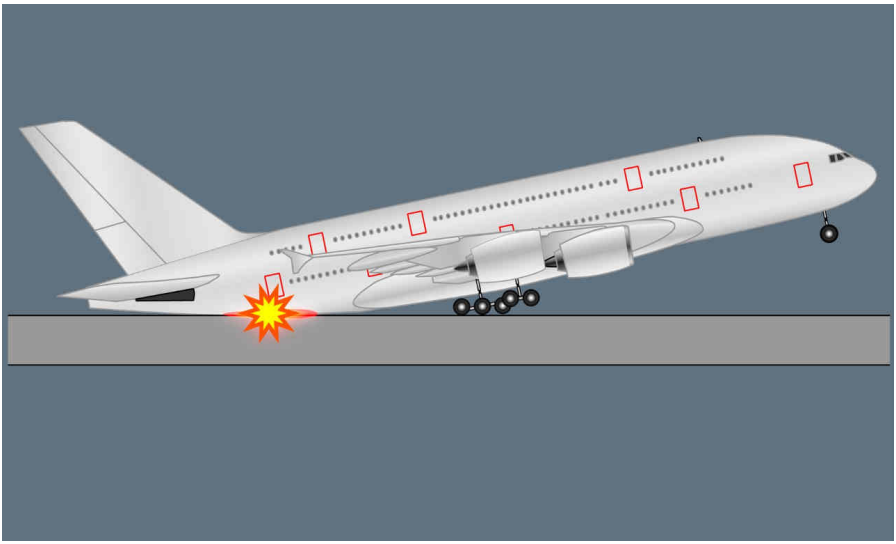
Applicable to: ALL

DEFINITION

VMU is the minimum speed at which the aircraft can safely lift off and continue the takeoff.
On geometrically limited aircraft, attempting to takeoff at a speed below VMU will result in a tailstrike.

L3 To demonstrate VMU during flight tests, at low speed, the pilot maintains full back stick until the tail touches the ground. This pitch attitude is maintained until the aircraft lifts off.

VMU



L1 **DISPLAY**

VMU is not displayed.

L2 **COMPUTATION**

VMU is not computed. It is determined during flight tests.
VMU is used for takeoff speed computation.

VFE

Applicable to: ALL

DEFINITION

VFE is the maximum speed with the slats or flaps extended.
There is one VFE per configuration. *Refer to LIM-13 Maximum Flaps/Slats Speeds*

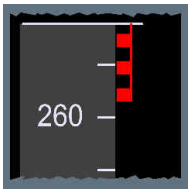
DISPLAY

The VFE is displayed on the airspeed scale of the PFD .

L2 The display of the VFE is based on:
- The actual position of the slats and flaps during retraction
- The position of the FLAPS lever during extension

In the case of a slats or flaps jamming, the display of the VFE is based on the actual position of the slats and flaps. The VFE corresponding to the abnormal configuration is also displayed on the ECAM .

L1



L2 **COMPUTATION**

The VFE s are not computed. They are included in the PRIM s. *Refer to LIM-13 Maximum Flaps/Slats Speeds*

Note: *The overspeed warning is independent of the display of the VFE s.*
When all PRIM s are failed, the VFE is not displayed, but the overspeed warning remains available.

VFE NEXT

Applicable to: ALL

DEFINITION

VFE NEXT is the VFE of the next more extended configuration.
The aim of VFE NEXT is to remind the flight crew the maximum speed at which they can extend the next configuration during approach.

DISPLAY

VFE NEXT is displayed on the airspeed scale of the PFD.



VFE NEXT is displayed in flight, below 20 000 ft.

L2 In the case of a slats or flaps jamming, the display of VFE NEXT is based on the actual position of the slats and flaps.

COMPUTATION

VFE NEXT is not computed. It is included in the PRIMs.

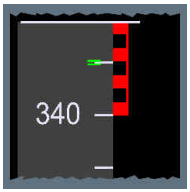
VMO / MMO

Applicable to: ALL

DEFINITION

VMO / MMO is the maximum speed in clean configuration.

DISPLAY



L2 COMPUTATION

VMO / MMO is computed by the ADIRU s.
VMO / MMO is sent to the PRIM s for display.

L3 There is a backup link between the ADIRU s and the CDS , to enable VMO / MMO display when all PRIM s fail.

L2 VMO / MMO is the smallest of:
- VMO
- MMO converted into CAS at this altitude.

Refer to LIM-13 Maximum Operating Speed VMO/MMO
During a revenue flight with gear down, the VMO / MMO $_{\text{gear down}}$ is displayed. (Maintenance action is required prior to dispatch).

V1

Applicable to: ALL

DEFINITION

V1 is the maximum speed at which the crew can decide to reject the takeoff, and is ensured to stop the aircraft within the limits of the runway.

DISPLAY

V1 is displayed on the airspeed scale of the PFD .



If V1 is outside of the airspeed scale, it is displayed at the top of the airspeed scale.



An auto call-out announces when the speed reaches V1 .

V1 Synthetic Voice

L2 COMPUTATION

V1 is not computed by the aircraft systems.
The crew inserts V1 on the T.O panel of the FMS PERF page.(*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page*)

VR

Applicable to: ALL

DEFINITION

VR is the speed at which the pilot rotates in order to reach V2 before reaching a height of 35 ft .

DISPLAY

VR is displayed on the airspeed scale of the PFD . It is represented by a blue dot.



L2 COMPUTATION

VR is not computed by the aircraft systems.

The crew inserts VR on the T.O panel of the FMS PERF page.(*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page*)

V2

Applicable to: ALL

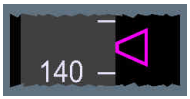
DEFINITION

V2 is the takeoff safety speed.

L2 V2 is determined in order to:
- Be reached before 35 ft , after rotation at VR , in case of an engine failure.
- Ensure a minimal climb gradient during the second segment
- Ensure a sufficient margin towards stall and VMCA . V2 must be greater than
  - 1.13 Vs1g
  - 1.10 VMCA

L1 DISPLAY

V2 is displayed on the airspeed scale of the PFD .



L2 COMPUTATION

V2 is not computed by the aircraft systems.
The crew inserts V2 on the T.O panel of the FMS PERF page.(*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page*)

VREF

Applicable to: ALL

DEFINITION

VREF is the reference speed used for normal approach and landing.
This speed is used to compute the regulatory landing performance of the aircraft.
It is also used as a reference when computing landing performance with failures.

DISPLAY

VREF is not displayed on the PFD .
It is displayed on the APPR panel of the FMS PERF page. (*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page*)

L2 **COMPUTATION**

VREF is equal to the VLS of CONF FULL.

VAPP

Applicable to: ALL

DEFINITION

VAPP is the final approach speed.

DISPLAY

There is no specific indication for the VAPP . It is displayed as the speed target during the approach phase.

L2 **COMPUTATION**

VAPP is computed by the FMS .
VAPP = $VLS_{LDG\ CONF}$ + (5 ≤ headwind/3 ≤ 15)
The VAPP can be updated by the crew on the APPR panel of the FMS PERF page. (*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page*)

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GENERAL

Applicable to: ALL

In the normal flight envelope, the flight control laws enable the same flying techniques than on a conventional aircraft.

In extreme situations, the flight control laws provide protections in order to:
- Give full authority to the flight crew in order to achieve the best possible aircraft performance
- Reduce the risk of over-controlling/over-stressing the aircraft
- Remain within safe limits.

Within the normal flight envelope, the autopilot is available. When out of the normal envelope, the AP disengages, and manual flight remains possible (efforts on the controls indicate the non-normal situation).

LOAD FACTOR PROTECTION

Applicable to: ALL

The load factor is automatically limited to:
- +2.5g to –1g, when the slats are retracted
- 2g to 0g, when the slats are extended.

BANK ANGLE

Applicable to: ALL

The maximum achievable bank angle is 67 °(60 ° in high lift configurations).

When the bank angle exceeds 45 °:
- The AP disengages
- The FD disappears, but remains engaged.

PITCH ATTITUDE PROTECTION

Applicable to: ALL

PITCH UP PROTECTION

The pitch attitude is limited to 30 ° nose up, progressively reduced to 25 ° at low speed.

When the pitch attitude is above 25 ° nose up:
- The AP disengages
- The FD no longer appears, but remains engaged.

PITCH DOWN PROTECTION

The pitch attitude is limited to 15 ° nose down.

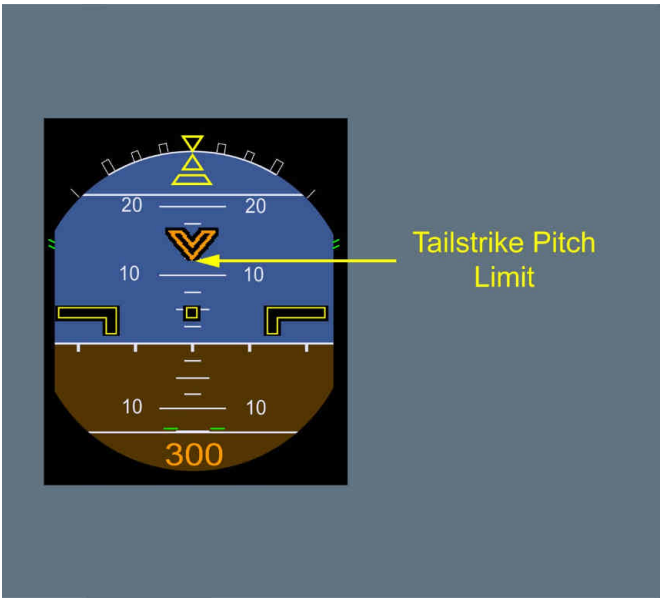
When the pitch attitude is below 13 ° nose down:
- The AP disengages
- The FD no longer appears, but remains engaged.

PITCH ATTITUDE ALERT

During landing, if the pitch attitude is excessive close to the ground, an aural alert “PITCH PITCH” is triggered.

Pitch Synthetic voice
The pitch attitude aural alert is available during manual landings, below 400 ft RA .
It is triggered when the pitch attitude is above 12 ° (i.e. maximum achievable geometrical angle on ground, with the landing gear compressed). For more information : *Refer to PRO-NOR-SOP-210-A Landing-GROUND CLEARANCE* .
A tailstrike pitch limit also appears for takeoff and landing. For more information: *Refer to Tailstrike Pitch Limit display conditions*

Tailstrike Pitch Limit



If a tailstrike is detected, the TAIL STRIKE alert is triggered (*Refer to procedure*).

HIGH SPEED PROTECTION

Applicable to: ALL

In normal law, the aircraft is protected against excessive overspeed.
The AP disengages at VMO + 15 kt or MMO + M 0.04 .
The high speed protection is active 10 kt above VMO or M .02 above MMO .

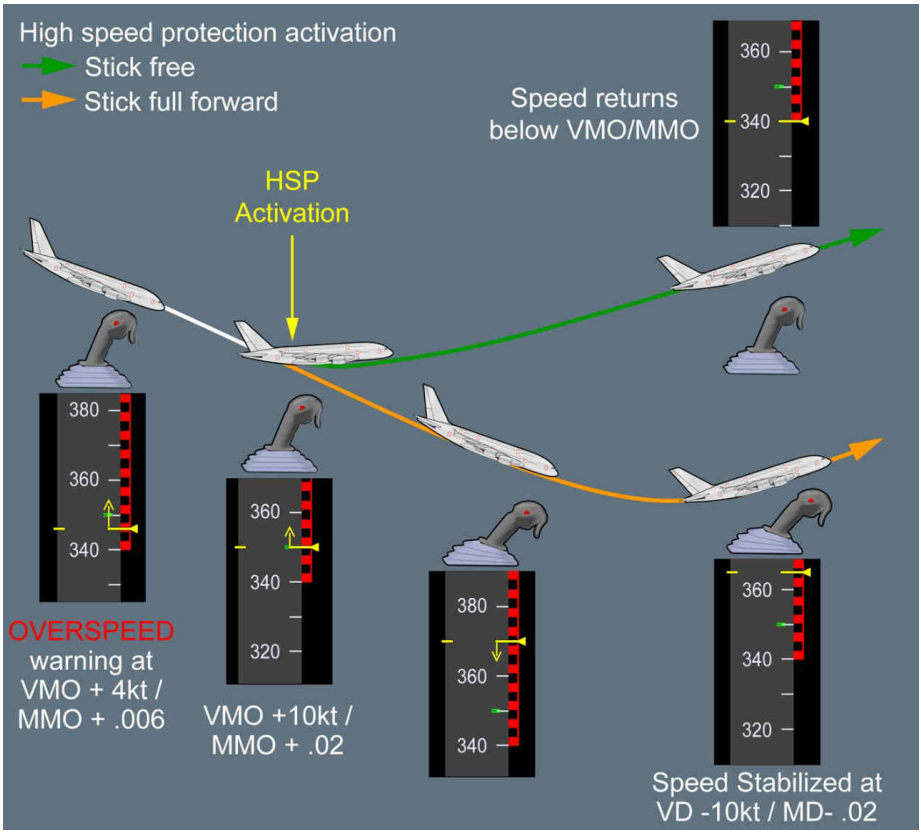
Note: Whatever the active flight control law, the OVERSPEED warning is triggered 4 kt above VMO , or M 0.006 above MMO (Refer to PRO-ABN-ECAM-10-27-10-50 OVERSPEED).

When high speed protection is active:
- The bank angle is limited to 45°
- The pitch trim position is frozen
- Positive static stability is restored (the pitch attitude increases when the speed increases)
- Positive spiral stability is restored (the bank angle returns to 0° when the sidestick is released)
- The speed stabilizes at VD - 10 kt / MD - M .02 if the sidestick is full forward,or
  The speed will return below VMO / MMO , if the sidestick is released.

L2 *Note: VD/MD is the design dive speed, which is the maximum structural speed.*

- *VD = 375 kt*
- *MD = M 0.96*

High Speed Protection

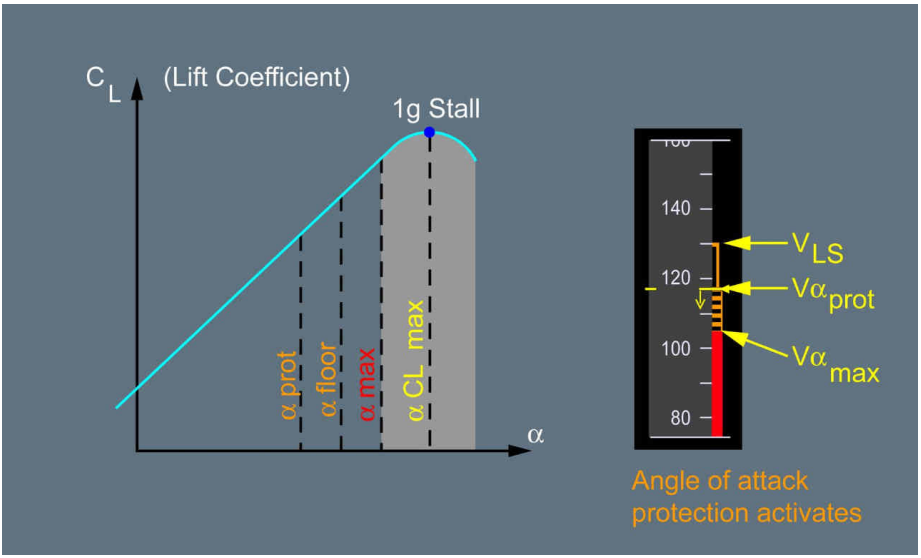


ANGLE OF ATTACK PROTECTION

Applicable to: ALL

In normal law, the aircraft is protected against stall, in dynamic maneuvers or gusts.
The angle of attack protection activates when the angle of attack exceeds α_{prot}. In any case, the angle of attack cannot exceed α_{max}.

Angle of attack protection



When the angle of attack protection is active:

- The pitch control law controls the angle of attack (the angle of attack is proportional to the sidestick deflection) between:
  - α_{max} (Full back stick)
  - α_{prot} (Sidestick at neutral)
- Static stability is restored
- The bank angle is limited by the maximum achievable load factor (The maximum achievable bank angle is greater than 45°).

LOW ENERGY PROTECTION

Applicable to: ALL

The objectives of the low energy alert and of the alpha floor function are to protect the flight path angle by providing means to achieve a proper level of energy:

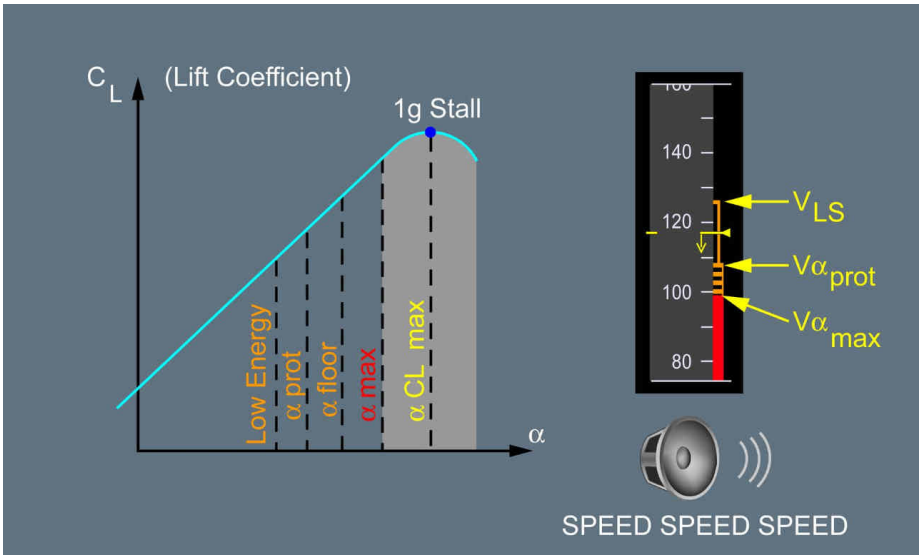
- The low energy alert is the first level of protection. It requires crew action, for manual thrust increase.
- The alpha floor function is the second level of protection. It automatically sets maximum thrust. For more information: *Refer to DSC-22-27-20-20A Alpha Floor Protection* .

When it is not possible to recover a positive flight path angle using the pitch control, an aural alert "SPEED SPEED SPEED" is repeated every 5 seconds, as long as the thrust has not been sufficiently increased.

Speed (Synthetic voice)
The low energy alert is triggered when the speed is between VLS and $V\alpha_{prot}$.

L2 The low energy alert is triggered when the speed is close to $V\alpha_{prot}$, but it can be triggered closer to VLS, in the case of:
- A negative flight path angle, or
- A negative speed trend.

Low Energy Warning



L1 The low energy alert will be triggered during deceleration before the activation of α-floor. The delay between the low energy alert and the activation of α-floor depends on the deceleration rate.

The low energy alert is available:
- Below 2 500 ft RA
- Above 100 ft RA for landing, above 200 ft RA for takeoff

- In CONF 2, 3 and FULL

L2 If the slats or flaps are jammed, the low energy alert is available when the aircraft is not in clean configuration.

L1 - In all flight control laws (Normal, Alternate, and Direct)

It is inhibited when:
- At least one engine thrust lever is at TOGA , or
- α-floor is active, or
- The angle of attack has reduced below the warning threshold.

L2 The low energy alert requires the following equipment
- 1 PRIM
- 1 ADIRS
- 1 RA

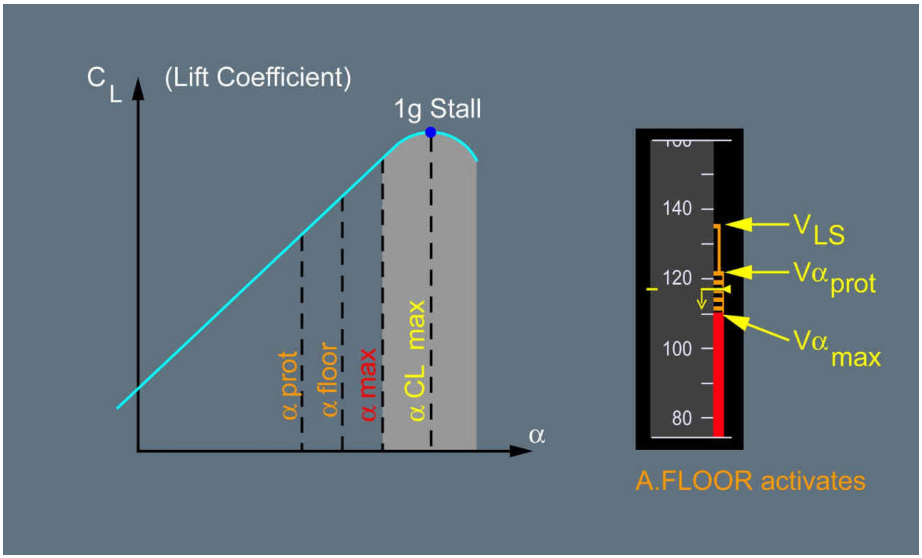
ALPHA FLOOR PROTECTION

Applicable to: ALL

To avoid flying at low speed with a low thrust, the α-floor function automatically applies TOGA thrust, when the angle of attack exceeds the α-floor threshold (between α-prot and α-max). TOGA thrust is applied, whatever the thrust lever position and A/THR engagement status.
If the A/THR was previously not active, it automatically activates. The thrust remains at TOGA , as long as the A/THR is active. (*Refer to DSC-22-FG-50-50-C A/THR Mode Reversion*)

L2 The α-floor function activates when one of the following conditions is true:
- The angle of attack is greater than α-floor (α-floor depends on the aircraft's configuration)
- The angle of attack protection is active, and the sidestick deflection is close to full back stick
- The pitch up attitude protection is active, and the sidestick deflection is close to full back stick

Alpha Floor



L1 α-floor is available:
- From liftoff down to 100 ft RA
- In normal law.

α-floor is inhibited if one of the following conditions occurs:
- The Mach is above 0.5
- The AP / FD TCAS mode engages following a Resolution Advisory, and the thrust levers are at or below the CL detent.

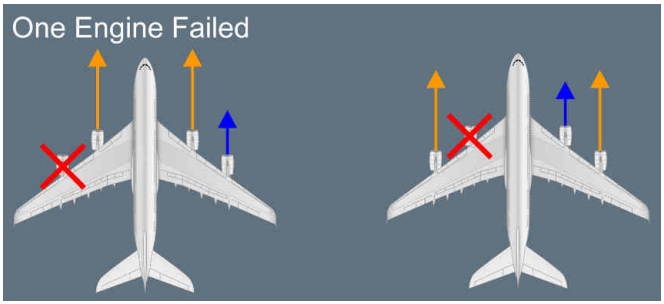
L3 If at least one thrust lever is below the CL detent, when the TCAS mode engages, the α-floor is inhibited during 5 s , to enable the flight crew to set the thrust levers to the CL detent.

L2 The α-floor remains inhibited as long as the TCAS mode is engaged.

ENGINE FAILURE CASE

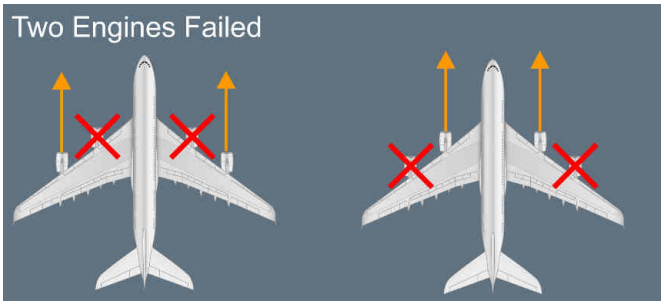
When one engine is failed, α-floor remains available. To avoid thrust dissymmetry, TOGA thrust will not be commanded on the engines opposite to the failed engine. On this engine, the thrust is frozen at the moment of α-floor activation.

One Engine Failed



When two engines are failed, α-floor remains available if the two failed engines are symmetrical (i.e. if engines 1 and 4, or engines 2 and 3 are failed).

Two Engines Failed



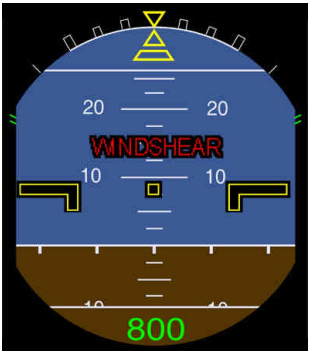
REACTIVE WINDSHEAR DETECTION

Applicable to: ALL

A windshear alert triggers, when the aircraft encounters wind gradients during takeoff and landing, which could reduce the margin towards stall.

The windshear alert consists of:

- A red windshear message displayed on both PFD.



It flashes during 9 s, then remains steady, as long as the windshear is detected.

- An aural WINDSHEAR alert

Windshear (Synthetic voice)

L2 The reactive windshear detection is performed by the PRIMs.

It is available:

- During takeoff: 3 s after liftoff, and until reaching 1 300 ft
- During landing: From 1 300 ft to 50 ft.

It is inhibited if the aircraft is in CONF 0.

AIRCRAFT SYSTEMS

22 - AFS INTRODUCTION

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DSC-22-INT-PLP PRELIMINARY PAGES

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SYSTEM DESCRIPTION

Applicable to: ALL

OVERVIEW

The Auto Flight System (AFS) includes:

- The Flight Guidance (FG)
  The FG provides guidance in accordance with flight targets selected by the flight crew, or managed by the Flight Management System.
- The Flight Management System (FMS)
  The FMS manages the flight plan, defined by the flight crew, and provides flight parameters to the FG accordingly.

The AFS also includes:

- The Flight Envelope (FE)
- The Flight Control Data Concentrator (FCDC).

FLIGHT GUIDANCE (FG)

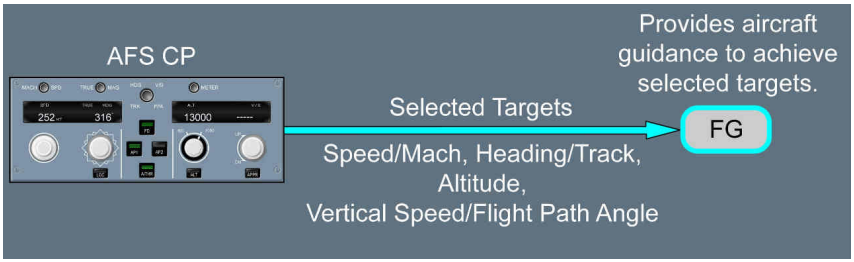
FG OBJECTIVES

The objectives of the FG are to provide lateral and vertical guidance, including speed or Mach control, based on defined targets. These targets can be either selected or managed.

Selected Targets

The flight crew selects the targets via the short-term interface: The AFS Control Panel (CP). Then the FG uses these targets to perform selected guidance.

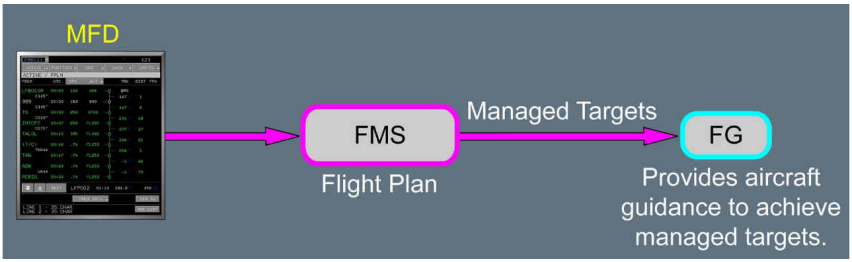
Selected Guidance



Managed Targets

The flight crew uses the long-term interface, the Multi Function Display (MFD), to prepare the flight plan. The FMS calculates managed targets accordingly. Then the FG uses these targets to perform managed guidance.

Managed Guidance



Selected and Managed Guidance — Combinations

Lateral guidance and vertical guidance can be selected or managed, independently of each other. However, managed vertical guidance is not possible, when selected lateral guidance is used.

L2 The following table outlines the possible combinations:

L12

		Lateral	
		Selected	Managed
Vertical	Selected	Yes	Yes
	Managed	No	Yes

L1 Speed or Mach can be either selected or managed, regardless of lateral and vertical guidance.

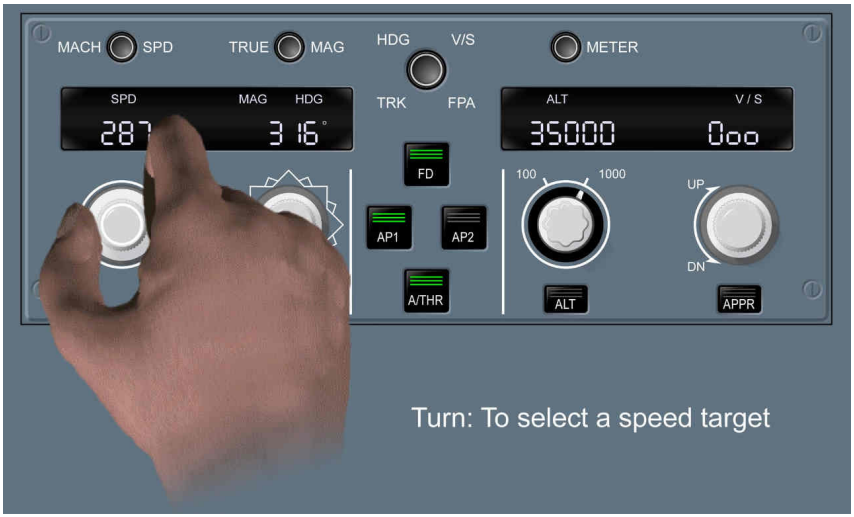
AFS CP Philosophy

On the AFS CP , the SPD /MACH, HDG / TRK , V/S / FPA knobs can be turned, pulled, and pushed. This enables the flight crew to:

- Preselect a target: Turn
- Engage a mode that will guide the aircraft to a selected target: Pull
- Arm or engage a mode that will guide the aircraft to a managed target: Push.

Here is an example with the SPD/MACH knob .

AFS CP Philosophy: Turn to Select a Speed Target



AFS CP Philosophy: Pull to engage selected speed mode



AFS CP Philosophy: Push to arm or engaged managed speed mode



When in managed guidance, the flight crew can take over control at any time, and change to selected guidance.

FG FUNCTIONS: AP , FD AND A/THR

In order to achieve its objectives (lateral guidance, vertical guidance, including speed or Mach control), the FG uses:

- The Autopilot 1 and/or 2 (AP 1 and/or AP 2)
  The AP provides flight guidance by calculating pitch, roll, yaw and nosewheel steering orders.
- The Flight Directors 1 and 2 (FD 1 and FD 2)
  The FD s display guidance orders on the PFD s to assist the flight crew to fly the aircraft manually. When the AP is engaged, the flight crew can use the FD orders to monitor the guidance.
- The Autothrust (A/THR)
  A/THR controls the thrust by sending commands to the engines.

Refer to AFS - FLIGHT GUIDANCE / GENERAL .

FLIGHT MANAGEMENT SYSTEM (FMS)

LONG-TERM GUIDANCE

The Flight Management System (FMS) provides long-term guidance along the inserted flight plan.

To achieve these long-term objectives, the FMS computes managed targets, that are then sent to the FG .

FMS FUNCTIONS

In addition to long-term guidance, the FMS :
- Provides flight planning and navigation information
- Calculates and optimizes performance data
- Displays information on the MFD , ND and PFD .

Refer to AFS - Flight Management System / General .

FLIGHT ENVELOPE (FE)

The FE computes the aircraft normal flight envelope. The FE is used by the FG and by the flight controls to prevent the aircraft from exiting the envelope.
Refer to DSC-22-27-20 General .

L3 FLIGHT CONTROL DATA CONCENTRATOR (FCDC)

The FCDC :
- Determines the approach capability for the AFS
  For more information, *Refer to Limitations / Required Conditions for F-APP, F-APP+RAW, or RAW ONLY Approach Capability* , and *Refer to Limitations / Required Equipment for CAT2, or CAT3 Approach Capability* .
- Interfaces the AP , FD and A/THR with the FWS to allow the associated alerts to be triggered
- Generates maintenance messages for the AFS (FG and FE).

The FCDC also performs functions for the flight controls (e.g. monitoring and display of the flight control surfaces position, transmission of flight control parameters to the recorders): *Refer to Flight Controls / FCDC* .

OVERALL ARCHITECTURE

Applicable to: ALL

GENERAL

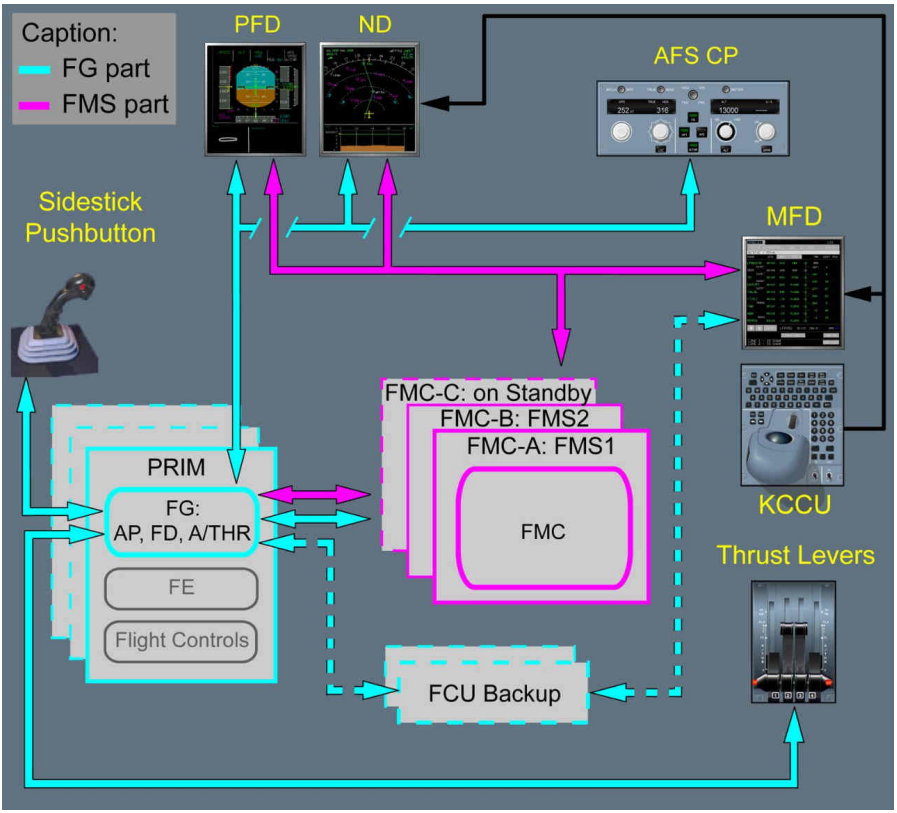
The AFS has:

- Three Primary flight control and guidance computers (PRIM s)
- Three Flight Management Computers (FMC s).

The flight crew interfaces with the AFS via:

- One AFS Control Panel
  The AFS CP has a backup, displayed on the MFD s. This backup is referred to as the FCU backup / AUTO FLT page.
- Two Multi Function Displays (MFD s)
- Two Primary Flight Displays (PFD s)
- Two Navigation Displays (ND s)
- One sidestick pushbutton on each sidestick
- Four thrust levers, and two A/THR instinctive disconnect pushbuttons.

OVERALL ARCHITECTURE



PRIMARY FLIGHT CONTROL AND GUIDANCE COMPUTER (PRIM)

There are three PRIM s, that operate the FG . Each PRIM can operate one or both AP s, and/or both FD s, and/or the A/THR .
The PRIM s also operate the FE and flight control functions.
For the PRIM architecture for the FG , *Refer to AFS - FLIGHT GUIDANCE / PRIM ARCHITECTURE FOR FG* .

FLIGHT MANAGEMENT COMPUTER (FMC)

There are two FMS s (FMS 1 and FMS 2), that are using three FMC s: FMC -A, FMC -B and FMC -C.

In normal operation:
- FMC -A operates FMS 1
- FMC -B operates FMS 2
- FMC -C is on standby, ready to operate FMS 1 or FMS 2.

Each FMC can operate all the flight management functions.
Refer to AFS - Flight Management System / Architecture .

AFS CONTROL PANEL

The AFS Control Panel is the main interface with the FG . The flight crew can:

- Engage managed or selected guidance
- Select targets for short-term guidance (speed/Mach, heading/track, altitude, vertical speed/flight path angle)
- Engage the AP , FD and A/THR
- Select altitude display in meters
- Select magnetic or true North reference.

In case the AFS CP fails, the MFD FCU BKUP / AFS CP page provides all the AFS CP controls and indicators (For more information, *Refer to Flight Guidance / FCU Backup*).

MULTI FUNCTION DISPLAY (MFD)

The MFD is the main interface with the FMS . It is also the interface of the FCU BKUP .
The flight crew can navigate through the MFD pages, and enter or modify data, with the Keyboard and Cursor Control Unit (KCCU).
For more information, *Refer to FMS / MFD* , and *Refer to Flight Guidance / FCU Backup* .

Note: The MFD also displays:
- *The Air Traffic Control (ATC) Communication pages*
- *The Surveillance (SURV) pages*
- *The FCU backup pages.*

PRIMARY FLIGHT DISPLAY (PFD)

The PFD mainly displays:
- Primary flight parameters (bank angle, pitch angle, speed, Mach, heading, track, altitude, vertical speed, flight path vector, velocity vector)
- Selected and managed guidance targets (e.g. speed and altitude targets)
- Armed and engaged modes, landing capability, AP, FD and A/THR engagement status on the Flight Mode Annunciator (FMA)
- Flight Director guidance orders
- Instrument approach information.

NAVIGATION DISPLAY (ND)

The ND mainly displays lateral and vertical parts of flight plans, and their associated navigation information. The flight crew can use the ND to modify the lateral part of the flight plan by using the KCCU.
The flight crew controls the ND display via an EFIS Control Panel, located on the glareshield.

SIDESTICKS

Asidestick pb located on each sidestick, allows the AP to be disengaged.
When the AP is not engaged, the flight crew uses the sidesticks to fly the aircraft.

THRUST LEVERS

The flight crew interfaces with the A/THR via the thrust levers. The detent positions are sent to the PRIMs. Then the A/THR sends thrust commands to the Full Authority Digital Engine Control (FADEC) system. The FADEC system regulates the engine thrusts.
When armed or active, the Autothrust can be disconnected by one of the two instinctive disconnect pushbuttons located on the thrust levers.

AIRCRAFT SYSTEMS

22 - AFS - FLIGHT GUIDANCE

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INTRODUCTION

Applicable to: ALL

Flight Guidance (FG) operates by using the following modes:

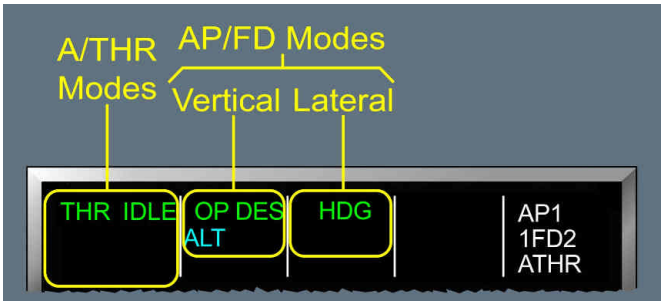
- AP/FD lateral modes
  These modes control the lateral trajectory.
- AP/FD vertical modes

  These modes can control either:
  - The vertical trajectory, or
  - The Speed or Mach.
- A/THR modes

  These modes can control either:
  - The thrust, or
  - The speed or Mach.

Speed or Mach cannot be simultaneously controlled by the AP/FD and the A/THR.
The FG modes appear on the Flight Mode Annunciator (FMA) of the Primary Flight Displays (PFDs).

A/THR Modes and AP/FD Modes

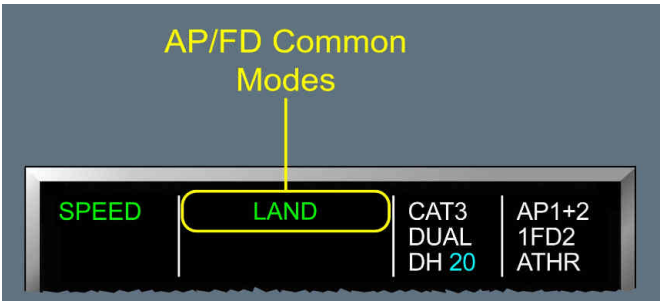


Some AP/FD lateral and vertical modes are specifically linked to each other to form common modes.
A common mode fulfills the objectives of both a lateral and a vertical mode.

LAND is an example of a common mode:

- The lateral objective is to guide the aircraft along the LOC beam
- The vertical objective is to guide the aircraft along the G/S beam.

AP/FD Common Modes



SELECTED AND MANAGED MODES

Applicable to: ALL

Guidance is either selected or managed. Therefore, the corresponding modes are also referred to as either selected or managed:

Guidance	Managed Modes	Selected Modes
Lateral	NAV LOC*, LOC LOC B/C*, LOC B/C F-LOC*, F-LOC RWY, RWY TRK GA TRK	HDG, TRACK
Vertical	SRS CLB ALT*, ALT ALT CRZ*, ALT CRZ ALT CST*, ALT CST DES G/S*, G/S F-G/S*, F-G/S TCAS	OP CLB ALT*, ALT ALT CRZ*, ALT CRZ OP DES V/S, FPA
Lateral and Vertical	LAND FLARE ROLL OUT (1)	
Speed or Mach	SPEED, MACH with FMS reference.	SPEED, MACH with AFS CP reference.

(1) *These modes are common modes.*

INTERACTION BETWEEN AP / FD AND A/THR

Applicable to: ALL

The AP / FD vertical mode determines the associated A/THR mode:

- When an AP / FD vertical mode controls a speed or Mach target, the A/THR mode controls thrust.

L2 The vertical trajectory is a result of speed or Mach, and of thrust.

L1 - When an AP / FD vertical mode controls the vertical trajectory, the A/THR mode controls a speed or Mach target.

Note: During ROLL OUT , and during FLARE with the AP on, the A/THR mode controls thrust at idle.

- If no AP / FD mode is engaged, A/THR engages in SPEED or MACH mode, in order to control a speed or Mach target.

AP / FD		A/THR	
Vertical Modes	**Objectives**	**Modes**	**Objectives**
SRS OP CLB CLB OP DES DES in idle path	Control of Speed or Mach Target	THRUST Modes	Control of Thrust
V/S / FPA ALT* , ALT ALT CST* , ALT CST ALT CRZ* , ALT CRZ DES in geometric path G/S* , G/S F-G/S* , F-G/S TCAS LAND common mode FLARE common mode with FD s engaged only	Control of Vertical Trajectory	SPEED / MACH	Control of Speed or Mach Target
FLARE common mode during autoland	Control of Vertical Trajectory	THRUST Mode	Control of Thrust at Idle
None		SPEED / MACH	Control of Speed or Mach

For information on AP / FD modes, *Refer to AP/FD Modes / General* .

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GENERAL

Applicable to: ALL

There are three PRIMs. Each PRIM can operate one or both APs, and/or FDs, and/or A/THR.

L2 Due to the fact that each PRIM can operate the A/THR, there are three A/THR channels.

L1 To determine which PRIM will operate the engaged AP(s), FDs, and A/THR, each PRIM computes its operational capability, taking into account:

- Manual flight control law capability
- FE, AP, and approach capability
- A/THR capability.

The Master PRIM is the PRIM that has the best operational capability. The Slave 1 PRIM has the second best operational capability, and the Slave 2 PRIM has the third best.

When all the PRIMs have the same capability:

- PRIM1 is the Master PRIM
- PRIM2 is the Slave 1 PRIM
- PRIM3 is the Slave 2 PRIM.

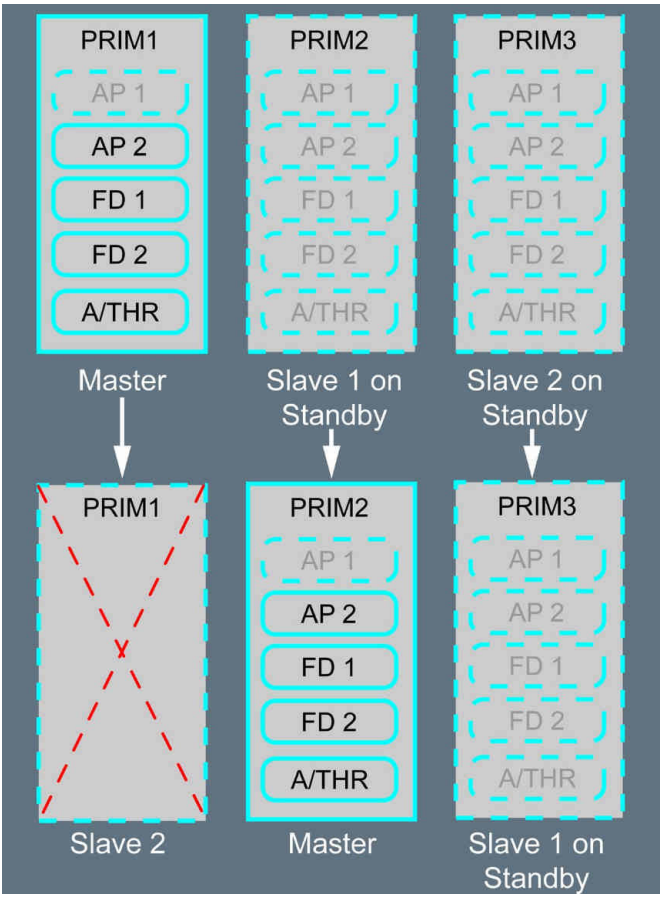
The Master PRIM has the priority to operate AP(s), FDs and A/THR.

If the Master PRIM loses the best operational capability, the engaged AP, FDs and A/THR do not disconnect. They are transferred to the Slave 1 PRIM, and:

- The Slave 1 PRIM becomes the Master PRIM
- The two other PRIMs become Slave 1 PRIM and Slave 2 PRIM.

In the following example, all the PRIMs initially have the same capability, AP2 is engaged, FDs are engaged, A/THR is armed or active, and PRIM1 fails:

PRIM Architecture

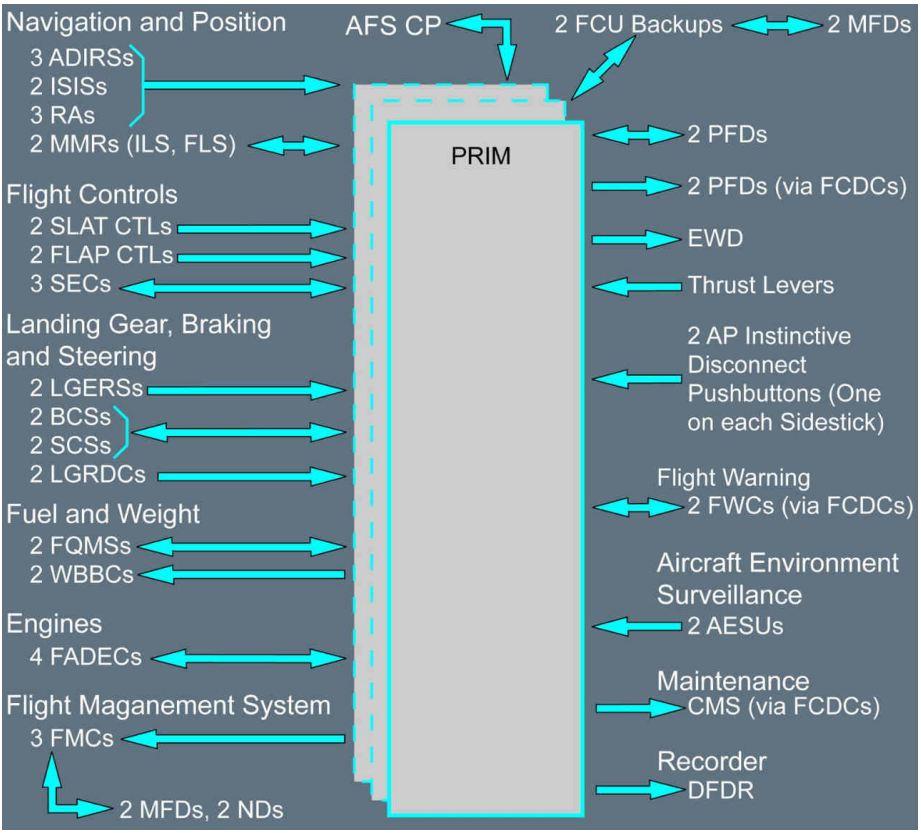


PRIM INTERFACES FOR FG

Applicable to: ALL

L2 The PRIM interfaces with the following peripheral systems:

PRIM Interfaces for FG



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GENERAL

Applicable to: ALL

The Flight Director (FD) displays guidance orders on the Primary Flight Displays (PFDs):
- If no AP is engaged, the flight crew can manually fly the aircraft by following FD orders
- If at least one AP is engaged, the flight crew can use the FD to monitor the flight guidance.

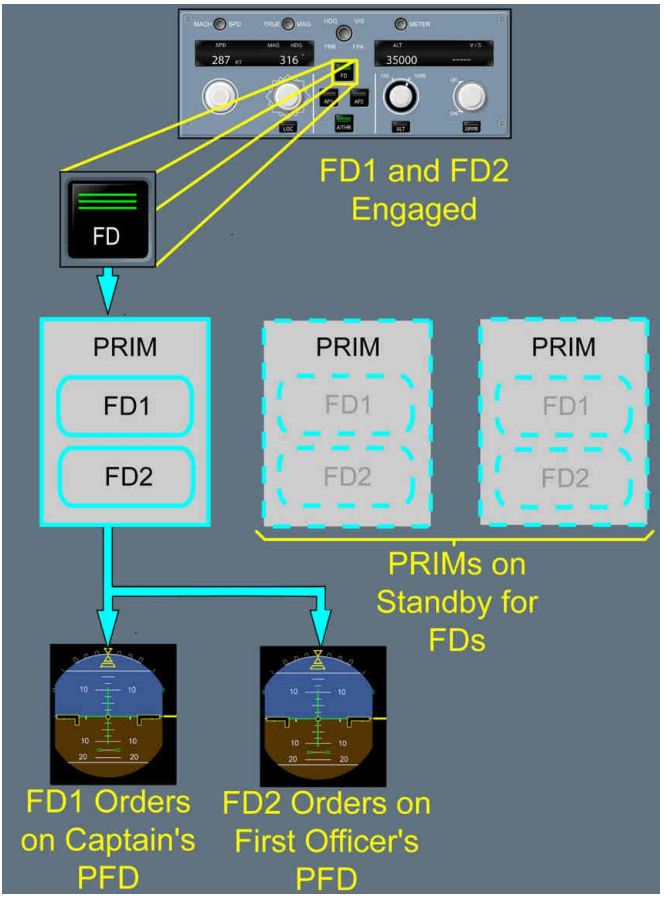
There are two FDs, referred to as FD1 and FD2:
- FD1 guidance orders appear on the Captain's PFD

FD1 uses data from the systems on the Captain's side:
- When in managed mode, FD1 guidance orders are computed by using FMS1 data
- L2 FD1 uses ADIRS1 data.

L1 - FD2 guidance orders appear on the First Officer's PFD.

FD2 uses data from the systems on the First Officer's side:
- When in managed mode, FD2 guidance orders are computed by using FMS2 data
- L2 FD2 uses ADIRS2 data.

Flight Director



FD DISPLAY

Applicable to: ALL

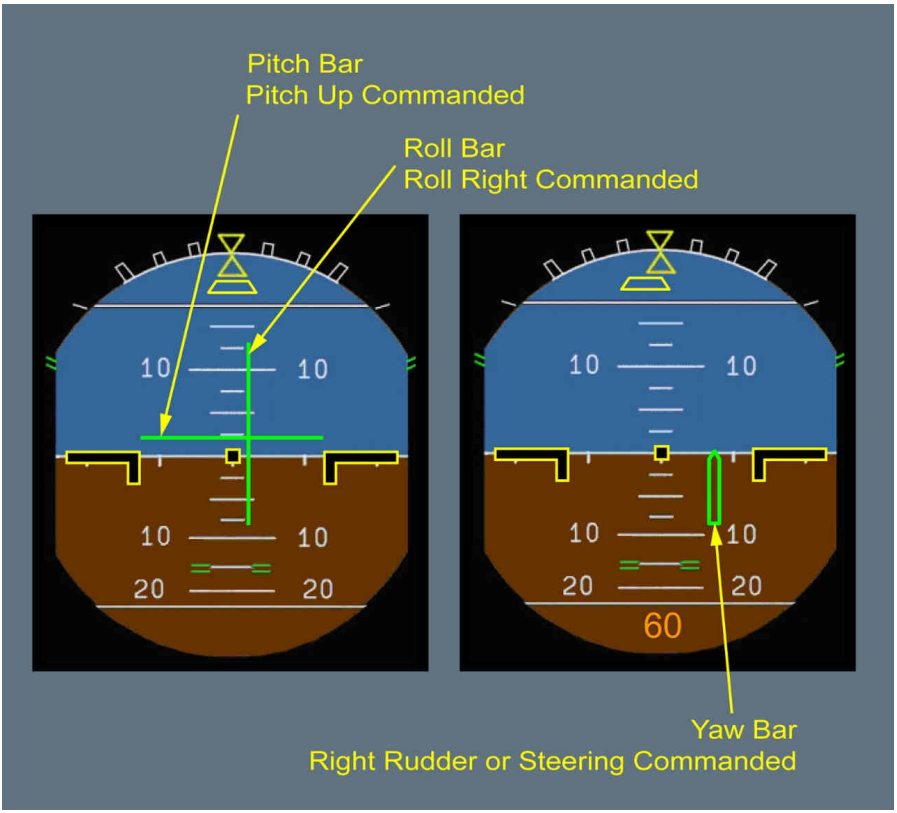
The pitch, roll, and yaw bars respectively indicate the pitch, roll, and yaw FD guidance orders.

Note: *Independently from FD display, the Flight Path Vector (FPV) or Velocity Vector (VV) can be displayed on the PFD s. The FPV (VV) does not indicate guidance orders. The flight crew must not use the FPV (VV) as guidance orders. However, the FPV (VV) provides an indication of the aircraft trajectory with respect to the ground reference.*
For definition and display conditions of the FPV (VV), Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector) .

FD s ARE ENGAGED

When the FD s are engaged, the PFD s can display the roll, pitch and yaw bars.

Pitch, Roll, and Yaw FD Bars



The roll bar appears on the PFD s, when a lateral mode is engaged.
The pitch bar appears on the PFD s , when a vertical mode is engaged.

In RWY , FLARE , and ROLL OUT , the yaw bar appears:
- With the pitch bar in RWY
- With the roll and pitch bars in FLARE
- Alone in ROLL OUT .

The FD bars disappear, if the aircraft pitch exceeds 13 ° down or 25 ° up, or if the aircraft bank angle exceeds 45 ° . However, the FD s remain engaged.

Note: *In this case, when the FD bars disappear, if the AP was previously engaged, it disengages.*

FD s ARE NOT ENGAGED

If the FD s are not engaged, the FD bars do not appear on the PFD s.

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INTRODUCTION

Applicable to: ALL

FD1 and FD2 engage at the same time.

L2 PRELIMINARY REQUIRED CONDITIONS FOR FD ENGAGEMENT

In order to be able to engage both FDs, all of the following conditions must be previously met:
- At least one PRIM is available
- At least two ADRs are available
- At least two IRS are available in NAV mode
- The AFS CP, or the AFS CP page of the FCU backup is available
- One of the following flight control laws is active: Normal, alternate 1A, or alternate 1B.

ENGAGEMENT CONDITIONS

Applicable to: ALL

GROUND ENGAGEMENT AT AIRCRAFT POWER-UP

The FDs automatically engage at aircraft power-up.

MANUAL ENGAGEMENT

Both FD1 and FD2 manually engage, when the flight crew presses the FD pb on the AFS CP. If no AP was previously engaged, then HDG or TRACK, and V/S or FPA engage. The FD bars flash for 10 s.

AUTOMATIC ENGAGEMENT

If not already engaged, FD1 and FD2 automatically engage, if:
- The flight crew engages a go-around , or
- The AP/FD TCAS mode engages upon a Resolution Advisory alert, or
- The AP disengages, when ROLL OUT is engaged.
  The PFDs then display the yaw bar.

ENGAGEMENT ANNUNCIATION

Applicable to: ALL

When the FD s engage:
- The FD pb on the AFS CP comes on
- 1FD2 appears on both FMA s
- When a mode is active, the PFD s display the FD orders.
  For FD display conditions on PFD s, *Refer to DSC-22-FG-30-20 FD Display* .

The engagement status of the FD appears in the AP , FD , A/THR engagement status column of both FMA s.

FD 1 and FD 2 Engaged



The possible FD messages are:

FMA Message	Meaning
1FD2	FD 1 and FD 2 are engaged.
1FD1	FD 1 is engaged, and FD 1 guidance orders are displayed on both PFD s.
2FD2	FD 2 is engaged, and FD 2 guidance orders are displayed on both PFD s.
No FD message	No FD is engaged.

DISENGAGEMENT OF BOTH FD s

Applicable to: ALL

In normal operation, FD 1 and FD 2 disengage at the same time.
When the FD s disengage with no AP engaged, lateral and vertical modes will disengage (if engaged).
If the A/THR is engaged in THRUST mode, A/THR automatically reverts to SPEED or MACH mode.
When the FD s disengage with one AP engaged, the AP lateral and vertical modes remain engaged.

MANUAL DISENGAGEMENT

The flight crew can manually disengage the FD s by pressing the FD pb .

AUTOMATIC DISENGAGEMENT

The FD s automatically disengage, if one of the following occurs:

- With no AP engaged, the aircraft speed is either:
  - Below VLS – 2 kt in DES or OP DES
    If the A/THR is engaged, it reverts to SPEED or MACH , and increases the thurst to recover the speed target. A triple click aural warning sounds.
  - Above VMAX + 4 kt kt in CLB or OP CLB.
    The OVERSPEED alert triggers.
    If the A/THR is engaged, it reverts to SPEED or MACH , and reduces the thurst to recover the speed target. A triple click aural warning sounds.

L3 - In ROLL OUT , the difference between the aircraft track and the runway track is more than 20 °

L1 - The FD s become inoperative.

L2 One of the preliminary conditions required for FD engagement is no longer met (*Refer to FD Engagement / Introduction*).

Note: 1. If the FD s are inoperative, the AP is also inoperative.
2. If both AFS CP and AFS CP page on FCU backup are not available, when LAND , FLARE , ROLL OUT or go-around is engaged, the FD s remain operative and engaged.

L1 *Note: If the FD s automatically disengage, they will not automatically reengage.*

DISENGAGEMENT ANNUNCIATION

Applicable to: ALL

When both FDs disengage:

- The FD pb goes off
- 1FD2 message is cleared from the FMA.

If FD1(2) disengages with the FD2(1) still engaged: The 2FD2 (1FD1) message replaces the 1FD2 message on both FMAs.

PITCH AND ROLL BAR FLASHING

Applicable to: ALL

The pitch and/or roll bars flash for 10 s on both PFD s:

- If an automatic mode reversion to HDG / TRACK (V/S / FPA) occurs
  The roll (pitch) bar will flash.
  A triple click aural warning sounds.
- If all AP and FD s were previously off, and the flight crew engages the AP or the FD s.
  HDG / TRACK and V/S / FPA engage. Both pitch and roll bars will flash.

The pitch and roll bars permanently flash on PFD 1(2), if a failure occurs in approach:

- LOC* , LOC B/C* , LOC , LOC B/C , LAND or FLARE is engaged, and:
  - The ILS 1(2) receiver fails, or
  - The GLS 1(2) receiver fails, or
  - The MMR 1(2) fails, or
  - The GLS ground station fails, or
  - The ILS transmitter fails.

  Note: 1. If only the LOC (G/S) signal is failed, only the roll (pitch) bar will flash.
  2. The pitch and/or roll bars flash on both PFD s.

L3 This is applicable above 15 ft RA .

L1 - F-LOC* , F-LOC , F-G/S* , or F-G/S is engaged, and:
  - The FLS function in MMR 1(2) fails, or
  - The MMR 1(2) fails, or
  - Three FMC s are fault.

  Note: The pitch and roll bars flash on both PFD s.

L3 This is applicable above 15 ft RA .

L1 The bar(s) stop flashing, when one of the engaged above mode disengages.

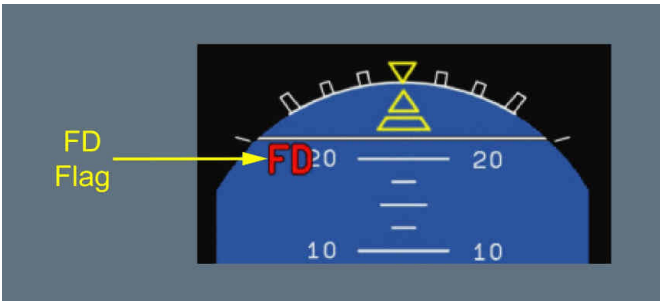
Note: In some cases, all AP and FD s disengage at once, or 7 s after the failure (Refer to AP Automatic Disengagement). Then, the FD s automatically reengage in HDG / TRACK and V/S / FPA . A triple click aural warning sounds. The FD bars flash for 10 s on both PFD s.

FD FLAG

Applicable to: ALL

If pitch, roll, and yaw orders are not available when the FDs are engaged: A red FD flag flashes on the PFDs, and then remains steady. The PFDs will not display the bars.

FD Flag



GENERAL

Applicable to: ALL

The Autopilot (AP):
- Stabilizes the aircraft around its center of gravity
- Controls the lateral trajectory
- Controls the vertical trajectory, or speed/Mach
- Coordinates with the A/THR
- Performs the automatic landing, or the go-around.

The AP generates:
- Pitch, roll, and yaw orders
- The nosewheel angle.

There are two APs: AP1 and AP2. Only one operates at a time.
L2 AP1 uses ADIRS1, and AP2 uses ADIRS2.

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Introduction

INTRODUCTION

Applicable to: ALL

AP1 and AP2 usually engage separately. In some conditions, the flight crew can engage both at the same time.

L2 PRELIMINARY CONDITIONS REQUIRED FOR AP ENGAGEMENT

In order to be able to engage AP1 and/or AP2, all of the following conditions must be previously met:

- At least one PRIM is available
- At least two ADRs are available
- At least two IRS are available in NAV mode
- The AFS CP, or the AFS CP page of the FCU backup is available
- One of the following flight control laws is active: Normal, alternate 1A, or alternate 1B.

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Engagement Conditions

ENGAGEMENT OF ONE AP

Applicable to: ALL

One AP engages when the flight crew presses the AP1 pb or the AP2 pb on the AFS CP, and:

- The aircraft is in flight for more than 5 s
- The aircraft pitch, bank angle, and speed are not excessive.

L2
- The pitch is between -11 ° and 22.5 °
- The bank angle is less than 40 °
- The speed is between VLS and VMAX.

Note: *1. In flight, the flight crew can also engage the AP, if the sidestick or rudder pedals are deflected. The AP becomes active, as soon as the flight crew stops moving the sidestick and the rudder pedals.*

2. AP engagement increases the breakout force on the sidesticks and on the rudder pedals.

L1 If the FDs were previously engaged, the AP engages in the current FD engaged modes.
If the FDs were not previously engaged, the AP engages in HDG or TRACK, and V/S or FPA. The FD bars flash for 10 seconds.

ENGAGEMENT OF BOTH AP s

Applicable to: ALL

When one AP is engaged, the flight crew can engage the other second AP by pressing the corresponding AP pb, when one of the following conditions is met:

- The following approach modes are armed or engaged:
  - LOC is armed, or LOC* or LOC is engaged, and
  - G/S is armed, or G/S* or G/S is engaged

L3 - LAND is engaged

L1 - Go-around is engaged.

When both APs are engaged, AP1 is active, and AP2 is on standby, regardless of the order of AP engagement.

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Engagement Annunciation

ENGAGEMENT ANNUNCIATION

Applicable to: ALL

When AP1(2) engages:
- The AP1(2) pb comes on
- Both FMAs display:
  - AP1 (AP2)
  - AP1+2, if both APs are engaged.

The engagement status of the AP appears in the AP, FD, A/THR engagement status column of FMAs.

AP1 Engaged



The possible AP messages are:

FMA Message	Meaning
AP1	AP1 is engaged.
AP2	AP2 is engaged.
AP1+2	Both APs are engaged.

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MANUAL DISENGAGEMENT

Applicable to: ALL

The flight crew disengages one AP by pressing the AP1(2) pb, when AP1(2) is already engaged.

The flight crew disengages all AP(s) engaged by:

- Pressing the sidestick pb on either sidestick, or
- Moving a sidestick, or

L3 The sidestick deflection goes beyond 5° on pitch axis, or 6° on roll axis.

L1 - Moving the rudder pedals.

L3 The rudder pedal deflection goes beyond 10°.

L1 Airbus recommends disengaging all AP(s) engaged by pressing the sidestick pb two times. The other ways of disengagement are to be avoided. Disengaging all AP(s) engaged by moving a sidestick, or the rudder pedals may be very uncomfortable for passengers.

Note: *At the end of the flight, any engaged AP will not automatically disengage.*

AUTOMATIC DISENGAGEMENT

Applicable to: ALL

The AP automatically disengages, if one of the following occurs:

- The aircraft pitch, bank angle, speed/Mach, or Angle Of Attack (AOA) becomes excessive:

L2 • The pitch is below - 13 ° , or above 25 °

Note: The FD bars no longer appear.

• The bank angle exceeds 45 °

Note: The FD bars no longer appear.

• The speed is above VMO + 15 kt , or the Mach is above MMO + 0.04
For information on high speed protection, *Refer to Flight Envelope / High Speed Protection* .

L1 • The angle of attack is above α_{prot} + 1 ° .
L3 This is applicable above 100 ft RA .
L1 For information on angle of attack protection, *Refer to Flight Envelope / Angle of Attack Protection* .

L3 This is not applicable in LAND below 200 ft RA .

L1 - A failure occurs in approach:

• The three RA s are fault, when:
■ LOC is armed, or
■ LOC* or LOC is engaged, or
■ LAND or FLARE is engaged.

• The ILS transmitter fails, when LOC* , LOC , LOC B/C* , LOC B/C , or LAND is engaged
L3 This is applicable above 200 ft RA .
The failure must be confirmed for 7 s .

L1 • The GLS ground station fails, when LOC* , LOC , or LAND is engaged
L3 This is applicable above 200 ft RA .
The failure must be confirmed for 7 s .

• The three FMC s are fault, when F-LOC* , F-LOC , F-G/S* or F-G/S is engaged
The FLS deviations are no longer available.
This is applicable above 200 ft RA .
The triple FMC failure must be confirmed 7 s .

L1 • Both ILS receivers, or both MMR s fail, when:
■ LOC or LOC B/C is armed, or
■ LOC* , LOC , LOC B/C* , LOC B/C , LAND , FLARE , or ROLL OUT is engaged.

• Both GLS receivers fail, when:
■ LOC is armed, or
■ LOC* , LOC , LAND , FLARE , or ROLL OUT is engaged.

- The FLS function in both MMR s are failed, or both MMR s are failed, when:
  - F-LOC , or F-G/S is armed, or
  - F-LOC* , F-LOC , F-G/S* , or F-G/S is engaged.

L2 • The difference between the aircraft track and the runway track is above 7 ° when in LOC , or LAND .

L3 The difference must be confirmed 5 s .
This is applicable between 700 ft and 200 ft RA .

L1 *Note: 1. In all these cases of failure in approach: If the FD s were previously engaged, they disengage, and reengage in HDG / TRACK and V/S / FPA . A triple click oral warning sounds. The FD bars flash for 10 s .*
2. If the LOC, F-LOC, G/S or F-G/S deviation is lost, the FD pitch and/or roll bars may permanently flash: Refer to DSC-22-FG-30-50 Pitch and Roll Bar Flashing .

- Both AP s are engaged in SRS GA , and SRS GA disengages
AP 2 disengages, and AP 1 remains engaged.

L3 - The aircraft is on ground in autoland, and the flight crew:
  • Initiates a go-around (SRS GA and GA TRK engage)

    Note: If the FD s were not previously engaged, they engage.

  • Or sets all thrust levers on or above FLX/MCT detent.

- During an autoland in ROLL OUT , the difference between the aircraft track, and the runway track is more than 20 °

  Note: If the FD s were previously engaged, they disengage.

L2 - The flight crew has engaged the AP while the sidestick or the rudder pedals are deflected, and the sidestick or rudder pedals are still deflected 6 seconds after AP engagement

L1 - The AP becomes inoperative.

L2 One of the preliminary conditions required for AP engagement is no longer met (*Refer to AP Engagement / Introduction*).

Note: 1. If the AP is failed, the FD s are also failed.
2. If both AFS CP and AFS CP page on FCU backup are not available, when LAND , FLARE , ROLL OUT or go-around is engaged, the AP remains operative and engaged.

DISENGAGEMENT ANNUNCIATIONS AND WARNINGS

Applicable to: ALL

When AP 1(2) disengages:
- AP1(2) pb goes off
- On both FMA s:
  - If one AP was previously engaged, the AP1 (AP2) message disappears
  - If both AP s were previously engaged, the AP2 (AP1) message replaces the AP1+2 message.

Different warnings will trigger, depending on the way of disconnection.

Note: When both AP s are engaged, and only one AP disengages, the warnings will not trigger.

DISCONNECTION VIA THE SIDESTICK PUSHBUTTON

The normal way to disconnect the AP is to press the sidestick pushbutton two times.

When the flight crew presses the sidestick pushbutton for the first time, the following warnings will trigger, and will continue, until the flight crew presses the sidestick pushbutton a second time:
- The AP OFF memo appears on the PFD s and on the EWD
- A cavalry charge, at low volume

L3 The maximum duration is 0.8 s .

L1 - The MASTER WARN light comes on.

L2 The flight crew must press the sidestick pushbutton two times within 1.8 s .

Note: If the flight crew presses the sidestick pushbutton one time, then presses the MASTER WARN light within 1.8 s , the above warnings will stop.

L1 If the flight crew does not quickly press the sidestick pushbutton a second time, the following additional warnings will trigger:
- A cavalry charge, at high volume
- The AUTO FLIGHT AP OFF alert.

L2 The additional warnings will trigger 1.8 s after the sidestick pushbutton is pressed the first time.

L1 Pressing the MASTER WARN light , or the sidestick pushbutton a second time, will clear all warnings and memos.

OTHER WAYS OF DISCONNECTION

If the AP disengages, without any flight crew action on the sidestick pushbutton, the following warnings will trigger:
- Cavalry charge at high volume
- The AUTO FLIGHT AP OFF alert.

L2 For more information, *Refer to PRO-ABN-ECAM-10-22-FG-10 AUTO FLT AP OFF* .

L1 When the flight crew presses the MASTER WARN light , or the sidestick pushbutton (one time), all warnings will stop.

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GENERAL

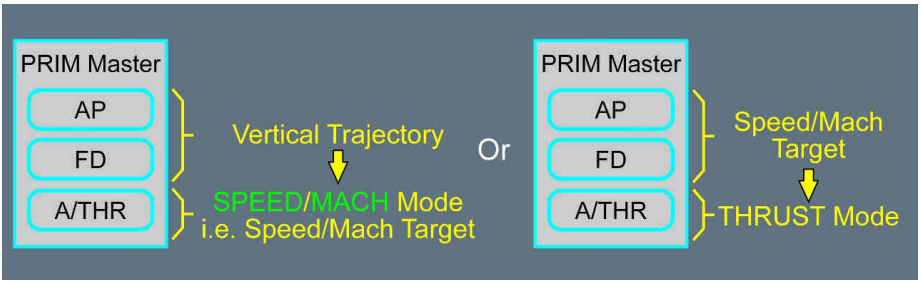
Applicable to: ALL

The autothrust (A/THR) manages the engine thrust.
The A/THR is either armed, active, or disconnected.

When active, the A/THR can work in two different types of mode:
- SPEED / MACH mode: The A/THR continuously adjusts the thrust in order to maintain a speed/Mach target, e.g. during cruise, and approach
- THRUST modes: The A/THR controls a fixed thrust, in accordance with the engaged THRUST mode.

The A/THR modes are automatically linked to the AP / FD vertical modes:
- When an AP / FD vertical mode controls the trajectory (e.g. altitude acquire modes, altitude hold modes, V/S / FPA , G/S , F-G/S), the A/THR is in SPEED / MACH mode
- When an AP / FD vertical mode adjusts the aircraft pitch in order to keep a speed/Mach target (e.g. climb, descent), the A/THR is in THRUST mode.

AP / FD / A/THR Interaction



When the A/THR is active, the A/THR thrust target is sent to the four FADEC s. The FADEC s computes thrust commands, in accordance with the aircraft environment and status. The thrust commands are then sent to the engines.
When the A/THR is armed, the FADEC s compute the thrust commands in accordance with the thrust lever positions, and the selection of FMS PERF page - T.O panel.
When the A/THR is disconnected, the FADEC s compute the thrust commands in accordance with the thrust lever positions.
For more information on thrust control performed by the FADEC s: *Refer to Engines / Thrust Control* .

A/THR ARCHITECTURE

Applicable to: ALL

Each PRIM can perform the A/THR . Therefore, there are three A/THR channels. The Master PRIM performs the A/THR . For information on Master PRIM , *Refer to PRIM Architecture for FG* .

L2 If no AP is engaged, or AP 1 is engaged, the A/THR uses ADIRS 1. If AP 2 is engaged, the A/THR uses ADIRS 2.

THRUST LEVERS

Applicable to: ALL

The flight crew uses the thrust levers to:

- Arm, activate, and disconnect the A/THR
- Engage the takeoff and go-around modes
  For more information, *Refer to AP/FD Modes / SRS TO Engagement Conditions* , and *Refer to AP/FD Modes / SRS GA Engagement Conditions* .
- Manually control the thrust of each engine, when the A/THR is disconnected
  For more information on the use of the thrust levers when the A/THR is disconnected, *Refer to Engines / Thrust Control in Manual Mode* .
- Engage reverse thrust on engine 2 and 3.

The thrust levers have:

- Four detents: 0 (idle), CL, FLX-MCT, TOGA.
- Two instinctive disconnect pushbuttons.

For more information on the thurst levers, *Refer to Controls and Indicators / Thrust Levers* .

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PRELIMINARY CONDITIONS REQUIRED FOR A/THR ARMING OR ACTIVATION

Applicable to: ALL

L2 In order to be able to arm or activate the A/THR, all of the following conditions must be previously met:

- At least one PRIM is available
- The A/THR is not disconnected for the remainder of the flight
- At least three FADECs are able to perform the A/THR
- At least two FADECs are in normal mode
- At least one ADR is available

L3 - The vertical speed and the altitude are available from at least:

- Two ADIRS, or
- One ADIRS and one ISIS, or
- One ADIRS, if A.FLOOR is engaged.

L2 - The AFS CP, or the AFS CP page of the FCU backup is available, except in A.FLOOR , go-around, LAND, FLARE or ROLL OUT

- The aircraft weight is available.

A/THR ARMING

Applicable to: ALL

The flight crew arms the A/THR at takeoff, by setting the thrust levers to TOGA or FLX-MCT, in accordance with TOGA, FLEX or DERATED selection on the T.O panel of the FMS PERF page . The A/THR controls the thrust at TOGA, FLEX or DERATED.
When the aircraft reaches the thrust reduction altitude, the flight crew activates the A/THR by setting the thrust levers at the CL detent (or FLX-MCT detent, if at least one engine is out).
For scenario example, *Refer to DSC-22-FG-50-60 From Takeoff to Thrust Reduction Altitude* .
The flight crew also arms the A/THR by engaging a go-around: The flight crew sets the thrust levers at the TOGA detent. The A/THR controls the thrust at TOGA thrust.
When the aircraft reaches the GA thrust reduction altitude, the flight crew activates the A/THR by setting the thrust levers at the CL detent (or FLX-MCT detent, it at least one engine is out).

ARMING CONDITIONS

The A/THR arms, if one of the following occurs:

- SRS TO engages
  For more information, *Refer to SRS TO Engagement Conditions* .
- SRS GA engages
  For more information, *Refer to SRS GA Engagement Conditions* .

- The A/THR is disconnected, and the flight crew presses the A/THR pb , when:
  - The thrust levers are:
    - Above CL, when all engines are operative
    - Above FLX-MCT, if at least one engine is out.
  - The aircraft is above 100 ft RA , or all RA s are failed.
  - LAND or FLARE is not engaged.
- The A/THR is disconnected, and the AP / FD TCAS mode engages upon a Resolution Advisory alert, when the thrust levers are in the arming range.

In addition, when the A/THR is active, it can become armed by a flight crew action on the thrust levers: *Refer to A/THR Activation / Effect of thrust lever movement when the A/THR is active* .

FMA DISPLAY

When the A/THR is armed:
- The FMA displays:
  - The A/THR message on the third line of the fifth column
  - MAN TOGA, MAN FLX +XX or MAN DTO message on the first and second lines of the first column. The message is in a white box.
- The A/THR pb light is illuminated on the AFS CP.

The FMA message appears as follows:

Conditions		Thrust lever position	FMA Message (1)
From takeoff, and until the thrust reduction altitude.	TOGA has been selected on the T.O panel of the FMS PERF page.	TOGA (2) (3)	MAN TOGA
	FLX has been selected on the T.O panel of the FMS PERF page.	FLX-MCT (4)	MAN FLX +XX
	DERATED has been selected on the T.O panel of the FMS PERF page.	FLX-MCT (5)	MAN DTO
In descent, or approach.	The flight crew engages a go-around.	TOGA (2) (3)	MAN TOGA

(1) *The FMA message appears in a white box, on the first and second lines of the first column.*
(2) *If the flight crew sets the thrust levers to FLX-MCT, MAN MCT will appear on FMA.*
(3) *If the flight crew sets the thrust levers between CL and TOGA, but not at the CL, FLX-MCT, or TOGA detent, MAN THR will appear on FMA.*
(4) *If at least one engine is out, the flight crew can set the thrust levers to TOGA.*
(5) *If at least one engine is out, the flight crew must not set the thrust levers to TOGA.*

L2 The following table presents the detailed display conditions of MAN TOGA, MAN FLX +XX, MAN DTO, MAN MCT, and MAN THR messages:

FMA Message (1)	Display Conditions
MAN TOGA	At least one thrust lever is set to the TOGA detent.
MAN FLX +XX	All of the following conditions are met: - The A/THR is armed - FLX has been selected on the T.O panel of the FMS PERF page - The most forward thrust lever is on the FLX-MCT detent.
MAN DTO	All of the following conditions are met: - The A/THR is armed - DERATED has been selected on the T.O panel of the FMS PERF page - The most forward thrust lever is on the FLX-MCT detent.
MAN MCT	All of the following conditions are met: - The A/THR is armed - The most forward thrust lever is on the FLX-MCT detent - The engagement conditions of MAN FLX +XX or MAN DTO are not met.
MAN THR	The A/THR is armed, and one of the following conditions is met: - The most forward thrust lever is between the FLX-MCT and TOGA detents, or - All the thrust levers are between the CL and FLX-MCT detents.

(1) The FMA message appears in a white box.

A/THR ACTIVATION

Applicable to: ALL

When active, the A/THR controls:
- The thrust, when an A/THR THRUST mode is engaged, or
- The speed/Mach, when the A/THR SPEED/MACH mode is engaged.

The thrust lever positions determine the maximum thrust that the A/THR can command (except in A.FLOOR).

The normal position of the thrust levers is:
- At the CL detent, when all engines are operative
- At the FLX-MCT detent for the operative engines, when at least one engine is out.

ACTIVATION CONDITIONS

The A/THR activates, if one of the following occurs:

- The A/THR is armed, and the flight crew sets the thrust levers on the active range:

L13

Engine Condition	Active Range
All engines are operative.	Between idle and CL detents (idle excluded, CL included). However, the A/THR also activates, if: - TOGA is selected on the T.O panel of the FMS PERF page, and: • At least one thrust lever is on or below the CL detent, and • The others are on or below FLX-MCT detent. - FLX or DERATED TO is selected on the T.O panel of the FMS PERF page, and: • At least one thrust lever is on or below the CL detent, and • The others are below FLX-MCT detent.
At least one engine is out. (1)	Between idle and FLX-MCT detents (idle excluded, FLX-MCT included). If the engine-out has occurred during a flex or derated takeoff, the flight crew activates the A/THR by: 1. Setting all the thrust levers of operative engines below FLX-MCT, 2. Then, settings all the thurst levers of operative engines back to FLX-MCT.

(1) The thrust lever of each engine-out should be at the idle detent.

- The A/THR is disconnected, and the flight crew presses the A/THR pb when:
  - The thrust levers are on the active range, or at the idle detent
  - L3 The aircraft is above 100 ft RA , or all RA s are failed
  - LAND or FLARE is not engaged.
- L1 The A/THR is disconnected, and the AP / FD TCAS mode engages upon a Resolution Advisory alert, when the thrust levers are on the active range
- A.FLOOR engages.
  For A.FLOOR engagement conditions, *Refer to Flight Envelope / Protections / Alpha Floor*).

  Note: A.FLOOR engages regardless of the initial A/THR status, and the position of the thrust levers.

DISPLAY

When the A/THR is active:

- The FMA displays:
  - The A/THR message on the third line of the fifth column
  - The A/THR mode in green on the first line of the first column.
- The A/THR pb light is illuminated on the AFS CP.

EFFECT OF THRUST LEVER MOVEMENT WHEN THE A/THR IS ACTIVE

A/THR TRANSITION FROM ACTIVE TO ARMED

When the A/THR is active, it becomes armed, when as described in the following table:

L13

Engine Condition	When the A/THR is active, it becomes armed, when:
All engines are operative.	All the thrust levers are above the CL detent. Or at least one thrust lever is above the FLX-MCT detent. If FLX or DERATED TO is selected, the A/THR also becomes armed, if at least one thrust lever is at the FLX-MCT detent.
At least one engine is out.	At least one thrust lever is above the FLX-MCT detent.

When the A/THR becomes armed, the thrust immediately increases, in accordance with the thrust lever position.

A/THR LIMITED

The AUTO FLT A/THR LIMITED alert triggers, when:
- All the thrust levers are set below the CL detent, when all engines are operative, or
- All the thrust levers are set below the FLX-MCT detent, when at least one engine is out.

The FMA displays THR LVR on the first line of the first column.
LVR CLB or LVR MCT (in engine-out) flashes on the third column of the FMA.
The AUTO FLT A/THR LIMITED alert is repeated every 5 s, until the flight crew moves the thrust levers to the CL detent or FLX-MCT detent (in engine-out).

ASYMMETRIC THRUST LEVERS

When the A/THR is active with all engines operative, and at least one thrust lever is set out of the CL detent, LVR ASYM message flashes on the third line of the first column of the FMA.

L3 The LVR ASYM message can appear in other cases.

LVR ASYM appears, when all of the following conditions are met:
- The A/THR is armed, or active
- One thrust lever is on the CL (FLX-MCT) detent, and at least one thrust lever is out of the CL (FLX-MCT) detent
- All the engines are operative.

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A/THR DISCONNECTION

Applicable to: ALL

The A/THR disconnects, if one of the following occurs:
- The flight crew presses one A/THR instinctive disconnect pushbutton
- The flight crew sets all the thrust levers at the idle detent
- The flight crew presses the A/THR pb

L2 This is applicable, if neither LAND nor FLARE is engaged.

L1 - The A/THR becomes inoperative.

L2 One of the preliminary conditions required for A/THR arming or activation is no longer met. For more information, *Refer to DSC-22-FG-50-30 Preliminary Conditions Required for A/THR Arming or Activation* .

L1 It is recommended to disconnect the A/THR by pressing one A/THR instinctive disconnect pushbutton. In this case, at A/THR disconnection, the engine thrust target will immediately be set to the thrust lever position.

L13

CAUTION	If the flight crew presses, and holds one A/THR instinctive disconnect pushbutton for more than 15 seconds, the A/THR will be disconnected for the remainder of the flight. All A/THR modes, including A.FLOOR will be lost. The A/THR will be recovered at the next aircraft power-up. The A/THR will be recovered, when one of the following occurs: - Five seconds after all engines shutdown - After power-up of all PRIMS and all FADECs.

THRUST LOCK FUNCTION

The THRUST LOCK function activates when an A/THR involuntary disconnection occurs, and:
- THR LK flashes on the third line of the first column on the FMA
- The AUTO FLT A/THR OFF alert triggers, asking the flight crew to move the thrust levers
- If the flight crew does not move the thrust levers within 5 s , the ENG THRUST LOCKED alert will trigger every 5 s .

L2 However, the ENG THRUST LOCKED alert is inhibited during takeoff.

L1 The thrust is locked at its level prior disconnection, until the flight crew moves the thrust levers. Then, the THR LK message disappears.
For information on involuntary disconnection, *Refer to A/THR Involuntary Disconnection* .

A/THR DISCONNECTION ANNUNCIATIONS AND WARNINGS

Applicable to: ALL

Different warnings trigger, depending on if the A/THR disconnection is voluntary or involuntary.

VOLUNTARY DISCONNECTION

A voluntary disconnection occurs when:
- The flight crew presses one A/THR instinctive disconnect pushbutton, or
- The flight crew sets all the thrust levers to idle.

When the aircraft is below 50 ft RA, and the flight crew sets all the thrust levers to idle, no warning triggers.

In all other cases of voluntary disconnection, the following warnings trigger:
- The A/THR OFF memo appears on the PFDs and on the EWD

L3 The maximum duration is 9 seconds.

L1 - The MASTER CAUT light comes on

L3 The maximum duration is three seconds.

L1 - The Single Chime.

Pressing the A/THR instinctive disconnect pushbutton, or the MASTER CAUT light clears all the warnings.

INVOLUNTARY DISCONNECTION

A involuntary disconnection occurs when:
- The flight crew presses the A/THR pb on the AFS CP , or
- The A/THR becomes inoperative.

L2 One of the preliminary conditions required for A/THR arming or activation is no longer met:
Refer to DSC-22-FG-50-30 Preliminary Conditions Required for A/THR Arming or Activation .

L1 The following warnings trigger:
- The AUTO FLT A/THR OFF alert
  For the procedure associated to the alert, *Refer to PRO-ABN-ECAM-10-22-FG-20 AUTO FLT A/THR OFF* .
- The MASTER CAUT light comes on
- The Single Chime.

The flight crew can cancel the alert by:
- Pressing one A/THR instinctive disconnect pushbutton
- Arming, or activating the A/THR , if the A/THR is operative.

GENERAL

Applicable to: ALL

When the A/THR is active, an A/THR mode is engaged.
The A/THR modes are: THRUST, SPEED/MACH and RETARD.

THRUST MODES

Applicable to: ALL

When the AP/FD vertical mode is SRS, OP CLB, CLB, OP DES, or DES in idle path, the A/THR is in THRUST mode.
When a THRUST mode is engaged, the A/THR commands the thrust. The thrust target depends on the THRUST mode. However, the thrust target can be limited by the thrust lever position, when the thrust levers are below the CL detent (or FLX MCT, when at least one engine is out).

THRUST MODE OPERATION

After takeoff, when the aircraft reaches the thrust reduction altitude, LVR CLB flashes on the FMA , asking the flight crew to set the thrust levers to the CL detent. The thrust reduction (THR RED) altitude is displayed on the T.O panel of the FMS PERF page.

L2 The thrust reduction altitude may be below, equal to, or above the ACCEL ALT. Therefore, the thrust reduction altitude can be reached when SRS TO , CLB or OP CLB is engaged.

L1 The following table presents the display conditions of the THRUST modes.

AP / FD Vertical Mode	Additional Conditions	Thrust Lever Position for Operative Engines (Detent)	THRUST Mode (Displayed on FMA) (1) .
SRS TO , CLB , or OP CLB is engaged, and the aircraft is above the thrust reduction altitude	The engagement conditions of THR DCLBX , THR NOISE , or THR CLB* are not met.	CL, or FLX-MCT if at least one engine is out.	THR CLB , or THR MCT if at least one engine is out.
	- DERATED has been selected on the CLB panel of the FMS PERF page - The thrust goes toward derated climb thrust, but the derated climb thrust is not yet achieved.	CL	THR DCLB*
	- DERATED has been selected on the CLB panel of the FMS PERF page - The engines apply derated climb thrust.	CL	THR DCLBx

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SRS TO , or CLB is engaged, and the aircraft is above the thrust reduction altitude	- A NOISE THR has been selected on the T.O panel of the FMS PERF page (or on the CLB panel), and - The altitude is below the NOISE END altitude. *Refer to Scenario Examples / Noise Abatement Departure Procedure .*	CL	THR NOISE *(2)*
CLB is engaged, and the aircraft is above the thrust reduction altitude	- A NOISE THR has been selected on the T.O panel of the FMS PERF page (or latter on the CLB panel), and - The altitude is above the NOISE END altitude, and - The thrust goes toward the climb thrust, but the climb thrust target is not yet achieved.	CL	THR CLB* *(2)*
DES in idle path	The FMS requests a thrust slightly higher than the idle thrust.	CL, or FLX-MCT if at least one engine is out	THR DES
	The FMS requests the idle thrust.	CL, or FLX-MCT if at least one engine is out	THR IDLE
OP DES	N/A	CL, or FLX-MCT if at least one engine is out.	THR IDLE
SRS GA is engaged, and the aircraft is above the GA thrust reduction altitude	N/A	CL, or FLX-MCT if at least one engine is out	THR CLB , or THR MCT if at least one engine is out.

(1) The FMA displays the THRUST mode on the first line of the first column.

(2) THR NOISE and THR CLB are not available, if a least one engine is out.*

L2 **DETAILED ENGAGEMENT CONDITIONS**

The following table presents the detailed engagement conditions of the THRUST modes:

THRUST Mode (1)	Engagement Conditions (2)
THR CLB	All of the following conditions are met: - The A/THR is active - DERATED has not been selected on the CLB panel of the FMS PERF page - The aircraft is not in a Noise Abatment Departure Procedure - SRS TO, CLB , OP CLB , or SRS GA is engaged - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .
THR DCLB*	All of the following conditions are met: - The A/THR is active - DERATED has been selected on the CLB panel of the FMS PERF page - At least one thrust lever is on the CL detent, and the others are on or below the CL detent. - SRS TO, CLB , OP CLB , or SRS GA is engaged - The thrust goes toward derated climb thrust - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .
THR DCLBX	All of the following conditions are met: - The A/THR is active - DERATED has been selected on the CLB panel of the FMS PERF page - At least one thrust lever is on the CL detent, and the others are on or below the CL detent. - SRS TO, CLB , OP CLB , or SRS GA is engaged - The engines apply derated climb thrust - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .
THR NOISE	All of the following conditions are met: - The A/THR is active - A NOISE THR has been selected on the T.O panel of the FMS PERF page (or on the CLB panel) - The altitude is below the NOISE END altitude - SRS TO or CLB is engaged - All the engines are operative - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .

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THR CLB*	All of the following conditions are met: - The A/THR is active - A NOISE THR has been selected on the T.O panel of the FMS PERF page (or latter on the CLB panel) - The altitude is above the NOISE END altitude - The thurst goes towards the climb thrust, but the climb thrust target is not yet achieved. - CLB is engaged - All the engines are operative - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .
THR DES	All of the following conditions are met: - The A/THR is active - DES is engaged in idle path - The FMS requests a thrust slightly higher than the idle thrust - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .
THR IDLE	The A/THR is active, and one of the following conditions is met: - OP DES , DES in idle path, or the A/THR RETARD mode is engaged For information on the A/THR RETARD mode, *Refer to DSC-22-FG-50-50 RETARD Mode* . - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .
THR MCT	All of the following conditions are met: - The A/THR is active - At least one engine is out - At least one thrust lever is on the MCT detent - SRS TO, CLB , OP CLB , or SRS GA is engaged - The engagement conditions of THR LVR are not met. For engagement conditions of THR LVR , See .

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THR LVR	The A/THR is active, and one of the following condition is met: - All the thrust levers are below the CL detent, when all engines are operative, or - All the thrust levers are below the MCT FLX detent, when at least one engine is out.
A.FLOOR	A.FLOOR engages. For A.FLOOR engagement conditions, *Refer to Fligth Envelope / Protections / Alpha Floor* . Note: *A.FLOOR can engage, even if the A/THR was not previously armed, or active.*

(1) The FMA displays the THRUST mode on the first line of the first column.

(2) The thrust lever position refers to the thrust levers of operative engines. The thrust levers of inoperative engines should be at the idle detent.

SPEED/MACH MODE

Applicable to: ALL

With the A/THR active, SPEED or MACH engages when one of the following AP / FD vertical mode is engaged:
- V/S / FPA
- Altitude mode: ALT* , ALT , ALT CST* , ALT CST , ALT CRZ* , ALT CRZ
- DES in geometric path
- Approach mode: G/S* , G/S , F-G/S* , F-G/S , LAND , FLARE (except when RETARD is engaged in autoland below 50 ft)
- AP / FD TCAS mode.

If all AP s and all FD s are disengaged with the A/THR is active, the A/THR is in SPEED / MACH . When the A/THR is in SPEED / MACH , the A/THR adjusts the thrust in order to acquire and hold a speed/Mach target.
The FMA displays SPEED or MACH on the first line of the first column.

The speed/Mach target is:
- Managed, when the target comes from the FMS
  For engagement conditions of managed speed/Mach, *Refer to Managed Speed/Mach / Engagement Conditions* .
- Selected, when the target comes from the SPD/MACH knob of the AFS CP .
  For engagement conditions of selected speed/Mach, *Refer to Selected Speed/Mach / Engagement Conditions*

The speed/Mach target is always limited by VLS , and VMAX -5 kt kt. In addition, when the speed/Mach is managed, the speed/Mach does no go below the maneuvring speed of the current slats/flaps configuration (Green Dot, F , S).

SPEED or MACH engages, in accordance with the speed/Mach switching selection: *Refer to DSC-22-FG-60-40 Speed/Mach Switching* .

L2 A/THR SOFT MODE

FUNCTION

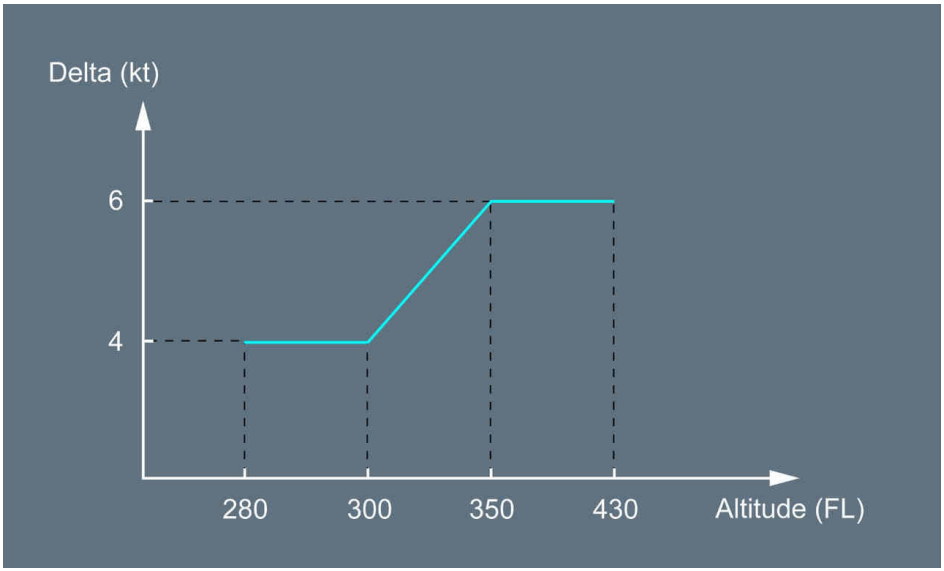
The A/THR soft mode is available when the A/THR is in SPEED/MACH. This mode reduces the thrust variation, specifically in light turbulence. The mode allows slight variation of the speed/Mach.

ACTIVATION

The A/THR soft mode activates, when all of the following conditions are met:
- The A/THR is in SPEED/MACH
- The AP is engaged
- ALT, ALT CST, ALT CRZ or DES is engaged
- At least three engines are operative
- The aircraft is in clean configuration, the gear is up, and the speed brakes are retracted

- The aircraft is above FL280, and the Mach corresponding to the speed/Mach target is above 0.55
- The aircraft speed is not beyond the speed/Mach target + or - delta.
  However, if the speed/Mach go beyond speed/Mach target + or - delta, and returns inside speed/Mach target + or - delta in less than 30 s, then the soft mode remains engaged.
  Delta depends on the altitude, and is described as follows:

Delta



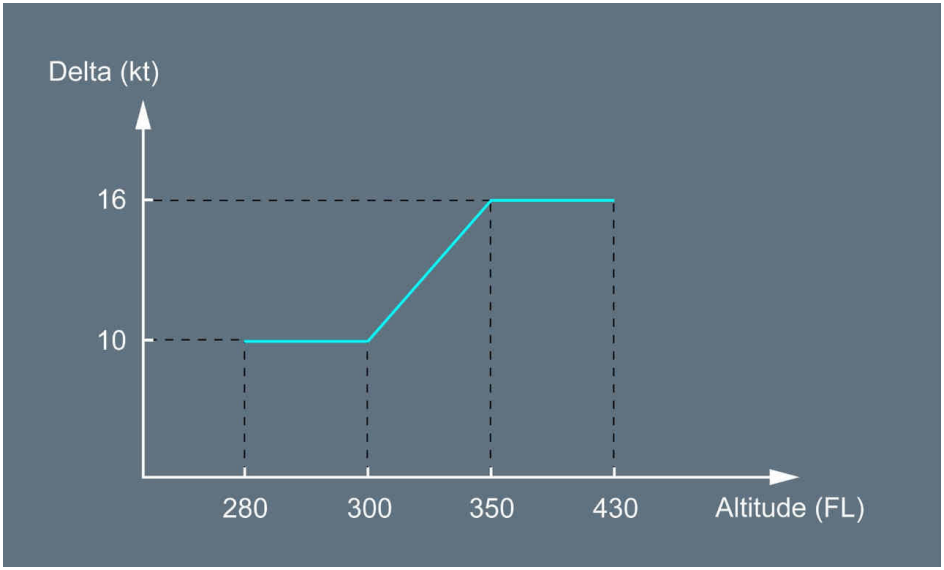
Note: *There is no message to indicate that the A/THR soft mode is active.*

DEACTIVATION

The A/THR soft mode deactivates, when one of the following occurs:

- One of the conditions required to activate the A/THR soft mode is no longer met
- The aircraft speed is beyond the speed/Mach target + or - delta for 4 s.
  Delta depends on the altitude, and is described as follows:

Delta



- The aircraft speed is greater than VMAX - 5 ft
- The aircraft speed is below VLS.

RETARD MODE

Applicable to: ALL

The A/THR RETARD mode is only available during automatic landing.

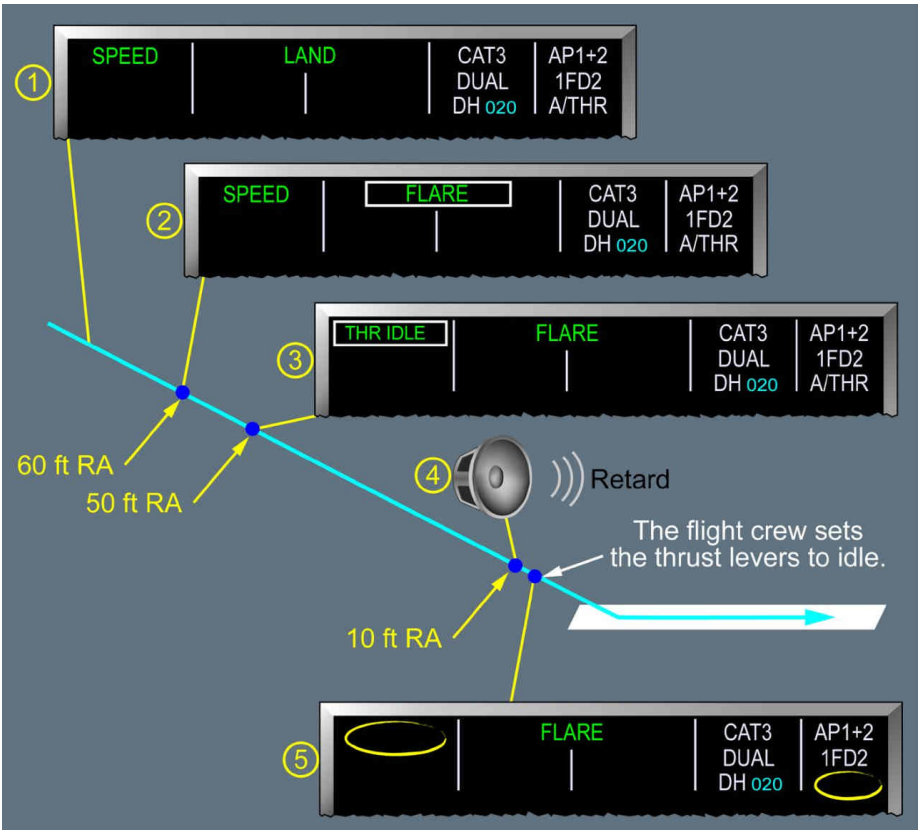
The RETARD mode engagement occurs as follows:

1. At least one AP is engaged. The LAND mode, and the A/THR SPEED mode are engaged.
2. At approximately 60 ft RA , FLARE engages.
3. When the aircraft reaches 50 ft RA , the A/THR RETARD mode automatically engages. The FMA displays THR IDLE . The A/THR controls thrust at idle.

4. A RETARD callout triggers at 10 ft RA , asking the flight crew to set the thrust levers to idle.
5. The flight crew sets the thrust levers to idle: The A/THR disconnects, and so RETARD disengages.

Here is an example:

RETARD Mode



L2 If the last AP disengages when RETARD is engaged, RETARD disengages, and SPEED engages.

L1 *Note:* *In manual landing, the RETARD callout triggers at 20 ft RA .*

L2 In manual or automatic landing, the RETARD callout triggers, independently of the thrust levers position.

L1 In manual or automatic landing, if the flight crew does not set the thrust levers to idle:

- The RETARD callout is repeated
- The spoilers will not extend after touchdown, and the autobrake will not activate.
  For more information ground spoiler extension, *Refer to Flight Controls / Ground Spoiler Control.*
  For more information on autobrake activation, *Refer to Landing Gear / Autobrake* .

A/THR MODE REVERSIONS

Applicable to: ALL

The following table presents the A/THR mode reversions:

L12

Initial A/THR Mode	A/THR Mode after Reversion	Conditions Leading to A/THR Mode Reversion	Warning
THRUST	SPEED / MACH	With no AP engaged, the FD s automatically disengage, when: - The aircraft speed is below VLS - 2 kt when DES or OP DES is engaged, or - The aircraft speed is above VMAX + 4 kt when CLB or OP CLB is engaged.	A triple click aural warning sounds. If the aircraft speed goes above VMAX + 4 kt , the OVERSPEED alert triggers.
THR NOISE , or THR CLB*	THR CLB	The aircraft does not follow the speed target. The reversion occurs, when: - The aircraft speed is below VLS , or - The aircraft speed is 10 kt below the speed target, and the flight path angle is below 0.5 ° .	A triple click aural warning sounds.
Whatever A/THR mode. The A/THR can be armed, active, or disconnected.	A.FLOOR	*Refer to Flight Envelope / Protections / Alpha Floor* .	*Refer to DSC-22-FG-50-50-C ALPHA FLOOR* .

ALPHA FLOOR

The α-floor protection triggers when the aircraft angle of attack is above a pre-determined threshold function of the configuration. For engagement conditions of A.FLOOR , *Refer to Flight Envelope / Protections / Alpha Floor* .

When the α-floor protection triggers:
- The A/THR automatically activates, independently of the previous A/THR engagement status
- A.FLOOR engages
- The A/THR commands TOGA thrust, regardless of the thrust lever positions.
  If at least one engine is failed, the A/THR commands symmetrical thrust on the engines: *Refer to Flight Envelope / Protections / Engine Failure Case* .

The protection is available from lift-off down to 100 ft RA in approach.

The following indications appear:
- As long as the α-floor conditions are met:
  - The FMA displays A.FLOOR with a flashing amber box on the first line of the first column
  - The EWD displays A.FLOOR .
- When the aircraft leaves the α-floor conditions: The FMA displays TOGA LK with a flashing amber box on the first line of the first column, indicating that TOGA thrust is still frozen.

A.FLOOR or TOGA LK can only be disengaged by disconnecting the A/THR .

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INTRODUCTION

Applicable to: ALL

For scenario examples on A/THR :

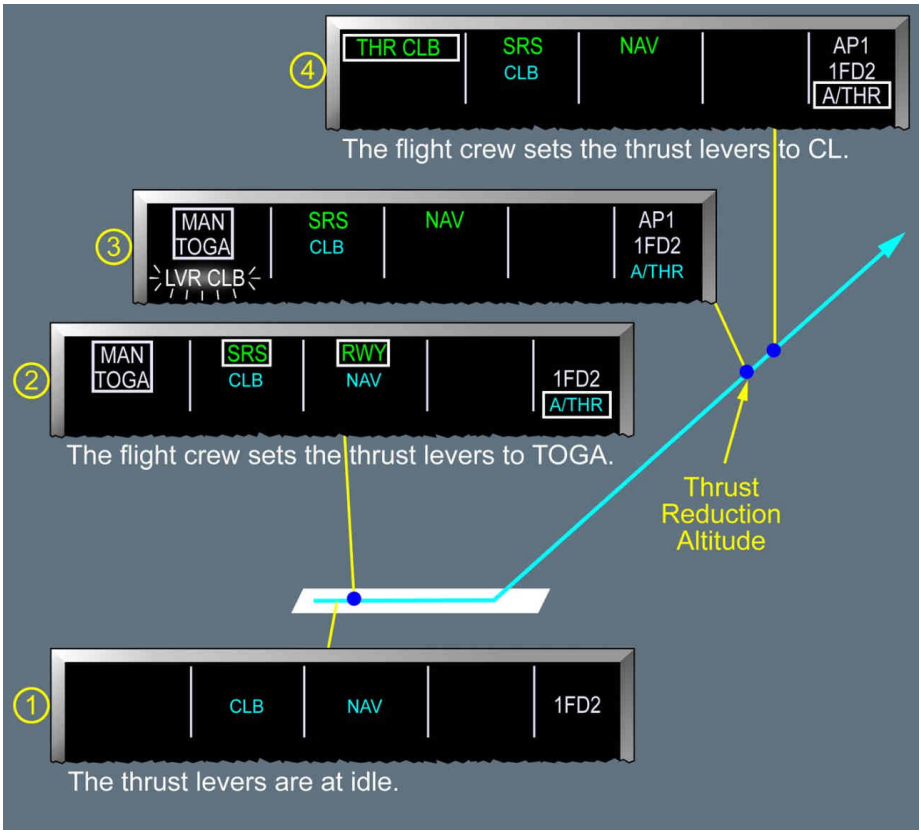
- *Refer to DSC-22-FG-50-60 From Takeoff to Thrust Reduction Altitude*
- *Refer to DSC-22-FG-50-60 Noise Abatement Departure Procedure* .

FROM TAKEOFF TO THRUST REDUCTION ALTITUDE

Applicable to: ALL

The aircraft is on ground, and the flight crew has selected TOGA on the T.O panel of the FMS PERF page. The flight crew sets the thrust levers to TOGA: The A/THR arms, the engines apply TOGA thrust, MAN TOGA appears on the FMA, and SRS TO engages.
When the aircraft reaches the thrust reduction altitude, LVR CLB flashes, and the flight crew sets the thrust levers to CL: The A/THR activates, and THR CLB engages.

From Takeoff to Thrust Reduction Altitude



NOISE ABATEMENT DEPARTURE PROCEDURE

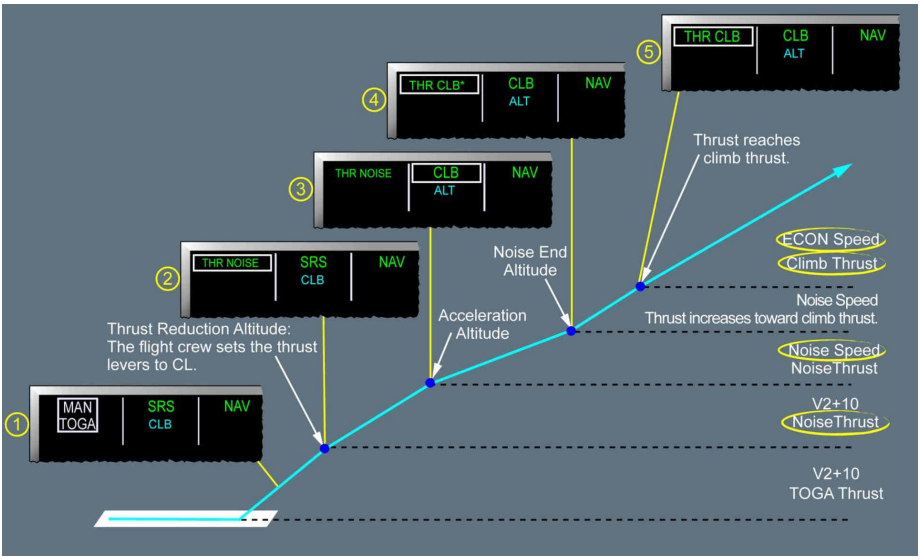
Applicable to: ALL

When on ground, the flight crew has performed the following selections on the T.O panel of the FMS PERF page:

- TOGA
- A NOISE END altitude, a NOISE SPD, and an N1 target in the NOISE THR entry field.
  For more information on the Noise Abatement Departure Procedure, *Refer to FMS / NADP* .

THR NOISE and THR CLB* are the A/THR modes of the Noise Abatement Departure Procedure. They engage as follows:

Noise Abatement Departure Procedure



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GENERAL

Applicable to: ALL

The speed/Mach control is:

- Managed, when the target comes from the FMS
- Selected, when the target comes from the SPD/MACH knob on the AFS CP .

In flight, either the AP / FD or the A/THR can acquire and hold a speed/Mach target (*Refer to DSC-22-FG-10 Interaction Between AP/FD and A/THR*). However, managed speed/Mach control and selected speed/Mach control require that the A/THR be armed or active.

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DISPLAY

Applicable to: ALL

When the speed/Mach target is managed, the SPD/MACH window on the AFS CP displays dashes (For more information on SPD/MACH window, *Refer to DSC-22-FG-80-20-A SPD/MACH Window*).



The PFD airspeed scale indicates the managed speed target with a magenta triangle.
When the Mach is managed, the PFD s indicates the associated speed target by a magenta triangle.
For more information on the speed target display on PFD , *Refer to DSC-31-20-20-40 General Airspeed Indications* .

Note: *The managed speed/Mach target may be beyond VLS and VMAX - 5 kt . But the FG will limit the speed to VLS and VMAX - 5 kt .*

ENGAGEMENT CONDITIONS

Applicable to: ALL

The speed/Mach becomes managed, if one of the following occurs:

- On ground, when V2 is inserted on the T.O panel of the FMS PERF page

L2 This is applicable, if:

- The AP and/or FD s is(are) engaged, or
- One engine is started, or
- The flight crew presses the SPD/MACH knob on the AFS CP .

L1 - SRS TO or SRS GA engages

L12

Note: *At takeoff, SRS will not engage, if V2 is not available.*
However, if the three FMC s are fault, SRS TO is still available, and V2 is equal to the speed target of the AFS CP .

- In flight, the flight crew presses the SPD/MACH knob on the AFS CP , and a managed speed/Mach target is available.
For more information on the SPD/MACH knob , *Refer to DSC-22-FG-80-20-A SPD/MACH Knob* .

MANAGED SPEED/MACH CONTROL AVAILABILITY

If all AP s and FD s are off, the managed speed/Mach control is only available when the FMS flight phase is the approach phase. The A/THR is then in SPEED mode.
The managed speed/Mach target is still available, if the flight crew inserts a speed/Mach on the DES panel of the FMS PERF page to replace the ECON DES SPD or MACH. Although the flight crew selects the value, this speed/Mach target is a managed target.

For more information on the ECON DES SPD or MACH, *Refer to DSC-22-FMS-10-50-20-22FMS1050A Speed Profile - DESCENT* .

MANAGED SPEED/MACH TARGET

Applicable to: ALL

When speed/Mach is managed, the target is defined as follows:

L12

AP / FD Engaged Mode or FMS Flight Phase	Managed Speed/Mach Target
SRS TO is engaged, and the aircraft is on ground.	V2 If V2 is lost, the managed speed target remains engaged, and equals V2, because the PRIM s memorize the target value at SRS TO engagement.
SRS TO is engaged, and the aircraft is airborne.	V2 + 10 kt Note: *However, the magenta triangle appears on V2 on the PFD s.* If V2 is lost by the FMS , the managed speed target remains engaged, and equals V2 + 10 kt , because the PRIM s memorizes the target value at SRS TO engagement.
SRS TO is engaged, and at least one engine is out.	Memorized aircraft speed at engine-out detection. The target value is limited by V2 and V2 + 15 kt .
SRS GA is engaged.	Memorized aircraft speed at SRS GA engagement. The lower limit of the target is the VAPP that the PRIM s memorize at 700 ft RA . The higher limit of the target is the lowest value between: - VLS + 25 kt (or VLS + 15 kt in engine-out) - VMAX - 5 kt .

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- The FMS flight phase is the approach phase In this case, the AP (s) and/or FD s may be on or off Or - F-G/S , G/S , LAND or FLARE is engaged	VAPP, corrected from the Ground Speed Mini function *Refer to Ground Speed Mini Function .* Before reaching the landing configuration, the speed will not go below: - Green Dot, in clean configuration - S, in CONF 1 - F, in CONF 2 - F, in CONF 3, when CONF full is the landing configuration (as defined in the APPR panel of the FMS PERF page). Note: *When the managed speed target is limited by Green Dot, S, or F, the short-term managed speed appears. The FG uses the short-term managed speed as the current speed/Mach target.* *For more information on the short-term managed speed, Refer to DSC-22-FG-60-20 Short-Term Managed Speed .* The PRIM s memorize the VAPP at 700 ft RA , so if the FMS loses the VAPP below 700 ft RA , the managed speed target is still computed. The lower limit of the managed speed target is the VAPP that is computed by the FMS , and displayed on the MFD . The higher limit of the managed speed target is the VFE NEXT (or VFE - 5 kt in full configuration) of the landing configuration.
For All other cases	The managed speed/Mach target is provided by the FMS : - If NAV is engaged, the managed speed/Mach target is defined by the speed/Mach profile of the FMS flight plan. All the speed/Mach constraints are taken into account. - If NAV is not engaged, the managed speed/Mach target is defined by the speed/Mach profile of the FMS flight plan. But the speed/Mach constraints are not taken into account. For information on the speed/Mach profile, *Refer to DSC-22-FG-60-20 FMS Speed/Mach Target .* Note: *The managed speed/Mach target may exceed the flight envelope limits, or the maneuvring speed of the current slats/flaps configuration: The short-term managed speed then appears. The FG uses the short-term managed speed as the current speed/Mach target.* *For more information on the short-term managed speed, Refer to DSC-22-FG-60-20 Short-Term Managed Speed .*

GROUND SPEED MINI FUNCTION

Applicable to: ALL

When the aircraft flies an approach in managed speed, the managed speed target, displayed by the magenta triangle on the PFDs, is variable. This managed speed target is VAPP, displayed on the APPR panel of the FMS PERF page, and corrected by the Ground Speed Mini function.

ACTIVATION CONDITIONS OF THE GROUND SPEED MINI FUNCTION

The speed target is VAPP, corrected by the Ground Speed Mini function, when the speed is managed, and:

- The FMS flight phase is the approach phase, or

L2 In this case, the AP(s) and/or FDs may be on or off

L1 - F-G/S, G/S, LAND or FLARE is engaged.

However, if the aircraft is not in landing configuration, as defined in the APPR panel of the FMS PERF page, the speed will be limited by Green Dot, S, or F, in accordance with the slats/flaps configuration.

When the aircraft is in landing configuration:

- If the A/THR is active, the SPEED mode is engaged, and the A/THR acquires the managed speed target

L3 *Note: In autoland, when FLARE is engaged, the RETARD mode will engage at 50 ft RA: SPEED will disengage, and the ground speed mini function will no longer be effective.*

L1 - If the A/THR is disconnected, the flight crew manually adjust the thrust in order to acquire the managed speed target.

GROUND SPEED MINI FUNCTION PRINCIPLE

The purpose of the Ground Speed Mini function is to take advantage of the aircraft inertia, when the wind varies during the approach. It does so by providing the adequate indicated speed target (i.e. the managed speed target represented by the magenta triangle). When the aircraft flies this indicated speed target, the energy of the aircraft is maintained above a minimum level ensuring standard aerodynamic margins versus stall.

The minimum energy level is the energy level the aircraft will have at touch down if it lands with the indicated airspeed equal to VAPP , and with the wind equal to the tower reported wind as inserted on the APPR panel of the FMS PERF page. The ground speed then equals the Ground Speed Mini.

L2 Ground Speed Mini = VAPP - TOWER HEADWIND COMPONENT

For definition of the TOWER HEADWIND COMPONENT, *Refer to DSC-22-FG-60-20-A Managed Speed Target Computation* .

L1 The Ground Speed Mini is not displayed to the flight crew.
During the approach, the FG continuously computes the managed speed target, in order to keep the ground speed at, or above the Ground Speed Mini.

L2 MANAGED SPEED TARGET COMPUTATION

The computation of the managed speed target uses the TOWER HEADWIND COMPONENT, the CURRENT HEADWIND COMPONENT, and the VAPP .

TOWER WIND

The tower wind is the average wind provided by the ATIS or the tower. The flight crew enters the tower wind in the MAG WIND entry field on the APPR panel of the FMS PERF page.

TOWER HEADWIND COMPONENT

The TOWER HEADWIND COMPONENT is the MAG WIND projected on the runway axis.

CURRENT HEADWIND COMPONENT

The current wind measured by the ADIRS s is projected on the aircraft axis to define the CURRENT HEADWIND COMPONENT (instantaneous headwind).

VAPP

The FMS computes the VAPP , and displays it on the APPR panel of the FMS PERF page.
VAPP is computed as follows:
VAPP = VLS + 1/3 of the TOWER HEADWIND COMPONENT
In the formula, VLS is the VLS computed by the FMS . For more information on VLS computation by FMS , *Refer to DSC-22-FMS-20-30-22FMS502BC PERF page - Landing Configuration and VLS* .
“1/3 of the TOWER HEADWIND COMPONENT” has a limit of 5 kt , as a minimum value.
The flight crew can modify the VAPP .

MANAGED SPEED TARGET COMPUTATION

The FG continuously computes the managed speed target that is equal to VAPP plus an additional variable gust:
Managed speed target = VAPP + 0.33 * gust
The gust is the instantaneous difference between the CURRENT HEADWIND COMPONENT and the TOWER HEADWIND COMPONENT. The gust has a limit of 0, as a minimum value.
The VAPP is corrected by a third of the variable gust to avoid too high speeds during the flare.

The managed speed target has the following limits:
- VAPP , as the minimum value
- VFE NEXT, in configuration 0, 1, 2, 3, VFE - 5 kt in configuration full, as the maximum value.

FMS SPEED/MACH TARGET

Applicable to: ALL

The FMS speed/Mach targets are used to define the speed/Mach profile.

For information on the speed/Mach profile, *Refer to DSC-22-FMS-10-50-20-22FMS1050A Flight Phases - Speed Profile* .

In the following table, the first column indicates the FMS speed/Mach targets, and the second column indicates where the FMS speed/Mach targets are displayed:

FMS Speed/Mach Target	FMS PERF Page
V2 NOISE SPD	T.O Panel
ECON RTA NOISE SPD CLB SPD LIM SPD CSTR HOLD SPD PROC SPD EO-GDOT EO-LRC	CLB Panel
ECON RTA SPD LIM CMS HOLD SPD PROC SPD EO-ECON EO-LRC	CRZ Panel

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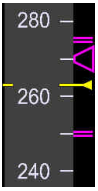
ECON RTA *Note:* *When the FMS flight phase is the descent phase, and the DES mode is engaged, the FG does not accurately maintain the ECON speed/Mach (or RTA speed/Mach). However, the managed speed/Mach should not go beyond the high and low speed margins.*  *Each margin is indicated by two dashes on the PFD airspeed scale.* *For more information on high and low speed margins, Refer to DSC-22-FMS-10-50-20-22FMS1050A Speed Profile - DESCENT .* SPD CSTR HOLD SPD PROC SPD DES SPD LIM	DES Panel
VAPP	APPR Panel

SHORT-TERM MANAGED SPEED

Applicable to: ALL



The short-term managed speed may appear when the speed/Mach is either managed, or selected. This speed is indicated by a magenta dot on the PFD airspeed scale.

WHEN THE SPEED/MACH IS MANAGED

The short-term managed speed appears, when the managed speed/Mach target exceeds the flight envelope limits, or the maneuvring speed of the current slats/flaps configuration:

If the managed speed/Mach target is:	Then, the short-term managed speed is equal to:
Above VMAX - 5 kt (e.g. VFE - 5 kt in high-lift configuration, with the gear up, when the aircraft is climbing)	VMAX - 5 kt

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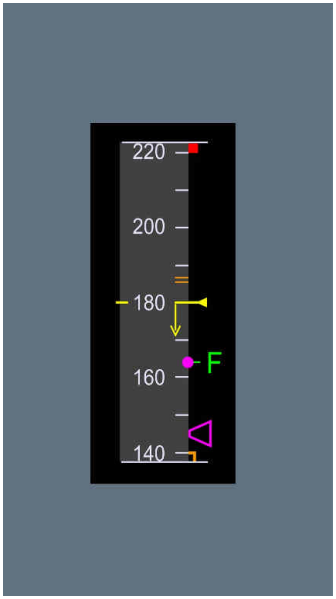
Below VLS	VLS
Below the maneuvring speed of the current slats/flaps configuration: Green Dot, S, F This occurs, for example: - In approach, or - When the aircraft flies a holding pattern, and the HOLD speed is below green dot.	Green Dot, S, F

L2 The short-term managed speed is inhibited when:
- The FMS flight phase is cruise, or
- The AP/FD DES mode is engaged.

L3 *Note: The short-term managed speed only appears, if the difference between the short-term managed speed, and the managed speed/Mach target (i.e. magenta triangle) is equal to, or higher than 2 kt.*

L1 The FG uses the short-term managed speed, as the current speed/Mach target.
Thus, when the speed/Mach is managed, the FG always uses a speed/Mach target that is limited by VLS, and VMAX - 5 kt.
The following illustration of the PFD airspeed scale provides an example of the short-term managed speed when speed/Mach is managed:



The aircraft is in approach, in CONF 2. The managed speed target is VAPP. The short-term managed speed is F. F is the current speed target.

WHEN THE SPEED/MACH IS SELECTED

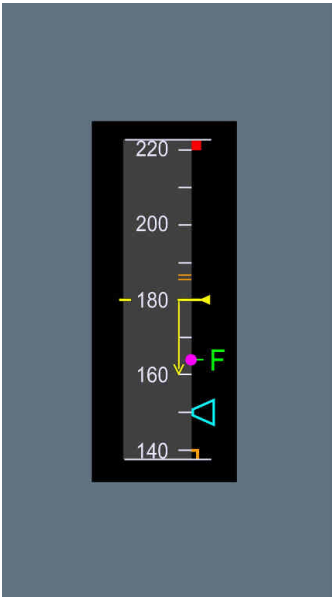
The short-term managed speed is the speed/Mach target, that would be used if the flight crew engages the managed speed/Mach control.

L3 *Note:*

1. *The short-term managed speed only appears, if the difference between the short-term managed speed, and the selected speed/Mach target (i.e. blue triangle) is equal to, or higher than 2 kt.*
2. *When the aircraft is in the deceleration segment toward a hold speed, or speed limit, the short-term managed speed is the managed ECON speed, and not the hold speed, or the speed limit.*

L1 The following illustrations of the PFD airspeed scale provide examples of the short-term managed speed when speed/Mach is selected:

EXAMPLE 1

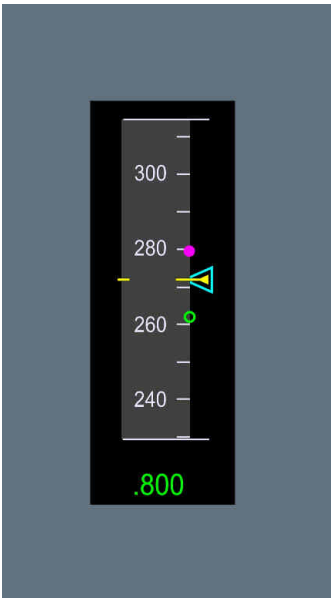


The aircraft is in approach, in CONF 2, and the selected speed target is 150 kt. The short-term managed speed is F.

At this moment, if the flight crew engages the managed speed control:

- The managed speed target would be VAPP
- The short-term managed speed would remain equal to F
- The current speed target would be F.

EXAMPLE 2



The aircraft is in cruise, the selected Mach target is 0.8, and the ECON Mach is 0.82. The short-term managed speed is the ECON Mach.
At this moment, if the flight crew engages the managed Mach control, the managed Mach target would be the ECON Mach (i.e. 0.82).

DISENGAGEMENT CONDITIONS

Applicable to: ALL

The speed/Mach is no longer managed, if one of the following occurs:

- The flight crew selects a speed/Mach target by pulling the SPD/MACH knob on the AFS CP
- The flight crew has preselected a speed/Mach on the CLB or CRZ panel of the FMS PERF page, and the associated FMS flight phase engages

- The managed speed/Mach target is lost

L2 This is not applicable, if one of the following conditions is met:

- SRS TO or SRS GA is engaged
- LAND or FLARE is engaged
- ROLL OUT is engaged

L3 - LAND is armed below 700 ft RA.

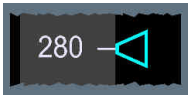
L1 If the managed speed/Mach target is lost, the speed/Mach target reverts to selected, and becomes equal to the current aircraft speed/Mach.

- All APs and FDs disengage, and the FMS flight phase is not the approach phase.
  The speed/Mach target becomes selected, and equal to the current aircraft speed/Mach.

DISPLAY

Applicable to: ALL

When a speed/Mach target is selected, the SPD/MACH window on the AFS CP displays the target.



The PFD airspeed scale indicates the selected speed target with a blue triangle.
When the Mach is selected, the PFD displays the associated speed target on the airspeed scale.
For more information on the speed target display on PFD , *Refer to DSC-31-20-20-40 General Airspeed Indications* .

Note: *The selected speed/Mach target may be set beyond VLS and VMAX - 5 kt . However, the guidance limits the speed to VLS and VMAX - 5 kt .*

SELECTED SPEED/MACH PRIORITY

Applicable to: ALL

Selected speed has priority over managed speed. The only automatic change from selected to managed speed/Mach target occurs at go-around engagement.

When in selected speed/Mach, if the situation calls for managed speed/Mach, then both PFDs and both MFDs display a message, that proposes a manual change to managed speed or Mach:

- SET HOLD SPD, when flying a holding pattern
- CHECK SPD MODE, when:
  - The FMS flight phase becomes cruise, and a speed/Mach presel has not been defined for the cruise phase
  - The aircraft sequences a CMS start waypoint
  - The FMS flight phase becomes descent.
- SET EO SPD SETTING when in engine-out, and the speed selected on the AFS CP is 10 kt away from EO green dot.
  This message invites the flight crew to select a speed closer to the EO green dot, or to engage managed speed/Mach control.

ENGAGEMENT CONDITIONS

Applicable to: ALL

The speed/Mach target becomes selected, if one the following occurs:

- The flight crew pulls the SPD/MACH knob on the AFS CP in flight

L3 This is also applicable, if:

- The aircraft is on ground with all engines stopped
- All FMC s are fault in flight, or on ground with all engines stopped.

L1 For more information on the SPD/MACH knob , *Refer to DSC-22-FG-80-20-A SPD/MACH Knob* .

- The flight crew has preselected a speed/Mach on the CLB or CRZ panel of the FMS PERF page, and the associated FMS flight phase engages
  The SPD /MACH window on the AFS CP will display the selected speed/Mach target.
- The managed speed/Mach target is lost, and reverts to selected
  For more information, *Refer to Managed Speed/Mach / Disengagement Conditions* .
- All AP (s) and FD s disengage, and the FMS flight phase is not the approach phase
  The selected speed/Mach target becomes the current aircraft speed/Mach.
- At liftoff, if the speed target was not managed.
  The selected speed target becomes the current aircraft speed at liftoff.

L2 *Note: The SPD/MACH window, and the blue triangle on the PFD airspeed scale display this new speed target.*

L1 *Note: The selected speed/Mach target is always limited by VLS , and by VMAX - 5 kt .*

DISENGAGEMENT CONDITIONS

Applicable to: ALL

The selected speed/Mach target disengages, if one of the following occurs:

- The speed/Mach target becomes managed
- L3 On ground, the FDs engage (e.g. at aircraft power-up)
- On ground, the engines are started, while the AP and/or FDs is(are) engaged.

FMS FLIGHT PLAN PREDICTIONS WHEN IN SELECTED SPEED/MACH

Applicable to: ALL

In most cases, when the speed/Mach is selected, the FMS flight plan predictions consider that the speed/Mach remains selected, until the next SPD LIM, SPD CSTR, or the next phase, whichever comes first, and then the speed/Mach becomes managed.
For more information, *Refer to FMS / Fligth Plan Predictions / Selected Speed/Mach* .

SPEED/MACH SWITCHING

Applicable to: ALL

Speed/Mach switching can be automatic, or manual.

AUTOMATIC SWITCHING

During climb, when the crossover altitude is reached, the speed target (selected or managed) changes automatically to the associated Mach target.
During descent, when the crossover altitude is reached, the Mach target (selected or managed) changes automatically to the associated speed target.
The crossover altitude is at approx. 30 000 ft . It is based on the ECON MACH value.

MANUAL SWITCHING

When the speed/Mach is selected, the flight crew can perform the switching, by pressing the SPD/MACH pb on the AFS CP (For more information on the SPD/MACH pb , *Refer to DSC-22-FG-80-20-A SPD/MACH pb*).

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AP/FD MODES GENERAL

Applicable to: ALL

The AP/FD modes are either lateral, vertical, or common.

AP/FD LATERAL MODES

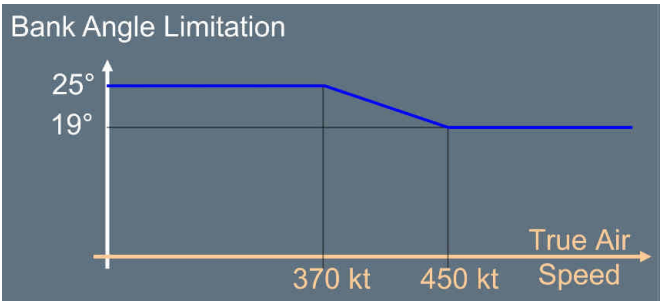
The AP/FD lateral modes are:

RWY , RWY TRK	Runway mode, Runway track mode
NAV	Navigation mode
HDG , TRACK	Heading mode, Track mode HDG and TRACK are the lateral basic modes.
LOC *, LOC	Localizer capture mode, Localizer track mode
LOC B/C *, LOC B/C	Localizer back course capture mode, Loc back course track mode
F-LOC *, F-LOC	Flight Management System Landing System Localizer capture mode, Flight Management System Landing System Localizer track mode
GA TRK	Go-around track mode

L2 BANK ANGLE LIMITATION

The following limitations apply when the AP is engaged. However, if the AP is not engaged, the FD orders respect the bank angle limitations.
In addition to the bank angle limitation, there is a bank angle protection. For more information, *Refer to DSC-22-27-20 Bank Angle Protection* .

When all Engines are Operative

AP/FD Lateral Mode	Bank Angle Limitation
HDG, TRACK	Bank Angle Limitation 
NAV	Function of the True Air Speed, the maximum is 30°.

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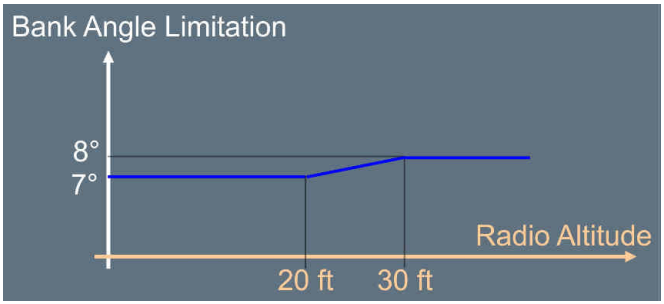
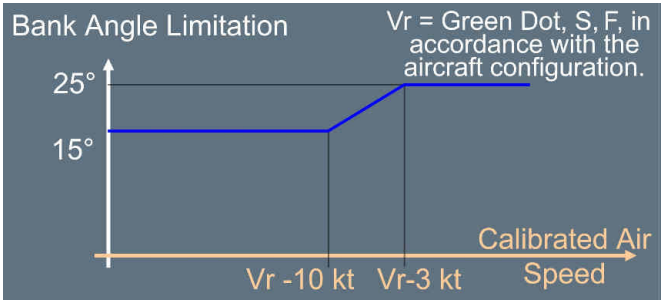
AP/FD Lateral Mode	Bank Angle Limitation
LOC*, LOC B/C*, F-LOC*	30°
LOC, LOC B/C, F-LOC, LAND, FLARE	Bank Angle Limitation 

When at least one Engine is Inoperative

AP/FD Lateral Mode	Bank Angle Limitation
HDG, TRACK	Bank Angle Limitation 
NAV	15°

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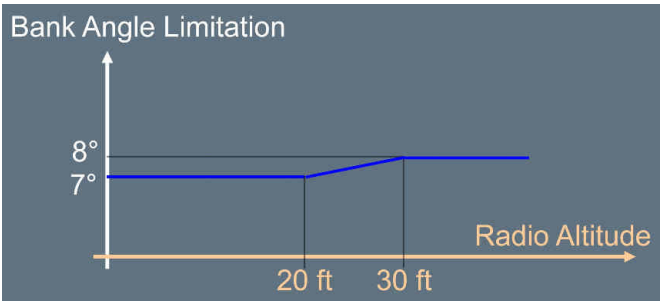
AP/FD Lateral Mode	Bank Angle Limitation
LOC*, LOC B/C*, F-LOC*	30°
LOC, LOC B/C, F-LOC, LAND, FLARE	Bank Angle Limitation 

AP/FD VERTICAL MODES

The AP/FD vertical modes are:

SRS	Speed Reference System mode, used during takeoff and go-around SRS TO refers to SRS mode during takeoff, and SRS GA refers to SRS mode during go-around.
CLB	Climb mode
DES	Descent mode
OP CLB	Open Climb mode
OP DES	Open Descent mode
V/S, FPA	Vertical Speed mode, Flight Path Angle mode V/S and FPA are the vertical basic modes.
ALT*, ALT *(1)*	Altitude capture mode, Altitude hold mode
ALT CST*, ALT CST *(1)*	Altitude constraint capture mode, altitude constraint hold mode
ALT CRZ*, ALT CRZ *(1)*	Altitude capture of the cruise flight level, Altitude hold of the cruise flight level
G/S*, G/S	Glide slope capture mode, Glide slope track mode
F-G/S*, F-G/S	FLS-G/S capture mode, FLS-G/S track mode
TCAS	AP/FD TCAS mode

(1) ALT, ALT CST*, and ALT CRZ* are referred to as the altitude acquire modes.*
ALT, ALT CST, and ALT CRZ are referred to as the altitude hold modes.

AP/FD COMMON MODES

The AP/FD common modes are:

LAND	Land mode
FLARE	Flare mode
ROLL OUT	Rollout mode

AP/FD MODE STATUS AND DISPLAY

Applicable to: ALL

An AP/FD lateral or vertical mode can be armed, engaged, or disengaged.
When an AP/FD lateral mode is armed, the FMA displays the lateral mode in blue, on the second line of the third column. When an AP/FD lateral mode is engaged, the FMA displays the lateral mode in green, on the first line of the third column.
When an AP/FD vertical mode is armed, the FMA displays the vertical mode in blue, on the second line of the second column. When an AP/FD vertical mode is engaged, the FMA displays the vertical mode in green, on the first line of the second column.
When an AP/FD lateral or vertical mode is disengaged, the FMA does not display the disengaged mode.
An AP/FD common mode can either be engaged or disengaged.
When an AP/FD common mode is engaged, the FMA displays the common mode in green, on the first line of the second and third columns. When an AP/FD common mode is disengaged, the FMA does not display the mode.
When all APs and FDs are disengaged, all AP/FD modes are disengaged.

General

GENERAL

Applicable to: ALL

At takeoff, the Speed Reference System (SRS) vertical mode, and the runway (RWY) lateral mode simultaneously engage. They disengage at different moment. In some cases, RWY is replaced by RWY TRK.

For scenario examples on takeoff:

- *Refer to DSC-22-FG-70-120-20 Takeoff with NAV*
- *Refer to DSC-22-FG-70-120-20 Takeoff with HDG/TRK Preset* .

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SRS TO Mode

GENERAL

Applicable to: ALL

The Speed Reference System (SRS) mode is a managed vertical mode. This mode is used during takeoff, and during go-around. The present chapter deals with the SRS mode during takeoff, also referred to as the SRS TO mode. The FMA announces the SRS TO mode by SRS .
SRS TO controls the speed via the elevators, in order to steer the aircraft along a vertical path.

L2 The guidance law also includes:
- A flight path angle protection, that ensures a positive climb
- A pitch angle protection to reduce the aircraft nose-up (14 ° of maximum pitch attitude).

L1 SRS TO engages when the flight crew sets the thrust levers to TOGA or FLX-MCT, V2 is inserted on the T.O panel of the FMS PERF page, and the slats are extended.

Note: When V2 is inserted, or SRS TO is engaged, the speed automatically becomes managed. For more information engagement conditions of managed speed, Refer to Managed Speed/Mach / Engagement Conditions .

When the aircraft is on ground, V2 is the speed target. When the aircraft is airborne, V2 + 10 kt becomes the speed target. If one engine fails, the speed target is the current aircraft speed at the engine failure detection. However, the speed target is limited by V2 and V2 + 15 kt . For more information on the speed target, *Refer to Speed/Mach Control / Managed Speed/Mach Target* .
In main cases, SRS TO disengages at the acceleration altitude: CLB or OP CLB engages.

ENGAGEMENT CONDITIONS

Applicable to: ALL

SRS TO engages, when all of the following conditions are met:
- The aircraft is on ground

L3 The aircraft must be on ground for at least 30 s .

L1 - V2 is inserted on the T.O panel of the FMS PERF page

L2 Or, the three FMC s are fault. In this case, V2 will be equal to the speed target of the AFS CP .

L1 - The slats are extended
- The flight crew sets all the thrust levers:
  - To TOGA, or
  - To FLX-MCT, when FLX or DERATED has been selected on the T.O panel of the FMS PERF page.

Refer to Scenario Examples / Takeoff with NAV , step 2, and *Refer to Scenario Examples / Takeoff with HDG/TRK Preset* , step 2.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

SRS TO mode disengages, when one of the following occurs:

- CLB or OP CLB is armed, and the aircraft reaches the acceleration altitude
  CLB or OP CLB engages.
- The aircraft reaches the capture zone of the AFS CP selected altitude
  ALT* engages.

L3 This scenario is applicable, if the aircraft is above 400 ft RA.

L1 - NAV is engaged, and the aircraft reaches the capture zone of the altitude constraint
  ALT CST* engages.

L3 This scenario is applicable, if the aircraft is above 400 ft RA.

L1 - The flight crew pushes the ALT pb
  ALT engages.

- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew pushes the ALT knob, when all of the following conditions are met:
  - NAV is engaged
  - CLB is not armed
  - The AFS CP selected altitude is above the aircraft altitude
  - The acceleration altitude is above the aircraft altitude

L3 • The vertical flight plan is valid.

L1 CLB engages.

- The flight crew pulls the V/S / FPA knob.
  V/S / FPA engages.

REVERSION

SRS TO reverts to OP CLB, when the AFS CP selected altitude is above the aircraft altitude, and the flight crew pulls the SPD/MACH knob. A triple click aural warning sounds.

RWY Mode

GENERAL

Applicable to: ALL

The Runway (RWY) mode is a managed lateral mode.
When the LOC signal is available, the RWY mode gives lateral guidance orders during takeoff, and initial climb.

L2 The RWY guidance law aim to maintain the aircraft on the runway centerline during the takeoff run, and on the LOC beam when the aircraft in airborne. To do so, RWY provides the FD yaw bar order.

L1 RWY arms when the aircraft approaches the runway threshold.
RWY engages when the flight crew sets the thrust levers to TOGA, or FLX-MCT.
If NAV is armed, RWY disengages at 30 ft RA, and NAV engages.
If a HDG/TRK preset was defined (NAV not armed), RWY disengages at 50 ft RA, and RWY TRK engages.

ARMING CONDITIONS

Applicable to: ALL

RWY arms, when the aircraft approaches the runway threshold.

L3 RWY arms, when all of the following conditions are met:

- The aircraft is on ground for more than 120 s
- The flaps lever is not in the 0 detent
- The LOC signal is valid
- A LOC B/C approach is not selected in the flight plan
- The ILS course is equal to the runway heading, as inserted in the flight plan
- The aircraft heading reaches 115 ° of the ILS course
- The LOC deviation reaches one dot, and decreases.

DISARMING CONDITIONS

Applicable to: ALL

L3 RWY disarms, when one of the following occurs:

- The flaps lever is set to the 0 detent
- The LOC signal becomes invalid
- A LOC B/C approach is selected in the flight plan
- The ILS course is no longer equal to the runway heading, as defined is the flight plan
- The aircraft becomes airborne.

ENGAGEMENT CONDITIONS

Applicable to: ALL

RWY engages, if all of the following conditions are met:

- L3 - The aircraft is on ground for more than 30 s
- The flaps lever are not in the 0 detent
- The LOC signal is valid
- L2 - The LOC deviation below 0.5 dot
- L3 - The aircraft heading is within 20 ° of the ILS course
- The ILS course is equal to the runway heading, as defined in the flight plan
- L1 - The flight crew sets the thrust levers to:
  - TOGA, if TOGA has been selected on the T.O panel of the FMS PERF page, or
  - FLX-MCT, if FLEX or DERATED has been selected on the T.O panel of the FMS PERF page.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

RWY disengages, if one of the following occurs:

- NAV is armed, and the aircraft reaches 30 ft RA
  NAV engages.
- L2 - NAV is not armed, and the aircraft reaches 50 ft RA
  RWY TRK engages.
- L1 - The flight crew pulls the HDG/TRK knob
  HDG/TRACK engages.
- L3 - The aircraft heading deviates from more than 20 degrees from the ILS course.
  HDG/TRACK engages.

RWY TRK Mode

GENERAL

Applicable to: ALL

The Runway Track (RWY TRK) mode is a managed lateral mode.
The RWY TRK mode guides the aircraft along a constant track target. The track target is the aircraft track at RWY TRK engagement.
RWY TRK engages at 50 ft RA, if NAV was neither armed, nor engaged.

ENGAGEMENT CONDITIONS

Applicable to: ALL

The RWY TRK automatically engages at 50 ft RA, if:

L3 - The FMS flight phase is takeoff, and

L1 - NAV is not engaged.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

RWY TRK disengages, when one of the following occurs:

- The flight crew pulls the HDG/TRK knob
  HDG/TRACK engages.
- NAV is armed, and the aircraft reaches the capture zone of the active leg
  NAV engages.
- The flight crew inserts a DIRECT TO.
  NAV engages.

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General

GENERAL

Applicable to: ALL

The Heading (HDG), TRACK and Navigation (NAV) modes guides the aircraft laterally. They are mainly used during climb, cruise and descent.

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HDG/TRACK Mode

GENERAL

Applicable to: ALL

Heading (HDG) and TRACK are selected lateral modes. They are the basic modes of lateral guidance.
HDG/TRACK guides the aircraft laterally along the heading/track target, that appears in the HDG/TRK window on the AFS CP . For more information on the HDG/TRK window, *Refer to DSC-22-FG-80-20-B HDG/TRK Window* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

HDG / TRACK engages, when one of the following occurs:
- The flight crew pulls the HDG/TRK knob on the AFS CP in flight

L3 This is applicable, if:
- The aircraft is in flight, for at least 5 s after liftoff
- Not in LAND , FLARE , or ROLL OUT
- Not in GA TRK below 100 ft RA .

L1 For more information on the HDG/TRK knob , *Refer to DSC-22-FG-80-20-B HDG/TRK Knob* .
- NAV disengages after:

L3
- The flight plan becomes invalid, or
  For more information, *Refer to NAV Disengagement Conditions* .

L1
- The aircraft has reached a flight plan discontinuity.

This is a reversion. A triple click aural warning sounds, and the FD roll bar flashes for 10 s .

L23

Note: *1. The reversion to HDG / TRACK also occurs, if the flight plan becomes invalid.*

This occurs when for example:
- *The FMS aircraft position is lost, or*
- *The ground speed is invalid.*

2. If a managed vertical mode was previously engaged, it simultaneously reverts to a selected vertical mode:
- *If CLB was engaged, OP CLB engages*
- *If ALT CST* , ALT CRZ* , or DES was engaged, V/S / FPA engages*
  The FD pitch bar will flash for 10 s .
- *If ALT CST was engaged, ALT engages.*

- All AP and FD s were previously off, and the flight crew engages the AP or the FD s

  Note: *1. The AP or FD s engage in basic modes: HDG / TRACK , and V/S / FPA .*
  2. If the FD engages, the FD bars flash for 10 s .

L2 - The APPR pb (LOC pb) is on, and the flight crew presses the APPR pb (LOC pb) again, when the approach mode is engaged

L3 - The approach is modified in the flight plan, when LOC* , LOC , F-LOC* , F-LOC , LOC B/C* , or LOC B/C is engaged
This is a reversion. A triple click aural warning sounds. HDG / TRACK , and V/S / FPA will engage. The FD bars will flash for 10 s .

Note: *1. If the approach is modified, when one of the above approach modes is armed, the approach mode will disarm. HDG / TRACK will not engage.*
2. Below 700 ft RA , it will not be possible to modify the approach, if:
- *LOC is armed or engaged, with G/S armed or engaged*
- *LOC is armed or engaged, with F-G/S armed or engaged*
- *F-LOC is armed or engaged, with F-G/S armed or engaged.*

L1 - LOC* , LOC , F-LOC* , F-LOC , LOC B/C* , or LOC B/C is lost after a failure occurs in approach (*Refer to AP Automatic Disengagement*)
This is a reversion. A triple click aural warning sounds. All AP (s) and FD s disengage. The FD s reengage in HDG / TRACK , and V/S / FPA . The FD bars flash for 10 s .

L3 - RWY disengages after the aircraft has deviated from the ILS course for more than 20 ° .

L1 HDG or TRACK engages, in accordance with the HDG-V/S / TRK-FPA selection: *Refer to DSC-22-FG-70-30-20 HDG-V/S / TRK-FPA Selection* .

HDG-V/S / TRK-FPA SELECTION

Applicable to: ALL

HDG-V/S is automatically selected:
- At aircraft power-up, or
- When the flight crew engages a go-around.

L2 This is not applicable if the TRK mode was engaged before go-around. In this case, TRK mode remains engaged, with TRK-FPA selection.

L1 .
The flight crew switches from one selection to another, by pressing the HDG-V/S / TRK-FPA pb on the AFS CP .

When HDG-V/S is selected:
- HDG appears on the HDG/TRK window of the AFS CP
  For more information on the HDG/TRK window, *Refer to Controls and Indicators / HDG/TRK Window* .
- V/S appears on the V/S / FPA window of the AFS CP
  For more information on the V/S / FPA window, *Refer to Controls and Indicators / V/S / FPA Window* .
- HDG and/or V/S mode(s) can be engaged
- TRACK and FPA modes cannot be engaged
- If the VV pb is pressed on the EFIS CP , the associated PFD displays the Velocity Vector (VV) in black.
  For more information on the VV, *Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector)* .

When TRK-FPA is selected:
- TRK appears on the HDG/TRK window of the AFS CP
- FPA appears on the V/S / FPA window of the AFS CP
- HDG and/or V/S mode(s) cannot be engaged
- TRACK and FPA modes can be engaged
- Both PFD s display the Flight Path Vector (FPV) in green.
  For more information on the FPV , *Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector)* .

HDG / TRK PRESET

Applicable to: ALL

The FG has a HDG/TRK preset function for takeoff and go-around.
If the flight crew decides not to fly the flight plan after a takeoff or go-around, they may preset a heading or a track on the AFS CP by turning the HDG/TRK knob .

AT TAKEOFF

Turning the HDG/TRK knob before takeoff and up to 30 ft RA , defines a HDG/TRK preset, and NAV disarms. The preset value remains displayed in the HDG/TRK window (even when RWY TRK engages at 50 ft RA).
When the flight crew pulls the HDG/TRK knob (at least 5 s after liftoff), HDG or TRACK engages. The aircraft follows the preset target.

AT GO-AROUND

Turning the HDG/TRK knob when LOC* , LOC , F-LOC* , F-LOC , LAND , FLARE , ROLL OUT or GA TRK is engaged, defines a HDG/TRK preset. The preset value remains displayed in the HDG/TRK window, as long as one of these modes is engaged.

If a HDG (TRK) is preset when the flight crew initiates a go-around, GA TRK lateral mode engages, until the flight crew pulls the HDG/TRK knob .

L3 In this case, NAV mode does not arm. *Refer to DSC-22-FG-70-100-10 General* .

L1 When the flight crew pulls the HDG/TRK knob , HDG (TRACK) engages, and the heading/track target is the HDG/TRK preset.

L3 This is applicable, if the flight crew pulls the HDG/TRK knob above 100 ft RA .

L1 **CANCELLATION**

The flight crew can cancel a HDG/TRK preset by:

- Arming NAV , by pushing the HDG/TRK knob , or
- Engaging NAV , by activating a DIR TO with the FMS , or

L3 This is applicable, if:

- Below 700 ft RA , LOC* , LOC , F-LOC* , F-LOC , LOC B/C* or LOC B/C , LAND , FLARE , ROLL OUT is not engaged
- Below 100 ft RA , GA TRK is not engaged
- Below 30 ft RA , the FMS flight phase is not takeoff.

L1 For more information on DIR TO, *Refer to FMS / DIRECT TO* .

- Disengaging the AP and FD s.

HEADING/TRACK TARGET

Applicable to: ALL

When HDG/TRACK engages, the heading/track target is defined as followed:

HDG/TRACK engages after:	Heading/Track Target
The flight crew has pulled the HDG/TRK knob knob.	The heading/track selected with the HDG/TRACK knob, or the HDG/TRK preset.
For all other cases	The current heading or track of the aircraft. Note: *The HDG/TRK window automatically displays this target at HDG/TRACK engagement.*

DISENGAGEMENT CONDITIONS

Applicable to: ALL

HDG/TRACK disengages, when another lateral mode engages.

NAV Mode

GENERAL

Applicable to: ALL

The Navigation (NAV) mode is a managed lateral mode, that guides the aircraft laterally along the FMS flight plan. It is designed to have a zero crosstrack error.
NAV usually arms before engaging.

ARMING CONDITIONS

Applicable to: ALL

L2 For NAV arming, the lateral flight plan must be available.

L1 NAV arms, when one of the following occurs:
- The aircraft is on ground, and:
  - There is no HDG/TRK preset
  - RWY engages, or no lateral mode is engaged.
- The flight crew pushes the HDG/TRK knob on the AFS CP
- The flight crew activates a DIR TO / INTERCEPT with the FMS .
  For more information on DIR TO / INTERCEPT, *Refer to FMS / DIRECT TO* .
- The flight crew initiates a go-around.

L2 This is not applicable if a HDG / TRK was preset.
For more information on NAV arming in the case of a go-around, *Refer to DSC-22-FG-70-100-10 General* .

L3 Except in the case of a go-around, NAV cannot arm, if one of the following modes is engaged: LOC* , LOC , F-LOC* , F-LOC , LOC B/C* , LOC B/C , LAND , FLARE , ROLL OUT .

DISARMING CONDITIONS

Applicable to: ALL

L2 NAV disarms, when one of the following occurs:
- The flight crew presets a HDG/TRK for takeoff

L3 - NAV engages
- The flight crew pulls the HDG/TRK knob

L2 - The flight crew arms or engages an approach mode

L3 - GA TRK engages
- The flight plan becomes invalid.
  For more information, *Refer to NAV Disengagement Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

For NAV engagement, the lateral flight plan must be available.

NAV engages, if one of the following occurs:

- NAV is armed, and the aircraft reaches 30 ft RA after takeoff
- NAV is armed, and the aircraft reaches the capture zone of the flight plan active leg
- The flight crew activates a DIR TO on the MFD

L3 This is not applicable, if LOC* , LOC , F-LOC* , F-LOC , LOC B/C* or LOC B/C , LAND , FLARE , ROLL OUT is engaged below 700 ft RA .

L1 - The flight crew initiates a go-around above 100 ft RA , and the aircraft reaches the capture zone of the flight plan active leg.

L2 This is not applicable if a HDG / TRK was preset.

For more information on NAV engagement in the case of a go-around, *Refer to DSC-22-FG-70-100-10 General* .

L1 When NAV is engaged, the HDG/TRK window on the AFS CP displays dashes.

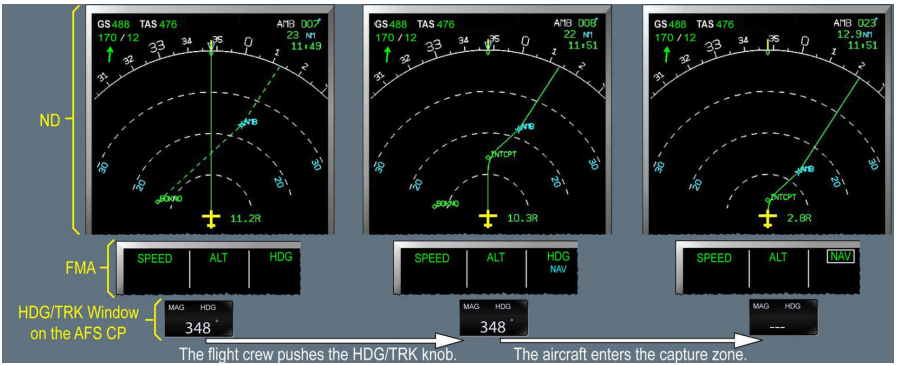
CAPTURE ZONE OF THE FLIGHT PLAN ACTIVE LEG

When NAV is armed, it automatically engages, if:

- The aircraft track line intercepts the flight plan between the FROM and the TO waypoints
- The intercept waypoint (INTCPT) is displayed on the ND
- The aircraft reaches the capture zone of the flight plan active leg.

The following is an example:

Capture Zone



DISENGAGEMENT CONDITIONS

Applicable to: ALL

NAV disengages, when another lateral mode engages.

L2 NAV disengages, when one of the following occurs:

- The flight crew pulls the HDG/TRK knob to engage HDG/TRACK
- The aircraft reaches a flight plan discontinuity
  This is a reversion. A triple click aural warning sounds. HDG/TRACK engages. The FD roll bar flashes for 10 s.

L23

Note: *1. The reversion to HDG/TRACK also occurs, if the flight plan becomes invalid.*

This occurs when for example:

- *The FMS aircraft position is lost, or*
- *The ground speed is invalid.*

2. If a managed vertical mode was previously engaged, it simultaneously reverts to a selected vertical mode:

- *If CLB was engaged, OP CLB engages*
- *If ALT CST*, ALT CRZ*, or DES was engaged, V/S / FPA engages*
  The FD pitch bar will flash for 10 s.
- *If ALT CST was engaged, ALT engages.*

- LOC*, F-LOC*, LOC B/C*, or GA TRK engages.

INTERACTIONS WITH VERTICAL MODES

Applicable to: ALL

When NAV is engaged with the managed vertical modes CLB or DES, the guidance takes into account the altitude and speed constraints, linked to waypoints on the lateral flight plan.
When NAV is disengaged, the managed vertical modes are not available, and all altitude and speed constraints are disregarded.

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General

GENERAL

Applicable to: ALL

During climb, OP CLB or CLB guides the aircraft vertically to an altitude target.
V/S / FPA can also climb the aircraft: *Refer to V/S / FPA* .

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OP CLB Mode

GENERAL

Applicable to: ALL

Open Climb (OP CLB) mode is a selected vertical mode.
OP CLB guides the aircraft vertically to the AFS CP selected altitude. All altitude constraints are disregarded.

When OP CLB is engaged:
- OP CLB controls the speed/Mach target (selected or managed)
- If the A/THR is active, the A/THR will control the thrust.

OP CLB usually arms before it engages.

For scenario examples on climb with OP CLB mode:
- *Refer to DSC-22-FG-70-120-40 At the Acceleration Altitude*
- *Refer to DSC-22-FG-70-120-40 The Flight Crew Pulls the ALT Knob*
- *Refer to DSC-22-FG-70-120-40 NAV Disengages* .

OP CLB ASSOCIATION WITH ALTITUDE MODES

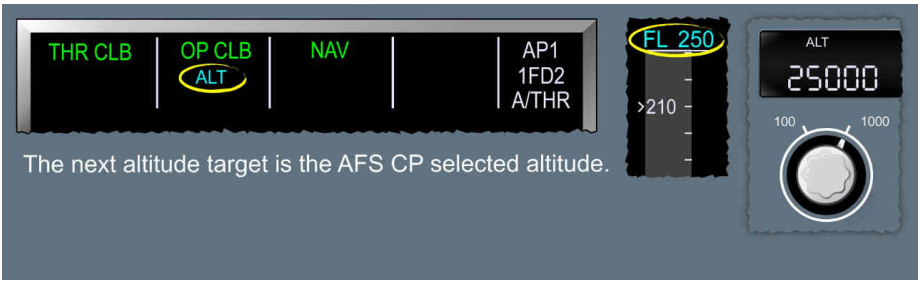
Applicable to: ALL

OP CLB is always associated to an altitude mode.
When OP CLB is engaged:

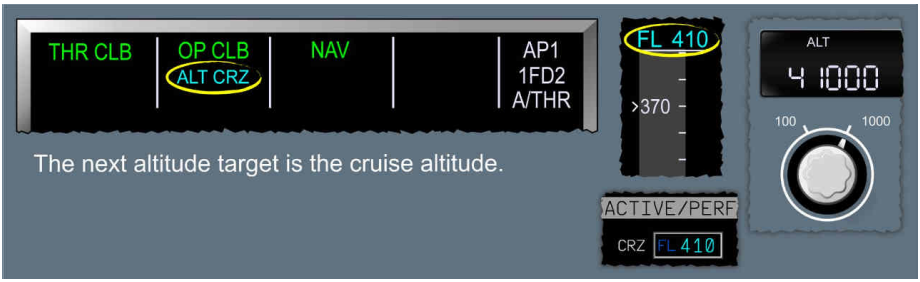
Conditions	**The FMA displays the following message on the second line of the second column:**
The next altitude target is the AFS CP selected altitude. In addition, the AFS CP selected altitude is not set the cruise altitude.	ALT (ALT is armed)
The next altitude target is the cruise altitude. In this case, the AFS CP selected altitude is equal to the cruise altitude. Note: *The cruise altitude is defined on the CRZ panel of the FMS PERF page.*	ALT CRZ (ALT CRZ is armed)

The following are examples:

OP CLB and ALT armed



OP CLB and ALT CRZ armed



ARMING CONDITIONS

Applicable to: ALL

OP CLB arms, when all of the following conditions are met:

- The aircraft is on ground, or SRS is engaged (TO or GA)
- NAV is neither armed nor engaged, or the vertical fight plan is not available
- The Acceleration (ACC) altitude is available, and is below the AFS CP selected altitude.

Refer to Scenario Examples / At the Acceleration Altitude , step 1.

DISARMING CONDITIONS

Applicable to: ALL

L2 OP CLB disarms, when one of the following occurs:

- V/S/FPA engages

L3 - The ACC altitude becomes equal to, or above the AFS CP selected altitude

- CLB arms.

ENGAGEMENT CONDITIONS

Applicable to: ALL

OP CLB engages, when one of the following occurs:

- The AFS CP selected altitude is above the aircraft altitude, and the flight crew pulls the ALT knob

L3 This scenario is applicable, if:

- LAND is not engaged
- If SRS GA is engaged, the aircraft is above 100 ft RA
- The aircraft is airborne for at least 5 s.

L1 - SRS is engaged (TO or GA) with OP CLB armed, and the aircraft reaches the ACC altitude

L3 This scenario is applicable, if the aircraft is airborne for at least 5 s.

L2 - SRS is engaged (TO or GA), and the flight crew pulls the SPD/MACH knob.

L3 This scenario is applicable, if:

- The AFS CP selected altitude is above the aircraft altitude
- If SRS GA is engaged, the aircraft is above 100 ft RA
- The aircraft is in flight for at least 5 s.

L1 When OP CLB engages, ALT automatically arms.

REVERSIONS

OP CLB also engages, when one of the following reversions occurs:

- CLB and NAV are engaged, and NAV disengages
  Refer to Scenario Examples / NAV disengages .

L3 - CLB is engaged, and the vertical flight plan becomes invalid

- CLB is engaged, and the FMS flight phase changes to the descent or approach phase

L1 - SRS TO is engaged, the AFS CP selected altitude is above the aircraft altitude, and the flight crew pulls the SPD/MACH knob .

The reversion is announced by a triple click aural warning.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

OP CLB disengages, when another vertical mode engages.

L2 OP CLB disengages, when one of the following occurs:

- The aircraft reaches the capture zone of the AFS CP selected altitude ALT* engages.
- ALT CRZ is armed, and the aircraft reaches the capture zone of the cruise altitude ALT CRZ* engages.
- The flight crew pushes the ALT knob, when:
  - NAV is engaged
  - The vertical flight plan is available
  - L3 The FMS flight phase is neither the descent nor the approach phase.
- L2 The flight crew pulls the V/S / FPA knob to engage V/S/FPA
- The flight crew pushes the ALT knob to engage ALT.

L1 **REVERSION**

OP CLB reverts to V/S/FPA, when the flight crew sets the AFS CP selected altitude below the aircraft altitude. A triple click aural warning sounds. The pitch bar flashes for 10 s.

CLB Mode

GENERAL

Applicable to: ALL

Climb (CLB) mode is a managed vertical mode.
CLB guides the aircraft vertically along the FMS flight plan, to the AFS CP selected altitude, or to the next altitude constraint, whichever comes first. Therefore, altitude constraints, associated with applicable waypoints, are taken into account.
CLB can only be engaged, when NAV is engaged.

When CLB is engaged:
- The AP / FD s controls the speed/Mach target (selected or managed) through the elevators

  Note: *The Flight Guidance system does not adjust the speed/Mach target to match the altitude constraints.*

- If the A/THR is active, the A/THR will control the thrust.

CLB usually arms before it engages.

For scenario examples on climb with CLB mode:
- *Refer to DSC-22-FG-70-120-50 At the Acceleration Altitude*
- *Refer to DSC-22-FG-70-120-50 Climbing toward an Altitude Constraint* .

CLB ASSOCIATION WITH ALTITUDE MODES

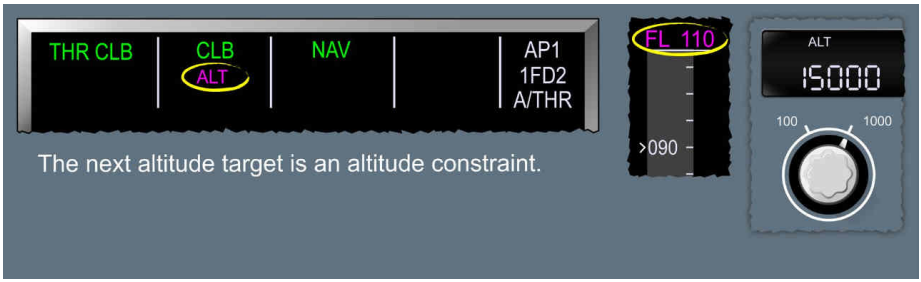
Applicable to: ALL

CLB is always associated to an altitude mode.
When CLB is engaged:

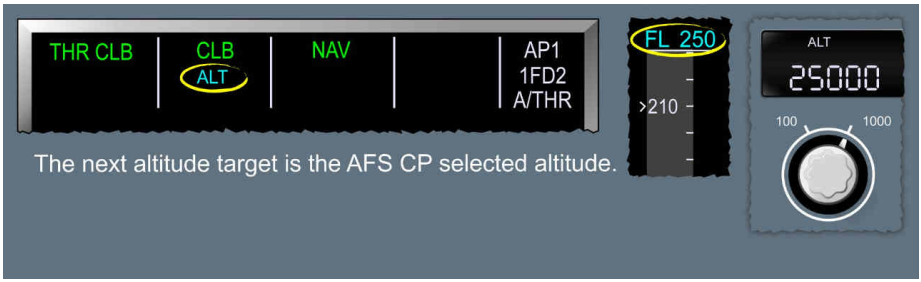
Conditions	The FMA displays the following message on the second line of the second column:
The next altitude target is the AFS CP selected altitude. In addition, the AFS CP selected altitude is not set to the cruise altitude. However, the AFS CP selected altitude can be equal to an altitude constraint.	ALT (ALT is armed)
The next altitude target is an altitude constraint, and the AFS CP selected altitude is above the altitude constraint.	ALT (ALT CST is armed)
The next altitude target is the cruise altitude. In this case, the AFS CP selected altitude is equal to the cruise altitude. Note: *The cruise altitude is defined on the CRZ panel of the FMS PERF page.*	ALT CRZ (ALT CRZ is armed)

The following are examples:

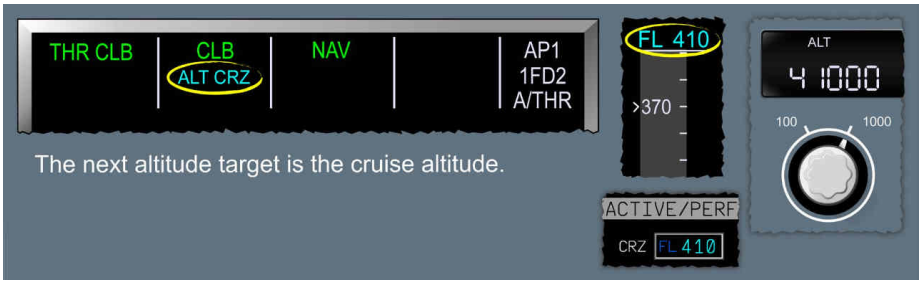
ALT CST arms



ALT arms



ALT CRZ arms



ARMING CONDITIONS

Applicable to: ALL

CLB arms, when the aircraft is on ground, or when SRS is engaged (TO or GA) and:

- NAV is armed, or engaged
- The Acceleration (ACC) altitude is available, and is below:
  - The AFS CP selected altitude
  - The next altitude constraint.

L2 - The vertical flight plan is available.

L1 *Refer to Scenario examples / At Acceleration Altitude* , step 1.

L2 CLB also arms, when CLB was previously engaged, and ALT CST* engages. This scenario is possible, when the AFS CP selected altitude is set to be above the altitude constraint. *Refer to Scenario Examples / Climbing towards an Altitude Constraint* , steps 1 and 2.

L1 The ACC altitude is displayed on the T.O and GA panel of the FMS PERF page. The flight crew can modify the ACC altitude. For more information , *Refer to FMS / Acceleration Altitude on T.O Panel* , and *Refer to FMS / Acceleration Altitude on GA Panel* .

DISARMING CONDITIONS

Applicable to: ALL

CLB disarms, when one of the following occurs:

- NAV disarms, or NAV disengages

L2 - The flight crew sets the AFS CP target altitude to the altitude constraint, when ALT CST* or ALT CST is engaged

- OP CLB, or V/S /FPA engages

L3 - The ACC altitude becomes equal to, or above, the subsequent target altitude, when the aircraft is on ground, or when SRS is engaged (TO or GA)

- The AFS CP selected altitude is set to be below the aircraft altitude
- The vertical fight plan becomes invalid
- The FMS flight phase changes to the descent or approach phase.

ENGAGEMENT CONDITIONS

Applicable to: ALL

CLB engages, when one of the following occurs:

- SRS is engaged (TO or GA) with CLB armed, and the aircraft reaches the ACC altitude

L3 This is applicable, if the aircraft is airborne for at least 5 s .

L1 *Refer to Scenario Examples / At the Acceleration Altitude* , step 3.

- ALT CST is engaged with CLB armed, and the aircraft sequences the altitude constraint
  Refer to Scenario Examples / Climbing towards an Altitude Constraint , step 4.
- The AFS CP selected altitude is set to be above the aircraft altitude, and the flight crew pushes the ALT knob .

This scenario is applicable, if:

- NAV is engaged

L3
- CLB is not yet armed
- The FMS flight phase is neither the descent nor the approach phase
- The vertical flight plan is valid
- The aircraft is in flight for at least 5 s .

L2 Note: *If the aircraft altitude is within the capture zone of the AFS CP selected altitude, CLB will immediately disengage, and ALT* will engage.*

DISENGAGEMENT CONDITIONS

Applicable to: ALL

CLB disengages, when another vertical mode engages.

L2 This signifies that CLB disengages, when one of the following occurs:

- The aircraft reaches the capture zone of the AFS CP selected altitude: ALT* engages
- The aircraft reaches the capture zone of the altitude constraint: ALT CST* engages
  Refer to Scenario Examples / Climbing towards an Altitude Constraint , step 2.
- The aircraft reaches the capture zone of the cruise altitude: ALT CRZ* engages
- The flight crew pulls the V/S / FPA knob to engage V/S / FPA
- The flight crew pulls the ALT knob to engage ALT
- NAV disengages.
  OP CLB engages.
  However, in some cases, this scenario is a reversion: *Refer to DSC-22-FG-70-40-30-B Reversions* .

REVERSIONS

CLB also disengages, when one of the following reversions occurs:

- NAV disengages after:
  - The aircraft has reached a flight plan discontinuity, or
  - The next altitude target was an altitude constraint, and the flight crew has engaged HDG / TRACK mode.

  OP CLB engages.
  Refer to OP CLB / Scenario Examples / NAV disengages .
- The flight crew sets the AFS CP selected altitude below the aircraft altitude
  V/S / FPA engages on the current vertical speed or current flight path angle.
- The vertical flight plan becomes invalid
  OP CLB engages.
- L3 - The FMS flight phase changes to the descent or approach phase.
  OP CLB engages.

L1 The reversion is announced by a triple click aural warning.
If CLB reverts to V/S / FPA , the FD pitch bar will flash for 10 s .

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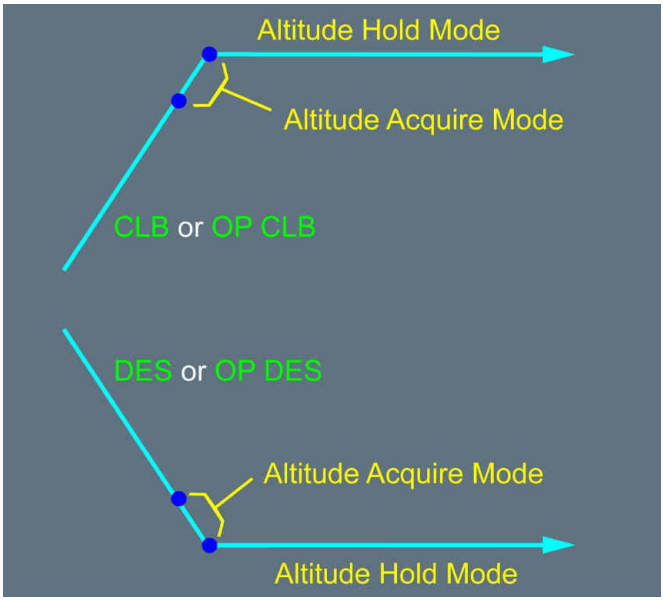
General

GENERAL

Applicable to: ALL

When climbing (descending) toward an altitude target, CLB or OP CLB (DES or OP DES) is engaged. When approaching the altitude target, an altitude acquire mode engages. When reaching the altitude target, an altitude hold mode engages.

ALT acquire mode, and ALT hold mode



The altitude target is one of the following: An altitude constraint (associated to a waypoint), the cruise altitude, the AFS CP selected altitude.
The altitude acquire mode is one of the following: ALT *, ALT CST *, ALT CRZ *.
The altitude hold mode is one of the following: ALT , ALT CST , ALT CRZ .

For scenario examples on altitude acquire and altitude hold:
- *Refer to DSC-22-FG-70-120-60 CLB and ALT - Example 1*
- *Refer to DSC-22-FG-70-120-60 CLB and ALT - Example 2*
- *Refer to DSC-22-FG-70-120-60 CLB and ALT CST*
- *Refer to DSC-22-FG-70-120-60 CLB and ALT CRZ*

- *Refer to DSC-22-FG-70-120-60 OP CLB and ALT*
- *Refer to DSC-22-FG-70-120-60 OP CLB and ALT CRZ* .

WHEN THE VERTICAL GUIDANCE IS MANAGED

When the vertical guidance is managed, CLB or DES guides the aircraft toward the next altitude target.

The next altitude target is the first altitude among the following that the aircraft will reach:
- The AFS CP selected altitude
- The altitude constraint (associated to a waypoint)
- The cruise altitude.

The altitude acquire mode, and the altitude hold mode are as follows:

Conditions	Altitude Acquire Mode	Altitude Hold Mode	Scenario Example
The next altitude target is the AFS CP selected altitude. In addition, the AFS CP selected altitude is not set the cruise altitude. However, the AFS CP selected altitude can be equal to an altitude constraint.	ALT*	ALT	*Refer to Scenario Examples / CLB and ALT - Example 1* , and *Refer to Scenario Examples / CLB and ALT - Example 2* .
The next altitude target is an altitude constraint, and the AFS CP selected altitude is above (below) the altitude constraint in climb (descent).	ALT CST*	ALT CST	*Refer to Scenario Examples / CLB and ALT CST* .
The next altitude target is the cruise altitude. In this case, the AFS CP selected altitude is equal to the cruise altitude. Note: 1. *The cruise altitude is defined on the CRZ panel of the FMS PERF page. For more information on the cruise altitude, Refer to FMS / Cruise Fligth Level* . 2. *If the AFS CP selected altitude is set above the cruise altitude, the cruise altitude is automatically updated to the AFS CP selected altitude.*	ALT CRZ*	ALT CRZ	*Refer to Scenario Examples / CLB and ALT CRZ* .

WHEN THE VERTICAL GUIDANCE IS SELECTED

When the vertical guidance is selected, OP CLB or OP DES guides the aircraft toward the AFS CP selected altitude.

All the altitude constraints are disregarded.

The altitude acquire mode, and the altitude hold mode are as follows:

Conditions	Altitude Acquire Mode	Altitude Hold Mode	Scenario Example
The AFS CP selected altitude is below the cruise altitude.	ALT*	ALT	*Refer to Scenario Examples / OP CLB and ALT .*
The AFS CP selected altitude is equal to the cruise altitude. *Note:* 1. *The cruise altitude is defined on the CRZ panel of the FMS PERF page. For more information on the cruise altitude, Refer to FMS / Cruise Fligth Level .* 2. *If the AFS CP selected altitude is set above the cruise altitude, the cruise altitude is automatically updated to the AFS CP selected altitude.*	ALT CRZ*	ALT CRZ	*Refer to Scenario Examples / OP CLB and ALT CRZ .*

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Altitude Acquire Modes

GENERAL

Applicable to: ALL

The altitude acquire mode is one of the following: ALT*, ALT CST*, ALT CRZ*.
ALT* mode guides the aircraft to acquire the AFS CP selected altitude.
ALT CST* guides the aircraft to acquire an altitude constraint.
ALT CRZ* guides the aircraft to acquire the cruise altitude, as selected on the MFP PERF page, and on the AFS CP.
When the aircraft reaches the altitude target, the altitude hold mode (ALT, ALT CST, or ALT CRZ) engages.

ARMING AND DISARMING CONDITIONS

Applicable to: ALL

An altitude acquire mode arms or disarms, when the corresponding altitude hold mode arms or disarms: *Refer to Altitude Hold Modes / Arming Conditions* , and *Refer to Altitude Hold Modes / Disarming Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

The altitude acquire mode engages, when one of the following occurs:
- The altitude hold mode is armed, and the aircraft reaches the capture zone of the altitude target

L3 - The flight crew engages the AP, when all of the following conditions are met:
  - The AP was not previously engaged
  - The altitude hold mode is engaged
  - The aircraft is within 250 ft of the altitude target.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

The altitude acquire mode disengages, when one of the following occurs:
- The aircraft reaches the altitude target
  The altitude hold mode engages.
- The aircraft reaches the glideslope capture zone, when:
  - LOC or LOC* is engaged, and
  - G/S is armed.

  G/S engages.

- The aircraft reaches the F-glideslope capture zone, when:
  - F-LOC, F-LOC*, LOC or LOC* is engaged, and
  - F-G/S is armed.

  F-G/S engages.
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.
- The flight crew engages go-around.
  SRS GA engages.

ADDITIONAL SCENARIO: ALT* DISENGAGEMENT (REVERSION)

ALT* disengages, if the flight crew sets the AFS CP selected altitude out of the capture zone. V/S / FPA engages. A triple click aural warning sounds. The FD pitch bar flashes for 10 s.

ADDITIONAL SCENARIOS: ALT CST* DISENGAGEMENT

ALT CST* disengages, when one of the following occurs:
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew presses the ALT pb.
  ALT CST engages.

REVERSIONS

ALT CST* reverts to V/S / FPA, when one of the following occurs:
- NAV disengages
  A triple click aural warning sounds. The FD pitch bar flashes for 10 s.

L3
- The vertical flight plan is lost.
  A triple click aural warning sounds. The FD pitch bar flashes for 10 s.

L1 **ADDITIONAL SCENARIOS: ALT CRZ* DISENGAGEMENT**

ALT CRZ* disengages, when one of the following occurs:
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew presses the ALT pb.
  ALT engages.

REVERSION

ALT CRZ* reverts to V/S / FPA if NAV disengages. A triple click aural warning sounds. The FD pitch bar flashes for 10 s.

GUIDANCE

Applicable to: ALL

L2 The altitude acquire mode has a V/S control law that is a function of the difference between aircraft altitude and the altitude target.

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Altitude Hold Modes

GENERAL

Applicable to: ALL

The altitude hold mode is one of the following: ALT, ALT CST, ALT CRZ.
The altitude hold mode maintains a target altitude. This target altitude is either the AFS CP selected altitude, or an altitude constraint.

ARMING CONDITIONS

Applicable to: ALL

The altitude hold mode arms, when the aircraft climbs or descends toward an altitude target.
However, the altitude hold mode do not arm, when one of the following mode is engaged: G/S*, G/S, F-G/S*, F-G/S, LAND, FLARE, ROLL OUT.

ALT ARMING

ALT arms, when one of the following occurs:
- OP CLB engages, and the AFS CP selected altitude is not set to the cruise altitude
- OP DES engages
- CLB engages, when the next altitude target is:
  - Equal to the AFS CP selected altitude
  - Not equal to the cruise altitude.
- The next altitude target is the AFS CP selected altitude, and DES engages
- The next altitude target is the AFS CP selected altitude, and V/S / FPA engages
- The aircraft is on ground, or SRS TO or SRS GA engages, and:
  - The next altitude target is the AFS CP selected altitude
  - The AFS CP selected altitude is below the acceleration altitude.

ALT CST ARMING

ALT CST arms, when CLB (DES) engages, and:
- The next target altitude is an altitude constraint
- The AFS CP selected altitude is above (below) the altitude constraint.

ALT CRZ ARMING

ALT CRZ arms, when one of the following occurs:
- The AFS CP selected altitude is equal to the cruise altitude, and the cruise altitude becomes the cruise altitude

L3 This scenario is possible, if ALT is not engaged.

L1 - ALT is armed, and the AFS CP selected altitude is set to the cruise altitude.

FMA MESSAGE

The following table presents the FMA message, when an altitude hold mode is armed:

Conditions on Altitude (1)	The armed altitude hold mode is:	The FMA displays the following message on the second line of the second column:
The next altitude target is the AFS CP selected altitude. In addition, the AFS CP selected altitude is not set to the cruise altitude. However, the AFS CP selected altitude can be equal to an altitude constraint.	ALT	ALT
All of the following conditions are met: - The next altitude target is an altitude constraint - CLB (DES) is engaged, and the AFS CP selected altitude is above (below) the altitude constraint.	ALT CST	ALT
The next altitude target is the cruise altitude. In this case, the AFS CP selected altitude is equal to the cruise altitude. *Note: The cruise altitude is defined on the CRZ panel of the FMS PERF page.*	ALT CRZ	ALT CRZ

(1) The overall conditions of altitude hold mode arming are presented above.

DISARMING CONDITIONS

Applicable to: ALL

The altitude hold mode disarms, when G/S* or F-G/S* engages.

L2 The altitude hold mode disarms in the other following cases.

ALT DISARMING

ALT disarms, when one of the following occurs:

- ALT CST arms
  This occurs when: OP CLB (OP DES) is engaged, with the AFS CP selected altitude set above (below) the altitude constraint, and CLB (DES) engages.

L3 - SRS GA engages, and the AFS CP selected altitude is above the acceleration altitude.

L2 ALT CST DISARMING

ALT CST disarms, when one of the following occurs:

- CLB or DES is engaged, and the AFS CP selected altitude becomes the next altitude target
- CLB is engaged, and OP CLB or V/S / FPA engages

- DES is engaged, and OP DES or V/S / FPA engages

L3 - DES is engaged, and SRS GA engages.

L2 **ALT CRZ DISARMING**

ALT CRZ disarms, when the AFS CP selected altitude is set below the cruise altitude: ALT arms.

ENGAGEMENT CONDITIONS

Applicable to: ALL

The altitude hold mode engages, when the altitude acquire mode is engaged, and the aircraft reaches the altitude target.

L2 The difference between the aircraft altitude and the altitude target is less than 40 ft for more than one second.

L1 **ADDITIONAL SCENARIOS: ALT ENGAGEMENT**

ALT engages, when one of the following occurs:

- The flight presses the ALT pb, and all of the following conditions are met:

L3 This scenario is not possible, if one of the following modes is engaged: ALT CST*, ALT CST, LAND, SRS GA below 100 ft RA.

L1 - ALT CST is engaged, and the flight crew sets the AFS CP selected altitude to the altitude constraint

L2 - ALT CST is engaged, and NAV disengages

L3 - ALT CST engaged, and the vertical flight plan is lost.

L2 **ADDITIONAL SCENARIOS: ALT CST ENGAGEMENT**

ALT CST engages, when one of the following occurs:
- ALT CST* is engaged, and the flight crew presses the ALT pb.
- The flight crew pushes the ALT knob, and all of the following conditions are met:
  - ALT is engaged
  - The aircraft altitude is equal to the altitude constraint
  - The AFS CP selected altitude is set above the aircraft altitude
  - L3 The AFS CP selected altitude is at least 250 ft above the aircraft altitude.
  - L2 NAV is engaged
  - The FMS flight phase is neither descent, nor approach
  - L3 The vertical flight plan is valid.
- L2 The flight crew pushes the ALT knob, and all of the following conditions are met:
  - ALT is engaged
  - The aircraft altitude is equal to the altitude constraint
  - The AFS CP selected altitude is set below the aircraft altitude
  - L3 The AFS CP selected altitude is at least 250 ft below the aircraft altitude.
  - L2 One of the following modes is engaged: NAV, LOC*, LOC, LOC B/C*, LOC B/C
  - The FMS flight phase is not one of the following: Takeoff, climb, go-around.

L3 **ADDITIONAL SCENARIOS: ALT CRZ ENGAGEMENT**

ALT CRZ engages, when:
- ALT is engaged, and
- The aircraft altitude is equal to the AFS CP selected altitude, and
- The flight crew sets the cruise altitude to the aircraft altitude.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

COMMON SCENARIOS

The altitude hold mode disengages, when any other vertical modes engages.

The altitude hold mode disengages, when one of the following occurs:
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.

L3 - The flight crew engages the AP, when all of the following conditions are met:
- The AP was not previously engaged
- The aircraft is within 250 ft of the altitude target.

The altitude acquire mode engages.

L1 - The aircraft reaches the glideslope capture zone, when:
- LOC* or LOC is engaged, and
- G/S is armed.

G/S* engages.

- The aircraft reaches the F-glideslope capture zone, when:
  - LOC*, LOC, F-LOC*, F-LOC is engaged, and
  - F-G/S is armed.

  F-G/S* engages.
- The flight crew engages go-around.
  SRS GA engages.

ADDITIONAL SCENARIOS: ALT DISENGAGEMENT

ALT disengages, when one of the following occurs:
- The flight crew pushes the ALT knob, when all of the following conditions are met:
  - The AFS CP selected altitude is above the aircraft altitude
  - NAV is engaged

L3 - The vertical flight plan is valid

L1 - The FMS flight phase is neither descent, nor approach.

  CLB engages.
- The flight crew pushes the ALT knob, when all of the following conditions are met:
  - The AFS CP selected altitude is below the aircraft altitude
  - One of the following modes is engaged: NAV, LOC*, LOC, LOC B/C*, LOC B/C

L3 - The vertical flight plan is valid

L1 - The FMS flight phase is not one of the following: Takeoff, climb, go-around.

  DES engages.

L2 - The flight crew pushes the ALT knob, and all of the following conditions are met:
- The aircraft altitude is equal to the altitude constraint
- The AFS CP selected altitude is set above the aircraft altitude

L3 The AFS CP selected altitude is at least 250 ft above the aircraft altitude.

L2 - NAV is engaged
- The FMS flight phase is neither descent, nor approach

L3 - The vertical flight plan is valid.

L2 ALT CST engages.

- The flight crew pushes the ALT knob, and all of the following conditions are met:
  - The aircraft altitude is equal to the altitude constraint
  - The AFS CP selected altitude is set below the aircraft altitude
  - L3 The AFS CP selected altitude is at least 250 ft below the aircraft altitude.
  - L2 One of the following modes is engaged: NAV, LOC*, LOC, LOC B/C*, LOC B/C
  - The FMS flight phase is not one of the following: Takeoff, climb, go-around.

  ALT CST engages.
- L3 The aircraft altitude is equal to the AFS CP selected altitude, and the flight crew sets the cruise altitude to the aircraft altitude
  ALT CRZ engages.
- The flight crew engages the AP, when:
  - The AP was not previously engaged
  - The aircraft altitude is within 250 ft of the AFS CP selected altitude.

  ALT* engages.

ADDITIONAL SCENARIOS: ALT CST DISENGAGEMENT

ALT CST disengages, when one of the following occurs:
- The aircraft sequences the waypoint, for which the altitude constraint is associated
- NAV disengages

  ALT engages.
- L3 The vertical flight plan is lost
- L1 The flight crew set the AFS CP selected altitude to the altitude constraint

  ALT engages.
- L3 The flight crew engages the AP, when:
  - The AP was not previously engaged, and
  - The aircraft altitude is within 250 ft of the altitude constraint.

  ALT CST* engages.
- L1 The flight crew deletes the altitude constraint.

  CLB or DES engages.

ADDITIONAL SCENARIOS: ALT CRZ DISENGAGEMENT

ALT CRZ disengages, when one of the following occurs:

- The AFS CP selected altitude is below the aircraft altitude, and the flight crew pushes the ALT knob
  DES engages.

L3 - The flight crew engages the AP, when:
  - The AP was not previously engaged, and
  - The aircraft altitude is within 250 ft of the cruise altitude.

  ALT CRZ* engages.

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General

GENERAL

Applicable to: ALL

During descent, OP DES or DES guides the aircraft vertically to an altitude target, or to a glideslope or F -glideslope capture zone.
V/S / FPA can also descent the aircraft: *Refer to V/S / FPA* .

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OP DES

GENERAL

Applicable to: ALL

Open Descent (OP DES) is a vertical selected mode.
When OP DES is engaged, the AP/FD adjusts the pitch in order to maintain a speed/Mach target (selected or managed). The A/THR then maintains idle thrust.
All the altitude constraints are disregarded.

ENGAGEMENT CONDITIONS

Applicable to: ALL

OP DES engages, if the AFS CP selected altitude is below the aircraft altitude, and the flight crew pulls the ALT knob.

L3 OP DES cannot engage, if:
- SRS GA is engaged below 100 ft RA, or
- LAND is engaged.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

OP DES disengages, if one of the following conditions is met:
- The aircraft reaches the capture zone of the AFS CP selected altitude
  ALT* engages.
- ALT CRZ is armed, and the aircraft reaches the capture zone of the cruise altitude.
  ALT CRZ* engages.
- The flight crew presses the ALT knob
  ALT engages.
- The flight crew pushes the ALT knob, when all of the following conditions are met:
  - One of the following modes is engaged: NAV, LOC*, LOC, LOC BC*, LOC BC
  - L3 The FMS flight phase is cruise or descent
  - The vertical flight plan is valid.

L1 DES engages.
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.
- The aircraft reaches the glideslope capture zone, when:
  - LOC* or LOC is engaged, and
  - G/S is armed.

  G/S* engages.

- The aircraft reaches the glideslope capture zone, when:
  - One of the following modes is engaged: LOC*, LOC, F-LOC*, F-LOC, and
  - G/S is armed.

  F-G/S* engages.
- The flight crew engages go-around.
  SRS GA engages.

REVERSION

OP DES reverts to V/S / FPA, if the flight crew sets the AFS CP selected altitude above the aircraft altitude. A triple click aural warning sounds. The FD pitch bar flashes for 10 seconds.

DES

GENERAL

Applicable to: ALL

DES is a managed vertical mode.
DES guides the aircraft vertically along the vertical flight plan. All the altitude constraints, associated to waypoints, are taken into account.
When DES is engaged in idle path, the AP/FD adjusts the pitch in order to maintain a speed/Mach target (selected or managed). The A/THR then maintains idle thrust.
When DES is engaged in geometric path, the AP/FD controls the vertical trajectory. The A/THR is then in SPEED/MACH.

ARMING CONDITIONS

Applicable to: ALL

DES arms, when one of the following occurs:
- DES is previously engaged, and ALT CST* engages
- The flight crew pushes the ALT knob, when all of the following conditions are met:
  - ALT is engaged
  - The aircraft is on an altitude constraint
  - The AFS CP selected altitude is below the aircraft altitude
  - One of the following mode is engaged: NAV, LOC*, LOC, LOC BC*, LOC BC

L3 • The FMS flight phase is cruise, descent, or approach.

L1 ALT CST engages.

DISARMING CONDITIONS

Applicable to: ALL

DES disarms, when one of the following occurs:

L2 - ALT CSTR* is engaged, and one of the following modes engages: OP DES, V/S / FPA, ALT*, ALT, G/S*, SRS GA
- ALT CSTR is engaged, and one of the following modes engages: OP DES, V/S / FPA, ALT, G/S*, SRS GA
- ALT CST* or ALT CST is engaged, and the AFS CP selected altitude is set:
  - To the altitude constraint

L3 • Or above the aircraft altitude.

L1 - NAV, LOC*, or LOC disengages, whereas the mode was previously engaged

L3 - The vertical flight plan is lost.

ENGAGEMENT CONDITIONS

Applicable to: ALL

DES engages, when one of the following occurs:

- ALT CSTR is engaged with DES armed, and the aircraft sequences ALT CSTR waypoint
- The flight crew pushes the ALT knob when ALT CRZ is engaged, and the AFS CP selected altitude is below the aircraft altitude
- The flight crew pushes the ALT knob, and all of the following conditions are met:
  - The AFS CP selected altitude is below the aircraft altitude
  - One of the following modes is engaged: NAV, LOC*, LOC, LOC BC*, LOC BC, F-LOC*, F-LOC
  - DES is not armed
  - The FMS flight phase is cruise, descent, or approach
  - The vertical flight plan is valid.

  However, DES will not engage, if one of the following modes is engaged: G/S*, G/S, F-G/S*, F-G/S, LAND.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

DES disengages, when one of the following occurs:

- The aircraft reaches the capture zone of the AFS CP selected altitude
  ALT* engages.
- The aircraft reaches the capture zone of the altitude constraint
  ALT CST* engages.
- The flight crew presses the ALT knob
  ALT engages.
- The flight crew pulls the ALT knob
  OP DES engages.
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.
- The aircraft reaches the glideslope capture zone when:
  - LOC* or LOC is engaged, and
  - G/S is armed.

  G/S* engages.
- The aircraft reaches the F-glideslope capture zone when:
  - One of the following modes is engaged: LOC*, LOC, F-LOC*, F-LOC, and
  - F-G/S is armed.

  F-G/S* engages.
- The flight crew engages go-around.
  SRS GA engages.

REVERSIONS

DES reverts to V/S / FPA, when one of the following occurs:

- The flight crew sets the AFS CP selected altitude above the aircraft altitude
- One of the following modes was engaged, and disengages: NAV, LOC*, LOC, LOC BC*

L3 - The vertical flight plan is lost.

L1 A triple click aural warning sounds. The FD pitch bar flashes for 10 seconds.

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GENERAL

Applicable to: ALL

V/S and FPA are selected vertical modes. They are the basic modes of vertical guidance.
V/S / FPA acquires and holds the vertical speed or the flight path angle, that is displayed in the V/S / FPA window of the AFS CP . For more information, *Refer to DSC-22-FG-80-20-D V/S / FPA Window* .

When V/S / FPA engages following a reversion, the V/S / FPA target is the V/S / FPA that has the aircraft when V/S / FPA engages.

ENGAGEMENT CONDITIONS

Applicable to: ALL

V/S / FPA engages, when one of the following occurs:

- The flight crew pulls the V/S / FPA knob

L3 V/S / FPA will not engage, if LAND is engaged, or SRS GA is engaged below 100 ft RA .

L1 - The AP s and FD s are disengaged, and the flight crew engages the FD s or the AP HDG / TRACK also engages. The FD pitch and roll bars flash for 10 seconds.

L3 - No vertical mode is engaged, and the flight crew engages the FD s
This scenario is possible, if the aircraft is airborne for 5 seconds.

L1 - A reversion to V/S / FPA occurs.

V/S or FPA engages, in accordance with the HDG-V/S / TRK-FPA selection. For more information on HDG-V/S / TRK-FPA selection: *Refer to Lateral Guidance from Takeoff to Descent / HDG-V/S / TRK-FPA Selection* .

REVERSIONS TO V/S / FPA

A vertical mode reverts to V/S / FPA, when one of the following occurs:

- The flight crew sets the AFS CP selected altitude out of the capture zone.

L2 - OP DES, or DES is engaged, and the AFS CP selected altitude is set above the aircraft altitude

- OP CLB, or CLB is engaged, and the AFS CP selected altitude is set below the aircraft altitude

L1 - NAV disengages, when one of the following modes is engaged: DES, ALT CST*, ALT CRZ*

L3 - The vertical flight plan is lost, when one of the following modes is engaged: DES, ALT CST*, ALT CRZ*

- The flight crew changes the approach when:
  - G/S* or G/S is engaged, and
  - The aircraft is below 700 ft RA.
- The flight crew changes the approach when F-G/S* or F-G/S is engaged.

L1 - G/S* or G/S is engaged, and LOC* or LOC disengages

- F-GS* or F-G/S is engaged, and the lateral approach mode disengages
- The flight crew presses the LOC pb, when G/S* or G/S is engaged.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

V/S / FPA disengages, when one of the following occurs:

- The aircraft reaches the capture zone of the AFS CP selected altitude
  ALT* engages.
- ALT CRZ is armed, and the aircraft reaches the capture zone of the cruise altitude
  ALT CRZ* engages.
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew pushes the ALT knob
  - NAV is engaged
  - The AFS CP selected altitude is above the aircraft altitude
  - L3 The FMS flight phase is neither descent, nor approach
  - The vertical flight plan is valid.

  L1 CLB engages.
- The flight crew pushes the ALT knob
  - One of the following modes is engaged: NAV, LOC*, LOC, LOC BC*, LOC BC
  - The AFS CP selected altitude is below the aircraft altitude
  - L3 The FMS flight phase is cruise, or descent
  - The vertical flight plan is valid.

  L1 DES engages.
- The flight crew presses the ALT pb
  ALT engages.
- The aircraft reaches the glideslope capture zone when:
  - LOC* or LOC is engaged
  - G/S is armed.

  G/S* engages.
- The aircraft reaches the F-glideslope capture zone when:
  - LOC*, LOC, F-LOC*, F-LOC is engaged
  - F-G/S is armed.

  F-G/S* engages.
- The flight crew engages go-around.
  SRS GA engages.

General

GENERAL

Applicable to: ALL

The aircraft flies the following types of approach:

- Precision approach: ILS approach, and GLS approach
- Non-Precision Approaches (NPA s):
  - VOR , VOR / DME , NDB , NDB / DME and RNAV approaches
  - ILS with glideslope out, LOC only, and LOC B/C approaches.

For scenario examples on approaches:

- *Refer to DSC-22-FG-70-120-90 ILS Approach and Autoland*
- *Refer to DSC-22-FG-70-120-90 VOR Approach Flown with FLS Function*
- *Refer to DSC-22-FG-70-120-90 LOC only Approach Flown with FLS Function*

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ILS Approach

ILS APPROACH

Applicable to: ALL

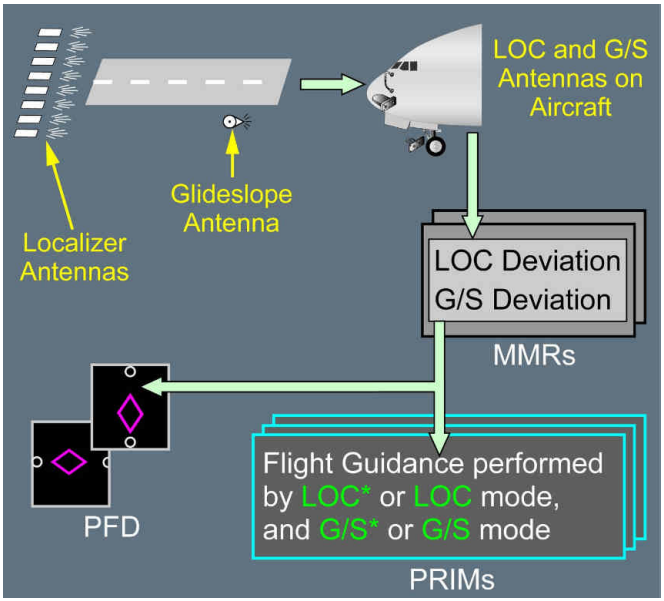
An ILS approach uses the Localizer (LOC) and Glideslope (G/S) signals emitted from localizer antennas and a glideslope antenna on ground. Each MMR computes LOC and G/S deviations. The Flight Guidance uses the LOC and G/S deviations in order to fly the aircraft along the LOC and G/S beams.

The ILS approach modes are:

	Lateral Guidance	Vertical Guidance
Above 400 ft RA	LOC* : Capture of the LOC beam LOC : Track of the LOC beam.	G/S* : Capture of the G/S beam G/S : Track of the G/S beam.
Below 400 ft RA , and until end of roll out	LAND : Track of LOC and G/S beams FLARE : Alignment of the yaw axis on the runway centerline, and flare on the pitch axis ROLL OUT : Track of the runway centerline, and nose down.	

Each ILS receiver is hosted in one MMR .

ILS Architecture



In accordance with the approach capability, and the Decision Height (DH), the flight crew can, or must perform an autoland. For more information, *Refer to Limitations / Required Equipement for CAT2, or CAT3 Approach Capability* .
To fly an ILS approach, the flight crew selects an ILS approach on the FMS ARRIVAL page.

ILS SELECTION

Applicable to: ALL

STANDARD SELECTION

To fly an ILS approach, the flight crew selects an ILS approach on the FMS ARRIVAL page.

NON-STANDARD SELECTION

MANUAL TUNING ON THE FMS

If the flight crew manually-tunes an ILS on the FMS POSITION / NAVAIDS page, the aircraft will fly the manually-tuned ILS .

L2 In addition, if the flight crew has selected another ILS approach on the FMS ARRIVAL page:
- The ILS approach selected on the FMS ARRIVAL page will be disregarded, and the MFD will display the RUNWAY / LS DISAGREE message
- The aircraft will fly the manually-tuned ILS .

L1 #### MANUAL TUNING ON THE RMP

If all the FMC s are fault, the flight crew selects STBY RAD NAV on one RMP , and manually-tunes an ILS (frequency and course).

ILS SELECTION IN THE ILS RECEIVERS

L2 When an approach is selected on the FMS ARRIVAL page, or manually-tuned on FMS or RMP , the ILS frequency and course are sent to both ILS receivers. For more information on ILS receivers, *Refer to Navigation / MMR / Architecture* .

ILS APPROACH SEQUENCE

Applicable to: ALL

The sequence to fly an ILS approach is:
1. The flight crew selects an ILS approach on the FMS ARRIVAL page.
2. The FMS approach phase activates:
   - Manually, when the flight crew clicks on the ACTIVATE APPR on the FMS PERF page, or
   - Automatically, when NAV is engaged, and the aircraft flies the DECEL pseudo waypoint.

   For more information on the activation of the FMS approach phase, *Refer to DSC-22-FMS-10-50-20 Flight Phases - Overview* .

Then, the managed speed target becomes Green Dot, S, F, and VAPP corrected from the Ground Speed Mini function, in accordance with the slats/flaps configuration. For more information, *Refer to Speed/Mach Control / Managed Speed/Mach Target* .

3. The flight crew presses the APPR pb on the AFS CP :
   - LOC and G/S arm
   - The flight crew can engage the second AP .
4. The aircraft reaches the capture zone of the LOC beam: LOC* engage.
5. The aircraft becomes established on the LOC beam: LOC engage.
6. The aircraft reaches the capture zone of the G/S beam: G/S* engages.

L2 *Note: G/S* can also engage before LOC engagement, when LOC* is engaged.*

L1 7. The aircraft becomes established on the G/S beam: G/S engages.

L2 *Note: G/S can only engage, when LOC is engaged.*

L1 8. At 400 ft RA , LAND engages.

9. At Decision Height (DH), the flight crew can disengage all AP engaged to land manually.
10. At approximately 60 ft RA , FLARE engages.
11. At touch down, ROLL OUT engages.
12. At the end of the roll out, if an autoland was performed, the flight crew disengages all AP engaged.

Note: Instead of pressing the APPR pb (at step 3), the flight crew can press the LOC pb to intercept the LOC beam: LOC arms, LOC engages, and LOC engages.*
When ready to intercept the G/S beam, the flight crew presses the APPR pb : G/S arms, G/S engages, and G/S engages.*

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GLS Approach

GLS APPROACH

Applicable to: ALL

The Global Navigation Satellite System (GNSS) Landing System (GLS) is a system that enables the flight crew to fly a precision approach in an ILS look alike way.

The GLS ground station sends to the aircraft:
- Position corrections
- Satellite integrity information
- Data for approach path definition.

On the aircraft, the LOC antenna receives these data, and sends them to both Multi-Mode Receivers (MMRs).

Each MMR computes the GLS lateral deviation and the GLS vertical deviation, from the following data:
- The GPS position from the GPS receiver
- The data received from the GLS ground station.

The GLS lateral deviation is referred to as the LOC deviation. The GLS vertical deviation is referred to as the G/S deviation.
To fly a GLS approach, the flight crew selects a GLS approach on the FMS ARRIVAL page.
The approach modes are:

Lateral	Vertical
LOC*, LOC	G/S*, G/S
LAND, FLARE, ROLL OUT	

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NPA Flown with FLS Function

VOR, VOR/DME, NDB, NDB/DME OR RNAV APPROACH FLOWN WITH FLS FUNCTION

Applicable to: ALL

The FLS function provides the flight crew with an interface to fly a VOR , VOR / DME , NDB , NDB / DME or RNAV approach in an ILS look alike way. The Flight Guidance uses:

- Pseudo LOC deviation, referred to as F-LOC deviation
- Pseudo G/S deviation, referred to as F-G/S deviation.

Each MMR computes the F-LOC and F-G/S deviations by comparing the FMS position, associated to the barometric altitude, with:

- The pseudo LOC beam, referred to as the F-LOC beam, and
- The pseudo G/S beam, referred to as the F-G/S beam.

The set of F-LOC beam, and F-G/S beam is also referred to as the FLS beam.
The FLS beam is defined in the FMS , based on NPA data, stored in the navigation database.

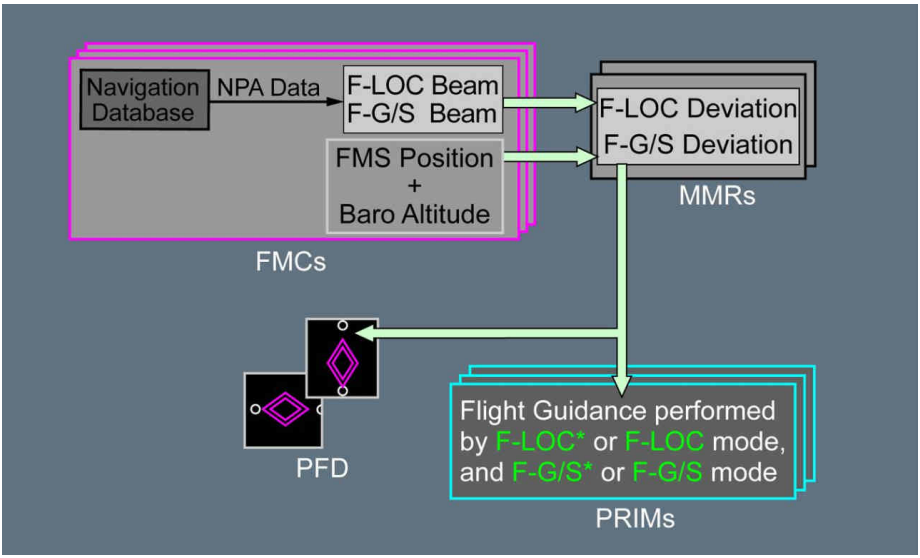
Note: Depending on the NPA , the F-LOC beam may not be aligned with the runway centerline.

For more information on the definition of the FLS beam, *Refer to FMS* / FLS Beam Computation.
The approach modes are:

Lateral Guidance	Vertical Guidance
F-LOC* : Capture of F-LOC beam F-LOC : Track of F-LOC beam.	F-G/S* : Capture of F-G/S beam F-G/S : Track of F-G/S beam.

L2 These approach modes use the same guidance laws as LOC* , LOC , G/S* , and G/S modes.

FLS Function Architecture



L1 To fly a NPA with the FLS function, the flight crew selects one of the following approaches on the FMS ARRIVAL page:

NPA	Approach Selection on the FMS ARRIVAL Page
VOR , VOR / DME	VOR
NDB , NDB / DME	NDB
RNAV	RNV, or GPS

For the approach sequence, *Refer to DSC-22-FG-70-80-30 Sequence of an NPA Flown with FLS Function* .

ILS WITH G/S OUT, LOC ONLY, OR LOC B/C APPROACH FLOWN WITH FLS FUNCTION

Applicable to: ALL

The aircraft can fly an ILS with glideslope out, a LOC only, or a LOC B/C approach with the FLS function.

The following table indicates:
- The approach selection on the FMS ARRIVAL page
- The approach modes used by the Flight Guidance.

NPA	Approach Selection on the FMS ARRIVAL Page	Approach Modes	
		Lateral Guidance	Vertical Guidance
ILS with glideslope out	ILS In addition, the flight crew deselects the G/S on the FMS POSITION / NAVAIDS page.	LOC*: Capture of the LOC beam LOC: Track of the LOC beam.	F-G/S*: Capture of the F-G/S beam F-G/S: Track of the F-G/S beam.
LOC only	LOC		
LOC B/C	BAC	LOC B/C*: Capture of the LOC beam LOC B/C: Track of the LOC beam.	

FLS FUNCTION AVAILABILITY

Applicable to: ALL

The FLS function becomes available, if the flight crew selects:

- A VOR, NDB, RNV, GPS, LOC or BAC approach on the FMS ARRIVAL page

L3 The FLS function is not available for SDF, and LDA approaches.

L1 - An ILS approach on the FMS ARRIVAL page, and deselects the G/S by clicking on the DESELECT GLIDE button on the FMS POSITION / NAVAIDS page

However, the FLS function is not available, if the NPA is as follows:

- The Missed Approach Point is before the runway threshold, and
- The difference between the final approach course and the runway course is more than 50°.

When the flight crew selects an NPA, and if the FLS function is not available for this NPA, the NO FLS FOR THIS APPR message appears on the FMS message area.

SEQUENCE OF AN NPA FLOWN WITH FLS FUNCTION

Applicable to: ALL

The sequence to fly a NPA with the FLS function, is:

1. The flight crew selects a NPA on the FMS ARRIVAL page.
2. The flight crew presses the LS pb on the EFIS CP : The LS deviations appear on the PFD , and the FLS capability appears on the FMA .
3. The FMS approach phase activates:
   - Manually, when the flight crew clicks on the ACTIVATE APPR on the FMS PERF page, or
   - Automatically, when NAV is engaged, and the aircraft flies the DECEL pseudo waypoint.

   For more information on the activation of the FMS approach phase, *Refer to DSC-22-FMS-10-50-20 Flight Phases - Overview* .

Then, the managed speed target becomes Green Dot, S, F, and VAPP corrected from the Ground Speed Mini function, in accordance with the slats/flaps configuration. For more information, *Refer to Speed/Mach Control / Managed Speed/Mach Target* .

4. The flight crew presses the APPR pb on the AFS CP : F-LOC , LOC , or LOC B/C arms, and F-G/S arms.
5. The aircraft reaches the capture zone of F-LOC , LOC or LOC B/C beam: F-LOC* , LOC* , or LOC B/C* engages.
6. The aircraft becomes established on the F-LOC , LOC or LOC B/C beam: F-LOC , LOC , or LOC B/C engages.
7. The aircraft reaches the capture zone of F-G/S beam: F-G/S* engages.

   Note: *F-G/S* can also engage, when F-LOC* , LOC* , or LOC B/C* is engaged.*

8. The aircraft becomes established on the F-G/S beam: F-G/S engages.
9. At the MDA (Minimum Descent Altitude):
   - If one AP is engaged, the flight crew disengages the AP
   - The flight crew disengages the FD s
   - The flight crew sets the LS pb off.

   Note: *At MDA - 50 ft , if one AP is still engaged, the DISCONNECT AP FOR LDG message appears on the FMA (on the second and third columns of the third line).*

10. The flight crew manually lands the aircraft.

Note: *Instead of pressing the APPR pb (at step 3), the flight crew can press the LOC pb to intercept the F-LOC , LOC or LOC B/C beam: F-LOC , LOC , or LOC B/C arms, F-LOC* , LOC* , or LOC B/C* engages, and F-LOC , LOC , or LOC B/C engages.*
When reading to intercept the F-G/S beam, the flight crew presses the APPR pb : F-G/S arms, F-G/S engages, and F-G/S engages.*

NPA Flown without FLS Function

VOR, VOR/DME, NDB, NDB/DME OR RNAV APPROACH FLOWN WITHOUT FLS FUNCTION

Applicable to: ALL

The flight crew can also fly a VOR, VOR/DME, NDB, or NDB/DME approach:
- In NAV, with selected vertical modes
- In selected vertical and lateral modes.

The flight crew can also fly an RNAV approach in NAV, with selected vertical modes.

The sequence is:
1. The flight crew selects a VOR, NDB, RNV, or GPS approach on the FMS ARRIVAL page.
2. The FMS approach phase activates:
   - Manually, when the flight crew clicks on the ACTIVATE APPR on the FMS PERF page, or
   - Automatically, when NAV is engaged, and the aircraft flies the DECEL pseudo waypoint. Then, the managed speed target becomes Green Dot, S, F, and VAPP corrected from the Ground Speed Mini function, in accordance with the slats/flaps configuration.

The flight crew does not press the APPR pb.

ILS WITH GLIDESLOPE OUT, LOC ONLY, OR LOC B/C APPROACH FLOWN WITHOUT FLS FUNCTION

Applicable to: ALL

The aircraft can fly an ILS with glideslope out, a LOC only, or a LOC B/C approach without the FLS function.

The following table indicates:
- The approach selection on the FMS ARRIVAL page
- The AP/FD modes used by the Flight Guidance.

NPA	Approach Selection on the FMS ARRIVAL Page	Approach Modes	
		Lateral Guidance	Vertical Guidance

Continued on the following page

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ILS with glideslope out	ILS In addition, the flight crew deselects the G/S on the FMS POSITION / NAVAIDS page.	LOC*: Capture of the LOC beam LOC: Track of the LOC beam.	ALT*, ALT FPA (or V/S)
LOC only	LOC		
LOC B/C	BAC	LOC B/C*: Capture of the LOC beam LOC B/C: Track of the LOC beam.	

The sequence to fly the approach without the FLS function is:

1. The flight crew selects the approach on the FMS ARRIVAL page.
2. The FMS approach phase activates:
   - Manually, when the flight crew clicks on the ACTIVATE APPR on the FMS PERF page, or
   - Automatically, when NAV is engaged, and the aircraft flies the DECEL pseudo waypoint.

   Then, the managed speed target becomes Green Dot, S, F, and VAPP corrected from the Ground Speed Mini function, in accordance with the slats/flaps configuration.
3. The flight crew presses the LOC pb on the AFS CP: LOC, or LOC B/C arms. The flight crew manages the vertical guidance by using selected vertical modes: ALT*, ALT, FPA (or V/S).
4. The aircraft reaches the capture zone of the LOC or LOC B/C beam: LOC*, or LOC B/C* engages.
5. The aircraft becomes established on the LOC or LOC B/C beam: LOC, or LOC B/C engages.
6. At the Minimum Descent Altitude (MDA), if one AP is engaged, the flight crew disengages the AP.

   Note: *At MDA - 50 ft, if one AP is still engaged, the DISCONNECT AP FOR LDG message appears on the FMA (on the second and third columns of the third line).*

7. The flight crew manually lands the aircraft.

LOC* Mode

GENERAL

Applicable to: ALL

The Localizer capture (LOC*) mode captures the localizer beam of the ILS(GLS).

ARMING AND DISARMING CONDITIONS

Applicable to: ALL

L2 LOC* and LOC modes arm (disarm) together and simultaneously. The arming is announced by LOC on the FMA .
For LOC arming conditions, *Refer to LOC Mode / Arming Conditions* .
For LOC disarming conditions, *Refer to LOC Mode / Disarming Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

LOC* engages, when LOC is armed, and the aircraft reaches the capture zone, or the pre-capture zone of the LOC beam.
The capture zone is a zone available, when the LOC deviation is less than 2.3 dots.

The pre-capture zone is a zone available, when:
- The LOC deviation is more than 2.3 dots
- The FMS is in GPS PRIMARY.

When LOC is armed, and the aircraft reaches the pre-capture zone of the LOC beam, LOC* engages, and pre-captures the LOC beam, by using FMS data.
When the LOC deviation becomes less than 2.3 dots, LOC* no longer uses the FMS data: LOC* performs the LOC capture by using the LOC deviation.

Note: *On the PFD, and on the ND, the flight crew will observe movement of the LOC deviation toward the center of the scale, only when the LOC deviation is less than 2 dots. This occurs when the aircraft is in the capture zone.*

The pre-capture of the LOC beam allows to:
- Enhance the performance of the LOC capture
- Avoid a false capture
- Capture the LOC beam without overshoot.

L2 **CAPTURE ZONE OF THE LOC BEAM**

The aircraft reaches the capture zone of the LOC beam, when one of the following occurs:
- The LOC deviation is less than 2.3 dots, and:
  - The difference between the track and the QFU is less than 115 °, and
  - The roll order is such that LOC* will capture the LOC beam with a single turn.
- The LOC deviation is less than 1.3 dot, and the difference between the track and the QFU is less than 15 °.

PRE-CAPTURE OF THE LOC BEAM

The aircraft reaches the pre-capture zone of the LOC beam, when all of the following conditions are met:
- The LOC deviation is more than 2.3 dots
- The FMS is in GPS PRIMARY
- The difference between the track and the QFU is less than 115 °
- The roll order is such that LOC* will capture the LOC beam with a single turn.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

LOC* disengages, when another lateral mode engages.

L2 LOC* disengages, when one of the following occurs:
- The aircraft becomes established on the LOC beam

L3 LOC* is engaged for more than 10 s , and the LOC deviation becomes less than 0.2 dot.

L2 LOC engages.
- The flight crew presses the LOC pb , and no vertical approach mode is engaged
  HDG / TRACK engages.

  Note: *If a vertical approach mode was previously engaged, LOC* remains engaged, and a vertical mode reversion occurs.*

- The flight crew pulls the HDG/TRK knob
  HDG / TRACK engages.

  Note: *If a vertical approach mode was previously engaged, lateral and vertical mode reversions occur: Refer to DSC-22-FG-70-90-10-GDISE Reversions .*

L3 - The aircraft is above 700 ft RA , and the flight crew inserts a DIRECT TO
  NAV engages.

L2 - The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 **REVERSIONS**

LOC* reverts to HDG/TRACK, when one of the following occurs:

- The flight crew presses the APPR pb, and one of the following conditions is met:
  - G/S is armed
  - G/S* is engaged
  - G/S is engaged
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  A triple click aural warning sounds. The vertical approach mode disengages, and V/S / FPA engages. The pitch and roll bars flash for 10 s.
- The flight crew pulls the HDG/TRK knob, and one of the following mode is engaged: G/S*, G/S, F-G/S*, or F-G/S.
  HDG/TRACK and V/S / FPA engage.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

L3 - The flight crew changes the approach on the FMS ARRIVAL page, and one of the following conditions is met:
  - G/S is armed
  - G/S* is engaged
  - G/S is engaged
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  HDG/TRACK and V/S / FPA engage.
  This scenario is applicable, if the aircraft is above 700 ft RA.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

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LOC Mode

GENERAL

Applicable to: ALL

The Localizer track mode tracks the localizer beam of the ILS(GLS).

ARMING CONDITIONS

Applicable to: ALL

L3 In order to be able to arm LOC , all of the following conditions must be previously met:
- At least one ILS (GLS) receiver is operative
- When both ILS (GLS) receivers are operative: The ILS frequency(GLS channel) and course must be equal in both ILS (GLS) receivers.

In addition, in order to arm LOC with the APPR pb , one RA must be operative.

L2 LOC can only arm when:
- HDG / TRACK or NAV is engaged

L3 - The aircraft is above 400 ft RA .

L1 LOC arms, when the flight crew presses the APPR pb , or the LOC pb , and one of the following conditions is met:
- The flight crew has selected an ILS(GLS) approach on the FMS ARRIVAL page

L2 *Note: For ILS approach, the flight crew may have deselected the G/S on the FMS POSITION NAVAIDS page (Refer to FMS / Deselect Glideslope Button)*

L1 - The flight crew has manually-tuned an ILS(GLS) on the FMS POSITION NAVAIDS page (*Refer to FMS / Landing System Identifier Entry Field*)

Note: If the flight crew has selected a different ILS(GLS) approach on the FMS ARRIVAL page:
- *The aircraft will fly the manually-tuned ILS(GLS)*
- *The MFD displays the RUNWAY / LS DISAGREE message.*

- The flight crew has manually-tuned the frequency(channel) and course of an ILS(GLS) on the RMP (*Refer to DSC-34-10-60-30 How to Tune Navaids in Standby RadNav*)
- The flight crew has selected a LOC only approach on the FMS ARRIVAL page.

For information on approach selection on the FMS ARRIVAL page, *Refer to FMS / Approach List* .

DISARMING CONDITIONS

Applicable to: ALL

L2 LOC disarms, when one of the following occurs:
- G/S or F-G/S is armed, and the flight crew presses the APPR pb
- Neither G/S, nor F-G/S is armed, and the flight crew presses the LOC pb

L3 - NAV arms
- The flight crew engages go-around
- The flight crew modifies the approach selection.

  Note: *The flight crew can change the approach selection, only when the aircraft is above 700 ft RA.*

- The ILS(GLS) frequency(channel) and course are not equal in both ILS(GLS) receivers.

ENGAGEMENT CONDITIONS

Applicable to: ALL

LOC engages, when LOC* is engaged, and the aircraft becomes established on the LOC beam.

L3 The aircraft becomes established on the LOC beam, when:
- LOC is engaged for more than 10 s, and
- The LOC deviation becomes less than 0.2 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

LOC disengages, when another lateral mode engages.

L2 LOC disengages, when one of the following occurs:
- G/S is engaged, and the aircraft reaches 400 ft RA
  LAND engages.
- The flight crew presses the LOC pb, and no vertical approach mode is engaged
  HDG/TRACK engages.
- The flight crew pulls the HDG/TRK knob, and no vertical approach mode is engaged
  HDG/TRACK engages.

L3 - The aircraft is above 700 ft RA, and the flight crew inserts a DIRECT TO
  NAV engages.

L2 - The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 REVERSIONS

LOC reverts to HDG/TRACK, when one of the following occurs:

- The flight crew presses the APPR pb, and one of the following conditions is met:
  - G/S is armed
  - G/S* is engaged
  - G/S is engaged
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  A triple click aural warning sounds. The vertical approach mode disengages, and V/S / FPA engages. The pitch and roll bars flash for 10 s.
- The flight crew pulls the HDG/TRK knob, and one of the following mode is engaged: G/S*, G/S, F-G/S*, or F-G/S.
  HDG/TRACK and V/S / FPA engage.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

L3 - The flight crew changes the approach on the FMS ARRIVAL page, and one of the following conditions is met:
  - G/S is armed
  - G/S* is engaged
  - G/S is engaged
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  HDG/TRACK and V/S / FPA engage.
  This scenario is applicable, if the aircraft is above 700 ft RA.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

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G/S* Mode

GENERAL

Applicable to: ALL

The Glide Slope Capture (G/S*) mode captures the glide slope beam of the ILS(GLS).

ARMING AND DISARMING CONDITIONS

Applicable to: ALL

L2 G/S* and G/S modes arm (disarm) together and simultaneously. The arming is announced by G/S on the FMA .

For G/S arming conditions, *Refer to G/S Mode / Arming Conditions* .

For G/S disarming conditions, *Refer to G/S Mode / Disarming Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

G/S* engages when the aircraft reaches the capture zone of the G/S beam, and:

- G/S is armed, and
- LOC* or LOC is engaged.

L2 The aircraft reaches the capture zone of the G/S beam, when one of the following occurs:

- Passage far from the G/S beam:
  - The G/S deviation is less than 2 dots
  - The pitch order is such that G/S* will capture the G/S beam with a single resource.
- Passage near the G/S beam: The G/S deviation is less than a threshold depending on the radio altitude.
  This threshold is between 0.1 and 0.3 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

G/S* disengages when another lateral mode engages.

L2 G/S* disengages, when one of the following occurs:

- The aircraft becomes established on the G/S beam

L3 G/S is engaged for more than 15 s, and the G/S deviation becomes less than 0.3 dot.

L2 G/S engages.

- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.

- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew presses the ALT pb
  ALT engages.
- The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 **REVERSIONS**

G/S* reverts to V/S / FPA, when one of the following occurs:

- LOC disengages
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.
- The flight crew presses the APPR pb
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.
- The flight crew presses the LOC pb
  A triple click aural warning sounds. V/S / FPA engages. The pitch bar flashes for 10 s.

L3 - The aircraft is above 700 ft RA, and the flight crew changes the approach on the FMS ARRIVAL page.
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.

G/S Mode

GENERAL

Applicable to: ALL

The Glide Slope track (G/S) mode tracks the glide slope beam of the ILS(GLS).

ARMING CONDITIONS

Applicable to: ALL

L3 In order to be able to arm G/S , all of the following conditions must be met:
- At least one RA is operative
- At least one ILS (GLS) receiver is operative
- When both ILS (GLS) receivers are operative: The ILS(GLS) frequency(channel) and course must be equal in both ILS (GLS) receivers.

L1 G/S arms, when the flight crew presses the APPR pb , and one of the following conditions is met:
- The flight crew has selected an ILS(GLS) approach on the FMS ARRIVAL page

L3 This is applicable, if the aircraft is above 400 ft RA .

L1 - The flight crew has manually-tuned an ILS(GLS) on the FMS POSITION NAVAIDS page (*Refer to FMS / Landing System Identifier Entry Field*)

L3 This is applicable, if the aircraft is above 400 ft RA .

L1 <u>Note:</u> *If the flight crew has selected a different ILS(GLS) approach on the FMS ARRIVAL page:*
- *The aircraft will fly the manually-tuned ILS(GLS)*
- *The MFD displays RUNWAY / LS DISAGREE message.*

- The flight crew has manually-tuned the frequency(channel) and course of an ILS(GLS) on the RMP (*Refer to DSC-34-10-60-30 How to Tune Navaids in Standby RadNav*).

L3 This is applicable, if the aircraft is above 400 ft RA .

G/S cannot arm, if one of the following mode is engaged: SRS TO , RWY , RWY TRK , SRS GA , GA TRK .

L1 For information on approach selection on the FMS ARRIVAL page, *Refer to FMS / Approach List* .

DISARMING CONDITIONS

Applicable to: ALL

L2 G/S disarms, when one of the following occurs:
- The flight crew presses the APPR pb, or the LOC pb
- LOC disarms
- LOC*, or LOC is lost.

ENGAGEMENT CONDITIONS

Applicable to: ALL

G/S engages, when LOC and G/S* are engaged, and the aircraft becomes established on the G/S beam.

L3 The aircraft becomes established on the G/S beam, when:
- G/S* is engaged for more than 15 s, and
- The G/S deviation becomes less than 0.3 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

G/S disengages when another lateral mode engages.

L2 G/S disengages, when one of the following occurs:
- LOC is engaged, and the aircraft reaches 400 ft RA
  LAND engages.
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew presses the ALT pb
  ALT engages.
- The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 **REVERSIONS**

G/S reverts to V/S / FPA, when one of the following occurs:

- LOC disengages
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.
- The flight crew presses the APPR pb
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.
- The flight crew presses the LOC pb
  A triple click aural warning sounds. V/S / FPA engages. The pitch bar flashes for 10 s.

L3 - The aircraft is above 700 ft RA, and the flight crew changes the approach on the FMS ARRIVAL page.
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.

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LAND Mode

GENERAL

Applicable to: ALL

The LAND mode is a common mode: LAND tracks the LOC and G/S beams of the ILS(GLS) from 400 ft RA to approximately 60 ft RA.

ENGAGEMENT CONDITIONS

Applicable to: ALL

LAND automatically engages, when G/S and LOC are engaged, and the aircraft reaches 400 ft RA.
L3 The aircraft is below 400 ft for more than 1 s.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

LAND automatically disengages, when the aircraft approximately reaches 60 ft RA: FLARE engages.
When LAND is engaged, no action on the AFS CP can disengage LAND.
The flight crew can only disengage LAND by performing a go-around. SRS GA and GA TRK will engage.

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FLARE Mode

GENERAL

Applicable to: ALL

The FLARE mode is a common mode:

- Lateral guidance: The FLARE mode reduces the slideslip angle, such that the aircraft will be aligned with the runway centerline at the aircraft touchdown
- Vertical guidance: The FLARE mode decreases the descent rate, in order to ensure a comfortable transition between the glide tracking, and the aircraft touchdown.

ENGAGEMENT CONDITIONS

Applicable to: ALL

FLARE engages, when LAND is engaged, and the aircraft approximately reaches 60 ft.

L3 Additional conditions must be met:

- The landing gear is down
- The aircraft is not in clean configuration.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

FLARE automatically disengages, when the aircraft touches down. ROLL OUT engages.
The flight crew can only disengage FLARE by performing a go-around.

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ROLL OUT Mode

GENERAL

Applicable to: ALL

ROLL OUT is a common mode:

- Lateral guidance: The ROLL OUT mode guides the aircraft along the runway centerline
- Vertical guidance: The ROLL OUT mode lands the nose landing gear.

L3 The vertical speed is close to 2.5 ft/s.

ENGAGEMENT CONDITIONS

Applicable to: ALL

ROLL OUT engages when the aircraft touches down.

L2 This occurs, when one landing gear touches down.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

ROLL OUT disengages, when one of the following occurs:

- All APs and FDs are disengaged

L13

Note: In automatic roll-out, the flight crew should disengage the AP(s) at low speed, as per procedures.
All APs (if still engaged), and FDs disengage when the aircraft exits the runway.
When the difference between the aircraft track and the runway track is more than 20 °: All APs (if still engaged), and FDs disengage.

- The flight crew engages a go-around

L3 - The APs are disengaged, and the flight crew presses the APPR pb.
This is applicable, if ROLL OUT is engaged for more than 10 s.

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F-LOC* Mode

GENERAL

Applicable to: ALL

The FLS Localizer capture (F-LOC*) mode captures the F-LOC beam.

ARMING AND DISARMING CONDITIONS

Applicable to: ALL

L2 F-LOC* and F-LOC modes arm (disarm) together and simultaneously. The arming is announced by F-LOC on the FMA .
For F-LOC arming conditions, *Refer to F-LOC Mode / Arming Conditions* .
For F-LOC disarming conditions, *Refer to F-LOC Mode / Disarming Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

F-LOC* engages, when F-LOC is armed, and the aircraft reaches the capture zone, or the pre-capture zone of the F-LOC beam.
The capture zone is a zone available, when the F-LOC deviation is less than 2.3 dots.
The pre-capture zone is a zone available, when the F-LOC deviation is more than 2.3 dots.

L2 CAPTURE ZONE OF THE F-LOC BEAM

The aircraft reaches the capture zone of the F-LOC beam, when one of the following occurs:
- The F-LOC deviation is less than 2.3 dots, and:
  - The difference between the track and the QFU is less than 115 °, and
  - The roll order is such that F-LOC* will capture the F-LOC beam with a single turn.
- The F-LOC deviation is less than 1.3 dot, and the difference between the track and the QFU is less than 15 °.

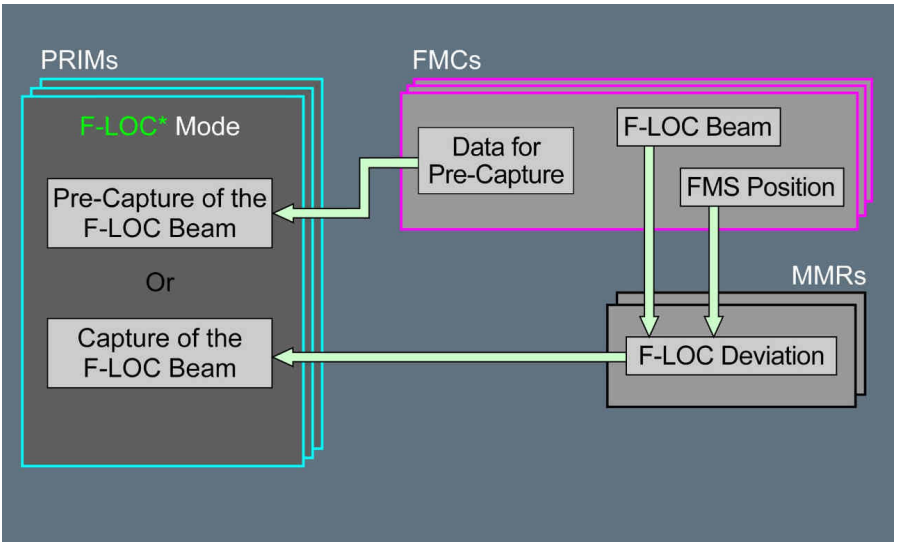
PRE-CAPTURE OF THE F-LOC BEAM

The aircraft reaches the pre-capture zone of the F-LOC beam, when all of the following conditions are met:
- The F-LOC deviation is more than 2.3 dots
- The difference between the track and the QFU is less than 115 °
- The roll order is such that F-LOC* will capture the F-LOC beam with a single turn.

When F-LOC is armed, and the aircraft reaches the pre-capture zone of the F-LOC beam, F-LOC* engages, and pre-captures the F-LOC beam, by using dedicated FMS data.

When the F-LOC deviation becomes less than 2.3 dots, F-LOC* no longer performs the pre-capture: F-LOC* no longer uses the dedicated FMS data for pre-capture. F-LOC* remains engaged, and performs the F-LOC capture by using the F-LOC deviation.

Pre-Capture and Capture of the F-LOC Beam



DISENGAGEMENT CONDITIONS

Applicable to: ALL

F-LOC* disengages, when another lateral mode engages.

L2 F-LOC* disengages, when one of the following occurs:

- The aircraft becomes established on the F-LOC beam

L3 F-LOC* is engaged for more than 10 s , and the F-LOC deviation becomes less than 0.2 dot.

L2 F-LOC engages.

- The flight crew presses the LOC pb , and neither F-G/S* nor F-G/S is engaged
  HDG / TRACK engages.

Note: *If F-G/S* or F-G/S was previously engaged, F-LOC* remains engaged, and a vertical mode reversion occurs.*

- The flight crew pulls the HDG/TRK knob
  HDG / TRACK engages.

  Note: *If F-G/S* or F-G/S was previously engaged, lateral and vertical mode reversions occur: Refer to DSC-22-FG-70-90-80-GDISE Reversions .*

L3 - The aircraft is above 700 ft RA , and the flight crew inserts a DIRECT TO
  NAV engages.

L2 - The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 REVERSIONS

F-LOC* reverts to HDG/TRACK, when one of the following occurs:

- The flight crew presses the APPR pb, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  A triple click aural warning sounds. The vertical approach mode disengages, and V/S / FPA engages. The pitch and roll bars flash for 10 s.
- F-G/S*, or F-G/S is engaged, and the flight crew pulls the HDG/TRK knob
  HDG/TRACK and V/S / FPA engage.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

L3 - The flight crew changes the approach on the FMS ARRIVAL page, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  HDG/TRACK and V/S / FPA engage.
  This scenario is applicable, if the aircraft is above 700 ft RA.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

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F-LOC Mode

GENERAL

Applicable to: ALL

The FLS Localizer track (F-LOC) mode tracks the F-LOC beam.

ARMING CONDITIONS

Applicable to: ALL

L3 In order to be able to arm F-LOC , all of the following conditions must be previously met:
- At least one FMS is operative
- At least one MMR is able to compute the F-LOC and F-G/S deviations

Note: If the NO FLS FOR THIS APPR message has appeared on the MFD , the MMR (s) will not be able to compute the F-LOC and F-G/S deviations.

- When both MMR s are operative, the runway headings of the NPA must be equal in both MMR s.

L2 F-LOC can only arm when:
- HDG / TRACK or NAV is engaged

L3 - The aircraft is above 400 ft RA .

L1 F-LOC arms, when:
- The flight crew has selected a VOR, NDB, RNV, or GPS approach in the FMS ARRIVAL page, and
- The flight crew presses the APPR pb , or the LOC pb .

For information on approach selection on the FMS ARRIVAL page, *Refer to FMS / Approach List* .

DISARMING CONDITIONS

Applicable to: ALL

L2 F-LOC disarms, when one of the following occurs:
- F-G/S is armed, and the flight crew presses the APPR pb
- F-G/S is not armed, and the flight crew presses the LOC pb

L3 - NAV arms
- The flight crew engages go-around

- The flight crew modifies the approach selection

  Note: *The flight crew can change the approach selection, only when the aircraft is above 700 ft RA.*

- The runway headings of the NPA are not equal in both MMRs.

ENGAGEMENT CONDITIONS

Applicable to: ALL

F-LOC engages, when F-LOC* is engaged, and the aircraft becomes established on the F-LOC beam.

L3 The aircraft becomes established on the F-LOC beam, when:
- F-LOC is engaged for more than 10 s, and
- The F-LOC deviation becomes less than 0.2 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

F-LOC disengages, when another lateral mode engages.

L2 F-LOC disengages, when one of the following occurs:
- The flight crew presses the LOC pb , and neither F-G/S* nor F-G/S is engaged
  HDG / TRACK engages.

  Note: *If F-G/S* or F-G/S was previously engaged, F-LOC remains engaged, and a vertical mode reversion occurs.*

- The flight crew pulls the HDG/TRK knob
  HDG / TRACK engages.

  Note: *If F-G/S* or F-G/S was previously engaged, lateral and vertical mode reversions occur: Refer to DSC-22-FG-70-90-80-GDISE Reversions .*

L3 - The aircraft is above 700 ft RA , and the flight crew inserts a DIRECT TO
NAV engages.

L2 - The flight crew performs a go-around
SRS GA and GA TRK engage.

L2 **REVERSIONS**

F-LOC reverts to HDG/TRACK, when one of the following occurs:

- The flight crew presses the APPR pb, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  A triple click aural warning sounds. The vertical approach mode disengages, and V/S / FPA engages. The pitch and roll bars flash for 10 s.
- F-G/S*, or F-G/S is engaged, and the flight crew pulls the HDG/TRK knob
  HDG/TRACK and V/S / FPA engage.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

L3 - The flight crew changes the approach on the FMS ARRIVAL page, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  HDG/TRACK and V/S / FPA engage.
  This scenario is applicable, if the aircraft is above 700 ft RA.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

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F-G/S* Mode

GENERAL

Applicable to: ALL

The FLS Glide Slope capture (F-G/S*) mode captures the F-G/S beam.

ARMING AND DISARMING CONDITIONS

Applicable to: ALL

L2 F-G/S* and F-G/S modes arm (disarm) together and simultaneously. The arming is announced by F-G/S on the FMA .
For F-G/S arming conditions, *Refer to F-G/S Mode / Arming Conditions* .
For F-G/S disarming conditions, *Refer to F-G/S Mode / Disarming Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

F-G/S* engages, when the aircraft reaches the capture zone of the F-G/S beam, and:
- F-G/S is armed, and
- One of the following mode is engaged: LOC*, LOC, F-LOC*, or F-LOC.

L2 The aircraft reaches the capture zone of the F-G/S beam, when one of the following occurs:
- Passage far from the F-G/S beam:
  - The F-G/S deviation is less than 2 dots
  - The pitch order is such that F-G/S* will capture the F-G/S beam with a single resource.
- Passage near the F-G/S beam: The F-G/S deviation is less than a threshold depending on the radio altitude.
  This threshold is between 0.1 and 0.3 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

F-G/S* disengages when another lateral mode engages.

L2 F-G/S* disengages, when one of the following occurs:
- The aircraft becomes established on the F-G/S beam

L3 F-G/S is engaged for more than 15 s, and the F-G/S deviation becomes less than 0.3 dot.

L2 F-G/S engages.
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew presses the ALT pb
  ALT engages.
- The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 **REVERSIONS**

F-G/S* reverts to V/S / FPA, when one of the following occurs:
- The flight crew presses the APPR pb
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.
- The flight crew presses the LOC pb
  A triple click aural warning sounds. V/S / FPA engages. The pitch bar flashes for 10 s.
- The flight crew presses the HDG/TRK knob
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.

L3 - The aircraft is above 700 ft RA, and the flight crew changes the approach on the FMS ARRIVAL page.
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.

F-G/S Mode

GENERAL

Applicable to: ALL

The FLS Glide Slope track (F-G/S) mode tracks the F-G/S beam.

ARMING CONDITIONS

Applicable to: ALL

L3 In order to be able to arm F-G/S , all of the following conditions must be met:
- At least one FMS is operative
- At least one MMR is able to compute the F-LOC and F-G/S deviations

  Note: *If the NO FLS FOR THIS APPR message has appeared on the MFD , the MMR (s) will not be able to compute the F-LOC and F-G/S deviations.*

- When both MMR s are operative, the runway headings of the NPA must be equal in both MMR s.

L1 F-G/S arms, if the flight crew has selected a NPA on the FMS ARRIVAL page, and the flight crew presses the APPR pb .
L3 This is applicable if, the aircraft is above 400 ft RA .
L1 For information on approach selection on the FMS ARRIVAL page, *Refer to FMS / Approach List* .
L3 F-G/S cannot arm, if one of the following mode is engaged: SRS TO , RWY , RWY TRK , SRS GA , or GA TRK .

DISARMING CONDITIONS

Applicable to: ALL

L2 F-G/S disarms, when one of the following occurs:
- The flight crew presses the APPR pb, or the LOC pb
- LOC or F-LOC disarms
- LOC*, LOC, F-LOC*, or F-LOC disengages

L3 - The flight crew modifies the approach selection

  Note: *The flight crew can change the approach selection, only when the aircraft is above 700 ft RA.*

- The runway headings of the NPA are not equal in both MMRs.
- The F-LOC and F-G/S deviations become invalid

L2 - The flight crew engages a go-around.

ENGAGEMENT CONDITIONS

Applicable to: ALL

F-G/S engages, when F-G/S* is engaged, and the aircraft becomes established on the F-G/S beam.

L3 The aircraft becomes established on the F-G/S beam, when:
- F-G/S* is engaged for more than 15 s, and
- The F-G/S deviation becomes less than 0.3 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

F-G/S disengages when another lateral mode engages.

L2 F-G/S disengages, when one of the following occurs:
- The flight crew pulls the V/S / FPA knob
  V/S / FPA engages.
- The flight crew pulls the ALT knob
  OP CLB or OP DES engages.
- The flight crew presses the ALT pb
  ALT engages.
- The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 REVERSIONS

F-G/S reverts to V/S / FPA, when one of the following occurs:
- The flight crew presses the APPR pb
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.
- The flight crew presses the LOC pb
  A triple click aural warning sounds. V/S / FPA engages. The pitch bar flashes for 10 s.
- The flight crew pulls the HDG/TRK knob
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.

L3 - The aircraft is above 700 ft RA, and the flight crew changes the approach on the FMS ARRIVAL page.
  A triple click aural warning sounds. V/S / FPA and HDG/TRACK engage. The pitch and roll bar flash for 10 s.

LOC B/C* Mode

GENERAL

Applicable to: ALL

The Localizer Back Course capture (LOC B/C*) mode captures the localizer back course beam of the ILS.

ARMING AND DISARMING CONDITIONS

Applicable to: ALL

LOC B/C* arms, or disarms, when LOC B/C arms, or disarms: *Refer to LOC B/C Mode / Arming Conditions* , or *Refer to LOC B/C Mode / Disarrming Conditions* .

ENGAGEMENT CONDITIONS

Applicable to: ALL

LOC B/C* engages, when LOC B/C is armed, and the aircraft reaches the capture zone of the LOC B/C beam.

L2 CAPTURE ZONE OF THE LOC B/C BEAM

The aircraft reaches the capture zone of the LOC B/C beam, when one of the following occurs:

- The difference between the track and the QFU is less than 115 °, and:
  - The LOC B/C deviation is less than 2.3 dots, and
  - The roll order is such that LOC B/C* will capture the LOC B/C beam with a single turn.
- The difference between the track and the QFU is less than 15 °, and the LOC B/C deviation is less than 1.3 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

LOC B/C* disengages, when another lateral mode engages.

L2 LOC B/C* disengages, when one of the following occurs:
- The aircraft becomes established on the LOC B/C beam

L3 LOC B/C* is engaged for more than 10 s , and the LOC B/C deviation becomes less than 0.2 dot.

L2 LOC B/C engages.
- The flight crew presses the LOC pb , and no vertical approach mode is engaged
  HDG / TRACK engages.

  Note: *If a vertical approach mode was previously engaged, LOC B/C* remains engaged, and a vertical mode reversion occurs.*

- The flight crew pulls the HDG/TRK knob
  HDG / TRACK engages.

  Note: *If a vertical approach mode was previously engaged, lateral and vertical mode reversions occur: Refer to DSC-22-FG-70-90-120-GDISE Reversions .*

L3 - The aircraft is above 700 ft RA , and the flight crew inserts a DIRECT TO
  NAV engages.

L2 - The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 REVERSIONS

LOC B/C* reverts to HDG/TRACK, when one of the following occurs:
- The flight crew presses the APPR pb, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  A triple click aural warning sounds. The vertical approach mode disengages, and V/S / FPA engages. The pitch and roll bars flash for 10 s.
- The flight crew pulls the HDG/TRK knob, and F-G/S*, or F-G/S.
  HDG/TRACK and V/S / FPA engage.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

L3 - The flight crew changes the approach on the FMS ARRIVAL page, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  HDG/TRACK and V/S / FPA engage.
  This scenario is applicable, if the aircraft is above 700 ft RA.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

LOC B/C Mode

GENERAL

Applicable to: ALL

The Localizer Back Course track (LOC B/C) mode tracks the localizer back course beam of the ILS.

ARMING CONDITIONS

Applicable to: ALL

L3 In order to be able to arm LOC B/C , all of the following conditions must be previously met:
- At least one RA is operative
- At least one ILS receiver is operative
- When both ILS receivers are operative: The ILS frequency and course must be equal in both ILS receivers.

L2 LOC B/C can only arm when:
- HDG / TRACK or NAV is engaged

L3 - The aircraft is above 400 ft RA .

L1 LOC B/C arms, when:
- The flight crew has selected a BAC approach on the FMS ARRIVAL page, and
- The flight crew presses the APPR pb , or the LOC pb .

For information on approach selection on the FMS ARRIVAL page, *Refer to FMS / Approach List* .

DISARMING CONDITIONS

Applicable to: ALL

L2 LOC B/C disarms, when one of the following occurs:
- F-G/S is armed, and the flight crew presses the APPR pb
- F-G/S is not armed, and the flight crew presses the LOC pb

L3 - NAV arms
- The flight crew engages go-around
- The flight crew modifies the approach selection.

  Note: *The flight crew can change the approach selection, only when the aircraft is above 700 ft RA.*

- The ILS frequency and course are not equal in both ILS receivers.

ENGAGEMENT CONDITIONS

Applicable to: ALL

LOC B/C engages, when LOC B/C* is engaged, and the aircraft becomes established on the LOC B/C beam.

L3 The aircraft becomes established on the LOC B/C beam, when:
- LOC B/C is engaged for more than 10 s, and
- The LOC B/C deviation becomes less than 0.2 dot.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

LOC B/C disengages, when another lateral mode engages.

L2 LOC B/C disengages, when one of the following occurs:
- The flight crew presses the LOC pb, and no vertical approach mode is engaged
  HDG/TRACK engages.
- The flight crew pulls the HDG/TRK knob, and no vertical approach mode is engaged
  HDG/TRACK engages.

L3 - The aircraft is above 700 ft RA, and the flight crew inserts a DIRECT TO
  NAV engages.

L2 - The flight crew performs a go-around
  SRS GA and GA TRK engage.

L2 **REVERSIONS**

LOC B/C reverts to HDG/TRACK, when one of the following occurs:

- The flight crew presses the APPR pb, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  A triple click aural warning sounds. The vertical approach mode disengages, and V/S / FPA engages. The pitch and roll bars flash for 10 s.
- The flight crew pulls the HDG/TRK knob, and F-G/S*, or F-G/S is engaged.
  HDG/TRACK and V/S / FPA engage.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

L3 - The flight crew changes the approach on the FMS ARRIVAL page, and one of the following conditions is met:
  - F-G/S is armed
  - F-G/S* is engaged
  - F-G/S is engaged.

  HDG/TRACK and V/S / FPA engage.
  This scenario is applicable, if the aircraft is above 700 ft RA.
  A triple click aural warning sounds. The pitch and roll bars flash for 10 s.

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General

GENERAL

Applicable to: ALL

When the flight crew initiates a go-around, the SRS GA vertical mode engages. In addition, one of the following occurs:

- If a lateral managed mode is engaged (except NAV mode), GA TRK engages, and NAV mode arms
  This occurs if the flight crew performs a go-around during a precision approach, or a non-precision approach with the FLS function.
  NAV automatically engages as soon as the aircraft reaches the capture zone of the flight plan active leg.

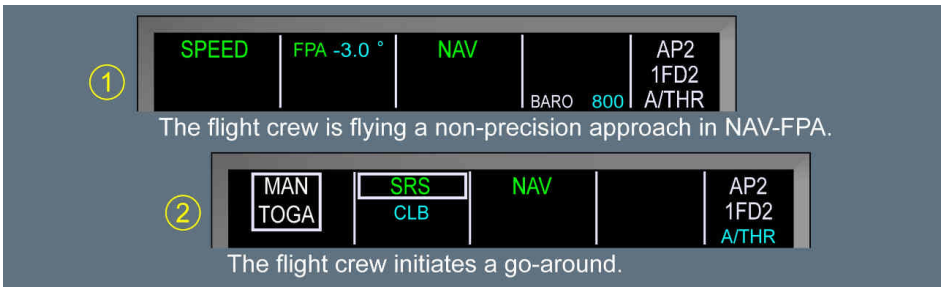
L2 *Note: If a HDG (TRK) was preset, NAV mode does not arm. GA TRK engages, until the flight crew pulls the HDG/TRK knob to follow the preset target.*

Example: Go-around during a precision approach



L1 - If NAV mode is engaged, it remains engaged
This occurs if the flight crew performs a go-around during a non-precision approach with NAV and V/S (FPA) guidance.

Example: Go-around during a non-precision approach in NAV-FPA



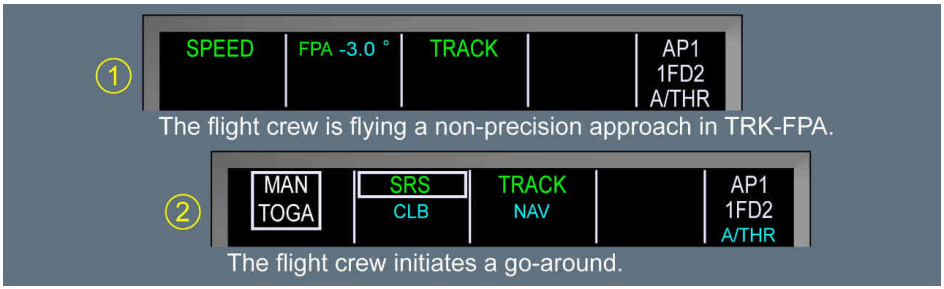
- If HDG (TRK) mode is engaged, it remains engaged, and NAV mode arms

This occurs if the flight crew performs a go-around during a non-precision approach with HDG (TRK) and V/S (FPA) guidance.
NAV automatically engages as soon as the aircraft reaches the capture zone of the flight plan active leg.

Example: Go-around during a non-precision approach in HDG-V/S



Example: Go-around during a non-precision approach in TRK-FPA



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Note: *If the flight crew initiates the go-around below 100 ft RA , GA TRK engages, and NAV mode arms, until 100 ft .*
Then, NAV automatically engages, if the aircraft is in the capture zone of the flight plan active leg.

In addition, at go-around engagement:
- The FMS flight phase becomes go-around
- If not previously engaged, the FD s automatically engage
- HDG-V/S is automatically selected, except if the TRK mode was engaged before go-around
  For more information, *Refer to DSC-22-FG-70-30-20 HDG-V/S / TRK-FPA Selection* .
- If previously displayed, the FPV(VV) disappears, except if the TRK mode was engaged before go-around.

The FMS flight phase changes from go-around to climb, when one of the following modes engages: Altitude acquire mode, altitude hold mode, OP CLB , CLB , V/S / FPA .

However, the FMS flight phase will change from climb to cruise, if ALT CRZ* or ALT CRZ engages. This occurs, when the aircraft approaches the AFS CP selected altitude, and the cruise altitude is the AFS CP selected altitude.

For more information on FMS flight phase transitions, *Refer to DSC-22-FMS-10-50-20 Flight Phases - Overview* .

When SRS GA engages, the speed target becomes managed. The managed speed target is the aircraft speed at SRS GA engagement.

L2 For more information on the managed speed target limits, *Refer to Speed/Mach Control / Managed Speed/Mach target* .

L1 When SRS GA disengages, the managed speed target will be the speed target provided by the FMS , in accordance with the FMS flight phase.

Note: *If the FMS flight phase is cruise, the SPD LIM, and SPD CSTR are still respected (when applicable).*

SRS GA Mode

GENERAL

Applicable to: ALL

The Speed Reference System (SRS) mode is a managed vertical mode. This mode is used during takeoff and during go-around. The present chapter deals with the SRS mode during go-around, also referred to as SRS GA mode. The FMA announces the SRS GA mode by SRS.
SRS GA controls the speed via the elevators, in order to steer the aircraft along a vertical path.

L2 The guidance law also includes:
- A flight path angle protection, that ensures a positive climb
- A pitch angle protection to reduce the aircraft nose-up (22.5 ° of maximum pitch attitude).

L1 The speed target is the memorized aircraft speed at SRS GA engagement.
L2 The lower limit of the target is the VAPP that the PRIMs memorize at 700 ft RA.

The higher limit of the target is the lowest value between:
- VLS + 25 kt (or VLS + 15 kt in engine-out)
- VMAX - 5 kt.

L1 *Note:* *At SRS GA engagement, the speed becomes managed.*

When SRS GA disengages, the managed speed target becomes green dot.

ENGAGEMENT CONDITIONS

Applicable to: ALL

SRS GA engages when all of the following conditions are met:
- The flight crew sets at least two thrust levers to TOGA
- The flap lever is not at the 0 detent
L2 - The aircraft is airborne, or on ground for less than 30 s.

L1 SRS GA mode can be engaged from whatever vertical mode (except SRS TO).

DISENGAGEMENT CONDITIONS

Applicable to: ALL

SRS GA disengages when one of the following occurs:

- OP CLB, or CLB is armed, and the aircraft reaches the GA acceleration altitude
  OP CLB, or CLB engages.
  The GA acceleration altitude is displayed on the G.A panel of the FMS PERF page.

L3 *Note: ALT CST* and ALT CST will not engage at the GA acceleration altitude, even if all of the following conditions are met:*

- *An altitude constraint associated to a waypoint has the same altitude than the GA acceleration altitude*
- *The AFS CP selected altitude is set above the GA acceleration altitude*
- *NAV armed or engaged.*

L1 - The aircraft reaches the capture zone of the AFS CP selected altitude
ALT* engages.
L3 This scenario is possible, if the aircraft is above 400 ft RA.
L1 - The flight crew presses the ALT knob
ALT engages.
L3 This scenario is possible, if the aircraft is above 100 ft RA.
L1 - The flight crew pulls the ALT knob
OP CLB or OP DES engages.
L3 This scenario is possible, if the aircraft is above 100 ft RA.
L1 - The flight crew pulls the V/S / FPA knob
V/S / FPA engages.
L3 This scenario is possible, if the aircraft is above 100 ft RA.
L2 - The AFS CP selected altitude is above, and the flight crew pulls the SPD/MACH knob.
OP CLB engages.
L3 This scenario is possible, if the aircraft is above 100 ft RA.

GA TRK Mode

GENERAL

Applicable to: ALL

GA TRK mode maintains the track the aircraft has at GA TRK engagement.

ENGAGEMENT CONDITIONS

Applicable to: ALL

GA TRK engages, when all of the following conditions are met:

L2 - The aircraft is airborne, or on ground for less than 30 s

L1 - The flap lever is not at the 0 detent

- The flight crew sets at least two thrust levers to TOGA
- NAV, HDG, or TRK is not engaged

L3 - SRS TO is not engaged.

L1 GA TRK simultaneously engages with SRS GA.

DISENGAGEMENT CONDITIONS

Applicable to: ALL

GA TRK disengages, when one of the following occurs:

- The flight crew pulls the HDG/TRK knob
  HDG/TRACK engages.
- NAV is armed, and the aircraft reaches the capture zone of the active leg
  NAV engages.

L2 - The flight crew performs a DIRECT TO.
NAV engages.

L3 GA TRK cannot be disengaged below 100 ft RA.

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General

GENERAL

Applicable to: ALL

The AP / FD TCAS mode is an AP / FD vertical mode, that provides vertical guidance in the case of a Resolution Advisory alert, generated by the Traffic Collision Avoidance System (TCAS).

L2 For more information on the TCAS , *Refer to 34 - SURVEILLANCE / TCAS* .

L1 When a Traffic Advisory is triggered, the AP / FD TCAS mode arms.

When a Resolution Advisory is triggered, the AP / FD TCAS mode engages to provide guidance in accordance with the Resolution Advisory order:

- The AP status does not change: Remains engaged or disengaged
- If the FD s are disengaged, they automatically engage.

When the "CLEAR OF CONFLICT" aural alert sounds, the AP / FD TCAS mode disengages. The AP/FD provides guidance toward the AFS CP selected altitude at the previous ATC clearance.

AP/FD TCAS MODE AVAILABILITY

Applicable to: ALL

The AP/FD TCAS mode is available, when all of the following conditions are met:

- TCAS 1 or TCAS 2 is available
- TCAS is in TA/RA mode
- At least one AP, or one FD, is available
- The AP/FD TCAS mode is not failed (i.e. the ECAM did not trigger the AUTO FLT TCAS MODE FAULT alert).

When the AP/FD TCAS mode is available, the AP/FD TCAS mode can arm or engage.

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Arming and Disarming Conditions

ARMING CONDITIONS (WHEN A TRAFFIC ADVISORY IS TRIGGERED)

Applicable to: ALL

L2 To arm, the AP / FD TCAS mode must be available. For more information, *Refer to DSC-22-FG-70-110-10 AP/FD TCAS Mode Availability* .

L1 The AP / FD TCAS mode arms, when
- A Traffic Advisory (TA) alert is triggered, or
- An intruder enters within the TA range.

L2 This usually occurs at the end of a Resolution Advisory, when the "CLEAR OF CONFLICT" aural alert sounds.

L1 The AP / FD TCAS mode arms, even if both AP s, and both FD s are disengaged. In this case, the AP s and FD s remain disengaged. For more information, *Refer to DSC-22-FG-70-110-40-GNTA Introduction* .

DISARMING CONDITIONS

Applicable to: ALL

The AP/FD TCAS mode disarms, when one of the following occurs:
- The intruder becomes white on the ND, or
- The AP/FD TCAS mode engages upon a Resolution Advisory alert, or

L2 - The TA ONLY mode of the TCAS is selected, or
- The STANDBY mode of the TCAS is selected, or
- The AP/FD TCAS mode fails (i.e the ECAM triggers the AUTO FLT TCAS MODE FAULT alert).

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Engagement and Disengagement Conditions

ENGAGEMENT CONDITIONS (WHEN A RESOLUTION ADVISORY IS TRIGGERED)

Applicable to: ALL

L2 To engage, the AP/FD TCAS mode must be available. For more information, *Refer to DSC-22-FG-70-110-10 AP/FD TCAS Mode Availability* .

L1 The AP / FD TCAS mode engages, when a Resolution Advisory is triggered.
The AP / FD TCAS mode engages, even if both AP s, and both FD s are disengaged. In this case, the FD s automatically engage. For more information, *Refer to DSC-22-FG-70-110-40-GNRA Introduction* .

L2 *Note:* *When the AP / FD TCAS mode engages, the triple click aural alert does not sound, and the FD pitch bar does not flash.*

DISENGAGEMENT CONDITIONS

Applicable to: ALL

The AP / FD TCAS mode automatically disengages, when the "CLEAR OF CONFLICT" aural alert sounds.
Then the AP / FD engages in a vertical mode that leads the aircraft toward the latest target altitude set on the AFS CP . For more information, *Refer to DSC-22-FG-70-110-40-GNCOC Introduction* .

L2 The AP / FD TCAS mode also automatically disengages, if one of the following occurs:
- The TA ONLY mode of the TCAS is selected, or
- The STANDBY mode of the TCAS is selected, or
- The ECAM triggers the AP / FD AUTO FLT TCAS MODE FAULT alert, or
- The flight crew engages another AP / FD vertical mode (e.g. in the case of go-around).

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Normal Operations

WHEN A TRAFFIC ADVISORY IS TRIGGERED

Applicable to: ALL

When a Traffic Advisory (TA) alert is triggered, the TCAS mode arms.

CONSEQUENCE ON AP AND FD

When the AP/FD TCAS mode arms, the AP and FDs engagement status does not change.

CONSEQUENCE ON AP/FD LATERAL MODE

When the AP/FD TCAS mode arms, any engaged(armed) AP/FD lateral mode remains engaged(armed).

CONSEQUENCE ON AP/FD VERTICAL MODE

When the AP/FD TCAS mode arms, any armed(engaged) AP/FD vertical mode remains armed(engaged).
The FMA displays TCAS on the third line of the second column. If another AP/FD vertical mode is armed, the FMA displays both modes.

WHEN A RESOLUTION ADVISORY IS TRIGGERED

Applicable to: ALL

At occurrence of any preventive or corrective Resolution Advisory (RA), the AP/FD TCAS mode engages. It provides vertical guidance in accordance with the TCAS vertical speed orders.

CONSEQUENCE ON AP AND FD

When the AP/FD TCAS mode engages:
- The AP engagement status does not change
- If both FDs are disengaged, the FDs automatically engage.

CONSEQUENCE ON AP/FD LATERAL MODE

When the AP/FD TCAS mode engages, any engaged(armed) AP/FD lateral mode remains engaged(armed).
If both APs and both FDs are disengaged, when the AP/FD TCAS mode engages, HDG automatically engages. The heading target is the aircraft heading at HDG engagement.

CONSEQUENCE ON AP/FD VERTICAL MODE

GUIDANCE

Depending on the Resolution Advisory (RA) and the AFS CP selected altitude, the AP/FD TCAS mode uses the guidance law of one of the following modes: V/S, altitude acquire, or altitude hold.

V/S guidance

The AP/FD TCAS mode uses the guidance law of the V/S mode if:
- ALT(ALT CRZ) is not armed, or
- The capture(hold) of the AFS CP selected altitude is not compatible with the RA order.

The vertical speed target is one of the following values:
- The aircraft vertical speed at the engagement of the AP/FD TCAS mode, if a preventive RA is triggered, or
- The limit between the green and red area of the vertical speed scale, plus(minus) 200 ft/min if the aircraft should climb(descend).
  If the Resolution Advisory order changes, the AP/FD TCAS mode follows the new target.

L2 In AP/FD TCAS mode, the load factor authority of the guidance law is increased, and can reach ±0.3 g. The AP/FD TCAS mode ensures that the aircraft speed remains between VLS - 5 kt and VMAX.

L1 Altitude acquire(hold) guidance

The AP/FD TCAS mode uses the guidance law of the ALT(ALT CRZ)(ALT*)(ALT CRZ*) mode if:
- ALT(ALT CRZ) is armed
- The capture(hold) of the AFS CP selected altitude is compatible with the RA order.

L2 For more information, See Capture of the selected altitude in TCAS mode.

L1 **AP/FD VERTICAL MODE ENGAGED AT OCCURRENCE OF THE RA**

When the AP/FD TCAS mode engages, any engaged AP/FD vertical mode disengages.

L2 *Note: If G/S(F-G/S) is engaged, when the AP/FD TCAS mode engages:*
- *G/S(F-G/S) disengages*
- *The APPR pb comes off, and the LOC pb comes on.*

L1 **AP/FD VERTICAL MODE ARMED AT OCCURRENCE OF THE RA**

When the AP/FD TCAS mode engages, any armed AP/FD vertical mode disarms, except ALT(ALT CRZ) if the altitude capture is compatible with the RA order.

L2 *Note: If G/S(F-G/S) is armed, when the AP/FD TCAS mode engages:*
- *G/S(F-G/S) disarms*
- *The APPR pb comes off, and the LOC pb comes on.*

Capture of the Selected Altitude in TCAS mode

If ALT(ALT CRZ) is armed, when the AP/FD TCAS mode engages:
- ALT(ALT CRZ) remains armed if the capture of the AFS CP selected altitude is compatible with the Resolution Advisory order, and if the selected level is reached before the clear of conflict.

L3 If ALT(ALT CRZ) is armed, and ALT capture conditions occur during the Resolution Advisory, the AP/FD TCAS mode captures the AFS CP selected altitude (without ALT* indicated on the FMA).

L2 This can occur when the TCAS triggers a preventive RA "MONITOR VERTICAL SPEED", or a corrective RA "ADJUST VERTICAL SPEED, ADJUST".

L3 However, if the vertical speed order of the Resolution Advisory is zero, ALT(ALT CRZ) disarms.

L2 - ALT(ALT CRZ) disarms, if the capture of the AFS CP selected altitude is not compatible with the Resolution Advisory order.

White Box on FMA

When a vertical mode disarms at TCAS mode engagement, the FMA displays a white box for 10 s.

CONSEQUENCE ON THE FLYING REFERENCE

If the flying reference is TRK-FPA, when the AP/FD TCAS mode engages, the flying reference automatically becomes HDG-V/S.
When the AP/FD TCAS mode disengages (e.g. at the CLEAR OF CONFLICT), the FMA displays the TRK FPA DESELECTED message for 10 s on the third line.

CONSEQUENCE ON A/THR AND SPEED/MACH CONTROL

When the AP/FD TCAS mode engages:
- If the A/THR is disconnected, it becomes armed or active, depending on the thrust lever position
- If the A/THR is armed, it remains armed
- If the A/THR is active, it remains active.

A/THR ACTIVE

When the AP/FD TCAS mode engages, if the A/THR becomes(remains) active, the SPEED/MACH mode engages.

The speed/Mach control becomes selected, and the speed/Mach target becomes the aircraft speed/Mach at the occurrence of the Resolution Advisory (RA).

L2 If a new RA order occurs, the speed/Mach target changes, and becomes the aircraft speed/Mach at the occurrence of the new RA.

L1 **A/THR ARMED**

When the AP/FD TCAS mode engages, if the A/THR becomes(remains) armed, the thrust target does not change.
The FMA displays the A/THR message, in accordance with the thrust lever position (e.g. MAN THR, MAN TOGA).

L2 *Note: If the flight crew sets the thrust levers to the CL detent, the A/THR activates. The SPEED/MACH mode engages. The speed/Mach control becomes selected, and the speed/Mach target becomes the aircraft speed/Mach at the A/THR activation.*

L1 LVR CLB Message on the FMA

In the case of AP/FD TCAS mode engagement when the A/THR is armed (e.g. Resolution Advisory order before the thrust reduction altitude), the LVR CLB message may flash on the FMA:

- If the vertical speed order of the resolution advisory is above 500 ft/min, the LVR CLB message is inhibited
  However, if the speed becomes greater than VFE - 20 kt, the LVR CLB message flashes on the FMA.
- If the vertical speed order of the Resolution Advisory is equal to, or below 500 ft/min, the LVR CLB message flashes on the FMA.

WHEN CLEAR OF CONFLICT

Applicable to: ALL

When the "CLEAR OF CONFLICT" aural alert sounds, the AP/FD TCAS mode automatically disengages. The AP/FD provides guidance toward the previous AFS CP selected altitude.

CONSEQUENCE ON AP/FD LATERAL MODE

When the AP/FD TCAS mode disengages, any engaged(armed) AP/FD lateral mode remains engaged(armed).

CONSEQUENCE ON AP / FD VERTICAL MODE

When the AP / FD TCAS mode disengages, one of the following modes engages: V/S , ALT* , ALT , ALT CRZ* , or ALT CRZ :

- In the case of an altitude capture or hold during TCAS mode engagement (*Refer to DSC-22-FG-70-110-40-GNRA Consequence on AP and FD*), the TCAS mode may revert to ALT* (ALT CRZ*), or ALT (ALT CRZ) when clear of conflict.
- In all other cases, the TCAS mode reverts to V/S mode when clear of conflict.

TCAS MODE REVERSION TO V/S

When the AP / FD TCAS mode reverts to V/S when clear of conflict, all of the following occurs:

- ALT or ALT CRZ arms

L3 However, ALT does not arm in the following cases:

- A preventive Resolution Advisory occurred, when one of the following modes was engaged: G/S* , G/S , F-G/S* , or F-G/S
- The AFS CP selected altitude is above the aircraft altitude.

L1
- A triple click aural alert sounds, and the pitch bar flashes for 10 s
- The vertical speed target depends on whether a preventive Resolution Advisory occurred, or a corrective Resolution Advisory occurred.

Vertical Speed Target - A Preventive Resolution Advisory Occurred

The vertical speed target remains the vertical speed target at the triggering of the Resolution Advisory.

Vertical Speed Target - A Corrective Resolution Advisory Occurred

The vertical speed target becomes:

- 500 ft/min , if the aircraft is at, or above 30 000 ft , and the AFS CP selected altitude is above the aircraft
- ± 1 000 ft/min , in all other cases.
  V/S leads the aircraft toward the AFS CP selected altitude.

TCAS MODE REVERSION TO ALT (ALT CRZ)(ALT*)(ALT CRZ*)

If ALT (ALT CRZ) is armed, when the AP / FD TCAS mode disengages:

- ALT* (ALT CRZ*) engages, if the aircraft is within the capture zone of the AFS CP selected altitude
- ALT (ALT CRZ) engages, if the aircraft altitude is equal to the AFS CP selected altitude.
- In all other cases, V/S engages.

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Inhibition Conditions

INHIBITION CONDITIONS

Applicable to: ALL

The AP / FD TCAS mode arming and engagement are inhibited when the TCAS is in Traffic Advisory only (TA ONLY) mode or in Standby (STBY) mode.

L2 For more information on the manual or automatic selection of the TA ONLY mode, *Refer to DSC-34-20-40-10-20 TA ONLY Mode* .

For more information on the selection of the STBY mode, *Refer to DSC-34-20-40-10-20 Standby Mode* .

If the TA ONLY(STBY) mode of the TCAS is automatically or manually selected during a Traffic Advisory, the AP / FD TCAS mode automatically disarms.

If the TA ONLY(STBY) mode of the TCAS is automatically or manually selected during a Resolution Advisory, the AP / FD TCAS mode automatically disengages.

When the AP / FD TCAS mode disengages, all of the following simultaneously occurs:

1. The AP / FD TCAS mode reverts to V/S
   A triple click aural alert sounds and the FD pitch bar flashes for 10 s
   L3 If the Resolution Advisory order was to descend, the vertical speed target becomes 0 ft/min .
   If not, the vertical speed target remains equal to the vertical speed target at the TCAS mode engagement.
2. L2 The AP / FD lateral mode remains engaged
3. The FMA displays the TCAS RA INHIBITED message on the second and third columns of the third line.

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Takeoff

INTRODUCTION

Applicable to: ALL

For scenario examples on takeoff:

- *Refer to DSC-22-FG-70-120-20 Takeoff with NAV*
- *Refer to DSC-22-FG-70-120-20 Takeoff with HDG/TRK Preset* .

TAKEOFF WITH NAV

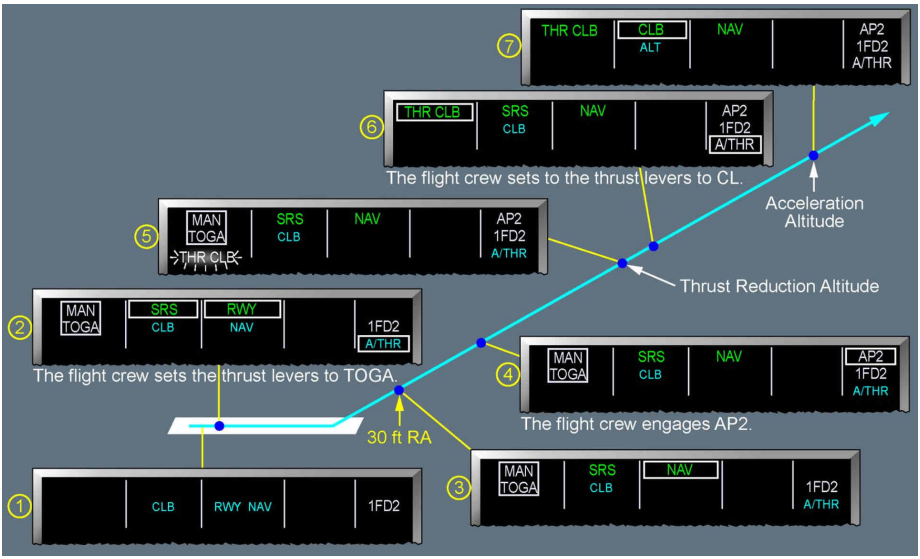
Applicable to: ALL

The aircraft is on ground, and:

- FDs are engaged
- A runway and a SID are selected in the flight plan
- V2 is inserted in the APPR panel of the FMS PERF page
- TOGA is selected in the APPR panel of the FMS PERF page
- The AFS CP selected altitude is set above the acceleration altitude
- The slats are extended.

These settings cause NAV and CLB arming. The aircraft approaches the runway threshold, and the LOC signal is available: RWY arms.
The aircraft is at the runway threshold, and the flight crew sets the thrust levers to TOGA: SRS TO and RWY engage, MAN TOGA appears on the FMA. At least five seconds after liftoff, the flight crew can engage one AP. At 30 ft RA, RWY disengages, and NAV engages. When the aircraft reaches the thrust reduction altitude, LVR CLB flashes. The flight crew sets the thrust levers to CL: MAN TOGA disappears, THR CLB engages. At the acceleration altitude, SRS TO disengages, and CLB engages.
From liftoff to the acceleration altitude, the managed speed target is V2 + 10 kt. At the acceleration altitude, the managed speed target becomes the applicable FMS speed target (e.g. CLB SPD LIM, ECON speed).

Takeoff with NAV



TAKEOFF WITH HDG/TRK PRESET

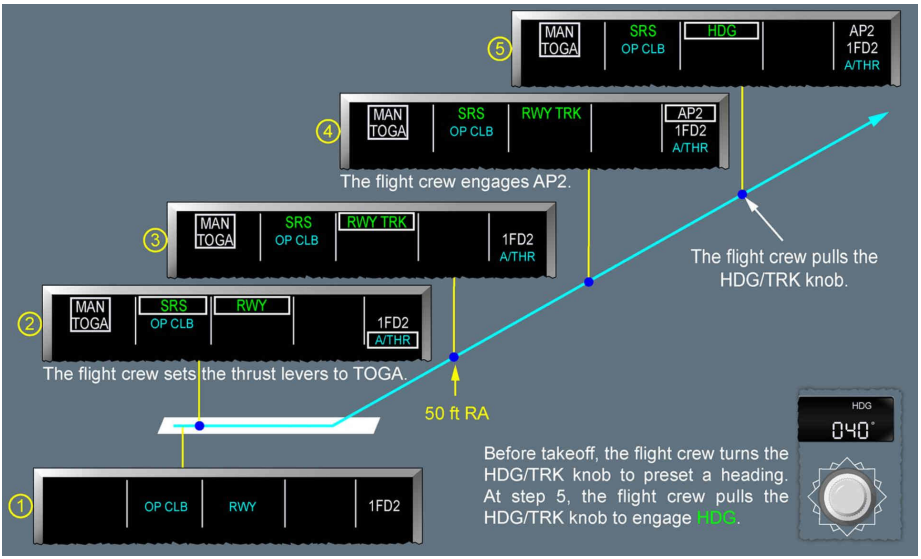
Applicable to: ALL

The aircraft is on ground, and:
- FDs are engaged
- A runway is selected in the flight plan
- V2 is inserted in the APPR panel of the FMS PERF page
- TOGA is selected in the APPR panel of the FMS PERF page
- The AFS CP selected altitude is set above the acceleration altitude
- The flight crew selects a heading (or track) preset by turning the HDG/TRK knob on the AFS CP
- The slats are extended.

These settings cause OP CLB arming. The HDG/TRK window displays the heading (or track). The display remains, as long as RWY, RWY TRK, and HDG (or TRACK) are engaged.
The aircraft approaches the runway threshold, and the LOC signal is available: RWY arms.
The aircraft is at the runway threshold, and the flight crew sets the thrust levers to TOGA: SRS TO and RWY engage, MAN TOGA appears on the FMA. At least five seconds after liftoff, the flight crew can engage one AP. At 50 ft RA, RWY disengages, and RWY TRK engages. The flight crew pulls the HDG/TRK knob: HDG engages (HDG-V/S is selected).
At the thrust reduction altitude, THR CLB engages. At the acceleration altitude, OP CLB engages.

From liftoff to the acceleration altitude, the managed speed target is V2 + 10 kt. At the acceleration altitude, the managed speed target becomes the applicable FMS speed target (e.g. CLB SPD LIM, ECON speed).

Takeoff with HDG/TRK Preset



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Climb with OP CLB Mode

INTRODUCTION

Applicable to: ALL

For scenario examples on climb with OP CLB mode:

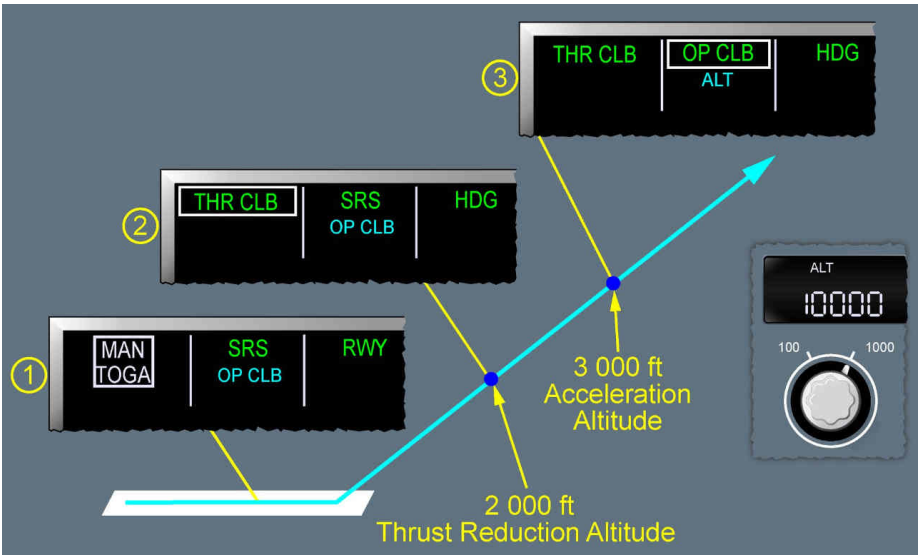
- *Refer to DSC-22-FG-70-120-40 At the Acceleration Altitude*
- *Refer to DSC-22-FG-70-120-40 The Flight Crew Pulls the ALT Knob*
- *Refer to DSC-22-FG-70-120-40 NAV Disengages .*

AT THE ACCELERATION ALTITUDE

Applicable to: ALL

On ground, with NAV not armed, OP CLB arms. OP CLB automatically engages at the acceleration altitude.

At the Acceleration Altitude

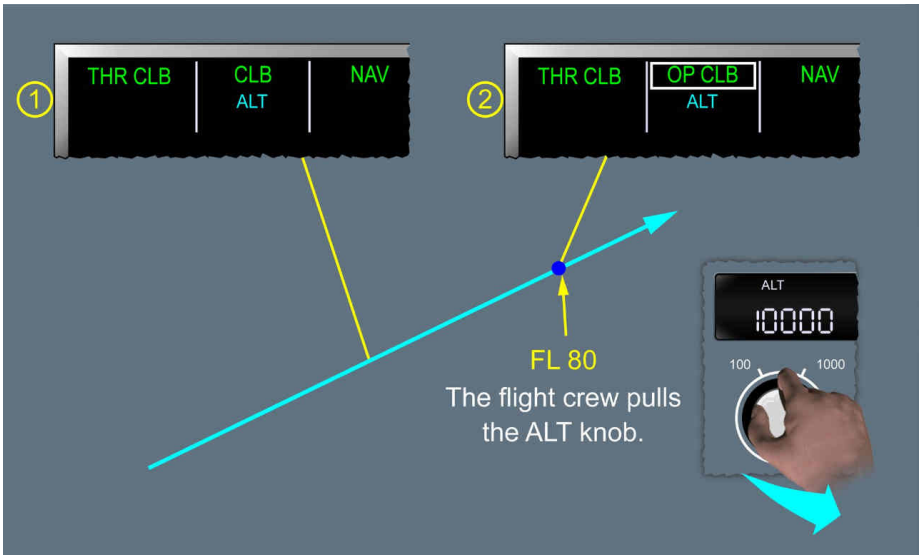


THE FLIGHT CREW PULLS THE ALT KNOB

Applicable to: ALL

CLB is engaged, and the flight crew pulls the ALT knob: OP CLB engages.

The Flight Crew Pulls the ALT Knob



NAV DISENGAGES

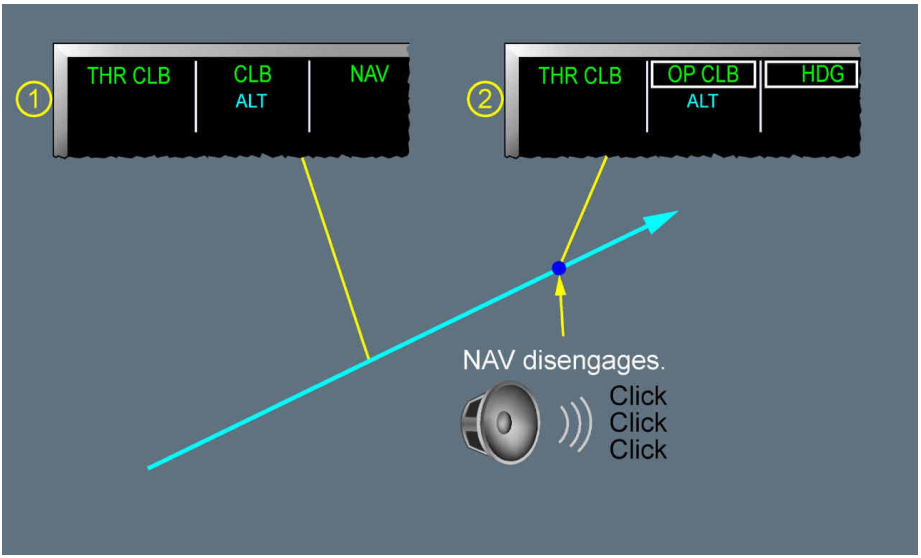
Applicable to: ALL

CLB and NAV are engaged.
If NAV disengages: CLB automatically disengages, and OP CLB engages.

However, if NAV has disengaged after:
- The aircraft has reached a flight plan discontinuity, or
- The next altitude target was an altitude constraint, and the flight crew has engaged HDG/TRACK mode.

Then, the scenario is a reversion: A triple click aural warning sounds.

NAV disengages



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Climb with CLB Mode

INTRODUCTION

Applicable to: ALL

For scenario examples on climb with CLB mode:

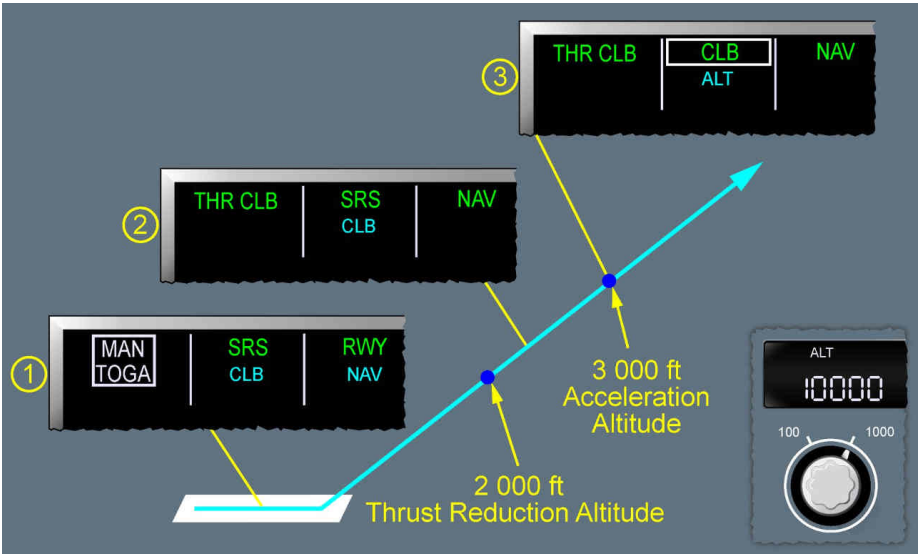
- *Refer to DSC-22-FG-70-120-50 At the Acceleration Altitude*
- *Refer to DSC-22-FG-70-120-50 Climbing toward an Altitude Constraint .*

AT THE ACCELERATION ALTITUDE

Applicable to: ALL

On ground, with NAV armed, CLB arms. CLB automatically engages at the acceleration altitude.

At the Acceleration Altitude

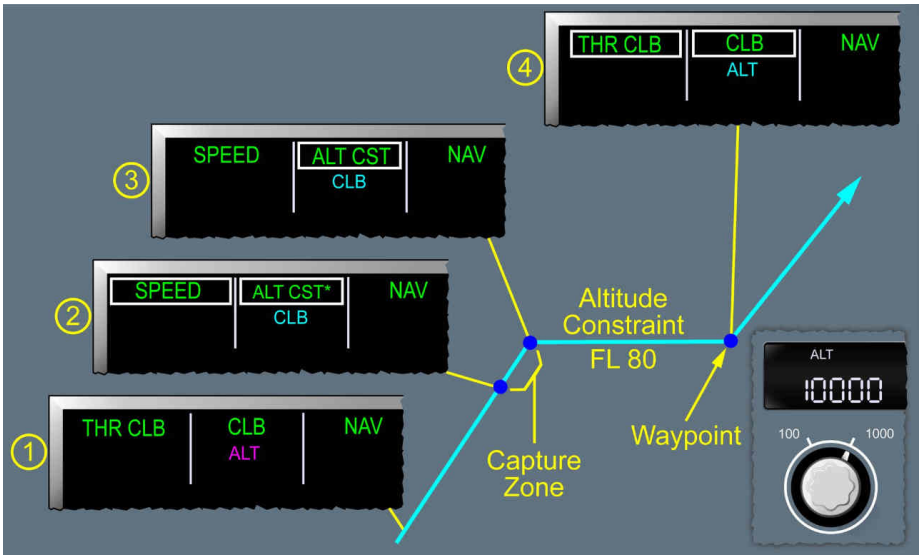


CLIMBING TOWARD AN ALTITUDE CONSTRAINT

Applicable to: ALL

When an altitude constraint is defined at a waypoint, CLB remains engaged until reaching the altitude constraint. CLB will reengage when the aircraft sequences the waypoint.

Climbing toward an Altitude Constraint



Altitude Acquire and Altitude Hold

INTRODUCTION

Applicable to: ALL

For scenario examples on altitude acquire and altitude hold:

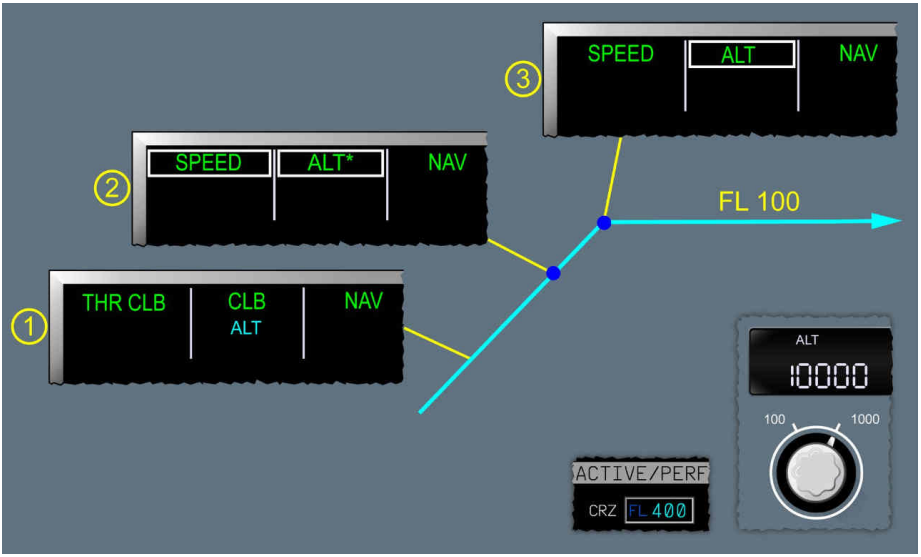
- *Refer to DSC-22-FG-70-120-60 CLB and ALT - Example 1*
- *Refer to DSC-22-FG-70-120-60 CLB and ALT - Example 2*
- *Refer to DSC-22-FG-70-120-60 CLB and ALT CST*
- *Refer to DSC-22-FG-70-120-60 CLB and ALT CRZ*
- *Refer to DSC-22-FG-70-120-60 OP CLB and ALT*
- *Refer to DSC-22-FG-70-120-60 OP CLB and ALT CRZ .*

CLB AND ALT - EXAMPLE 1

Applicable to: ALL

The vertical guidance is managed, and the aircraft climbs toward the AFS CP selected altitude.

CLB and ALT - Example 1



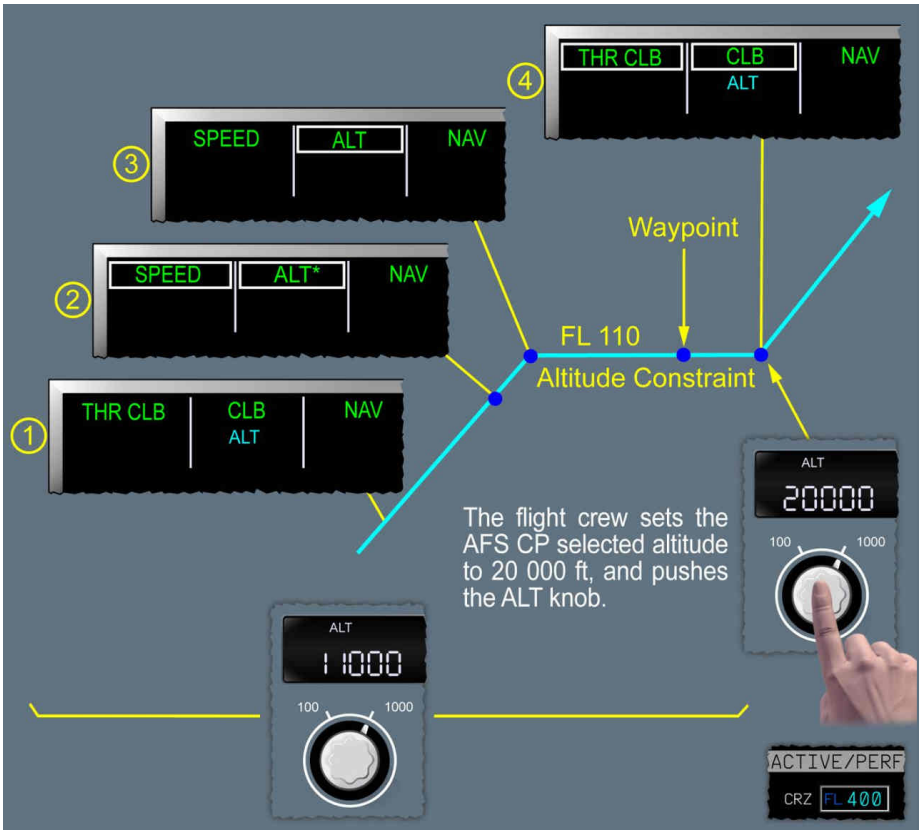
CLB AND ALT - EXAMPLE 2

Applicable to: ALL

The vertical guidance is managed, and:

- The aircraft climbs toward an altitude constraint, and
- The AFS CP selected altitude is equal to the altitude constraint.

CLB and ALT - Example 2



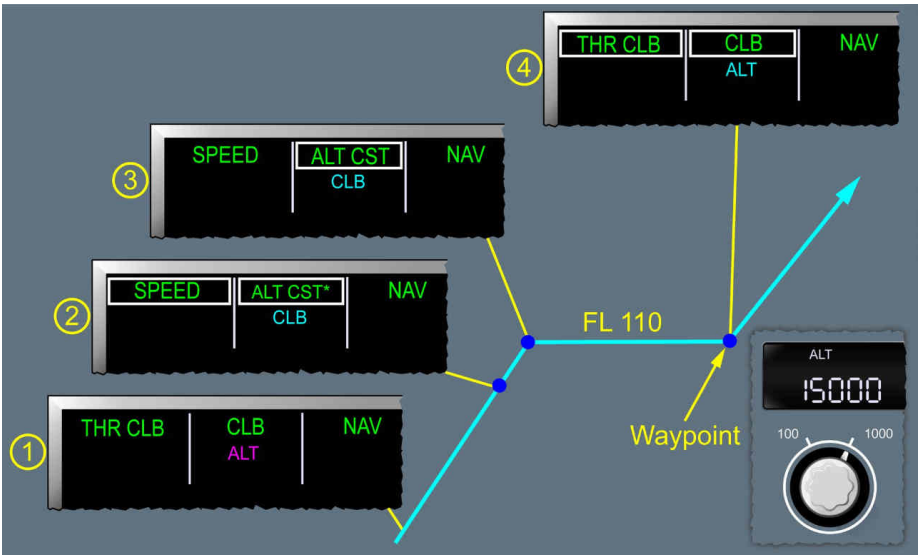
CLB AND ALT CST

Applicable to: ALL

The vertical guidance is managed, and:

- The aircraft climbs toward an altitude constraint, and
- The AFS CP selected altitude is above the altitude constraint.

CLB and ALT CST

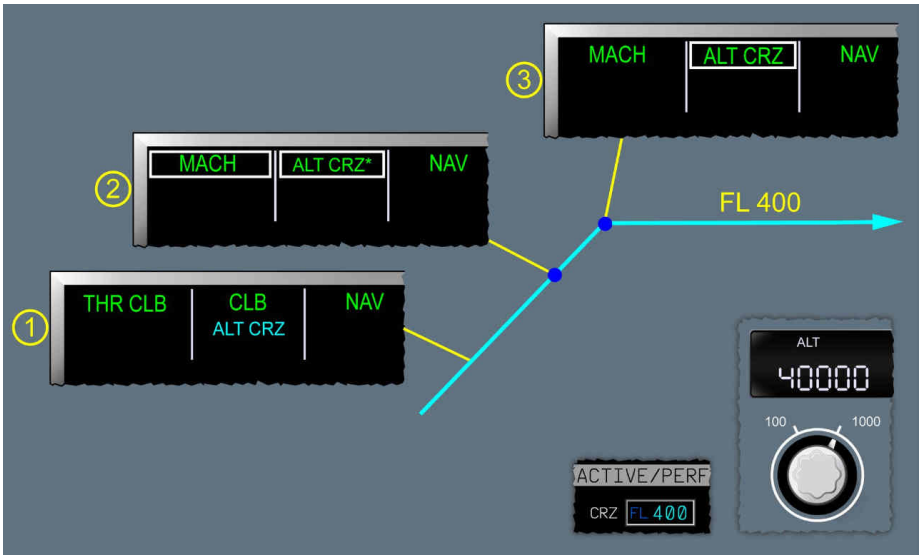


CLB AND ALT CRZ

Applicable to: ALL

The vertical guidance is managed, and the aircraft climbs toward the cruise altitude. The AFS CP selected altitude is equal to the cruise altitude.

CLB and ALT CRZ

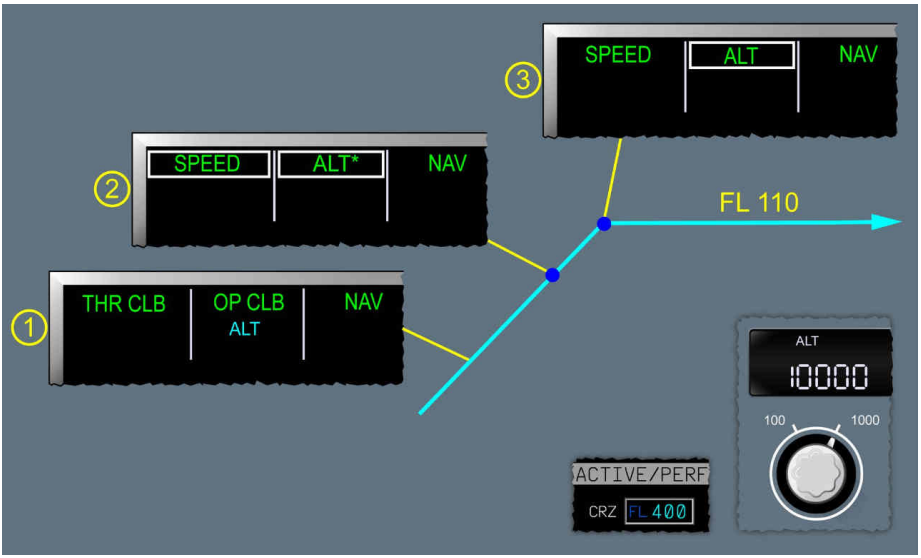


OP CLB AND ALT

Applicable to: ALL

OP CLB is engaged, and the aircraft climbs toward the AFS CP selected altitude.

OP CLB and ALT

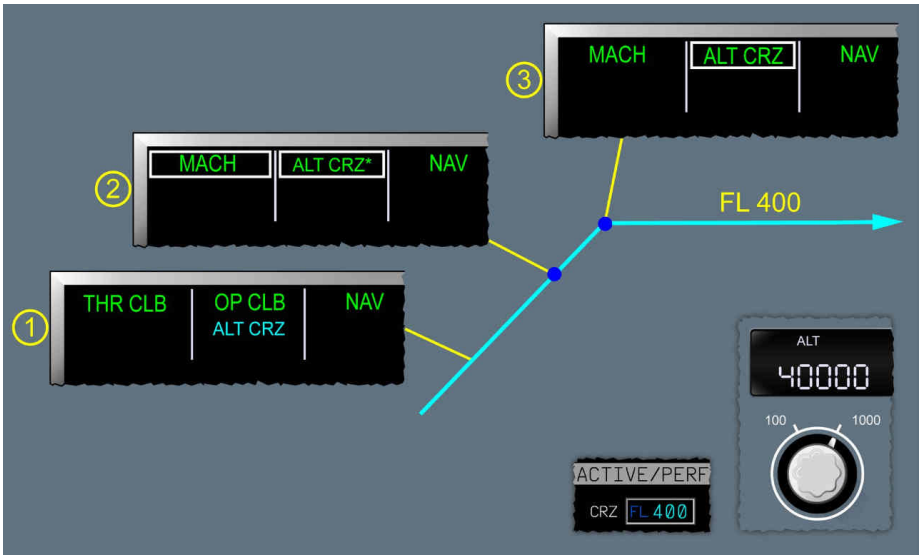


OP CLB AND ALT CRZ

Applicable to: ALL

OP CLB is engaged, and the aircraft climbs toward the cruise altitude. The AFS CP selected altitude is equal to the cruise altitude.

OP CLB and ALT CRZ



Approach and Landing

INTRODUCTION

Applicable to: ALL

For scenario examples on approaches:

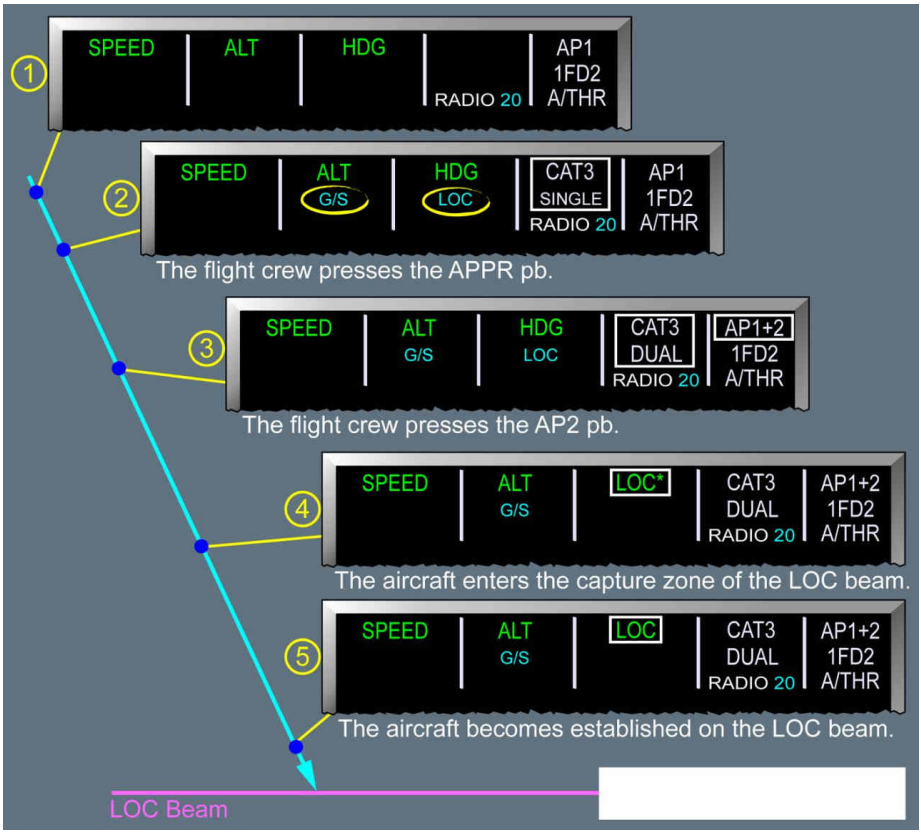
- *Refer to DSC-22-FG-70-120-90 ILS Approach and Autoland*
- *Refer to DSC-22-FG-70-120-90 VOR Approach Flown with FLS Function*
- *Refer to DSC-22-FG-70-120-90 LOC only Approach Flown with FLS Function*

ILS APPROACH AND AUTOLAND

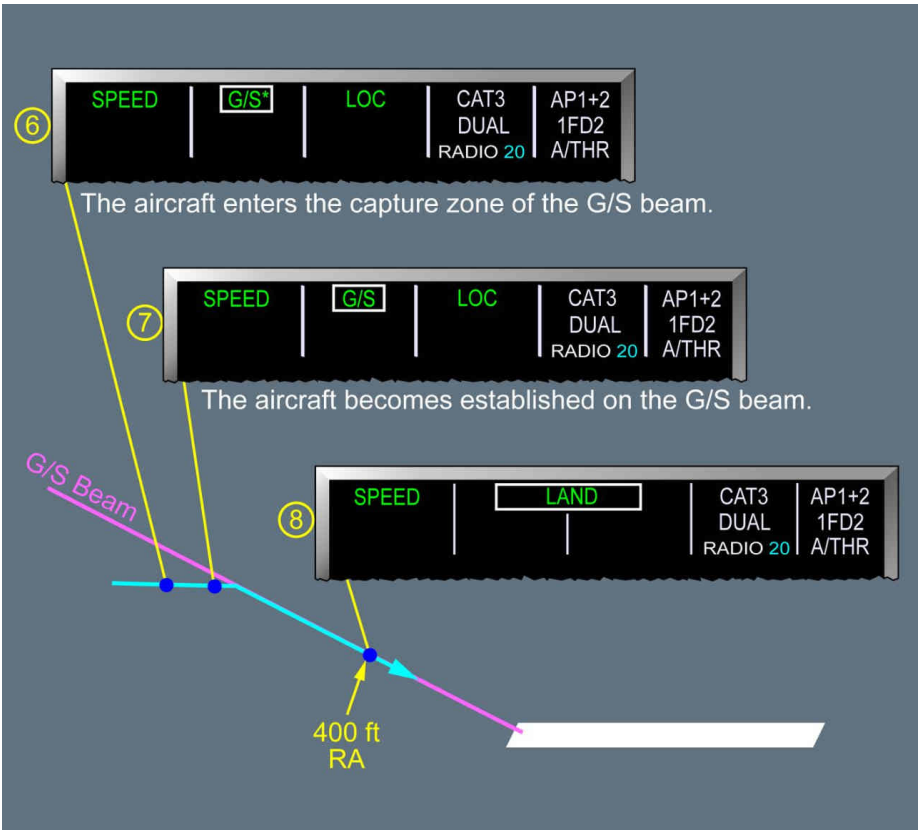
Applicable to: ALL

The flight crew has selected an ILS approach on the FMS ARRIVAL page.
AP1 is engaged. The flight crew has selected a heading, so as to converge toward the LOC beam.

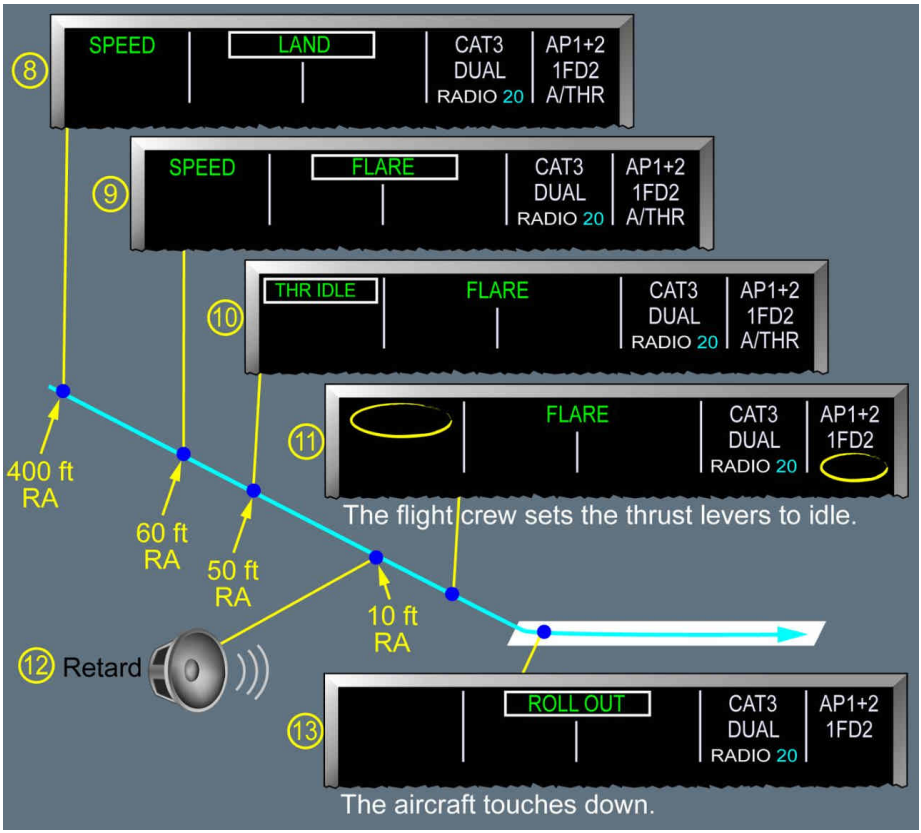
ILS Approach and Autoland - Step 1 to 5



ILS Approach and Autoland - Step 6 to 8



ILS Approach and Autoland - Step 8 to 12

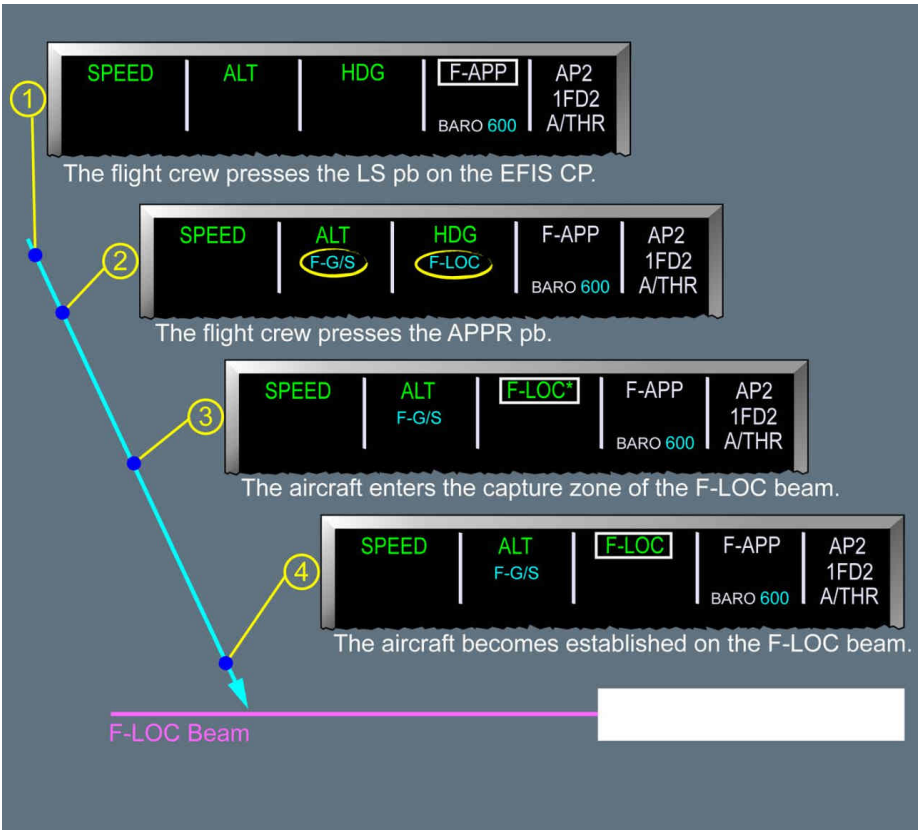


VOR APPROACH FLOWN WITH FLS FUNCTION

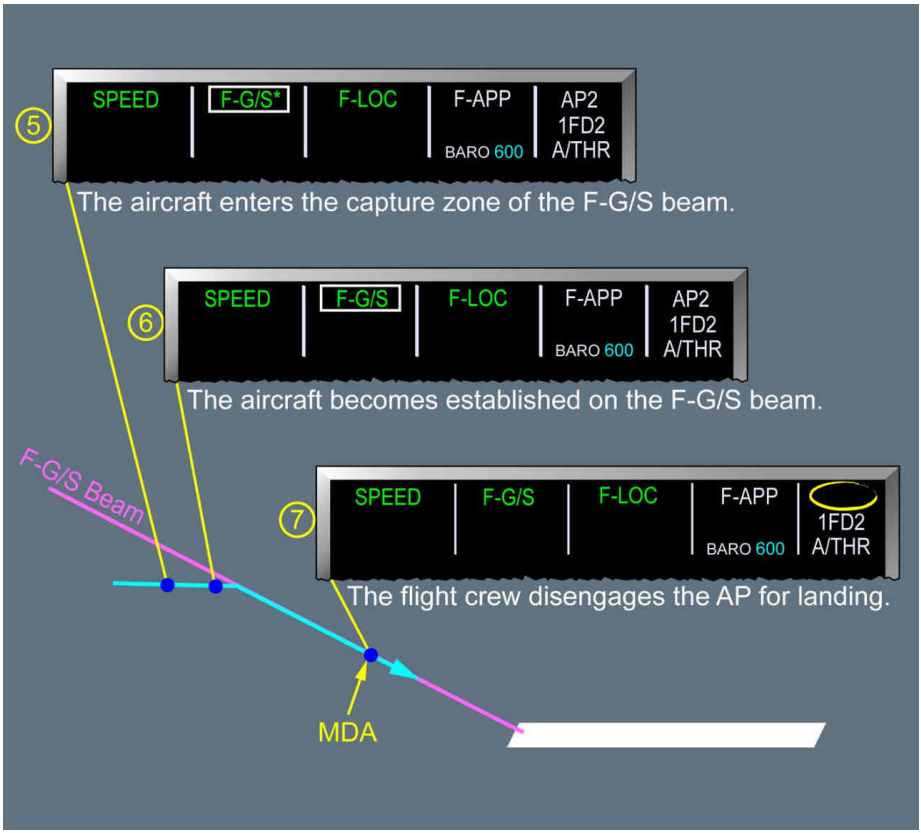
Applicable to: ALL

The flight crew has selected a VOR approach on the FMS ARRIVAL page. The FMS approach phase is activated. AP2 is engaged.
The flight crew has selected a heading, so as to converge toward the F-LOC beam.

VOR Approach Flown with FLS Function - Step 1 to 4



VOR Approach Flown with FLS Function - Step 5 to 7

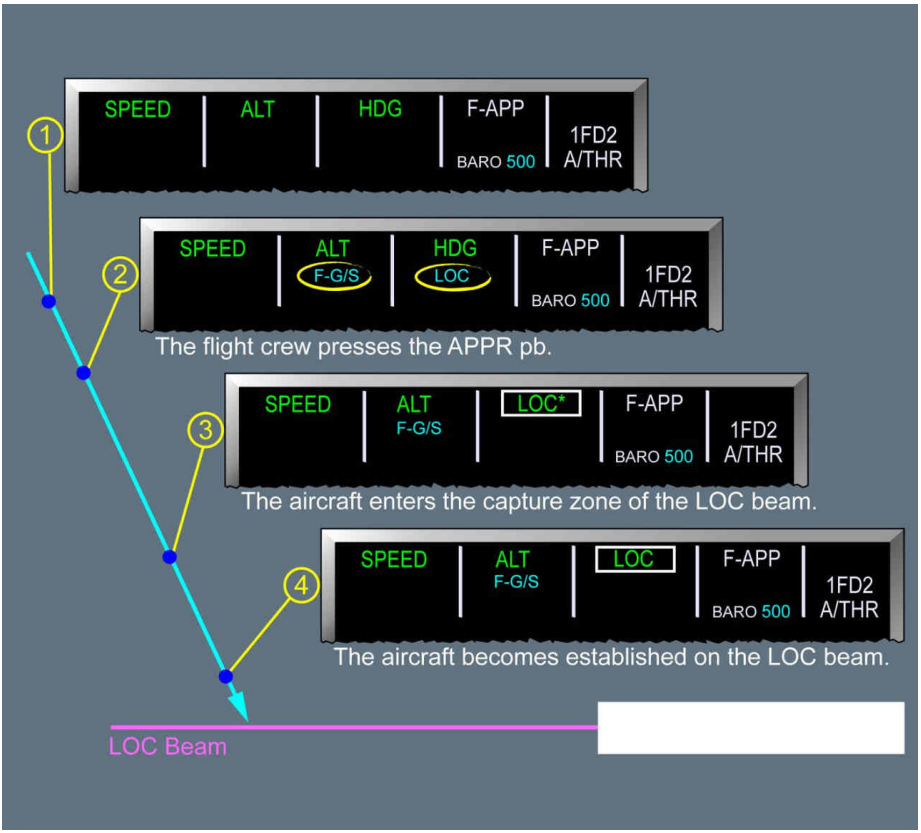


LOC ONLY APPROACH FLOWN WITH FLS FUNCTION

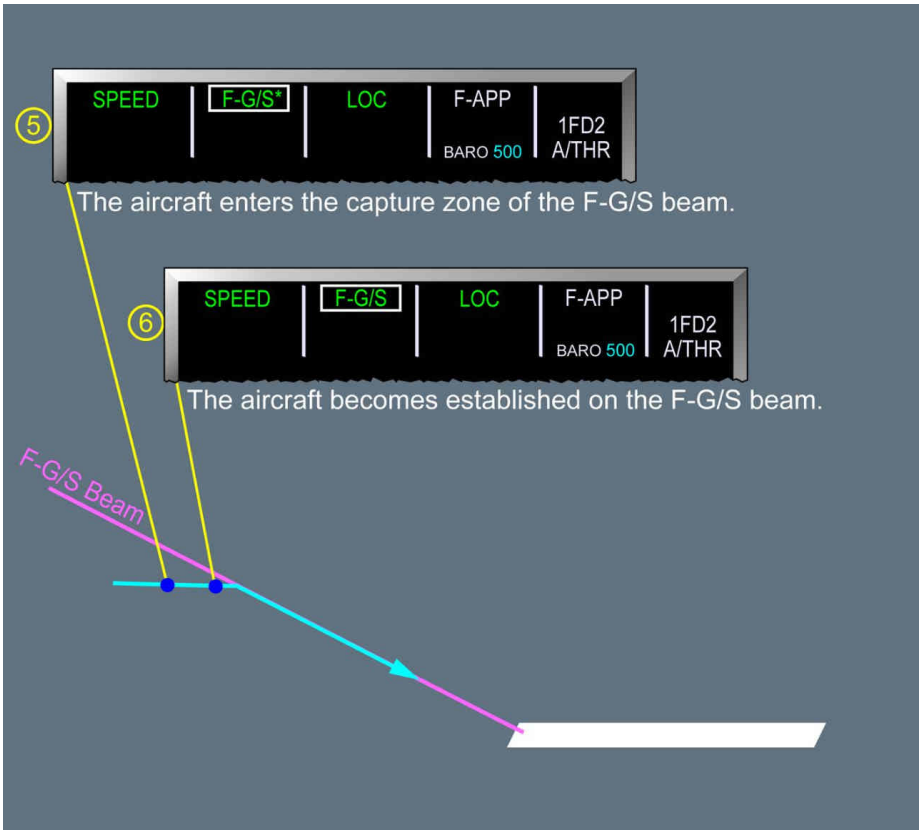
Applicable to: ALL

The flight crew has selected a LOC approach on the FMS ARRIVAL page. The FMS approach phase is activated. AP2 is engaged.
The flight crew has selected a heading, so as to converge toward the LOC beam.

LOC only Approach Flown with FLS Function - Step 1 to 4



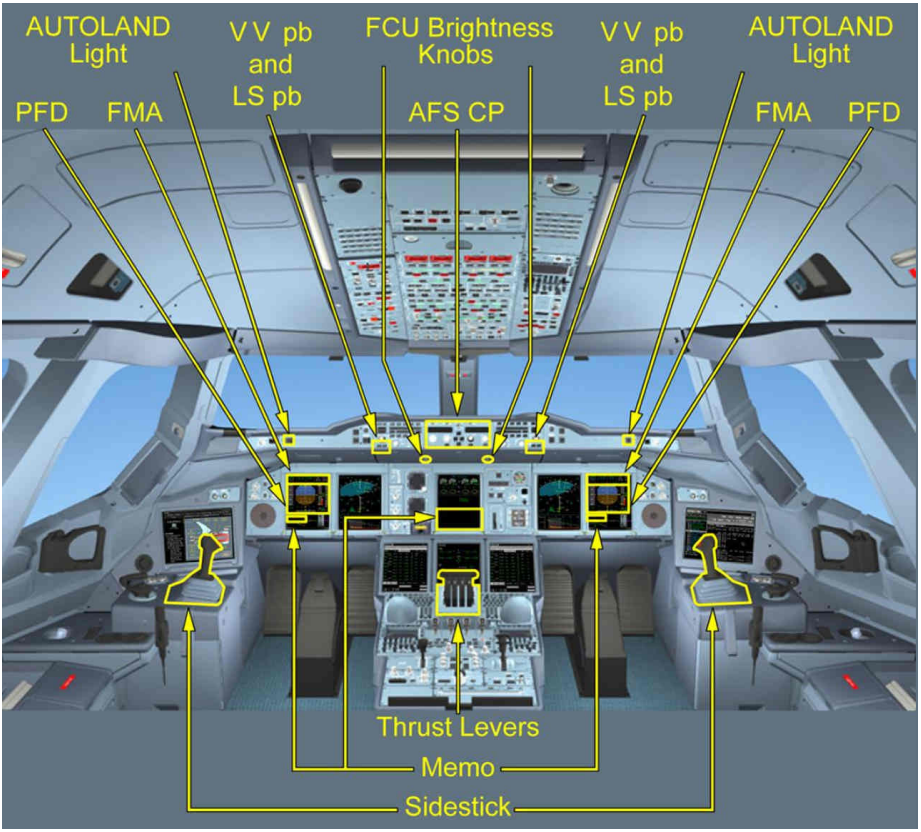
LOC only Approach Flown with FLS Function - Step 5 to 7



COCKPIT VIEW

Applicable to: ALL

Cockpit View



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OVERVIEW

Applicable to: ALL

AFS CP



SPD/MACH CONTROL

Applicable to: ALL

SPD /MACH Control



SPD/MACH pb

L13



If the speed (Mach) target is selected:
Pressing the SPD/MACH pb changes the speed target to the corresponding Mach target, and vice versa.

Note: *If the speed or Mach is managed:*
Pressing the SPD/MACH pb will take effect when the speed (Mach) becomes selected.

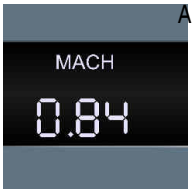
SPD/ MACH WINDOW

L13

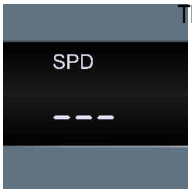


A speed target is selected.

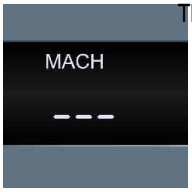
Note: 1. At the aircraft power-up, the SPD/MACH window displays 100 kt.
2. If APs, FDs, and A/THR are off, the SPD/MACH will display the current aircraft speed target.



A Mach target is selected.



The speed target is managed.



The Mach target is managed.

Note: At the speed/Mach crossover altitude, the managed speed target automatically changes to a managed Mach target. The display on the SPD/MACH window changes from SPD to MACH (and vice versa in descent).

SPD/MACH knob



- When turned, preselects a speed or Mach target

Note: *When the SPD/MACH window is dashed, and if the flight crew begins to turn the knob without pulling it, the window displays:*
- *The current aircraft speed, if SRS TO, or SRS GA is engaged, or*
- *The managed speed/Mach target, in all other cases.*

Then, turning the knob would change the value. If there is no action on the knob for 45 s, the dashes reappear.

- When pulled, activates the selected speed or Mach target
- When pushed, the speed or Mach becomes managed.

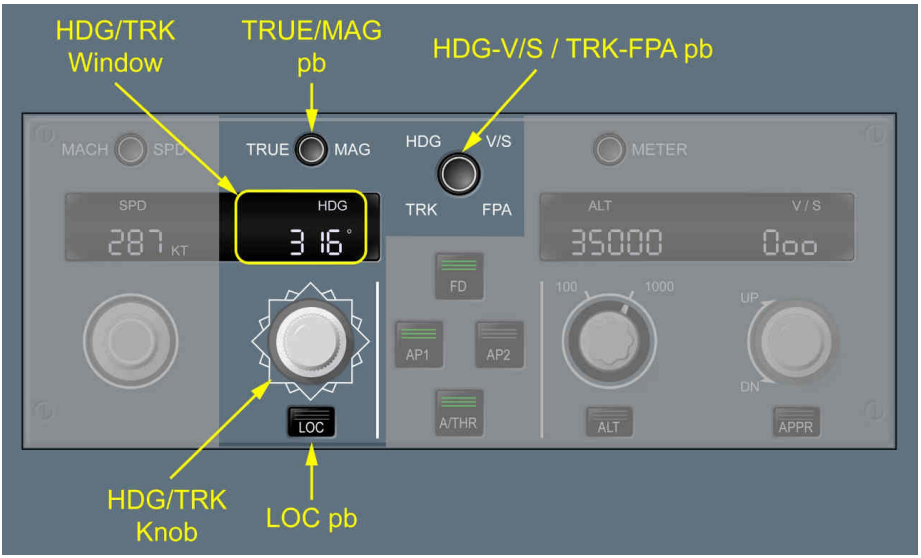
L3 One entire rotation of the knob equals 32 kt (1 kt per click), or 0.32 Mach (0.01 Mach per click).

The selection has a range of:
- 100 kt to 399 kt for the speed
- M 0.01 toM 0.99 for the Mach.

LATERAL CONTROL

Applicable to: ALL

Lateral Control



TRUE/MAG pb



When pressed, changes the TRUE North reference to Magnetic (MAG) North reference, and vice versa.

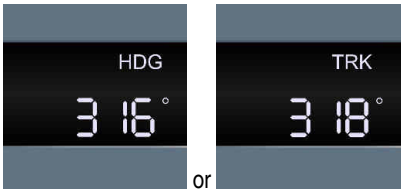
The North reference is magnetic, unless the aircraft is in the polar zone.

When the aircraft reaches the polar zone:

- The North reference automatically changes from MAG to TRUE in the ADIRSs
- The following messages ask the flight crew to change from MAG to TRUE North reference:
  - The SELECT TRUE NORTH REF memo appears on the ND
  - The NAV EXTREME LATITUDE triggers.

HDG / TRK WINDOW

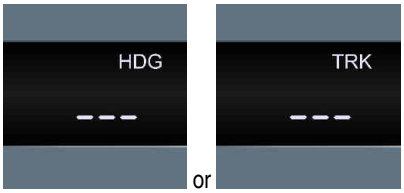
L13



or

- A heading/track target is selected, or
- A HDG / TRK preset is defined, or
  (For more information, *Refer to DSC-22-FG-70-30-20 HDG/TRK Preset* .)
- No AP , and no FD is engaged.

Note: *At the aircraft power-up, the HDG / TRK window displays the current aircraft heading.*



or

The lateral guidance is managed.

Note: *The HDG / TRK window displays TRUE , at the top left corner of the HDG / TRK window, if TRUE is selected with the TRUE/MAG pb .*

HDG/TRK knob



- When turned, preselects a heading or track target

Note: *When the HDG/TRK window is dashed, and if the flight crew begins to turn the knob without pulling it, the window displays the current aircraft heading/track. Then, turning the knob would change the value. If there is no action on the knob for 45 s, the dashes reappear. However, if a HDG/TRK preset is defined, the display of the value remains permanently.*

- When pulled, activates the selected heading or track target
- When pushed, a managed lateral mode arms or engages.

L3 One entire rotation of the knob equals 32 ° (1 ° per click).
The selection has a range of 0° to 359°.

LOC pb

L12



: When pressed, arms the:

- LOC mode, if the flight crew has selected an ILS , a GLS , or a LOC only approach on the FMS ARRIVAL page

  Note: *If the flight crew has manually-tuned an ILS(GLS) on the FMS POSITION NAVAIDS page:*
  - *The approach selected on the FMS ARRIVAL page is disregarded*
  - *The LOC mode arms to fly the LOC of the manually tuned ILS(GLS).*

- F-LOC mode, if the flight crew has selected a VOR, NDB, RNV, or GPS approach on the FMS ARRIVAL page
- LOC B/C mode, if one of the following conditions is met:
  - The flight crew has selected a BAC approach (i.e. LOC B/C approach) on the FMS ARRIVAL page
  - The flight crew has selected a LOC only approach on the FMS ARRIVAL page, and entered a back course on the FMS POSITION NAVAIDS page
  - The flight crew has selected an ILS approach on the FMS ARRIVAL page, deselected the G/S on the FMS POSITION NAVAIDS page, and entered a back course on the FMS POSITION NAVAIDS page.

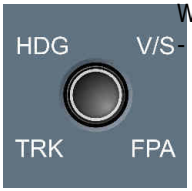
  Note: *If the flight crew has selected an ILS with a back course on the FMS POSITION NAVAIDS page:*
  - *The approach selected on the FMS ARRIVAL page is disregarded*
  - *The LOC B/C mode arms to fly the back course LOC .*



When pressed again, disarms or disengages the LOC, LOC B/C, or F-LOC mode.

For more information on the arming conditions of the approach modes:
- *Refer to LOC Mode / Arming Conditions*
- *Refer to G/S Mode / Arming Conditions*
- *Refer to F-LOC Mode / Arming Conditions*
- *Refer to F-G/S Mode / Arming Conditions*
- *Refer to LOC B/C Mode / Arming Conditions .*

HDG-V/S / TRK-FPA pb



When pressed, selects either:

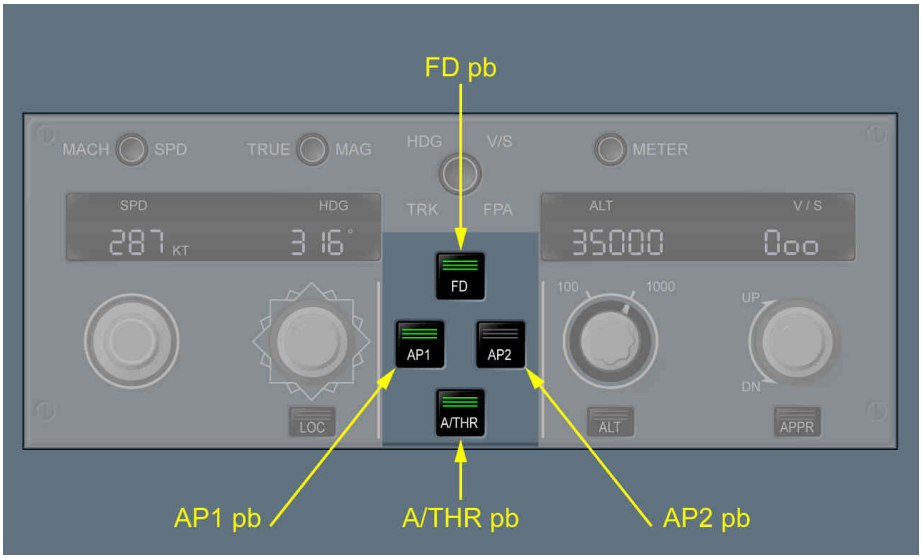
- HDG-V/S: Heading (HDG) is associated with Vertical Speed (V/S)
  If the VV pb is pressed on the EFIS CP , the associated PFD displays the Velocity Vector (VV) in black.
  For more information on the VV, *Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector)* .
- TRK-FPA: Track (TRK) is associated with Flight Path Angle (FPA)
  The PFD s display the Flight Path Vector (FPV) in green.
  For more information on the FPV, *Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector)* .

For more information on HDG-V/S / TRK-FPA selection, *Refer to AP/FD Modes / HDG-V/S / TRK-FPA Selection* .

AP, FD AND A/THR CONTROL

Applicable to: ALL

AP , FD and A/THR Control



FD pb



The FDs are not engaged.

L12



When pressed, engages FD1 and FD2.

Note: *If only one FD is engaged, the FD pb is also illuminated.*

AP1(2) pb



The AP1(2) is not engaged.



When pressed, engages AP1(2).

A/THR pb



The A/THR is disconnected.



When pressed, arms or activates the A/THR.

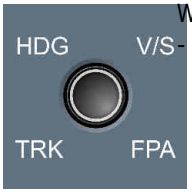
VERTICAL CONTROL

Applicable to: ALL

Vertical Control



HDG-V/S / TRK-FPA pb



When pressed, selects either:

- HDG-V/S: Heading (HDG) is associated with Vertical Speed (V/S)
  If the VV pb is pressed on the EFIS CP , the associated PFD displays the Velocity Vector (VV) in black.
  For more information on the VV, *Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector)* .
- TRK-FPA: Track (TRK) is associated with Flight Path Angle (FPA)
  The PFD s display the Flight Path Vector (FPV) in green.
  For more information on the FPV, *Refer to DSC-31-20-20-100 Flight Path Vector(Velocity Vector)* .

For more information on HDG-V/S / TRK-FPA selection, *Refer to AP/FD Modes / HDG-V/S / TRK-FPA Selection* .

METER pb



When pressed, displays the current and target altitudes in meters (in addition to feet) on the PFDs.
When pressed again, clears the meter display from the PFDs.

ALT WINDOW

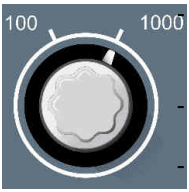
L13



Displays the altitude set by the flight crew with the ALT knob.

Note: *1. The window never displays dashes.*
2. At the aircraft power-up, the ALT window displays the current aircraft altitude, rounded to the nearest hundred.

ALT knob



When turned, sets the target altitude on the AFS CP .
The outer knob has two positions: 100 and 1000, to set the target altitude in increments of 100 ft or 1 000 ft .

- When pulled, activates the selected target altitude on the AFS CP . The FMS vertical profile is disregarded.
- When pushed, the altitude target becomes managed. The FMS vertical profile is respected, or the AFS CP target altitude is respected, if applicable (*Refer to AP/FD Modes / Altitude Acquire and Altitude Hold / General* .

ALT pb



When pressed, the aircraft immediately starts to level-off.

Note: *The ALT pb also comes on, when the aircraft maintains a selected or managed altitude.*

V/S / FPA WINDOW

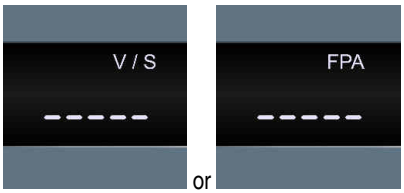


or



- A V/S / FPA target is selected, or
- No AP, and no FD is engaged.

L13



- The vertical profile is managed, or
- A selected vertical mode, different than V/S or FPA, is engaged.

Note: *At the aircraft power-up, the V/S / FPA window displays dashes.*

V/S / FPA knob



- When turned, preselects a vertical speed or flight path angle target

Note: *When the V/S / FPA window is dashed, and if the flight crew turns the knob without pulling it, the window displays the current V/S / FPA aircraft. Then, turning the knob would change the value. If there is no action for 45 s, the dashes reappear.*

- When pulled, activates the selected vertical speed or flight path angle target.

Note: *When pushed: There is no effect.*

L3 One entire rotation equals 1 600 ft/min in vertical speed (100 ft/min per 2 clicks), or 3.2 ° in flight path angle (0.1 ° per click).

The selection has a range of:
- –6 000 ft/min to +6 000 ft/min for the vertical speed
- –9.9 ° to + 9.9 ° for the flight path angle.

APPR PB

L12



Enables the aircraft to fly:
- An ILS approach, or
- A GLS approach, or
- A NPA with the FLS function.

When pressed, arms the:
- LOC and G/S modes, if the flight crew has selected an ILS(GLS) approach on the FMS ARRIVAL page

  Note: *If the flight crew has manually-tuned an ILS(GLS) on the FMS POSITION NAVAIDS page:*
  - *The approach selected on the FMS ARRIVAL page is automatically disregarded*
  - *The LOC and G/S modes arm to fly the manually-tuned ILS(GLS).*

- F-LOC and F-G/S modes, if the flight crew has selected a VOR, NDB, RNV, or GPS approach on the FMS ARRIVAL page
- LOC and F-G/S modes, if:
  - The flight crew has selected an ILS approach on the FMS ARRIVAL page, and deselected the G/S on the FMS POSITION NAVAIDS page, or
  - The flight crew has selected a LOC only approach on the FMS ARRIVAL page.
- LOC B/C and F-G/S modes, if one of the following conditions is met:
  - The flight crew has selected a BAC approach (i.e. LOC B/C approach) on the FMS ARRIVAL page
  - The flight crew has selected a LOC only approach on the FMS ARRIVAL page, and entered a back course on the FMS POSITION NAVAIDS page
  - The flight crew has selected an ILS approach on the FMS ARRIVAL page, deselected the G/S on the FMS POSITION NAVAIDS page, and entered a back course on the FMS POSITION NAVAIDS page.



When pressed again, disarms or disengages the approach modes.

For more information on the arming conditions of the approach modes:
- *Refer to LOC Mode / Arming Conditions*
- *Refer to G/S Mode / Arming Conditions*
- *Refer to F-LOC Mode / Arming Conditions*

- *Refer to F-G/S Mode / Arming Conditions*
- *Refer to LOC B/C Mode / Arming Conditions* .

VV PB

Applicable to: ALL



The Captain's (First Officer's) PFD displays the Velocity Vector (VV).



The Captain's (First Officer's) PFD does not display the VV.

When TRK-FPA is selected, both PFD s automatically display the Flight Path Vector (FPV).

L3 When TRK-FPA is selected, pressing the VV pb has no effect: Both PFD s continue to display the FPV , and the VV light remains on.

L1 When HDG-V/S is selected, the PFD s do not automatically display the VV. However, the Captain (First Officer) can display the VV on their PFD by pressing the VV pb .

The PFD s no longer display the FPV (VV), when:

- The flight crew changes from TRK-FPA to HDG-V/S
  For more information on HDG-V/S / TRK-FPA selection, *Refer to AP/FD Modes / HDG-V/S / TRK-FPA Selection* .
- The flight crew performs a go-around.

LS PB

Applicable to: ALL

L12



The Captain's (First Officer's) PFD displays the following landing system data in accordance with the approach selected on the FMS ARRIVAL page: Deviation scales, deviation signals, course pointer, information.
For information on the landing system data, *Refer to PFD / Approach Guidance* .
If the flight crew selected an NPA on the FMS ARRIVAL page, and the FMS flight phase is descent or approach, the Captain's (First Officer's) FMA displays the FLS capability.
However, the FLS capability will not appear, if the NO FLS FOR THIS APPR message appeared on the MFD .

Note: *1. If the direct distance to the destination airport is more than 300 nm , only the deviation scales appear.*
2. The LS light automatically comes on when LOC , LOC B/C or F-LOC arms.



The Captain's (First Officer's) PFD does not display the landing system data.

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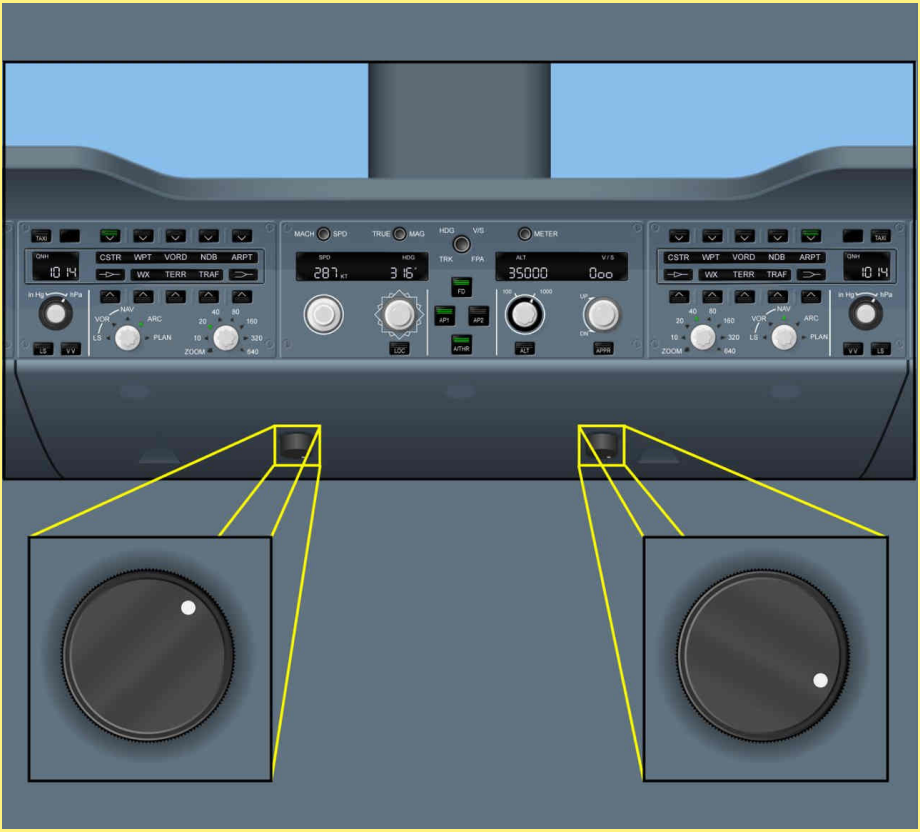
FCU BRIGHTNESS KNOBS

Applicable to: ALL
Impacted DU: 00017142 FCU Brightness Knobs

FCU Brightness Knobs



THE LEFT KNOB

Controls the brightness of the FCU windows.
When completely turned clockwise: Switches off the FCU.

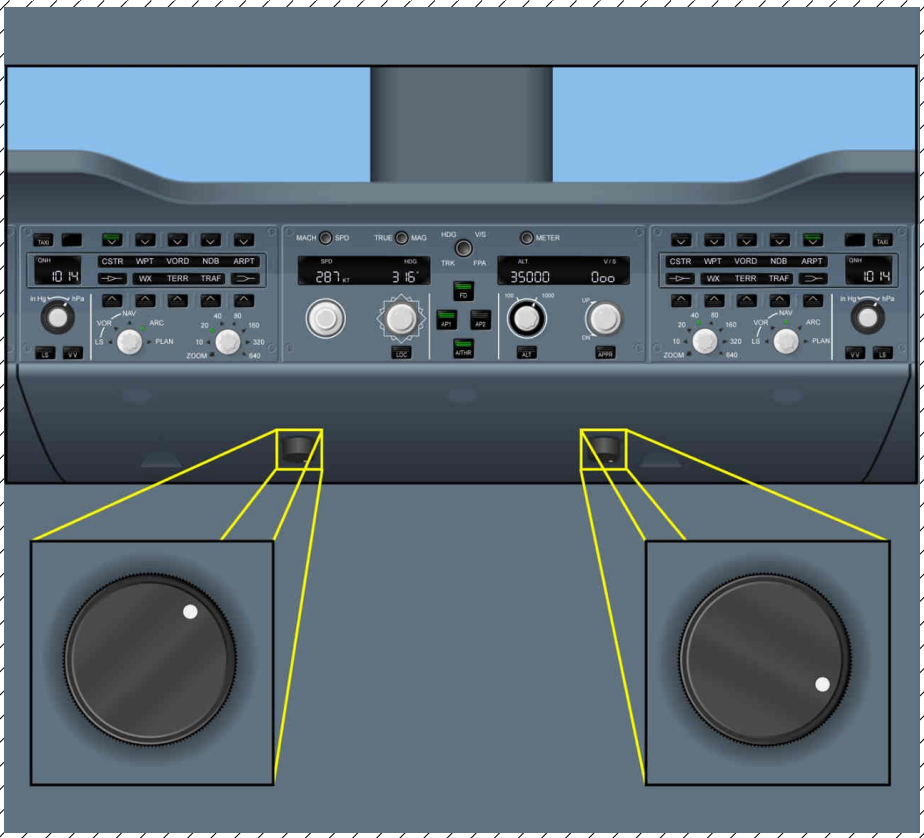
L2 When the FCU is switched off:
- The EFIS CPs and the AFS CP are electrically shutoff.
- The CDS & AUTO FLT FCU SWITCHED OFF alert triggers.

L1 *Note: If the FCU is inadvertently switched off, when adjusting the brightness, wait 3 s to switch back to on the FCU.*

FCU BRIGHTNESS KNOBS

Applicable to: ALL
Impacted by TDU: 00022764 FCU Brightness Knobs

FCU Brightness Knobs



THE LEFT KNOB

Controls the brightness of the FCU windows.
When completely turned clockwise: Switches off the FCU.

L2 When the FCU is switched off:
- The EFIS CPs and the AFS CP are electrically shutoff.
- The CDS & AUTO FLT FCU SWITCHED OFF alert triggers.

L1 **THE RIGHT KNOB**

Controls the brightness of the FCU labels.

Intentionally left blank

MFD - FCU BACKUP

Applicable to: ALL

Refer to DSC-22-FG-90-10-GCONT Control of the FCU Backup .

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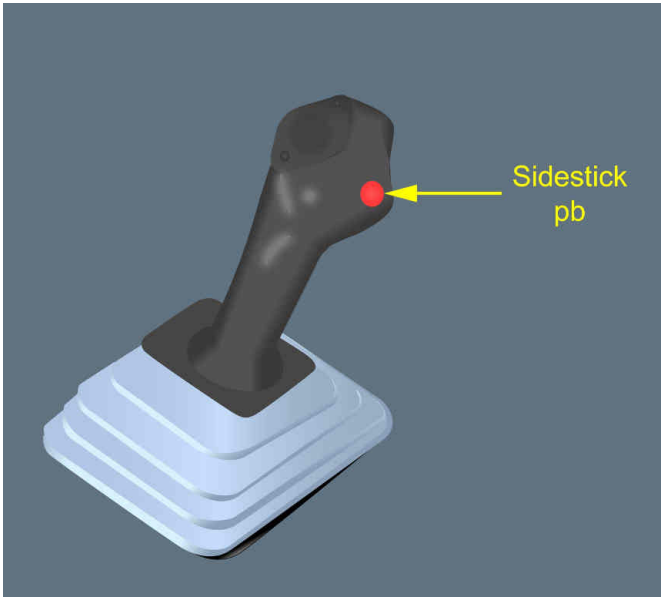
SIDESTICK

Applicable to: ALL

Sidestick



When at least one AP is engaged, the sidesticks are locked in the neutral position.
The flight crew presses the sidestick pushbutton to disengage all AP (s) engaged.
All AP (s) engaged will also disengage, if the flight crew applies a force above a given threshold on the sidestick.
For more information on AP manual disengagement, *Refer to AP Manual Disengagement* .
For information on AP disconnection annunciations and warnings, *Refer to AP Disengagement Annunciations and Warnings* .
When no AP is engaged, the sidesticks are not locked.

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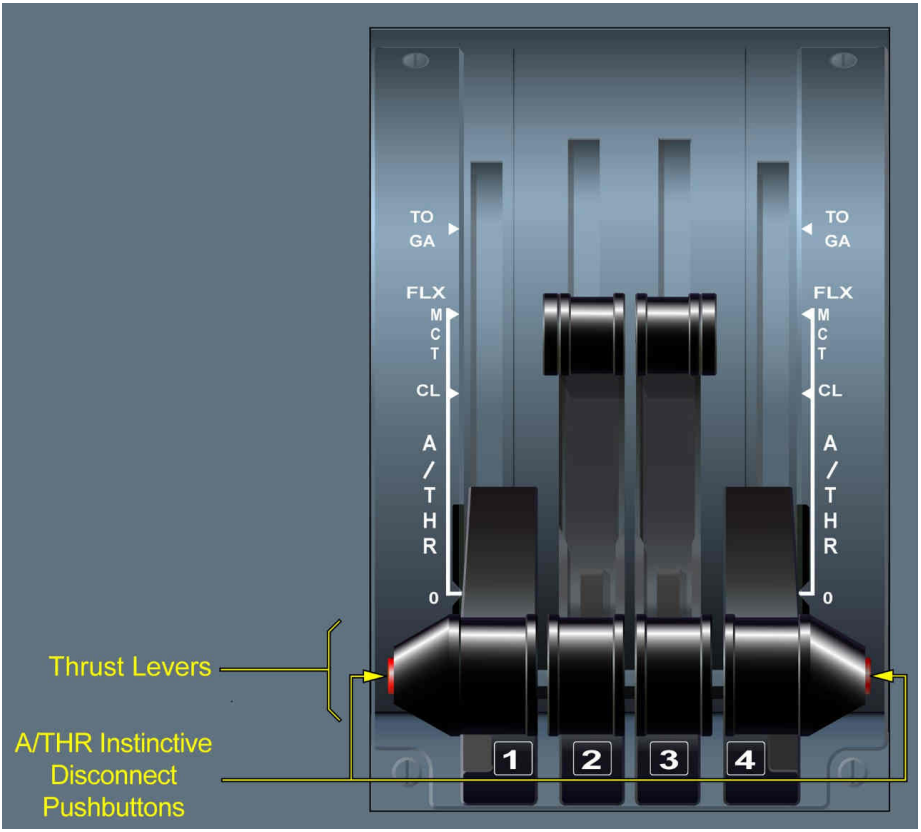
THRUST LEVERS

Applicable to: ALL

Thrust Levers



A/THR INSTINCTIVE DISCONNECT PUSHBUTTON

Pressing on one A/THR instinctive disconnect pushbutton disconnects the A/THR .

L13

CAUTION	If the flight crew presses, and holds one A/THR instinctive disconnect pushbutton for more than 15 seconds, the A/THR will be disconnected for the remainder of the flight. All A/THR modes, including A.FLOOR will be lost. The A/THR will be recovered at the next aircraft power-up. The A/THR will be recovered, when one of the following occurs: - Five seconds after all engines shutdown - After power-up of all PRIMS and all FADECs.

L2 If the flight crew presses on one A/THR instinctive disconnect pushbutton when an AUTO BRK landing mode is armed (active), the AUTO BRK mode disarms (deactivates).

L1 **THRUST LEVERS**

The flight crew uses the thrust levers to:

- Arm, activate or disconnect the A/THR
  For information on A/THR arming, *Refer to DSC-22-FG-50-30-GAARM Introduction* .
  For information on A/THR activation, *Refer to DSC-22-FG-50-30-GAACT Introduction* .
- Control the thrust, when the A/THR is disconnected.
  For information on manual thrust control, *Refer to Engines / Thrust Control in Manual Mode* .

For information on standard and non-standard A/THR disconnection, *Refer to DSC-22-FG-50-40-A A/THR Disconnection* .

FMA

Applicable to: ALL

The Flight Mode Annunciator (FMA) is located on the upper part of the PFD . The FMA can display:

- The autobrake modes: *Refer to Landing Gear / AUTO BRK Mode Annunciation on the FMA*
- The A/THR messages and modes
- The AP / FD modes
- The approach capability
- The minimum decision height/altitude, or the decision height
- The AP , FD , and A/THR engagement status
- The messages from: FMS , flight guidance, and flight controls.

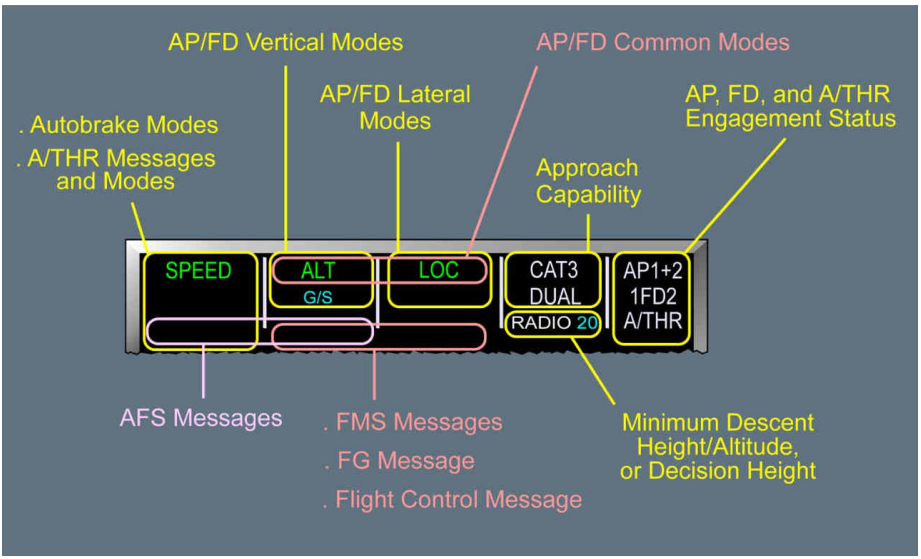
A white box appears for 10 s around the annunciation of:

- An A/THR mode engagement
- An AP / FD mode engagement

L3 Following an AP / FD TCAS mode engagement, the white box may extend to the second line to highlight any change of the status of the AP / FD vertical armed mode.

L1 - The approach capability (or the change of the approach capability)
- An AP , FD , or A/THR engagement status change.

FMA



A/THR MESSAGES AND MODES (COLUMN 1)

FIRST AND SECOND LINES

Display	Meaning	For display conditions:
MAN TOGA	The A/THR is armed, and the engines apply maximum thrust.	*Refer to A/THR Arming / FMA Display .*
MAN FLX +45	The A/THR is armed, and the engines apply flexible thrust, with FLEX temperature set to 45 ° .	
MAN DTO	The A/THR is armed, and the engines apply derated thrust.	
MAN MCT	The A/THR is armed, and the engines apply maximum continuous thrust.	
MAN THR	The A/THR is armed, and the engines apply a thrust defined by the thrust lever positions.	

These messages appear with a permanent white box.

FIRST AND SECOND LINES

Display	Meaning	For display conditions:
THR CLB	The A/THR is active, and the engines apply climb thrust.	*Refer to DSC-22-FG-50-50-A THRUST Mode Operation .*
THR DCLB*	The A/THR is active, and the thrust goes toward derated climb thrust.	
THR DCLB1	The A/THR is active, and the engines apply derated climb thrust, with the derated climb level set to 1.	
NOISE N1 82%	The A/THR is active, and the engines apply noise thrust, with 82% N1 target.	
THR CLB*	The A/THR is active, and the engines apply a thrust that converges toward climb thrust.	
THR DES	The A/THR is active, and the engines apply a thrust slightly highest than idle thrust.	
THR IDLE	The A/THR is active, and the engines apply idle thrust.	
THR MCT	The A/THR is active, and the operative engines apply maximum continuous thrust.	
THR LVR	The A/THR is active, and the engines apply a thrust defined by the thrust level positions.	
SPEED or MACH	The A/THR is active, and controls a speed target, or a Mach target.	*Refer to DSC-22-FG-50-50-B SPEED/MACH Mode .*
A.FLOOR with a flashing amber box	The A/THR is active, and the engines apply maximum thrust. *Note:* *The α-floor conditions are met.*	*Refer to DSC-22-FG-50-50-C ALPHA FLOOR .*
TOGA LK with a flashing amber box	The A/THR is active, and the engines apply maximum thrust. *Note:* *The α-floor conditions are no longer met.*	

THIRD LINE

Display	Meaning	For display conditions:
LVR ASYM flashing	The A/THR is armed or active, and one thrust lever is on the CL (FLX-MCT) detent, and at least one thrust lever is out the CL (FLX-MCT) detent. Note: *All the engines are operative.*	*Refer to DSC-22-FG-50-30-GAACT Effect of thrust lever movement when the A/THR is active .*
THR LK flashing	The thrust is frozen after an A/THR involuntary disconnection.	*Refer to DSC-22-FG-50-40-A THRUST LOCK Function .*
LVR CLB flashing	Requests to set the thrust levers to the CL detent.	*Refer to DSC-22-FG-50-30-GAACT Effect of thrust lever movement when the A/THR is active .*
LVR MCT flashing	Requests to set the thrust levers to the FLX-MCT detent.	

AFS MESSAGES (LINE 3)

FIRST AND SECOND COLUMNS

Display	Meaning	For more information:
SPD SEL : 220	The flight crew has preselected 220 kt on the CLB or CRZ panel of the FMS PERF page. Note: *The selected speed target is taken into account, when the next FMS flight phase engages (climb, or cruise).*	*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page .*
MACH SEL : .82	The flight crew has preselected M 0.82 on the CRZ panel of the FMS PERF page. Note: *The selected Mach target is taken into account, when the cruise flight phase engages.*	

AP / FD VERTICAL MODES (COLUMN 2)

FIRST LINE

L12

Display	Meaning	For display conditions:
SRS	The speed reference system mode is engaged during takeoff or go-around.	*Refer to SRS TO Mode / Engagement Conditions* , and *Refer to SRS GA Mode / Engagement Conditions .*
OP CLB	The Open Climb mode is engaged.	*Refer to OP CLB Mode / Engagement Conditions .*

Continued on the following page

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Display	Meaning	For display conditions:
CLB	The Climb mode is engaged.	*Refer to CLB Mode / Engagement Conditions .*
ALT*	The altitude capture mode is engaged, and acquires the AFS CP selected altitude.	*Refer to Altitude Acquire Modes / Engagement Conditions .*
ALT CST*	The altitude capture mode is engaged, and acquires an altitude constraint.	
ALT CRZ*	The altitude capture mode is engaged, and acquires the cruise altitude.	
ALT	The altitude hold mode is engaged, and holds the AFS CP selected altitude.	*Refer to Altitude Hold Modes / Engagement Conditions .*
ALT CST	The altitude hold mode is engaged, and holds an altitude constraint.	
ALT CRZ	The altitude hold mode is engaged, and holds the cruise altitude.	
OP DES	The Open Descent mode is engaged.	*Refer to OP DES Mode / Engagement Conditions .*
DES	The Descent mode is engaged.	*Refer to DES Mode / Engagement Conditions .*
V/S ±XXXX	The Vertical Speed mode is engaged to acquire and hold the V/S selected on the AFS CP . *Note: If the V/S target is not held when the AP is engaged:* *- A triple click aural warning sounds* *- An amber box around the message flashes* *- The V/S target pulses.* *This occurs, when the V/S is 500 ft/min below (above) the V/S target in climb (descent).*	*Refer to V/S / FPA Mode / Engagement Conditions .*
FPA ±X.X°	The Flight Path Angle mode is engaged to acquire and hold the FPA selected on the AFS CP . *Note: If the FPA target is not held when the AP is engaged:* *- A triple click aural warning sounds* *- An amber box around the message flashes* *- The FPA target pulses.* *This occurs, when the V/S is 500 ft/min below (above) the V/S / FPA target in climb (descent).*	
G/S*	The Glide Slope capture mode is engaged.	*Refer to G/S* Mode / Engagement Conditions .*
G/S	The Glide Slope track mode is engaged.	*Refer to G/S Mode / Engagement Conditions .*
F-G/S*	The FLS Glide Slope capture mode is engaged.	*Refer to F-G/S* Mode / Engagement Conditions .*

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Display	Meaning	For display conditions:
F-G/S	The FLS Glide Slope track mode is engaged.	*Refer to F-G/S Mode / Engagement Conditions .*
TCAS	The AP / FD TCAS mode is engaged.	*Refer to AP/FD TCAS Mode / Engagement Conditions .*

SECOND LINE

Display	Meaning	For display conditions:
CLB	The Climb mode is armed.	*Refer to CLB Mode / Arming Conditions .*
OP CLB	The Open Climb mode is armed.	*Refer to OP CLB Mode / Arming Conditions .*
ALT	The ALT Mode is armed.	*Refer to Altitude Hold Modes / Arming Conditions .*
ALT	The ALT CST Mode is armed.	
ALT CRZ	Altitude mode is armed. Target altitude is the CRZ FL.	
DES	The Descent mode is armed.	*Refer to DES Mode / Arming Conditions .*
G/S	The Glide Slope mode is armed.	*Refer to G/S Mode / Arming Conditions .*
F-G/S	The FLS Glide Slope mode is armed.	*Refer to F-G/S Mode / Arming Conditions .*

Note: G/S or F-G/S can be simultaneously displayed with ALT , ALT , or DES .

THIRD LINE

Display	Meaning	For display conditions:
TCAS	The AP / FD TCAS mode is armed.	*Refer to AP/FD TCAS Mode / Arming Conditions .*

AP / FD LATERAL MODES (COLUMN 3)

FIRST LINE

Display	Meaning	For display conditions:
RWY	The Runway mode is engaged.	*Refer to RWY Mode / Engagement Conditions .*
RWY TRK	The Runway Track mode is engaged.	*Refer to RWY TRK Mode / Engagement Conditions .*
HDG	The Heading mode is engaged.	*Refer to HDG/TRACK Mode / Engagement Conditions .*
TRACK	The Track mode is engaged.	
NAV	The Navigation mode is engaged.	*Refer to NAV Mode / Engagement Conditions .*

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Display	Meaning	For display conditions:
LOC*	The Localizer capture mode is engaged.	*Refer to LOC* Mode / Engagement Conditions .*
LOC	The Localizer track mode is engaged.	*Refer to LOC Mode / Engagement Conditions .*
F-LOC*	The FLS Localizer capture mode is engaged.	*Refer to F-LOC* Mode / Engagement Conditions .*
F-LOC	The FLS Localizer track mode is engaged.	*Refer to F-LOC Mode / Engagement Conditions .*
LOC B/C*	The Localizer Back Course capture mode is engaged.	*Refer to LOC B/C* Mode / Engagement Conditions .*
LOC B/C	The Localizer Back Course track mode is engaged.	*Refer to LOC B/C Mode / Engagement Conditions .*
GA TRK	The Go-Around Track mode is engaged.	*Refer to GA TRK Mode / Engagement Conditions .*

SECOND LINE

Display	Meaning	For display conditions:
RWY	The RWY mode is armed.	*Refer to RWY Mode / Arming Conditions .*
NAV	The NAV mode is armed.	*Refer to NAV Mode / Arming Conditions .*
LOC	The LOC mode is armed.	*Refer to LOC Mode / Arming Conditions .*
F-LOC	The F-LOC mode is armed.	*Refer to F-LOC Mode / Arming Conditions .*
LOC B/C	The LOC B/C mode is armed.	*Refer to LOC B/C Mode / Arming Conditions .*

Note: RWY and NAV can be simultaneously displayed.

AP / FD COMMON MODES (COLUMN 2 AND 3)

FIRST LINE

Display	Meaning	For display conditions:
LAND	The Land mode is engaged.	*Refer to LAND Mode / Engagement Conditions .*
FLARE	The Flare mode is engaged.	*Refer to FLARE Mode / Engagement Conditions .*
ROLL OUT	The Roll Out mode is engaged.	*Refer to ROLL OUT Mode / Engagement Conditions .*

APPROACH CAPABILITY (COLUMN 4)

FIRST AND SECOND LINES

Display	Meaning	Display Conditions:
RAW ONLY	The non-precision approach capability is RAW ONLY.	*Refer to LIM-22-20 Required Conditions for F-APP, F-APP + RAW, or RAW ONLY Capability .*
F-APP +RAW	The non-precision approach capability is F-APP +RAW.	
F-APP	The non-precision approach capability is F-APP.	
CAT1	The precision approach capability is CAT1.	The LOC and G/S modes are armed, or engaged, and: - The following equipment is available: • One PRIM • The AFS CP , or the AFS CP backup • The EFIS CP , or the EFIS CP backup. • One MMR • Two ADR s • Two IRS s • Two angles of attack - The flight control law is: Normal, alternate 1A, or alternate 1B.
CAT2	The precision approach capability is CAT2.	*Refer to LIM-22-30 Required Equipment for CAT II, or CAT III Operation .*
CAT3 SINGLE	The precision approach capability is CAT3 SINGLE.	
CAT3 DUAL	The precision approach capability is CAT3 DUAL.	
AUTO LAND	The precision approach capability is GLS CAT 1 Autoland.	*Refer to LIM-22-30 Required Equipment for GLS CAT I Automatic Approach and Automatic Landing .*

MINIMUM DESCENT HEIGHT/ALTITUDE, OR DECISION HEIGHT (COLUMN 4)

THIRD LINE

Display	Meaning	For more information:
BARO XXXXX	Minimum descent height/altitude, as entered on the FMS PERF page - APPR panel.	*Refer to DSC-22-FMS-20-30-22FMS502BC PERF page .*
RADIO XXX	Decision height, as entered on the FMS PERF page - APPR panel.	
NO DH	No BARO or RADIO value is entered on the FMS PERF page.	

AP , FD , AND A/THR ENGAGEMENT STATUS (COLUMN 5)

FIRST LINE

DISPLAY	MEANING	For display conditions:
AP1+2	The AP 1 and AP 2 are engaged.	*Refer to Engagement Conditions / Engagement of both APs .*
AP1	The AP 1 is engaged.	*Refer to Engagement Conditions / Engagement of one AP .*
AP2	The AP 2 is engaged.	

SECOND LINE

DISPLAY	MEANING	For display conditions:
1FD2	FD 1 and FD 2 are engaged.	*Refer to FD Engagement Conditions .*
1FD1	FD 1 is engaged on both sides.	
2FD2	FD 2 is engaged on both sides.	

THIRD LINE

DISPLAY	MEANING	For display conditions:
A/THR	The A/THR is active.	*Refer to A/THR Arming Conditions .*
A/THR	The A/THR is armed.	*Refer to A/THR Activation Conditions .*

FMS MESSAGES (LINE 3)

SECOND AND THIRD COLUMNS

Display	Meaning	For display conditions:
CHECK APPR SEL	Check the approach selection.	*Refer to Message .*
CHECK EO SPD SETTING	Check the engine-out speed setting.	*Refer to Message .*
CHECK SPD MODE	Check the speed mode.	*Refer to Message .*
EXTEND SPD BRK	Extend the speed brakes.	*Refer to Message .*
RETRACT SPD BRK	Retract the speed brakes.	*Refer to Message .*
SET HOLD SPD	Set the hold speed.	*Refer to Message .*
T/D REACHED	The top of descent is reached.	*Refer to Message .*

FG MESSAGE (LINE 3)

SECOND AND THIRD COLUMNS

L123

Display	Meaning	Display Conditions
DISCONNECT AP FOR LDG (pulses 9 s , and then remains steady)	The flight crew must disconnect the AP for landing.	The aircraft reaches the minimum decision height/altitude - 50 ft , when: - One AP is engaged - The flight crew has selected a non-precision approach on the FMS ARRIVAL page - The FMS flight phase is approach. Note: *If the flight crew has not entered the minimum decision height/altitude on the FMS PERF page - APPR panel, the message will appear at 350 ft plus the landing elevation.* The message disappears, when the flight crew disengages the AP .
TCAS RA INHIBITED	The AP / FD TCAS mode is disengaged because the TA ONLY or the STDBY mode of the TCAS is selected.	*Refer to AP/FD TCAS Mode / Inhibitions Conditions* .
TRK FPA DESELECTED	The flight reference TRK-FPA changed to HDG-V/S following AP / FD TCAS mode engagement.	*Refer to AP/FD TCAS Mode / Normal Operations / When a RA is triggered / Consequence on the Flying Reference* .

FLIGHT CONTROL MESSAGE (LINE 3)

SECOND AND THIRD COLUMNS

Display	Meaning	Display conditions:
USE MAN PITCH TRIM (pulses 9 s , and then remains steady)	The autotrim is lost: The flight crew must use the pitch trim sw , as required.	The flight controls are in direct law. For more information on the reconfiguration to direct law, *Refer to DSC-27-10-40 Reconfiguration Control Laws* .

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PFD

Applicable to: ALL

For guidance indications on PFD , *Refer to PFD / Guidance* .

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AUTOLAND LIGHT

Applicable to: ALL

L123



The AUTOLAND light flashes, when the aircraft is in autoland below 200 ft RA , and the required conditions to perform an autoland are no longer met.
For required conditions to perform an autoland, *Refer to AUTOLAND Alert* .

Note: *The flight crew can press the AUTOLAND light to check that the light is operative: As long as the AUTOLAND light is pressed, the AUTOLAND light flashes.*

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MEMO

Applicable to: ALL

AP OFF	Both AP s are disengaged, after the flight crew has pressed the sidestick pushbutton. Appears on the PFD s and on the EWD . For information on AP disengagement annunciations and warnings, *Refer to AP Disengagement Annunciation and Warnings* .
A/THR OFF	The A/THR is disconnected, after the flight crew has voluntary disconnected the A/THR by: - Pressing one A/THR instinctive disconnect pushbutton, or - Setting the thrust levers at the idle detent when the altitude is below 50 ft RA . Appears on the PFD s and on the EWD . For more information, *Refer to A/THR Disconnection Annunciations and Warnings* .

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OVERVIEW

Applicable to: ALL

Each MFD can display the FCU backup. The flight crew can access to the FCU backup via the MFD system menu.

The FCU backup has two pages:
- The AFS CP page presents the AFS CP backup
  The AFS CP page enables to recover all the AFS CP controls and indicators.
- The Captain (First Officer) EFIS CP page presents the Captain (First Officer) EFIS CP backup.
  The Captain (First Officer) EFIS CP page enables to recover all the Captain (First Officer) EFIS CP controls and indicators. However, the OANS, and the ETACS are not available.

IF ONE CONTROL PANEL OF THE FCU IS FAILED

If the AFS CP fails:
- The AUTO FLT AFS CTL PNL FAULT alert triggers
- The AFS CP backup automatically activates
- On the AFS CP page:
  - The AFS CP BACKUP button turns on in green
  - The last valid selections and values of the AFS CP are recovered.

If the Captain (First Officer) EFIS CP fails:
- The CDS CAPT (F/O) EFIS CTL PNL FAULT alert triggers
- The Captain (First Officer) EFIS CP backup automatically activates
- On the Captain (First Officer) EFIS CP page:
  - The EFIS CP BACKUP button turns on in green
  - The last valid selections and values of the Captain (First Officer) EFIS CP are recovered.

If both EFIS CPs fail:
- The CDS CAPT+F/O EFIS CTL PNL FAULT alert triggers
- The Captain and First Officer EFIS CP backups automatically activate
- On both EFIS CP pages:
  - The Captain and First Officer EFIS CP BACKUP buttons turn on in green
  - The last valid selections and values of the EFIS CPs are recovered.

When the flight crew selects the FCU backup via the MFD system menu, the page corresponding to the activated backup automatically appears.

Note: If both AFS CP backup and EFIS CP backup are activated on one MFD, the AFS CP backup page has priority to appear.

IF THE FLIGHT CREW DETECTS A FAILURE ON THE FCU

If the flight crew detects a failure on the FCU, the flight crew can activate the corresponding backup, by clicking on the corresponding button: AFS CP BACKUP button, or Captain (First Officer) EFIS CP BACKUP button. The activation will turn the corresponding Control Panel into blank. The AFS CP backup page or the Captain (First Officer) EFIS CP backup page displays the last selections of the corresponding Control Panel.

L2 WHEN THE AFS CP BACKUP, OR THE CAPTAIN (FIRST OFFICER) EFIS CP BACKUP IS NOT ACTIVATED

When the FCU is operative, the flight crew can also access to the FCU backup. In accordance with changes on the FCU, the following indications are continuously updated:

- Speed/Mach, heading/track, altitude, and vertical speed/flight path angle targets on the AFS CP page
- ND mode, ND range, and the barometric setting on the EFIS CP page.

CONTROL OF THE FCU BACKUP

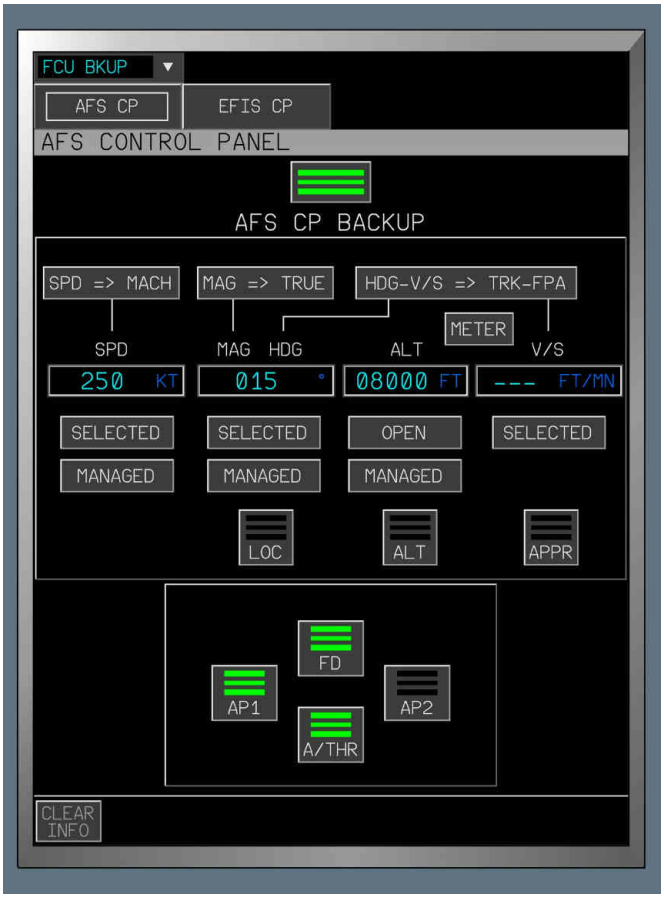
Applicable to: ALL

The AFS CP page and the EFIS CP page work as the AFS CP and the EFIS CP. The AFS CP page and the EFIS CP page recover all the EFIS CP anc AFS CP controls and indicators. However, on the EFIS CP page, the OANS, and the ETACS are not available.
The flight crew performs the selections on the FCU backup via the KCCU.

AFS CP PAGE

On the AFS CP page, the flight crew uses the KCCU wheel to select the targets: Speed/Mach, heading/track, altitude, and vertical speed/flight path angle. For these selections, the numeric keys of the keyboard are not available.
A selection on the Captain (First Officer) AFS CP page is automatically updated on the First Officer (Captain) AFS CP page.
In the following graphic, the AFS CP backup is activated:

AFS CP Page



EFIS CP PAGE

In the following graphic, the Captain or First Officer EFIS CP backup is not activated:

EFIS CP Page


FCU BKUP
AFS CP
EFIS CP
EFIS CONTROL PANEL
EFIS CP BACKUP
CSTR
VORD
NDB
WPT
ARPT
VOR1
WX
TERR
TRAF
ND MODE
ARC
ND RANGE
40
STD
QNH
1013 HPA
HPA => IN HG
LS
VV
CLEAR
INFO

WARNINGS DURING APPROACH

Applicable to: ALL

AUTOLAND WARNING

When the aircraft is in autoland below 200 ft RA, the AUTOLAND light flashes, if one of the following occurs:

- The last AP disengages

  Note: In the flight crew quickly presses on the sidestick pushbutton two times, the AUTOLAND light appears furtively.

- Above 100 ft RA, during a CAT 2 or CAT 3 ILS approach:
  - The glide signal of the ILS transmitter fails, or
  - The glide deviation is excessive.

  L3 The glide deviation becomes excessive, when the glide deviation is one gradation away from the center of the scale.

L1 - Above 15 ft RA, during a CAT 2 or CAT 3 ILS approach:
  - The LOC signal of the ILS transmitter fails, or
  - The LOC deviation is excessive.

  L3 The LOC deviation becomes excessive, when the LOC deviation is one quarter gradation away from the center of the scale.

L1 - One radio altimeter is failed, and the values provided by the two remaining radio altimeters differ by more than 15 ft

The AUTOLAND light stops flashing, when:
- LAND, FLARE or ROLL OUT disengages, or
- The flight crew disengages the AP(s).

- A long flare is detected.

L3 A long flare is detected, when FLARE is engaged for 13 s.

L1 When the AUTOLAND light flashes, the flight crew must discontinue the autoland.

WARNING OF EXCESSIVE LOC OR G/S DEVIATION

When the aircraft is in LOC, LAND, or FLARE with CAT 2 or CAT 3 below 1 000 ft, the LOC and/or G/S scale may flash on the PFD, and on the ND (in ROSE-LS mode):

- The LOC scale flashes, if the LOC deviation is more than one quarter dot for more than two seconds.

L2 This is applicable, if the aircraft is above 15 ft RA.

L1 - The G/S scale flashes, if the G/S deviation is more than one dot for more than two seconds.

L2 This is applicable, if the aircraft is above 100 ft RA.

WARNING ASSOCIATED WITH PRECISION APPROACH CAPABILITY, OR FLS CAPABILITY

A triple click aural warning sounds, if:
- The FLS capability downgrades, or
- The precision approach capability, monitored by the aircraft, downgrades.

FAILURE OF LOC AND/OR G/S RECEIVER

IMPACT ON PFD AND ND (IN ROSE-LS MODE)

The LOC flag appears instead of the LOC scale on the CAPT's side (F/O's side), if:
- The CAPT (F/O) has pressed the LS pb
- The LOC receiver on the same side is failed.

The G/S flag appears instead of the G/S scale on the CAPT's side (F/O's side), if:
- The CAPT (F/O) has pressed the LS pb
- The G/S receiver on the same side is failed.

IMPACT ON AP AND FD s

FD Bars

The roll (pitch) bar flashes on the PFD 1(2), when:
- The LOC (G/S) of the ILS 1(2) receiver fails
- One of the following mode is engaged: LOC*, LOC, LOC B/C*, LOC B/C, LAND, FLARE
- L3 The aircraft is above 15 ft RA.

L1 The roll (pitch) bar stops flashing, when the approach mode disengages.

AP and FD Engagement Status

The AP (if engaged) automatically disengage, if both ILS receivers fail, or both MMRs fail, when:
- The aircraft is above 100 ft RA, and
- One of the following occurs:
  - LOC or LOC B/C is armed, or
  - LOC*, LOC, LOC B/C*, LOC B/C, LAND, FLARE or ROLL OUT is engaged.

If the FDs were engaged, HDG/TRACK and V/S / FPA engages. A triple click aural warning sounds. The FD bars flash for 10 s.

FAILURE OF FLS FUNCTION WITHIN MMR

IMPACT ON PFD AND ND (IN ROSE-LS MODE)

The F-LOC flag appears instead of the F-LOC scale on the CAPT's side (F/O's side), if:
- The CAPT (F/O) has pressed the LS pb
- The FLS function within the MMR of the same side is failed.

The F-G/S flag appears instead of the F-G/S scale on the CAPT's side (F/O's side), if:
- The CAPT (F/O) has pressed the LS pb
- The FLS function within the MMR of the same side is failed.

IMPACT ON AP AND FD s

FD Bars

The FD bars flash on the PFD 1(2), when:
- The FLS function within the MMR 1(2)
- One of the following mode is engaged: F-LOC*, F-LOC, F-G/S*, F-G/S
- The aircraft is above 15 ft RA. L3

The FD bars stop flashing, when the approach mode disengages. L1

AP and FD Engagement Status

The AP (if engaged) automatically disengage, if the FLS function within both MMRs fails, or both MMRs fail, when:
- F-LOC or F-G/S is armed
- F-LOC*, F-LOC, F-G/S*, or F-G/S is engaged.

If the FDs were engaged, HDG/TRACK and V/S / FPA engages. A triple click aural warning sounds. The FD bars flash for 10 s.

FAILURE OF LOC OR G/S TRANSMITTER

IMPACT ON PFD AND ND (IN ROSE-LS MODE)

If the LOC transmitter fails:
- The LOC index disappears
- The LOC scales flash.

This can only occur, if the aircraft is between 15 ft and 200 ft RA, and LOC, LAND, or FLARE is engaged. L3

L1 If the G/S transmitter fails:
- The G/S index disappears
- The G/S scales flash.

L3 This can only occur, if the aircraft is between 100 ft and 200 ft RA, and G/S, LAND, or FLARE is engaged.

L1 **IMPACT ON AP AND FD s**

FD Bars

The FD bars flash on both PFDs, when:
- The ILS transmitter fails
- One of the following mode is engaged: LOC*, LOC, LOC B/C*, LOC B/C, LAND, FLARE

L3 - The aircraft is above 15 ft RA.

L1 The FD bars stop flashing, when the approach mode disengages.

AP and FD Engagement Status

The AP (if engaged) automatically disengages, if the ILS transmitter fails when:
- The aircraft is above 200 ft RA, and
- LOC*, LOC, LOC B/C* or LOC B/C is engaged.

L2 The ILS transmitter failure must be confirmed 7 s.

L1 If the FDs were engaged, HDG/TRACK and V/S / FPA engages. A triple click aural warning sounds. The FD bars flash for 10 s.

FAILURE OF THREE FMC s

If three FMCs are failed, the F-LOC and F-G/S deviations are no longer available.

IMPACT ON PFD AND ND (IN ROSE-LS MODE)

If three FMCs fail:
- The LOC flag appears instead of the F-LOC deviation, and the F-LOC scale.
- The G/S flag appears instead of the F-G/S deviation, and the F-G/S scale.

IMPACT ON AP AND FD s

FD Bars

The FD bars flash on both PFDs, when:
- The three FMCs are failed
- One of the following mode is engaged: F-LOC*, F-LOC, F-G/S*, F-G/S

L3 - The aircraft is above 15 ft RA.

L1 The FD bars stop flashing, when the approach mode disengages.

AP and FD Engagement Status

The AP (if engaged) automatically disengages, if three FMCs fail when:
- The aircraft is above 200 ft RA, and
- F-LOC*, F-LOC, F-G/S* or F-G/S is engaged.

L2 The triple FMC failure must be confirmed 7 s.

L1 If the FDs were engaged, HDG/TRACK and V/S / FPA engages. A triple click aural warning sounds. The FD bars flash for 10 s.

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Overview

OVERVIEW

Applicable to: ALL

This chapter provides the specific actions to perform in the case of failure occurring during a CAT I GLS, CAT II ILS, or CAT III ILS approach. These actions are only related to the automatic approach and landing management. They provide additional material to the ECAM procedures.
In the case of multiple failures, the flight crew must apply the most limiting specific actions.

The failures and associated specific actions are presented in accordance with:
- The altitude: *Refer to Which Altitude?*
- The failure: *Refer to Which Failure?* .

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Which Altitude?

OVERVIEW

Applicable to: ALL

This chapter illustrates the failures and associated specific actions, in accordance with the altitude:

- *Refer to DSC-22-FG-90-40-20 Failures Occurring above 1000 ft during a CAT I GLS Approach*
- *Refer to DSC-22-FG-90-40-20 Failures Occurring above 1000 ft during a CAT II ILS or CAT III ILS Approach*
- *Refer to DSC-22-FG-90-40-20 Failures Occurring below 1000 ft during Automatic Approach and Automatic Landing .*

FAILURES OCCURRING ABOVE 1000 FT DURING A CAT I GLS APPROACH

Applicable to: ALL

The following table illustrates the specific actions to perform, in accordance with the failure occurring above 1 000 ft .
In the case of multiple failures, the most limiting applies.

Failure occurring above 1 000 ft	Actions to perform
Loss of AUTO LAND capability	Try to recover.
Nose wheel steering failure	Disengage the AP at nose landing gear touch down.
Alpha floor activation	Check speed. Disengage and reengage A/THR mode (TOGA LK should disappear from FMA).
One engine failure	Apply the standard one engine inoperative procedure (*Refer to PRO-ABN-ECAM-10-70-30 ENG 1(2)(3)(4) SHUT DOWN*).
Two engine failure on the same side	Apply the standard two engine inoperative on the same side procedure (*Refer to PRO-ABN-ECAM-10-70-272 ENG TWO ENGs OUT ON SAME SIDE*).
Two engine failure on the opposite side	Apply the standard two engine inoperative on the opposite side procedure (*Refer to PRO-ABN-ECAM-10-70-273 ENG TWO ENGs OUT ON OPPOSITE SIDE*).
CHECK ATT flag on both PFD s	**CAUTION** Do not make any switching below 1 000 ft . Check aircraft attitude with standby horizon. Use the ATT HDG selector to try to recover valid data.
ATT flag on one PFD HDG flag on one ND and one PFD	**CAUTION** Do not make any switching below 1 000 ft . Use the ATT HDG selector to try to recover valid data.
CHECK HDG flag on both ND s and both PFD s	**CAUTION** Do not make any switching below 1 000 ft . Check heading with the standby compass. Use the ATT HDG selector to try to recover valid data.
SPD flag on one PFD	**CAUTION** Do not make any switching below 1 000 ft . Use the AIR DATA selector to try to recover valid data.
AP OFF warning	Try to reengage autopilot.

FAILURES OCCURRING ABOVE 1000 FT DURING A CAT II ILS OR CAT III ILS APPROACH

Applicable to: ALL

The following table illustrates the specific actions to perform, in accordance with the failure occurring above 1 000 ft.
In the case of multiple failures, the most limiting apply.

Failure occurring above 1 000 ft	Actions to perform
Capability downgrading	Try to recover. ● **If no recovery:** Revert to the available capability, or CAT I ILS minima (if applicable).
Failure leading to slats/flaps less than CONF 3	Revert to CAT I ILS minima.
Nose wheel steering failure	● **When flying a CAT III ILS approach without DH:** Revert to CAT III ILS with DH set to 50 ft. Disengage the AP at nose landing gear touch down. ● **When flying a CAT III ILS approach with DH:** Revert to CAT III single minima. Disengage the AP at nose landing gear touch down. ● **When flying a CAT II ILS approach:** Disengage the AP at nose landing gear touch down.
Anti-skid failure	● **When flying a CAT III ILS approach without DH:** Revert to CAT III single minima. Disengage the AP at touchdown. Brake manually. ● **When flying a CAT III ILS approach with DH:** Revert to CAT III single minima. Brake manually.
Alpha floor activation	Check speed. Disengage and reengage A/THR mode (TOGA LK should disappear from FMA).
One engine failure	● **When flying a CAT III ILS approach:** Revert to CAT III single minima. *Note: CAT III dual capacity can be recovered provided the APU is running, and one APU generator is connected to the electrical network.*
Two engine failure on the same side	Revert to CAT I ILS minima.
Two engine failure on the opposite side	● **When flying a CAT III ILS approach:** Revert to CAT II ILS minima.
RA flag on both PFDs	Revert to CAT I ILS minima.

Continued on the following page

FAILURES OCCURRING ABOVE 1000 FT DURING A CAT II ILS OR CAT III ILS APPROACH (Cont'd)

Failure occurring above 1 000 ft	Actions to perform
CHECK ATT flag on both PFDs	**CAUTION** Do not make any switching below 1 000 ft. Check aircraft attitude with standby horizon. Use the ATT HDG selector to recover valid data. ● **If the flag disappears:** ● **When flying a CAT III ILS approach:** A CAT III single approach is still possible. ● **When flying a CAT II ILS approach:** A CAT II ILS approach is still possible. ● **If the flag persists:** Revert to CAT I ILS minima.
ATT flag on one PFD HDG flag on one ND and one PFD	**CAUTION** Do not make any switching below 1 000 ft. Use the ATT HDG selector to recover valid data. ● **If the flag disappears:** ● **When flying a CAT III ILS approach:** A CAT III single approach is still possible. ● **When flying a CAT II ILS approach:** A CAT II ILS approach is still possible. ● **If the flag persists:** Revert to CAT I ILS minima.
CHECK HDG flag on both NDs and both PFDs	**CAUTION** Do not make any switching below 1 000 ft. Check heading with standby compass. Use the ATT HDG selector to recover valid data. ● **If the flag disappears:** ● **When flying a CAT III ILS approach:** A CAT III single approach is still possible. ● **When flying a CAT II ILS approach:** A CAT II ILS approach is still possible. ● **If the flag persists:** Revert to CAT I ILS minima.
SPD flag on one PFD	**CAUTION** Do not make any switching below 1 000 ft. Use the AIR DATA selector to recover valid data. ● **If the flag disappears:**

Continued on the following page

FAILURES OCCURRING ABOVE 1000 FT DURING A CAT II ILS OR CAT III ILS APPROACH (Cont'd)

Failure occurring above 1 000 ft	Actions to perform
	● **When flying a CAT III ILS approach:** A CAT III single approach is still possible. ● **When flying a CAT II ILS approach:** A CAT II ILS approach is still possible. ● **If the flag persists:** Revert to CAT I ILS minima.
AP OFF warning	Try to reengage autopilot. ● **If not successful:** Revert to CAT I ILS minima.
A/THR OFF	● **When flying a CAT III ILS approach:** Try to reengage the A/THR. ● **If not successful:** Revert to CAT II ILS minima, and control the thrust manually.

FAILURES OCCURRING BELOW 1000 FT DURING AUTOMATIC APPROACH AND AUTOMATIC LANDING

Applicable to: ALL

Refer to Which Failure? / Overview .

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Which Failure?

OVERVIEW

Applicable to: ALL

This chapter lists the specific actions to perform in accordance with failure:
- During a CAT II approach: *Refer to DSC-22-FG-90-40-30-GFAI1 Failures and Associated Actions during a CAT II Approach with or without Automatic Landing*
- During a CAT III approach with DH: *Refer to DSC-22-FG-90-40-30-GFAI2 Failures and Associated Actions during CAT III Approach with DH*
- During a CAT III approach without DH: *Refer to DSC-22-FG-90-40-30-GFAI3 Failures and Associated Actions during a CAT III Approach without DH .*

FAILURES AND ASSOCIATED ACTIONS DURING A CAT I GLS APPROACH WITH AUTOMATIC LANDING

Applicable to: ALL

In the case of multiple failures, the flight crew must apply the most limiting specific actions.

LOSS OF AUTO LAND CAPABILITY ON FMA

- **If AUTO LAND not displayed on FMA above 1 000 ft:**
  Try to recover.
- **If AUTO LAND disappears on FMA between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If AUTO LAND disappears on FMA below DH:**
  Land manually.

NOSE WHEEL STEERING FAILURE

Disconnect autopilot at nose landing gear touch down or when the failure occurs during landing roll.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT I GLS APPROACH WITH AUTOMATIC LANDING (Cont'd)

ALPHA FLOOR ACTIVATION

- **If activation occurs above 1 000 ft:**
  Check speed.
  Disengage and re-engage A/THR mode (TOGA LK should disappear from FMA).
- **If activation occurs below 1 000 ft:**
  Go around if insufficient visual references.

Note: Alpha floor protection is inhibited below 100 ft at landing.

ONE ENGINE FAILURE

Note: Automatic approach, landing and roll out have been demonstrated in CONF 3 and CONF Full with one engine inoperative prior to initiating the approach.

- **If failure occurs between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If failure occurs below DH:**
  Land.

TWO ENGINE FAILURE

- **If two engine failure on the same side:**
  - **If failure occurs between 1 000 ft and 500 ft:**
    Go around, if the visual references are insufficient .
  - **If failure occurs below 500 ft:**
    Land.
- **If two engine failure on opposite sides:**
  - **If failure occurs between 1 000 ft and DH:**
    Go around, if the visual references are insufficient .
  - **If failure occurs below DH:**
    Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT I GLS APPROACH WITH AUTOMATIC LANDING (Cont'd)

RED "RA" FLAG ON BOTH PFDs

- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Note: 1. AP/FD may not be available in APPR mode.
2. The red "RA" flag is displayed on both PFDs when none of the three radio heights can be displayed.

AMBER "CHECK ATT" ON BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check aircraft attitude with standby horizon.
  Use switching to recover valid data.
- **If alert appears between 1 000 ft and DH:**
  Go around if insufficient visual references using standby horizon.
- **If alert appears below DH:**
  Land.

RED "ATT" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT I GLS APPROACH WITH AUTOMATIC LANDING (Cont'd)

AMBER "CHECK HDG" ON BOTH NDs AND BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check heading with standby compass.
  Use switching to recover valid data.
- **If alert appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If alert appears below DH:**
  Land.

RED "HDG" ON ONE ND AND ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to try to recover valid data.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

RED "SPD" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to try to recover valid data.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT I GLS APPROACH WITH AUTOMATIC LANDING (Cont'd)

AP OFF WARNINGS

- **If warning appears above 1 000 ft:**
  Try to reengage autopilot.
- **If warning appears between 1 000 ft and DH:**
  Manually go around if insufficient visual references.
- **If warning appears below DH:**
  Land manually.

"AUTOLAND" WARNING

- **If warning appears below DH:**
  Land manually.

LOC OR G/S EXCESSIVE DEVIATION ON PFD

- **If alert appears above DH:**
  Monitor GLS tracking.
- **If alert appears below DH:**
  Land manually.

NO "LAND" AT 350 FT

Perform a manual landing if sufficient visual references, or go around.

INCORRECT SELECTED COURSE AT 350 FT

Continue and disengage autopilot at 160 ft at the latest.

Note: Selected course deviation is considered incorrect when above 5 °.

NO "FLARE" AT 30 FT

Disengage autopilot and land manually.

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING

Applicable to: ALL

In the case of multiple failures, the flight crew must apply the most limiting specific actions.

LOSS OF CAT2 CAPABILITY ON FMA

- **If CAT II not displayed on FMA above 1 000 ft:**
  Try to recover.
  - **If no recovery:**
    Revert to CAT I minima.
- **If CAT II disappears on FMA between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If CAT II disappears on FMA below DH:**
  Land manually.

FAILURE LEADING TO SLATS/FLAPS LESS THAN CONF 3

Revert to CAT I minima.

NOSE WHEEL STEERING FAILURE

Disconnect autopilot at nose landing gear touch down or when the failure occurs during landing roll.

ALPHA FLOOR ACTIVATION

- **If activation occurs above 1 000 ft:**
  Check speed.
  Disengage and re-engage A/THR mode (TOGA LK should disappear from FMA).
- **If activation occurs below 1 000 ft:**
  Go around if insufficient visual references.

Note: *Alpha floor protection is inhibited below 100 ft at landing.*

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING (Cont'd)

ONE ENGINE FAILURE

Note: Automatic approach, landing and roll out have been demonstrated in CONF 3 and CONF Full with one engine inoperative prior to initiating the approach.

- **If failure occurs between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If failure occurs below DH:**
  Land.

TWO ENGINE FAILURE

- **If two engine failure on the same side:**
  - **If failure occurs above 1 000 ft:**
    Revert to CAT I.
  - **If failure occurs between 1 000 ft and 500 ft:**
    Go around, if the visual references are insufficient .
  - **If failure occurs below 500 ft:**
    Land.
- **If two engine failure on opposite sides:**
  - **If failure occurs between 1 000 ft and DH:**
    Go around, if the visual references are insufficient .
  - **If failure occurs below DH:**
    Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING (Cont'd)

"RA" FLAG ON BOTH PFDs, AND ON THE HUD (IF DEPLOYED)

- **If warning appears above 1 000 ft:**
  Revert to CAT I minima.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Note: *1. AP/FD may not be available in APPR mode.*
2. The "RA" flag is displayed on both PFDs, and on the HUD (if deployed), when none of the three radio heights can be displayed.

AMBER "CHECK ATT" ON BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check aircraft attitude with standby horizon.
  Use switching to recover valid data.
  - **If alert disappears:**
    A CAT II approach is still possible.
  - **If alert persists:**
    Revert to CAT I minima.
  - **If alert appears between 1 000 ft and DH:**
    Go around if insufficient visual references using standby horizon.
  - **If alert appears below DH:**
    Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING (Cont'd)

RED "ATT" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT II approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

AMBER "CHECK HDG" ON BOTH NDs AND BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check heading with standby compass.
  Use switching to recover valid data.
  - **If alert disappears:**
    A CAT II approach is still possible.
  - **If alert persists:**
    Revert to CAT I minima.
  - **If alert appears between 1 000 ft and DH:**
    Go around if insufficient visual references.
  - **If alert appears below DH:**
    Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING (Cont'd)

RED "HDG" ON ONE ND AND ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT II approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
  - **If warning appears between 1 000 ft and DH:**
    Go around if insufficient visual references.
  - **If warning appears below DH:**
    Land.

RED "SPD" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT II approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING (Cont'd)

AP OFF WARNINGS

- **If warning appears above 1 000 ft:**
  Try to reengage autopilot.
  - **If unsuccessful:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

"AUTOLAND" WARNING

- **If warning appears between 200 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land manually.

LOC OR G/S EXCESSIVE DEVIATION ON PFD

- **If alert appears above 200 ft:**
  Monitor ILS tracking.
- **If alert appears between 200 ft and DH:**
  Go around if insufficient visual references.
- **If alert appears below DH:**
  Land manually.

NO "LAND" AT 350 FT

Perform a manual landing if sufficient visual references, or go around.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT II APPROACH WITH OR WITHOUT AUTOMATIC LANDING (Cont'd)

INCORRECT SELECTED COURSE AT 350 FT

Continue and disengage autopilot at 80 ft at the latest.

Note: Selected course deviation is considered incorrect when above 5 °.

NO "FLARE" AT 30 FT

Disengage autopilot and land manually.

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH

Applicable to: ALL

In the case of multiple failures, the flight crew must apply the most limiting specific actions.

CAPABILITY DECREASE

- **If alert appears above 1 000 ft:**

  Try to recover.

  - **If unsuccessful:**

    Revert to the available capability.

  - **If alert appears below 1 000 ft:**

    Go around if insufficient visual references.

Note: 1. Capability decrease is inhibited below 200 ft.
2. This procedure does not apply in case of autothrust loss.

FAILURE LEADING TO SLATS/FLAPS LESS THAN CONF 3

Revert to CAT I minima.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

NOSE WHEEL STEERING FAILURE

Disengage autopilot at nose landing gear touch down or when the failure occurs during landing roll.

- **If failure occurs above 350 ft:**
  Revert to CAT III single minima.
- **If failure occurs between 350 ft and 200 ft:**
  Go around if insufficient visual references.
- **If failure occurs below 200 ft:**
  Continue standard CAT III procedure.

ANTI-SKID FAILURE

Brake manually.

Note: *Autobrake is inoperative.*

- **If failure occurs above 350 ft:**
  Revert to CAT III single minima.
- **If failure occurs between 350 ft and 200 ft:**
  Go around if insufficient visual references.
- **If failure occurs below 200 ft:**
  Land if sufficient visual references at 50 ft for a CAT III single.

ALPHA FLOOR ACTIVATION

- **If activation occurs above 1 000 ft:**
  Check speed.
  Disengage and re-engage autothrust mode (TOGA LK should disappear from FMA).
- **If activation occurs between 1 000 ft and 100 ft:**
  Go around if insufficient visual references.

Note: *Alpha floor protection is inhibited below 100 ft at landing.*

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

ONE ENGINE FAILURE

Note: Automatic Approach, Landing and Roll Out have been demonstrated in CONF 3 and CONF Full with one engine inoperative prior to initiating the approach.

- **If failure occurs above 1 000 ft:**
  Revert to CAT III single minima.

  Note: CAT III dual capacity can be recovered provided APU is running and one APU generator is connected to the electrical network.

- **If failure occurs between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.

- **If failure occurs below 200 ft:**
  Land.

TWO ENGINE FAILURE

- **If two engine failure on the same side:**
  - **If failure occurs above 1 000 ft:**
    Revert to CAT I.
  - **If failure occurs between 1 000 ft and 500 ft:**
    Go around, if the visual references are insufficient.
  - **If failure occurs below 500 ft:**
    Land.
- **If two engine failure on opposite sides:**
  - **If failure occurs above 1 000 ft:**
    Revert to CAT II minima.
  - **If failure occurs between 1 000 ft and DH:**
    Go around, if the visual references are insufficient.
  - **If failure occurs below DH:**
    Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

AUTO CALL OUT RA FAILURE

- **If failure appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If failure appears below 200 ft:**
  Continue standard CAT III approach.

"RA" FLAG ON BOTH PFDs, AND ON THE HUD (IF DEPLOYED)

- **If warning appears above 1 000 ft:**
  Revert to CAT I minima.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Note: *1. AP/FD may not be available in APPR mode.*
2. The "RA" flag is displayed on both PFDs, and on the HUD (if deployed), when none of the three radio heights can be displayed.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

AMBER "CHECK ATT" ON BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check aircraft attitude with standby horizon.
  Use switching to recover valid data.
  - **If alert disappears:**
    A CAT III single approach is still possible.
  - **If alert persists:**
    Revert to CAT I minima.
- **If alert appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references using standby horizon.
- **If alert appears below 200 ft:**
  Continue standard CAT III approach.

RED "ATT" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT III single approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If warning appears below 200 ft:**
  Continue standard CAT III approach.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

AMBER "CHECK HDG" ON BOTH ND_S AND BOTH PFD_S

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check heading with standby compass.
  Use switching to recover valid data.
  - **If alert disappears:**
    A CAT III single approach is still possible.
  - **If alert persists:**
    Revert to CAT I minima.
- **If alert appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If alert appears below 200 ft:**
  Continue standard CAT III approach.

RED "HDG" ON ONE ND AND ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT III single approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If warning appears below 200 ft:**
  Continue standard CAT III approach.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

RED "SPD" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT III single approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If warning appears below 200 ft:**
  Continue standard CAT III approach.

"AP OFF" WARNINGS

- **If warning appears above 1 000 ft:**
  Try to reengage autopilot.
  - **If unsuccessful:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

A/THR OFF

- **If alert appears above 1 000 ft:**
  Try to re-engage autothrust.
  - **If unsuccessful:**
    Revert to CAT II minima and control thrust manually.
- **If alert appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual reference.
- **If alert appears below 200 ft:**
  Continue and control thrust manually.

  Note: A go around must be performed if unsufficient visual references at 50 ft for a CAT III single approach.

LOC OR G/S EXCESSIVE DEVIATION ON PFD

- **If alert appears above 200 ft:**
  Monitor ILS tracking.
- **If alert appears between 200 ft and DH:**
  Go around if insufficient visual references.
- **If alert appears below DH:**
  Land manually.

"AUTOLAND" WARNING

- **If warning appears between 200 ft and DH:**
  Go around if insufficient visual references.
- **If warning appears below DH:**
  Land manually.

NO "LAND" AT 350 FT

Perform a manual landing if sufficient visual references, or go around.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING CAT III APPROACH WITH DH (Cont'd)

INCORRECT SELECTED COURSE AT 350 FT

Go around if insufficient visual references.
Disengage autopilot at 50 ft at the latest.

Note: Selected course deviation is considered incorrect when above 5 °.

NO "FLARE" AT 30 FT

- **If unsufficient visual references:**
  Go around.
- **If sufficient visual references:**
  Disengage autopilot.
  Land manually.

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH

Applicable to: ALL

In the case of multiple failures, the flight crew must apply the most limiting specific actions.

CAPABILITIES DECREASE

- **If alert appears above 1 000 ft:**
  Try to recover.
  - **If unsuccessful:**
    Revert to the available capability.
- **If alert appears below 1 000 ft:**
  Go around if insufficient visual references.

Note: 1. Capability decrease is inhibited below 200 ft.
2. This procedure does not apply in case of autothrust loss.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

FAILURE LEADING TO SLATS/FLAPS LESS THAN CONF 3

Revert to CAT I minima.

NOSE WHEEL STEERING FAILURE

Disengage autopilot at nose landing gear touch down or when the failure occurs during landing roll.

- **If failure occurs above 350 ft:**
  Revert to CAT III with DH set to 50 ft.
- **If failure occurs between 350 ft and 200 ft:**
  Go around if insufficient visual references.
- **If failure occurs below 200 ft:**
  Continue.

ANTI-SKID FAILURE

Disengage autopilot at touch down or when the failure occurs during landing roll.
Brake manually.

Note: *Autobrake is inoperative.*

- **If failure occurs above 350 ft:**
  Revert to CAT III single minima.
- **If failure occurs between 350 ft and 200 ft:**
  Go around if insufficient visual references.
- **If failure occurs below 200 ft:**
  Continue.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

ALPHA FLOOR ACTIVATION

- **If activation occurs above 1 000 ft:**

  Check speed.

  Disengage and re-engage autothrust mode (TOGA LK should disappear from FMA).

- **If activation occurs between 1 000 ft and 100 ft:**

  Go around if insufficient visual references.

Note: Alpha floor protection is inhibited below 100 ft at landing.

ONE ENGINE FAILURE

Note: Automatic Approach, Landing and Roll Out have been demonstrated in CONF 3 and CONF Full with one engine inoperative prior to initiating the approach.

- **If failure occurs above 1 000 ft:**

  Revert to CAT III single minima.

  Note: CAT III dual capacity can be recovered provided APU is running and one APU generator is connected to the electrical network.

- **If failure occurs between 1 000 ft and 200 ft:**

  Go around if insufficient visual references.

- **If failure occurs below 200 ft:**

  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

TWO ENGINE FAILURE

- **If two engine failure on the same side:**
  - **If failure occurs above 1 000 ft:**
    Revert to CAT I.
  - **If failure occurs between 1 000 ft and 500 ft:**
    Go around.
  - **If failure occurs below 500 ft:**
    Land.
- **If two engine failure on opposite sides:**
  - **If failure occurs above 1 000 ft:**
    Revert to CAT II minima.
  - **If failure occurs between 1 000 ft and 200 ft:**
    Go around.
  - **If failure occurs below 200 ft:**
    Land.

AUTO CALL OUT RA FAILURE

- **If failure appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If failure appears below 200 ft:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

"RA" FLAG ON BOTH PFDs, AND ON THE HUD (IF DEPLOYED)

- **If warning appears above 1 000 ft:**
  Revert to CAT I minima.
- **If warning appears below 1 000 ft:**
  Go around if insufficient visual references.

Note: *1. AP/FD may not be available in APPR mode.*
2. The "RA" flag is displayed on both PFDs, and on the HUD (if deployed), when none of the three radio heights can be displayed.

AMBER "CHECK ATT" ON BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check A/C attitude with standby horizon.
  Use switching to recover valid data.
  - **If alert disappears:**
    A CAT III single approach is still possible.
  - **If alert persists:**
    Revert to CAT I minima.
- **If alert appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references using standby horizon.
- **If warning appears below 200 ft:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

RED "ATT" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT III single approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If warning appears below 200 ft:**
  Land.

AMBER "CHECK HDG" ON BOTH NDs AND BOTH PFDs

CAUTION	Do not make any switching below 1 000 ft.

- **If alert appears above 1 000 ft:**
  Check heading with standby compass.
  Use switching to recover valid data.
  - **If alert disappears:**
    A CAT III single approach is still possible.
  - **If alert persists:**
    Revert to CAT I minima.
- **If alert appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If alert appears below 200 ft:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

RED "HDG" ON ONE ND AND ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT III single approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If warning appears below 200 ft:**
  Land.

RED "SPD" ON ONE PFD

CAUTION	Do not make any switching below 1 000 ft.

- **If warning appears above 1 000 ft:**
  Use switching to recover valid data.
  - **If warning disappears:**
    A CAT III single approach is still possible.
  - **If warning persists:**
    Revert to CAT I minima.
- **If warning appears between 1 000 ft and 200 ft:**
  Go around if insufficient visual references.
- **If warning appears below 200 ft:**
  Land.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

"AP OFF" WARNINGS

- **If warning appears above 1 000 ft:**
  Try to reengage autopilot.
  - **If unsuccessful:**
    Revert to CAT I minima.
- **If warning appears below 1 000 ft:**
  Go around manually if insufficient visual references.

A/THR OFF

- **If alert appears above 1 000 ft:**
  Try to reengage autothrust.
  - **If unsuccessful:**
    Revert to CAT II minima and control thrust manually.
- **If alert appears between 1 000 ft and 200 ft:**
  Go around if unsufficient visual references.
- **If alert appears below 200 ft:**
  Land.

LOC OR G/S EXCESSIVE DEVIATION ON PFD

- **If alert appears above 200 ft:**
  Monitor ILS tracking.
- **If alert appears below 200 ft:**
  Go around if insufficient visual references.

"AUTOLAND" WARNING

Go around if insufficient visual references.

Continued on the following page

FAILURES AND ASSOCIATED ACTIONS DURING A CAT III APPROACH WITHOUT DH (Cont'd)

NO "LAND" AT 350 FT

Perform a manual landing if sufficient visual references, or go around.

INCORRECT SELECTED COURSE AT 350 FT

Go around if unsufficient visual references.
Disengage autopilot at 50 ft at the latest.

Note: Selected course deviation is considered incorrect when above 5 °.

NO "FLARE" AT 30 FT

- **If unsufficient visual references:**
  Go around.
- **If sufficient visual references:**
  Disengage autopilot.
  Land manually.

HOW TO DEFINE A HDG/TRK PRESET FOR TAKEOFF OR GO-AROUND

Applicable to: ALL

HOW TO DEFINE A HDG/TRK PRESET FOR TAKEOFF

- **Before takeoff, and up to 30 ft RA**

  Turn the HDG/TRK knob.

  This action defines a HDG/TRK preset. NAV disarms. The preset value remains displayed on the HDG/TRK window (even when RWY TRK engages at 50 ft RA).
  When the flight crew pulls the HDG/TRK knob (at least 5 s after liftoff), HDG or TRACK engages. The aircraft follows the preset target.

HOW TO DEFINE A HDG/TRK PRESET FOR GO-AROUND

- **LOC*, LOC, F-LOC*, F-LOC, LAND, FLARE, ROLL OUT or GA TRK is engaged**

  Turn the HDG/TRK knob.

  This action defines a HDG/TRK preset. The preset value remains displayed on the HDG/TRK window, as long as one of the above modes is engaged.
  After go-around engagement, HDG/TRACK will engage, when the flight crew pulls the HDG/TRK knob.

L3 *This is applicable, if the flight crew pulls the HDG/TRK knob above 100 ft RA.*

L1 *When the HDG or TRACK engages, the heading/track target is the HDG/TRK preset.*

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ECAM ALERTS

Applicable to: ALL

AUTO FLT AP OFF (*Refer to procedure)*

AUTOLAND (*Refer to procedure*)

AUTO FLT A/THR LIMITED (*Refer to procedure*)

AUTO FLT A/THR OFF (*Refer to procedure*)

AUTO FLT AFS CTL PNL FAULT (*Refer to procedure*)

AUTO FLT APPROACH CAPABILITY DOWNGRADED (*Refer to procedure*)

AUTO FLT CAPT (F/O) AFS BKUP CTL FAULT (*Refer to procedure*)

AUTO FLT ENG 1(2)(3)(4) A/THR OFF (*Refer to procedure*)

AUTO FLT ROLL OUT FAULT (*Refer to procedure*)

AUTO FLT TCAS MODE FAULT (*Refer to procedure*)

CDS & AUTO FLT FCU SWITCHED OFF (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

L13

System	Subsystem	Electrical Supply
PRIM	PRIM 1	DC ESS
	PRIM 2	DC 2 (1)
	PRIM 3	DC 1
FCU	FCU Channel 1	DC ESS
	FCU Channel 2	DC 2
FCU Backup	Captain FCU Backup	DC ESS
	First Officer FCU Backup	DC 2
FCDC	FCDC 1	DC ESS
	FCDC 2	DC 2

(1) Also powered in case of all engine flamout.

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AIRCRAFT SYSTEMS

22 - AFS - FLIGHT MANAGEMENT SYSTEM

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OVERVIEW

Applicable to: ALL

The Flight Management System (FMS) provides:
- Flight planning and navigation information
- Performance calculation, and optimization
- Long-term guidance targets
- Information display on the MFD, ND, and PFD.

FLIGHT PLANNING

The flight crew can create a complete flight plan (**lateral** and **vertical**) in the FMS .
The flight crew first selects or creates a basic flight plan, and then inserts fuel, load, and wind information. When all necessary data is added, the FMS computes and displays the track, speed, altitude, time, wind, and fuel predictions that are associated with the flight plan.
The flight crew can modify the flight plan at any time. These modifications are called **flight plan revisions** .
Refer to Flight Planning

NAVIGATION

The FMS tunes the radio navigation aids, and computes the aircraft position and position accuracy.

PERFORMANCE CALCULATION AND OPTIMIZATION

The FMS provides optimization and flight phase-related performance data.

LONG-TERM GUIDANCE TARGETS

The FMS sends targets to the FG to guide the aircraft along the inserted flight plan.

INFORMATION DISPLAY

FMS information appears on the: Multi-Function Displays (MFDs), Navigation Displays (NDs), and Primary Flight Displays (PFDs).
The MFDs and the NDs are interactive display units, that are used to enter or modify data, via the Keyboard and Cursor Control Units (KCCUs).

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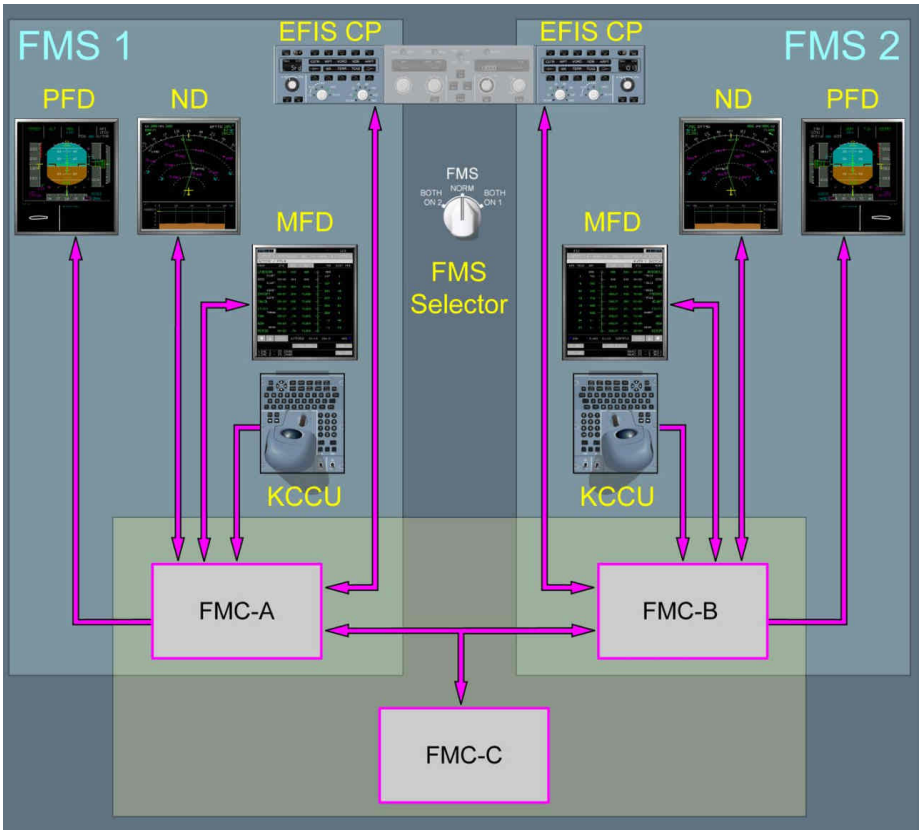
ARCHITECTURE

Applicable to: ALL

There are two flight management systems:
- The FMS 1, on the Captain's side
- The FMS 2, on the First Officer's side.

Each FMS uses:
- A computer, called the Flight Management Computer (FMC)
- The following cockpit interfaces:
  - One Multi Function Display (MFD)
  - One Navigation Display (ND)
  - One Primary Flight Display (PFD)
  - One EFIS Control Panel (EFIS CP)
  - One Keyboard and Cursor Control Unit (KCCU).

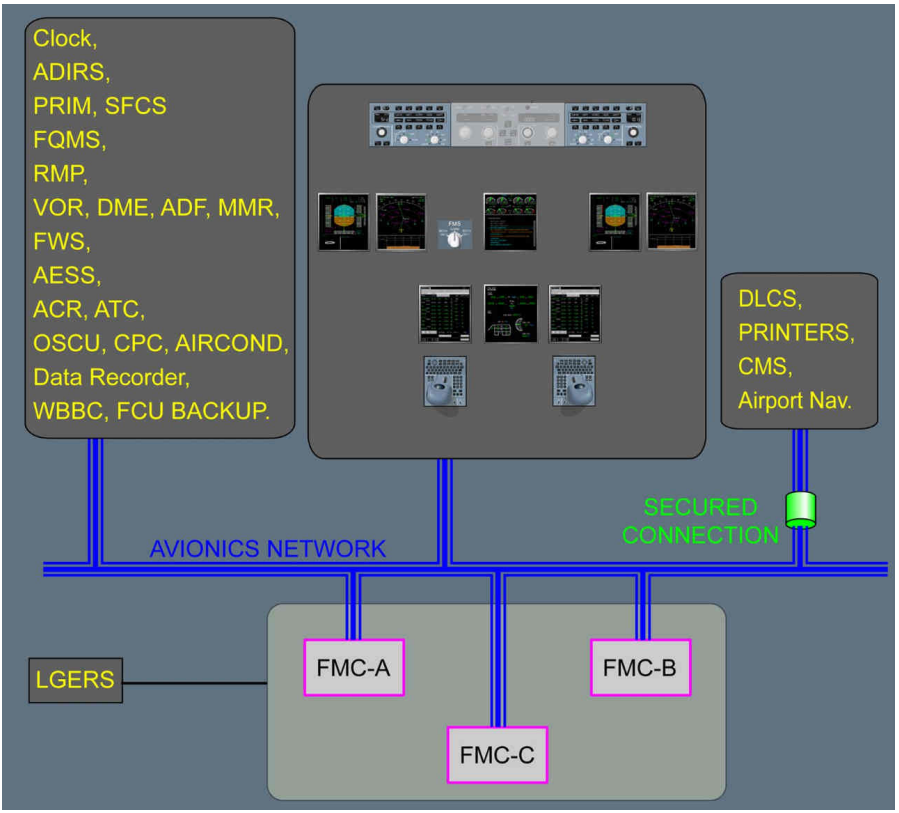
FMS Architecture



L2 PERIPHERAL SYSTEMS

The FMC interferes also with the following peripheral systems via the Avionics Network or other classic connections:

Peripheral Systems



CLOCK

FMS receives: Aircraft UTC time.

ADIRS

FMS receives: Position data for aircraft position computation.
FMS transmits: Reference position for IRS alignment.

PRIM

FMS receives: Data from the flight guidance and flight envelope system and from external systems (example: Anti Ice).
FMS transmits: Data for flight guidance and flight envelope systems.

SFCS (SLATS AND FLAPS CONTROL)

FMS receives: Flap setting for flight plan predictions computation.

FQMS (FUEL QUANTITY MANAGEMENT)

FMS receives: Weight, CG and fuel data for FMS predictions update.
FMS transmits: Weight, CG and fuel data for FQMS initialization.

RMP

FMS transmits: Data for VOR , DME , ADF and MMR tuning.

VOR , DME , ADF

FMS receives: Radio position data for FMS aircraft position computation.

MMR

FMS receives: GPS position.

FWS

FMS transmits: Data for warnings computation.

AESS

FMS transmits: Navigation and flight plan data.

ACR (AVIONICS COMMUNICATION ROUTER)

FMS receives: Uplinked messages from the company ground station.
FMS transmits: Messages and aircraft parameters to downlink to the company ground station.

ATC

FMS receives: Uplinked messages from the ATC ground center to be loaded in the FMS .
FMS transmits: Report message to downlink to the ATC ground center.

OSCU (OXYGEN SYSTEM CONTROL)

FMS transmits: Number of passengers and destination airfield elevation for oxygen control.

CPCS (CABIN PRESSURE CONTROL)

FMS transmits: Vertical flight plan data for cabin pressurization.

AIR COND

FMS transmits: Number of passengers for temperature control and fresh air supply.

DATA RECORDER

FMS transmits: All FMS data that is exchanged via the AFDX network is recorded by the Data Recorder.

WBBC

FMS receives: Weight and CG for FMS predictions update (backup of the FQMS).

FCU BACKUP

FMS receives: Display mode, range and options parameters.

DLCS (DATA LOADING)

FMS receives: Software and Databases to be loaded in the FMS .

PRINTERS

FMS transmits: FMS data to be printed.

CMS (MAINTENANCE)

FMS transmits: All FMS maintenance messages.

AIRPORT NAVIGATION

FMS transmits: Airport (origin and arrival) and runway data.

LGERS (LANDING GEAR EXTENSION/RETRACTION)

FMS receives: Discrete telling whether the aircraft is on ground or not.

FMC

There are three FMC s:
- FMC -A
- FMC -B
- FMC -C.

In normal operation:
- FMC -A provides data to FMS 1
- FMC -B provides data to FMS 2
- FMC -C is the standby computer.

Of the two active FMC s, one FMC is the “master”, the other is the “slave”. This depends on which Autopilot (AP) is active, and on the selected position of the FMS Source Select sw .
The two active FMC s independently calculate data, and they exchange, compare, and synchronize this data.
The standby FMC does not perform any calculation.

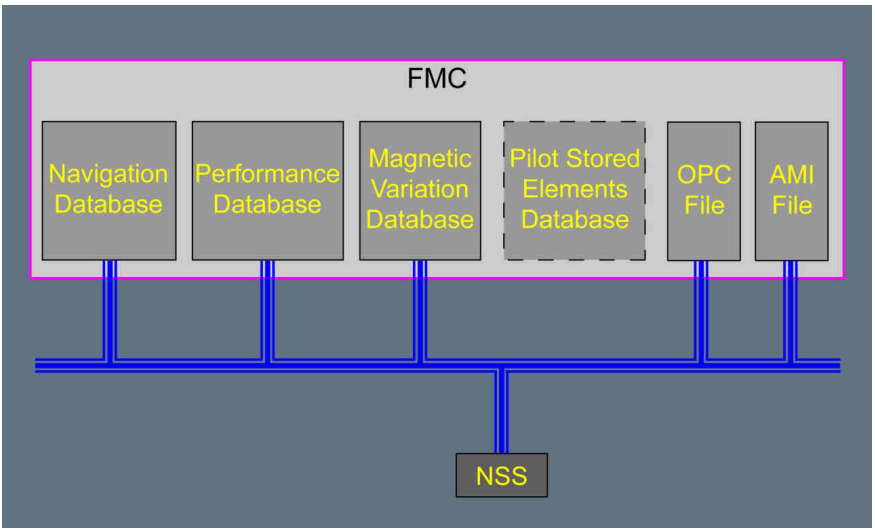
Refer to More Information on the FMS Modes of Operation

FMC DATABASES

Each FMC has four databases:
- Navigation database
- Performance database
- Magnetic variation database
- Pilot-stored elements database.

L3 Some FMS data can be customized, using the following two files:
- Operational Program Configuration file (OPC -file)
- Airline Modifiable Information file (AMI -file).

FMC Databases



L2 NAVIGATION DATABASE

The navigation database provides standard navigation data: NAVAIDS , waypoints, airports, runways, airways, holding patterns, company routes, terminal area procedures (SID , STAR , APPROACH), MSA , and MORA .
This data is stored for two successive 28–day cycles.

L3 The operator defines, obtains, updates, loads, and uses this data.

L2 The ACFT STATUS panel of the DATA / STATUS page displays the validity (starting and expiration dates) of the database.

L3 The part number of the navigation database is also displayed on the ACFT STATUS panel of the DATA / STATUS page.

L2 *Refer to STATUS page*

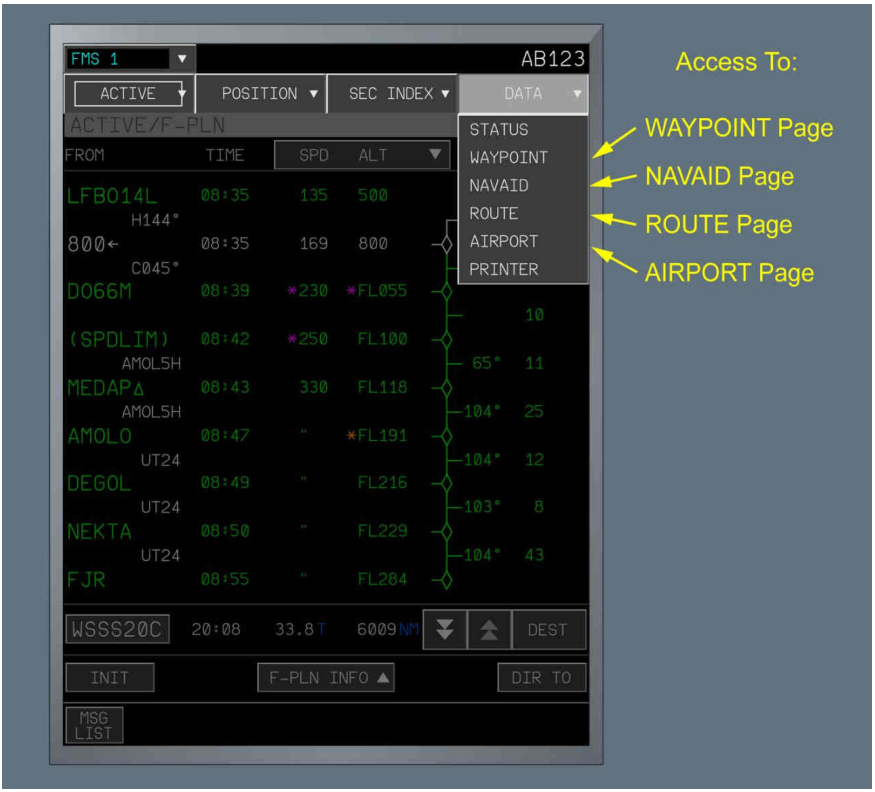
If the aircraft clock date does not match the database cycle, the white message “CHECK DATABASE CYCLE” is displayed in the FMS message zone on the MFD .

DATA PAGES

The flight crew can consult the waypoints, NAVAIDS , routes and airports (with runways), that are stored in the navigation database, on the DATA pages. The DATA pages are accessed via the DATA menu on the General Menu Bar.

Refer to DATA / WAYPOINT page
Refer to DATA / NAVAID page
Refer to DATA / ROUTE page
Refer to DATA / AIRPORT page

DATA Menu



L2 PERFORMANCE DATABASE

The performance database is used for the computation of FMS performance parameters, flight plan predictions and optimization.

L3 It includes the engine model, aerodynamic model, and performance model.

The Operator cannot modify this database.

The FMS P/N panel of the STATUS page displays the part number of the performance database.

Refer to STATUS page

L2 MAGNETIC VARIATION DATABASE

The magnetic variation database provides magnetic variation data, used to compute local magnetic variation declination.

L3 The aircraft manufacturer updates this database.
The FMS P/N panel of the STATUS page displays the part number of the magnetic variation database.
Refer to STATUS page

L2 PILOT-STORED ELEMENTS DATABASE

The pilot-stored elements database stores the waypoints, NAVAIDS , runways, and routes created by the flight crew. The contents of this database are limited to:
- 50 waypoints
- 20 NAVAIDS
- 10 runways
- 5 routes (with a maximum size of 30 flight plan elements per route).

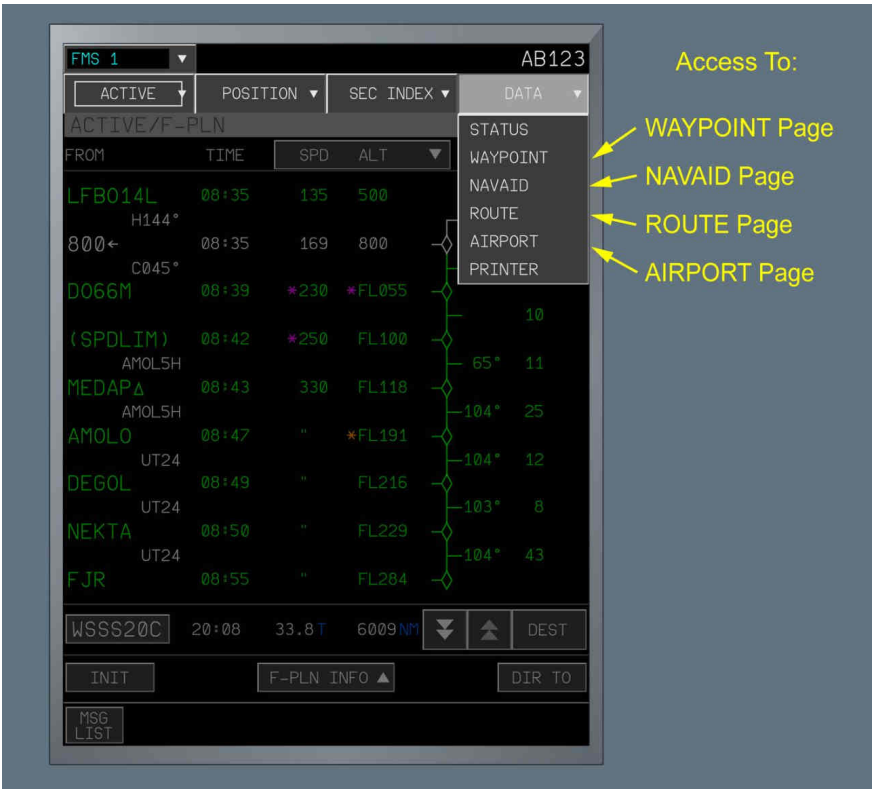
The pilot-stored elements can be deleted:
- Manually: At any time, with the DELETE ALL function on the ACFT STATUS panel of the STATUS page
- Automatically: After each flight (This is an optional feature that Operators can activate via the AMI -file).

All the pilot-stored elements are deleted when all FMC s are shut down.
The ACFT STATUS panel of the STATUS page displays the number and types of pilot-stored elements.
Refer to STATUS page

DATA PAGES

The flight crew can create waypoints, NAVAIDS , routes and airports/runways, that will be stored in the pilot-stored elements database, on the DATA pages. The DATA pages are accessed via the DATA menu on the General Menu Bar.
Refer to DATA / WAYPOINT page
Refer to DATA / NAVAID page
Refer to DATA / ROUTE page
Refer to DATA / AIRPORT page

DATA Menu



L3 OPERATIONAL PROGRAM CONFIGURATION FILE (OPC -FILE)

The Operational Program Configuration (OPC) file is also called the FMS Options Configuration File.

The aircraft manufacturer manages the contents of the OPC file.

The OPC file provides a set of operational high-level software options. Operators select these options, and load the OPC file into the FMC . This then automatically activates the correct options for use by the FMS .

An example of these options include: Weight Unit (lb/kg), FLS (Yes/No), AOC (Yes/No), FANS (Yes/No), ND Interactivity (Yes/No).

The FMS P/N panel of the STATUS page displays the part number of the OPC file.

Refer to STATUS page

L3 AIRLINE MODIFIABLE INFORMATION FILE (AMI -FILE)

The Airline Modifiable Information (AMI) file is also called the FMS Airline Configuration File. The AMI file provides the following set of FMS data, that Operators can customize:

- Software Options: DIR TO default option (with abeam/without abeam), Default Intercept Angle Value...
- Airline Policy Values (e.g. THR RED altitude, ACC altitude...)
- Fuel Policy Values (e.g. Taxi Fuel, Route Reserve %...)
- AOC Policy Values (e.g. AOC Flight-plan request (Yes/No), AOC Performance Data request (Yes/No)...)
- FANS Policy Values (e.g. ATC Free Text (Yes/No)...)
- OIS Policy Values: (e.g. OIS Flight-plan request (Yes/No), OIS Performance Data request (Yes/No)...)

An operator can define one or more AMI s for all of its fleet, as needed.
The FMS P/N panel of the STATUS page displays the part number of the AMI file.
Refer to STATUS page

L3 NSS

The Data Loading Configuration Software (DLCS) on the Network Server System (NSS) is used to load all the databases (except the pilot-stored elements database), and the configuration files into the FMC.

MFD

The MFD displays FMS textual data. There are more than 50 FMS pages that provide information on the flight plan, aircraft position and flight performance. The MFD is interactive: The flight crew can navigate through the pages, and can consult, enter or modify the data via the KCCU .
Refer to MFD

KCCU

The flight crew uses the Keyboard and Cursor Control Unit (KCCU) to:
- Navigate through the FMS pages on the MFD
- Enter and modify data on the MFD FMS pages
- Perform some flight-plan revisions on the lateral ND .

Refer to KCCU

PFD AND ND/VD (EFIS)

The ND , VD and the PFD display graphical and textual information related to flight management. The ND displays the lateral and the VD the vertical parts of the flight plan.
On the lateral part of the ND , the flight crew can make some FMS lateral flight plan modifications via the KCCU . The VD is not interactive.
Refer to ND
Refer to VD
Refer to PFD

EFIS CP

With the EFIS CP , the flight crew controls the graphical and textual FMS data that appear on the ND .
Refer to EFIS CP

FMS selector

The FMS selector allows the flight crew to link all flight management interfaces on both sides with the FMC on Captain's side (when selecting BOTH ON 1), or the FMC on First Officer's side (when selecting BOTH ON 2).
Refer to FMS selector

Aircraft Position

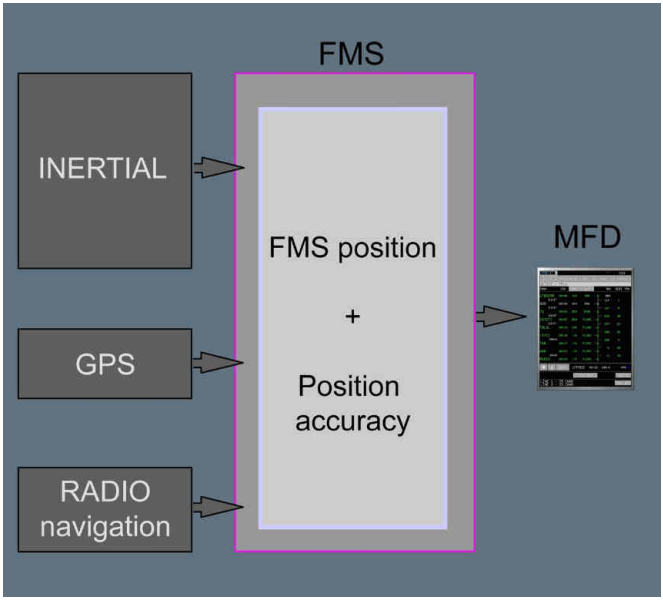
AIRCRAFT POSITION COMPUTATION - INTRODUCTION

Applicable to: ALL

Each FMS computes its aircraft position and the position accuracy, using three types of sources:
- Inertial
- Global Positioning System (GPS)
- Radio navigation.

The POSITION pages on the MFD display all the information about the FMS position and position accuracy.

FMS POSITION COMPUTATION



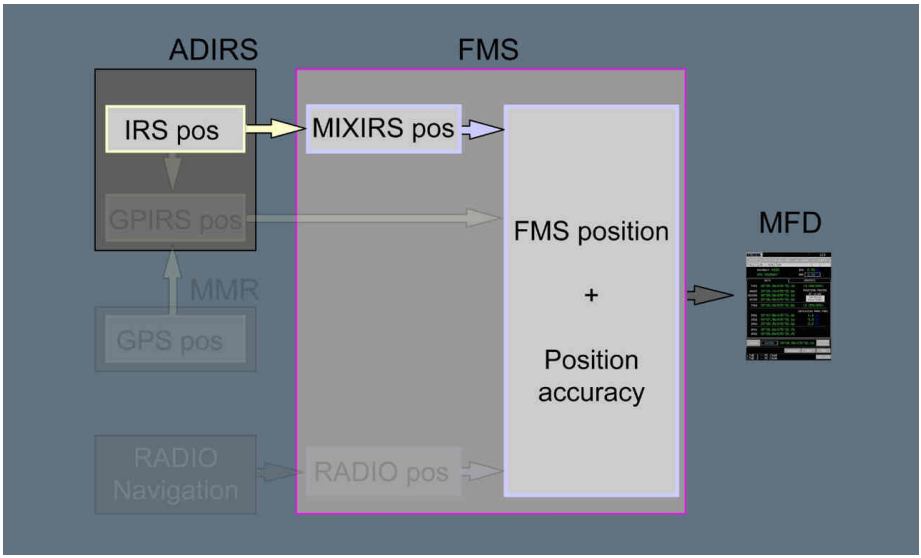
L2 If the GPS data is valid and accurate, the FMS uses only the GPS and inertial sources to compute the aircraft position.

If the GPS data is not valid or not accurate, the FMS uses:
- A combination of the radio navigation and inertial sources, or
- The inertial source only, if the radio navigation data is not accurate, or not available.

POSITION COMPUTATION - INERTIAL

Applicable to: ALL

INERTIAL POSITIONS



IRS POSITION

Each of the three ADIRSs has its IRS position. The three IRS positions are sent to both FMSs.

L2 ALIGNMENT OF THE IRS

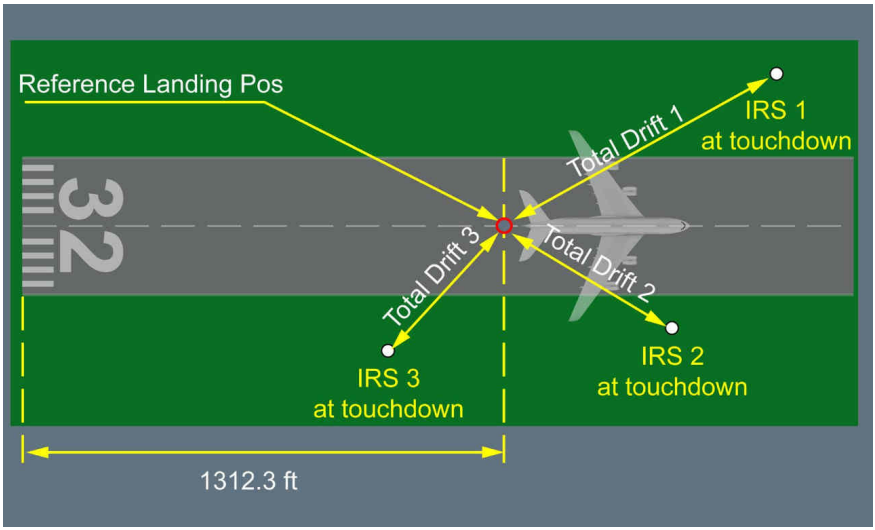
If the GPS position is available and accurate, the three IRSs take the GPS position as the alignment reference point.
The flight crew can change this reference point manually, by entering the coordinates in the Align On Other Reference window on the POSITION / IRS page.
If the GPS position is not available or not accurate, the IRS alignment cannot start, and the ALIGN IRS message appears in the FMS message zone. In this case, the flight crew must enter the alignment reference point, by entering the coordinates on the Align On Other Reference window on the POSITION / IRS page.

L3 A standard alignment takes 10 min. A fast alignment takes 30 s. A fast alignment occurs, if a pre-aligned IRS position is updated with a new position.

L2 AVERAGE DRIFT COMPUTATION

At the end of the flight, each FMC computes an average drift for each IRS position. The three drift values appear on the POSITION / IRS page. After each flight, the flight crew uses the average drift values to check the IRS performance.
The Average Drift = Total Drift / Time since last alignment.
The Total Drift is: The difference between the IRS position at landing and the reference landing position. The reference landing position is the position of the destination runway threshold, plus a shift of 1 315 ft on the runway axis.

TOTAL DRIFT

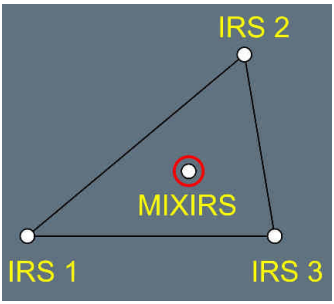


Note: The Average Drift is equal to the Total Drift, if the time since last alignment is less than one hour.

MIX IRS POSITION

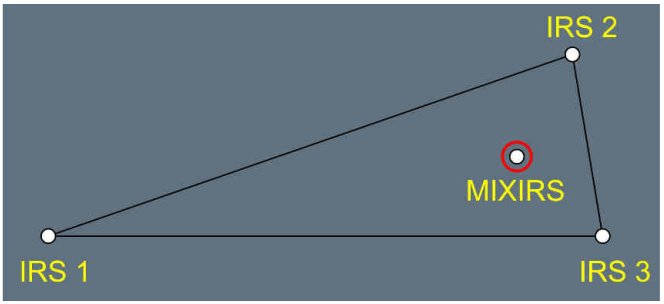
Each active FMS receives the IRS position from the three ADIRSs, and computes a weighted average. This weighted average is referred to as the MIX IRS position. The FMS uses the MIX IRS position to compute the aircraft position.

MIX IRS position



L2 If an IRS position drifts abnormally, the FMS reduces the influence (weight factor) of the drifting IRS on the MIX IRS position.

MIX IRS with a drifting IRS position



If one of the IRS positions is not valid, it is not used to compute the MIX IRS position. In such a case:

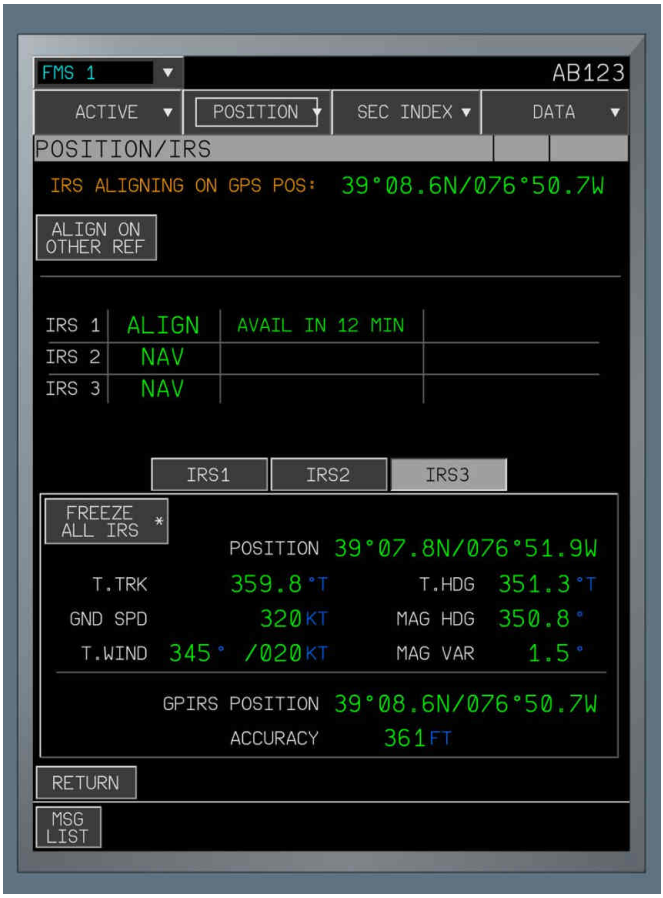
- Each FMS uses only the IRS position from the onside ADIRS
- If the onside IRS position is not valid, the FMS uses the IRS 3 position
- If neither the onside IRS nor the IRS 3 positions are valid, the FMS uses the offside IRS position.

CONTROLS AND INDICATORS

The POSITION / IRS page displays information about all three IRS positions and their alignment status.

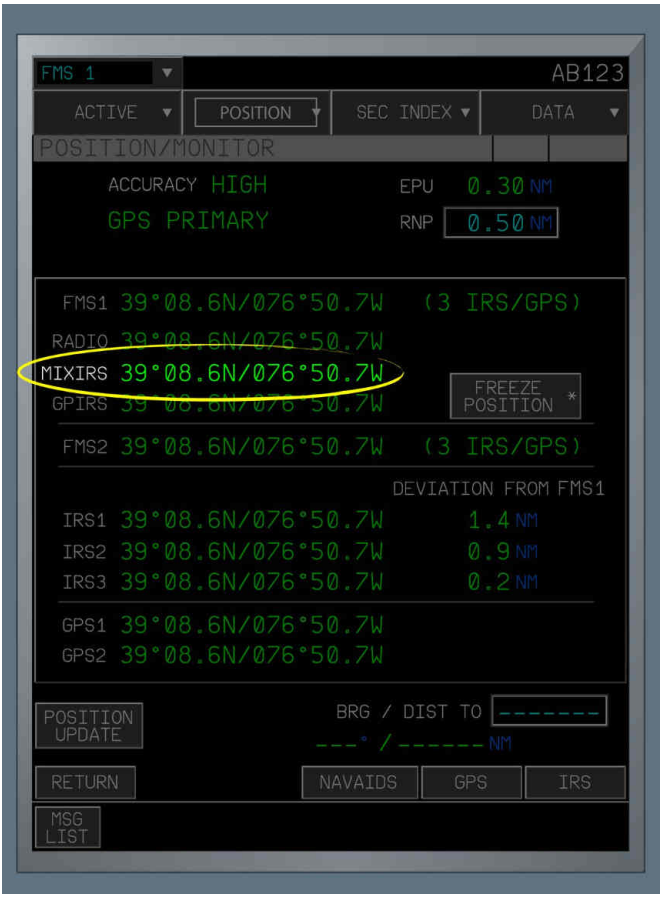
Refer to POSITION / IRS page

POSITION / IRS Page



The POSITION / MONITOR page displays the MIX IRS position.
Refer to POSITION / MONITOR page

POSITION / MONITOR Page



ASSOCIATED MESSAGES

ON THE MFD MESSAGE AREA:

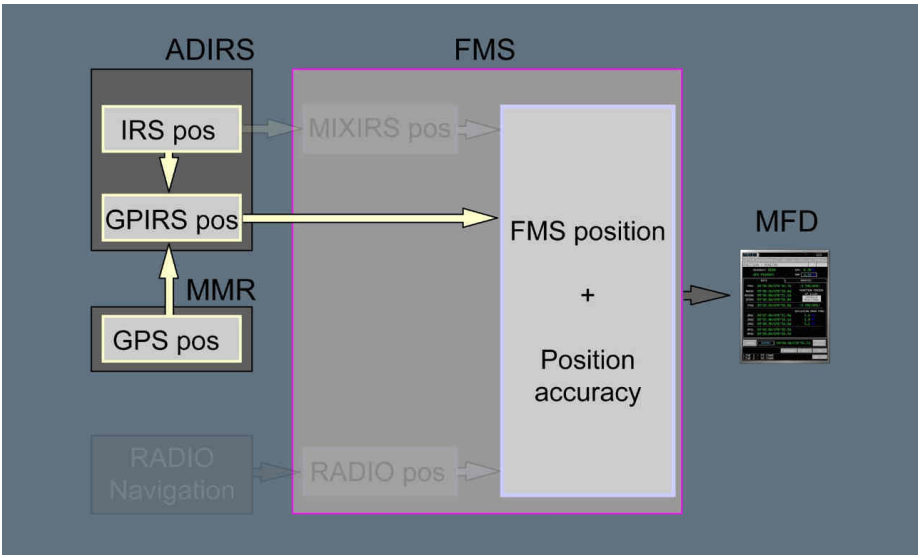
Refer to ALIGN IRS
Refer to ARPT REF / LAST IRS POSITION DISAGREE
Refer to ARPT REF / GPS POSITION DISAGREE
Refer to CHECK IRS / ARPT POSITION
Refer to CHECK IRS1(2)(3) / FMS POSITION

ON THE ECAM:
IRS IN ALIGN

POSITION COMPUTATION - GPS

Applicable to: ALL

GPS POSITIONS



GPS POSITION

The Multi Mode Receiver (MMR) sends the GPS position to the ADIRS , to compute the GPIRS position.

Note: *The ADIRS send also the pure GPS position to the FMS . It is used for display purposes only on the POSITION / MONITOR and POSITION / GPS page.*
Refer to POSITION / MONITOR page
Refer to POSITION / GPS page

GPIRS POSITION

Each ADIRS computes a hybrid position, composed of the GPS and IRS position. The hybrid position is referred to as the GPIRS position.
Each FMS uses the onside GPIRS position to compute the FMS position (for example: FMS 1 uses GPIRS 1).

L2 If the onside GPIRS position is not valid or integer, the FMS uses:
- The GPIRS 3 position, or
- The offside GPIRS position, if the GPIRS 3 position is not valid.

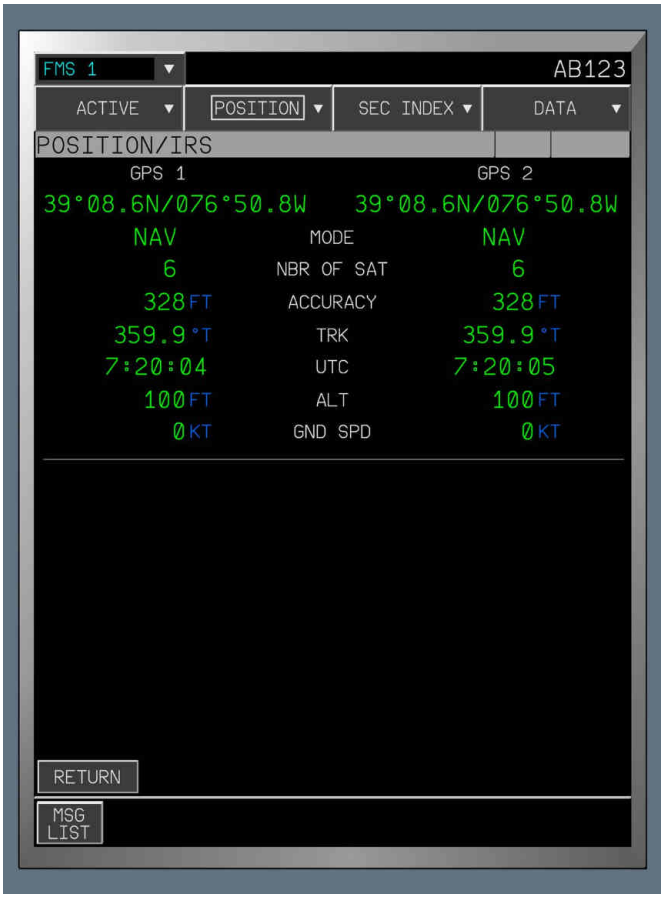
DESELECT GPS

The flight crew can deselect the GPS source on the Selected For FMS Navigation panel of the POSITION / NAVAIDS page. When the GPS source is deselected, the GPIRS position is no longer used to compute the FMS position.
Refer to POSITION / NAVAIDS page

CONTROLS AND INDICATORS

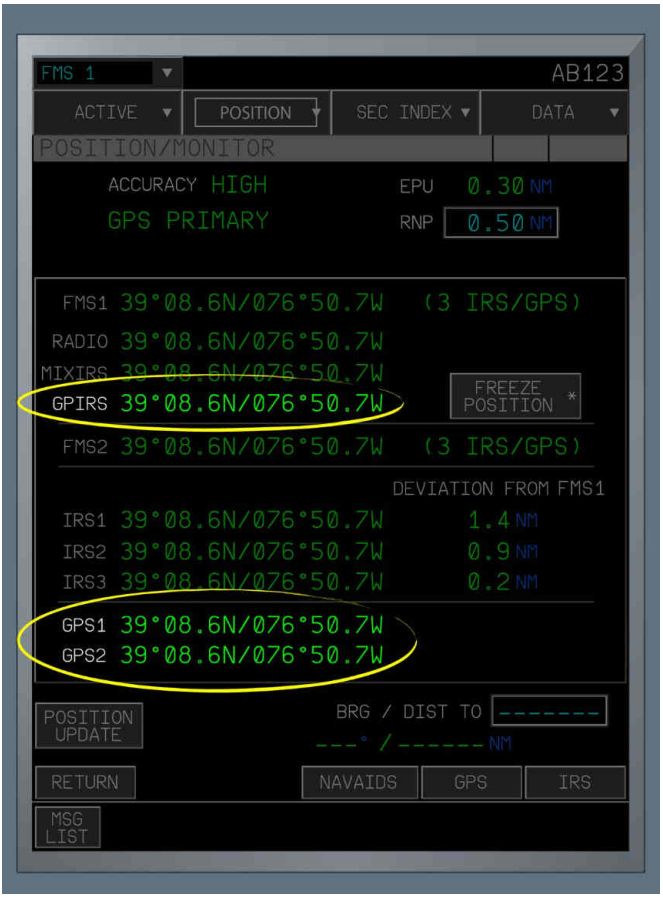
The POSITION / GPS page displays information on the GPS position.
Refer to POSITION / GPS page

POSITION / GPS Page



The POSITION / MONITOR page displays the GPIRS and the GPS position.
Refer to POSITION / MONITOR page

POSITION / MONITOR Page



ASSOCIATED MESSAGES

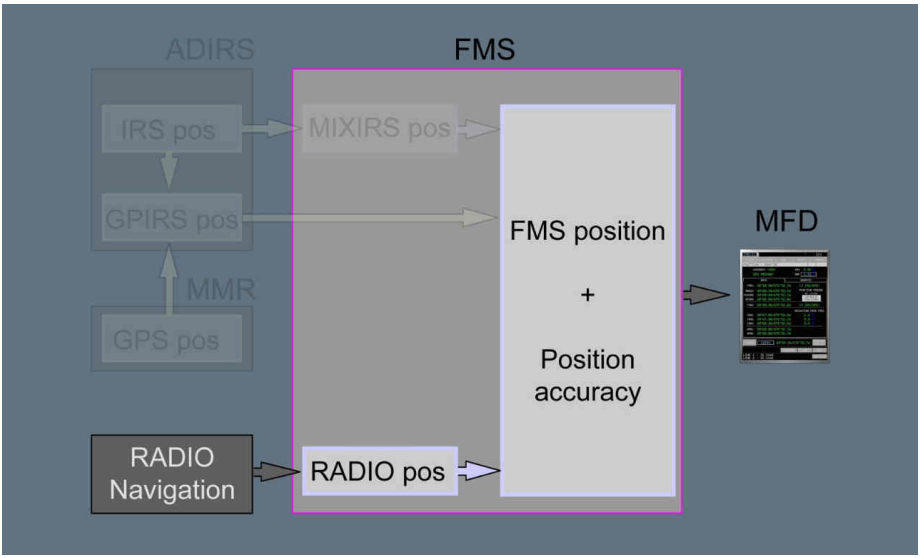
ON THE MFD MESSAGE AREA:

Refer to GPS DESELECTED
Refer to GPS PRIMARY
Refer to GPS PRIMARY LOST

POSITION COMPUTATION - RADIO NAVIGATION

Applicable to: ALL

RADIO POSITION



RADIO POSITION

Each FMS computes the radio position, using the data from its onside Radio Navigation Aids (NAVAID S) receivers.

The FMS can compute two different radio positions:
- DME / DME , or
- VOR / DME

Note: When the FMS navigation mode is not IRS / GPS (Refer to FMS Navigation Modes), during an ILS approach, the radio position is updated with the LOCalizer signal (LOC). The associated radio positions are referred to as DME / DME - LOC , and VOR / DME - LOC .

L2 If one or more onside NAVAIDS receivers fail, the FMS can use the offside NAVAIDS to compute the DME / DME or VOR / DME radio position.

L1 *Refer to Radio Navigation Tuning*

L2 **DESELECT NAVAIDS**

The flight crew can deselect up to 6 NAVAIDS on the POSITION / NAVAIDS page. When a NAVAID is deselected, the FMS can no longer use it to compute the radio position, nor for display on the ND .
Refer to POSITION / NAVAIDS page

CONTROLS AND INDICATORS

The POSITION / NAVAIDS page displays information about:
- The radio position
- The radio navigation mode
- The NAVAIDS used to compute the radio position.

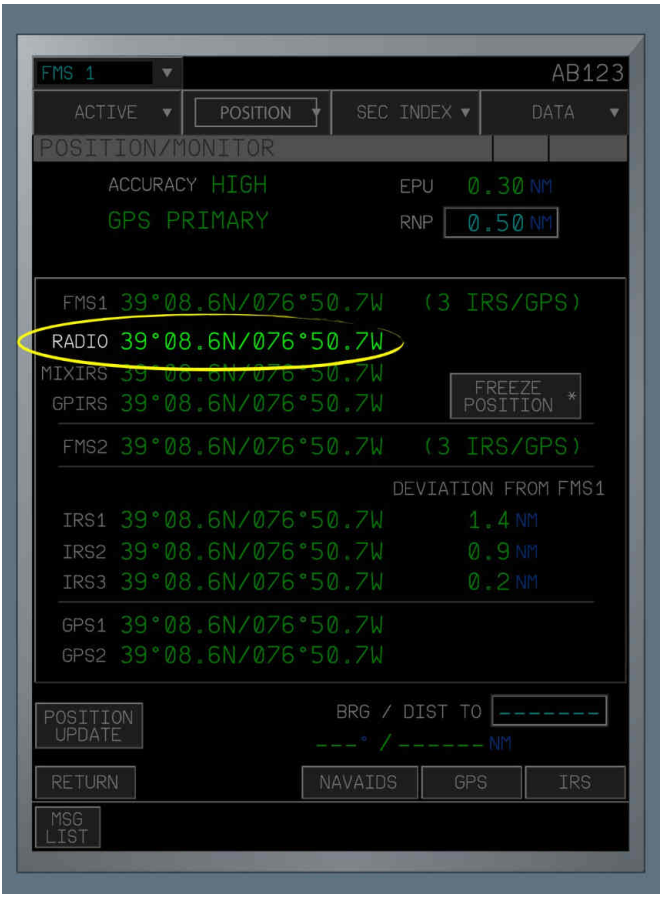
Refer to POSITION / NAVAIDS page

POSITION / NAVAIDS Page



The POSITION / MONITOR page displays the radio position.
Refer to POSITION / MONITOR page

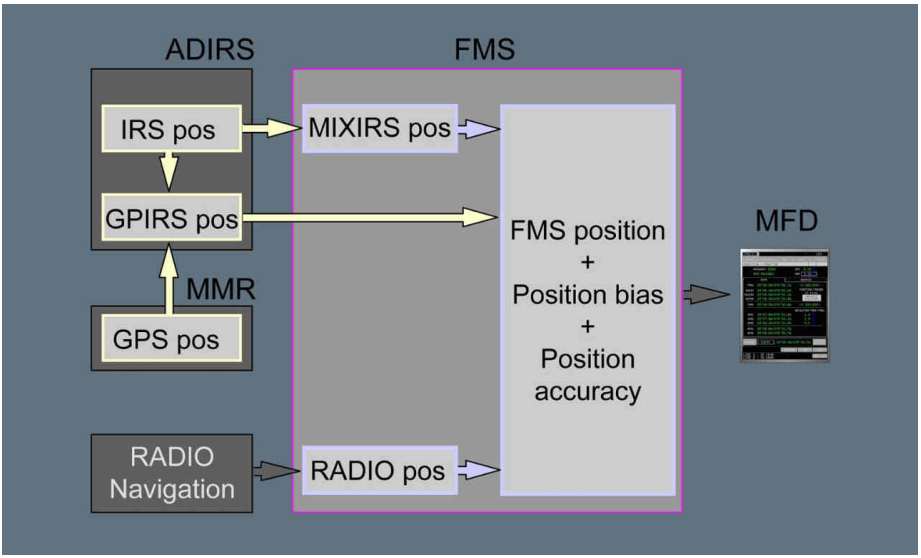
POSITION / MONITOR Page



POSITION COMPUTATION - FMS POSITION

Applicable to: ALL

FMS POSITION



FMS POSITION AND NAVIGATION MODES

Each FMS computes its FMS position from its MIX IRS position and the GPIRS or radio position, depending on which source provides the most accurate data.

L2 *Note: The FMS aircraft position computation is based on the inertial position. This computation is not possible if the inertial position is not valid. In this case, all FMS navigation and flight planning functions are no longer available.*

L1 The FMS uses four main navigation modes, that correspond to the combination of sources that are used to compute the aircraft position. The navigation modes are, in decreasing order of priority:

- Inertial - GPS (IRS/GPS)
- Inertial - DME/DME (IRS/DME/DME)
- Inertial - VOR/DME (IRS/VOR/DME)
- Inertial only (IRS)

L2 FMS POSITION UPDATES

If the navigation mode is not IRS/GPS, three FMS position updates may occur:

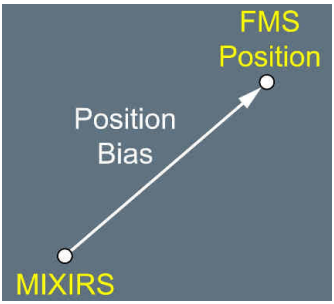
- At takeoff:
  An automatic position update on the runway threshold (plus possible takeoff shift entered by the flight crew on the Takeoff tab panel of PERF page).
- During an ILS approach:

  A temporary lateral update by the LOCalizer signal (LOC), creating three special navigation modes, listed in decreasing order of priority:
  - Inertial - DME/DME - LOC (IRS/DME/LOC)
  - Inertial - VOR/DME - LOC (IRS/VOR/LOC)
  - Inertial only - LOC (IRS/LOC)
- At any time:
  A manual position update, via the POSITION UPDATE function on the POSITION / MONITOR page.

POSITION BIAS

The FMS continuously memorizes the difference between the MIX IRS and the FMS position. This difference is referred to as the position bias.

POSITION BIAS



L2 If the FMS loses all radio and GPIRS positions, the new FMS position will be computed by taking the MIXIRS plus the last memorized position bias. The position bias does not change until the GPIRS or radio position is restored.

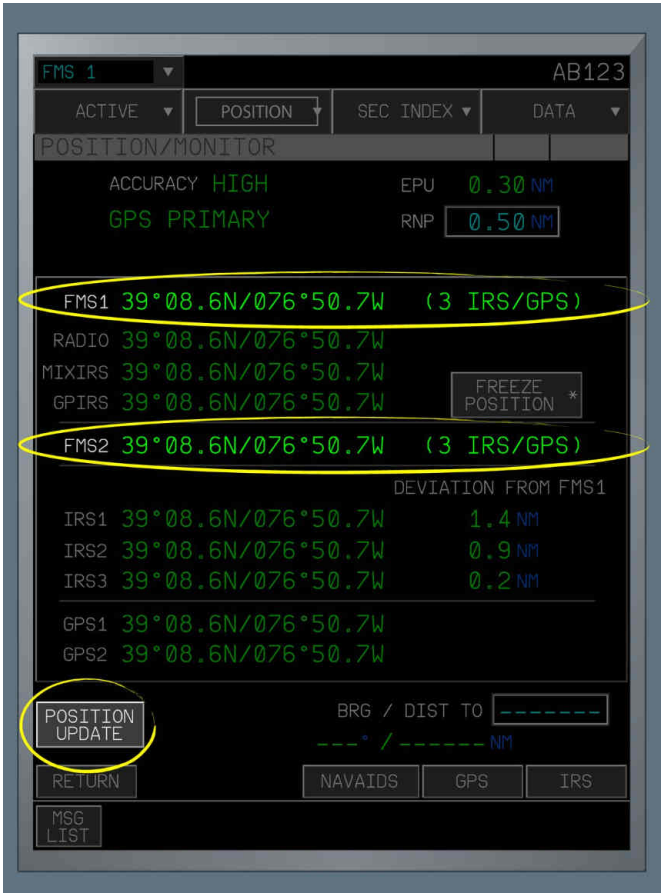
L1 Manually updating the FMS position also updates the position bias.

CONTROLS AND INDICATORS

The POSITION / MONITOR page displays the FMS position and navigation modes. The flight crew can also make a position update on this page.

Refer to POSITION / MONITOR page

POSITION / MONITOR Page



ASSOCIATED MESSAGES

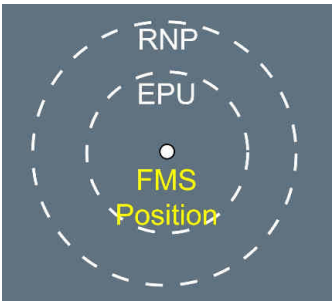
ON THE MFD MESSAGE AREA:

Refer to CHECK IRS1(2)(3) / FMS POSITION

POSITION ACCURACY

Applicable to: ALL

EPU - RNP



ESTIMATED POSITION UNCERTAINTY (EPU)

The FMS continuously computes the Estimated Position Uncertainty (EPU). It is used, together with the Required Navigation Performance, RNP, to define the aircraft navigation accuracy.

L2 The EPU represents the radius (in nautical miles) of the circle around the FMS computed position in which the real aircraft position lies 95 % of the time.

L3 EPU AND NAVIGATION MODE

After the IRS alignment on ground, the EPU is set to 0.2 nm. The EPU then depends on the FMS navigation mode:

Inertial-GPS:

The EPU is the greater of the two following values:

- The distance between the FMS position and the GPIRS position, or
- The GPS position uncertainty.
  The GPS position uncertainty computation is based on the GPS integrity (or Figure of Merit if the GPS integrity is not available) and the ground speed.

Inertial-Radio:

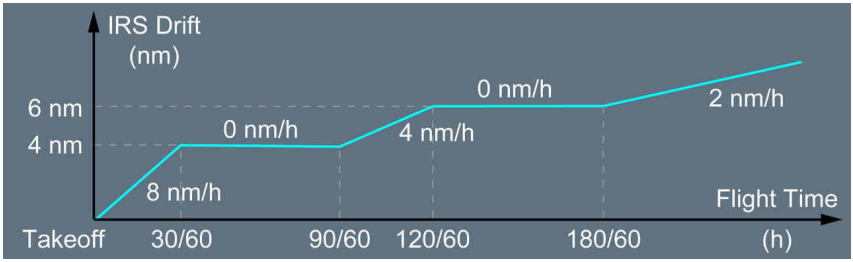
The EPU is the greater of the two following values:

- The distance between the FMS position and the radio position, or
- The radio position uncertainty.
  The radio position uncertainty computation is based on the distance and angle between the aircraft position and the NAVAIDS, and on the aircraft altitude and groundspeed.

Inertial Only:

The figure shows the mean inertial EPU evolution as a function of the time:

EPU Inertial Only



EPU AND POSITION UPDATE

After a manual or automatic position update on ground, the EPU is set to 0.2 nm.
After a position update in flight, the new EPU depends on the navigation mode:

Inertial-GPS:

The EPU = (distance between the update position and the GPIRS position) + GPS position uncertainty.

Inertial-Radio:

The EPU = (distance between the update position and the radio position) + radio position uncertainty.

Inertial Only:

The EPU = (distance between the update position and the FMS position) + previous EPU.

REQUIRED NAVIGATION PERFORMANCE (RNP)

The RNP value, together with the EPU , are used by the FMS to define the navigation class (*Refer to Evaluation of Navigation Accuracy*).
The FMS has a default RNP value.

L2 The following table gives the FMS default RNP values:

L12

En route	2 nm
Oceanic	2 nm
Takeoff area	1 nm
Terminal area	1 nm
GPS approach	0.3 nm

Continued on the following page

Continued from the previous page

Precision approach	0.5 nm
Non-precision approach	0.5 nm
VOR / RNAV approach using specified NAVAIDS for position updating	Max (0.5 nm , radio position uncertainty)

L3 The default values are defined in the Navigation Policy of the OPC file:

L1 A terminal area procedure may have an associated specific RNP value, defined in the navigation database. If this procedure is entered, this RNP value overwrites the default FMS value.
The flight crew can manually overwrite the FMS default or terminal area procedure value.

L2 When the flight crew enters a RNP value that is greater than the existing navigation database value, the message " PROC RNP is XX.XX " appears in the FMS message zone on the MFD . If no navigation database value exists, and the flight crew-entered value is greater than the area default value, the message " AREA RNP is XXXX " appears in the FMS message zone on the MFD .
Both messages can also appear when the navigation database value or area default value becomes less than the flight crew -entered value, when the flight area changes.

Note: The RNP shall be in accordance with the specified RNP values of the navigation and approach charts (if an RNP is specified).

EVALUATION OF NAVIGATION ACCURACY

NAVIGATION ACCURACY: HIGH, LOW

The FMS continuously compares the actual EPU with the current RNP and defines the navigation accuracy as:
- HIGH, if the EPU is less than, or equal to, the RNP
- LOW, if the EPU is greater than the RNP.

L2 If the navigation mode is not IRS/GPS:
- The message NAV ACCUR DOWNGRADED will appear on the MFD, when the navigation accuracy changes from HIGH to LOW
- The message NAV ACCUR UPGRADED will appear on the MFD, when the navigation accuracy changes from LOW to HIGH.

L1 GPS PRIMARY

The aircraft is in GPS PRIMARY, when the two following conditions are met:
- The navigation mode is IRS/GPS and
- The navigation accuracy is HIGH.

If at least one of the conditions is no longer met, the aircraft is no longer in GPS PRIMARY: The GPS PRIMARY LOST message appears on the MFD and ND.

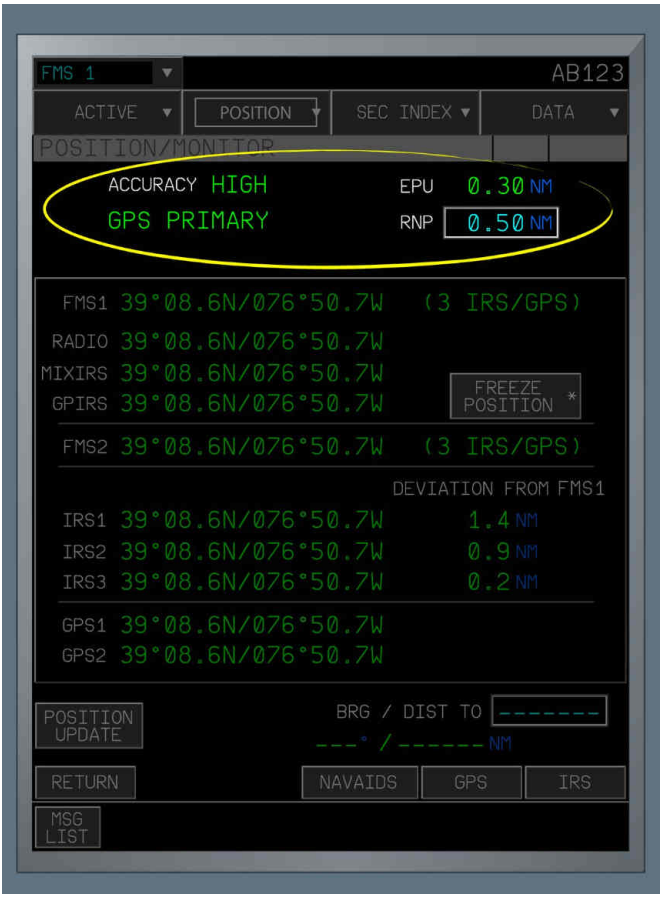
Note: During a non-precision approach, that is flown with the FLS function, the GPS PRIMARY LOST condition degrades the FLS capability. The triple-click aural warning is generated.

When both conditions become valid again, the message GPS PRIMARY appears on the MFD and ND.

CONTROLS AND INDICATORS

The POSITION / MONITOR page displays the navigation class and the GPS PRIMARY status.
Refer to POSITION / MONITOR page

POSITION / MONITOR Page



ASSOCIATED MESSAGES

ON THE MFD MESSAGE AREA:

Refer to NAV ACCUR DOWNGRADED
Refer to NAV ACCUR UPGRADED
Refer to GPS PRIMARY
Refer to GPS PRIMARY LOST

AIRCRAFT POSITION AND POSITION ACCURACY MONITORING

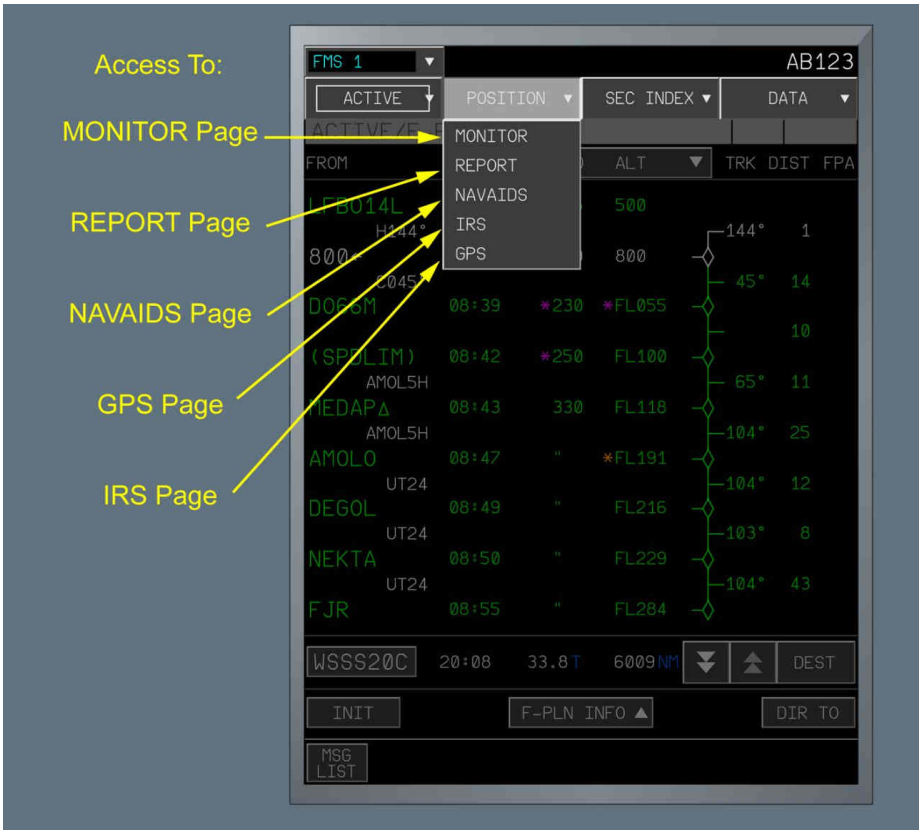
Applicable to: ALL

All information on the aircraft positions, navigation modes, and position accuracy is available on 5 specific position pages on the MFD :

- POSITION / MONITOR (*Refer to Page)*
- POSITION / REPORT (*Refer to Page)*
- POSITION / NAVAIDS (*Refer to Page)*
- POSITION / GPS (*Refer to Page)*
- POSITION / IRS (*Refer to Page)*

These pages are accessed via the POSITION menu on the General Menu bar.

POSITION Menu



Radio Navigation Tuning

DESCRIPTION

Applicable to: ALL

The FMS automatically tunes:
- The NAVAIDS used for the radio position computation (*Refer to Radio Position*)
- The NAVAIDS for display on the ND
- The NAVAIDS of the landing system.

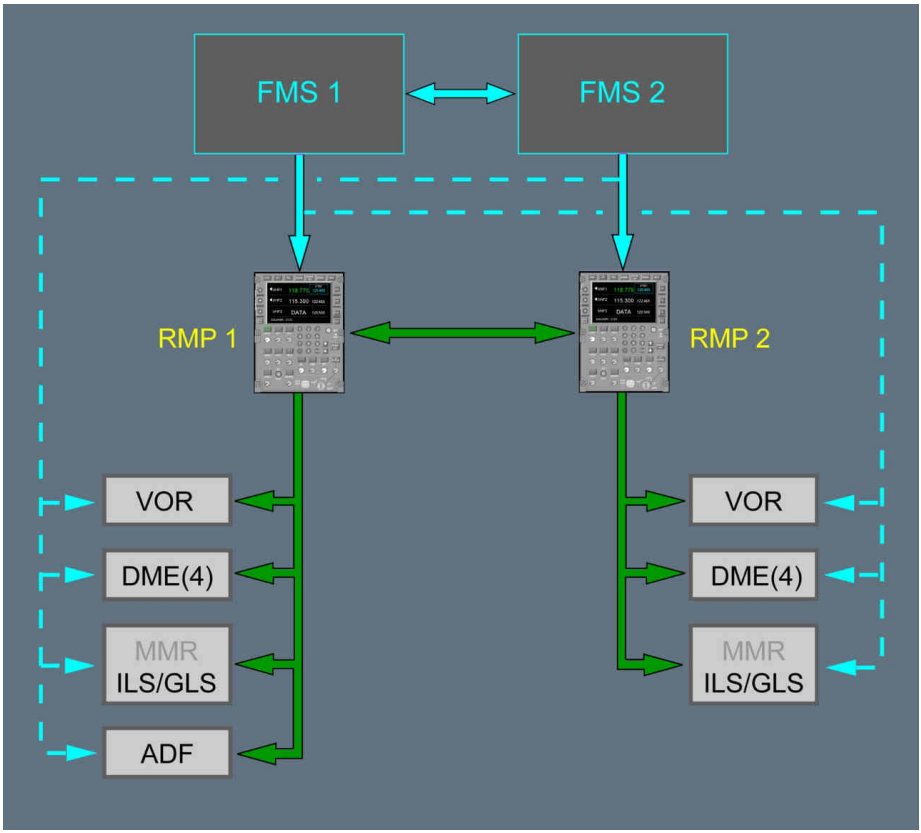
The NAVAIDS that are displayed on the ND , and the landing system NAVAIDS, can also be tuned manually on the POSITION / NAVAIDS page. (*Refer to Page*)
Manual tuning always has priority over automatic tuning.

L2 *Note:* *In case of a triple FMC failure, the flight crew can manually tune the NAVAIDS that are displayed on the ND , and the landing system NAVAIDS, via the Radio Management Panel (RMP).*
Refer to More information on the Standby Radio Navigation

L1 In dual and independent FMS modes, each FMS tunes its onside NAVAIDS. On each side, the FMS can tune:
- 1 VOR
- 4 DME s
- 1 ILS or GLS

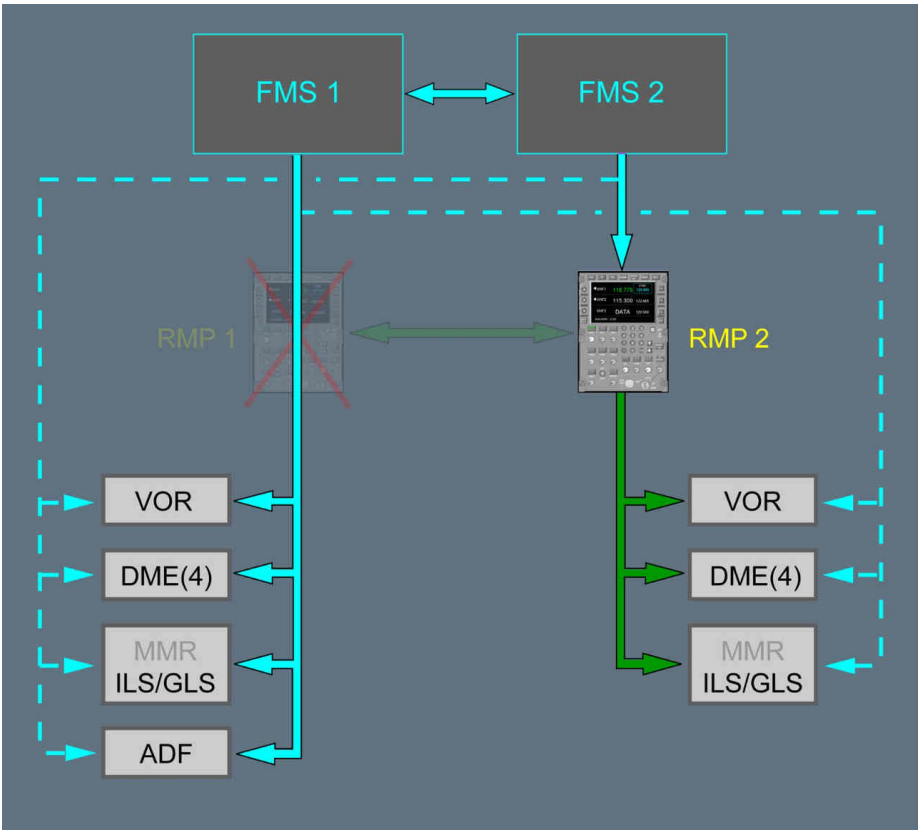
FMS 1 can tune 1 ADF .

Radio Navigation Tuning



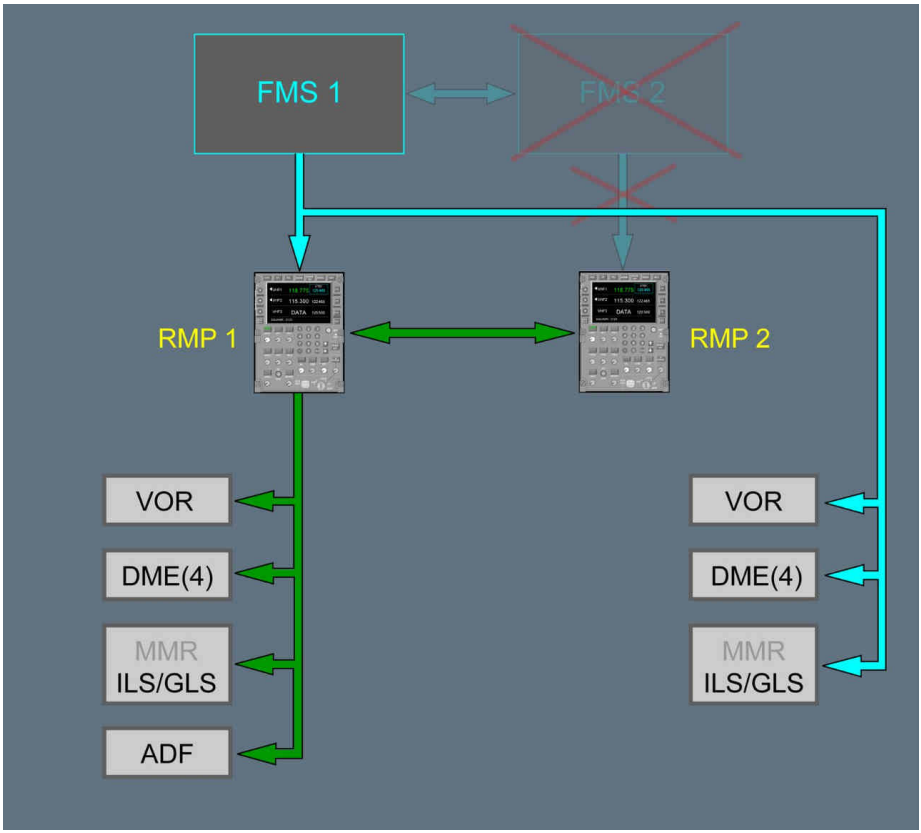
L2 The tuning of the onside NAVAIDS passes through the onside RMP , to synchronize the NAVAIDS tuning between the FMS and the RMP .
If at least one of the RMP s is in NAV mode, the FMS tuning of the NAVAIDS is interrupted on both sides. The RMP then tunes automatically the NAVAIDS previously tuned by the FMS .
If an RMP fails, the tuning information is still sent from the FMS to its onside NAVAIDS.

RMP Failure



In single FMS mode, or in case of communication failure between an FMS and its onside RMP , the available FMS will tune both side NAVAIDS.

Single FMS Mode



Note: *The onside NAVAIDS are tuned via the onside RMP , the offside NAVAIDS via a direct FMS -NAVAIDS connection.*

L3 NAVAIDS TUNING AND FMS SELECTOR

The position of the FMS Selector determines whether FMS 1 or FMS 2 tunes the NAVAIDS on both sides:

- NORM: The NAVAIDS are tuned, depending on the FMS operational mode:
  - DUAL and INDEPENDENT mode: Each active FMC tunes its onside NAVAIDS
  - SINGLE mode: The valid FMC tunes the NAVAIDS on both sides.
- BOTH ON CAPT : FMS 1 tunes the NAVAIDS on both sides
- BOTH ON F/O : FMS 2 tunes the NAVAIDS on both sides.

VOR TUNING

In normal operation, each FMS can tune one VOR. The FMS uses the same VOR for display on the ND as the one to compute the aircraft radio position.

L3 The VOR that will be tuned, is selected in accordance with the following order of priority:

1. The NAVAID manually selected by the flight crew
2. The NAVAID specified for the approach, in case of RNAV, VOR and VOR/DME approaches and the TO waypoint of the flight plan is one of the approach waypoints.
3. The NAVAID specified for the active leg
4. The NAVAID required to compute the aircraft radio position
5. The TO waypoint, if it is a NAVAID
6. Any down path waypoint, if it is a NAVAID
7. The FROM waypoint, if it is a NAVAID
8. The NAVAID nearest to the aircraft's present position.

DME TUNING

In normal operation, each FMS can tune four DME s at the same time.

L3 - One DME for display
  This DME can be manually or automatically tuned.
  The same order of priority for VOR tuning applies to DME tuning.
  If a VOR / DME is tuned to compute the aircraft radio position. The same VOR / DME will also be used for display on the ND .
- Two DME s to compute the DME / DME aircraft radio position. These NAVAIDS are automatically tuned, *Refer to Radio Position Computation* .
- One DME associated with ILS / DME .

ILS/GLS TUNING

In normal operation, each FMS can tune one ILS/GLS.

L3 The ILS/GLS that will be tuned, is selected in accordance with the following order of priority:
- The ILS/GLS manually selected by the flight crew
- The ILS/GLS associated with the takeoff runway, selected on the ACTIVE/F-PLN/DEPARTURE page, if the active flight phase is PREFLIGHT or TAKEOFF
- The ILS/GLS associated with the approach, selected on the ACTIVE/F-PLN/ARRIVAL page, if the active flight phase is CLB, CRZ, DES, APPR or GO AROUND, and the direct distance to the destination airport is less than 300 nm.

ADF (NDB) TUNING

In normal operation, FMS 1 can tune one NDB.

L3 The NDB that will be tuned, is selected in accordance with the following order of priority:
- The NDB manually selected by the flight crew
- The NDB specified for the approach, when an NDB approach is selected, and the TO waypoint of the flight plan is one of the approach waypoints
- The TO waypoint, if it is an NDB
- The FROM waypoint, if it is an NDB.

RADIO NAVIGATION TUNING - CONTROLS AND INDICATORS

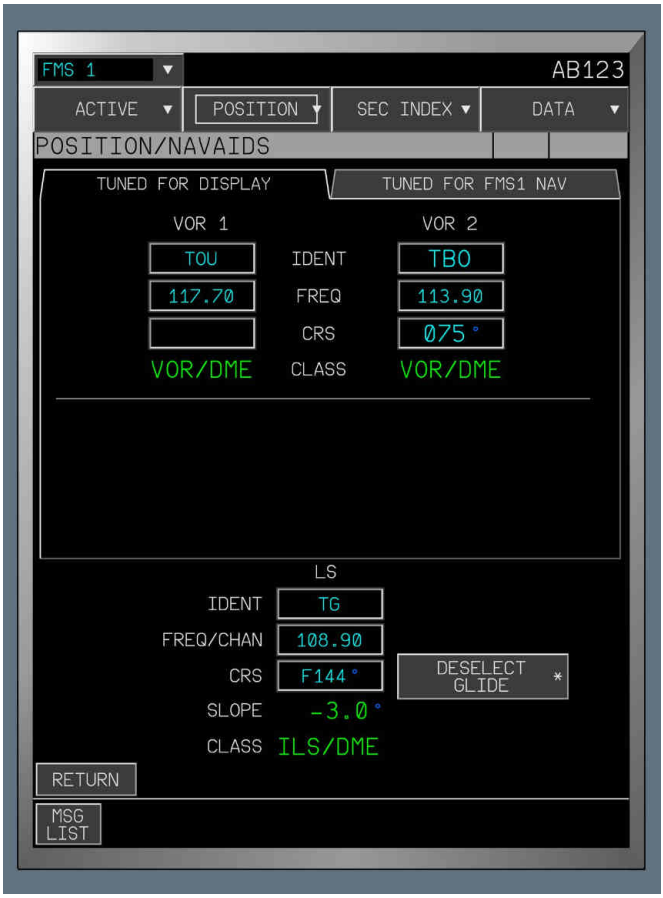
Applicable to: ALL

CONTROLS AND INDICATORS

ON THE MFD

The POSITION / NAVAIDS page displays information on the automatically-tuned NAVAIDS . It is also the interface for manual tuning.
The lower part of the POSITION / NAVAIDS page displays the parameters of the selected landing system. The landing system can be tuned manually, by entering its parameters in the appropriate entry fields.
Refer to POSITION / NAVAIDS page

POSITION / NAVAIDS Page



RADIO NAVIGATION TUNING - ASSOCIATED MESSAGES

Applicable to: ALL

ON THE MFD MESSAGE AREA:

TUNE XXX FFF.FF
SPECIF VOR-D NOT AVAIL

SPECIF NDB NOT AVAIL
RUNWAY / LS DISAGREE

Polar Navigation

INTRODUCTION

Applicable to: ALL

When a flight is scheduled to cross high latitude areas (beyond 60 ° of latitude), the flight crew must take various precautions, regarding the ADIRS, FG, FMS, and EFIS.

These precautions are based on:
- The change from MAG to TRUE heading (track) reference, due to the airway reference changes in high latitude, or due to the IRS, unable to provide magnetic heading
- Some particularities due to the pole overfly.

ADIRS

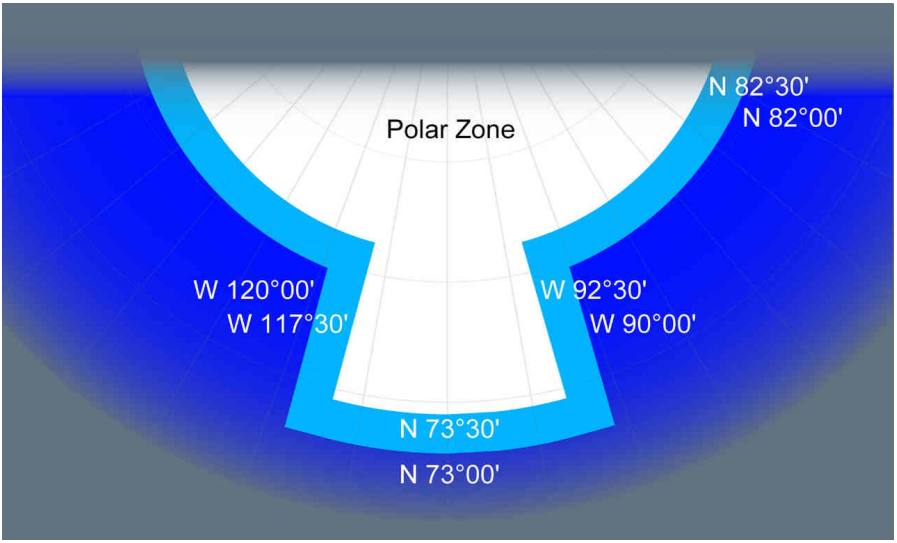
Applicable to: ALL

IRS ALIGNMENT

Up to latitude 73 °N(S), the flight crew can align the IRS without any particular procedures.
Between 73 °N(S) and 82 °N(S), the required alignment time is greater.
Beyond 82 °N(S), no IRS alignment is possible.

TRUE/MAG REFERENCE

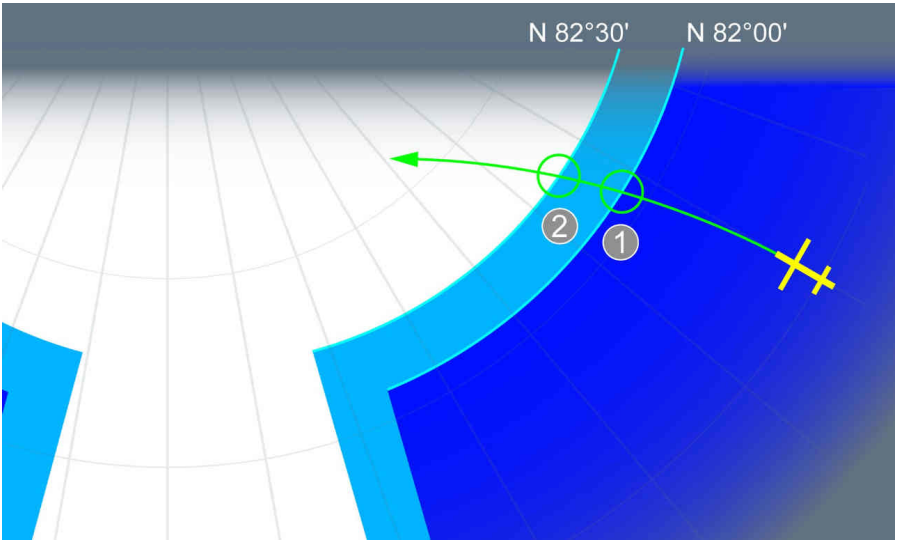
The ADIRS are able to provide TRUE heading (track), regardless of the aircraft latitude.
The ADIRS are able to provide MAG heading (track) between latitudes 82 °30' N and 60 °30' S, except in the vicinity of the magnetic pole:



Note: *1. The latitude and longitude values, given in this diagram, are average values. In reality, the polar area involves different hysteresis, combined with the track angle penetration of the aircraft in the zone.*

2. Although located outside the above polar zone, Thule is TRUE oriented.

The flight crew selects the TRUE reference by pressing the TRUE/MAG pb, or the change is done automatically when the aircraft enters the polar zone with MAG still selected. In this case, the following messages and cautions are displayed:



- When in 1, MFD and ND display SELECT TRUE NORTH REF
- When in 2, and MAG reference is still selected, the following events will occur:
  - The IRSs automatically revert from MAG to TRUE
  - An indication TRUE appears on the ND and PFD heading scales. The GRID track information appears on the ND.
  - An amber caution is triggered on the ECAM:
    NAV EXTREME LATITUDE
    NORTH REF SEL.....TRUE
  - The autopilot may disconnect, and the caution NAV CAPT AND F/O HDG DISCREPANCY (associated with a CHECK HDG message on the PFD and ND) may be triggered (this happens when the IRS do not reach the polar zone simultaneously).

Note: The messages and cautions are triggered as soon as the first IRS reaches the polar zone. When the flight crew has cleared the messages, the messages are not displayed again when the other two IRS enter the polar zone.

FLIGHT GUIDANCE

Applicable to: ALL

- When the flight crew manually changes the heading reference from MAG to TRUE or vice versa, there is no discontinuity in the lateral guidance, whether the mode is NAV or HDG/TRACK.
- When an automatic TRUE/MAG switching occurs when entering the polar zone, the autopilot may disengage, due to the fact that the automatic switching does not occur simultaneously for the 3 IRS.
- If TRUE is selected, only CAT 1 ILS approaches may be flown.

FLIGHT MANAGEMENT

Applicable to: ALL

The FMS provides a MIXIRS position, and as a result the FMS aircraft position, regardless the latitude.

AIRPORT NORTH REFERENCE

A takeoff with TRUE reference is very rare. During the preflight phase, if the cockpit north reference is TRUE, the following indications remind the flight crew of this selection:
- The ND and MFD display CHECK NORTH REF, if the departure airport north reference is MAG
- The TRUE label above the PFD/ND heading scales pulses for 10 s at slat extension
- The TRUE NORTH REF memo on the ECAM pulses for 10 s at engine start, or at slat extension.

Before approach, if the cockpit north reference is TRUE, the following indications remind the flight crew of this selection:
- The ND and MFD display CHECK NORTH REF, when the aircraft reaches the arrival area (approximately 25 nm from destination) and the destination airport north reference is MAG
- The TRUE label above the PFD/ND heading scales and the TRUE NORTH REF memo on the ECAM pulse for 10 s at slat extension.

FMS TRACK AND BEARING

The FMS computes the tracks, bearings, and radials according to the TRUE/MAG cockpit selection. If the selection is TRUE, the unit of the track, bearing, and radial figures and entry fields becomes °T.

When the flight crew wants to create a PBD, PB/PB waypoint or define a radial (DIRECT TO with INTCPT), the entry rule is as follows:

- If the flight crew inserts the figure with its reference (M for magnetic, or T for true), the FMS considers the entered reference
- If the flight crew inserts the figure without its reference, the FMS considers the cockpit TRUE/MAG selection.

CONTROLS AND INDICATORS

Applicable to: ALL

ON THE PFD/ND

TRUE REFERENCE INDICATION AND GRID TRACK

When the TRUE reference is selected:

- The PFD and ND display the TRUE label above the heading scales



- The ISIS display the TRU label


MODE
LS/ D
355
320
300
280
260
345
20
20
10
10
10
10
349
00
.84
34
0
2
1013
TRU
MENU
SET/SEL
IR3
34
TRU



- The EWD displays TRUE NORTH REF.



There is no specific indication, when the MAG reference is selected.

GRID TRACK INDICATION

The ND displays the grid track when reaching latitude 65° in all ND modes, except in PLAN mode.



ADF BEARING DISPLAY

The ADF needle represents the relative bearing between the aircraft and the NDB.
The ADF relative bearing information is thus independent of the TRUE/MAG selection, and the needle is always pointing in the same direction whatever the selection is.

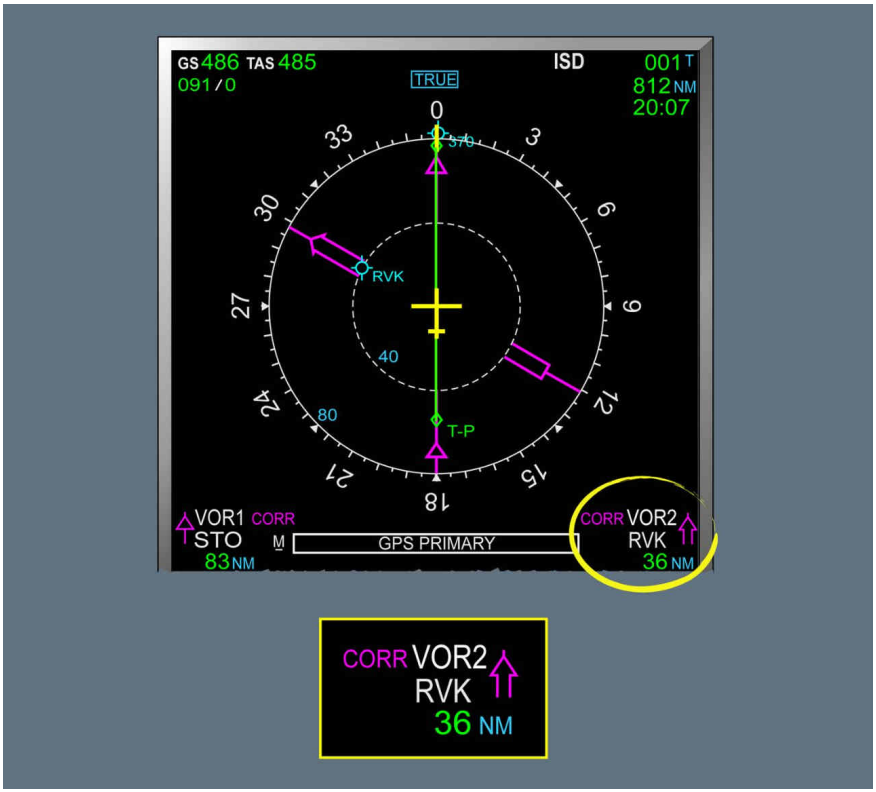
VOR BEARING DISPLAY

The VOR bearing is measured by the VOR, at the VOR location:

- It is a TRUE bearing if the VOR station is TRUE referenced
- It is a MAG bearing if the VOR station is MAG referenced.

When the ND display mode is ARC or ROSE-NAV, the flight crew can simultaneously display the VOR data and the FMS flight plan data. It is important that the FMS and the VOR raw data have the same north reference.

Therefore, if the aircraft north reference and the VOR station north reference are not the same, the VOR raw bearing is corrected with the magnetic variation at the aircraft present position. In this case, the VOR needles appear in magenta, and the ND displays CORR next to the VOR1(2) label.



For all other ND display modes (ROSE-VOR, ROSE-LS), the VOR raw data is not corrected. If the VOR station reference and the aircraft north reference are not the same, the ND displays the VOR station north reference (MAG, TRUE) next to the VOR identifier.


GS 486 TAS 485
091 / 0
TRUE 349°G
VOR1 112.00
CRS 000°
MSTO
0
3
6
9
12
15
18
21
24
27
30
33
20
40
VOR1 MAG
STO
17.8 NM
M
GPS PRIMARY
MAG VOR2
BNN
15.6 NM
MAG VOR2
BNN
15.6 NM

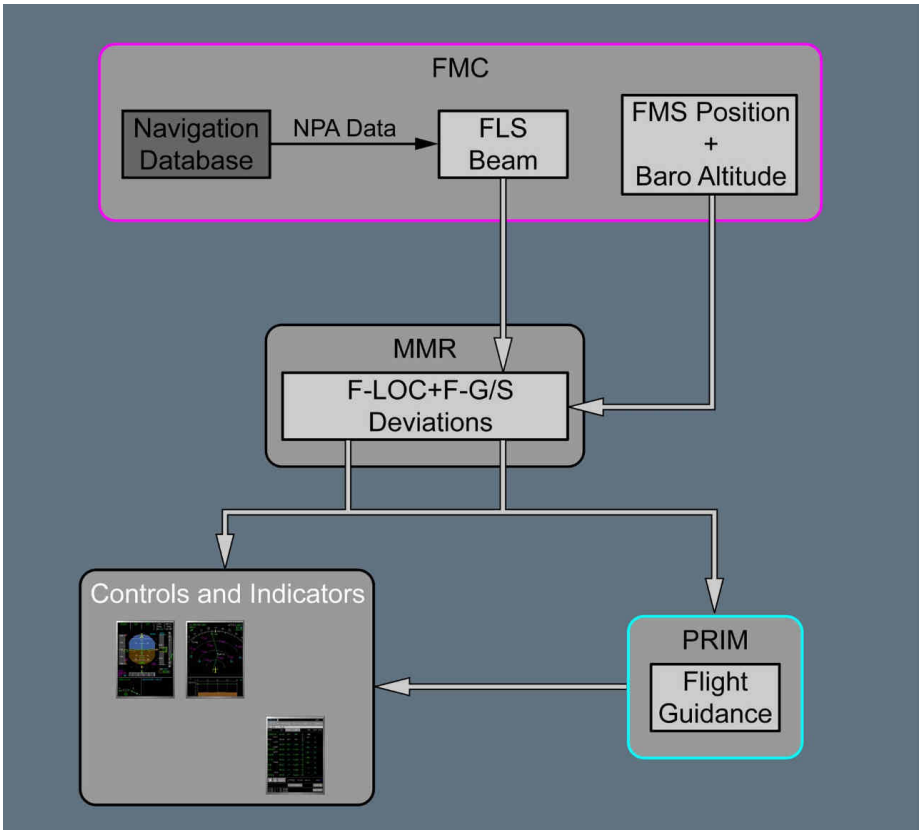
FLS Function within FMS

GENERAL

Applicable to: ALL

The FLS (FMS Landing System) function provides the flight crew with cockpit indications and guidance to fly a VOR , VOR / DME , or RNAV approach (including GPS approach) in an ILS look alike way.
The FMS computes a final approach path, called the FLS beam, and sends it to the MMR .
The MMR computes the deviations between the aircraft position and the FLS beam.
The MMR sends these pseudo LOC and G/S deviations (now called F-LOC , and F-G/S) to the PRIM for flight guidance, and to the PFD and ND for display.

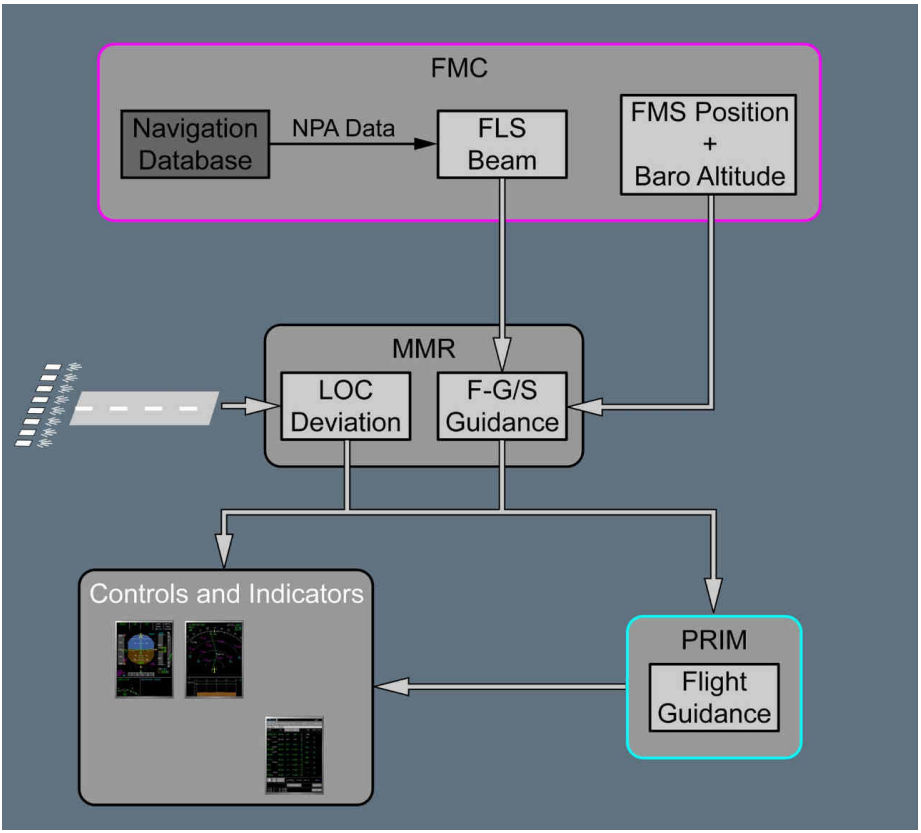
FLS



The flight crew can also use the FLS function to fly an ILS approach with glideslope out, or a LOC only (or LOC B/C) approach.

In this case, the flight guidance uses:
- The ILS LOC beam (LOC) for lateral guidance,
- The FLS G/S beam (F-G/S) for vertical guidance.

Mix LOC/FLS



L13

Note: *The FLS function is only available for approaches, that are stored in the navigation database.*
The FLS function is not available for IGS without G/S , SDF , and LDA approaches.

FLS BEAM COMPUTATION

Applicable to: ALL

FLS BEAM COMPUTATION

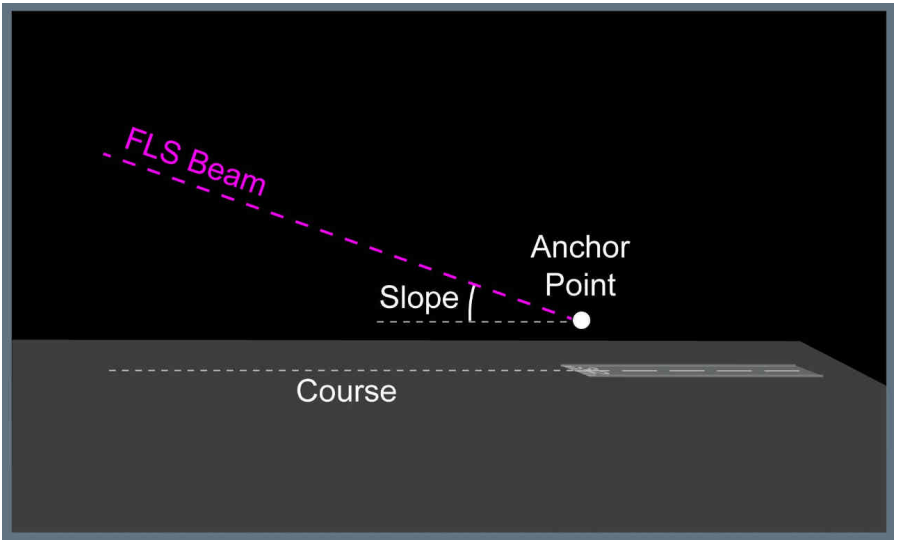
The FMS computes an FLS beam, when the flight crew:
- Inserts a VOR, RNV, GPS, LOC, or BAC approach (on the ARRIVAL page), or
- Inserts an ILS approach (on the ARRIVAL page), and deselects the glideslope (on the POSITION / NAVAIDS page).

The FLS beam represents the final approach leg of the non precision approach (NPA).

The FLS beam is defined by:
- An anchor point
- A course
- A slope.

The FLS beam can be captured up to 100 nm from the destination.

FLS Beam



CAUTION	The FLS beam is a virtual beam of 100 nm and may interfere with terrain obstacles outside the published approach. The obstacle clearance outside the published approach is the responsibility of the flight crew.

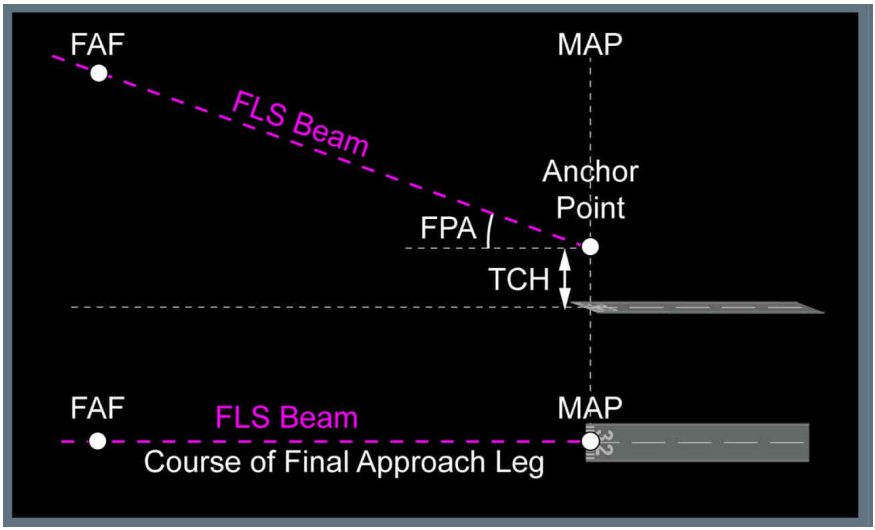
L2 The layout of the FLS beam is based on the relative position of the Missed Approach Point (MAP) to the runway threshold.

MAP IS ON THE RUNWAY THRESHOLD

When the MAP of the selected approach is defined on the runway threshold (+/- 0.14 nm):

- The anchor point is located on the runway threshold, at the Threshold Crossing Height, TCH (or threshold height + 50 ft if no threshold crossing height is stored in the database).
  The ident of the anchor point is the ICAO code of the airport, followed by the threshold runway identifier (e.g. LFBO33L)
- The course of the FLS beam is the course of the final approach leg
- The slope of the FLS beam is the Flight Path Angle (FPA), stored with the runway threshold in the navigation database.

MAP on Runway Threshold



MAP IS BEFORE THE RUNWAY THRESHOLD

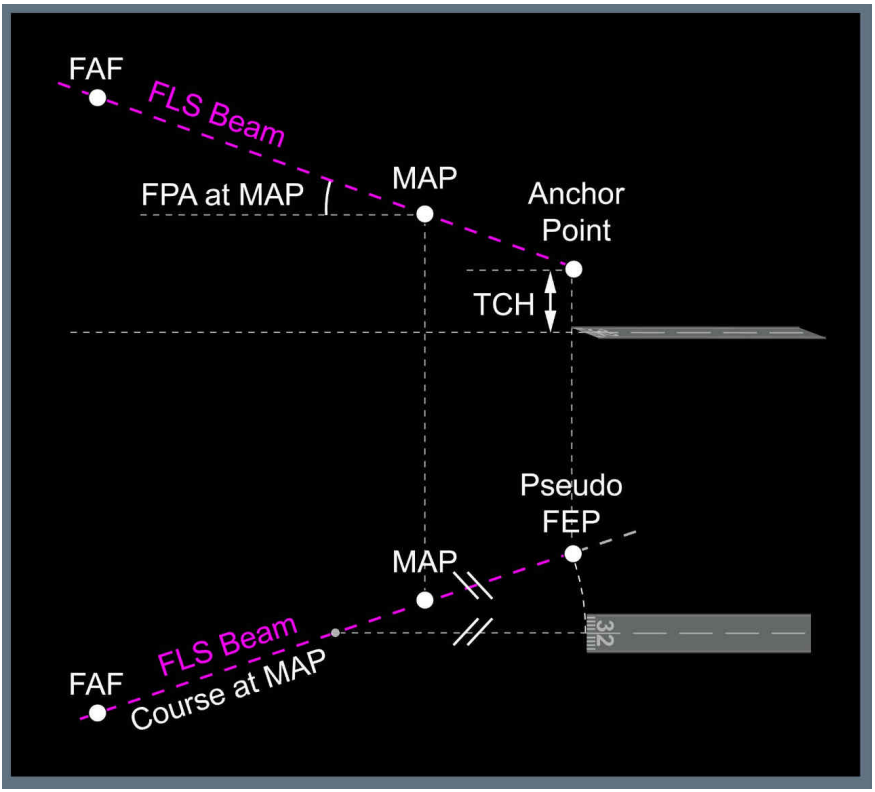
When the MAP of the selected approach is before the runway threshold:

- The anchor point is located on a pseudo final end point (that is computed by the FMS) at the Threshold Crossing Height, TCH (or threshold height + 50 ft if no threshold crossing height is stored in the database).
  The ident of the anchor point is EPxxx, where EP stands for End Point, and xxx is the threshold runway identifier (e.g. EP33L)

L3 *Note: When the anchor point is closer than 0.1 nm to the runway threshold, the ident of the anchor point is the ICAO code of the airport, followed by the threshold runway identifier (e.g. LFBO33L).*

L2 - The course of the FLS beam is the course that is stored with the MAP in the navigation database
- The slope of the FLS beam is the Flight Path Angle (FPA) stored with the MAP in the navigation database.

MAP before Runway Threshold



MAP IS BEYOND THE RUNWAY THRESHOLD

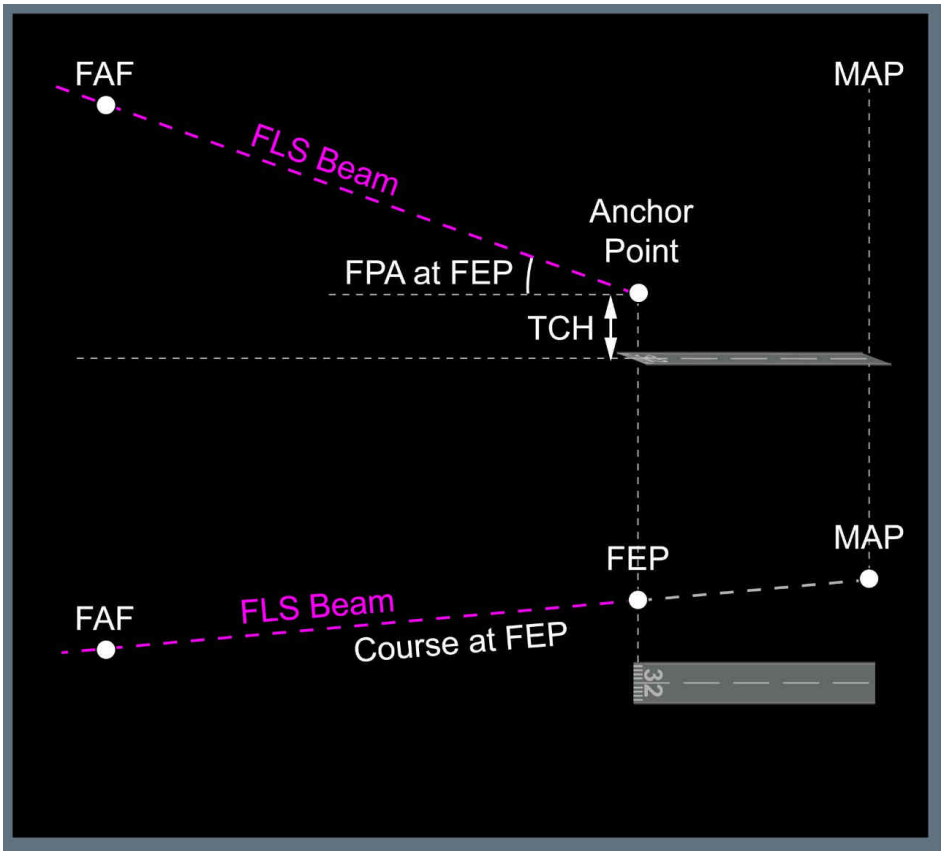
When the MAP of the selected approach is beyond the runway threshold:

- The anchor point is located on the final end point (that is stored in the navigation database) at the Threshold Crossing Height, TCH (or threshold height + 50 ft if no threshold crossing height is stored in the database).
  The ident of the anchor point is the ident of the final end point (e.g. EP33L)

L3 *Note: When the anchor point is closer than 0.1 nm to the runway threshold, the ident of the anchor point is the ICAO code of the airport, followed by the threshold runway identifier (e.g. LFBO33L).*

L2
- The course of the FLS beam is the course that is stored with the final end point in the navigation database
- The slope of the FLS beam is the Flight Path Angle (FPA) stored with the final end point in the navigation database.

MAP beyond Runway Threshold



NO FLS BEAM COMPUTED

The FMS does not compute the FLS beam:

- For IGS without G/S, SDF and LDA approaches, or
- If the angle between the course of the final approach leg and the runway course is more than 50 °C.

In these cases, the FLS function is not available: the FMS Message Area displays the NO FLS FOR THIS APPR message.

BARO CORRECTION OF THE FLS BEAM

When the baro setting is STD , the computation of the FLS beam and the F-G/S deviation is based on the QNH, that is entered on the APPR panel of the PERF page. (*Refer to PERF page*)
If no QNH is entered, a QNH of 1 013 hPa is considered for the computation of the FLS beam. However, in that case, no F-G/S deviation is computed.
When the baro setting is QNH, the computation of the FLS beam and the F-G/S deviation is based on the current QNH.

COLD WEATHER CORRECTION OF THE FLS BEAM

When the temperature at destination (that is entered on the APPR panel of the PERF page) is below the ISA temperature, the computation of the FLS beam and the F-G/S deviation is corrected with the entered temperature.
If no temperature is entered, the ISA temperature is considered at destination.

Note: *The temperature correction is only done for the computation of the FLS beam and the F-G/S deviation and does not change the barometric aircraft altitude on the PFD .*

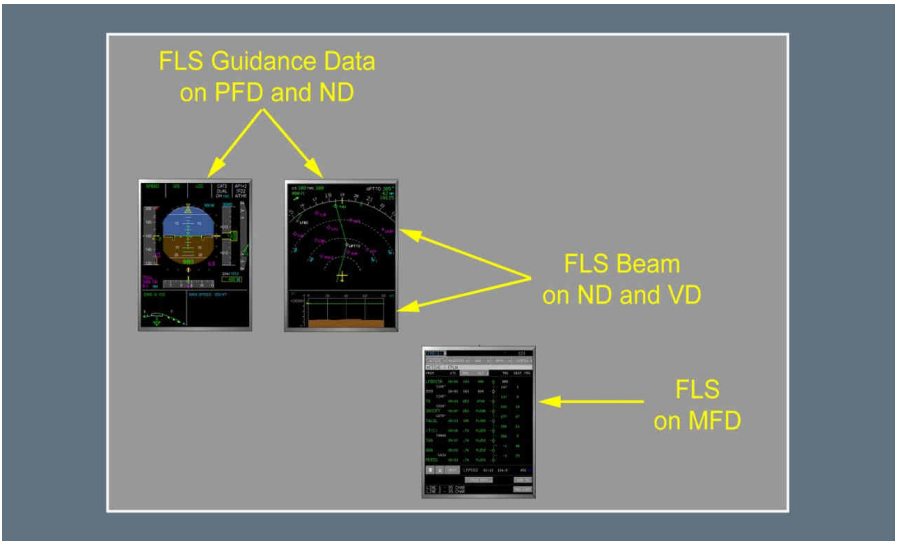
L2 For more information on the cold weather display of the VD, *Refer to DSC-31-20-40-20-GVERT Cold Weather*

CONTROLS AND INDICATORS

Applicable to: ALL

CONTROLS AND INDICATORS

FLS Controls and Indicators



FLS BEAM ON ND/VD

FLS Beam



L2 The FMS sends the FLS beam to the ND and VD .

L1 The ND and VD display the FLS beam as a magenta dotted line (with a length of 80 nm).

L2 When the anchor point is a published point that is stored in the navigation database, it is displayed in green. This indicates that the anchor point is a flight plan waypoint.
When the anchor point is a pseudo end point that is computed by the FMS, it is displayed in magenta. This indicates that the anchor point is a virtual point.
Refer to FLS Beam and Anchor Point Computation

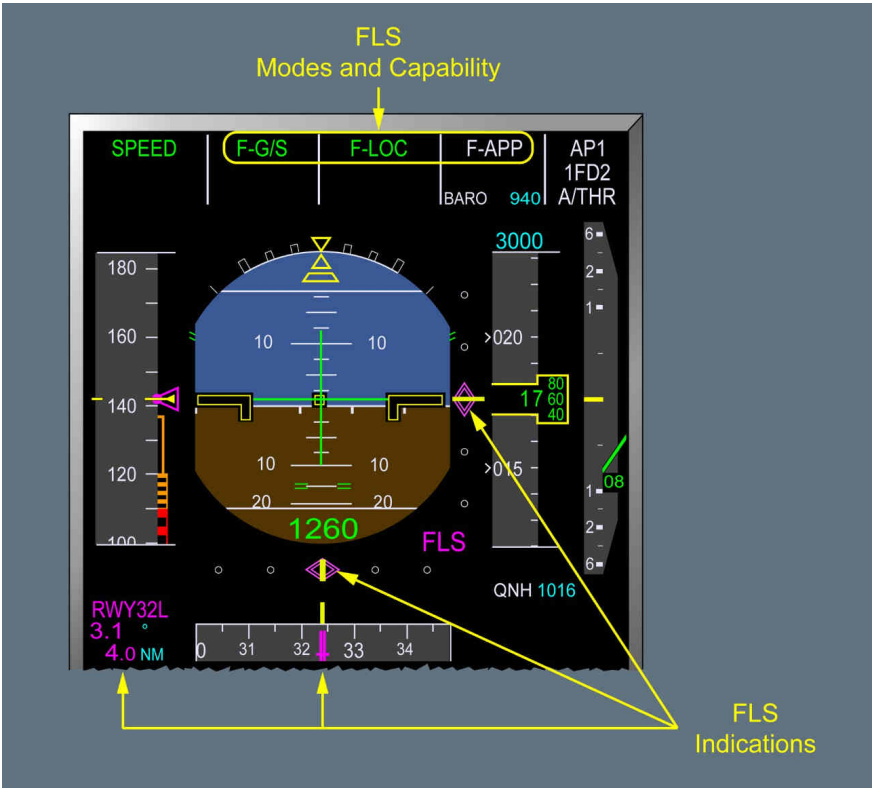
L1 The FLS beam appears when:
- The flight crew has selected an NPA for the active flight plan,
- The flight crew has pressed the LS pb on the EFIS CP , and
- The flight crew has selected an ND range that is less than or equal to:
  - 80 nm in ARC or PLAN mode, or
  - 160 nm in ROSE-NAV mode.

Note: The FLS beam is displayed on the VD only when the vertical cut is defined along the flight plan (or along the LS axis).

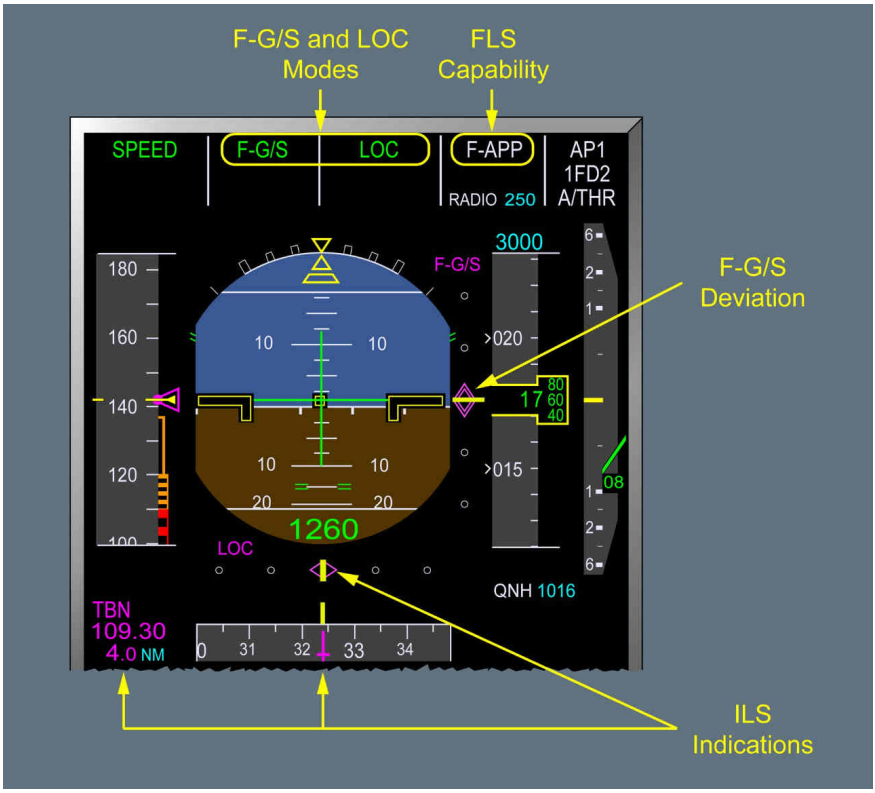
FLS GUIDANCE DATA ON PFD / ND

ON THE PFD

FLS on PFD



MIX LOC/FLS on PFD



The PFD displays:

The FLS Modes and Capability on the FMA

The FMA displays:
- The modes F-LOC , F-LOC* , F-LOC , F-G/S , F-G/S* , and F-G/S , when applied
- The FLS capability: F-APP, F-APP+RAW, RAW ONLY.

L2 The flight guidance (PRIM) sends the modes and FLS capability to the FMA .

L1 For more information on the FMA modes, *Refer to DSC-22-FG-80-80-F Overview*

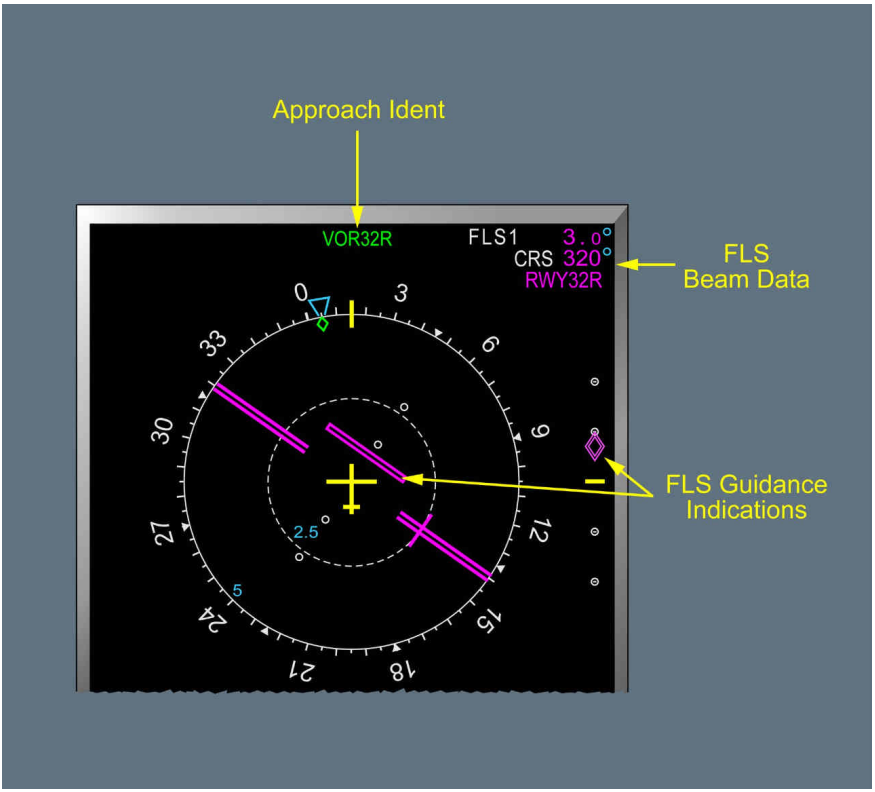
The FLS Indications

L2 The MMR sends the FLS indications to the PFD .

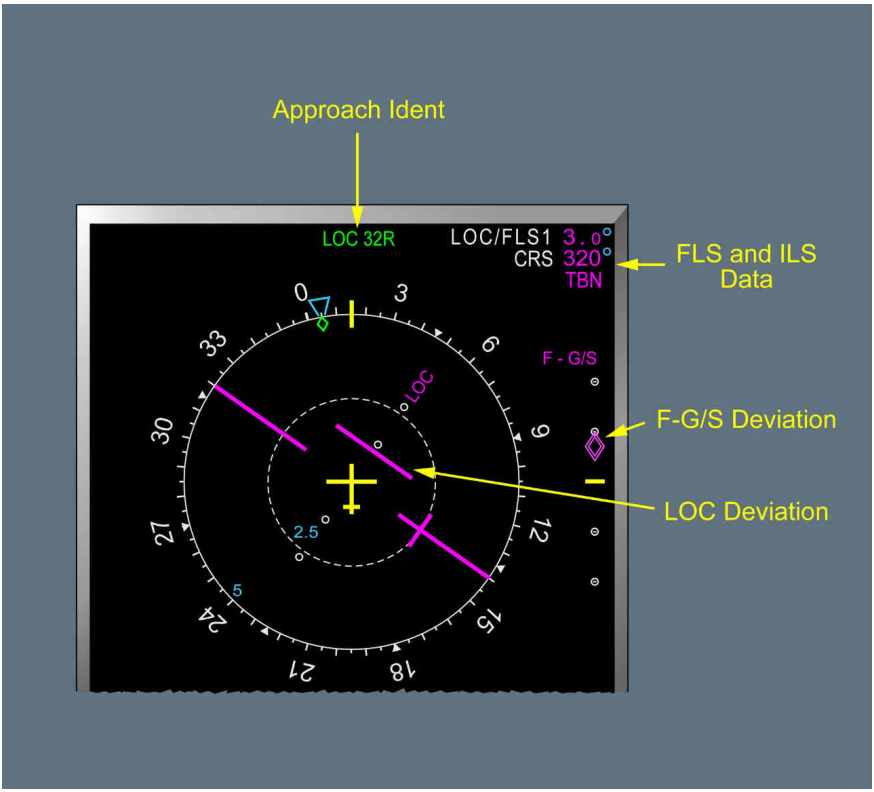
L1 For more information on the non precision approach PFD indications, *Refer to DSC-31-20-20-110-10 VOR, VOR/DME, or RNAV Approach*

ON THE ND

FLS in ROSE-LS mode



Mix LOC/FLS in ROSE-LS mode



In ROSE-LS mode, the ND displays:

Approach Ident

Indicates the ident of the selected non-precision approach.

FLS Beam Data

Indicates:

- The active landing system: FLS1, FLS2, LOC/FLS1, LOC/FLS2
  Indicates whether the FLS data is computed by MMR 1, or by MMR 2.
  MMR 1 sends the FLS data to the F/O 's ND , and MMR 2 to the captain's ND .
- The FLS beam slope,

- The FLS beam course,
- The anchor point ident.
  When the approach is flown in mix LOC/ FLS , this label displays the ILS ident.

FLS Guidance Indications

Indicates:

- The course of the FLS beam and the F-LOC deviation
  When the approach is flown in mix LOC/ FLS , the label LOC (or B/C) is displayed next to the deviation bar.
- The F-G/S deviation
  When the approach is flown in mix LOC/ FLS , the label F-G/S is displayed above the deviation scale.

L2 The MMR sends the guidance indications to the ND .

FLS ON MFD

The flight crew selects the non-precision approach on the ARRIVAL page. (*Refer to Page*)
When the flight crew has selected an ILS approach on the ARRIVAL page, he can deselect the glide slope (in order to fly the approach in mix LOC/FLS) on the POSITION / NAVAIDS page. (*Refer to Page*)
The flight crew enters the QNH, and temperature (OAT) at destination on the APPR panel of the PERF page. (*Refer to Page*)

ASSOCIATED MESSAGES

Applicable to: ALL

Refer to NO FLS FOR THIS APPR
Refer to F-G/S BASED ON ISA
Refer to ENTER DEST DATA

HOW TO FLY AN NPA WITH THE FLS FUNCTION

Applicable to: ALL

Refer to DSC-22-FG-70-80-30 Sequence of an NPA Flown with FLS Function
Refer to DSC-22-FG-70-120-90 VOR Approach Flown with FLS Function

General

FLIGHT PLANNING - INTRODUCTION

Applicable to: ALL

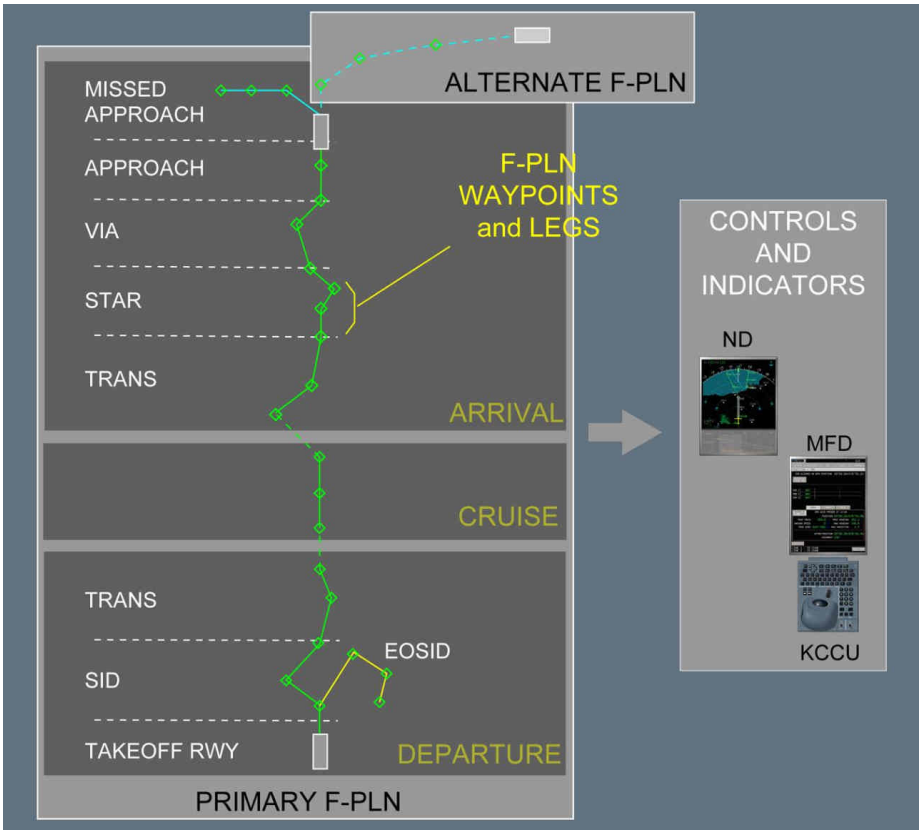
A major purpose of the Flight Management System (FMS) is to help the flight crew with flight planning.
The flight crew can enter the **flight plan** in the FMS . This flight plan includes the intended **lateral** and **vertical** trajectory.
When all of the necessary data is entered, the FMS computes and displays the track, speed, altitude, time, and fuel **predictions** that are associated with the flight plan.
The flight crew can change the flight plan at any time. These changes are called **lateral revisions** , if the change is made to the lateral part of the trajectory, and **vertical revisions** , if the change is made to the vertical part of the trajectory.
The FMS can simultaneously memorize four flight plans: one **active** and three **secondary** flight plans. The FMS uses the active flight plan for lateral and vertical long-term guidance, and for radio navigation auto-tuning. The flight crew can use the secondary flight plans as a draft to compare predictions, to anticipate a diversion, or to store company, ATC , and OIS flight plans.
Refer to Lateral Flight Plan
Refer to Vertical Flight Plan

LATERAL FLIGHT PLAN

Applicable to: ALL

The lateral part of the flight plan, called the lateral flight plan, has the following elements:

Lateral Flight Plan



PRIMARY FLIGHT PLAN

The primary flight plan is the flight plan from the origin to the destination airport. It has the following elements: Departure, Cruise, and Arrival.

DEPARTURE

The Departure has the following elements:

- The Takeoff Runway
- The Standard Instrumental Departure (SID)
  The SID is the central part of the departure procedure.
- The departure transition (TRANS)
  The departure transition is the possible trajectory between the last point of the SID and the first en-route waypoint.

These elements can be inserted or changed with the DEPARTURE lateral revision.
Refer to DEPARTURE revision

CRUISE

The Cruise part of the lateral flight plan includes all the en-route waypoints.
These elements can be inserted with the AIRWAYS, or INSERT NEXT WAYPOINT lateral revision.
Refer to AIRWAYS revision
Refer to INSERT NEXT WAYPOINT revision

ARRIVAL

The Arrival has the following elements:

- The arrival transition (TRANS)
  The arrival transition is the possible trajectory between the last en-route waypoint and the first waypoint of the STAR .
- The Standard Arrival (STAR)
  The STAR is the central part of the arrival procedure.
- The VIA
  The VIA is the possible trajectory between the last waypoint of the STAR and the first waypoint of the approach.
- Approach and missed approach
  The approach part includes the runway for landing at the primary destination airport, and the approach, and missed approach procedure.

  Note: The destination of the primary flight plan will be further called: the primary destination.

These elements are inserted or changed with the ARRIVAL lateral revision.
Refer to ARRIVAL revision

ALTERNATE FLIGHT PLAN

The alternate flight plan is the diversion flight plan from the destination airport to the alternate destination airport. It has the same elements as the primary flight plan: Departure, Cruise and Arrival.

Note: The destination of the alternate flight plan will be further called: the alternate destination.

The alternate destination is inserted with the ALTERNATE lateral revision.
Refer to ALTERNATE function
The Departure, Cruise and Arrival elements are inserted with DEPARTURE, AIRWAYS, INSERT NEXT WAYPOINT, and ARRIVAL lateral revisions.
Refer to DEPARTURE function
Refer to AIRWAYS function
Refer to INSERT NEXT WAYPOINT function
Refer to ARRIVAL function

The flight plan is defined by waypoints, and legs between the waypoints.

FLIGHT PLAN WAYPOINTS

There are four different types of flight plan waypoints:

- Navigation database waypoints
  These waypoints are part of the navigation database, and are inserted in the flight plan by the flight crew as part of a company route, or independently via a lateral flight plan revision. (example: DVL, TOU, LFBO)
- Flight crew created waypoints:

  The flight crew can insert the following self-created waypoints
  - Latitude/Longitude waypoints
  - Place/Distance waypoints
  - Place/Bearing/Distance waypoints
  - Place-Bearing/Place-Bearing waypoints
  - Latitude/Longitude crossing waypoints
  - Radial intercept waypoints
  - Circle intercept waypoints
  - Abeam waypoints

L2 The Latitude/Longitude, Place/Distance, and Place/Bearing/Distance waypoints, created by the flight crew, are stored in the pilot stored elements database.
The other flight crew created waypoints are not stored in the pilot stored database, so that they are only memorized until they are sequenced.
Refer to Pilot stored elements database

L1 - FMS created waypoints
For certain flight plan revisions, the FMS inserts a waypoint, to indicate a revision in the flight plan.
(example: T-P, IN-BND, OUT-BND)
- Pseudo waypoints
Pseudo waypoints are reference points, indicating a vertical flight plan event. They do not influence the lateral flight plan.
(example: (T/C), (SPD), (T/D))

L2 **WAYPOINT SEQUENCING**

In flight, and in the lateral managed mode, a flight plan waypoint is sequenced when the aircraft flies over (or passes nearby) the waypoint.

FROM, TO AND NEXT WAYPOINT

The FROM waypoint of the flight plan is the last sequenced waypoint.

Note: The FROM waypoint is the aircraft present position (P.POS) when the aircraft is in a flight plan discontinuity, and the next flight plan is not activated.
(link to flight plan discontinuity)

The TO waypoint is the next waypoint that will be sequenced.
The NEXT waypoint is the waypoint that will be sequenced after the TO waypoint.

FLIGHT PLAN LEGS

The FMS links the flight plan waypoints with flight plan legs.

There are many different types of flight plan legs, including:
- Course-to-a-fix leg
- Heading leg
- MANUAL leg.
- Holding pattern leg
- Direct leg, etc ...

Most of the leg types cannot be manually created by the flight crew. They are part of the inserted flight plan elements (company route, departure, arrival, holding pattern, airways, etc ...), that are stored in the navigation database.
The flight crew can manually create a holding pattern leg with the HOLD lateral revision. (*Refer to Revision*)

The flight crew can manually create a direct leg:
- Between the aircraft present position, and a waypoint, NAVAID , or airport, with the DIRECT TO lateral revision. (*Refer to Revision*)
- Between a waypoint of the flight plan and another waypoint, NAVAID , or airport, with the INSERT NEXT WAYPOINT lateral revision. (*Refer to Revision*)
- Between two waypoints of the flight plan, by clearing the discontinuity in between with the DELETE lateral revision. (*Refer to Revision*)

ACTIVE LEG

The leg that is actually flown (between the aircraft present position and the TO waypoint), is called the active leg.

FLIGHT PLAN DISCONTINUITY

The flight plan has a discontinuity if no leg is defined between two waypoints.

L2 *Note: For flight plan predictions computation, the system assumes that the aircraft will fly a direct leg between the waypoints that define the discontinuity.*
When the aircraft moves into a flight plan discontinuity, the NAV mode automatically switches to the HDG (TRK) mode. The flight plan FROM waypoint reverts to P.POS.

MANUAL LEG

A manual leg is a constant course, heading, or track leg, without termination point. The leg has to be terminated manually by the flight crew (this explains the term manual leg).
The flight crew cannot manually insert a manual leg, except when using the DIRECT TO — COURSE OUT revision. (*Refer to Revision)* . A manual leg is part of a departure, or arrival procedure.

L2 When the aircraft flies a manual leg, the NAV mode remains engaged. For predictions computation, the FMS assumes that the aircraft will fly a direct leg from its current position to the next waypoint.

Note: The use of the DES mode is not recommended on a manual leg.

L1

CAUTION	Before flying the manual leg, the VD display assumes that the aircraft will fly a direct leg from the starting point of the manual leg, to the next waypoint.

LATERAL FLIGHT PLAN REVISIONS

The flight crew can change the lateral flight plan. A change to the lateral flight plan is called a lateral revision.
Refer to Lateral Revisions

CONTROLS AND INDICATORS

ON THE MFD

The F-PLN page displays textual lateral flight plan data, including:
- All flight plan waypoints and legs
- The track and distance between two waypoints, and the distance to the destination

F-PLN Page



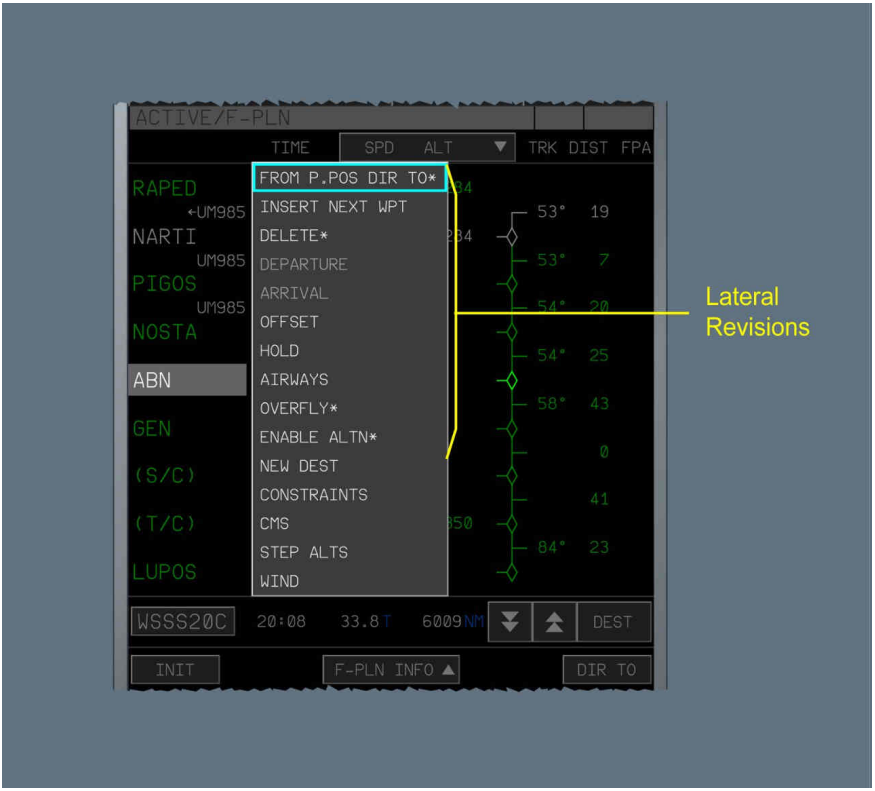
The flight plan waypoints are displayed in green (or cyan for the missed approach and alternate flight plan waypoints). The flight plan leg idents are displayed in white. The lateral distance and track predictions are displayed in green (or cyan for the missed approach and alternate flight plan waypoints).

Note: *All data relating to the active leg and the TO waypoint are displayed in white.*

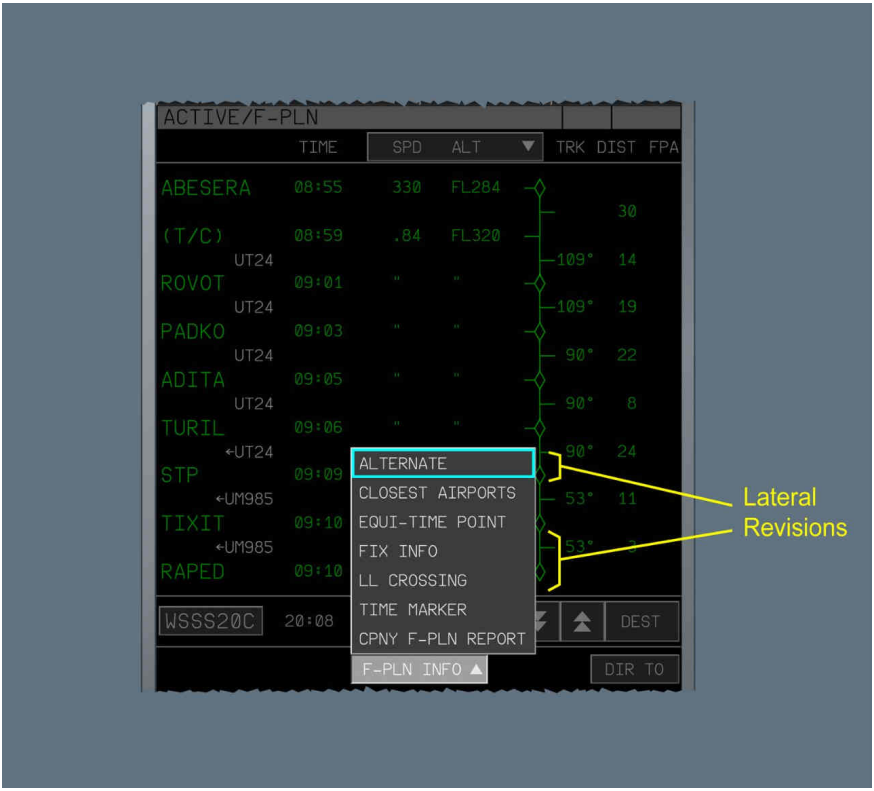
Refer to F-PLN Page

All lateral flight plan revisions can be accessed through the F-PLN page, via the waypoint revisions, or the F-PLN INFO menu.

Waypoint Revisions Menu



F-PLN INFO Menu



ON THE ND

The lateral ND displays graphical and textual flight plan data. The flight crew can control the display of this data via the EFIS CP .
The flight crew can perform three lateral revisions via the lateral ND : DIRECT TO, DELETE and INSERT WAYPOINT.
Refer to Interactive ND

VERTICAL FLIGHT PLAN

Applicable to: ALL

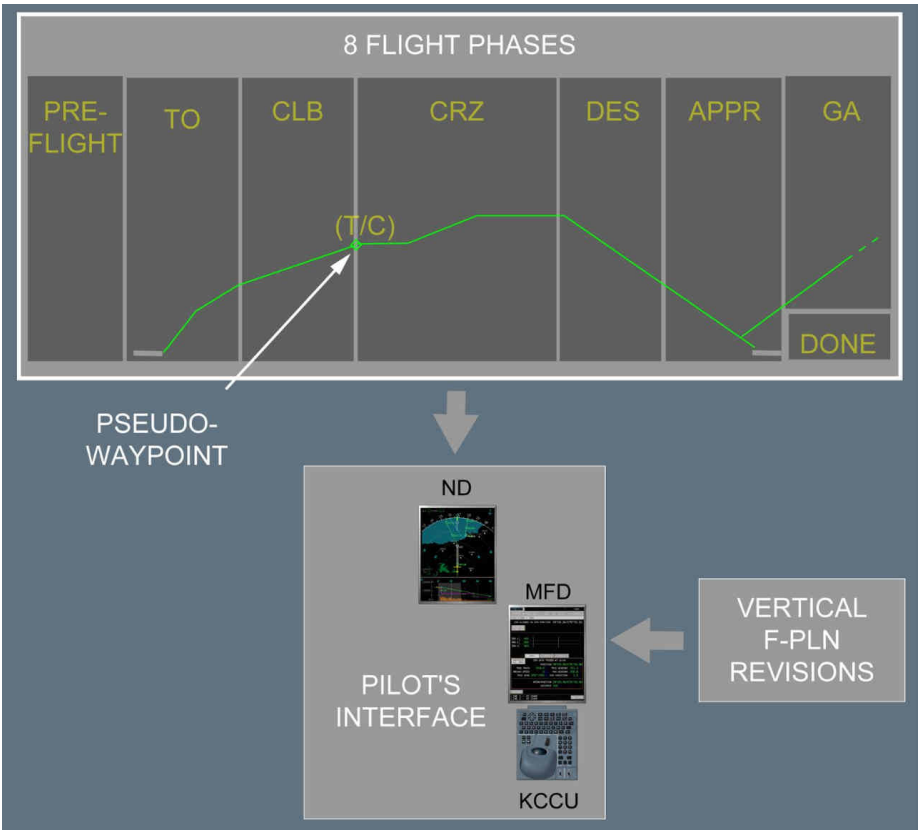
The vertical part of the flight plan, called the vertical flight plan, includes all data required to compute the altitude, speed and time predictions, that build up the vertical profile of the flight plan.
This data is called up from the navigation database or is entered manually by the flight crew.

There are four types of vertical data:

- Overall flight plan data:
  - Cost Index (CI)
  - Cruise flight level, and cruise temperature (CRZ FL , CRZ TEMP)
  - Fuel and load data (ZFW , ZFWCG , Block Fuel)
- Flight phase related performance data:
  - Takeoff thrust setting (TOGA, FLEX, DERATED)
  - Thrust reduction and acceleration altitude
  - Climb, cruise, descent and approach speeds
  - Pressure and temperature at destination.
- Vertical constraints data:
  - Speed limits and constraints
  - Altitude constraints
  - Time constraints
  - Step climb and step descent constraints.
- Wind data:
  Climb, cruise, descent, approach and alternate flight plan winds.

The overall flight plan and flight phase related performance data are described in the Performance chapter. The vertical constraints and wind data are described in the Vertical Revisions chapter.

Vertical Flight Plan



FLIGHT PHASES

When all necessary vertical data is entered, the FMS builds up a vertical profile, divided into eight flight phases: PREFLIGHT, CLIMB, CRUISE, DESCENT, APPROACH, GO AROUND, and DONE.

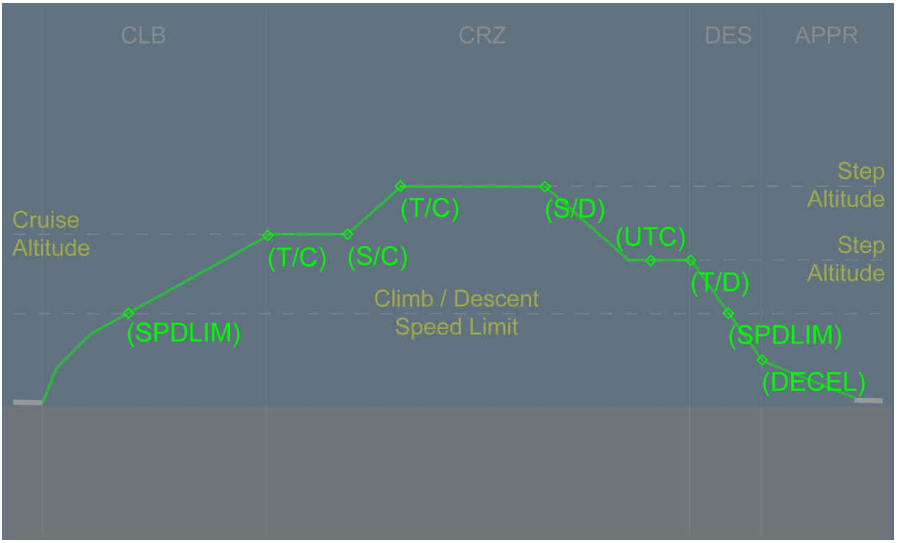
L2 *Note: The FMS flight phases are different from the flight phases used by other aircraft systems.*

L1 For each flight phase, the FMS computes the optimum speed or Mach profile. The FMS switches automatically from one flight phase to another if the transition conditions are fulfilled.
The speed profiles and flight phase switching conditions are described in the performance chapter, *Refer to Flight Phases and Speed Profile .*

PSEUDO-WAYPOINTS

The vertical flight plan is indicated with pseudo-waypoints. Each pseudo-waypoint represents a vertical profile event. As the vertical profile is a result of the FMS predictions computation, the position along the flight plan of the pseudo-waypoints can move after a data change, or flight plan revision.

Pseudo-waypoints



On the MFD , the pseudo-waypoints are displayed between brackets on the F-PLN page. Each pseudo waypoint has time, speed, altitude and wind predictions.
On the ND (lateral and vertical), the pseudo-waypoints are indicated with their dedicated symbols.
(*Refer to Vertical Flight Plan - Controls and Indicators*)

SPEED LIMIT (SPD LIM)

The point where the aircraft will cross the climb or descent speed limit altitude.

L2 The flight crew defines the climb and descent speed limit on the SPD panel of the VERT REV page. (*Refer to SPD Panel*)

L1 TOP OF CLIMB (T/C)

The point where the aircraft will reach the cruise altitude (or the descent path, if this is reached before cruise altitude), or the step climb altitude, if there is one.

L2 The flight crew can change the cruise flight level on the PERF page (link to PERF page), and can define a climb step on the STEP ALTs panel on the VERT REV page. (*Refer to STEP ALTs Panel*)

L1 **STEP CLIMB (S/C) OR (OPT)**

The point where the step climb is planned to begin.

Note: *If the step climb is defined at a waypoint, the step climb pseudo waypoint is displayed on the line below that waypoint on the F-PLN page.*
if the step climb start waypoint is an optimum start point, the pseudo-waypoint is (OPT).

L2 The flight crew defines a climb step on the STEP ALTs panel on the VERT REV page. (*Refer to STEP ALTs Panel*)

L1 **STEP DESCENT (S/D)**

The point where the step descent is planned to begin.

Note: *On the F-PLN page, the step descent pseudo waypoint is displayed on the line below the flight plan start waypoint.*

L2 The flight crew defines a descent step on the STEP ALTs panel on the VERT REV page. (*Refer to STEP ALTs Panel*)

L1 **TIME MARKER (UTC)**

The point where the aircraft will be at the entered UTC time.

L2 The flight crew enters a time marker on the LL XING - TIIME MKR page. (*Refer to Page*)

L1 **TOP OF DESCENT (T/D)**

The point where the descent is planned to begin.

DECELERATION POINT (DECEL)

The point where the aircraft will decelerate for descent and landing.

VERTICAL FLIGHT PLAN REVISIONS

The flight crew can change the vertical flight plan. A change to the vertical flight plan is called a vertical revision.
Refer to Vertical Revisions

CONTROLS AND INDICATORS

ON THE MFD

The F-PLN page displays the textual vertical data, associated with the entered lateral flight plan.
The F-PLN displays, for each lateral flight plan waypoint:

- The time prediction, in Universal Time Coordinates (UTC)
- The speed prediction (SPD)
- The altitude prediction (ALT)
- The wind data (WIND)

A flight plan leg, that is part of the arrival procedure, can also have an associated Flight Path Angle (FPA).

F-PLN Page



F-PLN Page - WIND predictions



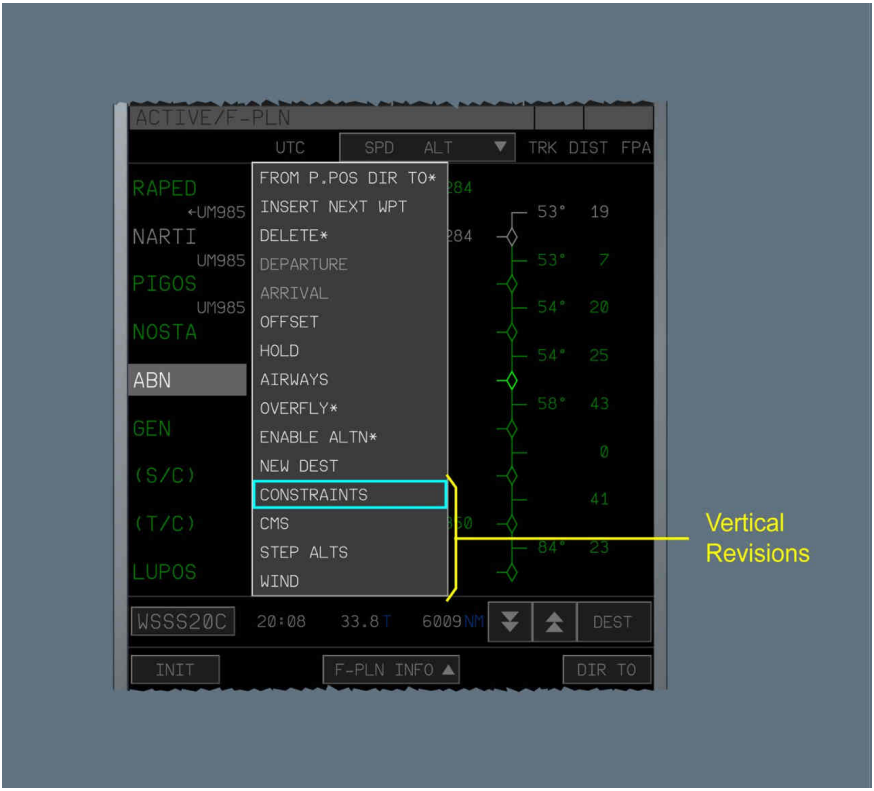
The F-PLN page also displays the pseudo-waypoints, and the speed and altitude symbols.
A pseudo-waypoint is displayed between brackets, and has time, speed, altitude, and wind predictions.
A speed, or altitude constraint is indicated with a star next to the speed, or altitude prediction.

Pseudo-waypoint and Constraint Symbol



Refer to Page
All vertical flight plan revisions can be accessed through the F-PLN page, via the waypoint revisions menu, or by clicking directly on the time, speed, altitude, or wind prediction.

Waypoint Revisions Menu



ON THE ND

The lateral ND displays pseudo-waypoints, and speed and altitude constraints. The flight crew can control the display of this data via the EFIS CP .
The VD displays the profile of the vertical flight plan in relation to weather, terrain and safety altitudes data.
No vertical flight plan revisions are possible via the ND or VD .

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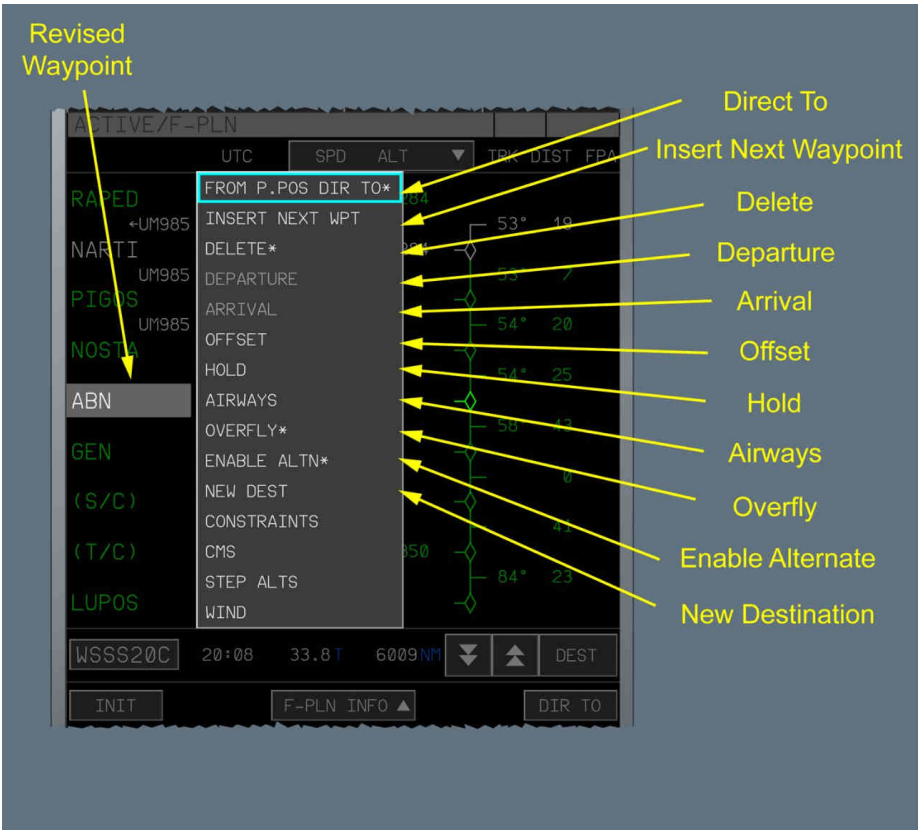
Lateral Flight Plan Revisions

LATERAL REVISIONS - INTRODUCTION

Applicable to: ALL

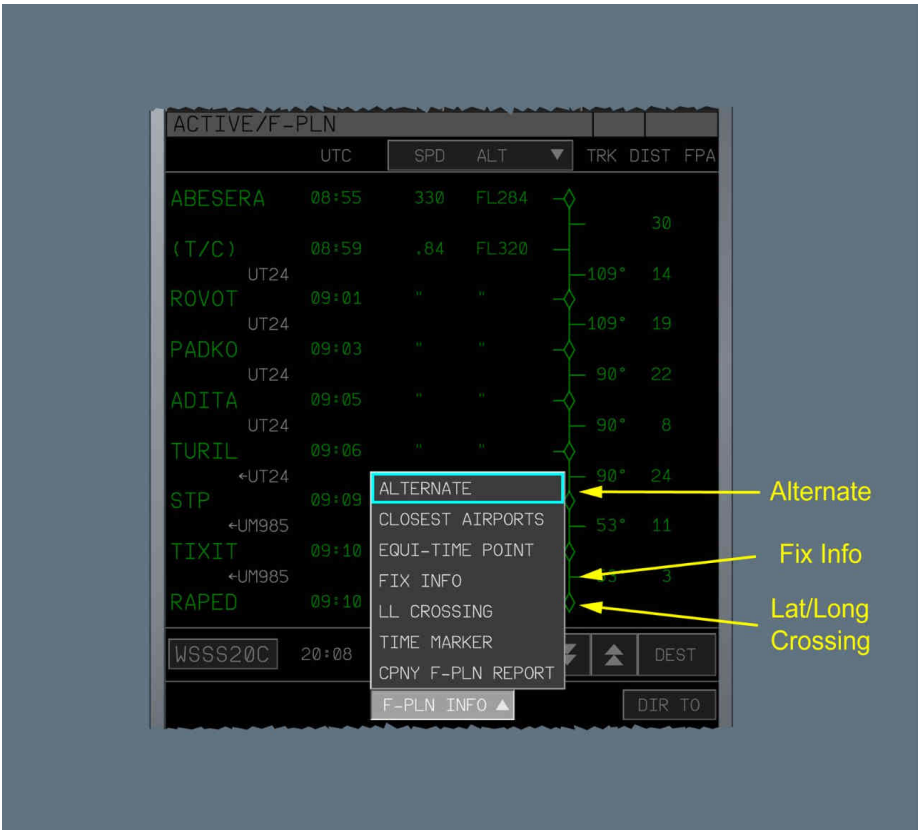
A change to the lateral flight plan is called a lateral revision.
All lateral revisions can be reached via the F-PLN page on the MFD .
The starting point for most lateral revisions is a waypoint on the flight plan, called the revised waypoint. Clicking on the revised waypoint, opens the waypoint revisions menu. The upper part of the waypoint revisions menu displays the lateral revisions, indicated in the following illustration:

Waypoint Revisions Menu



Other lateral revisions are not related to a specific waypoint, but to the entire flight plan. They are accessed through the F-PLN INFO menu on the F-PLN page. The global lateral flight plan revisions are indicated in the following illustration:

F-PLN INFO Menu



The direct to (DIR TO), insert next waypoint (INSERT NEXT WPT), and delete (DELETE) revisions can also be performed via the interactive lateral ND . Clicking on the revised waypoint, on the flight plan on the lateral ND , opens the waypoint revisions menu with the three lateral revisions.

LATERAL REVISION AND SECONDARY FLIGHT PLAN

All lateral revisions (except fix info) are available on the active and secondary flight plans.

DIRECT TO (DIR TO)

Applicable to: ALL

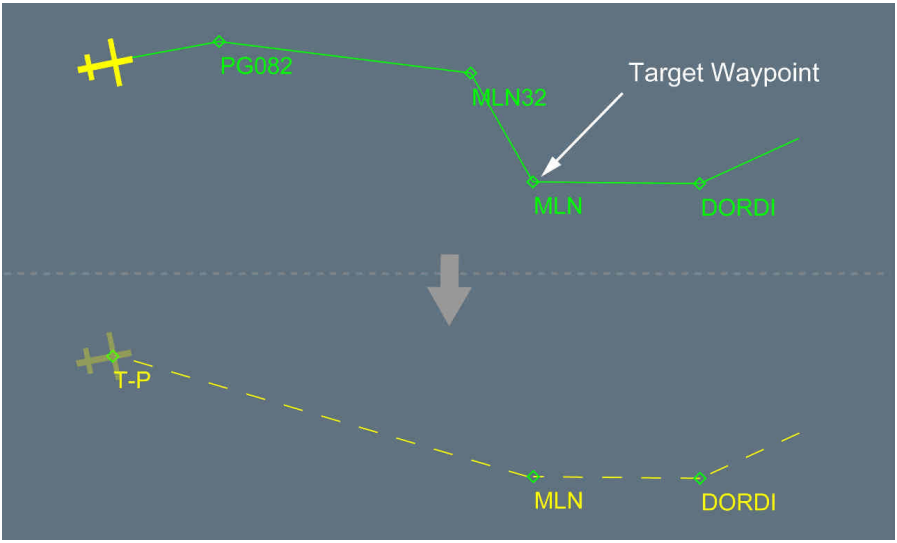
PURPOSE

The flight crew uses the direct to (DIR TO) revision to create a direct (great circle) leg from the aircraft present position to:

- A flight plan waypoint
- Any navigation database waypoint, airport, or NAVAID
- A latitude/longitude (LL), place/bearing/distance (PBD), or place-bearing/place-bearing (PB / PB) waypoint.

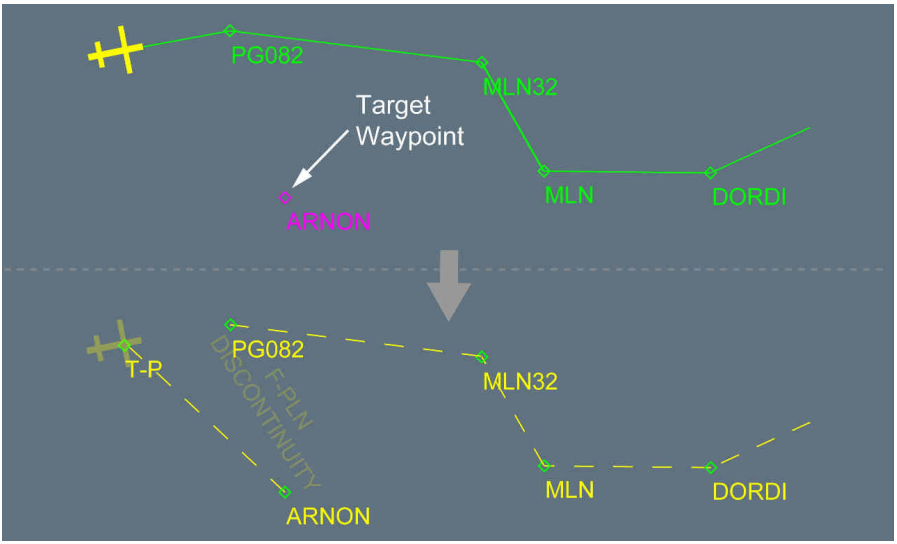
A DIR TO a flight plan waypoint creates a direct leg between the aircraft present position and the selected target waypoint. The flight plan waypoints between the aircraft present position and the selected target waypoint are deleted.

DIR TO a Flight Plan Waypoint



A DIR TO any other waypoint, that is not on the flight plan, creates a direct leg between the aircraft present position and the selected target waypoint, and a flight plan discontinuity between the target waypoint and the former TO waypoint.

DIR TO a Waypoint that is not in the Flight Plan



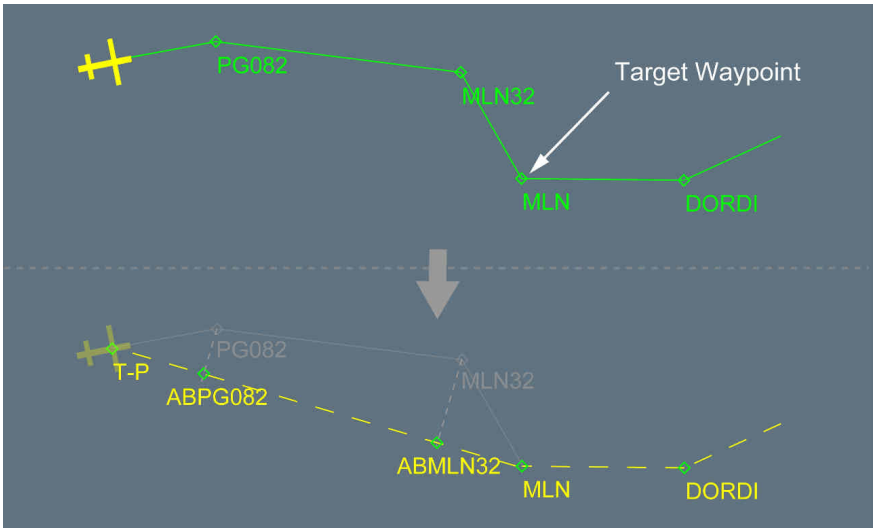
If the lateral mode is HDG / TRACK or LOC, the NAV mode engages automatically when the DIR TO is inserted.

The flight crew has three options for creating the direct leg:
- DIR TO with abeam points (DIRECT WITH ABEAM), or
- DIR TO with inbound course (CRS IN), or
- DIR TO with outbound course (CRS OUT).

DIRECT WITH ABEAM

This option creates abeam waypoints along the direct leg. Abeam waypoints are the projections of the flight plan waypoints on the direct leg, that are between the aircraft present position and the selected target waypoint. The initial flight plan waypoints are deleted.

DIRECT WITH ABEAM



L2 Abeam waypoints are part of the flight plan, but are not stored in the pilot-stored elements database. This means that the abeam waypoints can be used for every flight plan revision (except AIRWAYS), until they are sequenced. As soon as they are sequenced, they are no longer memorized by the FMS .

L3 When a latitude/longitude crossing, circle/radial intercept, or abeam waypoint is projected, it is recomputed, using the initial latitude/longitude, and reference fix waypoint.
Speed, altitude, and time constraints are not transferred to the abeam waypoint.
Wind data is transferred, when the distance between the abeam and the initial waypoint is less than 100 nm .

L1 **CRS IN**

This option creates a direct leg from the aircraft present position to intercept an inbound course (selected by the flight crew) of the target waypoint.
The track of the direct leg is the current aircraft track.

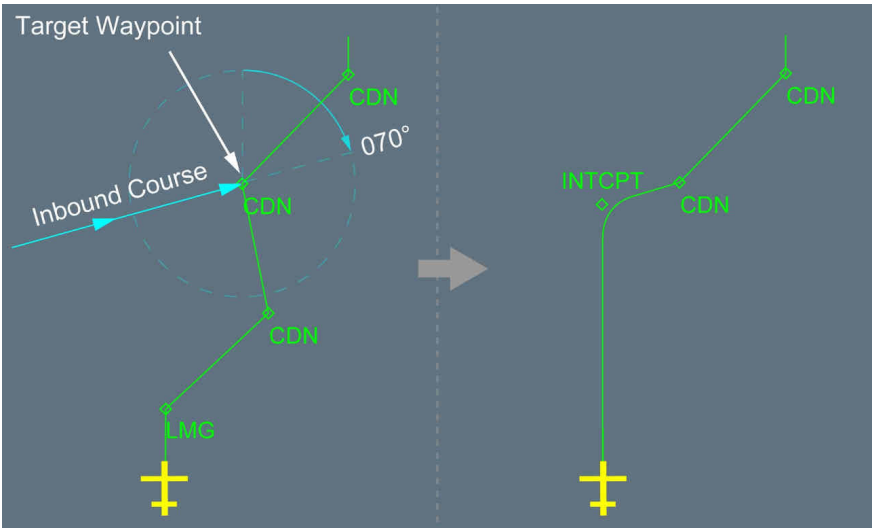
If the angle between the direct leg and the inbound course is less than 160 ° :
- An intercept point (INTCPT) is computed
- The lateral HDG mode is engaged and NAV is armed.

Note: - *The INTCPT waypoint is recomputed, when the flight crew changes the aircraft track.*
- *The NAV mode engages automatically, when INTCPT is sequenced.*

If the angle between the direct leg and the inbound course is more than 160 ° :
- No intercept point (INTCPT) is computed, and
- The lateral HDG mode is engaged, and NAV is armed.

Note: *NAV mode does not engage if the angle between the direct leg, and the inbound course remains more than 160 ° .*

CRS IN



L2 When the flight crew inserts a DIR TO - CRS IN, the ADJUST DESIRED TRK OR HDG message is displayed. (*Refer to Message)*

This message informs the flight crew that it is possible to adjust the aircraft heading/track:
- To enable the computation of the INTCPT (if, after the heading/track change, the intercept angle becomes less than 160 °), or
- To change the position of the INTCPT (if it was previously computed).

L1 **CRS OUT**

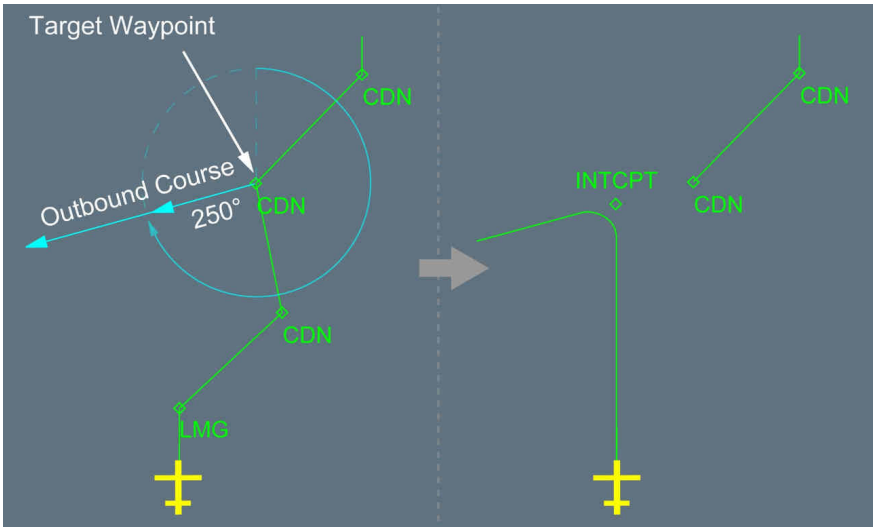
This option creates a direct leg from the aircraft present position to intercept an outbound course (selected by the flight crew) of the target waypoint.

The track of the direct leg is the current aircraft track.

If the direct leg is not parallel with the outbound course:
- An intercept point (INTCPT) is computed,
- The lateral HDG mode is engaged and NAV is armed.

Note:
- *The INTCPT waypoint is recomputed when the flight crew changes the aircraft track.*
- *The NAV mode engages automatically when INTCPT is sequenced.*
- *When the INTCPT is sequenced, the aircraft is on the selected outbound course leg, which is a MANUAL leg. (Refer to Manual Leg)*

CRS OUT



L2 When the flight crew inserts a DIR TO - CRS OUT, the ADJUST DESIRED TRK OR HDG message is displayed. (*Refer to Message)*
This message informs the flight crew that it is possible to adjust the aircraft heading/track, to change the position of the INTCPT (if it was previously computed).

DIR TO REVISION AND SECONDARY FLIGHT PLAN

The DIR TO revision is not available on the secondary flight plans.

DIR TO REVISION AND TEMPORARY FLIGHT PLAN

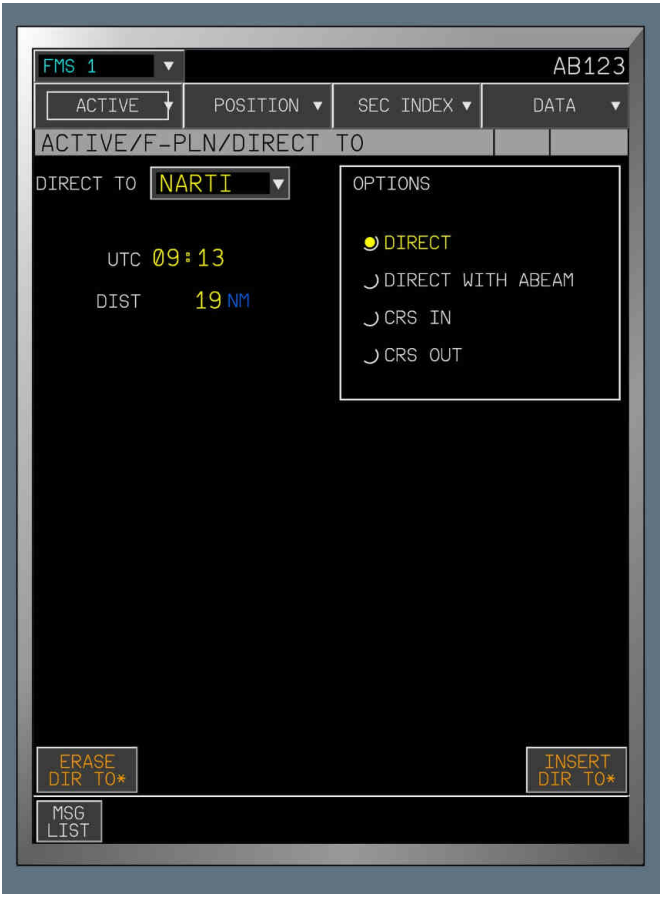
The DIR TO revision creates a temporary flight plan.
No other revisions can be made on this temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can insert a DIR TO leg on the ACTIVE / F-PLN / DIRECT TO page.

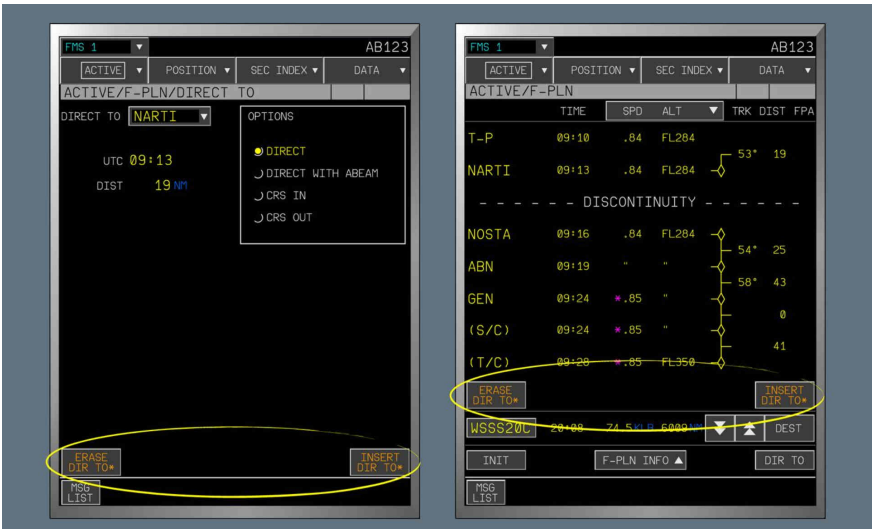
DIRECT TO Page



Refer to DIRECT TO page

The temporary flight plan created by the DIR TO revision can be inserted on the DIRECT TO, or ACTIVE / F-PLN page.

INSERT/ERASE DIRECT TO



Refer to F-PLN page

The abeam waypoints of a DIRECT WITH ABEAM are not displayed in the temporary flight plan. The ABEAM PTS indicator is displayed between the turning point (T-P) and the target waypoint. When the temporary flight plan is inserted, the indicator disappears and the abeam waypoints appear.

DIRECT WITH ABEAM



ASSOCIATED MESSAGES

Refer to ADJUST DESIRED TRK OR HDG

INSERT NEXT WAYPOINT (INSERT NEXT WPT)

Applicable to: ALL

PURPOSE

The flight crew uses the insert next waypoint (INSERT NEXT WPT) revision to insert a waypoint after the revised waypoint.

The flight crew can insert:

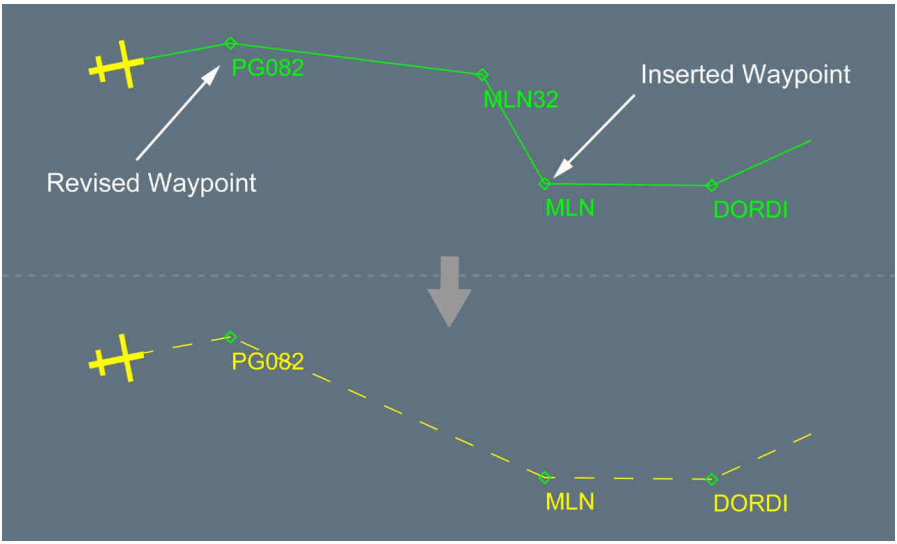
- A flight plan waypoint
- Any navigation database waypoint, airport, or NAVAID
- A latitude/longitude (LL), a place/bearing/distance (PBD), a place-bearing/place-bearing (PB/PB), or a place/distance (PD) waypoint.

L2 *Note:*

- *A PD waypoint, with a negative distance (example: LMG/-15), is inserted "before" the revised waypoint*
- *The "place" waypoint needs to be the revised waypoint*
- *The distance of the PD waypoint is limited so that the PD cannot be before (after) the waypoint that precedes (follows) the revised waypoint.*

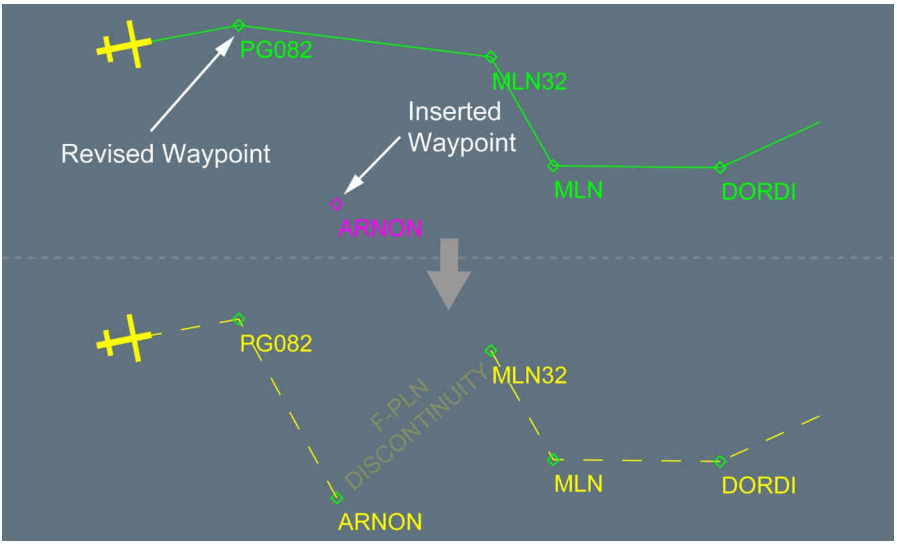
L1 If the flight crew inserts a flight plan waypoint, a direct leg is created between the revised waypoint and the inserted waypoint. All waypoints between the revised waypoint, and the inserted waypoint are deleted.

Insertion of a Flight Plan Waypoint



If the flight crew inserts a waypoint that is not in the flight plan, a direct leg is created between the revised waypoint and the inserted waypoint.

Insertion of a Waypoint



L2 The flight crew can insert a waypoint on any waypoint of the flight plan. To insert a waypoint on the FROM waypoint, the flight crew must first engage the HDG/TRK mode.

INSERT NEXT WAYPOINT REVISION AND SECONDARY FLIGHT PLAN

The INSERT NEXT WPT revision is available on the active (or temporary) flight plan, and on the secondary flight plans.

INSERT NEXT WAYPOINT REVISION AND TEMPORARY FLIGHT PLAN

The INSERT NEXT WPT revision creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The INSERT NEXT WPT revision is the second revision in the waypoint revisions menu on the ACTIVE (or SEC) / F-PLN page.
When the fight crew selects the INSERT NEXT WPT revision, the Insert Next Waypoint window appears on the flight plan page.
Refer to Insert Next Waypoint Window

Insert Next Waypoint



DELETE

Applicable to: ALL

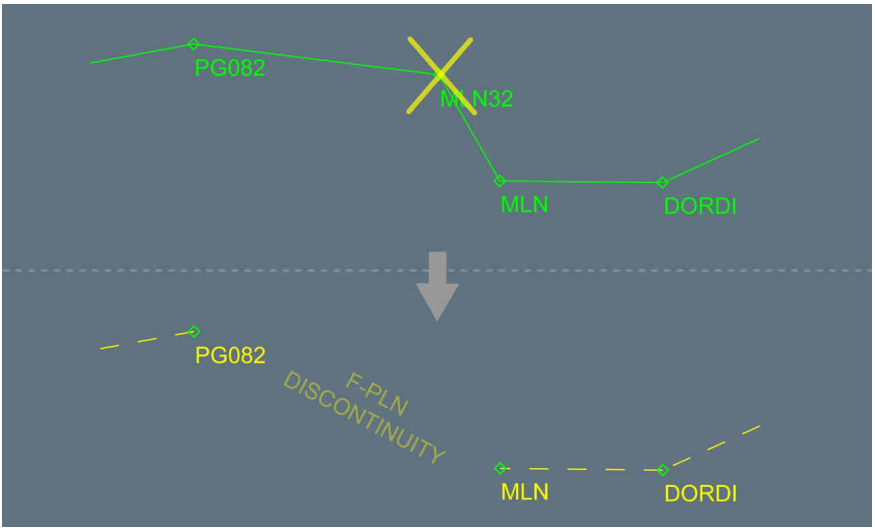
PURPOSE

The flight crew uses the delete revision (DELETE) to delete a flight plan waypoint or discontinuity.

DELETION OF A WAYPOINT

Deletion of a waypoint removes the waypoint from the flight plan and inserts a discontinuity in its place.

Deletion of a Waypoint



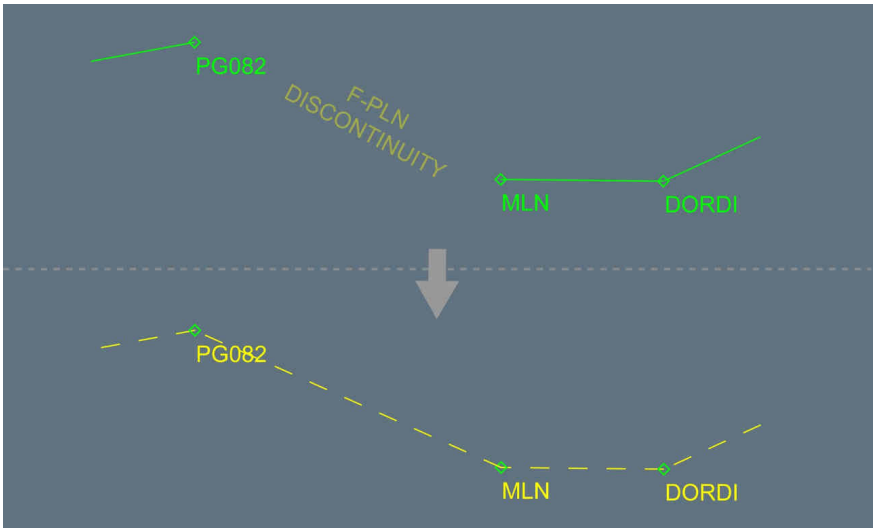
L2 In NAV mode, the flight crew can delete any waypoint on the flight plan, except the FROM and TO waypoint. To delete the FROM and TO waypoint, the flight crew should select the HDG/TRACK mode first.

L3 *Note:*
- *Deletion of the T-P, when an offset or holding pattern is active, removes the offset or the holding pattern from the flight plan.*
- *Deletion of a holding fix, removes the holding pattern from the flight plan, but does not create a discontinuity.*

L1 ## DELETION OF A DISCONTINUITY

Deletion of a discontinuity removes the discontinuity from the flight plan and replaces it with a direct leg, between the waypoint that was before the discontinuity and the waypoint that was after the discontinuity.

Deletion of a Discontinuity



L2 The flight crew can delete any discontinuity in the flight plan, except a discontinuity following P.POS, or a manual leg.

DELETE REVISION AND SECONDARY FLIGHT PLAN

The delete revision is available on the active (or temporary), and secondary flight plans.

DELETE REVISION AND TEMPORARY FLIGHT PLAN

Deletion of a waypoint, or discontinuity, creates a temporary flight plan.

CONTROLS AND INDICATORS

The flight crew can delete a waypoint via the MFD or on the lateral ND . However, a discontinuity can be deleted via the MFD only.

ON THE MFD

The delete revision is the third revision (DELETE) in the waypoint revisions menu on the ACTIVE (or SEC) / F-PLN page.

Delete Revision



L2 For the waypoints that cannot be deleted, the delete revision is inhibited in the waypoint revisions menu.

L1 **ON THE ND**

The delete revision is the third revision in the waypoint revisions menu for a waypoint on the active (or temporay), and secondary flight plan.
For more information on the Interactive ND - DELETE Revision, *Refer to DELETE Revision*

DEPARTURE

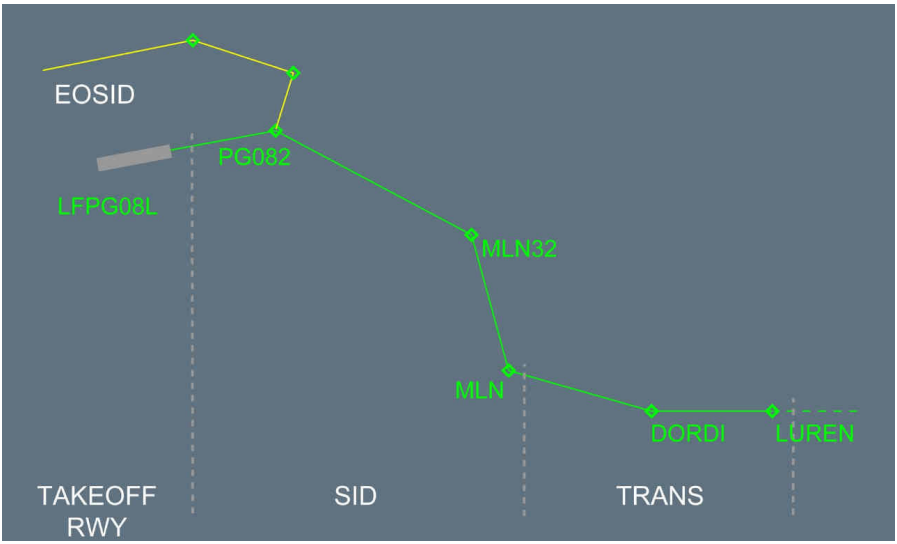
Applicable to: ALL

PURPOSE

The flight crew uses the departure revision (DEPARTURE) to insert, or change, the three following elements of the departure procedure:

- The takeoff runway (and Engine Out Standard Instrument Departure (EOSID))
- The Standard Instrument Departure (SID)
- The departure transition (TRANS).

Departure Procedure



The three above-mentioned elements are part of the navigation database. (*Refer to Navigation Database)*

The flight crew selects a compatible runway, SID , and TRANS . The FMS will link the elements accordingly, starting with the takeoff runway, up to the en-route waypoints.

The flight crew can choose to have no SID and/or no TRANS , by selecting the NONE option. This option is selected automatically if, for the selected takeoff runway, no SID and/or TRANS are available in the database.

If the flight crew chooses to have no SID , the FMS inserts a flight plan leg after the takeoff runway axis. The leg stops at 1 500 ft MSL , and is followed by a discontinuity.

Note: When a flight plan has a DEPARTURE procedure (RWY+SID+TRANS), and the flight crew changes the RWY, the FMS may automatically change or delete some elements of the SID. As a result, if the flight crew changes the RWY, they should check all of the elements of the DEPARTURE procedure, and correct them, if necessary.

L3 HOW THE FMS LINKS THE DIFFERENT DEPARTURE ELEMENTS

The FMS searches for a waypoint of the next element (for example, the TRANS), that is identical to the last waypoint of the previous element (for example, the SID). The FMS links the two elements (the SID and TRANS) at the common waypoint, and ignores all the waypoints of the next element (the TRANS) before the common point.
If no common waypoint is found between the departure procedure and the en-route flight plan, a discontinuity is inserted between them.

L2 DEPARTURE REVISION AND SECONDARY FLIGHT PLAN

The DEPARTURE function is available on the active (or temporary), and secondary flight plans.

DEPARTURE REVISION AND TEMPORARY FLIGHT PLAN

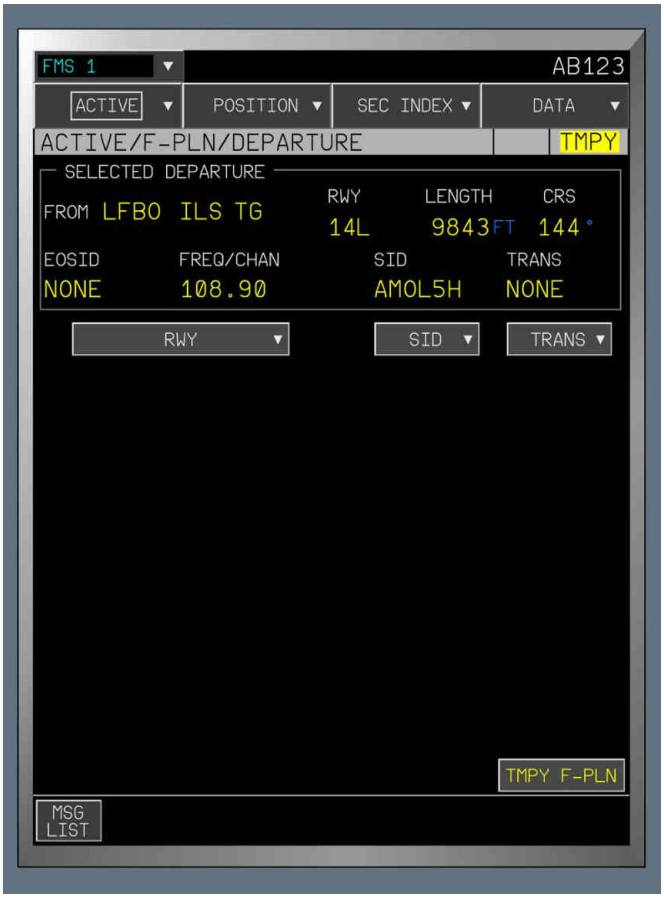
The insertion of the entire departure procedure, or a change to an element of the departure procedure, creates a temporary flight plan. In both cases, the entire departure revision is considered as a single lateral flight plan revision.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can insert, or change, the departure procedure on the ACTIVE (or SEC) / F-PLN / DEPARTURE page.

DEPARTURE Page



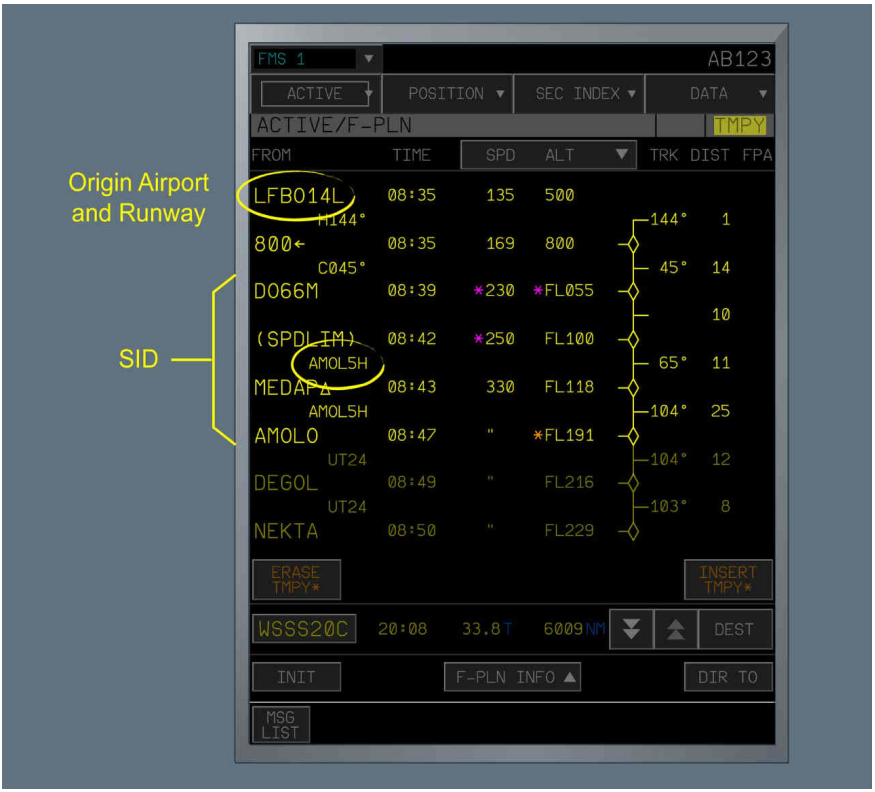
Refer to DEPARTURE page

The flight crew can access the DEPARTURE page via the F-PLN page, by selecting the DEPARTURE revision in the waypoint revisions menu for the primary (or alternate) origin airport.

The flight crew checks the result of the departure selection on the ACTIVE (or SEC) / F-PLN page.

Refer to F-PLN page

F-PLN Page



ON THE ND

The departure procedure is displayed graphically on the ND .

ARRIVAL

Applicable to: ALL

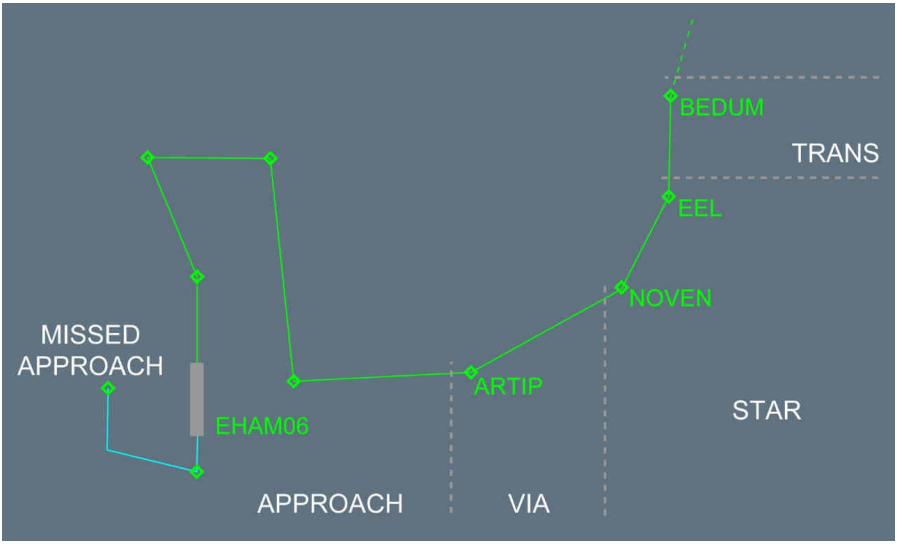
PURPOSE

The flight crew uses the arrival revision (ARRIVAL) to insert, or change, the following four elements of the arrival procedure:

- The final approach (APPR), including the landing runway and missed approach
- The approach via (VIA)

- The standard arrival (STAR)
- The arrival transition (TRANS).

Arrival Procedure



The four above-mentioned elements are part of the navigation database. (*Refer to Navigation Database)*
The flight crew selects a compatible approach: STAR , VIA, and TRANS . The FMS will link the elements accordingly, starting with the en-route waypoints, up to the landing runway.
The flight crew can choose to have no STAR , no VIA and/or no TRANS , by selecting the NONE option. This option is selected automatically if, for the selected landing runway, no STAR , VIA and/or TRANS are available in the database.

Note: *When a flight plan has an ARRIVAL procedure (APPROACH+VIA+STAR+TRANS), and the flight crew changes the APPROACH, the FMS may automatically change or delete some elements of the VIA or STAR. As a result, if the flight crew changes the APPROACH, they should check all of the elements of the ARRIVAL procedure, and correct them, if necessary.*

L3 HOW THE FMS LINKS THE DIFFERENT ARRIVAL ELEMENTS

The FMS searches for a waypoint of the next element (for example, the STAR), that is identical to the last waypoint of the previous element (for example, the TRANS). The FMS links the

two elements (the STAR and the TRANS) at the common waypoint, and disregards all the waypoints of the next element (the STAR) before the common point.
If no common waypoint is found between two elements, a discontinuity is inserted between them.

L2 **ARRIVAL REVISION AND SECONDARY FLIGHT PLAN**

The ARRIVAL revision is available on the active (or temporary), and secondary flight plans.

ARRIVAL REVISION AND TEMPORARY FLIGHT PLAN

The selection of the entire arrival procedure, or a change to an element of the arrival procedure, creates a temporary flight plan. In both cases, the entire arrival revision is considered as a single lateral flight plan revision.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can insert, or change, the arrival procedure on the ACTIVE (or SEC) / F-PLN / ARRIVAL page.

ARRIVAL Page

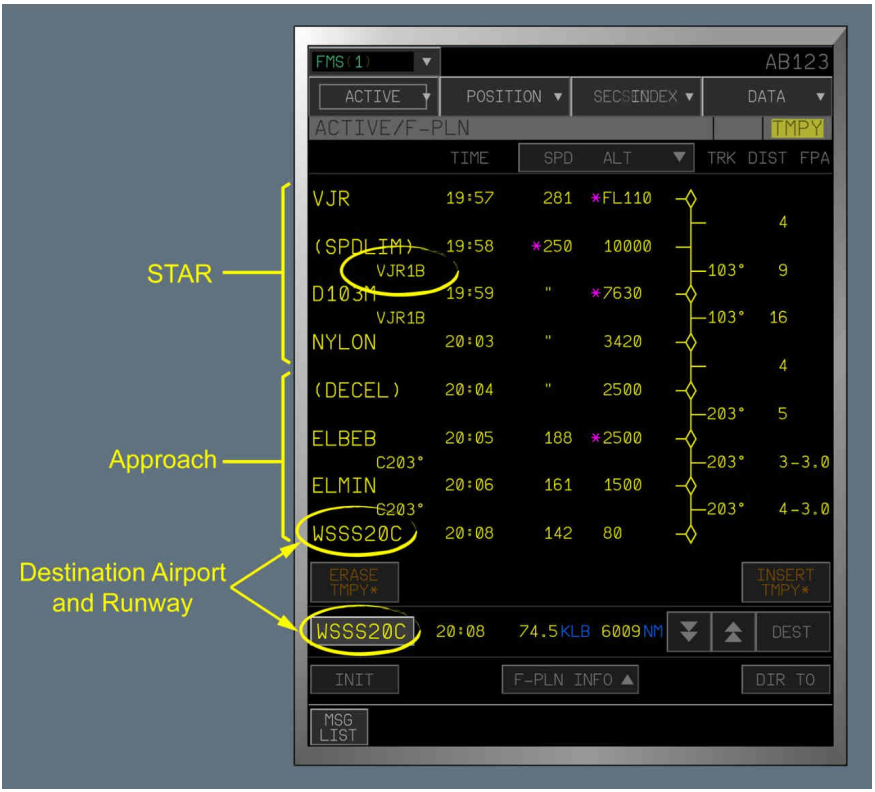


Refer to ARRIVAL page

The flight crew can access the ARRIVAL page via the F-PLN page, by selecting the ARRIVAL revision in the waypoint revisions menu of the primary (or alternate) destination airport, or by clicking directly on the destination airport of the destination zone, at the bottom of the F-PLN page.

The flight crew can check the result of the arrival selection on the ACTIVE (or SEC) / F-PLN page.

F-PLN Page



Refer to F-PLN page

ON THE ND

The arrival procedure is displayed graphically on the ND .

OFFSET

Applicable to: ALL

PURPOSE

The flight crew uses the offset revision (OFFSET) to create a parallel path from the original lateral flight plan. The offset is defined by:

- The start waypoint

L2 The start waypoint on the flight plan is where the aircraft leaves the original flight plan to join the offset path. The start waypoint may be the aircraft's present position.

L1 - The end waypoint

L2 The end waypoint on the flight plan is the first point where the aircraft is back on the original flight path.

L1 - The lateral offset distance

L2 The lateral offset distance is the lateral distance between the offset path and the original flight plan.

L1 - The offset side

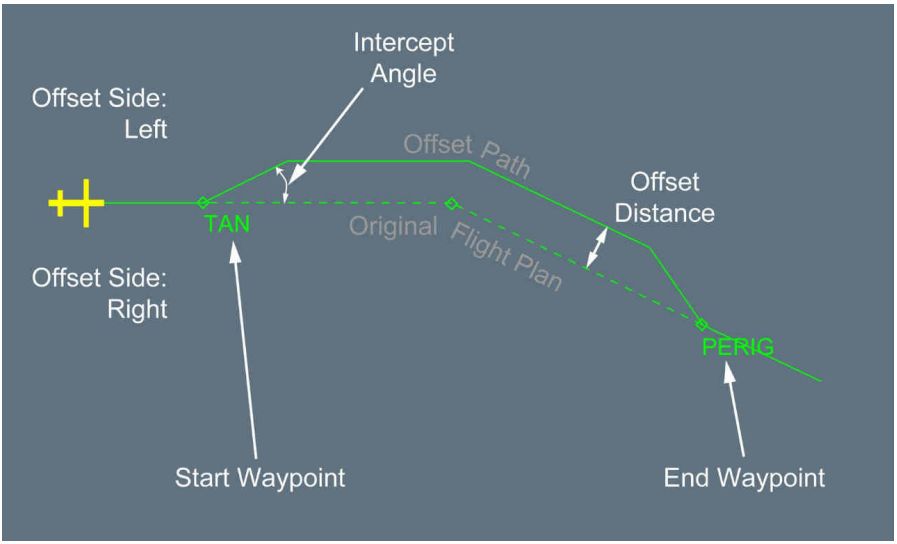
L2 The offset side indicates whether the offset path is to the left or to the right of the original flight plan.

L1 - The intercept angle

L2 The offset intercept angle is the angle between the original flight plan, and the transition trajectory from the original flight plan to the offset path (or vice versa).

L1 *Note: The transition trajectory between the original flight plan and the offset path can be along more than one flight plan leg, if necessary.*

Offset Revision



The flight crew can create only one offset path in the flight plan.
The flight crew can change or delete an existing offset, even if the aircraft is already flying the offset trajectory.

Note: An existing offset path can be deleted automatically, after a flight plan revision that makes the offset path no longer possible. (example: Deletion of the start and end waypoint)

L2 **OFFSET REVISION AND SECONDARY FLIGHT PLAN**

The offset revision is available on the active (or temporary), and secondary flight plans.

OFFSET REVISION AND TEMPORARY FLIGHT PLAN

The insertion of an offset path, or a change of an existing offset path, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete the offset path on the ACTIVE (or SEC) / F-PLN / OFFSET page.

OFFSET Page



Refer to OFFSET page

The flight crew can access the OFFSET page via the F-PLN page, by selecting the OFFSET revision in the waypoint revisions menu.

On the F-PLN page, a left or right arrow next to the leg data indicates that there is a left or right side offset defined on the leg. When the aircraft is currently flying the offset, the MFD page title displays OFFSET NNX, where NN is the lateral offset distance, and X is the offset side (example: OFFSET 10R).

F-PLN Page



ON THE ND

The ND always displays both the offset path (solid line) and the original flight plan (dashed line). If the aircraft is currently flying the offset, the ND displays OFST XNN in the bottom left corner, where X is the offset side and NN the lateral offset distance.

Note: *This label is not displayed, if the FMS MORA is displayed on the ND .*

HOLD

Applicable to: ALL

PURPOSE

The flight crew uses the hold revision to:
- Insert a holding pattern in the flight plan
- Change an already existing holding pattern.

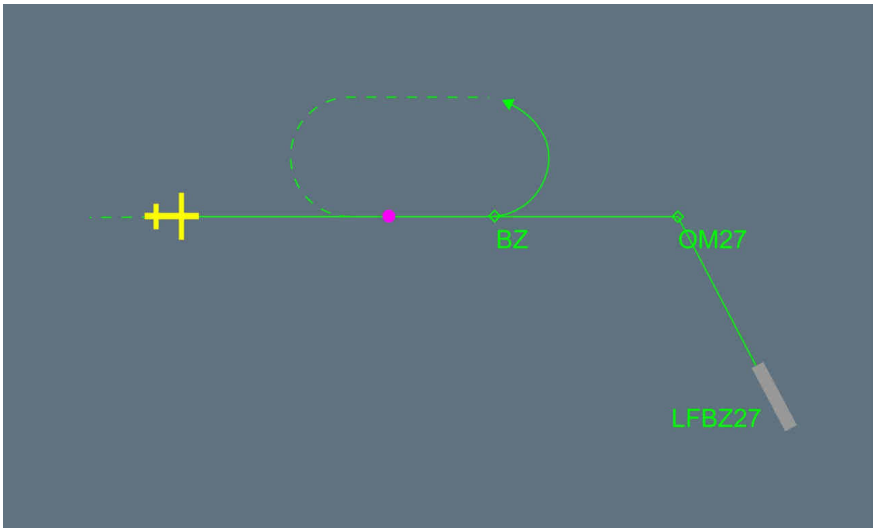
The FMS has three types of holding pattern, based on three different ways to exit the hold:
- Hold to Fix (HF)
- Hold to Altitude (HA)
- Hold with Manual termination (HM).

HF , and HA are always part of a departure or arrival procedure, and cannot be created by the flight crew. A HM may be part of an arrival procedure, or can be created by the flight crew at any waypoint of the flight plan.

Note: *The term "hold fix" represents the entry and exit waypoint of the holding pattern.*

HOLD TO FIX (HF)

Hold To Fix

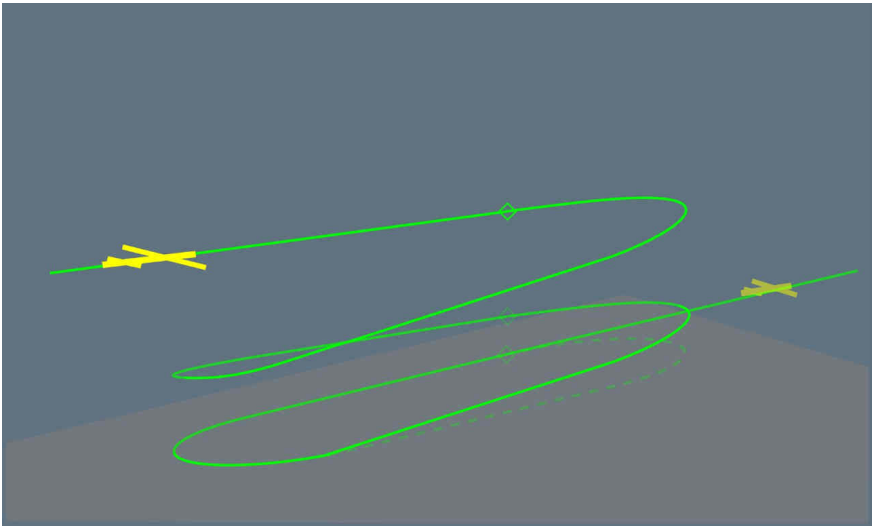


The aircraft flies the holding pattern one time, and exits it automatically at the hold fix.

The HF is part of a navigation database departure, or arrival procedure, and cannot be created by the flight crew.
The flight crew can remove the holding pattern from the flight plan, by deleting the hold fix.

HOLD TO ALTITUDE (HA)

Hold To Altitude



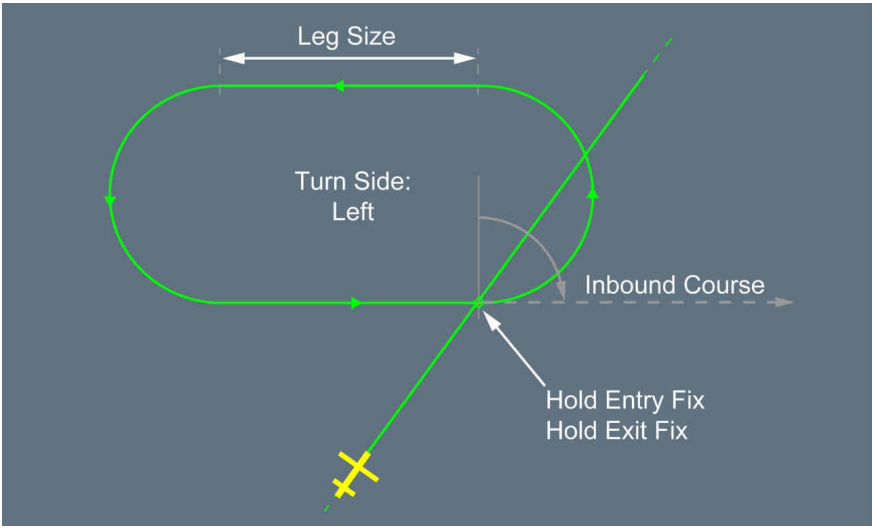
The aircraft flies the holding pattern until it reaches the specified altitude. Then, the aircraft exits the hold automatically at the hold fix.
The HA is part of a navigation database departure, or arrival procedure, and cannot be created by the flight crew.
The flight crew can remove the holding pattern from the flight plan, by deleting the hold fix.

HOLD WITH MANUAL TERMINATION (HM)

The aircraft flies the holding pattern until the flight crew decides to exit.
The flight crew may enter manually a HM at P.POS , or at any waypoint of the flight plan to comply with a defined procedure, a clearance limit, or an operational need, such as: Losing altitude, holding for weather improvement, or absorbing an ATC delay.
An HM may also be part of a navigation database arrival procedure.
The flight crew can always change an HM .

The HM is defined by:
- The hold fix
- The inbound course
- The turn side
- The leg size (in time, or distance).

Hold With Manual Termination



The flight crew inserts an HM into the flight plan, by performing a lateral revision on the flight plan waypoint, where the holding pattern should start. The revised waypoint becomes the hold fix.
To insert an HM at P.POS , the flight crew performs the lateral revision on the flight plan FROM waypoint.
The flight crew can insert three different types of HM :

DATABASE HOLD

The FMS navigation database, may have an HM , associated to the revised waypoint.
The inbound course, turn side, and leg size are taken from the navigation database.

COMPUTED HOLD

The FMS automatically creates a holding pattern, associated to the revised waypoint, and proposes it to the flight crew.

L2 This computed hold has the following parameters:
- Inbound course: Track of the flight plan leg preceding the holding fix, or the aircraft bearing if the holding fix is P.POS
- Turn side: RIGHT
- Leg size: 1 minute if the predicted aircraft altitude at the hold is below 14 000 ft , or 1.5 min if the altitude is above 14 000 ft .

L1 MODIFIED HOLD

The flight crew can always change one or more parameters of a database or computed hold. The HM is then called “modified hold”.

PREDICTIONS AND GUIDANCE FOR HF AND HA

The FMS considers a HF , or HA , as a normal flight plan leg.

The predicted speed on the hold leg is the lowest of:
- ICAO hold speed limit
- Maximum endurance speed
- Speed constraint or speed limit (if any)
- Navigation database hold speed.

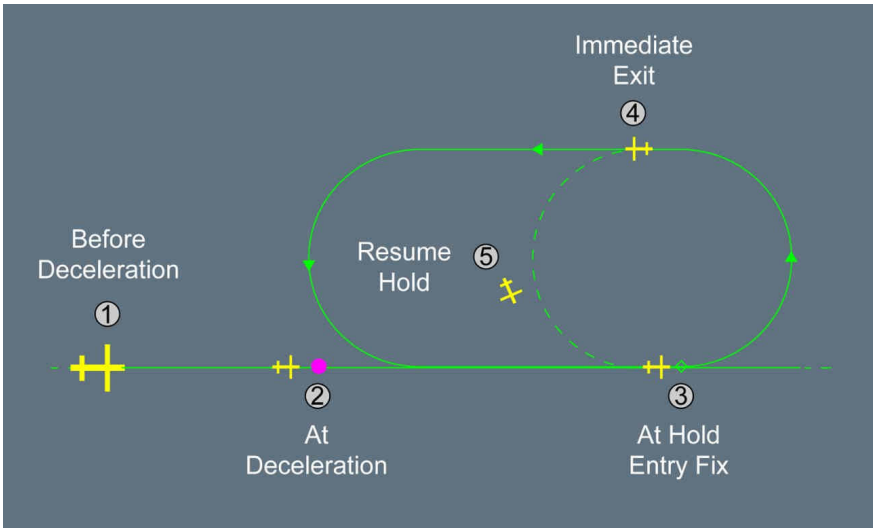
Note: The predicted speed is limited by the speed envelope.

L3 When there is a HF in the arrival procedure, that is on the runway axis, and the aircraft is on the runway axis, and has the right altitude, the flight crew may decide to engage the approach modes (LOC, G/S, F-LOC, F-G/S), without flying the holding pattern. In this case, the FMS still takes into account the holding pattern for the flight plan predictions. The result of this behavior is that the display on VD and PFD is not consistent.: The PFD displays the guidance raw data. The VD displays the data along the predicted flight plan. As the holding pattern is still part of the predicted flight plan, the VD distance between the aircraft's current position and the destination airport (and FLS beam, if any) is greater than the distance that the aircraft will really fly. In this particular case, the flight crew should monitor the PFD deviations and disregard the VD flight plan data.
When the aircraft sequences the hold entry/exit fix, the FMS updates the predictions: The holding pattern is no longer part of the predicted flight plan. PFD and VD are consistent.

L1 **PREDICTIONS AND GUIDANCE FOR HM**

The predictions and guidance for an HM depend on the position of the aircraft in the holding pattern, and on the following flight crew actions:

HM



Before deceleration

Although the hold is inserted into the flight plan, the FMS does not take it into account for predictions.
However, the FMS schedules a deceleration point and displays it on the ND and VD .
If the ND range is 80 nm or less, the ND displays the holding pattern and the entry trajectory, when the aircraft sequences the waypoint that precedes the holding fix, or passes the deceleration point.
When the holding leg parameter is a time (and not a distance), the FMS computes the holding pattern size based on the predicted hold speed.

The predicted hold speed is the lowest of:
- ICAO hold speed limit
- Maximum endurance speed
- Speed constraint or speed limit (if any)
- Navigation database hold speed.

Note: *The predicted speed is limited by the speed envelope.*

L2 When the selected speed mode is active, the FMS computes the holding pattern size based on the selected hold speed.

L1 The FMS also predicts the estimated time and amount of fuel remaining at which the aircraft must exit the holding pattern, so as to comply with the fuel policy. The HOLD page displays these time and fuel estimations.

Upon reaching the deceleration pseudo waypoint

The FMS assumes that the aircraft will fly one loop of the holding pattern, and revises the predictions accordingly.
The aircraft decelerates to the hold speed.
The hold speed is the speed target that is sent to the flight guidance (PRIM). This may be the predicted hold speed (limited by the speed envelope), or a different target speed associated with a flaps setting when the aircraft is in the approach phase.
When the holding leg parameter is a time (and not a distance), the FMS computes the holding pattern size based on the hold speed.

L2 When the selected speed mode is active, and the aircraft reaches the deceleration point, the MFD and PFD display the SET HOLD SPD message. (*Refer to Message*)
When the selected speed mode is active, the holding pattern size is based on the selected speed target.

L1 The flight crew can still decide not to fly the holding pattern, by using the IMMEDIATE EXIT button on the ACTIVE / F-PLN page.

After reaching the holding fix

The aircraft enters the hold.
When the holding leg parameter is a time (and not a distance), the FMS revises the size of the holding pattern, based on the speed target at the hold entry fix. The holding pattern size is frozen during one loop, and is updated again at the next overfly of the hold entry fix.

L2 When the selected speed mode is active, the holding pattern size revision is based on the selected speed target.

L1 Each time the aircraft flies over the hold fix, the FMS updates the predictions for one more holding loop.

Note: When the aircraft is flying a hold, the flight crew can make a revision of the hold. This revision will create a temporary flight plan. The flight crew can check the new holding pattern in the temporary flight plan (on MFD and ND). When the flight crew inserts the temporary flight plan however, the aircraft keeps on flying the old holding pattern. Only when the aircraft sequences the hold fix, the FMS takes into account and displays the updated holding pattern.

The flight crew decides to exit the hold immediately

The flight crew clicks on the IMMEDIATE EXIT button on the ACTIVE / F-PLN page.
The FMS assumes that the aircraft will return immediately to the hold exit fix, and revises the predictions accordingly. The aircraft keeps the hold speed until it reaches the hold exit fix.

When sequencing the hold fix, the aircraft exits the holding pattern, and resumes its navigation. The FMS sets the target speed to the applicable speed of the current flight phase.

The flight crew decides to resume the hold

The flight crew clicks on the RESUME HOLD button on the ACTIVE / F-PLN page.
The aircraft intercepts the holding pattern, following the holding pattern entries logic. (See Holding Pattern Entries)
Each time the aircraft flies over the hold fix, the FMS updates the predictions for one more holding loop.

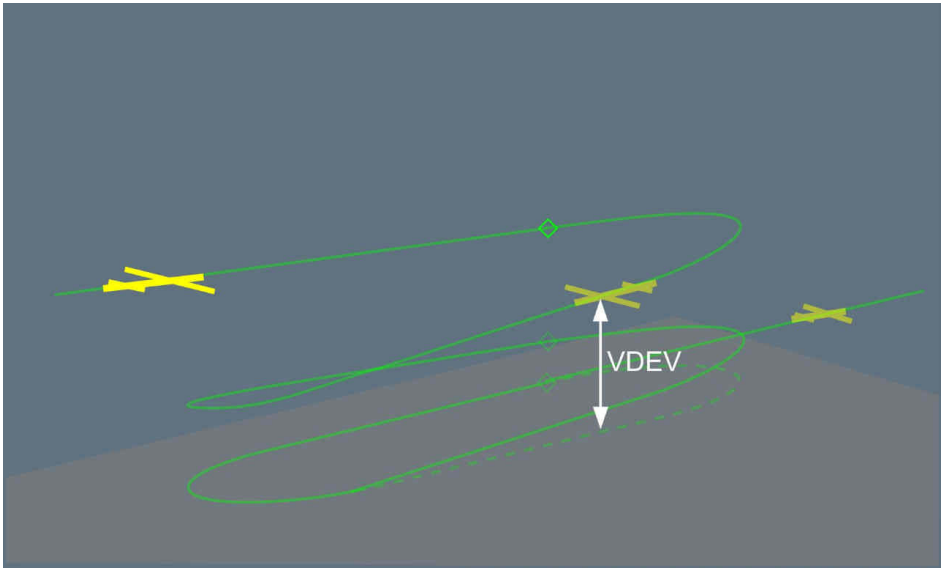
HM and Descent

The following applies for a holding pattern in descent, or approach:

- Before the deceleration pseudo waypoint, the FMS does not take into account the holding pattern for the descent path computation
- Upon reaching the deceleration pseudo waypoint, the FMS computes the theoretical descent path backwards from the destination airport up to the hold exit fix. The FMS does not compute a theoretical descent path inside the hold.

- During descent and approach, the PFD , the DES, and APPR panel of the PERF page display the vertical deviation (VDEV). In the deceleration leg, and in the hold, the vertical deviation is the difference between the aircraft's current altitude and the altitude at which it should be when it reaches the hold exit fix, in order to be properly positioned on the theoretical descent path.

VDEV and HOLD



- The vertical guidance in the HM , during the descent phase, targets a descent rate of 1 000 ft/min . However, the FMS takes into account altitude constraints that will take effect down path the flight plan, so that during the holding pattern, the aircraft will not descend lower than the next altitude constraint. If the aircraft reaches the constraint altitude, it will level off and the ALT CSTR mode will engage.
- The flight crew cannot enter speed constraints at the hold exit fix (This is only allowed at the hold entry fix)

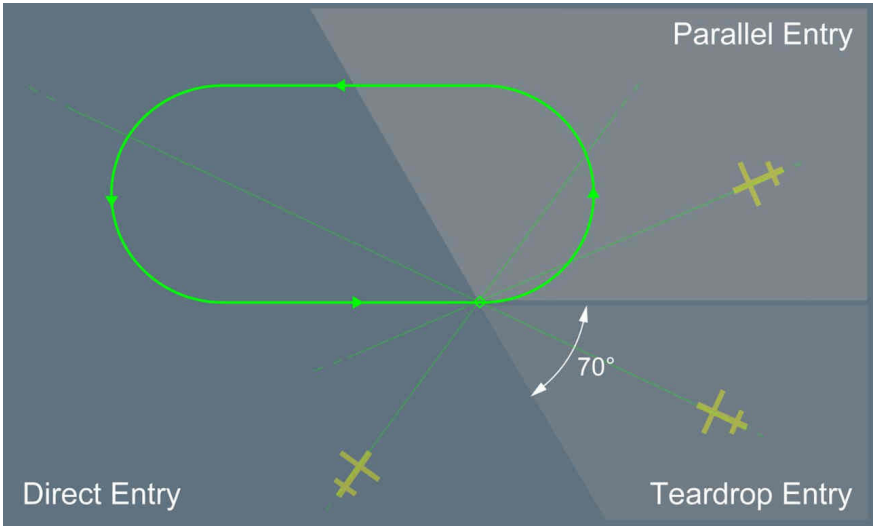
HOLDING PATTERN ENTRIES

The way of entering into a holding pattern depends on the difference of angle between the heading of the aircraft and the hold inbound course.

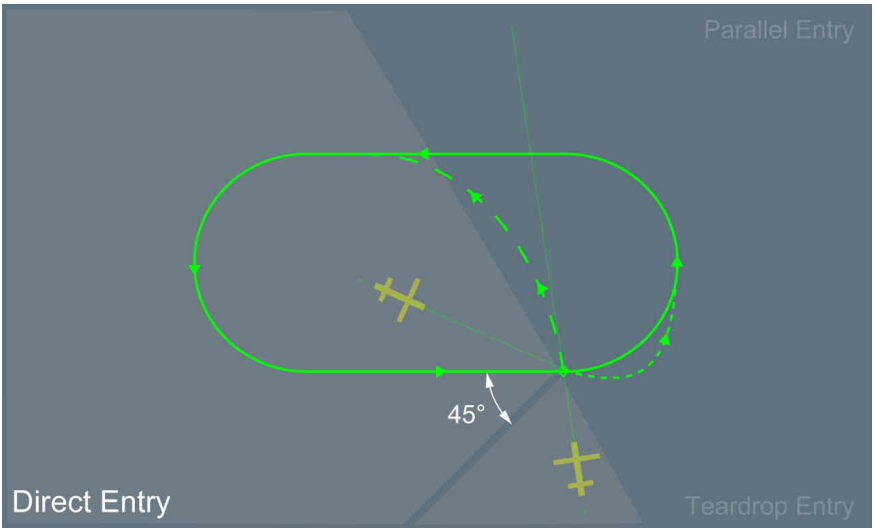
The FMS applies three holding entries:

- The direct entry
- The teardrop entry
- The parallel entry.

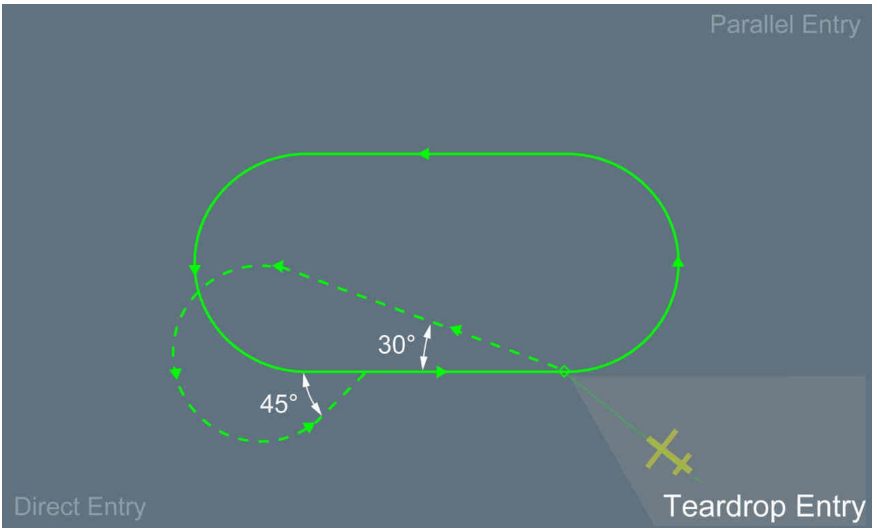
Holding Entries



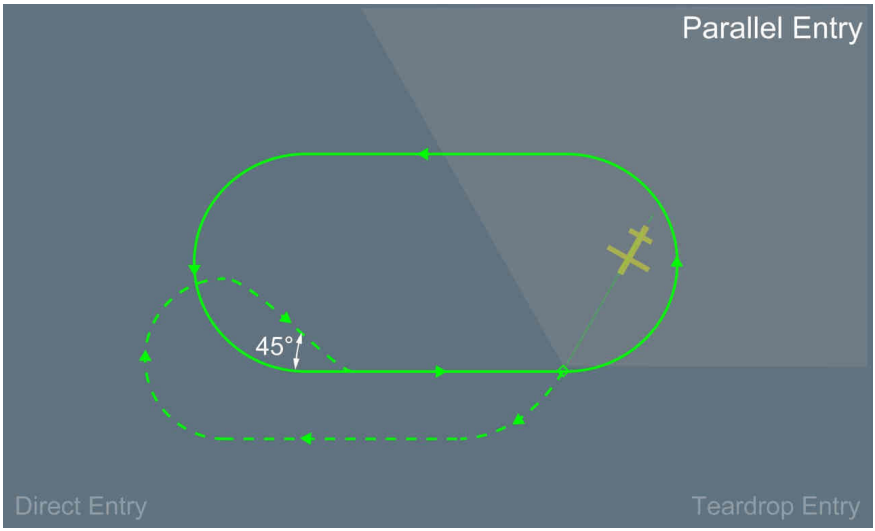
Direct Entry



Teardrop Entry



Parallel Entry



Note: *Border case: If the flight plan leg towards the hold entry fix has the opposite course of the hold inbound course, the aircraft will fly a parallel entry.*

L2 **HOLD REVISION AND SECONDARY FLIGHT PLAN**

The HOLD revision is available on the active (or temporary), and secondary flight plans.

HOLD REVISION AND TEMPORARY FLIGHT PLAN

The insertion of a holding pattern, or a change of an existing hold, creates a temporary flight plan.

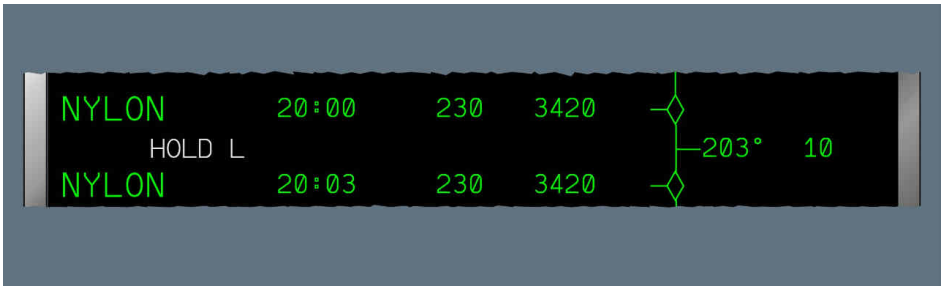
CONTROLS AND INDICATORS

ON THE MFD

On the F-PLN page, the different types of holding pattern are indicated as follows:

- HOLD TO FIX (HF)

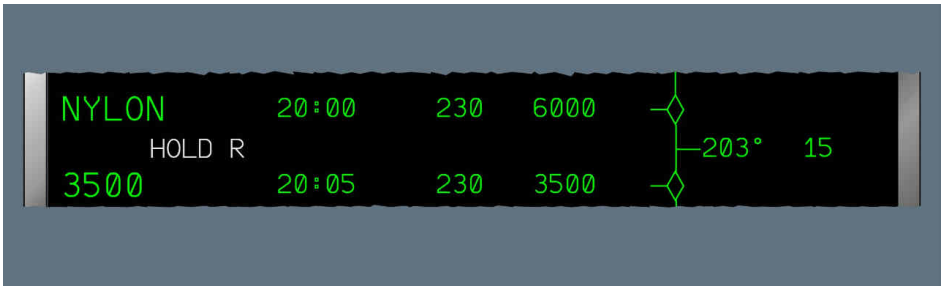
HF



The flight plan displays the entry and exit fix on two lines. The label HOLD L or HOLD R, between the fix waypoint lines, indicates the turning side.
The flight crew can remove the HF , by deleting the hold fix waypoint.

- HOLD TO ALTITUDE (HA)

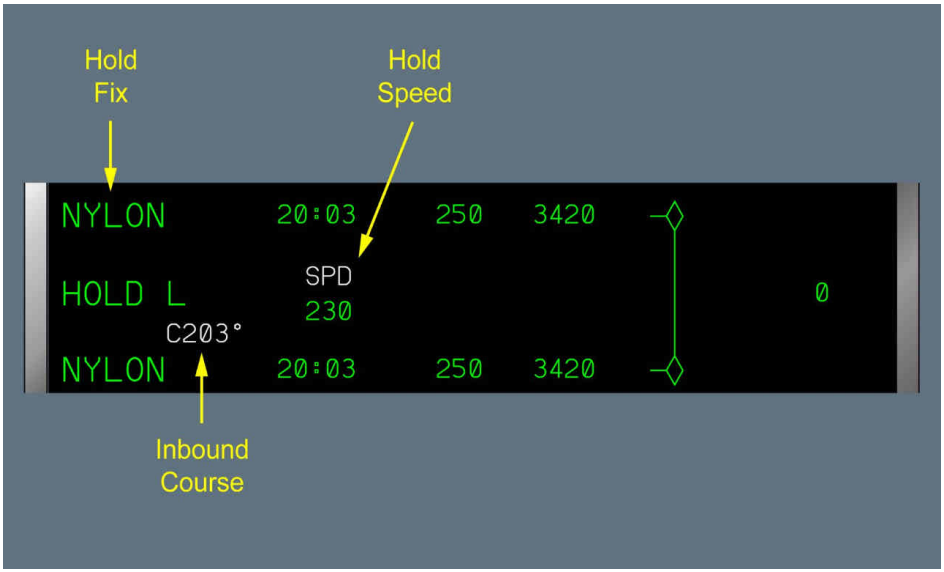
HA



The flight plan displays the entry fix on one line, and the exit altitude on another line. The label HOLD L or HOLD R, between the fix and altitude lines, indicates the turning side.
The flight crew can remove the HA , by deleting the hold fix waypoint.

- HOLD WITH MANUAL TERMINATION (HM)

HM



The flight plan displays the entry and exit fix on two lines. The label HOLD L or HOLD R (indicating the turning side), and the label SPD (indicating the hold managed or selected speed), are displayed on a line between the two fix waypoint lines. The inbound course is displayed between HOLD L(R) and the exit fix.
The flight crew can remove the HM , by deleting the hold fix waypoint.
After sequencing the hold deceleration point, the flight plan displays the IMMEDIATE EXIT button. The flight crew can use this button to delete the holding pattern, before sequencing the hold entry fix, or to immediately exit the holding pattern when flying it.

IMMEDIATE EXIT Button



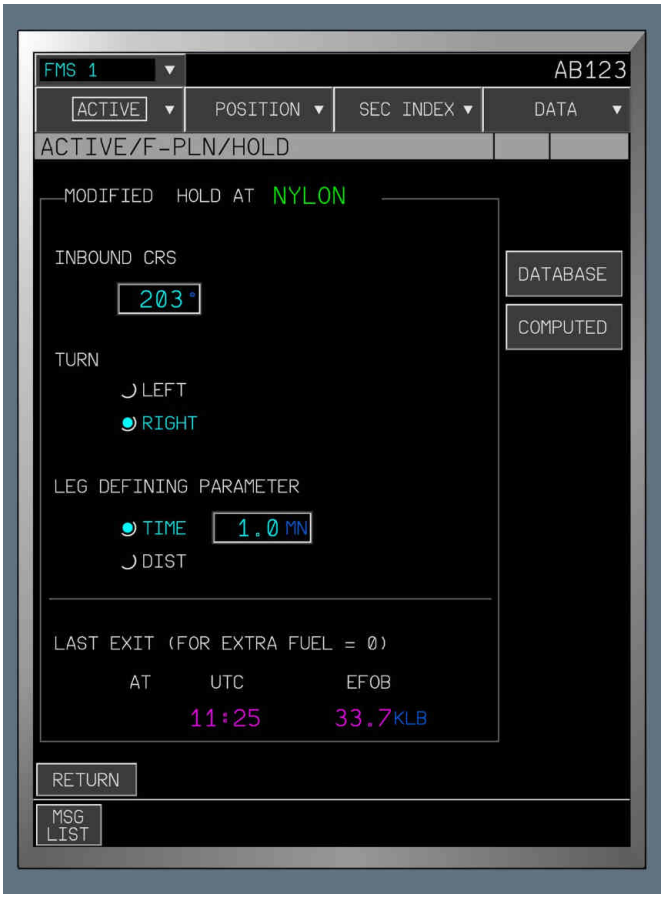
The flight crew can resume the holding pattern, that was initially planned, using the RESUME HOLD button. The F-PLN page displays this button until the hold fix is sequenced.

RESUME HOLD Button



The flight crew can enter, or modify an HM on the ACTIVE (or SEC) / F-PLN / HOLD page.

HOLD Page



Refer to HOLD page

The flight crew can access the HOLD page via the F-PLN page, by selecting the HOLD revision in the waypoint revisions menu.

L2 When flying an HM , the PERF / DES page displays the vertical deviation (VDEV). It is the difference between the aircraft's current altitude and the altitude at which it should be when it reaches the hold exit fix. Also the PFD displays this parameter.

L1 **ON THE ND**

The ND displays the entire holding pattern and its entry trajectory, only when:
- The ND range is 80 nm or less, and
- The aircraft has sequenced the waypoint that precedes the hold entry fix or has passed the hold deceleration point.

In all other cases, the ND displays the holding pattern symbol.

L2 **ON THE PFD**

When flying an HM , the PFD displays the vertical deviation. It is the difference between the aircraft's current altitude and the altitude at which it should be when it reaches the holding exit fix. Also the DES panel of the PERF page displays this parameter.

ASSOCIATED MESSAGES

Refer to SET HOLD SPD
Refer to TIME TO EXIT

AIRWAYS

Applicable to: ALL

PURPOSE

The flight crew uses the AIRWAYS revision to insert airway segments in the flight plan.

Each airway segment is defined by:

- The start waypoint

L2 For the first segment, the start waypoint is the revised flight plan waypoint. For any other segment, the start waypoint is the end waypoint of the previous segment. .

L1 - The airway

L2 All airways are included in the navigation database. The flight crew can select the airway by entering the airway's ident.

L1 - The end waypoint.

The end waypoint can be defined either manually or automatically:

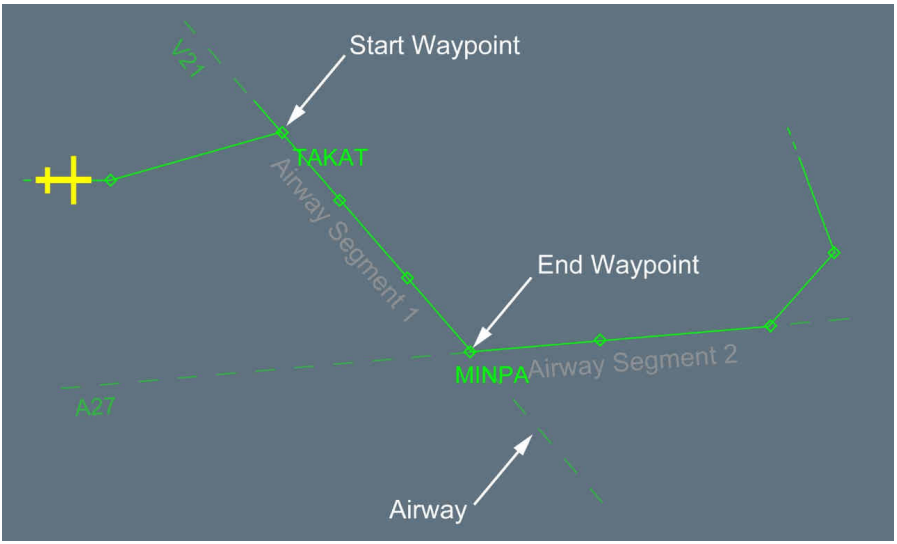
- Manually
  The flight crew can enter the ident of the end waypoint in the associated entry field.

  Note: The flight crew can enter any waypoint, if it belongs to the defined airway. If not, the "AIRWAY / WPT DISAGREE" message is displayed.

- Automatically
  The flight crew can enter two airways of two consecutive segments. The FMS then searches the common waypoint or computes the geographic intersection of both airways and defines it as the end waypoint of the first segment.

  Note: If the FMS does not find a common waypoint nor geographic intersection for the two defined airways, the "NO INTERSECTION FOUND" message is displayed.

Airway Segment



L2 The airway segments are inserted in the flight plan, starting with the revised waypoint, and ending with the end waypoint of the last segment. If the end waypoint is part of the original flight plan (= the flight plan before the revision), all waypoints and legs, of the original flight plan, that are up path the end waypoint are deleted.
If the end waypoint is not part of the original flight plan, a discontinuity will be inserted between the end waypoint and the first waypoint of the original flight plan, down path the revised waypoint.
When inserted in the flight plan, the airway segments are considered as normal flight plan legs and waypoints, with their associated flight plan revisions.

FIXED TURN RADIUS AIRWAYS

An airway can have a constant turn radius defined for one or more waypoints. The FMS uses this turn radius to compute the transition between the two legs at the specific waypoint.

L3 The turn radius is not taken into account, if:
- The waypoint is the start waypoint of the first airway segment, or the end waypoint of the last airway segment
- The flight crew inserts an overfly at the waypoint
- The flight crew performs an intercept direct to the waypoint
- The waypoint is part of an offset capture or return path.

L2 **AIRWAYS REVISION AND SECONDARY FLIGHT PLAN**

The AIRWAYS function is available on the active (or temporary), and secondary flight plans.

AIRWAYS REVISION AND TEMPORARY FLIGHT PLAN

Insertion, changing, or removing airways segments, creates a temporary flight plan. The entry of several airway segments is considered as a single flight plan revision.

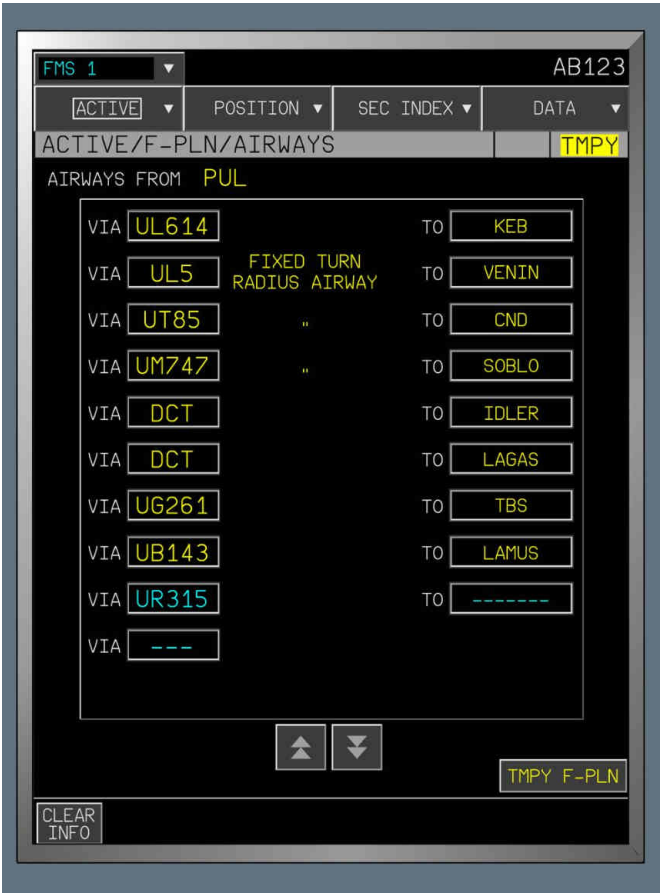
Note: If an airways entry is in progress, the flight crew cannot perform an other flight plan revision at the same time. The AIRWAYS INSERTION IN PROGRESS: F-PLN REVISION NOT ALLOWED message is displayed, when the flight crew tries to access a revision. (Refer to Message)

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter airway segments on the ACTIVE (or SEC) / F-PLN / AIRWAYS page. On this page, the flight crew can also insert waypoints. An inserted waypoint is linked to an airway, or to another waypoint by a direct to.

AIRWAYS Page



Refer to AIRWAYS Page

The flight crew can access the AIRWAYS page via the F-PLN page, by selecting the AIRWAYS revision in the revisions option menu.

On the F-PLN page, the airway ident is indicated in the leg-label.

F-PLN Page



ON THE ND

The airway segments are considered as normal flight plan legs and waypoints. On the ND , no special symbology is used to indicate the airway segments.

ASSOCIATED MESSAGES

Refer to AIRWAY / WPT DISAGREE
Refer to NO INTERSECTION FOUND
Refer to AIRWAYS INSERTION IN PROGRESS: F-PLN REVISION NOT ALLOWED

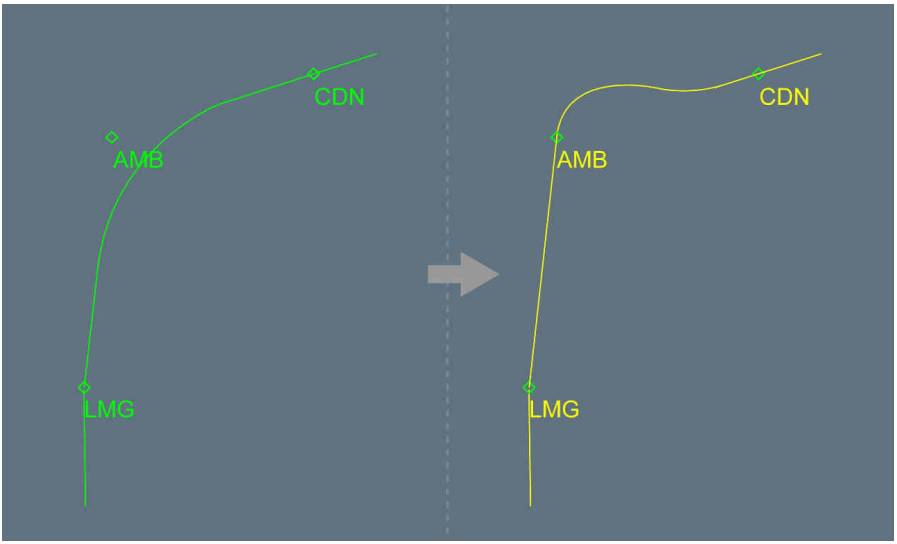
OVERFLY

Applicable to: ALL

PURPOSE

The flight crew uses the overfly revision (OVERFLY) to ensure that the aircraft overflies a specific flight plan waypoint.

Overfly



L2 The flight crew can define an overfly on any waypoint of the flight plan, except:
- On the origin and destination airport
- On the FROM waypoint
- On a holding fix
- On a manual leg.

L1 When an overfly is defined on a waypoint, the flight crew can remove it with the delete overfly revision (DELETE OVERFLY).

L2 **OVERFLY REVISION AND SECONDARY FLIGHT PLAN**

The overfly revision is available on the active (or temporary), and secondary flight plans.

OVERFLY REVISION AND TEMPORARY FLIGHT PLAN

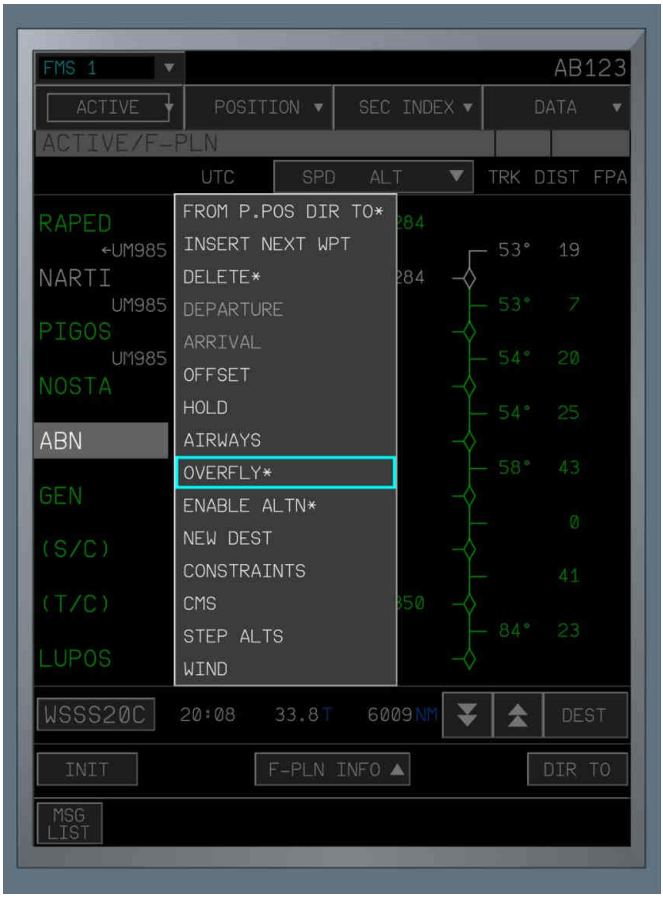
Creating, or deleting, an overfly, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The overfly revision is the eighth revision (OVERFLY) in the waypoint revisions menu on the ACTIVE (or SEC) / F-PLN page.

OVERFLY Revision



On the F-PLN page, a triangle next to the revised waypoint ident, indicates the overfly.

Overfly on F-PLN Page



The flight crew can remove an existing overfly, by selecting the DELETE OVERFLY in the waypoint revisions menu.

Note: *The eighth item in the revisions list is either DELETE OVERFLY or OVERFLY, depending on whether the revised waypoint has an overfly or not.*

Delete Overfly



ENABLE ALTERNATE (ENABLE ALTN)

Applicable to: ALL

PURPOSE

The flight crew uses the enable alternate revision (ENABLE ALTN) to initiate a diversion by enabling the alternate flight plan.

Enabling the alternate flight plan, deletes all waypoints of the primary flight plan beyond the revised waypoint (including the destination airport and the missed approach), and links the revised waypoint to the first waypoint of the alternate flight plan, with a discontinuity.

Enable Alternate Revision



L2 The flight crew can enable the alternate flight plan from a waypoint on the primary flight plan, including the flight plan discontinuities.

Note: *The flight crew cannot enable the alternate flight plan from a waypoint or airport of the alternate flight plan.*

L3 If the revised waypoint is the destination airport of the primary flight plan, the destination airport becomes a flight plan waypoint, and a discontinuity is inserted between the primary destination and the first waypoint of the alternate flight plan.

If the new primary destination (the former alternate destination) is the same as the previous primary destination, the following parameters remain unchanged:

- Go-around thrust reduction and acceleration altitudes
- Descent transition altitudes
- Descent speed limit
- Descent winds (not the alternate wind)
- Destination QNH, temperature, wind and landing configuration.

L2 **ENABLE ALTERNATE FUNCTION AND SECONDARY FLIGHT PLAN**

The enable alternate revision is available on the active (or temporary), and secondary flight plans.

ENABLE ALTERNATE FUNCTION AND TEMPORARY FLIGHT PLAN

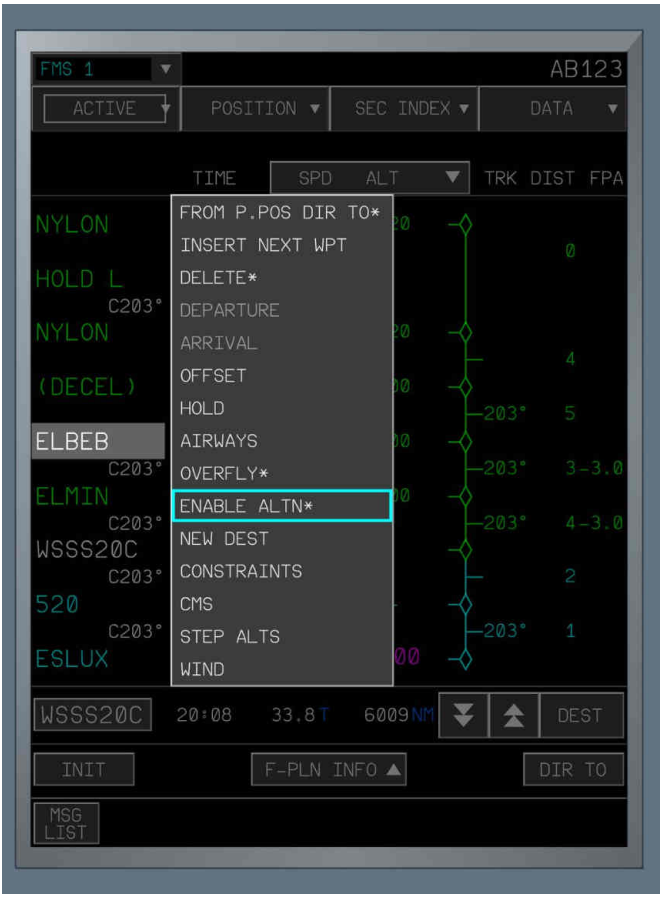
Enabling the alternate flight plan, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The enable alternate revision is the tenth revision (ENABLE ALTN) in the waypoint revisions menu on the ACTIVE (or SEC) / F-PLN page.

Enable Alternate Revision



NEW DESTINATION (NEW DEST)

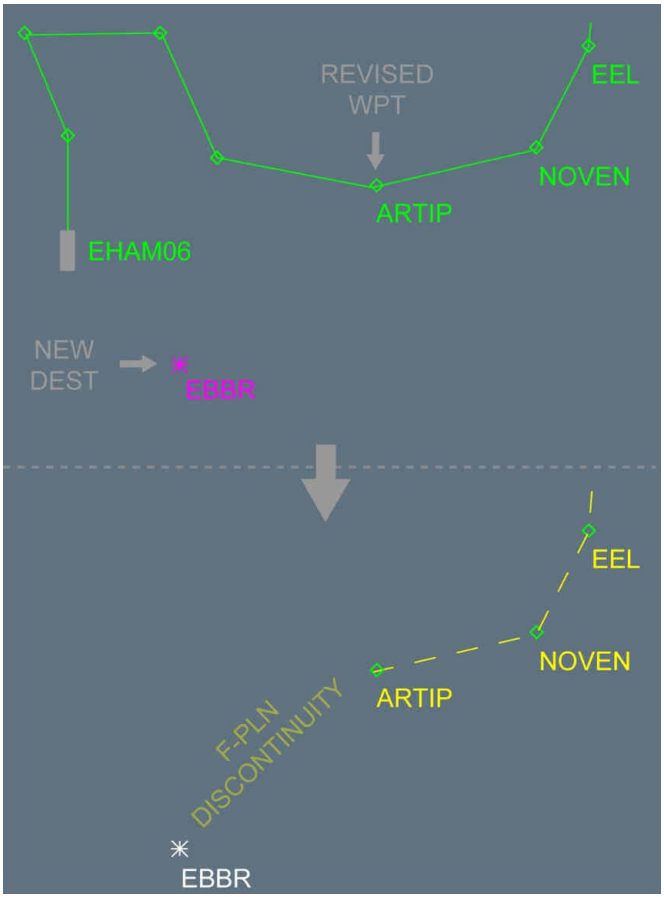
Applicable to: ALL

PURPOSE

The flight crew uses the new destination revision (NEW DEST) to define a new destination for the primary flight plan.

Insertion of a new destination, deletes all waypoints on the flight plan between the revised waypoint and the new destination, and inserts a flight plan discontinuity in their place.

New Destination Revision



L2 After a new destination entry, the alternate flight plan associated with the new destination replaces the old one if it is different.

The flight crew can create a new destination from any waypoint or discontinuity on the primary flight plan (including the origin and destination airports), except:

- From the FROM (or P.POS) waypoint in flight
- From a manual leg
- From a leg that does not end at a fixed waypoint.

L3 If the revised waypoint is the destination airport of the primary flight plan, the destination airport becomes a flight plan waypoint, and a discontinuity is inserted between the old and new destination.

L2 **NEW DESTINATION REVISION AND SECONDARY FLIGHT PLAN**

The new destination revision is available on the active (or temporary), and secondary flight plans.

NEW DESTINATION FUNCTION AND TEMPORARY FLIGHT PLAN

Insertion of a new destination, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

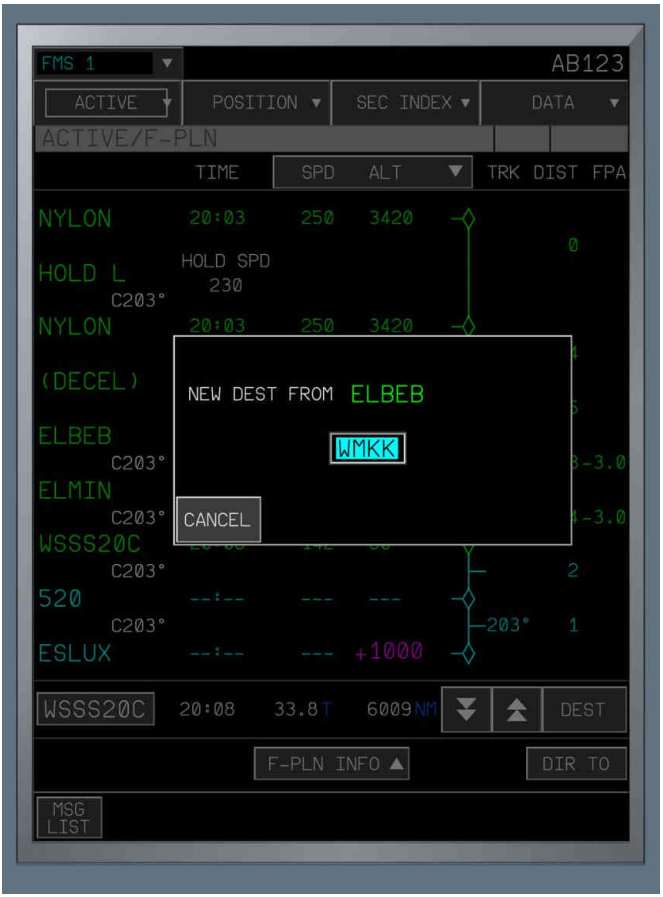
The new destination revision (NEW DEST) is the tenth revision in the waypoint revisions menu on the ACTIVE (or SEC) / F-PLN page.

New Destination Revision



Selecting the NEW DESTINATION revision displays the new destination window.

New Destination Window



Refer to New Destination Window

ALTERNATE

Applicable to: ALL

PURPOSE

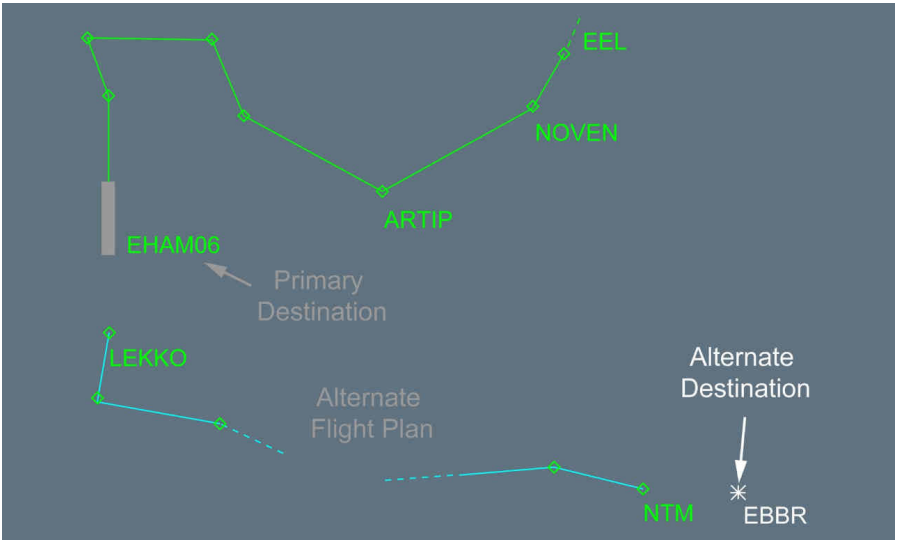
The flight crew uses the alternate revision (ALTERNATE) to insert, change or remove the alternate destination.

Associated to the destination airport, the navigation database may have a list of alternate airports (maximum 6) and related alternate company routes. One of the alternate airports is marked, by the airline, as the preferred one.

Note: *Some airports do not have associated alternate airports in the navigation database.*

When the flight crew enters a city pair (FROM/TO airports) or company route, the FMS completes the primary flight plan with the preferred alternate destination and alternate company route.
If the navigation database has no company route between the given primary and alternate airport, the alternate route will be a direct route (indicated by a flight plan discontinuity) between the primary and alternate destination.

Alternate Destination and Flight Plan



At any time, the flight crew can consult the list of alternate airports, that are associated with the current destination, and can designate any of the airports in the list as the alternate destination. The flight crew can also designate any other airport, that is not in the alternate list, as the alternate destination.

L2 ALTERNATE LIST INFORMATION AND PREDICTIONS

The FMS provides the following information, for each alternate airport in the navigation database alternate list:

- Alternate company route between the primary destination airport and the alternate airport, if there is one
- Distance between the primary destination airport and the alternate airport, along the company route, or the direct distance if there is no company route
- Great circle track between the primary destination airport and the alternate airport
- Estimated extra fuel at the alternate airport.

This information helps the flight crew to compare the alternate airports and to change the alternate destination, if necessary.

As soon as the alternate destination and the flight plan are inserted in the flight plan, the FMS computes the following supplementary predictions:

- Alternate trip time and trip fuel
- Estimated time and fuel on board at the alternate destination
- Estimated extra fuel at the alternate destination.

L3 The alternate predictions are based on the following assumptions:

- The alternate initial aircraft weight is equal to the estimated landing weight at the primary destination.
- The alternate flight plan represents a flight from takeoff at the primary destination to landing at alternate destination.
- The distance of the alternate flight plan is the distance along the alternate company route, or the distance along the alternate flight plan created by the flight crew, or the direct distance between primary and alternate destination when no waypoints have been created between them.
- If the alternate flight plan distance is less than 200 nm , the alternate cruise flight level is FL 220 . If the alternate flight plan distance is 200 nm or more, the alternate cruise flight level is FL 310 .
- The delta ISA is constant along the alternate flight plan, and is equal to the delta ISA at the primary destination.
- The alternate trip wind is a constant value, entered by the flight crew on the DESCENT WIND page.
- The cost index is equal to 0 (minimum fuel optimization).

L2 ALTERNATE REVISION AND SECONDARY FLIGHT PLAN

The alternate revision is available on the active (or temporary), and secondary flight plans.

ALTERNATE REVISION AND TEMPORARY FLIGHT PLAN

Insertion, changing, or removing the alternate destination, creates a temporary flight plan.

Note: Inserting, changing, or deleting the alternate destination (and alternate flight plan) on the ACTIVE / INIT page does not create a temporary flight plan.

L1 **ENABLE ALTERNATE**

The flight crew activates the alternate flight plan using the ENABLE ALTERNATE revision.
Refer to ENABLE ALTERNATE

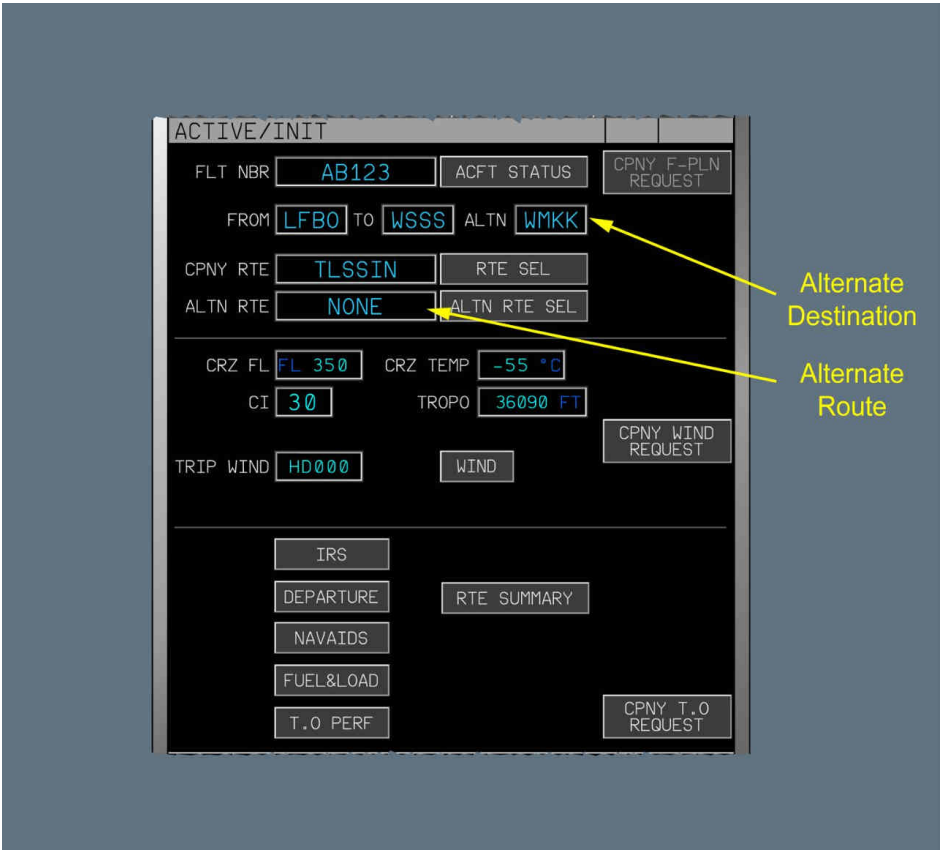
CONTROLS AND INDICATORS

ON THE MFD

During the flight plan initialization, the flight crew can check, enter, and change the alternate destination and alternate company route on the ACTIVE (or SEC)/INIT page.

Note: *Entering or changing the alternate destination and/or alternate company route via the INIT page does not create a temporary flight plan.*

Alternate on INIT Page



The flight crew can consult the list of possible alternate airports (and its associated predictions), and insert, delete or change the alternate destination, on the ACTIVE (or SEC)/F-PLN/ALTERNATE page.

ALTERNATE Page



Refer to ALTERNATE page

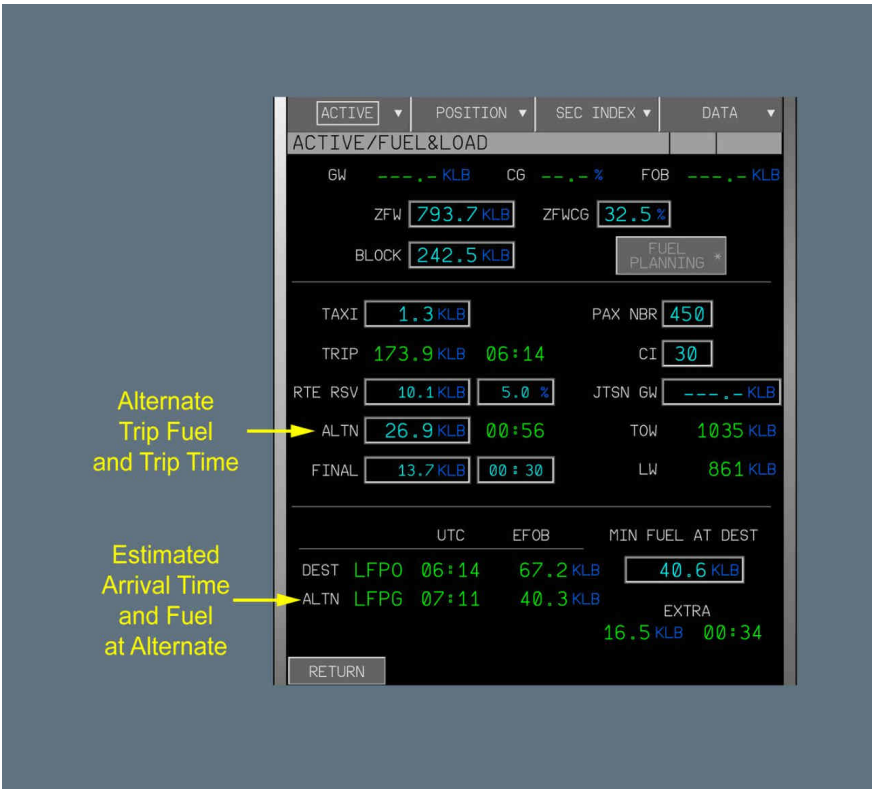
The flight crew can access the ALTERNATE page via the F-PLN page, by selecting ALTERNATE revision in the F-PLN INFO option menu.

The alternate flight plan is displayed in blue on the F-PLN page.

The ACTIVE (or SEC)/FUEL & LOAD page displays:

- The alternate trip fuel and time
- The time of arrival, at the alternate destination
- The estimated fuel on board, at the alternate destination

Alternate on FUEL&LOAD Page



FIX INFO

Applicable to: ALL

PURPOSE

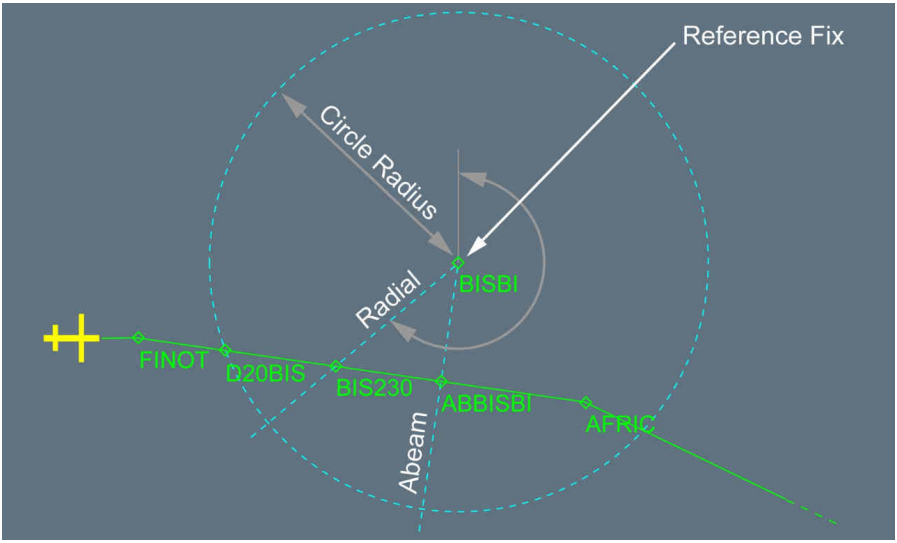
The flight crew uses the fix info revision (FIX INFO) to compute the intersection of the flight plan and:

- A radial from a specified reference point, and/or
- A circle with a specified reference point as center, and/or

Note: The FMS searches only for the first intersection down path the flight plan.

- The abeam line from a specified reference point.

Fix Info Revision



L2 The reference point, also called reference fix, can be a navigation database or pilot-stored waypoint, NAVAID, NDB, airport or runway.

L1 The FMS computes the following predictions for each intersection:

- Time of arrival
- Distance from P.POS
- Altitude.

INSERTION OF THE INTERSECTION IN THE FLIGHT PLAN

The flight crew can insert the computed intersections in the flight plan.

L2 The fix info waypoints are part of the flight plan, but are not stored in the pilot-stored elements database. This means that the fix info waypoints can be used for every flight plan revision (except AIRWAYS), until they are sequenced. As soon as they are sequenced, they are no longer memorized by the FMS.

Note: The fix info revision can also be used for display purposes only (without flight plan changes). The reference point, and selected radial, circle or abeam are highlighted on the lateral ND as soon as they are computed, whether an intersection with the flight plan is found or not.

FIX INFO FUNCTION AND SECONDARY FLIGHT PLAN

The fix info revision is only available on the active (or temporary) flight plan.
Intersections are only created on the primary active flight plan.

FIX INFO REVISION AND TEMPORARY FLIGHT PLAN

Insertion of a fix info intersection waypoint creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can consult, and insert, fix info waypoints on the ACTIVE / F-PLN / FIX INFO page.

FIX INFO Page



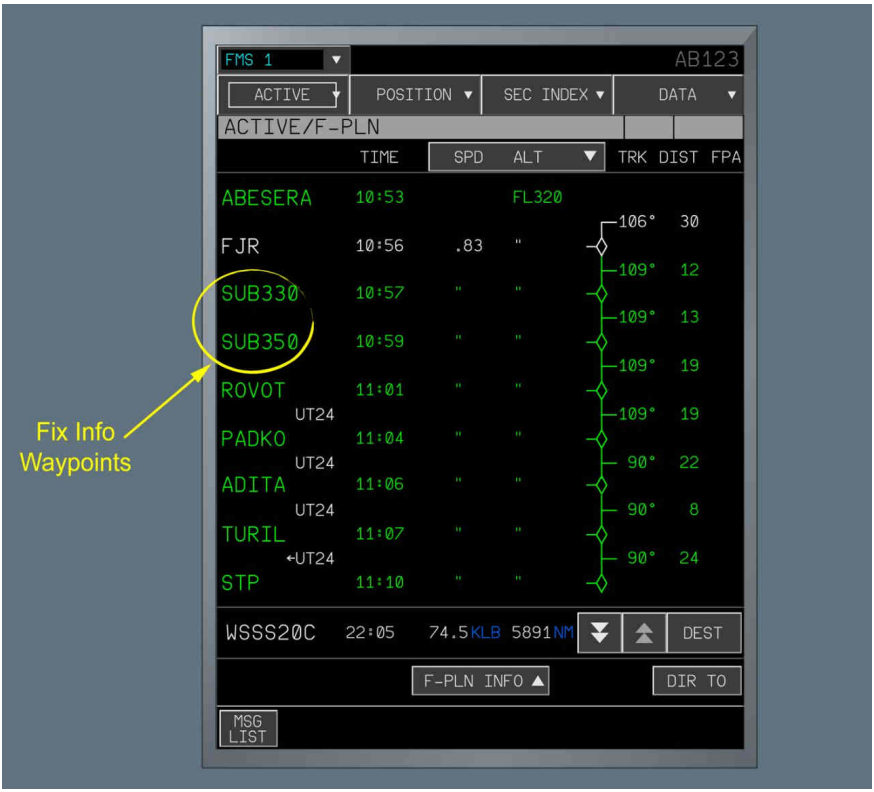
Refer to FIX INFO page

The flight crew can access the FIX INFO page via the F-PLN page, by selecting the FIX INFO revision in the F-PLN INFO option menu.

L3 The created intersections may be inserted in the flight plan. The fix info waypoints appear under the following ident:

- Intersection with radial: YYYNNN, where YYY are the first three characters of the reference fix, and NNN the radial (example: BIS230)
- Intersection with circle: DNNNYYY, where NNN is the radius of the circle (in nm), and YYY the first three characters of the reference fix (example: D70BIS)
- Abeam intersection: ABYYYYY, where YYYYY are the first five characters of the reference fix (example: ABBISBI).

F-PLN Page



L1 **ON THE ND**

The designated reference fix(es) is/are highlighted on the ND .

The selected radial(s) and circle(s) are also highlighted on the ND , whether an intersection with the flight plan is found or not.
The abeam radial is highlighted on the ND , only if an abeam point is found.
Radials, circles and abeam radials are no longer displayed on the ND , if their associated intersection is inserted in the flight plan, or if their entry field is cleared.

LAT/LONG CROSSING (LL CROSSING)

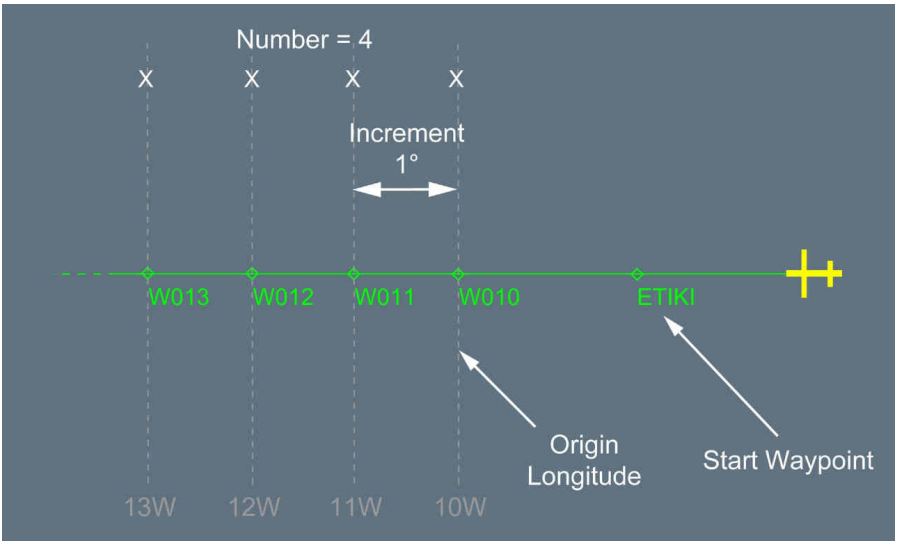
Applicable to: ALL

PURPOSE

The flight crew uses the latitude/longitude crossing revision (LL CROSSING) to insert a waypoint or a series of waypoints along the flight plan, defined by the intersection(s) of the flight plan with a series of latitudes or longitudes. The flight crew defines the series of waypoints, by entering:

- The start waypoint
- The origin latitude or longitude
- The latitude or longitude increment
- The maximum number of intersections.

Latitude/Longitude Crossing Revision



L2 No intersections are created beyond the last en—route waypoint.

L3 The latitude/longitude crossing waypoints are part of the flight plan, but are not stored in the pilot-stored elements database. This means that latitude/longitude crossing waypoints can be used for every flight plan revision (except AIRWAYS), until they are sequenced. As soon as they are sequenced, they are no longer memorized by the FMS.

L2 **LATITUDE/LONGITUDE CROSSING REVISION AND SECONDARY FLIGHT PLAN**

The latitude/longitude crossing revision is available on the active (or temporary), and secondary flight plans.

LATITUDE/LONGITUDE CROSSING REVISION AND TEMPORARY FLIGHT PLAN

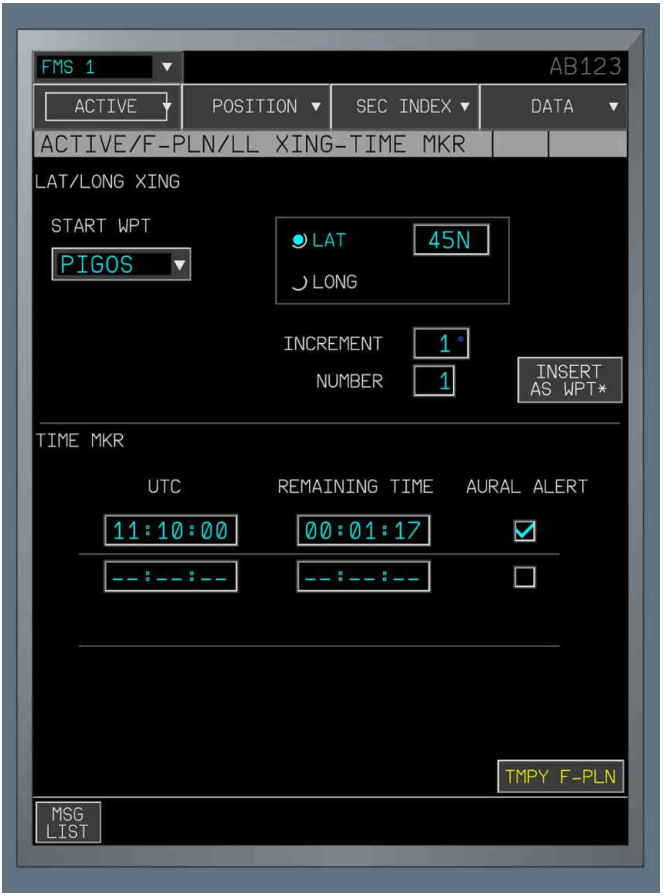
Insertion of a latitude/longitude crossing waypoint, or series of waypoints, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can create, and insert, latitude/longitude crossing waypoints on the ACTIVE (or SEC) / F-PLN / LL XING - TIME MKR page.

LL XING - TIME MKR Page



Refer to LL XING — TIME MKR page
The flight crew can access the LL XING — TIME MKR page via the F-PLN page, by selecting the LL CROSSING revision in the F-PLN INFO option menu.

The created intersections are inserted in the flight plan, under the following IDENT :
- NXX or SXX for latitude crossings, example: N75
- EXXX or WXXX for longitude crossings, example: W125

ASSOCIATED MESSAGES

Refer to NO INTERSECTION FOUND

Vertical Flight Plan Revisions

VERTICAL REVISIONS - INTRODUCTION

Applicable to: ALL

A change to the vertical flight plan is called a vertical revision.
All vertical revisions can be accessed via the F-PLN page on the MFD .

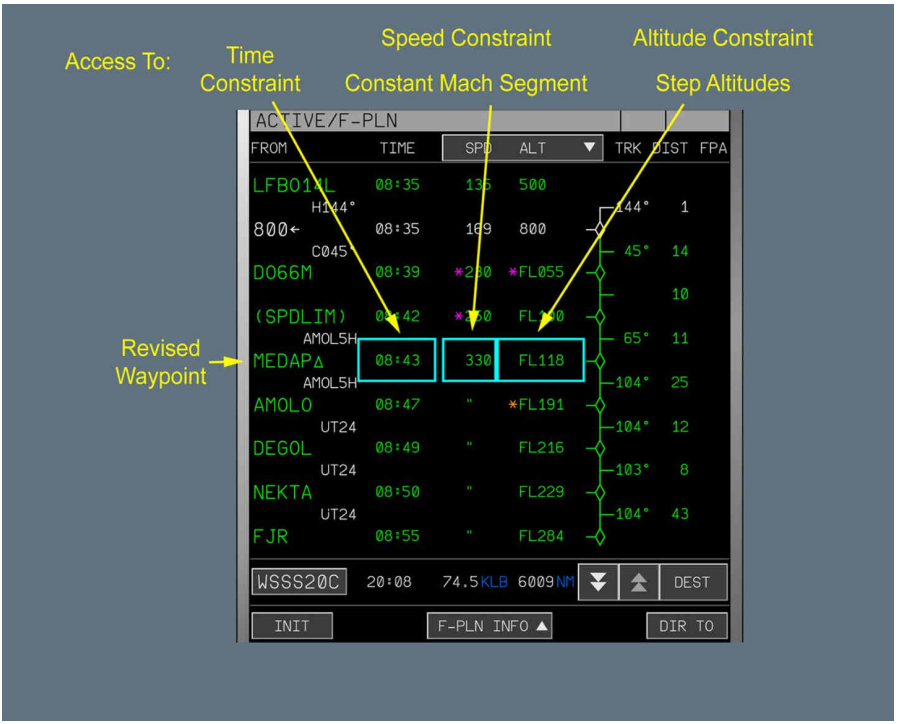
The starting point for all vertical revisions is a waypoint on the flight plan, called the revised waypoint.
The flight crew can access the vertical revision on the F-PLN page, by:
- Clicking on the time, speed, altitude, or wind prediction of the revised waypoint, or
- Via the waypoint revisions menu of the revised waypoint.

Note: The flight crew can also access the wind revision via the ACTIVE menu of the general menu bar.

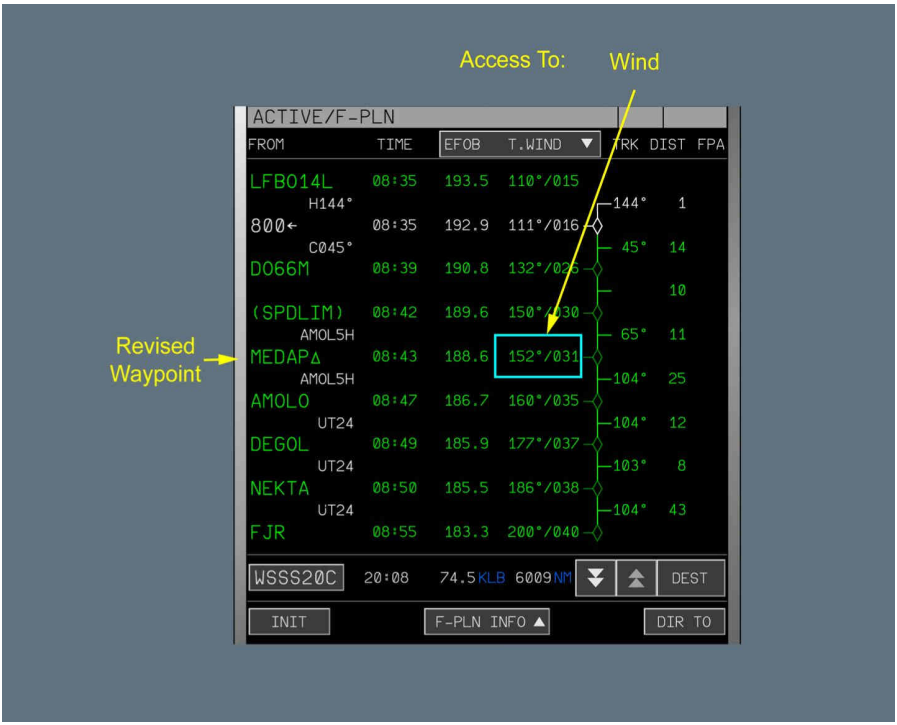
ACCESS VIA THE WAYPOINT PREDICTIONS

- The time prediction provides access to the time constraint revision
- The speed prediction provides access to the speed constraint, or to the Constant Mach Segment (CMS) revision, depending on the flight phase to which the revised waypoint belongs
- The altitude prediction provides access to the altitude constraint revision, or step altitudes revision, depending on the flight phase to which the revised waypoint belongs
- The wind prediction provides access to the wind revision.

Direct Access to Vertical Revisions



Direct Access to Vertical Revisions

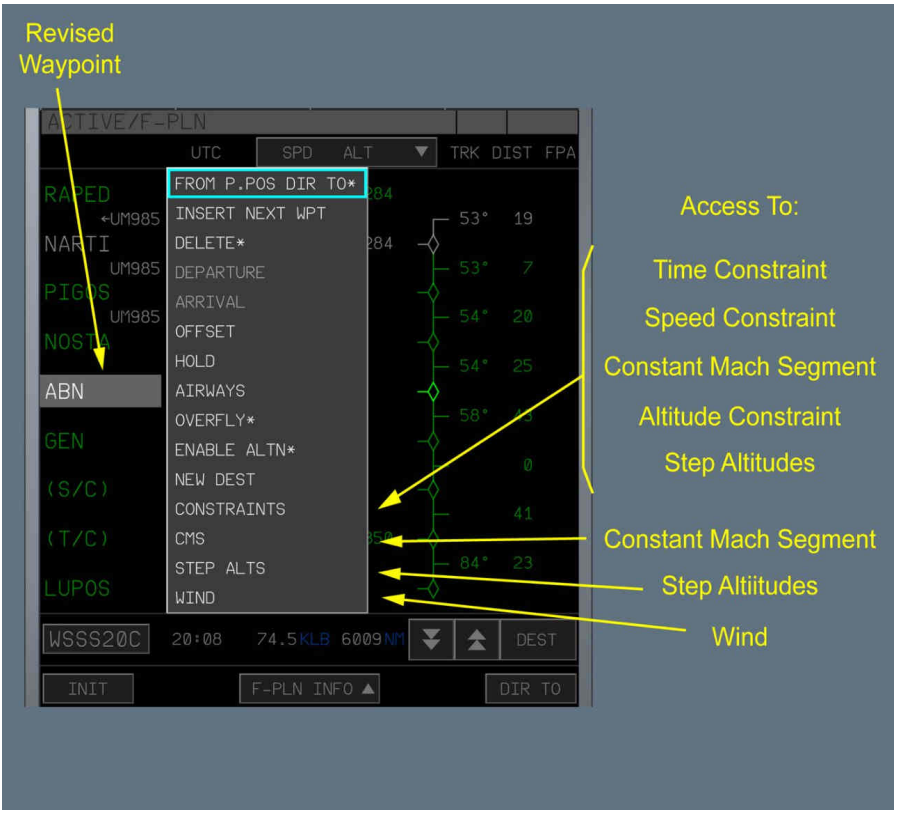


ACCESS VIA THE WAYPOINT REVISIONS MENU

The lower part of the waypoint revisions menu displays the following vertical revisions:

- CONSTRAINTS: Provides access to the VERT REV page, that collects all the vertical revisions, except the wind revision
- CMS : Provides access to the Constant Mach Segment (CMS) revision
- STEP ALTs: Provides access to the step altitudes revision
- WIND: Provides access to the wind revision.

Waypoint Revisions Menu



TIME CONSTRAINT (RTA)

Applicable to: ALL

PURPOSE

The flight crew uses the time constraint revision to:

- Enter, change, or delete a Required Time of Arrival (RTA) on a waypoint
- Enter or change the Estimated Takeoff Time (ETT).

REQUIRED TIME OF ARRIVAL (RTA)

The RTA is a time constraint that must be respected at the revised waypoint.

The constraint can be to reach the waypoint “AT”, “AT or BEFORE”, or “AT or AFTER” the entered RTA .

L2 The flight crew can define an RTA on all waypoints on the primary flight plan (including the destination airport), except on the origin airport, the FROM waypoint, and missed approach waypoints.
There can be only one RTA per flight plan. If there is already an RTA in the flight plan and the flight crew enters a new RTA on a different waypoint, the previous RTA is deleted, and the new one is taken into account.

L3 It is not possible to insert an RTA , or the existing RTA is not taken into account, if:
- The Engine Out (EO) mode is active
- The aircraft clock data is not valid
- The aircraft is in a hold with manual termination, or in the deceleration zone of this hold
- The flight phase is CRUISE and the aircraft is closer than 40 nm from the T/D
- The flight phase is DESCENT, APPROACH, or GO AROUND.

Automatic Deletion of the RTA

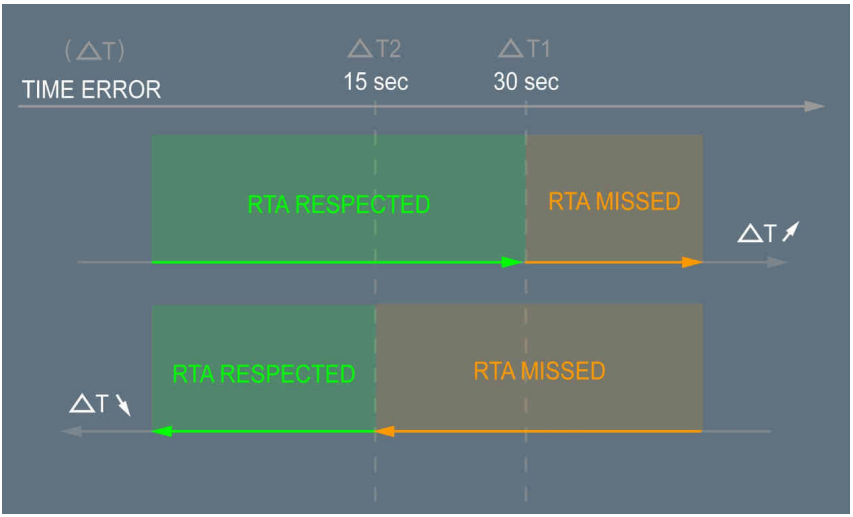
The existing RTA is automatically deleted, with the associated FMS message RTA DELETED (*Refer to Message*), if one of the following occurs:
- The Engine Out (EO) mode becomes active
- The aircraft clock data is no longer valid
- The aircraft enters a hold with manual termination, or the deceleration zone of this hold
- The flight phase transitions from DESCENT or APPROACH, to CLIMB or CRUISE
- The flight phase becomes GO AROUND.

The existing RTA is automatically deleted, with no associated FMS message, if one of the following occurs:
- A second RTA is entered in the flight plan
- The alternate flight plan is enabled
- The waypoint with the time constraint becomes an ABEAM waypoint, when a DIRECT TO with ABEAM is performed.

L1 Time Error

The FMS compares the RTA with the Estimated Time of Arrival (ETA) on the waypoint, and predicts whether the time constraint will be respected or missed. The difference between the RTA and the ETA is referred to as the time error.
The time constraint is predicted as missed, if the time error is more than 30 s . When missed, the time constraint remains missed as long as the time error is more than 15 s .

Time Error



L3 *Note:* *ΔT1 and ΔT2 are respectively 30 s and 15 s , if the distance between the aircraft and the waypoint with the time constraint is less than 2 000 nm .*
If the distance is more than 2 000 nm , ΔT1 and ΔT2 linearly increase at a rate of 60 s per 1 000 nm .

L1 When the time constraint is missed, the FMS displays the TIME ERROR AT XXXXXXX message on the MFD , with XXXXXXX the ident of the waypoint with the time constraint. (*Refer to Message*).

ESTIMATED TAKEOFF TIME (ETT)

The ETT is the time reference used for flight plan predictions in the PREFLIGHT flight phase. At transition to the TAKEOFF flight phase, the predictions are based on the current aircraft time.

The ETT may be (in the following order of priority):
- A flight crew entry
- An FMS computed value:
  The FMS computes an ETT , when there is an RTA in the flight plan. The default ETT is updated after each flight plan revision.

L2 *Note:* *There is an automatically computed ETT , when the necessary flight time from the origin airport to the constrained waypoint is less than the available time between the current aircraft time and the RTA .*

The flight crew can clear the manually entered ETT at any time. However, the automatically computed ETT can only be cleared by deleting the associated RTA .
When the flight crew changes the origin airport, the ETT is cleared automatically.

L1 If the aircraft clock time reaches the ETT , or at transition to the TAKEOFF flight phase, the ETT becomes the aircraft clock time.

L3 The ETT can only be defined, if:
- The flight phase is PREFLIGHT
- The aircraft clock data is valid.

L2 **TIME CONSTRAINT AND SECONDARY FLIGHT PLAN**

The RTA , and ETT revision is available on the active (or temporary), and secondary flight plans.

TIME CONSTRAINT AND TEMPORARY FLIGHT PLAN

Insertion, change, or deletion of an RTA , or ETT , creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete the RTA and ETT , on the RTA panel of the ACTIVE (or SEC) / F-PLN / VERT REV page.

RTA Panel on the VERT REV Page



Refer to RTA Panel

The flight crew can access the VERT REV page via the F-PLN page, by clicking on the time prediction associated with the revised waypoint, or by selecting the CONSTRAINTS revision in the waypoint revisions menu.

On the F-PLN page:
- The time constraint on a waypoint is indicated by a star to the left of the waypoint time prediction. The color of the star is magenta, if the time constraint will be respected, and amber, if the constraint will be missed.
- During the PREFLIGHT phase, the ETT is displayed in magenta in the time prediction column of the FROM waypoint.

Refer to F-PLN page

ON THE ND

On the lateral ND , the time constraint value is displayed under the waypoint ident, when the CONSTRAINTS option is selected on the EFIS CP . The color of the constraint is magenta, if the time constraint will be respected, and amber, if the time constraint will be missed.
The time constraint is not indicated on the vertical ND .

ASSOCIATED MESSAGES

Refer to ADJUSTING SPD DUE TO RTA
Refer to RTA ALREADY EXISTING
Refer to RTA DELETED
Refer to RTA NOT CONSIDERED FOR FUEL PLANNING
Refer to TIME ERROR AT XXXXXXX
Refer to T.O TIME REACHED

SPEED CONSTRAINT (SPD CSTR)

Applicable to: ALL

PURPOSE

The flight crew uses the speed constraint revision to enter, change, or delete a speed constraint on a waypoint.

Speed constraints may exist for the CLIMB and the DESCENT phases:
- For a climb speed constraint, the aircraft has to fly at or below the specified speed, from the origin airport up to the speed constraint waypoint
- For a descent speed constraint, the aircraft has to fly at or below the specified speed, from the speed constraint down to the destination airport.

Speed Constraint



The speed constraint may be (in the following order of priority):

- A flight crew entry
- A database value (the speed constraints can be stored with the terminal area procedures in the navigation database).

L3 A holding pattern that is part of a procedure, may have a database speed constraint. In this case, however, the speed constraint will not apply at the hold entry fix, but at the hold exit fix. If the flight crew wants the speed constraint to apply on the hold entry fix, he should manually enter the speed constraint on the hold entry fix, or engage the selected speed control.

L2 The flight crew can define a speed constraint on the takeoff, climb, descent and approach waypoints of the primary flight plan. The flight crew cannot define a speed constraint on the origin and destination airports, the FROM waypoint, or any pseudo waypoint.

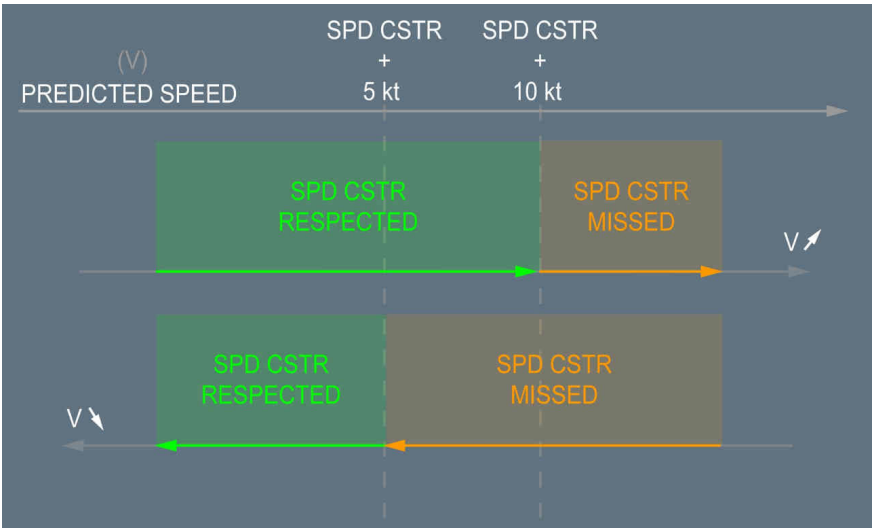
L3 AUTOMATIC DELETION OF THE SPEED CONSTRAINT(S)

- When the flight phase transitions from CRUISE, DESCENT, or APPROACH, to GO AROUND, all speed constraints between the aircraft and the primary destination are deleted.
  The CONSTRAINTS BEFORE XXXXXXX : DELETED message is displayed on the MFD , where XXXXXXX is the ident of the waypoint, following the last down path waypoint with a descent speed constraint. (*Refer to Message*).
- When the alternate flight plan is enabled, all speed constraints between the aircraft and the former primary destination, and all speed constraints on the alternate flight plan that are below the current aircraft altitude, are deleted.
  The CONSTRAINTS BEFORE XXXXXXX : DELETED message is displayed on the MFD , where XXXXXXX is the ident of the waypoint, following the last down path waypoint with a speed constraint below the current aircraft altitude. (*Refer to Message*).
- When the waypoint, with the speed constraint, becomes an ABEAM waypoint when a DIRECT TO with ABEAM is performed, the constraint is deleted.

L1 SPEED ERROR

The FMS compares the speed constraint value with the predicted speed on a waypoint, and predicts whether the speed constraint will be respected or missed.
The speed constraint is predicted as missed, when the predicted speed is more than 10 kt over the speed constraint value. When missed, the speed constraint remains missed as long as the predicted speed is more than 5 kt over the speed constraint value.

Speed Error



When the speed constraint is missed, the FMS displays the SPD ERROR AT XXXXXXX message on the MFD , with XXXXXXX the ident of the nearest waypoint (between P.POS and the revised waypoint in climb, or between P.POS and the destination in descent), where the speed constraint is missed. (*Refer to Message*)

L2 **SPEED CONSTRAINT AND SECONDARY FLIGHT PLAN**

The speed constraint revision is available on the active (or temporary), and secondary flight plans.

SPEED CONSTRAINT AND TEMPORARY FLIGHT PLAN

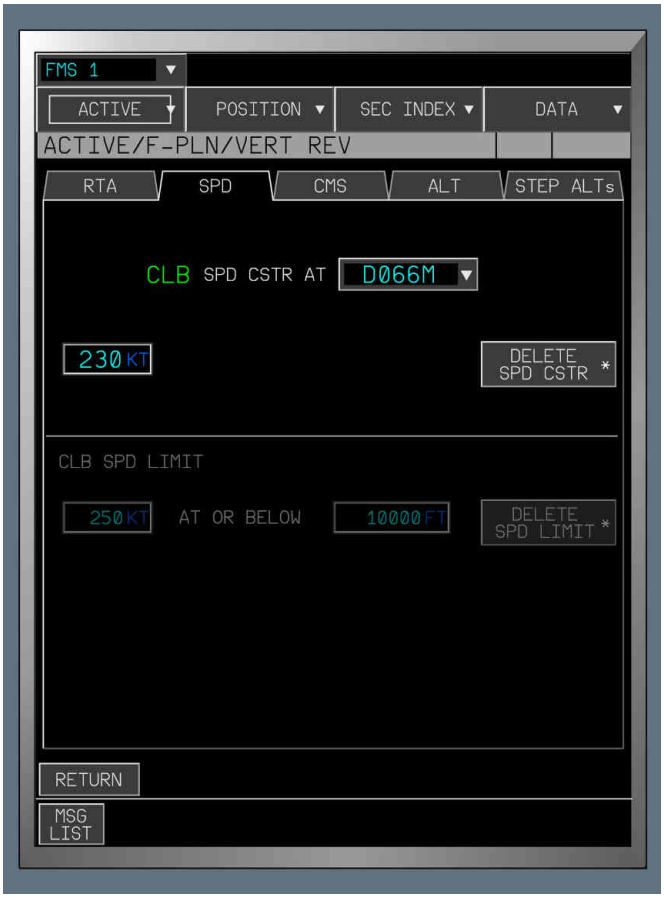
Insertion, change, or deletion of a speed constraint, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete a speed constraint on the upper part of the SPD panel on the ACTIVE (or SEC) /F-PLN/ VERT REV page.

SPD Panel on the VERT REV Page



Refer to SPD Panel

The flight crew can access the VERT REV page via the F-PLN page, by clicking on the speed prediction associated with the revised waypoint, or by selecting the CONSTRAINTS revision in the waypoint revisions menu, then by selecting the SPD panel.

On the F-PLN page, the speed constraint on a waypoint is indicated with a star to the left of the speed prediction of the waypoint. The color of the star is magenta, if the constraint will be respected, and amber, if the constraint will be missed.

Refer to F-PLN Page

ON THE ND

On the ND , the speed constraint value is displayed under the waypoint ident, when the CONSTRAINTS option is selected on the EFIS CP . The color of the constraint is magenta, if the constraint will be respected, and amber, if the constraint will be missed.
The speed constraint is not indicated on the VD .

ASSOCIATED MESSAGES

Refer to DSC-22-FMS-20-110 CONSTRAINTS BEFORE XXXXXXX : DELETED CONSTRAINTS BEFORE XXXXXXX : DELETED
Refer to DSC-22-FMS-20-110 SPD ERROR AT XXXXXXX SPD ERROR AT XXXXXXX

SPEED LIMIT (SPD LIMIT)

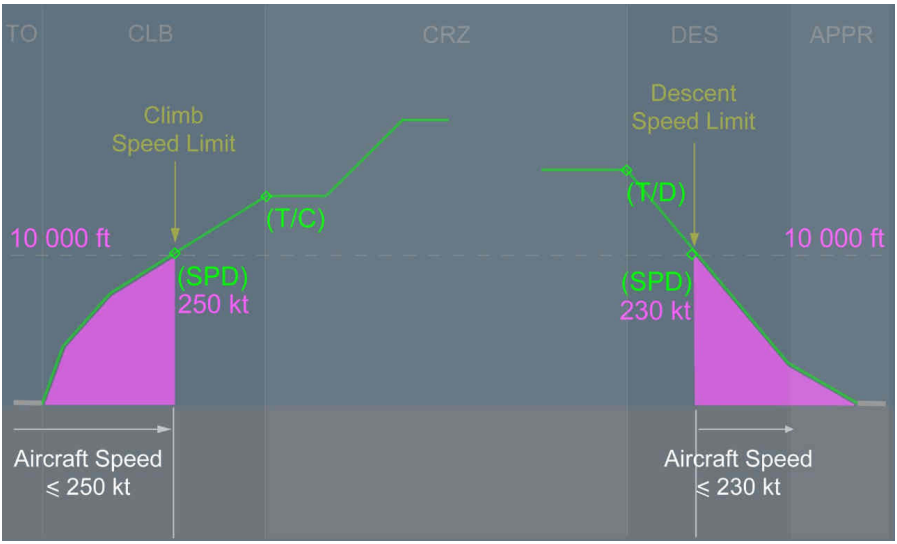
Applicable to: ALL

PURPOSE

The flight crew uses the speed limit revision to enter, change, or delete the climb or descent speed limit.
The speed limit is a speed constraint to be respected, at and below the specified altitude.
There is only one speed limit for the CLIMB phase (climb speed limit) and/or one for the DESCENT phase (descent speed limit).

Note: *The speed limit is not applied in the APPROACH phase.*

Speed Limit



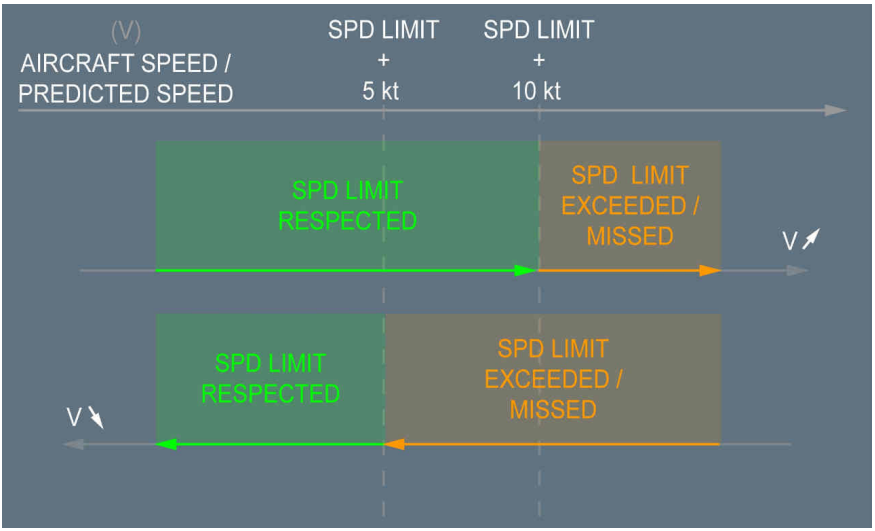
The speed limit may be (in the following order of priority):

- The flight crew entry
- The database value (the speed limits can be stored with the associated origin and destination airports in the navigation database)
- The FMS default value, that is 250 kt / 10 000 ft .

SPEED LIMIT EXCEEDED

The speed limit is exceeded when the aircraft's altitude is below the speed limit altitude, and the aircraft's speed is more than 10 kt over the speed limit. When exceeded, the speed limit remains exceeded, as long as the aircraft's speed is more than 5 kt over the speed limit.
When the speed limit is exceeded, the FMS displays the SPD LIMIT EXCEEDED message on the MFD . (*Refer to DSC-22-FMS-20-110 SPD LIMIT EXCEEDED* message)
The speed limit is predicted as missed when the predicted speed at the speed limit altitude is more than 10 kt over the speed limit. When missed, the speed limit remains missed, as long as the predicted speed is more than 5 kt over the speed limit.

Speed Limit Exceeded / Missed



L2 **SPEED LIMIT AND SECONDARY FLIGHT PLAN**

The speed limit revision is available on the active (or temporary), and secondary flight plans.

SPEED LIMIT AND TEMPORARY FLIGHT PLAN

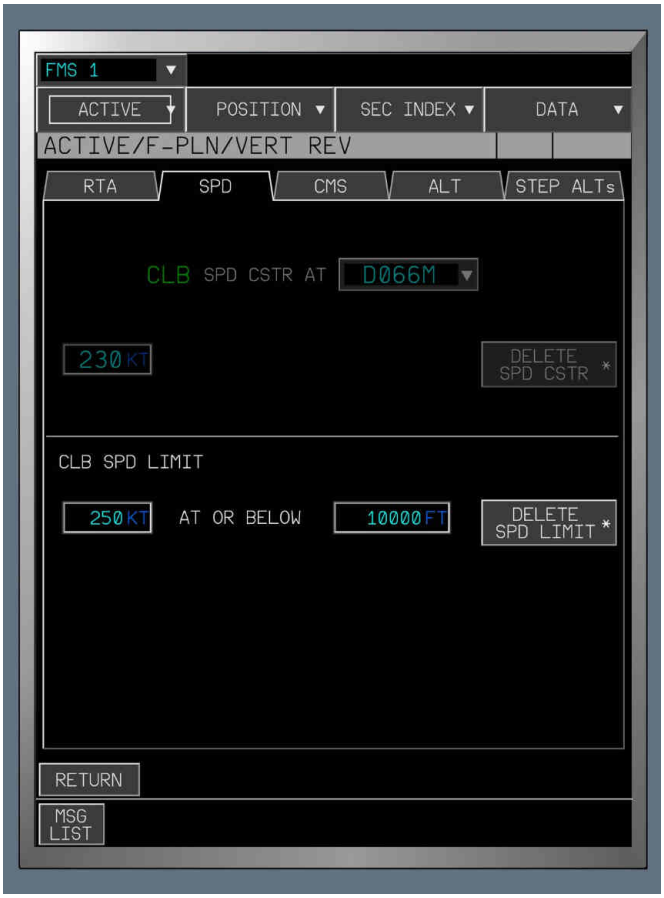
Insertion, change, or deletion of a speed limit, creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete a speed limit on the lower part of the SPD panel on the ACTIVE (or SEC) /F-PLN/ VERT REV page.

SPD Panel on the VERT REV Page



Refer to SPD Panel

The flight crew can access the VERT REV page via the F-PLN page, by clicking on the speed prediction associated with a waypoint of the CLIMB or DESCENT phase, or by selecting the CONSTRAINTS revision in the waypoint revisions menu, then by selecting the SPD panel.
On the F-PLN page, the speed limit is indicated by a pseudo-waypoint: (SPD). This pseudo-waypoint is inserted into the flight plan, where the aircraft will cross the speed limit altitude. A star to the left of the speed prediction of the pseudo-waypoint indicates whether the speed limit is predicted to be respected or missed. The color of the star is magenta, if the constraint is predicted to be respected, and amber, if the constraint is predicted to be missed.

Note: The flight crew can access the SPD panel of the VERT REV page via the speed limit pseudo-waypoint, by clicking on its associated speed prediction, or by selecting the CONSTRAINTS item in its revisions menu.

Refer to F-PLN Page

ON THE ND

On the ND, the speed limit pseudo-waypoint is indicated with a magenta dot, if the speed limit is respected. No dot is displayed, if the speed limit is missed.

ASSOCIATED MESSAGES

Refer to DSC-22-FMS-20-110 SPD LIMIT EXCEEDED SPD LIMIT EXCEEDED

CONSTANT MACH SEGMENT (CMS)

Applicable to: ALL

PURPOSE

The flight crew uses the Constant Mach Segment (CMS) revision to insert a constant Mach constraint on a cruise segment of the primary flight plan. The flight crew defines the CMS by entering:

- The start waypoint

L2 The start waypoint may be any cruise waypoint on the primary flight plan, if it is not part of the departure or arrival procedure.

L1 - The end waypoint

L2 The end waypoint may be any cruise waypoint on the primary flight plan, if it is not part of the departure or arrival procedure.

L1 - The Mach number

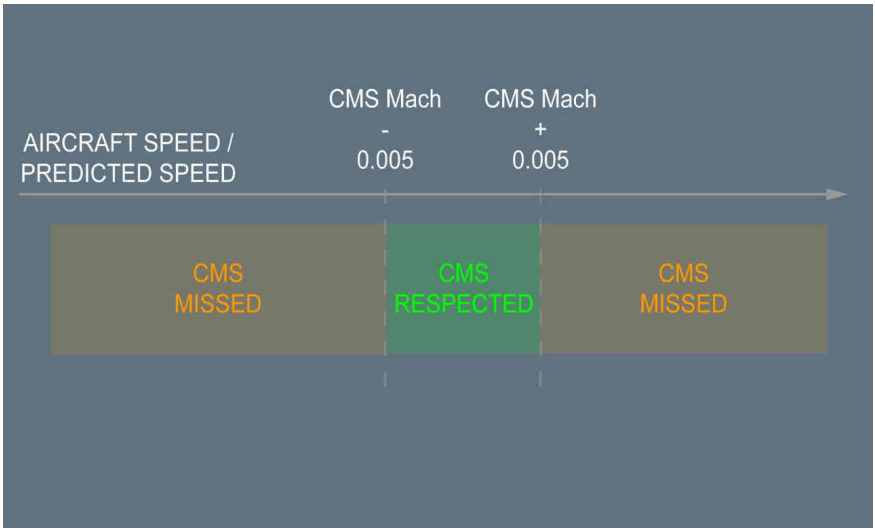
L2 The flight crew can create a CMS on all waypoints of the CRUISE phase of the primary flight plan.
The flight crew cannot create a CMS on the alternate flight plan.
The flight crew can create only one CMS in the flight plan.

L1 The flight crew can change or delete an existing CMS , even when the aircraft is already flying it.

CMS MISSED

The FMS compares the CMS Mach number with the aircraft speed, and the predicted speed on the CMS waypoints, and computes whether the CMS will be respected or missed.
The CMS is predicted as missed when the aircraft's speed, or predicted speed, is not within (CMS Mach — 0.005 , CMS Mach + 0.005).

CMS Missed



L3 AUTOMATIC DELETION OF THE CMS

The existing CMS is automatically deleted, if one of the following occurs:
- The alternate flight plan is enabled
- The Engine Out (EO) mode becomes active
- The flight phase transitions from CRUISE to another flight phase.

When the CMS is automatically deleted in the active flight plan, due to a flight phase transition from CRUISE to another flight phase, the MACH SEGMENT DELETED message is displayed on the MFD . (*Refer to DSC-22-FMS-20-110 MACH SEGMENT DELETED* message)

L2 CONSTANT MACH SEGMENT AND SECONDARY FLIGHT PLAN

The constant Mach segment revision is available on the active (or temporary), and secondary flight plans.

CONSTANT MACH SEGMENT AND TEMPORARY FLIGHT PLAN

Insertion, change or deletion of a constant Mach segment creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete the CMS on the CMS panel of the ACTIVE (or SEC) /F-PLN/ VERT REV page.

CMS Panel on the VERT REV Page



Refer to CMS Panel

The flight crew can access the VERT REV page via the F-PLN page, by clicking on the speed prediction, associated with the revised waypoint, or by selecting the CMS revision in the waypoint revisions menu.
On the F-PLN page, the CMS is indicated by a star to the left of the speed prediction of all the waypoints (except the start waypoint) of the segment. The color of the star is magenta, if the constraint will be respected, and amber, if the constraint will be missed.
Refer to F-PLN Page

ON THE ND

On the ND , the CMS Mach number is displayed under the waypoint ident of all waypoints of the segment (except the start waypoint), when the CONSTRAINTS option is selected on the EFIS CP . The color of the constraint is magenta, if the constraint will be respected, and amber, if the constraint will be missed.
The ND also displays the speed change indicator, where the aircraft will accelerate or decelerate to reach the required Mach of the CMS.
The CMS is not indicated on the VD .

ASSOCIATED MESSAGES

Refer to DSC-22-FMS-20-110 MACH SEGMENT DELETED MACH SEGMENT DELETED

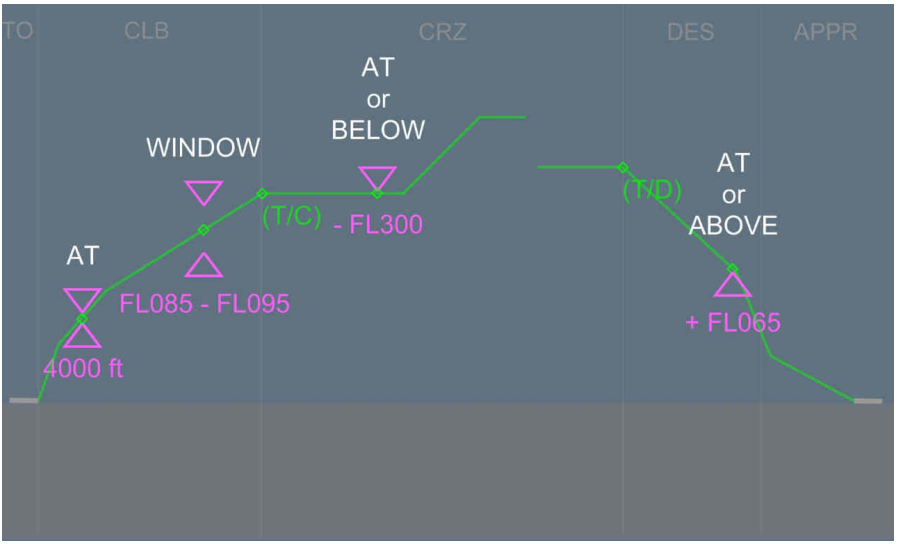
ALTITUDE CONSTRAINT (ALT CSTR)

Applicable to: ALL

PURPOSE

The flight crew uses the altitude constraint revision to enter, change, or delete an altitude constraint on a waypoint.
The altitude constraint can be to reach the waypoint AT, AT or BELOW, AT or ABOVE the specified altitude, or between two specified altitudes (ALTITUDE WINDOW).

Altitude Constraint



The altitude constraint may be (in the following order of priority):
- The flight crew entry
- The database value (the altitude constraints can be stored with the terminal area procedures in the navigation database).

Note: *The ALTITUDE WINDOW constraint can only be a value from the navigation database. The flight crew cannot manually enter or change this constraint.*

L2 The flight crew can define an altitude constraint on the TAKEOFF, CLIMB, DESCENT, and APPROACH waypoints on the primary flight plan. The flight crew cannot define an altitude constraint on the origin and destination airports, the FROM waypoint, or any pseudo waypoint.

L3 **AUTOMATIC DELETION OF THE ALTITUDE CONSTRAINT(S)**

- When the flight phase transitions from CRUISE, DESCENT, or APPROACH, to GO AROUND, all altitude constraints between the aircraft and the primary destination are deleted.
  The CONSTRAINTS BEFORE XXXXXXX : DELETED message is displayed on the MFD .
  XXXXXXX is the ident of the waypoint, following the last down path waypoint with a descent altitude constraint. (*Refer to Message*)
- When the alternate flight plan is enabled, the following altitude constraints are deleted: All altitude constraints between the aircraft and the former primary destination, and all altitude constraints on the alternate flight plan, that are below the current aircraft altitude.
  The CONSTRAINTS BEFORE XXXXXXX : DELETED message is displayed on the MFD .
  XXXXXXX is the ident of the waypoint, following the last down path waypoint with an altitude constraint, below the current aircraft altitude. (*Refer to Message*)
- When the CRZ FL or step altitudes are changed, the following constraints are deleted:
  The climb and descent constraints, that are at or above the new CRZ FL , and the descent constraints, that are at or above any inserted step altitude.
  The CONSTRAINTS ABOVE CRZ FL: DELETED message is displayed on the MFD . (*Refer to Message*)
- When the waypoint, with the constraint, becomes an ABEAM waypoint when a DIRECT TO with ABEAM is performed, the constraint is deleted.

L2 **ALTITUDE CONSTRAINT UNIT REFERENCE**

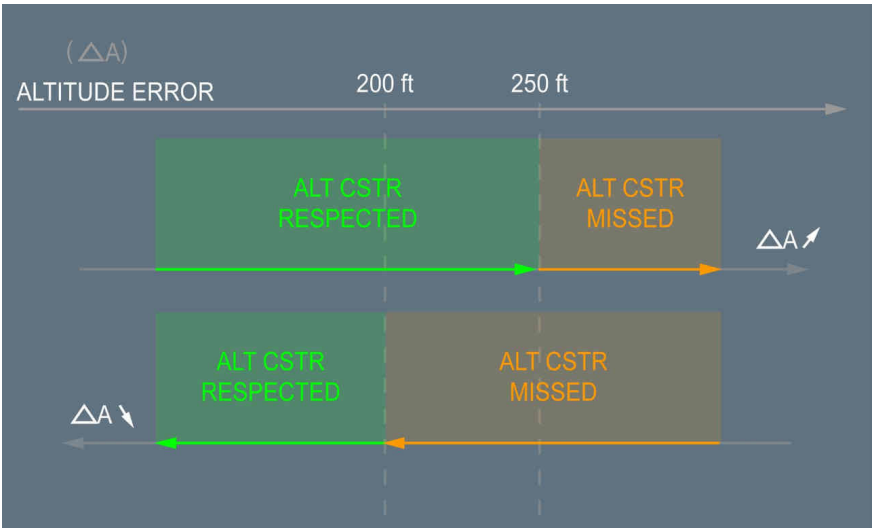
The altitude constraint is in feet, if its value is less than the transition altitude.
The altitude constraint is in FL , if its value is above the transition altitude.
If there is a transition altitude change, the altitude constraints change accordingly.

Note: *The altitude constraint unit of measure does not change if the flight crew changes the baro setting.*
For example, if the baro setting is changed from QNH to STD , a down path altitude constraint that was defined in feet, remains defined in feet.

L1 **ALTITUDE ERROR**

The FMS compares the altitude constraint value with the predicted altitude value on the waypoint, and predicts whether the altitude constraint will be respected or missed. The difference between the two values is referred to as the altitude error.
The altitude constraint is predicted as missed, if the altitude error becomes more than 250 ft .
When missed, the altitude constraint remains missed as long as the altitude error is more than 200 ft .

Altitude Error



L2 **ALTITUDE CONSTRAINT AND SECONDARY FLIGHT PLAN**

The altitude constraint revision is available on the active (or temporary), and secondary flight plans.

ALTITUDE CONSTRAINT AND TEMPORARY FLIGHT PLAN

Insertion, change, or deletion of an altitude constraint creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete the altitude constraint on the ALT panel of the ACTIVE (or SEC) /F-PLN/ VERT REV page.

ALT Panel on the VERT REV Page



Refer to ALT Panel

The flight crew can access the ALT tab panel of the VERT REV page via the F-PLN page, by clicking on the altitude prediction, associated with the revised waypoint, or by selecting the CONSTRAINTS revision in the waypoint revisions menu, followed by selecting the ALT panel.
On the F-PLN page, the altitude constraint on a waypoint is indicated with a star to the left of the altitude prediction of the waypoint. The color of the star is magenta, if the constraint is predicted to be respected, and amber, if the constraint is predicted to be missed.

Refer to F-PLN Page

ON THE ND

On the ND , the altitude constraint is indicated with a circle around the waypoint symbol. The constraint value under the waypoint ident is displayed when the CONSTRAINTS option is selected on the EFIS CP . The color of the constraint and the circle is magenta, if the constraint is predicted to be respected, and amber, if the constraint is predicted to be missed.

On the VD , the altitude constraint is indicated with:
- An upside-down triangle, for the AT OR BELOW altitude constraint
- A triangle, for the AT OR ABOVE altitude constraint
- Two triangles (hourglass shape, with touching tips), for the AT altitude constraint
- Two triangles (hourglass shape, with tips that do not touch), for the WINDOW altitude constraint.

ASSOCIATED MESSAGES

Refer to DSC-22-FMS-20-110 CONSTRAINTS BEFORE XXXXXXX : DELETED CONSTRAINTS BEFORE XXXXXXX : DELETED
Refer to DSC-22-FMS-20-110 CONSTRAINTS ABOVE CRZ FL: DELETED CONSTRAINTS ABOVE CRZ FL : DELETED

STEP ALTITUDES (STEP ALTS)

Applicable to: ALL

PURPOSE

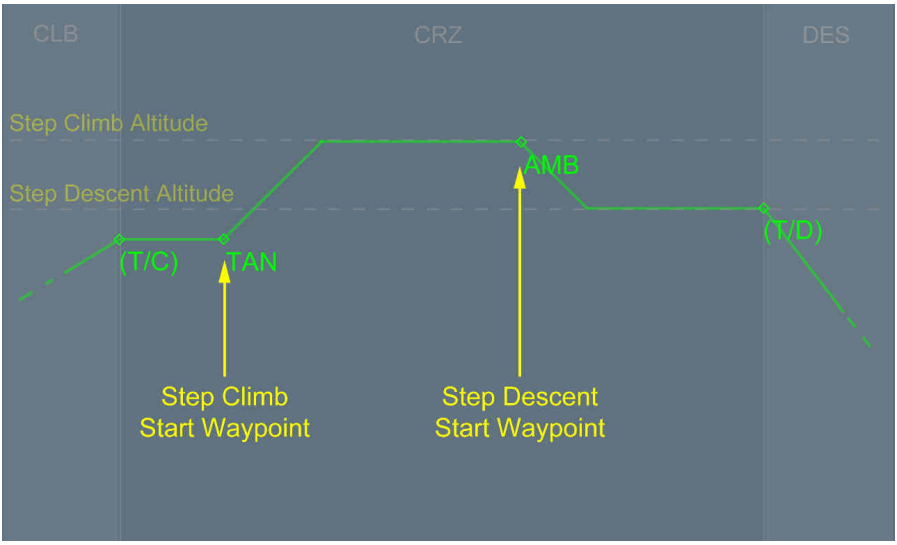
The flight crew uses the step altitudes revision to insert or modify a step climb, or step descent. A step climb or step descent is a change to a higher or lower cruise altitude, respectively.
The flight crew inserts step altitudes to create a vertical flight plan, with associated predictions, that correspond as much as possible to the Operator's computerized flight plan.
The flight crew can define up to 10 steps.

The flight crew defines the step, by entering:
- The step altitude
- The step start waypoint
  The step start waypoint is the waypoint on the flight plan where the aircraft should leave the current cruise altitude to join the step altitude.

  Note: An automatic vertical maneuver will not occur, when reaching the step point. The flight crew has to manually initiate the step climb or step descent by changing the target FCU altitude. The flight crew can do this at any time before reaching the step point.

L2 The flight crew can insert up to 10 step altitudes on the CRUISE waypoints of the primary flight plan.

Step Altitudes



L1 **OPTIMUM STEP POINT**

If the flight crew has entered one (or more) altitude steps, the FMS computes an optimum step start point for the next down path step, if it is a step climb. The FMS also computes the fuel and time savings that would be made, if the step climb was initiated at the optimum step, instead of at the start waypoint entered by the flight crew.

If there is no step in the flight plan, the FMS computes an optimum step start point, after entry of the step altitude. In this case, the fuel and time savings are computed between a flight plan with, and a flight plan without, the step climb.

L2 The optimum step point function is not available for the secondary flight plans.

Note: *When the active flight plan has an optimum step point, and the flight crew imports the active flight plan into a secondary flight plan, the optimum step point will not be copied into the secondary flight plan.*

IGNORED STEP

A step is IGNORED when:
- The step end waypoint (the point of reaching the step altitude), is nearer than 50 nm to the T/D , or
- The step start point, or the step end waypoint, are located before the T/C or after the T/D .

Ignored steps are not deleted, but are ignored for the computation of predictions. An ignored step is not indicated in the flight plan on the MFD or the ND , but remains displayed on the STEP ALTS panel on the VERT REV page.
An ignored step may become a predicted step again, after a flight plan change.

L3 **AUTOMATIC STEP DELETION**

A step climb or step descent is automatically deleted when:
- The step start waypoint is deleted, or sequenced
- The Engine Out (EO) mode becomes active
- In PREFLIGHT, TAKEOFF, or CLIMB, the flight crew changes the cruise flight level, and a step climb becomes a step descent, or vice versa
- In CRUISE, the flight crew sets the FCU altitude above the aircraft altitude. In this case, all step descents, and all step climbs with a step altitude less than the new FCU altitude, are deleted.
- In CRUISE, the flight crew sets the FCU altitude below the aircraft altitude. In this case, all step climbs, and all step descents with a step altitude greater than the new FCU altitude, are deleted.

When the step altitude is automatically deleted, the STEP DELETED message is displayed on the MFD (*Refer to Message).*

L2 **STEP ALTITUDES AND SECONDARY FLIGHT PLAN**

The step altitudes revision is available on the active (or temporary), and secondary flight plans.

STEP ALTITUDES AND TEMPORARY FLIGHT PLAN

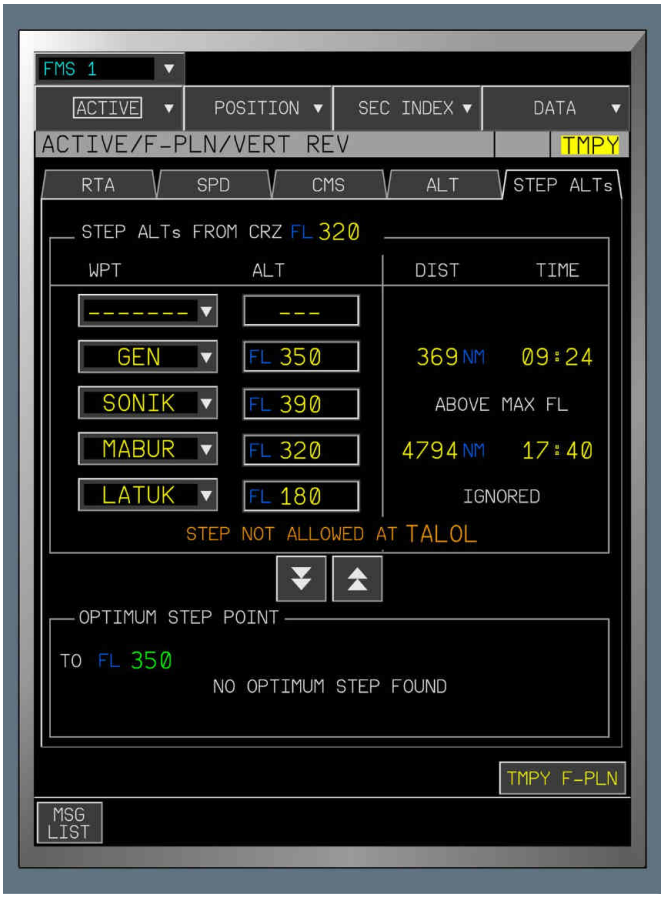
Insertion, change, or deletion of a step climb, or step descent creates a temporary flight plan.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can enter, change, or delete step altitudes on the STEP ALT panel of the ACTIVE (or SEC) /F-PLN/ VERT REV page.
The flight crew consults, enters, and updates the optimum step point in the OPTIMUM STEP area at the bottom of the page.

STEP ALT Panel on the VERT REV Page



Refer to STEP ALTs Panel

The flight crew can access the STEP ALT panel of the VERT REV page via the F-PLN page, by clicking on the altitude prediction, associated with the revised waypoint, or by selecting the STEP ALT revision in the waypoint revisions menu.

On the F-PLN page, the step point is indicated with the Step Climb (S/C), or Step Descent (S/D) pseudo-waypoint.

ON THE ND

On the ND , the step start waypoint is indicated with the step climb, or step descent symbol.

ASSOCIATED MESSAGES

Refer to STEP ABOVE MAX FL
Refer to STEP DELETED
Refer to STEP AHEAD

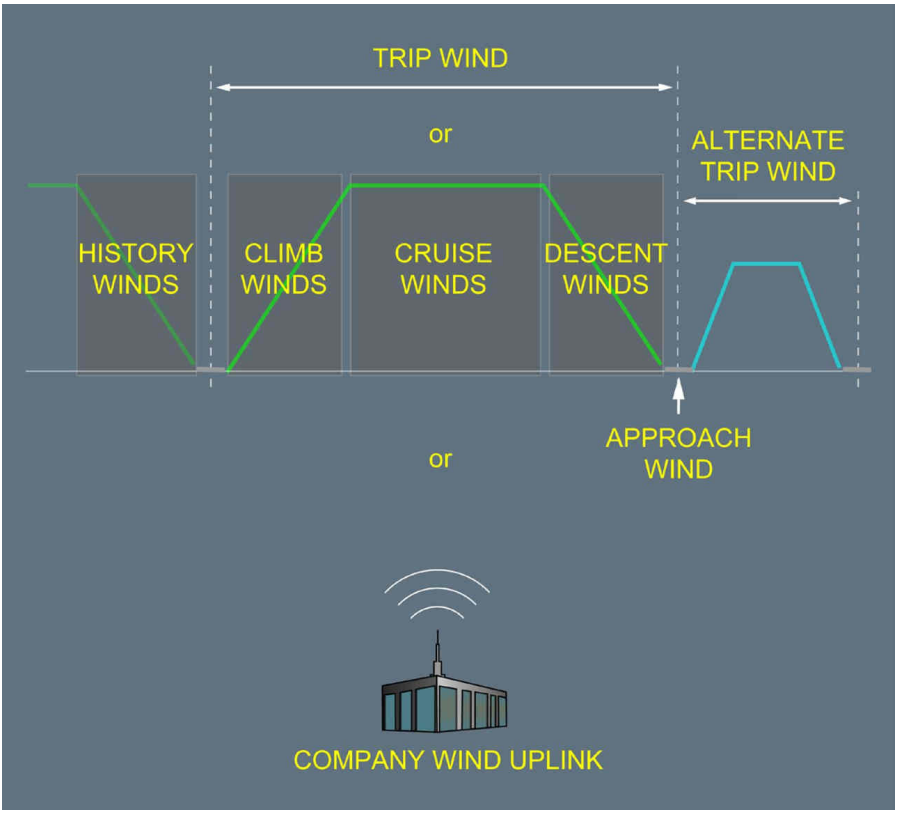
WIND

Applicable to: ALL

PURPOSE

The flight crew uses the WIND revision to check, insert, and modify flight plan winds.
Wind data has to be entered to obtain realistic flight plan predictions. The flight crew can enter an average trip wind for the entire flight, or can enter more precise wind data for the different flight phases, and different flight plan cruise waypoints.
The FMS uses the inserted winds to compute the flight plan wind predictions. The wind predictions are on their turn used to compute the other flight plan and performance predictions. (*Refer to More Information on the Wind Predictions*)

Wind Revision



TRIP WIND

The trip wind is an average wind for the entire flight from the origin airport to the primary destination.

Note: *The predictions for the alternate flight plan do not consider this trip wind. The trip wind for the alternate flight plan has to be entered separately. (See Alternate Trip Wind)*

The trip wind is defined as a headwind or tailwind component.
The FMS uses the trip wind for predictions computation as long as no climb, cruise, descent, or approach winds are entered.

HISTORY WINDS

The history winds are the stored descent winds of the previous flight.
After the T/D of the previous flight, the FMS measures and stores the winds at CRZ FL, FL 250 , FL 150 , and FL 050 .
In preflight, the flight crew can insert the history winds of the previous flight as the climb winds for the next flight.

CLIMB WINDS

The flight crew can insert climb winds on 5 different levels. The wind at ground level (GND) can be entered as one of these levels. An altitude entry below 400 ft is considered as a ground level.
The flight crew can also insert the history winds as the climb winds. The inserted history winds can always be changed by the flight crew afterwards.

L2 The climb winds can only be inserted, or changed before the CLB phase.

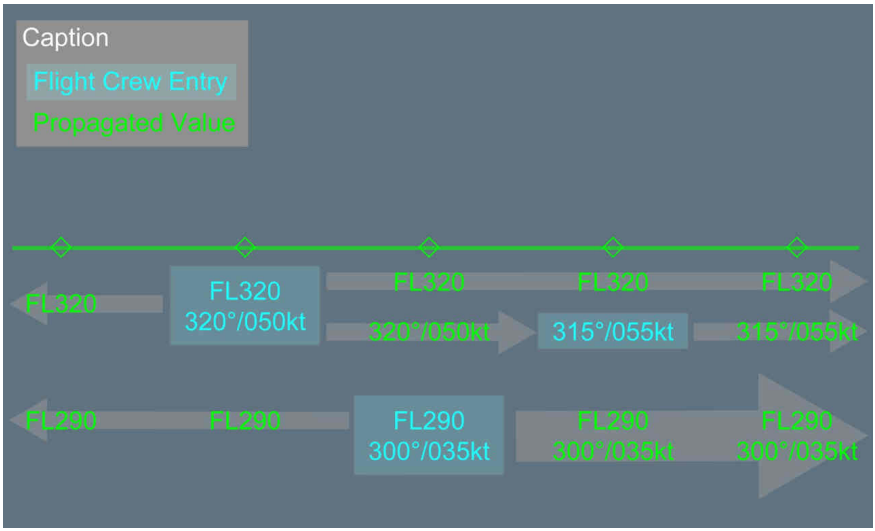
L1 CRUISE WINDS AND TEMPERATURES

The flight crew can insert different cruise wind data for all cruise waypoints, and this for 4 different flight levels.

When the flight crew enters wind data on a waypoint:
- The associated flight level is propagated to all (up path and down path) cruise waypoints
- The wind direction and velocity are propagated to the down path cruise waypoints until the waypoint for which the flight crew has entered wind data for the same flight level.

The flight crew can always change (but not clear) propagated wind data.

Wind Propagation



For each cruise waypoint, the flight crew can insert a temperature for a specific flight level. The FMS uses the temperature data to define a temperature profile, that is used for predictions computation. The temperature is propagated to the down path cruise waypoints in the same manner as the wind data.

L2 The FMS defines an estimated temperature profile based on the difference between a reference temperature profile, and a measured or entered Static Air Temperature (SAT) at different altitudes.
The reference temperature profile is defined by the tropopause altitude that is entered on the INIT page. The default tropopause altitude is the ISA tropopause.
The flight crew defines the deviation from the reference temperature profile, for the cruise waypoints, by entering the SAT associated to an altitude.

L1 **DESCENT WINDS**

The flight crew can insert descent winds on 5 different levels. The wind at ground level (GND) at the primary destination can be entered as one of these levels. An altitude entry below 400 ft is considered as a ground level.

Note: *The wind at ground level is also considered as the approach wind.*

L2 The descent winds can only be inserted, or changed before the DES phase.

L1 **APPROACH WIND**

The flight crew can enter the approach wind at the primary destination. The approach wind is used for the approach speed computation.

Note: *The approach wind is also considered as the wind at ground level for the descent wind profile computation.*

ALTERNATE TRIP WIND

The alternate trip wind is an average cruise wind for the alternate flight plan (from the primary destination to the alternate destination).
If the alternate flight plan distance is less than 200 nm , the alternate cruise flight level is defaulted to FL 220 . If the alternate flight plan distance is 200 nm or more, the alternate cruise flight level is FL 310 .
The alternate trip wind is defined by a wind direction and wind velocity.
The flight crew can always change the alternate flight level and associated trip wind.

COMPANY WIND UPLINK

The flight crew can request company wind and temperature data for the active, and the three secondary flight plans. The received wind and temperature data will be associated with the flight plan from which the request was sent.
The company can also uplink wind and temperature data without any request from the flight crew. These wind data will be associated with the active flight plan.

L2 **WIND REVISION AND SECONDARY FLIGHT PLAN**

The WIND revision is available on the active, and secondary flight plans.

WIND REVISION AND TEMPORARY FLIGHT PLAN

Insertion, change, or deletion of any wind data does not create a temporary flight plan. However, insertion, change, or deletion of wind data, creates a set of draft winds. The draft winds are not considered for predictions computation before they are inserted.

Note: *Insertion of history winds does not create draft winds, the history winds are directly inserted as the climb winds of the active flight plan.*

Insertion, change, or deletion of any wind data is not possible if a temporary flight plan is pending.
When draft winds are pending, and the flight crew creates a temporary flight plan, the draft winds are automatically inserted in the active (and temporary) flight plan. The FMS displays the DRAFT WIND INSERTED message. (*Refer to Message*)

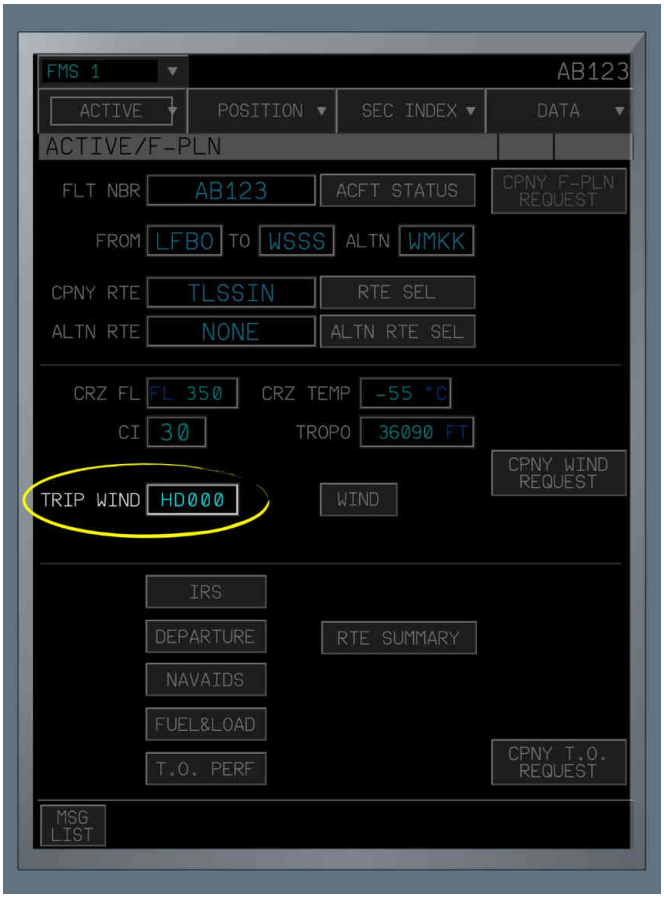
CONTROLS AND INDICATORS

ON THE MFD

The flight crew can:

- Enter the trip wind on the INIT page

INIT Page

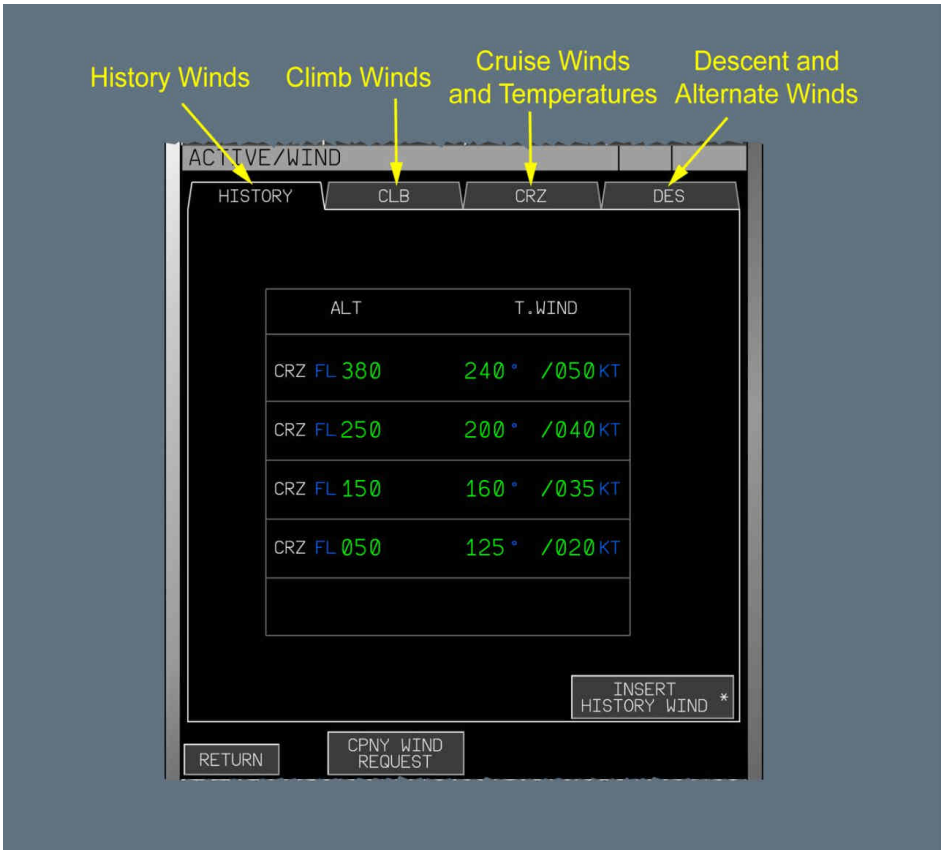


Refer to Page

- Insert the history, climb, cruise, descent, and alternate winds on the WIND page

L2 Note: *The descent wind at ground level is automatically copied on the APPR panel of the PERF page.*

WIND Page



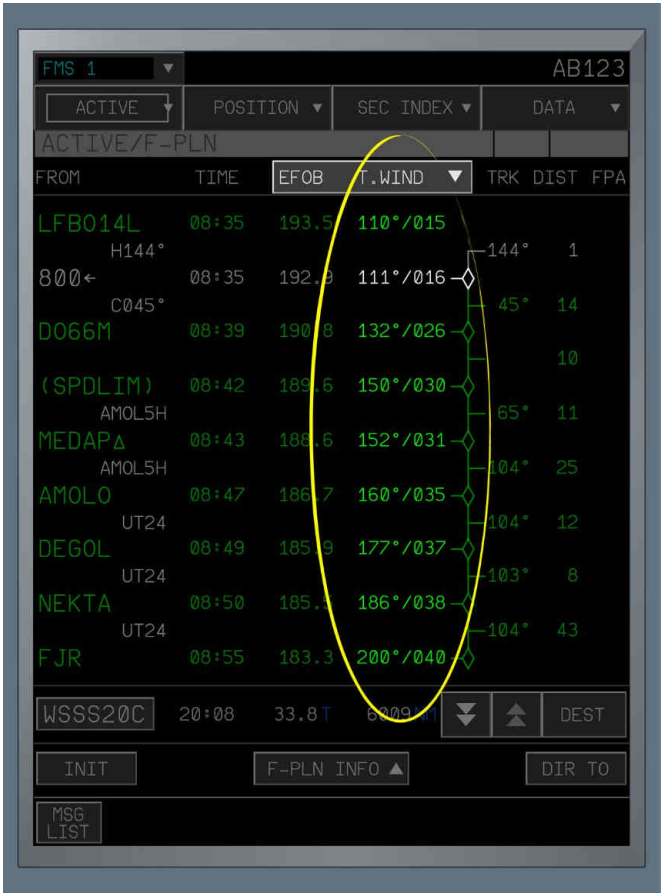
L1 *Refer to Page*

- Enter the approach wind on the APPR panel of the PERF page

L2 Note: *The approach wind is automatically copied on the DES panel of the WIND page as the wind at ground level (GND).*

L1 - Check the flight plan wind profile on the F-PLN page

F-PLN Page



Refer to Page

- Make a wind request on the INIT, or WIND page

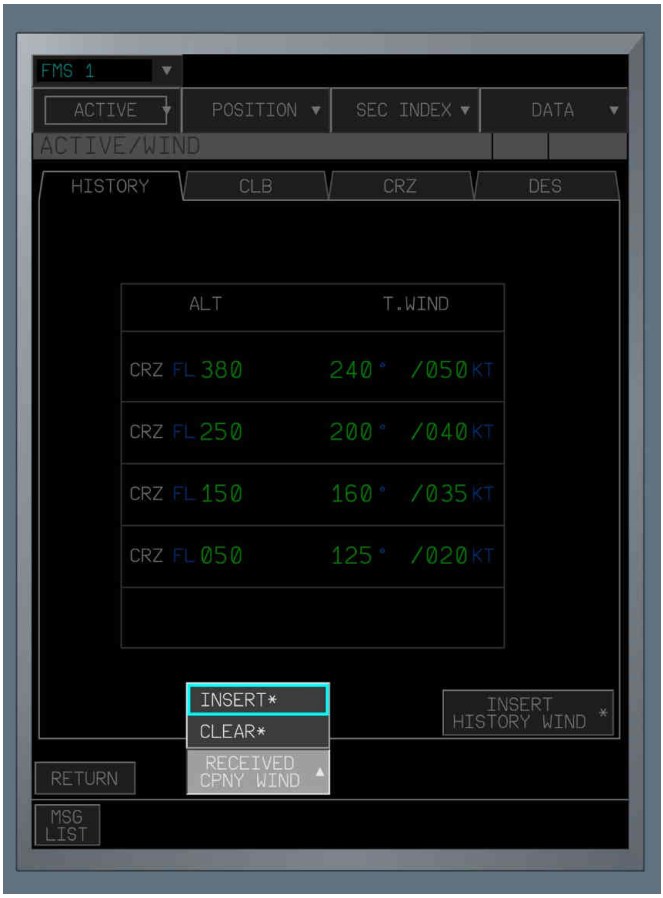
Wind Request on INIT and WIND Page



Refer to Page
Refer to Page

- Insert received company wind data on the WIND page.

Insert or Clear Company Wind



Refer to Page

ON THE ND

The ND only displays the actual measured wind.
Refer to More Information on the ND Measured Wind Indication

ASSOCIATED MESSAGES

Refer to COMPANY WIND DATA RECEIVED WAITING FOR INSERTION IN ACTIVE

Refer to COMPANY WIND DATA RECEIVED WAITING FOR INSERTION IN SEC 1(2)(3)
Refer to COMPANY WIND UPLINK PENDING
Refer to RECEIVED COMPANY WIND DATA NOT VALID

Diversion

INTRODUCTION

Applicable to: ALL

To prepare an en route diversion over oceanic and deserted areas, the flight crew uses the Equi-Time Point (ETP) function to determine the diversion point(s) between two diversion airports, *Refer to The Equi-Time Point (ETP) Function* . The flight crew defines the diversion airports prior to departure, or in flight, using the closest airports data, *Refer to The Closest Airports Function* .
When the flight crew defines the most suitable diversion point and diversion airport, they then prepare the diversion on the secondary flight plan, *Refer to The Secondary Flight Plan* .
The flight crew performs a diversion by activating the secondary flight plan, *Refer to Performing a Diversion* .
If the flight crew decides to divert at the end of the cruise, beyond the last ETP , or in the DES or GA phase, they will most probably divert to the alternate airport using the ALTERNATE and ENABLE ALTERNATE revisions, *Refer to Diversion to the Alternate Airport* .

EQUI-TIME POINT

Applicable to: ALL

The flight crew uses the Equi-Time Point (ETP) function to compute the point along the lateral flight plan where the time to reach two designated reference airports(waypoints) is the same.
The default reference airports are the origin and destination airports. The flight crew may overwrite these default airports, and insert the local wind values at the applicable cruise flight level.

The FMS computes and updates regularly the ETP , using:
- The current aircraft speed: managed or selected speed
- The flight plan winds, combined with the winds at the reference airports.

The FMS defines the ETP as a place/distance waypoint associated with the subsequent waypoint, (e.g. RANAH/-40.5NM).
L2 The ETP can only be located on a cruise flight plan leg, and cannot be located in a holding pattern or procedure turn.

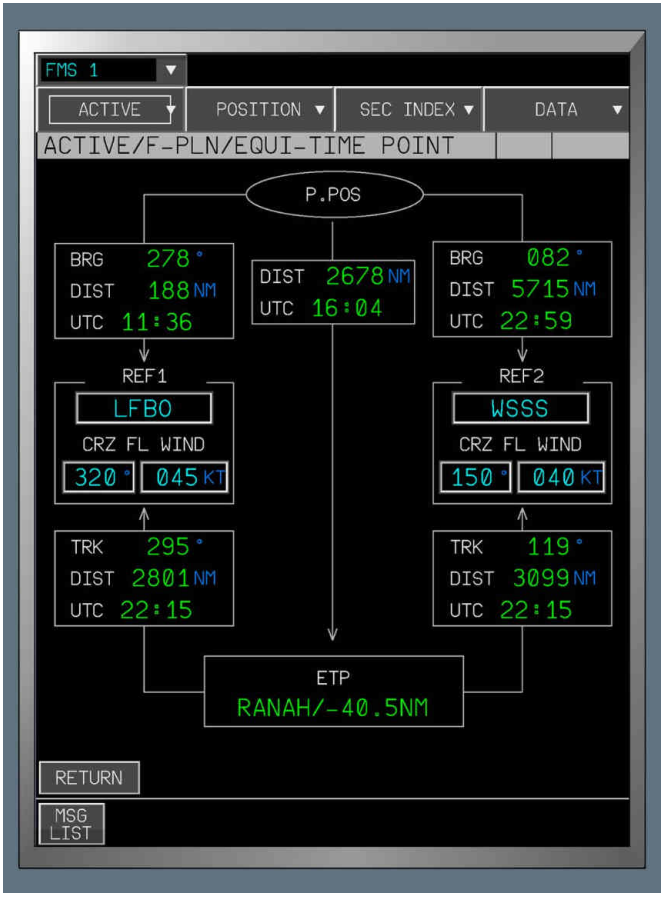
L1 The FMS also provides the following data:

- From the current position of the aircraft to the ETP :
  - Distance along the flight plan
  - Estimated time of arrival (UTC) at the ETP , based on a trajectory along the flight plan.
- From the current position of the aircraft to the reference airports:
  - Bearing (BRG)
  - Direct distance (DIST)
  - Estimated time of arrival (UTC) at the reference airport, based on a direct trajectory.
- From the ETP to the reference airports:
  - Track (TRK)
  - Direct distance (DIST)
  - Estimated time of arrival (UTC) at the reference airport, based on an overfly of the ETP and a direct trajectory between the ETP and the reference airport.

CONTROLS AND INDICATORS

ON THE MFD

The flight crew can compute the ETP on the ACTIVE/F-PLN/EQUI-TIME POINT page.



Refer to EQUI-TIME POINT page
No associated pseudo waypoint exists on the F-PLN page.

Note: *In order to indicate the ETP on the F-PLN page, and/or to prepare the next applicable ETP on the EQUI-TIME POINT page, the flight crew may define a TIME MARKER at the estimated time of arrival at the ETP , Refer to LL XING-TIME MKR page .*

ON THE ND

The ND displays the ETP pseudo waypoint.

CLOSEST AIRPORTS

Applicable to: ALL

The closest airports function computes the four database airports, that are closest to the current position of the aircraft.

For each airport, the FMS computes:
- The direct distance (DIST) between the current position of the aircraft, and the airport
- The bearing (BRG) to the airport
- The estimated time of arrival (UTC) at the airport, based on a direct trajectory
- The Estimated Fuel On Board (EFOB) at the airport
- An effective wind (EFF WIND) default value, based on the flight plan winds.
  The flight crew may overwrite this default value.

The fuel and time predictions are based on:
- The great circle distance and bearing to the airport
- The effective winds (default values, or values entered by the flight crew)
- The current delta ISA
- A flight from the current position to the ground, based on:
  - A computed cruise distance, flown at an optimum cruise Mach (based on the current CRZ FL , GW , and CI) in managed speed control, or at the selected Mach in selected speed control.
L2 In the case of an engine out, the EO LRC Mach, and the EO MAX FL (or the CRZ FL , if it is lower than the EO MAX FL) are considered.
L1 - A continuous descent from the CRZ FL to the airport elevation.

The flight crew can also enter up to three other airports, for which they want to compute the associated predictions.

CONTROLS AND INDICATORS

The CLOSEST AIRPORTS page displays the closest airports and their associated data.

CLOSEST AIRPORTS Page



Refer to CLOSEST AIRPORTS page

AIRPORTS ON THE ND

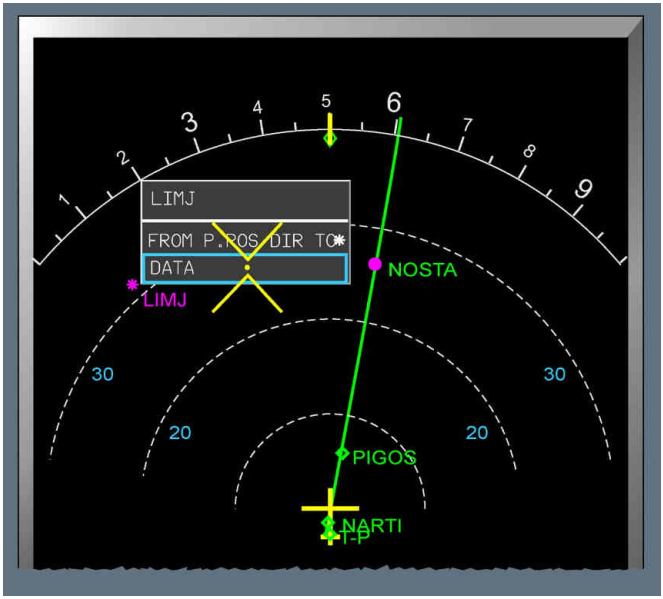
Applicable to: ALL

In certain cases, the flight crew may choose the diversion airport on the ND :

- Display all database airports on the ND by selecting the ARPT option on the EFIS CP



- If required, obtain additional information on the database airport(s) by selecting DATA in the airport list. This displays the DATA/AIRPORT page on the MFD, *Refer to Page* .



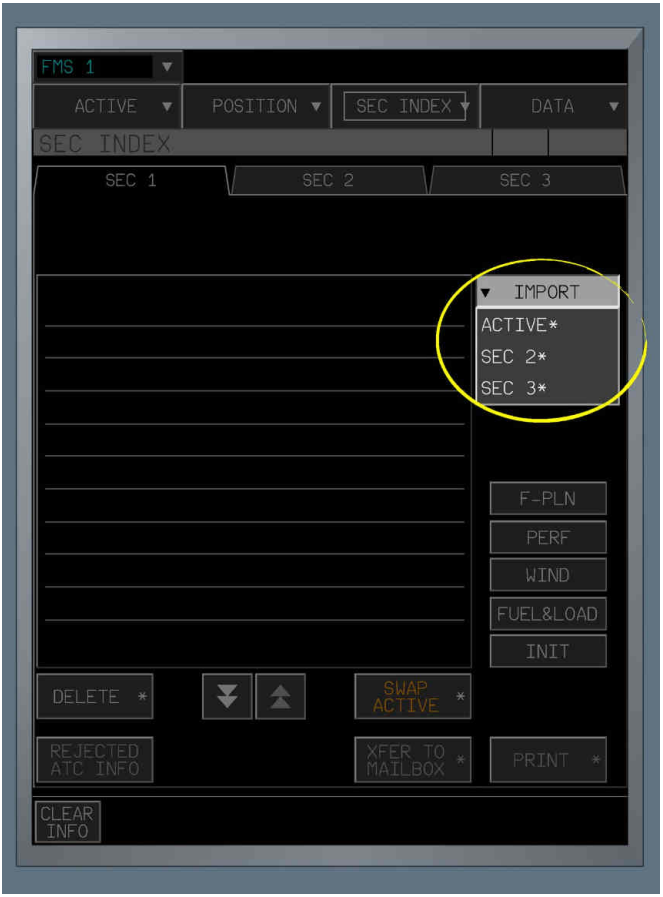
In addition, during oceanic or deserted area flights, the flight crew may use the BRG/DIST function on the POSITION/MONITOR page to continuously monitor the direct distance and bearing to the selected diversion airport(s), *Refer to Page* .

SECONDARY FLIGHT PLAN

Applicable to: ALL

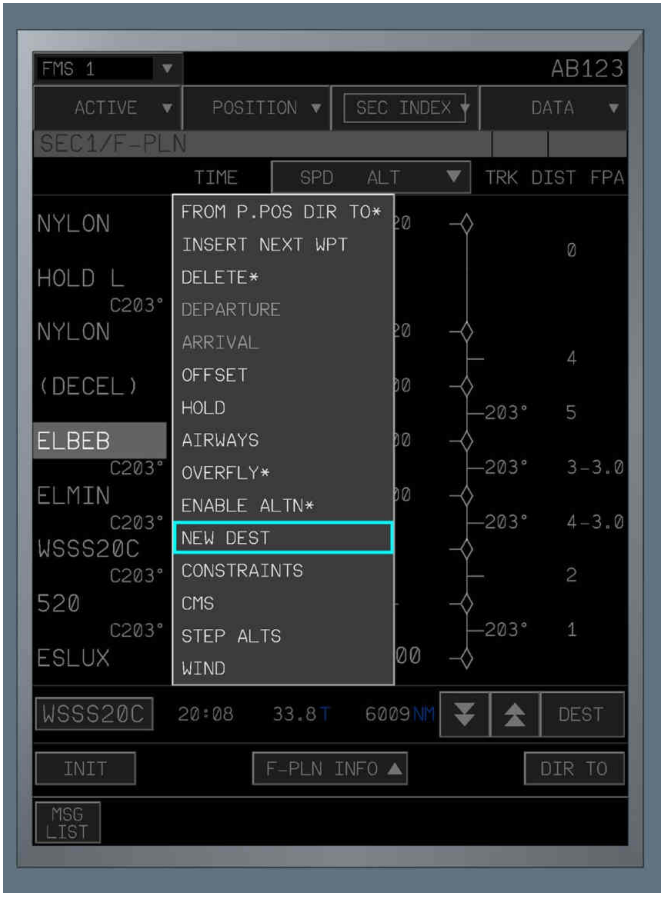
The flight crew prepares the diversion on the secondary flight plan:

- Import the active flight plan into SEC 1(2)(3)



Note: *The flight crew should not use SEC 3 for diversion purposes if they plan to load an ATC flight plan from the ATC mailbox into the FMS. This is because if there is a flight plan in SEC 3, this flight plan will be deleted when the ATC flight plan is loaded.*

- Select the NEW DEST revision on the diversion waypoint, *Refer to Revision*


FMS 1
AB123
ACTIVE
POSITION
SEC INDEX
DATA
SEC1/F-PLN
TIME
SPD
ALT
TRK DIST FPA
NYLON
HOLD L
C203°
NYLON
(DECEL)
ELBEB
C203°
ELMIN
C203°
WSSS20C
C203°
520
C203°
ESLUX
FROM P.POS DIR TO*
INSERT NEXT WPT
DELETE*
DEPARTURE
ARRIVAL
OFFSET
HOLD
AIRWAYS
OVERFLY*
ENABLE ALTN*
NEW DEST
CONSTRAINTS
CMS
STEP ALTS
WIND
0
4
-203° 5
-203° 3-3.0
-203° 4-3.0
2
-203° 1
WSSS20C
20:08
33.8T
6009NM
DEST
INIT
F-PLN INFO
DIR TO
MSG LIST

- Enter the ident of the diversion airport in the NEW DEST entry field



- Complete the flight plan between the diversion waypoint and the diversion airport

When the diversion airport is no longer applicable, or the ETP is sequenced, repeat the same procedure for the next diversion airport.

PERFORMING A DIVERSION

Applicable to: ALL

When the flight crew decides to divert:

- Display the secondary flight plan panel on which the diversion is prepared
- Click on the SWAP ACTIVE button to activate the secondary flight plan, *Refer to Swap Function*



- Perform a DIRECT TO, if required.

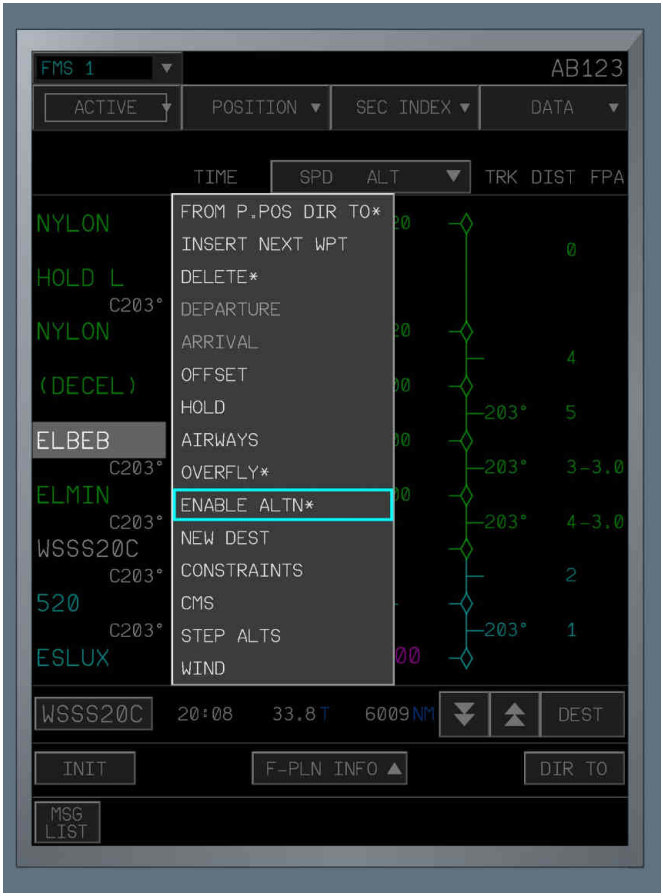
DIVERSION TO AN ALTERNATE AIRPORT

Applicable to: ALL

The flight plan includes an alternate flight plan. The alternate flight plan is the diversion flight plan from the primary destination airport to the alternate destination airport.
The flight crew selects an alternate airport with the ALTERNATE revision, *Refer to Revision* .
After the alternate airport selection, the flight crew completes the alternate flight plan, if required.

When the flight crew decides to divert:

- Select the ENABLE ALTN revision on the TO waypoint (or another flight plan waypoint, if appropriate), *Refer to Revision*



- Check the temporary flight plan, and insert the temporary flight plan when it is validated
- Perform a DIRECT TO, if required.

Intentionally left blank

Temporary Flight Plan

TEMPORARY FLIGHT PLAN

Applicable to: ALL

GENERAL

When the flight crew makes a flight plan revision, the FMS creates a temporary flight plan.
The temporary flight plan is a copy of the active flight plan, with the flight plan revision integrated.
This flight plan draft replaces temporarily the active flight plan, and allows the flight crew to check the impact of the revision on the flight plan before insertion.
While the temporary flight plan exists, the FMS still uses the original active flight plan for guidance and radio tuning.

The temporary flight plan exists until it is inserted, or erased:
- When the flight crew inserts the temporary flight plan, it replaces the active flight plan.
- When the flight crew erases the temporary flight plan, the revisions are not taken into account. The active flight plan remains unchanged.

L2 When both FMS are in DUAL mode, only one temporary flight plan can exist at a time.

L1 CREATION OF A TEMPORARY FLIGHT PLAN

The FMS creates (or updates) a temporary flight plan upon a lateral, or vertical flight plan revision (except the WIND revision) of the active flight plan. A revision of a secondary flight plans does not create a temporary flight plan.
Refer to Lateral Revisions
Refer to Vertical Revisions

L3 The FMS creates automatically a temporary flight plan when it detects an engine out at takeoff, before the EOSID diversion point. (*Refer to EOSID*)

L2 The FMS does not create a temporary flight plan when the flight crew:
- Changes the cruise flight level
- Changes the cost index, ZFW , ZFWCG , fuel data, perf, or idle factor
- Changes any wind, or temperature
- Inserts a time marker
- Exits, or resumes a holding pattern (*Refer to HOLD revision).*

L1 MULTI-REVISION

The flight crew can make multiple lateral, and vertical flight plan revisions in the same temporary flight plan.

Note: This is not valid for the DIRECT TO revision:
- *When the flight has created a temporary flight plan via the direct to revision, no other flight plan revisions can be made in this temporary flight plan. The flight crew has to insert (or erase) the temporary flight plan first*
- *When the flight has created a temporary flight plan via a revision, other than the direct to revision, the flight crew can not insert a direct to in this temporary flight plan. The flight crew has to insert (or erase) the temporary flight plan first.*

When a temporary flight plan with multiple revisions exists, the flight crew can UNDO the last revision. This removes the last revision from the temporary flight plan.

Note: The flight crew can only UNDO the "last" revision of the temporary flight plan. When he has done that, he only can insert or erase the temporary flight plan.

L2 **TEMPORARY FLIGHT PLAN SEQUENCING**

The temporary flight plan is sequenced with the active flight plan, if the first leg of the temporary flight plan is identical to the first leg of the active flight plan.

Note: When the NAV mode is engaged, and the flight crew tries to insert a temporary flight plan with a first leg different from the active leg, the SELECT HDG OR TRK FIRST message is displayed. (Refer to Message)

CONTROLS AND INDICATORS

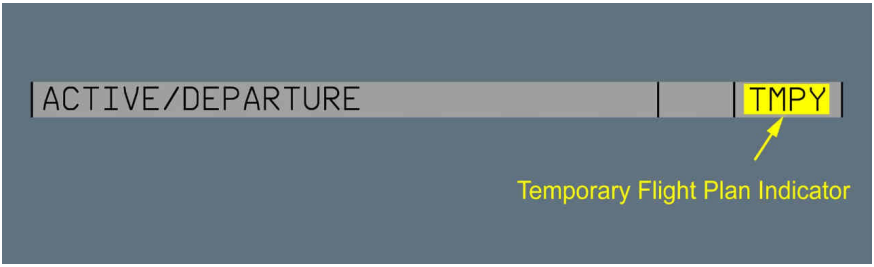
Applicable to: ALL

CONTROLS AND INDICATORS

When both FMS are in DUAL mode, the temporary flight plan data is displayed on the Captain's and First Officer's MFD and ND .

ON THE MFD

When a temporary flight plan exists, the page header displays TMPY for all pages that are related to the active or secondary flight plan: F-PLN page, flight plan revisions pages, INIT, FUEL&LOAD, PERF, WIND, and SEC INDEX page.



The temporary flight plan is displayed in yellow on the ACTIVE/F-PLN page. The active flight plan that is used for guidance and NAVAIDS tuning cannot be displayed on the MFD when a temporary flight plan exists. The flight crew uses the temporary flight plan page as the ACTIVE/F-PLN page (*Refer to Page*).



The revision data on a flight plan revision page are displayed in yellow, if the revision has created or updated the temporary flight plan.
Example: If the flight crew creates a temporary flight plan by inserting a time constraint, the data on the RTA panel of the VERT REV page are displayed in yellow. However, the data on the other panels of the VERT REV page (ALT, SPD, CMS, STEP ALTS) are not displayed in yellow, because the revisions of these panels are not included in the temporary flight plan.



INSERT/ERASE/UNDO

The flight crew can insert, or erase, the temporary flight plan on the ACTIVE/F-PLN page. The INSERT, and ERASE (UNDO) buttons are displayed in the bottom right, and left corner of the ACTIVE/F-PLN page.



The flight crew can also directly insert a temporary flight plan that was created by a DIRECT TO revision via the DIRECT TO page.



ON THE ND

The ND displays the temporary flight plan as a yellow dashed line.
The active flight plan remains on the ND in green, when a temporary flight plan exists. It is used for guidance, and NAVAIDS tuning. However, the waypoints of the active flight plan that are not part of the temporary flight plan, are no longer interactive.
The revision data on the ND DIRECT TO, and INSERT NEXT WPT revision windows are displayed in yellow.

INSERT/ERASE/UNDO

The flight crew can insert, or erase the temporary flight plan on the ND . The INSERT, and ERASE (UNDO) buttons are displayed in the bottom right, and left corner of the ND .

Note: The INSERT, and ERASE (UNDO) buttons are only displayed when the cursor is on the ND.

ASSOCIATED MESSAGES

Applicable to: ALL

ASSOCIATED MESSAGES

Refer to INSERT OR ERASE TMPY F-PLN FIRST
Refer to SELECT HDG OR TRK FIRST

Secondary Flight Plans

ACTIVE AND SECONDARY FLIGHT PLANS

Applicable to: ALL

The FMS can simultaneously memorize four flight plans: one active and three secondary flight plans. The FMS uses the active flight plan for lateral and vertical long-term guidance, and for radio navigation auto-tuning.

The flight crew uses the three secondary flight plans to:
- Prepare a second takeoff runway and/or departure procedure, in preflight
- Prepare a second landing runway and/or approach procedure
- Plan a diversion
- Prepare a down path flight plan part or a complete flight plan
- Compare predictions of possible flight plans
- Store a company, or ATC flight plan before activation.

SECONDARY FLIGHT PLAN INITIALIZATION

Applicable to: ALL

SECONDARY FLIGHT PLAN INITIALIZATION

The flight crew can initialize a secondary flight plan by:
- Making a copy from the active, or one of the secondary flight plans
- Up linking a company flight plan from the company ground station (if the option is embedded)
- Entering the flight plan initialization data on the SEC 1(2)(3) / INIT and SEC 1(2)(3) / F-PLN pages.
- Up loading an ATC flight plan from the ATC mailbox.

COPY FROM ACTIVE (OR SECONDARY) FLIGHT PLAN

A copy from the active (or secondary) flight plan includes:
- Flight plan data (company route, cruise flight level, cost index, wind, speed constraints, etc ...)
- Fuel and load data (ZFWCG, ZFW, BLOCK, etc ...)
- Performance data (V1, VR, V2, flaps setting, etc ...)

L2 A **copy from the active flight plan** is still linked with the active flight plan through the following parameters:
- Flight number
- Cruise flight level and temperature
- Tropopause altitude
- Cost index
- Before engine start: ZFW, ZFWCG, Minimum fuel at destination, and BLOCK fuel

- Route reserve and final fuel (or time) data
- Passenger number

This means that when the flight crew changes one of these parameters in the active flight plan, the same parameter will be updated automatically in the secondary flight plan.
However, if the flight crew changes one of these parameters in the secondary flight plan, the link is broken, and the active and secondary flight plans become independent.

Note: The link does not exist for a copy from a secondary flight plan. A copy from a secondary flight plan is independent from its original secondary flight plan.

L1 **ATC FLIGHT PLAN UPLOAD**

The flight crew can load an ATC flight plan into the FMS via the LOAD function on the ATC mailbox.
By clicking on the LOAD to SEC 3 button on the ATC mailbox, the received ATC flight plan is inserted in the third secondary flight plan (SEC 3).

CAUTION	If there is a flight plan in SEC 3, this flight plan will be deleted when the ATC flight plan is up loaded. To avoid an involuntary loss of a flight plan, the flight crew has to copy the SEC 3 flight plan in SEC 1, or SEC 2 before up loading the ATC flight plan.

SECONDARY FLIGHT PLAN SEQUENCING

Applicable to: ALL

SECONDARY FLIGHT PLAN SEQUENCING

A secondary flight plan is sequenced with the active flight plan, if:
- The secondary flight plan is a copy from the active flight plan (or a copy from a secondary flight plan that was created with a copy from the active flight plan), and
- The first leg of the secondary flight plan is identical to the active leg of the active flight plan.

Note: The active leg is the leg that is actually flown (between the aircraft present position and the TO waypoint).

SECONDARY FLIGHT PLAN PREDICTIONS

Applicable to: ALL

SECONDARY FLIGHT PLAN PREDICTIONS

The FMS computes the same flight plan predictions for the three secondary flight plans as for the active flight plan, and uses the same rules and assumptions as for the active flight plan predictions computation.

Refer to Flight Plan Predictions

The predictions of a secondary flight plan, that was created by a copy of the active flight plan, are based on the following parameters, reflecting the aircraft current situation and environment:

- GW , FOB , CG
- Aircraft clock time
- Aircraft position
- Perf and idle factors
- Lateral, and vertical guidance modes
- AFS CP altitude target
- Wind and temperature
- ...

However, a secondary flight plan, that was created via the SEC 1(2)(3) / INIT page, considers the aircraft on ground, before engine start. In this case, the predictions are not based on the current aircraft and environment parameters. The secondary flight plan is completely independent from the active flight plan.

SECONDARY FLIGHT PLAN REVISIONS

Applicable to: ALL

SECONDARY FLIGHT PLAN REVISIONS

The flight crew can make all lateral (except direct to, and fix info) and vertical flight plan revisions on the three secondary flight plans.

Refer to Lateral Revisions

Refer to Vertical Revisions

A flight plan revision on a secondary flight plan does not create a temporary flight plan.

SWAP SECONDARY WITH ACTIVE FLIGHT PLAN

Applicable to: ALL

SWAP SECONDARY AND ACTIVE FLIGHT PLAN

The flight crew can activate a secondary flight plan by using the swap function.

The swap function exchanges the entire active and selected secondary flight plan.

L3 If for the secondary flight plan, the flight number, cost index, ZFW, ZFWCG, BLOCK, or TAXI fuel are not defined, the FMS will keep the active flight plan value for the specific parameter, when the swap action is performed.

L1 The swap function is always available on ground.

In flight, the swap function is available:
- When the NAV mode is engaged, and the first leg of the selected secondary flight plan is identical to the active leg, or
- When the HDG/TRACK mode is engaged.

When the NAV mode is engaged, and the first leg from the secondary flight plan is different from the active leg, the flight crew cannot swap the active and secondary flight plan: the SWAP button on the SEC INDEX page cannot be selected. In this case, the flight crew needs to engage the HDG/TRACK mode first, before he can swap the flight plans.

Note: The swap function is not available when a temporary flight plan is pending, or when the secondary flight plan is empty.

PILOTS INTERFACE

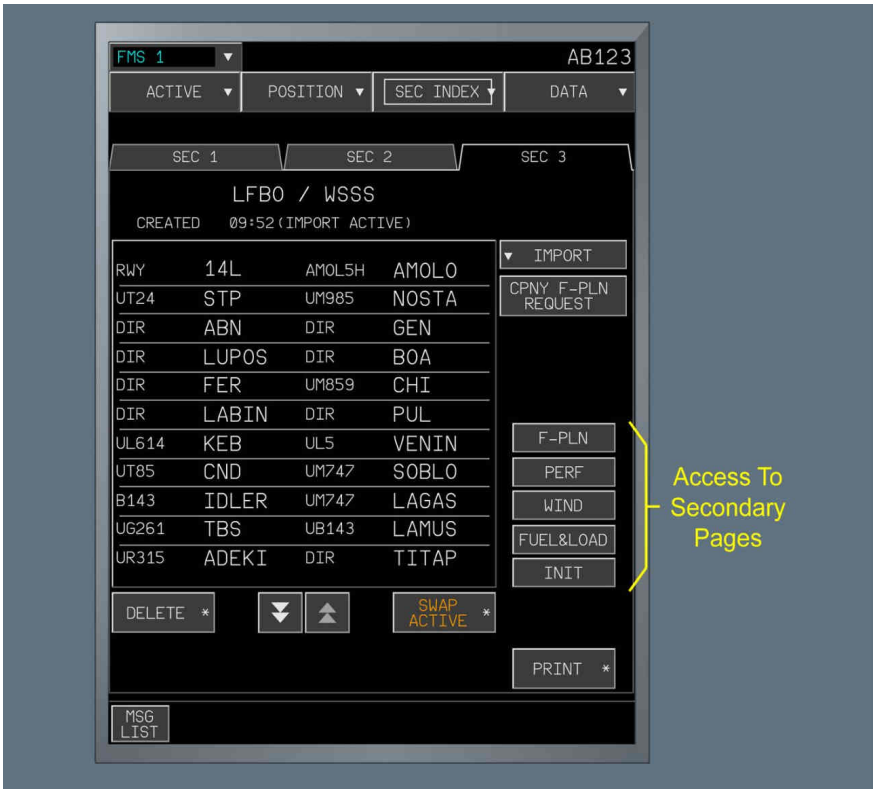
Applicable to: ALL

CONTROLS AND INDICATORS

ON THE MFD

The flight crew manages the three secondary flight plans on the SEC INDEX page.
This page gives a route summary, and gives access to the main secondary pages, related to each secondary flight plan.

SEC INDEX Page



Refer to Page

L2 The secondary pages have globally the same content as the active pages. There are however a few differences:

- The system computed values are white (they are green for the active flight plan)
- There are no amber boxes (there are no mandatory parameters)
- SEC / INIT page:
  - No access to the POSITION / IRS, DEPARTURE, ROUTE SUMMARY, POSITION / NAVAIDS, FUEL&LOAD, and PERF pages.
  - Display of the latitude and longitude of the origin airport reference point.

- SEC / PERF page:
  - No display of the optimum nor recommended maximum flight level
  - No access to the POSITION / MONITOR page
  - No engine out mode
  - No activate approach button
  - CLB, CRZ, and DES panel: No time and distance predictions for the different speed profiles
  - TO panel: No company takeoff data request
  - DES panel: No descent cabin rate entry field, and no display of the vertical deviation
  - APPR panel: No display of the VREF .
- SEC / WIND page: No history winds are available.

L1 **ON THE ND**

When a secondary page is displayed, the related secondary flight plan is displayed in white on the ND.

Note: The flight crew cannot make revisions on the secondary flight plan via the interactive ND.

Flight Plan Predictions

FLIGHT PLAN PREDICTIONS

Applicable to: ALL

The FMS computes flight plan predictions for the active, the temporary, and the three secondary flight plans.
The predictions are based on the flight plan, the current state of the aircraft (position, GW , CG , etc ...), and its environment (wind, temperature, etc ...).

The flight plan predictions include:
- Time of arrival, speed, altitude, estimated fuel on board (EFOB), and wind at each waypoint
- Pseudo-waypoints
  (*Refer to Pseudo-waypoints*)
- Equi-time-point.

Note: The equi-time-point is not computed for the secondary flight plans.

START AND UPDATE OF PREDICTIONS

Applicable to: ALL
Impacted by TDU: 00016865 Start and Update of Predictions

In preflight, the FMS starts computing the flight plan predictions when the following data is available:
- The lateral flight plan
- The cruise flight level (CRZ FL)
- The cost index (CI)

L2 *Note: If the flight crew does not enter a cost index, the FMS uses the cost index of the previous flight, stored in the DONE phase. When there is no stored cost index, the FMS uses a cost index equal to 0.*

L1 - The aircraft gross weight (GW)
L2 Before engine start, the FMS computes the GW from the flight crew entered ZFW, and BLOCK fuel.
After engine start, the FMS uses the GW, computed by the FQMS

L1 The FMS updates the predictions at regular intervals, and when one of the following events occur:
- Change of the lateral, or vertical flight plan (e.g. insertion of a waypoint, a time constraint, constant mach segment, etc...),
- Change of the cost index,
- Change of the cruise temperature, SAT, or tropopause altitude,
- Change of any load data (e.g. ZFW)

- Switching from managed to selected control, or vice versa,
- Change of the selected target,
- Sequencing a (pseudo-) waypoint,
- L2 Change of the maximum cabin rate,
- Change of the performance factor,
- Engine out.

START AND UPDATE OF PREDICTIONS

Applicable to: ALL
Impacted DU: 00007400 Start and Update of Predictions

In preflight, the FMS starts computing the flight plan predictions when the following data is available:
- The lateral flight plan
- The cruise flight level (CRZ FL)
- The cost index (CI)

Note: If the flight crew did not enter a cost index, the default value is the cost index of the previous flight, stored in the DONE phase (or 0 if there is no stored cost index).

- The aircraft gross weight (GW)

L2 Before engine start, the FMS computes the GW from the flight crew entered ZFW, and BLOCK fuel.
After engine start, the FMS uses the GW, computed by the FQMS

L1 The FMS updates the predictions at regular intervals, and when:
- The lateral, or vertical flight plan is changed
- The cost index is changed
- The cruise temperature, SAT, or tropopause altitude are changed
- The load data is changed
- The flight crew switches from managed to selected control, or vice versa
- A (pseudo-) waypoint is sequenced
- L2 The maximum cabin rate is changed
- The performance factor is changed
- An engine out occurs.

L1 *Note: After an FMS reset, the predictions may be lost. Entering again the cost index (even when the Cost Index entry field is not empty) brings the predictions back.*

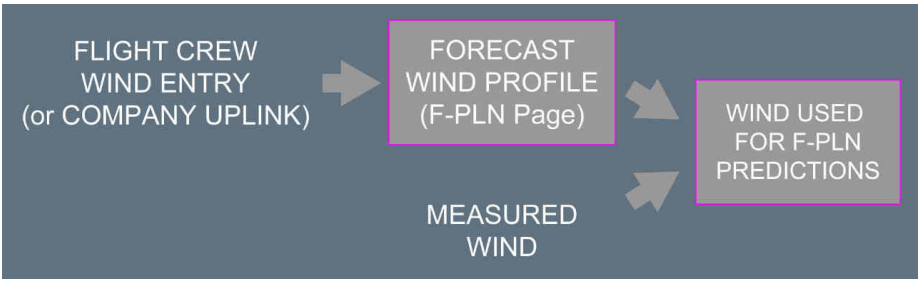
WIND PREDICTIONS

Applicable to: ALL

The computation of the wind predictions considers:
- The wind data entered by the flight crew (or uplinked by the operator), and
- The measured wind

The FMS computes a forecast wind profile, based on the entered wind. The forecast wind is displayed on the F-PLN page.
Once in flight, the FMS takes into account the measured wind to compute a corrected wind profile that is used for the flight plan predictions (time, EFOB, etc...). This corrected wind profile is never displayed on the F-PLN page.

Wind Predictions



The wind predictions computation is different for the climb, cruise, or descent waypoints:

WIND PREDICTIONS AND TRIP WIND

TRIP WIND ENTRY

In preflight, the flight crew can enter a trip wind, in order to have flight plan predictions before entering more precise wind data afterwards.
The flight crew enters the trip wind on the INIT page. (*Refer to Page*)
When the flight crew enters any climb, cruise, or descent data, the trip wind is ignored for the predictions computation.

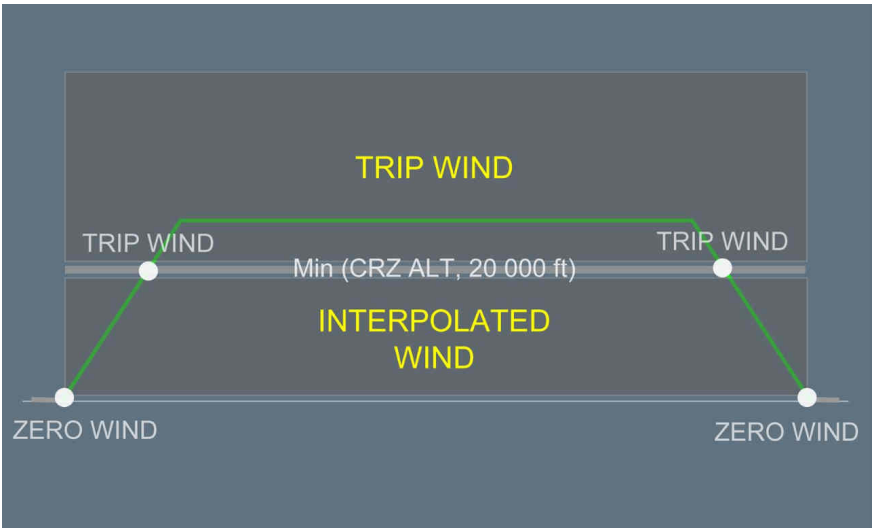
FORECAST WIND PROFILE

The FMS creates the following forecast wind profile when only the trip wind is entered:

- In cruise: The trip wind applies for all altitudes
- In climb, and descent:
  - Below 20 000 ft (or below the cruise flight level, if it is below 20 000 ft): The wind is interpolated between zero wind at ground level (origin or destination elevation) and the trip wind at 20 000 ft .
  - Above 20 000 ft (or above the cruise flight level, if it is below 20 000 ft): The trip wind applies for all altitudes.

Note: *On the F-PLN page, the trip wind value is displayed for all climb, cruise, and descent waypoints. The interpolated wind profile below 20 000 ft is used for predictions computation, but is not displayed on the F-PLN page.*

Trip Wind



CORRECTED WIND PROFILE

Once in flight, the FMS takes into account the measured wind. This wind correction depends on the flight phase, and is explained in the following chapters.

WIND PREDICTIONS FOR CLIMB WAYPOINTS

WIND ENTRY

The flight crew can insert climb winds for 5 different flight levels. The wind at ground level (GND) can be entered as one of these levels.
The flight crew enters the climb winds on the CLB panel of the WIND page. (*Refer to Page*)

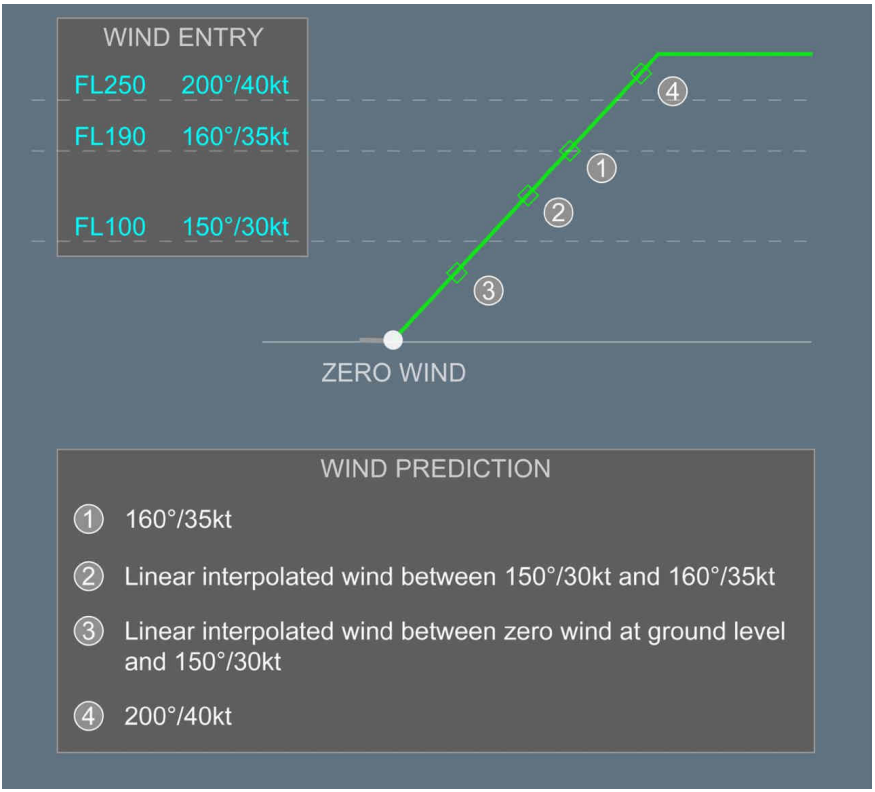
FORECAST WIND PROFILE

The FMS creates the wind profile for the climb waypoints, as follows:

- If the predicted altitude at a waypoint matches one of the entered climb wind altitudes, the predicted wind at the waypoint is the associated climb wind
- If the predicted altitude at a waypoint is between two entered climb wind altitudes, the predicted wind at the waypoint is linearly interpolated between the two associated climb winds
- If the predicted altitude at a waypoint is below the lowest entered climb wind altitude (no ground wind is entered), the predicted wind at the waypoint is linearly interpolated between zero wind at ground level, and the lowest entered climb wind
- If the predicted altitude at a waypoint is above the highest entered climb wind altitude, the predicted wind at the waypoint is the extrapolated highest entered climb wind.

Note: If no climb winds (nor trip wind) are entered, a default wind of 0 °C / 0 kt is used.

Climb Waypoints Predictions



CORRECTED WIND PROFILE

In climb, the FMS takes into account the measured wind, as follows:

- At the aircraft's current altitude, the corrected wind is equal to the measured wind,
- Higher than 10 000 ft above the aircraft's current altitude, the wind is no longer corrected with the measured wind: the wind prediction is equal to the forecast wind,
- Between the aircraft's current altitude and 10 000 ft above the current altitude, the corrected wind is a linear interpolation between the measured wind and the forecast wind.

WIND PREDICTIONS FOR CRUISE WAYPOINTS

WIND ENTRY

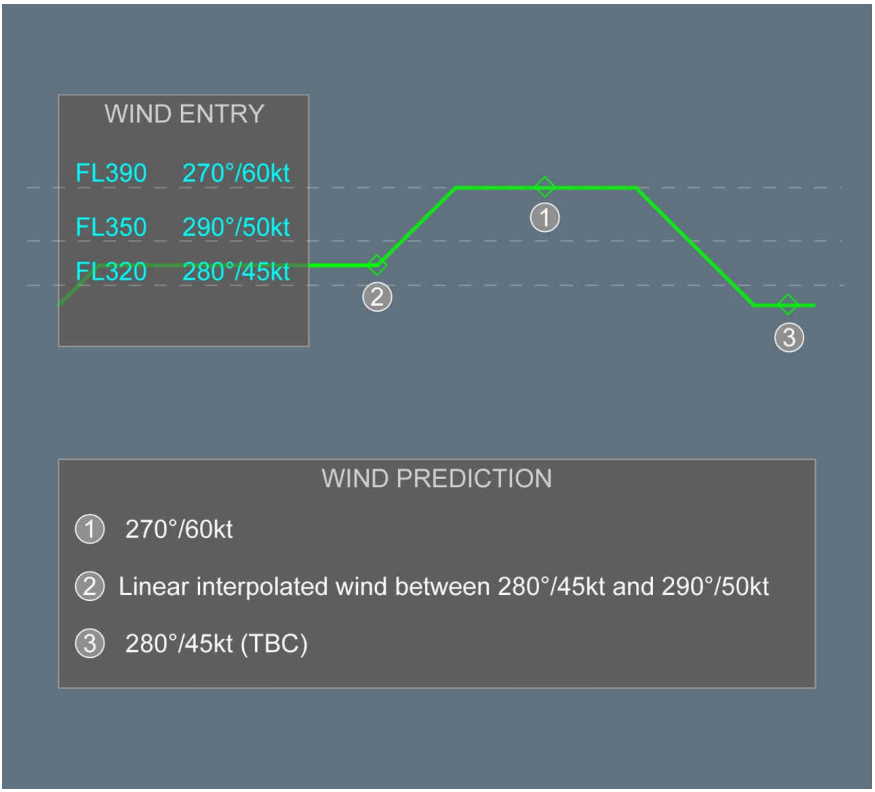
The flight crew can insert different cruise wind data for all cruise waypoints, and this for 4 different flight levels.
When the flight crew enters wind data on a waypoint, the wind direction and velocity is propagated on the down path cruise waypoints until the waypoint for which the flight crew has entered other wind data for the same flight level.
The flight crew enters the cruise winds on the CRZ panel of the WIND page. (*Refer to Page*)

FORECAST WIND PROFILE

The FMS creates the wind profile for the cruise waypoints, as follows:

- If the predicted altitude at a waypoint matches one of the entered or propagated cruise wind altitudes, the predicted wind at the waypoint is the associated descent wind
- If the predicted altitude at a waypoint is between two entered or propagated cruise wind altitudes, the predicted wind at the waypoint is linearly interpolated between the two associated descent winds
- If the predicted altitude at a waypoint is above (or below) the highest (or lowest) entered or propagated cruise wind altitude, the predicted wind at the waypoint is the extrapolated highest (or lowest) entered or propagated cruise wind.

Cruise Waypoints Predictions



Once in flight, the predicted wind profile is corrected with the measured wind. The measured wind is propagated laterally to200 nm ahead of the aircraft, and to10000 ft above and below the aircraft. The influence of the measured wind decreases with the distance (or altitude) from the aircraft.
The F-PLN page displays the wind predictions without the measured wind correction.

CORRECTED WIND PROFILE

In cruise, the FMS takes into account the measured wind, as follows:

- At the aircraft's current position and current altitude, the corrected wind is equal to the measured wind,
- Further than 200 nm ahead the aircraft, or higher than 10 000 ft above the aircraft's current altitude, the wind is no longer corrected with the measured wind: the wind prediction is equal to the forecast wind,
- Between the aircraft's current altitude and 10 000 ft above the current altitude, the corrected wind is a linear interpolation between the measured wind and the forecast wind,
- Between the aircraft's current position and 200 nm ahead the aircraft, the corrected wind is a linear interpolation between the measured wind and the forecast wind.

WIND PREDICTIONS FOR DESCENT WAYPOINTS

WIND ENTRY

The flight crew can insert descent winds for 5 different levels. The wind at ground level (GND) can be entered as one of these levels.

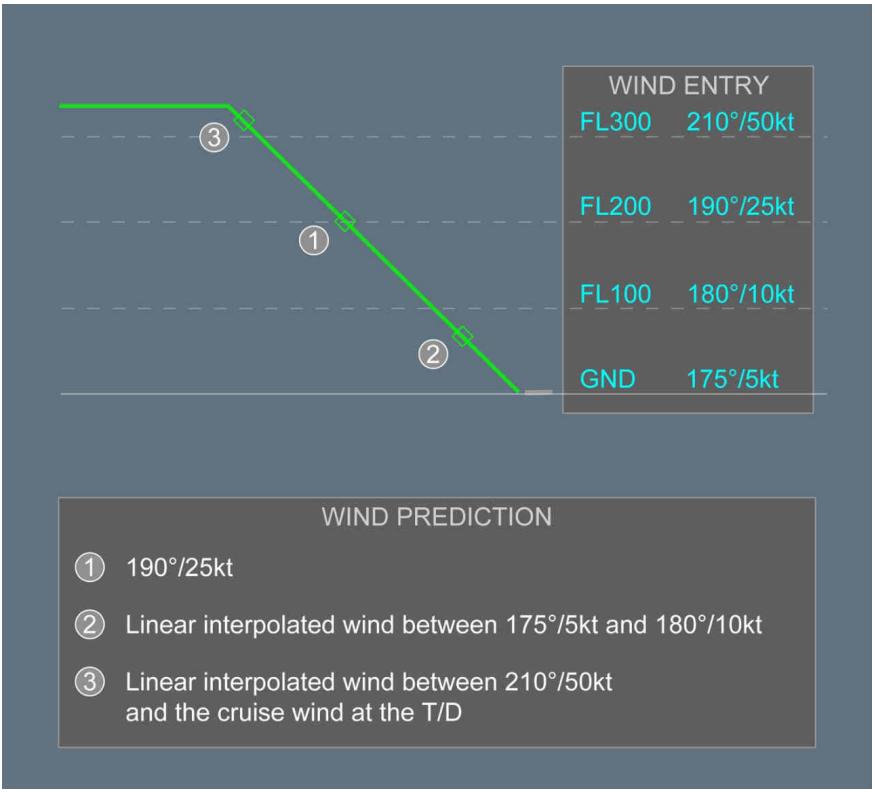
FORECAST WIND PROFILE

The FMS creates the wind profile for the descent waypoints, as follows:

- If the predicted altitude at a waypoint matches one of the entered descent wind altitudes, the predicted wind at the waypoint is the associated descent wind
- If the predicted altitude at a waypoint is between two entered descent wind altitudes, the predicted wind at the waypoint is linearly interpolated between the two associated descent winds
- If the predicted altitude at a waypoint is below the lowest entered descent wind altitude (no ground wind is entered), the predicted wind at the waypoint is linearly interpolated between zero wind at ground level, and the lowest entered descent wind
- If the predicted altitude at a waypoint is above the highest entered descent wind altitude, the predicted wind at the waypoint is linearly interpolated between the cruise wind at the T/D and the highest entered descent wind.

Note: If no descent winds (nor trip wind) are entered, the predicted descent winds are linearly interpolated between the cruise wind at T/D and zero wind at ground level.

Descent Waypoints Predictions



CORRECTED WIND PROFILE

In descent, the FMS takes into account the measured wind, as follows:

- At the aircraft's current altitude, the corrected wind is equal to the measured wind,
- Lower than 10 000 ftbelow the aircraft's current altitude, the wind is no longer corrected with the measured wind: the wind prediction is equal to the forecast wind,
- Between the aircraft's current altitude and 10 000 ftbelow the current altitude, the corrected wind is a linear interpolation between the measured wind and the forecast wind.

WIND PREDICTIONS FOR ALTERNATE FLIGHT PLAN

The flight crew can enter an alternate cruise wind.

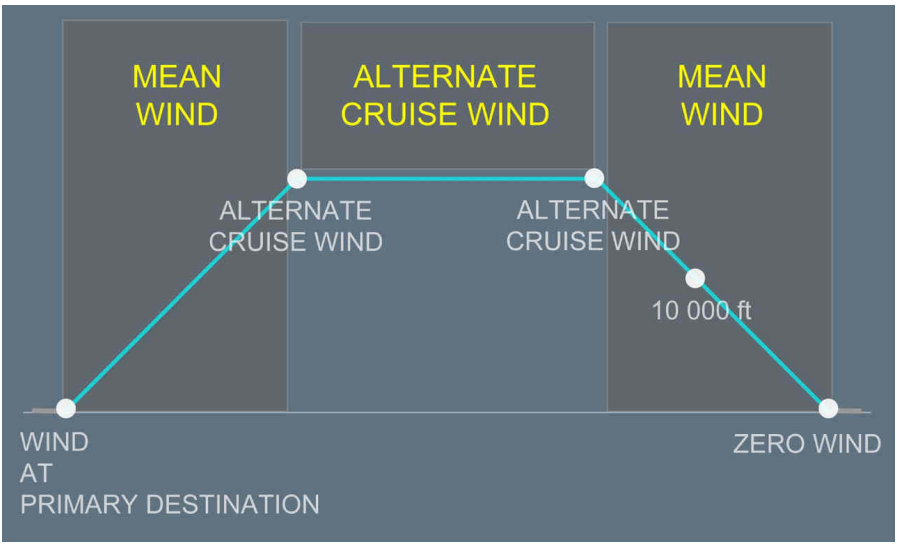
If the alternate flight plan distance is less than 200 nm, the alternate cruise flight level is defaulted to FL 220. If the alternate flight plan distance is 200 nm or more, the alternate cruise flight level is FL 310.

The FMS creates the following forecast wind profile for the alternate flight plan:

- For the alternate climb applies a mean climb wind between the wind at the primary destination and the entered alternate cruise wind
- For the alternate cruise applies the entered alternate cruise wind
- For the alternate descent applies a mean descent wind between the entered alternate cruise wind and the interpolated wind at 10 000 ft. The wind at 10 000 ft is interpolated between the entered alternate cruise wind and zero wind at ground level.

Note: *The alternate wind profile is used for predictions computation, but is not displayed on the F-PLN page.*
Once the alternate flight plan enabled (it becomes part of the active flight plan), the wind profile is computed as for the active flight plan.

Alternate Flight Plan Predictions



PREDICTIONS AND SELECTED MODES

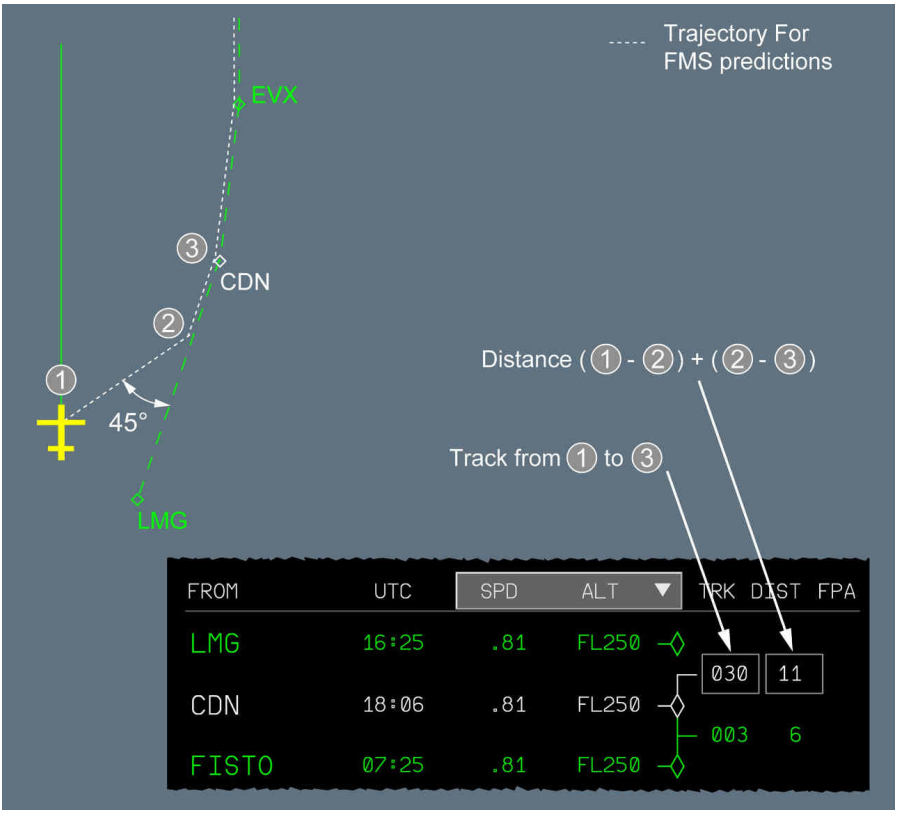
Applicable to: ALL

The FMS builds up a lateral and vertical flight plan that will be flown when the lateral and vertical managed modes are engaged.
When one or more selected modes are engaged, the predictions are updated to reflect the new situation of the aircraft.
The update of the predictions follows the general philosophy: the selected modes are short-term modes and are engaged temporarily. The FMS assumes that the flight crew returns quickly to the managed modes. The exact moment of return to the managed flight plan predictions depends on the selected mode, and the flight phase:

HDG/TRACK MODE

When the flight crew selects the HDG/TRACK mode, the FMS assumes an immediate return to the lateral flight plan. This rule is valid for all flight phases.
The return path is the direct leg from the aircraft present position to the TO waypoint. This direct leg (with its distance and track) is displayed as the first leg of the flight plan on the F-PLN page.

Example: Immediate Return to Lateral Flight Plan

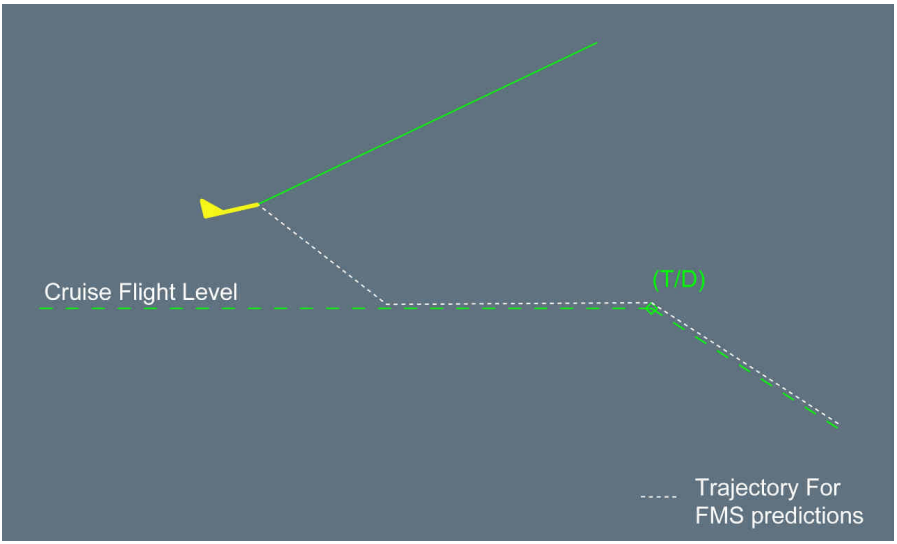


OP CLB, OP DES, OR V/S / FPA MODE

When the flight crew selects the OP CLB, OP DES, or V/S / FPA mode, the FMS assumes an immediate de-selection of the selected mode, and:

- In the climb phase: An immediate return to the CLB mode
- In the cruise phase: An immediate return to the cruise flight level (in CLB, or DES mode if necessary)
- In the descent phase: An immediate return to the theoretical descent profile in the DES mode.

Example: Immediate Return To Cruise Altitude



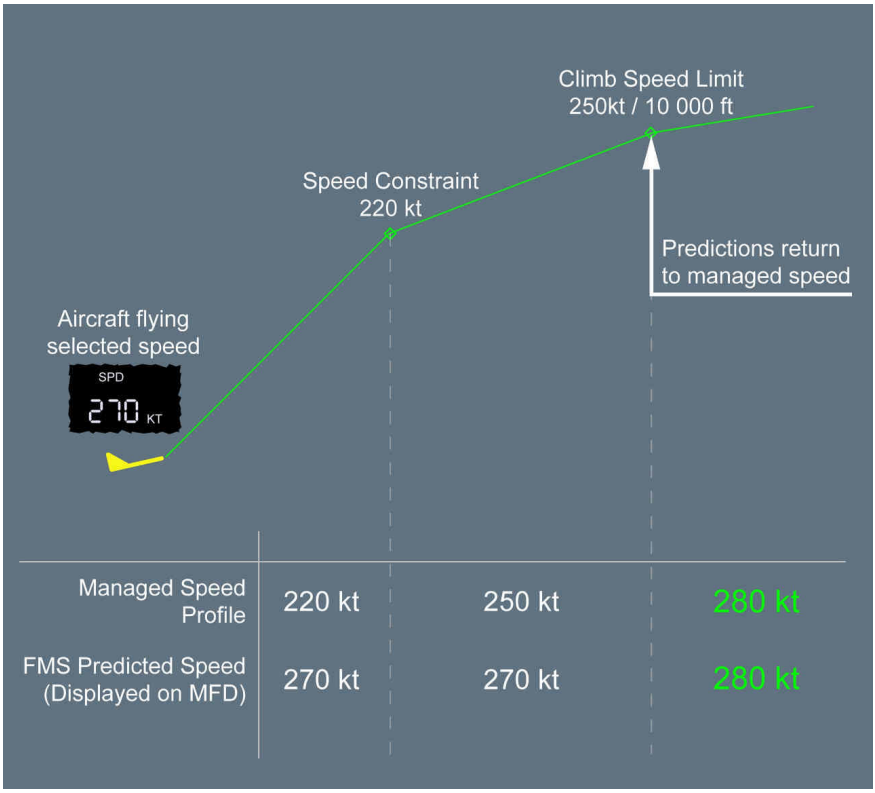
SELECTED SPEED/MACH

The FMS assumptions depend on the flight phase:

IN TAKEOFF AND CLIMB

When the flight crew engages the selected speed/MACH control, the FMS assumes a return to the managed speed at the next climb speed limit or speed constraint where the managed speed becomes greater than the selected speed.
If the managed speed does not become greater than the selected speed at the speed limit and constraints, or there are no speed limits nor speed constraints, the FMS assumes a return to the managed speed at the top of climb (T/C).

Example: Selected Speed in Climb



IN CRUISE

When the flight crew engages the selected speed/MACH control, the FMS assumes a return to the managed speed at the top of descent (T/D).

L3 When the flight crew selects a CAS (or Mach) and there is a step altitude in the flight plan, that crosses the CAS/Mach cross over altitude, the FMS uses the complementary Mach (or CAS) of the selected CAS (or Mach) for the predictions beyond the cross over altitude.

L1 ### IN DESCENT

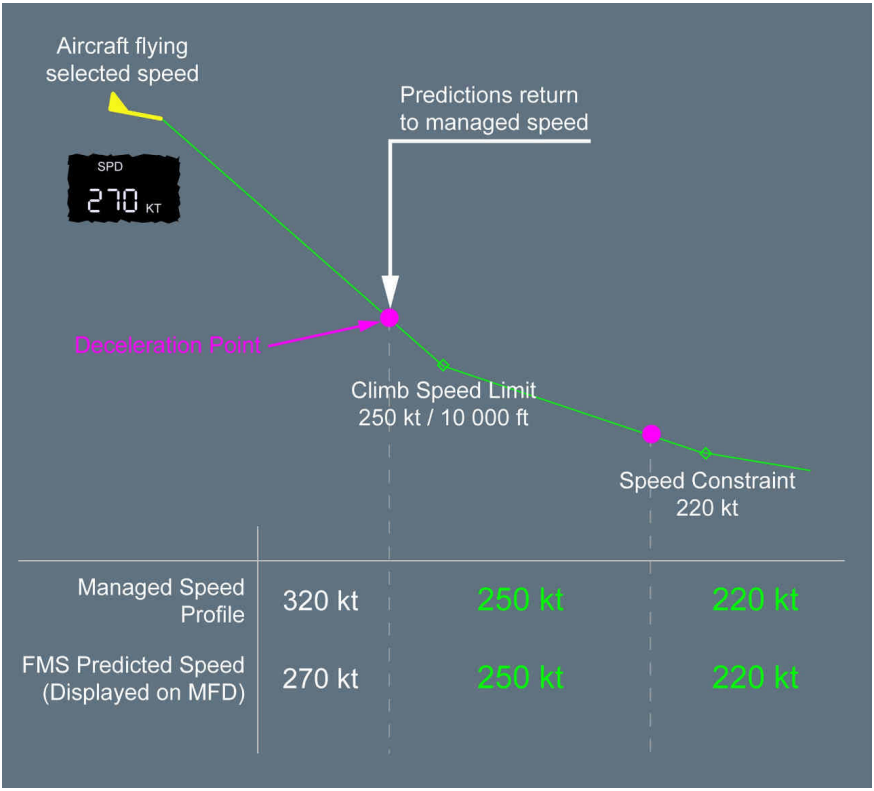
When the flight crew engages the selected speed/MACH control, the FMS assumes a return to the managed speed at the start of the deceleration to the next speed constraint or descent speed limit where the managed speed becomes less than the selected speed.

If the managed speed does not become less than the selected speed at the speed limit and constraints, or there are no speed limits nor speed constraints, the FMS assumes a return to the managed speed:

- At the deceleration point (start of the approach segment), if the managed speed after deceleration is less than the selected speed, or
- Beyond the deceleration point, where the managed speed becomes less than the selected speed.

L3 When the flight crew selects a Mach, the FMS uses the complementary CAS of the selected Mach, for the predictions beyond the cross over altitude.

Example: Selected Speed in Descent



L1 **IN APPROACH**

When the flight crew engages the selected speed/MACH control, the FMS assumes an immediate return to the managed speed.

PREDICTIONS IN GO AROUND

Applicable to: ALL

The FMS does not compute the waypoint vertical predictions for the missed approach segment. The F-PLN page only displays the distance, and track of the missed approach legs. The time, speed, altitude, EFOB, and wind predictions display dashes. If there is an altitude or speed constraint on a missed approach waypoint, the constraint value is displayed in magenta on the F-PLN page.

During the go around phase, the FMS provides only the following data for the primary and alternate destination:
- Distance
- EFOB
- Estimated Time of Arrival
- Route Reserve, Final, and Extra Fuel

For these predictions, the FMS does not consider any speed or altitude constraints, nor wind.

L2 *Note: The FMS does not compute the vertical predictions during the GA_{phase}. The FMS cannot manage a vertical flight plan when the vertical predictions are not available. At the GA ACCEL ALT, the CLB_{phase} becomes active and the FMS computes again the vertical predictions, taking into account the flight plan constraints.*
When the flight crew sets an AT, or AT or BELOW constraint, that has a constraint value that is equal to the GA ACCEL ALT, the FMS will not take into account this constraint, because of the fact that the FMS will start the predictions computation when the constraint altitude is already sequenced.

PREDICTIONS FOR THE ALTERNATE FLIGHT PLAN

Applicable to: ALL

As soon as the alternate destination and the flight plan are inserted in the flight plan, the FMS computes the following predictions:
- Alternate trip time and trip fuel,
- Estimated time and fuel on board at the alternate destination,
- Estimated extra fuel at the alternate destination.

The alternate predictions are based on the following assumptions:

- The alternate initial aircraft weight is equal to the estimated landing weight at the primary destination,
- The alternate flight plan represents a flight from takeoff at the primary destination to landing at alternate destination,
- The distance of the alternate flight plan is the distance along the alternate company route, or the distance along the alternate flight plan created by the flight crew, or the direct distance between primary and alternate destination when no waypoints have been created between them,
- If the alternate flight plan distance is less than 200 nm , the alternate cruise flight level is FL 220 . If the alternate flight plan distance is 200 nm or more, the alternate cruise flight level is FL 310 ,
- The delta ISA is constant along the alternate flight plan, and is equal to the delta ISA at the primary destination,
- The alternate trip wind is a constant value, entered by the flight crew on the DES panel of the WIND page,
  Refer to WIND page
  Refer to Wind Predictions for the Alternate Flight Plan
- The cost index is equal to 0 (minimum fuel optimization).

Datalink with Company Ground Station

INTRODUCTION

Applicable to: ALL

With the Airline Operational Control (AOC) function, it is possible to transfer data:
- From the FMS to the company ground station, i.e data requests and reports
- From the company ground station to the FMS , i.e. data messages.

The AOC function enables the transfer of the following:
- *Refer to F-PLN initialization data*
- *Refer to Wind data*
- *Refer to Takeoff data*
- *Refer to Flight reports*
- *Refer to Broadcast data.*

For more information on the AOC , *Refer to AOC function.*

L2 The FMS sends the requests and reports to the ground station via the Avionics Communication Router (ACR).
The ACR receives the data from the company ground station, and sends it to the FMS .
If a communication failure occurs between the FMS and the ACR , the FMS message area displays NOT TRANSMITTED TO ACR .

L3 For more information on the ACR , *Refer to Communication System Architecture.*

F-PLN INITIALIZATION DATA

Applicable to: ALL

The flight crew can request and receive the following flight plan initialization data from the company ground station:

- Flight number
- Lateral and vertical F-PLN data:
  - FROM, TO, ALTN airports
  - Waypoints, airways, speed/altitude constraints, step, hold procedures.
- Associated performance and load data:
  - Cruise flight level
  - Tropopause Altitude
  - Cruise Temperature
  - Perf Factor
  - Cost Index
  - Climb transition altitude
  - ZFW, ZFWCG
  - Block fuel
  - Taxi fuel
  - Route reserve.

COMPANY F-PLN REQUEST

The flight crew can send a F-PLN request:

- Before engine start: for the active and secondary flight plan

L2 *Note: For active F-PLN , a request is only possible when active F-PLN is empty*

L1 - After engine start: for the secondary flight plan only.

Only one request is possible at a time, for active or secondary flight plan.
The flight crew can initiate a company F-PLN request using the CPNY F-PLN REQUEST button on the ACTIVE or SEC1(2)(3) / INIT page, or on the SEC / INDEX page.
Refer to INIT page
Refer to SEC INDEX page

CPNY F-PLN REQUEST Button



When clicked, displays the COMPANY F-PLN REQUEST page, where the flight crew can add the flight Number, the company route and any free text before sending the request, *Refer to COMPANY F-PLN REQUEST page* .
Once the flight crew has sent the request, the button label changes to REQUEST PENDING... , till the flight plan data is received.

REQUEST PENDING ...



L2 If the FMS does not receive a response from the company ground station, within 4 min after the request:
- The FMS message area displays: NO COMPANY REPLY
- The associated buttons on the INIT, SEC INDEX, and COMPANY F-PLN REQUEST page allow a new flight plan request.

RECEIVED COMPANY F-PLN

The FMS receives flight plan initialization data:
- In response to the flight crew request, or
- Directly without previous request from the flight crew.

The FMS may receive:
- Flight plan data only
- Flight plan data with associated performance and load data
- Performance and load data only.

When the FMS receives the uplink, it displays one of the following messages in the FMS message area:
- COMPANY F-PLN RECEIVED WAITING FOR INSERTION: The uplink has only flight plan data
- COMPANY F-PLN & LOAD RECEIVED WAITING FOR INSERTION: The uplink has flight plan and performance and load data
- COMPANY LOAD DATA RECEIVED WAITING FOR INSERTION: The uplink has only performance and load data
- RECEIVED COMPANY F-PLN NOT VALID: The flight plan, up linked from the company ground station, is not valid
- RECEIVED FLT NUMBER NOT VALID: The received flight number, that is part of the up linked flight plan data, is not valid.

L3 After insertion, the FMS message area may display one of the following messages:
- CHECK CPNY RTE: The company route ident of the up linked flight plan differs from the company route ident of the flight plan request
- FLT NUMBER RECEIVED: The FMS has received the flight number, as part of the up linked flight plan data, without previous request from the flight crew
- CHECK FLT NUMBER: The company up linked flight number differs from the flight number of the flight plan request

L1 The flight crew can insert the uplink via the RECEIVED CPNY F-PLN button (or the RECEIVED CPNY LOAD button, if the uplink has only performance and load data) on the ACTIVE (or SEC) / INIT page, or on the SEC / INDEX page.

RECEIVED CPNY F-PLN



When clicked, opens a menu:
- INSERT: Inserts the uplink
- CLEAR: Clears the uplink

Note: The flight crew cannot preview the received data, prior to insertion.

The following table gives the rules of insertion for the active and secondary flight plans:

	Active flight plan empty			Active flight plan exists	
	Uplink received without request	Request from active	Request from secondary	Uplink received without request	Request from secondary
Before Engine Start	Insertion in active or secondary		Insertion in secondary only		
After Engine Start	Insertion in secondary only				

Note: The flight crew can only insert performance and load data before engine start.

WIND DATA

Applicable to: ALL

The flight crew can request and receive the following wind data from the company ground station:
- Climb winds
- Cruise winds
- Descent winds
- Alternate winds.

The flight crew can request and receive the wind data for active or secondary flight plans.

COMPANY WIND REQUEST

The flight crew can send a wind request in all flight phases, except in DES, APPR, and GA.
Before sending a request to the ground, the flight crew may define a minimum of flight plan information, depending on the forecasted wind data they need (e.g. cruise flight level, waypoints, top of climb, step climb etc.). The FMS will send this information with the request .
Only one request is possible at a time, for active or secondary flight plan.
The flight crew can initiate a wind request using the CPNY WIND REQUEST button on the INIT, or WIND page.
Refer to INIT page
Refer to WIND page

CPNY WIND REQUEST Button



When clicked, displays the COMPANY WIND DATA REQUEST page, where the flight crew can add any free text before sending the request. The request refers to the F-PLN from where it is sent.

Refer to COMPANY WIND DATA REQUEST page

Once the flight crew has sent the request, the button label changes to REQUEST PENDING... , till the wind data is received.

REQUEST PENDING ...



L2 If the FMS does not receive a response from the company ground station, within 4 min after the request:

- The FMS message area displays: NO COMPANY REPLY
- The associated buttons on the INIT, or WIND page allow a new wind request.

RECEIVED COMPANY WIND:

The FMS receives the wind data:
- In response to the flight crew request: The received wind data is linked with the flight plan from which the request was sent.
- Directly without previous request from the flight crew: The received wind data is linked to the active flight plan only.

Note: *If the active flight plan is empty, the received data are buffered till the active flight plan is filled.*

To ensure its compatibility with the active, or secondary flight plans, the received wind message has wind data for different waypoints on different altitudes or flight levels. The wind data that is not compatible with the flight plan is deleted automatically.

The FMS may receive:
- Climb wind data: Wind direction and wind velocity for up to 5 altitudes and/or flight levels
- Cruise wind data: Wind direction and wind velocity for up to 4 flight levels, for a list of cruise waypoints
- Descent wind data:
  - Wind direction and wind velocity for up to 5 altitudes and/or flight levels
  - The destination delta ISA, QNH and the transition flight level.
- Alternate wind data: Wind direction and wind velocity for the alternate cruise flight level

Note: *If the flight crew inserts wind data, with destination QNH, and/or destination ground wind, and/or destination OAT, the three values are updated on the APPR panel of the PERF page.*
In this case, when the aircraft is less than 180 nmfrom destination, the FMS displays the CHECK DES DATA message to notify the flight crew that the QNH, and/or ground wind, and/or OAT, have been completed by a company wind uplink.

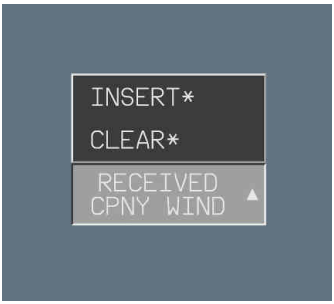
When the FMS receives the uplink, it displays one of the following messages in the FMS message area:
- COMPANY WIND DATA RECEIVED WAITING FOR INSERTION IN ACTIVE: The uplink has wind data compatible with the active flight plan
- COMPANY WIND DATA RECEIVED WAITING FOR INSERTION IN SEC1(2)(3): The uplink has wind data compatible with the secondary 1(2)(3) flight plan

- COMPANY WIND UPLINK PENDING: The FMS receives company wind data, while a temporary flight plan exists, or the DIRECT TO page is displayed. The flight crew needs to insert, or clear the temporary flight plan, or needs to finalize the DIRECT TO revision, before he can insert the received wind data.

L3 - RECEIVED COMPANY WIND DATA NOT VALID: The wind data, up linked from the company ground station, is not valid.

L1 The flight crew can insert the uplink via the RECEIVED CPNY WIND button on the ACTIVE (or SEC) / WIND page.

RECEIVED CPNY WIND Menu



When clicked, opens a menu:
- INSERT: Inserts the uplink
- CLEAR: Clears the uplink

TAKEOFF DATA

Applicable to: ALL

The flight crew can request and receive the following takeoff data from the company ground station:
- Takeoff speeds: V1, VR, V2
- Thrust rating: TOGA, Flex, Derated
- Flaps setting
- Thrust reduction and acceleration altitudes
- Noise procedure parameters.

The flight crew can request and receive takeoff data for the active flight plan only.

COMPANY TAKEOFF DATA REQUEST:

The flight crew can send a takeoff data request before engine start, for the active flight plan only.

The flight crew can initiate a takeoff data request for 2 runways using the CPNY T.O REQUEST button on the ACTIVE / INIT, or ACTIVE / PERF page.
Refer to INIT page
Refer to PERF page

COMPANY T.O. REQUEST button



When clicked, displays the COMPANY T.O DATA REQUEST page, *Refer to COMPANY T.O DATA REQUEST page* .

This page displays the data, that are sent in the request message. The FMS completes automatically the data, based on the available flight plan and load data. The flight crew may always complete or change the takeoff request data.

- The departure airport
- The runway ident
- The takeoff weight
- The takeoff CG
- The environmental conditions:
  - Baro setting
  - Wind
  - Runway condition
  - Temperature
- The takeoff thrust rating
- The FLAPS setting
- The takeoff shift
- The takeoff limit
- Any free text

The flight crew clicks on the SEND T.O REQUEST button to send the request.
Once the flight crew has sent the request, the button label changes to REQUEST PENDING... , till the flight plan data is received.

REQUEST PENDING ...



L2 If the FMS does not receive a response from the company ground station, within 4 min after the request:
- The FMS message area displays: NO COMPANY REPLY
- The associated buttons on the INIT, PERF, and COMPANY T.O DATA REQUEST page allow a new flight plan request.

RECEIVED COMPANY TAKEOFF DATA:

The FMS receives the takeoff data:
- In response to the flight crew request
- Directly, without previous request from the flight crew.

When the FMS receives the uplink, it displays one of the following messages in the FMS message area:
- COMPANY T.O DATA RECEIVED WAITING FOR INSERTION

L3 - RECEIVED COMPANY T.O DATA NOT VALID: The takeoff data, up linked from the company ground station, is not valid.

L1 The flight crew displays the received takeoff data using the RECEIVED CPNY T.O button on ACTIVE / INIT page or ACTIVE / PERF page.

RECEIVED CPNY T.O.



When clicked, displays the RECEIVED COMPANY T.O DATA page, *Refer to RECEIVED COMPANY T.O DATA page* .

The received takeoff data (for up to 4 different takeoff runways and for up to 2 engine thrust ratings per runway) are:

- The takeoff runway
- The takeoff weight
- The takeoff CG
- The environmental conditions:
  - Baro setting
  - Wind
  - Runway condition
  - Temperature
- The takeoff speeds: V1, VR, V2
- The takeoff thrust rating
- The flaps setting
- The takeoff shift
- The takeoff limit
- The thrust reduction and acceleration altitudes
- The noise procedure parameters.

The flight crew can insert (or clear) this data using the INSERT (or CLEAR) button. When inserted, the T.O panel of the PERF page is updated.

L2 The flight crew can insert the received takeoff data only if the following conditions are fulfilled:
- The departure airport and runway match the departure airport and runway of the active flight plan
- The takeoff weight is not more than 4 400 lb below or 15 500 lb above the takeoff weight on the FUEL&LOAD page
- The following data are part of the received data: The takeoff speeds (V1, VR, V2), wind, runway condition, baro setting and temperature.

Note:
- *If one of these conditions is not met, the flight crew cannot insert the uplinked data.*
- *If the condition on the takeoff weight is not met and the received runway matches the active runway, the TOW value appears in amber on the RECEIVED COMPANY T.O DATA page, associated with the UPLINK/ACTIVE TOW DISAGREE message.*

FLIGHT REPORTS

Applicable to: ALL

The FMS sends real time flight reports to provide information on the aircraft's current position and situation to the company ground station. There are 4 types of reports:
- Position report: Current aircraft position
- Progress report: Destination data
- F-PLN report: Active flight plan data
- Performance data report: Active performance data.

The flight crew can manually send the position and F-PLN reports.
The FMS can automatically send the position, progress, F-PLN and performance data reports after specific events or in response to a ground request.

POSITION REPORT

The position report has the following information:
- Last sequenced waypoint with its related SAT , wind and FOB
- TO waypoint
- NEXT waypoint
- Next cruise vertical profile change
- Destination with its related ETA , distance and EFOB

The flight crew can display and send the position report on the POSITION / REPORT page, *Refer to Page* .

PROGRESS REPORT

The progress report has the ETA and EFOB at destination.

The FMS automatically sends a position report upon a ground request, or if one of the following occurs:

- A change of the destination airport in flight
- A change of the destination runway in flight
- A specific event (optional):
  - X minutes to T/D
  - X minutes to destination
  - The ETA differs from the initial ETA by more than X minutes.

  The airline defines X.

F-PLN REPORT

The F-PLN report has the following information:

- Company route
- Flight number
- Departure airport
- Takeoff runway
- Departure procedure
- En route segment
- Destination airport
- Arrival procedure
- Approach procedure
- Destination runway
- Step

The flight crew can send a F-PLN report by selecting CPNY F-PLN REPORT in the F-PLN INFO menu of the ACTIVE / F-PLN page, *Refer to Page* .

PERFORMANCE DATA REPORT

The performance report has the following information:

- Current GW
- Cruise flight level
- Current CG
- FOB
- Block fuel
- Route reserve
- CI
- T/C temperature
- Climb transition altitude
- Performance factor

- Tropopause altitude
- Taxi fuel
- ZFW
- ZFWCG

The FMS automatically sends a performance report upon a ground request.

BROADCAST DATA

Applicable to: ALL

The FMS automatically sends data to the ACR. The FMS acts as an information provider without any flight crew action.

L2 The data sent to the ACR is:

- MS identifier word (System Address Label)
- Flight number
- Active database
- Company route
- TO waypoint
- Wind direction and velocity
- ZFW
- Block fuel
- FOB
- GW
- Destination runway
- Alternate destination
- ETA
- Discrete AP modes
- Discrete flight phase
- Aircraft altitude, latitude/longitude
- Roll angle
- City pair.

Datalink with ATC Center

INTRODUCTION

Applicable to: ALL

The ATC function of the FMS enables the flight crew to:

- Prepare and send flight plan clearances requests to an ATC center, *Refer to ATC F-PLN Clearance Request* .
- Receive ATC flight plan clearances from an ATC center, *Refer to Received ATC F-PLN Clearance* .

To request or receive flight plan clearances, the ATC Datalink system must be connected and notified to an ATC center, for more information *Refer to ATC Datalink System.*

The ATC flight plan clearances, requested or received, may have the following information:

- Departure:
  - Airport
  - Runway
  - Procedure (SID)
  - TRANS
- Enroute segment:
  - Waypoints
  - Holding patterns
  - Speed and/or altitude constraints
  - Time constraints
  - Airways
- Arrival:
  - TRANS
  - Procedure (STAR)
  - Approach transition (APPR VIA)
  - Approach procedure (APPR)
  - Airport
  - Runway

L2 In addition, the FMS automatically sends data (position, altitude, speed...) to the ATC Datalink System. This data is used for:

- The ATC reports:
  - *Refer to Position Reports*
  - *Refer to Modify Reports*
  - *Refer to Other Reports* .
- The ATC confirm messages
- The ATC deferred clearances: *Refer to How to Manage a Deferred Clearance Message*
- The ADS function: *Refer to ADS* .

Note: For all ATC reports, the FMS acts as an information provider without any flight crew action.

ATC F-PLN CLEARANCE REQUEST

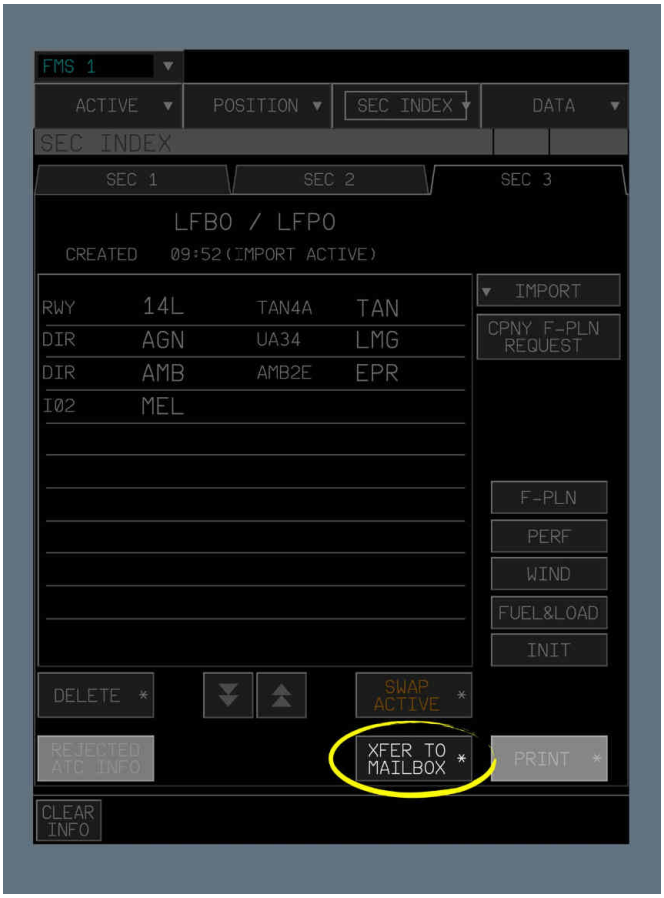
Applicable to: ALL

The flight crew can, during all the phases of flight, request an ATC F-PLN clearance:

- To initialize the flight plan
- To modify the flight plan.

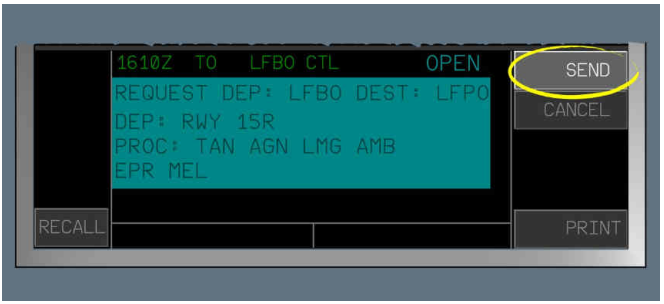
To initiate an ATC F-PLN Request, the flight crew will prepare the desired flight plan in the secondary flight plan SEC 1(2)(3) and, then transfer it in the mailbox.
For more information, *Refer to Secondary Flight Plans* .
The flight crew sends the desired flight plan to the mailbox by clicking on the XFER TO MAILBOX button on the SEC INDEX page.

TRANSFER TO MAILBOX



The flight crew then sends the ATC flight plan request to the ATC center by clicking on the SEND button on the mailbox.

SEND button on the mailbox



Only one F-PLN clearance request can be loaded in the mailbox at a time.

L2 Furthermore, as soon as the request is transferred in the mailbox, the flight crew has 2 min to send the clearance request to the ATC center, otherwise the mailbox displays the message CLOSE RTE REQUEST FIRST.

RECEIVED ATC F-PLN CLEARANCE

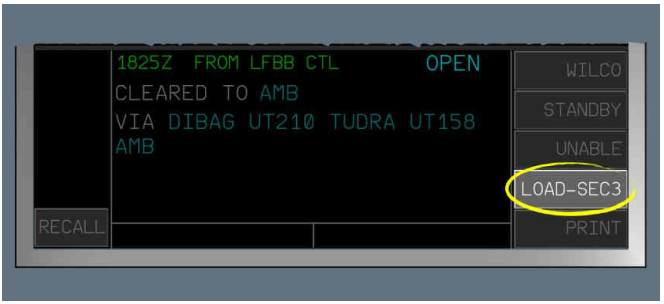
Applicable to: ALL

The ATC center may clear the flight crew to fly a route by sending a loadable flight plan clearance:

- To initialize the flight plan
- To modify the flight plan.

The flight crew first receives the flight plan clearance in the mailbox.
When received, the flight crew can load the flight plan clearance to the third secondary flight plan (SEC 3) by clicking on the mailbox LOAD-SEC 3 button.

LOAD-SEC3 button on Mailbox

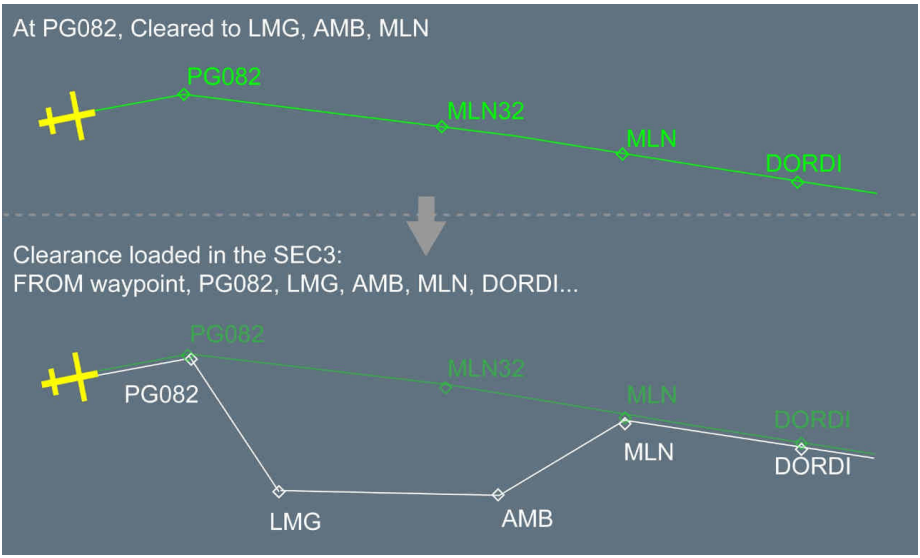


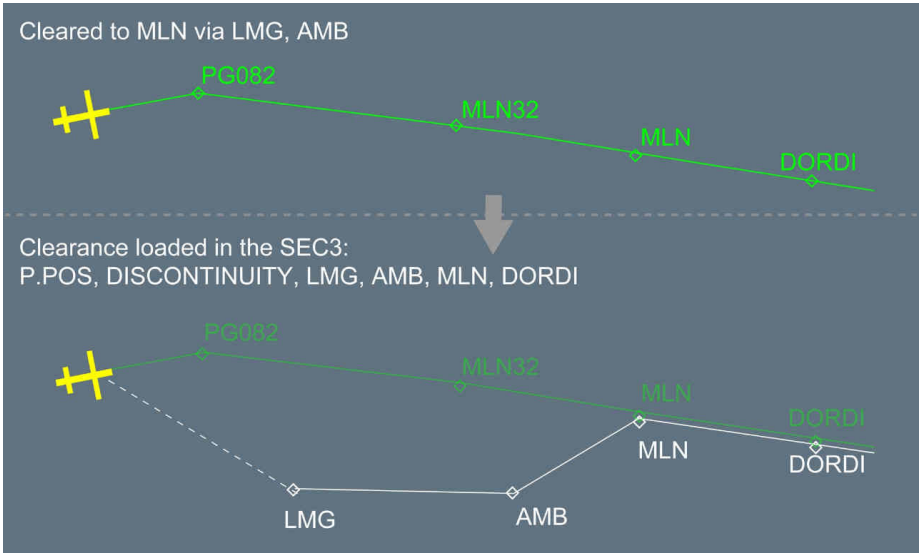
For more information, *Refer to How to manage a received ATC F-PLN clearance*

To load the ATC clearance, the FMS automatically creates a third secondary flight plan as a copy from the active flight plan and inserts the ATC clearance. When the clearance is a flight plan initialization, the FMS also copies all data from the ACTIVE/INIT and ACTIVE/FUEL&LOAD pages into the third secondary flight plan (SEC 3).

Note: *If there is a flight plan in SEC 3, this flight plan will be deleted when the ATC flight plan is up loaded.*
To avoid an involuntary loss of a flight plan, the flight crew has to copy the SEC 3 flight plan in SEC 1, or SEC 2 before up loading the ATC flight plan.

L2 Examples:





L1 When the received ATC F-PLN clearance is loaded in the FMS , one of the following message appears in the FMS messages area:

- ATC F-PLN INSERTED IN SEC3: The received ATC F-PLN is loaded in the secondary flight plan SEC3

L2 The mailbox displays LOAD OK. *Refer to ATC mailbox messages.*

L1 - ATC F-PLN INSERTED IN SEC 3 REJECTED INFO SEE SEC / INDEX: The received ATC F-PLN is partially loaded in the secondary flight plan SEC 3 due to not valid data sent by the ATC center.
The flight crew can review the rejected data from the REJECTED ATC INFO page, *Refer to REJECTED ATC INFO page.*

L2 The mailbox displays PARTIAL LOAD. *Refer to ATC mailbox messages.*

L1 - RECEIVED ATC MSG NOT VALID: The received ATC F-PLN is totally rejected by the FMS due to not valid data sent by the ATC center.
The flight crew can review the rejected data from the REJECTED ATC INFO page, *Refer to REJECTED ATC INFO page.*

L2 The mailbox displays LOAD FAILED. *Refer to ATC mailbox messages.* Any data previously entered in the SEC3 is deleted.

Introduction

INTRODUCTION

Applicable to: ALL

The performance function of the FMS:

- Provides the operating speeds for takeoff, approach, and go-around,
- Computes an optimum, and recommended maximum flight level,
- Computes a speed/Mach profile for the CLIMB, CRUISE, and DESCENT phase, that is based on the cost index,
- Computes a descent path from the cruise flight level to the destination airport,
- Allows the flight crew to fly a Noise Abatement Departure Procedure (NADP) in managed speed mode.

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Cost Index

COST INDEX

Applicable to: ALL

The operator uses the cost index to achieve minimum trip cost by means of a trade-off between operating costs per hour (time costs) and fuel consumption per hour (fuel costs).

Cost Index (CI) = $\frac{TimeCosts}{FuelCosts}$

The range of the cost index is between 0 and 999:
CI = 0, means optimized fuel cost (maximum range),
CI = 999, means optimized time cost (minimum time).

The FMS uses the cost index to compute the ECON speed/Mach, that define the managed speed profile. (*Refer to Managed Speed Profile*)
The FMS also uses the cost index to compute the optimum flight level. (*Refer to Optimum Flight Level*)
The cost index is often associated to a company route.
The flight crew can also enter (or change) the cost index manually. The cost index can no longer be changed when the DES $_{phase}$ becomes active.
L2 When the flight crew has not entered a cost index before entering the ZFW (on the FUEL&LOAD page), the FMS sets a default value. The default value is the last cost index of the previous flight, stored in the DONE $_{phase}$ (or 0, if there is no stored cost index, after a power up for example).

CONTROLS AND INDICATORS

The flight crew can enter (or change) the cost index on the INIT, FUEL&LOAD, or on the CLB, CRZ, and DES panel of the PERF page.
Refer to INIT Page
Refer to FUEL&LOAD Page
Refer to PERF Page
L2 When the flight crew has not entered a cost index before entering the ZFW (on the FUEL&LOAD page), the FMS sets a default value. The default value is the last cost index of the previous flight, stored in the DONE phase (or 0, if there is no cost index, after a power up for example).

ASSOCIATED MESSAGES

Refer to COST INDEX-NNN IN USE

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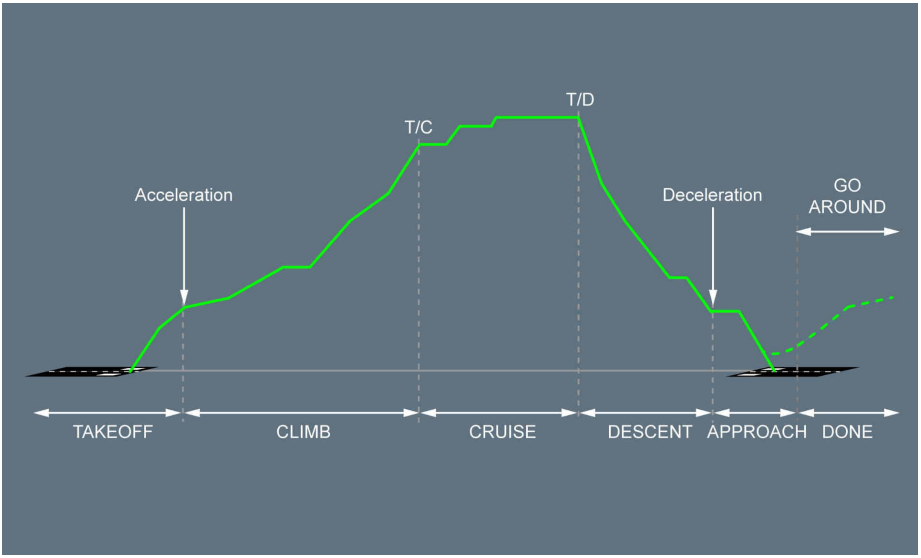
FMS Flight Phases and Speed Profile

FLIGHT PHASES - OVERVIEW

Applicable to: ALL

The vertical flight plan is divided into eight flight phases: PREFLIGHT, Takeoff (T.O), Climb (CLB), Cruise (CRZ), Descent (DES), Approach (APPR), Go-Around (GA), and DONE.

FMS Flight Phases



For each flight phase, the FMS computes the optimum speed/Mach profile. The aircraft will fly this speed profile when the managed speed control is active.

L123

Flight Phase	Speed Profile	Switching Conditions
PREFLIGHT *(1)*	-	See PREFLIGHT → T.O
T.O	*Refer to T.O Speed Profile*	See T.O → CLB
CLB	*Refer to CLB Speed Profile*	See CLB → CRZ See CLB → APPR See CLB → DES See CLB → GA

Continued on the following page

Continued from the previous page

Flight Phase	Speed Profile	Switching Conditions
CRZ	*Refer to CRZ Speed Profile*	See CRZ → DES See CRZ → APPR See CRZ → GA
DES	*Refer to DES Speed Profile*	See DES → APPR See DES → CRZ See DES → GA See DES → CLB
APPR	*Refer to APPR Speed Profile*	See APPR → DONE See APPR → GA See APPR → CLB See APPR → CRZ
GA	*Refer to GA Speed Profile*	See GA → CLB See GA → APPR
DONE *(2)*	-	See Any flight phase → DONE See DONE → PREFLIGHT See DONE → T.O

(1) In the PREFLIGHT phase, the flight crew inserts the flight plan, and all other data that are needed for the flight.

(2) In the DONE phase, the FMS erases the data that was entered for the flight.

PREFLIGHT → T.O

- The SRS TO mode is engaged (*Refer to SRS TO Mode*),
  and
- The current engine thrust is sufficient (two inner engines N1 ≥ 85 %), **or**
  The ground speed > 90 kt .

T.O → CLB

At the acceleration altitude, **or**
The flight crew engages one of the following vertical modes: V/S , FPA , ALT* , ALT , ALT CST* , ALT CST , CLB , OP CLB , DES or OP DES . (*Refer to AF/FD Modes*)

CLB → CRZ

The aircraft reaches the cruise flight level (The ALT CRZ* , or ALT CRZ mode is engaged).

CLB → APPR

The flight crew activates the approach phase via the ACTIVATE APPR button on the PERF page. (*Refer to Page*)

L3 **CLB → DES**

- The distance to destination (along the flight plan) ≤ 200 nm , **or**
  The selected altitude target ≤ Max (FL 200 , highest descent altitude constraint), **or**
  There is no destination,
  and
- The selected altitude target ≤ cruise flight level,
  and
- DES or OP DES is engaged, **or**
  V/S or FPA is engaged, and the selected altitude target ≤ aircraft current altitude.

CLB → GA

The flight crew engages the go-around modes. (*Refer to Go-Around Modes*)

L1 **CRZ → DES**

- No planned step descent ahead the aircraft,
  and
- The distance to destination (along the flight plan) ≤ 200 nm , **or**
  The selected altitude target ≤ Max (FL 200 , highest descent altitude constraint),
  and
- The selected altitude target ≤ cruise flight level,
  and
- DES or OP DES is engaged, **or**
  V/S or FPA is engaged, and the selected altitude target ≤ aircraft current altitude.

CRZ → APPR

The flight crew activates the approach phase via the ACTIVATE APPR button on the PERF page. (*Refer to Page*)

L3 **CRZ → GA**

The flight crew engages the go-around modes. (*Refer to Go-Around Modes*)

L1 **DES → APPR**

The aircraft overflies the DECEL pseudo-waypoint, with NAV mode engaged and at an altitude < 7 200 ft AGL , **or**
The flight crew activates the approach phase via the ACTIVATE APPR button on the PERF page. (*Refer to Page*)

L2 **DES → CRZ**

The flight crew defines a new cruise flight level (on the PERF page, *Refer to Page*), **and** the aircraft altitude ≥ cruise flight level.

L3 **DES → GA**

The flight crew engages the go-around modes. (*Refer to Go-Around Modes*)

DES → CLB

The flight crew defines a new cruise flight level (on the PERF page, *Refer to Page*), **and** the aircraft altitude < cruise flight level.

L1 **APPR → DONE**

30 s after landing.

APPR → GA

The flight crew engages the go-around modes. (*Refer to Go-Around Modes*)

L3 **APPR → CLB**

The flight crew defines a new cruise flight level (on the PERF page, *Refer to Page*), **and** the aircraft altitude < cruise flight level.

APPR → CRZ

The flight crew defines a new cruise flight level (on the PERF page, *Refer to Page*), **and** the aircraft altitude ≥ cruise flight level.

L1 **GA → CLB**

At the go-around acceleration altitude, **or**
The flight crew engages one of the following vertical modes: V/S , FPA , ALT* , ALT , ALT CST* , ALT CST , CLB , OP CLB , DES or OP DES . (*Refer to AF/FD Modes*)

GA→ APPR

The flight crew activates the approach phase via the ACTIVATE APPR button on the PERF page. (*Refer to Page*)

ANY FLIGHT PHASE → DONE

Not airborne for 30 s , **and** all engines are off.

DONE → PREFLIGHT

The flight crew displays the ACTIVE / INIT, ACTIVE / FUEL&LOAD, or ACTIVE PERF page, **or**
The flight crew initializes the flight plan by swapping a secondary flight plan, or by inserting a company flight plan uplink.

L3 **DONE → T.O**

- The SRS TO mode is engaged (*Refer to SRS TO Mode*),
  and
- The current engine thrust is sufficient (two inner engines N1 ≥ 85 %), **or**
  The ground speed > 90 kt .

FLIGHT PHASES - SPEED PROFILE

Applicable to: ALL

For each flight phase, the FMS computes the optimum speed/Mach profile. The aircraft will fly this speed profile when the managed speed control is active.

TAKEOFF

OPERATING SPEEDS

The performance function computes the operating speeds for takeoff, and displays these speeds on the T.O panel of the PERF page (*Refer to PERF page*):

- The Flaps retraction speed F: The minimum recommended speed at which the flaps may be retracted from CONF 2 or 3 to CONF 1+F after takeoff,
- The Slats retraction speed S: The minimum recommended speed at which the slats may be retracted,
- The Green Dot speed O : The recommended speed with the best climb performance, and the minimum fuel consumption.

L2 In PREFLIGHT, the FMS uses the estimated weight, CG to compute the operating speeds. During the T.O $_{phase}$, the FMS uses the current weight and CG .

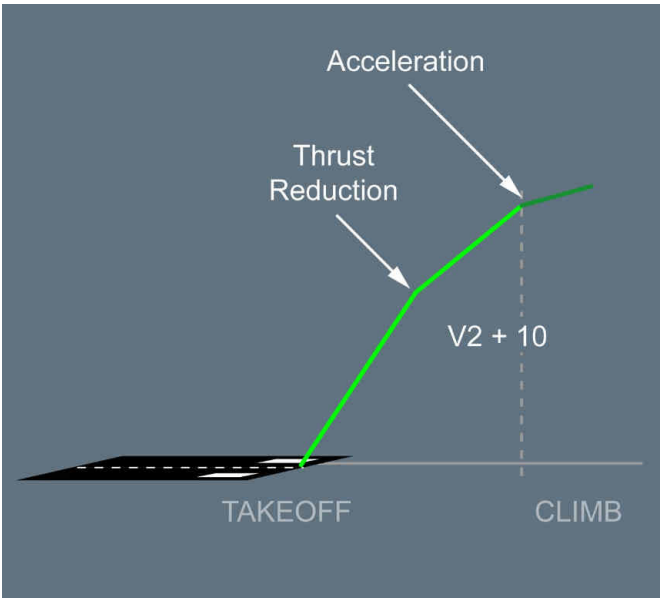
Note: The operating speeds that are displayed on the PFD , are computed by the PRIM s, always based on the current weight, CG . Therefore, in PREFLIGHT, the operating speeds displayed on the PFD may be slightly different from the speeds displayed on the T.O panel of the PERF page.

L1 **MANAGED SPEED PROFILE**

From liftoff to the acceleration altitude, the managed speed target is V2 + 10 kt .

Note: The magenta triangle on the PFD airspeed scale indicates V2. However, the managed speed target is V2 + 10 kt .

T.O Speed Profile



CLIMB

The FMS computes an optimized speed/Mach couple (ECON speed/Mach), that is based on:
- The cost index
- The aircraft gross weight
- The cruise flight level
- The wind and temperature data
- A time constraint, if any (*Refer to Time Constraint*).

When a time constraint exists, the optimized speed is called RTA.

L3 The ECON speed/Mach are limited by the following operational speed envelope:
- Minimum Speed = MAX (VLS , green dot)
- Maximum Speed = MIN (MMO -Δ MMO , VMO -Δ VMO , Mach(0.3G buffet margin)).

L1 The CLB panel of the PERF page displays the ECON speed/Mach couple for the CLB $_{phase}$. (*Refer to PERF page*)

MANAGED SPEED PROFILE

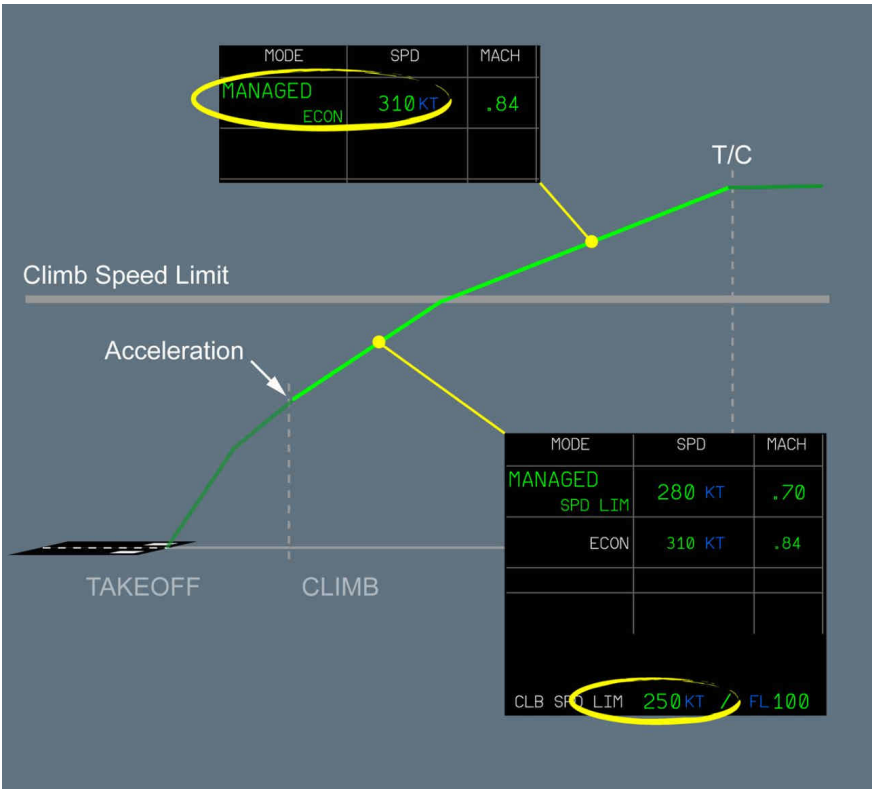
When a climb speed limit (or climb speed constraint) is defined in the flight plan, the managed speed target is:

- The speed limit (or speed constraint) between the acceleration altitude and the speed limit altitude (or speed constraint waypoint)
- The ECON speed/Mach between the speed limit altitude (or speed constraint waypoint) and the T/C.

L3 The aircraft flies at the ECON speed until the cross-over altitude. Between the cross-over altitude and the T/C, the aircraft flies at the ECON Mach. The cross-over altitude is the altitude where the ECON speed and the ECON Mach have the same TAS.

L1 The CLB panel of the PERF page also displays the climb speed limit (or climb speed constraint), if any.
Refer to Speed Limit
Refer to Speed Constraint
If no climb speed limit (nor climb speed constraint) is defined in the flight plan, the managed speed target, between the acceleration altitude and the T/C, is the ECON speed/Mach.

CLB Speed Profile



CRUISE

ECON

The FMS computes an optimized Mach/speed (ECON speed/Mach) , that is based on:

- The cost index
- The aircraft gross weight
- The cruise flight level
- The wind and temperature data
- A time constraint, if any (*Refer to Time Constraint*).

L2 The FMS computes a cruise Mach when the cruise flight level is above FL 200 , and a cruise speed when the cruise flight level is below FL 200 .

L1 When a time constraint exists, the optimized speed is called RTA.

L3 The ECON speed/Mach are limited by the following operational speed envelope:
- Minimum Speed = MAX (VLS , green dot)
- Maximum Speed = MIN (MMO -Δ MMO , VMO -Δ VMO , Mach(0.3G buffet margin), Mach(Thrust Limitation)).

L1 The CRZ panel of the PERF page displays the ECON Mach/speed for the CRZ_{phase} . (*Refer to PERF page*)

LONG RANGE CRUISE MACH (LRC)

For the CRZ_{phase} , the FMS also computes the speed to fly a long range (minimum fuel consumption).

The LRC Mach depends on:
- The current gross weight
- The wind and temperature conditions.

The CRZ panel of the PERF page displays the LRC Mach.
To fly this speed, the flight crew selects the LRC Mach on the AFS CP, and engages the manual speed control.

MAXIMUM TURBULENCE MACH (MAX TURB)

For the CRZ_{phase} , the FMS also computes the recommended speed in turbulent atmospheric conditions.
The turbulence speed is a protection against inadvertent stall, and maintains structural margins.

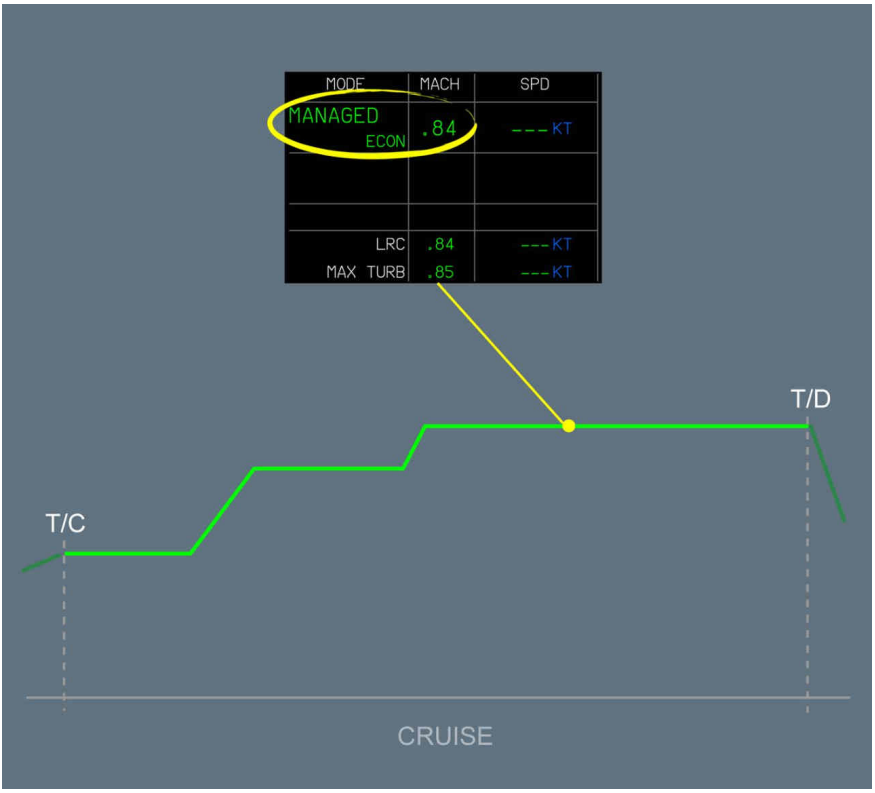
The MAX TURB Mach depends on:
- The current gross weight
- The current altitude.

The CRZ panel of the PERF page displays the MAX TURB Mach.
To fly this speed, the flight crew selects the MAX TURB Mach on the AFS CP, and engages the manual speed control.

MANAGED SPEED PROFILE

When no Constant Mach Segment (CMS) is defined in the flight plan, the managed speed target, between the acceleration altitude and the T/C, is the ECON Mach/speed.

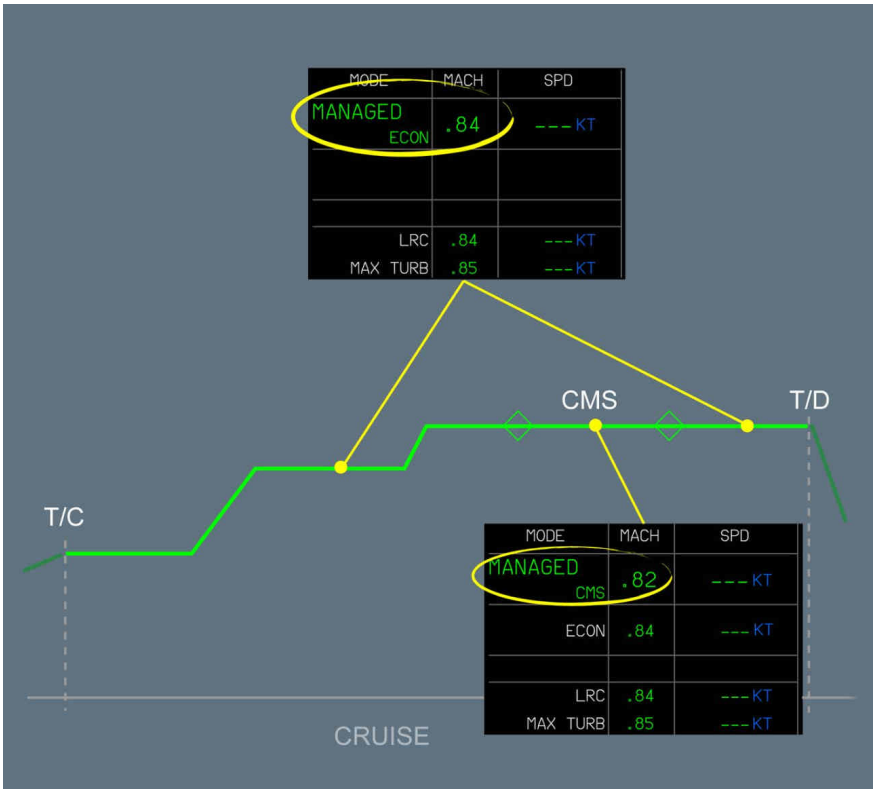
CRZ Speed Profile



When a CMS is defined in the flight plan, the managed speed target is:

- The Mach defined by the flight crew, during the CMS (*Refer to Constant Mach Segment*) When the aircraft is flying a CMS , the optimized speed is called CMS. A CMS has priority over a time constraint.
- The ECON Mach/speed otherwise.

CRZ Speed Profile - with CMS



DESCENT

The FMS computes an optimized Mach/speed (ECON Mach/speed) , that is based on:

- The cost index
- The aircraft gross weight at the T/D
- The cruise flight level
- The wind and temperature data
- A time constraint, if any (*Refer to Time Constraint*).

When a time constraint exists, the optimized speed is called RTA.

L3 The ECON speed/Mach are limited by the following operational speed envelope:
- Minimum Speed = MAX (VLS , green dot),
- Maximum Speed = MIN (MMO -Δ MMO , VMO -Δ VMO , Mach(0.3G buffet margin)).

L1 Before the DES $_{phase}$, the flight crew can change the ECON speed. If he does so, the speed will not be updated during the DES $_{phase}$ when the flight conditions change.
The DES panel of the PERF page displays the ECON Mach/speed couple for the DES $_{phase}$. (*Refer to PERF page*)

L2 **OPTIMIZED DESCENT PATH**

The descent path is computed to minimize the fuel consumption, while respecting the various altitude constraints and the descent speed profile, in order to reach VAPP at 1 000 ft .

The descent path computation is also based on:
- The lateral and vertical flight plan data,
- The descent and approach winds, and the maximum cabin descent rate.

During the DES $_{phase}$, the descent path is updated when the flight crew changes the flight plan, or any approach data (approach wind, VAPP , or landing configuration).

Note: *The descent path computation does not take into account the position of the speed brakes.*

L1 **MANAGED SPEED PROFILE**

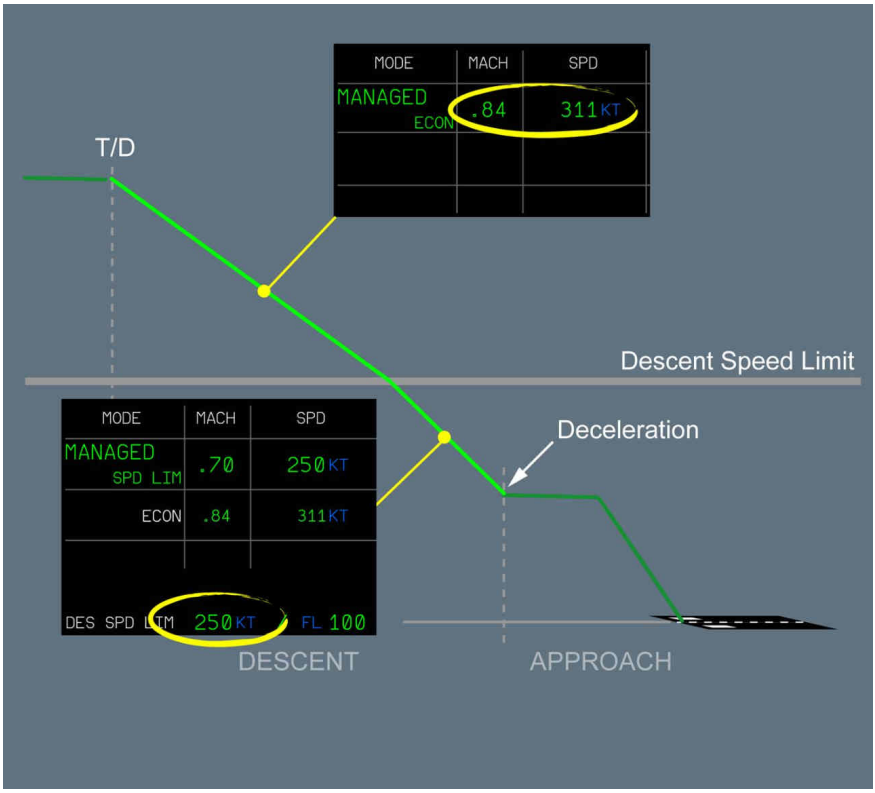
When a descent speed limit (or descent speed constraint) is defined in the flight plan, the managed speed target is:
- The ECON Mach/speed between the T/D and the speed limit altitude (or speed constraint waypoint),

L3 The aircraft flies at the ECON Mach until the cross-over altitude. Between the cross-over altitude and the DECEL point, the aircraft flies at the ECON speed. The cross-over altitude is the altitude where the ECON speed and the ECON Mach have the same TAS.

L1 - The speed limit (or speed constraint) between the speed limit altitude (or speed constraint waypoint) and the DECEL point.

The DES panel of the PERF page also displays the descent speed limit (or descent speed constraint), if any.
Refer to Speed Limit
Refer to Speed Constraint
If no descent speed limit (nor descent speed constraint) is defined in the flight plan, the managed speed target, between the T/D and the DECEL point, is the ECON speed/Mach.

DES Speed Profile



APPROACH

The performance function computes the following speeds for the APPR $_{phase}$:

- The operating speeds (green dot, S, and F),
- VREF ,
- VLS of the selected landing configuration,
- VAPP .

Before the APPR $_{phase}$, the FMS uses the predicted landing weight and CG to compute the speeds.
When the APPR $_{phase}$ is active, the FMS uses the current GW and CG .
The APPR panel of the PERF page displays these speeds. (*Refer to PERF page*)

OPERATING SPEEDS

The performance function computes the operating speeds (green dot, S, and F):

- The green dot speed O : The managed speed target, when in CONF 0,
- The Slats extension speed S: The managed speed target, when in CONF 1 or CONF 1+F,
- The Flaps extension speed F: The managed speed target, when in CONF 2 or CONF 3.

VLS

VLS is the lowest selectable speed for the selected landing configuration.

The VLS depends on:
- The selected landing configuration (The FMS computes the VLS for CONF 3 or CONF FULL),
- The estimated landing weight and CG ,
- The destination airport elevation.

L3 When the APPR $_{phase}$ is active, the FMS uses the current weight and CG , received from the FQMS .

Note: The VLS , that is displayed on the PFD , is computed by the PRIM s, and is based on the current weight, CG , flaps configuration, and altitude. (Refer to VLS from PRIM s) Therefore, the VLS displayed on the PFD may be different from the VLS , displayed on the APPR panel of the PERF page.

L1 ### VAPP

VAPP is the final approach speed. It is the managed speed target when in the approach configuration (CONF 3 or CONF FULL).

To compute a default VAPP , the FMS takes into account:
- VLS , that depends on the selected landing configuration,
- The wind at the destination airport,
L3 - Constants, defined in different tables, that are selected by OPC option.

L1 The flight crew can always overwrite the default value.

VREF

VREF is the reference speed for approach and landing. This speed is used to compute the regulatory landing performance of the aircraft.
The flight crew also uses this speed to compute landing performance with failures.

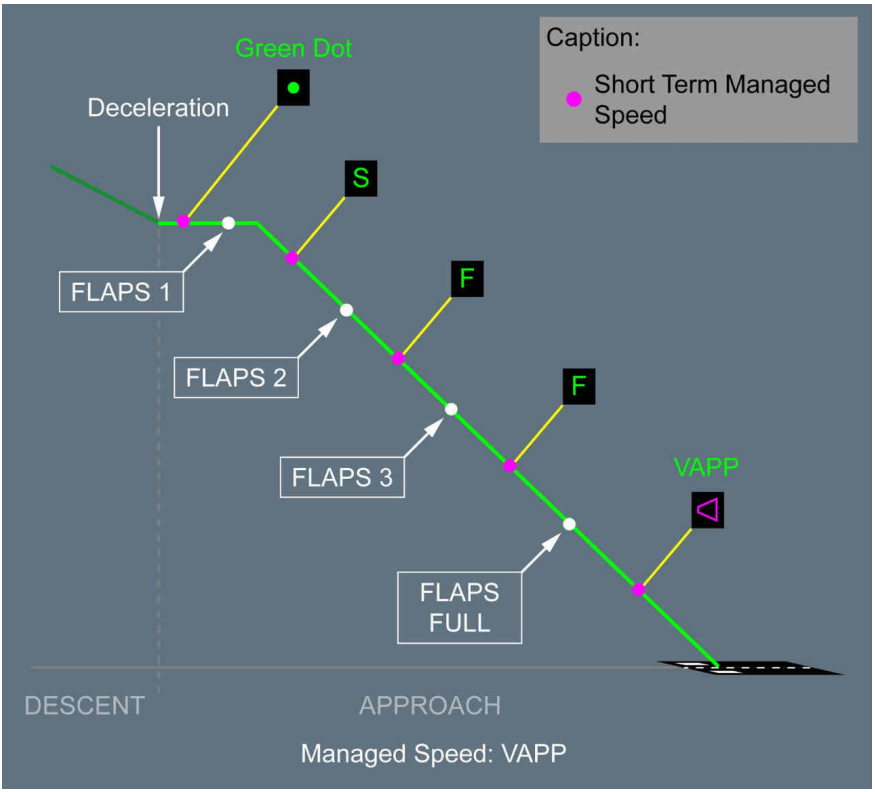
MANAGED SPEED PROFILE

During the APPR $_{phase}$, the managed speed target is VAPP .

However, the flight guidance uses the short-term managed speed as the current speed target:

- When sequencing the DECEL point, the short-term managed speed is green dot: the aircraft decelerates from the descent speed to green dot,
- When the flight crew sets PLAPS 1, the short-term managed speed becomes the S speed, the aircraft decelerates from green dot to S,
- When the flight crew sets FLAPS 2, the short-term managed speed becomes the F speed, the aircraft decelerates from S to F,
- When the flight crew sets FLAPS 3:
  - And the landing FLAPS setting is CONF FULL: the short-term managed speed becomes the F speed for CONF 3, the aircraft decelerates from F (CONF 2) to F (CONF 3),
  - And the landing FLAPS setting is CONF 3: the aircraft decelerates from F to VAPP.
- When the flight crew sets FLAPS FULL: the aircraft decelerates from F to VAPP.

APPR Speed Profile



GO-AROUND

OPERATING SPEEDS

The performance function computes the operating speeds (F, S, and green dot), and displays these speeds on the GA panel of the PERF page (*Refer to PERF page*):

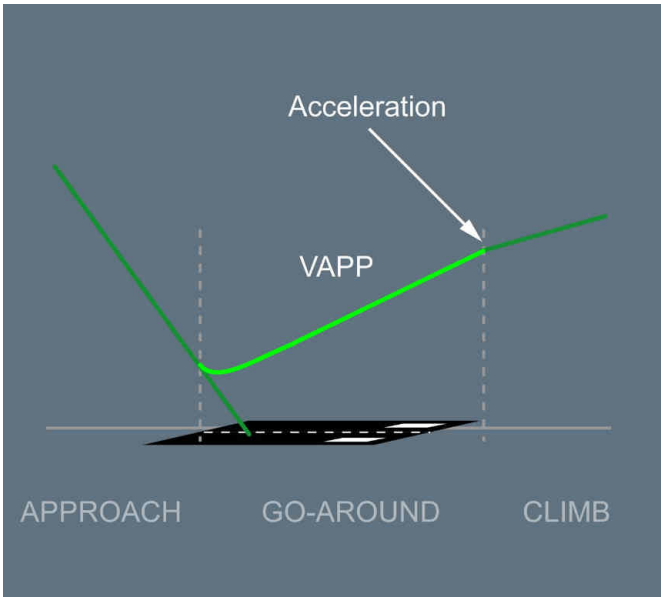
- The Flaps retraction speed F: The minimum recommended speed at which the flaps may be retracted from CONF 2 or 3 to CONF 1+F after takeoff,
- The Slats retraction speed S: The minimum recommended speed at which the slats may be retracted,
- The Green Dot speed O : The recommended speed with the best climb performance, and the minimum fuel consumption.

The FMS uses the estimated weight, CG , and altitude to compute the operating speeds.

MANAGED SPEED PROFILE

During the GA $_{phase}$, the managed target speed is the speed that the aircraft was flying when the GA $_{phase}$ became active.
In normal operation, this speed will be VAPP .

GA Speed Profile



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Optimum and Maximum Flight Level

OPTIMUM FLIGHT LEVEL

Applicable to: ALL

The performance function of the FMS computes the optimum flight level. The optimum flight level is the flight level with the lowest fuel consumption.

The optimum flight level computation takes into account:
- The aircraft gross weight
- The cost index
- The temperature and winds
- A minimum cruising time of 15 min at that altitude.

The computation does not take into account any Constant Mach Segment (CMS).
The FMS computes the optimum flight level until 15 nm from the T/D.
The PERF page displays the optimum flight level.
Refer to Page

RECOMMENDED MAXIMUM FLIGHT LEVEL

Applicable to: ALL

The performance function of the FMS computes the recommended maximum flight level, based on the delta ISA and the current aircraft gross weight.

L3 The delta ISA vertical profile, that is used for the computation of the recommended maximum flight level, is defined by the CRZ FL , CRZ TEMP , and TROPO entries on the INIT page. In cruise, the delta ISA vertical profile is corrected by the measured temperature.

L1 The aircraft can reach the recommended maximum flight level with a minimum vertical speed of 300 ft/min at MAX CLB thrust. At the recommended maximum flight level, the aircraft:
- Can fly a speed between green dot and VMO / MMO
- Can keep a thrust rating, without acceleration, less than MAX CRUISE
- Has a buffeting margin of 0.3 G.

In engine-out, the FMS computes the engine-out maximum flight level, *Refer to Engine-Out Maximum Flight level* .
The PERF page displays the recommended maximum flight level (or EO maximum flight level) in the upper right corner, *Refer to Page* .

L2 The FMS message area displays the CRZ FL ABOVE MAX FL, or STEP ABOVE MAX FL message if the flight crew enters a cruise flight level or step altitude that is higher than the recommended maximum flight level.

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NADP

INTRODUCTION

Applicable to: ALL

The NOISE function of the FMS allows the flight crew to fly an optimized Noise Abatement Departure Procedure (NADP) in managed mode.

There are two types of NADP:

- An NADP of type I is a departure procedure that intends to reduce noise levels close to the airport. This procedure involves a thrust cutback at or above a prescribed minimum altitude and delaying the flaps/slats retraction (not later than the prescribed maximum altitude).
  This procedure is also called a **close-in** noise abatement procedure.
- An NADP procedure of type II aims at reducing noise levels further away from the airport. This is a departure procedure where the initiation of the flaps/slats retraction occurs before reducing the thrust (the thrust reduction altitude is higher than the acceleration altitude).
  This procedure is also called a **distant** noise abatement procedure.

The NOISE function of the FMS covers both NADP types.

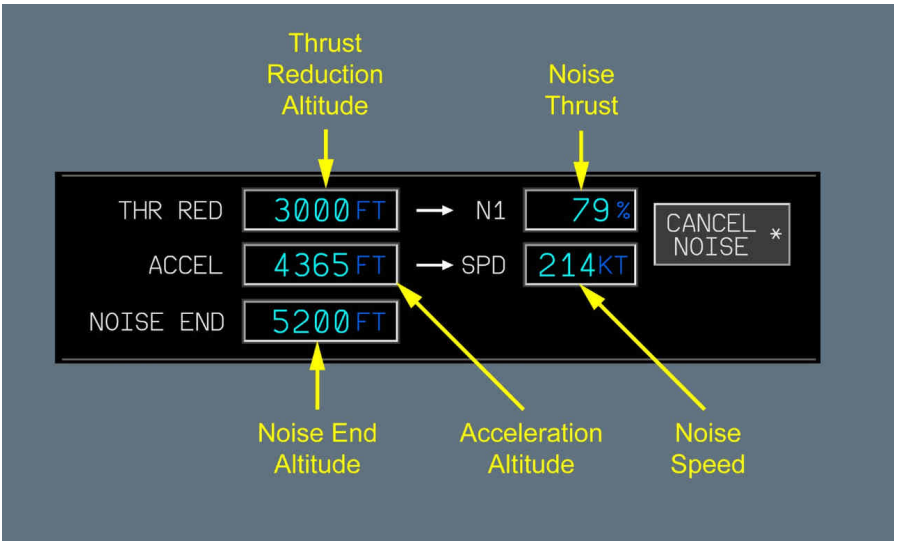
NADP DESCRIPTION

Applicable to: ALL

NOISE PARAMETERS

The FMS computes a vertical noise profile, based on the following 5 parameters. The flight crew enters these parameters on the T.O panel of the PERF page.

NOISE Parameters



THRUST REDUCTION ALTITUDE

The thrust reduction altitude is the altitude where the flight crew reduces the thrust from TOGA (or FLX) to CLB.
In case of an NADP, at the thrust reduction altitude the thrust target changes from TOGA (or flex, or derated) thrust to noise thrust.
The default value is 1 500 ftabove the origin airport elevation.

ACCELERATION ALTITUDE

The acceleration altitude is the altitude where the aircraft accelerates towards the noise speed.
The default value is 1 500 ftabove the origin airport elevation.

NOISE END ALTITUDE

The noise end altitude is the altitude where the noise restrictions end. Below this altitude, a speed and noise restriction may apply.
At the noise end altitude, the thrust target changes from noise thrust to climb (or derated climb) thrust.
The transition from noise thrust to climb thrust is a smooth transition with a thrust gradient of 0.2 %N1 per second. During the thrust ramp, the aircraft still flies at the noise speed.
If no end altitude is entered, no noise profile is computed.

NOISE THRUST

The noise thrust is the thrust target (in percentage of N1) between the thrust reduction altitude and the noise end altitude.
The lowest accepted noise thrust is 40 %N1.
At the noise end altitude, the thrust target changes from noise thrust to climb (or derated climb) thrust.
The transition from noise thrust to climb thrust is a smooth transition with a thrust gradient of 0.2 %N1 per second. During the thrust ramp, the aircraft still flies at the noise speed.
When no noise end altitude exists, no noise thrust can be entered.

NOISE SPEED

The noise speed is the managed speed between the acceleration altitude and the end of the noise thrust ramp.
When the flight crew has entered a noise end altitude, the FMS computes a default noise speed that is the maximum of (S + 15 kt, VLS + 10 kt), where S is the slats retraction speed, and VLS is the lowest selectable speed in clean configuration at the noise end altitude.

Note: The default noise speed may be less than the green dot speed.

The flight crew can always overwrite the default value.
When no noise end altitude exists, no default noise speed is computed, and no noise speed can be entered.

NOISE PROFILE

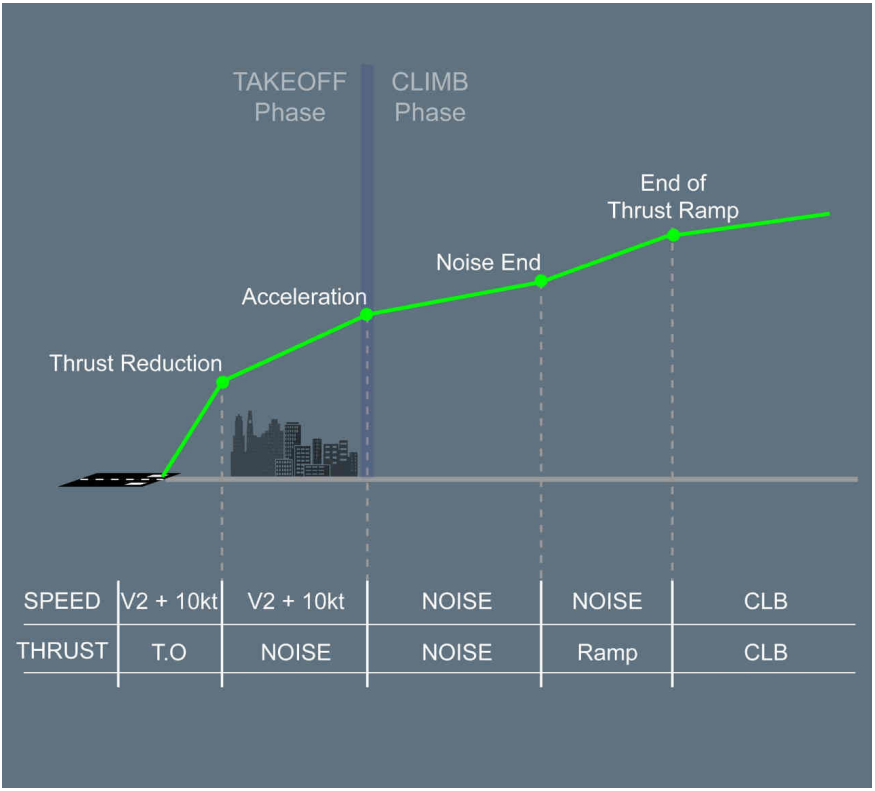
The FMS computes a noise profile as soon as the flight crew has entered a noise end altitude and a noise speed, or noise thrust.

L2 If no noise end altitude exists, no noise profile is computed.
If a noise end altitude and noise speed exist, but no noise thrust is defined, the FMS computes a noise profile based on the MAX CLB thrust.
If a noise end altitude and noise thrust exist, but no noise speed is defined, the FMS computes a noise profile based on the ECON CLB speed.
In what follows, all noise parameters are entered.

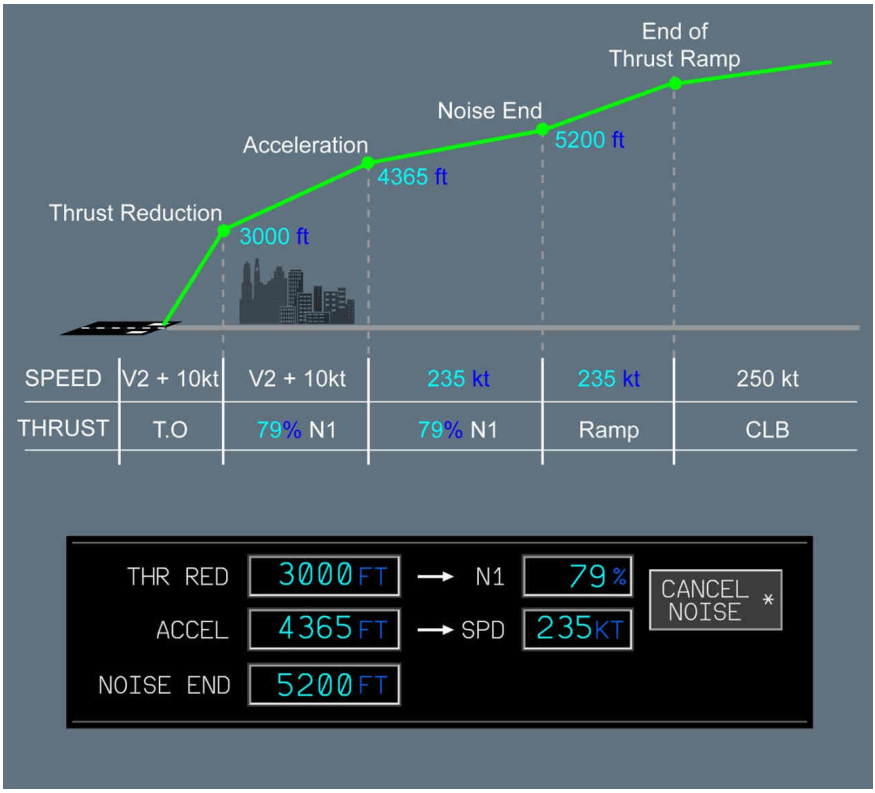
L1 The flight can change the noise parameters until the aircraft reaches the noise end altitude.

CLOSE-IN NADP

Close-In NADP

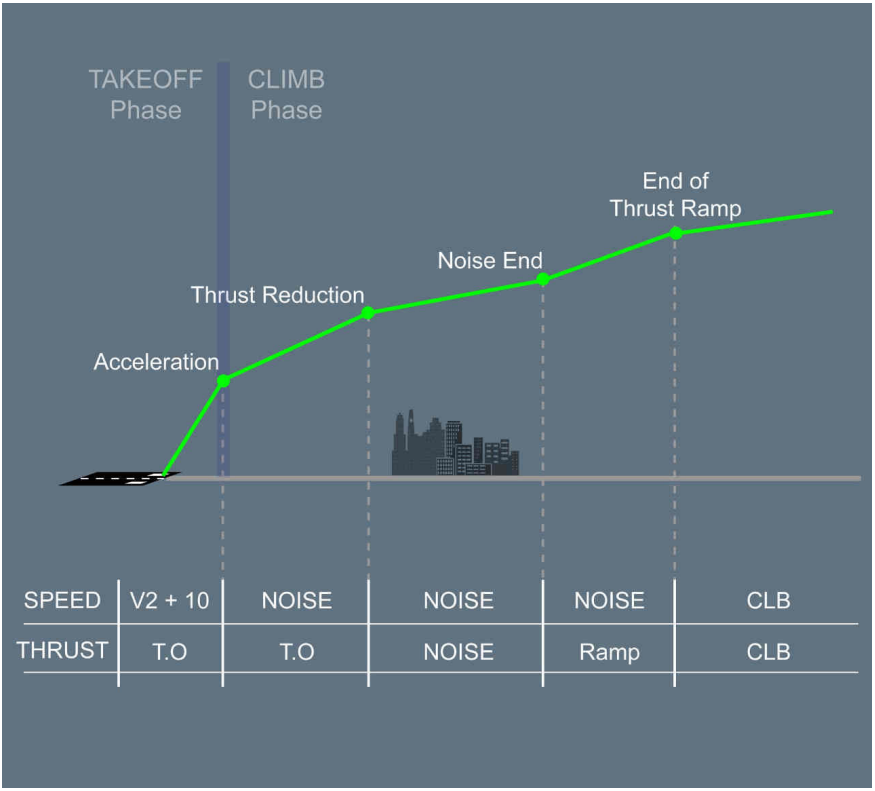


Example

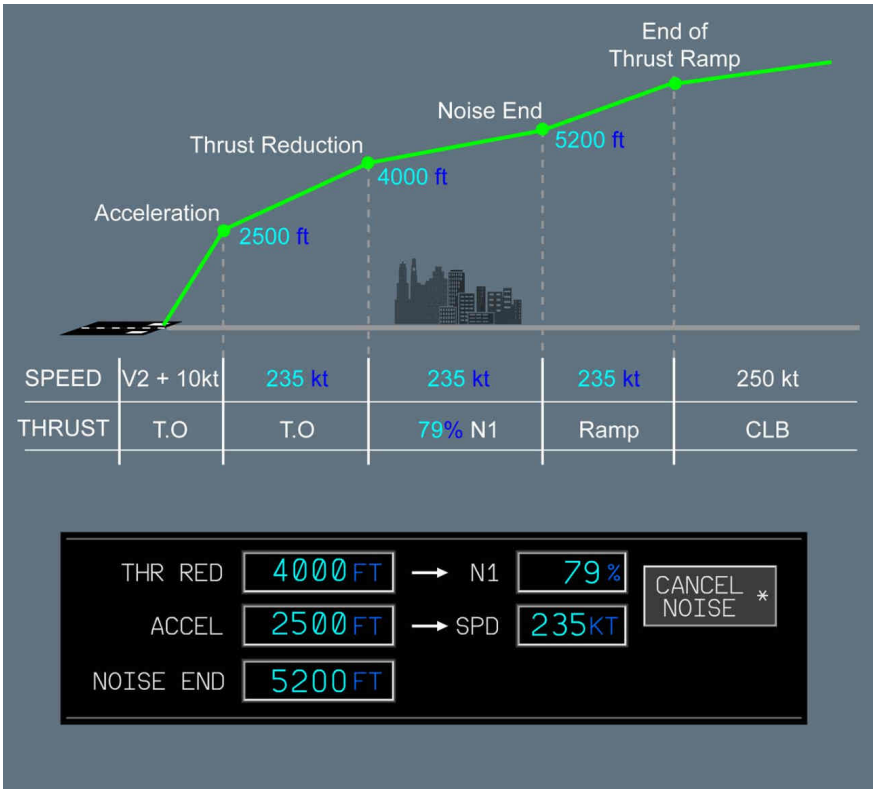

End of
Thrust Ramp
Noise End
5200 ft
Acceleration
4365 ft
Thrust Reduction
3000 ft
SPEED
V2 + 10kt
V2 + 10kt
235 kt
235 kt
250 kt
THRUST
T.O
79% N1
79% N1
Ramp
CLB
THR RED
3000 FT
N1
79 %
CANCEL
NOISE *
ACCEL
4365 FT
SPD
235 KT
NOISE END
5200 FT

DISTANT NADP

Distant NADP



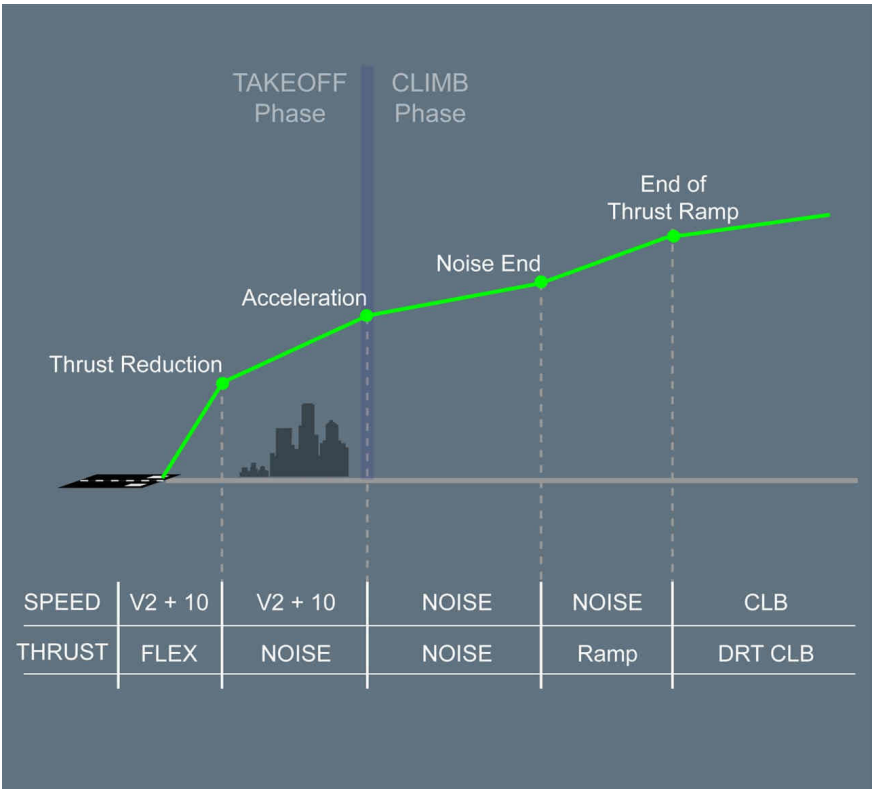
Example



L2 **NADP WITH FLEX(OR DRT) T.O AND DRT CLIMB**

An FMS noise procedure may be combined with a flex or derated takeoff and/or a derated climb.

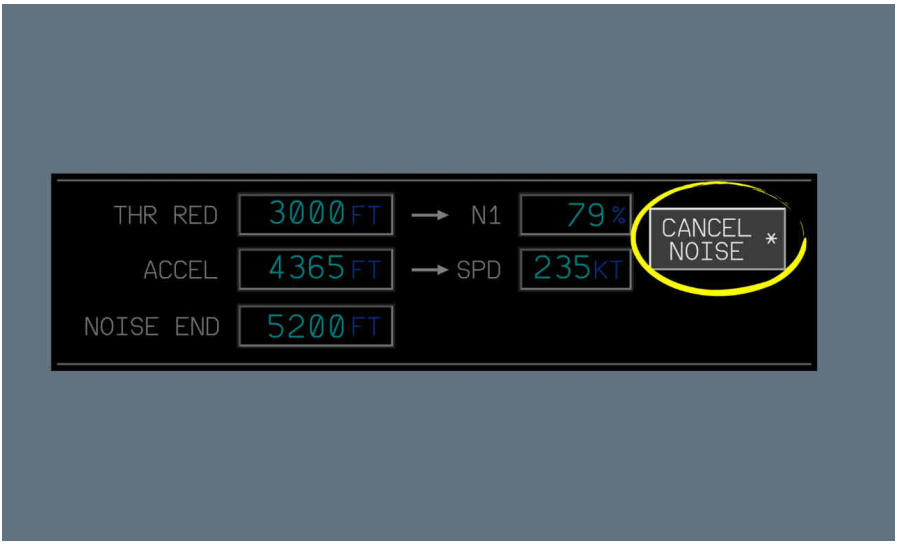
FLEX + Derated



END OF NADP

The FMS noise procedure ends at the end of the thrust ramp.
The flight crew can always cancel and exit the noise procedure by clicking on the CANCEL NOISE button on the T.O or CLB panel of the PERF page.

CANCEL NOISE Button



When the noise procedure is exited, then:

- The thrust target reverts to CLB thrust if the aircraft is above the thrust reduction altitude, or to T.O thrust if the aircraft is below the thrust reduction altitude
- The managed target speed reverts to the ECON climb speed if the aircraft is above the acceleration altitude, or to V2 + 10 ktif the aircraft is below the acceleration altitude.

Note: *In flight, once exited, the noise procedure cannot be activated again.*

NADP AND ENGINE-OUT

When an engine-out is detected, the noise procedure is exited automatically.

L2 **NADP AND FLIGHT GUIDANCE MODES**

The noise procedure is part of the FMS climb profile. As a consequence, when the flight crew engages a selected guidance mode, the guidance rules, as described in the Flight Guidance chapter, are respected.

A few examples:

- When the flight crew disconnects the A/THR while flying the noise procedure, the noise thrust is disregarded. However, the managed speed target is still the noise speed. When the flight crew activates the A/THR again, the thrust target becomes the noise thrust.
- When the flight crew engages the HDG/TRACK mode, the vertical mode reverts to selected guidance (OP CLB, V/S / FPA). In this case, the noise thrust is disregarded: the thrust mode switches to SPEED mode in order to target the managed speed, that is still the noise speed.
- When the flight crew activates the selected speed control, the managed noise speed is disregarded. However, the thrust target is still the noise thrust. When the flight activates the managed speed control again, the managed speed target becomes the noise speed.

Note: *When the flight crew has preset a selected speed on the CLB panel of the PERF page, the selected speed control is activated automatically at the acceleration altitude. In this case, the aircraft will fly the selected speed, between the acceleration altitude and the noise end altitude. The thrust target is still the noise thrust.*

When the OP CLB, V/S, or ALT mode is engaged while the aircraft is flying the thrust ramp, the noise procedure is exited definitively.

CONTROLS AND INDICATORS

Applicable to: ALL

CONTROLS AND INDICATORS

ON THE MFD

The flight crew enters the noise parameters on the T.O or CLB panel of the PERF page. (*Refer to PERF page*)

PERF page



ON THE FMA (PFD)

Noise Thrust



While flying a noise abatement departure procedure, and the noise thrust is applied, the Flight Mode Annunciator (FMA) displays the percentage of N1.

Perf and Idle Factor

PERF AND IDLE FACTOR

Applicable to: ALL

The performance factor is a correction factor for the fuel flow, due to aerodynamics or engine deterioration. The perf factor is taken into account in the computation of the managed speed profile, and the optimum altitude.

The idle factor is a correction factor for the engine idle rating. The idle factor is taken into account in the construction of the descent and approach path and predictions.

Perf and idle factors can be up linked via ACARS, or entered manually on the STATUS page. (*Refer to Page*)

Intentionally left blank

GENERAL

Applicable to: ALL

The FMS takes into account a single and double engine failure for performance, predictions, and long-term guidance targets computation.

When an engine failure occurs, the FMS :
- Changes the managed speed target, upon the active flight phase
- Computes the engine-out maximum flight levels (LRC and green dot maximum flight levels)
- Updates the flight plan predictions, based on the new managed speed targets, and engine-out maximum altitudes

  Note: - *In case of a single engine failure, the FMS considers the outer engine as failed*
  - *In case of a double engine failure, the FMS considers the two failed engines on the same wing*

- Deletes all the pre-selected speeds
  The flight crew can enter new pre-selected speeds, if required.
- Creates a temporary flight plan with the engine-out SID, if applicable
- Deletes all the planned altitude steps (climb or descent), if any
- Deletes the time constraint, if any
- Displays the PERF page.

When the engine out is recovered, the FMS returns automatically to its normal performance and predictions computation.
At all times, the flight crew can clear the engine-out state manually via the CLEAR EO button on the PERF page. (*Refer to Page*)

ENGINE-OUT SID

Applicable to: ALL

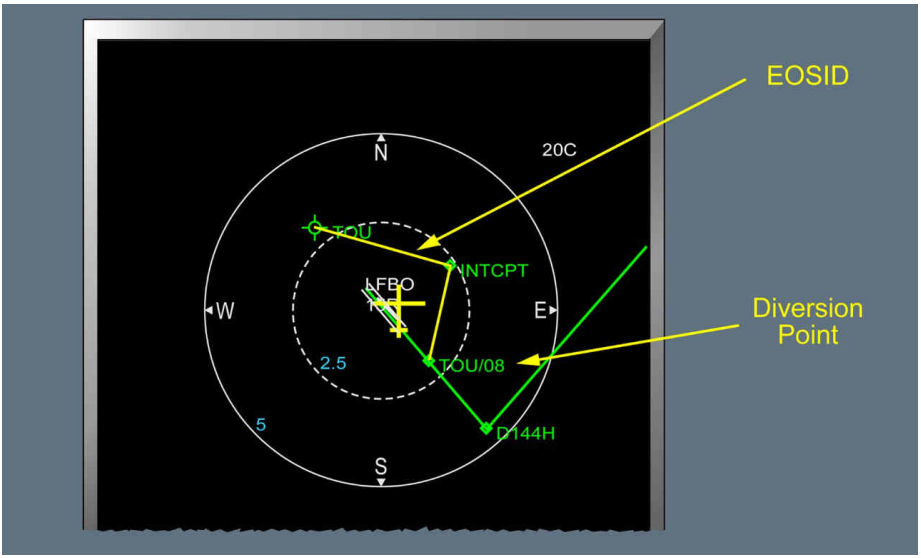
The Engine-Out Standard Instrument Departure (EOSID) is a standard procedure to fly when an engine fails just after takeoff.
L2 The operator can define an EOSID for a specific runway in the navigation database.
L1 The DEPARTURE page displays the ident of the EOSID, if any.

DEPARTURE Page



The flight crew can review the EOSID on the PLAN mode of the ND. The EOSID is indicated by a yellow line.
The last point that is common between the SID and EOSID is called the diversion point.

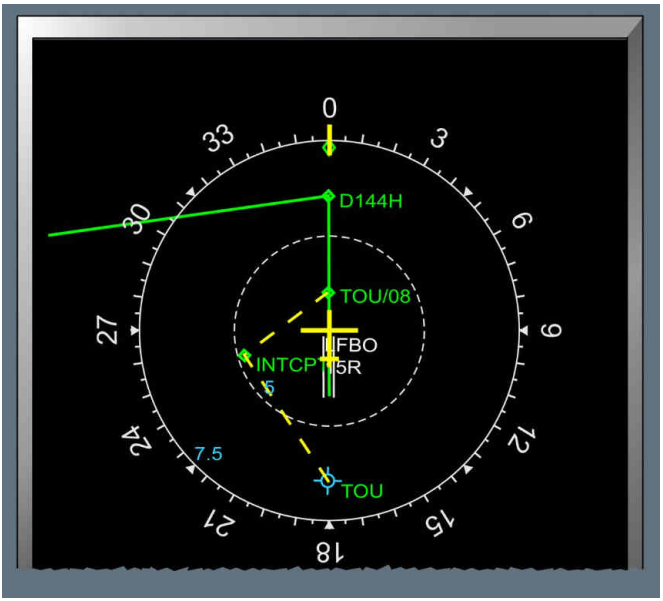
EOSID in ND PLAN mode



ENGINE-OUT BEFORE THE DIVERSION POINT

When an engine-out occurs before the diversion point, the FMS creates a temporary flight plan with the EOSID strung after the diversion point. The EOSID is followed by a discontinuity.
The flight crew can insert or erase the temporary flight plan, whether he wants to fly the EOSID or not.

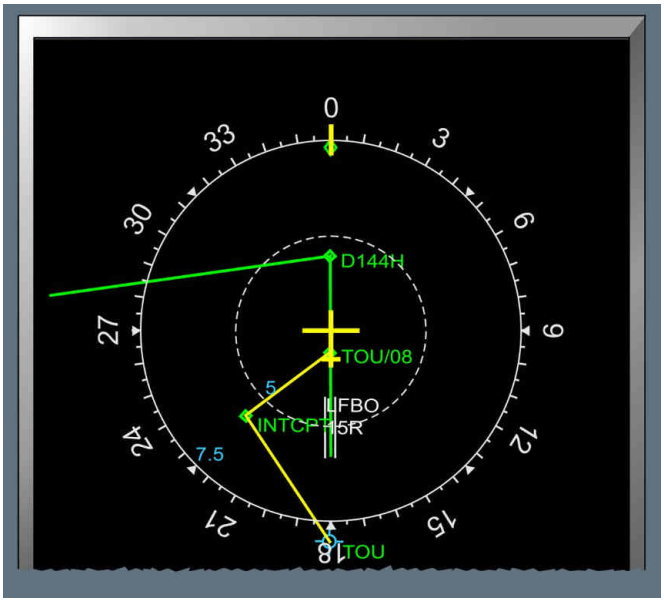
EO Before Diversion Point



ENGINE-OUT AFTER THE DIVERSION POINT

When an engine-out occurs after the diversion point, the FMS does not create a temporary flight plan. The EOSID is indicated by a yellow line on the ND, for information only.
If required, the flight crew can perform a direct to a waypoint of the EOSID, and adjusts the resulting flight plan afterwards.

EO After Diversion Point



ENGINE-OUT MAXIMUM FLIGHT LEVEL

Applicable to: ALL

In engine-out, the FMS computes the long range cruise maximum flight level, based on the current aircraft gross weight and temperature.

At this flight level, the aircraft:

- Can fly in level flight at the long range cruise (LRC) speed, with the operating engines in MCT, anti-ice OFF, and the failed engine(s) in wind milling
- Has a buffeting margin of 0.3 G.

The PERF page displays the EO maximum flight level in the upper right corner. (*Refer to Page*)

EO MAX



GREEN DOT DRIFT DOWN FLIGHT LEVEL

Applicable to: ALL

In engine-out, during the CRUISE $_{phase}$, the FMS computes the green dot drift down altitude.

The green dot drift down altitude is the maximum flight level where the aircraft can fly in level flight, at the green dot speed, with the operating engines in MCT.

L2 The FMS computes this flight level as follows: When the aircraft descents at the green dot speed, the drift down altitude is the altitude where the aircraft would reach the level-off.

L1 The CRZ panel of the PERF page displays the green dot drift down altitude. (*Refer to Page*)

Drift Down


ACTIVE/PERF
EO
CRZ FL 350
OPT ---
EO MAX FL 324
T.O
CLB
CRZ
DES
APPR
GA
CI 99
CRZ MODE EO-ECON
MODE
MACH
SPD
DRIFT DOWN TO FL 350
MANAGED EO-ECON
.84
280 KT
17:19
256 NM
MAX TURB
.79
280 KT
DEST WSSS 06:23 40.5 KLB
CMS
STEP ALTs
RETURN
ACTIVATE APPR
POS MONITOR
CLEAR EO
Green Dot
Drift Down
Flight Level

ENGINE-OUT IN TAKEOFF PHASE

Applicable to: ALL

BELOW THE THRUST REDUCTION ALTITUDE

When an engine failure occurs below the thrust reduction altitude:
- The speed target is the current aircraft speed, limited between V2 and V2+ 15 kt
- The FMS creates a temporary flight plan with the EOSID if the aircraft is before the EOSID diversion point, or displays the EOSID on the ND, for information only, if the aircraft is after the diversion point(*Refer to Engine-out SID*)
- The FMS displays the PERF page, with the EO maximum altitude in the upper right corner, and the CLR EO button on the bottom of the page (*Refer to PERF page*)

FLIGHT PLAN PREDICTIONS

The FMS does not compute the flight plan predictions until the aircraft reaches the acceleration altitude.

ABOVE THE THRUST REDUCTION ALTITUDE

When an engine failure occurs above the thrust reduction altitude:
- The speed target is the current aircraft speed, limited between V2 and V2+ 15 kt
- LVR MCT flashes on the FMA
- The ND displays the EOSID , for information only (*Refer to Engine-out SID*)
- The FMS displays the PERF page, with the EO maximum altitude in the upper right corner, and the CLR EO button on the bottom of the page. (*Refer to PERF page*)

FLIGHT PLAN PREDICTIONS

The FMS does not compute the flight plan predictions until the aircraft reaches the acceleration altitude.

ENGINE-OUT IN CLIMB PHASE

Applicable to: ALL

BELOW THE EO MAXIMUM FLIGHT LEVEL

When an engine failure occurs below the EO maximum flight level:

- And the aircraft is climbing (CLB , or OP CLB mode), the managed target speed is green dot (EO-GDOT)
  When the aircraft is in level flight (ALT , ALT* , ALT CST , or ALT CST* mode), the managed target speed is the engine-out long range cruise speed (EO-LRC), limited by the speed limit or speed constraint, if any.

  Note: *To avoid heavy thrust reduction, the target speed ramps down from the current speed to EO-GDOT (or EO-LRC) with 1 kt per second.*

- LVR MCT flashes on the FMA
- The FMS displays the PERF page, with the EO maximum flight level in the upper right corner, and the CLR EO button on the bottom of the page. (*Refer to PERF page*)
  The CLB panel of the PERF page displays the managed target speed (EO-GDOT, or EO-LRC).

FLIGHT PLAN PREDICTIONS

The FMS computes the flight plan predictions based on the EO-GDOT , or EO-LRC speed, and a cruising at Minimum(Cruise Flight Level, EO Maximum Flight Level).

ABOVE THE EO MAXIMUM FLIGHT LEVEL

When an engine failure occurs above the EO maximum flight level:

- The CLB mode, if engaged, reverts to OP CLB . (or V/S , with current vertical speed)

  Note: *The flight crew cannot arm nor engage the CLB mode above the EO maximum flight level.*

- When the aircraft is climbing (CLB , or OP CLB mode), the managed target speed is green dot (EO-GDOT),
  When the aircraft is in level flight (ALT , ALT* , ALT CST , or ALT CST* mode), the managed target speed does not change (However, the aircraft will decelerate due to engine performance).

  Note: *To avoid heavy thrust reduction, the target speed ramps down from the current speed to EO-GDOT with 1 kt per second.*

- LVR MCT flashes on the FMA,
- The FMS displays the PERF page, with the EO maximum flight level in the upper right corner, and the CLR EO button on the bottom of the page. (*Refer to PERF page*)
  The CLB panel of the PERF page displays the managed target speed (EO-GDOT).

FLIGHT PLAN PREDICTIONS

The FMS computes the flight plan predictions assuming an immediate level-off and deceleration to green dot, followed by a descent (at green dot speed and a minimum vertical speed of - 100 ft/min) to the EO maximum flight level, and a cruising at this flight level at the EO LRC speed.

ENGINE-OUT IN CRUISE PHASE

Applicable to: ALL

ENGINE-OUT IN CRUISE PHASE

When an engine failure occurs during the CRZ $_{phase}$ (and above the EO maximum flight level):

- The managed target speed does not change (However, the aircraft will decelerate due to engine performance),
  When the flight crew engages the OP DES mode, the managed speed target becomes EO-GDOT

  At or below the EO maximum flight level, the flight crew can choose between two target speeds representing two engine-out strategies:
  - EO-ECON: The managed target speed is based on the current cost index
  - EO-LRC: The managed target speed is based on an optimized cost index to ensure a minimum fuel consumption (long range).

  When the flight crew initiates a climb (and the aircraft is below the drift down flight level), the managed target speed is EO-GDOT.
- LVR MCT flashes on the FMA
- The FMS displays the PERF page, with the EO maximum flight level in the upper right corner, and the CLR EO button on the bottom of the page, *Refer to PERF page* .

  The CRZ panel of the PERF page displays:
  - The green dot drift down flight level
  - The managed target speed: EO-GDOT, EO-ECON, or EO-LRC.

FLIGHT PLAN PREDICTIONS

The FMS computes the flight plan predictions assuming a deceleration to green dot, followed by a descent (at green dot speed and a minimum vertical speed of - 100 ft/min) to the EO maximum flight level, and a cruising at this flight level at the EO-LRC speed.

ENGINE-OUT IN DESCENT PHASE

Applicable to: ALL

ENGINE-OUT IN DESCENT PHASE

When an engine failure occurs during the DES $_{phase}$:

- The managed speed target speed does not change
- The DES mode, if engaged, reverts to V/S (with the current vertical speed)

Note: The flight crew can keep the V/S mode, or can engage OP DES , as appropriate. Below the EO LRC maximum flight level, the flight crew can engage the DES mode again.

- LVR MCT flashes on the FMA
- The FMS displays the PERF page, with the EO maximum flight level in the upper right corner, and the CLR EO button on the bottom of the page, *Refer to PERF page* .

FLIGHT PLAN PREDICTIONS

The FMS computes the theoretical descent (and approach) path, based on a 3 (or 2) operative engines model.
If the engine failure occurs above the EO LRC maximum flight level, the FMS assumes that the OP DES mode is used until the EO LRC maximum flight level, and the DES mode below this altitude.

ENGINE-OUT IN GO-AROUND PHASE

Applicable to: ALL

ENGINE-OUT IN GO-AROUND PHASE

For an engine-out during the go-around phase, the computations and procedures of the TAKEOFF phase apply.
However, the ND does not display the EOSID.

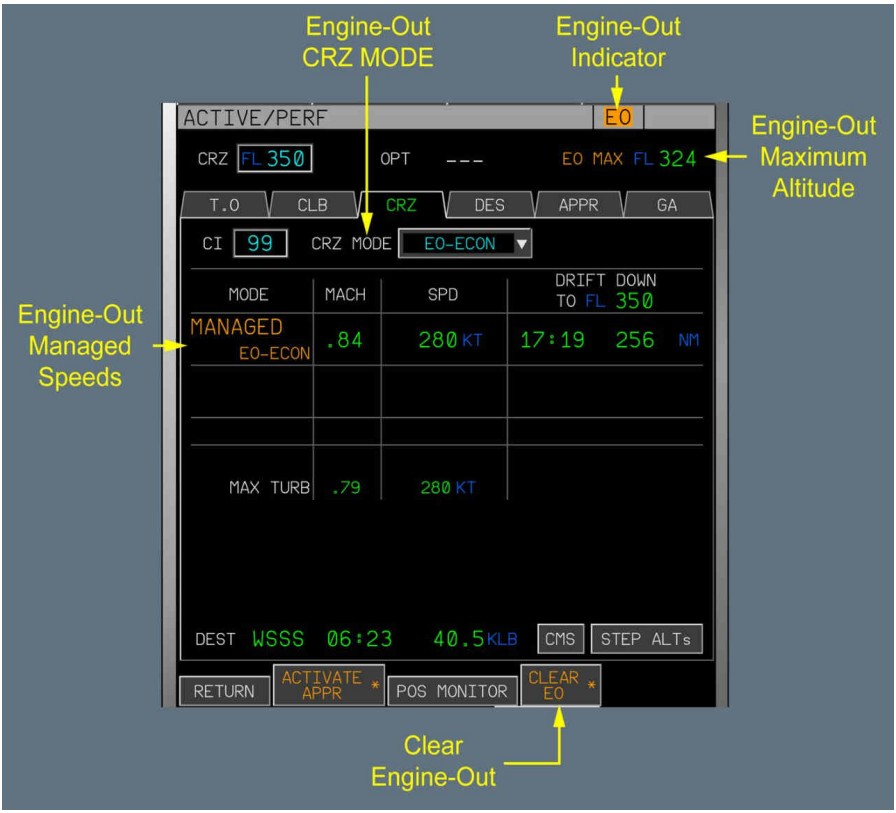
CONTROLS AND INDICATORS

Applicable to: ALL

ON THE MFD

In engine-out, the MFD page header displays EO in the upper right corner.
The PERF page displays the engine-out maximum altitude in the upper right corner, and the CLEAR EO button on the bottom of the page.
The CLB, and CRZ panel display the engine-out managed speeds (EO-GDOT , and EO-LRC), if applicable.

Engine-Out on MFD



ON THE ND

The ND displays the EOSID , as a part of the temporary flight plan if the engine-out occurs before the diversion point, or for information only (yellow line) if the engine-out occurs after the diversion point.

Refer to EOSID

ASSOCIATED MESSAGES

Applicable to: ALL

Refer to CHECK EO SPD SETTING

PRINT FUNCTIONS

Applicable to: ALL

The print function enables several types of data and reports to be printed either automatically or manually:

- Active flight plan data
- Flight plan reports
- Received uplinks.

ACTIVE F-PLN DATA

- Flight plan initialization data

```
================================================================
 FM ACTIVE FLIGHT PLAN INITIALIZATION DATA     DATE: 08 DEC 06
                                               TIME: 09:45

   FLT NUMBER : ----------          FROM/TO    : LFBO/LFBO
   CO RTE     : ----------          ALTN       : LFBD
   ALTN CO RTE: TLSBOD

 PRIMARY F-PLN
 -------------
   ATO : BOLSA,+15.0,---/------/-----

   DIR : KANIG
   DIR : N42000E002595
   DIR : OKETA
   DIR : BLO49,020-BL040,135
   DIR : SBD
   DIR : ALEPH

   ARV PRC: ASPE4T
   ARV PRC: ILS32L
   ARV RWY: 32L

 ALTN F-PLN
 ----------
   DEP PRC: LACO5A

   ARV PRC: MIRBA4

================================================================

================================================================
 FM ACTIVE FLIGHT PLAN INITIALIZATION DATA     DATE: 08 DEC 06
                                               TIME: 09:45

 PERFORMANCE DATA
 ----------------
  PERF FACTOR :  +0.0              COST INDEX :   258
  IDLE FACTOR :  +0.0
  CRZ ALT     : FL250              ZFWCG      :  33.0 %
  CRZ TEMP    :   ---              ZFW        : 300.0
  CRZ TRANS   :  5000              BLOCK      : 150.0
  TROPOPAUSE  : 36090              TAXI       :   1.5

================================================================
```

- Takeoff data

```
FM ACTIVE  TAKE-OFF  DATA                          DATE :  31  JUL  06
                                                   TIME :  19 : 56

  RUNWAY  FLBO- 14R- - - -
    TOW          :  350 . 3                 TO SHIFT     :  - - - - M
    TOCG         :   36 . 2 %               TO LIMIT     :  - - - - M
    STA          :  +14                     MAG WIND     :  - - - ' / - - -
    CONTAM       :  - - - - - - - - - -
    MAX  TO  - - - - - - - - - - - -
         TEMP :  - - -
         FLAP :  -
         THS  :   - - .- %
         V1   :  - - -
         VR   :  - - -
         V2   :  - - -

  THR RED ALT :   1990                        BARO         :  E1013
  ACC ALT     :   1990                NOISE  END  ALT  :  - - - -
  EO ACC ALT  :   1990                        NOISE SPD    :  - - - -
                                              NOISE THR    :  - - - -
```

- Wind data.

```
============================================================
 FM ACTIVE WIND DATA                          DATE: 20 JUN 07
                                              TIME: 13:47

 CRUISE WINDS
 ------------
     ALT:      FL180      FL210      FL280      FL310
      NPT    T, WIND    T, WIND    T. WIND    T. WIND   SAT/ALT
   KITAP    070'/008   152'/046   234'/034   303'/015   ---/---
   MIGMA    083'/015   178'/003   247'/041   316'/022   ---/---
   KIPOM    096'/022   178'/010   260'/048   329'/029   ---/---
   DEGNO    109'/029   191'/017   273'/005   342'/036   ---/---
   RAPMA    122'/036   204'/024   286'/012   355'/043   ---/---
   RESAL    135'/043   217'/031   299'/019   008'/050   ---/---
   KIA      148'/050   230'/038   212'/026   021'/007   ---/---
   VELOS    161'/050   243'/045   225'/033   034'/014   ---/---
   KUSRO    174'/014   256'/002   238'/040   047'/021   ---/---
   GAS      187'/021   269'/009   251'/047   060'/028   ---/---
   HIL      200'/028   282'/016   204'/004   073'/035   ---/---
   SOBAS    213'/035   295'/023   017'/011   086'/042   ---/---
   NABEK    226'/042   308'/030   030'/018   099'/049   ---/---

   ISKIA    139'/039   221'/027   290'/008   059'/039   ---/---
   PNZ      139'/039   221'/027   290'/008   059'/039   ---/---
   ROTUN    139'/039   221'/027   290'/008   059'/039   ---/---
   TURMO    139'/039   221'/027   290'/008   059'/039   ---/---
   POKAV    139'/039   221'/027   290'/008   059'/039   ---/---
   ROXAN    139'/039   221'/027   290'/008   059'/039   ---/---
   SUKUN    139'/039   221'/027   290'/008   059'/039   ---/---
   KOLOS    139'/039   221'/027   290'/008   059'/039   ---/---
   MOROB    139'/039   221'/027   290'/008   059'/039   ---/---
   ALG      139'/039   221'/027   290'/008   059'/039   ---/---
   RISGA    139'/039   221'/027   290'/008   059'/039   ---/---
   ARPAG    139'/039   221'/027   290'/008   059'/039   ---/---
   REKTO    139'/039   221'/027   290'/008   059'/039   ---/---
   NEMUR    139'/039   221'/027   290'/008   059'/039   ---/---
   LARAP    139'/039   221'/027   290'/008   059'/039   ---/---

 DEST DATA
 ------------
   ONH         : ---
   TEMP        : ---
   MAG WIND    : ---/---

   TRANS ALT  :5000

 ALTERNATE WIND
 --------------
============================================================
```

The flight crew can manually print the active flight plan data via the DATA/PRINTER page.

F-PLN REPORTS

- Active flight plan reports
  The flight crew can manually print the active flight plan reports (pre-flight, in-flight, post-flight) via the DATA/PRINTER page or select the automatic prints. The reports are then automatically printed at specific events:

  • Pre-flight report: At engine start

```
 ACTIVE PREFLIGHT REPORT                    DATE: 21 DEC 06
                                            TIME: 08:52

 A/C TYPE    : A380-800          DATABASE   : ABV0610001
 ENG TYPE    : TRENT 972         CYCLE      : 31 AUG-28 SEP

 FLT NUMBER : LS759V002          FROM/TO    : LFBO/LFBO
 CO RTE     : ----------         ALTN       : ----
 ALTN CO RTE: ----------         PAX NBR    :  48

 PERF FACTOR: +0.0               COST INDEX :  79
 IDLE FACTOR: +0.0

CRUISE FL/STEP START WPT
------------------------
 CRZ FL 1   : FL350

FLIGHT PLAN DATA
----------------
                : DIST     TIME      CRZ FL
 DEST-LFBO  : 3216     00:48     FL050
 ALTN-----  : ----     --:--     FL---

 DEP RWY    : 32L                ARV PRC    : BRIV4N
 DEP PRC    : GAI5B              ARV PRC    : VOR32L
                                 ARV RWY    : 32L

 WPT    TIME   SPD/ALT    FOB   T. WIND   TAS SAT  CRS  DIST
-------------------------------------------------------------
PREDICTED VALUES
LFB032L 00:00 127/  500   98.5   TL/017    0 +14  324     0
900     00:00 152/  900   98.5   TL/017  154 +13  324     1
TOU     00:02 220/ 2530   97.3   TL/017  228 +10  324     4
80VOR   00:47 154/ 1620   89.1   TL/017  157 +10  325     5
MD32L   00:48 149/  690   88.9   TL/017  157 +14  325     3
900     --:-- ---/-----   ---.-  ---'/---  --- ---  ---- ----
TOU     --:-- ---/-----   ---.-  ---'/---  --- ---  ---- ----
D305J   --:-- ---/-----   ---.-  ---'/---  --- ---  ---- ----
INTCPT  --:-- ---/-----   ---.-  ---'/---  --- ---  ---- ----
SULIT   --:-- ---/-----   ---.-  ---'/---  --- ---  ---- ----

FUEL PREDICTIONS
----------------
  TAXI       :   1.5              ZFWCG      :  33.0 %
  TRIP (DEST):  09.6              ZFW        : 350.0
  RSV        :   0.5              TOW        : 448.5
  ALTN       : ---.-              LW         : 438.9
  FINAL      :   6.5              CG         : 033.0 %
  EXTRA      :  82.0
  -----------------
  BLOCK      : 100.0


FUEL PREDICTIONS
----------------
  TAXI       :   1.5              ZFWCG      :  33.0 %
  TRIP (DEST):   9.6              ZFW        : 350.0
  RSV        :   0.5              TOW        : 448.5
  ALTN       : ---.-              LW         : 438.9
  FINAL      :   6.5              CG         : 033.0 %
  EXTRA      :  82.0
  -----------------
  BLOCK      : 100.0
```

  • In-flight: At transition to TAKEOFF

```
================================================================
 FM ACTIVE INFLIGHT REPORT                    DATE: 20 NOV 07
                                              TIME: 14:28

   A/C TYPE    : A380-800          DATABASE   : ABV0710001
   ENG TYPE    : TRENT 972         CYCLE      : 30 AUG-27 SEP

   FLT NUMBER : LS868              FROM/TO    : VABB/VABB
   CO RTE     : ----------        ALTN       : VIDP
   ALTN CO RTE: ----------         PAX NBR    : 300

   PERF FACTOR: +0.0               COST INDEX : 100
   IDLE FACTOR: +0.0

 CRUISE FL/STEP START WPT
 ------------------------
   CRZ FL 1    : FL---

 FLIGHT PLAN DATA
 ----------------
                 DIST      TIME      CRZ FL
   DEST-VABB   :   74      14:45     FL---
   ALTN-VADP   :  613      16:16     FL310

   DEP RWY     : 27                ARV PRC    : ------
   DEP PRC     : KABSO1            ARR PRC    : ILS27
                                   ARV RWY    : 27

  WPT     TIME    SPD/ALT     FOB   T. WIND    TAS SAT  CRS  DIST
 ----------------------------------------------------------------
 HISTORY VALUES
 VABB27  13:25 125/    30    51.0  359'/000   --- +15  269     0
 VAB04   13:27 191/ 3100     51.0  268'/001   200 +08  267     4
 INTCPT  13:29 251/FL070     51.0  271'/001   277 +01  136     5
 BBB10   13:30 250/FL070     51.0  137'/001   276 +01  182     7
 D1830   13:31 250/FL070     51.0  154'/001   276 +01  181     5
 KABSO   13:46 .81/FL330     51.0 2666'/002   469 -51  164   104
 GGO     14:01 .80/FL330     51.0  189'/002   468 -51  102   117
 UDULO   14:10 .80/FL330     51.0  150'/001   468 -51  345    61
 MABTA   14:16 .81/FL330     51.0  190'/001   468 -51  345    61
 ----------------------------------------------------------------
 CURRENT POSITIOP : N18-32.3/E073-00.7
         14;28 307/fl184     51.0  178'/001   399 -22  347     3

 PREDICTED VALUES
 E073    14:28 305/FL174     51.0  018'/017   391 -19  348     3
 BBB     14:34 250/FL098     50.0  016'/011   288 -04  347    30
 INTCPT  14:34 250/FL097     50.7  016'/011   288 -04  386     0
 OM27    14:36 250/FL071     50.5  015'/009   277 -01  090    10
 VABB27  14:45 136/    70    49.8  014'/003   137 +18  270     8
 2600    --:-- ---/-----  ---.-  ---'/---   --- ---  ----- -----
 BBB     --:-- ---/-----  ---.-  ---'/---   --- ---  ----- -----
 BBB     --:-- ---/-----  ---.-  ---'/---   --- ---  ----- -----

 FUEL INFORMATION AT 14:28
 -------------------
   WEIGHT      CG       FOB      RSV/RSV%      FINAL      EXTRA
    371.0     38.8%     51.0     --.-/--.-%      5.1       27.8

  FMS 1: FMC-A P/N STATUS                FMS 2: FMC-A P/N STATUS
  -----------------------                -----------------------
                        FMS SOFTWARE
```

- Post-flight: At engine shutdown.

```
============================================================
 FM ACTIVE POSTFLIGHT REPORT                  DATE: 20 JUN 07
                                              TIME: 15:57

   A/C TYPE    : A380-800          DATABASE   : ABV0706001
   ENG TYPE    : TRENT 972         CYCLE      : 07 JUN-05 JUL

   FLT NUMBER : ----------         FROM/TO    : VABB/VABB
   CO RTE     : ----------         ALTN       : ----
   ALTN CO RTE: ----------         PAX NBR    :   3

   PERF FACTOR: +0.0               COST INDEX : 999
   IDLE FACTOR: +0.0

 FLIGHT PLAN DATA
 ----------------
                 DIST      TIME      CRZ FL
   DEST-VABB   : ----      --:--     FL---
   ALTN-----   : ----      --:--     FL---

   DEP NWY     : 27                  ARV PRC    : ------
   DEP PRC     : BIMOLA              APR PRC    : ILS09
                                     ARV RWY    : 09

  WPT     TIME    SPD/ALT    FOB    T.WIND    TAS SAT  CRS  DIST
 ------------------------------------------------------------------
 HISTORY VALUES
 VABB27  15:02 132/   30  159.1  000'/000  --- +15  269     0
 1700    15:03 191/ 1770  158.2  290'/001  196 +11  268     2
 INTCPT  15:04 250/ 2720  157.7  269'/001  260 +09  318     2
 FI09    15:53 148/ 1500  146.0  257'/001  151 +12  088     5
 VABB09  15:54 150/   30  145.8  261'/000  150 +15  088     4
 ------------------------------------------------------------------

 FUEL AND TIME SUMMARY
 ---------------------
   START UP                        SHUT DOWN
      FUEL   : ---.-                  FUEL   : ---.-
      WEIGHT : ---.-                  WEIGHT : ---.-
      TIME   : 14-59                  TIME   : 15-56
      TO TIME: 15-02                  LDG TIME: 15-54

 IRS DATA AT: VABB09
 -------------------    IRS 1       IRS 2       IRS 3
   AVERAGE DRIFT     - --.- NM/H   --.- NM/H   --.- NM/H
   RESIDUAL GND SPD - 17.7 KTS     17.7 KTS    17.7 KTS

  FMS 1: FMC-A P/N STATUS                FMS 2: FMC-B P/N STATUS
  -----------------------                -----------------------
                       FMS SOFTWARE
  HNP50XAL01X8002                        HNP50XAL01X8002
                       NAV DATABASE
  ABV0706001                             ABV0706001
                    FM AIRLINE CONFIG
  HNP30XCD02X801V                        HNP30XCD02X801V
                    FM OPTIONS CONFIG
  HNP35XCD05X801X                        HNP35XCD05X801X
                       PERF DATABASE
  HNP59XCD06X8017                        HNP59XCD06X8017
                    MAG VAR DATABASE
  HNP5FXCD03X8005                        HNP5FXCD03X8005
```

- Secondary flight plan reports.
  The flight crew can manually print the secondary flight plan reports SEC 1(2)(3) via the DATA/PRINTER page or via the SEC INDEX page.

```
================================================================
FM SECONDARY 2 PREFLIGHT REPORT                DATE: 09 OCT 07
                                               TIME: 13:43

  A/C TYPE    : A380-800          DATABASE    : ABV0710001
  ENG TYPE    : TRENT 972         CYCLE       : 02 AUG-27 AUG

  FLT NUMBER : PRINT1             FROM/TO     : LFPG/KJFK
  CO RTE     : CDGJFK             ALTN        : ----
  ALTN CO RTE: ----------         PAX NBR     : ---

  PERF FACTOR: +0.0               COST INDEX : 357
  IDLE FACTOR: +0.0

CRUISE FL/STEP START WPT
------------------------
  CRZ FL 1    : FL380
  CRZ FL 2    : FL400/4830N

FLIGHT PLAN DATA
----------------
              : DIST      TIME       CRZ FL
  DEST-KJFK   : 3217      06:42      FL380
  ALTN-----   : ----      --:--      FL---

  DEP RWY     : ---                  ARV PRC     : ---
  DEP PRC     : -------              ARV PRC     : --------
                                     ARV RWY     : ---

 WPT     TIME    SPD/ALT     FOB    T. WIND    TAS SAT  CRS  DIST
----------------------------------------------------------------
PREDICTED VALUES
LGL     00:13 ---/  390    91.6   000'/000   494 -41  001    81
GALBO   00:17 .85/FL336    90.2   000'/000   493 -52  278    31
KOKOS   00:24 .86/FL380    88.4   000'/000   492 -57  278    57
BASTK   00:30 .86/FL380    87.1   000'/000   492 -57  276    51
BETUV   00:31 .86/FL380    86.9   000'/000   492 -57  276     7
RUSIB   00:34 .86/FL380    86.2   000'/000   492 -57  276    27
NERLA   00:38 .86/FL380    85.4   000'/000   492 -57  275    33
DEKOR   00:45 .86/FL380    84.0   000'/000   492 -57  274    51
MOSIS   00:51 .86/FL380    82.0   000'/000   492 -57  274    51
ALUTA   00:52 .86/FL380    82.4   000'/000   492 -57  274    11
TAKAS   00:55 .86/FL380    81.9   000'/000   492 -57  273    20
GUNSO   00:13 .86/FL380    78.1   000'/000   492 -57  273   149
DEDRA   01:28 .86/FL380    74.9   000'/000   493 -57  276   128
4820N   01:54 .86/FL380    69.7   000'/000   493 -57  262   208
4830N   01:43 .86/FL380    59.7   000'/000   493 -57  283   403
4840N   03:32 .86/FL400    49.8   000'/000   493 -57  287   403
4750N   04:22 .86/FL400    49.1   000'/000   493 -57  281   411
RO?PO   04:27 .86/FL400    39.1   000'/000   493 -57  279   411
TUSKY   05:53 .86/FL400    23.7   000'/000   494 -57  278    64
TUSKY   05:53 .86/FL400    23.0   000'/000   494 -57  277   642
PLYMM   06:14 .86/FL400    23.7   000'/000   494 -57  257   177
KJFK    06:42 136/   60    16.9   000'/000   136 -15  257   173

FUEL PREDICTIONS
----------------
  TAXI        :   1.5            ZFWCG       :  33.0 %
  TRIP (DEST):  81.6             ZFW         : 350.0
  RSV         :  04.1            TOW         : 422.0
  ALTN        : ---.-            LW          : 340.5
  FINAL       :   5.3            CG          : 033.0 %
  EXTRA       :   7.5
  ------------------
  BLOCK       : 100.0
```

RECEIVED UPLINKS

- From the company ground station: Flight plan initialization data, Takeoff data and Wind data

```
================================================================
 FM AOC UPLINK TAKE-OFF DATA                    DATE  31 JUL 06
                                                TIME: 18:59

   RUNWAY LFBO-14R----
     TOW       : 357.6              TO SHIFT :   305 M
     TOCG      :  36.2 %            TO LIMIT : ----- M
     SAT       : ---                TO WIND  : 250'/015
     CONTAM    : DRY
     MAX  TO ------------           FLEX TO ------------
         TEMP  : +30                    FLX  : ---
         FLAP  : -                      FLAP : -
         THS   :  --.- %                THS  : ---.- %
         V1    : 129                    V1   : ---
         VR    : 133                    VR   : ---
         V2    : 135                    V2   : ---

   THR RED ALT: -----              BARO      : -----
   ACC ALT    : -----           NOISE END ALT : -----
   EO ACC ALT : -----               NOISE SPD : -----
                                    NOISE THR : -----

================================================================
```

```
================================================================
  FM AOC UPLINK WIND DATA                          DATE  31 JUL 06
                                                   TIME: 18:14

  CLIMB WINDS
  -----------
     T. WIND/ALT
    230'/032/FL150
    028'/020/FL190
    128'/045/FL230
    125'/014/FL260
    240'/025/FL350

  CRUISE WINDS
  ------------
      ALT:      FL150      FL180      FL250      FL320
      WPT:    T. WIND    T. WIND    T. WIND    T. WIND   SAT/ALT

  DESCENT WINDS
  -------------
     T. WIND/ALT
    254'/025/FL350
    187'/014/FL260
    145'/045/FL230
    025'/020/FL190
    231'/032/FL150

  DEST DATA
  ---------
    QNH          : ----
    TEMP         : ---'
    MAG WIND     : ---'/---

    TRANS ALT    : -----

================================================================
```

- From the ATC center: Flight plan initialization data.

The received data are automatically printed at reception.

CONTROLS AND INDICATORS

On the DATA/PRINTER page, the flight crew can:
- Start the manual printing of active flight plan data and secondary flight plan reports
- Configure the automatic printing of company data and active flight plan reports.

For more information, *Refer to DATA/PRINTER page.*
On the SEC INDEX page, the flight crew can manually print the secondary flight plan data for SEC1(2)(3).

For more information, *Refer to SEC INDEX page.*

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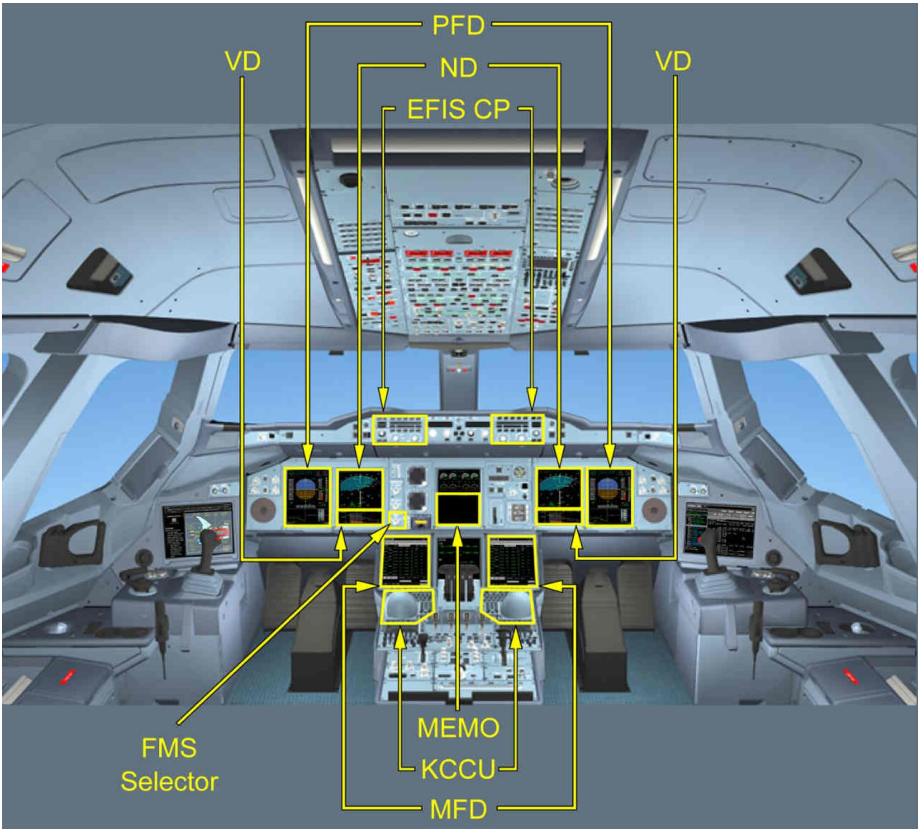
COCKPIT VIEW - FMS CONTROLS AND INDICATORS

Applicable to: ALL

FMS Controls and Indicators



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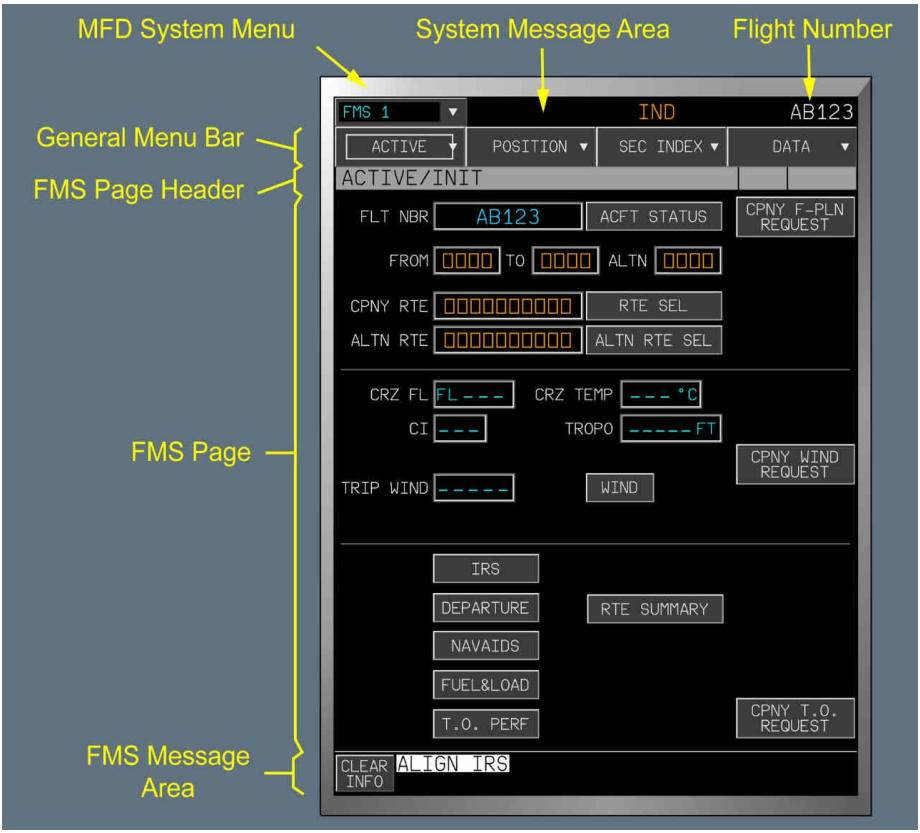
MFD - OVERVIEW

Applicable to: ALL

Multi Function Display (MFD)



Refer to Cockpit View

There are two Multi Function Displays (MFD s): One for the Captain (CAPT) and one for the First Officer (F/O).

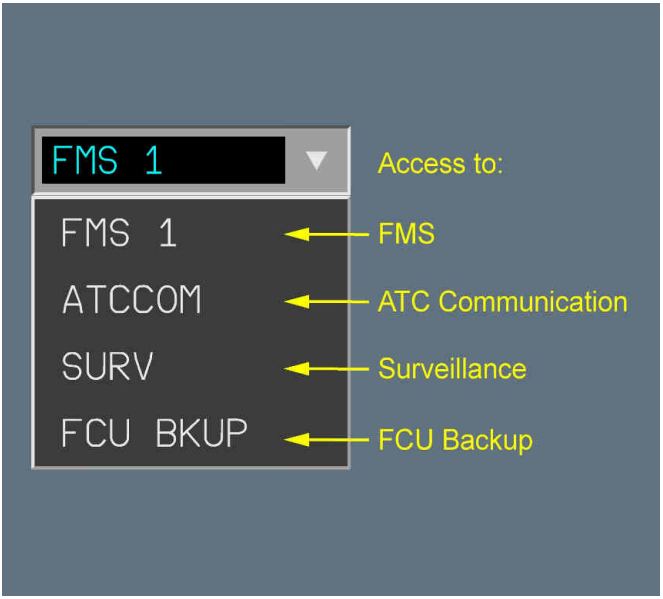
The Multi Function Display (MFD) displays the FMS textual data, on 50 FMS pages.

The MFD is interactive: The flight crew can navigate through the FMS pages, and can consult, enter or modify the data via the KCCU . (*Refer to KCCU*)

L2 In addition to the FMS data, the MFD also displays:
- The ATC Communication pages (ATC COM)
- The surveillance pages (SURV)
- The FCU backup pages (FCU BKUP).

MFD SYSTEM MENU

MFD System Menu



Indicates the system identifier that is actually displaying data on the MFD .
The menu list displays all systems that can display data on the MFD :

FMS

Gives access to the FMS pages.
The identifier is different on the captain's side and first officers's side, and depends on which FMC is providing data for display on the MFD .
Refer to Abnormal Operations
Refer to FMS Selector
On the captain's side:

FMS 1	Normal configuration: FMC -A provides data for FMS 1.
FMS 1-C	Abnormal configuration: FMC -C provides data for FMS 1.
FMS 2	Abnormal Configuration: The flight crew has selected BOTH ON 2 on the FMS Source Select Switch. FMC -B provides data for FMS 2, and the data from side 2 is displayed on side 1.
FMS 2-C	Abnormal Configuration: The flight crew has selected BOTH ON 2 on the FMS Source Select Switch. FMC -C provides data for FMS 2, and the data from side 2 is displayed on side 1.

On the first officer's side:

FMS 2	Normal configuration: FMC -B provides data for FMS 1.
FMS 2-C	Abnormal configuration: FMC -C provides data for FMS 2.
FMS 1	Abnormal Configuration: The flight crew has selected BOTH ON 1 on the FMS Source Select Switch. FMC -A provides data for FMS 1, and the data from side 1 is displayed on side 2.
FMS 1-C	Abnormal Configuration: The flight crew has selected BOTH ON 1 on the FMS Source Select Switch. FMC -C provides data for FMS 1, and the data from side 1 is displayed on side 2.

ATC COM

Gives access to the ATC communication pages.
Refer to ATCCOM Pages Overview

SURV

Gives access to the surveillance pages.
Refer to SURV Pages Overview

FCU BKUP

Gives access to the FCU backup pages.
Refer to FCU Backup Pages Overview

SYSTEM MESSAGE AREA

The System Message Area displays three different messages to get the attention of the flight crew on an FMS or ATCCOM event, when the MFD actually not displays the FMS, or ATCCOM pages:

- NEW ATIS RECEIVED:
  Indicates that a new ATIS report is received, and the MFD displays an application other than ATCCOM. This message is removed when the flight crew accesses an ATCCOM page.
- ATIS SYS MSG:
  Indicates that a ATIS FSM message is received, and the MFD displays an application other than ATC COM. This message is removed when the flight crew accesses an ATC COM page.
- CHECK FMS MESSAGE:
  Indicates that an amber FMS message is pending, and the MFD displays an application other than FMS. This message is removed when the flight crew accesses an FMS page.

FLIGHT NUMBER

Indicates the flight number that the flight crew has entered on the ACTIVE / INIT page. (*Refer to Page*)

L2 The Control and Display System (CDS) manages the display of the flight number.

GENERAL MENU BAR

General Menu Bar



The general menu bar gives the flight crew access to the main FMS pages.
The main FMS pages are divided into 4 groups, represented by the 4 menus of the general menu bar: ACTIVE, POSITION, SEC , and DATA.

Note: - *The pages that are not in one of the menus of the general menu bar, are pages of a second level in the page hierarchy. They are accessed via the main pages. (example: the F-PLN page is a main FMS page, the OFFSET page is not a main FMS page and is accessed via the F-PLN page).*
- *A rectangle around the menu name indicates that the displayed page belongs to this menu.*

ACTIVE MENU

Active Menu



The ACTIVE menu groups the active flight plan pages:
- ACTIVE / F-PLN (*Refer to Page*)
- ACTIVE / PERF (*Refer to Page*)
- ACTIVE / FUEL&LOAD (*Refer to Page*)
- ACTIVE / WIND (*Refer to Page*)
- ACTIVE / INIT (*Refer to Page*)

POSITION MENU

Position Menu



The POSITION menu groups the pages related to the FMS aircraft position:

- POSITION / MONITOR (*Refer to Page*)
- POSITION / REPORT (*Refer to Page*)
- POSITION / NAVAIDS (*Refer to Page*)
- POSITION / IRS (*Refer to Page*)
- POSITION / GPS (*Refer to Page*)

SEC INDEX MENU

SEC Menu

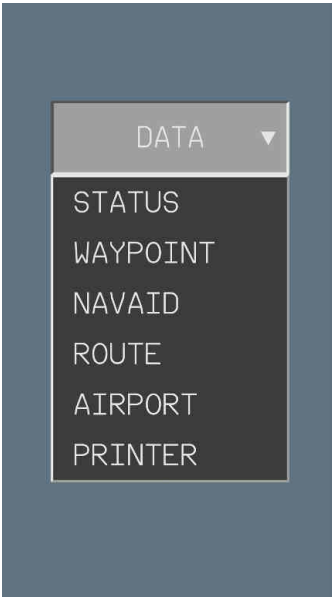


The SEC INDEX menu groups the three secondary flight plans:
- SEC 1
- SEC 2
- SEC 3

Selecting SEC 1(2)(3) displays the SEC INDEX page with the SEC 1(2)(3) panel opened. (*Refer to SEC INDEX page*)

DATA MENU

DATA Menu

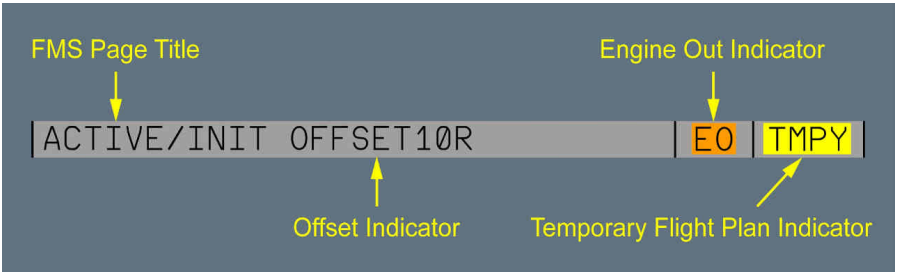


The DATA menu groups the pages related to the database, the aircraft status, and printer configuration.

- STATUS (*Refer to Page*)
- DATA / WAYPOINT (*Refer to Page*)
- DATA / NAVAID (*Refer to Page*)
- DATA / ROUTE (*Refer to Page*)
- DATA / AIRPORT (*Refer to Page*)
- PRINTER (*Refer to Page*)

FMS PAGE HEADER

FMS Page Header



FMS PAGE TITLE

Indicates the title of the FMS page.
The page title contains the different levels of the page hierarchy, separated with a slash.

OFFSET INDICATOR

When the aircraft is currently flying an offset, the header displays OFFSET NNX, where NN is the lateral offset distance, and X is the offset side (example: OFFSET 10R).

ENGINE OUT INDICATOR

When the FMS engine out mode is currently active, the header displays EO .
Refer to Engine-Out

TEMPORARY FLIGHT PLAN INDICATOR

When the FMS displays a page that is related to the active or secondary flight plan (F-PLN + revisions pages, INIT, FUEL&LOAD, PERF, WIND, and SEC INDEX), the header displays TMPY when a temporary flight plan is pending.
Refer to Temporary Flight Plan

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FMS PAGES - INDEX

Applicable to: ALL

The FMS pages are sorted in alphabetical order:

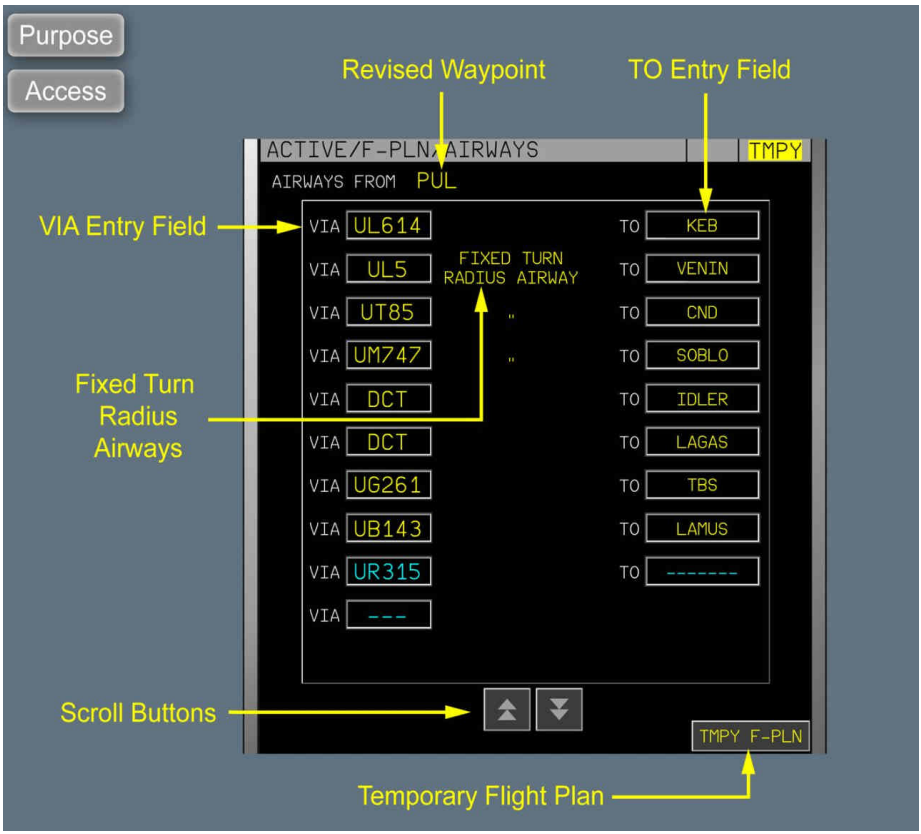
Refer to AIRWAYS page
Refer to ALTERNATE page
Refer to ARRIVAL page
Refer to CLOSEST AIRPORTS page
Refer to COMPANY F-PLN REPORT page
Refer to COMPANY F-PLN REQUEST page
Refer to COMPANY T.O DATA REQUEST page
Refer to COMPANY WIND DATA REQUEST page
Refer to DATA / AIRPORT page
Refer to DATA / NAVAID page
Refer to DATA / ROUTE page
Refer to DATA / WAYPOINT page
Refer to DEPARTURE page
Refer to DIRECT TO page
Refer to DUPLICATE NAMES page
Refer to EQUI-TIME POINT page
Refer to FIX INFO page
Refer to F-PLN page
Refer to FUEL and LOAD page
Refer to HOLD page
Refer to INIT page
Refer to MESSAGES LIST page
Refer to LL XING - TIME MKR page
Refer to OFFSET page
Refer to PERF page
Refer to POSITION / GPS page
Refer to POSITION / IRS page
Refer to POSITION / MONITOR page
Refer to POSITION / NAVAIDS page
Refer to POSITION / REPORT page
Refer to PRINTER page
Refer to RECEIVED COMPANY T.O DATA page
Refer to REJECTED ATC INFO page
Refer to ROUTE SELECTION page
Refer to SEC INDEX page
Refer to STATUS page

Refer to TRANSFER TO MAILBOX page
Refer to VERT REV page
Refer to WIND page

AIRWAYS PAGE

Applicable to: ALL

AIRWAYS Page



PURPOSE

The AIRWAYS page enables the flight crew to insert up to 31 airway segments, or waypoints in the flight plan, starting from the revised waypoint.
The AIRWAYS page is available for the active and secondary flight plans.

LINKS

LINKS *Refer to AIRWAYS Revision*

ACCESS

The flight crew can access the AIRWAYS page via the F-PLN page, by selecting the AIRWAYS revision in the waypoint revisions menu.

F-PLN Page



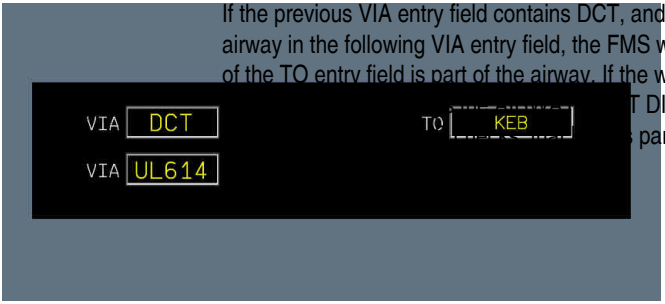
REVISED WAYPOINT

The revised waypoint is the waypoint from which the flight crew has selected the AIRWAYS revision.

VIA ENTRY FIELD

Indicates the ident of the airway, or DCT .
The flight crew can enter an airway, or DCT in the VIA entry field.

DCT creates a Direct To between the previous waypoint, and the following waypoint.



If the previous VIA entry field contains DCT, and the flight crew enters an airway in the following VIA entry field, the FMS will check that the waypoint of the TO entry field is part of the airway. If the waypoint is not part of the T DISAGREE message.
part of the UL616 airways.

ENTRY FORMAT

Refer to AIRWAY (VIA) Entry Format

TO ENTRY FIELD

Indicates the end waypoint of the airway segment, or a waypoint.

WHEN THERE ARE TWO CONSECUTIVE AIRWAYS BETWEEN THE TO ENTRY FIELDS

When the flight crew enters the ident of two airways in two consecutive VIA entry fields, the TO entry field displays the common waypoint of both airways.

L2 If the two entered airways do not have a common waypoint in the navigation database, the FMS creates a latitude/longitude waypoint at the geographic intersection of the airways. The ident of this waypoint starts with an “X” and is followed by the ident of the second airway (e.g. XUB4).

L1 The flight crew can also manually enter or change the end waypoint.

WHEN THERE IS NO AIRWAY BEFORE THE TO ENTRY FIELD

In this case, the VIA entry field, that is before the TO entry field, is empty, or has DCT.
The flight crew can enter a waypoint in the TO entry field. In this case, if the VIA entry field, that is before the TO waypoint is empty, this VIA entry field automatically displays DCT.

ENTRY FORMAT

Refer to WAYPOINT Entry Format

SCROLL BUTTONS

The flight crew uses the Scroll down (up) button to move, page by page, downwards (upwards) through the airway segments list.

FIXED TURN RADIUS AIRWAY

Indicates that the flight crew has inserted a fixed turn radius airway.

L2 A fixed turn radius airway has a constant turn radius defined for one or more waypoints.

TEMPORARY FLIGHT PLAN BUTTON

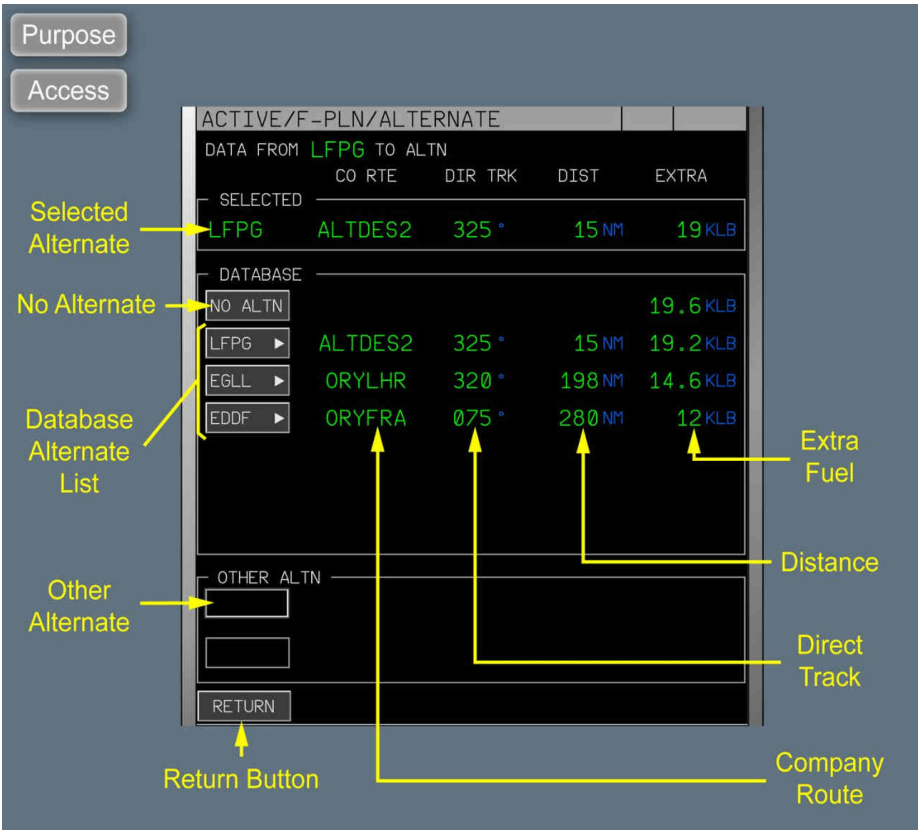
When clicked, displays the ACTIVE / F-PLN page. (*Refer to Page*)

L2 The Temporary Flight Plan button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the Return button is displayed: Clicking on the Return button, displays the F-PLN page.

ALTERNATE PAGE

Applicable to: ALL

ALTERNATE Page



PURPOSE

On the ALTERNATE page, the flight crew can:

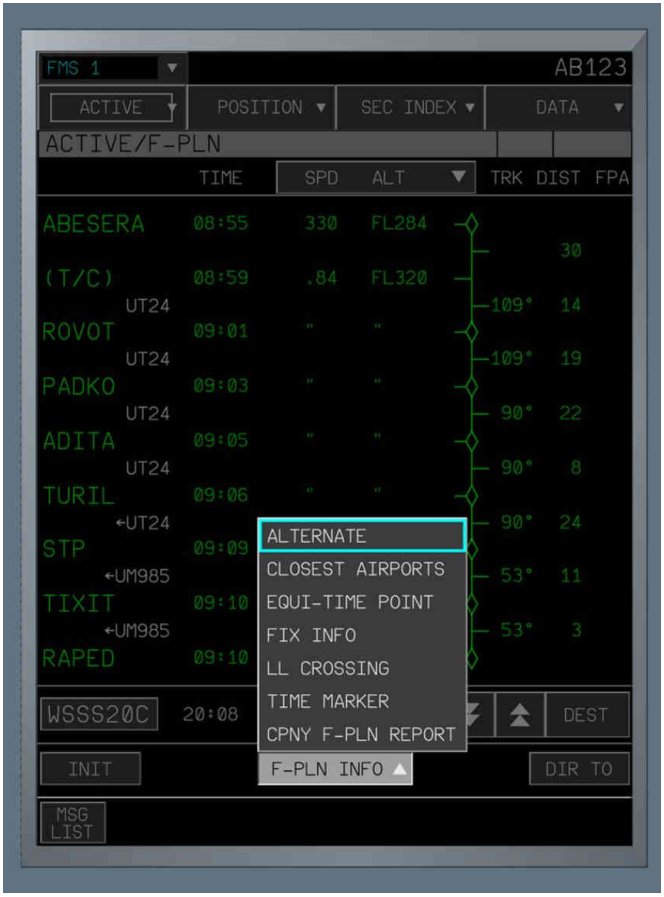
- Access and compare the different alternate airports and their associated predictions (i.e. company route, direct track, distance, extra fuel)
- Enter any other airport (different from the navigation database alternate airports), and access and compare their associated predictions
- Select any airport displayed on this page as the alternate destination.

LINKS

Refer to ALTERNATE Revision

ACCESS

The flight crew can access the ALTERNATE page via the F-PLN page by selecting ALTERNATE in the F-PLN INFO menu.



SELECTED ALTERNATE

Indicates the selected alternate airport and the associated information (i.e. alternate company route, direct track and distance from the primary to the alternate destination, and the extra fuel at the alternate destination).

Note: *The distance from the primary to the alternate destination is the distance along the alternate company route, or the direct distance if there is no alternate company route.*

NO ALTN BUTTON

When clicked, the FMS creates a temporary flight plan without an alternate destination.
For this option, the FMS computes and displays the extra fuel at the primary destination.

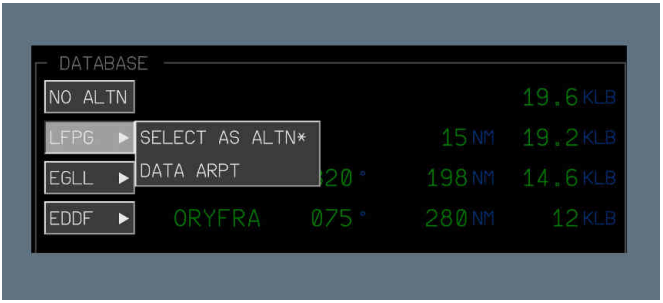
DATABASE ALTERNATE LIST

Indicates all the alternate airports that are stored in the navigation database (a maximum of 6). Also indicates for each alternate airport the alternate company route (if there is one), the direct track and distance from the primary to alternate destination, and the extra fuel at the alternate destination.

Note: *The distance from the primary to the alternate destination is the distance along the alternate company route, or the direct distance, if there is no alternate company route.*

When the airport ident is clicked, the airport ident menu displays the following options:

Airport Ident Menu



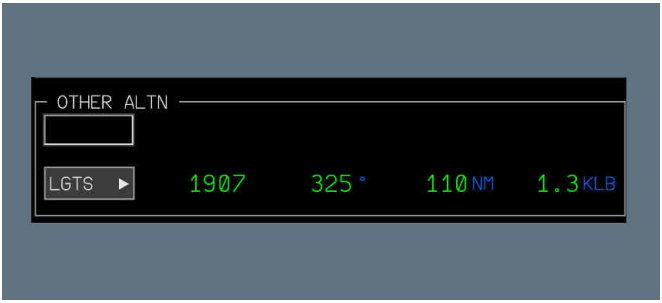
- SELECT AS ALTN: Selects the associated airport as the new alternate destination and creates a temporary flight plan
- DATA AIRPORT: Displays the DATA/AIRPORT page with additional information on the alternate airport, *Refer to Page* .

OTHER ALTN ENTRY FIELD

The flight crew may enter any airport in the entry field.
The FMS computes and displays the following for the entered airport: The alternate company route (if there is one), the direct track and distance from primary to alternate destination, and the extra fuel at the alternate destination.

Note: *The distance from the primary to the alternate destination is the distance along the alternate company route, or the direct distance, if there is no alternate company route.*

OTHER ALTN Entry Field



When the airport ident is clicked, a menu displays the following options:

OTHER ALTN Menu



- SELECT AS ALTN: Selects the associated airport as the new alternate destination and creates a temporary flight plan
- DATA AIRPORT: Displays the DATA/AIRPORT page with additional information on the airport, *Refer to Page*
- RTE SELECTION: Displays the ROUTE SELECTION page which enables the flight crew to select a company route, if there is one, *Refer to Page* .

CO RTE

Indicates the alternate company route.

DIR TRK

Indicates the direct track from the destination airport to the alternate airport.

DIST

Indicates the distance between the primary airport and the alternate destination, along the alternate company route, if there is one, or the direct distance, if there is no alternate company route.

EXTRA

Indicates the extra fuel at the alternate airport.

Note: - *The extra fuel for the NO ALTN option is the extra fuel at the primary destination.*
- *The extra fuel for all the alternate airports is dashed if the flight crew enters a MIN FUEL AT DEST on the FUEL&LOAD page.*

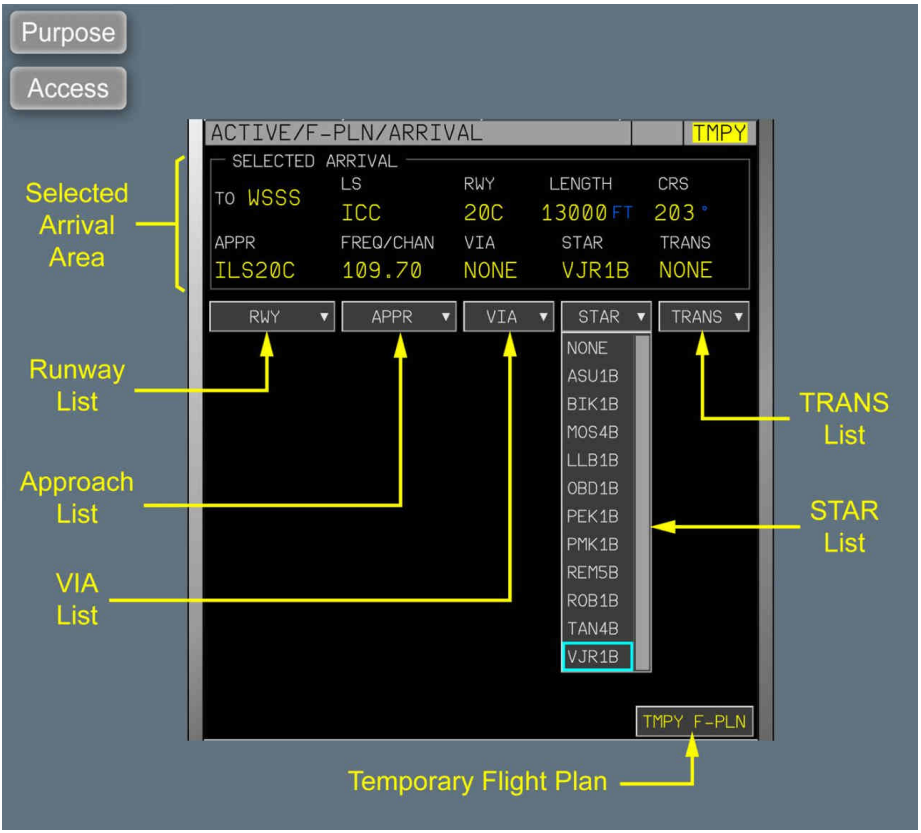
RETURN BUTTON

When clicked, displays the F-PLN page, *Refer to Page* .

ARRIVAL PAGE

Applicable to: ALL

ARRIVAL Page



PURPOSE

The ARRIVAL page enables the flight crew to insert or change the arrival procedure.
The ARRIVAL page is available for the active and secondary flight plans.

LINKS

Refer to ARRIVAL Revision

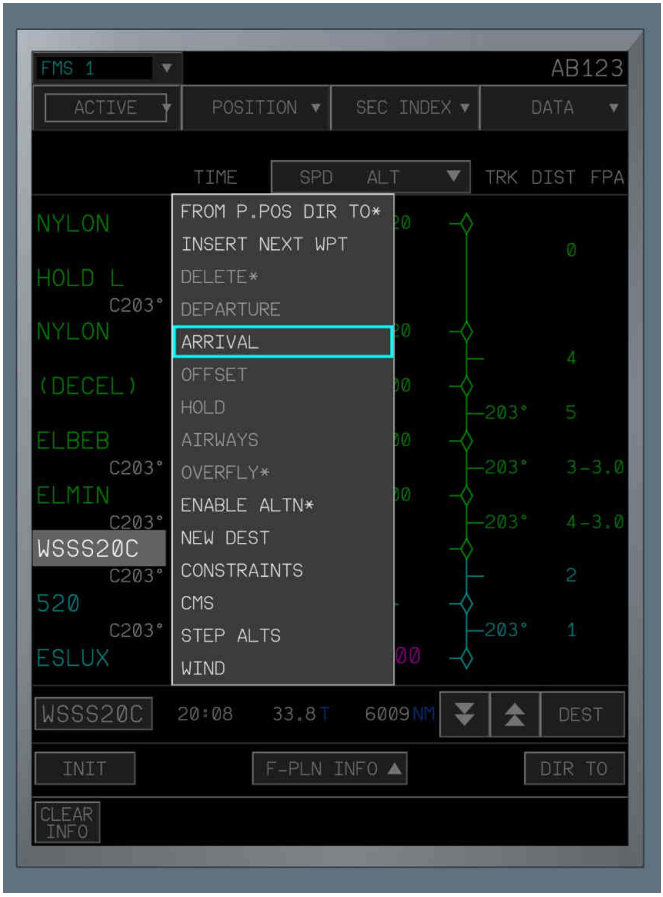
ACCESS

The flight crew can access the ARRIVAL page via the F-PLN page, by:

- Clicking directly on the destination airport

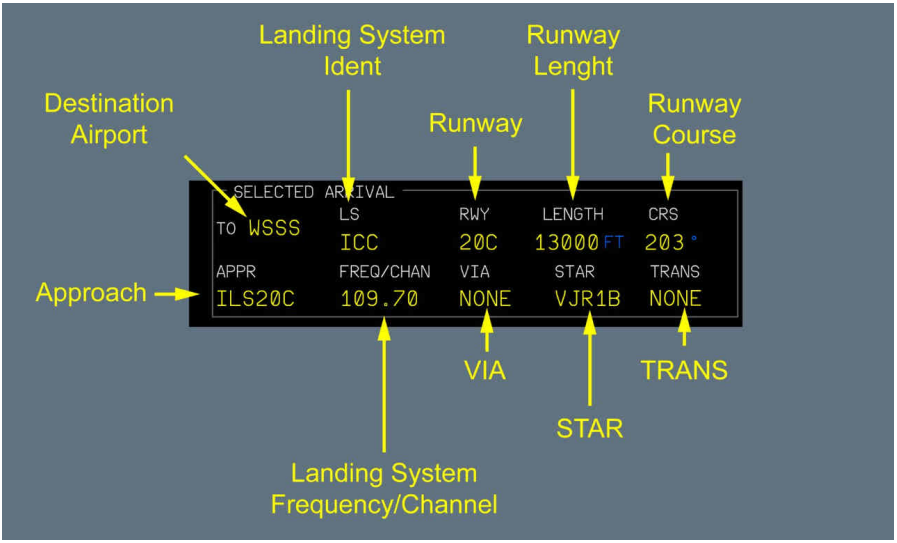


- Selecting the ARRIVAL revision in the waypoint revisions menu of the primary(alternate) destination.


FMS 1
AB123
ACTIVE
POSITION
SEC INDEX
DATA
TIME
SPD ALT
TRK DIST FPA
NYLON
HOLD L
C203°
NYLON
(DECEL)
ELBEB
C203°
ELMIN
C203°
WSSS20C
C203°
520
C203°
ESLUX
FROM P.POS DIR TO*
INSERT NEXT WPT
DELETE*
DEPARTURE
ARRIVAL
OFFSET
HOLD
AIRWAYS
OVERFLY*
ENABLE ALTN*
NEW DEST
CONSTRAINTS
CMS
STEP ALTS
WIND
0
4
203° 5
203° 3-3.0
203° 4-3.0
2
203° 1
WSSS20C
20:08
33.8T
6009NM
DEST
INIT
F-PLN INFO
DIR TO
CLEAR
INFO

SELECTED ARRIVAL AREA

Selected Arrival Area



This area displays the selected arrival procedure parameters.

L2 The information appears in green, if it is part of the active flight plan. It appears in yellow, if the flight crew created a temporary flight plan, by selecting or changing the arrival procedure.

Note: If a temporary flight plan exists, and was created by a revision other than the arrival procedure revision, the information is displayed in green.

The arrival information is displayed in white for the secondary flight plans.

L1 All fields, except the destination airport, display dashes if the flight crew did not make any selection.

TO

Indicates the current destination airport of the primary, or alternate, flight plan.

RWY

Indicates the runway of the selected approach.

LENGTH

Indicates the navigation database runway length (in meters or feet) of the selected arrival runway.

CRS

Indicates the navigation database runway course (in degrees °) of the selected arrival runway.

APPR

Indicates the approach selected by the flight crew in the APPROACH list.

LS

Indicates the ident of the landing system of the selected approach.

LANDING SYSTEM FREQUENCY(CHANNEL)

Indicates the frequency(channel) of the landing system of the selected approach.

VIA

Indicates the VIA, selected by the flight crew from the VIA list.

STAR

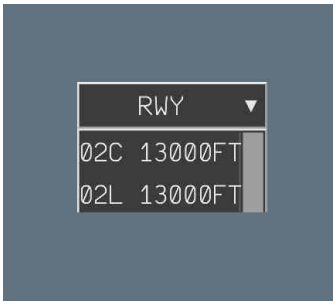
Indicates the STAR, selected by the flight crew from the STAR list.

TRANS

Indicates the TRANS, selected by the flight crew from the TRANS list.

RWY LIST

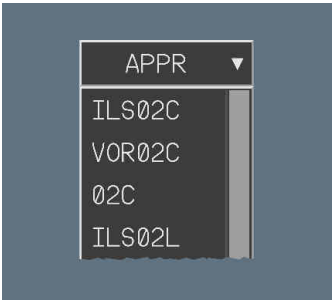
Runway List



Displays all runways that are compatible with the current destination airport, and their associated length.
When the flight crew selects a runway, the FMS creates or updates a temporary flight plan with a default leg of 5 nm on the axis of the selected runway, and completes the runway, runway length and runway course fields in the selected arrival area.

APPR LIST

Approach List



Displays all the approaches that are compatible with the current destination airport. The approaches are sorted by runway. The last option of each group of approaches, associated to one runway, is the runway itself (e.g. 02C).

L3 If the aircraft does not have an ADF receiver, the NDB approaches are not part of the list.

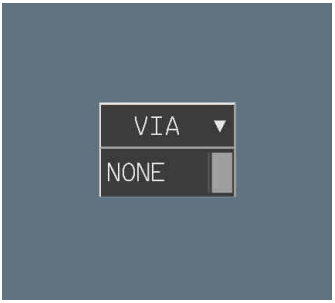
L2 *Note: When the flight crew selects the runway (e.g. 02C), a default leg of 5 nm in the runway axis is created.*

L1 When the flight crew selects an approach, the FMS creates(updates) a temporary flight plan, and completes(updates) the following fields in the selected arrival area:

- The approach
- The landing system
- The landing system frequency/channel
- The runway
- The runway length
- The runway course.

VIA LIST

VIA List



Displays all VIAs that are compatible with the selected approach and STAR. If no STAR is selected, the list displays all VIA that are compatible with the selected approach.

L2 *Note: The flight crew can only open the VIA list if an approach is selected.*

L1 The first option in the VIA list is NONE.

L2 *Note: The NONE option is selected automatically when the flight crew selects an approach and STAR, and there is no compatible VIA.*

L1 When the flight crew selects a VIA, or the NONE option, the FMS creates(updates) a temporary flight plan and completes(updates) the VIA field in the selected arrival area.

STAR LIST

STAR List



Displays all STARs that are compatible with the selected approach.

L2 Note: *The flight crew can only open the STAR list if an approach is selected.*

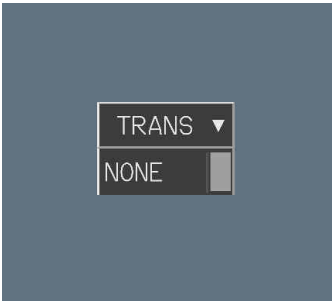
L1 The first option in the STAR list is NONE.

L2 Note: *The NONE option is selected automatically, when the flight crew selects an approach, and no STAR is available.*

L1 When the flight crew selects a STAR, or the NONE option, the FMS creates(updates) a temporary flight plan, and completes(updates) the STAR field in the selected arrival area.

TRANS LIST

TRANS List



Displays all TRANS that are compatible with the selected STAR.

L2 Note: *The flight crew can only open the TRANS list if a STAR is selected.*

L1 The first option in the TRANS list is NONE.

L2 Note: *The NONE option is selected automatically, when the flight crew selects a STAR, and no TRANS is available.*

L1 When the flight crew selects a TRANS, or the NONE option, the FMS creates(updates) a temporary flight plan, and completes(updates) the TRANS field in the selected arrival area.

TMPY F-PLN BUTTON

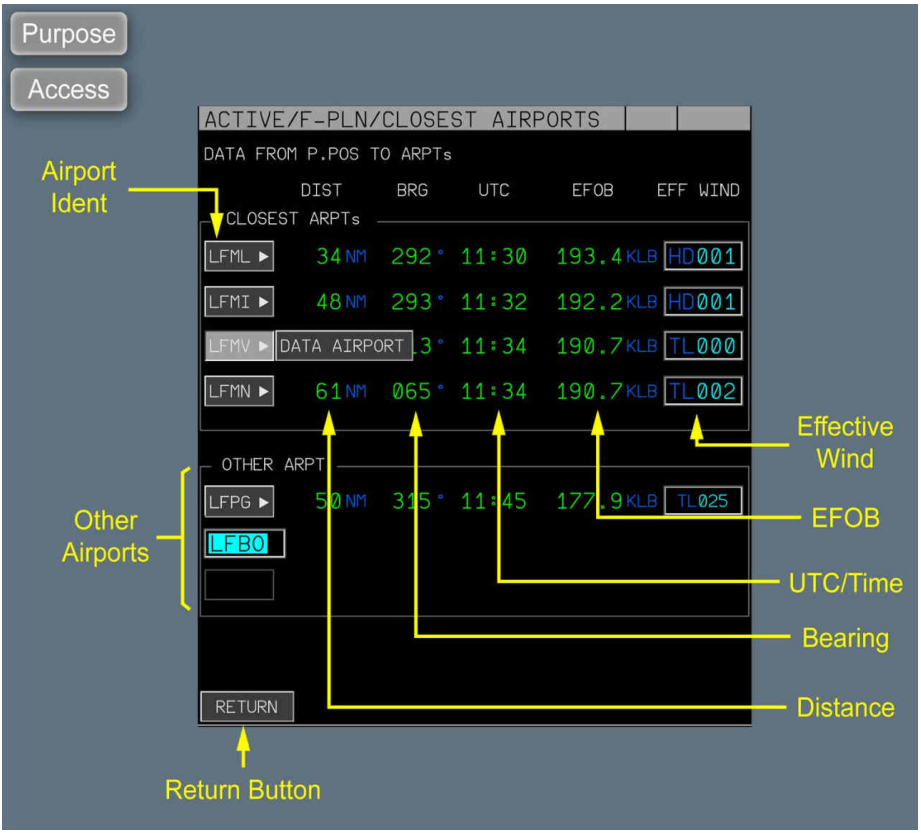
When clicked, displays the ACTIVE/F-PLN page, *Refer to Page* .

L2 The TMPY F-PLN button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the RETURN button is displayed in the bottom left corner of the page. When the flight crew clicks on the RETURN button, the F-PLN page appears.

CLOSEST AIRPORTS PAGE

Applicable to: ALL

CLOSEST AIRPORTS Page



PURPOSE

On the CLOSEST AIRPORTS page, the flight crew can:

- Access the four closest airports and their associated data (i.e. distance, bearing, UTC and EFOB).

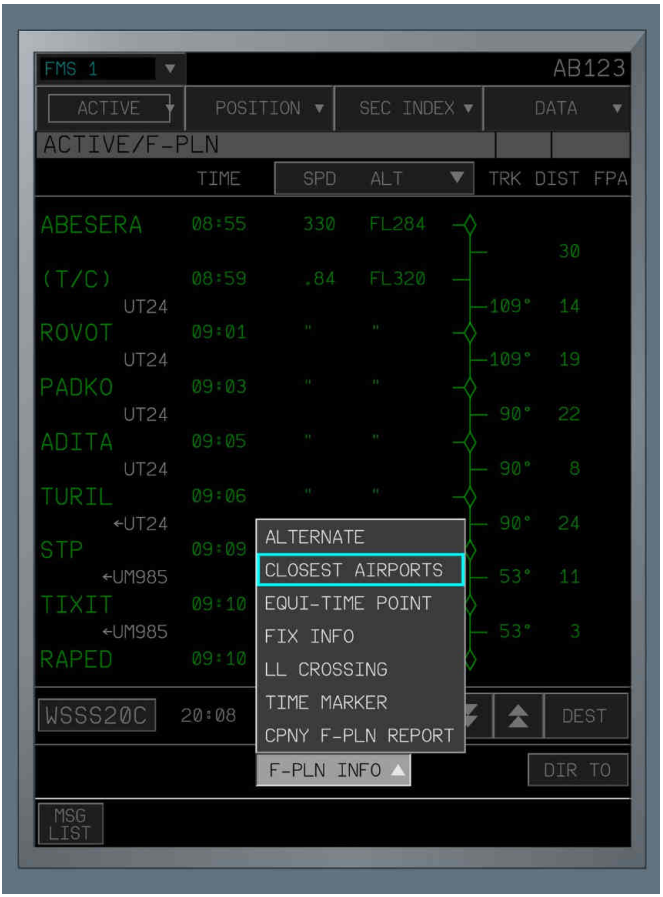
L2 The airports are ranked in increasing order of distance from the current aircraft position.

L1 - Compute the same data for the three other desired airports.

ACCESS

The flight crew can access the CLOSEST AIRPORT page via the ACTIVE/F-PLN page by selecting CLOSEST AIRPORTS in the F-PLN INFO menu.

ACTIVE/F-PLN Page

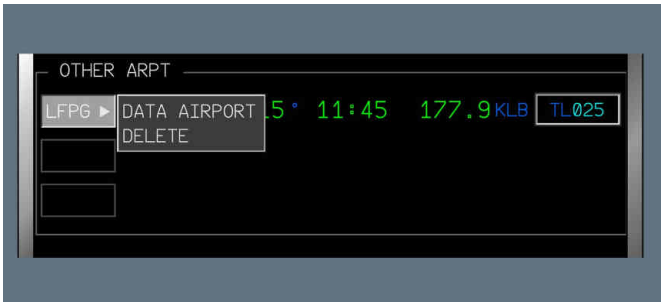


OTHER ARPT

The flight crew can manually enter up to three airport idents in order to compute the associated distance, bearing, UTC and EFOB predictions.

The flight crew can then compare these data with the closest airports computed by the FMS.
When the flight crew clicks on the airport ident button, a list opens and enables the flight crew to access airport data or to delete the manually entered airport.

Other Airports



AIRPORT IDENT

Indicates the airport ident.
When clicked, opens a menu. Selecting DATA AIRPORT displays the DATA/AIRPORT page that contains additional data about the selected airport, *Refer to Page* .

DIST

Indicates the direct distance between the current aircraft position and the airport.

BRG

Indicates the bearing from the current aircraft position to the airport.

Note: *The bearing displayed reflects the MAG/TRUE flight crew selection.*

UTC/TIME

Indicates the estimated time of arrival (in UTC time, or flight time) at the airport.
The UTC/TIME is computed in cruise flight phase only.

L2 *Note:* *The UTC/TIME displayed on the page is based on:*
- *Current aircraft gross weight*
- *Flight from current aircraft position to ground*
- *Great-circle distance and bearing to the airport*
- *Current CRZ FL*
- *Constant ISA DEV equal to current aircraft ISA DEV*
- *Entered or computed EFF WIND along the bearing*
- *Current Cost Index (CI).*

EFOB

Indicates the Estimated Fuel On Board (EFOB) at the airport.
The EFOB is computed in cruise flight phase only.

L2 *Note:* *The UTC/TIME displayed on the page is based on:*
- *Current aircraft gross weight*
- *Flight from current aircraft position to ground*
- *Great-circle distance and bearing to the airport*
- *Current CRZ FL*
- *Constant ISA DEV equal to current aircraft ISA DEV*
- *Entered or computed EFF WIND along the bearing*
- *Current Cost Index (CI).*

EFF WIND ENTRY FIELD

Indicates a head or tail wind for the associated airport route.
The FMS computes and displays a default wind that is based on the wind data entered by the flight crew.
The flight crew can overwrite the default value at any time.
The FMS uses the effective wind to compute the time and EFOB prediction for the airports.

ENTRY FORMAT

Refer to EFF WIND Entry Format

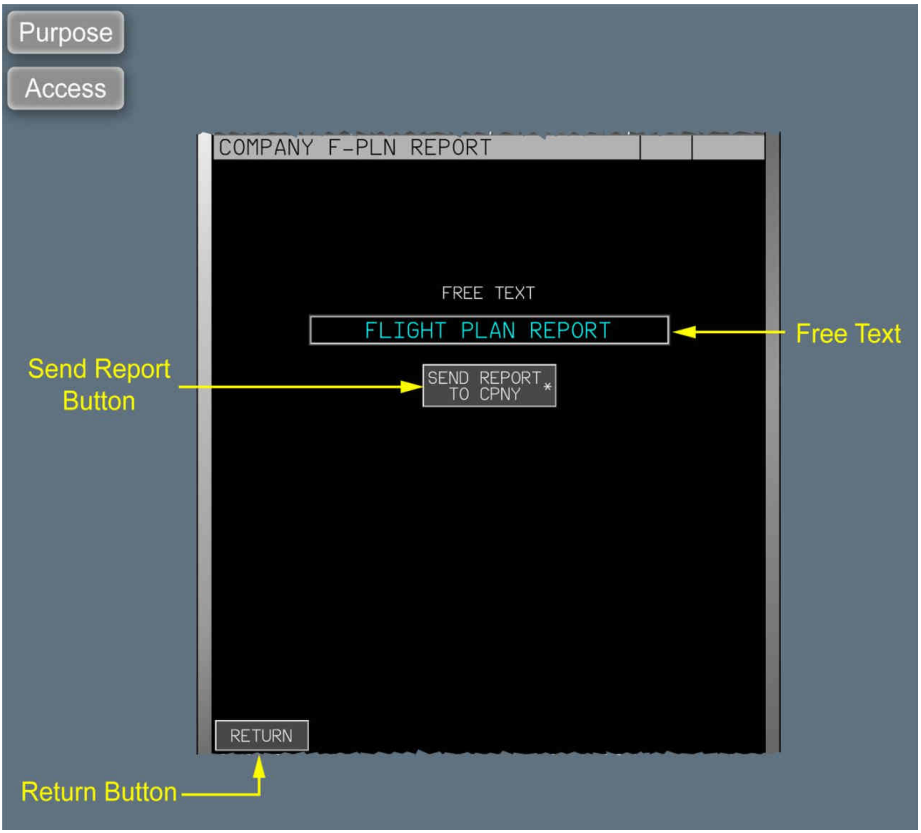
RETURN BUTTON

When clicked, displays the ACTIVE/F-PLN page, *Refer to Page* .

COMPANY F-PLN REPORT PAGE

Applicable to: ALL

COMPANY F-PLN REPORT page



PURPOSE

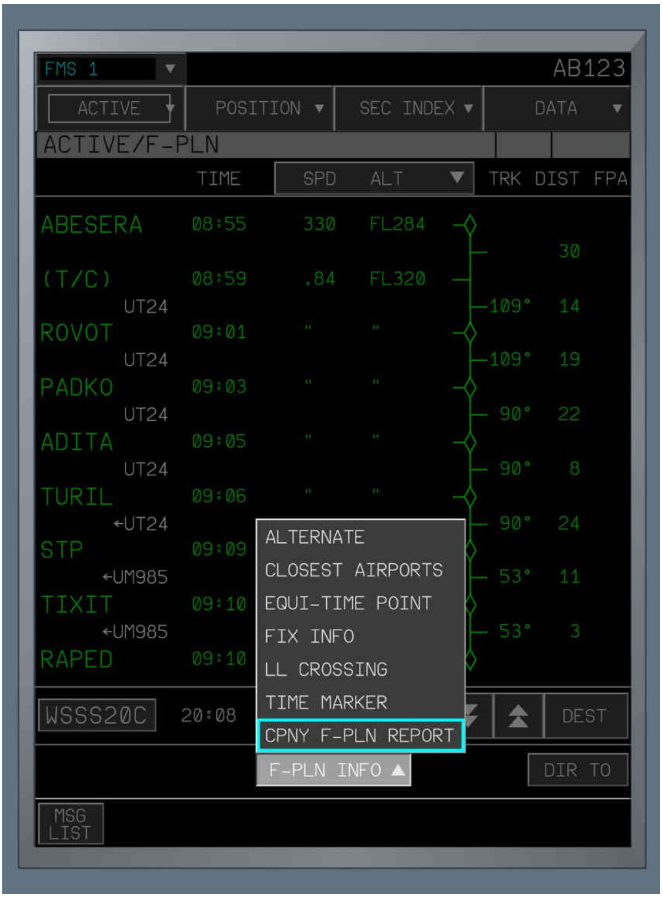
On the COMPANY F-PLN REPORT page, the flight crew can send (via ACARS) an active flight plan report to the company ground station.
If the Free Text AMI option is not activated, the COMPANY F-PLN REPORT page is not available. In this case, the flight crew sends the flight plan report by selecting CPNY F-FPLN REPORT in the F-PLN INFO menu.

The COMPANY F-PLN REPORT page is only available for the active flight plan.

ACCESS

The flight crew can access the COMPANY F-PLN REPORT page via the ACTIVE / F-PLN page by selecting CPNY F-PLN REPORT in the F-PLN INFO menu.

ACTIVE / F-PLN page



FREE TEXT

The flight crew can enter a free text, of maximum 24 characters, in the entry field. The free text is sent with the flight plan report to the company ground station.

ENTRY FORMAT

Refer to FREE TEXT Entry Format .

SEND REPORT BUTTON

When clicked, sends the flight plan report to the company ground station (via ACARS).

L2 During the report transmission to the Avionics Communication Router (ACR), the button displays SENDING ... .

SENDING ...



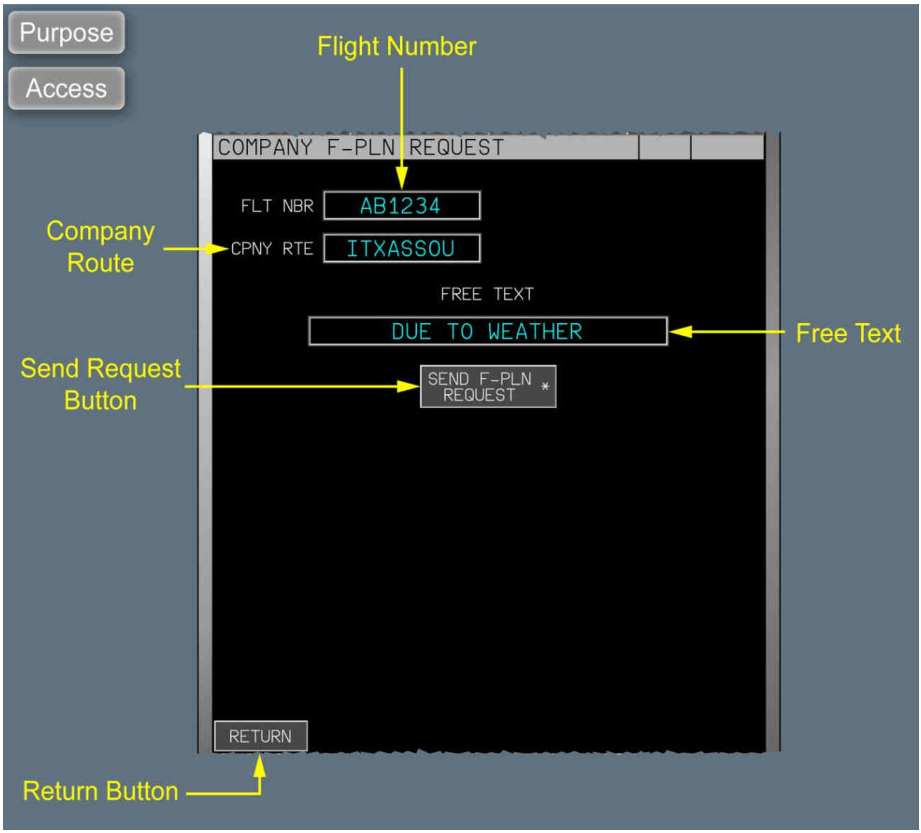
RETURN BUTTON

When clicked, displays the ACTIVE / F-PLN page.

COMPANY F-PLN REQUEST PAGE

Applicable to: ALL

COMPANY F-PLN REQUEST Page



PURPOSE

On the COMPANY F-PLN REQUEST page, the flight crew can send a flight plan request to the company ground station.

Before engine start, a performance data request is associated with the flight plan request.

L2 The request is always associated with the flight plan (active or any secondary) from where the request was sent.

After engine start, the flight crew can only send a flight plan request from one of the secondary flight plans.

L1 The COMPANY F-PLN REQUEST page is available for the active and secondary flight plans.

ACCESS

The flight crew can access the COMPANY F-PLN REQUEST page, via:

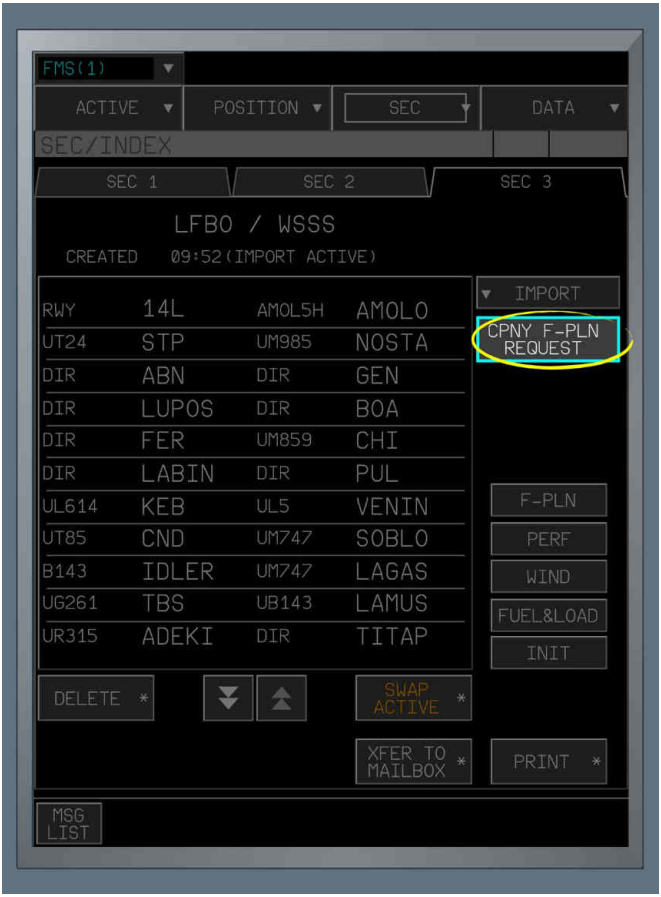
- The INIT page, by clicking on the CPNY F-PLN REQUEST button.

INIT page



Note: For the secondary flight plans, the flight crew can access the COMPANY F-PLN REQUEST page via the SEC / INIT or the SEC INDEX page.

SEC INDEX page



FLIGHT NUMBER

Indicates the flight number of the requested flight plan.
The default value is the flight number of the active (or secondary) flight plan, if any. The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to FLT NBR Entry Format .

COMPANY ROUTE

Indicates the company route of the requested flight plan.
If the F-PLN request is accessed from one of the SEC pages, the default value is the company route of the secondary flight plan, if any. The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to CO RTE Entry Format .

FREE TEXT

The flight crew can enter a free text, of maximum 24 characters, in the entry field. The free text is sent with the flight plan request to the company ground station.
If the Free Text AMI option is not activated, the free text entry field is not available.

ENTRY FORMAT

Refer to FREE TEXT Entry Format .

SEND REQUEST BUTTON

When clicked, sends the F-PLN and performance data request to the company ground station (via ACARS).

L2 During the request transmission to the Avionics Communication Router (ACR), the button displays REQUEST PENDING ... .

Request Pending



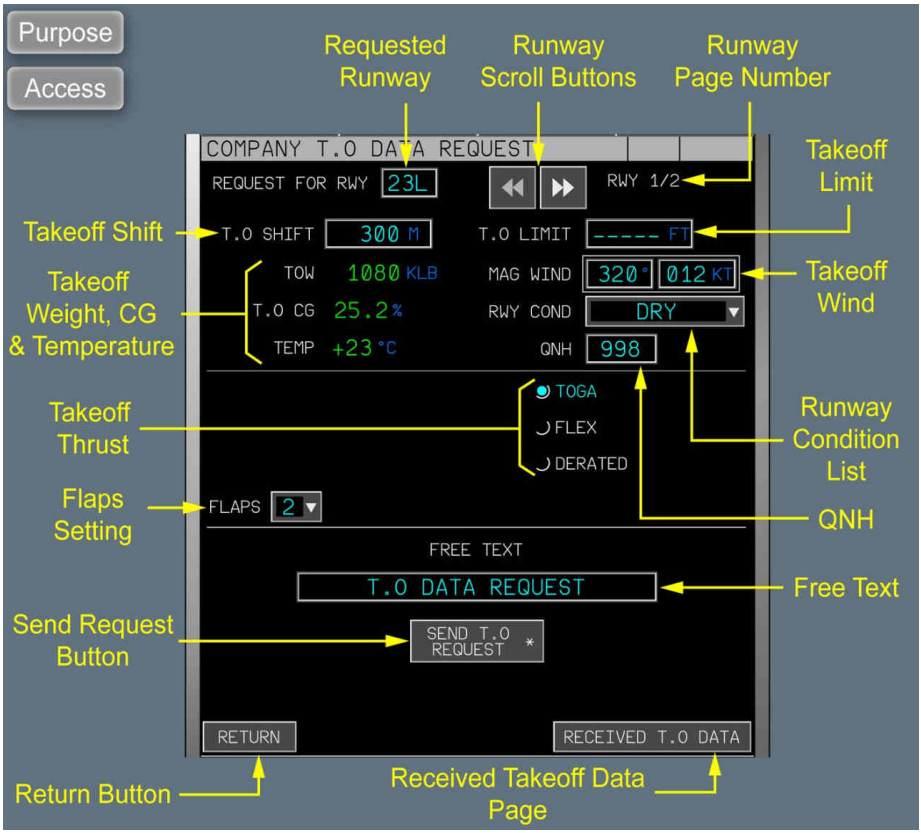
RETURN BUTTON

When clicked, displays the page that was displayed before the COMPANY F-PLN REQUEST page.

COMPANY T.O DATA REQUEST PAGE

Applicable to: ALL

COMPANY T.O DATA REQUEST page



PURPOSE

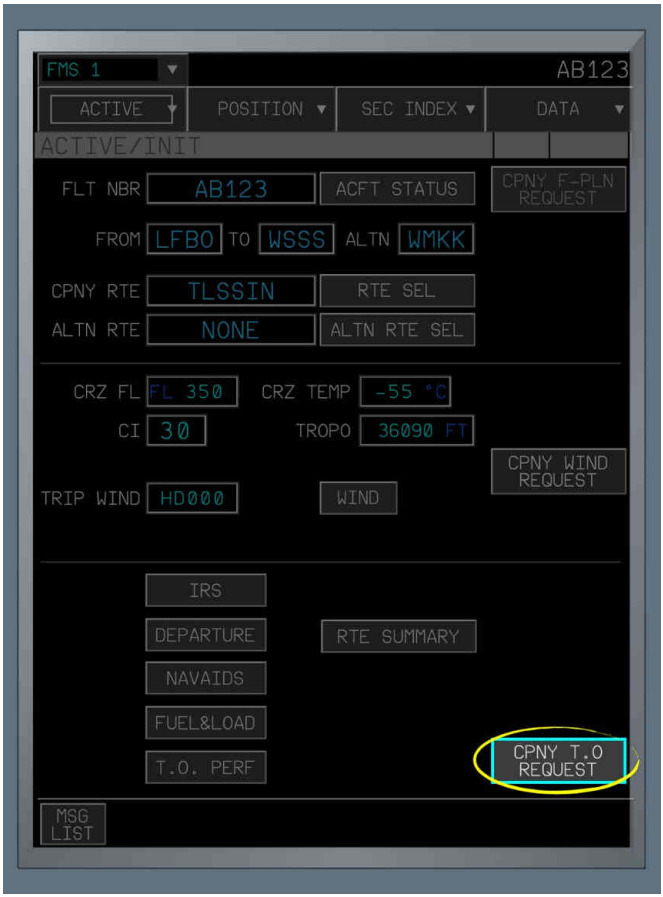
On the COMPANY T.O DATA REQUEST page, the flight crew can request takeoff data (for two different runways) to the company ground station.
The flight crew may also enter additional takeoff parameters that will be sent with the request, and used for the takeoff data computation on ground.
The COMPANY T.O DATA REQUEST page is only available for the active flight plan.

ACCESS

The flight crew can access the COMPANY T.O DATA REQUEST page, via:

- The INIT page, by clicking on the CPNY T.O REQUEST button

INIT Page



- The T.O panel of the ACTIVE / PERF page, by clicking on the CPNY T.O REQUEST button

ACTIVE / PERF / T.O Page



- The RECEIVED COMPANY T.O DATA page, by clicking on the CPNY T.O REQUEST button.

RECEIVED COMPANY T.O DATA Page



REQUESTED RUNWAY

Indicates the runway for which the takeoff data is requested.
If a departure runway is defined in the active flight plan, its ident is automatically entered in the entry field. The flight crew can always overwrite the automatically-selected ident.

ENTRY FORMAT

Refer to RWY IDENT Entry Format .

RUNWAY SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll through the two requested runway pages.

RUNWAY PAGE NUMBER

Indicates the ranking of the requested runway page.

TAKEOFF WEIGHT, CG & TEMPERATURE

Indicate the aircraft weight, CG and the outside temperature at takeoff.
The takeoff weight is the FMS value that is displayed on the ACTIVE / FUEL & LOAD page (TOW). *Refer to page* .
The FQMS provides the takeoff CG.
The takeoff temperature is the current static temperature value, provided by the ADIRS .

TAKEOFF WIND ENTRY FIELDS

Indicate the wind direction and velocity.
The takeoff wind direction and velocity are those defined at the origin airport, on the CLB panel of the WIND page. The flight crew can always overwrite the default values.

L2 If the airport reference is the true north, the wind is the true wind. The label displays TRUE WIND.

L1 **ENTRY FORMAT**

Refer to WIND DIRECTION Entry Format .
Refer to WIND VELOCITY Entry Format .

RUNWAY CONDITION LIST

Indicates the runway condition at takeoff.
The flight crew selects the runway condition in the list.

Runway Condition List



QNH ENTRY FIELD

Indicates the selected QNH at takeoff.
The QNH selected on the EFIS CP is displayed by default. The flight crew can overwrite the default values at any time.

ENTRY FORMAT

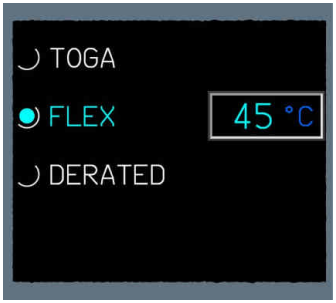
Refer to QNH Entry Format .

TAKEOFF THRUST OPTION

The flight crew selects the desired takeoff thrust:

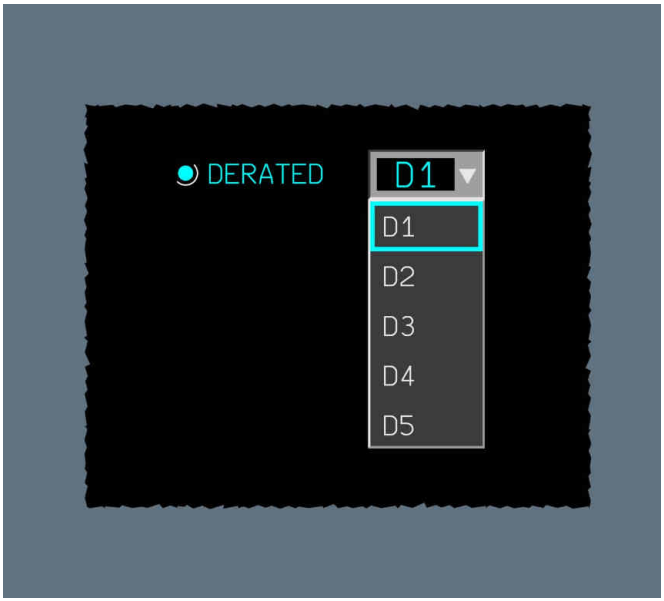
- TOGA, default setting
- FLEX
  The flight crew enters the flex value in the entry field.

FLEX Entry Field



- DERATED.
  The flight crew enters the derated level via the keyboard, or by selecting it in the list.

Derated List



ENTRY FORMAT

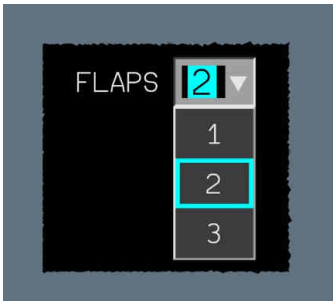
Refer to FLEX Entry Format .
Refer to DERATED Entry Format .

FLAPS SETTING LIST

Indicates the flaps setting for takeoff.
The default setting is the flaps setting of the T.O panel on the PERF page.

The flight crew can always overwrite default value by:
- Selecting in the list
- Entering via the keyboard.

Flaps Setting List



ENTRY FORMAT

Refer to FLAPS Entry Format .

TAKEOFF SHIFT ENTRY FIELD

Indicates the runway shift for takeoff.
The takeoff shift is the distance in meters (or feet) between the runway threshold and the aircraft's takeoff position.
The default value is the takeoff shift of the T.O panel on the PERF page. The flight crew can always overwrite an automatically-selected takeoff shift.

ENTRY FORMAT

Refer to TAKEOFF SHIFT Entry Format .

TAKEOFF LIMIT ENTRY FIELD

Indicates the limited runway length considering obstacles.

ENTRY FORMAT

Refer to TAKEOFF LIMIT Entry Format .

FREE TEXT ENTRY FIELD

The flight crew can enter a free text, of maximum 24 characters, in the entry field. The free text is sent with the T.O data request to the company ground station.
If the Free Text AMI option is not activated, the free text entry field is not available.

ENTRY FORMAT

Refer to FREE TEXT Entry Format .

SEND REQUEST BUTTON

When clicked, sends the T.O data request to the company ground station (via ACARS).

L2 During the request transmission to the Avionics Communication Router (ACR), the button displays REQUEST PENDING ... .

REQUEST PENDING ...



RECEIVED TAKEOFF DATA PAGE

When clicked, displays the RECEIVED CPNY T.O DATA page.
Refer to Page .

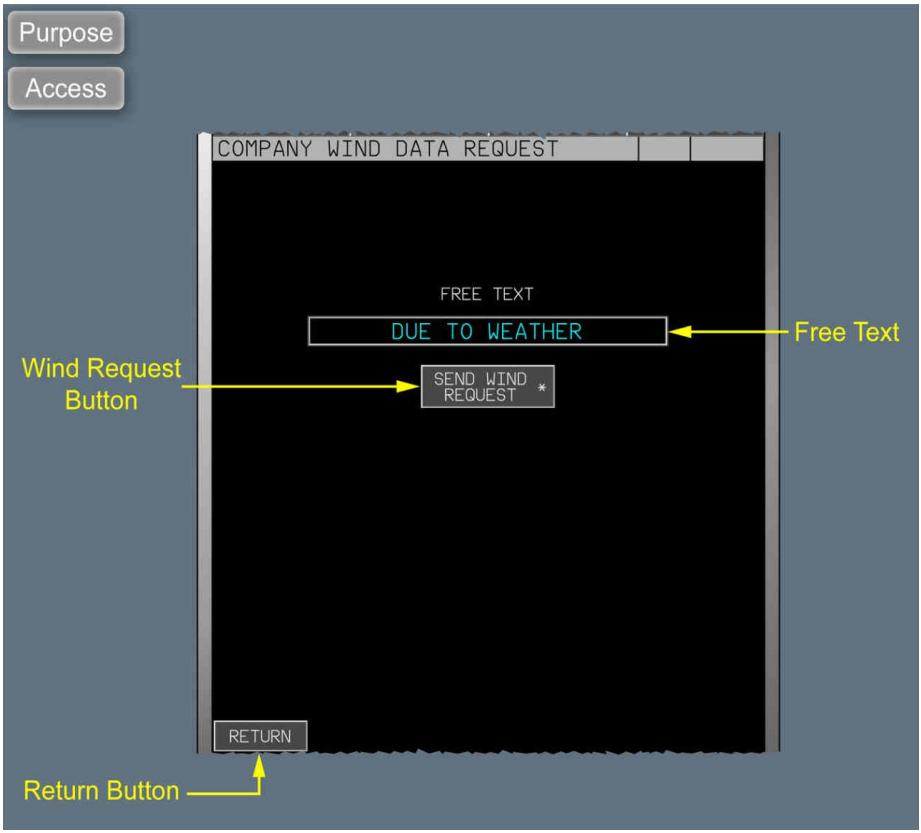
RETURN BUTTON

When clicked, displays the page that was displayed before the COMPANY T.O DATA REQUEST page.

COMPANY WIND DATA REQUEST PAGE

Applicable to: ALL

COMPANY WIND DATA REQUEST page



PURPOSE

On the COMPANY WIND DATA REQUEST page, the flight crew can send a wind request to the company ground station.

L2 The content of the wind request message depends on the flight phase currently flown by the aircraft:
- In $PREFLIGHT_{phase}$ or $T.O_{phase}$: Climb, cruise, descent and alternate wind data
- In CLB_{phase} or CRZ_{phase}: Cruise, descent and alternate wind data.

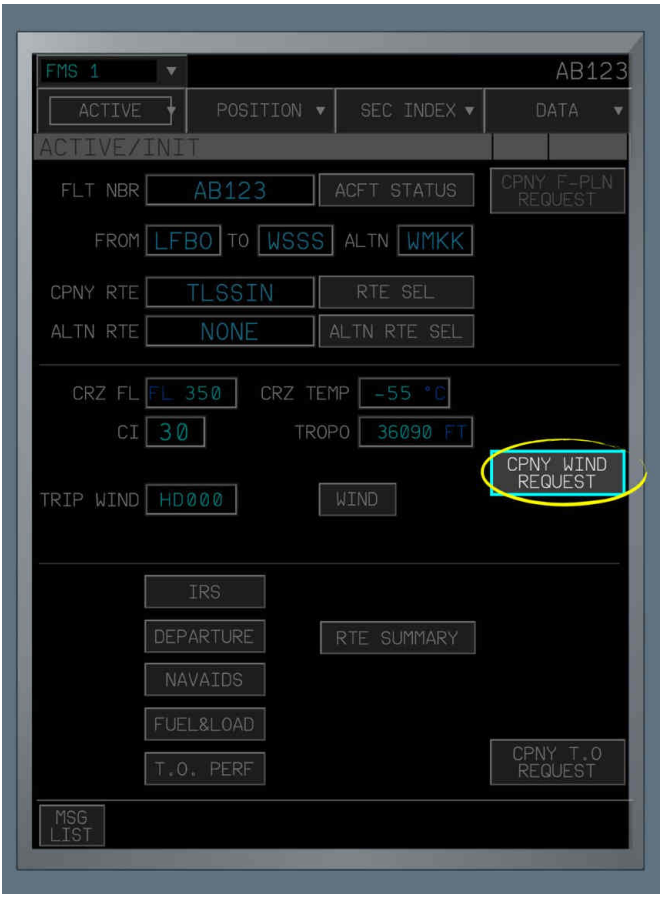
L1 When the aircraft is in DES_{phase}, $APPR_{phase}$, or GA_{phase}, no wind request is possible.
If the Free Text AMI option is not activated, the COMPANY WIND DATA REQUEST page is not available. In this case, the flight crew sends the wind request by clicking on the CPNY WIND REQUEST button on the INIT or WIND page.
The COMPANY WIND DATA REQUEST page is available for the active and secondary flight plans.

ACCESS

The flight crew can access the COMPANY WIND DATA REQUEST page, via:

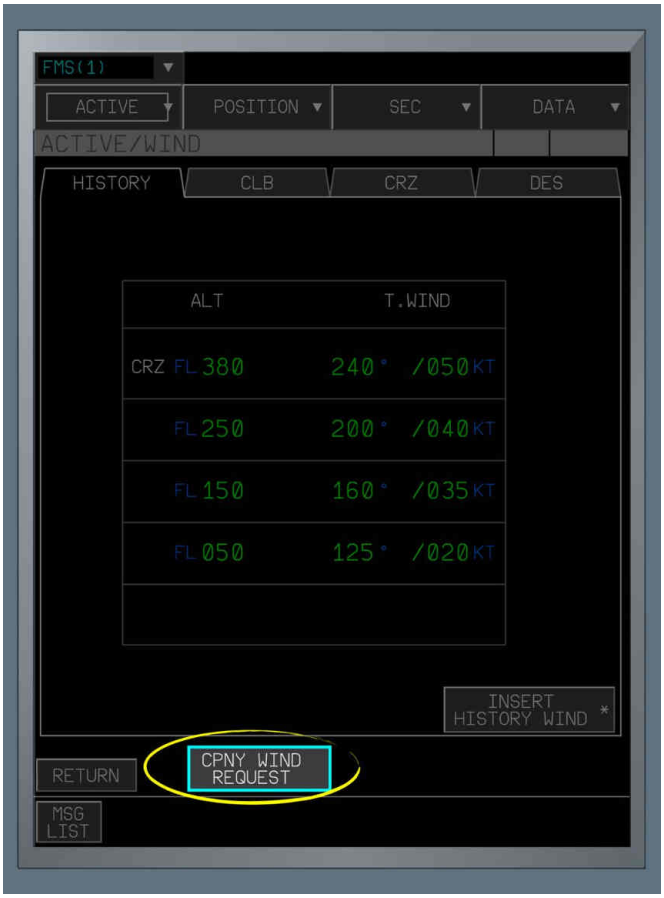
- The INIT page, by clicking on the CPNY WIND REQUEST button,

INIT Page



- The WIND page, by clicking on the CPNY WIND REQUEST button.

WIND Page



Note: *For the secondary flight plans, the flight crew can access the COMPANY WIND DATA REQUEST page via the SEC / INIT or SEC / WIND pages.*

FREE TEXT ENTRY FIELD

The flight crew can enter a free text, of maximum 24 characters, in the entry field. The free text is sent with the wind data request to the company ground station.

ENTRY FORMAT

Refer to FREE TEXT Entry Format .

WIND REQUEST BUTTON

When clicked, sends the wind request to the company ground station (via ACARS).

L2 During the request transmission to the Avionics Communication Router (ACR), the button displays REQUEST PENDING ... .

Request Pending



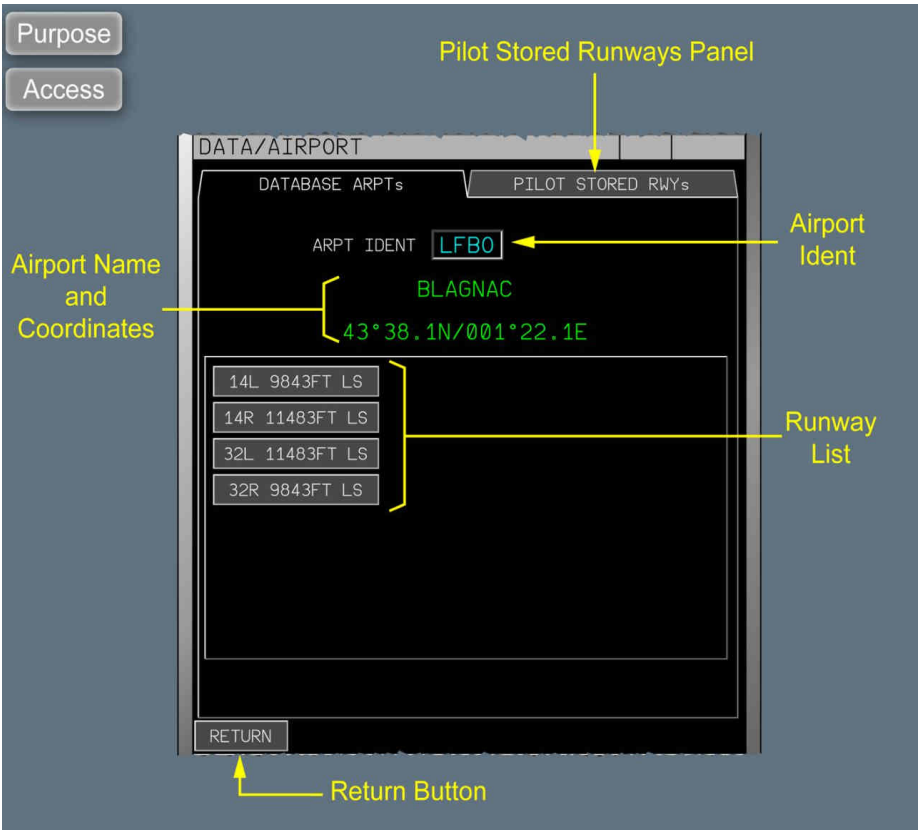
RETURN BUTTON

When clicked, displays the page that was displayed before the COMPANY WIND DATA REQUEST page.

DATA / AIRPORT PAGE

Applicable to: ALL

Overview



PURPOSE

On the DATA / AIRPORT page, the flight crew can:

- Call up the data for a runway or an airport, that is stored in the navigation database, or in the pilot stored elements database
- Create or delete runways in the pilot stored elements database.

LINKS

Refer to Navigation Database .
Refer to Pilot Stored Elements Database .

ACCESS

The flight crew can access the DATA / AIRPORT page:

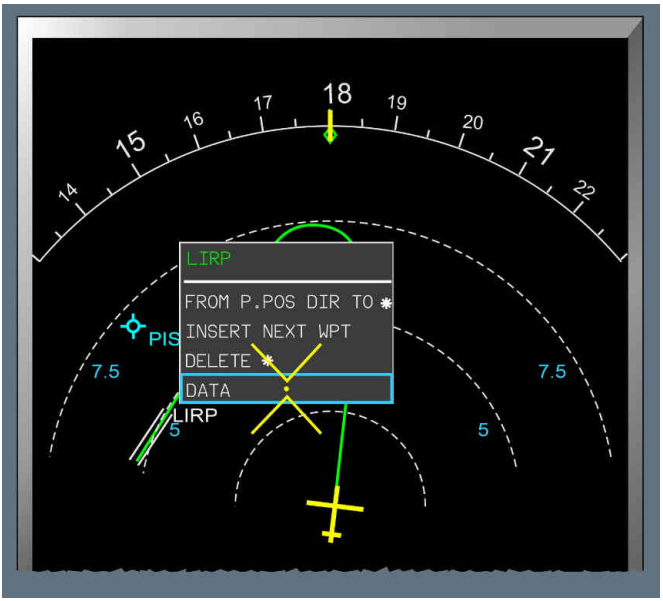
- Via the General Menu Bar, by selecting AIRPORT in the DATA menu
  The DATABASE ARPTs panel is opened by default.

General Menu



- Via the Interactive ND, by selecting DATA in the menu of any airport

Flight Plan Airport



The DATABASE ARPTs panel is opened by default if the airport is part of the navigation database. The PILOT STORED RWYs panel is opened by default in all other cases.

- By selecting DATA AIRPORT in the ARPT menu of:
  - The ALTERNATE page, or
  - The CLOSEST AIRPORTS page.

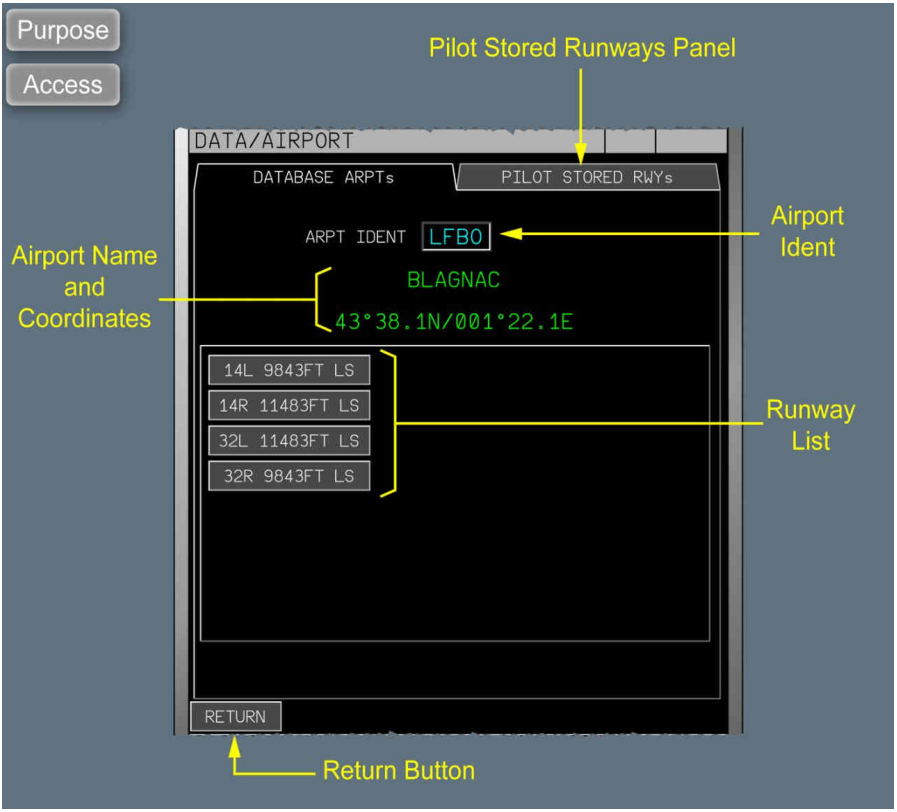
  The DATABASE ARPTs panel is opened by default if the airport is part of the navigation database. The PILOT STORED RWYs panel is opened by default in all other cases.

ALTERNATE Page



DATABASE ARPTS PANEL

DATABASE ARPTs Panel



AIRPORT IDENT ENTRY FIELD

The flight crew enters the ident of an airport in the entry field.

L2 If the entered airport is an airport created by the flight crew, the PILOT STORED RWYS panel is opened, and displays the associated position data.

If the entered airport is not a navigation database, nor a pilot created airport, the PILOT STORED RWYS panel is opened, and displays the new runway function, *Refer to New Runway Function* .

L1 **ENTRY FORMAT**

Refer to AIRPORT Entry Format .

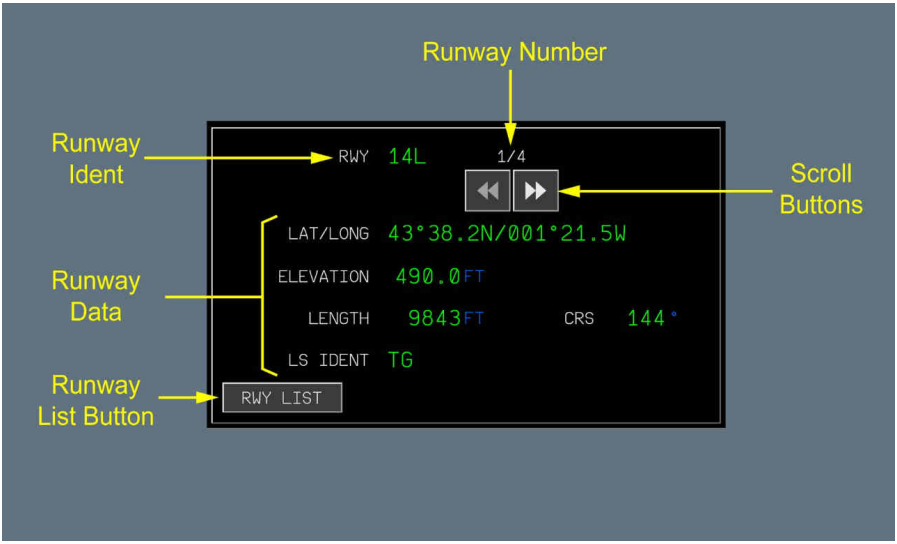
AIRPORT NAME AND COORDINATES

Indicates the name and the latitude/longitude coordinates of the navigation database airport.

RUNWAY LIST

Indicates all the runways that are associated with the navigation database airport.
The flight crew clicks on the runway button to display additional data about the associated runway.

Runway Data Panel



RWY

Indicates the ident of the runway.

RUNWAY NUMBER

Indicates the ranking of the displayed runway, and the total number of runways that are associated with the selected airport.

SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the runways of the selected airport.

RUNWAY DATA

Indicates:

- The latitude and longitude of the runway threshold
- The runway elevation
- The runway length
- The runway course

L2 The letter T indicates that the course is defined in the TRUE north reference.

L1 - The landing system NAVAID that is associated with the runway, if there is one.

RUNWAY LIST BUTTON

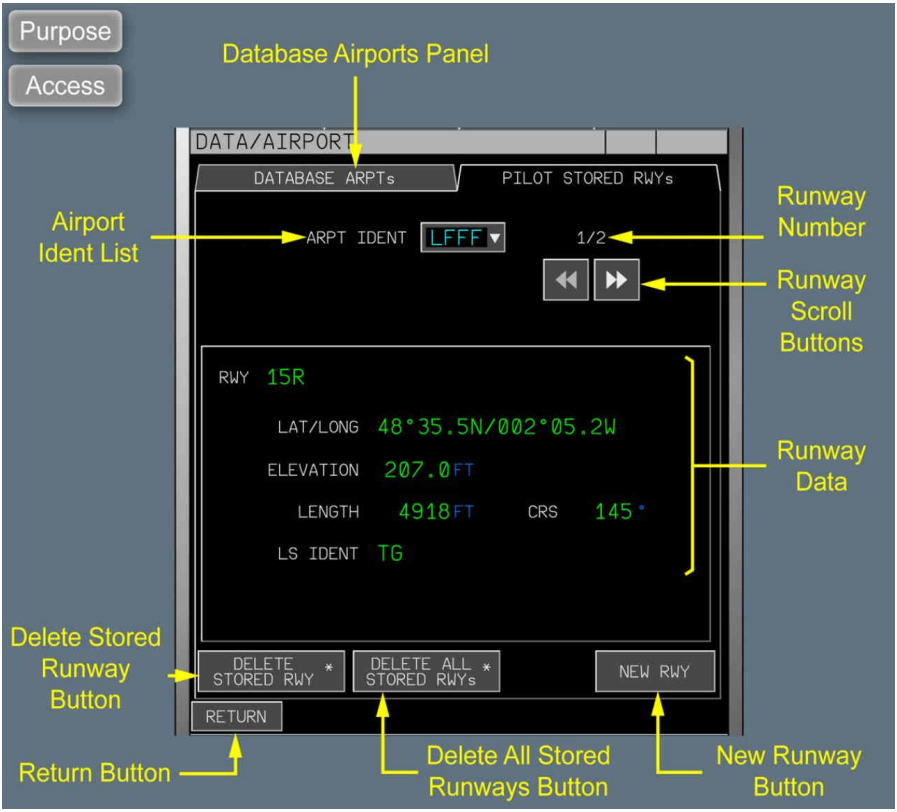
When clicked, displays the runway list.

RETURN BUTTON

When clicked, displays the page that was displayed before the DATA / AIRPORT page.

PILOT-STORED RWYS PANEL

PILOT-STORED RWYs Panel



AIRPORT IDENT LIST

Indicates the ident of the consulted pilot stored airport.
The list displays all airports that are associated with the pilot stored runways.
If the pilot stored runways database is empty, the panel displays " NO PILOT STORED RWY ".

NO PILOT STORED RWY



ENTRY FORMAT

Refer to AIRPORT Entry Format .

RUNWAY NUMBER

Indicates the ranking of the displayed pilot stored runway, and the total number of pilot stored runways.
The pilot stored runways database has a maximum of 10 runways.

RUNWAY SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the pilot stored runways.

RUNWAY DATA

Indicates:

- The latitude and longitude of the runway threshold
- The runway elevation
- The runway length
- The runway course

L2 The T letter indicates that the course is defined in the TRUE north reference.

L1 - The landing system NAVAID that is associated with the runway, if any.

DELETE ALL STORED RUNWAYS BUTTON

When clicked, deletes all pilot stored runways.
A confirmation action is required.

CONFIRM/CANCEL Window



If there are pilot stored runways that are still used by the FMS , they are not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message*).

L2 The operator can choose (via the AMI file) to have all pilot stored elements automatically deleted at transition to the DONE flight phase.

DELETE STORED RUNWAY BUTTON

When clicked, deletes the pilot stored runway that is currently displayed.
A confirmation action is required.

CONFIRM/CANCEL



If the pilot stored runway is still used by the FMS , it is not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message)* .

RETURN BUTTON

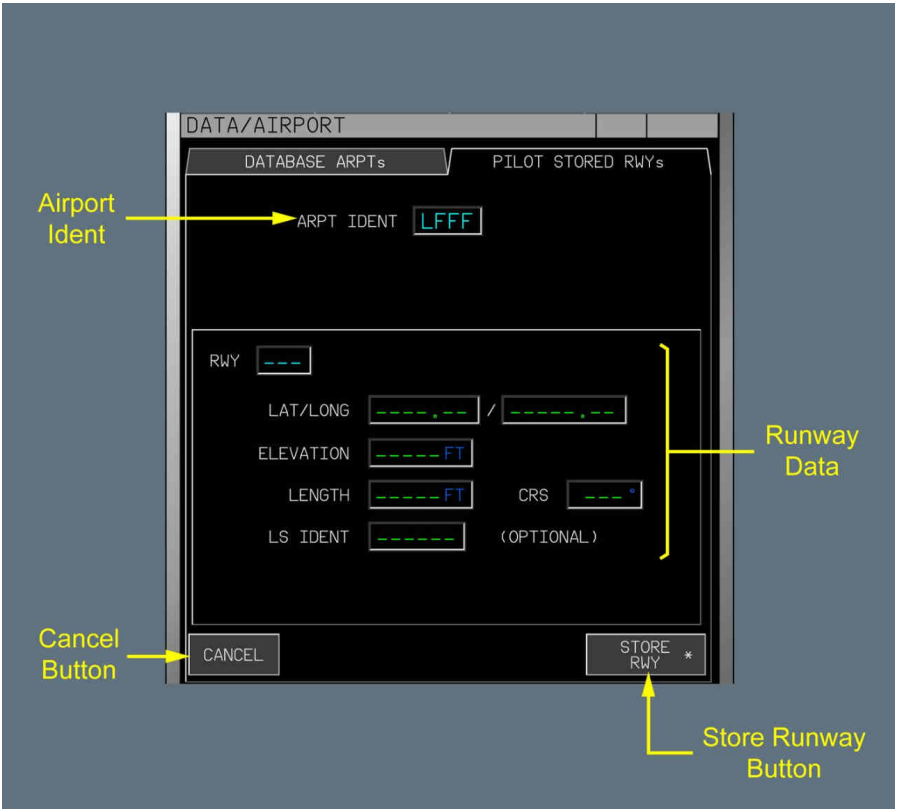
When clicked, displays the page that was displayed before the DATA / AIRPORT page.

NEW RUNWAY BUTTON

When clicked, displays the new runway function on the PILOT STORED RWYS panel, *Refer to New Runway Function* .

NEW RUNWAY FUNCTION

New Runway Function



AIRPORT IDENT ENTRY FIELD

Indicates the airport ident of the new runway.

ENTRY FORMAT

Refer to AIRPORT Entry Format .

RUNWAY DATA ENTRY FIELDS

The flight crew enters:
- The ident of the new runway,
- The latitude and longitude of the runway threshold,
- The runway elevation,
- The runway length,
- The runway course, if both latitude and longitude are defined,
- The landing system NAVAID that is associated with the runway, if any.

The flight crew needs to enter all data (except the landing system) to define a new runway.

ENTRY FORMAT

The formats for the runway data entries are:
- *Refer to RWY Entry Format*
- *Refer to LAT Entry Format*
- *Refer to LONG Entry Format*
- *Refer to RWY ELEVATION Entry Format*
- *Refer to RWY LENGTH Entry Format*
- *Refer to CRS Entry Format*
- *Refer to LS IDENT Entry Format* .

STORE RUNWAY BUTTON

When clicked, stores the new runway in the pilot stored runways database.
The pilot stored runways database has a maximum of 10 runways.

L2 If the pilot stored runways database is full, the first created runway (that is not part of the flight plan) is deleted. If all of the 10 runways are used by the FMS , the runway creation is rejected, and the 10 RWYS MAX: ALL IN USE message is displayed. *Refer to 10 RWYS MAX: ALL IN USE message* .

L3 If the PILOT STORED RWYS panel is accessed from the PILOTS STORED NAVAID panel of the DATA / NAVAID page, the STORE RWY button is replaced by the STORE RWY + NAVAID button.

STORE RWY + NAVAID Button



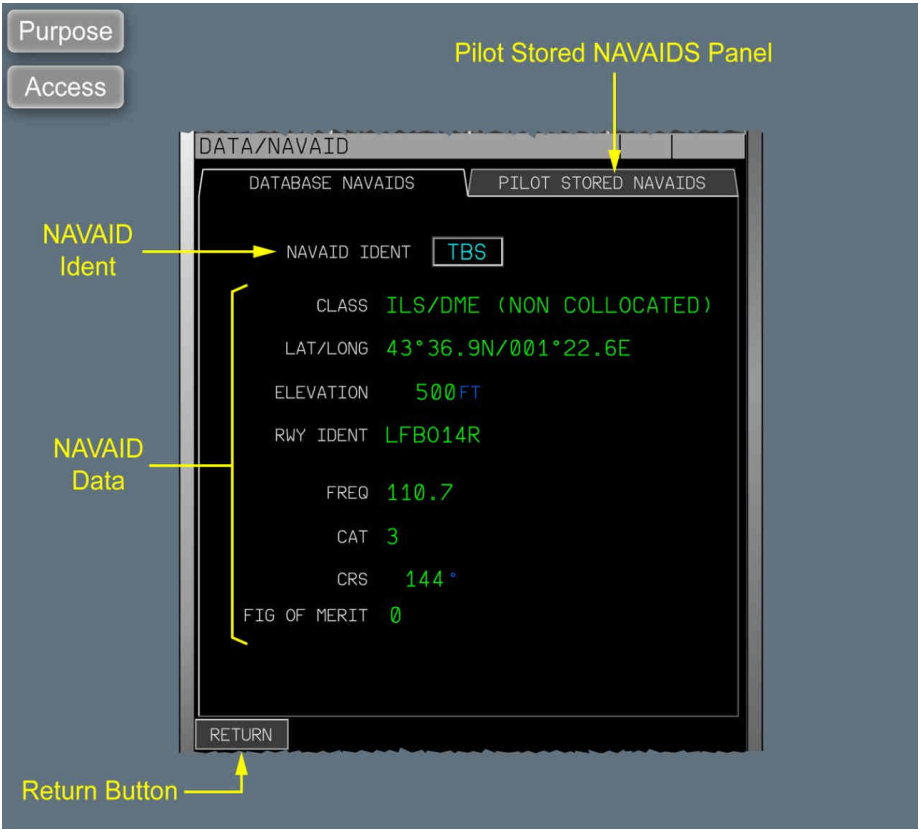
CANCEL BUTTON

When clicked, cancels the new runway function.

DATA / NAVAID PAGE

Applicable to: ALL

Overview



PURPOSE

On the DATA / NAVAID page, the flight crew can:

- Call up the data for a NAVAID, that is stored in the navigation database, or in the pilot stored elements database
- Create or delete NAVAIDS in the pilot stored elements database.

LINKS

Refer to Navigation Database .
Refer to Pilot Stored Elements Database .

ACCESS

The flight crew can access the DATA / NAVAID page:

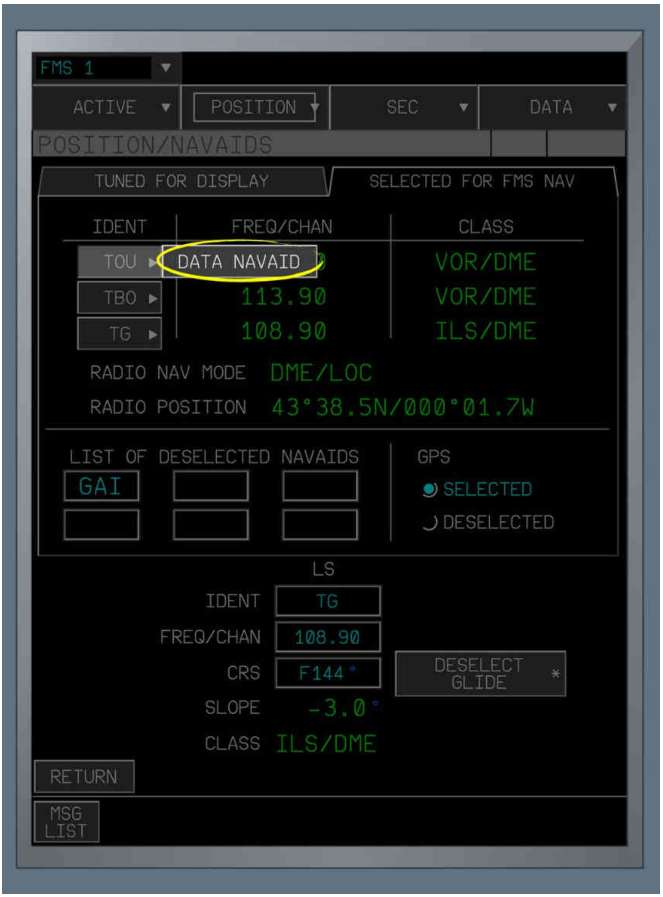
- Via the General Menu Bar, by selecting NAVAID in the DATA menu
  The DATABASE NAVAIDS panel is opened by default.

General Menu



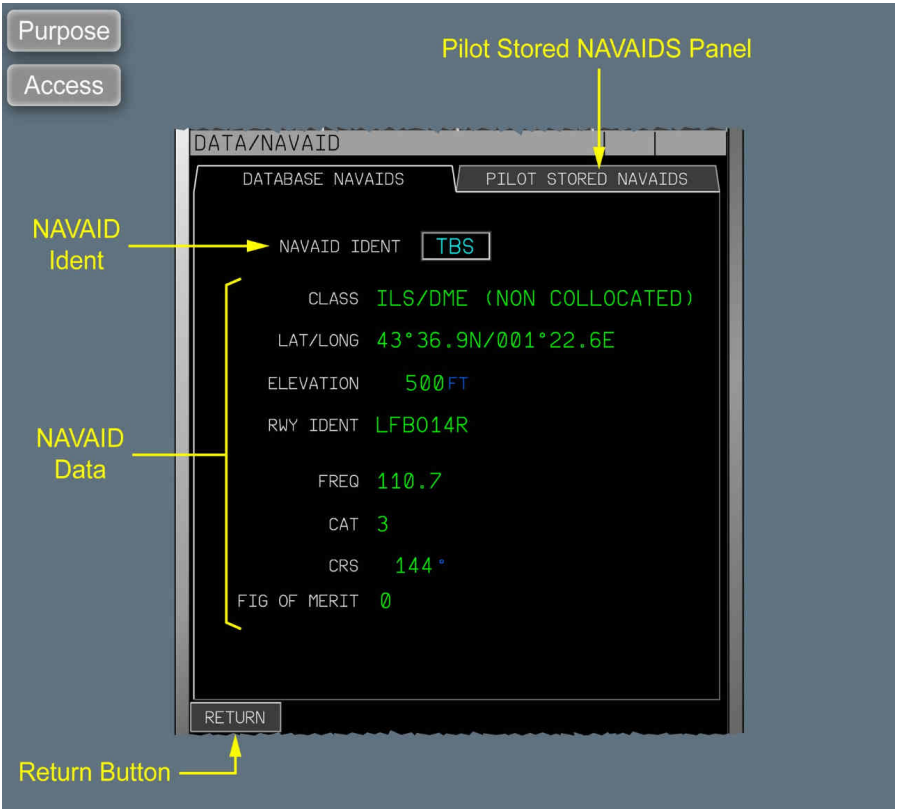
- By selecting DATA NAVAID in the NAVAID menu of the TUNED FOR FMS NAV panel of the POSITION / NAVAID page
  The DATABASE NAVAIDS panel is opened by default if the NAVAID is in the navigation database. The PILOT STORED NAVAIDS panel is opened by default, in all other cases.

NAVAID Menu


FMS 1
ACTIVE
POSITION
SEC
DATA
POSITION/NAVAIDS
TUNED FOR DISPLAY
SELECTED FOR FMS NAV
IDENT
FREQ/CHAN
CLASS
TOU
DATA NAVAID
VOR/DME
TBO
113.90
VOR/DME
TG
108.90
ILS/DME
RADIO NAV MODE
DME/LOC
RADIO POSITION
43°38.5N/000°01.7W
LIST OF DESELECTED NAVAIDS
GAI
GPS
SELECTED
DESELECTED
LS
IDENT
TG
FREQ/CHAN
108.90
CRS
F144°
DESELECT GLIDE
SLOPE
-3.0°
CLASS
ILS/DME
RETURN
MSG LIST

DATABASE NAVAIDS PANEL

DATABASE NAVAIDS Panel



NAVAID IDENT ENTRY FIELD

The flight crew enters the ident of a NAVAID in the entry field.

L2 If the entered NAVAID is a NAVAID created by the flight crew, the PILOT STORED NAVAIDS panel is opened, and displays the associated data.

If the entered NAVAID is not a navigation database, nor a pilot created NAVAID, the PILOT STORED NAVAIDS panel is opened, and displays the new NAVAID function, *Refer to New NAVAID Function* .

L1 **ENTRY FIELD**

Refer to NAVAID Entry Format .

NAVAID DATA

Indicates:

- The class

L2
- VOR
- DME
- LOC
- ILS
- GLS
- NDB
- ILS/DME
- VOR/DME.

L1 - The latitude/longitude coordinates (LAT/LONG)
- The elevation (ELEVATION)

L2 This label is not displayed for VOR and NDB.

L1 - The ident of the runway that is associated with the NAVAID (RWY IDENT)

L2 This label is only displayed for landing system NAVAIDS.

L1 - The magnetic declination (STATION DEC)

L2 This label is only displayed for VOR and VOR/DME.

L1 - The frequency (FREQ),
or channel (CHANNEL) for GLS
- The approach category (CAT)

L2 The category may be 1, 2 or 3.

L1 - The figure of merit, (FIG OF MERIT), that indicates the maximum tuning distance of the NAVAID

L2 The FIG OF MERIT may be one of the following:
- 0 (40NM)
- 1 (70NM)
- 2 (130NM)
- 3 (250NM).

L1 - The course (CRS)

L2 This label is only displayed for landing system NAVAIDS.
The T letter indicates that the course is defined in TRUE north reference.

L1 - The slope (SLOPE).

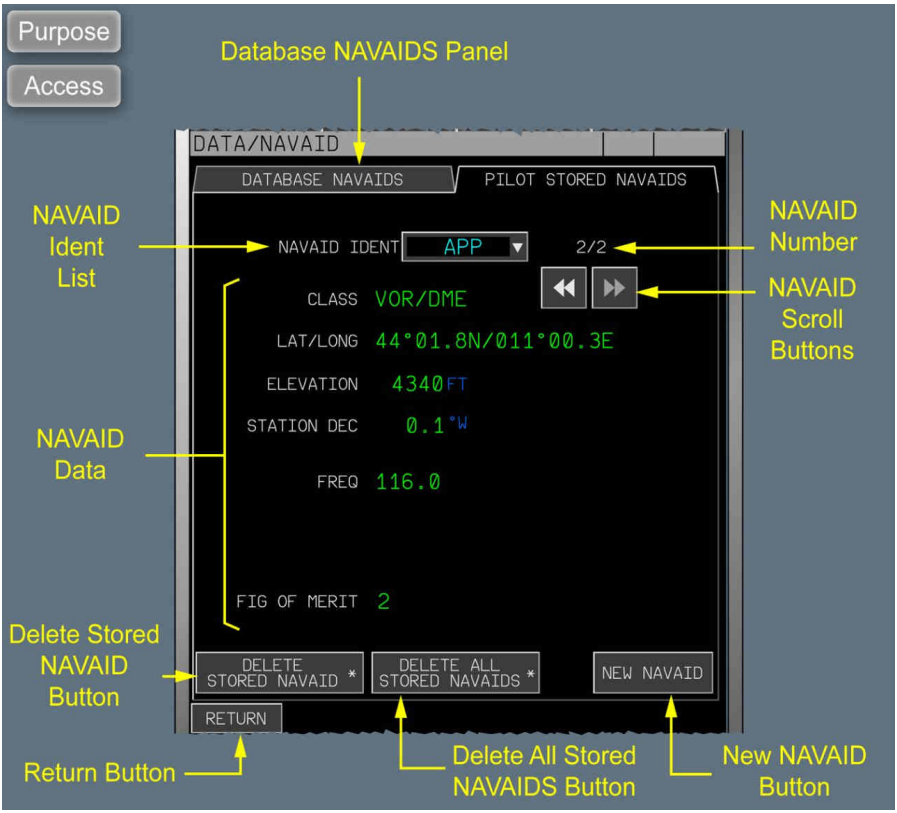
L2 This label is only displayed for GLS.

RETURN BUTTON

When clicked, displays the page that was displayed before the DATA / NAVAID page.

PILOT STORED NAVAIDS PANEL

PILOT STORED NAVAIDS Panel



NAVAID IDENT LIST

Indicates the ident of the consulted pilot stored NAVAID.
The list displays all the pilot stored NAVAIDs.

L2 If the entered NAVAID is not a navigation database, nor a pilot created NAVAID, the New NAVAID Function is displayed, *Refer to New NAVAID Function* .

L1 If the pilot stored NAVAIDs database is empty, the panel displays " NO PILOT STORED NAVAID ".

NO PILOT STORED NAVAID



ENTRY FORMAT

Refer to NAVAID Entry Format .

NAVAID NUMBER

Indicates the ranking of the displayed pilot stored NAVAID, and the total number of pilot stored NAVAIDS.

The pilot stored NAVAIDS database has a maximum of 20 NAVAIDS.

NAVAID SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the pilot stored NAVAIDS.

NAVAID DATA

Indicates:

- The class

L2
- VOR
- DME
- LOC
- ILS
- GLS
- NDB
- VOR/DME.

L1 - The latitude/longitude coordinates (LAT / LONG)

- The elevation (ELEVATION)

L2 This label is not displayed for VOR and NDB.

L1 - The ident of the runway that is associated with the NAVAID (RWY IDENT)

L2 This label is only displayed for landing system NAVAIDS.

L1 - The magnetic declination (STATION DEC)

L2 This label is only displayed for VOR and VOR/DME.

L1 - The frequency (FREQ),
or channel (CHANNEL) for GLS

- The approach category (CAT)

L2 The category may be 1, 2 or 3.

L1 - The figure of merit, (FIG OF MERIT), that indicates the maximum tuning distance of the NAVAID

L2 The FIG OF MERIT may be one of the following:
- 0 (40NM)
- 1 (70NM)
- 2 (130NM)
- 3 (250NM).

L1 - The course (CRS)

L2 This label is only displayed for landing system NAVAIDS.
The T letter indicates that the course is defined in TRUE north reference.

L1 - The slope (SLOPE).

L2 This label is only displayed for GLS.

DELETE ALL STORED NAVAIDS BUTTON

When clicked, deletes all pilot stored NAVAIDs.
A confirmation action is required.

CONFIRM/CANCEL



If there are pilot stored NAVAIDs that are still used by the FMS , they are not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message).*

L2 The operator can choose (via the AMI file) to have all pilot stored elements automatically deleted at transition to the DONE flight phase.

DELETE STORED NAVAID BUTTON

When clicked, deletes the pilot stored NAVAID that is currently displayed.
A confirmation action is required.

CONFIRM/CANCEL



If the pilot stored NAVAID is still used by the FMS , it is not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message)* .

RETURN BUTTON

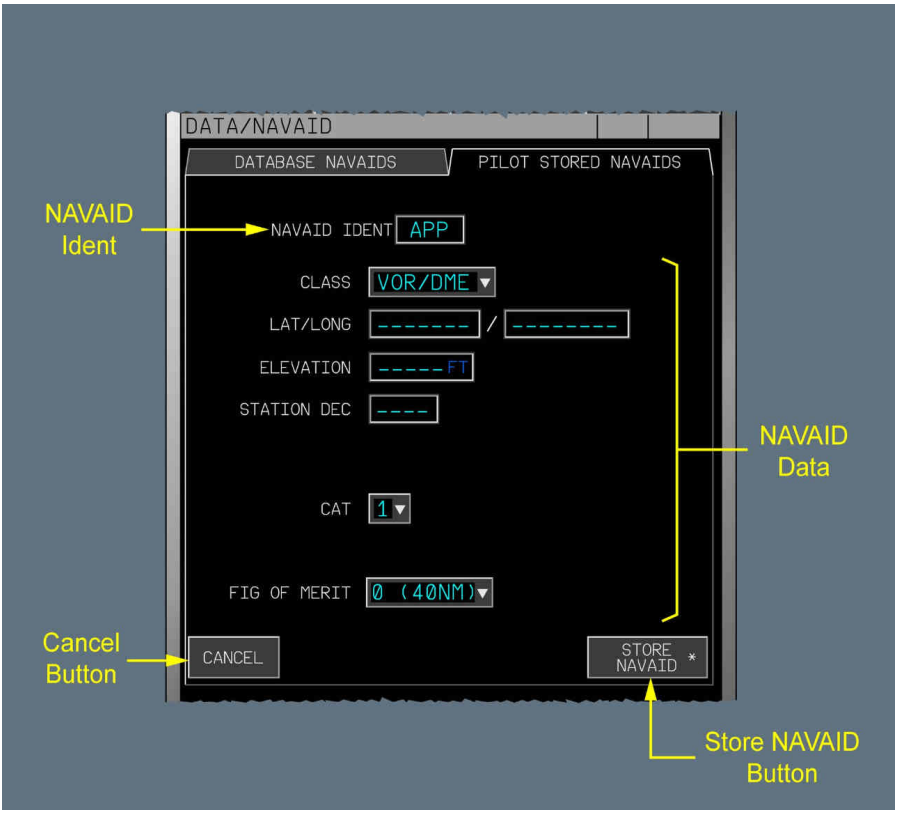
When clicked, displays the page that was displayed before the DATA / NAVAID page.

NEW NAVAID BUTTON

When clicked, displays the new NAVAID function on the PILOT STORED NAVAIDS panel, *Refer to New NAVAID Function* .

NEW NAVAID FUNCTION

New NAVAID Function



NAVAID IDENT ENTRY FIELD

Indicates the NAVAID ident of the new NAVAID.

ENTRY FORMAT

Refer to NAVAID Entry Format .

NAVAID DATA ENTRY FIELDS

The flight crew enters:

- The class of the NAVAID, by using the selection list

L2 The class of the NAVAID can be one of the following:

- VOR
- DME
- LOC
- ILS
- GLS
- NDB
- VOR/DME.

L1 - The latitude/longitude coordinates (LAT / LONG)
- The elevation (ELEVATION)

L2 This label is not displayed for VOR and NDB .

L1 - The ident of the runway that is associated with the NAVAID (RWY IDENT)

L2 This label is only displayed for landing system NAVAIDS.
If the entered runway ident is not a navigation database, nor a pilot created airport, the PILOT STORED RWYS panel is opened, and displays the new runway function. For more information, *Refer to DATA/AIRPORT page* .

L1 - The magnetic declination (STATION DEC)

L2 This label is only displayed for VOR and VOR/DME.
The T letter indicates that the NAVAID is defined in TRUE north reference.

L1 - The frequency (FREQ),
or channel (CHANNEL) for GLS
- The approach category (CAT)

L2 The category may be 1, 2 or 3.

L1 - The figure of merit, (FIG OF MERIT), that indicates the maximum tuning distance of the NAVAID

L2 The FIG OF MERIT may be one of the following:
- 0 (40NM)
- 1 (70NM)
- 2 (130NM)
- 3 (250NM).

L1 - The course (CRS)

L2 This label is only displayed for landing system NAVAIDS.
The T letter indicates that the course is defined in TRUE north reference.

L1 - The slope (SLOPE).

L2 This entry field is only displayed for GLS .

L1 **ENTRY FORMAT**

- Latitude (*Refer to Entry Format*)
- Longitude (*Refer to Entry format*)
- Elevation (*Refer to Entry Format*)
- Runway Ident (*Refer to Entry Format*)
- Station Declination (*Refer to Entry Format*)
- ILS Frequency (*Refer to Entry Format*) or VOR / DME frequency (*Refer to Entry Format*)
- GLS Channel (*Refer to Entry Format*)
- Course (*Refer to Entry Format*)
- Bearing (*Refer to Entry Format*)
- GLS Slope (*Refer to Entry Format*)

STORE NAVAID BUTTON

When clicked, stores the new NAVAID in the pilot-stored elements database.
The pilot-stored NAVAID database has a maximum of 20 NAVAIDS.

L2 If the pilot-stored NAVAIDs database is full, the first created NAVAID that is not part of the flight plan is deleted. If all of the 20 NAVAIDs are used by the FMS , the NAVAID creation is rejected, and the 20 NAVAIDS MAX : ALL IN USE message is displayed, *Refer to Message* .

L3 If the flight crew accesses the PILOT STORED NAVAIDS panel from the PILOT STORED RWYs panel of the DATA/AIRPORT page, the STORE NAVAID + RWY button appears, instead of the STORE NAVAID button.

STORE NAVAID+RWY Button



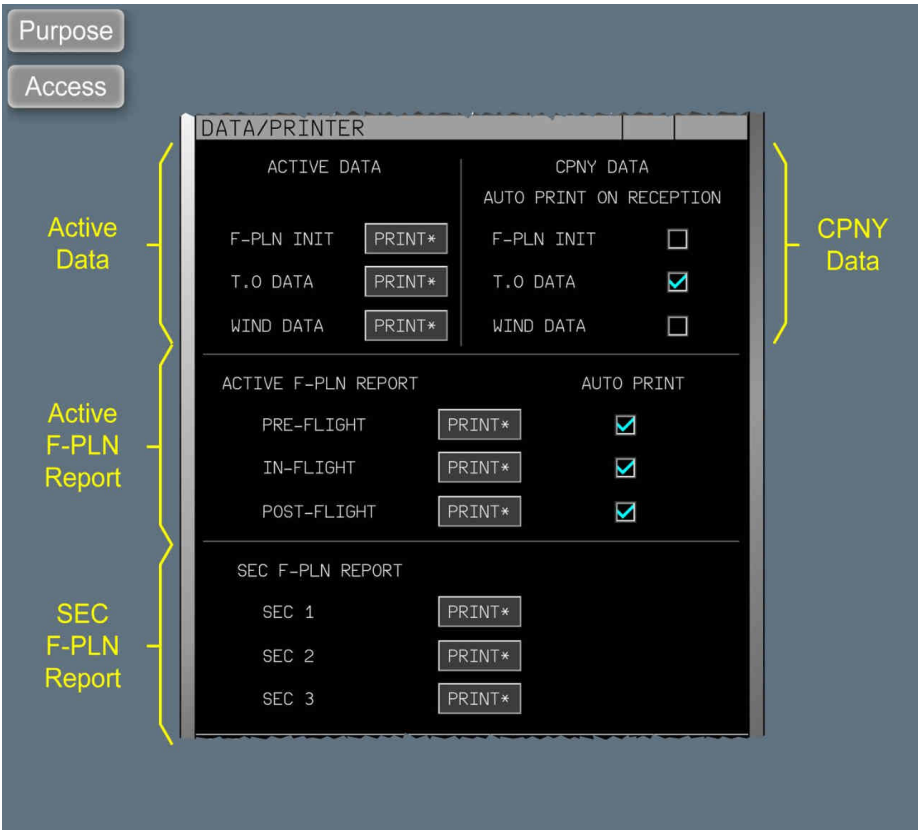
CANCEL BUTTON

When clicked, cancels the new NAVAID function.

DATA / PRINTER PAGE

Applicable to: ALL

PRINTER page



PURPOSE

On the PRINTER page, the flight crew can:

- Start the manual printing of active flight plan data and secondary flight plan reports
- Configure the automatic printing of company data and active flight plan reports.

ACCESS

The flight crew can access the PRINTER page via the General Menu Bar by selecting PRINTER in the DATA menu.

General Menu Bar



ACTIVE DATA

The flight crew clicks on the button to print out the associated data:
- Flight plan initialization data
- Takeoff data
- Wind data.

CPNY DATA

The flight crew selects (or deselects) the option(s) to activate (or deactivate) the automatic printing on reception of:
- Flight plan initialization data
- Takeoff data
- Wind data.

L2 Some options may be selected by default as defined in the AMI file.

ACTIVE F-PLN REPORT

The flight crew clicks on the button to print out the associated active flight plan report, and selects (or deselects) the option to activate (or deactivate) the automatic printing.

L2 Some option(s) may be selected by default as defined in the AMI file.

L1 **PRE-FLIGHT**

PRINT Button

The flight crew clicks on this button to print out the pre-flight report.

L2 This is only possible when the following two conditions are fulfilled:
- The FMS flight phase is PREFLIGHT, and
- The flight plan data is entered.

L1 AUTO PRINT Option

The flight crew selects (or deselects) the pre-flight option to activate (or deactivate) the automatic printing of the pre-flight report.
If activated, the automatic pre-flight report printing will occur at engine start.

IN-FLIGHT

PRINT Button

The flight crew clicks on this button to print out the in-flight report for the active flight plan.

L2 This is only possible when the FMS flight phase is either TAKEOFF, CLIMB, CRUISE, DESCENT, APPROACH, GO AROUND, or DONE and prior to all engine shut down.

L1 AUTO PRINT Option

The flight crew selects (or deselects) the in-flight option to activate (or deactivate) the automatic printing of the in-flight report.
If activated, the automatic in-flight report printing will occur at transition to TAKEOFF.

POST-FLIGHT

PRINT Button

The flight crew clicks on this button to print out the post-flight report for the active flight plan.
This is only possible after all engine shut down.

AUTO PRINT Option

The flight crew selects (or deselects) the post-flight option to activate (or deactivate) the automatic printing of the post-flight report.
If activated, the automatic post-flight report printing will occur at engine shut down.

SEC F-PLN REPORT

The flight crew clicks on the button to print out the associated secondary flight plan report.
This report may be either a pre-flight, or in-flight report.

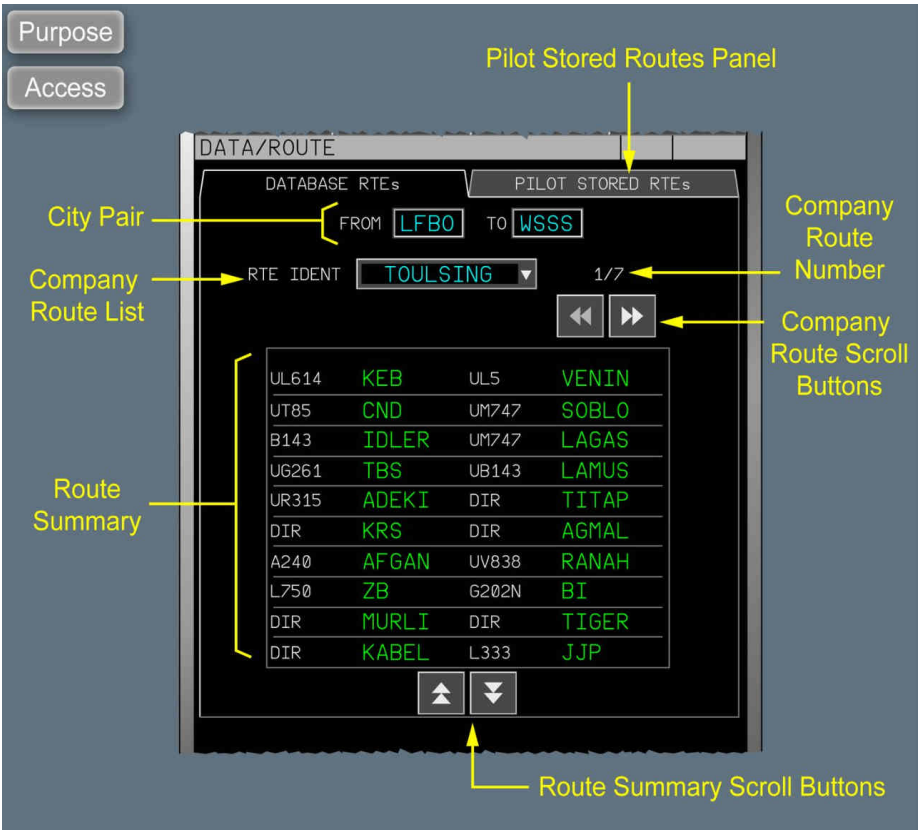
L2 If the secondary flight plan is created by a copy of the active flight plan and, and if this secondary flight plan is sequencing along with the active flight plan (the active leg of the secondary flight plan matches the active leg of the active flight plan) :

- A pre-flight report is available, if the FMS flight phase is PREFLIGHT
- An in-flight report is available in flight, except in the DONE phase.
  In all other cases, the secondary flight plan report is a pre-flight report.

DATA / ROUTE PAGE

Applicable to: ALL

Overview



PURPOSE

On the DATA / ROUTE page, the flight crew can:

- Call up the data for a company route, that is stored in the navigation database, or in the pilot stored elements database
- Create or delete company routes in the pilot stored elements database.

LINKS

Refer to Navigation Database .
Refer to Pilot Stored Elements Database .

ACCESS

The flight crew can access the DATA / ROUTE page, via:

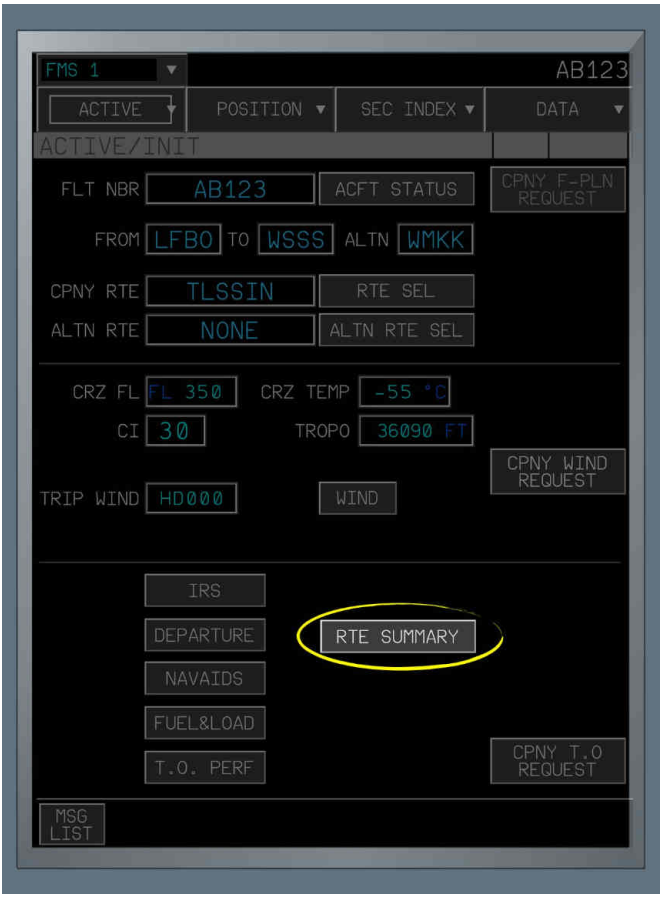
- The General Menu Bar, by selecting ROUTE in the DATA menu
  The DATABASE RTEs panel is opened by default.

General Menu



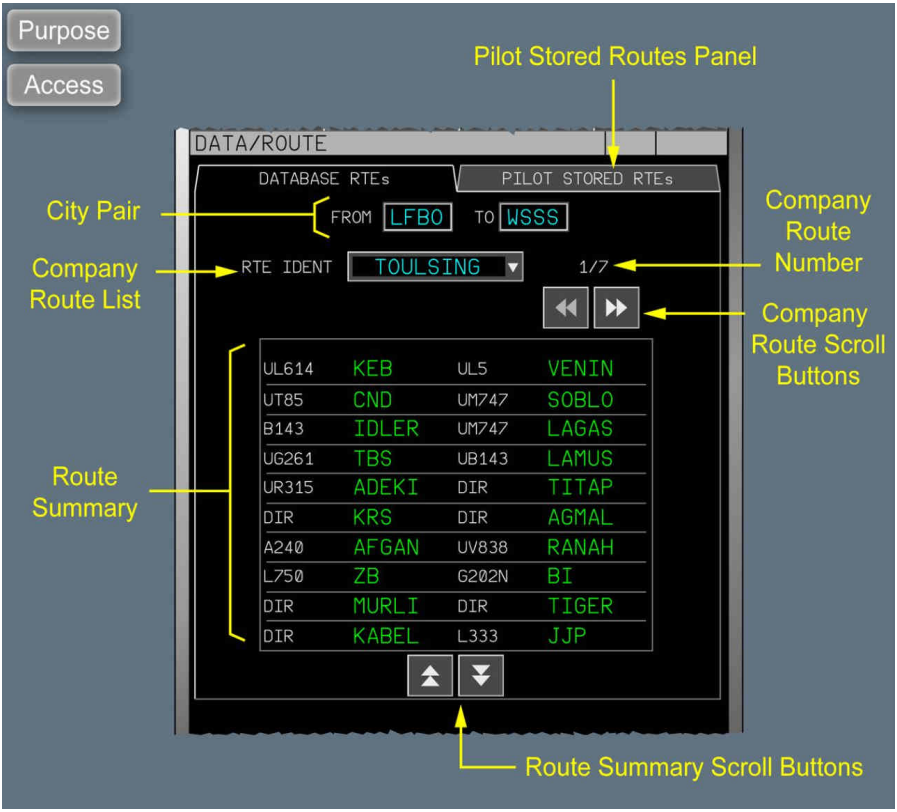
- The ACTIVE / INIT page, by clicking on the RTE SUMMARY button.
  The PILOT STORED RTEs panel is opened by default and the active flight plan is automatically copied as a new route.

RTE SUMMARY Button



DATABASE RTES PANEL

DATABASE RTEs Panel



CITY PAIR ENTRY FIELDS

The flight crew enters the idents of the FROM / TO city pair (origin and destination airports), in the entry fields.

L2 If the entered airport is not a navigation database, nor a pilot created airport, the NOT IN DATABASE message is displayed. *Refer to Message* .

If the entered airport is a pilot created airport, the NOT ALLOWED DATABASE ARPTs ONLY message is displayed. *Refer to Message* .

L1 **ENTRY FORMAT**

Refer to AIRPORT Entry Format .

COMPANY ROUTE LIST

The flight crew enters the company route ident via the keyboard, or by selecting it in the list. The list displays all the navigation database routes, that are associated with the FROM/TO city pair entered by the flight crew.

L2 If the entered route is not a navigation database, nor a pilot created route, the NOT IN DATABASE message is displayed. *Refer to Message .*

If the entered route is a pilot created route, the PILOT STORED RTES panel is opened, and displays the associated data.

L1 **ENTRY FORMAT**

Refer to CO RTE Entry Format

COMPANY ROUTE NUMBER

Indicates the ranking of the displayed route, and the total number of navigation database routes that are associated with the FROM/TO city pair.

COMPANY ROUTE SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the navigation database routes that are associated with the FROM/TO city pair.

ROUTE SUMMARY

Indicates the route summary of the selected company route.
The summary has to be read from left to right, and from top to bottom.
Company route waypoints are displayed in green big font. Airways and procedures are displayed in small white font.

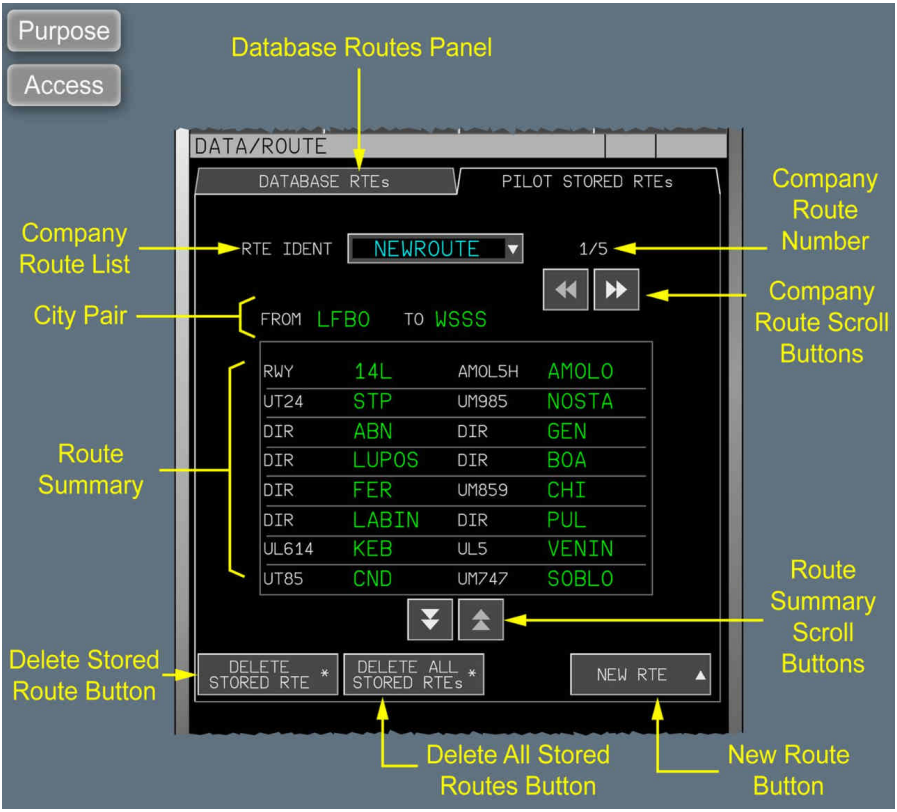
Note:
- *The VIA part of a procedure, and direct legs are indicated with DIR*
- *A runway is indicated with RWY*
- *When the company route has an approach procedure, only the first waypoint and the name of the procedure are displayed in the route summary.*

ROUTE SUMMARY SCROLL BUTTONS

The flight crew uses the scroll buttons to move, page by page, downwards (upwards) through the route summary.

PILOT STORED RTES PANEL

PILOT STORED RTEs Panel



COMPANY ROUTE LIST

Indicates the ident of the consulted pilot stored company route.
The list displays all pilot stored routes.
If the pilot stored routes database is empty, the panel displays " NO PILOT STORED RTEs ".

NO PILOT STORED RTE



ENTRY FORMAT

Refer to CO RTE Entry Format .

CITY PAIR

Indicates the FROM/TO (origin / destination) city pair that is associated with the displayed pilot stored route.

COMPANY ROUTE NUMBER

Indicates the ranking of the displayed route, and the total number of pilot stored routes.
The pilot stored routes database has a maximum of 5 routes.

COMPANY ROUTE SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the pilot stored routes.

ROUTE SUMMARY

Indicates the route summary of the selected company route.
The summary has to be read from left to right, and from top to bottom.
Company route waypoints are displayed in green big font. Airways and procedures are displayed in small white font.

Note:
- *The VIA part of a procedure, and direct legs are indicated with DIR*
- *A runway is indicated with RWY*
- *When the company route has an approach procedure, only the first waypoint and the name of the procedure are displayed in the route summary.*

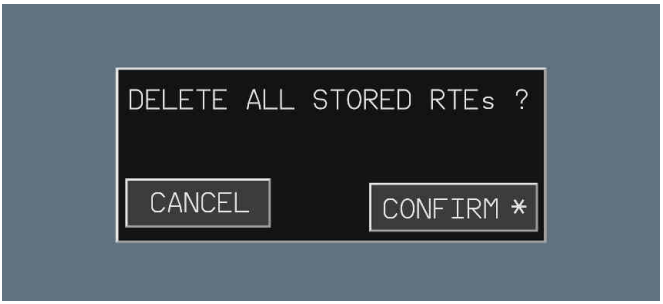
ROUTE SUMMARY SCROLL BUTTONS

The flight crew uses the scroll buttons to move, page by page, downwards (upwards) through the route summary.

DELETE ALL STORED ROUTES BUTTON

When clicked, deletes all pilot stored routes.
A confirmation action is required.

CONFIRM/CANCEL



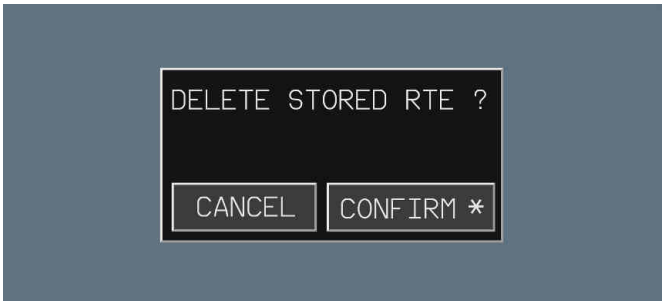
If there are pilot stored routes that are still used by the FMS , they are not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message).*

L2 The operator can choose (via the AMI file) to have all pilot stored elements automatically deleted at transition to the DONE flight phase.

DELETE STORED ROUTE BUTTON

When clicked, deletes the pilot stored route that is currently displayed.
A confirmation action is required.

CONFIRM/CANCEL



If the pilot stored route is still used by the FMS , it is not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message)* .

NEW ROUTE BUTTON

When clicked, opens a menu.
With the options of this menu, the flight crew can store a copy of the active or any secondary flight plan in the pilot stored elements database, *Refer to New Route Function* .

L2 The flight crew can store a copy of the active flight plan, only in pre-flight.

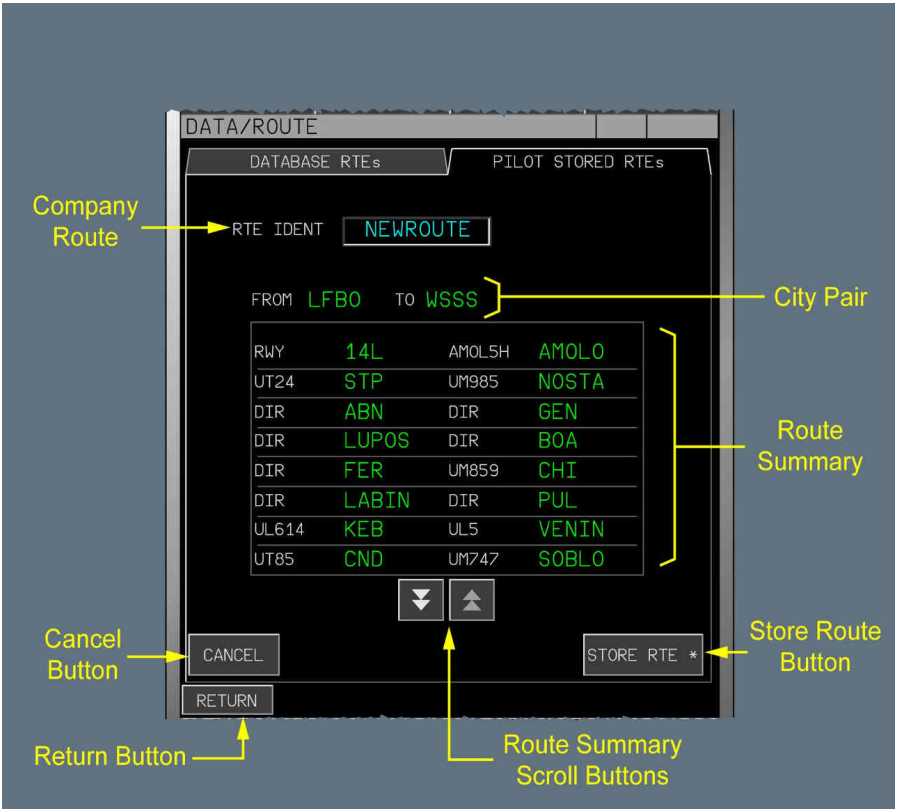
New Route Menu



L1 When the flight crew has copied one of the flight plans, its summary is displayed, and the route can be stored in the pilot stored routes database.

NEW ROUTE FUNCTION

New Route Function



COMPANY ROUTE ENTRY FIELD

Indicates the route ident of the new route.

L2 If the entered route ident already exists in the navigation database, or in the pilot stored routes database, the RTE IDENT ALREADY USED message is displayed. *Refer to DSC-22-FMS-20-110 RTE IDENT ALREADY USED .*

L1 **ENTRY FORMAT**

Refer to CO RTE Entry Format .

CITY PAIR

Indicates the FROM/TO (origin / destination) city pair that is associated with the new pilot stored route.

ROUTE SUMMARY

Indicates the route summary of the copied flight plan.
The summary has to be read from left to right, and from top to bottom.
Company route waypoints are displayed in green big font. Airways and procedures are displayed in small white font.

Note:
- *The VIA part of a procedure, and direct legs are indicated with DIR*
- *A runway is indicated with RWY*
- *When the company route has an approach procedure, only the first waypoint and the name of the procedure are displayed in the route summary.*

ROUTE SUMMARY SCROLL BUTTONS

The flight crew uses the scroll buttons to move, page by page, downwards (upwards) through the route summary.

STORE ROUTE BUTTON

When clicked, stores the new route in the pilot stored elements database.
The pilot stored routes database has a maximum of 5 routes.
L2 If the pilot stored route database is full, the route creation is rejected, and the PILOT RTEs LIST FULL message is displayed. *Refer to Message .*
Each stored route has a maximum size of 30 flight plan elements. When the route is longer, only the first 30 elements are stored, and the SOME REVISIONS NOT STORED message is displayed. *Refer to Message*

CANCEL BUTTON

When clicked, cancels the new route function.

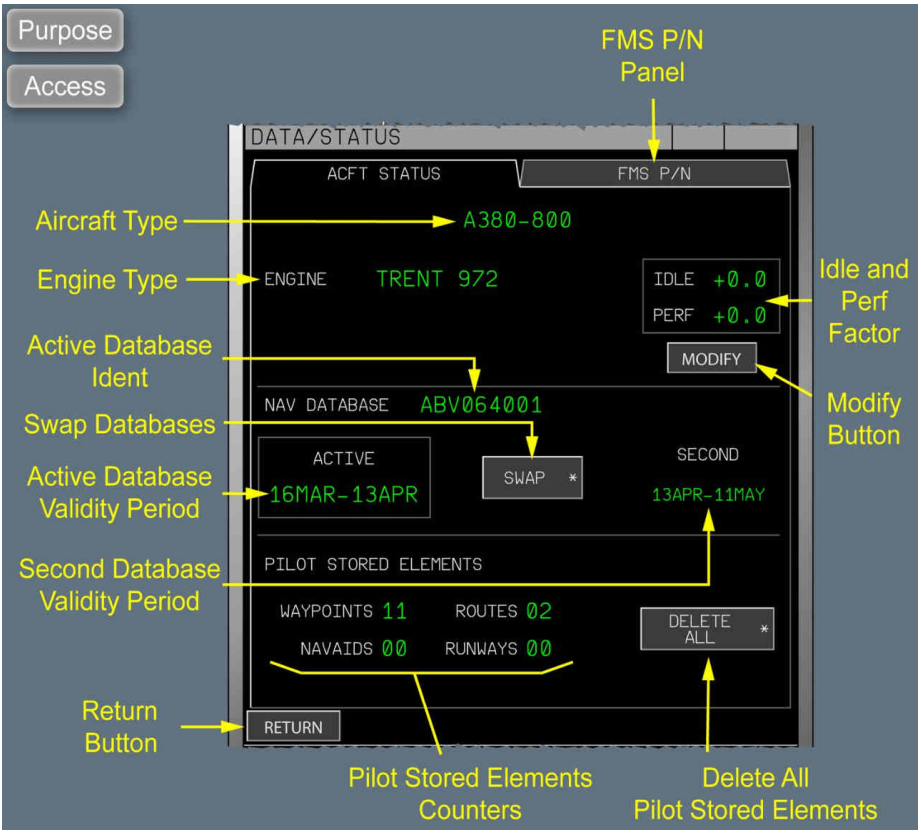
RETURN BUTTON

When clicked, displays the ACTIVE / INIT page.

DATA / STATUS PAGE

Applicable to: ALL

STATUS Page



PURPOSE

On the ACFT STATUS panel of the STATUS page, the flight crew can:

- Check the aircraft model and engine type
- Check the navigation database validity
- Swap navigation database cycles
- Check the number of pilot stored elements

- Delete the pilot stored elements

L2 - Modify the engine PERF and IDLE factors

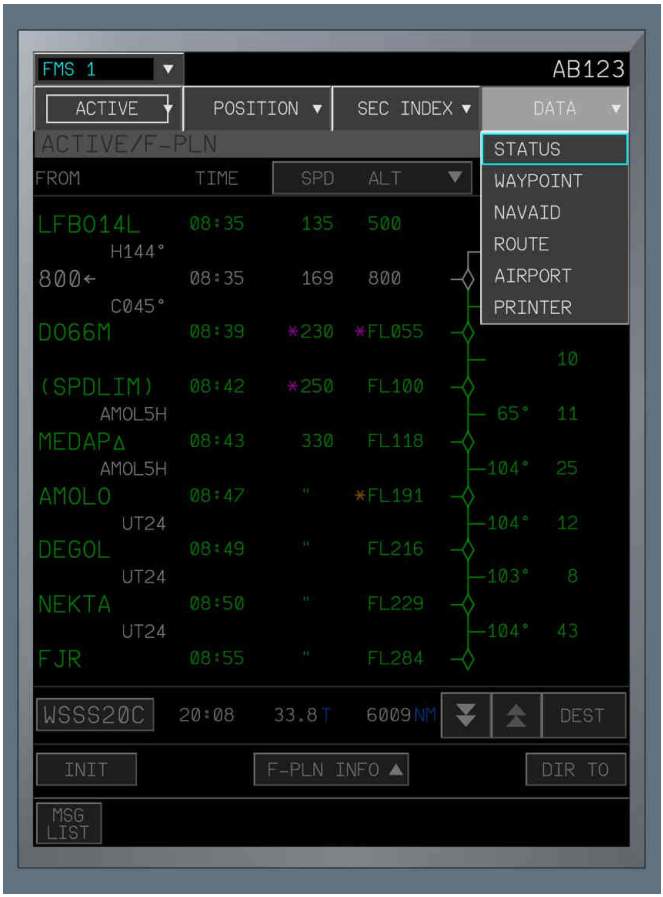
L1 On the FMS P/N panel of the STATUS page, the flight crew can consult the part numbers of the FMS software, the FMC databases, and configuration files.

ACCESS

The flight crew can access the STATUS page:

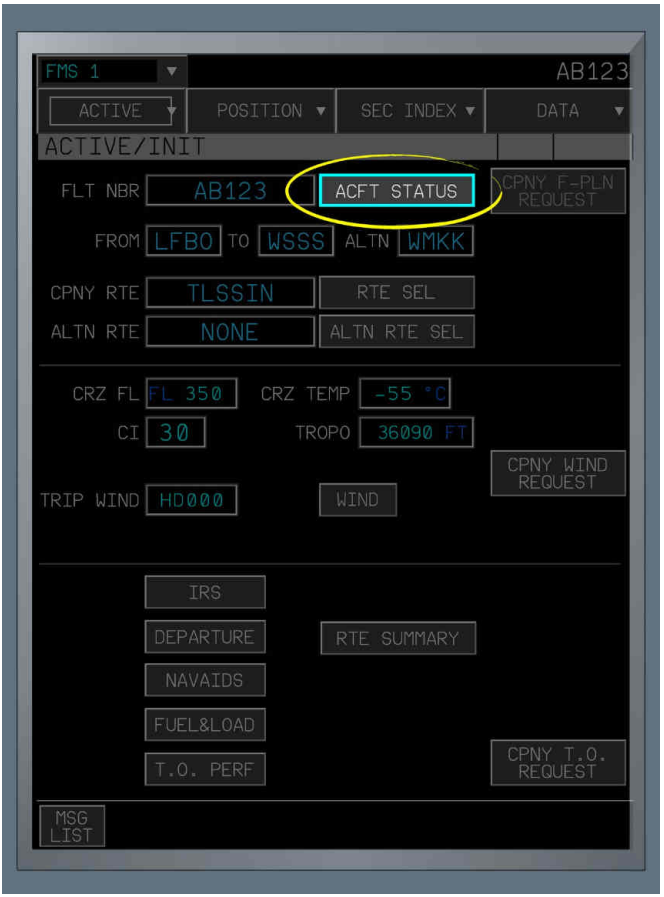
- Via the General Menu Bar, by selecting STATUS in the DATA menu

General Menu Bar



- Via the ACTIVE / INIT page, by clicking on the ACFT STATUS button

ACFT STATUS Button on the INIT page



L2 The ACFT STATUS panel on the STATUS page is automatically displayed:
- At the FMS power up
- After an automatic FMS reconfiguration, or FMC reset, before engine start
- Upon transition to the DONE phase.

The FMS P/N panel on the STATUS page is automatically displayed upon a power transient greater than 5 s, or an FMC reset with part number incompatibilities between the different FMCs.

AIRCRAFT TYPE

Indicates the aircraft type.

L2 The aircraft type is part of the performance database. (*Refer to Performance Database*)

ENGINE TYPE

Indicates the type of engine that is used for performance computations.

L2 The engine type is part of the performance database. (*Refer to Performance Database*)

IDLE AND PERF FACTOR

The idle and perf factor are two correction factors that are used for the FMS performance and predictions computation.

The idle factor is a correction factor of the idle engine rating.

The perf factor is a correction factor of the fuel flow, due to aerodynamics or engine deterioration.

L2 The operator can define a default value for both factors in the AMI file.

L1 Idle and perf factors can be changed via the modify button (*Refer to Modify)* . They can also be uplinked via ACARS .

L2 The manually entered idle and perf factors are stored and retained after transition to the DONE flight phase, or after a long term power cut.

L1 ENTRY FORMAT

Refer to IDLE FACTOR ENTRY FORMAT
Refer to PERF FACTOR ENTRY FORMAT

MODIFY BUTTON

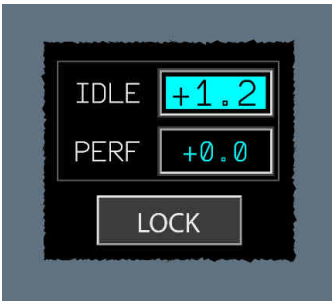
When clicked, removes the button and displays the key entry field.

Key Entry Field



After entry of the right key code, the idle and perf entry fields, and the lock button are displayed.

Idle and Perf Entry Fields



The idle and perf factors can now be changed. The entered values are locked by clicking on the lock button.

ACTIVE DATABASE IDENT

Indicates the part number of the currently loaded navigation database.

ACTIVE DATABASE VALIDITY PERIOD

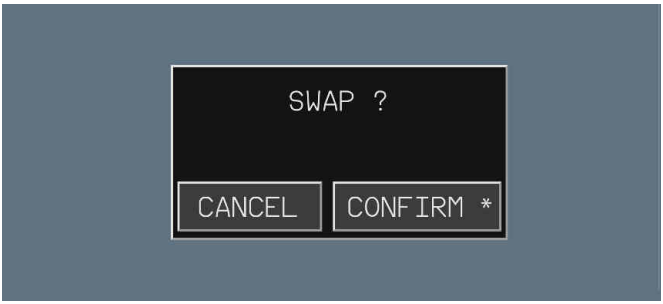
Indicates the validity period of the active navigation database.

SWAP DATABASES BUTTON

When clicked, the second navigation becomes the active one, and vice versa.

L2 *Note: The flight crew has to confirm the database swapping by clicking on the Confirm button in the Confirm/Cancel window.*

CONFIRM/CANCEL Window



L1

CAUTION	Swapping the databases, erases the active and secondary flight plans, as well as the flight crew stored data. The flight crew must never do this in flight.

SECOND DATABASE VALIDITY PERIOD

Indicates the validity period of the second navigation database.

PILOT STORED ELEMENTS COUNTERS

The pilot stored elements counters display the number of pilot stored waypoints, routes, NAVAIDS and runways.

L2 The operator can choose (via the AMI file) to have the pilot stored elements automatically deleted at transition to the DONE flight phase.

L1 All pilot stored elements are deleted when a new navigation database is loaded or when the active and second databases are swapped.

DELETE ALL BUTTON

When clicked, deletes all pilot stored waypoints, routes, NAVAIDS, and runways.

L2 *Note: The flight crew has to confirm the deletion of the pilot stored elements by clicking on the Confirm button in the Confirm/Cancel window.*

CONFIRM/CANCEL Window



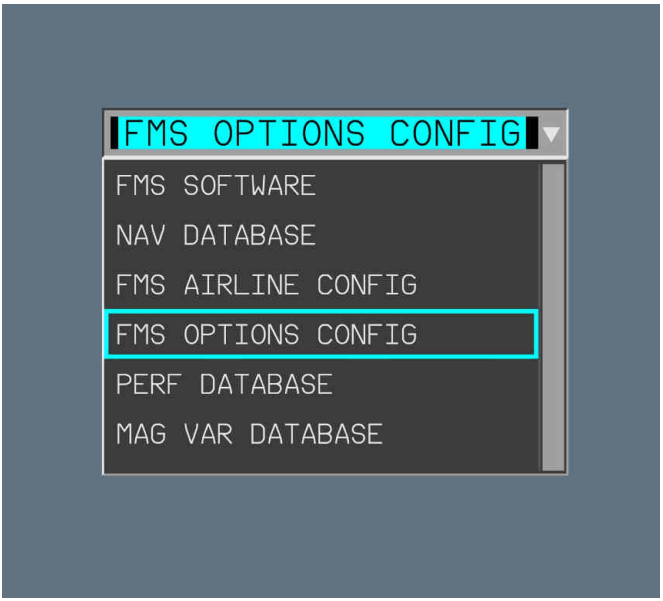
L1 If there are pilot stored elements that are still used by the FMS , they are not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message).*

L2 The operator can choose (via the AMI file) to have the pilot stored elements automatically deleted at transition to the DONE flight phase.

DATABASE LIST

The flight crew selects in the list the type of database for which he wants to displays the part numbers.

Database List



The database list displays:
- FMS SOFTWARE
- NAV DATABASE (*Refer to Navigation Database)*
- FMS AIRLINE CONFIG *Refer to AMI File)*
- FMS OPTIONS CONFIG (*Refer to OPC File)*
- PERF DATABASE (*Refer to Performance Database)*
- MAG VAR DATABASE (*Refer to Magnetic Variation Database)*

SCROLL BUTTONS

The flight crew uses the Scroll buttons to scroll, one by one, through the Database list. The associated part number data is displayed accordingly.

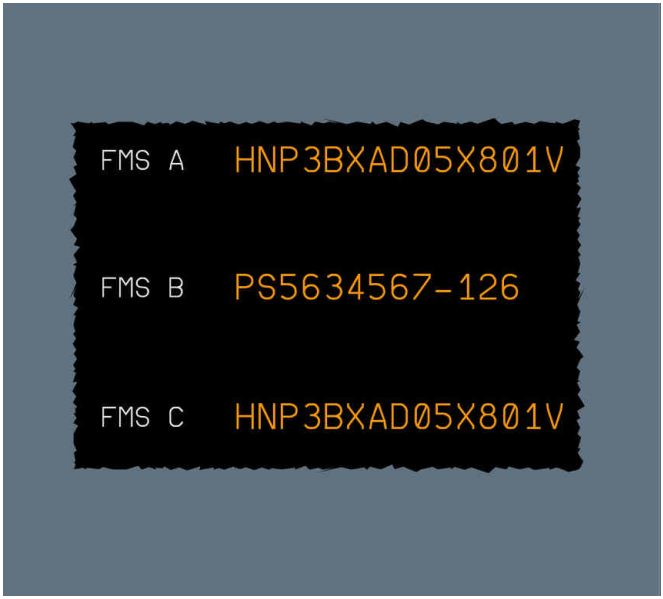
Note: *The wheel of the KCCU has the same functionality as the scroll buttons: Scrolling down (or up) the wheel displays the next (or previous) database and its part number data.*

FMC PART NUMBERS

Indicate for the three FMCs, the part number of the database selected in the database list.

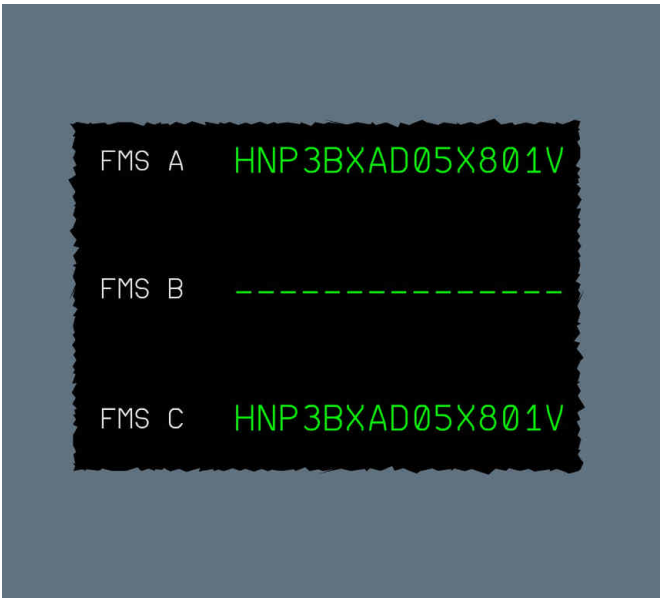
L2 The part numbers are all displayed in amber when there are at least two different numbers for a same database.

Different Part Numbers



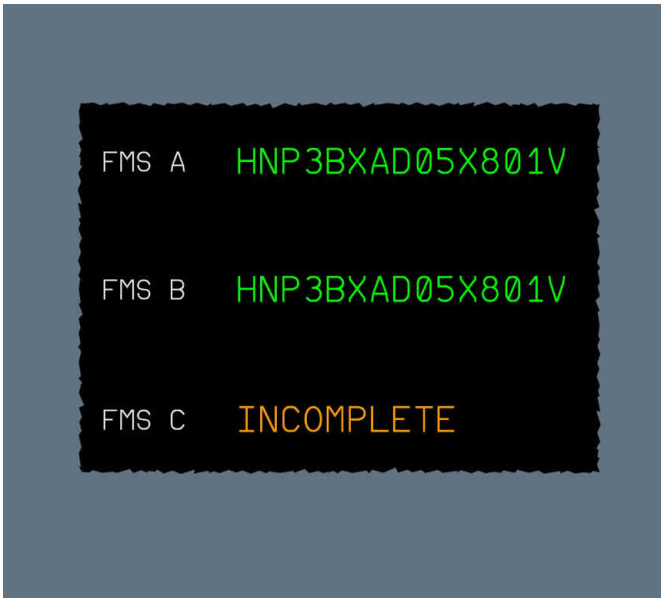
If an FMC is not available (or not connected to the FMC that controls the MFD, on which the STATUS page is displayed), the associated part number displays dashes.

Part Number Not Available



The FMS SOFTWARE, NAV DATABASE, FMS OPTIONS CONFIG, PERF DATABASE, and MAG VAR DATABASE are mandatory: They need to be loaded into the FMC.
If the part number of a mandatory database does not exist, the part number displays INCOMPLETE.

INCOMPLETE



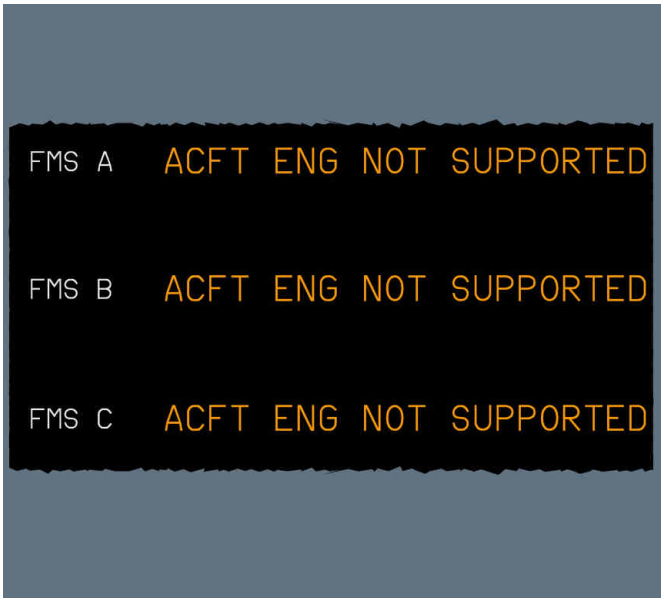
The FMS AIRLINE CONFIG is a not a mandatory database. If the part number for this database does not exist, the part number displays DEFAULT.

DEFAULT



If the PERF DATABASE is selected in the Database list, and there is no performance model associated to the given aircraft and engine type, ACFT ENG NOT SUPPORTED is displayed in amber.

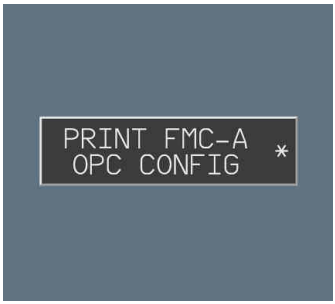
ACFT ENG NOT SUPPORTED



PRINT FMC OPC/AMI CONFIG BUTTON

If the FMS OPTIONS CONFIG is selected in the Database list, the flight crew uses this button to print the content of the OPC file of the FMC that controls the MFD, on which the STATUS page is displayed.

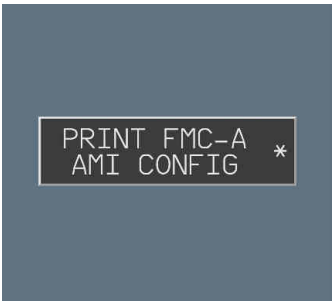
Print OPC Content



In this case, the label of the button may be:
- "PRINT FMC-A OPC CONFIG" (FMC-A controls the current MFD), or
- "PRINT FMC-B OPC CONFIG" (FMC-B controls the current MFD), or
- "PRINT FMC-C OPC CONFIG" (FMC-C controls the current MFD).

If the FMS AIRLINE CONFIG is selected in the Database list, the flight crew uses this button to print the content of the AMI file of the FMC that controls the MFD, on which the STATUS page is displayed.

Print AMI Content



In this case, the label of the button may be:
- "PRINT FMC-A AMI CONFIG" (FMC-A controls the current MFD), or
- "PRINT FMC-B AMI CONFIG" (FMC-B controls the current MFD), or
- "PRINT FMC-C AMI CONFIG" (FMC-C controls the current MFD).

PRINT ALL P/N BUTTON

When clicked, prints the FM P/N STATUS REPORT.

RETURN BUTTON

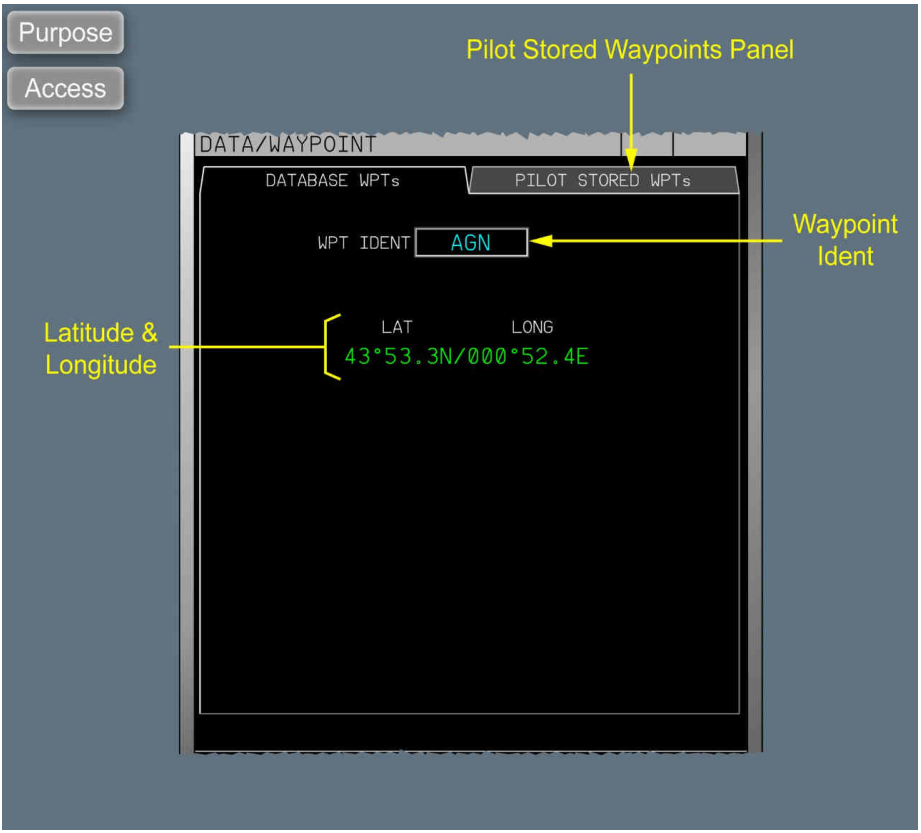
When clicked, displays the ACTIVE / INIT page. (*Refer to Page*)

L2 The Return button is only displayed when the flight crew has accessed the STATUS page via the INIT page.

DATA / WAYPOINT PAGE

Applicable to: ALL

Overview



PURPOSE

On the DATA / WAYPOINT page, the flight crew can:

- Call up the data for a waypoint, a NAVAID, a runway or an airport, that is stored in the navigation database, or in the pilot stored elements database
- Create or delete waypoints in the pilot stored elements database.

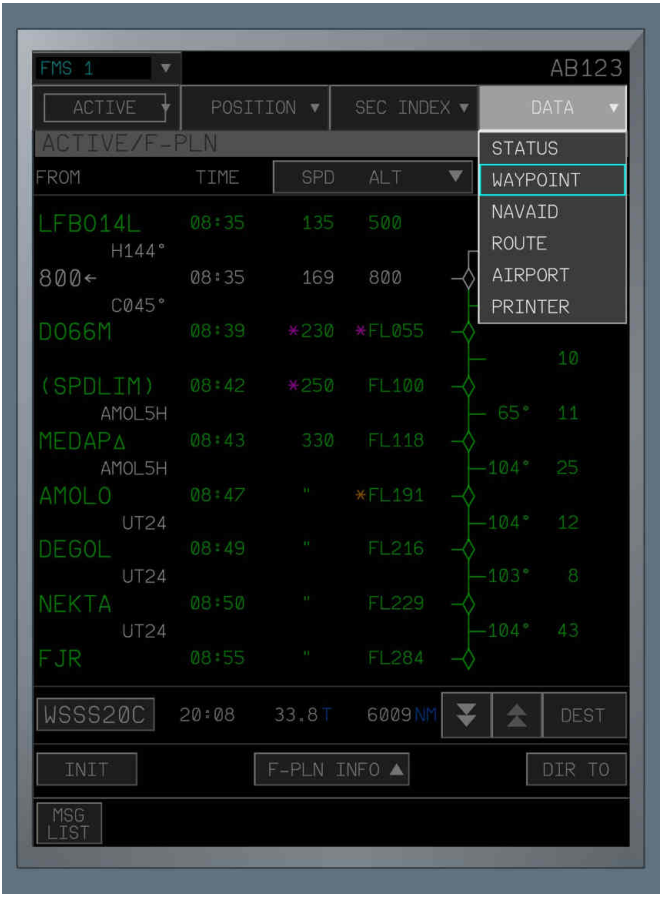
LINKS

Refer to Navigation Database .
Refer to Pilot Stored Elements Database .

ACCESS

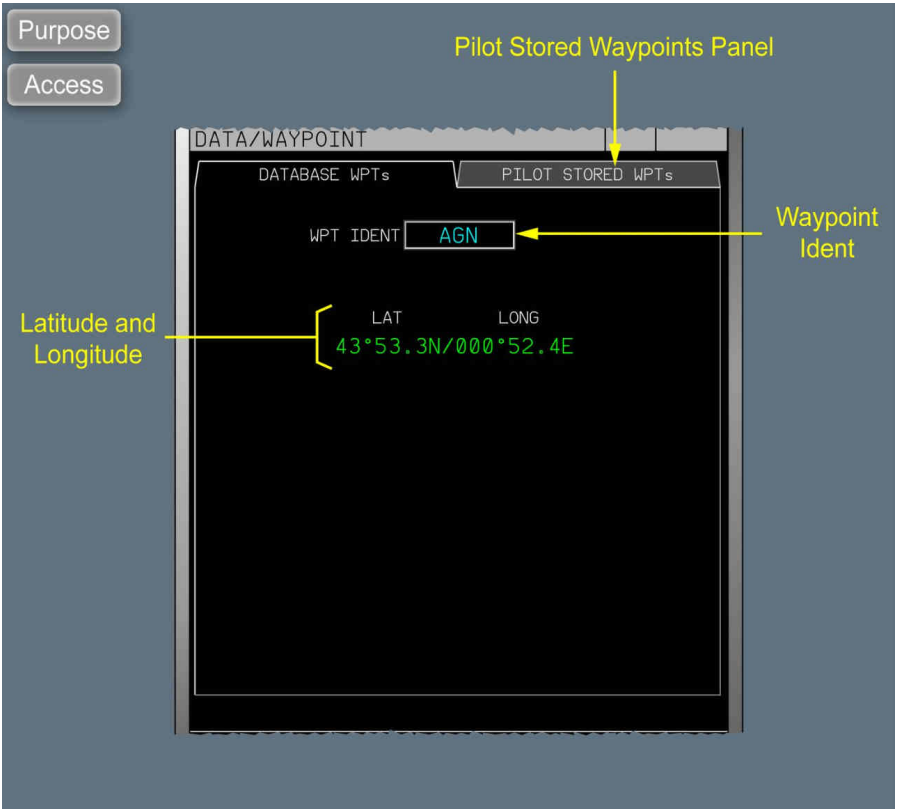
The flight crew can access the DATA / WAYPOINT page, via the General Menu Bar, by selecting WAYPOINT in the DATA menu.
The DATABASE WPTs panel is opened by default.

General Menu Bar



DATABASE WPTS PANEL

DATABASE WPTs Panel



WAYPOINT IDENT ENTRY FIELD

The flight crew enters the ident of a waypoint (or NAVAID, runway, or airport) in the entry field.

L2 If the entered waypoint is a waypoint created by the flight crew, the PILOT STORED WPTs panel is opened, and displays the associated position data.

If the entered waypoint is not a navigation database, nor a pilot created waypoint, the PILOT STORED WPTs panel is opened, and displays the new waypoint function, *Refer to New Waypoint Function* .

L1 **ENTRY FORMAT**

The possible formats for a waypoint ident entry are:

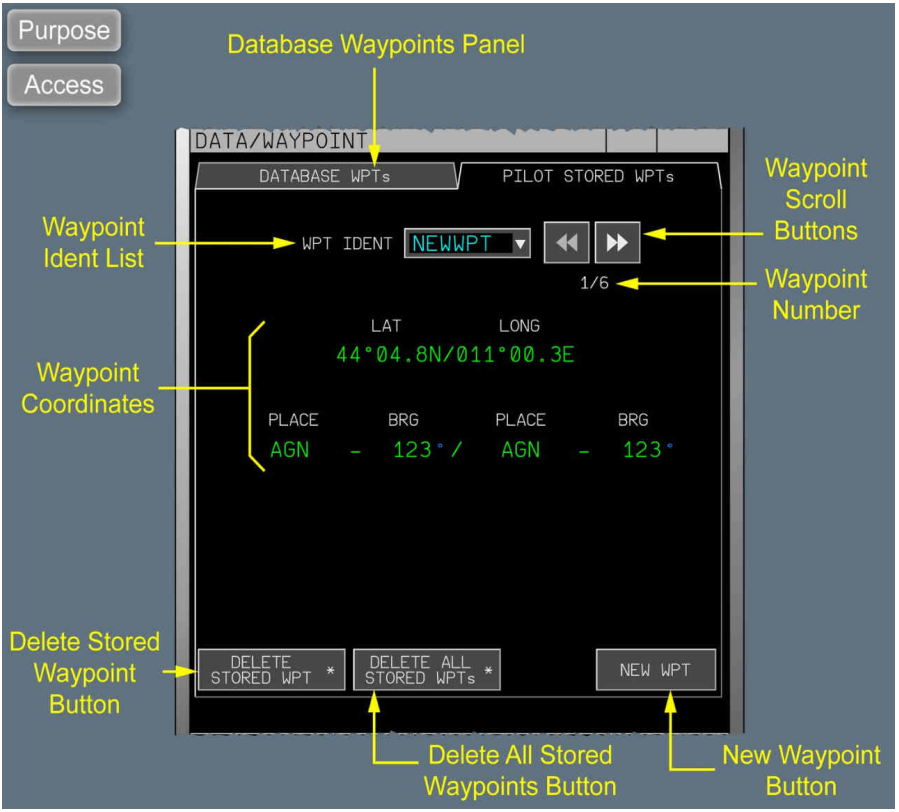
- *Refer to WAYPOINT Entry Format*
- *Refer to NAVAID Entry Format*
- *Refer to AIRPORT Entry Format*
- *Refer to RUNWAY Entry Format*

LATITUDE AND LONGITUDE

Indicates the latitude and longitude coordinates of the navigation database waypoint (or NAVAID, runway, or airport).

PILOT STORED WPTS PANEL

PILOT STORED WPTs Panel



WAYPOINT IDENT LIST

Indicates the ident of the consulted pilot stored waypoint.
The list displays all the pilot stored waypoints.

L2 If the entered waypoint is not a navigation database, nor a pilot created waypoint, the PILOT STORED WPTs panel is opened, and displays the New Waypoint Function, *Refer to New Waypoint Function* .

L1 If the pilot stored waypoints database is empty, the panel displays " NO PILOT STORED WPT ".

NO PILOT STORED WPT



ENTRY FORMAT

The possible formats for a waypoint ident entry are:

- *Refer to WAYPOINT Entry Format*
- *Refer to NAVAID Entry Format*
- *Refer to AIRPORT Entry Format*
- *Refer to RUNWAY Entry Format*

WAYPOINT SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the pilot stored waypoints.

WAYPOINT NUMBER

Indicates the ranking of the displayed pilot-stored waypoint, and the total number of pilot-stored waypoints.
The pilot-stored waypoints database has a maximum of 50 waypoints.

WAYPOINT COORDINATES

Indicates the position data of the pilot stored waypoint:

- Place/Distance waypoint:

Place/Distance Waypoint



- Place/Bearing/Distance waypoint:

Place/Bearing/Distance Waypoint



- Place-Bearing/Place-Bearing waypoint:

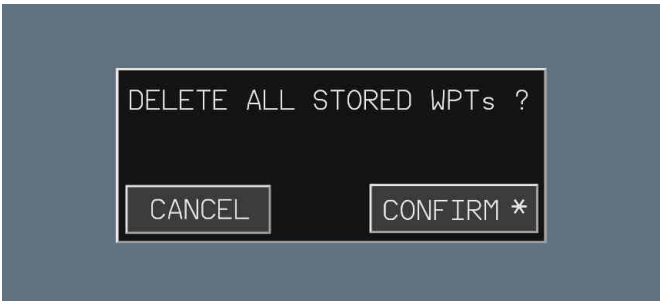
Place-Bearing/Place-Bearing Waypoint



DELETE ALL STORED WAYPOINTS BUTTON

When clicked, deletes all pilot stored waypoints.
A confirmation action is required.

CONFIRM/CANCEL



If there are pilot stored waypoints that are still used by the FMS , they are not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message).*

L2 The operator can choose (via the AMI file) to have all pilot stored elements automatically deleted at transition to the DONE flight phase.

DELETE STORED WAYPOINT BUTTON

When clicked, deletes the pilot stored waypoint that is currently displayed.
A confirmation action is required.

CONFIRM/CANCEL



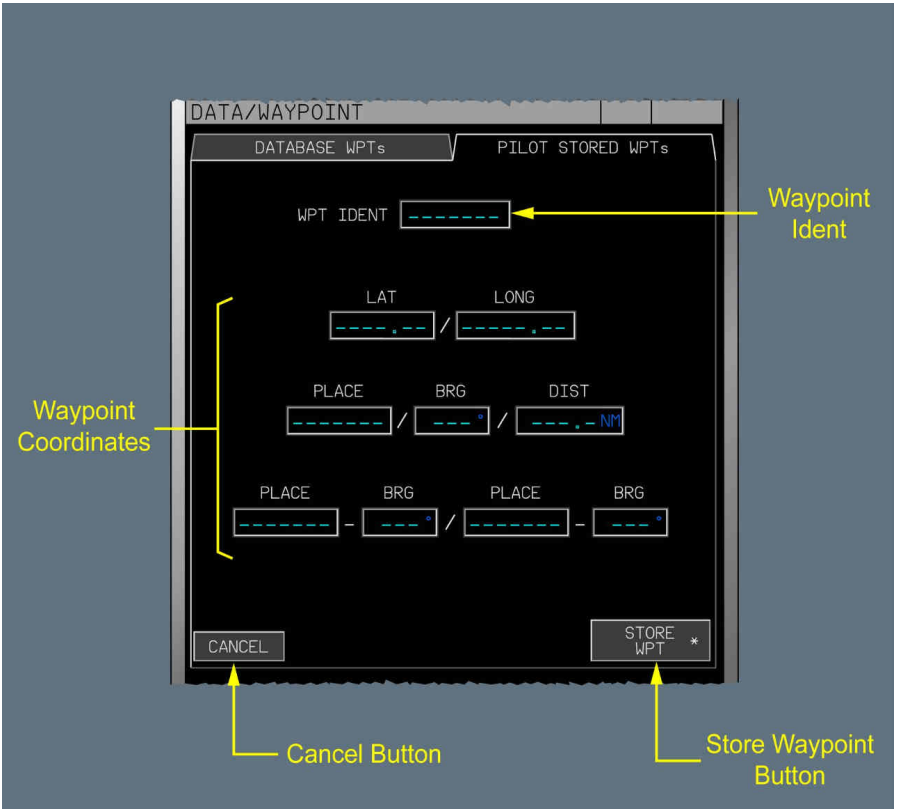
If the pilot stored waypoint is still used by the FMS , it is not deleted. The FMS displays the message F-PLN ELEMENT RETAINED (*Refer to Message)* .

NEW WAYPOINT BUTTON

When clicked, displays the new waypoint function of the PILOT STORED WPTs panel, *Refer to New Waypoint Function* .

NEW WAYPOINT FUNCTION

New Waypoint Function



WAYPOINT IDENT ENTRY FIELD

Indicates the waypoint ident that is associated with the new waypoint.

ENTRY FORMAT

The possible formats for a waypoint ident entry are:

- *Refer to WAYPOINT Entry Format*
- *Refer to NAVAID Entry Format*

- *Refer to AIRPORT Entry Format*
- *Refer to RUNWAY Entry Format*

WAYPOINT COORDINATES ENTRY FIELDS

The flight crew can create a waypoint in the three different ways, by entering:
- A latitude and longitude
- A Place/Bearing/Distance
- A Place-Bearing/Place-Bearing.

ENTRY FORMAT

The possible formats for waypoint coordinates entries are:
- *Refer to LATITUDE Entry Format*
- *Refer to LONGITUDE Entry Format*
- *Refer to PLACE Entry Format*
- *Refer to BEARING Entry Format*
- *Refer to DISTANCE Entry Format* .

STORE WPT BUTTON

When clicked, stores the new waypoint in the pilot-stored elements database.
The pilot-stored waypoints database has a maximum of 50 waypoints.
L2 If the pilot-stored waypoints database is full, the first created waypoint that is not part of the flight plan is deleted. If all of the 50 waypoints are used by the FMS , the waypoint creation is rejected, and the 50 WPTs MAX : ALL IN USE message is displayed, *Refer to Message* .

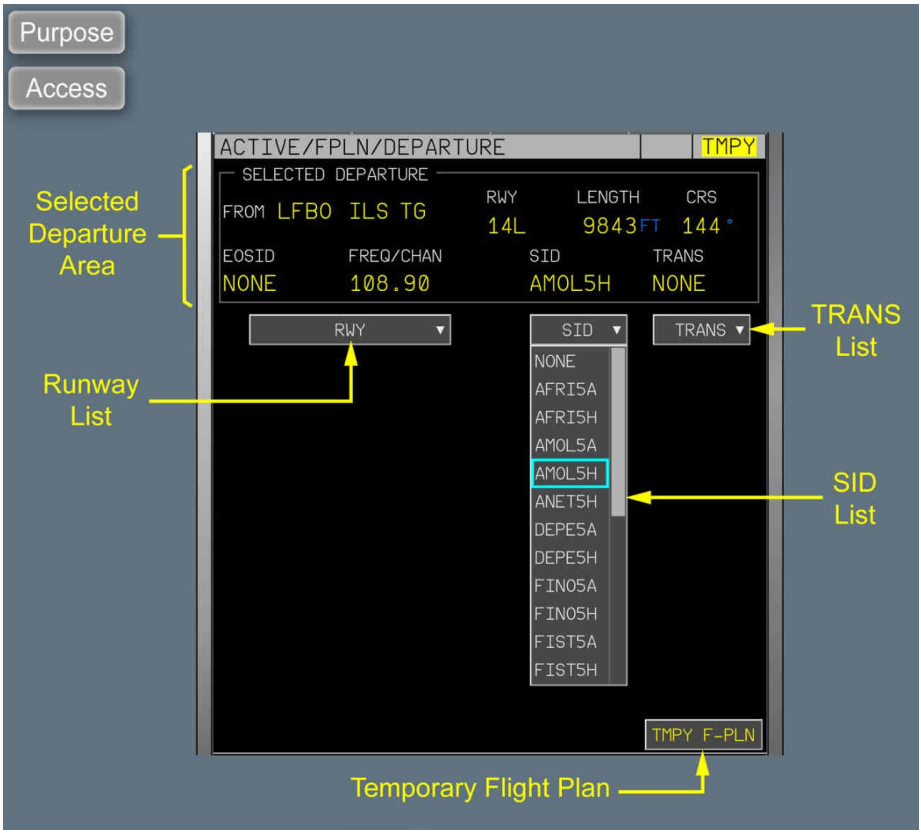
CANCEL BUTTON

When clicked, cancels the new waypoint function.

DEPARTURE PAGE

Applicable to: ALL

DEPARTURE Page



PURPOSE

The DEPARTURE page enables the flight crew to insert or change the departure procedure. The DEPARTURE page is available for the active and secondary flight plans.

LINKS

Refer to DEPARTURE Revision

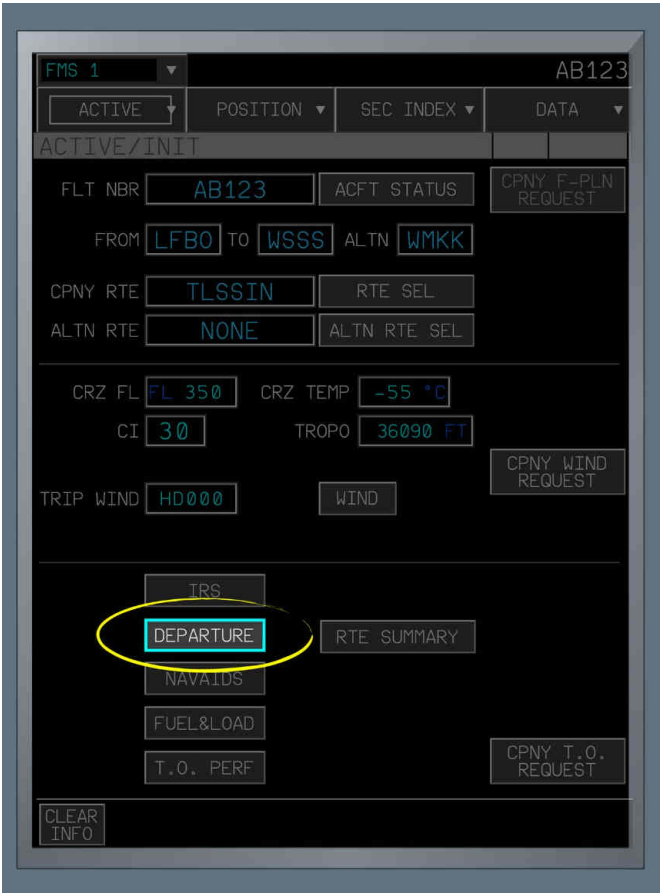
ACCESS

The flight crew can access the DEPARTURE page, via:

- The F-PLN page, by selecting the DEPARTURE revision in the waypoint revisions menu of the primary(alternate) origin airport.



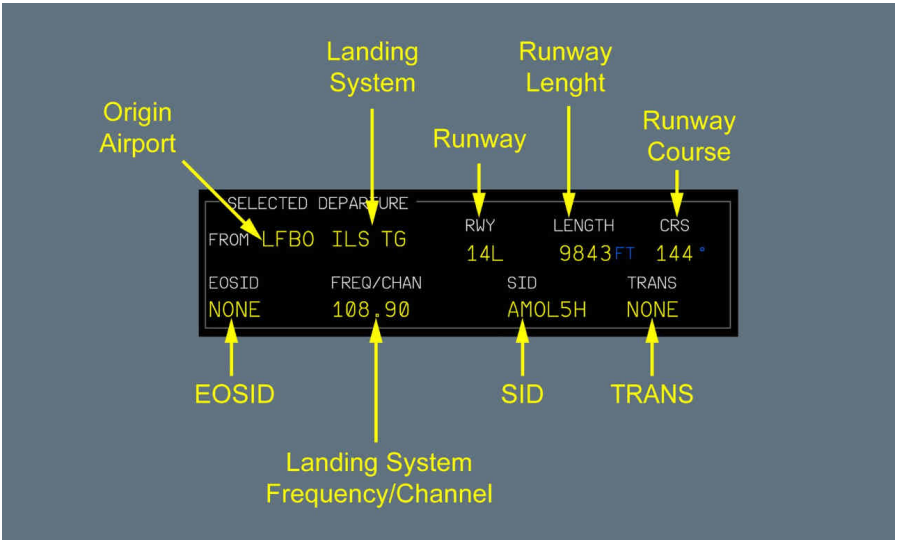
- The INIT page, by clicking on the DEPARTURE button.



Note: *For the secondary flight plans, the flight crew can access the DEPARTURE page only via the SEC 1(2)(3)/F-PLN page.*

SELECTED DEPARTURE AREA

Selected Departure Area



This area displays the selected departure procedure parameters.

L2 The information appears in green, if it is part of the active flight plan. It appears in yellow, if the flight crew created a temporary flight plan, by selecting or changing the departure procedure.

Note: If a temporary flight plan exists, and was created by a revision other than the departure procedure revision, the information is displayed in green.

The arrival information is displayed in a white font for the secondary flight plans.

L1 All fields, except the origin airport, display dashes if the flight crew made no selection.

ORIGIN AIRPORT

Indicates the current origin airport of the primary or alternate flight plan.

EOSID

Indicates the Engine Out Standard Instrument Departure (EOSID), associated with the selected departure runway.
NONE is displayed, if no EOSID exists for the selected departure runway.

LANDING SYSTEM TYPE AND IDENT

Indicates the type and ident of the landing system of the selected departure runway.

LANDING SYSTEM FREQUENCY(CHANNEL)

Indicates the frequency(channel) of the landing system of the selected departure runway.

RUNWAY

Indicates the selected departure runway.

RUNWAY LENGTH

Indicates the navigation database runway length (in meters or feet) of the selected departure runway.

RUNWAY COURSE

Indicates the navigation database runway course (in degrees °) of the selected departure runway.

SID

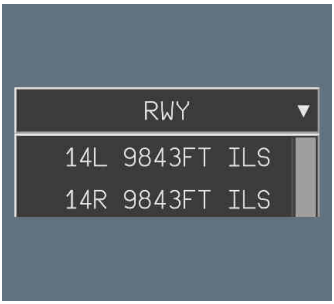
Indicates the SID selected by the flight crew from the SID list.

TRANS

Indicates the TRANS selected by the flight crew from the TRANS list.

RWY LIST

RWY List



Displays all runways that are compatible with the current origin airport of the primary(alternate) flight plan, with their associated length and landing system.

When the flight crew selects a runway, the FMS creates or updates a temporary flight plan, and completes or updates the following fields in the selected departure area:
- The runway
- The runway length

- The runway course
- The EOSID
- The landing system type and ident
- The landing system frequency/channel.

SID LIST

SID List



Displays all SIDs that are compatible with the selected departure runway.

L2 *Note: The flight crew can only open the SID list if a departure runway is selected.*

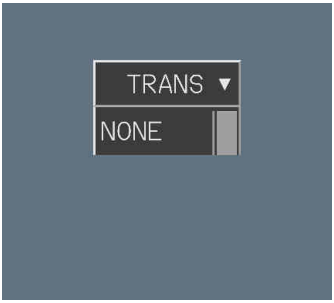
L1 The first element of the SID list is NONE.

L2 *Note: The NONE option is selected automatically, when the flight crew selects a departure runway, and there is no compatible SID.*
When the flight crew selects NONE, or when there is no compatible SID, a default leg, up to 1 500 ft on the runway axis, is created.

L1 When the flight crew selects a SID, or the NONE option, the FMS creates(updates) a temporary flight plan, and completes or updates the SID field in the selected departure area.

TRANS LIST

TRANS List



Displays all TRANS that are compatible with the selected departure runway and SID.

L2 *Note: The flight crew can only open the TRANS list if a departure runway and SID are selected.*

L1 The first option in the TRANS list is NONE.

L2 *Note: The NONE option is selected automatically, when the flight crew selects a departure runway and SID, and there is no compatible TRANS.*

L1 When the flight crew selects a TRANS, or the NONE option, the FMS creates(updates) a temporary flight plan, and completes(updates) the TRANS field in the selected departure area.

TMPY F-PLN BUTTON

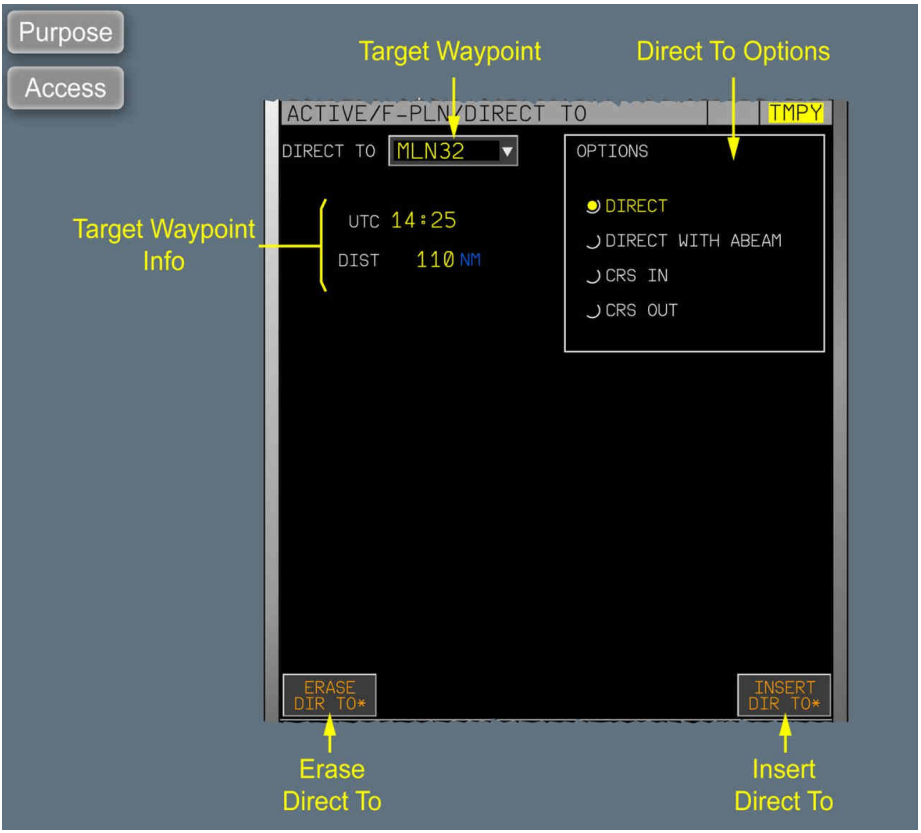
When clicked, displays the ACTIVE/F-PLN page, *Refer to Page* .

L2 The TMPY F-PLN button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the RETURN button is displayed in the bottom left corner of the page: When clicked, the F-PLN, or INIT page is displayed.

DIRECT TO PAGE

Applicable to: ALL

DIRECT TO Page



PURPOSE

On the DIRECT TO page, the flight crew can insert:

- A DIRECT TO leg (DIRECT)
- A DIRECT TO leg with abeam waypoints (DIRECT WITH ABEAM)
- A DIRECT TO leg with interception of an inbound radial (CRS IN)
- A DIRECT TO leg with interception of an outbound radial (CRS OUT).

The DIRECT TO page is only available for the active flight plan.

LINKS

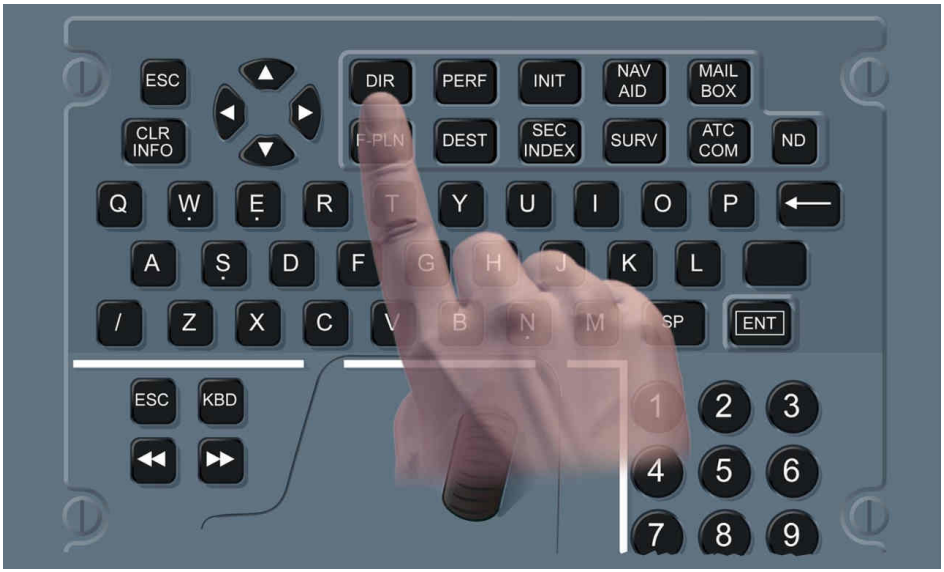
Refer to More Information on the DIR TO Revision

ACCESS

The flight crew can access the DIRECT TO page:

- By pressing the DIR key on the keyboard of the KCCU

DIR Key on the KCCU



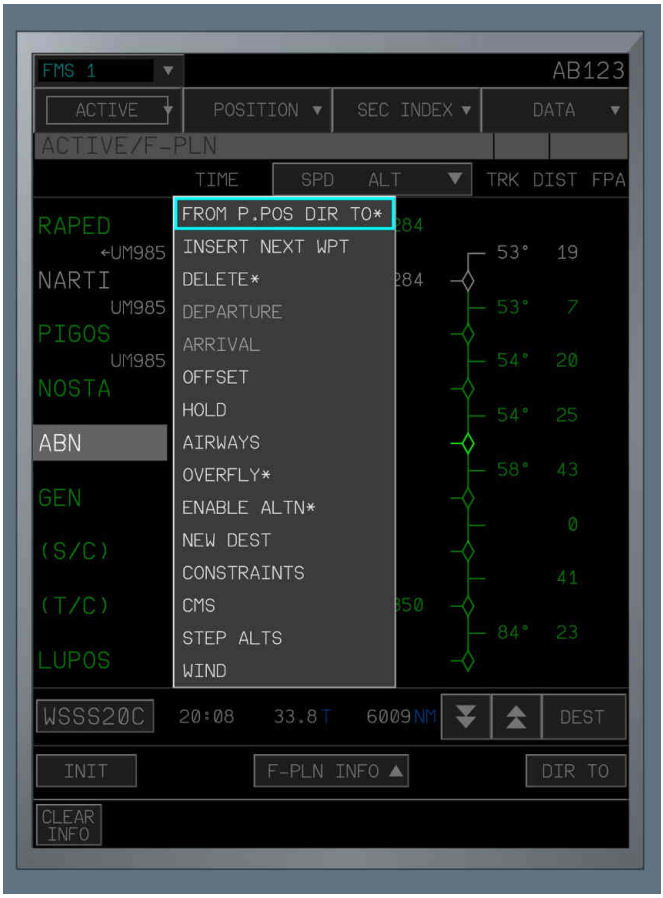
- Via the ACTIVE / F-PLN page, by clicking on the DIR TO button

F-PLN Page



- Via the ACTIVE / F-PLN page, by selecting the direct to revision (FROM P.POS DIR TO) in the waypoint revisions menu of the direct to fix.

F-PLN Page



L2 The flight crew cannot access the DIRECT TO page, when:

- A temporary flight plan (that is not created by a direct to) is pending.
  The FMS displays the message INSERT OR ERASE TMPY F-PLN FIRST. (*Refer to Message)*
- The FMS aircraft position is not valid.
  The FMS displays the message ACFT POSITION NOT VALID. (*Refer to Message)*

TARGET WAYPOINT LIST

Target Waypoint



Indicates the DIR TO target waypoint.
The flight crew enters the target waypoint via the keyboard, or by selecting it in the list. The list displays all flight plan waypoints between the FROM waypoint and the primary destination.
The target waypoint is automatically set to the revised waypoint, when the flight crew has accessed the DIRECT TO page via the waypoint revisions menu.

ENTRY FORMAT

The possible formats for a manual waypoint entry are:

- The ident of a navigation database, or pilot stored waypoint, NAVAID, airport, or runway
  Refer to Waypoint Entry Format
  Refer to NAVAID Entry Format
  Refer to Airport Entry Format
  Refer to Runway Entry Format
- Latitude/longitude (*Refer to Entry Format*)
- Place/bearing/distance (*Refer to Entry Format*)
- Place-bearing/place-bearing (*Refer to Entry Format).*

If the flight crew inserts a DIR TO a latitude/longitude, place/bearing/distance, or place-bearing/place-bearing waypoint, this waypoint is registered in the pilot-stored elements database (*Refer to Pilot Stored Elements Database*).

DIRECT TO OPTIONS

The flight crew can select the DIRECT TO option.

L2 The default DIR TO option is DIRECT, or DIRECT WITH ABEAM, depending on the Operator's selection. The AMI files defines the default DIRECT TO option. (*Refer to AMI file)*

L1 When the flight crew selects the CRS IN or the CRS OUT option the ND displays an associated entry field.

CRS ENTRY FIELD



If the DIRECT TO target waypoint is a flight plan waypoint, the FMS enters a default value for the inbound or outbound radial.
The default CRS IN is the course from the flight plan waypoint that precedes the target waypoint, to the target waypoint.
The default CRS OUT is the course from the target waypoint to the flight plan waypoint that follows the target waypoint.

ENTRY FORMAT

Refer to CRS IN (CRS OUT) ENTRY FORMAT

TARGET WAYPOINT INFO

The ND displays the UTC time of arrival at the target waypoint, and the distance between the current position of the aircraft and the target waypoint.

INSERT DIRECT TO BUTTON

When clicked, the temporary flight plan is inserted, and the ND displays the new active flight plan.

ERASE DIRECT TO BUTTON

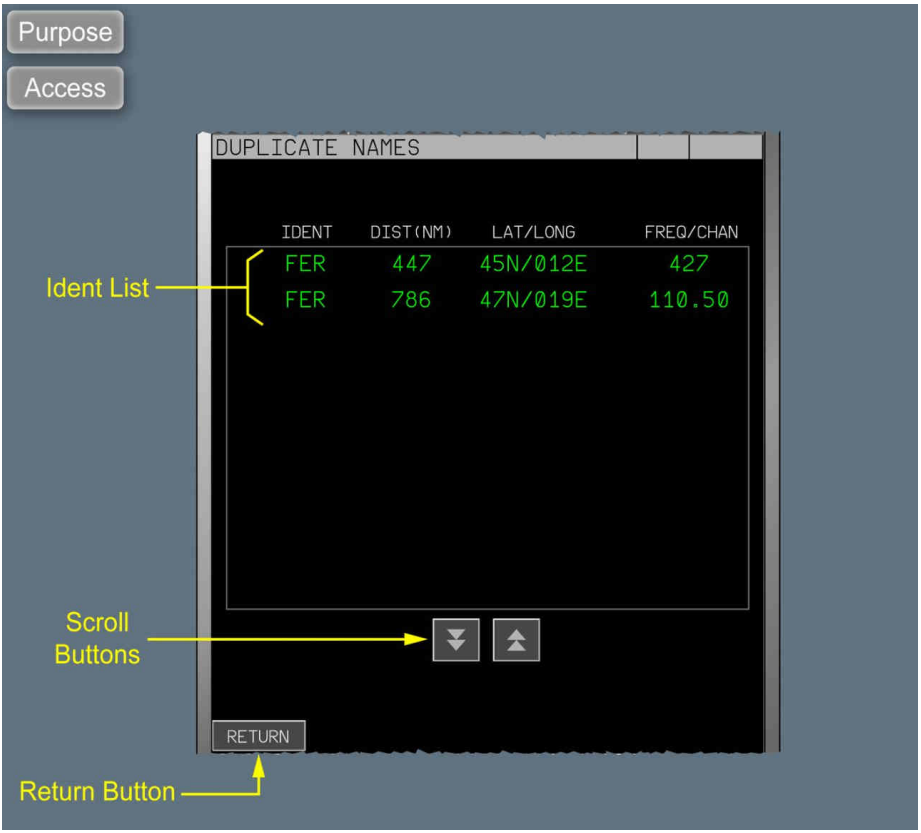
When clicked, the temporary flight plan is deleted, and the ND displays the active flight plan. (*Refer to Page*)

L2 The Erase Direct To button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the Return button is displayed. Clicking on the Return button, displays the ACTIVE / F-PLN page.

DUPLICATE NAMES PAGE

Applicable to: ALL

DUPLICATE NAMES page



PURPOSE

On the DUPLICATE NAMES page, the flight crew can select the desired waypoint, airport, runway, or NAVAID, when its ident is not unique in the navigation and pilot stored elements database.

ACCESS

The DUPLICATE NAMES page is displayed automatically when the flight crew enters the ident of a database element that is not unique in the database.

IDENT LIST

Indicates the following data of the database element:
- The ident (IDENT)
- The direct distance to the aircraft (DIST)
- The latitude and longitude (LAT/LONG)
- The frequency (FREQ), only for NAVAIDS
- The channel (CHAN), only for GLS.

The elements are ranked in increasing order of direct distance from the present position.

SCROLL BUTTONS

The flight crew uses the scroll buttons to move, page by page, downwards (upwards) through the list.

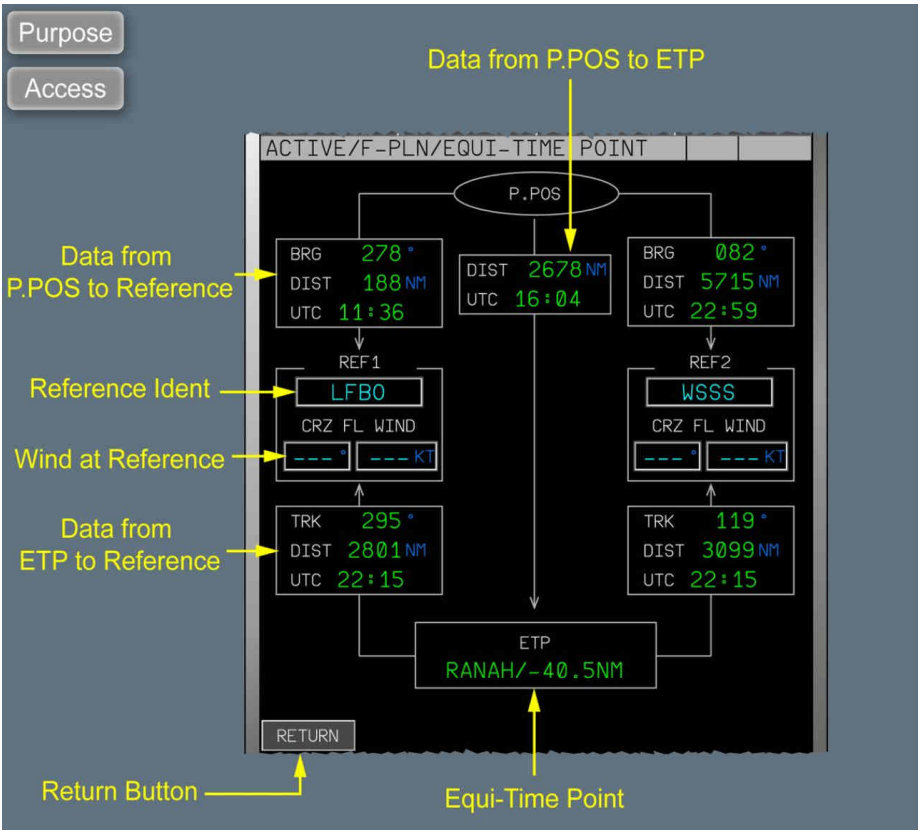
RETURN BUTTON

When clicked, displays the page that was displayed before the DUPLICATE NAMES page.

EQUI-TIME POINT PAGE

Applicable to: ALL

EQUI-TIME POINT Page



PURPOSE

On the EQUI-TIME POINT page, the flight crew can compute the pseudo waypoint called Equi-Time Point (ETP). The ETP is the point on the flight plan from where the time to reach both selected references is the same.

The FMS computes by default the ETP between the origin and the destination airports.

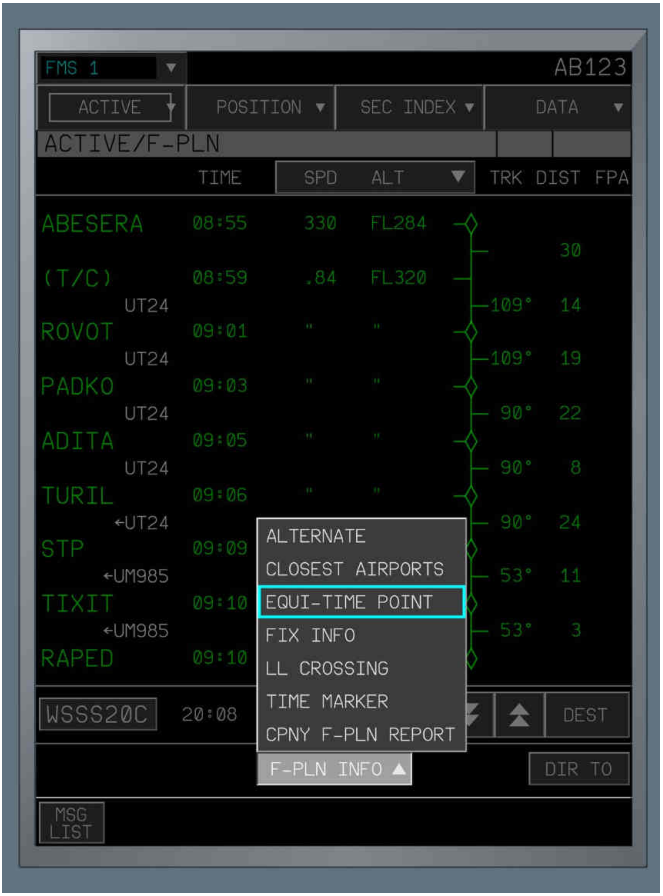
L2 *Note: The FMS computation of the ETP takes into account the cost index, the speed/Mach control and the entered wind at the reference points.*

L1 The EQUI-TIME POINT page is only available for the active flight plan.

ACCESS

The flight crew can access the EQUI-TIME page via the ACTIVE / F-PLN page by selecting EQUI-TIME POINT in the F-PLN INFO menu.

ACTIVE / F-PLN page



DATA FROM P.POS TO REFERENCE 1 (2)

Indicates:

- The bearing, between the current aircraft position and the reference point
L2 The T letter indicates that the bearing is defined in TRUE north reference.
L1 - The direct distance, from the current aircraft position to the reference point
- The estimated time of arrival (or flight time if the clock is not valid) at the reference point. This considers a direct trajectory to the reference.

Impacted DU: 00016694 EQUI-TIME POINT page - Reference Ident

REF1(2)

Indicates the ident of the reference waypoint, airport, NAVAID or runway.
The default REF1 is the origin airport. The default REF2 is the destination airport. The flight crew can overwrite the default value at any time.

L2 If the entered ident is already selected in the other reference ident entry field, the FMS displays the NOT ALLOWED message, *Refer to DSC-22-FMS-20-110 NOT ALLOWED* .

L1 *Note:* *When the flight crew tries to enter a reference ident in REF 1(2) field, the FMS may erroneously reject the entered ident and display the NOT ALLOWED message.*

If such behavior is suspected, the flight crew can:

- *Enter the desired reference ident on the other MFD . When both MFD s synchronize, the flight crew will get the EQUI-TIME POINT computation results on both MFD s, or*
- *Temporarily enter and validate two other valid reference idents in REF 1 and REF 2 fields on the affected MFD . This will properly "erase" the reference ident from the FMS memory. Then, the flight crew will be able to enter again the desired reference idents in REF 1 and REF 2 fields.*

ENTRY FORMAT

The possible formats for an ident entry are:

- *Refer to WAYPOINT Entry Format*
- *Refer to NAVAID Entry Format*
- *Refer to AIRPORT Entry Format*
- *Refer to RUNWAY Entry Format* .

Impacted by TDU: 00023579 EQUI-TIME POINT page - Reference Ident

REF1(2)

Indicates the ident of the reference waypoint, airport, NAVAID or runway.
The default REF1 is the origin airport. The default REF2 is the destination airport. The flight crew can overwrite the default value at any time.

L2 If the entered ident is already selected in the other reference ident entry field, the FMS displays the NOT ALLOWED message, *Refer to DSC-22-FMS-20-110 NOT ALLOWED* .

L1 **ENTRY FORMAT**

The possible formats for an ident entry are:
- *Refer to WAYPOINT Entry Format*
- *Refer to NAVAID Entry Format*
- *Refer to AIRPORT Entry Format*
- *Refer to RUNWAY Entry Format* .

WIND AT REFERENCE ENTRY FIELD

The flight crew enters the wind direction and velocity for the cruise flight level at the reference point, in the entry field.

ENTRY FIELD

- *Refer to WIND DIRECTION Entry Format*
- *Refer to WIND VELOCITY Entry Format* .

DATA FROM ETP TO REFERENCE 1 (2)

Indicates:
- The track, from the ETP to the reference point

L2 The T letter indicates that the track is defined in TRUE north reference.

L1
- The direct distance, from the ETP to the reference point
- The estimated time of arrival (or flight time, if the clock is not valid) at the reference point. This considers an overfly of the ETP, and a direct trajectory between the ETP and the reference.

EQUI-TIME POINT

Indicates the equi-time point.
The ETP is a place/distance waypoint. The place reference is the waypoint that follows the ETP.
If the FMS can not compute any ETP, the panel displays "ETP NOT FOUND".
When the ETP is sequenced, the panel displays "ETP SEQUENCED".

DATA FROM P.POS TO ETP

Indicates the distance between P.POS and the ETP, along the flight plan. It also indicates the estimated time of arrival (or flight time if the clock is not valid) at the ETP.

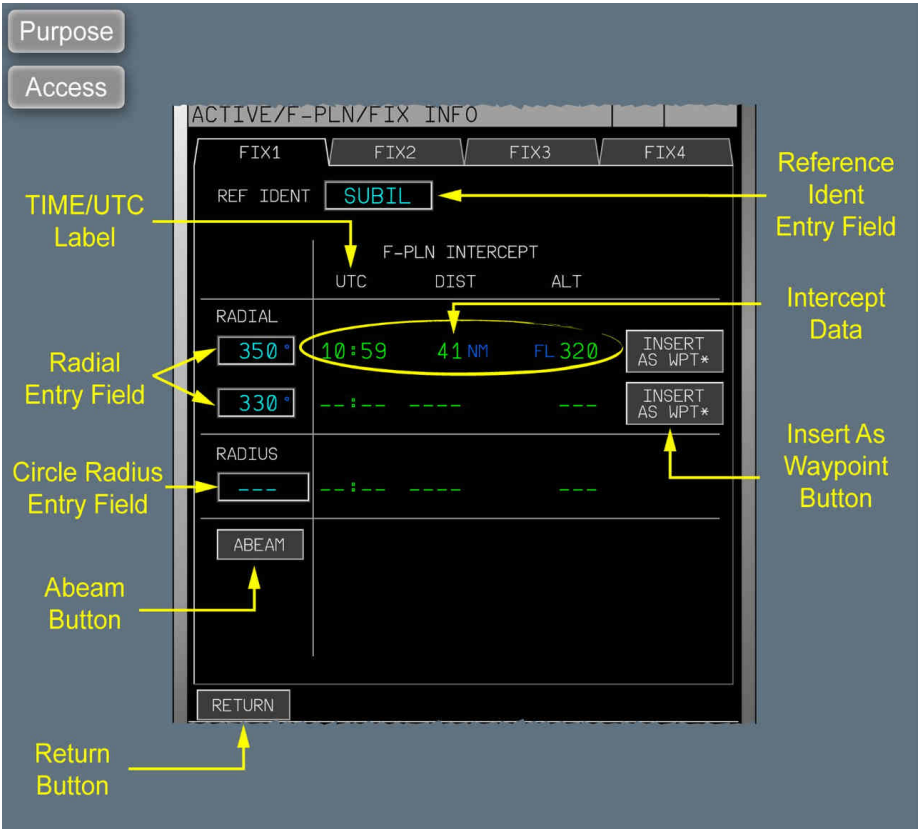
RETURN BUTTON

When clicked, displays the ACTIVE / F-PLN page.

FIX INFO PAGE

Applicable to: ALL

FIX INFO Page



PURPOSE

On the FIX INFO page, the flight crew can:
- Define a reference fix for display on the ND
- Define two radials, and one circle associated to the selected reference fix, for display on the ND
- Compute the abeam line from the reference fix on the flight plan, for display on the ND
- Insert into the flight plan the intersection points between the defined radial(s), circle and abeam line and the flight plan.

The flight crew can do this for four reference fixes on the four identical panels of the FIX INFO page.
The FIX INFO page is not available for the secondary flight plans.

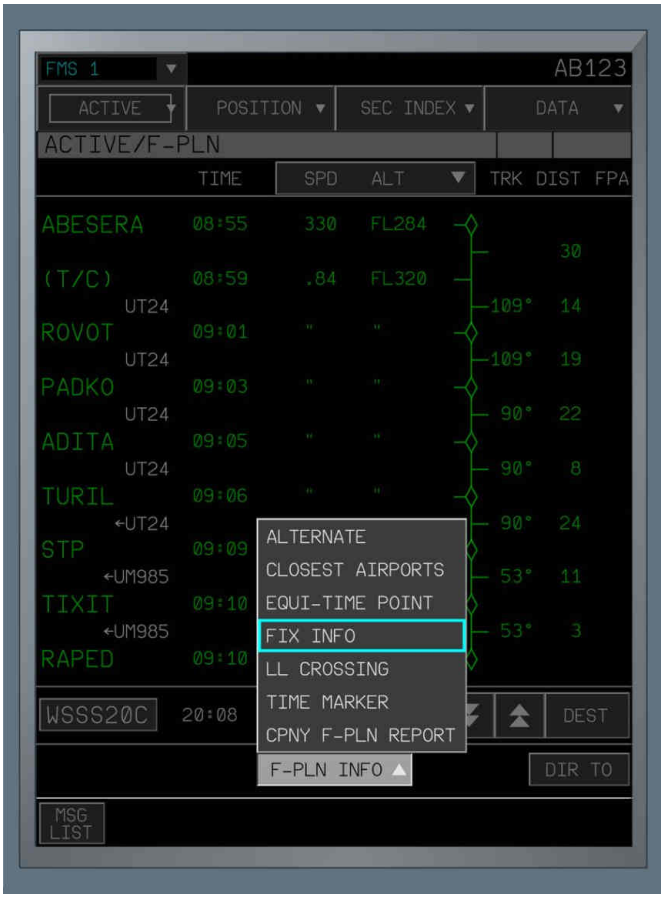
LINKS

Refer to More Information on the FIX INFO Revision

ACCESS

The flight crew can access the FIX INFO page via the ACTIVE / F-PLN page by selecting the FIX INFO revision in the F-PLN INFO menu.

F-PLN Info on the F-PLN Page



REF IDENT ENTRY FIELD

The flight crew enters the reference fix ident in the entry field.
The reference fix ident may be:

- Any navigation database
- Waypoint
- NDB
- Airport

- Runway
- Pilot stored element (*Refer to Pilot stored element database*).

ENTRY FORMAT

The possible formats for the reference fix ident are:

- NAVAID (*Refer to Entry Format*)
- Waypoint (*Refer to Entry Format*)
- Airport (*Refer to Entry Format*)
- Runway (*Refer to Entry Format*).

TIME / UTC LABEL

Indicates whether the time reference is Universal Time Coordinates (UTC), or flight time (TIME).

L2 The time reference is flight time (TIME) when:

- In preflight, and the flight crew has not entered the Estimated Takeoff Time (ETT).
  The flight crew enters the ETT on the RTA panel of the VERT REV page. (*Refer to VERT REV page)*
- In flight, and the FMS UTC time is not valid.

RADIAL ENTRY FIELD

The flight crew enters a radial of the reference fix in the entry field.
The FMS displays the data from the intersection point (between the radial and the flight plan) on the same line. (*Refer to Intercepted Point Data*)
If no intersection is found, dashes are displayed.

Note: *When the intersection is inserted as a waypoint in the active flight plan, the radial and intercept data are no longer displayed on the page.*

ENTRY FORMAT

Refer to Radial Entry Format

INTERCEPT POINT DATA

This line indicates for each computed intersection point:

- The ETA (or flight time) at the intersection point
- The estimated distance along the flight plan between the aircraft present position and the intersection point
- The estimated altitude (in flight level) at the intersection point.

INSERT AS WAYPOINT BUTTON

When clicked, inserts into the temporary flight plan a waypoint at the intersection between the defined radial, radius, or abeam line, and the active (respectively temporary) flight plan.

RADIUS ENTRY FIELD

The flight crew enters a circle radius from the reference fix in the entry field.
The FMS displays the data from the intersection point (between the circle and the flight plan) on the same line. (*Refer to Intercepted Point Data*)
If no intersection is found, dashes are displayed.

ENTRY FORMAT

Refer to Radius Entry Format

ABEAM/CLOSE BUTTON

When clicked, the FMS computes and displays the abeam radial, the associated intersection point data and the button CLOSE instead of ABEAM.
When the flight crew clicks on the CLOSE button, the ABEAM data on the page and (or) the ND are removed.

ABEAM DATA



RETURN BUTTON

When clicked, displays the F-PLN page.

L2 The Return button is displayed if no temporary flight plan is pending.
If a temporary flight plan exists, the Temporary Flight Plan button is displayed.

F-PLN PAGE

Applicable to: ALL

F-PLN Page



PURPOSE

The F-PLN page displays textual lateral and vertical flight plan data, including:

- All flight plan waypoints and legs
- Time, speed, altitude, fuel, and wind predictions for each waypoint
- Track, and distance between waypoints

- Flight path angle for approach waypoints
- Access to all lateral and vertical flight plan revisions

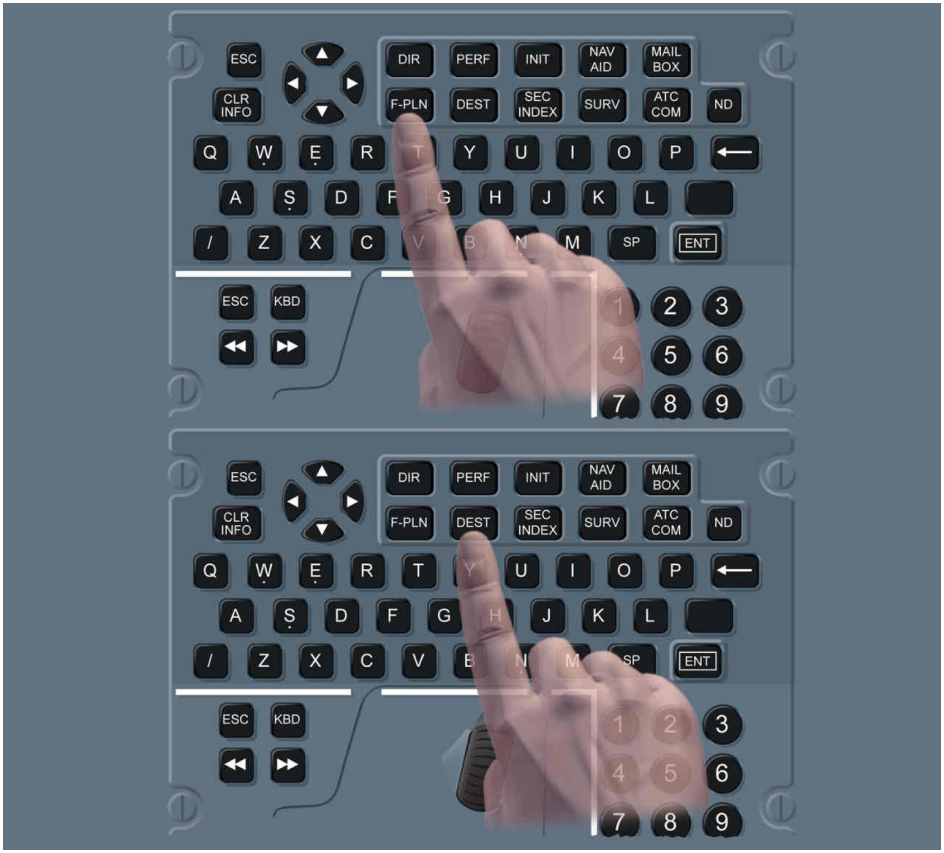
The F-PLN page is available for the active and secondary flight plans.

ACCESS

The flight crew can access the F-PLN page, via:

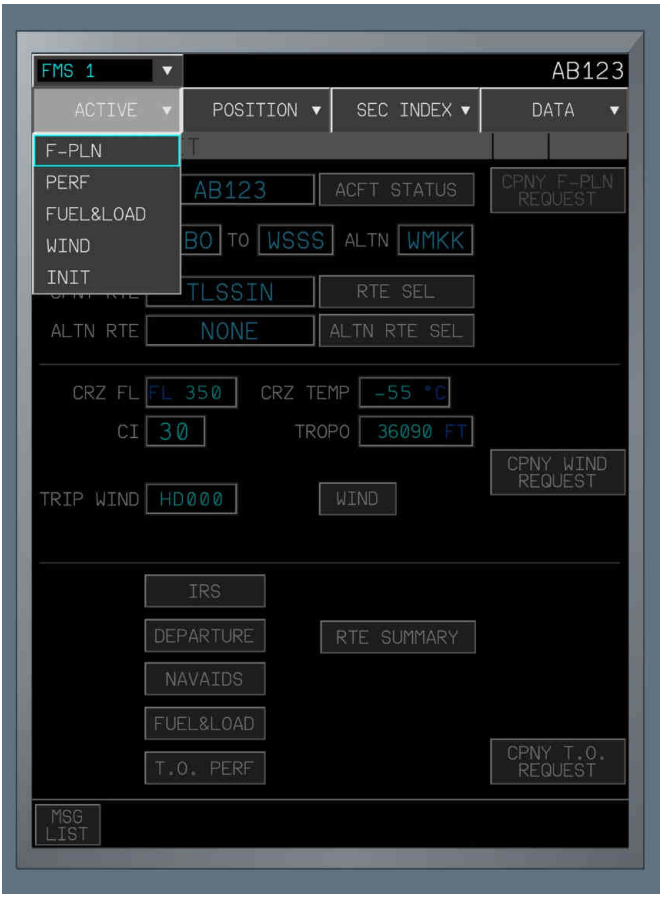
- The KCCU, by pressing the F-PLN, or DEST key on the keyboard
  Pressing the F-PLN key, displays the first page of the F-PLN (FROM waypoint on the first line).
  Pressing the DEST key, displays the last page of the primary flight plan (destination on the last line).

F-PLN, DEST Key on the KCCU



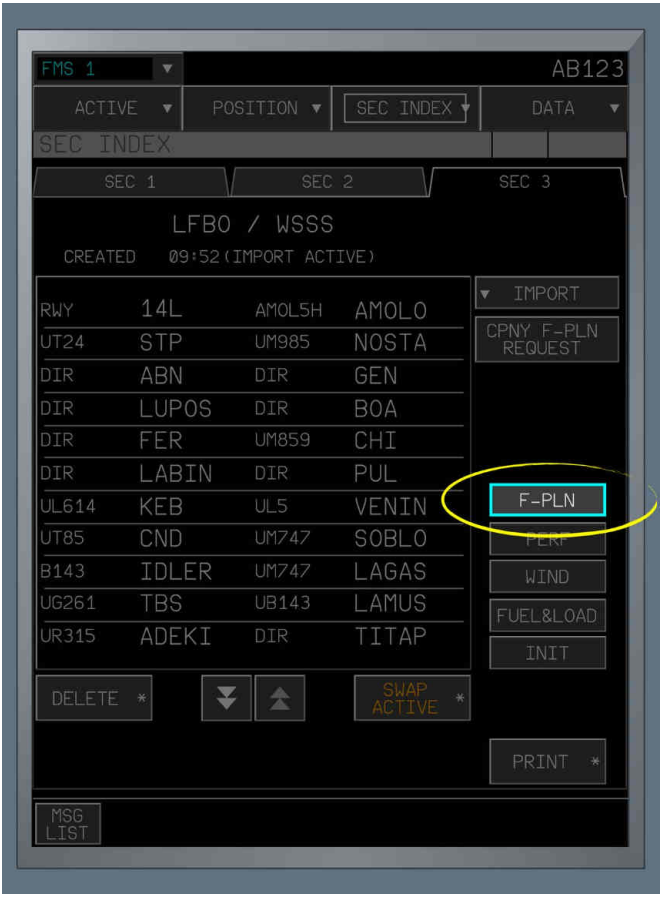
- The General Menu Bar, by selecting F-PLN in the ACTIVE menu:

General Menu Bar



Note: *The flight crew can access the secondary flight plan page (SEC 1(2)(3)/F-PLN), via the SEC INDEX page, by clicking on the F-PLN button.*

SEC INDEX Page



FROM LABEL

Indicates that the first line of the F-PLN page is the FROM waypoint.
The FROM label disappears when the first line of the F-PLN page displays a waypoint that is not the FROM waypoint.

TIME / UTC LABEL

Indicates whether the time reference is Universal Time Coordinates (UTC), or flight time (TIME).

L2 The time reference is flight time (TIME) when:

- In preflight, and the flight crew has not entered the Estimated Takeoff Time (ETT).
  The flight crew enters the ETT on the RTA panel of the VERT REV page. (*Refer to VERT REV page)*
- In flight, and the FMS UTC time is not valid.

OFFSET INDICATOR

When the aircraft is flying an offset, the header displays OFFSET NNX, where NN is the offset distance, and X is the offset side (example: OFFSET 10R).

SPEED-ALT/EFOB-WIND BUTTON

SPEED-ALT/EFOB-WIND Button

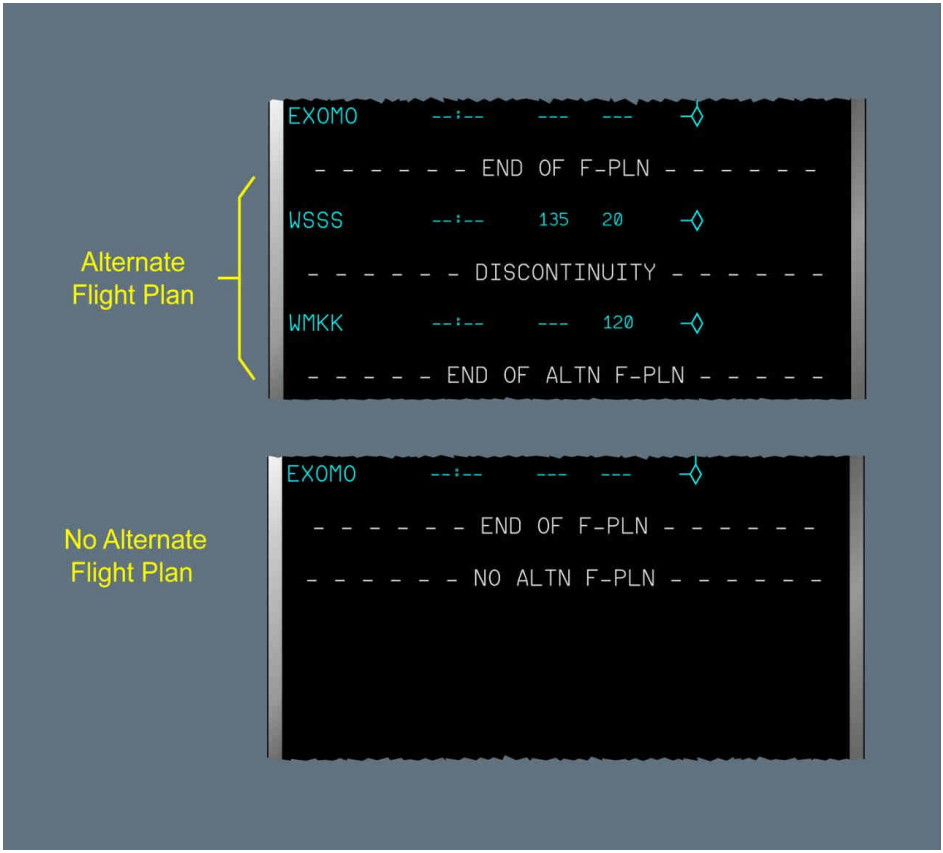


The flight crew uses this button to display either the speed and altitude predictions, or the EFOB and wind predictions.

FLIGHT PLAN LIMIT

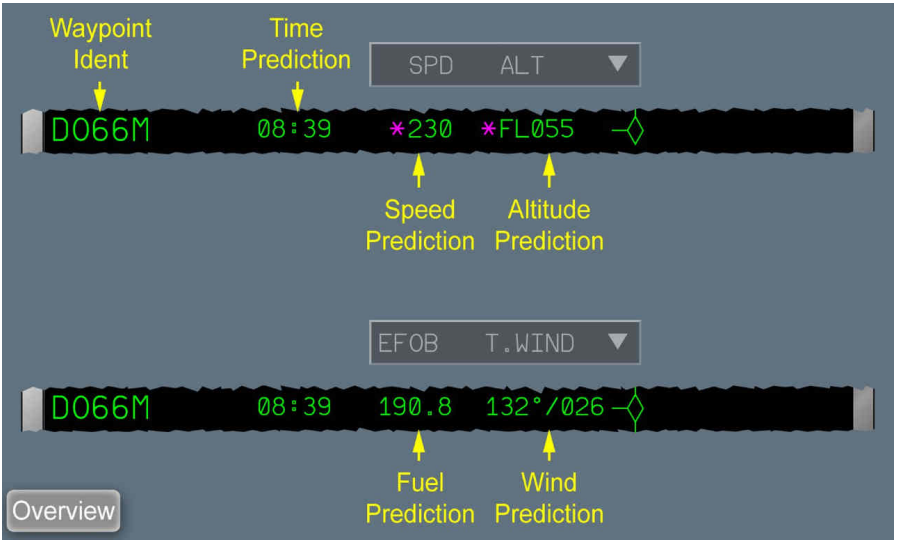
- END OF F-PLN:
  Indicates the end of the active (or secondary) primary flight plan. (*Refer to Primary Flight Plan)*
- END OF ALTN F-PLN:
  Indicates the end of the alternate flight plan. (*Refer to Alternate Flight Plan)*
  If no alternate flight plan exists, NO ALTN F-PLN is displayed after the END OF F-PLN limit.

ALTN F-PLN



WAYPOINT

Waypoint Data



The waypoint data line gives for each waypoint:
- The waypoint ident
- The time prediction
- The speed prediction
- The altitude prediction
- The estimated fuel on board
- The wind prediction

The F-PLN page displays 9 waypoint data lines maximum.
If a temporary flight plan is pending, only 8 waypoint data lines are displayed.

COLOUR

The waypoint data is displayed in:
- White, for the TO waypoint
- Green, for the active primary flight plan waypoints, or
- Cyan, for the missed approach and alternate flight plan waypoints.

When a temporary flight plan is pending, all waypoint data is displayed in yellow.
The waypoint data of all secondary flight plan waypoints is displayed in white.

WAYPOINT IDENT

Indicates the ident of the flight plan waypoints, and airports.



A navigation database airport is indicated by its 4 character ICAO code, followed by the selected runway, if any.



A navigation database waypoint is indicated by its ident (max 7 characters).



A triangle next to the waypoint ident indicates that the waypoint will be overflown.
(*Refer to Revision)*



A left, or right arrow next to the waypoint ident indicates the turn direction of a procedure turn (that is stored in the navigation database).



A pseudo-waypoint is displayed between brackets.
(*Refer to Pseudo-Waypoints)*

L2



A latitude/longitude waypoint is displayed in the XDDYDDD format, where X is “N” for North or “S” for South, and Y is “E” for East, or “W” for West. The latitude is abbreviated to its two degree characters (DD), and the longitude is abbreviated to its three degree characters (DDD). (example: N32°45.5W170°23.3 is abbreviated to N32W170)
(*Refer to Revision)*



A place/bearing/distance waypoint is displayed in the PBDNN format, where NN is a number from 01 to 20, defining the chronological position in the pilot defined waypoints list. (example: AMB/320/5 is identified with the PBD03 ident, when this waypoint is the third pilot defined waypoint)
(*Refer to Revision)*



A place-bearing/place-bearing waypoint is displayed in the PBXNN format, where NN is a number from 01 to 20, defining the chronological position in the pilot defined waypoints list. (example: AMB–320/DVL–180) is identified with the PBX04 ident, when this waypoint is the fourth pilot defined waypoint)
(*Refer to Revision)*



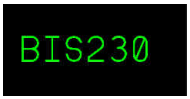
A place/distance waypoint is displayed in the PDNN format, where NN is a number from 01 to 20, defining the chronological position in the pilot defined waypoints list. (example: AMB/10) is identified with the PD05 ident, when this waypoint is the fifth pilot defined waypoint)
(*Refer to Revision)*



A latitude crossing waypoint is displayed in the XNN format, where X is “N” for North or “S” for South. NN is the degrees of latitude.
(*Refer to Revision)*



A longitude crossing waypoint is displayed in the YNNN format, where Y is “E” for East, or “W” for West. NNN is the degrees of longitude.
(*Refer to Revision)*



A radial intercept waypoint is displayed in the XXXNNN format, where XXX are the first three characters of the reference fix, and NNN the radial.
(*Refer to Revision)*



A circle intercept waypoint is displayed in the DNNNXXX format, where XXX are the first three characters of the reference fix, and NNN the radius of the circle.
(*Refer to Revision)*



An abeam intercept waypoint is displayed in the ABXXXXX format, where XXXXX are the first five characters of the reference fix.
(*Refer to Fix Info Revision)*
(*Refer to Direct To Revision)*



An altitude waypoint is displayed in the NNNNN, where NNNNN is the altitude where the leg terminates.



Indicates a turning point. A turning point is inserted in the temporary flight plan, as the FROM waypoint, when a direct to, or holding pattern at the present position is pending. The turning point becomes a fix waypoint with the latitude/longitude of the position where the temporary flight plan is inserted.
(*Refer to Direct To Revision)*
(*Refer to Hold Revision)*



IN-BND is inserted in the temporary flight plan, as the FROM waypoint, when a direct to/inbound intercept is pending. It becomes a fix waypoint with the latitude/longitude of the position where the temporary flight plan is inserted.
(*Refer to Direct To Revision)*



OUT-BND is inserted in the temporary flight plan, as the FROM waypoint, when a direct to/outbound intercept is pending. It becomes a fix waypoint with the latitude/longitude of the position where the temporary flight plan is inserted.
(*Refer to Direct To Revision)*



Indicates the aircraft present position. PPOS is displayed, as the FROM waypoint, when the aircraft is in a discontinuity.



INTCPT indicates where the aircraft will intercept the planned lateral flight plan.



Indicates a manual leg. The leg needs to be terminated manually by a flight crew action. (example: DIRECT TO).

L1 **WAYPOINT REVISIONS**

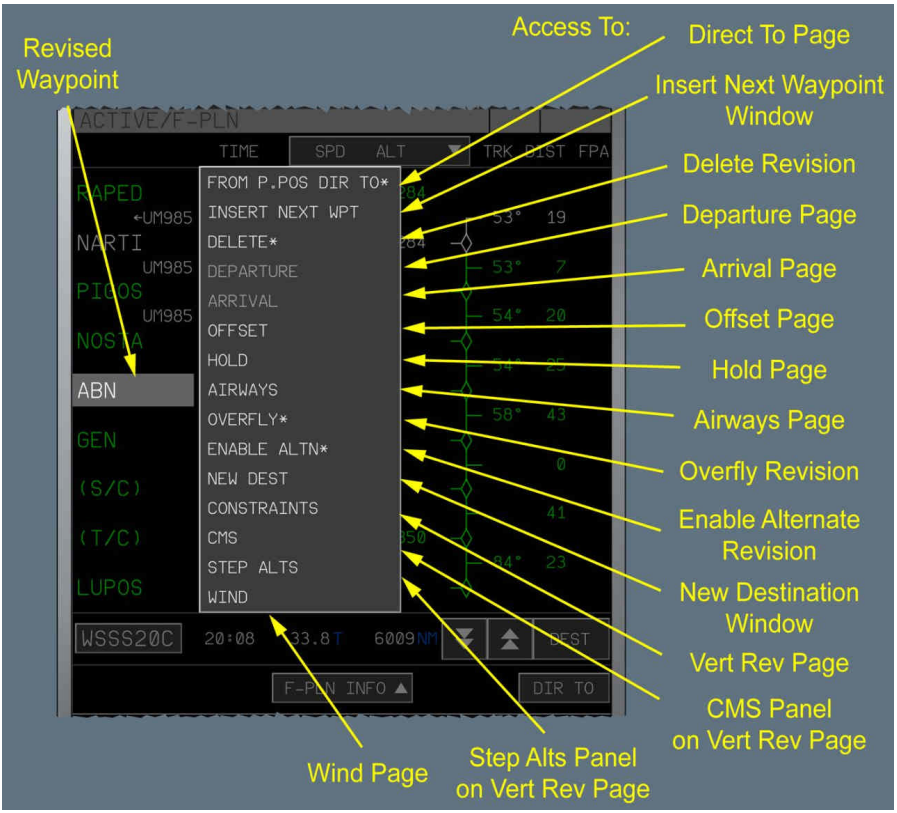
The waypoint ident is interactive: When clicked, opens the waypoint revisions menu.
Refer to Waypoint Revisions Menu

WAYPOINT REVISIONS MENU

The waypoint revisions menu gives access to the lateral, and vertical flight plan revisions pages.

Note: The revisions with a star (example; DELETE), create a temporary flight plan when clicked.*
The other revisions, without a star, give access to a page or window, associated with the selected revision.

Waypoint Revisions Menu



FROM P.POS DIR TO*

When selected, displays the DIRECT TO page, and creates a temporary flight plan with a direct leg to the revised waypoint.
Refer to Page

INSERT NEXT WAYPOINT

When selected, opens the Insert Next Waypoint window on the F-PLN page.
Refer to Insert Next Waypoint Window

DELETE*

When selected, deletes the revised waypoint and creates or updates the temporary flight plan.

Refer to More Information on the Insert Next Waypoint revision

DEPARTURE

When selected, displays the DEPARTURE page.
Refer to Page

ARRIVAL

When selected, displays the ARRIVAL page.
Refer to Page

OFFSET

When selected, displays the OFFSET page.
Refer to Page

HOLD

When selected, displays the HOLD page.
Refer to Page

AIRWAYS

When selected, displays the AIRWAYS page.
Refer to AIRWAYS page

OVERFLY*

When selected, defines an overfly on the revised waypoint, and creates or updates the temporary flight plan.
When an overfly exists on the revised waypoint, the waypoint revisions menu displays DELETE OVERFLY*. When selected, removes the overfly from the revised waypoint, and creates or updates the temporary flight plan.
Refer to More Information on the Overfly revision

ENABLE ALTN*

When selected, activates the alternate flight plan, and creates or updates the temporary flight plan.
Refer to More Information on the Enable Alternate revision

NEW DEST

When selected, displays the New Destination window on the F-PLN page.
Refer to New Destination Window

CONSTRAINTS

When selected, displays the ALT panel of the VERT REV page.

Refer to Page

CMS

When selected, displays the CMS panel of the VERT REV page.
Refer to Page

STEP ALTS

When selected, displays the STEP ALTs panel of the VERT REV page.
Refer to Page

WIND

When selected, and the revised waypoint is a climb waypoint, displays the CLB panel of the WIND page.
When selected, and the revised waypoint is a cruise waypoint, displays the CRZ panel of the WIND page.
When selected, and the revised waypoint is a descent waypoint, displays the DES panel of the WIND page.
Refer to Page

TIME PREDICTION

Indicates the Estimated Time of Arrival (ETA) at the waypoint.
Refer to More Information on the Flight Plan Predictions
In preflight, and an Estimated Takeoff Time (ETT) exists, the time reference of the time predictions is UTC. If no ETT exists, the time predictions are “flight times”, starting at 00:00.
In flight, the time reference is the aircraft UTC clock time. If the aircraft clock is not valid, the time predictions are “flight times”, starting at 00:00.

TIME CONSTRAINT

The time prediction is interactive: When clicked, displays the RTA panel of the VERT REV page, where the flight crew can check, add, or change a time constraint on the revised waypoint. (*Refer to Page)*
If a time constraint exists on a waypoint, a star is displayed to the left of the time prediction. (*Refer to Time Constraint)*



The color of the star is magenta, if the time constraint will be respected.



The color of the star is amber, if the time constraint will be missed.



If a time constraint exists on a waypoint, and time predictions are not available, the time constraint value is displayed in magenta big font.
The constraint value is preceded by a plus (or minus) sign for an AT or AFTER (or AT or BEFORE) constraint.

FROM WAYPOINT

In flight, the time prediction of the FROM waypoint displays the time when the FROM waypoint was sequenced.
In preflight, the time prediction of the FROM waypoint displays the ETT in magenta. If no ETT exists, the time prediction displays 00:00.
When clicked, opens the RTA panel of the VERT REV page, where the flight crew can change the ETT , if necessary. (*Refer to Page)*
If the ETT is exceeded, it is replaced by the aircraft clock time in green.

SPEED PREDICTION

Indicates the predicted speed, or Mach, at the waypoint.
Refer to More Information on the Flight Plan Predictions

L2 If the speed prediction has the same value as the one for the waypoint just above, a ditto character is displayed.

L1 SPEED CONSTRAINT / CMS

The speed prediction is interactive:
When the flight crew clicks on the speed prediction of a climb, descent, or approach waypoint, the SPD panel of the VERT REV page is displayed.
When the flight crew clicks on the speed prediction of a cruise waypoint, the CMS panel of the VERT REV page is displayed.
Refer to VERT REV page
If a speed constraint exists on a waypoint, or the waypoint is part of a CMS , a star is displayed to the left of the speed prediction. (*Refer to Speed Constraint* , *Refer to Speed Limit* , *Refer to Constant Mach Segment*)



The color of the star is magenta, if the speed constraint will be respected.



The color of the star is amber, if the speed constraint will be missed.

L2



If a speed constraint exists on a waypoint, and speed predictions are not available, the speed constraint value is displayed in magenta big font.

L1 **FROM WAYPOINT**

In preflight, the speed prediction of the FROM waypoint displays V1 .

ALTITUDE PREDICTION

Indicates the predicted altitude at the waypoint.
Refer to More Information on the Flight Plan Predictions

L2 If the altitude prediction has the same value as the one for the waypoint just above, a ditto character is displayed.

L1 **ALTITUDE CONSTRAINT / STEP ALTS**

The altitude prediction is interactive:
When the flight crew clicks on the altitude prediction of a climb, descent, or approach waypoint, the ALT panel of the VERT REV page is displayed.
When the flight crew clicks on the altitude prediction of a cruise waypoint, the STEP ALTS panel of the VERT REV page is displayed.
Refer to VERT REV page
If an altitude constraint exists on a waypoint, a star is displayed to the left of the altitude prediction. (*Refer to Altitude Constraint* , *Refer to Step Altitudes)*



The color of the star is magenta, if the altitude constraint will be respected.



The color of the star is amber, if the altitude constraint will be missed.

L2



If an altitude constraint exists on a waypoint, and altitude predictions are not available, the altitude constraint value (or “WINDOW”) is displayed instead, in magenta color. The constraint value is preceded by a plus (or minus) sign for an AT or ABOVE (or AT or BELOW) constraint.

L1 **FROM WAYPOINT**

In flight, the altitude prediction of the FROM waypoint displays the altitude of the aircraft when the FROM waypoint was sequenced.

EFOB

Indicates the Estimated Fuel On Board (EFOB), at the waypoint.
Refer to More Information on the Flight Plan Predictions

L2 If the fuel prediction has the same value as the one for the waypoint just above, a ditto character is displayed.

L1 **FROM WAYPOINT**

In flight, the fuel prediction of the FROM waypoint displays the Fuel On Board (FOB) when the FROM waypoint was sequenced.

WIND PREDICTION

Indicates the predicted true wind (direction and velocity), at the waypoint.

Note: *The F-PLN page displays the wind prediction that is not corrected with the measured wind. However, the FMS uses the corrected wind to compute the other flight plan predictions, such as time, altitude, fuel, etc ...*

Refer to More Information on the Wind Predictions

L2 If the wind direction, and/or velocity has the same value as the one for the waypoint just above, a ditto character is displayed.

L1 **TRIP WIND**

If the flight crew only has entered a trip wind, it is displayed as the wind prediction for each flight plan waypoint, in the format HD/NNN, or TL/NNN.

WIND ENTRY

The wind prediction is interactive:
When the flight crew clicks on the wind prediction of a climb waypoint, the CLB panel of the WIND page is displayed.
When the flight crew clicks on the wind prediction of a cruise waypoint, the CRZ panel of the WIND page is displayed.
When the flight crew clicks on the wind prediction of a descent waypoint, the DES panel of the WIND page is displayed.
Refer to VERT REV Page
Refer to Wind Revision

FROM WAYPOINT

The wind prediction of the FROM waypoint displays the trip wind, or predicted wind.

SPECIAL FLIGHT LABELS

FLIGHT PLAN DISCONTINUITY

DISCONTINUITY



Indicates a flight plan discontinuity. (*Refer to Flight Plan Discontinuity)*

When clicked, opens the waypoint revisions menu, from which the following revisions can be selected:

- INSERT NEXT WAYPOINT (*Refer to Revision)*
- DELETE (*Refer to Revision)*
- OFFSET (*Refer to Revision)*
- ENABLE ALTERNATE (*Refer to Revision)*
- NEW DESTINATION (*Refer to Revision)*

TOO STEEP PATH

TOO STEEP PATH



Indicates the start of a too steep path in the vertical descent profile.
When clicked, opens the waypoint revisions menu, from which only the INSERT NEXT WAYPOINT revision can be selected. (*Refer to Revision)*

ABEAM PTS

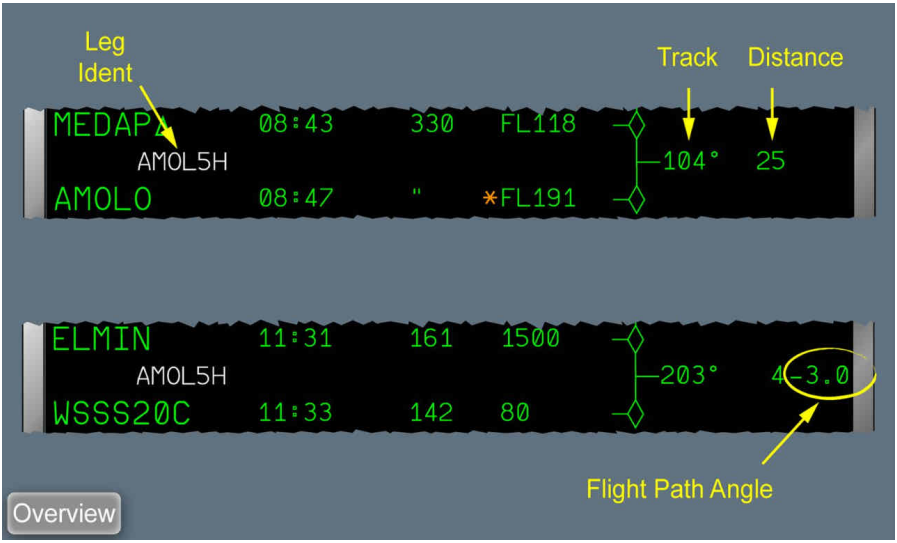
ABEAM PTS



The indicator ABEAM PTS is displayed in the temporary flight plan, when a direct to with abeam is pending. When the temporary flight plan is inserted, the indicator is removed and the fix abeam waypoints are displayed. (*Refer to Revision)*

LEG DATA

Leg Data



The leg data gives for each leg between two waypoints:
- The leg ident
- The distance between the two waypoints
- The leg track
- The flight path angle (only for legs of the arrival procedure)

The F-PLN page displays 8 leg data lines maximum.
If a temporary flight plan is pending, only 7 leg data lines are displayed.

L2 **COLOUR**

The leg ident is displayed in white for all waypoints of the active flight plan.

The other leg data is displayed in:
- White, for the active leg
- Green, for the active primary flight plan legs, or
- Cyan, for the missed approach and alternate flight plan legs.

When a temporary flight plan is pending, all leg data is displayed in yellow.
The leg data of all secondary flight plan waypoints is displayed in white.

L1 **HOLD LEG**

A hold leg is displayed on one entire line between the holding entry, and holding exit, fix waypoints.

Hold Leg



The specific display for the different holding pattern types, is described in the hold revision chapter. (*Refer to Revision)*

LEG IDENT

Indicates the ident of the flight plan leg.



A leg that takes part of a departure, or arrival procedure, has the name of that procedure.



A leg that takes part of an airway, has the name of that airway.



An offset leg is indicated with a left, or right arrow, next to the leg ident. The arrow indicates the offset side.

L2



A course leg is displayed in the CNNN° format, where NNN is the course. When the FCU TRUE/MAG setting is TRUE, a “T” is displayed after the degree symbol.



A heading leg is displayed in the HNNN° format, where NNN is the heading. When the FCU TRUE/MAG setting is TRUE, a “T” is displayed after the degree symbol.



An arc leg is displayed in the NN XXX format, where NN is the arc distance, and XXX is the NAVAID ident.



A radius leg is displayed in the NN ARC format, where NN is the arc distance.



A leg with a manual or altitude termination point, is displayed in the XXXNNN format, where XXX are the first three characters of the waypoint ident, and NNN the outbound course. When the FCU TRUE/MAG setting is TRUE, a "T" is displayed after the outbound course.



A procedure turn is displayed in the PROC X format, where X is "L" for Left, or "R" for Right, depending on the turn direction.

TRACK

Indicates the track between two waypoints.
It is a magnetic, or true track, depending on the FCU TRUE/MAG setting.



Magnetic Track



True Track

ACTIVE LEG

In flight, the track of the active leg displays the direct bearing between the aircraft present position and the TO waypoint.

DISTANCE

Indicates the distance between two waypoints.

ACTIVE LEG

In flight, the distance of the active leg displays the distance between the aircraft present position and the TO waypoint.

FLIGHT PATH ANGLE

Indicates the flight path angle (FPA), in degrees, at a leg of the arrival procedure.
The FPA is associated with the leg in the navigation database. It can not be changed by the flight crew.

DESTINATION IDENT

Indicates the ident of the destination airport, followed by the selected runway, if any.
The destination ident is interactive: When clicked, opens the ARRIVAL page. (*Refer to Page)*

DESTINATION ETA

Indicates the estimated time of arrival (ETA) at destination.
In preflight, and an Estimated Takeoff Time (ETT) exists, the time reference of the destination ETA is UTC. If no ETT exists, the ETA is a flight time.
In flight, the time reference is the aircraft UTC clock time. If the aircraft clock is not valid, the ETA is a flight time.

DESTINATION EFOB

Indicates the estimated fuel on board (EFOB) at destination.
The destination EFOB is displayed in amber, when its value is lower than the minimum fuel at destination, displayed on the FUEL&LOAD page. (*Refer to Page)*

DISTANCE TO DESTINATION

The distance to destination is the sum of the direct distance to the TO waypoint and the distance, along the flight plan, from the TO waypoint to the destination.
L2 If a discontinuity exists in the flight plan, the system assumes that the aircraft will fly a direct leg between the waypoints that define the discontinuity.

SCROLL BUTTONS

SCROLL DOWN / UP

The flight crew uses the scroll down (up) button to move, page per page, downwards (upwards) through the flight plan.

L2 The flight crew can move, line by line, through the flight plan with:
- The scroll wheel of the cursor control unit, or with
- The arrow keys of the keyboard

Refer to More Information on the KCCU Controls
Whatever the means of scroll, the scroll down (up) stops at the last (first) flight plan waypoint.

L1 **SCROLL TO DESTINATION (DEST)**

When clicked, displays the last page of the primary flight plan, with the primary destination on the last line.

L2 The flight crew can display the “first” page of the primary flight plan, by:
- Pressing the F-PLN key of the KCCU , or by
- Selecting F-PLN in the ACTIVE menu of the General Menu Bar.

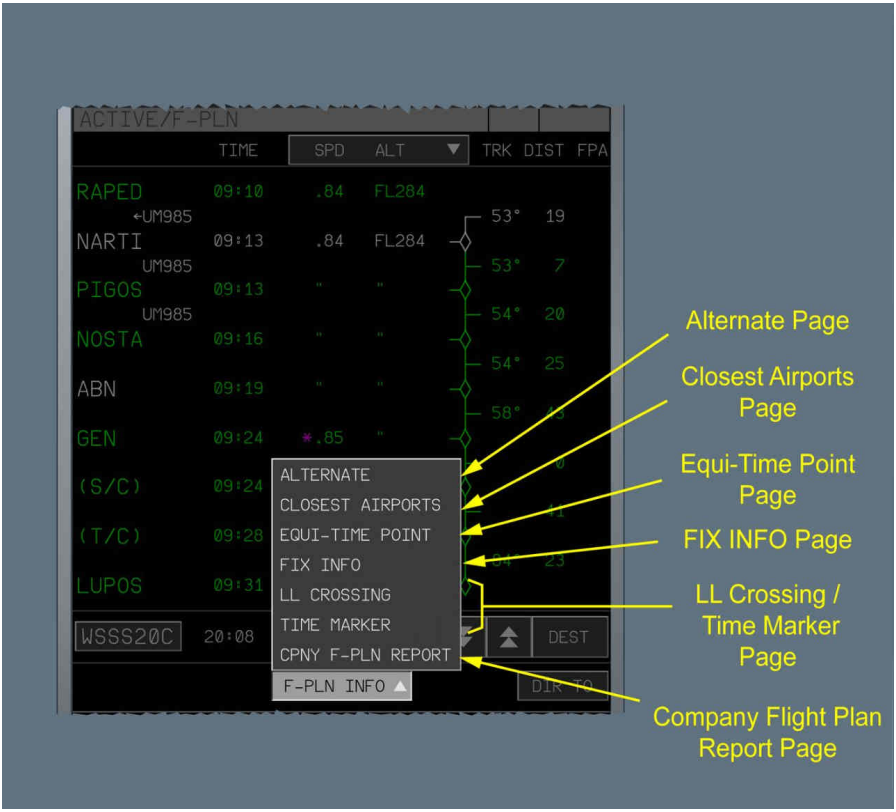
INIT BUTTON

When clicked, displays the INIT page. (*Refer to Page*)

L2 The INIT button is only displayed in preflight.

F-PLN INFO MENU

Flight Plan Info Menu



ALTERNATE

When selected, displays the ALTERNATE page.
Refer to Page

CLOSEST AIRPORTS

When selected, displays the CLOSEST AIRPORTS page.
Refer to Page

EQUI-TIME POINT

When selected, displays the EQUI-TIME POINT page.
Refer to Page

FIX INFO

When selected, displays the FIX INFO page.
Refer to Page

LL CROSSING / TIME MARKER

When selected, displays the LL XING — TIME MKR page.
Refer to Page

CPNY F-PLN REPORT

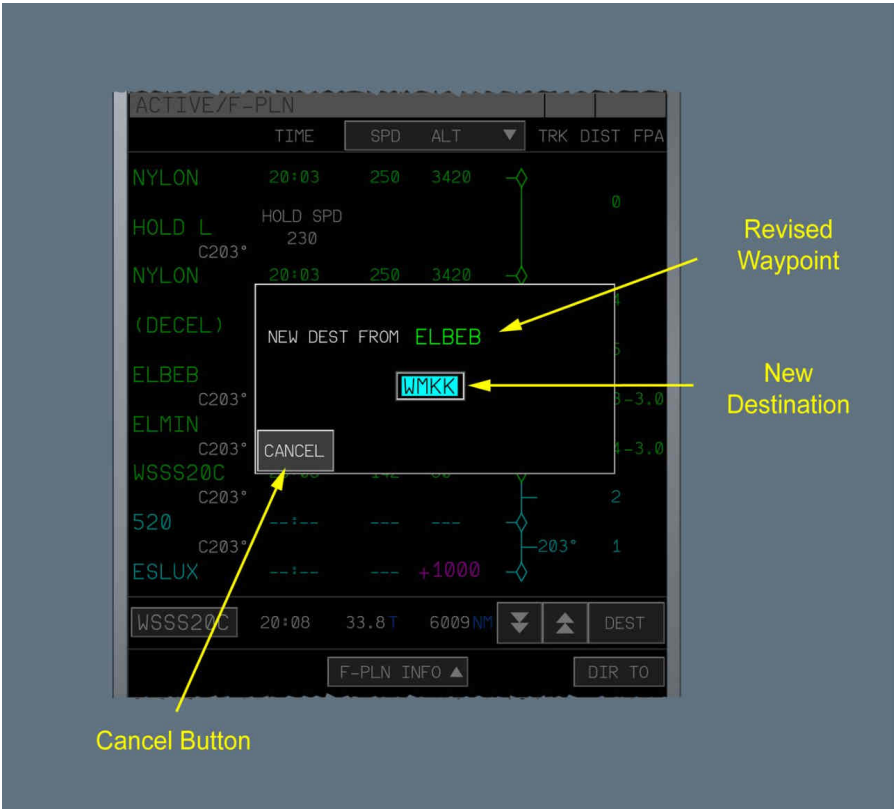
When selected, sends via ACARS an active flight plan report to the company ground station. If the Free Text AMI option is activated, selecting CPNY F-PLN REPORT will display the COMPANY F-PLN REPORT page. (*Refer to Page*)

DIR TO BUTTON

When clicked, displays the DIRECT TO page. (*Refer to Page*)

NEW DESTINATION WINDOW

New Destination Window



REVISED WAYPOINT

The revised waypoint is the waypoint from which the flight crew has selected the new destination revision.

NEW DESTINATION ENTRY FIELD

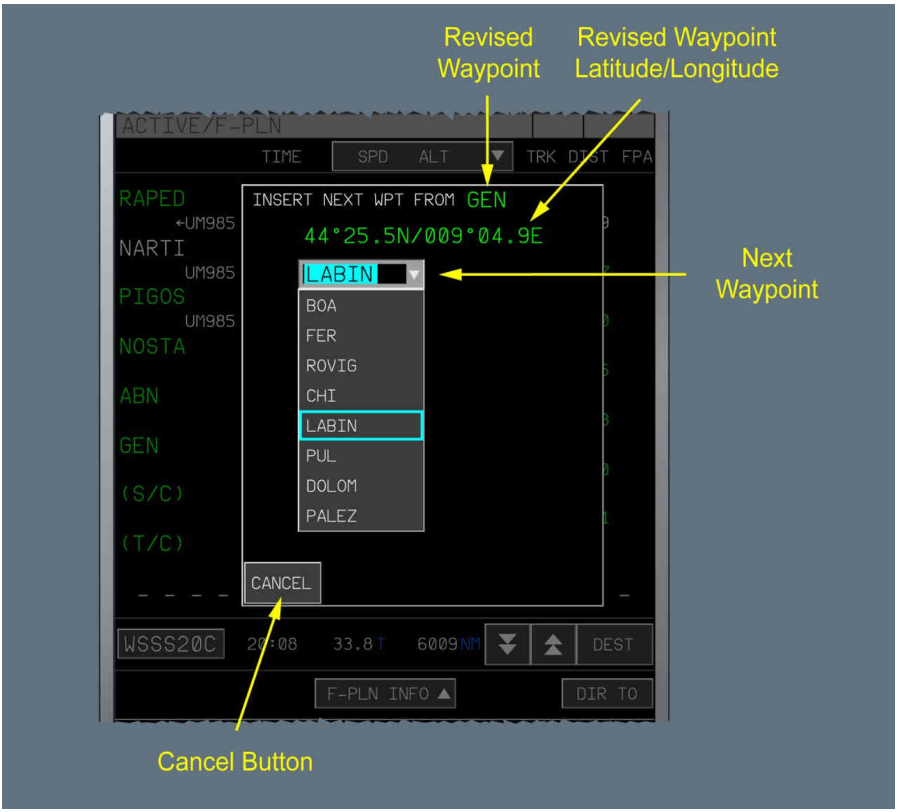
The flight crew enters the 4 character ICAO code of the new destination airport in the entry field. *Refer to AIRPORT Entry Format*

CANCEL BUTTON

When clicked, closes the new destination window, without inserting a new destination.

INSERT NEXT WAYPOINT WINDOW

Insert Next Waypoint Window



REVISED WAYPOINT

The revised waypoint is the waypoint from which the flight crew has selected the insert next waypoint revision.

REVISED WAYPOINT LATITUDE/LONGITUDE

Indicates the latitude and longitude of the revised waypoint.

NEXT WAYPOINT

The flight crew enters the next waypoint via the keyboard, or by selecting it in the list.
The list displays all flight plan waypoints between the revised waypoint and the primary destination.

L2 If the revised waypoint is a missed approach waypoint, the last waypoint of the list is the last missed approach waypoint.
If the revised waypoint is a part of the alternate flight plan, the last waypoint of the list is the last missed approach waypoint.

L1 ENTRY FORMAT

The possible formats for a manual waypoint entry are:
- The ident of the navigation database, or pilot stored waypoint (*Refer to Entry Format*)
- Latitude/longitude (*Refer to Entry Format*)
- Place/bearing/distance (*Refer to Entry Format*)
- Place-bearing/place-bearing (*Refer to Entry Format)*
- Place/distance (*Refer to Entry Format)*

Note: The flight crew can enter a place/distance waypoint, relative to the revised waypoint, by entering:
- *The distance value only, mandatory preceded by a plus or minus sign (example:+15), or*
- *The distance value, preceded by a slash, and a plus or minus sign, the plus sign is not mandatory if the slash is used (example: /15).*

If the flight crew inserts a latitude/longitude, place/bearing/distance, place-bearing/place-bearing, or place/distance waypoint, this waypoint is stored in the pilot stored elements database (*Refer to Pilot Stored Elements Database*).

CANCEL BUTTON

When clicked, closes the insert next waypoint window without inserting any waypoint.

TEMPORARY FLIGHT PLAN INDICATOR

Indicates that a temporary flight plan is pending.

INSERT TEMPORARY BUTTON

When clicked, inserts the temporary flight plan.

ERASE TEMPORARY BUTTON

When clicked, erases the temporary flight plan.

When a temporary flight plan with multiple revisions is pending, the button displays UNDO*. When clicked, erases the last revision from the temporary flight plan.

Note: *The flight crew can only undo the "last" flight plan revision. When the flight crew has clicked once on the UNDO button, the button displays ERASE*.*

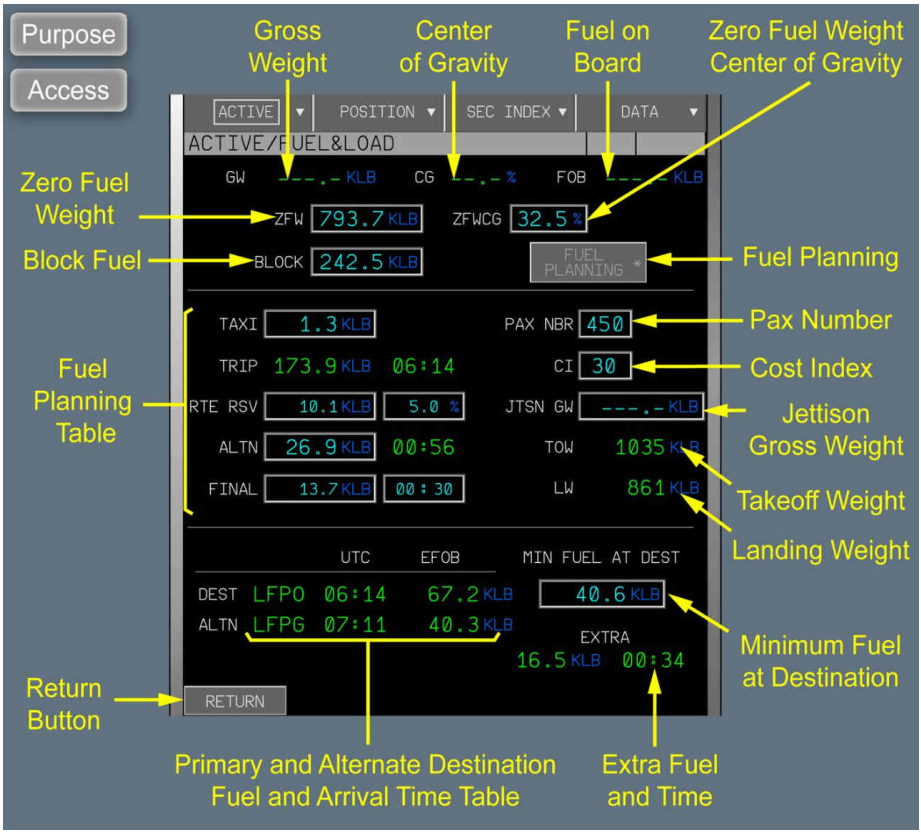
UNDO Button



FUEL AND LOAD PAGE

Applicable to: ALL

FUEL & LOAD Page



PURPOSE

The FUEL&LOAD page enables the flight crew to:

- Enter and consult the aircraft load data
- Enter and consult the flight fuel planning.

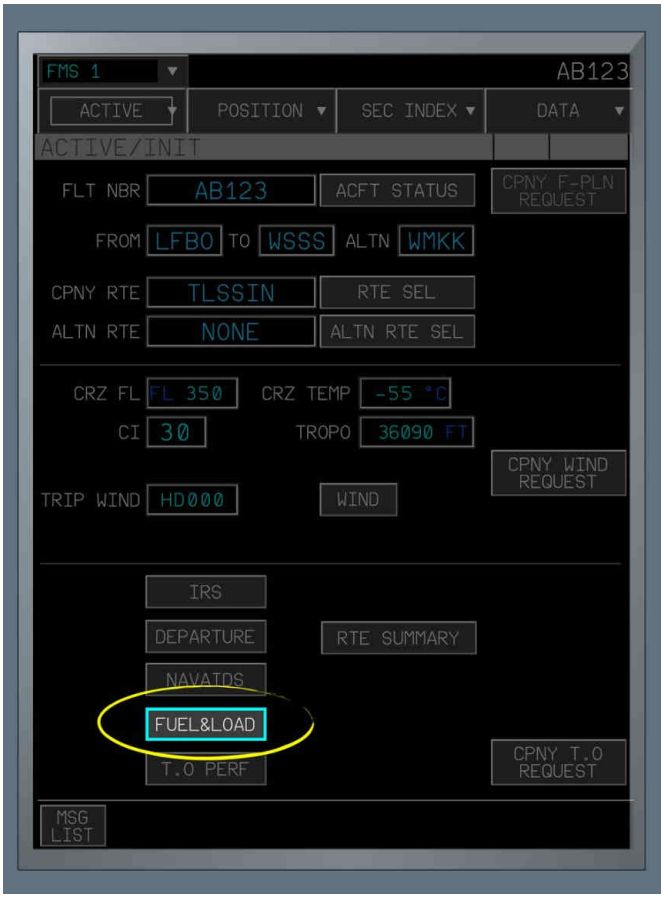
The FUEL&LOAD page is available for the active and secondary flight plans.

ACCESS

The flight crew can access the FUEL&LOAD page, via:

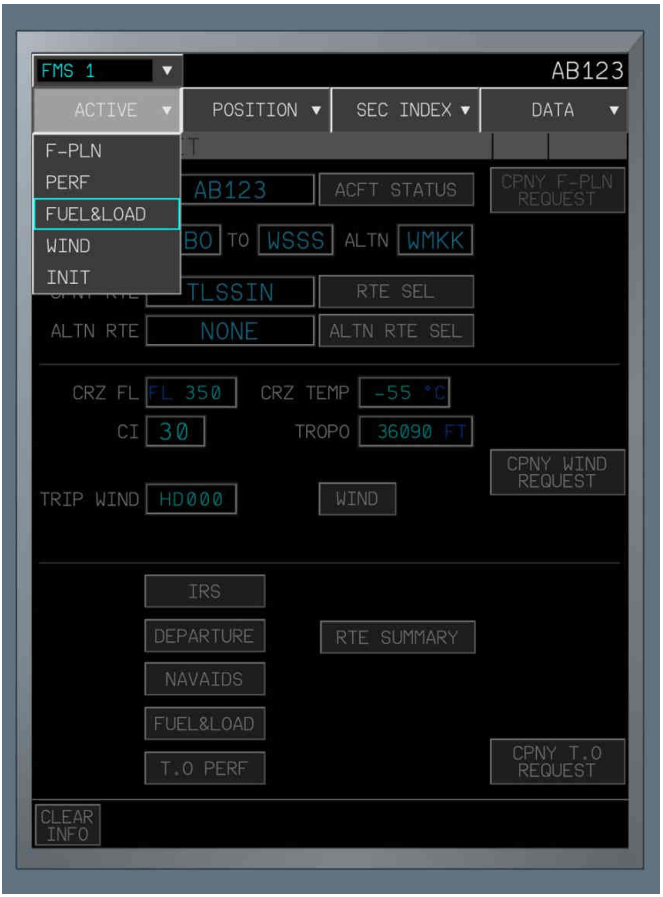
- The INIT page, by clicking on the FUEL&LOAD button:

INIT Page



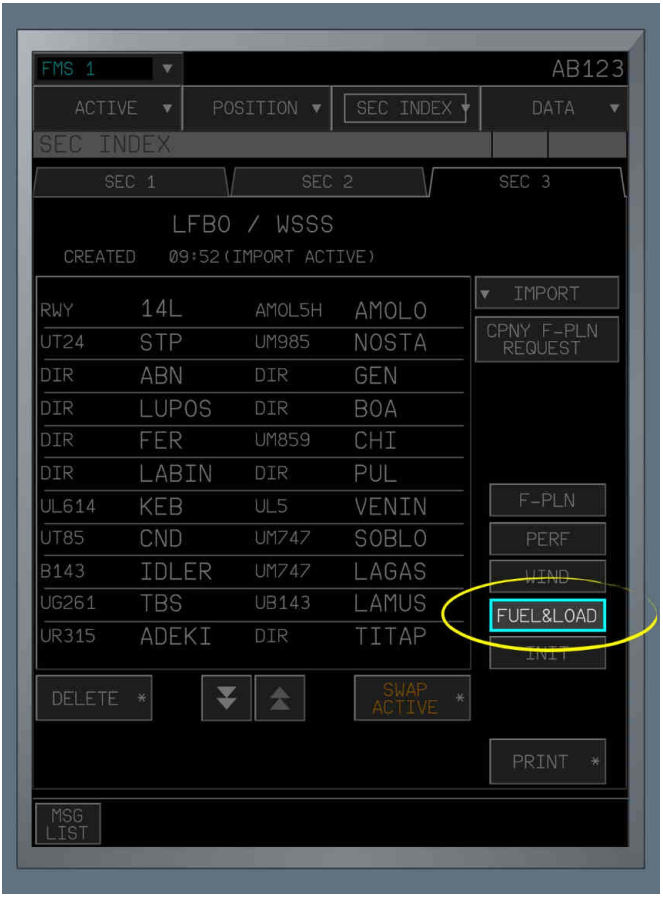
- The General Menu Bar, by selecting FUEL&LOAD in the ACTIVE menu:

General Menu Bar



Note: For the secondary flight plans, the flight crew can access the FUEL&LOAD page only via the SEC INDEX page, by clicking on the FUEL&LOAD button.

SEC INDEX Page



GW

Indicates, only after engine start, the aircraft Gross Weight (GW).
The FMS displays the GW, that is provided by the FQMS.

L2 If the GW from the FQMS is no longer available, the FMS computes and displays the GW, based on the entered ZFW and on:
- The current FOB provided by the FQMS, if available, or
- The FOB stored by the FQMS just after engine start and the current fuel used provided by the 4 FADECs and the APU (when the APU is ON).

CG

Indicates the aircraft Center of Gravity (CG).
The CG is displayed after engine start.
The FMS displays the CG, that is provided by the FQMS.
L2 If the FQMS is failed, the FMS displays the CG, provided by the WBBC.

FOB

Indicates the quantity of Fuel On Board (FOB).
The FOB is displayed after engine start.
The FMS displays the FOB, that is provided by the FQMS.

L2 If the FOB from the FQMS is no longer available, the FMS computes and displays the FOB, based on:
- The FOB stored by the FQMS just after engine start, and
- The current fuel used provided by the 4 FADECs and the APU (when the APU is ON).

ZFW ENTRY FIELD

Indicates the aircraft Zero Fuel Weight (ZFW).
The ZFW entry field is mandatory, and is entered by the flight crew.
L2 The FQMS uses this value to compute the aircraft gross weight.
The flight crew cannot clear the entry field.

L1 *Note: The FMS rejects the entered ZFW value and displays the ENTRY OUT OF RANGE message (Refer to Message), if the flight crew enters a ZFW value that exceeds the acceptable range, as defined in the performance database.*

ENTRY FORMAT

Refer to ZFW Entry Format

ZFWCG ENTRY FIELD

Indicates the aircraft Zero Fuel Weight Center of Gravity (ZFWCG).
The ZFWCG entry field is mandatory, and is entered by the flight crew.
L2 The FQMS uses this value to compute the aircraft CG .

The flight crew cannot clear the entry field.

L1 **ENTRY FORMAT**

Refer to ZFWCG Entry Format

FUEL PLANNING BUTTON

When clicked, starts the fuel planning computation.
The fuel planning function first computes the TRIP fuel in accordance with the entered flight plan. The fuel planning function then uses the TRIP fuel value, together with the default, or flight crew entered values for the TAXI, RTE RSV, and MIN FUEL AT DEST, to compute the minimum BLOCK fuel.
BLOCK = TAXI + TRIP + RTE RSV + MIN FUEL AT DEST

L2 If the flight crew did not manually enter a MIN FUEL AT DEST, the FMS uses the default or flight crew entered values for the ALTN and FINAL fuel to compute a MIN FUEL AT DEST value. In this case:
MIN FUEL AT DEST = ALTN + FINAL

L1 *Note: The fuel planning function assumes an EXTRA FUEL equal to zero.*

L2 The fuel planning computation is possible:
- Before engine start, and
- The flight crew has defined a flight plan and entered a cruise flight level, and
- The flight crew has entered the ZFW and ZFWCG, and
- No BLOCK fuel is entered by the flight crew.

L1 The resulting minimum BLOCK fuel is displayed in yellow next to the BLOCK entry field.

Fuel Planning Block Fuel



The flight crew can now confirm the computed BLOCK fuel, by clicking on the fuel planning button, that displays CONFIRM BLOCK.
When the flight crew confirms the computed BLOCK fuel, the value automatically appears in the BLOCK entry field.

Note: The FMS-computed BLOCK fuel automatically disappears, when the flight crew manually enters a block fuel in the BLOCK fuel entry field.

BLOCK ENTRY FIELD

Indicates the BLOCK fuel.

The BLOCK entry field is mandatory, and entered:
- Manually by the flight crew, or
- Automatically, when the flight crew confirms the FMS-computed BLOCK fuel.

The BLOCK entry field disappears after engine start.

L2 Before engine start, the FMS uses the BLOCK fuel to compute the fuel predictions. After engine start, the FMS uses the FOB , provided by the FQMS .

L1 **ENTRY FORMAT**

Refer to BLOCK Entry Format

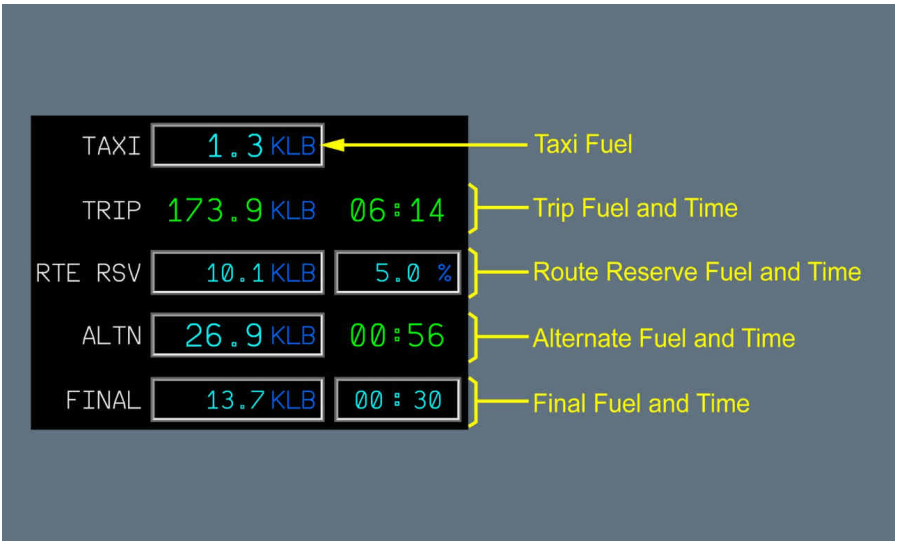
FUEL PLANNING TABLE

The fuel planning table provides the results of the fuel planning computation.
The fuel planning computation is performed after a BLOCK entry, or after clicking on the FUEL PLANNING button (in this last case, the minimum BLOCK fuel is computed for an EXTRA fuel equal to zero).

L2 The fuel planning table is also updated, when:
- The ZFW , ZFWCG , MIN FUEL AT DEST, or any value in the fuel planning table is changed
- A lateral or vertical flight plan revision is performed

L3
- The cost index is changed
- The maximum cabin rate is changed
- The cruise temperature, SAT , or tropopause altitude are changed
- A preselected speed is entered, or changed.

Fuel Planning Table



L1 **TAXI FUEL ENTRY FIELD**

Indicates the TAXI fuel.
The TAXI fuel is the fuel quantity necessary for taxi.
The default value for the taxi fuel is defined in the fuel policy of the AMI file. The flight crew can override the default value.

L2 At takeoff, the TAXI fuel entry field displays dashes, and can no longer be changed.

L1 ENTRY FORMAT

Refer to TAXI Entry Format

TRIP FUEL AND TIME

Indicates the TRIP fuel quantity and TRIP time.
The TRIP fuel (time) is the fuel quantity (time) necessary for the trip between takeoff at the origin airport (or from the P.POS in flight) to landing at the primary destination.

ROUTE RESERVE FUEL AND TIME ENTRY FIELDS

Indicates the RTE RSV fuel quantity and RTE RSV percentage.
The way the RTE RSV is computed, and the default value, are defined in the company fuel policy of the AMI file. The RTE RSV is either a percentage of the TRIP fuel, or a percentage of the (TRIP + ALTN) fuel.

The flight crew can override the default value.

L2 At takeoff, the RTE RSV is set to 0. The RTE RSV fuel is now included in the EXTRA FUEL.

L1 ENTRY FORMAT

Refer to RTE RSV Entry Format
Refer to RTE RSV% Entry Format

ALTERNATE FUEL ENTRY FIELD AND TIME

Indicates the ALTN fuel quantity and ALTN time.
The ALTN fuel (time) is the fuel quantity (time) necessary for the trip between the primary destination airport and landing at the alternate destination.

L2 The computation of the default value considers:
- A cost index equal to zero (minimum fuel consumption)
- A flight level FL 220 , if the alternate flight plan distance is less than 200 nm , or a flight level FL 310 , if the alternate flight plan distance is 200 nm or more.

L1 The flight crew can override the default value.

ENTRY FORMAT

Refer to ALTN FUEL Entry Format

FINAL FUEL AND TIME ENTRY FIELDS

Indicates the FINAL fuel and FINAL time.
The FINAL fuel (time) is the fuel quantity (time) planned for a holding pattern that could be flown at either the primary or alternate destination.
The parameters used to compute the FINAL fuel (time), and the default values, are defined in the company fuel policy of the AMI file.
The flight crew can override the default values.

ENTRY FORMAT

Refer to FINAL FUEL Entry Format
Refer to FINAL TIME Entry Format

TOW

Indicates the Takeoff Weight (TOW).
Before engine start, the TOW is:
TOW = ZFW + BLOCK - TAXI
After engine start, the takeoff weight is:
TOW = GW - TAXI

L2 In flight, the takeoff weight is equal to the gross weight.

LW

Indicates the Landing Weight (LW).
Before engine start, the LW is computed as follows:
LW = TOW - TRIP Fuel
After engine start, the landing weight is:
LW = GW - TRIP Fuel - TAXI Fuel
In flight, the landing weight is:
LW = GW - TRIP Fuel

PAX NBR ENTRY FIELD

Indicates the number of passengers (PAX NBR).
The PAX number entry field is mandatory, and is entered by the flight crew.
L2 The FMS PAX number is used by the air conditioning system.

L1 **ENTRY FORMAT**

Refer to PAX NBR Entry Format

CI ENTRY FIELD

Indicates the Cost Index (CI).

The completion of the CI entry field is mandatory. It can be completed either:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a CPNY RTE in the CPNY RTE entry field, or when a received company or ATC flight plan is inserted, and a CI is associated with the entered company route.

The CI entry field reflects the CI entry, made on the PERF or INIT page. (*Refer to PERF page* , *Refer to INIT page*)
For more information, *Refer to Cost Index* .

ENTRY FORMAT

Refer to CI Entry Format

DEFAULT VALUE

When there is no CI entered at engine start, the field is completed with the default value.
The default value is the last CI of the previous flight, stored in the DONE phase (or 0, if there is no CI).

L2 **LIMITATIONS**

The flight crew cannot enter the CI , when the aircraft is in the DESCENT, APPROACH, or GO AROUND flight phase.

JTSN GW ENTRY FIELD

Indicates the Jettison Gross Weight (JTSN GW).
The JTSN GW is entered by the flight crew, and corresponds to the aircraft GW that the flight crew wants to obtain after fuel jettison.
The JTSN GW is used by the FQMS to automatically stop the jettison when the aircraft GW reaches the JTSN GW .
For more information, *Refer to DSC-28-40 Fuel Jettison* .

ENTRY FORMAT

Refer to JTSN GW Entry Format

MIN FUEL AT DEST

Indicates the minimum fuel quantity at the primary destination.

The MIN FUEL AT DEST can be either:
- Entered by the flight crew, or
- Computed by the FMS , if the flight crew did not enter any MIN FUEL AT DEST value. In this case, the MIN FUEL AT DEST = ALTN + FINAL fuel.

If the flight crew manually enters a MIN FUEL AT DEST value and this value is below ALTN + FINAL fuel, the FMS displays the message CHECK MIN FUEL AT DEST (*Refer to CHECK MIN FUEL AT DEST*).
If the flight crew tries to clear the MIN FUEL AT DEST entry field without entering any value, the FMS displays the message NOT ALLOWED (*Refer to NOT ALLOWED*).

ENTRY FORMAT

Refer to MIN FUEL AT DEST Entry Format

EXTRA FUEL AND TIME

Indicates the EXTRA fuel and EXTRA time.
The EXTRA fuel (time) is the fuel quantity (time) that will remain after landing at the primary destination, minus the MIN FUEL AT DEST.
In PREFLIGHT, the EXTRA fuel is computed as follows:
EXTRA = BLOCK (or FOB, after engine start) - TAXI - TRIP - MIN FUEL AT DEST - RTE RSV
In flight, the EXTRA fuel is:
EXTRA = FOB - TRIP - MIN FUEL AT DEST

L2 At takeoff, the FMS sets the RTE RSV to 0 and includes the RTE RSV fuel in the EXTRA fuel.

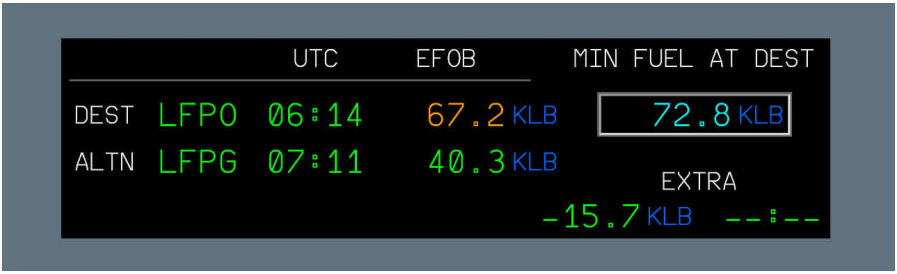
PRIMARY AND ALTERNATE DESTINATION FUEL AND ARRIVAL TIME TABLE

This table provides the estimated time of arrival (UTC), and the Estimated Fuel on Board (EFOB), at the primary and alternate destination.

Note: During the PREFLIGHT phase, if there is no ETT , the time prediction is not a UTC time, but a "flight time".

The EFOB at destination is displayed amber, when it is below the MIN FUEL AT DEST. In this case, the FMS also displays the message DEST EFOB BELOW MIN (*Refer to DEST EFOB BELOW MIN*).

EFOB at Destination lower than MIN FUEL AT DEST



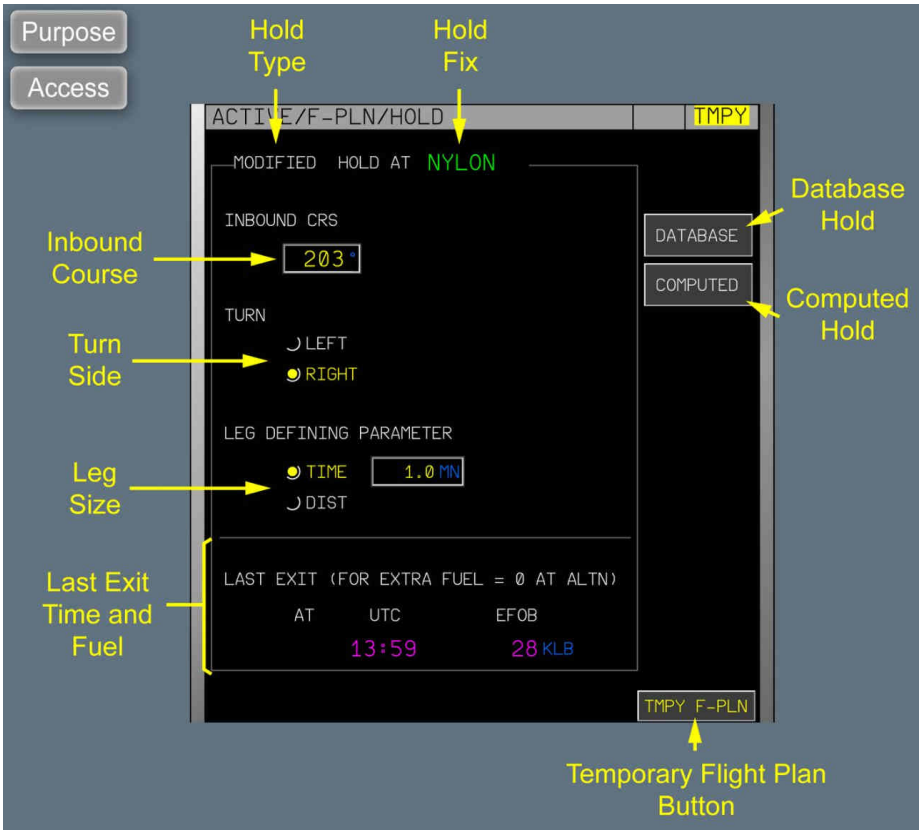
RETURN BUTTON

When clicked, displays the ACTIVE/INIT page.
Refer to Page

HOLD PAGE

Applicable to: ALL

HOLD Page



PURPOSE

On the HOLD page, the flight crew can:
- Check the parameters of a holding pattern defined on the revised waypoint, or
- Define a holding pattern (with manual termination) on the revised waypoint.

The flight crew insert:
- A hold, stored in the navigation database
- A hold, computed by the FMS
- A hold, defined by the flight crew.

The revised flight plan waypoint is called the “hold fix”. The hold fix is the start and end waypoint of the holding pattern.
The HOLD page is available for the active and secondary flight plans.

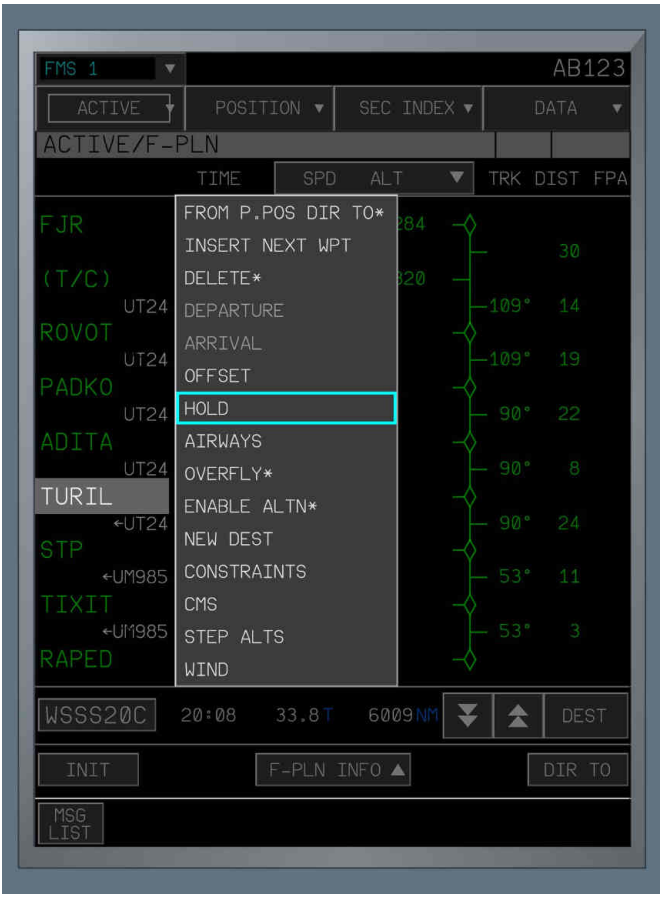
LINKS

Refer to More Information on the HOLD Revision

ACCESS

The flight crew can access the HOLD page via the F-PLN page, by selecting the HOLD revision in the waypoint revisions menu.

F-PLN Page


FMS 1
AB123
ACTIVE
POSITION
SEC INDEX
DATA
ACTIVE/F-PLN
TIME
SPD
ALT
TRK
DIST
FPA
FROM P.POS DIR TO*
INSERT NEXT WPT
DELETE*
DEPARTURE
ARRIVAL
OFFSET
HOLD
AIRWAYS
OVERFLY*
ENABLE ALTN*
NEW DEST
CONSTRAINTS
CMS
STEP ALTS
WIND
FJR
(T/C)
UT24
ROVOT
UT24
PADKO
UT24
ADITA
UT24
TURIL
←UT24
STP
←UM985
TIXIT
←UM985
RAPED
30
109°
14
109°
19
90°
22
90°
8
90°
24
53°
11
53°
3
WSSS20C
20:08
33.8T
6009NM
DEST
INIT
F-PLN INFO
DIR TO
MSG
LIST

HOLD TYPE

Indicates the origin of the holding pattern:

- DATABASE:
  The hold is stored in the navigation database. The flight crew selects the database hold, associated with the revised waypoint, by clicking on the Database Hold button. (*Refer to Button*)
- COMPUTED:
  The hold is computed by the FMS. The flight crew selects a computed hold by clicking on the COMPUTED Hold button. (*Refer to Button*)
- MODIFIED:
  The hold is created by the flight crew, by entering the parameters in the entry fields. As soon as the flight crew changes a parameter of a database, or computed hold, the hold becomes a modified hold.
- The hold type label is blanked when no hold exists on the revised waypoint, or when the hold is inserted with a departure or arrival procedure, or with a flight plan uplink.

HOLD FIX

Indicates the start, and end waypoint of the holding pattern.
The hold fix is the flight plan waypoint from which the flight crew has selected the HOLD revision.

INBOUND COURSE ENTRY FIELD

Indicates the inbound course of the holding pattern.
The inbound course is completed automatically (in small font) when the flight crew selects a database, or computed hold.
The flight crew can always manually change the automatically entered value. The flight crew entered inbound course is displayed in big font.

ENTRY FORMAT

Refer to Inbound Course Entry Format
(revoir la DU Entry Format)

TURN SIDE OPTION

Indicates the hold turn side.
The flight crew selects the turn side by clicking on the turn side option.

LEG SIZE OPTION

The flight crew selects whether the leg size is defined by a time or distance.
The flight crew enters the time, or distance, in the associated entry field.

The leg size is completed automatically (in small font) when the flight crew selects a database, or computed hold.
The flight crew can always manually change the automatically entered value. The flight crew entered leg size is displayed in big font.

ENTRY FORMAT

Refer to HOLD TIME Entry Format
Refer to HOLD DISTANCE Entry Format

LAST EXIT TIME AND FUEL

Indicates the estimated UTC time (or flight time), and amount of fuel remaining, at which the aircraft must exit the holding pattern, so as to comply with the fuel policy. The fuel policy considers an extra fuel = 0 at landing at the primary destination.

DATABASE HOLD BUTTON

When clicked, displays the database hold, associated to the revised waypoint, and updates the temporary flight plan with this hold.
If no database hold exists for the selected waypoint, the button cannot be selected.

COMPUTED HOLD BUTTON

When clicked, computes and displays the computed hold, associated to the revised waypoint, and updates the temporary flight plan with this hold.

L2 The computed hold has the following parameters:
- Inbound course: Track of the flight plan leg preceding the holding fix, or the aircraft bearing if the holding fix is P.POS
- Turn side: RIGHT
- Leg size: 1 minute if the predicted aircraft altitude at the hold is below 14 000 ft , or 1.5 min if the altitude is above 14 000 ft.

TEMPORARY FLIGHT PLAN BUTTON

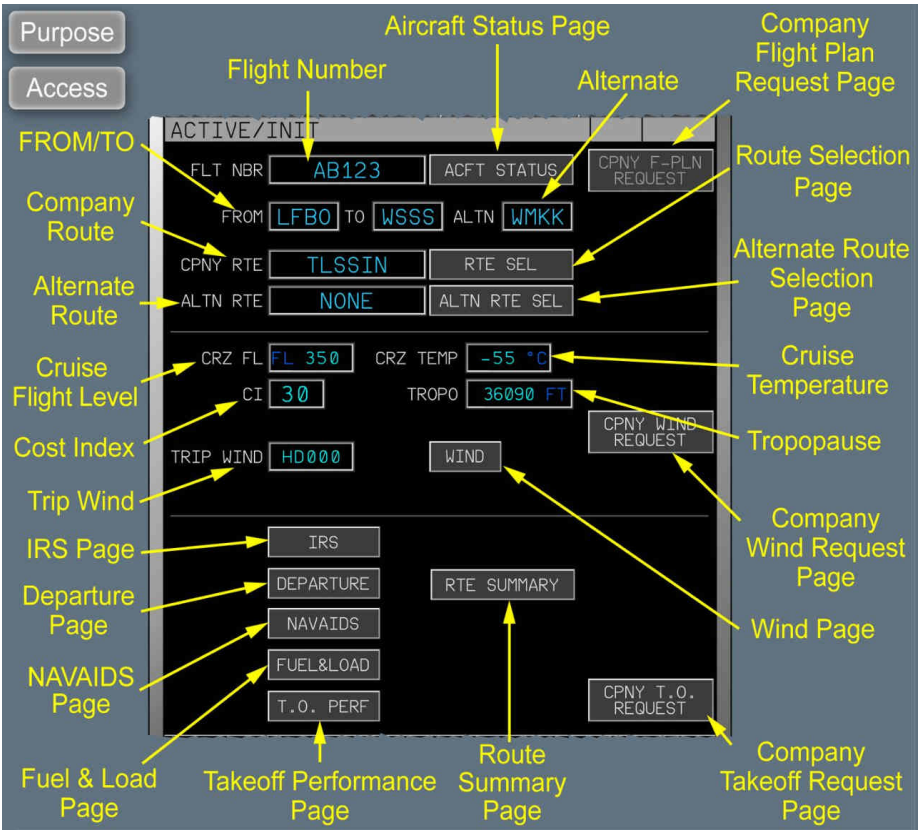
When clicked, displays the ACTIVE / F-PLN page. (*Refer to Page*)

L2 The Temporary Flight Plan button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the Return button is displayed in the lower left corner of the page: When clicked, displays the F-PLN page.

INIT PAGE

Applicable to: ALL

INIT Page



PURPOSE

On the INIT page, the flight crew can:
- Initialize the flight plan
- Access the company request pages (flight plan, wind and takeoff data requests)
- Insert company flight plan, and load data uplinks

Note:
- *The uplinked wind data is inserted on the WIND page (Refer to Page)*
- *The uplinked wind data is inserted on the RECEIVED COMPANY T.O DATA page (Refer to Page)*

The INIT page also guides the flight crew through the FMS initialization via the buttons on the lower part of the page: IRS, DEPARTURE, NAVAIDS, FUEL&LOAD, T.O PERF.
The INIT page is available for the active and secondary flight plans. The SEC / INIT page doesn't display the navigation buttons on the lower part of the page.

ACCESS

The flight crew can access the INIT page, by:

- Pressing the INIT key on the keyboard of the KCCU

INIT Key on the KCCU



- Selecting INIT in the ACTIVE menu on the General Menu Bar

General Menu Bar



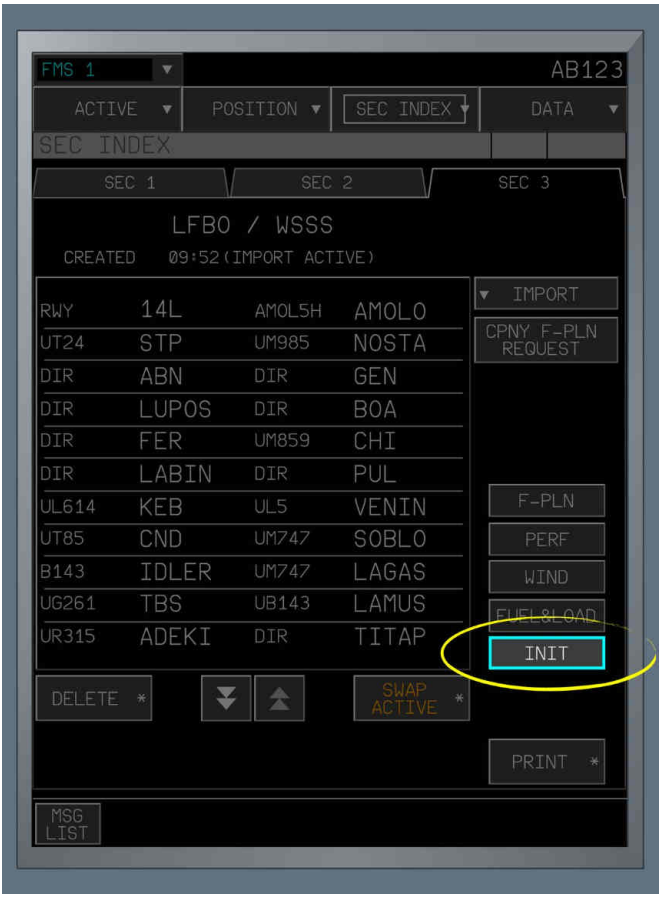
- Clicking on the INIT button, on the F-PLN page (this is only possible in PREFLIGHT)

INIT Button on the F-PLN Page



Note: *For the secondary flight plans, the flight crew can access the INIT page only via the SEC INDEX page, by clicking on the INIT button on this page. In that case, the SEC / INIT page displays the Return button to return to the SEC INDEX page.*

SEC INDEX Page



FLIGHT NUMBER ENTRY FIELD

Indicates the FMS flight number.
The flight number entry field is mandatory, and is entered by the flight crew.

L2 After flight crew entry, the flight number is displayed in the upper right corner of the MFD , even when the MFD does not display an FMS page.
The FMS sends the flight number to the ATC system for use in the ATC downlink messages.

L1 **ENTRY FORMAT**

Refer to FLT NBR Entry Format

AIRCRAFT STATUS BUTTON

Pressing the aircraft status button, displays the ACFT STATUS panel on the DATA / STATUS page.
Refer to STATUS page — ACFT STATUS panel

Impacted by TDU: 00019651 INIT page - FROM TO entry fields

FROM / TO ENTRY FIELDS

Indicate the ICAO origin / destination city-pair.

The FROM / TO entry fields are mandatory. They are entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route in the company route entry field, or when a received company or ATC flight plan is inserted.

A manual city-pair entry calls up the ROUTE SELECTION page, if, for the given city-pair, at least one company route exists. (*Refer to Page*)

CAUTION	Entering the city-pair re-initializes the flight plan, and deletes the existing flight plan, if any.

ENTRY FORMAT

Refer to AIRPORT Entry Format

Note: If the format is correct but the entered airport is not in the navigation database, the PILOT STORED RWYs panel on the DATA / AIRPORT page is displayed. This gives the flight crew the opportunity to add the selected airport to the pilots stored elements database.
Refer to DATA AIRPORT - PILOT STORED RWYs panel
Refer to Pilot Stored Elements Database

L2 **LIMITATIONS**

The flight crew can not enter the city-pair (on the ACTIVE / INIT page) when:
- The aircraft is not in the PREFLIGHT phase, or
- When a temporary flight plan is pending.

~~The flight crew can not clear the fields.~~

Impacted DU: 00003510 INIT page - FROM TO entry fields

FROM / TO ENTRY FIELDS

Indicate the ICAO origin / destination city-pair.

The FROM / TO entry fields are mandatory. They are entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route in the company route entry field, or when a received company or ATC flight plan is inserted.

A manual city-pair entry calls up the ROUTE SELECTION page, if, for the given city-pair, at least one company route exists. (*Refer to Page*)

CAUTION	Entering the city-pair re-initializes the flight plan, and deletes the existing flight plan data (except the performance data), if any.

ENTRY FORMAT

Refer to AIRPORT Entry Format

Note: If the format is correct but the entered airport is not in the navigation database, the PILOT STORED RWYs panel on the DATA / AIRPORT page is displayed. This gives the flight crew the opportunity to add the selected airport to the pilots stored elements database.
Refer to DATA AIRPORT - PILOT STORED RWYs panel
Refer to Pilot Stored Elements Database

L2 **LIMITATIONS**

The flight crew can not enter the city-pair (on the ACTIVE / INIT page) when:
- The aircraft is not in the PREFLIGHT phase, or
- When a temporary flight plan is pending.

The flight crew can not clear the fields.

ALTERNATE ENTRY FIELD

Indicates the ICAO code of the alternate airport.

The alternate entry field is mandatory, and entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route in the company route entry field, or when a received company or ATC flight plan is inserted, and an alternate airport is associated with the entered company route.

A manual alternate airport entry calls up the ROUTE SELECTION page, if, for the given primary and alternate destination pair, at least one company route exists. (*Refer to Page*)
The alternate destination can also be entered via the ALTERNATE revision. The Alternate entry field reflects the alternate airport selection, made on the ALTERNATE page.
Refer to More Information on the ALTERNATE Revision
Refer to ALTERNATE Page

CAUTION	Entering the alternate destination re-initializes the alternate flight plan, and deletes the existing alternate flight plan, if any.

ENTRY FORMAT

Refer to ALTN Entry Format

Note: *If the entered airport is not in the navigation database, the PILOT STORED RWYs panel on the DATA / AIRPORT page is displayed. This gives the flight crew the opportunity to add the selected airport to the pilots stored elements database.*
Refer to DATA AIRPORT - PILOT STORED RWYs panel
Refer to Pilot Stored Elements Database

DEFAULT VALUE

The alternate entry field displays the alternate airport, associated with the defined primary destination, if any. If no associated alternate airport exists, the alternate field displays NONE.

COMPANY ROUTE ENTRY FIELD

Indicates the company route.
The company route entry field is mandatory, if there is no FROM/TO city-pair defined.

The alternate entry field is entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew selects a company route on the ROUTE SELECTION page. (*Refer to Page*)

CAUTION	Entering a company route re-initializes the flight plan, and deletes the existing flight plan, if any.

If a FROM / TO city-pair is defined, and no company route has been selected, then the company route field displays NONE.

ENTRY FORMAT

Refer to CO RTE Entry Format

L2 **LIMITATIONS**

The flight crew can not enter the company route (on the ACTIVE / INIT page) when:
- The aircraft is not in the PREFLIGHT phase, or
- When a temporary flight plan is pending.

The flight crew cannot clear the field.

ALTERNATE ROUTE ENTRY FIELD

Indicates the alternate company route.

The alternate company route is entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew selects an alternate company route on the ALTERNATE ROUTE SELECTION page. (*Refer to Page*)

The alternate route can also be entered via the ALTERNATE revision. The alternate route entry field reflects the alternate route selection, made on the ALTERNATE page.
Refer to More Information on the ALTERNATE Revision
Refer to ALTERNATE Page

CAUTION	Entering an alternate route re-initializes the alternate flight plan, and deletes the existing alternate flight plan, if any.

If a primary destination is defined, and no alternate route has been selected, then the Alternate Route field displays NONE.

ENTRY FORMAT

Refer to ALTN RTE Entry Format

L2 **LIMITATIONS**

The flight crew can not enter the alternate company route (on the ACTIVE / INIT page) when:
- No primary destination is defined, or
- A temporary flight plan is pending.

The flight crew cannot clear the field.

ROUTE SELECTION BUTTON

Pressing the route selection button, displays the ROUTE SELECTION page. (*Refer to Page*)

ALTERNATE ROUTE SELECTION BUTTON

When clicked, displays the ROUTE SELECTION page. (*Refer to Page*)

CRUISE FLIGHT LEVEL ENTRY FIELD

Indicates the cruise flight level.

The cruise flight level entry field is mandatory, and entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route in the company route entry field, or when a received company or ATC flight plan is inserted, and a cruise flight level is associated with the entered route.

The Cruise Flight Level field reflects the cruise flight level entry, made on the PERF page. (*Refer to Page*)

ENTRY FORMAT

Refer to CRZ FL Entry Format

AUTOMATIC UPDATE

L2 If no cruise flight level is defined, and the TAKEOFF flight phase becomes active, the cruise flight level is set to the highest of the following two values:
- The FCU clearance altitude
- The highest climb altitude constraint in the primary flight plan.

L1 When the flight crew sets the AFS CP selected altitude above the cruise flight level, the cruise flight level is set to the AFS CP selected altitude.
When the flight crew enters a cruise flight level lower than the AFS CP selected altitude, the entry is not accepted and the cruise flight level is set to the AFS CP selected altitude.
The cruise flight level displays dashes when the descent, or approach phase becomes active.

L2 LIMITATIONS

The flight crew can not enter the cruise flight level (on the ACTIVE / INIT page) when no FROM / TO city-pair is defined.
The flight crew cannot clear the field.

CRUISE TEMPERATURE ENTRY FIELD

Indicates the cruise temperature.

ENTRY FORMAT

Refer to CRZ TEMP Entry Format

DEFAULT VALUE

If a cruise flight level is entered, or when the cruise temperature entry field is cleared, the cruise temperature is set to the ISA temperature.

AUTOMATIC UPDATE

For automatic cruise temperature updates, (link to the Performance Parameters chapter)

L2 **LIMITATIONS**

The flight crew can not enter the cruise temperature (on the ACTIVE / INIT page) when no cruise flight level is defined.

COST INDEX ENTRY FIELD

Indicates the cost index.

The cost index entry field is mandatory, and entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route in the company route entry field, or when a received company or ATC flight plan is inserted, and a cost index is associated with the entered company route.

The cost index field reflects the cost index entry, made on the PERF and FUEL&LOAD page. (*Refer to PERF page* , *Refer to FUEL&LOAD page*)
For more information on the use of the cost index, *Refer to Cost Index* .

ENTRY FORMAT

Refer to CI Entry Format

DEFAULT VALUE

When there is no cost index defined at engine start, the field is completed with the default value. The default value is the last cost index of the previous flight, stored in the DONE phase (or 0, if there is no cost index).

L2 **LIMITATIONS**

The flight crew can not enter the cost index (on the ACTIVE / INIT page), when the aircraft is in the DESCENT, APPROACH, or GO AROUND flight phase.

TROPOPAUSE ENTRY FIELD

Indicates the tropopause altitude.

ENTRY FORMAT

Refer to TROPO Entry Format

DEFAULT VALUE

The default tropopause altitude is 36 090 ft .

TRIP WIND ENTRY FIELD

Indicates the trip wind.

L2 The trip wind is the mean effective wind component for the trip from the origin to the destination airport.

L1 The trip wind is entered manually by the flight crew.
When the flight crew enters any of the climb, cruise, or descent winds on the WIND page, then the FMS does not use the trip wind value any more. In that case, the trip wind entry field is disabled and displays dashes.

ENTRY FORMAT

Refer to TRIP WIND Entry Format

DEFAULT VALUE

The default trip wind value is HD000.

L2 **LIMITATIONS**

The flight crew can not enter the trip wind when no FROM / TO city-pair is defined.

WIND BUTTON

When clicked, displays the WIND page. (*Refer to Page*)

IRS BUTTON

When clicked, displays the POSITION / IRS page. (*Refer to Page*)

DEPARTURE BUTTON

When clicked, displays the DEPARTURE page. (*Refer to Page*)
The DEPARTURE button can be selected only in PREFLIGHT, and when an origin airport exists.

ROUTE SUMMARY BUTTON

When clicked, displays the DATA / ROUTE page. (*Refer to page*)

NAVAID S BUTTON

When clicked, displays the POSITION / NAVAIDS page. (*Refer to Page*)

FUEL&LOAD BUTTON

When clicked, displays the FUEL&LOAD page. (*Refer to Page*)

TAKEOFF PERFORMANCE BUTTON

When clicked, displays the TO panel of the PERF page. (*Refer to Page*)

COMPANY FLIGHT PLAN REQUEST BUTTON

When clicked, displays the COMPANY F-PLN REQUEST page. (*Refer to Page*)

L2 The company flight plan request button can only be selected before engine start, when:
- No active flight plan is defined, and
- No secondary flight plan request is pending.

L1 When an active flight plan request is pending, the button displays REQUEST PENDING ... . The button gives still access to the COMPANY F-PLN REQUEST page.

REQUEST PENDING ...



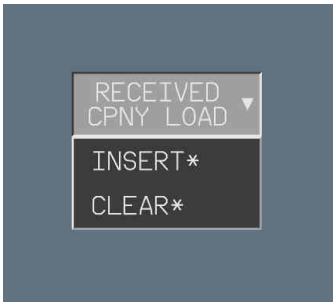
When an active company flight plan is received, the button displays RECEIVED CPNY F-PLN . When clicked, opens a menu that allows the flight crew to insert, or clear the received company flight plan.

RECEIVED CPNY F-PLN



When the received company message contains only the flight plan load data, and not the flight-plan itself, the button displays RECEIVED CPNY LOAD. When clicked, opens a menu that allows the flight crew to insert, or clear the received company load data.

RECEIVED CPNY LOAD



COMPANY WIND REQUEST BUTTON

When clicked, sends via ACARS a company wind request to the company ground station.
If the Free Text AMI option is activated, clicking on the CPNY WIND REQUEST button will display the COMPANY WIND DATA REQUEST page. (*Refer to Page*)
On this page, the flight crew can enter any free text that will be sent with the wind request.
When an active wind request is pending, the button displays REQUEST PENDING ... . The button gives still access to the COMPANY WIND DATA REQUEST page.

REQUEST PENDING ...



COMPANY TAKEOFF REQUEST BUTTON

When clicked, displays the COMPANY T.O DATA REQUEST page.
Refer to Page

L2 The company flight plan request button can only be selected when the flight phase is PREFLIGHT or DONE.

L1 When an active takeoff data request is pending, the button displays REQUEST PENDING ... . The button gives still access to the COMPANY T.O DATA REQUEST page.

REQUEST PENDING ...



When the active company takeoff data is received, the button displays RECEIVED CPNY T.O. When clicked, displays the RECEIVED CPNY T.O DATA page.
Refer to Page

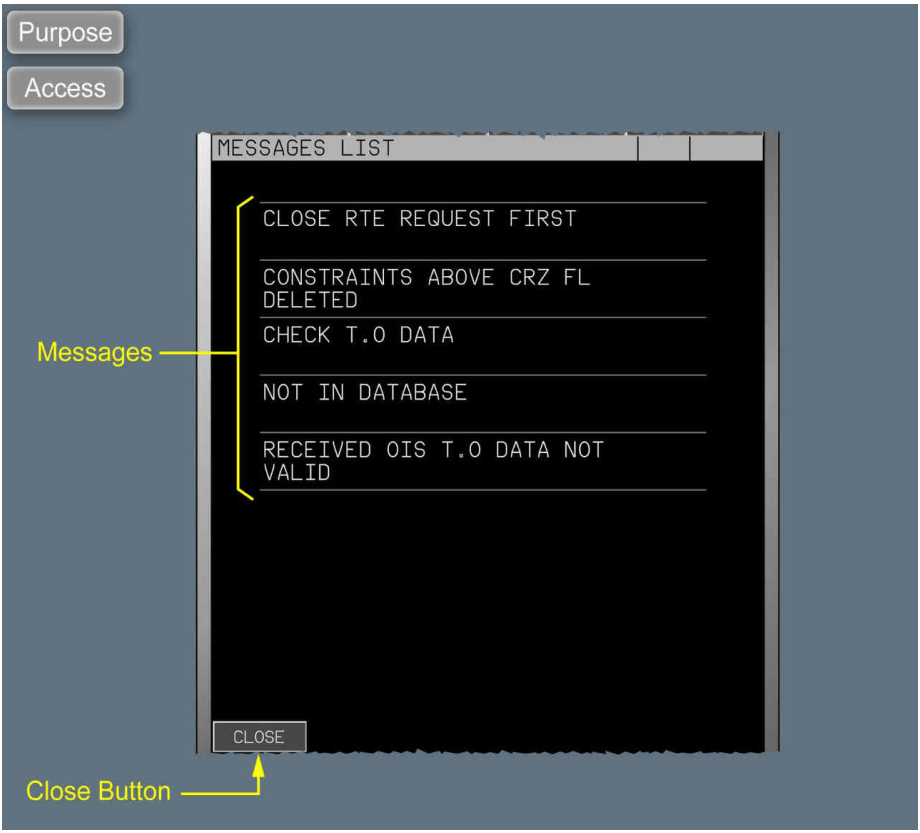
RECEIVED CPNY T.O.



MESSAGES LIST PAGE

Applicable to: ALL

MESSAGES LIST page



PURPOSE

On the MESSAGES LIST page, the flight crew can review the type II messages history.

LINKS

Refer to FMS Messages .

ACCESS

The flight crew can access the MESSAGES LIST page, via the MSG LIST button of the FMS Message Area. (*Refer to FMS Message Area*)
The MSG LIST button is only available when all messages are cleared.

MESSAGES

Indicates the first-in / first-out message list of type II messages.
A message is automatically removed from the list as soon as the display conditions of the message no longer apply.
The list has a maximum of 5 messages.

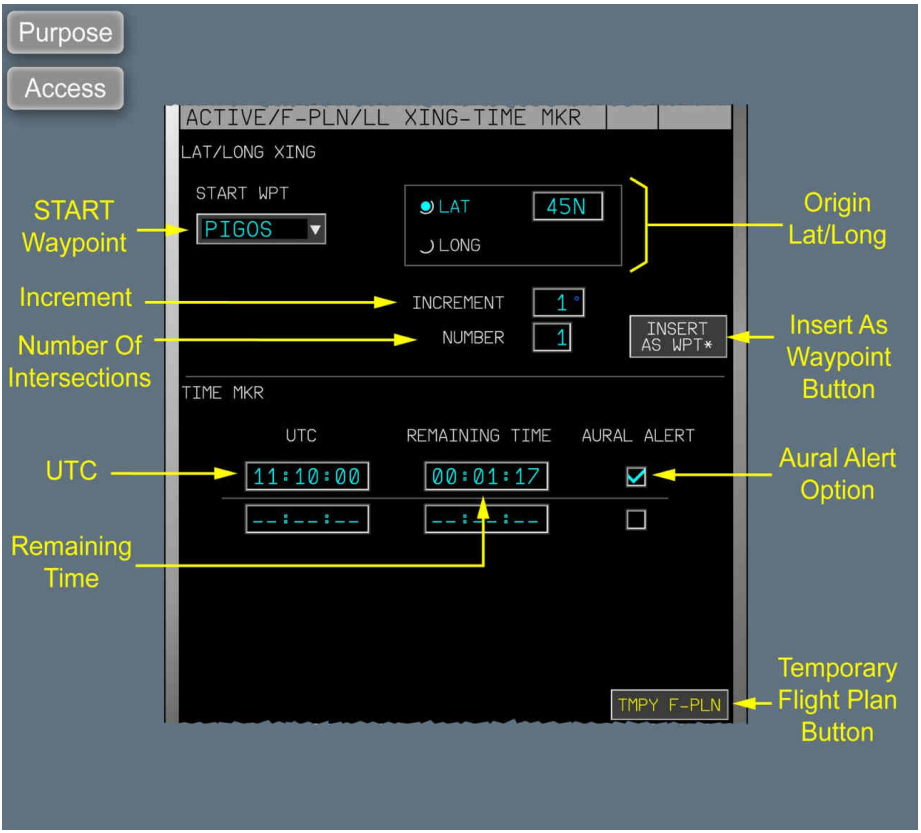
CLOSE BUTTON

When clicked, displays the page that was displayed before the MESSAGES LIST page.

LL XING - TIME MKR PAGE

Applicable to: ALL

LL XING — TIME MKR Page



PURPOSE

On the LL XING - TIME MKR page, the flight crew can:

- Create LAT / LONG CROSSING points, and insert them as waypoints in the temporary flight plan
- Define up to 4 time marker.

The LL XING - TIME MKR page is available for the active and secondary flight plans. However, for the secondary flight plans, the LL XING - TIME MKR page only displays the LAT / LONG CROSSING function.

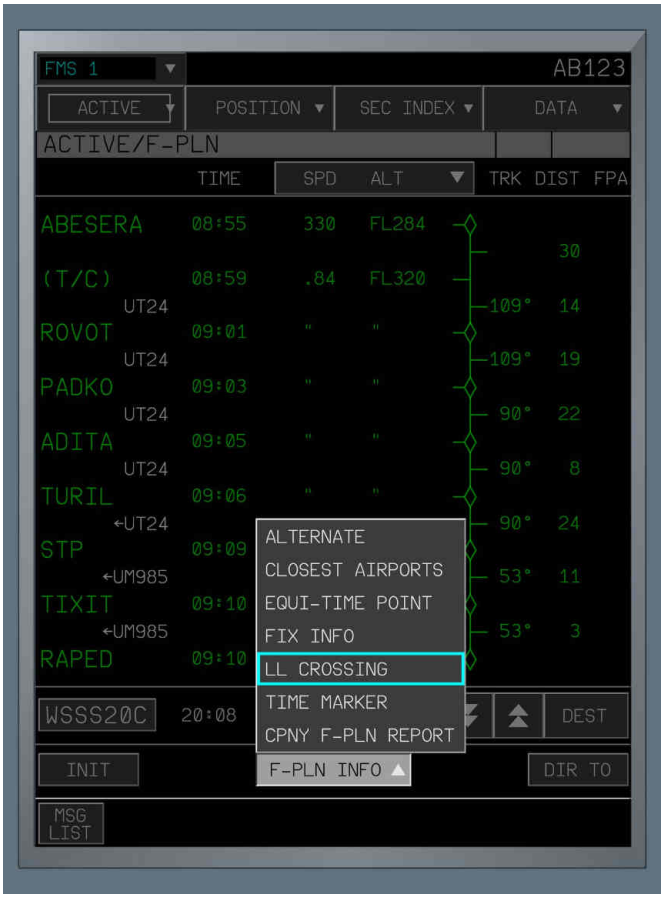
LINKS

Refer to DSC-22-FMS-10-40-50-22FMS4030N LAT/LONG CROSSING - Purpose LAT/LONG CROSSING - Revision Description

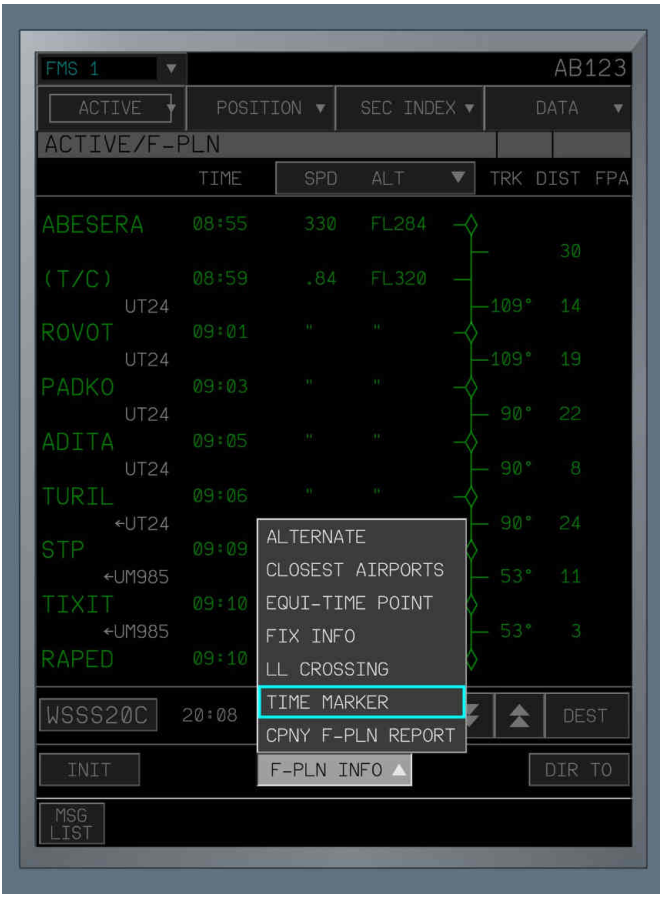
ACCESS

The flight crew can access the LL XING — TIME MKR page via the F-PLN page by selecting LL CROSSING or TIME MARKER in the F-PLN INFO menu.

Access via the LL CROSSING option



Access via the TIME MARKER option



START WAYPOINT ENTRY FIELD AND LIST

Indicates the first waypoint along the flight plan taken by the FMS to compute LAT/LONG crossing point series.
The flight crew enters the target waypoint via the keyboard, or by selecting it in the list.
The start waypoint can be defined between the origin and:

- The last enroute waypoint (excluded), or
- The waypoint associated to the first descent constraint in the primary flight plan (excluded).

ENTRY FORMAT

Refer to Waypoint entry format

ORIGIN LATITUDE/LONGITUDE

The flight crew selects wether the crossing points are intersections with a latitude, or with a longitude.
The default selection is latitude.
The flight crew enters the origin latitude (or longitude) in the entry field.
The default value is the rounded latitude (or longitude) of the waypoint in the flight plan following the first waypoint of the start waypoint list. If the FMS does not find latitude (or longitude) corresponding to this flight plan point, the default value will be the rounded latitude (or longitude) of the first waypoint of the start waypoint list

ENTRY FORMAT

Refer to LAT Entry Format
Refer to LONG Entry Format

INCREMENT ENTRY FIELD

The flight crew enters the increment (in degrees) between the crossing latitudes (or longitudes).
The default value is 1.

ENTRY FORMAT

Refer to Increment entry format

NUMBER OF INTERSECTIONS

The flight crew enters the maximum desired number of intersections in the entry field.

ENTRY FORMAT

Refer to Number entry format

INSERT AS WAYPOINT BUTTON

When clicked, inserts the intersections as waypoints in the temporary flight plan.

UTC ENTRY FIELD

The flight crew enters the UTC time of the time marker in the entry field.
The ND displays the associated pseudo waypoint on the lateral flight plan.
The entry field is entered automatically when the time marker is defined by a remaining time entry.

ENTRY FORMAT

Refer to TIME MARKER UTC Entry Format

REMAINING TIME ENTRY FIELD

The flight crew enters the remaining time to reach the desired time marker position from the present position in the entry field.
The ND displays the associated pseudo waypoint on the lateral flight plan.
The entry field is entered automatically when the remaining time is defined by a UTC entry.

ENTRY FORMAT

Refer to Remaining Time entry format

AURAL ALERT OPTION

The flight crew selects this option if he wants to be alerted aurally when the time marker is reached.

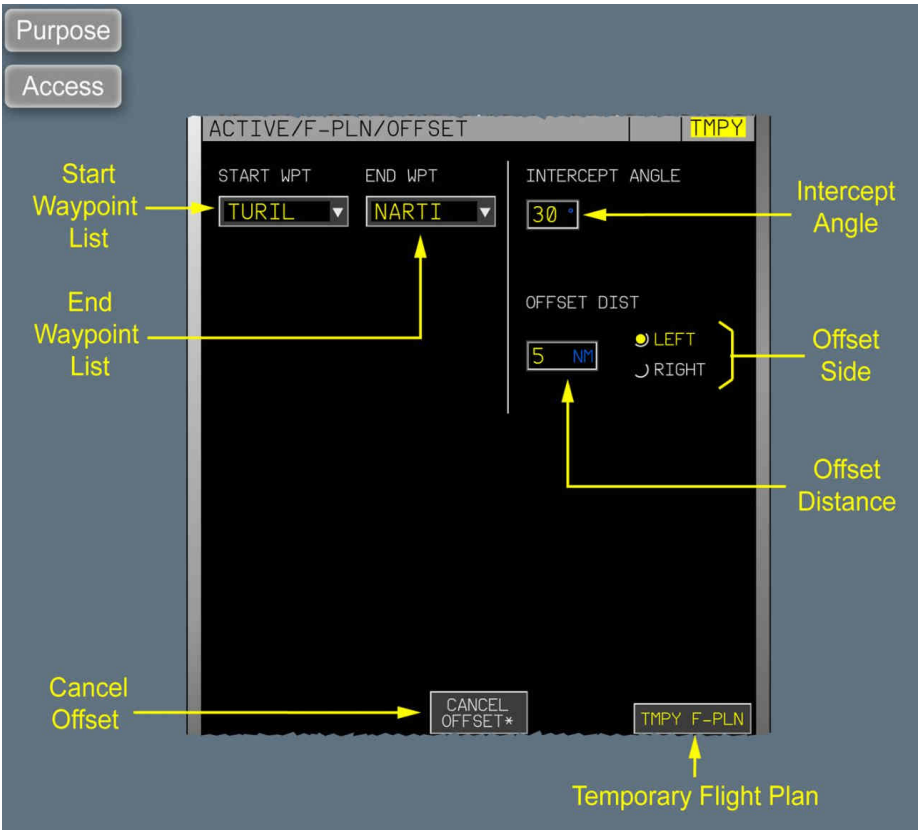
TEMPORARY FLIGHT PLAN BUTTON

When clicked, displays the ACTIVE / F-PLN page. (*Refer to Page*)
L2 The Temporary Flight Plan button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the Return button is displayed: Clicking on the Return button, displays the ACTIVE / F-PLN page.

OFFSET PAGE

Applicable to: ALL

OFFSET Page



PURPOSE

On the OFFSET page, the flight crew can insert, change, or delete an offset segment. The OFFSET page is available for the active and secondary flight plans.

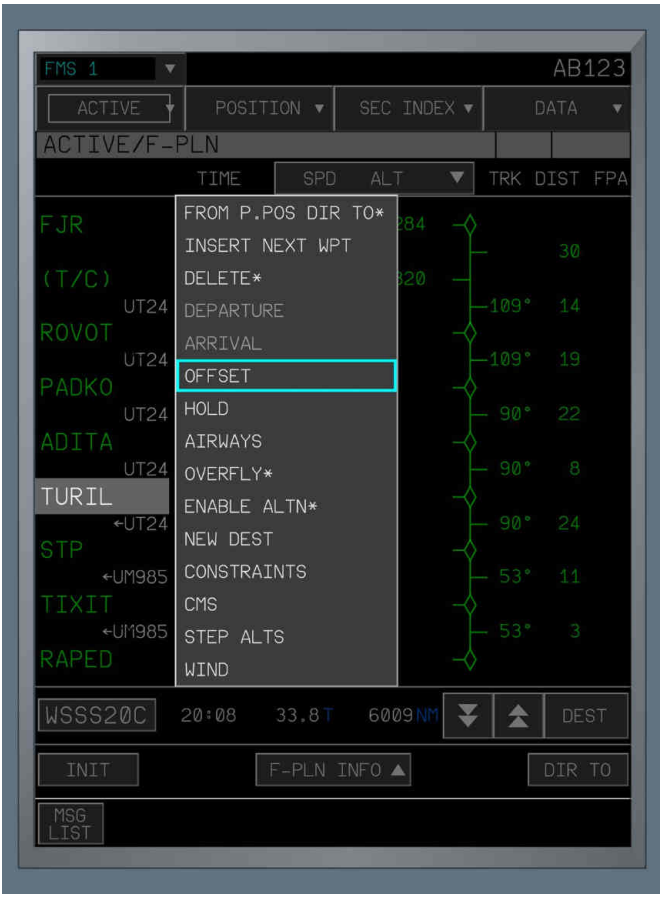
LINKS

Refer to More Information on the OFFSET Revision

ACCESS

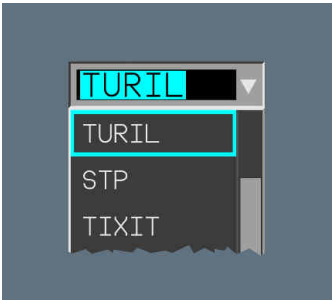
The flight crew can access the OFFSET page via the F-PLN page, by selecting the OFFSET revision in the waypoint revision menu.

Offset access



START WAYPOINT LIST

Start Waypoint List



The start waypoint list displays all flight plan waypoints from the aircraft present position to the primary destination.
The flight crew selects the offset start waypoint in the list, or enters it into the entry field using the keyboard.
Some flight plan waypoints cannot be part of the offset segment (example: holding fix). These waypoints are not displayed in the start waypoint list.

The default start waypoint is:
- The revised waypoint, if there is no offset segment in the flight plan.

  Note: - *If the revised waypoint is the FROM waypoint, the default start waypoint is P.POS .*
  - *If the revised waypoint cannot be part of an offset segment (example: a holding fix), the default start waypoint is the first valid flight plan waypoint downpath the revised waypoint.*

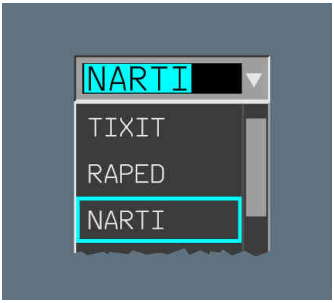
- The start waypoint of the offset segment, if there is an offset segment in the flight plan
- P.POS , if the aircraft is currently flying the offset segment
  In this case, the flight crew cannot change the start waypoint.

ENTRY FORMAT

Refer to WAYPOINT Entry Format

END WAYPOINT LIST

End Waypoint List



The end waypoint list displays all flight plan waypoints from the selected start waypoint to the primary destination.
The flight crew selects the offset end waypoint in the list, or enters it into the entry field using the keyboard.
Some flight plan waypoints cannot be part of the offset segment (example: holding fix). The end waypoint list only displays the flight plan waypoints between the selected start waypoint, and the first not valid waypoint.

The default start waypoint is:
- The last waypoint of the flight plan before the primary destination, or the last waypoint before the first not valid waypoint, if there is no offset segment in the flight plan
- The end waypoint of the offset segment, if there is one.

ENTRY FORMAT

Refer to WAYPOINT Entry Format

OFFSET DISTANCE ENTRY FIELD

Indicates the offset distance.
The flight crew can enter the offset side (L or R) with the offset distance (example: 15L, or L15)
After validation of the entry, the offset distance entry field only displays the offset distance, and the offset side option is automatically updated.

ENTRY FORMAT

Refer to OFFSET DISTANCE ENTRY FORMAT

OFFSET SIDE OPTION

Indicates the offset side.
The flight crew selects the offset side by clicking on the offset side option.

INTERCEPT ANGLE ENTRY FIELD

Indicates the angle between the original flight plan, and the transition trajectory from the original flight plan to the offset path (or vice versa).
The default intercept angle is 30 ° (this value can be changed by the operator in the AMI file).
The flight crew can change the default value.

ENTRY FORMAT

Refer to ANGLE ENTRY FORMAT

CANCEL OFFSET BUTTON

When clicked, cancels the offset segment in the temporary flight plan and displays the F-PLN page.
L2 The flight crew can also cancel the offset segment by entering 0 in the offset distance field.

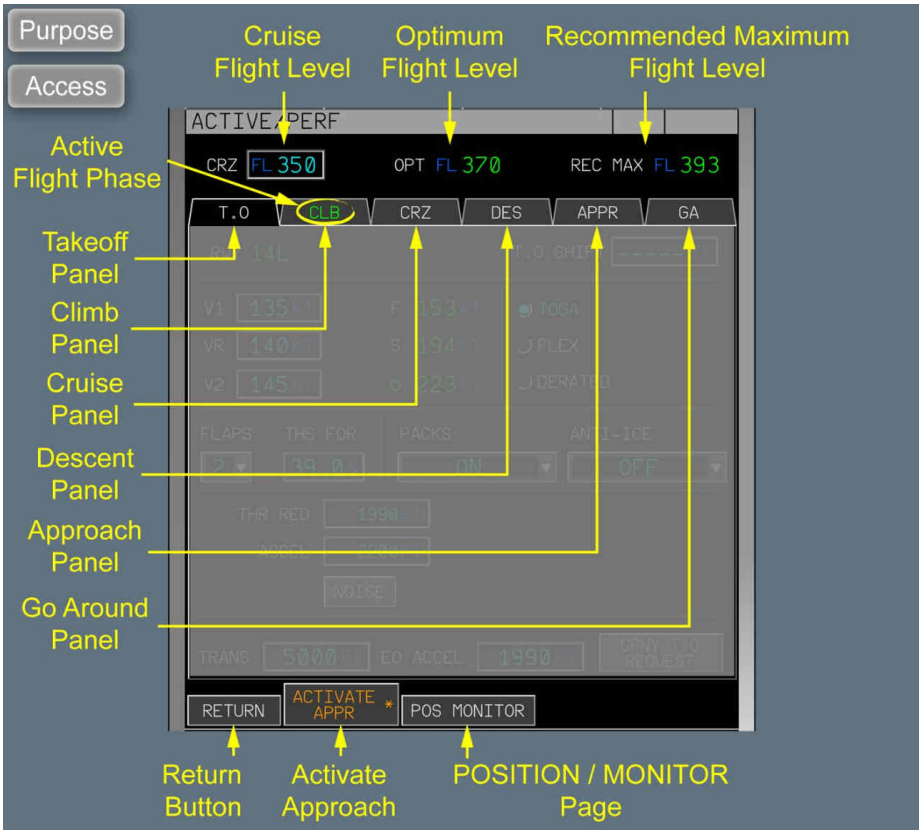
TEMPORARY FLIGHT PLAN BUTTON

When clicked, displays the ACTIVE / F-PLN page. (*Refer to Page*)
L2 The Temporary Flight Plan button is only displayed if a temporary flight plan exists. If no temporary flight plan exists, the Return button is displayed in the lower left corner of the page: When clicked, displays the F-PLN page.

PERF PAGE

Applicable to: ALL

PERF Page - Overview



PURPOSE

On the PERF page, the flight crew can:

- Change the cruise flight level,
- Consult the optimum and recommended maximum flight levels,
- Display, change, or complete the performance data for the following FMS flight phases: Takeoff (T.O), climb (CLB), cruise (CRZ), descent (DES), approach (APPR), and go-around (GA),

- Change the cost index,
- Activate the APPR $_{phase}$,
- Clear the engine-out state.

The PERF page is available for the active and secondary flight plans.

LINKS

Refer to FMS Performance Computation
Refer to FMS Engine-out

ACCESS

The flight crew can access the PERF page, via:

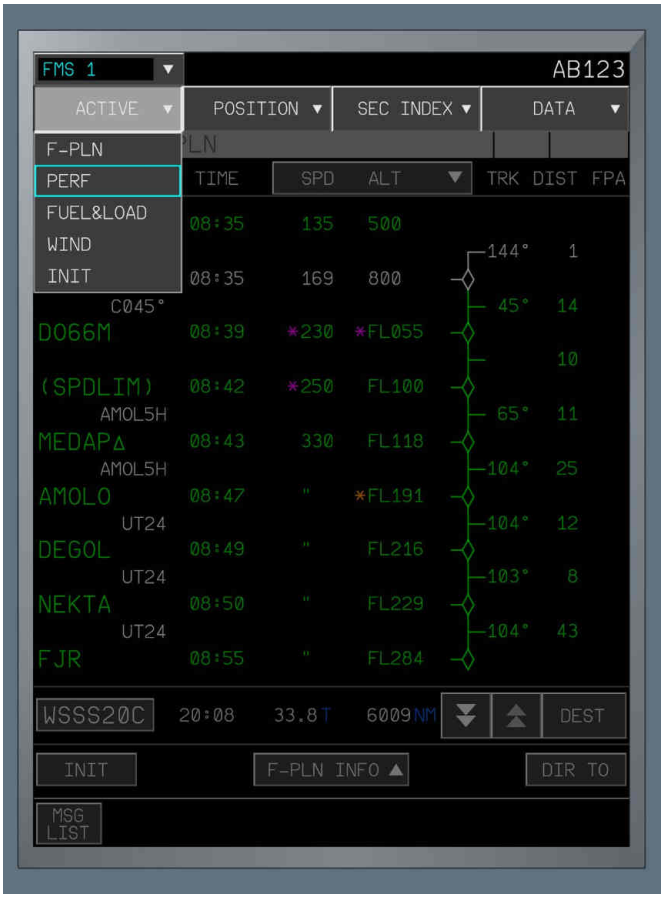
- The KCCU, by pressing the PERF key on the keyboard, the panel of the active flight phase is opened by default,

KCCU



- The General Menu Bar, by selecting PERF in the ACTIVE menu, the panel of the active flight phase is opened by default,

General Menu Bar



- The ACTIVE / INIT page, by clicking on the T.O PERF button, the T.O panel is opened by default,

ACTIVE / INIT Page



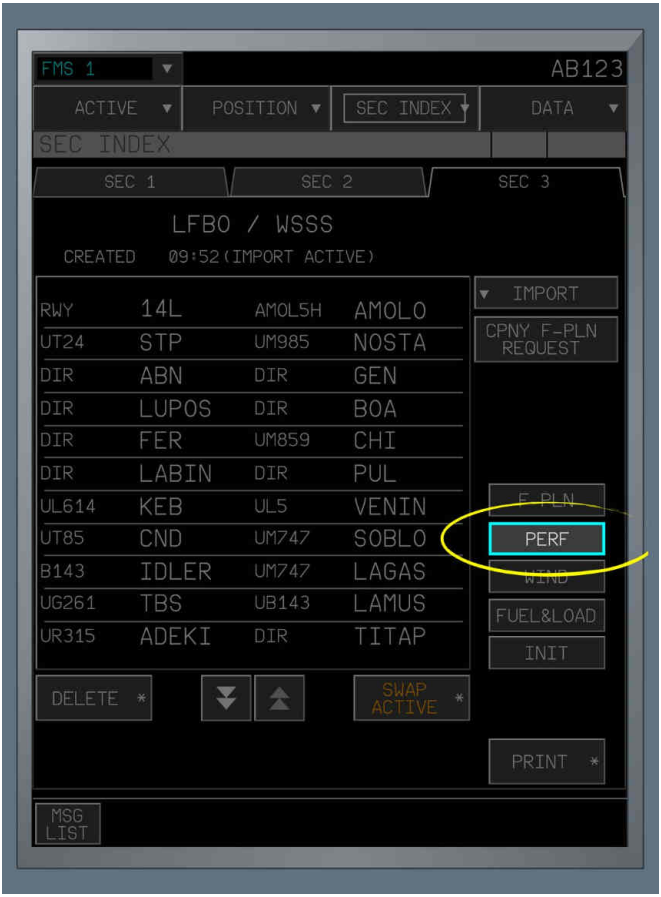
- The RECEIVED COMPANY T.O DATA page, by clicking on the T.O PERF button, the T.O panel is opened by default,

RECEIVED COMPANY T.O DATA Page



Note: *For the secondary flight plans, the flight crew can access the PERF page via the SEC INDEX page, by clicking on the PERF button.*

SEC INDEX Page



CRUISE FLIGHT LEVEL ENTRY FIELD

Indicates the cruise flight level.
The Cruise Flight Level field reflects the cruise flight level entry, made on the INIT page. (*Refer to Page*)

ENTRY FORMAT

Refer to CRZ FL Entry Format

AUTOMATIC UPDATE

L2 When the T.O $_{phase}$ becomes active, and no cruise flight level is defined by the flight crew, the cruise flight level is automatically set to the highest of the following two values:
- The AFS CP clearance altitude,
- The highest climb altitude constraint in the primary flight plan.

L1 When the flight crew sets the AFS CP selected altitude above the cruise flight level, the cruise flight level is set to the AFS CP selected altitude.
When the flight crew enters a cruise flight level lower than the AFS CP selected altitude, the entry is not accepted and the cruise flight level is set to the AFS CP selected altitude.
The cruise flight level displays dashes when the descent, or approach phase becomes active.

OPTIMUM FLIGHT LEVEL

Indicates the current optimum flight level.
Refer to Optimum Flight Level

L2 The label displays dashes:
- In DES $_{phase}$ and APPR $_{phase}$,
- In the engine-out state.

RECOMMENDED MAXIMUM FLIGHT LEVEL

Indicates the recommended maximum flight level.
Refer to Recommended Maximum Flight Level

L2 In engine-out, the label displays EO MAX in amber. It indicates the engine-out maximum flight level.
Refer to Engine-Out Maximum Flight level

EO MAX



RETURN BUTTON

When clicked, displays the INIT page. (*Refer to Page*)

POSITION MONITOR BUTTON

When clicked, displays the POSITION / MONITOR page. (*Refer to Page*)

ACTIVATE APPROACH BUTTON

The flight crew uses the button to activate the APPR $_{phase}$.
A confirmation action is required.

CONFIRM / CANCEL

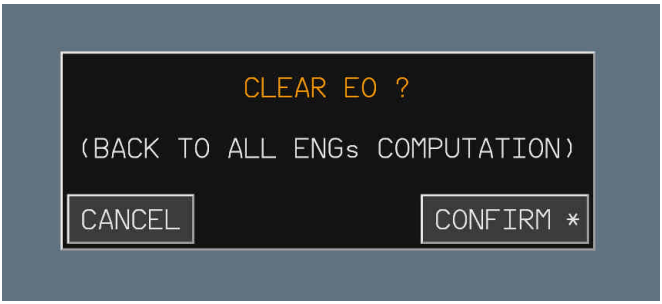


The flight crew can activate the APPR $_{phase}$ with this button during the CLB $_{phase}$, CRZ $_{phase}$, DES $_{phase}$, or GA $_{phase}$. Otherwise, the button is not displayed.
For more information on the flight phase switching, *Refer to FMS Flight Phases*

CLEAR ENGINE-OUT BUTTON

The flight crew uses the button to deactivate the FMS engine-out state.
A confirmation action is required.

CONFIRM / CANCEL



ACTIVE FLIGHT PHASE

The name of the active flight phase is displayed in green. The other flight phases are white.
For more information on the flight phase switching, *Refer to FMS Flight Phases*

TAKEOFF RUNWAY

Indicates the flight plan takeoff runway.

TAKEOFF SPEEDS ENTRY FIELDS

Indicate the takeoff speeds:
- V1 (*Refer to Definition*)
- VR (*Refer to Definition*)
- V2 (*Refer to Definition*)

The takeoff speeds are mandatory, and entered manually by the flight crew.

Note: - *If the flight crew does not enter V1 or VR, the ECAM triggers the NAV T.O SPEEDS NOT INSERTED alert, when the TO CONFIG pb of the ECP is pressed, or when the engines are set to takeoff power.*
- *If the flight crew does not enter V2, the SRS mode will not be available at takeoff.*

L2 The takeoff speed are completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 The FMS Message Area displays V1/VR/V2 DISAGREE (*Refer to Message)* , if the inserted V1, VR, V2 speeds do not satisfy the condition V1 ≤ VR ≤ V2.

The FMS Message Area displays T.O SPEED TOO LOW - CHECK TOW & T.O DATA (*Refer to Message)* , if the inserted V1, VR, V2 speeds do not satisfy the existing regulatory conditions regarding VMC and VS1G speeds.

If the flight crew has already entered the takeoff speeds, and then changes the takeoff runway, the takeoff speeds need to be confirmed again, or changed if necessary:

- The FMS Message Area displays CHECK T.O DATA to alert the flight crew (*Refer to Message*),
- On the T.O panel, the old takeoff speeds are displayed in yellow next to the entry fields. The flight crew can accept these speeds by clicking on the CONFIRM T.O SPDs button. If the takeoff speeds have changed, the flight crew enters the new values in the entry fields.

Confirm Takeoff Speeds



L2 If the flight crew has already entered the takeoff speeds, and then changes the flaps setting, or takeoff shift, or when the flight crew activates a secondary flight plan (in preflight), the old takeoff speeds are not cleared. However, the CHECK T.O DATA message is displayed.

L1 **ENTRY FORMAT**

Refer to V1 Entry Format
Refer to VR Entry Format
Refer to V2 Entry Format

OPERATING SPEEDS

Indicate:

- The Flaps retraction speed F: The minimum recommended speed at which the flaps may be retracted from CONF 2 or 3 to CONF 1+F after takeoff,
- The Slats retraction speed S: The minimum recommended speed at which the slats may be retracted,
- The Green Dot speed O: The recommended speed with the best climb performance, and the minimum fuel consumption.

Note: The FMS uses estimated weight, CG, and altitude to compute the operating speeds. The operating speeds that are displayed on the PFD, are computed by the PRIMs, based on the current weight, CG, and altitude. Therefore, the operating speeds displayed on the PFD may be different from the speeds displayed on the TO panel of the PERF page.

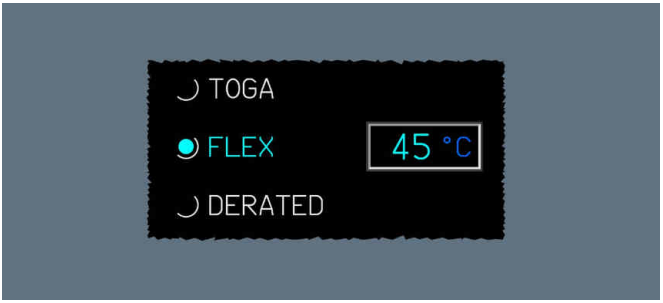
TAKEOFF THRUST OPTION

The flight crew selects the desired takeoff thrust rating:

- TOGA
- FLEX

  When selected, displays the flex temperature entry field: *Refer to FLEX Entry Format*

Flex Temperature

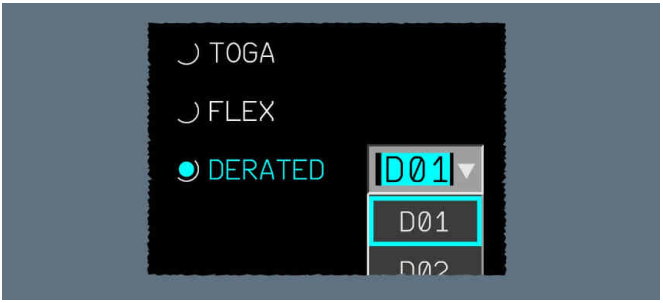


- DERATED

  When selected, displays the list with the different derated thrust levels. The list may have maximum 9 derated levels. The number of available thrust levels depends on the selected engine type.

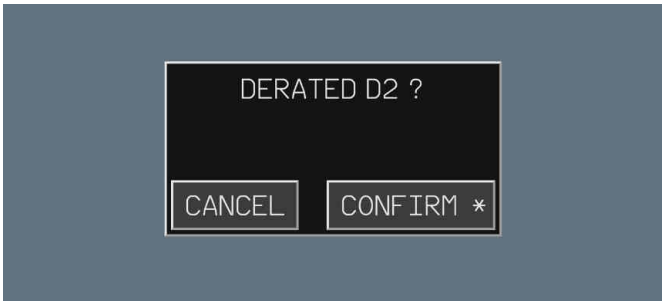
  The flight crew can select the desired level in the list or can enter it via the keyboard. (*Refer to DERATED Entry Format*)

Derated Thrust



A confirmation action is required.

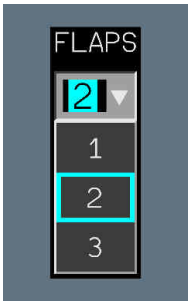
CONFIRM / CANCEL



L2 The thrust setting is set automatically when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

FLAPS SETTING

Flaps Lever Position



Indicates the flaps lever position for takeoff.
The list displays the three possible lever settings for takeoff: 1, 2, or 3.
The flight crew can select the desired setting in the list or can enter it via the keyboard.

L2 The flaps setting is entered automatically when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 If the actual flaps lever position differs from the value that is entered on the TO panel of the PERF page, and the flight crew presses the TO CONFIG pb of the ECP , the ECAM displays the F/CTL T.O FLAPS/FMS DISAGREE alert. (*Refer to Caution*)

ENTRY FORMAT

Refer to FLAPS Entry Format

THS SETTING ENTRY FIELD

Indicates the CG for takeoff.
The CG setting is mandatory. The flight crew computes the CG with the load application and enters it manually in the entry field.
The FMS sends the CG to the FWS for the takeoff trim check. When the check fails, the ECAM displays the F/CTL PITCH TRIM/FMS/CG DISAGREE caution.
For more information on the trim check and the ECAM caution, *Refer to Caution*

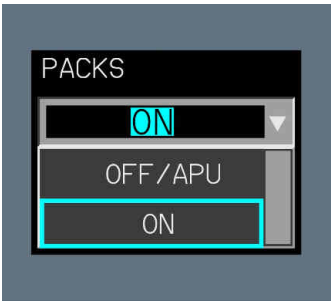
L2 When the flight crew inserts the received company takeoff data, the THS setting is cleared and the entry field displays amber boxes. The flight crew needs to enter the THS setting again. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 **ENTRY FORMAT**

Refer to THS Entry Format

PACKS SETTING

Packs Setting



Indicates the packs setting for takeoff.

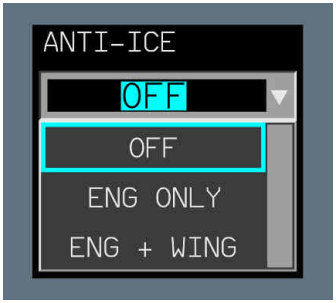
The list displays the two possible packs settings for takeoff:
- OFF / APU : Packs are OFF or supplied by APU bleed
- ON : Packs are ON and supplied by engine bleed.

The flight crew selects the desired setting in the list.
After engine start, if the flight crew modifies the packs setting on the T.O panel of the PERF page, the message CHECK T.O DATA appears in the FMS Message Area (*Refer to Check T.O Data*).

L2 The packs setting on the T.O panel of the PERF page is not used:
- Neither by the FMS to compute the flight plan predictions,
- Nor by the XCHECK WITH AVNCS function to crosscheck the packs setting with the OIS takeoff performance application.

ANTI-ICE SETTING

Anti-Ice Setting



Indicates the anti-ice setting for takeoff.

The list displays the three possible anti-ice settings for takeoff:
- OFF : Anti-ice is OFF
- ENG ONLY: Only the engine anti-ice is ON
- ENG + WING: Both engine and wing anti-ice are ON.

The flight crew selects the desired setting in the list.
After engine start, if the flight crew modifies the anti-ice setting on the T.O panel of the PERF page, the message CHECK T.O DATA appears in the FMS Message Area (*Refer to CHECK T.O Data*).

L2 The anti-ice setting on the T.O panel of the PERF page is not used:
- Neither by the FMS to compute the flight plan predictions,
- Nor by the XCHECK WITH AVNCS function to crosscheck the anti-ice setting with the OIS takeoff performance application.

TAKEOFF SHIFT ENTRY FIELD

Indicates the runway shift for takeoff.
The takeoff shift is the distance in meters (or feet) between the runway threshold and the aircraft's takeoff position.

If the FMS navigation mode is not IRS / GPS , the FMS position is updated (at takeoff) on the position of the runway threshold + entered takeoff shift.

L2 The takeoff shift is entered automatically when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 **ENTRY FORMAT**

Refer to T.O SHIFT Entry Format

THRUST REDUCTION ALTITUDE ENTRY FIELD

Indicates the thrust reduction altitude.
This is the altitude at which the flight crew should reduce the thrust from TOGA (or FLX) to CLB.

DEFAULT VALUE

The default value for the thrust reduction altitude is either:
- The value, associated to the origin airport, that is stored in the navigation database, or
- The value, that is the sum of the origin airport elevation (stored in the navigation database) and the thrust reduction height (defined by the operator in the AMI file, default value is 1 500 ft).

The flight crew can always overwrite the default value.

L2 The thrust reduction altitude is completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

AUTOMATIC UPDATE

When the flight crew enters on a climb waypoint an AT, or AT OR BELOW altitude constraint, that induces a level-off below the thrust reduction altitude, the constraint altitude becomes the new thrust reduction altitude. In this case, the FMS Message Area displays NEW THR RED ALT : HHHHH, with HHHHH the altitude constraint altitude. (*Refer to Message*)
In the T.O $_{phase}$, and the AFS CP selected altitude is set below the thrust reduction altitude, the AFS CP selected altitude becomes the new thrust reduction altitude.

L1 **ENTRY FORMAT**

Refer to THR RED Entry Format

ACCELERATION ALTITUDE ENTRY FIELD

Indicates the acceleration altitude.
This is the altitude at which the aircraft accelerates towards the initial climb speed (or noise speed, if any noise procedure is entered, or PRESEL speed, if any).
At the acceleration altitude, the FMS flight phase becomes CLB.

DEFAULT VALUE

The default value for the acceleration altitude is either:
- The value, associated to the origin airport, that is stored in the navigation database, or
- The value, that is the sum of the origin airport elevation (stored in the navigation database) and the acceleration height (defined by the operator in the AMI file, default value is 1 500 ft).

The flight crew can always overwrite the default value.

L2 The acceleration altitude is completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

AUTOMATIC UPDATE

When the flight crew enters on a climb waypoint an AT, or AT OR BELOW altitude constraint, that induces a level-off below the acceleration altitude, the constraint altitude becomes the new acceleration altitude. In this case, the FMS Message Area displays NEW ACC ALT : HHHHH, with HHHHH the altitude constraint altitude. (*Refer to Message*)
In the $T.O_{phase}$, when the flight crew sets the AFS CP selected altitude below the acceleration altitude, the AFS CP selected altitude becomes the new acceleration altitude.

L1 **ENTRY FORMAT**

Refer to ACCEL ALT Entry Format

ENGINE-OUT ACCELERATION ALTITUDE ENTRY FIELD

Indicates the acceleration altitude in engine-out.
The engine-out acceleration altitude is only a reminder. There is no specific system behavior associated to this altitude.

DEFAULT VALUE

The default value for the acceleration altitude is either:
- The value, associated to the origin airport, that is stored in the navigation database, or
- The value, that is the sum of the origin airport elevation (stored in the navigation database) and the engine-out acceleration height (defined by the operator in the AMI file, default value is 1 500 ft).

The flight crew can always overwrite the default value.

L2 The engine-out acceleration altitude is completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 **ENTRY FORMAT**

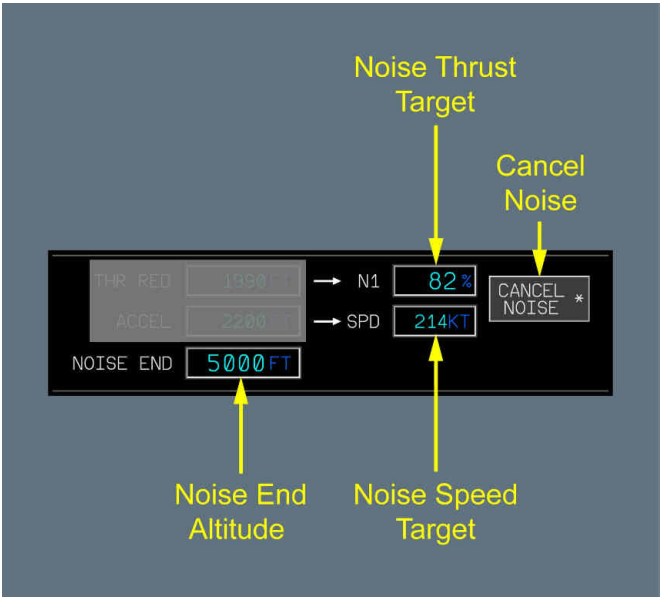
Refer to EO ACCEL Entry Format

NOISE BUTTON

When clicked, displays the Noise Parameters.

NOISE PARAMETERS

Noise Parameters



NOISE END ALTITUDE ENTRY FIELD

Indicates the noise end altitude.
This is the altitude at which the noise restrictions end. Below the noise end altitude, a speed restriction, and thrust restriction may apply.
For more information, *Refer to Noise Parameters*
Refer to NOISE END Entry Format

L2 The noise end altitude is completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 NOISE THRUST (N1) ENTRY FIELD

Indicates the noise thrust.
The noise thrust is the thrust that will apply (in A/THR mode) between the thrust reduction altitude and the noise end altitude.

If the flight crew does not enter any noise thrust, the climb thrust will apply.
For more information, *Refer to Noise Parameters*
Refer to N1 (NOISE) Entry Format

L2 The noise thrust is completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 **NOISE SPEED ENTRY FIELD**

Indicates the noise speed.
The noise speed is the speed that the aircraft will fly (in managed speed mode) between the acceleration altitude and the noise thrust ramp.
When the flight crew enters a noise end altitude, the entry field is completed with the noise speed default value.
The flight crew can always overwrite the default value.
For more information, *Refer to Noise Parameters*
Refer to SPD Entry Format

L2 The noise speed is completed automatically, when the flight crew inserts the received company takeoff data. (*Refer to RECEIVED COMPANY T.O DATA Page*)

L1 **CANCEL NOISE BUTTON**

When clicked, cancels the noise abatement procedure.

TRANSITION ALTITUDE ENTRY FIELD

Indicates the climb transition altitude.
The entry field reflects the transition altitude entry, made on the CLB panel of the PERF page.

DEFAULT VALUE

The default value is the transition altitude, associated to the origin airport departure procedure, that is stored in the navigation database. If no transition altitude exists in the navigation database, the entry field displays dashes.
The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to TRANS Entry Format

COMPANY TAKEOFF REQUEST BUTTON

When clicked, displays the COMPANY T.O DATA REQUEST page.
Refer to Page

L2 The CPNY T.O REQUEST button can only be selected when the flight phase is PREFLIGHT or DONE.

L1 When an active takeoff data request is pending, the button displays REQUEST PENDING ... . The button still provides access to the COMPANY T.O DATA REQUEST page.

REQUEST PENDING ...



When the active company takeoff data is received, the button displays RECEIVED CPNY T.O. When clicked, displays the RECEIVED CPNY T.O DATA page.
Refer to Page

RECEIVED CPNY T.O.



COST INDEX ENTRY FIELD

Indicates the cost index.

The cost index entry field is mandatory, and entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route, or when a received company or ATC flight plan is inserted, and a cost index is associated with the entered company route.

The cost index field reflects the cost index entry, made on the INIT, FUEL&LOAD page, or CRZ and DES panels of the PERF page. (*Refer to INIT page* , *Refer to FUEL&LOAD page)*
For more information on the cost index, *Refer to Performance - Cost Index*

ENTRY FORMAT

Refer to CI Entry Format

DERATED CLIMB THRUST LIST

Indicates the derated climb thrust setting.
The flight crew can select the desired level in the list or can enter it via the keyboard. The list displays NONE (no derated climb thrust), and maximum five derated climb levels (01, 02, etc ...).

ENTRY FORMAT

Refer to DERATED CLB Entry Format

PREDICTIONS REFERENCE ALTITUDE ENTRY FIELD

The FMS computes the time and distance predictions from the aircraft present position to reach the reference altitude, displayed in this entry field.
In PREFLIGHT $_{phase}$, the entry field displays dashes by default.
When the T.O $_{phase}$ becomes active, the entry field displays the AFS CP selected altitude by default.
The flight crew can always overwrite the default value.

L2 **AUTOMATIC UPDATE**

When the flight crew changes the AFS CP selected altitude to a value above the aircraft altitude, the predictions reference altitude is set to the AFS CP selected altitude. This update is only done when no flight crew entry exists for the reference altitude.
When the aircraft is still below the AFS CP selected altitude, and the aircraft altitude becomes higher than the predictions reference altitude, the predictions reference altitude is set to the AFS CP selected altitude.

L3 When the aircraft is above the AFS CP selected altitude, and above the predictions reference altitude, the entry field displays dashes.

L1 **ENTRY FORMAT**

Refer to PRED TO (ALTITUDE) Entry Format

SPEED MODE TABLE (BEFORE CLB)

Before the CLB phase becomes active, the speed mode table displays the following speed modes:

Note: The speed mode that will be set when the CLB phase becomes active is displayed in green font.

PRESEL

The flight crew uses the entry field to preset a selected speed target for the CLB phase.
After a speed entry, the FMS computes the preselected Mach, and the time and speed predictions to reach the entered reference altitude.
When the flight crew has preset a selected speed, and the CLB phase becomes active, the selected speed control engages automatically if the selected speed control was not active before, and the flight guidance targets this preselected speed.

Note: *The preselected speed has priority over the noise speed.*

The flight crew can always cancel the preselection by clearing the entry field.

ENTRY FORMAT

Refer to SPD Entry Format

MANAGED

Indicates the managed speed target for the CLB phase and its associated time and distance predictions to reach the entered reference altitude.
When there is no preselected speed, the flight guidance targets this managed speed when the CLB phase becomes active and the managed speed control is engaged.

ECON

Indicates the predicted ECON climb speed/Mach.
The ECON speed is the FMS optimized speed based on the cost index.
For more information on the ECON climb speed, *Refer to Climb Speed Profile* .

Note: *The table displays this line only if the planned managed climb speed is different from the ECON speed.*

CLIMB SPEED LIMIT

Indicates the climb speed limit, if any.

SPEED MODE TABLE (IN CLB)

In the CLB phase, the first line of the speed mode table displays the active speed mode: selected or managed.
If the selected speed control is active, the second line of the table displays the managed climb speed.
The table also displays the ECON(RTA) speed on a separate line if the managed climb speed is different from the ECON(RTA) speed.

SELECTED

Indicates the speed/Mach, selected on the AFS CP .
The FMS computes the associated time and speed predictions to reach the entered reference altitude.

MANAGED

Indicates the managed climb speed target and its associated time and distance predictions to reach the entered reference altitude.
The flight guidance targets the managed climb speed if the flight crew engages the managed speed control.
If there is no speed restriction, the managed climb speed is the ECON speed, the FMS optimized speed, based on the cost index. For more information on the ECON climb speed, *Refer to Climb Speed Profile* .
If there is a speed restriction, the table indicates the type of restriction that is currently applicable.
The following speed restrictions may apply, in decreasing order of priority:

- NOISE SPD:
  The managed speed is the noise speed.
  For more information, *Refer to Noise Parameters* .
- SPD CSTR:
  The managed speed is the speed constraint. The Speed Restriction label displays the end waypoint of the speed constraint.
  For more information, *Refer to Speed Constraint Refer to Speed Restriction Label* .
- SPD LIM:
  The managed speed is the climb speed limit. The Speed Restriction label displays the end altitude of the speed limit.
  For more information, *Refer to Speed Limit* and *Refer to Speed Restriction Label* .
- HOLD SPD:
  The managed speed is the hold speed. The Speed Restriction label displays the hold entry/exit waypoint.
  For more information, *Refer to Hold Speed* and *Refer to Speed Restriction Label* .
- PROC SPD:
  The managed speed is the ICAO hold speed limit of a procedure hold. The Speed Restriction label displays the hold entry/exit waypoint.
  For more information, *Refer to Hold Speed* and *Refer to Speed Restriction Label* .
- RTA:
  The managed speed is the FMS optimized speed, based on a time constraint (RTA).
  For more information, *Refer to Time Constraint (RTA)* .

ECON(RTA)

Indicates the predicted ECON climb speed/Mach, or the predicted RTA climb speed/Mach.
The ECON speed is the FMS optimized speed based on the cost index.
The RTA speed is the FMS optimized speed based on a time constraint.
For more information on the ECON climb speed, *Refer to Climb Speed Profile* .
For more information on the time constraint, *Refer to Time Constraint (RTA)* .

Note: The table displays this line only if the planned managed climb speed is different from the ECON(RTA) speed.

SPEED RESTRICTION (IN CLB)

Indicates in the CLB phase the type of restriction that applies to the managed speed, if any.

The constraint may be one of the following:

- Speed Constraint (SPD CSTR)
  Indicates the speed constraint and the end waypoint.
  For more information, *Refer to Speed Constraint* .

SPD CSTR



- Climb Speed Limit (CLB SPD LIM)
  Indicates the climb speed limit and the end altitude.
  For more information, *Refer to Speed Limit* .

CLB SPD LIM



- Hold Speed (HOLD SPD)
  Indicates the hold speed and the hold exit waypoint.
  For more information, *Refer to Hold Speed* .

HOLD SPD



- Procedure Speed (PROC SPD)
  Indicates the ICAO hold speed limit and the hold entry/exit waypoint.
  For more information, *Refer to Hold Speed* .

PROC SPD



SPEED MODE TABLE (EO)

In engine-out, the first line of the speed mode table displays the active speed mode: selected or managed.
If the selected speed control is active, the second line of the table displays the managed engine-out climb speed.

SELECTED

Indicates the speed/Mach, selected on the AFS CP .

The FMS computes the associated time and speed predictions to reach the entered reference altitude.

MANAGED

Indicates the managed engine-out speed target and its associated time and distance predictions to reach the entered reference altitude.
The flight guidance targets the managed engine-out speed if the flight crew engages the managed speed control.

On the same line, the table displays the managed speed type:
- EO-GDOT:
  The managed speed is the EO-GDOT speed, when the aircraft is climbing or descending.
- EO-LRC:
  The managed speed is the EO-LRC speed, when the aircraft is in level flight.

For more information, *Refer to Engine-out in CLB phase* .

EO-ECON

Indicates the EO-ECON speed, when the aircraft is in level flight.
The FMS displays the EO-ECON speed for information only.

SPEED CONSTRAINT BUTTON

When clicked, displays the SPD panel of the VERT REV page. (*Refer to Page*)
On the SPD panel of the VERT REV page, the flight crew may consult, create, or delete a speed constraint or speed limit.

TRANSITION ALTITUDE ENTRY FIELD

Indicates the climb transition altitude.
The entry field reflects the transition altitude entry, made on the TO panel of the PERF page.

DEFAULT VALUE

The default value is the transition altitude, associated to the origin airport departure procedure, that is stored in the navigation database. If no transition altitude exists in the navigation database, the entry field displays dashes.
The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to TRANS Entry Format

COST INDEX ENTRY FIELD

Indicates the cost index.

The cost index entry field is mandatory, and entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route, or when a received company or ATC flight plan is inserted, and a cost index is associated with the entered company route.

The cost index field reflects the cost index entry, made on the INIT, FUEL&LOAD page, or CLB and DES panels of the PERF page. (*Refer to INIT page* , *Refer to FUEL&LOAD page)*
For more information on the cost index, *Refer to Performance - Cost Index*

ENTRY FORMAT

Refer to CI Entry Format

PREDICTIONS REFERENCE LABEL

The FMS computes the time and distance predictions from the aircraft present position to reach the reference point, that is indicated by this label:

- The reference point is the Top of Descent (T/D),

T/D



- The reference is the starting point of the next step climb , or step descent,

Step Climb / Descent



- The STEP AHEAD label Indicates that the aircraft is at less than 20 nm from the step starting waypoint. The reference for the time and distance predictions is the step starting waypoint,

Step Ahead



L2 - The reference is the point of reaching the drift down altitude.

Note: *This label is only displayed when in engine-out, and the aircraft is above the green dot level-off altitude, Refer to Engine-out in CRZ phase .*

Drift Down



SPEED MODE TABLE (BEFORE CRZ)

Before the CRZ phase becomes active, the speed mode table displays the following speed modes:

Note: *The speed mode that will be set when the CRZ phase becomes active is displayed in green font.*

PRESEL

The flight crew uses the entry fields to preset a selected Mach or speed target for the CRZ phase.

After a Mach or speed entry, the FMS computes the time and speed predictions to reach the T/D .

When the flight crew has preset a selected Mach or speed, and the CRZ phase becomes active while the managed speed control is active:
- The selected speed control automatically engages, and
- The flight guidance targets this preselected speed.

The flight crew can always cancel the preselection by clearing the entry fields.

ENTRY FORMAT

Refer to MACH Entry Format
Refer to SPD Entry Format

MANAGED

Indicates the managed speed target for the CRZ phase and its associated time and distance predictions to reach the entered reference altitude.
When there is no preselected speed, the flight guidance targets this managed speed when the CRZ phase becomes active and the managed speed control is active.

ECON

Indicates the predicted ECON climb speed/Mach.
The ECON speed is the FMS optimized speed based on the cost index.
For more information on the ECON climb speed, *Refer to Climb Speed Profile* .

Note: The table displays this line only if the planned managed climb speed is different from the ECON speed.

LRC

Indicates the predicted Long Range Cruise (LRC) Mach/speed.
For more information on the LRC speed, *Refer to Cruise Speed Profile* .
The LRC Mach/speed is for information only. This speed cannot be activated via the PERF page. To fly the LRC Mach/speed, the flight crew engages the selected speed control, and sets the LRC Mach/speed as selected target speed.

MAX TURB

Indicates the predicted MAX TURB Mach/speed. The MAX TURB Mach/speed is the maximum Mach/speed to fly safely in a turbulent atmosphere.
For more information on the MAX TURB Mach/speed, *Refer to Cruise Speed Profile* .
The MAX TURB speed is for information only. This speed cannot be activated via the PERF page. To fly the MAX TURB speed, the flight crew engages the selected speed control, and sets the MAX TURB speed as selected target speed.

For more information, *Refer to Severe Turbulence in Cruise* .

SPEED MODE TABLE (IN CRZ)

In the CRZ phase, the first line of the speed mode table displays the active speed mode: selected or managed.
If the selected speed control is active, the second line of the table displays the managed cruise speed.
The table also displays:

- The ECON speed on a separate line if the managed cruise speed is different from the ECON speed
- The long range cruise speed (LRC)
- The maximum turbulence speed (MAX TURB).

SELECTED

Indicates the Mach/speed, selected on the AFS CP .
The FMS computes the associated time and speed predictions to reach the T/D .

MANAGED

Indicates the managed cruise speed target and its associated time and distance predictions to reach the T/D .
The flight guidance targets the managed cruise speed if the flight crew engages the managed speed control.
If there is no speed restriction, the managed cruise speed is the ECON speed, the FMS optimized speed, based on the cost index. For more information on the ECON cruise speed, *Refer to Cruise Speed Profile* .
If there is a speed restriction, the table indicates the type of restriction that is currently applicable.

The following speed restrictions may apply, in decreasing order of priority:

- SPD LIM:
  The managed speed is the climb speed limit. The Managed Speed Information label displays the end altitude of the speed limit.
  For more information, *Refer to Speed Limit* and *Refer to Speed Restriction Label* .
- CMS:
  The managed speed is a constant Mach.
  For more information, *Refer to Constant Mach Segment* .
- HOLD SPD:
  The managed speed is the hold speed. The Managed Speed Information label displays the hold exit waypoint.
  For more information, *Refer to Hold Speed* and *Refer to Speed Restriction Label* .

- PROC SP:
  The managed speed is the ICAO hold speed limit of a procedure hold. The Speed Restriction label displays the hold entry/exit waypoint.
  For more information, *Refer to Hold Speed* and *Refer to Speed Restriction Label* .
- RTA:
  The managed speed is the FMS optimized speed, based on a time constraint (RTA).
  For more information, *Refer to Time Constraint (RTA)* .

ECON(RTA)

Indicates the predicted ECON climb speed/Mach, or the predicted RTA climb speed/Mach.
The ECON speed is the FMS optimized speed based on the cost index.
The RTA speed is the FMS optimized speed based on a time constraint.
For more information on the ECON climb speed, *Refer to Climb Speed Profile* .
For more information on the time constraint, *Refer to Time Constraint (RTA)* .

Note: *The table displays this line only if the planned managed climb speed is different from the ECON(RTA) speed.*

LRC

Indicates the predicted Long Range Cruise (LRC) Mach/speed.
For more information on the LRC speed, *Refer to Cruise Speed Profile* .
The LRC Mach/speed is for information only. This speed cannot be activated via the PERF page. To fly the LRC Mach/speed, the flight crew engages the selected speed control, and sets the LRC Mach/speed as selected target speed.

MAX TURB

Indicates the predicted MAX TURB Mach/speed. The MAX TURB Mach/speed is the maximum Mach/speed to fly safely in a turbulent atmosphere.
For more information on the MAX TURB Mach/speed, *Refer to Cruise Speed Profile* .
The MAX TURB speed is for information only. This speed cannot be activated via the PERF page. To fly the MAX TURB speed, the flight crew engages the selected speed control, and sets the MAX TURB speed as selected target speed.
For more information, *Refer to Severe Turbulence in Cruise* .

SPEED RESTRICTION (IN CRZ)

Indicates in the CRZ phase the type of restriction that applies to the managed speed, if any.

The constraint may be one of the following:

- Climb Speed Limit (CLB SPD LIM)
  Indicates the climb speed limit and the end altitude.
  For more information, *Refer to Speed Limit* .

CLB SPD LIM



- Hold Speed (HOLD SPD)
  Indicates the hold speed and the hold exit waypoint.
  For more information, *Refer to Hold Speed* .

HOLD SPD



- Procedure Speed (PROC SPD)
  Indicates the ICAO hold speed limit and the hold entry/exit waypoint.
  For more information, *Refer to Hold Speed* .

PROC SPD



EO CRZ MODE

Engine-Out Cruise Mode



Indicates the engine-out strategy for the CRZ phase.
The flight crew can select the EO-ECON or EO-LRC strategy.
For more information, *Refer to Engine-out in CRZ phase* .

DRIFT DOWN ALTITUDE

Indicates the drift down altitude, *Refer to Green dot drift down altitude* .
This label is only displayed when in engine-out the aircraft is above the green dot level-off altitude.

SPEED MODE TABLE (EO)

In engine-out, the first line of the speed mode table displays the active speed mode: selected or managed.
If the selected speed control is active, the second line of the table displays the managed engine-out climb speed.

SELECTED

Indicates the speed/Mach, selected on the AFS CP .
The FMS computes the associated time and speed predictions to reach the entered reference altitude.

MANAGED

Indicates the managed engine-out speed target and its associated time and distance predictions to reach the drift down altitude or the T/D .
The flight guidance targets the managed engine-out speed if the flight crew engages the managed speed control.

The table also displays the managed speed type:

- EO-GDOT:
  The managed speed is the EO-GDOT speed. The EO-GDOT speed is the target when the aircraft is climbing or descending.
- EO-LRC:
  The managed speed is the EO-LRC speed. The EO-LRC speed is the target when the aircraft is in level flight and the flight crew selected the EO-LRC strategy in the EO CRZ MODE list.
- EO-ECON:
  The managed speed is the EO-ECON speed. The EO-ECON speed is the target when the aircraft is in level flight and the flight crew selected the EO-ECON strategy in the EO CRZ MODE list.

For more information, *Refer to Engine-out in CRZ phase* .

MAX TURB

Indicates the predicted MAX TURB Mach/speed. The MAX TURB Mach/speed is the maximum Mach/speed to fly safely in a turbulent atmosphere.
For more information on the MAX TURB Mach/speed, *Refer to Cruise Speed Profile* .
The MAX TURB speed is for information only. This speed cannot be activated via the PERF page. To fly the MAX TURB speed, the flight crew engages the selected speed control, and sets the MAX TURB speed as selected target speed.
For more information, *Refer to Severe Turbulence in Cruise* .

DESTINATION DATA

Indicates:
- The ident of the destination airport,
- The Estimated Time of Arrival (ETA) at destination,

L2 In PREFLIGHT $_{phase}$, and if an Estimated Takeoff Time (ETT) exists, the time reference of the destination ETA is UTC . If no ETT exists, the ETA is a flight time.
In flight, the time reference is the aircraft UTC clock time. If the aircraft clock is not valid, the ETA is a flight time.

L1 - The Estimated Fuel on Board (EFOB) at destination.

L2 The destination EFOB is displayed in amber, when its value is lower than the minimum fuel at destination, displayed on the FUEL&LOAD page. (*Refer to Page)*

CONSTANT MACH SEGMENT BUTTON

When clicked, displays the CMS panel of the VERT REV page. (*Refer to Page*)
On the CMS panel of the VERT REV page, the flight crew may consult, create, or delete a constant mach segment.

STEP ALTITUDES BUTTON

When clicked, displays the STEP ALTs panel of the VERT REV page. (*Refer to Page*)
On the STEP ALTs panel of the VERT REV page, the flight crew may consult, create, or delete step altitudes.

COST INDEX ENTRY FIELD

Indicates the cost index.

The cost index entry field is mandatory, and entered:
- Manually, by the flight crew, or
- Automatically, when the flight crew enters a company route, or when a received company or ATC flight plan is inserted, and a cost index is associated with the entered company route.

The cost index field reflects the cost index entry, made on the INIT, FUEL&LOAD page, or CLB and CRZ panels of the PERF page. (*Refer to INIT page* , *Refer to FUEL&LOAD page)*
For more information on the cost index, *Refer to Performance - Cost Index*

ENTRY FORMAT

Refer to CI Entry Format

L2 ### DEFAULT VALUE

When there is no cost index defined at engine start, the field is completed with the default value.

The default value is the last cost index of the previous flight, stored in the DONE phase (or 0, if there is no cost index).

DESCENT CABIN RATE ENTRY FIELD

Indicates the maximum descent cabin rate.

The maximum descent cabin rate is the maximum of the following two values:

- The mean descent rate of the cabin:
  This value is computed by the FMS, and based on the difference between the pressure at cruise flight level, and the pressure at destination.
- The maximum descent rate of the cabin:
  The maximum descent rate is 350 ft/min by default. The flight crew can overwrite the default value in the Descent Cabin Rate Entry Field.

Note: To define the maximum of the two values, the FMS considers the absolute values (without the minus sign).

A value computed by the FMS, is displayed in small font. A value, entered by the flight crew is displayed in big font.
The FMS computes the T/D in order to respect the maximum descent cabin rate.

ENTRY FORMAT

Refer to DES CABIN RATE Entry Format

PREDICTIONS REFERENCE ALTITUDE ENTRY FIELD

The FMS computes the time and distance predictions from the aircraft present position to reach the reference altitude, displayed in this entry field.
The flight crew can only use this field when the DES $_{phase}$ is active.

L2 **AUTOMATIC UPDATE**

When the flight crew changes the AFS CP selected altitude to a value below the aircraft altitude, the predictions reference altitude is set to the AFS CP selected altitude. This update is only done when no flight crew entry exists for the reference altitude.
When the aircraft is still above the AFS CP selected altitude, and the aircraft altitude becomes lower than the predictions reference altitude, the predictions reference altitude is set to the AFS CP selected altitude.

L3 When the aircraft is below the AFS CP selected altitude, and below the predictions reference altitude, the entry field displays dashes.

L1 **ENTRY FORMAT**

Refer to PRED TO (ALTITUDE) Entry Format

SPEED MODE TABLE (BEFORE DES)

Before the DES phase becomes active, the flight crew can enter the managed Mach/speed target for the DES phase in these entry fields.
The FMS computes the time and speed predictions for the entered Mach/speed.
The default values for these entry fields are the ECON speed (or RTA speed when there is a time constraint in the flight plan).
The flight crew can always set the ECON (RTA) speed again, by clearing one of the entry fields.
When the DES becomes active, and the managed speed control is active, the flight guidance targets the Mach/speed that was entered in the entry fields.

ENTRY FORMAT

Refer to MACH Entry Format
Refer to SPD Entry Format

SPEED MODE TABLE (IN DES)

In the DES phase, the first line of the speed mode table displays the active speed mode: selected or managed.
If the selected speed control is active, the second line of the table displays the managed descent speed.
The table also displays the ECON speed on a separate line if the managed descent speed is different from the ECON speed.

SELECTED

Indicates the speed/Mach, selected on the AFS CP .
The FMS computes the associated time and speed predictions to reach the entered reference altitude.

MANAGED

Indicates the managed descent speed target and its associated time and distance predictions to reach the entered reference altitude.
The flight guidance targets the managed descent speed if the flight crew engages the managed speed control.
If there is no speed restriction, the managed descent speed is the ECON speed, the FMS optimized speed, based on the cost index. For more information on the ECON descent speed, *Refer to Descent Speed Profile* .
If there is a speed restriction, the table indicates the type of restriction that is currently applicable.

The following speed restrictions may apply, in decreasing order of priority:

- SPD LIM:
  The managed speed is the descent speed limit. The Managed Speed Information label displays the start altitude of the speed limit.
  For more information, *Refer to Speed Limit* and *Refer to Speed Restriction Label* .
- SPD CSTR:
  The managed speed is the speed constraint. The Managed Speed Information label displays the start waypoint of the speed constraint.
  For more information, *Refer to Speed Constraint* and *Refer to Speed Restriction Label* .
- HOLD:
  The managed speed is the hold speed. The Managed Speed Information label displays the hold exit waypoint.
  For more information, *Refer to Hold Speed* and *Refer to Speed Restriction Label* .
- PROC SP:
  For more information, *Refer to Hold Speed* and *Refer to Speed Restriction Label* .
- RTA:
  The managed speed is the FMS optimized speed, based on a time constraint (RTA).
  For more information, *Refer to Time Constraint (RTA)* .

SPEED RESTRICTION (DES)

Indicates in the DES phase the type of restriction that applies to the managed speed, if any.

The constraint may be one of the following:

- Speed Constraint (SPD CSTR)
  Indicates the speed constraint and the end waypoint.
  For more information, *Refer to Speed Constraint* .

SPD CSTR



- Descent Speed Limit (DES SPD LIM)
  Indicates the descent speed limit and the end altitude.
  For more information, *Refer to Speed Limit* .

DES SPD LIM



- Hold Speed (HOLD SPD)
  Indicates the hold speed and the hold exit waypoint.
  For more information, *Refer to Hold Speed* .

HOLD SPD



- Procedure Speed (PROC SPD)
  Indicates the ICAO hold speed limit and the hold entry/exit waypoint.
  For more information, *Refer to Hold Speed* .

PROC SPD



TRANSITION FLIGHT LEVEL ENTRY FIELD

Indicates the descent transition flight level.
The entry field reflects the transition flight level entry, made on the APPR panel of the PERF page.

DEFAULT VALUE

The default value is the transition flight level, associated to the destination airport arrival procedures, that is stored in the navigation database. If no transition flight level exists in the navigation database, the entry field displays dashes.
The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to TRANS Entry Format

VERTICAL DEVIATION

Indicates the altitude error between the aircraft current altitude and the altitude at which the aircraft would be if it was on the theoretical descent (or approach) path.

DESTINATION DATA

Indicates:
- The ident of the destination airport,
- The Estimated Time of Arrival (ETA) at destination,

L2 In PREFLIGHT $_{phase}$, and if an Estimated Takeoff Time (ETT) exists, the time reference of the destination ETA is UTC. If no ETT exists, the ETA is a flight time.
In flight, the time reference is the aircraft UTC clock time. If the aircraft clock is not valid, the ETA is a flight time.

L1 - The Estimated Fuel on Board (EFOB) at destination.

L2 The destination EFOB is displayed in amber, when its value is lower than the minimum fuel at destination, displayed on the FUEL&LOAD page. *Refer to Page*)

SPEED CONSTRAINT BUTTON

When clicked, displays the SPD panel of the VERT REV page. (*Refer to Page*)
On the SPD panel of the VERT REV page, the flight crew may consult, create, or delete a speed constraint or speed limit.

APPROACH IDENT

Indicates the ident of the approach procedure.
The flight crew can check, select, or change the approach procedure on the ARRIVAL page. (*Refer to Page*)

DESTINATION IDENT

Indicates the ident of the destination airport.

LANDING WEIGHT

Indicates the landing weight.
Before engine start, the landing weight is computed as follows:
LW = TOW — TRIP Fuel
After engine start, the landing weight is:

LW = GW — TRIP Fuel — TAXI Fuel
In flight, the landing weight is:
LW = GW — TRIP Fuel

WIND AT DESTINATION

The flight crew enters in the entry fields the wind direction and velocity of the magnetic ground wind at destination.
The entered ground wind is automatically copied on the DES panel of the WIND page, and vice versa: the entered ground wind on the DES panel of the WIND page is copied on the APPR panel of the PERF page.

Note: *The winds on the WIND page are true north winds, while the wind on the PERF page is a magnetic wind. The FMS uses the magnetic variation at the destination airport to make the conversion.*

When there is a valid ground wind, the FMS computes the headwind and crosswind components and displays them right below the entry fields.

ENTRY FORMAT

Refer to WIND DIRECTION Entry Format
Refer to WIND VELOCITY Entry Format

OAT AT DESTINATION ENTRY FIELD

Indicates the Outside Air Temperature (OAT).

The FMS uses this temperature to:
- Refine the computation of the descent profile
- To correct the FLS beam in cold weather, *Refer to Cold Weather Correction* .

ENTRY FORMAT

Refer to OAT Entry Format

QNH AT DESTINATION ENTRY FIELD

Indicates the QNH at destination.

The FMS uses the QNH to:
- Compute the descent profile
- Compute the FLS beam, *Refer to Baro Correction*

The pressurization system also uses the QNH , in order to automatically control the cabin pressurization. Therefore, an incorrect QNH entry may result in an incorrect cabin pressurization profile.

ENTRY FORMAT

Refer to QNH Entry Format

MINIMUM ENTRY FIELDS

The flight crew enters the required minimum altitude in the BARO or RADIO entry field.
The FMS considers a BARO entry as an MSL altitude. Generally, the flight crew enters the minimum descent altitude of a non-precision approach in the BARO entry field.
The FMS considers a RADIO entry as a radio altitude (height). Generally, the flight crew enters the decision height of a precision approach in the RADIO entry field.

ENTRY FORMAT

Refer to BARO Entry Format
Refer to RADIO Entry Format

OPERATING SPEEDS

Indicate:
- The green dot speed O : The target speed in managed speed control, when in CONF 0, when the APPR phase is active
- The Slats retraction speed S: The target speed in managed speed control, when in CONF 1 or CONF 1+F
- The Flaps retraction speed F: The target speed in managed speed control, when in CONF 2 or CONF 3
- The reference speed for approach and landing VREF : This speed is used to compute the regulatory landing performance of the aircraft.

Refer to APPR Speed Profile

Note: The FMS uses estimated weight, CG , and altitude to compute the operating speeds. The operating speeds that are displayed on the PFD , are computed by the PRIM s, based on the current weight, CG , and altitude. Therefore, the operating speeds displayed on the PFD may be different from the speeds displayed on the TO panel of the PERF page.

LANDING CONFIGURATION AND VLS

The flight crew selects the landing configuration and the FMS computes the VLS associated with the selected configuration.
FULL is selected by default.
The displayed VLS is the estimated lowest selectable speed for landing.

The FMS computes the VLS estimation, depending on:
- The selected landing configuration,
- The estimated landing weight and CG,
- The destination airport elevation.

L3 When the APPR $_{phase}$ is active, the FMS uses the current weight and CG , received from the FQMS .

L1 *Note: The VLS , that is displayed on the PFD , is computed by the PRIM s, and is based on the current weight, CG , flaps configuration, and altitude. (Refer to VLS from PRIM s) Therefore, the VLS displayed on the PFD may be different from the VLS , displayed on the APPR panel of the PERF page.*

VAPP

Indicates the approach speed VAPP .

To compute VAPP , the FMS takes into account:
- VLS , that depends on the selected landing configuration
- The wind at the destination airport.

L3 - Constants, defined in different tables, that are selected by OPC option.

L1 VAPP , computed by the FMS , is displayed in small font.
The flight crew can always overwrite the FMS computed value.
VAPP , entered by the flight crew, is displayed in big font.

ENTRY FORMAT

Refer to VAPP Entry Format

VERTICAL DEVIATION

Indicates the altitude error between the aircraft current altitude and the altitude at which the aircraft would be if it was on the theoretical descent (or approach) path.

TRANSITION FLIGHT LEVEL ENTRY FIELD

Indicates the descent transition flight level.
The entry field reflects the transition flight level entry, made on the DES panel of the PERF page.

DEFAULT VALUE

The default value is the transition flight level, associated to the destination airport arrival procedures, that is stored in the navigation database. If no transition flight level exists in the navigation database, the entry field displays dashes.
The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to TRANS Entry Format

OPERATING SPEEDS

Indicate:
- The Flaps retraction speed F: The minimum recommended speed at which the flaps may be retracted from CONF 2 or 3 to CONF 1+F after takeoff
- The Slats retraction speed S: The minimum recommended speed at which the slats may be retracted
- The Green Dot speed O: The recommended speed with the best climb performance, and the minimum fuel consumption.

Note: *The FMS uses estimated weight, CG, and altitude to compute the operating speeds. The operating speeds that are displayed on the PFD, are computed by the PRIMs, based on the current weight, CG, and altitude. Therefore, the operating speeds displayed on the PFD may be different from the speeds displayed on the TO panel of the PERF page.*

THRUST REDUCTION ALTITUDE ENTRY FIELD

Indicates the thrust reduction altitude.
This is the altitude at which the flight crew should reduce the thrust from TOGA to CLB.

DEFAULT VALUE

The default value for the thrust reduction altitude is either:
- The value, associated to the destination airport, that is stored in the navigation database, or
- The value, that is the sum of the destination airport elevation (stored in the navigation database) and the thrust reduction height (defined by the operator in the AMI file, default value is 1 500 ft).

The flight crew can always overwrite the default value.

L2 **AUTOMATIC UPDATE**

When the flight crew enters on a climb waypoint an AT, or AT OR BELOW altitude constraint, that induces a level-off below the thrust reduction altitude, the constraint altitude becomes the new thrust reduction altitude. In this case, the FMS Message Area displays NEW THR RED ALT : HHHHH, with HHHHH the altitude constraint altitude. (*Refer to Message*)
In flight, when the flight crew sets the AFS CP selected altitude below the thrust reduction altitude, the AFS CP selected altitude becomes the new thrust reduction altitude.

L1 **ENTRY FORMAT**

Refer to THR RED Entry Format

ACCELERATION ALTITUDE ENTRY FIELD

Indicates the acceleration altitude.
This is the altitude at which the aircraft accelerates towards the initial climb speed.
At the acceleration altitude, the FMS flight phase becomes CLIMB.

DEFAULT VALUE

The default value for the acceleration altitude is either:
- The value, associated to the destination airport, that is stored in the navigation database, or
- The value, that is the sum of the destination airport elevation (stored in the navigation database) and the acceleration height (defined by the operator in the AMI file, default value is 1 500 ft).

The flight crew can always overwrite the default value.

L2 **AUTOMATIC UPDATE**

When the flight crew enters on a climb waypoint an AT, or AT OR BELOW altitude constraint, that induces a level-off below the acceleration altitude, the constraint altitude becomes the new acceleration altitude. In this case, the FMS Message Area displays NEW ACC ALT : HHHHH, with HHHHH the altitude constraint altitude. (*Refer to Message*)
In flight, when the flight crew sets the AFS CP selected altitude below the acceleration altitude, the AFS CP selected altitude becomes the new acceleration altitude.

L1 **DEFAULT VALUE**

Refer to ACCEL ALT Entry Format

ENGINE-OUT ACCELERATION ALTITUDE ENTRY FIELD

Indicates the acceleration altitude in engine-out.
The engine-out acceleration altitude is only a reminder. There is no specific system behavior associated to this altitude.

DEFAULT VALUE

The default value for the acceleration altitude is either:
- The value, associated to the destination airport, that is stored in the navigation database, or
- The value, that is the sum of the destination airport elevation (stored in the navigation database) and the engine-out acceleration height (defined by the operator in the AMI file, default value is 1 500 ft).

The flight crew can always overwrite the default value.

DEFAULT VALUE

Refer to EO ACCEL Entry Format

TRANSITION ALTITUDE ENTRY FIELD

Indicates the climb transition altitude.
The entry field reflects the transition altitude entry, made on the APPR panel of the PERF page.

DEFAULT VALUE

The default value is the transition altitude, associated to the destination airport departure procedures, that is stored in the navigation database. If no transition altitude exists in the navigation database, the entry field displays dashes.
The flight crew can always overwrite the default value.

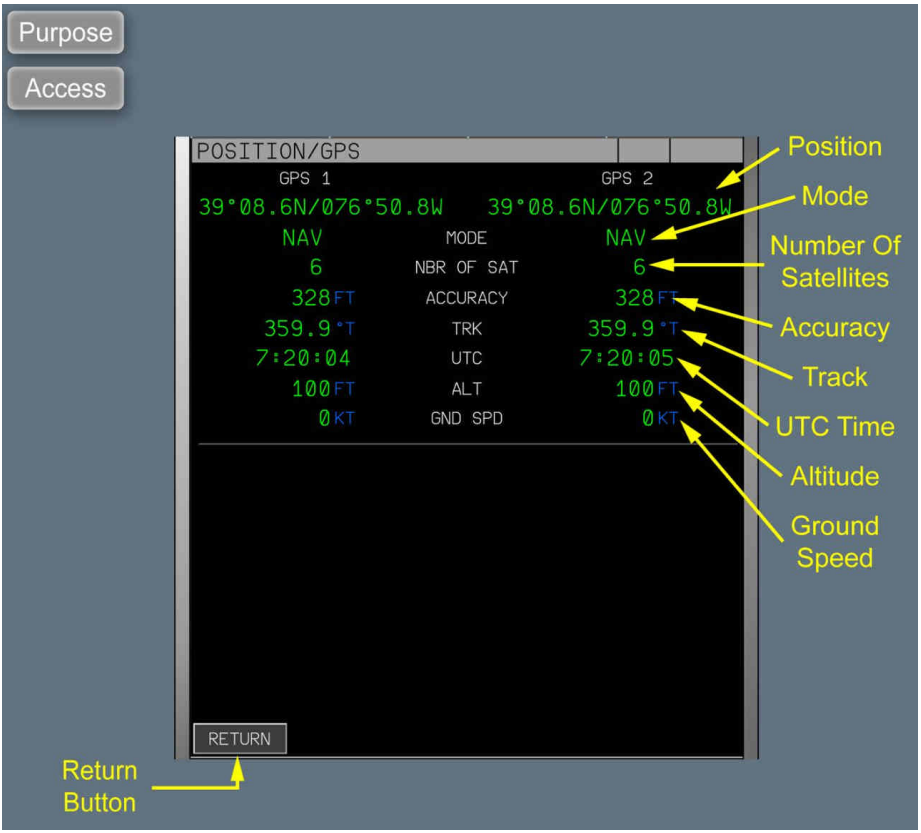
ENTRY FORMAT

Refer to TRANS Entry Format

POSITION / GPS PAGE

Applicable to: ALL

POSITION / GPS Page



PURPOSE

The POSITION / GPS page displays the GPS 1 and GPS 2 data.
The ADIRS receive the GPS data from the MMR, and send it to the FMS.

LINKS

Refer to For More Information on the GPS Receiver

ACCESS

The flight crew can access the POSITION / GPS page, via:

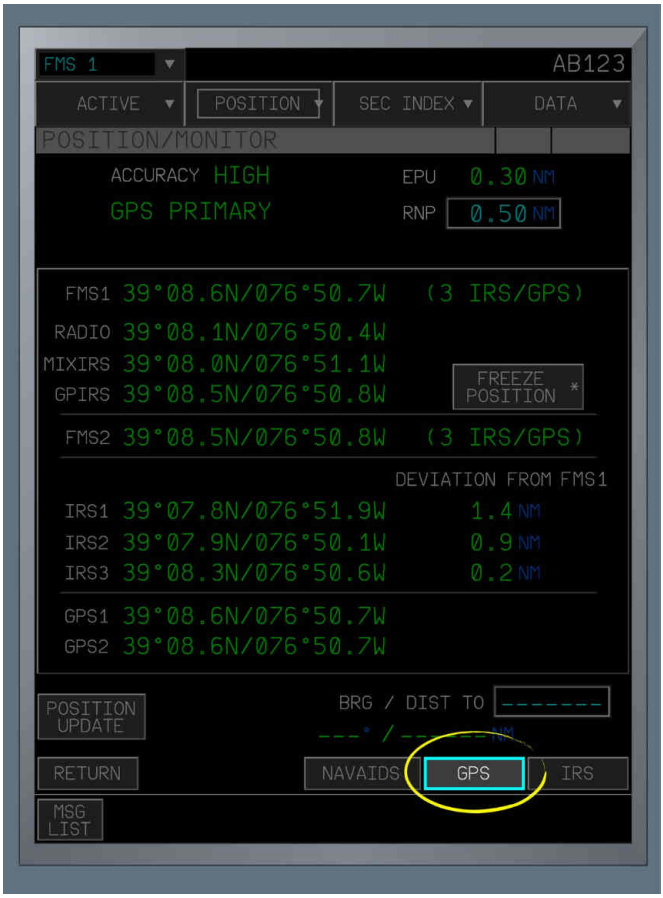
- The General Menu Bar, by selecting GPS in the POSITION menu

General Menu Bar



- The POSITION / MONITOR page, by clicking on the GPS button

POSITION / MONITOR Page



POSITION

Indicates the GPS 1(2) position latitude and longitude.

MODE

Indicates the GPS 1(2) mode.

The mode may be:
- INIT
- ACQ
- NAV
- TEST
- FAULT
- ALTAID
- AIDED
- DIFF

Refer to For More Information on the GPS Modes

NUMBER OF SATELLITES

Indicates the number of satellites available for GPS 1(2).

ACCURACY

Indicates the GPS 1(2) Horizontal Figure Of Merit (HFOM), in meter.

TRACK

Indicates the GPS 1(2) true track.

UTC TIME

Indicates the GPS 1(2) UTC time.

ALTITUDE

Indicates the GPS 1(2) altitude.

GROUND SPEED

Indicates the GPS 1(2) ground speed, in knots.

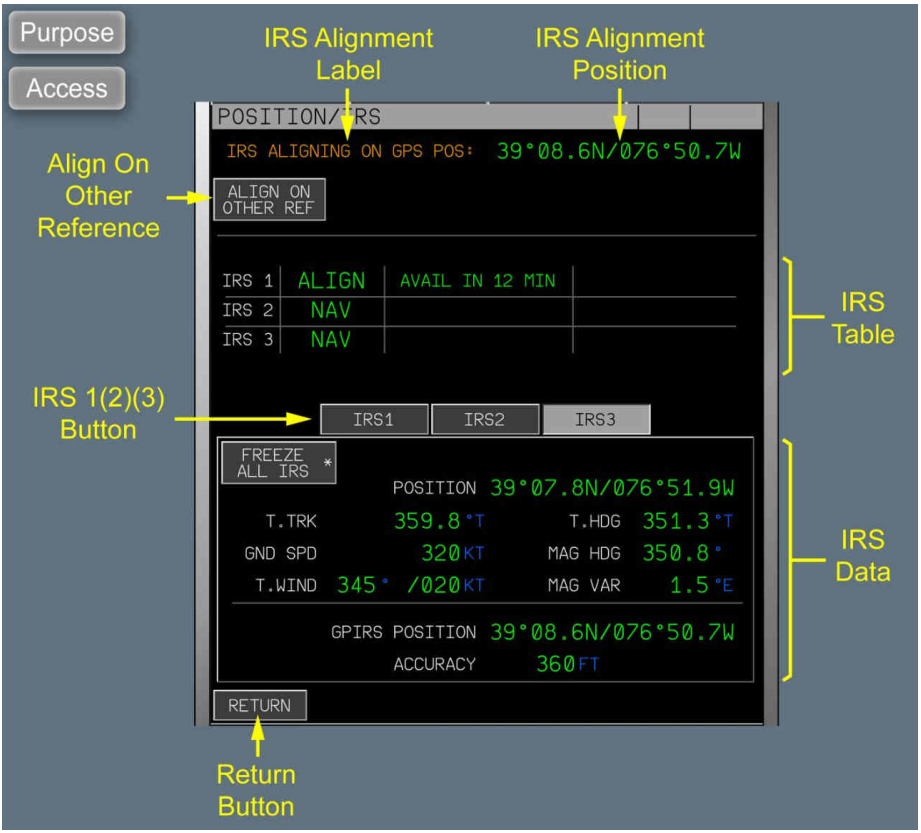
RETURN BUTTON

When clicked, displays the POSITION / MONITOR page. (*Refer to Page*)

POSITION / IRS PAGE

Applicable to: ALL

POSITION / IRS Page



PURPOSE

On the POSITION / IRS page, the flight crew can:

- Define and monitor the IRS alignment reference position
- Monitor the IRS mode and status
- Enter the heading when one (or more) IRS is in ATT mode

- Monitor the IRS 1(2)(3) data
- Monitor the IRS 1(2)(3) drift in the DONE phase

LINKS

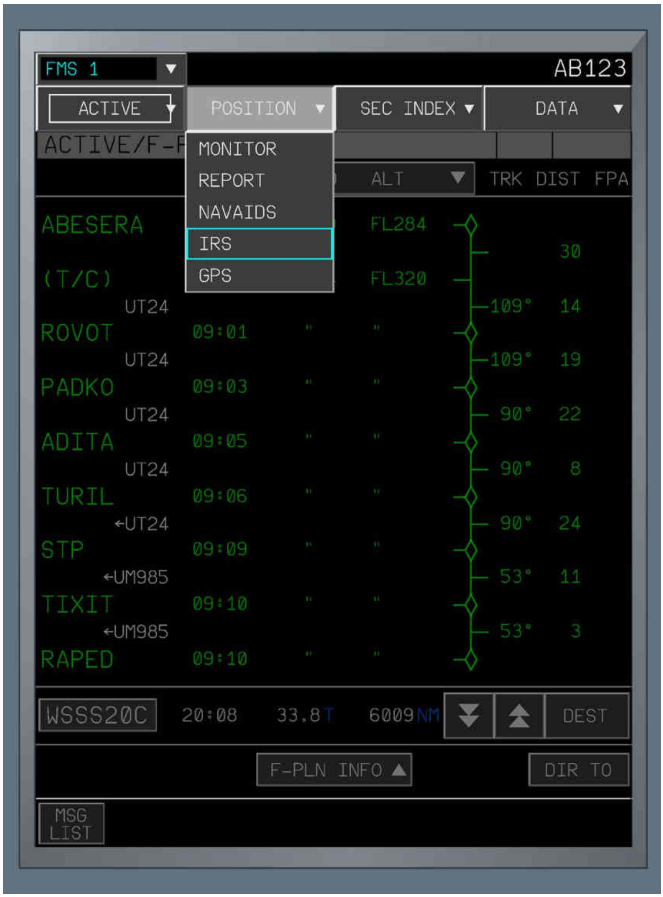
Refer to More Information on the IRS position
Refer to For More Information on the ADIRU

ACCESS

The flight crew can access the POSITION / IRS page, via:

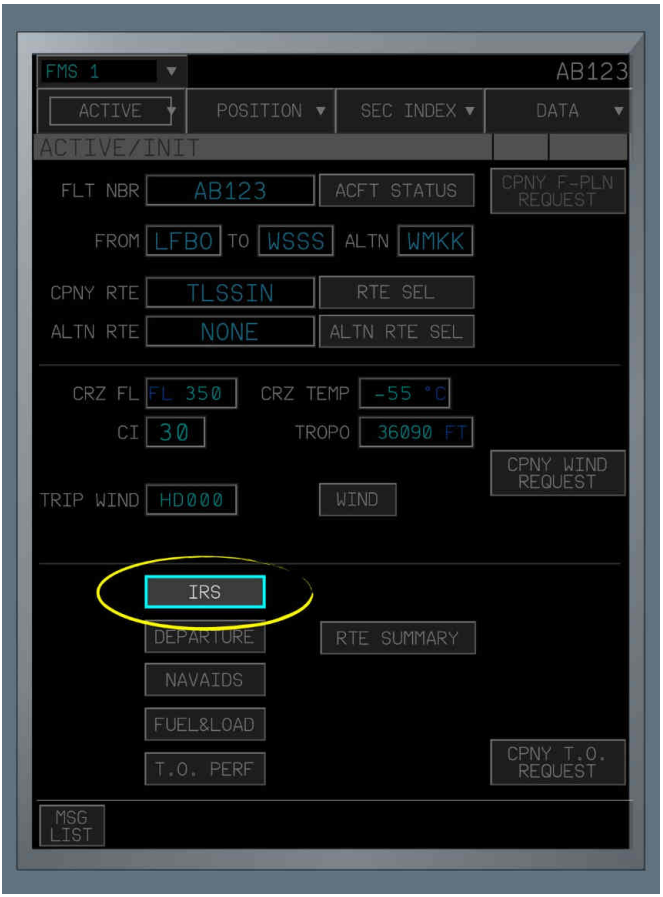
- The General Menu Bar, by selecting IRS in the POSITION menu

General Menu Bar



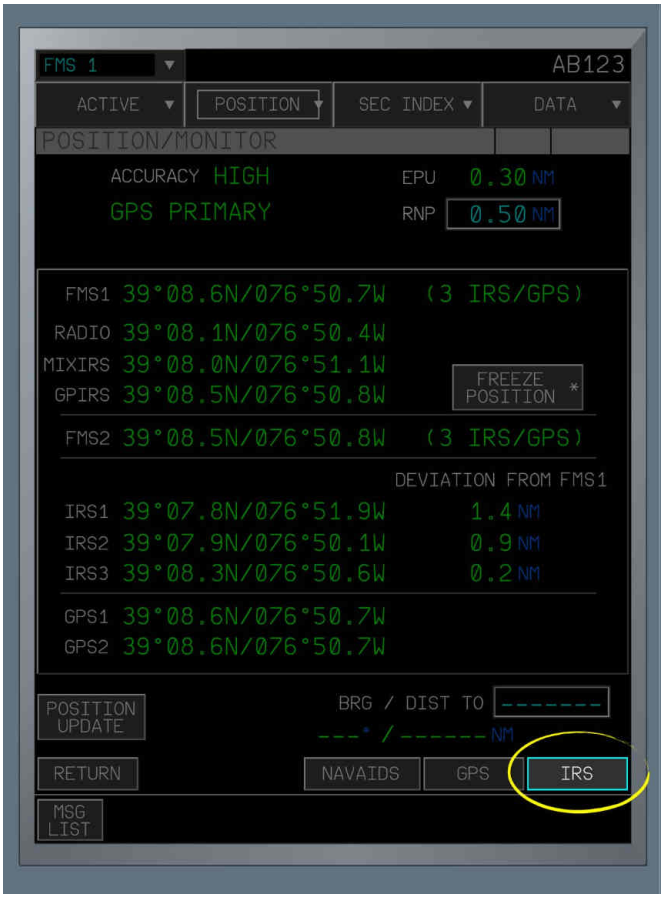
- The ACTIVE / INIT page, by clicking on the IRS button

ACTIVE / INIT Page



- The POSITION / MONITOR page, by clicking on the IRS button

POSITION / MONITOR Page



IRS ALIGNMENT POSITION

Indicates the latitude and longitude of the IRS alignment position.
The ADIRS send this position to the FMS , at the IRS alignment.

L2 This label displays dashes, if:
- The IRS are not aligned
- The FMC s power up after the IRS alignment: The FMS does not have the IRS alignment position, because the FMS was not available when it was sent
- Both active FMC s reset simultaneously after the IRS alignment: The FMS does not keep the IRS alignment position in its memory.

Note: *If only one active FMC powers up (or resets) after the IRS alignment, the affected FMC will recover the IRS alignment position during the resynchronization with the not affected FMC .*

L1 *Refer to More Information on the IRS Alignment*

IRS ALIGNMENT LABEL

Indicates whether the IRS are aligned, or still aligning, on the GPS position or on an other reference position:
- IRS ALIGNING ON GPS POS :
  Indicates that the IRS are aligning on the GPS position
- IRS ALIGNED ON GPS POS:
  Indicates that the IRS are aligned on the GPS position
- IRS ALIGNING ON REF POS :
  Indicates that the IRS are aligning on a reference position, different from the GPS position. The flight crew defines the other reference position on the Align On Other Reference panel. (*Refer to Panel)*
- IRS ALIGNED ON REF POS:
  Indicates that the IRS are aligned on a reference position, different from the GPS position. The flight crew defines the other reference position on the Align On Other Reference panel. (*Refer to Panel)*

ALIGN ON OTHER REFERENCE BUTTON

When clicked, displays the Align On Other Reference panel.

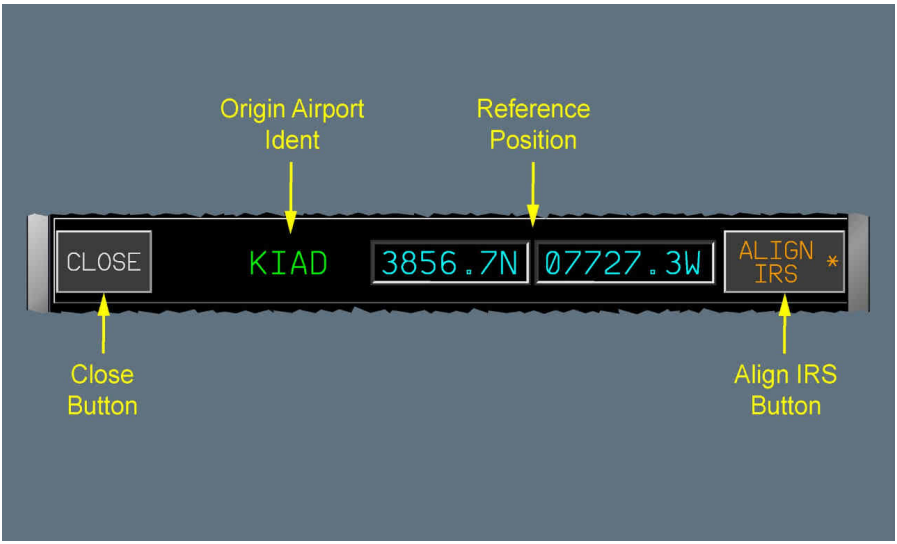
L2 The flight crew can only define an other reference position in the PREFLIGHT, or DONE flight phase.

ALIGN ON OTHER REFERENCE PANEL

On this panel, the flight crew defines a reference position for the IRS alignment.

L2 The flight crew uses this function to define an IRS reference position, other than the GPS position.

Align On Other Reference Panel



CLOSE BUTTON

When clicked, removes the Align On Other Reference Panel.

ORIGIN AIRPORT IDENT

Indicates the ident of the origin airport.

L2 This label is only displayed when the values in the entry fields are the latitude and longitude of the origin airport reference point.

REFERENCE POSITION ENTRY FIELDS

The flight crew enters the latitude and longitude of the new reference position in the entry fields. The default position is the origin airport of the active flight plan, if any.

ENTRY FORMAT

Refer to Latitude Entry Format
Refer to Longitude Entry Format

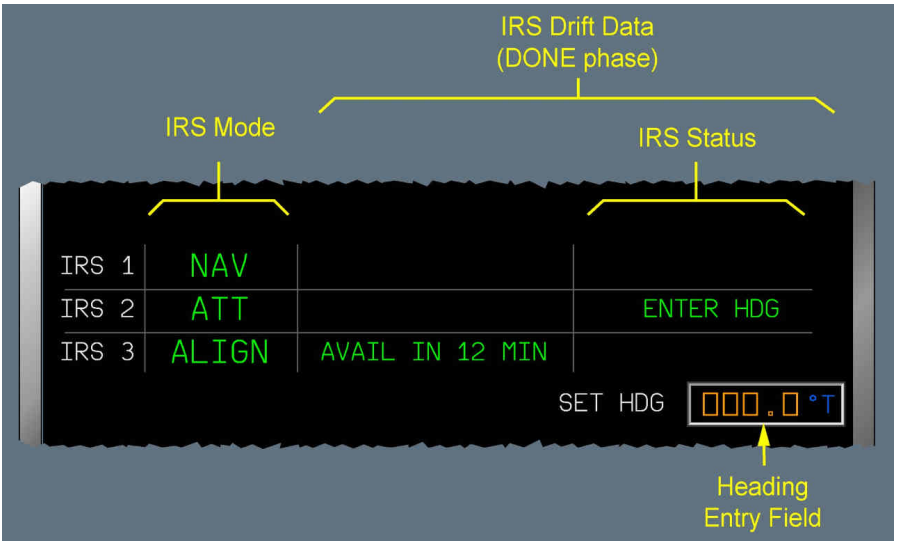
ALIGN IRS BUTTON

When clicked, sends the new reference position to the ADIRS, for IRS alignment.

IRS TABLE

The IRS table displays:
- In the first column: The IRS mode
- In the third column: The IRS status
- In the second and third column (in the DONE phase): The IRS drift data.

IRS Table



IRS MODE

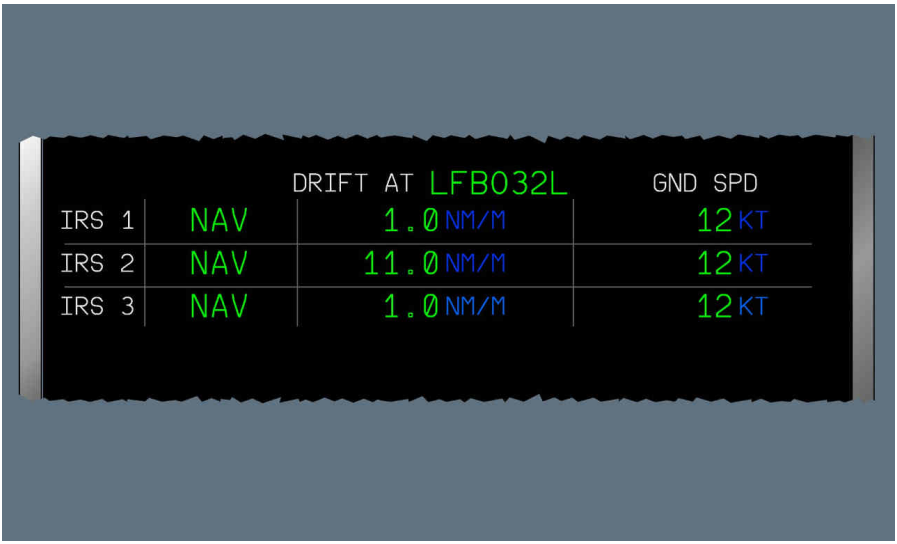
The first column of the table displays the IRS mode:
- NAV: This is the normal mode, the IRS is in navigation.
- ALIGN: The IRS is waiting for an alignment reference position, or the IRS is aligning. When the IRS is aligning, the second column of the table displays the estimated time to complete IRS alignment.
- ATT: The IRS is in attitude mode. (*Refer to More Information on the ATT mode*) When one of the three IRS is in the attitude mode, the third column of the table displays ENTER HDG, and the Heading entry field is displayed just below the table. *Refer to Heading Entry Field*
- INVALID: The IRS is invalid.

IRS DRIFT DATA

In the DONE phase, the second and third column of the IRS table display, respectively:

- The average drift in nautical miles per hour,
  Refer to More Information on the Average Drift Computation
- The residual ground speed in knots.

IRS Drift Data



IRS STATUS DATA

The third column of the table displays the IRS status:

- The label displays blanks when the status is normal
- IR FAULT
- DELAYED MAINT
- ENTER P.POS
- SELECT ATT
- EXCESS MOTION
- SWITCH ADR
- CHECK C/B
- ENTER HDG

- REENTER P.POS
- SYS BELOW —15°

HEADING ENTRY FIELD

The flight crew enters the heading in the entry field.
The entered heading initializes the IRS in ATT mode.

ENTRY FORMAT

Refer to Heading Entry Field

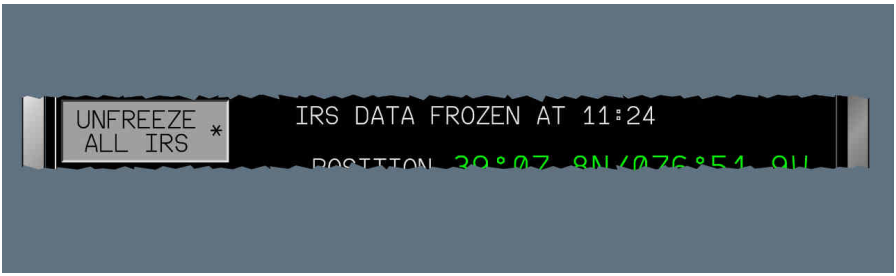
IRS 1(2)(3) BUTTON

When clicked, displays the IRS 1(2)(3) data panel.
When clicked again, removes the data panel from display.

FREEZE ALL IRS BUTTON

When clicked, freezes the display of all IRS data on the IRS 1, IRS 2, and IRS 3 panel.
A label indicates the UTC time (or flight time), when the IRS data has been frozen.
The flight crew can unfreeze the position data by clicking on the same button, that now displays UNFREEZE ALL IRS.

Unfreeze All IRS Button



IRS 1(2)(3) DATA PANEL

Displays the following IRS 1(2)(3) data:
- Position latitude and longitude
- True track
- Ground Speed
- True wind
- True heading

- Magnetic heading
  This label displays dashes when the aircraft is at extreme latitudes.
- Magnetic variation:
  The magnetic variation is difference between the IRS true heading and the IRS magnetic heading.
- GPIRS position
- GPIRS position accuracy
  Is the Horizontal Figure Of Merit (HFOM) of the GPIRS position.

L2 When the IRS is in ATT mode:
- The position and true track are not available and display dashes
- The magnetic variation is equal to 0, so that the magnetic heading is equal to the true heading
- The other data of the IRS Data panel is available as long as the GPS is valid.

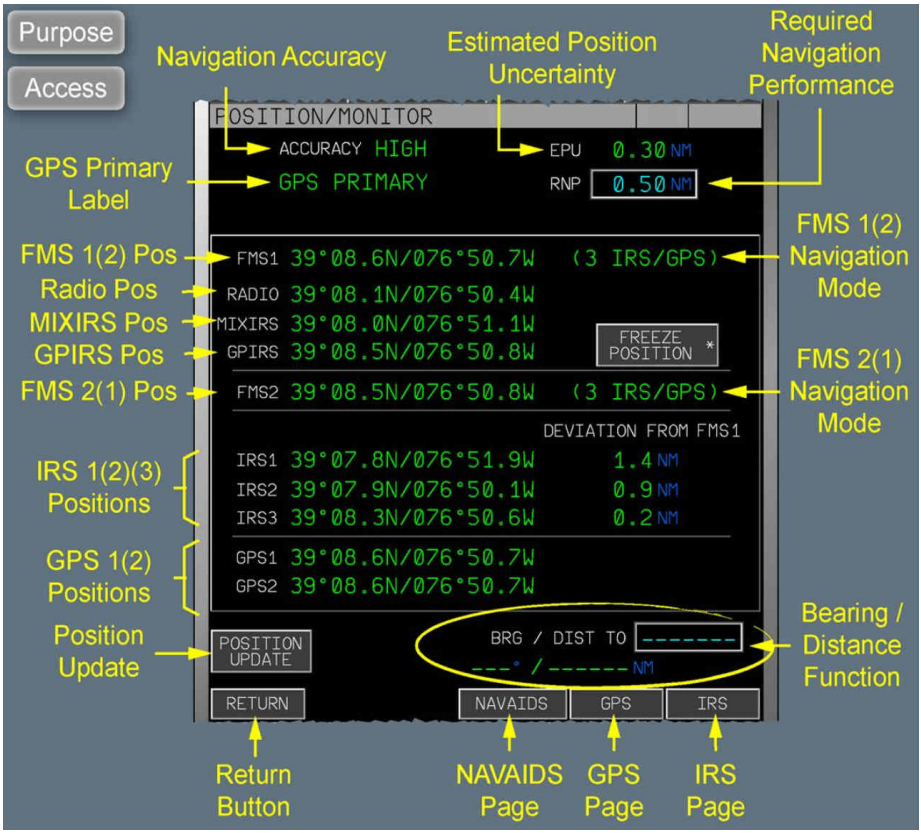
RETURN BUTTON

When clicked, displays the POSITION / MONITOR, or the INIT page, depending on the page that was displayed before.
Refer to POSITION / MONITOR page
Refer to INIT page

POSITION / MONITOR PAGE

Applicable to: ALL

POSITION / MONITOR Page



PURPOSE

On the POSITION / MONITOR page, the flight crew can:

- Monitor the navigation accuracy
- Monitor the FMS, Radio, MIXIRS, GPIRS, IRS, and GPS positions

- Manually update the FMS position
- Compute the bearing and distance from the aircraft present position to a waypoint, NAVAID, runway, etc .. .

Via the POSITION / MONITOR page, the flight crew can access:
- The POSITION / NAVAIDS page, for more information on the radio position
- The POSITION / GPS page, for more information on the GPS position(s)
- The POSITION / IRS page, for more information on the IRS position(s).

LINKS

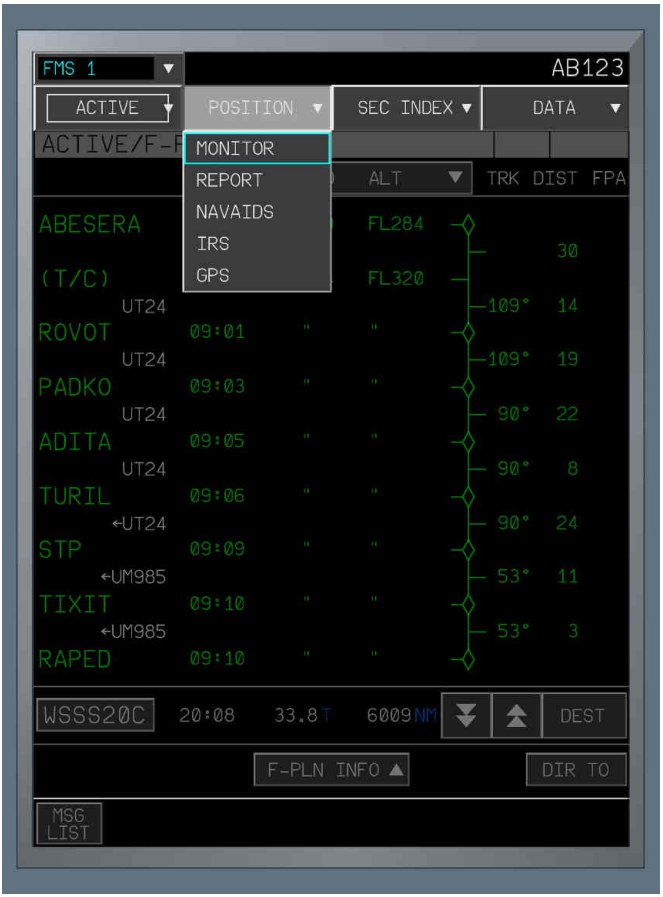
Refer to More Information on the Aircraft Position Computation

ACCESS

The flight crew can access the POSITION / MONITOR page, via:

- The General Menu Bar, by selecting MONITOR in the POSITION menu

General Menu Bar



- The ACTIVE / PERF page, by clicking on the POS MONITOR button.
  Refer to Page

PERF Page



NAVIGATION ACCURACY

Indicates whether the navigation accuracy is HIGH, or LOW.
Refer to More Information on the Navigation Accuracy

GPS PRIMARY LABEL

Indicates that the navigation mode is GPS PRIMARY.
Refer to More Information on GPS PRIMARY

EPU

Indicates the Estimated Position Uncertainty (EPU).
Refer to More Information on the EPU

RNP ENTRY FIELD

Indicates the Required Navigation Performance (RNP).
There is a default RNP value, that depends on the flight phase. The default value is displayed in small font.
The flight crew can always change the default value. The RNP entered by the flight crew is displayed in big font.
Refer to More Information on the RNP

ENTRY FORMAT

Refer to RNP Entry Format

FMS 1(2) POSITION

Indicates the latitude/longitude position computed by the onside FMS (when the FMS selector is set to NORM):
- FMS1 on Captain's side
- FMS2 on FO's side

Refer to More Information on the FMS Position Computation
The navigation mode, that is used to compute this FMS position, is displayed between brackets on the same line.

FMS 1(2) NAVIGATION MODE

Indicates the navigation mode that is used to compute the onside FMS position.

The navigation mode may be:
- N IRS/GPS
- N IRS/DME/DME
- N IRS/VOR/DME
- N IRS
- N IRS/DME/LOC
- N IRS/VOR/LOC
- N IRS/LOC

N (= 3 or 1) indicates whether 3 or 1 IRS are used to compute the IRS position. (*Refer to More Information on the IRS Position*)
Refer to More Information on the FMS Navigation Modes

RADIO POSITION

Indicates the latitude/longitude radio position, computed by the onside FMS.
Refer to More Information on the Radio Position

MIXIRS POSITION

Indicates the latitude/longitude MIXIRS position, computed by the onside FMS.
L2 If the MIXIRS position is not available, the FMS only uses the IRS 1(2)(3) position. In that case, this line displays the IRS 1(2)(3) position, instead of the MIXIRS position.
L1 *Refer to More Information on the MIXIRS Position*

GPIRS POSITION

Indicates the latitude/longitude GPIRS position, selected by the onside FMS.
The ADIRS computes the GPIRS position and sends it to the FMS.
Refer to More Information on the GPIRS Position

FMS 2(1) POSITION

Indicates the latitude/longitude position computed by the offside FMS (when the FMS selector is set to NORM):
- FMS2 on Captain's side
- FMS1 on FO's side

Refer to More Information on the FMS Position Computation
The navigation mode, that is used to compute this FMS position, is displayed between brackets on the same line.
L2 If the FMSs are in INDEPENDENT mode, this line is empty. (*Refer to More Information on the INDEPENDENT Mode*)

FMS 2(1) NAVIGATION MODE

Indicates the navigation mode that is used to compute the offside FMS position.

The navigation mode may be:
- N IRS/GPS
- N IRS/DME/DME
- N IRS/VOR/DME
- N IRS
- N IRS/DME/LOC
- N IRS/VOR/LOC
- N IRS/LOC

N (= 3 or 1) indicates whether 3 or 1 IRS are used to compute the IRS position. (*Refer to More Information on the IRS Position*)
Refer to More Information on the FMS Navigation Modes
L2 If the FMSs are in INDEPENDENT mode, this label is not displayed. (*Refer to More Information on the INDEPENDENT Mode*)

IRS 1(2)(3) POSITIONS

Indicate the three latitude/longitude IRS positions, and their deviation (in nautical miles) from the FMS 1(2) position.
Each ADIRS has its IRS position and sends it to both FMSs.
Refer to More Information on the IRS Position

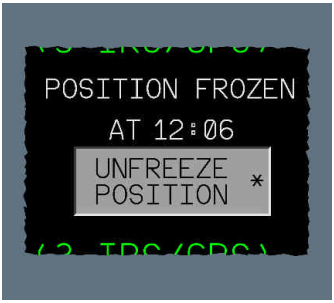
GPS 1(2) POSITIONS

Indicate the two latitude/longitude GPS positions.
The MMR sends the GPS positions to the FMS, via the ADIRS.
Refer to More Information on the GPS Position

FREEZE POSITION BUTTON

When clicked, freezes the display of all position data on the onside POSITION / MONITOR page.
A label indicates the UTC time (or flight time), when the position data has been frozen.
The flight crew can unfreeze the position data by clicking on the same button, that now displays UNFREEZE POSITION.

Unfreeze Position Button



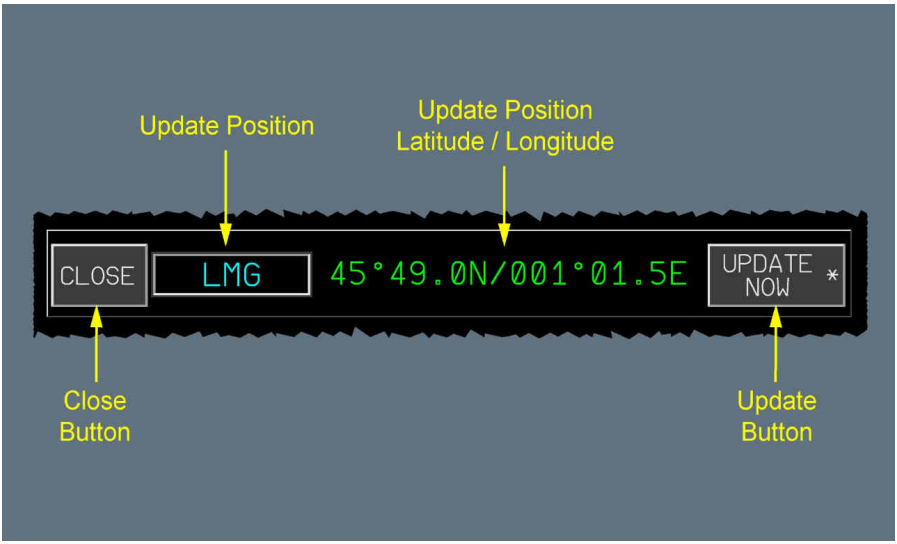
Note: *When the flight crew navigates to another FMS page, the position data is automatically unfrozen.*

POSITION UPDATE BUTTON

When clicked, displays the Position Update panel.
The Position Update button can only be selected when the FMS navigation mode is not IRS/GPS.

POSITION UPDATE PANEL

Position Update Panel



Note: *The Position Update panel closes automatically when the FMS navigation mode becomes IRS/GPS.*
Refer to More Information on the FMS Navigation Modes

CLOSE BUTTON

When clicked, closes the Position Update panel.

UPDATE POSITION ENTRY FIELD

The flight crew enters the update position in the entry field.

The possible entry formats are:

- The ident of a navigation database, or pilot stored waypoint, NAVAID, airport, or runway
  Refer to Waypoint Entry Format
  Refer to NAVAID Entry Format
  Refer to Airport Entry Format
  Refer to Runway Entry Format
- Latitude/longitude (*Refer to Entry Format*)
- Place/bearing/distance (*Refer to Entry Format*)
- Place-bearing/place-bearing (*Refer to Entry Format).*

If the flight crew has entered a valid latitude/longitude, place/bearing/distance, or place-bearing/place-bearing, the entry field displays “ENTRY”.

UPDATE POSITION LATITUDE / LONGITUDE

Indicates the latitude and longitude of the update position.

UPDATE BUTTON

When clicked, updates the FMS position with the position entered in the position entry field. The flight crew clicks on this button when the aircraft overflies the location.

BEARING / DISTANCE FUNCTION

The flight crew enters a location in the entry field , to compute the bearing and distance, from the aircraft's present FMS position to the entered location.
The FMS displays the result of the computation just below the entry field.

Bearing / Distance Function



ENTRY FORMAT

The possible entry formats for the location, are:

- The ident of a navigation database, or pilot stored waypoint, NAVAID, airport, or runway
  Refer to Waypoint Entry Format
  Refer to NAVAID Entry Format
  Refer to Airport Entry Format
  Refer to Runway Entry Format
- Latitude/longitude (*Refer to Entry Format*)
- Place/bearing/distance (*Refer to Entry Format*)
- Place-bearing/place-bearing (*Refer to Entry Format).*

If the flight crew has entered a valid latitude/longitude, place/bearing/distance, or place-bearing/place-bearing, the entry field displays “ENTRY”.

RETURN BUTTON

When clicked, displays the ACTIVE / PERF page. (*Refer to Page*)

L2 The Return button is only displayed when the flight crew has accessed the page via the ACTIVE / PERF page.

NAVAIDS BUTTON

When clicked, displays the POSITION / NAVAIDS page. (*Refer to Page*

GPS BUTTON

When clicked, displays the POSITION / GPS page. (*Refer to Page*)

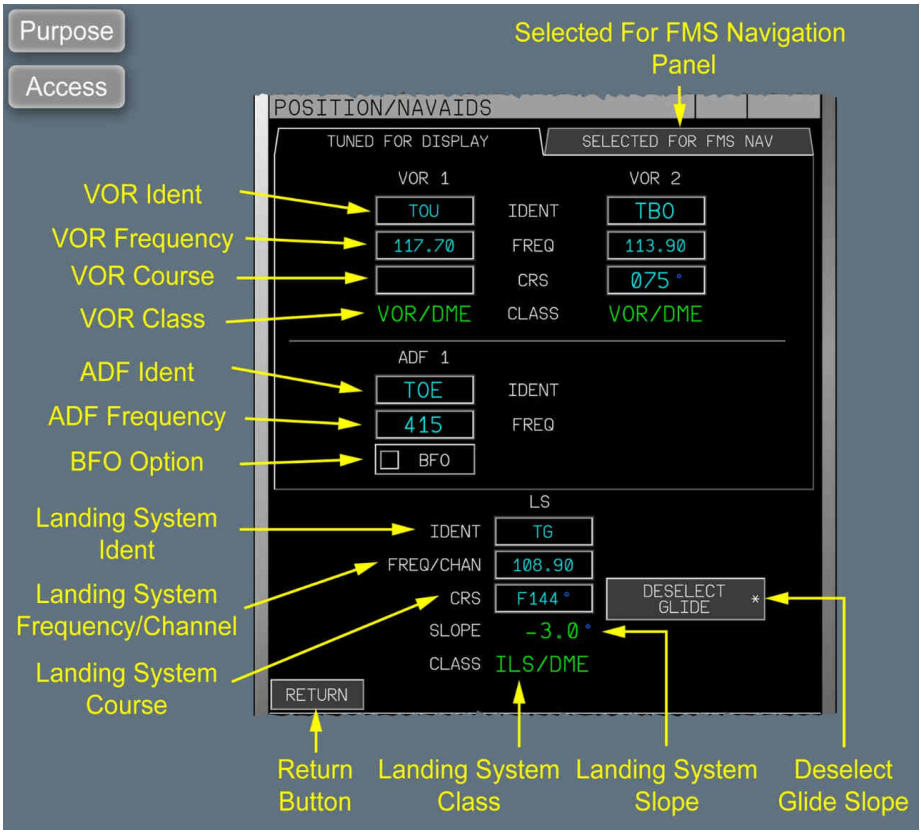
IRS BUTTON

When clicked, displays the POSITION / IRS page. (*Refer to Page*)

POSITION / NAVAIDS PAGE

Applicable to: ALL

POSITION / NAVAIDS page



PURPOSE

On the POSITION / NAVAIDS page, the flight crew can:

- Tune the VOR s and ADF for display on the ND (TUNED FOR DISPLAY panel)
- Check the NAVAIDS , that are automatically tuned to compute the radio position (SELECTED FOR FMS NAV panel)
- Check the radio position, and radio navigation mode (SELECTED FOR FMS NAV panel)

- Deselect a NAVAID , or GPS
- Tune the landing system NAVAID .

Note: *When the STANDBY RAD NAV mode of the RMP is active, all entry fields on the POSITION / NAVAIDS page are cleared, and cannot be selected.*

LINKS

Refer to Radio Navigation Tuning
Refer to Radio Position

ACCESS

The flight crew can access the POSITION / NAVAIDS page, via:

- The KCCU, by pressing the NAVAID key on the keyboard

Access via the KCCU



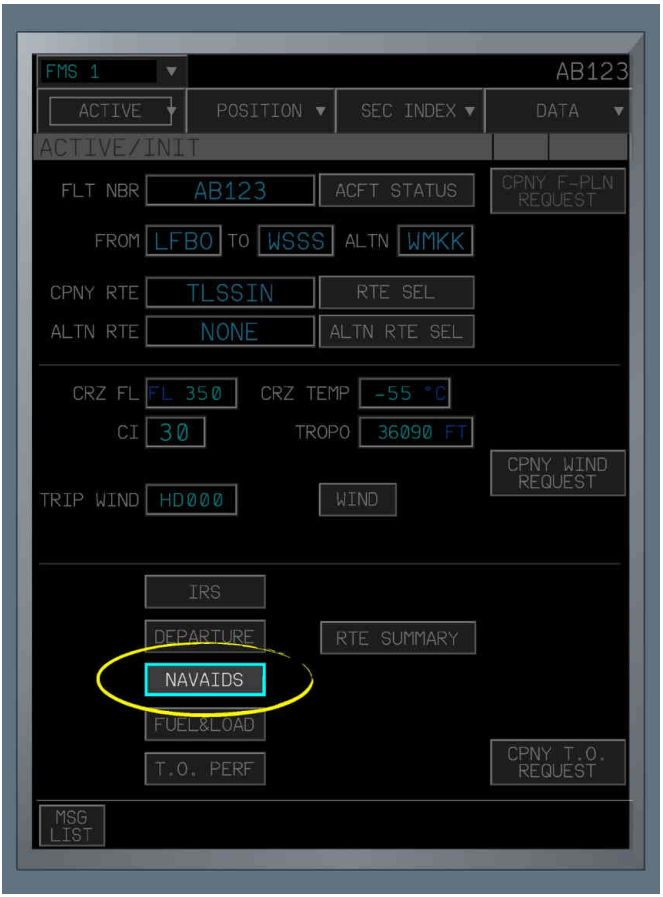
- The General Menu Bar, by selecting NAVAIDS in the POSITION menu

Access via the General Menu Bar



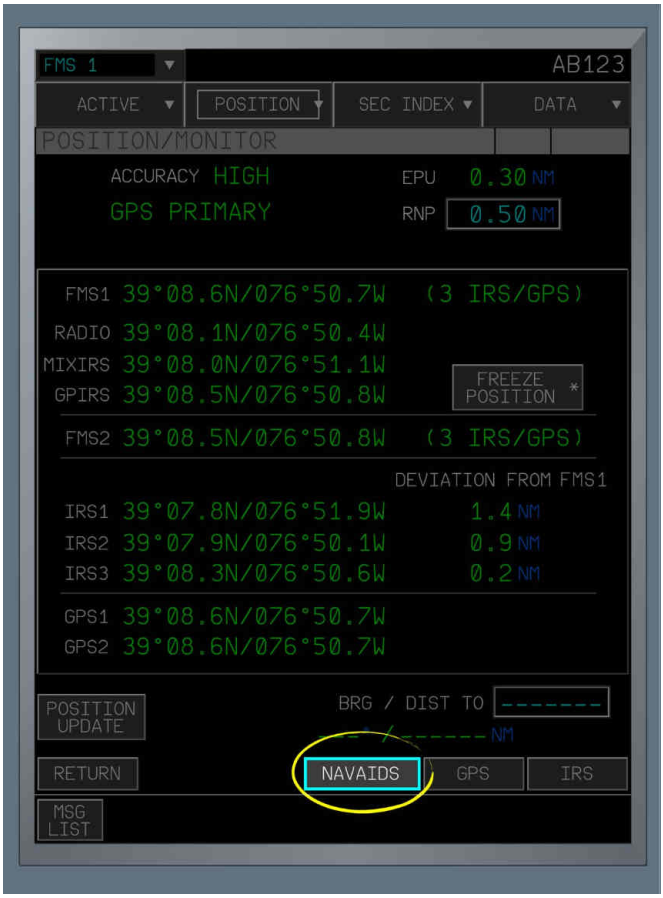
- The ACTIVE / INIT page, by clicking on the NAVAIDS button
  The TUNED FOR DISPLAY panel is opened by default.

Access via the ACTIVE / INIT Page



- The POSITION / MONITOR page, by clicking on the NAVAIDS button
  The SELECTED FOR FMS NAV panel is opened by default.

Access via the POSITION / MONITOR Page



VOR IDENT ENTRY FIELDS

Indicate the ident of the VOR s, that are tuned for display on the ND .
In normal operation, VOR 1 is tuned by FMS 1, and VOR 2 is tuned by FMS 2.
A VOR , that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically-selected VOR . A VOR , that is entered by the flight crew, is displayed in big font.

Note: *If the flight crew enters a NAVAID that has been deselected, the XXX IS DESELECTED message is displayed in the FMS Message Area.*

To revert to automatic VOR selection, the flight crew has to clear the entry field.

ENTRY FORMAT

Refer to NAVAID Entry Format

Note: *If the entered NAVAID is not in the navigation database, the PILOT STORED NAVAIDS panel, on the DATA / NAVAID page, is displayed. This provides the flight crew with the opportunity to add the selected NAVAID to the pilot stored elements database.*
Refer to DATA / NAVAID Page — PILOT STORED NAVAIDS Panel
Refer to Pilot Stored Elements Database

VOR FREQUENCY ENTRY FIELDS

Indicate the frequency of the VOR s, that are tuned for display on the ND .
VOR 1 is tuned by FMS 1. VOR 2 is tuned by FMS 2.
The frequency entry field is completed automatically, when the VOR ident is entered.
A frequency, that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically-selected frequency. A frequency entered by the flight crew, is displayed in big font.

Note: *The flight crew should use the VOR ident rather than the VOR frequency, to manually tune a NAVAID , unless the NAVAID is not in the database.*
When the flight crew manually enters a frequency, the VOR Ident entry field is blanked.

To revert to automatic VOR selection, the flight crew has to clear the entry field.

ENTRY FORMAT

Refer to VOR FREQ Entry Format

VOR COURSE ENTRY FIELDS

Indicate the course of the VOR s, that are tuned for display on the ND .
The flight crew can enter a course when the NAVAID , that is entered in the VOR Identity entry field, is a VOR , VOR / DME or VOR / TAC .

ENTRY FORMAT

Refer to VOR Course Entry Format

VOR CLASS

Indicates the class of the NAVAID, that is entered in the VOR ident entry field.

The class can be:
- VOR
- DME (or TACAN)
- VOR/DME (or VOR/TACAN)

ADF IDENT ENTRY FIELD

Indicates the identity of the NDB , that is tuned for display on the ND .
In normal operation, FMS 1 tunes ADF 1.
An NDB , that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically selected NDB . An NDB , entered by the flight crew, is displayed in big font.
To revert to automatic NDB selection, the flight crew has to clear the entry field.

ENTRY FORMAT

Refer to NAVAID Entry Format

Note: *If the entered NAVAID is not in the navigation database, the PILOT STORED NAVAIDS panel on the DATA / NAVAID page is displayed. This provides the flight crew with the opportunity to add the selected NAVAID to the pilot stored elements database.*
Refer to DATA / NAVAID Page — PILOT STORED NAVAIDS Panel
Refer to Pilot Stored Elements Database

ADF FREQUENCY ENTRY FIELD

Indicates the frequency of the NDB , that is tuned for display on the ND .
In normal operation, FMS 1 tunes ADF 1.
The frequency entry field is completed automatically, when the ADF ident is entered.
A frequency, that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically-selected frequency. A frequency, that is entered by the flight crew, is displayed in big font.

Note: *The flight crew should use the ADF ident, rather than the ADF frequency, to manually tune a NAVAID , unless the NAVAID is not in the database.*
When the flight crew manually enters a frequency, the ADF Ident entry field is blanked.

To revert to automatic NDB selection, the flight crew has to clear the entry field.

ENTRY FORMAT

Refer to ADF Frequency Entry Format

BFO OPTION

Indicates whether the BFO coding is selected or not.
By default, the BFO option is deselected.

LANDING SYSTEM IDENT ENTRY FIELD

Indicates the ident of the tuned landing system (ILS / GLS).
The entry field is completed automatically, when an ILS / GLS approach is selected. A landing system, that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically-selected landing system. A landing system, that is entered by the flight crew, is displayed in big font.

Note:
- *If the flight crew enters a landing system that has been deselected, the XXXX IS DESELECTED message is displayed on the FMS Message Area.*
- *If the flight crew manually tunes a landing system, that does not match the runway selected in the flight plan, the RUNWAY / LS DISAGREE message is displayed on the FMS Message Area.*
- *If the flight crew manually tunes an ILS / GLS , that does not correspond with the approach selected in the flight plan, the CHECK APPR SEL message is selected on the MFD FMS Message Area and on the PFD.*

L2 The ident entry field is completed automatically, when the frequency or channel of the landing system, that is part of the flight plan arrival (or departure) procedure, is entered in the frequency/channel entry field.
To revert to an automatic landing system selection, the flight crew has to clear the entry field.

L1 **ENTRY FORMAT**

Refer to LS IDENT Entry Format

Note: If the entered landing system is not in the navigation database, the PILOT STORED NAVAIDS panel, on the DATA/NAVAID page, is displayed. This gives the flight crew the opportunity to add the entered landing system to the pilots stored elements database.
Refer to DATA / NAVAID Page - PILOT STORED NAVAIDS Panel
Refer to Pilot Stored Elements Database

LANDING SYSTEM FREQUENCY/CHANNEL ENTRY FIELD

Indicates the frequency (for ILS), or channel (for GLS), of the tuned landing system.

The entry field is completed automatically, when the landing system ident is entered.
A frequency(channel), that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically-selected frequency(channel). A frequency(channel), that is entered by the flight crew, is displayed in big font.

Note: *The flight crew should use the landing system ident, rather than the landing system frequency(channel), to manually tune a landing system, unless the landing system is not in the database.*
When the flight crew manually enters a frequency(channel), the landing system ident entry field is completed automatically.

To revert to automatic landing system selection, the flight crew has to clear the entry field.

ENTRY FORMAT

Refer to LS FREQ Entry Format
Refer to CHANNEL (GLS) Entry Format

LANDING SYSTEM COURSE ENTRY FIELD

Indicates the course of the tuned landing system.
The course entry field may be completed automatically, when the landing system is tuned.
A course, that is automatically selected by the FMS , is displayed in small font.
The flight crew can always overwrite an automatically-selected course. A course, that is entered by the flight crew, is displayed in big font.
To revert to automatic course selection, the flight crew has to clear the entry field.

ENTRY FORMAT

Refer to LS Course Entry Format

LANDING SYSTEM SLOPE

Indicates the slope of the tuned landing system.

LANDING SYSTEM CLASS

Indicates the class of the tuned landing system.

The class may be:
- ILS
- ILS/DME (or ILS/TACAN)
- GLS

DESELECT GLIDE SLOPE BUTTON

When clicked, deselects the use of the glide slope data, during the ILS approach.
Deselection of the glide slope data may be required in case of partial loss, or during maintenance, of the ILS ground station.

L2 This function is only available for ILS approaches, when the FLS and Mix LOC/VNAV OPC options are activated.

L1 When the flight crew deselects glide slope data, the approach can be flown in LOC/FLS guidance mode.

When the flight crew deselects glide slope data, and when one of the following modes is active: LOC armed, LOC*, LOC, LAND armed, and LAND; the label GLIDE DESELECTED label is displayed to highlight the glide slope deselection.

GLIDE DESELECTED Label



When the glide slope data is deselected, the flight crew can re-select it by clicking on the same button. The button now displays SELECT GLIDE.
For both deselection and selection of the glide slope data, a confirmation action is required.

CONFIRM / CANCEL



NAVAID IDENT BUTTONS

Indicate the ident of the NAVAIDS , that are used for the radio position computation.
When clicked, opens a menu. Selecting DATA NAVAID opens the DATABASE NAVAIDS panel of the DATA / NAVAID page. Selecting the DATA NAVAID option opens the DATABASE NAVAIDS panel on the DATA / NAVAID page.
Refer to DATA / NAVAID Page — DATABASE NAVAIDS Panel

Note: If a landing system has been defined, the landing system NAVAID is displayed in the third row of the table, even when the landing system is not used for the radio position computation.

NAVAID FREQUENCY/CHANNEL

Indicates the frequency of the NAVAID that is automatically tuned for the radio position computation.
For more information, *Refer to Radio Position Computation* .

NAVAID CLASS

Indicates the class of the NAVAID, that is used for the radio position computation.

The class may be:
- VOR/DME (or VOR/TACAN)
- DME (or TACAN)
- ILS
- ILS/DME (or ILS/TACAN)

RADIO NAVIGATION MODE

The radio navigation mode indicates the combination of NAVAID types, that are used to compute the radio position.

The radio navigation mode can be:
- DME / DME
- VOR / DME
- DME / DME - LOC , displayed as DME / LOC
- VOR / DME - LOC , displayed as VOR / LOC
- LOC

Refer to More Information on the Radio Position Computation

RADIO POSITION LABEL

Indicates the radio position.
Refer to More Information on the Radio Position Computation

DESELECTED NAVAIDS ENTRY FIELDS

The flight crew deselects a NAVAID by entering its ident in one of the 6 entry fields.
When deselected, the NAVAID can no longer be tuned for radio position computation or for display on the ND.

The deselection is cancelled:
- Manually: By clearing the entry field
- Automatically: On transition to the DONE or PREFLIGHT flight phase, or after cycling the navigation database.

ENTRY FORMAT

Refer to NAVAID Ident Entry Format

GPS OPTION

The flight crew can use these option to select, or deselect, the GPS source for the FMS aircraft position computation.

L2 If the GPS source is deselected, the GPS DESELECTED message is displayed in the FMS Message Area, when the aircraft is at 80 nm from the top of descent, or when the aircraft enters in the APPROACH phase.
On transition to the DONE flight phase, the option is automatically set to SELECTED.

L1 *Refer to More Information on the FMS Position Computation*

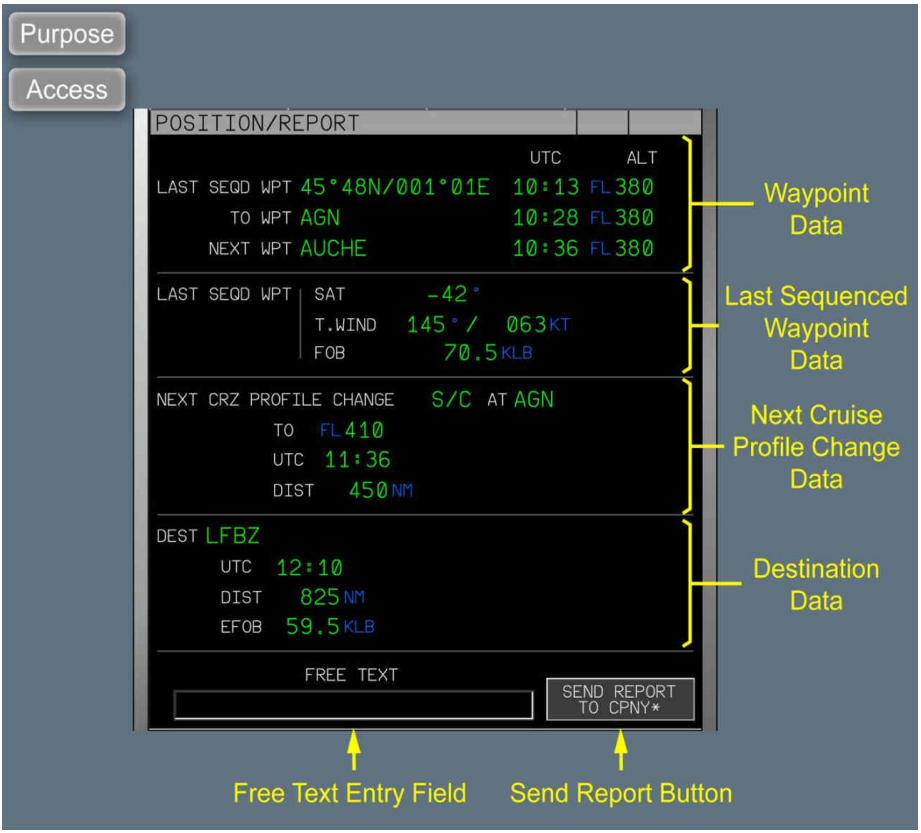
RETURN BUTTON

When clicked, displays the POSITION / MONITOR, or the INIT page, depending on the page that was displayed before.
Refer to POSITION / MONITOR page
Refer to INIT page

POSITION / REPORT PAGE

Applicable to: ALL

POSITION / REPORT Page



PURPOSE

On the POSITION / REPORT page, the flight crew can check and send the position report. The position report has stored and predicted data of:

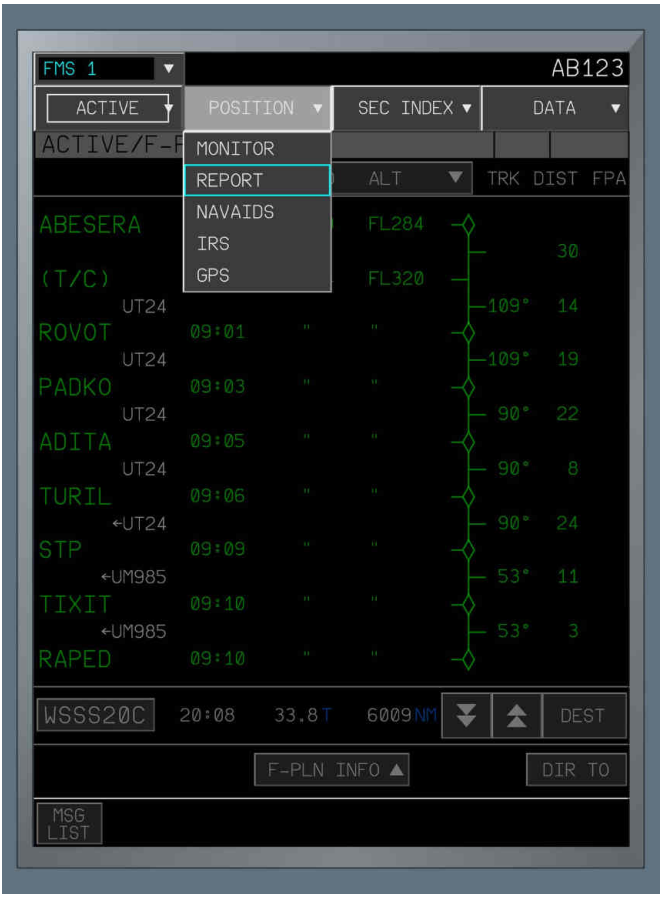
- The last sequenced waypoint
- The TO waypoint
- The NEXT waypoint

- The next cruise vertical profile change
- The destination.

ACCESS

The flight crew can access the POSITION / REPORT page via the General Menu Bar, by selecting REPORT in the POSITION menu.

General Menu Bar



WAYPOINT DATA

Displays the recorded UTC time (or flight time) and altitude at the last sequenced waypoint.

L2 The last sequenced waypoint is the last navigation database, or pilot stored waypoint, that has been sequenced. The last sequenced waypoint may not be identical to the flight plan FROM waypoint when the FROM waypoint is for example T-P, PPOS, IN-BND, etc ...

L1 Displays the predicted time of arrival (UTC or flight time) and altitude for the TO and NEXT waypoint.

L2 The TO and NEXT waypoint are database, or pilot stored waypoints. Flight plan pseudo-waypoints are excluded.

LAST SEQUENCED WAYPOINT DATA

Displays the following data, recorded at the last sequenced waypoint:

- Static Air Temperature (SAT)
- True Wind
- Fuel on Board (FOB).
  The FQMS provides the FOB.

NEXT CRUISE PROFILE CHANGE DATA

Displays (only in CRUISE) the following data for the next vertical profile change:

- The type of vertical change
  The type may be: S/C (Start of Climb), S/D (Start of Descent), T/D (Top of Descent).
  When no vertical change is planned in the flight plan, NONE is displayed.
- The start waypoint
- The target altitude (or current altitude)
- The predicted time of arrival (UTC or flight time) at the start waypoint
- The distance to the start waypoint, along the flight plan.

DESTINATION DATA

Displays the following data for the destination airport:

- The predicted time of arrival (UTC or flight time) at destination
- The distance to the destination, along the flight plan
- The estimated fuel on board at destination.

FREE TEXT ENTRY FIELD

The flight crew can enter a free text, of maximum 24 characters, in the entry field. The free text is sent with the position report to the airline.

SEND REPORT BUTTON

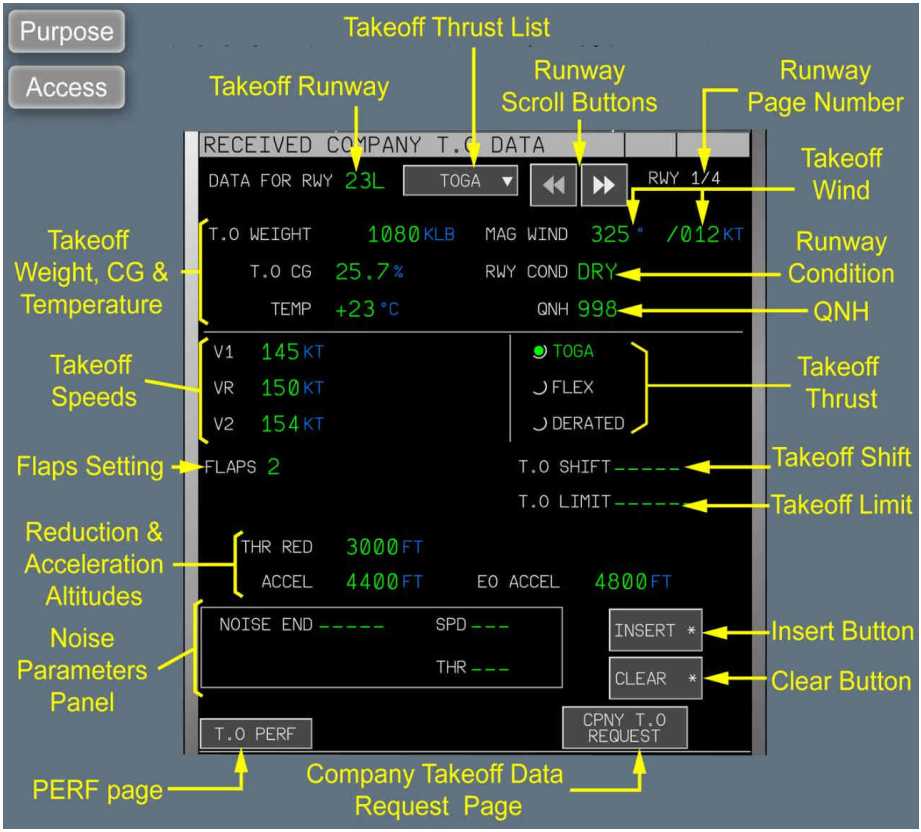
When clicked, sends the position report to the airline, via ACARS.

L2 During the transmission of the position report to the ACR, the button displays SENDING ... .

RECEIVED COMPANY T.O DATA PAGE

Applicable to: ALL

RECEIVED COMPANY T.O DATA Page



PURPOSE

On the RECEIVED COMPANY T.O DATA page, the flight crew can:

- Check the received company takeoff data,
- Delete or insert the received takeoff data in the flight plan.

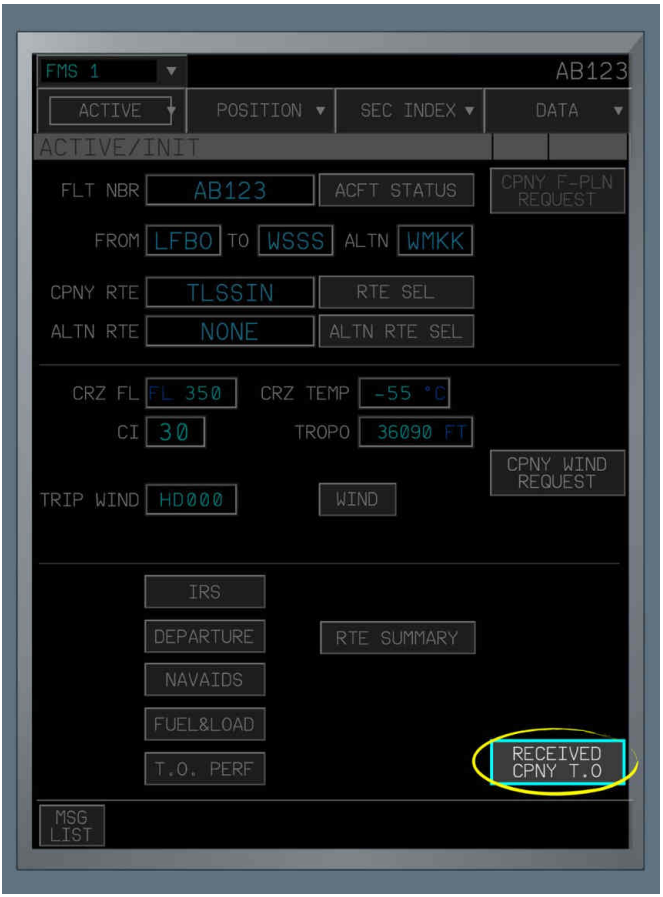
The flight crew can display takeoff data for up to four runways, and for two different takeoff thrust settings per runway.
The RECEIVED COMPANY T.O DATA page is only available for the active flight plan.

ACCESS

The flight crew can access the RECEIVED COMPANY T.O DATA page, via:

- The INIT page, by clicking on the RECEIVED CPNY T.O button

INIT page



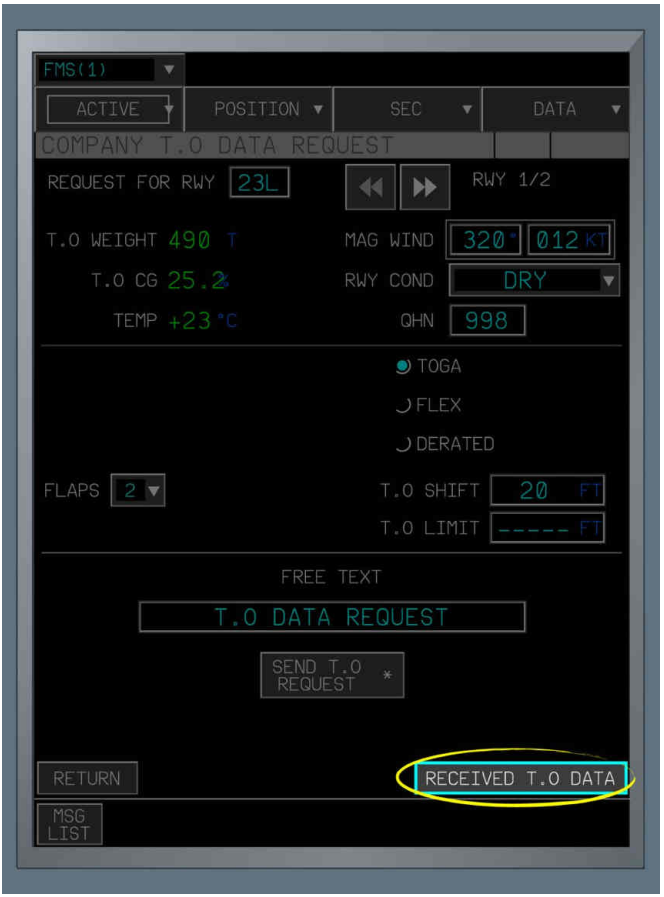
- The T.O panel on the ACTIVE / PERF page, by clicking on the RECEIVED CPNY T.O button

ACTIVE / PERF page



- The COMPANY T.O DATA REQUEST page, by clicking on the RECEIVED T.O DATA button.

COMPANY T.O DATA REQUEST page



TAKEOFF RUNWAY

Indicates the runway that is associated with the takeoff data displayed on the page.
Appears in amber, if the runway is different from the runway selected in the active flight plan.

TAKEOFF THRUST LIST

Takeoff Thrust List



Displays the takeoff thrust that is associated with the takeoff data of the page.
When the flight crew selects a takeoff thrust, the page displays the corresponding takeoff data.

RUNWAY SCROLL BUTTONS

The flight crew uses the scroll buttons to scroll, one by one, through the four takeoff runway pages.

RUNWAY PAGE NUMBER

Indicates the ranking of the takeoff runway page.

TAKEOFF WEIGHT, CG & TEMPERATURE

Indicate:
- The aircraft weight and CG, that are associated with the takeoff data
- The outside temperature, that is associated with the takeoff runway, when the TOGA thrust setting is selected. When the flight crew has selected a FLEX or a DERATED thrust, green dashes replace the temperature value.

L12

Note: *The FMS crosschecks the received takeoff weight with the FMS takeoff weight.*
If the received takeoff weight is outside an acceptable margin, the takeoff weight value appears in amber on the RECEIVED COMPANY T.O DATA page.
The received takeoff weight is within the acceptable margin if $TOW_{FMS} - 2\ t \leq TOW_{Received} \leq TOW_{FMS} + 7\ t$.
In this case, if the received runway matches the active runway, the UPLINK/ACTIVE TOW DISAGREE message also appears on the RECEIVED COMPANY T.O DATA page.

TAKEOFF WIND

Indicate the wind direction and velocity, that are associated with the takeoff runway.

RUNWAY CONDITION

Indicates the takeoff runway condition.

QNH

Indicates the QNH that is associated with the takeoff runway.

TAKEOFF THRUST

Indicates the takeoff thrust.
The flight crew can display the takeoff data for two different takeoff thrust settings per runway.
The possible thrust settings are: TOGA, FLEX, or DRT.

TAKEOFF SPEEDS

Indicates V1, VR and V2 that are associated with the takeoff runway.

FLAPS SETTING

Indicates the flaps setting, that is associated with the takeoff runway.

TAKEOFF SHIFT

Indicates the runway shift, that is associated with the takeoff runway.

TAKEOFF LIMIT

Indicates the remaining takeoff runway length.

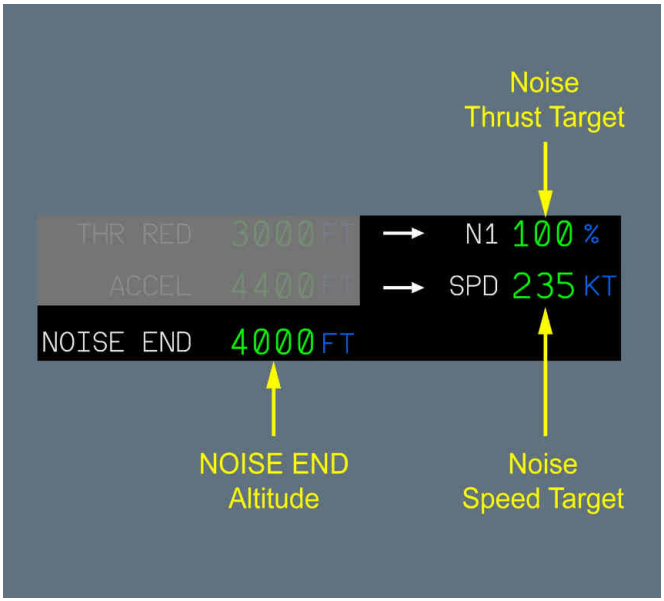
REDUCTION & ACCELERATION ALTITUDES

Indicates for the takeoff runway:
- The thrust reduction altitude (THR RED)
- The acceleration altitude all engines operative (ACCEL)
- The acceleration altitude in engine-out (EO ACCEL).

NOISE PARAMETERS

Indicate the parameters for the noise procedure that is associated with the takeoff runway.
For more information, *Refer to DSC-22-FMS-20-30-22FMS502BC PERF page - Noise Parameters Panel* .

Noise Procedure Data



COMPANY TAKEOFF DATA REQUEST PAGE

When clicked, displays the COMPANY T.O DATA REQUEST page.
Refer to Page

PERF PAGE

When clicked, displays the T.O panel of the ACTIVE / PERF page.
Refer to PERF page

INSERT BUTTON

When clicked:

- Inserts the following takeoff data in the active flight plan:
  - Takeoff speeds (V1, VR, V2),
  - Flaps setting,
  - Takeoff thrust,
  - Takeoff shift,
  - Thrust reduction and acceleration altitudes,
  - Noise parameters.
- Displays the T.O panel of the ACTIVE / PERF page. The T.O panel now displays the inserted takeoff data.

L2 The insertion is not possible when:

- The received runway does not match the active runway, or
- The received takeoff weight differs from the takeoff weight on the FUEL&LOAD page (*Refer to TOW, CG & TEMPERATURE)* , or
- One of the following received takeoff data is not defined :
  - Takeoff speeds (V1, VR, V2)
  - Takeoff runway
  - TOW
  - T.O CG
  - Takeoff wind
  - Runway condition
  - Baro setting
  - Temperature.

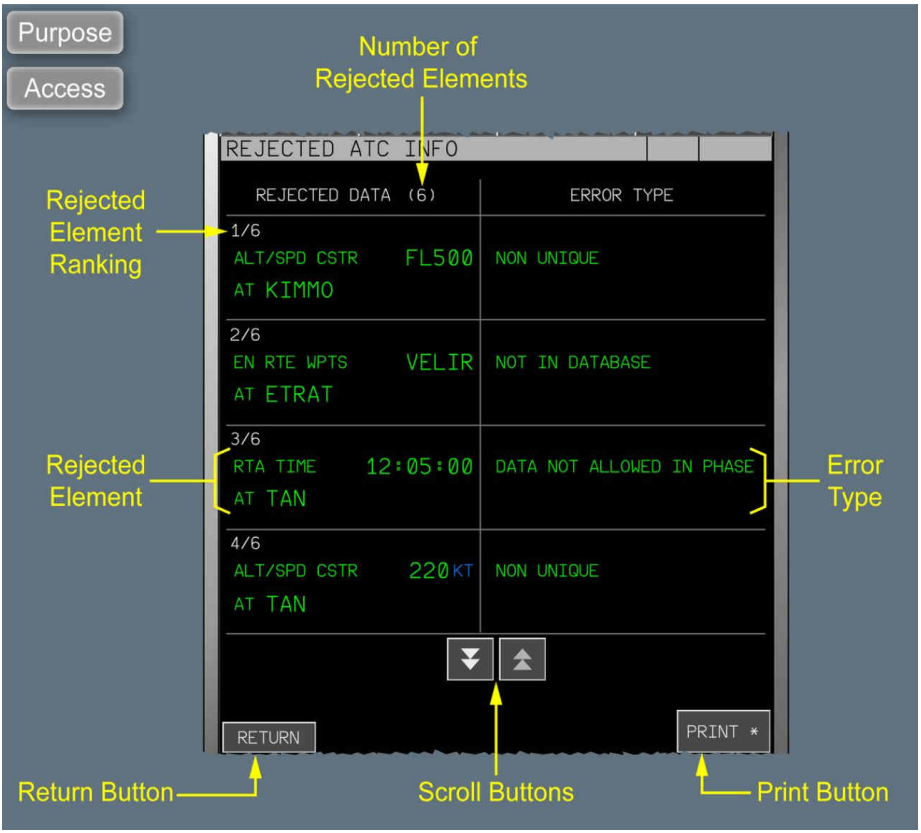
CLEAR BUTTON

When clicked, deletes the received takeoff data, that are associated with all the takeoff runways.

REJECTED ATC INFO PAGE

Applicable to: ALL

REJECTED ATC INFO page



PURPOSE

On the REJECTED ATC INFO page, the flight crew can check the rejected elements of the ATC flight plan, that is inserted in SEC 3.

ACCESS

The flight crew can access the REJECTED ATC INFO page via the SEC 3 panel of the SEC INDEX page, by clicking on the REJECTED ATC INFO button.

SEC / INDEX page



NUMBER OF REJECTED ELEMENTS

Indicates the number of rejected elements.

REJECTED ELEMENT RANKING

Indicates the ranking of the rejected element.

REJECTED ELEMENT

Indicates the description of the rejected element.

ERROR TYPE

Indicates the error type (reason for rejection), that is associated with the rejected element.

SCROLL BUTTONS

The flight crew uses the scroll down (up) button to move, page per page, downwards (upwards) through the rejected data.

PRINT BUTTON

When clicked, prints the third secondary flight plan (SEC 3) and the associated rejected elements.

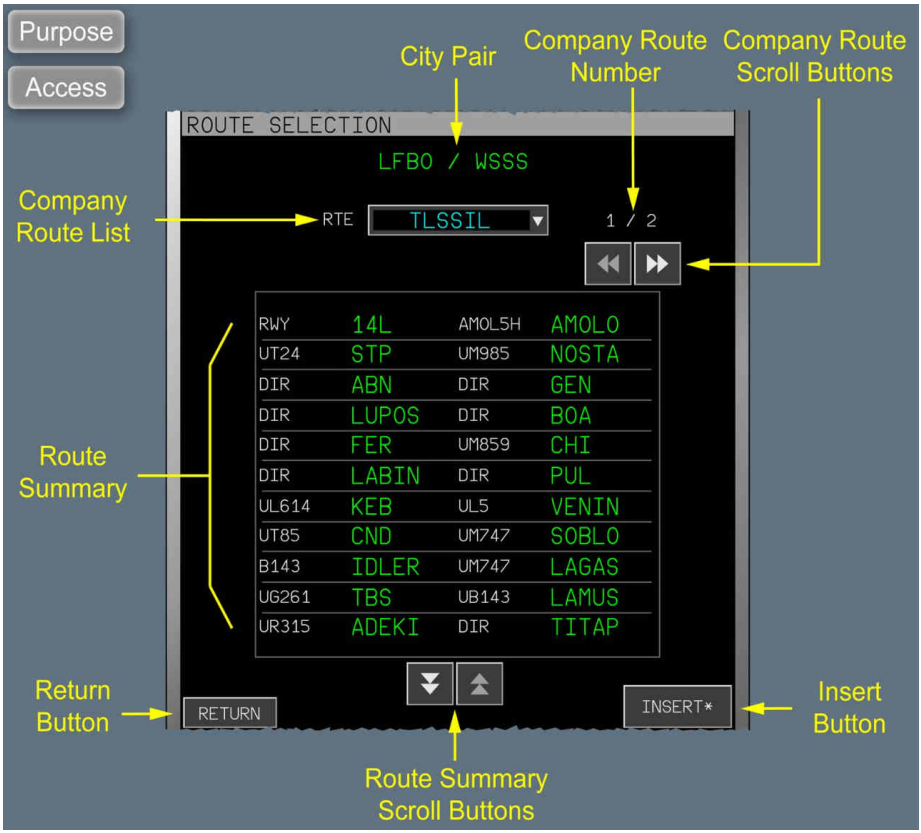
RETURN BUTTON

When clicked, displays the SEC 3 panel of the SEC INDEX page.

ROUTE SELECTION PAGE

Applicable to: ALL

ROUTE SELECTION Page



PURPOSE

On the ROUTE SELECTION page, the flight crew can:

- Display the summary of all company routes (or alternate company routes) of a defined FROM/TO (or TO/ALTN) city pair
- Select a company route and insert it in the flight plan.

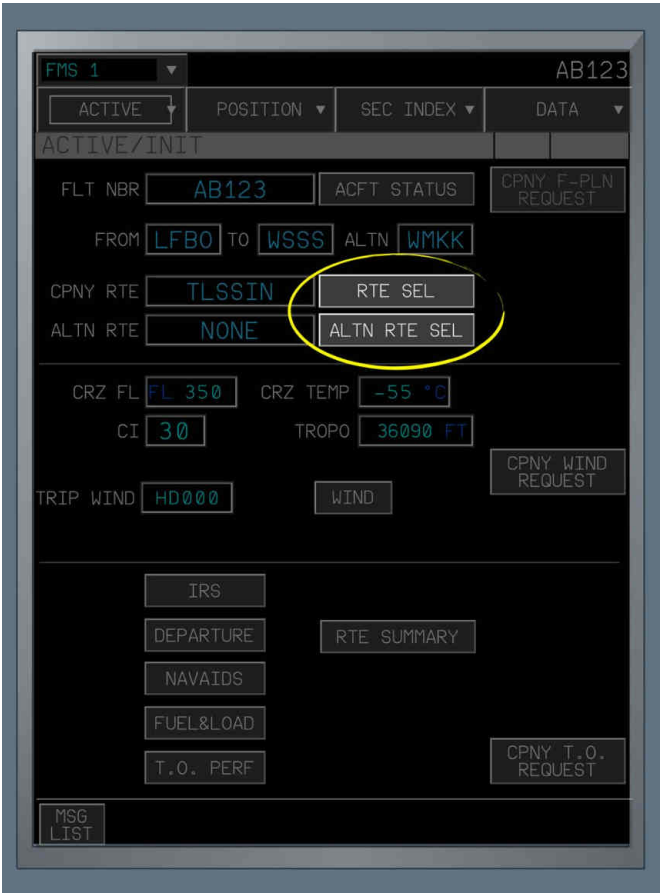
The ROUTE SELECTION page is available for the active and secondary flight plans.

ACCESS

The flight crew can access to the ROUTE SELECTION page via:

- The INIT page:
  - By clicking on the (ALTN) RTE SEL button

(ALTN) RTE SEL button on the INIT Page



  - By entering a FROM/TO city pair
    The ROUTE SELECTION page is displayed automatically when at least one company route exists for the city pair.
  - By changing the alternate destination

The ROUTE SELECTION page is displayed automatically when at least one company route exists for the TO/ALTN city pair.

- The ALTERNATE page:
  - By selecting the RTE SELECTION option of the airport option menu
  - By entering an airport in the Other Alternate Entry Field:
    The ROUTE SELECTION page is displayed automatically when at least one alternate company list exists for the TO/ALTN city pair.

CITY PAIR

Indicates the FROM/TO (origin / primary destination) or TO/ALTN (primary destination / alternate destination) ICAO city pair.

COMPANY ROUTE NUMBER

Indicates the ranking of the displayed company route in the list of available company routes.

COMPANY ROUTE LIST

Indicates the ident of the displayed (alternate) company route.
The flight crew selects the company route that he wants to display by choosing in the list, or by using the company route scroll buttons.
The company route list displays all (alternate) company routes, that are in the navigation or pilot stored elements database, associated with the defined FROM/TO (or TO/ALTN) city pair.

COMPANY ROUTE SCROLL BUTTONS

The flight crew uses the Scroll buttons to scroll, one by one, through the company route list.
The flight crew can also scroll through the list with the scroll wheel of the KCCU.

ROUTE SUMMARY

Indicates the route summary of the (alternate) company route that is selected in the company route list.
The summary has to be read from left to right and from top to bottom.
Company route waypoints are displayed in green big font. Airways and procedures are displayed in small white font.

Note: - *The VIA part of a procedure, and direct legs are indicated with DIR*
- *A runway is indicated with RWY*
- *When the company route has an approach procedure, only the first waypoint and the name of the procedure are displayed in the route summary.*

RETURN BUTTON

When clicked, displays the page that was displayed before the ROUTE SELECTION page without selection of the displayed company route.

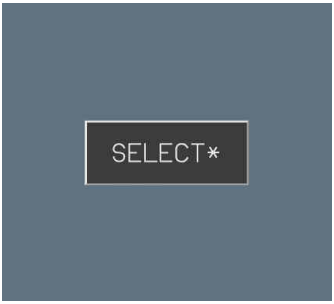
INSERT BUTTON

When clicked:

- Inserts the selected company route, and
- Displays the INIT page. (*Refer to Page)*

L2 If the page was accessed via the ALTERNATE page, the button displays SELECT.

Select button



When clicked:
- Selects the company route, and
- Displays the ALTERNATE page. (*Refer to Page)*

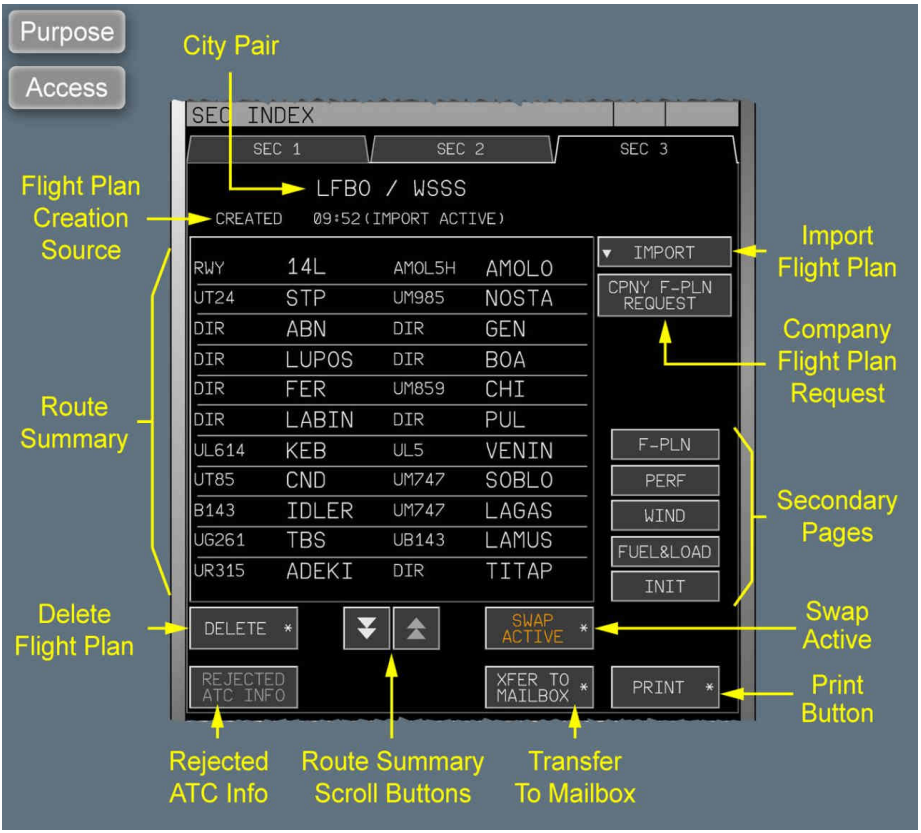
ROUTE SUMMARY SCROLL BUTTONS

The flight crew uses the scroll buttons to move, page by page, downwards (upwards) through the route summary.

SEC INDEX PAGE

Applicable to: ALL

SEC / INDEX Page



PURPOSE

On the SEC INDEX page, the flight crew can manage the three secondary flight plans on three identical panels: SEC 1(2)(3).

On each panel, the flight crew can:

- Check the origin and route summary of the secondary flight plan
- Import the active, or any other secondary flight plan, as a new secondary flight plan

- Request a secondary flight plan to the ground station, and insert it when received
- Swap the secondary and active flight plan
- Transfer the secondary flight plan to the ATC mailbox
- Print the secondary flight plan
- Access the secondary pages: F-PLN, PERF, WIND, FUEL&LOAD, and INIT.

LINKS

Refer to More Information On the Secondary Flight Plans

ACCESS

The flight crew can access the SEC INDEX page, via:

- The KCCU, by pressing the SEC INDEX key on the keyboard

Access via the KCCU



- The General Menu Bar, by selecting SEC 1(2)(3) in the SEC INDEX menu.

Access via the General Menu Bar



CITY PAIR

Indicates the FROM/TO (origin / primary destination) ICAO city pair.

FLIGHT PLAN CREATION SOURCE

Indicates the UTC time of creation and the source of creation of the secondary flight plan:

- (IMPORT ACTIVE)
  The flight crew created the secondary flight plan by importing the active flight plan.
- (IMPORT ACTIVE-MODIFIED)
  The flight crew created the secondary flight plan by importing the active flight plan, and changed it via a lateral or vertical flight plan revision.
- (SWAP ACTIVE)
  The flight crew created the secondary flight plan by swapping the active flight plan.
- (SWAP ACTIVE-MODIFIED)
  The flight crew created the secondary flight plan by swapping the active flight plan, and changed it via a lateral or vertical flight plan revision.
- (MANUAL)
  The flight crew created the secondary flight plan manually via the SEC 1(2)(3) / INIT, and/or SEC 1(2)(3) / F-PLN pages.
- (CPNY F-PLN)
  The flight crew created the secondary flight plan by inserting a received company flight plan.
- (CPNY F-PLN-MODIFIED)
  The flight crew created the secondary flight plan by inserting a received company flight plan, and changed it via a lateral or vertical flight plan revision.
- (ATC F-PLN)
  The flight crew created the secondary flight plan by uploading a received ATC flight plan.

  Note: An ATC flight plan can only be uploaded in the third secondary flight plan (SEC 3).

- (ATC F-PLN-MODIFIED)
  The flight crew created the secondary flight plan by uploading a received ATC flight plan, and changed it via a lateral or vertical flight plan revision.

  Note: An ATC flight plan can only be uploaded in the third secondary flight plan (SEC 3).

When the flight crew imports a secondary flight plan into an other secondary flight plan, the source of creation of the new secondary flight plan is the source of flight plan that has been imported.

ROUTE SUMMARY

Indicates the route summary of the secondary flight plan.
The summary has to be read from left to right and from top to bottom.
Waypoints are displayed in big font. Airways and procedures are displayed in small font.

Note: - *The VIA part of a procedure, and direct legs are indicated with DIR*
- *A runway is indicated with RWY*
- *When the route has an approach procedure, only the first waypoint and the name of the procedure are displayed in the route summary.*

ROUTE SUMMARY SCROLL BUTTONS

The flight crew uses the Scroll buttons to move, page by page, downwards (upwards) through the route summary.

FLIGHT PLAN IMPORT MENU

When clicked, opens a menu:

Import Menu



The flight crew creates the secondary flight plan by importing (making a copy of) the active flight plan, or one of the two other secondary flight plans.
Refer to More Information on the Secondary Flight Plan Initialization

COMPANY FLIGHT PLAN REQUEST BUTTON

When clicked, displays the COMPANY F-PLN REQUEST page.
Refer to Page

L2 The company flight plan request button can only be selected when no other flight plan request is pending.

L1 When a flight plan request is pending, the button displays REQUEST PENDING ... . The button still gives access to the COMPANY F-PLN REQUEST page.

REQUEST PENDING ...



When a company flight plan is received, the button displays RECEIVED CPNY F-PLN . When clicked, opens a menu that allows the flight crew to insert, or clear the received company flight plan.

RECEIVED CPNY F-PLN



SECONDARY PAGES BUTTONS

F-PLN BUTTON

When clicked, opens the SEC 1(2)(3) / F-PLN page. (*Refer to Page*)

PERF BUTTON

When clicked, opens the SEC 1(2)(3) / PERF page. (*Refer to Page*)

WIND BUTTON

When clicked, opens the SEC 1(2)(3) / WIND page. (*Refer to Page*)

FUEL&LOAD BUTTON

When clicked, opens the SEC 1(2)(3) / FUEL&LOAD page. (*Refer to Page*)

INIT BUTTON

When clicked, opens the SEC 1(2)(3) / INIT page. (*Refer to Page*)

SWAP ACTIVE BUTTON

When clicked, swaps the secondary and the active flight plan. The secondary flight plan becomes the active flight plan, and the active the secondary flight plan.
The flight crew cannot select this button when the swapping conditions are not fulfilled.
Refer to More Information on the Flight Plan Swapping

DELETE FLIGHT PLAN BUTTON

When clicked, deletes the secondary flight plan and its associated data.

TRANSFER TO MAILBOX BUTTON

When clicked, sends the flight plan to the ATC mailbox.
When sending, the buttons displays XFER... , and cannot be selected any more.

XFER...



If the Free Text AMI option is activated, clicking on the XFER TO MAILBOX button will display the TRANSFER TO MAILBOX page. (*Refer to Page*)
On this page, the flight crew can enter any free text that will be sent with the flight plan.

PRINT BUTTON

When clicked, prints the secondary flight plan.

REJECTED ATC INFO BUTTON

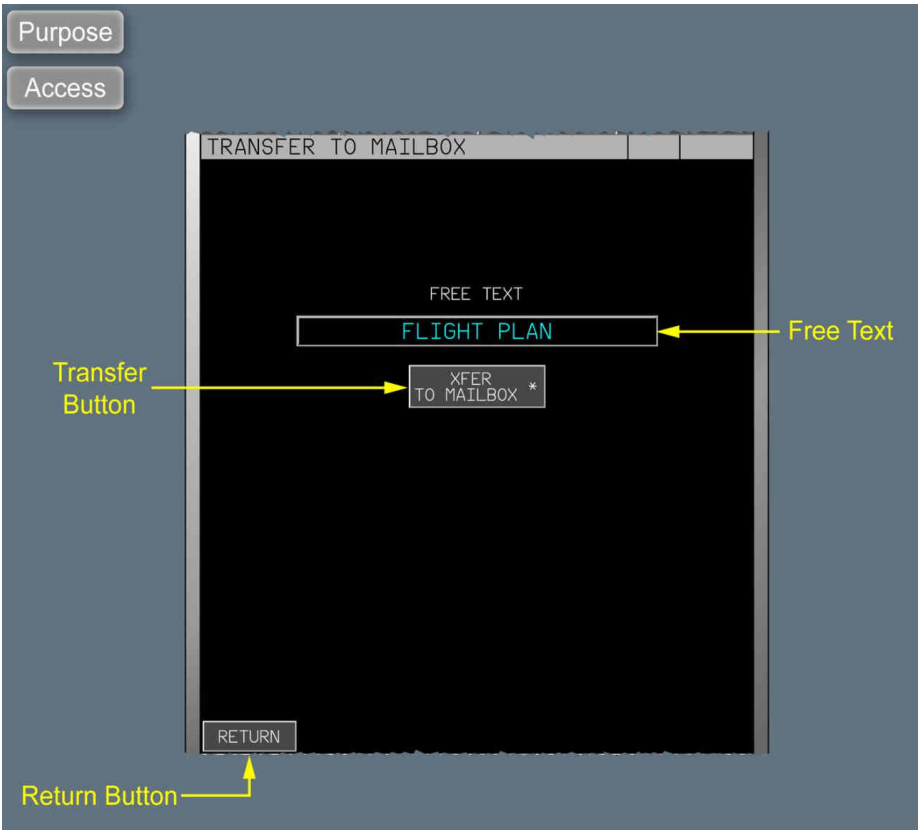
When clicked, displays the REJECTED ATC INFO page. (*Refer to Page*)
This button is displayed (only on the SEC 3 panel) when an ATC flight plan is loaded, and the FMS has rejected ATC data. The flight crew can consult this data on the REJECTED ATC INFO page.

Note: *The flight crew can load an ATC flight plan only in the third secondary flight plan (SEC 3).*

TRANSFER TO MAILBOX PAGE

Applicable to: ALL

TRANSFER TO MAILBOX page



PURPOSE

On the TRANSFER TO MAILBOX page, the flight crew can send a secondary flight plan to the ATC mailbox, before sending it to the ATC ground station.

If the Free Text AMI option is not activated, the TRANSFER TO MAILBOX page is not available. In this case, the flight crew sends the secondary flight plan by clicking on the XFER TO MAILBOX button on the SEC INDEX page.
The TRANSFER TO MAILBOX page is only available for the secondary flight plans.

ACCESS

The flight crew can access the TRANSFER TO MAILBOX page via the SEC INDEX page, by clicking on the XFER TO MAILBOX button.

SEC INDEX page



FREE TEXT

The flight crew can enter a free text, of maximum 24 characters, in the entry field. The free text is sent with the flight plan request to the ATC mailbox.

ENTRY FORMAT

Refer to FREE TEXT Entry Format .

TRANSFER BUTTON

When clicked, sends the secondary flight plan to the ATC mailbox.

L2 During the flight plan transmission to the ATC mailbox, the button displays XFER ... .

XFER



RETURN BUTTON

When clicked, displays the SEC INDEX page.

VERT REV PAGE

Applicable to: ALL

Overview



PURPOSE

The VERT REV page has 5 panels: RTA, SPD, CMS, ALT, and STEP ALTs.

On the RTA panel of the VERT REV page, the flight crew can:

- Insert, modify, or delete a time constraint (RTA) on a waypoint
- Insert, modify, or delete the Estimated Takeoff Time (ETT).

On the SPD panel of the VERT REV page, the flight crew can:
- Insert, modify, or delete a speed constraint on a waypoint
- Insert, modify, or delete the climb and descent speed limit.

On the CMS panel of the VERT REV page, the flight crew can insert, modify, or delete a Constant Mach Segment (CMS).
On the ALT panel of the VERT REV page, the flight crew can insert, modify, or delete a climb or descent altitude constraint on a waypoint.

On the STEP ALTS panel of the VERT REV page, the flight crew can:
- Insert, modify, or delete a step climb, or step descent on a waypoint
- Insert a step climb with optimum step start point.

The VERT REV page is available for the active and secondary flight plans.

LINKS

Refer to TIME CONSTRAINT Revision
Refer to SPEED CONSTRAINT Revision
Refer to SPEED LIMIT Revision
Refer to CONSTANT MACH SEGMENT Revision
Refer to ALTITUDE CONSTRAINT Revision
Refer to STEP ALTITUDES Revision

ACCESS

The flight crew can access the desired panel of the VERT REV page, as described in the following chapters:

ACCESS - RTA PANEL

The flight crew can access the RTA panel of the VERT REV page, via the F-PLN page, by:

- Clicking on the time prediction, associated to a waypoint.

Time Prediction



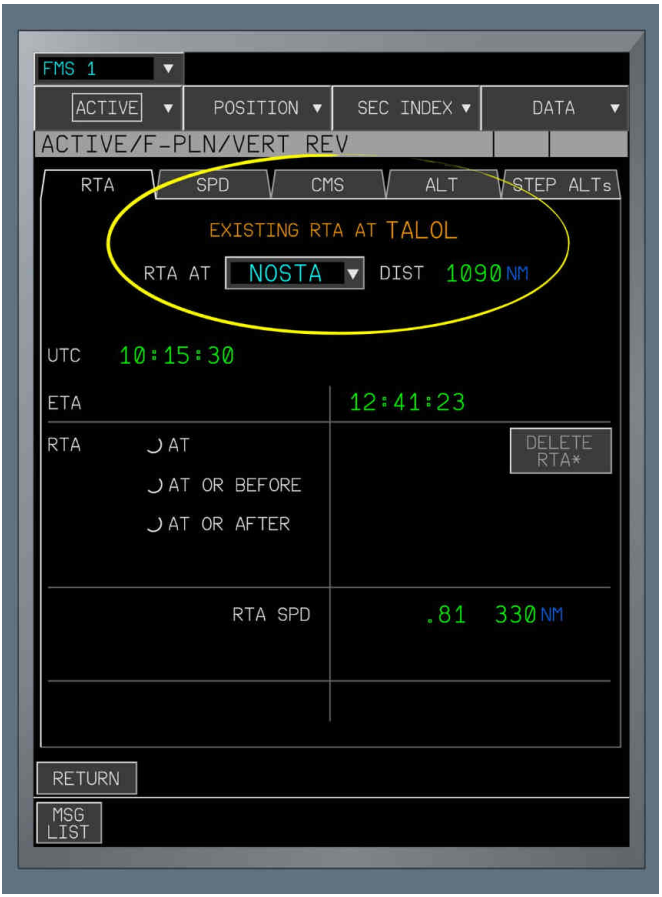
- Selecting CONSTRAINTS in the waypoint revisions menu (followed by clicking on the RTA tab).

Waypoint Revisions Menu



L3 *Note: When an RTA already exists in the flight plan, and the flight crew accesses the RTA panel via a waypoint, other than the one with the RTA , the RTA panel displays EXISTING RTA AT (ident of the waypoint).*

EXISTING RTA AT



When the flight crew accesses the RTA panel via a waypoint on which it is not possible to insert a RTA , the RTA panel displays RTA NOT ALLOWED AT (ident of the waypoint).

RTA NOT ALLOWED AT



ACCESS - SPD PANEL

The flight crew can access the SPD panel of the VERT REV page, via:

- The F-PLN page by clicking on the speed prediction associated to a takeoff, climb, descent or approach waypoint

Speed Prediction



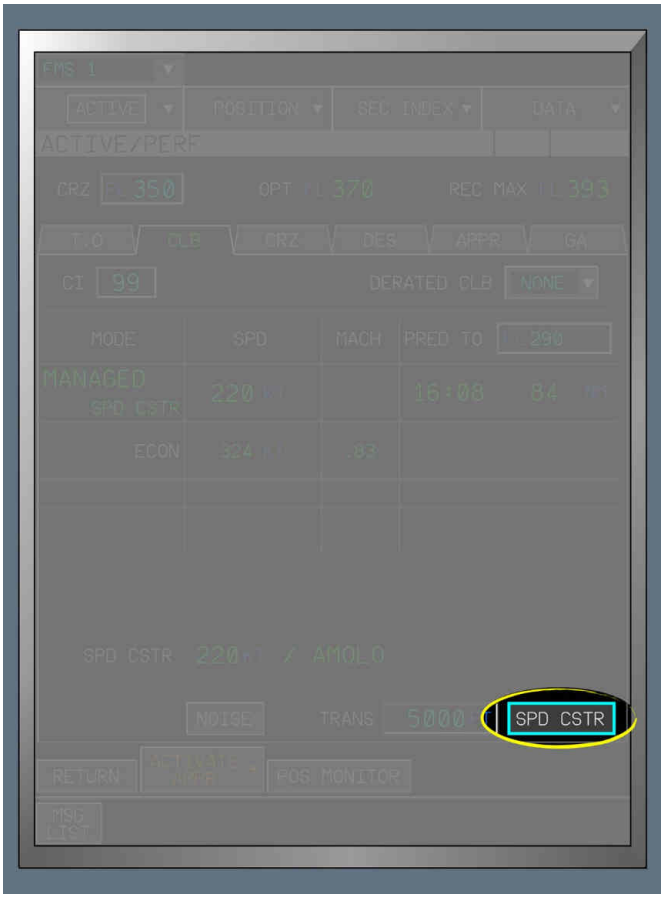
- The F-PLN page, by selecting CONSTRAINTS in the waypoint revisions menu (followed by clicking on the SPD tab of the VERT REV page).

Waypoint Revisions Menu



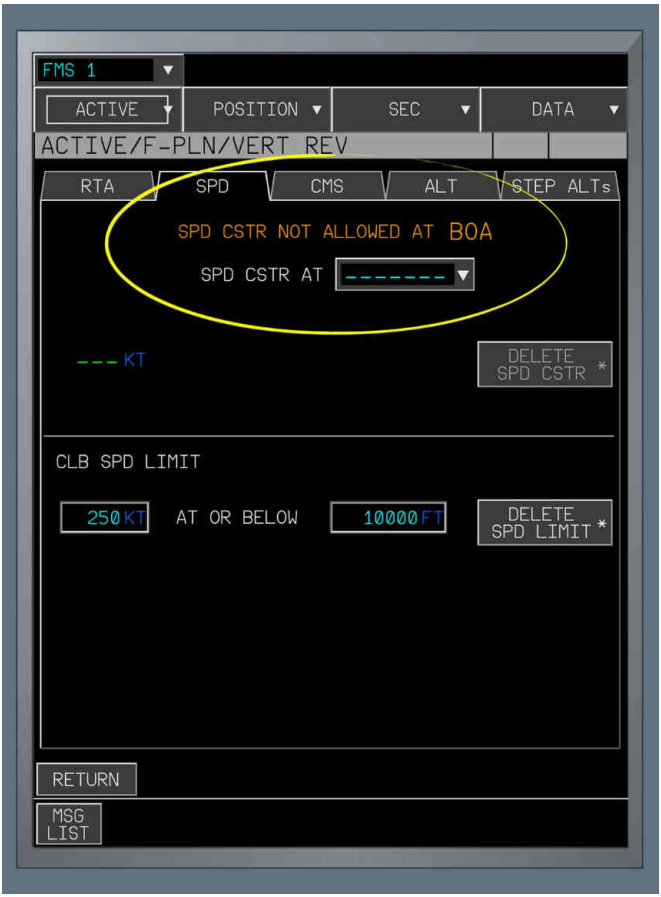
- The CLB or DES panel of the PERF page, by clicking on the SPD CSTR button.

PERF Page


FMS 1
ACTIVE
POSITION
SEC INDEX
DATA
ACTIVE/PERF
CRZ FL 350
OPT FL 370
REC MAX FL 393
T.O
CLB
CRZ
DES
APPR
GA
CI 99
DERATED CLB
NONE
MODE
SPD
MACH
PRED TO
MANAGED
SPD CSTR
220
16:08
84
ECON
324
.83
SPD CSTR 220 / AMOL0
NOISE
TRANS 5000
SPD CSTR
RETURN
ACTIVATE
POS MONITOR
MSG
LIST

L3 *Note: When the flight crew accesses the SPD panel via a waypoint on which it is not possible to insert a speed constraint, the SPD panel displays SPD CSTR NOT ALLOWED AT (ident of the waypoint).*

SPD CSTR NOT ALLOWED AT

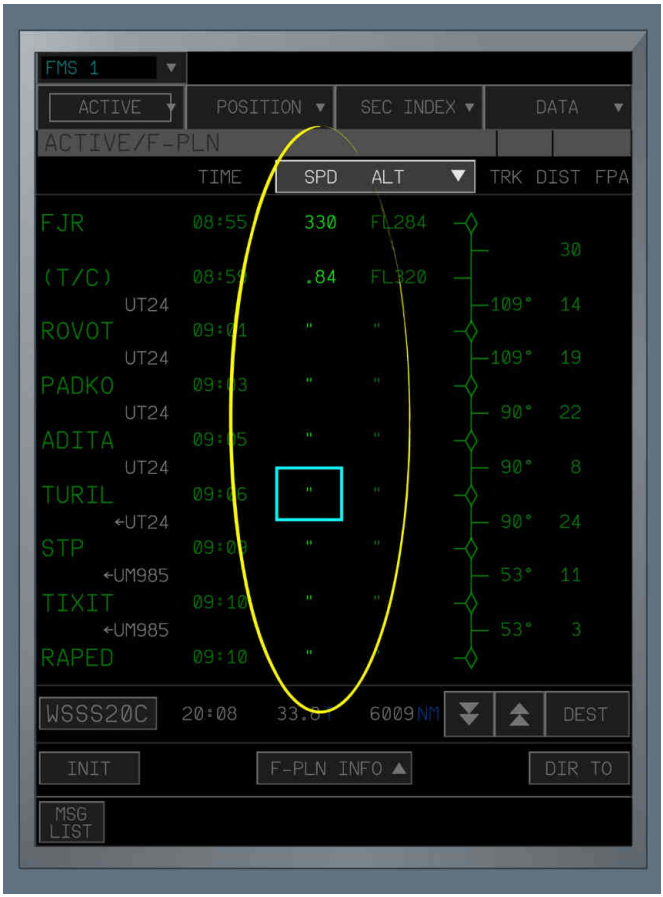


ACCESS - CMS PANEL

The flight crew can access the CMS panel of the VERT REV page, via:

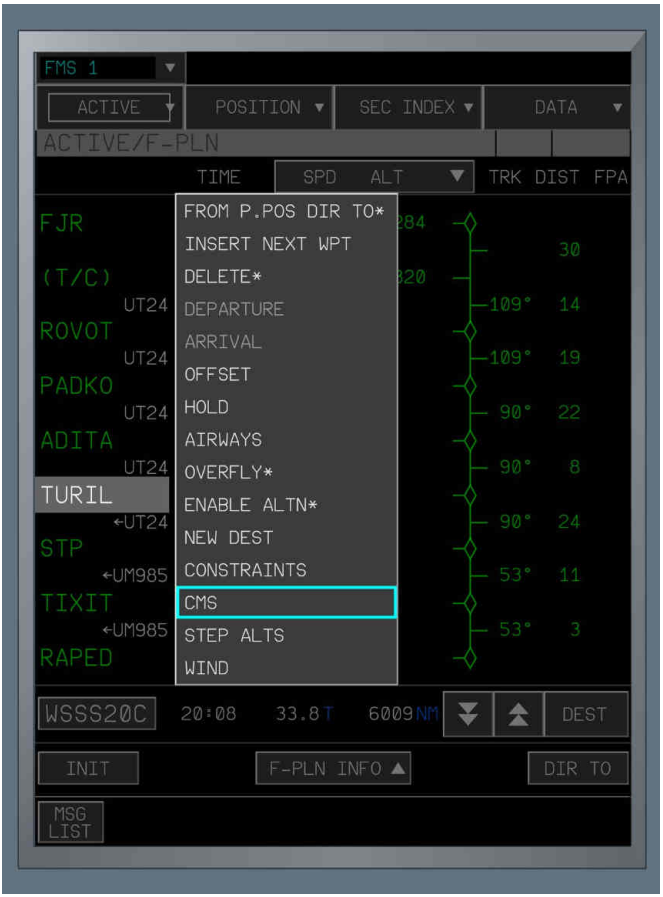
- The F-PLN page, by clicking on the speed prediction of a cruise waypoint

Speed Prediction



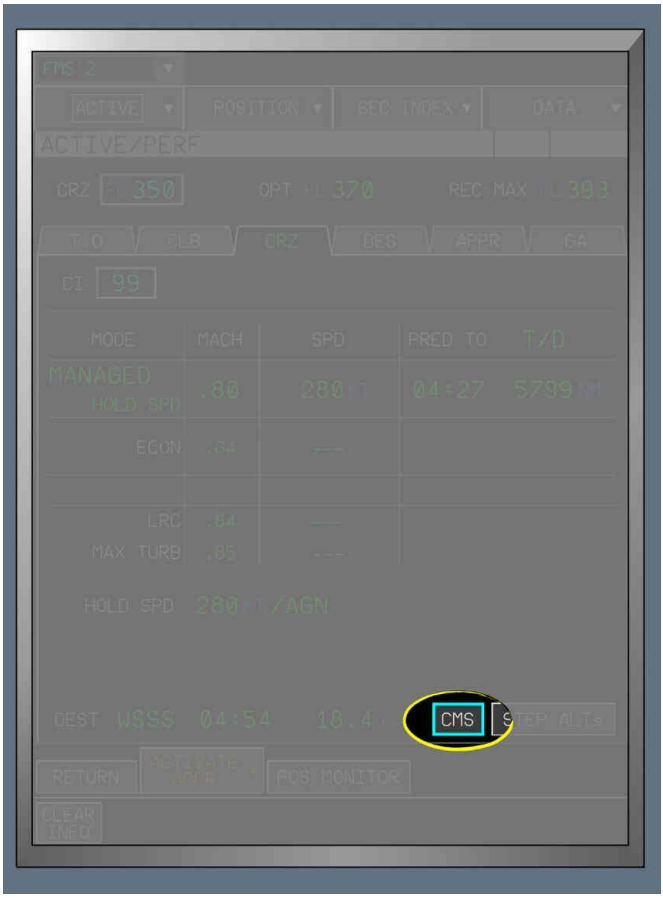
- The F-PLN page, by selecting CMS in the waypoint revisions menu

Waypoint Revisions Menu



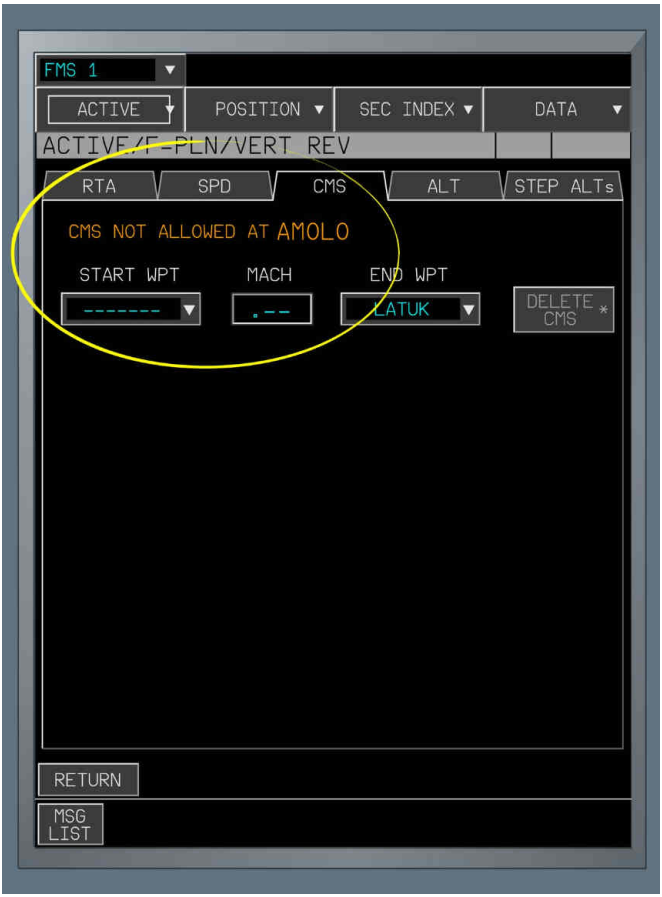
- The CRZ panel of the PERF page, by clicking on the CMS button.

PERF Page


FMS 2
ACTIVE
POSITION
REC INDEX
DATA
ACTIVE/PERF
CRZ FL 350
OPT FL 370
REC MAX FL 393
T/O
CLB
CRZ
DES
APPR
GA
CI 99
MODE
MACH
SPD
PRED TO
T/D
MANAGED
HOLD SPD
.80
280/T
04:27
5799
ECON
.64
LRC
.64
MAX TURB
.85
HOLD SPD 280/T /AGN
DEST WSSS 04:54
CMS
RETURN
ACTIVATE
PERF
POS MONITOR
CLEAR
INFO

L3 *Note:* *When the flight crew accesses the CMS panel via a waypoint on which it is not possible to insert a CMS, the CMS panel displays CMS NOT ALLOWED AT (ident of the waypoint).*

CMS NOT ALLOWED AT



When the flight crew accesses the CMS panel and it is not possible to insert a CMS, due to a special condition, the CMS panel will be empty, with a message that gives the reason of the unavailability of the function.

The possible messages are:
- *CMS NOT ALLOWED IN EO*
- *CMS NOT ALLOWED IN ALTN F-PLN*

CMS NOT ALLOWED IN EO



ACCESS - ALT PANEL

The flight crew can access the ALT panel of the VERT REV page, via the F-PLN page, by:

- Clicking on the altitude prediction associated to a takeoff, climb, descent, or approach waypoint

Altitude Prediction



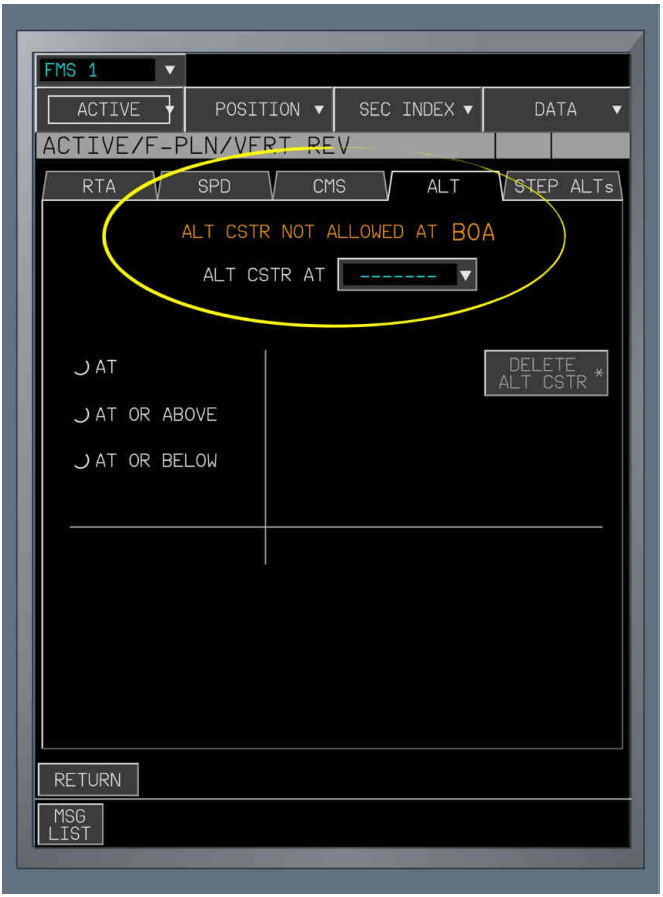
- Selecting CONSTRAINTS in the waypoint revisions menu.

Waypoint Revision Menu



L3 *Note:* *When the flight crew accesses the ALT panel via a waypoint on which it is not possible to insert an altitude constraint, the ALT panel displays the message ALT CSTR NOT ALLOWED AT (ident of the waypoint).*

ALT CSTR NOT ALLOWED AT



When the flight crew accesses the ALT panel via a waypoint belonging to a too steep path segment, the ALT panel displays TOO STEEP PATH AHEAD.

TOO STEEP PATH AHEAD

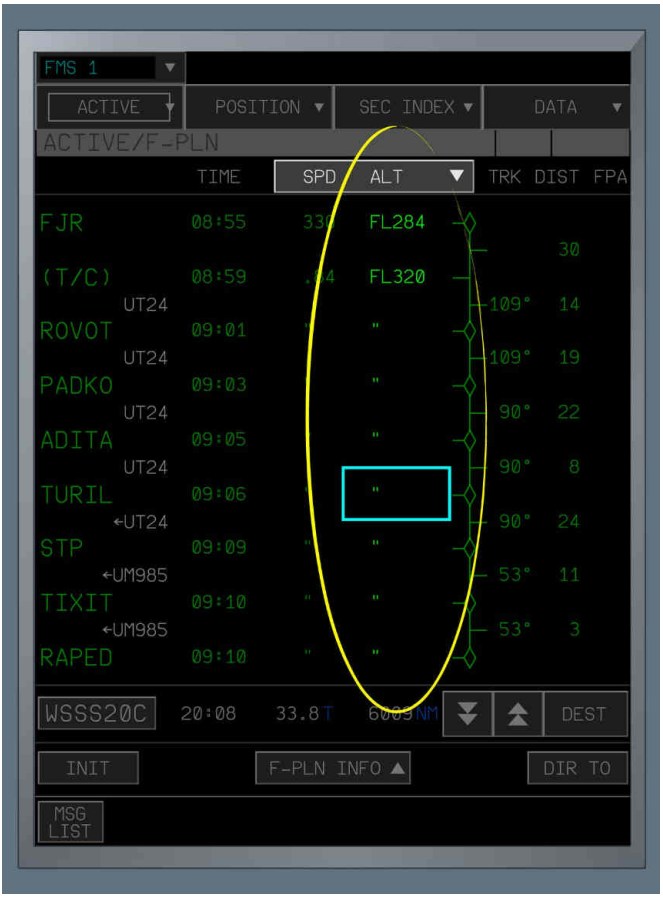


ACCESS - STEP ALTS PANEL

The flight crew can access the STEP ALTs panel of the VERT REV page, via:

- The F-PLN page, by clicking on the altitude prediction of a cruise waypoint

Altitude Prediction



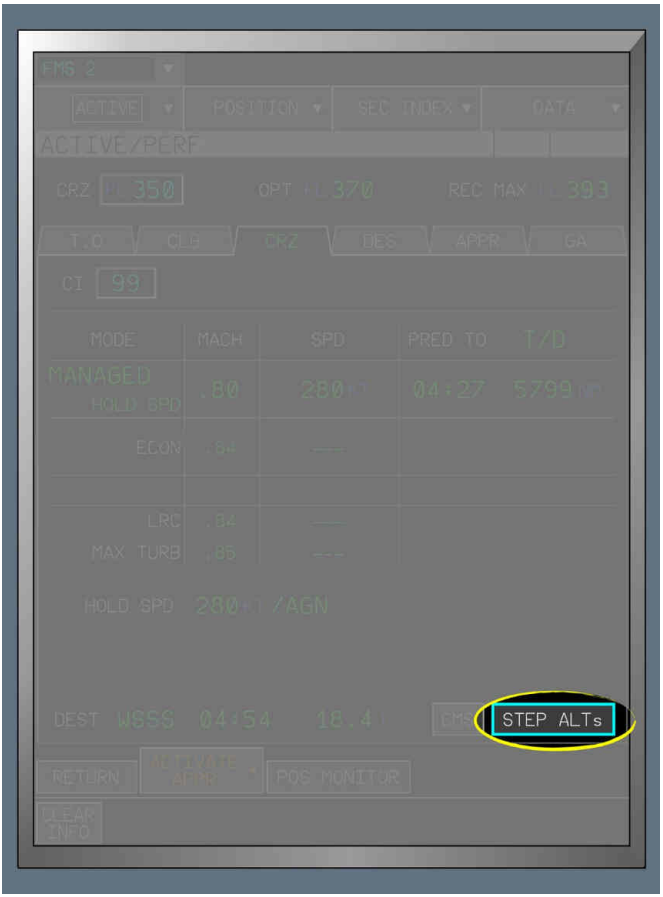
- The F-PLN page, by selecting STEP ALTs in the waypoint revisions menu.

Waypoint Revisions Menu



- The CRZ panel of the PERF page, by clicking on the STEP ALTs button.

PERF Page


FMS 2
ACTIVE
POSITION
SEC INDEX
DATA
ACTIVE/PERF
CRZ FL 350
OPT FL 370
REC MAX FL 393
T.O
CLB
CRZ
DES
APPR
GA
CI 99
MODE
MACH
SPD
PRED TO
T/D
MANAGED
HOLD SPD
.80
280/.7
04:27
5799
ECON
.84

LRC
.84

MAX TURB
.85

HOLD SPD 280/.7 /AGN
DEST WSSS 04:54 18.4
STEP ALTs
RETURN
ACTIVATE APPR
POS MONITOR
CLEAR INFO

L3 *Note:* *When the flight crew accesses the STEP ALTs panel and it is not possible to insert a step altitude, due to a special condition, the STEP ALTs panel will be empty, with a message that gives the reason of the unavailability of the function.*

The possible messages are:

- *STEP ALTs NOT ALLOWED IN EO*
- *STEP ALTs NOT ALLOWED IN DES*
- *STEP ALTs NOT ALLOWED IN APPR*
- *STEP ALTs NOT ALLOWED IN GA*
- *STEP ALTs NOT ALLOWED IN DONE*
- *STEP ALTs NOT ALLOWED: NO CRZ FL*

STEP ALTs NOT ALLOWED IN EO



RETURN BUTTON

When clicked, displays the page that was displayed before the VERT REV page.

TEMPORARY FLIGHT PLAN BUTTON

When clicked, displays the F-PLN page.

RTA PANEL

RTA Panel



RTA MESSAGE AREA

This area may display one of the following labels:

- RTA NOT ALLOWED AT XXXXXXX (XXXXXXX is the revised waypoint ident):
  Indicates that the flight crew cannot create a time constraint on the revised waypoint.
- EXISTING RTA AT XXXXXXX (XXXXXXX is a waypoint ident):
  Indicates that the flight plan already has a time constraint on the waypoint XXXXXXX. This waypoint is different from the waypoint selected in the revised waypoint list.
  Only one time constraint can exist in the flight plan. If the flight crew creates a new time constraint on the selected waypoint, the FMS will delete the time constraint on the waypoint XXXXXXX.
- EXISTING RTA AT XXXXXXX DELETED IN TMPY (XXXXXXX is a waypoint ident):
  Indicates that the FMS has deleted the time constraint on the waypoint XXXXXXX.
  Only one time constraint can exist in the flight plan. If there is a time constraint on the waypoint XXXXXXX, and the flight crew creates a new time constraint on another waypoint, the FMS deletes the time constraint on the waypoint XXXXXXX.

REVISED WAYPOINT LIST

Waypoint List



The flight crew selects the waypoint in the list, or enters it into the entry field using the keyboard.
The list displays all possible waypoints, on which a time constraint can be defined.

L2 By default, the revised waypoint is selected.

L3 When an RTA already exists in the flight plan, and the flight crew selects a waypoint in the list, other than the one with the RTA , the panel displays EXISTING RTA AT (ident of the waypoint).

L1 **ENTRY FORMAT**

Refer to WAYPOINT Entry Format

WAYPOINT DISTANCE

Indicates the distance, along the flight plan, between the aircraft present position and the revised waypoint.
Dashes are displayed when no waypoint has been selected in the Waypoint list.

AIRCRAFT TIME

Indicates the UTC aircraft time, in flight.
In preflight, the Estimated Takeoff Time (ETT) entry field is displayed.

ETT



L2 The entered ETT will be the time reference for the flight plan time predictions.
Refer to More Information on the ETT

L1 **ENTRY FORMAT**

Refer to ETT Entry Format

WAYPOINT ETA

Indicates the Estimated Time of Arrival (ETA) at the revised waypoint.

RTA OPTION

The flight crew selects the type of time constraint:
- AT
- AT or BEFORE
- AT or AFTER

When one of the three options is selected, the associated RTA entry field is displayed.

RTA ENTRY FIELD

The flight crew enters in the entry field the Required Time of Arrival (RTA).
The default value for the RTA is the ETA at the revised waypoint.

ENTRY FORMAT

Refer to RTA Entry Format

RTA MACH/SPEED

Indicates the Mach number and CAS of the managed RTA SPD.
The RTA SPD is the managed speed when an RTA is defined in the flight plan.

L2 When a RTA is defined but not yet inserted in the active flight plan (the temporary flight plan is still pending), the displayed RTA SPD is the target speed of the managed speed mode after insertion of the temporary flight plan.

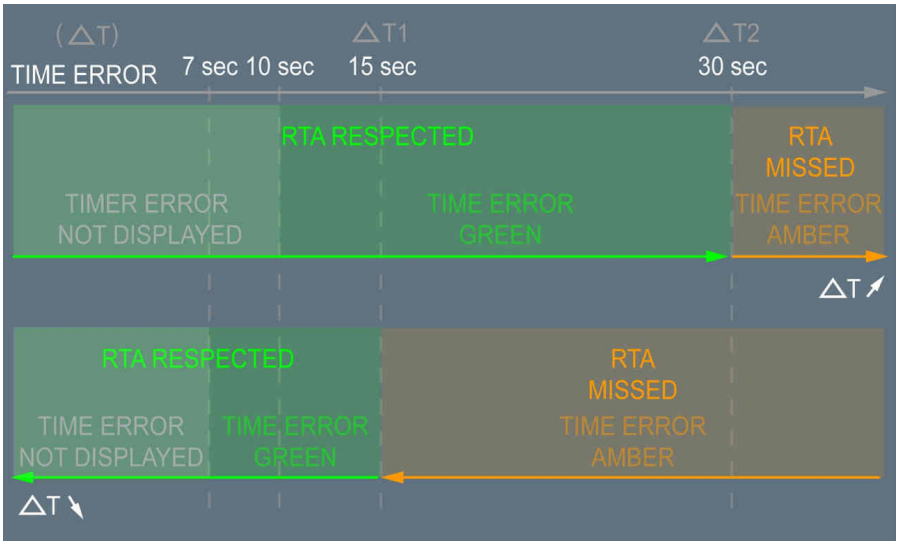
TIME ERROR

Indicates the time difference between the ETA and the RTA (Time error = ETA - RTA), and the type of time error, if applicable:

- LATE, if the time error is a positive value: the aircraft will arrive, at the revised waypoint, later than the requested AT or AT or BEFORE constraint
- EARLY, if the time error is a negative value: the aircraft will arrive, at the revised waypoint, earlier than the requested AT or AT or AFTER constraint.

L2 Following figure gives the display and color logic of the timer error:

Time Error Display



Note: *△T1 and △T2 are respectively 30 s and 15 s, if the distance between the aircraft and the waypoint with the time constraint is less than 2 000 nm.*
If the distance is more than 2 000 nm, △T1 and △T2 are linearly increased at a rate of 60 s per 1 000 nm.,

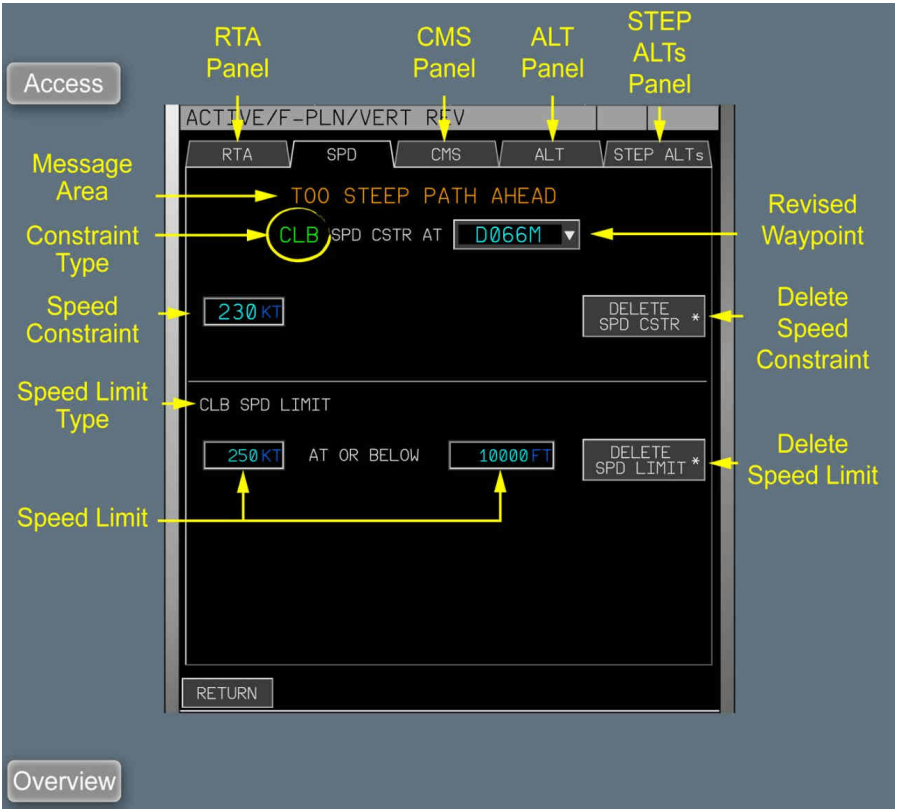
DELETE RTA BUTTON

When clicked, deletes the existing RTA and creates (or updates) the temporary flight plan.

L3 When clicked, and the flight phase is DESCENT or APPROACH and the aircraft current altitude is below FL 100 (or below the descent speed limit altitude if it is higher than FL 100), displays the F-PLN page.

SPD PANEL

SPD Panel



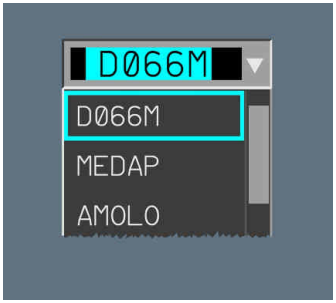
SPEED CONSTRAINT MESSAGE AREA

This area may display one of the following labels:

- SPD CSTR NOT ALLOWED AT XXXXXXX (XXXXXXX is the revised waypoint ident):
  Indicates that the flight crew cannot create a speed constraint on the revised waypoint.
- TOO STEEP PATH AHEAD:
  Indicates that the revised waypoint is part of a too steep path segment.

REVISED WAYPOINT LIST

Waypoint List



The flight crew selects the waypoint in the list, or enters it into the entry field using the keyboard.
The list displays all possible waypoints, on which a speed constraint can be defined.

L2 By default, the revised waypoint is selected.

L1 **ENTRY FORMAT**

Refer to WAYPOINT Entry Format

SPEED CONSTRAINT TYPE

Indicates whether the constraint is a climb (CLB) or descent (DES) speed constraint.
If the FMS cannot determine the type of constraint, the CLB/DES option is displayed. This option allows the flight crew to select the desired speed constraint type. (*Refer to CLB/DES Option*)

SPEED CONSTRAINT ENTRY FIELD

The flight crew enters the speed constraint in the entry field.
There may be a default speed constraint, stored in the navigation database with the revised waypoint. The flight crew can always overwrite the default value.

ENTRY FORMAT

Refer to SPD Entry Format

CLB/DES OPTION

With the CLB/DES option, the flight crew selects whether the constraint is a climb, or descent speed constraint.

CLB/DES Option



This option is only displayed if the FMS cannot determine the speed constraint type by itself.

DELETE SPEED CONSTRAINT BUTTON

When clicked, deletes the existing speed constraint and creates (or updates) the temporary flight plan.

SPEED LIMIT TYPE

Indicates whether the speed limit is a climb (CLB SPD LIMIT) or descent (DES SPD LIMIT) speed limit.

SPEED LIMIT ENTRY FIELDS

The flight crew enters the speed and altitude values of the speed limit in the entry fields.

The default speed limit may be (in the following order of priority):
- The navigation database value (the speed limits can be stored with the associated origin and destination airports)
- The FMS default value, that is 250 kt / 10 000 ft

The flight crew can always overwrite the default value.

ENTRY FORMAT

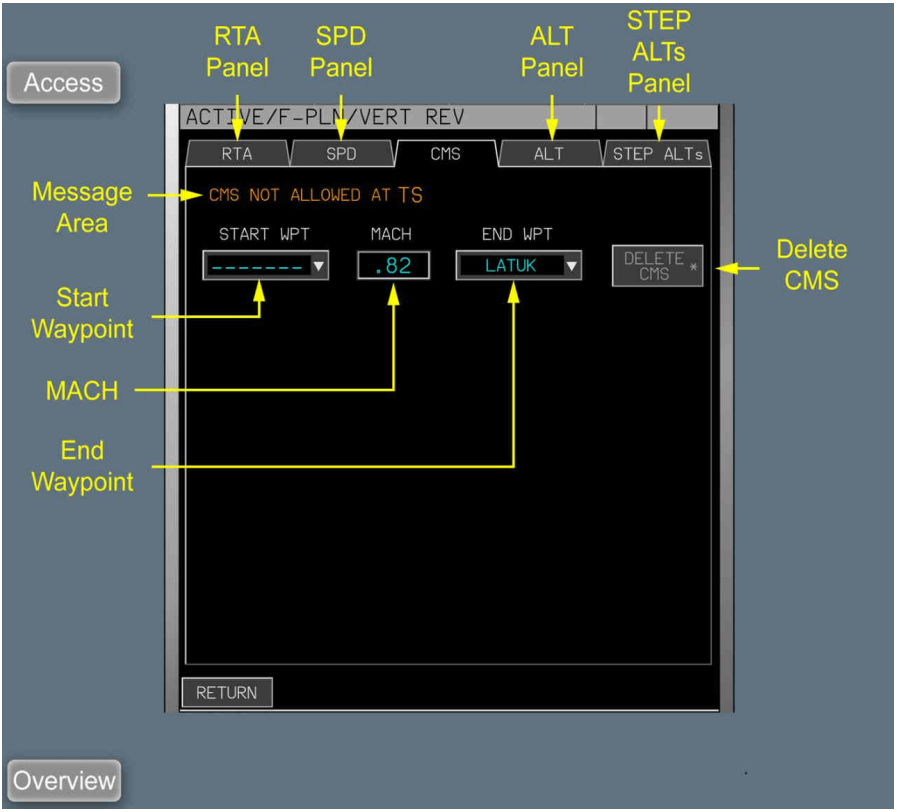
Refer to SPD Entry Format
Refer to ALT Entry Format

DELETE SPEED LIMIT BUTTON

When clicked, deletes the existing speed limit and creates (or updates) the temporary flight plan.

CMS PANEL

CMS Panel

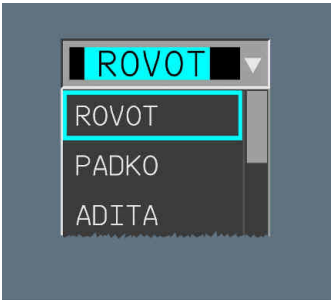


CMS MESSAGE AREA

The CMS NOT ALLOWED AT XXXXXXX (XXXXXXX is the revised waypoint ident) label, indicates that the flight crew cannot create a CMS on the revised waypoint.

START WAYPOINT LIST

Start Waypoint List



The flight crew selects the start waypoint in the list, or enters it into the entry field using the keyboard.
The start waypoint list displays all flight plan cruise waypoints down path the aircraft present position.

ENTRY FORMAT

Refer to WAYPOINT Entry Format

MACH ENTRY FIELD

The flight crew enters the Mach value in the entry field.

ENTRY FORMAT

Refer to MACH Entry Format

END WAYPOINT LIST

End Waypoint List



The flight crew selects the end waypoint in the list, or enters it into the entry field using the keyboard.
The end waypoint list displays all flight plan cruise waypoints down path the selected start waypoint.

ENTRY FORMAT

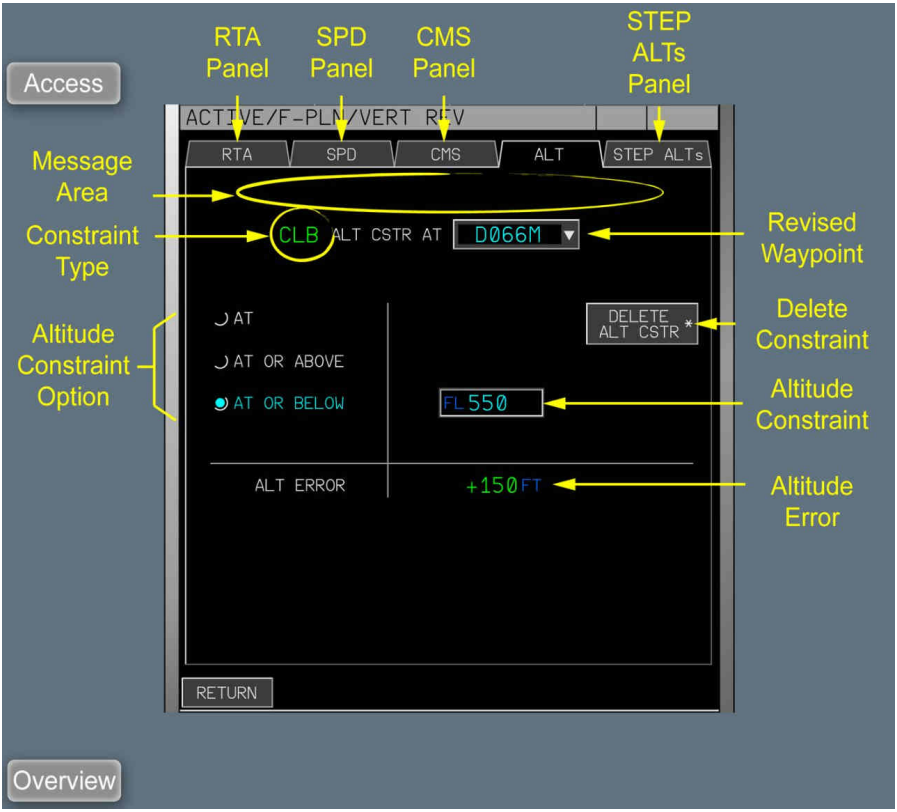
Refer to WAYPOINT Entry Format

DELETE CMS BUTTON

When clicked, deletes the existing CMS and creates (or updates) the temporary flight plan.

ALT PANEL

ALT Panel



ALTITUDE CONSTRAINT MESSAGE AREA

This area may display one of the following labels:

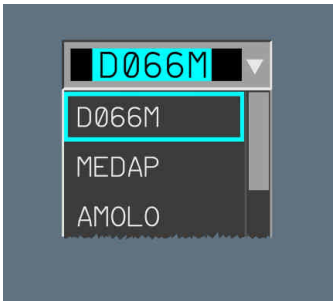
- ALT CSTR NOT ALLOWED AT XXXXXXX (XXXXXXX is the revised waypoint ident):
  Indicates that the flight crew cannot create an altitude constraint on the revised waypoint.
- TOO STEEP PATH AHEAD:
  Indicates that the revised waypoint is part of a too steep path segment.

ALTITUDE CONSTRAINT TYPE

Indicates whether the constraint is a climb (CLB) or descent (DES) altitude constraint.
If the FMS cannot determine the type of constraint, the CLB/DES option is displayed. This option allows the flight crew to select the desired altitude constraint type. (*Refer to CLB/DES Option*)

REVISED WAYPOINT LIST

Waypoint List



The flight crew selects the waypoint in the list, or enters it into the entry field using the keyboard.
The list displays all possible waypoints, on which an altitude constraint can be defined.

L2 By default, the revised waypoint is selected.

L1 **ENTRY FORMAT**

Refer to WAYPOINT Entry Format

ALTITUDE CONSTRAINT OPTION

The flight crew selects the type of altitude constraint:
- AT
- AT or ABOVE
- AT or BELOW

When one of these three options is selected, the associated entry field is displayed.
The navigation database may have a window altitude constraint associated with the revised waypoint. The flight crew cannot manually create a window altitude constraint.
If there is one, the window constraint is selected by default.

Note: After selecting an AT, AT OR ABOVE, or AT OR BELOW constraint, the flight crew cannot select the window constraint again.

Window Altitude Constraint



ALTITUDE CONSTRAINT ENTRY FIELD

The flight crew enters the altitude constraint in the entry field.

ENTRY FORMAT

Refer to ALT Entry Format

CLB/DES OPTION

With the CLB/DES option, the flight crew selects whether the constraint is a climb, or descent altitude constraint.

CLB/DES Option



This option is only displayed if the FMS cannot determine the altitude constraint type by itself.

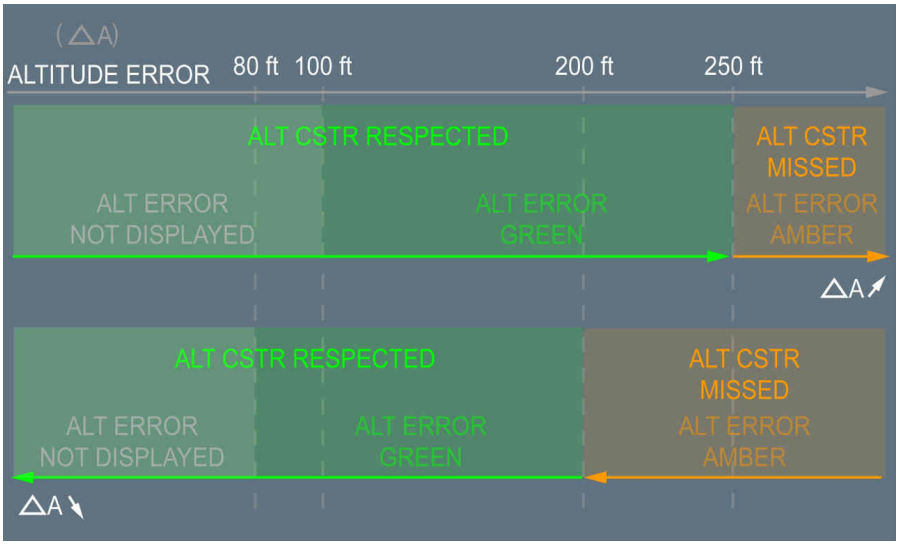
ALTITUDE ERROR

Indicates the altitude difference between the altitude constraint value and the predicted altitude value on the waypoint (ALT ERROR = Predicted Altitude - Altitude Constraint):

- If the altitude error is positive: the aircraft will be higher than the requested AT, AT or BELOW, or WINDOW constraint
- If the altitude error is negative: the aircraft will be lower than the requested AT, AT or ABOVE, or WINDOW constraint

L2 Following figure gives the display and color logic of the altitude error:

Altitude Error Display

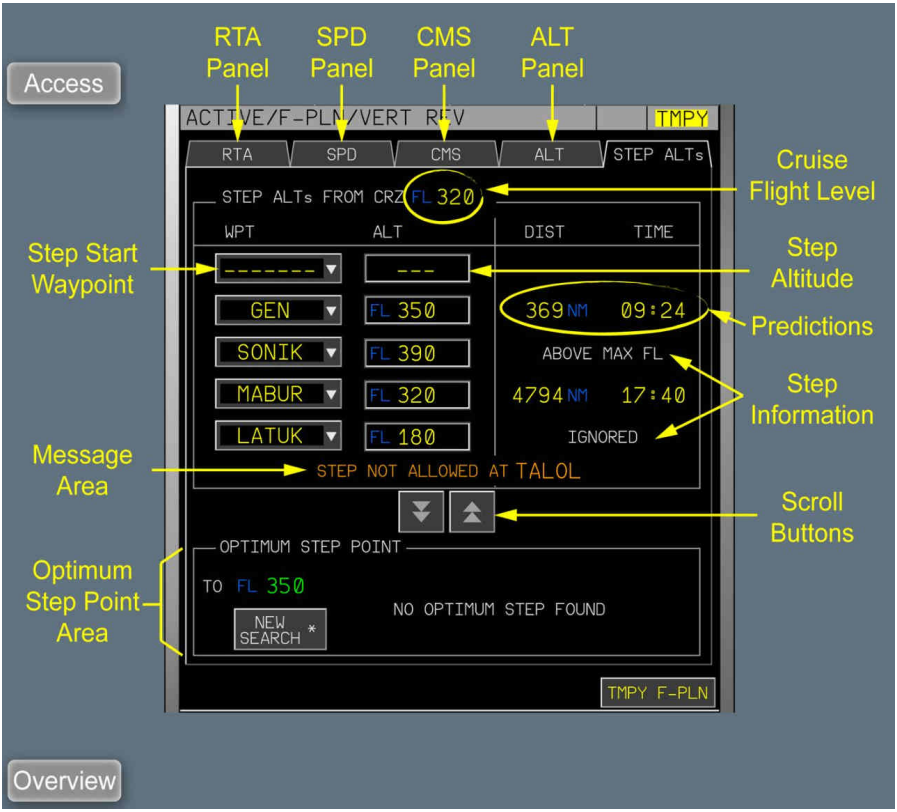


DELETE ALTITUDE CONSTRAINT BUTTON

When clicked, deletes the existing altitude constraint and creates (or updates) the temporary flight plan.

STEP ALT s PANEL

STEP ALTs Panel

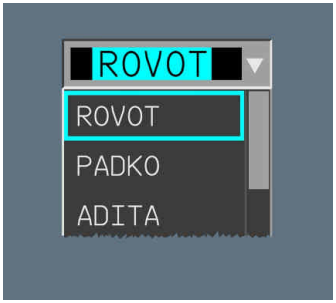


CRUISE FLIGHT LEVEL

Indicates the cruise flight level of the active flight plan.

STEP START WAYPOINT LIST

Start Waypoint



The flight crew selects the start waypoint in the list, or enters it into the entry field using the keyboard.
The start waypoint list displays all flight plan cruise waypoints down path the aircraft present position.
The default start waypoint for a new step is the revised waypoint.
When the flight crew has selected the optimum step point, the entry field displays OPT.

ENTRY FORMAT

Refer to WAYPOINT Entry Format
The flight crew can enter a place / distance, only when the flight crew has already entered a step altitude on the same line.
Refer to PLACE/DISTANCE Entry Format

ALTITUDE ENTRY FIELD

The flight crew enters the step altitude in the entry field.

ENTRY FORMAT

Refer to ALT Entry Format

STEP INFORMATION LABEL

Indicates that the step is ignored, or that the entered step is above the recommended maximum flight level.

L2 A step is ignored, when:
- The step end waypoint (the point of reaching the step altitude), is nearer than 50 nm to the T/D, or
- The step start point, or the step end waypoint, is located before the T/C or after the T/D.

Ignored steps are not deleted, but are ignored for the computation of predictions. An ignored step is not indicated in the flight plan on the MFD or the ND, but remains displayed on the STEP ALTs panel on the VERT REV page.
An ignored step may become a predicted step again, after a flight plan change.

DISTANCE AND TIME PREDICTIONS

Indicate:
- The distance to the step start waypoint, along the flight plan
- The estimated time of arrival (or flight time) at the step start waypoint.

SCROLL BUTTONS

The flight crew uses the scroll buttons to move, page by page, downwards (upwards) through the list of step altitudes.

STEP ALTS MESSAGE AREA

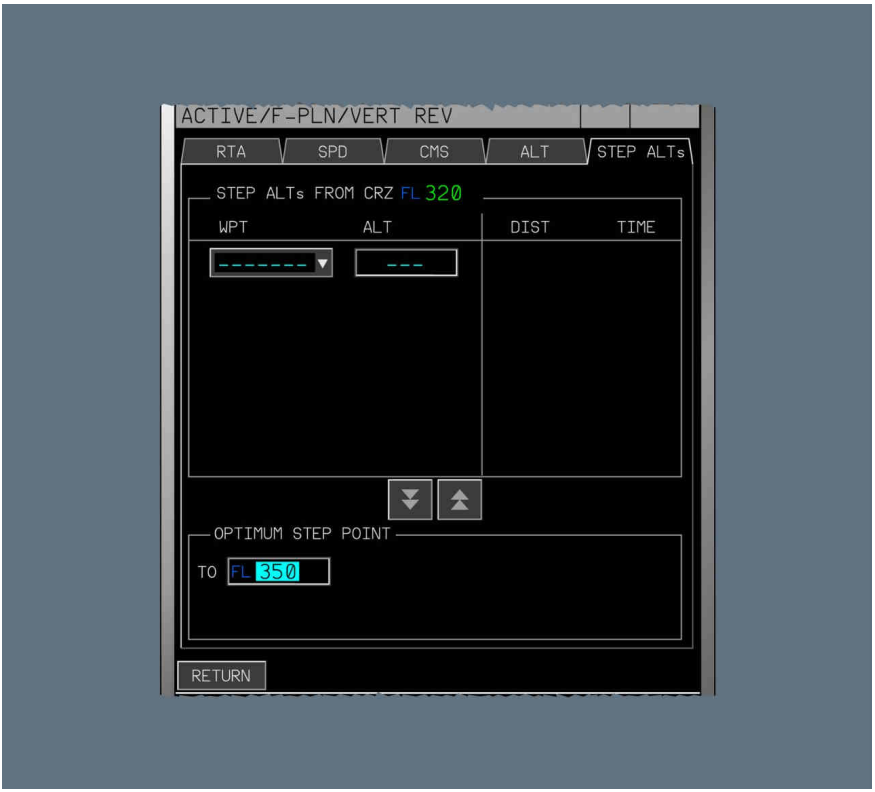
The STEP NOT ALLOWED AT XXXXXXX (XXXXXXX is the revised waypoint ident) label, indicates that the flight crew cannot create a step altitude on the revised waypoint.

OPTIMUM STEP POINT AREA

NO STEP IN THE FLIGHT PLAN

When no step exists in the flight plan, this area displays an altitude entry field:

Step Altitude Entry



The flight crew enters the step altitude for which he wants to compute the optimum step point. (*Refer to ALT Entry Format*)

Note: *The entered step altitude needs to be at least 100 ft above the current cruise flight level.*

When a valid step altitude is entered, the FMS computes the optimum step point and displays the predictions:

Note: *During the optimum step point computation, the optimum step point area displays NO OPTIMUM STEP POINT.*

Optimum Step Point



Distance and Time Predictions

Indicates the distance along the flight plan to the optimum step point, and the time of arrival (or flight time) at the optimum step point.

L2 These predictions are not displayed when the optimum step point is inserted in the active (or temporary flight plan).

L1 Fuel and Time Savings

Indicate the savings that would be made, if the step climb with optimum step point was inserted in the flight plan.
A minus sign means that there will be a fuel, or time saving.
A plus sign means that there will be an additional fuel, or time, cost.

Select / Update Button

When clicked if the button displays SELECT, inserts the optimum step point in the temporary flight plan, and displays the OPTIMUM SELECTED label.

Optimum Selected

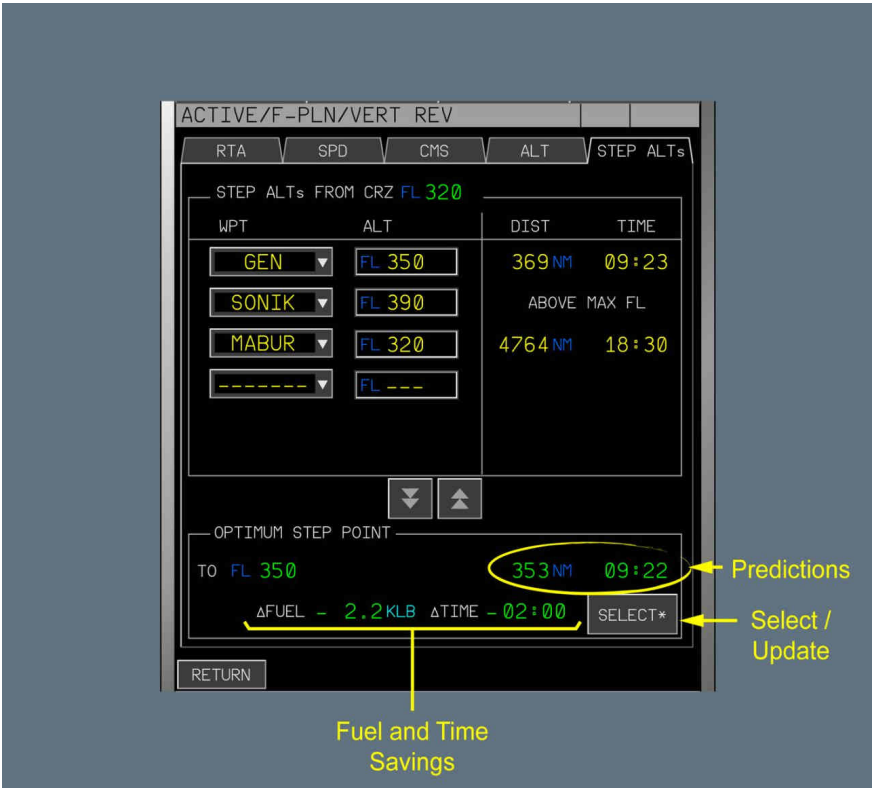


When clicked if the button displays UPDATE, the FMS will compute again the optimum step point. When the computation results in a new optimum step point, the flight crew has to click on the SELECT button to insert it in the temporary flight plan.

THE FLIGHT PLAN HAS AT LEAST ONE STEP

When the next down path step in the flight plan is a step climb, the FMS computes the optimum step point for this step, and displays the predictions:

Optimum Step Point



Step Altitude

Indicates the climb step altitude of the computed optimum step point.

Distance and Time Predictions

Indicates the distance along the flight plan to the optimum step point, and the time of arrival (or flight time) at the optimum step point.

L2 These predictions are not displayed when the optimum step point is inserted in the active (or temporary flight plan).

L1 Fuel and Time Savings

Indicate the savings that would be made, if the step climb was initiated at the optimum step, instead of at the start waypoint entered by the flight crew.

A minus sign means that there will be a fuel, or time saving.
A plus sign means that there will be an additional fuel, or time, cost.

Select / Update Button

When clicked if the button displays SELECT, inserts the optimum step point in the temporary flight plan, and displays the OPTIMUM SELECTED label.

Optimum Selected

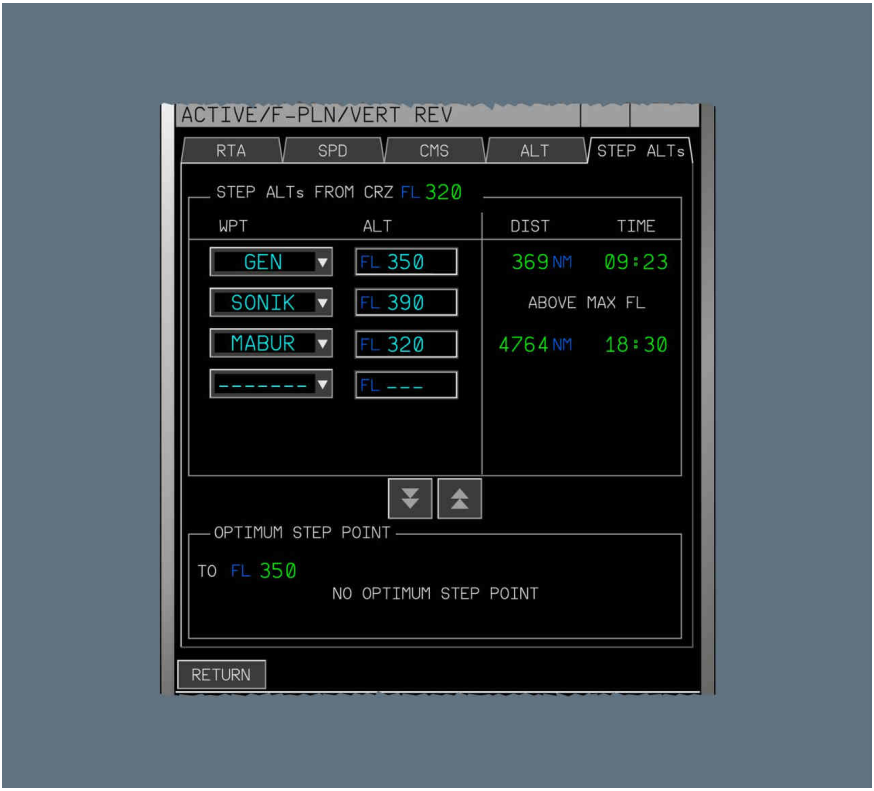


When clicked if the button displays UPDATE, the FMS will compute again the optimum step point. When the computation results in a new optimum step point, the flight crew has to click on the SELECT button to insert it in the temporary flight plan.

NO OPTIMUM STEP

If no optimum step point exists, or when the FMS is computing the optimum step point, the NO OPTIMUM STEP POINT label appears.

NO OPTIMUM STEP POINT



If a time constraint exists in the flight plan, the FMS cannot compute the optimum step point. In this case, the OPTIMUM NOT AVAIL: RTA EXISTING label appears.

RTA EXISTING



WIND PAGE

Applicable to: ALL

WIND Page — Overview



PURPOSE

On the WIND page, the flight crew can:

- Insert climb, cruise, and descent winds
- Insert cruise temperatures
- Insert the alternate trip wind
- Insert (or clear) the received company wind data.

The WIND page is available for the active and secondary flight plans.

LINKS

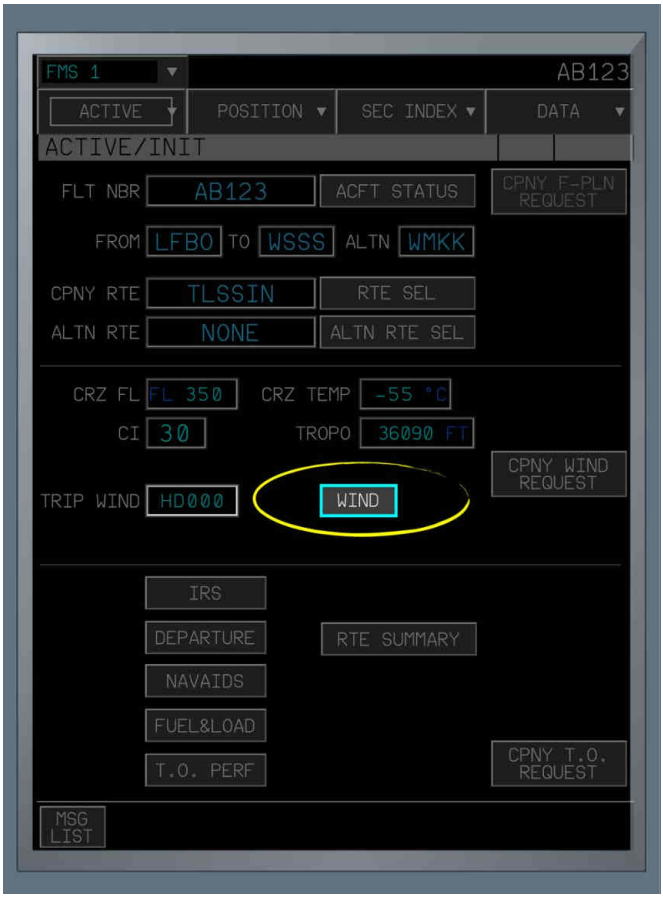
Refer to More Information on the WIND Revision

ACCESS

The flight crew can access the WIND page, via:

- The INIT page, by clicking on the Wind button

Wind Button on the INIT Page



- The F-PLN page, by:
  - Clicking directly on the wind prediction, associated to the waypoint

Wind Prediction on the F-PLN Page



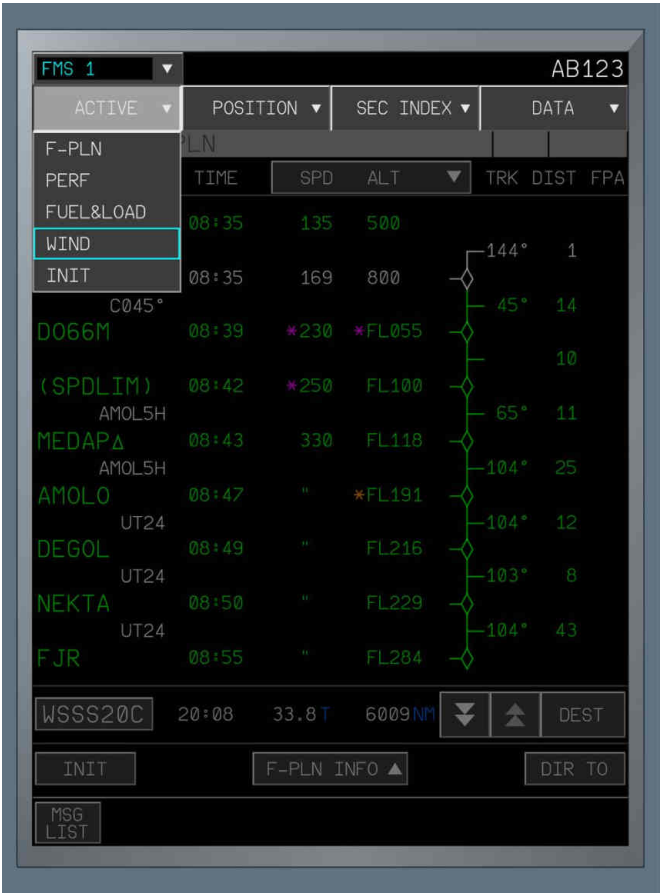
- Selecting the WIND revision in the waypoint revisions menu on any waypoint.

Revisions Menu on the F-PLN Page



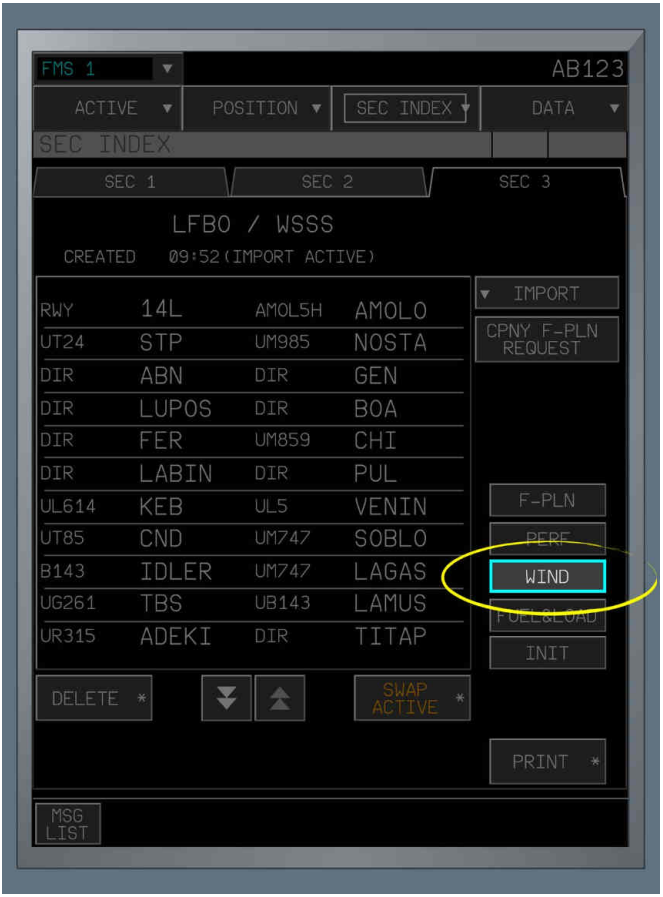
- The General Menu Bar, by selecting the WIND option from the ACTIVE menu.

General Menu Bar



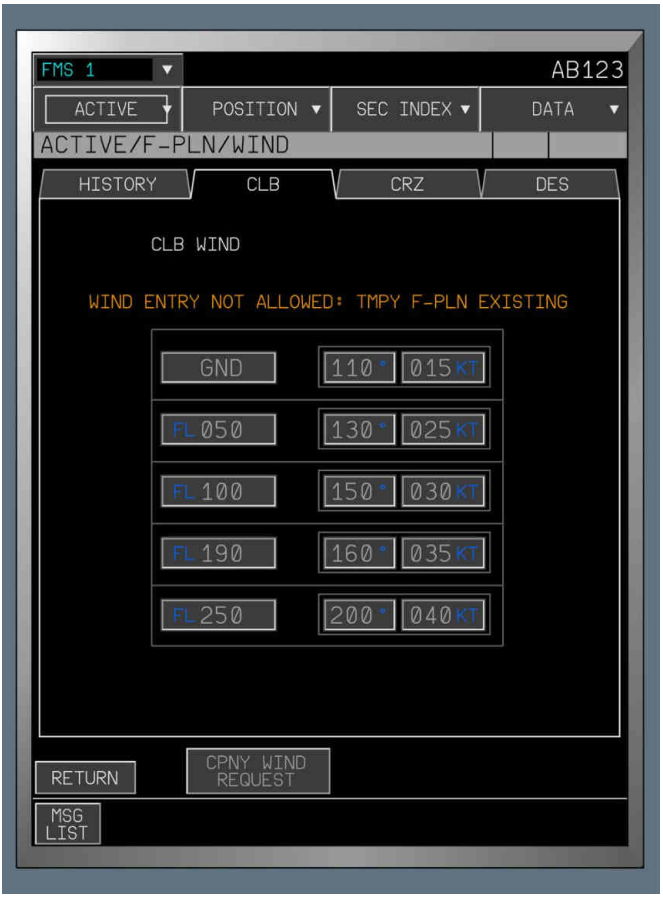
Note: *For the secondary flight plans, the flight crew can access the WIND page via the SEC / INIT or SEC / F-PLN page, or via the SEC INDEX page, by clicking on the WIND button.*

SEC INDEX Page



L2 When a temporary flight plan is pending, the flight crew cannot enter or change any wind data. In that case, the flight crew can still access the wind page. However, the entry fields cannot be selected and the WIND page displays WIND ENTRY NOT ALLOWED : TMPY F-PLN EXISTING.

WIND ENTRY NOT ALLOWED



RETURN BUTTON

When clicked, displays the page that was displayed before the WIND page.
The return button is not displayed, if the flight crew has accessed the WIND page via the General Menu Bar.

COMPANY WIND REQUEST BUTTON

When clicked, sends via ACARS a company wind request to the company ground station.

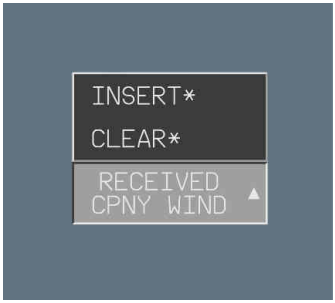
If the Free Text AMI option is activated, clicking on the CPNY WIND REQUEST button will display the COMPANY WIND DATA REQUEST page. (*Refer to Page*)
On this page, the flight crew can enter any free text that will be sent with the wind request.
When an active wind request is pending, the button displays REQUEST PENDING ... . The button gives still access to the COMPANY WIND DATA REQUEST page.

REQUEST PENDING ...



When company wind data is received, the button displays RECEIVED CPNY WIND. When clicked, opens a menu that allows the flight crew to insert, or clear the received company wind.

RECEIVED CPNY WIND



INSERT WIND BUTTON

When clicked, inserts the draft climb, cruise, and descent winds and temperatures.
Insertion, change, or deletion of wind data, creates a set of draft winds. The draft winds are not considered for predictions computation before they are inserted.
The Draft Wind label indicates that a set of draft winds exists.

Note: When draft winds are pending and a temporary flight plan is created (by a flight plan revision, other than the WIND revision), the draft winds are inserted automatically in the active (and temporary) flight plan.

CANCEL WIND BUTTON

When clicked, cancels the draft climb, cruise, and descent winds and temperatures. After cancelling the draft winds, the WIND page displays the inserted winds that were considered before the wind update.
Insertion, change, or deletion of wind data, creates a set of draft winds. The draft winds are not considered for predictions computation before they are inserted.
The Draft Wind label indicates that a set of draft winds exists.

Note: When draft winds are pending and a temporary flight plan is created (by a flight plan revision, other than the WIND revision), the draft winds are inserted automatically in the active (and temporary) flight plan.

HISTORY WINDS

The history winds are the stored descent winds of the previous flight.
Winds are measured, and stored for the CRZ FL, FL 250 , FL 150 , and FL 050 .
The wind format is: Wind Direction (True North Reference) / Wind Velocity (knots).
In preflight, the flight crew can insert the history winds of the previous flight as the climb winds for the next flight, with the Insert History Wind button. (*Refer to Button*)
L2 The history winds are only available for the active flight plan.

INSERT HISTORY WIND BUTTON

When clicked, inserts the history winds as the climb winds of the active flight plan, and displays the CLB panel of the WIND page.

Note:
- *Insertion of the history winds does not create draft climb winds. The winds are directly inserted in the active flight plan.*
- *The flight crew cannot insert the history winds when draft winds, or a temporary flight plan are pending.*

CLIMB WIND ENTRY FIELDS

Indicate the wind direction and velocity, associated to (maximum) 5 altitudes or flight levels.
Inserted history winds are displayed in small font.
Inserted company wind uplinks, and wind data entered by the flight crew are displayed in big font.

L2 The climb winds can only be entered, or changed:
- In preflight, and
- When no temporary flight plan is pending.

L1 **WIND ALTITUDE**

Indicates a climb altitude:
- In feet, if the altitude is below the transition altitude
- In flight level, if the altitude is above the transition altitude.

The flight crew can enter a ground wind, by entering an altitude less than 400 ft , or by entering "GND" in the entry field.
Refer to WIND ALTITUDE ENTRY FORMAT

WIND DIRECTION AND VELOCITY

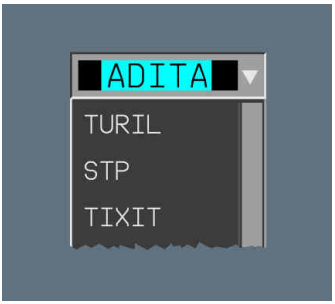
Indicates the wind direction (True North Reference), and the wind velocity (knots).
Refer to WIND DIRECTION ENTRY FORMAT
Refer to WIND VELOCITY ENTRY FORMAT

DRAFT WIND LABEL

Indicates (on the CLB, CRZ, and DES panel) that draft winds are pending.
Insertion, change, or deletion of wind data, creates a set of draft winds. The draft winds are not considered for predictions computation before they are inserted.

CRUISE WAYPOINT LIST

Cruise Waypoint List



Displays all cruise waypoints of the primary flight plan (between T/C and T/D).
The flight crew selects in the list the cruise waypoint for which he wants to display, and/or change the wind and temperature data.

WAYPOINT SCROLL BUTTONS

The flight crew uses the scroll down (or up) button to display the wind and temperature data of the next down path (or previous up path) cruise waypoint, without opening the cruise waypoint list.

Note: When the cursor is on the CRZ panel of the WIND page, the wheel of the KCCU has the same functionality as the scroll buttons: Scrolling down (or up) the wheel displays the next down path (or previous up path) cruise waypoint and its wind data.

CRUISE WIND ENTRY FIELDS

Indicate the wind direction and velocity, associated to a maximum of 4 flight levels.

L2 The cruise winds can only be entered if no temporary flight plan is pending.

L1 WIND ALTITUDE

Indicates a cruise flight level.
When the flight crew enters an altitude, the altitude is propagated to all (up-path and down-path) cruise waypoints. The flight crew can only change this altitude on the waypoint that it was defined on, and not on the waypoints where the altitude was propagated. If the waypoint is sequenced, the flight crew can change the altitude value on the next down-path waypoint.
Refer to WIND ALTITUDE Entry Format

WIND DIRECTION AND VELOCITY

Indicates the wind direction (True North Reference), and the wind velocity in knots.
When the flight crew enters a wind direction and velocity, they are propagated to the down-path cruise waypoints until the waypoint for which the flight crew has entered different wind data for the same flight level.
The flight crew can always change, but not clear, propagated wind data.
Propagated wind data is displayed in small font. Flight crew-entered wind data is displayed in big font.
Refer to WIND DIRECTION Entry Format
Refer to WIND VELOCITY Entry Format

EXAMPLE

STEP1: The flight crew enters a wind altitude, direction, and velocity at ADITA:
- The wind altitude (FL 320) is propagated to all waypoints, and this altitude can only be changed at ADITA
- The wind direction, and velocity (320 ° / 050 kt) are propagated to all down-path waypoints, and can be changed at all down-path waypoints

STEP 1



STEP 2: The flight crew changes the propagated wind at STP: The new wind direction, and velocity (315 ° / 055 kt) are propagated to all down-path waypoints, and can be changed at all down-path waypoints.

STEP 2



STEP 3: The flight crew enters a wind altitude, direction, and velocity at TURIL:

- The wind altitude (FL 290) is propagated to all waypoints, and this altitude can only be changed at TURIL
- The wind direction, and velocity (300 ° / 035 kt) are propagated to all down-path waypoints, and can be changed at all down-path waypoints

STEP 3



STEP 4: The aircraft sequences ADITA: The wind altitude (FL 320), that was entered at ADITA can now be changed at TURIL.

STEP 4



SAT ENTRY FIELDS

Indicates a flight level, and its associated Static Air Temperature (SAT).
The flight crew enters the altitude and SAT to define a temperature profile for predictions computation.

L2 The FMS defines an estimated temperature profile based on the difference between a reference temperature profile, and a measured or entered Static Air Temperature (SAT) at different altitudes.
The reference temperature profile is defined by the tropopause altitude that is entered on the INIT page. The default tropopause altitude is the ISA tropopause.
The flight crew defines the deviation from the reference temperature profile, for the cruise waypoints, by entering the SAT associated to an altitude.

L1 The temperature is propagated to the down path cruise waypoints in the same manner as the wind data.

ENTRY FORMAT

Refer to SAT ALTITUDE ENTRY FORMAT
Refer to SAT ENTRY FORMAT

DESCENT WIND ENTRY FIELDS

Indicate the wind direction and velocity, associated to (maximum 5) altitudes or flight levels.

L2 The descent winds can only be entered, or changed:
- Before the DESCENT flight phase, and
- When no temporary flight plan is pending.

L1 **WIND ALTITUDE**

Indicates the descent altitude:
- In feet, if the altitude is below the transition altitude
- In flight level, if the altitude is above the transition altitude.

The flight crew can enter a ground wind, by entering an altitude less than 400 ft , or by entering "GND" in the entry field.
Refer to WIND ALTITUDE ENTRY FORMAT

WIND DIRECTION AND VELOCITY

Indicates the wind direction (True North Reference), and the wind velocity (knots).
Refer to WIND DIRECTION ENTRY FORMAT
Refer to WIND VELOCITY ENTRY FORMAT

ALTERNATE CRUISE ALTITUDE

Indicates the alternate cruise flight level.
If the alternate flight plan distance is less than 200 nm, the alternate cruise flight level is FL 220. If the alternate flight plan distance is 200 nm or more, the alternate cruise flight level is FL 310.
The flight crew cannot change the alternate cruise flight level.

ALTERNATE TRIP WIND ENTRY FIELDS

Indicate the alternate trip wind direction (True North Reference) and velocity (knots).
L2 The alternate wind can only be entered if no temporary flight plan is pending.

L1 **ENTRY FORMAT**

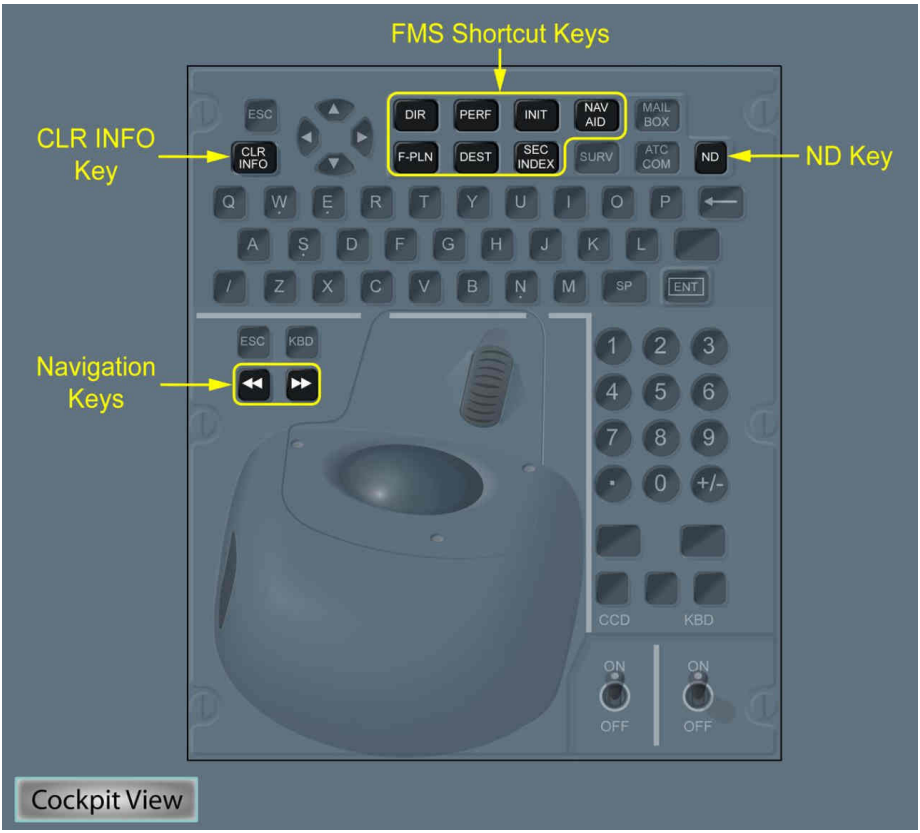
Refer to WIND DIRECTION Entry Format
Refer to WIND VELOCITY Entry Format

Intentionally left blank

FMS DEDICATED KCCU CONTROLS

Applicable to: ALL

FMS Dedicated KCCU Controls



There are two Keyboard and Cursor Control Units (KCCU s) on the center pedestal. There is one for the Captain and one for the First Officer.

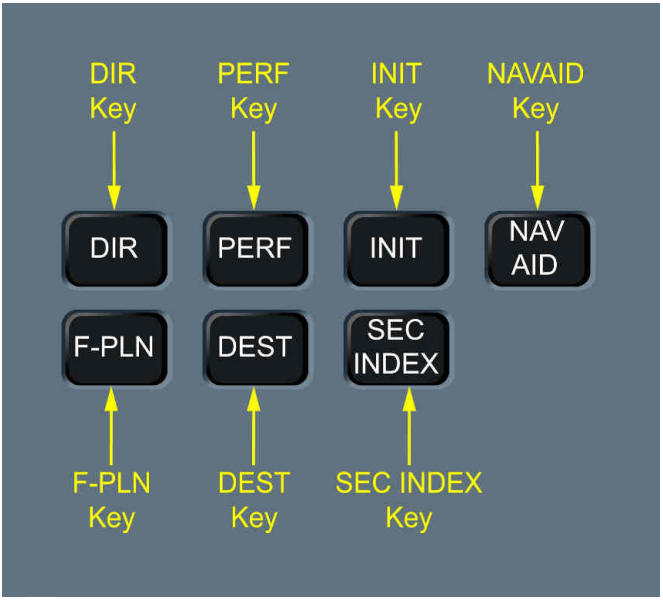
The flight crew uses the Keyboard and Cursor Control Unit (KCCU) to:

- Navigate through the FMS pages on the MFD
- Enter and modify data on the MFD FMS pages
- Perform some flight-plan revisions on the lateral ND .

The FMS dedicated KCCU controls are:
- The FMS shortcut keys
- The CLR INFO key
- The ND key
- The Navigation keys

For information on all KCCU controls, *Refer to Indicating/Recording - KCCU* .

FMS Shortcut Keys



DIR KEY



When pressed:
- Displays the FMS DIRECT TO page on the MFD (*Refer to FMS - DIRECT TO page*)
- Moves the cursor back to the MFD if it was on an other display before.

PERF KEY



When pressed:

- Displays the FMS ACTIVE / PERF page (on the panel that corresponds to the active flight phase) on the MFD (*Refer to FMS - PERF page*)
- Moves the cursor back to the MFD if it was on an other display before.

INIT KEY



When pressed:

- Displays the FMS ACTIVE / INIT page on the MFD (*Refer to FMS - INIT page*)
- Moves the cursor back to the MFD if it was on an other display before.

NAVAID KEY



When pressed:

- Displays the FMS POSITION / NAVAIDS page on the MFD (*Refer to POSITION / NAVAIDS page*)
- Moves back the cursor to the MFD if it was on an other display before.

F-PLN KEY



When pressed:

- Displays the top of the flight plan on the FMS ACTIVE / F-PLN page on the MFD , (*Refer to FMS - F-PLN page*)
- Moves the cursor back to the MFD if it was on an other display (ND , or ATC Mailbox) before.

DEST KEY



When pressed:

- Displays the bottom of the primary flight plan on the FMS ACTIVE / F-PLN page on the MFD (*Refer to FMS - F-PLN page*)
- Moves the cursor back to the MFD if it was on an other display before.

SEC INDEX KEY



When pressed:

- Displays the FMS SEC / INDEX page on the MFD (*Refer to FMS - SEC / INDEX page*)
- Moves the cursor back to the MFD if it was on an other display before.

CLR INFO KEY



When pressed, clears the message that is currently displayed in the FMS Message Area. (*Refer to Message Area)*

Note: This key is also used to clear the ATC COM , and SURV messages.

ND KEY



When pressed, moves the cursor to the ND.

NAVIGATION KEYS

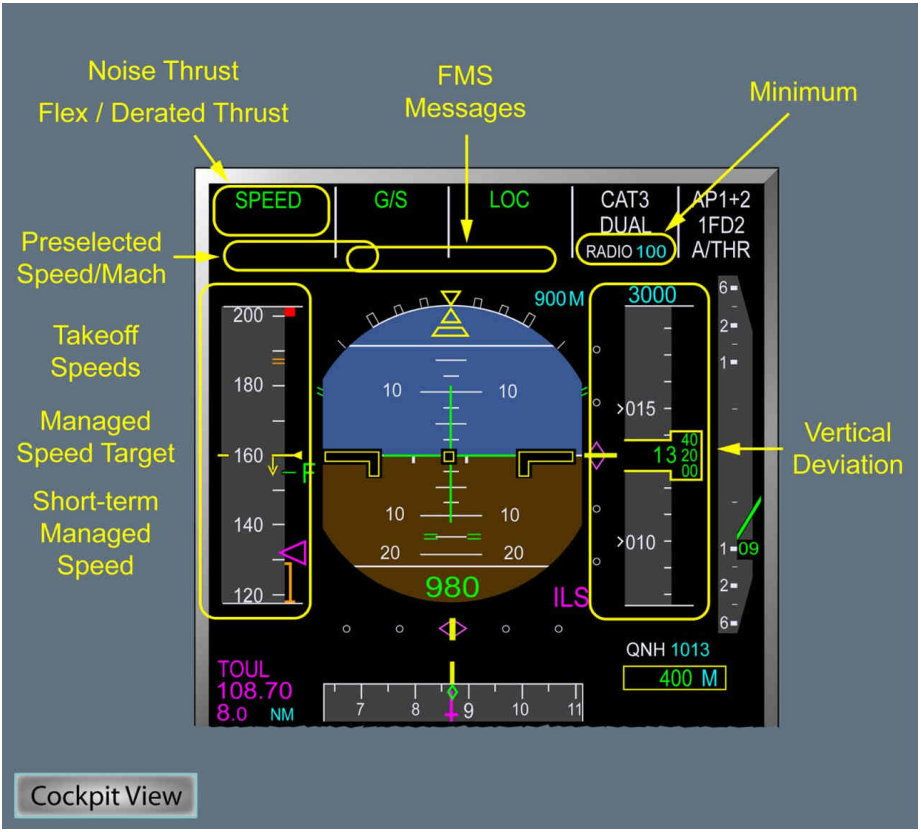


Moves the cursor to the display unit that is to the right, or to the left, of the one that is currently selected (if applicable).

FMS DATA ON PFD

Applicable to: ALL

FMS Data on PFD



FMS MESSAGES

Applicable to: ALL

FMS MESSAGES

The third line of the Flight Mode Annunciator (FMA) may display the following FMS messages:

- *Refer to CHECK APPR SEL*
- *Refer to CHECK EO SPD SETTING*

- *Refer to EXTEND SPD BRK*
- *Refer to RETRACT SPD BRK*
- *Refer to SET HOLD SPD*
- *Refer to T/D REACHED* .

MINIMUM

Applicable to: ALL

MINIMUM

Minimum



Indicates the approach minimum value, as entered on the APPR panel of the PERF page. (*Refer to Page*)
If the flight crew has not defined a minimum, the FMA displays NO DH.

L2 Appears when the aircraft is in:
- CRZ $_{phase}$, and less than 250 nm from the destination
- DES $_{phase}$
- APPR $_{phase}$
- GA $_{phase}$.

PRESELECTED SPEED/MACH

Applicable to: ALL

PRESELECTED SPEED/MACH

Preselected Speed/Mach



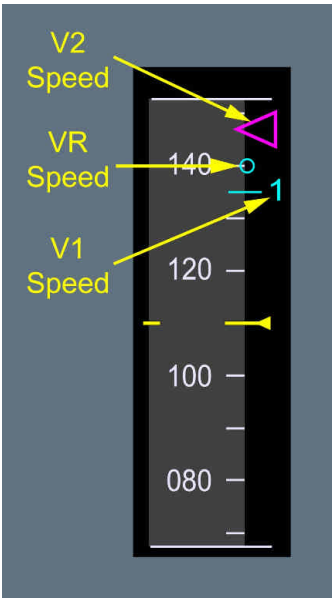
The FMA displays the preselected speed (or Mach), as entered on the CLB, or CRZ panel of the PERF page. (*Refer to PERF page*)

TAKEOFF SPEEDS

Applicable to: ALL

TAKEOFF SPEEDS

Takeoff Speeds on PFD



The airspeed scale displays V1, VR, and V2, as entered on the T.O panel of the PERF page.
For more information, *Refer to Airspeed indications during takeoff* .

MANAGED SPEED TARGET

Applicable to: ALL

MANAGED SPEED TARGET



The FMS computes the managed speed target, and displays it as a magenta triangle on the PFD airspeed scale.

For more information on the FMS managed speed profile, *Refer to Speed Profile* .

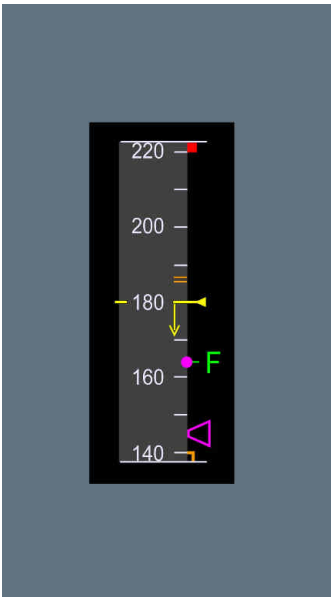
Fore more information on the managed speed/Mach behavior, *Refer to Flight Guidance - Managed Speed/MachTarget* .

SHORT-TERM MANAGED SPEED

Applicable to: ALL

SHORT-TERM MANAGED SPEED

Short-Term Managed Speed

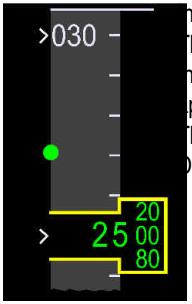


The FMS computes the short-term managed speed, and displays it as a magenta dot on the PFD airspeed scale.
For more information, *Refer to Short-term managed speed* .

VERTICAL DEVIATION

Applicable to: ALL

VERTICAL DEVIATION



ndicates the vertical deviation.
The FMS computes the difference between the current aircraft altitude, and he altitude where the aircraft would be, if it was on the theoretical descent or pproach path.
The flight crew can consult the numeric value of the vertical deviation on the ES and APPR panel of the ACTIVE / PERF page. (*Refer to PERF page*)

L2 The PFD displays the vertical deviation, when:
- The aircraft reaches the Top of Descent (T/D), or
- The FMS flight phase is DESCENT, or APPROACH.

Note: *When the aircraft is in a holding pattern (with manual exit), the vertical deviation is the difference between the altitude of the aircraft, and the altitude of the holding exit: Refer to DSC-22-FMS-10-40-50-22FMS4030G HOLD - Purpose .*

NOISE THRUST

Applicable to: ALL

NOISE THRUST

Noise Thrust



While flying a noise abatement departure procedure, and if the noise thrust is applied, the Flight Mode Annunciator (FMA) displays the percentage of N1.

The flight crew enters the noise thrust on the T.O, or CLB panel, of the PERF page. (*Refer to PERF page*)

FLEX/DERATED

Applicable to: ALL

FLEX / DERATED

Flex / Derated



Indicates when the engines apply a flex or derated thrust. When the engines apply a flex thrust, the FMA also displays the flex temperature.
The flight crew sets a flex, or derated thrust on the T.O panel of the PERF page. (*Refer to Page*)

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ND

Applicable to: ALL

For more information:

- On the FMS data on the ND, *Refer to DSC-31-20-30-80-GFMSD FMS Data Overview* ,
- On the interactive ND, *Refer to DSC-31-20-30-90 Interactive ND Overview* .

Intentionally left blank

VD

Applicable to: ALL

For more information on the VD , *Refer to DSC-31-20-40-10-GVERT Overview*

Intentionally left blank

EFIS CP

Applicable to: ALL

For more information on the EFIS CP, *Refer to DSC-31-20-50-GEFIS EFIS Control Panel*

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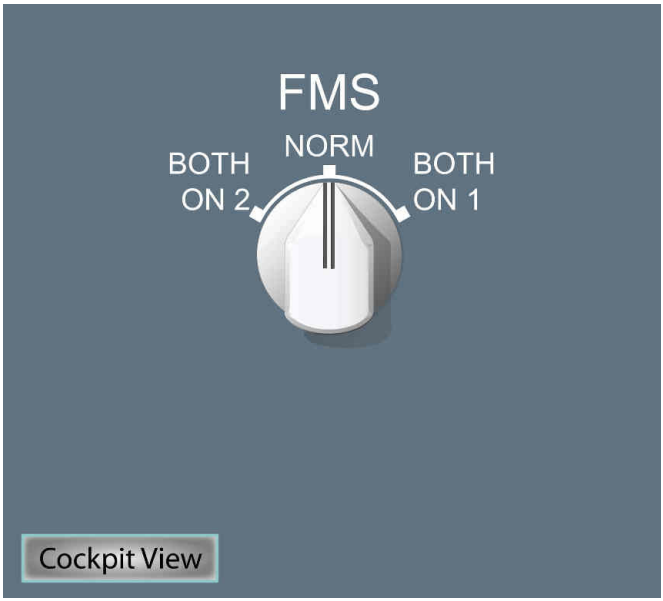
FMS SELECTOR

Applicable to: ALL

FMS selector



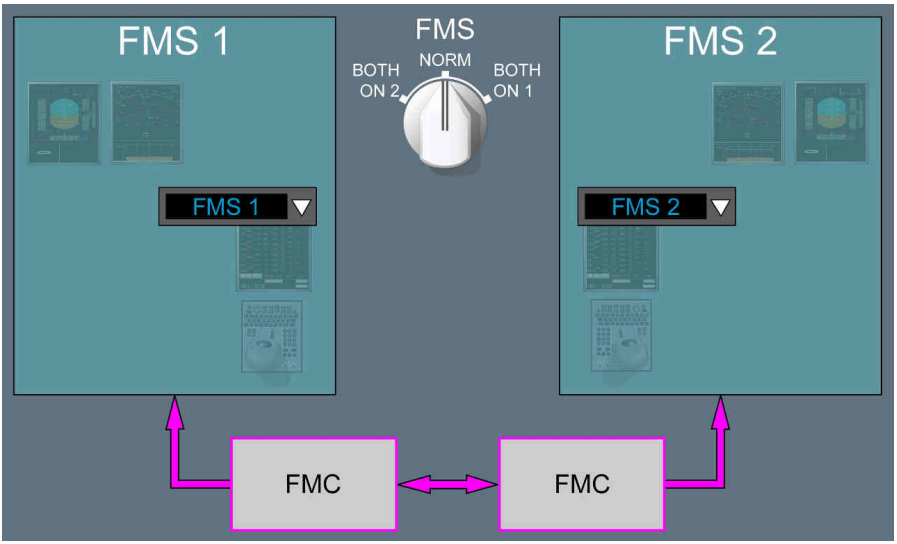
The FMS selector enables the flight crew to provide the flight management interfaces of both sides with data of the FMC on the Captain's side (when selecting BOTH ON 1), or with data of the FMC on the First Officer's side (when selecting BOTH ON 2).
The selector is used when FMS 1, or FMS 2 is failed.
Refer to Two FMC s FAULT (SINGLE Mode)

Note: The use of the selector has no influence on the weather and terrain data display.

NORM

When the FMS selector is set to NORM, each active FMC provides data to the onside flight management interfaces.

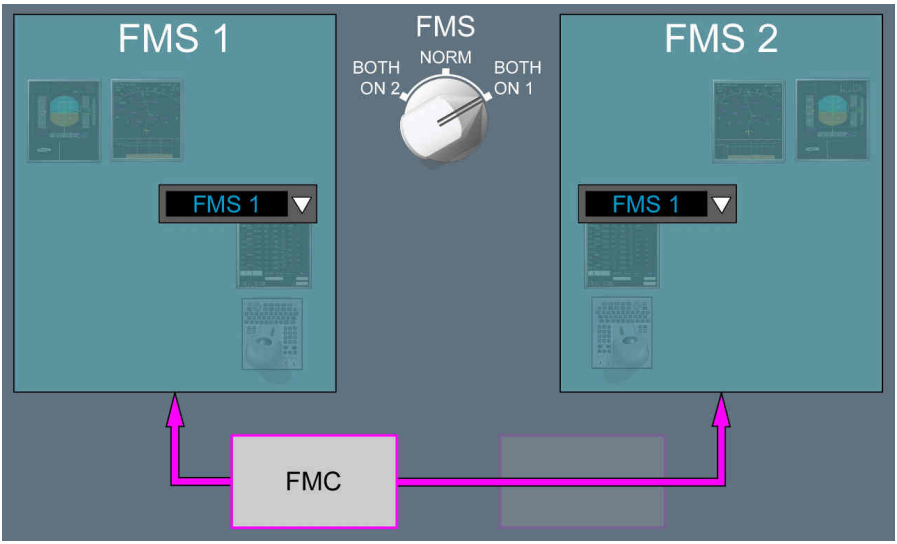
FMS selector set to NORM



BOTH ON 1

When the flight crew sets the FMS selector to BOTH ON 1, the active FMC on the Captain's side provides data to the flight management interfaces of both sides.

FMS selector set to BOTH ON 1



- The First Officer's MFD displays the ACTIVE / F-PLN page.
  The MFD System Menu displays the same label as on the Captain's MFD. This indicates that both sides display data, provided by the same FMC.
- The First Officer's ND displays the OFFSIDE FM CONTROL label: This message indicates that the active FMC on the Captain's side provides the FMS data for the First Officer's side.
- On the First Officer's EFIS CP, the flight crew can no longer select:
  - The FMS display options: CSTR, WPT, VORD, NDB, and ARPT
  - The ND mode (except the ROSE-VOR, and ROSE-LS modes)
  - The ND range (except the ZOOM position).

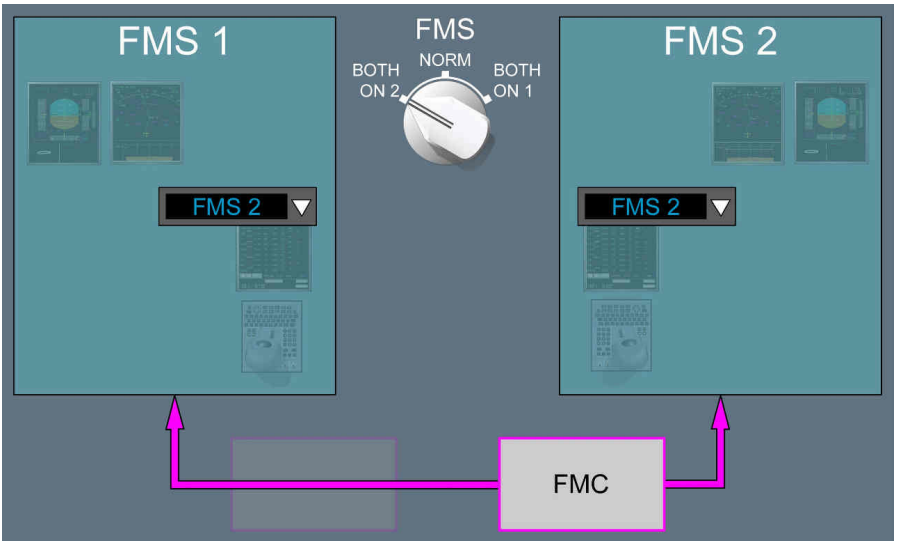
  From now on, these display options are driven by the Captain's EFIS CP.
- The First Officer's ND displays the weather (terrain) data, if the WXR (TERR) option is selected on the First Officer's EFIS CP, and:
  - The First Officer's or Captain's ND is in ROSE-VOR, or ROSE-LS mode, or
  - The Captain's ND is in ROSE-NAV mode, and the range is 80 nm.

  In all other cases, the First Officer's ND displays the WXR RNG (TERR RNG) message.
- The First Officer's VD displays the terrain (weather, if the WXR option is selected on the First Officer's EFIS CP) data, if the Captain's ND is in ROSE-NAV mode, and the range is 80 nm.
  If not, the First Officer's VD displays the TERR INOP (WXR INOP) message.

BOTH ON 2

When the flight crew sets the FMS selector to BOTH ON 2, the active FMC on the First Officer's side provides data for the flight management interfaces of both sides.

FMS selector set to BOTH ON 2



- The Captain's MFD displays the ACTIVE / F-PLN page.
  The MFD System Menu displays the same label as on the First Officer's MFD. This indicates that both sides display data, provided by the same FMC.
- The Captain's ND displays the OFFSIDE FM CONTROL label: This message indicates that the active FMC on the First Officer's side provides the FMS data for the Captain's side.
- On the Captain's EFIS CP, the flight crew can no longer select:
  - The FMS display options: CSTR, WPT, VORD, NDB, and ARPT
  - The ND mode (except the ROSE-VOR, and ROSE-LS modes)
  - The ND range (except the ZOOM position).

  From now on, these display options are driven by the First Officer's EFIS CP.

- The Captain's ND displays the weather (terrain) data, if the WXR (TERR) option is selected on the Captain's EFIS CP, and:
  - The Captain's or First Officer's ND is in ROSE-VOR, or ROSE-LS mode, or
  - The First Officer's ND is in ROSE-NAV mode, and the range is 80 nm.

  In all other cases, the Captain's ND displays the WXR RNG (TERR RNG) message.
- The Captain's VD displays the terrain (weather, if the WXR option is selected on the Captain's EFIS CP) data, if the First Officer's ND is in ROSE-NAV mode, and the range is 80 nm.
  If not, the Captain's VD displays the TERR INOP (WXR INOP) message.

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DATA ENTRY FORMATS

Applicable to: ALL

This chapter lists all data that the flight crew may enter on the MFD and interactive ND.

For each data, the table displays:
- The format

  Note: *Unless otherwise specified, leading and trailing zeros can be omitted.*

- The units
- The range
- The resolution

  Note: *When the flight crew scrolls the data with the cursor control wheel, the resolution is the scroll increment/decrement.*

- The page(s) where the flight crew enters the data.

The following characters are used to indicate the format:
- A: Letters
- T: True reference
- N: Numeric (Numbers)
- X: Alphanumeric (Letters and Numbers).

ACCEL ALT

Applicable to: ALL

Format	NNNNN
Units	FEET MSL (FT) If the flight crew enters 3 characters or less, the FMS considers the entry as a flight level. In this case, the unit of the entry field reverts to FL .
Range	*Min* : Takeoff (or Go Around) runway elevation + 400 ft *Max* : Maximum Certified Altitude (Performance Database)
Resolution	1
Page	PERF page - TO panel PERF page - GA panel *Refer to PERF page*

AIRPORT

Applicable to: ALL

Format	AAAA
Range	Maximum 4 letters
Page	*Refer to CLOSEST AIRPORTS page* *Refer to DATA / AIRPORT page* *Refer to DATA / ROUTE page* *Refer to DATA / WAYPOINT page* *Refer to EQUI-TIME POINT page* *Refer to F-PLN page* *Refer to INIT page* *Refer to POSITION / MONITOR page* Insert Next Waypoint revision, *Refer to F-PLN page* Insert Next Waypoint and Direct To revision on interactive ND, *Refer to Interactive ND*

AIRWAY (VIA)

Applicable to: ALL

Format	XXXXX
Range	Maximum 5 alphanumeric characters
Page	*Refer to AIRWAYS page*

ALT

Applicable to: ALL

Format	NNNNN
Units	FEET MSL (FT) If the flight crew enters 3 characters or less, the FMS considers the entry as a flight level. In this case, the unit of the entry field reverts to FL .
Range	*Min* : 1 ft *Max* : Max Certified Altitude (Performance Database)
Resolution	1
Page	*Refer to VERT REV page - SPD panel* *Refer to VERT REV page - ALT panel* *Refer to VERT REV page - STEP ALTS panel*

ALTN

Applicable to: ALL

Format	AAAA NONE is a valid entry
Range	Maximum 4 letters
Page	*Refer to ALTERNATE page* *Refer to INIT page*

ALTN FUEL

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)
Range	*Min* : 0 lb *Max* : 639 300 lb
Resolution	0.1
Page	*Refer to FUEL&LOAD page*

ALTN RTE

Applicable to: ALL

Format	XXXXXXXXXX NONE is a valid entry
Range	Maximum 10 alphanumeric characters
Page	*Refer to INIT page*

BARO ALTITUDE

Applicable to: ALL

Format	NNNNN
Units	FEET MSL (FT)
Range	*Min* : 1 ft *Max* : Maximum Certified Altitude (Performance Database)
Resolution	1
Page	*Refer to PERF page - APPR panel*

BLOCK (FUEL)

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)

Continued on the following page

Continued from the previous page

Range	*Min* : 0 lb *Max* : 639 300 lb
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

BRG

Applicable to: ALL

Format	NNN
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 360 °
Resolution	1
Page	*Refer to DATA / WAYPOINT page*

CATEGORY (CAT)

Applicable to: ALL

Format	N
Range	*Min* : 1 *Max* : 3
Resolution	1
Page	*Refer to DATA / NAVAID*

CHANNEL (GLS)

Applicable to: ALL

Format	NNNNN
Range	*Min* : 20001 *Max* : 99999
Resolution	1
Page	*Refer to DATA/NAVAID page* *Refer to POSITION/NAVAIDS page*

CI (COST INDEX)

Applicable to: ALL

Format	NNN
Units	KILOGRAM per MINUTE This unit is not displayed.

Continued on the following page

Continued from the previous page

Range	*Min* : 0 *Max* : 999
Resolution	1
Page	*Refer to FUEL&LOAD page* *Refer to INIT page* *Refer to PERF page*

COURSE IN/OUT (CRS IN/OUT)

Applicable to: ALL

Format	NNNB or BNNN NNN: Bearing B: True/Mag Heading reference (default: Mag reference)
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 360 ° *B* : M or nothing for Mag, or T for True
Resolution	1
Page	*Refer to DIRECT TO page*

CPNY RTE

Applicable to: ALL

Format	XXXXXXXXXX
Range	Maximum 10 alphanumeric characters
Page	*Refer to COMPANY F-PLN REQUEST page* *Refer to DATA / ROUTE page* *Refer to INIT page* *Refer to ROUTE SELECTION page*

CRZ FL

Applicable to: ALL

Format	NNN, or FLNNN
Units	FLIGHT LEVEL (FL)
Range	*Min* : 1 *Max* : Maximum Certified Altitude (in feet) / 100 (Performance Database)
Resolution	1
Page	*Refer to INIT page*

CRZ TEMP

Applicable to: ALL

Format	± NN If no sign, FMS assumes -.
Units	DEGREES (°)
Range	*Min* : -99 °C *Max* : 99 °C
Resolution	1
Page	*Refer to INIT page*

DERATED CLB

Applicable to: ALL

Format	NN or NONE
Range	*Min* : 01 *Max* : 05 (The possible DERATED levels are defined in the PERF Database)
Resolution	01
Page	*Refer to PERF page*

DERATED T.O

Applicable to: ALL

Format	DNN
Range	*Min* : D01 *Max* : D09 (The possible DERATED levels are defined in the PERF Database)
Resolution	D01
Page	*Refer to COMPANY T.O DATA REQUEST page* *Refer to PERF page*

DES CABIN RATE

Applicable to: ALL

Format	- NNN If no sign, FMS assumes -.
Units	Feet per Minute (FT/MN)
Range	*Min* : - 100 ft/min *Max* : - 999 ft/min
Resolution	1
Page	*Refer to PERF page*

DIST

Applicable to: ALL

Format	NNN.N
Units	NAUTICAL MILES (NM)
Range	*Min* : 0 nm *Max* : 999.9 nm
Resolution	0.1
Page	*Refer to DATA / WAYPOINT page*

EFF WIND

Applicable to: ALL

Format	XXNNN XX: Wind Direction NNN: Wind Velocity
Units	KNOTS (KT)
Range	XX: "-", "H", or "HD" for Headwind; "+", "T", "TL", or nothing for tailwind *Min* : 0 kt *Max* : 250 kt
Resolution	1
Page	*Refer to CLOSEST AIRPORTS page*

NOISE END ALTITUDE

Applicable to: ALL

Format	NNNNN or NNN
Units	NNNNN: FEET (MSL) (FT), rounded to the nearest 10 feet NNN: FL
Range	*Min NNNNN* : Takeoff Origin Airport Altitude + 400 ft *Max NNNNN* : Maximum Certified Altitude (Performance Database) *Min NNN* : (Takeoff Origin Airport Altitude + 400 ft)/ 100 ft *Max NNN* : (Maximum Certified Altitude (Performance Database))/ 100 ft
Resolution	NNNNN: 10 NNN: 1
Page	PERF page - TO panel (*Refer to PERF page*)

EO ACCELERATION ALTITUDE

Applicable to: ALL

Format	NNNNN
Units	FEET MSL (FT) If the flight crew enters 3 characters or less, the FMS considers the entry as a flight level. In this case, the unit of the entry field reverts to FL .
Range	*Min* : Takeoff (or Go Around) runway elevation + 400 ft *Max* : Maximum Certified Altitude (Performance Database)
Resolution	1
Page	PERF page - TO panel PERF page - GA panel *Refer to PERF page*

ETT

Applicable to: ALL

Format	HHMM or HHMMSS
Units	HH : HOURS MM : MINUTES SS : SECONDS
Range	RTA < aircraft UTC time + 20 h HH: 0 h - 23 h MM: 0 min - 59 min SS: 0 s - 59 s
Resolution	HH : 1 MM : 1 SS : 1
Page	*Refer to VERT REV page - RTA panel*

FINAL FUEL

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)
Range	*Min* : 0 lb *Max* : 220 500 lb
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

FINAL TIME

Applicable to: ALL

Format	HHMM or MM
Units	HH: HOURS MM and M: MINUTES
Range	HH: 0 h - 23 h MM: 0 min - 59 min (Maximum FINAL time is 1 hour and 30 minutes)
Resolution	HH: 1 MM or M: 1
Page	*Refer to FUEL and LOAD page*

FLAPS

Applicable to: ALL

Format	N
Range	*Min* : 0 *Max* : 3
Resolution	1
Page	*Refer to COMPANY T.O DATA REQUEST page Refer to PERF page* *Refer to COMPANY T.O DATA REQUEST page*

FLEX

Applicable to: ALL

Format	±NN If no sign, FMS assumes +.
Units	DEGREES (°)
Range	*Min* : 00 ° *Max* : 99 °
Resolution	1
Page	*Refer to COMPANY TO DATA REQUEST page* *Refer to PERF page*

FLT NBR

Applicable to: ALL

Format	XXXXXXXXXX
Range	Maximum 10 alphanumeric characters
Page	*Refer to COMPANY F-PLN REQUEST page* *Refer to INIT page*

FREE TEXT

Applicable to: ALL

Format	XXXXXXXXXXXXXXXXXXXXXXXX
Range	Maximum 24 characters
Page	*Refer to COMPANY F-PLN REPORT page* *Refer to COMPANY F-PLN REQUEST page* *Refer to COMPANY T.O DATA REQUEST page* *Refer to COMPANY WIND DATA REQUEST page* *Refer to POSITION / REPORT page* *Refer to TRANSFER TO MAILBOX page*

FREQUENCY (ADF)

Applicable to: ALL

Format	NNNN.N
Range	*Min* : 190.0 *Max* : 1750.0
Resolution	0.5
Page	*Refer to DATA/NAVAID page* *Refer to POSITION/NAVAIDS page*

FREQUENCY (ILS)

Applicable to: ALL

Format	NNN.NN
Range	*Min* : 108.0 *Max* : 111.95
Resolution	0.05
Page	*Refer to DATA / NAVAID page* *Refer to POSITION / NAVAIDS page*

FREQUENCY (VOR / DME)

Applicable to: ALL

Format	NNN.NN
Range	*Min* : 108.0 *Max* : 117.95
Resolution	0.05
Page	*Refer to DATA / NAVAID page* *Refer to POSITION / NAVAIDS page*

FROM

Applicable to: ALL

Format	AAAA
Range	Maximum 4 alphabetic characters
Page	*Refer to DATA / ROUTE page - DATABASE RTEs panel* *Refer to INIT page*

SET HEADING

Applicable to: ALL

Format	NNN.N
Units	DEGREES (°) The unit is °T when the course is in true north reference.
Range	*Min* : 000.0 ° *Max* : 360.0 °
Resolution	0.1
Page	*Refer to POSITION / IRS page*

HOLD DIST

Applicable to: ALL

Format	NN.N
Units	NAUTICAL MILES (NM)
Range	*Min* : 0.0 nm *Max* : 99.9 nm
Resolution	0.1
Page	*Refer to HOLD page*

HOLD TIME

Applicable to: ALL

Format	N.N
Units	MINUTES (MN)
Range	*Min* : 0.0 min *Max* : 9.9 min
Resolution	0.1
Page	*Refer to HOLD page*

IDLE FACTOR (IDLE)

Applicable to: ALL

Format	±N.N If no sign, FMS assumes +.
Units	PERCENT (%)
Range	*Min* : -9.9 % *Max* : 9.9 %
Resolution	0.1
Page	*Refer to STATUS Page*

INBOUND CRS

Applicable to: ALL

Format	NNNB or BNNN NNN: Bearing B: True/Mag Heading reference (default: Mag reference)
Units	DEGREES (°)
Range	*Min* : 000 ° *Max* : 360 ° B: M or nothing for Mag, or “T” for True
Resolution	1
Page	*Refer to HOLD page*

INCREMENT

Applicable to: ALL

Format	NN
Units	DEGREES (°)
Range	*Min* : 1 ° *Max* : 20 °
Resolution	1
Page	*Refer to LL XING - TIME MKR page*

INTERCEPT ANGLE

Applicable to: ALL

Format	NN
Units	DEGREES (°)
Range	*Min* : 10 ° *Max* : 50 °

Continued on the following page

Continued from the previous page

Resolution	1
Page	*Refer to OFFSET page*

JTSN GW

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)
Range	*Min* : ZFW + 11 000 lb *Max* : Maximum GW
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

LAT

Applicable to: ALL

Format	XDD°MM.M or DD°MM.MX, or XDDMM.M or DDMM.MX, or XDD or DDX.
Units	DD: DEGREES (°) MM.M: MINUTES (MIN)
Range	DD: 0 ° - 90 ° MM.M: 0 min - 59.9 min X: N for North, or S for South
Resolution	DD: 1 MM.M: 0.1
Page	*Refer to DATA / AIRPORT page* *Refer to DATA / NAVAID page* *Refer to DATA / WAYPOINT page* *Refer to POSITION / IRS page*

LAT (LL XING)

Applicable to: ALL

Format	XDD or DDX
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 90 ° X: N for North, or S for South
Resolution	1
Page	*Refer to LL XING - TIME MKR page*

LAT / LONG

Applicable to: ALL

Format	LAT/LONG LAT: XDD°MM.M or DD°MM.MX, or XDDMM.M or DDMM.MX, or XDD or DDX LONG: YDDD°MM.M or DDD°MM.MY, or YDDDMM.M or DDDMM.MY, or YDDD or DDDY
Units	DD and DDD: DEGREES (°) MM.M: MINUTES (MIN)
Range	DD: 0 ° - 90 ° DDD: 0 ° - 180 ° MM.M: 0 min - 59.9 min X: N for North, or S for South Y: W for West, or E for East
Page	*Refer to DIRECT TO page* *Refer to POSITION / MONITOR page* *Refer to POSITION / GPS page* *Refer to POSITION / IRS* *Refer to POSITION / NAVAIDS* *Refer to POSITION / REPORT* *Refer to POSITION / MONITOR* *Refer to DATA / WAYPOINT* *Refer to DATA / AIRPORT* *Refer to DSC-22-FMS-20-30-22FMS5020W DATA / NAVAID page*

LONG (LL XING)

Applicable to: ALL

Format	YDDD or DDDY
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 180 ° Y: W for West, or E for East
Resolution	1
Page	*Refer to LL XING - TIME MKR page*

LONG

Applicable to: ALL

Format	YDDD°MM.M or DDD°MM.MY, or YDDDMM.M or DDDMM.MY, or YDDD or DDDY.
Units	DDD: DEGREES (°) MM.M: MINUTES (MIN)

Continued on the following page

Continued from the previous page

Range	DDD: 0 ° - 180 ° MM.M: 0 min - 59.9 min Y: W for West, or E for East
Resolution	DDD: 1 MM.M: 0.1
Page	*Refer to DATA / AIRPORT page* *Refer to DATA / NAVAID page* *Refer to DATA / WAYPOINT page* *Refer to POSITION / IRS page*

LS COURSE

Applicable to: ALL

Format	ANNN or NNNA
Units	DEGREES (°) The unit is °T when the course is in true north reference.
Range	*Min* : 000 ° *Max* : 360 ° A : F or no letter for front beam course, or B for back beam course (only for ILS).
Resolution	1
Page	*Refer to POSITION / NAVAIDS page* *Refer to DATA / NAVAID page - PILOT STORED NAVAIDS panel*

LS FREQ

Applicable to: ALL

Format	NNN.NN
Range	*Min* : 108.0 *Max* : 111.95
Resolution	0.05
Page	*Refer to DATA / NAVAID page* *Refer to POSITION / NAVAIDS page*

LS IDENT

Applicable to: ALL

Format	XXXX
Range	Maximum 4 characters
Page	*Refer to DATA / AIRPORT page* *Refer to POSITION / NAVAIDS page*

LS SLOPE

Applicable to: ALL

Format	AN.N
Units	DEGREES
Range	*Min* : -9.9 ° *Max* : 0 ° A is "-" or nothing (by default "-" when nothing entered)
Resolution	0.1
Page	DATA/NAVAID page - PILOT STORED NAVAIDS panel (*Refer to Page*)

MACH

Applicable to: ALL

Format	0.NN or .NN or NN
Range	0.3 – [MMO-ΔMMO] (Performance Database), for CMS panel of the VERT REV page 0.1 – [MMO-ΔMMO] (Performance Database), for DES panel of the PERF page 0.1 – MMO (Performance Database), for CRZ panel of the PERF page
Resolution	0.01
Page	*Refer to VERT REV page - CMS panel* *Refer to PERF page*

MIN FUEL AT DEST

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)
Range	*Min* : 0.0 lb *Max* : 551 200 lb
Resolution	0.1
Page	FUEL and LOAD page (*Refer to page*)

N1 (NOISE)

Applicable to: ALL

Format	NNN
Units	PERCENTAGE (%)
Range	*Min* : 40 % *Max* : 110 %
Resolution	1
Page	*Refer to PERF page*

NAVAID COURSE (CRS)

Applicable to: ALL

Format	NNNB or BNNN NNN: Bearing B: True/Mag Heading reference (default: Mag reference)
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 360 ° *B* : M or nothing for Mag, or T for True
Resolution	1
Page	*Refer to DATA / NAVAID page*

NAVAID ELEVATION

Applicable to: ALL

Format	±NNNNN If no sign, FMS assumes +.
Units	FEET (MSL) (FT)
Range	*Min* : - 1 000 ft *Max* : 20 470 ft
Resolution	1
Page	*Refer to DATA / NAVAID page*

NAVAID IDENT

Applicable to: ALL

Format	XXXX
Range	Maximum 4 characters
Page	*Refer to DATA / NAVAID page* *Refer to DATA / WAYPOINT page* *Refer to EQUI-TIME POINT page* *Refer to POSITION / NAVAIDS page*

NUMBER

Applicable to: ALL

Format	NN
Range	*Min* : 1 *Max* : 99
Resolution	1
Page	*Refer to LL XING - TIME MKR page*

OAT

Applicable to: ALL

Format	± NN If no sign, FMS assumes +.
Units	DEGREES (°)
Range	*Min* : -99 °C *Max* : 99 °C
Resolution	1
Page	*Refer to PERF page*

OFFSET DIST

Applicable to: ALL

Format	NN or ANN or NNA
Units	NAUTICAL MILES (NM)
Range	*Min* : 0 nm *Max* : 50 nm A: L or R
Resolution	1
Page	*Refer to OFFSET page*

PAX NBR

Applicable to: ALL

Format	NNN
Range	*Min* : 0 *Max* : 999
Resolution	1
Page	*Refer to FUEL and LOAD page*

PERF FACTOR (PERF)

Applicable to: ALL

Format	±N.N If no sign, FMS assumes +.
Units	PERCENT (%)
Range	*Min* : -9.9 % *Max* : 9.9 %
Resolution	0.1
Page	*Refer to STATUS Page*

PLACE

Applicable to: ALL

Format	XXXXXXX
Range	Maximum 7 alphanumeric characters
Page	*Refer to DATA / WAYPOINT page*

PLACE / BEARING / DISTANCE (PBD)

Applicable to: ALL

Format	PLACE/BEARING/DISTANCE PLACE: XXXXXXX BEARING: NNN DISTANCE: NNN.N
Units	BEARING: DEGREES (°) DISTANCE: NAUTICAL MILES (NM)
Range	PLACE: Maximum 7 alphanumeric characters BEARING: *Min:* 0 ° , *Max:* 360 ° DISTANCE: *Min:* 0 nm , *Max:* 999.9 nm
Resolution	BEARING: 1 DISTANCE: 0.1
Page	*Refer to DIRECT TO page* Insert Next Waypoint revision, *Refer to F-PLN page* *Refer to POSITION / MONITOR page* Insert Next Waypoint and Direct To revision on interactive ND, *Refer to Interactive ND*

PLACE / DISTANCE (PD)

Applicable to: ALL

Format	PLACE/DISTANCE PLACE: XXXXXXX DISTANCE: ± NNN.N (if no sign, FMS assumes +)
Units	DISTANCE: NAUTICAL MILES (NM)
Range	PLACE: Maximum 7 alphanumeric characters DISTANCE: *Min:* 0 nm , *Max:* 999.9 nm *Note:* *The distance is also limited so that the place/distance waypoint cannot be before (after) the waypoint that precedes (follows) the PLACE waypoint.*
Resolution	DISTANCE: 0.1
Page	*Refer to DIRECT TO page* Insert Next Waypoint revision, *Refer to F-PLN page* *Refer to VERT REV page - STEP ALTs panel* Insert Next Waypoint and Direct To revision on interactive ND, *Refer to Interactive ND*

PLACE-BEARING / PLACE-BEARING (PB / PB)

Applicable to: ALL

Format	PLACE-BEARING/PLACE-BEARING PLACE: XXXXXXX BEARING: NNN
Units	BEARING: DEGREES (°)
Range	PLACE: Maximum 7 alphanumeric characters BEARING: *Min:* 0 ° , *Max:* 360 °
Resolution	BEARING: 1
Page	*Refer to DIRECT TO page* *Refer to POSITION / MONITOR page*

PRED TO (ALTITUDE)

Applicable to: ALL

Format	NNNNN or FLNNN
Units	NNNNN: FEET (MSL) (FT) If the flight crew enters 3 characters or less, the FMS considers the entry as a flight level. In this case, the unit of the entry field reverts to FL .
Range	*Min* : Aircraft altitude for the entry field on the CLB panel, or the destination runway elevation + 50 ft for the entry field on the DES panel *Max NNNNN* : Maximum Certified Altitude (Performance Database), or the aircraft altitude for the entry field on the DES panel
Resolution	1
Page	*Refer to PERF page*

QNH

Applicable to: ALL

Format	NNNN or NN.NN
Units	NNNN: HECTO PASCAL (HPA) NN.NN: INCHES OF MERCURY (inHG)
Range	NNNN: 745 hPa - 1 100 hPa NN.NN: 22.00 inHg - 32.48 inHg If the flight crew enters 3 characters or more (without a decimal point), the FMS considers the entry as a HECTO PASCAL entry. If the flight crew enters less than 3 characters or makes an entry with a decimal point, the FMS considers the entry as an INCHES OF MERCURY entry.
Resolution	1
Page	*Refer to PERF page* *Refer to COMPANY T.O DATA REQUEST page*

RADIAL

Applicable to: ALL

Format	NNN
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 360 °
Resolution	1
Page	*Refer to FIX INFO page*

RADIO ALTITUDE

Applicable to: ALL

Format	NNNNN NONE, NO, NO DH, or NODH are valid entries
Units	FEET AGL (FT)
Range	*Min* : 1 ft *Max* : Maximum Certified Altitude (Performance Database)
Resolution	1
Page	*Refer to PERF page - APPR panel*

RADIUS

Applicable to: ALL

Format	NNNN
Units	NAUTICAL MILES (NM)
Range	*Min* : 1 nm *Max* : 9 999 nm
Resolution	1
Page	*Refer to FIX INFO page*

REMAINING TIME

Applicable to: ALL

Format	HHMM or HHMMSS
Units	HH : HOURS MM : MINUTES SS : SECONDS
Range	HH: 0 h - 23 h MM: 0 min - 59 min SS: 0 s - 59 s

Continued on the following page

Continued from the previous page

Resolution	HH : 01 MM : 01 SS : 01
Page	*Refer to LL XING - TIME MKR page*

RNP

Applicable to: ALL

Format	N.NN or NN.N
Units	NAUTICAL MILES (NM)
Range	*Min* : 0.01 nm *Max* : 20.0 nm
Resolution	0.01 when RNP < 10.0 0.1 when RNP > 10.0
Page	*Refer to POSITION / MONITOR page*

RTA

Applicable to: ALL

Format	HHMM or HHMMSS
Units	HH : Hours MM : Minutes SS : seconds
Range	RTA < aircraft UTC time + 20 h HH: 0 h - 23 h MM: 0 min - 59 min SS: 0 s - 59 s
Resolution	HH : 1 MM : 1 SS : 1
Page	*Refer to VERT REV page - RTA panel*

RTE RSV (FUEL)

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)
Range	*Min* : The minimum reserve fuel value is defined in the AMI file. Default value: 0 lb *Max* :The maximum reserve fuel value is defined in the AMI file. Default value: 110 200 lb
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

RTE RSV (%)

Applicable to: ALL

Format	NN.N
Units	PERCENT (%)
Range	*Min* : 0 % *Max* : 15 %
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

RWY

Applicable to: ALL

Format	NN or NND
Range	*Min* : 01 *Max* : 36 D: L for Left, R for Right, or C for Center
Page	*Refer to DATA / AIRPORT page - PILOT STORED RWYs panel* *Refer to COMPANY T.O DATA REQUEST page*

RWY COURSE (CRS)

Applicable to: ALL

Format	NNNB or BNNN NNN: Bearing B: True/Mag Heading reference (default: Mag reference)
Units	DEGREES (°)
Range	*Min* : 000 ° *Max* : 360 ° *B* : M or nothing for Mag, or T for True
Resolution	1
Page	*Refer to DATA / AIRPORT page*

RWY ELEVATION (ELEVATION)

Applicable to: ALL

Format	± NNNNN If no sign, FMS assumes +.
Units	FEET MSL (FT)
Range	*Min* : -1 000 ft *Max* : 20 470 ft
Resolution	1
Page	*Refer to DATA / AIRPORT page*

RWY IDENT

Applicable to: ALL

Format	AAAANN or AAAANND
Range	AAAA: Maximum 4 alphabetic characters *Min NN* : 01 *Max NN* : 36 D: L for Left, R for Right, or C for Center
Page	*Refer to COMPANY T.O DATA REQUEST page* *Refer to DATA / NAVAID page* *Refer to DATA / WAYPOINT page* *Refer to EQUI-TIME POINT page* *Refer to POSITION / MONITOR page* Insert Next Waypoint revision, *Refer to F-PLN page* Insert Next Waypoint and Direct To revision on interactive ND, *Refer to Interactive ND*

RWY LENGTH

Applicable to: ALL

Format	NNNN
Units	NNNN: FOOT (FT)
Range	*Min* : 3 280 ft *Max* : 26 247 ft
Resolution	1
Page	*Refer to DATA / AIRPORT page*

SAT

Applicable to: ALL

Format	±NN If no sign, FMS assumes -.
Units	DEGREES (°)
Range	*Min* : -99 ° *Max* : 99 °
Resolution	1
Page	*Refer to WIND page*

SAT ALTITUDE

Applicable to: ALL

Format	NNN or FLNNN
Units	Hundreds of Feet (FL)

Continued on the following page

Continued from the previous page

Range	*Min* : 1 *Max* : (Maximum Certified Altitude)/ 100 ft
Resolution	1
Page	*Refer to WIND page*

SPD

Applicable to: ALL

Format	NNN
Units	KNOTS (KT)
Range	*Min* : 90 kt *Max* : VMO (Performance Database) *Note:* *For the SPD field on the DES panel of the PERF page, the maximum value is VMO-ΔVMO (Performance Database).*
Resolution	1
Page	*Refer to VERT REV page - SPD panel* *Refer to PERF page*

STATION DECLINATION

Applicable to: ALL

Format	NNNY
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 360 ° Y: W for West, or E for East
Resolution	1
Page	*Refer to DATA / NAVAID page*

T.O LIMIT

Applicable to: ALL

Format	NNNN
Units	FOOT (FT)
Range	*Min* : 3 280 ft *Max* : 26 247 ft
Resolution	1
Page	*Refer to COMPANY T.O DATA REQUEST page*

T.O SHIFT

Applicable to: ALL

Format	NNNN
Units	METER (M)
Range	*Min* : 1 *Max* : Length of origin runway
Resolution	1
Page	*Refer to PERF page* *Refer to COMPANY T.O DATA REQUEST page*

TAXI (FUEL)

Applicable to: ALL

Format	N.N
Units	KILO POUNDS (KLB)
Range	*Min* : 0 lb *Max* : 21 800 lb
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

THRUST RED (ALTITUDE)

Applicable to: ALL

Format	NNNNN
Units	FEET (MSL) (FT) If the flight crew enters 3 characters or less, the FMS considers the entry as a flight level. In this case, the unit of the entry field reverts to FL .
Range	*Min* : Takeoff (or Go Around) runway elevation + 400 ft *Max* : Maximum Certified Altitude (Performance Database)
Resolution	1
Page	PERF page - TO panel PERF page - GA panel *Refer to PERF page*

TIME MARKER UTC

Applicable to: ALL

Format	HHMM or HHMMSS
Units	HH: HOURS MM: MINUTES SS: SECONDS

Continued on the following page

Continued from the previous page

Range	HH: 0 h - 23 h MM: 0 min - 59 min SS: 0 s - 59 s
Resolution	HH : 1 MM : 1 SS : 1
Page	*Refer to LL XING - TIME MKR page*

TO

Applicable to: ALL

Format	AAAA
Range	Maximum 4 alphabetic characters
Page	*Refer to INIT page* *Refer to DATA / ROUTE page - DATABASE RTES panel*

TRANS (ALTITUDE)

Applicable to: ALL

Format	NNNNN
Units	FEET (MSL) (FT)
Range	*Min* : 1 ft *Max* : MaximumCertifiedAltitude(PerformanceDatabase) ft
Resolution	1
Page	*Refer to PERF page*

TRANS (FLIGHT LEVEL)

Applicable to: ALL

Format	NNN
Units	Hundreds of Feet (FL)
Range	*Min* : 1 ft *Max* : Maximum Certified Altitude/ 100 ft (Performance Database)
Resolution	1
Page	*Refer to PERF page*

THS

Applicable to: ALL

Format	NN.N
Units	PERCENT (%)

Continued on the following page

Continued from the previous page

Range	*Min* : 0.0 % *Max* : 99.9 %
Resolution	0.1
Page	*Refer to PERF page*

TRIP WIND

Applicable to: ALL

Format	XXNNN
Units	KNOTS (KT)
Range	XX: "-", "H", or "HD" for headwind; or "+", "T", "TL", or nothing for tailwind *Min* : 0 kt *Max* : 250 kt
Resolution	1
Page	*Refer to INIT page*

TROPO

Applicable to: ALL

Format	NNNNN or NNN *Note:* *When the flight crew enters the data on 3 digits, the FMS multiplies by 100 for display.*
Units	FEET (FT)
Range	*Min* : 1 000 ft *Max* : 60 000 ft
Resolution	1
Page	*Refer to INIT page*

VAPP

Applicable to: ALL

Format	NNN
Units	KNOTS (KT)
Range	*Min* : 90 kt *Max* : VMO-ΔVMO (Performance Database)
Resolution	1
Page	*Refer to PERF page*

VR

Applicable to: ALL

Format	NNN
Units	KNOTS (KT)
Range	*Min* : 90 kt *Max* : VMO (Performance Database)
Resolution	1
Page	*Refer to PERF page*

V1

Applicable to: ALL

Format	NNN
Units	KNOTS (KT)
Range	*Min* : 90 kt *Max* : VMO-ΔVMO (Performance Database)
Resolution	1
Page	*Refer to PERF page*

V2

Applicable to: ALL

Format	NNN
Units	KNOTS (KT)
Range	*Min* : 90 kt *Max* : VMO-ΔVMO (Performance Database)
Resolution	1
Page	*Refer to PERF page*

VOR COURSE (CRS)

Applicable to: ALL

Format	NNN
Units	DEGREES (°) The unit is °T when the course is in true north reference.
Range	*Min* : 0 ° *Max* : 360 °
Resolution	1
Page	*Refer to POSITION / NAVAIDS page*

VOR FREQUENCY (FREQ)

Applicable to: ALL

Format	NNN.NN
Range	*Min* : 108.0 *Max* : 117.95
Resolution	0.05
Page	*Refer to DATA / NAVAID page* *Refer to POSITION / NAVAIDS page*

WAYPOINT

Applicable to: ALL

Format	XXXXXXX
Range	Maximum 7 alphanumeric characters
Page	*Refer to DIRECT TO page* *Refer to POSITION / GPS page* *Refer to POSITION / MONITOR page* *Refer to VERT REV page - STEP ALTs panel* *Refer to OFFSET page* *Refer to FIX INFO page* *Refer to AIRWAYS page* *Refer to EQUI-TIME POINT page* *Refer to DATA / WAYPOINT page* Insert Next Waypoint revision, *Refer to F-PLN page* Insert Next Waypoint and Direct To revision on interactive ND, *Refer to Interactive ND*

WIND ALTITUDE

Applicable to: ALL

Format	NNN or NNNNN
Units	NNN: FLIGHT LEVEL (FL) NNNNN: FEET (FT)
Range	*Min:* FL 1 , 1 ft *Max* : Maximum Certified Altitude (Performance Database)
Resolution	1
Page	*Refer to WIND Page*

WIND DIRECTION

Applicable to: ALL

Format	NNN, TNNN, or NNNT (For WIND page, and COMPANY T.O DATA REQUEST page) T: True Heading Reference NNN (For APPR panel on the PERF page, and EQUI-TIME POINT page)
Units	DEGREES (°)
Range	*Min* : 0 ° *Max* : 359 °
Resolution	1
Page	*Refer to COMPANY T.O DATA REQUEST page* *Refer to EQUI-TIME POINT page* *Refer to PERF page* *Refer to WIND page*

WIND VELOCITY

Applicable to: ALL

Format	NNN
Units	KNOTS (KT)
Range	*Min* : 0 kt *Max* : 250 kt
Resolution	1
Page	*Refer to COMPANY T.O DATA REQUEST page* *Refer to EQUI-TIME POINT page* *Refer to PERF Page - APPR panel* *Refer to WIND page*

ZFW

Applicable to: ALL

Format	NNN.N
Units	KILO POUNDS (KLB)
Range	The minimum and maximum zero fuel weight are defined in the performance database.
Resolution	0.1
Page	*Refer to FUEL&LOAD page*

ZFWCG

Applicable to: ALL

Format	NN.N
Units	PERCENT (%)

Continued on the following page

Continued from the previous page

Range	*Min* : 23.0 % *Max* : 48.0 %
Resolution	0.1
Page	*Refer to FUEL and LOAD page*

GENERAL

Applicable to: ALL

GENERAL

There are two types of FMS messages displayed in the FMS Message Area:
- Type I messages: These messages are a direct result of a flight crew action.
- Type II messages: These messages are displayed automatically to inform the flight crew on a given situation, or to call for a flight crew action.

Note: Some type II messages are also displayed on the ND, or PFD.

Type I messages always have priority over type II messages.

MESSAGE COLOR

The messages appears in black over :
- a white background for messages that are result from a flight crew entry, and for less important messages
- an amber background for messages which concern navigation, for messages that request for a data entry, and for more important messages.

AUTOMATIC CLEARING OF MESSAGES

Type I messages are cleared automatically, when:
- The flight crew makes a valid entry or selection for the data, that resulted in the display of the message
- The flight crew presses the DIR TO, F-PLN, INIT, NAVAIDS, PERF, or SEC key on the KCCU

Type II messages are cleared automatically when the display conditions of the message no longer apply.

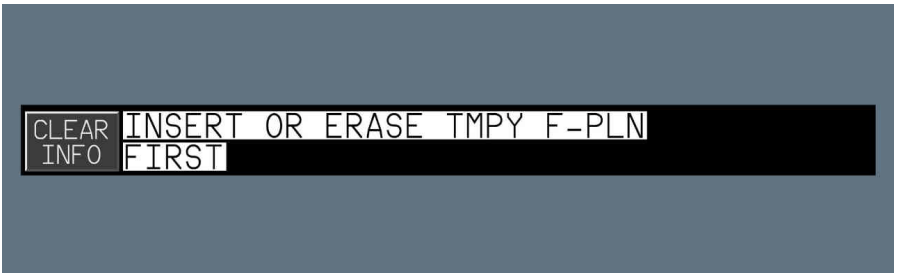
MESSAGES HISTORY LIST

Type II messages are stored in a first-in / first-out message list (5 messages maximum).
The first message of the message list is displayed in the FMS Message Area (if no type I message is currently displayed).
A message is automatically removed from the list as soon as the display conditions of the message no longer apply.
When the flight crew clears a type II message, it is not removed from the message history list, as long as the display conditions apply. The FMS Message Area then displays the next message of the message history list, if the flight crew has not cleared this message before.

The message history list is displayed on the MESSAGES LIST page. The flight crew can access this page via the MSG LIST button of the FMS Message Area. This button is only displayed when no messages are displayed.

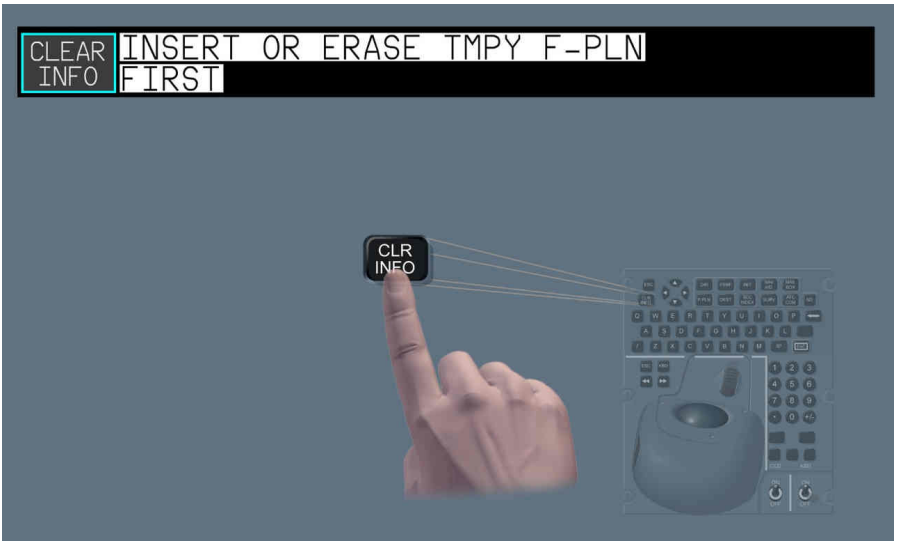
FMS MESSAGE AREA

FMS Message Area



The FMS displays the messages on two lines of 33 characters.
The flight crew can clear the displayed message by clicking on the CLEAR INFO button, or by pressing the CLR INFO key on the KCCU .

Clear Info



When no message are displayed, the flight crew can access the MESSAGE LIST page, by clicking on the MSG LIST button.

Message List



The MESSAGE LIST page displays the five latest type II messages. (*Refer to Page)*

ACFT POSITION NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft position has become invalid (while the HOLD, DIRECT TO, or CLOSEST AIRPORTs page is displayed).

ADJUST DESIRED TRK OR HDG

Applicable to: ALL

Type	II
Interface	MFD
Conditions	A direct to with interception of an inbound/outbound radial is inserted. This message informs the flight crew that it is possible to adjust the aircraft heading/track, to allow the computation of the INTCPT, or to change its position (if it was already computed before).

ADJUSTING SPD DUE TO RTA

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS is computing a new managed target speed in order to respect the time constraint. This message is automatically cleared after 15 s.

AIRWAY / WPT DISAGREE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	- The entered end waypoint of the airway segment does not belong to the defined airway, or - The entered airway does not contain the end waypoint of the preceding airway segment, or - The waypoint that has DCT, in its preceding VIA entry field, and an airway in the following VIA entry field, is not part of the airway.

AIRWAYS INSERTION IN PROGRESS: F-PLN REVISION NOT ALLOWED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	An airways revision is in progress on one MFD, and the flight crew tries to access an other revision on the opposite side MFD.

ALIGN IRS

Applicable to: ALL

Type	II
Interface	MFD
Conditions	At least one IRS is waiting for an alignment position. In normal operation, the IRS automatically aligns on the GPS position. When this is not possible, the flight crew needs to initiate the alignment from the POSITION / IRS page. (*Refer to Page*)

AREA RNP IS XX.XX

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has entered an RNP value that is greater than the default RNP value of the current flight phase, and there is no RNP value defined in the navigation database for the active leg or route.

ARPT REF / GPS POSITION DISAGREE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The IRS alignment failed. There is a disagreement between the alignment position, entered by the flight crew on the POSITION / IRS page, and the GPS position. *Refer to Page*

ARPT REF / LAST IRS POSITION DISAGREE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The IRS alignment failed. There is a disagreement between the alignment position, entered by the flight crew on the POSITION / IRS page, and the last stored IRS position. *Refer to Page*

ATC F-PLN INSERTED IN SEC 3

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The received ATC F-PLN is properly loaded in the secondary flight plan SEC3.

ATC F-PLN INSERTED IN SEC 3 REJECTED INFO SEE SEC /INDEX

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The received ATC F-PLN is partially loaded in the secondary flight plan SEC3 due to not valid data sent by the ATC center. The flight crew can review the rejected data on the REJECTED ATC INFO page, *Refer to REJECTED ATC INFO page.*

CABIN RATE EXCEEDED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft is in CRUISE $_{phase}$, closer than 200 nm to the destination, and the cabin rate associated to the theoretical descent profile is higher than the maximum cabin rate. The flight can check and/or change the maximum cabin rate on the DES panel of the PERF page, *Refer to Page* .

CHECK ALTN WIND

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The company up linked alternate cruise flight level differs from the default alternate cruise flight level.

CHECK APPR SEL

Applicable to: ALL

L12

Type	II
Interface	MFD AND PFD
Conditions	The flight crew has manually tuned an ILS(GLS), on the POSITION/NAVAIDS page, that does not correspond with the approach selected in the flight plan. This message is only displayed, when the aircraft is: - In cruise, and less then 100 nm from the T/D, or - In descent, or - In approach, and the altitude is higher then 800 ft.

CHECK CPNY RTE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The company route ident of the up linked flight plan differs from the company route ident of the flight plan request.

CHECK DATABASE CYCLE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The current date does not match the effectivity of the active navigation database. This message is triggered when the flight crew enters a FROM/TO airport or company route.

CHECK DEST DATA

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The QNH, or OAT, or destination wind, that are displayed on the APPR panel of the PERF page, are completed by a company wind uplink. The flight crew should check the up linked values.

CHECK EO SPD SETTING

Applicable to: ALL

Type	II
Interface	MFD AND PFD
Conditions	In CLIMB, or CRUISE (and the guidance mode is not ALT* or ALT): the engine-out (EO) mode is active, and the selected speed target is not within the range (GREENDOT - 10 kt, GREENDOT + 10 kt).

CHECK IRS / ARPT POSITION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The difference between at least one IRS position (IRS1, IRS2, or IRS3) and the airport position is 5 nmor more.

CHECK FLT NUMBER

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The company up linked flight number differs from the flight number of the flight plan request.

CHECK IRS 1(2)(3) / FMS POSITION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	IRS1(2)(3) has drifted abnormally: The difference between the IRS1(2)(3) position and the FMS position is greater than a specified threshold. The threshold is function of time.

CHECK MIN FUEL AT DEST

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The entered MIN FUEL AT DEST is below ALTN + FINAL fuel. *Refer to Minimum Fuel At Destination*

CHECK NORTH REF

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	The position of the TRUE/MAG pb differs from the airport bearing reference. The airport bearing reference is stored in the navigation database. This message may be triggered for the origin airport (in preflight) or for the destination airport (in arrival and approach).

CHECK ONSIDE FMS P/N

Applicable to: ALL

Type	II
Interface	MFD
Conditions	There is a part number incompatibility between the different FMCs. The MFD displays automatically the FMS P/N pannel of the STATUS page.

CHECK SPD MODE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The **selected** speed control is active, and: - The flight phase changes from CLIMB to CRUISE, or - The flight phase changes from CLIMB (or CRUISE) to DESCENT, or - The aircraft sequences the start waypoint of a constant mach segment (CMS).

CHECK T.O DATA

Applicable to: ALL

L12

Type	II
Interface	MFD
Conditions	The takeoff data has already been entered, and the flight crew: - Changes the takeoff runway, takeoff shift, flaps setting, packs setting, or anti-ice setting, or - Activates a secondary flight plan (in PREFLIGHT, or DONE phase) This message is also displayed when among the received company takeoff data, the TOW differs more than 2 200 lb from the FMS estimated TOW, or when the received TOCG differs more than 0.5 % from the FMS estimated TOCG. In that case, the flight crew cannot insert the received company takeoff data.

CHECK ZFW

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has swapped a secondary flight plan with the active flight plan, and the two flight plans have a different ZFW, or ZFWCG. Note: *This may only happen before engine start.* *Before engine start, and when a swap is performed, the FQMS will use the new ZFW / ZFWCG values to initialize.* *After engine start, the active ZFW / ZFWCG values do not change after a swap. The FQMS does not initialize again.*

COMPANY F-PLN & LOAD DATA RECEIVED WAITING FOR INSERTION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received a flight plan and performance and load data uplink. The flight crew should insert, or clear, the uplink, via the RECEIVED CPNY F-PLN button on the INIT, or SEC INDEX page. *Refer to INIT page* *Refer to SEC INDEX page*

COMPANY F-PLN RECEIVED WAITING FOR INSERTION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received a flight plan data uplink. The flight crew should insert, or clear, the uplink, via the RECEIVED CPNY F-PLN button on the INIT, or SEC INDEX page. *Refer to INIT page* *Refer to SEC INDEX page*

COMPANY LOAD DATA RECEIVED WAITING FOR INSERTION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received a performance and load data uplink. The flight crew should insert, or clear, the uplink, via the RECEIVED CPNY LOAD button on the INIT, or SEC INDEX page. *Refer to INIT page* *Refer to SEC INDEX page*

COMPANY MSG INSERTION IN PROGRESS

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The insertion of the received company takeoff data is in progress.

COMPANY T.O DATA RECEIVED WAITING FOR INSERTION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received takeoff data. The flight can display, insert, or clear, the uplink, on the RECEIVED CPNY T.O DATA page. *Refer to RECEIVED CPNY T.O DATA page*

COMPANY WIND DATA RECEIVED WAITING FOR INSERTION IN ACTIVE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received wind data for the active flight plan. The flight crew should insert, or clear, the uplink, via the RECEIVED CPNY WIND button on the ACTIVE / WIND page. *Refer to WIND page*

COMPANY WIND DATA RECEIVED WAITING FOR INSERTION IN SEC 1(2)(3)

Applicable to: ALL

Type:	II
Interface:	MFD
Conditions:	The FMS has received wind data for the secondary 1(2)(3) flight plan. The flight crew should insert, or clear, the uplink, via the RECEIVED CPNY WIND button on the SEC1(2)(3) / WIND page. *Refer to WIND page*

COMPANY WIND UPLINK PENDING

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received company wind data, while a temporary flight plan exists, or while the DIRECT TO page is displayed. The flight crew needs to insert, or clear the temporary flight plan, or needs to finalize the DIRECT TO revision, before he can insert (or clear) the received wind data.

CONSTRAINTS ABOVE CRZ FL: DELETED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The CRZ FL or step altitudes are changed, so that the following constraints are deleted: The climb and descent constraints, that are at or above the new CRZ FL, and the descent constraints, that are at or above any inserted step altitude.

CONSTRAINTS BEFORE XXXXXXX : DELETED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	- The flight phase transitions from CRUISE, DESCENT, or APPROACH, to GO AROUND, so that all altitude, and speed constraints between the aircraft and the primary destination are deleted. XXXXXXX is the ident of the waypoint, following the last down path waypoint with a descent altitude or speed constraint. - The alternate flight plan is enabled, so that all altitude, and speed constraints between the aircraft and the former primary destination, and all altitude, and speed constraints on the alternate flight plan, that are below the current aircraft altitude are deleted. XXXXXXX is the ident of the waypoint, following the last down path waypoint with a speed constraint, below the current aircraft altitude.

COST INDEX-NNN IN USE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The FMS has set a default value for the cost index. The default value is the last cost index of the previous flight, stored in the DONE phase (or 0, if there is no cost index, after a power up for example). The flight crew can always change the default value.

CRZ FL ABOVE MAX FL

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has entered a flight level, that is higher than the recommended maximum flight level. *Refer to Recommended Maximum Flight Level*

DEST / ALTN CPNY RTE DISAGREE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew tried to enter an alternate company route, and the origin airport of the alternate company route does not match the destination airport of the primary flight plan.

DEST EFOB BELOW MIN

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The EFOB at destination is lower than the specified minimum fuel at destination.

DRAFT WIND INSERTED

Applicable to: ALL

Type	I
Interface	MFD
Conditions	When draft winds are pending and the flight crew creates a temporary flight plan, the draft wind are automatically inserted in the active (and temporary) flight plan.

ENTER DEST DATA

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew did not enter one or more of the destination data (QNH, OAT, or WIND), and the flight phase is CRUISE (and the aircraft is closer than 180 nmto the destination), DESCENT, or APPROACH.

ENTRY NOT IN LIST

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew tried to make a manual entry, and the entry is not in the list associated to the entry field.

ENTRY OUT OF RANGE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew has entered a value that is out of the accepted range of the data, or the entered value leads to the computation of a parameter that is out of range. When applicable, the expected range and units are displayed on the second line of the FMS Message Area in the following format: “RNG: *(Lower Range Limit)* TO *(Upper Range Limit) (Unit)*”. Example: RNG: 23.0 TO 28.0 %

EXPECT TURN AREA EXCEEDANCE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft will fly (or is flying) a procedure turn, and the FMS predicts that the aircraft will exceed the excursion distance (based on the predicted CAS, converted to a ground speed). The excursion distance is part of the navigation database, associated with the procedure turn.

EXTEND SPD BRK

Applicable to: ALL

Type	II
Interface	MFD AND PFD
Conditions	The DES mode is active, the thrust is IDLE, the flaps setting is not 3 or FULL, and the aircraft needs to decelerate to recover the vertical path, or to respect an altitude or speed constraint, or speed limit.

F-G/S BASED ON ISA

Applicable to: ALL

L12

Type	II
Interface	MFD
Conditions	The F-G/S deviation is computed, considering the ISA temperature at destination. The flight crew did not enter the temperature at destination (OAT) on the APPR panel of the PERF page. This message is displayed when the flight crew has pressed the LS pb on the EFIS CP, and the DES or APPROACH flight phase becomes active.

FLT NUMBER RECEIVED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has received the flight number, as part of the up linked flight plan data, without previous request from the flight crew.

FMCS ACFT STATUS DISAGREE

Applicable to: ALL

L13

Type	II
Interface	MFD
Conditions	At power-up, the critical aircraft status data is not identical between one active FMC and the standby FMC. The critical aircraft status data are: - Navigation database - Performance database - Magnetic Variation database - OPC, and AMI file - FM Operational Program - Aircraft and engine type, and engine manufacturer program pins.

FMCS ACFT STATUS DISAGREE INDEPENDENT OPERATION

Applicable to: ALL

L13

Type	II
Interface	MFD
Conditions	At power-up, the status data is not identical for the two active FMC's. FMS 1 and FMS 2 operate independently. The status data are: - Navigation database - Performance database - Magnetic Variation database - OPC, and AMI file - FM Operational Program - Aircraft and engine type, and engine manufacturer program pins.

FMCS PIN PROG TYPE DISAGREE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	At power-up, critical program pins (not aircraft or engine type related) are not identical between one active FMC and the standby FMC.

FMCS PIN PROG TYPE DISAGREE INDEPENDENT OPERATION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	At power-up, critical program pins (not aircraft or engine type related) are not identical for the two active FMC's. FMS 1 and FMS 2 operate independently.

FMS DATALINK NOT AVAIL

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The data communication between the FMS and the Avionics Communication Router (ACR) is not available.

FMS1 / FMS2 GW DISAGREE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS 1 and FMS 2 gross weight differ by 4 400 lb or more. This message is cleared automatically when the difference becomes less than 3 300 lb.

FMS1 / FMS2 POSITION DISAGREE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS 1 and FMS 2 aircraft position differ by 0.5 nm or more. This message is cleared automatically when the difference becomes less than 0.3 nm.

FMS1 / FMS2 SPD TARGET DISAGREE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS 1 and FMS 2 target speed differ by 5 kt or more. This message is cleared automatically when the difference becomes less than 2.5 kt.

FORMAT ERROR

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew has entered a value that has not the right format. When applicable, the expected format and units are displayed on the second line of the FMS Message Area in the following format: "FORMAT: *(Format) (Unit)*". The FMS uses the following characters to indicate the format: - A: Letters - X: Letters and Numbers - HHMMSS: Hours, Minutes, and Seconds - N/S: North, South - E/W: Est, West - F/B: Frontbeam, Backbeam - L/R: Left, Right - UP/DN: Up, Down Example: FORMAT: NN.N %

FORMAT ERROR ENTER ALT BEFORE PLACE/DIST

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew needs to enter the step altitude first, before he can enter a place/distance start waypoint.

F-PLN ELEMENT RETAINED

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The pilot stored elements are deleted, except the ones that are still used by the FMS. This message informs the flight crew that those elements are retained.

F-PLN FULL

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight plan data memory is exceeded.

GPS DESELECTED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has deselected manually the GPS, and the aircraft is at 80 nm from the T/D or the APPROACH phase became active.

GPS PRIMARY

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	The GPS becomes again the primary means for the computation of the FMS position (where GPS PRIMARY was LOST before). For more information, *Refer to Navigation Accuracy*

GPS PRIMARY LOST

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	The GPS is no longer the primary means for the computation of the FMS position. For more information, *Refer to Navigation Accuracy*

GLIDE DESELECTED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has deselected the glide slope data on the POSITION / NAVAIDS page, and one of the following modes is active: LOC armed, LOC*, LOC, LAND armed, or LAND.

INDEPENDENT OPERATION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	A communication failure occurred between the two active FMC's: FMS 1 and FMS 2 operate independently.

INITIALIZE ZFW / ZFWCG

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has started at least on engine, and the ZFW and ZFWCG are still undefined.

INSERT OR ERASE TMPY F-PLN FIRST

Applicable to: ALL

Type	I
Interface	MFD
Conditions	A temporary flight plan (that is not created by a direct to) is pending, and the flight crew tries to access the direct to revision via the KCCU.

LATERAL DISCONTINUITY AHEAD

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft is at 30 sor less from flying a flight plan discontinuity.

MACH SEGMENT DELETED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The Constant Mach Segment is automatically deleted in the active flight plan, due to a flight phase transition from CRUISE to another flight phase.

NAV ACCUR DOWNGRADED

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	The navigation accuracy changed from HIGH to LOW. For more information, *Refer to Navigation Accuracy*

NAV ACCUR UPGRADED

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	The navigation accuracy changed from LOW to HIGH. For more information, *Refer to Navigation Accuracy*

NEW ACCEL ALT: HHHHH

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has entered on a climb waypoint an AT, or AT OR BELOW altitude constraint, that induces a level-off below the acceleration altitude. The constraint altitude became the new acceleration altitude. HHHHH is the altitude constraint altitude.

NEW CRZ ALT: HHHHH

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The cruise flight level (on the INIT and PERF page) has been automatically updated with the AFS CP selected altitude.

NEW THR RED ALT : HHHHH

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has entered on a climb waypoint an AT, or AT OR BELOW altitude constraint, that induces a level-off below the thrust reduction altitude. The constraint altitude became the new thrust reduction altitude. HHHHH is the altitude constraint altitude. (*Refer to Message*)

NO COMPANY REPLY

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS did not receive any response from the company ground station within 4 minafter the company request.

NO FLS FOR THIS APPR

Applicable to: ALL

L13

Type	II
Interface	MFD
Conditions	The FMS does not compute an FLS beam for the selected non-precision approach. The FLS approach function is not available. The FMS does not compute the FLS beam: - For IGS with G/S out, SDF and LDA approaches, or - If the angle between the course of the final approach leg and the runway course is more than 50 °C.

NO INTERSECTION FOUND

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The system cannot find a common waypoint nor intersection (for the definition of an airway segment, LAT/LONG crossing waypoint, or Place-Bearing / Place-Bearing waypoint).

NO NAV INTERCEPTION

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The selected HDG/TRACK does not intercept the flight plan before the TO waypoint. No interception path is displayed on the ND.

NOT ALLOWED

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The data entry or selection is not allowed.

NOT ALLOWED DATABASE ARPTS ONLY

Applicable to: ALL

Type	I
Interface	MFD
Conditions	In the DATABASE RTEs panel of the DATA / ROUTE page, the flight crew has entered an airport that is a pilot created airport.

NOT IN DATABASE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	In the DATABASE RTEs panel of the DATA / ROUTE page, the flight crew has entered an airport or a route that is not a navigation database, nor a pilot created element.

NOT TRANSMITTED TO ACR

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew tried to sent a company request or report, and a communication failure occurred between the FMS and the Avionics Communication Router (ACR).

PILOT RTES LIST FULL

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The pilot stored routes database is full. This message informs the flight crew that the new route creation is rejected.

PLACE / DIST IN TRANS

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew has tried to define a PLACE / DISTANCE (PD) waypoint within a planned fixed-turn-radius transition between two flight plan legs.

PLACE / WPT DISAGREE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	To define a PLACE/DISTANCE (PD) waypoint, the flight crew has entered a PLACE that is different from the revised waypoint.

PLEASE WAIT

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The FMS is processing.

PLEASE WAIT FOR COMPANY F-PLN UPLINK

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew has made a change on the INIT, PERF, or FUEL&LOAD page, or has made a flight plan revision, while a flight plan request is pending. The flight crew should make the flight plan changes after reception and insertion of the flight plan uplink, to avoid data to be overwritten.

PLEASE WAIT FOR FMS RESYNCH

Applicable to: ALL

Type	I
Interface	MFD
Conditions	An FMC resynchronization is in progress.

PRINTER NOT AVAIL

Applicable to: ALL

Type	II
Interface	MFD
Conditions	A printer communication error has occurred while printing a report.

PROC RNP IS XX.XX

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has entered an RNP value that is greater than the RNP value that is defined in the navigation database for the active leg or route.

RECEIVED ATC MSG NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The received ATC F-PLN is totally rejected by the FMS due to not valid data sent by the ATC center. The flight crew can review the rejected data on the REJECTED ATC INFO page, *Refer to REJECTED ATC INFO page.*

RECEIVED COMPANY F-PLN NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight plan, up linked from the company ground station, is not valid.

RECEIVED COMPANY LOAD DATA NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The performance data, up linked from the company ground station, is not valid.

RECEIVED COMPANY WIND DATA NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The wind data, up linked from the company ground station, is not valid.

RECEIVED COMPANY T.O DATA NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The takeoff data, up linked from the company ground station, is not valid.

RECEIVED FLT NUMBER NOT VALID

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The received flight number, that is part of the up linked flight plan data, is not valid.

REENTER ZFW / ZFWCG

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has detected a difference of more than 220 lb / 0.1 % between the ZFW / ZFWCG , entered by the flight crew, and the ZFW / ZFWCG , received from the FQMS . Both values need to be entered again. Note: *The FMS also displays this message in the case of the FQMS 1+2 FAULT alert. In this case, the flight crew should disregard the message. Refer to Alert*

RETRACT SPD BRK

Applicable to: ALL

Type	II
Interface	MFD AND PFD
Conditions	The DES mode is active, the speed brakes are extended, and: - The ALT* or ALT mode engages, or - The aircraft is below the vertical path and needs to recover it, or - The flaps setting becomes 3 or FULL.

RTA ALREADY EXISTING

Applicable to: ALL

Type	I
Interface	MFD
Conditions	In preflight, when an RTA exists, the flight crew tries to delete the FMS computed ETT.

RTA DELETED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The RTA is automatically deleted in the active flight plan. This happens when one of the following events occur: - The Engine Out (EO) mode becomes active - The aircraft clock data is no longer valid - The aircraft is in a manual hold, or in the deceleration zone of a manual hold - The flight phase transitions from DESCENT, or APPROACH, to CLIMB, or CRUISE - The flight phase becomes GO AROUND

RTA NOT CONSIDERED FOR FUEL PLANNING

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew initiates the fuel planning function on the FUEL&LOAD page, and an RTA exists in the flight plan.

RTE IDENT ALREADY USED

Applicable to: ALL

Type	I
Interface	MFD
Conditions	This message informs the flight crew that the new route ident already exists in the navigation database, or in the pilot stored routes database.

RUNWAY / LS DISAGREE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The flight crew has manually tuned a landing system on the POSITION / NAVAIDS page, that does not match the runway selected in the flight plan.

SELECT HDG OR TRK FIRST

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The aircraft is in NAV, and the flight crew tries to insert a temporary flight plan, or activate a secondary flight plan, while the first leg of the temporary or secondary flight plan is not identical to the active leg of the active flight plan.

SELECT TRUE NORTH REF

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	At least one IRS reached an extreme latitude (> N82°) and the TRUE/MAG pb is still in the MAG position.

SET HOLD SPD

Applicable to: ALL

Type	II
Interface	MFD and PFD
Conditions	- The selected speed control is active - The aircraft is between the deceleration point and the Hold Entry Fix - The selected speed differs from the hold speed by more than 5 kt.

SOME REVISIONS NOT STORED

Applicable to: ALL

L12

Type	II
Interface	MFD
Conditions	The flight crew has stored a route and some flight plan elements are removed from the stored flight plan. When a route is stored, the following flight plan elements are removed: - Holding pattern(s), entered by the flight crew - Offset(s) - Changes to terminal area procedures - Constraints, entered by the flight crew - Waypoint, created by the FMS (example: Latitude/Longitude Crossing points) - Optimum Step - CMS, defined by the flight crew - When a route is stored, only the first 30 flight plan elements are stored. All other elements are removed.

SPD ERROR AT XXXXXXX

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The speed constraint will be missed at waypoint XXXXXXX. The speed error is more than 10 kt.

SPD LIMIT EXCEEDED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The speed limit is actually exceeded: the aircraft's altitude is below the speed limit altitude, and the aircraft's speed is more than 10 kt over the speed limit.

SPECIF NDB NOT AVAIL

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The NDB (defined for an NDB approach) is not available or deselected.

SPECIF VOR-D NOT AVAIL

Applicable to: ALL

Type	II
Interface	MFD AND ND
Conditions	The VOR or VOR/DME (defined for an RNAV or VOR approach) is not available or deselected.

STEP ABOVE MAX FL

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The entered step altitude is above the recommended maximum flight level. *Refer to Recommended Maximum Flight Level*

STEP AHEAD

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft is closer than 20 nm from the start waypoint of a step climb or step descent.

STEP DELETED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The step is automatically deleted in the active or temporary flight plan. For the active flight plan, the STEP DELETED message appears when one of the following events occurs : - The step start waypoint is sequenced and the flight crew did not initiate the step climb or step descent - The Engine Out (EO) mode becomes active - After a cruise altitude change in PREFLIGHT, TAKEOFF, or CLIMB, a step climb becomes a step descent, or vice versa - The FCU altitude is increased to 100 ft or more above the aircraft altitude, in CRUISE, all step descents, and all step climbs with a step altitude less than the new FCU altitude, are deleted - The FCU altitude is decreased to 100 ft or more below the aircraft altitude, in CRUISE, all step climbs, and all step descents with a step altitude greater than the new FCU altitude, are deleted. For the temporary flight plan, the STEP DELETED message appears when the step start waypoint is deleted.

T/D REACHED

Applicable to: ALL

Type	II
Interface	MFD AND PFD
Conditions	The managed speed control is active, and the aircraft reaches the top of descent (T/D).

TIME ERROR AT XXXXXXX

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The time constraint will be missed at waypoint XXXXXXX. The time error is more than 30 s.

TIME MARKER REACHED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The time marker is reached.

TIME TO EXIT

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft must leave the holding pattern immediately to meet the fuel reserve requirements. The fuel requirements consider an extra fuel = 0 at landing at the primary destination.

TOO STEEP PATH AHEAD

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS has detected a too steep path in the vertical descent profile. *Note: This message is displayed only once per destination.*

T.O SPEED TOO LOW - CHECK TOW & T.O DATA

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The inserted V1, VR, V2 speeds do not satisfy the existing regulatory conditions regarding VMC and VS1G speeds.

T.O TIME REACHED

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The aircraft clock time reaches the ETT.

TRUE NORTH REFERENCED ENTRY EXPECTED

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew tried to make a course entry with magnetic reference, while the aircraft is flying at extreme latitudes.

TUNE BBB FFF.FF

Applicable to: ALL

Type	II
Interface	MFD
Conditions	The FMS cannot tune the desired NAVAID because of a manual NAVAID selection. BBB is the NAVAID ident. FFF.FF is the associated frequency.

V1/VR/V2 DISAGREE

Applicable to: ALL

Type	II
Interface	MFD
Conditions	V1, VR and V2 speeds do not satisfy the condition V1 ≤ VR ≤ V2.

XXXX IS DESELECTED

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The flight crew tried to manually tune a deselected NAVAID, or tried to deselect a NAVAID that was already deselected. XXXX is the ident of the NAVAID.

10 RWYS MAX : ALL IN USE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The pilot stored runways database is full, and the flight crew tries to store a new runway. This message informs the flight crew that the storage of the new runway is rejected.

50 WPTS MAX : ALL IN USE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The pilot stored database is full, and the flight crew tries to store a new waypoint. This message informs the flight crew that the storage of the new waypoint is rejected.

20 NAVAIDS MAX : ALL IN USE

Applicable to: ALL

Type	I
Interface	MFD
Conditions	The pilot stored database is full, and the flight crew tries to store a new navaid. This message informs the flight crew that the storage of the new navaid is rejected.

MEMO

Applicable to: ALL

FMS SWTG	The FMS selector is in the BOTH ON 1, or BOTH ON 2 position.

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OVERVIEW

Applicable to: ALL

NORMAL OPERATION

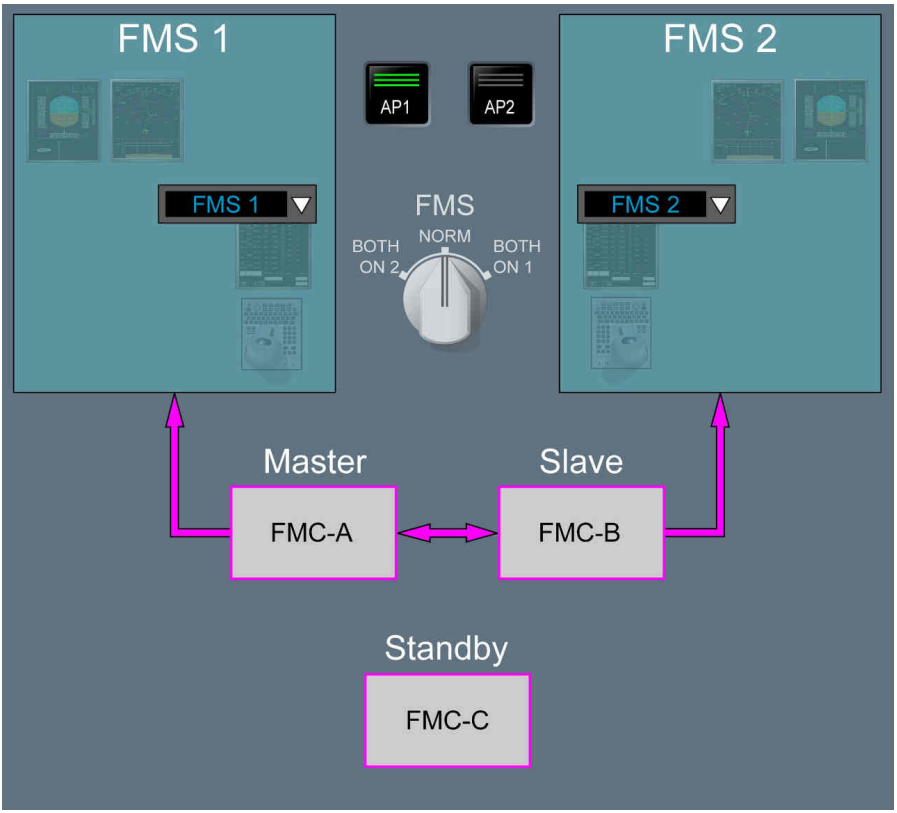
In normal operation:
- FMC -A provides data to FMS 1
- FMC -B provides data to FMS 2
- FMC -C is the standby computer
- The FMS selector is set to NORM.

L2 FMC -A, FMC -B, and FMC -C are three identical computers, each able to perform all FMS tasks. However, FMC -A and FMC -B are assigned to their specific FMS side (FMC -A to FMS 1, and FMC -B to FMS 2), or to the standby position.

Note: FMC -A cannot be assigned to FMS 2, and FMC -B cannot be assigned to FMS 1.

In case of an FMC -A, or FMC -B failure, the FMC s will automatically reconfigure to set FMC -C on FMS 1 or FMS 2.

Normal Operation



L1 **DUAL MODE**

In normal operation, FMS 1 and FMS 2 are in DUAL mode: The two active FMC s independently calculate data, and then share, compare, and synchronize this data.

MASTER AND SLAVE FMCS

Of the two active FMC s, one FMC is referred to as the “master”, the other as the “slave”. Flight guidance uses only the master FMC long-term guidance data.

L2 The master FMC provides some important FMS data to be used by the slave FMC , such as:

- The FMS flight phase
- The FCU clearance altitude

- Landing system frequency and course
- etc ...

L1 The selection of the master FMC is based on which Autopilot (AP) is active, and on the position of the FMS selector . The switch has priority over the Autopilot.

Master FMS side	Position of the FMS selector		
	BOTH ON 2	NORM	BOTH ON 1
AP 1 engaged	FMS 2	FMS 1	FMS 1
AP 2 engaged	FMS 2	FMS 2	FMS 1

Refer to More Information on the FMS selector

When no Autopilot is active, and the FMS selector is in the NORM position, the FMC of FMS 1 is the master FMC .

STANDBY COMPUTER

The standby FMC has no data and does not perform any calculation.
In normal operation, FMC -C is the standby computer. If FMC -A, or FMC -B fails, FMC -C is able to take over and to provide data for FMS 1 (or FMS 2).

ABNORMAL OPERATION

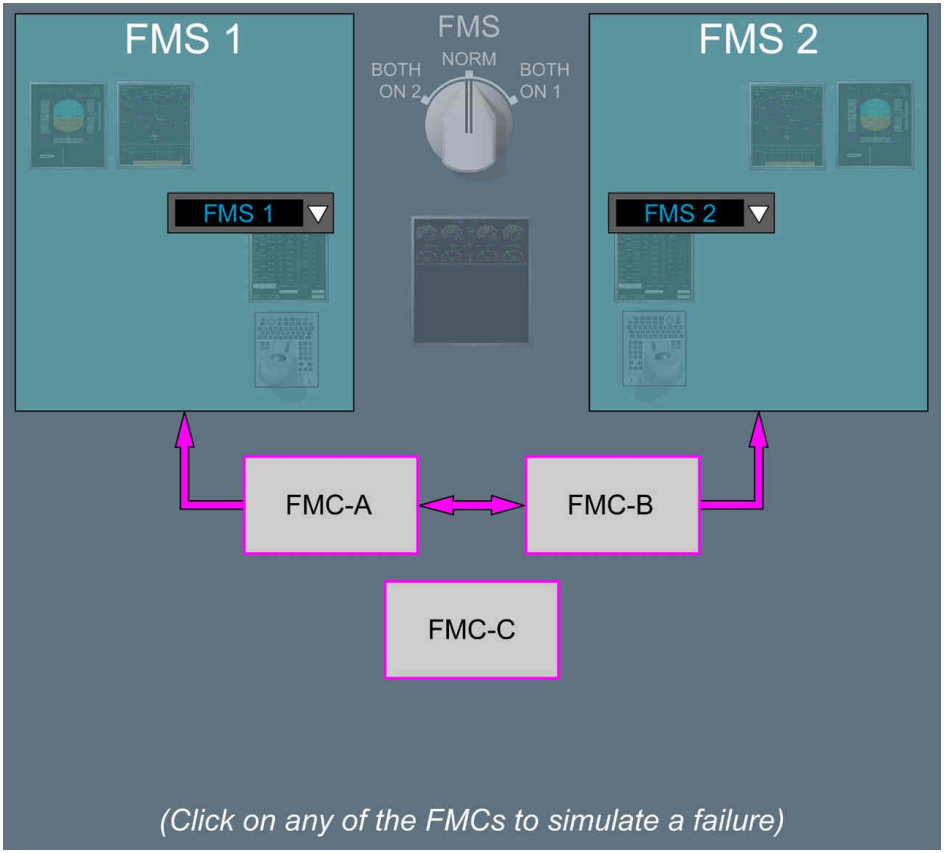
In abnormal operation, one (or more) of the following may occur:

- FMS 1 and FMS 2 no longer share data (*Refer to INDEPENDENT mode*)
- FMC failure(s)

  One or more FMC s fail:

  On the illustration below, click on any of the FMCs to simulate its failure.

Abnormal Operation

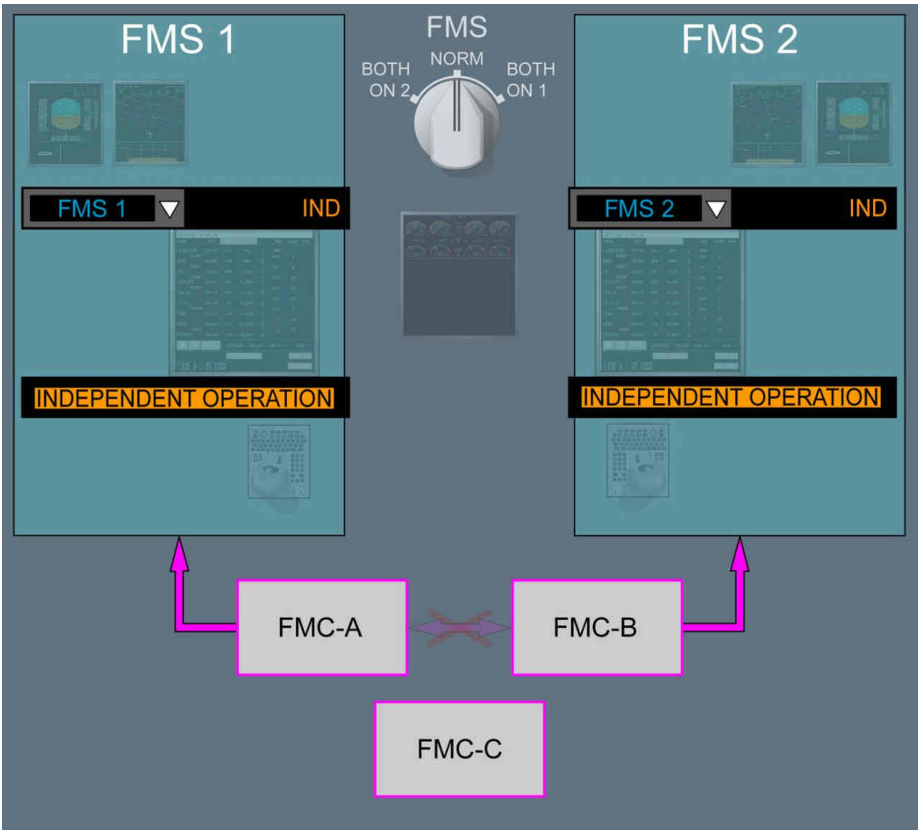


INDEPENDENT MODE

Applicable to: ALL

In normal operation, FMS 1 and FMS 2 are in DUAL mode: The two active FMC s independently calculate data, and then share, compare, and synchronize this data.
The FMS s change from DUAL to INDEPENDENT mode, if there is a communication failure (avionics network problem) between the active FMC s .
When the FMS s are in the INDEPENDENT mode, the FMC s no longer share information. They operate independently.

Independent Operation



L3 At FMC power-up, the active FMC s crosscheck data that needs to be identical for a normal DUAL operation. If one of these data is not identical, the active FMC s will change to INDEPENDENT mode.

The crosschecked data is:
- Navigation, Performance, and Magnetic Variation databases
- OPC and AMI files
- Aircraft and engine type
- FM Operational Program
- Engine manufacturer program pins.

L1 **CONTROLS AND INDICATORS**

ON THE MFD

Both MFD s display:
- IND in the system message area, and
- The INDEPENDENT OPERATION message in the FMS message area.

L3 At FMC power-up, when the active FMC s change to INDEPENDENT mode, due to not identical data, the type of the not identical data is added to the INDEPENDENT OPERATION message.
Refer to FMCs ACFT STATUS DISAGREE INDEPENDENT OPERATION
Refer to FMCs PIN PROG TYPE DISAGREE INDEPENDENT OPERATION

INDEPENDENT OPERATION



L2 The POSITION pages do not display the position data, that is computed by the offside FMC .

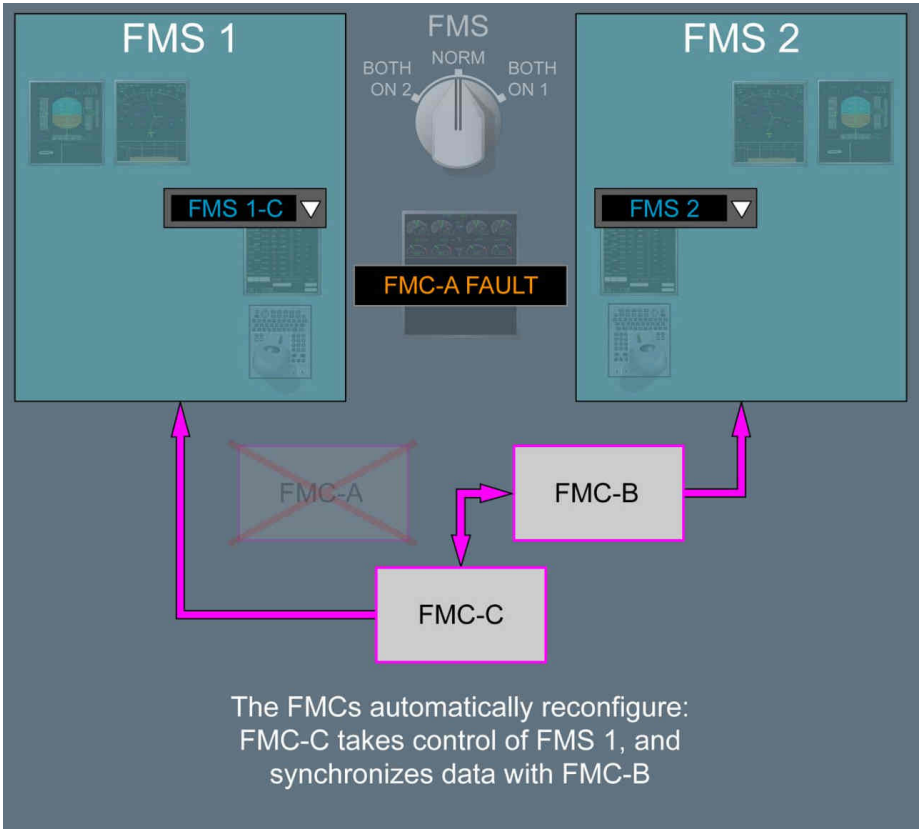
ONE FMC FAULT

Applicable to: ALL

If one of the active FMC s fails, the standby FMC takes over, and synchronizes with the not affected active FMC . FMS 1, and FMS 2 are still operative. However, redundancy is lost, because there is no longer a standby FMC .
If the standby FMC fails, redundancy is lost.

Note: *When the autopilot is engaged, and the onside active FMC fails, the autopilot does not disconnect. However, the flight guidance modes revert to HDG / TRACK and V/S / FPA. The flight crew can engage the managed guidance modes again as soon as the standby FMC has taken control of the failed FMS side.*

Example: FMC A FAULT



CONTROLS AND INDICATORS

ECAM ALERTS

Refer to AUTO FLT FMC -A(B)(C) FAULT

ON THE MFD , AND ND

If the standby FMC fails, the MFD will not indicate the FMC failure.

If one of the active FMC s fails:
- The onside ND displays MAP NOT AVAIL
- The onside VD displays the altitude and distance scales in red

  Note: *If the VD displays the FMS dialog area, the dialog area disappears and the VD displays FMS PAGE NOT AVAIL.*

- If the onside MFD displays an FMS page, the page disappears and the MFD displays FMS PAGE NOT AVAIL.

  As soon as the standby FMC takes over, the MFD displays:
  - FMS 1–C (or FMS 2–C) in the MFD system menu, to indicate that FMC -C will provide data to FMS 1 (or FMS 2)
  - The STATUS page (before engine start), or the ACTIVE / F-PLN page (after engine start)
  - The PLEASE WAIT FOR FMS RESYNCH message in the FMS message area

When the standby FMC becomes operative, the PLEASE WAIT FOR FMS RESYNCH message disappears from the FMS message area.

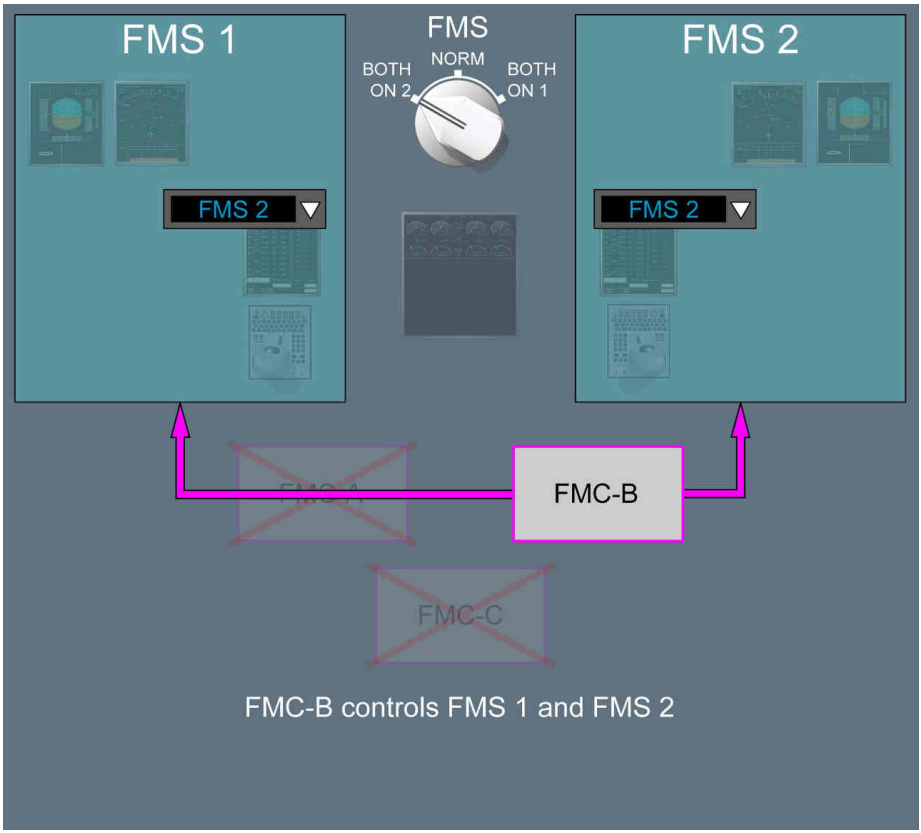
TWO FMC S FAULT (SINGLE MODE)

Applicable to: ALL

If two FMC s fail, one entire FMS side (FMS 1, or FMS 2) is lost: The remaining FMS is in SINGLE mode.
In this case, the flight crew uses the FMS selector to display the data from the not affected FMS side on both sides.

Note: *When the autopilot is engaged, and the onside FMS fails, the autopilot does not disconnect. However, the flight guidance modes revert to HDG / TRACK and V/S / FPA.*
The flight crew can engage the managed guidance modes again as soon as he sets the FMS selector to the right position.

Example: FMC A+C FAULT



L2 If the two active FMC s fail, and the time between the two failures was too short for the standby FMC to synchronize the data, all FMS data is lost: The flight crew then must initialize the FMS again.

L1 **CONTROLS AND INDICATORS**

ECAM ALERTS

Refer to AUTO FLT FMS 1(2) FAULT

ON THE MFD , AND ND / VD

If one FMS side fails:

- The onside ND displays MAP NOT AVAIL: The onside ND no longer displays flight plan, and weather (terrain) data.
- The onside VD displays the altitude and range scales in red color: The onside VD no longer displays flight plan, and weather (terrain) data.

  Note: *If the VD displays an FMS dialog area, the dialog area disappears and the VD displays FMS PAGE NOT AVAIL instead.*

- If the onside MFD displays an FMS page, the page disappears and the MFD displays FMS PAGE NOT AVAIL.

After setting the FMS selector :

- The onside MFD displays the ACTIVE / F-PLN page.
  The MFD System Menu displays the same label as on the offside MFD . This indicates that both sides display data, provided by the same FMC .
- The onside ND displays the OFFSIDE FM CONTROL label: This message indicates that the offside FMC provides all FMS data.
- On the onside EFIS CP , the flight crew can no longer select:
  - The FMS display options: CSTR, WPT, VORD, NDB, and ARPT
  - The ND mode (except the ROSE-VOR, and ROSE-LS modes)
  - The ND range (except the ZOOM position).

  From now on, these display options are driven by the offside EFIS CP .
- The onside ND displays the weather (terrain) data, if the WXR (TERR) option is selected on the onside EFIS CP , and:
  - The onside or offside ND is in ROSE-VOR, or ROSE-LS mode, or
  - The offside ND is in ROSE-NAV mode, and the range is 80 nm .

  In all other cases, the onside ND displays the WXR RNG (TERR RNG) message.
- The onside VD displays the terrain (weather, if the WXR option is selected on the onside EFIS CP) data, if the offside ND is in ROSE-NAV mode, and the range is 80 nm .
  If not, the onside VD displays the TERR INOP (WXR INOP) message.

ALL FMCS FAULT (BACKUP NAVIGATION)

Applicable to: ALL

If all FMC s fail, all FMS data and functions are lost on both sides (FMS 1 and FMS 2).
The flight crew must tune the NAVAIDS via the RMP . (*Refer to For more information on the Standby Radnav*)
The flight crew can create a basic flight plan via the ISIS . (*Refer to For more information on the ISIS*)

All FMC s Fault



CONTROLS AND INDICATORS

ECAM ALERTS

Refer to AUTO FLT FMS 1+2 FAULT

ON THE MFD , AND ND

If all FMC s fail:
- Both ND s display MAP NOT AVAIL
- Both VD s display the altitude and distance scales in red color

Note: If the VD displays an FMS dialog area, the dialog area disappears and the VD displays FMS PAGE NOT AVAIL.

- If the MFD displays an FMS page, the page disappears and the MFD displays FMS PAGE NOT AVAIL.

FMC RESET AND RESYNCHRONIZATION

Applicable to: ALL

AUTOMATIC FMC RESET

When the FMC software cannot work properly or receives instructions to perform impossible operations, it automatically resets.

MINOR RESET

In case of a simple **minor** reset, the FMC recovers all FMS data.
After the data recovery, the FMC resynchronizes with the other active FMC to restore the DUAL mode of operation.

MAJOR RESET

When three resets occur at short intervals, the FMC looses all FMS data. This is called a **major** reset. To recover the FMS data, the FMC will resynchronize with the healthy FMC, if any.

LATCH

When four resets occur at short intervals, the FMC is latched and the FMC A(B)(C) FAULT message is triggered. The standby FMC, if available, will take over.

Note: In the case of an FMC latch, the flight crew applies the ECAM procedure.

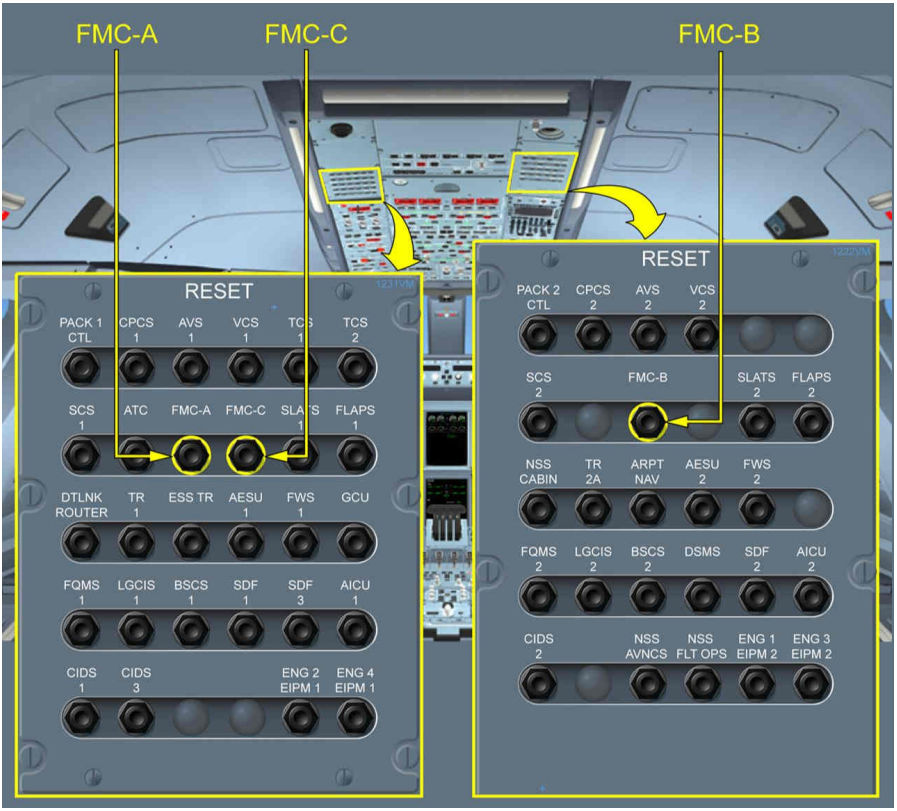
AUTOMATIC FMC RESYNCHRONIZATION

After a reset, the FMC resynchronizes with the healthy FMC to recover all FMS data and/or to restore the DUAL mode of operation.
If several resynchronizations occur and fail at short intervals, the active FMCs will start working in the INDEPENDENT mode.

MANUAL FMC RESET

On rare occasions, the FMC may require manual resetting.
The flight crew should reset one FMC at a time.
The flight crew uses the three FMC reset buttons on the overhead panel.

Reset Buttons



FMC MALFUNCTION

When the flight crew detects an FMC malfunction (with or without the associated FMC-A(B)(C) FAULT alert on the ECAM), the flight crew may try to restore the FMS functions by resetting the FMC. To reset the FMC, the flight crew pulls and pushes the reset button.

FMC IN ABNORMAL CONFIGURATION

Before engine start, if all FMCs are operative, the three FMCs ensure automatically the normal operation configuration:

- FMC-A on FMS 1
- FMC-B on FMS 2
- FMC-C in standby.

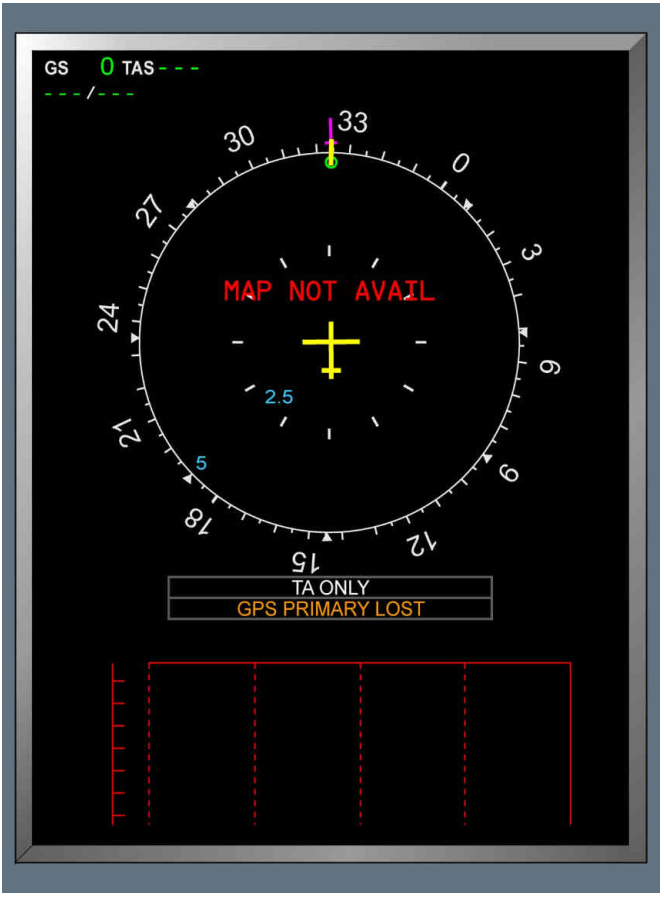
After engine start, the flight crew may detect that the three FMCs are operative, but in an abnormal configuration (for example: FMC-C on FMS 1, and FMC-A in standby). The flight crew can restore the normal operation configuration by resetting one of the FMCs, that is not in the right configuration. To perform this manual re-configuration, the flight crew pulls the reset button more than 10 s, and then pushes the reset button.
Example: FMC-C is on FMS 1, FMC-B on FMS 2, and FMC-A in standby, and all three FMCs are healthy. When the flight crew resets FMC-A, FMC-A will take over control of FMS side 1, and FMC-C will return to standby.

FMS STATUS DURING FMC RESET AND RESYNCHRONIZATION

During an FMC reset and resynchronization:

- The ND displays the MAP NOT AVAIL message, and the VD displays the altitude and distance scales in red.

The ND/VD During Reset



- The MFD temporarily displays FMS PAGE NOT AVAIL.

During the resynchronization, the MFD displays:

- The STATUS page

- The PLEASE WAIT FOR FMS RESYNCH message in the FMS message area.

MFD During Reset and Resynchronization



After FMC resynchronization, the MFD displays:

- The STATUS page before engine start, or
- The ACTIVE / F-PLN page after engine start.

- The auto-tuning of the NAVAIDS is lost on the failed FMS side.
  After FMC resynchronization, the auto-tuning is recovered.
- The managed modes may be lost: In this case, the AP/FD modes revert to HDG/TRACK and V/S / FPA.
  After FMC resynchronization, the flight crew should push the HDG/TRK knob and the ALT knob to engage the managed modes again.

ECAM ALERTS

Applicable to: ALL

AUTO FLT FMC-A(B)(C) FAULT (*Refer to procedure*)

AUTO FLT FMS 1(2) FAULT (*Refer to procedure*)

AUTO FLT FMS 1+2 FAULT (*Refer to procedure*)

T.O SPEEDS NOT INSERTED (*Refer to procedure*).

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PERFORMANCE DATA NOT CLEARED AT F-PLN RE-INITIALIZATION

Applicable to: ALL

DESCRIPTION

When a flight plan exists, and the flight crew enters the city-pair again, the flight plan re-initializes. The FMS deletes the existing flight plan data. However, the FMS does not delete the associated performance data.
Refer to TDU

ERRONEOUS FUEL PREDICTIONS IN THE CASE OF DESCENT WITH TWO ALTITUDE CONSTRAINTS

Applicable to: ALL

DESCRIPTION

If the flight plan has two altitude constraints for the descent, the flight crew may notice erroneous FMS fuel predictions.

EXPLANATION

If the flight plan has two altitude constraints for the descent, the FMS may define a geometric segment between both altitude constraints. If there is a deceleration required within the geometric segment, the FMS may consider that the geometric segment is too steep to fly without speedbrakes. In this case, the FMS tags the entire geometric segment as a speedbrake segment: The FMS assumes that during the entire segment half of the speedbrakes are extended, even for the parts where no deceleration is planned. As a consequence, the FMS will predict an increased thrust for the entire geometric segment. This may lead to erroneous fuel predictions. (e.g. a geometric segment of 160 nm may lead to an error of1.3 t for the fuel prediction at destination).

Note: When flying the geometric segment, the predictions become better as the aircraft approaches the end of the geometric segment, and turn back to normal when the aircraft has sequenced the second altitude constraint.

PROCEDURE

If the flight crew suspects this behavior in preflight, or during the flight, they can delete and enter again one altitude constraint in descent and compare the fuel predictions of the flight plan with and without the geometric segment. This allows the flight crew to evaluate the impact of the geometric segment on the fuel predictions.
It is not recommended to permanently delete altitude constraints that are stored in the navigation database.

REF IDENT ENTRY NOT ALLOWED ON EQUI-TIME POINT PAGE

Applicable to: ALL

DESCRIPTION

When the flight crew tries to enter a reference ident in REF 1(2) field on the EQUI-TIME POINT page, the FMS may erroneously reject the entered ident and display the NOT ALLOWED message in the FMS Message Area.
Refer to TDU .

EXPLANATION

Due to a misbehavior of the FMS , the reference ident may be still kept in the FMS memory after an automatic clear of REF 1(2) field (e.g. following the activation of a secondary flight plan).
The consequence is that in some cases, the FMS may consider that the reference ident is already selected in the other reference entry field and therefore reject the entered reference ident and display the NOT ALLOWED message.

PROCEDURE

If such behavior is suspected, the flight crew can:
- Enter the desired reference ident on the other MFD . When both MFD s synchronize, the flight crew will get the EQUI-TIME POINT computation results on both MFD s, or
- Temporarily enter and validate two other valid reference idents in REF 1 and REF 2 fields on the affected MFD . This will properly “erase” the reference ident from the FMS memory. Then, the flight crew will be able to enter again the desired reference idents in REF 1 and REF 2 fields.

REVERSION FROM MANAGED TO SELECTED SPEED TARGET AFTER MAP SEQUENCING IN NPA

Applicable to: ALL

DESCRIPTION

In non precision approaches, the managed speed mode will revert to the selected speed mode 5 s after sequencing the MAP (Missed Approach Point), if the Vapp is the one computed by the FMS .
This misbehavior does not occur if, before sequencing the MAP (e.g during descent preparation), the flight crew manually enters the Vapp on the APPR panel of the FMS PERF page.

EXPLANATION & OPERATIONAL CONSEQUENCES

Due to a misbehavior of the FMS L2 standard, the Vapp is no longer computed 5 s after sequencing the MAP (Missed Approach Point).
This misbehavior has no consequence on precision approaches.

L2 There is no effect on precision approaches, because:
- The Vapp is memorized by the PRIM below 700 ft RA until approach modes are disengaged/disarmed, and
- The MAP is at the runway threshold.

L1 On non precision approaches, 5 s after sequencing the MAP :

- The managed speed target reverts to selected speed target.
- The selected speed is the current aircraft speed.

L2 The selected speed target is limited in lower value by VLS . Before the reversion from managed speed to selected speed, the managed speed target was limited in lower value by VLS + 5 kt .

L1 - The ground speed mini function is lost.
For more information on the ground speed mini function, *Refer to 00009382 **Not found** .*

This misbehavior has no consequence on GO-AROUND guidance.

L2 In the case of a GO-AROUND after the MAP , the PRIM will behave as usual:
- SRS GA and GA TRK engage
- There is a reversion from selected speed target to managed speed target
- The managed speed target is the memorized aircraft speed at SRS GA engagement
- But the lower speed limit will not be the usual one. The speed target for GO AROUND SRS will be limited in lower value by VLS + 5 kt instead of being limited by Vapp.

L1 This misbehavior is cancelled by the next FMS L3 standard.

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Electrical Supply
FMC-A	DC ESS
FMC-B	DC 2
FMC-C	DC 1

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AIRCRAFT SYSTEMS

23 - COMMUNICATION

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INTRODUCTION

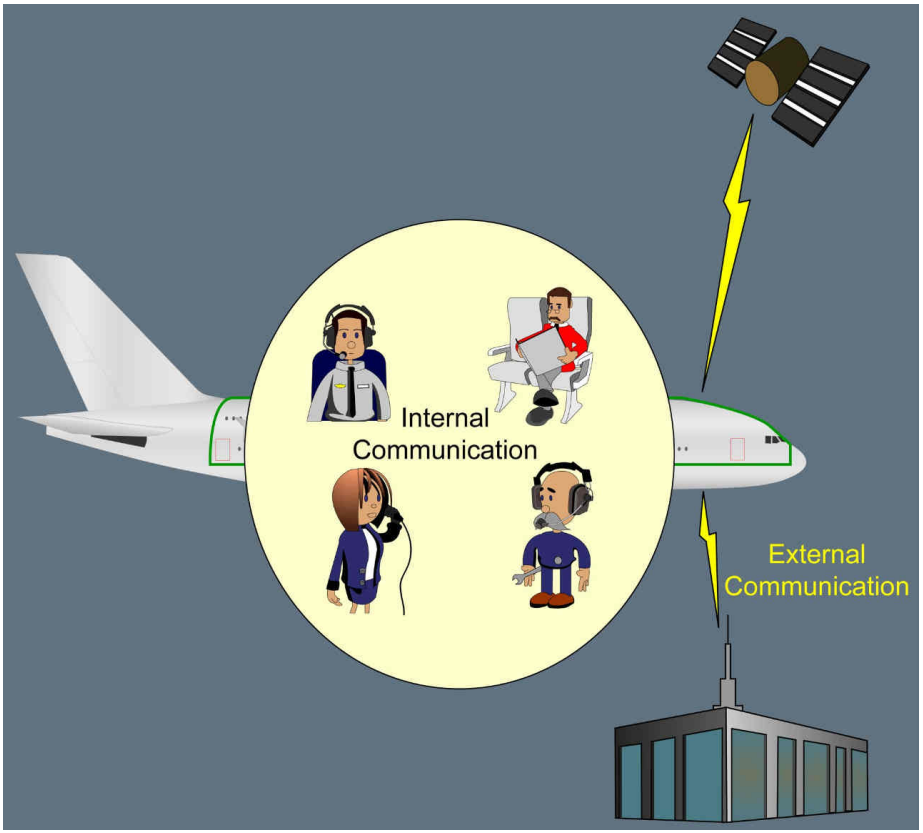
Applicable to: ALL

The communication system enables:

- Internal communication between the:
  - Captain
  - First Officer
  - Third and fourth occupants
  - Cabin crew
  - Ground crew
  - Passengers (i.e. for flight or cabin crew announcements)

  Internal communication is possible via the flight, cabin, and service interphones, and via the Passenger Address (PA).
- External communication in voice and data modes, via the VHF , HF , and Satellite Communication (SATCOM) systems.

Communication System Overview

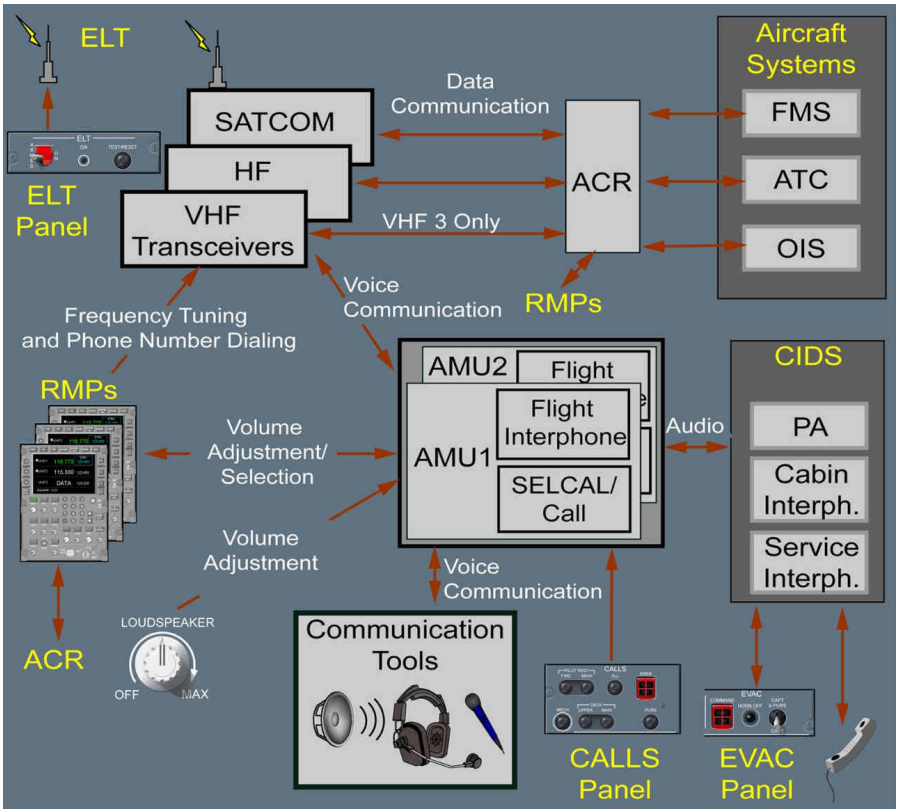


COMMUNICATION SYSTEM ARCHITECTURE

Applicable to: ALL

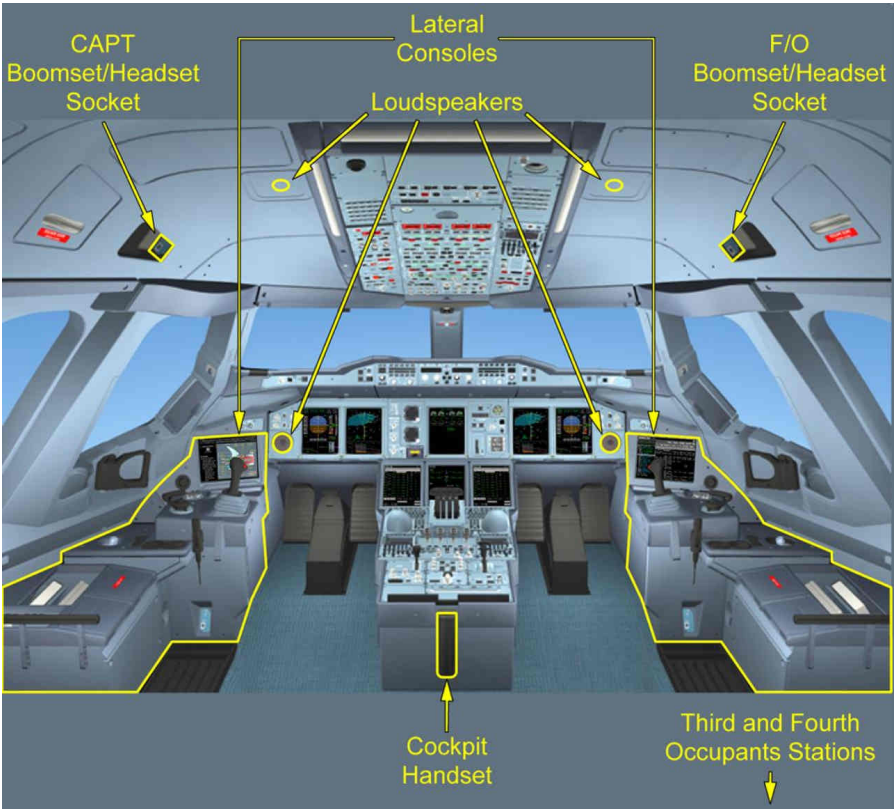
COMMUNICATION SYSTEM ARCHITECTURE

Communication System Architecture



COMMUNICATION EQUIPMENT

Communication Equipment Cockpit View



The cockpit has the following equipment:

- Four loudspeakers

L2 The two loudspeakers on the left are for communication broadcasts that the Captain selects on the RMP.

The two loudspeakers on the right are for communication broadcasts that the First Officer selects on the RMP.

L1 - One Push-To-Talk switch (PTT sw) on each one of the two sidesticks
- Three boomsets
- Four headsets

- Three hand microphones, each with a PTT sw

L3 Communication via the hand microphone takes priority over communication via the boomset or via the oxygen mask microphone.

L1 - One microphone on the oxygen mask of the Captain (CAPT), First Officer (FO) and third occupant
- One cockpit handset.

RADIO MANAGEMENT PANEL (RMP)

There are three Radio Management Panels (RMP s) in the cockpit. The flight crew uses these RMPs to control the communication system.

On each RMP , the flight crew can:
- Select the communication mean(s) in transmission and/or reception mode(s)
- Tune HF and VHF frequencies
- Dial SATCOM Telephone (TEL) numbers
- Select voice or data mode
- Monitor and change data mode parameters
- Enter the Squawk (SQWK) code
- Select Standby Radio Navigation (STBY RAD NAV) and tune the NAVAID s (only via RMP 1 and RMP 2).
  For information on radio navigation tuning, *Refer to DSC-22-FMS-10-30-20-22FMS3020A Radio Navigation Tuning - Introduction* .
  For information on standby radio navigation, *Refer to DSC-22-FMS-30 All FMCs FAULT (Backup Navigation)* .
- Adjust the volume for voice communication and for NAVAID identification.

In addition to the RMP s, the flight crew uses:
- The CALLS panel to generate visual, and aural call indications (in the cabin and/or on the steering nose gear panel) via the flight and cabin interphones
- The Evacuation (EVAC) panel, to initiate evacuation of the aircraft
- The Emergency Locator Transmitter (ELT) panel, to control the ELT.

For more information on the RMP s, *Refer to DSC-23-10-10-20 RMP Architecture* .

L2 AUDIO MANAGEMENT UNIT (AMU)

There are two Audio Management Units (AMUs) in the aircraft. The AMUs are located in the main backward avionic bays.

The AMUs manage:
- communication transmission / reception of all the radio communication and radio navigation facilities,
- Interphone communication between crew members.

L3 The AMUs distribute, and adjust the volume of audio signals (analog) between the communication equipment and the:
- HF/VHF transceivers
- SATCOM system
- SELCAL
- NAVAID receivers (for NAVAID identification in STBY RAD NAV)
- Flight interphone
- Cabin Intercommunication Data System (CIDS) that includes:
  - The cabin interphone
  - The service interphone
  - The Passenger Address (PA).

L2 *Note: The cockpit handset is directly connected to the CIDS.*

L3 AVIONICS COMMUNICATION ROUTER (ACR)

The RMPs also transmit flight crew selections to the Avionics Communication Router (ACR). The ACR controls datalink communications for Air Traffic Control (ATC) and Airline Operational Communications (AOC) applications, and is hosted in CPIOM D.

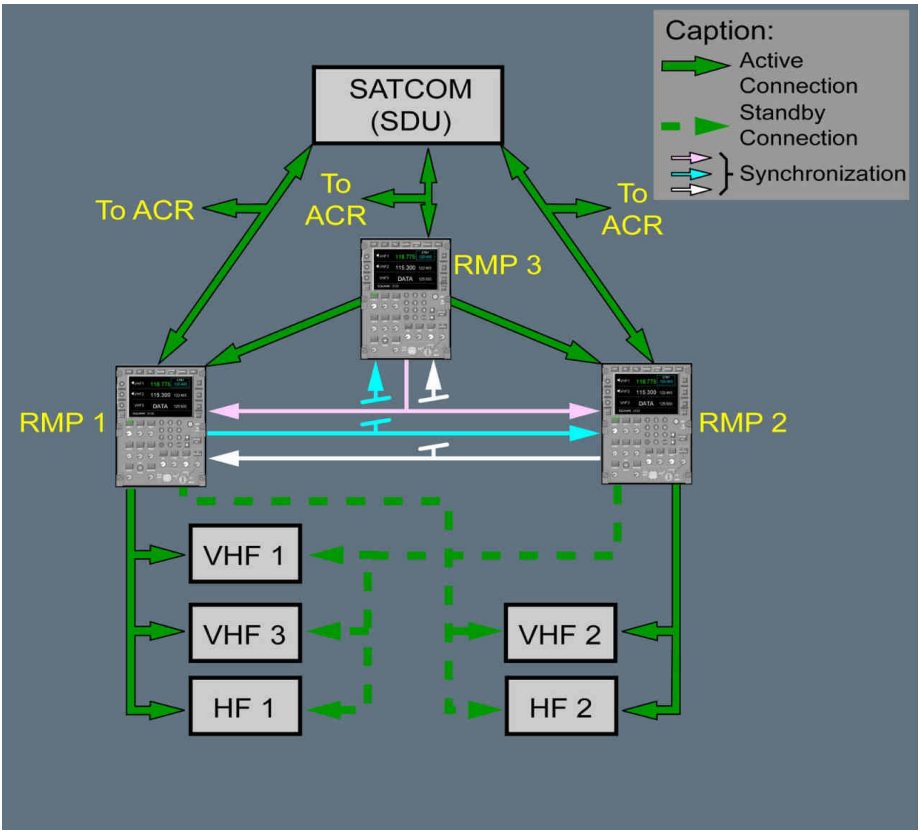
Note: The ACR interfaces with:

- *The Flight Management System (FMS)*
- *The ATC datalink system*
- *The Onboard Information System (OIS).*

RMP ARCHITECTURE

Applicable to: ALL

RMP Architecture



RMP SYNCHRONIZATION

The RMPs share selections and inputs to enable the flight crew to control all radio communication via any RMP.

L2 The RMPs share mainly the following data:
- Active and standby frequencies
- SATCOM channels and their status (e.g. logged on/off, cabin calls enabled/disabled, connected)
- Active function displays (e.g. Amplitude Modulation (AM))

L1 However, it is possible to display a different page on each RMP.

ACTIVE COMMUNICATION

In normal operation:

- The Captain controls communication via RMP 1
- The First Officer controls communication via RMP 2
- The third and the fourth occupants control communication via RMP 3.

RMPs 1 and 2 are directly connected to the VHF and HF transceivers.
L2 RMP 1 transmits all commands to VHF 1, VHF 3 and HF 1.
RMP 2 transmits all commands to VHF 2 and HF 2.
L1 RMP 3 transmits commands to RMP 1 or RMP 2, via the appropriate control connection. RMP 1 and/or RMP 2 then send these commands to the appropriate transceivers.
All three RMPs are directly connected to the SATCOM system.

STANDBY CONTROL

If a connection or an RMP fails, the communication system can automatically reconfigure to ensure continued communication control.
L3 Standby connections are activated instead of the failed connections.
L1 RMP 3 can be used, as a backup, instead of the failed RMP (not for STBY RAD NAV control).
For information on reconfiguration with RMP failures or with connection failures, refer to the abnormal operation chapter.
If the FMS can no longer control the radio NAVAIDS (e.g. FMS failure), RMPs 1 and 2 can also be used, as a backup, to tune the NAVAIDS.

Flight Interphone

FLIGHT INTERPHONE

Applicable to: ALL

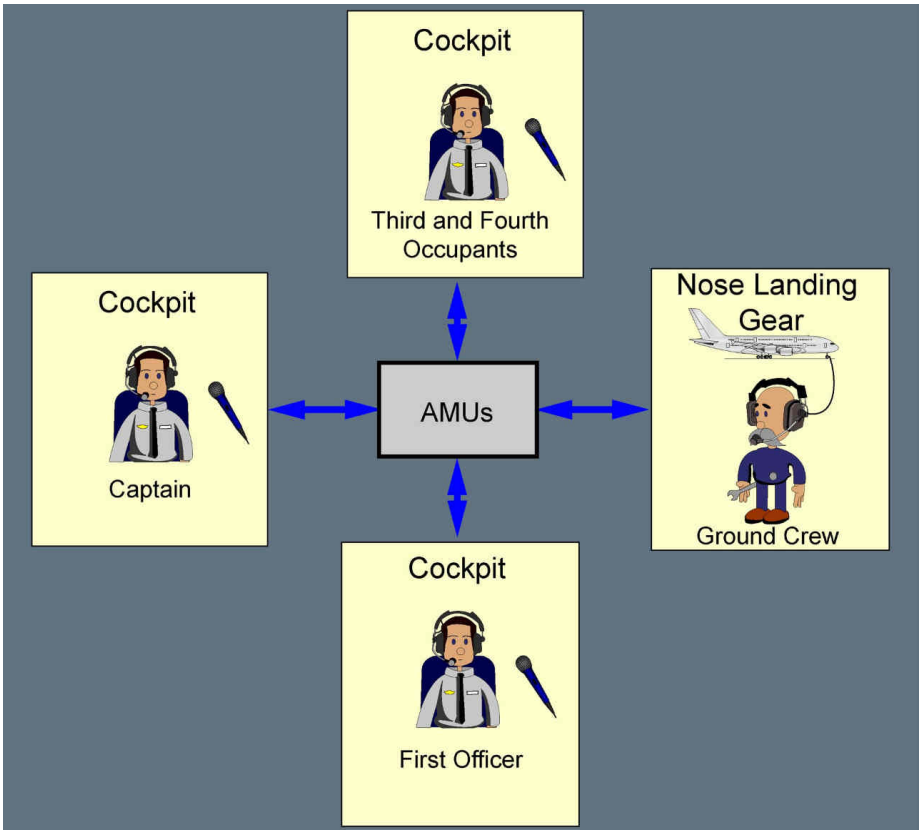
L3 The Audio Management Units (AMUs) host the flight interphone.

L1 The flight crewmembers use the flight interphone to communicate with each other, and with the ground crew via the:

- Boomsets/headsets
- Hand microphones
- Microphones on the oxygen masks.

The ground crew can communicate with the flight crew via the FLT INT jack on the maintenance nose landing gear panel.

Flight Interphone



Before transmitting via the flight interphone, the flight crewmember must:
- Press and release the INT reception knob to the out position
- Press the INT transmission key
- Press a PTT sw or set the INT/RAD sw to RAD to transmit.

For permanent transmission (i.e. conference mode):
- Press and release the INT reception knob to the out position
- Set the INT/RAD sw to INT.

Cabin Interphone

CABIN INTERPHONE

Applicable to: ALL

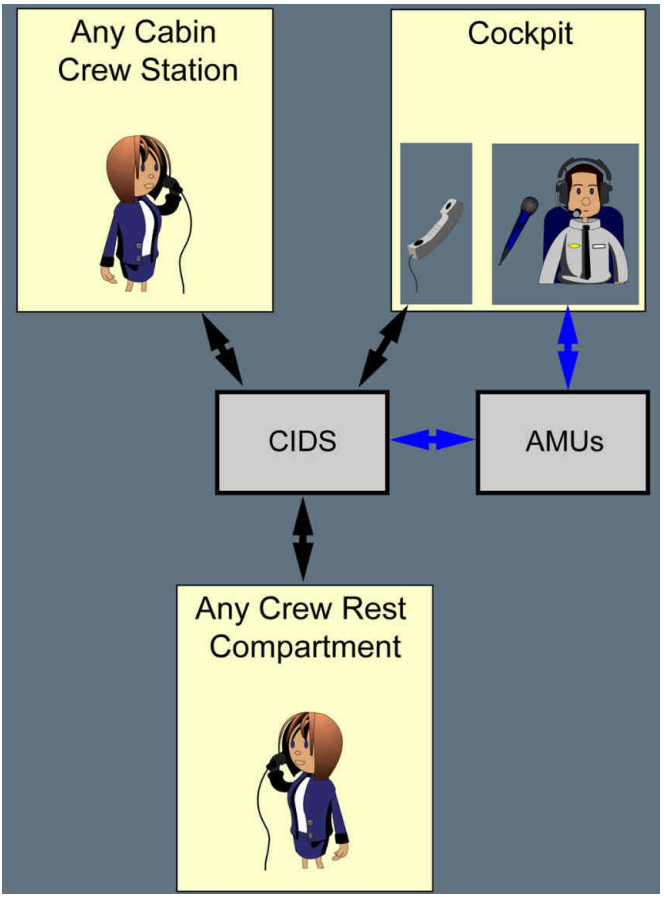
L3 The Cabin Intercommunication Data System (CIDS) hosts the cabin interphone.

L1 The flight crew can use the cabin interphone to communicate with the cabin crew at any cabin crew station, and with a crewmember in a crew rest compartment via the:

- Boomsets/headsets
- Hand microphones
- Microphones on the oxygen masks
- Cockpit handset. For more information *Refer to DSC-23-10-20-20-10 Cockpit Handset* .

Note: *Cabin crewmembers can also use the cabin interphone to communicate with other cabin crewmembers that are at different attendant stations or in the crew rest compartment.*

Cabin Interphone



Before transmitting via any other appropriate equipment, the flight crewmember should:
- Press and release the CAB reception knob in the out position
- Press the CAB transmission key
- Press a PTT sw or set the INT/RAD sw to RAD to transmit.

COCKPIT HANDSET DESCRIPTION

Applicable to: ALL

Impacted DU: 00016492 Cockpit Handset

COCKPIT HANDSET DESCRIPTION

The flight crew can use the cockpit handset:
- For public address
- For internal communication to each handset (i.e Cabin or CCRC handset)

Note: The flight crew must use the PILOT REST pb on the overhead CALL panel to call the Flight Crew Rest Compartment (FCRC).

- For communication with ground crew to each service area.

L3 The company can customize the Cabin Intercommunication Data System (CIDS) through the Cabin Assignment Module (CAM). In accordance with the CIDS customisation, the crew could have access to optional functions.

L1 For more information on handset description and utilization, *Refer to DSC-23-10-20-20-10 Cockpit handset layout*

Impacted by TDU: 00023043 Cockpit Handset

COCKPIT HANDSET DESCRIPTION

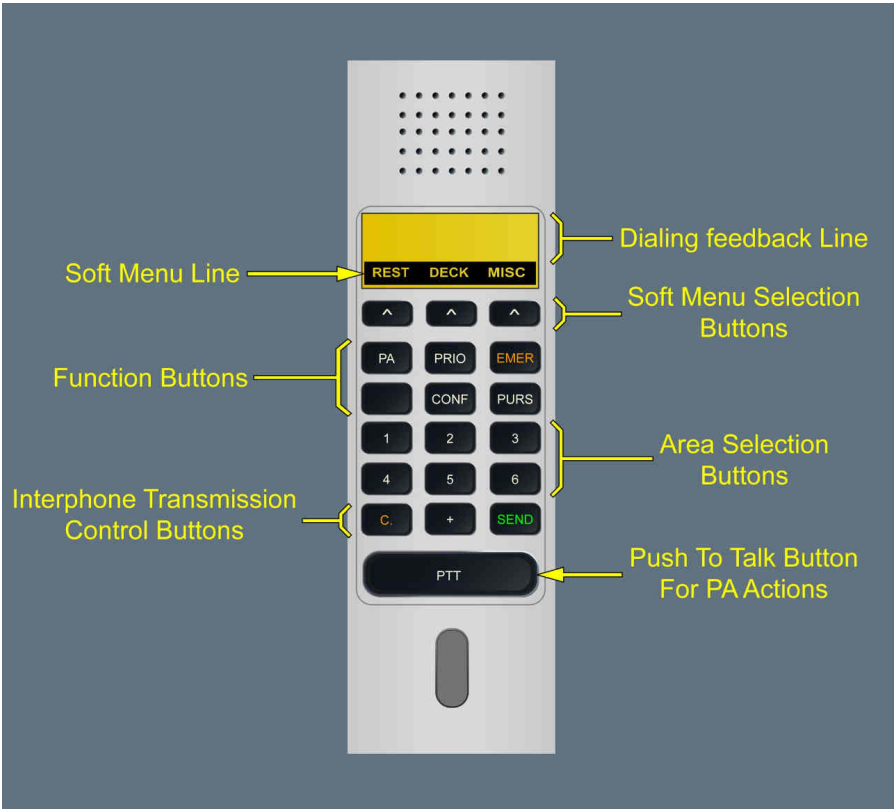
The flight crew can use the cockpit handset:
- For public address
- For internal communication to each handset (i.e. cabin, FCRC or CCRC handset)
- For communication with ground crew to each service area.

L3 The company can customize the Cabin Intercommunication Data System (CIDS) through the Cabin Assignment Module (CAM). In accordance with the CIDS customisation, the crew could have access to optional functions.

L1 For more information on handset description and utilization, *Refer to DSC-23-10-20-20-10 Cockpit handset layout*

COCKPIT HANDSET LAYOUT

Cockpit Handset Layout



SOFT MENU LINE

Displays the various function that can be selected using the soft menu selection button. After activation of a call function, this line give the transmission state of the call.

DIALING FEED-BACK LINE

Displays data system state.

SOFT MENU SELECTION BUTTONS

Push any of the soft menu selection buttons to access the relevant menu or function.

FUNCTION BUTTONS

PUBLIC ADDRESS (PA) BUTTON

Push the PA button access the public address function.

Following the access to the PA function, the flight crew can choose a specific zone for public address using:
- area selection button, or
- sof menu selection button

To transmit voice message, the flight crew will push and keep pushed the PTT button .

PRIO BUTTON

Push to give priority to the call.

L2 *Note: For the handset operation, the following order of priority is defined (level 1 is the highest priority) :*
- *Level 1: Emergency call (EMER)*
- *Level 2: Calls from cockpit*
- *Level 3: Priority calls (PRIO)*
- *Level 4: Purser calls (PURS)*
- *Level 5: Conference calls (CONF)*
- *Level 6: Normal calls*

For public address operation, the following order of priority is defined (not combine with interphone) :
- *Level 1: PA from AMU (cockpit)*
- *Level 2: Direct public address (Direct PA)*
- *Level 3: Priority public address (PRIO PA)*
- *Level 4: Normal public address (PA)*

L1 CONF BUTTON

Push the conference interphone function connects several cabin crew or ground crew stations for communication.
The flight crew chooses the desired zone for conference interphone calls by using the soft menu selection button and pushes the SEND button to activate the selected conference call.

PURS BUTTON

Push to call the purser. The flight crew will push the SEND button after PURS button to activate the purser call.

EMER BUTTON

Press to initiate an emergency call to all the handsets in the cabin.
For activation of the emergency call the flight crew must press the EMER button at least 5 s
L2 This button also requires higher pressure than the others.
L1 The emergency call has priority over any other function or call.

AREA SELECTION BUTTONS

Press the correspondent key, to access the desired zone for interphone function or per Public Address.

INTERPHONE TRANSMISSION BUTTONS

SEND BUTTON

Press to call the selected interphone addressees.

C. BUTTON

Press to undo or delete the last selection menu or stop the conversation.

PUSH TO TALK BUTTON

Press to directly access the Public Address (PA) function for the entire aircraft.
L2 This mode overrides all other active announcements.
L1 When specific areas are selected before the PTT button is pressed, announcements will be made on these areas only.

Passenger Address (PA)

PASSENGER ADDRESS (PA)

Applicable to: ALL

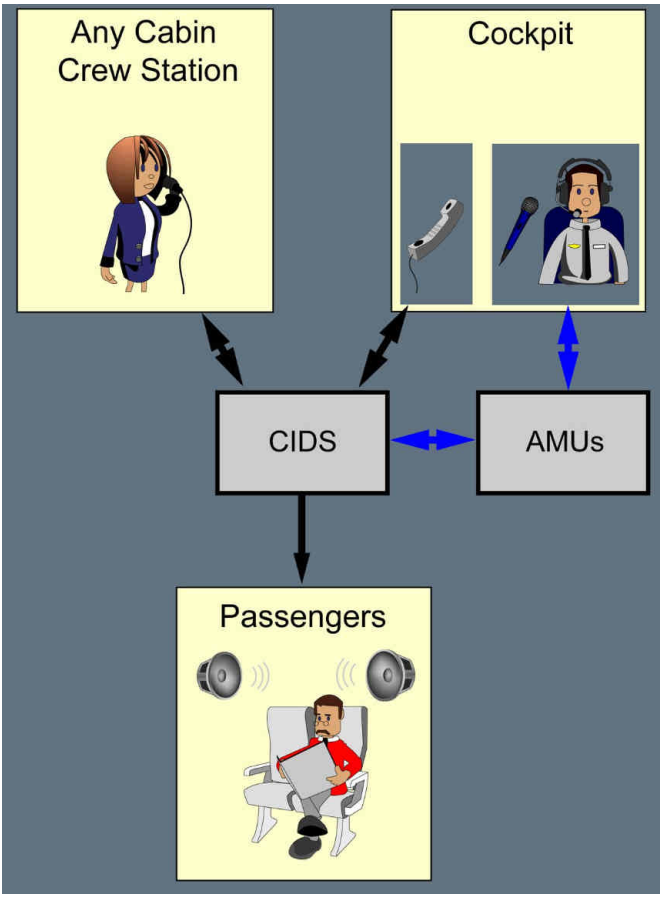
L3 The Cabin Intercommunication Data System (CIDS) hosts the PA .

L1 The flight crew, and the cabin crew can use the PA to make announcements to the passengers via the:

- Boomsets/headsets
- Hand microphones
- Microphones on the oxygen masks
- Cockpit handset. For more information *Refer to DSC-23-10-20-20-10 Cockpit Handset* .

For more information on the PA, *Refer to CCOM/05-20-10 General Information about the PA System* .

PA



Before making an announcement via any other appropriate equipment, the flight crewmember should:

- Press and release the PA reception knob to the out position
- Press and hold the PA transmission key on the RMP to make the announcement.

Note: *It is not necessary to use a PTT sw .*

Cabin Intercommunication Data System

SERVICE INTERPHONE

Applicable to: ALL

L3 The Cabin Intercommunication Data System (CIDS) hosts the service interphone.

L1 The flight crew can use the service interphone to communicate with the cabin crew at any cabin crew station, and with the ground crew via the:

- Boomsets/headsets
- Hand microphones
- Microphones on the oxygen masks
- Cockpit handset. For more information *Refer to DSC-23-10-20-20-10 Cockpit Handset* .

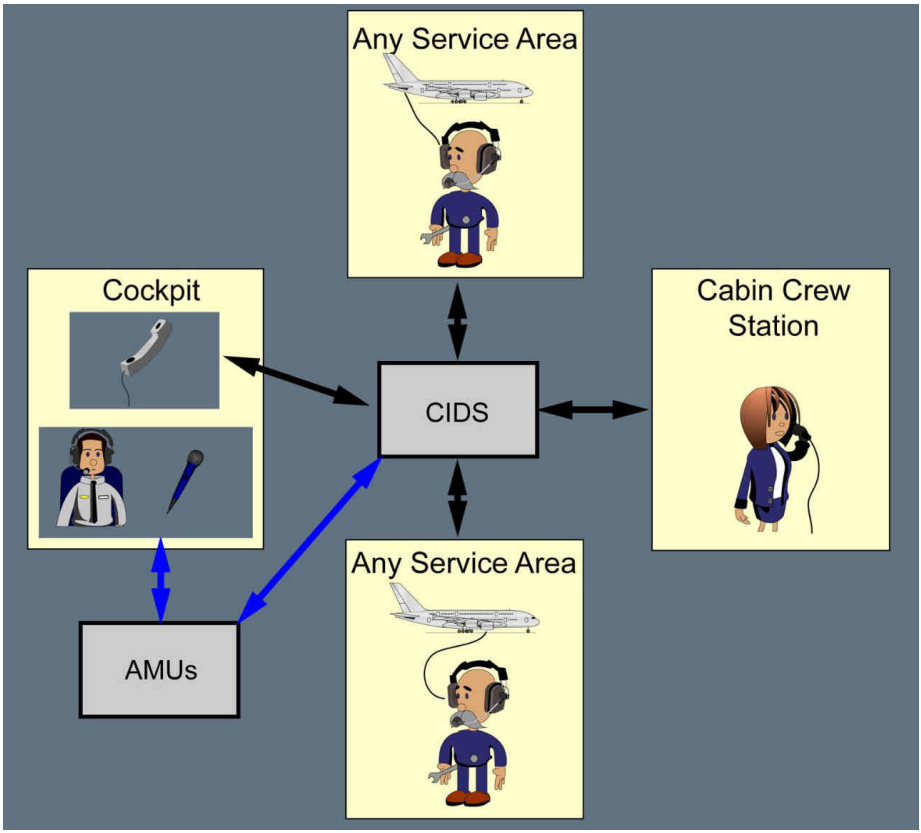
The ground crew can communicate with the flight crew via any SVCE INT jack at any service area.

L2 There is a SVCE INT jack:

- At the nose landing gear maintenance panel
- In the APU bay
- In the main avionics bay
- On the external surface of each engine air intake
- At several locations on the fuselage.

L1 *Note:* *Ground crewmembers can also use the service interphone to communicate with other ground crewmembers that are at different service areas.*

Service Interphone



Before transmitting via any other appropriate equipment, the flight crewmember should:

- Press and release the CAB reception knob to the out position
- Press the CAB transmission key
- Press a PTT sw or set the INT/RAD sw to RAD to transmit.

Radiocommunication

VHF

Applicable to: ALL

The communication system has three VHF transceivers, and each transceiver has its own antenna.
L2 *Refer to Antenna locations*
L3 Each VHF transceiver operates within a frequency band that ranges from 118.000 MHz to 136.975 MHz, by increments of 8.33 kHz.
L1 VHF 1 and VHF 2 are for short-range communication in voice mode only.
VHF 3 is mainly for short-range communication in data mode. VHF 3 can be a backup for communication in voice mode.

L3 Data communication is automatically transferred to the SATCOM , or to the available HF transceiver, if:
- VHF 3 is in voice mode, or
- The aircraft is outside the range of a VHF station.

The Operator can customize the configuration software that defines the policy for Avionics Communication Router (ACR) transfers.
L1 For information on how to tune the RMP , *Refer to DSC-23-40 How to Tune a Radio Frequency* .
For information on how to switch to DATA mode, *Refer to DSC-23-40 How to Switch to DATA Mode* .
For information on how to modify the VHF datalink provider, *Refer to DSC-23-40 How to Modify the VHF Datalink Provider* .

HF

Applicable to: ALL
Impacted DU: 00002316 HF

The communication system has two HF transceivers that operate either in Amplitude Modulation (AM) or Single Side Band (SSB) mode.
L2 The flight crew can select the AM or SSB mode via the HF page on any RMP .
L1 HF 1 and HF 2 are for long-range communication in voice or data mode.

Note: *If the flight crew wants to use the HF in data mode, the flight crew should preferably use the HF 1 in data mode.*

L3 Each HF transceiver operates within a frequency band that ranges from 2.800 MHz to 23.999 MHz, by increments of 1 kHz.
L1 The two transceivers use the same antenna, and cannot transmit information simultaneously.
L2 *Refer to Antenna locations*

L1 If the flight crew tries to transmit voice messages simultaneously via HF 1 and HF 2, an aural alert is generated via the headsets and the loudspeakers.
L2 In case of simultaneous voice and data transmission, voice communication takes priority over data communication .
However, simultaneous reception is possible, when no HF is transmitting.
L3 On ground, HF communication in data mode is automatically inhibited. For maintenance purposes, the ground crew can override this inhibition using the GND HF DATALINK pb-sw on the overhead maintenance panel.
L1 For information on how to tune the RMP , *Refer to DSC-23-40 How to Tune a Radio Frequency* .
For information on how to switch to DATA mode, *Refer to DSC-23-40 How to Switch to DATA Mode* .

HF

Applicable to: ALL
Impacted by TDU: 00023570 HF

The communication system has two HF transceivers that operate either in Amplitude Modulation (AM) or Single Side Band (SSB) mode.
L2 The flight crew can select the AM or SSB mode via the HF page on any RMP .
L1 HF 1 and HF 2 are for long-range communication in voice or data mode.
L3 Each HF transceiver operates within a frequency band that ranges from 2.800 MHz to 23.999 MHz, by increments of 1 kHz.
L1 The two transceivers use the same antenna, and cannot transmit information simultaneously.
L2 *Refer to Antenna locations*
L1 If the flight crew tries to transmit voice messages simultaneously via HF 1 and HF 2, an aural alert is generated via the headsets and the loudspeakers.
L2 In case of simultaneous voice and data transmission, voice communication takes priority over data communication .
However, simultaneous reception is possible, when no HF is transmitting.
L3 On ground, HF communication in data mode is automatically inhibited. For maintenance purposes, the ground crew can override this inhibition using the GND HF DATALINK pb-sw on the overhead maintenance panel.
L1 For information on how to tune the RMP , *Refer to DSC-23-40 How to Tune a Radio Frequency* .
For information on how to switch to DATA mode, *Refer to DSC-23-40 How to Switch to DATA Mode* .

SATCOM

SATCOM

Applicable to: ALL

The flight crew, the cabin crew, and the passengers use the SATCOM to communicate with ground, in voice and data modes.
There are six voice channels and one data channel. The voice channels are for cockpit and cabin telephone (TEL) communication.
L2 However, on two voice channels, cockpit communication has priority over cabin communication, provided that the telephone number is assigned a higher priority than “PUBLIC”.
For information on priority levels, *Refer to priority levels* .
L1 For information on how to dial a telephone number, *Refer to DSC-23-40 How to Dial a Telephone Number* .
For information on how to disable telephone calls from the cabin, *Refer to DSC-23-40 How to Disable Telephone Calls from the Cabin*

The SATCOM has:
- An antenna to exchange signals with Ground Earth Stations (GES), via geostationary satellites
L2 *Refer to Antenna locations*
L3 - A Satellite Data Unit (SDU), that encodes/decodes the voice and data signals that are exchanged between the GES and the aircraft systems
The SDU interfaces with the RMP s, the AMU s, and the ACR .
Voice communication is exchanged via the AMU s, and data communication via the ACR .
The SDU also receives aircraft position and aircraft attitude data from the Air Data and Inertial Reference Units (ADIRU s), in order to send an appropriate steering command to the BSU .
- A High Power Amplifier (HPA), that amplifies SDU signals
- A Beam Steering Unit (BSU), that electronically steers the antenna to track the selected satellite.

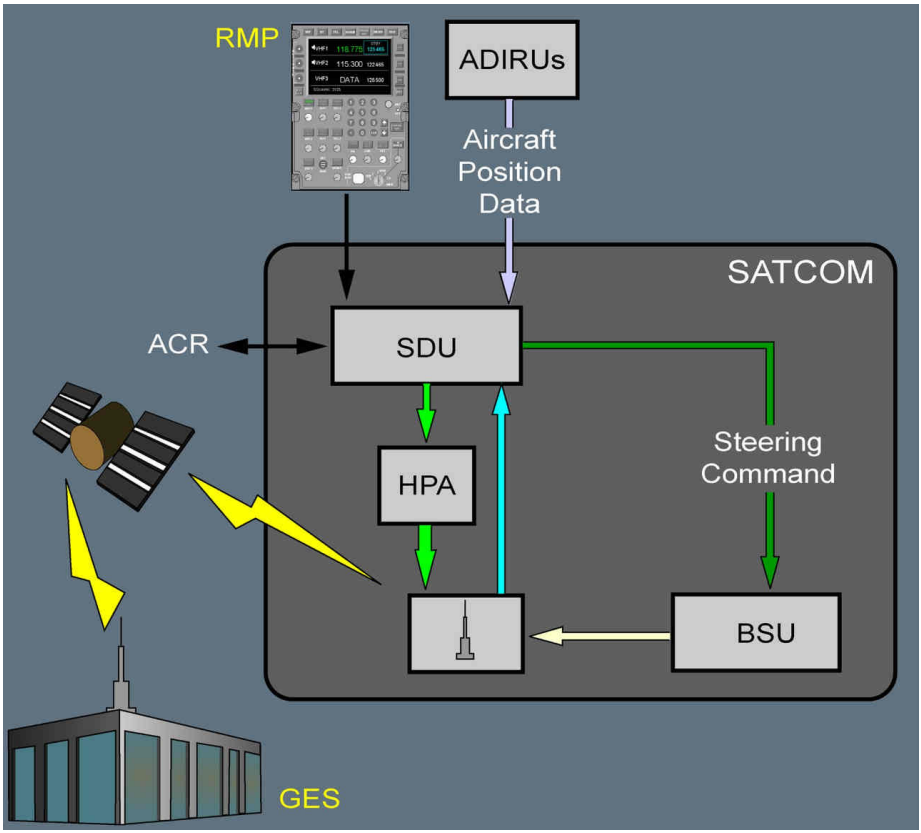
The SATCOM system is not available, when the position of the aircraft exceeds a latitude of 80 degrees North or 80 degrees South.

L1 The flight crew can select either one of the following functions for SATCOM connection to a GES :
- The AUTO LOG ON function
The SATCOM automatically selects the satellite and the GES .
- The MANUAL LOG ON function
The flight crew manually selects the satellite and the GES .

For information on how to automatically log on the SATCOM , *Refer to DSC-23-40 How to LOG ON to the SATCOM Automatically* .
(For information on how to manually log on the SATCOM , *Refer to DSC-23-40 How to LOG ON to the SATCOM Manually* .

The flight crew uses the LOG OFF function to disconnect the SATCOM .

SATCOM



SELCAL

SELCAL

Applicable to: ALL

The Selective Calling (SELCAL) identifies incoming VHF or HF calls that have the aircraft-specific SELCAL code. SELCAL then triggers visual and aural alerts:

- On the RMP, the CALL light of the corresponding VHF or HF transmission key flashes in amber
- A buzzer sounds in the cockpit
- On the RMP, the Reset (RST) key on the RMP goes on in amber.

Note: The buzzer sounds when an incoming call is identified, regardless of the setting of the loudspeaker volume, but is inhibited during takeoff and landing.

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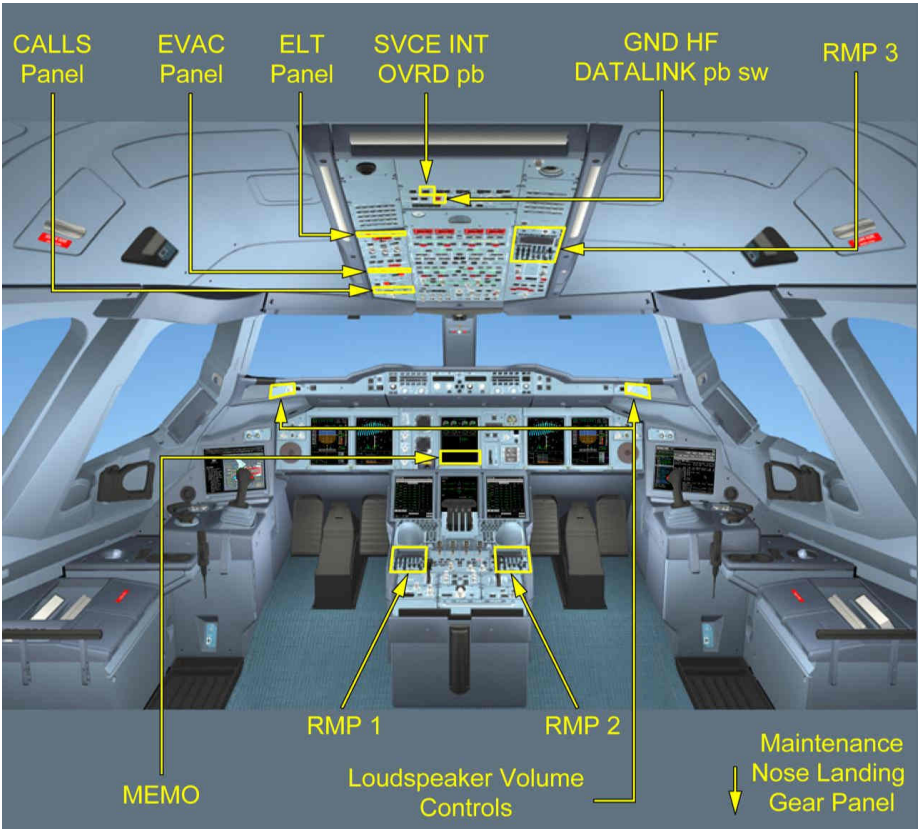
COCKPIT VIEW

Applicable to: ALL

Cockpit View

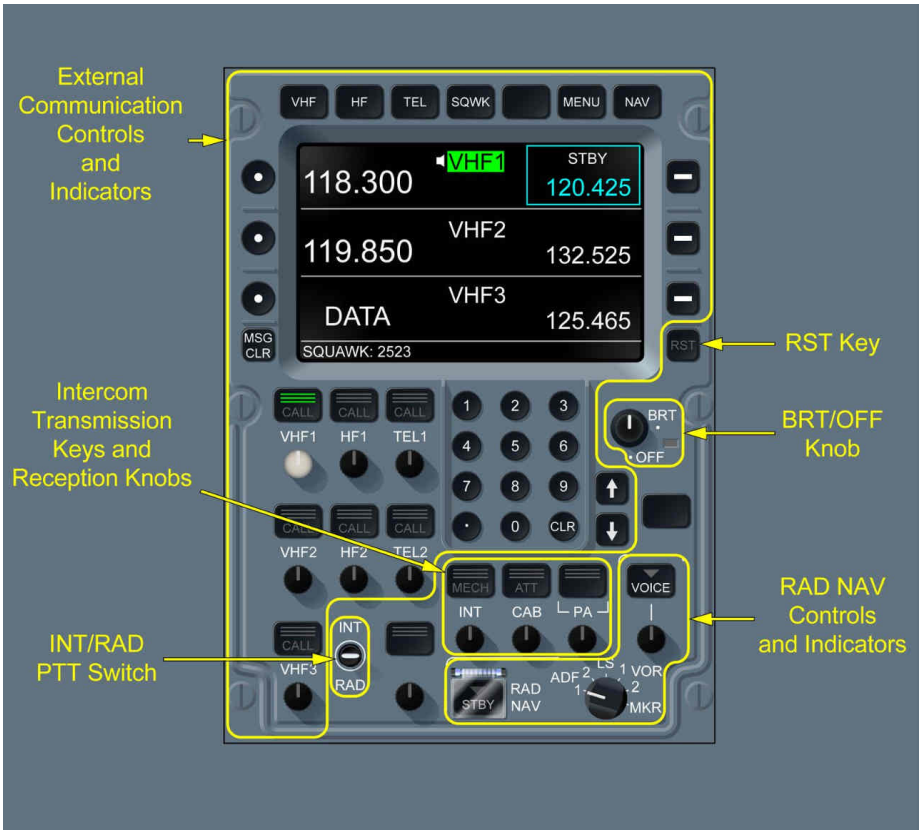


For information on the communication equipment, *Refer to DSC-23-10-10-10 Communication Equipment* .

RMP OVERVIEW

Applicable to: ALL

RMP Overview



INT/RAD SWITCH

The flight crew uses the INT/RAD sw to activate the boomset, or the oxygen mask microphones.

The switch on:
- RMP 1 controls the microphones for the Captain
- RMP 2 controls the microphones for the First Officer
- RMP 3 controls the microphones for the third occupant.



The Interphone/Radio Push-To-Talk switch (INT/RAD sw) is in the off position.



- When set to RAD, the INT/RAD sw activates the boomset or the oxygen mask microphone. However, the appropriate transmission key should be selected first, in order to transmit the message.
- When released, the INT/RAD sw returns to the off position.



- When set to INT, the INT/RAD sw activates the boomset or the oxygen mask microphone.
- When released, the INT/RAD sw remains in the INT position, until the flight crew selects another.

BRT/OFF knob

The flight crew uses the BRT/OFF knob to turn the RMP on or off, and to adjust the brightness of the RMP screen.
The status indicator changes color to indicate the status of the RMP.



The RMP is OFF and is on standby.



The RMP is OFF, and is failed.



The RMP is on.



The RMP is on, but is failed.

RESET (RST) KEY



The Reset (RST) key is not active.



The RST light goes on in amber, when the buzzer sound associated to an incoming SELCAL, or telephone call is generated.
When the RST key is pressed, the buzzer sound is cancelled, and the RST light goes off.

Note: The RST key cancels also the CALL light, on the transmission keys, when the associated communication mean is already in transmission mode.

RAD NAV CONTROLS AND INDICATORS

For more information *Refer to DSC-34-10-60-10 Overview* for description.

Impacted DU: 00002883 Internal Communication Transmission Keys and Reception Knobs

INT(CAB)(PA) TRANSMISSION KEY AND Reception knob

INT(CAB)(PA) Transmission KEY



The associated interphone (i.e. INT, CAB, or PA) is not in transmission mode.
When pressed, the transmission key turns on the transmission mode.

Note: Only one communication type at a time (internal and external communication) can be in transmission mode on each RMP.



The associated interphone (i.e. INT, CAB, or PA) is in transmission mode.
When pressed, the transmission key turns off the transmission mode.

Note: To make an announcement on the PA, the flight crew must press and maintain the PA transmission key during the announcement. In this case, it is not necessary to use any PTT sw.

L13



The amber light (i.e. MECH or ATT) flashes to indicate an incoming call:
- From the ground crew (MECH light), or
- From the cabin crew (ATT light).

The light flashes for 60 s at the most, or until the flight crew answers the call.

Associated to the light:
- When the ground crew calls the cockpit, a buzzer continuously sounds, as long as the ground crew maintains down the COCKPIT CALL sw
- When the cabin crew makes a normal call, a buzzer sounds one time
- When the cabin crew makes a priority call to Captain, a buzzer sounds one time

  Note: If the flight crew wants to differentiate a priority call to Captain from a normal call, the flight crew must watch the dialing feedback line of the handset:
  - *In the case of a priority call to Captain, PRIO CAPTAIN appears*
  - *In the case of a normal call, CAPTAIN appears.*

- When the cabin crew makes an emergency call:
  - A buzzer sounds three times
  - The CALL light of the EMER pb-sw on the CALLS panel flashes for 60 s at the most, or until the flight crew answers the call.

INT(CAB)(PA) Reception knob



The associated interphone (i.e. INT, CAB, or PA) is not in reception mode. When pressed and released in the out position, the reception knob turns on the reception mode.



The associated interphone (i.e. INT, CAB, or PA) is in reception mode. When pressed and released in the in position, the reception knob turns off the reception mode.
When turned, the reception knob adjusts the volume of the headset.

Impacted by TDU: 00023122 Internal Communication Transmission Keys and Reception Knobs

INT(CAB)(PA) TRANSMISSION KEY AND Reception knob

INT(CAB)(PA) Transmission KEY



The associated interphone (i.e. INT, CAB, or PA) is not in transmission mode. When pressed, the transmission key turns on the transmission mode.

Note: Only one communication type at a time (internal and external communication) can be in transmission mode on each RMP.



The associated interphone (i.e. INT, CAB, or PA) is in transmission mode. When pressed, the transmission key turns off the transmission mode.

Note: To make an announcement on the PA, the flight crew must press and maintain the PA transmission key during the announcement. In this case, it is not necessary to use any PTT sw.



The amber light (i.e. MECH or ATT) flashes to indicate an incoming call:
- From the ground crew (MECH light), or
- From the cabin crew (ATT light).

The amber light flashes for 60 s at the most, or until the flight crew answers the call.

Associated to the light:
- When the ground crew calls the cockpit, a buzzer continuously sounds, as long as the ground crew maintains down the COCKPIT CALL sw
- When the cabin crew makes a normal call, a buzzer sounds one time
- When the cabin crew makes a priority call to Captain, a buzzer sounds three times
- When the cabin crew makes an emergency call:
  - A buzzer sounds three times
  - The CALL light of the EMER pb-sw on the CALLS panel flashes for 60 s at the most, or until the flight crew answers the call.

INT(CAB)(PA) Reception knob



The associated interphone (i.e. INT, CAB, or PA) is not in reception mode. When pressed and released in the out position, the reception knob turns on the reception mode.

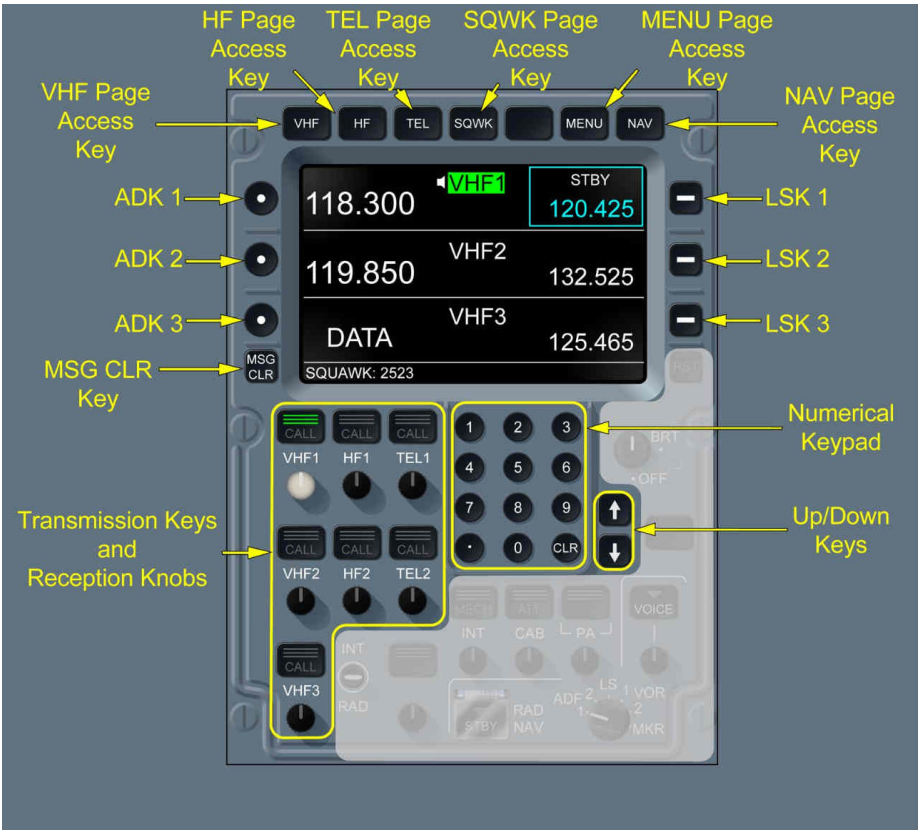


The associated interphone (i.e. INT, CAB, or PA) is in reception mode. When pressed and released in the in position, the reception knob turns off the reception mode.
When turned, the reception knob adjusts the volume of the headset.

RMP EXTERNAL COMMUNICATION

Applicable to: ALL

RMP External Communication



Line Selection KEYS : LSK 1(2)(3)



When pressed, select, validate, or activate the corresponding displays (e.g. frequencies, functions, page titles).

Activation/Dialing KEYS : ADK 1(2)(3)



When pressed, dial, select, validate, activate the corresponding displays (e.g. frequencies, functions).

MESSAGE CLEAR (MSG CLR) KEY



When pressed, clears any displayed RMP message.

Note: Does not clear the squawk code that appears on the VHF, HF and TEL pages.

NUMERICAL KEYPAD

NUMBER KEYS



When pressed, inserts the corresponding number at the cursor position, in the field selected for modification.

DECIMAL KEY



Not active. The decimal is automatically-entered where necessary.

CLR KEY



- When pressed and released, clears the last digit
- When pressed and maintained, clears the field selected for modification, and displays the last validated entry.

SCROLL KEYS

UP KEY



When pressed and released, scrolls up a list of items provided that an up arrow is displayed in the field that is selected for modification.
When pressed and maintained, displays the first item of the list.

DOWN KEY



When pressed and released, scrolls down a list of items provided that a down arrow is displayed in the field that is selected for modification.
When pressed and maintained, displays the last item of the list.

VHF 1(2)(3)/HF 1(2)/TEL 1(2) TRANSMISSION KEYS AND Reception knobS

VHF 1(2)(3)/HF 1(2)/TEL 1(2) Transmission KEYS



The associated communication mean (i.e. VHF 1(2)(3), HF 1(2) or TEL 1(2)) is not in transmission mode. When pressed, the transmission key turns on the transmission mode.

Note: Only one communication mean at a time (internal and external communication) can be in transmission mode on each RMP.



The associated communication mean (i.e. VHF 1(2)(3), HF 1(2) or TEL 1(2)) is in transmission mode. When pressed, the transmission key turns off the transmission mode.
The TEL 1(2) transmission key flashes to indicate that an outgoing telephone call is connected, and TEL 1(2) is not in transmission mode. When pressed, the TEL 1(2) transmission key activates the transmission mode and enables the telephone communication.



Flashes to indicate an incoming:
- Telephone call, or
- SELCAL.

When a telephone call, or a SELCAL is received, a buzzer sounds in the cockpit until it is reset, via the RST key, or the flight crew answers the call.

VHF 1(2)(3)/HF 1(2)/TEL 1(2) Reception knobS



The associated communication mean (i.e. VHF 1(2)(3), HF 1(2) or TEL 1(2)) is not in reception mode. When pressed and released in the out position, the reception knob turns on the reception mode.



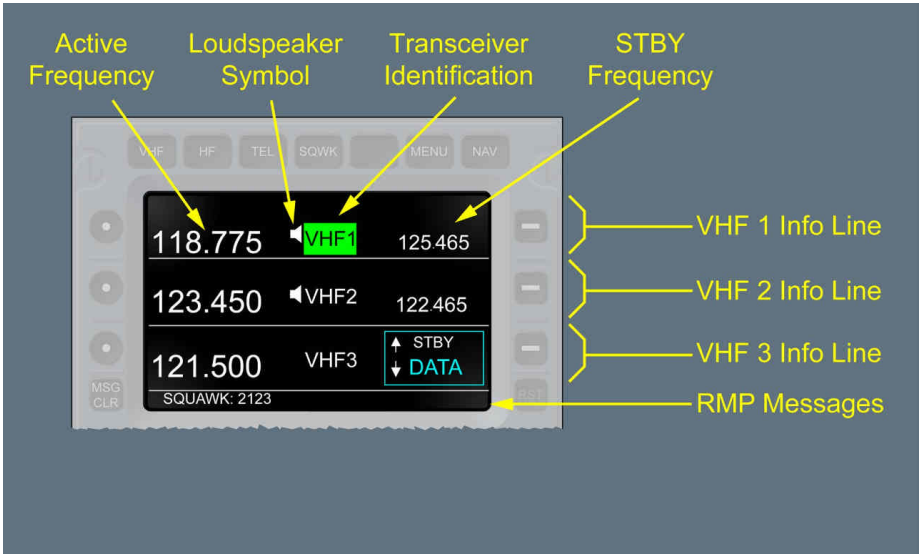
The associated communication mean (i.e. VHF 1(2)(3), HF 1(2) or TEL 1(2)) is in reception mode. When pressed and released in the in position, the reception knob turns off the reception mode.
When turned, the reception knob adjusts the volume of the headset.

VHF PAGE

Applicable to: ALL

L2 After an RMP power-up or reset, or after deactivation of the RAD NAV STBY mode, the RMP display defaults to the VHF page.

VHF Page



L1 In the illustration above:

- VHF 1 is in transmission and reception mode, 118.775 MHz is the active frequency, and 125.465 MHz is the standby frequency
- VHF 2 is in reception mode only
- VHF 3 is neither in transmission nor reception mode
- The VHF 3 standby frequency is boxed to indicate that it is selected for modification
- The current squawk code is 2123.

LOUDSPEAKER SYMBOL

No display: Reception mode is off.



The active frequency is in reception mode.

L13



The active frequency is in transmission mode, but not in reception mode. When the flight crew turns on the transmission mode only, the symbol flashes for 2 s, and then remains steady.

TRANSCEIVER IDENTIFICATION



VHF 1(2)(3) is not in transmission mode.



VHF 1(2)(3) is in transmission mode.

ACTIVE FREQUENCY



The VHF transceiver is tuned on the displayed frequency.



The VHF transceiver is in voice mode, and is either failed or not available.

For information on possible failures:
- *Refer to DSC-23-30-20 RMP Synchronization Failure*
- *Refer to DSC-23-30-20 RMP - VHF/HF Transceiver Connection Failure* .

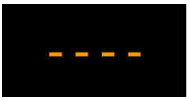
FOR VHF 3 ONLY



Data mode is active.



Data mode is disconnecting.



The VHF transceiver is in data mode, and is either failed or not available.

For information on possible failures:
- *Refer to DSC-23-30-20 RMP Synchronization Failure*
- *Refer to DSC-23-30-20 RMP - VHF/HF Transceiver Connection Failure* .

STANDBY (STBY) FREQUENCY



The standby frequency cannot be modified.



The VHF transceiver is in voice mode and is either failed, or not available. For an example of failure, *Refer to DSC-23-30-20 RMP Synchronization Failure* .



The modified standby frequency is not a standard VHF voice frequency. The flight crew can clear the erroneous digits, via the CLR key, until the standby frequency displays in blue again.
The VHF 1(2) FREQ NOT VALID RMP message is displayed also. For more information on this message, *Refer to DSC-23-20-100 VHF 1(2) (3)/HF 1(2) FREQ NOT VALID* .

FOR VHF 1 AND VHF 2 ONLY



When boxed, the standby frequency can be modified.

The standby frequency appears in :
- Big characters until it is validated by the flight crew, via the appropriate LSK
- Small characters after validation by the flight crew.

When entering a frequency, the flight crew may start with the second digit provided it is different from “1”.

Note: After a flight crewmember modifies a standby frequency, he should validate it, in order to prevent inadvertent modification of the frequency.

FOR VHF 3 ONLY

L12



When boxed, the standby frequency can be modified.

The standby frequency (except DATA) appears in :
- Big characters until it is validated by the flight crew, via the appropriate LSK
- Small characters after validation by the flight crew.

Note: After a flight crewmember modifies a standby frequency, he should validate it, in order to Prevent inadvertent modification of the frequency.

When entering a frequency, the flight crew may start with the second digit provided it is different from “1”.
The up-arrow and the down-arrow indicate that the flight crew can use the up and down keys to scroll through the list of frequencies.

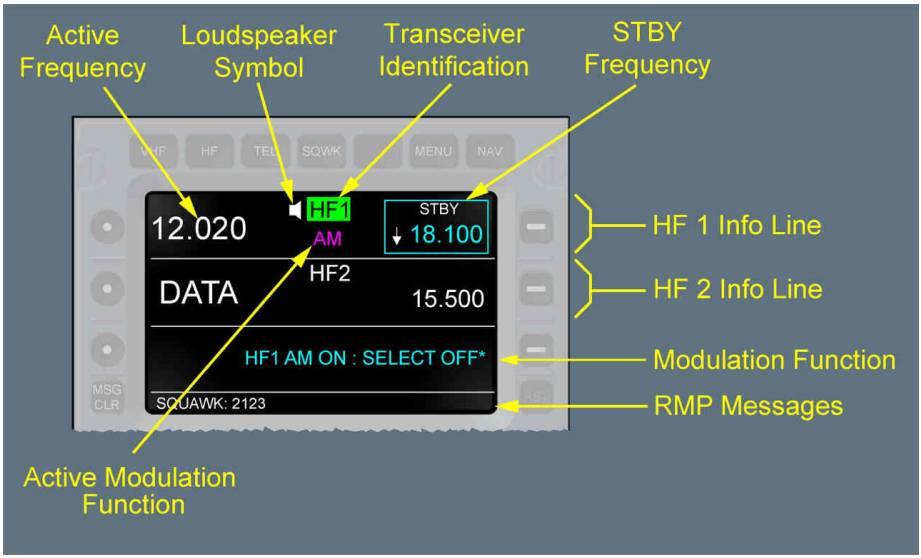
The list contains the following frequencies :
- DATA
- 121.500 MHz
- the modifiable frequency.

When the flight crew enters a frequency, via the numerical keypad, the modifiable frequency appears automatically whatever the current display.

HF PAGE

Applicable to: ALL

HF Page



In the illustration above :

- HF 1 is in transmission (AM mode) and reception mode, and 12.020 MHz is the active frequency. The standby frequency is boxed to indicate that it is selected for modification.
- HF 2 is in data mode.

LOUDSPEAKER SYMBOL

No display: Reception mode is off.



The active frequency is in reception mode.

L13



The active frequency is in transmission mode, but not in reception mode. When the flight crew turns on the transmission mode only, the symbol flashes for 2 s, and then remains steady.

TRANSCEIVER IDENTIFICATION



HF 1(2) is not in transmission mode.

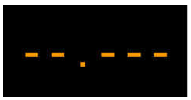


HF 1(2) is in transmission mode.

ACTIVE FREQUENCY



The HF transceiver is tuned on the displayed frequency.



The HF transceiver is in voice mode, and is either failed or not available.

For information on possible failures:
- *Refer to DSC-23-30-20 RMP Synchronization Failure*
- *Refer to DSC-23-30-20 RMP - VHF/HF Transceiver Connection Failure* .



The HF transceiver is in data mode.



The HF transceiver is in data mode, and is either failed or not available.

For more information on possible failures:
- *Refer to DSC-23-30-20 RMP Synchronization Failure*
- *Refer to DSC-23-30-20 RMP - VHF/HF Transceiver Connection Failure*

STANDBY (STBY) FREQUENCY



The standby frequency is displayed and cannot be changed.



The HF transceiver is in voice mode and is either failed, or not available. For an example of failure, *Refer to DSC-23-30-20 RMP Synchronization Failure* .

L12



When boxed, the standby frequency can be modified.

A voice standby frequency displays:
- In large characters until it is inserted, via the appropriate LSK
- In small characters after insertion.

Note: *After a flight crewmember modifies the standby frequency, he should insert it, in order to prevent inadvertent modification of the frequency.*

The up-arrow and the down-arrow indicate that the list of frequencies can be scrolled up, or down.

The list contains the following frequencies:
- DATA
- 8.364 MHz
- The modifiable frequency.

When the flight crew enters a frequency, via the numerical keypad, the modifiable frequency appears automatically whatever the current display.

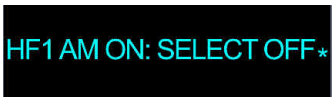


The standby frequency is not a standard HF voice frequency. The flight crew can clear the erroneous digits, via the CLR key, until the standby frequency displays in blue again.
The HF 1(2) FREQ NOT VALID RMP message is displayed also. For more information on this message, *Refer to DSC-23-20-100 VHF 1(2) (3)/HF 1(2) FREQ NOT VALID* .

MODULATION FUNCTION



HF 1(2) is in Single Side Band (SSB) mode. When the flight crew presses the associated LSK, the Amplitude Modulation (AM) mode activates.
The modulation function display changes from HF 1 to HF 2 when the blue box is moved from HF 1 to HF 2 standby frequency.



HF 1(2) is in Amplitude Modulation (AM) mode. When the flight crew presses the associated LSK, the Single Side Band (SSB) mode activates.

ACTIVE MODULATION FUNCTION

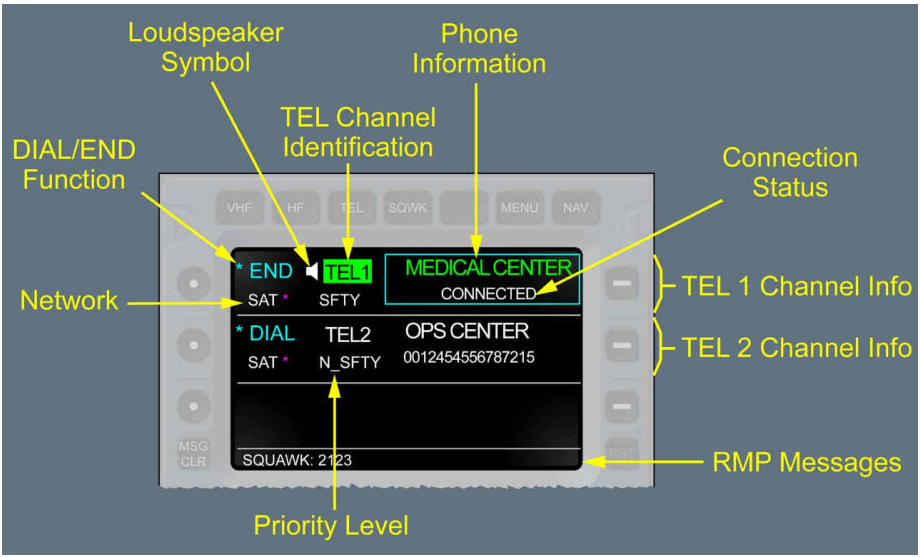
No display — Single Side Band (SSB) mode is active.

AM — Amplitude Modulation (AM) mode is active.

TEL PAGE

Applicable to: ALL

TEL Page



LOUDSPEAKER SYMBOL

No display: Reception mode is off.

The active frequency is in reception mode.

L13

The active frequency is in transmission mode, but not in reception mode. When the flight crew turns on the transmission mode only, the symbol flashes for 2 s, and then remains steady.

DIAL/END FUNCTION

L12



When selected, the telephone number is dialed, and connected. After the telephone number is connected, the transmission and reception modes should be activated via the appropriate TEL transmission key and reception knob.
The DIAL function appears, when the associated telephone number is not yet connected.

L12



When selected, the telephone number is disconnected.
The END function appears, when the associated telephone number is connected.

TELEPHONE (TEL) CHANNEL IDENTIFICATION



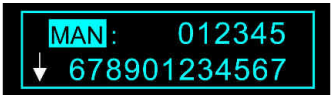
TEL 1(2) is not in transmission mode.



TEL 1(2) is in transmission mode.

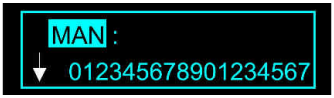
TELEPHONE INFORMATION

L12



- When boxed, indicates that the flight crew can modify the telephone information field
- MAN indicates that the flight crew has manually dialed the telephone number
- The down arrow indicates that the flight crew can scroll down the list
- The manually-dialed telephone number is displayed in big characters to indicate that it is not validated
- The telephone information appears on two lines, until the connection is established, and CONNECTING is displayed.

Note: *The flight crew can dial a telephone number manually even if the MAN line is not already displayed. Dialing the telephone number via the keypad will automatically display the MAN line.*

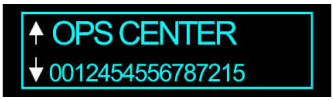


The flight crew has manually-dialed and validated the telephone number.



The manually-dialed telephone call is connected.

L12



- When boxed, indicates that the flight crew can modify the telephone information field
- The up arrow and down arrow indicate that the flight crew can scroll up or down the list
- The telephone number is selected from the list of pre-dialed telephone numbers
- The telephone information appears on two lines, until the connection is established, and CONNECTING is displayed.



The pre-dialed telephone number, selected by the flight crew from the scroll list, is connected.



An external call is received. In this case, the status of the connection can be INCOMING CALL, CONNECTED, or CALL ENDED.



The SATCOM is either failed, or not logged on.

TELEPHONE CONNECTION STATUS

No display — No telephone call connection.

L13



Connection of the telephone call is in progress.
Appears for outgoing telephone calls only.



Telephone call connection is established.

L12

CALL ENDED

Disconnection of the telephone call is in progress.

Appears temporarily, when:
- The flight crew ends the call, or
- The ground station ends the call, or
- The flight crew rejects an incoming external call, or
- The telephone connection is failed.

INCOMING CALL

The flight crew is receiving a telephone call from a ground station.

PRIORITY LEVEL

Each telephone number is assigned a priority level.

L3 The airline can assign and customize the priority levels.

L1

EMER

Top priority.

SFTY

High priority.

N_SFTY

Medium priority.

PUBLIC

Low priority.

- - - - -

The SATCOM is either failed, or not available.

NETWORK

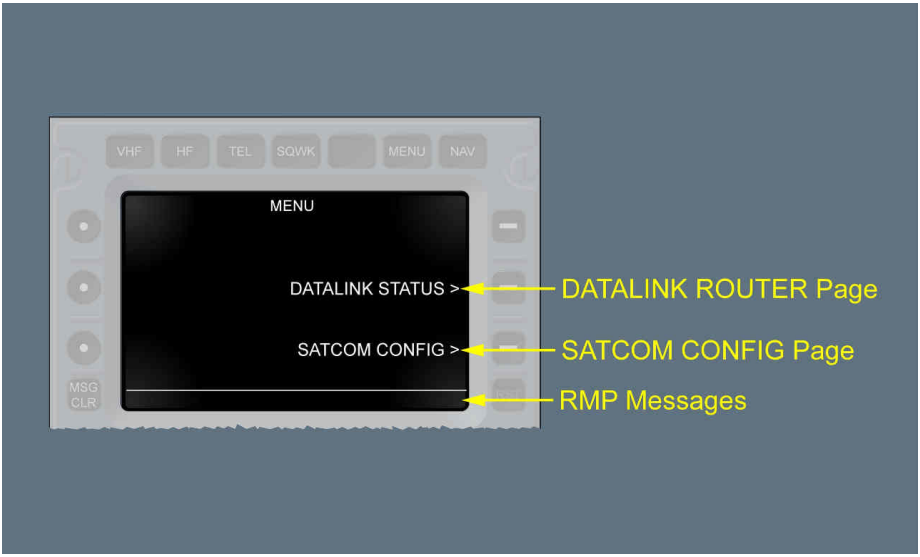
SAT

The SATCOM is available.

MENU PAGE

Applicable to: ALL

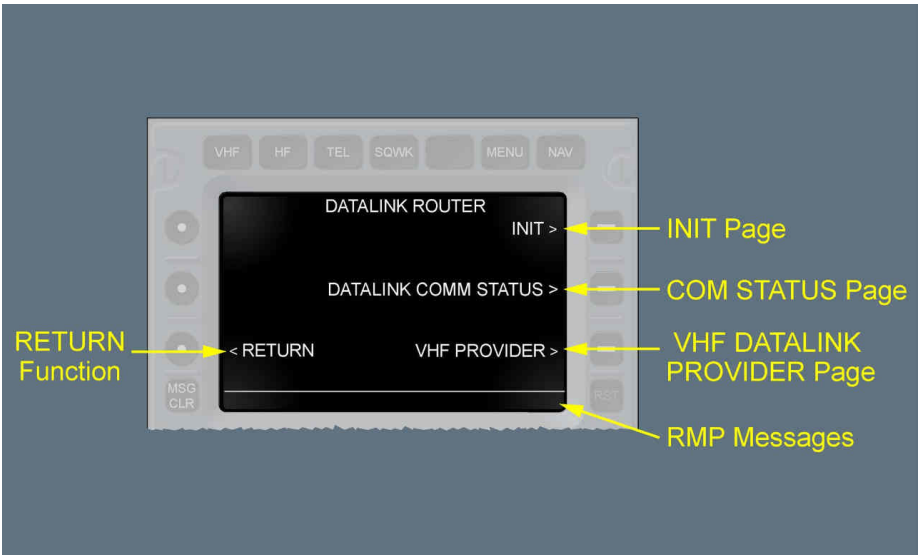
MENU Page



DATALINK ROUTER PAGE

Applicable to: ALL

DATALINK ROUTER Page



The DATALINK ROUTER, also referred to as the Avionics Communication Router (ACR), manages data communication.
On the DATALINK ROUTER page, the flight crew can access sub-pages to display some data communication parameters, and to change the VHF datalink provider.

RETURN FUNCTION

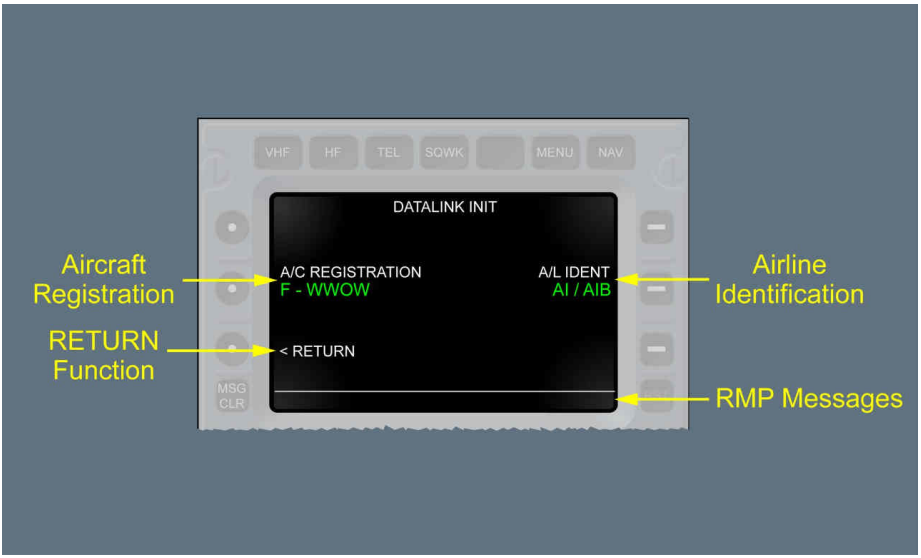
< RETURN

When selected, the previous page (MENU) appears.

DATALINK INIT PAGE

Applicable to: ALL

DATALINK INIT Page



The DATALINK INIT page displays the information that identifies the aircraft in datalink messages.

AIRLINE IDENTIFICATION



The ACR hosts datalink configuration data, and sends the airline identification information to the RMPs.
The flight crew cannot modify this information.

AIRCRAFT REGISTRATION



The ACR hosts datalink configuration data, and sends the aircraft registration information to the RMPs.
The flight crew cannot modify this information.

RETURN FUNCTION

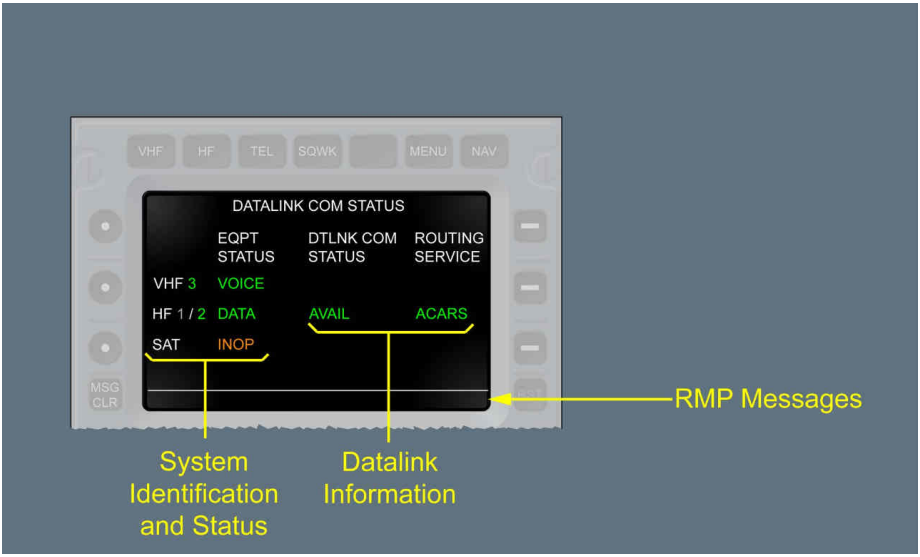
< RETURN

When selected, the previous page (DATALINK ROUTER) appears.

DATALINK COM STATUS PAGE

Applicable to: ALL

DATALINK COM STATUS Page



The DATALINK COM STATUS page indicates which communication means are available for data communication.

SYSTEM IDENTIFICATION AND STATUS

VHF 3 VOICE

VHF 3 is available in voice mode.



HF 1 is available in voice mode, and HF 2 is available in data mode.



HF 1 is not available, and HF 2 is available in voice mode.



The SATCOM is inoperative.

DATALINK INFORMATION

No Display

The associated communication mean is either in voice mode, or not available.

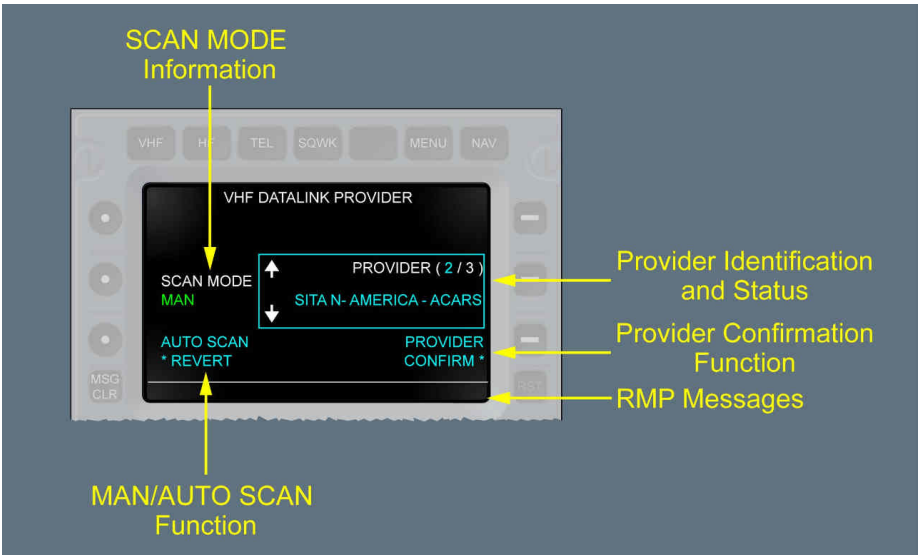


The associated communication mean available for data communication via ACARS.

VHF DATALINK PROVIDER PAGE

Applicable to: ALL

VHF DATALINK PROVIDER Page



The VHF DATALINK PROVIDER displays the selected ground network for VHF data communication. Also, the flight crew can activate either the automatic, or manual, scan mode for the selection of the ground network.

SCAN MODE INFORMATION

SCAN MODE
AUTO

The automatic VHF datalink provider scan mode is active.

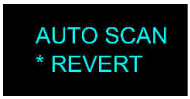
SCAN MODE
MAN

The manual VHF datalink provider scan mode is active.

MAN/AUTO SCAN FUNCTION



The flight crew can activate the MAN SCAN function by pressing the associated Activation/Dialing Key (lADK).
When the MAN SCAN function is active, the flight crew can manually select the VHF datalink provider.



The flight crew can activate the AUTO SCAN function by pressing the associated ADK.
When the AUTO SCAN function is active, the system automatically selects the most appropriate VHF datalink provider.

PROVIDER IDENTIFICATION AND STATUS



The VHF datalink provider was automatically selected, and is connected.

L12



The MAN SCAN function is active.
The flight crew can use the UP and DOWN keys on the RMP, to manually select a provider in the list.
When scrolling: if a provider is already connected , the PROVIDER header changes to ACTIVE PROVIDER, and the RMP displays “CONNECTED” as the status.

PROVIDER CONFIRMATION FUNCTION

No Display : The AUTO SCAN function is active.

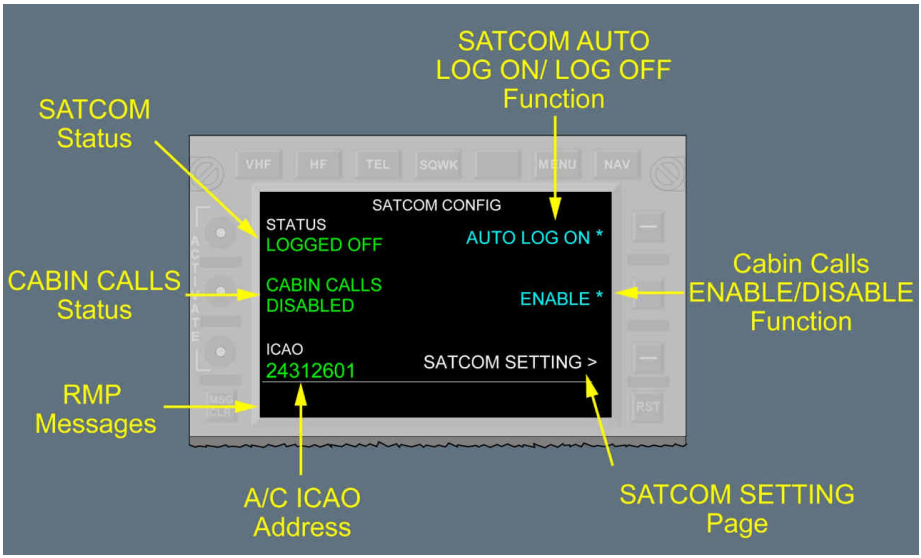


The MAN SCAN function is active, and the flight crew has manually selected a provider. To connect the provider, the flight crew should confirm the selection by pressing the associated Activation/Dialing Key (ADK).

SATCOM CONFIG PAGE

Applicable to: ALL

SATCOM CONFIG Page



SATCOM STATUS

LOGGED ON AUTO	The SATCOM is on and connected. The satellite and the GES are automatically-selected.
LOGGED ON MANUAL	The SATCOM is on and connected. The satellite and the GES are manually-selected.
LOGGING ON AUTO	The SATCOM is attempting to connect. The satellite and the GES are automatically-selected.
LOGGING ON MANUAL	The SATCOM is attempting to connect. The satellite and the GES are manually-selected.



The SATCOM is logging off.



The SATCOM is disconnected.
The satellite and the GES are not connected.

SATCOM AUTO LOG ON/OFF FUNCTION

L13



The AUTO LOG ON function is available, and can be activated by pressing the associated Line Selection Key (LSK).
When this function is active, the satellite and the GES are automatically-selected.
Appears, only when SATCOM is logged off.

L13



The LOG OFF function is available, and can be activated by pressing the associated LSK.
Appears, only when SATCOM is logged on or logging on.

CABIN CALLS STATUS



It is possible to make telephone calls in the cabin.



It is not possible to make telephone calls in the cabin.

CABIN CALLS ENABLE/DISABLE FUNCTION



The cabin telephone calls ENABLE function is available. When this function is selected, it is possible to make telephone calls from the cabin via the SATCOM.



The cabin telephone calls DISABLE function is available. When this function is selected, it is not possible to make telephone calls from the cabin via the SATCOM.

AIRCRAFT ICAO ADDRESS

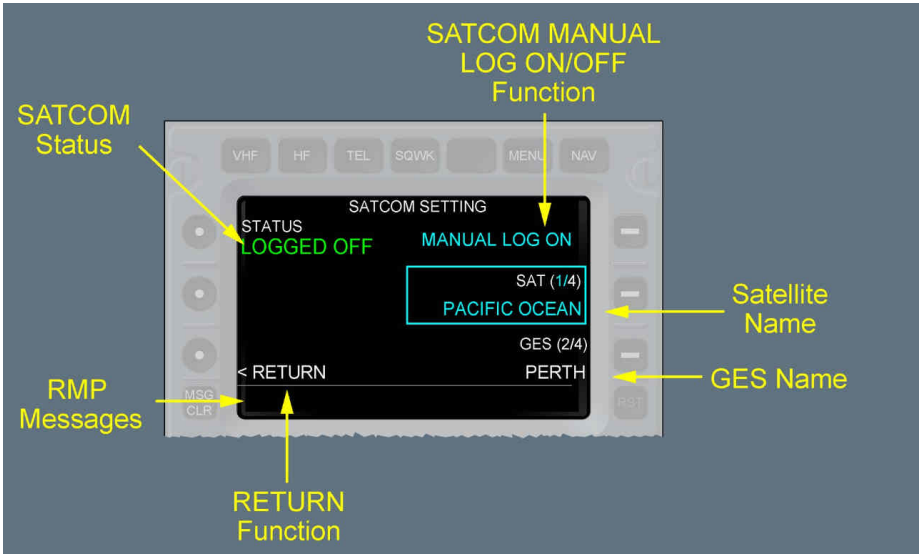
The aircraft ICAO address identifies the aircraft during all SATCOM voice or data communication.
The flight crew cannot change the address.

L3 The aircraft ICAO address is entered in the Satellite Data Unit (SDU) by pin programming.

SATCOM SETTING PAGE

Applicable to: ALL

SATCOM SETTING Page



SATCOM MANUAL LOG ON/OFF FUNCTION

L13

MANUAL LOG ON *

The MANUAL LOG ON function is available, and can be activated by pressing the associated Line Selection Key (LSK).
When this function is active, the satellite and the GES are manually-selected.
Appears, only when SATCOM is logged off.

L13



The LOG OFF function is available, and can be activated by pressing the associated LSK.
Appears, when SATCOM is logged on, or logging on.

SATCOM STATUS



The SATCOM is on and connected.
The satellite and the GES are automatically-selected.



The SATCOM is on and connected.
The satellite and the GES are manually-selected.



The SATCOM is attempting to connect.
The satellite and the GES are automatically-selected.



The SATCOM is attempting to connect.
The satellite and the GES are manually-selected.



The SATCOM is logging off.



The SATCOM is disconnected.
The satellite and the GES are not connected.

SATELLITE NAME

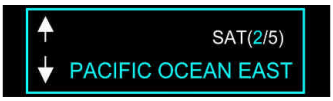


The SATCOM is not connected, and the flight crew cannot change the satellite name.



The SATCOM is connected, and the flight crew cannot change the satellite name.

L12



The SATCOM is not connected, and the flight crew can change the satellite name, because it is boxed.
SAT(2/5) indicates that PACIFIC OCEAN EAST is second in the list of satellites, and there are 5 satellites currently available.
The up and down arrows indicate that the flight crew can scroll through the list of currently available satellites.

GROUND EARTH STATION (GES) NAME



The SATCOM is not connected, and the flight crew cannot change the GES.



The SATCOM is connected, and the flight crew cannot change the GES.

L12



The SATCOM is not connected. The GES is boxed, and can be changed.
GES(7/15) indicates that NILES CANYON is seventh in the list of GES, and there are 15 GES currently available.
The up and down arrows indicate that the flight crew can scroll through the list of currently available GES.

RETURN FUNCTION



When selected, the previous page (SATCOM CONFIG) appears.

NAV PAGE

Applicable to: ALL

The flight crew uses the NAV page to tune the NAVAID frequencies/channel when FMS 1 and FMS 2 are failed.
This page is available on RMP 1 and RMP 2 only. The flight crew must press the RAD NAV STBY key to enable the NAV page access key. For more information on how to tune the navaid in standby mode, *Refer to DSC-34-10-60-30 How to Tune Navaids in Standby RadNav* .

SQWK PAGE

Applicable to: ALL

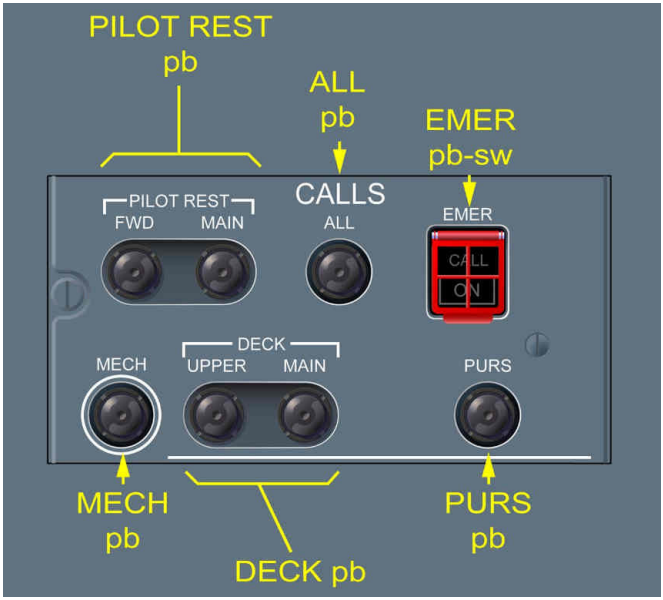
The flight crew uses the SQWK page to:

- set the squawk,
- activate the IDENT function. *Refer to DSC-34-20-50-20-10 RMP*

CALLS PANEL

Applicable to: ALL

CALLS Panel



PURS pb



When pressed:
- A pink light, on the Purser Area Call Panel (ACP), comes on
- The CAPTAIN CALL message appears on the Purser Attendant Indication Panel (AIP)
- A high/low chime sounds through the associated cabin loudspeakers.

PILOT REST pb



When pressed, a high/low chime sounds in the forward(aft) crew rest.

DECK pb



When pressed:
- A pink light, on the upper(lower) deck Area Call Panels (ACP), comes on
- The CAPTAIN CALL message appears on the upper(lower) deck Attendant Indication Panels (AIP)
- A high/low chime sounds through the upper(lower) deck cabin loudspeakers.

ALL pb



When pressed:
- A pink light, on all the ACPs in the cabin, comes on. For information on the ACPs, *Refer to CCOM/04-20-20-B Area Call Panel (ACP)*
- The CALL ALL CAPT message appears on all AIPs in the cabin. For information on the AIPs, *Refer to CCOM/04-20-20-A Attendant Indication Panel (AIP)*
- A high/low chime sounds through the cabin loudspeakers.

MECH pb



When pressed:
- The COCKPIT CALL light on the maintenance nose gear panel comes on
- An external horn sounds as long as the ground crew maintains the MECH pb pressed.

EMER pb-sw



Neither the flight crew nor the cabin crew has made an EMER call.



The cabin crew has made an EMER call. The CALL light flashes, and a buzzer sounds three times through the cockpit loudspeakers.

-
EMER Call

The ATT transmission key flashes on all RMPs.

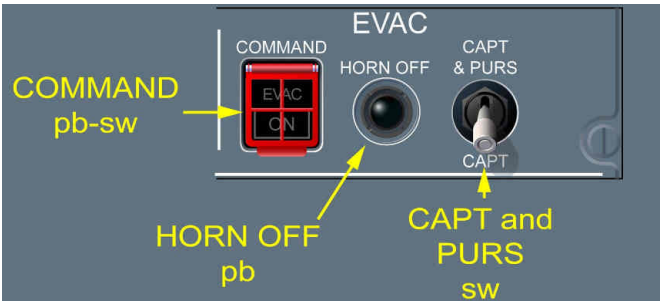


When pressed:
- The ON and the CALL lights come on
- A pink light, on all the area call panels in the cabin, comes on
- The CALL PRIO CAPT message appears on all AIPs in the cabin
- Three successive high/low chimes sound through the cabin loudspeakers.

EVAC PANEL

Applicable to: ALL

EVAC Panel



COMMAND pb-sw



Normal Operation. Neither the Captain nor the Chief Purser order an evacuation.



The Chief Purser requests or orders an evacuation.

If the CAPT and PURS sw is set to CAPT position, when the Chief Purser requests an evacuation:
- The EVAC light comes on
- A horn sounds in the cockpit during 3 s.

Evac Horn

If the CAPT and PURS sw is set to CAPT & PURS position, when the Chief Purser orders an evacuation:
- The EVAC light flashes
- Message EVAC ACTIVE is displayed on the ECAM
- A horn sounds in the cockpit

Evac Horn
- The EVACUATION ALERT message appears on all Attendant Indication Panels (AIP) in the cabin
- EVAC CMD pb on FAPs, MINI FAPs and AAPs will be lit in the cabin
- The evacuation horn sounds in the cabin.



The Flight Crew orders an evacuation, regardless of the CAPT and PURS sw position (CAPT or CAPT & PURS).

When pressed:
- The ON light and the EVAC light flashes
- Message EVAC ACTIVE is displayed on the ECAM
- The EVACUATION ALERT message appears on all Attendant Indication Panels (AIP) in the cabin
- EVAC CMD pb on FAPs, MINI FAPs and AAPs will be lit in the cabin
- The evacuation horn sounds in the cabin.

HORN OFF pb



When pressed, the horn goes off in the cockpit.

CAPT AND PURS SWITCH



Only the Captain can order the evacuation.

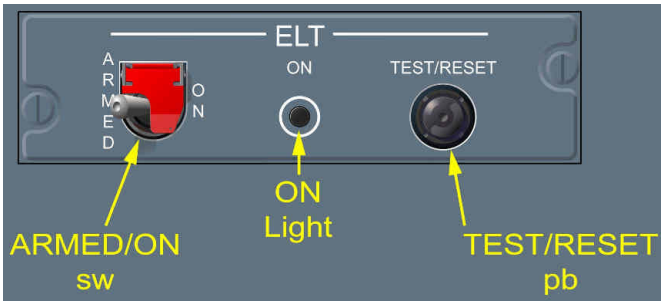


The Captain or the Chief Purser can order the evacuation.

ELT PANEL

Applicable to: ALL

ELT Panel



ARMED/ON sw



The Emergency Locator Transmitter (ELT) is armed, and automatically transmits the emergency radio signal, when the aircraft sustains an abnormal load factor.



The ELT is on, and transmits the emergency radio signal.

ON light



The ELT is not transmitting.

L12



The ELT is either transmitting, or running a self-test.

Note: If the ELT is transmitting when the aircraft is on the ground, the external horn sounds.

TEST/RESET pb

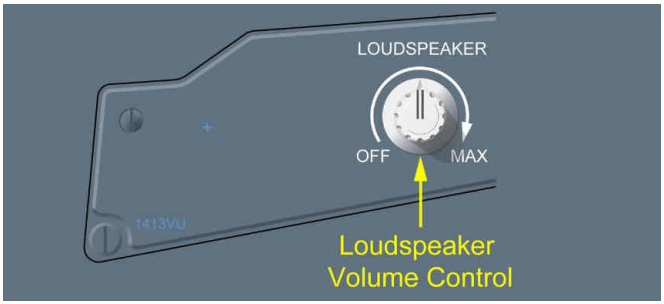


When pressed:
- An ELT self-test starts, or
- The ELT stops transmitting.

LOUDSPEAKER VOLUME CONTROL PANEL

Applicable to: ALL

Loudspeaker volume control panel



Loudspeaker Volume Control knob



The two onside loudspeakers are OFF.



The two onside loudspeakers are on. The volume is adjusted by turning the knob.

Note: *The volume control knobs of the loudspeakers adjust the volume of voice communication messages, but cannot adjust the volume of Flight Warning System (FWS) and Aircraft Environment Surveillance System (SURV) audio messages.*

GND HF DATALINK pb-sw

Applicable to: ALL

L2 **GND HF DATALINK pb-sw**



HF data communication is automatically inhibited on ground.



For maintenance purposes, the ground crew can press the GND HF DATALINK pb-sw to activate HF data communication on ground.

SVCE INT OVRD pb

Applicable to: ALL

L2 SVCE INT OVRD pb



The service interphone is automatically inhibited in flight.

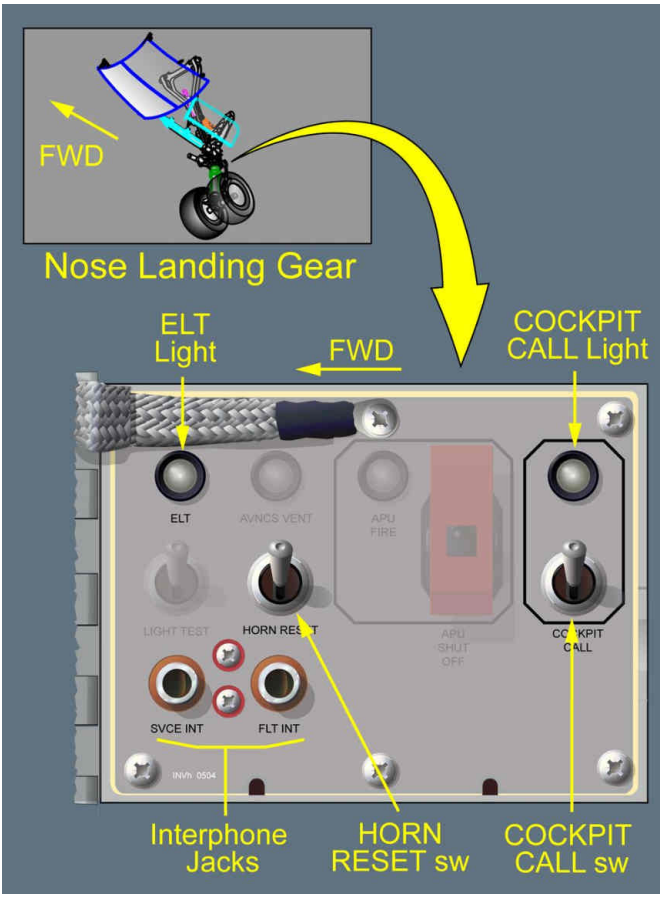


If the service interphone remains abnormally inhibited on ground, the ground crew can manually activate it, by pressing the SVCE INT OVRD pb .

MAINTENANCE NOSE GEAR PANEL

Applicable to: ALL

Nose Landing Gear Panel



L2 **ELT light**



The ELT is not transmitting.



The ELT is transmitting.

Note: If the ELT is transmitting when the aircraft is on the ground, the external horn sounds.

L2 COCKPIT CALL light



The flight crew does not initiate a call from the cockpit.



The flight crew initiates a call from the cockpit. This light flashes and the external horn sounds.

L2 COCKPIT CALL sw

L23



When pushed down and maintained:

- The buzzer sounds through the loudspeakers in the cockpit
  The buzzer in the cockpit goes off when the ground crew releases the COCKPIT CALL sw.
- The MECH light on the MECH key flashes in amber on the cockpit RMP.

  The flashed MECH light on the MECH key goes off when:
  - The flight crew pushes the MECH key in order to answer the call, or
  - The flight crew pushes the RST key without answering to the call, or
  - Automatically after 60 s if the flight crew does not answer.

L2 HORN RESET sw

L23



When pressed, the COCKPIT CALL light goes off.
When the flight crew releases the MECH pb on the overhead CALLS panel, the external horn stops but the COCKPIT CALL light remains on.

RMP MESSAGES

Applicable to: ALL

RMP MESSAGES

The RMP displays messages to inform the flight crew, when:
- A selection is not appropriate, or not complete, or
- A connection is failed, or
- Voice or data mode is not available.

Note: The current squawk is displayed by default in the scratchpads of the VHF, HF and TEL pages.

L3 An RMP message can be displayed on all RMPs simultaneously (global display), or on one RMP only (local display). However, some local messages can be displayed on more than one RMP, provided that the same page is displayed.
If several messages are displayed one after the other without being cleared, the active messages are stored in a queue, in their order of appearance (the RMP displays the most recent message). The flight crew must check, and clear the active messages, one by one, in order to cancel the queue.

L1 The various RMP communication messages are listed below:

L12 DATA FIELD NOT MODIFIABLE : The flight crew tries to modify a field that cannot be modified.

L12 VHF 3 / HF 1(2) DATA MODE NOT AVAILABLE : The flight crew tries to activate VHF 3 / HF 1(2) in data mode, but the data mode is not available.

L12 VHF 1(2)(3) / HF 1(2) FREQ NOT COMPLETED : The flight crew tries to validate a frequency that is not complete.

L12 VHF 1(2)(3) / HF 1(2) FREQ NOT VALID : The flight crew enters a frequency that is not a standard VHF / HF voice communication frequency.

L12 VHF 1(2)(3) / HF 1(2) / TEL 1(2) RECEPTION NOT SELECTED : The flight crew selects VHF 1(2)(3) / HF 1(2) / TEL 1(2) in transmission mode, but the reception mode is not active.

L12

VHF 1(2)(3) / HF 1(2) STBY REVERTED TO PREV ENTRY : The flight crew tries to validate a frequency that is not a standard VHF / HF voice frequency, and the VHF 1(2)(3) / HF 1(2) FREQ NOT VALID message is already displayed. The last validated STBY frequency appears instead of the invalid entry.

L12

HF 1(2) VOICE MODE NOT AVAILABLE : The flight crew tries to activate HF 1(2) in voice mode, but the voice mode is not available.

L12

LOG OFF TO MODIFY SATCOM SETTINGS: The flight crew tries to modify the SATCOM settings, but the SATCOM is logged on.

L12

MAN DIALING NOT ALLOWED : The flight crew tries to manually dial a telephone number, but the SATCOM configuration software does not allow it.

L12

NO MORE LIST ITEMS : The flight crew tries to scroll through a list and the first (last) element of the list is displayed.

L12

NO NUMBER DIALED : The flight crew tries to make a telephone call by pressing an ADK, but has not dialed a telephone number.

L12

SATCOM CONFIG PAGE NOT AVAIL : The flight crew presses the SATCOM CONFIG page access key, but the SATCOM or the connections between the RMPs and the SATCOM are failed.

L12

SATCOM LOG ON: FAIL : The flight crew to log on the SATCOM, but the log on fails.

L12

SATCOM SETTING PAGE NOT AVAIL : The flight crew presses the SATCOM SETTING page access key, but the SATCOM, or the connections between the RMPs and the SATCOM are failed.

L12

TEL 1(2) CONNECTION: FAIL : The flight crew tries to make a telephone call, but it cannot be established or it is interrupted due to a failure.

L12

TEL 1(2) NOT CONNECTED : The flight crew selects TEL 1(2) in transmission mode, but no connection is established.

L12

TEL 1(2) REVERTED TO PREV ENTRY : The flight crew dials a telephone number, then clears it by using the MSG CLR key.

L12

TEL 1(2) STILL CONNECTED : The flight crew tries to end a telephone call that is still connected.

L12

USE MAN SCAN TO MODIFY PROVIDER : The flight crew tries to modify the VHF datalink provider on the VHF DATALINK PROVIDER page, and the AUTO SCAN function is active.

MEMO

Applicable to: ALL

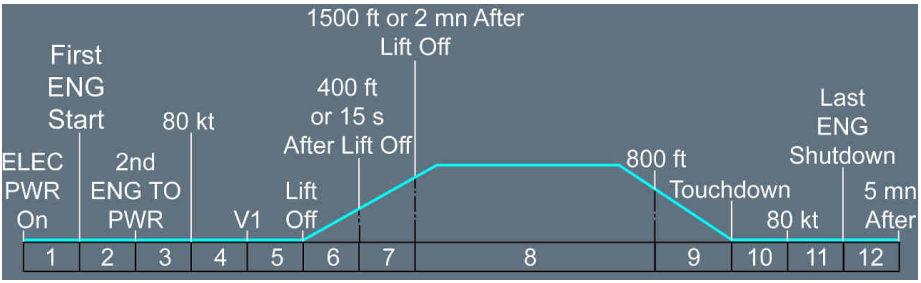
L12

CAPT(F/O) ON RMP 3 : Only RMP 1(2) is OFF, and indicates that the CAPT(F/O) must use RMP 3.

CAPT+F/O ON RMP 3 RMPs 2 and 3 are OFF. Both the CAPT and the F/O must use RMP 3.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



CABIN READY	Indicates to the flight crew that the cabin is ready for take-off and/or for landing.

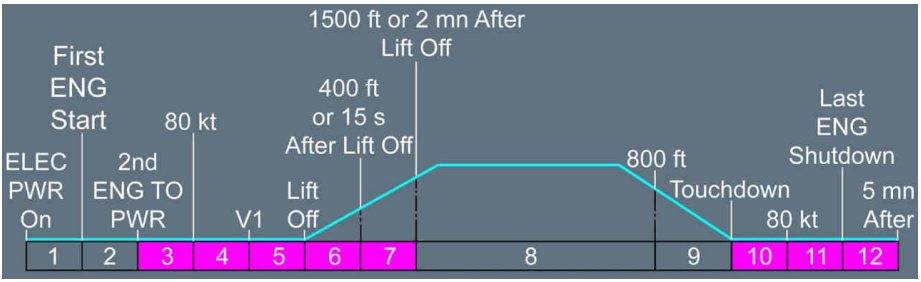
L2 The CABIN READY information can be optionally displayed:

- In the T/O memo and LDG memo
- In the BEFORE TAKEOFF checklist and the LANDING checklist.

Note: In this case, the CABIN READY memo will never appear on the right hand side of the EWD.

Flight Phase Inhibition:

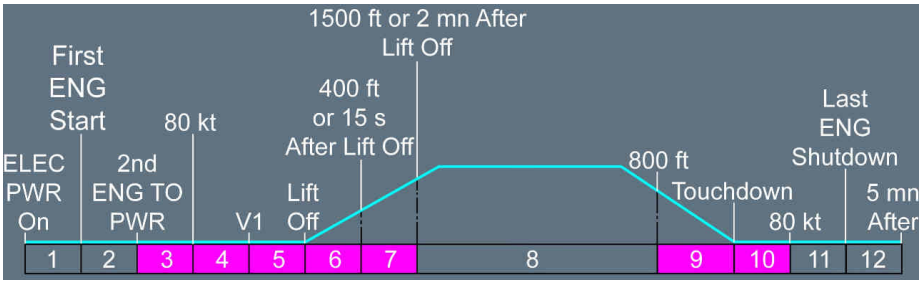
Flight Phase Inhibition



DATALINK STBY	Data mode is available, via at least one VHF/HF/SATCOM, but the datalink is temporarily lost.

L2 Flight Phase Inhibition:

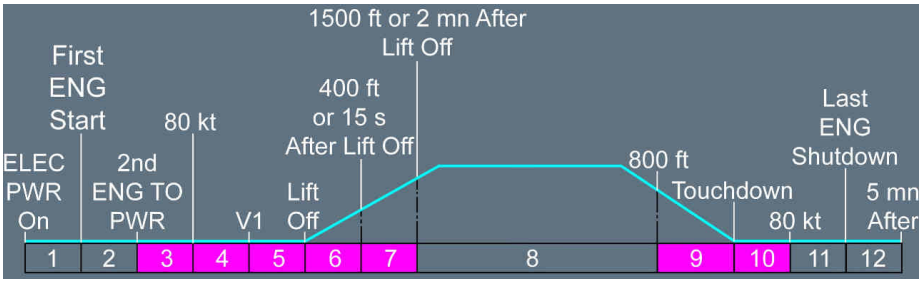
Flight Phase Inhibition



GND HF DATALINK OVRD	The GND HF DATALINK pb-sw is in the override position, and HF communication is not inhibited on ground. For more information on the GND HF DATALINK pb-sw , *Refer to DSC-23-20 GND HF DATALINK pb-sw* .

L2 Flight Phase Inhibition:

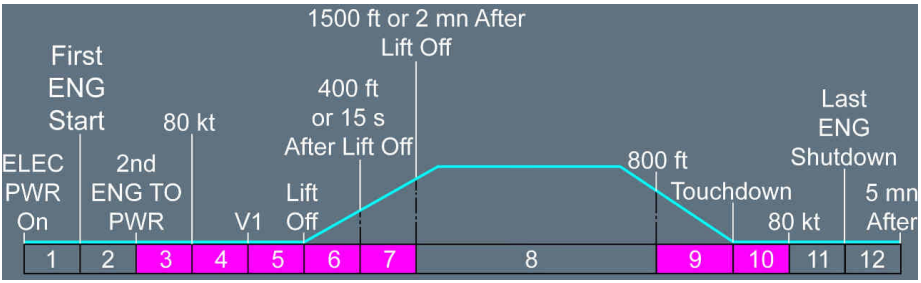
Flight Phase Inhibition



HF VOICE	HF data mode is: - Not selected, or - Interrupted, or - Failed.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



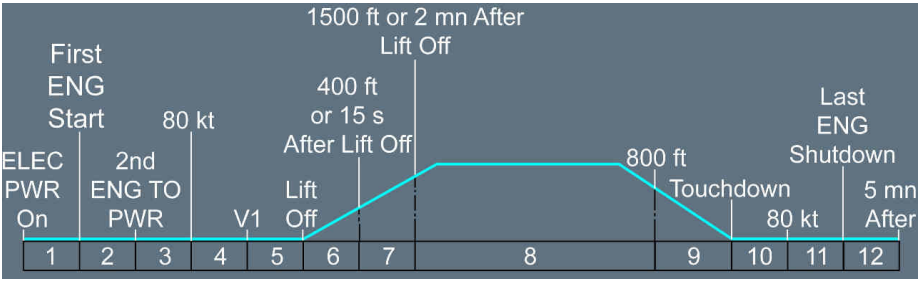
L12

PA IN USE : The flight crew presses and maintains the PA transmission key, in order to make an announcement in the cabin.

RMP 1+2+3 OFF RMPs 1, 2 and 3 are OFF.

L2 Flight Phase Inhibition:

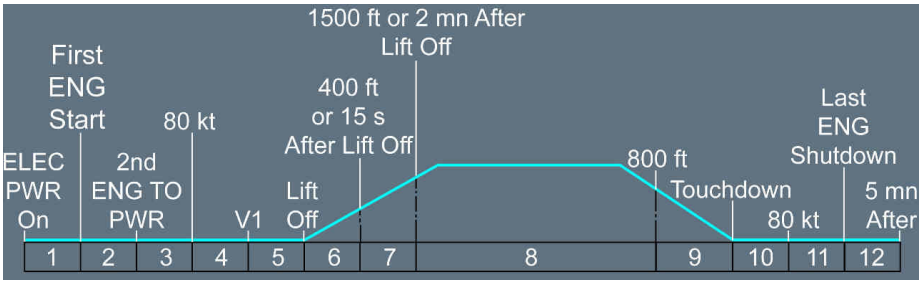
Flight Phase Inhibition



RMP 1+3(2+3) OFF RMPs 1 and 3(2 and 3) are OFF.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

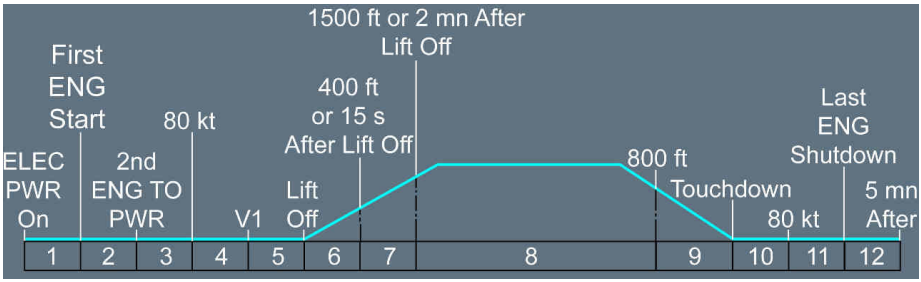


RMP 3 OFF

Only RMP 3 is OFF.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

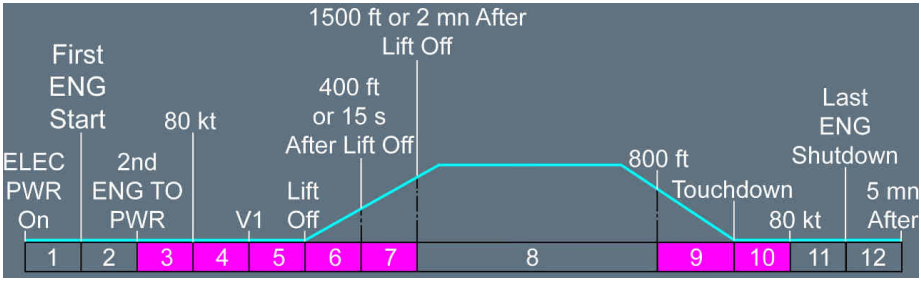


SATCOM ALERT

The flight crew has received a high priority telephone call, via the SATCOM (*Refer to DSC-23-20-30 Priority Level*).

L2 Flight Phase Inhibition:

Flight Phase Inhibition

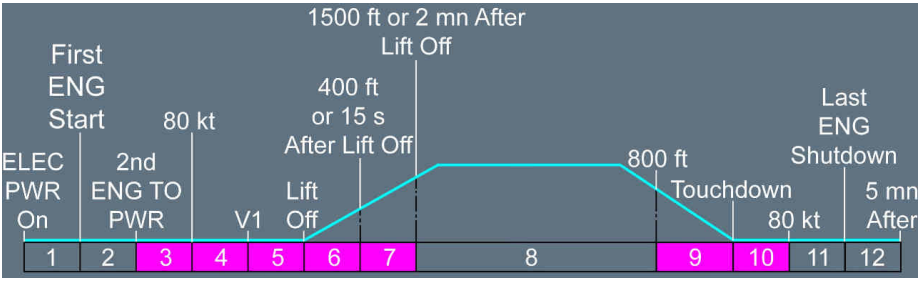


VHF DTLNK MAN SCAN

The flight crew has manually selected the datalink provider, via the DATALINK ROUTER page on the RMP . For more information on the DATALINK ROUTER page, *Refer to DSC-23-20-35 DATALINK ROUTER Page* .

L2 Flight Phase Inhibition:

Flight Phase Inhibition

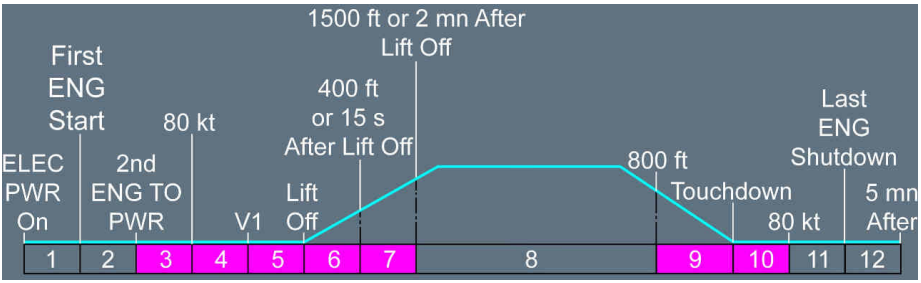


VHF VOICE

VHF data mode is:
- Not selected, or
- Interrupted, or
- Failed.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



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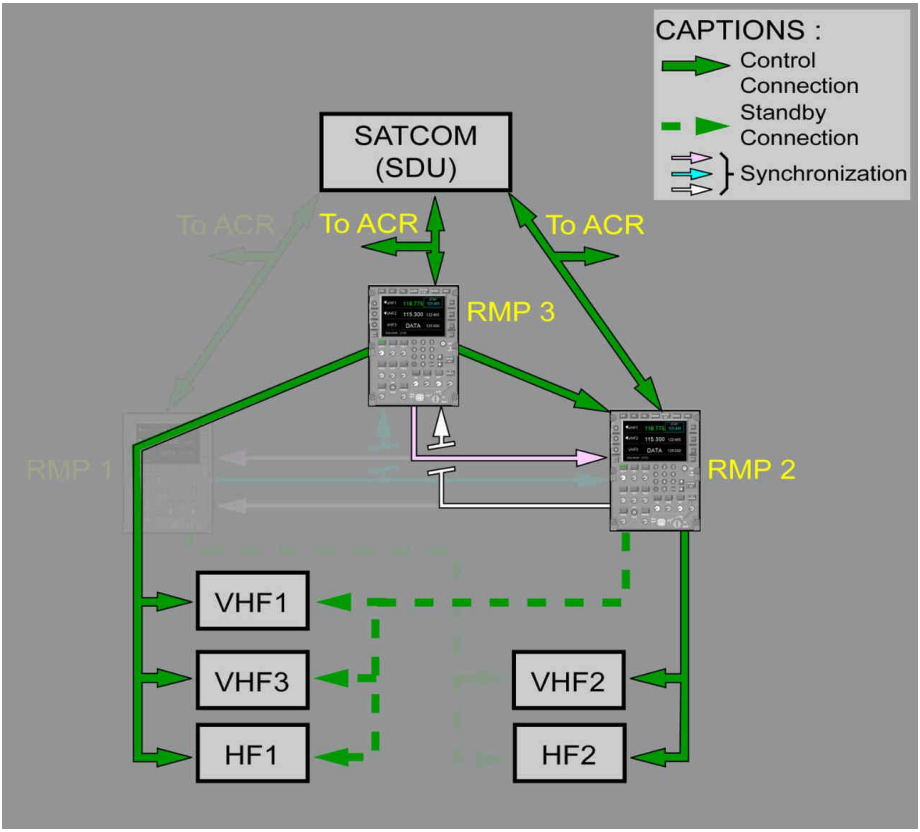
SINGLE RMP FAILURE

Applicable to: ALL

Single RMP Failure



If RMP 1 or RMP 2 fails, the Captain or the First Officer can use RMP 3 to recover control of the communication system.

When the failed RMP is turned off:
- RMP 3 connects directly to the VHF and HF transceivers
- The affected flight crewmember can control his communication equipment, via RMP 3.

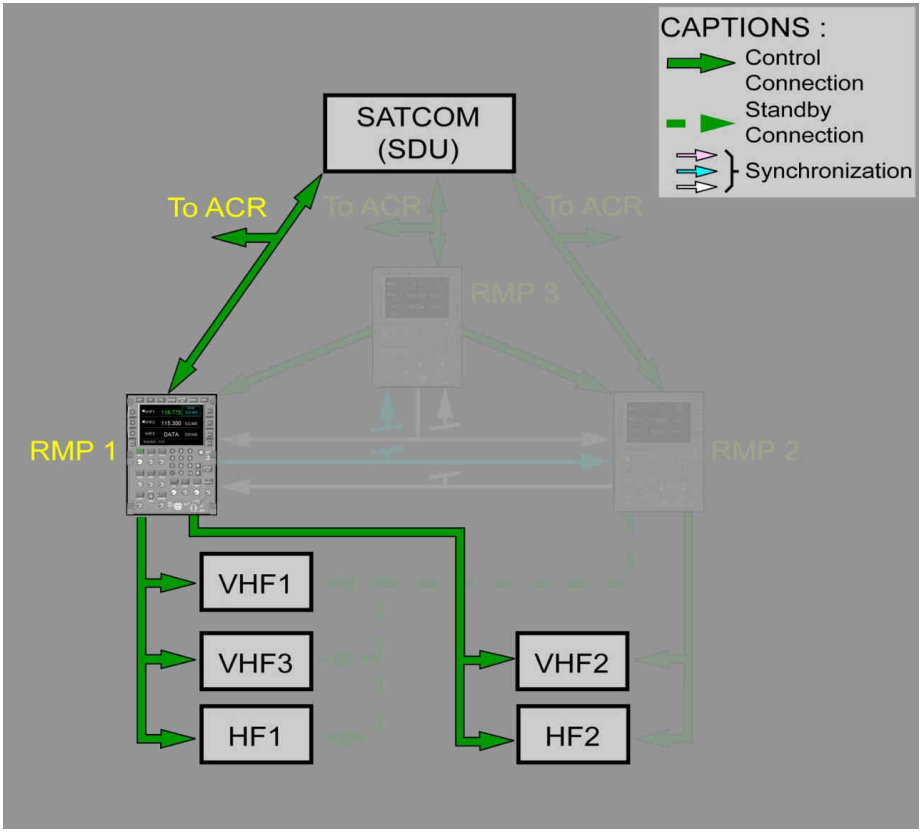
L3 If RMP 1 fails, RMP 3 controls VHF 1, VHF 3 and HF 1.
If RMP 2 fails, RMP 3 controls VHF 2 and HF 2.

L1 Standby radio navigation control is available via the operative RMP (RMP 1 and 2 only).

DUAL RMP FAILURE

Applicable to: ALL

Dual RMP Failure



If two RMPs fail, the Captain and the First Officer can use the remaining RMP to control the communication system.

When the failed RMPs are turned off, the operative RMP connects to, and controls all the radio communication means.

L3 Control of all radio communication is enabled by activation of standby connections.

L1 If RMP 1 and RMP 2 fail, standby radio navigation control is no longer available.

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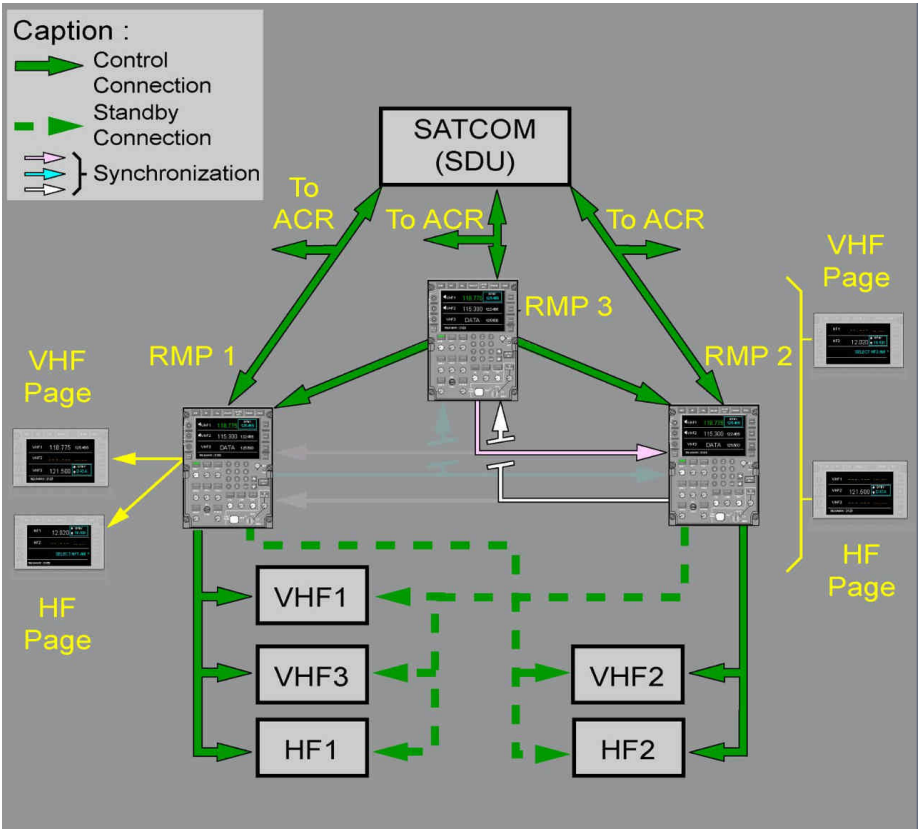
RMP SYNCHRONIZATION FAILURE

Applicable to: ALL

RMP Synchronization Failure



A synchronization failure results in a partial display of the VHF, HF, and NAV pages on each RMP.

L3 In the above illustration of connection failure, RMP 1 does not share information related to VHF 1, VHF 3 and HF 1 with the two other RMPs. Therefore, RMP 1 synchronization is interrupted. Only RMP 2 and RMP 3 are synchronized.

L1 The displays on the TEL, SATCOM and DATALINK ROUTER pages are normal.

RMP - VHF/HF TRANSCEIVER CONNECTION FAILURE

Applicable to: ALL

In the case of a control connection failure between an RMP and a VHF/HF transceiver in voice mode, the RMPs continue to operate normally. However, the affected transceiver cannot be controlled and remains tuned to the pre-failure active frequency.

The flight crew detects the discrepancy only when a frequency change is attempted and feedback from Air Traffic Control (ATC) is not consistent.

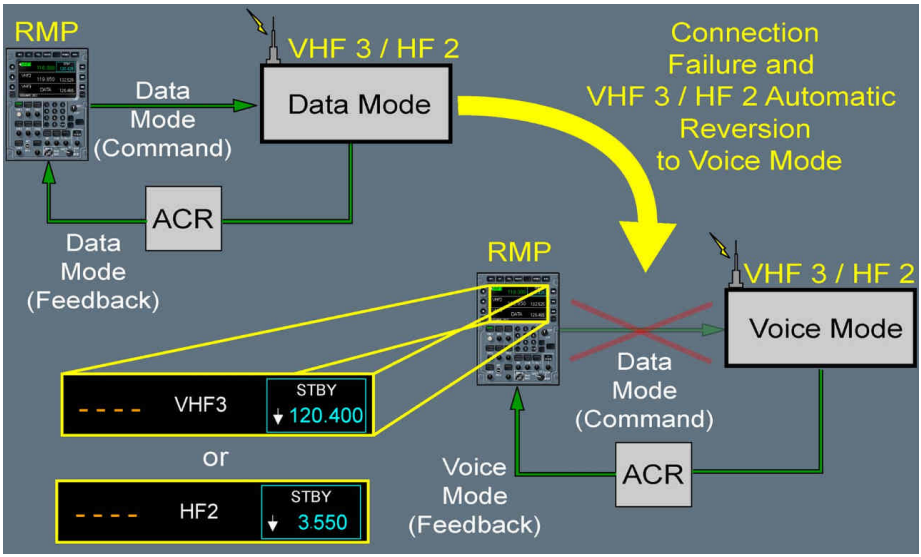
If such failure occurs when VHF 3 /HF 1(2) is in data mode, the transceiver automatically returns to the tune pre-failure standby frequency. Amber dashes replace DATA because the transceiver is in a mode (voice mode) that is not consistent with the mode commanded by the RMP (data mode).

L3 The ACR sends the VHF 3/HF 1(2) active mode information (voice or data) to the RMPs.

The illustration below shows an example of what happens when the connection, between an RMP and VHF 3/HF 2 fail.

In normal operation, a standby connection failure has no effect on the control of the VHF/HF transceivers.

RMP-VHF/HF Connection Failure



HOW TO TUNE A RADIO FREQUENCY

Applicable to: ALL

The procedure how to tune VHF or HF frequency is identical.



HOW TO SWITCH TO DATA MODE

Applicable to: ALL

The procedure how to switch to data mode for VHF or HF frequency is identical.

Switch HF2 to DATA Mode



Press LSK2 to select HF2 STBY frequency for modification.

HOW TO LOG ON TO THE SATCOM AUTOMATICALLY

Applicable to: ALL

SATCOM log on with the AUTO LOG ON function



Press LSK3 to select the SATCOM CONFIG page.

HOW TO LOG ON THE SATCOM MANUALLY

Applicable to: ALL



HOW TO DIAL A TELEPHONE NUMBER

Applicable to: ALL

How to manually-dial a telephone number is described. How to dial a telephone number from the scroll list is identical.

Manually Dial a Telephone Number via TEL 1



Press LSK1 to select the TEL1 phone number for modification.

HOW TO DISABLE TELEPHONE CALLS FROM THE CABIN

Applicable to: ALL



HOW TO TUNE NAVAIDS

Applicable to: ALL

The flight crew can tune navaids manually through:

- The FMS interface (*Refer to DSC-22-FMS-10-30-20-22FMS3020A Radio Navigation Tuning - Introduction*)
- The standby radio navigation interface (*Refer to DSC-34-10-60-30 How to Tune Navaids in Standby RadNav*)

HOW TO MODIFY THE VHF DATALINK PROVIDER

Applicable to: ALL

Modify the VHF datalink provider



Press LSK2 to select the DATALINK ROUTER page.

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ECAM ALERTS

Applicable to: ALL

CAB COM CIDS 1+2+3 FAULT (*Refer to procedure*)

CAB COM CIDS CABIN COM FAULT (*Refer to procedure*)

CAB COM COM DEGRADED (*Refer to procedure*)

COM CAPT (FO)(THIRD OCCUPANT) PTT STUCK (*Refer to procedure*)

COM DATALINK FAULT (*Refer to procedure*)

COM HF 1(2) DATALINK FAULT (*Refer to procedure*)

COM HF 1(2) EMITTING (*Refer to procedure*).

COM RMP 1(2)(3) FAULT (*Refer to procedure*)

COM RMP 1+2(1+3)(2+3) FAULT (*Refer to procedure*)

COM RMP 1+2+3 FAULT (*Refer to procedure*)

COM SATCOM DATALINK FAULT (*Refer to procedure*)

COM SATCOM FAULT (*Refer to procedure*)

COM SATCOM VOICE FAULT (*Refer to procedure*)

COM VHF 1(2)(3) EMITTING (*Refer to procedure*)

COM VHF 2(3) DATALINK FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Electrical Supply
Radio Management Panel (RMP) RMP 1	DC-ESS
RMP 2	DC-ESS (Only audio control panel of RMP 2)
RMP 3	DC 1
VHF 1	DC-ESS
VHF 2	DC 2
VHF 3	DC 1
External Communication Systems HF 1	AC 2
HF 2	AC 3
SATCOM	AC 2
SELCAL	DC-ESS
Flight Interphone	DC-ESS
Cabin Interphone	DC-ESS
Internal Communication Passenger Systems	DC-ESS
Service Interphone	Ground Servicing
EVAC	DC-ESS
Loudspeakers	DC-ESS

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AIRCRAFT SYSTEMS

24 - ELECTRICAL

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DSC-24-PLP PRELIMINARY PAGES

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DSC-24-50 ECAM Alerts

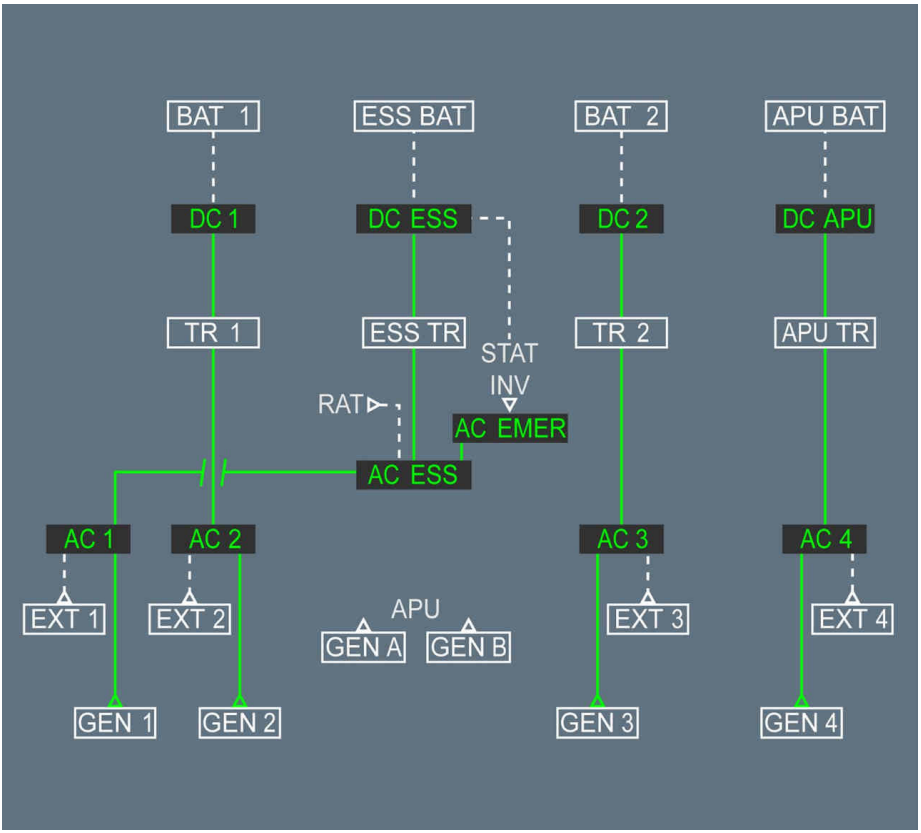
ECAM Alerts....A

OVERVIEW

Applicable to: ALL

The electrical power system generates and distributes electrical power to all applicable aircraft systems.

General



AC POWER

115 V Alternating Current (AC) power can be provided by three types of power sources:

- Four engine generators (GEN 1, GEN 2, GEN 3, and GEN 4)
- Two APU generators (APU GEN A and APU GEN B)
- Four external power units (EXT 1, EXT 2, EXT 3, and EXT 4).

Refer to AC Generation

In emergency configuration, the RAT or the DC static inverter can also provide some AC power.

Refer to Emergency Generation

DC POWER

28 V Direct Current (DC) power is provided from AC power by four Transformer Rectifiers (TR 1, ESS TR , TR 2, and APU TR).

In the event that AC power is not available, four batteries can also provide DC power.

Refer to DC Generation

ELECTRICAL NETWORKS AND POWER DISTRIBUTION

Electrical power is distributed to:

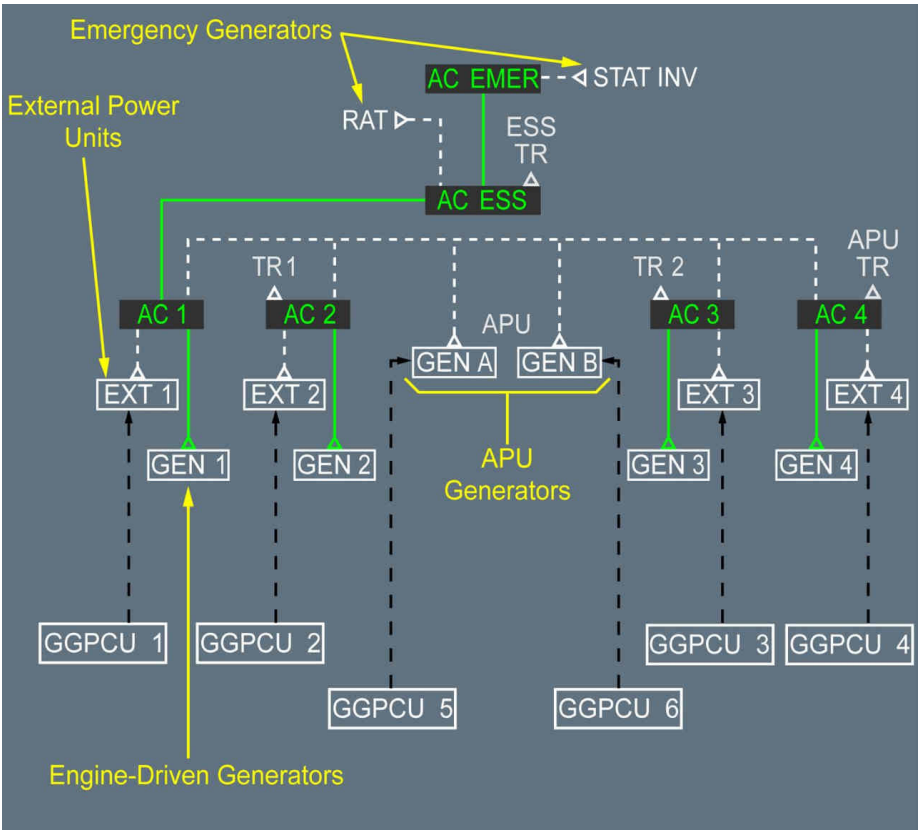
- The normal AC and DC networks via:
  - Four AC busbars (AC 1, AC 2, AC 3, and AC 4)
  - Two DC busbars (DC 1 and DC 2)
  - One DC APU busbar (DC APU busbar).
- The emergency AC and DC networks via:
  - One AC essential busbar (AC ESS)
  - One AC emergency busbar (AC EMER)
  - One DC essential busbar (DC ESS).

Refer to Electrical Networks and Power Distribution

AC GENERATION

Applicable to: ALL

AC Generation



ENGINE-DRIVEN GENERATORS

Each engine has one generator. These engine-driven generators are the main source of electrical power. When an engine is running, its generator provides 115 V AC power at variable frequency.

L3 This frequency ranges from 360 Hz to 800 Hz , depending on the N2 rotation speed of the engine. An oil system lubricates, and cools the engine generators. The ECAM monitors the oil level.

L1 Each engine generator supplies AC power to its assigned AC busbar (e.g. GEN 1 supplies AC 1).

If one or more generators fail, their assigned busbars are automatically supplied by the remaining generators. At least two engine generators (or APU generators) are necessary to supply the entire network. (*Refer to DSC-24-40 Reconfigurations Overview*).

L2 Each engine generator can supply up to 150 KVA .

There is one Generator and Ground Power Control Unit (GGPCU) per engine generator. Each GGPCU controls one engine generator and its corresponding external power unit.

The GGPCU :

- Monitors the frequency of the generator
- Controls the voltage of the generator
- Detects the generator overloads.

APU GENERATORS

The APU can drive two APU generators (APU GEN A and APU GEN B). When the APU is running, it drives both generators at the same time. These generators provide 115 V AC power at a constant frequency of 400 Hz .

An APU generator can replace the function of any generator, on ground and in flight, in the operational envelope of the APU .

For more precisions on the operational envelope of the APU : *Refer to LIM-49-20 Operational Envelope* .

- On ground, the two APU generators are able to supply the entire aircraft network.
- In flight, only one APU generator is available.

L2 In flight, when the APU is running, it drives the APU GEN A. If the APU GEN A is inoperative, in this case the APU drives the APU GEN B.

L3 The In-Flight or On-Ground information comes from the ADR 1 and ADR 3.

If the ADR 1 or the ADR 3 fails in flight, the APU GEN B will not be reconnected on ground.

L1 For more information on the electrical configuration with the APU only: *Refer to DSC-24-30 On Ground APU* .

L2 Each APU generator can supply up to 120 KVA .

There is one GGPCU per APU generator.

The GGPCU :

- Controls the frequency and voltage of the APU generator, and
- Detects the APU generator overloads.

EXTERNAL POWER UNITS

On ground, it is possible to connect as many as four external power units (EXT 1, EXT 2, EXT 3 and EXT 4).

Two external power units are sufficient to supply the entire aircraft network (*Refer to DSC-24-40 Reconfigurations Overview*).

L2 The external power units supply the aircraft by providing 115 V AC power at a constant frequency of 400 Hz . Each external power unit can supply up to 90 KVA .
There is one GGPCU per external power unit. Each external power unit controls its external power unit and its corresponding engine generator.

The GGPCU :

- Controls the frequency and voltage from the external power unit

L3 If the external power unit supplies more than 90 KVA , the GGPCU automatically limits the power supply of the external power unit to 90 KVA .

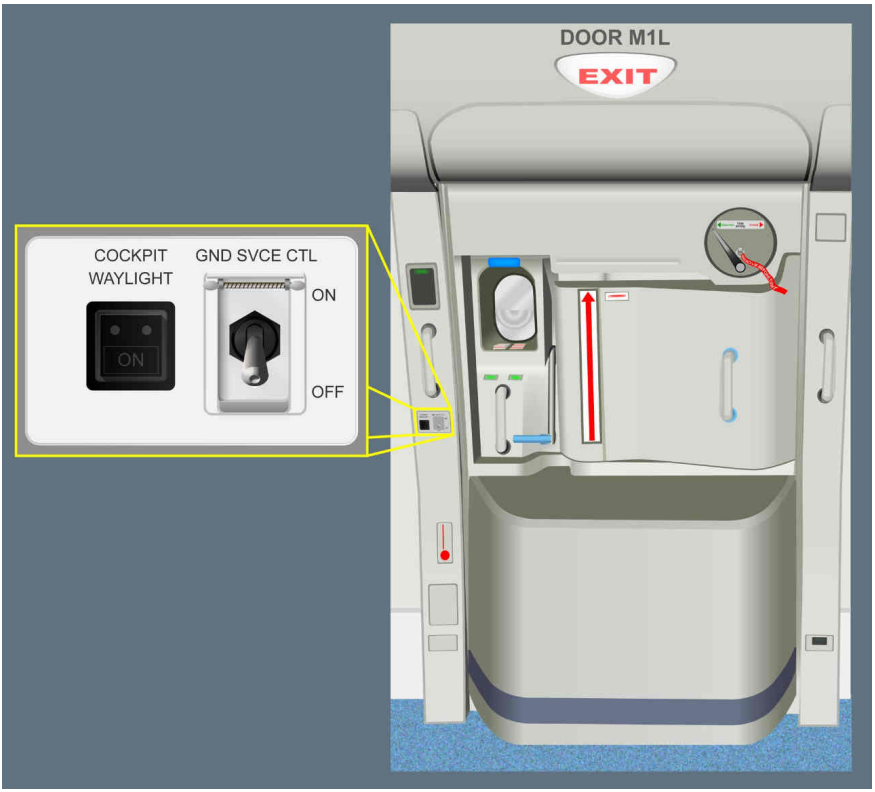
L2 - Detects the external power unit overloads.

GROUND SERVICING

The ground servicing electrical network is supplied, when:

- EXT 1 is connected to the aircraft.
- Maintenance and ground service personnel set the GND SVCE CTL sw to on.

GND SVCE CTL sw Location



In this configuration, the normal and emergency electrical networks are not supplied.

L3 EXT 1 supplies only the following loads:

- Cabin and cockpit lighting
- Hydraulic compartment lighting
- Cargo compartment lighting and power outlets
- Landing gear compartment lighting and servicing power outlets
- Equipment compartment lighting and servicing power outlets
- Vacuum cleaner power outlets
- Cockpit servicing power outlets
- Fuel quantity indicators
- Navigation lights

- Parking brake
- Cargo door hydraulic electric pumps.

L2 Note: *Ground servicing loads are also supplied, when at least two generators supply the electrical network.*

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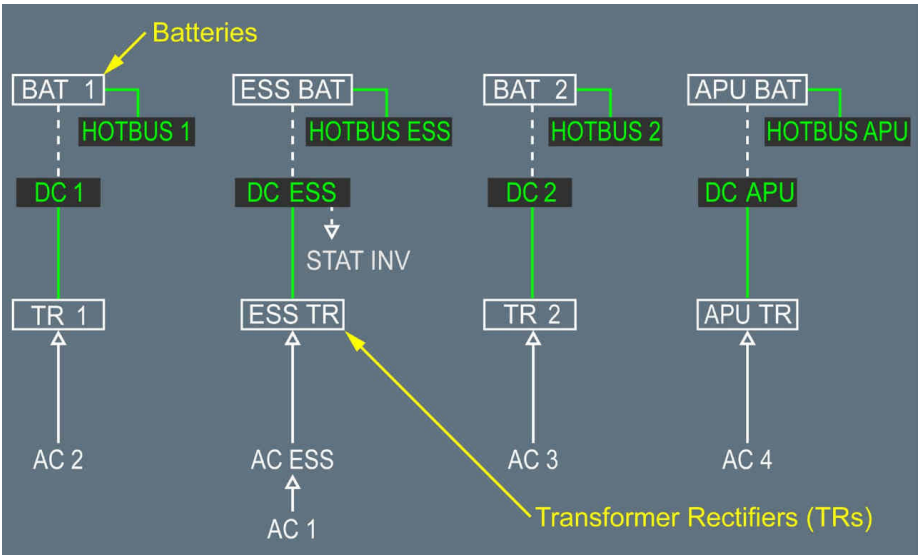
DC GENERATION

Applicable to: ALL

DC Generation



BATTERIES

The aircraft has four batteries:

- BAT 1

L3 BAT 1 is permanently connected to its assigned HOT BUS 1.

L1 - BAT 2

L3 BAT 2 is permanently connected to its assigned HOT BUS 2.

L1 - ESS BAT

L3 ESS BAT is permanently connected to its assigned HOT BUS ESS.

L1 - APU BAT

L3 APU BAT is permanently connected to its assigned APU HOT BUS.

The systems connected to the battery HOT BUS remain supplied by the associated battery even if the BAT pushbutton is set to OFF.

L1 In normal operation, and provided the BAT pushbutton is set to AUTO, BAT 1, BAT 2, ESS BAT, and APU BAT connect to the DC 1, DC 2, DC ESS, and APU BAT busbars, respectively.
The APU BAT is assigned to APU start.

In addition, BAT 1 and ESS BAT can supply the DC ESS busbar:
- On ground, when no other power source is available
- In emergency configuration:
  - During RAT extension, or
  - After landing, for evacuation procedures.

L3 Each battery has a capacity of 50 Ah.

TRANSFORMER RECTIFIERS

The Transformer Rectifiers (TRs) supply the DC network with a 28 V DC power from the 115 V AC power.

There are 4 TRs:
- TR 1

L2 Transforms power from the AC 2 busbar, to supply the DC 1 busbar.

L3 TR 1 also monitors BAT 1 charging.

L1 - ESS TR

L2 Transforms power from the AC ESS busbar, to supply the DC ESS busbar.

L3 ESS TR also monitors BAT ESS charging.

L1 - TR 2

L2 Transforms power from the AC 3 busbar, to supply the DC 2 busbar.

L3 TR 2 also monitors BAT 2 charging.

L1 - APU TR

L2
- Transforms power from the AC 4 busbar, to supply the DC APU busbar
- Connects the APU BAT to the DC APU busbar for APU starting, when no other power source is available.

L1 The TRs also control:

- Their associated battery charging
- The connection of their associated batteries to the DC busbars, in order to prevent a power interruption during source transfer.
  In normal operation, all the batteries, except the APU battery, are permanently connected to their associated busbar.

EMERGENCY GENERATION

Applicable to: ALL

RAM AIR TURBINE (RAT) GENERATOR

In the event that the AC 1, AC 2, AC 3, and AC 4 busbars are lost in flight, the RAT will automatically extend, and mechanically drive the emergency generator. This emergency generator supplies the AC ESS busbar with AC power at a variable frequency.

L3 This frequency ranges from 360 Hz to 800 Hz , depending on the rotation speed of the RAT .

L1 The emergency generator can supply all the electrical loads that are necessary for the remainder of the flight and for landing (for more information on the emergency configuration of the electrical system, *Refer to DSC-24-40 Emergency Electrical Configuration*).

L2 The RAT is under the LH wing, and supplies power, when the aircraft speed is greater, or equal to 140 kt .

The emergency Generator Control Unit (GCU) monitors and controls the RAT .

L3 The GCU :

- Monitors the frequency of the RAT generator,
- Controls the extension of the RAT , and
- Controls the output voltage of the RAT generator.

L1 STATIC INVERTER

During RAT extension, and after landing (speed less than 140 kt), the static inverter powers the AC EMER busbar.

L2 The static inverter transforms DC power from BAT 1, and from ESS BAT , into 115 V AC power at a constant frequency of 400 Hz .

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ELECTRICAL NETWORKS

Applicable to: ALL

NORMAL NETWORK

Each generator connects to the electrical networks via its assigned contactor.

The normal AC and DC network is supplied via:
- Four AC busbars: AC 1, AC 2, AC 3, and AC 4
- Two DC busbars: DC 1 and DC 2
- One DC APU busbar: DC APU .

The BUS TIE Contactors (BTC s) automatically open or close to reconfigure the electrical network.
For more information on the electrical network reconfigurations, *Refer to DSC-24-40 Reconfigurations Overview* .

L3 There are 8 BUS TIE contactors.

L1 When the flight crew sets the BUS TIE pb-sw to OFF , some BUS TIE contactors open to segregate:
- The AC 1 and AC 2 busbars from the AC 3 and AC 4 busbars, and
- The DC 1 busbar from the DC 2 busbar.

L2 The EHA AC busbar is supplied via the AC 3 busbar. The EHA DC busbar is supplied via the DC 2 busbar.

The EHA AC and the EHA DC busbars supply:
- Several EHA / EBHA actuators on the rudder,
- The PRIM 2, and
- The SEC 2.

In emergency configuration, and when both hydraulic systems are lost:
- The EHA AC busbar is supplied via the AC ESS busbar
- The EHA DC busbar is supplied via the DC ESS busbar.

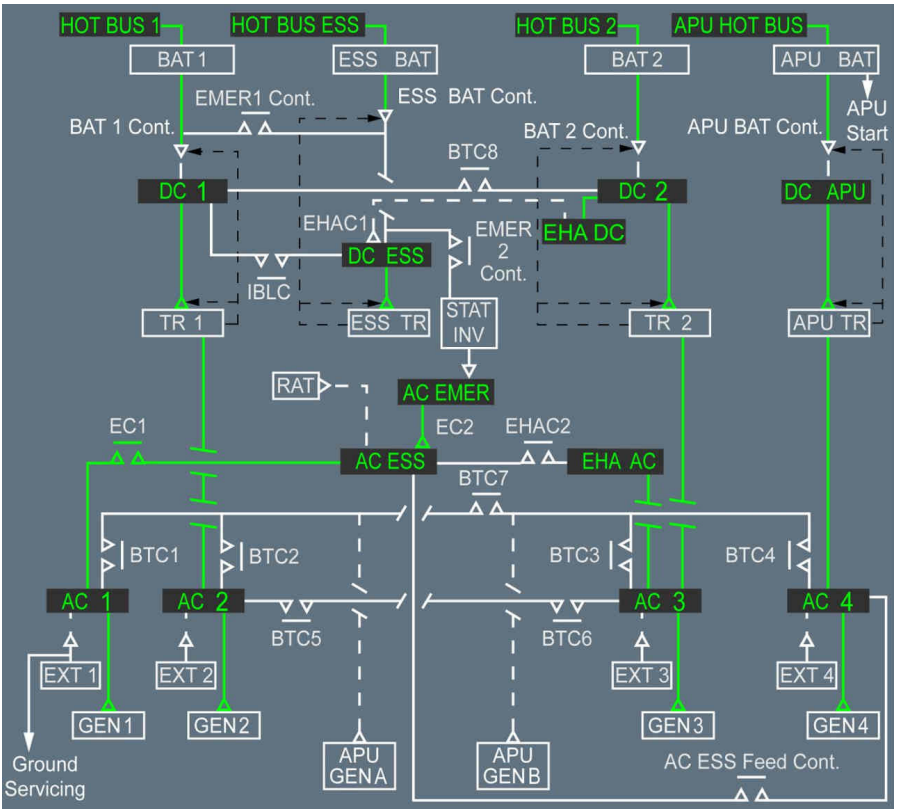
EMERGENCY NETWORK

The emergency network is supplied:

- Via the AC 1 busbar, or
- Via the AC 4 busbar if:
  - The AC 1 busbar is lost, or
  - AC ESS Feed pb-sw is set to ALTN.
- Directly from the RAT, in the event that the AC 1, AC 2, AC 3, and AC 4 busbars are lost.

ELECTRICAL NETWORKS

Electrical Networks



L3 Electricity is distributed to the electrical networks via supply centers (*Refer to DSC-24-10-50 Supply Centers*).

CONTACTORS

BTC 1, BTC 2, BTC 3, BTC 4, BTC 5, BTC 6, BTC 7	:	Enable any reconfiguration of the AC busbars. BTC 5, BTC 6, and BTC 7 are forced open when the BUS TIE pb-sw is set to OFF .
BTC 8 and the Inter Bus Line Contactor (IBLC)	:	Enable any reconfiguration of the DC busbars power supply. BTC 8 is forced open when the BUS TIE pb-sw is set to OFF .
EC 1	:	Closed to supply the AC ESS busbar via the AC 1 busbar (normal position). Opens, when - The AC ESS Feed pb-sw is set to ALTN , or - The static inverter supplies the AC EMER busbar.
AC ESS Feed contactor	:	Closes when: - The AC 1 busbar is lost, or - AC ESS FEED pb-sw is set to ALTN .
EC 2	:	Closed to supply AC EMER via AC ESS (normal position). Opens, when the static inverter supplies the AC EMER busbar.
EMER 1 and EMER 2 contactors	:	Close when: - The AC 1, AC 2, AC 3, and AC 4 busbars are lost, and - The RAT is not available. *Note: BAT ESS contactor also closes, when the EMER 1 and 2 contactors close.*
Battery contactors	:	Open: - When the associated battery is set to OFF . - If the associated battery fails.
EHA C1 and EHA C2	:	Close, in emergency configuration, when both hydraulic systems are lost.

SUPPLY CENTERS

Applicable to: ALL

The aircraft systems are supplied via the busbars. The busbars are grouped in several supply centers:

- The primary supply center: To distribute electricity to high loads (greater than 15 A) of the normal network.
- Two secondary supply centers: To distribute electricity to low loads (less than, or equal to, 15 A) of the normal network.
  The secondary supply center is ventilated by the avionics ventilation system, and by an assigned ventilation system.

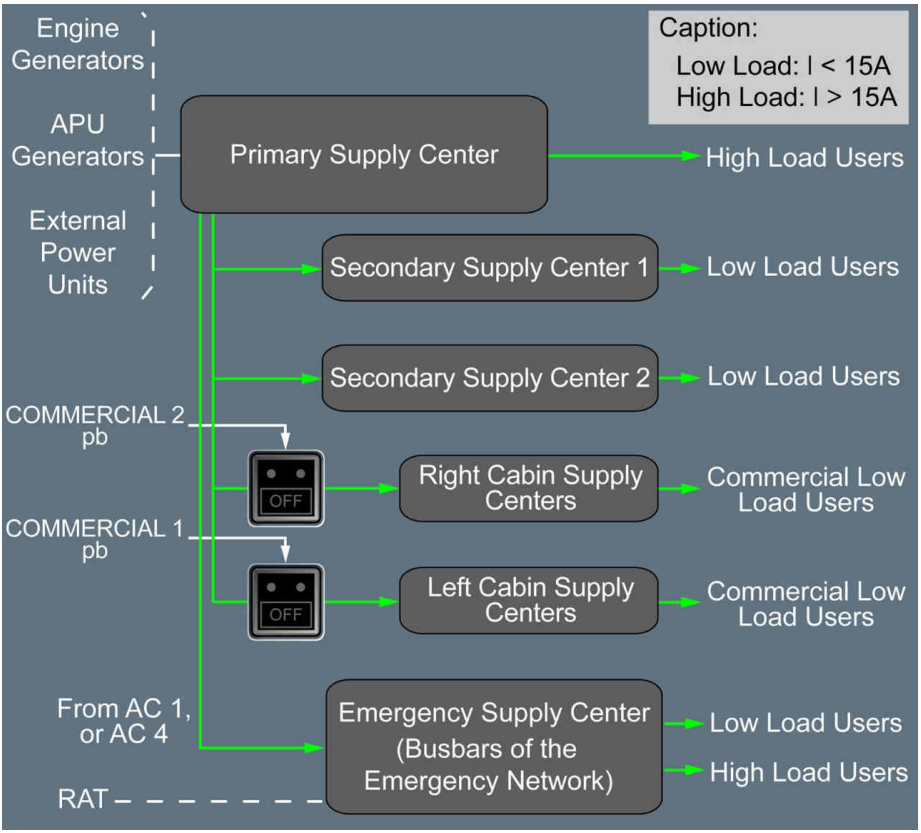
L2 There is one assigned blowing fan for each secondary supply center.

L1 - The left and right cabin supply centers: To distribute electricity to Commercial low loads.
Each cabin supply center has two overheat detectors, to detect any overheat in the commercial and cabin loads.

L3 There are four left cabin supply centers, and four right cabin supply centers.

L1 - The emergency supply center: To distribute electricity to emergency loads.

The Electrical Supply Centers



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ELECTRICAL NETWORK MANAGEMENT AND LOAD SHEDDING

Applicable to: ALL

The Electrical Network Management Units (ENMU 1 and ENMU 2) control the electrical networks by:

- Connecting AC and DC power sources.

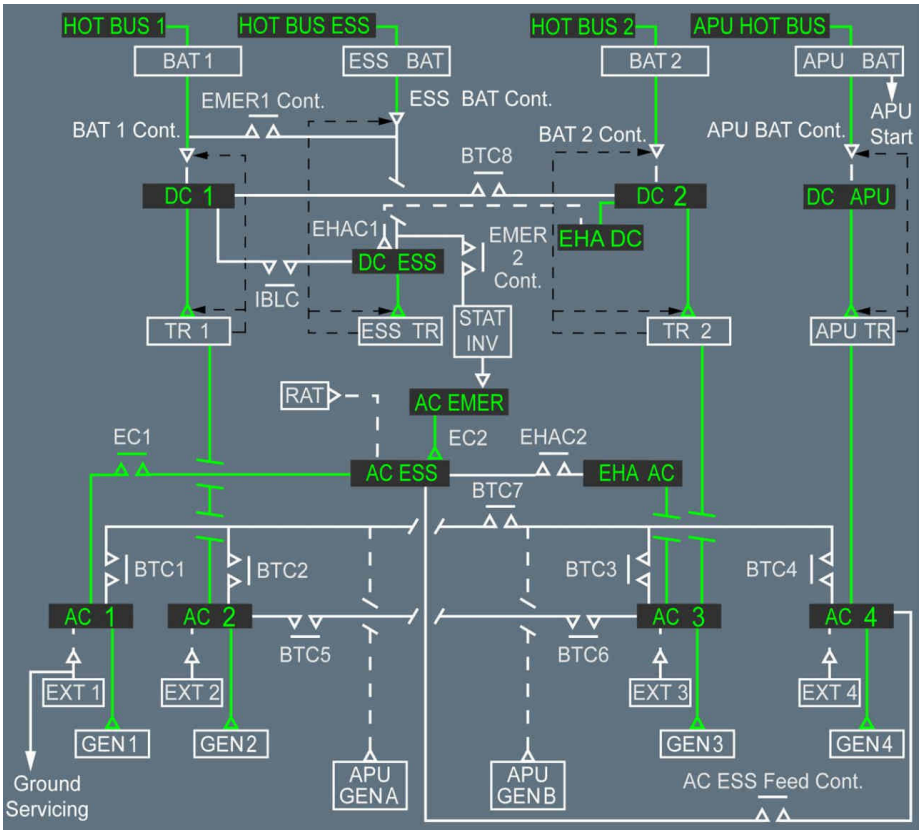
L2 E.g. the ENMU s will connect a power source to the network, by closing the appropriate power source contactor, when no power source malfunction is detected by the applicable GGPCU .

L1 - Reconfiguring the electrical network, depending on the availability of the busbars (for more information on the electrical reconfigurations, *Refer to DSC-24-40 Reconfigurations Overview*).

- Sending applicable information to the ECAM , for display on the EWD and the SD .
- Activating ground servicing to supply loads for aircraft cleaning, cargo loading/unloading, etc.

L2 (for more information on the ground servicing, *Refer to DSC-24-10-20-10 External Power Units*).

Control of the Electrical Networks



L3 ENMU 1 controls:

- Engine generator 1 and 2 contactors
- BUS TIE Contactors (BTC 1, BTC 2,and BTC 5)
- APU generator contactor 1
- Inter Bus Line Contactor (IBLC)
- EMER 1 and 2 contactors
- Static inverter contactor
- The Emergency Contactor 1 (EC)

ENMU 2 controls:
- Engine generators 3 and 4 contactors
- BUS TIE Contactors (BTC 3, BTC 4, BTC 6 and BTC 7, and BTC 8)
- APU generator contactor 2

L1 **LOAD SHEDDING**

In the event of a generator overload, some commercial AC loads will be automatically shed.

L2 These commercial loads are:
- All galleys
- The In-flight Entertainment (IFE) system
- The cargo loading system
- Water and waste ice protection
- Lavatory and cabin lights
- The water heater
- Supplemental cooling
- Door heaters.

L1 The load shedding function is performed by the ELMU .

L2 An overload may occur when there is a high demand, and only one or two generators are supplying the electrical network.

L1 When sufficient power is recovered, connections resume automatically.

L3 The applicable GGPCU determines the overloaded power source, and the overload value. The ELMU then sheds the appropriate loads.
Any commercial high or low AC load can be shed.
The ELMU uses the consumption priority criteria to identify which loads to reconnect.

L1 If the ELMU is not available, load shedding will be available only on high AC loads.

L3 The ENMU s will then perform this function, on high commercial AC loads greater than 15 A (e.g. galley).

CIRCUIT BREAKER (C/B) MONITORING

Applicable to: ALL

Two types of Circuit Breakers (C/Bs) protect the electrical networks:
- Conventional C/Bs on the normal and emergency networks.

L2 Conventional C/Bs connect:
- High loads to the normal network.
- High and low loads to the emergency network.

L1 - Self-monitored contactors, also referred to as remote C/Bs, that act as C/Bs, on the normal network.

L2 Self-monitored contactors connect low loads to the normal network.

L3 The self-monitored contactors can be monitored for maintenance purposes only, via the remote C/B controller that is at the back of the cockpit.
Low loads are on the secondary supply center, or on the cabin supply centers.

L1 C/B MONITORING FUNCTION

The C/B monitoring function:
- Identifies the tripped C/Bs (conventional and remote C/Bs) that connect loads to the electrical network
- Displays these tripped C/Bs on the C/B page of the SD.

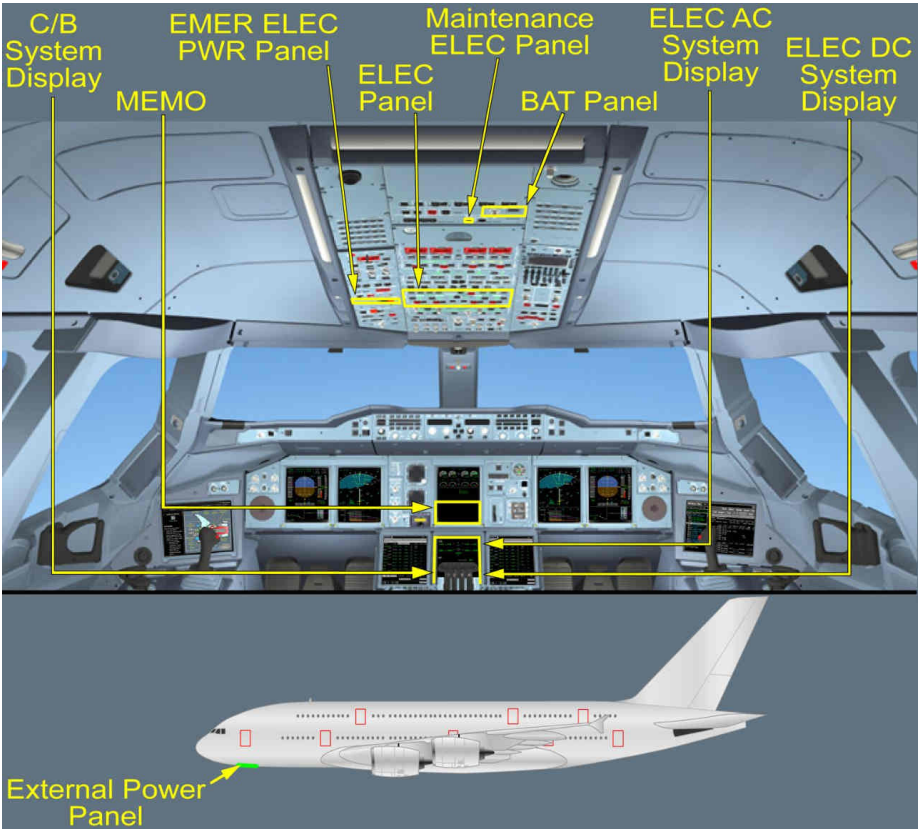
The emergency part of the C/B monitoring function:
- Identifies the tripped C/Bs that connect loads to the emergency network
- Displays these tripped C/Bs on the C/B page of the SD.

L3 The C/B monitoring function is hosted on the CPIOM E.

COCKPIT VIEW

Applicable to: ALL

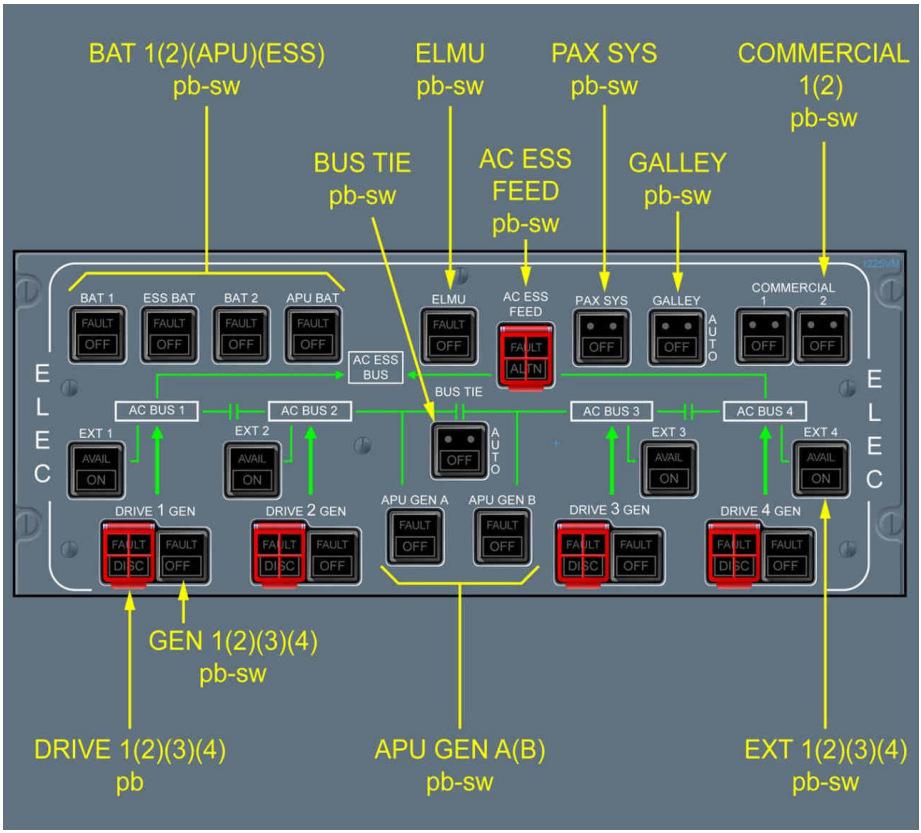
Cockpit View



ELEC PANEL

Applicable to: ALL

ELEC Panel



BAT1(2)(APU)(ESS) pb-sw



Normal position.
Battery charging is automatically-controlled by its associated TR .



The battery is disconnected from the network.

L12



The charging or discharging current of the battery is abnormal.
The battery automatically disconnects from its associated DC busbar.

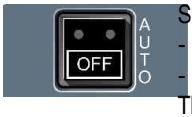
Associated with one of the following ECAM cautions:
- ELEC APU BAT FAULT (*Refer to procedure)*
- ELEC BAT 1 (2)(ESS) FAULT (*Refer to procedure).*

BUS TIE PB-SW



Normal position.
The BUS TIE contactors automatically open or close, to reconfigure the electrical network, as necessary.

L13



Some BUS TIE contactors open to segregate:
- The AC 1 and AC 2 busbars from the AC 3 and AC 4 busbars, and
- The DC 1 busbar from the DC 2 busbar.

The BUS TIE contactors BTC 5, BTC 6, BTC 7, and BTC 8 are forced open.
For more information, *Refer to Electrical Networks*

PAX SYS PB-SW



Normal Operation: The IFE center, and the passenger seats are electrically-supplied.



The IFE center, and the seat power supply are manually shed.

ELMU pb-sw



The automatic shedding function for high and low commercial loads is available.

L12



The ELMU is off: The automatic shedding function for low commercial loads is not available.
ENMU 1 and 2 can shed high loads, if necessary.

L12



The ELMU is failed: The automatic shedding function for low commercial loads is not available.
ENMU 1 and 2 can shed high loads, if necessary.

Associated with the following ECAM caution:
- ELEC LOAD MANAGT FAULT *Refer to procedure.*

AC ESS Feed pb-sw



Normal position:
- The AC 1 busbar supplies the AC ESS busbar.
- If the AC 1 busbar is lost, the AC 4 busbar will automatically supply the AC ESS busbar.



The AC ESS FEED pb-sw is manually set to ALTN .
The AC 4 busbar supplies the AC ESS busbar.

L12



The AC ESS busbar is not supplied.

Associated with the following ECAM caution:
- ELEC AC ESS BUS FAULT (*Refer to procedure).*

GALLEY pb-sw



The galleys are supplied. Some galleys may be automatically shed, if necessary.



All galleys are manually shed.

COMMERCIAL 1(2) PB-SW



All commercial loads of the upper left (right) cabin supply centers, are supplied. Some commercial loads may be automatically shed, if necessary.

L12



All commercial loads of the upper left (right) cabin supply centers, are manually shed.

The commercial loads are:
- All galleys
- The In-Flight Entertainment (IFE) system
- Ground servicing
- The cargo loading system
- Water and waste ice protection
- Lavatory and cabin lights
- The water heater
- The ice protection system for the slides.

EXT 1(2)(3)(4) pb



The external power unit is not connected to the aircraft.



The external power unit is connected to the aircraft, and is available to supply the electrical network.



The external power unit supplies the electrical network.

APU GEN A(B) pb-sw



The APU generator is available to supply the electrical network.



The APU GEN A(B) pb-sw is set to OFF with the APU running.

L12



The APU generator is disconnected from the electrical network.
The applicable GGPCU disconnects the APU generator from the electrical network.

L2 Associated with the following ECAM alert:
- ELEC APU GEN A(B) FAULT (*Refer to PRO-ABN-ECAM-10-24-80 ELEC APU GEN A(B) FAULT* procedure).

GEN 1(2)(3)(4) pb-sw



The engine generator is connected to the electrical network.



The GEN 1(2)(3)(4) pb-sw is set to OFF with the engine running.

L12



The engine generator is disconnected from the electrical network.
The applicable GGPCU disconnects the engine generator from the electrical network.

Associated with the following ECAM alerts:
- ELEC GEN 1(2)(3)(4) FAULT (*Refer to procedure).*

L2 *Note: If the DRIVE pb-sw is set to DISC , the engine is disconnected from the engine generator, and the ENG pb-sw automatically sets to FAULT .*

DRIVE 1(2)(3)(4) pb



L13

The engine generator is driven by the engine.



L12

The engine generator is disconnected from the engine.
It can only be reconnected by maintenance action on ground.
The reconnection requires the removal of the engine generator from the aircraft, and refurbishment of the engine generator in workshop.



The engine generator must be disconnected from the engine.

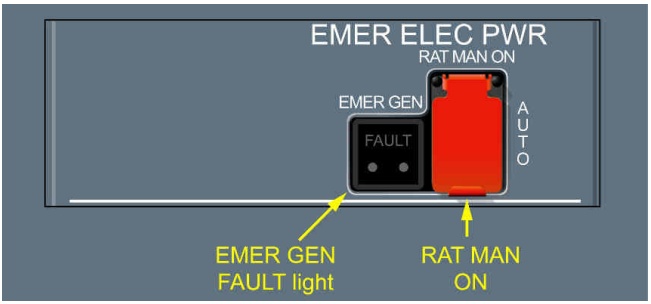
Associated with the following ECAM alerts:
- ELEC DRIVE 1(2)(3)(4) OIL OVHT (*Refer to PRO-ABN-ECAM-10-24-220 ELEC DRIVE 1(2)(3)(4) OIL OVHT*)
- ELEC DRIVE 1(2)(3)(4) OIL PRESS LO (*Refer to procedure)* .

EMER ELEC PWR PANEL

Applicable to: ALL

EMER ELEC PWR PANEL

EMER ELEC PWR Panel



RAT MAN ON pb



Normal position:

- The RAT is stowed, and the emergency generator does not supply the emergency network.
- In the event that all AC busbars are lost, the RAT automatically extends, and the emergency generator electrically-supplies the emergency network.



The guard is open.
When the pushbutton is pressed, the RAT extends, and the emergency generator connects to the emergency network.

EMER GEN FAULT LIGHT



The emergency generator is available, if necessary.



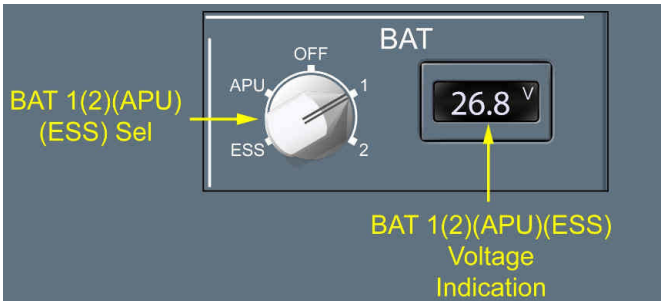
Comes on when:
- The RAT is extending, or
- The RAT is extended, and the emergency generator does not supply the emergency network.

BAT PANEL

Applicable to: ALL

BAT PANEL

BAT Panel



BAT 1 (2) (APU) (ESS) selector



Selects the battery, in order to display the associated voltage.

BAT 1 (2) (APU) (ESS) VOLTAGE INDICATION



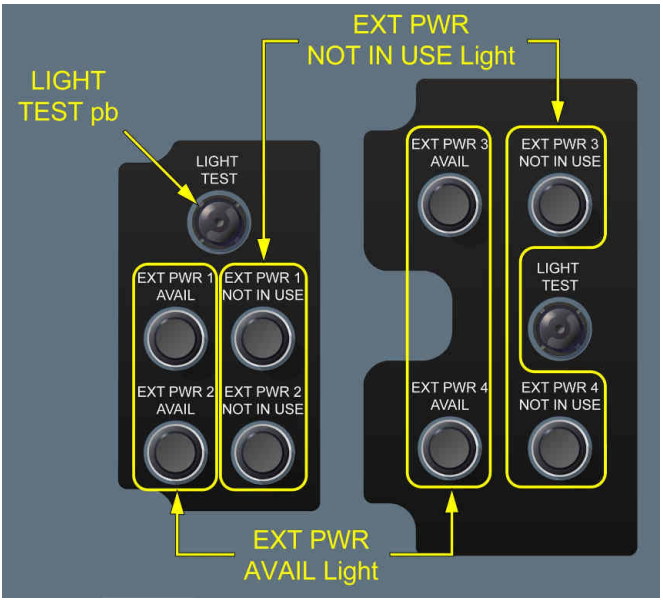
The voltage of the selected battery.

EXTERNAL POWER PANEL

Applicable to: ALL

EXTERNAL POWER PANELS

External Power Panels



EXT PWR 1 (2)(3)(4) NOT IN USE light

This white light comes on () to inform the ground mechanics that the applicable external power unit is not supplying the electrical network, and can be disconnected. The white light disappears, when the external power unit is supplying the electrical network.

EXT PWR 1(2)(3)(4) AVAIL light



This amber light comes on (), to inform the ground mechanics that the applicable external power unit is available, with an appropriate voltage.

LIGHT TEST pb

The LIGHT TEST pb is used to test the associated EXT PWR AVAIL light and EXT PWR NOT IN USE light.

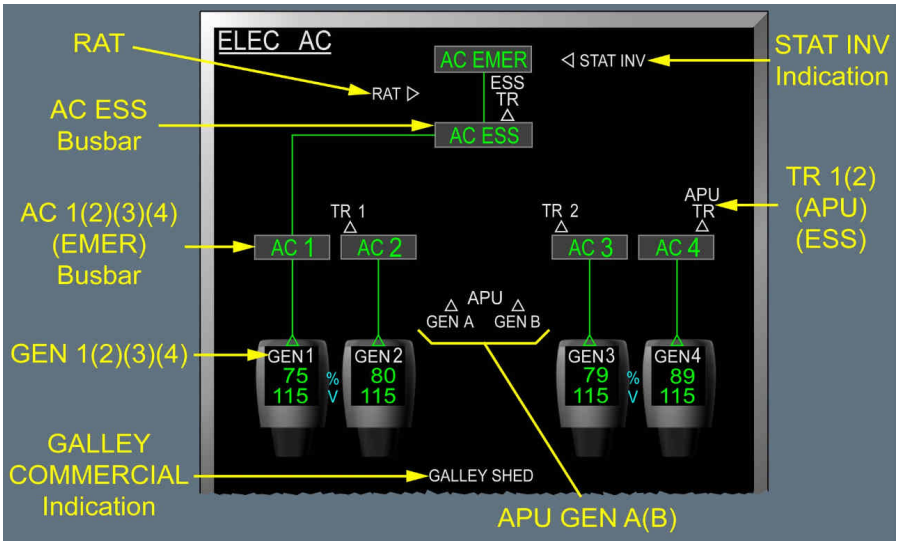
ELEC AC SYSTEM DISPLAY: IN-FLIGHT CONFIGURATION

Applicable to: ALL

For the ELEC AC system display on-ground configuration, *Refer to DSC-24-20-60 ELEC AC System Display: On-Ground Configuration* .

ELEC AC SYSTEM DISPLAY: IN-FLIGHT CONFIGURATION

ELEC AC System Display: In-Flight Configuration



STAT INV INDICATION

The static inverter indications on the SD differ, when the static inverter is:
- On standby, or
- In operation.

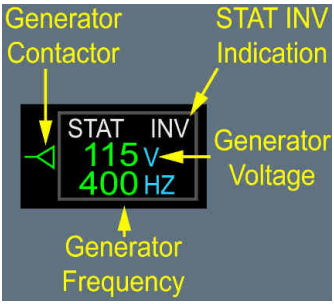
STATIC INVERTER ON STANDBY



The static inverter is on standby.

STATIC INVERTER IN OPERATION

Static Inverter In Operation



GENERATOR CONTACTOR



The static inverter is connected to the AC EMER busbar.



The static inverter contactor is failed: The static inverter is no longer connected to the AC EMER busbar.

STAT INV INDICATION



The static inverter operates normally.



The static inverter is failed.

GENERATOR VOLTAGE

L12



The static inverter voltage is normal.
The voltage is normal between 110 V and 120 V.



The static inverter voltage is abnormal.

GENERATOR FREQUENCY

L12



The static inverter frequency is normal.
The frequency is normal between 390 Hz and 410 Hz.



The static inverter frequency is abnormal.

AC ESS BUSBAR



The AC ESS busbar is powered.



The AC ESS busbar is not powered.

APU GEN A(B)

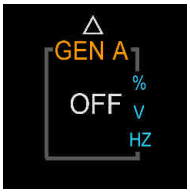
The APU generator indications on the SD differ, when the APU generator is:
- On standby, or
- Off, or
- In operation.

APU GENERATOR ON STANDBY



The APU generator is on standby: The APU is off.

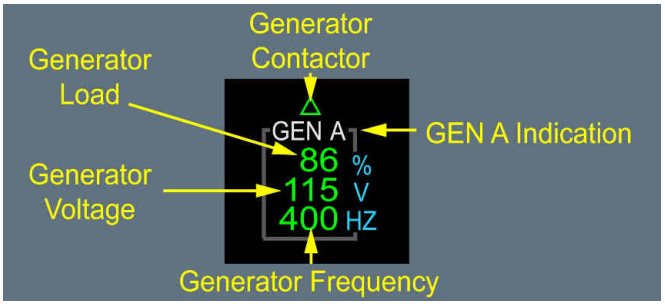
APU GENERATOR OFF



The APU generator is off: The APU is on, and the APU GEN A pb-sw is set to OFF.

APU GENERATOR IN OPERATION

GEN A In Operation



GENERATOR CONTACTOR

The APU generator is connected to the electrical network.

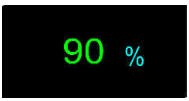
The APU generator is not connected to the electrical network.

GEN A INDICATION

GEN A — Normal operation.

GENERATOR LOAD

L12



The APU generator load is normal.
The load is normal, when it is less than 108 %.

L12



There is an overload on the APU generator.
The load is greater than 108 % for more than 10 s.

GENERATOR VOLTAGE

L12



The APU generator voltage is normal.
The voltage is normal between 110 V and 120 V.



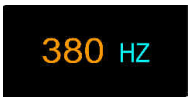
The APU generator voltage is abnormal.

GENERATOR FREQUENCY

L12



The APU generator frequency is normal.
The frequency is between 390 Hz and 410 Hz.



The APU generator frequency is abnormal.

GALLEY/COMMERCIAL INDICATION

COMMERCIAL OFF	All commercial loads are shed.
GALLEY SHED	All galley loads are shed.
COMMERCIAL PARTIALLY SHED	Some commercial loads are shed.
GALLEY PARTIALLY SHED	Some galley loads are shed.

GEN 1(2)(3)(4)

The engine generator indications on the SD differ, when the engine generator is:
- Off, or
- In operation.

ENGINE GENERATOR OFF



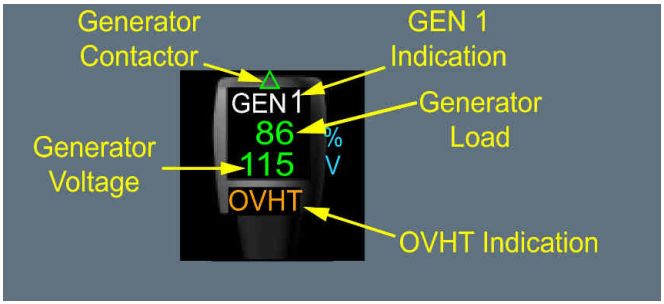
The engine generator is off.



The engine generator is disconnected from the engine.

ENGINE GENERATOR IN OPERATION

GEN 1(2)(3)(4) In Operation



GENERATOR CONTACTOR

△ The engine generator is connected to the electrical network.
Does not appear, if the generator is disconnected from the electrical network.

GEN 1 INDICATION



Normal operation.



The engine generator is off, failed, or the assigned engine is not running.



No information from the engine generator is available.

GENERATOR LOAD

L12



The engine generator load is normal.
The load is normal, when it is less than 108 %.

L12



There is an overload on the engine generator.
The load is greater than 108 % for more than 10 s.

GENERATOR VOLTAGE

L12



The engine generator voltage is normal.
The voltage is normal between 110 V and 120 V.



The engine generator voltage is abnormal.

OVHT INDICATION

L13



The engine generator overheats.
The temperature is above 185 °C.

AC 1(2)(3)(4)(EMER)



The AC busbar is powered.



The AC busbar is not powered.

TR 1(2)(APU)(ESS)



The TR is powered.



The TR is failed, or is not powered.

RAT

The RAT indications on the SD differ, when the RAT is:
- On standby, or
- In operation.

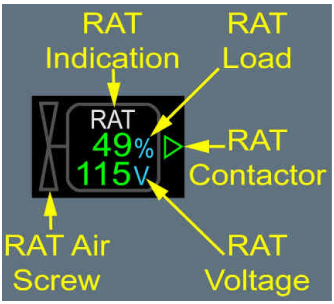
RAT ON STANDBY



The RAT is on standby.

RAT IN OPERATION

RAT In Operation



RAT INDICATION



Normal operation.



The RAT is failed.

RAT LOAD

L12



The RAT load is normal.
The load is normal, when it is less than 108 %.

L12



There is an overload on the RAT.
The load is greater than 108 % for more than 10 s.

RAT CONTACTOR



The RAT is connected to the emergency network.



The RAT contactor is failed.

RAT VOLTAGE

L12



The RAT voltage is normal.
The voltage is normal between 110 V and 120 V.



The RAT voltage is abnormal.

RAT AIR SCREW



The RAT is deployed.



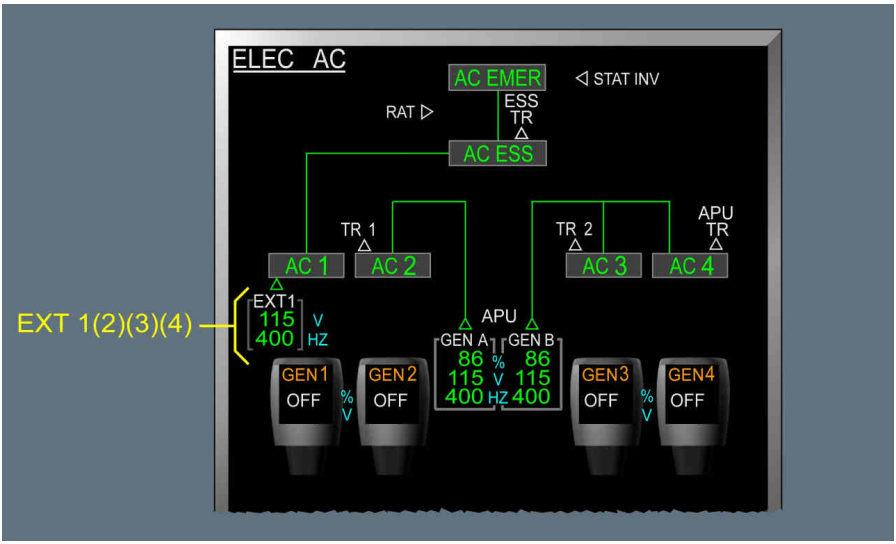
The RAT is still stowed, but should be deployed.

ELEC AC SYSTEM DISPLAY: ON-GROUND CONFIGURATION

Applicable to: ALL

ELEC AC SYSTEM DISPLAY: ON-GROUND CONFIGURATION

ELEC AC System Display: On-Ground Configuration



EXT 1(2)(3)(4) INDICATION

The external power unit indications on the SD differ, when the external power unit is:

- Not available: Not connected to the aircraft, or
- Available on standby: Connected to the aircraft and does not supply the electrical network, or
- In operation: Supplies the electrical network.

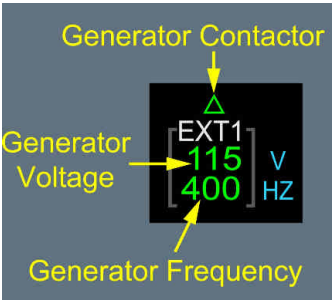
EXTERNAL POWER UNIT NOT AVAILABLE



The aircraft is on ground and the external power is not connected to the aircraft.

EXTERNAL POWER UNIT AVAILABLE OR IN OPERATION

External Power Unit In Operation



GENERATOR CONTACTOR

The external power unit supplies the electrical network.

The external power unit is not supplying the electrical network.

GENERATOR VOLTAGE

L12

115 V — The external power unit voltage is normal.
The voltage is normal between 110 V and 120 V.

108 V — The external power unit voltage is abnormal.

GENERATOR FREQUENCY

L12

400 HZ — The external power unit frequency is normal.
The frequency is normal between 390 Hz and 410 Hz.

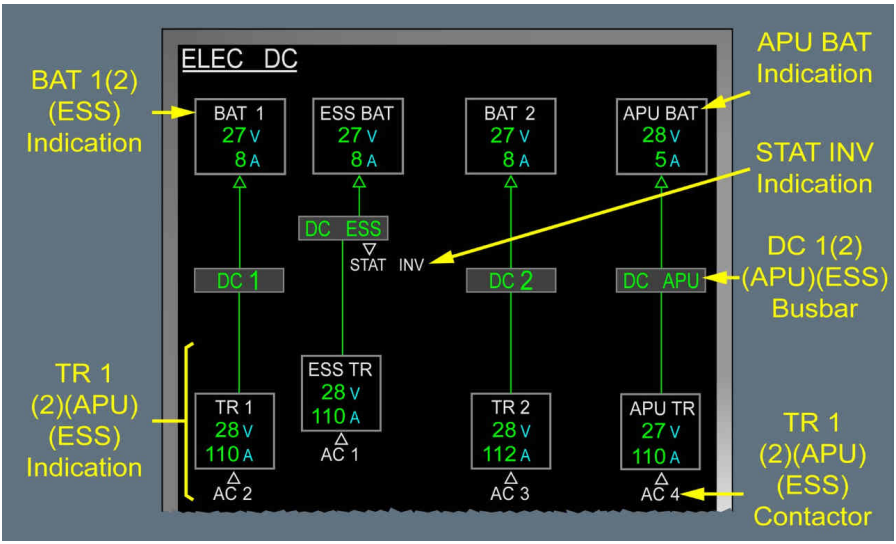
415 HZ — The external power unit frequency is abnormal.

ELEC DC SYSTEM DISPLAY

Applicable to: ALL

ELEC DC SYSTEM DISPLAY

ELEC DC System Display



STAT INV INDICATIONS



The static inverter is available.



The static inverter is failed.

DC (1)(2)(APU)



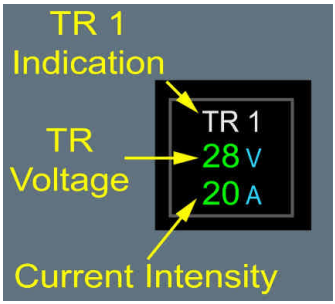
The DC busbar is powered.



he DC busbar is not powered.

TR 1(2)(APU)(ESS) INDICATION

TR 1



TR 1 INDICATION



The TR is powered.



The TR is not powered, or failed.

TR VOLTAGE

L12



The TR voltage is normal.
The voltage is normal between 27 V and 32 V.



The TR voltage is abnormal.

CURRENT INTENSITY

L12



The intensity of the current is normal.
The intensity of the current is normal, when greater than, or equal to, 2 A.



The intensity of the current is abnormal.

TR 1(2)(APU)(ESS) CONTACTOR



The busbar supplies its assigned TR.



The busbar does not supply its assigned TR.

BAT1(2)(ESS) INDICATIONS

The battery indications on the SD differ, when the battery is:
- Off, or
- In operation.

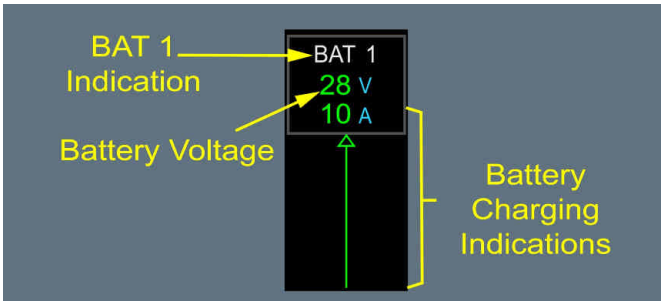
BATTERY OFF



The battery is off.

BATTERY IN OPERATION

BAT 1 In Operation



BAT 1 INDICATION

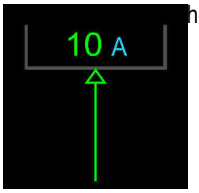


Normal operation.

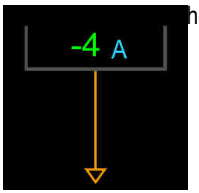


The battery is off, or is failed.

BATTERY CHARGING INDICATIONS

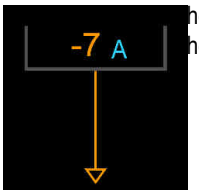


he battery is charging: The intensity of the current is normal.

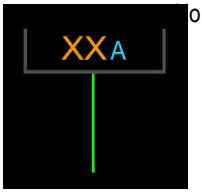


he battery is discharging: The intensity of the current is normal.

L12



he battery is discharging: The intensity of the current is abnormal.
he intensity of the current is abnormal, when it is less than –5 A.



o information from the battery charging is available.

BATTERY VOLTAGE



The battery voltage is normal.

L12



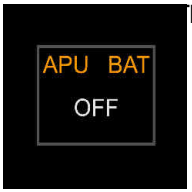
The battery voltage is abnormal.

The voltage is abnormal, if:
- It is less than, or equal to, 25 V, and current intensity is greater than 0 A, or
- It is less than 20 V.

APU BAT INDICATIONS

The APU battery indications on the SD differ, when the battery is:
- Off, or
- In Operation.

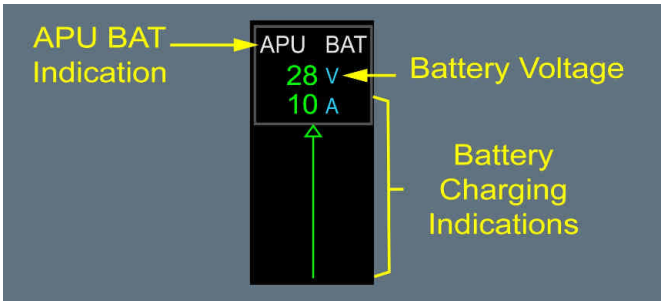
APU BAT OFF



The APU BAT pb-sw is set to OFF.

APU BAT IN OPERATION

APU Battery In Operation



APU BAT INDICATION



The APU battery operates normally.



The APU BAT pb-sw is set to OFF, or the APU battery is failed.

BATTERY VOLTAGE



The APU battery voltage is normal.

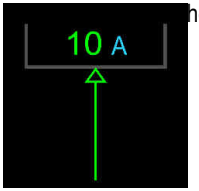
L12



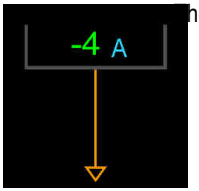
The APU battery voltage is abnormal.

The battery voltage is abnormal, if:
- It is less than, or equal to, 25 V and
- The APU is not in the starting sequence.

APU BATTERY CHARGING INDICATIONS

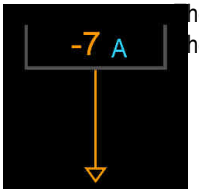


The APU battery is charging with a normal intensity of the current.

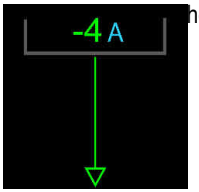


The APU battery is discharging with a normal intensity of the current.

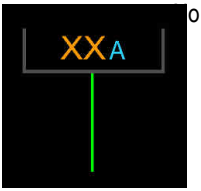
L12



The APU battery discharging with an abnormal intensity of the current.
The intensity of the current is abnormal when less than –5 A.



The APU battery is discharging to start the APU.



o information from the APU battery charging is available.

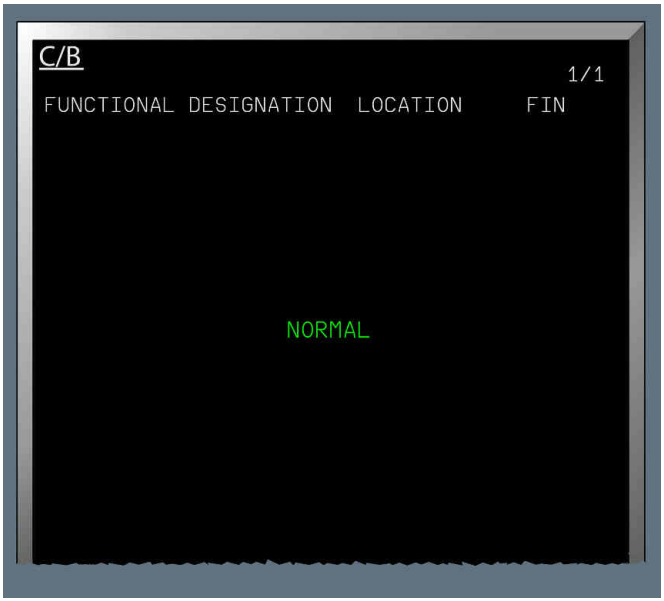
C/B ECAM PAGE

Applicable to: ALL

The indications on the C/B SD differ, when:
- No C/B is tripped, or
- At least one C/B is tripped.

NO C/B TRIPPED

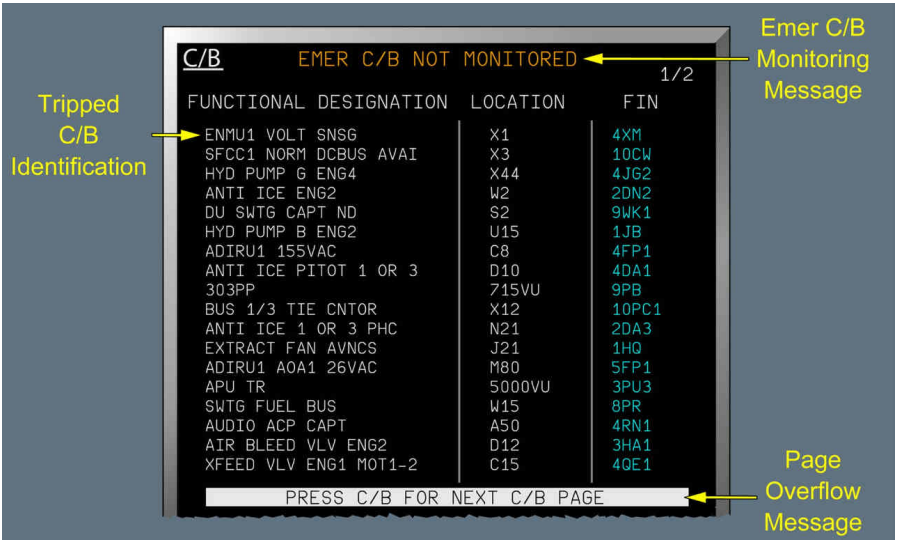
No C/B Tripped



The NORMAL indication is replaced by the NOT AVAIL indication, when the C/B monitoring function is lost.

AT LEAST ONE C/B TRIPPED

When at least one C/B is tripped



TRIPPED C/B IDENTIFICATION

The last tripped C/B is displayed at the top of the tripped C/B list.
The location and the Functional Identification Number (FIN) of the tripped C/B is for maintenance purposes only.

EMERGENCY C/B MONITORING MESSAGE

This message only appears, when the emergency C/B monitoring function is lost: The tripped C/B on the electrical emergency network can no longer be displayed on the C/B SD.

PAGE OVERFLOW MESSAGE

This message only appears, when there are more than 18 tripped C/Bs. The remaining tripped C/B appear, when the flight crew presses the C/B key on the ECAM control panel.

L3 A maximum of two pages is available.

MAINTENANCE ELEC PANEL

Applicable to: ALL

MAINTENANCE ELEC PANEL



Normal operation.



The remote C/B controller is ON, and can be displayed on the OIT. This controller is for maintenance purposes only.

MEMO

Applicable to: ALL

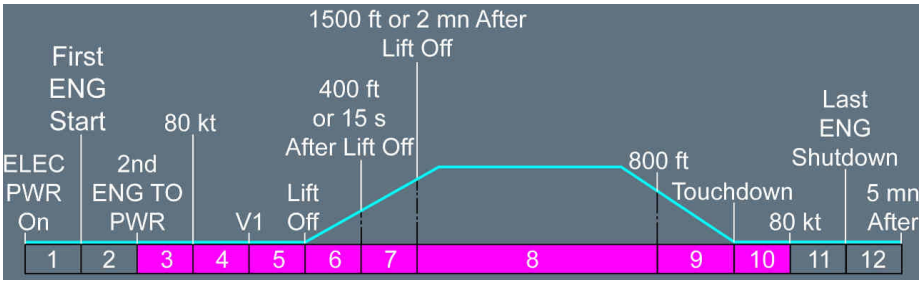
COMMERCIAL PART SHED

Commercial loads are partially shed. This MEMO is displayed in the following cases:

- Automatic load shedding by the ELMU (*Refer to DSC-24-10-60 Electrical Network Management and Load Shedding*).
- Manual load shedding by the COMMERCIAL 1(2) pb is set to OFF.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

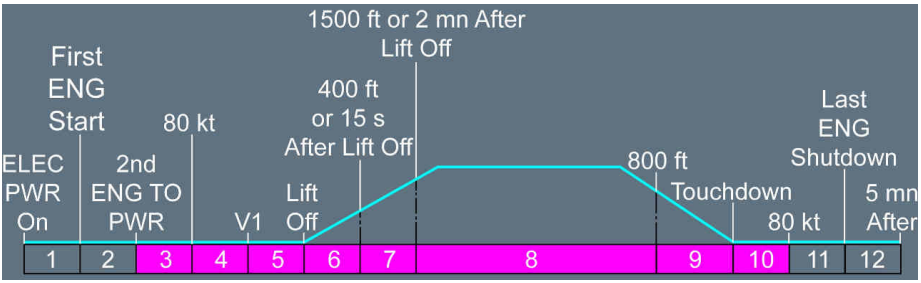


ELEC EXT PWR

At least one external power unit is connected to the electrical network, and two or more engines are running.

L2 Flight Phase Inhibition:

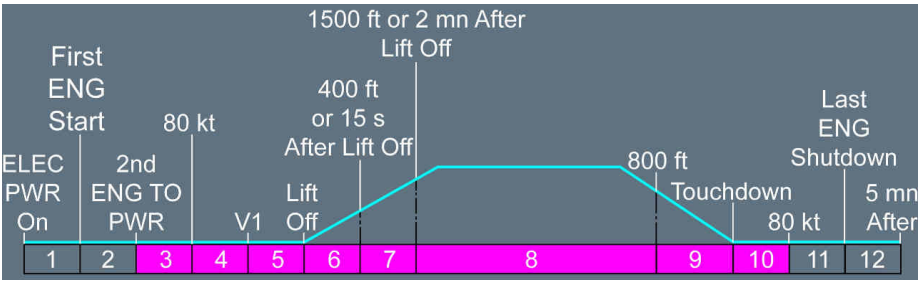
Flight Phase Inhibition



ELEC EXT PWR — At least one external power unit is connected to the electrical network, and one or no engine is running.

L2 Flight Phase Inhibition:

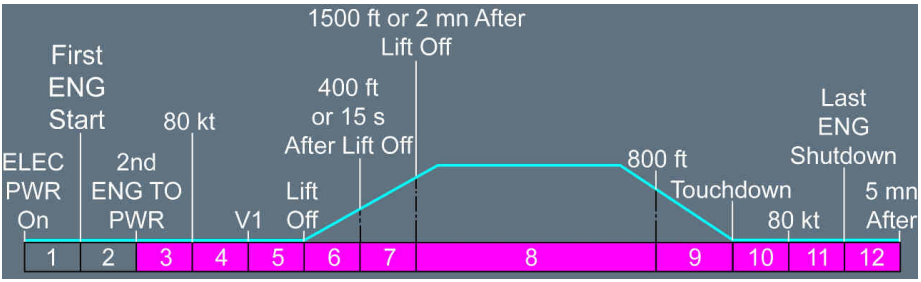
Flight Phase Inhibition



RAT OUT — The RAT is deployed, and the aircraft is on ground.

L2 Flight Phase Inhibition:

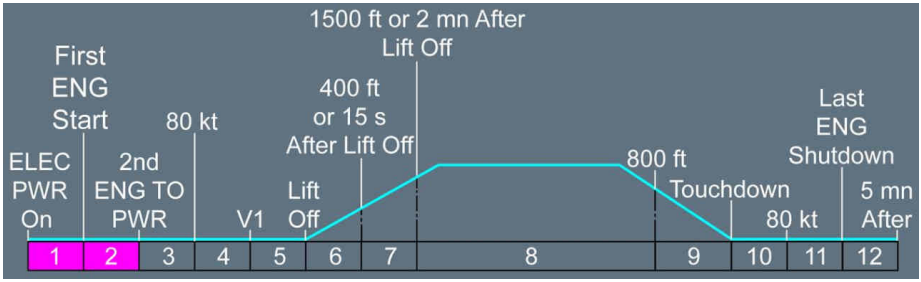
Flight Phase Inhibition



RAT OUT — The RAT is deployed, and the aircraft is in flight.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

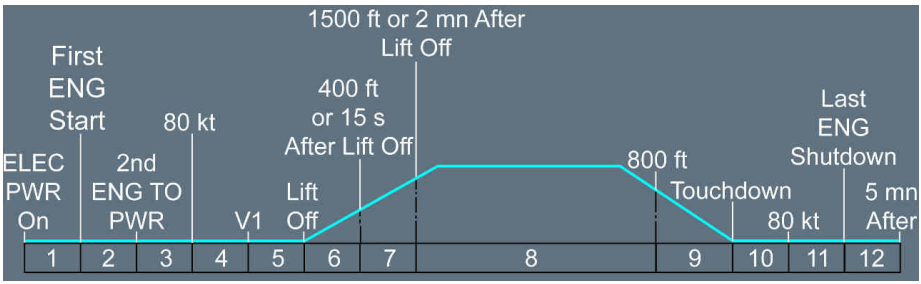


L13

REMOTE C/B CTL ON — The remote C/B controller is still ON . This controller is for maintenance purposes only.
Refer to DSC-24-10-60 Electrical Network Management and Load Shedding

L2 Flight Phase Inhibition:

Flight Phase Inhibition



OVERVIEW

Applicable to: ALL

In normal operation, and before all engines are started, the electrical network automatically reconfigures to supply as many busbars as possible.
This reconfiguration takes generator availability into account, and occurs according to priority rules.
Any two generators can supply the entire electrical network: Each generator can supply up to two AC busbars.

L2 Each AC busbar is supplied, in the following order of priority, by:

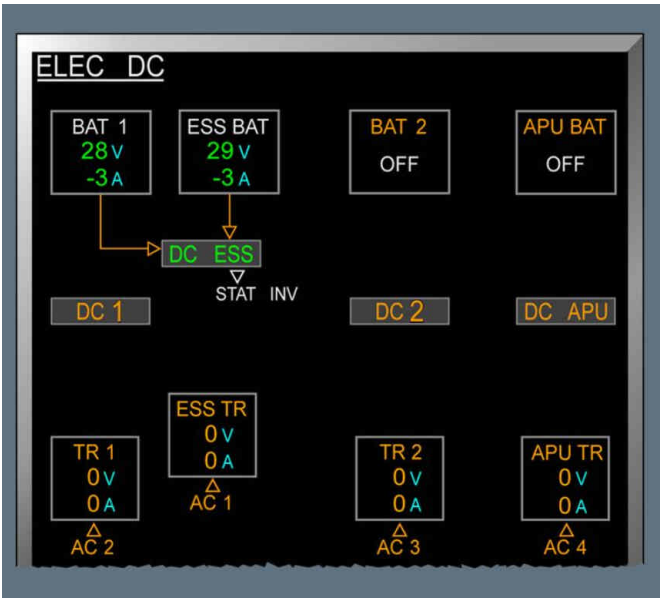
- Its assigned engine generator
- Its assigned external power unit
- The APU generator on the same side
- The APU generator on the other side
- The other engine generator on the same side
- The other external power unit on the same side
- Its symmetrical engine generator on the opposite side.
- Its symmetrical external power unit on the opposite side.

ON GROUND BATTERIES ONLY

Applicable to: ALL

Each DC ESS busbar is supplied by BAT ESS and BAT 1.

Batteries Only-ELEC DC



The DC ESS busbar powers the AC EMER busbar, via the static inverter.

Batteries Only-ELEC AC

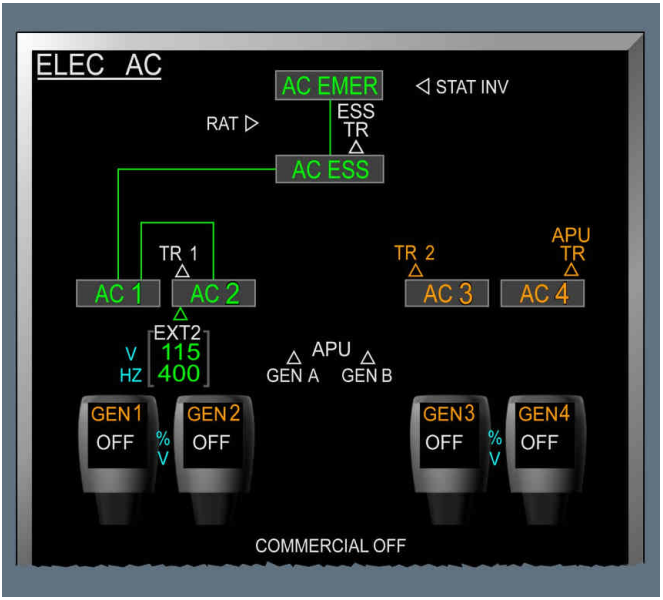


ON GROUND ONE EXTERNAL POWER UNIT

Applicable to: ALL

The external power unit (e.g. EXT 2) supplies its assigned busbar, and the other busbar on the same side.

EXT 2

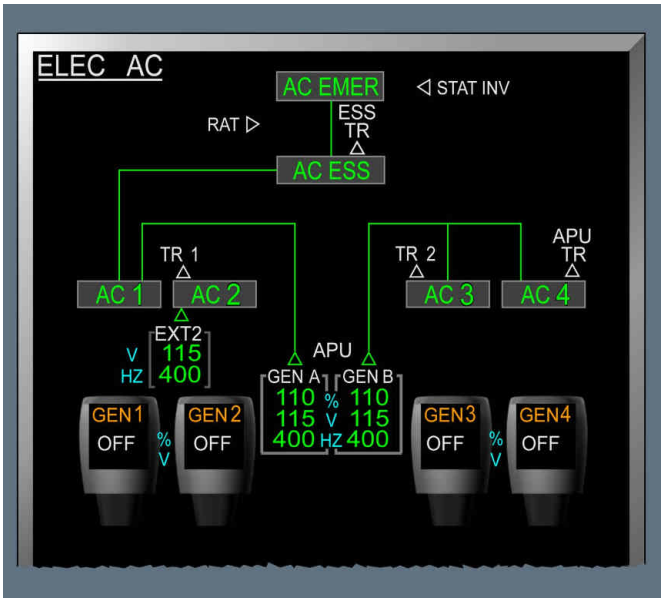


ON GROUND ONE EXTERNAL POWER UNIT, AND APU RUNNING

Applicable to: ALL

The external power unit supplies its assigned busbar.
The other AC busbars are supplied by the APU generator that is on their same side.

EXT 1 and APU

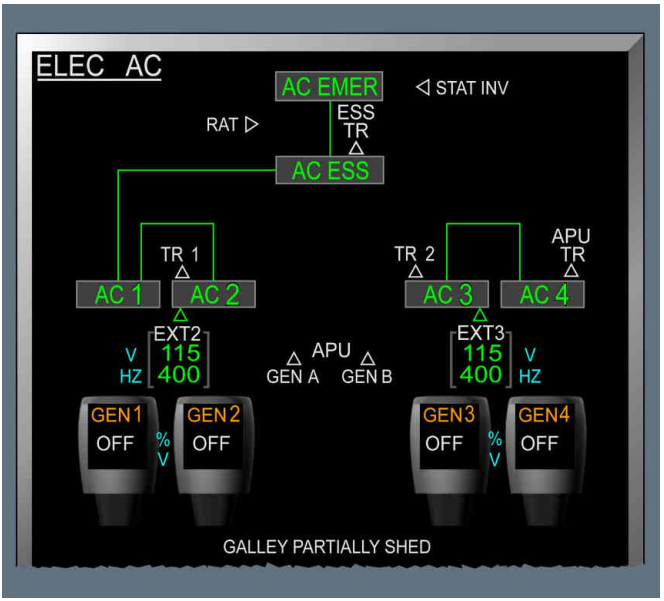


ON GROUND TWO EXTERNAL POWER UNITS

Applicable to: ALL

Each external power unit (e.g. EXT 2 and EXT 3) supplies the AC busbars on the same side.

EXT 2 and EXT 3

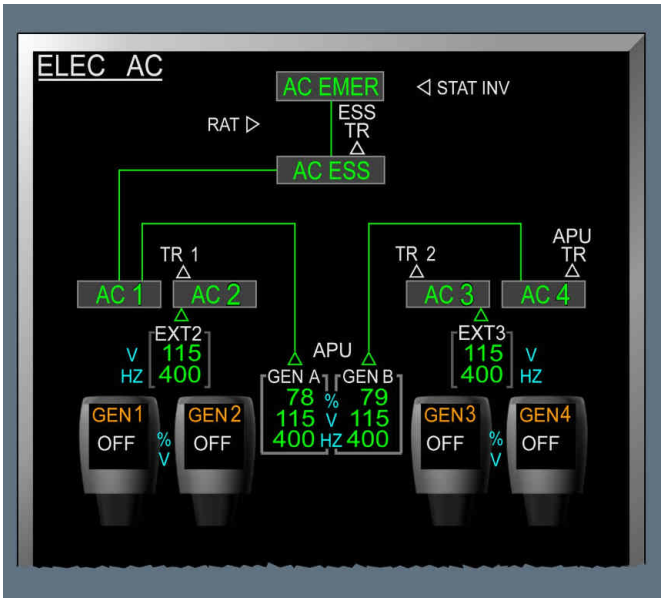


ON GROUND, TWO EXTERNAL POWER UNITS, AND APU RUNNING

Applicable to: ALL

The two external power units supply their assigned AC busbars.
The other two AC busbars are supplied by the APU generator that is on their same side.

EXT 2, EXT 3, and APU



Note: *APU GEN A (resp. APU GEN B) is available to supply the AC 2 (resp. AC 3) busbar. However, APU GEN A (resp. APU GEN B) is not connected to the AC 2 (resp. AC 3) busbar because EXT 2 and EXT 3 have priority on their assigned busbars.*

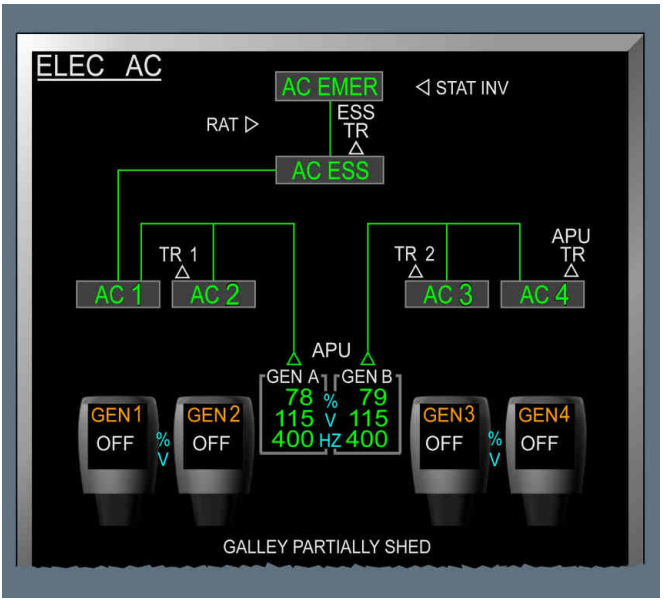
ON GROUND APU RUNNING

Applicable to: ALL

Each APU generator supplies the AC busbars on its same side:

- APU GEN A supplies the AC 1 and AC 2 busbars
- APU GEN B supplies the AC 3 and AC 4 busbars.

APU

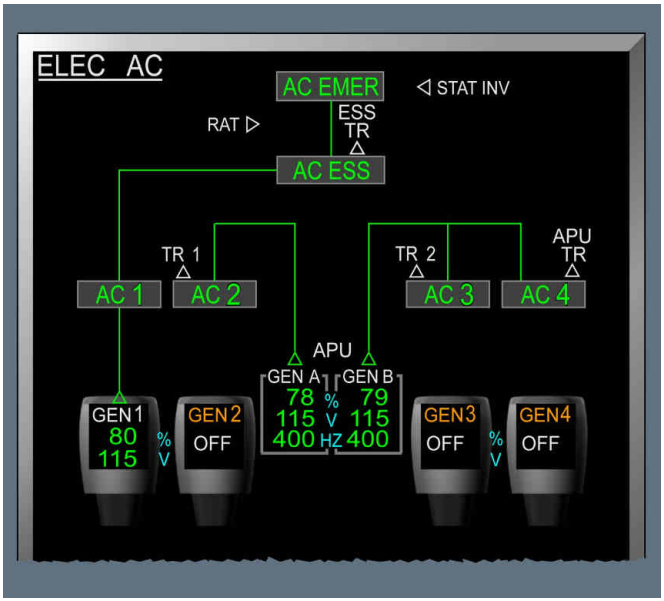


ON GROUND ONE ENGINE, AND APU RUNNING

Applicable to: ALL

The engine generator supplies its assigned AC busbar.
The APU generators supply the other three AC busbars.

APU and GEN 1

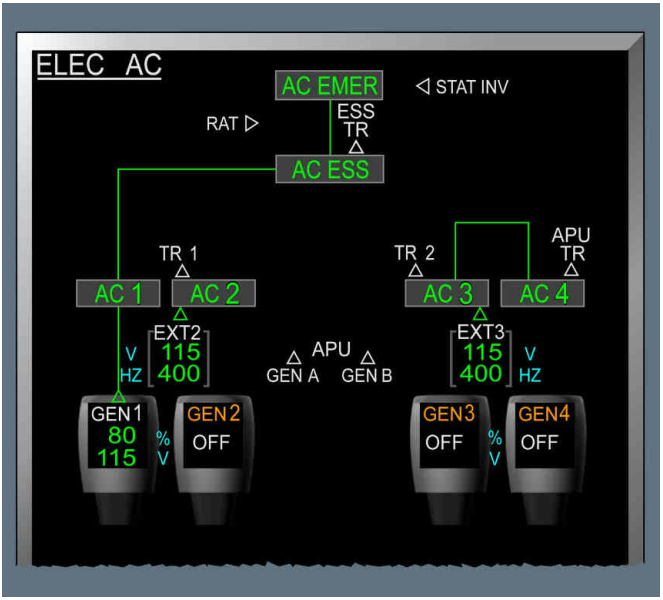


ON GROUND TWO EXTERNAL POWER UNITS, AND ONE ENGINE RUNNING

Applicable to: ALL

GEN 1 and EXT 2 supply their assigned AC busbar. EXT 3 supplies the two busbars on the same side.

EXT 2, EXT 3 and GEN 1



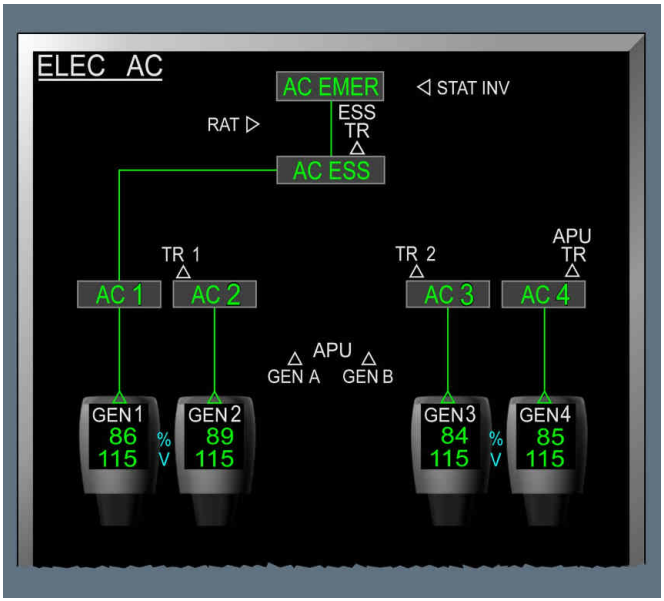
ALL ENGINES RUNNING

Applicable to: ALL

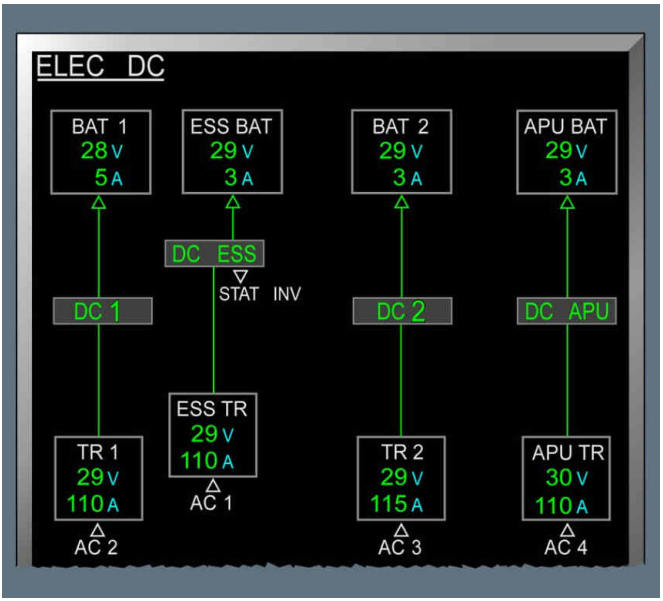
Each engine generator supplies its assigned AC busbar. The AC busbars then supply power, as follows:

- The AC 1 busbar supplies the AC ESS busbar.
  The AC ESS busbar supplies the AC EMER busbar and the ESS TR.
  ESS TR supplies the DC ESS busbar.
- The AC 2 busbar supplies TR 1.
  TR 1 supplies the DC 1 busbar.
- The AC 3 busbar supplies TR 2.
  TR 2 supplies the DC 2 busbar.
- The AC 4 busbar supplies APU TR.
  APU TR supplies the DC APU busbar.

In Flight-ELEC AC



In Flight-ELEC DC



RECONFIGURATIONS OVERVIEW

Applicable to: ALL

In any abnormal electrical configuration (e.g. failure of one or more engine generators, TR failure), the electrical network automatically reconfigures to ensure that the remaining power sources continue to supply as many busbars as possible.
Any two electrical generators can supply the entire electrical network: Each generator can supply up to two AC busbars.

FAILURE OF SOME ENGINE/APU GENERATORS

Each AC busbar will be supplied, in the following order of priority, by:

- The APU generators

L2 Priority is first given to the APU generator on the same side, then to the APU generator on the other side.

L1 - The other engine generators

L2 On ground, priority is first given to the engine generator on the same side, then to the engine generator that is symmetrically-opposite.

L1 *Note: All DC busbars continue to be supplied, provided that at least one generator is available.*

FAILURE OF ALL ENGINE/APU GENERATORS

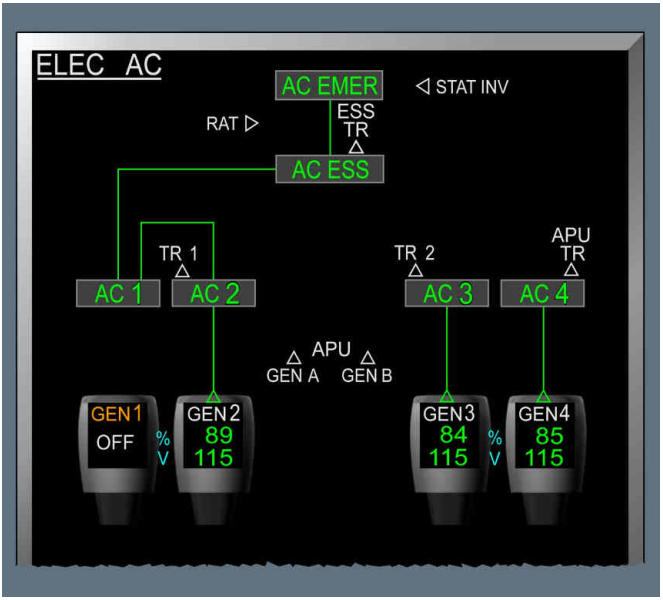
The RAT will supply the emergency network.

FAILURE OF ONE ENGINE GENERATOR, AND APU NOT RUNNING

Applicable to: ALL

If one engine generator fails, the other engine generator on the same side will take over.

GEN 1 Failure, with APU Not Running

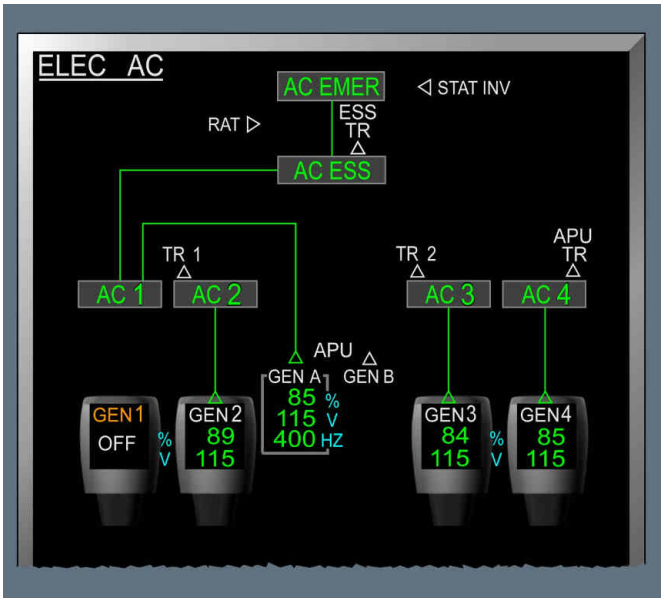


FAILURE OF ONE ENGINE GENERATOR, AND APU RUNNING

Applicable to: ALL

If one engine generator fails, the APU generator on the same side will take over.

Failure of GEN 1, and APU Running



FAILURE OF TWO ENGINE GENERATORS

Applicable to: ALL

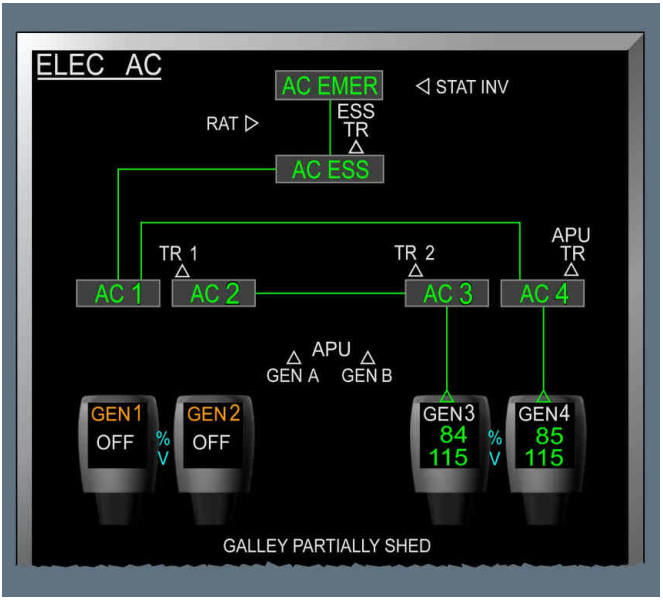
FAILURE OF TWO ENGINE GENERATORS ON THE SAME SIDE, AND APU NOT RUNNING

If two engine generators fail on one side:

- The outer-engine generator on the other side will supply both AC 1 and AC 4 busbars.
- The inner-engine generator on the other side will supply both AC 2 and AC 3 busbars.

In such a case, some of the commercial loads may be automatically shed, depending on the electrical demand.

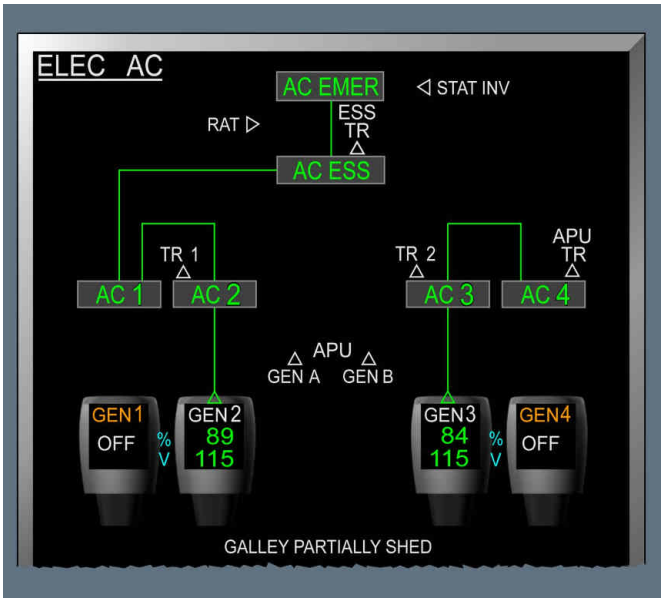
GEN 1 and GEN 2 Failure, and APU not Running



FAILURE OF ONE ENGINE GENERATOR ON EACH SIDE, AND APU NOT RUNNING

If one engine generator fails on each side, the other available generator on each side will take over, and supply both AC busbars on the corresponding side.
In this case, some of the commercial loads may be automatically shed, depending on the electrical demand.

Failure of GEN 1 and GEN 4, and APU not Running



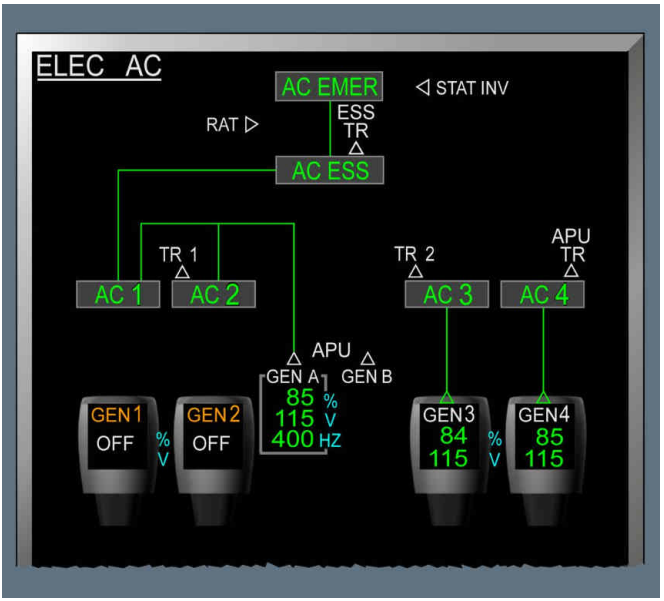
FAILURE OF TWO ENGINE GENERATORS, AND APU RUNNING

Applicable to: ALL

FAILURE OF TWO ENGINE GENERATORS ON THE SAME SIDE, AND APU RUNNING

If two engine generators fail on the same side, then the APU generator on the same side will supply the two affected busbars.

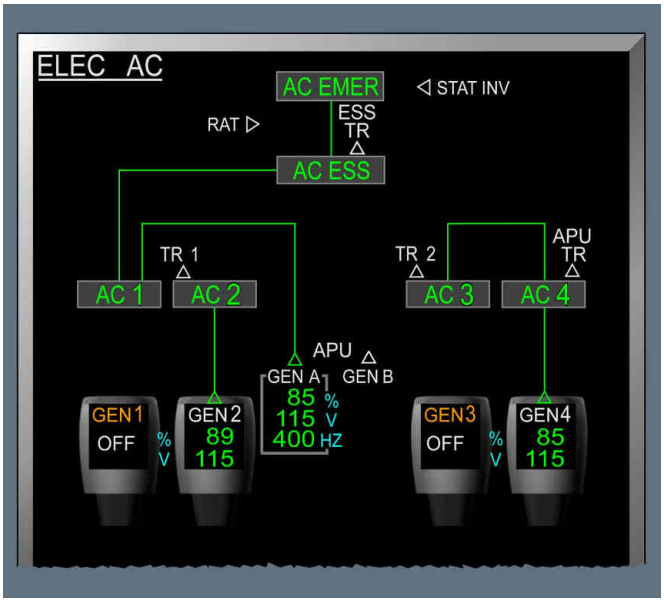
Failure of GEN 1 and GEN 2, and APU Running



FAILURE OF TWO ENGINE GENERATORS ON OPPOSITE SIDES, AND APU RUNNING

If one engine generator fails on each side, then the APU generator on each side will supply the affected busbar on its corresponding side.

Failure of GEN 1 and GEN 3, and APU Running



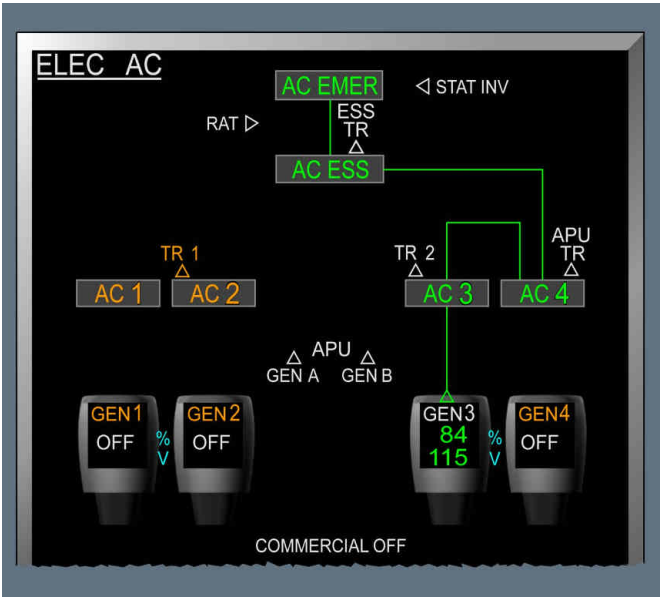
FAILURE OF THREE ENGINE GENERATORS, AND APU NOT RUNNING

Applicable to: ALL

If three engine generators fail, and the APU generators are not running, then the last available engine generator will supply only the two busbars on its same side.
In this case, some of the commercial loads may be automatically shed, depending on the electrical demand.

Note: *Emergency busbars are supplied, either via the AC 1 busbar, or via the AC 4 busbar, depending on which side is supplied.*

GEN 1, GEN 2 and GEN 3 Failure, APU not Running

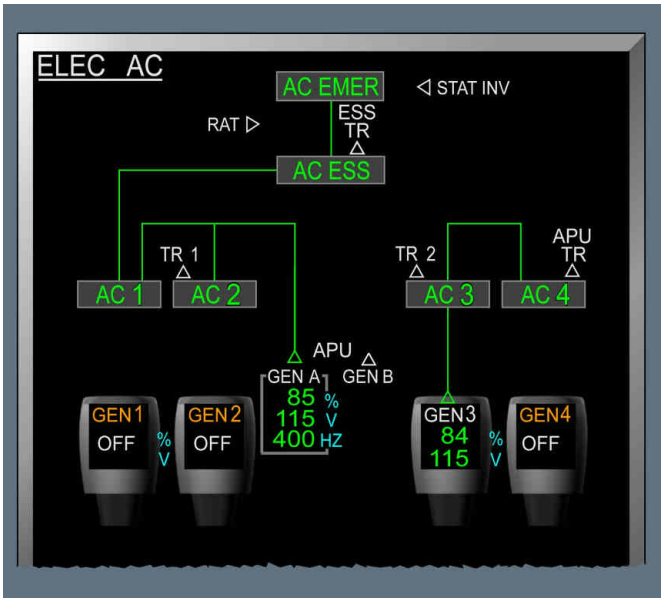


FAILURE OF THREE ENGINE GENERATORS, AND APU RUNNING

Applicable to: ALL

If three engine generators fail, the APU generators will automatically take over.

Failure of GEN 1, GEN 2 and GEN 4, and APU Running

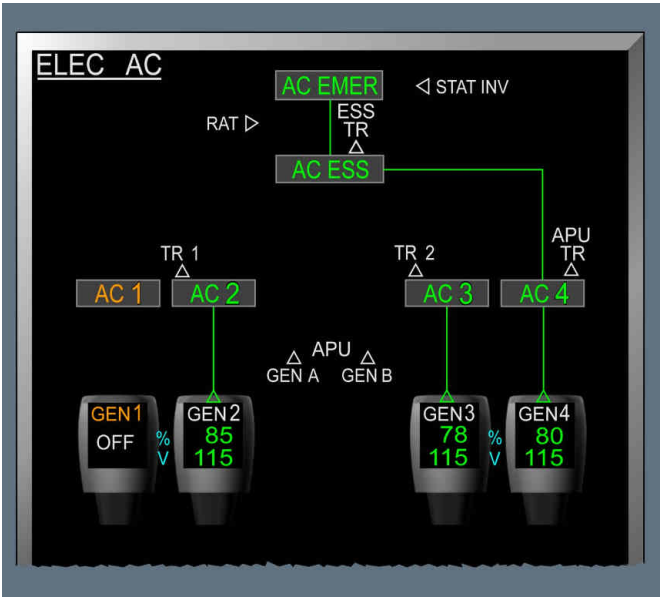


FAILURE OF THE AC 1 BUSBAR

Applicable to: ALL

If the AC 1 busbar is lost, it cannot be recovered.
In this case, the AC 4 busbar will supply the AC ESS and AC EMER busbars.

Failure of the AC 1 Busbar



FAILURE OF THE AC ESS BUSBAR

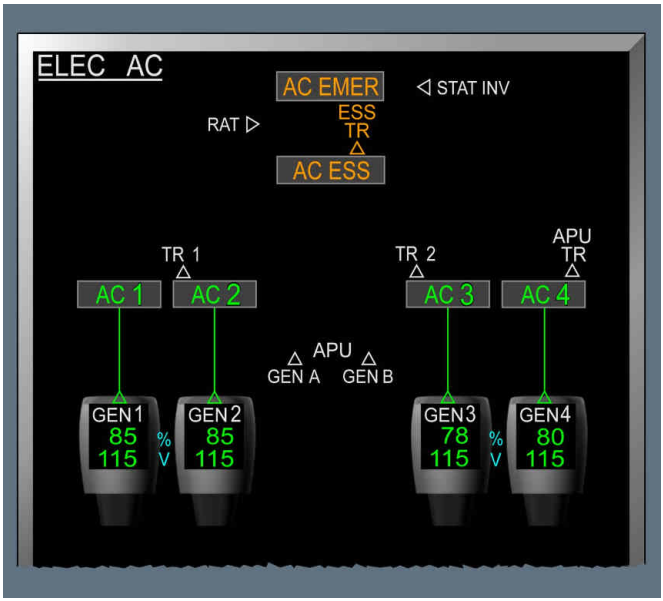
Applicable to: ALL

If the AC ESS busbar is lost, it cannot be recovered.

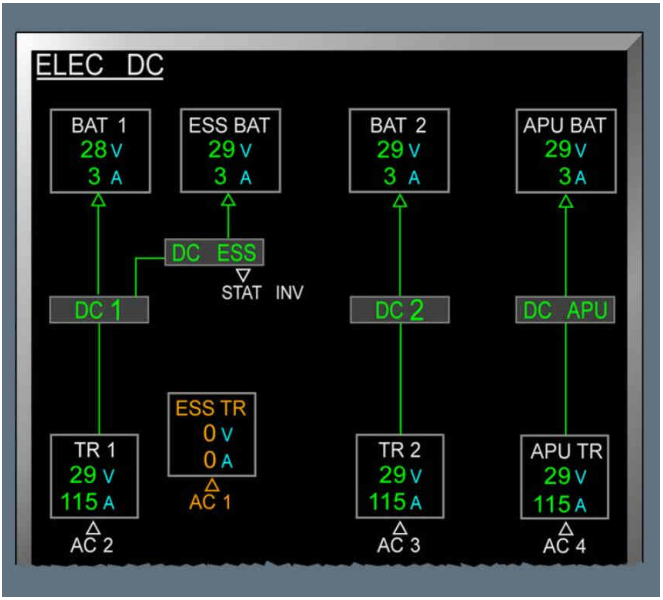
In this case:

- AC EMER and AC ESS will be lost.
- The DC 1 busbar will supply the DC ESS busbar.

ELEC AC Page-Failure of the AC ESS Busbar



ELEC DC Page-Failure of the AC ESS Busbar

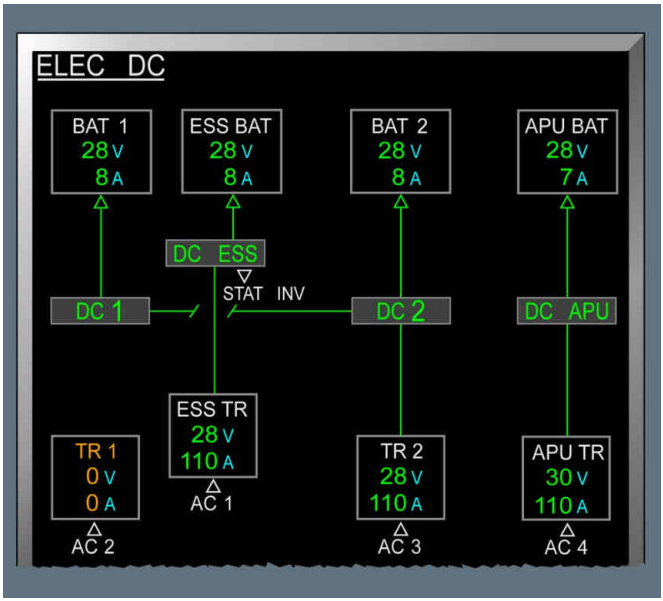


TR 1 FAILURE

Applicable to: ALL

If TR 1 fails, TR 2 will supply the DC 1 and DC 2 busbars.

TR 1 Failure

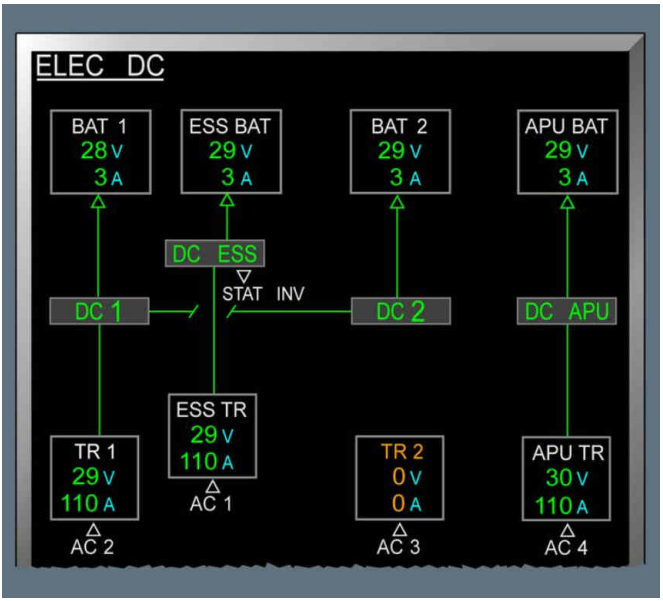


TR 2 FAILURE

Applicable to: ALL

If TR 2 fails, TR 1 will supply the DC 1 and DC 2 busbars.

TR 2A Failure

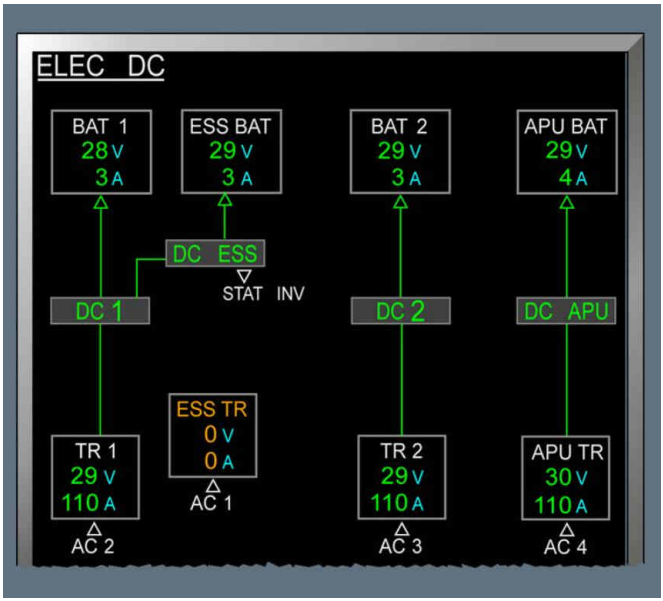


ESS TR FAILURE

Applicable to: ALL

If TR ESS fails, TR 1 will supply the DC 1 and DC ESS busbars.

ESS TR Failure

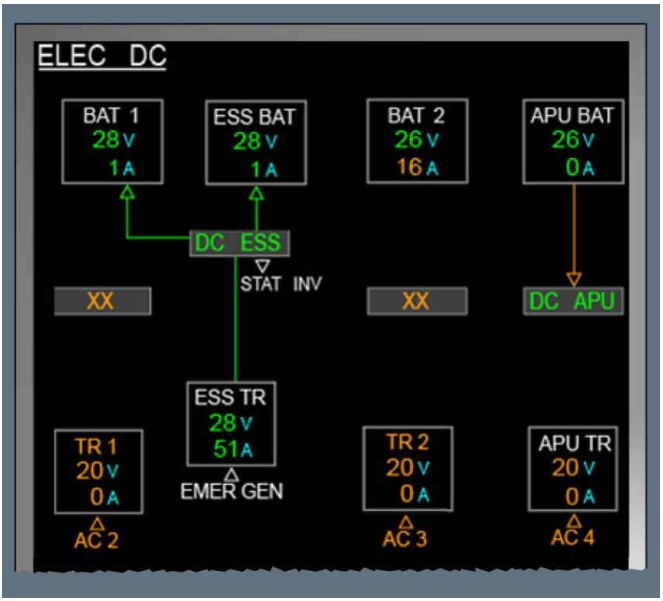


EMERGENCY ELECTRICAL CONFIGURATION

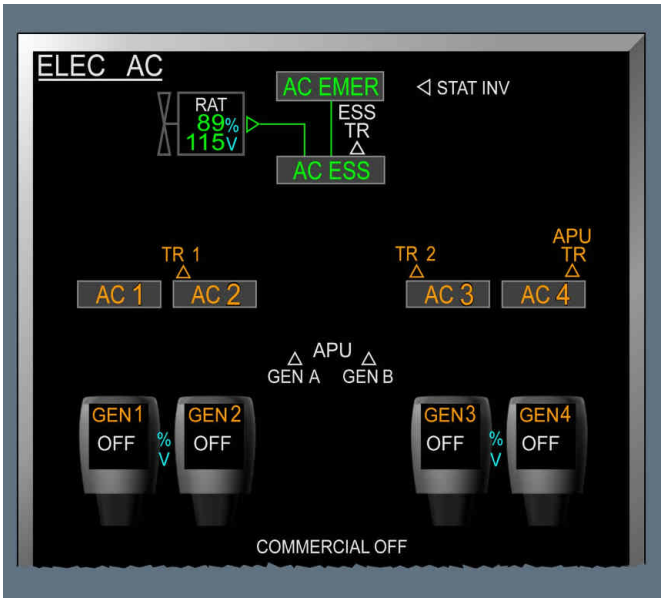
Applicable to: ALL

In the event that AC 1, AC 2, AC 3 and AC 4 busbars are lost, the RAT will automatically extend to power the AC ESS and AC EMER busbars, and the ESS TR . The ESS TR then supplies the DC ESS busbar.

Emergency Generation- ELEC DC



Emergency Generation- ELEC AC



ELEC EMER CONFIG (*Refer to procedure*)

L2 SYSTEMS REMAINING IN EMERGENCY ELECTRICAL CONFIGURATION

	Available Systems	Remarks
Air Conditioning Pressurization Ventilation	Automatic Pressurization Control	The four outflow valve controllers are operative.
	Manual Pressurization Control	
	Both Packs	
	RAM Air	
	Avionics Ventilation via the overboard valve	
	Cargo Ventilation	
Autoflight	FMS 1	Autothrust and autopilot are lost.
	CAPT EFIS CP s	
	AFS control panel	

Continued on the following page

Continued from the previous page

Communication	RMP 1 and audio controls on RMP 2	Tune VHF 1 and HF 1 on RMP 1 (RMP 2 display is not available).
	VHF 1	
	HF 1	
	EVAC	
	Flight interphone, cabin interphone, Passenger Address (PA)	
	Loudspeakers 1+2	
	ELT	
Fire and Smoke Detection	ENG 1, 2, 3 and 4 Extinguishing Function.	1 Squib of each Bottle of ENG 1, 2, 3 and 4.
	APU	1 Squib of the APU Bottle.
	Smoke Detectors	
Flight Controls	Direct Law Only	PRIM 1 is operative
		SEC 1 is operative
	Slats/Flaps	SFCC 1 is operative
Fuel System	Feed Tank 2 Main Pump	Only when slats are retracted.
	Feed Tank 3 Standby Pump	
	Crossfeed Valves are open	
	Left Trim Tank Pump	
	Engine LP Valves	
	FQMS 1	
Hydraulic System	Green and Yellow Hydraulic Circuits	
Ice and Rain Protection	Captain's Wiper	
	Captain Windshield Heating	
	Engine anti-ice remains on	
Indicating/Recording	PFD 1	Press MAIL BOX pb on the KCCU keyboard, or the RECONF pb on captain side, in order to display the SD pages on the MFD .
	ND 1	
	MFD 1	
	EWD	
	ECAM Control Panel	
	KCCU 1	
	FWS 1	
	Clock	
Landing Gear	Landing Gear Extension by Gravity	FFCM B only is available.
	Emergency Braking	
	Parking Brake	
	Ultimate Braking	
	L/G position on Center Instrument Panel	

Continued on the following page

Continued from the previous page

Lights	Landing Lighting	
	Emergency Lighting	
	Auxiliary Lighting	
	Left and Right Strip of the Ambient Light	Only if the AMBIENT LT knob is turned on.
	STBY Compass Light	
Navigation	ADIRU 1 and 3	ADR 1 or ADR 3 depending on captain's selection IR 1 or IR 3 depending on captain's selection
	GPS 1	
	SQWK on RMP 1, and on MFD 1	
	DME 1	
	SFD and SND	
	LS 1	
	VOR 1	
	ADF 1	
	WXR / TAWS 1	The XPDR / TCAS and WXR / TAWS are automatically set to SYS 1.
	XPDR / TCAS 1	
	RA SYS C	The radio height callouts and indications are available.
Information System	OIS on F/O Side	
APU	APU	
Engines	FADEC Channel A	
	Ignition System A	
	HP Valves Closure	

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ECAM ALERTS

Applicable to: ALL

ELEC EMER CONFIG (*Refer to procedure*)

ELEC ABNORMAL FLIGHT OPS SUPPLY (*Refer to procedure*)

ELEC AC BUS 1 FAULT (*Refer to procedure*)

ELEC AC BUS 1+2 & DC BUS 1 FAULT (*Refer to procedure*)

ELEC AC BUS 2 FAULT (*Refer to procedure*)

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (*Refer to procedure*)

ELEC AC BUS 2+4 FAULT (*Refer to procedure*)

ELEC AC BUS 3 FAULT (*Refer to procedure*)

ELEC AC BUS 3+4 & DC BUS 2 FAULT (*Refer to procedure*)

ELEC AC BUS 4 FAULT (*Refer to procedure*)

ELEC AC ESS BUS ALTN (*Refer to procedure*)

ELEC AC ESS BUS FAULT (*Refer to procedure*)

ELEC APU BAT FAULT (*Refer to procedure*)

ELEC APU GEN A(B) FAULT (*Refer to procedure*)

ELEC APU TR FAULT (*Refer to procedure*)

ELEC BAT 1(2)(ESS) FAULT (*Refer to procedure*)

ELEC BAT 1(2)(ESS)(APU) OFF (*Refer to procedure*)

ELEC BUS TIE OFF (*Refer to procedure*)

ELEC C/B MONITORING FAULT (*Refer to procedure*)

ELEC C/B TRIPPED (*Refer to procedure*)

ELEC CABIN L(R) SUPPLY CENTER OVHT (*Refer to procedure*)

ELEC CABIN L(R) SUPPLY CENTER OVHT DET FAULT (*Refer to procedure*)

ELEC DC BUS 1 FAULT (*Refer to procedure*)

ELEC DC BUS 1 + 2 FAULT (*Refer to procedure*)

ELEC DC BUS 1+ESS FAULT (*Refer to procedure*)

ELEC DC BUS 2 FAULT (*Refer to procedure*)

ELEC DC ESS BUS FAULT (*Refer to procedure*)

ELEC DC ESS BUS PART FAULT (*Refer to procedure*)

ELEC DRIVE 1(2)(3)(4) FAULT (*Refer to procedure*)

ELEC DRIVE 1(2)(3)(4) DISCONNECTED (*Refer to procedure*)

ELEC DRIVE 1(2)(3)(4) OIL LEVEL LO (*Refer to procedure*)

ELEC DRIVE 1(2)(3)(4) OIL OVHT (*Refer to procedure*)

ELEC DRIVE 1(2)(3)(4) OIL PRESS LO (*Refer to procedure*)

ELEC ELEC NETWORK MANAGEMENT 1(2) FAULT (*Refer to procedure)*

ELEC EMER C/B MONITORING FAULT (*Refer to procedure*)

ELEC EXT PWR (1)(2)(3)(4) FAULT (*Refer to procedure*)

ELEC F/CTL ACTUATOR PWR SUPPLY FAULT (*Refer to procedure*)

ELEC GEN 1(2)(3)(4) FAULT (*Refer to procedure*)

ELEC GEN 1(2)(3)(4) OFF (*Refer to procedure*)

ELEC LOAD MANAGEMENT FAULT (*Refer to procedure*)

ELEC PRIMARY SUPPLY CENTER 1(2) FAULT (*Refer to procedure.)*

ELEC RAT FAULT (*Refer to procedure*)

ELEC REMOTE C/B CTL ACTIVE (*Refer to procedure*)

ELEC SECONDARY SUPPLY CENTER 1(2) DEGRADED (*Refer to procedure*)

ELEC SECONDARY SUPPLY CENTER 1(2) FAULT (*Refer to procedure*)

ELEC SECONDARY SUPPLY CENTER 1(2) FAN FAULT (*Refer to procedure.)*

ELEC SECONDARY SUPPLY CTR 1(2) REDUND LOST (*Refer to procedure*)

ELEC STATIC INV FAULT (*Refer to procedure*)

ELEC TR1 (2)(ESS) FAULT (*Refer to procedure*)

ELEC TR 1(2)(ESS) MONITORING FAULT (*Refer to procedure*)

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AIRCRAFT SYSTEMS

25 - EQUIPMENT

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DSC-25-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

DSC-25-10 Cockpit

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Indications And Positions Of The Pushbuttons ..... B
Cockpit Front View C
Cockpit Rear View ..... D
Cockpit Seats ..... E

DSC-25-30 Crew Rest Compartments

Flight Crew Rest Compartments ..... A
Cabin Crew Rest Compartments ..... B

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OVERVIEW

Applicable to: ALL

The equipment in the cockpit ensures that both the Captain and the First Officer can monitor the instruments, and the systems necessary to operate the aircraft.

Most system controls are located on:
- The pedestal
- The front panels (main instrument panel and glareshield)
- The overhead panel.

There are three seats at the rear of the cockpit for three additional occupants.

INDICATIONS AND POSITIONS OF THE PUSHBUTTONS

Applicable to: ALL

The pushbutton switches have several positions and indications, that correspond to the configurations of the aircraft.
The pushbuttons have only one position (they do not remain pressed in), and their indications correspond to the configurations of the aircraft.

Indications have the following color code:

- For warnings:
  - Red: Indicates a failure that requires immediate action, e.g. 

.
- For cautions:
  - Amber: Indicates a configuration, or a failure that the flight crew should be aware of, but that does not require immediate action, e.g. 

.
    However, when time and situations permit, these cautions should be considered without delay, to prevent any further degradation of the affected system.
- For indications:
  - Green: Indicates that the corresponding system is in normal operation, e.g. 

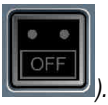
.
  - Cyan: Indicates that the corresponding system is in normal operation, and used temporarily, e.g. 

.
  - White: Indicates that the pushbutton has an abnormal position, e.g. 

.

When the aircraft is in normal configuration, only green lights can be lit permanently , the cyan light can be lit temporarily.
The following table outlines the possible pushbutton switch positions:

Position	Pushbutton switch Indications
Pressed in	ON, AUTO, OVRD
Released out	OFF, MAN

Note: *Two dots on the pushbutton, indicates that this part of the pushbutton is not used to give indications (e.g.* 

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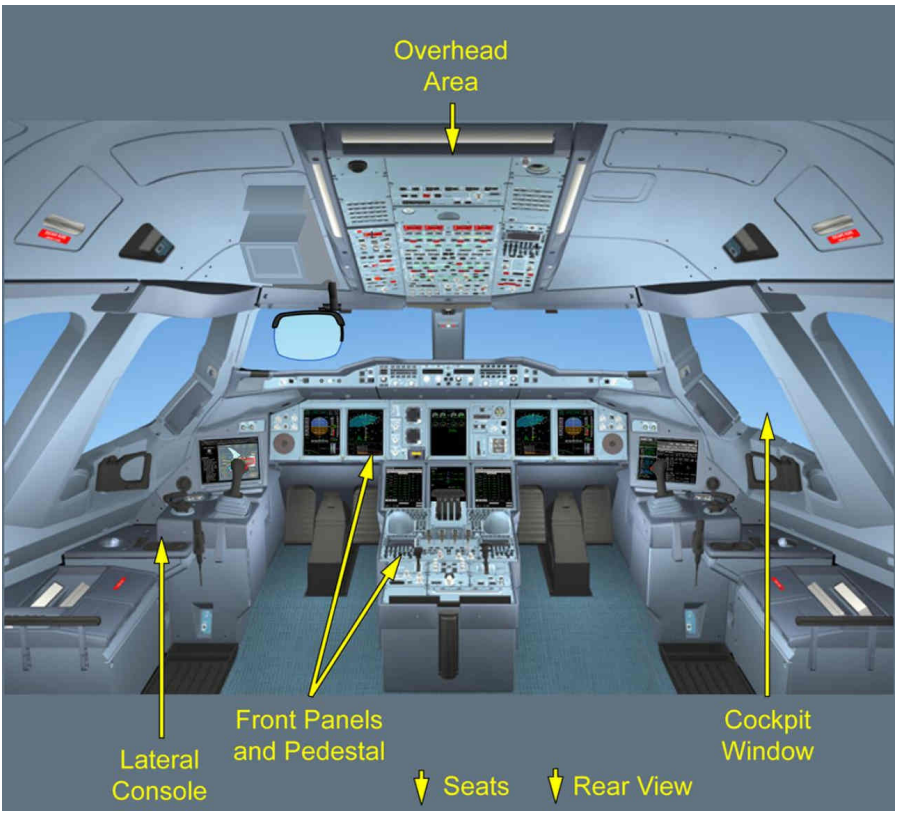
COCKPIT FRONT VIEW

Applicable to: ALL

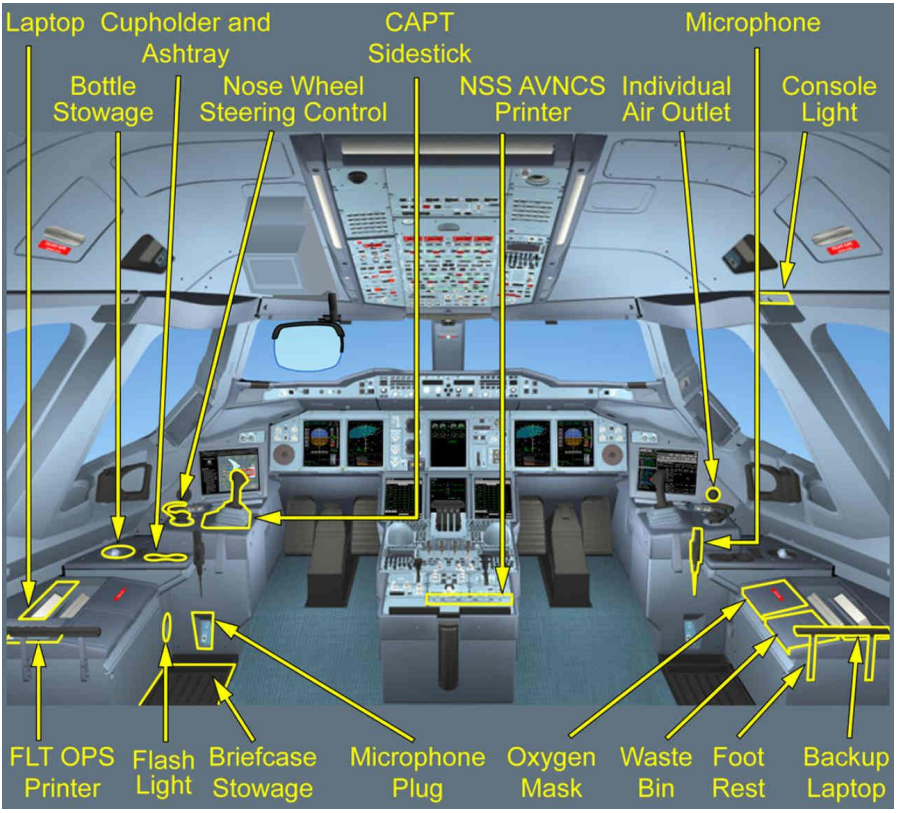
COCKPIT FRONT VIEW

Cockpit Front View



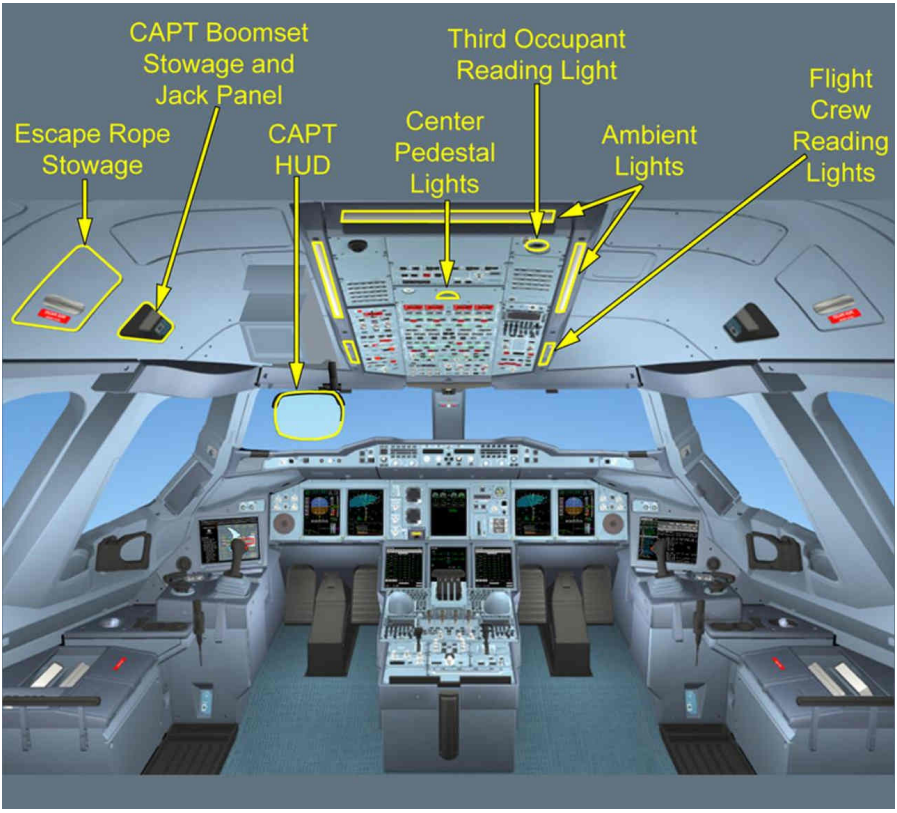
LATERAL CONSOLE

Lateral Console



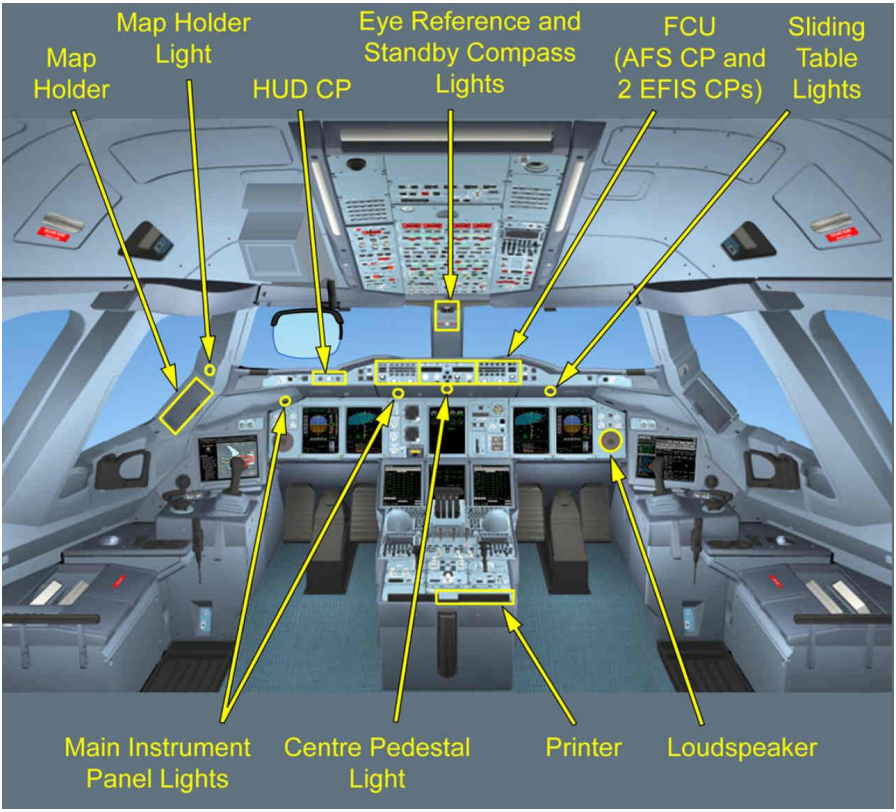
OVERHEAD AREA

Overhead Area



FRONT PANELS AND PEDESTAL

Front Panels and Pedestal



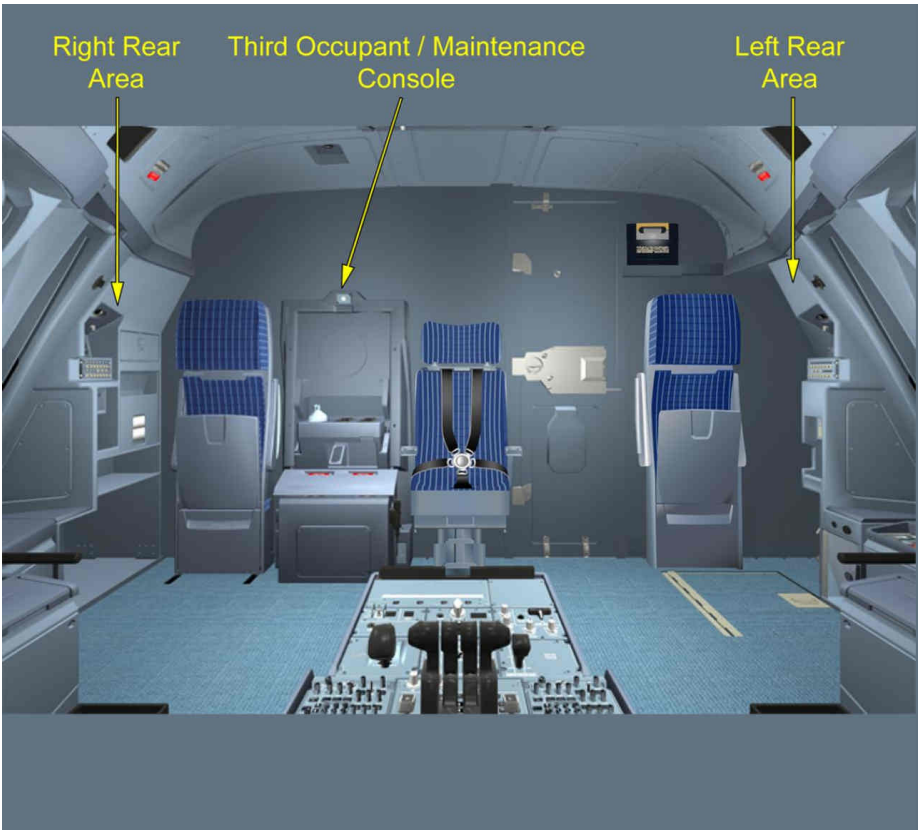
COCKPIT WINDOW

For the cockpit window description, *Refer to DSC-56-10 Cockpit Sliding Windows* .

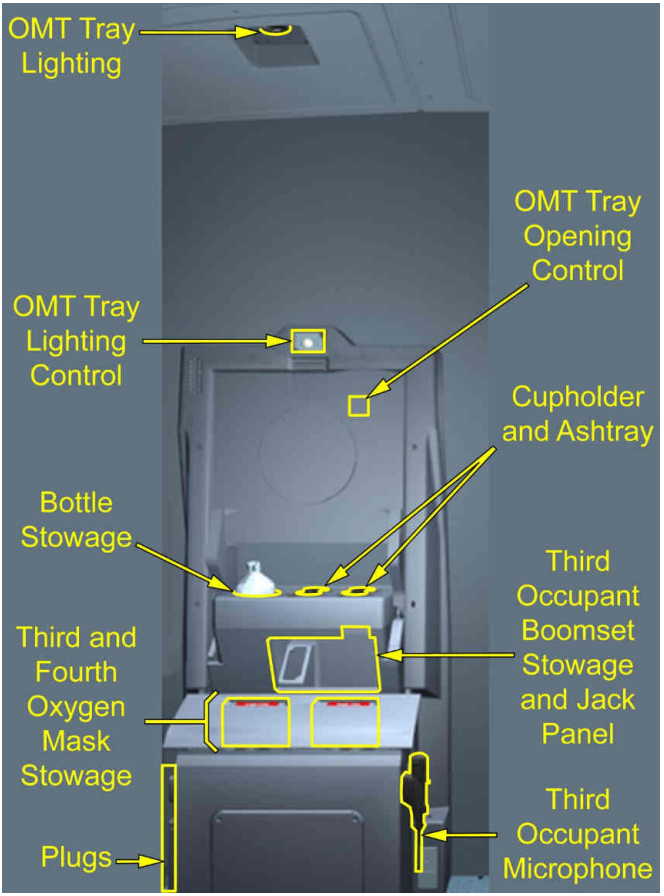
COCKPIT REAR VIEW

Applicable to: ALL

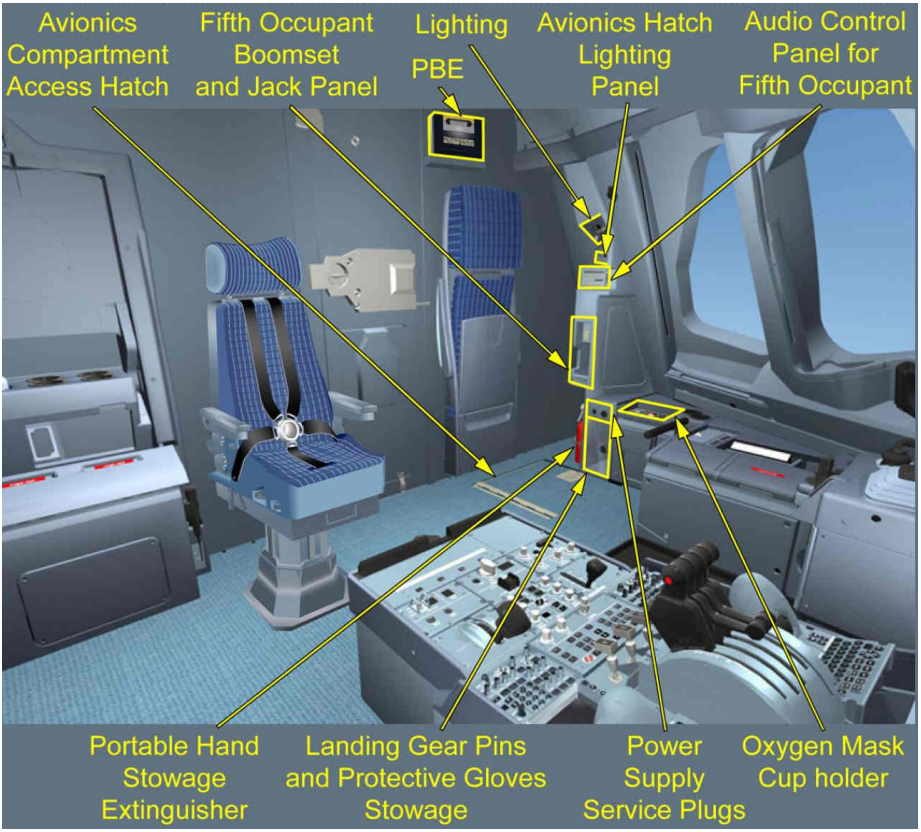
Cockpit Rear View



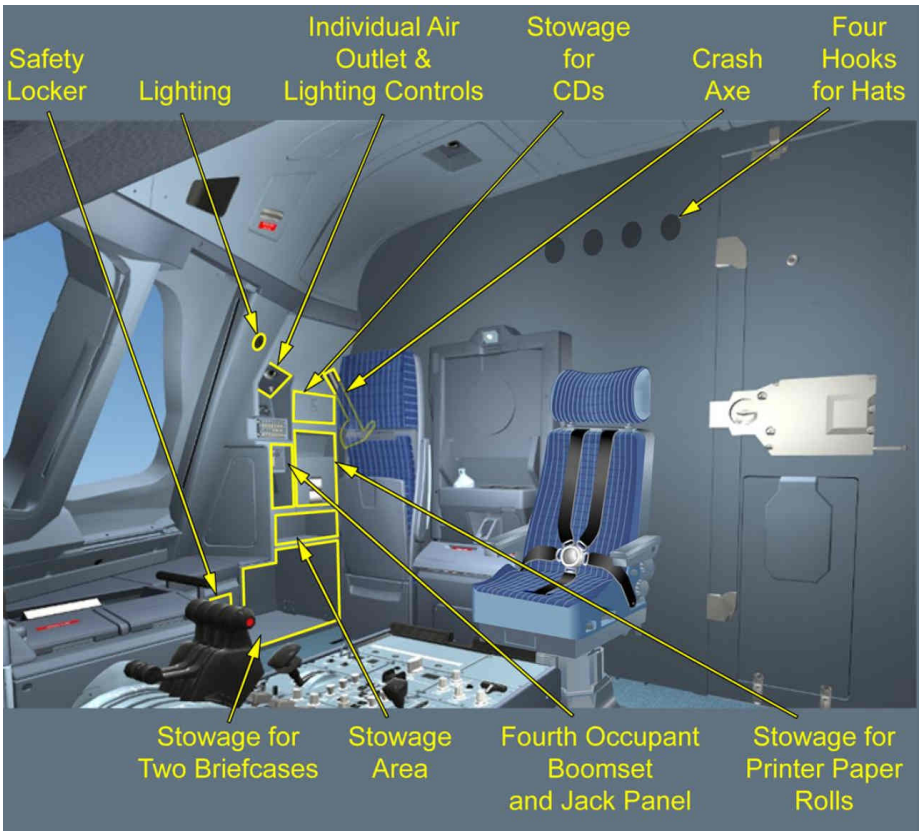
Third Occupant/Maintenance Console



Left Rear Area



Right Rear Area

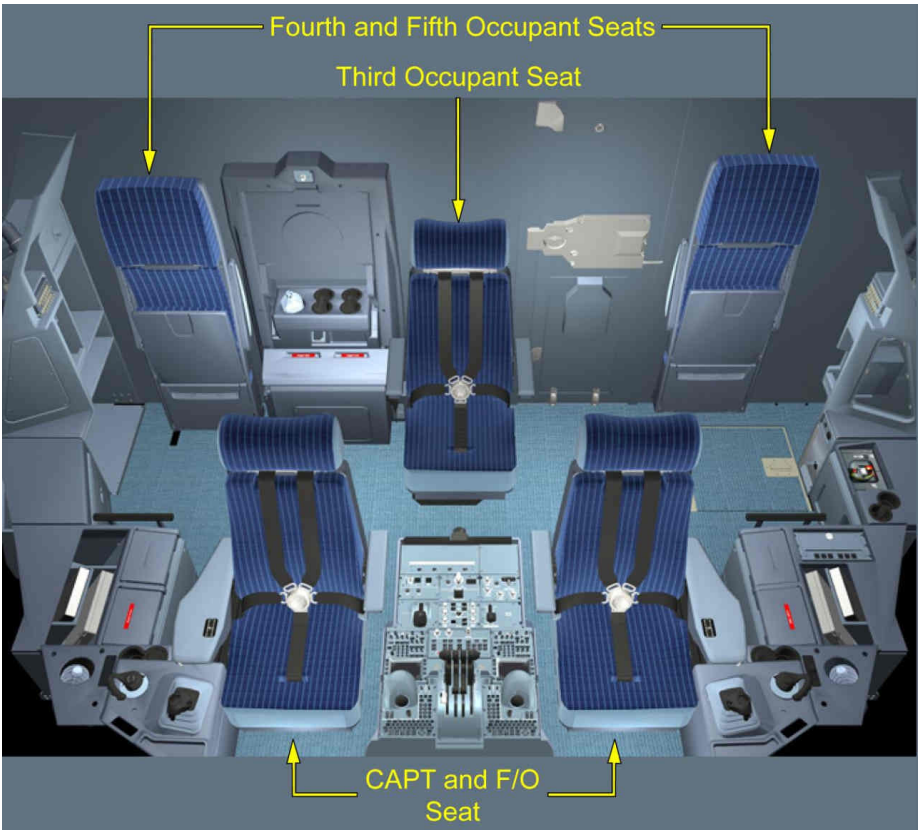


For the cockpit door description, *Refer to DSC-52-20-10-GCOCK Cockpit Door* .

COCKPIT SEATS

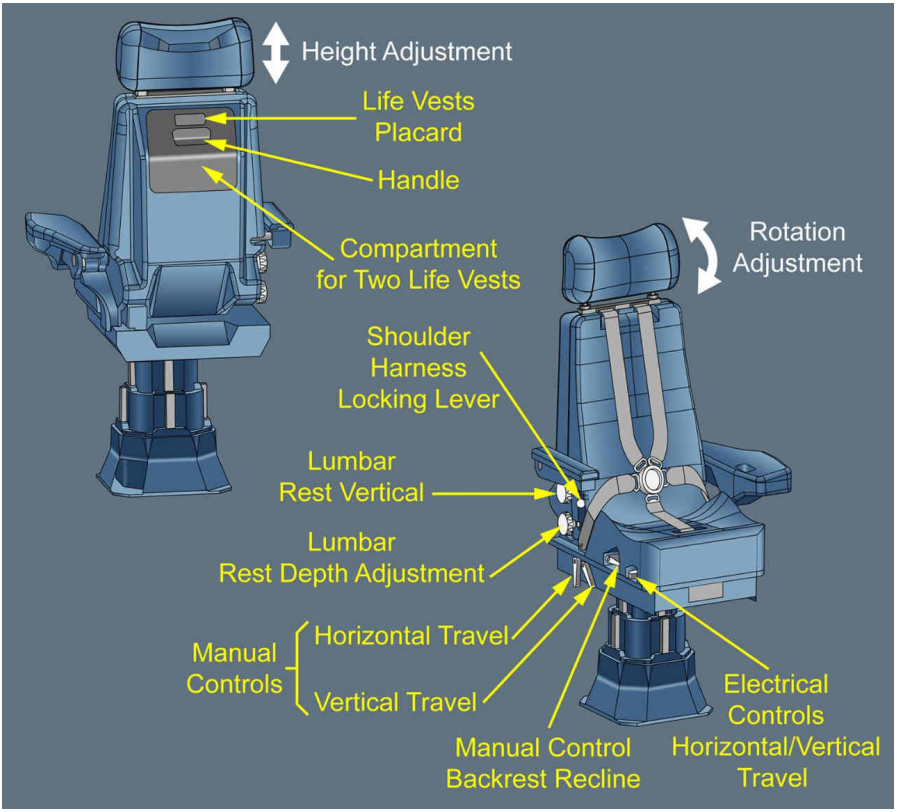
Applicable to: ALL

Cockpit Plan



CAPT AND F/O SEATS

Flight Crew Seat



CAPT AND F/O SEAT ADJUSTMENT

The flight crew can adjust his seat electrically by pressing the horizontal or the vertical adjustment electrical switch in the desired direction. As a backup, the flight crew can also adjust its seat mechanically by lifting the horizontal or vertical mechanical control handle.

The flight crew can adjust the depth and the vertical position of the lumbar rest by:
- Pulling the appropriate lumbar rest controller,
- Turning it to adjust the lumbar rest to the desired position, and
- Pushing it to keep the desired position.

HEADREST ADJUSTMENT

The flight crew can:
- Adjust manually the inclination of the headrest
- Adjust manually the height of the headrest.

SHOULDER HARNESS LOCK / UNLOCK POSITION

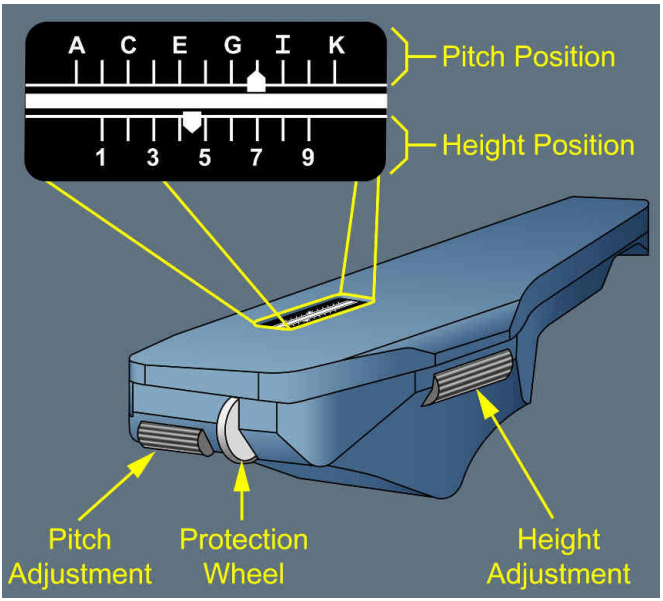


The flight crew can lock the shoulder harness position, by setting the shoulder harness lever to LOCK.

SIDESTICK ARMREST ADJUSTMENT

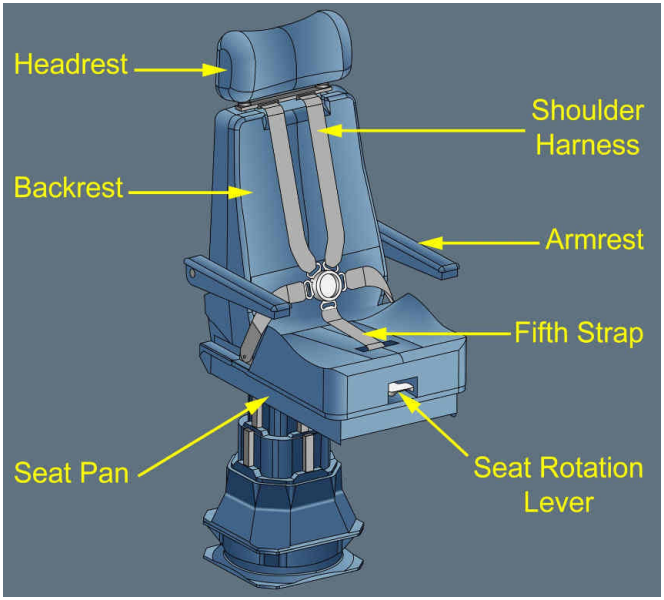
The flight crew can adjust the position of the sidestick armrest:
- By turning the pitch knob to adjust the pitch of the sidestick armrest.
- By turning the height knob to adjust the height of the sidestick armrest.

Sidestick Armrest



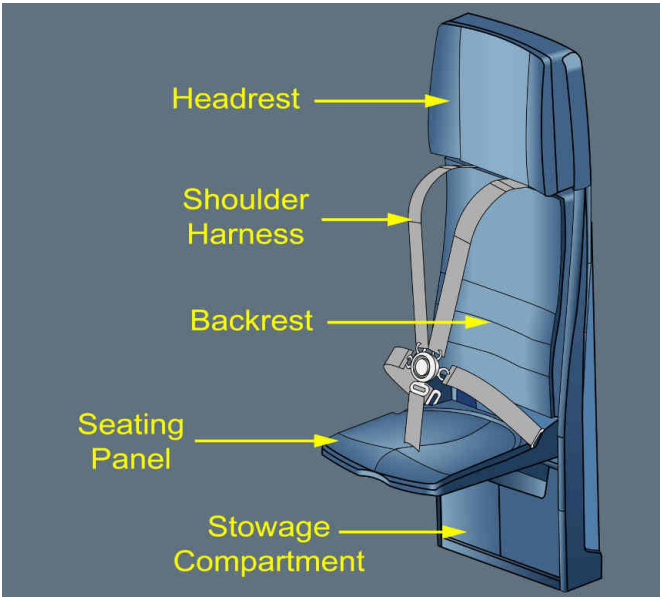
THIRD OCCUPANT SEAT

Third Occupant Seat



FOURTH AND FIFTH OCCUPANT SEATS

Fourth Occupant Seat



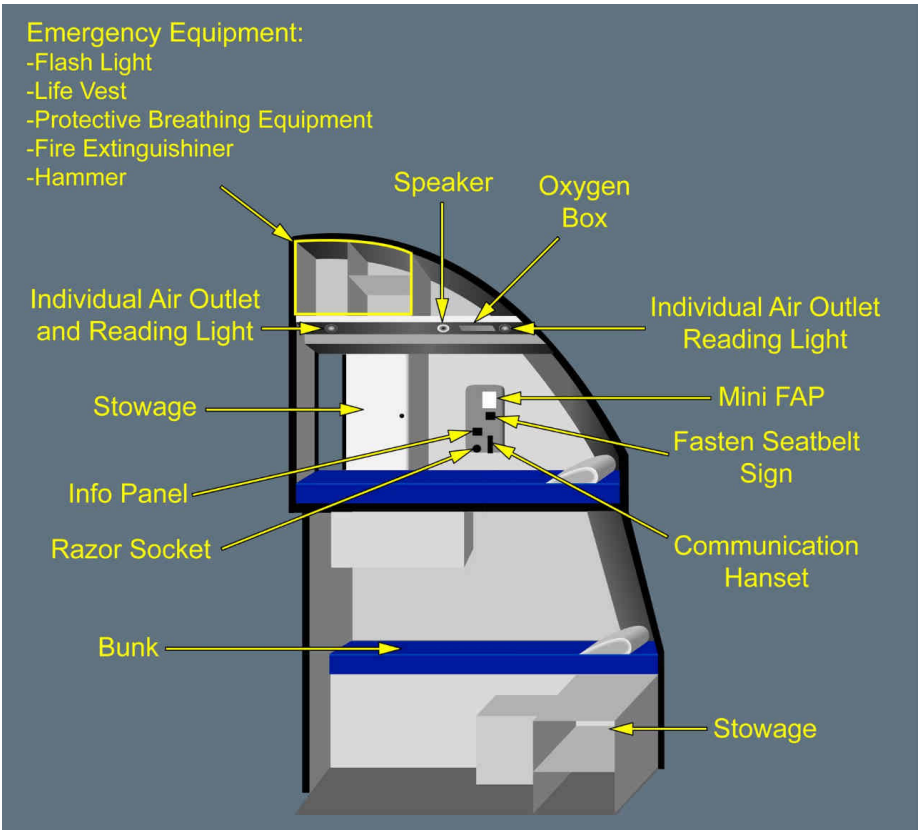
FLIGHT CREW REST COMPARTMENTS

Applicable to: ALL

The flight crew rest compartments allow two flight crew members to relax during long-haul flights. The flight crew rest compartments must not be occupied during taxi, takeoff, and landing, unless it has been fitted with the appropriate equipment.

Note: *Only the equipment provided by Airbus is described below. Optional equipment (e.g. seat) can be provided by other suppliers. For the description of this optional equipment, refer to supplier's documentation.*

Flight Crew Rest Compartments



CABIN CREW REST COMPARTMENTS

Applicable to: ALL

For the description of the cabin crew rest compartments, *Refer to CCOM/CCOM*.

AIRCRAFT SYSTEMS

26 - FIRE AND SMOKE PROTECTION

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DSC-26-PLP PRELIMINARY PAGES

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Avionics Bays Smoke Detection ..... A

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FIRE AND SMOKE PROTECTION - GENERAL

Applicable to: ALL

The fire and smoke protection system includes:

- Fire and overheat detection for the following aircraft areas:
  - The engines (*Refer to DSC-26-20-10 Engine Fire Protection - General*)
  - The APU (*Refer to DSC-26-30-10 APU Fire Protection - General*)
  - The Main Landing Gear (MLG) bay (*Refer to DSC-26-40-10-10 MLG Fire Protection - Detection*).
- Smoke detection for the following aircraft areas:
  - The avionics bays (*Refer to DSC-26-50-10-10 Avionics Bays Smoke Detection*)
  - The cargo compartments (*Refer to DSC-26-60-10 Cargo Compartments Protection - General*)
  - The cabin areas (*Refer to DSC-26-70-10-10 Crew Rest Compartments Protection - General*).
- Fire extinguishing for the following aircraft areas:
  - The engines (*Refer to DSC-26-20-10 Engine Fire Protection - Extinguishing*)
  - The APU (*Refer to DSC-26-30-10 APU Fire Protection - Extinguishing*)
  - The cargo compartments (*Refer to DSC-26-60-10 Cargo Compartments Fire Extinguishing*)
  - The lower deck Cabin Crew Rest (CCR) compartment (*Refer to DSC-26-70-10-10 Crew Rest Compartments Fire Extinguishing*)
  - The lavatories (*Refer to DSC-26-70-20-10 Waste Bin Fire Extinguishing*).

In addition, the aircraft has portable fire extinguishers in the cockpit (*Refer to DSC-25-10-20 Left Rear Area*) and in the cabin areas (*Refer to CCOM/11-10-30-B Portable Fire Extinguisher General*).

SMOKE DETECTION FUNCTION

Applicable to: ALL

The Smoke Detection Function (SDF) is a part of the Cabin Intercommunication Data System (CIDS) and monitors smoke detection in:

- The avionics bays
- The cargo compartments
- The cabin areas.

It also manages fire extinguishing in the cargo compartments.

FIRE DETECTION UNIT

Applicable to: ALL

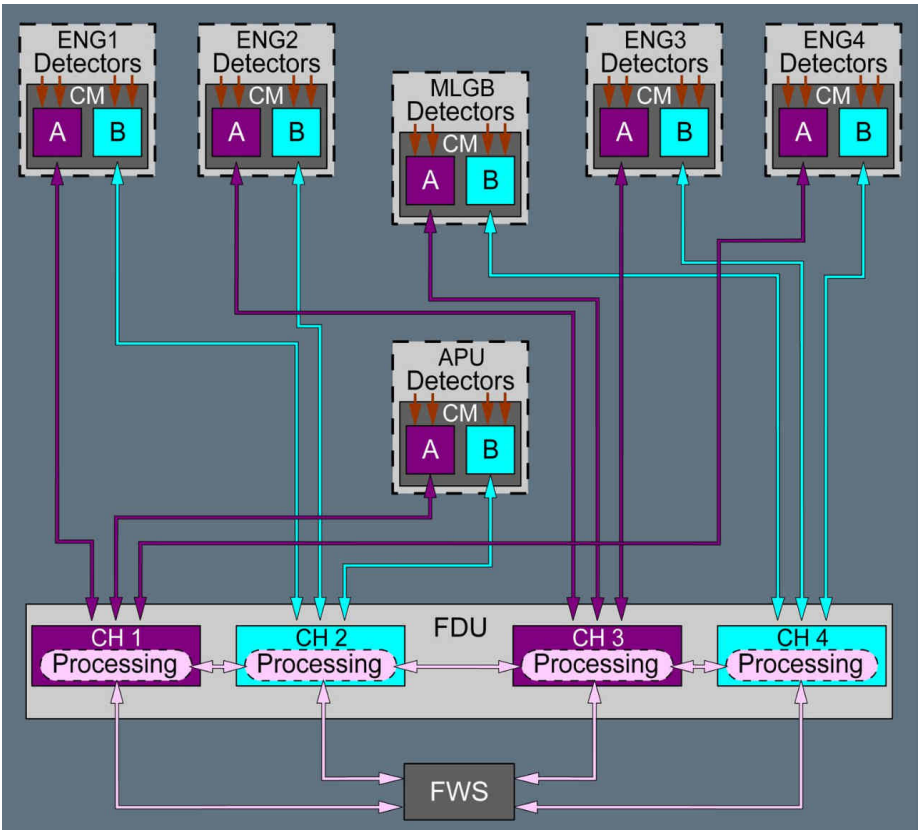
The Fire Detection Unit (FDU) monitors fire detection in:

- The engines
- The APU
- The MLG bay.

It also manages fire extinguishing in:

- The engines
- The APU.

Fire Detection Unit



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ECAM ALERTS

Applicable to: ALL

SMOKE DET FAULT (*Refer to Procedure*)

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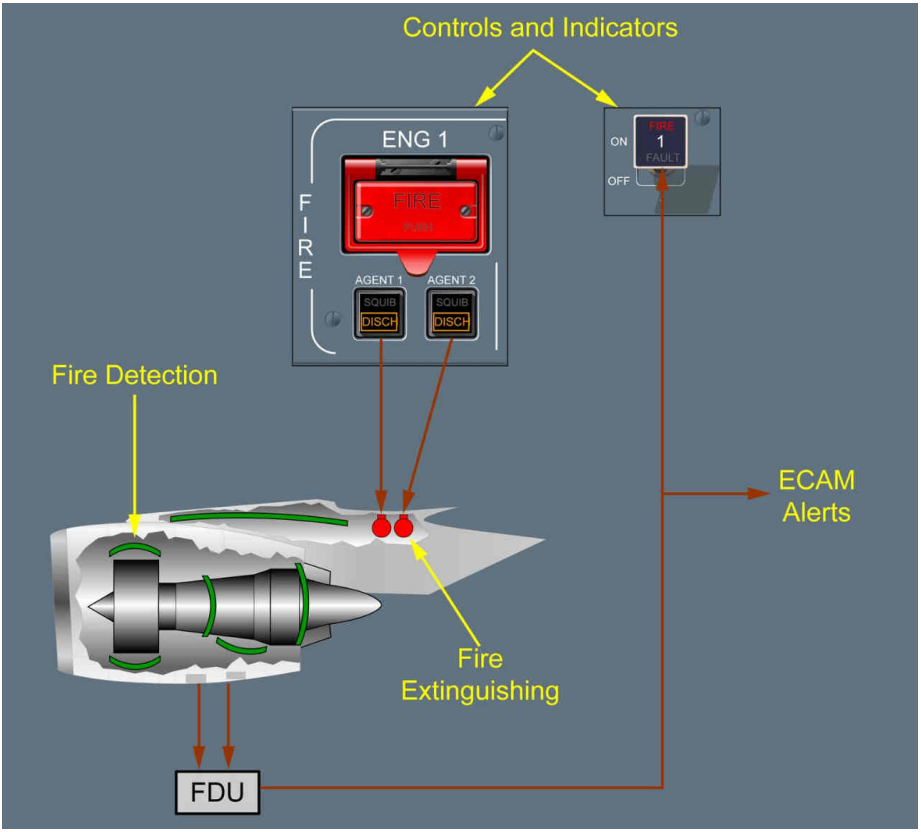
ENGINE FIRE PROTECTION - GENERAL

Applicable to: ALL

Each engine has a fire protection system, with:

- A fire detection system that monitors all sensitive zones
- Two extinguisher bottles that discharge extinguisher agent
- An ENG FIRE panel, with assigned pushbuttons
  These pushbuttons can be used to isolate the applicable engine(s) from the other aircraft systems, and to control fire extinguishing.
- Visual and aural alerts.

Engine Fire Protection



ENGINE FIRE PROTECTION - DETECTION

Applicable to: ALL

FIRE DETECTION

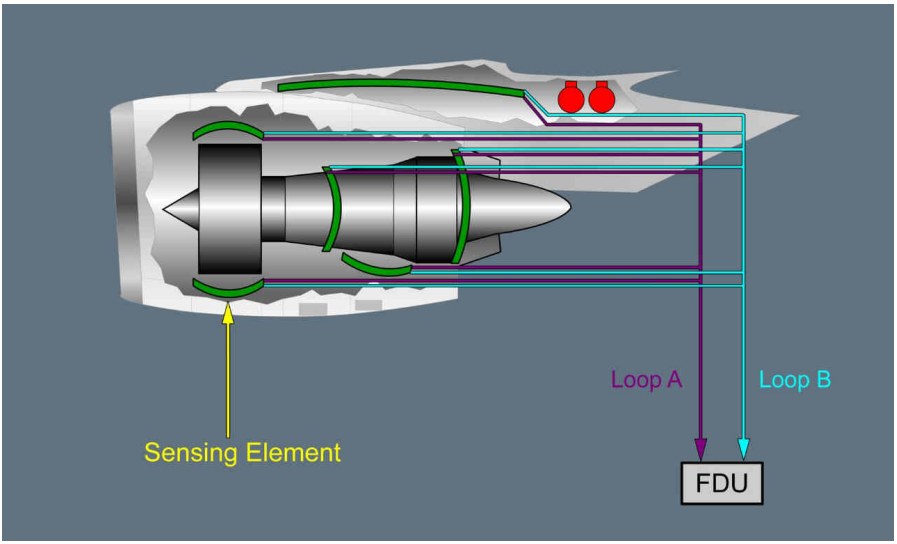
The fire detection system uses two identical loops (A and B) to monitor the sensitive zones.

L2 The sensitive zones of the engines are the:
- Fan compartment
- Intermediate compressor compartment
- Core compartment
- Pylon nacelle.

L3 The above zones are protected, because they are heat sensitive zones in which a fire could potentially start.

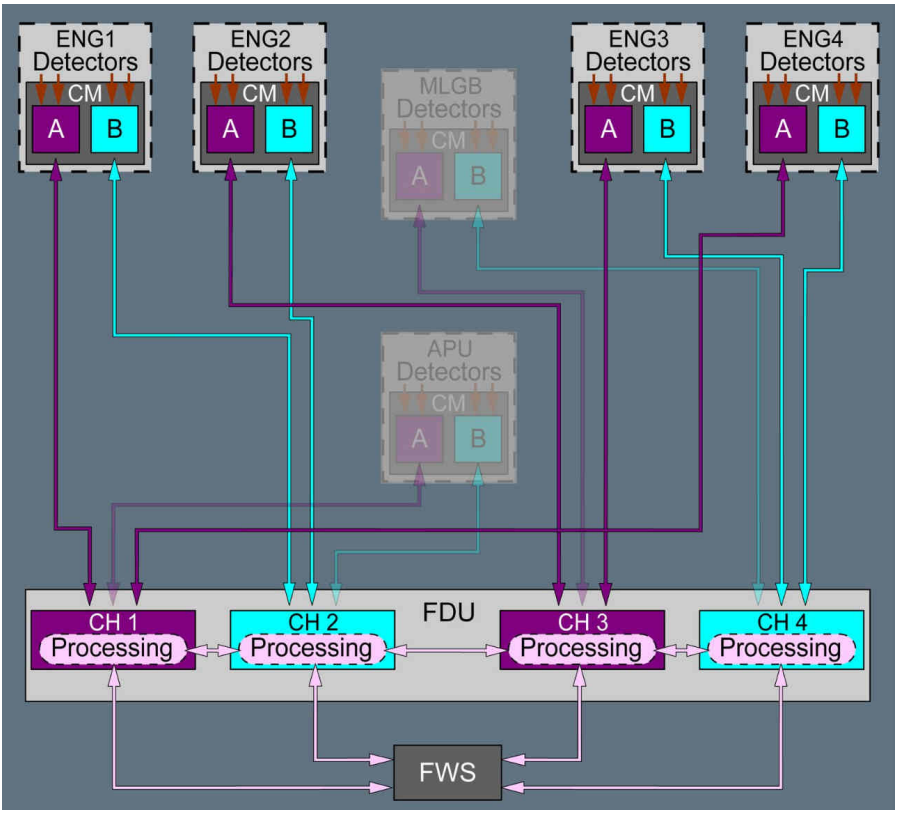
L1 Each loop has a fire detector for each sensitive zone.
The Fire Detection Unit (FDU) receives information from the two loops. The FDU provides information to the ECAM to generate applicable fire warnings or loop cautions.

Fire Detection Architecture



L3 The FDU has four independent channels.
For each engine, the FDU uses two different channels to compare the information that it receives from both loops.

Fire Detection Unit



L1 When fire is detected in an engine:
- The continuous repetitive chime sounds
- The MASTER WARN lights flash
- The associated ECAM ENG FIRE warning triggers
- The ECAM SD displays the ENG page
- On the ENG FIRE panel, the assigned FIRE light comes on
- On the ENG MASTER panel, the assigned FIRE light comes on.

L2 FIRE DETECTION AND LOOP FAULT LOGIC

The following alert(s) will trigger, when the loops detect either a fire, or a fault:

Detection on LOOP A		Detection on LOOP B		Alert
Fire	Fault	Fire	Fault	
Yes	No	Yes	No	ENG 1(2)(3)(4) FIRE
No	Yes	Yes	No	ENG 1(2)(3)(4) FIRE
Yes	No	No	Yes	ENG 1(2)(3)(4) FIRE
No	Yes	No	Yes	ENG 1(2)(3)(4) FIRE On the same engine: If one failure occurs after the other, within 5 s.
				ENG 1(2)(3)(4) FIRE DETECTN FAULT On the same engine: If one failure occurs after the other, at an interval greater than 5 s.
No	Yes	No	No	ENG 1(2)(3)(4) FIRE LOOP A FAULT (1)
Yes	No	No	No	ENG 1(2)(3)(4) FIRE LOOP A FAULT (1)
No	No	Yes	No	ENG 1(2)(3)(4) FIRE LOOP B FAULT (1)
No	No	No	Yes	ENG 1(2)(3)(4) FIRE LOOP B FAULT (1)

(1) *In case a failure is detected in one loop, the not affected loop continues to operate, and fire detection remains available.*

ENGINE FIRE PROTECTION - FIRE EXTINGUISHING

Applicable to: ALL

The flight crew can isolate and extinguish an engine fire from the ENG FIRE panel in the cockpit.

ENGINE ISOLATION

Each engine can be isolated by pressing its assigned ENG FIRE pb.

L2 When pressed, the system:
- Stops the aural fire warning
- Arms the squibs on the fire extinguishers
  The fire extinguisher bottles are ready to discharge.
- Closes the low-pressure fuel valve
- Closes the hydraulic fire shutoff valve
- Closes the engine bleed valve
- Closes the pack flow control valve
- Shuts off the FADEC power supply.

L1 FIRE EXTINGUISHING

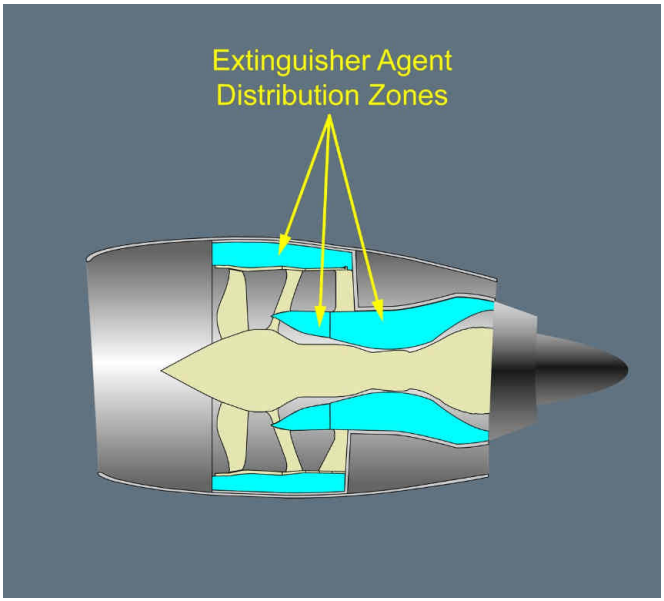
Each engine has two fire extinguisher bottles.

L3 Each bottle has two squibs that enable the discharge of fire extinguisher agent.

L1 After pressing the ENG FIRE pb, the fire extinguisher agent is discharged in the engine nacelle when the assigned AGENT pb is pressed.

L3 This occurs as soon as:
- Both fire extinguisher squibs are armed, or
- One fire extinguisher squib is armed, and the other is not operative.

Extinguisher Agent - Distribution Zones



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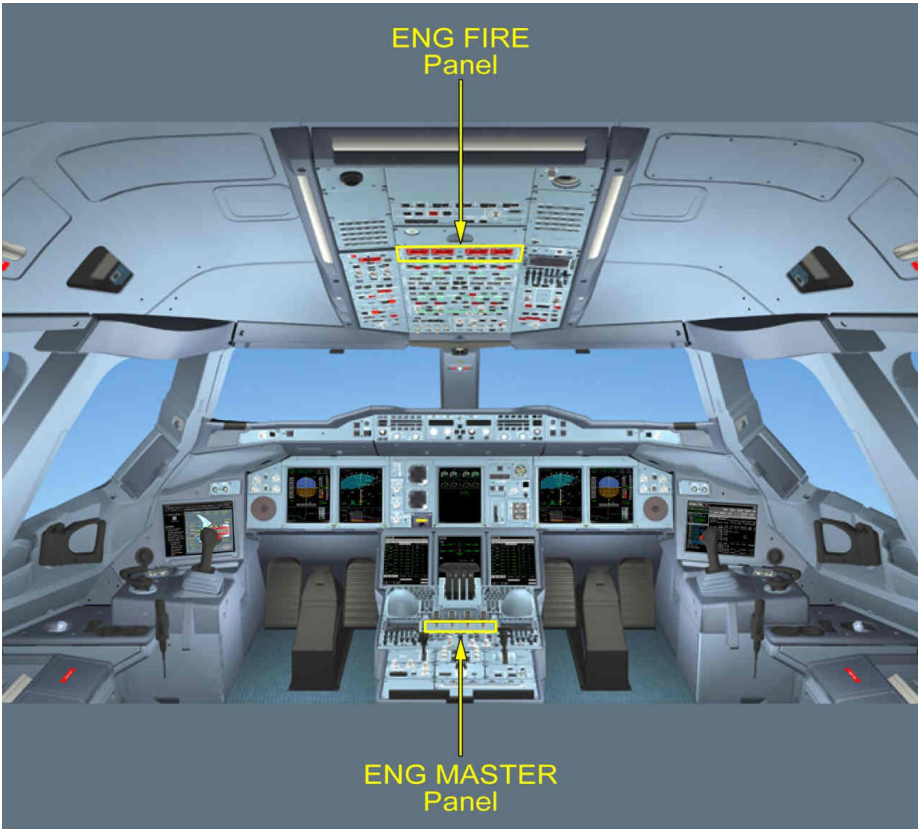
GENERAL

Applicable to: ALL

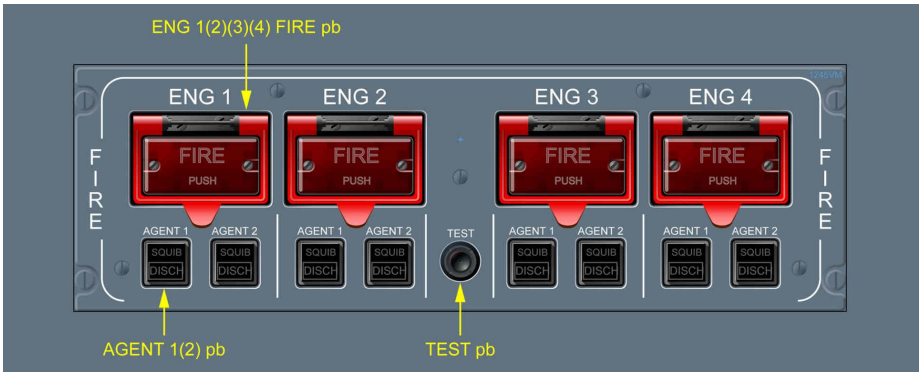
Controls and Indicators



ENG FIRE PANEL

Applicable to: ALL

ENG FIRE Panel



ENG 1(2)(3)(4) FIRE pb



Normal position. No fire is detected.

L12



- Fire is detected. The FIRE light of the ENG MASTER panel comes on, and also indicates the affected engine.

  Associated with the following ECAM warning:
  - ENG 1(2)(3)(4) FIRE (*Refer to Procedure*)

  The light remains on, until the fire is extinguished, regardless of the position of the ENG FIRE pb .
- The flight crew is pressing the ENG FIRE Panel Test pb (*Refer to Test pb*).



When pressed:
- All associated systems are isolated from the engine
- The aural fire warning stops
- The fire extinguishing system is armed, the bottles are ready to discharge.

AGENT 1(2) pb



Normal position.



The squibs of the fire extinguisher bottles are armed. The fire extinguisher bottles are ready to discharge extinguisher agent.
When pressed, the extinguisher bottles discharge and the SQUIB light goes off.



The fire extinguisher bottles discharge.



The flight crew is pressing the ENG FIRE panel TEST pb (*Refer to TEST pb*).

TEST pb



Tests the engines, the APU and the main landing gear bay fire warnings.

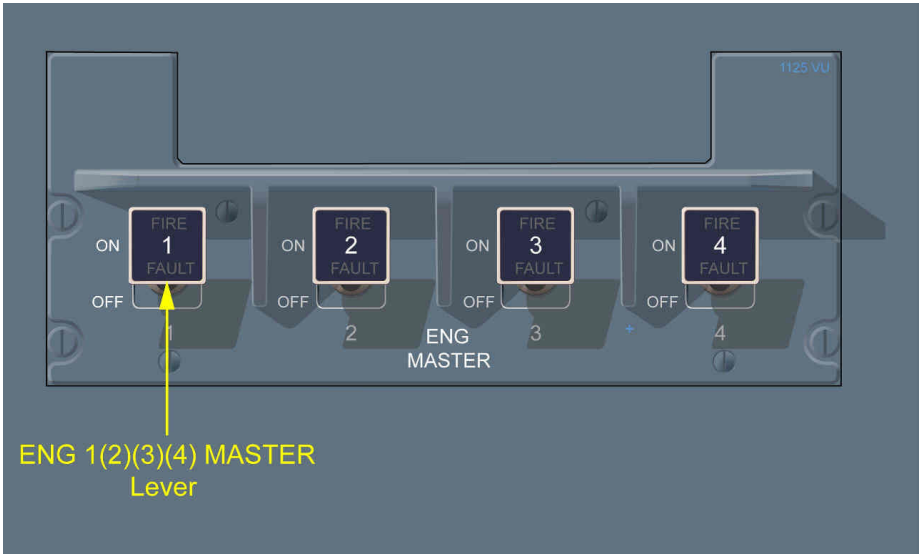
When pressed for at least three seconds, and until released, tests the operation of the engine fire detection and extinguishing system:

- The continuous repetitive chime sounds
- The MASTER WARN lights flash
- The ECAM displays ENG FIRE, APU FIRE and MLG FIRE warnings titles
- All ENG FIRE pb come on red
- The APU FIRE pb comes on red
- All SQUIB lights of the AGENT pb come on
- All DISCH lights of the AGENT pb come on
- All FIRE lights on the ENG MASTER panel come on.

ENG MASTER PANEL

Applicable to: ALL

ENG MASTER Panel



ENG 1(2)(3)(4) MASTER LEVER



No fire is detected.



Fire is detected or the flight crew is pressing the ENG FIRE panel TEST pb (*Refer to TEST pb*).

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ECAM ALERTS

Applicable to: ALL

ENG 1(2)(3)(4) FIRE (IN FLIGHT) (*Refer to procedure*)

ENG 1(2)(3)(4) FIRE (ON GROUND) (*Refer to procedure*)

ENG 1(2)(3)(4) FIRE DET FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) FIRE LOOP A(B) FAULT (*Refer to procedure*)

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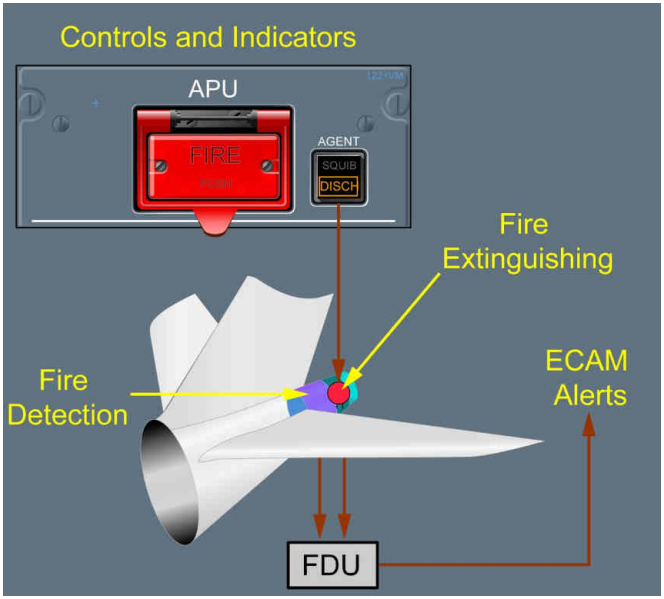
APU FIRE PROTECTION - GENERAL

Applicable to: ALL

The APU compartment has a fire protection system, with:

- A fire detection system
- One extinguisher bottle that discharges extinguisher agent
- An APU Fire panel, with assigned pushbuttons
  These pushbuttons can be used to isolate the APU from the other aircraft systems, and control fire extinguishing.
- Visual and aural alerts.

APU Fire Protection



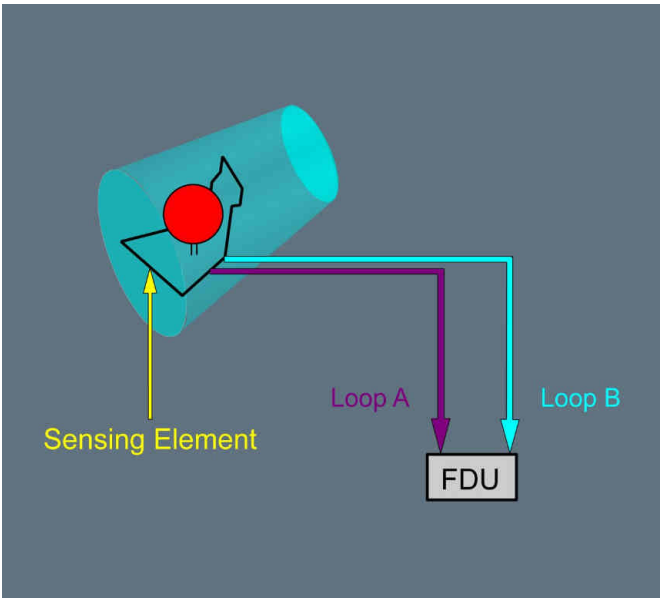
APU FIRE PROTECTION - DETECTION

Applicable to: ALL

FIRE DETECTION

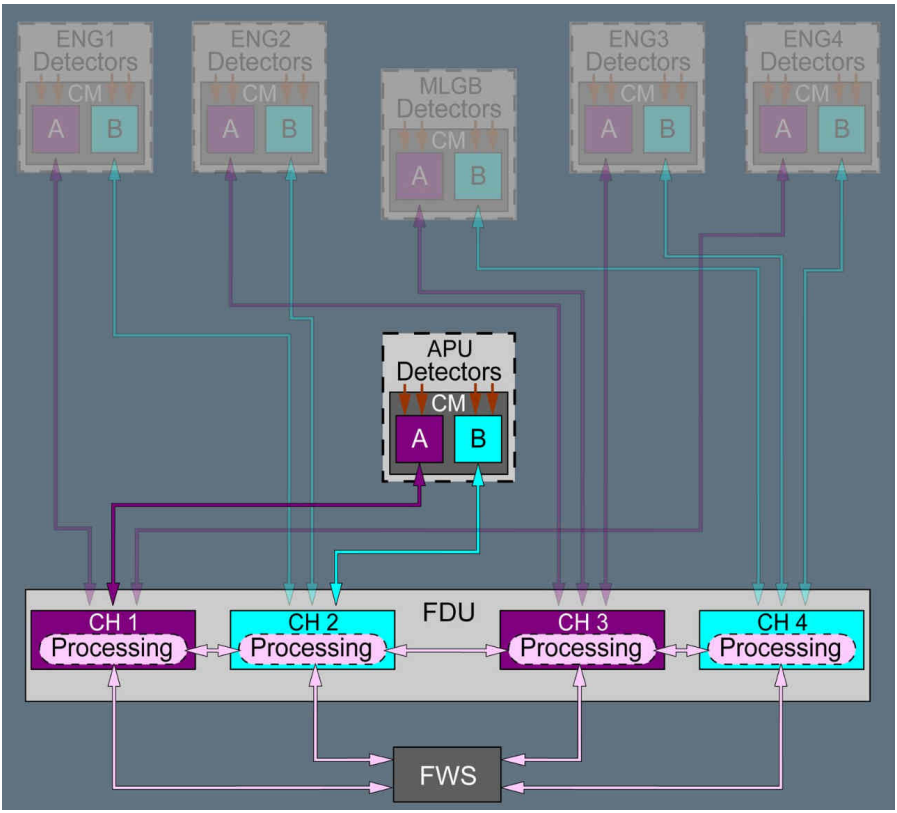
The detection system uses two identical loops (A and B). Each loop has fire detectors.
The Fire Detection Unit (FDU) receives information from the two loops. The FDU provides information to the ECAM to generate applicable fire warnings or loop cautions.

Fire Detection - Architecture



L3 The FDU has four independent channels.
The FDU uses two different channels to compare the information that it receives from both loops.

Fire Detection Unit



L1 In case the FDU detects a fire:

- In flight:
  - The continuous repetitive chime sounds
  - The MASTER WARN lights flash
  - The ECAM APU FIRE warning triggers
  - On the APU Fire panel, the FIRE light comes on.
- On ground, in addition to the warnings in the cockpit:
  - The APU automatically shuts down, and the external horn sounds
  - The APU Fire light, on the Maintenance Nose Gear panel, comes on.

L2 FIRE DETECTION AND LOOP FAULT LOGIC

The following alert(s) trigger, when the loops detect either a fire, or a fault:

Detection on LOOP A		Detection on LOOP B		Alert
Fire	Fault	Fire	Fault	
Yes	No	Yes	No	APU FIRE
No	Yes	Yes	No	APU FIRE
Yes	No	No	Yes	APU FIRE
No	Yes	No	Yes	APU FIRE If one failure occurs after the other, within 5 s.
				APU FIRE DETECTN FAULT If one failure occurs after the other, at an interval greater than 5 s.
No	Yes	No	No	APU FIRE LOOP A FAULT (1)
Yes	No	No	No	APU FIRE LOOP A FAULT (1)
No	No	Yes	No	APU FIRE LOOP B FAULT (1)
No	No	No	Yes	APU FIRE LOOP B FAULT (1)

(1) In case a failure is detected in one loop, the not affected loop continues to operate, and fire detection is still available.

APU FIRE PROTECTION - FIRE EXTINGUISHING

Applicable to: ALL

The flight crew can isolate and extinguish an APU fire from the APU Fire panel in the cockpit.

APU ISOLATION

The APU can be isolated by pressing its assigned APU FIRE pb.

L2 When pressed, the system:

- Shuts down the APU
- Stops the aural warning
- Arms the squibs on the fire extinguisher
  The fire extinguisher bottle is ready to discharge.
- Closes the low-pressure fuel valve
- Shuts off the APU fuel pumps
- Closes the APU bleed valve and crossbleed valve
- Deactivates the APU generators.

L1 FIRE EXTINGUISHING

The APU has one fire extinguisher bottle.

L3 The extinguisher bottle has two squibs that enable the discharge of fire extinguisher agent.

L1 The bottle discharges, either:
- In flight: Manually controlled from the APU Fire panel in the cockpit, or
- On ground: Automatically activated.

L2 The FDU receives signals from the Landing Gear Retraction System (LGERS), to determine whether the aircraft on ground or in flight.

L1 After pressing the APU FIRE pb, the fire extinguisher agent is discharged in the APU when the AGENT pb is pressed.

L3 This occurs as soon as:
- Both fire extinguisher squibs are armed, or
- One fire extinguisher squib is armed, and the other is not operative.

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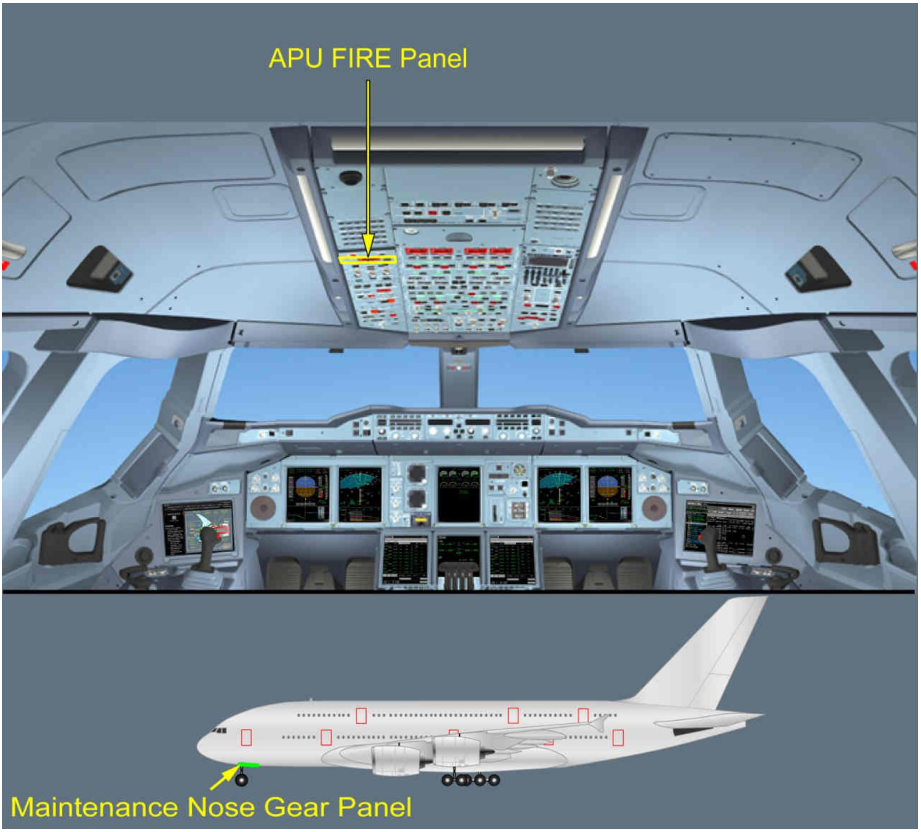
GENERAL

Applicable to: ALL

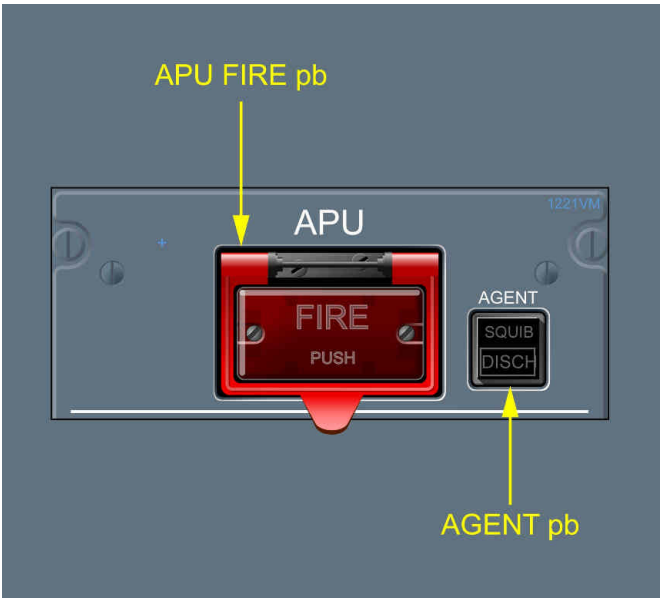
Controls and Indicators



APU FIRE PANEL

Applicable to: ALL

APU FIRE Panel



APU FIRE pb



Normal position. No fire is detected.

L12



Fire is detected.

Associated with the following ECAM warning:
- APU FIRE (*Refer to Procedure*)

The light remains on, until the fire is extinguished, regardless of the position of the APU FIRE pb .



When pressed:
- All associated systems are isolated from the APU
- The aural fire warning stops
- The fire extinguishing system is armed, the bottle is ready to discharge.

AGENT pb



Normal position.



The squibs of the fire extinguisher bottle are armed. The fire extinguisher bottle is ready to discharge extinguisher agent.
When pressed, the extinguisher bottle discharges and the SQUIB light goes off.

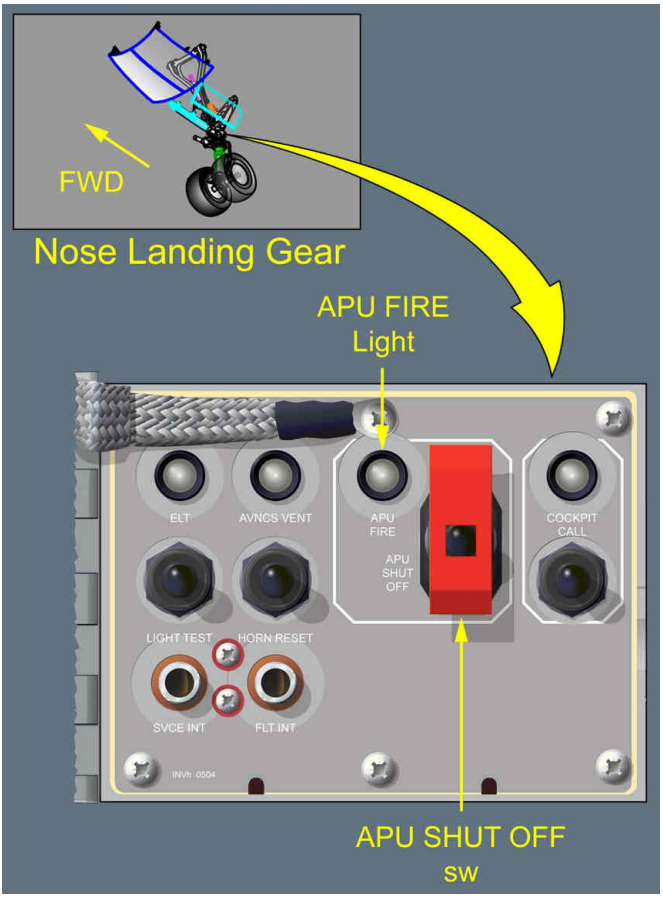


The fire extinguisher bottle has discharged.

MAINTENANCE NOSE GEAR PANEL

Applicable to: ALL

Maintenance Nose Gear Panel



APU FIRE LIGHT



Normal position. No fire is detected.

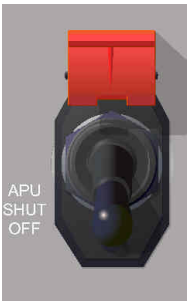


Fire is detected in the APU compartment. In addition of the light, an external horn comes on.
The APU automatically shuts down, the APU fuel valves close, and the APU fire extinguisher discharges the agent.
The light and the horn remain on, until the fire is extinguished.

APU SHUT OFF SW



Normal position.



The ground crew has opened the guard.

When pushed down and released:
- Initiates an APU shutdown from outside the aircraft (normal operation), or
- Initiates an emergency shutdown of the APU , due to an APU failure (*Refer to the Emergency Shutdown Description*).

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ECAM ALERTS

Applicable to: ALL

APU FIRE (*Refer to procedure*)

APU FIRE DET FAULT (*Refer to procedure*)

APU FIRE LOOP A(B) FAULT (*Refer to procedure*)

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MLG FIRE PROTECTION - DETECTION

Applicable to: ALL

FIRE DETECTION

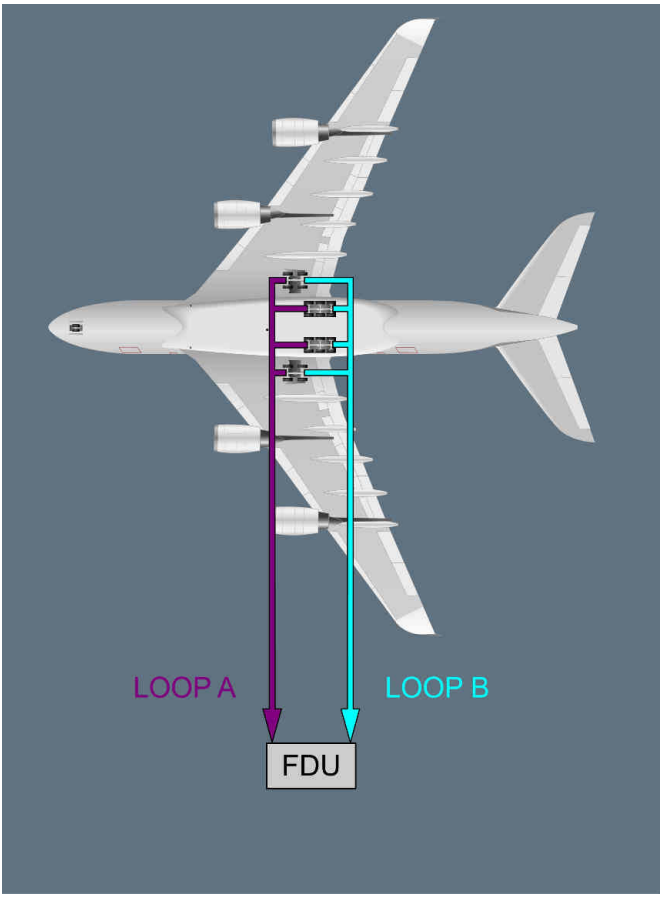
The Main Landing Gear (MLG) bays have a fire detection system with:
- A fire detection system
- Visual and aural alerts.

This system detects overheat in the:

- Two wing landing gear bays
- Two body landing gear bays.

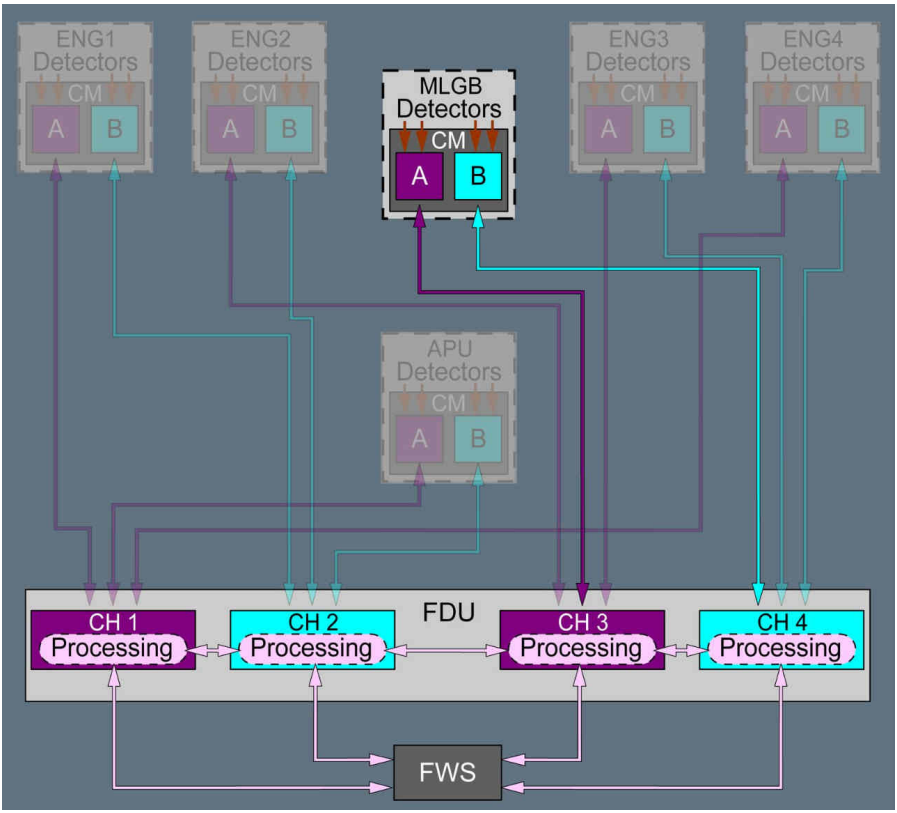
The fire detection system uses two identical loops (A and B) for each bay.
The Fire Detection Unit (FDU) receives information from the two loops. The FDU provides information to the ECAM to generate applicable fire warnings or loop cautions.

Fire Detection - Architecture



L3 The FDU has four independent channels.
The FDU uses two different channels to compare the information that it receives from both loops.

Fire Detection Unit



L1 If fire is detected in any landing gear bay:
- The continuous repetitive chime sounds
- The MASTER WARN lights flash
- The ECAM MLG BAY FIRE warning triggers
- The ECAM SD displays the WHEEL page.

L2 FIRE DETECTION AND LOOP FAULT LOGIC

The following alert(s) trigger, when the loops detect either a fire, or a fault:

Detection on LOOP A		Detection on LOOP B		Alert
Fire	Fault	Fire	Fault	
Yes	No	Yes	No	MLG BAY FIRE
No	Yes	Yes	No	MLG BAY FIRE
Yes	No	No	Yes	MLG BAY FIRE
No	Yes	No	Yes	MLG BAY FIRE DETECTN FAULT
No	Yes	No	No	MLG BAY FIRE LOOP A FAULT (1)
Yes	No	No	No	MLG BAY FIRE LOOP A FAULT (1)
No	No	Yes	No	MLG BAY FIRE LOOP B FAULT (1)
No	No	No	Yes	MLG BAY FIRE LOOP B FAULT (1)

(1) In case a failure is detected in one loop, the not affected loop continues to operate, and fire detection remains available.

ECAM ALERTS

Applicable to: ALL

MLG BAY FIRE (*Refer to procedure*)

MLG BAY FIRE DET FAULT (*Refer to procedure*)

MLG BAY FIRE LOOP A(B) FAULT (*Refer to procedure*)

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AVIONICS BAYS SMOKE DETECTION

Applicable to: ALL

GENERAL

Each avionics bay, the In Flight Entertainment (IFE) bay and the Network Server System (NSS) have a smoke detection system.

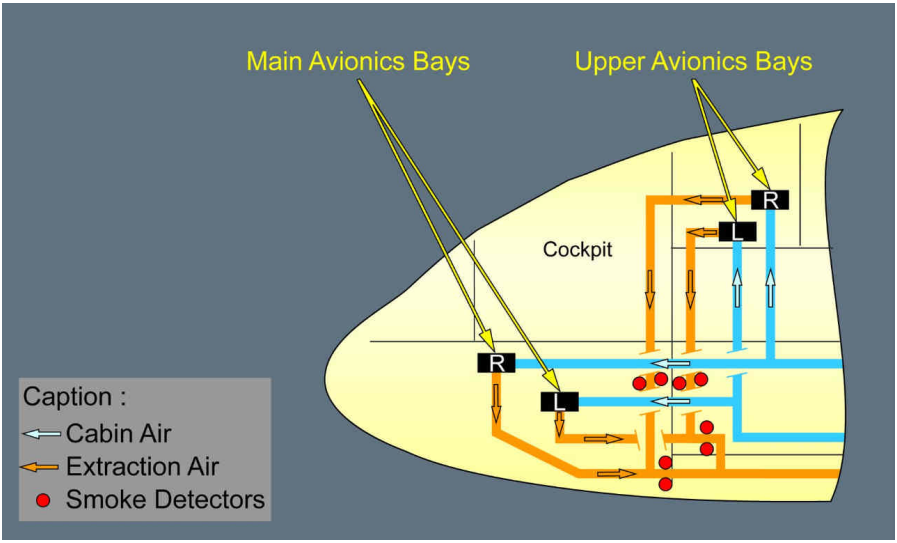
L2 Each bay has two smoke detectors. They are in the air extraction ducts of the avionics racks.

The avionics bays are:
- Main, left avionics bay
- Main, right avionics bay
- Upper, left avionics bay
- Upper, right avionics bay
- Aft avionics bay.

L1 The Smoke Detection Function (SDF) monitors the information received from the detectors of a specific bay. The SDF provides information to the ECAM to generate applicable smoke warnings, or detector fault cautions.

Note: *If the SDF detects smoke in the IFE, the Flight Attendant Panel (FAP) also triggers an alert to the cabin crew.*

Main and Upper Avionics Bays - Smoke Detection



L2 DETECTION LOGIC

- The SMOKE DET FAULT caution triggers for the applicable bay, when:
  - One detector fails, or
  - Only one detector detects smoke.
- The SMOKE warning triggers for the applicable bay, when:
  - One detector fails, and the other detects smoke, or
  - Both detectors detect smoke.

L3 MAIN AND UPPER AVIONICS

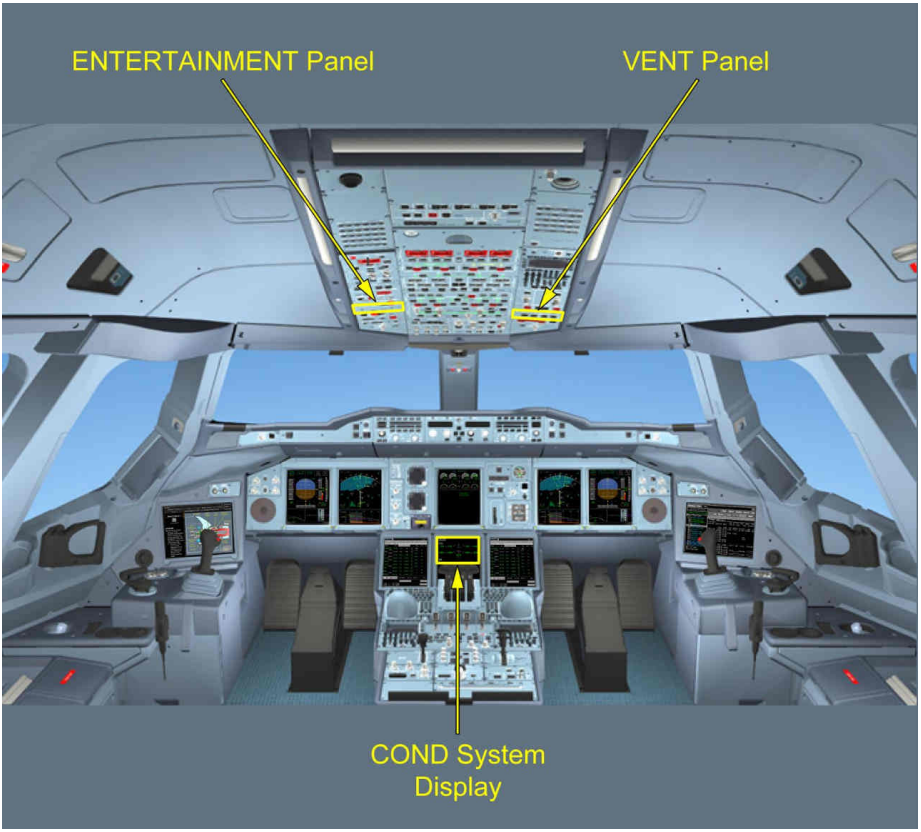
For the upper and main bays, and depending on which detectors detect the smoke, the following logic applies:

Smoke in the Main Avionics Bay	Smoke in the Upper Avionics Bay	Alert
No	Yes	SMOKE L(R) UPPER AVNCS SMOKE
Yes	No	SMOKE L(R) MAIN AVNCS SMOKE
Yes	Yes	SMOKE L(R) UPPER AVNCS SMOKE

GENERAL

Applicable to: ALL

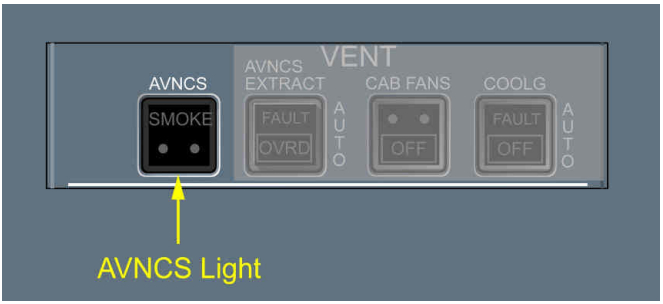
Controls and Indicators



VENT PANEL

Applicable to: ALL

VENT Panel



AVNCS light



No smoke detected.

L12

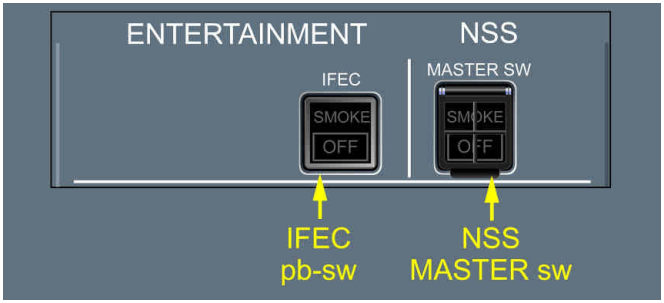


- Smoke is detected in the ventilation duct of the main, upper, or aft avionics bay, or

  Associated with the following ECAM warning:
  - SMOKE L(R) MAIN AVNCS SMOKE (*Refer to Procedure*), or
  - SMOKE L(R) UPPER AVNCS SMOKE (*Refer to Procedure*), or
  - SMOKE AFT AVNCS SMOKE (*Refer to Procedure*)
- The flight crew is pressing the CARGO SMOKE Panel Test pb (*Refer to Test pb*)

ENTERTAINMENT PANEL

Applicable to: ALL



IFEC pb-sw



Normal operation. No smoke is detected.



Smoke is detected in the IFE Center.
The ventilation extraction fan automatically stops, and electrical power to the IFE System is cut off. The SMOKE light remains on, as long as smoke is detected.



All electrical power to the IFE System is cut off.



All electrical power to the IFE System is cut off, and smoke is detected.

NSS MASTER sw



Normal operation. No smoke is detected.



Smoke is detected in the NSS.
The SMOKE light remains on, as long as smoke is detected.



All electrical power to the NSS is cut off.

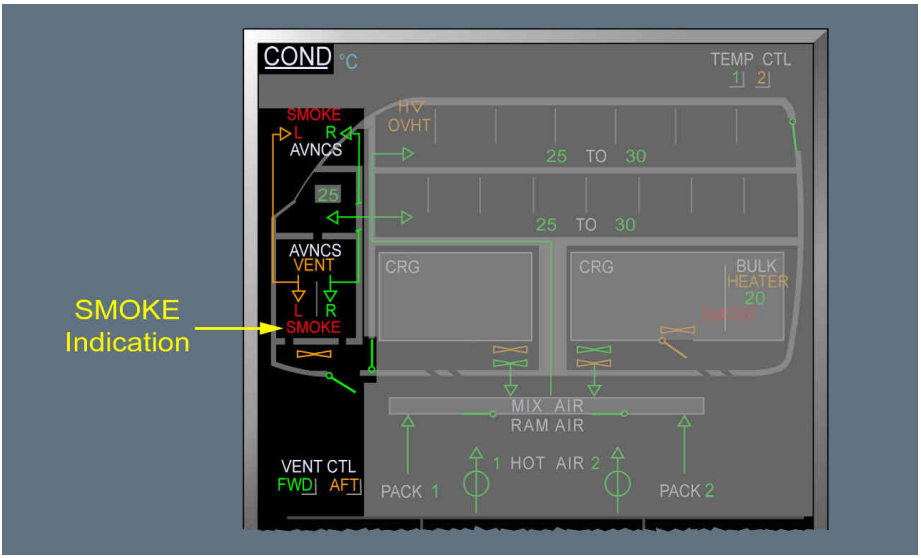


All electrical power to the NSS is cut off, and smoke is detected.

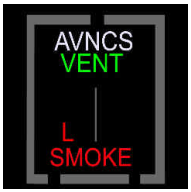
COND SD PAGE

Applicable to: ALL

COND SD Page



SMOKE INDICATION



Smoke is detected in the L circuit of the main avionics bay.



Smoke is detected in the L circuit of the upper avionics bay.

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ECAM ALERTS

Applicable to: ALL

SMOKE AFT AVNCS SMOKE (*Refer to procedure*)

SMOKE IFE BAY SMOKE (*Refer to procedure*)

SMOKE L(R) MAIN (UPPER) AVNCS SMOKE (*Refer to procedure*)

SMOKE AFT AVNCS DET FAULT (*Refer to procedure*)

SMOKE IFE BAY DET FAULT (*Refer to procedure*)

SMOKE L(R) MAIN(UPPER) AVNCS DET FAULT (*Refer to procedure*)

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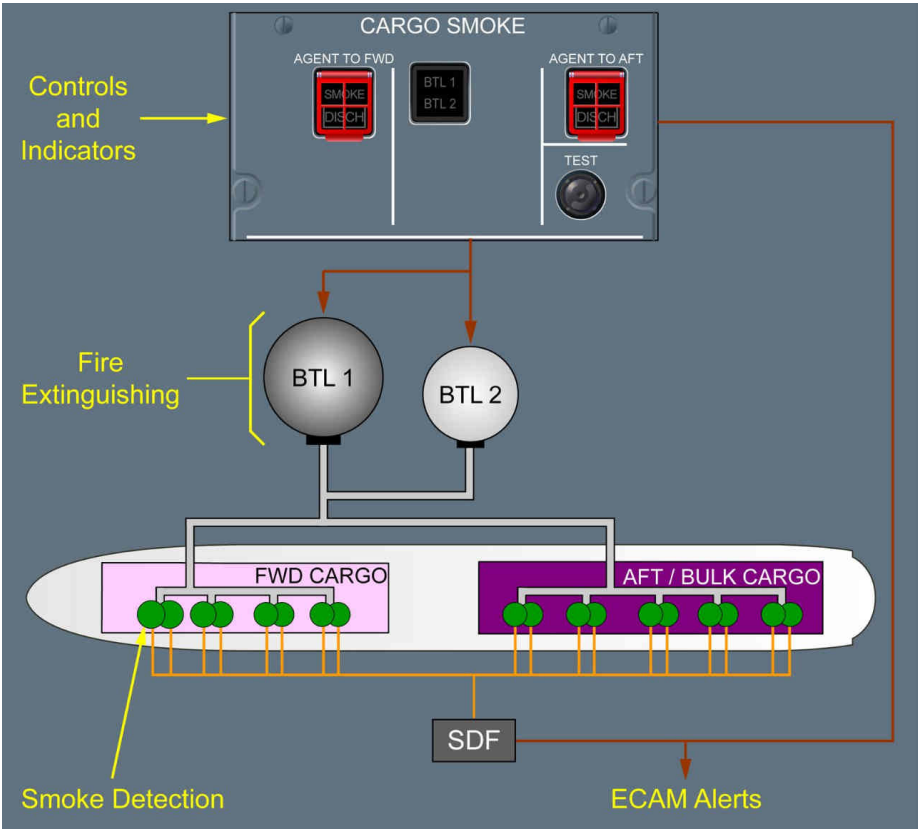
GENERAL

Applicable to: ALL

The forward and aft/bulk cargo compartments each has a fire protection system.
The fire protection system of the cargo compartments have a:

- Smoke detection system
- Fire extinguishing system.

Cargo Compartments - Fire Protection Description



CARGO COMPARTMENTS SMOKE DETECTION

Applicable to: ALL

SMOKE DETECTION

The smoke detection system has:

- Smoke detectors in the forward and aft/bulk cargo compartments.

L2 These detectors are in cavities within the ceiling panels. Each cargo compartment cavity has two detectors, and one extinguisher nozzle. There are:

- Four cavities in the forward cargo compartment
- Five cavities in the aft/bulk cargo compartment, one of which is in the bulk cargo compartment.

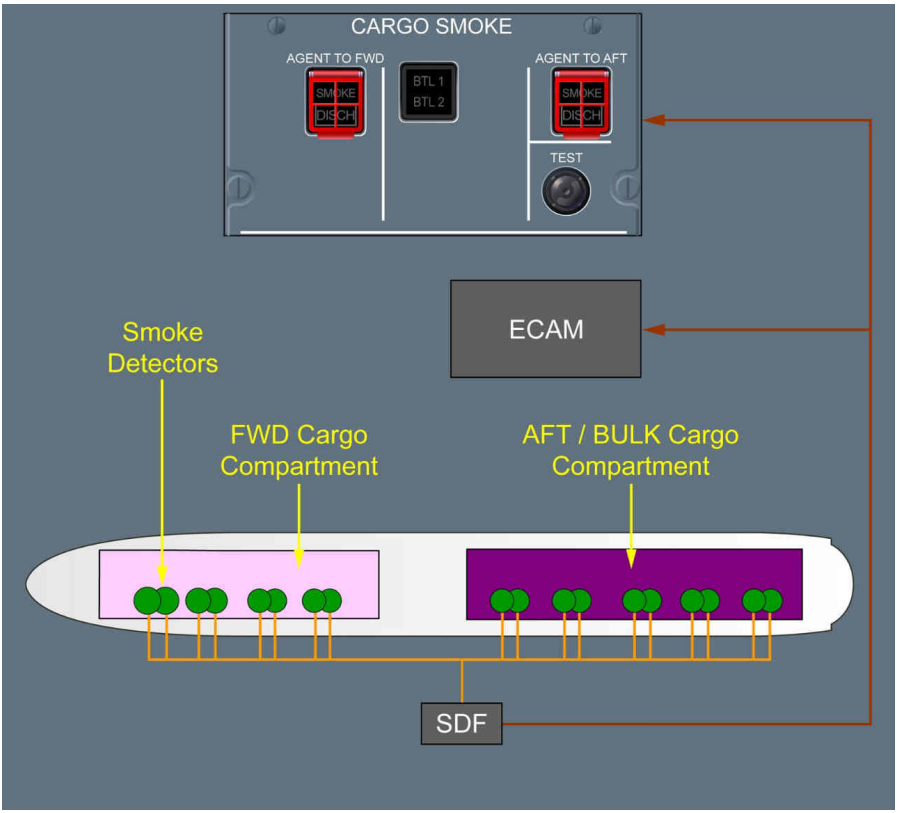
L1 - A Smoke Detection Function (SDF) that monitors the information received from the detectors of a given compartment. The SDF provides information to the ECAM to generate applicable smoke warnings, or detector fault cautions.

When smoke is detected in a cargo compartment, the associated SMOKE warning triggers.
If smoke is detected in the bulk cargo compartment, the ventilation automatically stops.

L3 Therefore:

- The isolation valves close
- The extraction fan stops.

Cargo Compartments - Smoke Detection



L2 DETECTION LOGIC

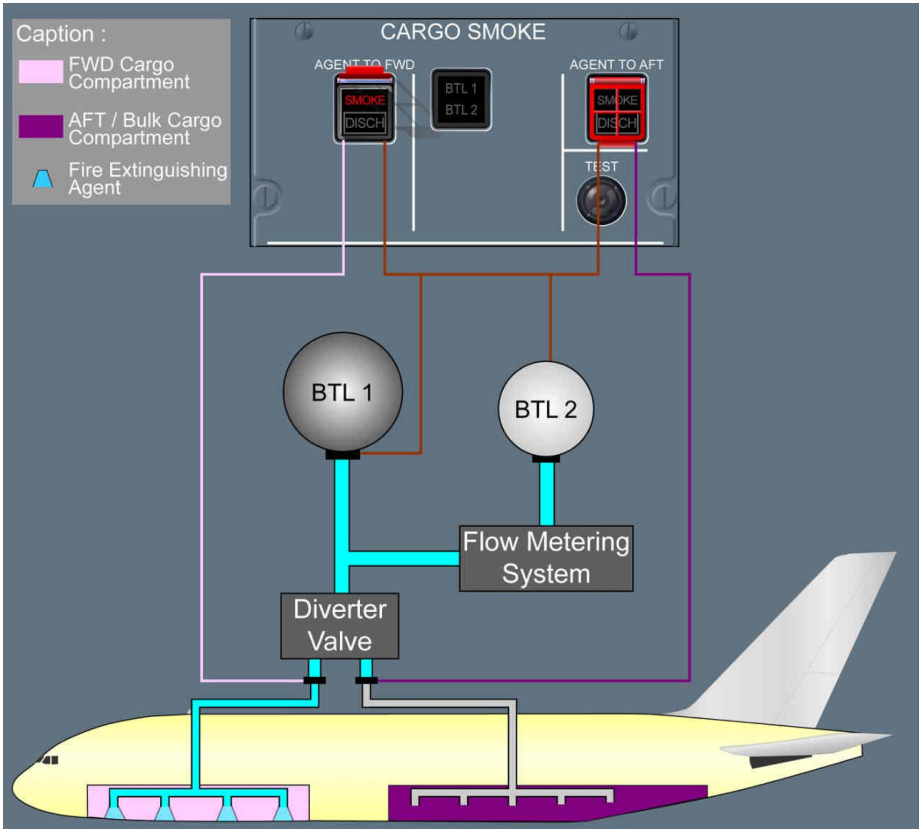
- The SMOKE DET FAULT caution triggers for the applicable compartment, when:
  - One detector fails, or
  - Only one detector detects smoke.
- The SMOKE warning triggers for the applicable compartment, when:
  - One detector fails, and the other detects smoke, or
  - Both detectors detect smoke.

FIRE EXTINGUISHING

Applicable to: ALL

There are two fire extinguisher bottles that can discharge extinguisher agent in the forward or aft/bulk cargo compartment.
When the fire extinguisher bottles discharge, the agent either extinguishes the fire, or prevents the fire from spreading for approximately four hours.

Fire Extinguishing



When the flight crew presses the assigned pushbutton, the extinguisher agent is released into the affected cargo compartment.
L3 A diverter valve directs extinguisher agent to either the forward or aft/bulk cargo compartment.

L2 - Bottle 1 first discharges extinguisher agent in the affected cargo compartment. This takes approximately one minute.

L3 Bottle 1 is bigger, and has a greater capacity of extinguisher agent than the other one, in order to saturate the affected cargo compartment with extinguisher agent.

L2 - Bottle 2 then slowly discharges extinguisher agent, to provide sufficient extinguisher agent concentration in the affected cargo compartment for approximately four hours.

L3 A flow-metering system regulates the flow of extinguisher agent.

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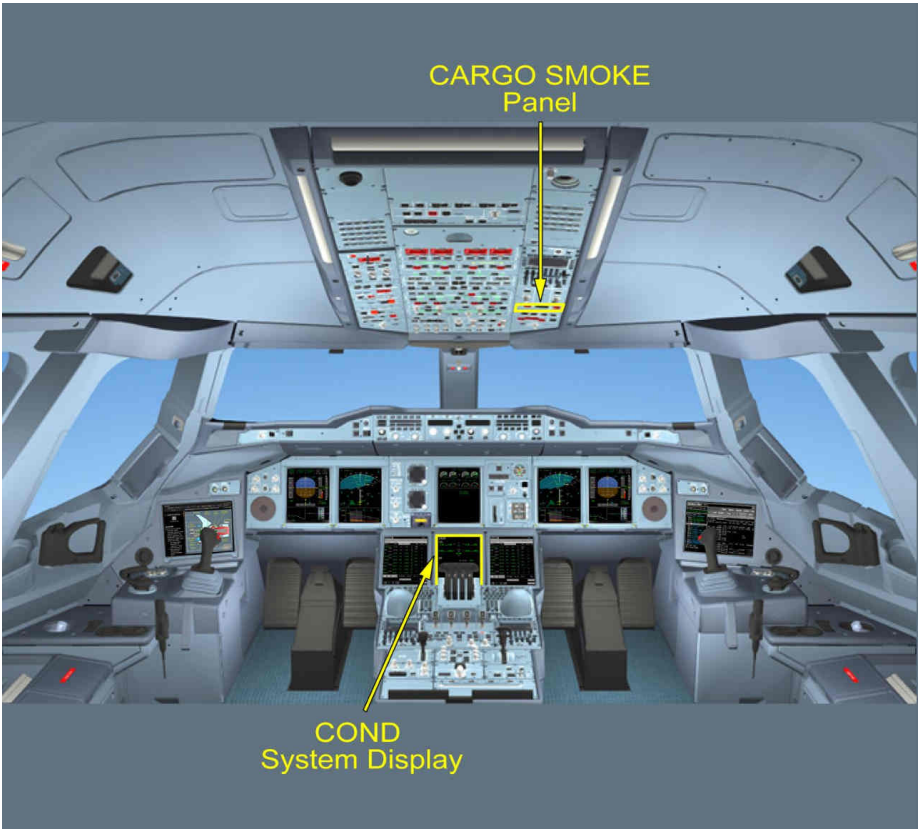
GENERAL

Applicable to: ALL

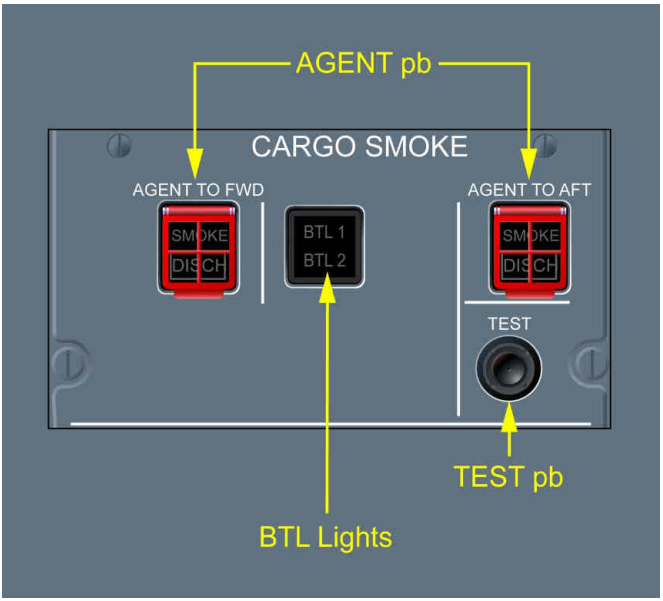
Controls and Indicators



CARGO SMOKE PANEL

Applicable to: ALL

Cargo Smoke Panel



AGENT TO FWD/AFT pb



No smoke is detected.

L12



Smoke is detected in the associated cargo compartment.

Associated with the following ECAM warning:
- SMOKE FWD (AFT/BULK) CARGO SMOKE (*Refer to Procedure*)

The SMOKE light remains on, as long as smoke is detected.



When pressed, the bottles discharge extinguisher agent in the associated cargo compartment.



The fire extinguisher bottles discharge.



- Smoke is detected in the associated cargo compartment, and the fire extinguisher bottles discharge, or
- The flight crew is pressing the CARGO SMOKE Panel Test pb (*Refer to Test pb*).

BTL LIGHTS



Normal position. No bottle has discharged.



The fire extinguisher bottle has discharged.



- The two fire extinguisher bottles have discharged, or
- The flight crew is pressing the CARGO SMOKE panel Test pb (*Refer to Test pb*).

Test pb



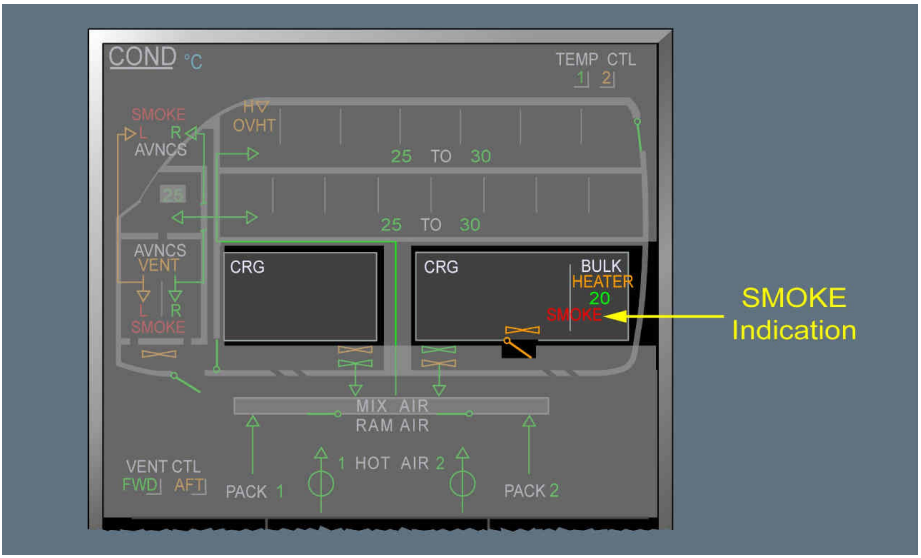
When pressed for at least three seconds, and until released, tests the operation of the cargo compartments fire detection and extinguishing system:

- The continuous repetitive chime sounds
- The MASTER WARN lights flash
- The ECAM displays the cargo compartments SMOKE and AVNCS SMOKE warnings
- The isolation valve of the ventilation system closes
- All BTL lights come on
- All DISCH lights AGENT pb come on
- All SMOKE lights AGENT pb come on
- The AVNCS SMOKE light on the VENT panel comes on.

COND SD PAGE

Applicable to: ALL

COND SD Page



SMOKE INDICATION

SMOKE — Smoke is detected in the indicated area (aft and bulk cargo compartment).

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ECAM ALERTS

Applicable to: ALL

SMOKE FWD (AFT/BULK) CARGO SMOKE (*Refer to procedure*)

SMOKE FWD (AFT) CARGO BOTTLES FAULT (*Refer to procedure*)

SMOKE FWD (AFT/BULK) CARGO DET FAULT (*Refer to procedure*)

SMOKE FWD+AFT CARGO BOTTLES FAULT (*Refer to PRO-ABN-ECAM-10-26-460 SMOKE FWD +AFT CARGO BOTTLES FAULT*)

SMOKE FWD+AFT CARGOS BTL 1(2) FAULT (*Refer to procedure*)

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CREW REST COMPARTMENTS

Applicable to: ALL

Each crew rest compartment (Flight Crew/Cabin Crew) has as a Smoke Detection Function (SDF). The Smoke Detection Function (SDF) monitors and compares the information received from the detectors in each compartment. The SDF provides information to the ECAM to generate applicable fire warnings, or detector fault cautions.

If smoke is detected in the lower cabin crew rest compartment:
- Aural and visual warnings trigger
- Ventilation shut-off valves close.

LOWER CABIN CREW REST COMPARTMENT FIRE EXTINGUISHING

There are two fire extinguisher bottles that can discharge extinguisher agent in the lower deck cabin crew rest compartment.
Refer to CCOM/14-20 Lower Deck Crew Rest Compartment Smoke/Fire Procedure

ECAM ALERTS

Applicable to: ALL

SMOKE AFT LWR CAB REST SMOKE (*Refer to procedure*)

SMOKE FLT REST SMOKE (*Refer to procedure*)

SMOKE AFT LWR CAB REST BTL 1(2) FAULT (*Refer to procedure*)

SMOKE AFT LWR CAB REST SMK DET FAULT (*Refer to procedure*)

SMOKE FLT REST DET FAULT (*Refer to procedure*)

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LAVATORY SMOKE DETECTION

Applicable to: ALL

GENERAL

Each lavatory has a Smoke Detection Function (SDF).

L2 There is one smoke detector next to the air extraction vent, that is in the ceiling of each lavatory.

L1 If the SDF detects smoke in any upper or lower lavatory, the SMOKE MAIN (UPPER) LAVATORY SMOKE warning triggers, and the Flight Attendant Panel (FAP) displays an associated cabin smoke alert.

WASTEBIN FIRE EXTINGUISHING

The wastebin in each lavatory has a built-in, automatic, fire extinguishing system.

ECAM ALERTS

Applicable to: ALL

SMOKE MAIN (UPPER) DECK LAVATORY SMOKE (*Refer to procedure*)

SMOKE MAIN (UPPER) DECK LAVATORY DET FAULT (*Refer to Procedure*)

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CWS SMOKE DETECTION

Applicable to: ALL

The Cabin Work Station (CWS) has a Smoke Detection Function (SDF).
If the SDF detects smoke in the CWS, the SMOKE MAIN(UPPER) XX CWS SMOKE warning triggers, and the Flight Attendant Panel (FAP) displays an associated cabin smoke alert.

ECAM ALERTS

Applicable to: ALL

SMOKE MAIN(UPPER) XX CWS DET FAULT (*Refer to procedure*)

SMOKE MAIN(UPPER) XX CWS SMOKE (*Refer to procedure*)

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DRESSING ROOM SMOKE DETECTION

Applicable to: ALL

The dressing room has a Smoke Detection Function (SDF).
If the SDF detects smoke in the dressing room, the SMOKE MAIN 1R DRESSING ROOM SMOKE warning triggers, and the Flight Attendant Panel (FAP) displays an associated cabin smoke alert.

ECAM ALERTS

Applicable to: ALL

SMOKE MAIN 1R DRESSING ROOM DET FAULT (*Refer to Procedure*)

SMOKE MAIN 1R DRESSING ROOM SMOKE (*Refer to Procedure*)

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ELECTRICAL BUS EQUIPMENT LIST

Applicable to: ALL

System	Subsystem	Electrical Supply
ENG Fire Detection	Loop A	DC ESS
	Loop B	DC 2
APU Fire Detection	Loop A	DC ESS
	Loop B	DC 2
MLGB Fire Detection	Loop A	DC ESS
	Loop B	DC 2

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AIRCRAFT SYSTEMS

27 - FLIGHT CONTROLS

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OVERVIEW

Applicable to: ALL

The flight control system is a fly-by-wire system.

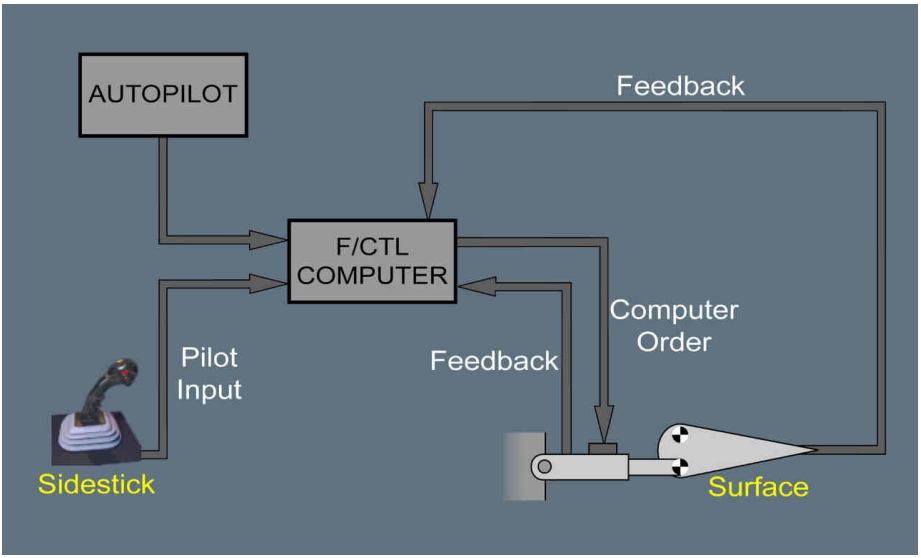
All the flight control surfaces are:
- Electrically controlled,
- Hydraulically actuated.

L2 The surfaces are actuated by one of the two hydraulic systems, or by an independent hydraulic source (EHA/EBHA).

Note: *The slats and the THS also have an electrical motor.*

L1 The flight crew uses sidesticks and rudder pedals to fly the aircraft. The flight control computers interpret the pilot's inputs, and order flight control surface movement, as necessary.
Additionally, a pitch trim switch and a rudder trim selector (with a rudder trim reset p/b) allow to trim the airplane when needed.

Basic principle

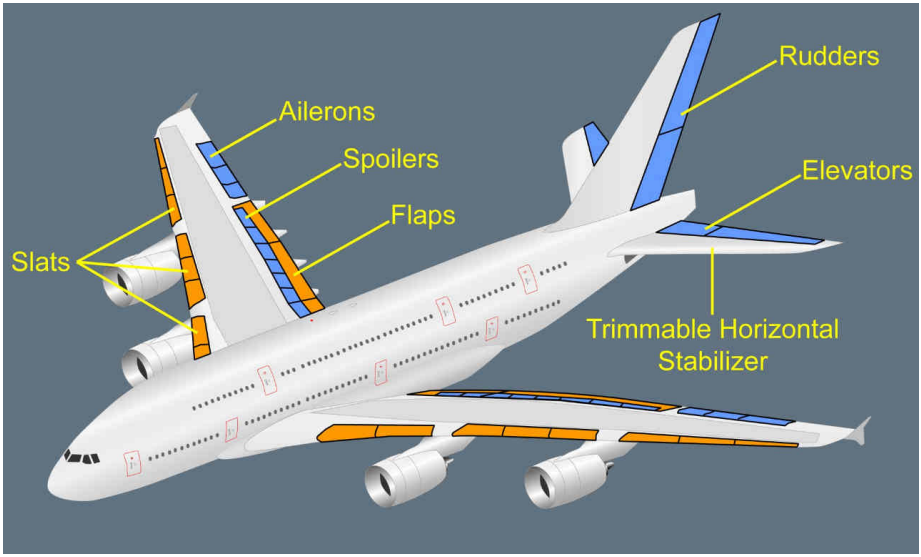


In normal law, regardless of the pilot's input, the computers will prevent excessive maneuvers and any exceedance of the safe envelope in pitch and roll.

CONTROL SURFACES

Applicable to: ALL

Control surfaces



Pitch control is provided by:
- Four elevators
- The Trimmable Horizontal Stabilizer (THS).

Roll control is provided by:
- 6 ailerons
- 12 spoilers.

Yaw control is provided by:
- Two rudders.

The speed brake and ground spoiler functions are provided by:
- 16 spoilers.

Lift augmentation is provided by:
- 16 slats
- 6 flaps.

For more information : *Refer to slats/flaps system description* .

FLIGHT CONTROL COMPUTERS

Applicable to: ALL

Six flight control computers process pilot and autopilot inputs according to normal, alternate or direct flight control laws. These computers are:

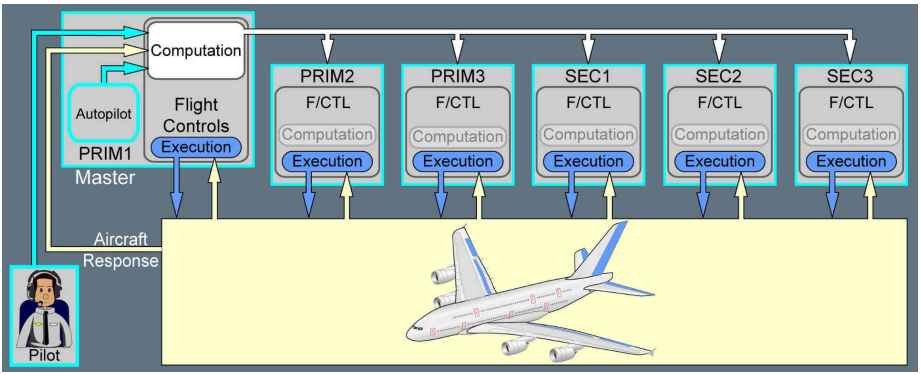
- 3 PRIMs
- 3 SECs

One computer of any type (PRIM or SEC) is capable of controlling the aircraft and of insuring safe flight and landing.

L2 In normal operation, one PRIM computer is declared to be the master (generally PRIM 1). It processes the orders and sends them to the other computers (PRIMs and SECs) which will then execute them on their associated actuators.

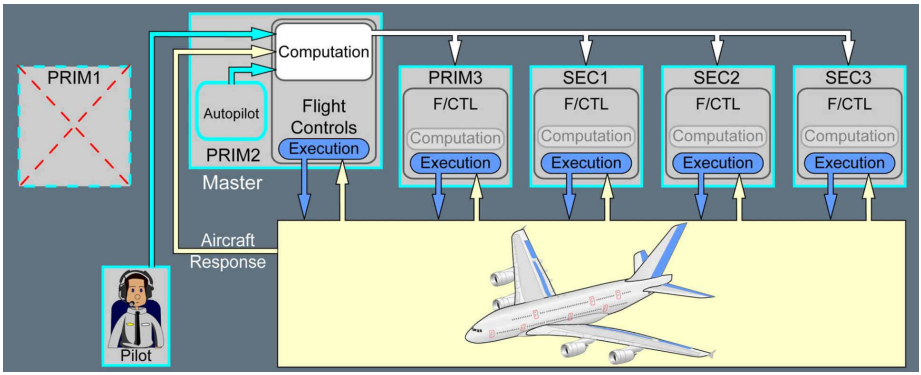
If one computer is unable to execute the orders sent by the master, another computer executes the task of the affected computer.

PRIM 1 Master



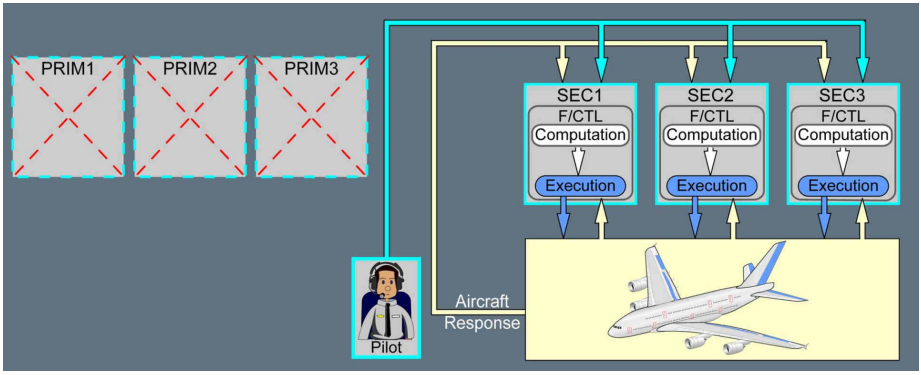
If PRIM 1 is not able to be the master, PRIM 2 (or PRIM 3 if PRIM 2 is not available) becomes the master.

PRIM 2 Master



If all PRIMs are lost, all the operative SECs compute and perform their orders independently. There is no master SEC, and direct law is active.

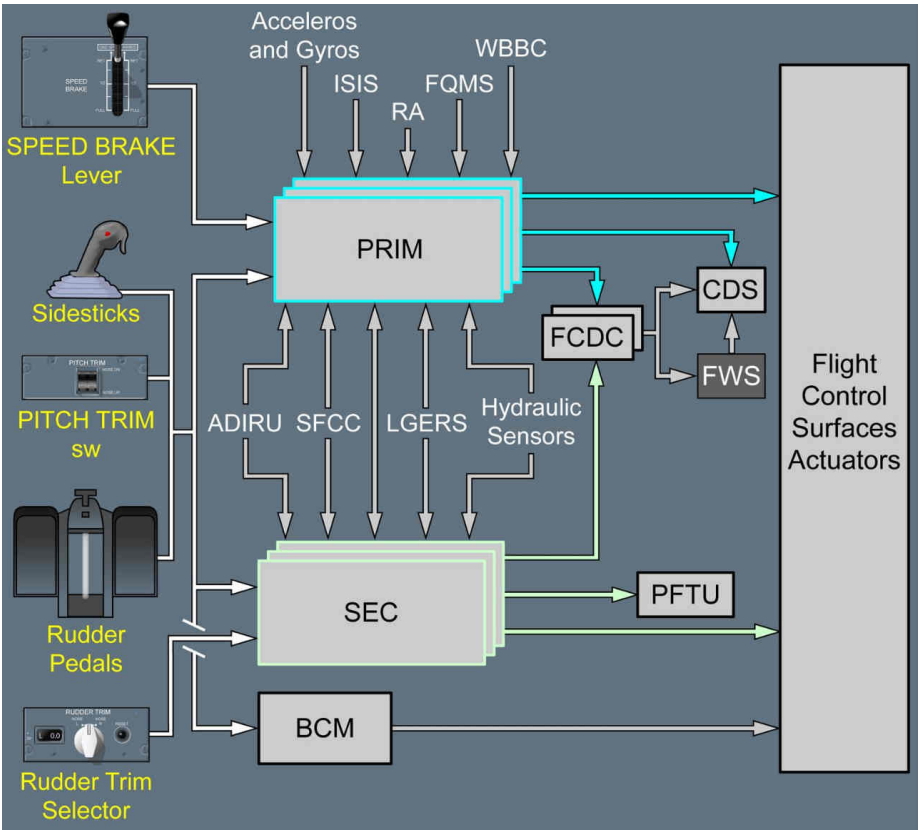
All PRIMs failed



FLIGHT CONTROL SYSTEM ARCHITECTURE

Applicable to: ALL

System Architecure



PRIM

The three PRIM s:

- Compute Normal, Alternate, and Direct control laws
- Control surfaces (ailerons, spoilers, elevators, THS and rudders)
- Compute the Load Alleviation Function (LAF) law

- Host the autopilot, flight director and autothrust functions. For more information : *Refer to AFS Architecture*
- Host the flight envelope protection functions
- Compute the characteristic speeds
- Host the inhibition function of the thrust reversers (Third line of defense). For more information: *Refer to Thrust Reverse System description* .

L3 Each PRIM is composed of two Flight Control and Guidance Units (FCGU).

L2 The PRIM s receive information from the following aircraft systems.

ADIRU

Each PRIM receives data from the three Air Data and Inertial Reference Units (ADIRU s).

L3 Each ADIRU has two parts:
- The Air Data Reference (ADR)
- The Inertial Reference (IR)

When the three IR (ADR) are valid, the used parameter is the median value.
When two IR (ADR) are valid, the used parameter is the average of both outputs.
When only one IRS is valid, its data is not used. When only one ADR is valid, its parameters are used, if monitored by the ISIS .

ISIS

There are two Integrated Standby Instrument Systems (ISIS), which use probes which are independent from the ADIRU s.
The data from the ISIS is used to monitor the ADR s. For more information: *Refer to ADR monitoring* .
The data from the ISIS is not used by the PRIM s for the computation of the flight control laws.

L2 **RA**

Each PRIM receives data from the three Radio Altimeters (RA).
L3 Each PRIM is connected to two RA s and receives data from the third RA via the other PRIM s.
When the three RA s are valid, the used parameter is the median value.
When two RA s are valid, the used parameter is the average of both outputs.
When only one RA is valid, its value is used.

L2 **FQMS**

The Fuel Quantity and Monitoring System (FQMS) provides the weight and centre of gravity data to the PRIM s.
L3 FQMS 1 sends the weight and CG information to the PRIM s. FQMS 2 takes over if FQMS 1 fails.

L2 **WBBC**

The Weight and Balance Backup Computer (WBBC) provides backup weight and CG data to the PRIM s.

L3 The data from the WBBC is used for flight control law and characteristic speeds computation in case of a dual FQMS failure, and to detect major discrepancy between the FQMS and the WBBC .

L2 For more information on the WBBC : *Refer to Fuel System Architecture* .

LGERS / BCS

The Landing Gear Extension Retraction System (LGERS) provides:
- Compressed/not compressed landing gear information
- Extended/retracted landing gear information
- L/G lever position.

The Braking Control System (BCS) provides:
- Wheel speed information
- Brake pedals position.

SFCC

The slats and flaps control units provide the slats and flaps position, and FLAPS lever position.

L3 Any slats or flaps control unit can provide the position of all the slats and flaps.

ACCELEROMETERS AND GYROMETERS

Accelerometers and gyrometers provide information for the computation of the flight control laws:
- 4 accelerometers in the center fuselage provide vertical acceleration information for the computation of the normal pitch law.
- 3 accelerometers in each outboard pylons provide vertical acceleration information for the computation of the LAF law.
- 4 accelerometers in the center fuselage provide lateral acceleration information for the lateral control law.
- 6 gyrometers in the center fuselage provide roll rate, yaw rate, and pitch rate information for the computation of the flight control laws.

HYDRAULIC SENSORS

The hydraulic sensors provide the status of the hydraulic systems and engine driven pumps. This enables flight control reconfiguration in case of hydraulic low pressure, or if only one pump remains available for one system.

SEC

The three SECs:
- Compute the Direct control law
- Control surfaces (ailerons, spoilers, elevators, THS and rudders)
- Control the rudder trim (SEC 1 and SEC 3 only).

L2 The SEC receive the same information as the PRIM from the following systems:
- ADIRU

L3 Each SEC receives data from two ADIRUs:
- SEC 1 receives data from ADIRUs 1 & 2
- SEC 2 receives data from ADIRUs 2 & 3
- SEC 3 receives data from ADIRUs 1 & 3.

L2
- SFCC
- LGERS
- Hydraulic sensors.

L3 The direct law, hosted by the SECs, is more simple than the normal and alternate laws, and requires less parameters. Therefore, the SECs are less affected by other aircraft system failures.

FLIGHT CONTROL DATA CONCENTRATOR (FCDC)

The two FCDCs acquire data from the PRIMs and SECs for:
- The F/CTL system display
- The Flight Warning System
L3 - The on-board maintenance system
- The flight data recorders.

The FCDCs are hosted in the CPIOM-C.

BACKUP CONTROL MODULE (BCM)

In the event of the temporary loss of all flight computers (PRIM s and SEC s), the Backup Control Module (BCM) provides aircraft control and stability. For more information : *Refer to DSC-27-10-40 Backup Control* .

PEDAL FEEL AND TRIM UNIT (PFTU)

The PFTU has two motors (one controlled by SEC 1, the other controlled by SEC 3) to move the zero-force position of the rudder pedals:

- For rudder trim, in manual flight
- To reflect autopilot rudder trim orders, when the autopilot is engaged.

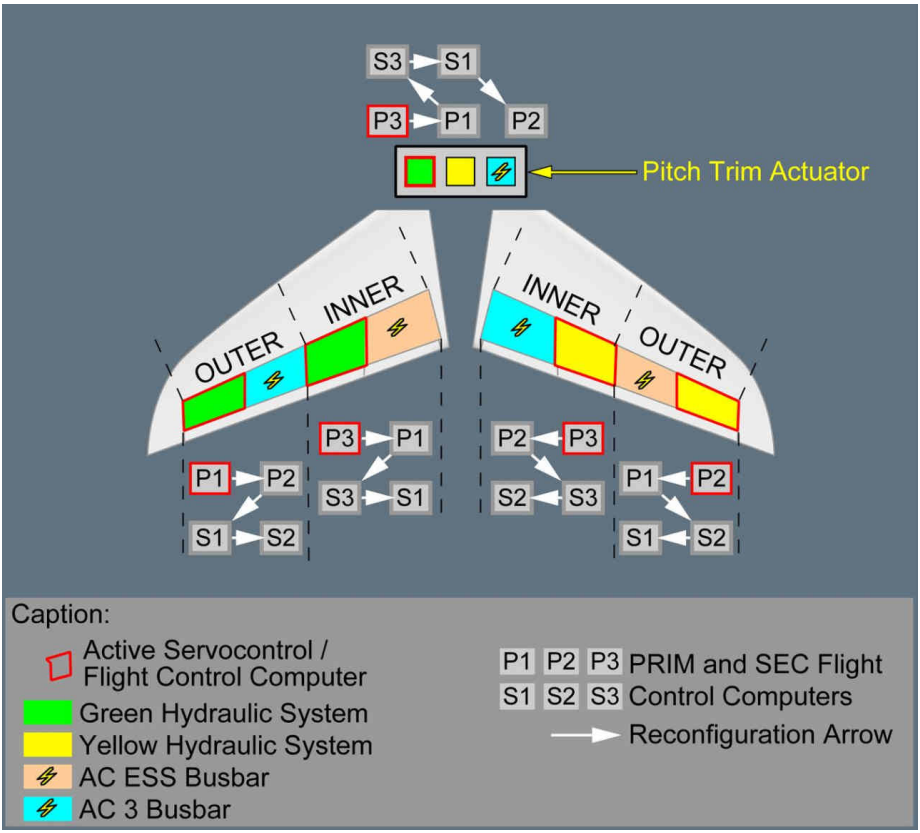
L3 The autopilot rudder trim orders are sent from the PRIM to the PFTU, via the SEC.

PITCH CONTROL

Applicable to: ALL

Four elevators and the trimmable horizontal stabilizer allow to control the aircraft in pitch.

Pitch Control



L2 *Note: In the event of an all engine flameout, all EHA s are powered via the AC ESS busbar.*

L1 **ELEVATORS**

L3 The maximum elevator deflection is 20 ° down and 30 ° up.

L1 Each elevator has two electrically-controlled actuators (conventional or EHA):
- One actuator is active (it commands the position of the surface)
- The other actuator is in damping mode (it follows the movement of the surface).

L3 Both actuators can be simultaneously active, when a high surface deflection rate or a high force to deflect the surface is required.

L1 **ELECTRICAL CONTROL**

Only one flight control computer per elevator is active. The others are in stand-by.

L2 When all systems are operative:
- PRIM 1 controls the outboard left-hand elevator
- PRIM 2 controls the outboard right-hand elevator
- PRIM 3 controls both inboard elevators.

L1 If a PRIM or a hydraulic system fails, another flight control computer and power source will take over, to ensure maximum elevator availability.

L2 For example: for the outboard left-hand elevator, if PRIM 1 or the green hydraulic system fails, PRIM 2 and the AC 3 busbar will takeover.

L1 The inboard elevators remain available in backup control (*Refer to DSC-27-10-40 Backup Control*).

TRIMMABLE HORIZONTAL STABILIZER (THS)

L3 The maximum THS deflection is 2 ° nose down and 10 ° nose up.

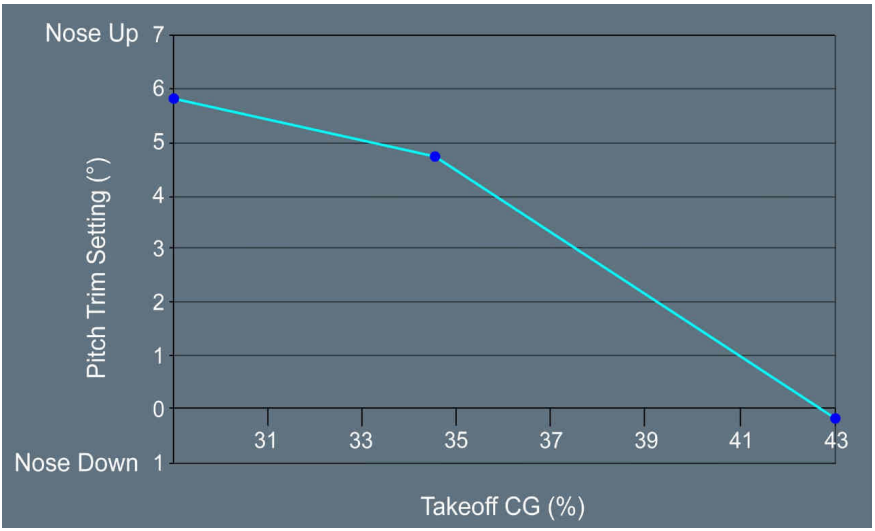
L1 The THS has two hydraulic motors and one electric motor.
Only one motor is active.
On ground, or in direct law, the THS is directly controlled via the pitch trim switch.
In flight, in normal and alternate law, the THS is controlled by the flight control computers.

AUTOMATIC PITCH TRIM SETTING

The pitch trim is automatically set for takeoff:
- When the first engine is started and a hydraulic system becomes pressurized, or
- When the flight crew arms the ground spoilers.

The pitch trim setting for takeoff is function of the takeoff CG .

Green Band



The takeoff CG used for the pitch trim setting is provided by the FQMS , based on the ZFCG entered by the flight crew in the FMS Fuel & Load page, and on the fuel distribution. It is displayed in the permanent data of the system display.

L2 *Note: In the TAKEOFF panel of the FMS PERF page, the flight crew enters the THS position for takeoff, based on the takeoff CG of the loadsheet. This input is not used for automatic pitch trim setting. It is used to trigger the F/CTL PITCH TRIM/FMS/CG DISAGREE caution, if necessary (For more information: Refer to PRO-ABN-ECAM-10-27-10-65 F/CTL PITCH TRIM/FMS/CG DISAGREE).*

During a touch and go, the pitch trim will automatically move to the takeoff position, based on the aircraft CG .

L3 The pitch trim will move when:

- Main landing gears are compressed for at least one second
- Aircraft speed is greater than 80 kt
- One of the following action is performed:
  - Slats/flaps are moved
  - Ground spoilers are disarmed
  - At least three thrust levers are not at idle.

L2 *Note: After landing, the pitch trim will move to 0° (maintenance position) when the speed goes below 30 kt .*

L1 **ELECTRICAL CONTROL**

Only one flight control computer is active. The others are in stand-by.

L2 When all systems are operative:
- PRIM 3 controls the pitch trim.

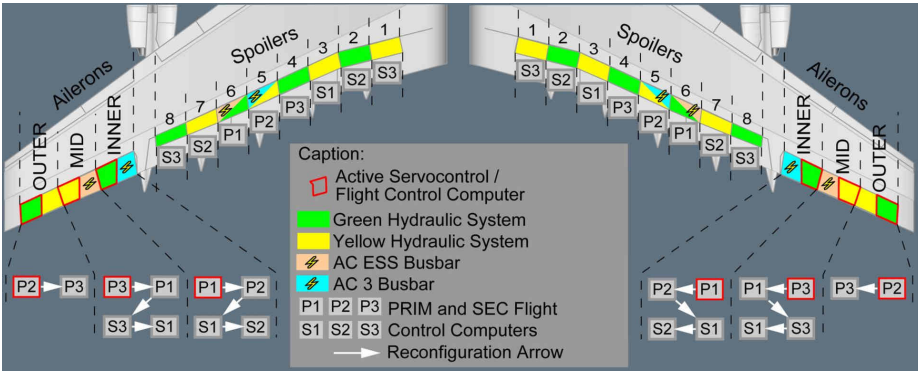
L1 If a PRIM or a hydraulic system fails, another flight control computer and power source will take over, to ensure maximum THS availability.
The THS remains available in backup control (*Refer to DSC-27-10-40 Backup Control*).

ROLL CONTROL

Applicable to: ALL

Three ailerons and the 6 outer spoilers on each wing allow to control the aircraft in roll.

Roll Control



L2 *Note: In the event of an all engine flameout, all EHA s/ EBHA s are powered via the AC ESS busbar.*

L1 **AILERONS**

L2 The outer ailerons:
- Are not deflected down above 240 kt .
- Are not deflected up above 300 kt (except for the Load Alleviation Function).

L3 The maximum aileron deflection is 20 ° down and 30 ° up.

L1 Each aileron has two electrically-controlled actuators (conventional or EHA):
- One actuator is active (it commands the position of the surface)
- The other actuator is in damping mode (it follows the movement of the surface).

ELECTRICAL CONTROL

Only one flight control computer per aileron is active. The others are in stand-by.

L2 When all systems are operative:
- PRIM 1 controls the inboard ailerons
- PRIM 2 controls the outboard ailerons
- PRIM 3 controls the mid ailerons.

L1 If a PRIM or a hydraulic system fails, another flight control computer and power source will take over, to ensure maximum aileron availability.

L2 For example: for the outboard ailerons, if PRIM 2 or the green hydraulic system fails, PRIM 3 and the yellow hydraulic system will takeover.

L1 The inboard ailerons remain available in backup control (*Refer to DSC-27-10-40 Backup Control*).

SPOILERS

L3 The maximum spoiler deflection for roll control is 45 ° .

L1 Each spoiler has one electrically-controlled actuator (conventional or EBHA), and one flight control computer.

L2 If the yellow (green) hydraulic system is available, the actuator of spoiler 5(6) operates as a conventional actuator. If the yellow(green) hydraulic system fails, the actuator of spoiler 5(6) operates as an EHA , powered by the AC 3 (AC ESS) busbar.

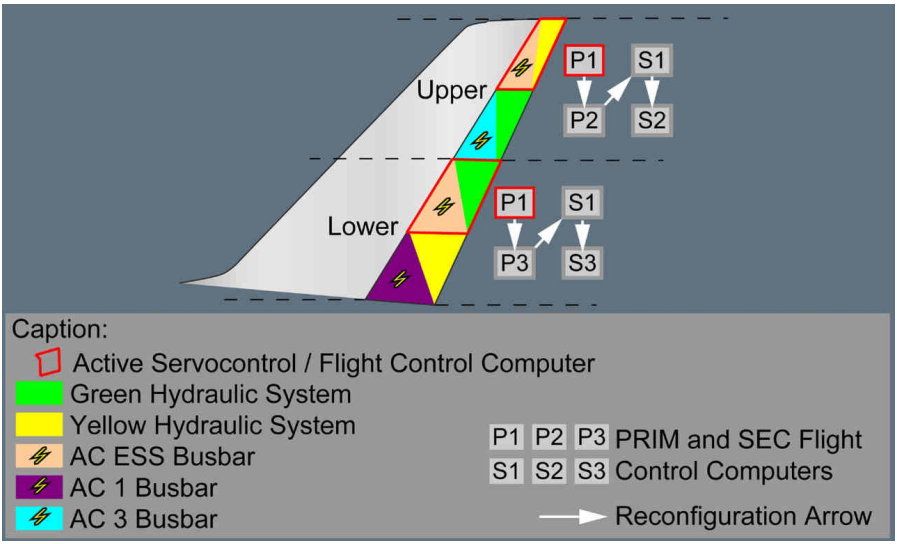
YAW CONTROL

Applicable to: ALL

RUDDER

Two rudders allow to control the aircraft in yaw.

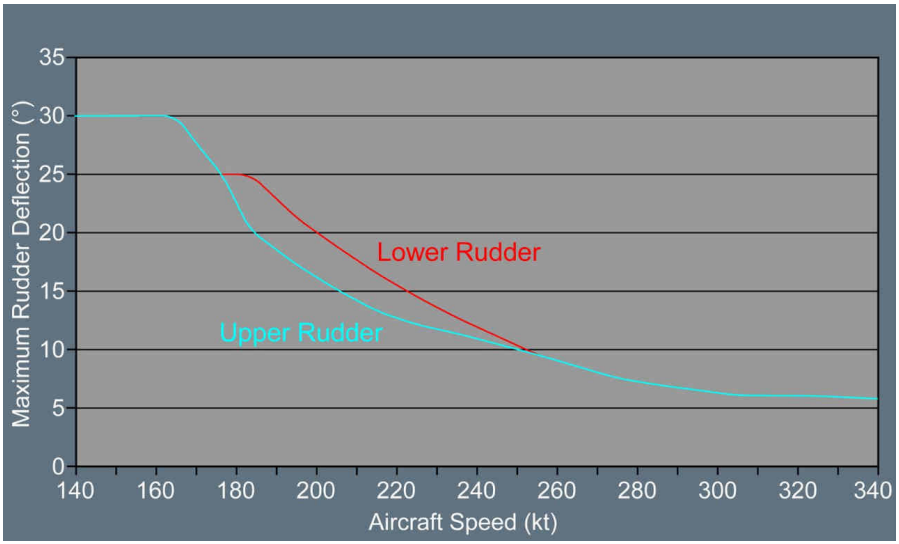
Yaw Control



L2 *Note: In the event of an all engine flameout, the EBHA that is normally powered via the AC 3 busbar is powered via the AC ESS busbar.*

L1 Maximum rudder deflection is limited as a function of the aircraft speed.

Maximum Rudder Deflection



L3 In the case the three ADR s are failed, the maximum rudder deflection is a function of the slats/flaps position. Maximum rudder deflection is available when in CONF FULL.

L2 Rudder pedal deflection is not limited. Above 165 kt , maximum rudder deflection may be achieved before reaching maximum rudder pedal deflection.

L1 Each rudder has two electrically-controlled actuators (EBHA):
- One actuator is active (it commands the position of the surface)
- The other actuator is in damping mode (it follows the movement of the surface).

Both actuators of a rudder simultaneously control the surface during takeoff, approach, and landing, or when a high rudder deflection rate is required.

ELECTRICAL CONTROL

Only one flight control computer per rudder is active. The others are in stand-by.

L2 When all systems are operative, PRIM 1 controls both rudders.

L1 If a PRIM or a hydraulic system fails, another flight control computer and power source will take over, to ensure maximum rudder availability.

L2 For example:
- If PRIM 1 fails, PRIM 2 will takeover on the upper rudder, and PRIM 3 will takeover on the lower rudder
- If the yellow hydraulic system fails, PRIM 2 and the green hydraulic system will takeover on the upper rudder only.

The actuators of the rudders are EBHA s. They operate as conventional actuators, as long as hydraulic power is available (i.e. if the green hydraulic system fails, the lower rudder will be controlled by the lower actuator, powered by the yellow hydraulic system, rather than using the upper actuator as an EHA .)

L1 Both rudders remain available in backup control (*Refer to DSC-27-10-40 Backup Control*).

RUDDER TRIM

Rudder trim is achieved via the Pedal Feel and Trim Unit (PFTU).

The PFTU has two electric motors (one controlled by SEC 1, the other controlled by SEC 3) to move the zero-force position of the rudder pedals:
- For rudder trim in manual flight
  Rudder trim is applied via the RUDDER TRIM selector on the pedestal.
- To reflect autopilot rudder trim orders, when the autopilot is engaged.

L3 The autopilot orders are sent from the PRIMs, via the SECs.

L2 The authority of the rudder trim is 85% of the maximum rudder deflection.

SPEEDBRAKES AND GROUND SPOILER CONTROL

Applicable to: ALL

SPEED BRAKE CONTROL

All the spoilers can be used as speed brakes.

L2 When a speed brake fails on one side, the symmetric one on the other wing is inhibited (except for spoilers 5 and 6).

Spoilers 3 to 8 are also used for roll control. The roll control function has priority over the speed brake function. When the sum of a roll order and a simultaneous speed brake order on one surface is greater than the maximum deflection available in flight, the symmetrical surface is retracted until the difference between the two surfaces is equal to the roll order.

The spoilers extend 5 ° up on ground, when the flaps are fully retracted or moving, and at least one engine is running. This prevents friction between the spoilers and the flaps, which could damage the spoilers.

L1 EXTENSION

The flight crew controls the speed brakes with the SPEED BRAKE lever.

L3 The maximum deflection for spoilers 1 to 5 is 20 °.
The maximum deflection for spoilers 6 to 8 is 45 °.

L2 The speed brake deflection is a function of

- The SPEED BRAKE lever position

L3 When the SPEED BRAKE lever is at the 1/2 position, the speed brakes are 3/4 extended.

L2 - The slats/flaps configuration

L3 Speed brake deflection is reduced in CONF 1+F, 2, 3, and FULL.

Speed brake n°	1–2	3–5	6–8
CONF 0 and 1	20 °	20 °	45 °
CONF 1+F	12 °	17 °	21 °
CONF 2	9 °	9 °	17 °
CONF 3	8 °	3 °	10 °
CONF FULL	6 °	0 °	10 °

Maximum Speed Brake Deflection

L2 - The load factor

L3 Maximum deflection is reduced below 0.3 g, and above 1.7 g.

L2 - Weight and altitude, in case of turbulence.

L3 Maximum deflection is reduced below 30 000 ft, when the gross weight is above 1 036 173 lb, to limit loads on the horizontal stabilizer due to the pitch compensation.

L1 AUTOMATIC RETRACTION

If extended, the speedbrakes automatically retract if:

- Alpha protection is activated, or
- Low speed stability is active, or
- A go-around is initiated.

Once retracted, the speedbrakes remain retracted, even if the conditions have disappeared. To extend the speed brakes again, the SPEED BRAKE lever must first be set to the retracted position for at least 5 s .

GROUND SPOILER CONTROL

All the spoilers and ailerons are also used as ground spoilers.

L2 When a spoiler fails on one side, the symmetric one on the other wing is inhibited (except for spoilers 5 and 6).

L1 The ground spoilers are used for lift dumping at landing, and for braking after landing and in the case of a rejected takeoff.

ARMING

The flight crew arms the ground spoilers by pulling the SPEED BRAKE lever into the armed position.

Note: The ground spoilers are automatically armed if the speed brakes are extended and the radio height is lower than 6 ft.

EXTENSION

Landing

After retard, when at least one landing gear is on ground, the ground spoilers partially extend. This partial extension, by decreasing the lift (lift dumping), will ease the touchdown of the aircraft, and will, consequently, lead to the full extension of the ground spoilers.

L3 During a partial extension:
- The deflection of spoilers 1 and 2 is 10 °
- The deflection of spoilers 3 to 8 is 15 °
- The ailerons are not deflected.

The extension rate is 5 °/s.

L1 The ground spoilers fully extend when three main landing gears are on ground.

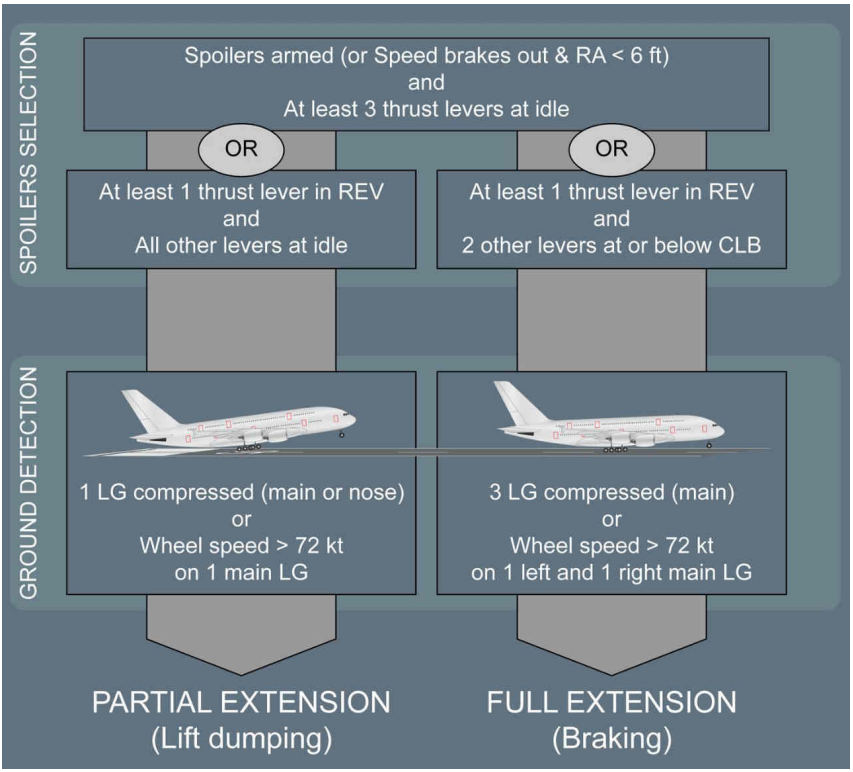
Note: If the ground spoilers are not armed, they will automatically extend when the reversers are selected.

L3 During a full extension:
- The deflection of spoilers 1 and 2 is 35 °
- The deflection of spoilers 3 to 8 is 50 °
- The deflection of the ailerons is 25 ° up.

L2 The roll function of the spoilers is inhibited below 110 kt, when the spoilers are used for the ground spoiler function. Roll control is available through ailerons.

L3 The extension rate is 17 °/s.

Ground Spoiler Logic for Landing



L1 Rejected Takeoff

The ground spoilers fully extend when the thrust levers are at idle and the speed is greater than 72 kt.

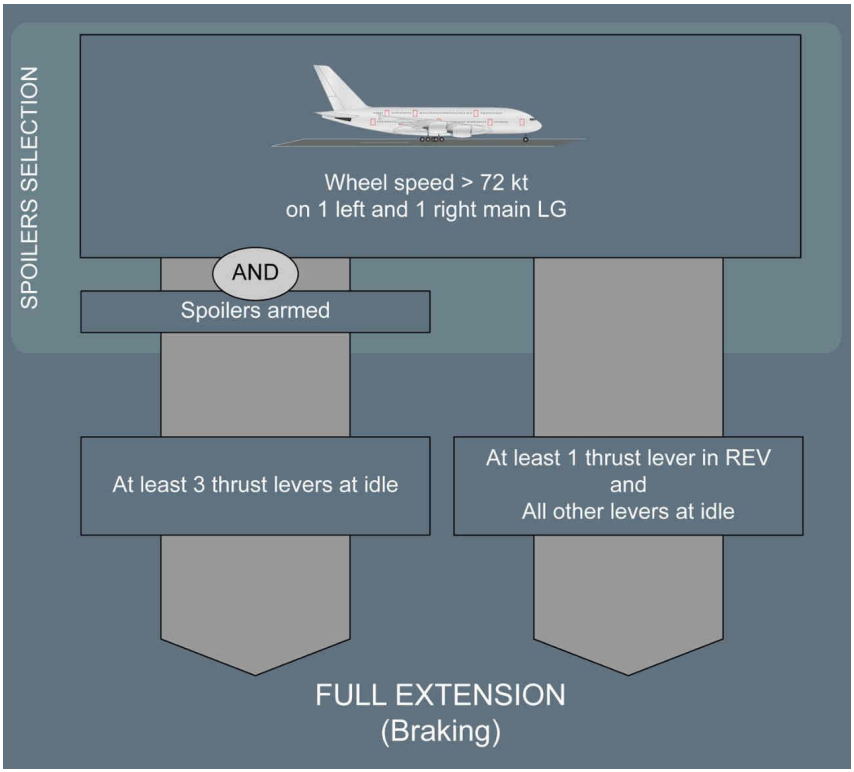
Note: *If the ground spoilers are not armed, they will automatically extend when the reversers are selected and the speed is greater than 72 kt.*

L3 During a full extension:

- The deflection of spoilers 1 and 2 is 35 °
- The deflection of spoilers 3 to 8 is 50 °
- The deflection of the ailerons is 25 ° up.

The extension rate is 17 °/s.

Ground Spoiler Logic for RTO



L2 Partial Extension with all PRIMs failed

When all PRIMs are failed, the ground spoilers partially extend, when the two body landing gears are compressed.

L1 **RETRACTION**

The ground spoilers retract when:

- The thrust reversers are stowed and the flight crew disarms the ground spoilers (by pushing down the SPEED BRAKE lever), or
- The flight crew sets at least two thrust levers above the CLB detent.

L3 The retraction rate is 17 °/s.

EHA / EBHA

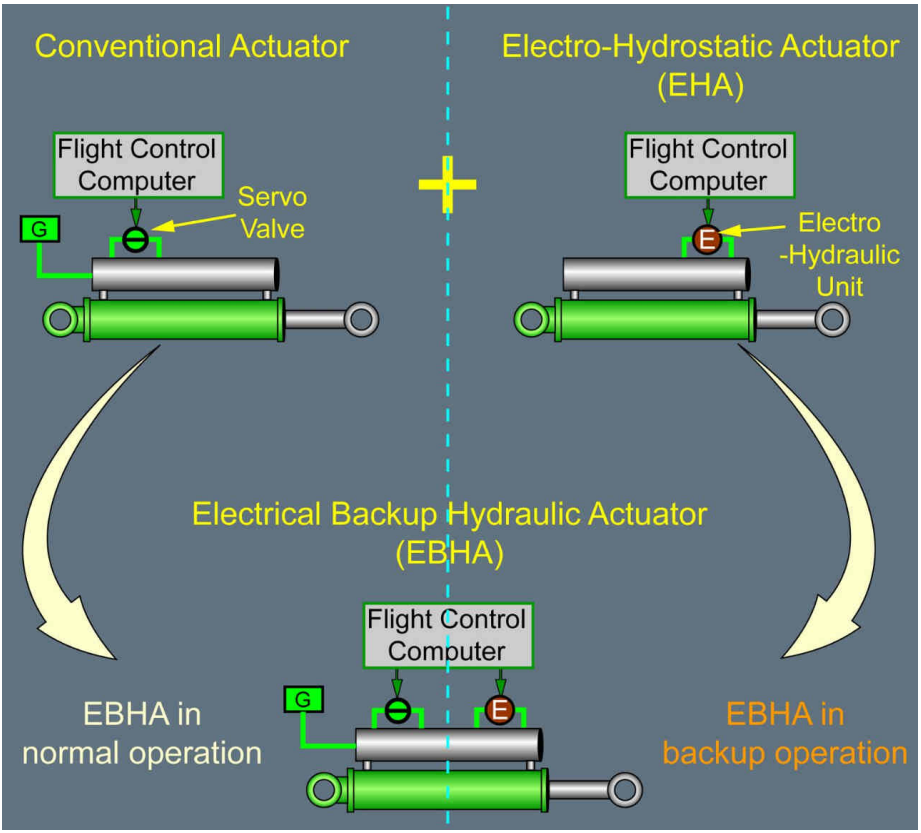
Applicable to: ALL

On most civil aircraft, there are at least three hydraulic systems, to ensure sufficient redundancy for flight controls and landing gear systems.
On the A380, to reduce the aircraft weight and maintenance costs, there are only two hydraulic systems. Equivalent redundancy is achieved with electro-hydraulic actuators.
Electro-hydraulic actuators use electrical power to locally generate their own hydraulic pressure to move a flight control surface. Each electro-hydraulic actuator has its own self-contained hydraulic reservoir.

There are two types of electro-hydraulic actuators:

- Electro-Hydrostatic Actuators (EHA) : Powered by one electric system
- Electrical Backup Hydraulic Actuators (EBHA) : Powered by one electric or one hydraulic system.

EHA / EBHA



ELECTRO-HYDROSTATIC ACTUATOR (EHA)

Except for spoilers, each surface has two actuators. When EHAs are installed, they are the backup of the conventional actuator.

Each EHA has:
- Its own hydraulic reservoir
- An electric hydraulic pump
- A hydraulic actuator.

L2 On ground, when hydraulic power is available, the reservoir of the EHA is automatically refilled, if needed. The hydraulic fluid is taken from the hydraulic systems (green or yellow).

L1 ELECTRICAL BACKUP HYDRAULIC ACTUATOR (EBHA)

The EBHA is a combination of a conventional actuator and of an EHA.
When hydraulic power is available, the EBHA behaves like a conventional actuator.
When hydraulic power is lost, the EBHA behaves as an EHA.

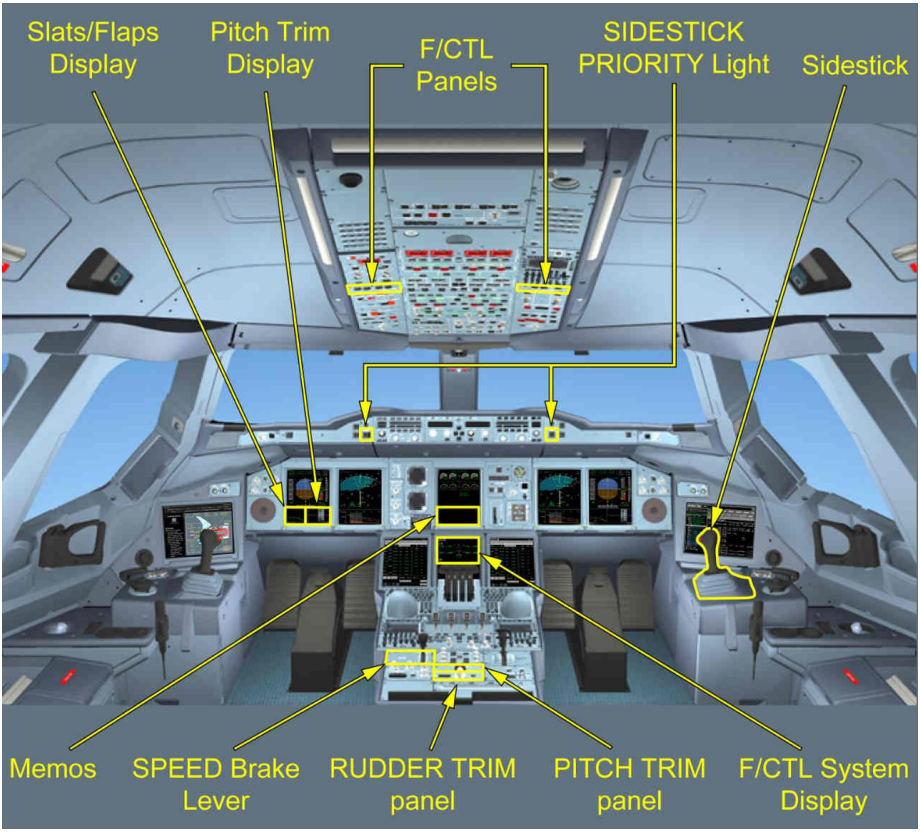
Each EBHA has:
- A servo valve for the hydraulic mode
- An electric hydraulic pump for the electric mode
- Its own hydraulic reservoir for the electric mode
- A hydraulic actuator.

L2 In electric mode, the EBHA is isolated from the hydraulic system. The reservoir is filled when hydraulic power is available.

COCKPIT VIEW

Applicable to: ALL

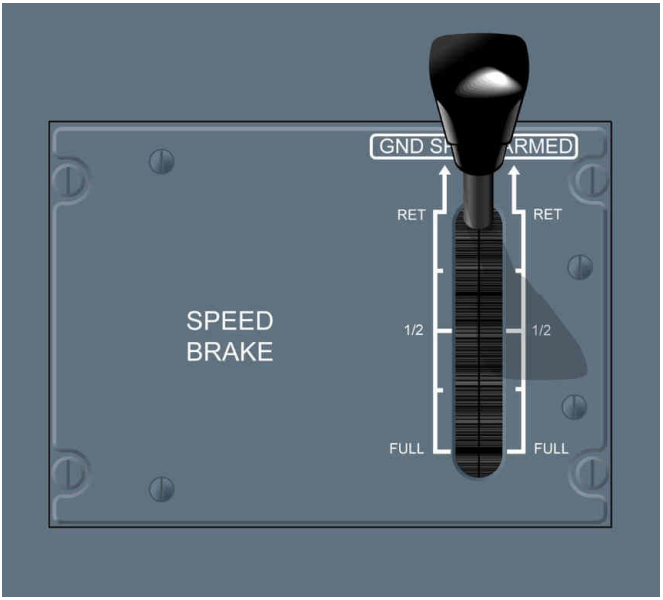
General



SPEED BRAKE lever

Applicable to: ALL

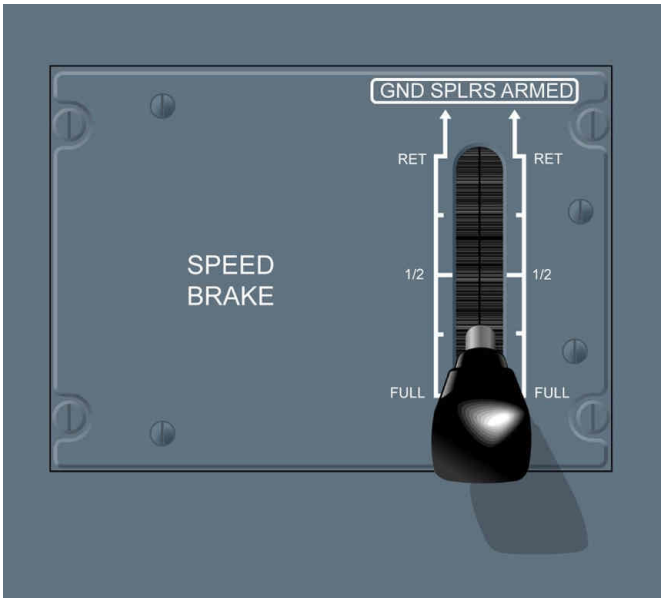
SPEED BRAKE Lever



The Speed Brake lever:

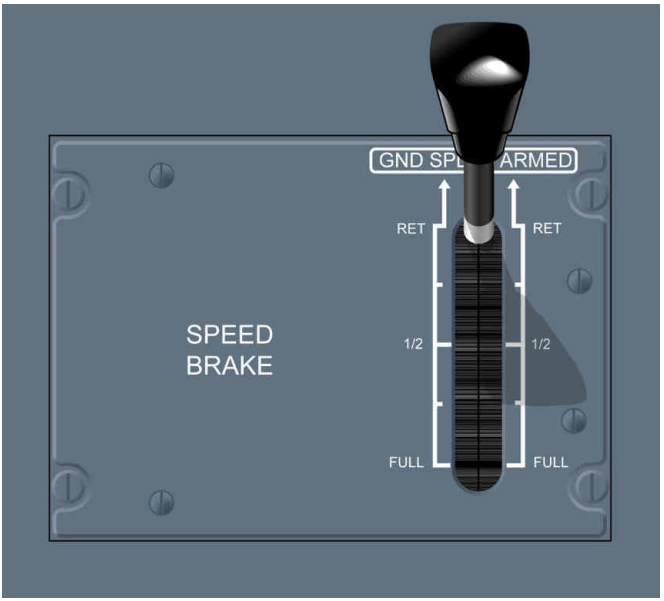
- Controls the speed brakes position
  The flight crew can set any intermediate position from RETracted to FULL.
  The flight crew must push the lever down to set it at the required position.

Speed Brakes 3/4 EXTENDED



- Arms the ground spoilers
  When the lever is in GND SPLRS ARMED position, the spoilers automatically extend at landing or in the case of a rejected takeoff.
  To arm the ground spoilers, the flight crew must pull the lever when it is in the RET position. A white band appears around the base of the speed brake lever, to indicate that the spoilers are armed.

Ground Spoilers Armed



PITCH TRIM sw

Applicable to: ALL

PITCH TRIM sw



Controls the position of the Trimmable Horizontal Stabilizer.

It moves the THS at the following speed:

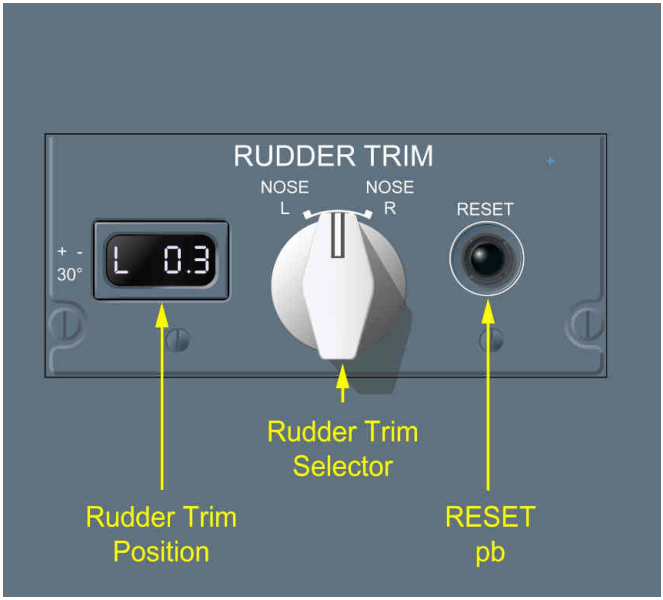
- In clean configuration : 0.15 °/s
- With slats/flaps extended : 0.25 °/s
- When both hydraulic systems are failed (electric motor only) : 0.1 °/s

The PITCH TRIM sw is composed of two switches, which are spring loaded to neutral.
In order to move the pitch trim, both switches must be pressed simultaneously.
On ground, the PITCH TRIM sw has priority over the automatic takeoff trim setting.
The PITCH TRIM sw is inhibited in flight, except in direct law. (The auto trim function is lost in direct law. USE MAN PITCH TRIM is displayed on the PFD.).

RUDDER TRIM PANEL

Applicable to: ALL

RUDDER TRIM Panel



Rudder Trim selector

Controls the rudder trim position.

L2 It moves the neutral point of the artificial feel by an equivalent of:
- In clean configuration : 0.5 °/s of rudder travel for quick inputs
  1.5 °/s for inputs longer than 1.5 s
- With slats/flaps extended : 1.5 °/s of rudder travel for quick inputs
  3 °/s for inputs longer than 1.5 s

L1 *Note: The rudder trim selector is not active with the autopilot engaged.*

RESET pb

Resets the rudder trim position.

L2 When pressed, the rudder trim position is ordered to zero at 3 °/s.

L1 *Note: The reset pb is not active with the autopilot engaged.*

RUDDER TRIM POSITION

Indicates the position of the rudder trim.



The rudder trim is 19.7 ° to the left.

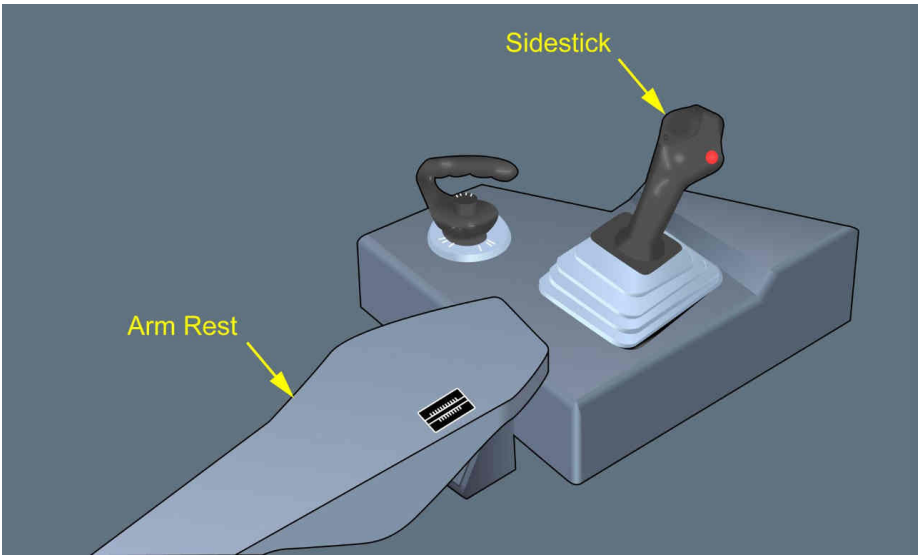


The rudder trim is 6.3 ° to the right.

SIDESTICKS

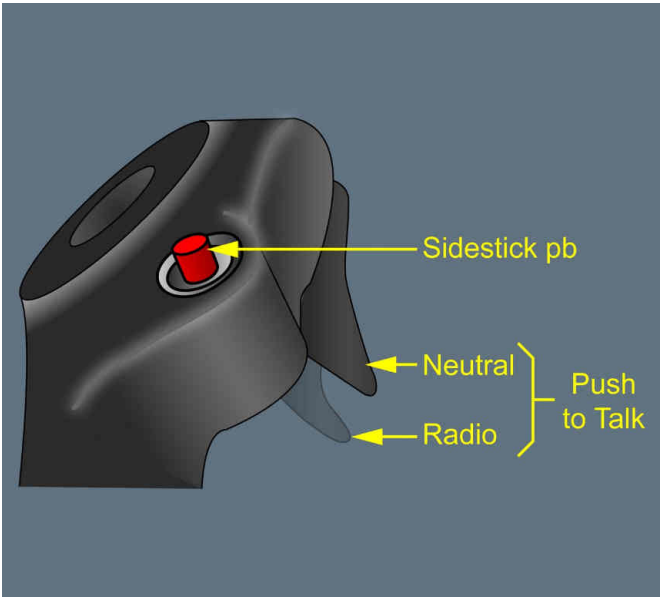
Applicable to: ALL

Lateral Console



SIDESTICKS

Sidestick



The flight crew uses two sidesticks, one on each side, to control pitch and roll.
The sidesticks are springloaded to neutral. They are not mechanically linked, and do not receive feedback from the flight control surfaces.
When the autopilot is engaged, the sidesticks are locked in the neutral position.

If a flight crewmember applies a force above a given threshold:
- The sidesticks unlock
- The autopilot disengages
- The AUTO FLT AP OFF alert triggers.

L3 The autopilot disengages when a pilot applies a force of more than 5 daN in pitch, or 3.5 daN in roll.

L1 *Note:* *This is not the recommended method for autopilot disengagement. For more information, Refer to DSC-22-FG-40-30 Manual Disengagement .*

Each sidestick has two controls:
- The Radio Push To Talk switch
- The sidestick pb , for autopilot disengagement, or sidestick priority.

SIDESTICK PRIORITY LOGIC

At all times, only one flight crewmember should fly the aircraft.
However, if both flight crewmembers use their sidesticks simultaneously, their orders are algebraically added.

L2 The flight control laws limit the combined order to the equivalent of the full deflection of one sidestick.

L1 A flight crewmember can deactivate the other sidestick and take full control, by pressing and keeping pressed the sidestick pb .
If a flight crewmember presses their sidestick pb during 30 s , the other sidestick is permanently deactivated, until any flight crewmember presses their sidestick pb .
If both flight crewmembers press their sidestick pb , the last pilot to press gets the priority.

L2 If one sidestick was deactivated on ground, the CONFIG L(R) SIDESTICK FAULT (BY TAKE-OVER) alert is triggered at takeoff power application, or during the TO CONFIG test.

ARM REST

The armrest on the sidestick side of the Captain and F/O seats are adjustable.
Correctly adjusting the seat eases the handling of the sidestick.
For information on how to adjust the armrest: *Refer to Description of CAPT and F/O seats* .

SIDESTICK PRIORITY light

Applicable to: ALL

SIDESTICK PRIORITY

No dual input



The SIDESTICK PRIORITY lights are on the glareshield.
There is no dual input, and no flight crewmember presses their sidestick pb.

DUAL INPUT

Dual Input



Both flight crewmembers simultaneously move their sidesticks.
The sidestick orders are algebraically added.
The CAPT and F/O lights flash, and the DUAL INPUT callout is triggered.

Dual Input Synthetic voice

PRIORITY LEFT

Priority Left



The Captain presses their sidestick pb. The PRIORITY LEFT callout is triggered.

Priority Left Synthetic voice
The CAPT light comes on, only if the First Officer moves their sidestick.

PRIORITY RIGHT

Priority Right



The First Officer presses their sidestick pb. The PRIORITY RIGHT callout is triggered.

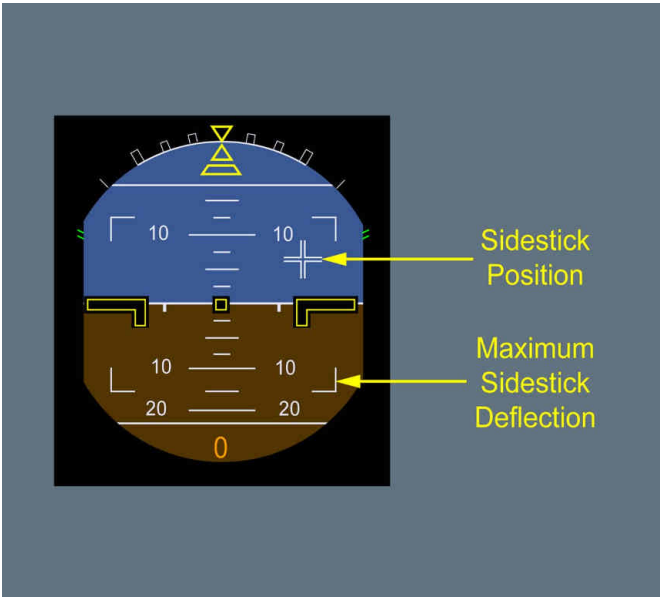
Priority Right Synthetic voice
The F/O light comes on, only if the Captain moves their sidestick.

SIDESTICK INDICATION ON PFD

Applicable to: ALL

SIDESTICK INDICATION ON PFD

Sidestick Position Indication

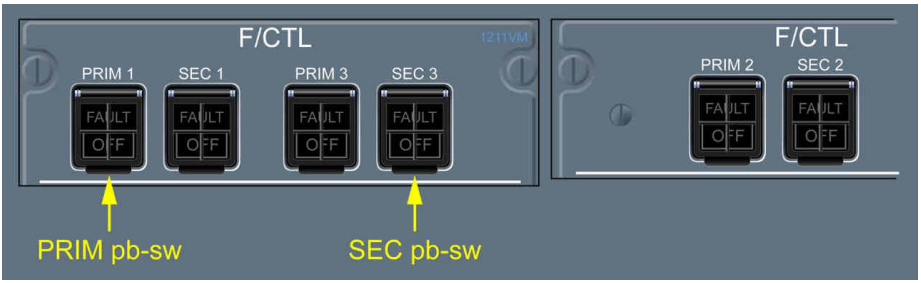


On ground, after the first engine start, the sidestick position indication appears on both PFDs.
It corresponds to the sum of both sidestick orders.
The indication disappears after liftoff.

F/CTL PANELS

Applicable to: ALL

F/CTL Panels



PRIM pb-sw



The corresponding PRIM is on.



The corresponding PRIM is off.
Switching it OFF then on resets it.

L12



The corresponding PRIM is failed.

Associated with the following ECAM alert:
- F/CTL PRIM 1(2)(3) FAULT (*Refer to procedure*).

The FAULT light goes off, when the flight crew selects OFF .
The FAULT light flashes during the PRIM safety test.

SEC pb-sw



The corresponding SEC is on.



The corresponding SEC is OFF.
Switching it OFF then on resets it.

L12



The corresponding SEC is failed.

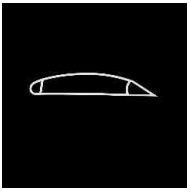
Associated with the following ECAM alert:
- F/CTL SEC 1(2)(3) FAULT (*Refer to procedure*).

The FAULT light goes off, when the flight crew selects OFF .
The FAULT light flashes during the SEC safety test.

SPOILER INDICATION ON THE SLATS/FLAPS DISPLAY

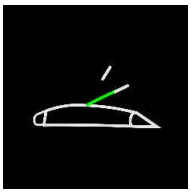
Applicable to: ALL

For slats/flaps position information: *Refer to DSC-27-20-30-273001 Slats/flaps displays*
For landing gear position information: *Refer to DSC-32-20-150 Slat/Flap Display*



The speed brakes are retracted.

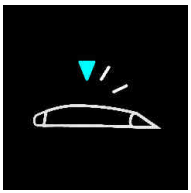
L12



The speed brakes are extended.
The speed brake scale is displayed as soon as the speed brake lever is moved out of the retracted position.

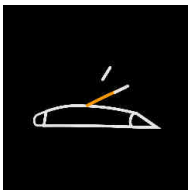
- The first line of the scale corresponds to the half extended position
- The second line of the scale represents the fully extended position in flight.

Note: The displayed position is the position of SPEED BRAKE lever . The actual position of the speed brakes is displayed on the F/CTL system display.



Ground spoilers are armed.
The blue triangle represents the fully extended position of the ground spoilers.

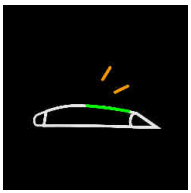
L12



Displayed when one of the following conditions is true:
- In cruise, the speed brakes have been extended for 50 s and at least one engine is not at idle.
- Below 800 ft , the speed brakes have been extended more than 5 s

Associated with the following ECAM alert:
- F/CTL SPD BRKs STILL EXTENDED (*Refer to procedure*)

L12



In cruise, the speed brake position does not correspond to the speed brake lever position.

Associated with the following ECAM alert:
- F/CTL SPD BRKs POSITION/LVR DISAGREE (*Refer to procedure*)

PITCH TRIM DISPLAY

Applicable to: ALL

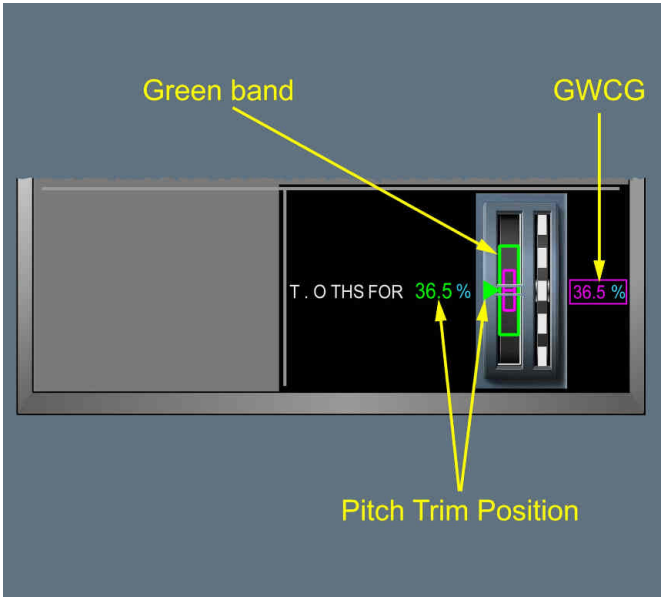
The pitch trim position is displayed on ground, before takeoff and after landing.

L3 - After takeoff, it disappears when the aircraft is 50 ft above the runway
- After landing, it is displayed when the ground speed is below 30 kt .

For touch and go:
- The pitch trim position appears, when:
  - The aircraft is on ground
  - The speed is below 80 kt
  - And, as soon as one of the following occurs:
    - Spoilers are disarmed
    - Flaps are retracted one step
    - The engine levers are moved out of idle
    - The flight crew presses the Pitch Trim switches.
- The pitch trim position disappears, when the aircraft takes off.

L1 *Note:* *The pitch trim position is also available on the F/CTL system display.*

Pitch Trim Display



The following are displayed:

- The Green Band
  The green band is the range of pitch trim positions for which takeoff has been certified, whatever the aircraft's CG inside the takeoff envelope.

L2 The green band ranges from 29 % to 43 %
This corresponds to a pitch trim position from 5.8 ° Nose Up to 0.2 ° Nose Down.

L1 - The aircraft GWCG
The GWCG is displayed before takeoff, and after first engine start.

L3 In addition, one hydraulic system must be pressurized.
The GWCG disappears, when the aircraft is 50 ft above the runway.
For touch and go, the GWCG appears and disappears with the pitch trim position.

L2 The GWCG is computed by the FQMS , based on the ZFW and ZFCG entered by the crew, and the FOB .

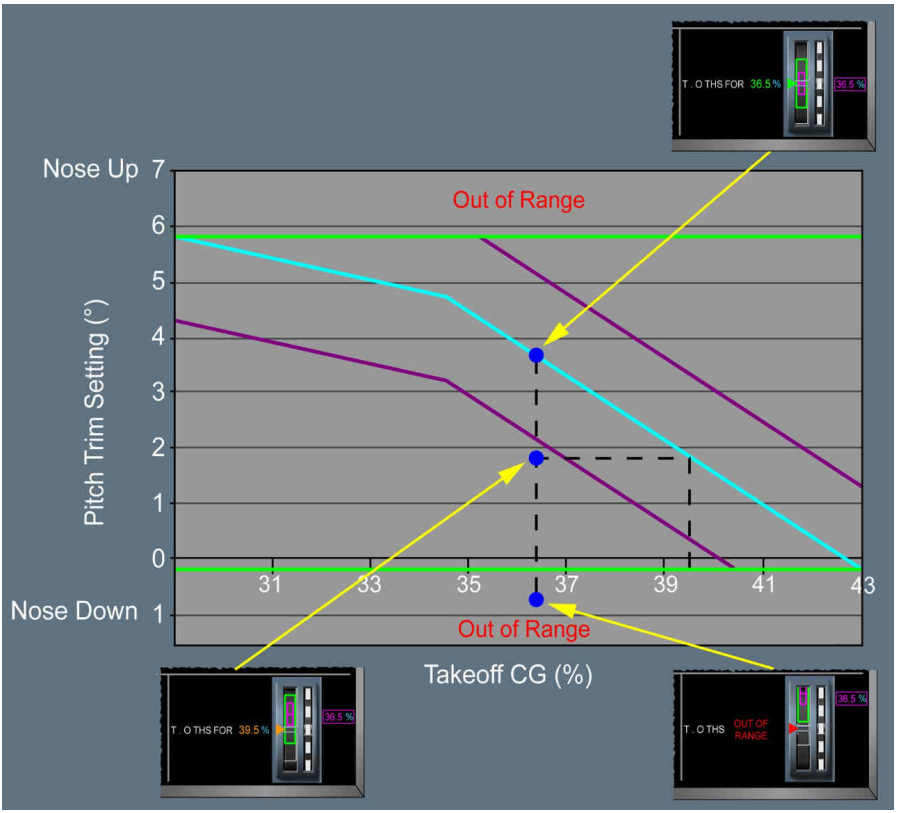
L1 - The position of the pitch trim, and the associated takeoff CG .

L2 In order to always have the same aircraft behavior at rotation, there is an optimum pitch trim setting for each takeoff CG.
This optimum pitch trim setting for takeoff is provided in the following graphic.

L1 **PITCH TRIM SETTING FOR TAKEOFF**

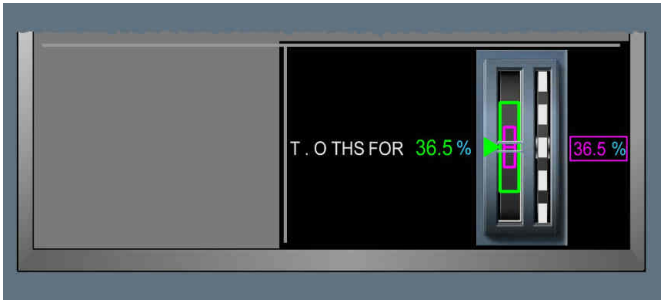
The pitch trim is automatically set for takeoff, based on the aircraft's CG (For more information: *Refer to Automatic Pitch Trim Setting*). The pitch trim display enables to check the correct setting of the pitch trim, prior to takeoff.

Pitch Trim setting for takeoff



PITCH TRIM SETTING AT TAKEOFF TARGET

Pitch Trim Position Indication

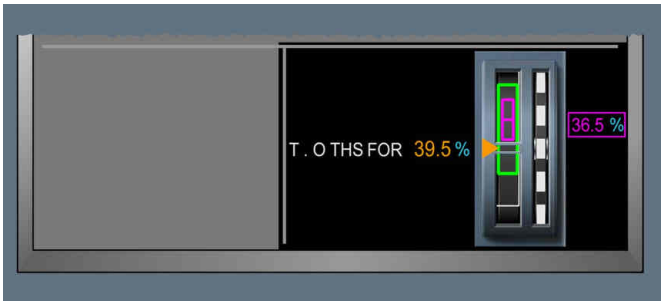


The pitch trim setting for takeoff is correct.

L2 The position of the pitch trim is within 1.5 ° of the optimum pitch trim position for takeoff for the current aircraft GWCG .

L1 **PITCH TRIM NOT AT TARGET**

Pitch Trim Not at Target



The position of the pitch trim is within the green band, but is not correct for takeoff.

L2 The position of the pitch trim is more than 1.5 ° away from the optimum pitch trim position for takeoff for the current GWCG .

In this example, the takeoff CG is 36.5%. The associated optimum pitch trim setting is 3.6 ° nose up, but the pitch trim is set at 1.8 ° nose up (i.e. beyond the 1.5 ° margin around the optimum pitch trim setting).

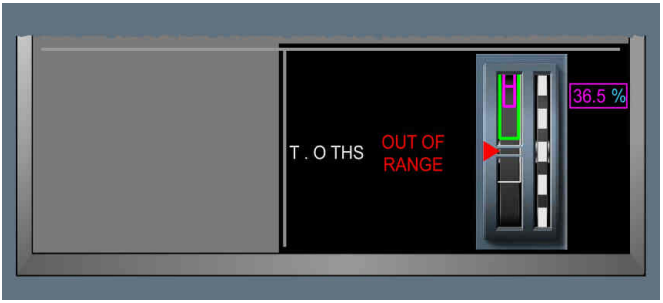
1.8 ° nose up is the optimum pitch trim setting when the takeoff CG is 39.5%.

Associated with the following ECAM alert:

- F/CTL PITCH TRIM/FMS/CG DISAGREE (*Refer to procedure*)

L1 **PITCH TRIM OUT OF THE GREEN BAND**

Pitch Trim Out of Green Band

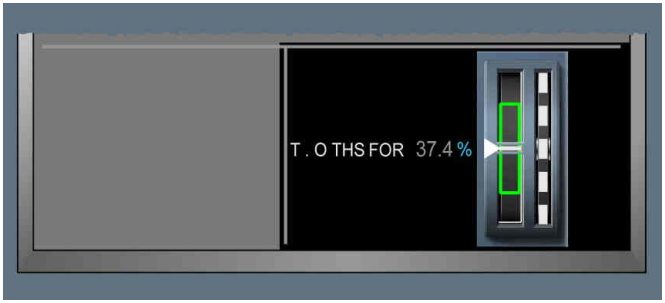


The pitch trim is out of the green band.

L2 Associated with the following ECAM alert:
- CONFIG PITCH TRIM NOT IN T.O RANGE (*Refer to procedure*)

L1 **PITCH TRIM AFTER LANDING**

Pitch Trim after landing



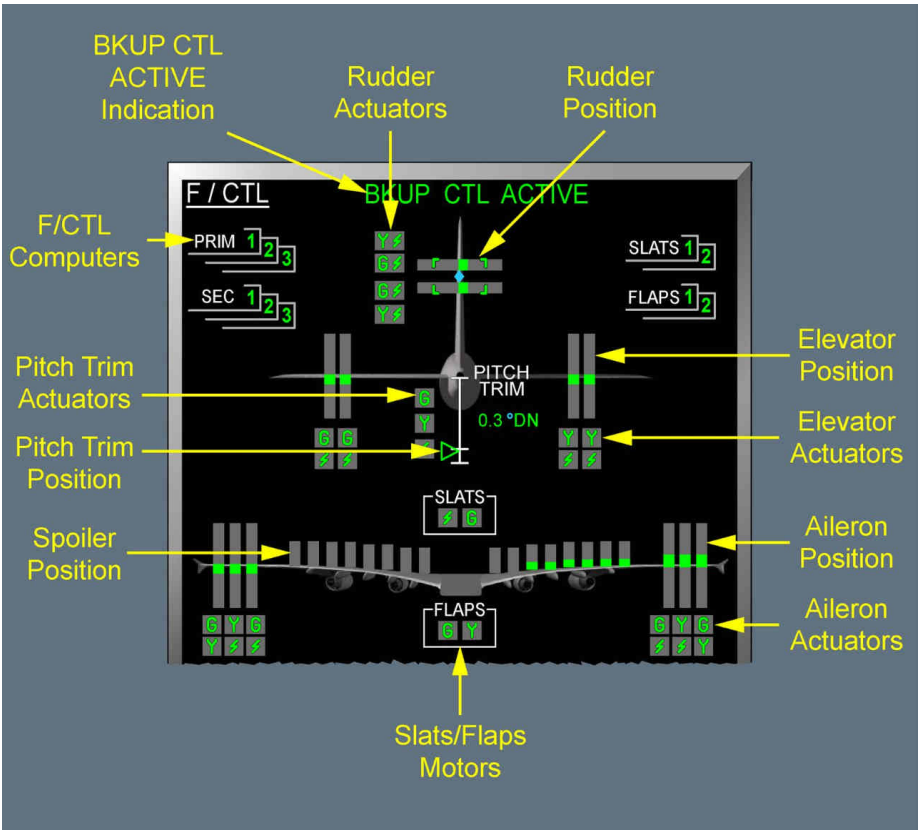
After landing, the pitch trim is reset to 0° (maintenance position).

F/CTL SYSTEM DISPLAY

Applicable to: ALL

The primary flight controls appear on the F/CTL System Display as if looking from the rear of the aircraft.

F/CTL System Display



F/CTL COMPUTERS

The status of the F/CTL computers (PRIM, SEC, SLATS and FLAPS computers) is displayed as follows:



The computers operate normally.



PRIM 2 is failed.

BKUP CTL ACTIVE INDICATION



Backup control is active.

RUDDER ACTUATORS

Each rudder is actuated by two EBHAs.
Each EBHA is powered by one hydraulic system and one electrical system.



The power supplies are available and the actuator is operating normally.



The hydraulic power supply is failed.



The status of the electrical power supply is not available.



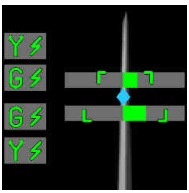
The hydraulic part of the actuator is failed.



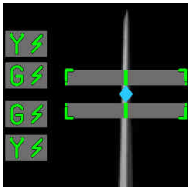
The actuator is failed.

RUDDER POSITION

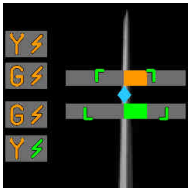
RUDDER POSITION



In flight, with the rudder travel limiter position indication.

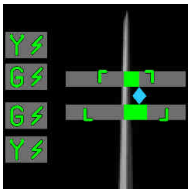


On ground, with maximum deflection indicators.
The maximum deflection indicators are displayed on ground only. They are used for the flight control check, to be sure that full surface deflection is available.
The rudder travel limiter is fully open.

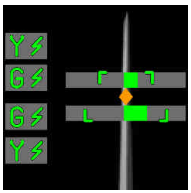


The power supplies of the upper rudder are failed.

RUDDER TRIM POSITION

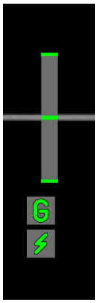


The rudder trim position is represented by a blue diamond.

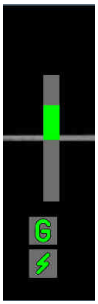


The rudder trim is failed.

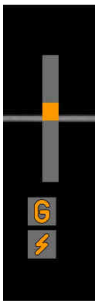
ELEVATOR POSITION



On ground, in neutral position, with maximum deflection indicators.
The maximum deflection indicators are displayed on ground only. They are used for the flight control check, to be sure that full surface deflection is available.



In flight, deflected upwards.



The power supplies of the elevator are failed.

ELEVATOR / AILERON / PITCH TRIM ACTUATORS



The power supply is available and the actuator is operative.



The power supply is failed.

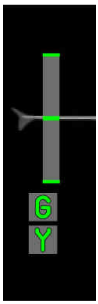


The status of the power supply is not available.



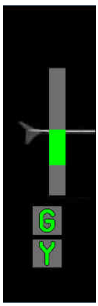
The actuator is failed, but the power supply is available.

AILERON POSITION



On ground, in neutral position, with maximum deflection indicators.
The maximum deflection indicators are displayed on ground only. They are used for the flight control check, to be sure that full surface deflection is available.

L13

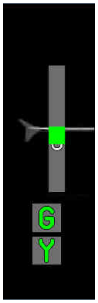


In flight, deflected downwards.

Note: *In cruise, to optimize fuel consumption, the neutral position of the ailerons is 1° down.*



The power supplies of the aileron are failed.



When the flaps are extended (CONF 1+F, 2, 3, and FULL), the neutral position of the ailerons is 5 ° down.
The neutral position in high-lift configurations (aileron droop) is represented by a white round symbol.

SLATS/FLAPS MOTORS



Both power supplies are available and both motors are operative.



One power supply is failed.



The status of one power supply is not available.



One motor is failed.

SPOILER POSITION

All spoilers are used as speedbrakes and ground spoilers.
Spoilers 3 to 8 are also used for roll control.



On ground, in retracted position, with maximum roll control indicator (green line).
The maximum deflection indicator is displayed for spoilers 3 to 8, and on ground only. It is used for the flight control check, to be sure that full surface deflection is available.



The spoiler is deflected in flight.



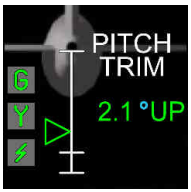
The spoiler is deflected and failed.



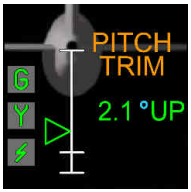
The spoiler is fully retracted and failed.

Speedbrakes indication is also displayed on the SLATS/FLAPS display (*Refer to DSC-27-10-20 Spoilers Indications on the Slats/Flaps Display*).

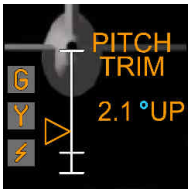
PITCH TRIM POSITION



The pitch trim is set to 2.1 ° UP.
The pitch trim position ranges from 2 ° DN to 15 ° UP.



The pitch trim command is jammed.



The pitch trim is failed due to green, yellow and electrical power supply failure.

MEMOS

Applicable to: ALL

GND SPLRs ARMED	The ground spoilers are armed.

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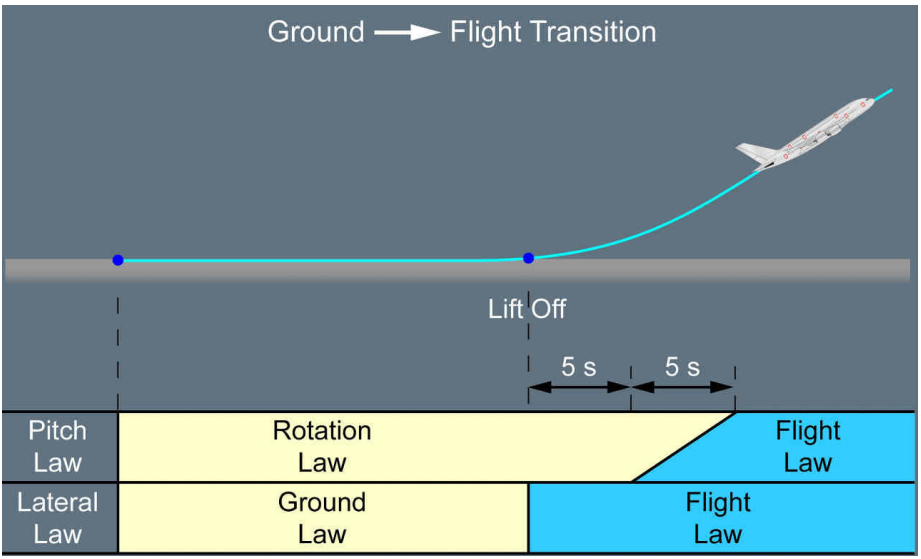
GENERAL

Applicable to: ALL

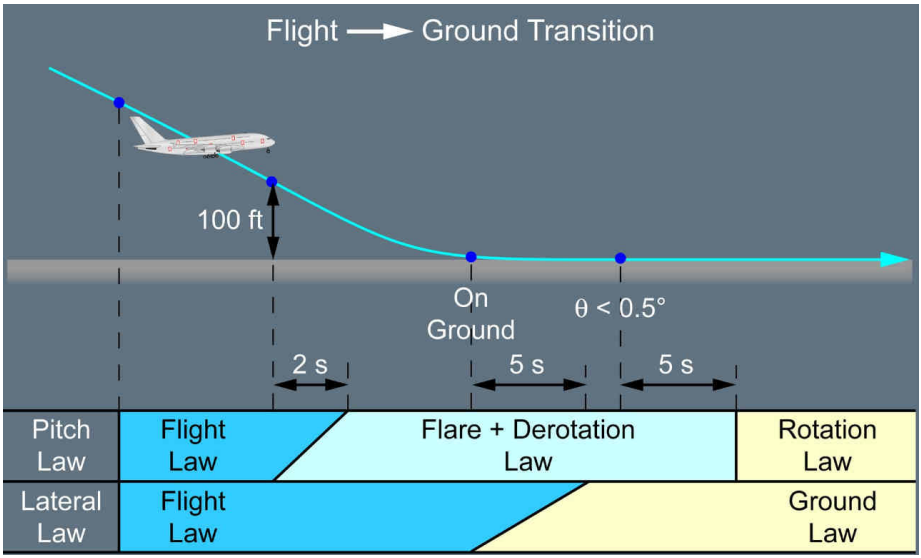
The normal flight control laws provides aircraft control on the 3 axis.

The characteristics of the normal law vary with the flight phase:
- On ground,
- In flight,
- During flare.

Ground to Flight transition



Flight to Ground transition

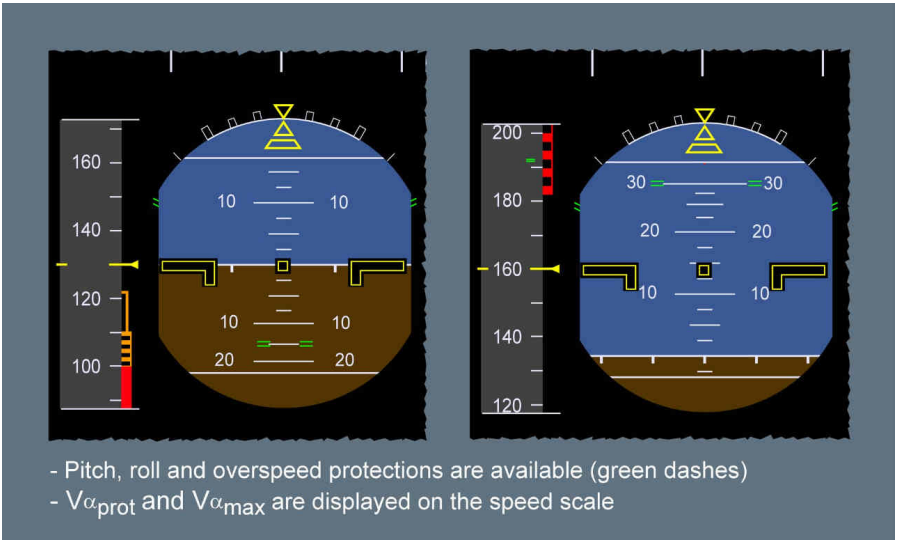


The normal law also provides the following flight envelope protections:
- Load factor protection (For more information: *Refer to DSC-22-27-20 Load Factor Protection*)
- Pitch attitude protection (For more information: *Refer to DSC-22-27-20 Pitch Attitude Protection*)
- Angle of attack protection (For more information: *Refer to DSC-22-27-20 High Angle of Attack Protection*)
- High speed protection (For more information: *Refer to DSC-22-27-20 High Speed Protection*)
- Bank angle protection (For more information: *Refer to DSC-22-27-20 Bank Angle Protection*).

The normal law also provides structural load alleviation, both in maneuver and in turbulence (*Refer to DSC-27-10-30 Load Alleviation Function*).

PFD DISPLAY

PFD Display in Normal Law



PITCH CONTROL

Applicable to: ALL

ROTATION LAW

The objective of the rotation law is to provide an homogeneous rotation for all possible weight, CG and configurations, while minimizing the risk of a tail strike.
The rotation law is a direct law, with some damping provided in case of a high pitch rate, to minimize the risk of a tail strike.

L2 This damping depends on:
- The pitch rate
- The tail clearance
- The sidestick position.

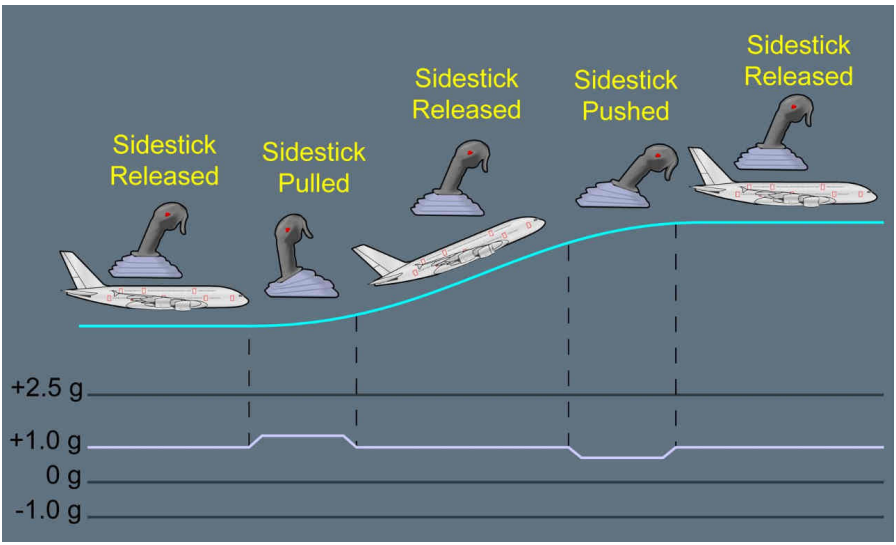
L1 *Note:* *A tailstrike indication is also available on the PFD . Refer to DSC-31-20-20-30-10 Tail Strike Pitch Limit*

The rotation law is active on ground, after nose wheel touchdown.

FLIGHT LAW

The normal law in flight is a load factor demand law with auto trim and full flight envelope protection.
In manual flight, the normal law provides elevator and pitch trim control from the sidesticks, to achieve a load factor which is a function of the sidestick deflection, independent of the aircraft speed.
With the sidestick at neutral and the wings level, the flight control system maintains 1g in pitch, corrected for pitch attitude. There is no need for the pilot to trim with speed and configuration changes.
In normal turns (up to 33° of bank), no pitch correction is required once the turn is established.

Pitch Normal Law



The normal flight law is available in flight from 5 s after liftoff, to below 100 ft during the approach. (The normal flight law is gradually phased-in during 5 s, 5 s after liftoff).
L2 The transition to the flight law is reduced to 2 s, if the angle of attack protection, or the pitch attitude protection is active.

FLARE + DEROTATION LAW

The objective of the flare law is to:
- Provide a conventional aircraft behavior during the flare
- Allow a precise control of the vertical speed and touchdown point
- Provide a smooth derotation and avoid hard nosewheel touchdown.

The flare law is a direct law without autotrim, with some damping provided by load factor and pitch rate feed back.
The flare law provides full elevator authority
The flare law is active below 100 ft.

L3 *Note: If radio altitude is lost, the flare law is active when the gear is down.*

LATERAL CONTROL

Applicable to: ALL

GROUND LAW

The objective of the lateral ground law is to facilitate aircraft handling on ground.
The lateral ground law is a full authority control law in roll and yaw, with some yaw damping. However, for small sidestick deflections, the lateral ground law helps the pilot to keep a small bank angle (less than 2 °), using only the ailerons. In particular, when the sidestick is at neutral, the law will aim to keep the wings level.

L2 When rudder pedal deflection is close to maximum, yaw damping is removed.

L1 The ground law is gradually phased in during 5 s after touchdown.

RUDDER DEFLECTION WITH DIFFERENTIAL BRAKING

In order to have adequate directional control in the case of a rudder pedal fault or jammed rudder pedals, differential braking controls the rudder and nosewheel steering.

L2 Differential braking control of the rudder is available when:
- The aircraft is on ground
- The autopilot is not engaged
- The speed is greater than 50 kt.

L1 When the differential braking is greater than 50%, the PRIMs order a rudder deflection, in addition to the rudder pedal order.

L2 *Note: The differential braking rudder deflection order is limited when the rudder pedals are not at 0 °.*

L3 **ENGINE FAILURE AT TAKEOFF**

To increase yaw efficiency in the case of an engine failure during takeoff, all the ailerons and spoiler 3 can be deflected on the wing opposite to the failed engine.

Note: Increasing yaw efficiency in the case of an engine failure on ground, reduces the VMCG, and therefore improves the takeoff performance.

The ailerons and spoiler will be deflected when:
- The aircraft is on ground
- The speed is greater than 60 kt
- The rudder pedal deflection is greater than 2/3 of the maximum rudder pedal deflection.

The inner and outer ailerons will be deflected upwards. The mid aileron will be deflected downwards. The aileron and spoiler deflection is proportional to the rudder pedal deflection.

When the rudder reaches its full deflection (30 °)
- The inner and outer ailerons reach their full upwards deflection (30 °)
- The mid ailerons reaches its full downwards deflection (20 °)
- Spoiler 3 reaches 40 °

FLIGHT LAW

The normal lateral law in flight:
- Is a roll rate demand law, by using the sidesticks
- Is a sideslip demand law, by using the rudder pedals.

The normal lateral law provides:
- Full flight envelope protection (maximum bank and sideslip angles)
- Turn coordination, and dutch roll damping.

To improve comfort, both rudders and all ailerons do not simultaneously have the same deflection. The flight law is available in flight, gradually phased-in during 5 s after liftoff.

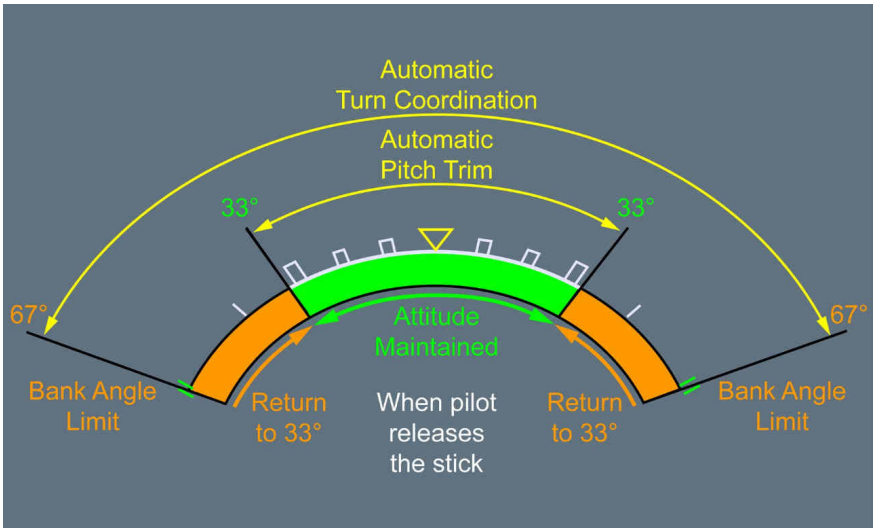
ROLL RATE DEMAND

In manual flight, the normal law provides aileron and spoiler control from the sidesticks, to achieve a roll rate which is proportional to the sidestick deflection, independent of the aircraft speed.

L3 With a full sidestick deflection, the maximum achievable roll rate is 15 °/s.

The maximum roll rate can be limited:
- To 7.5 °/s, if angle of attack protection is active
- Between 7.5 °/s and 15 °/s, in case of an engine failure, depending on the thrust asymmetry.

Bank Angle Protection



L1 When the bank angle is less than 33 °, the normal law:
- Maintains a constant bank angle when the sidestick is at neutral (neutral spiral stability)
- Provides automatic pitch trim (turn compensation).

When the bank angle is above 33 °,
- The bank angle returns to 33 ° if the sidestick is at neutral (positive spiral stability is restored)
- Automatic pitch trim is not available (aft pressure on the sidestick is needed to maintain altitude).

The maximum achievable bank angle is:
- 67 ° in clean configuration
- 60 ° in high lift configurations
- 45 ° if the minimum pitch attitude protection is active
- 45 ° if the high speed protection is active (in this case, the bank angle returns to 0 when the sidestick is at neutral)
- Limited by the maximum achievable load factor, when angle of attack protection is active (The maximum achievable bank angle is greater than 45 °).

SIDESLIP DEMAND

In manual flight, the normal law provides rudder control from the rudder pedals, to achieve a sideslip which is proportional to the pedal deflection, independent of the aircraft speed.
For a given sideslip angle, the aircraft will stabilize at a given roll angle.

The sideslip is limited by the flight control computers.

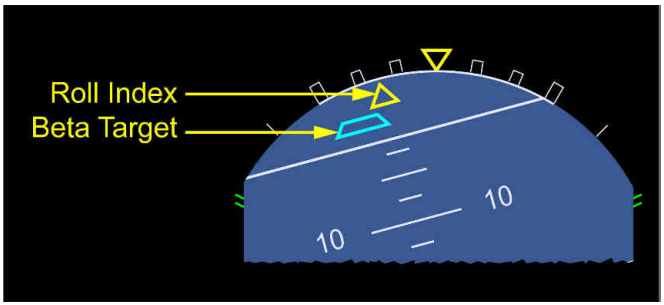
L2 The maximum sideslip is between:
- 2 ° at VMO
- 15 ° in CONF 3 and CONF FULL, at approach speed.

Note: When maximum sideslip is reached, pushing any further on the rudder pedals will have no effect.

L1 Engine Failure

In case of an engine failure, the lateral law provides sideslip and bank angle with a slowly diverging heading, as with a conventional aircraft.
During takeoff, the sideslip display is modified to ensure optimum takeoff performance. By centering the blue Beta target, the total aircraft drag is minimized. It results in a compromise between the drag produced by the flight control surfaces deflection and the drag produced by the sideslip of the airframe.

Beta target



LOAD ALLEVIATION FUNCTION

Applicable to: ALL

The aim of the Load Alleviation Function (LAF) is to reduce the fatigue and static loads on the wing.
The LAF is part of the normal pitch law.

L2 The LAF is available:
- In normal law and can also be available in alternate law
- When the speed is above 190 kt

The LAF is inhibited in CONF FULL.

L1 The LAF includes:

- The Passive Turbulence Alleviation (PTA)
- The Active Turbulence Alleviation (ATA)

PASSIVE TURBULENCE ALLEVIATION

The PTA reduces the static loads in turbulence and during maneuvers, by reducing the wing bending moment. This is done by symmetrically deflecting the ailerons and/or the outer spoilers upwards.

L2 The deflection of the ailerons and spoilers depends on the aircraft speed and the load factor.
A maximum of 15 ° of ailerons and/or spoilers can be added to the roll order.
Below 220 kt, the spoilers are not deflected. Above 220 kt, spoilers will be deflected above 1.7 g.

L3 The inner elevators are used to compensate for the ailerons and/or spoilers deflection.

L1 **ACTIVE TURBULENCE ALLEVIATION**

The ATA reduces fatigue and static loads by damping wing bending modes. This is done by symmetrically deflecting the ailerons.

L2 The deflection of the ailerons depends on the vertical acceleration measured by six accelerometers, located in the outboard engine pylons.
A maximum of 7 ° of ailerons (up or down) can be added to the roll order and/or the PTA order.

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RECONFIGURATION

Applicable to: ALL

A single failure cannot lead to the loss of the normal flight control law.
However, a combination of failures may result in a degradation of the flight control laws. The level of degradation will depend on the severity of the failures.
This degradation of the flight control laws is referred to as reconfiguration.

There are two reconfiguration levels:
- Alternate law (*Refer to DSC-27-10-40-DSC271040A Alternate Law*)
- Direct law (*Refer to DSC-27-10-40 Direct Law*).

L123

F/CTL Law		Ops impact	Failure Leading to Reconfiguration
ALTERNATE LAW	ALT 1	None	F/CTL SLAT SYS 1+2 FAULT
			F/CTL FLAP SYS 1+2 FAULT
			F/CTL SLATS LOCKED
			F/CTL FLAP LOCKED
			F/CTL SINGLE RUDDER FAULT
			F/CTL SINGLE ELEVATOR FAULT
			F/CTL PART SPLRs FAULT (if 4 pairs of roll spoilers are failed)
			F/CTL MOST SPLRs FAULT
			F/CTL L(R) INR(MID)(OUTR) AILERON FAULT (if two ailerons are failed)
			F/CTL STABILIZER FAULT
			HYD G+Y SYS PRESS LO
			FUEL WEIGHT DATA DISAGREE
			FUEL CG DATA DISAGREE (>8%)
	ALT 1	Max Speed: 310 kt / M .89	FUEL CG DATA DISAGREE (>12%)
			F/CTL Redundancy 3 accelerometers providing vertical acceleration are failed
			F/CTL DOUBLE ELEVATOR FAULT
			NAV IR 1+2(2+3)(1+3) FAULT
	ALT 1	Max Speed: 310 kt / M .89 AP s and FD s not available	NAV AOA DISAGREE
			F/CTL Redundancy
	ALT 2		NAV ADR 1+2(2+3)(1+3) FAULT
			F/CTL Redundancy Loss of: - Sideslip angle information, or - Upper and lower rudder position information, or - Ground detection information

Continued on the following page

Continued from the previous page

F/CTL Law		Ops impact	Failure Leading to Reconfiguration
DIRECT LAW	N/A	Max Speed: 310 kt / M .86 AP s and FD s not available	F/CTL PRIM 1+2+3 FAULT
			ELEC EMER CONFIG
			NAV ADR 1+2+3 FAULT
			3 gyrometers are failed
			FUEL WEIGHT DATA DISAGREE (if > 90 tons, and failure occurs after slats retraction)

In addition, the following enable aircraft control, in exceptional conditions:
- Abnormal attitude law, when the aircraft is far outside of the protected envelope (*Refer to DSC-27-10-40 Abnormal Attitude Law*)
- Electrical Backup mode, when all flight control computers are lost (*Refer to DSC-27-10-40 Backup Control*).

ALTERNATE LAW

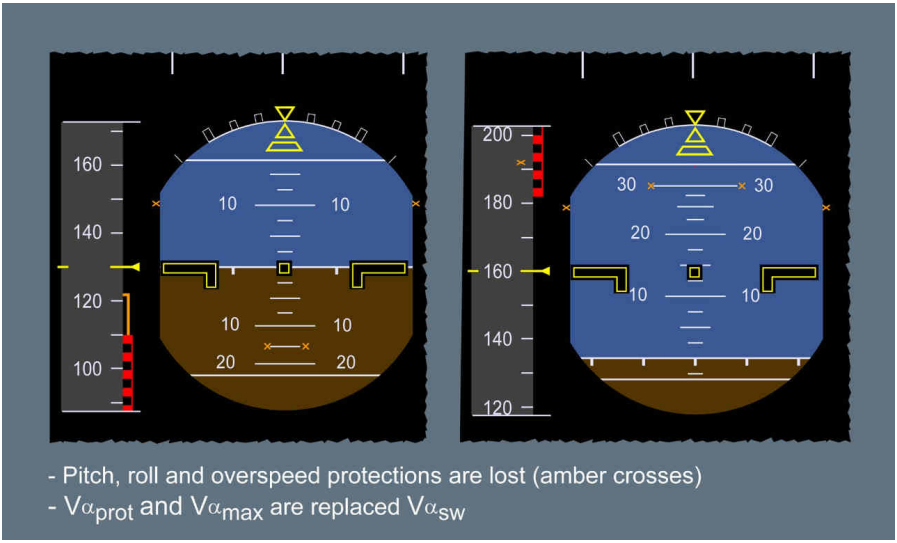
Applicable to: ALL

In alternate law:
- The pitch control is similar to the pitch control in normal law
- Depending on the failure:
  - The roll and yaw control is similar to the roll and yaw control in normal law, or
  - The roll and yaw control is almost a direct control, similar to the roll and yaw control of a conventional aircraft.
- Most flight control protections are lost

Depending on the reason for the reconfiguration in alternate law:
- The autopilot may be inoperative, and/or
- The speed is limited to 310 kt to maintain an adequate overspeed margin.

PFD DISPLAY

PFD Display in Alternate Law



L2 ALT 1

ALT 1 is very similar to the normal law.

PITCH CONTROL

The pitch control is similar to the pitch control in normal law.

LATERAL CONTROL

The lateral control law is the same as the lateral normal law.

L2 ALT 2

ALT 2 is similar to normal law in pitch, and to direct law in lateral.

PITCH CONTROL

Identical to pitch control of ALT 1. *Refer to DSC-27-10-40-DSC271040A ALT 1*

LATERAL CONTROL

The lateral control law of ALT 2 consists in roll direct law and yaw alternate law.

Roll Direct Law

In ALT 2 law, there is a direct relationship between the sidestick position and the aileron and spoiler position.
If all the roll surfaces are available (i.e. no hydraulic failure), the maximum achievable roll rate is higher than in normal law.

Yaw Alternate Law

In ALT 2 law, there is a direct relationship between the rudder pedal position and the rudder position.
The Yaw Alternate Law provides dutch roll damping and turn coordination.

PROTECTIONS

All protections are indicated as lost.
L2 Depending on the failure, some protections may still be available. However, these protections are degraded, and are therefore indicated as lost.

L1 HIGH SPEED STABILITY

When lost, the high speed protection is replaced by a high speed stability.
In this case, above VMO/MMO, a nose-up demand is introduced to avoid an excessive speed increase.
The crew can override the high speed stability.
The High speed protection indication on the speed scale is not displayed.
The overspeed warning remains available, whatever the flight control reconfiguration.

LOW SPEED STABILITY

When lost, the angle of attack protection is replaced by a low speed stability.
In this case, at low speeds, a nose-down demand is introduced to avoid further speed reduction.
L2 The nose-down demand is introduced 5 to 10 kt above the stall warning speed, depending on the aircraft weight and configuration.
L1 The pilot can override the low speed stability.
On the speed scale, Vαprot and Vαmax are not displayed. They are replaced by Vsw (Stall Warning Speed).
The STALL warning is available.

PITCH ATTITUDE PROTECTION

Pitch attitude protection may be lost.

BANK ANGLE PROTECTION

Bank angle protection may be lost.
L2 Bank angle protection remains available in ALT 1.

L1 *Note: Because the associated protections are lost, spiral stability is not restored in case of a high angle of attack or an overspeed.*

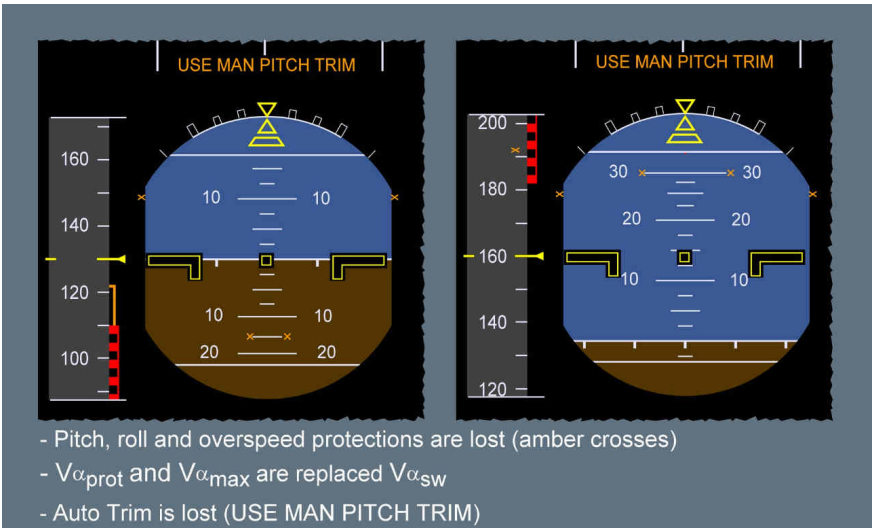
DIRECT LAW

Applicable to: ALL

DIRECT LAW

PFD DISPLAY

PFD Display in Direct Law



PITCH CONTROL

In direct law, there is a direct relationship between the sidestick position and the elevator position.
There is no autotrim. Pitch trim is adjusted via the pitch trim sw.

The speed is limited to:
- 310 kt, to maintain an adequate overspeed margin
- M .86, to maintain an adequate pitch stability.

LATERAL CONTROL

The lateral control in direct law is the same as in ALT 2 law:
- Roll direct law
- Yaw alternate law

PROTECTIONS

All protections are lost.
The OVERSPEED and STALL warnings remain available.

ABNORMAL ATTITUDE LAW

Applicable to: ALL

In the case of an extraordinary unpredictable external event (e.g. mid-air collision) the flight parameters may go far beyond the limits of the protected envelope. In this case, specific control laws are activated to ensure aircraft recovery, and to allow a safe continuation of the flight.

Note: Abnormal attitudes cannot be reached as a consequence of recorded atmospheric disturbance.

L2 The abnormal attitude law is activated if any of the following condition is true:
- Bank angle above 120°
- Pitch attitude above 50° nose up, or 30° nose down
- Speed below 70 kt , or above 420 kt
- Mach below 0.1, or above 0.96
- Angle of attack above 30°, or below -10°

L1 Once the abnormal attitude law is activated:
- The pitch direct law is active
- The roll direct law is active
- The yaw alternate law is active.

After recovery, the flight control system reverts to Alternate law for the remainder of the flight.

BACKUP CONTROL

Applicable to: ALL

In the unlikely event of the loss of all flight control computers (PRIMs and SECs), the backup control provides control and stability of the aircraft.

L2 The backup control has:

- Two Backup Power Supplies (BPS)
  The two BPS are electrical generators, each supplied by one hydraulic system. The BPS start to operate when PRIM 2 and SEC 2 are failed or no longer supplied.
- One Backup Control Module (BCM).
  The BCM is powered by either BPS. It starts to operate when all flight control computers are lost.

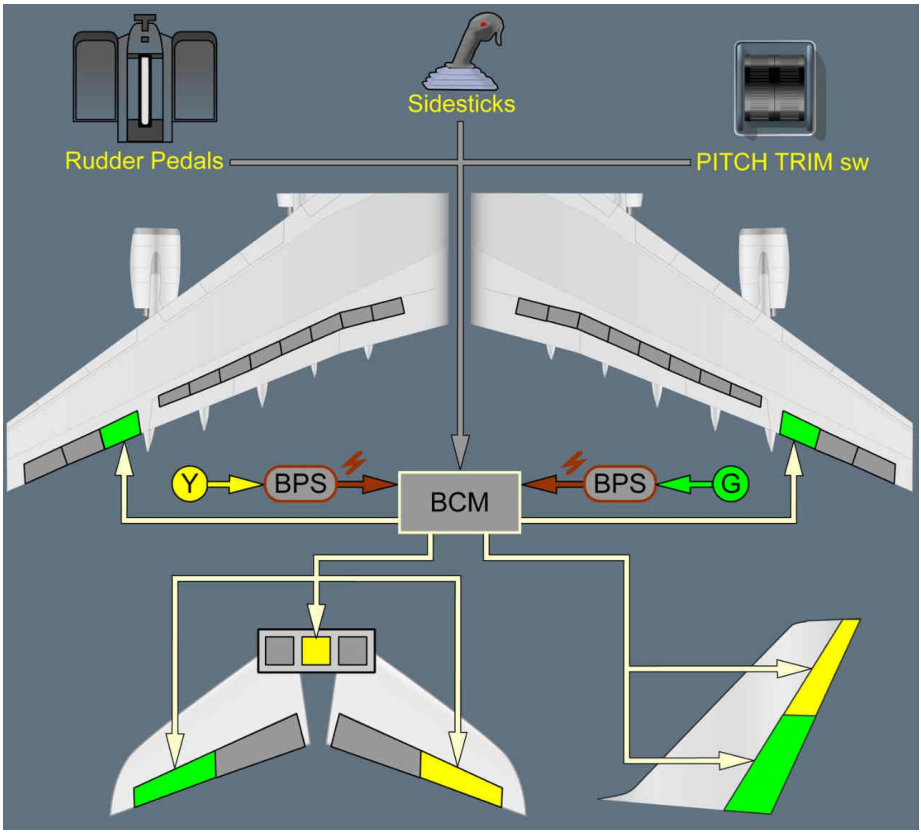
L1 The backup control controls the following surfaces:

- Inner ailerons
- Upper and lower rudders
- Outer elevators
- Trimmable Horizontal Stabilizer.

When the backup control is active, the flight crew controls the aircraft via:

- The sidesticks
- The rudder pedals
- The pitch trim switch.

Backup Control Surfaces



ECAM ALERTS

Applicable to: ALL

CONFIG L(R) SIDESTICK FAULT (BY TAKE-OVER) (*Refer to procedure*)

CONFIG PITCH TRIM NOT IN T.O RANGE (*Refer to procedure*)

CONFIG RUDDER TRIM NOT IN T.O RANGE (*Refer to procedure*)

CONFIG SPD BRK NOT RETRACTED (*Refer to procedure*)

F/CTL AILERON ACTUATOR FAULT (*Refer to procedure*)

F/CTL AILERON ELEC ACTUATOR FAULT (*Refer to procedure*)

F/CTL ALTERNATE LAW (PROT LOST) (*Refer to procedure*)

F/CTL DIRECT LAW (*Refer to procedure*)

F/CTL DOUBLE ELEVATOR FAULT (*Refer to procedure*)

F/CTL ELEVATOR ACTUATOR FAULT (*Refer to procedure*)

F/CTL ELEVATOR ELEC ACTUATOR FAULT (*Refer to procedure*)

F/CTL FCDC 1(2) FAULT (*Refer to procedure*)

F/CTL FCDC 1+2 FAULT (*Refer to procedure*)

F/CTL GND SPLRs FAULT (*Refer to procedure*)

F/CTL GND SPLRs NOT ARMED (*Refer to procedure*)

F/CTL TWO GYROMETERs FAULT (*Refer to procedure*)

F/CTL L(R) INR(MID)(OUTR) AILERON FAULT (*Refer to procedure*)

F/CTL L(R) SIDESTICK FAULT (*Refer to procedure*)

F/CTL L(R) SIDESTICK SENSOR FAULT (*Refer to procedure*)

F/CTL LOAD ALLEVIATION FAULT (*Refer to procedure*)

F/CTL PART (MOST) SPLRs FAULT (*Refer to procedure*)

F/CTL PITCH TRIM/FMS/CG DISAGREE (*Refer to procedure*)

F/CTL PRIM 1(2)(3) ELEVATOR ACTUATOR FAULT (*Refer to procedure*)

F/CTL PRIM 1(2)(3) FAULT (*Refer to procedure*)

F/CTL PRIM 1(2)(3) RUDDER ACTUATOR FAULT (*Refer to procedure*)

F/CTL PRIM 1(2)(3) SIDESTICK SENSOR FAULT (*Refer to procedure*)

F/CTL PRIM(SEC) VERSIONS DISAGREE (*Refer to procedure*)

F/CTL PRIMs PIN PROG DISAGREE (*Refer to procedure*)

F/CTL RUDDER ACTUATOR FAULT (*Refer to procedure*)

F/CTL RUDDER ELEC ACTUATOR FAULT (*Refer to procedure*)

F/CTL RUDDER PEDAL FAULT (*Refer to procedure*)

F/CTL RUDDER PEDAL JAMMED (*Refer to procedure*)

F/CTL RUDDER PEDAL SENSOR FAULT (*Refer to procedure*)

F/CTL RUDDER PRESSURE SENSOR FAULT (*Refer to procedure*)

F/CTL RUDDER TRIM 1(2) FAULT (*Refer to procedure*)

F/CTL RUDDER TRIM FAULT (*Refer to procedure*)

F/CTL RUDDER TRIM RUNWAY (*Refer to procedure*)

F/CTL SEC 1(2)(3) FAULT (*Refer to procedure*)

F/CTL SINGLE ELEVATOR FAULT (*Refer to procedure*)

F/CTL SINGLE RUDDER FAULT (*Refer to procedure*)

F/CTL SPD BRKs FAULT (*Refer to procedure*)

F/CTL SPD BRKs POSITION/LVR DISAGREE (*Refer to procedure*)

F/CTL SPD BRKs STILL EXTENDED (*Refer to procedure*)

F/CTL STABILIZER ACTUATOR FAULT (*Refer to procedure*)

F/CTL STABILIZER ELEC ACTUATOR FAULT (*Refer to procedure*)

F/CTL STABILIZER FAULT (*Refer to procedure*)

OVERSPEED (*Refer to procedure*)

TAIL STRIKE (*Refer to procedure*)

TAIL STRIKE DET FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
PRIM	PRIM 1	DC ESS
	PRIM 2	DC 2 (1)
	PRIM 3	DC 1
SEC	SEC 1	DC ESS
	SEC 2	DC 2 (1)
	SEC 3	DC 1
FCDC	FCDC 1	DC ESS
	FCDC 2	DC 2
EHA	Mid Ailerons	AC ESS and DC ESS
	Inner Ailerons	AC 3 (1) and DC 2 (1)
	Left Inner / Right Outer Elevator	AC ESS and DC ESS
	Left Outer / Right Inner Elevator	AC 3 (1) and DC 2 (1)
EBHA	Spoiler n°5	AC 3 (1)and DC 2 (1)
	Spoiler n°6	AC ESS and DC ESS
	Upper Rudder Upper Actuator	AC ESS and DC ESS
	Upper Rudder Lower Actuator	AC 3 (1) and DC 2 (1)
	Lower Rudder Upper Actuator	AC ESS and DC ESS
	Lower Rudder Lower Actuator	AC 1 and DC 1
Rudder Trim	Rudder Trim 1	DC ESS
	Rudder Trim 2	DC 1

(1) Also powered in the case of all engine flameout

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OVERVIEW

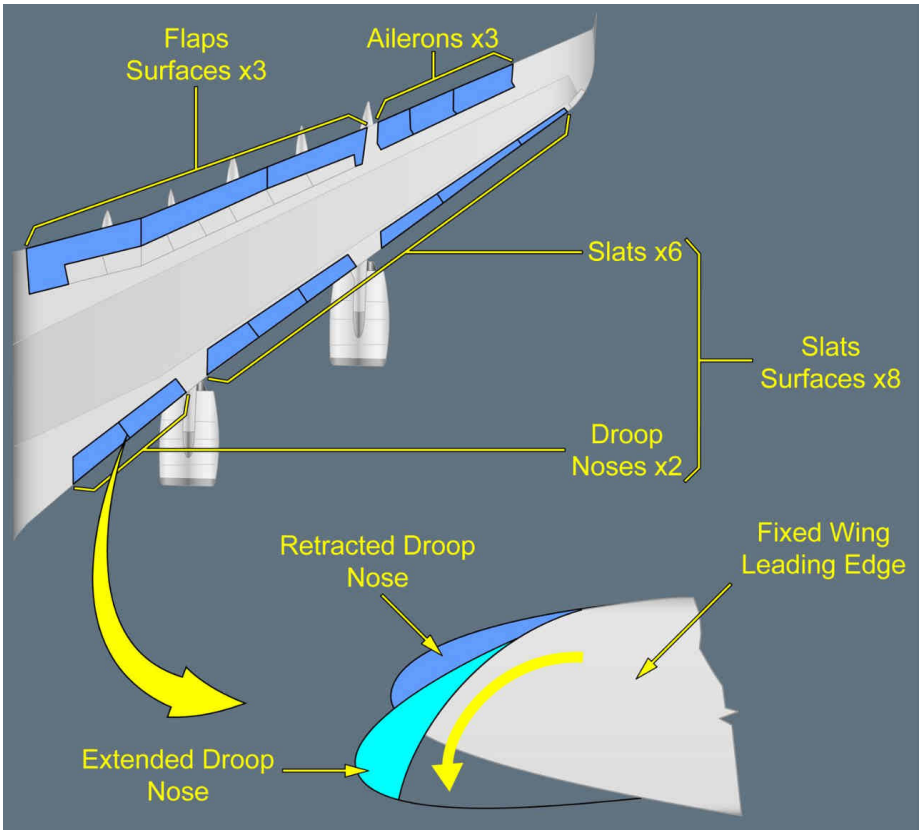
Applicable to: ALL

The following are located on each wing, and provide lift augmentation:

- 8 slats surfaces
- L2 2 of these surfaces are droop noses.
- L1 - 3 flaps surfaces
- 3 ailerons, via the aileron droop function.

Slats are electrically and hydraulically-actuated.
Flaps are hydraulically-actuated.
The FLAPS lever is used to select the position of the slats and flaps. This lever is located on the center pedestal.

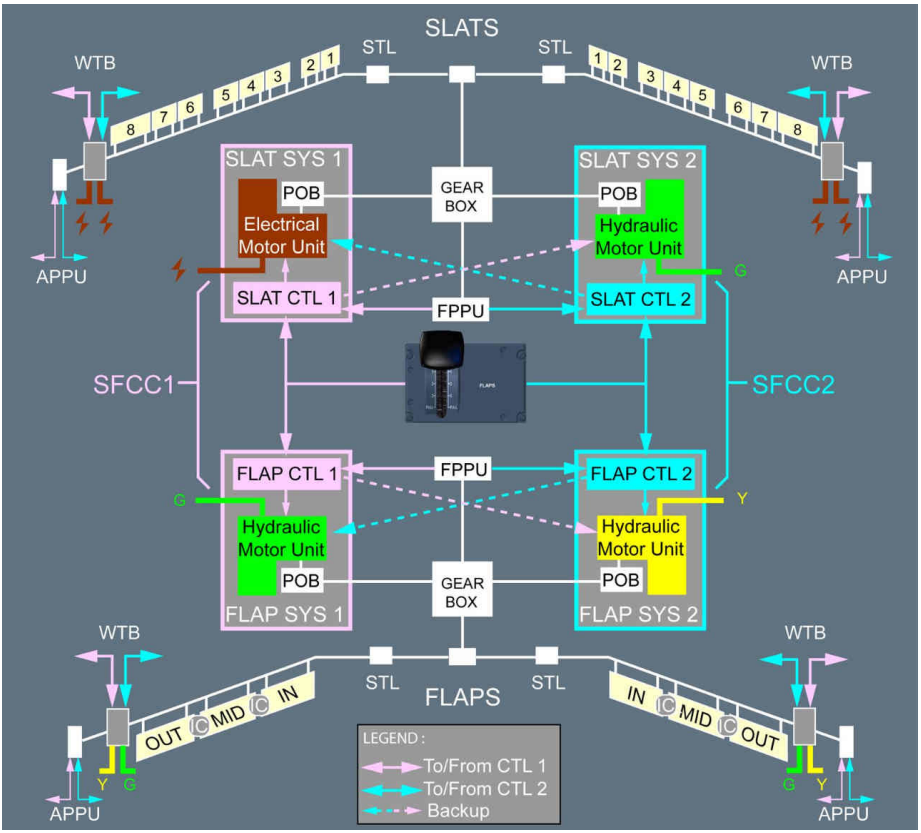
General


Flaps
Surfaces x3
Ailerons x3
Slats x6
Slats
Surfaces x8
Droop
Noses x2
Retracted Droop
Nose
Fixed Wing
Leading Edge
Extended Droop
Nose

SLATS/FLAPS SYSTEM

Applicable to: ALL

Slats/Flaps architecture



SLAT (FLAP) SYSTEMS

The slats and flaps are monitored and controlled as follows:

- SLAT SYS 1 and SLAT SYS 2 monitor and control the slats
- FLAP SYS 1 and FLAP SYS 2 monitor and control the flaps.

All four systems each have:
- 1 Slats(Flaps) control unit: SLAT(FLAP) CTL 1(2)
- 1 Motor
- 1 Power-Off Brake (POB).

SLATS (FLAPS) CONTROL UNIT

Each slats(flaps) control unit monitors the slats(flaps) and controls the motor of its associated slats(flaps) system.

L2 Each slats(flaps) control unit can also control the other slats(flaps) motor, in case the other slats(flaps) control unit fails. This enables the slats(flaps) to operate normally.

L1 SLAT CTL 1(2) and FLAP CTL 1(2) are part of SFCC 1(2) (Slat Flap Control Computer).

MOTOR

Slats are actuated by:
- One electrical motor, that is supplied by the AC ESS busbar (SLAT SYS 1).

L2 *Note: On ground, the electrical motor is operative, only when the green hydraulic system is pressurized. This prevents inadvertent slats movement with ground personnel around the aircraft.*

L1 - One hydraulic motor, that is supplied by the GREEN hydraulic system (SLAT SYS 2)

Flaps are actuated by:
- One hydraulic motor, that is supplied by the GREEN hydraulic system (FLAP SYS 1)
- One hydraulic motor, that is supplied by the YELLOW hydraulic system (FLAP SYS 2).

L3 **POWER-OFF BRAKE (POB)**

The slats and flaps control units electrically control the POBs.

The POBs will mechanically lock the transmission shaft from the motor to the gearbox:
- When slats (flaps) have reached the selected position
- In case of runaway or asymmetry
- In case of a power supply failure of a motor.

L3 **GEARBOX**

The gearbox adds the speed of the motors of both slats(flaps) systems (speed-summing system). Therefore, slats(flaps) will operate at half speed, if one motor is lost.
The gearbox transfers power to the surfaces, using torque-shaft transmission.

WING TIP BRAKES (WTB)

The Wing Tip Brakes WTBs will mechanically lock the slats(flaps), in case of runaway, overspeed, or asymmetry.

L2 The WTBs will lock the slats(flaps), only if both slats(flaps) control units detect a runaway, overspeed or asymmetry.

L3 DC ESS and DC 2 keep the WTBs of the slats unlocked. In case both these busbars fail, the WTBs of the slats will mechanically lock the slats.
Both hydraulic systems keep the WTBs of the flaps unlocked. In case both hydraulic systems fail, the WTBs of the flaps will mechanically lock the flaps.

L1 If locked, the WTBs cannot be unlocked in flight.

L3 SYSTEM TORQUE LIMITERS (STL)

In case of high friction or a jam (e.g. ice accretion), the System Torque Limiters (STLs) protect against overload, by stopping the movement of the slats(flaps) surfaces.
Recycling the FLAPS lever will restore surface movement, if the overload has disappeared.

L2 ASYMMETRY POSITION PICK-OFF UNITS (APPU) AND FEEDBACK POSITION PICK-OFF UNIT (FPPU)

Each slats(flaps) system has two Asymmetry Position Pick-off Units (APPUs), and one Feedback Position Pick-off Unit (FPPU).
The APPUs and the FPPU provide slats(flaps) position feedback to the slats(flaps) control units, to monitor the deployment of the surfaces, and measure any asymmetry between the left and right wings.

L3 FLAP DISCONNECT SENSOR

The flap disconnect sensors, located between each flap, measure any excessive differential movement between the flaps. If a sensor measures any excessive differential movement, the flaps control units will inhibit flaps operation, to limit further damage.

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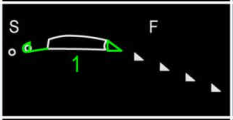
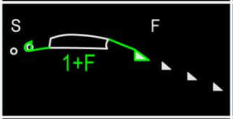
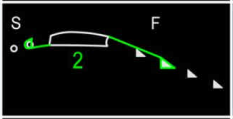
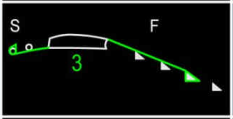
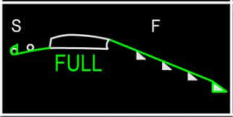
SLATS/FLAPS CONFIGURATIONS

Applicable to: ALL

The following table provides the configurations and associated surface positions (degrees), for each FLAPS lever position.

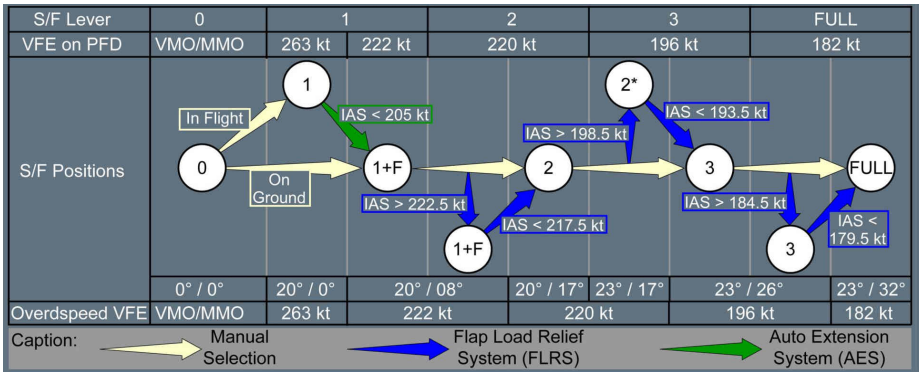
Slats/flaps configurations

FLAPS Lever Position	SLATS	FLAPS	Aileron Droop	Configuration on ECAM	Maximum Speed	Flight Phase
0	0 °	0 °	0 °		VMO/MMO	Cruise
1	20 °	0 °	0 °		263 kt	Holding
	20 °	8 °	5°		222 kt	Takeoff/ Approach
2	20 °	17 °	5°		220 kt	Takeoff/ Approach
3	23 °	26 °	5 °		196 kt	Takeoff/ Approach/ Landing
FULL	23 °	32 °	5 °		182 kt	Landing

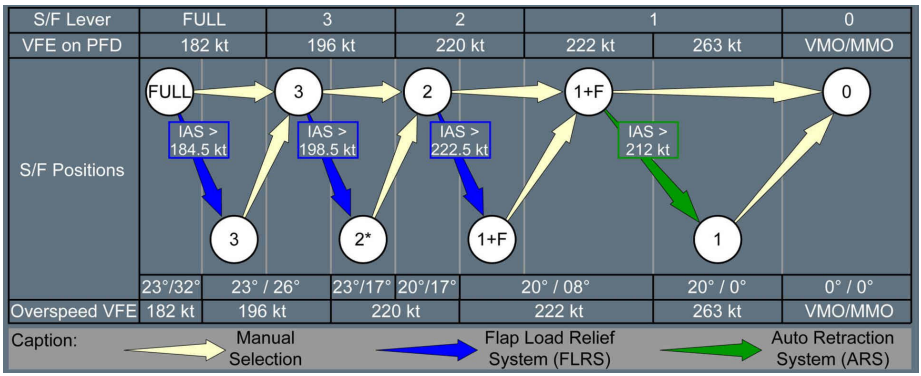
SLATS/FLAPS EXTENSION/RETRACTION

Applicable to: ALL

Slats/Flaps Extension



Slats/Flaps Retraction



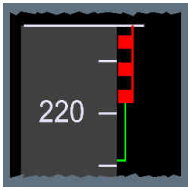
AUTO RETRACTION SYSTEM (ARS)

In CONF 1+F, the Auto Retraction System (ARS) automatically retracts the flaps, when needed. The resulting configuration is CONF 1.

L2 The ARS activates, when the aircraft reaches a speed of 212 kt, and if still in CONF 1+F.
In case of a high-weight takeoff, the S speed will be greater than 212 kt. The ARS will activate, as the aircraft accelerates towards S speed. This prevents excessive loads on the flaps, and improves climb performance.

Note: *S can also be greater than the VFE of CONF 1+F.*

L1



AUTOMATIC EXTENSION SYSTEM (AES)

In CONF 1, the Auto Extension System (AES) automatically extends the flaps, when needed. The resulting configuration is CONF 1+F.

L2 The AES activates, when the speed goes below 205 kt, and if still in CONF 1.

FLAP LOAD RELIEF SYSTEM (FLRS)

The Flap Load Relief System (FLRS) limits the loads on the flaps, in case of a VFE exceedance. The FLRS is only available in CONF 2, 3, or FULL.

L2 The flaps automatically retract at VFE + 2.5 kt (i.e. before the overspeed warning triggers at VFE + 4 kt).

L1 If the FLRS is active:

- The FLRS retracts the flaps to the next retracted flap position.
- A pulsing F RELIEF message appears in the Flap/Slat/Trim zone of the PFD.
- The PFD still indicates the VFE that corresponds to the selected lever position.
- L2 The FWS triggers an overspeed warning, if the speed exceeds the VFE of the actual slats/flaps configuration + 4 kt (i.e. the overspeed warning does not consider the selected lever position).

L1 When the VFE is no longer exceeded, the flaps automatically return to their normal (selected) position.

L2 This occurs at VFE – 2.5 kt.

SLAT ALPHA/SPEED LOCK FUNCTION

Applicable to: ALL

The slat alpha/speed lock function inhibits slats' retraction to zero at a high Angle-Of-Attack (AOA, also referred to as alpha), and/or at a very low speed.

L3 The slat alpha/speed lock function prevents the aircraft from stalling and/or losing altitude, when the slats are retracted to zero.

The slats and flaps control units use the AOA, or the airspeed, to inhibit slats' retraction. The ADIRUs provide this information to the slats and flaps control units.

L2 When the FLAPS lever is set to 0, the slats alpha/speed lock function activates and inhibits slats' retraction, if:
- AOA is greater than 9.5 °, or
- The speed is less than 155 kt.

Note: If the FLAPS lever is already set to 0, when either of the above conditions occurs, then the function will not activate.

L1 If the slat alpha/speed lock function is active:
- A pulsing A. LOCK message appears in the Flap/Slat/Trim zone of the PFD.
- The PFD indicates the VLS that corresponds to the actual slats/flaps position.

L2 Once the slats alpha/speed lock function is active, the slats retract to 0 when:
- AOA is less than 9.2 °, or
- The speed is greater than 161 kt.

SLATS/FLAPS CRUISE BAULK FUNCTION

Applicable to: ALL

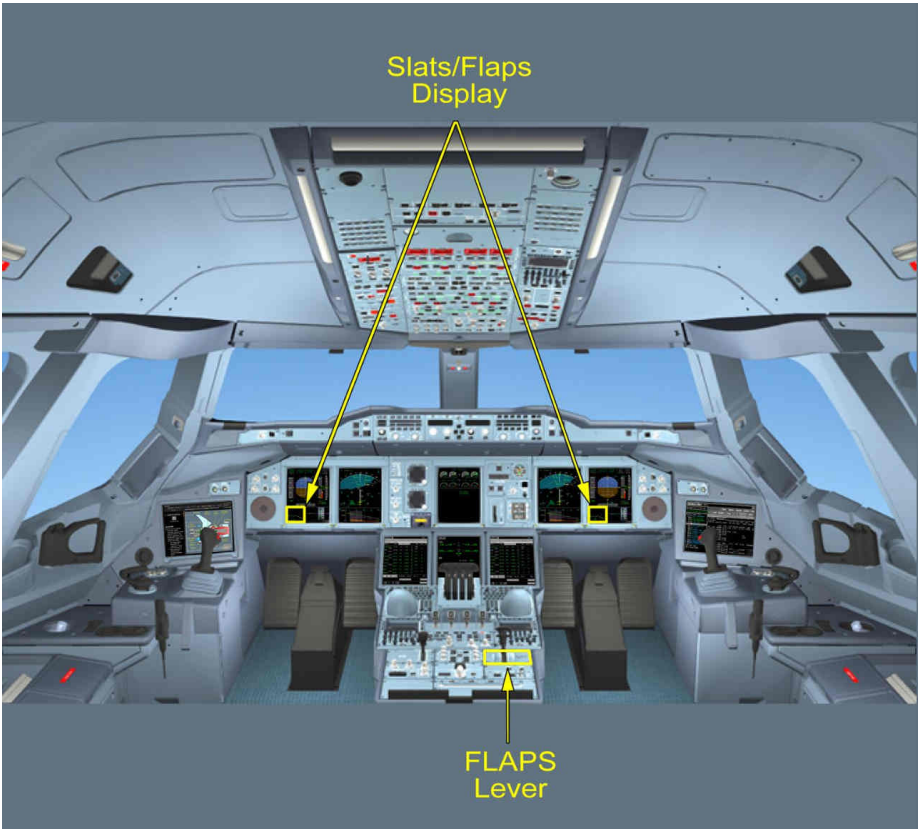
In case the FLAPS lever is inadvertently moved from 0 to 1 during cruise, the slats/flaps cruise baulk function will maintain the slats and flaps in their fully retracted position. In addition, the ECAM will trigger the F/CTL FLAP LVR NOT ZERO warning.

L2 The slats/flaps cruise baulk function activates, when the indicated airspeed is greater than the VFE of CONF 1 +2.5 kt, or the aircraft is at an altitude of more than 22 000 ft.
The slats/flaps cruise baulk function is valid only for FLAPS lever position 1. The selection of any other slats/flaps setting (2, 3, or FULL) will override the cruise baulk function, and allow slats' and flaps' extension.

COCKPIT VIEW

Applicable to: ALL

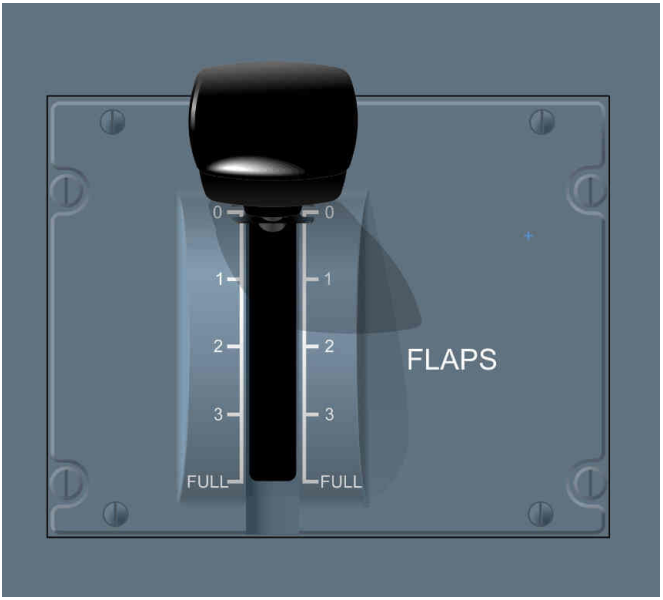
Controls and Indicators



Flaps LEVER

Applicable to: ALL

FLAPS LEVER



The FLAPS lever controls both the slats and the flaps at the same time.
There are five FLAPS lever positions, for selecting the desired configuration *Refer to DSC-27-20-20 Configuration* .

Note: *The FLAPS lever must be pulled out of detent, before it can be set to any position.*

L2 The FLAPS lever has a mechanical stop at positions 1 and 3. This prevents inadvertent excessive slats/flaps extension or retraction.
The FLAPS lever cannot be set to an intermediate lever position.

L1 **OVERRIDE MECHANISM**

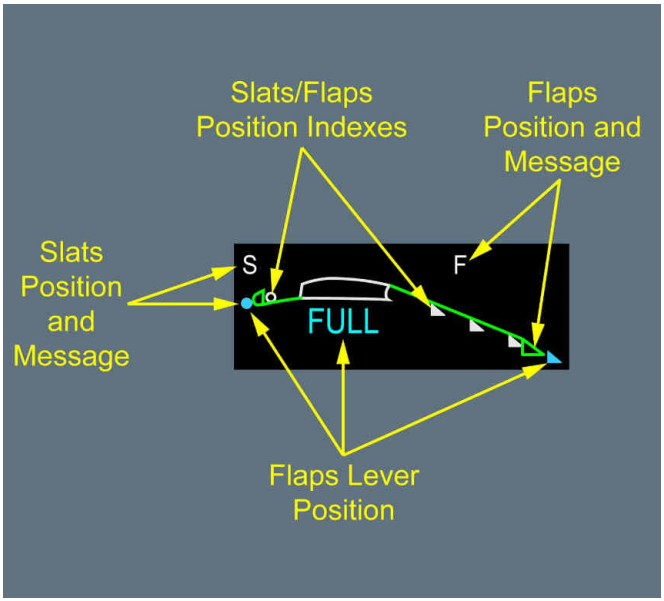
The FLAPS lever includes an override mechanism that is used in case the FLAPS lever is jammed. The override mechanism allows to extend the slats/flaps by one step (e.g. from 0 to 1, from 3 to FULL).
To use the override mechanism, the flight crew moves the lever one step with a strong force, without pulling the lever out of detent.

The override mechanism is reversible.

SLATS/FLAPS DISPLAY

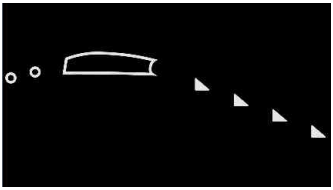
Applicable to: ALL

Slats/flaps Display

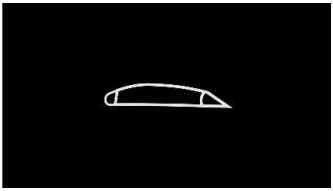


The slats/flaps display appears on the bottom left-hand side of the PFD displays.
Spoiler position information is also available on the slats/flaps display. For more information: *Refer to DSC-27-10-20 Spoilers Indications on the Slats/Flaps Display*
Landing gear position information is also available on the slats/flaps display. For more information: *Refer to Landing Gear Indication on the Slats/Flaps Display*

SLATS/FLAPS POSITION INDEXES

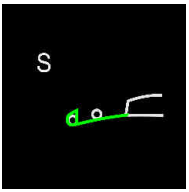


The dots indicate the slats positions that can be selected.
The triangles indicate the flaps positions that can be selected.



The slats and flaps are fully retracted.

SLATS— POSITIONS AND MESSAGES

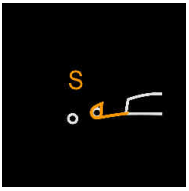


Position of the slats.



The alpha/speed lock function is active.
The indication pulses.

L12

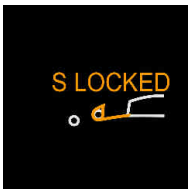


The slats are failed.

Associated with the following ECAM caution:
- F/CTL SLAT SYS 1+2 FAULT (*Refer to procedure*).

May also result from a failure of both the AC ESS and GREEN hydraulic.

L12



Wing-tip brakes are applied to the slats.

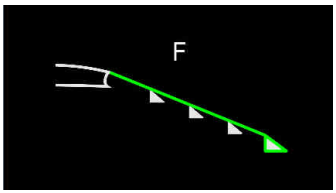
Associated with the following ECAM caution:
- F/CTL SLATS LOCKED (*Refer to procedure*).

L2

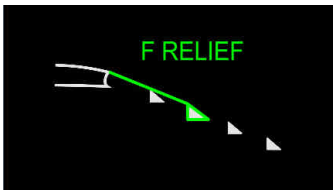


The position of the slats is not valid.

FLAPS— POSITIONS AND MESSAGES

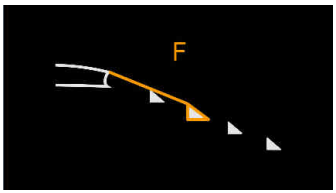


Position of the flaps.



The Flap Load Relief System is active.
The indication pulses.

L12

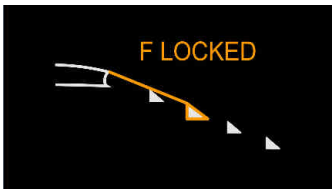


The flaps are failed.

Associated with the following ECAM caution:
- F/CTL FLAP SYS 1+2 FAULT (*Refer to procedure*).

May also result from a failure of both hydraulic systems.

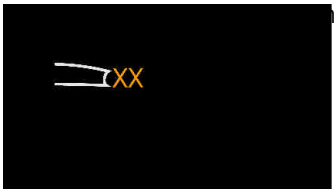
L12



Wing-tip brakes are applied to the flaps.

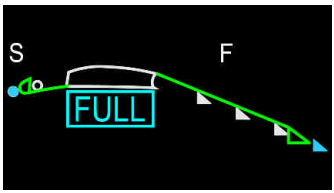
Associated with the following ECAM caution:
- F/CTL FLAPS LOCKED (*Refer to procedure*).

L2

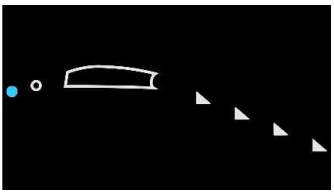
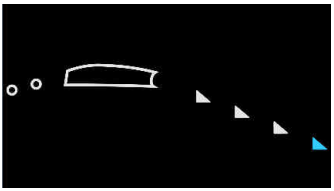


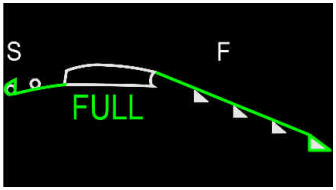
n of the flaps is not valid.

FLAPS LEVER POSITION



The slats/flaps move to the selected position.

- FULL Indicates the selected configuration (1, 1+F, 2, 3, or FULL)
-  Indicates the selected slats position
-  Indicates the selected flaps position



The slats/flaps have reached the selected position.

FULL : Indicates the current configuration.

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ECAM ALERTS

Applicable to: ALL

CONFIG SLATS (FLAPS) NOT IN T.O CONFIG (*Refer to procedure*)

F/CTL FLAPS LEVER NOT ZERO (*Refer to procedure*)

F/CTL FLAP CTL 1(2) FAULT (*Refer to procedure*)

F/CTL FLAP SYS 1(2) FAULT (*Refer to procedure*)

F/CTL FLAP SYS 1+2 FAULT (*Refer to procedure*)

F/CTL FLAP(SLAT) 1(2) SAFETY TEST REQUIRED (*Refer to procedure*)

F/CTL FLAPS LEVER OUT OF DETENT (*Refer to procedure*)

F/CTL FLAPS LEVER SYS 1 (2) FAULT (*Refer to procedure*)

F/CTL FLAPS LOCKED (*Refer to procedure*)

F/CTL LDG WITH FLAPS LEVER JAMMED (*Refer to procedure*)

F/CTL LDG WITH NO SLATS NO FLAPS (*Refer to procedure*)

F/CTL SLAT CTL 1(2) FAULT (*Refer to procedure*)

F/CTL SLAT SYS 1(2) FAULT (*Refer to procedure*)

F/CTL SLAT SYS 1+2 FAULT (*Refer to procedure*)

F/CTL SLATS LOCKED (*Refer to procedure*)

F/CTL SLATS(FLAPS) TIP BRK TEST REQUIRED (*Refer to procedure*)

F/CTL T.O FLAPS / FMS DISAGREE (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
SFCC	SFCC 1	DC ESS
	SFCC 2	DC 2
SLAT SYS 1	Electrical Motor	AC ESS
Slats Wing Tip Brakes	N/A	DC ESS or DC 2

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AIRCRAFT SYSTEMS

28 - FUEL

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DSC-28-PLP PRELIMINARY PAGES

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Electrical Supply ..... A

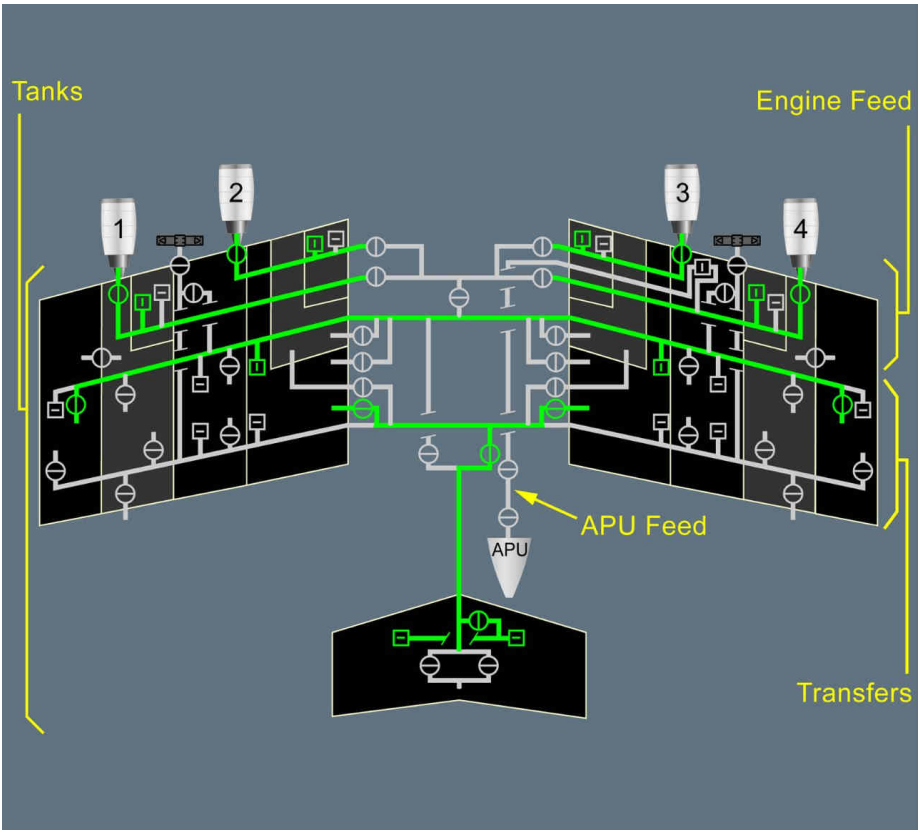
OVERVIEW

Applicable to: ALL

The fuel system stores fuel, monitors the quantity and temperature of fuel in each tank, and controls fuel transfers to:

- Supply fuel to the engines and to the Auxiliary Power Unit (APU)
- Maintain the Center of Gravity (CG) within limits
- Reduce structural loads
- Control refueling and defueling
- Enable fuel jettison, if necessary.

Fuel System



TANKS

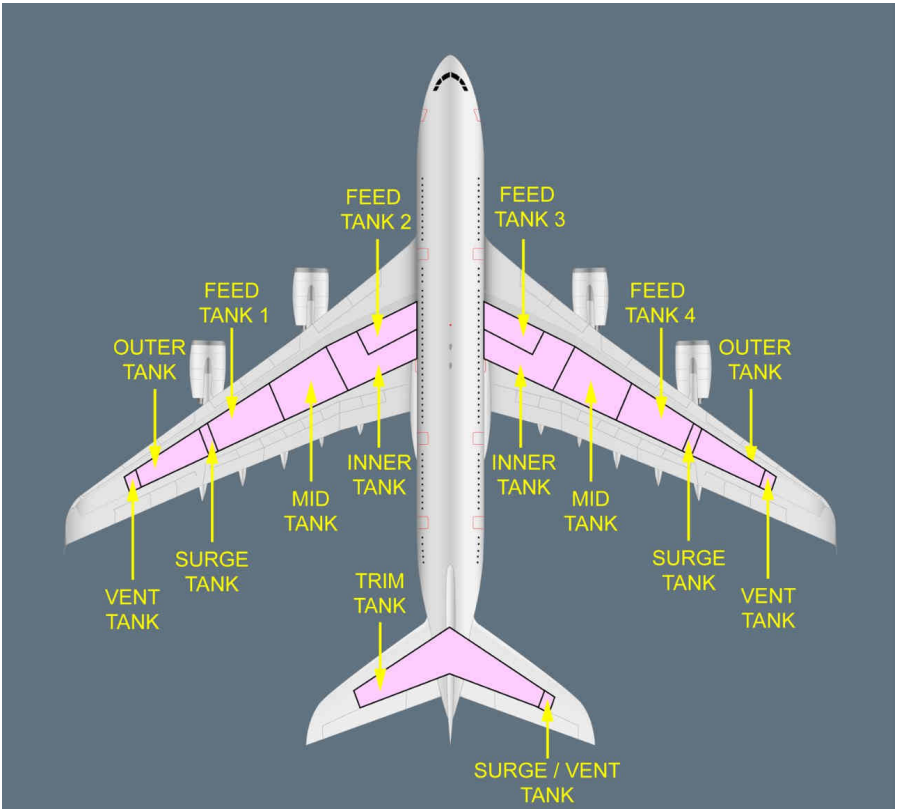
Applicable to: ALL

Fuel is stored in the:
- Wings
- Trimmable Horizontal Stabilizer (THS).

Wing tanks, and their components, are symmetrical.

TANK ARRANGEMENT

Tank Arrangement



There are 11 tanks that store fuel:

- 5 tanks in each wing:
  - 1 outer tank (OUTR TK)
  - 1 mid tank (MID TK)
  - 1 inner tank (INR TK)
  - 2 feed tanks (FEED TK).
- 1 trim tank in the THS.

Each feed tank:
- Provides fuel to the engines and the APU
- Receives fuel from all of the transfer tanks (inner, mid, outer, and trim tanks)
- Contains a collector cell that has a fuel capacity of approximately 2 866 lb.

L2 The collector cell is maintained full, to keep the fuel pumps immersed, in order to provide low or negative "g" protection to feed the engine.

Note: - *Feed tanks 2 and 3 are positioned to avoid engine 1 or 4 rotor burst.*
- *Feed tanks 1 and 4 are positioned to avoid engine 2 or 3 rotor burst.*

FUEL TANK QUANTITY

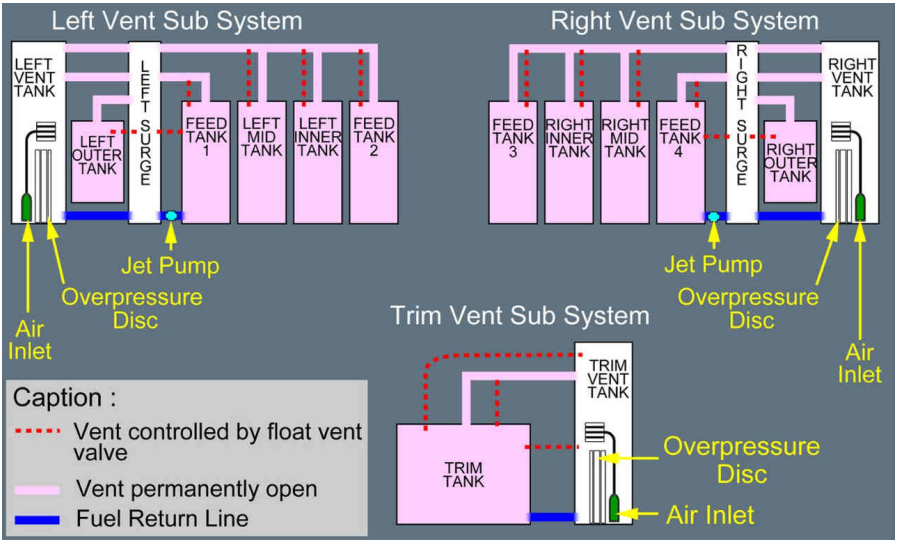
Usable Fuel (Fuel specific density: 6.55 lb/US Gal)							
	Outer Tanks (each)	Feed Tanks 1, 4 (each)	Mid Tanks (each)	Inner Tanks (each)	Feed Tanks 2, 3 (each)	Trim Tank	Total
Volume	2 731.5 US Gal	7 300 US Gal	9 633 US Gal	2 190.5 US Gal	7 754 US Gal	6 261 US Gal	85 479 US Gal
Weight	17 891 lb	47 815 lb	63 096 lb	79 848 lb	50 789 lb	41 010 lb	559 888 lb

L2 In cold temperature conditions, the specific density of the fuel can reach a maximum of 7.45 lb/US Gal. With this maximum specific density, the tanks weight is:
- 20 350 lb for each outer tank
- 54 385 lb for each feed tank 1 and 4
- 90 827 lb for each inner tank
- 57 767 lb for each feed tank 2 & 3
- 46 645 lb for the trim tank.

L3 Only the quantity of usable fuel appears on the FUEL SD page.
The quantity of unusable fuel in the tanks is less than 0.25 % of the total capacity. This percentage corresponds to 213.7 US Gal (1 400 lb for a specific density of 6.55 lb/US Gal).

L2 SURGE/VENT TANK SYSTEM

Surge/Vent Tank System



VENT TANK SYSTEM

There are three vent tanks:

- One on each wing, between the wing tip and the outer tank
- One on the right-hand side of the THS. This vent tank is also used as a surge tank.

Each fuel tank connects to the outside atmosphere via a vent tank. This limits the differential pressure between the tanks and the atmosphere, and maintains the pressure within structural limits.

L3 An air inlet connects the vent tanks with the atmosphere. In the event of over(under-)pressure in the vent tank, an overpressure protector (disc) breaks in the corresponding vent tank . This enables the fuel tanks to be vented into the atmosphere, and maintains the pressure within design limits.

L2 SURGE TANK SYSTEM

There are three surge tanks:

- One on each wing, between the outboard feed tank and the outer tank
- One on the right-hand side of the THS.

Surge tanks temporarily collect fuel that may overflow from any tank, when the quantity of fuel in that tank is close to MAX capacity (e.g. If fuel expands by more than 2%, or in case of tight turns during taxi).

Wing Surge Tank System

Each wing has a surge tank.
Fuel that enters the surge tank returns to the outboard feed tank.
L3 This is done by a surge tank jet pump. The fuel returns to the feed tank via a dedicated fuel line.

Note: If the surge tank is full, the fuel will flow into the vent tanks. If this occurs, the fuel will return to the surge tanks by gravity.

L2 THS Surge Tank System

The THS has a surge/vent tank.
Fuel that enters the surge/vent tank returns to the trim tank.
L3 A non-return valve uses gravity to return any fuel from the surge/vent tank to the trim tank, via a dedicated non-return valve.

L3 WATER DRAINING

All fuel tanks and the vent and surge tanks have water-drain valves at their lowest point. These valves are used to drain water from the tank.

ENGINE FEED

Applicable to: ALL

In normal operation, feed tank pumps independently feed each engine from its assigned feed tank. If necessary, crossfeed valves enable any engine to be fed from any feed tank.

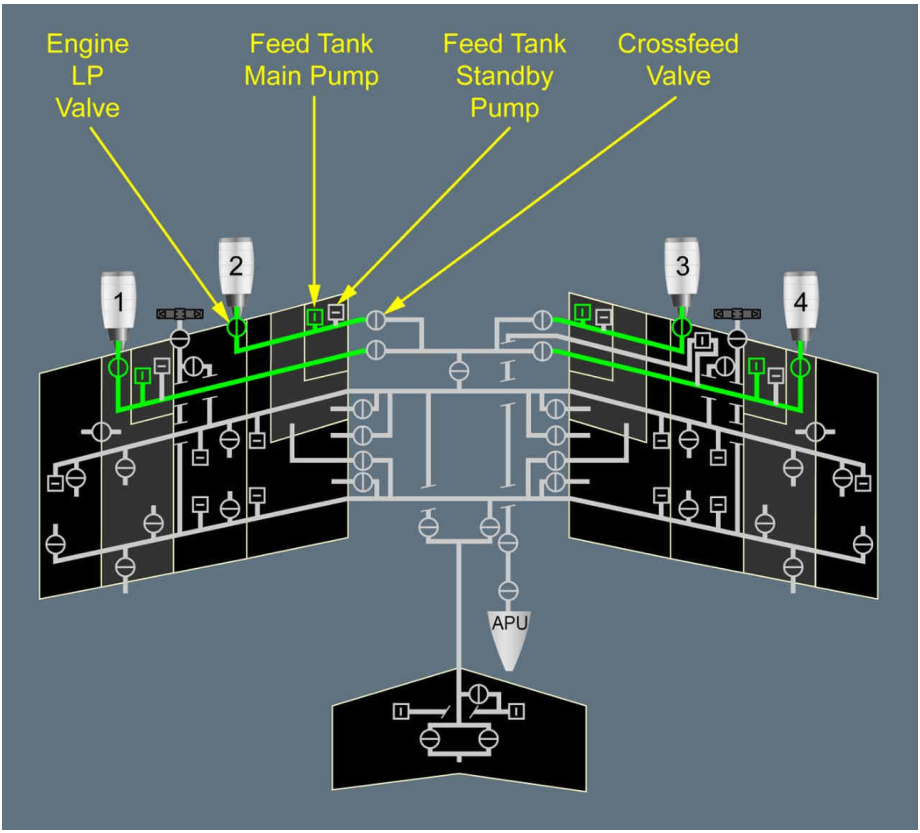
L23

Note: In the case all feed tank pumps fail, fuel can be fed to the engines by gravity, when the aircraft altitude is below the gravity feed ceiling.

The gravity feed properties of the fuel improve with time at altitude, therefore the gravity feed ceiling is:
- *FL 280 , if the flight time above FL 300 is greater than 30 min*
- *FL 050 , if the flight time above FL 300 is less than 30 min .*

When all crossfeed valves are closed, it is possible to select TOGA, up to the gravity feed ceiling.

Engine Feed



FEED TANK PUMPS

There are two identical feed tank pumps in each collector cell. One is a main pump, the other is a standby pump.
In normal operation, each main pump runs continuously, and feeds its assigned engine.
If a main pump is detected low pressure, or is switched off, the corresponding standby pump automatically takes over.

Note: *In flight, with all crossfeed valves open, two pumps can supply fuel to the four engines.*

CROSSFEED VALVES

Each engine has a crossfeed valve, that connects the engine and its assigned pumps to the crossfeed line. This valve enables the engine to be fed from any feed tank pump, if necessary (e.g. its assigned main and standby pumps are off).
Crossfeed valves allow the flight crew to manually correct any fuel imbalance in the feed tanks.

All crossfeed valves automatically open:
- In electrical emergency configuration, and the slats are retracted, or
- When required for an automatic ground transfer.

L3 The crossfeed valves are positioned to avoid rotor burst.
For redundancy, each crossfeed valve has two motors with different electrical supplies.

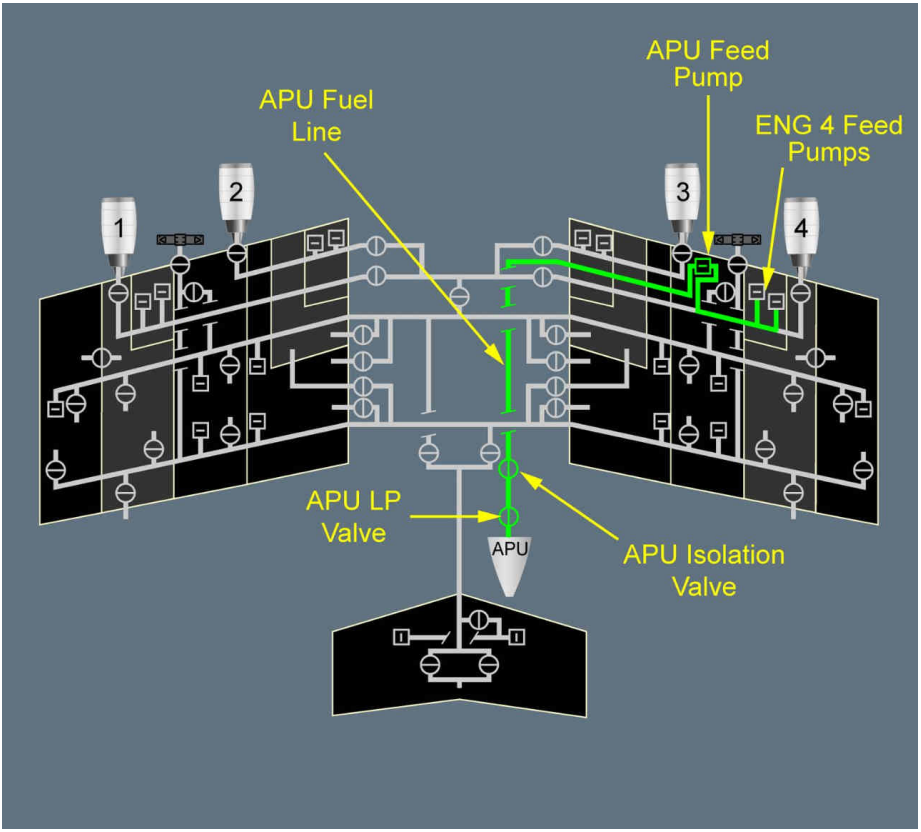
ENGINE LP VALVES

Each engine has a Low Pressure (LP) valve, that is used to stop the flow of fuel to the engine.
The ENG MASTER sw control the LP valves.
The LP valves automatically close, when their associated ENG FIRE pb is pushed.
L3 For redundancy, each LP valve has two motors with different electrical supplies.

APU FEED

Applicable to: ALL

APU Feed System



The engine-feed system feeds the APU via its assigned fuel line.

The APU can be fed by:

- The main or standby pump of Feed Tank 4, or
- The main or standby pump of any feed tank, provided that the applicable crossfeed valves are open, or
- The APU feed pump, that operates automatically, if required.

L2 The APU feed pump automatically starts to run, if the fuel pressure is too low for the APU to operate correctly.

An APU LP valve and an APU isolation valve can isolate the fuel supply to the APU . Both valves close, when the APU FIRE pb is pushed, or when the APU MASTER pb-sw is set to OFF.

L3 For redundancy, the APU LP valve has two motors with different electrical supplies.

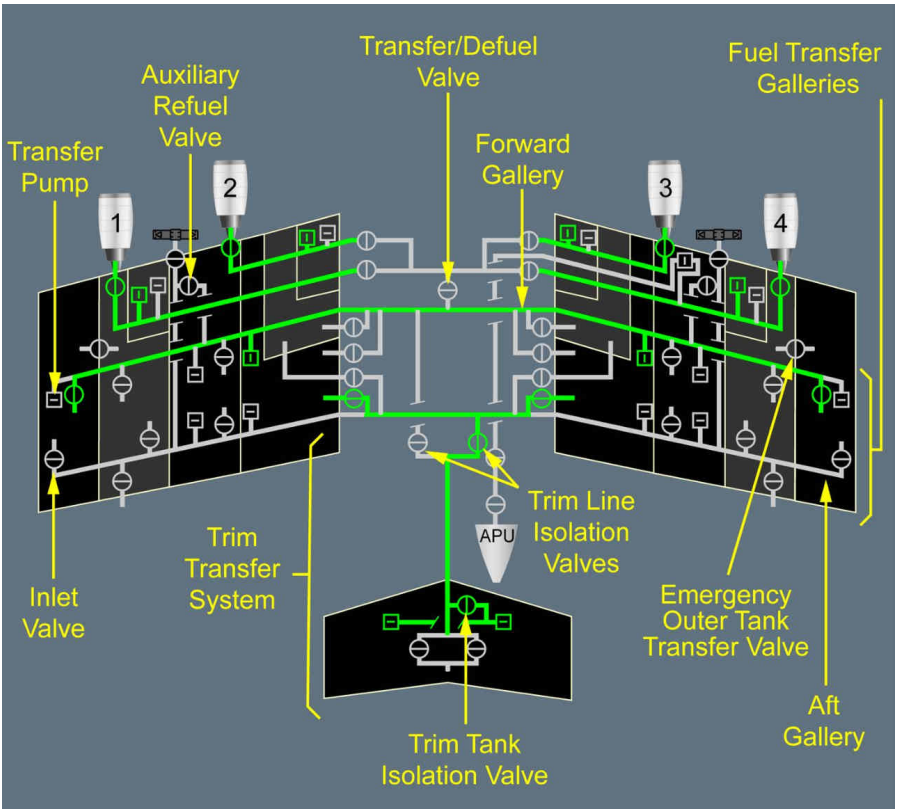
L2 If the fuel system detects any damage to the APU feed line, the APU LP valve and APU isolation valve automatically close, to avoid fuel leaks in the fuselage. If running, the APU feed pump is also turned off.

TRANSFER SYSTEM

Applicable to: ALL

GENERAL

Fuel Transfer System



The fuel transfer system enables the transfer of necessary fuel quantities from tank to tank. Fuel transfers can:

- Provide fuel to the feed tanks, from the transfer tanks (inner, mid, outer, and trim tanks). *Refer to Main Transfers*
- Reduce the loads on the structure, by controlling the quantity of fuel in the outer and trim tanks. *Refer to Load Alleviation Transfers*
- Control the Center of Gravity (CG) of the aircraft, by transferring fuel from the trim tank to the wing tanks. *Refer to CG Control Transfers*

FUEL TRANSFER GALLERIES

Two galleries (FWD and AFT) pass through all wing tanks (inner, mid, outer, and feed tanks) to enable fuel transfers.

L3 The FWD and AFT galleries:
- Can be connected to each other, via two auxiliary refuel valves (one on each side), during refueling, defueling, jettison, and some alternate transfers.
- Can be connected to the crossfeed line, via one transfer/defuel valve, when required for defuel and ground transfers. This enables the feed tanks to be defueled.

L1 **FWD GALLERY**

The transfer tanks (inner, mid, and outer tanks) each have one transfer pump connected to the FWD gallery.
Each wing tank (transfer and feed tanks) can receive fuel from the FWD gallery, via one inlet valve in each tank.

AFT GALLERY

The inner and mid tanks each have one transfer pump connected to the AFT gallery.
Each wing tank (transfer and feed tanks) can receive fuel from the AFT gallery, via one inlet valve in each tank.

In normal operation:
- The FWD gallery is for fuel transfers to the wing tanks
- The AFT gallery is for fuel transfers from the trim tank to the wing tanks.

Note: *The fuel transfer system can use the FWD and AFT galleries simultaneously to perform two different transfers (e.g. a wing tank transfer and a CG control transfer).*

In case of a failure in one of the galleries, the other gallery takes over for alternate fuel transfers (For more information: *Refer to DSC-28-40-2840B Alternate Transfers*).

L2 If the FWD gallery is no longer available:
- The mid and inner tanks each use one transfer pump connected to the AFT gallery
- The outer tanks each use their inlet valve, that is connected to the AFT gallery, as an outlet valve.

TRIM TRANSFER SYSTEM

A trim line connects the trim tank to the AFT and FWD galleries.

L3 This is done via two trim line isolation valves, one for each gallery.

L2 If the fuel system detects any damage to the trim line, it is automatically isolated, to avoid fuel leaks in the fuselage.

L1 In normal operation, fuel is transferred from/to the trim tank, via the AFT gallery.

FOR AFT TRANSFERS ON GROUND:

Fuel transfers to the trim tank, via the inlet valve.

L3 There are two inlet valves in the trim tank. However, they appear as a single valve on the FUEL System Display.

L1 FOR FORWARD TRANSFERS (ON GROUND AND IN FLIGHT):

Fuel transfers from the trim tank, using two trim transfer pumps, via the trim tank isolation valve.

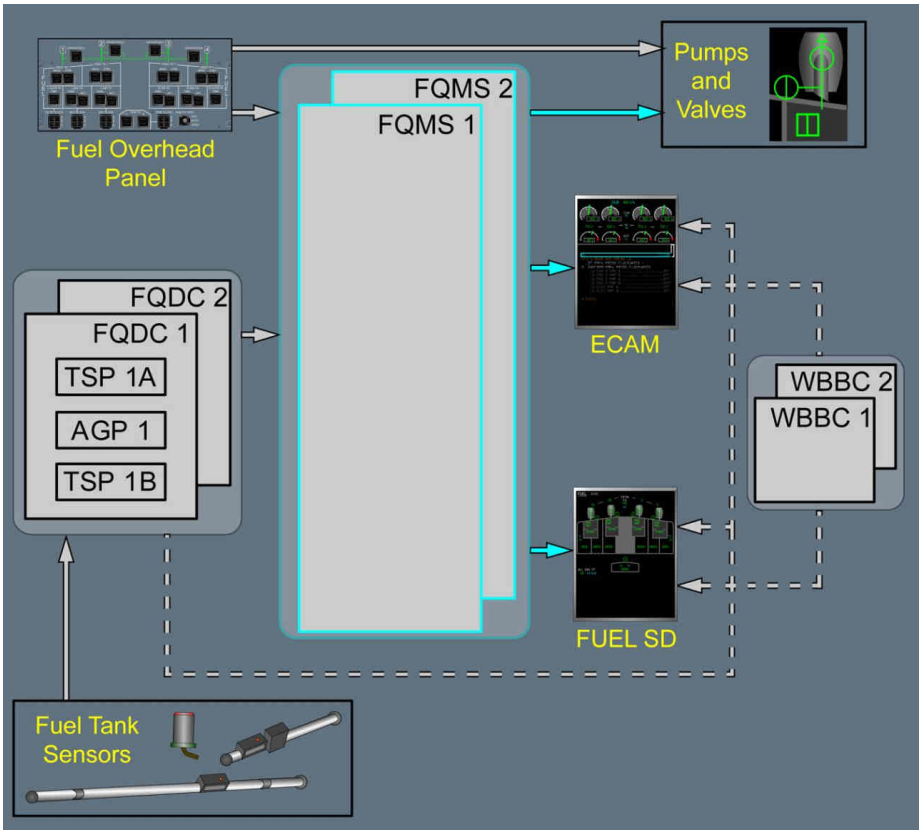
EMERGENCY OUTER TANK TRANSFER VALVE

In each wing, a valve connects the outer tank to the outer feed tank (FEED TK 1 or 4).
In normal operations, the valves remain closed.
If a manual outer tank transfer is performed with any outer tank pump off, the emergency outer tank transfer valve will automatically open (For more information: *Refer to DSC-28-40-DSC2840A Manual transfer from the outer tanks to the feed tanks*).
In some failure cases, the flight crew will open the emergency outer tank transfer valves, via the OUTR TK EMER XFR pb-sw , as requested by the ECAM.

FUEL SYSTEM ARCHITECTURE

Applicable to: ALL

Fuel System Architecture



FUEL QUANTITY MANAGEMENT SYSTEM (FQMS)

There are two FQMS , that control and monitor the fuel system.

L3 The FQMS are hosted on CPIOM -F.

L2 The FQMS :
- Measure the fuel quantity and temperature in the tanks.

L3 The FQMS receive fuel tank sensor data, via the Fuel Quantity Data Concentrator (FQDC). The FQMS compute the fuel quantity in each tank.

L2
- Compute the Gross Weight (GW) and the Gross Weight Center of Gravity (GWCG) of the aircraft, based on the Zero Fuel Weight (ZFW) and the Zero Fuel CG (ZFCG) entered by the flight crew in the FMS
- Monitor the engine feed system
- Control and monitor the APU feed system
- Control and monitor the fuel transfers (Main, Load alleviation and CG control transfers)
- Monitor manual transfers
- Control and monitor the fuel jettison system
- Control and monitor refueling, defueling and automatic ground transfers

Note: During a manual refuel/defuel, the FQMS only monitors.

- Provide fault detection for the ECAM , and fuel system indication for the FUEL System Display (SD)
- Control and monitor the Fuel/hydraulic heat exchangers (For more information: *Refer to Hydraulic System Description*).

L1 One FQMS is active and the other is in standby. If the active FQMS fails, the other takes over.

If both FQMS fail (FUEL FQMS 1+2 FAULT), the following functions remain available:
- Manual transfers, via the overhead panel
- Pumps and crossfeed valves control, via the overhead panel
- Pumps and crossfeed valves indications on the FUEL System Display
- FOB , GW and GWCG display on the FUEL System Display

L2 Depending on the failure case:
- FOB , GW and GWCG are computed by the FQMS (FUEL FQMS 1+2 FAULT is due to the failure of the fuel management function of both FQMS)
- FOB is computed by the CDS , based on the FOB at departure and the fuel used, while the GW and GWCG are computed by the WBBC (in all other failure cases). FOB , GW and GWCG are displayed with amber dashes.

L1 - Fuel tank quantity indications on the FUEL SD

L2 Depending on the failure case:
- Fuel tank quantities are computed by the FQMS (FUEL FQMS 1+2 FAULT is due to the failure of the fuel management function of both FQMS)
- Fuel tank quantities are computed by the AGP (FUEL FQMS 1+2 FAULT is due to the total failure of both FQMS). Fuel tank quantities are displayed with amber dashes.
- Fuel tank quantities are lost, and replaced by amber crosses (FUEL FQMS 1+2 FAULT is due to the disagree between the AGP and the FQMS).

L1 - Low level, overflow, excessive aft CG and lateral imbalance cautions.

If both FQMS fail, the transfer indications and the trim tank isolation valve indication are lost.

FUEL QUANTITY DATA CONCENTRATOR (FQDC)

There are two FQDCs which collect the following information from in-tank sensors:
- Fuel level
- Fuel density
- Fuel temperature.

The FQDCs transmits this data to the FQMS.

L2 Each FQDC includes:
- Two Tanks Signal Processors (TSPs)
- One Alternate Gauging Processor (AGP).

TANK SIGNAL PROCESSORS (TSP)

The Tank Signal Processors are the interface between the tank sensors and the FQMS.
The TSPs receive fuel level, density and temperature information from all the sensors located in the fuel tanks.

ALTERNATE GAUGING PROCESSOR (AGP)

The AGP receives fuel tank sensor data, via the TSPs, and computes fuel tank quantities.
The fuel tank quantities computed by the AGP are transmitted to the FQMS for comparison with the fuel tank quantities computed by the FQMS. If the FQMS computes a difference that is greater than a given threshold, the FQMS is declared faulty. This ensures the integrity of the fuel tank quantities displayed on the FUEL SD page.
The fuel quantities computed by the AGP appear on the FUEL SD page, when both FQMS are failed (except if the failure is due to a difference between the AGP and the FQMS).

Note: Fuel quantities computed by the AGP are less accurate than fuel quantities computed by the FQMS. Therefore, the quantities computed by the AGP appear with amber dashes.

The AGP is used to provide cautions in the event of low level, overflow, lateral or longitudinal (on ground only) imbalance and transfer pump faults (pump running in a dry tank), in addition to the FQMS detection.

L2 **FUEL TANK SENSORS**

The FQDCs receive information from the following fuel tank sensors:

- Fuel Quantity Indication (FQI) probes

L3 FQI probes are distributed throughout all the tanks (including surge and vent tanks).
Each fuel tank probe enables the FQMS to know the fuel level at a given point in a tank.

L2 - Temperature sensors

L3 The temperature sensors are located:

- In the outer tanks and trim tank, to trigger the FUEL TEMP LO caution
- In the feed tanks, to trigger the FUEL FEED TK 1(2)(3)(4) TEMP HI and FUEL TEMP LO cautions.

L2 - Fuel properties measurement units (FPMU)

L3 The three FPMUs (in Feed Tank 1, 2 and 3) provide fuel density, temperature and electrical characteristics.
If two FPMUs are failed, the fuel quantity indication accuracy is degraded in all tanks

L2 - Probe Compensator and Temperature (PCT) sensor

L3 There is one PCT sensor in each wing tank and two in the trim tank.
When the probe is fully immersed, it provides fuel temperature and electrical characteristics.
When the probe is not fully immersed, it provides fuel temperature and level.

WEIGHT AND BALANCE BACKUP COMPUTER

There are two WBBCs that compute the GW and CG, based on aerodynamic data and on the position of the flight control surfaces.

L2 *Note: The WBBC starts computing the GW and CG after the retraction of the slats and flaps.*

L1 The GW and CG computed by the WBBC are:

- Displayed on the permanent data of the System Display when both FQMS are failed (GW and GWCG displayed with amber dashes)
- Used to compute flight control laws and characteristic speeds when both FQMS are failed
- Used to provide a warning against excessive aft CG
- Used to detect discrepancies between the GW and CG computed by the FQMS, and the GW and CG computed by the WBBC.

L2 The WBBC computes the aircraft GW and CG by using the following parameters:

- Altitude
- Mach

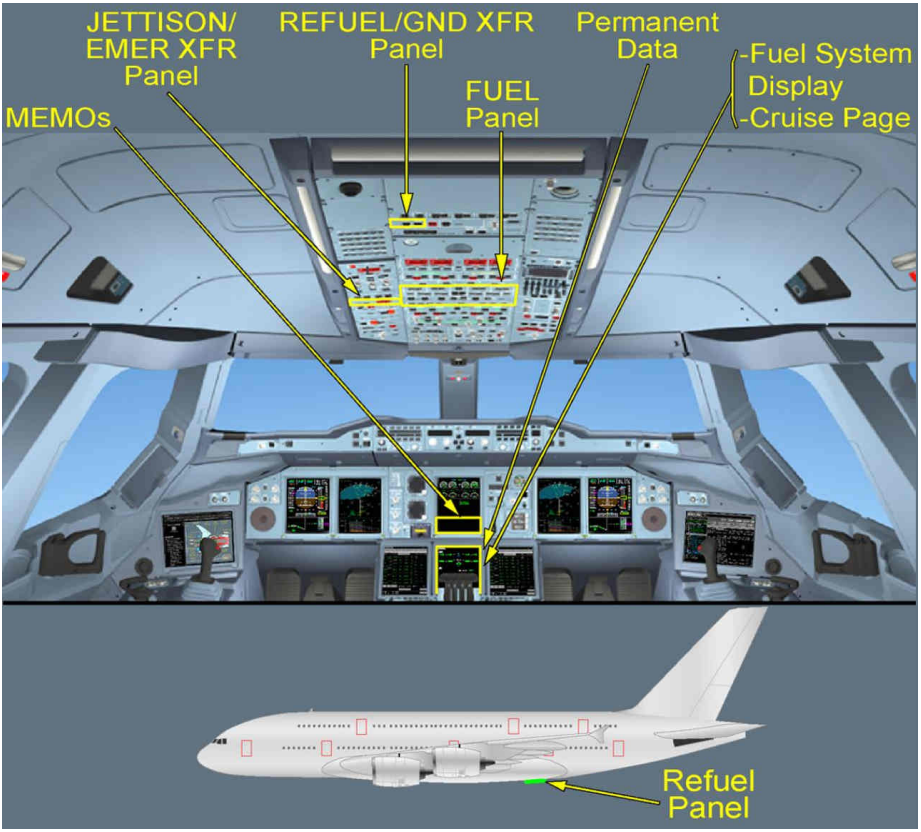
- Angle of attack
- The position of the elevators and the trimmable horizontal stabilizer.

If the WBBC does not have the necessary input to compute the GW by using aerodynamic data, or after slats/flaps extension, the GW is computed by using the fuel used and the takeoff GW (as computed by the WBBC at slats/flaps retraction).
The computation of the CG is unavailable after slats/flaps extension.

COCKPIT VIEW

Applicable to: ALL

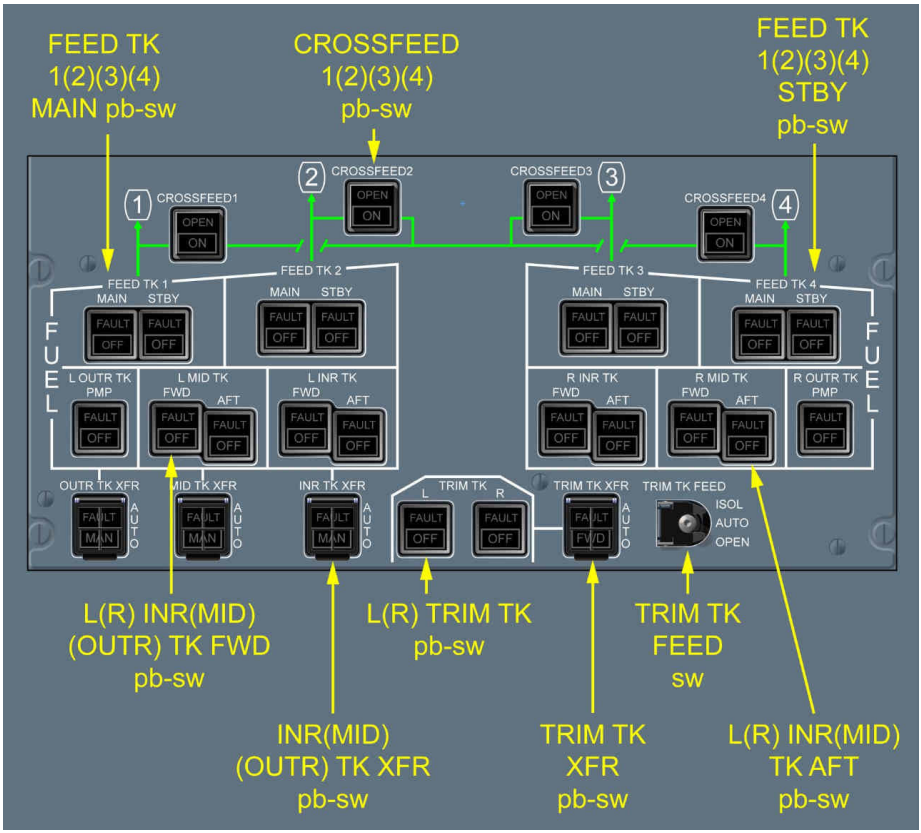
Controls and Indicators



FUEL PANEL

Applicable to: ALL

FUEL Panel



feed tk 1(2)(3)(4) MAIN pb-sw



The main pump is running.



The main pump is off.

L12



The main pump is running at low pressure or is failed.

Associated with one of the following ECAM cautions:
- FUEL FEED TK 1(2)(3)(4) MAIN PMP FAULT (*Refer to procedure*)
- FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMP FAULT (*Refer to procedure*)
- FUEL L(R) WING FEED PMPs FAULT (*Refer to procedure*).

The FAULT light goes off, when the flight crew sets the FEED TK 1(2)(3)(4) MAIN pb-sw to OFF .

FEED TK 1(2)(3)(4) stby pb-sw



The standby pump runs automatically, when the associated main pump is failed, or is off.



The standby pump is off.

L12



The standby pump is running at low pressure or is failed.

Associated with one of the following ECAM alerts:
- FUEL FEED TK 1(2)(3)(4) STBY PMP FAULT (*Refer to procedure*)
- FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMP FAULT (*Refer to procedure*)
- FUEL L(R) WING FEED PMPs FAULT (*Refer to procedure*)

The FAULT light goes off, when the flight crew sets the FEED TK 1(2)(3)(4) STBY pb-sw to OFF .

I(r) INR(MID)(OUTR) TK FWD pb-sw



The transfer pump runs, if necessary:
- For an automatic fuel transfer from the inner, mid, or outer tanks, via the forward gallery, or
- For a manual transfer from the outer tanks, via the forward gallery (except if any outer tank pump has been switched off), or
- During jettison.



The transfer pump is off.

L12



Comes on:

- When the transfer pump is failed, or is abnormally on

  Associated with one of the following ECAM alerts:
  - FUEL L(R) INR FWD PMP FAULT (*Refer to procedure*)
  - FUEL L(R) INR FWD+AFT PMPs FAULT (*Refer to procedure*)
  - FUEL L(R) MID FWD PMP FAULT (*Refer to procedure*)
  - FUEL L(R) MID FWD+AFT PMPs FAULT (*Refer to procedure*)
  - FUEL L(R) OUTR PMP FAULT (*Refer to procedure*).

- Or, when the transfer pump must be turned off to allow a manual gravity transfer:

  Associated with the following ECAM alert:
  - FUEL OUTR TK XFR FAULT (*Refer to procedure*)

The FAULT light goes off, when the flight crew sets the L(R) INR(MID)(OUTR) TK FWD pb-sw to OFF .

L(R) MID(INR) TK AFT pb-sw



The transfer pump runs, if necessary:

- For an automatic or manual fuel transfer from the inner, or mid tanks, via the aft gallery, or
- During jettison.



The transfer pump is off.

L12



The transfer pump is failed, or is abnormally on, or a low pressure is detected during a manual transfer

Associated with one of the following ECAM alerts:
- FUEL L(R) INR AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) INR FWD+AFT PMPs FAULT (*Refer to procedure*)
- FUEL L(R) MID AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) MID FWD+AFT PMPs FAULT (*Refer to procedure*)

The FAULT light goes off, when the flight crew sets the L(R) MID(INR) TK AFT pb-sw to OFF .

TRIM TK L(R) pb-sw



The transfer pump runs, if necessary:
- For an automatic or manual fuel transfer, or
- During jettison.



The transfer pump is off.

L12



Comes on:
- When the transfer pump is failed, or is abnormally on, or a low pressure is detected during a manual transfer

  Associated with one of the following ECAM alerts:
  - FUEL TRIM TK L(R) PMP FAULT (*Refer to procedure*)
  - FUEL TRIM TK L+R PMPs FAULT (*Refer to procedure*)
  - FUEL TRIM TK XFR FAULT (*Refer to procedure*)
- Or, when the trim line is damaged and all trim tank transfers must be inhibited.

  Associated with the following ECAM alert:
  - FUEL TRIM & APU LINES FAULT (*Refer to procedure*)

The FAULT light goes off, when the flight crew sets the TRIM TK L(R) pb-sw to OFF .

INR(MID)(OUTR) TK XFR pb-sw



Automatic fuel transfers from the inner (mid)(outer) tanks are available.
For more information: *Refer to Fuel Transfer Sequence*



Fuel manually transfers from the inner (mid)(outer) tanks to the feed tanks.

L12



Comes on:

- When automatic fuel transfers from the affected tanks are no longer possible.

  Associated with one of the following ECAM alerts:
  - FUEL MAN XFR PROCEDURE (*Refer to procedure*)
  - FUEL OUTR TK XFR FAULT (*Refer to procedure*)

- Or, when a low level is detected in one or more of the feed tanks.

  Associated with the following ECAM alerts:
  - FUEL FEED TK 1(2)(3)(4) LEVEL LO (*Refer to procedure*)
  - FUEL FEED TKs 1+2(3+4) LEVEL LO (*Refer to procedure*)
  - FUEL ALL FEED TKs LEVEL LO (*Refer to procedure*)

- Or, (for the OUTR TK XFR pb-sw only) when a low fuel temperature is detected in the outer tanks.

  Associated with the following ECAM alert:
  - FUEL TEMP LO (*Refer to procedure*)

The FAULT light goes off, when the flight crew sets the INR(MID)(OUTR) TK XFR pb-sw to MAN .

TRIM TK XFR pb-sw



Automatic fuel transfers from the trim tank are available.
For more information: *Refer to Fuel Transfer Sequence*



Fuel manually transfers from the trim tank to the inner tanks.

L12



Comes on:

- When an excessive aft CG is detected
  The Weight and Balance Backup Computer (WBBC) monitors the CG .

  Associated with the following ECAM alert:
  - FUEL EXCESS AFT CG (*Refer to procedure*)

- Or, when the CG has been previously detected at the forward limit, and the trim tank transfer can resume

  Associated with the following ECAM alert:
  - FUEL CG AT FWD LIMIT (*Refer to procedure*)

- Or, when a manual trim tank transfer is required

  Associated with the following ECAM alert:
  - FUEL TRIM XFR FAULT (*Refer to procedure*)
  - FUEL MAN XFR PROCEDURE (*Refer to procedure*)

- Or, when a low fuel temperature is detected in the trim tank

  Associated with the following ECAM alert:
  - FUEL TEMP LO (*Refer to procedure*)

- Or, when there is a low level of fuel in any feed tank, and there is still some fuel in the trim tank

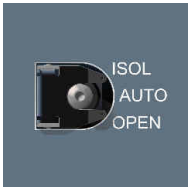
  Associated with one of the following ECAM alerts:
  - FUEL FEED TK 1(2)(3)(4) LEVEL LO (*Refer to procedure*)
  - FUEL FEED TKs 1+2 (3+4) LEVEL LO (*Refer to procedure*)
  - FUEL ALL FEED TKs LEVEL LO (*Refer to procedure*)

- Or, when an overflow of the trim tank is detected.

  Associated with the following ECAM alert:
  - FUEL TRIM TK OVERFLOW (*Refer to procedure*)

The FAULT light goes off, when the flight crew sets the TRIM TK XFR pb-sw to MAN .

TRIM TK FEED selector



The trim tank transfers are automatic.

L12



The trim tank forward transfer stops and the trim tank transfer line is isolated.

The following valves close to isolate the transfer line:
- The trim tank isolation valve
- The trim tank inlet valves
- The trim pipe isolation valves.



The following valves open, to allow gravity transfer from the trim tank to the inner tanks:
- Trim tank inlet valves
- Trim pipe isolation valve connected to the aft gallery
- Inner tank aft inlet valves.

CROSSFEED 1(2)(3)(4) pb-sw



The crossfeed valve is closed.

All crossfeed valves automatically open:
- In electrical emergency configuration, while the slats are retracted, or
- If required for an automatic ground transfer.



The CROSSFEED 1(2)(3)(4) pb-sw is set to ON and the crossfeed valve is open.

L12



The CROSSFEED 1(2)(3)(4) pb-sw is set to ON and the crossfeed valve remains closed.

Associated with the following ECAM alert:
- FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (*Refer to procedure*).

The OPEN /ON lights go off, when the flight crew deselects the CROSSFEED 1(2)(3)(4) pb-sw .

L12



The CROSSFEED 1(2)(3)(4) pb-sw is deselected and the crossfeed valve is open.

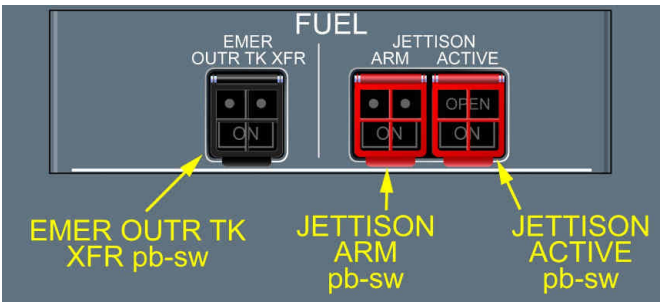
If the crossfeed valve is abnormally open, this is associated with the following ECAM alert:
- FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (*Refer to procedure*).

If the crossfeed valve is automatically commanded open (automatic ground transfer or electrical emergency configuration), there is no associated alert.

JETTISON / EMER OUTR TK XFR PANEL

Applicable to: ALL

JETTISON / EMER OUTR TK XFR Panel



JETTISON ARM pb-sw



Jettison is not armed.



Jettison is armed, and can be activated using the JETTISON ACTIVE pb-sw.

JETTISON ACTIVE pb-sw



Jettison is not active.



Jettison is selected active. The jettison valves open, if the JETTISON ARM pb-sw is also ON .



The jettison valves are fully open.
The ON and OPEN lights go off, when the FQMS automatically stops the jettison, or when the flight crew presses the JETTISON ACTIVE pb-sw or JETTISON ARM pb-sw again.
Fore more information: *Refer to Fuel Jettison System Description and Operation* .

EMER OUTR TK XFR pb-sw



The emergency outer tank transfer valves are closed.

L12



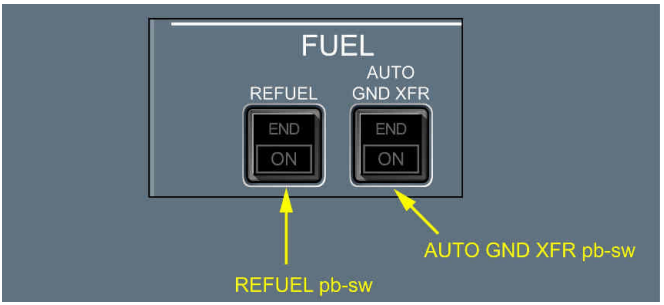
The emergency outer tank transfer valves are commanded open. Fuel transfers from the outer tanks into the outer feed tanks (FEED TK 1 or 4).

The EMER OUTR TK XFR pb-sw is used in the case of:
- ENG 1(2)(3)(4) FAIL with damage (*Refer to procedure*)
- FUEL NORM XFR FAULT (*Refer to procedure*)
- FUEL NORM + ALTN XFR FAULT (*Refer to procedure*)
- ELEC EMER CONFIG (*Refer to procedure*)
- ELEC AC BUS 2 FAULT (*Refer to procedure*)
- ELEC AC BUS 4 FAULT (*Refer to procedure*)
- ELEC AC ESS BUS FAULT (*Refer to procedure*)
- ELEC DC BUS 1 FAULT (*Refer to procedure*)
- ELEC DC BUS 2 FAULT (*Refer to procedure*)
- ELEC DC ESS BUS FAULT (*Refer to procedure*).

REFUEL/GROUND TRANSFER PANEL

Applicable to: ALL

REFUEL/AUTO GND XFR Panel



REFUEL pb-sw

Refueling is usually initiated from the external REFUEL panel, that is under the aircraft belly fairing.
However, refueling can also be initiated from the cockpit, via the REFUEL pb-sw . Cockpit refueling takes a priority over a refueling initiated from the external REFUEL panel.



Refueling from is not activated.



When pressed, refueling from the cockpit is enabled.

L12



Refueling was initiated from the cockpit and has completed, or has aborted.

If the FQMS aborts refueling, the light flashes. This is associated with the following ECAM alert:
- FUEL REFUEL FAULT (*Refer to procedure*)

AUTO GND XFR pb-sw

L12



Automatic ground transfer is not active.

Note: Only manual transfers can be initiated from the external REFUEL panel.

L12



When pressed, automatic ground transfer is activated to automatically obtain the ground CG target.

Note: All transfer pumps must selected ON to perform an automatic ground transfer.

L12



Automatic ground transfer is completed, or is aborted by the FQMS .

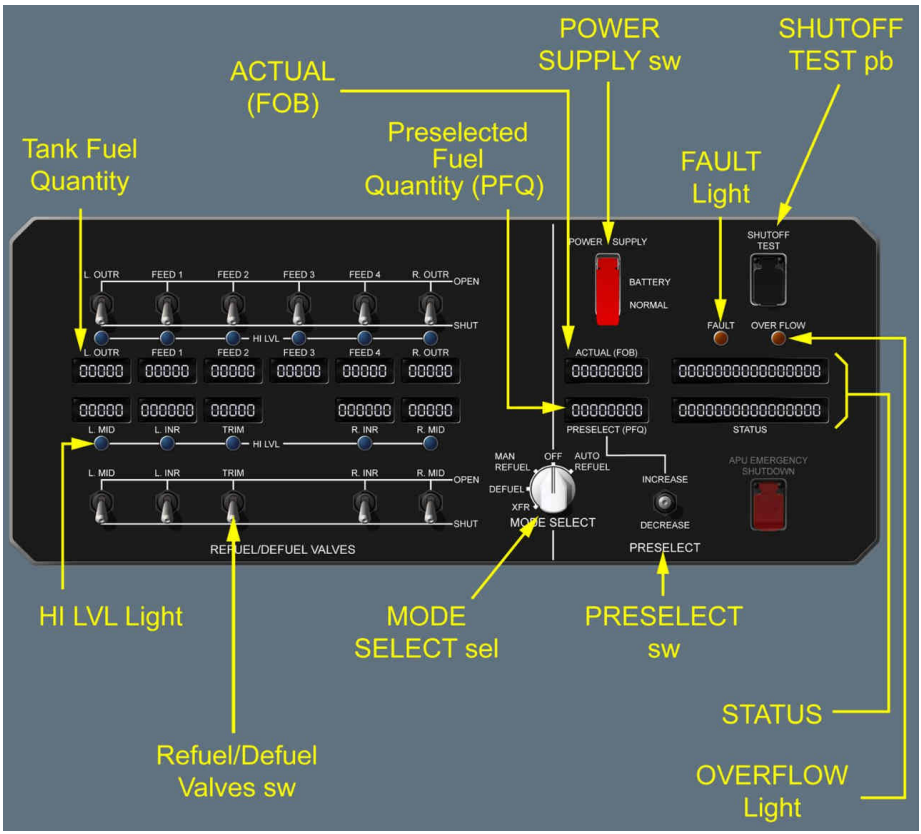
If the FQMS aborts the automatic ground transfer, the light flashes. This is associated with the following ECAM alert:
- FUEL AUTO GND XFR FAULT (*Refer to procedure*)

REFUEL PANEL

Applicable to: ALL

Refueling can be initiated from the cockpit, or from the external refuel panel.
L2 The external refuel panel is on the right-hand side of the lower belly fairing.

Refuel Panel



L3 TANK FUEL QUANTITY INDICATORS

Display the actual fuel quantity in each tank.

The fuel quantity indicators do not display the units. They use the same units that the FQMS uses for cockpit indications (i.e. kg or lbs). Theses units also appear in the ACTUAL and PRESELECT indications on the external refuel panel.

L3 PRESELECT (PFQ) INDICATOR

Displays the Preselected Fuel Quantity (PFQ) for automatic refueling.

The PFQ is selected via:
- The PRESELECT sw on the refuel panel, or
- A ground terminal, via ACARS, or
- The OIS REFUEL application, or
- The FMS FUEL & LOAD page.

L3 ACTUAL FUEL QUANTITY INDICATOR

Displays the current total fuel quantity on board.

L3 POWER SUPPLY sw

During refueling/defueling, the fuel system is powered by the external electrical power or by the APU.
If these electrical sources are not available, the fuel system can also be powered by the batteries, by using the POWER SUPPLY sw.

L3 FAULT LIGHT

Comes on in amber, if there is an equipment failure. The STATUS indicator displays the type of the failure.

L3 SHUTOFF TEST pb

When pressed, the shutoff test is initiated:
1. All the lights and displays come on
2. When released, all the inlet valves close, in the same order as during a refuel abort
3. The result of the test appears on the STATUS indicators.

L3 OVERFLOW LIGHT

Comes on in amber, if there is more than 264 US Gal of fuel in any surge tank.

L3 STATUS INDICATOR

The two lines of the STATUS indicator display the status of the refuel, transfer or defuel.
The top line displays the current mode.

The bottom line displays any additional message or failure.

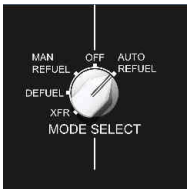
L3 PRESELECT sw

Increases or decreases the PFQ.

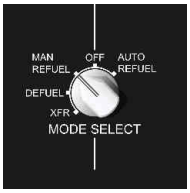
L3 MODE SELECT selector



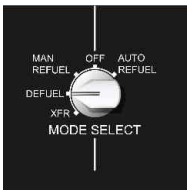
Refueling, defueling or ground transfer is not initiated from the external refuel panel.



Automatic refueling is initiated and controlled from the external refuel panel.



Manual refueling is initiated and controlled from the external refuel panel.



Defueling is initiated and controlled from the external refuel panel.



A manual ground transfer is initiated and controlled from the external refuel panel.
Automatic ground transfers can be initiated from the cockpit only.

Note: Automatic refueling or automatic ground transfer can be initiated from the cockpit at any time, whatever the position MODE SELECT selector.

L3 **Refuel/defuel Valves sw**

The refuel/defuel valves switches open the two inlet valves of the associated tank, during manual refueling, manual ground transfer or defueling (the MODE SELECT selector is set to MAN REFUEL, XFR or DEFUEL).

L3 **HI LVL LIGHT**

Comes on in blue, when a high fuel level is detected in the corresponding tank.

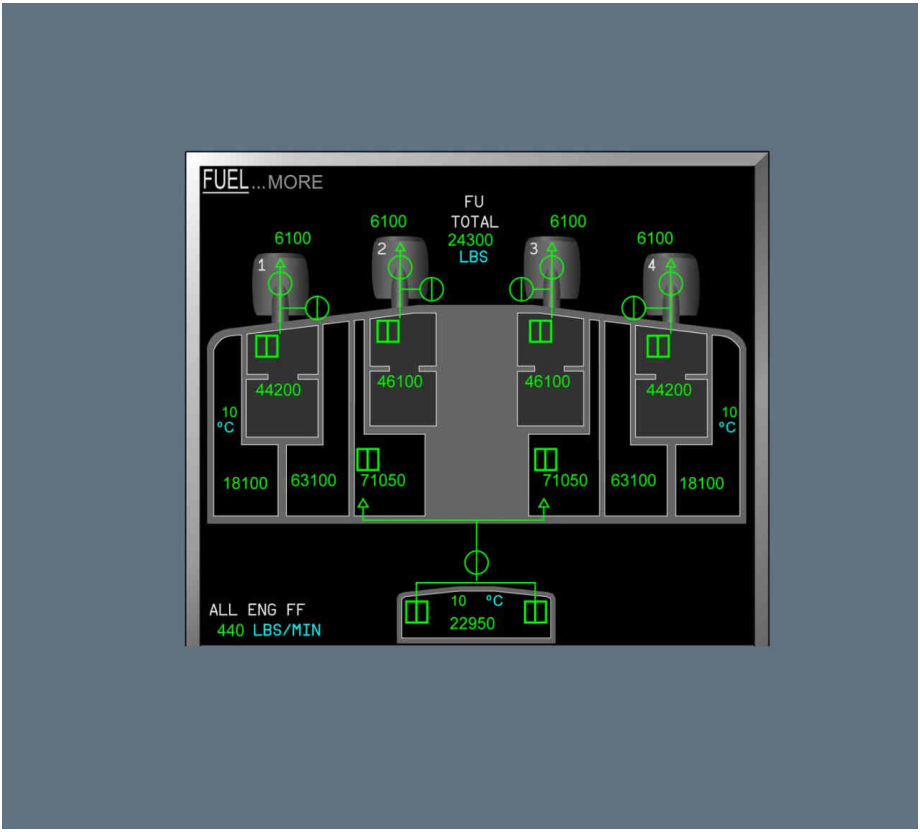
FUEL SYSTEM DISPLAY

Applicable to: ALL

The FUEL System Display provides the flight crew with information on the aircraft's fuel system and indicates the:

- Status of the fuel system components that are in use (e.g.: pumps, transfer paths)
- Fuel temperature in the Outer Tanks and Trim Tank
- Quantity of fuel in each tank
- Quantity of fuel used
- Fuel flow value.

FUEL System Display



The MORE key on the ECP can be used to display additional fuel system information. When pressed:

-

The MORE title, on the top left-hand corner of the ECAM page, changes from 

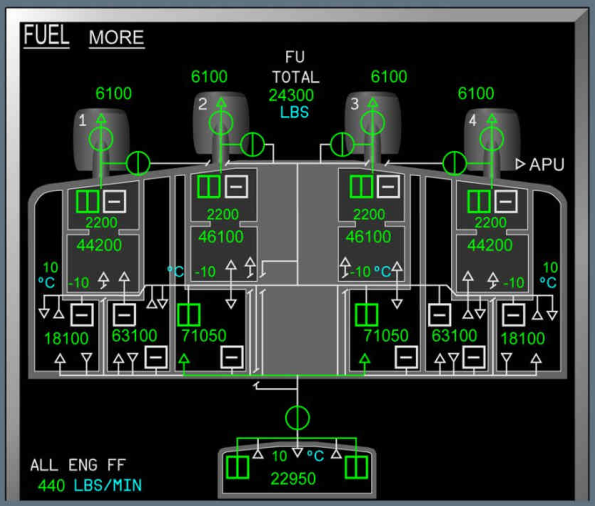
to 

- The quantity of fuel in the collector cells, and the fuel temperature in the Feed Tanks are displayed

L2 *Note:* *In the case of an abnormal feed tank temperature or collector cell quantity, the associated indication will be displayed, even if the MORE page is not selected.*

L1 - All supplementary data appears in grey.

FUEL MORE System Display



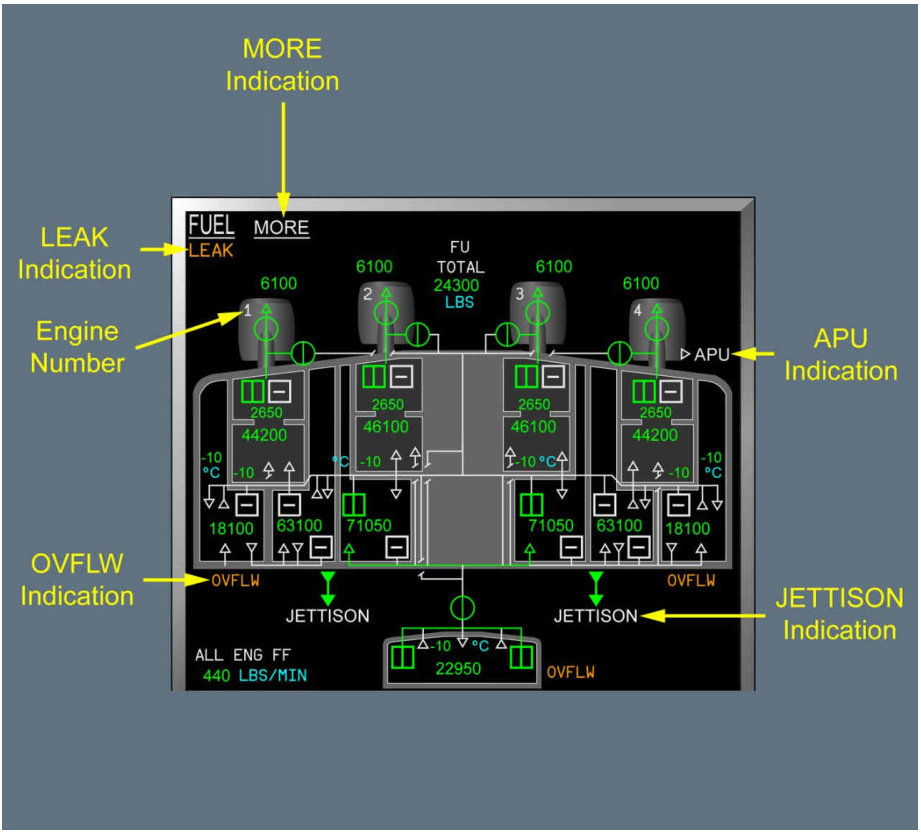
For a description of the FUEL System Display:

- *Refer to Fuel indications*
- *Refer to Fuel quantities, temperatures, Fuel Used and Fuel Flow*
- *Refer to Pumps and valves*

FUEL SYSTEM DISPLAY - INDICATIONS

Applicable to: ALL

Fuel System Display — Indications



MORE INDICATION



The fuel system components in use (e.g. the pumps that are running, the transfer paths), the fuel used, the fuel flow, and the fuel tank quantities are displayed on the FUEL system display.



Additional information (e.g. pumps on standby, collector cell quantity) is displayed.

APU INDICATION

L12



Fuel is not fed to the APU .
The APU LP valve and/or the APU isolation valve are closed.
This information appears on the MORE page only.

L12



Fuel is fed to the APU .
The APU LP valve and the APU isolation valve are open.

L12



Fuel is abnormally fed to the APU .
The APU LP valve and the APU isolation valve are abnormally open.

Associated with the following ECAM alert:
- FUEL APU FEED VLV NOT CLOSED (*Refer to procedure*).

L12



Fuel is abnormally not fed to the APU .
The APU LP valve and/or the APU isolation valve are abnormally closed.

Associated with the following ECAM alert:
- FUEL APU FEED FAULT (*Refer to procedure*).

JETTISON INDICATION



Jettison is active. The jettison valves are open.

L12



Jettison is activated, but the jettison valves are closed.

Associated with the following ECAM alert:
- FUEL JETTISON FAULT (*Refer to procedure*).

L12



Either jettison valve is abnormally open.

Associated with the following ECAM alert:
- FUEL JETTISON VLV NOT CLOSED (*Refer to procedure*).

OVERFLOW INDICATION

L12

OVFLW

- For the wing tanks: Appears when a L(R) vent overflow is detected, or fuel is detected in the L(R) surge tank
- For the trim tank: Appears when a trim vent overflow is detected.

Associated with one of the following ECAM alerts:
- FUEL WING TK OVERFLOW (*Refer to procedure*)
- FUEL TRIM TK OVERFLOW (*Refer to procedure*)

The indication disappears, when the overflow is no longer detected.

ENGINE NUMBER INDICATION

1

Engine 1(2)(3)(4) is running.

1

Engine 1(2)(3)(4) is not running.

LEAK INDICATION

L12

LEAK

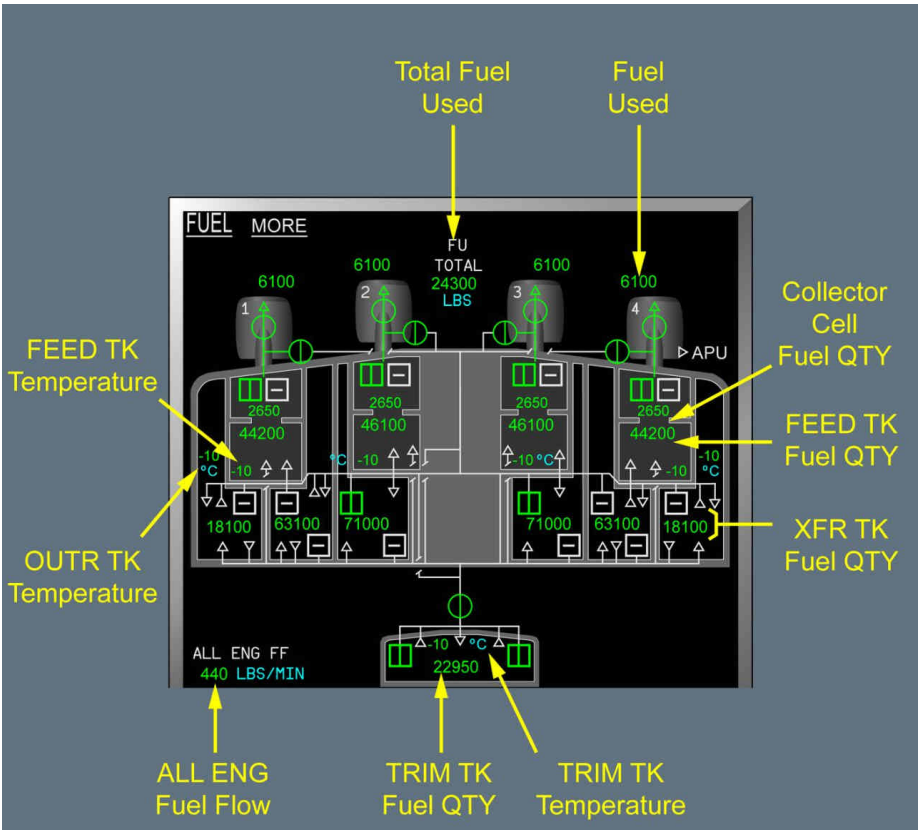
Indicates a fuel leak.
Appears only in the event that the ECAM does not display the FUEL LEAK DETECTED alert.

Note: The ECAM will not display the FUEL LEAK DETECTED alert if the communication between the FQMS and the FWS is failed. In this case, the flight crew can activate the FUEL LEAK DETECTED alert, via the not sensed procedures.

FUEL SYSTEM DISPLAY - FUEL QTY, TEMP, FU AND FF

Applicable to: ALL

FUEL System Display — QTY, TEMP, FU and FF



FUEL USED (FU) INDICATION

L12

6100

Indicates the fuel used by each engine.
This value automatically resets on ground, at the next engine start.
Appears in multiples of 100 lb.



The accuracy of the displayed value is degraded.

TOTAL FUEL USED INDICATION

L2 This indication automatically resets on ground, at the first engine start.

L12



Indicates the total fuel used by the four engines and the APU.
Appears in multiples of 100 lb.

L1



Indicates the total fuel used by the four engines. The fuel used by the APU is not available.



The total fuel used accuracy is degraded, because the fuel used accuracy of at least one engine is degraded.



The all engine fuel used accuracy is degraded, because the fuel used accuracy of at least one engine is degraded. The fuel used by the APU is not available.

COLLECTOR CELLS - FUEL QUANTITY INDICATION

The collector cell fuel quantity appears, in case of a low collector cell fuel quantity, or when the MORE key is pressed.

L12



The fuel quantity of collector cell 1(2)(3)(4) is within a normal range.
This information appears on the MORE page only.
The value is displayed in multiples of 50 lb .

L12



A low fuel quantity is detected in the collector cell.

Associated with the following ECAM alert:
- FUEL COLLECTOR CELL 1(2)(3)(4) NOT FULL (*Refer to procedure*).

The collector cell fuel quantity indication disappears, when the fuel quantities in all collector cells return to normal.

FEED TANK FUEL QUANTITY INDICATION

L12



The fuel quantity in feed tank 1(2)(3)(4) is within a normal range.
The value is displayed in multiples of 50 lb .

L12



The value accuracy is degraded.

Associated with one of the following ECAM alerts:
- FUEL GAUGING FAULT (*Refer to procedure*)
- FUEL FQMS 1+2 FAULT (*Refer to procedure*)

L12



A low fuel quantity is detected in the corresponding feed tank.

Associated with one of the following ECAM alerts:
- FUEL FEED TK 1(2)(3)(4) LEVEL LO (*Refer to procedure*)
- FUEL FEED TKs 1+2(3+4) LEVEL LO (*Refer to procedure*)
- FUEL ALL FEED TKs LEVEL LO (*Refer to procedure*)

As soon as the fuel quantity returns to normal, the indication becomes green.

L12



The fuel quantity in feed tanks 1(2) is not balanced with the fuel quantity in feed tank 4(3).

Associated with the following ECAM alert:
- FUEL WINGS NOT BALANCED (*Refer to procedure*)

When the fuel is balanced, the FUEL WINGS BALANCED (*Refer to procedure*) caution appears.

L12



Some of the fuel in the feed tank is not usable.

Associated with one of the following ECAM alerts:
- FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPs FAULT (*Refer to procedure*)
- FUEL L(R) WING FEED PMPs FAULT (*Refer to procedure*)

L12



The fuel in the feed tank is not usable.

Associated with the following ECAM alert:
- FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (*Refer to procedure*)

L (R) INNER (MID) (OUTER) TANK FUEL QUANTITY INDICATION

L12



The fuel quantity of the left (right) inner (mid) (outer) tank.
The value is displayed in multiples of 50 lb .

L12



The value accuracy is degraded.

Associated with one of the following ECAM alerts:
- FUEL GAUGING FAULT (*Refer to procedure*)
- FUEL FQMS 1+2 FAULT (*Refer to procedure*)

L12



The fuel quantity in the left inner (mid) (outer) tank is not balanced with the fuel quantity in the right inner (mid) (outer) tank.
Associated with the following ECAM alert:

- FUEL WINGS NOT BALANCED (*Refer to procedure*)

When the fuel is balanced, the FUEL WINGS BALANCED (*Refer to procedure*) caution appears.

L12



The fuel in the tank is not usable.

Associated with one of the following ECAM alerts:
- FUEL NORM + ALTN XFR FAULT (*Refer to procedure*)
- FUEL L(R) INR TK FWD + AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) MID TK FWD + AFT PMP FAULT (*Refer to procedure*)

L12



Some of the fuel in the tank is not usable.

Associated with one of the following ECAM alerts:
- FUEL NORM + ALTN XFR FAULT (*Refer to procedure*)
- FUEL L(R) OUTR TK PMP FAULT (*Refer to procedure*)

OUTER AND TRIM TANKS - FUEL TEMPERATURE INDICATION

When there is fuel in the outer and trim tanks and the temperature sensors are immersed, their associated fuel temperatures are displayed on the FUEL SD page.

L2 The temperature sensor immersion thresholds for cruise pitch & roll conditions (at average fuel density) are approximately:
- 8 819 lb in the outer tanks
- 13 890 lb in the trim tank.

L1 When the fuel temperature sensors are not immersed, the associated fuel temperatures are not displayed.



The fuel temperature in the left(right) outer(trim) tank is within a normal range.

L12



The fuel temperature is below -40 °C .
Associated with the following ECAM alert:

- FUEL TEMP LO (*Refer to procedure*).

TRIM TANK FUEL QUANTITY INDICATION

L12



The fuel quantity in the trim tank.
The value is displayed in multiples of 50 lb .

L12



The value accuracy is degraded.

Associated with one of the following ECAM alerts:
- FUEL GAUGING FAULT (*Refer to procedure*)
- FUEL FQMS 1+2 FAULT (*Refer to procedure*)

L12



The fuel in the trim tank is not usable.

Associated with one of the following ECAM alerts:
- FUEL TRIM TK XFR FAULT (*Refer to procedure*)
- FUEL TRIM & APU LINES FAULT (*Refer to procedure*)

L12



Some fuel in the trim tank is not usable.

Associated with one of the following ECAM alerts:
- FUEL TRIM TK XFR FAULT (*Refer to procedure*)
- FUEL TRIM TK L+R PMPs FAULT (*Refer to procedure*)

ALL ENGINE FUEL FLOW (ALL ENG FF) INDICATION

L12



The fuel flow of all engines.
The value is displayed in multiples of 20 lb/min.



The value accuracy is degraded.

FEED TANK - FUEL TEMPERATURE INDICATION

The feed tank temperature appears, in case of low or high temperature, or when the MORE key is pressed.



The fuel temperature is within a normal range.

L12



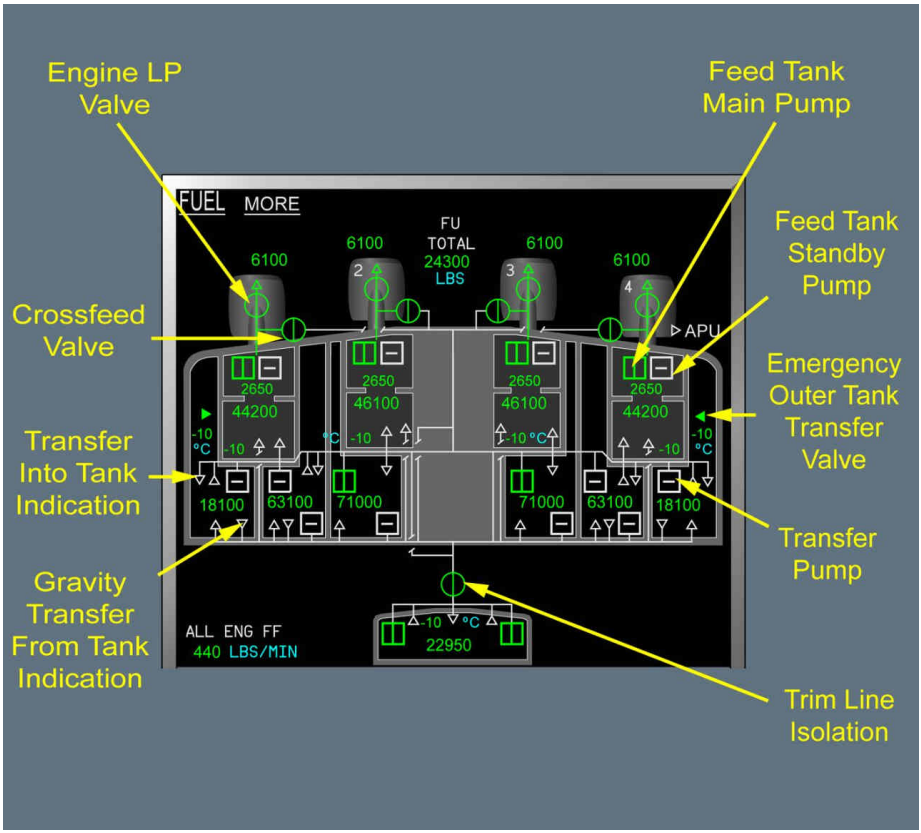
The fuel temperature is above 53 °C , or below -40 °C .
Associated with one of the following ECAM alerts:

- FUEL TEMP LO (*Refer to procedure*)
- FUEL FEED TK 1(2)(3)(4) TEMP HI (*Refer to procedure*).

FUEL SYSTEM DISPLAY - PMPS, VALVES

Applicable to: ALL

FUEL System Display - PMPs Valves and Transfers



ENGINE LP VALVE



The valve is open.

L12



The valve is abnormally open.

Associated with the following ECAM alert:
- FUEL ENG 1(2)(3)(4) LP VLV FAULT (*Refer to procedure*).

L12



The valve is normally or abnormally closed.

If the valve is abnormally closed, it is associated with the following ECAM alert:
- FUEL ENG 1(2)(3)(4) LP VLV FAULT (*Refer to procedure*).

FEED TANK MAIN PUMP



The pump is running.



The pump is abnormally running.

L12



The pump is failed or is turned off by the flight crew.

Associated with the following ECAM alert:
- FUEL FEED TK 1(2)(3)(4) MAIN PMP FAULT (*Refer to procedure*)



The pump is on, and the pump pressure is below normal.

FEED TANK STANDBY PUMP



The feed tank standby feed pump is not running, because the feed tank main pump is running.
This information appears on the MORE page only.



The standby pump is running.
The main engine pump pressure is below normal.



The standby pump is abnormally running.

L12



The main and standby pumps are failed or turned off.

Associated with the following ECAM alert:
- FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPs FAULT (*Refer to procedure*).



The standby pump is on, and the pump pressure is below normal.

EMERGENCY OUTER TANK TRANSFER VALVE



The emergency transfer valve between the outer tank and the outer feed tank is open.



The emergency transfer valve is abnormally open or abnormally closed.

TRANSFER PUMPS



The transfer pump is not running.
This information appears on the MORE page only.



The transfer pump is running.

L12



The transfer pump is abnormally running.

Associated with one of the following ECAM alerts:
- FUEL L(R) INR(MID) TK FWD PMP FAULT (*Refer to procedure*)
- FUEL L(R) INR(MID) TK AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) INR TK FWD + AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) MID TK FWD + AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) OUTR TK PMP FAULT (*Refer to procedure*)
- FUEL TRIM TK L(R) PMP FAULT (*Refer to procedure*)
- FUEL TRIM TK L+R PMP FAULT (*Refer to procedure*)

L12



The transfer pump is failed or is turned off.

Associated with one of the following ECAM alerts:
- FUEL L(R) INR(MID) TK FWD PMP FAULT (*Refer to procedure*)
- FUEL L(R) INR(MID) TK AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) INR TK FWD + AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) MID TK FWD + AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) OUTR TK PMP FAULT (*Refer to procedure*)
- FUEL TRIM TK L(R) PMP FAULT (*Refer to procedure*)
- FUEL TRIM TK L+R PMP FAULT (*Refer to procedure*)

L12



The transfer pump is on, and:
- The pump pressure is below normal, or
- The pump is used for a manual transfer and the associated tank is empty, or
- The pump is used for a manual transfer, the pump pressure is below normal, and the associated tank is not empty.

Associated with one of the following ECAM alerts:
- FUEL L(R) INR(MID) TK AFT PMP FAULT (*Refer to procedure*)
- FUEL L(R) OUTR TK PMP FAULT (*Refer to procedure*)
- FUEL TRIM TK L(R) PMP FAULT (*Refer to procedure*)
- FUEL TRIM TK L+R PMP FAULT (*Refer to procedure*)

TRIM LINE ISOLATION

This valve represents the isolation of the trim line.

L123



The trim tank isolation valve is open.

Note: In flight, when there is fuel in the trim tank, and the TRIM TK FEED selector is set to AUTO, the trim tank isolation valve is open. The trim tank isolation valve is closed for takeoff. It opens above FL 250, or as soon as a CG transfer is required.

L12



The trim line is isolated.

The following valves are closed:
- The trim tank isolation valve
- The trim line isolation valves
- The trim tank inlet valves.

L12



The trim line is abnormally isolated.

- During an automatic transfer:
  - Both trim line isolation valves are abnormally closed, or
  - Both trim tank inlet valves and the trim tank isolation valves are abnormally closed.
- During a pumped manual trim tank transfer:
  - The trim line isolation valve connected to the aft transfer gallery is abnormally closed, or
  - The trim tank isolation valve is abnormally closed.
- During a gravity trim tank transfer:
  - The trim tank isolation valve is abnormally closed, or
  - Any trim tank inlet valve is abnormally closed.

L12



The trim line is abnormally not isolated.

At least one of the following valves is abnormally open:
- The trim tank isolation valve
- The trim tank inlet valves
- The trim line isolation valves.

TRANSFER INTO TANK INDICATION



No fuel transfer into the tank.
This information appears on the MORE page only.



Automatic fuel transfer into the tank.



Manual fuel transfer into the tank.



Abnormal fuel transfer into the tank.

OUTLET VALVE

L2 The inlet valves of the trim, mid, and outer tanks can also be used as outlet valves for gravity transfers.

L1



No gravity transfer from the tank.
This information appears on the MORE page only.



Automatic gravity transfer from the tank.



Manual gravity transfer from the tank.



Abnormal gravity transfer from the tank.

CROSSFEED VALVE



The crossfeed valve is closed.



The crossfeed valve is open.
If at least two crossfeed valves are open, the ECAM displays the CROSSFEED OPEN memo.
During takeoff, this memo is in amber.

L12



The crossfeed valve is abnormally closed.

Associated with the following ECAM alert:
- FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (*Refer to procedure*).

L12



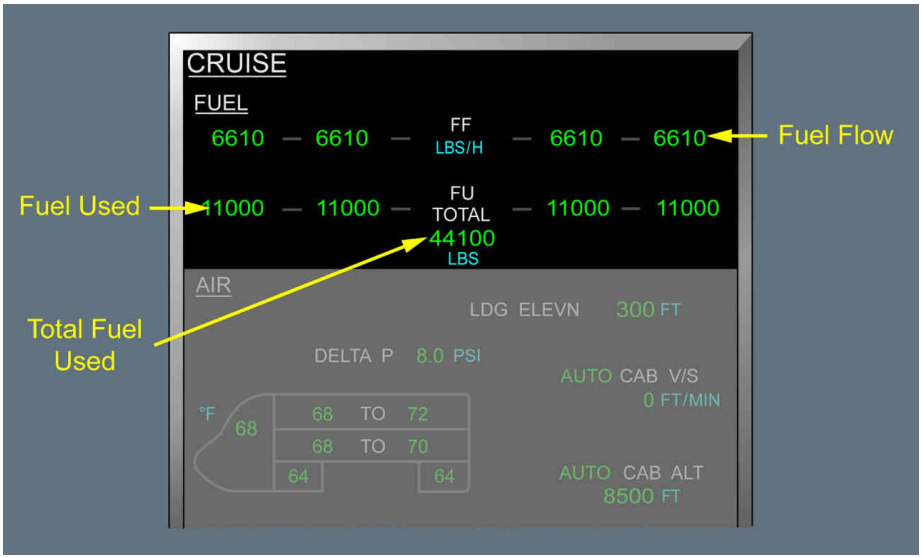
The crossfeed valve is abnormally open.

Associated with the following ECAM alert:
- FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (*Refer to procedure*).

CRUISE PAGE - UPPER PART

Applicable to: ALL

CRUISE System Display — Upper Part



FUEL FLOW INDICATION

L12

3000	The fuel flow of each engine. The value is displayed in multiples of 10 lb/h.
3000	The value accuracy is degraded.

TOTAL FUEL USED INDICATION

L12



Indicates the total fuel used by the four engines and the APU.
Appears in multiples of 100 lb.

L12



Indicates the total fuel used by the four engines only. The APU fuel used value is not valid.
Appears in multiples of 100 lb.



The total fuel used accuracy is degraded, because the fuel used accuracy of at least one engine is degraded.



The all engine fuel used accuracy is degraded, because the fuel used accuracy of at least one engine is degraded. The fuel used by the APU is not available.

FUEL USED (FU) INDICATION

L12



Indicates the fuel used by each engine.
This value automatically resets on ground, at the next engine start.
Appears in multiples of 100 lb.



The accuracy of the displayed value is degraded.

PERMANENT DATA - SYSTEM DISPLAY

Applicable to: ALL

PERMANENT DATA



FUEL ON BOARD INDICATION



quantity on board the aircraft.
displayed in multiples of 100 lb.



uracy is degraded.



t one tank is not usable.

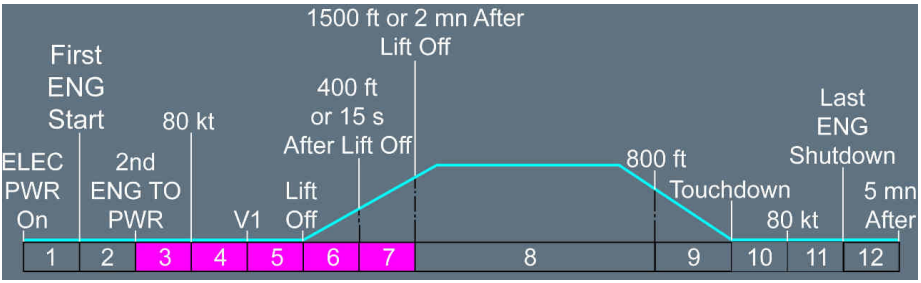
MEMO

Applicable to: ALL

CROSSFEED OPEN — At least two crossfeed valves are open.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

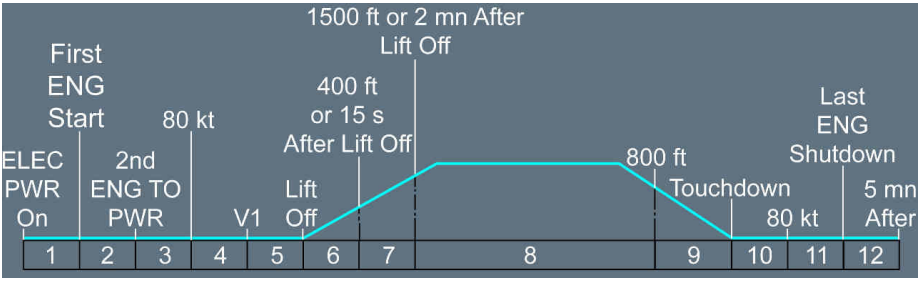


COLDFUEL OUTR TK XFR

Automatic cold fuel transfer from the outer tank is in progress.
For more information on the cold fuel transfer, *Refer to DSC-28-30 Cold Fuel Transfer* .

L2 Flight Phase Inhibition:

Flight Phase Inhibition

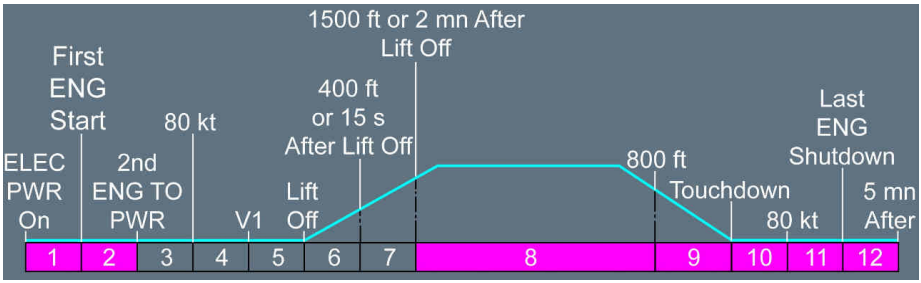


CROSSFEED OPEN

At least two crossfeed valves are open during the takeoff and the go-around phases.

L2 Flight Phase Inhibition:

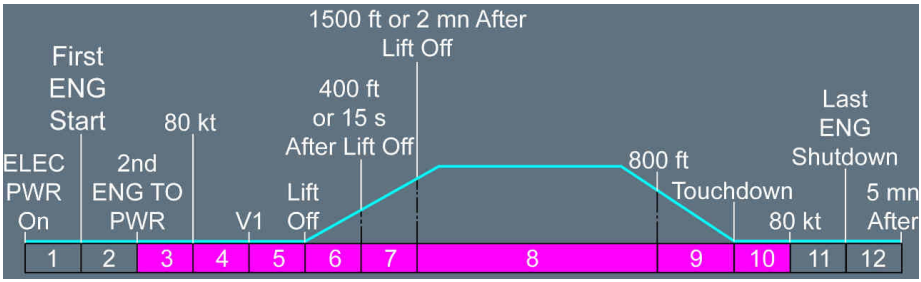
Flight Phase Inhibition



DEFUEL IN PROGRESS — Defueling is in progress.

L2 Flight Phase Inhibition:

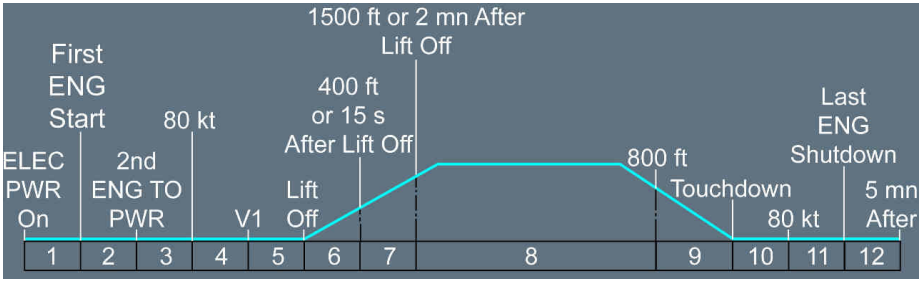
Flight Phase Inhibition



FWD XFR IN PROGRESS — Transfer from trim tank is in progress.

L2 Flight Phase Inhibition:

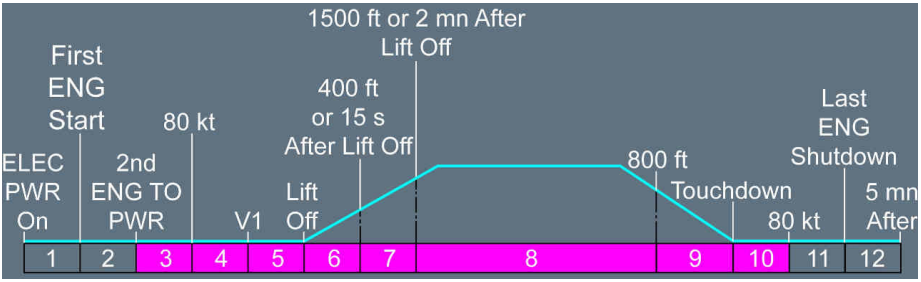
Flight Phase Inhibition



GND XFR IN PROGRESS — Ground transfer is in progress.

L2 Flight Phase Inhibition:

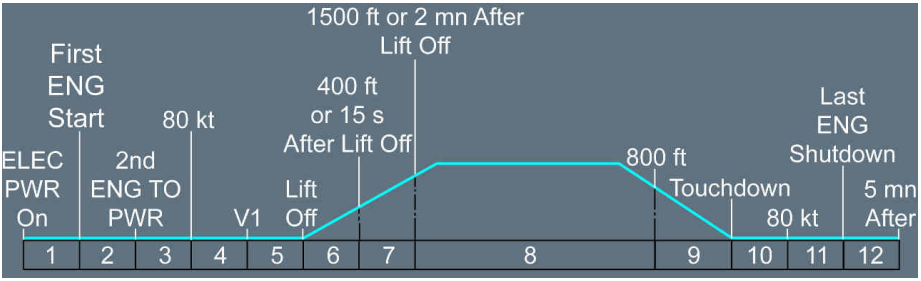
Flight Phase Inhibition



JETTISON IN PROGRESS — Fuel jettison is in progress.

L2 Flight Phase Inhibition:

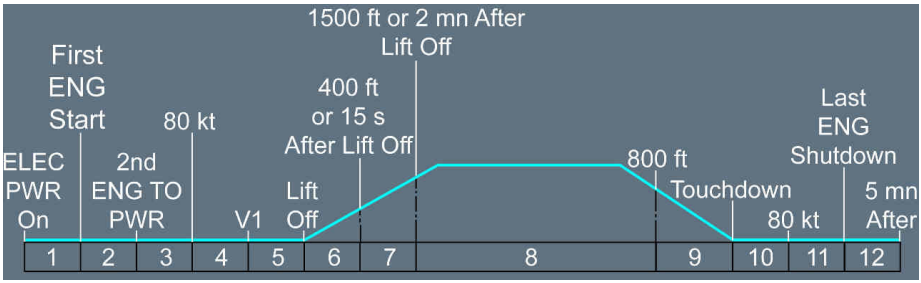
Flight Phase Inhibition



OUTR TK XFR IN PROG — Transfer from outer tanks is in progress.

L2 Flight Phase Inhibition:

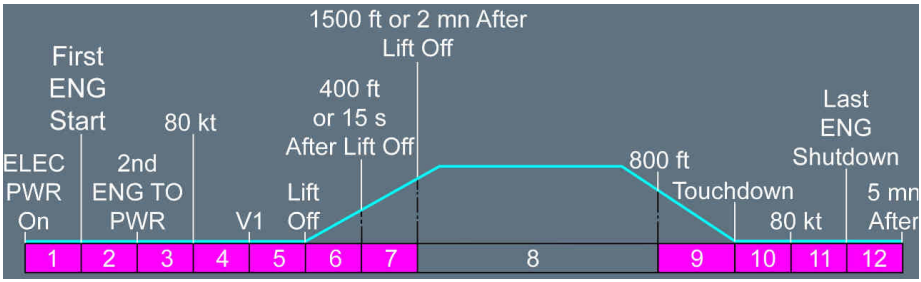
Flight Phase Inhibition



OUTR TKs XFRD — All the fuel in the outer tanks has been transferred.

L2 Flight Phase Inhibition:

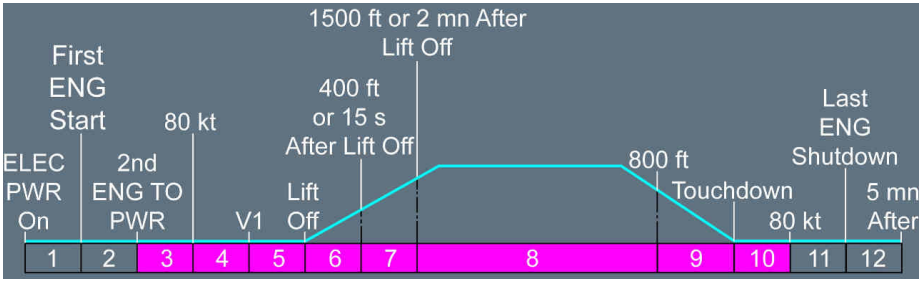
Flight Phase Inhibition



REFUEL IN PROGRESS — Refueling is in progress.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

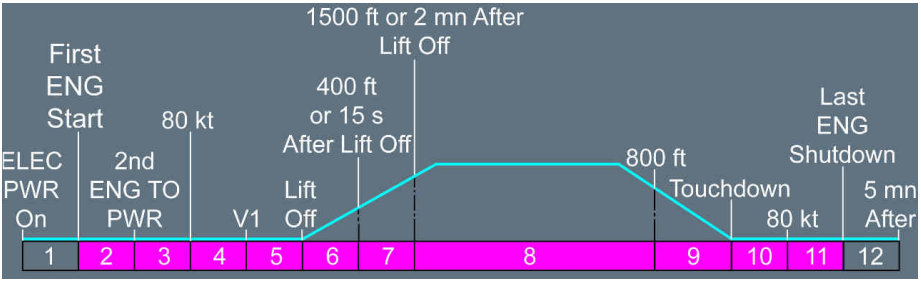


REFUEL PNL DOOR OPEN

The door of the refuel panel is open.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

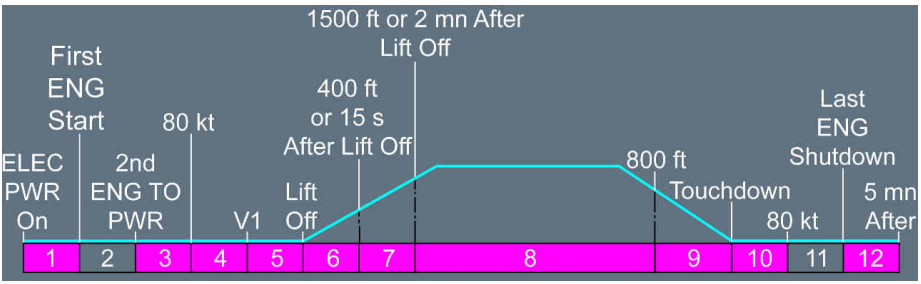


REFUEL PNL DOOR OPEN

The door of the refuel panel is open and an engine is running.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

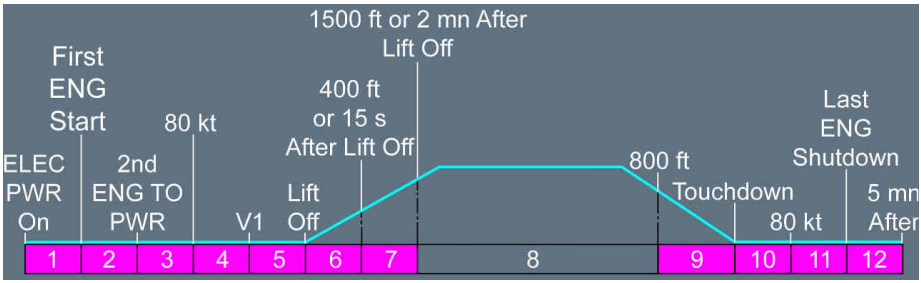


TRIM TK XFRD

All the fuel in the trim tank has been transferred.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

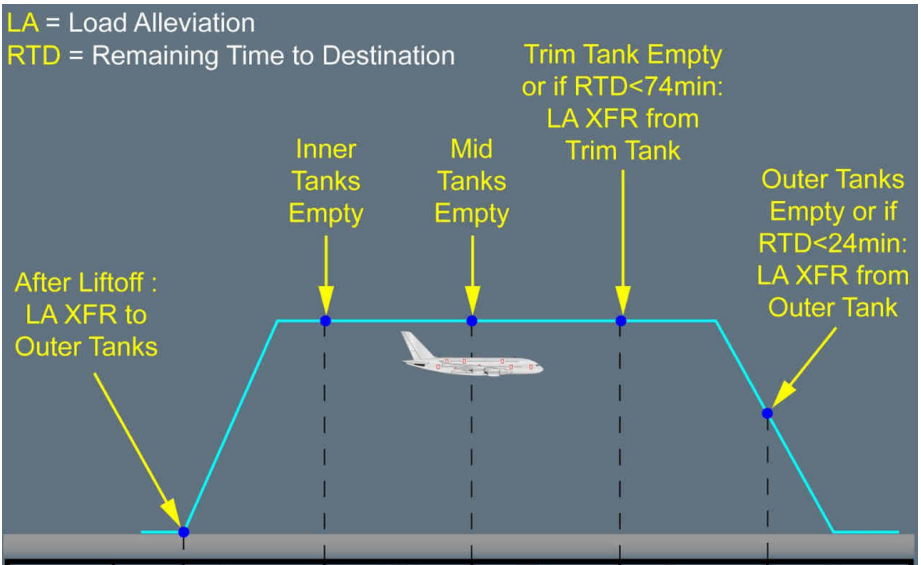


FUEL TRANSFER SEQUENCE

Applicable to: ALL

The following illustration indicates the fuel transfer sequence that is most likely to occur in flight:

Fuel transfer sequence



Main Transfer	From	Inner Tanks	Mid Tanks	Trim Tank	Outer Tanks	No Transfer
	To	Feed Tanks				
CG Transfer	From	Trim Tank				
	To	Inner Tanks	Mid Tanks	Feed Tanks	No Transfer	

MAIN TRANSFERS

Applicable to: ALL

Fuel transfers from the other tanks to the feed tanks are performed to compensate for engine fuel burn.
These transfers are automatic, and are referred to as main transfers.

Main transfers occur in the following sequence:
1. Inner tanks to feed tanks
2. Mid tanks to feed tanks, when the inner tanks are empty
3. Trim tank to feed tanks, when the mid tanks are empty
4. Outer tanks to feed tanks, when the trim tank is empty.

At any moment, only one tank (or pair of symmetric tanks) will provide fuel for main transfers.

L2 **MAIN TRANSFERS FROM THE INNER OR MID TANKS**

The main transfers from the inner or mid tanks to the feed tanks maintain the quantity of fuel in the feed tanks between the transfer threshold and the transfer threshold + 2 200 lb:
- The transfer threshold for feed tanks 1 and 4 is 43 100 lb
- The transfer threshold for feed tanks 2 and 3 is 45 950 lb.

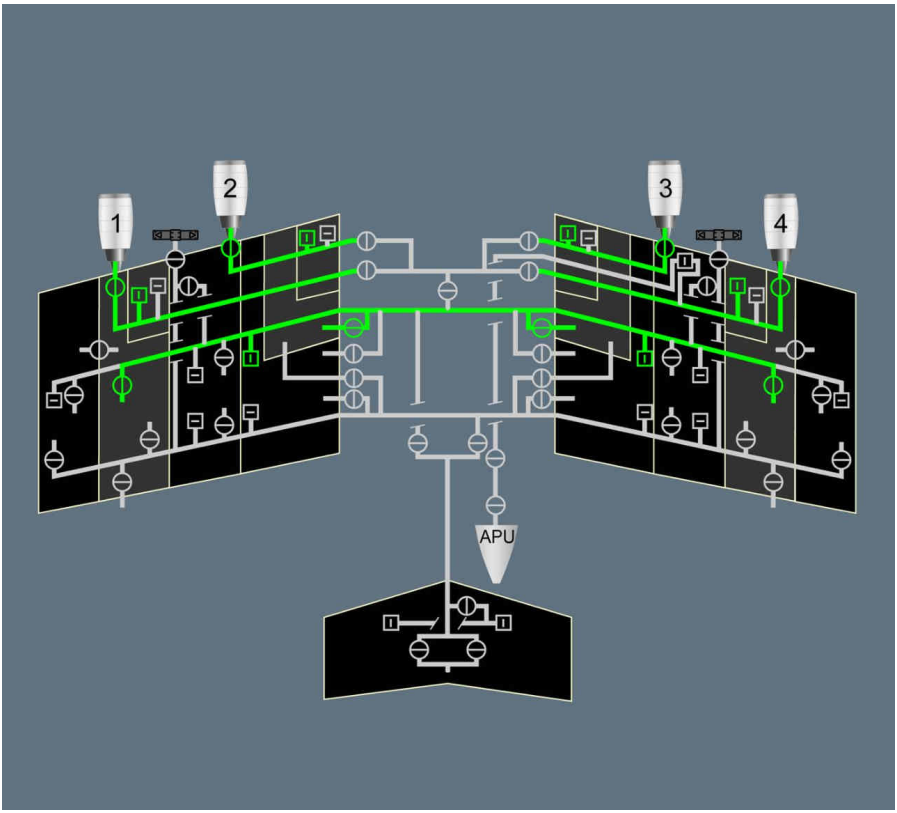
L23

Note: *If the remaining time to destination is less than 90 min:*
- *The transfer threshold for feed tanks 1 and 4 is 36 500 lb*
- *The transfer threshold for feed tanks 2 and 3 is 39 350 lb.*

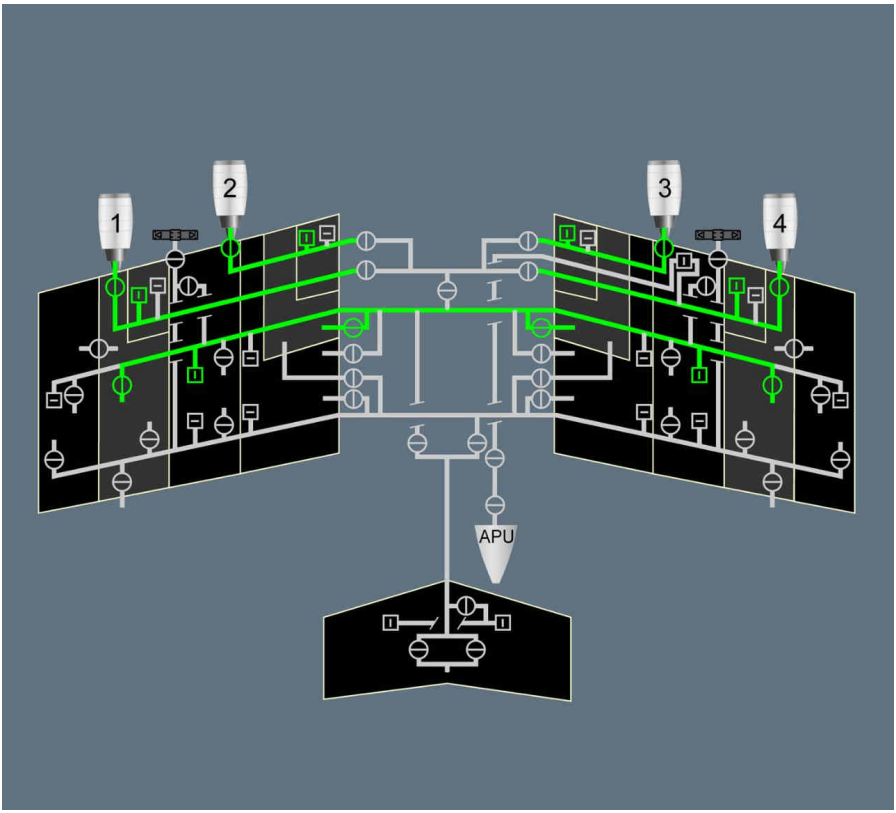
The transfer threshold are reduced to be sure that the feed tanks will not be full at landing. This ensures that sufficient fuel uplifted during refuel goes through the fuel properties measurement units in feed tanks 1, 2 and 3.

Fuel transfers to the feed tanks, via the forward gallery.

Main Transfer from the Inner Tanks



Main Transfer from the Mid Tanks

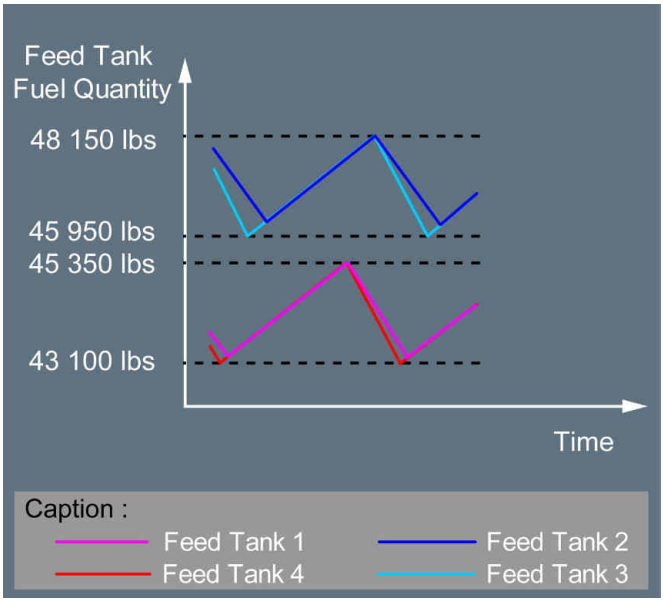


L3 The fuel transfer rate from the inner or mid tanks to the feed tanks is approximately 22 050 lb/h per feed tank.
Due to variations in fuel burn, the fuel quantities in the symmetric feed tanks may decrease at different rates.

In this case, in order to balance the fuel quantities in the symmetric feed tanks, transfer to these tanks will not start simultaneously:

- When the lower feed tank reaches its transfer threshold, transfer starts to this feed tank
- When both tanks become balanced, transfer starts to the other feed tank.

Main transfer from the inner tanks



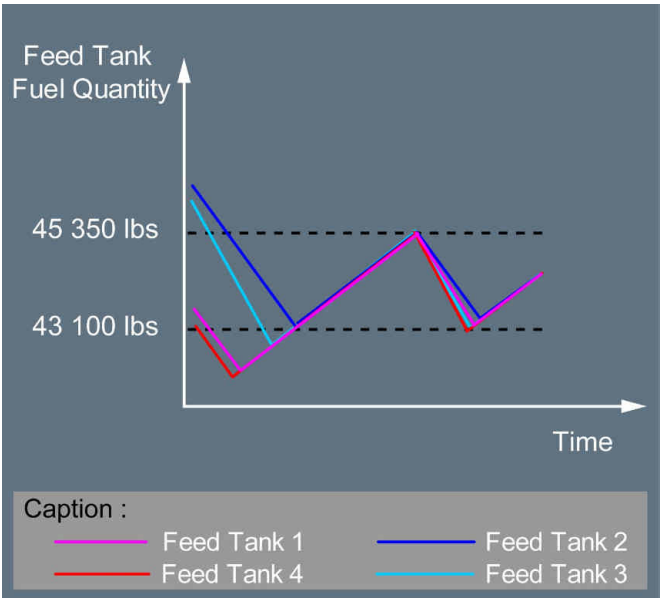
L2 When the sum of the fuel in both mid tanks is less than 17 650 lb, the transfer threshold for all feed tanks becomes 43 100 lb. The fuel quantities in the feed tanks are maintained between this transfer threshold and this transfer threshold + 2 200 lb, until the mid tanks are empty.

L3 The fuel quantities in all the feed tanks are balanced as follows:

1. A transfer from the mid tanks to the feed tank with the least fuel in it starts, when :
   - The fuel quantity in the feed tank with the least fuel in it is below the transfer threshold, and
   - The fuel quantities in all the feed tanks are below the transfer threshold + 2 200 lb.
2. When the fuel quantity in the receiving feed tank reaches the fuel quantity of another feed tank, a transfer to this feed tank starts.
3. The transfers stop, when all the feed tanks have reached the transfer threshold + 2 200 lb.

These steps are repeated, until the mid tanks are empty.

Main transfer from the mid tanks



L2 MAIN TRANSFER FROM THE TRIM TANK

When the inner and mid tanks are empty, fuel can be transferred from the trim tank to the feed tanks.
The main transfer from the trim tank starts, when the fuel quantity in any feed tank is less than 13 250 lb, and stops when the trim tank is empty.

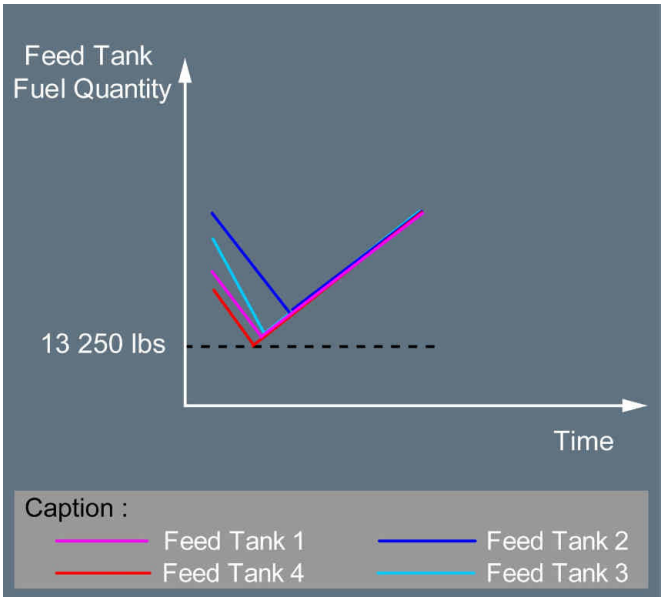
Depending on the fuel quantity in the trim tank, two types of main transfer from the trim tank can occur:

- If there is enough fuel in the trim tank, the fuel system aims to balance the fuel quantity in all the feed tanks:

L3

1. When the fuel quantity in the lowest feed tank reaches 13 250 lb, a main transfer to this tank starts.
2. When the fuel quantity in the receiving feed tank reaches the fuel quantity of another feed tank, a transfer to this feed tank starts.

Main transfer from the trim tank



L2

- When there is not enough fuel in the trim tank to balance the fuel quantities in all the feed tanks, the fuel system aims to balance the fuel quantity in each pair of symmetric feed tanks:

L3

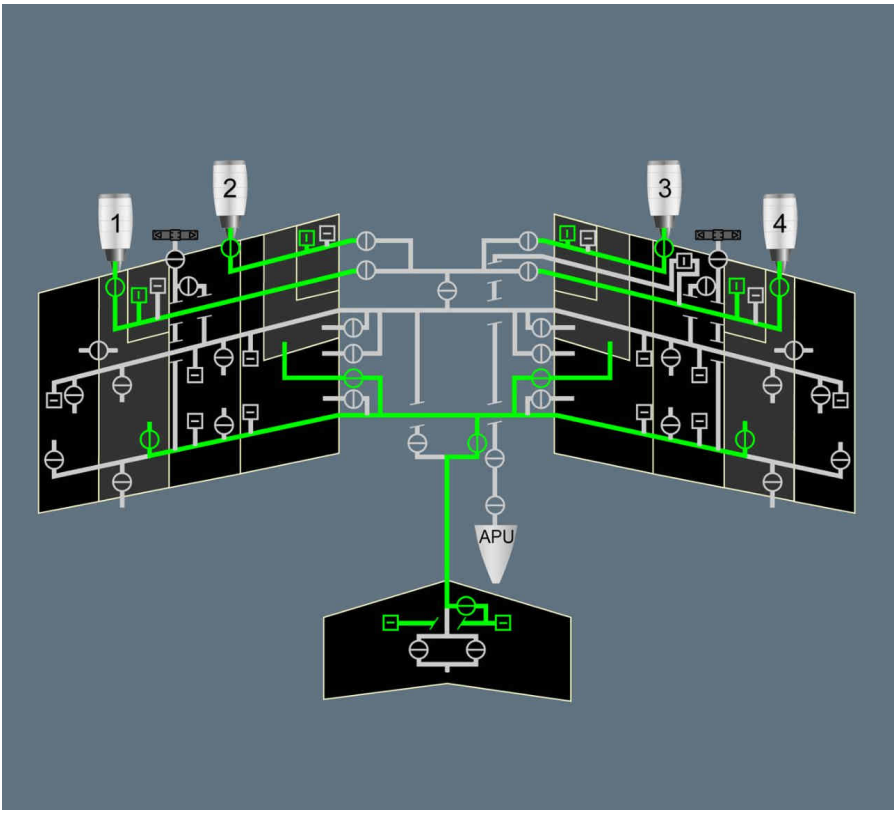
1. When the fuel quantity in any feed tank reaches 13 250 lb, a main transfer to this tank starts.
2. When the fuel quantity in the receiving feed tank reaches the fuel quantity of the symmetric feed tank, a transfer to this feed tank starts.
3. When the sum of fuel in the pair of receiving feed tanks equals the sum of fuel in the other pair, the main transfer stops.

Note: *The transfers stop only when the receiving feed tanks are balanced*

4. When the fuel quantity in any feed tank of the other pair reaches 13 250 lb, a main transfer to this tank starts.
5. When the fuel quantity in the receiving feed tank reaches the fuel quantity of the symmetric feed tank, a transfer to this feed tank starts.
6. The transfer continues until the trim tank is empty.

L2 Fuel transfers from the trim tank to the feed tanks via the aft gallery.

Main transfer from the trim tank

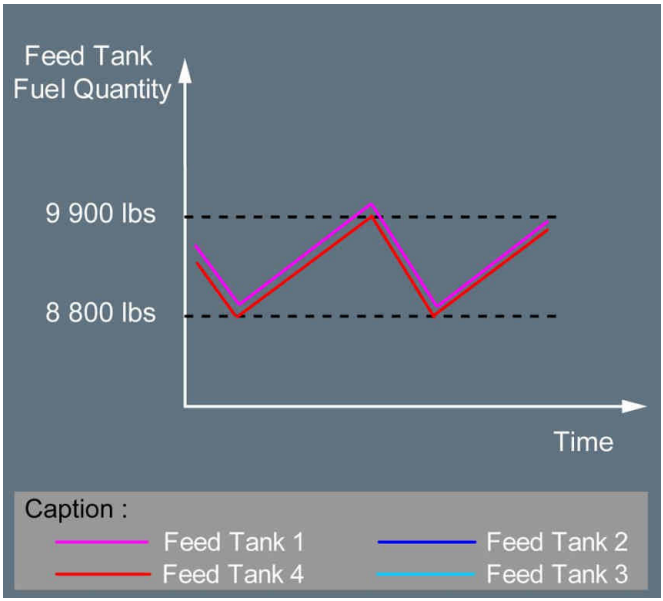


L3 The transfer rate from the trim tank to the feed tanks is approximately 11 000 lb/h per feed tank.

L2 MAIN TRANSFERS FROM THE OUTER TANKS

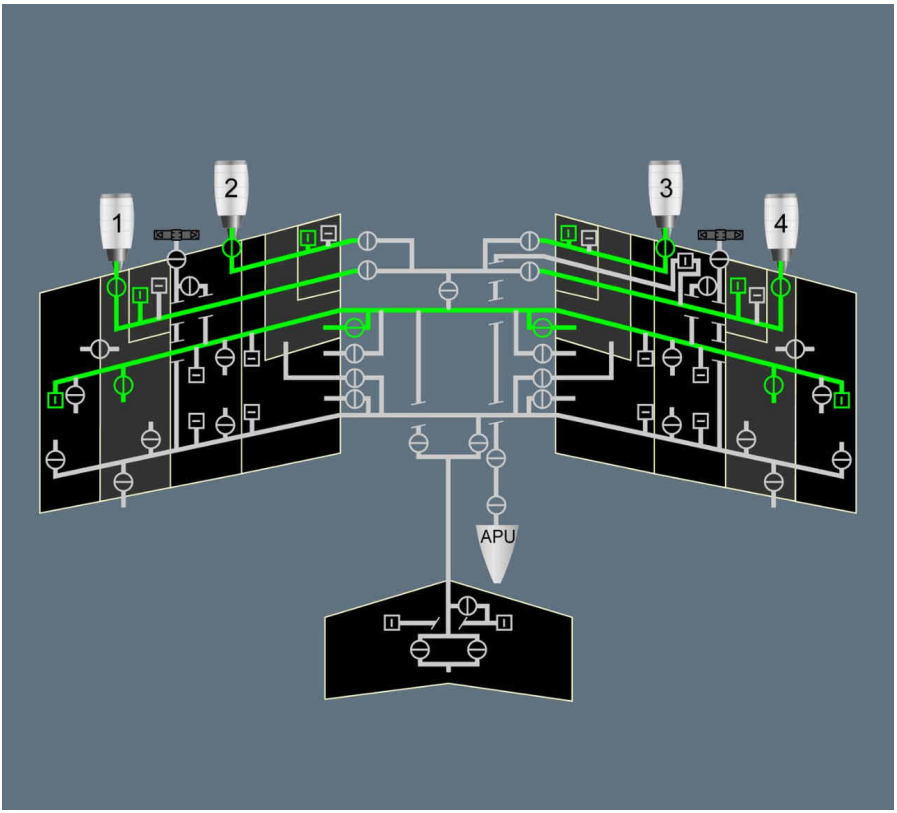
When the inner, mid, and trim tanks are empty, fuel can be transferred from the outer tanks to the feed tanks.
A main transfer to a pair of symmetric feed tanks starts, when the fuel quantity in any of these feed tanks is less than 8 800 lb.
The main transfer stops, when the fuel quantity in each of these feed tanks is greater than 9 900 lb.

Main transfer from the outer tanks



Fuel transfers from the outer tanks to the feed tanks via the forward gallery.

Main Transfers from the Outer Tanks



L3 The transfer rate from the outer tanks to the feed tanks is approximately 17 650 lb/h per outer tank.

LOAD ALLEVIATION TRANSFER

Applicable to: ALL

The distribution of fuel has an important impact on the aircraft structure. An appropriate fuel distribution reduces the loads on the structure.

For the wing:

- In flight, the lift produced by the wing creates an important upward bending moment. Maintaining fuel in the outer tanks as long as possible reduces this bending moment.
- On ground, the weight of the engines creates a downward bending moment. Fuel in the outer tanks increases this bending moment. This is why the outer tanks are not completely filled on ground (except if all the other fuel tanks are already full).

For the fuselage:

- At touchdown, the weight of the fuselage aft of the landing gear creates a downward bending moment. This bending moment is reduced by emptying the trim tank before landing.

The following load alleviation transfers will occur in flight:

1. After takeoff: Transfer to the outer tanks, until the outer tanks are full
2. Before landing:
   - Transfer from the trim tank, until the trim tank is empty
   - Transfer from the outer tanks, until the outer tanks are half-empty.

L2 LOAD ALLEVIATION TRANSFER TO THE OUTER TANKS

A load alleviation transfer to the outer tanks occurs, when:

- The FOB is greater than 110 200 lb
- The outer tanks are not full
- The aircraft is in flight.

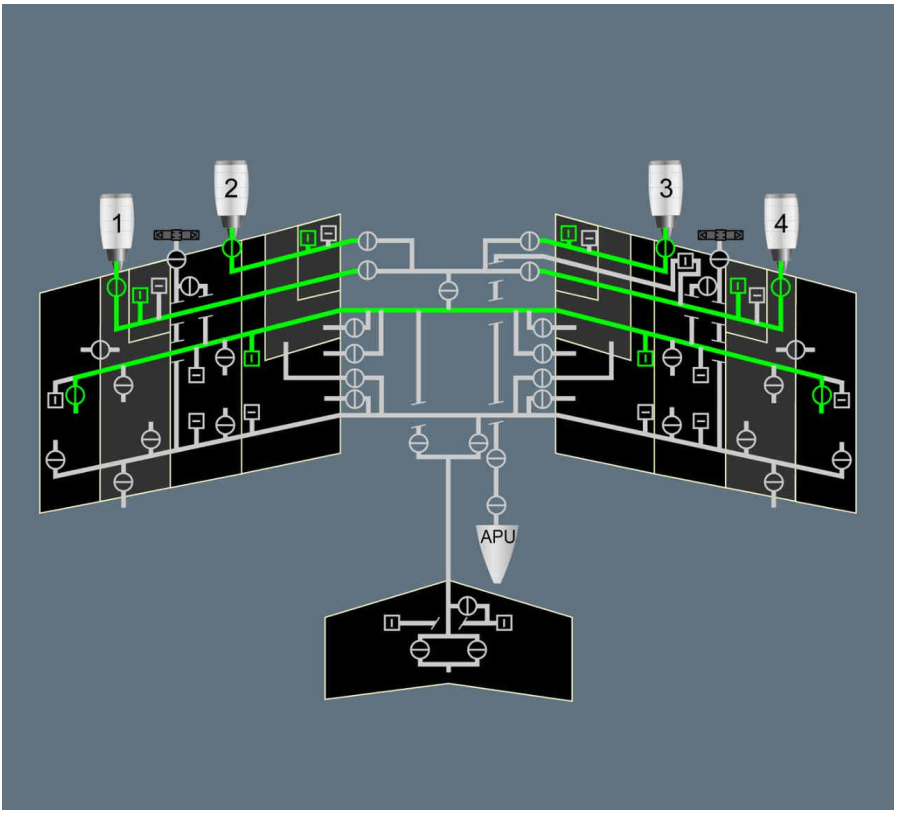
The load alleviation transfer stops, when the outer tanks are full.

Fuel transfers to the outer tanks, via the forward galley, from the:

- Inner tanks, or
- Mid tanks, when the inner tanks are empty.

Note: *After refueling, if the FOB is greater than 110 200 lb, there will be sufficient fuel in the inner tanks.*

Load Alleviation Transfer to the Outer tanks



L3 The fuel transfer rate to the outer tanks is approximately 44 100 lb/h per outer tank.

L2 LOAD ALLEVIATION TRANSFER FROM THE TRIM TANK

A load alleviation transfer from the trim tank occurs, when the Remaining Time to Destination (RTD) is less than 78 min.

L3 *Note:* *The transfer starts when:*

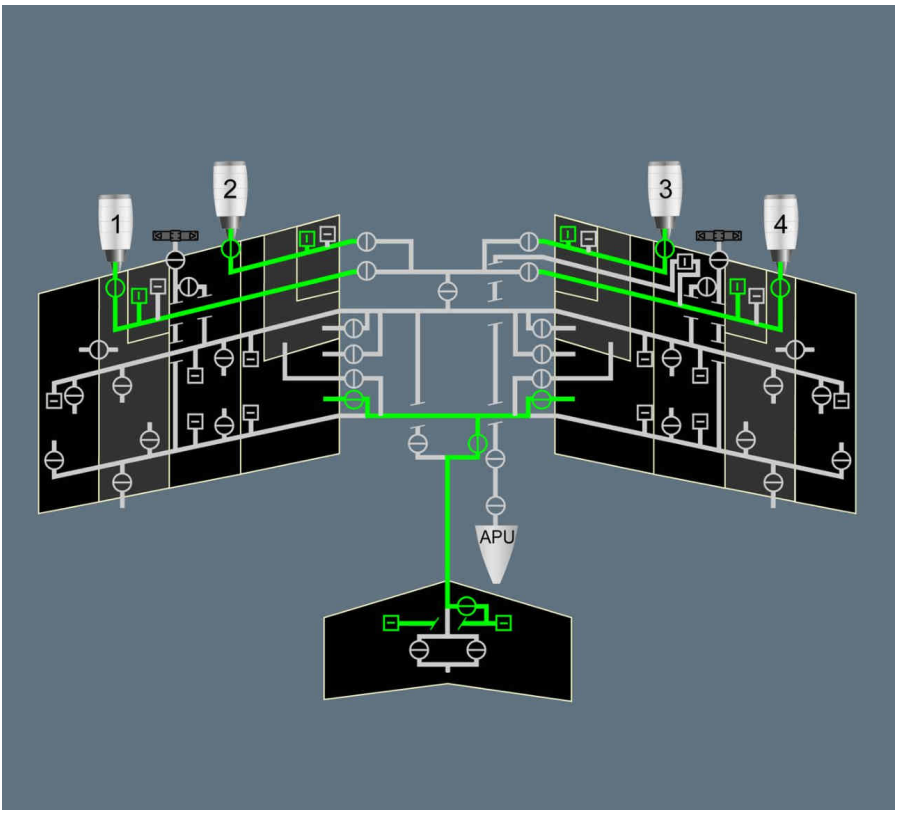
- *The RTD has been below 80 min, for 3 min, or*
- *The altitude goes below FL 245, if it was previously above FL 255.*

L2 Fuel transfers from the trim tank, via the aft gallery, to the:
- Feed tanks, or
- Mid tanks, if the feed tanks are full, or
- Inner tanks, if the feed tanks and mid tanks are full.

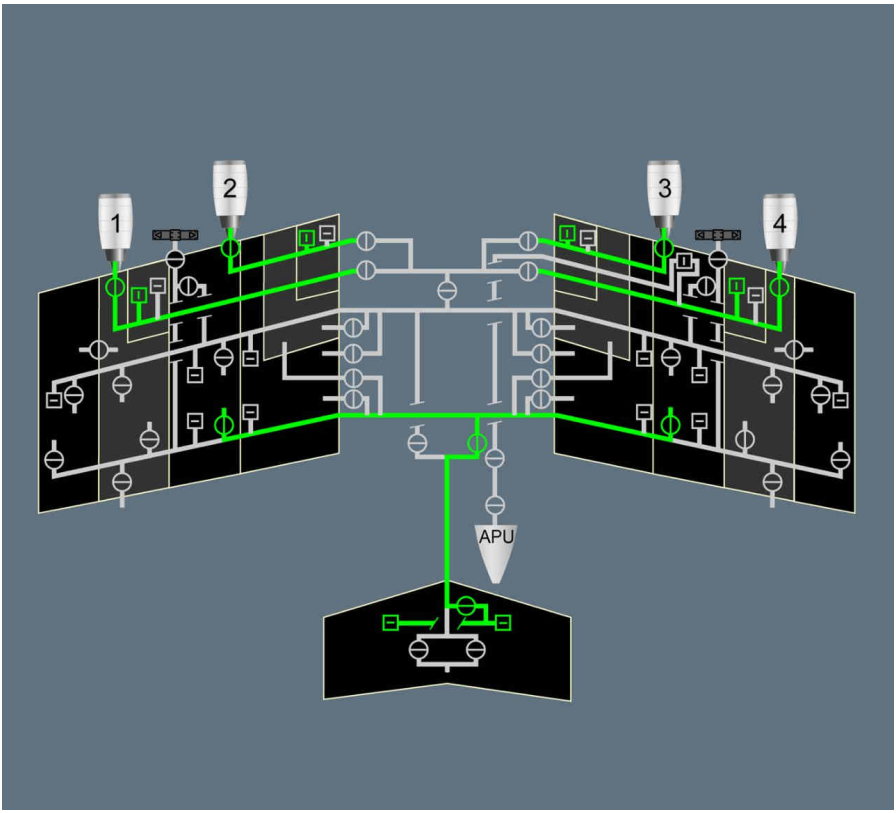
The load alleviation transfer stops, when the trim tank is empty.

The transfer also stops if:
- The TRIM TK FEED sw is set to ISOL, or
- The RTD goes above 80 min.
  This can happen if the FMS flight plan modification leads to a new RTD above 80 min. In this case, the transfer resumes when the RTD goes below 78 min.

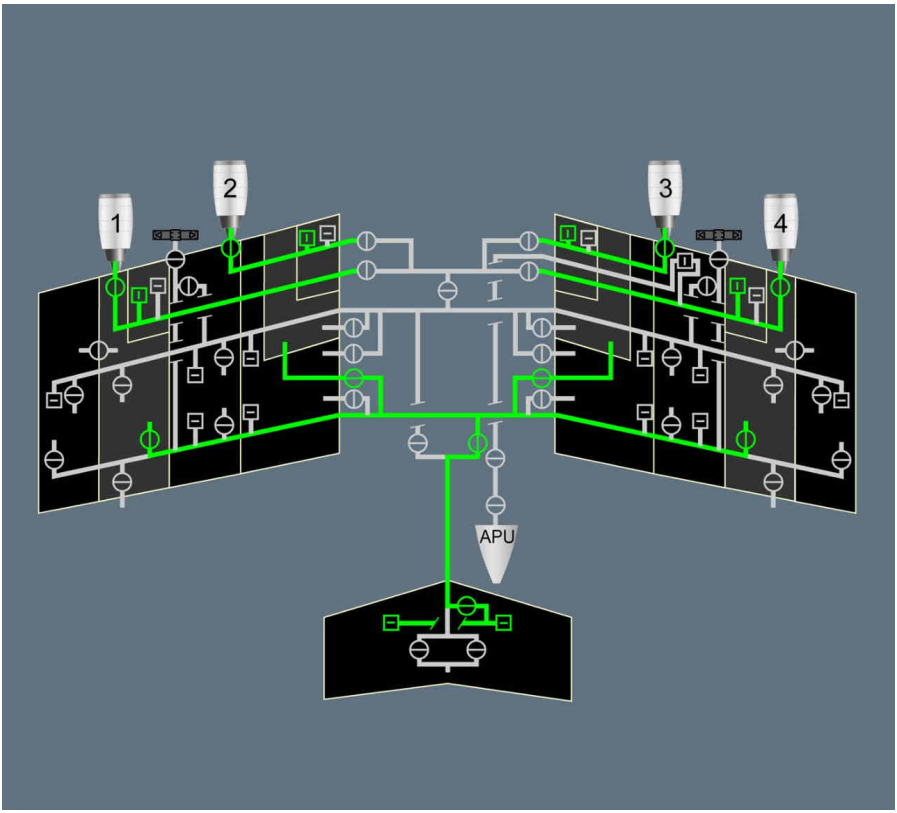
Load Alleviation Transfer from the Trim Tank to the Inner Tanks



Load Alleviation Transfer from the Trim Tank to the Mid Tanks



Load Alleviation Transfer from the Trim Tank to the Feed Tanks



L3 The transfer rate from the trim tank is approximately 44 100 lb/h.

L2 LOAD ALLEVIATION TRANSFER FROM THE OUTER TANKS

A load alleviation transfer from the outer tanks occurs, when the Remaining Time to Destination (RTD) is less than 28 min, and the fuel quantity in any outer tank is greater than 8 800 lb.

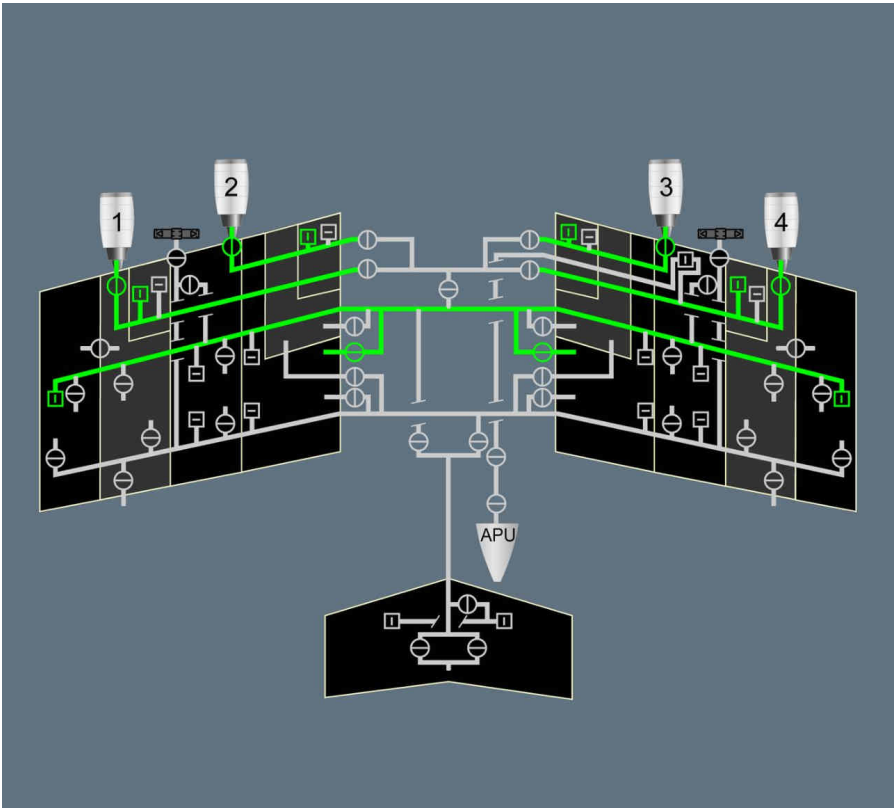
L3 *Note:* *The transfer starts when:*

- *The RTD has been below 30 min, for 3 min, or*
- *The altitude goes below FL 245, if it was previously above FL 255.*

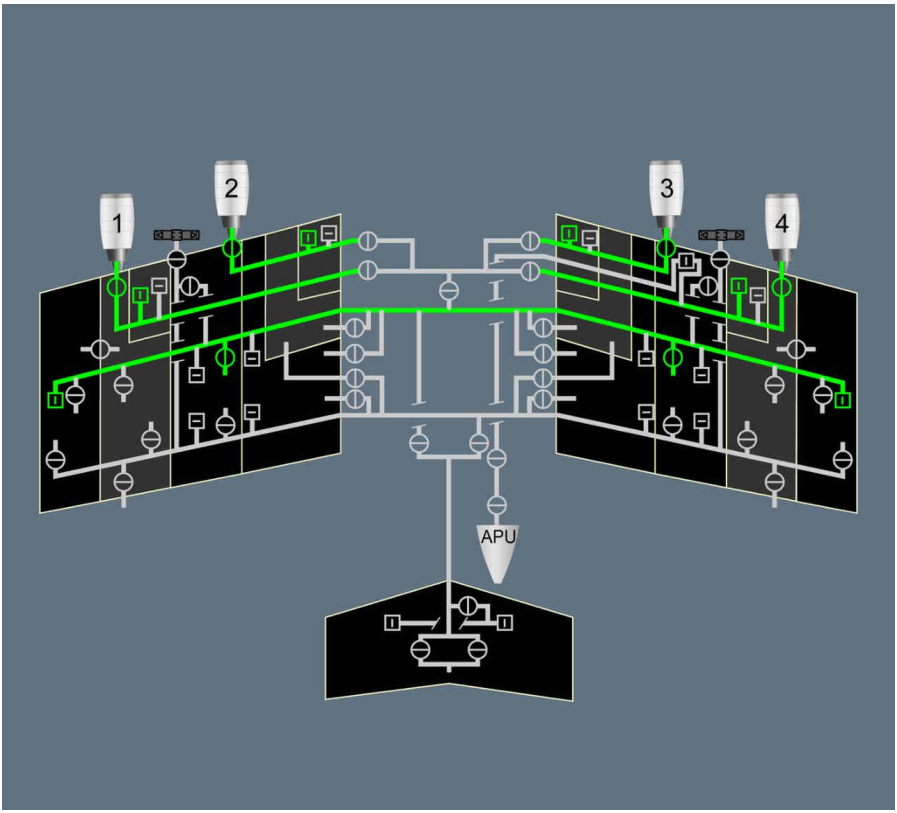
L2 Fuel transfers from the outer tanks, via the forward gallery, to the:
- Feed tanks, or
- Mid tanks, if the feed tanks are full, or
- Inner tanks, if the feed tanks and mid tanks are full.

The load alleviation transfer stops if:
- The fuel quantity in each outer tank reaches 8 800 lb (i.e. half-full), or
- The RTD goes above 30 min.
  This can happen if the FMS flight plan modification leads to a new RTD above 30 min. In this case, the transfer resumes when the RTD goes below 28 min.

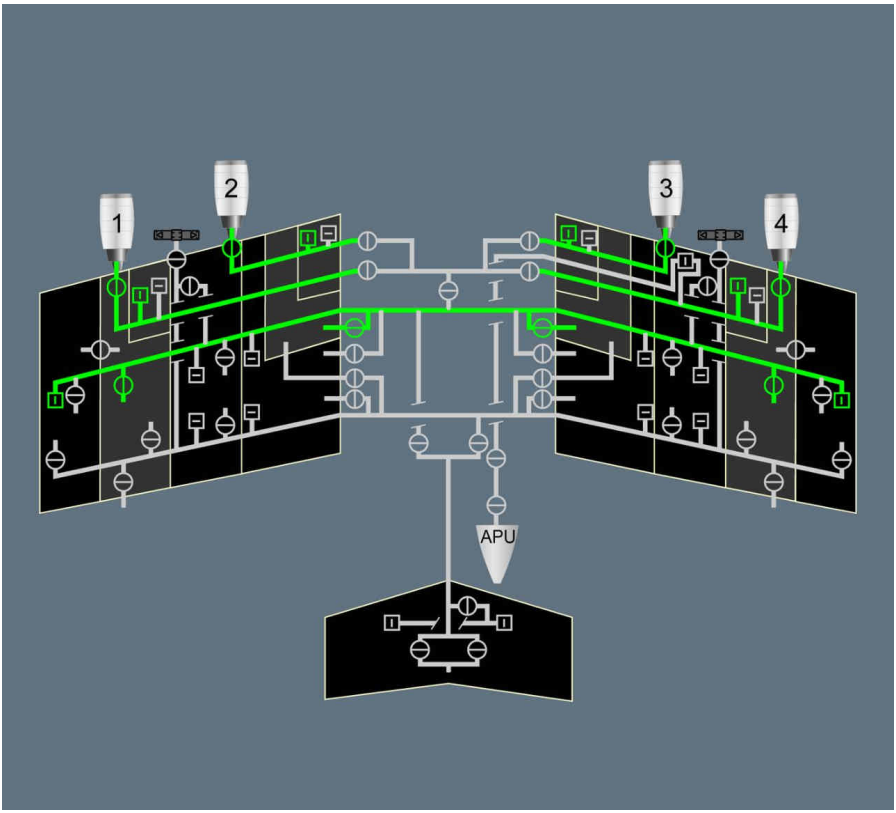
Load Alleviation Transfer from the Outer Tanks to the Inner Tanks



Load Alleviation Transfer from the Outer Tanks to the Mid Tanks



Load Alleviation Transfer from the Outer Tanks to the Feed Tanks



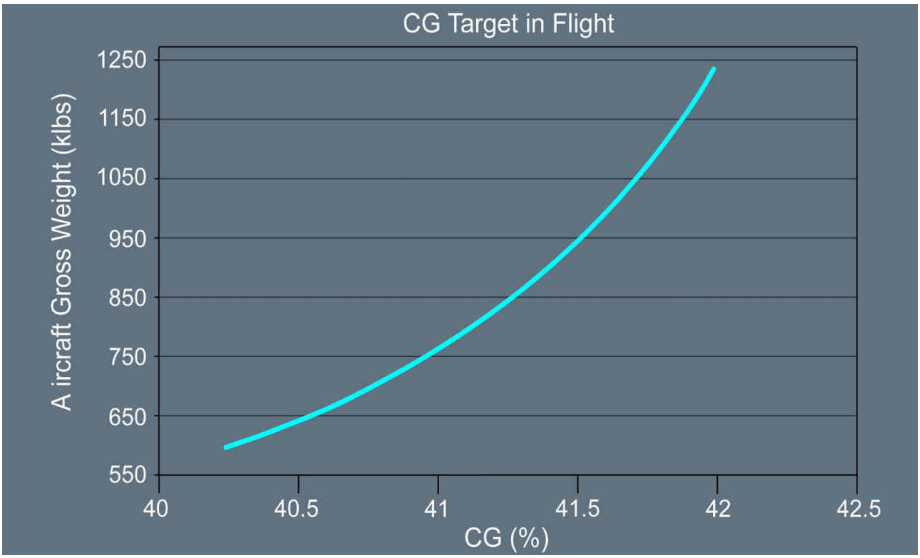
L3 The transfer rate from the outer tanks is approximately 33 050 lb/h per outer tank.

CG CONTROL TRANSFERS

Applicable to: ALL

CG Control transfers maintain the aircraft's Center of Gravity (CG) forward of the aft certified limit.
L2 A CG control transfer occurs, when the aircraft's CG reaches the aft CG target.

CG Target in Flight



Fuel transfers from the trim tank, via the aft gallery, to the:

- Inner tanks, or
- Mid tanks, if the inner tanks are empty, or
- Feed tanks, if the inner and mid tanks are empty.

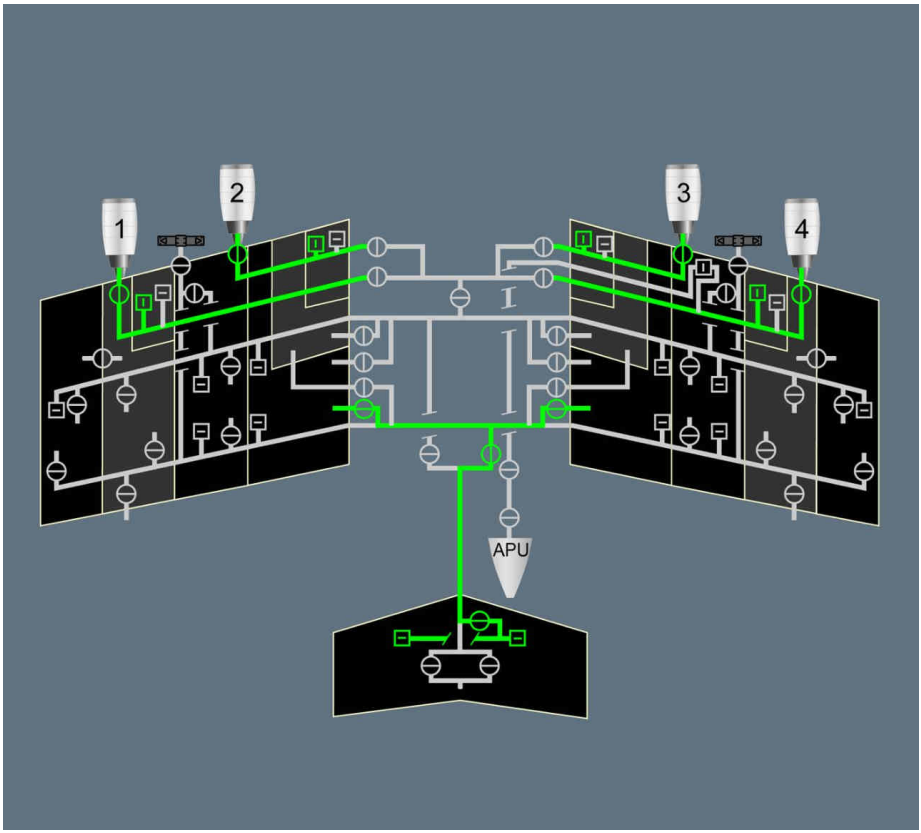
L3 When fuel is transferred to the inner(mid)(feed) tanks, fuel will first be transferred to the inner(mid)(feed) tank that contains less fuel. Fuel will be transferred to both inner(mid) tanks (or to the symmetric feed tank), as soon as the tanks are balanced.

L2 The CG control transfer stops, when the CG is 1% forward of the aft CG target.

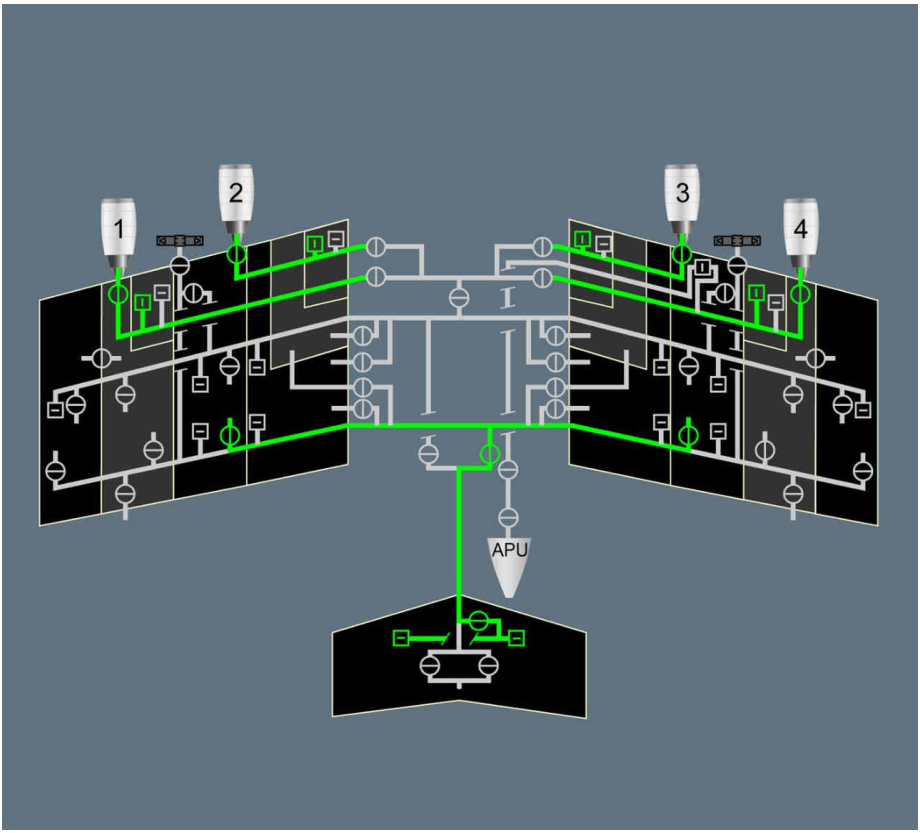
L3 There are no aft CG transfers, because:

- The CG is aft for takeoff, due to the CG targeting during automatic refuel (For more information: *Refer to DSC-28-50-10-DSC285010A REFUEL DISTRIBUTION*)
- The CG will move further aft during the load alleviation transfer to the outer tanks.

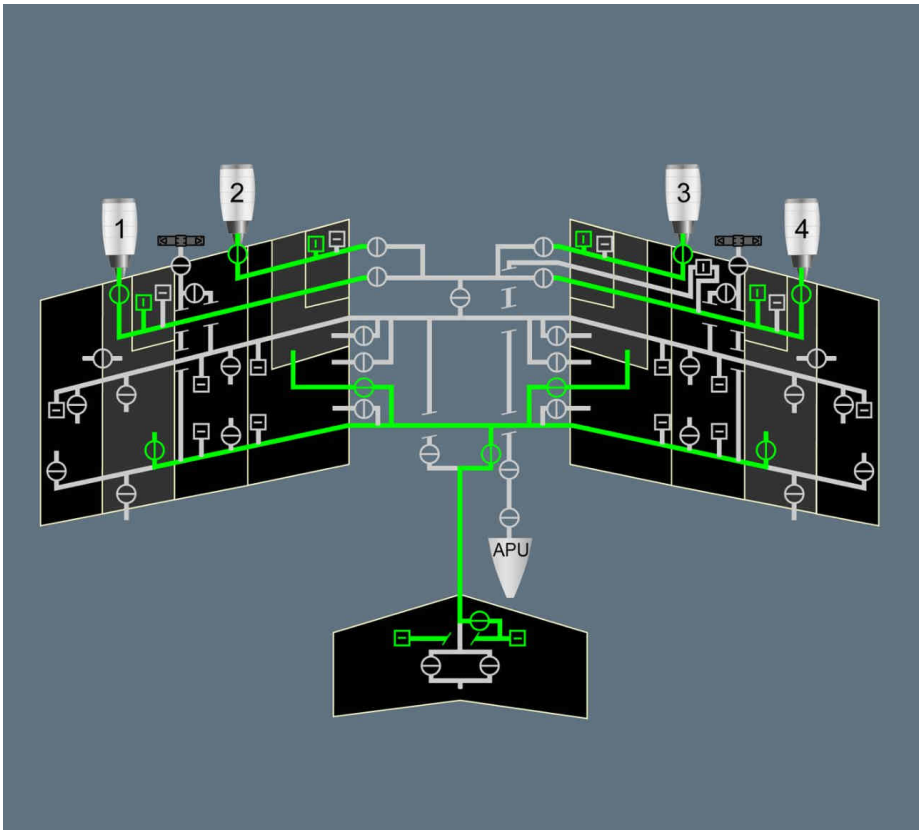
CG Transfer to the Inner Tanks



CG Transfer to the Mid Tanks



CG Transfer to the Feed Tanks



COLD FUEL TRANSFER

Applicable to: ALL

In cold weather conditions, fuel temperature in the outer tanks may decrease more rapidly than in the other tanks.

Therefore, in order to avoid fuel freezing, the FQMS automatically transfers fuel from the outer tanks to the feed tanks, if:

- The temperature of the fuel in any outer tank is less than -35 °
- Any feed tank is less than 39 683 lb.

The FQMS stops all other transfers to the feed tanks.

L2 The FQMS transfers fuel from the outer tanks to the feed tanks via the forward gallery. When the feed tanks are full, the FQMS transfers fuel from the outer tanks to the mid tanks. When the mid tanks are full, it transfers fuel from the outer tanks to the inner tanks.

The automatic cold fuel transfer stops if any failure occurs leading to an alternate transfer.

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ALTERNATE TRANSFERS

Applicable to: ALL

When a failure affects the fuel system (eg: pump or valve failure), the FQMS remains capable of performing automatic transfers.

Depending on the failure:
- Normal transfers remain available, or
- Normal transfers are lost. Alternate automatic transfers takeover. In some cases, flight crew action may be required, based on the associated ECAM procedure.

If a second failure affects the fuel system, the alternate transfers are usually available. However, in some cases, or when a third failure affects the fuel system, alternate transfers are lost. The flight crew must perform any available remaining transfers manually, as required by the ECAM procedure (*Refer to PRO-ABN-ECAM-10-28-320 FUEL NORM + ALTN XFR FAULT*).

L2 The following table presents the applicable alternate transfers for single failures.

Failed equipment	Status	ECAM Alert	Alternate Transfer
Aft Gallery			
OUTR TK inlet valve	Open	FUEL NORM XFR FAULT	*Refer to Case 1*
MID TK inlet valve	Open or closed		*Refer to Case 1*
INR TK inlet valve	Open or closed		*Refer to Case 1*
FEED TK inlet valve	Open or closed		*Refer to Case 1*
Jettison valve	Open		*Refer to Case 1*
Forward Gallery			
OUTR TK inlet valve	Open	FUEL NORM XFR FAULT	*Refer to Case 2*
	Closed		*Refer to Case 3*
MID TK inlet valve	Open		*Refer to Case 2*
INR TK inlet valve	Open		*Refer to Case 2*
FEED TK inlet valve	Open or closed		*Refer to Case 2*
INR TK PMP	Failed	FUEL L(R) INR TK FWD PMP FAULT	*Refer to Case 4*
MID TK PMP	Failed	FUEL L(R) MID TK FWD PMP FAULT	*Refer to Case 4*
OUTR TK PMP	Failed	FUEL L(R) OUTR TK PMP FAULT	*Refer to Case 5*
Trim Transfer System			
Trim to Aft gallery isolation valve	Closed	FUEL NORM XFR FAULT	*Refer to Case 1*
Trim to FWD gallery isolation valve	Open		*Refer to Case 1*
	Closed		*Refer to Case 6*

CASE 1: ALL TRANSFERS ON THE FWD GALLERY ONLY

The FUEL NORM XFR FAULT caution is triggered (*Refer to procedure*).

The following automatic transfers are inhibited:
- CG Transfers
- Load Alleviation transfers from the outer tanks.

The other transfers occur via the forward gallery.

L2 The transfers occur in the following order:
1. Load Alleviation transfer from the inner tanks to the outer tanks
2. Main transfer from the inner tanks to the feed tanks, as long as the CG remains forward of the CG target
3. When the CG has reached the CG target: Main transfer from the trim tank to the feed tanks
   The transfer is stopped when the CG reaches the forward CG limit. It resumes when the CG is 0.5% aft of the forward limit.

   Note: *If the CG does not reach the CG target, the main transfer from the trim tank occurs after the main transfer from the mid tanks.*

4. Main transfer from the inner tanks to the feed tanks
5. Main transfer from the mid tanks to the feed tanks
6. Main transfer from the outer tanks to the feed tanks.

CASE 2: ALL TRANSFERS ON THE AFT GALLERY ONLY

The FUEL NORM XFR FAULT alert is triggered (*Refer to procedure*).

The following automatic transfers are inhibited:
- CG Transfers
- Load Alleviation transfers from the outer tanks.

The other transfers occur via the aft gallery.

L2 The transfers occur in the following order:
1. Load Alleviation transfer from the inner tanks to the outer tanks
2. Main transfer from the inner tanks to the feed tanks, as long as the CG remains forward of the CG target
3. Main transfer from the trim tank to the feed tanks
   The transfer stops when the CG reaches the forward CG limit. It resumes when the CG is 0.5 % aft of the forward limit.

   Note: *If the CG does not reach the CG target, the main transfer from the trim tank occurs after the main transfer from the mid tanks.*

4. Main transfer from the inner tanks to the feed tanks
5. Main transfer from the mid tanks to the feed tanks
6. Gravity transfer from the outer tanks to the feed tanks.

The transfer starts when the lowest feed tank quantity goes below 28 660 lb . The fuel transfers from the outer tanks to feed tanks 2 and 3, via the aft gallery.
Simultaneously, the FUEL NORM XFR FAULT alert is recalled. The ECAM procedure requests to open the emergency outer tank transfer valves, to allow fuel to transfer from outer tanks to feed tanks 1 and 4.
Because the transfer rate is greater to feed tanks 1 and 4, the flight crew should consider if it is necessary to correct the fuel imbalance (in accordance with the ECAM not-sensed procedure).

CASE 3: TRANSFER TO THE OUTER TANKS ON THE AFT GALLERY

The FUEL NORM XFR FAULT caution is triggered (*Refer to procedure*).
The load alleviation transfer to the outer tanks occurs on the aft gallery, instead of the forward gallery.
All the other transfers are normal.
The CG transfers are inhibited while the load alleviation transfer to the outer tanks is in progress.

CASE 4: GALLERY FUNCTIONALITY SWAP

The FUEL L(R) INR(MID) TK FWD PMP FAULT caution is triggered (*Refer to procedure*).

For the affected tank:
- Main transfers and load alleviation transfers from/to the outer tanks are done via the aft gallery
- CG transfers and load alleviation transfers from the trim tank are done via the forward gallery

All the other transfers are normal.

CASE 5: GRAVITY TRANSFER FROM THE OUTER TANKS

The FUEL L(R) OUTR TK PMP FAULT alert is triggered (*Refer to procedure*).
The transfers from the outer tanks are done by gravity.
All the other transfers are normal.

L2 The transfer starts when the lowest feed tank quantity goes below 28 660 lb . Thus the transfer from the outer tanks to the feed tanks occurs before the transfer from the trim tank.
Simultaneously, the FUEL NORM XFR FAULT alert is triggered. The ECAM procedure requests to open the emergency outer tank transfer valves.

Fuel transfers from the outer tanks:
- To feed tanks 1 and 4, via the forward gallery, and via the emergency outer tank transfer valves
- To feed tanks 2 and 3, via the aft gallery.

Because the transfer rate is greater to feed tanks 1 and 4, the flight crew should consider if it is necessary to correct the fuel imbalance (in accordance with the ECAM not-sensed procedure).

CASE 6: TRIM TANK TRANSFER

The FUEL NORM XFR FAULT caution is triggered (*Refer to procedure*).
The trim tank is transferred in one shot, as soon as the CG reaches the target.
The transfer is stopped when the CG reaches the forward CG limit. It resumes when the CG is 0.5% aft of the forward limit.
All the other transfers are normal.

MANUAL TRANSFERS

Applicable to: ALL

In normal operation, fuel transfers are fully automatic and require no crew action. However, the flight crew can initiate manual transfers, via the FUEL overhead panel, as requested by ECAM procedures.

L2 Manual transfers are requested, in the event that:
- The automatic transfers fail, and no automatic alternate transfer is possible.
- The fuel in the outer tanks or in the trim tank is cold enough to trigger the FUEL TEMP LO alert. It must be transferred to another tank before it freezes.

L1 The following manual transfers are possible:
- From any wing tanks to the feed tanks
- From the trim tank to the inner tanks.

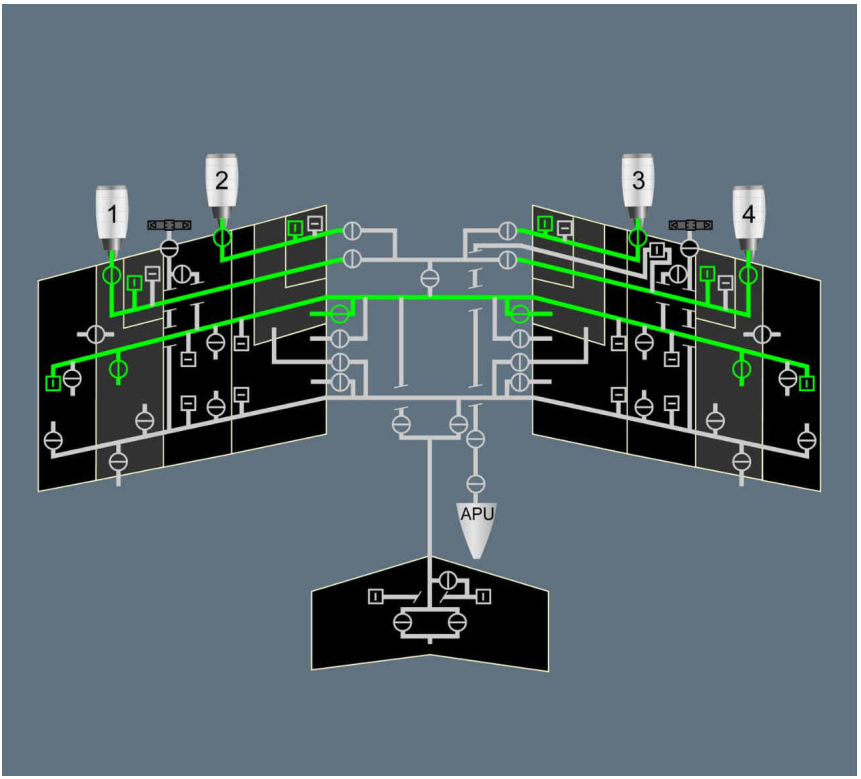
L2 When a manual transfer is in progress, some automatic transfers may be inhibited. They resume when the manual transfer is completed (MAN XFR pb-sw deselected).

L2 MANUAL TRANSFER FROM THE OUTER TANKS TO THE FEED TANKS

The flight crew initiate the transfer, by pressing the OUTR TK XFR pb-sw.

- **If both outer tank pumps are running (L(R) OUTR TK PMP pb-sw are not set to OFF)**
  The fuel transfers via the forward gallery, using the outer tank pumps.

Pumped Manual Transfer

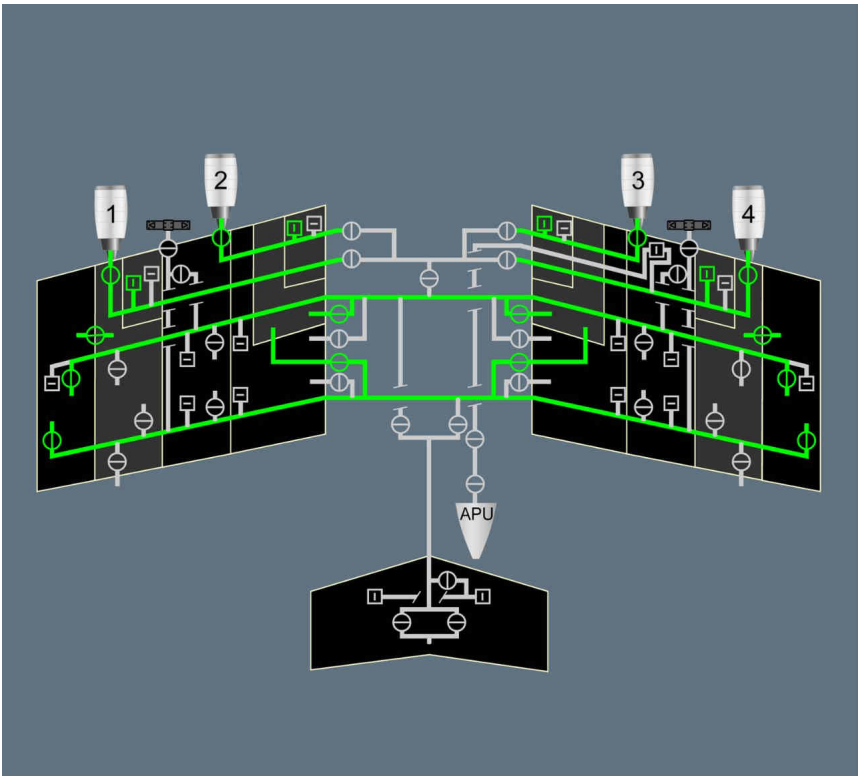


- **If any outer tank pump is not running (L(R) OUTR TK PMP pb-sw is set to OFF)**

  From the outer tanks to the outer feed tanks (FEED TK 1 and 4):
  - Fuel transfers via the outer tank emergency transfer valves.

  From the outer tanks to the inner feed tanks (FEED TK 2 and 3):
  - Fuel transfers via the forward and aft galleries
  - Fuel exits the outer tank via the inlet valves, that are used as outlet valves.

Gravity Manual Transfer

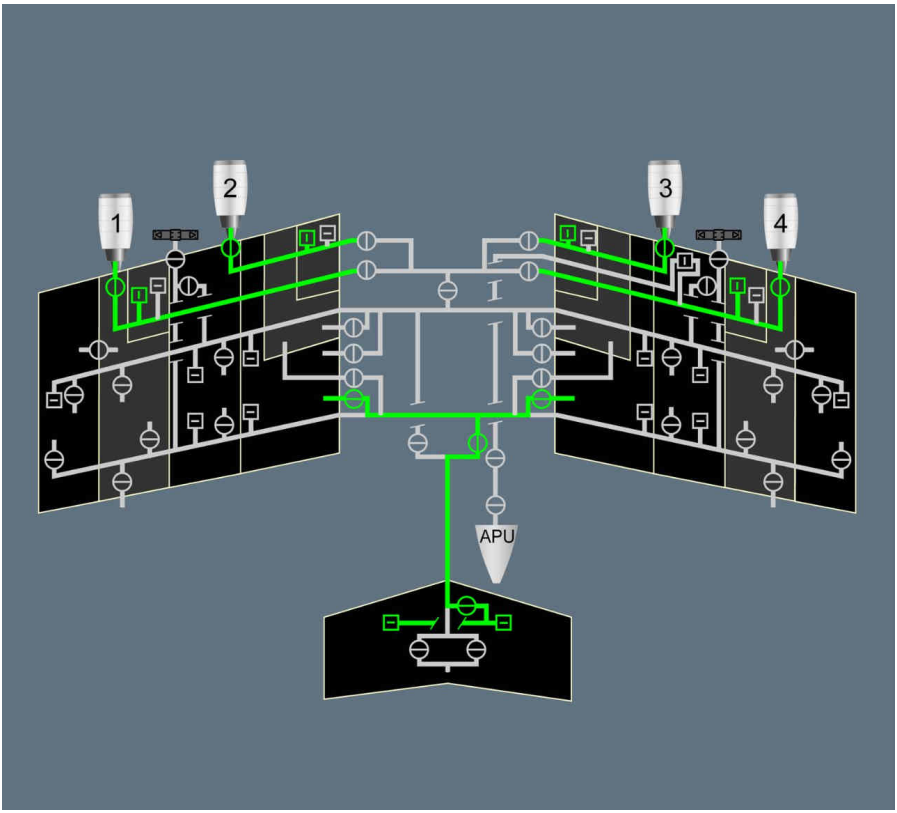


Note: *If another manual transfer is selected:*
- *The transfer from the outer tanks stops on the aft gallery (it continues via the forward gallery and the outer tank emergency transfer valves)*
- *The other transfer is performed via the aft gallery.*

L2 MANUAL TRANSFER FROM THE TRIM TANK TO THE INNER TANKS

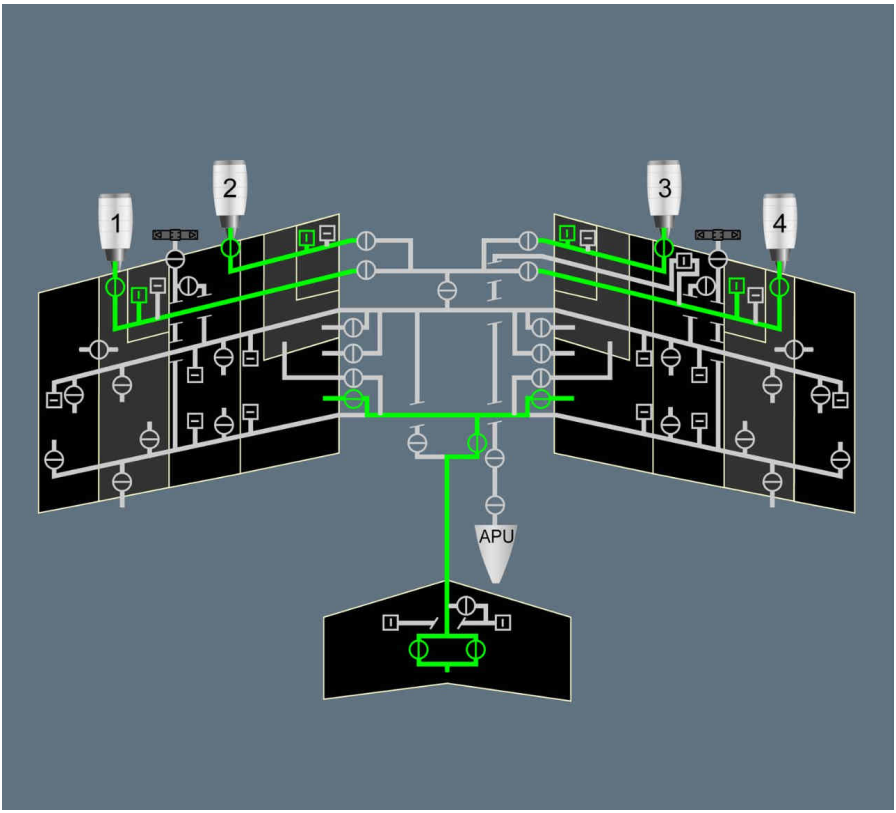
Fuel transfers from the trim tank via the aft gallery, using the trim tank pumps.
The flight crew initiate the transfer, by pressing the TRIM TK XFR pb-sw.

Pumped Trim Tank Transfer



If the trim tank isolation valve is failed in the closed position, the fuel can be transferred by gravity, via the trim tank inlet valves.
The flight crew initiates the gravity transfer, by setting the TRIM TK FEED selector to OPEN.

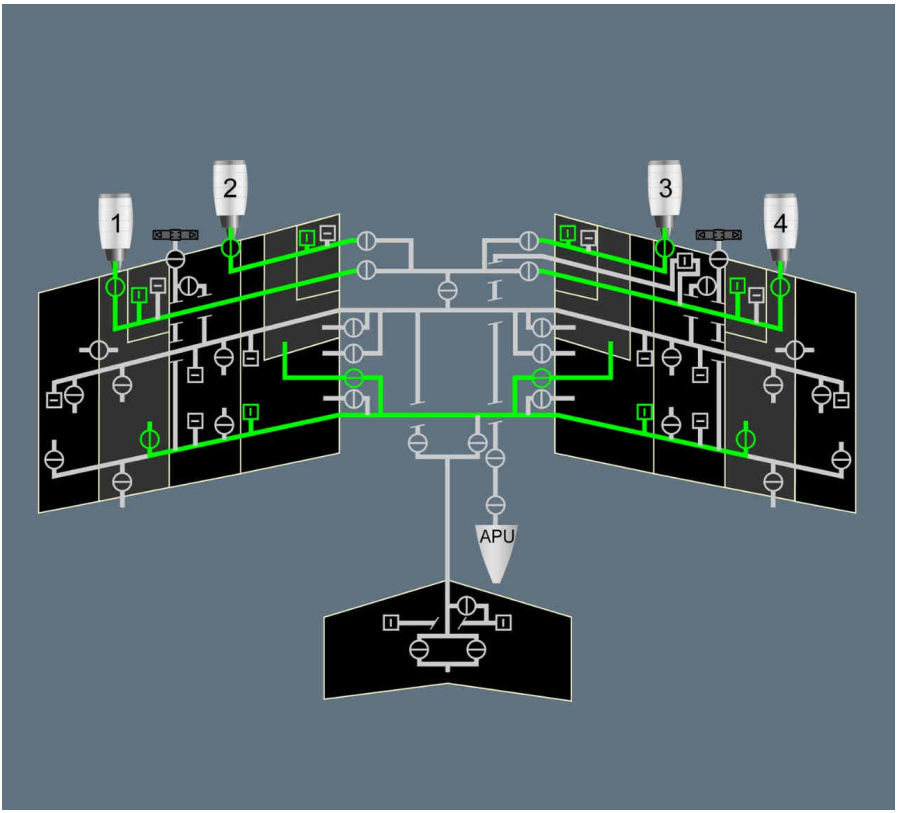
Gravity Trim Tank Transfer



L2 MANUAL TRANSFER FROM THE INNER TANKS TO THE FEED TANKS

The flight crew initiates this transfer, by pressing the INR TK XFR pb-sw.
Fuel transfers via the aft gallery, using the inner tank pumps.

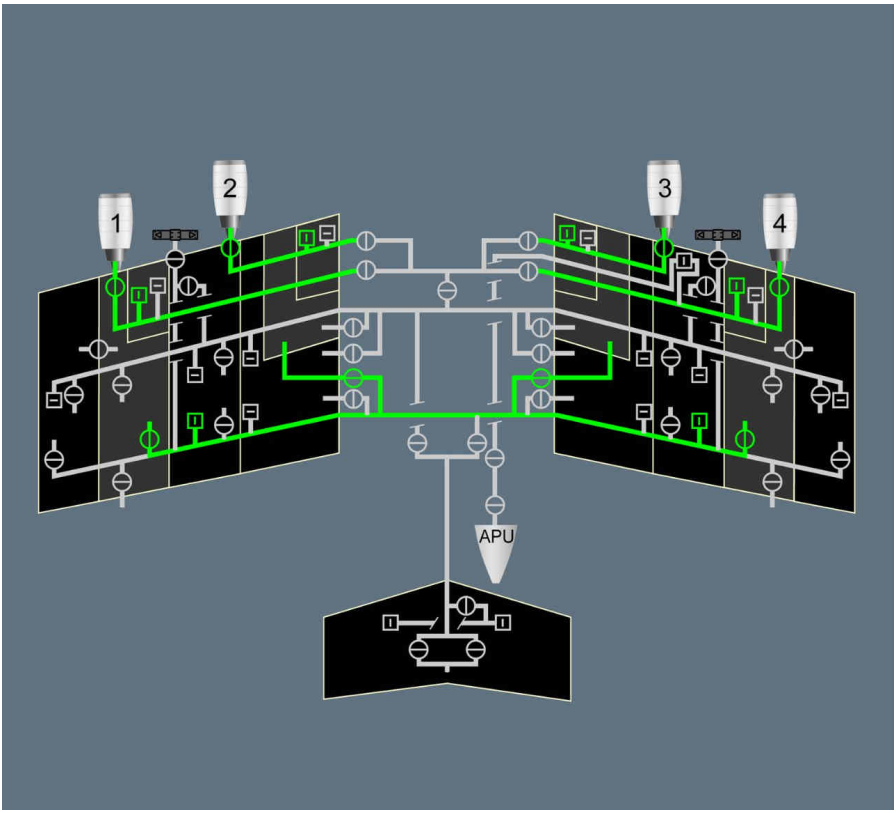
Inner Tank Transfer



L2 MANUAL TRANSFER FROM THE MID TANKS TO THE FEED TANKS

The flight crew initiates this transfer, by pressing the MID TK XFR pb-sw.
Fuel transfers via the aft gallery, using the mid tank pumps.

Mid Tanks Transfer



FUEL JETTISON

Applicable to: ALL

To rapidly reduce the aircraft gross weight, the jettison system can be used to discharge fuel overboard. The output rate is approximately 330 693 lb/h (5 512 lb/min).
Fuel is jettisoned simultaneously from all the transfer tanks (inner, mid, outer and trim tanks). Fuel in the feed tanks cannot be jettisoned.

Note: *It is not possible to jettison fuel from the feed tanks. Therefore, it is not always possible to reduce the aircraft gross weight below the Maximum Landing Weight. The flight crew should consider the Overweight Landing procedure (Refer to PRO-ABN-ECAM-10-80-50 MISC OVERWEIGHT LDG).*

JETTISON OPERATION

In accordance with the procedure (*Refer to PRO-ABN-ECAM-10-28-80 FUEL JETTISON*), to initiate fuel jettison, the flight crew:

- Enters the jettison final gross weight in the FMS FUEL & LOAD page (For information on the FUEL & LOAD page, *Refer to FMS Controls and Indicators — FUEL & LOAD Page*)
- Presses the JETTISON ARM pb-sw and the JETTISON ACTIVE pb-sw on the JETTISON / EMER XFR panel (*Refer to DSC-28-20-DSC2820B Jettison / EMER OUTR TK XFR panel*).

Note: *Jettison starts as soon as both pushbuttons are pressed, even if no jettison final gross weight has been entered. The jettison final gross weight can be entered or updated at any time.*

L2 When fuel jettison is initiated:

- All fuel transfers stop
- All transfer pumps run

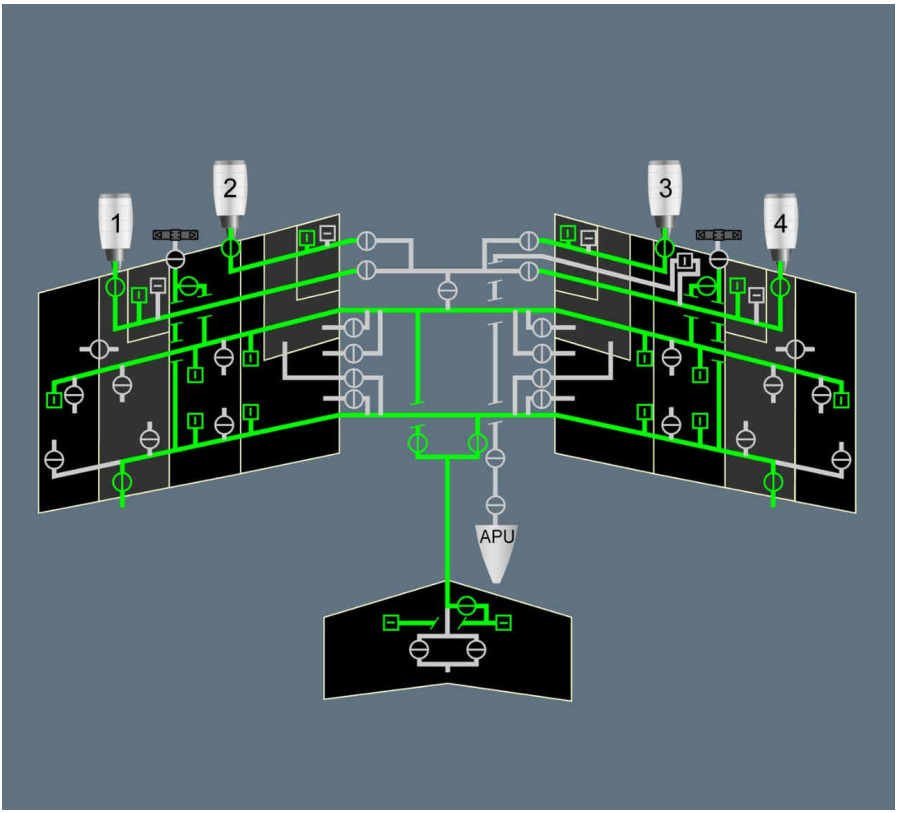
- The forward gallery connects to the aft gallery
- The jettison valves open.
  There are two jettison valves, that are on the aft gallery. These jettison valves connect the aft gallery to two discharge points through which the fuel is jettisoned. There is one discharge point on the trailing edge of each wing.



The FQMS controls and monitors the fuel jettison. All transfer tanks are emptied simultaneously. When there is fuel in the trim tank, the CG moves forward during jettison. If the CG reaches the forward certified takeoff and landing limit, the FQMS momentarily stops the trim tank transfer pumps. When the CG is 0.5 % aft of the forward certified takeoff and landing limit, the FQMS resumes jettison from the trim tank.

L3 For redundancy, each jettison valve has two motors with different electrical supplies.

Fuel Jettison



L1 **JETTISON TERMINATION**

Jettison stops when one of the following occurs:

- The gross weight reaches the jettison final gross weight entered in the FMS FUEL & LOAD page

L2 The FQMS stops the jettison, and the FUEL JETTISON COMPLETED procedure appears on the ECAM (*Refer to procedure*).

L1 - The flight crew stops jettison by turning off any of the two JETTISON pushbuttons on the overhead panel
- The inner, mid, outer, and trim tanks are empty.

L2 The FQMS stops jettison, and the FUEL JETTISON COMPLETED procedure appears on the ECAM (*Refer to procedure*).

L1 *Note: This occurs when the jettison final gross weight cannot be reached because the fuel in the feed tank cannot be jettisoned, or because the flight crew did not enter any jettison final gross weight in the FMS FUEL & LOAD Page.*

FUEL SYSTEM IN ELECTRICAL EMERGENCY CONFIGURATION

Applicable to: ALL

The following describes the behavior of the fuel system, in the event of an electrical emergency configuration (*Refer to PRO-ABN-ECAM-10-24-250 ELEC EMER CONFIG*).

While the slats are retracted:

- All crossfeed valves open
- The main pump of feed tank 2 and the standby pump of feed tank 3 run
- The left trim tank pump runs, if there is fuel in the trim tank.

Transfers to feed tank 2 and feed tank 3 will occur, via the aft gallery, in the following sequence:

1. From the trim tank, using the left trim tank pump
2. From the outer tanks, by gravity, when the trim tank is empty.

L3 The fuel transfer rate is approximately 13 250 lb/h .

L1 3. From the outer tanks, via the emergency outer tank transfer valves
As requested by the ECAM procedure, the flight crew will press the EMER OUTR TK XFR pb-sw when there is less than 28 660 lb in feed tank 1 or in feed tank 4.

L3 The fuel transfer rate is approximately 30 850 lb/h .

L1 4. From feed tanks 1 and 4, by gravity, when the outer tanks are empty.
The fuel transfer stops when the fuel quantity in feed tanks 1 and 4 is less than the fuel quantity in feed tanks 2 and 3. It resumes when the difference is greater than 1 100 lb .

L3 The fuel transfer rate is approximately 15 450 lb/h .

L1 When the slats are extended, all the pumps stop and crossfeed valves close. Fuel is fed by gravity from all the feed tanks.

FUEL GAUGING DEGRADATION

Applicable to: ALL

In normal operations, the FQMS uses the tanks sensors via the FQDCs to compute the fuel tank quantities.
The FQDC performs an alternate gauging used for checking the data computed by the FQMS, and for display in the case of a dual FQMS failure.

PRIMARY GAUGING

Fuel tank sensors are in all the tanks, for fuel quantity computation.

L2 When all tank sensors are available, the accuracy error of the fuel quantity indications on the FUEL SD page is:
- Less than ± 1 % of tank capacity, on ground
- Less than ± 2 % of tank capacity, in flight.

L1 LOW DEGRADATION

If some tank sensors fail in a tank (e.g. FQI probes), the FQMS is still able to compute the fuel tank quantities, but the accuracy is degraded.

In this case:
- The ECAM triggers the FUEL GAUGING FAULT alert with the GAUGING LO DEGRADATION subtitle
- The fuel quantity of the affected tank appears with amber dashes
- FOB, GW and GWCG appear with amber dashes.

L2 For the affected tank, the accuracy error of the fuel quantity indication is:
- Between ± 1 % and ± 2 % of tank capacity, on ground
- Between ± 2 % and ± 4 % of tank capacity, in flight.

L1 If multiple tanks are in low degradation, the fuel leak detection is not operative.
All the automatic transfers are operative.

MEDIUM DEGRADATION

If additional tank sensors fail in a tank, the FQMS is still able to compute the fuel tank quantities, but the accuracy is further degraded.

In this case:
- The ECAM triggers the FUEL GAUGING FAULT alert with the GAUGING MEDIUM DEGRADATION subtitle
- The fuel quantity of the affected tank appears with amber dashes
- FOB, GW and GWCG appear with amber dashes.

L2 For the affected tank, the accuracy error of the fuel quantity indication is:
- Between ± 2 % and a value depending on the affected tank (between 5 % and 10 % of tank capacity), on ground
- Between ± 4 % and a value depending on the affected tank (between 5 % and 10 % of tank capacity), in flight.

L1 The fuel leak detection is not operative.
In flight, all the automatic transfers are operative. On ground, the automatic refuel and the automatic ground transfers are not available. Only the manual refuel and manual transfers are available.

FAILURE

If additional tank sensors fail, the FQMS is no longer able to compute the fuel quantity of the affected tank.

In this case:
- The ECAM triggers the FUEL FQI FAULT alert
- The fuel quantity of the affected tank is lost (replaced by amber crosses)
- FOB may appear with amber dashes after fourth engine start, or is lost (replaced by amber crosses)
  The FOB is computed by using the initial FOB and the fuel used.

L2 After the fourth engine start, the FQMS initializes the FOB taking into account the MMEL procedure:
- In the case of FQI failure in a wing tank, the FQMS considers that the fuel quantity in the failed tank is the same as the fuel quantity in the opposite tank
- In the case of FQI failure in the trim tank, the FQMS considers that the trim tank is empty.

L1 - GW and GWCG may appear with amber dashes, or may be lost (replaced by amber crosses).

In flight, as required by the ECAM, the flight crew should use manual transfers if the failure occurs in a feed tank, or in more than one tank. In all other failure cases, the automatic transfers are operative. On ground, the automatic refuel and the automatic ground transfers are not available. Only the manual refuel and manual transfers are available.

ALTERNATE GAUGING

The FQDC computes the alternate gauging by using the same tank sensors as the primary gauging.
The FQMS uses the alternate gauging to check that the primary gauging is correct.
The alternate gauging is also used for display on the FUEL SD page, if the primary gauging is failed but the tank sensors are still available.

In this case:

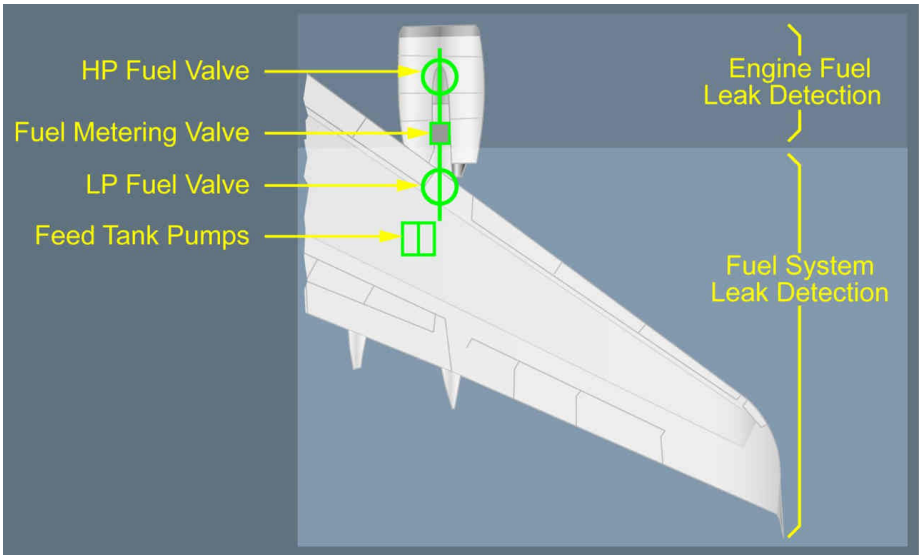
- The ECAM triggers the FUEL FQMS 1+2 FAULT alert
  ALTN GAUGING ONLY indicates that the alternate gauging is used for display on the FUEL SD page.
- The fuel quantity of the all the tanks appears with amber dashes
- If the FOB is computed by using the FOB at departure and the Fuel Used, the ECAM displays FOB COMPUTED FROM FU and FOB appears with amber dashes. In all other cases, FOB is lost (replaced by amber crosses).
- If the Weight and Balance Backup Computer (WBBC) computes GW and GWCG, GW and GWCG appear with amber dashes. In all other cases, GW and GWCG are lost (replaced by amber crosses).

FUEL LEAK DETECTION

Applicable to: ALL

Fuel leaks can occur in the fuel system (Tanks, Transfer lines...) or in the engine fuel system (i.e. downstream of the fuel metering valve).

Fuel Leak Detection



A leak in the fuel system:
- Is detected by an increasing difference between the BLOCK fuel and the sum of the Fuel On Board (FOB) and the Fuel Used (FU)
- L2 Is detected by the FQMS (*Refer to DSC-28-40-2840A Fuel system leak detection*)
- L1 Triggers the FUEL LEAK DETECTED ECAM caution (*Refer to PRO-ABN-ECAM-10-28-120 FUEL LEAK DETECTED*).

A leak in the engine fuel system:
- Is detected by an abnormally high fuel flow on one engine
- L2 Is detected by the FWS (*Refer to DSC-28-40-2840A Engine Fuel leak Detection*)
- L1 Triggers the ENG FUEL LEAK ECAM caution (*Refer to PRO-ABN-ECAM-10-70-310 ENG 1(2)(3)(4) FUEL LEAK*).

L2 FUEL SYSTEM LEAK DETECTION

The FQMS performs the fuel system leak detection.

There are two types of fuel system leak detection:
- A slow leak detection
- A fast leak detection.

The fuel system leak detection is inhibited in the case of:
- Engine shutdown
- Loss or degradation of any engine Fuel Used
- Invalid FOB
- Fuel jettison in progress
- Abnormal flight attitude
- Degraded Fuel Quantity Indications (FQI) for more than one tank
- Any FQI is failed.

If the fuel system leak detection is inhibited, the ECAM triggers the FUEL LEAK DET FAULT alert. The slow leak detection is lost until the end of the flight. The fast leak detection is recovered if the inhibition conditions are no longer true.

SLOW LEAK DETECTION

The slow leak detection compares the BLOCK fuel with the sum of the FOB and the Fuel Used. If the difference is greater than 15 450 lb, the ECAM triggers the FUEL LEAK DETECTED alert.

L3 The 15 450 lb threshold takes into account the measurement errors of the fuel quantities and fuel used.

L2 **FAST LEAK DETECTION**

The fast leak detection compares the Fuel Used during the previous 30 min, with the delta FOB during the previous 30 min. If the difference is greater than 4 400 lb, the ECAM triggers the FUEL LEAK DETECTED alert.

L3 The 4 400 lb threshold ensures that all fuel leaks with a rate of more than 8 800 lb per hour are rapidly detected.

L2 **ENGINE FUEL LEAK DETECTION**

The FWS performs the engine fuel leak detection.

Engine fuel leak detection is based on:
- The engine Fuel Flow, or
- The engine Fuel Used.

L3 The engine fuel leak detection is inhibited when:
- The aircraft is below FL 290 and the engine N1 is less than 62 %, or
- The A/THR is not active, or
- A thrust lever is set below the CLB detent, or
- The Fuel Flow measurement of any engine is degraded or lost.

L2 **LEAK DETECTION BASED ON FUEL FLOW**

If the highest fuel flow is greater than 3.8 times the average of the other fuel flows, the ECAM triggers the ENG FUEL LEAK alert.

LEAK DETECTION BASED ON FUEL USED

If the highest Fuel Used during the last five minutes is 25 % higher than the average of the other fuel used during the last five minutes, the ECAM triggers the ENG FUEL LEAK alert.

REFUEL SYSTEM

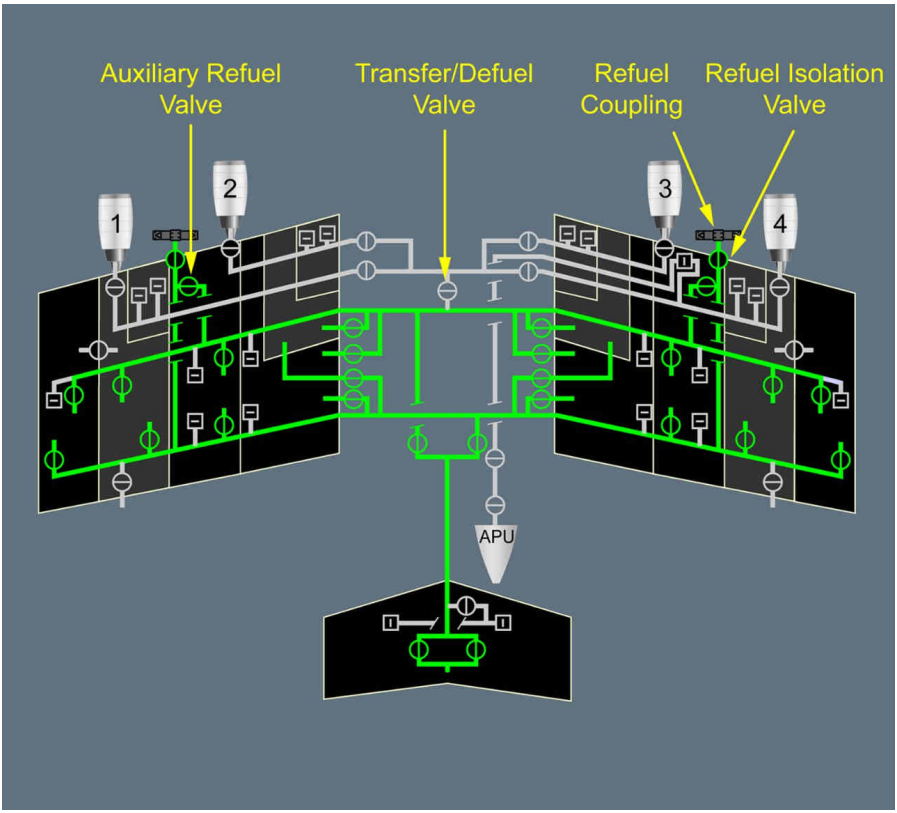
Applicable to: ALL

L2 REFUEL COUPLINGS

Two refuel couplings are installed under the wings. They are installed in the leading edge between the two engine pylons, at a height of approximately 20 ft . Two refueling hoses can be attached to each coupling.

L3 The refuel couplings are connected to the aft gallery, and to the forward gallery via refuel/defuel valves.

Refuel system



L2 When both couplings are used, it takes approximately 45 min to uplift 68 949 US Gal of fuel (with four refueling hoses and a refuel pressure of 40 PSI).

L3 It is not possible to achieve gravity refueling.

L2 **REFUEL PANEL**

The external refuel panel is located on the aircraft belly fairing. It is used for to control refueling operations.

L1 **REFUELING OPERATIONS**

Refueling can be performed automatically under the full control of the FQMS , or can be performed manually, via the FQMS .

AUTOMATIC REFUEL

In normal operations, refueling is performed under the full control of the FQMS .
Refueling can be initiated from the refuel panel.

L2 In this case, the operator must:
- Enter the Preselected Fuel Quantity (PFQ). The PFQ corresponds to the targeted FOB.
- Select AUTO REFUEL on the MODE SELECT selector

L1 Refueling can also be initiated from the cockpit. In this case, the flight crew must:
- Enter the BLOCK on the FMS FUEL & LOAD page.
- Press the REFUEL pb-sw on the overhead panel.

L3 Once the refueling has been initiated, the FQMS will determine the refuel distribution using the CG targeting method (*Refer to DSC-28-50-10-DSC285010A REFUEL DISTRIBUTION*) and the refuel valves (Refuel isolation valves and Auxiliary refuel valves) will open. The inlet valves of all the tanks that require refueling will open, and all these tanks will be refueled simultaneously. The inlet valves will close in sequence when the required quantity has been reached, or when a high level is detected.

L2 The FQMS will automatically stop the refuelling once the FOB is equal to the PFQ (+/- 882 lb). The refuelling valves will close.

L1 **MANUAL REFUEL**

Manual refueling is also possible from the external refuel panel, if necessary (e.g. failure cases). In this case, refueling is controlled by an operator, via the FQMS .

L3 The operator must:
- Determine the required fuel distribution
- Select MAN on the MODE SELECT selector . The refuel valves (Refuel isolation valves and Auxiliary refuel valves) open
- Open the inlet valves of the tanks which need to be refuelled using the Refuel/Defuel Valves switches

- Close the inlet valves of tanks, once the required fuel quantity has been reached
- Select OFF on the MODE SELECT selector when the targeted FOB has been reached. The refuel valves will close.

REFUEL DISTRIBUTION

Applicable to: ALL

For flexibility in payload loading, the refuel distribution varies, depending on the ZFW and ZFCG, in order to obtain a post-refuel CG of 39.5%, whenever possible. This is referred to as CG targeting.

CG TARGETING

CG targeting is used in automatic refuel mode only.

L3 During manual refueling, the ground operator is responsible for the fuel distribution and CG control.

L1 The FQMS controls the fuel loading and distribution to obtain a ground CG target of 39.5%, whenever possible.

L2 During refueling, the FQMS will simultaneously:
- Determine the quantity of fuel that must be loaded into the trim tank, in order to obtain the ground CG target.
- Distribute the remaining fuel in the wing tanks.
  Fuel is distributed in the wing tanks in accordance with a defined refuel distribution (*Refer to DSC-28-50-10-DSC285010A Wing distribution*).

Note: *1. CG targeting is not active, if the preselected fuel quantity is less than 103 617 lb . In this case, the trim tank will remain empty.*
2. When close to full fuel capacity, fuel distribution may not allow to reach the ground CG target of 39.5%

L1 **ZFW / ZFCG INPUT**

ZFW and ZFCG are necessary for CG targeting.

There are three ways to enter ZFW and ZFCG :
- The ground operations can enter the ZFW and ZFCG into the OIS Refuel application, via ACARS .
- Ground personnel can enter the ZFW and ZFCG into the OIS Refuel application, via the OMT or OIT on board the aircraft.
- Pilots can enter the ZFW and ZFCG into the FMS , via the MFD .

If no ZFW / ZFCG values have been entered, the FQMS uses the default ZFW / ZFCG values, to start the refueling.

L3 These default values are:
- ZFW : 621 704 lb
- ZFCG : 36.5%

L1 **ZFW/ZFCG UPDATE**

At any time during refueling, it is possible to update the ZFW and ZFCG values, using one of the three ways described above.

L2 When the FQMS receives new ZFW and ZFCG values, it computes again the fuel distribution required to obtain the ground CG target of 39.5%, when achievable. If the level of one or more tanks is already above its new target, fuel will not be discharged from these tanks. As a result, it is possible that the ground CG target of 39.5% will not be obtained.

L1 After refueling, if the CG target of 39.5% has not been obtained, it is possible to start an automatic ground transfer. *Refer to DSC-28-50-20 AUTOMATIC GROUND TRANSFER* .

L2 **WING REFUEL DISTRIBUTION**

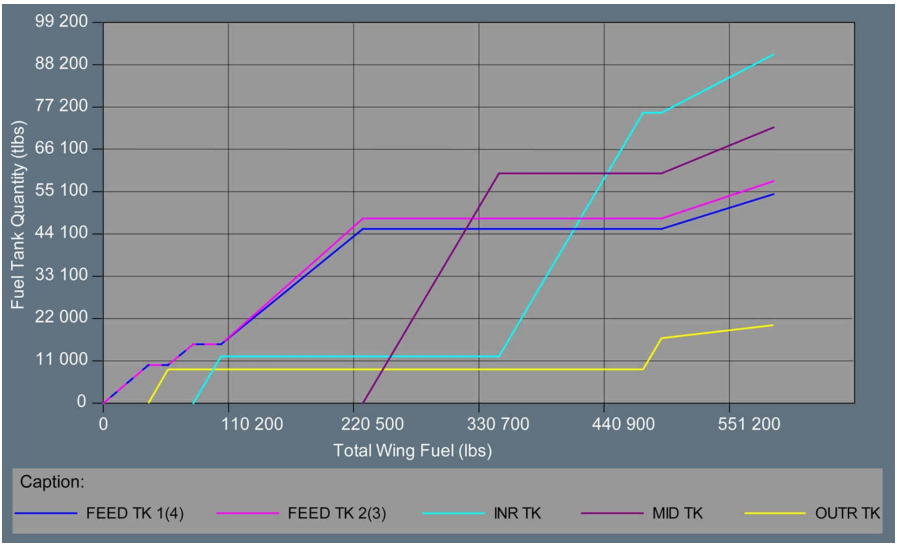
Fuel in the wing tanks is distributed as follows:

Total wing tank quantity (lbs)	Feed tank 1/4 (lbs)	Feed tank 2/3 (lbs)	Outer tanks (lbs)	Mid tanks (lbs)	Inner tanks (lbs)
0	0	0	0	0	0
39 700	9 900	9 900	0	0	0
57 300	9 900	9 900	8 800	0	0
79 350	15 450	15 450	8 800	0	0
103 600	15 450	15 450	8 800	0	12 150
228 813	45 323	48 140	8 800	0	12 150
348 423	45 323	48 140	8 800	59 805	12 150
475 541	45 323	48 140	8 800	59 805	75 685
491 824(1)	45 323	48 140	16 960	59 805	75 685
590 318(2)	54 399	57 780	20 355	71 782	90 841

(1) This corresponds to full wing tanks, at minimum fuel density

(2) This corresponds to full wing tanks, at maximum fuel density

Wing Refuel Distribution



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AUTOMATIC GROUND TRANSFER

Applicable to: ALL

When refueling is complete, the actual CG may be different from the ground CG target of 39.5%. This occurs, when the final ZFW / ZFCG values are available after refueling, or when CG targeting is no longer effective (*Refer to DSC-28-50-10-DSC285010A REFUEL DISTRIBUTION*).

If the actual CG is out of the takeoff limits, the flight crew can start an automatic ground transfer. This will redistribute the fuel, to obtain the ground CG target (+/- 1%), based on the final ZFW / ZFCG values entered in the FMS . The ground CG target will only be reached when this is achievable with the current ZFW, ZFCG and FOB.

L3 Fuel transfers from(to) the trim tank to(from) a pair of symmetric tanks. This enables the lateral balance of the aircraft to be maintained. If a fuel imbalance exists at the start of the automatic ground transfer, it will be corrected during the transfer sequence.

L2 During the ground transfer, the flight crew can monitor the transfers on the ECAM fuel page, and on the GWCG indication.

L1 The automatic ground transfer is complete in less than 25 min , if the FQMS has used the default ZFW/ZFCG values for refuel. It can be stopped at any time by the crew.

The automatic ground transfer is started and stopped with the AUTO GROUND XFR pb-sw on the overhead panel. All the transfer pumps must be on to perform the automatic ground transfer.

An automatic ground transfer should not be performed if the aircraft is moving (e.g. during towing.) It is inhibited as soon as at least two engines are running.

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DEFUEL

Applicable to: ALL

The fuel system can defuel. This enables the aircraft's fuel to be removed and collected.
Defueling may be necessary for maintenance reasons, or if the fuel in the aircraft is contaminated.
Defueling is manually controlled via the FQMS, by using the external refuel panel. The discharged fuel is collected through the refuel couplings.

L3 There are three methods for defueling:

- Suction defueling
  Fuel is sucked out of the aircraft.
  The operator sets the MODE SELECT selector on the refuel panel to DEFUEL. This opens the refuel isolation valves and the auxiliary refuel valves. The operator then opens all the tank inlet valves via the refuel/defuel valves switches on the external refuel panel.
- Pressure defueling
  The aircraft's fuel pumps are used to discharge the fuel from the aircraft.
  The operator sets the MODE SELECT selector on the refuel panel to DEFUEL. This opens the refuel isolation valves and the auxiliary refuel valves, and connects the engine feed gallery to the transfer galleries, by opening the Transfer/Defuel valve. All the pumps must be switched ON on the overhead panel. The crossfeed valves must be selected open, if defuel from the feed tanks is required.
- Suction-assisted pressure defueling
  As for pressure defueling, with the addition of suction from the bowser to assist the aircraft pumps and therefore increase the defuel rate.

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ECAM ALERTS

Applicable to: ALL

FUEL ABNORM AUTO REFUEL DISTRIBUTION (*Refer to procedure*)

FUEL ALL FEED TKs LEVEL LO (*Refer to procedure*)

FUEL APU FEED FAULT (*Refer to procedure*)

FUEL APU FEED VLV NOT CLOSED (*Refer to procedure*)

FUEL AUTO GND XFR COMPLETED (*Refer to procedure*)

FUEL AUTO GND XFR FAULT (*Refer to procedure*)

FUEL CG AT FWD LIMIT (*Refer to procedure*)

FUEL CG DATA DISAGREE (*Refer to procedure*)

FUEL CG OUT OF RANGE (*Refer to procedure*)

FUEL COLLECTOR CELL 1(2)(3)(4) NOT FULL (*Refer to procedure*)

FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (*Refer to procedure*)

FUEL ENG 1(2)(3)(4) LP VLV FAULT (*Refer to procedure*)

FUEL EXCESS AFT CG (*Refer to procedure*)

FUEL FEED TK 1(2)(3)(4) LEVEL LO (*Refer to procedure*)

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPs FAULT (*Refer to procedure*)

FUEL FEED TK 1(2)(3)(4) MAIN PMP FAULT (*Refer to procedure*)

FUEL FEED TK 1(2)(3)(4) STBY PMP FAULT (*Refer to procedure*)

FUEL FEED TK 1(2)(3)(4) TEMP HI (*Refer to procedure*)

FUEL FEED TKs 1+2(3+4) LEVEL LO (*Refer to procedure*)

FUEL FQDC 1(2) FAULT (*Refer to procedure*)

FUEL FQI FAULT (*Refer to procedure*)

FUEL FQMS 1(2) FAULT (*Refer to procedure*)

FUEL FQMS 1+2 FAULT (*Refer to procedure*)

FUEL GAUGING FAULT (*Refer to procedure*)

FUEL INR TK MAN XFR COMPLETED (*Refer to procedure*)

FUEL INR TKs QTY LO (*Refer to procedure*)

FUEL JETTISON (*Refer to procedure*)

FUEL JETTISON COMPLETED (*Refer to procedure*)

FUEL JETTISON FAULT (*Refer to procedure*)

FUEL JETTISON VLV NOT CLOSED (*Refer to procedure*)

FUEL L(R) INR TK FWD+AFT PMPs FAULT (*Refer to procedure*)

FUEL L(R) INR(MID) TK AFT PMP FAULT (*Refer to procedure*)

FUEL L(R) INR(MID) TK FWD PMP FAULT (*Refer to procedure*)

FUEL L(R) MID TK FWD+AFT PMPs FAULT (*Refer to procedure*)

FUEL L(R) OUTR TK PMP FAULT (*Refer to procedure*)

FUEL L(R) WING FEED PMPs FAULT (*Refer to procedure*)

FUEL LEAK DET FAULT (*Refer to procedure*)

FUEL LEAK DETECTED (*Refer to procedure*)

FUEL MAN XFR PROCEDURE (*Refer to procedure*)

FUEL MID TK MAN XFR COMPLETED (*Refer to procedure*)

FUEL NO ZFW OR ZFCG DATA (*Refer to procedure*)

FUEL NORM + ALTN XFR FAULT (*Refer to procedure*)

FUEL NORM XFR FAULT (*Refer to procedure*)

FUEL OUTR TK XFR FAULT (*Refer to procedure*)

FUEL OUTR TK MAN XFR COMPLETED (*Refer to procedure*)

FUEL PREDICTED CG OUT OF T.O RANGE (*Refer to procedure*)

FUEL REFUEL / DEFUEL SYS FAULT (*Refer to procedure*)

FUEL REFUEL DATA / FMS DISAGREE (*Refer to procedure*)

FUEL REFUEL FAULT (*Refer to procedure*)

FUEL SYS COMPONENT FAULT (*Refer to procedure*)

FUEL TEMP LO (*Refer to procedure*)

FUEL TRIM & APU LINES FAULT (*Refer to procedure*)

FUEL TRIM TK GRVTY FWD XFR FAULT (*Refer to procedure*)

FUEL TRIM TK L(R) PMP FAULT (*Refer to procedure*)

FUEL TRIM TK L+R PMPs FAULT (*Refer to procedure*)

FUEL TRIM TK MAN XFR COMPLETED (*Refer to procedure*)

FUEL TRIM TK OVERFLOW (*Refer to procedure*)

FUEL TRIM TK XFR FAULT (*Refer to procedure*)

FUEL WEIGHT & BALANCE BKUP FAULT (*Refer to procedure*)

FUEL WEIGHT DATA DISAGREE (*Refer to procedure*)

FUEL WING TK OVERFLOW (*Refer to procedure*)

FUEL WINGS BALANCED (*Refer to procedure*)

FUEL WINGS MAN BALANCING PROCEDURE (*Refer to procedure*)

FUEL WINGS NOT BALANCED (*Refer to procedure*)

FUEL ZFW OR ZFCG FMS DISAGREE (*Refer to procedure*)

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
FQMS	FQMS 1	DC ESS (2)
	FQMS 2	DC 2
FQDC	FQDC 1	DC ESS (2)
	FQDC 2	DC 1
Feed Tank Pumps	FEED TK 1 Main Pump	AC 4
	FEED TK 1 Standby Pump	AC 2
	FEED TK 2 Main Pump	AC ESS and DC ESS (1)
	FEED TK 2 Standby Pump	AC 3
	FEED TK 3 Main Pump	AC 3
	FEED TK 3 Standby Pump	AC ESS and DC ESS (1)
	FEED TK 4 Main Pump	AC 2
	FEED TK 4 Standby Pump	AC 4
Crossfeed Valves	N/A	DC 2 or DC ESS
Engine LP Valves	N/A	DC 2 or DC ESS
APU	Pump	DC ESS
	Isolation Valve	DC ESS
	LP Valve	DC ESS or DC APU
Jettison	Valves	DC 1 or DC 2
Auxiliary Refuel Valves	Left Side	DC ESS (2)
	Right Side	DC 2 (2)
Transfer/Defuel Valve	N/A	DC 1
Refuel Valves	N/A	DC 2 (2)
Forward Gallery	Inlet Valves	DC 2 (2)
	OUTR TK pumps	AC 2 and DC 1
	MID TK pumps	AC 3 and DC 2
	INR TK pumps	AC 4 and DC 2
Aft Gallery	Inlet Valves	DC ESS (2)
	MID TK pumps	AC 1 and DC 1
	INR TK pumps	AC 2 and DC 1
Outer Tank	Emergency Transfer Valves	DC1 or DC ESS
Trim Tank	Left Inlet Valve	DC 1 (2)
	Right Inlet Valve	DC 2 (2)
	Isolation Valve	DC ESS
	Left Pump	AC ESS and DC ESS
	Right Pump	AC 2 and DC 1

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System	Subsystem	Electrical Supply
Trim Line Isolation Valve	Connected to Forward Gallery	DC 1 (2)
	Connected to Aft Gallery	DC ESS (2)

(1) *In Electrical Emergency Configuration, the pumps are not electrically supplied when the slats are extended (gravity feeding only)*

(2) *Available on batteries during refuelling, if external power or APU is not available.*

AIRCRAFT SYSTEMS

29 - HYDRAULIC SYSTEM

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DSC-29-PLP PRELIMINARY PAGES

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GND HYD Panel C
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ECAM Alerts ..... A

DSC-29-40 Electrical Supply

Electrical Supply ..... A

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OVERVIEW

Applicable to: ALL

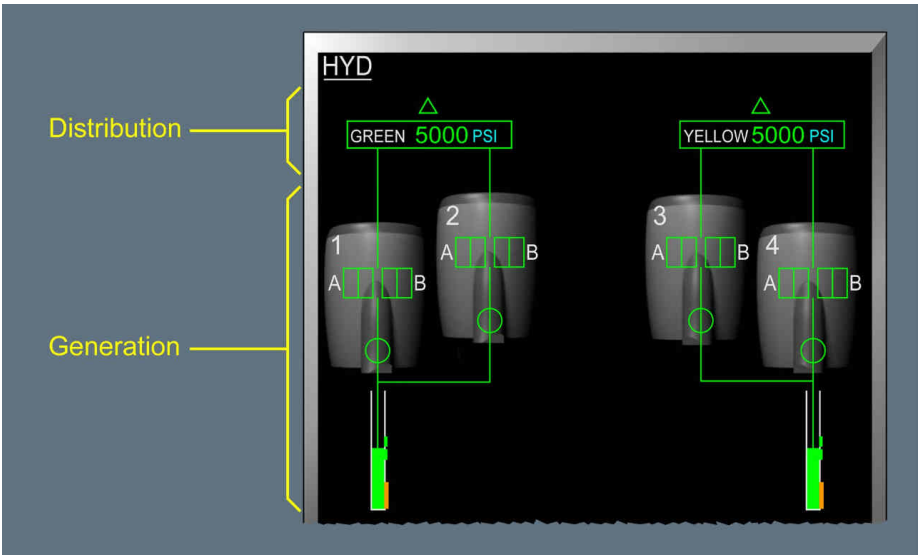
The aircraft has two identical and independent hydraulic systems, referred to as GREEN and YELLOW . These two systems operate continuously, and power the flight controls, the landing gear systems, and the cargo doors. Hydraulic fluid cannot be transferred from one system to the other.

In case one or both hydraulic systems fail, the following hydro-electrical backups are available:
- For flight controls: The Electro-Hydrostatic Actuators (EHA s) and the Electrical Backup Hydraulic Actuator (EBHA). For information on EHA s and EBHA s: *Refer to EHA/EBHA description* .
- For braking and nose wheel steering: The Local Electro-Hydraulic Generation System (LEHGS). For more information on the LEHGS : *Refer to Braking System Architecture* and *Refer to Nose Wheel Steering System* .

The normal operating pressure of each hydraulic system is 5 000 PSI .
Each hydraulic system is monitored and controlled by its assigned Hydraulic System Monitoring Unit (HSMU).

The hydraulic systems ensure:
- Hydraulic generation
- Hydraulic distribution.

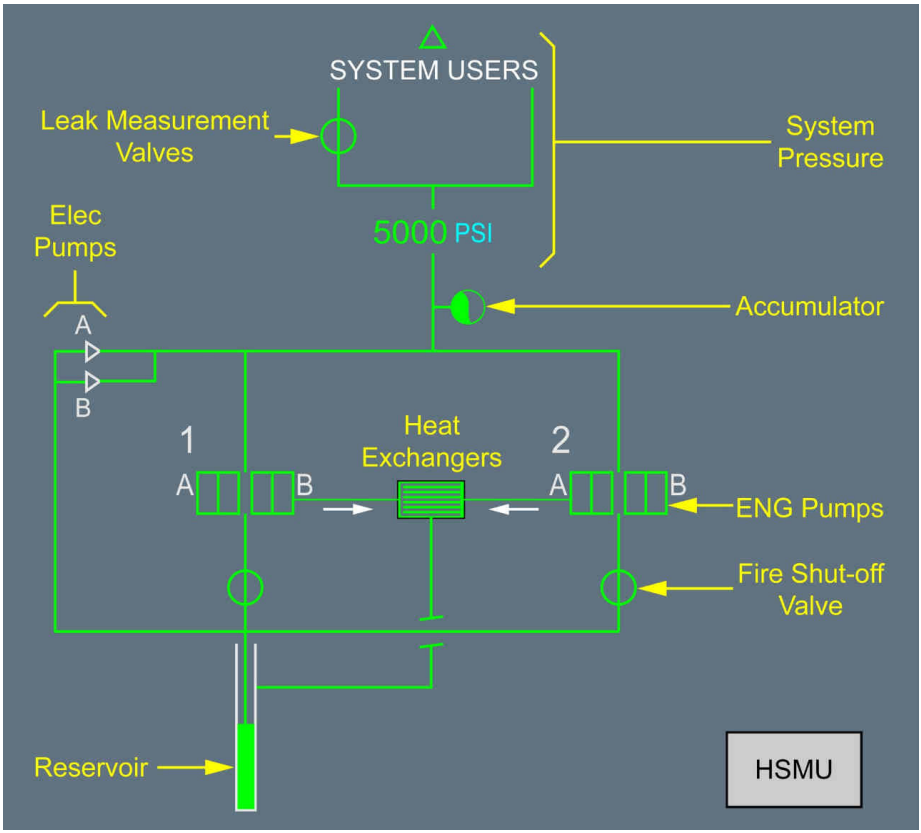
Hydraulic system



HYDRAULIC GENERATION

Applicable to: ALL

Hydraulic Generation



The two hydraulic systems are identical. Therefore, only one system is illustrated and described below.

HYDRAULIC FLUID RESERVOIR

The reservoir provides hydraulic fluid to the system.
To prevent pump cavitation, the hydraulic fluid reservoir is automatically pressurized by bleed air.

L3 The outer engine provides this high pressure air. If the pressure is not sufficient, the reservoir can be pressurized via the aircraft bleed system.
The reservoir is located close to the hydraulic pumps, in the pylon of the outer engine. This also prevents pump cavitation.
The total volume of the reservoir is 31.70 US Gal.

FIRE SHUTOFF VALVES

There is one fire shutoff valve per engine. It is between the reservoir and the engine-driven pumps.
The fire shut-off valves close, when the ENG FIRE pb-sw is pressed.
In case of an engine fire, closing the fire shutoff valves will prevent hydraulic fluid from flowing into, and sustaining, the fire.

ENGINE-DRIVEN PUMPS (ENG PMP)

Each hydraulic system is pressurized by four engine-driven pumps (two per engine).
- The pumps of Engines 1 and 2 pressurize the GREEN hydraulic system
- The pumps of Engines 3 and 4 pressurize the YELLOW hydraulic system.

L2 Two engine-driven pumps are sufficient to provide hydraulic pressure to the users.

If only one engine-driven pump is operative:
- Ailerons, elevators, rudders and the THS switch to the other hydraulic system or to an electrical backup.
- Slats and flaps hydraulic motors and spoilers remain available.
- Landing gear retraction/extension is available, but retraction time is longer than in normal operation.
- Normal braking and nose wheel steering remain available.

The engine accessory gearbox drives the pumps.
In the case of a hydraulic reservoir low level, or a system overheat (only if the pump depressurization is not successful), the ECAM requests the disconnection of the engine pump from the engine accessory gearbox. Disconnection prevents engine pump damage.
If the pumps are disconnected, they cannot be reconnected by the flight crew. Maintenance action is required.

ELECTRIC PUMPS (ELEC PMP)

Two electric pumps can provide hydraulic power on ground only.
The green (yellow) electric pumps can pressurize the GREEN (YELLOW) hydraulic system, if the engines 1 and 2 (3 and 4) are not running.

L3 Theelectricpumps needs400 Hz AC power. Because of the variable frequency of the engine generators, the green (yellow) electric pumps are inhibited as soon as the engine 1 or 2 (3 or 4) is running.

L1 The electric pumps operate automatically for cargo door actuation, and for Body Wheel Steering (BWS).

L2 The electric pumps of the GREEN hydraulic system automatically start, when the cargo doors are being operated.
The electric pumps of the YELLOW hydraulic system automatically start, when BWS is required for pushback or towing.

L1 When the green (yellow) electric pumps operate automatically, only cargo door actuation (BWS) is pressurized.

L2 One green (yellow) electric pump is sufficient to pressurize cargo door actuation (BWS).

For maintenance purposes, the electric pumps can also be started manually, via the ELEC PMP sw on the GND HYD panel:
- When the yellow electric pumps are started manually , the YELLOW hydraulic system powers all the systems
- When the green electric pumps are started manually , the GREEN hydraulic system powers all the systems, except the cargo door actuation.

L3 In the case of an overheat, the HSMU automatically switches off the affected electric pump.

HYDRAULIC SYSTEM MONITORING UNIT (HSMU)

Each hydraulic system is monitored and controlled by its assigned Hydraulic System Monitoring Unit (HSMU).

L2 The HSMU monitors:
- The pressure of the engine pumps
- The pressure and temperature of the electric pumps
- The pressure and level of the reservoir
- The position of the fire shut-off valves
- The temperature of the system.

In addition, the HSMU controls the electric pumps and the heat exchangers.

L3 Each HSMU has two channels: A and B:

- Channel A of the green (yellow) HSMU:
  - Monitors the pressure of the ENG 1 (4) pumps
  - Monitors the position of the fire shut-off valve of ENG 1 (4)
  - Controls the green (yellow) elec pumps and monitors their pressure and temperature
  - Controls the green (yellow) air heat exchanger fan of the ENG 1(4) case drain
  - Controls the green (yellow) fuel heat exchanger, via the FQMS
  - Detects system overheat.
- Channel B of the green (yellow) HSMU:
  - Monitors the pressure of the ENG 2 (3) pumps
  - Monitors the position of the fire shut-off valve of ENG 2 (3)
  - Monitors the green (yellow) reservoir pressure and level
  - Controls the green (yellow) air heat exchanger fan of the ENG 2(3)
  - Controls the green (yellow) fuel heat exchanger, via the FQMS
  - Detects system overheat.

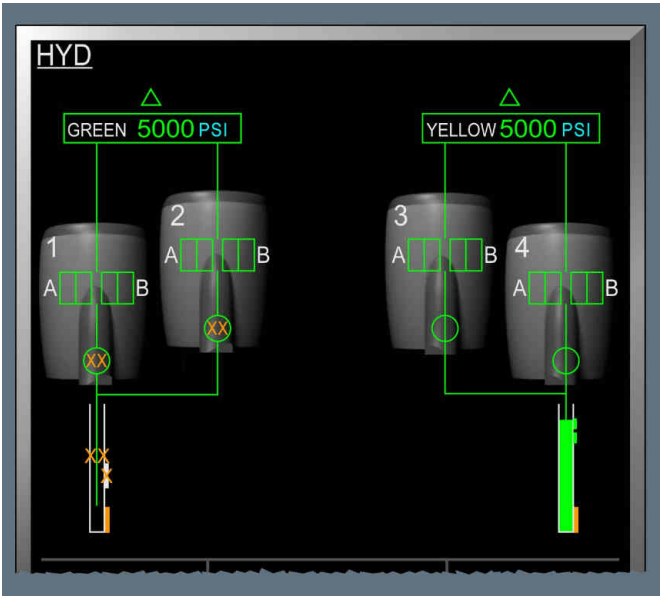
L2 If one HSMU fails:

- Its associated hydraulic system remains operative

  Note: *The electric pumps are lost.*

- The fire shut-off valve indications, and reservoir level indications are lost
- The system pressure, reservoir air pressure, reservoir level, and pump pressure remain monitored.

Green HSMU fault



L3 ACCUMULATOR

An accumulator helps to maintain a constant pressure by compensating for transient demands during normal operation.

L3 LEAK MEASUREMENT VALVES

There are four leak measurement valves between the hydraulic pumps and the system users. These valves are used to detect any abnormal internal leaks in the system.
Only maintenance personnel operate these valves, via the OMS.

SYSTEM PRESSURE

The hydraulic system supplies a constant pressure of around 5 000 PSI to the applicable system users.

L3 The hydraulic pressure is between 5 000 PSI and 5 200 PSI in normal operation.

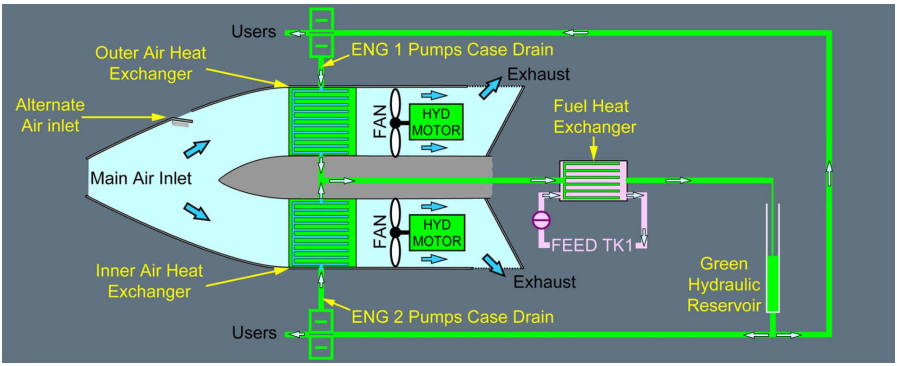
HYDRAULIC HEAT EXCHANGERS

Both hydraulic circuits have a cooling system, that prevents the overheat and thermal degradation of hydraulic fluid.

This cooling system has:
- Two air/hydraulic heat exchangers
- One fuel/hydraulic heat exchanger, that is a backup to the air/hydraulic heat exchangers.

In the engine pumps, a part of the hydraulic flow is used to lubricate the pumps. This flow is not pressurized to provide hydraulic power. It returns to the hydraulic reservoir through the heat exchangers, via the engine-pump case drain.

Hydraulic Heat Exchanger



AIR/HYDRAULIC HEAT EXCHANGER

There are two air/hydraulic heat exchangers for each hydraulic system.

L3 These heat exchangers are in flap-track fairing n°5.

L1 The air/hydraulic heat exchangers use ambient air to cool the hydraulic fluid. The ambient air comes through the main air inlet that is at the front of the flap track fairing.
On ground, and at low aircraft speeds, hydraulically-powered fans ensure that there is sufficient airflow.

L3 For the inner heat exchanger, the HSMU:
- Turns the fans on when the reservoir temperature exceeds 55 °C
- Stops them when the reservoir temperature goes below 35 °C.

For the outer heat exchanger, the HSMU:
- Turns the fans on when the reservoir temperature exceeds 20 °C
- Stops them when the reservoir temperature goes below 0 °C.

The fans are inhibited when the aircraft exceeds M 0.45. However, they are not inhibited if wing anti-ice has been turned on during the flight.

L1 If the main air inlet is blocked (e.g. due to ice accretion), the door of the alternate air inlet, located on the side of the flap-track fairing, will open.

Note: The door of the alternate air inlet is open on ground.

L2 The door of the alternate air inlet is kept open by a spring. When the airflow coming from the main air inlet is sufficient, the door will close. When the airflow decreases due to a blockage of the main air inlet, the pressure of the airflow will not be sufficient to keep the door closed, and the door will open.

L1 FUEL/HYDRAULIC HEAT EXCHANGER

When both air/hydraulic heat exchangers are operative, the hydraulic fluid is cool enough to return to the reservoir. The hydraulic fluid flows through the fuel/hydraulic heat exchanger. However, fuel does not flow through the heat exchanger.
The fuel/hydraulic heat exchanger is active when an air/hydraulic heat exchanger fails.
The fuel comes from engine feed tank 1(4).

L3 The failure of an air/hydraulic heat exchanger is detected by an abnormal increase of the hydraulic reservoir temperature.
The HSMU, via the FQMS, controls the fuel/hydraulic heat exchanger valves, and opens the valves, if the temperature in the hydraulic reservoir exceeds 85 °C, and closes the valves when the temperature goes below 40 °C.

The FQMS inhibits the fuel/hydraulic heat exchanger if:
- Low quantity of fuel in feed tank 1(4)
- High fuel temperature in feed tank 1(4) (above 53 °C)
- Crossfeed valves are open
- Gravity feed
- Low pressure in the feed pumps
- Electrical Emergency Configuration.

HYDRAULIC DISTRIBUTION

Applicable to: ALL

The GREEN and YELLOW hydraulic systems power the following:

1. Flight controls:

L2
- Inboard ailerons (GREEN)
- Midboard ailerons (YELLOW)
- Outboard ailerons (GREEN and YELLOW)
- Spoilers 1, 3, 5, 7 (YELLOW)
- Spoilers 2, 4, 6, 8 (GREEN)
- Rudder (GREEN and YELLOW)
- Elevators (GREEN and YELLOW)
- Trimmable Horizontal Stabilizer (GREEN and YELLOW)
- Slats (GREEN)
- Flaps (GREEN and YELLOW).

L1 2. Landing gear systems:

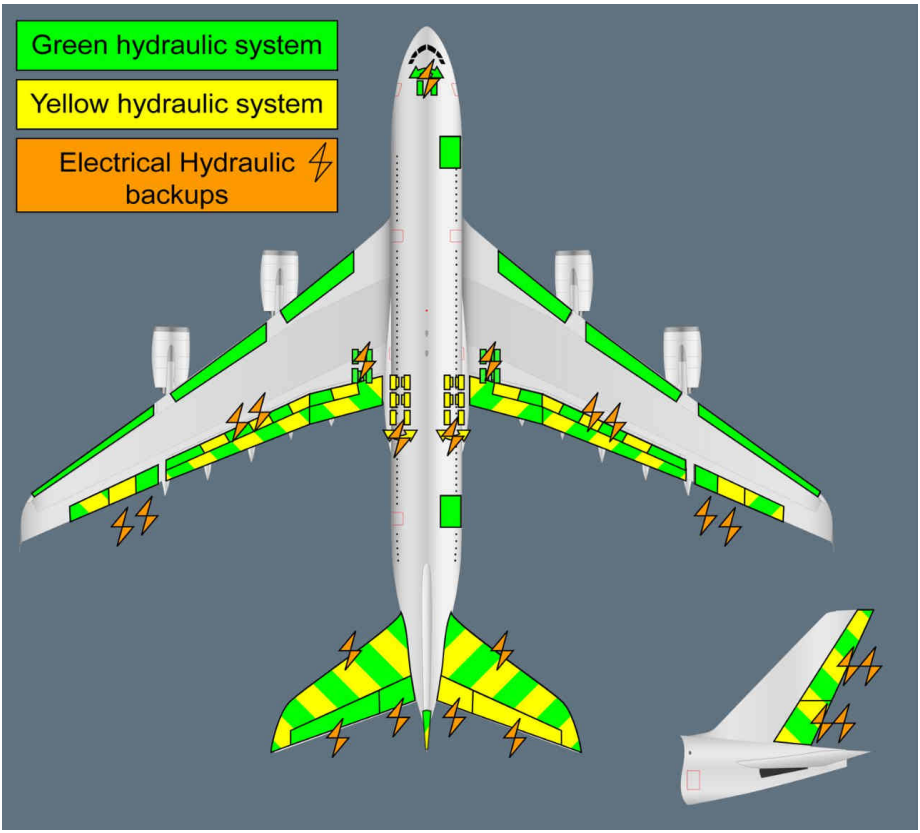
L2
- Body landing gear: Actuation (gears and doors), braking, and steering (YELLOW)
- Wing landing gear: Actuation (gears and doors) and braking (GREEN)
- Nose landing gear: Actuation (gears and doors) and nosewheel steering (GREEN)

L1 3. Cargo door actuation (GREEN)

L2 *Note: Cargo door actuation is possible only via the electric pumps in automatic mode.*

L3 The green hydraulic system powers RAT retraction, on ground.

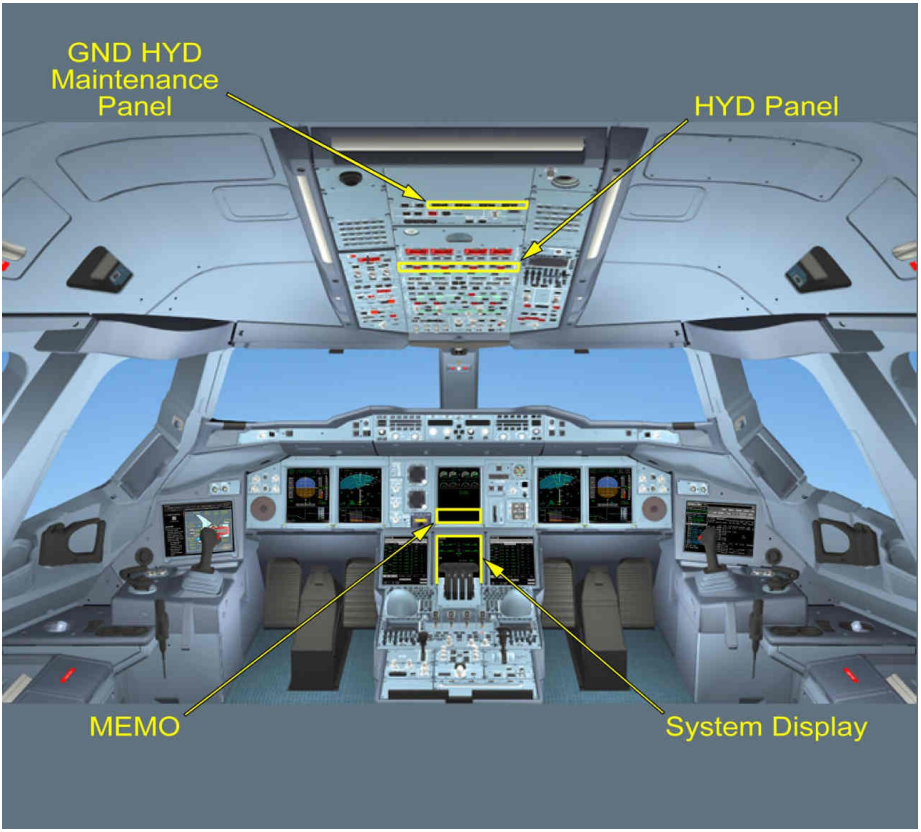
Hydraulic Distribution



COCKPIT VIEW

Applicable to: ALL

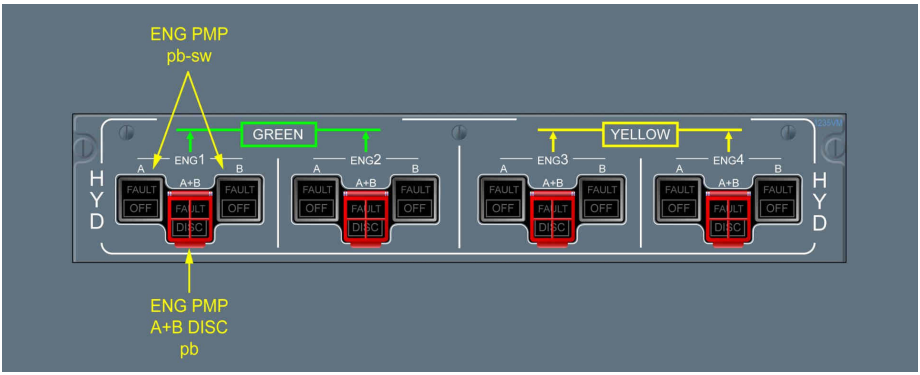
CONTROLS AND INDICATORS



HYD OVERHEAD PANEL

Applicable to: ALL

HYDRAULIC OVERHEAD PANEL



eng pmp pb-sw



The pump pressurizes its hydraulic system, when the engine is running.



The pump is depressurized.

L12



The pump is failed, or the pump must be depressurized because of a hydraulic system failure.

Associated with one of the following ECAM alerts:
- HYD G(Y) ENG 1 or 2 (3 or 4) PMP A or B PRESS LO (*Refer to procedure*).
- HYD G(Y) SYS OVHT (*Refer to procedure*).
- HYD G(Y) SYS TEMP EXCESS HI (*Refer to procedure*).
- HYD G(Y) RSVR LEVEL LO (*Refer to procedure*).
- HYD G(Y) RSVR AIR PRESS LO (*Refer to procedure*).

The FAULT light goes off, when the flight crew selects OFF . However, in case of an overheat, the FAULT light will remain on, until the overheat disappears.

ENG pmp a+b disc pb



L123

Pumps A and B are connected to the engine accessory gearbox.



L12

Pumps A and B are disconnected from the engine accessory gearbox.

Note: *When disconnected, they cannot be reconnected by the flight crew. Maintenance action is required.*



The hydraulic system is failed, and cannot be recovered before the end of the flight. Therefore, the pumps must be disconnected from the engine accessory gearbox.

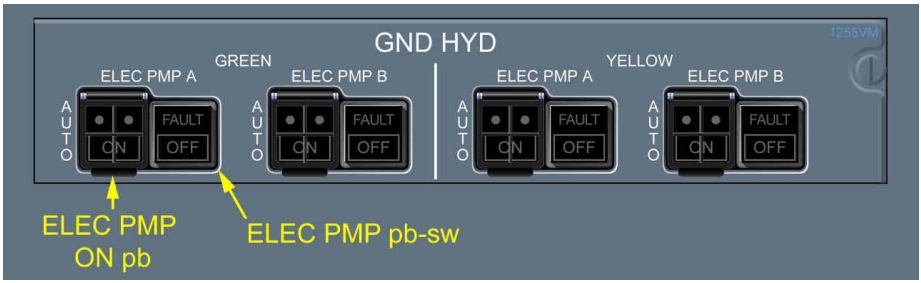
Associated with one of the following ECAM alerts:
- HYD G(Y) RSVR LEVEL LO (*Refer to procedure*).
- HYD G(Y) SYS OVHT (If pump depressurization failed) (*Refer to procedure*).
- HYD G(Y) SYS TEMP EXCESS HI (*Refer to PRO-ABN-ECAM-10-29-60 HYD G(Y) SYS TEMP EXCESS HI*)

The FAULT light goes off, when the crew selects DISC .

GND HYD PANEL

Applicable to: ALL

GND HYD PANEL



ELEC PMP ON pb



The electric pump is not running.



The pump is running, and has either been automatically-controlled or manually-selected.
The electric pumps can be manually set to ON, but this is not operationally recommended.

Note:
- *When the electric pumps operate in automatic mode, any action on the ELEC PMP ON pb is disregarded*
- *When the electric pumps operate in manual mode, the automatic mode is disregarded (e.g. cargo door actuation).*

CAUTION	When the pump is manually-selected, the hydraulic system is fully pressurized. Do not pressurize the hydraulic system without clearance from the ground crew.

ELEC PMP pb-sw

The electric pumps are fully automatic and do not require any crew action, unless requested by the ECAM .



The HSMU automatically controls the pump.



The pump is OFF and can neither be started by the HSMU , nor by the flight crew.

L12



The pump is failed, or the pump must be stopped because of a hydraulic system failure.

Associated with one of the following ECAM alerts:

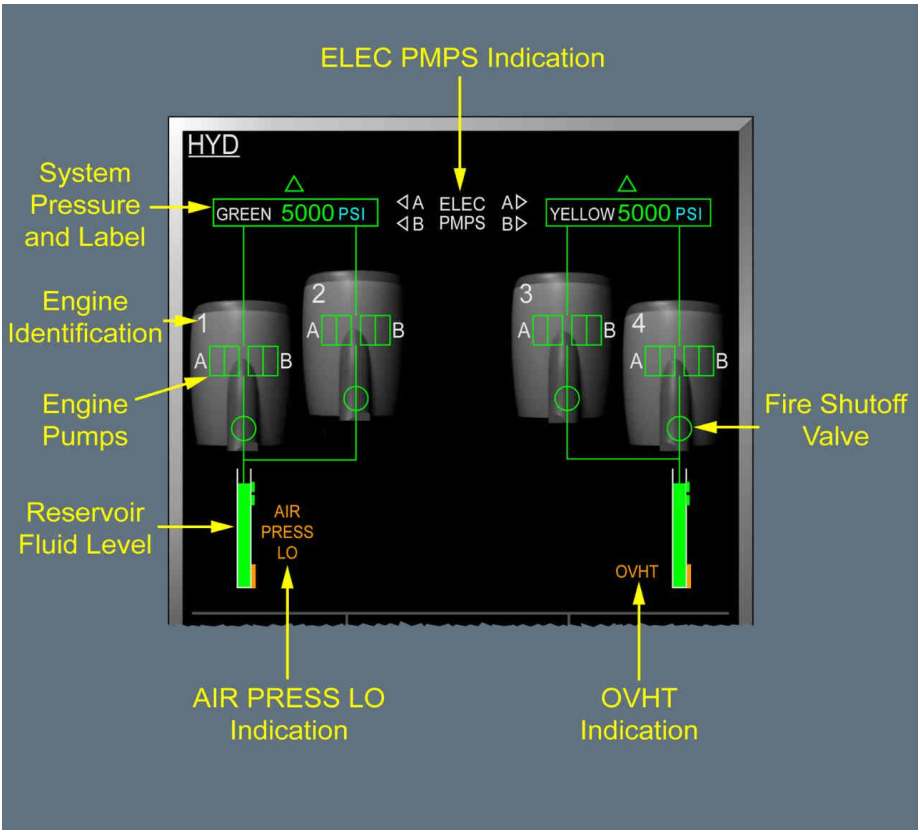
- HYD G(Y) ELEC PMP A (B) FAULT (*Refer to procedure*)
- HYD G(Y) SYS OVHT (on ground, with engines OFF) (*Refer to procedure*)
- HYD G(Y) SYS TEMP EXCESS HI (on ground, with engines OFF) (*Refer to procedure*).
- HYD G(Y) RSVR LEVEL LO (on ground, with engines OFF) (*Refer to procedure*).
- HYD G(Y) RSVR AIR PRESS LO (on ground, with engines OFF) (*Refer to procedure*).

The FAULT light goes off, when the flight crew selects OFF . However, in case of an overheat, the FAULT light will remain on, until the overheat disappears.

HYDRAULIC SYSTEM DISPLAY

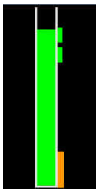
Applicable to: ALL

Hydraulic System Display



RESERVOIR FLUID LEVEL

L123



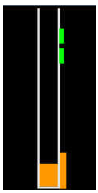
The fluid level is within normal range.
The normal filling range is displayed in green on the right hand side of the reservoir. It is corrected for temperature.
The normal filling range is increased when the landing gear is retracted.
The normal filling range is around 12 US Gal , when the temperature in the reservoir is 20 °C .

L13



The HSMU is unable to compute the normal filling range.
The index is set at 12 US Gal .

L12



The fluid level is below the low level limit.

Associated with the following ECAM alert:
- HYD G(Y) RSVR LEVEL LO (*Refer to procedure*)

RESERVOIR OVHT

L12



The temperature in the reservoir is above normal.

Associated with the following ECAM alert:
- HYD G(Y) SYS OVHT (*Refer to procedure*)
- HYD G(Y) SYS TEMP EXCESS HI (*Refer to procedure*).

RESERVOIR AIR PRESS LO

L12



The air pressure in the reservoir is below normal.

Associated with the following ECAM alert:
- HYD G(Y) RSVR AIR PRESS LO (*Refer to procedure*)

FIRE SHUTOFF VALVE



The valve is open.



The valve is closed.

ENGINE PUMPS



The engine pump is on, and hydraulic pressure is normal.



The engine pump is depressurized.



The engine pump is abnormally pressurized (ENG PMP pb-sw is OFF).

L12



- The engine pump is on, and the engine pump pressure is below normal

  Associated with the following ECAM alert:
  - HYD G(Y) ENG 1 or 2 (3 or 4) PMP A or B PRESS LO (*Refer to procedure*)
- On ground, the associated engine is not running.

L12



The pump is disconnected from the engine accessory gearbox, via the ENG PMP A+B DISC pb .

Note: If the pump has been disconnected by maintenance prior to dispatch, the engine pump will be shown as depressurized.

ENGINE IDENTIFICATION



The engine is running.



The engine is not running.

ELEC PMPS

The ELEC PMPs indication is displayed on ground, when the engines are not running.



The electric pump is running.



The electric pump is in automatic mode, and is not running.

L12



The electric pump is running, and is failed.

Associated with the following ECAM alert:
- HYD G(Y) ELEC PMP A(B) FAULT (*Refer to procedure*)

L12



The electric pump is either switched OFF, or is failed and stopped.

In case of failure, it is associated with the following ECAM alert:
- HYD G(Y) ELEC PMP A(B) FAULT (*Refer to procedure*)

SYSTEM PRESSURE AND LABEL

Indicates the actual pressure of the hydraulic system.



Hydraulic pressure is above 2 900 PSI .

L12



Hydraulic pressure is below 2 900 PSI .

Associated with the following ECAM alert:
- HYD G(Y) SYS PRESS LO (*Refer to procedure*)

MEMO	
Applicable to: ALL	
G ELEC PMP A (B) CTL	ELEC PMP A(B) of the GREEN hydraulic system is running

Y ELEC PMP A (B) CTL	ELEC PMP A(B) of the YELLOW hydraulic system is running

ECAM ALERTS

Applicable to: ALL

HYD G(Y) ELEC PMP A(B) FAULT (*Refer to procedure*)

HYD G(Y) ENG 1 or 2 (3 or 4) PMP A or B PRESS LO (*Refer to procedure*)

HYD G(Y) FUEL HEAT EXCHANGER VLV FAULT (*Refer to procedure*)

HYD G(Y) HEAT EXCHANGER AIR LEAK (*Refer to procedure*)

HYD G(Y) HEAT EXCHANGER AIR LEAK DET FAULT (*Refer to procedure*)

HYD G(Y) RSVR AIR PRESS LO (*Refer to procedure*)

HYD G(Y) RSVR LEVEL LO (*Refer to procedure*)

HYD G(Y) SYS CHAN A or B OVHT DET FAULT (*Refer to procedure*)

HYD G(Y) SYS COOLING FAULT (*Refer to procedure*)

HYD G(Y) SYS MONITORING FAULT (*Refer to procedure*)

HYD G(Y) SYS OVHT (*Refer to procedure*)

HYD G(Y) SYS OVHT DET FAULT (*Refer to procedure*)

HYD G(Y) SYS PRESS LO (*Refer to procedure*)

HYD G(Y) SYS TEMP EXCESS HI (*Refer to procedure*)

HYD G+Y SYS PRESS LO (*Refer to procedure*)

HYD Y ELEC PMP A+B OFF (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
HSMU	Green HSMU	DC 1 and DC 2
	Yellow HSMU	DC 1 and DC 2
Engine pump control	Engine 1 Pumps	DC 2 or DC ESS
	Engine 2 Pumps	DC ESS
	Engine 3 Pumps	DC 2 or DC ESS
	Engine 4 Pumps	DC ESS
Engine pump disconnection	Engine 1 Pumps	DC 2
	Engine 2 Pumps	DC 1
	Engine 3 Pumps	DC 2
	Engine 4 Pumps	DC 1
Fire Shut Off Valves	Engine 1	DC 2 or DC ESS
	Engine 2	DC ESS
	Engine 3	DC 2 or DC ESS
	Engine 4	DC ESS
Electric Pumps	Green Pump A	AC 1 and DC 2
	Green Pump B	AC 2 and DC 2
	Yellow Pump A	AC 3 and DC 1
	Yellow Pump B	AC 4 and DC 1
Fuel Heat Exchangers	N/A	DC 1 or DC ESS

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AIRCRAFT SYSTEMS

30 - ICE AND RAIN PROTECTION

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DSC-30-PLP PRELIMINARY PAGES

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OVERVIEW

Applicable to: ALL

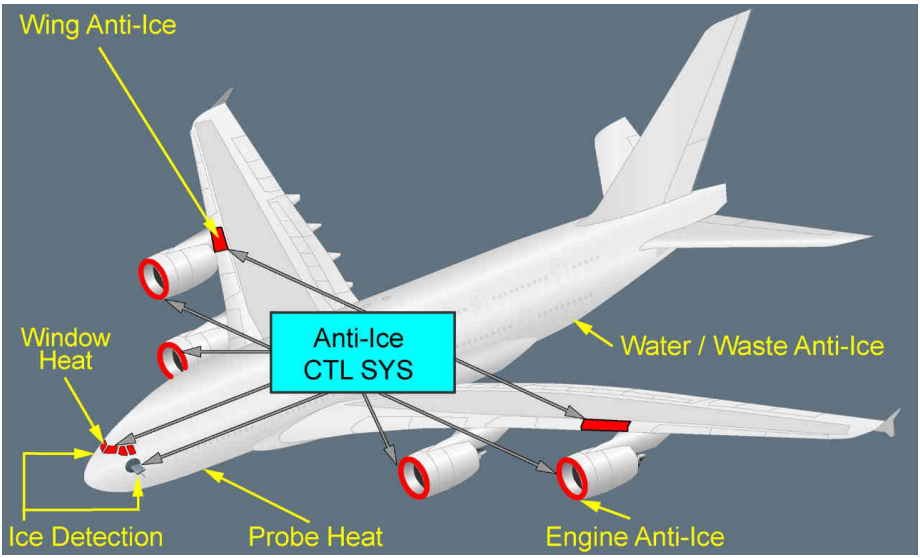
The ice protection system allows unrestricted operation of the aircraft in icing conditions.

This system protects the critical areas of the aircraft against ice, by using:

- Hot bleed air for:
  - Engine anti-ice
  - Wing anti-ice.
- Electrical power for:
  - Window heating
  - Water/Waste drain masts heating
  - Probe heating.

An ice detection system measures ice accretion via the anti-ice control system and provides this information to the flight crew.

Ice protection



ANTI-ICE CONTROL SYSTEM

Applicable to: ALL

The anti-ice control system monitors and controls:

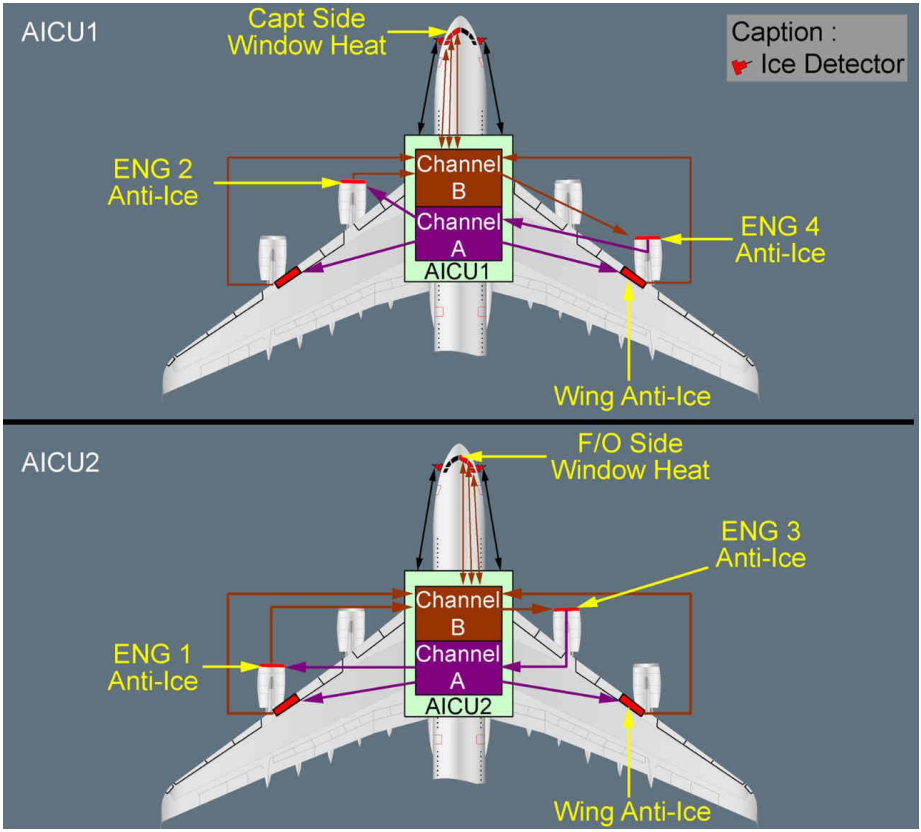
- Wing anti-ice
- Engine anti-ice
- Window heat
- Rain repellent.

The anti-ice control system has two Anti-Ice Control Units (AICUs).

L2 Each AICU has two channels: A and B.

Each channel monitors and/or controls the anti-ice systems, as shown on the following diagram.

Anti-Ice Control Units



AICU 1	Channel A	Wing Anti-ice Control
		ENG 2 Anti-ice Control
		ENG 4 Anti-ice Monitoring
	Channel B	Wing Anti-ice Monitoring
		ENG 2 Anti-ice Monitoring
		ENG 4 Anti-ice Control
		Captain's side Window Heating
AICU 2	Channel A	Wing Anti-ice Control
		ENG 1 Anti-ice Control
		ENG 3 Anti-ice Monitoring
	Channel B	Wing Anti-ice Monitoring
		ENG 1 Anti-ice Monitoring
		ENG 3 Anti-ice Control
		F/O's side Window Heating

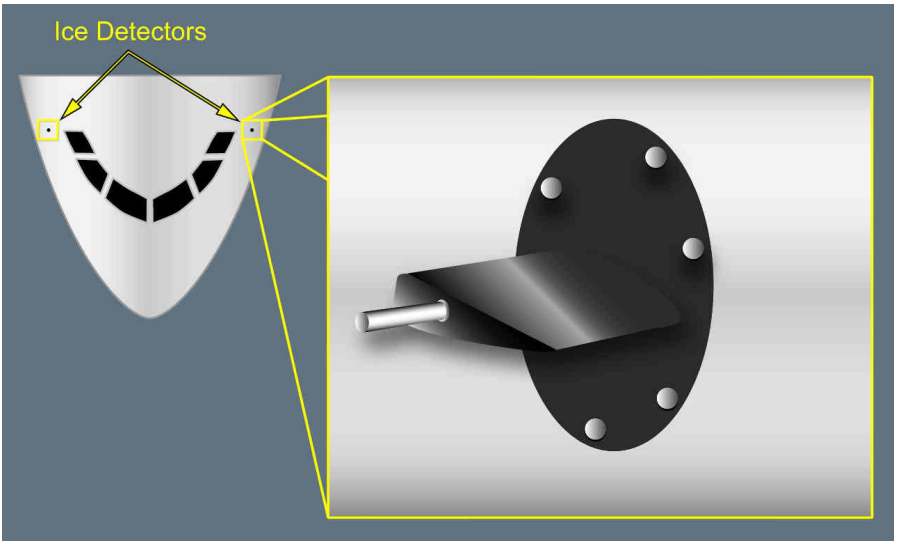
ICE DETECTION

Applicable to: ALL

ICE DETECTION SYSTEM

The ice detection system has two ice detectors that measure ice accretion. If icing, or severe icing conditions exist, the ice detectors provide this information to the flight crew.
There is one ice detector on each side of the fuselage, next to each fixed cockpit side window.

Ice detectors



L3 Each ice detector has a probe that measures icing. The probe is located outside the boundary layer.

L1 - If at least one ice detector detects icing conditions, and if engine anti-ice is off: The ECAM triggers the A-ICE ICE DETECTED caution.

L3 If 0.5 mm of ice builds up on any probe, the ice detection system informs the anti-ice control system of icing conditions.
An internal heating device deices the probes, to permit subsequent ice detection.

L1 - If at least one ice detector subsequently detects severe icing conditions, and if wing anti-ice is off: The ECAM triggers the A-ICE SEVERE ICE DETECTED caution.

L3 If 0.5 mm of ice builds up 7 times on the same probe, the ice detection system informs the anti-ice control system of severe icing conditions. This number of ice detections corresponds to approximately 5 mm of ice accretion on the airframe. The ice detection counter resets to zero, when wing anti-ice is on.

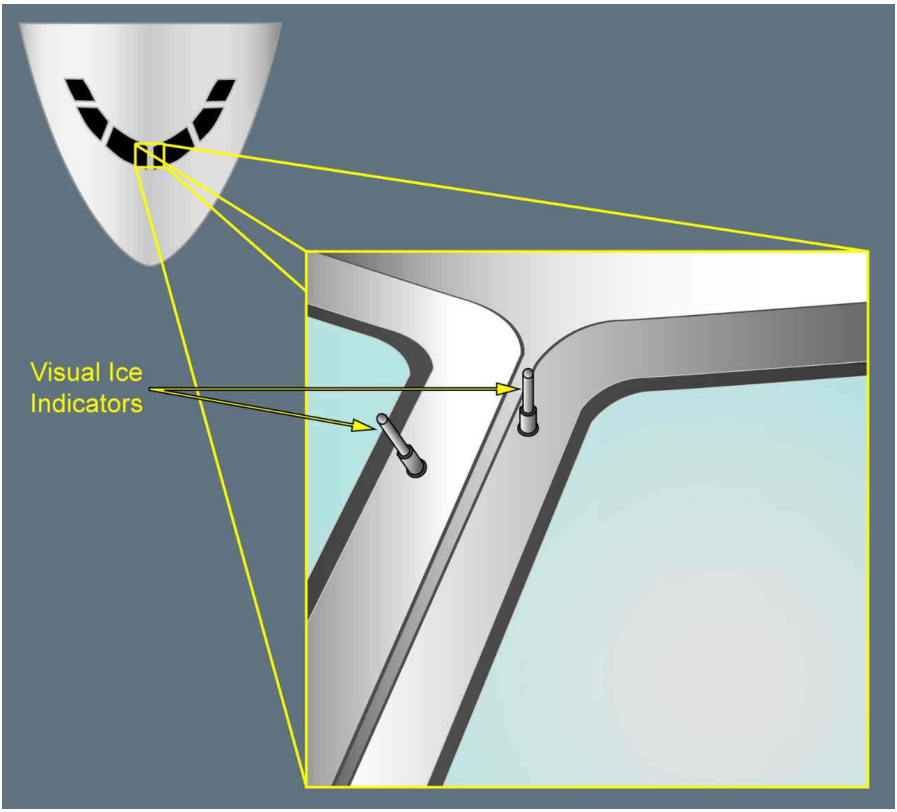
L1 - If icing is not detected for approximately 2 min, and if wing anti-ice and/or engine anti-ice are on: The ECAM displays the ICE NOT DETECTED memo.

VISUAL ICE INDICATORS

There are two visual ice indicators outside the aircraft, between the two windshields. They provide the flight crew with a visual backup to the ice detection system.

The visual ice indicators can be illuminated (*Refer to ICE IND & STBY COMPASS light*).

Visual Ice Detectors



ENGINE ANTI-ICE

Applicable to: ALL

Each engine has its own anti-ice system, with an independent hot bleed air source.

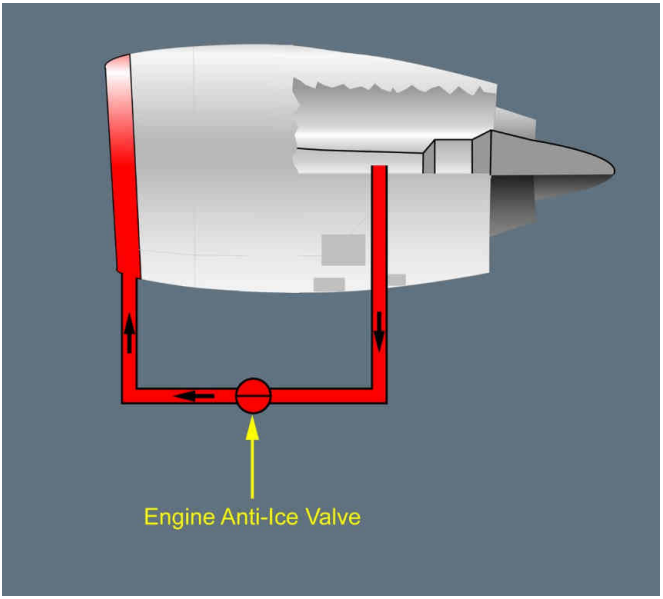
L3 This bleed air comes from the 3rd stage of the High Pressure Compressor to anti-ice the engine air inlet.

L1 An anti-ice valve on each engine enables the flow of hot air.

L2 - AICU 1 controls the anti-ice valves on Engines 2 and 4
- AICU 2 controls the anti-ice valves on Engines 1 and 3.

L3 Each valve is electrically-controlled and pneumatically-actuated. The valve opens, if it loses its power supply.

Engine anti-ice



L1 By setting the applicable engine ANTI ICE pb to ON, the flight crew activates the engine anti-ice valve of that selected engine.

WING ANTI-ICE

Applicable to: ALL

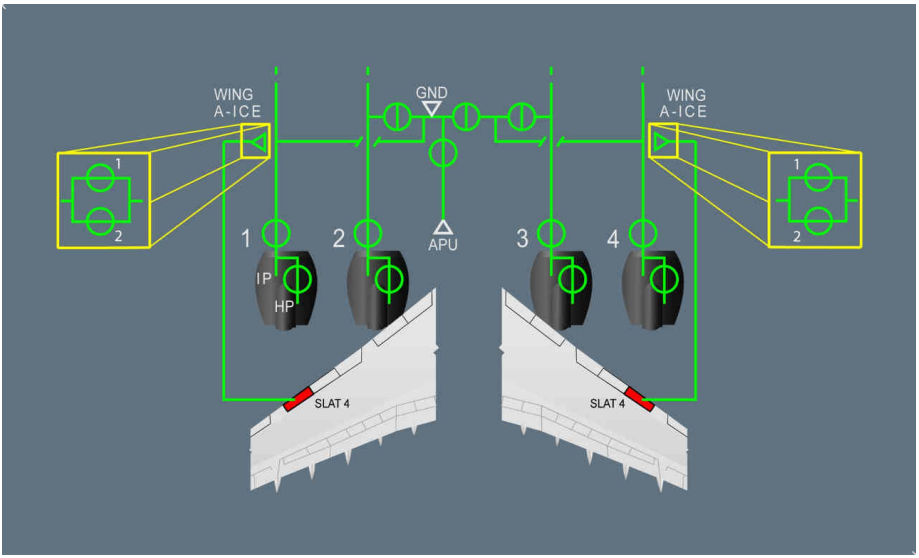
Hot air from the pneumatic system can be used to prevent ice accretion on slat 4.

L3 The A380 is less affected by icing than smaller aircraft, due to the size and thickness of its wings. Therefore, slat 4 is the only part of the leading edge that is deiced.

L1 In each wing, wing anti-ice valves enable the flow of hot air.

L2 There are two redundant wing anti-ice valves per wing:
- AICU 1 controls the outer wing anti-ice valves
- AICU 2 controls the inner wing anti-ice valves.

Wing anti-ice



When the crew sets the WING ANTI ICE pb to ON, both wing anti-ice valves in both wings will open.
L1 On ground, if the WING ANTI ICE pb is set to ON, the wing anti-ice valves will open for 30 s . Wing anti-ice will then be inhibited for 10 min, provided the aircraft is not in flight.
Wing anti-ice is also inhibited during takeoff, until takeoff thrust reduction.
L3 Each valve is electrically-controlled and pneumatically-actuated. The valve closes, if it loses its power supply.

WATER/WASTE ANTI-ICE

Applicable to: ALL

The water lines are automatically heated to prevent ice formation, which could lead to damage and/or obstruction of the water lines.
L3 Water lines heating is monitored and controlled by two Ice Protection Control Units (IPCU).

The following areas are heated:
- The drain masts
- The sections of the water/waste lines coming from the galleys and lavatory wahsbassins, which are located below the cargo compartment floor
- The drain tubes of the waste tanks

- The water servicing panel
- The potable water lines, located close to the potable water tanks, close to the forward drain panel, and inside the wing center section.

Sensors measure the temperature in these areas. For each area, the IPCUs compare the temperature to a reference temperature. When the actual temperature is below the reference temperature, the IPCUs activate the heating in the affected area.

COCKPIT WINDOW HEATING

Applicable to: ALL

The cockpit windows (windshield and side windows) are electrically-heated.

L2 - The windshields are heated to prevent icing and to defog.
- The side windows are heated to defog only.

L1 The heating system is fully automatic, and operates as soon as any engine is started.
However, before engine start, the crew can manually activate the system, via the PROBE / WINDOW HEAT pb-sw.

L2 Each Anti-Ice Control Unit (AICU) monitors and controls the windows on its side:
- AICU 1: The windows on the Captain's side
- AICU 2: The windows on the First Officer's side.

L3 The AICUs:
- Regulate cockpit window temperature
- Operate the windshield heating at half power, on ground, and at normal power, in flight
- Operate the side window heating at normal power, on ground and in flight.

PROBE HEAT

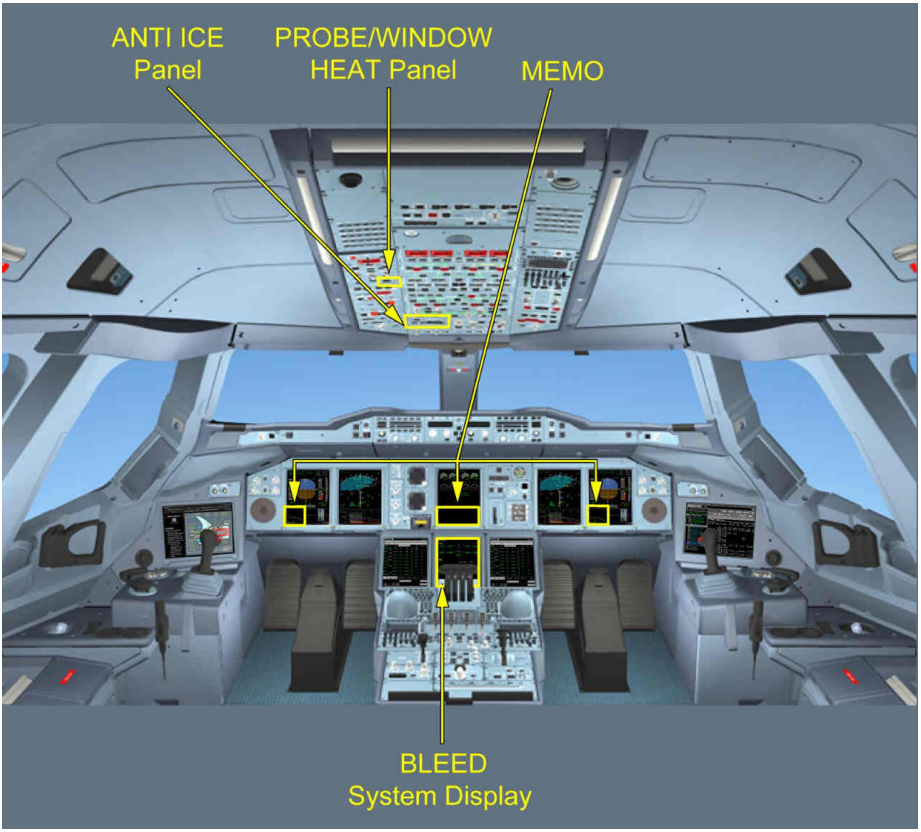
Applicable to: ALL

The pitot TAT AOA probes, the static probes, and the side slip angle probes are automatically heated to prevent ice formation. The pitot probe and the static probe of the ISIS are also automatically heated.
The probe heating system is fully automatic, and operates as soon as any engine is started.
However, before engine start, the crew can manually activate the system, via the PROBE / WINDOW HEAT pb-sw.

COCKPIT VIEW

Applicable to: ALL

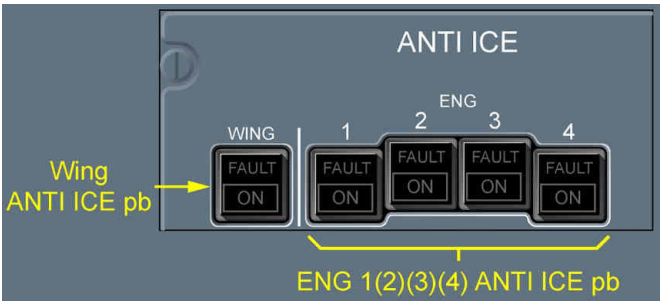
Controls and indicators



ANTI ICE OVERHEAD PANEL

Applicable to: ALL

ANTI ICE Overhead Panel



ENG 1(2)(3)(4) ANTI ICE pb



The anti-ice of the applicable engine is off.



The anti-ice of the applicable engine is on.
The ECAM displays the ENG A-ICE memo.

L12



The anti-ice valve position disagrees with the requested position.

Associated with one of the following ECAM alerts:
- A-ICE ENG 1(2)(3)(4) VALVE CLOSED (*Refer to procedure*)
- A-ICE ENG 1(2)(3)(4) VALVE OPEN (*Refer to procedure*)

Wing ANTI ICE pb



Wing anti-ice is off.

L12



Wing anti-ice is on.
The ECAM displays the WING A-ICE memo.
On ground, the wing anti-ice valves will open for 30 s . Wing anti-ice will then be inhibited for 10 min , provided the aircraft is not in flight. If the flight crew does not switch off wing anti-ice, the ON light will remain on, even though wing anti-ice is off. The wing anti-ice valves will then reopen after takeoff thrust reduction.

L12



- The anti-ice valve position disagrees with the requested position.

  Associated with one of the following ECAM cautions:
  - A-ICE L(R) WING VLV CLOSED (*Refer to procedure*)
  - A-ICE L(R) WING VLV OPEN (*Refer to procedure*)

- Or, the anti-ice valve is open, but a low pressure is detected.

  Associated with the following ECAM caution:
  - A-ICE L(R) WING VLV PRESS LO (*Refer to procedure*)

The FAULT light goes off, when the affected wing anti-ice system is recovered, after applying the procedure. If the system cannot be recovered, the FAULT light will remain on for the remainder of the flight.

PROBE WINDOW HEAT

Applicable to: ALL

Probes / Window Heat pb-sw



Probe and window heating is automatic, and will operate as soon as any engine is started.

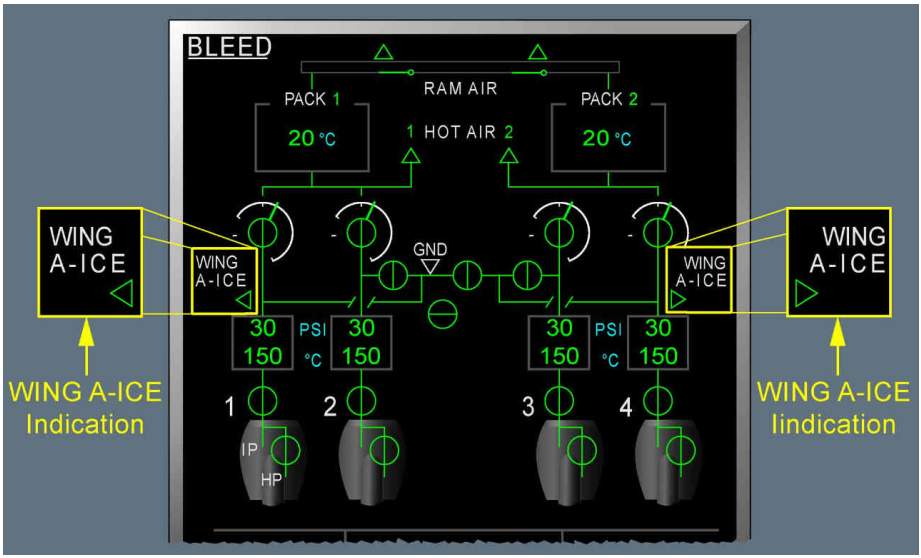


Probe and window heating is selected on.

BLEED SYSTEM DISPLAY

Applicable to: ALL

BLEED System Display



WING A-ICE INDICATION

The indication is not displayed when wing anti-ice is off.



Wing anti-ice is on.

L12



Wing anti-ice is commanded on but remains off.

Associated with the following ECAM caution:

- A-ICE L(R) WING VLV CLOSED (*Refer to procedure*)

L12



- Wing anti-ice is commanded off but remains on.

  Associated with the following ECAM caution:
  - A-ICE L(R) WING VLV OPEN (*Refer to procedure*)

- Or, an abnormal pressure is detected.

  Associated with one of the following ECAM cautions:
  - A-ICE L(R) WING VLV PRESS HI (*Refer to procedure*)
  - A-ICE L(R) WING VLV PRESS LO (*Refer to procedure*)

MEMO

Applicable to: ALL

ENG A-ICE	Engine anti-ice is on. Appears on the PFDs and on the EWD.
WING A-ICE	Wing anti-ice is on. Appears on the PFDs and on the EWD.
ICE NOT DETECTED	Wing anti-ice and/or engine anti-ice are ON, and the ice detectors have not detected any ice for approximately 2 min.

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ECAM ALERTS

Applicable to: ALL

A-ICE ALL PROBES 1(2)(3) NOT DE-ICED (*Refer to procedure*)

A-ICE CTL SYS FAULT (*Refer to procedure*)

A-ICE ENG 1(2)(3)(4) VALVE CLOSED (*Refer to procedure*)

A-ICE ENG 1(2)(3)(4) VALVE OPEN (*Refer to procedure*)

A-ICE ICE DET FAULT (*Refer to procedure*)

A-ICE ICE DETECTED (*Refer to procedure*)

A-ICE L(R) FIXED WINDOW HEATG FAULT (*Refer to procedure*)

A-ICE L(R) SLIDING WINDOW HEATG FAULT (*Refer to procedure*)

A-ICE L(R) WINDSHIELD HEATG FAULT (*Refer to procedure*)

A-ICE L(R) WING VLV CLOSED (*Refer to procedure*)

A-ICE L(R) WING VLV OPEN (*Refer to procedure*)

A-ICE L(R) WING VLV PRESS HI (*Refer to procedure*)

A-ICE L(R) WING VLV PRESS LO (*Refer to procedure*)

A-ICE L+R WINDSHIELD HEATG FAULT (*Refer to procedure*)

A-ICE PITOT TAT AOA PROBES 1(2)(3) HEATG FAULT (*Refer to procedure*)

A-ICE SEVERE ICE DETECTED (*Refer to procedure*)

A-ICE SIDE SLIP PROBE 1(2)(3) HEATING FAULT (*Refer to procedure*)

A-ICE STATIC PROBE 1(2)(3) HEATING FAULT (*Refer to procedure*)

A-ICE STBY PITOT PROBE HEATG FAULT (*Refer to procedure*)

A-ICE STBY STATIC PROBE HEATG FAULT (*Refer to procedure*)

CABIN DRAIN MASTS HEATING FAULT (*Refer to procedure*)

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
AICU	AICU 1	DC ESS
	AICU 2	DC 2
Ice Detectors	Ice detector 1	AC 1
	Ice detector 2	AC 4
Wing Anti-Ice	Outer valves	DC 1
	Inner Valves	DC 2
Engine Anti-Ice	ENG 1	DC 2
	ENG 2	DC 1
	ENG 3	DC 2
	ENG 4	DC 1
Window Heating	Captain Sliding/Fixed Window	AC 2
	F/O Sliding/Fixed Window	AC 4
Windshield Heating	Captain's side	AC ESS
	F/O's side	AC 3

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WIPERS

Applicable to: ALL

The Captain and First Officer windshields each have a two-speed electric wiper.
The wipers can be used during taxi, takeoff, holding, approach, and landing.
Each windshield wiper is controlled by its assigned WIPER selector.

L3 When the wipers are not in use: They are out of view, and do not rest on the surface of the windshield. This prevents the accretion of sand and dust, that could scratch the windshield.

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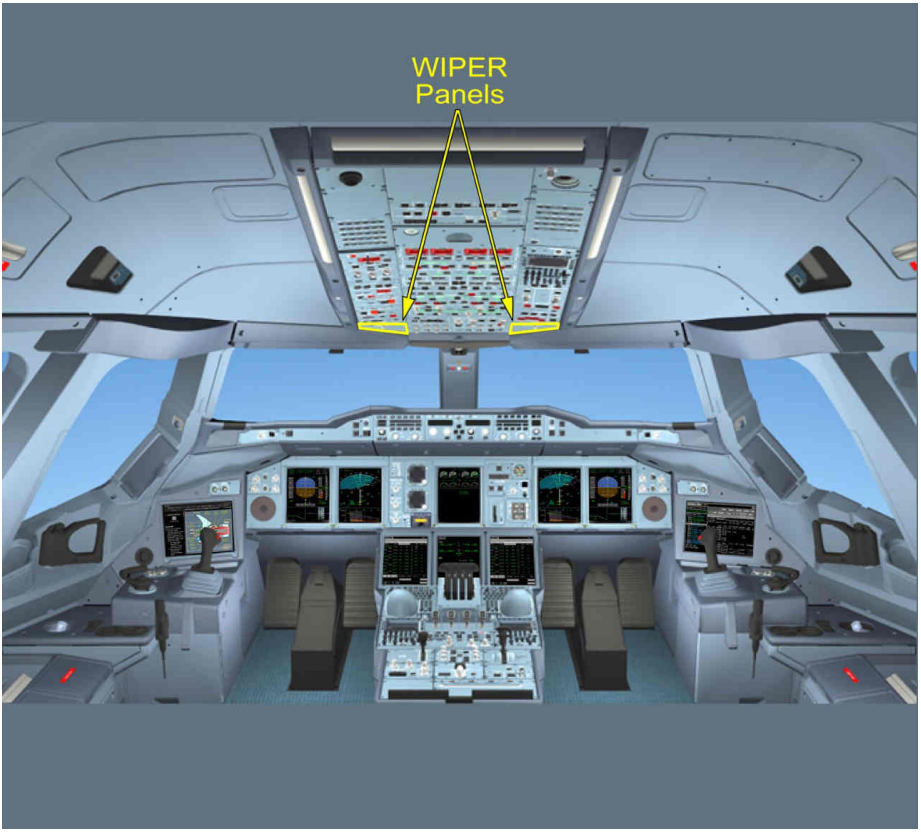
COCKPIT VIEW

Applicable to: ALL

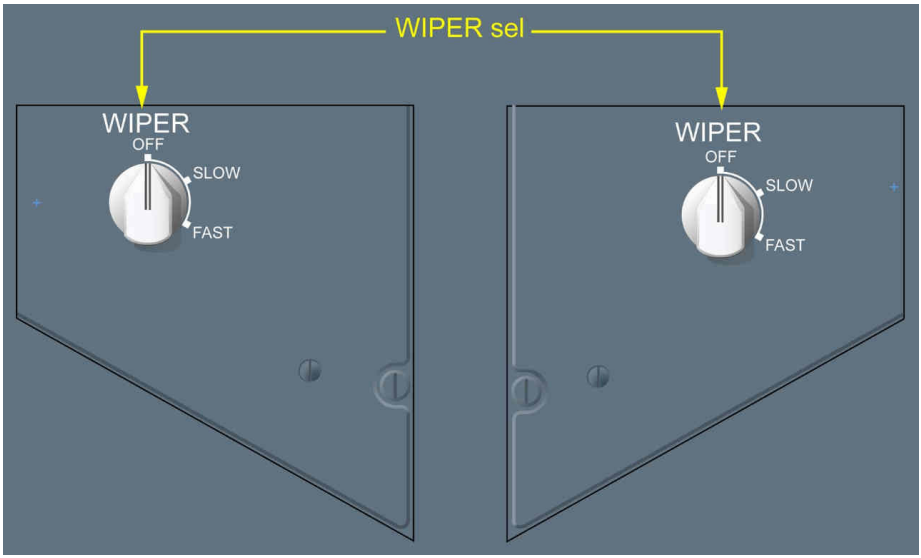
Controls and indicators



OVERHEAD PANEL

Applicable to: ALL

WIPER Panels



Wiper selector

Each windshield wiper is controlled by its own WIPER selector, that has a SLOW and FAST speed setting.

L3 When the WIPER selector is selected OFF, the wipers are out of view, and do not rest on the surface of the windshield.

L1 The wipers should not be used when the speed is greater than 250 kt.

ELECTRICAL SUPPLY

Applicable to: ALL

System	Sub-System	Electrical Supply
Wipers	Captain's Side	AC ESS
	F/O's Side	AC 4

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AIRCRAFT SYSTEMS

31 - INDICATING/RECORDING

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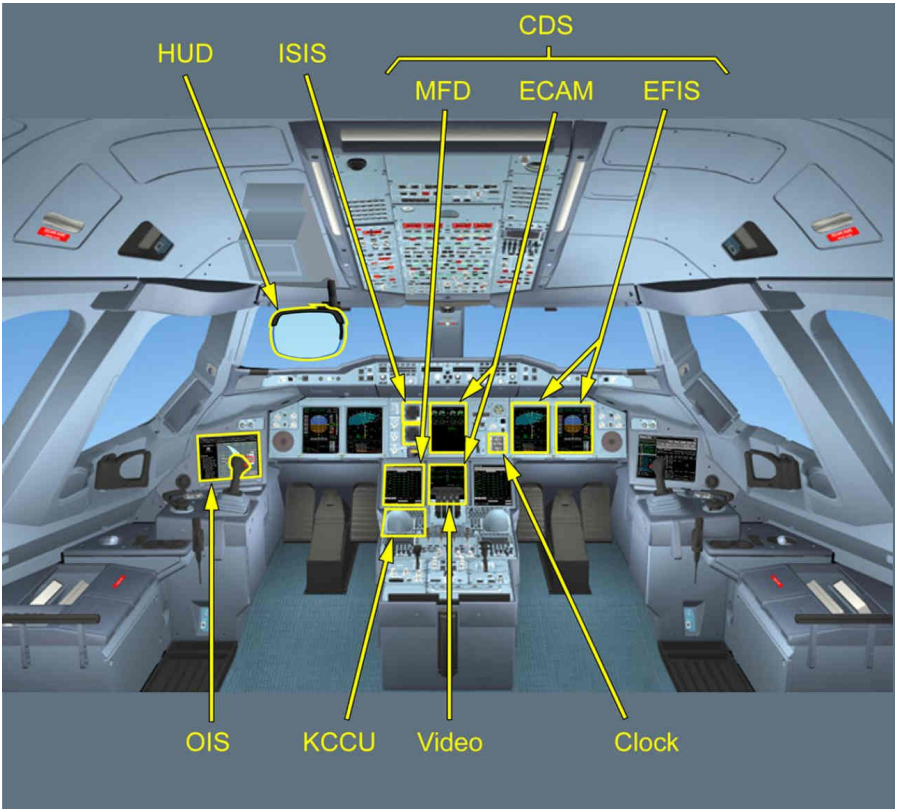
INDICATING AND RECORDING

Applicable to: ALL

INDICATING

Systems Overview



The following systems and displays provide the flight crew with the information necessary to operate the aircraft:

- A Control and Display System (CDS) has 8 Display Units (DU s). Each pilot uses a Keyboard and Cursor Control Unit (KCCU) to interact with the systems displayed on the DU s.

  The CDS uses the following functions to display information to the flight crew:
  - Electronic Flight Instrument System (EFIS)
  - Electronic Centralized Aircraft Monitoring (ECAM)
  - Multi-Function Display (MFD).
- A Head-Up Display (HUD) provides guidance to the flight crew by gathering primary flight display information. It displays this information by superimposing symbols on external parameters. The HUD is in the primary and forward field of vision of the pilots.
  For more information on the HUD, *Refer to DSC-31-60-20-10 Overview* .
- An Onboard Information System (OIS) provides access to flight operations manuals and applications (e.g. performance computation modules). The Captain and First Officer both have an OIS terminal and an OIS keyboard.
  For more information on the OIS , *Refer to DSC-46-20-10-10 Overview* .
- A clock operates independently from other systems, and provides time data to all the aircraft systems that require a time reference.
- A backup flight and navigation instrument display, also referred to as Integrated Standby Instrument System (ISIS), provides information in the case of loss of PFD , or ND .
  For more information on the ISIS , *Refer to DSC-34-10-20-10 Overview* .

RECORDING

There are two recorders system:

- The Flight Data Recording System (FDRS) that records all flight parameters
  For more information, *Refer to FDRS* .
- The Cockpit Voice Recorder System (CVRS) that records all the conversations and sounds in the cockpit.
  For more information, *Refer to CVRS* .

CDS PRESENTATION

Applicable to: ALL

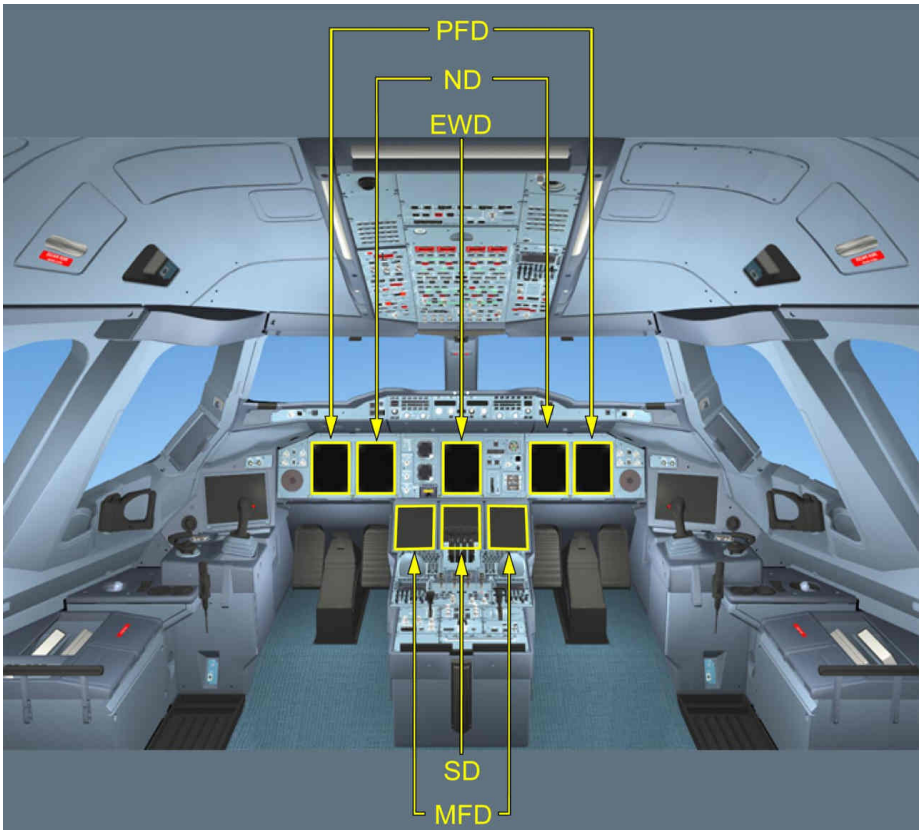
The Controls and Display System (CDS) has 8 Display Units (DU s) that display information to the flight crew, using the following functions:

- The Electronic Flight Instrument System (EFIS) displays flight parameters and navigation data on:
  - Two Primary Flight Displays (PFD s) for short-term flight information, and
  - Two Navigation Displays (ND s) for medium and long-term flight information.
- The Electronic Centralized Aircraft Monitoring (ECAM) displays monitored aircraft systems on:
  - One Engine/Warning Display (EWD)
  - One System Display (SD)
  - The lower section (or part) of the PFD s.
- Two Multi-Function Displays (MFD s) interface with the:
  - Flight Management System (FMS). *Refer to DSC-22-FMS-10-10-22FMS10A General - Description*
  - Air Traffic Control (ATC). *Refer to DSC-46-10-10-10 General*
  - Aircraft Environment Surveillance System (AESS). *Refer to DSC-34-20-10 Overview*
  - FCU backup function for the AFS . *Refer to DSC-22-FG-90-10 Overview*
  - Video system display. *Refer to DSC-31-80-10 Overview*

The CDS also has the following three control panels to interface with the above functions:

- An EFIS-CP , to interface with the EFIS
- An ECAM-CP , to interface with the ECAM
- Two KCCU s, one for each flight crewmember, to interface with the applicable functions available on the MFD , ND , and SD .

CDS Presentation



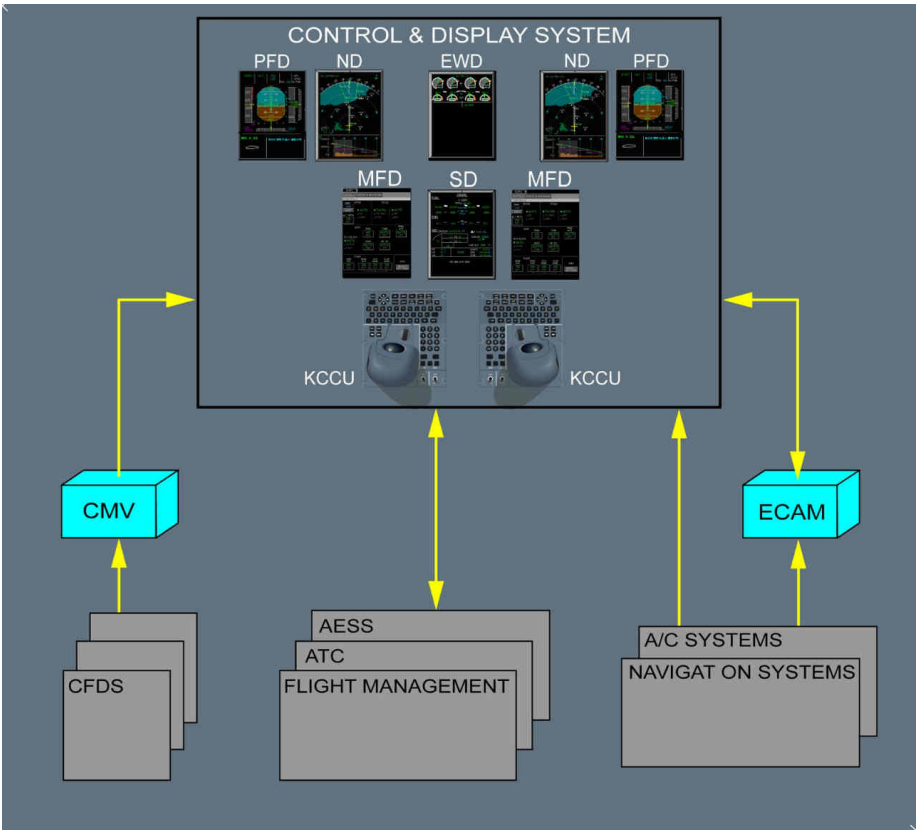
CDS ARCHITECTURE

Applicable to: ALL

The CDS displays information to the flight crew, using the:

- Flight Management System (FMS)
- Air Traffic Control (ATC)
- Aircraft Environment Surveillance System (AESS)
- Concentrator and Multiplexer for Video (CMV), for the video system
- Electronic Flight Instrument Systems (EFIS), for aircraft attitude and navigation systems
- Electronic Centralized Aircraft Monitoring (ECAM).

CDS architecture



DISPLAY UNITS

Applicable to: ALL

The Display Units (DUs) of the CDS are based on Liquid Crystal Display (LCD) technology. The 8 DUs are identical.

L3 Each DU is directly connected to the AFDX bus, and has:

- A display area that is 15.6 cm x 20.8 cm (6.17 in x 8.22 in)
- Fiber-optic video capability
- Bitmap capability, via AFDX.

L1 The 8 DUs are:
- The CAPT PFD
- The CAPT ND
- The CAPT MFD
- The E/WD
- The SD
- The F/O MFD
- The F/O ND
- The F/O PFD.

DISPLAY UNIT - USER INTERFACE RULES

Applicable to: ALL

ENTRY FIELD

The flight crew uses the entry field to select and change data.

The entry field may:
- Be blank for free text: Data entry is optional
- Contain  : Data entry is optional
- Contain  : Data entry is mandatory.

When applicable, the entry field also contains the unit of measurement.

Entry Field



The flight crew can edit an entry field, by moving the cursor over the field. When the blue box appears, it is possible to modify the data, without first pressing the Validation pb.
When the data is entered, the flight crew presses the Validation pb, and the cursor jumps to the field that is most likely to be used next.

OPTION-LIST

The flight crew can select one of the listed items, by scrolling the wheel of the cursor control device, or by using the direction arrow keys.

Option-List



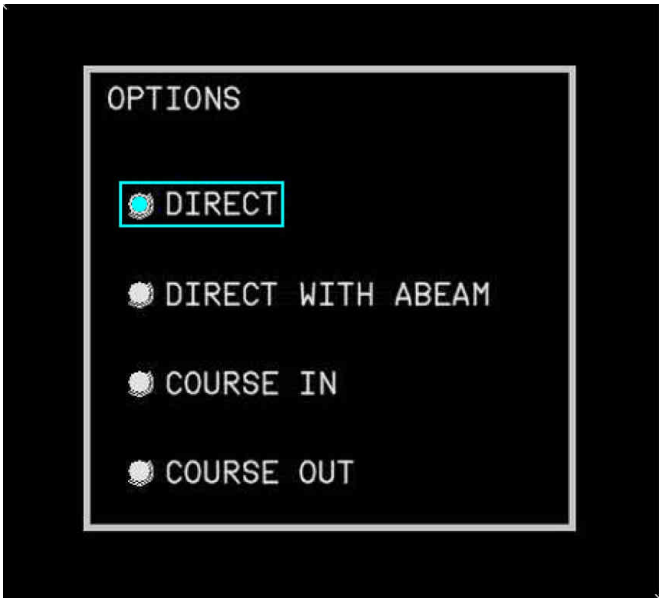
When the item is selected, the flight crew presses the Validation pb, and the cursor moves to the field that is most likely to be used next.

Note: *For some option-lists, the flight crew can type in data, other than those listed. When the data is typed, the list disappears.*

BULLETED ITEM

The flight crew can select only one of the options in a bulleted list, by clicking on the option.

Selection Bullet



TICK-BOX

The flight crew can validate/invalidate one or more of the items listed in a tick-box, by clicking on the applicable item(s).
When validated, a tick appears next to the applicable item.

Tick-box



DISPLAY UNIT MONITORING

Applicable to: ALL

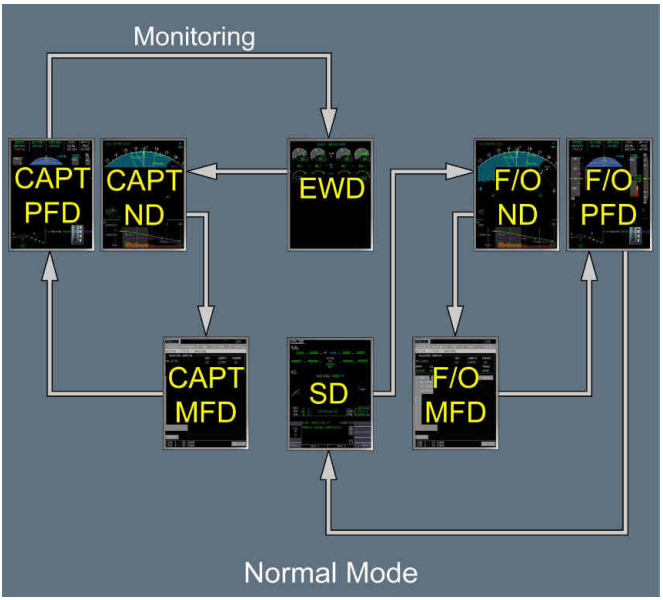
DU MONITORING

Each DU has a Display Unit Monitoring function, which detects erroneous display of the following indications:

- Altitude, speed, pitch, roll, heading, FD bars on the PFD.
- Heading on the ND.
- The clock second for the MFD.
- Thrust, N1, EGT on the EWD.
- The Fuel On Board (FOB) on all SD pages; FOB, N2, Fuel Flow when the SD Engine pages is displayed; FOB and Fuel Flow when the SD Cruise page is displayed.

L2 A DU monitors another DU, which in turn monitors another DU. This makes a monitoring "loop". There are two independent feedback-monitoring loops, and each loop has four DUs.

Normal Mode



L3 Aircraft systems send raw data including critical parameters to the CDS. Each DU performs a display process with an image signature sent to the adjacent DU. This adjacent DU performs a

reversion of the display process in order to compare critical parameters with those sent by the aircraft systems.

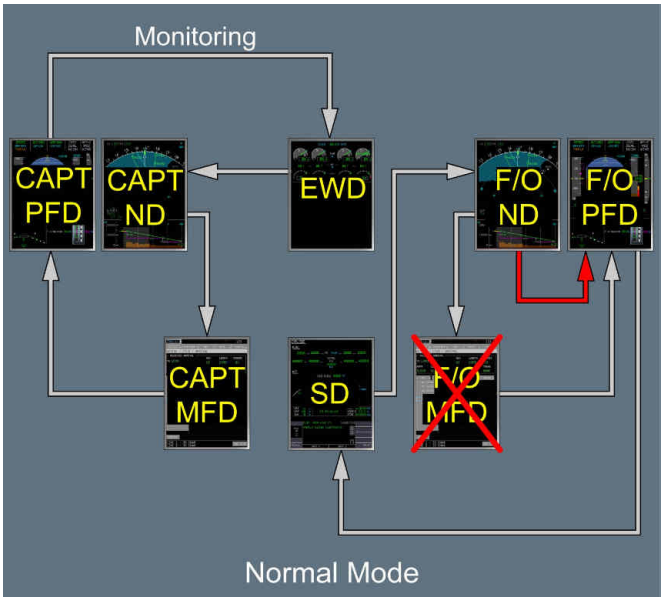
L1 If a DU detects a discrepancy between the data that it receives from a given system and the data displayed on another DU, the ECAM will trigger the following alert : CDS DISPLAY DISAGREE.
If the monitoring of a DU is no longer available, the ECAM will trigger the following alert: CDS CAPT PFD(CAPT ND)(EWD)(F/O PFD)(F/O ND) DU NOT MONITORED.

DU MONITORING IN CASE OF DU FAILURE

If a DU fails, The DU monitoring loops are automatically reconfigured. For example:
- In normal configuration, the F/O ND DU monitors the F/O MFD DU.
- The F/O MFD DU monitors the F/O PFD DU.

If the F/O MFD DU fails, the F/O ND DU will monitor the F/O PFD DU.

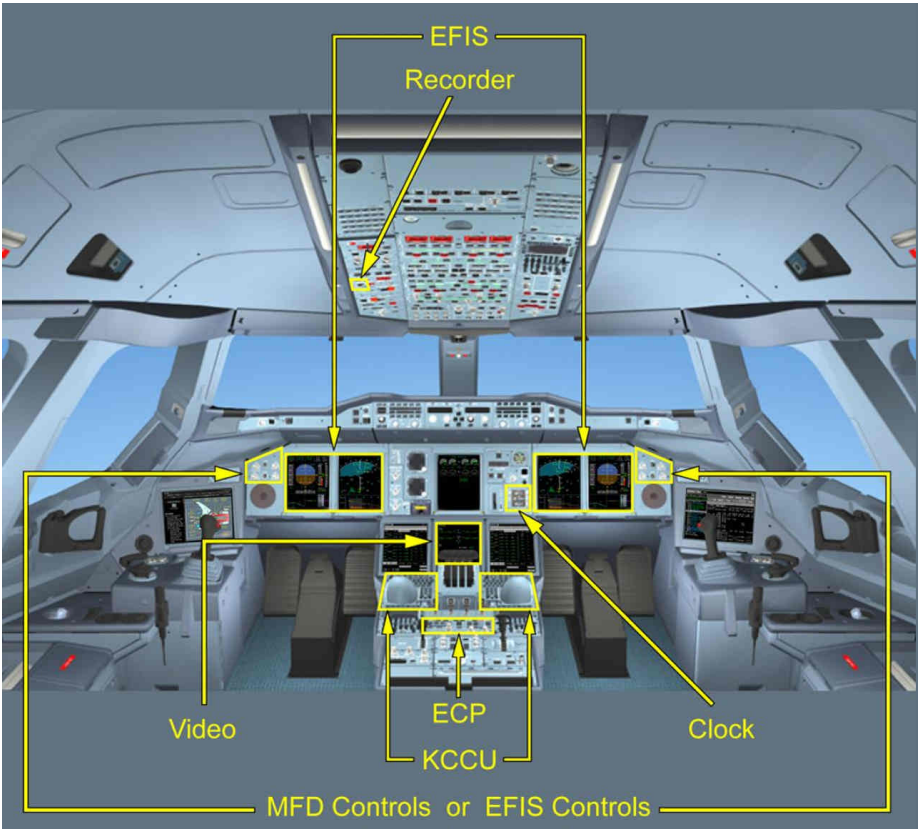
Abnormal Operation



COCKPIT OVERVIEW

Applicable to: ALL

cockpit overview



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GENERAL

Applicable to: ALL

When one or more display units (DU) fail, there is a re-organization of the displays to provide the flight crew with the necessary information when required. This is called display unit reconfiguration.
Two types of reconfiguration are possible: Automatic or on-request.

AUTOMATIC RECONFIGURATION

Applicable to: ALL

Two displays are considered as more important for continuing the flight. They are the Primary Flight Display (PFD) and Engine and Warning Display (EWD).
They are normally and respectively displayed on the CAPT (F/O) PFD DU and the EWD DU.
If the CAPT (F/O) PFD DU fails, the PFD is automatically displayed on the CAPT (F/O) ND DU.
If the EWD DU fails, the EWD is automatically displayed on the SD DU.

MANUAL RECONFIGURATION

Applicable to: ALL

In case of a display unit failure, the flight crew can manually reconfigure one of the remaining display units to recover the lost display.

This manual reconfiguration is done using:
- either the reconfiguration pushbutton (DU RECONF pb)
- or, the KCCU function keys.

This DU RECONF pb is active only if there is a failed on-side display unit. The EWD DU and SD DU can be reconfigured from both sides.
The push-button acts on the following display unit, in the given order.

For the CAPT side:
1. The MFD DU
2. The ND DU, if the MFD DU is failed
3. The PFD DU, if both the ND DU and MFD DU are failed.

For the F/O side:
1. The ND DU, if the PFD DU and ND DU are both operative
2. The MFD DU, if either the PFD DU or the ND DU is failed

L3 *Note:* *This is to favor the display of the PFD on either the PFD or ND DU.*

L1 3. The PFD DU, if both the ND DU and MFD DU are failed.

Note: - *If the EWD DU, and/or SD DU fails, the EWD and/or the SD can be displayed on either side*
- *The EWD (SD) cannot be displayed on both sides at the same time*

DISPLAY UNIT CAPABILITY

Applicable to: ALL

The following table summarizes the displays that can be shown on each display unit and the display sequence when using the DU RECONF pb.

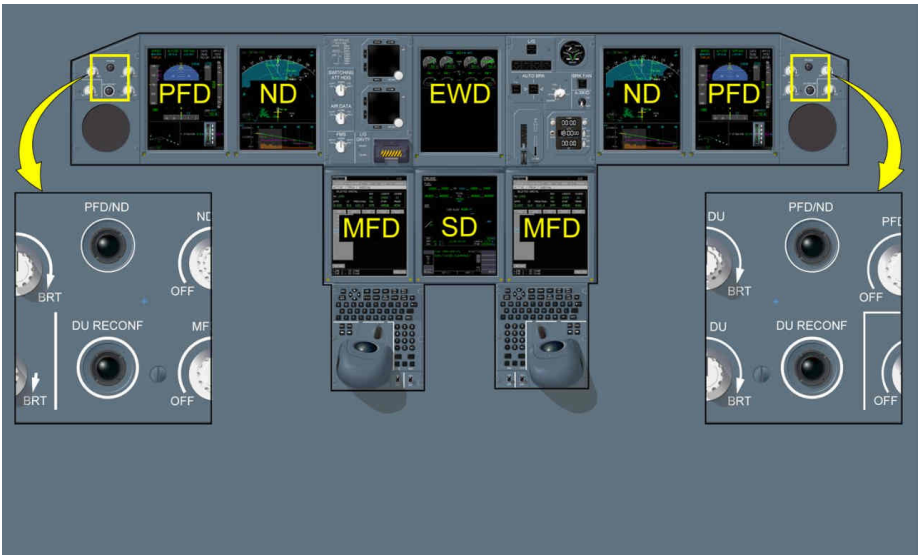
Display Unit	Display	Access mode
EWD DU	EWD	Normal
SD DU	SD	Normal
	EWD	Automatic
CAPT (F/O) PFD DU	PFD	Normal
	ND	Manual
	MFD	Manual
CAPT (F/O) ND DU	ND	Normal
	MFD	Manual
	EWD	Manual
	SD	Manual
	PFD	Automatic
CAPT (F/O) MFD DU	MFD	Normal
	EWD	Manual
	SD	Manual
	PFD	Manual
	ND	Manual

DISPLAY UNIT RECONFIGURATION OVERVIEW

Applicable to: ALL

The aside illustration provides an overview of the use of the two pushbuttons for reconfiguring display units in an event of a failure.
Click on a display unit to set it failed, and press one of the available pushbuttons to view the reconfiguration.
In this illustration, up to two display units may be set as failed.

Reconf Overview



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ECAM ALERTS

Applicable to: ALL

CDS & AUTO FLT FCU SWITCHED OFF (*Refer to procedure*)

CDS CAPT (F/O) EFIS BKUP CTL FAULT (*Refer to procedure*)

CDS CAPT (F/O) EFIS CTL PNL FAULT (*Refer to procedure*)

CDS CAPT+F/O EFIS CTL PNLs FAULT (*Refer to procedure*)

CDS CAPT PFD(CAPT ND)(EWD)(F/O PFD)(F/O ND) DU NOT MONITORED (*Refer to procedure*)

CDS DISPLAY DISAGREE (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
CDS	CAPT PFD DU	DC ESS
	CAPT ND DU	DC ESS/ DC 1
	CAPT MFD DU	DC ESS/ DC 1
	F/O PFD DU	DC 2
	F/O ND DU	DC 1 / DC 2
	F/O MFD DU	DC 1 / DC 2
	EWD DU	DC ESS
	SD DU	DC 2

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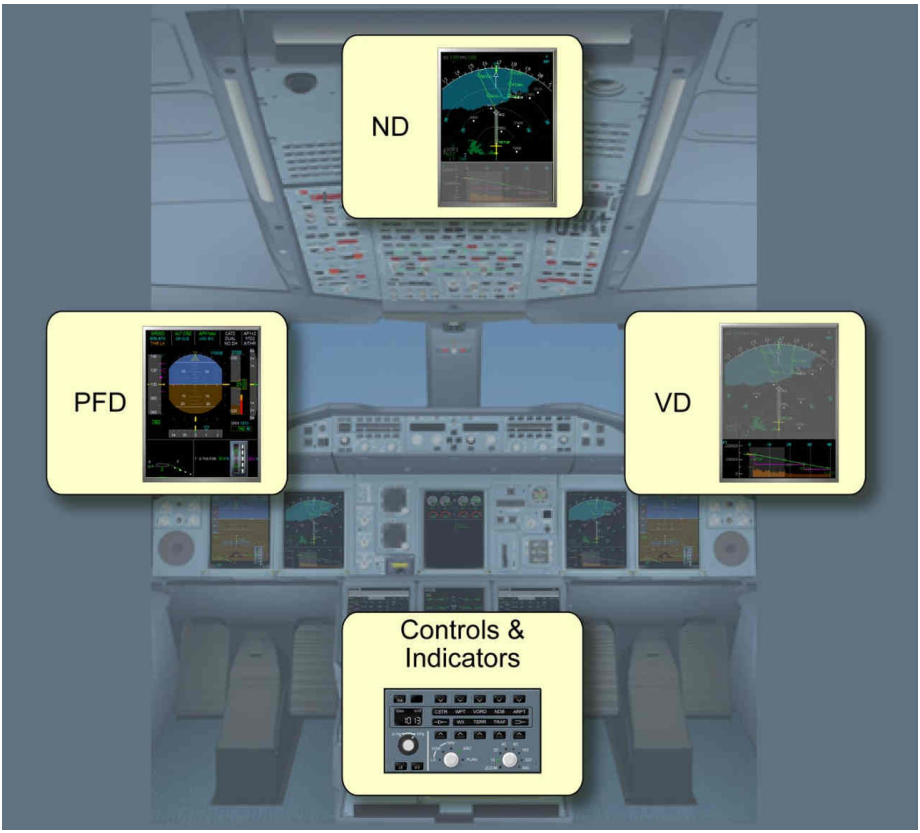
OVERVIEW

Applicable to: ALL

The Electronic Flight Instrument System (EFIS) controls the flight parameters displayed on the Primary Flight Displays (PFD s), and the navigation data displayed on the Navigation Displays (ND s).

The ND s indicate:
- The lateral navigation data on the upper part of the ND display unit (ND)
- The vertical navigation data on the lower part of the ND display unit (VD).

EFIS Overview



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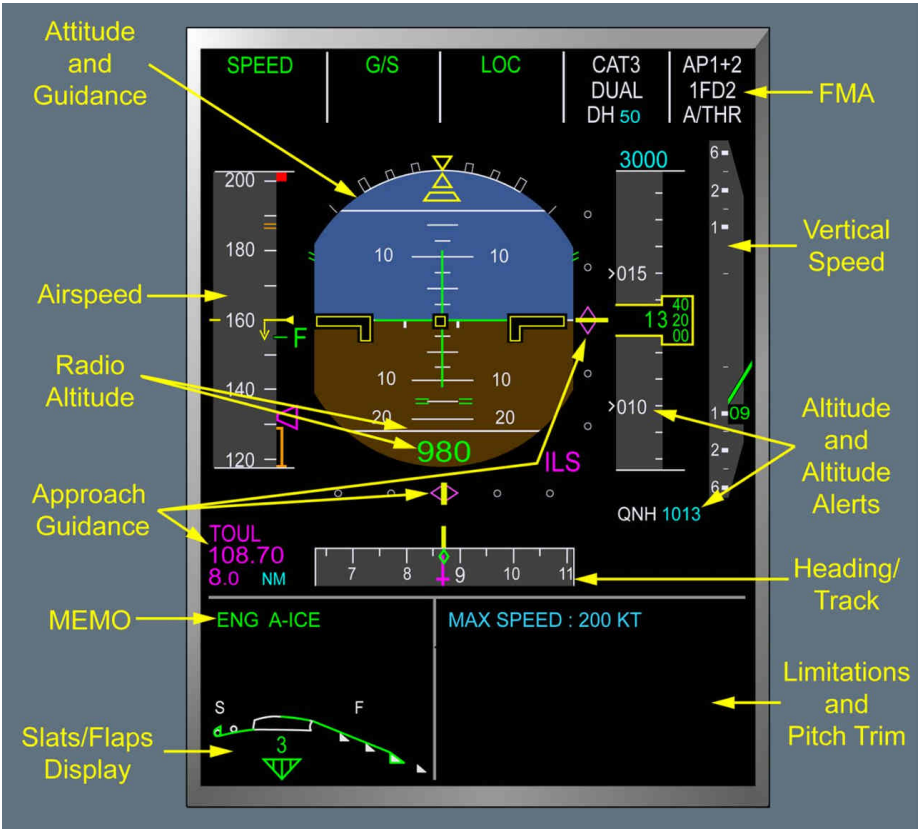
Overview

OVERVIEW

Applicable to: ALL

PFD Overview



Some indications only appear on ground: *Refer to DSC-31-20-20-20-10 On Ground Indications* .
The backup speed scale and the backup altitude scale automatically appear, if necessary: *Refer to DSC-31-20-20-130-10 Backup Scales* .

In addition, the surveillance (SURV) system can display:

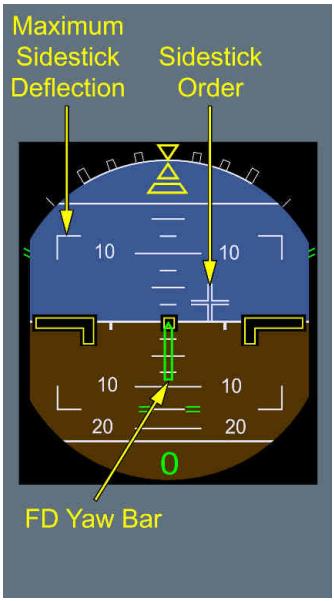
- The TAWS messages
  Refer to DSC/34-Surveillance/TAWS/CONTROLS and INDICATORS/PFD
- The WINDSHEAR messages
  Refer to DSC/34-Surveillance/WXR/CONTROLS and INDICATORS/PFD
- The TCAS messages.
  Refer to DSC/34-Surveillance/TCAS/CONTROLS and INDICATORS/PFD

On Ground Indications

ON GROUND INDICATIONS

Applicable to: ALL

On Ground Indications



SIDESTICK ORDER

L3 The FCDC provides the sidestick order.

L1 

Indicates the total combination of the captain's and first officer's sidestick orders.
Appears on ground, when one engine starts.

Note: *The flight crew must not use the sidestick order indication to check the flight controls after engine start, because this indication does not show the position of the flight controls .*

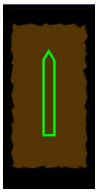
MAXIMUM SIDESTICK DEFLECTION

On ground, the maximum sidestick deflection appears on the PFD, when one engine starts.

L2 The maximum sidestick deflection is equal to ± 15 ° in pitch and ± 19 ° in roll.

FD YAW BAR

L3 The PRIM provides the FD yaw bar information.

L1 

Indicates the FD yaw orders, in order for the flight crew to maintain the aircraft on the runway centerline.

Appears:
- When the FD s are engaged
- In RWY , FLARE , or ROLL OUT modes.
  For more information, *Refer to DSC-22-FG-30-20 FD Display* .

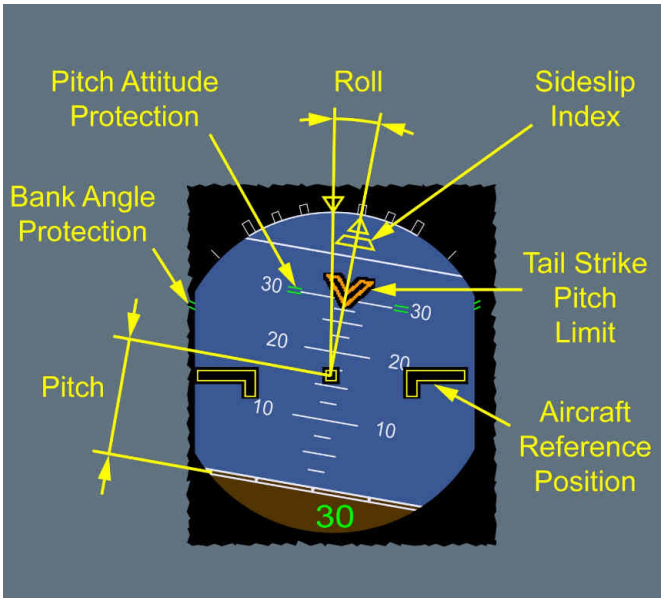
L2 The yaw scale has markers every 10 ° .

Attitude

ATTITUDE

Applicable to: ALL

Attitude



L12

ATT — No attitude data is available. The attitude and guidance indications no longer appear.
Flashes for 9 s , then remains steady.

L12

CHECK ATT — Attitude data on both PFD s differs by more than 5 ° .
Flashes for 9 s , then remains steady.

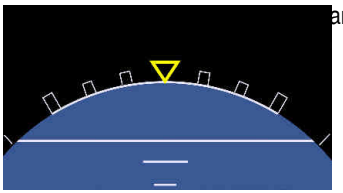
AIRCRAFT REFERENCE POSITION

Indicates the fixed reference position of the aircraft.

ROLL

Indicates the bank angle of the aircraft.

L3 The ADIRS provide the bank angle information.

L2 
arkers at 0 °, 10 °, 20 °, 30 °, and 45 ° of bank.

BANK ANGLE PROTECTION

L3 The FCDC provides the value of the bank angle protection.

L12

Indicates the limit of the bank angle protection in normal law.
Indicates a bank angle of ±67 °.

L1 The bank angle protection is lost. The aircraft is in alternate, or direct law.

PITCH

L3 The ADIRS provide the pitch attitude information.

L1 The scale indicates the pitch attitude of the aircraft.

L2 Degrees are indicated in increments of:
- 10 °, between 80 ° nose down, and 80 ° nose up
- 2.5 °, between 10 ° nose down, and 30 ° nose up.

L12



Indicates that the pitch attitude of the aircraft is too high, and the direction to take in order to reduce it.
Appears if the pitch attitude is more than 30 °, or less than -30 °.

PITCH ATTITUDE PROTECTION

L3 The FCDC provides the information of the pitch attitude protection.

L12

Indicates the limit of the pitch attitude protection in normal law.
Indicates a pitch attitude of 15 ° nose down, and 30 ° nose up.

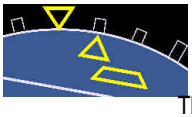
L1 Pitch attitude protection is lost. The aircraft is in alternate, or direct law.

For more information on the normal law, *Refer to 27-Flight Controls/Normal Law* .

For more information on the alternate law, *Refer to 27-Flight Controls/Alternate Law* .
For more information on the direct law, *Refer to 27-Flight Controls/Direct Law* .

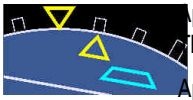
SIDESLIP INDEX

L123



On ground, indicates the aircraft lateral acceleration
In flight, indicates the sideslip of the aircraft.
If the sideslip is not available, indicates the lateral acceleration of the aircraft.
The ADIRS provide the sideslip and the lateral acceleration.
0.39 in between the roll, and the sideslip index corresponds to a 0.2 g acceleration.
Sideslip index reaches its stop at 0.3 g (i.e. 0.59 in on the scale).

L13

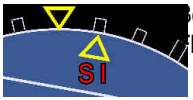


Appears, when one engine fails during takeoff, or go-around.
The sideslip index then corresponds to the beta target.

Appears, when:
- The flight crew selects CONF 1, 2, or 3
- The N1 of at least one engine is above 80%
- The difference between the N1 of two engines is above 40%.

The PRIMs provide the beta target information.

L12



Both sideslip and lateral acceleration indications are not valid.
Flashes for 9 s, then remains steady.

TAIL STRIKE PITCH LIMIT

L13



Indicates the maximum pitch attitude, in order to avoid tail strike at takeoff and landing.
The PRIMs provide the tail strike pitch limit.

L2

During Takeoff

- The indication moves from the pitch limit value, with main landing gear compressed, to the pitch limit value, with main landing gear extended.
- No longer appears 3 s after liftoff.

During Landing

- Appears, when the aircraft is below 400 ft radio altitude, at a fixed value corresponding to the compressed main landing gear .
- No longer appears:
  - When the ground speed is less than 50 kt
  - 4 s after a go-around is initiated.

Airspeed

AIRSPEED

Applicable to: ALL

The following general indications concerning the airspeed of the aircraft can appear during all flight phases:
- The speed reference line
- The airspeed target
- The speed trend arrow
- The Mach number.

Refer to DSC-31-20-20-40 General Airspeed Indications .

The following airspeed indications appear in flight:
- During takeoff:
  - V1
  - VR
  - V2
  - The short term managed speed
  - F speed
  - S speed
  - Green dot
  - The automatic retraction speed.

  Refer to DSC-31-20-20-40-10 Airspeed Indications During Takeoff .
- During descent:
  - VFE next
  - F speed
  - S speed
  - The short term managed speed
  - Lower and upper speed range limits.

  Refer to DSC-31-20-20-40 Airspeed Indications During Descent
- After touchdown:
  - The speed trend arrow
  - The DECEL indication

  Refer to DSC-31-20-20-40 Airspeed Indications After Touchdown

During the flight, the airspeed scale also displays the following protection speeds:
- VMAX, and the high speed protection indication
- VLS
- $V\alpha_{prot}$

- $V\alpha_{max}$
- $V\alpha_{sw}$.

Refer to DSC-31-20-20-40 Airspeed Protections .

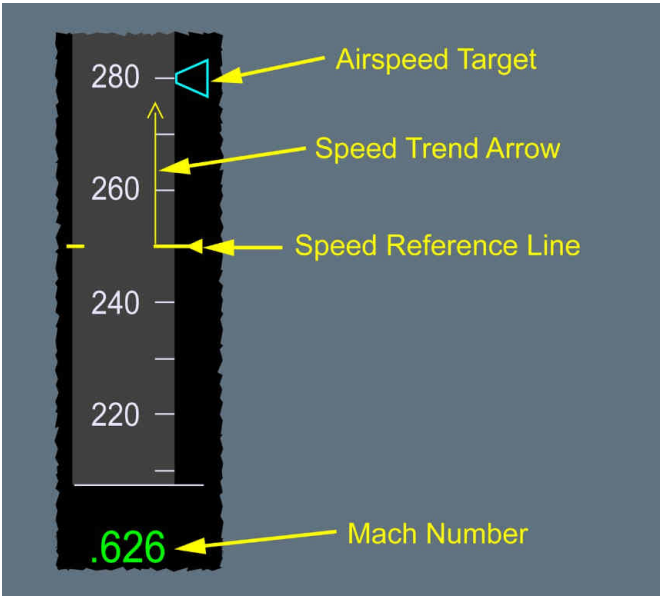
The backup speed scale automatically appears on the PFD , if necessary (*Refer to DSC-31-20-20-130-10 Backup Speed Scale*).

GENERAL AIRSPEED INDICATIONS

Applicable to: ALL

L2 The airspeed scale has markers every 10 kt, and starts at 30 kt.

General Airspeed Indications



L12

SPD	Appears, instead of the airspeed scale, when no speed information is available. Flashes for 9 s, then remains steady.

L12



Appears, when characteristic speeds computation is no longer available.

The following airspeed indications do not appear on the airspeed scale:
- VLS
- S speed
- F speed
- Green dot speed
- Speed trend arrow
- VFE next
- $V\alpha_{sw}$.

Appears, when:
- The three PRIMs are lost, or
- Both SFCC slats channels are lost, or
- Both SFCC flaps channels are lost.

Flashes for 9 s, then remains steady.

L1 **SPEED REFERENCE LINE**

L13



Indicates the current airspeed of the aircraft.
The ADRs provide the current airspeed information.

SPEED TREND ARROW

L123



Indicates the airspeed that the aircraft will reach in 10 s, if its current acceleration(deceleration) remains constant.
Appears, when the speed trend is more than 2 kt.
No longer appears, when the speed trend is less than 1 kt.
The PRIMs provide the speed trend information.

AIRSPEED TARGET

Indicates the airspeed target, or the airspeed corresponding to the Mach target.

L3 The PRIMs provide the airspeed target information. If all three PRIMs are lost, the FCU backup provides the airspeed target information.

L1



- The flight crew selects the airspeed target (manually selected on the AFS CP, or manually entered in the FMS)
- The airspeed target is within the airspeed scale.



- The flight crew selects the airspeed target (manually selected on the AFS CP, or manually entered in the FMS)
- The airspeed target is not within the airspeed scale.



- The airspeed target is managed (computed by the FMS)
- The airspeed target is within the airspeed scale.



- The airspeed target is managed (computed by the FMS)
- The airspeed target is not within the airspeed scale.

L12

SPD SEL — The airspeed selected on the AFS CP is not available.
Flashes for 9 s, then remains steady.

MACH NUMBER

L3 The ADIRS provide the Mach number information.

L1 0.626 — Appears below the airspeed scale, if the aircraft speed is more than M 0.5.
No longer appears, if the aircraft speed is less than M 0.45.

L12

MACH — The Mach data is not available.
Flashes for 9 s, then no longer appears.

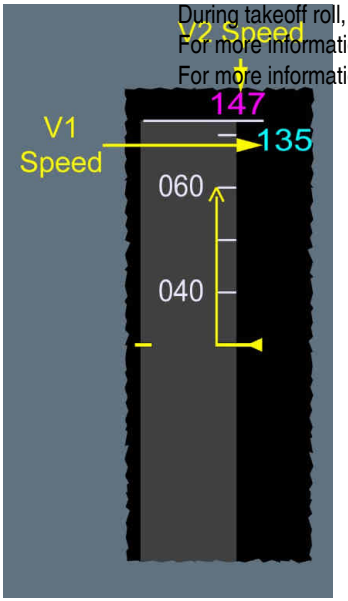
AIRSPEED INDICATIONS DURING TAKEOFF

Applicable to: ALL

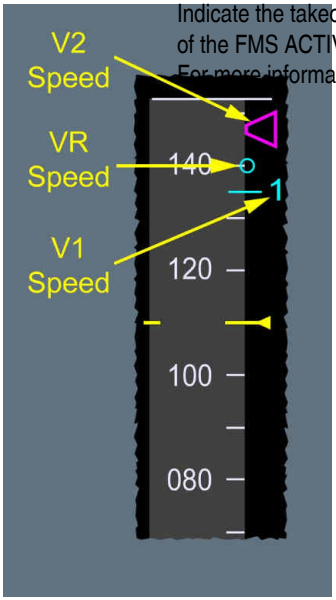
BEFORE LIFTOFF

L3 The FMS provides V1, VR , and V2 information.

L1



During takeoff roll, V1, and V2 are outside the airspeed scale.
For more information about V1, *Refer to 22-27/Operating Speeds* .
For more information about V2, *Refer to 22-27/Operating Speeds* .



Indicate the takeoff speeds that the flight crew manually enters in the T.O panel of the FMS ACTIVE/PERF page (V1, the rotation speed VR, and V2).
For more information about VR, *Refer to 22-27/Operating Speeds* .

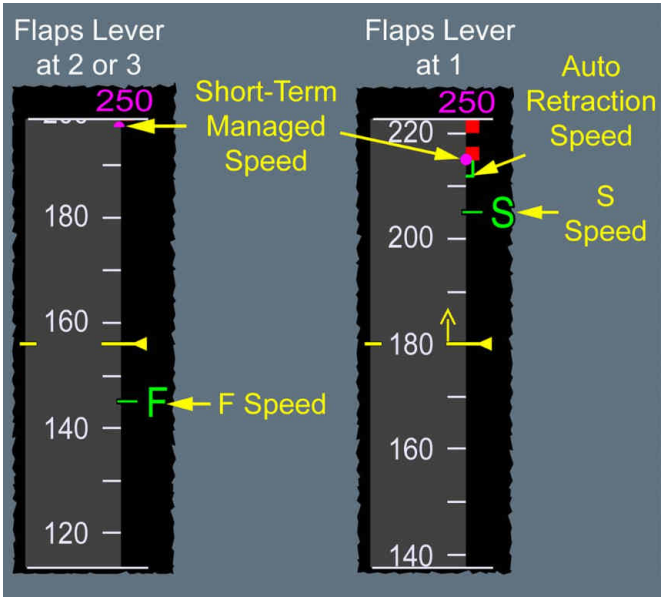
L2 V1 and VR no longer appear after liftoff.
L12



V1 is not valid.
Flashes for 9 s , then remains steady.

AFTER LIFTOFF

After Liftoff



L3 The PRIM provides these speeds.

L1



In managed speed/Mach, the short-term managed speed indicates the current speed target in accordance with the configuration of the aircraft.
In selected speed/Mach, the short-term managed speed is the speed/Mach target, that would be used if the flight crew engages the managed speed/Mach control.
For more information about the short-term managed speed, *Refer to 22-FG/Speed-Mach Control/Managed Speed/Short-term Managed Speed* .



When the FLAP lever is set to 2 or 3, indicates the minimum flap retraction speed, also referred to as F speed.
For more information about F speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/F* .

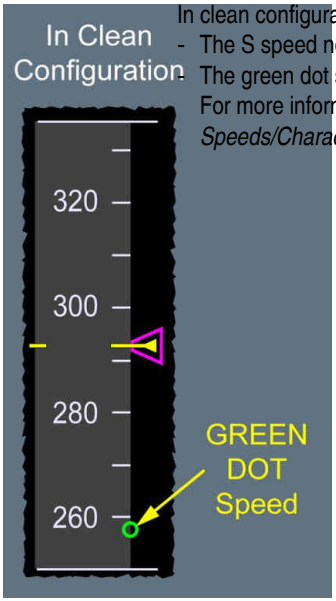


When the FLAP lever is set to 1 (CONF 1+F), indicates the Automatic Retraction Speed (ARS).
For more information about the automatic retraction speed, *Refer to 27/Slats-Flaps/Configurations/ARS* .



When the FLAP lever is set to 1, indicates the minimum slat retraction speed, also referred to as S speed.
For more information about S speed, *Refer to 22-27/Operating Speeds/Limit Speeds/S* .

IN CLEAN CONFIGURATION

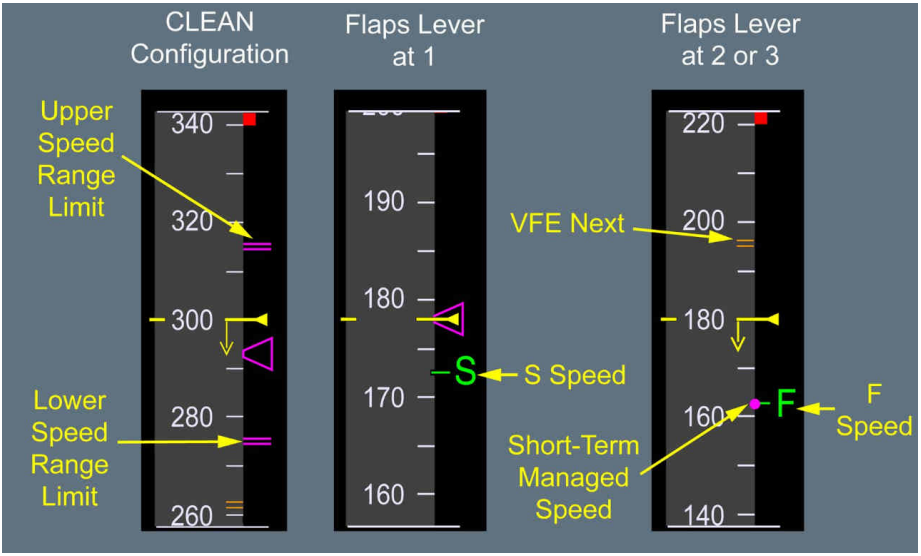


In clean configuration:
- The S speed no longer appears
- The green dot speed appears.

For more information about the green dot speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/Green Dot* .

AIRSPEED INDICATIONS DURING DESCENT

Applicable to: ALL



L123



Indicates the range of aircraft speed, in order for the flight crew to maintain the appropriate vertical trajectory.
Appears during a managed descent.
The PRIM provides the speed range limits.

Note: *When the FMS flight phase is the descent phase, and the DES mode is engaged, the FG does not accurately maintain the ECON speed/Mach(RTA speed/Mach). However, the managed speed/Mach should not go beyond the high and low speed margins.*
For more information on high and low speed margins, Refer to 22-FMS/System Description/Performance/Flight Phases and Speed Profiles .



When the FLAPS lever is set to 1, indicates the target speed in managed mode, also referred to as S speed.
For more information about S speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/S* .



When the aircraft is below 20 000 ft , indicates the next flap limiting speed, also referred to as VFE next.
For more information about VFE next, *Refer to 22-27/Operating Speeds/Limit Speeds/VFE next* .



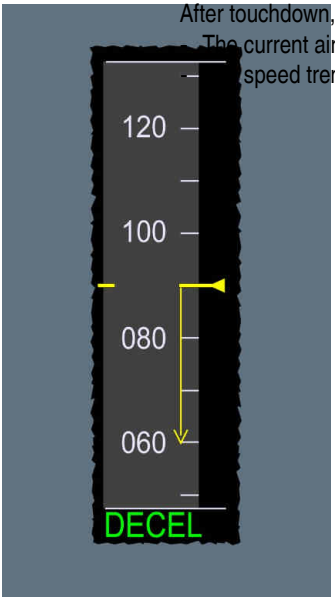
In managed speed/Mach, the short-term managed speed indicates the current speed target in accordance with the configuration of the aircraft.
In selected speed/Mach, the short-term managed speed is the speed/Mach target, that would be used if the flight crew engages the managed speed/Mach control.
For more information about the short-term managed speed, *Refer to 22-FG/Speed-Mach Control/Managed Speed/Short-term Managed Speed* .



When the FLAPS lever is set to 2 or 3, indicates the target speed in managed mode, also referred to as F speed.
For more information about F speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/F* .

AIRSPEED INDICATIONS AFTER TOUCHDOWN

Applicable to: ALL



After touchdown, the only indications that appear on the airspeed scale are:
- The current airspeed
- The speed trend arrow.

L123

DECEL — The autobrake is active, and the aircraft decelerates as selected via the AUTO BRK mode selector.
Appears, when the aircraft deceleration is at least 80 % of the selected deceleration.
No longer appears, when the aircraft deceleration is less than 70 % of the selected deceleration.
The BCS provides the DECEL information.

Note: *On a slippery runway, the A-SKID may be activated before the aircraft reaches the selected deceleration. Therefore, the DECEL indication may not appear, even if the autobrake is active.*

AIRSPEED PROTECTIONS

Applicable to: ALL

L3 The PRIM s provide speed protection information. If all three PRIM s are lost, the ADIR s provide the VMO / MMO information.

L1 **VMAX**



Indicates the VMAX speed, that is the lowest of the following speeds:
- VMO , or the speed corresponding to MMO
- VLE
- VFE .

For more information on the VMAX definition, *Refer to 22-27/Operating Speeds/Protection Speeds/VMAX* .

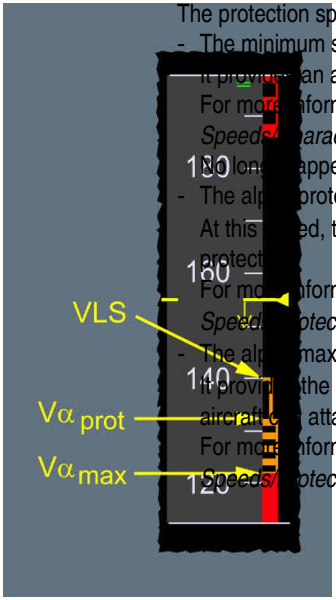
In normal law, when the aircraft reaches the speed indicated by the symbol , the high speed protection activates.
For more information on high speed protection, *Refer to 22-27/Protections/High Speed Protections* .



In alternate or direct law, the VMAX indication remains displayed, but the high speed protection is not available.
appears, instead of the high speed protection symbol.

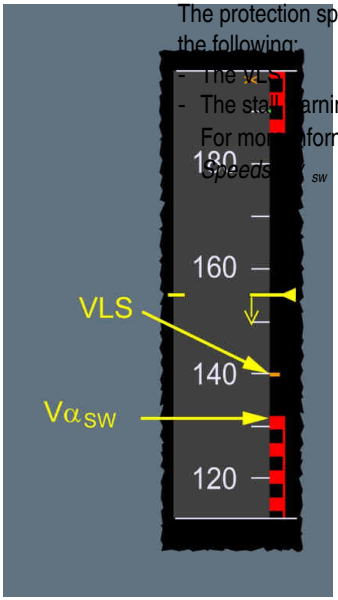
MINIMUM SPEEDS

L12



The protection speeds, with flight controls in normal law, are:

- The minimum selectable speed, also referred to as the VLS
  It provides an appropriate margin for the stall speed.
  For more information on the VLS , *Refer to 22-27/Operating Speeds/Characteristic Speeds/VLS* .
  No longer appears on ground.
- The alpha protection speed, also referred to as $V\alpha_{prot}$
  At this speed, the Angle-of-Attack of the aircraft activates the alpha protection.
  For more information on the $V\alpha_{prot}$, *Refer to 22-27/Operating Speeds/Protection Speeds/$V\alpha_{prot}$* .
- The alpha max speed, also referred to as $V\alpha_{max}$.
  It provides the speed associated with the maximum Angle-of-Attack that the aircraft can attain, in pitch normal law.
  For more information on the $V\alpha_{max}$, *Refer to 22-27/Operating Speeds/Protection Speeds/$V\alpha_{max}$* .



The protection speeds, with flight controls in alternate law, or in direct law, are the following:

- The VLS
- The stall warning speed, also referred to as $V\alpha_{sw}$.

For more information on $V\alpha_{sw}$, *Refer to 22-27/Operating Speeds/Protection Speeds/*$V\alpha_{sw}$.

AIRSPEED TOLERANCES

Applicable to: ALL

L2 The following values apply to an aircraft in symmetrical flight (no sideslip), in clean configuration, and in a straight and level flight.

The maximum differences in speed or Mach number indications between the different sources, and displays are:

		Comparison of Speed and Mach Number Indications between:				
		ADR 1 and ADR 2 (on the PFD)		ADR 3 and ADR 1, or ADR 3 and ADR 2 (on the PFD)		Standby Flight Display (SFD) and ADR 1(2)(3)
Flight Level	Speed or Mach Number	Speed	Mach Number	Speed	Mach Number	Speed Number
FL 50	250 kt	4 kt	Not displayed	4 kt	Not displayed	7 kt
FL 100	250 kt	4 kt	M 0.005	4 kt	M 0.006	7 kt
FL 200	320 kt	4 kt	M 0.007	4 kt	M 0.008	6 kt
FL 300	M 0.85	4 kt	M 0.008	4 kt	M 0.008	6 kt
FL 410	M 0.85	4 kt	M 0.009	4 kt	M 0.009	6 kt

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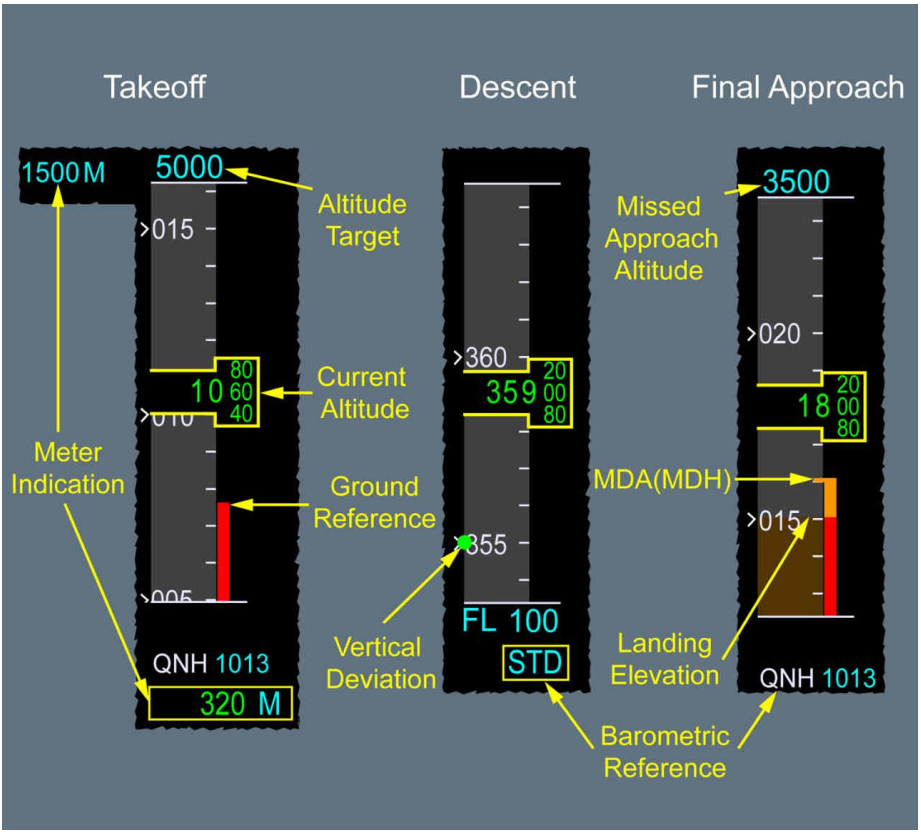
Altitude

ALTITUDE

Applicable to: ALL

Altitude



L12

ALT — Appears, instead of the altitude scale, when the altitude data, with the reference selected on the AFS CP , is not available.
Flashes for 9 s , then remains steady.

L12



The altitude indicated on both PFD s is different.

Appears, when:
- The barometric reference selected by the Captain is the same as the barometric reference selected by the First Officer
- The difference between the two PFD s altitude indications is:
  - Above 250 ft , when the barometric reference is QNH , or
  - Above 500 ft , when the barometric reference is STD .

  Flashes for 9 s , then remains steady.

L2 **MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS**

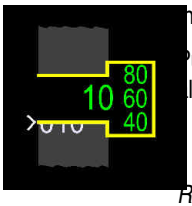
		Comparison of Altitude Indications (ft)		
Flight Level	Speed or Mach Number	ADR 1 and ADR 2 (on the PFD)	ADR 3 and ADR 1(2) (on the PFD)	ISIS and ADR 1(2)(3)
Ground Check	-	20	20	30
FL 50	250 kt	55	60	120
FL 100	250 kt	60	70	140
FL 200	320 kt	120	125	220
FL 300	M 0.85	150	150	320
FL 410	M 0.85	150	150	360

CURRENT ALTITUDE

L3 The ADR s provide the current altitude information.

L2 The altitude scale has markers every 100 ft .

L12



ndicates the current altitude.

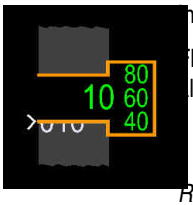
ulses, when the difference between the current altitude and the selected ltitude:

Decreases

Is between 200 ft and 750 ft .

Refer to DSC-31-20-20-60 Altitude Alerts .

L12

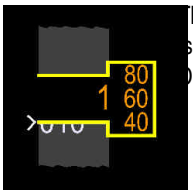


ndicates the current altitude.

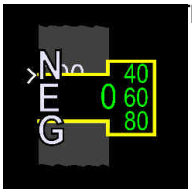
lashes, when the difference between the current altitude and the selected ltitude:
Increases
Is above 200 ft .

Refer to DSC-31-20-20-60 Altitude Alerts .

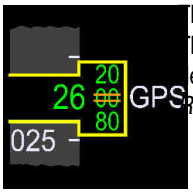
L1



he aircraft flies a Non-Precision Approach (NPA), and the current altitude s equal to, or below the Minimum Descent Altitude (MDA), or the Minimum escent Height (MDH).



he current altitude is negative.



he altitude is no longer available from the ADR s.
he GPS altitude remains available via the IR s. The accuracy of the altitude is egraded, and the altitude appears with a precision around +/- 500 ft .
efer to DSC-31-20-20-130-10 Backup Altitude Scale .

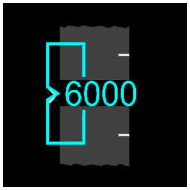
ALTITUDE TARGET

L3 The PRIMs provide the altitude target. If all three PRIMs are lost, the FCU backup provides the altitude target.

L1 Indicates:
- Altitude, if the selected barometric reference is QNH, or
- FL, if the selected barometric reference is STD.



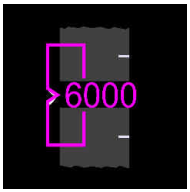
Indicates the AFS CP selected altitude if the vertical guidance is either selected or managed
The altitude target is not within the altitude scale.



Indicates the AFS CP selected altitude if the vertical guidance is either selected or managed
The altitude target is within the altitude scale.



Indicates an altitude constraint if the vertical guidance is managed
The next altitude target is not within the altitude scale.



- Indicates an altitude constraint if the vertical guidance is managed
- The next altitude target is within the altitude scale.

Note: *If a vertical approach mode is engaged, the altitude target appears in cyan when the flight crew selects the go-around altitude on the AFS CP.*

L12

ALT SEL

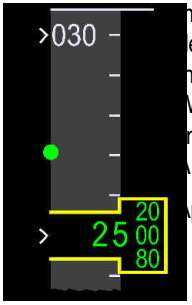
Appears, when the following information cannot be displayed:
- The altitude selected by the flight crew on the AFS CP
- The altitude selected by the flight crew on the FCU backup
- The altitude constraint from the FMS.

Flashes for 9 s, then remains steady.

VERTICAL DEVIATION

L3 The FMS provides the vertical deviation.

L12



ndicates the altitude of the theoretical vertical profile of the FMS . The vertical eviation is the difference between the current altitude of the aircraft, and the heoretical vertical profile of the FMS .
When the vertical deviation is above 540 ft , the symbol remains at the range mit, and the exact value of the vertical deviation appears on the DES and PPR panels of the FMS PERF page.

ppears when:
The aircraft reaches the Top of Descent (T/D), or
The FMS flight phase is descent, or approach.

L2 *Note: When the aircraft is in a holding pattern, the vertical deviation is the difference between the altitude of the aircraft, and the altitude of the holding exit: Refer to 22-FMS/System Description/Flight Planning/Lateral Revisions/Hold .*

MINIMUM DECISION ALTITUDE(HEIGHT) (MDA, MDH)

L3 The FMS provides the MDA(MDH) information.

L12



Indicates the Minimum Decision Altitude(Height) (MDA, MDH).
Appears when the difference between the current aircraft altitude and the MDA(MDH) is less than 570 ft.

LANDING ELEVATION

L2 The FMS provides the landing elevation information.

L12



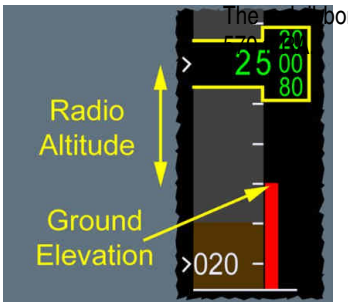
Indicates the landing elevation of the destination airport of the FMS flight plan.

Appears, when:
- The barometric reference is QNH
- The aircraft is:
  - In final approach, or
  - On ground, with a ground speed above 80 kt.
- The difference between the landing elevation and the current aircraft altitude is less than 570 ft.

GROUND REFERENCE

L3 The radioaltimeters provide the ground reference information.

L1 The [illegible]bon indicates the ground elevation, when the aircraft is below



BAROMETRIC REFERENCE

L3 The ADRs provide the barometric reference.

L1 

The flight crew selects the QNH pressure reference on the barometric reference knob of the EFIS CP.



The flight crew selects the QNH pressure reference (in inches of mercury) on the barometric reference knob of the EFIS CP.



The flight crew selects the standard pressure reference on the barometric reference knob of the EFIS CP.

L2 Flashes, when the flight crew selected:
- QNH on the AFS CP, and the aircraft is in the climb phase, above the transition altitude, or
- STD on the AFS CP, and the aircraft is in the approach phase, below the transition flight level.

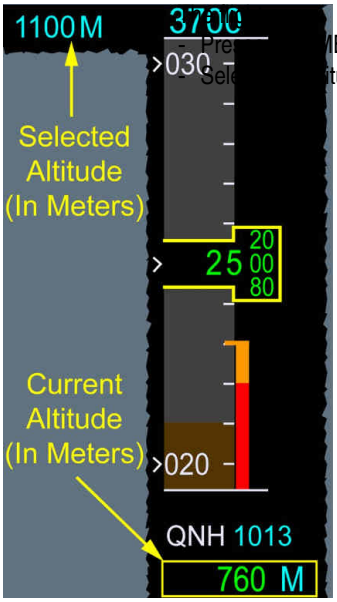
Note: If the transition altitude(flight level) is not available from the FMS, the default transition altitude(flight level) is automatically set to 2 500 ft radio altitude.

METER INDICATION

The selected altitude and the current aircraft altitude indications appear in meters, when the flight crew presses the METER pb on the AFS CP .

L3 The PRIM s provide the meter indication.

L1



ETER pb on the AFS CP
tude target on the AFS CP .



he flight crew:
Presses the METER pb on the AFS CP
The current altitude is below the MDA (MDH).



he altitude is no longer available from the ADR s.
he GPS altitude remains available via the IR s. The accuracy of the altitude is egraded, and the altitude appears with a precision of +/- 500 ft .
Refer to DSC-31-20-20-130-10 Backup Altitude Scale .

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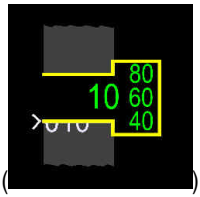
Altitude Alerts

ALTITUDE ALERTS

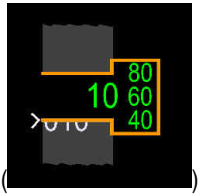
Applicable to: ALL

In manual flight, and when the aircraft approaches the selected altitude(flight level), or when the aircraft significantly deviates from the selected altitude(flight level), the ECAM generates an altitude alert:

-



The altitude frame pulses in yellow (), or flashes in amber



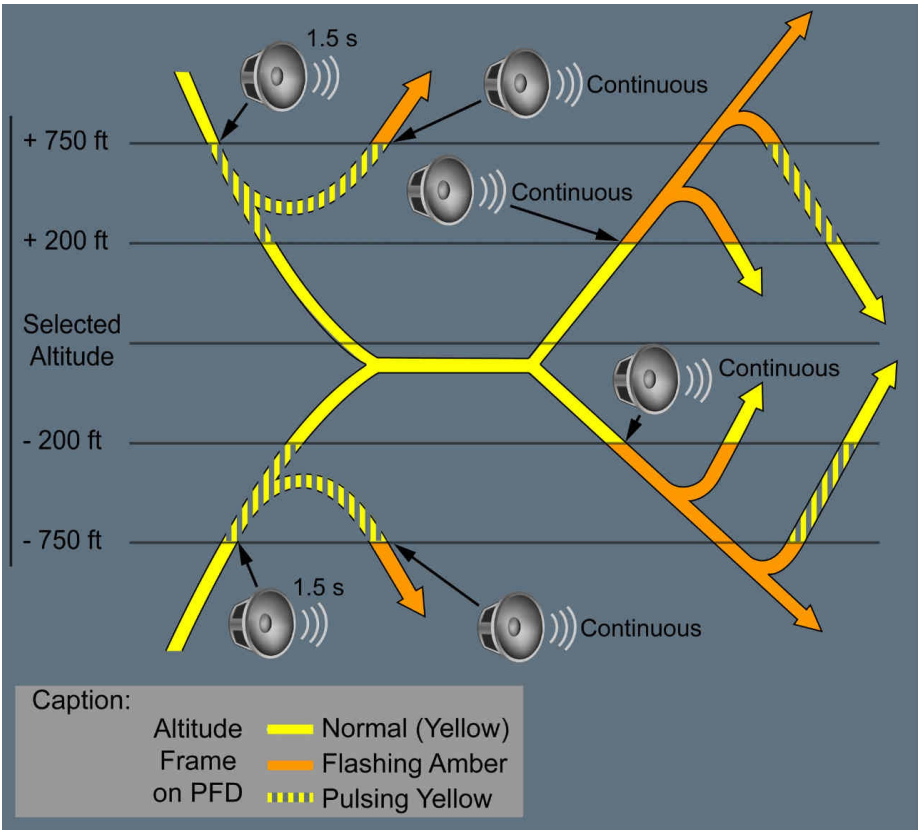
()

- The C chord sound is generated.

C Chord Sound

L3 Altitude alerts are triggered, when the altitude provided by the ADIRS is different from the altitude selected on the AFS CP.

Altitude Alerts



L2 The C chord sound no longer appears, when the flight crew:
- Selects a new altitude target, or
- Presses the EMER CANCEL pb on the ECAM CP, or
- Presses the MASTER WARN pb.

The altitude frame stops pulsing(flashing), when the flight crew selects a new altitude target.

This alert is inhibited:
- In approach, when the aircraft captures the glideslope, or
- When the landing gear is set to down, and the slats are extended, or

- When the landing gear is locked down, or
- When the AP/FD TCAS mode engages upon a Resolution Advisory order.

L3 If the altitude alert is triggered just after the aircraft is clear of conflict, and the AP is engaged, the C chord sound is inhibited.

If the altitude alert is triggered just after the aircraft is clear of conflict, and the AP is not engaged, a C chord sound is generated during 1.5 s.

Intentionally left blank

Radio Altitude

RADIO ALTITUDE

Applicable to: ALL

RADIO ALTITUDE

The radio altitude value appears on the PFD, when the aircraft is below 2 500 ft.

L3 The radio altitude value changes:
- Every10 ft above 50 ft
- Every 5 ft between 5 ft, and 50 ft
- Every foot below 5 ft.

L1



The aircraft is above:
- The minimum entered on the MFD (on the APPR panel of the FMS PERF page) + 100 ft, or
- 400 ft , if the flight crew did not enter a minimum on the MFD (on the APPR panel of the FMS PERF page).



The aircraft is below:
- The minimum entered on the MFD (on the APPR panel of the FMS PERF page) + 100 ft, or
- 400 ft , if the flight crew did not enter a minimum on the MFD (on the APPR panel of the FMS PERF page).

Note: *If the flight crew entered NO, NONE, NO DH, or NODH as the minimum on the MFD (on the APPR panel of the FMS PERF page), the minimum default value is zero.*

L12

DH — Appears above the RA indication, when the aircraft is below the minimum entered on the MFD (on the APPR panel of the FMS PERF page). Flashes for 9 s, then remains steady.

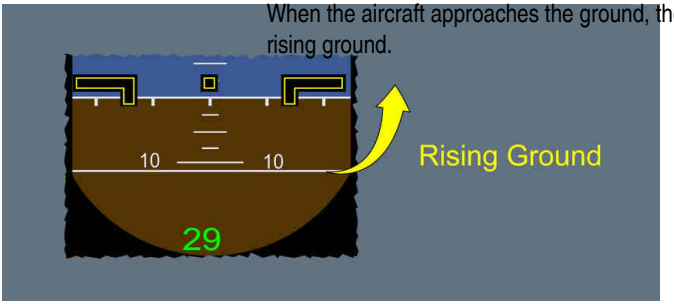
L12

RA
- The three radio altimeters (RA A, RA B, and RA C) are failed
- The aircraft is below the transition altitude.

Note: *The ground reference indication no longer appears on the altitude scale.*

Flashes for 9 s, then remains steady.

When the aircraft approaches the ground, the white line indicates the rising ground.



Vertical Speed

VERTICAL SPEED

Applicable to: ALL

The vertical speed scale ranges from -6 000 ft/min to 6 000 ft/min .

L2 The vertical speed indicated on the PFD is based on the baro inertial vertical speed from the IR s.

L3 *Note:* *To compute the baro inertial vertical speed, each IR mixes its own inertial data to the barometric data received from one ADR :*

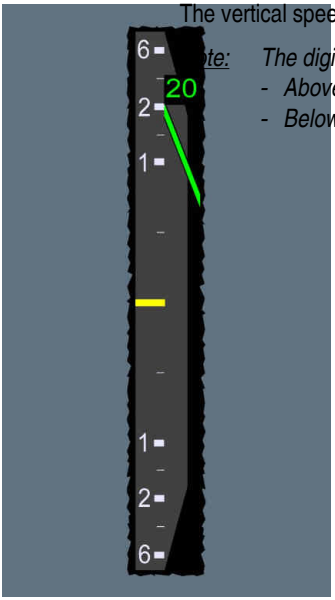
- *In normal configuration, each I R uses its own ADR (IR 1 uses ADR 1, IR 2 uses ADR 2 and IR 3 uses ADR 3).*
- *The IR 1(2) changes its ADR source based on the ADR status (operative or failed), independently from the position of the AIR DATA and the ATT HDG selectors.*
- *The IR 3 changes its ADR source based on the position of the AIR DATA and the ATT HDG selectors and on the ADR status (operative or failed).*

L2 If the baro inertial vertical speed from the IR s is no longer available, the vertical speed indicated on the PFD is based on a pure barometric vertical speed, provided by the ADR s.

The scale has markers:

- Every 500 ft/min , between -2 000 ft/min and 2 000 ft/min
- Every 2 000 ft/min :
  - Between -6 000 ft/min and -2 000 ft/min
  - Between 2 000 ft/min and 6 000 ft/min .

L12

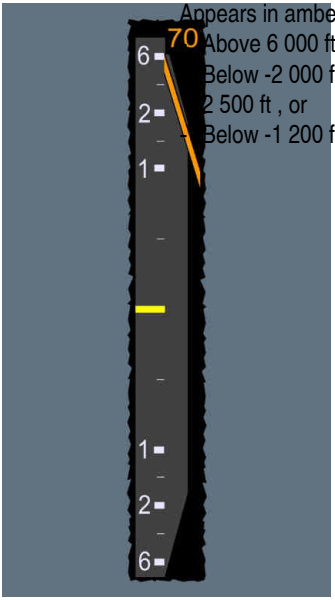


The vertical speed of the aircraft is between -6 000 ft/min and 6 000 ft/min .

Note: The digital indication only appears, when the vertical speed is:

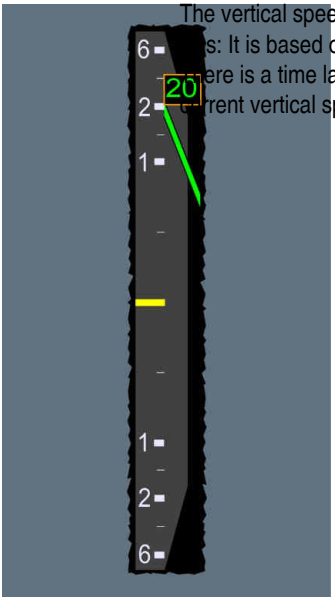
- *Above 200 ft/min , or*
- *Below - 200 ft/min .*

L1



Appears in amber, if the vertical speed is:
Above 6 000 ft/min (below -6 000 ft/min), or
Below -2 000 ft/min , and the aircraft radio altitude is between 1 000 ft and 2 500 ft , or
Below -1 200 ft/min , and the aircraft radio altitude is below 1 000 ft .

L12



The vertical speed is no longer based on the baro inertial vertical speed from the
s: It is based on the barometric vertical speed from the ADR s.
ere is a time lag between the vertical speed that appears on the PFD , and the
rrent vertical speed of the aircraft.

L12

V/S — The vertical speed information is not available, neither from the IR s, nor from the ADR s.
Flashes for 9 s , then remains steady.

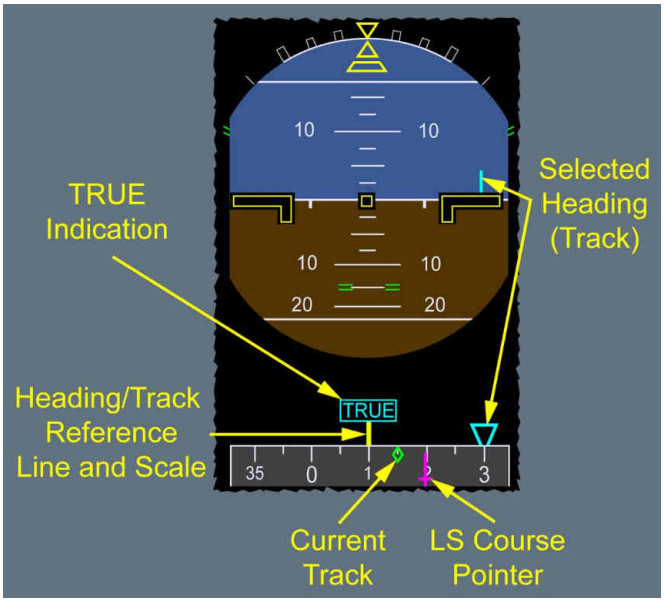
For more information on TCAS indications, *Refer to 34-Surveillance/TCAS/Controls and Indicators/PFD* .

Heading/Track

HEADING/TRACK

Applicable to: ALL

Heading/Track



L12

CHECK HDG — Heading information on both PFD s differs by more than 5 ° .
Flashes for 9 s , then remains steady.

L12

HDG — Appears, instead of the heading scale, when the heading information is not available.
Flashes for 9 s , then remains steady.

HEADING/TRACK REFERENCE LINE AND SCALE

L3 The ADIRS provide the heading information.

L2 Degrees are indicated in increments of 5 ° , with a numerical value every 10 ° .

The heading/track scale is in the TRUE reference, when:
- The flight crew presses the TRUE/MAG pb , on the AFS CP
- At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

For more information on the polar navigation, *Refer to 22/AFS-FLIGHT MANAGEMENT SYSTEM/NAVIGATION FUNCTIONS/POLAR NAVIGATION* .

L13



Indicates the current heading of the aircraft, on the heading scale.
The ADIRS provide the heading value, in the TRUE or MAG reference, depending on the MAG/TRUE pb selection.

CURRENT TRACK

L3 The ADIRS provide the current track information.

L1



Indicates the current track of the aircraft, on the heading scale.

SELECTED HEADING(TRACK)

L3 If all three PRIMs are lost, the FCU backup provides the selected heading(track) information. In all other cases, the PRIMs provide the selected heading(track) information.

L12



Indicates the selected heading(track) that the flight crew selected on the AFS CP.

Appears, when:
- The HDG/TRACK mode is engaged, or
- The APs and FDs are off.

L1



The selected heading(track) is not within the display area, the numerical value appears instead of the symbol on the right(left) side of the heading/track scale.

L12



The heading(track) bar also appears on the horizon line of the PFD, when the FDs are off.
The heading scale of the PFD horizon line has markers every 10 °.

TRUE INDICATION

L123



The heading reference is TRUE north.

Appears when:
- The flight crew presses the TRUE/MAG pb , on the AFS CP
- At high latitudes, the ADIRS automatically change the MAG north reference to the TRUE north reference.

  The aircraft is at high latitude:
  - Above 82.5 ° North, or
  - Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
  - Below 60.5 ° South.

  When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message appears on the ND , and requests that the flight crew selects the TRUE north reference.

For more information on the polar navigation, *Refer to 22/AFS-FLIGHT MANAGEMENT SYSTEM/NAVIGATION FUNCTIONS/POLAR NAVIGATION* .
Flashes for 9 s , then remains steady when the slats are extended.

LS COURSE POINTER

L3 The Multi Mode Receiver (MMR) and the PRIMs provide the LS course.

L1 Indicates the QFU of the LS course on the heading scale.

L2 Appears, when the flight crew:
- Selects an approach on the FMS ARRIVAL page
- Presses the LS pb on the EFIS CP.

L1



The flight crew selected a precision approach on the FMS ARRIVAL page.



The flight crew selected a Non-Precision Approach (NPA) on the FMS ARRIVAL page.



The LS course pointer is not within the display area, the numerical value appears instead of the symbol on the right(left) side of the heading/track scale.

Intentionally left blank

Guidance

GUIDANCE

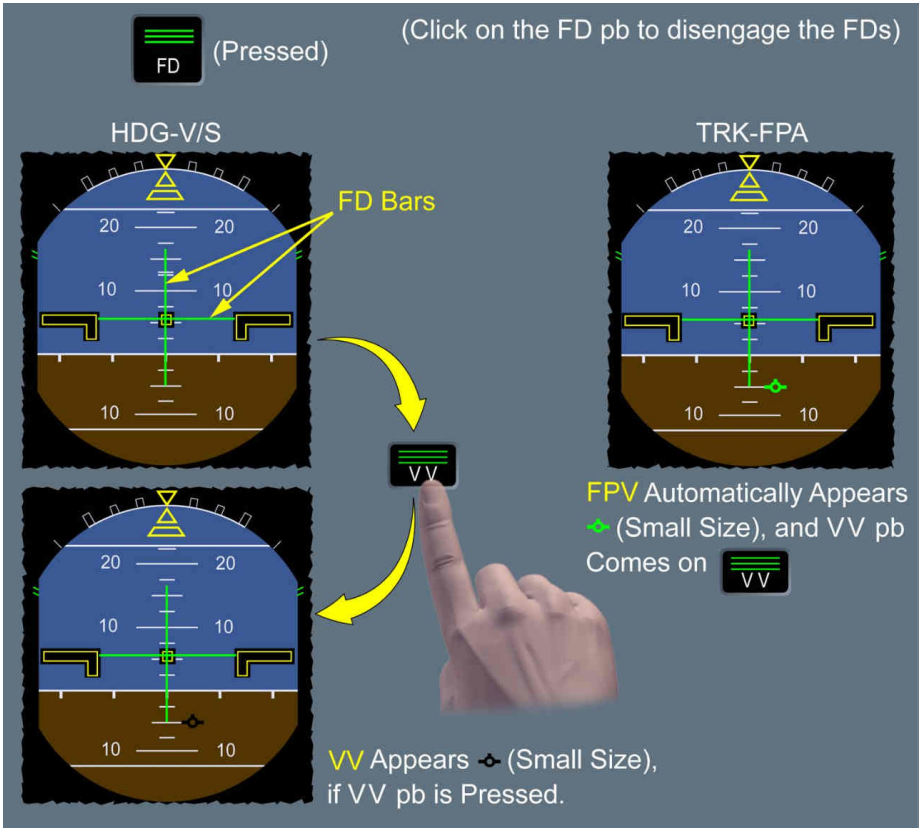
Applicable to: ALL

The guidance indications on the PFD depend on:

- The FD selection

  When the flight crew presses the FD pb :
  - Both FD 1 and FD 2 engage, and both FMA s display 1FD2 .
  - FD 1 guidance orders appear on the Captain's PFD , and FD 2 guidance orders appear on First Officer's PFD .

- The HDG-V/S/TRK-FPA selection
- The VV pb selection
  - Whatever the flying reference selected by the flight crew (HDG-V/S or TRK-FPA), the Flight Path Vector (FPV) (or Velocity Vector (VV)) can appear on the PFD .
  - The FPV (VV) can appear regardless the FD selection.



Note: *It is not recommended to have the FD s off, with the AP engaged.*

FD BARS

Applicable to: ALL

FD BARS

When the FD s are engaged, the PFD displays:

- The roll bar, when a lateral mode is engaged

L2 No longer appears in RWY and ROLL OUT .

L1 - The pitch bar, when a vertical mode is engaged

L2 No longer appears in ROLL OUT .

L1 - The yaw bar, in RWY , FLARE , and ROLL OUT .

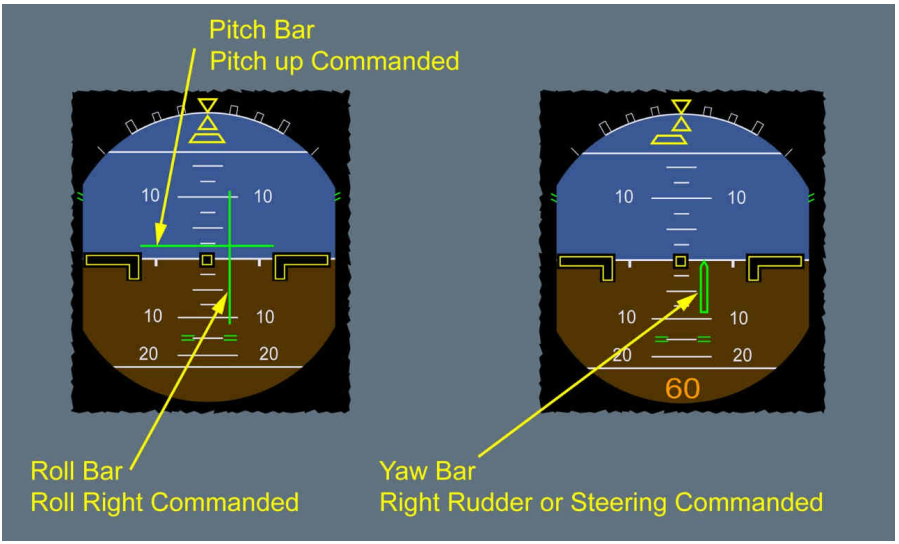
L2 The FD bars no longer appear, if:

- The pitch attitude exceeds 13 ° down or 25 ° up, or
- The bank angle exceeds 45 ° .

L1 For more information on the FD s, *Refer to 22-FG/Flight Director* .

L3 The PRIM s provide the FD bars informations.

FD Bars



L12

FD	Indicates that one or more guidance orders (i.e. roll, pitch, or yaw) are not valid. Flashes for 9 s , then remains steady.

FLIGHT PATH VECTOR(VELOCITY VECTOR)

Applicable to: ALL

FLIGHT PATH VECTOR(VELOCITY VECTOR)

L3 The ADIRS provide the flight path angle that is necessary in order to display the FPV.

L1 The Flight Path Vector (Velocity Vector) indicates the lateral (i.e. track), and vertical (i.e. flight path angle) aircraft trajectory, with respect to the ground, taking into account the wind effect.

- In the TRK-FPA flying reference, the symbol is called the Flight Path Vector (FPV)
- In the HDG-V/S flying reference, the symbol is called the Velocity Vector (VV).



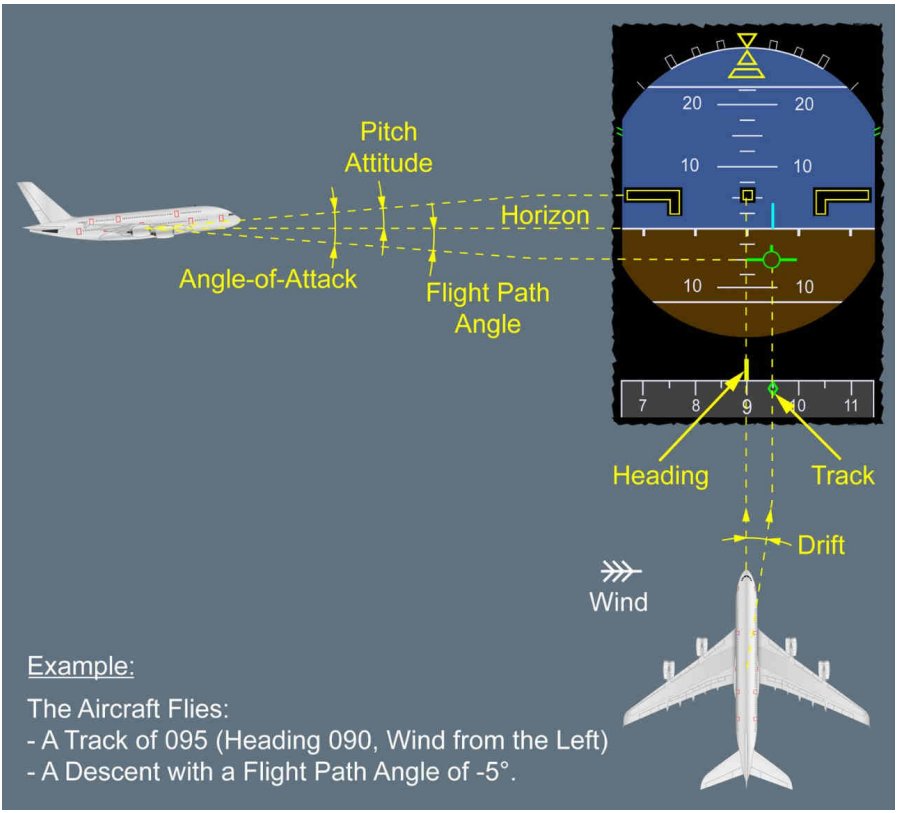
The FPV appears, when the flight crew selects TRK-FPA by pressing the HDG-V/S / TRK-FPA pb on the AFS CP.
If the FDs are not engaged, the size of the symbol increases.



The VV appears, when the flight crew:
- Selects HDG-V/S by pressing the HDG-V/S / TRK-FPA pb on the AFS CP
- Presses the VV pb on the EFIS CP.

If the FDs are not engaged, the size of the symbol increases.

FPV(VV)



L12

FPV — The FPV symbol is not available, i.e.:

- The flight path angle is not available, or
- The drift angle is not available.

Flashes for 9 s, then remains steady.

Intentionally left blank

Approach Guidance

APPROACH GUIDANCE

Applicable to: ALL

The approach guidance indications on the PFD differ, when the aircraft flies a:

- Precision approach (ILS (GLS) approach): *Refer to DSC-31-20-20-110-GILSA ILS Approach*), or
- Non-Precision Approach (NPA):
  - VOR, VOR/DME, RNAV approach (*Refer to DSC-31-20-20-110-10 VOR, VOR/DME, or RNAV Approach*)
  - ILS approach with G/S deselected (*Refer to DSC-31-20-20-110-10 LOC Only Approach*)
  - LOC only approach (*Refer to DSC-31-20-20-110-10 LOC Only Approach*)
  - LOC B/C approach (*Refer to DSC-31-20-20-110-10 LOC B/C Approach*).

ILS APPROACH

Applicable to: ALL

ILS (GLS) APPROACH

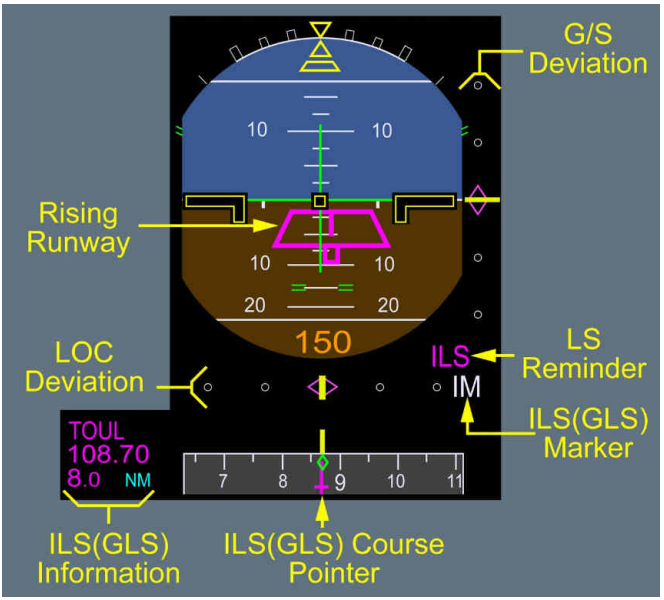
To perform an ILS (GLS) approach, the flight crew must:

- Select an ILS (GLS) approach on the FMS ARRIVAL page
- Press the LS pb on the EFIS CP .

L2 *Note:* *If an ILS (GLS) is manually-tuned on the FMS POSITION/NAVAIDS page:*

- *The approach selected on the FMS ARRIVAL page is automatically disregarded*
- *The LOC and G/S modes flies the manually-tuned ILS (GLS).*

ILS(GLS) Approach

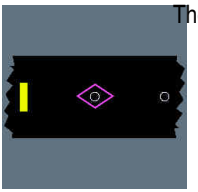


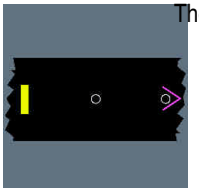
L1 **LOC DEVIATION**

L3 The MMR provides the LOC deviation.

L1 Appears, when:
- The LS pb is pressed
- The localizer signal is available.

L2 Flashes, and continues to flash if:
- The aircraft is between 15 ft and 1 000 ft
- CAT2 or CAT3 appears on the FMA
- LOC , LAND , or FLARE is engaged
- The deviation exceeds one quarter dot.

L1  The LOC deviation is within the scale.



The LOC deviation is not within the scale.

L12

LOC — Appears, instead of the LOC scale, when the LOC receiver on the same side is failed.
Flashes for 9 s , then remains steady.

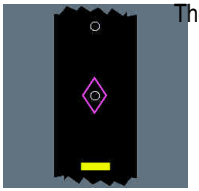
G/S DEVIATION

L3 The MMR provides the G/S deviation.

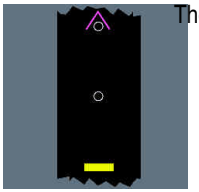
L1 Appears, when:
- The LS pb is pressed
- The G/S signal is available
- The flight crew did not select a back beam course.

L2 Flashes, and continues to flash if:
- The aircraft is between 100 ft and 1 000 ft
- CAT2 or CAT3 appears on the FMA
- G/S or LAND is engaged
- The deviation exceeds one dot.

L1



The G/S deviation is within the scale.



The G/S deviation is not within the scale.

L12



Appears, instead of the G/S scale, when the G/S receiver on the same side is failed.
Flashes for 9 s , then remains steady.

ILS (GLS) INFORMATION

L3 The MMR , the DME , and the FMS provide the ILS (GLS) information.

L123



Indicates the following information about the ILS (GLS):
The ILS (GLS) identification
The ILS (GLS) identification is decoded by the receiver.
The ILS Frequency (in MHz), or the GLS channel
The aircraft distance to the DME , if the ILS has a DME , or the aircraft distance to the threshold (GLS approach).

Note: CAPT PFD displays ILS (GLS) 1 information, F/O PFD displays ILS (GLS) 2 information.

L12

ILS — Appears, when one of the following is not available during an ILS approach:
- The LOC signal, or
- The G/S signal.

Flashes for 9 s , then remains steady.

L12

GLS — Appears, when one of the following is not available during a GLS approach:
- The LOC signal, or
- The G/S signal.

Flashes for 9 s , then remains steady.

L12

LS — The MMR sends inconsistent information about the selected approach.
Flashes for 9 s , then remains steady.

L12

DME — Appears, if:
- The ILS has a DME
- The distance to the DME is not available.

Flashes for 9 s , then remains steady.

L1 **ILS (GLS) MARKER INDICATION**

L2 Appears when:
- The LS pb is pressed
- The aircraft flies over the marker beacon.

L3 The VOR provides the marker beacon information.

L1

OM	The aircraft is flying over the outer marker of the ILS (GLS) approach.
MM	The aircraft is flying over the middle marker of the ILS (GLS) approach.
IM	The aircraft is flying over: - The inner marker of the ILS (GLS) approach, or - An airway marker.

L12

LS	The approach mode is armed(engaged), and the LS pb is not pressed. Flashes for 9 s , then remains steady.

LS REMINDER

L3 The MMR and the FMS provide the LS reminder information.

L12

ILS	The flight crew selected an ILS approach, and the LS pb is pressed. Flashes for 9 s , then remains steady.

L12

GLS	The flight crew selected a GLS approach, and the LS pb is pressed. Flashes for 9 s , then remains steady.

L1 **ILS (GLS) COURSE POINTER**

L3 The MMR and the PRIM provide the ILS (GLS) course pointer information.

L12



Indicates the QFU of the ILS (GLS) course on the heading scale. For more information on the LS course pointer, *Refer to DSC-31-20-20-90-10 LS Course Pointer* .

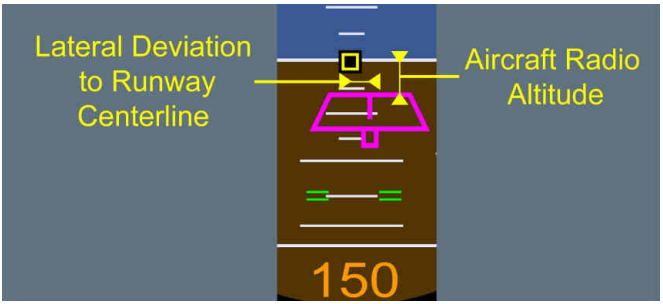
Note: *If an ILS (GLS) is manually-tuned on the FMS POSITION/NAVAIDS page, the approach selected on the FMS ARRIVAL page is disregarded. Therefore, the LS course symbol indicates the LS course of the manually-tuned ILS (GLS) .*

RISING RUNWAY

The rising runway appears, when:

- The aircraft radio altitude is below 200 ft
- The localizer signal is available
- The flight crew did not select the FLS function.

Rising Runway

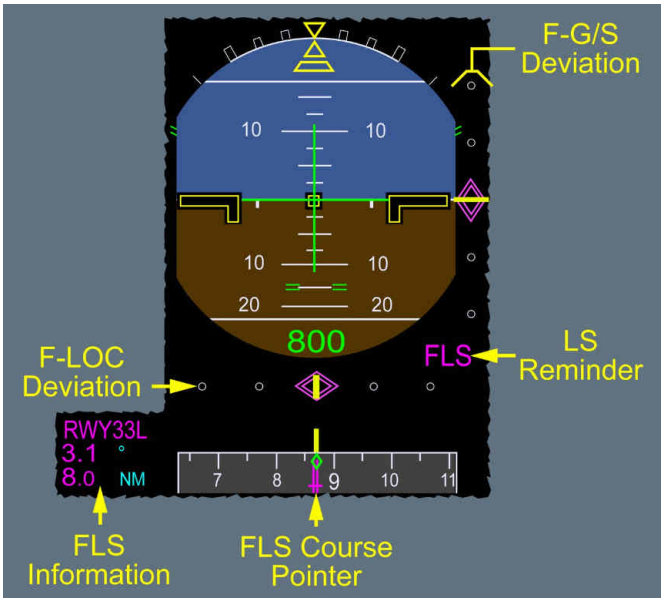


NON-PRECISION APPROACH

Applicable to: ALL

VOR , VOR / DME , OR RNAV APPROACH FLOWN WITH FLS FUNCTION

VOR, VOR/DME, or RNAV approach flown with FLS Function



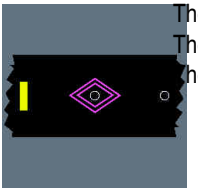
F-LOC DEVIATION

Appears, when:

- The flight crew pressed the LS pb
- The flight crew selected the FLS function
- The F-LOC deviation is valid.

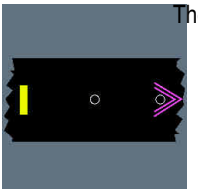
L3 The MMR provides the F-LOC deviation.

L12



The F-LOC deviation is within the scale.
The F-LOC deviation pulses, when the approach capability is RAW ONLY: The flight crew must press the LS pb .

L1



The F-LOC deviation is not within the scale.

L123

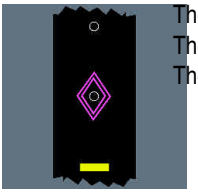
F-LOC — Appears, instead of the F-LOC scale, when the F-LOC deviation is not valid.
The F-LOC deviation is not available when the FLS function of the MMR on the same side is lost.
Flashes for 9 s , then remains steady.

F-G/S DEVIATION

Appears, when:
- The flight crew pressed the LS pb
- The flight crew selected the FLS function
- The F-G/S deviation is valid.

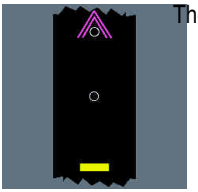
L3 The MMR provides the F-G/S deviation.

L12



The F-G/S deviation is within the scale.
The F-G/S deviation pulses, when the approach capability is RAW ONLY: The flight crew must press the LS pb .

L1



The F-G/S deviation is not within the scale.

L123



Appears, instead of the F-G/S scale, when the F-G/S deviation is not available.
The F-G/S deviation is not available when the FLS function of the MMR on the same side is lost.
Flashes for 9 s , then remains steady.

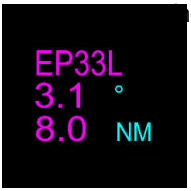
FLS INFORMATION

L13



Indicates:
The FLS anchor point identification, when the anchor point is on the runway threshold
The FLS beam slope
The aircraft distance to the anchor point.
The FMS computes this distance.

L13



Indicates:
The anchor point is not located on the runway threshold: In this case, the anchor point is also referred to as End Point (EP)
The FLS beam slope to the end point
The aircraft distance to the end point.
The FMS computes this distance.

L12



When the flight crew flies a NPA without the FLS function, indicates:
The side of the selected VOR
The ident of the VOR / DME
If the navigation station ident is not valid, the ND displays the station frequency, instead of the ident.
If the VOR frequency is not valid, the ND displays the DME frequency, instead of the VOR frequency.
The ND displays nothing, if both the identifier and the frequency are not valid.

- The distance from the aircraft to the selected VOR / DME beacon.

L12

FLS — Appears, when one of the following is not available:
- The FLS function, or
- The F-LOC signal, or
- The F-G/S signal, or
- The distance to the anchor point.

Flashes for 9 s , then remains steady.

L12

LOC/FLS — Appears, when one of the following is not available:
- The LOC / FLS function, or
- The LOC signal, or
- The F-G/S signal, or
- The distance to the anchor point.

Flashes for 9 s , then remains steady.

L12

LS — The MMR sends inconsistent information about the selected approach.
Flashes for 9 s , then remains steady.

LS REMINDER

L3 The MMR and the FMS provide the LS reminder information.

L12

FLS — The approach mode is armed(engaged), and the flight crew pressed the LS pb on the EFIS CP .
Flashes for 9 s , then remains steady.

L1 **FLS COURSE POINTER**

L3 The MMR and the PRIM provide the FLS course pointer information.

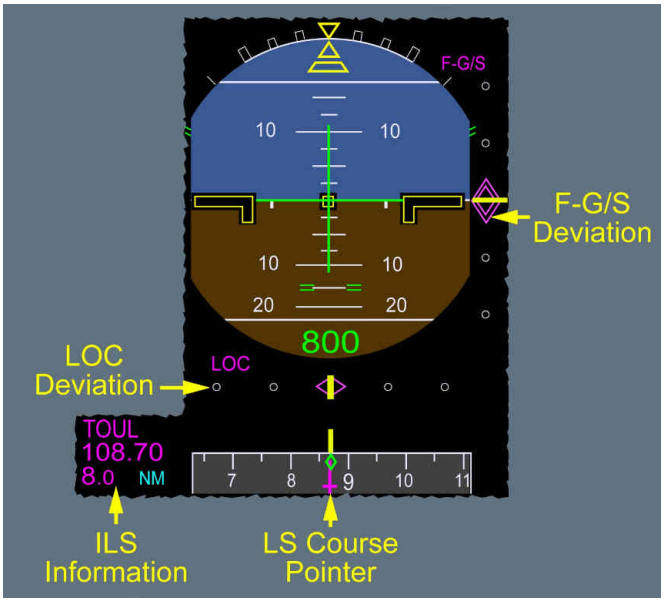
L1



Indicates the FLS course for a Non-Precision Approach flown with the FLS function. For more information on the LS course pointer, *Refer to DSC-31-20-20-90-10 LS Course Pointer* .

LOC ONLY OR ILS G/S OUT APPROACH FLOWN WITH FLS FUNCTION

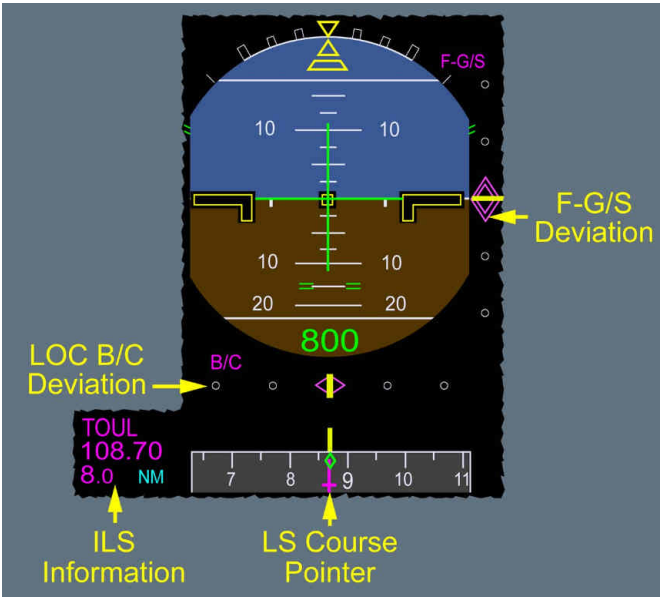
LOC Only or ILS G/S out Approach Flown with FLS function



The LOC deviation and the LS course pointer are the same as for the ILS approach.
The F-G/S deviation is the same as for the VOR, VOR/DME, or RNAV approach with the FLS function.
The ILS information is the same as for an ILS approach.

LOC B/C APPROACH FLOWN WITH FLS FUNCTION

LOC B/C Approach Flown with FLS Function



The LOC B/C deviation is the same as for an ILS approach.
The LS course for the LOC B/C approach corresponds to the QFU of the runway + 180 °. The display of the LS course is the same as for the ILS approach.
The F-G/S deviation is the same as for the VOR, VOR/DME, or RNAV approach flown with the FLS function.
The ILS information is the same as for an ILS approach.

Flight Mode Annunciator (FMA)

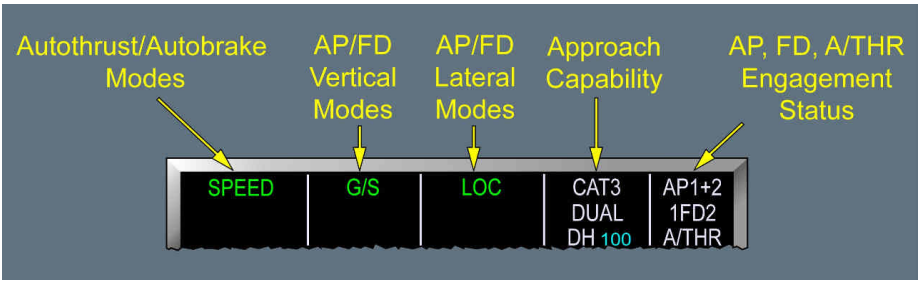
FLIGHT MODE ANNUNCIATOR (FMA)

Applicable to: ALL

The Flight Mode Annunciator (FMA) indicates:
- The status of the A/THR
- The AP / FD vertical and lateral modes
- The approach capability
- The AP / FD and A/THR engagement status
- The autobrake arming status.

Messages from the Flight Guidance, the Flight Controls, and the FMS can also appear below the FMA .
For more information on guidance indications on the FMA , *Refer to 22-FG/CONTROLS AND INDICATORS/FMA* .

FMA



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Backup Scales

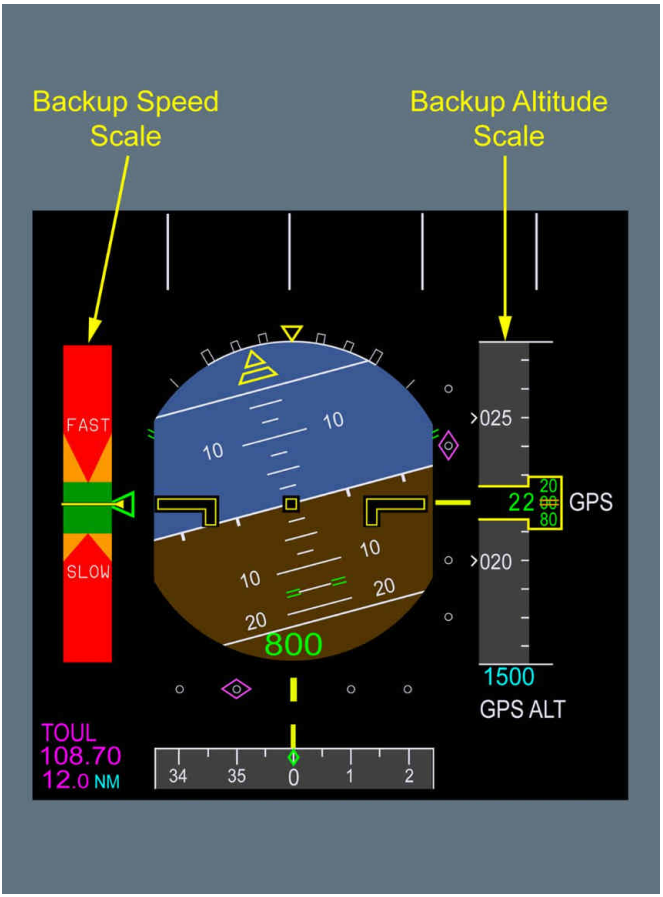
BACKUP SCALES

Applicable to: ALL

In flight, when all ADR s are off, the following backup scales appear:

- The backup speed scale
- The backup altitude scale.

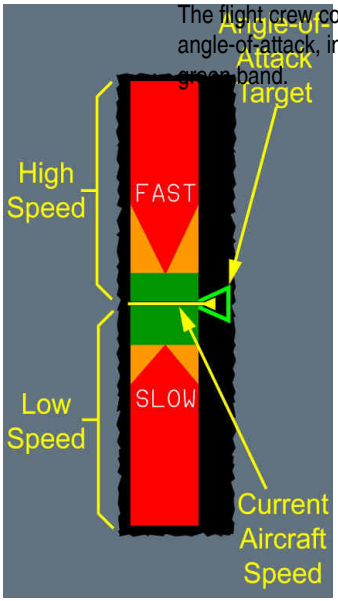
Backup Scales



BACKUP SPEED SCALE

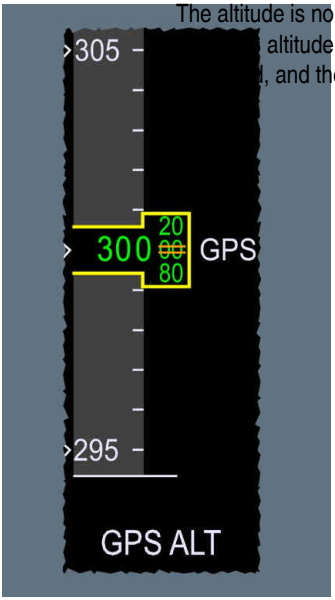
L3 The IRS provide the necessary information for the backup speed scale.

L1



The flight crew controls the aircraft speed by adjusting the aircraft angle-of-attack, in accordance with the angle-of-attack target that is in the green band.

BACKUP ALTITUDE SCALE



The altitude is no longer available from the ADR s.
altitude remains available via the IR s. The accuracy of the altitude is
, and the altitude appears with a precision of +/- 500 ft .

For more information on the backup speed and altitude scales, *Refer to DSC-34-10-30-10 Backup Speed Scale* .

Slats/Flaps Display

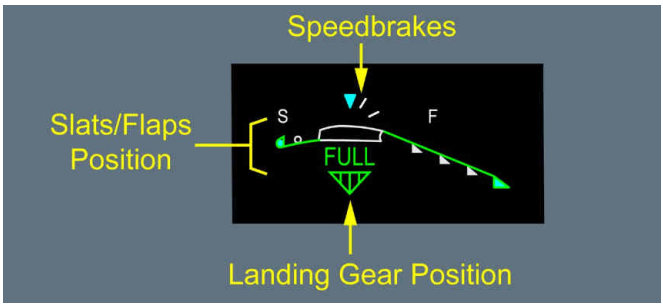
SLATS/FLAPS DISPLAY

Applicable to: ALL

The lower part of the PFD indicates the position of the:
- Slats/flaps
- Speedbrakes
- Landing gear.

For more information about the slats/flaps display, *Refer to DSC-27-20-30-273001 Slats/flaps displays* .

Slats/Flaps Display



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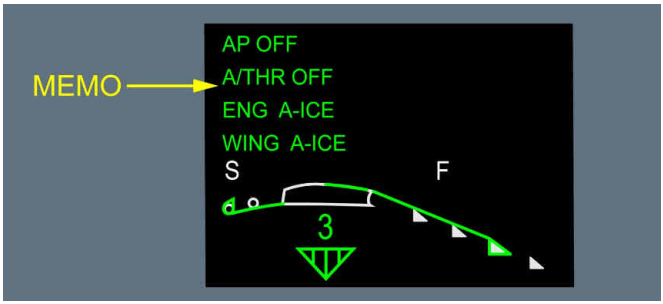
MEMO

MEMO

Applicable to: ALL

A maximum of four memo lines can appear on the lower part of the PFD .
The first line displays the most important memo. The other memos appear in decreasing order of importance.
Memos also appear on the EWD : *Refer to DSC/31/ECAM/System Description/Memos* .

MEMO



MEMO NOT AVAIL	The FWS cannot display the memos on the PFD .

Intentionally left blank

Limitations and Pitch Trim

LIMITATIONS AND PITCH TRIM

Applicable to: ALL

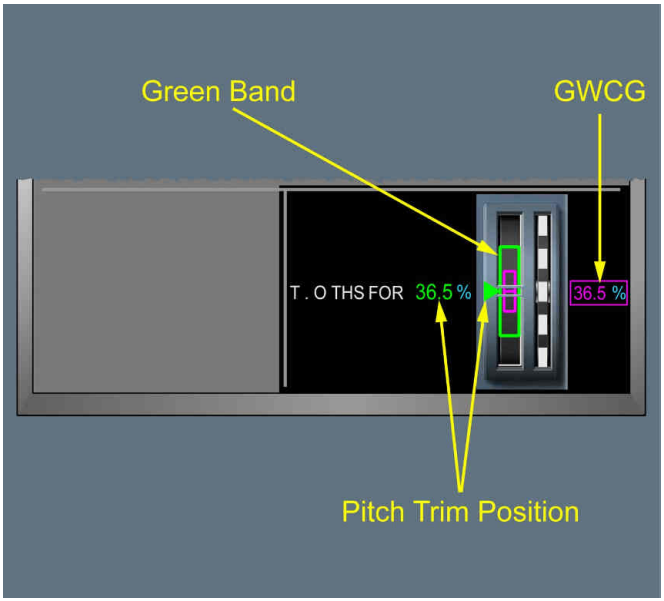
In flight, the lower part of the PFD displays the limitations that have a direct impact on the flight performance of the aircraft.

Limitations



LIMITATIONS NOT AVAIL The FWS cannot display limitations on the PFD .
At takeoff and after landing, the pitch trim indications appear on the lower part of the PFD .
For more information on the pitch trim display, *Refer to DSC/27/CONTROLS AND INDICATORS/PITCH TRIM DISPLAY* .

Pitch Trim



Overview

OVERVIEW

Applicable to: ALL

The Navigation Display (ND) provides the flight crew with mid-term information of the status of the lateral navigation of the aircraft, according to:

- The flight plan
- The navigation database data (waypoints, NAVAIDS , airports).

The flight crew can change some items of the flight plan directly from the ND . For more information, *Refer to Interactive ND* .

The ND also displays:

- The weather radar, the terrain, or information about traffic collision avoidance
- The airport navigation function. For more information, *Refer to Airport Navigation* .

For navigation, the flight crew can select one of the following ND modes:

- ARC
- PLAN
- ROSE-NAV
- ROSE-VOR
- ROSE-LS.

In PLAN mode, it is not possible to display additional information about the weather radar, the terrain, or traffic collision avoidance.
The lower part of the ND display unit also provides the Vertical Display (VD) information. For more information, *Refer to VD* .

Overview


WX
TERR
TRAF
NAV
VOR
ARC
LS
PLAN
40
80
20
160
10
320
ZOOM
640
Airport Navigation
Common Data
Messages
GS 300 TAS 466
320 / 20
CHECK EWD
CHECK HDG
ND RANGE CHANGE
12"12"
VOR1 CORR
TOU
5.0 NM
M
TCAS
GPS PRIMARY
R
ADF2
MUT
Common Data
FMS Data

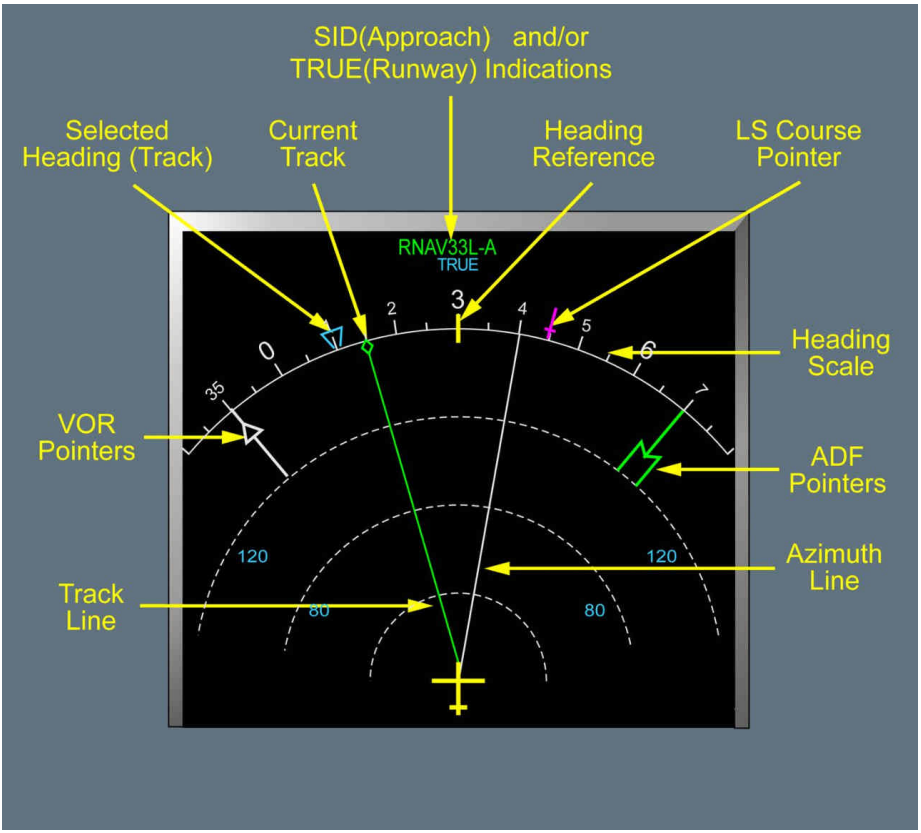
ARC Mode

ARC MODE

Applicable to: ALL

In ARC mode, the ND displays a sector that corresponds to 100 ° in front of the aircraft.

ARC Move Overview

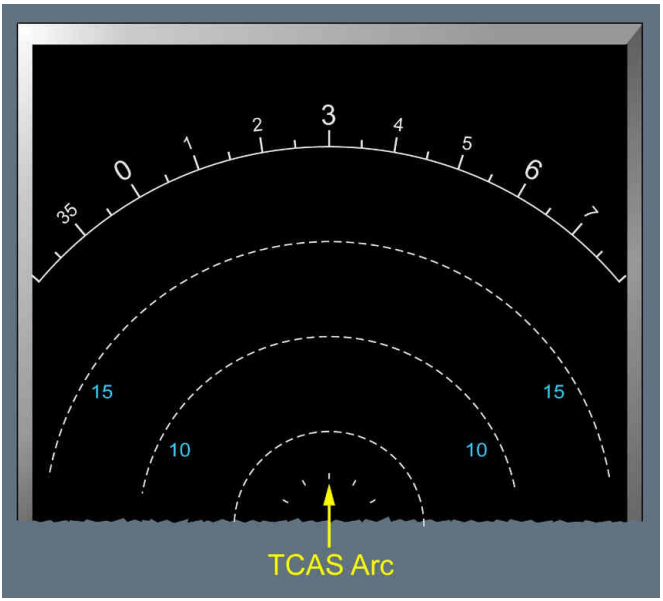


HEADING SCALE

The heading scale takes into account a sector of 100 ° . Degrees are indicated in increments of 5 ° , with a numerical value every 10 ° .
The radius of the heading scale corresponds to the range that the flight crew has selected on the EFIS CP .
The dotted arcs in front of the aircraft correspond to 1/4, 1/2 and 3/4 of the selected range.
For more information, *Refer to DSC-31-20-50-GEFIS ND Range Sel* .
The range values, on both sides of the ARC display, correspond to 1/2 and 3/4 of the selected range.

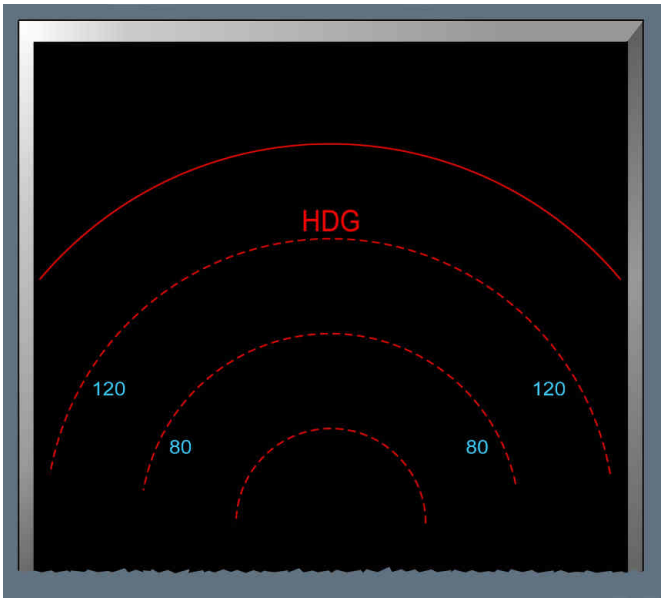
The TCAS arc indicates 2.5 nm , when:
- The selected range is less than, or equal to, 20 nm
- The flight crew selects the TRAF pb on the EFIS CP , or a TCAS alert is triggered.

TCAS Arc



L2 When the aircraft heading is not valid, the ND displays the heading scale in red.

Heading Scale Not Valid



HEADING REFERENCE



Indicates the current aircraft heading on the heading scale.

L2 The ADIRS provides the heading value, in the TRUE or MAG reference, depending on the MAG/TRUE pb selection.

L1 At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

L3 The aircraft is at high latitude:
- Above82.5 °North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

L1 When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew select the TRUE north reference.

L3 This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

L1 The flight crew can manually change the north reference by pressing the TRUE/MAG pb, on the AFS CP.

CURRENT TRACK



Indicates the current aircraft track on the heading scale.

L2 The ADIRS provides the aircraft track.

SELECTED HEADING(TRACK)

L12



Indicates the heading(track) that the flight crew has selected on the AFS CP.

Appears when:
- HDG/TRACK mode is engaged, or
- APs and FDs are off.

L2 If the selected heading(track) is above the maximum value displayed on the ARC scale, the numerical value appears instead of the symbol on the right (left) side of the heading scale.

LS COURSE POINTER



Indicates the QFU of the LS course on the heading scale.
Appears when the flight crew has selected a precision approach on the FMS.



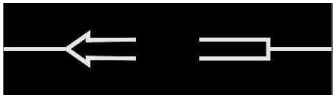
Indicates the QFU of the LS course on the heading scale.
Appears if the FLS function performs the lateral guidance.

L2 The Multi Mode Receiver (MMR) provides the LS course.

VOR POINTERS



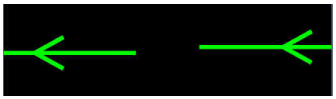
Indicates the bearing of the selected VOR1.
Appears when the flight crew presses the VOR/ADF1 pb on the EFIS CP.



Indicates the bearing of the selected VOR2.
Appears when the flight crew presses the VOR/ADF2 pb on the EFIS CP.

L3 The VOR pointer has an angle equal to the VOR bearing minus the aircraft heading.
If the tuned VOR reference in the FMS database (MAG or TRUE) is different from the current aircraft reference (MAG or TRUE), the VOR pointer appears in magenta, and is corrected from the IRS magnetic deviation.

ADF POINTERS



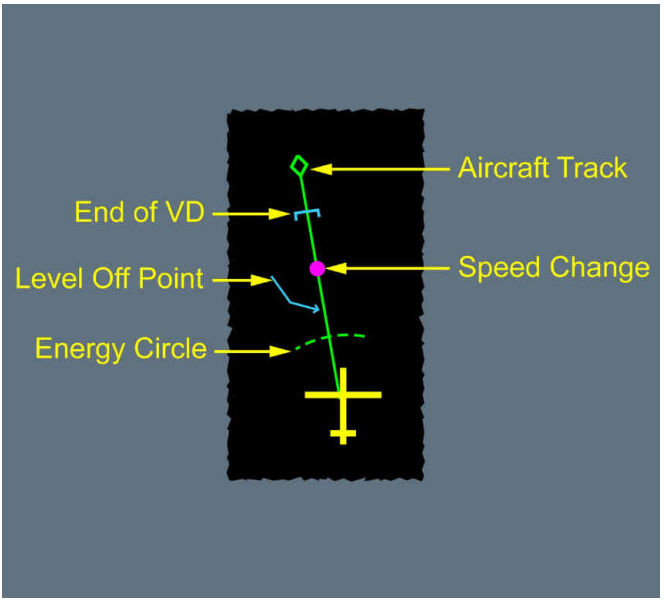
Indicates the bearing of the selected ADF.
Appears when the flight crew presses the VOR1/ADF pb two times (on the EFIS CP).

L3 The ADF pointer has an angle that is equal to the ADF bearing.

TRACK LINE

When a selected lateral mode is engaged, the ND displays the predicted track of the aircraft, based on the current aircraft track.
This predicted track is referred to as the track line:

Track Line



ENERGY CIRCLE

L12



Indicates the distance that the aircraft is required to descend and decelerate, in order to reach the selected landing point.
Appears when the aircraft is within 180 nm of the destination airport.

L2 The FMS provides the energy circle.

L1 ### SPEED CHANGE



Indicates the point at which the flight crew must change the aircraft speed, in order to reach a speed target.

L2 The FMS provides the speed change.

L1 ### LEVEL OFF POINT



The aircraft is descending.
Indicates the point at which the aircraft will reach the altitude target that was selected on the AFS CP .



The aircraft is climbing.
Indicates the point at which the aircraft will reach the altitude target that was selected on the AFS CP .

END OF VD



Indicates the end of the VD display on the aircraft trajectory.
For more information, *Refer to VD / RANGE* .

AZIMUTH LINE

A white line indicates the azimuth that is used for the computation of the vertical cut of the VD . For more information, *Refer to VD* .
The flight crew can manually select the VD AZIM mode via the VD AZIM knob , on the SURV panel. For more information, *Refer to SURV / WXR / WXR DISPLAY FUNCTION* .

SID(APPROACH) AND/OR TRUE(RUNWAY) INDICATIONS

The ND can display:
- The SID name, or
- The approach name.

The TRUE indication can be combined with the SID or the approach name.
If the ND does not display the TRUE indication, the BTV indication or the runway name can be combined with the approach name.



Indicates the SID name.

Appears when:
- The SID exists in the flight plan, and
- • The PRE-FLIGHT flight phase is active, or
  • T.O or CLB flight phase is active, and the aircraft flies the departure procedure as defined in the FMS (*Refer to DEPARTURE of the FMS*

L12



Indicates the type and the name of the approach.

Appears when:
- The approach exists in the flight plan, and
- • One of the DES , APP , or GA flight phases is active, or
  • The active flight phase is CRZ , and the along track distance to destination is less than 250 nm

The heading reference is magnetic.

L123



The heading reference is TRUE north.
At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

The aircraft is at high latitude:
- Above 82.5 ° North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew selects the TRUE north reference.

This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

The flight crew can manually change the north reference by pressing the TRUE/MAG pb , on the AFS CP .
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



The heading reference is TRUE north. The grid track indicates the true track value, minus the aircraft longitude.
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



Indicates the BTV indication composed by:
- BTV label
- The selected runway name
- The selected exit name.

Appears when the flight crew selects the BTV function on the AUTO BRK Mode selector .

L12



Indicates the runway name.

Appears for autobrake mode (i.e. LO , 2, 3 or HI), or for manual braking when:

- The aircraft reaches 500 ft in final, or
- The flight crew selects a runway on the OANS .

Intentionally left blank

PLAN Mode

PLAN MODE

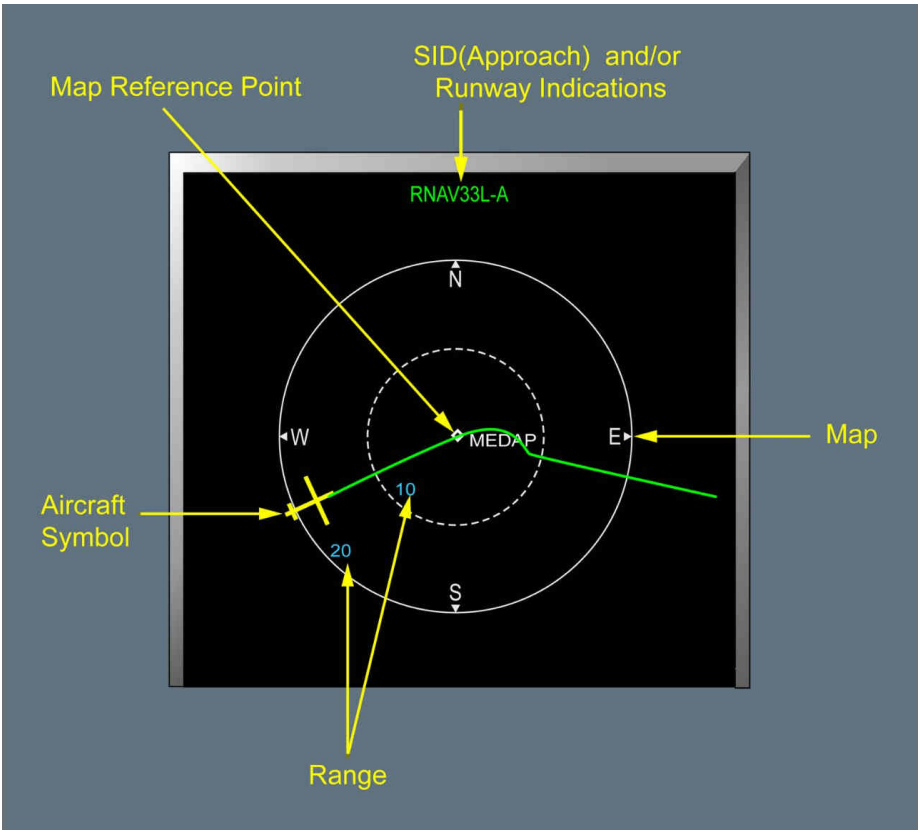
Applicable to: ALL

The PLAN mode displays the flight plan on a map, using the North (N)/South (S) and West (W)/East (E) references.

L2 Raw navigation station data is not available in this mode.

L1 In PLAN mode, the flight crew can scroll through, and display, the entire flight plan.

PLAN Mode Overview



MAP

The map is in the direction of TRUE north. The ND adjusts the center of the map to a Map Reference Point (MRP), that the flight crew selects on the MFD.

RANGE

The diameter of the outer circle corresponds to the range selected by the flight crew on the EFIS CP.
The range values correspond to 1/2 and 1/4 of the selected range.

AIRCRAFT SYMBOL



Indicates the aircraft position in relation to the flight plan. The mock-up orientation indicates the aircraft heading in relation to TRUE north.

L2 The FMS provides the aircraft position, and the ADIRS provides the aircraft heading.

MAP REFERENCE POINT

The Map Reference Point (MRP) is at the center of the map, and is:
- The first waypoint beyond the first line of the flight plan, when the MFD displays a flight plan page, or
- The TO waypoint of the active flight plan or of any secondary flight plan, if the MFD displays any other page than the flight plan page, or
- The current aircraft position, if there is no waypoint on the flight plan.

(SID)APPROACH AND/OR RUNWAY INDICATIONS

The ND can display:
- The SID name, or
- The approach name.

The BTV indication or the runway name can be combined with the approach name.



Indicates the SID name.

Appears when:
- The SID exists in the flight plan, and
- • The PRE-FLIGHT flight phase is active, or
  • T.O or CLB flight phase is active, and the aircraft flies the departure procedure as defined in the FMS (*Refer to DEPARTURE of the FMS*

L12



Indicates the type and the name of the approach.

Appears when:
- The approach exists in the flight plan, and
- • One of the DES , APP , or GA flight phases is active, or
  • The active flight phase is CRZ , and the along track distance to destination is less than 250 nm

The heading reference is magnetic.

L12



Indicates the BTV indication composed by:
- BTV label
- The selected runway name
- The selected exit name.

Appears when the flight crew selects the BTV function on the AUTO BRK Mode selector .

L12



Indicates the runway name.

Appears for autobrake mode (i.e. LO , 2, 3 or HI), or for manual braking when:
- The aircraft reaches 500 ft in final, or
- The flight crew selects a runway on the OANS .

Intentionally left blank

ROSE-NAV Mode

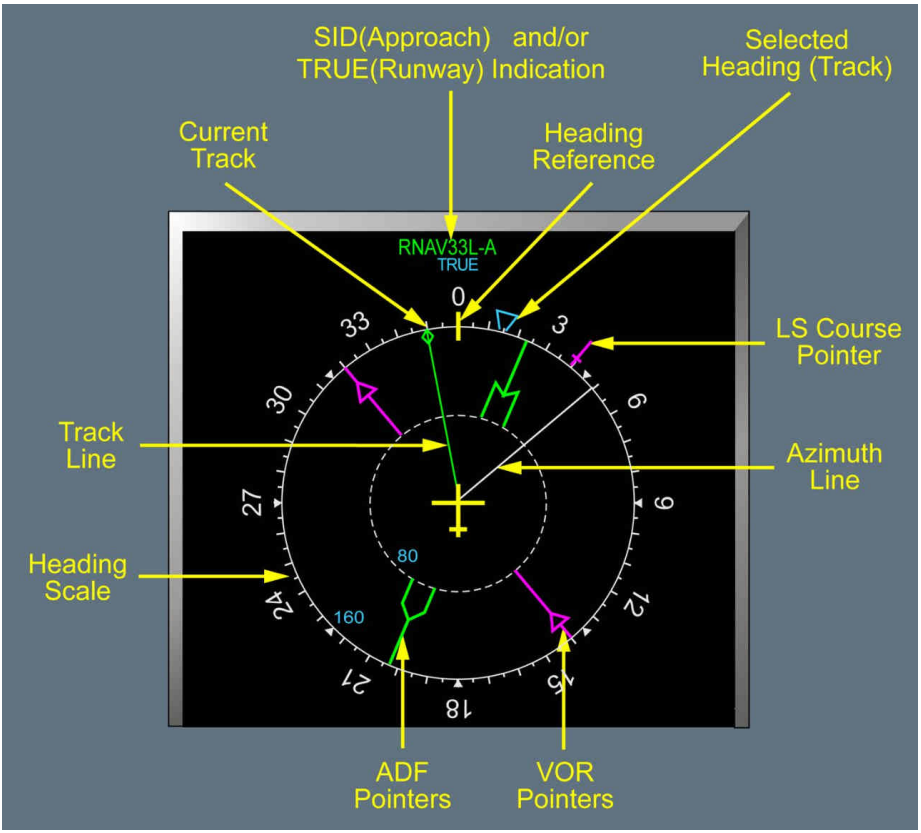
ROSE-NAV MODE

Applicable to: ALL

The ROSE-NAV mode provides the same information as the ARC mode, but on a 360 ° sector. The ND displays the ROSE-NAV in relation to the aircraft heading.

L2 If the ND mode, or the ND range, are not valid, the ND displays the ROSE-NAV mode by default, with a range of 80 nm .

ROSE-NAV Mode Overview

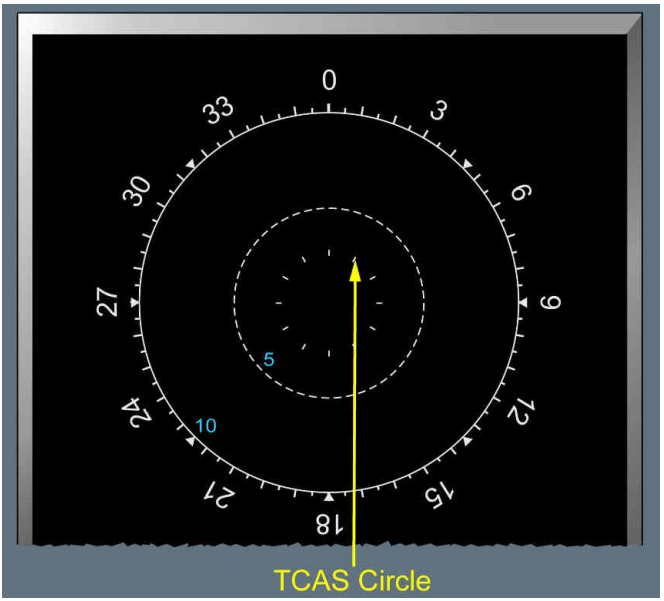


HEADING SCALE

The heading scale takes into account a sector of 360 °. Degrees are indicated in increments of 5 °, with a numerical value every 30 °.
The diameter of the heading scale corresponds to the range that the flight crew has selected on the EFIS CP.
The diameter of the dotted circle corresponds to 1/2 of the selected range.
The range values, on both sides of the ROSE display, correspond to 1/4 and 1/2 of the selected range.

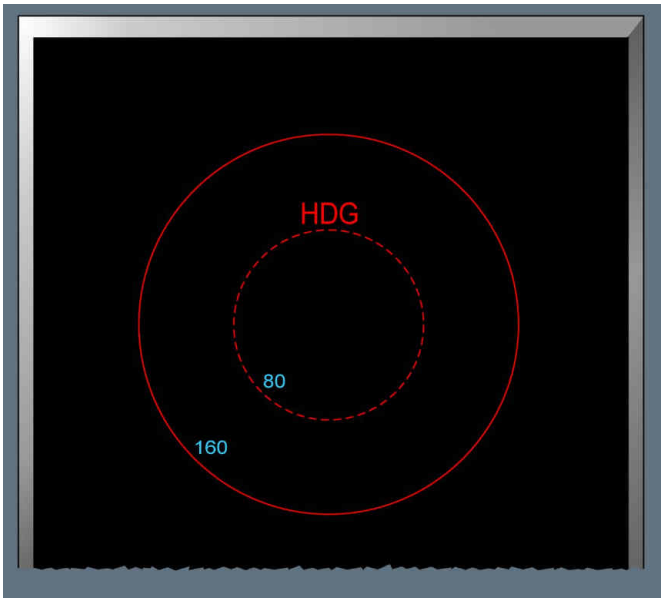
The TCAS circle indicates 2.5 nm, when:
- The selected range is less than, or equal to, 20 nm
- The flight crew selects the TRAF pb on the EFIS CP, or a TCAS alert is triggered.

TCAS Circle



L2 When the aircraft heading is not valid, the ND displays the heading scale in red.

Heading Scale Not Valid



HEADING REFERENCE



Indicates the current aircraft heading on the heading scale.

L2 The ADIRS provides the heading value, in the TRUE or MAG reference, depending on the MAG/TRUE pb selection.

L1 At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

L3 The aircraft is at high latitude:
- Above82.5 °North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

L1 When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew select the TRUE north reference.

L3 This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

L1 The flight crew can manually change the north reference by pressing the TRUE/MAG pb, on the AFS CP.

CURRENT TRACK



Indicates the current aircraft track on the heading scale.

L2 The ADIRS provides the aircraft track.

SELECTED HEADING(TRACK)

L12



Indicates the heading(track) that the flight crew has selected on the AFS CP.

Appears when:
- HDG/TRACK mode is engaged, or
- APs and FDs are off.

LS COURSE POINTER



Indicates the QFU of the LS course on the heading scale.
Appears when the flight crew has selected a precision approach on the FMS.



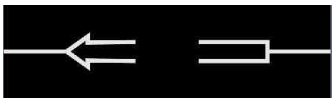
Indicates the QFU of the LS course on the heading scale.
Appears if the FLS function performs the lateral guidance.

L2 The Multi Mode Receiver (MMR) provides the LS course.

VOR POINTERS



Indicates the bearing of the selected VOR1.
Appears when the flight crew presses the VOR/ADF1 pb on the EFIS CP.



Indicates the bearing of the selected VOR2.
Appears when the flight crew presses the VOR/ADF2 pb on the EFIS CP.

L3 The ND displays the VOR pointer with a angle that is equal to the VOR bearing, minus the aircraft heading.
If the tuned VOR reference in the FMS database (MAG or TRUE) is different from the current aircraft reference (MAG or TRUE), the VOR pointer appears in magenta, and is corrected from the IRS magnetic deviation.

ADF POINTERS



Indicates the bearing of the selected ADF.
Appears when the flight crew presses the VOR1/ADF pb two times (on the EFIS CP).

L3 The ADF pointer has an angle that is equal to the ADF bearing.

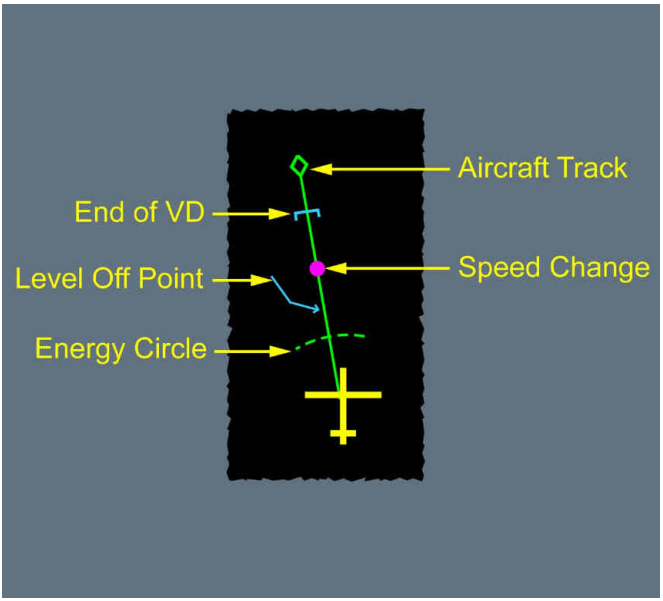
AZIMUTH LINE

A white line indicates the azimuth that is used for the computation of the vertical cut of the VD . For more information, *Refer to VD* .
The flight crew can manually select the VD AZIM mode via the VD AZIM knob , on the SURV panel. For more information, *Refer to SURV / WXR / WXR DISPLAY FUNCTION* .

TRACK LINE

When a selected lateral mode is engaged, the ND displays the predicted track of the aircraft, based on the current aircraft track.
This predicted track is referred to as the track line:

Track Line



ENERGY CIRCLE

L12



Indicates the distance that the aircraft is required to descend and decelerate, in order to reach the selected landing point.
Appears when the aircraft is within 180 nm of the destination airport.

L2 The FMS provides the energy circle.

L1 ### SPEED CHANGE



Indicates the point at which the flight crew must change the aircraft speed, in order to reach a speed target.

L2 The FMS provides the speed change.

L1 ### LEVEL OFF POINT



The aircraft is descending.
Indicates the point at which the aircraft will reach the altitude target that was selected on the AFS CP .



The aircraft is climbing.
Indicates the point at which the aircraft will reach the altitude target that was selected on the AFS CP .

END OF VD



Indicates the end of the VD display on the aircraft trajectory.
For more information, *Refer to VD / RANGE* .

SID(APPROACH) AND/OR TRUE(RUNWAY) INDICATIONS

The ND can display:
- The SID name, or
- The approach name.

The TRUE indication can be combined with the SID or the approach name.
If the ND does not display the TRUE indication, the BTV indication or the runway name can be combined with the approach name.



Indicates the SID name.

Appears when:
- The SID exists in the flight plan, and
- • The PRE-FLIGHT flight phase is active, or
  • T.O or CLB flight phase is active, and the aircraft flies the departure procedure as defined in the FMS (*Refer to DEPARTURE of the FMS*

L12



Indicates the type and the name of the approach.

Appears when:
- The approach exists in the flight plan, and
- • One of the DES , APP , or GA flight phases is active, or
  • The active flight phase is CRZ , and the along track distance to destination is less than 250 nm

The heading reference is magnetic.

L123



The heading reference is TRUE north.
At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

The aircraft is at high latitude:
- Above 82.5 ° North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew selects the TRUE north reference.

This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

The flight crew can manually change the north reference by pressing the TRUE/MAG pb , on the AFS CP .
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



The heading reference is TRUE north. The grid track indicates the true track value, minus the aircraft longitude.
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



Indicates the BTV indication composed by:
- BTV label
- The selected runway name
- The selected exit name.

Appears when the flight crew selects the BTV function on the AUTO BRK Mode selector .

L12



Indicates the runway name.

Appears for autobrake mode (i.e. LO , 2, 3 or HI), or for manual braking when:

- The aircraft reaches 500 ft in final, or
- The flight crew selects a runway on the OANS .

Intentionally left blank

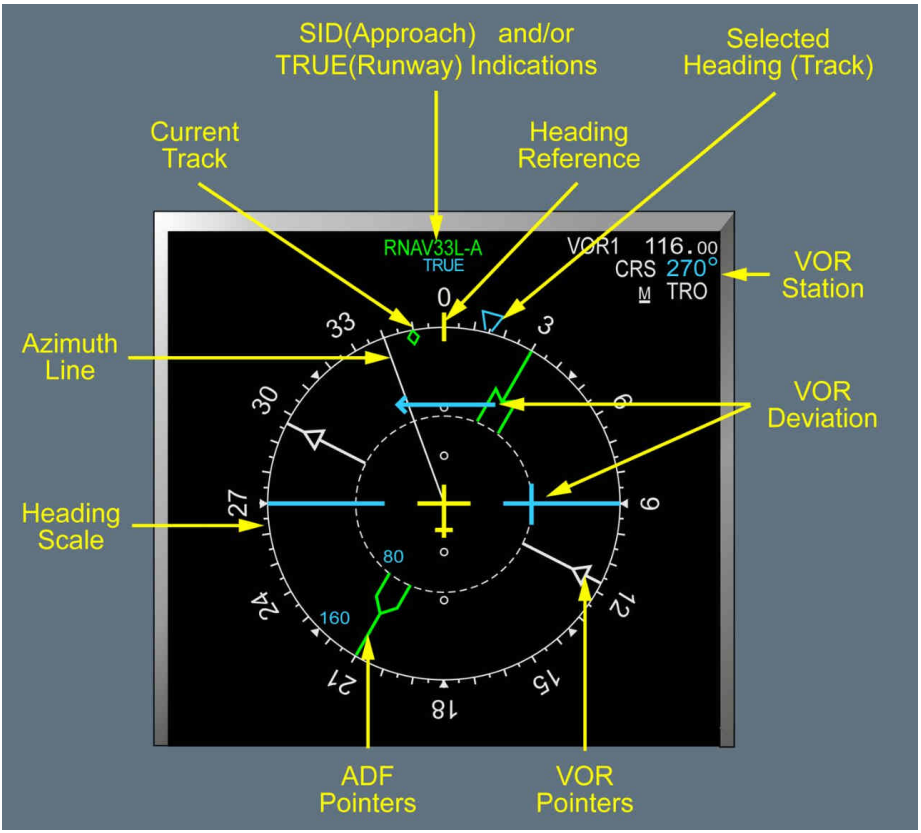
ROSE-VOR Mode

ROSE-VOR MODE

Applicable to: ALL

The ROSE-VOR mode displays the horizontal position of the aircraft, in relation to the tuned VOR . The ND displays the ROSE-VOR in relation to the aircraft heading.

ROSE-VOR Mode Overview

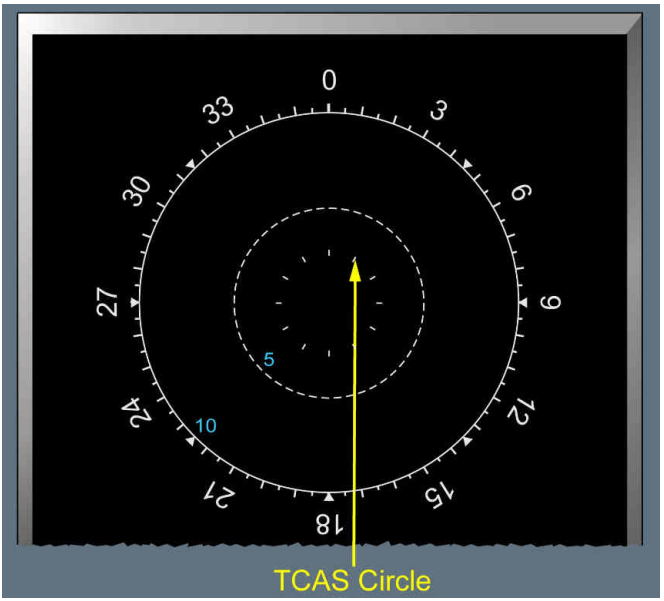


HEADING SCALE

The heading scale takes into account a sector of 360 °. Degrees are indicated in increments of 5 °, with a numerical value every 30 °.
The diameter of the heading scale corresponds to the range that the flight crew has selected on the EFIS CP.
The diameter of the dotted circle corresponds to 1/2 of the selected range.
The range values, on both sides of the ROSE display, correspond to 1/4 and 1/2 of the selected range.

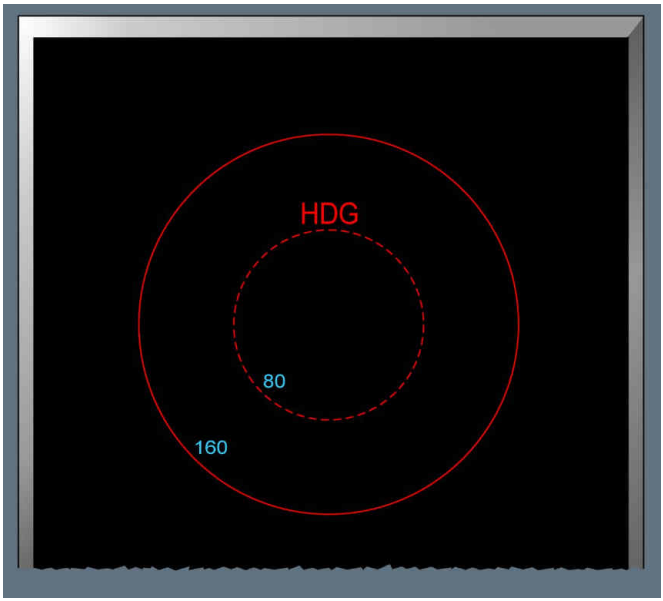
The TCAS circle indicates 2.5 nm, when:
- The selected range is less than, or equal to, 20 nm
- The flight crew selects the TRAF pb on the EFIS CP, or a TCAS alert is triggered.

TCAS Circle



L2 When the aircraft heading is not valid, the ND displays the heading scale in red.

Heading Scale Not Valid



HEADING REFERENCE



Indicates the current aircraft heading on the heading scale.

L2 The ADIRS provides the heading value, in the TRUE or MAG reference, depending on the MAG/TRUE pb selection.

L1 At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

L3 The aircraft is at high latitude:
- Above82.5 °North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

L1 When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew select the TRUE north reference.

L3 This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

L1 The flight crew can manually change the north reference by pressing the TRUE/MAG pb, on the AFS CP.

CURRENT TRACK



Indicates the current aircraft track on the heading scale.

L2 The ADIRS provides the aircraft track.

SELECTED HEADING(TRACK)

L12



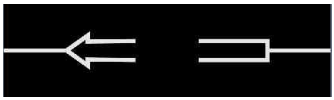
Indicates the heading(track) that the flight crew has selected on the AFS CP.

Appears when:
- HDG/TRACK mode is engaged, or
- APs and FDs are off.

VOR POINTERS



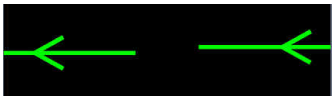
Indicates the bearing of the selected VOR1.
Appears when the flight crew presses the VOR/ADF1 pb on the EFIS CP.



Indicates the bearing of the selected VOR2.
Appears when the flight crew presses the VOR/ADF2 pb on the EFIS CP.

L3 The ND displays the VOR pointer with a angle that is equal to the VOR bearing, minus the aircraft heading.
If the VOR reference (MAG or TRUE) is different from the current aircraft reference, the VOR pointer indication is not corrected.

ADF POINTERS

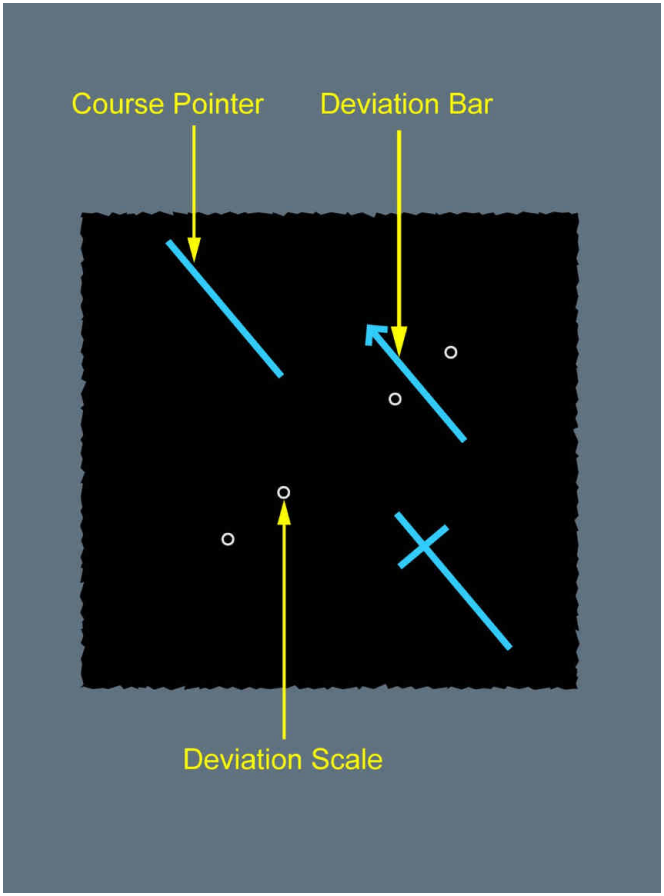


Indicates the bearing of the selected ADF.
Appears when the flight crew presses the VOR1/ADF pb two times (on the EFIS CP).

L3 The ADF pointer has an angle that is equal to the ADF bearing.

VOR DEVIATION

VOR Deviation

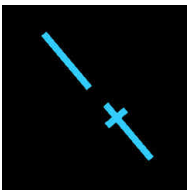


When the VOR bearing is not valid, the ND displays the VOR message in the middle of the ND screen.

L2 The VOR message flashes for 9 seconds, then remains steady.

L1 **COURSE POINTER**

L12



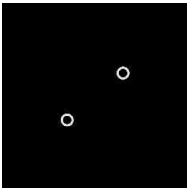
Indicates the course of the selected VOR .

The VOR course is selected:
- Automatically by the FMS , or
- Manually by the flight crew, via the MFD or the RMP .

For more information about the tuned NAVAID for display, *Refer to FMS / CONTROLS AND INDICATORS / MFD PAGES / POSITON / NAVAID PAGE* .
The VOR course pointer rotates with an angle equal to the VOR course minus the aircraft heading. If the VOR course, or the aircraft heading, is not valid, the pointer stays in a vertical position.

DEVIATION SCALE

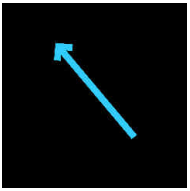
L12



The maximum deviation range of the deviation scale is 20 ° . Each dot on the scale represents 5 ° .
The scale flashes, if the VOR deviation becomes excessive.

DEVIATION BAR

L12



Indicates the aircraft deviation in relation to the selected VOR course. The ND displays the deviation bar at ±11 ° , if the VOR deviation becomes excessive.

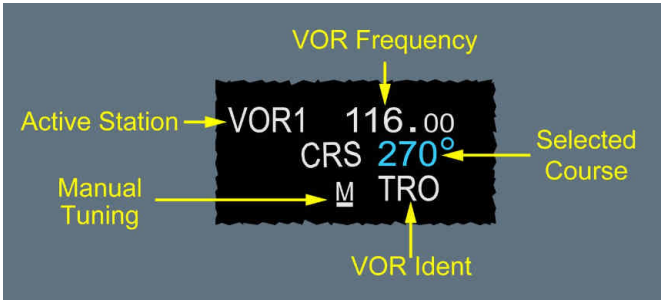
The distance of the deviation bar from the VOR course pointer is equal to:
- The VOR bearing, minus the VOR course, or
- The VOR bearing, minus the aircraft heading, if the VOR course is not valid.

The arrow on the deviation bar indicates TO / FROM information.

VOR STATION

The ND displays the characteristics of the selected VOR station. For more information on the tuned NAVAID for display, *Refer to FMS / CONTROLS AND INDICATORS / MFD PAGES / POSITON / NAVAID page* .

VOR Station



ACTIVE STATION



Indicates the side (1 or 2) of the selected VOR navigation station.

L2



The selected bearing is not valid.
VOR flashes for 9 seconds, then remains steady.

L1 **VOR FREQUENCY**



Indicates the VOR frequency of the selected VOR in MHz.

L2



The VOR frequency is not valid.

L1 **SELECTED COURSE**



Indicates the selected course in degrees.

L2



The selected course is not valid.



The course is Non Computed Data (NCD).

L1 **MANUAL TUNING**



The flight crew has manually tuned the NAVAID, via the RMP .



The flight crew has manually tuned the NAVAID, via the MFD .

AZIMUTH LINE

A white line indicates the azimuth that is used for the computation of the vertical cut of the VD . For more information, *Refer to VD* .
The flight crew can manually select the VD AZIM mode via the VD AZIM knob , on the SURV panel. For more information, *Refer to SURV / WXR / WXR DISPLAY FUNCTION* .

SID(APPROACH) AND/OR TRUE(RUNWAY) INDICATIONS

The ND can display:
- The SID name, or
- The approach name.

The TRUE indication can be combined with the SID or the approach name.
If the ND does not display the TRUE indication, the BTV indication or the runway name can be combined with the approach name.



Indicates the SID name.

Appears when:
- The SID exists in the flight plan, and
- • The PRE-FLIGHT flight phase is active, or
  • T.O or CLB flight phase is active, and the aircraft flies the departure procedure as defined in the FMS (*Refer to DEPARTURE of the FMS*

L12



Indicates the type and the name of the approach.

Appears when:
- The approach exists in the flight plan, and
- • One of the DES , APP , or GA flight phases is active, or
  • The active flight phase is CRZ , and the along track distance to destination is less than 250 nm

The heading reference is magnetic.

L123



The heading reference is TRUE north.
At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

The aircraft is at high latitude:
- Above 82.5 ° North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew selects the TRUE north reference.

This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

The flight crew can manually change the north reference by pressing the TRUE/MAG pb , on the AFS CP .
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



The heading reference is TRUE north. The grid track indicates the true track value, minus the aircraft longitude.
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



Indicates the BTV indication composed by:
- BTV label
- The selected runway name
- The selected exit name.

Appears when the flight crew selects the BTV function on the AUTO BRK Mode selector .

L12



Indicates the runway name.

Appears for autobrake mode (i.e. LO , 2, 3 or HI), or for manual braking when:
- The aircraft reaches 500 ft in final, or
- The flight crew selects a runway on the OANS .

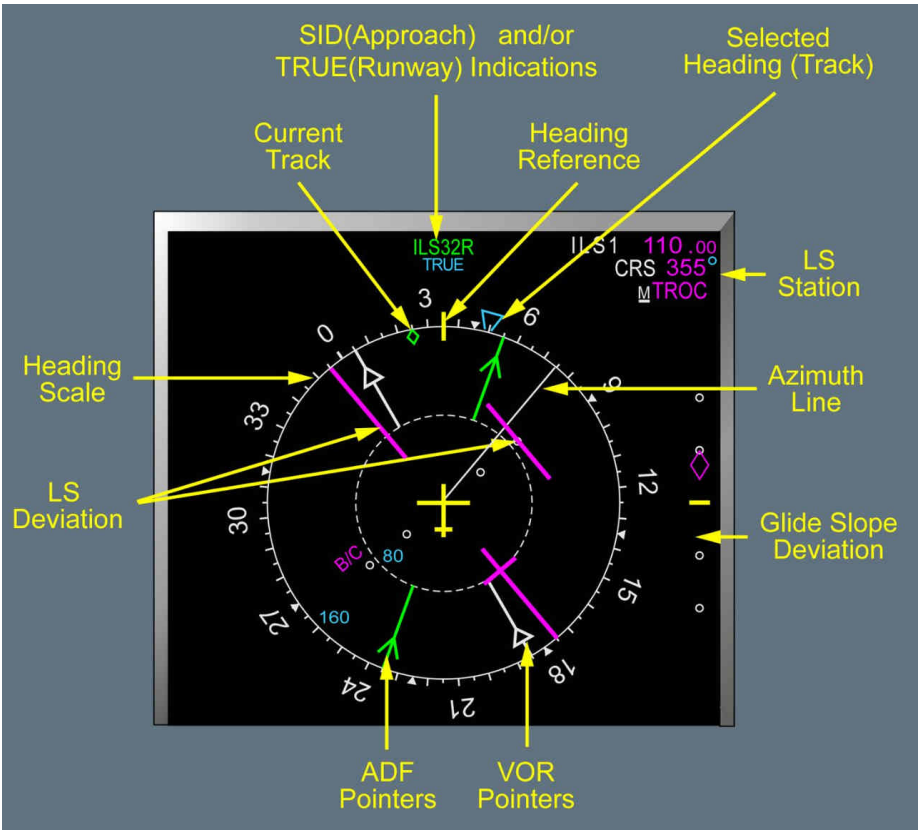
ROSE-LS Mode

ROSE-LS MODE

Applicable to: ALL

The ROSE-LS mode displays the horizontal position of the aircraft, in relation to the LOC , F-LOC , G/S and F-G/S indications. The ND displays the ROSE-LS in relation to the aircraft heading.

ROSE-LS Mode Overview

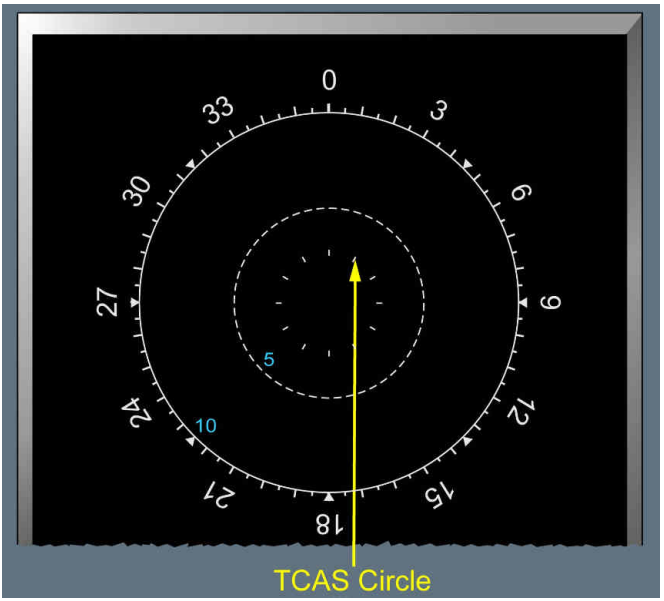


HEADING SCALE

The heading scale takes into account a sector of 360 °. Degrees are indicated in increments of 5 °, with a numerical value every 30 °.
The diameter of the heading scale corresponds to the range that the flight crew has selected on the EFIS CP.
The diameter of the dotted circle corresponds to 1/2 of the selected range.
The range values, on both sides of the ROSE display, correspond to 1/4 and 1/2 of the selected range.

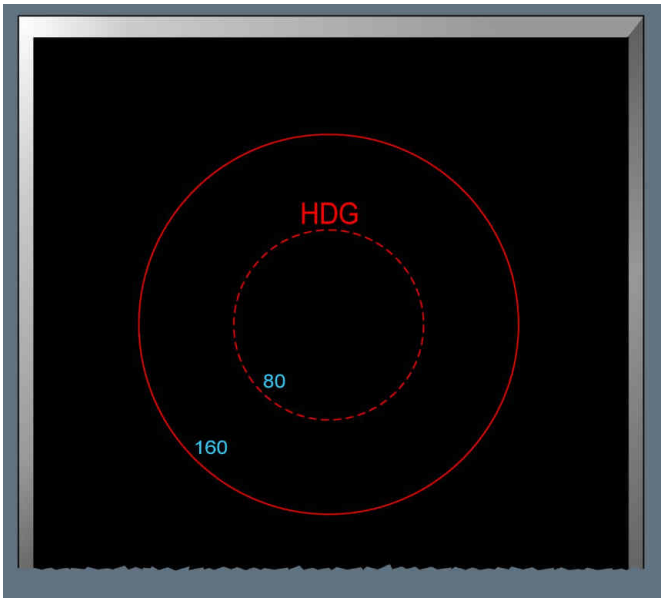
The TCAS circle indicates 2.5 nm, when:
- The selected range is less than, or equal to, 20 nm
- The flight crew selects the TRAF pb on the EFIS CP, or a TCAS alert is triggered.

TCAS Circle



L2 When the aircraft heading is not valid, the ND displays the heading scale in red.

Heading Scale Not Valid



HEADING REFERENCE



Indicates the current aircraft heading on the heading scale.

L2 The ADIRS provides the heading value, in the TRUE or MAG reference, depending on the MAG/TRUE pb selection.

L1 At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

L3 The aircraft is at high latitude:
- Above82.5 °North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

L1 When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew select the TRUE north reference.

L3 This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

L1 The flight crew can manually change the north reference by pressing the TRUE/MAG pb, on the AFS CP.

CURRENT TRACK



Indicates the current aircraft track on the heading scale.

L2 The ADIRS provides the aircraft track.

SELECTED HEADING(TRACK)

L12



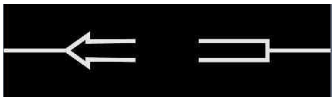
Indicates the heading(track) that the flight crew has selected on the AFS CP.

Appears when:
- HDG/TRACK mode is engaged, or
- APs and FDs are off.

VOR POINTERS



Indicates the bearing of the selected VOR1.
Appears when the flight crew presses the VOR/ADF1 pb on the EFIS CP.



Indicates the bearing of the selected VOR2.
Appears when the flight crew presses the VOR/ADF2 pb on the EFIS CP.

L3 The ND displays the VOR pointer with a angle that is equal to the VOR bearing, minus the aircraft heading.
VOR pointers are in white, if the aircraft heading is valid. They do not appear in any other case.
If the VOR reference (MAG or TRUE) is different from the current aircraft reference, the VOR pointer indication is not corrected.

ADF POINTERS

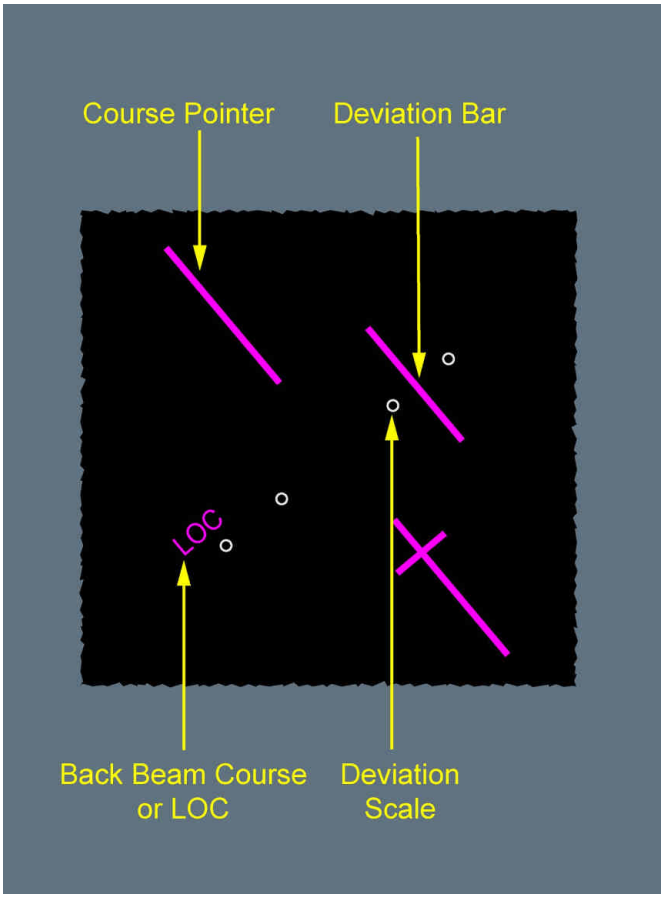


Indicates the bearing of the selected ADF.
Appears when the flight crew presses the VOR1/ADF pb two times (on the EFIS CP).

L3 The ADF pointer has an angle that is equal to the ADF bearing.

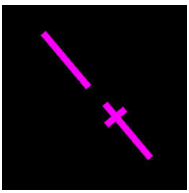
LS DEVIATION

LS Deviation



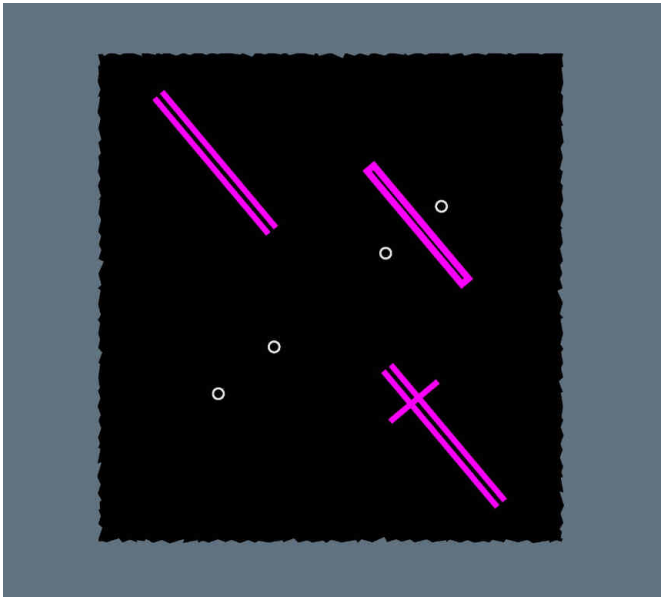
COURSE POINTER

L12



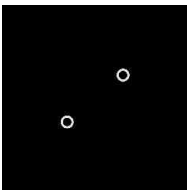
Indicates the course of the selected LS.
The LS course pointer rotates at an angle that is equal to the LS course, minus the aircraft heading.
During a Non-Precision Approach (NPA), flown with the FLS function, the deviation bar and the course pointer appear in pairs.

FLS Deviation



DEVIATION SCALE

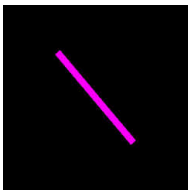
L12



The deviation scale is indicated via 4 dots.
The scale flashes, if the LS deviation becomes excessive.

DEVIATION BAR

L12



Indicates the aircraft deviation in relation to the LS course. The ND displays the flashing deviation bar on the outer dot of the scale, when the LS deviation becomes excessive.

The distance of the deviation bar from the LS course pointer is equal to:
- The LOC deviation, or
- Minus the LOC deviation, if the back beam mode is active.

During a NPA flown with the FLS function, the deviation bar in the middle pulses, if the ND receives only raw data.

BACK BEAM COURSE/LOC

LOC The flight crew has not selected a back beam course, when in LOC/FLS mode.

B/C The flight crew has selected a back beam course.

MESSAGES

L12

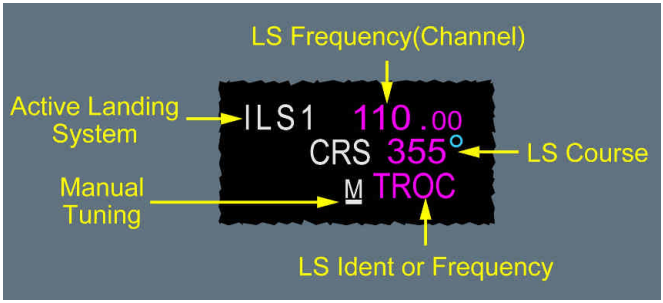
LOC The LOC deviation is not valid.
Flashes for 9 seconds, then remains steady.

L12

F-LOC During a NPA flown with the FLS function, the F-LOC deviation is not valid.
Flashes for 9 seconds, then remains steady.

LS STATION

The ND displays the selected LS station information.



ACTIVE LANDING SYSTEM

ILS1 — Indicates the side (MMR 1(2)) of the selected LS station.

L2 ILS1
- The glide slope deviation is not valid, or
- The localizer deviation is not valid, or
- The MMR is not active, or
- The approach is flown with the FLS function, and the distance to the runway threshold is not valid.

L1

LS FREQUENCY(CHANNEL)(SLOPE)



Indicates the ILS frequency in MHz.



Indicates the FLS slope.



Indicates the GLS channel.

L2 --- — The LS frequency(channel)(slope) is not valid.

L3 The range of the ILS frequency is between 108.0 MHz and 112.0 MHz.
The range of the GLS channel is between 20001 and 39999.

L1

LS COURSE



Indicates the LS course in degrees.

L2



The selected course is not valid.



The course is Non Computed Data (NCD).

L1

LS IDENT OR FREQUENCY

For precision approaches, the ND displays the LS station ident.
For NPA, the ND displays the ident of the anchor point.

In LOC only, or ILS G/S out or LOC B/C with the /FLS function, the ND displays the ILS ident. If the ILS ident is not valid (and if the frequency is not out of range), the ND displays the ILS frequency instead of the LS ident.

MANUAL TUNING



The flight crew has manually tuned the NAVAID, via the RMP.



The flight crew has manually tuned the NAVAID, via the MFD.

AZIMUTH LINE

A white line indicates the azimuth that is used for the computation of the vertical cut of the VD . For more information, *Refer to VD* .
The flight crew can manually select the VD AZIM mode via the VD AZIM knob , on the SURV panel. For more information, *Refer to SURV / WXR / WXR DISPLAY FUNCTION* .

SID(APPROACH) AND/OR TRUE(RUNWAY) INDICATIONS

The ND can display:
- The SID name, or
- The approach name.

The TRUE indication can be combined with the SID or the approach name.
If the ND does not display the TRUE indication, the BTV indication or the runway name can be combined with the approach name.



Indicates the SID name.

Appears when:
- The SID exists in the flight plan, and
- • The PRE-FLIGHT flight phase is active, or
  • T.O or CLB flight phase is active, and the aircraft flies the departure procedure as defined in the FMS (*Refer to DEPARTURE of the FMS*

L12



Indicates the type and the name of the approach.

Appears when:
- The approach exists in the flight plan, and
- • One of the DES , APP , or GA flight phases is active, or
  • The active flight phase is CRZ , and the along track distance to destination is less than 250 nm

The heading reference is magnetic.

L123



The heading reference is TRUE north.
At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

The aircraft is at high latitude:
- Above 82.5 ° North, or
- Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
- Below 60.5 ° South.

When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message requests that the flight crew selects the TRUE north reference.

This message appears:
- Above 82 ° North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

The flight crew can manually change the north reference by pressing the TRUE/MAG pb , on the AFS CP .
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



The heading reference is TRUE north. The grid track indicates the true track value, minus the aircraft longitude.
The TRUE message flashes for 10 seconds and remains steady when the slats are extended.

L12



Indicates the BTV indication composed by:
- BTV label
- The selected runway name
- The selected exit name.

Appears when the flight crew selects the BTV function on the AUTO BRK Mode selector .

L12



Indicates the runway name.

Appears for autobrake mode (i.e. LO , 2, 3 or HI), or for manual braking when:
- The aircraft reaches 500 ft in final, or
- The flight crew selects a runway on the OANS .

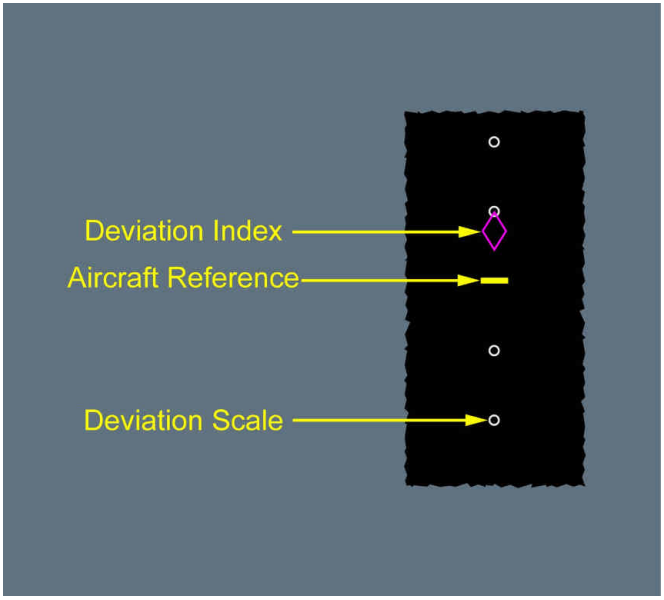
GLIDE SLOPE DEVIATION

Indicates the vertical deviation of the aircraft from the glide slope, during the approach phase.

L2 Appears when:
- The flight crew has selected an approach on the FMS
- The distance to the destination airport is less than 250 nm.

L1 The glide slope deviation is not available, when the flight crew has selected a back beam course approach.

Glide Slope Deviation



DEVIATION SCALE

If the glide slope deviation becomes excessive, the scale and the aircraft reference flash.

DEVIATION INDEX

For Precision Approaches



The glide slope deviation is within the scale.



The aircraft is above the glide slope.
The glide slope deviation is not within the scale.



The aircraft is below the glide slope.
The glide slope deviation is not within the scale.

For NPA Flown with the FLS Function



The glide slope deviation is within the scale.



The aircraft is above the FMS glide slope.
The glide slope deviation is not within the scale.

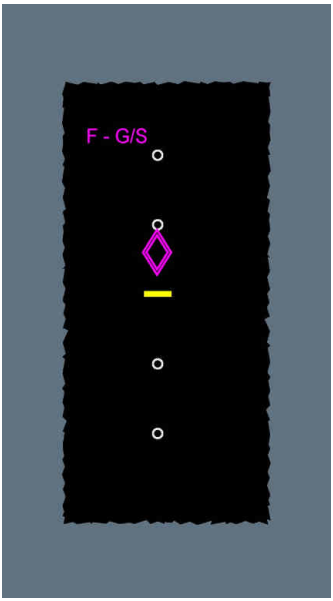


The aircraft is below the FMS glide slope.
The glide slope deviation is not within the scale.

F-G/S LABEL

The ND displays F-G/S, when the flight crew selects the LOC/FLS mode on the FMS.

F-G/S Label



DEVIATION NOT VALID

If the glide slope data is not valid, the ND displays the following flags, instead of the glide slope deviation:

L12



The flight crew has selected a precision approach, and the glide slope deviation is not valid.
Flashes for 9 s, then remains steady.

L12



The flight crew has selected a NPA flown with the FLS function, and the F-G/S deviation is not valid.
Flashes for 9 s, then remains steady.

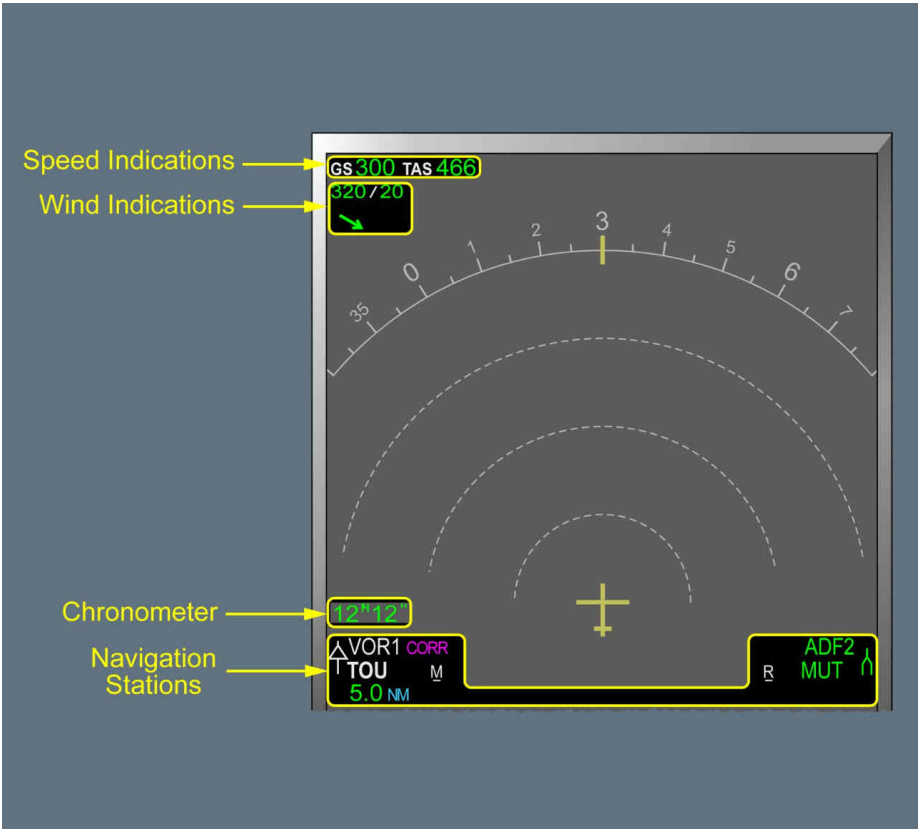
Intentionally left blank

Common Data

COMMON DATA

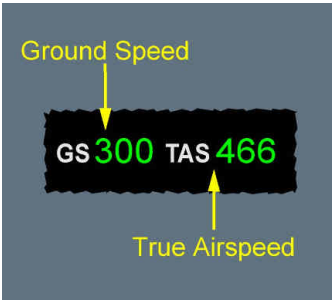
Applicable to: ALL

Common Data Overview



SPEED INDICATIONS

Speed Indications

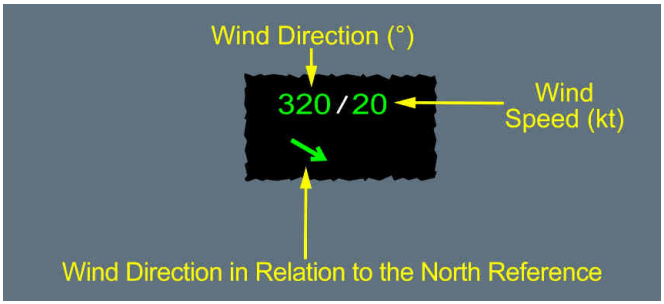


Indicates the current ground speed (GS), and the current true airspeed (TAS), in knots.

L2 The ADIRS provide the GS and the TAS. The ADIRS use the GPS and the IRS data for GS computation.

WIND INDICATIONS

Wind Indications



Indicates the current wind direction (in degrees, TRUE North reference) and the current wind speed (in knots).

If the wind speed is above 2 kt, the ND also displays a green arrow, that indicates the wind direction.

L2



The wind data is not valid.

The ADIRS provides the wind direction and speed data.

CHRONOMETER

The flight crew displays the elapsed time by pressing the onside CHRONO pb , on the EFIS CP . For more information, *Refer to CHRONO pb* .



Indicates the elapsed time in minutes and seconds.



Indicates the elapsed time in hours and minutes.

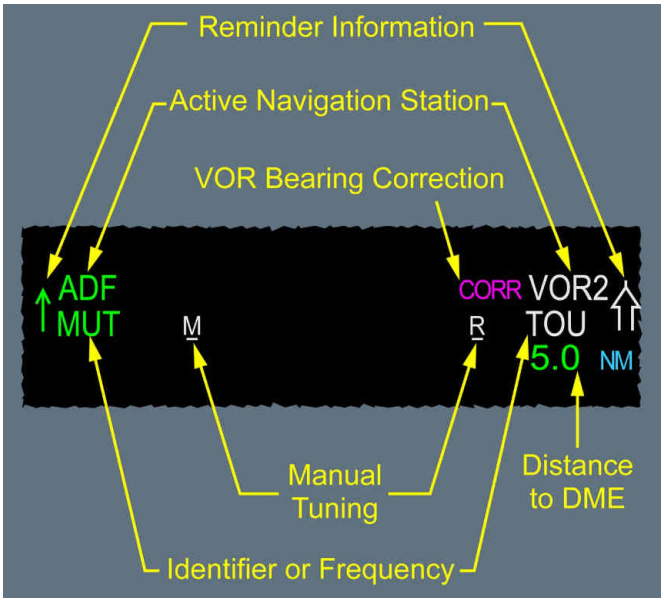
NAVIGATION STATIONS

The ND displays the raw navigation stations data:

- Only in ARC, or ROSE mode
- If the flight crew presses the VOR/ADF pb or the VOR pb , on the EFIS CP.

The left side of the ND corresponds to receiver 1, and the right side of the ND corresponds to receiver 2.

Navigation Stations



ACTIVE NAVIGATION STATION



Indicates the side (1 or 2) of the selected VOR (in white), or of the selected ADF (in green).

L2



The selected bearing is not valid.

L1 **IDENTIFIER OR FREQUENCY**



Indicates the ident of the VOR, DME, or ADF.

L2 If the navigation station ident is not valid, the ND displays the station frequency, instead of the ident.
If the VOR frequency is not valid, the ND displays the DME frequency, instead of the VOR frequency.
The ND displays nothing, if both the identifier and the frequency are not valid.

L1 **MANUAL TUNING**



The flight crew has manually tuned the NAVAID, via the RMP.



The flight crew has manually tuned the NAVAID, via the MFD.

L2 If the FMS automatically tunes the NAVAID, the ND does not display a letter.

L1 **VOR BEARING CORRECTION**

Indicates the VOR bearing correction, when the VOR reference that is in the FMS database (TRUE or MAG), is different from the current aircraft reference (TRUE or MAG).



In ARC or ROSE-NAV mode, the displayed bearing is corrected in relation to the magnetic deviation.



In ROSE-VOR or ROSE-LS mode, the VOR reference is MAG. No correction is applied to the bearing data.



In ROSE-VOR or ROSE-LS mode, the VOR reference is TRUE. No correction is applied to the bearing data.

REMINDER INFORMATION

The reminder information symbol is the same as the symbol of the associated navigation station pointer, displayed on the ARC or ROSE scale.



Indicates the VOR1 reminder information.



Indicates the VOR2 reminder information.

In ARC or ROSE-NAV mode, if the VOR reference (TRUE or MAG) is different from the aircraft flying reference (TRUE or MAG), the ND displays the VOR symbols in magenta. This is because they are corrected in relation to the magnetic deviation.



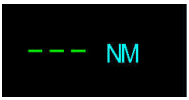
Indicates the ADF reminder information.

DISTANCE TO DME



Indicates the distance from the aircraft to the selected VOR/DME beacon.

L2



The DME distance is not computed.



The DME distance is not valid.

FMS Data

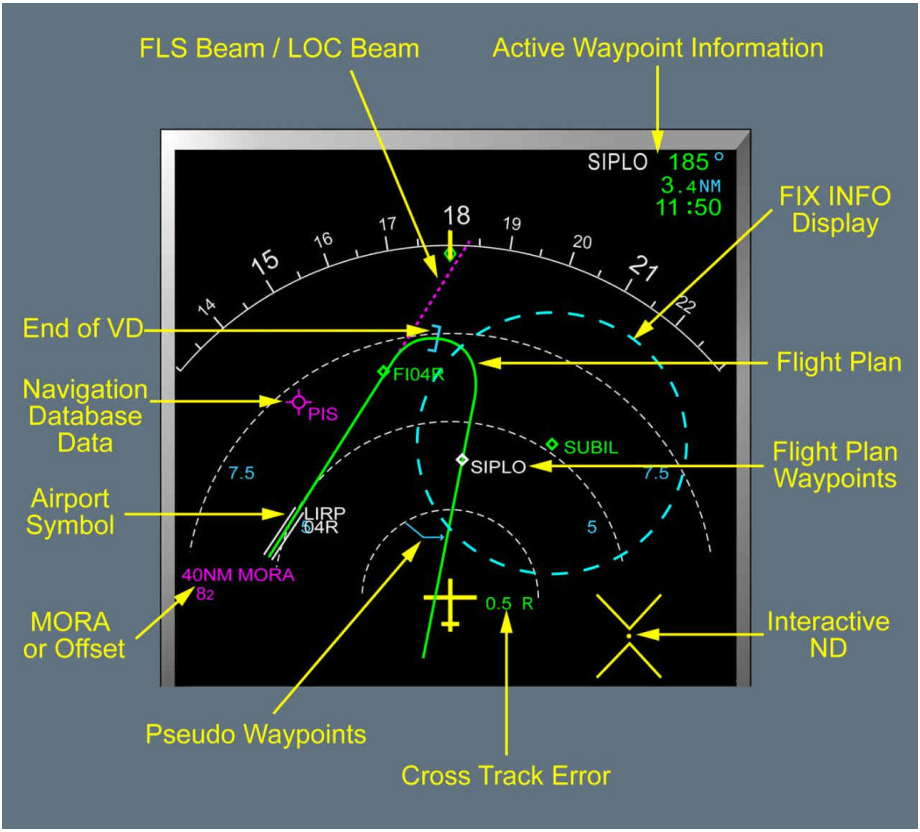
FMS DATA

Applicable to: ALL

The ND displays the flight plan information, if the flight crew has selected:

- The ARC, PLAN, or ROSE-NAV mode
- An ND range that is more, or equal to, 10 nm .

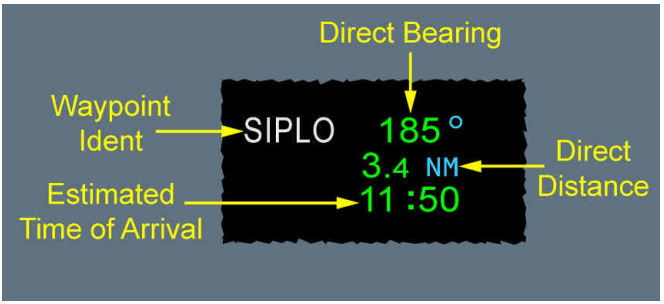
FMS Data



ACTIVE WAYPOINT INFORMATION

Indicates the following active waypoint.

Active Waypoint Information



Note: *The indicated Estimated Time of Arrival (ETA) is based on the estimate that the aircraft will fly directly from its present position to the active waypoint, at its current ground speed.*



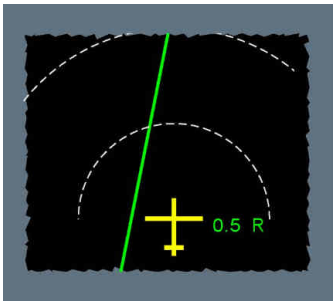
The aircraft flies in the polar zone.
Indicates the bearing to the active waypoint, in the TRUE north reference.

CROSS TRACK ERROR

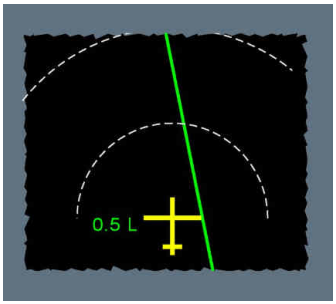
Indicates the lateral deviation of the aircraft from the active flight plan, in nautical miles (nm).

L2 Appears when the lateral deviation is above 0.2 nm.
No longer appears when the lateral deviation is below 0.1 nm.

L1



The aircraft is on the right side of the active flight plan.



The aircraft is on the left side of the active flight plan.

MORA



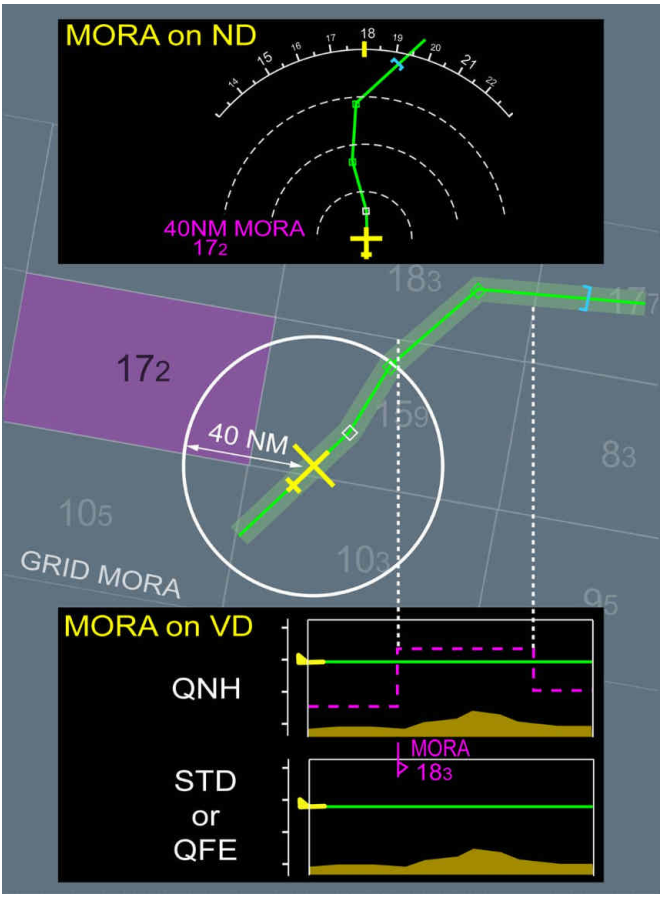
Indicates the highest grid Minimum Off Route Altitude (MORA) in a circular area, that has a fixed radius of 40 nm .

Appears when the flight crew:
- Has pressed the CSTR pb , on the EFIS CP
- Selects an ND range, that is above, or equal to 40 nm .

L3 The MORA unit is the same as the one that is in the charts.

L1 The VD also displays safety altitudes. However, the VD displays the highest grid MORA , or the MSA , along the aircraft trajectory and in the VD range. For more information, *Refer to VD / SAFETY ALTITUDES* .

Safety Altitudes



OFFSET

OFST
L5

Indicates the offset side and distance, when:
- The aircraft is flying the offset trajectory, or
- The offset trajectory is on standby in the temporary flight plan.

Appears in the same color as the flight plan, if the MORA is not already displayed.

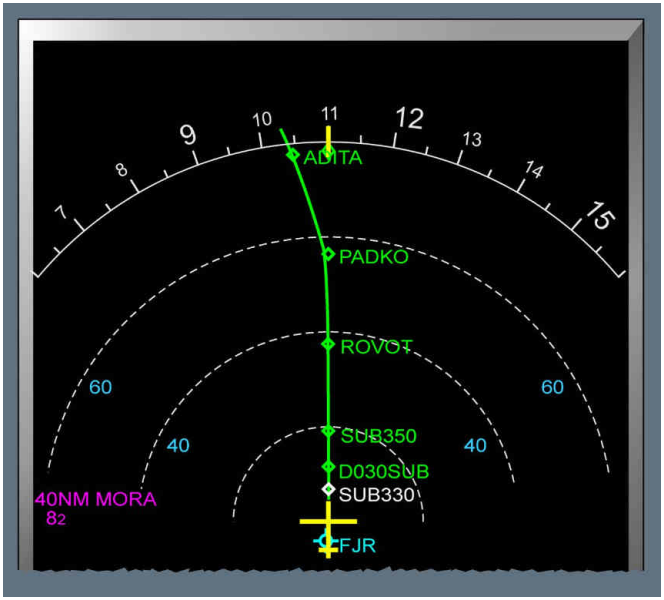
FLIGHT PLAN

The ND displays the following flight plans:

- The active flight plan (in green): If NAV mode is engaged, and the aircraft is on this flight plan

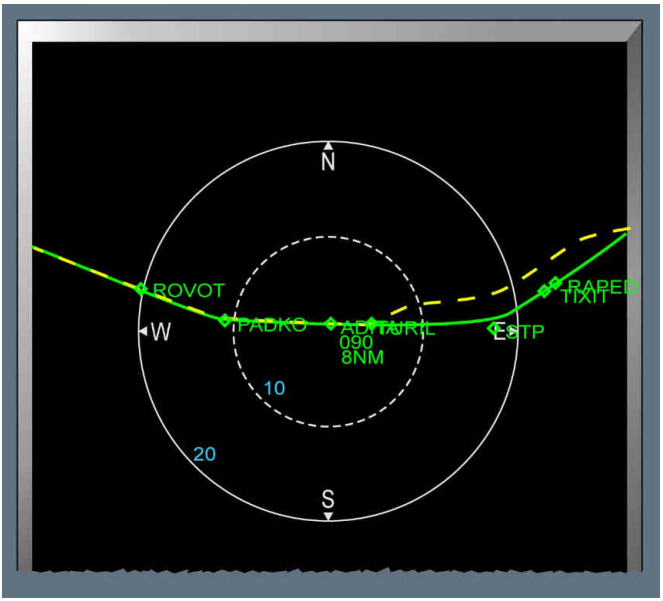
  The active flight plan is associated with:
  - The FROM waypoint
  - The waypoints that are in front of the aircraft.

Active Flight Plan



- The temporary flight plan (in dashed yellow), in addition to the active flight plan

Temporary Flight Plan



- Any of the three secondary flight plans (in white), in addition to the active flight plan. Appears, if the flight crew has selected a SEC page on the onside MFD .

L2 The ND displays only the legs that are different from the active flight plan in white.

Secondary Flight Plan



L1 In PLAN mode, the ND displays only the secondary flight plan, not the active flight plan, if the first leg of the secondary plan and the active leg are different.

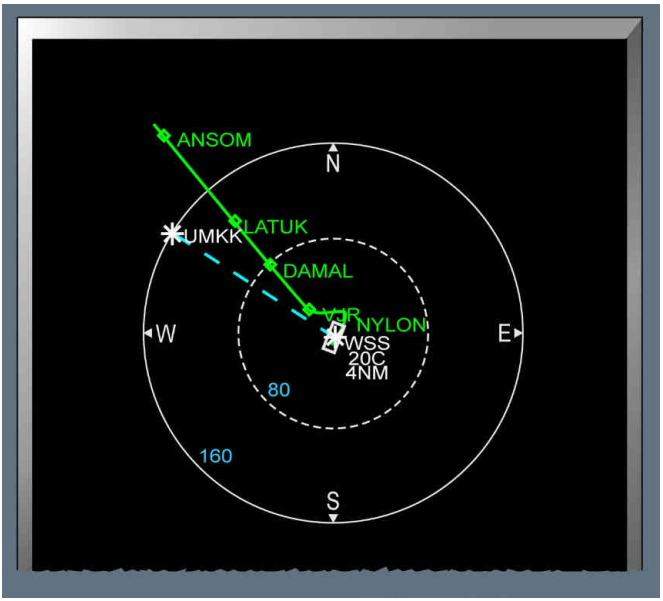
ALTERNATE FLIGHT PLAN

The ND displays the alternate flight plan as a dashed blue line.

Appears when:
- In ARC or ROSE-NAV mode, at least one waypoint of the alternate flight plan is on the FMS F-PLN page of the onside MFD .
- In PLAN mode, the Map Reference Point (MRP) is one of the waypoints of the alternate flight plan.

For more information, *Refer to FMS / FLIGHT PLANING / LATERAL REVISIONS / ALTERNATE* .

Alternate Flight Plan



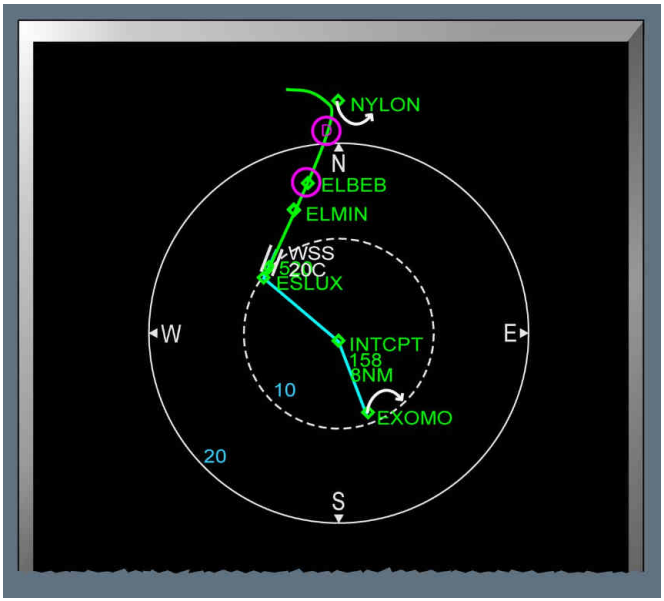
MISSED APPROACH

The ND displays the missed approach as a blue line.

Appears when:

- In ARC or ROSE-NAV mode, at least one waypoint of the missed approach is on the onside MFD .
- In PLAN mode, the MRP is one of the waypoints of the missed approach.

Missed Approach



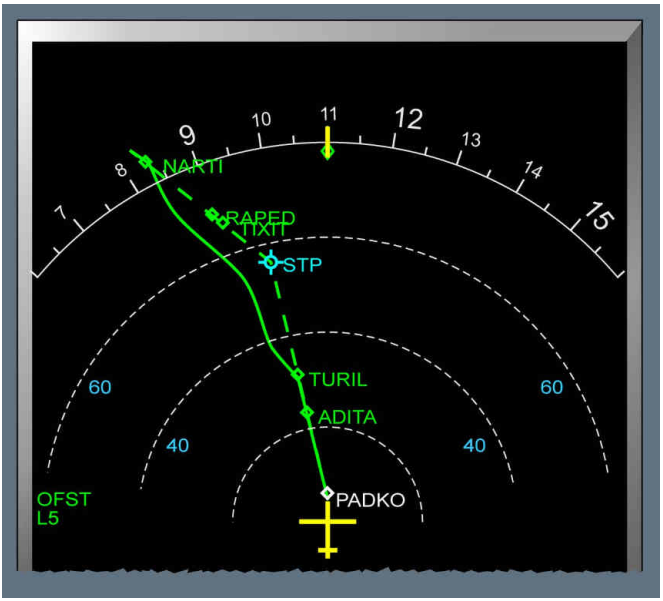
OFFSET PATH

The offset path is parallel to the initial lateral flight plan. For more information, *Refer to FMS / FLIGHT PLANNING / LATERAL REVISIONS / OFFSET* .

In the active (or secondary) flight plan, the ND displays:
- The offset path as a solid line
- The initial path as a dashed line.

Both the offset and the initial paths are the same color as the flight plan.
In the temporary flight plan, the ND displays the offset and the initial paths as dashed yellow lines.
The offset path is not associated with waypoint symbols. The ND only displays the waypoints that are on the initial path.

Offset Path

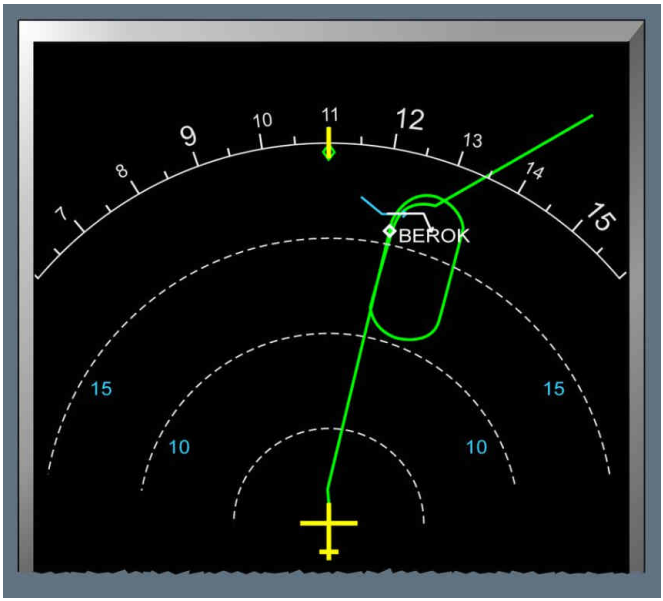


HOLDING PATTERN

The ND displays the entire holding pattern and its entry trajectory, only when:

- The ND range is 80 nm or less, and
- The aircraft has sequenced the waypoint that precedes the hold entry fix or has passed the hold deceleration point.

Holding Pattern





In all other cases, the ND displays the holding pattern symbol.

ENGINE OUT SID (EOSID)

If an engine failure occurs before the diversion point, the ND displays the Engine Out SID (EOSID) as a temporary flight plan (dashed yellow line), until:

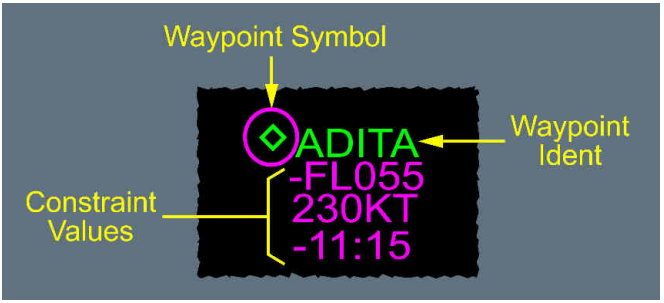
- The aircraft sequences the diversion point, or
- The flight crew inserts or clears the EOSID .

The ND displays a solid yellow line, instead of a dashed yellow line, if:

- An engine failure occurs after the diversion point, or
- An engine failure occurs before the diversion point, and the flight crew has erased the temporary flight plan that contains the EOSID .
- The EOSID is displayed in PLAN mode (even if all engines are operating).

For more information, *Refer to FMS / FLIGHT PLANNING / LATERAL REVISIONS / DEPARTURE* .

FLIGHT PLAN WAYPOINTS



WAYPOINT SYMBOL



Indicates a flight plan waypoint that is in the active flight plan.



Indicates:
- The TO waypoint in the active flight plan, or
- Any secondary flight plan waypoint.



Indicates a flight plan waypoint that is in the temporary flight plan.

If the flight plan waypoint is a tuned NAVAID , the following blue NAVAID symbols appear, instead of the waypoint symbol:



Indicates a DME only, or a TACAN .



Indicates a VOR .



Indicates either a VORTAC , a collocated or non-collocated VOR / DME , or a non-collocated VORTAC .

The ND does not display any symbol for ILS (GLS)-tuned NAVAIDS.
If the flight plan waypoint is a tuned NDB , the following blue NDB symbol appears, instead of the waypoint symbol:



ADF (NDB)

When an altitude constraint is associated with the active flight plan waypoint, the ND displays a circle around the waypoint symbol.

Note: *The ND displays a circle that indicates an altitude constraint, even if the flight crew has not pressed the CSTR pb on the EFIS CP .*



The FMS predicts that the aircraft will comply with the altitude constraint at the waypoint.



The FMS predicts that the aircraft will not comply with the altitude constraint at the waypoint.
An altitude constraint is not satisfied, if the predicted altitude is different from the constraint altitude by 250 ft .



The FMS predicts that the aircraft will not take into account the altitude constraint at the waypoint.

WAYPOINT IDENT

The ND displays the waypoint ident in the same color as the associated flight plan, except for the:
- TO Waypoint that is in white, or
- FIX INFO reference, that is in green, or
- Tuned NAVAID , or NDB , that is in blue.

For more information, *Refer to FMS/CONTROLS AND INDICATORS/MFD PAGES/F-PLN PAGE* .

CONSTRAINT VALUES

If the flight crew presses the CSTR pb on the EFIS CP , the ND displays the constraints values below the waypoint ident.

If there is more than one constraint at the same waypoint, the ND displays the constraint values in the following order:
- The altitude constraint

L2 The ND displays the altitude constraint value:
- In FL , if the altitude is above the transition altitude, or if the barometric setting is STD
- In feet in all other cases.

L1 - The speed constraint
L2 The ND displays the speed constraint value in knots, or in Mach numbers.
L1 - The time constraint.

Note: *For ILS / GLS approaches, the ND only displays speed and time constraints at the FAF waypoint up to destination.*

The constraint value and the constraint symbol have identical color coding.

Note: *In PLAN mode, and at the MRP waypoint, the ND also displays the track and the distance to the next waypoint.*

PSEUDO WAYPOINTS

Pseudo waypoints indicate a vertical flight plan event, only in the active flight plan.

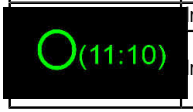
L2 The ND displays pseudo waypoints, according to the following color coding system:
- Blue indicates what the aircraft will do, without any required flight crew action
- White indicates that flight crew action is required, in order to follow the vertical flight plan
- Magenta indicates what the aircraft will do, in order to comply with an FMS constraint, without any required flight crew action
- Green indicates an information.

L12

Pseudo Waypoint	Definition
	Indicates the point at which the aircraft will reach the level that is defined by an altitude constraint. Appears when NAV mode is engaged, and: - CLB, or DES, mode is armed, or - One of the CLB, OPEN CLB, DES, OPEN DES, V/S, or FPA modes is engaged.
	Indicates the point at which the aircraft will reach the target altitude that is selected on the AFS CP. Appears when NAV mode is engaged, and: - CLB, or DES, mode is armed, or - One of the CLB, OPEN CLB, DES, OPEN DES, V/S, or FPA modes is engaged.
	Indicates the predicted Top of Descent (TOD), regardless of the active mode.
	Indicates the predicted TOD. Appears when NAV mode is engaged, and: - DES mode is armed, and ALT mode is engaged, or - One of the CLB, DES, OPEN DES, V/S, or FPA modes is engaged.
	Indicates the predicted start of climb. Appears when NAV mode is engaged, and CLB mode is not armed.

Continued on the following page

Continued from the previous page

Pseudo Waypoint	Definition
	Indicates the predicted start of climb. Appears when NAV mode is engaged, and: - CLB mode is armed, and ALT mode is engaged, or - One of the CLB, OPEN CLB, V/S, or FPA modes is engaged, and the pseudo waypoint indicating that the aircraft reaches the level of an altitude constraint is displayed.
	Indicates the point at which the aircraft will intercept the FMS-predicted descent or approach path, before the AFS CP-selected altitude. Appears when NAV mode is engaged, and V/S, or FPA, mode is engaged.
	Indicates the point at which the aircraft will intercept the FMS-predicted descent or approach path, before the AFS CP-selected altitude. Appears when NAV mode is engaged, and DES, or CLB, mode is armed or engaged.
	In NAV mode and managed speed modes, indicates the starting point of an acceleration or deceleration segment, as computed by the FMS.
	In HDG/TRK and managed speed modes, indicates the point at which the flight crew must change the speed due to the speed limit, while maintaining the selected track.
	Indicates the predicted start of an automatic deceleration, for an approach in a managed speed mode. In the descent or go-around phase, the flight crew must also engage NAV mode (or, if NAV is armed, the FMS must predict NAV mode engagement before the deceleration point).
	Indicates the predicted point at which the flight crew should start the deceleration, for an approach in a selected speed mode.
	Indicates the time marker.
	Indicates the equitime point.

FIX INFO DISPLAY

The flight crew uses the fix info revision (FIX INFO), to compute the intersection of the flight plan with:

- A radial from a specified reference point, and/or
- A circle with a specified reference point as the center, and/or
- The abeam line from a specified reference point.

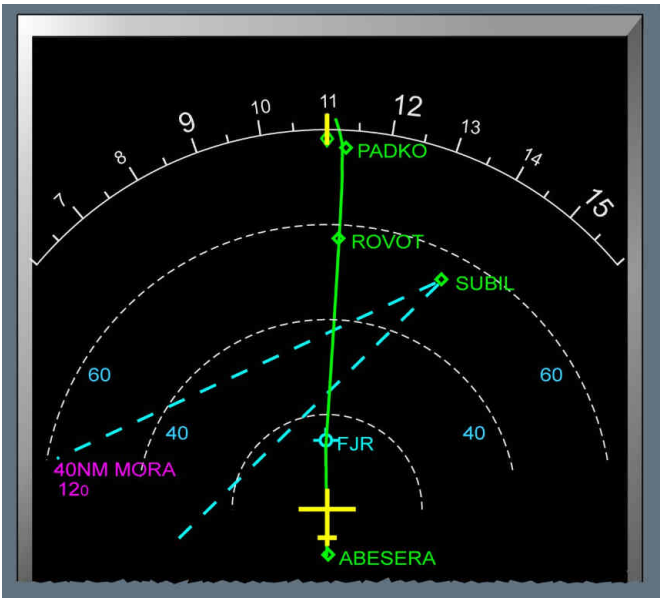
The reference FIX is in green on the onside ND .
For more information, *Refer to FMS / FLIGHT PLANNING / LATERAL REVISIONS / FIX INFO* .

RADIAL INTERCEPT

The ND displays the radial as dashed blue line, whether an intersection with the flight plan exists, or not.

If the flight crew inserts the radial intercept point in the temporary flight plan, the radial no longer appears.

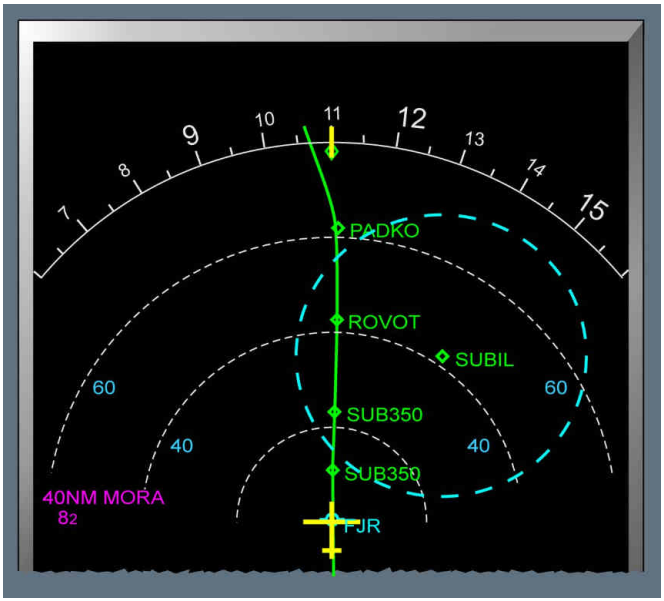
Radial Intercept Point



CIRCLE INTERCEPT

The ND displays the circle intercept as dashed blue circle, whether an intersection with the flight plan exists, or not.
If the flight crew inserts the circle intercept point in the temporary flight plan, the circle no longer appears.

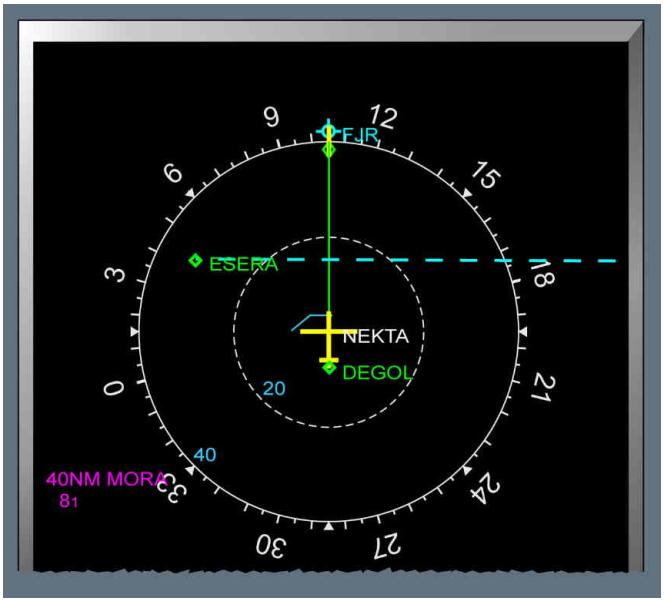
Circle Intercept Point



ABEAM INTERCEPT

The ND displays the abeam radial as dashed blue line, only when an intersection with the flight plan exists.
If the flight crew inserts the abeam intersect point in the temporary flight plan, the radial no longer appears.

Abeam Intercept Point



NAVIGATION DATABASE DATA

The flight crew can display all the data of the navigation database, and of the pilot stored elements database, on the ND.

WAYPOINTS



Indicates all the waypoints defined in the navigation database and/or stored waypoints, that are different from the flight plan waypoints
Appears when the flight crew presses the WPT pb on the EFIS CP.

NAVAIDS



Indicates the DME or the TACAN stations.
Appears when the flight crew presses the VORD pb on the EFIS CP.



Indicates the VOR stations.
Appears when the flight crew presses the VORD pb on the EFIS CP.



Indicates the VORTAC, the collocated or the non-collocated VOR/DME, or the non-collocated VORTAC stations.
Appears when the flight crew presses the VORD pb on the EFIS CP



Indicates the ADF stations.
Appears when the flight crew presses the NDB pb on the EFIS CP.

Note: The ND displays the tuned NAVAIDS in blue.

AIRPORT



Indicates all the airports (defined in the navigation database) and/or the stored airports that are different from the origin and the destination of the flight plan.
Appears when the flight crew presses the ARPT pb on the EFIS CP.

AIRPORT SYMBOL

The ND displays the origin and the destination airports for the active, temporary, and secondary flight plans.



The origin or the destination waypoint is an airport, and the runway is not specified.



The origin or the destination waypoint is a runway, and the flight crew has selected an ND range that is more, or equal, to 160 nm. The ND adjusts the display of the runway based on the QFU.

L12



The origin or the destination waypoint is a runway, and the flight crew has selected an ND range thatislowerthan160 nm. The ND adjusts the display of the runway based on the QFU.
The runway length that is displayed is the real length of the runway, in relation to the selected range.

FLS BEAM

Indicates in dotted magenta line the F-LOC beam of the Non Precision Approach (NPA): VOR, VOR/DME, RNAV (including GPS).

L2 Appears when the flight crew:
- Selects a VOR, VOR/DME, or RNAV (including GPS) approach, in the active flight plan
- Presses the LS pb on the EFIS CP, or the APPR pb on the AFS CP
- Selects an ND range that is less than or equal to:
  - 80 nm in ARC or PLAN mode, or
  - 160 nm in ROSE-NAV mode.

L1 If the anchor point is not defined at the runway threshold, the FMS displays the anchor point ident in magenta.

FLS Beam



LOC BEAM

Indicates in dotted magenta line the LOC beam of ILS, LOC, or BAC approach.

L2 Appears when the flight crew:
- Selects an ILS, LOC, or BAC approach, in the active flight plan
- Presses the LS pb on the EFIS CP, or the APPR pb on the AFS CP
- Selects an ND range that is less than or equal to:
  - 80 nm in ARC or PLAN mode, or
  - 160 nm in ROSE-NAV mode.

LOC Beam



END OF VD SYMBOL



Indicates the end of the VD , when the aircraft follows a flight plan.

L2 *Note: When the destination airport is in the VD range, the end of VD symbol is not displayed.*

L1 For more information, *Refer to VD / RANGE* .

INTERACTIVE ND

The flight crew can use the KCCU to change the flight plan on the ND . For more information, *Refer to DSC-31-20-30-90 Interactive ND Overview* .

Interactive ND

INTERACTIVE ND OVERVIEW

Applicable to: ALL

The flight crew can perform the following FMS tasks, via the interactive functions of the ND :
- Direct TO (FROM P.POS DIR TO or DIR TO). *Refer to DIRECT TO revision*
- Insert a waypoint (INSERT NEXT WPT). *Refer to INSERT NEXT WPT revision*
- Delete a waypoint (DELETE). *Refer to DELETE function*
- Select an airport for data consultation (DATA). *Refer to Airport DATA display*
- Insert or delete/undo a temporary flight plan. *Refer to INSERT or ERASE TMPY* .

The flight crew can use the interactive functions of the ND only in ARC, PLAN, or ROSE-NAV mode, because these functions are associated with the flight plan display.
In PLAN mode, the flight crew can scroll through the entire flight plan, using the KCCU trackball.

ACCESS

The flight crew can use the KCCU to move the cursor to the ND , by:
-
  Pressing the ND key 

, or
-
  Pressing the navigation key  (One time, if the cursor is on the MFD , and two times, if the cursor is on the mailbox).

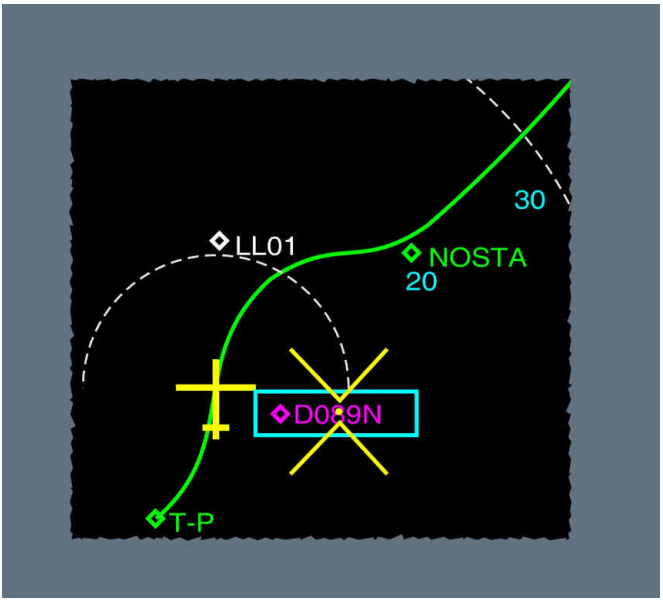
INTERACTIVE ELEMENTS

The flight crew can use the cursor to access:
- The aircraft symbol
- The flight plan waypoints
- The navigation database waypoints, the airports, and the NAVAIDS.

L2 If the ND displays a DIR TO temporary flight plan, no FMS revision is available via the interactive ND .
If the ND displays a secondary flight plan, the interactive functions are only available for the optional airports.

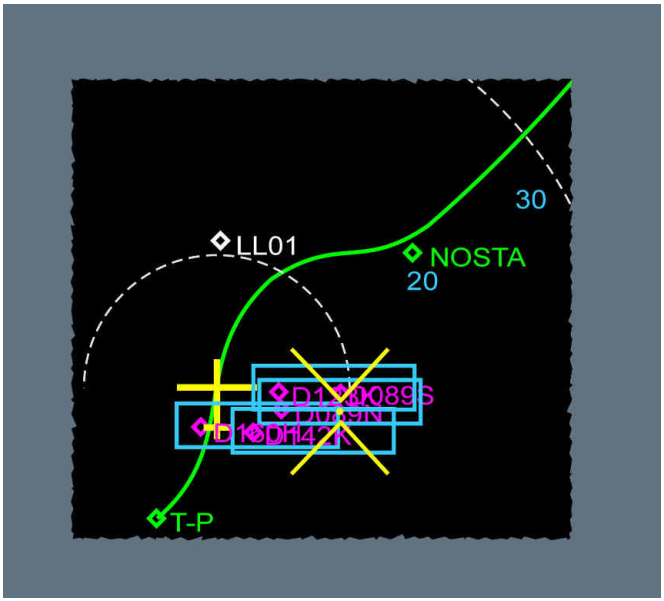
L1 A blue rectangle highlights the interactive areas around the selected element.

Interactive Area



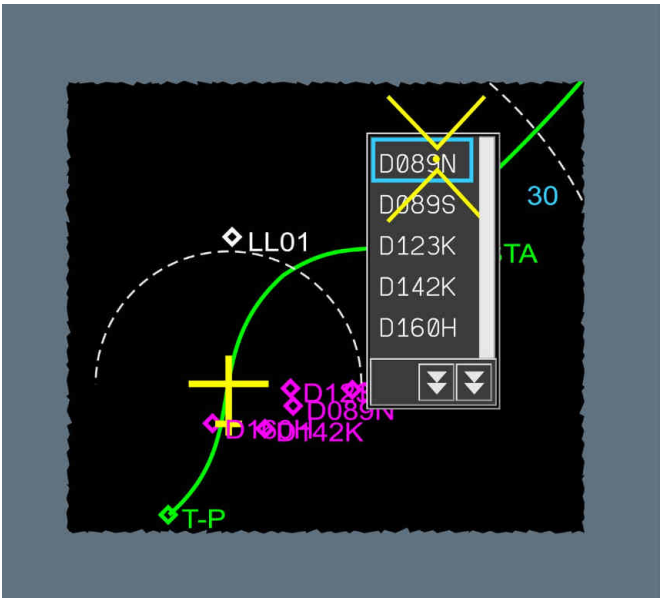
L2 If the active zone, below the cursor, contains more than one element, all the areas are highlighted.

Cursor Selection



If the flight crew clicks on an interactive area, the ND displays a list of all the interactive elements.

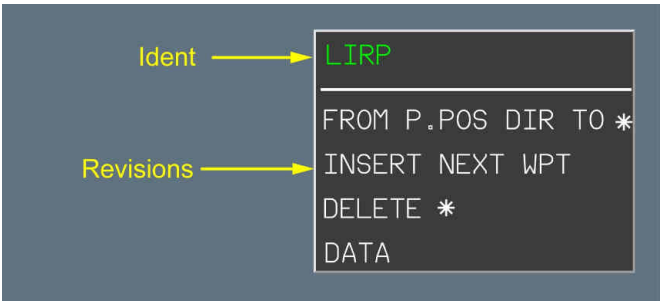
Dialog Box



If the flight crew selects one of the elements from the list, the ND displays the following revision list.

L1 If the flight crew clicks on the blue rectangle, the ND displays the list of the revisions that are available on the selected element.

Revisions List



IDENT

Indicates the ident of the selected element.

Appears:

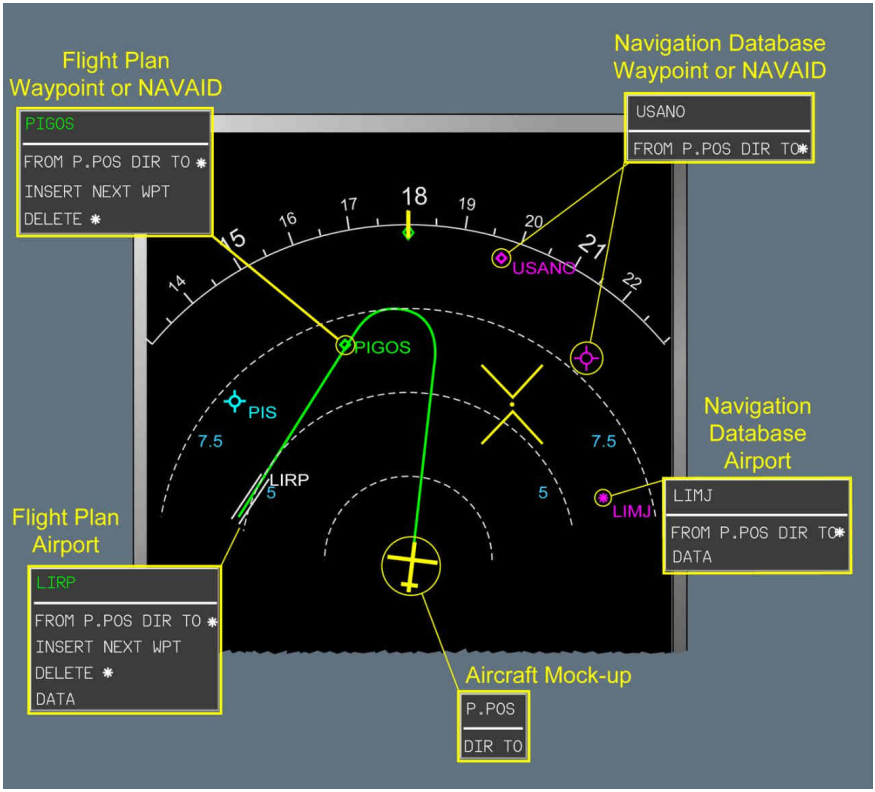
- In green, if the selected element is a waypoint (or an airport) in the active flight plan, or
- In yellow, if the selected element is a waypoint (or an airport) in the temporary flight plan, or
- In white, in all other cases.

If the selected element is the aircraft mock-up, the ident is P.POS.

REVISIONS

The list of the revisions depends on the type of the selected element:

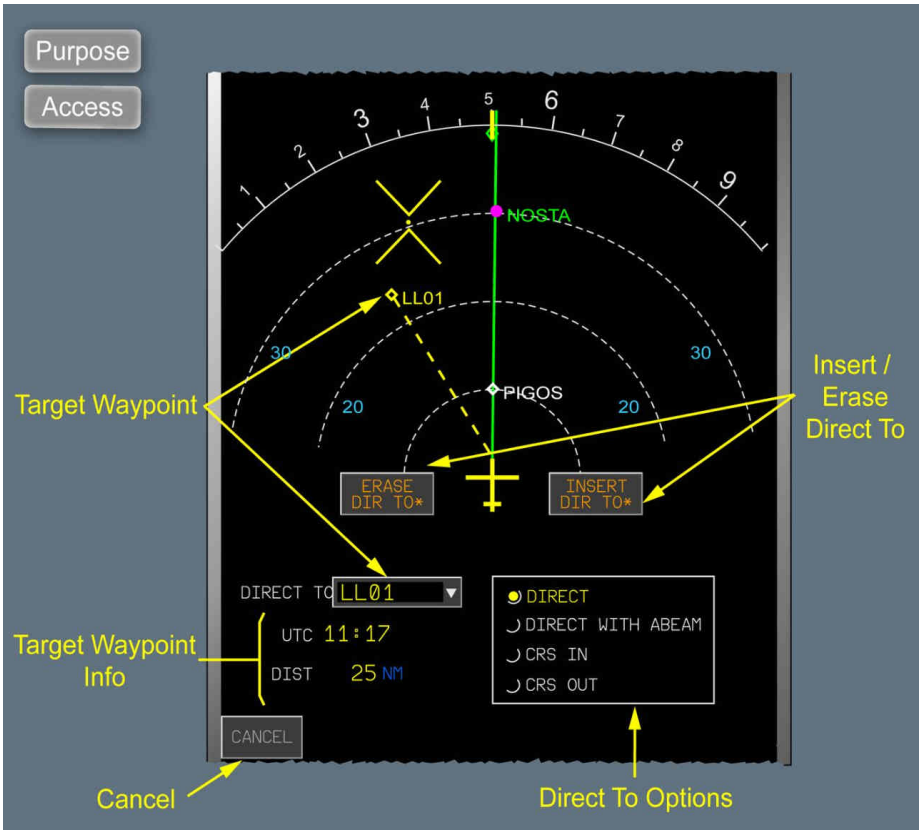
Interactive Areas and Revisions



DIRECT TO

Applicable to: ALL

DIRECT TO



PURPOSE

The DIRECT TO page enables the flight crew to insert:

- A DIRECT TO leg (DIRECT)
- A DIRECT TO leg with abeam waypoints (DIRECT WITH ABEAM)
- A DIRECT TO leg with interception of an inbound radial (CRS IN)
- A DIRECT TO leg with interception of an outbound radial (CRS OUT).

The DIRECT TO page is only available for the active flight plan.

LINKS

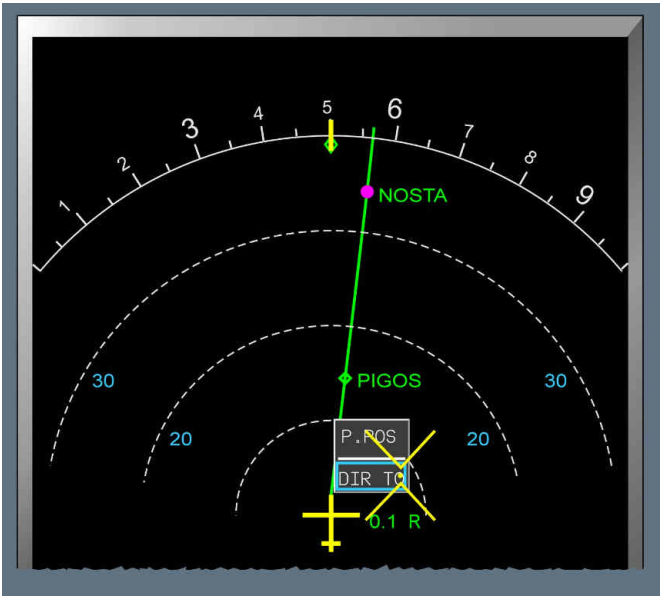
For more information, *Refer to FMS/FLIGHT PLANNING/LATERAL REVISIONS/DIRECT TO revision* .

ACCESS

The flight crew can access the DIRECT TO revision, via the interactive function of the ND, by selecting either:

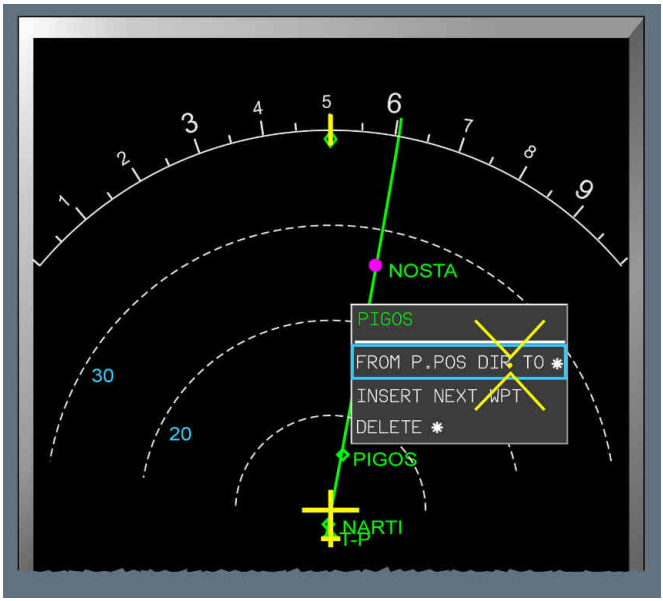
- DIR TO from the aircraft mock-up, or

DIR TO Revision



- FROM P.POS DIR TO * from any other interactive element.

DIRECT TO Revision



L2 If the ND displays a temporary flight plan, the flight crew cannot access the DIRECT TO revision.

TARGET WAYPOINT

The flight crew can enter the target waypoint:

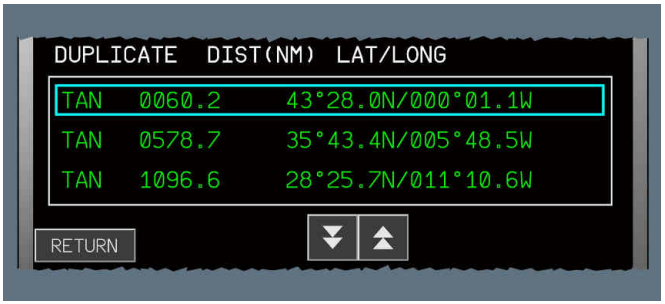
- Automatically:
  - If the flight crew selects the DIRECT TO revision on the FROM P.POS DIR TO menu. The target waypoint is the element from which the menu is selected.
  - If the flight crew selects the DIRECT TO revision at the aircraft mock-up, and the flight crew has selected the target waypoint via the cursor. The flight crew selects the target waypoint by clicking on an existing element, or by clicking on an blank area of the ND to create a latitude/longitude waypoint.
- Manually:
  - By selecting the waypoint ident from the list, or

Waypoint Entry Field and List



  - By entering the waypoint ident in the entry field, using the KCCU.
    If the entered ident is not the only ident in the database, a DUPLICATE window appears for the flight crew to select the appropriate waypoint.

DUPLICATE Page



DIRECT TO OPTIONS

The flight crew can select the DIRECT TO option.

L2 The default DIR TO option is DIRECT, or DIRECT WITH ABEAM, depending on the Operator's selection. The AMI files defines the default DIRECT TO option. (*Refer to AMI file)*

L1 When the flight crew selects the CRS IN or the CRS OUT option the ND displays an associated entry field.

CRS ENTRY FIELD

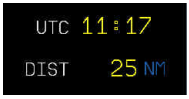


If the DIRECT TO target waypoint is a flight plan waypoint, the FMS enters a default value for the inbound or outbound radial.
The default CRS IN is the course from the flight plan waypoint that precedes the target waypoint, to the target waypoint.
The default CRS OUT is the course from the target waypoint to the flight plan waypoint that follows the target waypoint.

ENTRY FORMAT

Refer to CRS IN (CRS OUT) ENTRY FORMAT

TARGET WAYPOINT INFO



Indicates the UTC time of arrival at the target waypoint, and the distance between the current position of the aircraft and the target waypoint.

INSERT DIRECT TO BUTTON

L12



When clicked, inserts the temporary flight plan, and the ND displays the new active flight plan.

The ND displays the INSERT DIRECT TO button, if:
- A DIR TO temporary flight plan exists
- The cursor is in the ND window.

ERASE DIRECT TO BUTTON

L12



When clicked, erases the temporary flight plan, and the ND displays the active flight plan. (*Refer to Page*)

The ND displays the ERASE DIRECT TO button, if:
- A DIR TO temporary flight plan exists
- The cursor is in the ND window.

CANCEL BUTTON

L12

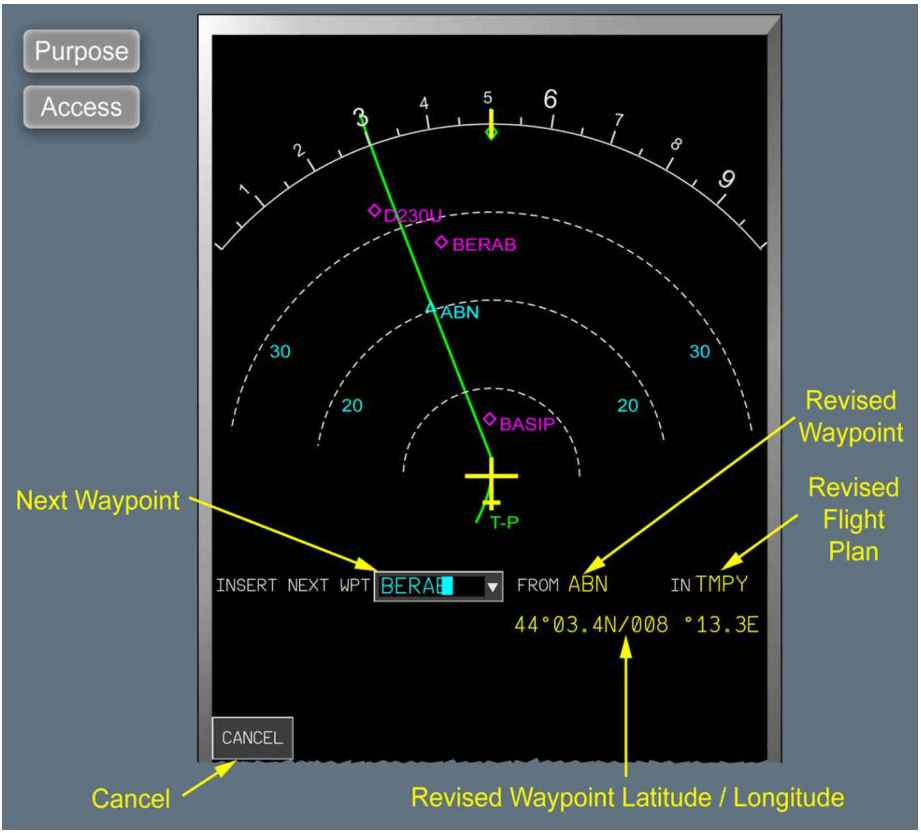


When clicked, closes the DIRECT TO ND page, and the ND returns to the flight plan display.
Appears if no temporary flight plan is on standby.

INSERT NEXT WPT

Applicable to: ALL

INSERT NEXT WPT



PURPOSE

The flight crew uses the insert next waypoint (INSERT NEXT WPT) revision to insert a waypoint after the revised waypoint.

The flight crew can insert:
- A flight plan waypoint
- Any navigation database waypoint, airport, or NAVAID
- A latitude/longitude (LL), a place/bearing/distance (PBD), a place-bearing/place-bearing (PB / PB), or a place/distance (PD) waypoint.

L2 *Note:*
- *A PD waypoint, with a negative distance (example: LMG/-15), is inserted "before" the revised waypoint*
- *The "place" waypoint needs to be the revised waypoint*
- *The distance of the PD waypoint is limited so that the PD cannot be before (after) the waypoint that precedes (follows) the revised waypoint.*

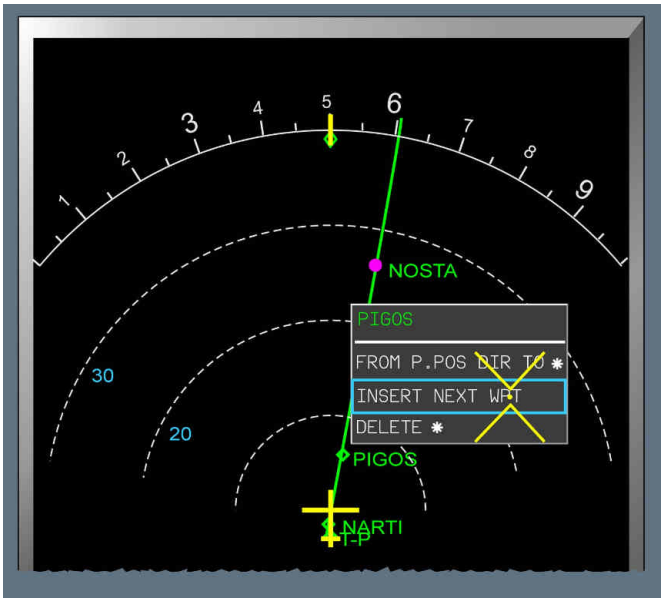
L1 **LINKS**

For more information, *Refer to FMS / FLIGHT PLANING / LATERAL REVISIONS / INSERT NEXT WPT Revision* .

ACCESS

The flight crew can access the INSERT NEXT WPT revision on the ND, by selecting INSERT NEXT WPT from any interactive element of the flight plan.

INSERT NEXT WPT Revision



REVISED WAYPOINT



Indicates the waypoint from which the flight crew has selected the INSERT NEXT WPT revision.

Appears:
- In green, if the waypoint is part of the active flight plan, or
- In yellow, if the waypoint is part of the temporary flight plan.

REVISED FLIGHT PLAN



Indicates that the revised waypoint is part of the temporary flight plan.
Appears if the revised flight plan is the temporary flight plan.

REVISED WAYPOINT LATITUDE/LONGITUDE



Indicates the latitude and the longitude of the revised waypoint, unless the revised waypoint is the FROM waypoint.

Appears:
- In green, if the waypoint is part of the active flight plan, or
- In yellow, if the waypoint is part of the temporary flight plan.

NEXT WAYPOINT

The flight crew can enter the next waypoint:

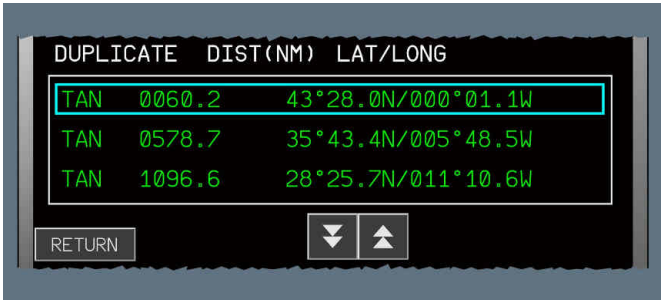
- With the cursor, if the flight crew clicks on an existing element, or on an blank area of the ND to create a latitude/longitude waypoint, or
- By selecting the waypoint ident from the list, or

Waypoint Entry Field and List



- By entering the waypoint ident in the entry field, using the KCCU. If the entered ident is not unique in the database, a DUPLICATE window appears. This window enables the flight crew to select the appropriate waypoint from a list of all the elements that have the same ident.

DUPLICATE Page



CANCEL BUTTON

L12



When clicked, closes the INSERT NEXT WPT ND page, and the ND returns to the flight plan display.
Appears if no temporary flight plan is on standby.

DELETE

Applicable to: ALL

PURPOSE

The flight crew uses the DELETE revision:

- To remove a waypoint from the flight plan
- To insert a discontinuity.

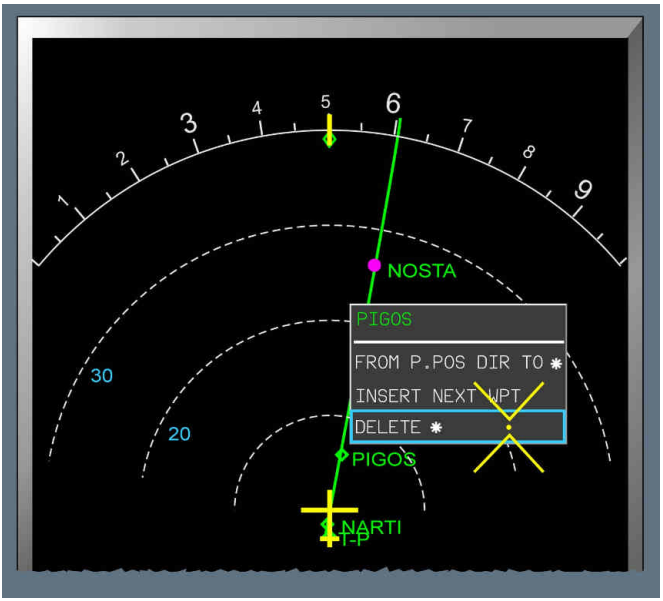
LINKS

For more information, *Refer to FMS/ FLIGHT PLANING / LATERAL REVISIONS / DELETE revision* .

ACCESS

The flight crew can access the DELETE revision on the ND by selecting DELETE * option on any interactive element of the flight plan.

DELETE Revision



DATA

Applicable to: ALL

PURPOSE

The flight crew can display the DATA / AIRPORT page on the MFD , by selecting the DATA option from any airport in the flight plan, or in the navigation database.

ARPTs Panel of the DATA / AIRPORT Page



LINKS

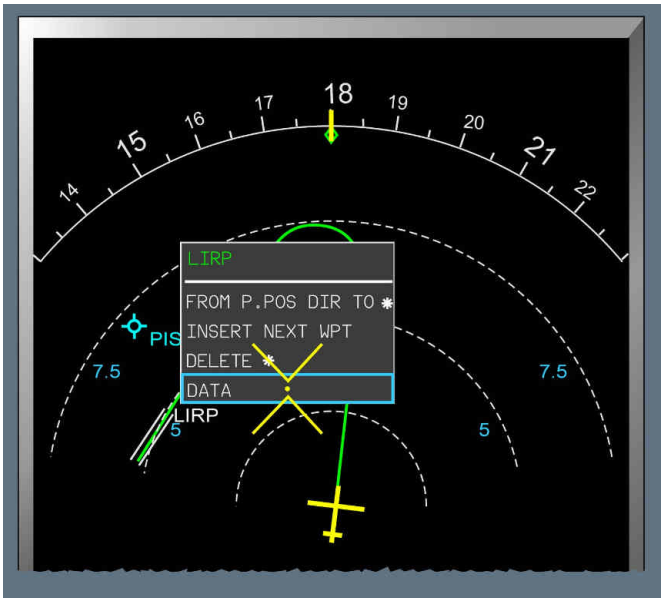
For more information, *Refer to FMS / MFD PAGES / DATA / AIRPORT page* .

ACCESS

The flight crew can access the DATA option on the ND by selecting DATA option on any airport in:

- The flight plan, or

Flight Plan Airport



- The navigation database.

Navigation Database Airport



INSERT OR ERASE TMPY

Applicable to: ALL

PURPOSE

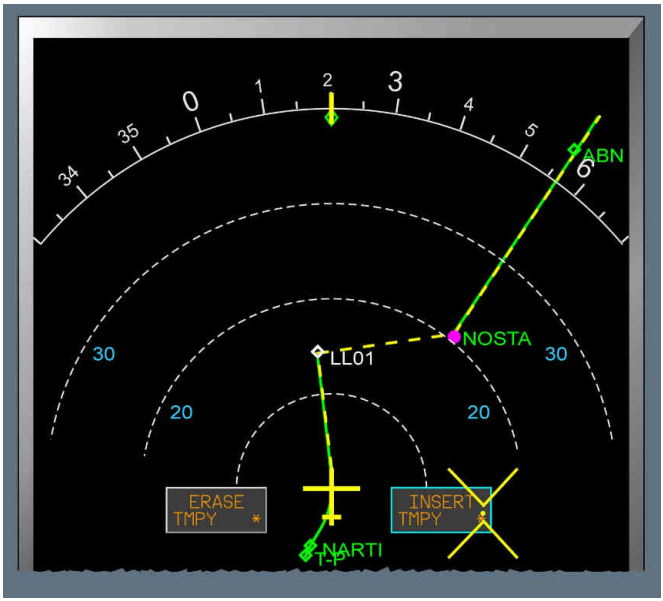
The flight crew can insert, or erase, the temporary flight plan that is displayed on the ND.

Note: *The ND displays the INSERT and ERASE buttons only when the cursor is in the ND.*

ACCESS

The flight crew can access the INSERT or the ERASE functions by clicking on the applicable button with the cursor.

INSERT or ERASE TMPY



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ND Messages

INDEX

Applicable to: ALL

Refer to ARPT NAV POS LOST
Refer to ARPT NOT IN ACTIVE F-PLN
Refer to CHECK EWD
Refer to CHECK HDG
Refer to CHECK SD
Refer to CHECK NORTH REF
Refer to DISPLAY SYSTEM VERSIONS DISAGREE
Refer to GPS PRIMARY
Refer to GPS PRIMARY LOST
Refer to FMS PAGE NOT AVAIL
Refer to MAP NOT AVAIL
Refer to MAP PARTLY DISPLAYED
Refer to NAV ACCUR DOWNGRADED
Refer to NAV ACCUR UPGRADED
Refer to ND MODE CHANGE
Refer to ND RANGE CHANGE
Refer to NO AZIM IN PLAN
Refer to NOT AVAIL
Refer to OFFSIDE FM CONTROL
Refer to PLEASE WAIT
Refer to RWY AHEAD : CHANGE MODE
Refer to SELECT TRUE NORTH REF
Refer to SPECIFIC VOR-D NOT AVAIL
Refer to TA ONLY
Refer to TCAS
Refer to TCAS:CHANGE MODE
Refer to TCAS:INCREASE RANGE
Refer to TCAS:REDUCE RANGE
Refer to TCAS STBY
Refer to TCAS TEST
Refer to TERR:CHANGE MODE
Refer to TERR:INCREASE RANGE
Refer to TERR:REDUCE RANGE
Refer to W/S:CHANGE MODE

Refer to W/S:INCREASE RANGE
Refer to W/S:SET RANGE 10 NM

AIRPORT NAVIGATION MESSAGES

Applicable to: ALL

ARPT NAV POS LOST

Appears in PLAN, ARC, or ROSE-NAV mode when the ND RANGE selector is set to ZOOM, and:
- An IRS failed, or
- Both MMRs failed.

ARPT NOT IN ACTIVE F-PLN

Appears in PLAN mode, when:
- The flight crew set the ND RANGE selector to ZOOM position
- The moving airport map is not part of the active F-PLN (i.e. origin, alternate, or destination airports). For more information, *Refer to DSC-34-10-70-20-GND Additional Functions* .

NOT AVAIL

Appears in PLAN, ARC or ROSE-NAV mode when the ND RANGE selector is set to ZOOM, and the airport navigation display is not available.

PLEASE WAIT

Appears in PLAN, ARC or ROSE-NAV mode when the ND RANGE selector is set to ZOOM. The flight crew request related to the airport navigation display is in progress.

FMS MESSAGES

Applicable to: ALL

CHECK NORTH REF

Appears in ARC, ROSE-NAV, or PLAN mode, when:
- The reference (TRUE or MAG) of the origin airport in the FMS database is not in accordance with the TRUE/MAG pb selection at takeoff, or
- The reference (TRUE or MAG) of the destination airport in the FMS database is not in accordance with the TRUE/MAG pb selection.

L2 The FMS provides the CHECK NORTH REF message.
L1 The flight crew can change TRUE or MAG reference, via the TRUE/MAG pb on the AFS CP.



Indicates that another FMS message is on standby.

CHECK NORTH REF



GPS PRIMARY

Appears in any ND mode, when:
- The navigation mode is GPIRS
- The navigation accuracy is HIGH.

For more information, *Refer to FMS / NAVIGATION FUNCTIONS / GPIRS position* .

L2 The FMS provides the GPS PRIMARY message.

L1 ↓ Indicates that another FMS message is on standby.

GPS PRIMARY



GPS PRIMARY LOST

Appears in any ND mode when the GPS is no longer the primary means for the computation of the FMS position.

For more information, *Refer to DSC-22-FMS-10-30-10-22FMS30E Aircraft Position Accuracy - Navigation Accuracy* .

L2 The FMS provides the GPS PRIMARY LOST message.

GPS PRIMARY LOST



MAP PARTLY DISPLAYED

Appears in ARC, ROSE-NAV, or PLAN mode:

- If the data transmission between the FMS and the CDS is not complete, or
- If the CDS cannot provide the entire map.

L2 The FMS or the CDS provides the MAP PARTLY DISPLAYED message.

MAP PARTLY DISPLAYED



NAV ACCUR DOWNGRADED

Appears in ARC, ROSE-NAV, or PLAN mode, when the navigation accuracy changes from HIGH to LOW. In the approach phase, the NAV ACCUR DOWNGRADED message appears only one time, to avoid disturbing the flight crew.

For more information, *Refer to FMS / NAVIGATION FUNCTIONS / POSITION ACCURACY* .

L2 The FMS provides the NAV ACCUR DOWNGRADED message.

L1 

Indicates that another FMS message is on standby.

NAV ACCUR DOWNGRADED



NAV ACCUR UPGRADED

Appears in ARC, ROSE-NAV, or PLAN mode, when:
- The navigation accuracy changes from LOW to HIGH
- The aircraft is not in the approach phase.

For more information, *Refer to FMS / NAVIGATION FUNCTIONS / POSITION ACCURACY* .

L2 The FMS provides the NAV ACCUR UPGRADED message.

L1



Indicates that another FMS message is on standby.

NAV ACCUR UPGRADED



SELECT TRUE NORTH REF

Appears in ARC, ROSE-NAV, or PLAN mode, when:

- The aircraft enters the polar zone

L3
- Above82 °North, or
- Above 73 ° North, with a longitude between 120 ° West, and 90 ° West, or
- Below 60 ° South.

L1 - The TRUE/MAG pb is set to MAG.

L2 The FMS provides the SELECT TRUE NORTH REF message.

L1  Indicates that another FMS message is on standby.

SELECT TRUE NORTH REF



SPECIFIC VOR-D NOT AVAIL

Appears In ARC, ROSE-NAV, or PLAN mode, when the FMS does not receive the tuned NAVAID for the selected approach, or departure.

L2 The FMS provides the SPECIFIC VOR-D NOT AVAIL message.

L1  Indicates that another FMS message is on standby.

SPECIFIC VOR-D NOT AVAIL



ND DISPLAY MESSAGES

Applicable to: ALL

CHECK HDG

Appears in ARC or ROSE mode, when the CDS detects a discrepancy between the heading parameters on the Captain's ND and on the First Officer's ND .

L2 Flashes for 9 seconds, then remains steady.

The CDS detects a discrepancy, if the difference between the two headings is more than:
- 5 ° in TRUE reference
- 7 ° in MAG reference.

L1 For more information about the warning and the procedure associated with the CHECK HDG message, *Refer to NAV CAPT AND F/O HDG DISAGREE* .

CHECK HDG



MAP NOT AVAIL

Appears when:

- ND MODE CHANGE or ND RANGE CHANGE appears for more than 6 s, or
- The aircraft true heading is not valid, or
- The FMS is not valid.

L2 The FMS provides the MAP NOT AVAIL message.

MAP NOT AVAIL



ND MODE CHANGE

Appears when:

- The FMS mode, and ND mode, of the EFIS CP are temporarily different (e.g. due to a change of mode), or
- A new page is being prepared for display.

ND MODE CHANGE



ND RANGE CHANGE

Appears when the FMS range, and ND range, of the EFIS CP are temporarily different (e.g. due to a change of range).

ND RANGE CHANGE



NO AZIM IN PLAN

Appears when:

- The flight crew selects the manual AZIM mode of the SURV system
- The ND is in PLAN mode.

L2 *Note:* *The AZIM mode is only available in ARC or ROSE mode.*

NO AZIM IN PLAN



OFFSIDE FM CONTROL

Appears in ARC, ROSE-NAV, or PLAN mode, when the offside FMS supplies the ND . When the FMS selector is set to BOTH ON 1(BOTH ON 2), the active FMC on the Captain's (First Officer's) side provides data to the flight management interfaces of both sides. For more information on the displays when BOTH ON1(2) is selected, *Refer to FMS Selector* .

OFFSIDE FM CONTROL



SURV MESSAGES

Applicable to: ALL

TA ONLY

Appears when the TCAS is in TA ONLY mode.

The flight crew can select this mode by:
- Pressing the TA pb on the SURV panel, or
- Selecting the TA ONLY option on the SURV/CONTROLS page of the MFD.

TA ONLY



TCAS

Appears when:
- The TCAS is failed
- The TRAF pb is pressed on the EFIS CP.

TCAS

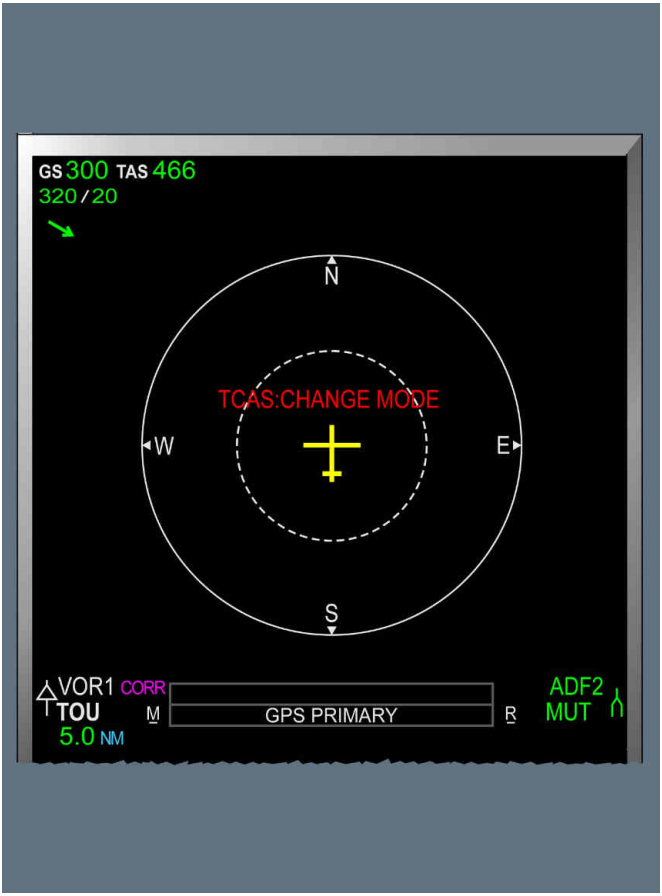


TCAS:CHANGE MODE

Appears in PLAN mode, when the TCAS identifies at least one RA intruder.
The flight crew should select ARC or ROSE mode to see the RA intruder.
Appears in amber, if the TCAS identifies at least one TA intruder.
If the flight crew sets the range selector to ZOOM, the ND does not display the TCAS:CHANGE MODE message, when the aircraft is on ground.

L2 The SURV system (TCAS) provides the TCAS:CHANGE MODE message.

TCAS:CHANGE MODE



TCAS:INCREASE RANGE

Appears in ROSE-VOR or ROSE-LS mode, when:
- The flight crew sets the range selector to ZOOM
- The aircraft is not on ground
- The TCAS identifies at least one RA intruder.

Appears in amber, if the TCAS identifies at least one TA intruder.

L2 The SURV system (TCAS) provides the TCAS:INCREASE RANGE message.

TCAS: INCREASE RANGE



TCAS:REDUCE RANGE

Appears when:
- The flight crew selects a range on the EFIS CP that is more than 40 nm
- The TCAS identifies at least one RA intruder.

Appears in amber, if the TCAS identifies at least one TA intruder.

L2 The SURV system (TCAS) provides the TCAS:REDUCE RANGE message.

TCAS:REDUCE RANGE



TCAS STBY

Appears when:
- The TCAS is in standby mode
- The TRAF pb is pressed on the EFIS CP.

The flight crew can activate this mode by selecting the STBY option on the SURV page of the MFD.

TCAS STBY



TCAS TEST

Appears when:
- The TCAS is in test
- The TRAF pb is pressed on the EFIS CP.

TCAS TEST



TERR:CHANGE MODE

Appears in PLAN mode, when the TAWS triggers a warning.
The flight crew should select ARC or ROSE mode, to see the terrain data.
Appears in amber, if the TAWS triggers a caution.
L2 The SURV system (TAWS) provides the TERR:CHANGE MODE message.

TERR: CHANGE MODE



TERR:INCREASE RANGE

Appears in ARC or ROSE mode, when:
- The flight crew sets the range selector to ZOOM
- The TAWS triggers a warning.

Appears in amber, if the TAWS triggers a caution.

L2 The SURV system (TAWS) provides the TERR:INCREASE RANGE message.

TERR: INCREASE RANGE



TERR:REDUCE RANGE

Appears in ARC or ROSE mode, when
- The flight crew selects a range on the EFIS CP that is more than 80 nm
- The TAWS triggers a warning.

Appears in amber, if the TAWS triggers a caution.

L2 The SURV system (TAWS) provides the TERR:REDUCE RANGE message.

TERR: REDUCE RANGE



W/S:CHANGE MODE

Appears in PLAN mode, when the PWS (of the SURV system) triggers a warning.
The flight crew should select ARC or ROSE mode, to see the weather data.
Appears in amber, if the PWS triggers a caution.

L2 The SURV system (WXR/PWS) provides the W/S:CHANGE MODE message.

W/S:CHANGE MODE



W/S:INCREASE RANGE

Appears in ROSE-VOR or ROSE-LS mode, when:
- The flight crew sets the range selector to ZOOM
- The PWS (of the SURV system) triggers a warning.

Appears in amber, if the PWS triggers a caution.

L2 The SURV system (/PWS) provides the W/S:INCREASE RANGE message.

W/S:INCREASE RANGE



W/S:SET RNG 10 NM

Appears in ARC or ROSE mode, when:
- The flight crew has selected a range different from 10 nm
- The PWS triggers a warning.

Appears in amber, if the PWS triggers a caution.

L2 The SURV system (WXR/PWS) provides the W/S:SET RNG 10 NM message.

W/S:SET RNG 10 NM



OTHER MESSAGES

Applicable to: ALL

CHECK EWD

Appears when the monitoring of the Display Units (DU) detects a difference between the critical parameters that the EWD s display.

For more information on the warnings and the procedures that are associated with this message, *Refer to CDS DISPLAY DISAGREE* .

L2 The CDS DISPLAY DISAGREE message flashes for 9 seconds, then remains steady.

CHECK EWD



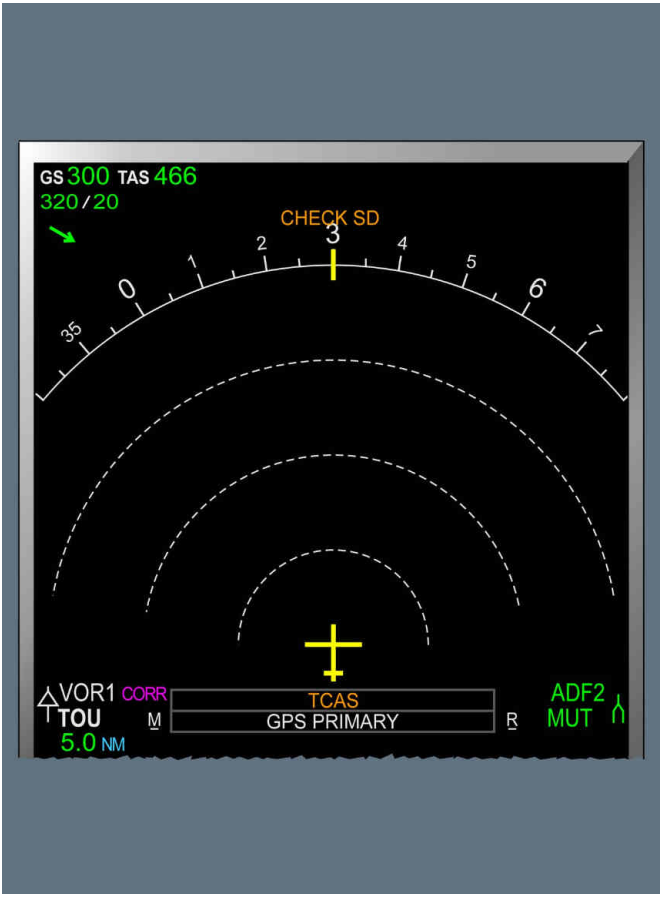
CHECK SD

Appears when the display units (DU) monitoring detects a difference between the critical parameters that the SD s display.

For more information on the warnings and procedures that are associated with this message, *Refer to CDS DISPLAY DISAGREE* .

L2 The CDS DISPLAY DISAGREE message flashes for 9 s , then remains steady.

CHECK SD



DISPLAY SYSTEM VERSIONS DISAGREE

Appears when:

- The aircraft is on ground, before engine start, or after landing
- The display units have different software.

DISPLAY SYSTEM VERSIONS DISAGREE



FMS PAGE NOT AVAIL

Appears instead of the ND when the FMS is no more able to provide data on the ND.


FMS PAGE NOT AVAIL

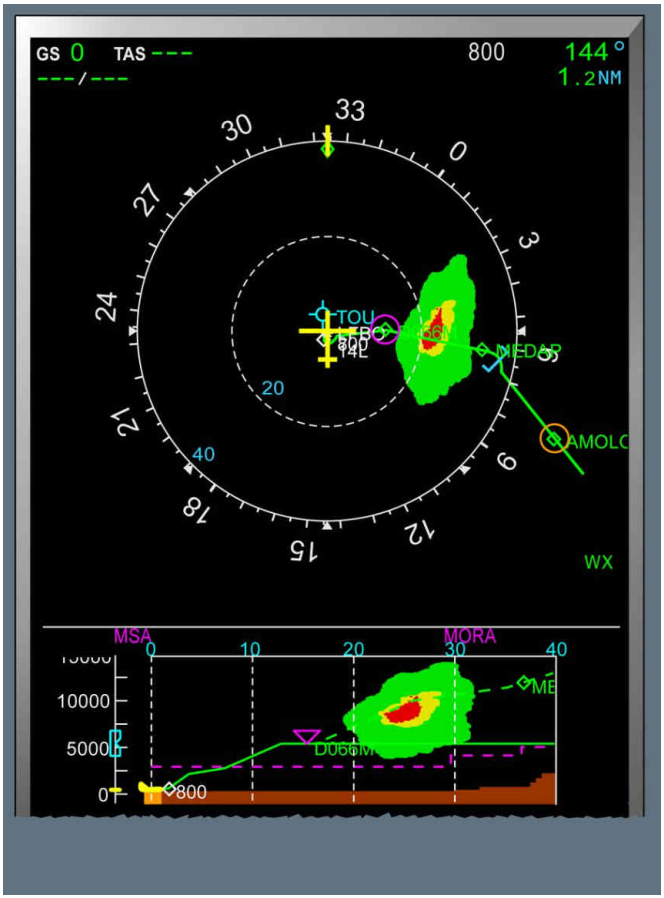
Weather

WEATHER

Applicable to: ALL

The ND displays weather information, when the flight crew presses the WX pb on the EFIS CP . For more information, *Refer to SURV / WXR / ND* .

Weather Display



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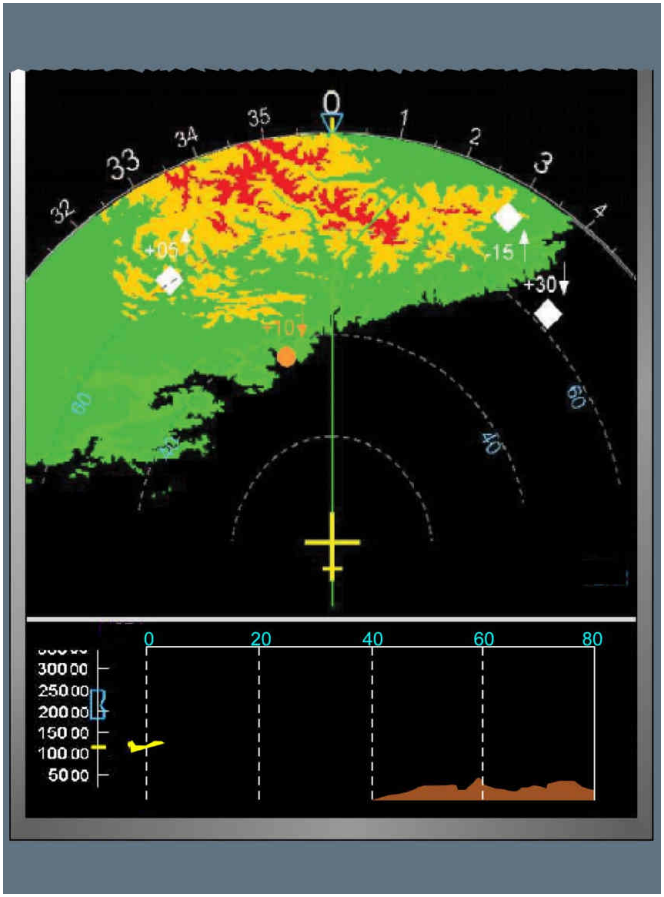
Terrain

TERRAIN

Applicable to: ALL

The ND displays terrain information, when the flight crew presses the TERR pb on the EFIS CP . For more information, *Refer to SURV / TAWS / ND* .

Terrain Display



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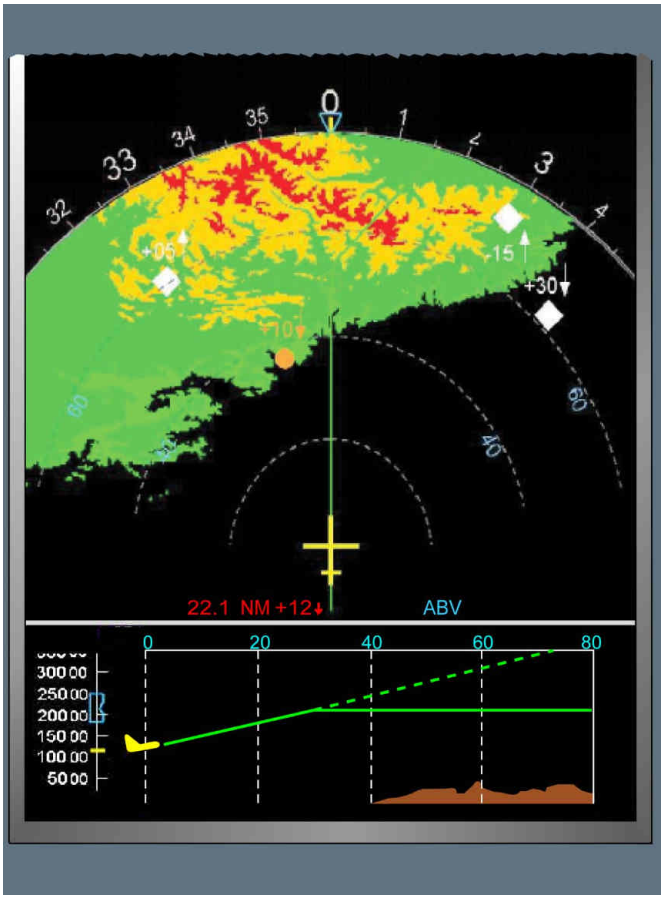
Traffic

TRAFFIC

Applicable to: ALL

The ND displays traffic information, when the flight crew presses the TRAF pb on the EFIS CP . For more information, *Refer to SURV / TCAS / ND* .

Traffic Display



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Airport Navigation

AIRPORT NAVIGATION

Applicable to: ALL

The Onboard Airport Navigation System (OANS) provides the flight crew with an improved awareness of the aircraft location in the airport area. The ND displays the airport navigation when the flight crew sets the range selector to ZOOM on the EFIS CP . The flight crew uses the keyboard and the KCCU to interact with the airport navigation display. For more information, *Refer to AIRPORT NAVIGATION* .

Airport Navigation



Vertical Display Description

VERTICAL DISPLAY

Applicable to: ALL

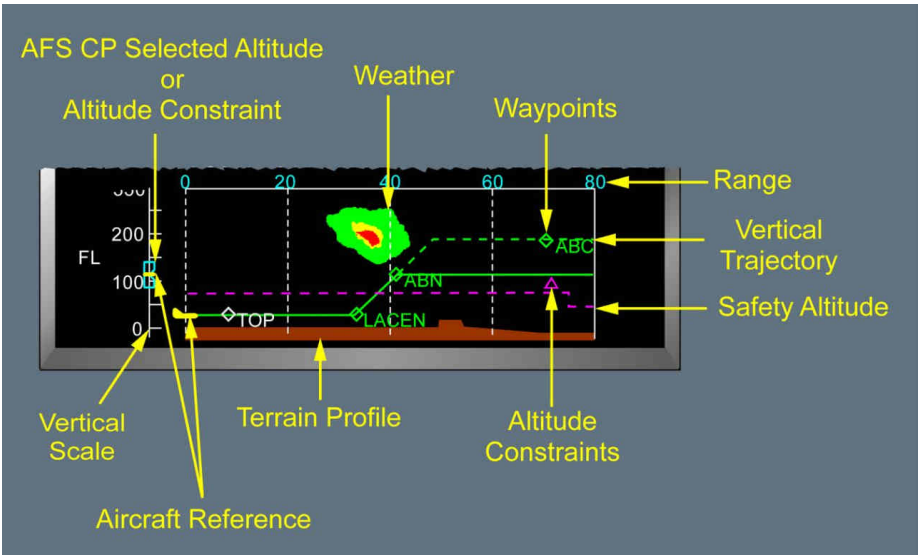
The Vertical Display (VD) provides the flight crew with an overview of the vertical position of the aircraft. The VD is a secondary means of navigation, that helps increase the flight crew's awareness of the aircraft vertical location.
The VD is only available in ARC and ROSE-NAV modes.
When the flight crew sets the EFIS CP RANGE selector to ZOOM, the airport navigation function appears instead of the vertical display. For more information on the airport navigation function, *Refer to DSC-34-10-70-10 General* .

The VD provides the current aircraft position, in relation to the:
- Safety altitudes
- Predicted trajectory
- Weather information
- Terrain information.

The VD is below the Navigation Display (ND).

L2 *Note:* *The VD update occurs after the computations of the FMS , and may last a few seconds longer than the ND update.*

Vertical Display



L1 The vertical display takes into account a vertical cut along the aircraft trajectory, in order to display terrain, weather and safety altitudes.

The vertical cut runs along:

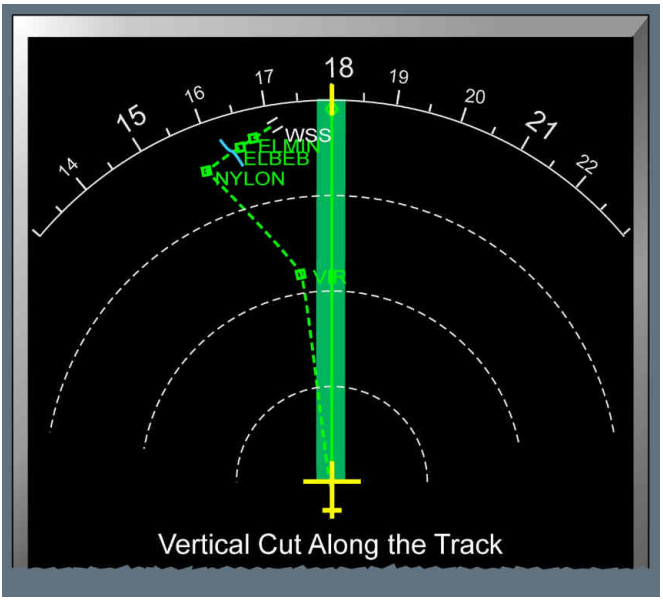
- The active flight plan or the LS beam, if the aircraft is in a managed mode, or

Vertical Cut Along the Flight Plan



- The current track, if the aircraft is in a selected mode or manually flown, or if the aircraft deviates from the flight plan, or

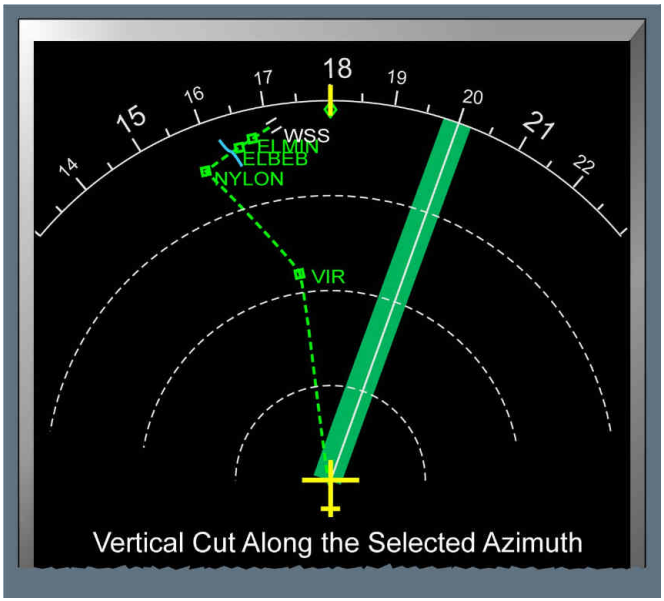
Vertical Cut Along the Track



- The azimuth, if the flight crew has selected the manual AZIM mode of the SURV system. For more information on the AZIM mode, *Refer to DSC-34-20-30-10-10 Manual Azimuth Mode* .

L2 In this case, weather and terrain displayed on the VD are limited to 160 nm ahead of the aircraft.

Vertical Cut Along the Selected Azimuth



There are different ways of determining the width of the vertical cut, for terrain and safety altitudes:

- If the vertical cut is defined along the active flight plan, the width for the safety altitudes and terrain display is equal to:
  - Two times the maximum EPU or FMS RNP, on the active leg
  - Two times the predicted RNP , on the other legs of the flight plan.
- If the vertical cut is defined along the aircraft track, the width is equal to:
  - Two times the TAWS RNP , for the terrain display
  - Two times the maximum EPU or FMS RNP , for the safety altitudes display.
- If the vertical cut is defined along the azimuth, the width is equal to two times the TAWS RNP , for the terrain display.

L3 For more information on the EPU and the FMS RNP , *Refer to FMS / NAVIGATION FUNCTIONS / POSITION ACCURACY* .

The TAWS RNP values are the following:

- In the takeoff area: 1 nm
- In the enroute area: 2 nm

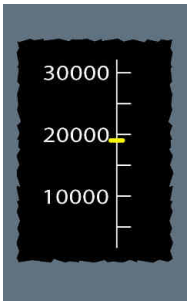
- In the terminal area: 1 nm
- In the approach area: The smallest of either 0.5 nm , or the runway required accuracy (from the runway database).

L2 The width of the vertical cut for the terrain display cannot exceed 10 nm .
For the weather display, WXR (of the SURV system) considers a zero-width vertical cut.

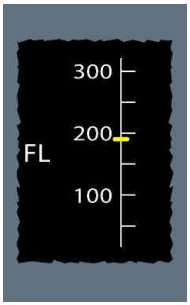
VERTICAL SCALE

The FMS defines the origin of the vertical scale, in order to display:
- The aircraft mock-up
- Most of the aircraft trajectory.

The vertical scale depends on the barometric setting that is selected by the flight crew on the EFIS CP . For more information, *Refer to EFIS CP/BAROMETRIC REFERENCE* .



The vertical scale is displayed in feet (FT). The flight crew selects a QNH barometric setting.



The vertical scale is displayed in flight levels (FL). The flight crew selects a STD barometric setting.

L3 The vertical scale cannot exceed 70 000 ft or FL 700 .
The vertical scale is associated with the VD range that the flight crew selects on the EFIS CP : The diagonal of the VD is equal to a 4 ° slope.

RANGE

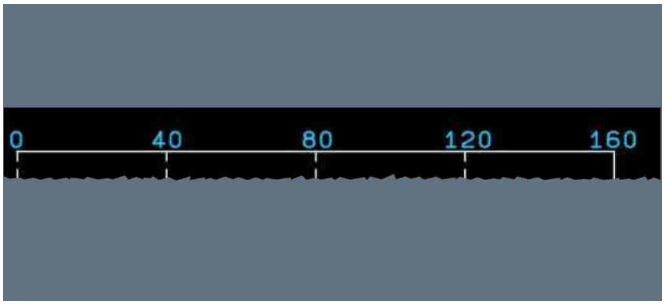
The VD range corresponds to the area that is displayed in front of the aircraft. The flight crew selects the range using the ND range selector on the EFIS CP . For more information, *Refer to ND RANGE selector* .

The VD range cannot exceed 160 nm .

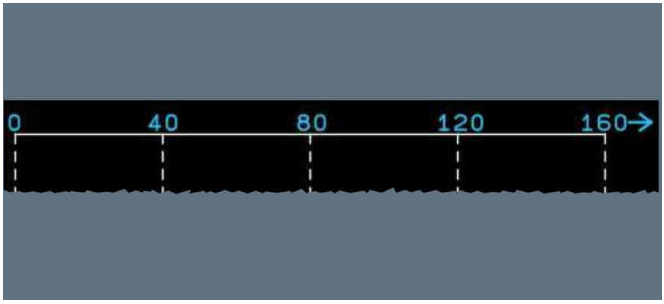
L3 The aircraft mock-up is the reference of the range scale (0 nm).

L1 For example:

- In ARC mode, the flight crew selects 160 nm , via the ND range selector , or
- In ROSE-NAV mode, the flight crew selects 320 nm , via the ND range selector .

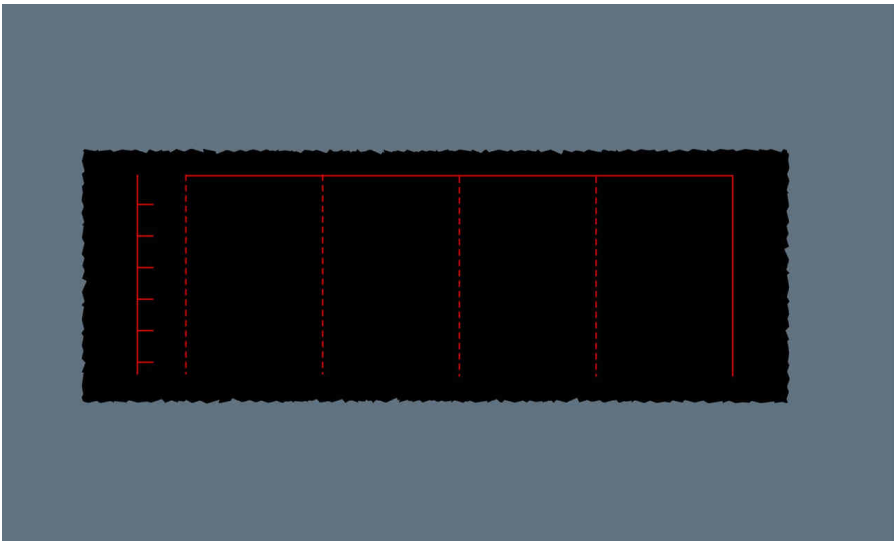


- In ARC mode, the flight crew selects 320 nm or 640 nm , via the ND range selector , or
- In ROSE-NAV mode, the flight crew selects 640 nm via the ND range selector .



L2 If the information necessary for the vertical display is not valid, the VD displays the following red scales:

Data not Valid



AIRCRAFT REFERENCE

The aircraft reference indicates the current barometric altitude.

L2 The CDS computes the aircraft reference.

L1 **ALTITUDE SYMBOL**



Indicates the aircraft altitude on the vertical scale.

AIRCRAFT MOCK-UP



The flight crew selects the AUTO AZIM mode of the SURV system. The aircraft mock-up is adjusted in relation to the aircraft pitch attitude, the angle-of-attack, and the flight path angle.

L2 *Note: The aircraft mock-up may no longer appear on the VD scale, if the aircraft descends, and if the target altitude of the AFS CP is set too high.*

L1 **NOT VALID PITCH ATTITUDE**

L12



Indicates the aircraft altitude on the vertical scale, if the pitch attitude is not valid.
The **ATT** message flashes for 9 s, then remains steady.

MANUAL AZIM MODE



The flight crew selects the manual AZIM mode of the SURV system.

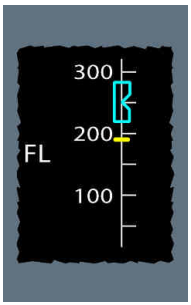
AFS CP SELECTED ALTITUDE OR ALTITUDE CONSTRAINT

AFS CP SELECTED ALTITUDE

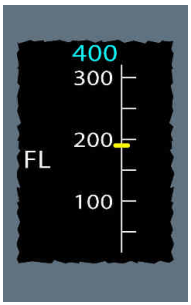
If the flight crew selects an altitude target on the AFS CP , this target appears on the vertical scale of the VD . For more information on the altitude target selection, *Refer to 22 - AFS - Flight Guidance / Controls and Indicators / Vertical Control* .

L3 The position of the AFS CP selected altitude depends on the barometric setting (feet or FL).

L1



The flight crew selects an altitude target on the AFS CP . This altitude target is in the vertical scale.



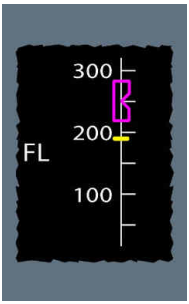
The flight crew selects an altitude target on the AFS CP . This altitude target is not in the vertical scale. The VD displays a numerical value, instead of the symbol. This value appears either on the top, or on the bottom of the scale.

L12



The selected altitude is not available.
The ALT SEL message flashes for 9 s , then remains steady.

ALTITUDE CONSTRAINT



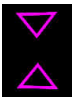
ALT CST* or ALT CST mode is engaged.

ALTITUDE CONSTRAINTS

The VD always displays altitude constraints that are defined in the active flight plan. For more information, *Refer to FMS / FLIGHT PLANING / VERTICAL REVISIONS* .

L2 The VD never displays numerical values of the altitude constraints.

L1 The VD displays the respected altitude constraints with the following symbols:

-  The constraint AT this altitude is predicted to be respected.
-  The constraint AT or BELOW this altitude is predicted to be respected.
-  The constraint AT or ABOVE this altitude is predicted to be respected.
-  The constraint between these two altitudes is predicted to be respected.

The same symbols appear in white, if the altitude constraint is ignored.

In selected mode, the FMS can no longer predict, if the altitude constraint will be respected. The VD displays the constraint symbol in white.



The constraint is predicted to be missed. The constraint symbol is associated with an dotted amber line. This helps the flight crew to identify the missed constraint, even if the symbol is not in the VD window.

SAFETY ALTITUDE

Safety altitudes are the minimum altitudes at which the aircraft must be flown above the terrain.

The FMS database provides the following safety altitudes:
- The grid MORA , or
- The MSA
  The MSA is only displayed, when the flight crew selects a departure, or an arrival procedure (SID , TRANS or APPR) in the FMS .

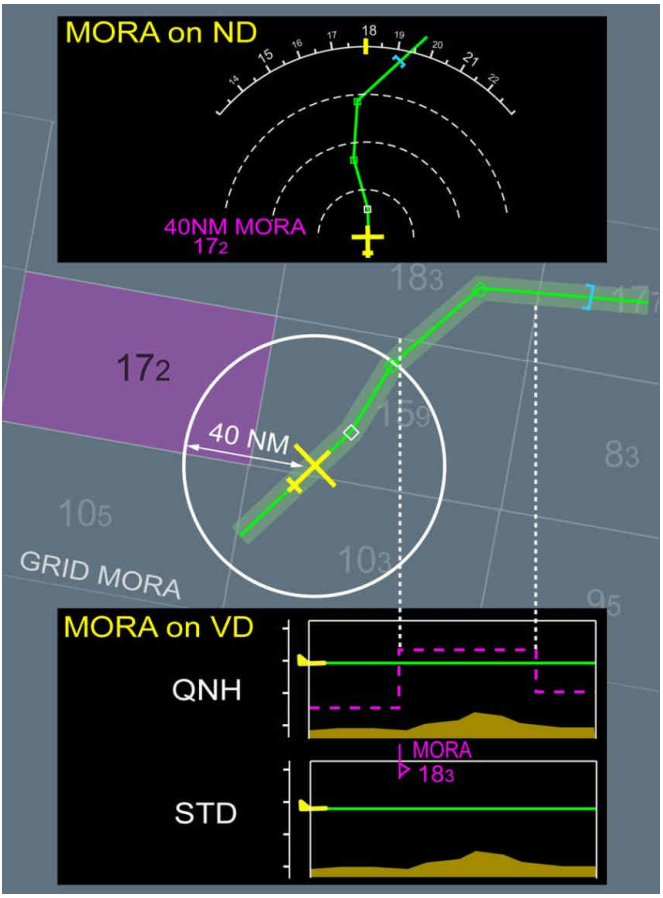
The FMS computes the safety altitudes:
- In the vertical cut, along the aircraft trajectory
- Limited by the VD range.

Note: *Grid MORA on the VD and on the charts may be slightly different, due to the fact that the grid used in the FMS navigation database may be tighter than the grid in the charts.*

The grid MORA is also displayed on the ND . However, the ND displays the highest grid MORA within a circular area of 40 nm around the aircraft. For more information, *Refer to ND/FMS DATA/MORA or OFFSET* .

L2 Safety altitudes are not available in manual AZIM mode, because they are applicable to the flight plan computations.

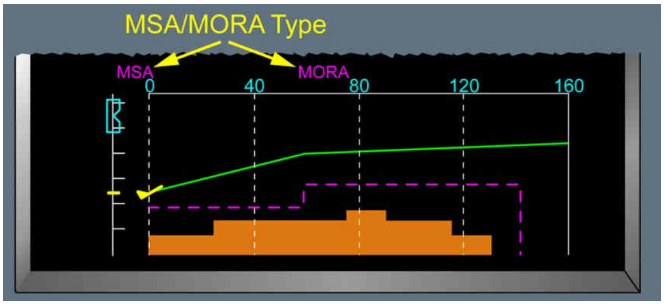
Safety Altitudes



L1 In the QNH barometric setting, the safety altitude profile is displayed as segments, all along the VD range, except in a flight plan discontinuity.

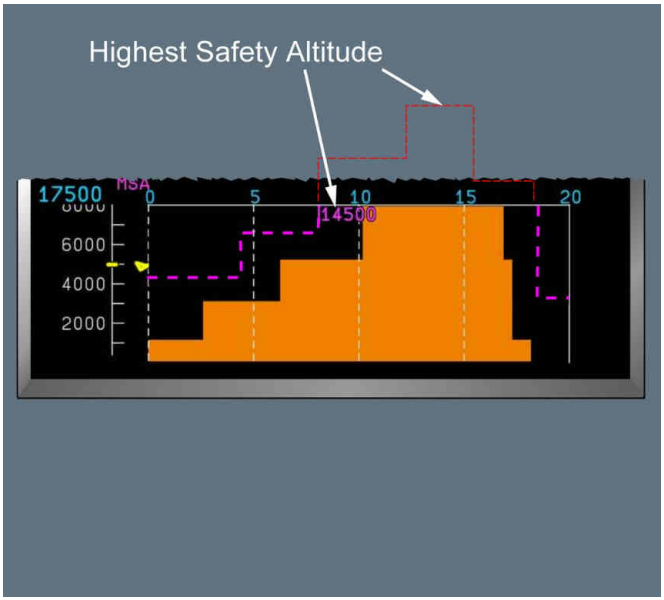
The MORA , or the MSA , label appears:
- Above or below the aircraft mock-up, and/or
- If the safety altitude type is changed.

MSA/MORA Type



If the highest safety altitude is not within the vertical scale, the highest safety altitude value is displayed, when the segments no longer appears on the VD .

Safety Altitude Not Within the Vertical Scale





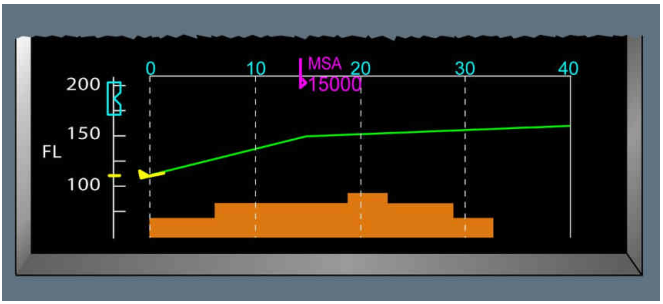
Indicates the type and the value of the highest safety altitude, along the VD range.

Appears when:
- The flight crew selects a QNH barometric setting on the EFIS CP , and none of the safety altitudes is within the vertical scale, or
- The flight crew selects the STD barometric setting on the EFIS CP .

Note: *Regardless of the barometric setting, the value of the safety altitude is always displayed in QNH reference to be in accordance with the safety altitude value provided by the charts.*

Appears on the:
- Upper part of the VD , if the aircraft is below the highest safety altitude
- Lower part of the VD , if the aircraft is above the highest safety altitude.

Safety Altitude in STD Barometric Setting



VERTICAL TRAJECTORY

For more information on the aircraft vertical trajectory, *Refer to VERTICAL TRAJECTORY* .

WAYPOINTS

The VD displays waypoints that are defined in the active flight plan.

L2 If G/S*, or F-G/S*, or G/S, or F-G/S mode is engaged, the FMS corrects the waypoint altitude of the destination temperature that the flight crew has entered in the PERF page.

If the flight crew defines an offset in the flight plan, the VD displays the waypoints that are associated with the initial flight path (i.e. the flight path that is displayed in green dashes on the ND). However, the vertical cut considers the green solid line on the ND that is associated with the active flight plan.

L1 **FLIGHT PLAN WAYPOINTS**



Indicates the TO waypoint of the active flight plan.



Indicates any other waypoint that is in the active flight plan.

L2 At the destination airport, the VD displays the destination symbol, instead of the flight plan waypoint symbol.
If the FMS predicts a waypoint and an altitude constraint to be at the same altitude, the VD only displays the altitude constraint symbol.

L1 **ORIGIN AND DESTINATION WAYPOINTS**



The origin or destination waypoint is an airport, and the flight crew did not select a runway.



The origin or destination waypoint is a runway, and the flight crew has selected an ND range that is above orequalto160 nm.

L12



The origin or destination waypoint is a runway, and the flight crew has selected an ND range lower than 160 nm.
The length of the symbol corresponds to the real size of the runway, according to the selected range.

L2 The FMS always corrects the destination waypoint altitude, in relation to the destination temperature that the flight crew enters on the PERF page.

L1 **PSEUDO WAYPOINTS**

The VD only displays the two pseudo waypoints:

L12



Indicates the starting point of an acceleration, or a deceleration, segment that is computed by the FMS.

Appears when:
- NAV mode is engaged
- Managed speed is engaged.

L12



Indicates the predicted start of the automatic deceleration, for an approach in managed speed.

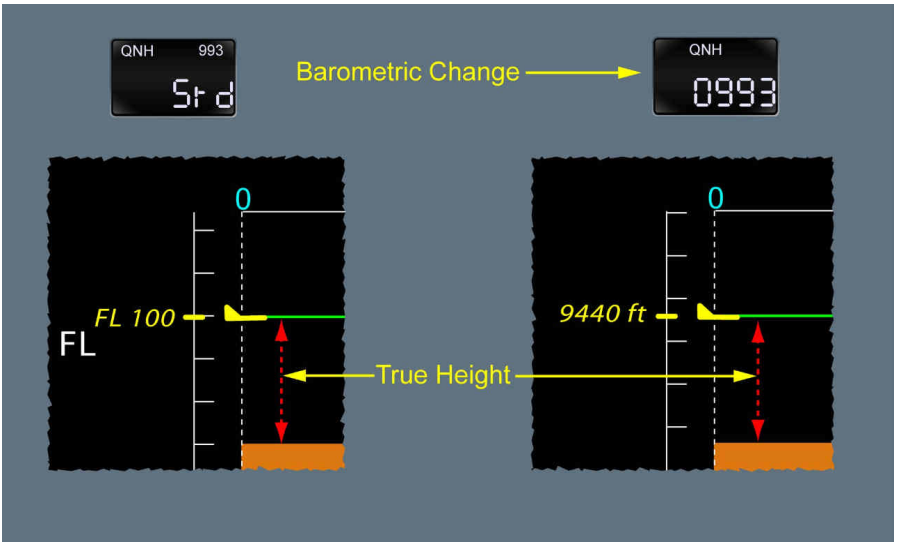
Appears in magenta, when:
- The aircraft is in the descent or go-around phase
- NAV mode is engaged (or NAV mode is armed. The FMS predicts that NAV mode will engage before the deceleration point).

Appears in white, in all other cases.

TERRAIN PROFILE

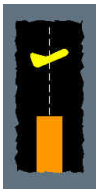
The TAWS (in the SURV system) computes the terrain elevation profile, along the vertical cut. The VD displays the terrain in relation to the aircraft altitude. The elevation between the terrain and the aircraft is the true height. The true height does not change with the barometric setting.

Barometric Setting Change



L2 *Note:* *In the polar zone, the TAWS cannot compute the terrain profile.*

L1



Indicates the real location of the terrain. The zone elevation in amber is based on the measured radio-altimeter information.
Appears when the aircraft radio-altimeter altitude is below 5 000 ft.

WEATHER DISPLAY

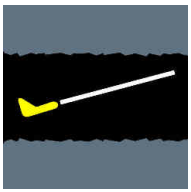
The WXR / PWS (in the SURV system) computes the weather display, along the vertical cut.
The flight crew can display the weather on the VD and on the ND , by pressing the WX pb on the EFIS CP . The flight crew can clear the weather display only from the VD , by selecting the WX ON VD option, on the MFD SURV page. For more information, *Refer to SURV / WXR / MFD / WX ON VD OPTION* .
The colors of the weather display are the same on the VD and the ND . The different colors indicate the intensity of the precipitation (black, green, yellow, and red). For more information, *Refer to SURV / WXR / ND* . Magenta indicates areas of turbulence, but these areas are not displayed on the VD .

L2 *Note: In the polar zone, the WXR is not able to compute the weather display.*

L1



Indicates the selected altitude, in manual elevation mode.



Indicates the selected tilt angle, in manual tilt mode.

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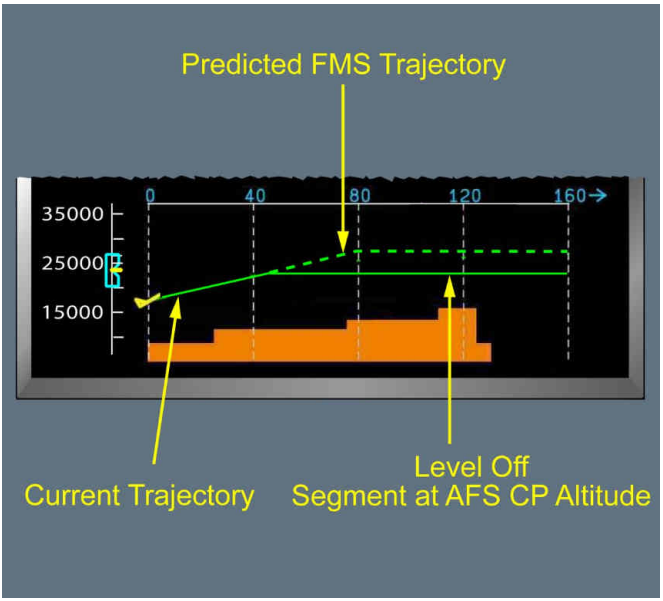
Vertical Trajectory

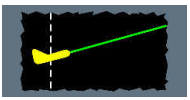
VERTICAL TRAJECTORY

Applicable to: ALL

Vertical Trajectory



L123



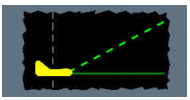
Indicates which trajectory the aircraft will fly, without any further action from the flight crew.

Appears, when:
- The aircraft flies in managed mode, and follows the flight plan or the LS beam, or
- The aircraft flies in a vertical selected mode.

If the flight crew selects an altitude target on the AFS CP, the solid green line follows a level-off segment at this altitude, except in final descent, when one of the G/S*, G/S, F-G/S*, or F-GS mode is engaged.

Note: *If the V/S mode is engaged, the solid green line takes into account the V/S value selected on the AFS CP. The FMS does not determine if the aircraft can physically achieve this vertical speed.*

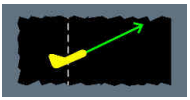
L12



Indicates the predicted FMS trajectory that the aircraft would fly, if managed vertically.

Note: *On the ND, the green dotted line indicates the initial path, if the flight crew has created an offset in the flight plan.*

L12



The aircraft does not achieve the conditions that are associated with the green lines.
The direction of the arrow depends on the current flight path angle of the aircraft.

L2 HOLDING PATTERN

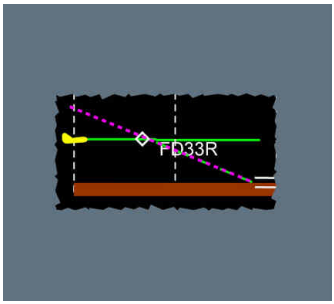


When the FMS takes into account the holding pattern in its predictions, the VD unfolds the holding trajectory.

FMS predictions take into account the holding pattern when:
- The deceleration point is flown in managed speed, or
- The entry fix is sequenced in another selected speed mode.

FLS BEAM

L12



Indicates the F-G/C beam of the Non Precision Approach (NPA).

Appears when:
- An NPA is in the active flight plan
- The flight crew presses the LS pb on the EFIS CP or the APPR pb on the AFS CP
- The vertical cut is defined along the flight plan, or along the LS axis.
- The ND range is less than or equal to:
  - 80 nm in ARC mode, or
  - 160 nm in ROSE-NAV mode.

When the flight crew enters a destination temperature on the PERF page of the MFD below the ISA temperature, the F-G/S beam is corrected.

If the anchor point is not defined at the runway threshold, the FMS displays the anchor point ident in magenta.

L2 **COLD WEATHER DISPLAY**

In the case of cold weather, the following information on the VD may not be consistent until the G/S* or the F-G/S* mode is engaged.

BEFORE GLIDE CAPTURE

The FMS does not correct the vertical trajectory of the active flight plan, in relation to the destination temperature.

The FMS corrects the FLS beam and the runway symbols in relation to the temperature, that the flight crew has entered on the PERF page of the MFD, when this temperature is below the ISA temperature.

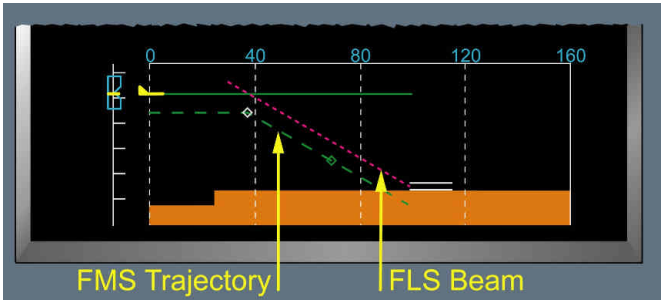
The terrain display is vertically positioned in relation to the aircraft, via the true altitude. The elevation between the terrain and the aircraft mock-up is always true, regardless of the outside temperature (only the terrain altitude value retrieved on the vertical scale may not be correct).

Due to the fact that the runway and the FLS beam are corrected in relation to the temperature, their position in relation to the terrain and the aircraft location is correct.

In cold weather, the flight crew selects an altitude target on the AFS CP, taking into account a manual temperature correction. Due to the fact that it is a barometric altitude, this altitude target

is higher than the true altitude. If the aircraft follows this altitude target, the aircraft is then higher than the FMS predicted trajectory.
If the aircraft flies an ILS(GLS) approach in cold weather, the information on the VD may not be consistent.

Cold Weather with FLS Function



AFTER GLIDE CAPTURE

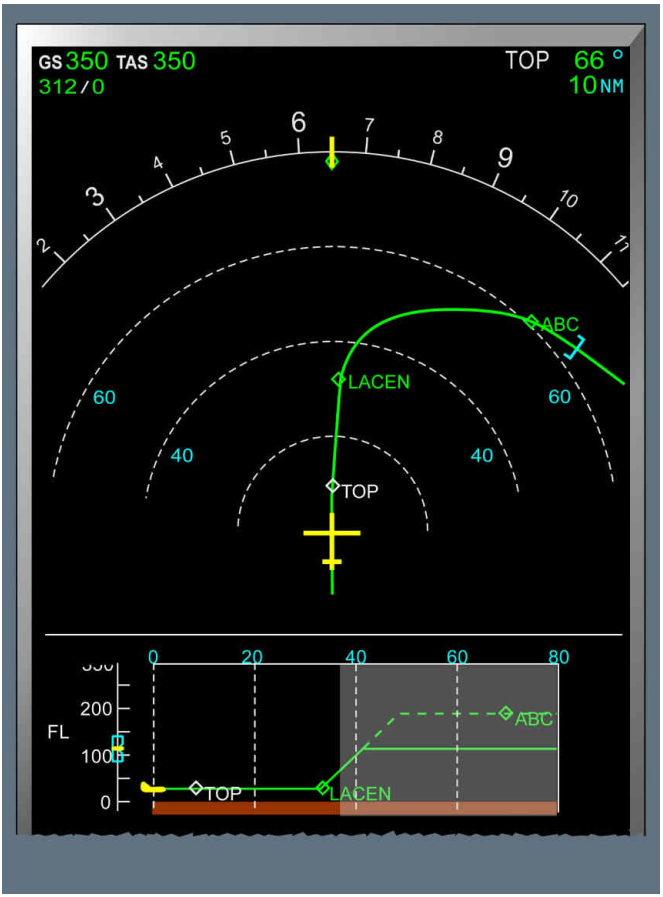
During the glide capture, the FMS vertical trajectory is corrected in relation to the external temperature. The FLS beam (if any), the FMS trajectory, the terrain and the runway are correctly displayed.

GREY AREA

If the aircraft follows the active flight plan, the grey area indicates that the next track turns by more than 3 °. The terrain displayed in this grey area, no longer corresponds to the terrain that is located directly in front of the aircraft.

L2 The SURV system defines the grey area. Therefore, in the case of a system failure, the grey area is no longer displayed.

Grey Area

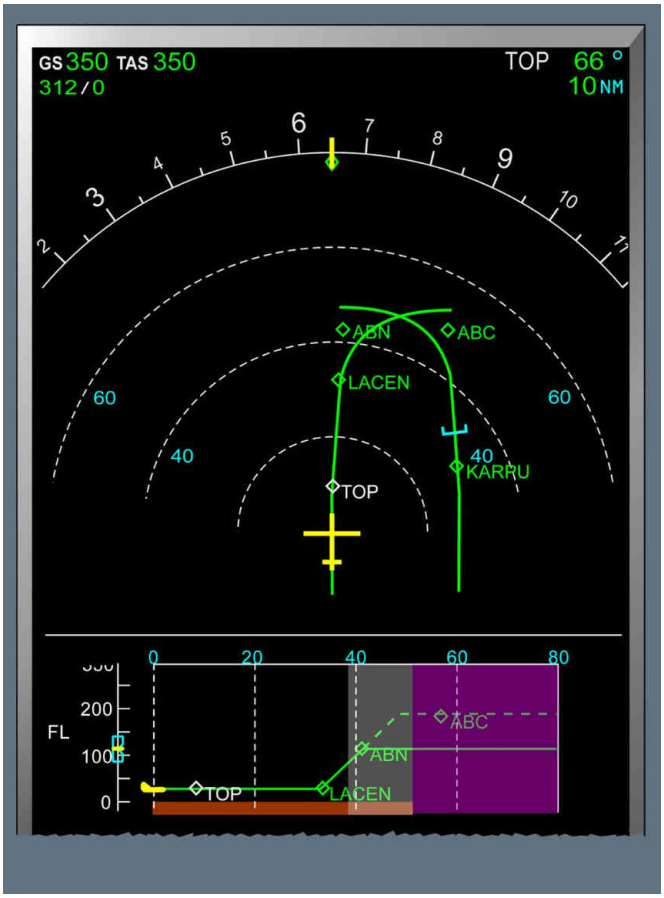


MAGENTA AREA

The magenta area indicates the area where the TAWS (of the SURV system) stops displaying the terrain on the VD.

L2 In some cases, the FMS may not be able to compute a continuous trajectory for the display on the ND. This creates a gap (sometimes not visible) on the flight plan that is displayed on the ND. However, this has no impact on the guidance. In this case, the SURV stops displaying the terrain and the weather on the VD, ahead of the gap up to the destination runway.

Magenta Area



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VD Messages

INDEX

Applicable to: ALL

Refer to CHECK ALT
Refer to NO TERR & WX DATA AVAILABLE
Refer to SAFETY ALTS PARTLY DISPLAYED
Refer to TERR INOP
Refer to TRAJ NOT AVAIL
Refer to VD MODE CHANGE
Refer to VD RANGE CHANGE
Refer to VIEW ALONG AZIM XX°
Refer to VIEW ALONG ACFT TRACK
Refer to WX NOT SEL
Refer to WXR INOP

FMS MESSAGES

Applicable to: ALL

SAFETY ALTS PARTLY DISPLAYED

Appears when the safety altitude type and/or numeric values are not available.

TRAJ NOT AVAIL

Appears when:
- The VD MODE CHANGE, or the VD RANGE CHANGE message is displayed, for more than 6 s, or
- The ground speed is not valid, or
- The FMS trajectory is not available.

L2 The FMS provides the TRAJ NOT AVAIL message.

SURV MESSAGES

Applicable to: ALL

NO TERR AND WX DATA AVAILABLE

Appears when the flight crew:
- Selects PLAN mode on the EFIS CP, or
- Sets to OFF the TERR SYS button on the SURV CONTROLS page of the MFD.

L2 The VD does not display the weather when the TERR function is not available, because it cannot locate the weather vertically (i.e. with respect to the terrain).

TERR INOP

Appears when:
- The TAWS has failed, or
- The flight crew turns off the TAWS, via the SURV page of the MFD, or
- The aircraft is flying in the polar zone.

VIEW ALONG AZIM XX°

The message is associated with the azimuth value, when the flight crew selects the manual AZIM mode.

L2 The VD is computed along the selected azimuth.

WX NOT SEL

Appears, when the flight crew:
- Presses the WX pb on the EFIS CP
- Sets the WX ON VD button to OFF on the SURV/CONTROLS page of the MFD.

WXR INOP

Appears, when the flight crew presses the WX pb on the EFIS CP, and:
- The WXR (on the SURV system) is failed, or
- The aircraft is flying in the polar zone.

VD DISPLAY MESSAGES

Applicable to: ALL

CHECK ALT

Appears when the CDS detects a difference between the Captain's and the First Officer's altitude parameters, and this difference is more than:

- 500 ft , if the flight crew selects the STD barometric setting, or
- 250 ft , if the flight crew selects the QNH barometric setting.

L2 The message flashes for 9 seconds, then remains steady.

L1 For more information about the warning and the procedure that are associated with this message, *Refer to NAV CAPT AND F/O ALT DISAGREE* .

VD MODE CHANGE

Appears when the FMS mode and ND mode of the EFIS CP are temporarily different (e.g. due to a change of mode).

VD RANGE CHANGE

Appears when the FMS range and ND range of the EFIS CP are temporarily different (e.g. due to a change of range).

VIEW ALONG ACFT TRK

Appears when the vertical cut for the VD is defined along the aircraft track, but the ND does not display a track line.

L3 *Note:* *Appears:*

- *In managed mode, when the aircraft deviates from the flight plan or from the LS beam, or*
- *During the transition from HDG to LOC mode, or*
- *When the GA TRK mode is engaged, or*
- *When the aircraft is flying a manual leg, or*
- *At takeoff, when there is no ILS associated with the runway.*
  In this case, the RWY mode does not engage, and the VD also displays the flight path arrow symbol.
  The VD recovers the flight plan trajectory after a few seconds, when one of the NAV mode, the RWYmode, the TRK mode , or the HDG mode is engaged.

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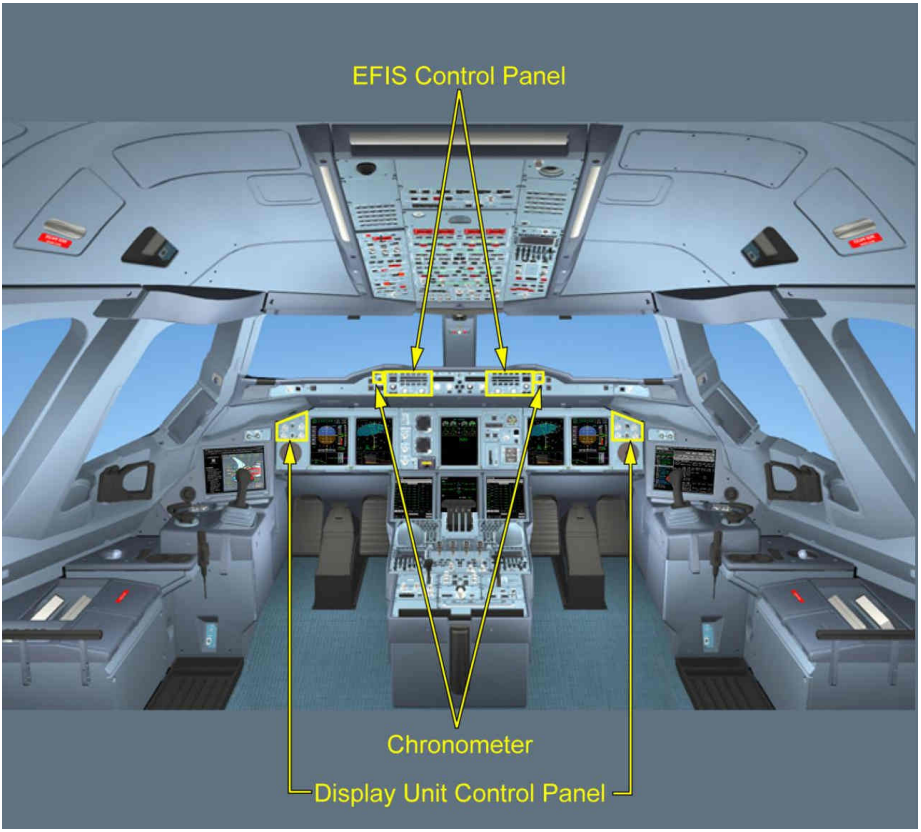
COCKPIT VIEW

Applicable to: ALL

Cockpit View



The flight crew can access the EFIS CP backup from the MFD , at any moment, or if an EFIS CP failure occurs. For more information, *Refer to FLIGHT GUIDANCE / ABNORMAL OPERATIONS / FCU BACKUP* .

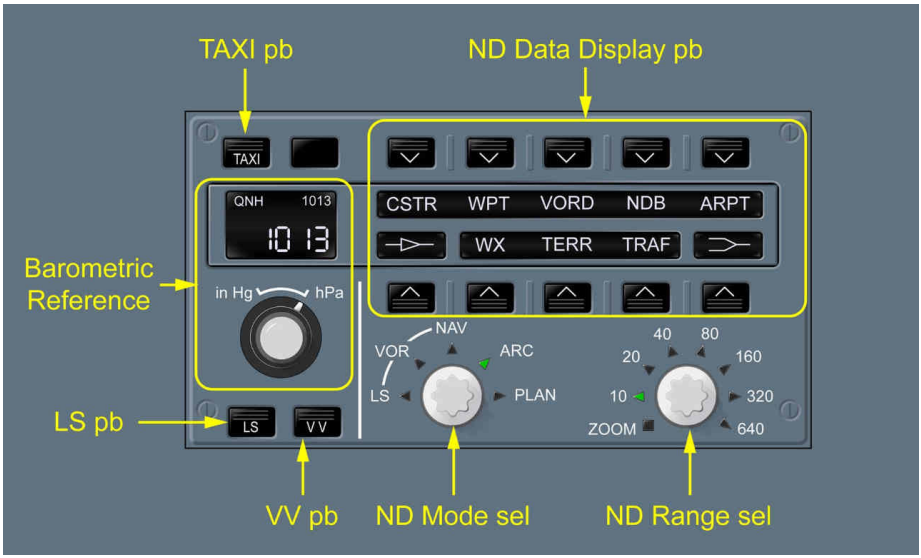
EFIS CONTROL PANEL

Applicable to: ALL

There are two identical EFIS Control Panels (EFIS CP s):
- One on the Captain's side
- One on the First Officer's side.

Each EFIS CP is associated with the onside PFD and ND .

EFIS CP



In the case of abnormal operations of the EFIS CP , the flight crew should use the FCU backup on the MFD . For more information, *Refer to FLIGHT GUIDANCE / ABNORMAL OPERATIONS / FCU backup* .

Taxi pb



The onside PFD does not display the ETACS videos.



The onside PFD displays the ETACS videos.

Impacted DU: 00000371 Barometric Reference

BAROMETRIC REFERENCE

Barometric Reference



BAROMETRIC REFERENCE WINDOW



The barometric reference is QNH 1 024 hPa.
The range of QNH is from 745 hPa(22.00 inHg) to 1 100 hPa(32.48 inHg).

Note: *The flight should not preset the limit values (i.e. 745 hPa and 1 100 hPa, or 22.00 inHg and 32.48 inHg) to avoid the loss of FMS vertical functions.*

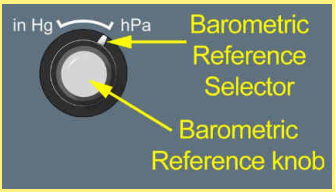


The barometric reference is STD. If the flight crew selects the QNH barometric reference, the barometric reference is automatically set to the preset value, i.e. 1 024 hPa.

BAROMETRIC REFERENCE CONTROLS

The barometric reference controls have an outer selector, and an inner knob.

Barometric Reference Controls



The flight crew uses the barometric reference selector to select the barometric unit (hectoPascal, or mercury inches) that is associated with the values displayed in the barometric reference window.

Note: *The PFDs do not display the selected barometric unit.*

The flight crew uses the barometric reference knob to select the barometric reference value. At the EFIS CP power-up, the barometric reference value starts at 1 013 hPa, or at 29.92 inHg, depending on the selected barometric unit.

When flight crew:

- Presses the barometric reference knob, the barometric reference is set to STD. The flight crew can turn the barometric reference knob to preset a QNH value. Then, when the flight crew reverts to the QNH barometric reference, the barometric reference automatically displays this preset value.
- Pulls the barometric reference knob, the barometric reference is set to QNH, and the preset value is selected.

Note: *The selected value appears in the barometric reference window, and under the altitude scale on the PFD.*

Impacted by TDU: 00024027 Barometric Reference

BAROMETRIC REFERENCE

Barometric Reference



BAROMETRIC REFERENCE WINDOW

L12



The barometric reference is QNH 1 024 hPa.
The range of QNH is from 745 hPa(22.00 inHg) to 1 100 hPa(32.48 inHg).

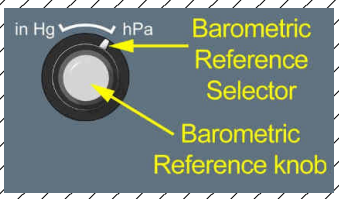


The barometric reference is STD. If the flight crew selects the QNH barometric reference, the barometric reference is automatically set to the preset value, i.e. 1 024 hPa.

BAROMETRIC REFERENCE CONTROLS

The barometric reference controls have an outer selector, and an inner knob.

Barometric Reference Controls



The flight crew uses the barometric reference selector to select the barometric unit (hectoPascal, or mercury inches) that is associated with the values displayed in the barometric reference window.

Note: The PFDs do not display the selected barometric unit.

The flight crew uses the barometric reference knob to select the barometric reference value. At the EFIS CP power-up, the barometric reference value starts at 1 013 hPa, or at 29.92 inHg, depending on the selected barometric unit.

When flight crew:

- Presses the barometric reference knob, the barometric reference is set to STD. The flight crew can turn the barometric reference knob to preset a QNH value. Then, when the flight crew reverts to the QNH barometric reference, the barometric reference automatically displays this preset value.
- Pulls the barometric reference knob, the barometric reference is set to QNH, and the preset value is selected.

Note: The selected value appears in the barometric reference window, and under the altitude scale on the PFD.

VV pb



The Captain's (First Officer's) PFD displays the Velocity Vector (VV).



The Captain's (First Officer's) PFD does not display the VV.

When TRK-FPA is selected, both PFD s automatically display the Flight Path Vector (FPV).

L3 When TRK-FPA is selected, pressing the VV pb has no effect: Both PFD s continue to display the FPV , and the VV light remains on.

L1 When HDG-V/S is selected, the PFD s do not automatically display the VV. However, the Captain (First Officer) can display the VV on their PFD by pressing the VV pb .

The PFD s no longer display the FPV (VV), when:
- The flight crew changes from TRK-FPA to HDG-V/S
  For more information on HDG-V/S / TRK-FPA selection, *Refer to AP/FD Modes / HDG-V/S / TRK-FPA Selection* .
- The flight crew performs a go-around.

LS pb

L12



The Captain's (First Officer's) PFD displays the following landing system data in accordance with the approach selected on the FMS ARRIVAL page: Deviation scales, deviation signals, course pointer, information.
For information on the landing system data, *Refer to PFD / Approach Guidance* .
If the flight crew selected an NPA on the FMS ARRIVAL page, and the FMS flight phase is descent or approach, the Captain's (First Officer's) FMA displays the FLS capability.
However, the FLS capability will not appear, if the NO FLS FOR THIS APPR message appeared on the MFD .

Note: *1. If the direct distance to the destination airport is more than 300 nm , only the deviation scales appear.*
2. The LS light automatically comes on when LOC , LOC B/C or F-LOC arms.



The Captain's (First Officer's) PFD does not display the landing system data.

ND MODE selector

L12



The flight crew can select one of the following navigational modes:

- PLAN mode
  For more information, *Refer to PLAN mode*
  If the flight crew selects the PLAN mode, the ND does not display terrain, weather, or traffic information.
- ARC mode
  For more information, *Refer to ARC mode*
- ROSE-NAV mode
  For more information, *Refer to ROSE-NAV mode*
- ROSE-VOR mode
  For more information, *Refer to ROSE-VOR mode*
- ROSE-LS mode.
  For more information, *Refer to ROSE-LS mode*

ND range selector



The flight crew selects the range for the ND and the VD , in nautical miles.

When the flight crew sets the ND range selector to ZOOM, the ND displays the moving airport map. For more information, *Refer to Airport Navigation* .

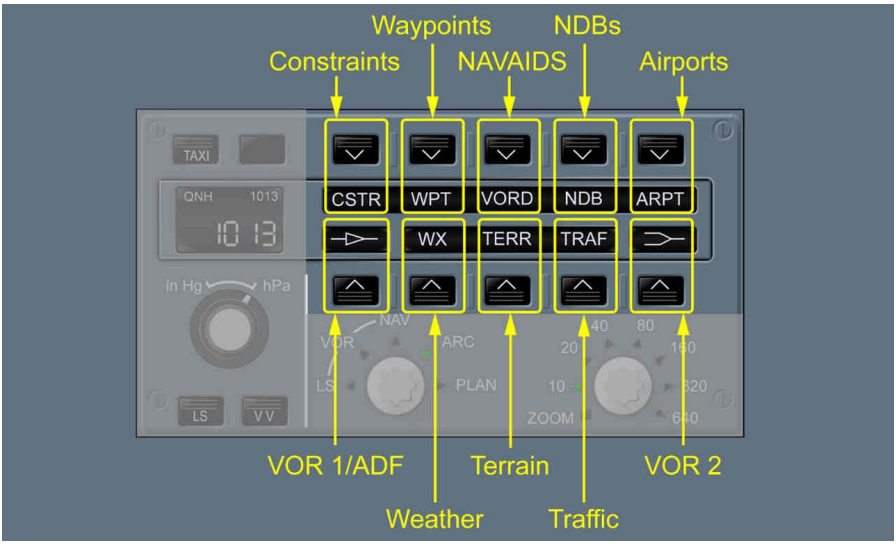
L3 *Note:* *The VD range is limited to 160 nm .*
The ND can only display the weather, if the selected range is below, or equal to, 320 nm .
If the flight crew sets the ND range selector to ZOOM, the VD display is no longer available.

L2 If the flight crew changes ND mode from ARC to one of the ROSE or PLAN modes, the ND range automatically increases to the next value. Therefore, the distance in front of the aircraft mock-up remains the same. If the flight crew changes ND mode to ARC mode, the ND range automatically decreases to the previous range value.

ND DATA DISPLAY

The flight crew can use the following pushbuttons to display associated optional data on the ND and/or on the VD :

ND Data Display



CONSTRAINTS



The ND displays:

- The constraint values associated with the flight plan waypoints
  The constraints values are the speed, altitude and time constraints.
  For more information, *Refer to ND / FMS DATA / Flight Plan Waypoints* .
- The Minimum Off Route Altitudes (MORA).
  If the flight crew selects a range that is equal to 20 nm or 10 nm , the MORA value is no longer displayed on the ND . For more information, *Refer to ND / FMS DATA /MORA or Offset* .

WAYPOINTS

L12



The ND displays all the waypoints that are stored in the navigation database and in the pilot stored database.
The flight crew can only press one of the WPT pb , VORD pb or NDB pb at the same time.

NAVAIDS

L12



The ND displays all the VOR s and the DME s of the navigation database and all the pilot stored NAVAIDS.
The flight crew can only press one of the WPT pb , VORD pb or NDB pb at the same time.

NDBS

L12



The ND displays all the non-directional beacons of the navigation database.
The flight crew can only press one of the WPT pb , VORD pb or NDB pb at the same time.

AIRPORTS



The ND displays all the airports of the navigation database, that are different from the origin or destination airports.

WEATHER

L12



Both ND and VD display the weather information.
If the flight crew has set the WX on VD option on the MFD to OFF, the VD does not display the weather information.
The flight crew cannot select the WXR pb and the TERR pb at the same time.
For more information, *Refer to SURV / WXR / ND.*

TRAFFIC



The ND displays all of the surrounding aircraft that have a transponder.
For more information, *Refer to SURV / TCAS / ND* .

TERRAIN

L12



The ND displays the terrain representation, and the TAWS messages.
The flight crew cannot select the WXR pb and the TERR pb at the same time.
For more information, *Refer to SURV / TAWS / ND* .

VOR1 /ADF



When pressed, the ND displays the following selected VOR 1 characteristics:
- The VOR 1 pointers, on the heading scale
- The VOR 1 station characteristics, on the lower left corner of the ND .



When pressed two times, the ND displays the following selected ADF characteristics:
- The ADF pointers, on the heading scale
- The ADF station characteristics, on the lower left corner of the ND .

VOR 2



When pressed, the ND displays the following selected VOR 2 characteristics:
- The VOR 2 pointers, on the heading scale
- The VOR 2 station characteristics, on the lower right corner of the ND .

CHRONOMETER

Applicable to: ALL

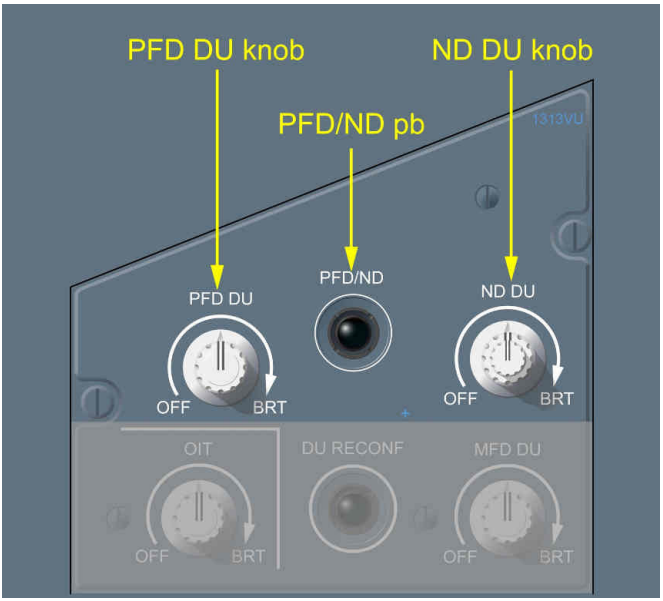


When pressed one time, the ND displays and starts the chronometer.
When pressed two times, the ND freezes the time that appears on the ND.
When pressed three times, the ND resets the chronometer, and the ND no longer displays the time.

DISPLAY UNIT CONTROL PANEL

Applicable to: ALL

Display Unit Control Panel



PFD DU knob

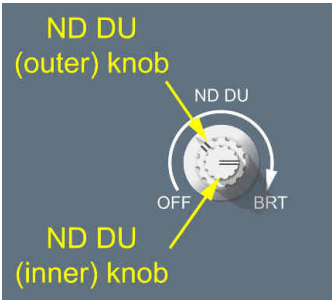


When turned, turns on or off the PFD screen, and adjusts the brightness of the PFD display unit.

The two light sensors that are located on the bottom of the display unit enable the automatic tuning of the brightness (in a limited range), according to the ambient lighting in the cockpit.

ND DU knob

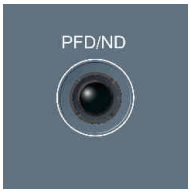
ND DU Knob



The inner knob:
- Turns on or off the ND
- Adjusts the brightness of the ND.
  The two light sensors that are located on the bottom of the display unit enable the automatic tuning of the brightness (in a limited range), according to the ambient lighting in the cockpit.

The outer knob controls the brightness of both the weather radar image and the terrain display.
L2 In the case of a terrain alert, the background lighting is set to 75 % of the overall lighting, regardless of the position of the ND DU knob. After the alert, the lighting returns to its default value.

PFD/ND pb



When pressed, exchanges the onside PFD and the ND, regardless of their default position.

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GENERAL

Applicable to: ALL

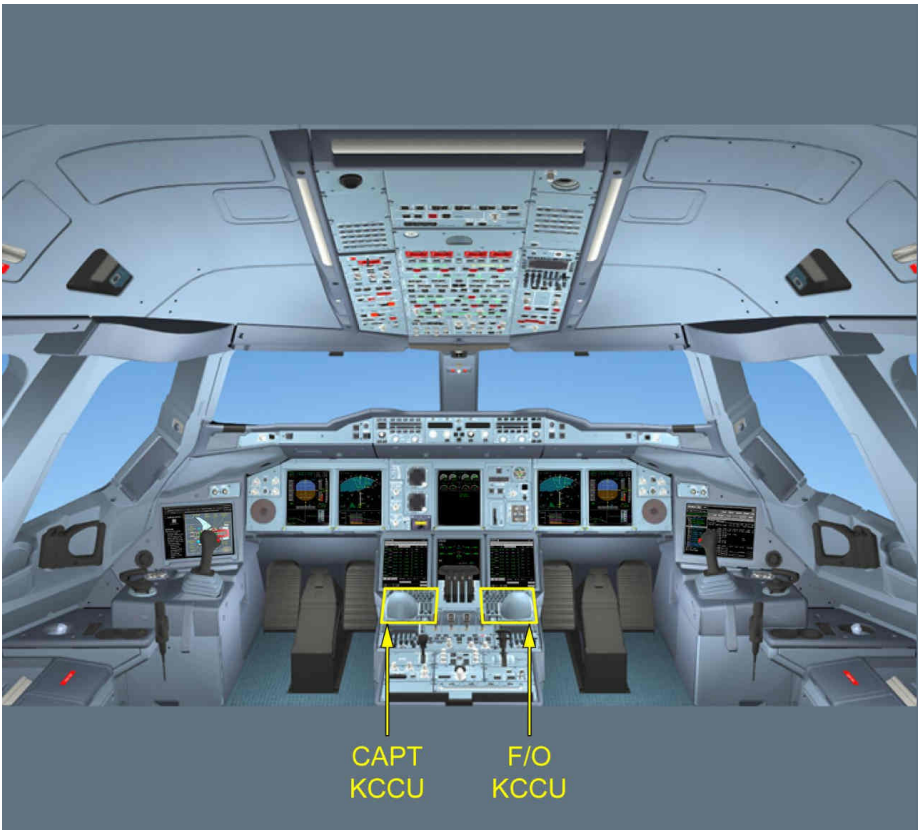
There are two Keyboard and Cursor Control Units (KCCUs) on the center pedestal. There is one for the Captain and one for the First Officer.

The KCCUs are used to:

- Interface with the Navigation Display (ND), the Multifunction Display (MFD), and the System Display (SD)
- Select and/or modify parameters.

L3 The two units are functionally identical.

Cockpit Presentation



L1 Each KCCU has a:

- Keyboard, to enter alphanumeric information.
  The keyboard also has shortcut keys that provide direct access to specific pages on a display unit.
- Cursor control device, that has a Validation pb, a wheel, a trackball and four control keys.

L2 The keyboard and the cursor control device are independent of each other: The failure of one does not affect the other.

The Captain KCCU



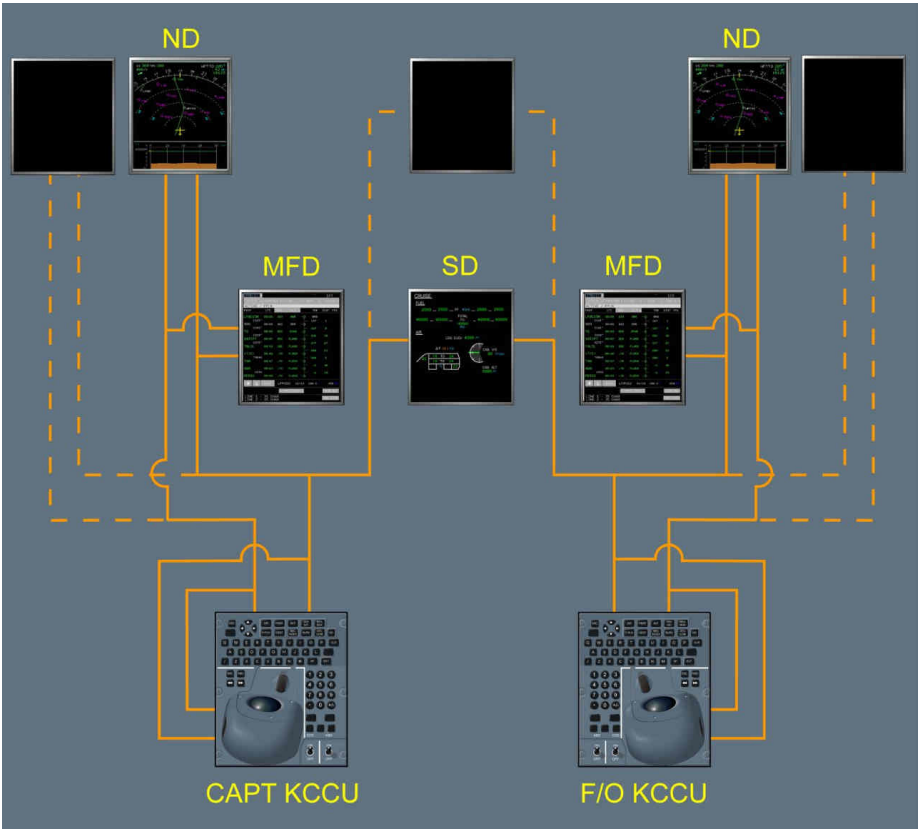
ARCHITECTURE

Applicable to: ALL

The KCCU s are directly-connected to the ND , MFD , and SD . They are also connected to the other display units for reconfiguration purposes (*Refer to Reconfiguration description*).

L3 They are connected via two redundant Controller Area Network (CAN) busbars.

Architecture

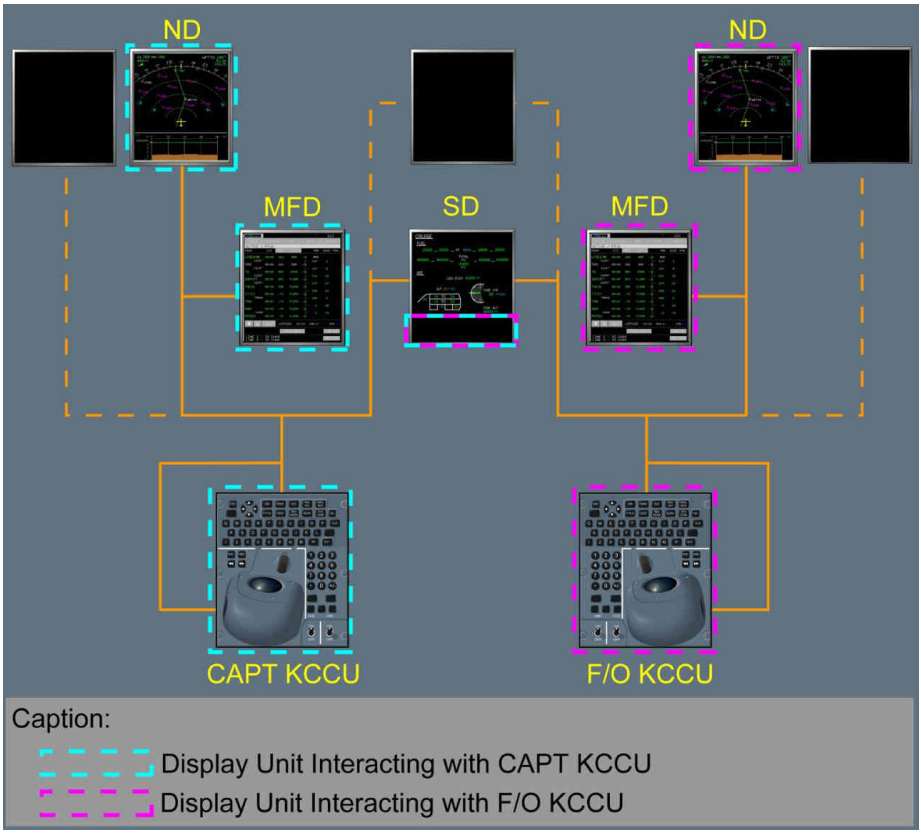


INTERACTION WITH DISPLAY UNITS

Applicable to: ALL

Each KCCU enables the flight crew to directly interact with:
- The onside ND
- The onside MFD
- The mailbox section of the SD.

Interaction with the Display Units



Note: *The KCCU continues to interact with the ND, MFD, and SD, irrespective of the display unit reconfiguration.*

CURSOR DISPLAY

Each KCCU displays a different cursor.

The Captain's cursor is :



The First Officer's cursor is :



Both cursors can appear in the mailbox section of the SD at the same time. However, only one KCCU can interact with the SD at one time. The active KCCU is the one that last interacted with the SD.

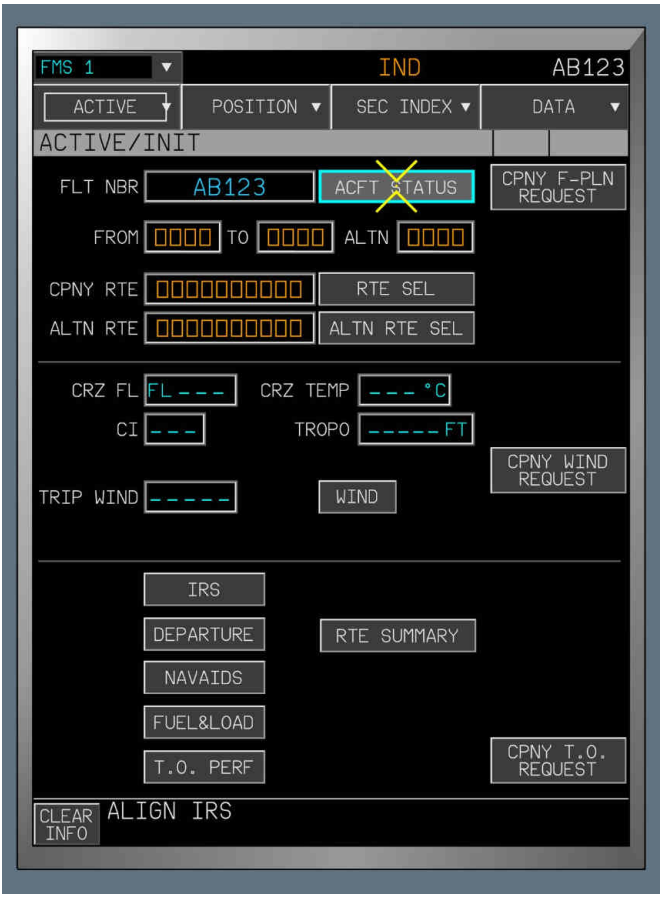
The KCCU is active on the display that shows the cursor.

However, the cursor may disappear when the KCCU is not used for an extended period of time. It reappears, when the flight crew uses any key, or the trackball of the KCCU.

INTERACTIVE ZONES

The flight crew can use the KCCU to interact with the objects on the different display units.

Interactive Zone



When the cursor is moved over a modifiable field of the display unit, a blue box appears around that field.

INTERACTION WITH THE ND

The lateral navigation part is the only interactive part of the ND.

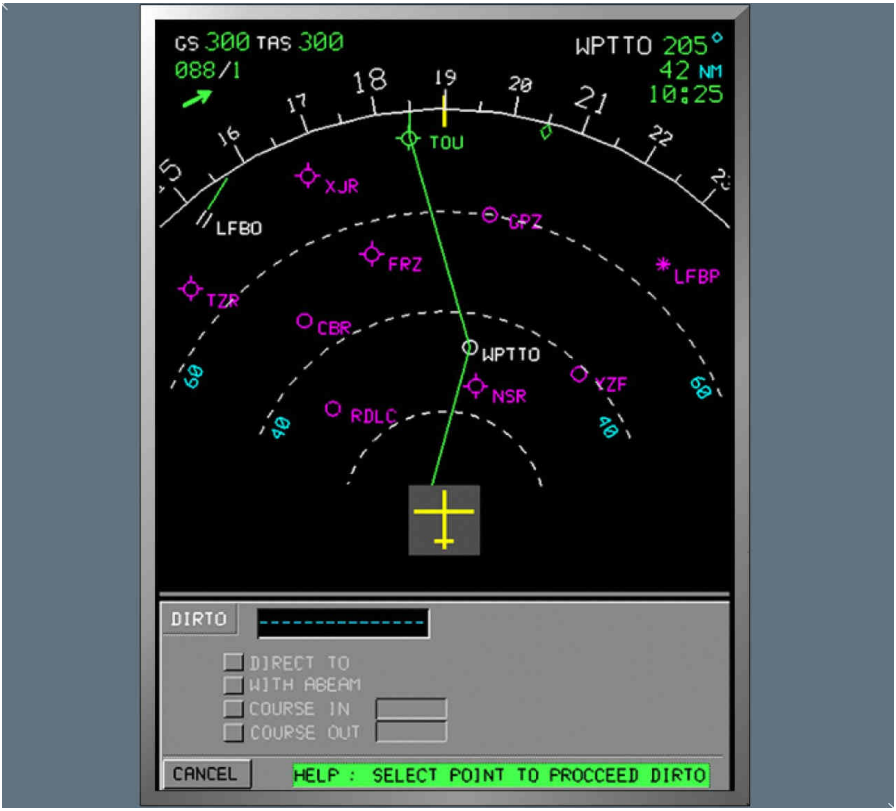
The interactive objects are:
- The aircraft symbol
- All displayed waypoints

- All displayed navaids
- All displayed airports.

The KCCU can be used to perform the following functions:
- Direct To
- Insert or delete a waypoint
- Access data on any displayed airport
- Insert, erase, or undo the temporary flight plan.

For the Direct To and the Insert functions, an interactive dialog box replaces the vertical display part of the ND. This dialog box enables the flight crew to enter parameters with the KCCU.

The ND



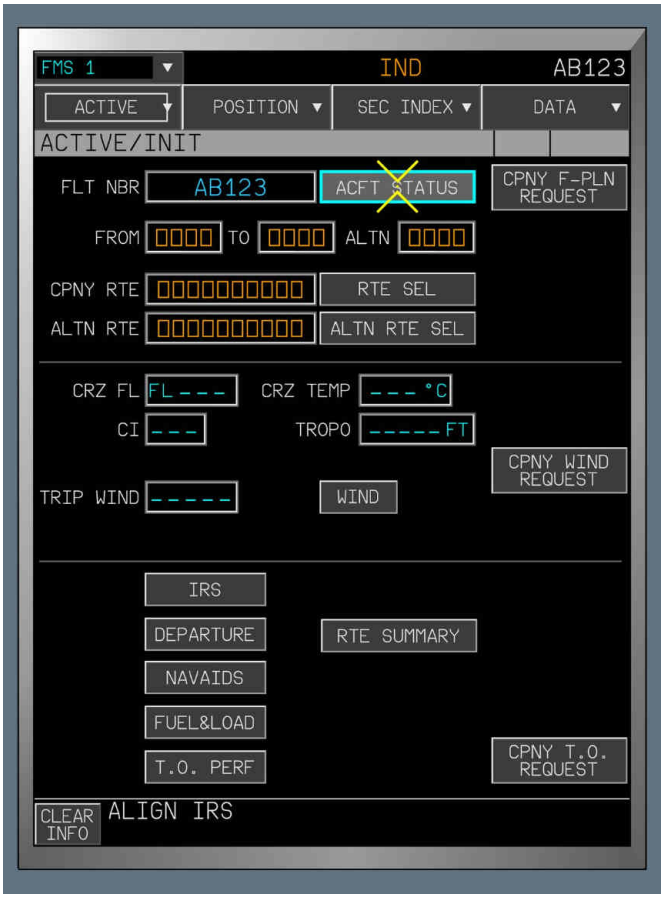
INTERACTION WITH THE MFD

The entire MFD screen is interactive.

The MFD displays the pages of the following applications:

- FMS
  The MFD enables to manage the flight planing functions of the aircraft.

FMS



- SURV(eillance)
  The MFD enables to manage the surveillance functions of the aircraft (TAWS, WXR, TCAS, XPDR).

SURV


SURV
AB123
CONTROLS
STATUS & SWITCHING
CONTROLS
SQWK
2000
IDENT
ALT RPTG
ON
OFF
XPDR
AUTO
ON
STBY
TCAS
TA/RA
TA ONLY
STBY
AUTO
ABV
BLW
WXR
WXR
AUTO
OFF
PRED W/S
AUTO
OFF
TURB
AUTO
OFF
ELEVN/TILT
AUTO
ELEVN
TILT
GAIN
AUTO
MAN
MODE
WX
MAP
WX ON VD
AUTO
OFF
TAWS
TERR SYS
ON
OFF
GPWS
ON
OFF
G/S MODE
ON
OFF
FLAP MODE
ON
OFF
SURV
DEFAULT SETTINGS
CLEAR INFO

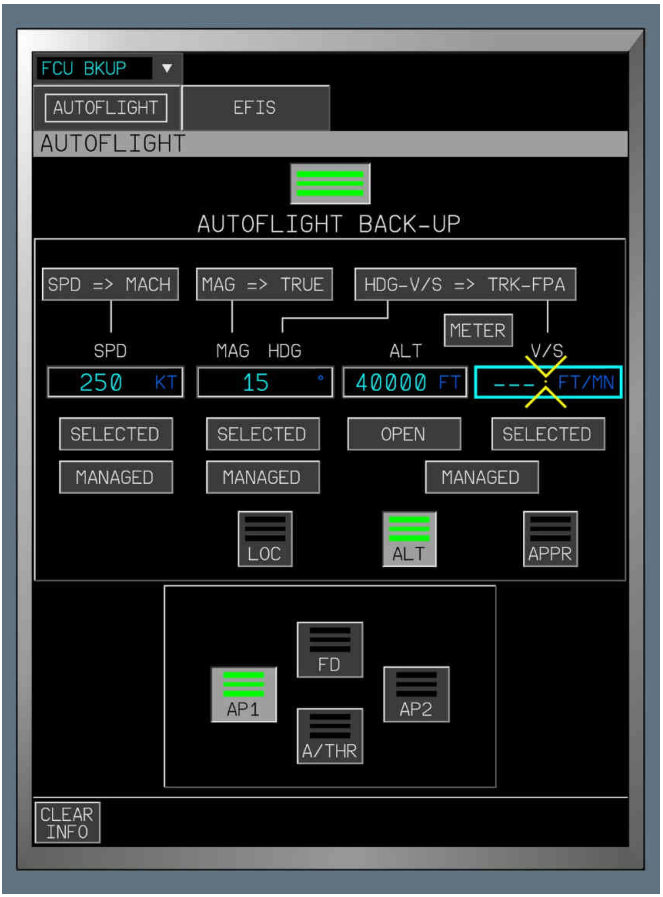
- ATC COM
  The MFD enables to manage the ATC functions of the aircraft.

ATC COM



- FCU backup.
  The MFD enables to recover all EFIS CP and/or all AFS CP functionalities through two dedicated pages.

FCU Backup



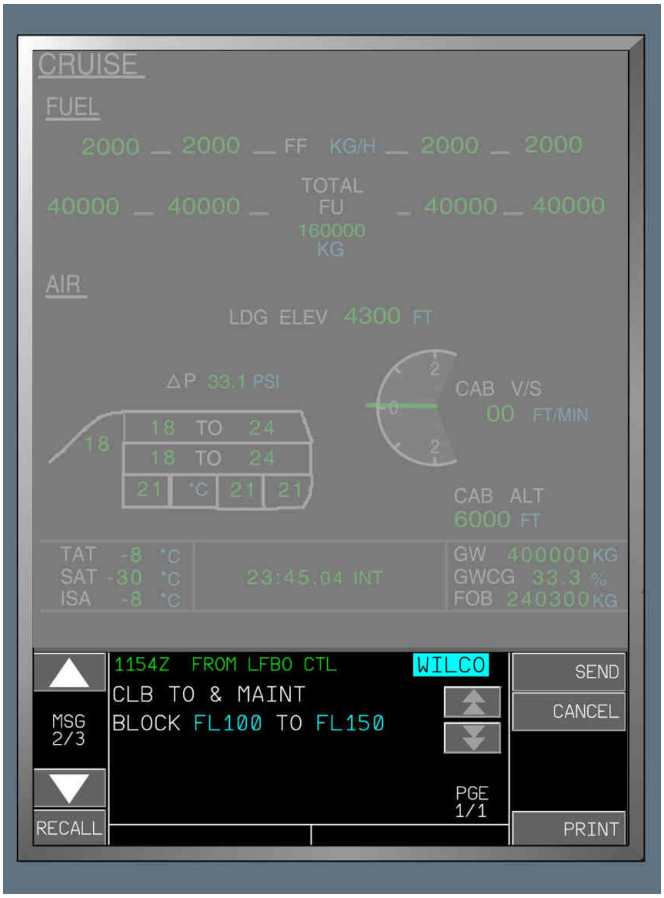
INTERACTION WITH THE SD

The ATC mailbox section is the only interactive part of the SD.

The flight crew can use the KCCU to:

- Write, select and send messages to the ATC
- Select and read messages from the ATC.

The SD


CRUISE
FUEL
2000 2000 FF KG/H 2000 2000
TOTAL FU
40000 40000 40000 40000
160000 KG
AIR
LDG ELEV 4300 FT
ΔP 33.1 PSI
CAB V/S
00 FT/MIN
18 TO 24
18 TO 24
21 °C 21 21
CAB ALT
6000 FT
TAT -8 °C
SAT -30 °C
ISA -8 °C
23:45.04 INT
GW 400000 KG
GWCG 33.3 %
FOB 240300 KG
1154Z FROM LFBO CTL
WILCO
CLB TO & MAINT
BLOCK FL100 TO FL150
MSG 2/3
PGE 1/1
RECALL
SEND
CANCEL
PRINT

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GENERAL

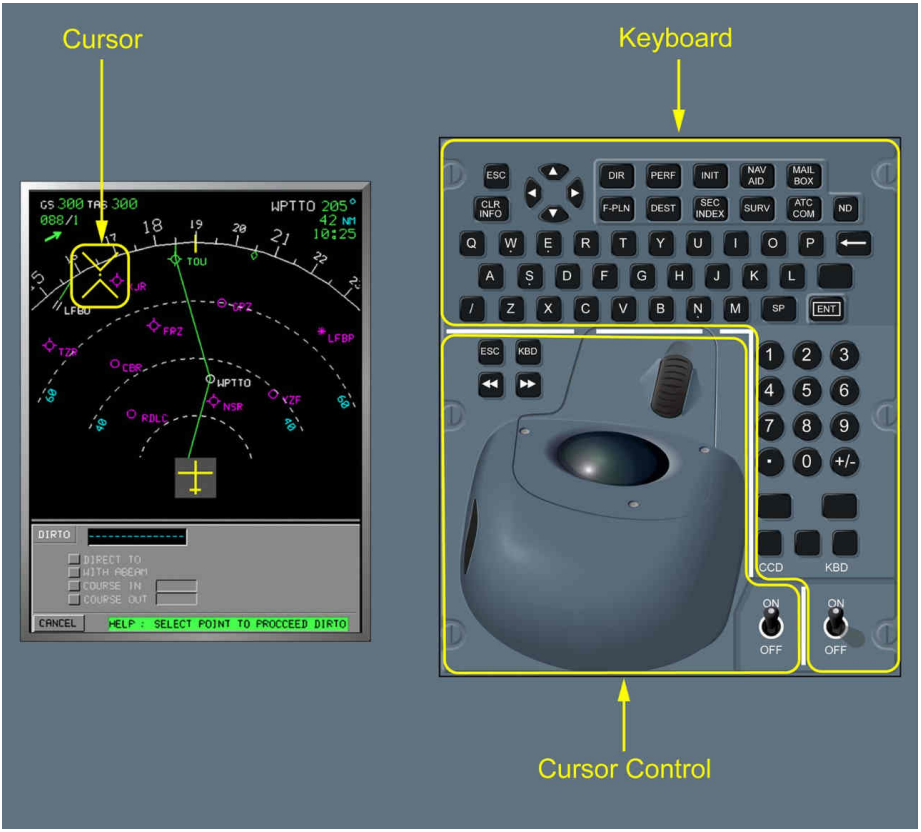
Applicable to: ALL

The KCCU has a:

- Keyboard
- Cursor control device.

The KCCU keys are backlit.

KCCU Parts



CURSORS

Applicable to: ALL

Each KCCU has a unique cursor. The symbol changes to indicate the status of the cursor.



The Captain's cursor is active.



The Captain's cursor is not active.
This only occurs when both cursors appear on the mailbox (on SD), and the First Officer's cursor is active.



The First Officer's cursor is active.



The First Officer's cursor is not active.
This only occurs when both cursors appear on the mailbox (on SD), and the Captain's cursor is active.



Appears:
- Before the cursor is displayed: The circle becomes increasingly smaller, until it disappears. Then, the cursor is active.
- When the flight crew selects a different page on the MFD, or moves the cursor to a different display unit.

KEYBOARD

Applicable to: ALL

Keyboard



The keyboard module has:

- Shortcut keys
- One Backspace key
- One ENT key
- Numeric keys
- One ON/OFF sw
- Alphabet keys

- One CLR INFO key
- One ESC key
- Four direction arrow keys.

DIR KEY



When pressed:
- Displays the FMS DIRECT TO page on the MFD (*Refer to FMS - DIRECT TO page*)
- Moves the cursor back to the MFD if it was on an other display before.

PERF KEY



When pressed:
- Displays the FMS ACTIVE / PERF page (on the panel that corresponds to the active flight phase) on the MFD (*Refer to FMS - PERF page*)
- Moves the cursor back to the MFD if it was on an other display before.

INIT KEY



When pressed:
- Displays the FMS ACTIVE / INIT page on the MFD (*Refer to FMS - INIT page*)
- Moves the cursor back to the MFD if it was on an other display before.

NAVAID KEY



When pressed:
- Displays the FMS POSITION / NAVAIDS page on the MFD (*Refer to POSITION / NAVAIDS page*)
- Moves back the cursor to the MFD if it was on an other display before.

F-PLN KEY



When pressed:
- Displays the top of the flight plan on the FMS ACTIVE / F-PLN page on the MFD , (*Refer to FMS - F-PLN page*)
- Moves the cursor back to the MFD if it was on an other display (ND , or ATC Mailbox) before.

DEST KEY



When pressed:
- Displays the bottom of the primary flight plan on the FMS ACTIVE / F-PLN page on the MFD (*Refer to FMS - F-PLN page*)
- Moves the cursor back to the MFD if it was on an other display before.

SEC INDEX KEY



When pressed:
- Displays the FMS SEC / INDEX page on the MFD (*Refer to FMS - SEC / INDEX page*)
- Moves the cursor back to the MFD if it was on an other display before.

SURV KEY



When pressed:
- Displays the SURV CONTROLS page on the MFD (*Refer to SURV - CONTROLS page*)
- The cursor moves back to the MFD if it was on an other display before.

Mailbox KEY



When pressed, the cursor moves to the mailbox section of the SD (*Refer to Mailbox*), if it was on an other display before.

ATC COM KEY



- Displays the ATC COM REQUEST page on the MFD (*Refer to ATC COM REQUEST page*)
- Moves the cursor back to the MFD if it was on an other display before.

ND KEY



When pressed, moves the cursor to the ND.

ENT KEY



Operates the same way as the Validation pb of the cursor control device.

- Edits an entry field:
  - The cursor is positioned in the field, and is ready for a new entry
  - When data is entered, another click validates the entry, and the cursor moves to the field, or to the action-button, that is most likely to be used next.
- Edits an option-list:
  - The option-list opens to the first option that is selected
  - The flight crew uses the wheel, or the direction arrow keys, to change the selected option, if required
  - Another click validates the selection, and the cursor moves to the field, or to the action-button, that is most likely to be used next.
- Activates an action-button.

← KEY



- Clears the entry field, if the entire field is selected, or

Example of Selection Clear



Note: *In some entry fields, such as NAVAIDS, clearing a previously entered value will set the entry field to the default value.*

- Clears the entry field, one character at a time, from right to left.

Example of Character Clear



NUMERIC KEYS

NUMBER KEYS



Inserts a number at the cursor position in the entry field.

+/- KEY



Inserts a plus or minus sign in front of the edited value.

. KEY



Inserts a "." (decimal point) at the cursor position in the entry field.

ALPHABET KEYS

LETTER KEYS



Inserts an alphabet character at the cursor position in the entry field.
The alphabet keys are organized in the "QWERTY" (US keyboard) layout.

N, E, S, W (CARDINAL POINT) KEYS



Inserts a cardinal point (N, E, S, W) in fields, when applicable.
There is a dot under these letters. This dot helps the flight crew to easily find these keys.

/ KEY



Inserts a "/" (slash) at the cursor position in the entry field.

SP KEY



Inserts a space at the cursor position in the entry field.

ON/OFF sw



The KCCU keyboard is active.



The KCCU keyboard is not active.

CLR INFO KEY



When pressed, the information message that is currently displayed in the FMS, ATC COM, or Surveillance message area is cleared.

ESC KEY



When pressed, cancels the current field edition. The field returns to the last valid value.
There is a similar key on the cursor control device.

DIRECTION ARROW KEYS

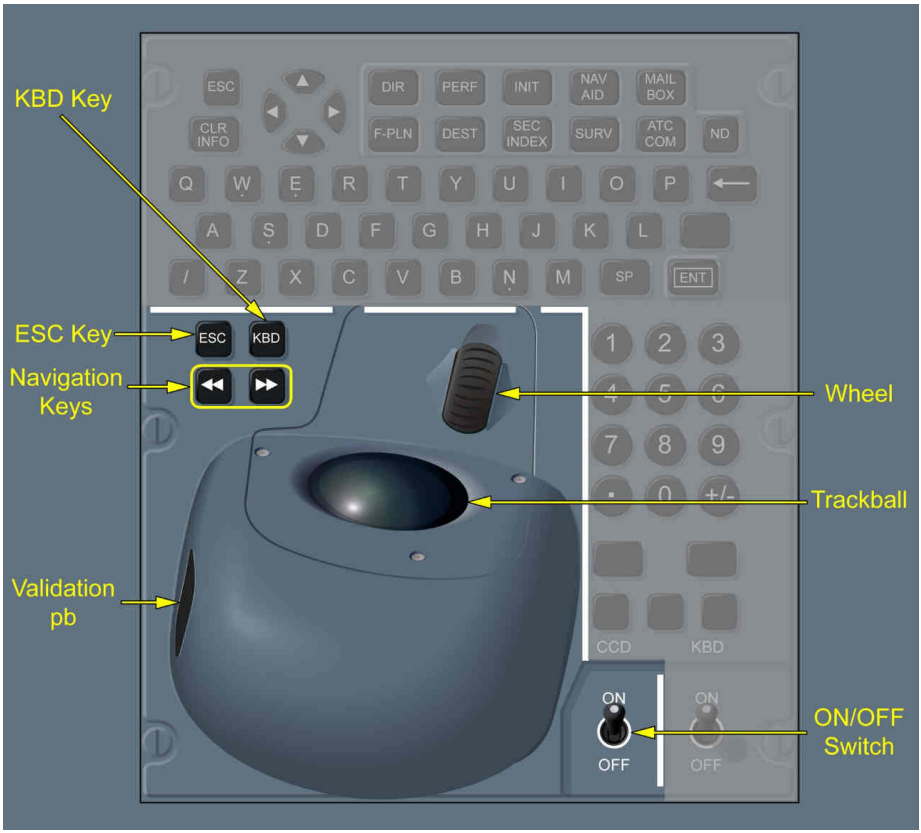


- Move the cursor from one field to another in the direction of the pressed key. The cursor remains in the selected display unit.
  These keys operate in the same way as the trackball on the cursor control device.
- Move the blue selection box in the option-list, in the direction of the pressed key. These keys operate in the same way as the wheel on the cursor control device.

CURSOR CONTROL

Applicable to: ALL

Cursor Control



The cursor control device has:
- One wheel
- One trackball
- One ON/OFF sw
- One Validation pb
- Two navigation keys

- One ESC key
- One KBD key.

WHEEL



Enables the flight crew:
- To change the selection in an option-list
- To scroll to a specific page display, for example, to the F-PLN or to the message list
- To increment a value in an entry field.

TRACKBALL



Operates the same way as the direction arrow keys on the keyboard. Enables the flight crew to move the cursor over the interactive section of the selected display unit.

ON/OFF sw



The KCCU cursor control device is active.



The KCCU cursor control device is not active.

Validation pb



Operates the same way as the ENT key of the keyboard.

Enables the flight crew to:

- Edit an entry field:
  - The cursor is positioned in the field, and is ready for a new entry
  - When data is entered, another click validates the entry, and the cursor moves to the field, or to the action-button, that is most likely to be used next.
- Edit an option-list:
  - The option-list opens to the first option that is selected
  - The flight crew uses the wheel, or the direction arrow keys, to change the selected option, if required
  - Another click validates the selection, and the cursor moves to the field, or to the action-button, that is most likely to be used next.
- Activates an action-button.

NAVIGATION KEYS



Moves the cursor to the display unit that is to the right, or to the left, of the one that is currently selected (if applicable).

ESC KEY



When pressed, cancels the current field edition. The field returns to the last valid value.
There is a similar key on the keyboard.

KBD KEY

L12



When pressed, displays the soft keyboard on the MFD.
By default, it appears in the lower part of the MFD, unless the field to be edited is in the lower part of the display unit.
The soft keyboard acts a backup to the KCCU keyboard.
When pressed again, the soft keyboard disappears from the MFD.

Note: *If the keyboard fails, or is switched off, the soft keyboard automatically appears, when the flight crew modifies an entry field.*

LOSS OF KEYBOARD

Applicable to: ALL

KEYBOARD BACKUP

In case of a total or partial loss of the keyboard, the flight crew can use a soft keyboard as a backup.

The soft keyboard has:
- Alphabet softkeys
  "A" to "Z" keys, organized in a "QWERTY" layout.
- Numeric softkeys
  "0" to "9", "." (decimal point) and "+/-" (plus and minus) keys.
- A CLR softkey
- An ENT softkey
- A "/" (slash) softkey
- An SP softkey
- An ESC softkey
- N, E, S, W softkeys
  These insert cardinal points. There is a dot under these letters. This dot helps the flight crew to easily find these keys.
- Left and right arrow softkeys
  These softkeys operate in the same way as the left and right keys of the direction arrow keys.

SOFT KEYBOARD DISPLAY

The soft keyboard appears in either the upper, or lower, part of the MFD:
- Automatically, if the hard keyboard fails, as soon as the flight crew edits any field
- If the flight crew presses the KBD key on the cursor control device.

It appears in the lower part of the MFD by default, unless the field to be edited is in the lower part of the display unit.

Note: The soft keyboard cannot be used to edit an entry field on the ND, even if the flight crew can continue to interact with the ND, via the cursor control device.
Therefore, when the hard keyboard fails, it is not recommended to access the FMS functions via the ND, but to use the MFD instead.

SOFT KEYBOARD EXIT

The soft keyboard is no longer displayed on the MFD:

- When the flight crew presses the ENT key or the ESC key
- When the flight crew presses the KBD key on the cursor control device, while the soft keyboard is displayed

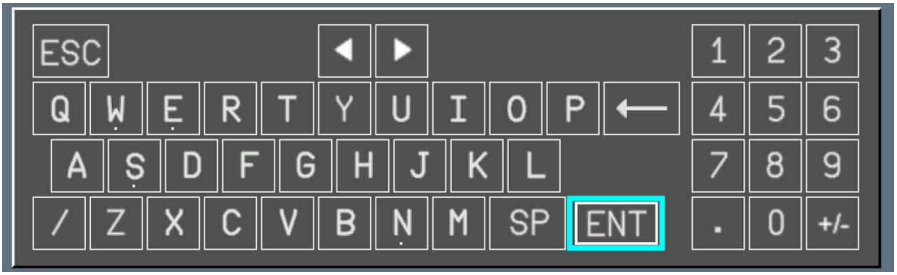
L3 *Note: Pressing the KBD key to remove the soft keyboard from the MFD, will leave the cursor in its current position.*

L1 - In case of a display unit reconfiguration involving the MFD.

USE OF THE SOFT KEYBOARD

When the soft keyboard is displayed, the “ENT” softkey is highlighted by a blue outline around the softkey.

Soft Keyboard



The blue box highlights the currently-selected softkey. The flight crew can change the selection with the trackball of the cursor control device.
Only one softkey is highlighted at a time.
When the flight crew presses the cursor control Validation pb, the selected character is entered in the active entry field.

ECAM ALERTS

Applicable to: ALL

CDS CAPT (F/O) CURSOR CTL FAULT (*Refer to Procedure*)

CDS CAPT (F/O) CURSOR CTL+KEYBOARD FAULT (*Refer to Procedure*)

CDS CAPT (F/O) KEYBOARD FAULT (*Refer to Procedure*)

CDS CAPT (F/O) MAILBOX ACCESS FAULT (*Refer to Procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
KCCU	CAPT KCCU Keyboard	DC ESS / DC 1
	CAPT KCCU Cursor and Control Device	DC ESS
	F/O KCCU Keyboard	DC 1 / DC 2
	F/O KCCU Cursor and Control Device	DC 2

Intentionally left blank

GENERAL

Applicable to: ALL

Electronic Centralized Aircraft Monitoring (ECAM) provides necessary information to the flight crew, for both normal and abnormal operations. It displays this information on the:

- Engine and Warning Display (EWD):
  For normal checklists, abnormal and emergency procedures, limitations, and memos
- System Display (SD):
  For system displays, aircraft status, and permanently-displayed data
- Primary Flight Display (PFD):
  For limitations that have an immediate impact on the flight, or to increase the flight crew awareness on memos.

ECAM ARCHITECTURE

Applicable to: ALL

The ECAM has:

- Two FWS s

L2 These FWS s collect data from aircraft systems, and trigger applicable alerts. When an alert is triggered, the FWS s send the information for display to the display units.

L1 - An ECAM Control Panel (ECP)

L2 The flight crew uses the ECP to interface with the ECAM .

L1 - Four attention-getters, referred to as master-lights.

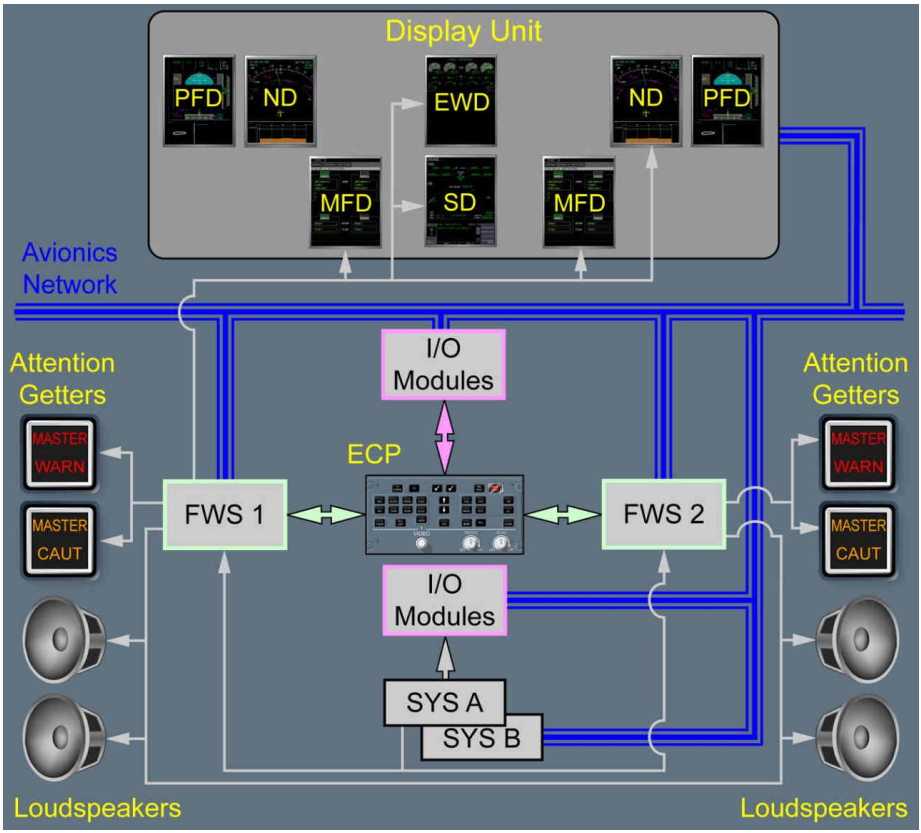
L2 These master lights include two MASTER CAUT lights, and the two MASTER WARN lights, that are on the cockpit glareshield.

L1 - Four loudspeakers

L2 There are two loudspeakers on the Captain's side, and two on the First Officer's side.

L1 - Can display information on the EWD , the SD , and the PFD .

ECAM Architecture



FLIGHT WARNING SYSTEM (FWS)

The ECAM monitors most aircraft systems, triggers alerts, and provides operational information to the flight crew.

The ECAM has two identical FWS s that:

- Monitor aircraft systems, and aircraft configuration.
  Both FWS s receive information from aircraft systems, and compute alerts (warnings and cautions) in real time.

L3 The FWS receives this information directly, via the avionics network. Systems that do not support direct avionics network connection, transmit the parameters via the assigned IMA input/output modules.
In the case of an avionics network failure, conventional buses ensure direct communication, and act as a backup between the ECAM and specific systems.

L1 - Operate independently, and in parallel. Therefore, if one FWS fails, the remaining FWS is sufficient to perform all functions, and there is no operational impact.
- Trigger failure messages and applicable alerts, and manage alert priority and flight phase inhibition (*Refer to DSC-31-40-10 Alert Types and Levels*).
  The ECAM also computes the flight phases that determine when alerts are displayed, if required.
- Display recovery procedures and, if required, associated limitations, aircraft status, memos, and system display pages.
- Produce applicable aural warnings, and visual attention-getters.

L2 These are linked to alerts, and attract the flight crew's attention, or emphasize the severity.

L1 - Provide not-sensed abnormal procedures (not detected by the FWS), when selected by the flight crew via the ECP .

L2 Some system failures that the ECAM cannot detect, or some aircraft configurations, may require the flight crew to access specific procedures. The flight crew can manually display this procedure on the EWD , by using the ABN PROC pb on the ECP .

L1 - Provide normal checklists, when requested by the flight crew.

L2 The flight crew can, at any time, display the normal checklists, and the deferred procedures, if any, by using the C/L pb on the ECP .

L1 If procedures are deferred to all phases or to the approach or landing phases, these deferred procedures will automatically appear during the approach phase.

- Emit automatic altitude callouts and audio indicators.

L3 The two FWS s are installed on two distinct CPIOM-C s.

L1 Each FWS has three databases:

- A database with all ECAM procedures of a FWS standard, abnormal, emergency, normal checklists (C/L), memos and limitations

L3 This database contains all the logics and procedures to ensure ECAM functions.

L1 - A temporary quick change database, to enable Airbus to update ECAM procedures in between two FWS standards, if necessary.
This database is also referred to as the Airbus Temporary Quick Change (ATQC) database.
An ECAM procedure modified, or updated via the ATQC database is temporary, and remains applicable until the appropriate technical solution is applied to the aircraft (new FWS standard, or new system standard).

L3 The ATQC enables Airbus to:
- Modify abnormal and emergency procedures
- Modify aircraft status, memos and limitations.

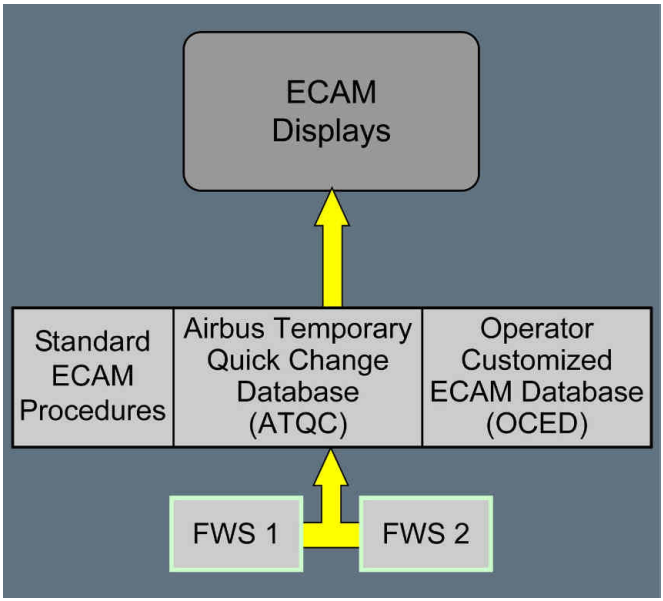
L1 - A customization database, to enable Operators to customize some of the ECAM procedures, if necessary.
This database is also referred to as the Operator Customized ECAM Database (OCED).

L3 The OCED enables Operator to:
- Modify the normal C/L
- Add not sensed abnormal procedures
- Add more information to a not sensed abnormal procedure or to an alert.

- The ATQC and the OCED databases have separate domains. Any parts of the ECAM procedures that are modified by one database, ATQC or OCED , cannot be modified by the other database.

L1 All ECAM displays take the three databases into account.
- If the ATQC database is not compatible with the FWS standard, the ECAM alert FWS ATQC DATABASE REJECTED is triggered on ground only at electrical power-up. For more information on this alert *Refer to DSC-31-40-60-10 FWS ATQC DATABASE REJECTED*
- If the OCED database is not compatible with the FWS standard, the ECAM alert FWS AIRLINE CUSTOMIZATION REJECTED is triggered on ground only at electrical power-up. For more information on this alert *Refer to PRO-ABN-ECAM-10-31-165 FWS AIRLINE CUSTOMIZATION REJECTED* .

FWS Databases



ECAM CONTROL PANEL (ECP)

The ECAM Control Panel (ECP) enables the flight crew to:

- Select and interface with the procedures and checklists displayed on the EWD
- Select the system display pages
- Control the video system.

Refer to DSC-31-40-20-AAA ECAM Control Panel .

ATTENTION-GETTERS

There are two attention-getters on the glareshield of each flight crew member's station: One MASTER WARN light , and one MASTER CAUT light , depending on the severity of the failure. These attention-getters inform the flight crew of an alert.
When pressed, the lights go off and the associated aural warnings stop.
MASTER WARN flashes in the case of emergency situations (e.g. emergency procedure displayed on the EWD).
MASTER CAUT lights up in the case of abnormal situations (e.g. abnormal procedure displayed on the EWD).

Note: *In the case of multiple failures, both MASTER WARN lights and MASTER CAUT lights may come on at the same time.*

Refer to ECAM - Glareshields Controls .

LOUDSPEAKERS

There are four loudspeakers in the cockpit: Two on the left, and two on the right side of the cockpit.
The loudspeakers can emit audio indicators, including synthetic voice messages.

Note: *1. The volume control knobs of the loudspeakers cannot adjust the volume of FWS audio indicators. These knobs can only adjust the volume of radio communication broadcasts.*
2. The ECAM controls the emission of aural indicators by managing priorities.

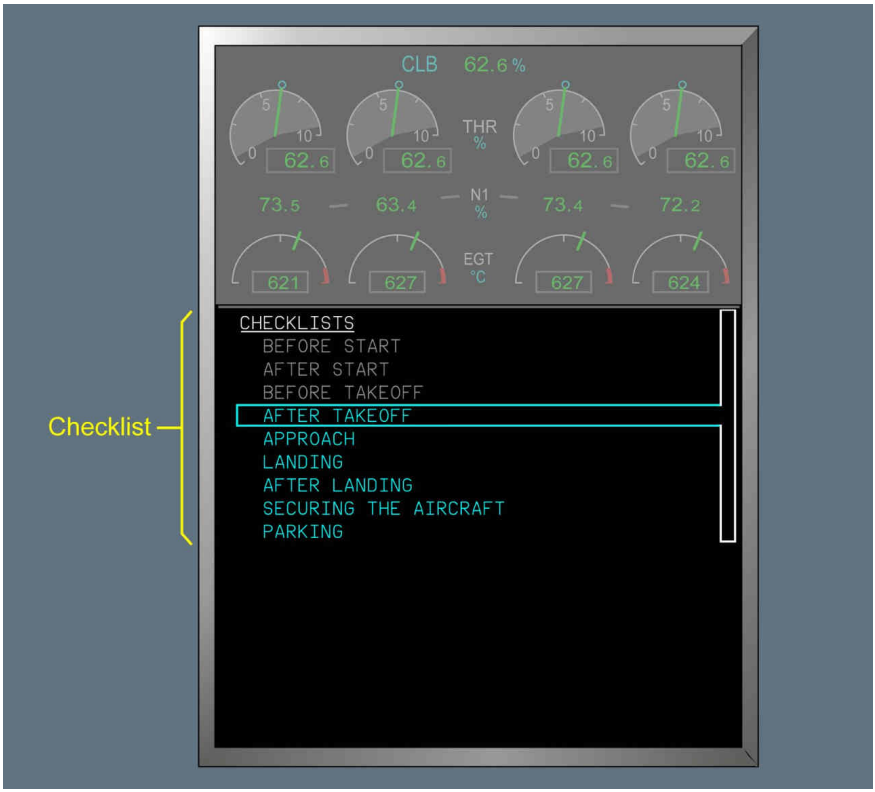
DISPLAY UNITS

The ECAM displays information on the Display Units:
- Engine and Warning Display (EWD)
- System Display (SD)
- Lower part of the Primary Flight Display (PFD).

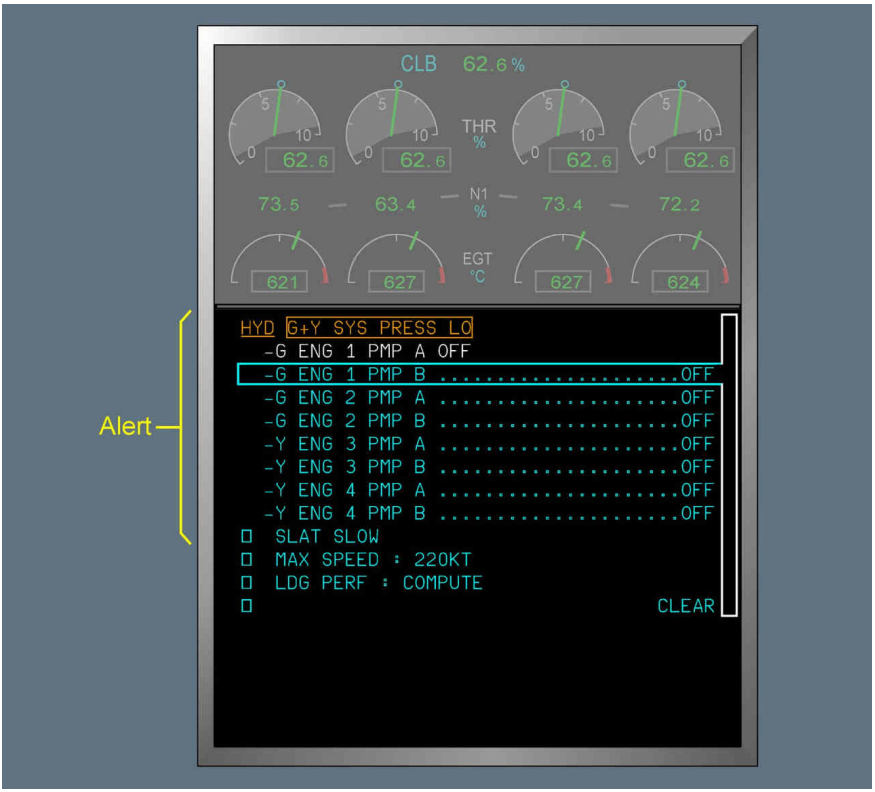
EWD

The EWD displays alerts, not-sensed procedures, memos, and checklists. *Refer to ECAM Display on the EWD* .

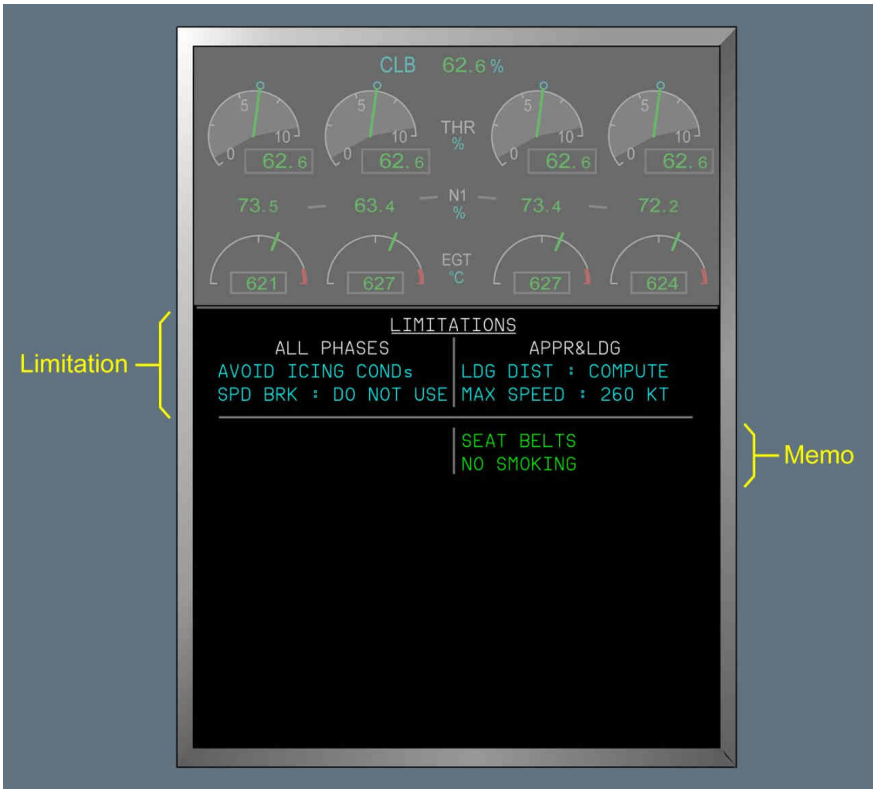
Checklist Display on the EWD



Alert Display on the EWD



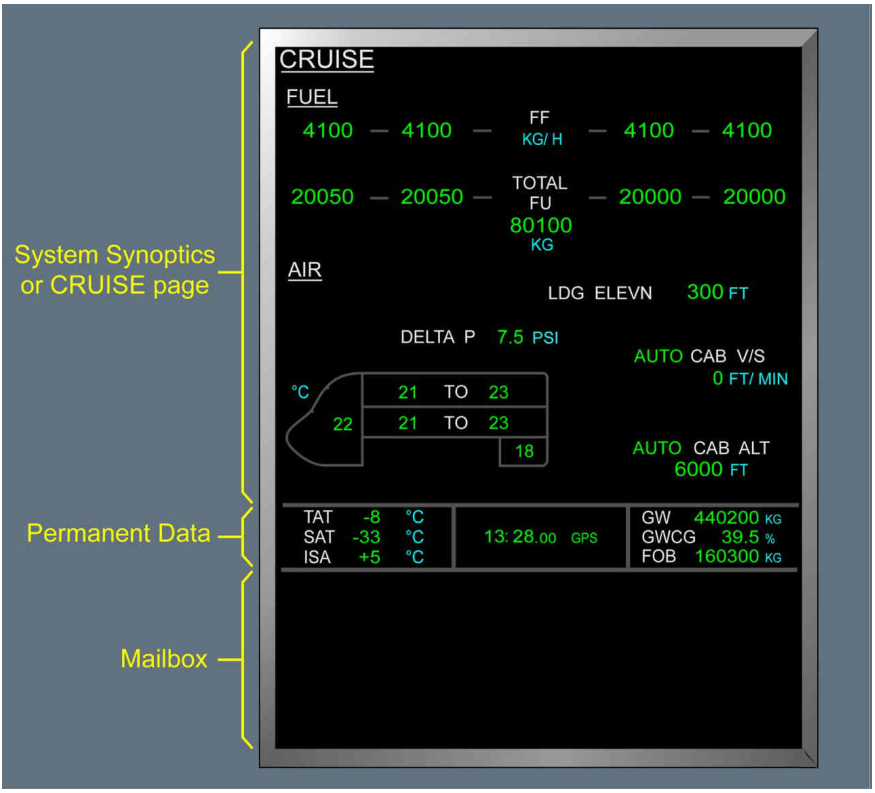
Memo and Limitation Display on the EWD



SD

The SD displays aircraft status, STATUS pages, and system pages. *Refer to ECAM Display on the SD* .

ECAM Display on the SD — GENERAL



PFD

The lower part of the PFD displays memos (*Refer to DSC-31-40-10 Memos*) and limitations (*Refer to DSC-31-40-10 Limitations*).

ECAM on the PFD — General



ECAM COLOR CODES

Applicable to: ALL

The ECAM displays information in various colors. Each color indicates the importance of the displayed information, or of the failure.

RED
- For configurations, or failures, that require immediate action.
- For specific limitations (e.g. LAND ASAP), or specific memo items (e.g. AP OFF).

AMBER	- For configurations, or failures, that the flight crew should be aware of, but that do not require immediate action. However, when time and situations permit, these cautions should be considered without delay, to prevent any further degradation of the affected system or of any other related system. - For specific limitations (e.g. LAND ANSA), or specific memo items (e.g. A/THR OFF).
GREEN	- For information in the procedure, or in the STATUS page. - For checklist items completed by the flight crew. - For memo items.
WHITE	- For a procedure completed by the flight crew. - For submenus, condition lines, and titles. - For more information item on the STATUS MORE page. - For a completed deferred procedure title in the checklist menu.
BLUE	- For actions to be completed, limitations to be followed, checklist items to be checked, or for not completed checklists in the checklist menu.
MAGENTA	- For a specific memo (e.g. TO or LDG inhibition).
GREY	- For checklists completed by the flight crew. - For an action not yet validated by the flight crew (e.g. condition items or a not-sensed procedure that are not activated).

ALERT TYPES AND LEVELS

Applicable to: ALL

ALERT

Alert : An alert is a visual, or aural, signal that helps the flight crew to detect and identify a system fault, the abnormal operation of a system, or a degraded condition of the aircraft.

ALERT LEVELS

The ECAM receives information from aircraft systems, computes alerts (warnings, and cautions) in real time, and displays or sounds these alerts in the cockpit. These alerts are organized, according to their level of importance, and the priority of required actions.

Alert Level	Color	Description	Aural Signals	Visual Signals
Warning (Level 3)	Red	For an emergency situation, that requires immediate flight crew action, because: - The aircraft is in a dangerous configuration, or in a limiting flight condition - Failure of a system that impacts the safety of the flight	Continuous Repetitive Chime (CRC), or a specific sound, or a synthetic voice.	- MASTER WARN light, and/or specific local red light. - Red warning displayed on EWD. - Applicable system page automatically displayed on SD, if any.
Caution (Level 2)	Amber	For an abnormal situation, that the flight crew should be aware of, but that does not require immediate action, because the failure does not immediately impact the flight. However, when time and situations permit, these cautions should be considered without delay, to prevent any further degradation of the affected system, or of any other associated system.	Single Chime (SC)	- Steady MASTER CAUT light. - Amber cuation displayed on EWD. - Applicable system page automatically displayed on SD, if any.
Caution (Level 1)	Amber	For a situation that requires the flight crew to be informed (crew awareness), but does not require a flight crew action (e.g. redundancy loss, or system degradation).	None	Amber caution message displayed on EWD without a procedure.

PRIORITY OF ALERTS

There are three levels of priority associated with warnings and cautions:

- Warnings (level 3)
- Caution (level 2)
- Caution (level 1).

Level 3 warnings have priority over level 2 cautions, that have priority over the level 1 cautions. In addition, if the ECAM detects multiple alerts that have the same level, it displays these alerts in their descending order of priority. In all cases, the ECAM will first display the alert that has the highest priority, and that should be treated first.

ALERT TYPES

There are three different types of alerts. They are classified by their potential impact on other systems.

Alert Type	ECAM Display	Description
Independent	Independent Alert F/CTL PRIM 1 FAULT	For a failure that affects an isolated system, but does not degrade other aircraft systems.
Primary	Primary Failure HYD G SYS PRESS LO	For a failure that affects a system, and causes the loss of other systems, or other system equipments.
Secondary	Secondary Alert *F/CTL	For the loss of a system, or a system reconfiguration , or a system limitation, that is the result of a primary failure. Affected parts of the failed system are indicated on the associated SD page.

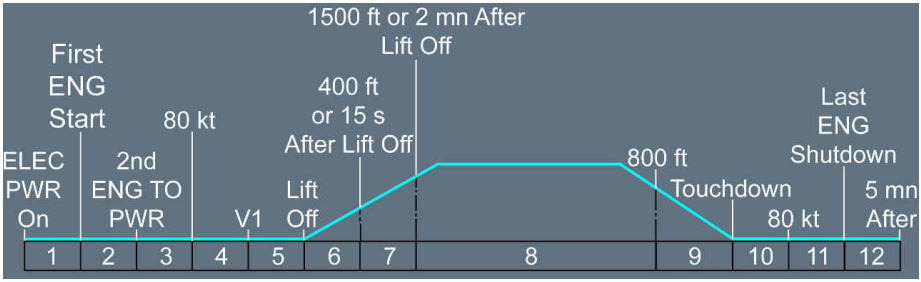
ECAM FLIGHT PHASES

Applicable to: ALL

The ECAM defines the flight phases for each flight.

L2 Each flight is divided into 12 flight phases. Flight phases change according to the aircraft configuration and system input.

Flight Phase Inhibition



L1 The ECAM uses flight phases to improve overall operational efficiency during each flight:

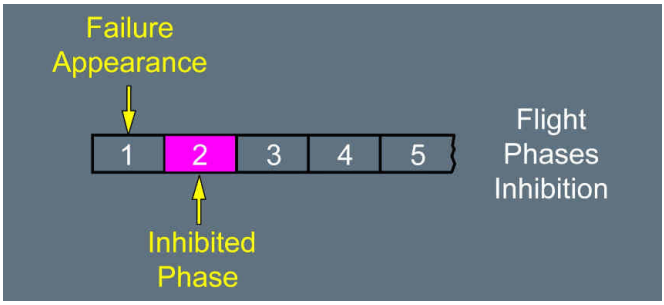
- During high workload phases, e.g. takeoff and landing, the ECAM inhibits warnings and cautions that can be delayed to a more appropriate time. This is also referred to as flight phase inhibition
- The ECAM displays the system page that corresponds to the current flight phase, unless there is an aircraft system failure
- The ECAM displays the applicable takeoff and landing memos.

L2 *Note:* *1. These ECAM flight phases are different and independent from the ones used by the FMS.*
2. They are also different from the flight phases in the checklist menu.
3. In flight phase 7, if the thrust is reduced (thrust levers at CL), the flight phase changes from 7 to 9. When the aircraft crosses 1 500 ft, the flight phase will then change from 9 to 8.

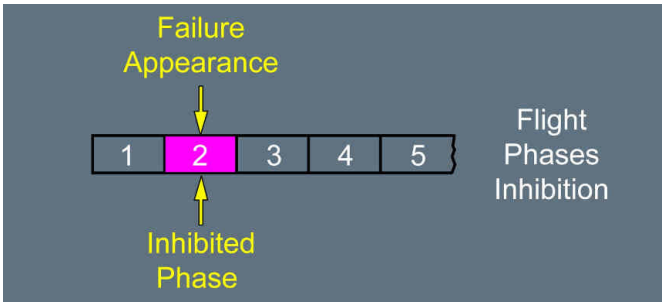
L1 **FLIGHT PHASE INHIBITION**

When the ECAM detects a failure, an applicable alert is either triggered immediately, or delayed to a more appropriate time.
Flight phase inhibition is defined for each system fault.

L2 *Note:* *The annunciation sections of the FCOM procedures indicate the flight phases that are inhibited for each system fault.*



The failure occurs during phase 1: The EWD immediately displays the alert, and continues to display it, as long as the failure is present (even if the next phase is inhibited).



The failure occurs during phase 2: The ECAM inhibits the alert. The EWD only displays the alert, when the aircraft exits phase 2.

AUDIO INDICATORS

Applicable to: ALL

The FWS generates audio indicators:
- Sounds, such as Single Chime (SC) or Continuous Repetitive Chime (CRC)
- Synthetic voice messages
- Auto callouts.

For more information about the audio indicators generated by the FWS , *Refer to DSC-31-40-20 FWS Audio Indicators* .

Other systems generate aural alerts:
- TAWS , *Refer to DSC-34-20-60-130-GAURA TAWS Aural Alerts*
- WXR , *Refer to DSC-34-20-60-130-GAURA WXR Aural Alerts*
- TCAS , *Refer to DSC-34-20-60-130-GAURA TCAS Aural Alerts* .

ECAM DISPLAY ON EWD

Applicable to: ALL

The EWD screen has two horizontal sections:
- The top section displays the engine parameters of the four engines
- The bottom section, called Warning Display (WD), displays either the:
  - Checklist menus and items, requested by the flight crew, or
  - Alerts, or
  - Not—Sensed Procedures and associated menus, requested by the flight crew, or
  - Memos and limitations, if any.

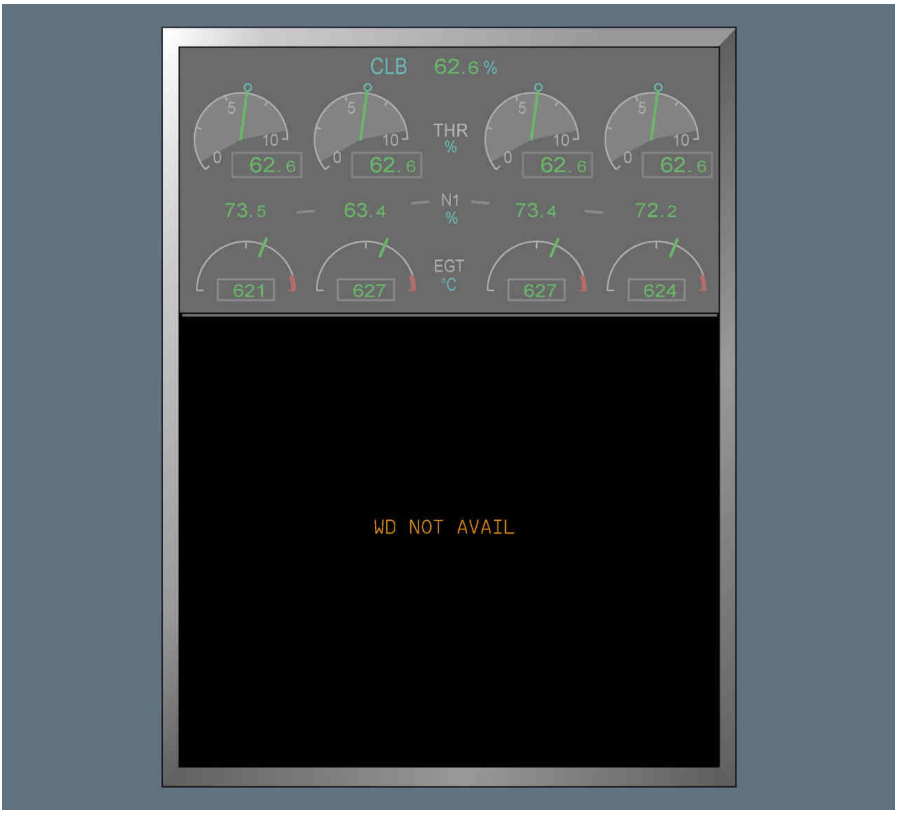
  An advisory (

) indication may also appear, when a monitored parameter deviates from its defined operational range.

WD NOT AVAILABLE

The WD DISPLAY NOT AVAIL message appears when the WD can no longer display ECAM.

WD NOT AVAIL



L2 The CDS displays this message, in case of a communication failure between the FWS and the display unit of the WD.

CHECKLIST (C/L)

Applicable to: ALL

A checklist (C/L) is a reminder of normal operation items, and should be performed in a specific flight phase in accordance with the Standard Operating Procedures (SOP). At any time during the flight, the flight crew can access, and display a checklist on the EWD .

CHECKLIST MENU

The checklist menu lists all checklists by flight phase.

Checklists are:

- In blue , when they have not been completed by the flight crew
- In grey , when they have been completed by the flight crew.

The C/L Menu



The checklist menu:

- Can be manually requested by flight crew, as required (*Refer to DSC-31-40-40 How to Handle the Checklists*)
- Automatically appears, if there is an active deferred procedure, when all alerts are cleared from the EWD
- Automatically appears during approach, if there is an active deferred procedure.

L2 The automatic display occurs during approach, when the slats are extended, or a barometric pressure altitude is selected.

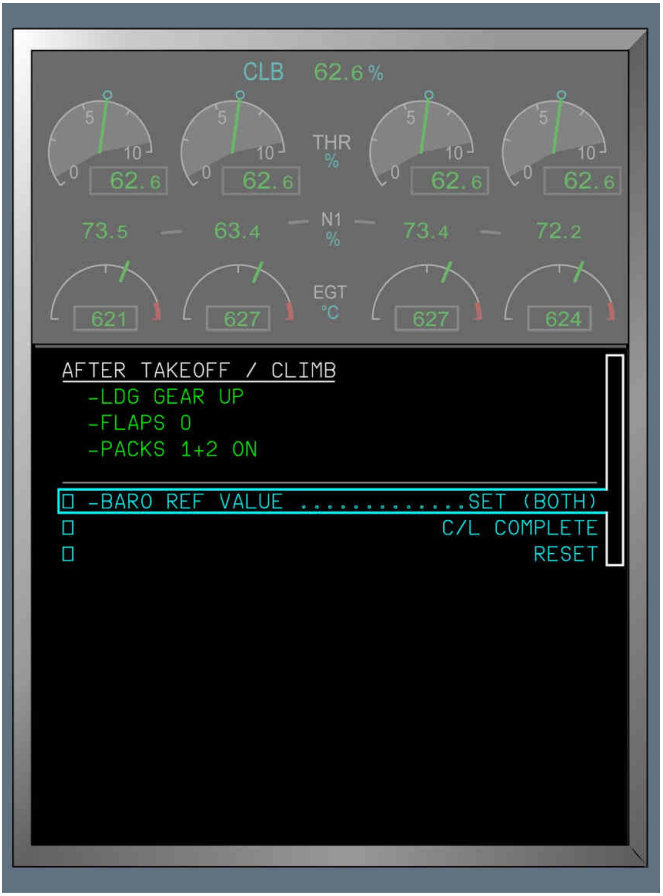
L3 The approach condition is activated, when the aircraft is below 20 000 ft .

L1 **ECAM BLUE BOX**

A blue box appears below the last completed checklist, and surrounds the title of the next applicable checklist.

CHECKLIST

Sample C/L



CHECKLIST TITLE

When the flight crew selects a checklist, the checklist title appears on the first line.

ECAM BLUE BOX

A blue box surrounds the applicable checklist item. When the flight crew validates or completes the checklist item, the next applicable checklist item is automatically surrounded by a blue box.

CHECKLIST ITEM LINE - SENSED BY ECAM

The item lines of the checklist appear:

- In blue , when the action is not completed by the flight crew

Action Line-Not Completed



- In green , when the action is completed by the flight crew

Action Line — Completed



CHECKLIST ITEM LINE - NOT- SENSED BY ECAM

A square appears before the item lines of the checklist :

- In blue , when the action is not completed by the flight crew

Action Line, Not-Sensed — Not Completed



- In green , when the action is completed by the flight crew.

Action line, Not-Sensed — Completed



CHECKLIST COMPLETE LINE INDICATION

A C/L COMPLETE line is displayed below the last item of the checklist.
The flight crew completes this line, when the checklist is completed.
When the C/L COMPLETE line is completed, the items of the checklist become grey , and the corresponding checklist in the checklist menu also becomes grey .

Note: *The flight crew can validate C/L COMPLETE line , and consider the checklist completed, even if they voluntarily did not validate some checklist items. This may be the case after a system failure that prevents the completion of some checklist items.*

Checklist Complete



CHECKLIST RESET LINE INDICATION

The RESET line is the last item of the checklist.

If flight crew validates the RESET line, the checklist resets automatically. When reset, any checklist items that were not-sensed by the ECAM are no longer validated and any checklist items that were previously sensed by the ECAM remain validated.

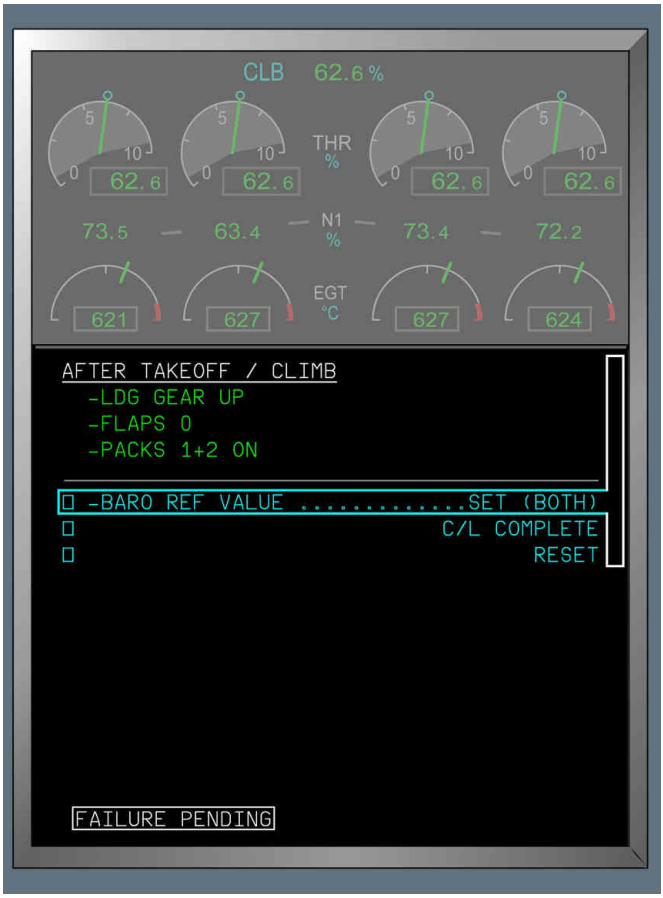
Note: *The flight crew can also reopen a previously completed checklist, and reset it via the RESET line.*

Note: *An automatic checklist reset can also occur in some conditions. For more information on automatic reset of a checklist, Refer to DSC-31-40-40 How to Handle the Checklists .*

FAILURE PENDING INDICATION

If flight crew displays the checklist menu or a checklist when a procedure (sensed or a not-sensed) is displayed, FAILURE PENDING reminder is displayed.
When the checklist menu or the checklist is cleared, the procedure reappears on the EWD .

C/L Open with an Alert Not Cleared



If flight crew displays the checklist menu or a checklist when an alert is triggered, the EWD displays the alert.
When the flight crew clears the procedure, the checklist menu or checklist reappears on the EWD .

STS INDICATION

Appears on the checklist when all of the following apply:
- The STATUS page is not empty.
- The STATUS page is not displayed on the SD .

C/L Open with STATUS Page Not Empty



ECAM PROCEDURE TYPES

Applicable to: ALL

The EWD displays the following ECAM procedures below the permanent engine parameters section:

Sensed Procedures	:	Sensed Procedures are abnormal/emergency procedures (also referred to as alert) that are automatically displayed by the ECAM .
Not-Sensed Procedures	:	Not-Sensed Procedures are abnormal/emergency procedures (also referred to as not-sensed ABN PROC) that are manually requested by flight crew by pressing the ABN PROC pb on the ECP (for more details *Refer to DSC-31-40-50 How to Activate a Not-Sensed ABN PROC*).

NOT-SENSED ABN PROC

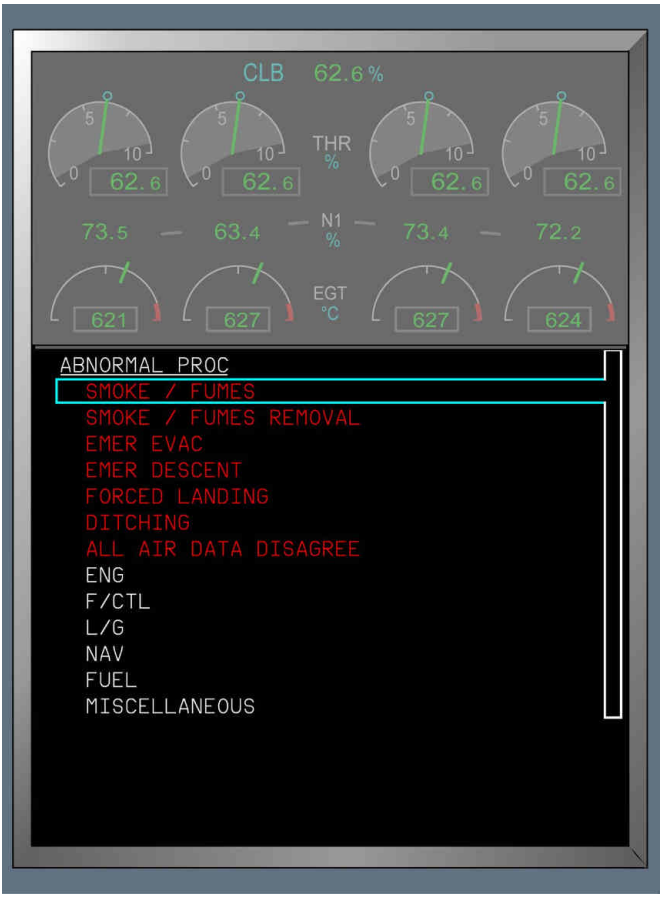
NOT-SENSED ABN PROC MENU

The not-sensed ABN PROC menu has the following two parts:

- The first provides the procedures that require the flight crew immediate access. These procedures are usually red procedures (warnings).
- The second displays the system submenus that enable the flight crew to access other abnormal procedures (cautions). These submenus appears in white.

Note: When the flight crew selects a not-sensed ABN PROC , there is neither an attention-getter, nor an aural alert.

Not-Sensed ABN PROC Menu



ACTIVATE A NOT-SENSED ABN PROC

When flight crew selects a not-sensed ABN PROC , the ACTIVATE line is the first line of the procedure. Until a not-sensed ABN PROC is activated, all the other lines of the procedure are in grey . (*Refer to DSC-31-40-50 How to Activate a Not-Sensed ABN PROC*)
If the EWD cannot displayed the not-sensed procedures on a single page, the flight crew must validate the procedure to access to the lines that are not visible. *Refer to DSC-31-40-10 Overflow Indication* .

If aircraft imitations, memos and/or deferred procedures are associated to a not-sensed ABN PROC , they will become applicable after the flight crew manually activates the procedure.

Not-Sensed ABN PROC Sample



When the flight crew validates the ACTIVATE line, the procedure is activated, and the lines of the procedure appear in their applicable colors.

Not-Sensed ABN PROC Activated



DEACTIVATION OF A NOT-SENSED ABN PROC

Automatic

An ACTIVE not-sensed ABN PROC is automatically deactivated at engine shutdown or at aircraft electrical power-up.

L2 A not-sensed ABN PROC is automatically deactivated 15 minutes after the last engine shutdown, or 10 minutes after aircraft electrical power-up.

L1 Manual

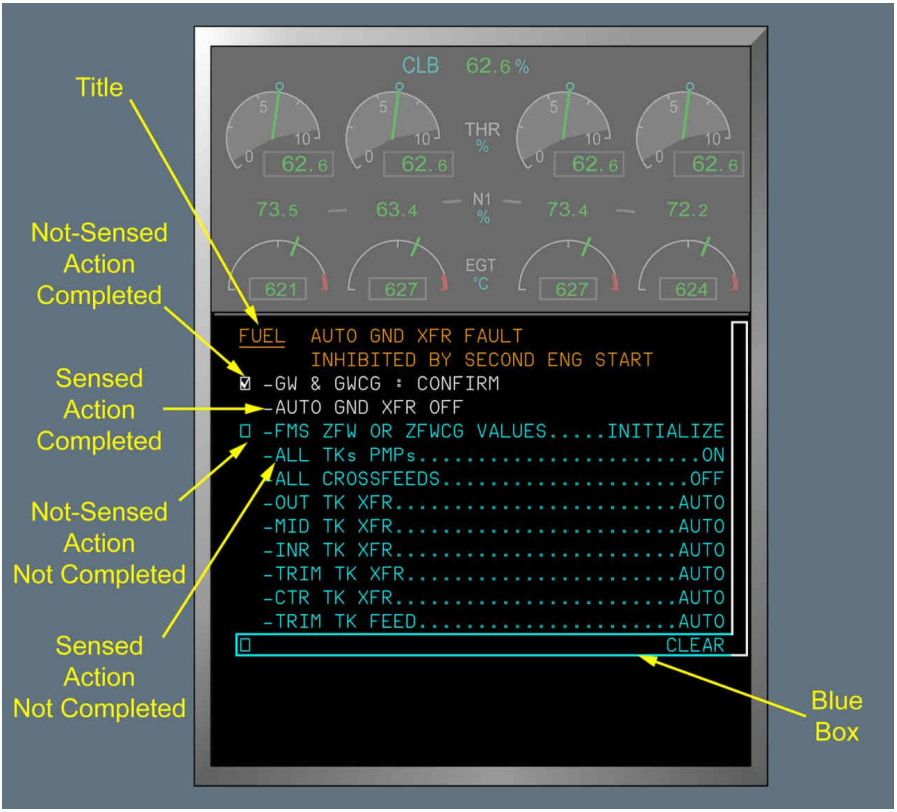
When an ACTIVE not-sensed ABN PROC is no longer applicable (e.g. no more turbulence), it may be necessary to deactivate it, in order to remove any aircraft limitations, memos and deferred procedures associated with the procedure.
Some ACTIVE not-sensed ABN PROC are no longer applicable after the flight crew complete the procedure (e.g. ENG RELIGHT IN FLT). In such case, the flight crew must manually deactivate the not-sensed ABN PROC in order to remove any aircraft imitations, memos and deferred procedures associated with the procedure.
The flight crew can deactivate a not-sensed ABN PROC by deselecting the ACTIVATE line that appears on the first line of the procedure. (*Refer to DSC-31-40-50 How to Deactivate a Not-Sensed ABN PROC*)

PROCEDURE DESCRIPTION

Applicable to: ALL

PROCEDURE DESCRIPTION

SAMPLE ECAM PROCEDURE



ECAM PROCEDURE TITLE

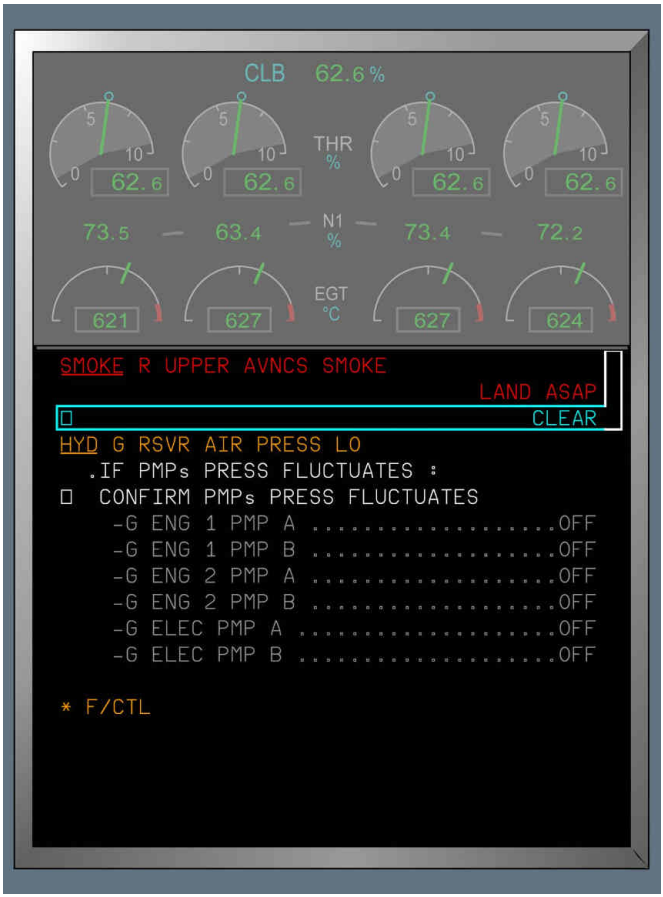
When an alert or a not-sensed ABN PROC is displayed, the title of the ECAM procedure appears on the first line, in:

- Red , for warnings
- Amber , for cautions.

Multiple ECAM Procedures

The EWD may display more than one ECAM procedure at a time. The number of procedure displayed is limited by the size of the screen.
The ECAM procedures appear in decreasing order of importance.

Multiple ECAM Procedures



LAND ASAP / LAND ANSA

In some failure cases, the ECAM may recommend landing at the next suitable airport.

In such cases, it will indicate, below the title:

- LAND ASAP (As Soon As Possible) , land as soon as possible at the nearest suitable airport at which a safe approach and landing can be made.
- LAND ANSA (At Nearest Suitable Airport) , advice to the flight crew to consider landing at the nearest suitable airport.

ECAM BLUE BOX

A blue box surrounds the applicable procedure line. When the flight crew validates or completes the procedures lines, the next applicable procedure line is automatically surrounded by the blue box.

ACTION LINE SENSED BY THE ECAM

The ECAM procedures have action lines that can be sensed by ECAM , and they appear as follows:

- When the action is not completed, the action line is in blue .

Action Line - Not Completed



- When the action is completed, the format of the action line changes, and appears in white .

Action Line - Completed

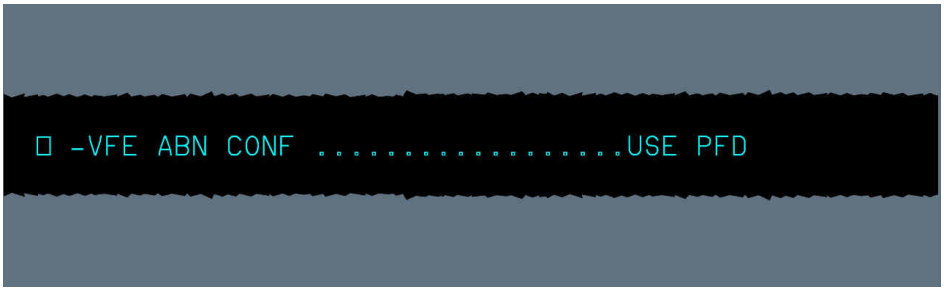


ACTION LINE NOT-SENSED BY THE ECAM

Some ECAM procedures have action lines that cannot be detected by the ECAM . A square appears before these action lines:

- When the action is not completed, the action line is in blue .

Action Line Not Completed



- When the action is completed, and validated by the flight crew, the format of the action line changes, and appears in white .

Action Line Completed



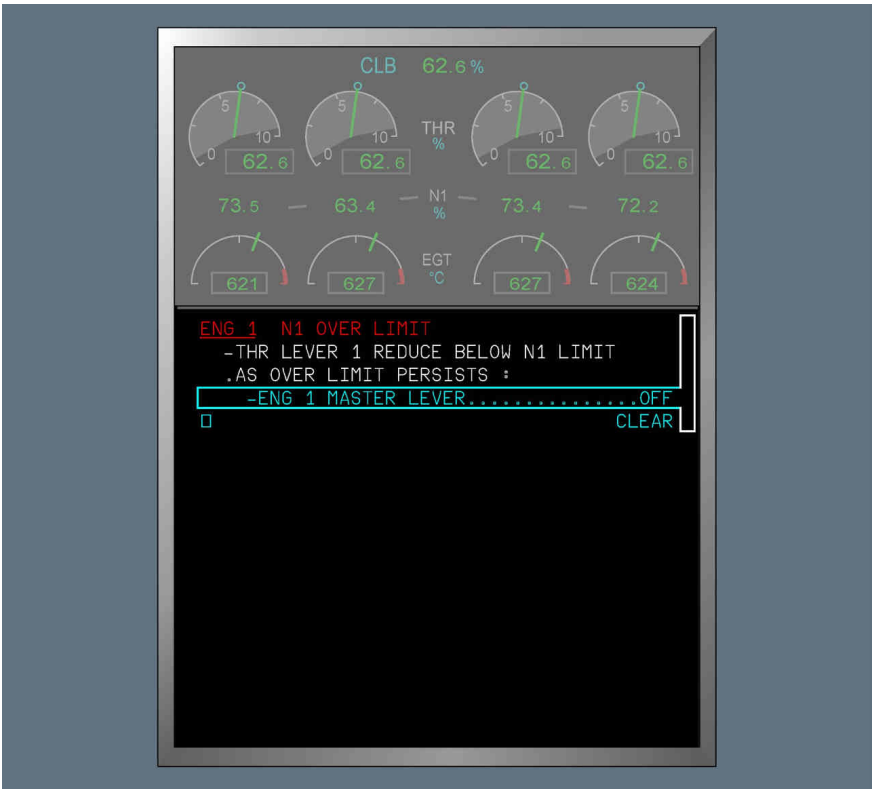
CONDITION SENSED BY THE ECAM

A condition that is sensed by the ECAM appears in white .
All subsequent actions lines appears in their applicable color, when the condition is true. If the condition is not true, all subsequent and applicable action lines appear in grey .

Condition Sensed by the ECAM : Not Completed



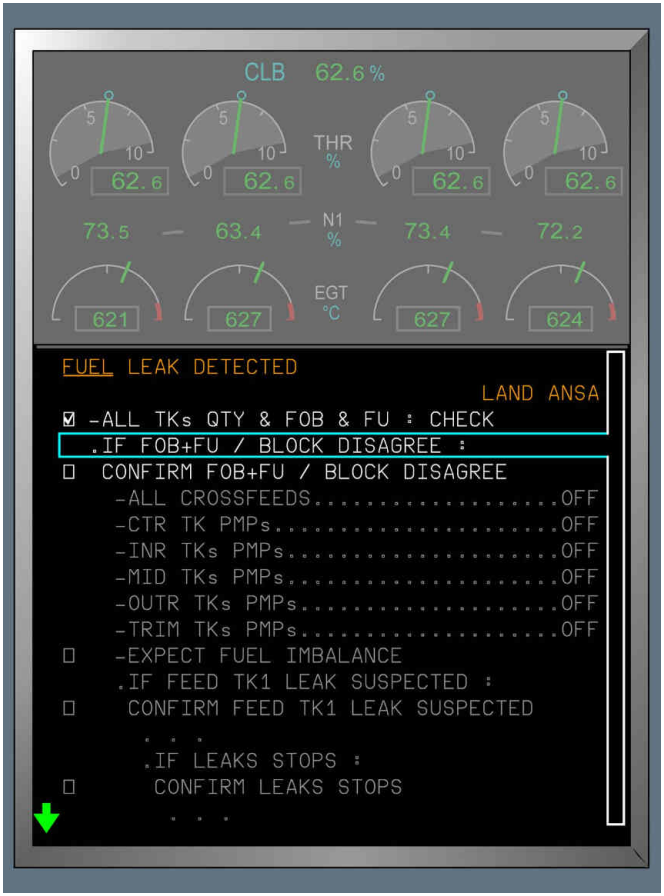
Condition Sensed by the ECAM : Completed



CONDITION NOT-SENSED BY THE ECAM

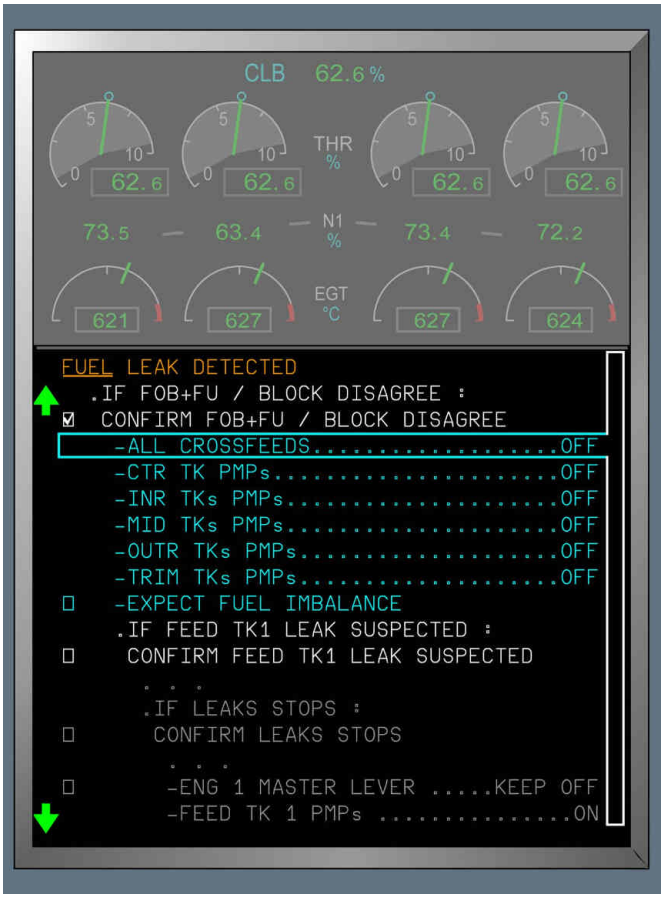
- Condition not-sensed by the ECAM that requires the flight crew to confirm a condition appears in white. All subsequent and applicable action lines appear in grey or may be replaced by until the flight confirms the condition.
  When the flight crew confirms the condition, all subsequent action lines appear in their applicable color.

Condition Not-Sensed by the ECAM : Not Confirmed by the Flight Crew



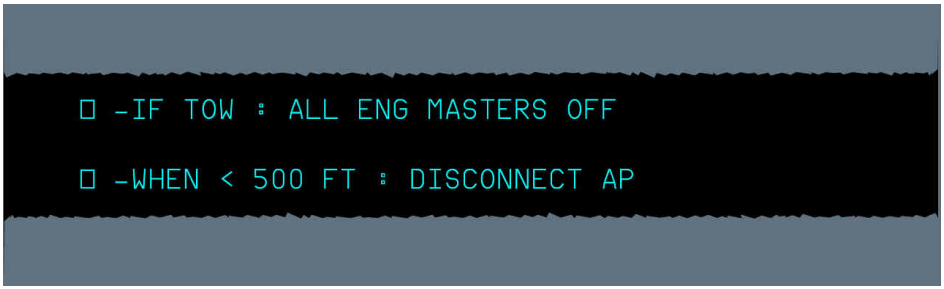
For long procedures containing conditions that requires the flight crew to perform a choice in between conditions, the actions lines linked to the conditions are not displayed to improve the readability. In that case actions lines are replaced by [redacted].
When the flight crew confirms the condition, the actions lines appear in their applicable color, instead of the [redacted].

Condition Not-Sensed by the ECAM : Confirmed



- Condition not-sensed by the ECAM that do not have a CONFIRM line appears in blue. The action linked to the condition is displayed on the same line, after the condition.

Condition Not-Sensed by the ECAM : Without Confirm Line



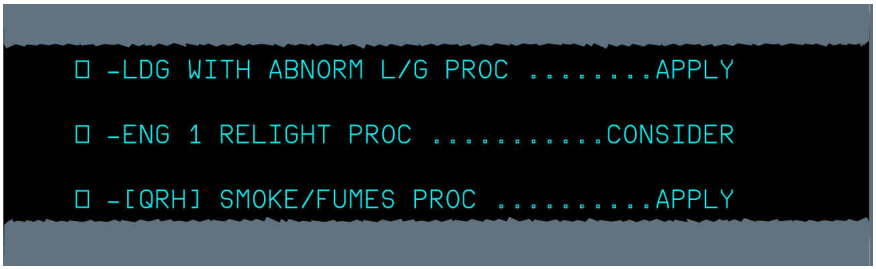
"PROC APPLY" OR "PROC CONSIDER" ACTION LINE

Some ECAM alerts contain an action line to request the flight crew to refer to an other procedure.

The action line displayed on the ECAM appears differently:

- Name of the not-sensed ABN PROC.....APPLY
  The flight crew stops the current ECAM procedure and immediately apply the referred not-sensed ABN PROC . The flight crew will finish the current ECAM procedure once the flight crew has performed the not-sensed ABN PROC .
  To perform the action line, the flight crew will display the not-sensed ABN PROC menu to select, and to perform the applicable procedure (*Refer to DSC-31-40-50 How to Activate a Not-Sensed ABN PROC*).
- Name of the not-sensed ABN PROC.....CONSIDER
  The flight crew should consider application of the not-sensed ABN PROC depending on circumstances (e.g. remaining flight time, flight conditions, or when time permit after the accomplishment of the current ECAM procedure). The flight crew can acknowledge the action line without performing immediately the not-sensed ABN PROC .
- [QRH] name of the procedure.....APPLY
  The flight crew stops the current ECAM procedure and immediately apply the paper procedure in the Quick Reference Handbook (QRH). The flight crew will finish the current ECAM procedure once the flight crew has completed the paper procedure.

Refer to PROC Action Line Sample



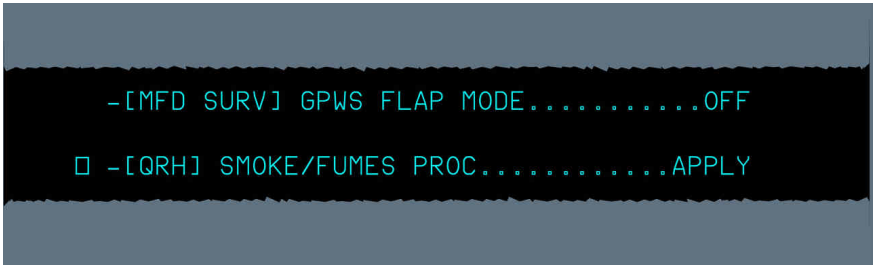
INFORMATION BETWEEN BRACKETS IN THE ACTION LINE

Some ECAM procedures have action lines with information between brackets.

Information between brackets indicates:

- The associated MFD page to perform the ECAM action, in order to guide the flight crew towards the applicable cockpit interface (e.g the interface is not frequently used by the flight crew, or when there are several cockpit interfaces dealing with the same functions), or
- That the procedure of the ECAM action is part of the Quick Reference Handbook (QRH).

Information in Brackets Sample

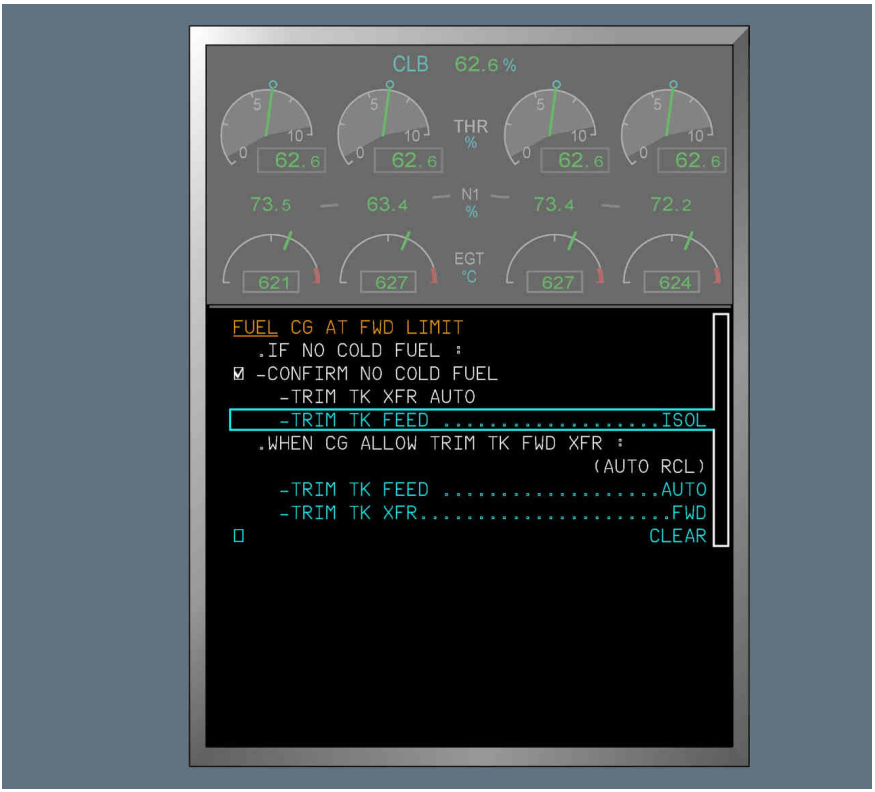


In the above example, the flight crew must set the GPWS FLAP MODE to OFF on the MFD SURV page, or the fight crew must use the paper procedure in the QRH .

AUTO RECALL (AUTO RCL) INDICATION AND FUNCTION

An (AUTO RCL) indication next to a condition line of an ECAM procedure indicates that the procedure will automatically reappears when the applicable condition is met. After the flight crew performs all applicable actions, the flight can clear the procedure. When the condition becomes applicable, the ECAM will automatically displays again the procedure to remind the flight crew to complete the relevant action steps.
The ECAM uses the (AUTO RCL) function for all actions that may take a long time to perform.

(AUTO RCL) Indication



The following is a list of procedures, that use the AUTO RECALL function:

- FUEL PREDICTED CG OUT OF RANGE (*Refer to procedure*)
- FUEL NORM XFR FAULT (*Refer to procedure)*
- FUEL MAN XFR PROCEDURE (*Refer to procedure*)
- FUEL CG AT FWD LIMIT (*Refer to procedure*)
- AVIONICS NETWORK ALL SWITCHES FAULT (*Refer to procedure*)
- FUEL JETTISON (*Refer to procedure*)
- AIR PACK 1(2) REGUL FAULT (*Refer to procedure*).

OVERFLOW INDICATION

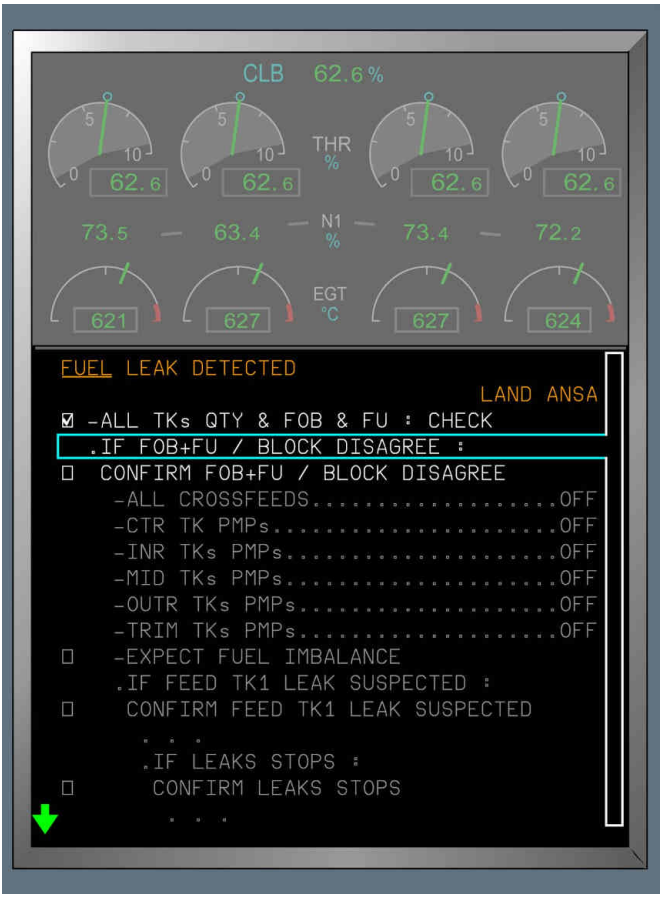
Applicable to: ALL

When an alert, a not-sensed ABN PROC, or a checklist contains many item lines, or when several alerts occur simultaneously, the EWD may not be able to display all lines at the same time.
In such cases, a down-arrow symbol appears at the bottom left of the screen to indicate that the procedure continues below the current display.

The down-arrow symbol appears on the ECAM:

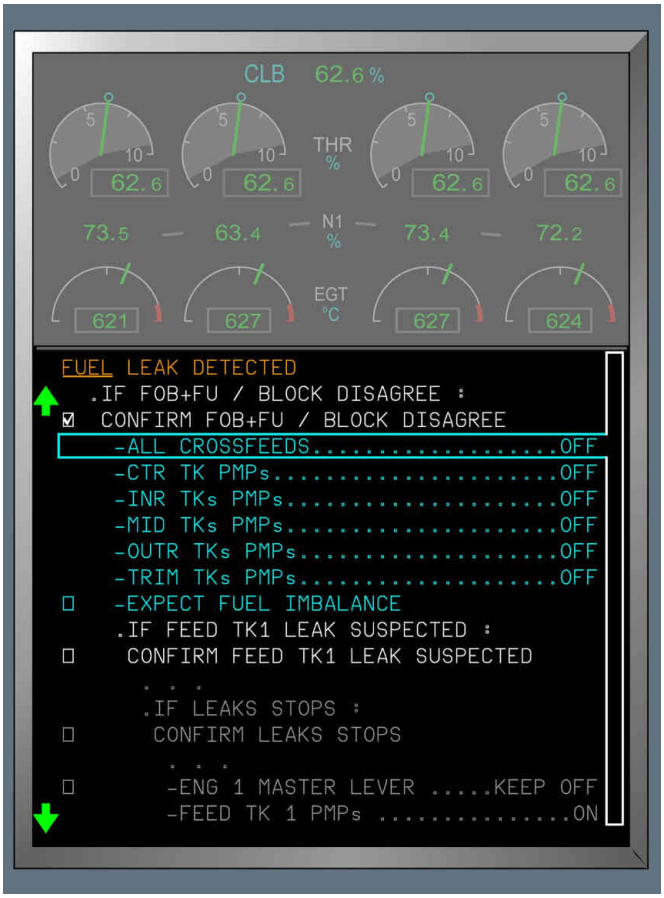
- In green (), or
- In grey (), until the flight crew validates the not-sensed ABN PROC.

Down-Arrow Symbol



When the flight crew scrolls down, a green up-arrow symbol () appears at the top left of the procedure, below the title of the procedure, to indicate that the procedure starts above the current display. The title of the procedure always appears.

Up-Arrow Symbol



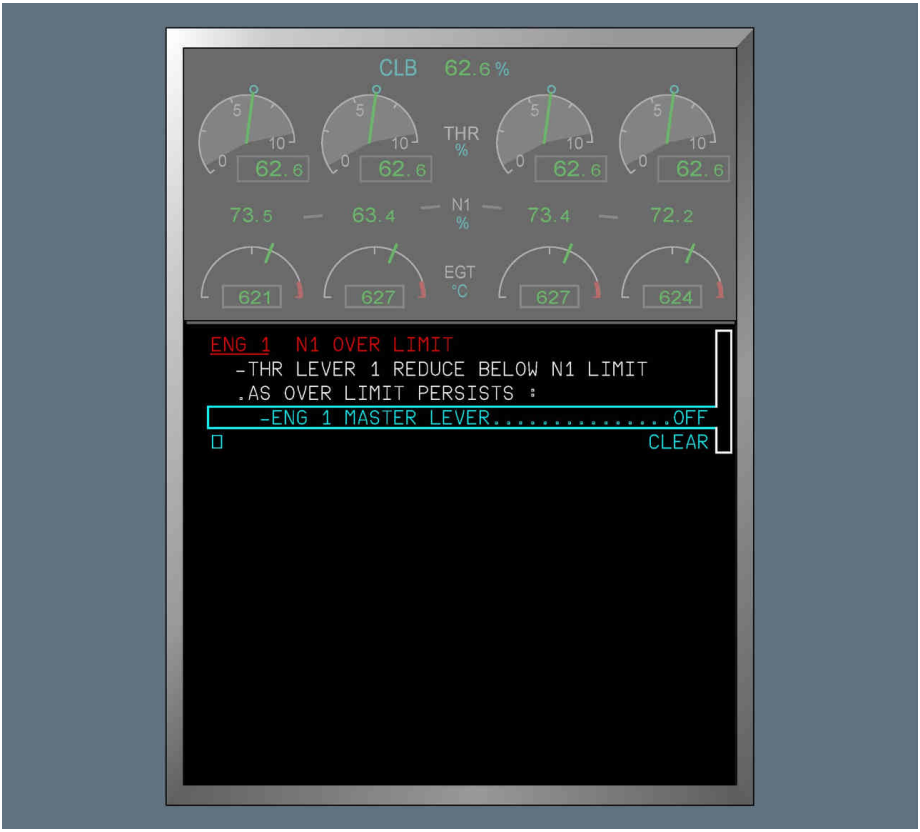
If the next selectable item of a procedure is in overflow, the EWD will automatically scroll down line by line to display the next items.

VERTICAL BAR INDICATION

Applicable to: ALL

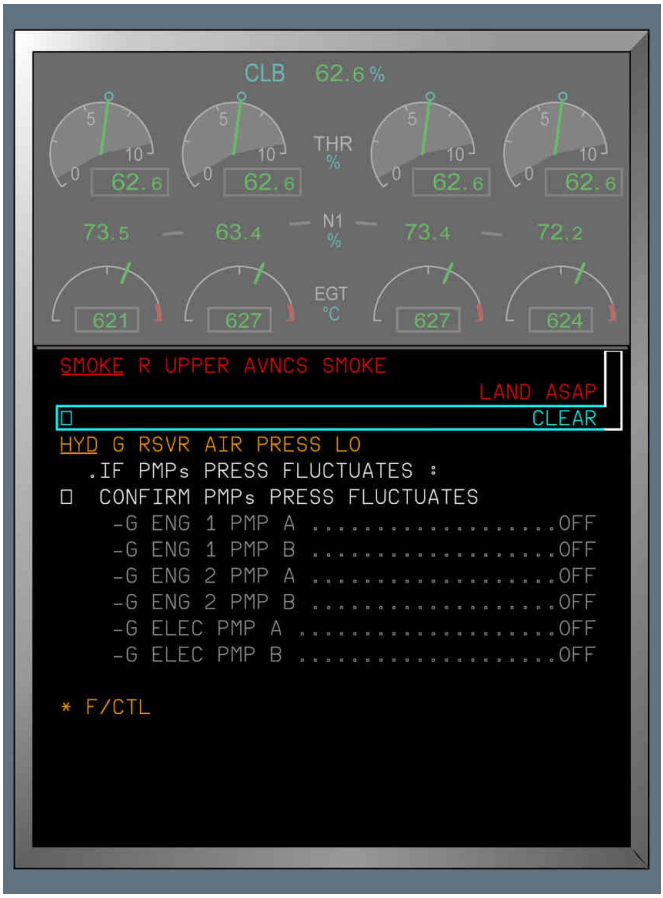
A vertical bar appears on the right side of the EWD or SD to indicate the items that will be cleared, when the flight crew presses the CLEAR pb on the ECP.

Condition Sensed by the ECAM: Completed



If the EWD displays multiple or secondary failures, a vertical bar appears on the right side of the screen, next to the first ECAM procedure that the flight crew should take into account. When the flight crew completes or clears the ECAM procedure, the vertical bar moves to the next procedure. The flight crew performs the procedure in decreasing order of importance.

Multiple ECAM Procedures



ADVISORY

Applicable to: ALL

An advisory indicates that a monitored parameter from an aircraft system is going outside from its normal operational range but has not reached a level that would trigger an alert.
An advisory is triggered when the affected parameter pulses in green on the applicable SD page.
The parameter pulses in green as long as aircraft system is outside of its normal operating range.

When there is an advisory condition for a system, the SD displays the applicable page, as follows:

- If the SD displays a flight phase page (*Refer to DSC-31-40-30 System Display Page*) : If there is an advisory condition, the SD automatically displays the associated system display page, and the associated pushbutton on the ECP comes on.
- If the SD displays a page that has been manually selected by the flight crew, the associated pushbutton on the ECP flashes until the fight crew presses it.
- If the SD displays a system display page following an ECAM alert or following a flight crew manual selection, there is no indication on the EWD and on SD until the flight crew clears the procedure or the SD displays the system pages associated to the flight phase.
- If the EWD displays memos and/or limitations, an 

indication appears, and pulses at the bottom right of the screen.

ADV on the EWD



The EWD no longer displays the ADV indication, when:

- The flight crew presses the associated pushbutton on the ECP , or
- The parameter, source of the advisory indication, returns to its defined operational range.

FLIGHT CREW RESPONSE TO ADVISORIES

Engines, pressurization, and APU systems have ECAM advisory conditions.

When the EWD displays an advisory, the flight crew should only monitor how the affected parameter evolves on the applicable SD page.

L2 **ENGINE**

Parameters	System Display	Conditions
Oil quantity	ENG	The oil quantity dropped below 4 quarts, that corresponds to the first white dash. The needle and the digital indication pulse in green. The advisory is inhibited: - At takeoff or go-around, or - When the reversers are selected, or - In alpha floor mode.
Nacelle temperature		The nacelle temperature is above 300 °C, that corresponds to the first white dash. The needle and the digital indication pulse green.
Oil Temperature		The indication pulses green when the oil temperature is above 163 °C.
Vibration		The indication pulses when the rotor vibration level of N1, or N2 is above the following thresholds: - N1 VIB, above 5 units - N2 VIB, above 5 units.

Engine - ECAM Advisories

PRESSURIZATION

Parameters	System Display	Conditions
Delta P	CAB PRESS	The green needle pulses during final approach, when the differential pressure is between 1.5 PSI and 8.92 PSI. It stops pulsing, when it is less than 1 PSI. The differential pressure stops pulsing, when: - The differential pressure is less than 1 PSI, or - The aircraft is no longer in final approach.
	CRUISE	The differential pressure value pulses, when: - The differential pressure is between 1.5 PSI and 8.92 PSI - The aircraft is in final approach.

Continued on the following page

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Vertical Speed	CAB PRESS	The cabin vertical speed needle pulses in green, if: - The cabin vertical speed is above 1 800 ft/min, and below 6 350 ft/min. The needle stops pulsing, if: - The cabin vertical speed is less than 1 600 ft/min, and above –6 350 ft/min.
	CRUISE	The cabin vertical speed arrow, and the CAB V/S indication pulse, if: - The cabin vertical speed ranges from -6 350 ft/min to –1 800 ft/min, and is less than, or equal to –1 600 ft/min for more than 5 s - The cabin vertical speed ranges from 1 800 ft/min to 6 350 ft/min, and is above, or equal to 1 600 ft/min for more than 5 s. The cabin vertical speed needle stops pulsing, when it ranges from –1 650 ft/min to 1 650 ft/min.
CAB ALT	CAB PRESS	The cabin altitude needle pulses in green, if: - The cabin altitude is above 8 300 ft, and below 9 550 ft. The needle stops pulsing, if: - The cabin altitude is less than 8 100 ft.
	CRUISE	The CAB ALT indication pulses, if the cabin altitude value ranges from 8 300 ft to 9 550 ft, for more than 5 s. The CAB ALT indication stops pulsing, when the cabin altitude is below 8 100 ft.

Pressurization - ECAM Advisories

APU

Parameters	System Display	Conditions
OIL LVL LO	APU	Pulses, when the APU oil level is below 2.38 US Gal.

APU - ECAM Advisory

LIMITATIONS

Applicable to: ALL

A limitation is an operational constraint that is applicable after a system failure.

DISPLAY OF LIMITATIONS

Limitations appear in blue on the lower part of the PFD , and/or on the EWD .
A limitation will appear on both the EWD and the PFD , when immediate action is required, or when the limitation has an immediate impact on the flight (e.g. MAX FL or MAX SPEED).
In all other cases (e.g. ATC COM VOICE ONLY), limitations will appear on the EWD only.

L2 When both the PFD and EWD display limitations, and the EWD indicates an overflow, the limitations then appear on the PFD only.

L1 **LIMITATIONS ON THE EWD**

Limitations on the EWD



The EWD displays limitations in two columns.
The title of the left column is (ALL PHASES), and this column displays the limitations applicable to all flight phases.
The title of the right column is (APPR & LDG), and this column displays only the limitations that are applicable to the APPROACH and/or LANDING phase(s).

The first line of each column displays the most important limitation. The other limitations appear in decreasing order of importance.

L13

Note: *1. In some flight phases, the EWD may temporarily clear some limitations from the screen, in order to optimize the information display. This may occur, for example, when the TO and LDG memos are displayed, because there is not sufficient space on the screen to display all the memos and limitations.*

The EWD clears limitations:
- *If they are also duplicated on the PFD*
- *According to an increasing order of importance.*

2. The EWD does not display limitations, if:
- *The flight crew requests either a checklist, or the ABN PROC menu.*
- *The flight crew requests the display of the contents of a checklist.*
- *The EWD displays a procedure, after the ECAM detects a system failure, or after the flight crew manually requests the display of this procedure.*

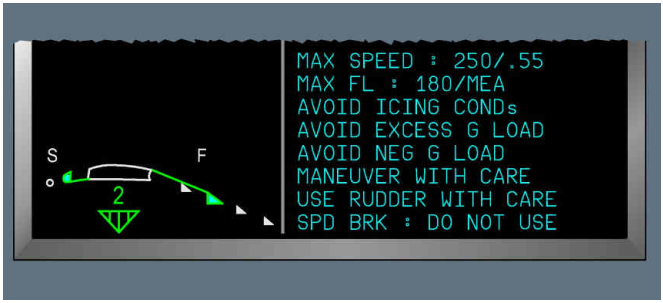
LIMITATIONS ON THE PFD

L2 The PFD can display a maximum of 8 limitation lines.

L1 The first line displays the most important limitation. The other limitations appear in decreasing order of importance.

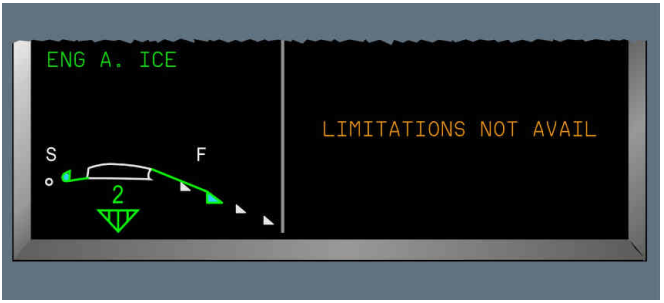
Note: *On ground, before takeoff and after landing, this area of the PFD displays the pitch trim settings (Refer to DSC-31-20-20-160 Limitations and Pitch Trim).*

Limitations on the PFD



LIMITATIONS NOT AVAILABLE

LIMITATION NOT AVAIL



The LIMITATIONS NOT AVAIL message appears when the PFD can no longer display limitations.
L2 The CDS displays this message, in the case of a communication failure between FWS and PFD display unit.

MEMO

Applicable to: ALL

Memo : A memo indicates the state of an aircraft system.

It usually appears:
- After a specific flight crew action or selection to remind the flight crew of the selection
- To indicate an automatic system function.

Note: Memos usually appear in green. However, some memo may be in amber (e.g. A/THR OFF), in red (e.g. AP OFF), or in magenta (e.g. T.O INHIBIT or LDG INHIBIT).

MEMO DISPLAY

Memos appear on the EWD, and on the lower part of the PFD.

A memo can appear on the EWD only, or on both the PFD and EWD.
- Memos that appear on both display units are memos to increase the flight crew awareness (e.g. A/THR OFF, AP OFF, or anti-ice)
- Other memos (e.g. seat belts) will appear only on the EWD.
  The EWD displays memos in two columns: The left column displays the Takeoff (T.O) and Landing (LDG) memos. The right column displays all other memos.

MEMOS ON THE EWD

Memos on the EWD



Note: *The EWD does not display memos, when:*

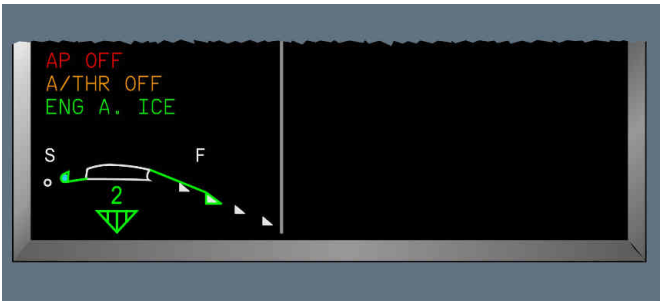
- *The flight crew requests the display of a checklist menu , or the not-sensed ABN PROC menu.*
- *The flight crew requests the display of the contents of a checklist.*
- *The EWD displays a procedure, after the ECAM detects a system failure, or after the flight crew manually requests the display of this procedure.*

MEMOS ON THE PFD

L2 The PFD displays a maximum of three memo lines .

L1 The first line displays the most important memo. The other memos appears in decreasing order of importance.

Memo on PFD



T.O AND LDG MEMOS

T.O and LDG memos provide the flight crew with the list of actions to be accomplished before takeoff and landing.

- The T.O memo automatically appears after the flight crew starts the engines.

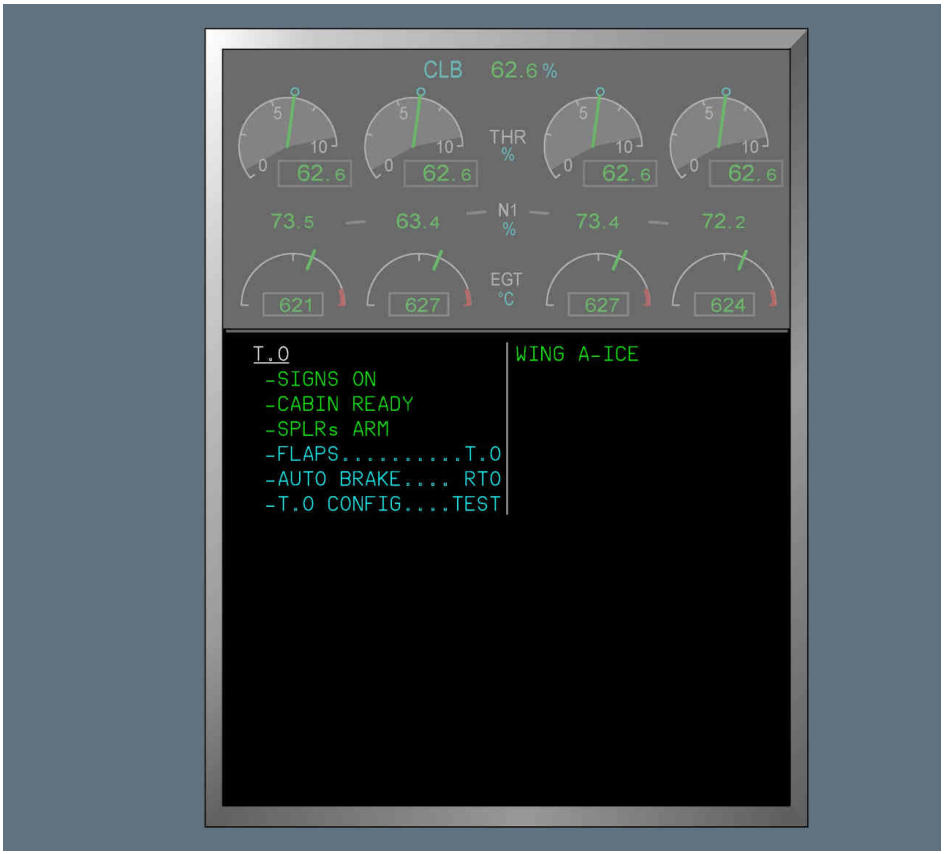
L2 Memos appear two minutes after the flight crew starts the third engine.

L1 If the flight crew has not yet performed the applicable actions, the listed items appear in blue. When the flight crew has performed the applicable actions, the listed items appear in green.

Note: *In accordance with the SOP, the flight crew must ensure that all memos are in green before takeoff.*

The T.O memo disappears, when the flight crew sets the takeoff power.

TO Memo



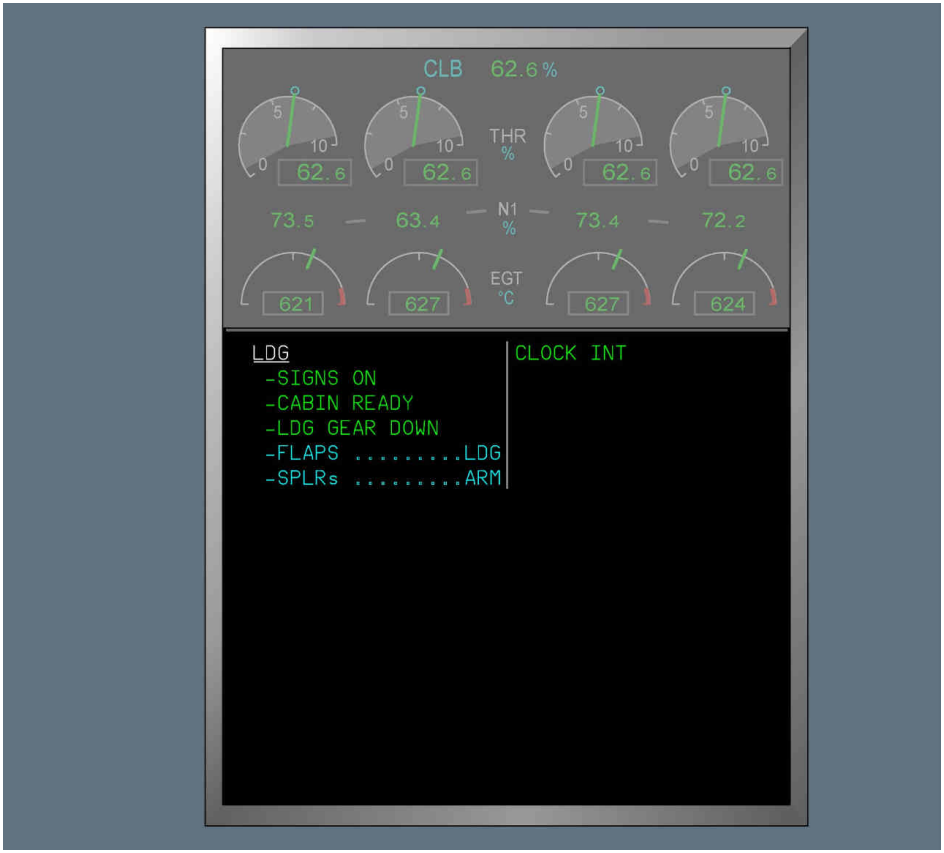
The T.O memo also appears in the BEFORE TAKEOFF checklist.

- The LDG memo automatically appears, when the aircraft is below 2 000 ft. RA.
  If the flight crew has not yet performed the applicable actions, the listed items appears in blue.
  When the flight crew has performed the applicable actions, the listed items appears in green.

  Note: *In accordance with the SOP, the flight crew must ensure that all memos are in green before landing.*

  The LDG memo disappears during landing roll, at approximately 80 kt.

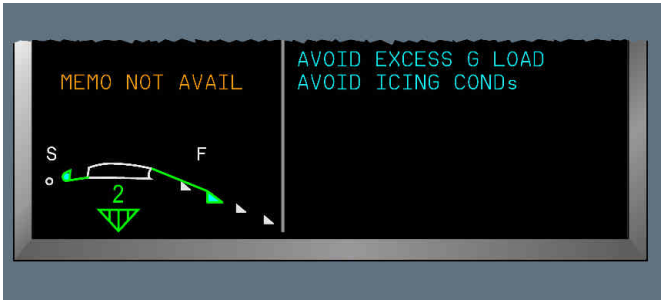
LDG Memo



The LDG memo also appears in the LANDING checklist.

MEMO NOT AVAILABLE

Memo Not Avail



The MEMO NOT AVAIL message appears when the PFD can no longer display memos.

L2 The CDS displays this message in the case of a communication failure between the FWS and the PFD display units.

LANDING PERFORMANCE INDICATIONS

Applicable to: ALL

LANDING PERFORMANCE INDICATIONS

When a failure has an impact on landing performance, the ECAM provides the flight crew with the appropriate information in the applicable procedure for landing performance computation.
The ECAM displays landing performance information in the applicable procedure, and also in the limitation section of the EWD .
Performance information depends on the impact that the failure, or the combination of failures, has on landing performance.
The following table summarizes the various landing performance ECAM indications, and their corresponding conditions:

ECAM Displays	Conditions
Procedure & Limitations: LDG DIST AFFECTED STATUS page: LDG DIST COEF < 1.XX ON DRY RUNWAY	- Single failure - No VAPP increase - Landing distance penalty below 1.XX. The penalty applies to the Actual Landing Distance (ALD) .

Note: *XX indicates a variable value, and has a value of 40, or 45, or 50.*

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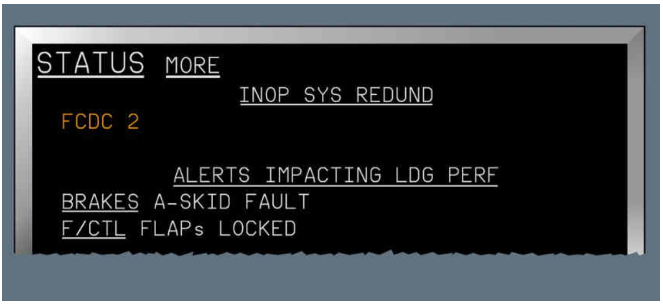
ECAM Displays	Conditions
Procedure & Limitations: LDG DIST AFFECTED Deferred Procedure: LDG DIST COMPUTATION CONFIRM	- No VAPP increase but landing distance penalty at 1.50 or above, or - No VAPP increase but multiple failures affecting the landing distance.
Procedure & Limitations: LDG PERF AFFECTED Deferred Procedure: LDG PERF COMPUTATION CONFIRM	VAPP increase and landing distance penalty (regardless it is).
Procedure: LDG PERF : COMPUTE Limitations: LDG PERF AFFECTED	- Slats or flaps failure - VAPP increase and landing distance penalty. *Note: A slats or flaps failure can happen after takeoff or in approach during slats/flaps retraction or extension. As a consequence, the procedure directly requests the computation of the landing distance as it should be done at that time.*
Procedure: LDG DIST IMPACT ON WET/CONTAM RWY ONLY	One or both thrust reversers are failed

Management of failures and ECAM procedures are described in the FCTM . For more information, *Refer to FCTM/AO-10 Landing Computation* .

STATUS PAGE INDICATIONS

All ECAM alerts that have an impact on landing performance are listed on the STATUS MORE page of the SD . For more details, *Refer to DSC-31-40-10-00000661 More pages on System Display* .

STATUS MORE — LDG Performance Alerts Example



To compute the LDG distance and VAPP , the flight crew uses the alerts listed in the STATUS MORE page to select the applicable failures in the OIS LDG PERF application. For more

information on how to compute landing penalties with a list of inoperative systems, *Refer to Landing Determination Conditions for In Flight.*

LANDING PERFORMANCE AND DISPATCH UNDER MEL

When an aircraft is dispatched under MEL , with an inoperative item that impacts landing performance, the flight crew must always use the OIS LDG PERF application, if an additional in flight failure that affects the landing performance occurs.
This is applicable, even if the ECAM displays LDG DIST COEFF < 1.XX ON DRY RUNWAY and the destination runway is dry because the ECAM cannot combine MEL items with in-flight failures.

DEFERRED PROCEDURE

Applicable to: ALL

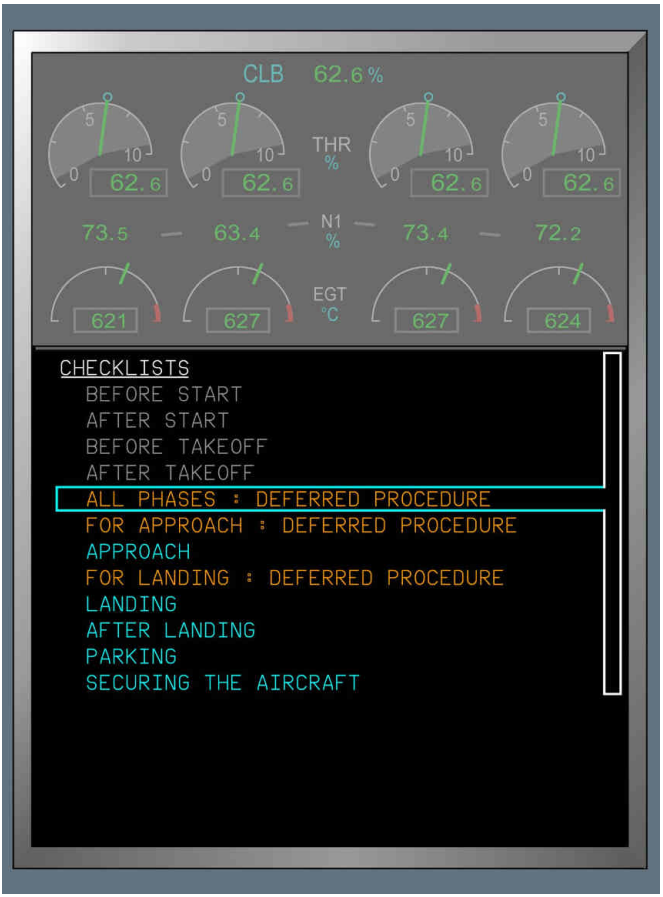
If a system fails, the ECAM may postpone some actions to a more appropriate time, later in flight. These actions are called deferred procedures.

Deferred procedures:
- Are related to, and grouped in the checklist menu as: Approach, landing, or all phases
- Appear in amber , when they have not been completed
- Appears in white , when they have been completed.

Actions may be deferred:
- Before approach:
  They appear in the checklist menu, and are referred to as FOR APPROACH : DEFERRED PROCEDURE
- Before landing:
  They appear in the checklist menu, and are referred to as FOR LANDING : DEFERRED PROCEDURE
- In all other flight phases:
  They appear in the checklist menu, and are referred to as ALL PHASES : DEFERRED PROCEDURE .

For more details on the management of deferred procedures, *Refer to DSC-31-40-50 Handling Procedure - Deferred proc* .

Deferred Procedure



After the flight crew clears all ECAM procedures from the EWD , the EWD displays the checklist menu, if there are any applicable deferred procedures.

If there is any deferred procedures, the checklist menu will automatically appear during approach.

L2 Automatic display during approach occurs, when either the slats are extended, or when the flight crew selects a barometric pressure altitude.

L3 The approach condition is activated, when aircraft is below 20 000 ft .

TIME LIMITED FAILURE

Applicable to: ALL

Time-limited failures are failures that do not have an impact on flight operations, or on flight dispatch. These failures are for maintenance action only, and must be repaired within a defined period of time. When a time-limited failure occurs, an automatic countdown begins. This countdown ends on the deadline by which this failure must be repaired, and provides maintenance personnel with enough time to repair the failure when convenient.

However, if the failure is not repaired within the defined period of time, the ECAM triggers when the aircraft is on ground:

- MAINTENANCE TIME LIMITED ITEM alert for a system failure
- ENG TIME LIMITED ITEM for an engine failure

In this case, the aircraft may be dispatched under MEL for a time-limited period, without conditions. For more information about this caution, and about the associated dispatch assessment, *Refer to MEL/ME-ECAM-45 MAINTENANCE TIME LIMITED ITEM* , or *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) TIME LIMITED ITEM* .

TAKEOFF CONFIGURATION TEST

Applicable to: ALL

At any time between engine start and takeoff, when the aircraft is ready for takeoff, the flight crew can request a takeoff configuration test. This test simulates the application of takeoff power, and triggers alerts, if any of the aircraft systems are not in the correct takeoff configuration.
In accordance with the SOP , this test is performed before takeoff.
The takeoff memo reminds the flight crew to perform this test.
"T.O CONFIG.....TEST" line in the T.O memo disappears when the configuration test is completed and is correct, and "T.O CONFIG NORMAL" appears instead.
L2 The test is requested again, if the configuration becomes abnormal.
L1 When the flight crew sets the takeoff power, the test will automatically run again.

If the test is not successful, any of the following alerts may be triggered:

- CONFIG SLATS (FLAPS) NOT IN T.O CONFIG , *Refer to procedure*
- CONFIG RUDDER TRIM NOT IN T.O RANGE , *Refer to procedure*
- CONFIG PITCH TRIM NOT IN T.O RANGE , *Refer to procedure*
- CONFIG SPD BRKs NOT RETRACTED , *Refer to procedure*
- CONFIG L(R) SIDESTICK FAULT (BY TAKE-OVER) , *Refer to procedure*
- DOOR POS DET FAULT , *Refer to procedure*
- DOOR MAIN 1(2)(3)(4)(5) R(L) NOT CLOSED , *Refer to procedure*
- DOOR UPPER 1(2)(3)(4) R(L) NOT CLOSED , *Refer to procedure*
- DOOR MAIN 1(2)(4)(5) R(L) POS DET FAULT , *Refer to procedure*

- DOOR UPPER 1(2)(3)(4) R(L) POS DET FAULT , *Refer to procedure*
- DOOR FWD(AFT)(MAIN)(UPPER)(BULK) CARGO NOT CLOSED , *Refer to procedure*
- DOOR AVNCS NOT CLOSED , *Refer to procedure*
- DOOR CKPT SLIDING WINDOW NOT CLOSED , *Refer to procedure*
- BRAKES BRAKES HOT , *Refer to procedure*
- ELEC DRIVE 1(2)(3)(4) DISCONNECTED , *Refer to procedure*
- ELEC GEN 1(2)(3)(4) FAULT , *Refer to procedure*
- ELEC GEN 1(2)(3)(4) OFF , *Refer to procedure*
- ENG 1(2)(3)(4) OIL TEMP LO , *Refer to procedure*
- F/CTL PITCH TRIM/FMS/CG DISAGREE , *Refer to procedure*
- F/CTL T.O FLAPS/FMS DISAGREE , *Refer to procedure*
- NAV T.O SPEEDS NOT INSERTED , *Refer to procedure* .

ECAM DISPLAY ON THE SYSTEM DISPLAY

Applicable to: ALL

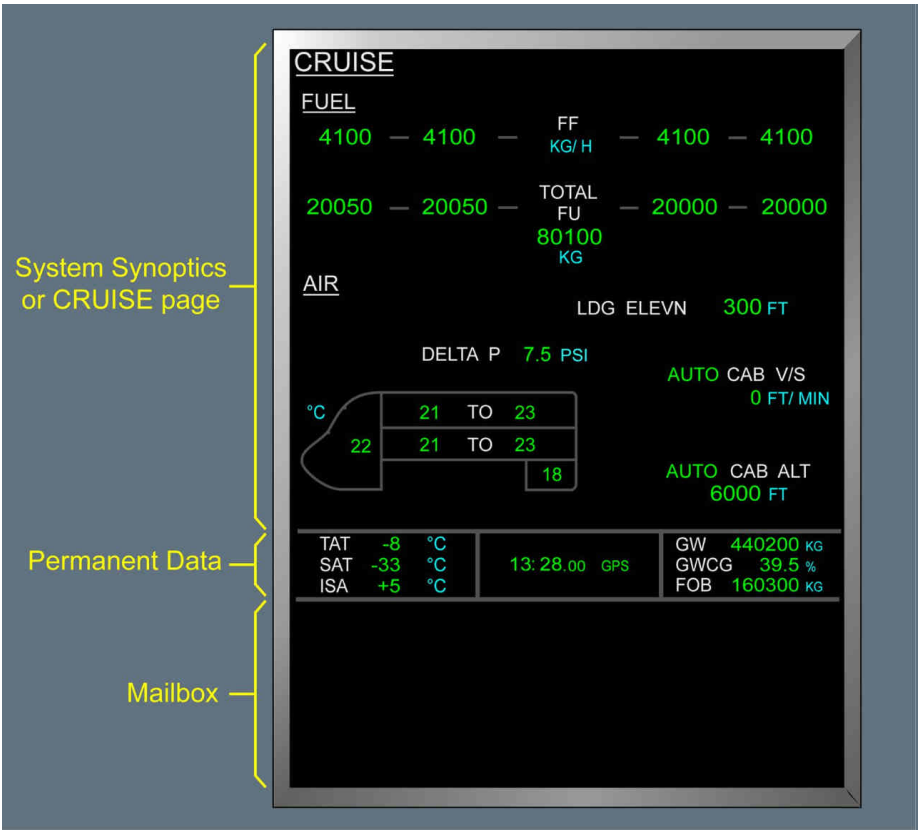
The SD screen has three horizontal sections:

- The top section provides the system display page, the STATUS page, or the STATUS MORE page.
  In normal operation, the SD provides system display pages. The system display pages appear:
  - Automatically, depending on the flight phase. For more details *Refer to Normal Operation* , or
  - When manually-selected by the flight crew. For more details *Refer to ECP* .
- The middle section displays permanently-displayed data such as: External temperature, time, aircraft weight, CG , and Fuel On Board (FOB).
- The bottom section displays the mailbox (*Refer to ECP*).

In addition, after an alert due to a system failure, the SD displays:

- The applicable system display page, if any.
- The aircraft STATUS page after the flight crew clears the alert from the EWD, if the STATUS page is not empty.

ECAM Display on the SD — GENERAL



The System Display (SD) pages appear on the SD in the following decreasing order of priority:
- SD page that the flight crew manually selects (*Refer to ECP System Page Pushbuttons*)
- SD page that appears after an alert, (*Refer to SD Display - Abnormal Operation*)
- SD page that automatically appears when there is an advisory, (*Refer to Advisory*)
- SD page that automatically appears depending on the flight phases, (*Refer to SD Display - Normal Operation*).

CRUISE PAGE

The CRUISE page provides the flight crew with information about the fuel system and air system.

The flight crew cannot select the CRUISE page via the ECP. It is automatically displayed at 1 500 ft AGL or at the thrust reduction, whichever occurs the first until L/G extension in approach.

The CRUISE page provides the following information about the fuel system:
- Current fuel flow per engine
- Fuel used per engine
- Total fuel used by the four engines.

The CRUISE page provides the following information about the air system:
- Overall cabin temperature per deck, and cargo hold temperature
- Cabin pressure altitude and vertical speed
- Landing Elevation (LDGELEVN) indication
- Differential pressure.

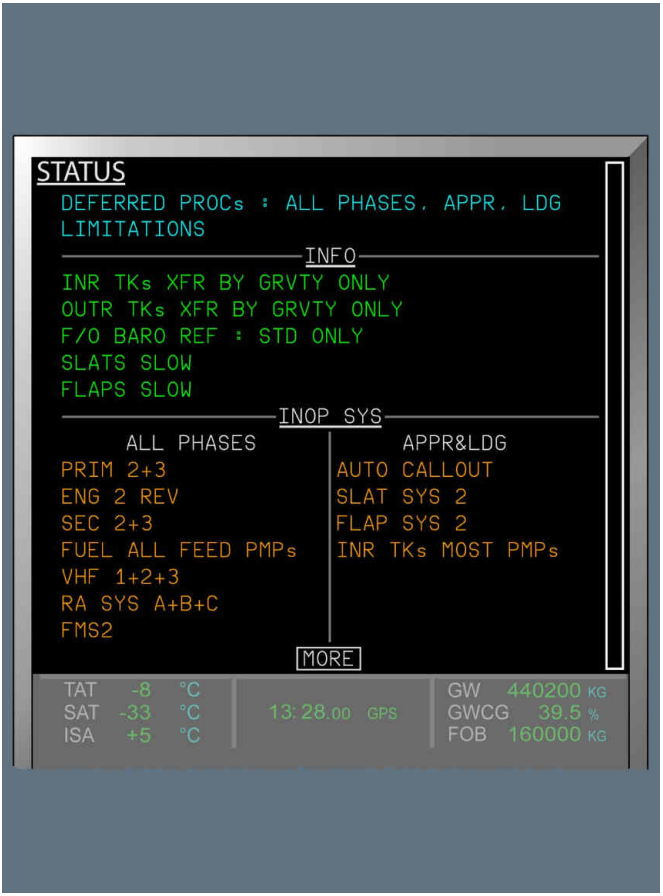
Cruise Page



STATUS PAGE

The STATUS page provides an operational summary of the aircraft status after the EWD has displayed a failure.

STATUS Page



The SD displays the STATUS page, to:

- Indicate, if there are DEFERRED PROCs and the phases in which phase they apply. Deferred procedures appear in the checklist menu
- Indicate if any LIMITATIONS apply. These limitations appear on the EWD and/or PFD
- Provide information on any degraded aircraft system in the INFO section.

- Provide all inoperative systems in the INOP SYS section in two columns.
  The title of the left column is (ALL PHASES), and this column displays the inoperative system applicable to all flight phases
  The title of the right column is (APPR & LDG), and this column displays the inoperative system that are applicable to the APPROACH and/or LANDING phases.
  The inoperative systems are displayed in amber and in decreasing order of importance.
- Indicate if a STATUS MORE page exists (MORE), in order to provide additional information related to the flight crew about the aircraft status (system redundancy losses, cautions canceled, or MORE INFO to a procedure).

The STATUS page:

- Automatically appears, if the STATUS is not empty, or if there is MORE INFO to a procedure in the STATUS MORE page, when the flight crew clears (via the CLEAR pb on the ECP) or cancels (via the EMER CANC pb on the ECP) the last alert on the EWD
- Automatically appears, if it is not empty, during approach

L2 The automatic display occurs during approach, when either the slats are extended or the flight crew selects a barometric pressure altitude.

L3 The approach condition is activated, when the aircraft is below 20 000 ft.

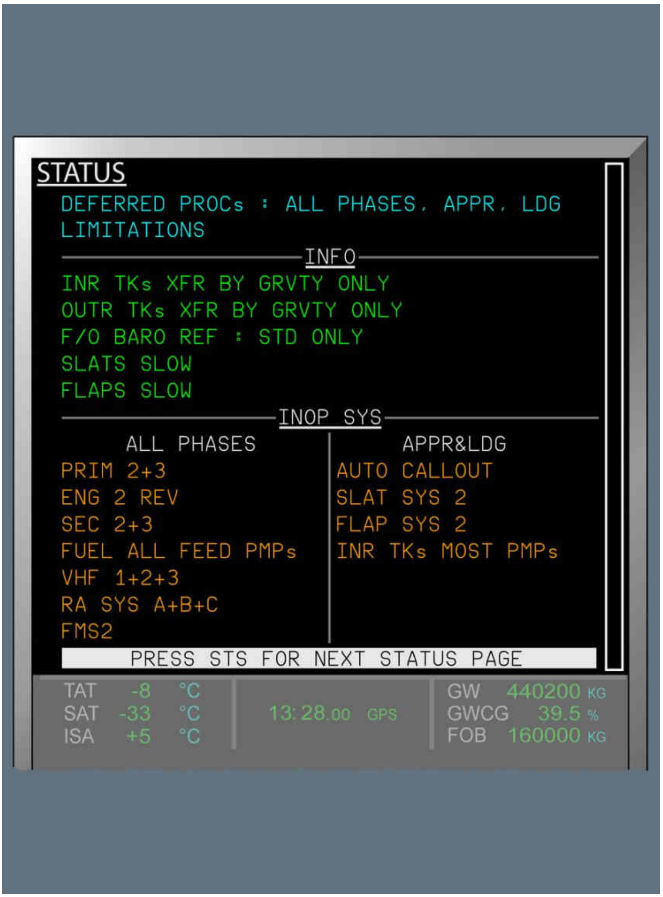
L1 - Can be manually displayed at any time by the flight crew, by pressing the STS pb on the ECP.
If the flight crew requests the STATUS page, but there is no STATUS information to display, then NORMAL appears.

OVERFLOW INDICATION

When the screen size does not enable the display of all information, only a part of this information appears.
In such cases, PRESS STS FOR NEXT STATUS PAGE appears on the bottom of the page to indicate the overflow below and that STATUS continues on the next page.
To erase the current displayed lines and to access the next page, the flight crew presses the STS pb on the ECP.

L2 Flight crew can access to the next page by pressing the CLEAR pb, if the vertical line is displayed on STATUS page.
If the memo/limitations page is not displayed, the flight crew should not use the CLEAR pb, in order to avoid inadvertently deleting the information displayed on EWD.

Overflow Indication



L1 STS **INDICATION**

Appears on the EWD, when all of the following apply:
- The STATUS is not empty
- The STATUS page does not appear on the SD
- The EWD displays either memo/limitations or a checklist.

STS Indication



STATUS NOT AVAILABLE

STATUS NOT AVAIL



The STATUS NOT AVAIL message appears when the SD can no longer display the STATUS page.

L2 The CDS displays this message in case of a communication failure between the FWS and the SD display unit.

STATUS MORE PAGE

When 

appears on the bottom of the STATUS page, it indicates that additional aircraft status information is available.
The flight crew can manually display a STATUS MORE page, if MORE appears at the bottom of the STATUS page, by pressing MORE pb on the ECP.

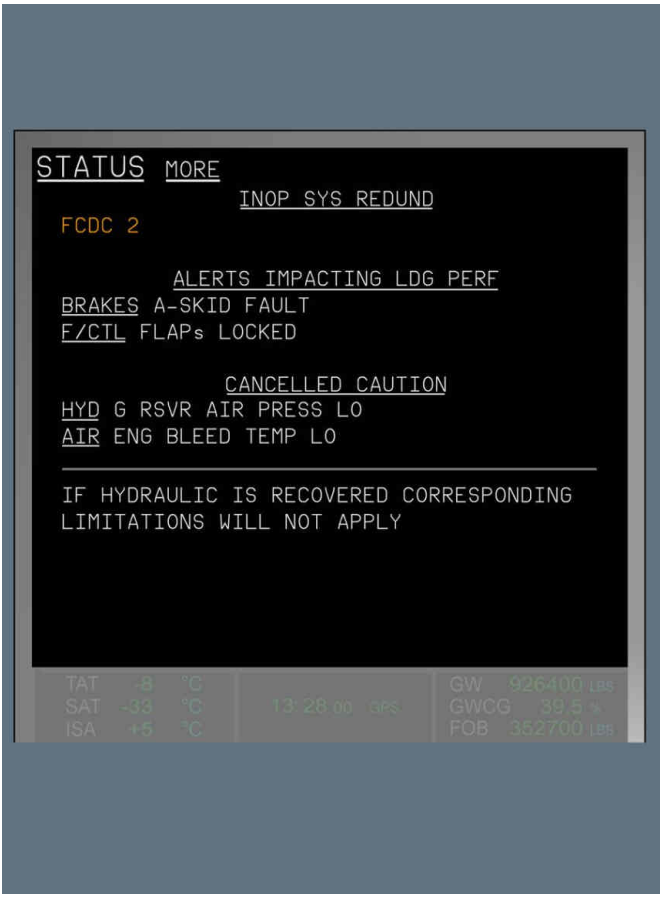
A STATUS MORE page is indicated by 

.

The STATUS MORE page:

- Indicates, in the INOP SYS REDUND section, the system redundancy losses that may occur following some alerts or not-sensed procedures
  System redundancy losses appear in amber and in decreasing order of importance.
- Indicates, in the ALERTS IMPACTING LDG PERF section, the alerts associated with performance
- Lists, in the CANCELLED CAUTION section, any cautions that were canceled with the EMER CANC pb
  Cancelled cautions appear in white and in decreasing order of importance.
- Provides, in white, additional procedural information. This section also refers to as MORE INFO.
  When there is at least one CANCELLED CAUTION, a separation line appears above the MORE INFO.

Status-More Sample



OVERFLOW INDICATION

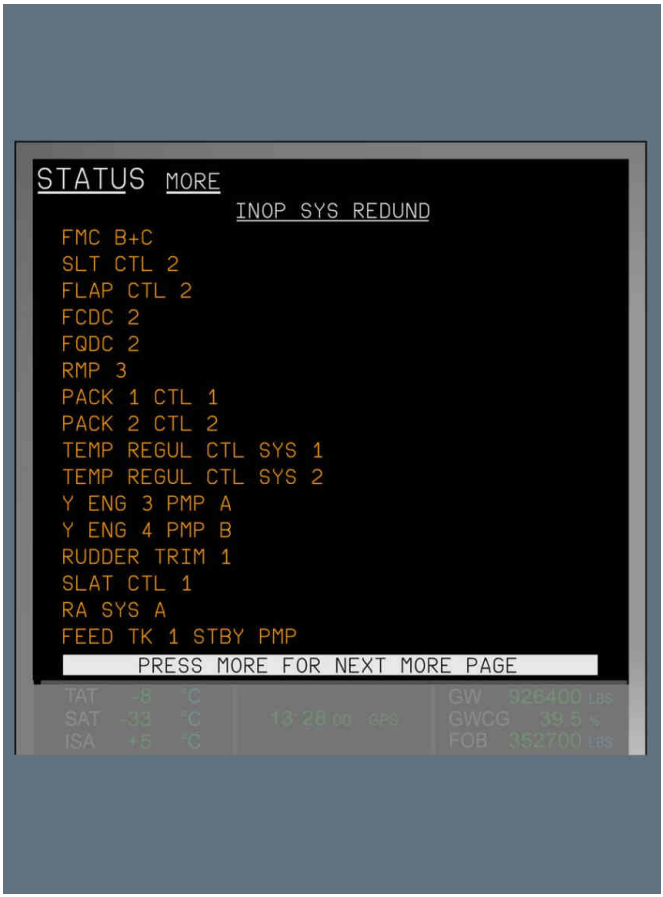
When the screen size does not enable the display of all information, the PRESS MORE FOR NEXT MORE PAGE message appears at the bottom of the page to indicate that the STATUS MORE continues on the next page.

To clear the currently display and to access the next pages, the flight crew presses MORE pb on the ECP.

L2 Flight Crew can access to the hidden information by pressing the CLEAR pb, if the vertical line is displayed on STATUS MORE page.

If memo/limitations page is not displayed, the flight crew should not use the CLEAR pb in order to avoid inadvertently deleting information displayed on EWD.

Overflow Indication



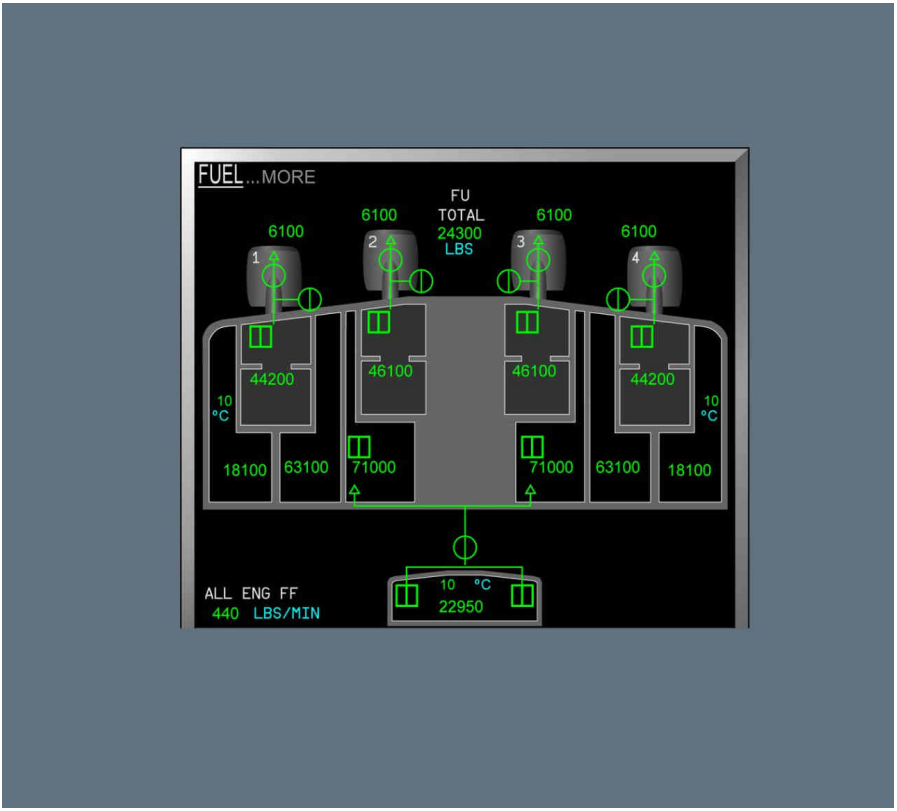
L1 **MORE ON SYSTEM DISPLAY PAGE**

Some systems displays have two pages available to provide additional information on the applicable system. In such a case, 

appears after the name of the system.

Landing gear and fuel systems have two pages of information.

FUEL System Display

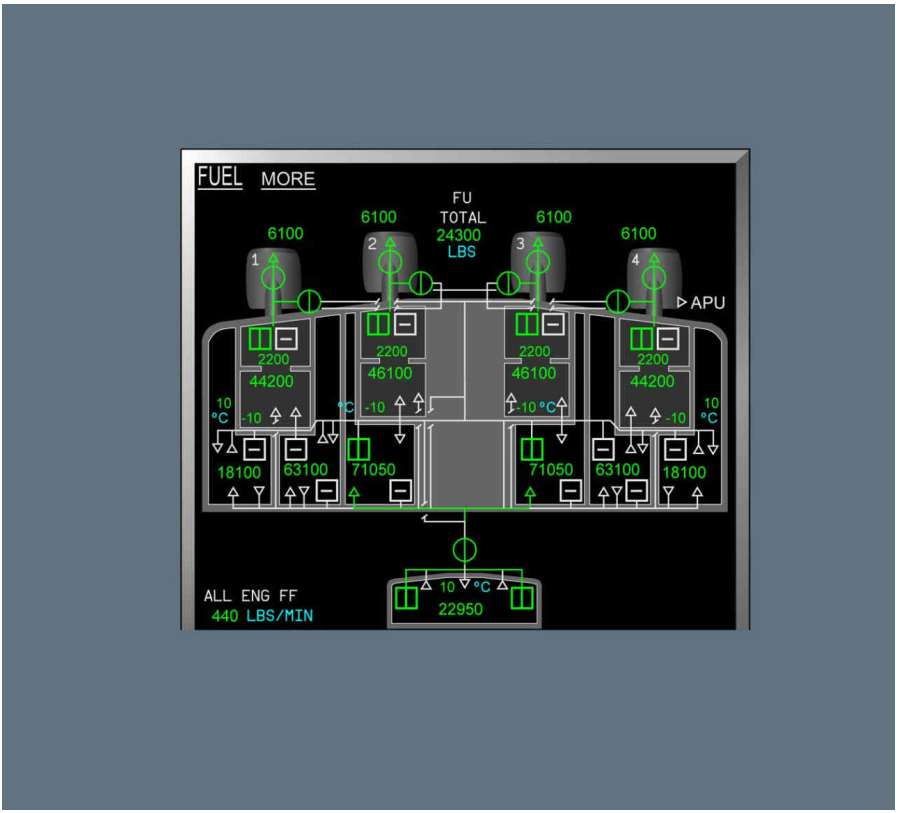


The MORE title, at the top left corner of the ECAM page, becomes



underlined, , when the flight crew presses MORE pb on the ECP
Parts of the system that are not active appear in grey.

FUEL MORE System Display



PERMANENT DATA ON SYSTEM DISPLAY

Applicable to: ALL

The SD permanently displays the following data, in three columns:

- Temperature
- Time
- Aircraft gross weight, center of gravity, and fuel data.

Permanently—displayed Data



TEMPERATURE DATA

The left column displays the external air temperature values in degrees Celsius.

These values include:
- The Total Air Temperature (TAT)
- The Static Air Temperature (SAT)
- The International Standard Atmosphere (ISA) deviation.

L3 The ADIRS provides both TAT and SAT data.
The CDS computes the ISA deviation using the SAT.

L1 The applicable plus and minus signs always appears..

TIME DATA

The second line of the middle column on the SD displays the Universal Time Coordinated (UTC).

L3 The clock provides the displayed UTC information. When the clock data is not valid, the time source of the ADIRS is used and provides the displayed UTC information. For information on time-reference, *Refer to Clock.*

L1



Normal UTC display. The format is HH : MM . SS



The clock is set to INT mode.

L13



The clock is set to GPS mode.
If the clock can no longer provide the time-reference, the GPS time-reference of the AIDRS , provides UTC .



All time sources are not valid.

L13



Degraded accuracy of the time data.
The dash lines appear when:

- The internal time-reference of the clock provides UTC , while clock is set to GPS mode, or
- If the clock can no longer provide the time-reference, the internal time-reference of the AIDRS provides UTC .



Clock is in SET mode.

G LOAD DATA

In case the measured G load exceeds a specific range, the first line of the middle column indicates an abnormal G load.

L3 The ADIRS provide G LOAD data.

L1



The aircraft becomes airborne, and the G LOAD is less than 0.7 g , or greater than 1.4 g , for longer than 2 seconds.
After the G load returns to normal, G LOAD data remains visible for 5 seconds.
The plus and minus signs are always displayed.



An abnormal G LOAD value has been measured, but the value is not available.

DISPLAY SYSTEM VERSIONS DISAGREE

The three lines of the middle column on the SD may display a “DISPLAY SYSTEM VERSIONS DISAGREE” message. This message is defined for maintenance purposes only.
This message is triggered when the aircraft is on ground.

L3 This message is normally triggered at power-up or during rollout when the aircraft speed is below 80 kt , or after the last engine shutdown.

L12



The CDS detects differences between the display unit versions.

The CDS checks that all display units have the same version of:
- Hardware
- Software

GW, GWCG, AND FOB DATA

The right column on the SD displays the aircraft Gross Weight (GW), the aircraft Gross Weight Center of Gravity (GWCG), and the Fuel On Board (FOB).

L3 The Fuel Quantity Management System (FQMS) provides the GW , the GWCG , and the FOB values.
If the GW , or the FOB value from the FQMS is no longer available, the FMS provides the GW , or the FOB value.
For more information on GW calculation from the FMS , *Refer to DSC-22-FMS-20-30-22FMS502BM Gross Weight* .
For more information on FOB calculation from the FMS , *Refer to DSC-22-FMS-20-30-22FMS502BM Fuel on Board* .
If the GWCG value from the FQMS is no longer available, the Weight and Balance Backup Computer (WBBC) provides the GWCG value.

L1 GW and FOB values are rounded off to the nearest hundred.



Normal.



Value accuracy is degraded.



The flight crew did not enter the ZFW , ZFWCG in the FMS .



Data is not valid.



GWCG appears in red, in the case of a FUEL EXCESS AFT CG (*Refer to PRO-ABN-ECAM-10-28-440 FUEL EXCESS AFT CG*).



GWCG appears in amber, in the case of:

- A CG OUT OF RANGE (*Refer to PRO-ABN-ECAM-10-28-520 FUEL CG OUT OF RANGE*), or
- A CG AT FWD LIMIT (*Refer to PRO-ABN-ECAM-10-28-460 FUEL CG AT FWD LIMIT*).



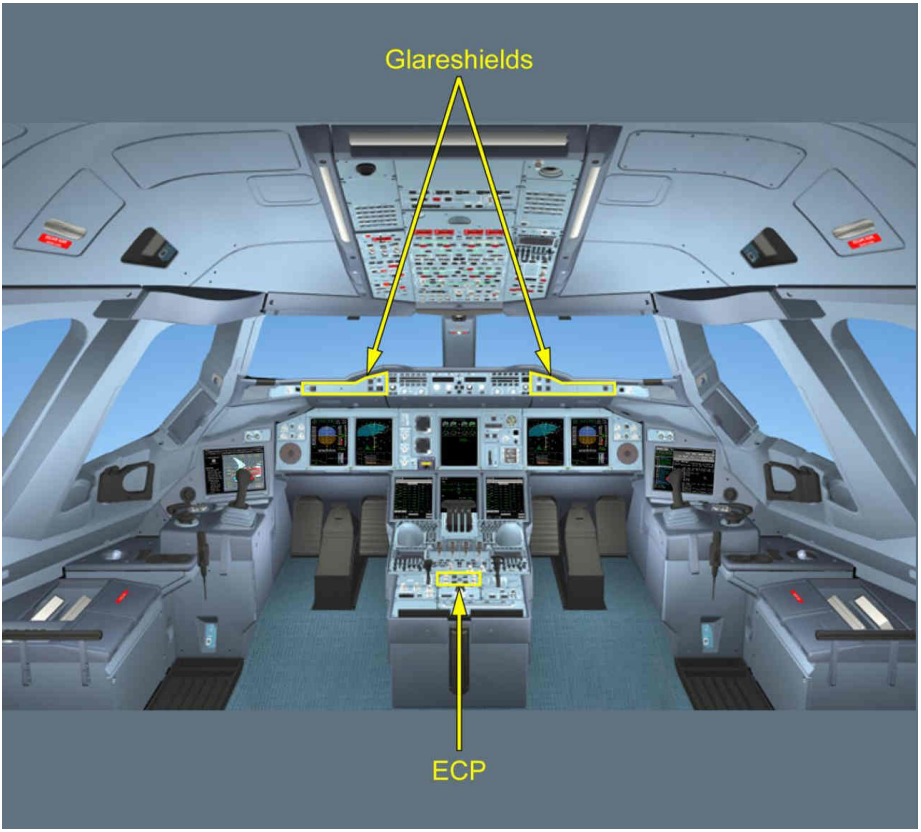
Appears, in the case of a tank fuel is not usable.

Intentionally left blank

ECAM CONTROLS

Applicable to: ALL

ECAM Controls



ECAM CONTROL PANEL

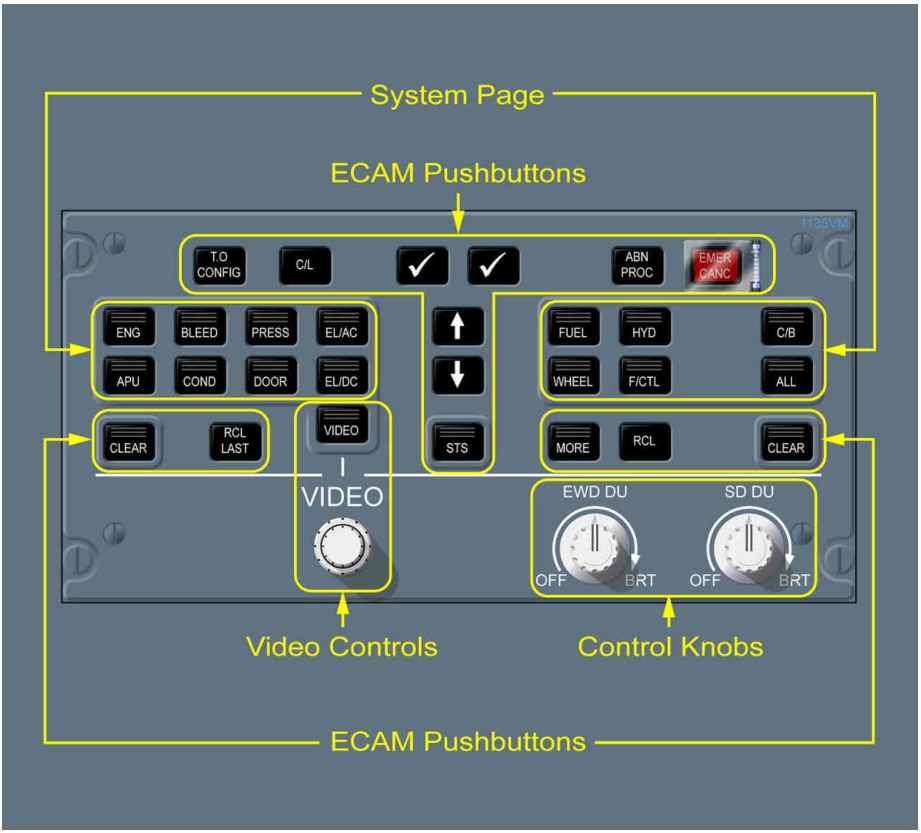
Applicable to: ALL

The flight crew uses the ECAM Control Panel (ECP) to interface with the ECAM system. There is one ECP , and it is located on the central pedestal.

The ECP provides keys that enables the flight crew to:
- Navigate in a menu list, checklist, and/or procedure
- Select an item in a menu list
- Activate an item in a checklist and/or procedure
- Activate the takeoff configuration test
- Clear or cancel alerts
- Access some system pages
- Access normal checklists
- Access not-sensed ABN PROC
- Access STATUS page
- Access STATUS MORE page
- Access additional information system pages.

In addition, the ECP provides:
- Rotary selectors to turn the EWD and SD on and off, and to adjust their brightness
- Video display selection and control.

ECP



SYSTEM PAGE PUSHBUTTONS

The flight crew can manually access each of the system pages on the SD via the associated pushbuttons on the ECP . When pressed, the pushbutton lights up, and the corresponding system page appears on the SD .
When pressed a second time, the corresponding system page no longer appears on the SD , and the light on the pushbutton goes off.



The SD displays the ENGINE system page. *Refer to DSC-70-90-60 System Display* .



The SD displays the APU system page. *Refer to DSC-49-20-40 APU System Display*



The SD displays the BLEED system page. *Refer to DSC-36-20-20 BLEED System Display* .



The SD displays the Air Conditioning (COND) system page. *Refer to DSC-21-10-20 COND System Display* .



The SD displays the Cabin Pressurization (CAB PRESS) system page. *Refer to DSC-21-10-20-80 CAB PRESS System Display* .



The SD displays the DOOR/OXYGEN system page. *Refer to DSC-35-20-20-D Oxygen indications on DOOR System Display* .



The SD displays the Electrical (ELEC) AC system page. *Refer to DSC-24-20-50 ELEC AC System Display: In-Flight Configuration* .



The SD displays the Electrical (ELEC) DC system page. *Refer to DSC-24-20-70 ELEC DC System Display* .



The SD displays the FUEL system page. *Refer to DSC-28-20 FUEL SYSTEM DISPLAY* .



The SD displays the WHEEL system page. *Refer to DSC-32-20-30 WHEEL System Display*



The SD displays the Hydraulic (HYD) system page. *Refer to DSC-29-20-DSC2920C HYDRAULIC SYSTEM DISPLAY* .



The SD displays the Flight Controls (FCTL) system page. *Refer to DSC-27-10-20-272001 F/CTL System Display* .



The SD displays the list of all the tripped circuit breakers. *Refer to DSC-24-20 C/B System Display* .

ALL pb



When pressed and maintained, each system display page consecutively appears on the SD, for three seconds.
When released, the last system display page remains, until a new display is either requested by the flight crew, or prompted by the ECAM.

TO CONFIG pb



: Simulates the application of takeoff power, by initiating a takeoff configuration test. A warning triggers, if any monitored system is not in the correct takeoff configuration. For more details *Refer to DSC-31-40-10 Takeoff Configuration Test* .
If the test is successful, the EWD displays a T.O CONFIG NORMAL message in the takeoff memo section.

C/L



: The EWD displays the normal checklist menu.

VALID (TICK) pb



: When pressed, validates/devalidates the item that is surrounded by a blue box on the EWD.

- Validates/devalidates a checklist item or procedure item, that is not detected by the ECAM.
- Selects one item of a checklist menu or procedure menu.

ABN PROC pb



: The EWD displays the menu of not—sensed emergency or abnormal procedures. The ECAM cannot detect these procedures. Therefore, the flight crew manually requests their display, when necessary.

EMER CANC pb

L2 The EMER CANC pb is a guarded pushbutton.

L1



: - Cancels the audio indicator and turns off the MASTER WARN light associated with an ECAM warning.
However, the associated procedure remains displayed on the EWD.
The audio indicator and MASTER WARN light are not canceled for the remainder of the flight. If the ECAM warning is triggered a second time, the audio indicator and MASTER WARN light appear again
- Cancels the SC, the procedure on the EWD, and turns off the MASTER CAUT light, associated with an ECAM caution. The ECAM caution is canceled for the remainder of the flight, even if the triggering conditions occur again
- Cancels all the audio indicators and aural alerts. If the triggering conditions occur again, the audio indicators and the aural alerts sound again
- Deactivates any activated not-sensed procedure.

Note: *a. All the alerts that are still active and canceled via the EMER CANC pb appear again on the EWD when the flight crew presses the RCL pb on the ECP for more than three seconds.*
b. When pressed and if there is no alert that the flight crew can cancel, the EWD displays the EMERGENCY CANCEL ON message.

UP-ARROW pb



: The blue box moves up to the previous selectable item on the EWD screen.
The blue box cannot surrounds a grey line (except on the checklist menu).

DOWN--ARROW pb



: The blue box moves down to the next selectable item on the EWD screen.
The blue box cannot surrounds a grey line (except on the checklist menu).

STS pb



: The SD displays the STATUS page, if applicable.
The SD displays NORMAL, if the STATUS page is empty.
If the SD displays a STATUS page, the STS pb comes on.
If pressed again, when the SD displays the STATUS page, the page is cleared.

CLEAR pb



: On EWD or SD clears the lines indicated by the displayed vertical bar. The CLEAR pb light comes on, when there is an alert to clear on EWD.

Note: *The CLEAR pb does not cancel any aural alerts associated with a caution/warning, and does not deactivate a Not-Sensed ABN PROC.*

RCL LAST pb



: Cancels the last CLEAR pb action on an alert.

MORE pb



: The SD displays the MORE information page that is available when MORE appears on the system display pages and STATUS page.
When the SD already displays the MORE information page, pressing again this pushbutton clears the MORE information page.

RCL pb



: - When pressed, all alerts previously performed and still active, and all not-sensed ABN PROC that are still active appear on the EWD.
- When pressed for more than three seconds, all alerts that were previously cancelled via the EMER CANC pb or cleared or inhibited by the current aircraft flight phase appear on the EWD.

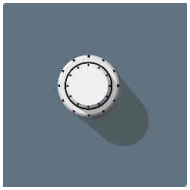
Note: *When there is no alert to recall, NORMAL appears for 3 seconds.*

CONTROL knob



Turns the EWD or SD on/off, and adjusts the brightness of the applicable display unit.

VIDEO knob



Displays the selected video on the applicable display unit. For more information, *Refer to Video Controls* .

ECAM - GLARESHIELD CONTROLS

Applicable to: ALL

MASTER WARNING



The MASTER WARN light flashes, and the continuous repetitive chime sounds when the ECAM triggers a warning.
When pressed, the light goes off, and the continuous repetitive chime associated with the MASTER WARN light is cancelled.

L3



: Each FWS controls half of the MASTER WARN light. If one FWS is inoperative, a warning is triggered and the remaining FWS turns on the applicable MASTER WARN light.

MASTER CAUTION

L13



The MASTER CAUT light comes on, and the single chime sounds when the FWS triggers a caution.
The MASTER CAUT light remains steady.
When pressed, the light goes off, and the single chime associated with the caution is canceled.

L3



Each FWS controls half of the MASTER CAUT light. If one FWS is inoperative, a warning is triggered and the remaining FWS turns on the applicable MASTER CAUT light .

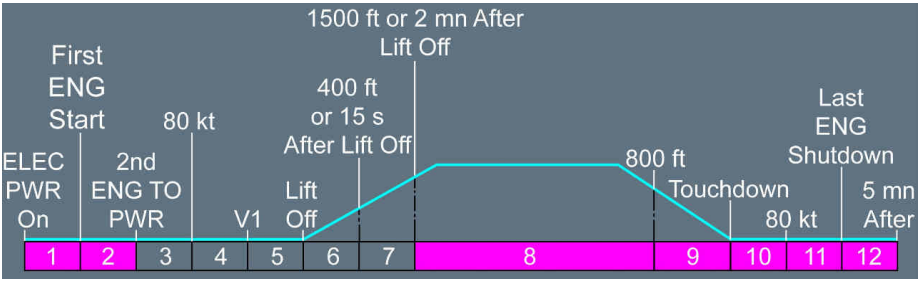
MEMO

Applicable to: ALL

T.O INHIBIT : The FWS inhibits some warnings and/or cautions to avoid unnecessarily alerting the flight crew during takeoff.

Note: *The EWD displays this memo even if no warnings and/or cautions are activated.*

Flight Phase Inhibition



LDG INHIBIT : The FWS inhibits some warnings and/or cautions to avoid unnecessarily alerting the flight crew during Landing.

Note: *This EWD displays this memo even if no warnings and/or cautions are activated.*

Flight Phase Inhibition



XX DISPLAY ON THE SD

Applicable to: ALL

If a parameter value on any SD page is not available for display, XX appears, instead of the value.

AUDIO INDICATORS

Applicable to: ALL

The following table provides the aural alerts generated by the FWS :

Audio Indicator	Meaning or Cause	Duration, or Quantity (1)
Single Chime (Sound)	Caution (Amber).	Sounds 1 time
Continuous Repetitive Chime (Sound)	Warning (Red).	Sounds until the flight crew presses any MASTER WARN light pb
Buzzer C (Sound)	MECH CALL (*Refer to DSC-23-20-05 Internal Communication Transmission Keys and Reception Knobs*).	- Sounds until the flight crew presses either the MECH key or the RST key on RMP , or - Stops automatically after 60 s .
	SELCAL (*Refer to DSC-23-10-30-30 SELCAL*).	Sounds until the flight crew presses either the transmission key or the RST key on RMP .
Buzzer Norm (Sound)	CABIN CALL (*Refer to DSC-23-20-05 Internal Communication Transmission Keys and Reception Knobs*).	- Sounds until the flight crew presses either the ATT key or the RST key on RMP , or - Stops automatically after 60 s .
Buzzer Emergency (Sound)	EMER CABIN CALL (*Refer to DSC-23-20-70 EMER Pb-sw*).	Sounds 1 time
Cavalry Charge (Low Volume Sound)	AP disconnection because the flight crew pressed the sidestick pb one time (*Refer to DSC-22-FG-40-30 Disengagement Annunciations and Warnings*).	- Sounds until the flight crew presses any MASTER WARN light pb or the sidestick pb a second time, or - Stops automatically after 0.8 s , and Cavalry charge high volume after 1.8 s .
Cavalry Charge (High Volume Sound)	AP disconnection due to: - Failure, or - Pedal movements, or - Sidestick deflection.	Sounds until the flight crew presses any MASTER WARN light pb , or presses the sidestick pb a second time
Triple Click (Sound)	- Landing capability change, or - Automatic mode reversion of AP / FD and A/THR , or - AP cannot hold VS / PFA target.	Sounds 1 time
Cockpit Door (Synthetic Voice)	Cabin requests the opening of cockpit door.	Sounds 1 time
Cockpit Door Emergency (Sound)	Cabin requests an emergency opening of the cockpit door.	- Sounds until the flight crew locks or unlocks the door, or - Until the door automatically unlocks.

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Audio Indicator	Meaning or Cause	Duration, or Quantity (1)
C Chord (Sound)	Altitude alerts (Refer to *Refer to DSC-31-20-20-60 Altitude Alerts*).	- Stops automatically after 1.5 s , when the aircraft approaches the selected altitude, or - Sounds when the aircraft altitude deviates from the selected altitude, until the flight crew presses any MASTER WARN light pb , or selects a new ALTITUDE, or the aircraft returns to the selected ALTITUDE.
Ring (Sound)	ATC messages (*Refer to DSC-46-10-20-70 ATC MSG pb*).	Sounds 1 time
Dual Input (Synthetic voice)	Both flight crew members simultaneously move the sidesticks.	Sounds 1 time
Pitch (Synthetic voice)	Pitch attitude alert: The aircraft has an excessive pitch attitude at landing.	Sounds 2 times
Priority Left (Synthetic voice)	The CAPT presses the sidestick pb .	Sounds 1 time
Priority Right (Synthetic voice)	The F/O presses the sidestick pb .	Sounds 1 time
Speed (Synthetic voice)	LOW ENERGY alert (*Refer to DSC-22-27-20 Low Energy Protection*).	Sounds 3 times
Cricket + Stall (Synthetic voice)	Speed protection alert: The aircraft speed reaches $V\alpha_{sw}$ protection (In alternate law or in direct law).	Sounds until the aircraft speed goes above the $V\alpha_{sw}$ protection speed
V1 (Synthetic Voice)	The aircraft reaches V1 speed.	Sounds 1 time
Retard (Synthetic voice)	The flight crew has not set the thrust levers in to the IDLE position for landing.	Sounds 1 time at 20 ft (10 ft in autoland with A/THR ON), then sounds until the flight crew sets the thrust levers to IDLE
Windshear (Synthetic voice)	WINDSHEAR alert (*Refer to DSC-22-27-20 Reactive Windshear Alert*).	Sounds 3 times
Company Alert (Synthetic Voice)	Company alert: The flight crew receives an urgent company message.	Sounds 1 time
Company Message (Synthetic Voice)	Company message: The flight crew receives a company message.	Sounds 1 time
Time Marker (Synthetic Voice)	Timemarker in 30 s .	Sounds 1 time

(1) All audio indicators can be cancelled by pressing the EMER CANC pb on the ECP .

Note: FWS also provides RA announcements. (Refer to Automatic Callouts).

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GENERAL

Applicable to: ALL

NORMAL OPERATIONS

In normal operations, the ECAM displays:

- System display pages on the SD
- Memos (e.g. SEAT BELTS, ENG A-ICE, T.O and LDG memos) on the EWD and the PFD.

The EWD displays the normal checklist, upon flight crew request.
In approach, the ECAM manages aural altitude callouts, and decision-height announcements.

SYSTEM DISPLAY PAGE

Applicable to: ALL

SD DISPLAY — NORMAL MODE

In normal operations, the SD displays system display pages.

These system display pages appear:
- Automatically on the SD, depending on the flight phase. The following table provides the system display pages that appear during specific flight phase
- When manually-selected by the flight crew from the ECP.

Note: An SD page manually-selected by the flight crew has priority over an SD page that automatically appears depending on the flight phase.

AUTOMATIC DISPLAY OF SYSTEM DISPLAY PAGES - ACCORDING TO FLIGHT PHASE

Display Conditions	System Display Page on the SD
- Before engine start, or - During 5 min after last engine is shutdown.	DOOR
When the APU MASTER sw is set to ON. No longer appears when: - APU is AVAIL for 10 s, or - The APU MASTER sw is set to OFF.	APU
- When the ENG START selector is set to IGN START, until the end of the engine start sequence, or - When at least one engine is in cranking, or - During takeoff, until 1 500 ft AGL or at the thrust reduction, whichever occurs the first.	ENG

Continued on the following page

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Display Conditions	System Display Page on the SD
- During taxi-out, until takeoff thrust is set, or - After landing gear extension, until last engine shutdown.	WHEEL
During flight control checks.	F/CTL
At 1 500 ft AGL or at the thrust reduction, whichever occurs the first until landing gear extension in approach.	CRUISE

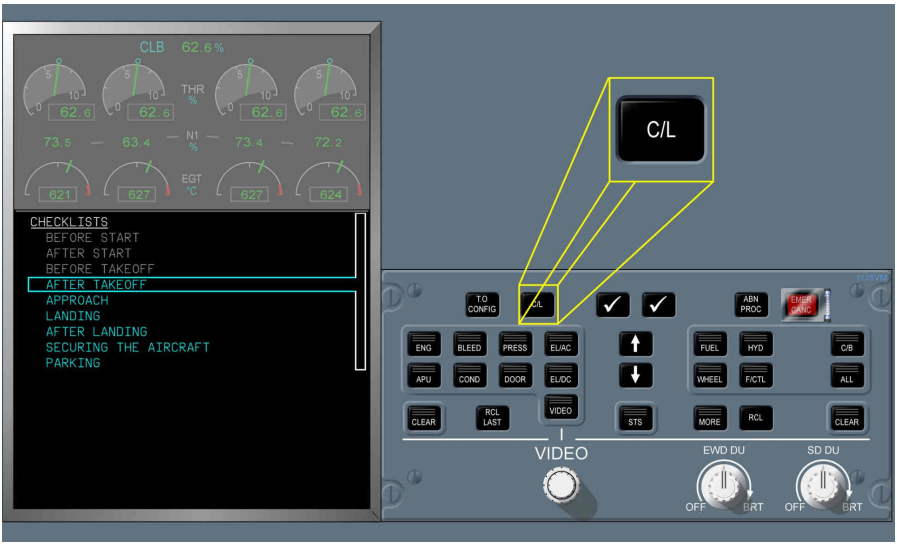
HOW TO HANDLE THE CHECKLISTS

Applicable to: ALL

DISPLAYING THE CHECKLIST MENU

At any time during the flight, the flight crew can access and display the checklist menu on the EWD, by pressing the C/L pb on the ECP.

Checklist Menu



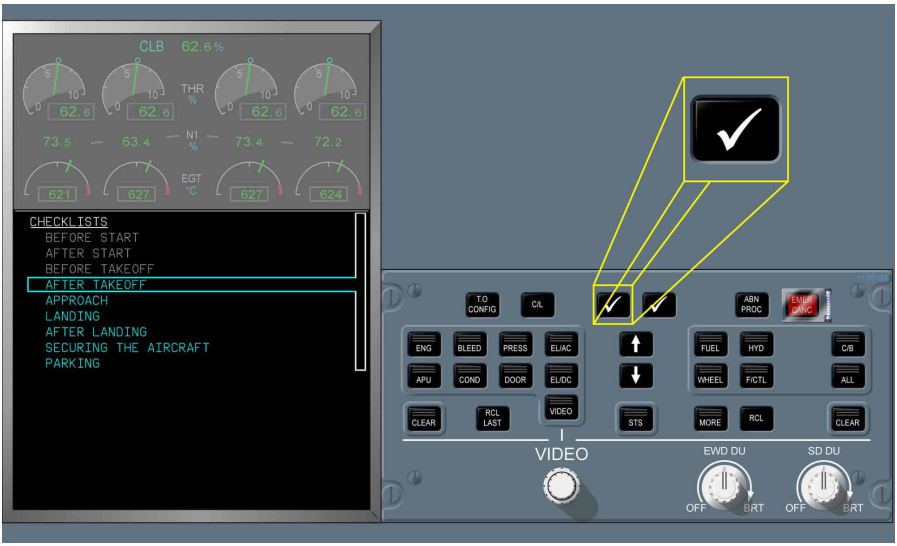
A blue box appears below the last completed checklist, and surrounds the title of the next applicable checklist.

The C/L Menu



The flight crew can change the checklist selection in the menu, with the  , or with the .  . The flight crew confirms the selection by pressing the  pb.

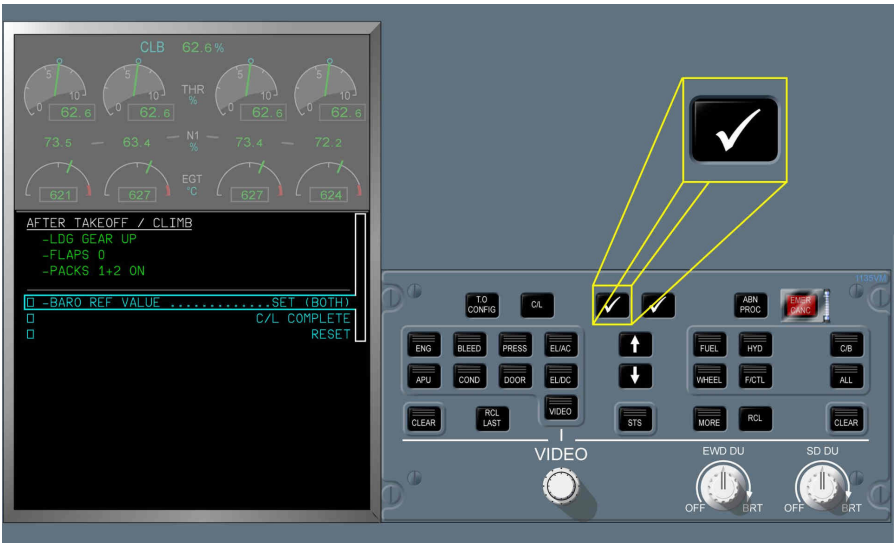
Selecting a checklist in the Menu



DISPLAYING A CHECKLIST

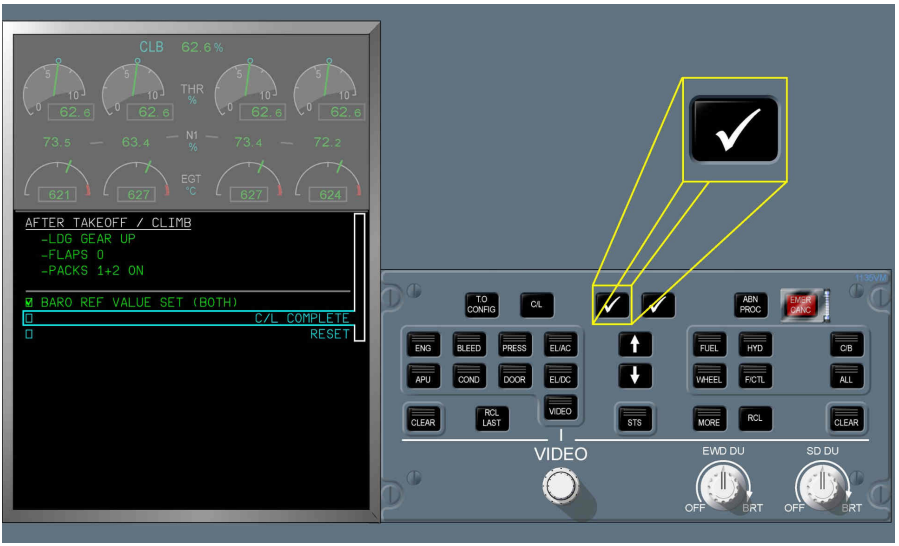
After the flight crew selects a checklist from the menu, it appears on the EWD.
Completed checklist items, sensed by the ECAM, appear in green. The flight crew must validate any not-sensed items with the tick pb.

Sample Checklist



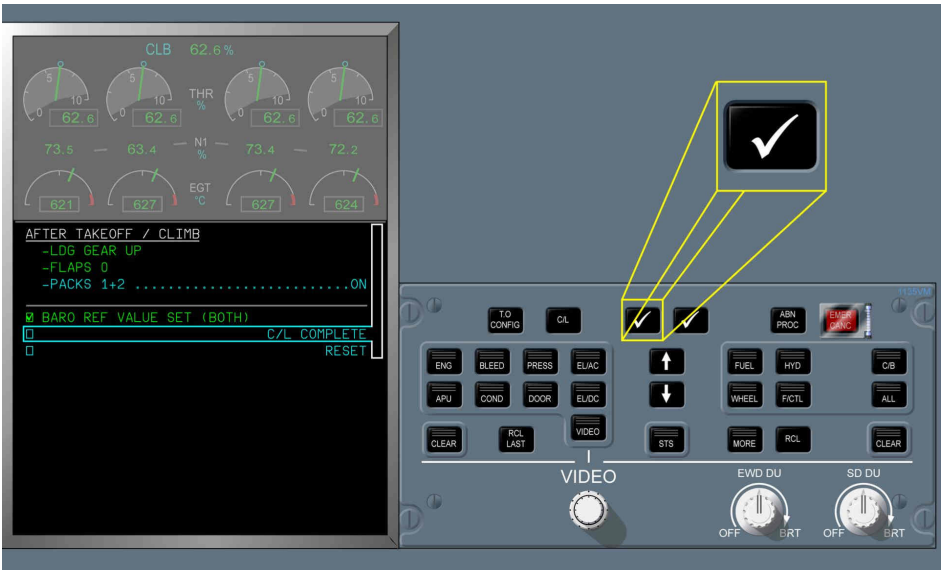
When the blue box surrounds C/L COMPLETED line, and the flight crew validates it with the tick pb, the checklist is completed and cleared. The checklist menu indicates that it is completed.

Validate the C/L COMPLETED Line

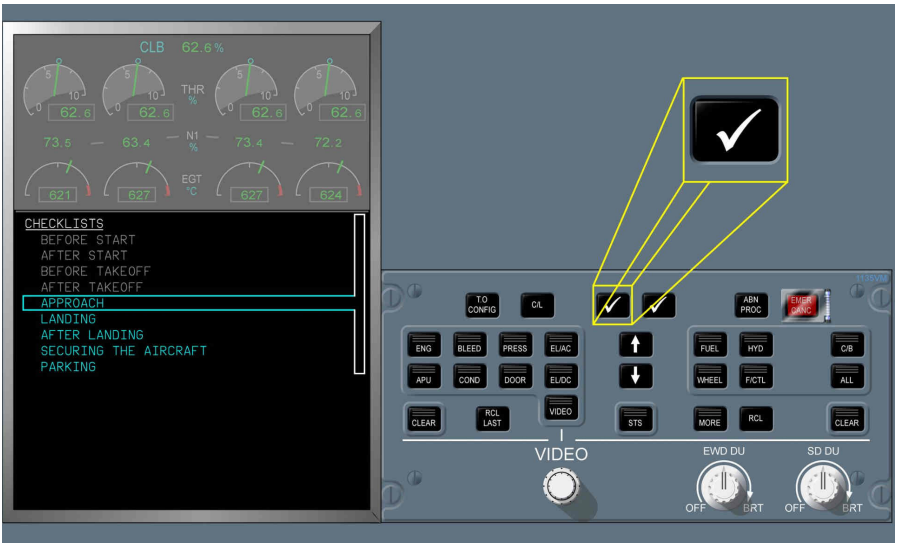


Note: *However, if the flight crew intentionally does not validate some checklist items, the flight crew can still validate the C/L COMPLETED line, and the checklist will still be considered as completed. This may be the case after a system failure, that may prevent the flight crew from performing some checklist items.*

C/L Complete, but not all Items Validated



C/L Menu after C/L Completion

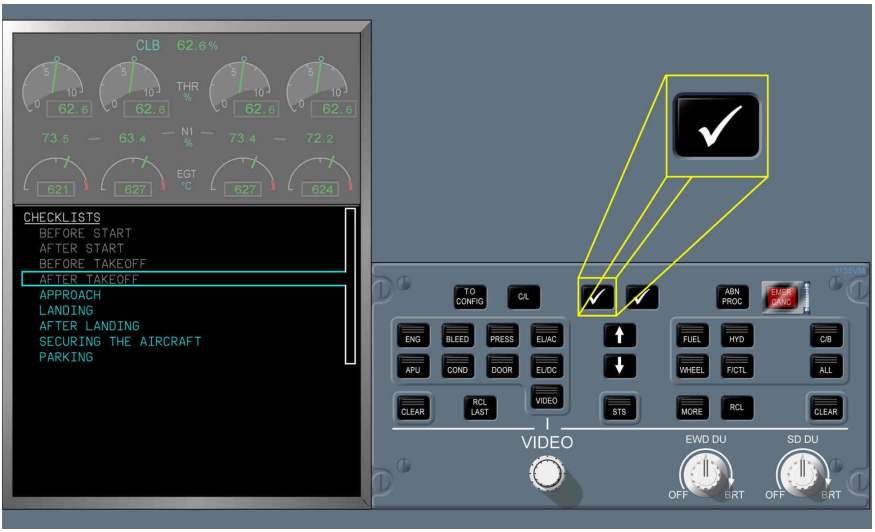


RESETTING A CHECKLIST

MANUAL RESET

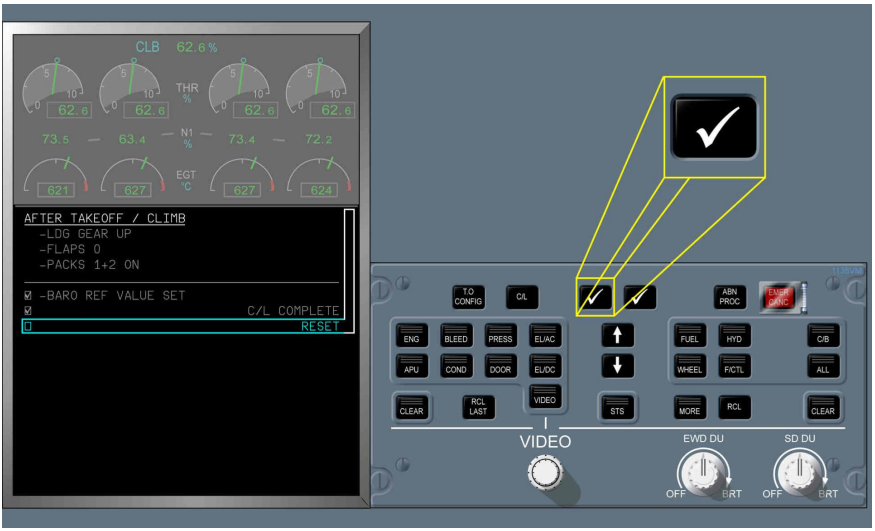
In some cases, it may be necessary for the flight crew to verify a checklist that has already been completed, by manually resetting the checklist.
The flight crew can also reset all checklists, by manually resetting the first checklist of the menu.
To reset a checklist, the flight crew selects a completed checklist on the checklist menu, and validates it with the tick pb.

Selecting a Completed Checklist



RESET appears on the last line of the completed checklist.

Resetting an Open Checklist



If the flight crew validates the RESET line, the entire checklist, and all of the subsequent checklists, are reset. The color of all checklist items changes from grey to the color that is applicable to their status.

Checklist Reset



AUTOMATIC RESET OF THE CHECKLISTS

An automatic reset of the checklists may occur, in the following cases:

- At aircraft power-up, or
- When the flight crew manually resets a checklist, all subsequent checklists, completed or not completed are automatically reset, or

- In the case of a go-around, AFTER TAKEOFF checklist and subsequent checklists are automatically reset, or
- At the end of the flight, if the aircraft remains powered and the flight crew does not manually reset a checklist.

L2 The checklists are automatically reset 50 min after the last engine shutdown.

GENERAL

Applicable to: ALL

ABNORMAL OPERATIONS

If the ECAM detects a failure, it informs the flight crew, and displays the applicable procedures. In addition, the ECAM displays not-sensed ABN procedures, upon flight crew request.

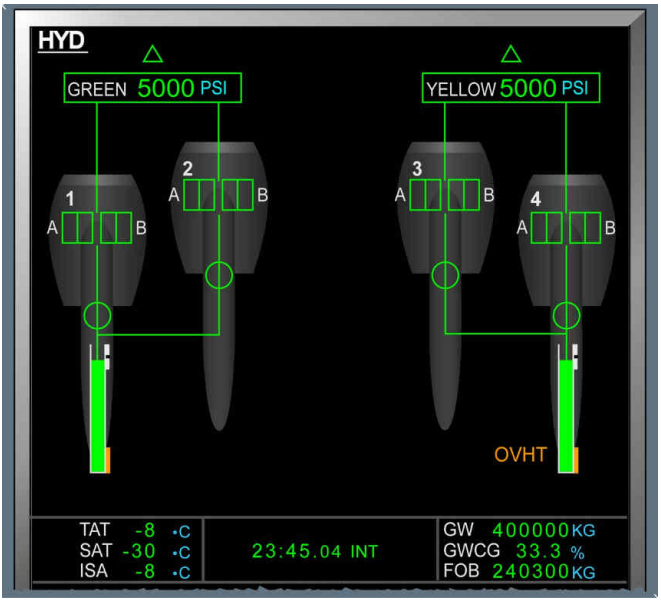
SYSTEM DISPLAY

Applicable to: ALL

SD DISPLAY — ABNORMAL OPERATIONS

In the case of a system failure, the SD automatically displays associated with the procedure that appears on the EWD (if any), and provides the configuration of the system with the faulty element.

ECAM System Display Page Sample



In the case of multiple failures, the SD changes the system display page corresponding to the procedure that appears on the EWD.

At the end of the procedure, if there are secondary failures:

- The system display page, associated with each secondary failure, appears on the SD
- The CLEAR pb on the ECP clears the secondary failures on the EWD, and the associated system display page on the SD, one after the other.

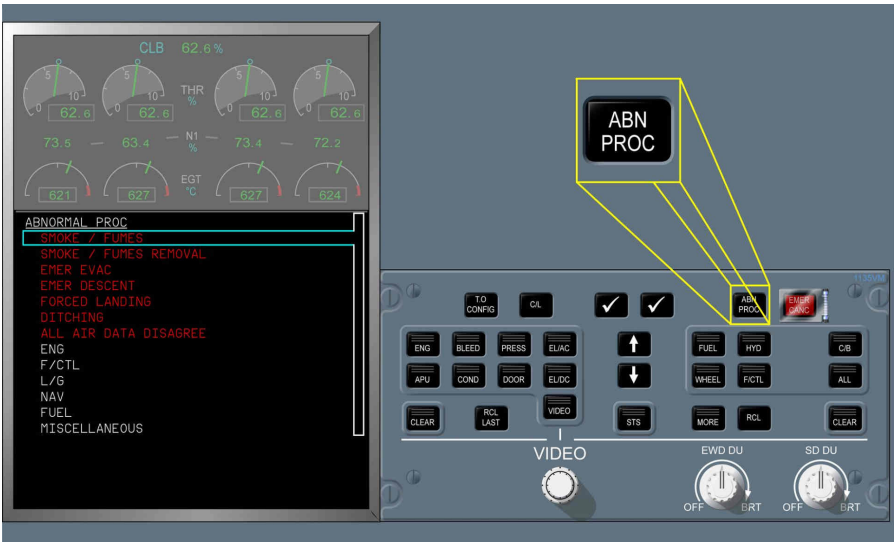
HOW TO ACTIVATE A NOT-SENSED ABN PROC

Applicable to: ALL

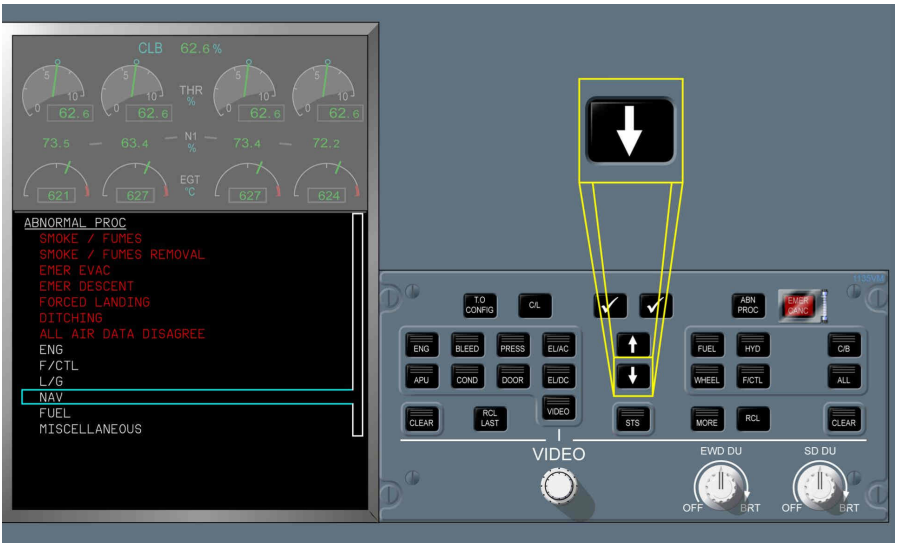
HOW TO ACTIVATE A NOT-SENSED ABN PROC

The flight crew can access and display the not-sensed ABN PROC menu on the EWD , by pressing the ABN PROC pb on the ECP .

Display the Not-Sensed ABN PROC Menu



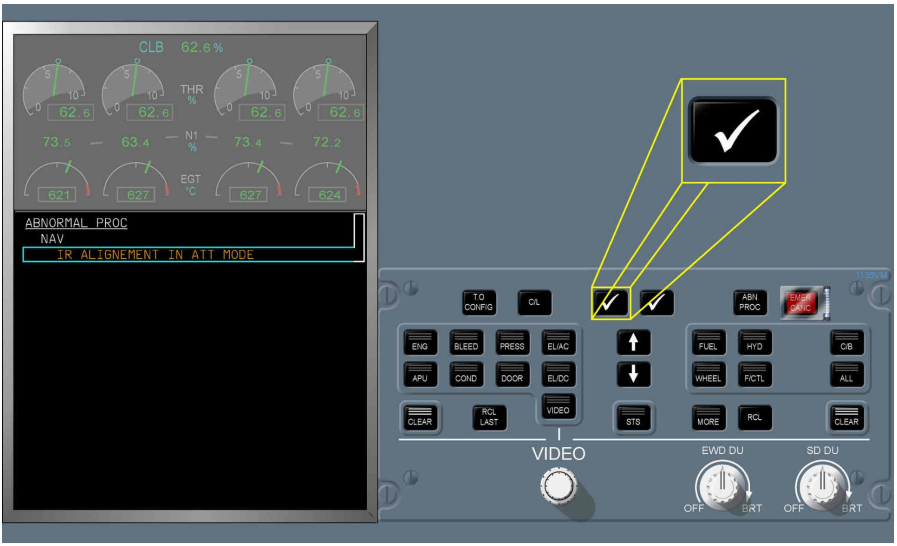
Not-Sensed ABN PROC menu



A blue box appears on the first procedure.

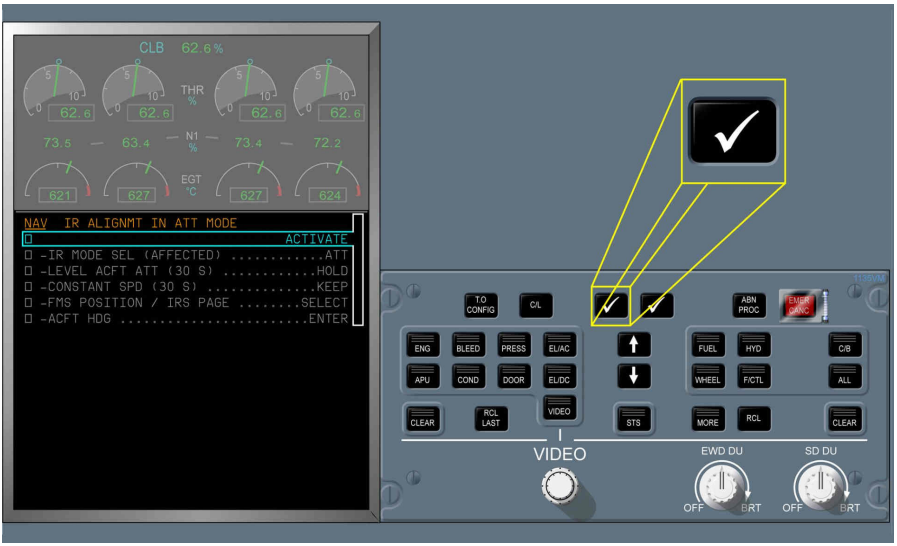
The flight crew selects a procedure in the menu or in a submenu, with the  , or with the .  . This selection is then confirmed with 

Not-Sensed ABN PROC Submenu



When the flight crew selects a procedure, it appears on the EWD .

Activation of a not—sensed ABN PROC Procedure



To apply a not-sensed ABN PROC , the flight crew must activate the procedure. If the flight crew applies a not-sensed ABN PROC , that is not activated, the limitations and/or memos associated with the procedure will not appear.
To activate the procedure, the flight crew presses the tick pb on the ECP , when the blue box is on the ACTIVATE line of the procedure.

Note: *Some not-sensed ABN PROC may have many lines, and the EWD may not display the procedure on a single display. In such case, if the flight crew applies the procedures, while the procedure is not activated, the flight will not have access to the lines of the procedure in the overflow.*

Active not—sensed ABN PROC Procedure



When the procedure is activated, the action lines of the procedure change from grey to the applicable colors, and the flight crew can start to perform the action lines.
The SD displays the associated system display page, if any.

Note: If the ECAM already displays a procedure when the flight crew activates a not-sensed ABN PROC, the ECAM will present the not-sensed ABN PROC as the first procedure to be considered by the flight crew, whatever the priority of the not-sensed ABN PROC. However, if an alert is triggered, while the flight crew performs a not-sensed ABN PROC procedure, the ECAM will display the procedures in the order the flight crew must apply them.

Note: Some ACTIVE not-sensed ABN PROC are no longer applicable after the flight crew complete the procedure (e.g. ENG RELIGHT IN FLT). In such case, the flight crew must manually deactivate the not-sensed ABN PROC in order to remove any aircraft limitations and memos associated with the procedure (Refer to DSC-31-40-50 How to Deactivate a Not-Sensed ABN PROC).

HOW TO DEACTIVATE A NOT-SENSED ABN PROC

Applicable to: ALL

HOW TO DEACTIVATE A NOT-SENSED ABN PROC

When an ACTIVE not-sensed ABN PROC is no longer applicable (e.g. no more turbulence), it may be necessary to deactivate it, in order to remove any aircraft limitations, memos and deferred procedures associated with the procedure.
The flight crew can deactivate a not—sensed ABN PROC, either by redisplaying it on the EWD, and canceling the ACTIVATE item with the tick pb on the ECP, or by pressing the EMER CANC pb.

HANDLING ECAM PROCEDURE - FLIGHT CREW ACTIONS

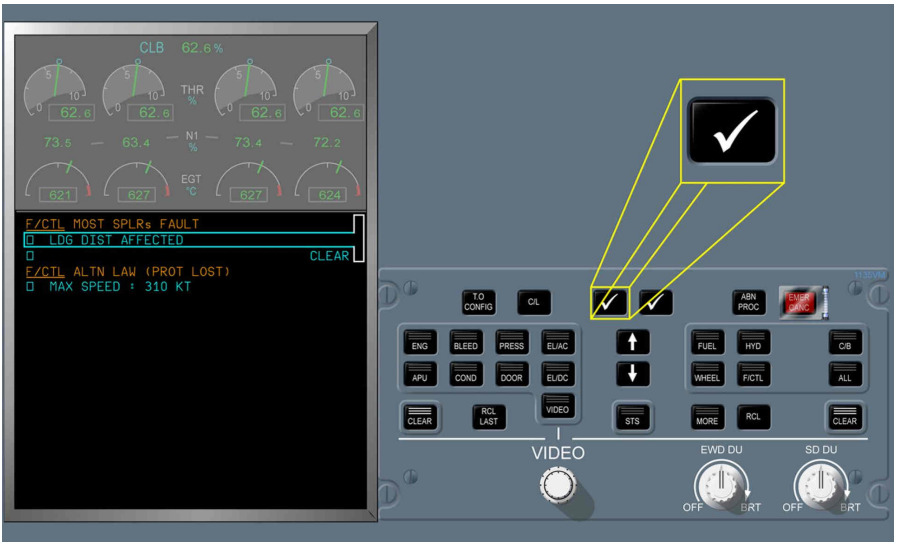
Applicable to: ALL

FLIGHT CREW ACTIONS

For all ECAM procedures (alert, not-sensed ABN PROC), the flight crew performs ECAM actions, by performing the action lines that appear on the EWD.
For action lines that are not-sensed by the ECAM, the flight crew must validate the action with the tick pb. The flight crew validates the action line, the blue box surrounds the next applicable item.
For actions that are sensed by the ECAM, the blue box selects the next applicable action line, when the flight crew has performed the action.
At the end of the procedure, when all actions are completed, the flight crew clears the procedure with the CLEAR pb or by validating the CLEAR item with the tick pb.
After the flight crew clears the ECAM procedure from the EWD, the EWD displays the C/L menu, if there are any applicable deferred procedures, or memos and limitations, if any.

Note: *The flight crew can always cancel the completed state of a not-sensed action line by selecting the action line with the up and down-arrows and by pressing the tick pb.*

Flight Crew Action



HANDLING ECAM PROCEDURES - STATUS ON SYSTEM DISPLAY

Applicable to: ALL

STATUS PAGE ON THE SD

After the flight crew clears the ECAM procedure, the STATUS page, if not empty, automatically appears on the SD .

The flight crew reviews the STATUS page, if not empty, and analyzes the different sections:

- DEFERRED PROCs , if any (*Refer to DSC-31-40-50 Handling Procedure - Deferred proc*)
  After the flight crew clears the ECAM procedure, the EWD displays the checklist menu, if there are any applicable deferred procedures.
- LIMITATIONS , if any
  To review the limitations, the flight crew must display the memos and limitations page on the EWD (*Refer to DSC-31-40-50 Handling Procedure - Memos and Limitations*).
- INFO , if any

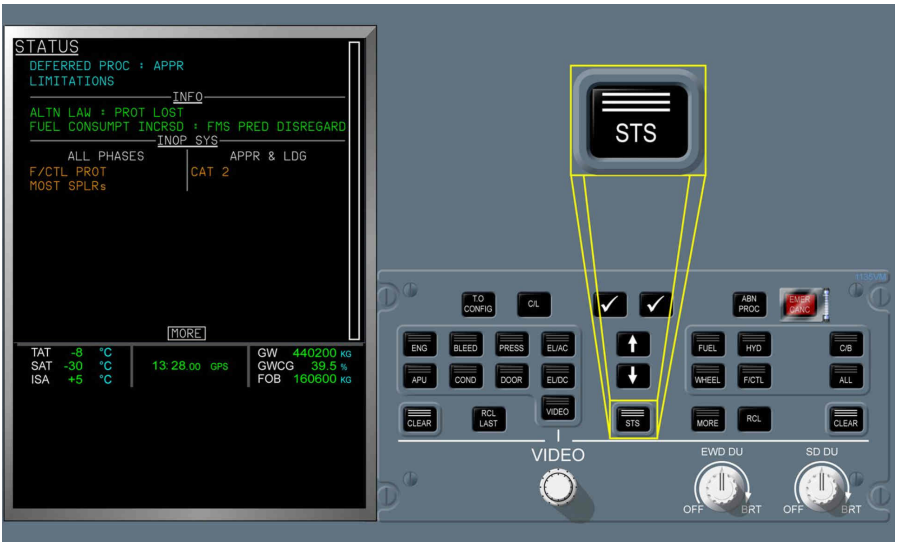
- INOP SYS , if any
- If the display indicates MORE, the flight crew can consult additional information about the aircraft status (*Refer to DSC-31-40-50 Handling Procedure - Status More on SD*).

The flight crew can remove the STATUS page by pressing the STS pb on ECP .

L2 The Flight crew can remove the STATUS page by pressing the CLEAR pb , if the vertical line appears on the STATUS page.

If memos/limitations page is not displayed, the flight crew should not use the CLEAR pb to remove the STATUS page, in order to avoid inadvertent deletion of information displayed on EWD .

Status Review



HANDLING ECAM PROCEDURES - STATUS MORE PAGE

Applicable to: ALL

MORE INFORMATION ON THE STATUS

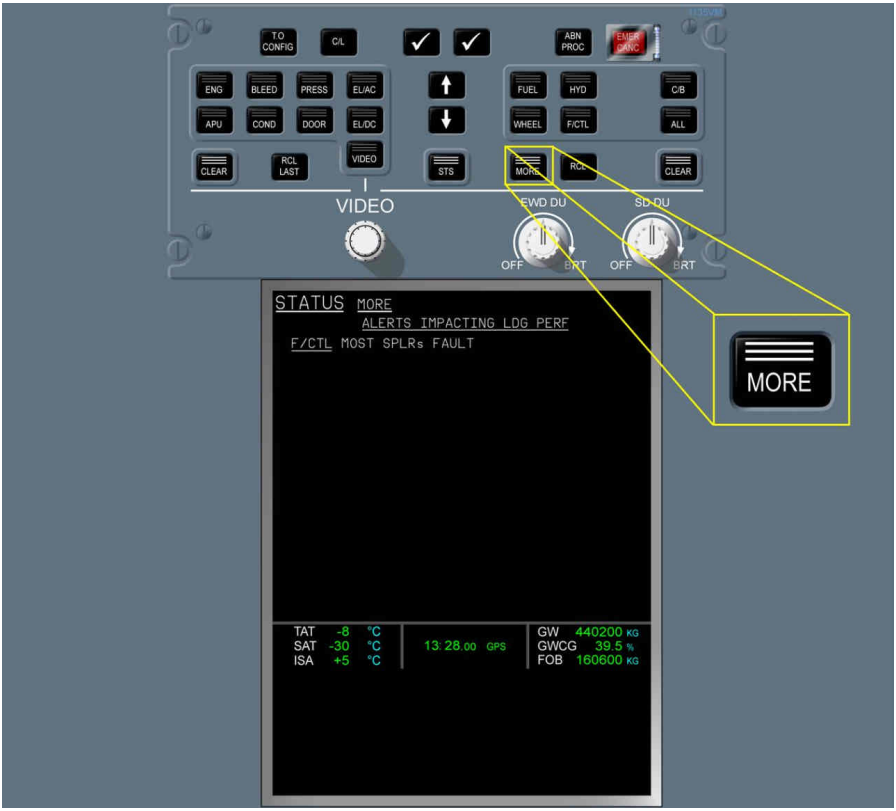
If there is additional information about the aircraft status, the display indicates MORE at the bottom of the STATUS page.

The flight crew can manually:

- Display the STATUS MORE page, by pressing the MORE pb on the ECP.
- Remove the STATUS MORE page, after display, by pressing the MORE pb on ECP, to revert to the STATUS page.

L2 The flight crew can remove the STATUS MORE page by pressing the CLEAR pb, if the vertical line appears on the STATUS MORE page.
If memos/limitations page is not displayed, the flight crew should not use the CLEAR pb to remove the STATUS MORE page, in order to avoid inadvertent deletion of information displayed on EWD.

Status More Page



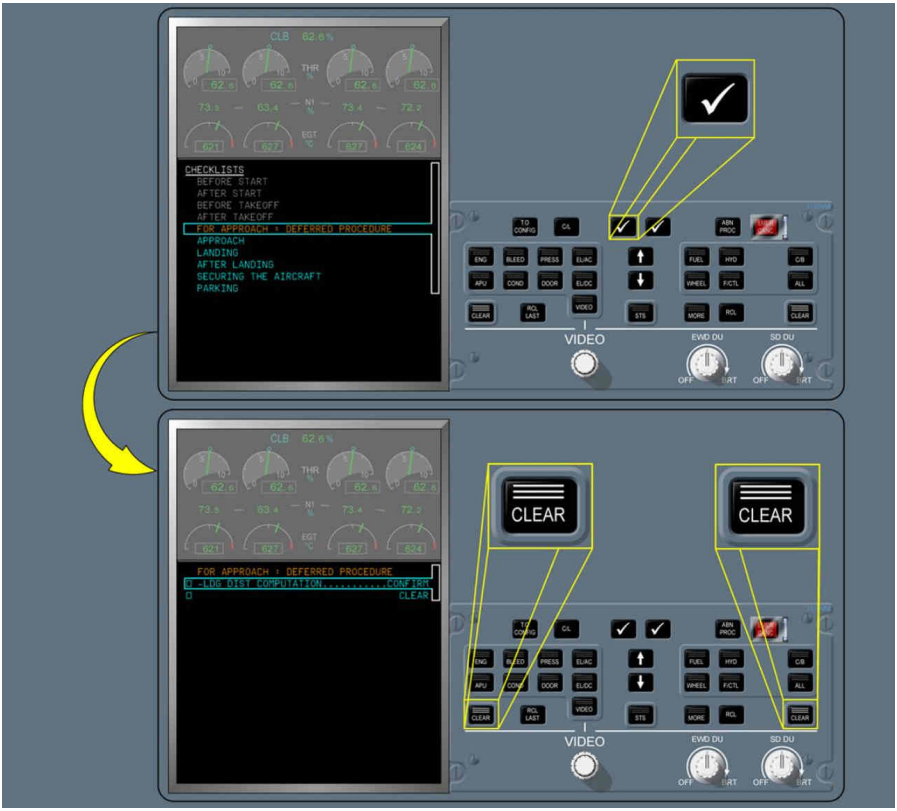
HANDLING ECAM PROCEDURES - DEFERRED PROC

Applicable to: ALL

DEFERRED PROCEDURES ON THE EWD

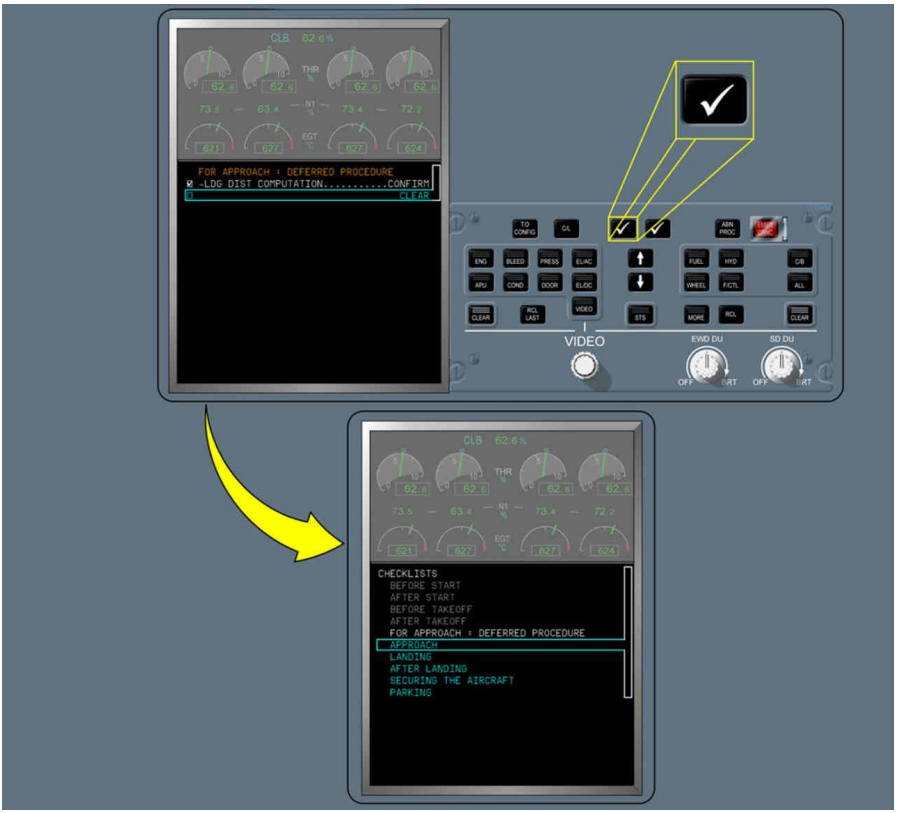
After the flight crew clears the ECAM procedure from the EWD , the EWD displays the checklist menu, if there are any applicable deferred procedures.
The flight crew selects the appropriate item in the checklist menu, in order to read the deferred procedures and to assess the most appropriate time in the flight to perform the actions.
When the flight crew has reviewed all the actions, the flight crew clears the deferred procedure from the EWD with the CLEAR pb and checklist menu appears.

Deferred Procedure Review



When the flight crew has to perform the deferred procedure, the flight crew displays the checklist menu to select and to display the deferred procedure on the EWD . For more information on how to access to the checklist menu *Refer to DSC-31-40-40 How to Handle the Checklists* .
When the flight has completed all the actions, the deferred procedure in the checklist menu changes from amber to white.
For more details on deferred procedure handling, *Refer to FCTM/OP-40-40-3-40-3-2 Tasksharing Rules* .

Deferred Procedure Review



HANDLING ECAM PROCEDURES - MEMOS ANDLIMITATIONS

Applicable to: ALL

MEMOS AND LIMITATIONS ON THE EWD AND THE PFD

After the flight crew clears the ECAM procedure and the checklist menu (and deferred procedures, if any) from the EWD, the EWD display memos and limitations, if any.

Limitation



HANDLING ECAM PROCEDURE - MULTIPLE ECAM PROCEDURES

Applicable to: ALL

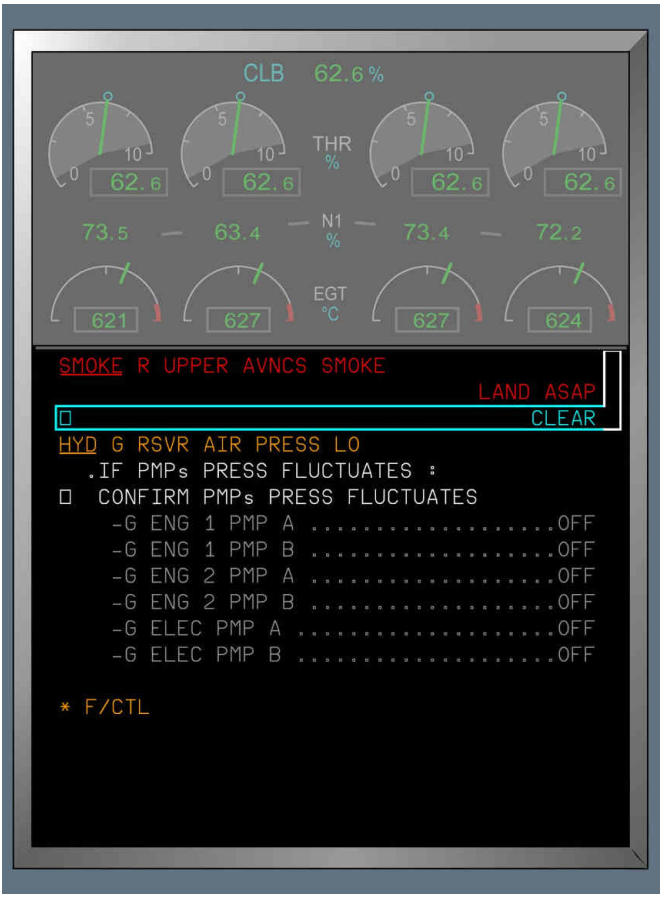
MULTIPLE ECAM PROCEDURES

When the ECAM displays more than one procedure at the same time, the flight crew must perform the procedures in the order the EWD presents the alerts. The alert that the flight crew must consider is indicated by the vertical bar on the right side of the EWD .

Unless the ECAM procedure contains AUTO RCL indication next to a condition line, the flight crew must not start to perform a new procedure, until the flight crew completes the on-going procedure. For more information on the AUTO RCL function, *Refer to DSC-31-40-10 Procedure Description* .

If the EWD cannot display all the alerts on a single display (overflow indication displayed), the flight must not attempt to see the other alerts or action lines of a procedure, that are not visible, by clearing the procedures not yet performed.

Multiple ECAM Procedures



ECAM ALERTS

Applicable to: ALL

FWS AIRLINE CUSTOMIZATION REJECTED (*Refer to PRO-ABN-ECAM-10-31-165 FWS AIRLINE CUSTOMIZATION REJECTED*)

CDS FWS 1+2 & CPIOM FAULT (*Refer to procedure*)

CDS FWS 1+2 & FCDC 1+2 FAULT (*Refer to procedure*)

FWS FWS 1+2 FAULT (*Refer to procedure*)

FWS ATQC DATABASE REJECTED *Refer to procedure*)

FWS AUDIO FUNCTION LOSS (*Refer to procedure*)

FWS ECP FAULT (*Refer to procedure*)

FWS FWS 1(2) FAULT (*Refer to procedure*)

MAINTENANCE TIME LIMITED ITEM (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
ECAM	FWS 1	DC ESS and BAT 1 and ESS BAT
	FWS 2	DC 2
	ECP	DC ESS
	MASTER WARN lights	DC ESS and DC 2
	MASTER CAUT lights	DC ESS and DC 2

L3 One half of the MASTER lights is powered by the DC ESS, and the second half is powered by the DC 2.

Intentionally left blank

MFD - OVERVIEW

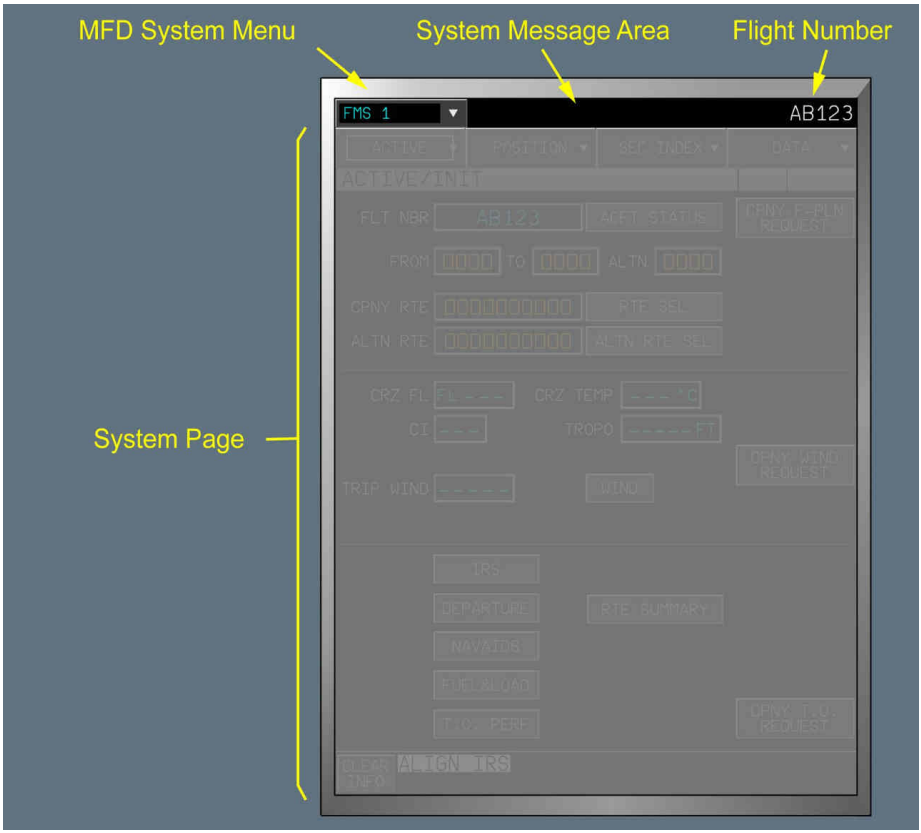
Applicable to: ALL

There are two Multi Function Displays (MFD s). There is one for the Captain and one for the First Officer.

The MFD displays:
- The FMS pages (FMS)
- The ATC Communication pages (ATC COM)
- The surveillance pages (SURV)
- The FCU backup (FCU BKUP)

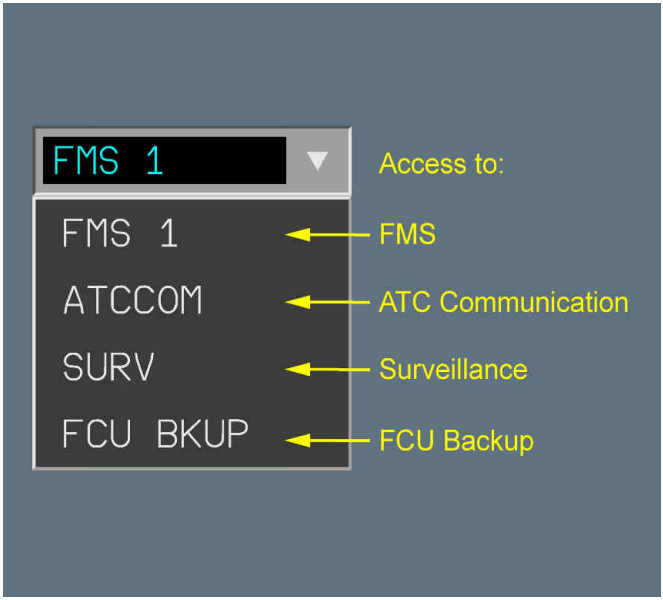
The MFD is interactive: The flight crew can navigate through the pages, and can consult, enter or modify the data via the KCCU . (*Refer to KCCU)*

Multi Function Display (MFD)



MFD SYSTEM MENU

MFD System Menu



Indicates the system identifier that is actually displaying data on the MFD .
The menu list displays all systems that can display data on the MFD :

FMS

Gives access to the FMS pages.

L2 The identifier is different on the captain's side and first officers's side, and depends on which FMC is providing data for display on the MFD .

Refer to More Information On the FMS Abnormal Operations

Refer to More Information on the FMS Selector

On the captain's side:

FMS 1	Normal configuration: FMC -A provides data for FMS 1.
FMS 1-C	Abnormal configuration: FMC -C provides data for FMS 1.

Continued on the following page

Continued from the previous page

FMS 2	Abnormal Configuration: The flight crew has selected BOTH ON 2 on the FMS Source Select Switch. FMC -B provides data for FMS 2, and the data from side 2 is displayed on side 1.
FMS 2-C	Abnormal Configuration: The flight crew has selected BOTH ON 2 on the FMS Source Select Switch. FMC -C provides data for FMS 2, and the data from side 2 is displayed on side 1.

On the first officer's side:

FMS 2	Normal configuration: FMC -B provides data for FMS 1.
FMS 2-C	Abnormal configuration: FMC -C provides data for FMS 2.
FMS 1	Abnormal Configuration: The flight crew has selected BOTH ON 1 on the FMS Source Select Switch. FMC -A provides data for FMS 1, and the data from side 1 is displayed on side 2.
FMS 1-C	Abnormal Configuration: The flight crew has selected BOTH ON 1 on the FMS Source Select Switch. FMC -C provides data for FMS 1, and the data from side 1 is displayed on side 2.

L1 **ATC COM**

Gives access to the ATC communication pages.
Refer to ATCCOM Pages Overview

SURV

Gives access to the surveillance pages.
Refer to SURV Pages Overview

FCU BKUP

Gives access to the FCU backup pages.
Refer to FCU Backup Pages Overview

SYSTEM MESSAGE AREA

The System Message Area displays three different messages to get the attention of the flight crew on an FMS or ATCCOM event, when the MFD actually not displays the FMS, or ATCCOM pages:

- NEW ATIS RECEIVED:
  Indicates that a new ATIS report is received, and the MFD displays an application other than ATCCOM. This message is removed when the flight crew accesses an ATCCOM page.
- ATIS SYS MSG:
  Indicates that a ATIS FSM message is received, and the MFD displays an application other than ATC COM. This message is removed when the flight crew accesses an ATC COM page.
- CHECK FMS MESSAGE:
  Indicates that an amber FMS message is pending, and the MFD displays an application other than FMS. This message is removed when the flight crew accesses an FMS page.

FLIGHT NUMBER

Indicates the flight number that the flight crew has entered on the FMS ACTIVE / INIT page. (*Refer to Page*)

SYSTEM PAGE

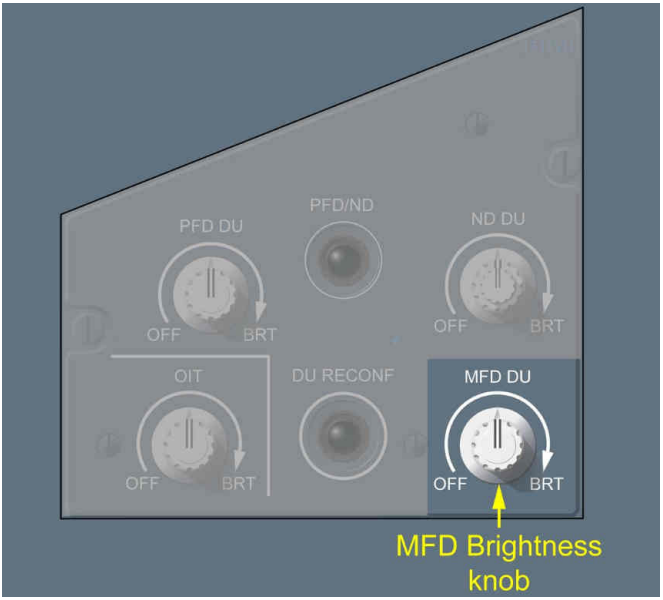
In this area, the MFD displays:

- The FMS pages (FMS)
  Refer to FMS Pages Overview
- The ATC Communication pages (ATC COM)
  Refer to ATCCOM Pages Overview
- The surveillance pages (SURV)
  Refer to SURV Pages Overview
- The FCU backup (FCU BKUP)
  Refer to FCU BKUP page Overview .

MFD BRIGHTNESS KNOB

Applicable to: ALL

MFD Brightness Knob



Turns the PFD screen on or off, and adjust its brightness.
The brightness is also automatically tuned (in a limited range) according to the ambient light in the cockpit, via the two light sensors that are located on the bottom of the DU.

GENERAL

Applicable to: ALL

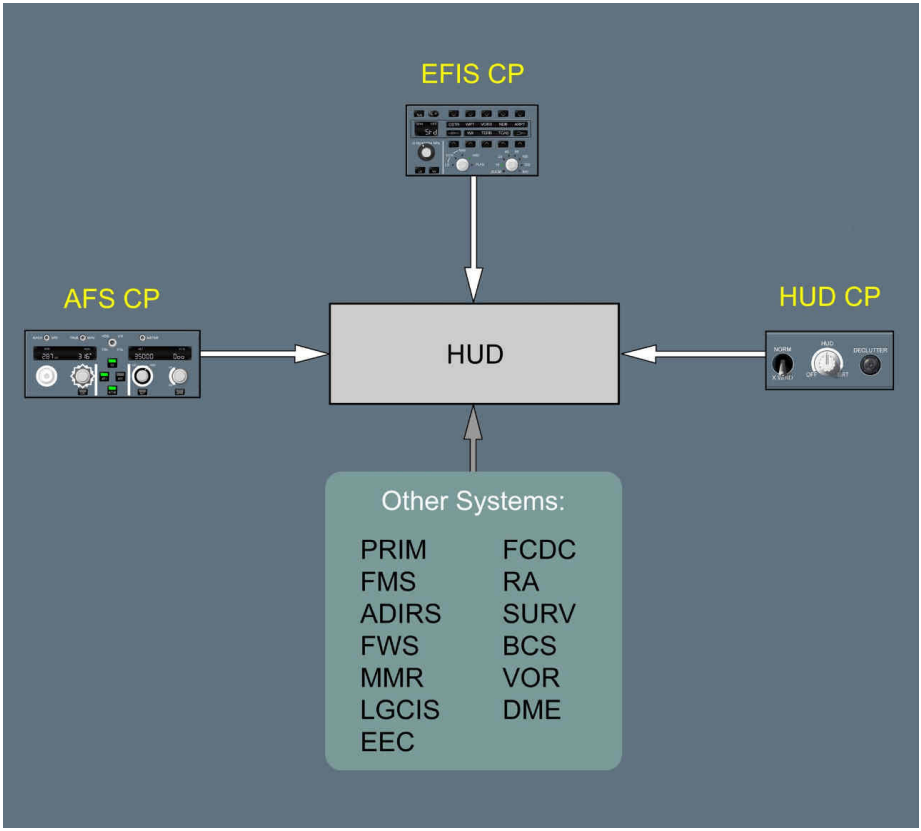
The Head-Up Display (HUD) provides flight data and/or images in the flight crew's field of view. The flight data is superimposed to the outside view. This enables the flight crew to adapt the flight, in relation to external parameters (e.g. terrain, runway surface, clouds, etc.).

ARCHITECTURE

Applicable to: ALL

The HUD includes:

- A Head-Up Display Computer (HUDC) that generates the display of the symbols
  The HUDC is located in the avionics compartment.
  L2 The HUDC uses the same source as the onside PFD .
- L1 An Head-Up Projection Unit (HPU)
  The unit is located above the flight crew, and projects the symbols on the Head-Up Combiner Unit (HCU).
- A Head-Up Combiner Unit (HCU).
  The unit is located in the flight crew's field of view, and superimposes the symbols to the outside view.



HUD CONTROL PANEL

The HUD CP enables the flight crew to adapt the HUD display in accordance with the flight conditions.
For more information, *Refer to DSC-31-60-30-GHUDC HUD Control Panel* .

AFS CONTROL PANEL

The flight crew uses the AFS CP for the flight guidance management.
For more information on the AFS CP , *Refer to 22-FG/CONTROLS AND INDICATORS/AFS CP* .

EFIS CONTROL PANEL

The flight crew uses the EFIS CP to select:
- The landing configuration, via the LS pb
- The barometric setting
- The VOR / ADF display, via the VOR/ADF pb .

For more information about the EFIS CP , *Refer to 31/EFIS/CONTROLS AND INDICATORS/EFIS CP* .

L3 OTHER SYSTEMS

The HUD also interfaces with the following systems:

AIR DATA AND INERTIAL REFERENCE SYSTEM (ADIRS)

The ADIRS provide data for the display logics and animation.
The HUD uses inputs from ADIRS1 (or ADIRS3, if the onside ATT HDG selector is set to ADIRS3 on the ADIRS CP).

PRIMARY FLIGHT CONTROL AND GUIDANCE COMPUTER (PRIM)

The PRIMs provide data from the flight guidance, the flight envelope and the reactive windshear function.
The HUD uses inputs from the master PRIM.

FLIGHT CONTROL DATA CONCENTRATOR (FCDC)

The HUD receives data for the FMA display.

FLIGHT MANAGEMENT SYSTEM (FMS)

The FMS provides data for approach and runway displays.

The HUD uses inputs from:
- FMS1 (or FMS3, if FMS1 is inoperative), or
- FMS2, if the FMS selector is set to BOTH ON 2.

RADIO ALTIMETERS (RA)

The RAs provide data for approach and runway displays.

The HUD uses:
- The median value, if all the RAs are operative, or
- The average value, if one RA is inoperative, or
- The remaining value, if two RAs are inoperative.

FLIGHT WARNING SYSTEM (FWS)

The FWS provides and receives data for the triggering of alerts.
The HUD uses inputs from FWS1 (FWS2, if FWS1 is inoperative).

MULTI MODE RECEIVER (MMR)

The MMR provides data for takeoff, approach, and runway displays.
The HUD uses inputs from MMR1.

DME, VOR

The HUD receives radio position data.
The HUD uses inputs from DME1.

SURVEILLANCE SYSTEM (SURV)

The SURV provides TAWS and TCAS warnings.
The HUD uses inputs from the master AESS.

ENGINE ELECTRONIC CONTROLLER (EEC)

The EEC provides data for the FMA, and for TOGA computation.

BRAKING CONTROL SYSTEM (BCS)

The BCS provides ground deceleration information.
The HUD uses inputs from the active BCS.

LANDING GEAR CONTROL AND INDICATION SYSTEM (LGCIS)

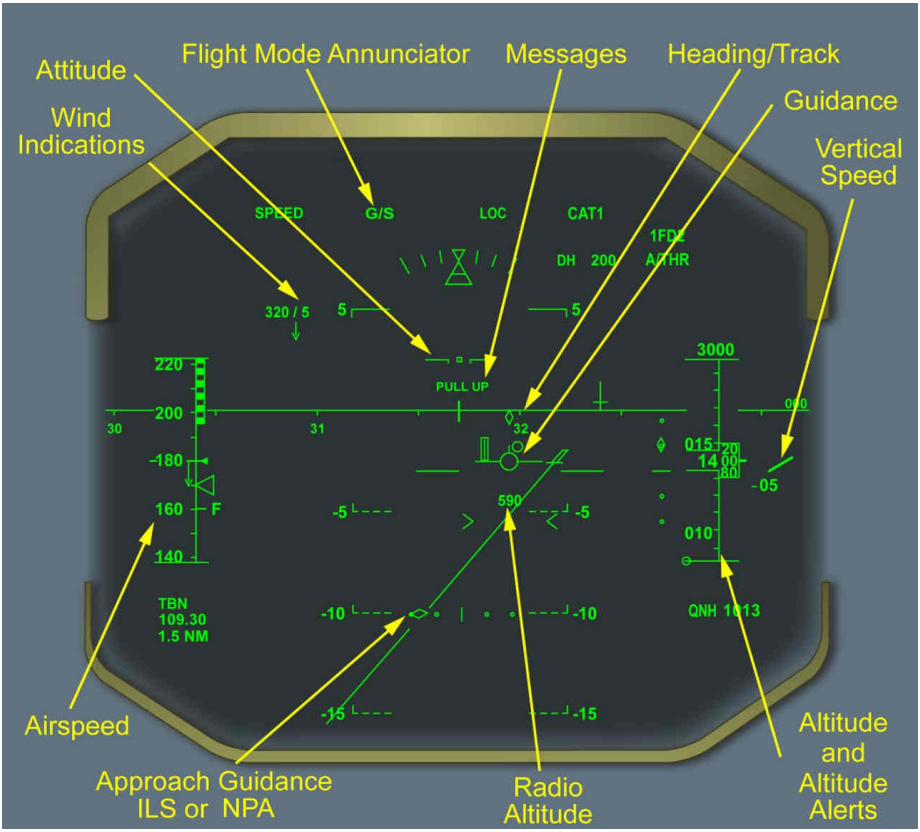
The LGCIS provides the aircraft on ground information.
The HUD uses inputs from the active LGCIS.

Overview

OVERVIEW

Applicable to: ALL

Overview



Some indications only appear on ground: *Refer to DSC-31-60-20-20 On Ground Indications* .

The flight crew can adapt the display to:

- The visibility conditions: *Refer to DSC-31-60-20-150 Declutter Modes*
- The wind conditions: *Refer to DSC-31-60-20-150 Crosswind Mode* .

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On Ground Indications

ON GROUND INDICATIONS

Applicable to: ALL

The HUD automatically adapts the symbols to the following flight phases:
- Taxi: *Refer to DSC-31-60-20-20-GTAXI Taxi Mode*
- Takeoff: *Refer to DSC-31-60-20-20-GTAKE Takeoff Mode*
- Rollout or rejected takeoff: *Refer to DSC-31-60-20-20-GROLL Roll Out or Rejected Takeoff Mode* .

TAXI MODE

Applicable to: ALL

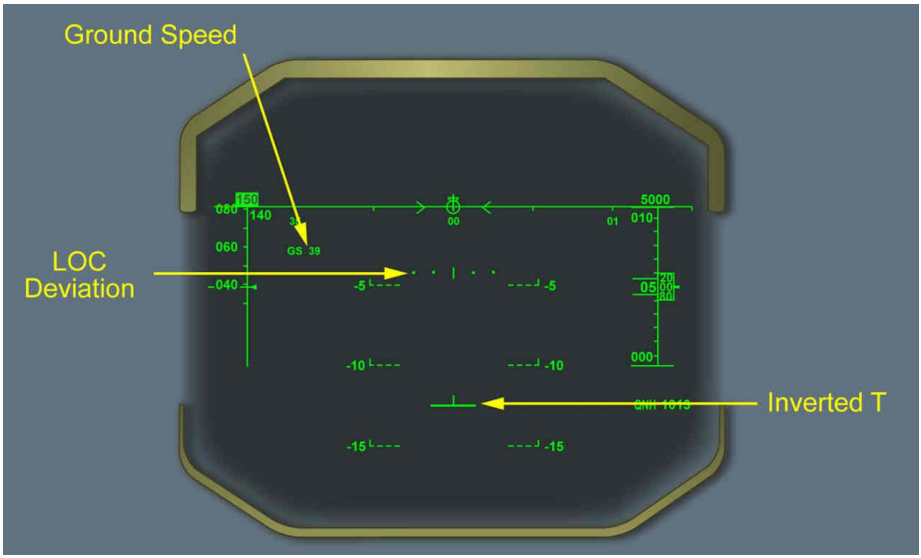
When the aircraft is taxiing, the HUD displays:
- Less information, for better visibility of the external environment
- Additional information useful for aircraft alignment on the taxiways and the runways.

L2 The taxi mode appears, if the aircraft is on ground, and at a speed less than 40 kt .

L1 The flight crew can select one of the following display modes, via the DECLUTTER pb :
- Normal mode
- Declutter mode.
  For more information on the taxi declutter mode, *Refer to DSC-31-60-20-150 Declutter Modes* .

During taxi, the flight crew cannot display the crosswind mode.

Taxi Normal Mode



GROUND SPEED

L3 The ADIRS use the GPS and the IRS data for GS computation.

L1 

Indicates the current Ground Speed (GS).

LOC DEVIATION

Indicates the LOC deviation in relation to the ILS axis.

Enables the flight crew to check that:
- The aircraft is aligned on the runway selected in the FMS
- The lateral guidance is available.

L2 Appears if the LOC is aligned with the runway heading (QFU).

L3 The MMR provides the LOC deviation information.

L1 
The LOC deviation is within the scale.



The LOC deviation is not within the scale.



The MMR is on standby.

L12

LOC — Appears, instead of the LOC scale, when the LOC receiver on the same side is failed.
Flashes for 9 s, then remains steady.

INVERTED T

L12



Indicates the offset pitch rotation symbol.

The difference between the inverted T and the aircraft indicates the target pitch attitude for rotation:
- 12.5 °, if all engines are operative
- 10 ° in the case of an engine failure.

No longer appears after liftoff:
- Above 100 ft radio altitude, or
- 1 s after the Flight Path Director (FPD) appears.

TAKEOFF MODE

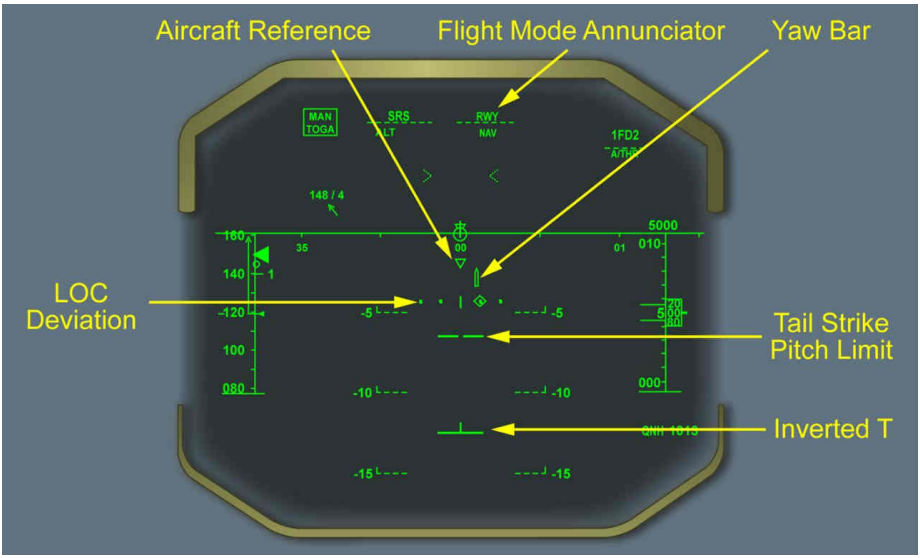
Applicable to: ALL

The takeoff mode provides useful information for the lateral control of the aircraft in low visibility conditions, when the aircraft is on ground.

L2 The takeoff mode appears, if the aircraft is on ground, at the takeoff power selection.
The takeoff mode no longer appears, if the aircraft is flying above 50 ft radio altitude.

L1 In the takeoff mode, the flight crew cannot display the crosswind mode or the declutter mode. As soon as the flight crew selects the takeoff thrust, the takeoff mode appears on the HUD , even if the declutter mode was previously selected.

Takeoff Mode



AIRCRAFT REFERENCE

L12



Indicates the aircraft axis, as a reference for the yaw bar.
Appears on ground, if the flight crew engages the FD.

YAW BAR

L3 The PRIMs provide the yaw orders.

L12



Indicates the yaw orders of the Flight Director (FD), in order for the flight crew to maintain the aircraft on the runway centerline.
Appears on ground, if the flight crew engages the FD.

Note: *The yaw bar is only available if the runway has a LOC aligned with the runway centerline.*

L12



When one engine fails during takeoff, indicates the yaw orders of the Flight Director (FD), in order for the flight crew to maintain the aircraft on the runway centerline.
Appears when the difference between engine 1(2) N1 and engine 4(3) N1 is more than 10 %.

LOC DEVIATION

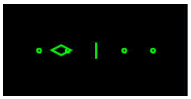
Indicates the LOC deviation in relation to the ILS axis.

Enables the flight crew to check that:
- The aircraft is aligned on the runway selected in the FMS
- The lateral guidance is available.

L2 Appears if the LOC is aligned with the runway heading (QFU).

L3 The MMR provides the LOC deviation information.

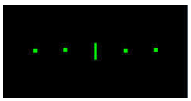
L1



The LOC deviation is within the scale.



The LOC deviation is not within the scale.



The MMR is on standby.

L12

LOC — Appears, instead of the LOC scale, when the LOC receiver on the same side is failed.
Flashes for 9 s, then remains steady.

INVERTED T

L12



Indicates the offset pitch rotation symbol.

The difference between the inverted T and the aircraft indicates the target pitch attitude for rotation:
- 12.5 °, if all engines are operative
- 10 ° in the case of an engine failure.

No longer appears after liftoff:
- Above 100 ft radio altitude, or
- 1 s after the Flight Path Director (FPD) appears.

TAIL STRIKE PITCH LIMIT

L3 The PRIMs provide the tail strike limit information.

L12



Indicates the maximum pitch attitude, in order to avoid tail strike during takeoff. The indication moves from the pitch limit value, with the main landing gear compressed (i.e. 12 °), to the pitch limit value, with the main landing gear not compressed (i.e. 13.5 °).
No longer appears 3 s after liftoff.

FLIGHT MODE ANNUNCIATOR (FMA)

The Flight Mode Annunciator (FMA) indicates:
- The status of the A/THR
- The AP / FD vertical and lateral modes
- The approach capability
- The AP / FD and A/THR engagement status
- The autobrake arming status.

Messages from the Flight Guidance, the Flight Controls, and the FMS can also appear below the FMA .
For more information about guidance indications on the FMA , *Refer to 22-FG/CONTROLS AND INDICATORS/FMA* .

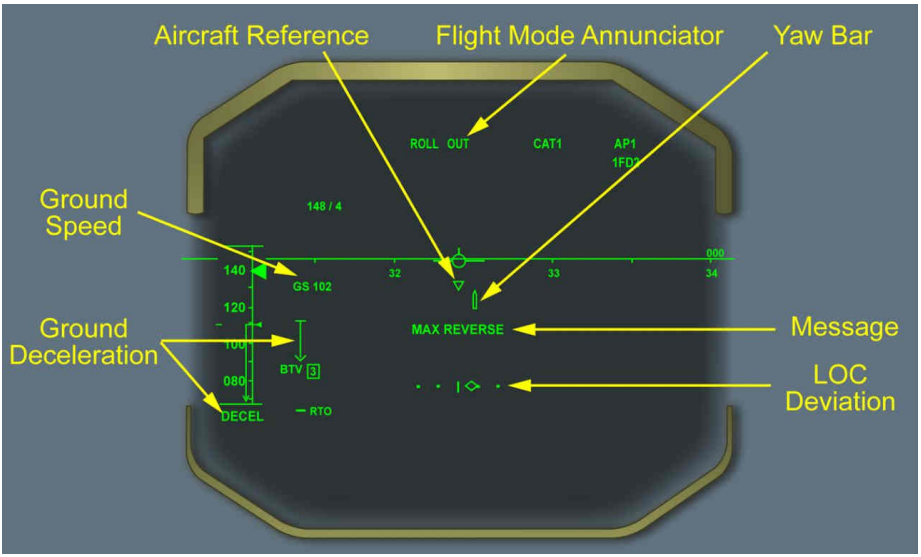
ROLL OUT OR REJECTED TAKEOFF MODE

Applicable to: ALL

L2 The roll out or rejected takeoff mode appears, if:

- The aircraft is on ground at a speed higher than 40 kt
- The thrust levers are not set to TOGA or FLEX.

L1 In the roll out or rejected takeoff mode, the flight crew can not display the crosswind mode, or the declutter mode.



AIRCRAFT REFERENCE

L12



Indicates the aircraft axis, as a reference for the yaw bar.
Appears on ground, if the flight crew engages the FD.

YAW BAR

L3 The PRIMs provide the yaw orders.

L12



Indicates the yaw orders of the Flight Director (FD), in order for the flight crew to maintain the aircraft on the runway centerline.
Appears on ground, if the flight crew engages the FD.

Note: *The yaw bar is only available if the runway has a LOC aligned with the runway centerline.*

LOC DEVIATION

Indicates the LOC deviation in relation to the ILS axis.

Enables the flight crew to check that:
- The aircraft is aligned on the runway selected in the FMS
- The lateral guidance is available.

L2 Appears if the LOC is aligned with the runway heading (QFU).

L3 The MMR provides the LOC deviation information.

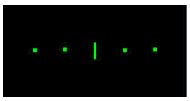
L1



The LOC deviation is within the scale.



The LOC deviation is not within the scale.



The MMR is on standby.

L12

LOC — Appears, instead of the LOC scale, when the LOC receiver on the same side is failed.
Flashes for 9 s, then remains steady.

GROUND SPEED

L3 The ADIRS use the GPS and the IRS data for GS computation.

L1

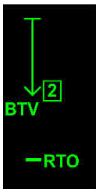


Indicates the current ground speed (GS).

GROUND DECELERATION

L3 The IRS provide the ground deceleration information, based on the longitudinal acceleration of the aircraft. The BCS provides the selected autobrake mode. The PRIM provides the BTV status.

L12



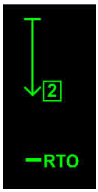
The BTV function is engaged.
Indicates the current deceleration of the aircraft.
No longer appears, if the autobrake function is failed.

L12



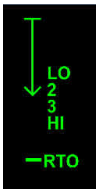
The autobrake is active in the RTO mode.
Indicates the current deceleration of the aircraft.
The deceleration arrow may not reach the RTO indication, even if the RTO mode provides the maximum braking performance.
No longer appears, if the autobrake function is failed.

L12



The autobrake is active.
Indicates the current deceleration of the aircraft.
No longer appears, if the autobrake function is failed.

L1



The autobrake is not active.
Indicates the current deceleration of the aircraft

L123

DECEL — The autobrake is active, and the aircraft decelerates as selected via the AUTO BRK mode selector.
Appears, when the aircraft deceleration is at least 80 % of the selected deceleration.
No longer appears, when the aircraft deceleration is less than 70 % of the selected deceleration.
The BCS provides the DECEL information.

Note: On a slippery runway, the A-SKID may be activated before the aircraft reaches the selected deceleration. Therefore, the DECEL indication may not appear, even if the autobrake is active.

FLIGHT MODE ANNUNCIATOR (FMA)

The Flight Mode Annunciator (FMA) indicates:
- The status of the A/THR
- The AP / FD vertical and lateral modes
- The approach capability
- The AP / FD and A / THR engagement status
- The autobrake arming status.

Messages from the Flight Guidance, the Flight Controls, and the FMS , can also appear below the FMA .
For more information about guidance indications on the FMA , *Refer to 22-FG/CONTROLS AND INDICATORS/FMA* .

MESSAGE

L3 The PRIM provides the ROP status.

L12

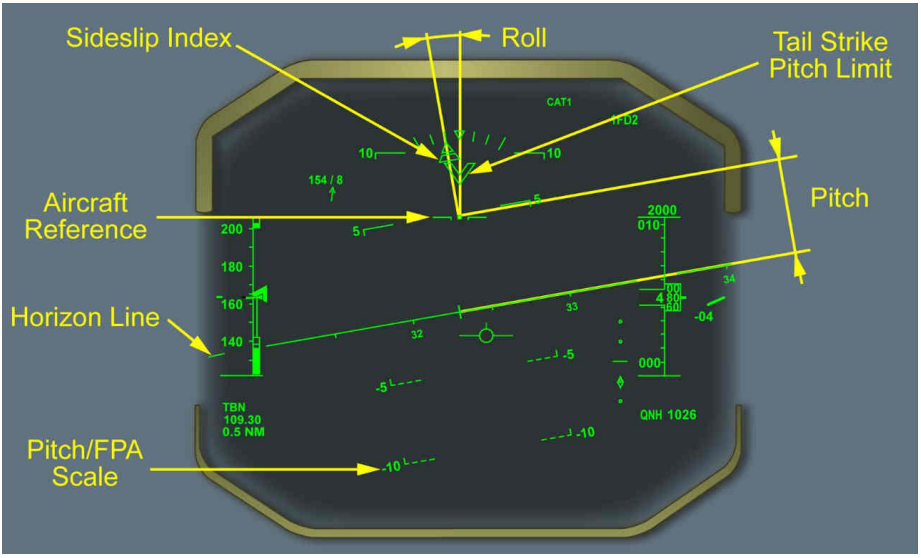
MAX REVERSE — The Runway Overrun Protection (ROP) function is engaged.
Flashes for 9 s, then remains steady.

Attitude

ATTITUDE

Applicable to: ALL

Attitude



HORIZON LINE

The horizon line is superimposed to the real horizon, and provides:
- An intuitive perception of the attitude of the aircraft
- The zero pitch angle/FPA information.

L3 The ADIRS provide pitch and roll data that are necessary for the display of the horizon line.

L2 Appears as a dotted line, if the line is no longer superimposed to the real horizon.

No longer appears if:
- The bank angle is more than 71 °, or less than -71 °, or
- The pitch attitude is more than 39 °, or less than -25 °.

AIRCRAFT REFERENCE

L12



Indicates the fixed reference position of the aircraft.

Appears, when the aircraft is above 100 ft radio altitude:
- In normal mode or declutter 1 mode
- In declutter 2 mode, if the tailstrike margin is below 1 °.

ROLL

Indicates the bank angle of the aircraft.

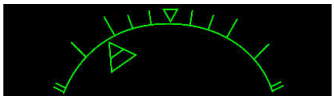
L3 The ADIRS provide the bank angle information.

L1



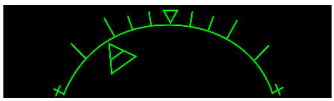
The bank angle of the aircraft is between ±35 °.
Degrees are indicated in increments of 10 ° up to ±30 °.

L12



The bank angle of the aircraft is above ±35 °.
The roll scale increases up to ±65 °.
Indicates the bank angle protection limit in normal law.

L12



The bank angle of the aircraft is above ±35 °, and the bank angle protection is lost. The aircraft is in alternate, or direct law.
The roll scale increases up to ±65 °.

L2 The roll scale and pointers no longer appear if:
- The pitch attitude is more than 39 °, or less than –25 °, or
- The bank angle is more than 71 °, or less than –71 °, or
- The aircraft is on ground.

PITCH/FPA SCALE

The scale indicates the pitch attitude, and the Flight Path Angle (FPA) of the aircraft.

L3 The ADIRS provide the pitch attitude and the flight path angle information.

L1 Degrees are indicated in increments of 5 °. The horizon line indicates the zero reference of the pitch/FPA scale.

L2 Appears as dotted lines for negative values.

L12



Indicates that the pitch attitude is too high, and the direction to take in order to reduce it.

Appears, when the pitch attitude of the aircraft is:
- More than 34 °, or
- Less than -20 °.

The pitch/FPA scale no longer appears on the HUD.

SIDESLIP INDEX

L2 No longer appears when the aircraft is on ground.

L123



- On ground, indicates the aircraft lateral acceleration
- In flight, indicates the sideslip of the aircraft.
  If the sideslip is not available, indicates the lateral acceleration of the aircraft.

The ADIRS provide the sideslip and the lateral acceleration.

L12



Both sideslip and lateral acceleration indications are not valid.
Flashes for 9 s, then remains steady.

L13



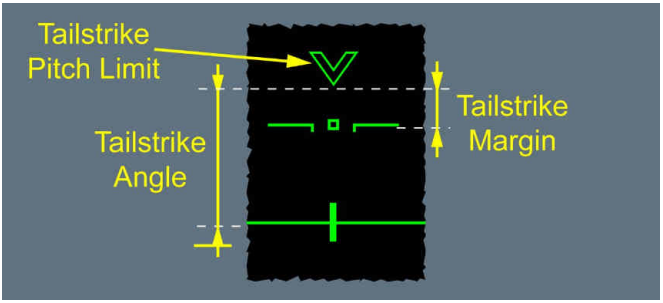
Appears when one engine fails during takeoff, or go-around.
The sideslip index then corresponds to the beta target.

Appears, when:
- The flight crew selects CONF 1, 2, or 3
- The N1 of at least one engine is above 80 %
- The difference between the N1 of two engines is above 40 %.

The PRIMs provide the beta target information.
The sideslip index also appears below the FPV.

TAIL STRIKE PITCH LIMIT

Tail strike Pitch Limit



Indicates the maximum pitch attitude, in order to avoid tail strike at landing.

L2 Pulses, if the tail strike margin is less than 1 °.

Appears, when the aircraft is below 400 ft radio altitude, at 12 ° corresponding to the tailstrike pitch attitude with compressed main landing gear.

No longer appears:

- When the ground speed is less than 50 kt, or
- 4 s after a go-around is initiated.

L3 The PRIMs provide the tail strike limit indication.

Airspeed

AIRSPEED

Applicable to: ALL

The following general indications concerning the airspeed of the aircraft appear during all flight phases:
- The speed reference line
- The airspeed target
- The speed trend arrow
- The Mach number.

Refer to DSC-31-60-20-40-GGEN General Airspeed Indications .

The following airspeed indications appear in flight:
- During takeoff:
  - V1
  - VR
  - V2
  - The short term managed speed
  - VFE next
  - F speed
  - S speed
  - Green dot
  - The automatic retraction speed.

  Refer to DSC-31-60-20-40-GTAKE Airspeed Indications During Takeoff
- During descent:
  - Lower and upper speed range limits.

  Refer to DSC-31-60-20-40 Airspeed Indications During Descent
- After touchdown:
  Refer to DSC-31-60-20-40 Airspeed Indications After Touchdown

During the flight, the airspeed scale also displays the following protection speeds:
- VMAX, and the high speed protection indication
- VLS
- $V\alpha_{prot}$ (in normal law)

- $V\alpha_{max}$ (in normal law)
- $V\alpha_{sw}$ (in alternate and direct law).

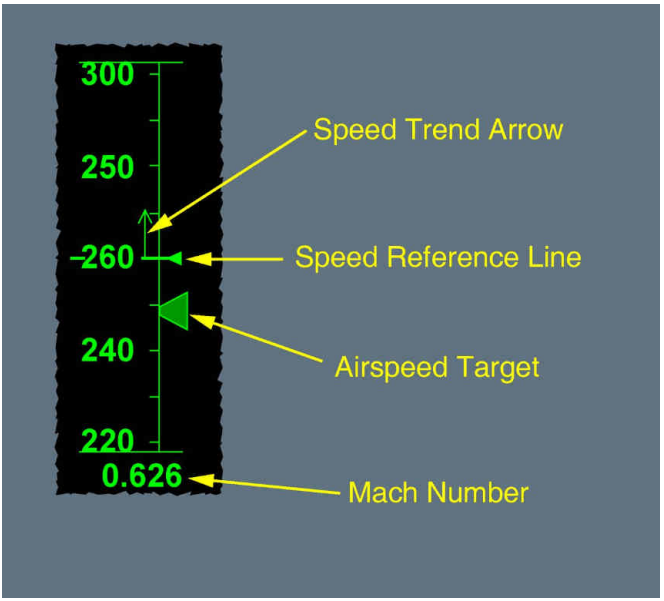
Refer to DSC-31-60-20-40 Airspeed Protections

GENERAL AIRSPEED INDICATIONS

Applicable to: ALL

L2 The airspeed scale has markers every 10 kt , and starts at 30 kt .

General Airspeed Indications



L12

SPD — Appears, instead of the airspeed scale, when no speed information is available. Flashes for 9 s , then remains steady.

L12



Appears, when characteristic speeds computation is no longer available.

The following airspeed indications do not appear on the airspeed scale:
- VLS
- S speed
- F speed
- Green dot speed
- Speed trend arrow
- VFE next
- $V\alpha_{sw}$.

Appears, when:
- The three PRIM s are lost, or
- Both SFCC slats channels are lost, or
- Both SFCC flaps channels are lost.

Flashes for 9 s , then remains steady.

SPEED REFERENCE LINE

L13



Indicates the current airspeed of the aircraft.
The ADRs provide the current airspeed information.

SPEED TREND ARROW

L123



Indicates the airspeed that the aircraft will reach in 10 s, if its current acceleration(deceleration) remains constant.
Appears, when the speed trend is more than 2 kt.
No longer appears, when the speed trend is less than 1 kt.
The PRIMs provide the speed trend information.

AIRSPEED TARGET

Indicates the airspeed target, or the airspeed corresponding to the Mach target.

L3 The PRIMs provide the airspeed target information. If all three PRIMs are lost, the FCU backup provides the airspeed target information.

L1



- The flight crew selects the airspeed target (manually selected on the AFS CP, or manually entered in the FMS)
- The airspeed target is within the airspeed scale.



- The flight crew selects the airspeed target (manually selected on the AFS CP, or manually entered in the FMS)
- The airspeed target is not within the airspeed scale.



- The airspeed target is managed (computed by the FMS)
- The airspeed target is within the airspeed scale.



- The airspeed target is managed (computed by the FMS)
- The airspeed target is not within the airspeed scale.

L12

SPD SEL — The airspeed selected on the AFS CP is not available.
Flashes for 9 s, then remains steady.

MACH NUMBER

L3 The ADIRS provide the Mach number information.

L1



Appears below the airspeed scale, if the aircraft speed is more than M 0.5.
No longer appears, if the aircraft speed is less than M 0.45.

L12

MACH — The Mach data is not available.
Flashes for 9 s, then no longer appears.

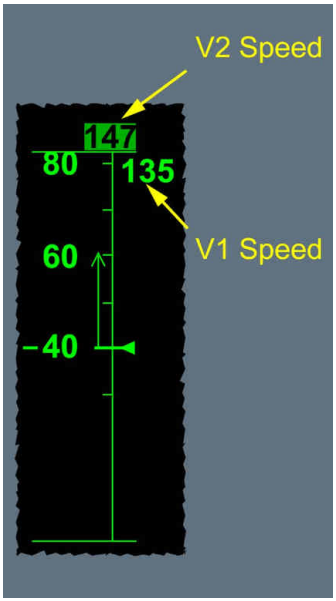
AIRSPEED INDICATIONS DURING TAKEOFF

Applicable to: ALL

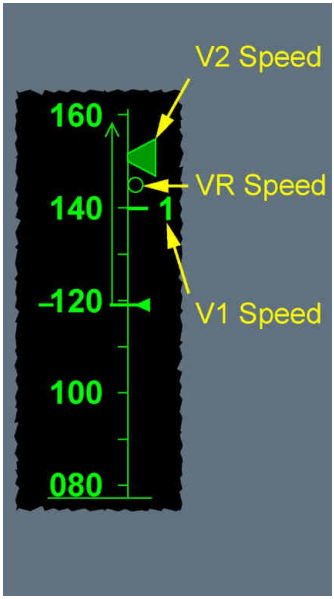
BEFORE LIFTOFF

L3 The FMS provides V1, VR , and V2 information.

L1



During the takeoff roll, V1, and V2 are outside the airspeed scale.
For more information about V1, *Refer to 22-27/Operating Speeds* .
For more information about V2, *Refer to 22-27/Operating Speeds* .



Indicate the takeoff speeds that the flight crew manually enters in the T.O panel of the FMS ACTIVE/PERF page (V1, the rotation speed VR, and V2).
For more information about VR, *Refer to 22-27/Operating Speeds* .

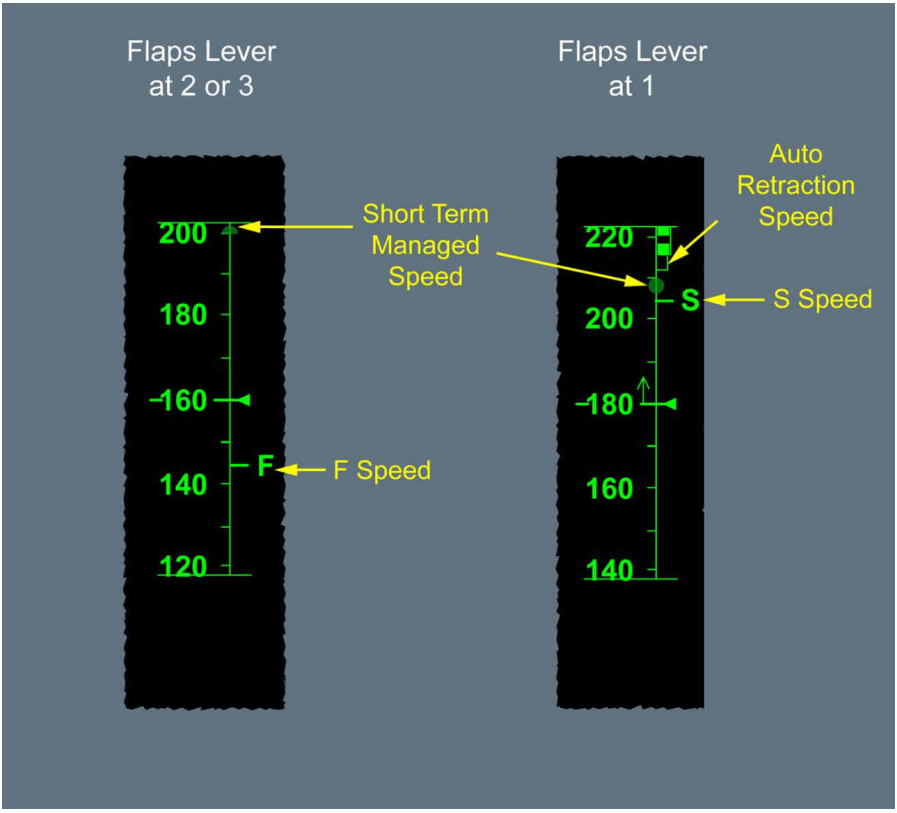
L2 V1 and VR indications no longer appear after liftoff.
L12

V1
INOP

V1 is not valid.
Flashes for 9 s , then remains steady.

AFTER LIFTOFF

After Liftoff



L3 The PRIM provides these speeds.

L1 

In managed speed/Mach, the short-term managed speed indicates the current speed target in accordance with the configuration of the aircraft.
In selected speed/Mach, the short-term managed speed is the speed/Mach target, that would be used if the flight crew engages the managed speed/Mach control.
For more information about the short-term managed speed, *Refer to 22-FG/Speed-Mach Control/Managed Speed/Short-term Managed Speed* .



When the FLAPS lever is set to 2 or 3, indicates the target speed in managed mode, also referred to as F speed.
For more information about F speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/F* .

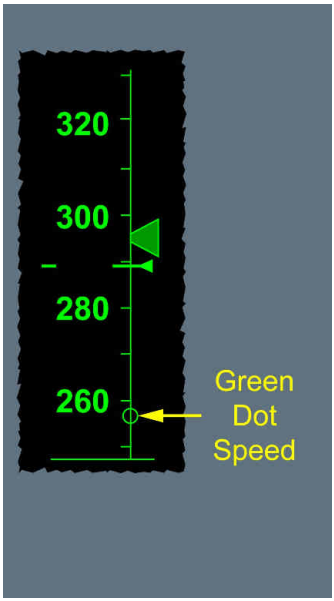


When the FLAP lever is set to 1 (CONF 1+F), indicates the Automatic Retraction Speed (ARS).
For more information about the automatic retraction speed, *Refer to 27/Slats-Flaps/Configurations/ARS* .



When the FLAPS lever is set to 1, indicates the target speed in managed mode, also referred to as S speed.
For more information about S speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/S* .

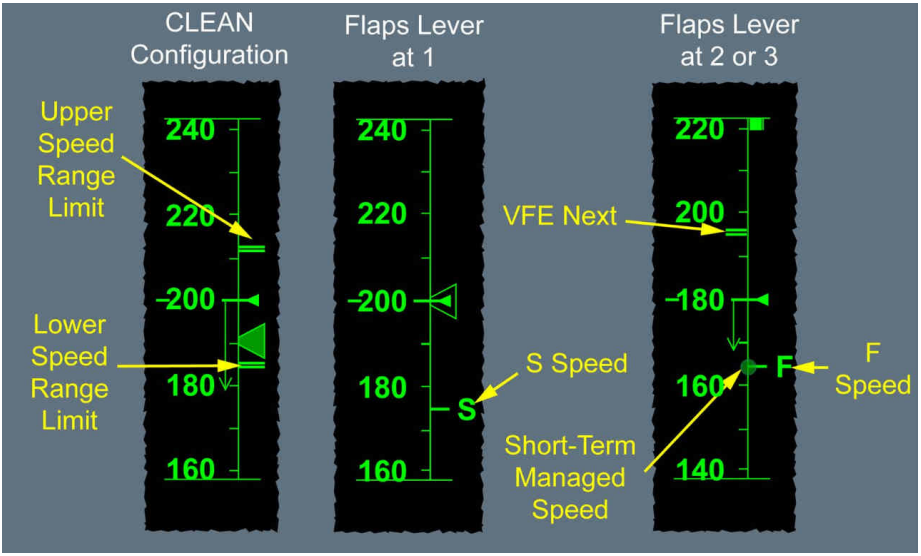
IN CLEAN CONFIGURATION



In clean configuration:
- The S speed no longer appears
- The green dot speed appears.
  For more information about the green dot speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/Green Dot* .

AIRSPEED INDICATIONS DURING DESCENT

Applicable to: ALL



L123



Indicates the possible values of the aircraft speed, in order for the flight crew to maintain the appropriate vertical trajectory.
Appears during a managed descent.
The PRIM provides the speed range limits.

Note: *When the FMS flight phase is the descent phase, and the DES mode is engaged, the FG does not accurately maintain the ECON speed/Mach(ECON-RTA speed/Mach). However, the managed speed/Mach should not go beyond the high and low speed margins. For more information on high and low speed margins, Refer to 22-FMS/System Description/Performance/Flight Phases and Speed Profiles .*



When the FLAPS lever is set to 1, indicates the target speed in managed mode, also referred to as S speed.
For more information about S speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/S* .



When the aircraft is below 20 000 ft , indicates the next flap limiting speed, also referred to as VFE next.
For more information about VFE next, *Refer to 22-27/Operating Speeds/Limit Speeds/VFE next* .



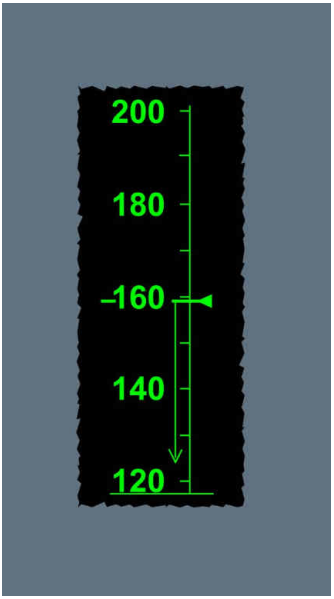
In managed speed/Mach, the short-term managed speed indicates the current speed target in accordance with the configuration of the aircraft.
In selected speed/Mach, the short-term managed speed is the speed/Mach target, that would be used if the flight crew engages the managed speed/Mach control.
For more information about the short-term managed speed, *Refer to 22-FG/Speed-Mach Control/Managed Speed/Short-term Managed Speed* .



When the FLAPS lever is set to 2 or 3, indicates the target speed in managed mode, also referred to as F speed.
For more information about F speed, *Refer to 22-27/Operating Speeds/Characteristic Speeds/F* .

AIRSPEED INDICATIONS AFTER TOUCHDOWN

Applicable to: ALL



After touchdown, the only indications that appear on the airspeed scale are:
- The current airspeed
- The speed trend arrow.

AIRSPEED PROTECTIONS

Applicable to: ALL

L3 The PRIM s provide speed protection information. If all three PRIM s are lost, the ADIR s provide the VMO / MMO information.

L1 VMAX



Indicates the VMAX speed, that is the lowest of the following speeds:
- VMO , or the speed corresponding to MMO
- VLE
- VFE .

For more information on the VMAX definition, *Refer to 22-27/Operating Speeds/Protection Speeds/VMAX* .

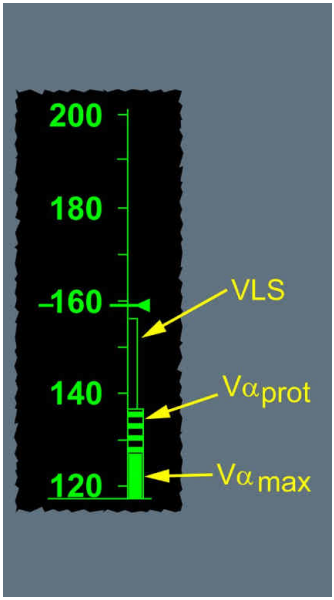
In normal law, when the aircraft reaches the speed indicated by the symbol , the high speed protection activates.
For more information about high speed protection, *Refer to 22-27Protections/High Speed Protections* .



In alternate or direct law, the VMAX indication remains displayed, but the high speed protection is not available.
appears, instead of the high speed protection symbol.

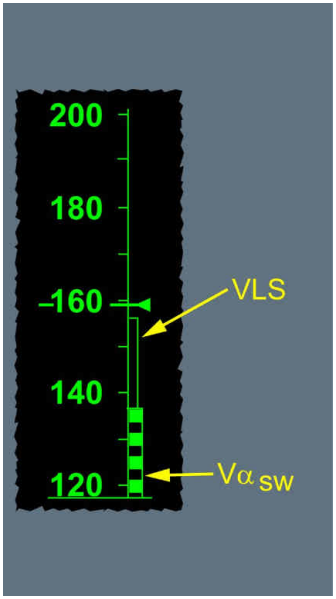
MINIMUM SPEEDS

L12



The protection speeds, with flight controls in normal law, are:

- The minimum selectable speed, also referred to as the VLS
  It provides an appropriate margin for the stall speed.
  For more information on the VLS , *Refer to 22-27/Operating Speeds/Characteristic Speeds/VLS* .
  No longer appears on ground.
- The alpha protection speed, also referred to as $V\alpha_{prot}$
  At this speed, the Angle-of-Attack of the aircraft activates the alpha protection.
  For more information on the $V\alpha_{prot}$, *Refer to 22-27/Operating Speeds/Protection Speeds/$V\alpha_{prot}$* .
- The alpha max speed, also referred to as $V\alpha_{max}$.
  It provides the speed associated with the maximum Angle-of-Attack that the aircraft can attain, in pitch normal law.
  For more information on the $V\alpha_{max}$, *Refer to 22-27/Operating Speeds/Protection Speeds/$V\alpha_{max}$* .



The protection speeds, with flight controls in alternate law, or in direct law, are the following:

- The VLS
- The stall warning speed, also referred to as $V\alpha_{sw}$.
  For more information on $V\alpha_{sw}$, *Refer to 22-27/Operating Speeds/Protection Speeds/$V\alpha_{sw}$*.

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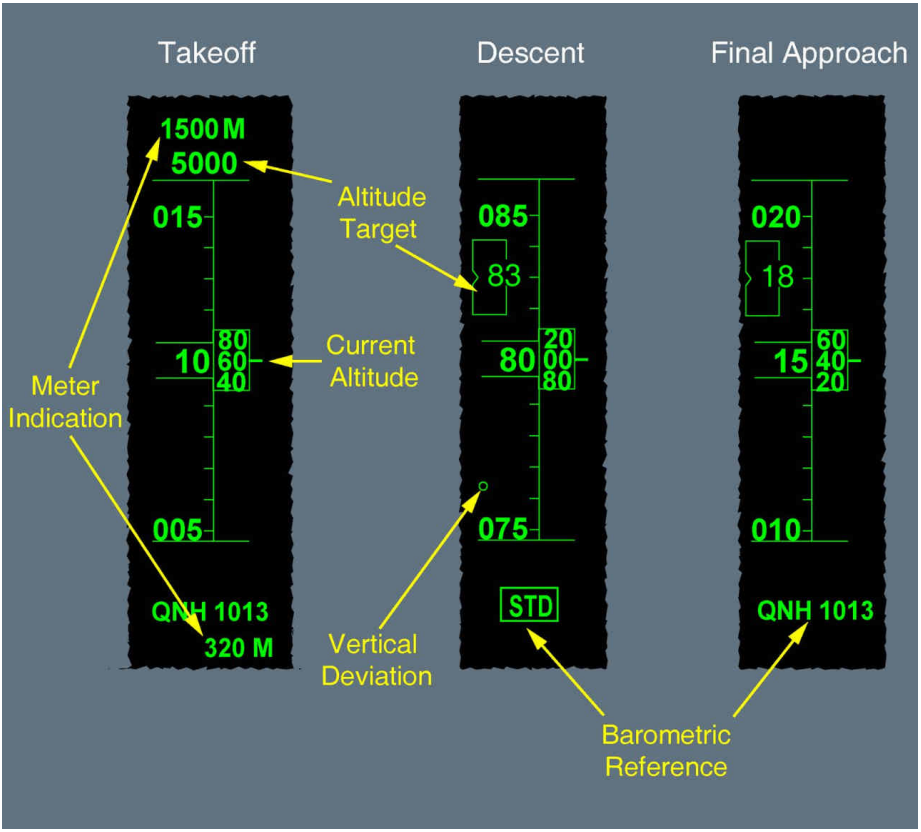
Altitude

ALTITUDE

Applicable to: ALL

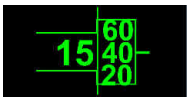
Altitude



CURRENT ALTITUDE

L3 The ADRs provide the current altitude information.

L12



Indicates the current altitude.

Pulses, when the difference between the current altitude and the selected altitude:
- Decreases
- Is between 200 ft and 750 ft.

Flashes, when the difference between the current altitude and the selected altitude:
- Increases
- Is above 200 ft.

L12

BARO

The aircraft flies a Non-Precision Approach, and the current altitude is equal to, or less than the Minimum Descent Altitude (MDA) (Minimum Descent Height (MDH)).
Pulses for 5 s, then remains steady.

L1

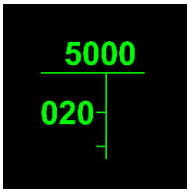


The current altitude is negative.

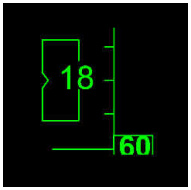
ALTITUDE TARGET

L3 The PRIMs provide the altitude target. If all three PRIMs are lost, the FCU backup provides the altitude target.

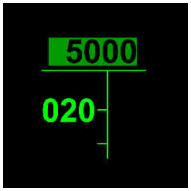
L1 Indicates:
- Altitude, if the selected barometric reference is QNH, or
- FL, if the selected barometric reference is STD.



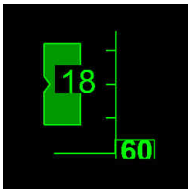
- Indicates the AFS CP selected altitude if the vertical guidance is either selected or managed
- The altitude target is not within the altitude scale.



- Indicates the AFS CP selected altitude if the vertical guidance is either selected or managed
- The altitude target is within the altitude scale.



- Indicates an altitude constraint if the vertical guidance is managed
- The next altitude target is not within the altitude scale.



- Indicates an altitude constraint if the vertical guidance is managed
- The next altitude target is within the altitude scale.

Note: *If a vertical approach mode is engaged, the altitude target has no green background when the flight crew selects the go-around altitude on the AFS CP.*

L12

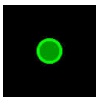
ALT SEL — Appears, when the following information cannot be displayed:
- The altitude selected by the flight crew on the AFS CP
- The altitude selected by the flight crew on the FCU backup
- The altitude constraint from the FMS.

Flashes for 9 s, then remains steady.

VERTICAL DEVIATION

L3 The FMS provides the vertical deviation.

L12



Indicates the vertical deviation between the current altitude of the aircraft, and the altitude that corresponds to the theoretical vertical profile of the FMS , within a range of +/- 570 ft .
When the vertical deviation is above 570 ft (or 200 ft in crosswind mode or declutter mode), the symbol remains at the range limit, and the exact value of the vertical deviation appears on the DES and APPR panels of the FMS PERF page.

Appears when:
- The aircraft reaches the Top of Descent (T/D), or
- The FMS flight phase is descent, or approach.

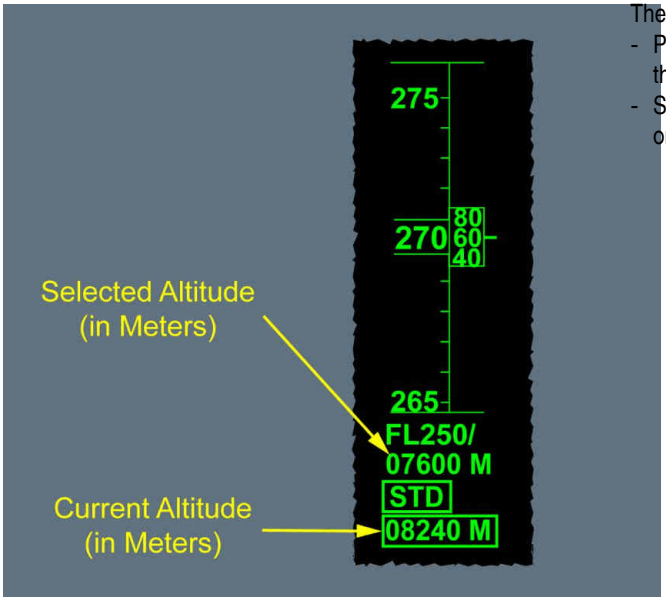
L2 *Note:* *When the aircraft is in a holding pattern, the vertical deviation is the difference between the altitude of the aircraft, and the altitude of the holding exit: Refer to 22-FMS/System Description/Flight Planning/Lateral Revisions/Hold .*

METER INDICATION

The selected altitude and the current aircraft altitude indications appear in meters, when the flight crew presses the METER pb on the AFS CP.

L3 The PRIMs provide the meter indication.

L1



The flight crew:
- Presses the METER pb on the AFS CP
- Selects an altitude target on the AFS CP.

BAROMETRIC REFERENCE

L3 The ADRs provide the barometric reference.

L1

QNH 1013	The flight crew selects the QNH pressure reference on the barometric reference knob of the EFIS CP.
QNH 28.60	The flight crew selects the QNH pressure reference (in inches of mercury) on the barometric reference knob of the EFIS CP.
	The flight crew selects the standard pressure reference on the barometric reference knob of the EFIS CP.

L2 Flashes, when the flight crew selected:
- QNH on the AFS CP, and the aircraft is in the climb phase, above the transition altitude, or
- STD on the AFS CP, and the aircraft is in the approach phase, below the transition flight level.

Note: If the transition altitude(flight level) is not available from the FMS, the default transition altitude(flight level) is automatically set to 2 500 ft radio altitude.

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Altitude Alerts

ALTITUDE ALERTS

Applicable to: ALL

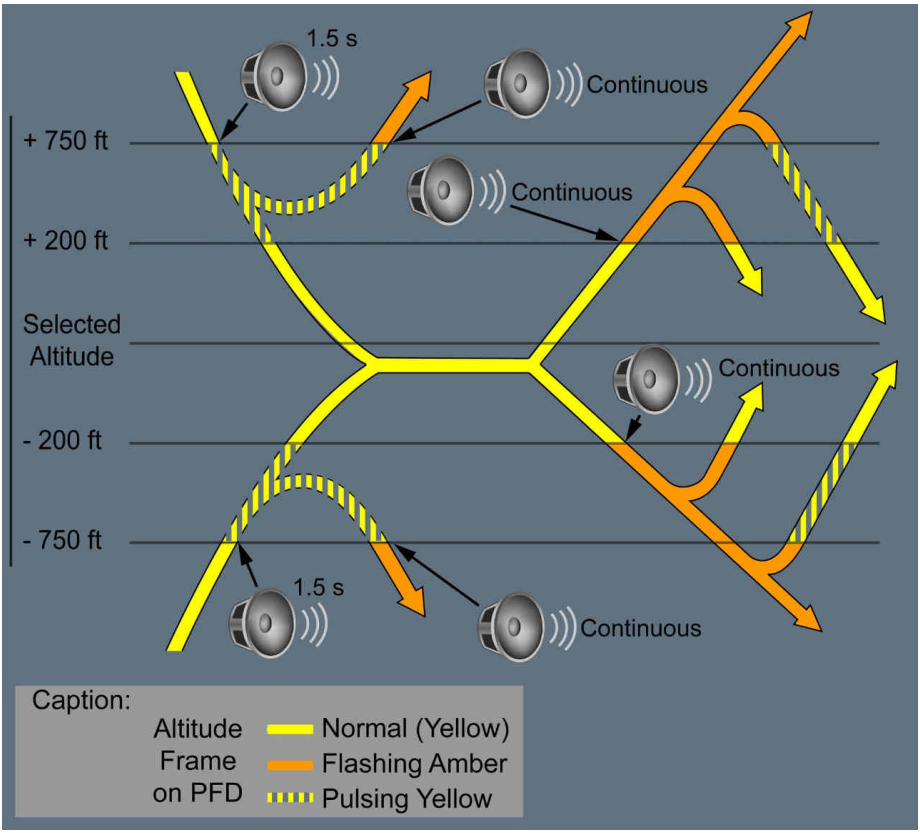
In manual flight, and when the aircraft approaches the selected altitude(flight level), or when the aircraft significantly deviates from the selected altitude(flight level), the ECAM generates an altitude alert:

- The altitude frame pulses, or flashes
- The C chord sound is generated.

C Chord Sound

L3 Altitude alerts are triggered, when the altitude provided by the ADIRS is different from the altitude selected on the AFS CP.

Altitude Alerts



L2 The C chord sound no longer appears, when the flight crew:
- Selects a new altitude target, or
- Presses the EMER CANCEL pb on the ECAM CP, or
- Presses the MASTER WARN pb.

The altitude frame stops pulsing(flashing), when the flight crew selects a new altitude target.

This alert is inhibited:
- In approach, when the aircraft captures the glideslope, or
- When the landing gear is set to down, and the slats are extended, or

- When the landing gear is locked down.
- When the AP/FD TCAS mode engages upon a Resolution Advisory order.

L3 If the altitude alert is triggered just after the aircraft is clear of conflict, and the AP is engaged, the C chord sound is inhibited.

If the altitude alert is triggered just after the aircraft is clear of conflict, and the AP is not engaged, a C chord sound is generated during 1.5 s.

Intentionally left blank

Radio Altitude

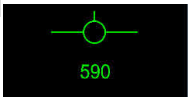
RADIO ALTITUDE

Applicable to: ALL

L3 The radio altitude value changes:
- Every 10 ft, above 50 ft
- Every 5 ft, between 5 ft and 50 ft
- Every foot below 5 ft.

L2 The radio altitude indication no longer appears when:
- The aircraft is on ground, or
- The attitudes of the aircraft are excessive, or
- The aircraft is above 2 500 ft radio altitude.

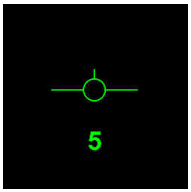
L1



Indicates the radio altitude, when the aircraft is:
- Below 2 500 ft
- Above 400 ft.



Indicates the radio altitude, when the aircraft is:
- Below 400 ft
- Above the minimum entered on the MFD (on the APPR panel of the FMS PERF page) + 100 ft.



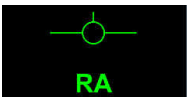
Appears when the aircraft is below:
- The minimum entered on the MFD (on the APPR panel of the FMS PERF page) + 100 ft, or
- 400 ft, if the flight crew did not enter a minimum on the MFD (on the APPR panel of the FMS PERF page).

L12



Appears when the aircraft is below the minimum entered on the MFD (on the APPR panel of the FMS PERF page) .
Pulses for 5 s, then remains steady.

L12



- The three radio altimeters (i.e. RA A, RA B, and RA C) are failed
- The aircraft is below the transition altitude.

Flashes for 9 s, then remains steady.

Note: *If the flight crew entered NO, NONE, NO DH, or NODH as the minimum on the MFD (on the APPR panel of the FMS PERF page), the minimum default value is zero.*

Vertical Speed

VERTICAL SPEED

Applicable to: ALL

The vertical speed scale ranges from -6 000 ft/min to 6 000 ft/min.

L2 The vertical speed indicated on the HUD is based on the baro inertial vertical speed from the IRs.

L3 *Note:* *To compute the baro inertial vertical speed, each IR mixes its own inertial data to the barometric data received from one ADR:*

- *In normal configuration, each IR uses its own ADR (IR 1 uses ADR 1, IR 2 uses ADR 2 and IR 3 uses ADR 3).*
- *The IR 1(2) changes its ADR source based on the ADR status (operative or failed), independently from the position of the AIR DATA and the ATT HDG selectors.*
- *The IR 3 changes its ADR source based on the position of the AIR DATA and the ATT HDG selectors and on the ADR status (operative or failed).*

L2 If the baro inertial vertical speed from the IRs is no longer available, the vertical speed indicated on the HUD is based on a pure barometric vertical speed, provided by the ADRs.

L12



Indicates the vertical speed of the aircraft.

Note: *The digital indication only appears, when the vertical speed is:*

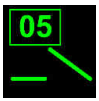
- *More than 200 ft/min, or*
- *Less than - 200 ft/min.*

If the vertical speed is more than 6 000 ft/min(less than -6 000 ft/min), the pointer remains on the top(bottom) of the scale.

Flashes, if the vertical speed is:

- Equal, or more than 6 000 ft/min, or less than -6 000 ft/min, or
- Less than -2 000 ft/min, and the aircraft is descending between 1 000 ft and 2 500 ft, or
- Less than -1 200 ft/min, and the aircraft is descending below 1 000 ft.

L12



The vertical speed is no longer based on the baro inertial vertical speed from the IRs: It is based on the barometric vertical speed from the ADRs.
There is a time lag between the vertical speed that appears on the HUD, and the current vertical speed of the aircraft.

L12



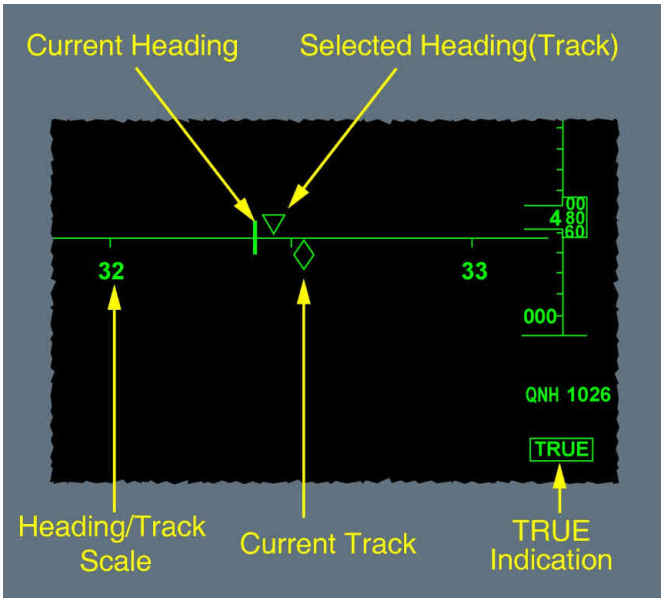
The vertical speed information is not available, neither from the IRs, nor from the ADRs.
Flashes for 9 s, then remains steady.

Heading/Track

HEADING/TRACK

Applicable to: ALL

Heading/Track



HEADING/TRACK SCALE

Appears on the horizon line, in the MAG or TRUE reference.
Degrees are indicated in increments of 5 ° , with a numerical value every 10 ° .

L2 The heading/track scale is in the TRUE reference, when:
- The flight crew presses the TRUE/MAG pb , on the AFS CP
- At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

For more information on the polar navigation, *Refer to DSC-22-FMS-10-30-30 Introduction* .

L3 The ADIRS provide the heading information.

CURRENT HEADING

L13



Indicates the current heading of the aircraft, on the heading scale.
The ADIRS provide the heading value, in the TRUE or MAG reference, depending on the MAG/TRUE pb selection.

CURRENT TRACK

L123



Indicates the current track of the aircraft, on the heading scale.
No longer appears, if the FPV is close to the horizon line, because it also provides the track information.
The ADIRS provide the current track information.

SELECTED HEADING(TRACK)

L3 If all three PRIMs are lost, the FCU backup provides the selected heading(track) information. In all other cases, the PRIMs provide the selected heading(track) information.

L12



Indicates the heading(track) that the flight crew selected on the AFS CP.

Appears, when:
- The HDG/TRACK mode is engaged, or
- The APs and FDs are off.

L1



The selected heading(track) is not within the display area, the numerical value appears instead of the symbol on the right(left) side of the heading/track scale.

TRUE INDICATION

L123



The heading reference is TRUE north.

Appears when:
- The flight crew presses the TRUE/MAG pb , on the AFS CP
- At high latitudes, the ADIRS automatically change the MAG north reference to the TRUE north reference.

  The aircraft is at high latitude:
  - Above 82.5 ° North, or
  - Above 73.5 ° North, with a longitude between 117.5 ° West, and 92.5 ° West, or
  - Below 60.5 ° South.

  When the aircraft approaches high latitudes, the SELECT TRUE NORTH REF message appears on the ND , and requests that the flight crew selects the TRUE north reference.

For more information on the polar navigation, *Refer to 22/AFS-FLIGHT MANAGEMENT SYSTEM/NAVIGATION FUNCTIONS/POLAR NAVIGATION* .
Flashes for 9 s , then remains steady when the slats are extended.

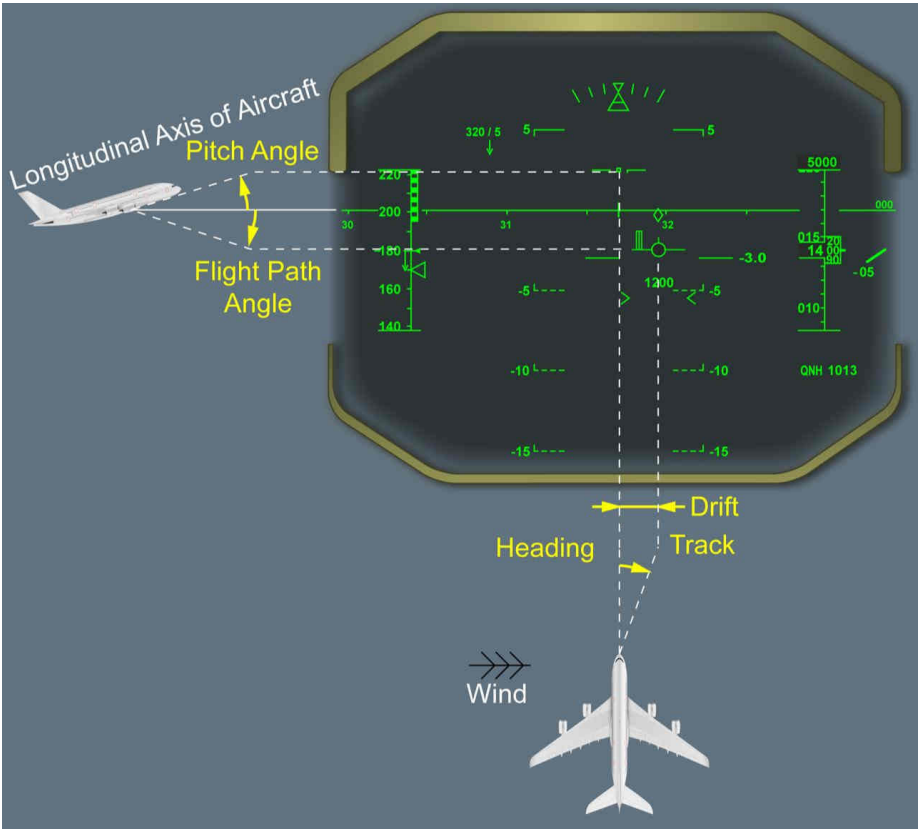
Intentionally left blank

Guidance

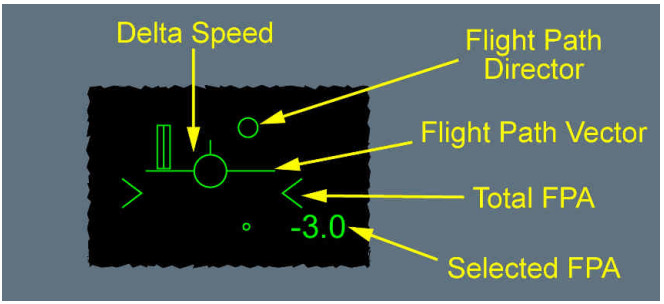
GUIDANCE

Applicable to: ALL

Guidance



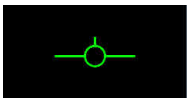
Guidance



FLIGHT PATH VECTOR (FPV)

L3 The ADIRS provide the flight path angle that is necessary in order to display the FPV.
The ADIRS and the GPIRS provide the current drift.

L123

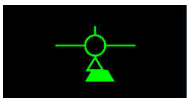


The Flight Path Vector (FPV) indicates:
- The Flight Path Angle (FPA) on the vertical axis
- The current track on the lateral axis.
  The current track is computed by using the hybrid position between IRS and GPS. If the GPIRS position is not valid, the IRS provides the current track, and the FPV IRS message appears on the HUD.

Appears as a dotted line at the edge of the display, if the FPV is not within the display area of the HUD.

The FPV is fixed at zero:
- On ground
- Under 60 kt.

L13



Appears when one engine fails during takeoff, or go-around.
The sideslip index then corresponds to the beta target.

Appears, when:
- The flight crew selects CONF 1, 2, or 3
- The N1 of at least one engine is above 80 %
- The difference between the N1 of two engines is above 40 %.

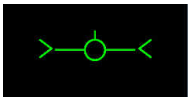
TOTAL FLIGHT PATH ANGLE (FPA)

Indicates the total energy of the aircraft. The position of the chevrons indicates whether the aircraft accelerates, or decelerates on the current flight path.

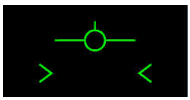
L2 Appears as a dotted line, at the edge of the display, if the FPV is not within the display area of the HUD.

L3 The PRIMs provide the total FPA.

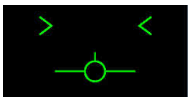
L1



The aircraft is at a constant speed.



The aircraft will decelerate, if the flight crew maintains the current thrust.



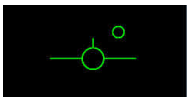
The aircraft will accelerate, if the flight crew maintains the current thrust.

Note: *When the aircraft is on ground, during the taxi and the takeoff roll, the same symbol indicates the acceleration/deceleration of the aircraft.*

FLIGHT PATH DIRECTOR (FPD)

L3 The PRIM s provide the FPD information.

L12



Indicates the Automatic Flight System (AFS) guidance in relation to the flight path vector.
Appears after liftoff, if the flight crew engaged the FD .

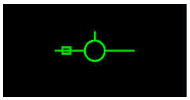
Pulses for 5 s :
- After liftoff, or
- During a go-around.

Flashes, when one of the FD bars flashes on the PFD . For more information on the conditions that lead to the FD flashing, *Refer to DSC-22-FG-30-50 Pitch and Roll Bar Flashing* .
Appears as a dotted line at the edge of the display, if the FPD is not within the display area of the HUD .

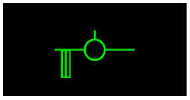
No longer appears:
- If the attitudes of the aircraft are excessive, or
- During flare, except during autoland.

DELTA SPEED

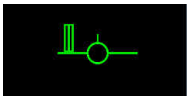
Indicates the difference between the current airspeed and the selected or managed airspeed target.



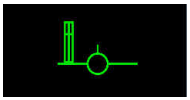
The current airspeed is equal to the airspeed target.



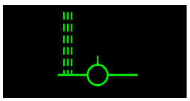
The current airspeed is less than the airspeed target, and the delta speed is below 10 kt.



The current airspeed is more than the airspeed target, and the delta speed is below 10 kt.



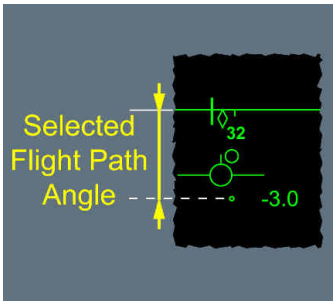
The current airspeed is more than the airspeed target, and the delta speed is more than 10 kt but below 20 kt.



The current airspeed is more than the airspeed target, and the delta speed is more than 20 kt.

SELECTED FLIGHT PATH ANGLE

L12



Indicates the FPA that the flight crew selects on the AFS CP.

Appears, when:

- The flight crew selects TRK-FPA on the AFS CP
- The flight crew engages the FD
- • The FPA mode is engaged, and the flight crew changes the selected FPA on the AFS CP, or
  The selected FPA appears for 5 s.
  • The FPA mode is not engaged, and the flight crew preselects the FPA value on the AFS CP.
  No longer appears when the FPA mode engages, or if any other AFS mode engages.

Intentionally left blank

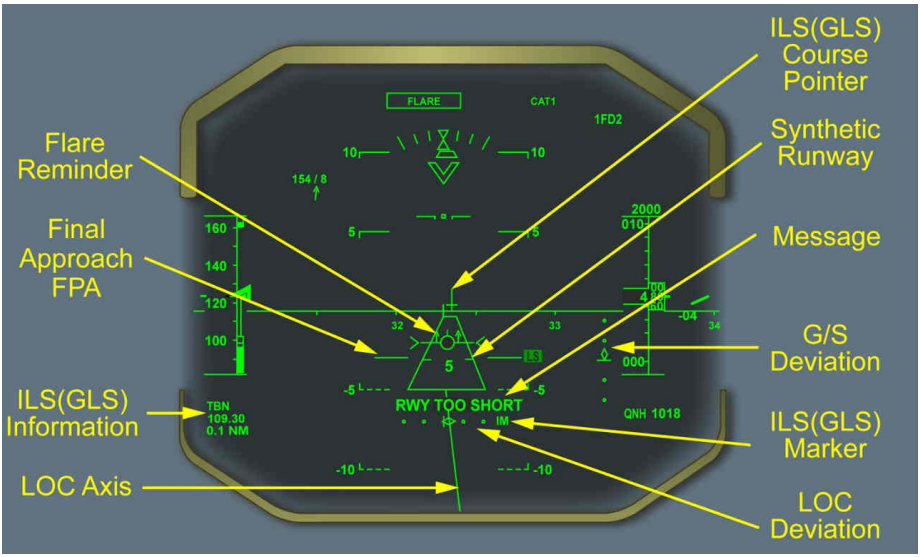
Approach Guidance

ILS APPROACH

Applicable to: ALL

To perform an ILS (GLS) approach, the flight crew must:
- Select an ILS (GLS) approach on the FMS ARRIVAL page
- Press the LS pb on the EFIS CP .

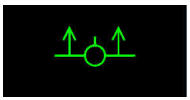
L2 *Note: If an ILS (GLS) is manually-tuned on the FMS POSITION/NAVAIDS page:*
- *The approach selected on the FMS ARRIVAL page is automatically disregarded*
- *The LOC and G/S modes flies the manually-tuned ILS (GLS).*



FLARE REMINDER

L3 The radio altimeters provide the radio altitude that is necessary for the display of the flare reminder.

L12



Indicates that it is necessary to flare.
Appears and pulses for 3 s, below 40 ft radio altitude.
No longer appears on ground.

LOC DEVIATION

L3 The MMR provides the LOC deviation.

L2 Flashes, and continues to flash if:
- The aircraft is between 15 ft and 1 000 ft
- CAT2 or CAT3 appears on the FMA
- LOC, LAND, or FLARE is engaged
- The deviation exceeds one quarter dot.

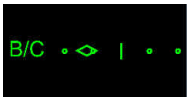
L1



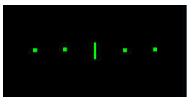
The LOC deviation is within the scale.



The LOC deviation is not within the scale.



The flight crew selects a back beam course.



The MMR is on standby.

L12

LOC — Appears, instead of the LOC scale, when the LOC receiver on the same side is failed.
Flashes for 9 s, then remains steady.

G/S DEVIATION

L2 Appears if the flight crew did not select a back beam course.
L3 The MMR provides the G/S deviation.

L2 Flashes, and continues to flash if:
- The aircraft is between 100 ft and 1 000 ft
- CAT2 or CAT3 appears on the FMA

- G/S or LAND is engaged
- The deviation exceeds one dot.

L1



The G/S deviation is within the scale.

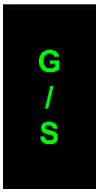


The G/S deviation is not within the scale.



The MMR is on standby.

L12



Appears, instead of the G/S scale, when:
- The G/S receiver on the same side is failed, or
- The MMR sends inconsistent information about the selected approach.

Flashes for 9 s, then remains steady.

ILS(GLS) COURSE POINTER

L3 The MMR and the PRIM provide the ILS(GLS) course pointer information.

L12



Indicates the QFU of the ILS(GLS) course on the heading scale.

Note: *If an ILS(GLS) is manually-tuned on the FMS POSITION/NAVAIDS page, the approach selected on the FMS ARRIVAL page is disregarded. Therefore, the LS course symbol indicates the LS course of the manually-tuned ILS(GLS) .*

LOC AXIS

L3 The MMR provides the LOC axis information. The ADIRS provide the barometric altitude and settings that are necessary to display the LOC axis.

L1 Indicates a view of the LOC axis on the ground.

L2 Appears if:
- The flight crew did not select a back beam course
- The LOC is aligned on the runway heading (QFU).

Flashes, and continues to flash if:
- The aircraft is between 15 ft and 1 000 ft
- CAT2 or CAT3 appears on the FMA
- LOC, LAND, or FLARE is engaged
- The deviation exceeds one quarter dot.

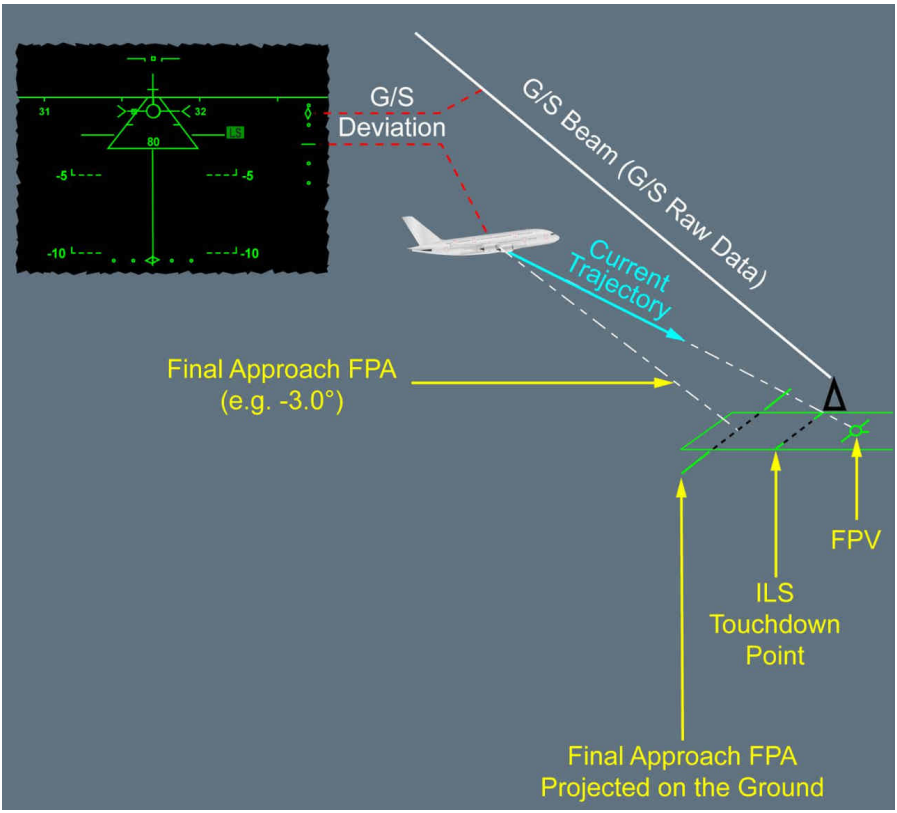
No longer appears, if the aircraft descends below:
- The minima, or
- 50 ft in the case of NO DH minima, or
- 400 ft above the runway threshold.

SYNTHETIC RUNWAY

Indicates the destination runway and the touchdown point.

L3 The MMR and the FMS provide the necessary information for the display of the destination runway and of the touchdown point.

Synthetic Runway



L2 Appears when the flight crew did not select a back beam course.

Appears as a dotted line when:
- The runway computation is less precise (i.e. using GPS data, instead of LOC and G/S deviations), or
- The difference between the LOC axis and the runway QFU is more than 2 °.

No longer appears, if the aircraft descends below:
- The minima, or
- 50 ft, in the case of NO DH minima, or
- 400 ft above the runway threshold elevation.

The touchdown point flashes, if the G/S deviation is excessive.

FINAL APPROACH FPA

L3 The FMS provides the final approach FPA.

L12



Indicates the reference slope of the G/S beam.
When the aircraft is on the G/S beam, the touchdown point is aligned with the final approach FPA symbol.
No longer appears during the flare, and if the slope of the vertical beam is not available in the navigation database.

ILS(GLS) MARKER INDICATION

L2 Appears when:
- The LS pb is pressed
- The aircraft flies over the marker beacon.

L3 The VOR provides the marker beacon information.

L1

OM	The aircraft is flying over the outer marker of the ILS(GLS) approach.
MM	The aircraft is flying over the middle marker of the ILS(GLS) approach.
IM	The aircraft is flying over: - Either the inner marker of the ILS(GLS) approach, or - An airway marker.

ILS(GLS) INFORMATION

L3 The MMR, the DME, and the FMS provide the ILS(GLS) information.

L13



ndicates the following information about the ILS(GLS):
The ILS(GLS) identification
The ILS(GLS) identification is decoded by the receiver.
- The ILS Frequency (in MHz), or the GLS channel
- The aircraft distance to the DME, if the ILS has a DME, or the aircraft distance to the threshold (GLS approach).

L12

ILS — Appears, when one of the following is not available during an ILS approach:
- The LOC signal, or
- The G/S signal.

Flashes for 9 s, then remains steady.

L12

GLS — Appears, when one of the following is not available during a GLS approach:
- The LOC signal, or
- The G/S signal.

Flashes for 9 s, then remains steady.

L12

DME — Appears, if:
- The ILS has a DME
- The distance to the DME is not available.

Flashes for 9 s, then remains steady.

L12

LS — The approach mode is armed(engaged), and the flight crew did not press the LS pb on the EFIS CP.
Flashes for 9 s, then remains steady.

MESSAGE

L12

RWY TOO SHORT — The Runway Overrun Warning (ROW) function computes that if the runway is dry, the landing distance is too short.
Flashes for 9 s, then remains steady.

L12

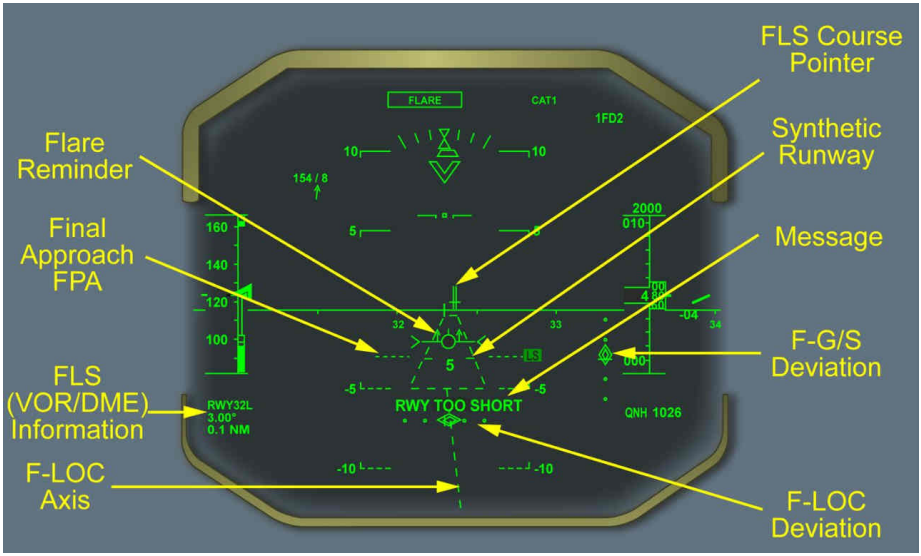
IF WET: RWY TOO SHORT — The ROW function computes that if the runway is wet, the landing distance is too short.
Flashes for 9 s, then remains steady.

NON-PRECISION APPROACHES

Applicable to: ALL

To perform a VOR , VOR / DME , or RNAV approach with the FLS function, the flight crew must:
- Select a VOR , or RNV / GPS approach on the FMS ARRIVAL page
- Press the LS pb on the EFIS CP
- Press the APPR pb .

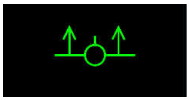
L2 *Note:* *When the AP s and the FD s are lost, it is not necessary for the flight crew to press the APPR pb .*



FLARE REMINDER

L3 The radio altimeters provide the radio altitude that is necessary for the display of the flare reminder.

L12



Indicates that it is necessary to flare.
Appears and pulses for 3 s, below 40 ft radio altitude.
No longer appears on ground.

F-LOC DEVIATION

L3 The MMR provides the F-LOC deviation.

L1 Appears, when:
- The flight crew pressed the LS pb
- The flight crew selected the FLS function
- The F-LOC deviation is valid.

L12



The F-LOC deviation is within the scale.
The F-LOC deviation pulses, when the approach capability is RAW ONLY: The flight crew must press the LS pb.



The F-LOC deviation is not within the scale.



The MMR is on standby.

L123

F-LOC — Appears, instead of the F-LOC scale, when the F-LOC deviation is not valid.
The F-LOC deviation is not available when the FLS function of the MMR on the same side is lost.
Flashes for 9 s, then remains steady.

F-G/S DEVIATION

L3 The MMR provides the F-G/S deviation.

L12



The F-G/S deviation is within the scale.
The F-G/S deviation pulses, when the approach capability is RAW ONLY: The flight crew must press the LS pb.

L1

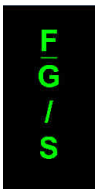


The F-G/S deviation is not within the scale.



The MMR is on standby.

L12



Appears, instead of the F-G/S scale, when:
- The F-G/S deviation is not available, or
- The MMR sends inconsistent information about the selected approach.

Flashes for 9 s, then remains steady.

FLS COURSE POINTER

L3 The MMR and the PRIM provide the FLS course pointer information.

L12



Indicates the FLS course for a Non-Precision Approach (NPA), flown with the FLS function.

Appears, when the flight crew:
- Selects a VOR, or a RNAV/GPS approach on the FMS ARRIVAL page
- Presses the LS pb on the EFIS CP.

F-LOC AXIS

L3 The MMR provides the F-LOC axis information. The ADIRS provide the barometric altitude and settings that are necessary to display the F-LOC axis.

L1 Indicates a view of the F-LOC axis on the ground.

L2 Flashes if the F-LOC deviation exceeds two dots for more than 2 s.

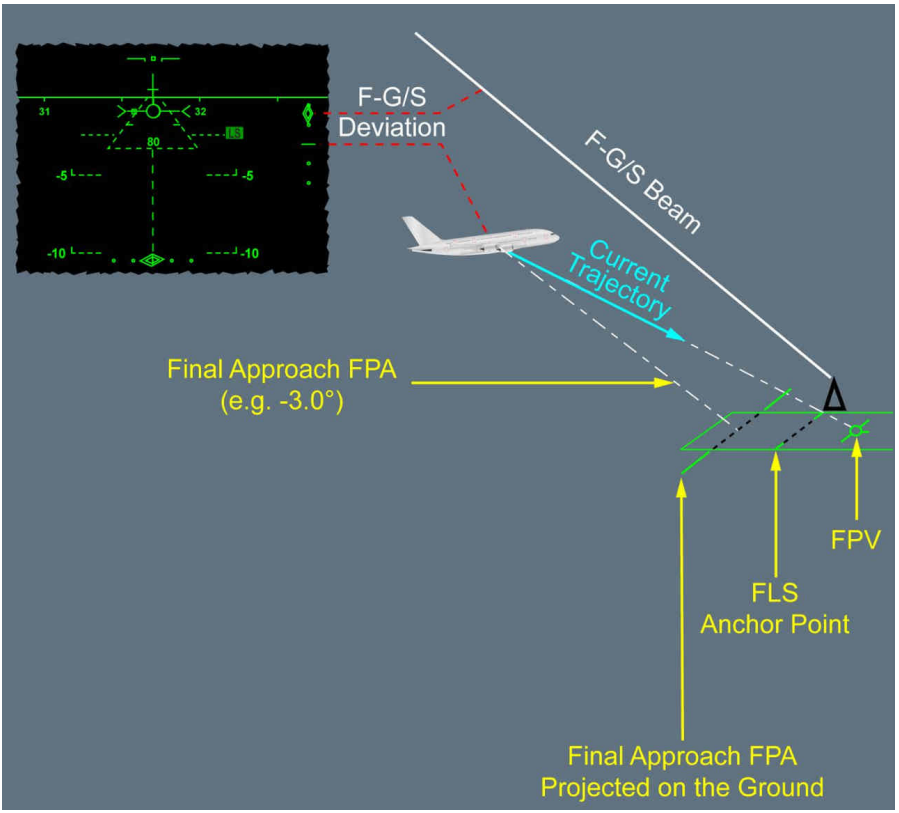
No longer appears, if the aircraft descends below:
- The minima, or
- 50 ft, in the case of NO DH minima, or
- 400 ft above the runway threshold.

SYNTHETIC RUNWAY

Indicates the destination runway and the anchor point.

L3 The MMR and the FMS provide the necessary information for the display of the destination runway and the anchor point.

Synthetic Runway



L2 No longer appears, if the aircraft descends below:
- The minima, or
- 50 ft, in the case of NO DH minima, or
- 400 ft above the runway threshold elevation.

FLS(VOR/DME) INFORMATION



When the flight crew flies a NPA with the FLS function, indicates:
The FLS anchor point identification, when the anchor point is on the runway threshold
- The FLS beam slope.



When the flight crew flies a NPA with the FLS function, indicates:
The anchor point is not located on the runway threshold: In this case, the anchor point is also referred to as End Point (EP)
- The FLS beam slope to the end point.

L12



When the flight crew flies a NPA without the FLS function, and presses the VOR pb on the EFIS CP, indicates:
The side of the selected VOR
- The ident of the VOR/DME
If the navigation station ident is not valid, the HUD displays the station frequency, instead of the ident.
If the VOR frequency is not valid, the HUD displays the DME frequency, instead of the VOR frequency.
The HUD displays nothing, if both the identifier and the frequency are not valid.
- The distance from the aircraft to the selected VOR/DME beacon.

L12

LS — The approach mode is armed(engaged), and the flight crew did not press the LS pb on the EFIS CP.
Flashes for 9 s, then remains steady.

L12

FLS — Appears, when one of the following is not available:
- The FLS function, or
- The F-LOC signal, or
- The F-G/S signal, or
- The distance to the anchor point.

Flashes for 9 s, then remains steady.

L12

LOC/FLS — Appears, when one of the following is not available:
- The LOC/FLS function, or
- The LOC signal, or
- The F-G/S signal, or
- The distance to the anchor point.

Flashes for 9 s, then remains steady.

FINAL APPROACH FPA

L2 No longer appears during the flare.

L123



The flight crew flies the NPA with the FLS function.
Indicates the reference slope of the F-G/S beam.
Appears when the flight crew presses the LS pb on the EFIS CP.
The MMR provides the reference slope of the F-G/S beam.

L1



The flight crew flies the NPA without the FLS function.
Indicates the default value -3 °.



The flight crew flies the NPA without the FLS function.
Indicates the FPA selected by the flight crew on the AFS CP.

MESSAGE

L12

RWY TOO SHORT	The Runway Overrun Warning (ROW) function computes that if the runway is dry, the landing distance is too short. Flashes for 9 s, then remains steady.

L12

IF WET: RWY TOO SHORT	The ROW function computes that if the runway is wet, the landing distance is too short. Flashes for 9 s, then remains steady.

Intentionally left blank

Flight Mode Annunciator

FLIGHT MODE ANNUNCIATOR (FMA)

Applicable to: ALL

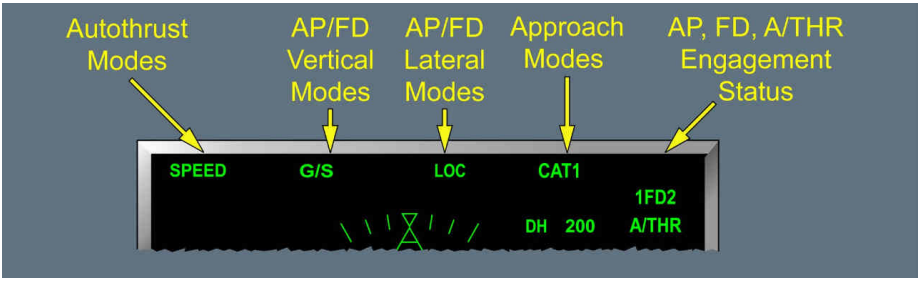
The Flight Mode Annunciator (FMA) indicates:
- The status of the A/THR
- The AP / FD vertical and lateral modes
- The approach capability
- The AP / FD and A / THR engagement status
- The autobrake arming status.

Messages from the Flight Guidance, the Flight Controls, and FMS can also appear below the FMA .

L2 No longer appears when:
- The bank angle is more than 45 ° , or less than - 45 ° , or
- The pitch attitude is more than 25 ° , or less than - 13 ° .

L1 For more information on guidance indications on the FMA , *Refer to 22-FG/CONTROLS AND INDICATORS/FMA* .

FMA



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Wind Indications

WIND INDICATIONS

Applicable to: ALL

L13



Indicates the current wind direction (in degrees, TRUE North reference) and the current wind speed (in knots).
If the wind speed is above 2 kt, the HUD also displays a green arrow that indicates the wind direction.
The IRS provide the wind information.

Intentionally left blank

Messages

MESSAGES

Applicable to: ALL

L12

ALT — Appears, instead of the altitude scale, when the altitude data, with the reference selected on the AFS CP, is not available.
Flashes for 9 s, then remains steady.

L12

ATT — No attitude data is available. The attitude and guidance indications no longer appear.
Flashes for 9 s, then remains steady.

L12

CHECK ALT — The altitude indicated on both PFDs is different.

Appears, when:
- The barometric reference selected by the Captain is the same as the barometric reference selected by the First Officer
- The difference between the two PFDs altitude indications is:
  - Above 250 ft, when the barometric reference is QNH, or
  - Above 500 ft, when the barometric reference is STD.

Flashes for 9 s, then remains steady.

L12

CHECK ATT — Attitude data on both PFDs differs by more than 5 °.
Flashes for 9 s, then remains steady.

L12

CHECK FPV — FPA data in the two selected IRS differs by more than 1 °.
Flashes for 9 s, then remains steady.

L12

CHECK HDG — Heading information on both PFDs differs by more than 5 °.
Flashes for 9 s, then remains steady.

COMBINER UNLOCKED — The Head-up Combiner Unit is deployed and unlocked.

L12

EXCESSIVE ATT — The attitudes of the aircraft are excessive.

Appears when:
- The bank angle is more than, or equal to 71 °, or less than or equal to -71 °, or
- The pitch attitude is more than, or equal to 34 °, or less than or equal to -20 °.

L12

HDG — Appears, instead of the heading scale, when the heading information is not available.
Flashes for 9 s, then remains steady.

L12

IF WET: RWY TOO SHORT — During the approach, the ROW function computes that if the runway is wet, the landing distance is too short.
Flashes for 9 s, then remains steady.

L12

MAX REVERSE — During the rollout, the Runway Overrun Protection (ROP) function is engaged.
Flashes for 9 s, then remains steady.

L12

PULL UP — The TAWS function of the SURV system triggers a PULL UP aural alert.
Flashes for 9 s, then remains steady.

L12

REVERT TO PFD — The flight crew must revert to the PFD.

Appears when:
- EXCESSIVE ATT appears, or
- TCAS RA appears.

Flashes for 9 s, then remains steady.

L12

RWY TOO SHORT — During the approach, the Runway Overrun Warning (ROW) function computes that if the runway is dry, the landing distance is too short.
Flashes for 9 s, then remains steady.

L12

TCAS RA — The TCAS function of the SURV system triggers a resolution advisory.
Flashes for 9 s, then remains steady.

L12

WINDSHEAR	The PRIMs trigger a reactive windshear alert. Flashes for 9 s, then remains steady.

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HUD Reduced Display Modes

DECLUTTER MODES

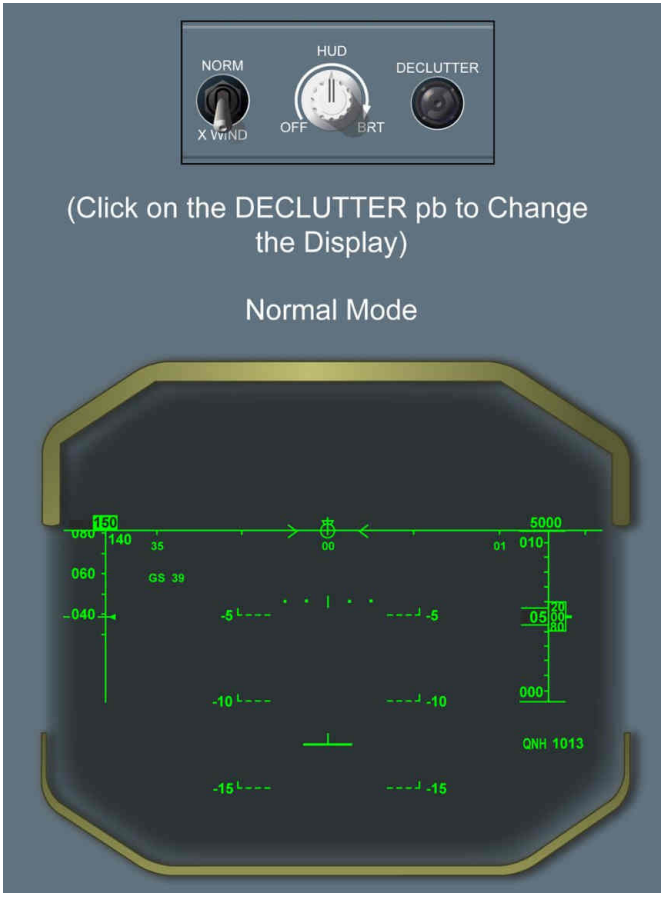
Applicable to: ALL

The flight crew can remove some information displayed on the HUD, in order to improve the observation of external parameters.

The flight crew can select different levels of declutter, according to the flight phase:
- In the taxi phase, there is one level of declutter
- In the approach phase, there are two levels of declutter: D1 and D2
- In all other flight phases, there is one level of declutter.

TAXI

The flight crew can remove the following symbols, by pressing the DECLUTTER pb on the HUD CP:
- The pitch scale
- The airspeed scale
- The altitude scale
- The barometric setting.



When the flight crew selects the takeoff thrust, the HUD automatically displays the normal mode for takeoff.

IN FLIGHT

- In normal mode, "N" appears on the HUD
- In declutter 1 mode, "D" appears on the HUD.

In normal and declutter 1 mode, the flight crew can also select the crosswind mode in order to reduce the speed and altitude scales.

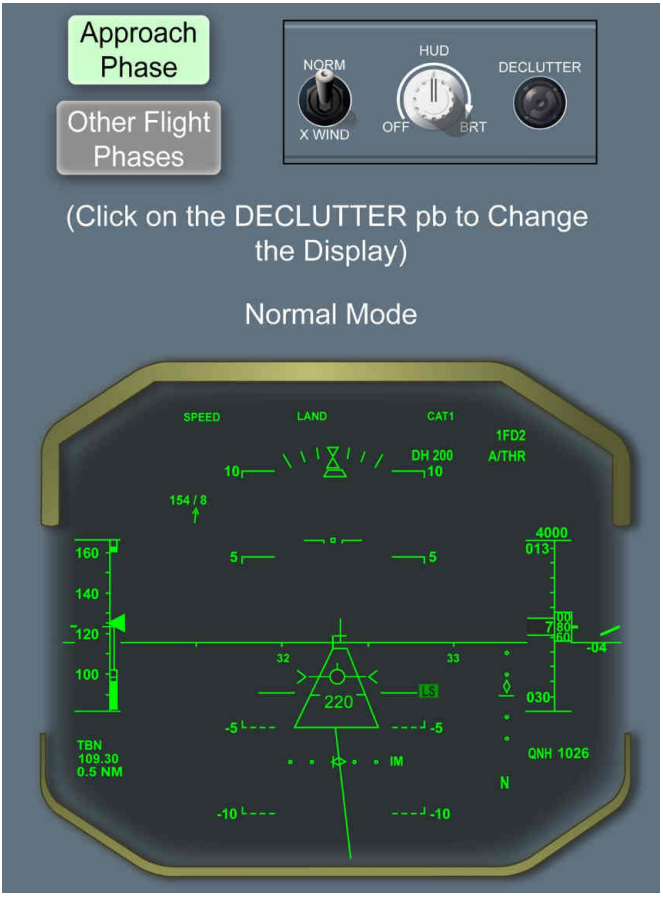
In declutter 2 mode, altitude and speed scales are already reduced, therefore the XWIND pb has no effect on the display.

During the approach phase, the flight crew can remove the following approach symbols, by pressing the DECLUTTER pb one time on the HUD CP:

- The synthetic runway
- The approach axis
- The touchdown point, or the anchor point.

The flight crew can reduce the display by maintaining only the following symbols, by pressing the DECLUTTER pb two times in the approach phase, or one time in the other flight phases:

- The flight path vector
- The flight path director
- The current heading
- The selected heading (track)
- The horizon line
- The aircraft reference, if the tail strike margin is less than 1 °
- Part of the pitch scale
- The reduced airspeed scale
- The reduced altitude scale
- The flare reminder
- The approach tail strike symbol, if the tail strike margin is less than 1 °
- The total FPA
- The selected FPA
- The final approach FPA
- The delta speed
- The radio altitude
- The A/THR messages and modes, and the annunciations within boxes on the FMA
- Messages in the case of alerts.



In the case of a go-around, the HUD automatically displays the normal mode.

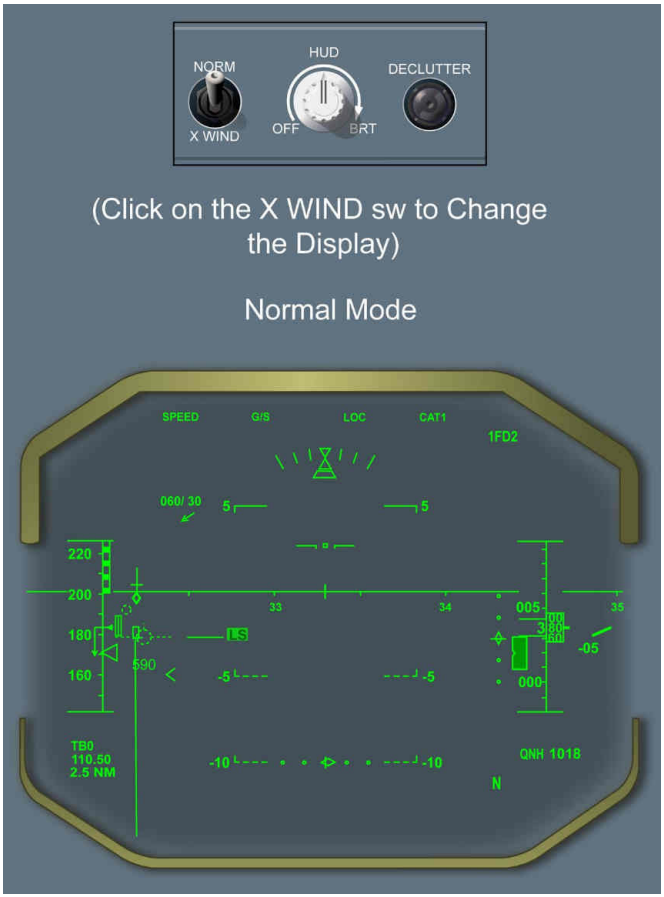
CROSSWIND MODE

Applicable to: ALL

When flying in crosswind conditions, the aircraft trajectory and guidance symbols may reach the border of the display zone.
In flight, the flight crew can reduce the speed and altitude scales, by using the XWIND sw on the HUD CP, in order to maintain adequate visibility of the symbols.

If the flight crew sets to X WIND the XWIND sw on ground, it has no effect on the HUD display until the aircraft reaches 30 ft radio-altimeter.

Crosswind



During approach, the flight crew can combine the declutter 1 mode and the crosswind mode.
In other declutter modes when altitude and speed scales are already reduced, therefore the XWIND pb has no effect on the display.

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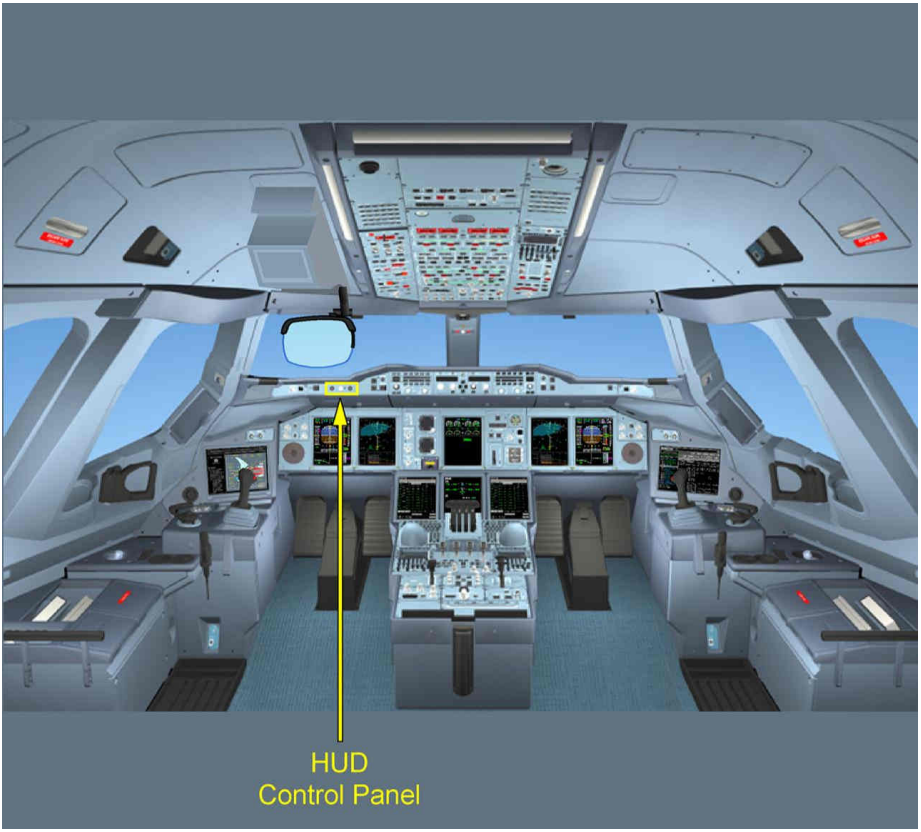
COCKPIT VIEW

Applicable to: ALL

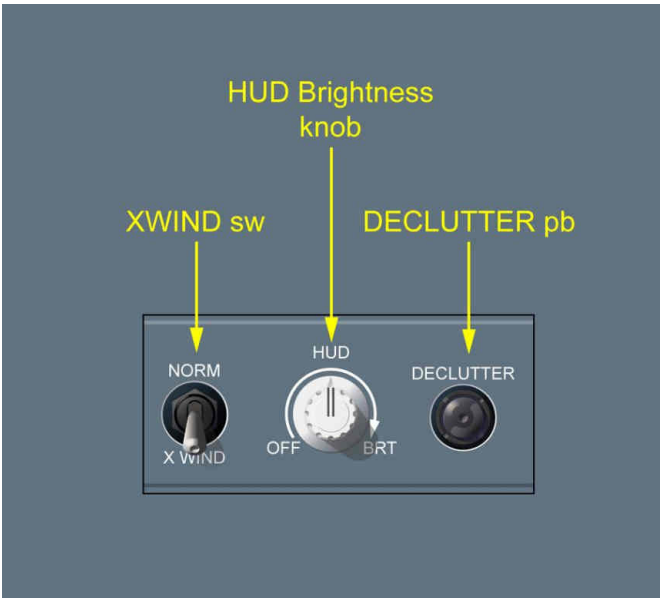
Cockpit View



HUD CONTROL PANEL

Applicable to: ALL

HUD CP



The HUD Control Panel (HUD CP) is located on the Captain's side.

XWIND sw



The flight crew selects the normal mode of the HUD .

L12



The flight crew selects the crosswind mode of the HUD .
The XWIND sw reduces the speed and altitude scales , only if the aircraft is in flight.

For more information on the crosswind mode, *Refer to DSC-31-60-20-150 Crosswind Mode* .

HUD Brightness knob



When turned, turns the HUD on or off, and adjust its brightness.

Declutter pb

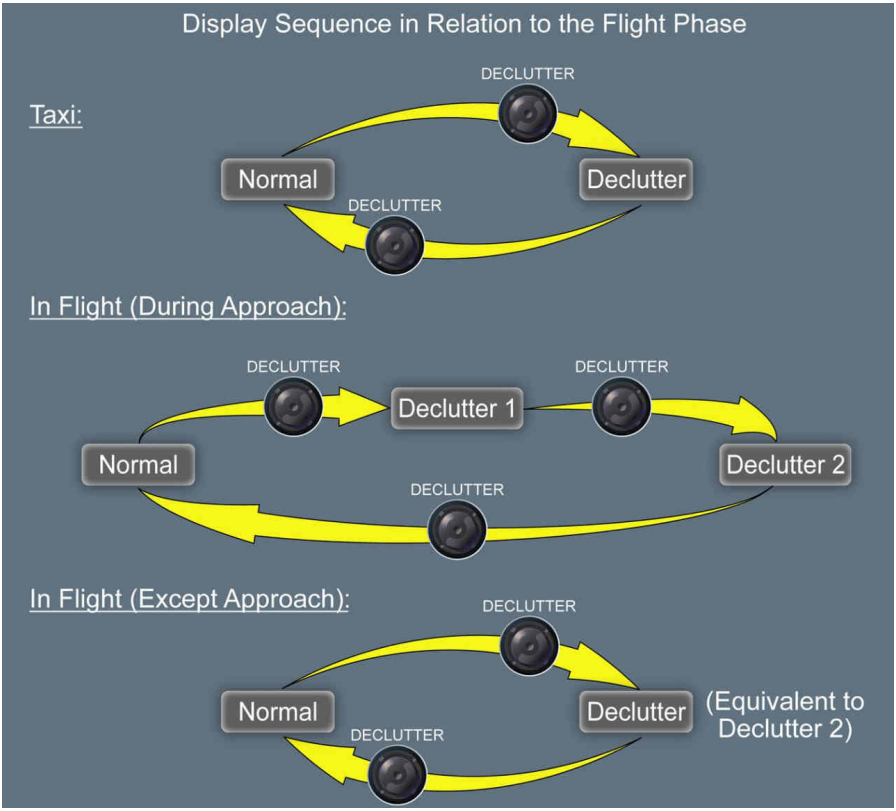
L12



The flight crew presses the DECLUTTER pb to reduce the HUD display.

The DECLUTTER pb changes the display, if HUD is in:
- Taxi phase, or
- Flight phase.

For more information on the declutter modes, *Refer to DSC-31-60-20-150 Declutter Modes* .


Display Sequence in Relation to the Flight Phase
Taxi:
DECLUTTER
Normal
Declutter
DECLUTTER
In Flight (During Approach):
DECLUTTER
DECLUTTER
Declutter 1
Normal
Declutter 2
DECLUTTER
In Flight (Except Approach):
DECLUTTER
Normal
Declutter
(Equivalent to Declutter 2)
DECLUTTER

NORMAL OPERATIONS

Applicable to: ALL

In normal operations, the HUD has two positions:

- Fully deployed and locked
  The HCU is in the flight crew's field of view, and the HUD displays the symbols.
- Stowed.
  The HCU is retracted, and the HUD does not display any symbol.

For more information on how to use the HUD, *Refer to FCTM/SI/Use of HUD*.

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ABNORMAL OPERATIONS

Applicable to: ALL

The HUD has two abnormal positions:

- Partly deployed and unlocked
  The HCU is in the flight crew's field of view. The HCU displays the COMBINER UNLOCKED message.
- Breakaway position.
  When already deployed, the HCU automatically moves forward and upward, and remains locked in this position, when the flight crew inadvertently bumps the HCU.
  The breakaway position avoids a possible injury of the flight crew's head.

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ECAM ALERTS

Applicable to: ALL

NAV HUD FAULT (*Refer to procedure*)

NAV HUD FPV DISAGREE (*Refer to procedure*)

Intentionally left blank

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
HUD	HUD CAPT	AC 2

Intentionally left blank

GENERAL

Applicable to: ALL

There is a clock in the cockpit. It is on the main panel, and it provides the time-reference for the operation of applicable aircraft systems.
The clock displays the time in Coordinated Universal Time (UTC). It has a CHRonometer (CHR), and a function to measure the Elapsed Time (ET). In addition, the clock can display the date.

Cockpit View



ARCHITECTURE

Applicable to: ALL

The GPS provides the time and the date to the clock.

L3 The clock is connected to GPS 1.

L1 The clock provides the time-reference for the operation of the:

- Navigation systems

L2 The main user is the FMS

L1 - Communication systems

L2 The main user is the Air Traffic Control (ATC)

L1 - Flight data recorder and voice recorder systems

L2 The main users are the Digital Flight Data Recorder (DFDR) and the Cockpit Voice Recorder (CVR)

L1 - Permanent data display of the E/WD

L2 The Control and Display System (CDS) enables the permanent data display

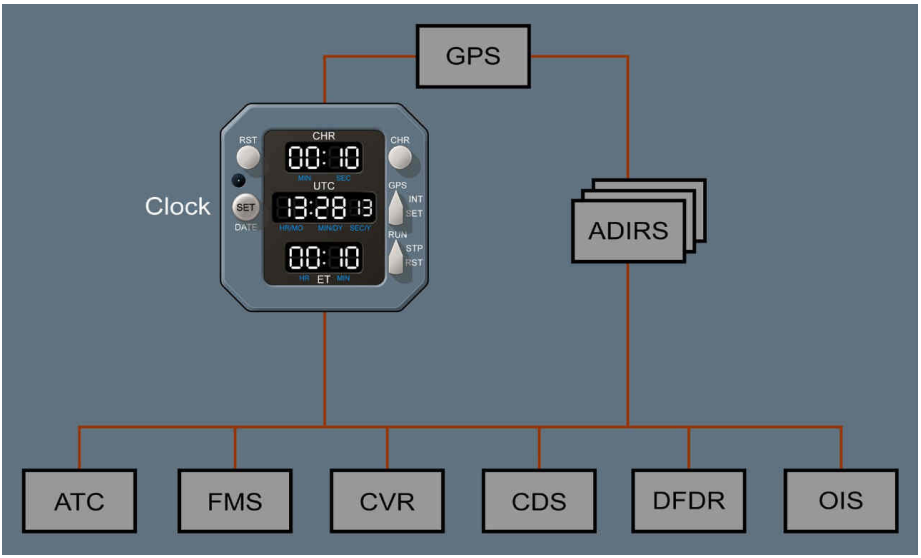
- On-board Information System (OIS).

L3 The clock provides the time-reference via two IOMs and the aircraft network.

L2 The ADIRS acts as a backup to the clock, when:

- The clock is set to SET
- The clock can no longer provide the time-reference.

Architecture



OPERATING MODES

Applicable to: ALL

The clock has two operating modes:
- GPS mode: The clock's time-reference is synchronized with the GPS.
- INT mode: The clock internally computes the time, and its time-reference is not synchronized with the GPS.

The flight crew can select the operating mode using the selector on the clock.
The standard operating mode is GPS mode. However, the clock can provide the time-reference to the various aircraft systems, in any mode.
The selected mode has no effect on the operation of the ET or the CHR.

GPS MODE

In GPS mode, the GPS continuously provides the clock with the UTC time and date.

L3 The GPS provides this data every second.

L2 If the clock does not receive a GPS signal, the clock internally computes the time and date automatically, by using the latest synchronized information it received.

L3 The internal clock deviates from the GPS by a maximum of one second every 24 h.

L2 When the GPS signal resumes, the clock automatically synchronizes with the GPS.

INT MODE

In INT mode, the clock internally computes the time and date.

The clock's internal time and date are based on:
- The latest information received from the GPS, or
- The manually-set time and date.

INT TIME AND DATE INITIALIZATION

Applicable to: ALL

The flight crew can manually set the time and date, by turning the operating mode selector to SET.

Operating Mode Selector



When the operating mode selector is set to SET, the seconds are blank, and the minutes flash to indicate that they can be changed:
- If the DATE/SET pb is turned clockwise, the minutes increase
- If the DATE/SET pb is turned counterclockwise, the minutes decrease
- When the DATE/SET pb is pressed, the values can be changed in the following order:

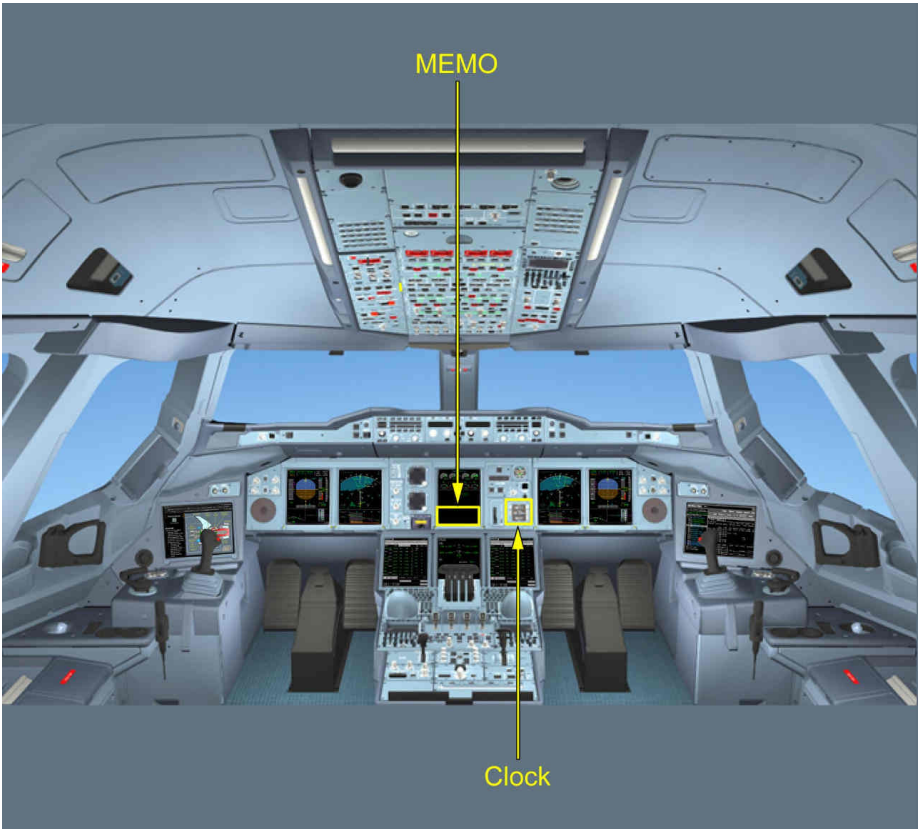
  • Hour
  • Year
  • Month
  • Day.

When the operating mode selector is set to INT, the clock starts and the seconds appear as “00”.

GENERAL

Applicable to: ALL

General



CLOCK

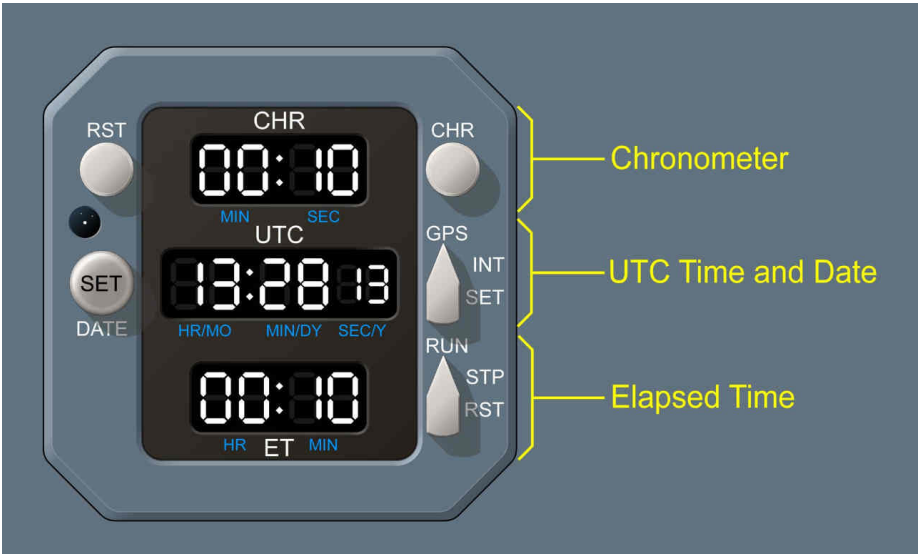
Applicable to: ALL

The clock digitally displays the:

- UTC Time as hours (HR), minutes (MIN), and seconds (SEC)
- Date as month (MO), day (DY), and year (Y)

- Elapsed Time (ET) as hours (HR), and minutes (MIN)
- CHRonometer (CHR) value as minutes (MIN), and seconds (SEC).

Clock



L2 BRIGHTNESS OF THE DISPLAY

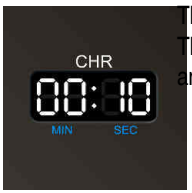
A photocell  , on the face of the clock, detects cockpit lighting. Then, the brightness of the display automatically adjusts to the cockpit lighting.

CHRONOMETER

Applicable to: ALL

CHRONOMETER (CHR) DISPLAY

L12



The chronometer time is in minutes and seconds.
The chronometer values range from 00 minutes and 00 seconds, to 99 minutes and 59 seconds.



The chronometer is reset, and is not running.

CHR pb



When pressed, starts the chronometer.
When pressed again, stops the chronometer.
When the chronometer stops, it displays the latest value. This value remains displayed until the chronometer is reset.

RST pb



When pressed, and if the chronometer is stopped, the display resets.

UTC TIME AND DATE

Applicable to: ALL

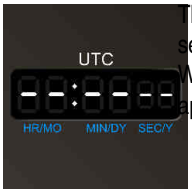
UTC TIME AND DATE DISPLAY

L12



Displays either the time in hours, minutes, and seconds, or the date in month, day, and year.
The UTC time values range from 00 hour, 00 minutes and 00 seconds, to 23 hours, 59 minutes and 59 seconds.
When the operating mode selector is set to SET, the flashing value indicates the value to be changed.

L13



There is no GPS signal at engine power-up, and the operating mode selector is set to GPS.
When the DATE/SET pb is pressed, the latest version (date) of the clock appears.



There is no GPS signal at engine power-up, and the operating mode selector is set to INT.

OPERATING MODE SELECTOR

The operating mode selector has three positions.
Two of these positions correspond to operating modes



GPS mode: The time and date synchronize with the GPS .



INT mode: The clock internally computes the time and date. (associated with memo *Refer to CLOCK INT .*



SET: The flight crew manually sets the time and date.

DATE/SET pb



If the operating mode selector is set to GPS or INT:
- When the DATE/SET pb is pressed, and until it is released, the date appears.

If the operating mode selector is set to SET:
- When the DATE/SET pb is pressed, it selects the time or date to be changed the selected value will flash
- If the DATE/SET pb is turned clockwise, the selected value increases
- If the DATE/SET pb is turned counterclockwise, the selected value decreases.

ELAPSED TIME

Applicable to: ALL

ELAPSED TIME (ET) DISPLAY

L12



The ET is in in hours and minutes.
The ET values range from 00 hours and 00 minutes, to 99 hours and 59 minutes.



The ET is reset, and is not running.

ELAPSED TIME (ET)SELECTOR



The counter starts.



The counter stops.
The latest ET value is displayed, and remains until reset.



The counter resets.
When the ET selector is released, it returns to STP.

MEMO

Applicable to: ALL

CLOCK INT	the operating mode selector is manually set on INT. The memo should guide the flight crew to set the operating mode selector back on GPS position.

Intentionally left blank

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Clock	N/A	DC ESS
	N/A	HOT BUS 1

Intentionally left blank

OVERVIEW

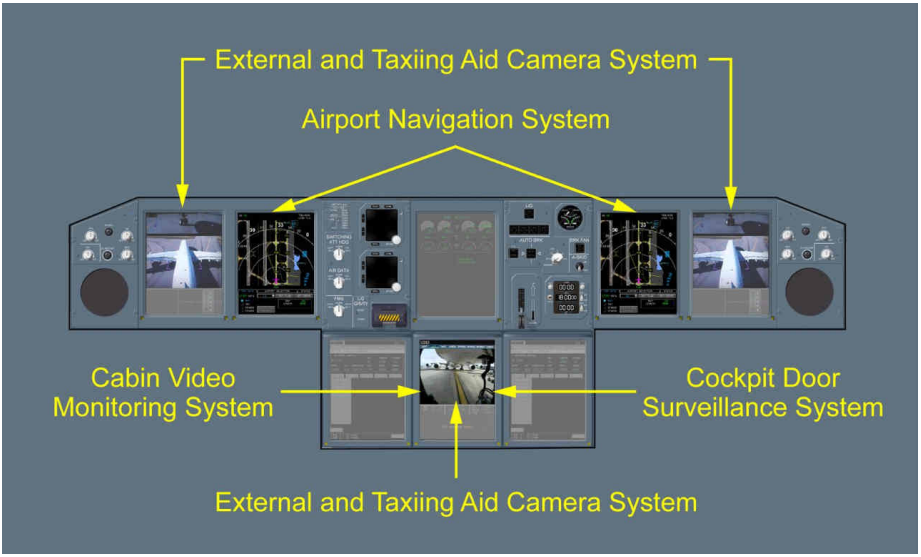
Applicable to: ALL

The Concentrator and Multiplexor for Video (CMV) enables videos, provided by different systems, to be displayed on some display units.

The CMV has the following two main functions:
- Adapts the video format of all aircraft videos to the format of the applicable display units
- Enables the flight crew to select the video system to be displayed on the applicable display units.

The CMV manages the following video systems:
- The External and Taxiing Aid Camera System (ETACS)
- The Airport Navigation System (Airport NAV)
- The Cabin Video Monitoring System (CVMS)
- The Cockpit Door Surveillance System (CDSS).

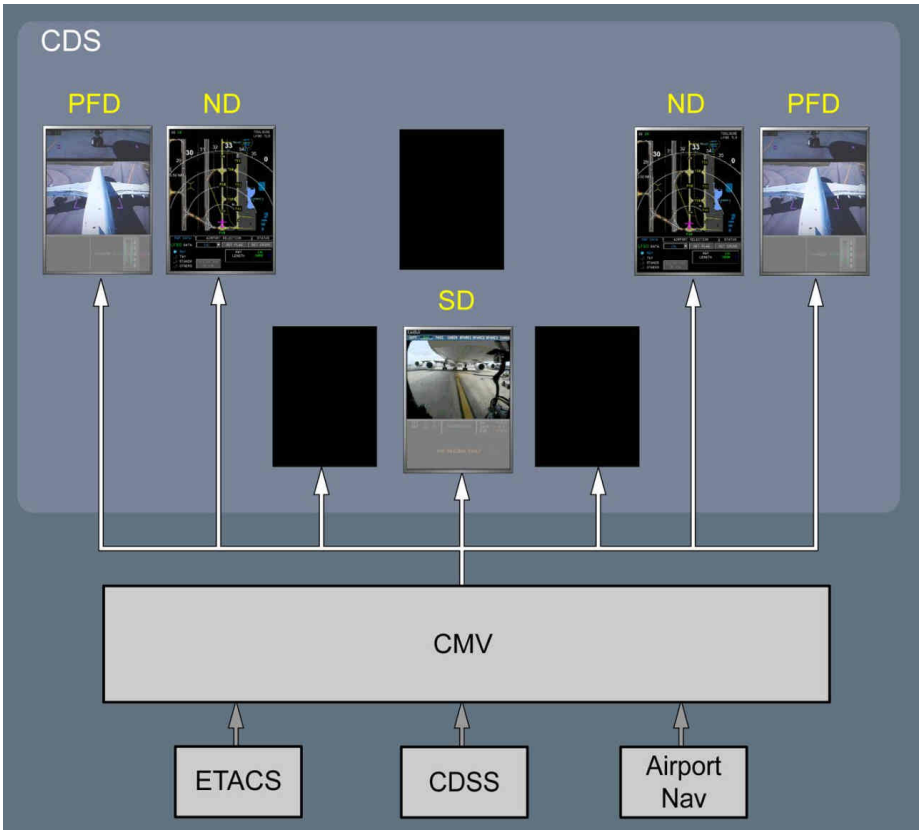
CMV



ARCHITECTURE

Applicable to: ALL

CMV Architecture



CMV

The Concentrator and Multiplexer for Video (CMV) :

- Manages the following systems:
  - The External and Taxiing Aid Camera System (ETACS)
  - The Airport Navigation System (Airport NAV)
  - The Cockpit Door Surveillance System (CDSS).
- Displays the video on the applicable Display Units (i.e. ND , PFD , or SD)

L2 In the case of a video failure, the corresponding part of the display is black (*Refer to 00023562 **Not found** *).

L1 - Manages the display priority of video systems.

L2 When the flight crew presses the VIDEO pb on the ECAM Control Panel, the CMV displays the last selected video image.
If the cabin crew requests a cockpit access, the CMV automatically displays as a priority the video image from CDSS on the SD .

L12

Note: *Depending on the situation (e.g. flight phase, current SD page), the CDS and the FWS can prevent the display of the video image.*
This priority management ensures that the flight crew can rapidly access to the relevant video image in accordance with the flight situation.

PFD

The PFD displays the ETACS videos.

ND

The ND displays the moving airport map of the Airport NAV.

SD

The VIDEO SD page displays video images from:

- The CDSS
- The ETACS

EXTERNAL AND TAXIING AID CAMERA SYSTEM

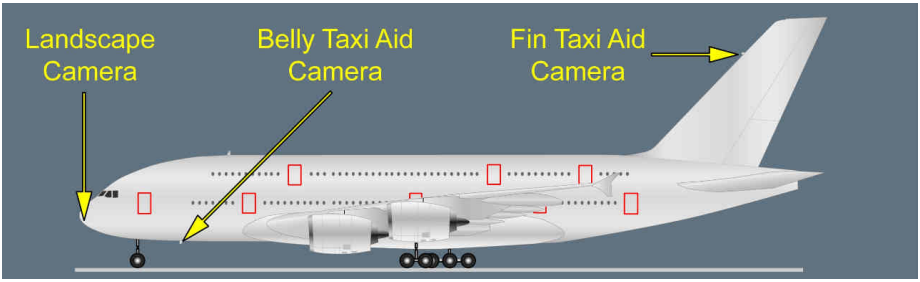
Applicable to: ALL

The ETACS provides the flight crew with an external view of the aircraft, in order to make taxiing easier. There are two cameras on the exterior of the aircraft that provide the external view of the aircraft in the cockpit.

These cameras are:
- The Fin Taxi Aid Camera (FTAC)
- The Belly Taxi Aid Camera (BTAC).

Note: *There is also a landscape camera that enables to display forward external views of the aircraft for passengers.*
The flight crew can inhibit live video images transmission from this camera by using the LANDSCAPE CAMERA pb.

ETACS Cameras



The FTAC and BTAC help the flight crew:
- To taxi the aircraft on the runway/taxiway centerline
- To evaluate the margin between the landing gear and the runway/taxiway edge for any maneuvers (e.g. a 180 ° turn).

The live video images from FTAC and BTAC can be displayed on:
- The PFDs, when the aircraft is on ground and the speed below 60 kt
- The SD, on ground or in flight.

The live video images from FTAC and BTAC are displayed as follows:

- The top 1/3 of the display provides the video from the BTAC
  Two squares, one on each side of the Nose Landing Gear (NLG), indicate a lateral 5 m distance from the NLG.
- The bottom 2/3 of the display provides the video from the FTAC.
  A position indicator on each side of the Main Landing Gear (MLG) indicates the outer edge of the MLG and helps the flight crew to determine the landing gear position in relation to the runway centerline.

ETACS Display



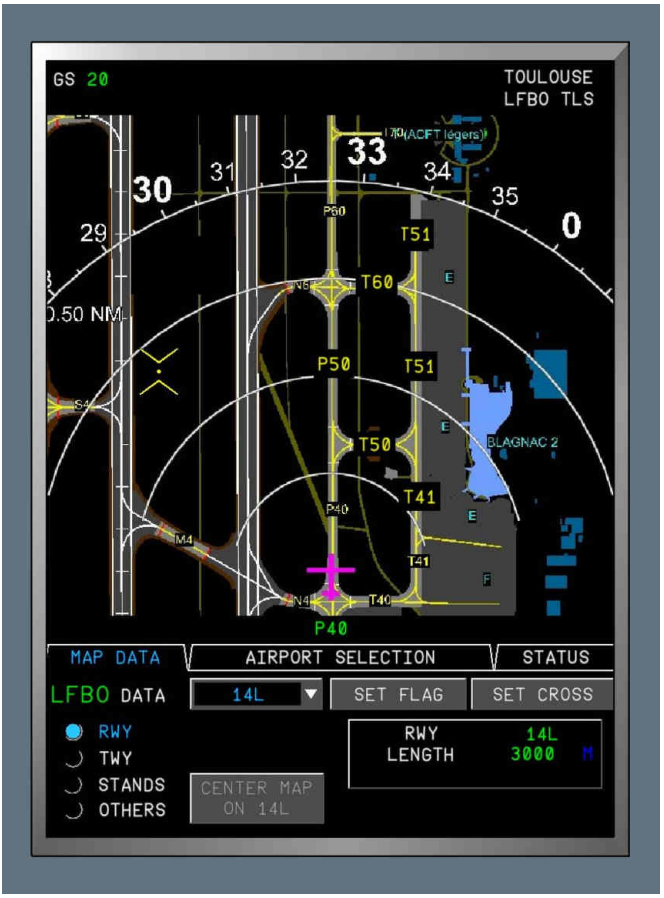
The FTAC is also connected to the IFE that enables to display the live video images from FTAC for passengers. The flight crew can inhibit live video images transmission from FTAC by using the LANDSCAPE CAMERA pb.

AIRPORT NAVIGATION SYSTEM

Applicable to: ALL

The Airport Navigation System (Airport NAV) enables the flight crew to visualize the aircraft's location, in relation to a moving airport map.
The Airport NAV is displayed on the Captain and/or F/O ND , by using the range selector of the onside EFIS Control Panel (*Refer to DSC-31-80-20-20 ND Range Selector*).

Airport NAV Display



For more information, *Refer to Airport NAV Description* .

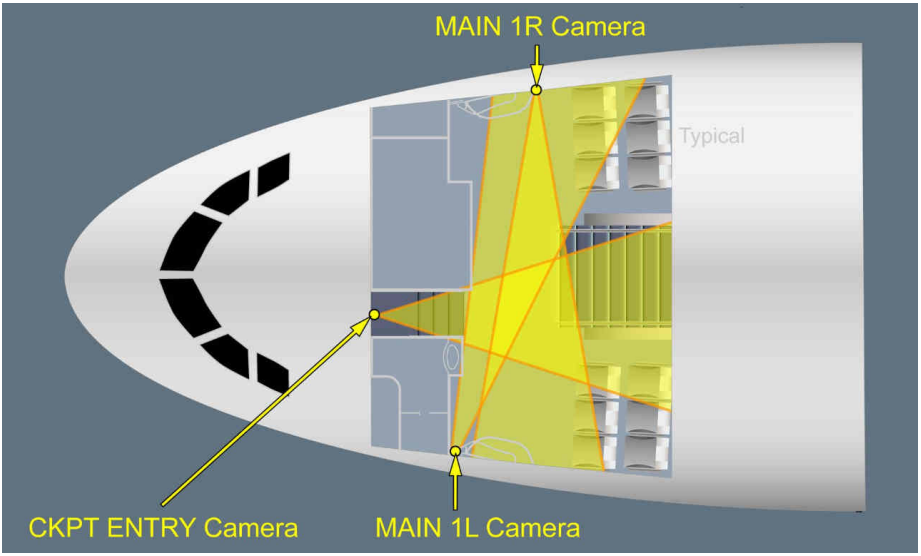
COCKPIT DOOR SURVEILLANCE SYSTEM

Applicable to: ALL

The Cockpit Door Surveillance System (CDSS) enables the flight crew to identify who is requesting entry to the cockpit, before authorizing (or not) their access.

The CDSS has three cameras:
- The CKPT ENTRY camera to monitor the area in front of the cockpit door
- The MAIN 1R camera and the MAIN 1L camera to monitor the cross-aisle between the M1R and M1L doors.

CDSS camera location



The video images from these three cameras appear on the SD (i.e. on the VIDEO SD page), in one of the following views :
- A full image of CKPT ENTRY camera, or
- Two separate images of the MAIN 1R camera and the MAIN 1L camera.

Video SD Page



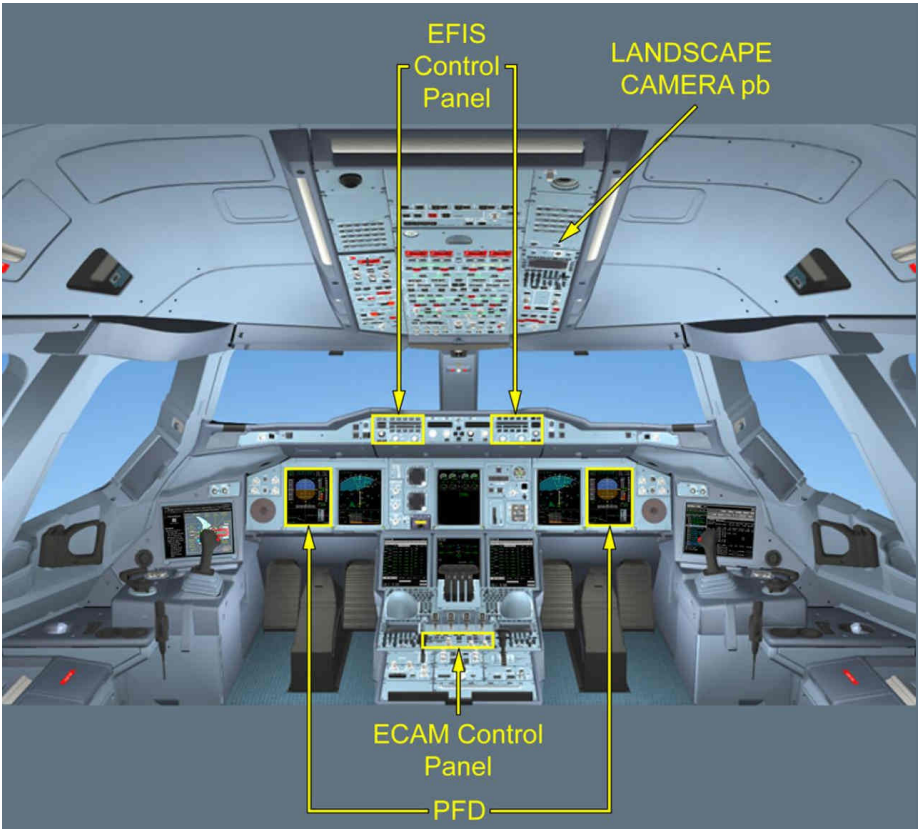
The SD automatically displays the video image of the CKPT ENTRY camera, if:
- The emergency cockpit access is requested, or
- In flight, the routine cockpit access is requested, and the ECAM displays the CRUISE page.

The flight crew can also display the CDSS images without a request for cockpit access. For more information, *Refer to 00007420 **Not found***).

OVERVIEW

Applicable to: ALL

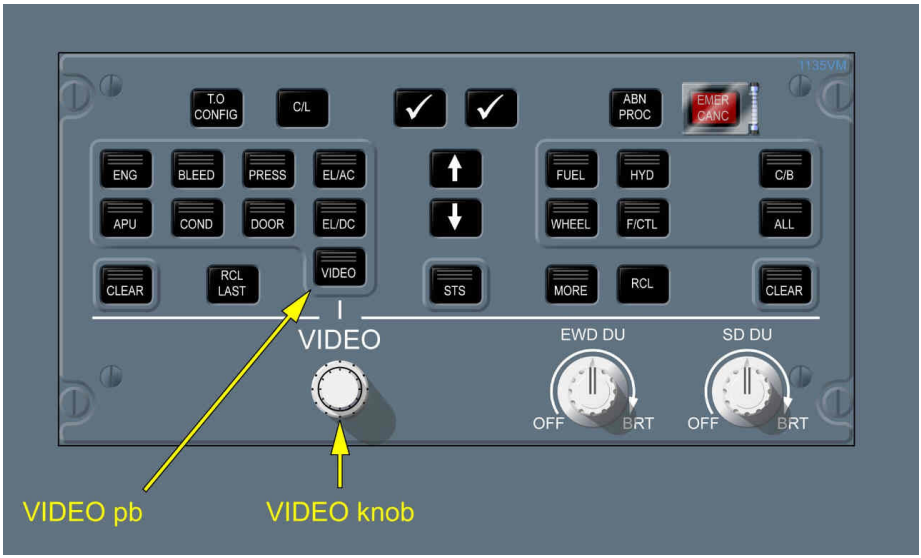
Controls and Indicators



ECAM CONTROL PANEL

Applicable to: ALL

ECAM Control Panel



Video pb



The SD does not displays VIDEO page.



The SD displays the VIDEO page.

VIDEO knob

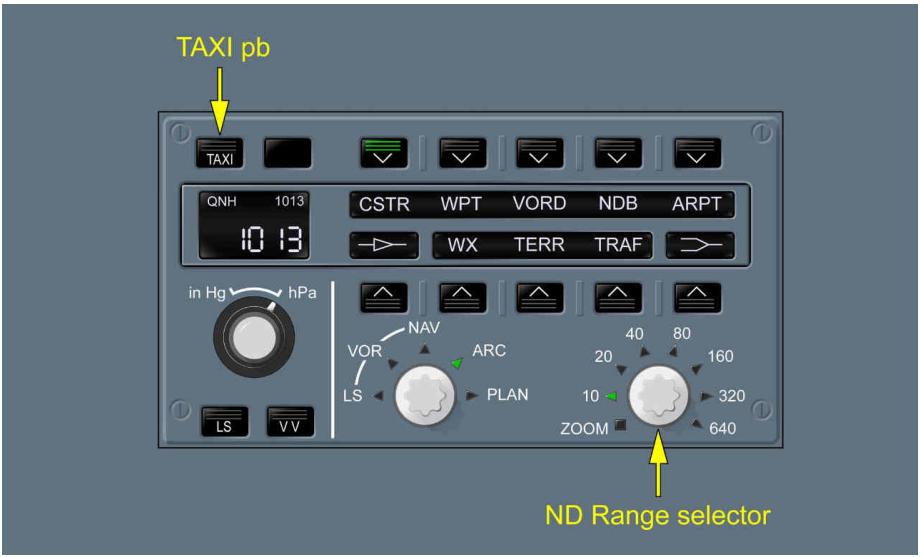


The outer part of the VIDEO knob enables the flight crew to select a different video system to be displayed on the SD.
The inner part of the VIDEO knob enables the flight crew to select a video camera, as applicable.

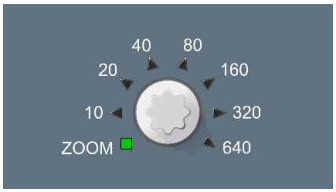
EFIS CONTROL PANEL

Applicable to: ALL

EFIS Control Panel



ND Range selector



The onside ND displays the moving airport map of the Airport NAV.

Taxi pb



The onside PFD does not display the ETACS videos.

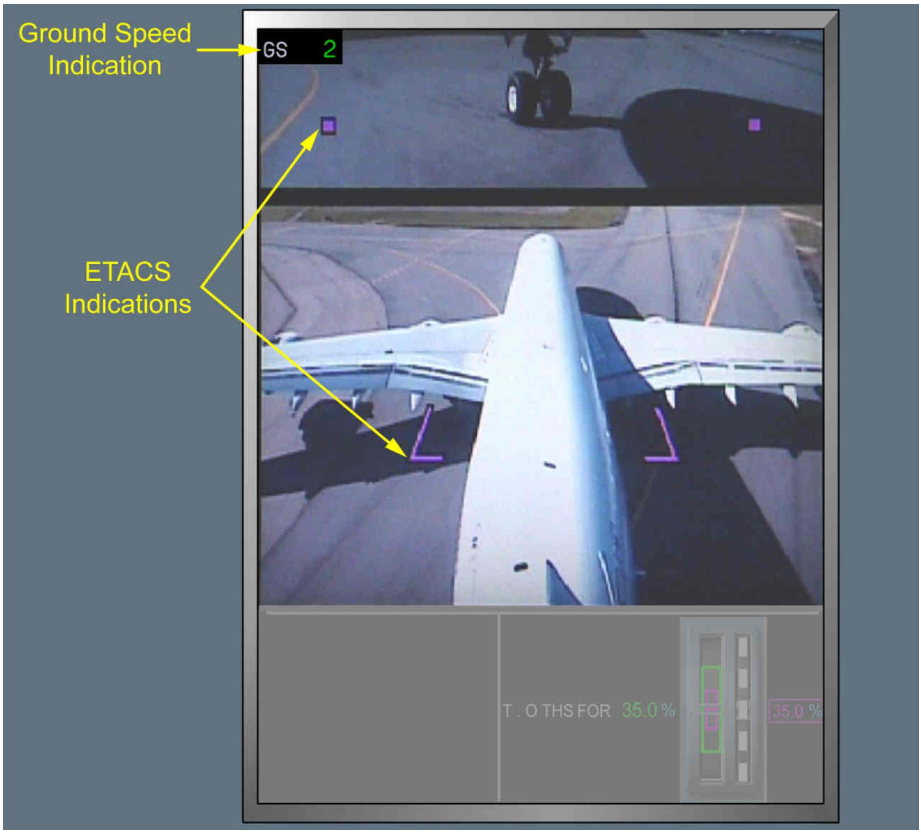


The onside PFD displays the ETACS videos.

PFD

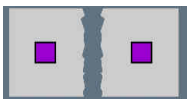
Applicable to: ALL

PFD



Note: *The same information can be displayed on the SD VIDEO page.*

ETACS INDICATIONS



These squares indicate:
- The starting points for performing a nosewheel steering maneuver, in order to guide the flight crew in turning the aircraft
- A lateral distance of 5 meters from the Nose Landing Gear (NLG).



These lines indicate:
- The position of the Main Landing Gear (MLG), in order to guide the flight crew in the case of reduced visibility
- The left and right outer edges of the MLG.

GROUND SPEED INDICATION



No ground speed data is transmitted.



The ground speed data is not valid.



Indicates the ground speed.

LANDSCAPE CAMERA PB-SW

Applicable to: ALL



Normal position.
The In-Flight Entertainment (IFE) system receives live video images from the landscape camera and the Fin Taxi Aid Camera (FTAC).



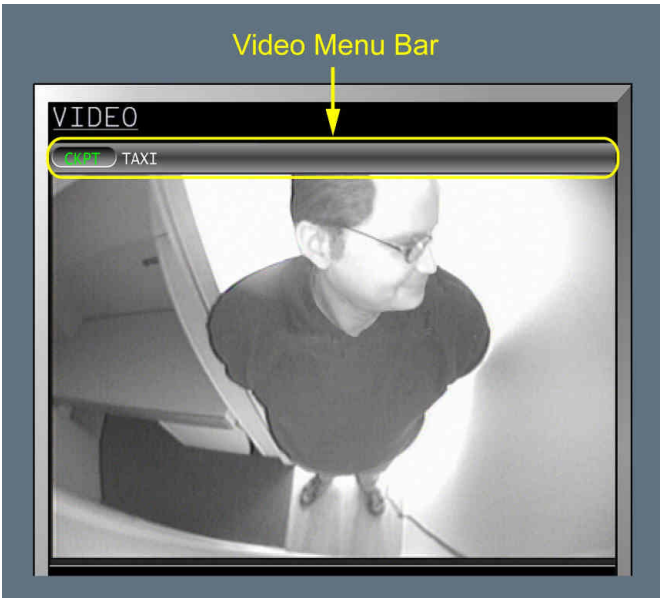
When pressed the transmission of live video from the landscape camera and the FTAC on the IFE is shut off.

VIDEO SD PAGE

Applicable to: ALL

A video menu bar indicates the video system selection:
- CKPT indicates the CDSS selection
- TAXI indicates the ETACS selection.

Video Menu Bar



VIDEO MESSAGES

Applicable to: ALL

L12

PLEASE WAIT — The video display is not ready
This message may appear for a short period of time, when the video synchronizes.

L12

NOT AVAIL — The video display is not available
When the video display is a combination of several videos, this message does not appear in the case of video failure.

ECAM ALERTS

Applicable to: ALL

VIDEO MULTIPLEXER FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Electrical Supply
CMV	28 V DC1

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OVERVIEW

Applicable to: ALL

There are two recorders systems:

- The Flight Data Recording System (FDRS) that records all flight parameters
- The Cockpit Voice Recorder System (CVRS) that records all the conversations and sounds in the cockpit.

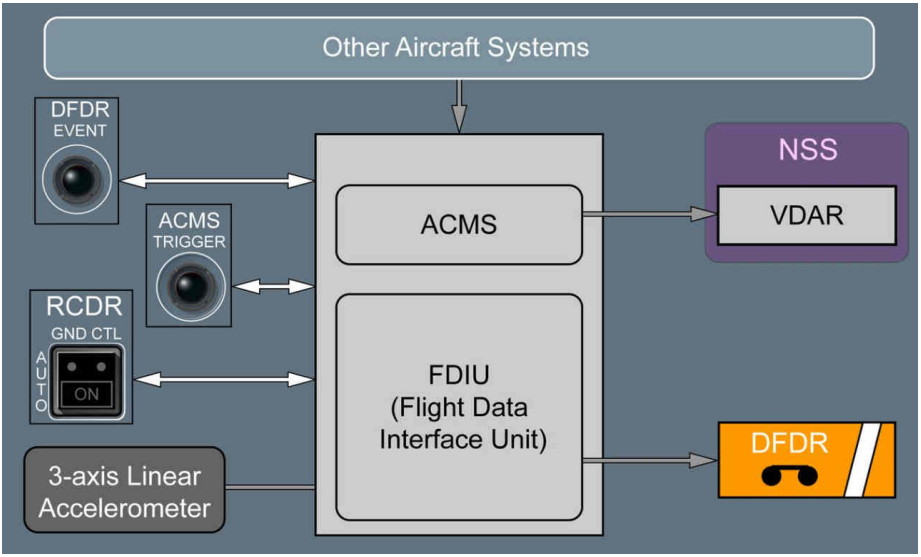
FLIGHT DATA RECORDING SYSTEM (FDRS)

Applicable to: ALL

The Flight Data Recording System (FDRS) records all mandatory flight data parameters on:

- The Digital Flight Data Recorder (DFDR)
- The Virtual Digital ACMS Recorder (VDAR)

FDRS Architecture

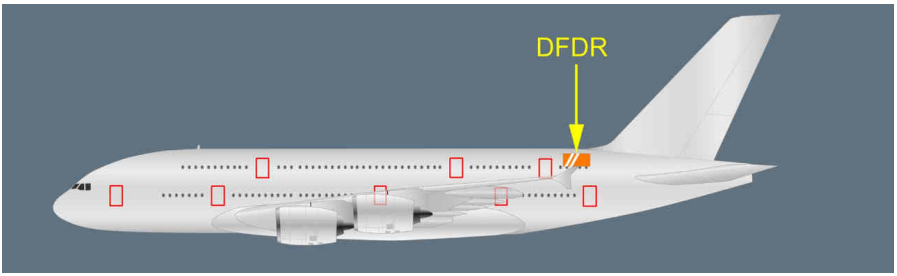


DIGITAL FLIGHT DATA RECORDER

The DFDR records flight parameters and data from various aircraft systems.

L3 The DFDR stores the data supplied in a crash protected memory (this memory keeps all the recorded data for at least the last 25 h of its operation). An underwater locator beacon is attached to the DFDR .

DFDR Location



L1 The flight crew uses the DFDR EVENT pb to point an event in the recorded data, *Refer to DFDR EVENT pb* .

VIRTUAL DIGITAL ACMS RECORDER (VDAR)

The VDAR receives a copy of all the data recorded by the ACMS.

L3 The VDAR is on the Network Server System (NSS) and stores the data sent by the ACMS on a hard disk (this memory keeps all the recorded data for at least the last 16 h of its operation). The Operator can customize the recorded parameters.

LINEAR 3-AXIS ACCELEROMETER

The accelerometer provides longitudinal, vertical, and lateral aircraft acceleration data to the recorder.

AIRCRAFT CONDITIONING MONITORING SYSTEM (ACMS)

The ACMS function provides a real-time monitoring of the aircraft parameters.

The ACMS can generate system reports, that can be:

- Printed: Automatically or via the ACMS TRIGGER pb on the pedestal (*Refer to ACMS TRIGGER pb)* , and/or
- Sent via ACARS or Gatelink, and/or
- Stored on the NSS .

L3 Default ACMS reports and triggering conditions are available at aircraft delivery. The Operator can customize the content and the triggering conditions of the reports.

FLIGHT DATA INTERFACE UNIT (FDIU)

The FDIU performs the following functions:

- Acquires avionics data and processes parameters from peripheral systems such as: FMS, FCDC, FQMS, HSMU, FWS, FADEC, LGERS, the Clock and other systems before storage in the DFDR

L3 Transmits parameters and data via the aircraft network. The following systems use ARINC 429 data buses: ADIRS, PRIM, FWS, MMR (as a backup).

L1 • Provides the CVR with UTC time reference from the clock in order to synchronize the recordings

COCKPIT VOICE RECORDER SYSTEM (CVRS)

Applicable to: ALL

The cockpit Voice Recording System (CVRS) records:

- All voice communication to and from the flight deck between the aircraft and any other station or aircraft.
- All voice communication between crew members
- All aural warnings
- The cockpit environment
- Datalink communication

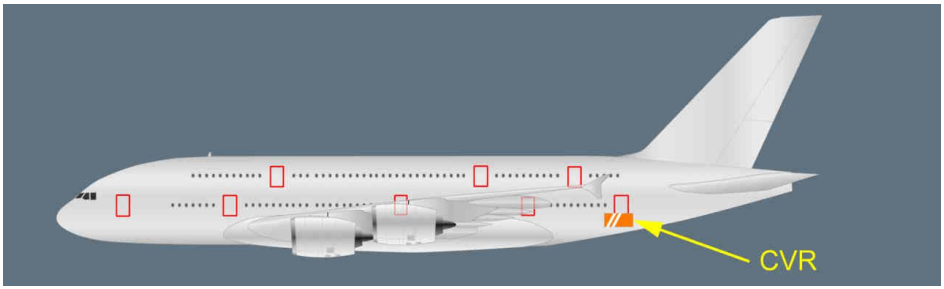
The CVRS records information from aircraft systems such as the FWS and communication system.

The CVRS has:

- A Cockpit Voice Recorder (CVR)
  The CVR stores all the audio and datalink communications.

L3 The CVR stores the data supplied in a crash protected memory (this memory keeps all the recorded data for at least the last 2 h of its operation). An underwater locator beacon is attached to the CVR.

CVR Location



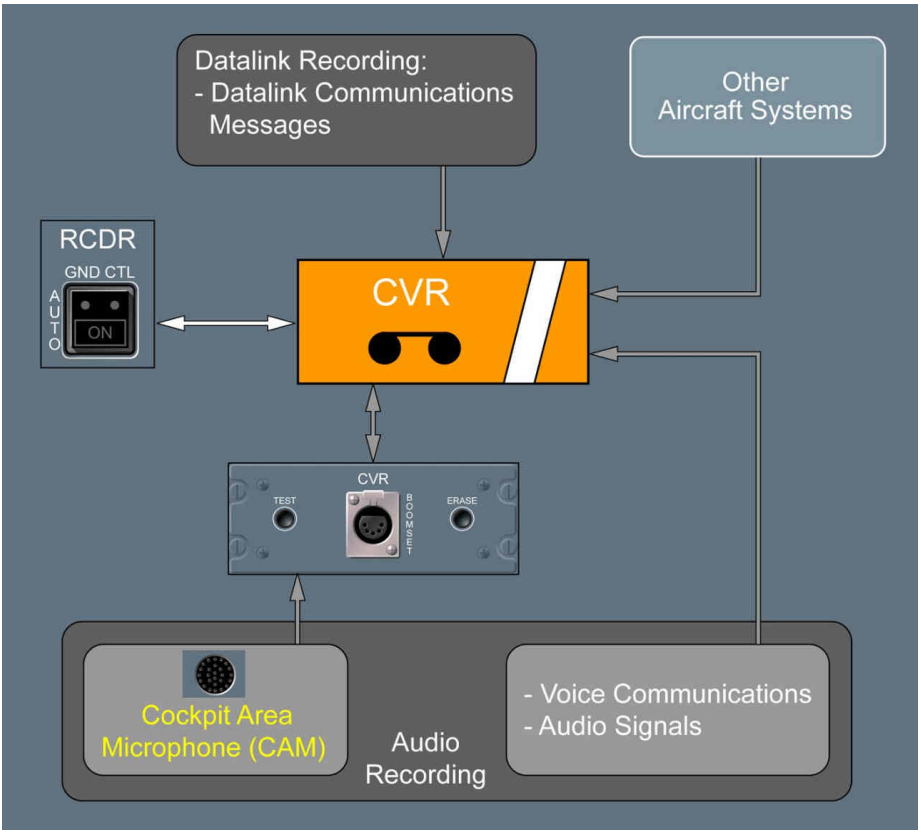
L1 - A Cockpit Area Microphone (CAM).
The CAM collects all cockpit sounds such as voice communications, aural warnings and all ambient noises.

L2 The CAM is above the standby compass at the bottom of the overhead panel.

L1 - A control panel, on the overhead panel
The flight crew uses this control panel to test the CVR, to erase the audio recording and to connect a boomset via a boomset jack.

- A RCDR GND CTL pb
  The flight crew uses this pushbutton to manually start and stop the recorder on ground, when all engines are shut down (provided that the aircraft is electrically powered)

CVR Architecture



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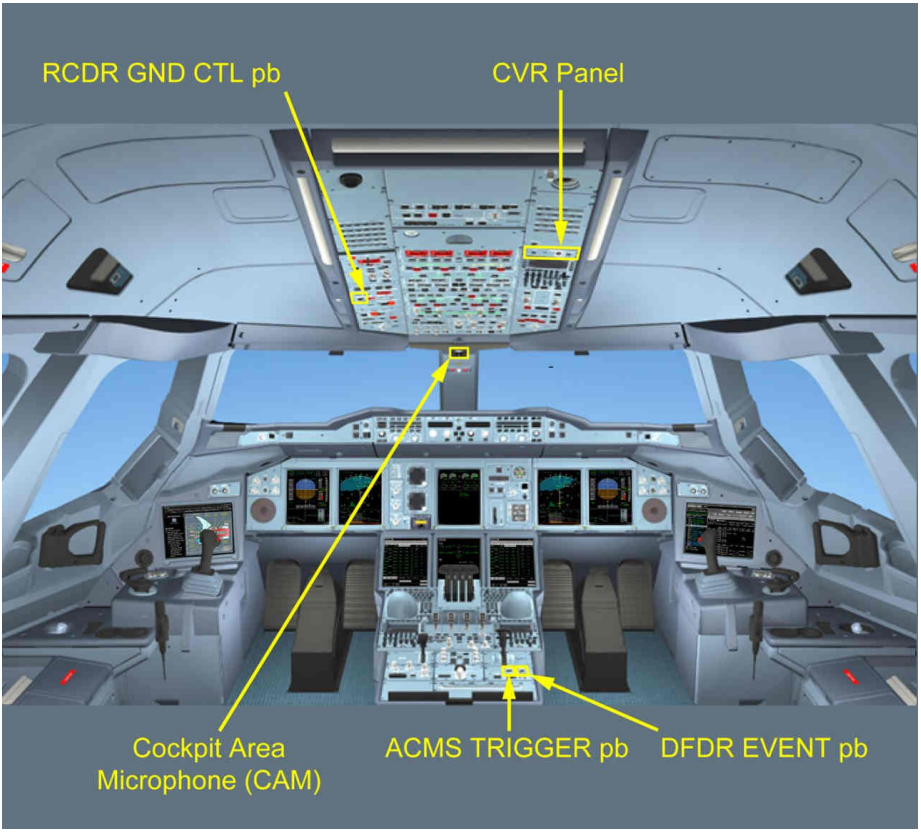
COCKPIT VIEW

Applicable to: ALL

Cockpit View



RCDR GND CTL PB

Applicable to: ALL

RCDR GND CTL Panel



RCDR GND CTL pb



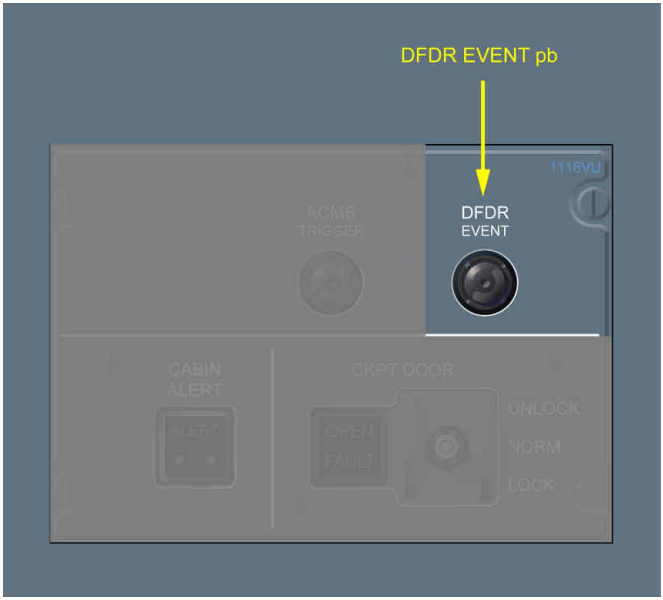
All recorders operate automatically.
For more details on recorders operations, *Refer to DSC-31-90-30 Overview*



The flight crew has manually started the recorders.
The system automatically switches from ON to AUTO, when the first engine is started.

DFDR EVENT PB

Applicable to: ALL



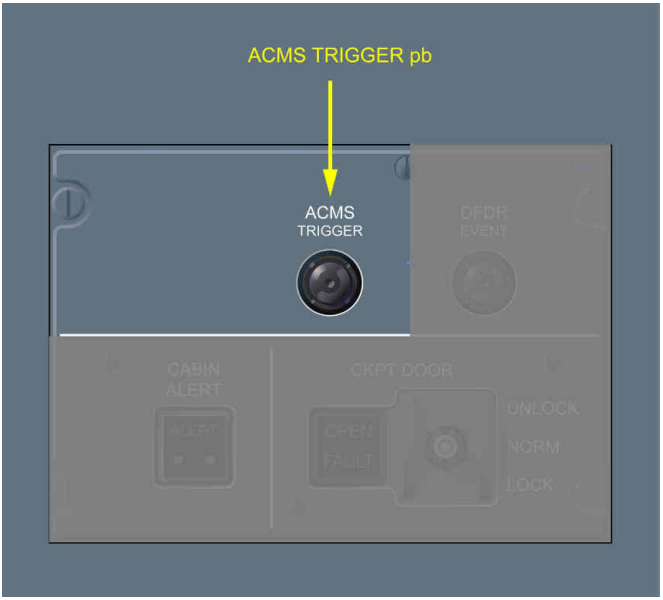
DFDR EVENT pb



When pressed, it points an event in the recorded DFDR data.

ACMS TRIGGER PB

Applicable to: ALL



ACMS TRIGGER PB

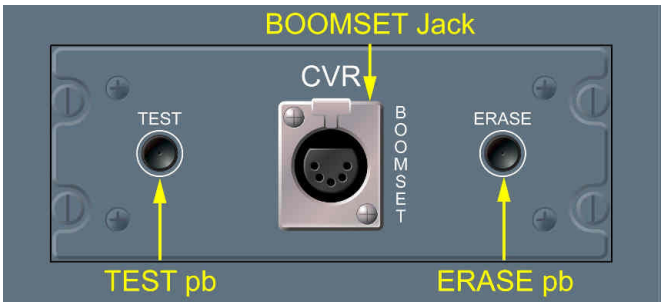
L13



When pressed, prints a specific ACMS report and/or triggers the recording of some specific parameters.
The Operator can customize the content and the triggering conditions of the ACMS reports.

CVR PANEL

Applicable to: ALL



Test pb

L123



When pressed, tests the CVR.
If a boomset is connected to the BOOMSET jack, the flight crew will hear a low frequency signal.
If the test is not successful, the ECAM triggers a RECORDER CVR FAULT alert 5 s after the pushbutton is pressed.
To perform this test, the recorder must be on.

ERASE pb

L123



When pressed for 2 seconds, the audio recording is erased, if the aircraft is on ground, and the parking brake is on.

Note: *Data recording cannot be erased.*

If a boomset is connected into the BOOMSET jack, the flight crew will hear a low frequency signal.
To erase audio recording, the recorder must be in use.

BOOMSET JACK



When a boomset is plugged in the BOOMSET jack:

- Cockpit sounds detected by the microphone are audible
- The test tone is audible, when the TEST pb is pressed
- The erase tone is audible, when the ERASE pb is pressed.

COCKPIT AREA MICROPHONE (CAM)

Applicable to: ALL



Records all the cockpit sounds.

OVERVIEW

Applicable to: ALL

The recording system operates automatically:

- On ground
  - During aircraft power up, the recording system will run for 5 minutes then stop
  - As soon as the first engine is started, the recording system will run and continue to record until 5 minutes after the last engine is shut down.
- In flight (with or without engines operative).

The flight crew can use the RCDR GND CTL pb to start or stop the recorders.
It is not possible to stop the recorders in flight.

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ECAM ALERTS

Applicable to: ALL

RECORDER ACCELMTR FAULT *Refer to Procedure*

RECORDER CVR FAULT *Refer to Procedure*

RECORDER DFDR FAULT *Refer to Procedure*

RECORDER SYS FAULT *Refer to Procedure*

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ELECTRICAL SUPPLY

Applicable to: MSN 0059-0075

L13

System	Subsystem	Electrical Supply
Flight Data Recording System (FDRS)	Digital Flight Data Recorder (DFDR)	AC ESS
	3-Axis Linear Accelerometer	DC ESS
	Flight Data Interface Unit (FDIU)	DC ESS
Cockpit Voice Recorder System (CVRS)	Cockpit Voice Recorder (CVR)	DC ESS or DC 1
	Cockpit Voice Recorder CTL	DC ESS

ELECTRICAL SUPPLY

Applicable to: HL7611, HL7612

L13

System	Subsystem	Electrical Supply
Flight Data Recording System (FDRS)	Digital Flight Data Recorder (DFDR)	AC ESS
	3-Axis Linear Accelerometer	DC ESS
	Flight Data Interface Unit (FDIU)	DC ESS
Cockpit Voice Recorder System (CVRS)	Cockpit Voice Recorder (CVR)	DC ESS
	Cockpit Voice Recorder CTL	DC ESS

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AIRCRAFT SYSTEMS

32 - LANDING GEAR

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OVERVIEW

Applicable to: ALL

The aircraft has:

- One Nose Landing Gear (NLG)
- Two Wing Landing Gears (WLG)
- Two Body Landing Gears (BLG)

The following systems are associated with the landing gear:

- The Landing Gear Extension and Retraction System (LGERS)
- The braking system
- The steering system
- The Tire Pressure Indicating System (TPIS)
- The Brake Temperature Monitoring System (BTMS)
- The Oleo Pressure Monitoring System (OPMS).

Landing Gear - General

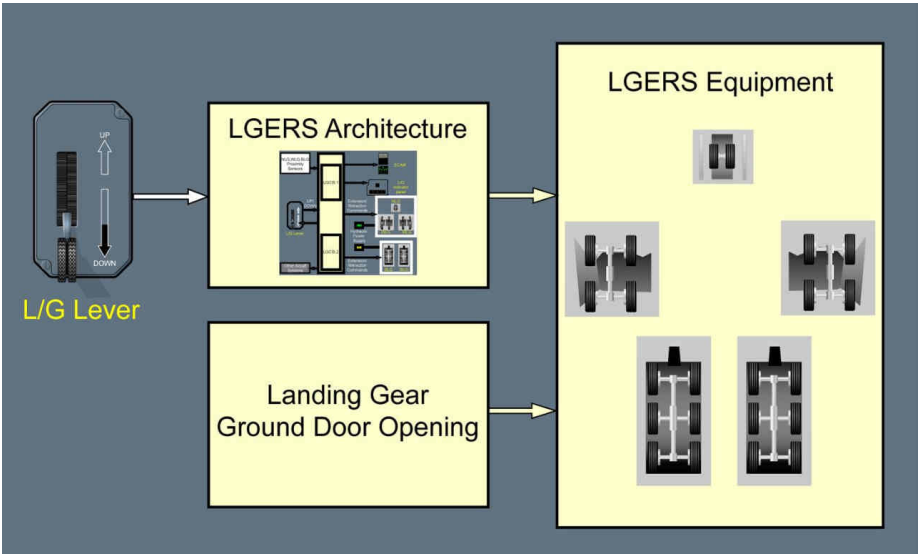


OVERVIEW

Applicable to: ALL

In normal operation, the flight crew selects the extension/retraction of the landing gear, via the landing gear lever.
The Landing Gear Extension Retraction System (LGERS) uses hydraulic power to actuate the landing gear, and the landing gear doors.

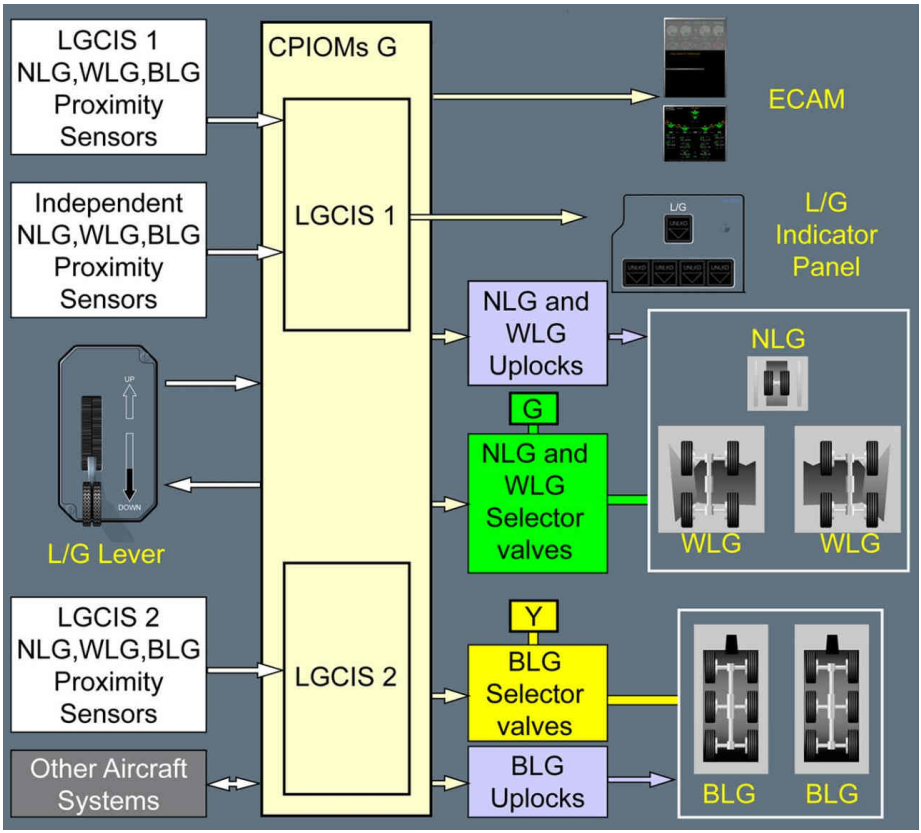
Overview



ARCHITECTURE

Applicable to: ALL

Architecture



LANDING GEAR CONTROL AND INDICATION SYSTEM (LGCIS)

The Landing Gear Control and Indication System (LGCIS) controls the LGERS and has two redundant control systems referred to as LGCIS 1 and LGCIS 2.

One LGCIS is active and controls the LGERS , while the other is a backup.

L2 The backup LGCIS activates automatically if the active LGCIS fails.

L3 The active LGCIS also changes after each landing gear extension.

Both LGCIS are hosted by the CPIOM s G.

L1 When the flight crew sets the L/G lever to UP or DOWN, the active LGCIS generates and sends the appropriate electrical commands in sequence to:
- Retract and secure the landing gear in the retracted position (uplock), or
- Extend and secure the landing gear in the extended position (downlock).

L23

Note: *It takes about1 min to extend or retract the landing gear.*
The landing gear retraction is allowed only when all the initial conditions are satisfactory.
All gears are retracted simultaneously.

Initial conditions:
- *The NLG shock absorber is fully extended and nose wheel steering centred*
- *Both WLG shock absorbers are fully extended*
- *Both BLG shock absorbers are fully extended*
- *Both WLG bogies are in the dip position*
- *The BLG bogies are in the dip position.*

To cope with all possible in flight failures, the NLG and the WLG are extended first. After WLG downlock, the BLG extension proceeds.

For more information on the L/G retraction and extension sequences, *Refer to DSC-32-30-10-10 NLG Extension/Retraction* .

L2 For an extension or a retraction, the commands are sent to:
- The uplocks
- The selector valves of the landing gear doors actuators
- The selector valves of the landing gear extension/retraction actuators
- The downlocks (*Refer to DSC-32-10-20-20 Landing Gear Downlocks*).

L3 LANDING GEAR AND LANDING GEAR DOOR UPLOCKS

The uplocks maintain the landing gear in the retracted position and the landing gear doors in the closed position.

Each uplock has:
- A locking hook
- Two electrical actuators.
  One actuator is controlled by the active LGCIS.
  The other actuator is controlled by the Free Fall Control Modules (FFCMs) for landing gear gravity extension.

PROXIMITY SENSORS

The proximity sensors provide the LGCIS with landing gear position feedback.

L3 Each LGCIS has an assigned set of proximity sensors, and receives the following data:
- Landing gear uplocked, unlocked or downlocked
- Landing gear doors open or closed
- Shock absorber compressed or extended
- Bogies in flight or in ground position.

L1 The landing position data is send to:
- The ECAM for the generation of alerts and the display of the WHEEL system page
- The Primary Flight Display (PFD) for the landing gear position indication
- The L/G lever panel, for the red arrow indication
- The L/G indicator panel (only from LGCIS 1).

An independent set of downlock proximity sensors also provides LGCIS 1 with additional landing gear position feedback to turn on the L/G indicator panel lights.

L2 SELECTOR VALVES

There is one selector valve per extension/retraction actuator.
The selector valves control the hydraulic power that is supplied to the extension/retraction actuators.

HYDRAULIC POWER SUPPLY

The GREEN hydraulic system powers:
- The extension/retraction of the NLG and the WLG
L2 - The operation of the NLG and the WLG doors.

L1 The YELLOW hydraulic system powers:
- The extension/retraction of the BLG
L2 - The operation of the BLG doors.

Note: The LGERS is pressurized only during the extension and the retraction phases. At all other flight phases, the LGERS is isolated from hydraulic pressure.

L3 OTHER AIRCRAFT SYSTEMS

The LGCIS sends the ground/flight data to the following aircraft systems:
- The Aircraft Condition Monitoring System (ACMS)
- The Surveillance System
- The anti-ice system
- The Auto Flight System (AFS) to enable the engagement of the Autopilot 5 seconds after liftoff

- The Auxiliary Power Unit (APU)
- The braking system
- The steering system
- The Cockpit Voice Recorder (CVR)
- The communication system to inhibit the ground crew interphone connections in flight, and the HF transmission on the ground
- The Digital Flight Data Recorder (DFDR)
- The Doors and Slides Management System (DSMS)
- The electrical system
- The External Taxi Aid Camera System (ETACS)
- The fire protection system
- The Flight Control System (FCS) for the ground spoilers extension logic
- The Flight Management System (FMS) to the DONE flight phase
- The Flight Warning System (FWS)
- The fuel system
- The Full Authority Digital Engine Control (FADEC)
- The hydraulic system
- The lights system
- The Onboard Airport Navigation System (OANS)
- The oxygen system
- The air conditioning system
- The cabin pressurization system to control the pressurization cycle
- The bleed air system
- The ventilation system
- The water and waste system.

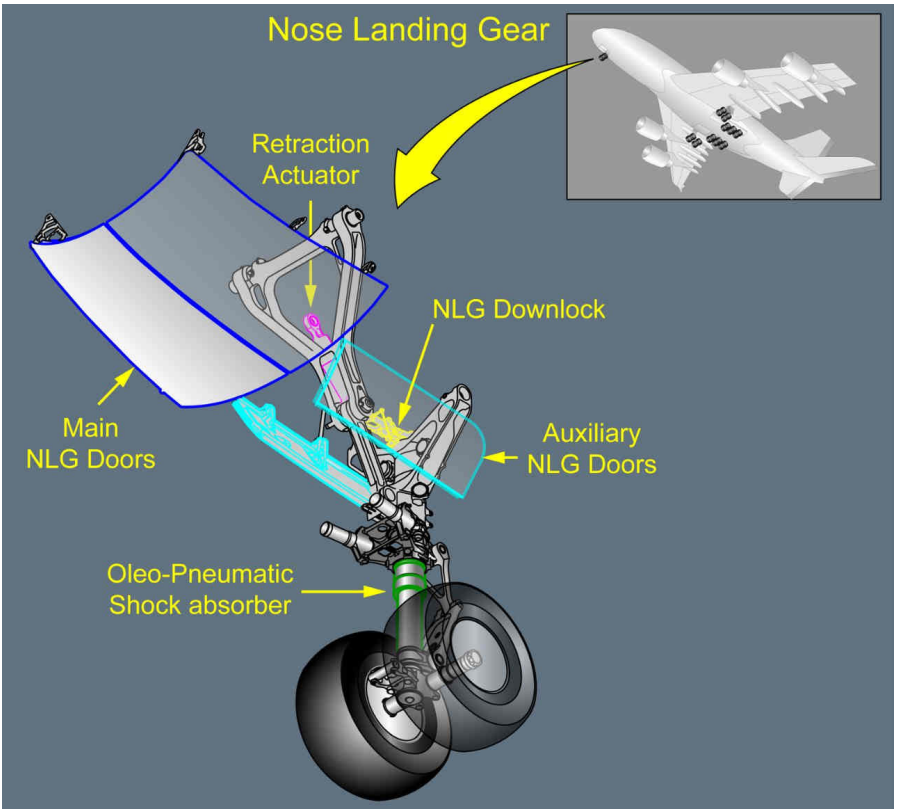
The LGCIS receives airspeed data from the ADIRS to inhibit the extension of the landing gear above 280 kt.

LANDING GEAR EXTENSION AND RETRACTION EQUIPMENT

Applicable to: ALL

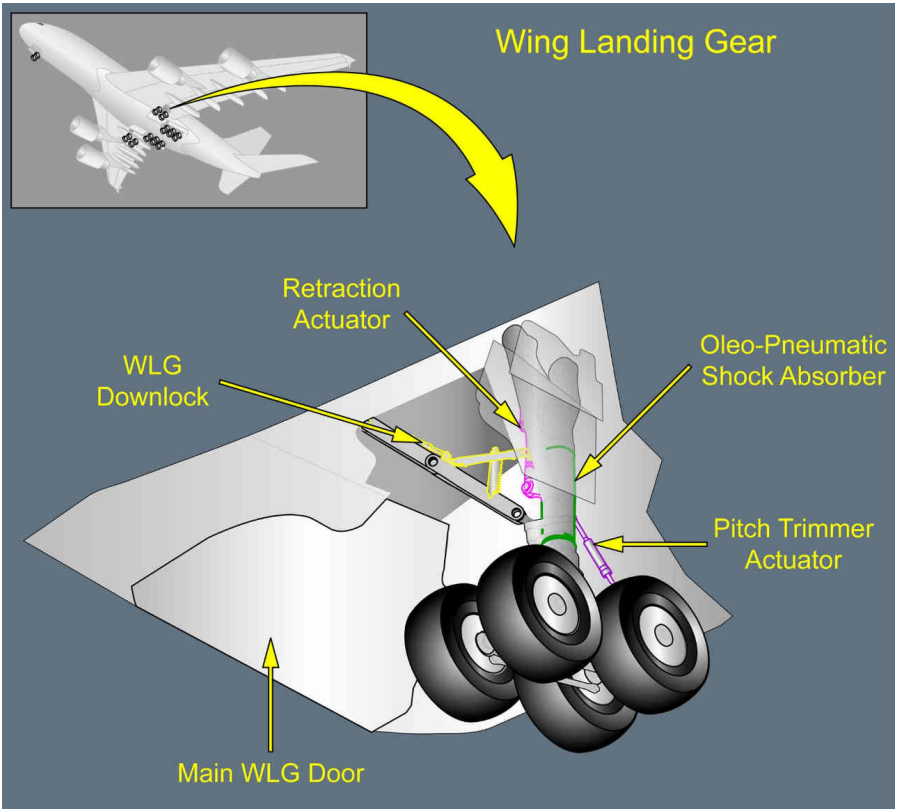
NOSE LANDING GEAR

Nose Landing Gear LGERS Equipment



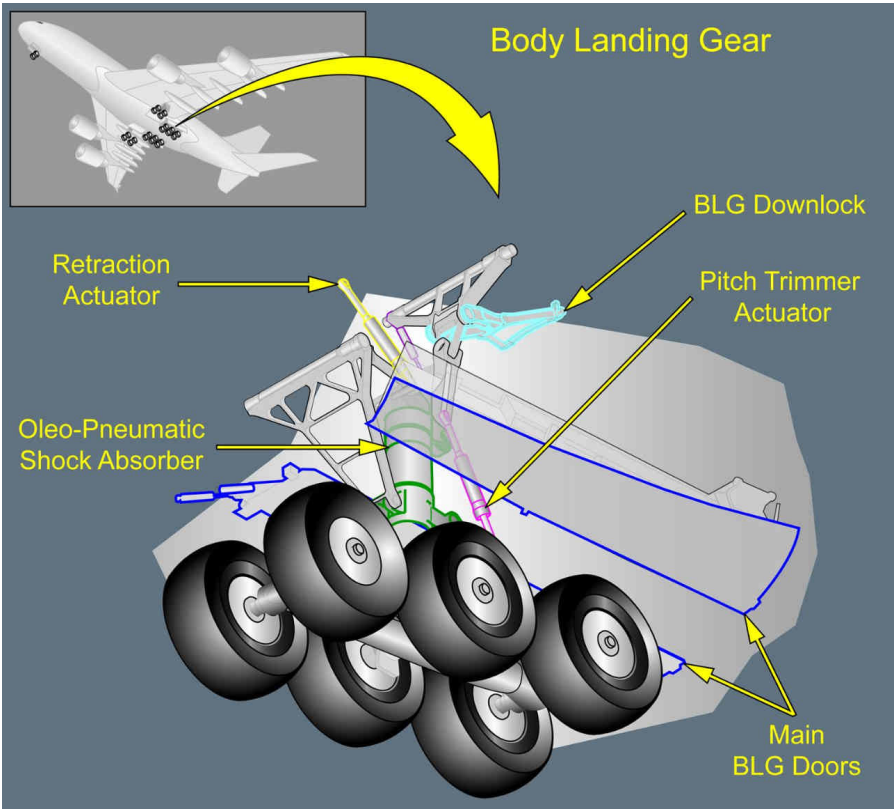
WING LANDING GEAR

Wing Landing Gear LGERS Equipment



BODY LANDING GEAR

Body Landing Gear LGERS Equipment



L3 PITCH TRIMMER ACTUATORS

When the aircraft is in flight, the pitch trimmer actuators maintain the WLG and BLG bogies in a pitch down attitude.
The 9 ° pitch down attitude is optimized for the stowage of the landing gear.
The hydraulic pressure in the pitch trimmer actuators is low. Therefore, when the aircraft is on the ground, the bogies are forced to the horizontal position by the weight of the aircraft.
The pitch trimmer actuators are the only gear retraction / extension hydraulic equipment permanently pressurized, including when gears are up.

LANDING GEAR DOWNLOCKS

The downlocks secure the landing gear in the extended position.

L3 The downlock is mechanical and is achieved via a downlock springs.

L1 When the aircraft is on the ground, locking pins are installed on each landing gear downlock to mechanically prevent the retraction of the landing gear.

LANDING GEAR GROUND DOOR OPENING

Applicable to: ALL

Only for special operation with aircraft on ground. For more information access to information level 2 and 3.

L2 For maintenance purposes, the landing gear doors can be opened and closed on the ground via the Ground Door Opening Levers (one per landing gear).

The landing gear doors open by gravity and need hydraulic pressure to be closed.

L3 The landing gear door opening needs the DC ESS electrical supply for door unlocking.

The landing gear door closing needs the LGCIS powered to command the closing sequence.

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Architecture

OVERVIEW

Applicable to: ALL

The braking system enables:

- Manual braking via flight crew action on:
  - The brake pedals
    Each brake pedal controls the brakes of its onside WLG and BLG
  - L2 The brake pedals, that are on the Captain (CAPT) and the First Officer (F/O) sides of the cockpit, are mechanically linked to each other.
  - L1 The PARK BRK handle.

L2 *Note:* *Manual braking is only available on ground.*

L1 - Automatic braking via:

- The basic autobrake (AUTO BRK)
- Brake To Vacate (BTV) function
- Runway Overrun Protection (ROP) function

L2 - Retraction braking that automatically decelerates the BLG and the WLG wheels, when the landing gear retracts.

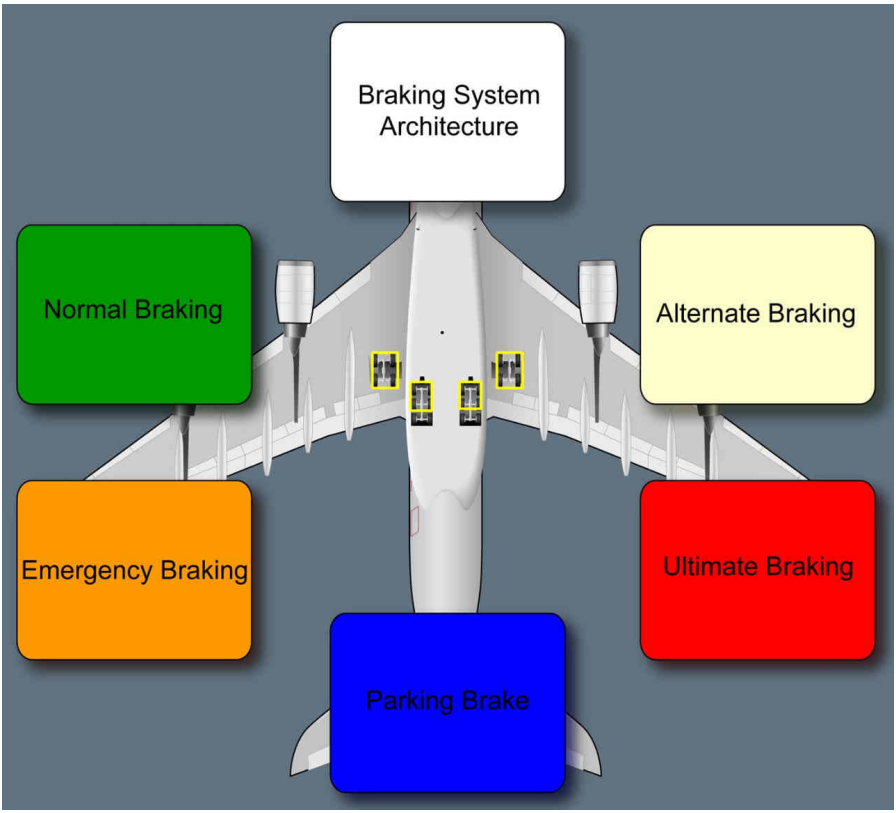
L1 BRAKING MODES

There are 5 braking modes:

- Normal braking
- Alternate braking
- Emergency braking
- Ultimate braking
- Parking brake.

In order to minimize the consequences of a local failure, the left BLG , the right BLG , and both WLG can operate independently in a different braking mode.

Overview



L2 BRAKES

The aircraft has 16 carbon brakes:
- One brake on each WLG wheel (8 brakes)
- One brake on the 4 most forward wheels of each BLG (8 brakes).

Each brake can be supplied with, either normal or alternate hydraulic power, because of the single cavity brake design. For each single cavity brake, there is a passive shuttle valve between normal and alternate hydraulic supplies.

Not avail in pdf format

Also, each brake has an individual visual wear indicator; When the parking brake is ON, the flight crew can check the wear of the BLG brakes (*Refer to PRO-NOR-SOP-50-E Before Walkaround_PARK BRK*).

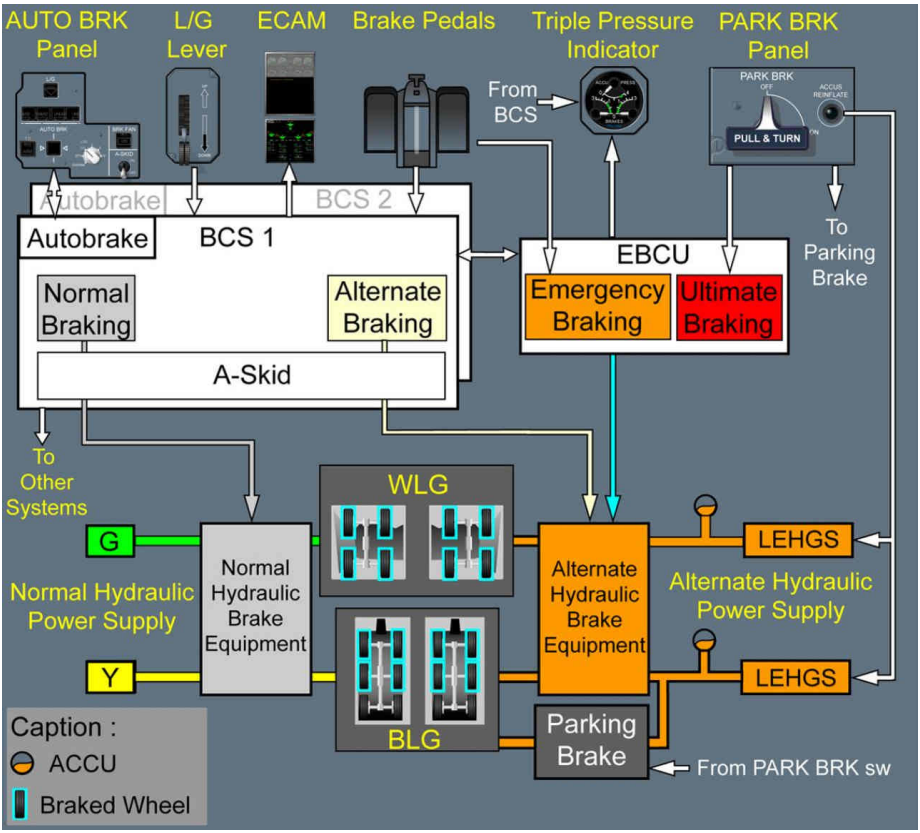
WHEEL FUSE PLUGS

Each WLG and BLG wheel has fuse plugs that prevent the wheel and tire from bursting. In the case of an excessive brake overheat, the fuses melt and the tire deflates.

ARCHITECTURE

Applicable to: ALL

Architecture



BRAKING CONTROL SYSTEM

The Braking Control System (BCS) controls the normal and the alternate braking modes and has two redundant control systems referred to as BCS 1 and BCS 2.
One BCS is active while the other is a backup.
L2 The backup BCS automatically activates, if the active BCS fails.
L3 The active BCS changes after each landing gear extension.
Both BCS are hosted by the CPIOMs G.

L1 Each BCS receives electrical commands from the flight crew via:
- The brake pedals
L3 The brake pedals have a Normal Brake Pedal Transmitter Unit (NBPTU) that converts the position of the pedals to an electrical signal.
L1 - The AUTO BRK selector
- The RTO pb
L2 - The Landing Gear (L/G) lever
  - In normal braking mode, the retraction braking activates when the L/G lever is set to the UP position

L1 Then, the active BCS computes and sends the corresponding electrical commands to the normal and/or to the alternate hydraulic equipment of the braking system, in accordance with flight crew inputs.

The BCS also sends data to:
- The ECAM, to generate alerts and to display the WHEEL system page
- The triple pressure indicator
L3 - The Emergency Brake Control Unit (EBCU), that activates if the BCS fails.

EMERGENCY BRAKE CONTROL UNIT (EBCU)

The EBCU controls emergency braking and ultimate braking (only on the WLG , *Refer to DSC-32-10-30-30-50 Ultimate Braking Control*), and activates automatically, when:
- The normal and the alternate braking modes fail, or
- The A-SKID sw is set to the OFF position.

Note: There is no A-SKID protection when in emergency or ultimate braking.

The EBCU receives electrical commands from the flight crew, via:
- The brake pedals
L3 The brake pedals have an Emergency Brake Pedal Transmitter Unit (EBPTU) that converts the position of the pedals to an electrical signal.
L1 - The PARK BRK handle.

Then, the EBCU computes and sends the corresponding electrical commands to the alternate hydraulic equipment of the braking system, in accordance with flight crew inputs.

The EBCU also sends data to:

L3 - The BCS that relays the fault data to the ECAM to generate alerts

L1 - The triple pressure indicator, when the braking control system fails.

NORMAL HYDRAULIC POWER SUPPLY

In normal braking mode, hydraulic power is supplied to the braking system by:
- The GREEN hydraulic system for the WLG
- The YELLOW hydraulic system for the BLG.

ALTERNATE HYDRAULIC POWER SUPPLY

L2 For the braking system, hydraulic supply redundancy is achieved with dedicated Local Electro-Hydraulic Generation Systems (LEHGS). Each LEHGS has its own hydraulic reservoir and uses electrical power to generate hydraulic pressure. This architecture prevents hydraulic fluid transfer and common point between main aircraft hydraulic systems, which are otherwise a drawback of single cavity brakes.

L1 In alternate, emergency, and ultimate braking modes, hydraulic power is supplied by:
- The Local Electro-Hydraulic Generation Systems (LEHGS)

L2 There is:
- One LEHGS for the WLG brakes
- One LEHGS for the BLG brakes.

Note: The LEHGS can automatically supply hydraulic pressure when the engines are running. When the engines are not running, the BLG LEHGS may be activated by pressing the ACCUS REINFLATE pb on the PARK BRK panel (a single push is enough).

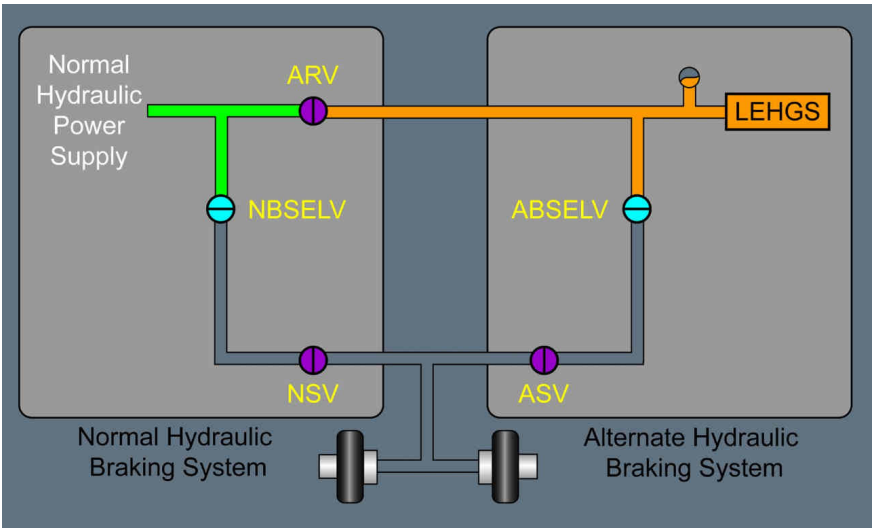
L1 - The brake accumulators.

L2 The brake accumulators store hydraulic pressure and are maintained pressurized by the LEHGS. They provide:
- Additional hydraulic pressure to deal with peak flow demands, when the associated LEHGS is operating
- Hydraulic pressure for at least 6 brake applications, if the associated LEHGS fails
- Hydraulic pressure for 12 h of efficient parking brake application.

L3 ARV

The braking system has Alternate Refill Valves (ARV) that can connect the normal and the alternate hydraulic power supplies. After engines are started, the ARVs automatically open to charge the brake accumulators and refill the hydraulic reservoirs of the LEHGS.
The ARVs automatically close when the ground speed exceeds 65 kt, and remain closed for the rest of the flight, to segregate normal and alternate hydraulic braking power supplies.

ARV



L3 INTERFACE WITH OTHER SYSTEMS

The BCS exchanges data with:

- The flight control system and the Auto Flight System (AFS) for flight calculations and the ground control laws
- The Flight Data Recording System (FDRS)
- The Central Maintenance System (CMS)
- The Control and Display System (CDS)
- The electrical system
- The Flight Warning System (FWS)
- The hydraulic system.

Braking Functions

BASIC AUTOBRAKE

Applicable to: ALL

BASIC AUTOBRAKE

The basic AUTO BRK is a function of the Braking Control System (BCS) that automatically decelerates the aircraft during landing, or in the case of a rejected takeoff (RTO).

L2 The basic AUTO BRK :
- Avoids any delay for brake application in the case of an RTO
- Reduces flight crew workload during landing, by maintaining a constant deceleration rate
- Reduces the number of brake applications, and therefore, brake wear.

L1 The basic AUTO BRK has four landing modes (LO, 2, 3 and HI) and one RTO mode.
The flight crew selects the basic AUTO BRK mode via the AUTO BRK selector , or the RTO pb .

L2 Each landing mode provides a specific deceleration.
The RTO mode provides maximum braking performance limited by A-SKID .

L3

Basic AUTO BRK Mode	LO	2	3	HI	RTO
Deceleration	2.0 m/s² 4 kt/s	2.5 m/s² 5 kt/s	3.0 m/s² 6 kt/s	3.5 m/s² 7 kt/s	Maximum braking performance limited by A-SKID

Basic AUTO BRK Modes

L1 **BASIC AUTO BRK ARMING**

The basic AUTO BRK is armed when:
- The flight crew selects a basic AUTO BRK mode
- A-SKID is available (normal and alternate modes)

L2 - At least two PRIM s are available
L3 The PRIM s provide the basic AUTO BRK with the ground spoilers extension command.

L2 - At least one ADIRU is available (in NAV mode)
L3 The ADIRU s provide the basic AUTO BRK with effective aircraft deceleration.

L1 The armed basic AUTO BRK mode is displayed in blue on the Flight Mode Annunciation (FMA).

Note: - *When on ground, the basic AUTO BRK can be armed in any mode, even if the parking brake is on*
- *When three IR s are in ATT mode, the basic AUTO BRK is not available.*
- *The flight crew cannot arm the RTO mode when the aircraft is in flight.*

BASIC AUTO BRK ACTIVATION

The basic AUTO BRK activates when:
- All the arming conditions are satisfied
- The ground spoilers extend. (*Refer to DSC-27-10-10-30 Speedbrake and ground spoiler control*)

L2 The basic AUTO BRK activates in landing mode when:
- The ground spoilers extend and the NLG is on ground, or
- 5 seconds after the ground spoilers extend, whichever occurs first.

L1 The ground spoilers do not extend automatically below 72 kt . As a result, in the case of an RTO initiated below 72 kt , the basic AUTO BRK does not activate.

L2 *Note:* *In addition to all the above conditions, the RTO mode does not activate below 40 kt . If the flight crew selects the RTO mode by error above 40 kt during the landing roll, the RTO mode will activate.*

L1 The active basic AUTO BRK mode is displayed in green on the FMA .

BASIC AUTO BRK DISARMING/DEACTIVATION

The basic AUTO BRK disarms or deactivates when:
- The flight crew applies sufficient pedal deflection on one or both brake pedals, or
L2 - The aircraft is in flight for more than 10 s (for RTO mode only), or
- The flight crew sets the AUTO BRK Mode selector to DISARM, or
- The flight crew presses the RTO pb in order to turn off the RTO light, or
- The flight crew presses one of the A/THR instinctive disconnect pushbuttons (only with basic AUTO BRK LDG modes, not for RTO mode), or
- Any basic AUTO BRK arming condition is lost, or
L1 - The ground spoilers retract. (*Refer to DSC-27-10-10-30 Speedbrake and ground spoiler control*).

Note: *If the basic AUTO BRK disarms during landing, the AUTO BRK Mode selector automatically returns to the DISARM position and the AUTO BRK mode no longer appears on the FMA .*

ANTISKID

Applicable to: ALL

A-SKID

Antiskid (A-SKID) optimizes manual and automatic braking performance by preventing any wheel lock.

L2 A-SKID also:
- Limits tire wear
- Prevents tire bursts
- Provides aquaplaning protection.

L1 For manual braking, the flight crew can achieve maximum braking performance by applying maximum deflection of the brake pedals.
For automatic braking, the flight crew can achieve maximum braking performance in RTO mode and ROP activation.
The flight crew can turn off the A-SKID from the A-SKID sw in the cockpit, without losing NWS .

CAUTION	The A-SKID disconnection with the A-SKID sw in the cockpit is allowed only in case of “Loss of Braking” procedure *Refer to Loss of Braking*

A-SKID is not available :

- In ALTN without A-SKID , in EMERGENCY, in ULTIMATE braking modes (All modes with ECAM warning “Brakes A-SKID Fault”)
- In Parking Brake mode
- If an excessive number of wheels are released.

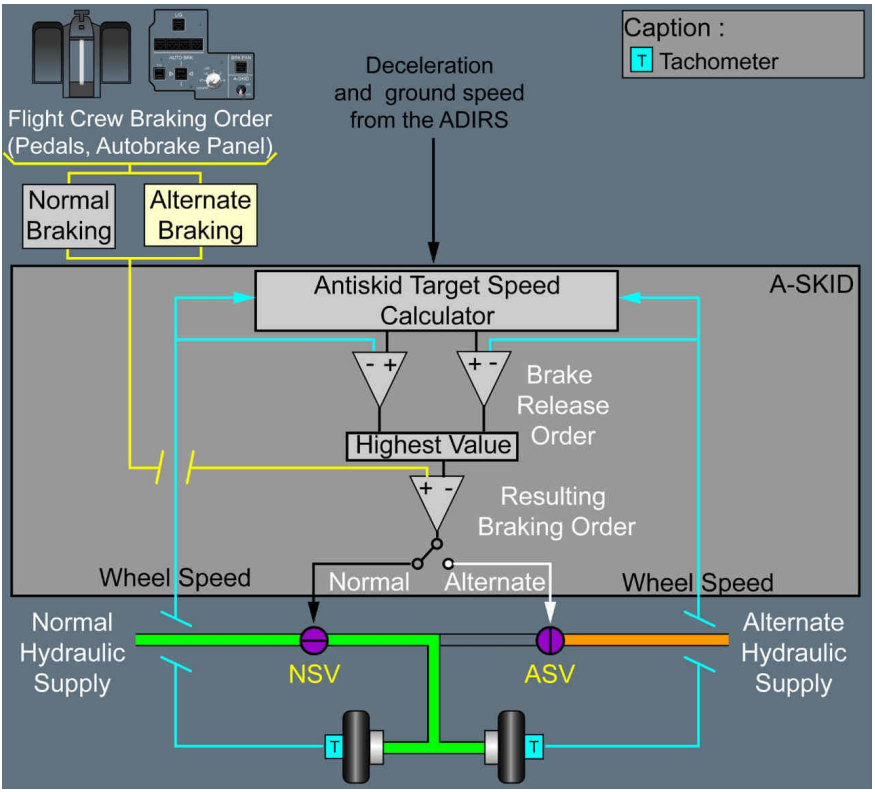
L3 A-SKID PRINCIPLE

The A-SKID uses data from the ADIRS and the tachometers to calculate an individual target speed for each pair of wheels. Each individual target speed provides maximum braking performance in the current runway conditions, and changes as runway conditions change.
When the speeds of a wheel pair decrease below the individual target speed, a brake release order is generated and combined with the braking orders of the flight crew or of the Auto-Brake to maintain this target speed.
The highest brake release order corresponds to the lowest speed of the wheel pair.

The resulting braking order is sent to:
- The Normal Servo Valves (NSV) of the affected pair of wheels, when in normal braking
- The Alternate Servo Valves (ASV) of the affected pair of wheels, when in alternate braking.

Note: A-SKID is available but degraded with all 3 ADIRS in OFF mode.

A-SKID Principle



BRAKE TO VACATE (BTV)

Applicable to: ALL

The Brake To Vacate (BTV) function manages the auto-brake deceleration at landing.

The BTV:

- Automatically manages the braking : to reach a runway exit pre-selected by the flight crew
- Optimizes the braking by delaying and minimizing the brake application
- Improves passenger comfort.

L2 The PRIMs host the BTV function.

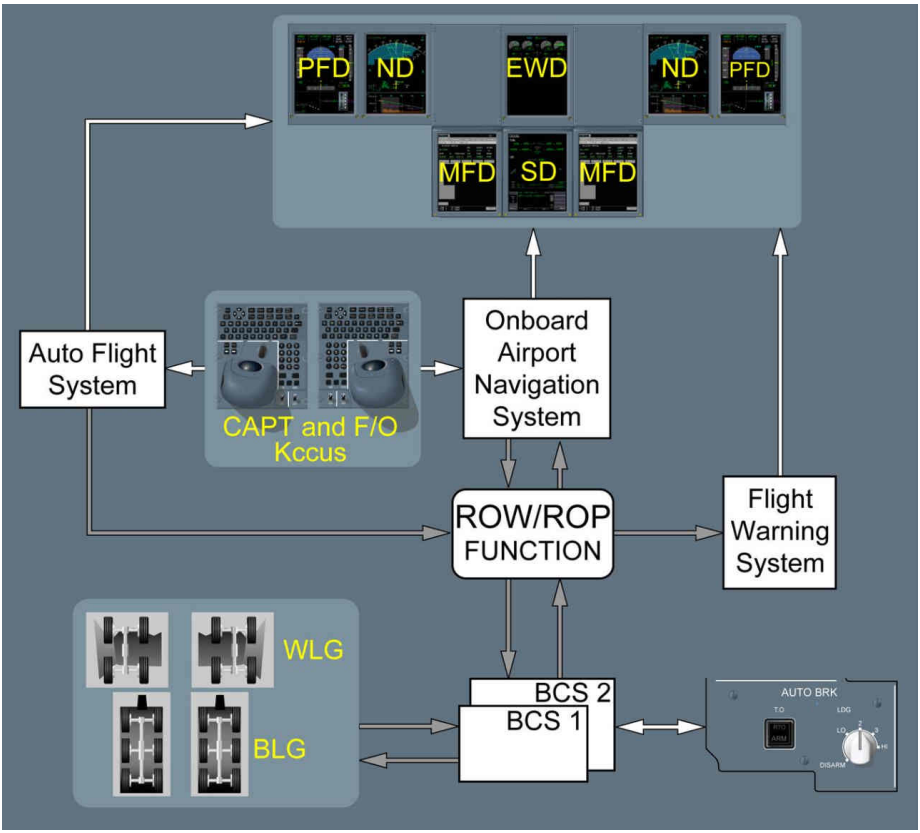
L1 The BTV function uses and exchanges data with the following systems:
- Onboard Airport Navigation System (OANS)
- The Airport Navigation display on ND
- Auto flight system

L2 The BTV function is located in the PRIM and uses PRIM data to compute in real time the different data for braking management.

L1
- Braking system
- Flight warning system
- Display system

L2
- Landing runway selected in the FMS.

BTV operational interaction



PRINCIPLE

The flight crew visualizes the data computed by the BTV on the ND, when the ND range selection is set to ZOOM.

The predicted distances of landing computed by the BTV are shown by two lines:
- The DRY line, that indicates the predicted landing distance on a dry runway
- The WET line, that indicates the predicted landing distance on a wet runway.

The DRY and WET lines have two functions:
- The flight crew uses the dry and wet lines to choose the appropriate runway exit during descent preparation
- The flight crew may use the DRY and WET lines to see in real time the BTV predicted landing distances during final approach.

Dry and Wet Line



SYSTEM OPERATION AND DISPLAY

BTV INITIALIZATION PHASE

Before arming BTV and use it for braking at landing, during the descent preparation, the flight crew must select the landing runway and select a runway exit. This is the BTV initialization phase.

The DRY and WET lines displayed during the initialisation phase of BTV correspond to the landing distance in autoland and with autobrake, on dry runway for the dry line, and on wet runway for the wet line.

BTV MONITORING PHASE

In short final, the flight crew can monitor the DRY and WET lines on the ND, with the ND range selector set to ZOOM.

Above 500 ft RA

Above 500 ft RA the dry and wet lines display the required landing distance. The lines do not move.

Between 500 ft and touchdown:

L2
- Below 500 ft and nose landing gear touchdown, or
- Below 500 ft and 5 s after the main landing gears touchdown, or
- Below 500 ft and the ground spoiler extension

L1 The DRY and WET lines are computed and displayed in real time
BTV computes in real time the estimated landing distance, adjusts and displays the DRY and WET lines accordingly, taking into account the aircraft behavior (speed, altitude).

Between touchdown and BTV disconnection

At touchdown:

L2
- When the nose landing gear touchdown, or
- 5 s after the main landing gear touchdown, or
- At the ground spoiler extension

L1 The DRY and WET lines disappear and a single green line is displayed: The stop bar.
The stop bar shows the predictive stop distance computed by the BTV, based on the real time braking efficiency.

COMPUTATION PRINCIPLE

The computation of the DRY and WET lines takes into account the following elements:

AIRBORNE DISTANCE

The airborne distance is a minimum of 1 312.3 ft (ICAO touchdown zone) between the runway threshold and the touchdown zone.

L2
- Above 500 ft, the airborne distance computation is based on FMS data, approach speed and inserted wind
- Below 500 ft and above 50 ft, the airborne distance computation is based on IRS ground speed
- Below 50 ft, the airborne distance computation is based on IRS ground speed and RA data.

Because the BTV considers a minimum airborne distance of 1 312.3 ft between the runway threshold and the touchdown zone, the headwind that could reduce the airborne distance, has no effect on the computation of the airborne distance.
A long flare or a tailwind is fully integrated in the computation of the airborne distance, because these conditions increase the airborne distance.

L1 **TOUCHDOWN GROUND SPEED**

L2 Above 500 ft, the computed touchdown ground speed is based on FMS data, approach speed and inserted wind.
Below 500 ft and until touchdown, the computed touchdown ground speed is based on the IRS ground speed corrected by the GPS ground speed.

L1 **BRAKING EFFICIENCY**

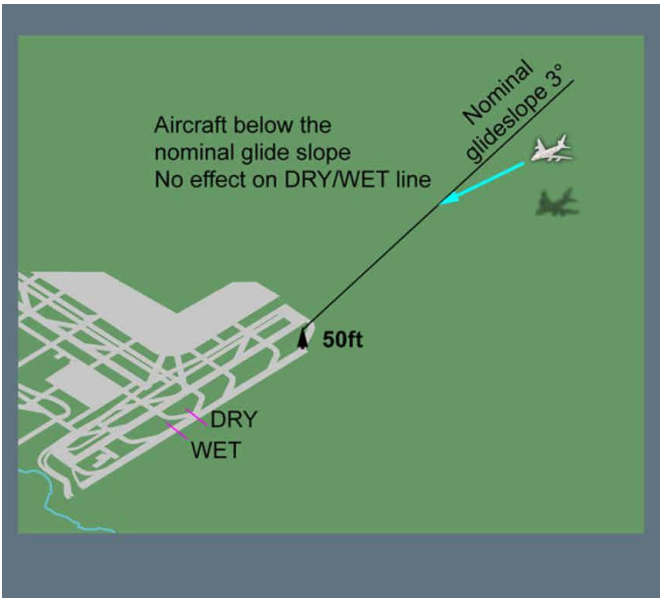
L2 For the computation of the DRY line:
- The runway is considered dry
- Autobrake HI is used
- No thrust reverser is used.

For the computation of the WET line:
- The runway is considered contaminated with 1/4 in water
- Maximum achievable braking is used
- Maximum reverser is used.

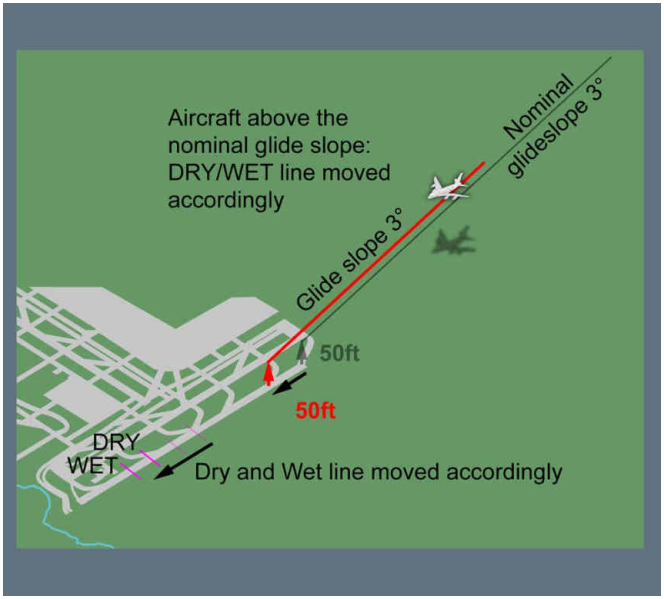
L1 **ADAPTATION OF THE DRY AND WET LINES BETWEEN 500FT AND 50FT**

L2 The computation of the DRY and WET lines take into account a standard glide slope of 3 °:

- If the aircraft is below the 3 ° glide slope, the dry and wet line are still positioned as if the aircraft was on the 3 ° glide slope, because the flight crew can reach the standard 3 ° glide slope.



- If the aircraft is above the 3 ° glide slope, the DRY and WET lines are moved accordingly, because BTV assumes that the flight crew maintains the 3 ° glide slope descent from the actual position of the aircraft. In this case, the 50 ft runway over fly point is also moved accordingly, i.e. after the runway threshold.



The objective of the BTV is to manage the automatic braking application to reach the selected runway exit with an aircraft speed of 10 kt.
If the runway exit selected by the flight crew is a high speed turn-off, the objective of BTV is to allow the flight crew to manage the entrance of the high speed turn-off with confidence with BTV active. The BTV speed target remains 10 kt.

L2 **BTV OPERATION**

In comparison with basic auto-brake mode, BTV does not only command a constant deceleration rate as selected by the flight crew. BTV first commands a regular increase in deceleration rate before it maintains a constant deceleration rate in order to reach the selected exit minus 215 ft at an aircraft speed of 10 kt.

The constant deceleration rate is function of the DRY and WET lines, and the position of the exit selected by the flight crew.

L3
- If the flight crew selects an exit between the dry and wet line, the constant deceleration rate is approximately 10 ft/s².
- If the flight crew selects an exit after the wet line, the constant deceleration rate is approximately 6.50 ft/s².

L2 If necessary, BTV can adjust the deceleration rate based on the remaining distance to the selected exit in order to reach the 10 kt target at the exit.

BTV ARMING

The BTV arms when:
- The flight crew selects a runway exit on the airport map display
- The flight crew selects BTV braking mode on the AUTO BRK mode selector
- No ECAM warning affects landing distances

L2 - At least two ADIRU are available (in NAV mode)
The ADIRU s provide BTV with actual aircraft deceleration.

L1 When armed, BTV is displayed on the Flight Mode Annunciation (FMA).

BTV ACTIVATION

The BTV activates when:
- All the arming conditions are satisfied
- The ground spoilers extend. (*Refer to DSC-27-10-10-30 Speedbrake and ground spoiler control*)

L2 BTV activates when:
- The ground spoilers extend and the NLG is on ground, or
- 5 seconds after the ground spoilers extension, whichever occurs first.

L1 When active, BTV is displayed on the FMA .

BTV DISARMING

When armed, BTV disarms if:
- The flight crew modifies the runway or runway exit on the airport map display, or
- The flight crew changes the selected FMS runway above 700 ft , or
- The flight crew changes of landing runway below 700 ft .

L12

Note: Below 700 ft , if the flight crew changes the landing runway or if any arming condition is lost, BTV detects that the actual landing runway is not the BTV selected runway. The auto-brake reverts to BRK HI mode, associated with a triple click, and BRK HI is displayed on the FMA .

L2 - The AUTO BRK selector is set to the DISARM position, or
- Any BTV arming condition is lost,

L1 **BTV DEACTIVATION**

BTV deactivates when:

- The aircraft ground speed reaches 10 kt , or
- The flight crew disconnects the autobrake via the brake pedals or the A/THR instinctive disconnect pb , or

L2 - Any BTV arming condition is lost, or

L1 - The ground spoilers retract. (*Refer to DSC-27-10-10-30 Speedbrake and ground spoiler control*).

ROW - ROP

Applicable to: ALL

ROW AND ROP OBJECTIVES

Runway Overrun Warning (ROW) and Runway Overrun Protection (ROP) are two functions available with BTV.

ROW and ROP functions alert the flight crew in the case of detected potential runway excursion.

ROW concerns the airborne phase, from 500 ft AGL until touchdown. ROW alerts the flight crew in the case of potential runway excursion at landing.

ROP concerns the ground phase of the landing. ROP alerts the flight crew in the case of potential runway overrun, asks the flight crew to use maximum reverser thrust and automatically commands maximum braking, when an auto-brake mode is engaged.

L2 ROW and ROP use the same principle and system resources as BTV.

PRINCIPLE

The ROW and ROP are two complementaries functions.

ROW and ROP use the Onboard Airport Navigation System database (OANS) , and the aircraft position to detect the current landing runway.

- ROW computes in short final and in real time the distance necessary to stop the aircraft on the runway
- ROP computes during landing roll and in real time the distance necessary to stop the aircraft on the runway.

The detection of the landing runway and the computation of the distance to stop the aircraft on the detected runway enable:

- ROW to detect and alert the flight crew of potential runway excursion in flight in short final
- ROP :
  - To detect and alert the flight crew in the case of potential runway excursion on ground
  - If it occurs, to activate maximum braking if necessary (only in auto-brake mode)

ROW AND ROP AVAILABILITY

ROW and ROP functions are available in:

- Basic auto-brake mode, or
- BTV , or
- Pedal braking.

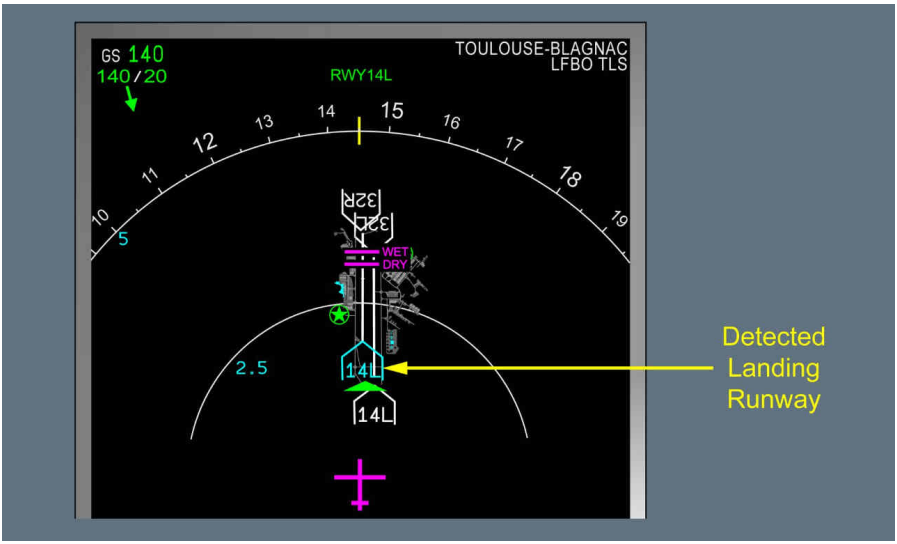
ROW ARMING PHASE

ROW scans the landing runway between 500 ft and 300 ft , taking into account the aircraft position and the runway position. Even if the flight crew changes of landing runway between 500 ft and 300 ft , the new runway becomes the protected runway.

L2 In BTV auto-brake mode, the runway detection is performed only at 300 ft . Between 500 ft and 300 ft , the protected runway is the runway selected by the flight crew for the landing in BTV auto-brake mode.

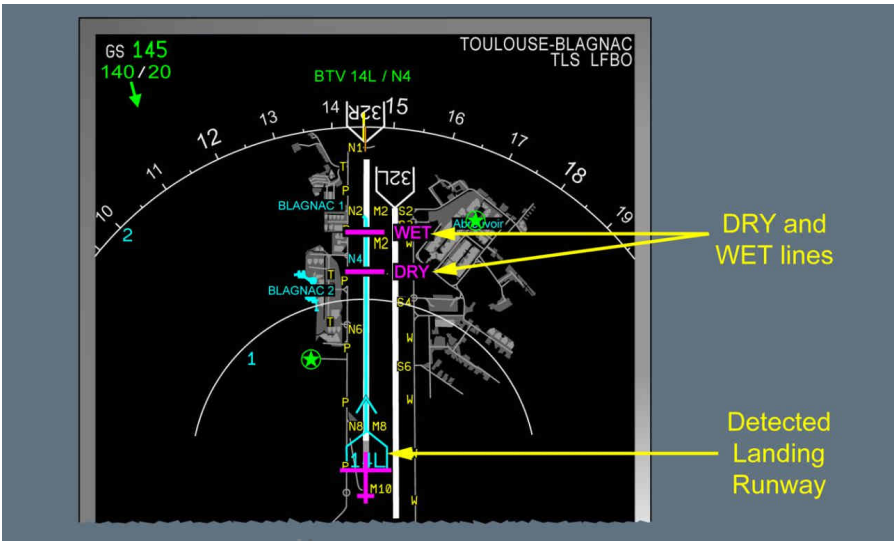
L1 As soon as ROW detects the landing runway, this landing runway is highlighted on the Airport Navigation Display on the ND by displaying the QFU in blue.

Detected Landing Runway in Basic Auto-brake Mode and Pedal Braking



In auto-brake mode (Basic or BTV) or pedal braking, in addition to the runway QFU displayed in blue, the DRY and WET lines are computed and displayed on the Airport Navigation Display. For more information *Refer to DSC-32-10-30-20-10 Dry and Wet line concept*

BTV Detected Landing Runway



ROP ARMING PHASE

ROP is armed when:
- The aircraft is on ground
- The landing runway is in the OANS database
- The landing runway is detected.

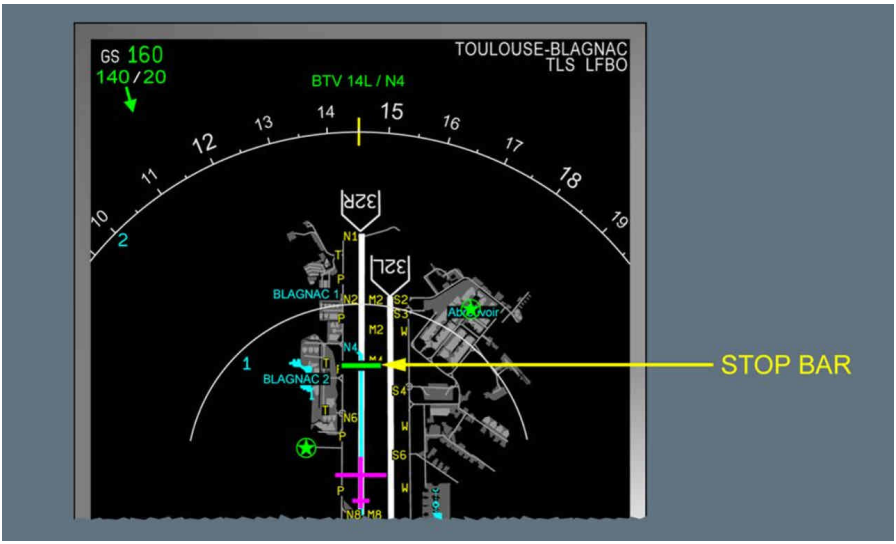
ROP remains armed until 20 kt , or until the aircraft vacates the runway.
In auto-brake mode (basic or BTV), when ROP is armed, a green BAR, showing the computed stop position of the aircraft is displayed on the Airport Navigation Display on the ND .
The blue line displays the predicted braking distance.
In basic auto-brake mode, the predicted braking distance goes from the aircraft position to the green stop bar.

Stop Bar in Classic Auto-Brake Mode



In BTV mode, the blue line showing the predicted braking path, goes from the runway threshold to the selected exit.

Stop Bar in BTV Auto-brake Mode



In pedal braking, the ND does not display the green BAR and the blue line. The ND does not display these informations to avoid the flight crew to use it to delay pedal braking application. On ground, when the flight crew disconnects the auto-brake (basic auto-brake or BTV), ROP remains armed, thanks to the availability of ROP in pedal braking.

LOSS OF ROW/ROP

ROW and ROP can be lost if:

- ROW or ROP receive the information that the aircraft position is erroneous
- ROW or ROP detect a data inconsistency in the Airport Navigation database
- The landing runway is not known by the system.

In this case, BTV and ROP are declared as inoperative and the following ECAM alert may be triggered:

- BRAKES BTV FAULT *Refer to PRO-ABN-ECAM-10-32-285 BRAKES BTV FAULT*
- SURV ROW/ROP LOST *Refer to PRO-ABN-ECAM-10-34-20-GROWR SURV ROW/ROP LOST*

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L2 **DURING ROW OR ROP ACTIVATION**

In the case of ROW / ROP loss when, ROW or ROP is active, or ROW or ROP alerts are displayed, or ROP commands maximum braking application, the ROW or ROP alerts remain displayed and the maximum braking application remains applied when ROP is active.

L1 **IN FLIGHT**

In the case of ROW loss in flight, when the function is armed, the detected runway is no more displayed on Airport Navigation display on ND .
If BTV is armed, the DRY and WET lines are no more displayed on ND .

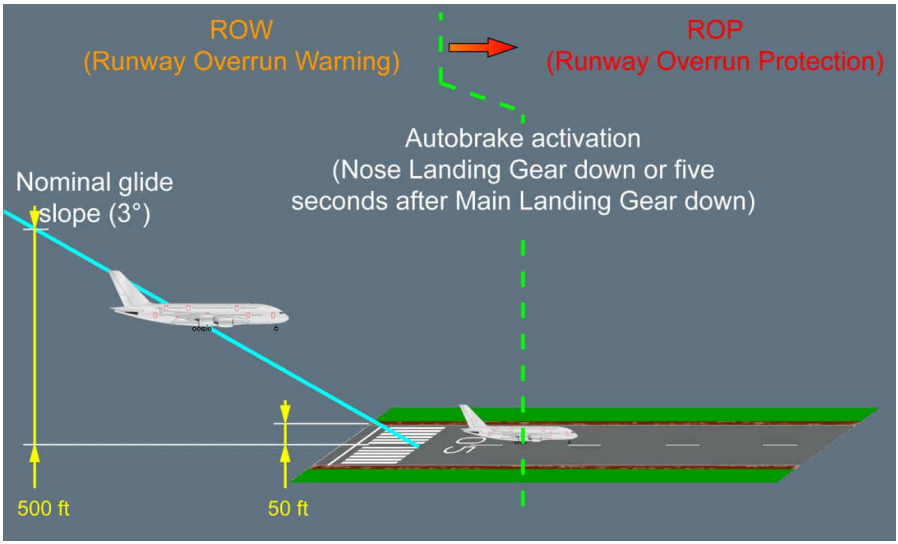
ON GROUND

In the case of ROP loss on ground, when the function is armed, the stop bar is no more displayed on the Airport Navigation display.

ROW ROP OPERATIONAL DOMAIN

ROW and ROP functions are operative:
- On all runway conditions
- In autoland or manual landing
- In any condition of wind
- In conf 3 or conf FULL
- In all weight conditions including for overweight landing.

ROW AND ROP OPERATIONAL DESCRIPTION



ROW ACTIVATION

ROW is armed below 500 ft until the aircraft touches down, independently of the braking means chosen by the flight crew (i.e. autobrake, or pedal braking), when ROW detects the landing runway.

L2 In basic autobrake mode or pedal braking, ROW detects the landing runway between 500 ft and 300 ft RA .

If the flight crew selects BTV autobrake mode, the BTV function detects the landing runway at 300 ft . The BTV function performs a late detection of the landing runway in order to favor the landing runway selected by the flight crew as long as possible.

L1 ROW detects a possible runway overrun when the aircraft is in flight, considering different parameters such as the aircraft weight, the aircraft speed, the aircraft altitude, the aircraft position, the wind.

If ROW detects a possible runway overrun, ROW activates aural and visual alerts to inform the flight crew of the situation.

On WET runway

ROW computes two lines: I.e. one WET line and one DRY line. These lines correspond to the minimum landing distance for a WET runway and for a DRY runway.

The flight crew uses the appropriate line as reference depending on the actual runway condition, i.e. dry or wet.

ROW informs the flight crew via a visual alert on the PFD IF WET : RWY TOO SHORT , meaning that if the runway is WET, the landing distance computed by ROW is too long.

CAUTION	If the runway is WET, and "IF WET: RWY TOO SHORT" is displayed on the PFD, the flight crew must perform a go-around.

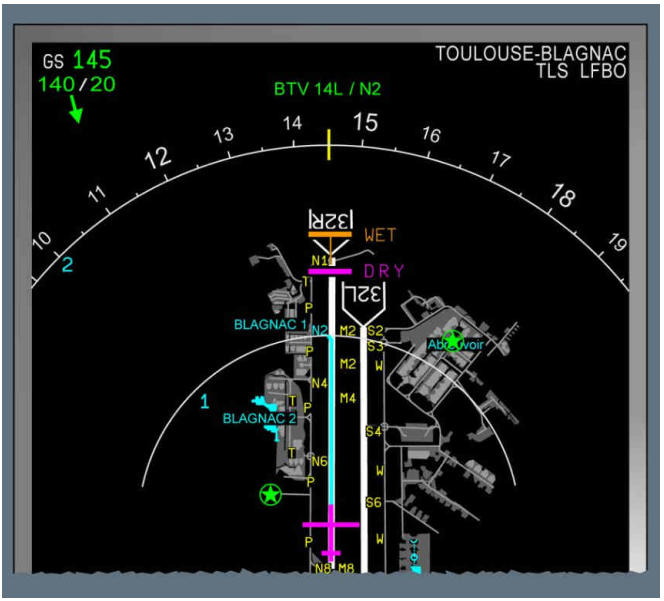
In the case of a dry runway, the flight crew can continue the landing.

PFD: IF WET RWY TOO SHORT



In addition to the message IF WET : RWY TOO SHORT displayed on the PFD , the WET line on the Airport Navigation appears in amber showing that the landing distance is longer than the available landing distance.

IF WET RWY TOO SHORT on BTV Airport Navigation display on ND



On DRY runway

Even if the runway is dry, because ROW cannot assess actual condition of the runway, the message IF WET: RWY TOO SHORT is displayed.
If for any reason, the landing distance computed for a dry runway becomes longer than the remaining runway length, a new message is displayed on the PFD : RWY TOO SHORT .
Associated with this message, an aural alert "RUNWAY TOO SHORT" is triggered. This aural alert is repeated as long as ROW detects that the aircraft is in a situation of possible runway overrun.

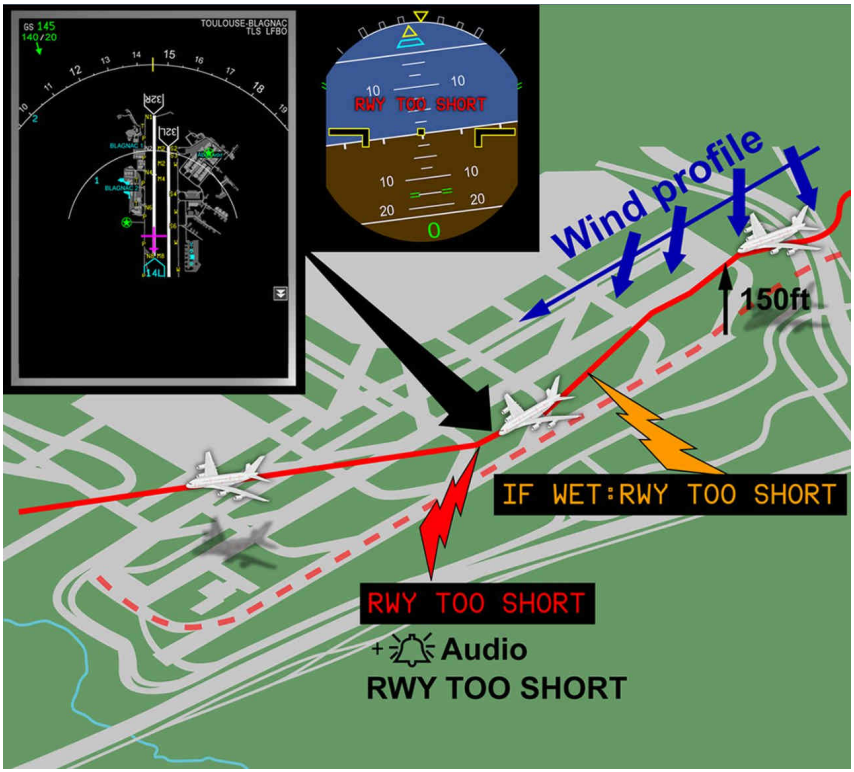
L2 The aural alert "runway too short" is triggered below 200 ft .

L1

WARNING	If RWY TOO SHORT alert is displayed on the PFD, associated with the aural alert "RUNWAY TOO SHORT", the flight must perform a go-around.

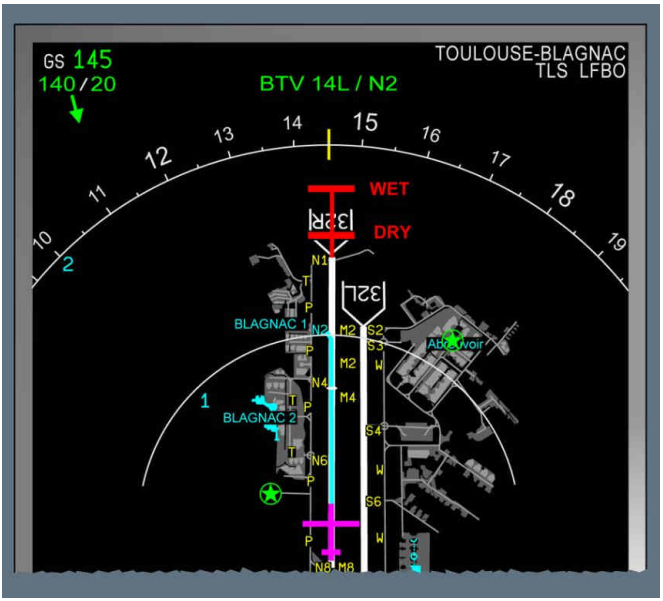
Not used in this context

RWY TOO SHORT: PFD ND classic auto-Brake mode



In addition to the message RWY TOO SHORT displayed on the PFD , the DRY and WET lines on the Airport Navigation appear in red showing that the landing distance is longer than the landing distance available.

Row Activation with BTV selected on ND



ROP ACTIVATION

ROP monitors the aircraft braking distance on ground. If ROP detects a possible runway overrun situation, ROP becomes active.

ROP considers two scenarios:
- When the flight crew selects an autobrake mode, or
- When the flight crew uses pedal braking.

In autobrake mode

When ROP is active:
- ROP commands the maximum braking performance
  L2 The braking system applies maximum braking, limited by the anti-skid.
- L1 The aural alert "SET MAX REVERSE" is triggered
- The message MAX REVERSE is displayed on the PFD . This message pulses for 9 s and then remains steady as long as ROP remains active.

Not used in this context
The aural alert "SET MAX REVERSE" is triggered only if the flight crew did not select the maximum reverse thrust position. The aural alert is repeated continuously until the flight crew

selects the maximum reverse thrust position and as long as ROP is active (i.e. situation of runway overrun detected).

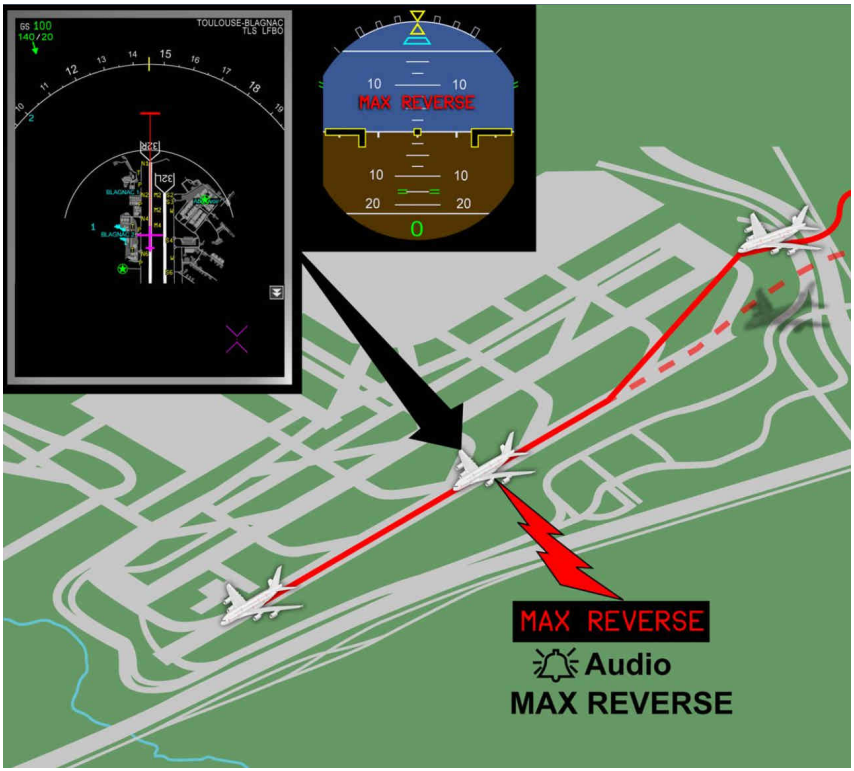
At 80 kt , the aural alert "KEEP MAX REVERSE" is triggered one time if:

- The max reversers are deployed
- ROP function is active.

The aural warning "KEEP MAX REVERSE" is triggered to ask the flight crew to keep max reverser deployed below 80 kt .

Not used in this context

MAX REVERSE: PFD ND



As long as ROP is active:
- The STOP bar displayed on the Airport Navigation is red and pulses
- The STOP bar is displayed after the end of the runway.
- ROP applies maximum braking limited by A-SKID (independently of BTV or basic autobrake mode).

The detection of an overrun situation is reversible. If the maximum braking application and the deceleration rate allow ROP to compute a landing distance shorter than the remaining runway length, ROP deactivates. ROP returns to armed state. The previously selected autobrake mode is active again.
When ROP is active, the flight crew can disconnect the maximum braking only by overriding the braking with a brake pedal application. In this situation, the flight crew reverts to pedal braking. Nevertheless, ROP remains active as long as an runway overrun is detected.

In pedal braking

When ROP is active:
- The aural alert "MAX BRAKING" is triggered
- The messages MAX BRAKING and MAX REVERSE are displayed on the PFD . These messages pulse for 9 s and then remain steady as long as ROP remains active (for more information on the PFD, *Refer to DSC-32-20-220 PFD ROW ROP*).

Not used in this context
The aural alert "MAX BRAKING" is triggered and repeated continuously until the flight crew applies maximum pedal braking and as long as ROP is active (situation of runway overrun detected).
When the flight crew applies maximum pedal braking, the aural alert "SET MAX REVERSE" replaces the aural alert "MAX BRAKING".
The aural alert "SET MAX REVERSE" is triggered only if the flight crew did not select maximum reverse thrust position. The aural alert is repeated continuously until the flight crew selects the maximum reverse thrust position and as long as ROP is active (if a situation of runway overrun is detected).

Not used in this context

At 80 kt , the aural alert "KEEP MAX REVERSE" is triggered one time if:
- The max reversers are deployed
- ROP function is active.

The aural alert "KEEP MAX REVERSE" is triggered to ask the flight crew to keep max reverser deployed below 80 kt .

Not used in this context

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Braking Modes

NORMAL BRAKING

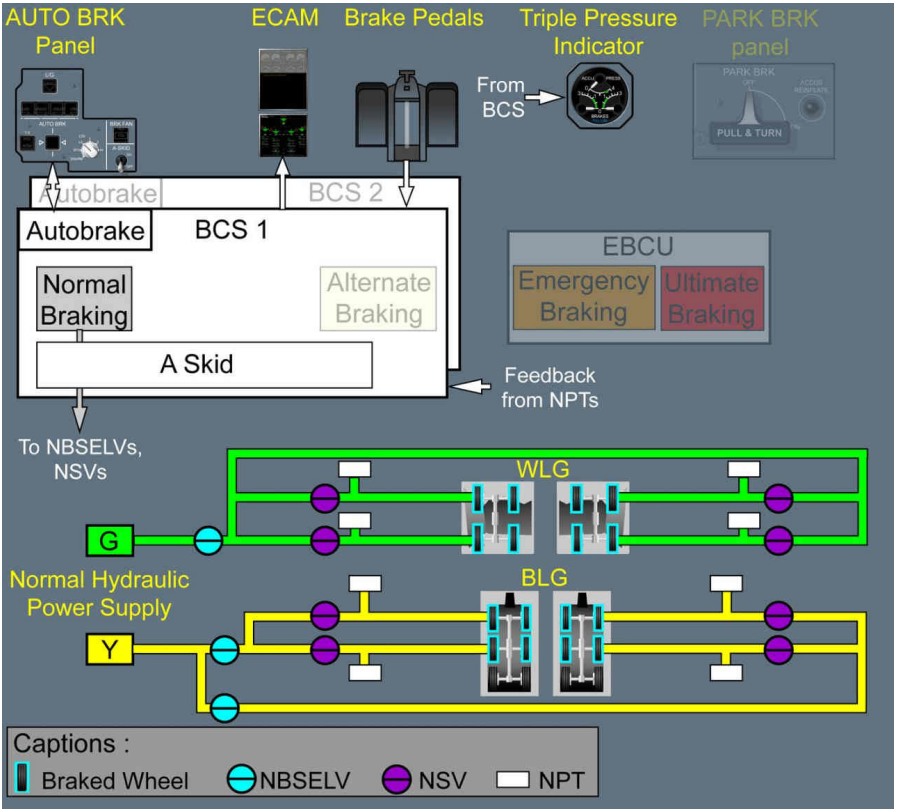
Applicable to: ALL

In normal braking:
- A-SKID is available
- AUTO BRK is available
- Differential braking is available.
- The flight crew can use the brake pedals:

L2 - Automatic retraction braking is available.
L1 - The number of brake applications is not limited

NORMAL BRAKING ARCHITECTURE

Normal Braking Architecture



NORMAL BRAKING CONTROL

The BCS controls normal braking.

NORMAL HYDRAULIC BRAKE EQUIPMENT

The normal hydraulic brake equipment receives electrical commands from the active BCS.
The normal brake equipment has valves (selector and servo valves) and pressure transmitters to control the GREEN or YELLOW hydraulic pressure, that is applied to the brakes.

L3 NORMAL BRAKE SELECTOR VALVES

There are three Normal Brake Selector Valves (NBSELV s):
- One for the left and the right WLG
- One for the right BLG
- One for the left BLG .

Each NBSELV operates independently from the others, and opens when normal braking is active on the corresponding landing gear.
If normal braking is lost on one or more landing gears, only the affected NBSELV (s) closes in order to isolate the brakes from the GREEN or the YELLOW hydraulic pressure. (*Refer to DSC-32-40-30 Braking System Reconfiguration*).

L3 NORMAL SERVO VALVES

There is one Normal Servo Valve (NSV) for each pair of brakes (8 NSVs).
The NSVs adjust the GREEN or the YELLOW hydraulic pressure to decelerate the aircraft, in accordance with flight crew inputs, via the brake pedals or the AUTO BRK.

L3 NORMAL PRESSURE TRANSMITTERS

There is one Normal Pressure Transmitter (NPT) for each pair of brakes (8 NPTs).
The NPTs measure the normal hydraulic pressure that is applied to the brakes.
This information is sent to the BCS to provide control feedback.

HYDRAULIC POWER SUPPLY

The normal hydraulic power (GREEN and YELLOW) supplies normal braking.

ALTERNATE BRAKING

Applicable to: ALL

In alternate braking:
- A-SKID is available
- AUTO BRK is available
- The flight crew can use the brake pedals:
  - Differential braking is available.
  - The number of brake applications is not limited

Note: *Alternate braking performance is equivalent to normal braking performance.*

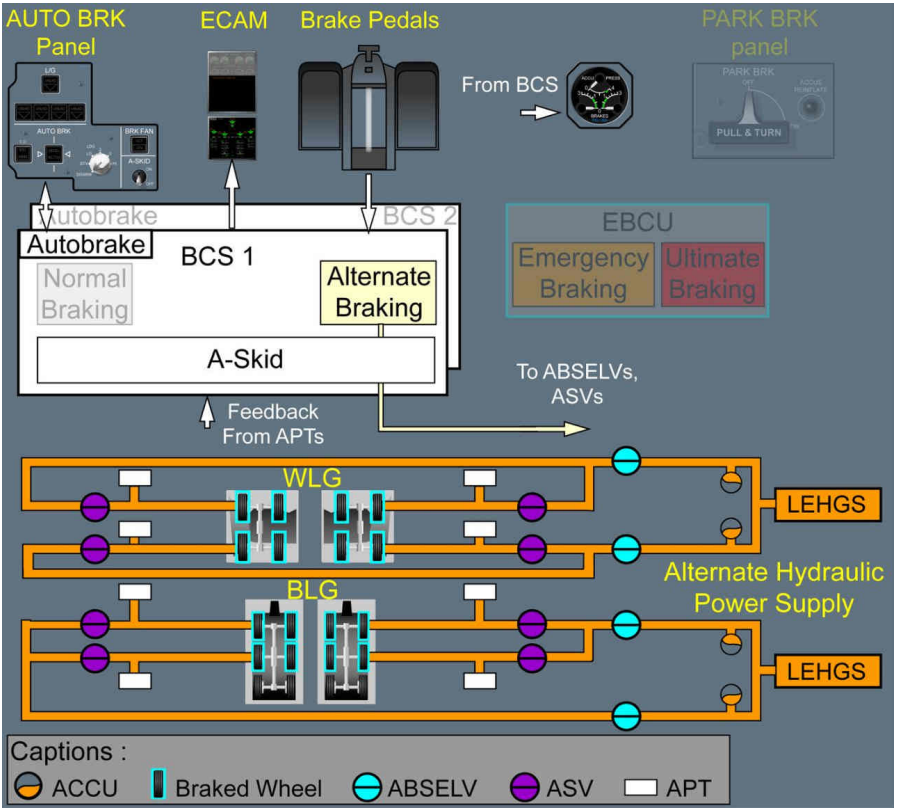
The brake system automatically changes from normal to alternate braking and the BRAKES NORM BRK FAULT alert is displayed, if an excessive number of brakes are released because of the failure of one or more normal hydraulic valves. (*Refer to DSC-32-40-30 Braking System Reconfiguration*).

ALTERNATE BRAKING WITHOUT A-SKID

L3 If the A-SKID is not available (BRAKES A-SKID FAULT alert displayed *Refer to PRO-ABN-ECAM-10-32-130 BRAKES A-SKID FAULT ON ALL L/Gs*) because of failed tachometers and the BCS operates normally, alternate braking remains available without A-SKID and AUTO BRK , under BCS control.

ALTERNATE BRAKING ARCHITECTURE

Alternate Braking Architecture



ALTERNATE BRAKING CONTROL

The BCS controls alternate braking.

ALTERNATE HYDRAULIC BRAKE EQUIPMENT

In alternate braking, the alternate hydraulic brake equipment receives electrical commands from the active BCS.
The alternate brake equipment has valves (selector and servo valves) and pressure transmitters to control the LEHGS/accumulators hydraulic pressure, that is applied to the brakes.

L3 ALTERNATE BRAKE SELECTOR VALVES

There are four Alternate Brake Selector Valves (ABSELVs):
- One for the forward brakes of the WLG
- One for the aft brakes of the WLG
- One for the left BLG
- One for the right BLG.

Each ABSELV operates independently from the others, and opens when alternate, emergency, or ultimate braking is active on the corresponding landing gear.
If normal braking is lost on one or more landing gears, only the affected ABSELV(s) open.

L3 ALTERNATE SERVO VALVES

There is one Alternate Servo Valve (ASV) for each pair of brakes (8 ASVs).
The ASVs adjust alternate hydraulic pressure to decelerate the aircraft, in accordance with the flight crew inputs.

L3 ALTERNATE PRESSURE TRANSMITTERS

There is one Alternate Pressure Transmitter (APT) for each pair of brakes (8 APTs).
The APTs measure the alternate hydraulic pressure that is applied to the brakes.
This information is sent to the BCS to provide control feedback and indications on the triple pressure indicator in the cockpit.

HYDRAULIC POWER SUPPLY

Alternate hydraulic power (LEHGS and accumulators) supplies alternate braking.

L3 There are four brake accumulators:
- Two for the WLG (one for the forward WLG brakes, one for the aft WLG brakes)
- Two for the BLG (one for the left BLG, one for the right BLG).

These accumulators are isolated between them: one accumulator failure will not prevent to keep half of WLG or BLG braking.

EMERGENCY BRAKING

Applicable to: ALL

In emergency braking:

- A-SKID is not available. Hydraulic pressure applied to the brakes is automatically limited, in order to limit risk of tire burst.

L2 Hydraulic pressure is automatically limited to 1 000 PSI at landing (landing brake law), 1 700 PSI for taxi-out and Take-Off (take-off brake law).

L3 It is possible to revert from landing brake law to take-off brake law by set parking brake to position ON.

L1 - AUTO BRK is not available

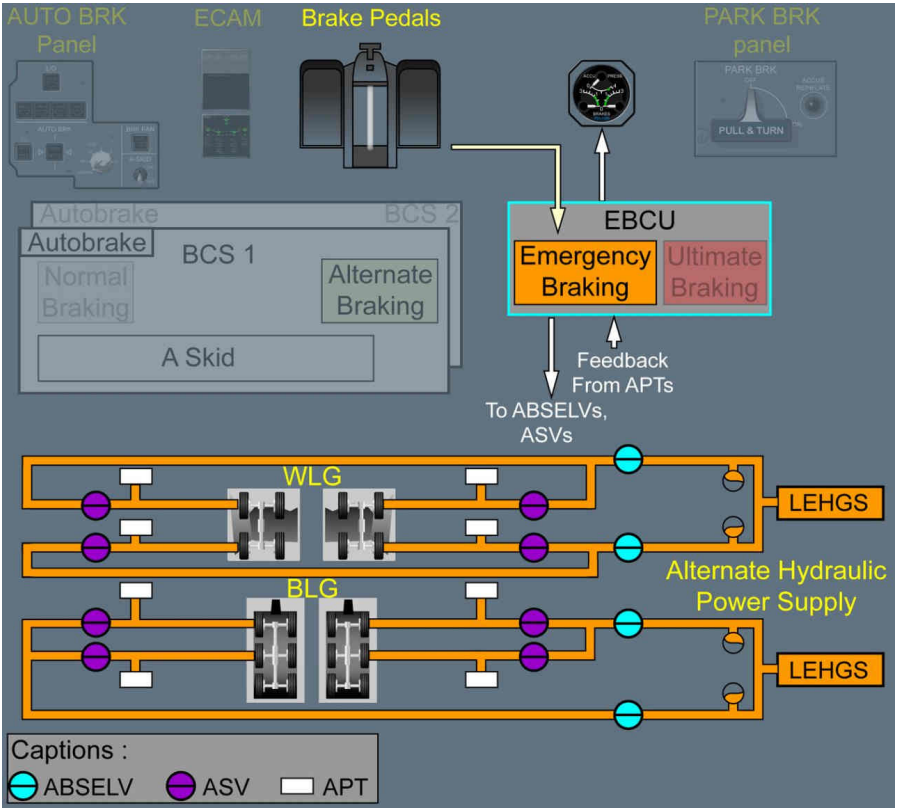
- The flight crew can use the brake pedals:
  - Differential braking is available
  - If the LEHGS is available, the number of brake applications is not limited
  - If the LEHGS is not available, the number of brake applications is limited: Hydraulic power is supplied only by the brake accumulators.

Note: *Braking performance is degraded.*

L2 The braking system automatically changes from normal, or alternate braking mode to emergency braking (BRAKES A-SKID FAULT alert is displayed), if:

- BCS 1 and BCS 2 fail, or
- A-SKID is set to OFF via the A-SKID sw in the cockpit (the BRAKES A-SKID OFF alert is displayed instead of FAULT), or
- A-SKID fails , or
- A LEHGS fails when in alternate braking (in fact alternate braking without A-SKID).

EMERGENCY BRAKING ARCHITECTURE



EMERGENCY BRAKING CONTROL

The EBCU controls emergency braking.

HYDRAULIC BRAKE EQUIPMENT

In emergency braking, the alternate hydraulic brake equipment receives electrical commands from the EBCU.
The alternate brake equipment has valves (selector and servo valves) and pressure transmitters to control the LEHGS/accumulators hydraulic pressure, that is applied to the brakes.

L3 The hydraulic brake equipment is common with the alternate braking mode. However, there are two independent motors for each valve. One motor is controlled exclusively by the BCS, and the other is controlled exclusively by the EBCU.

L3 ALTERNATE BRAKE SELECTOR VALVES

There are four Alternate Brake Selector Valves (ABSELVs):
- One for the forward brakes of the WLG
- One for the aft brakes of the WLG
- One for the left BLG
- One for the right BLG.

Each ABSELV operates independently from the others, and opens when alternate, emergency, or ultimate braking is active on the corresponding landing gear.
If normal braking is lost on one or more landing gears, only the affected ABSELV(s) open.

L3 ALTERNATE SERVO VALVES

There is one Alternate Servo Valve (ASV) for each pair of brakes (8 ASVs).
The ASVs adjust alternate hydraulic pressure to decelerate the aircraft, in accordance with the flight crew inputs.

L3 ALTERNATE PRESSURE TRANSMITTERS

There is one Alternate Pressure Transmitter (APT) for each pair of brakes (8 APTs).
The APTs measure the alternate hydraulic pressure that is applied to the brakes.
This information is sent to the EBCU to provide control feedback and indications on the triple pressure indicator in the cockpit.

HYDRAULIC POWER SUPPLY

Alternate hydraulic power (LEHGS and/or accumulators) supplies the emergency braking.
If the LEHGS is not available, only the brake accumulators supply hydraulic power.

L3 There are four brake accumulators:
- Two for the WLG (one for the forward WLG brakes, one for the aft WLG brakes)
- Two for the BLG (one for the left BLG, one for the right BLG).

These accumulators are isolated between them: one accumulator failure will not prevent to keep half of WLG or BLG braking.

ULTIMATE BRAKING

Applicable to: ALL

When PARK BRK handle is set to ON position::

- The parking brake is set on the BLG brakes, at full pressure (about 3 600 PSI) (for more information *Refer to DSC-32-10-30-30-60 Parking Brake*)
- In addition, in some conditions (detected by PRIM), the EBCU opens the appropriate valves to send a 1 700 PSI limited hydraulic pressure to the WLG brakes

Note: When the PARK BRK is selected, ultimate braking will be activated if the ground spoilers are extended and the ground speed is higher than 25 kt (Ultimate braking remains active as long as the PARK BRK handle is in the ON position, or if any engine is running).

When PARK BRK handle is set to ON position:

- Normal differential braking is not available
- AUTO BRK is not available
- A-SKID is not available.

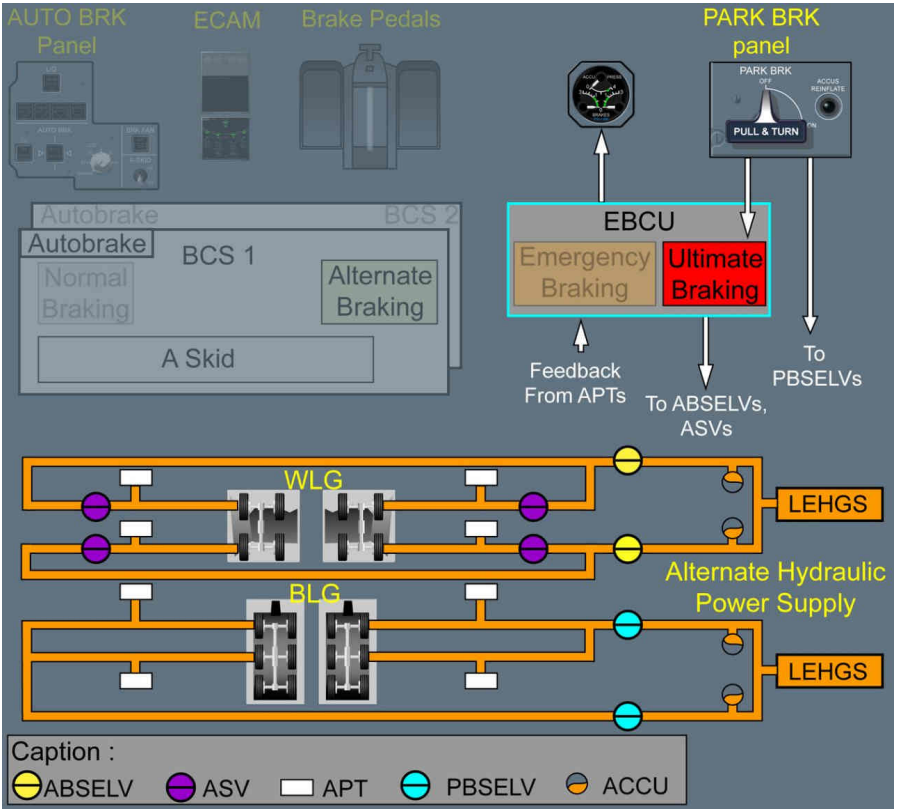
L2 The flight crew can monitor this limitation from the triple pressure indicator in the cockpit.

L1

CAUTION	Out of normal use of the PARK BRK when aircraft is stopped, flight crew must select PARK BRK handle to ON only if: - The brake pedals are jammed, or - The BRAKES PEDAL BRAKING FAULT alert is displayed. (*Refer to PRO-ABN-ECAM-10-32-190 BRAKES PEDAL BRAKING FAULT*). BLG tires will burst, WLG may burst.

ULTIMATE BRAKING ARCHITECTURE

Ultimate Braking Architecture



ULTIMATE BRAKING CONTROL

The EBCU controls ultimate braking on the WLG brakes.
The PARK BRK handle controls ultimate braking on the BLG brakes.

HYDRAULIC BRAKE EQUIPMENT

In ultimate braking, the alternate hydraulic brake equipment receives electrical commands from the EBCU.

The alternate brake equipment has valves (selector and servo valves) and pressure transmitters to control the LEHGS/accumulators hydraulic pressure, that is applied to the WLG brakes.

L3 The hydraulic brake equipment is common with the alternate braking mode and emergency braking mode.

L3 ALTERNATE BRAKE SELECTOR VALVES

There are four Alternate Brake Selector Valves (ABSELVs):
- One for the forward brakes of the WLG
- One for the aft brakes of the WLG
- One for the left BLG
- One for the right BLG.

Each ABSELV operates independently from the others, and opens when alternate, emergency, or ultimate braking is active on the corresponding landing gear.
If normal braking is lost on one or more landing gears, only the affected ABSELV(s) open.

L3 ALTERNATE SERVO VALVES

There is one Alternate Servo Valve (ASV) for each pair of WLG brakes (4 ASVs).
The ASVs adjust alternate hydraulic pressure to decelerate the aircraft.

L3 ALTERNATE PRESSURE TRANSMITTERS

There is one Alternate Pressure Transmitter (APT) for each pair of brakes (8 APTs).
The APTs measure the alternate hydraulic pressure that is applied to the brakes.
This information is sent to the EBCU to provide control feedback and indications on the triple pressure indicator in the cockpit.

L3 PARKING BRAKE SELECTOR VALVES

There are two Parking Brake Selector Valves (PBSELVs) :
- One for the right BLG
- One for the left BLG.

When the PARK BRK handle is set to the ON position, the PBSELVs open and hydraulic pressure from the brake accumulators is sent to the BLG brakes.

HYDRAULIC POWER SUPPLY

Alternate hydraulic power (LEHGS and/or accumulators) supplies the ultimate braking.
If the LEHGS is not available, only the brake accumulators supply hydraulic power.

L3 There are four brake accumulators:
- Two for the WLG (one for the forward WLG brakes, one for the aft WLG brakes)
- Two for the BLG (one for the left BLG, one for the right BLG).

PARKING BRAKE

Applicable to: ALL

The flight crew can apply the parking brake by setting the PARK BRK handle to ON.
When the parking brake is set to ON, the brakes of the BLG are applied, showing about 3 600 PSI on triple indicator with BLG accumulators normally filled.

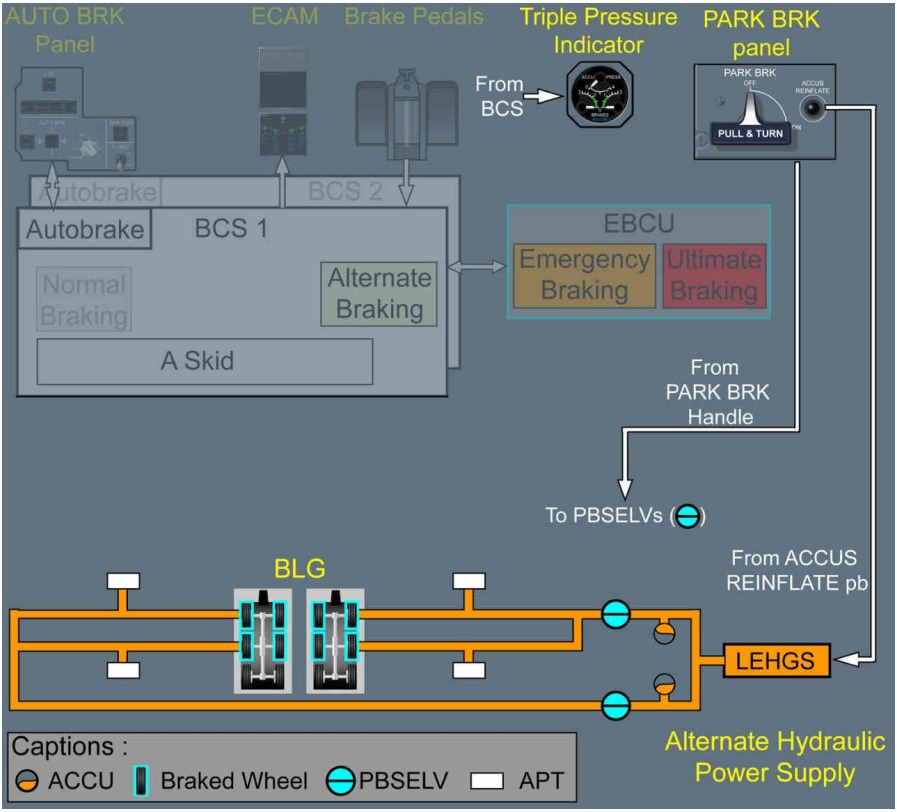
L2 *Note:* *If the flight crew applies more than 50% N1 on any engine with parking brake ON, the brakes of the WLG will be applied in addition to the BLG brakes.*

L1 A-SKID is not available.

Note:
- *There is no need to set PARK BRK to OFF to recover pedal braking*
- *If PARK BRK is set to ON and pedal is depressed by the flight crew, the highest commanded pressure between PARK BRK, normal brake, and alternate brake will always apply on each gear.*

PARKING BRAKE ARCHITECTURE

Parking Brake Architecture



ACCUS REINFLATE

The hydraulic pressure applied to the BLG brakes can be checked from the triple pressure indicator in the cockpit.

If the parking brake hydraulic pressure is low and all the engines are shut down, the ACCUS REINFLATE pb can be used to activate the BLG LEHGS and reinflate the BLG accumulators.

L2 With initial nominal BLG ACCUS filling, the parking brake is efficient for 12 h.

HYDRAULIC POWER SUPPLY

Alternate BLG hydraulic power (BLG LEGHS or BLG accumulators) supplies the parking brake.
If the LEHGS is not available, only the BLG brake accumulators supply hydraulic power.
There are two BLG brake accumulators:

- One for the LH BLG,
- One for the RH BLG.

The two BLG brake accumulators are isolated, preventing one BLG accumulator failure, or one BLG hydraulic leak on alternate braking system, to disable braking on the opposite BLG

L3 PARKING BRAKE SELECTOR VALVES

There are two Parking Brake Selector Valves (PBSELVs) :
- One for the right BLG
- One for the left BLG.

When the PARK BRK handle is set to the ON position, the PBSELVs open and hydraulic pressure from the brake accumulators is sent to the BLG brakes.

L3 ALTERNATE PRESSURE TRANSMITTERS

There is one Alternate Pressure Transmitter (APT) for each pair of brakes (8 APTs).
The four BLG APTs measure the alternate hydraulic pressure that is applied to the brakes, when the parking brake is set.
This information is sent to the BCS to provide control feedback and indications on the triple pressure indicator in the cockpit.

SUMMARY OF BRAKING MODES

Applicable to: ALL

Braking Mode	Hydraulic Power Supply	Braking Control	Cockpit Interface	Available Functions	Associated ECAM Alert Braking Performance
NORMAL	- WLG on GREEN - BLG on YELLOW	BCS	- Brake pedals - AUTO BRK Panel	- A-SKID - AUTO BRK - Differential braking	No associated alert Normal performance except if the *Refer to PRO-ABN-ECAM-10-32-200 BRAKES RELEASED* alert is displayed → Performance penalties

Continued on the following page

Continued from the previous page

Braking Mode	Hydraulic Power Supply	Braking Control	Cockpit Interface	Available Functions	Associated ECAM Alert Braking Performance
ALTERNATE	- LEHGS+ACCU	BCS	- Brake pedals - AUTO BRK Panel	- A-SKID - AUTO BRK - Differential braking	*Refer to PRO-ABN-ECAM-10-32-220 BRAKES NORM BRK FAULT* Normal performance except if the *Refer to PRO-ABN-ECAM-10-32-200 BRAKES RELEASED* alert is displayed → Performance penalties
EMERGENCY	- LEHGS+ACCU or - ACCU Only	EBCU	- Brake pedals	- Differential braking Brake pressure limited to: - 1 700 PSI for take off, and - 1 000 PSI for landing	*Refer to PRO-ABN-ECAM-10-32-130 BRAKES A-SKID FAULT ON ALL L/Gs* Degraded performance *Note: Limited number of brake applications if on ACCU only.*
ULTIMATE	- LEHGS+ACC or - ACCU Only	EBCU	- PARK BRK handle only	- Full PRK BRK pressure applied on BLG 3 600 PSI - Braking pressure on WLG limited to 1 700 PSI	*Refer to PRO-ABN-ECAM-10-32-190 BRAKES PEDAL BRAKING FAULT* Degraded performance *Note: Risk of BLG tire burst*
PARKING	- LEHGS+ACCU		- PARK BRK handle only	- PRK BRK applied on BLG only	N/A

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OVERVIEW

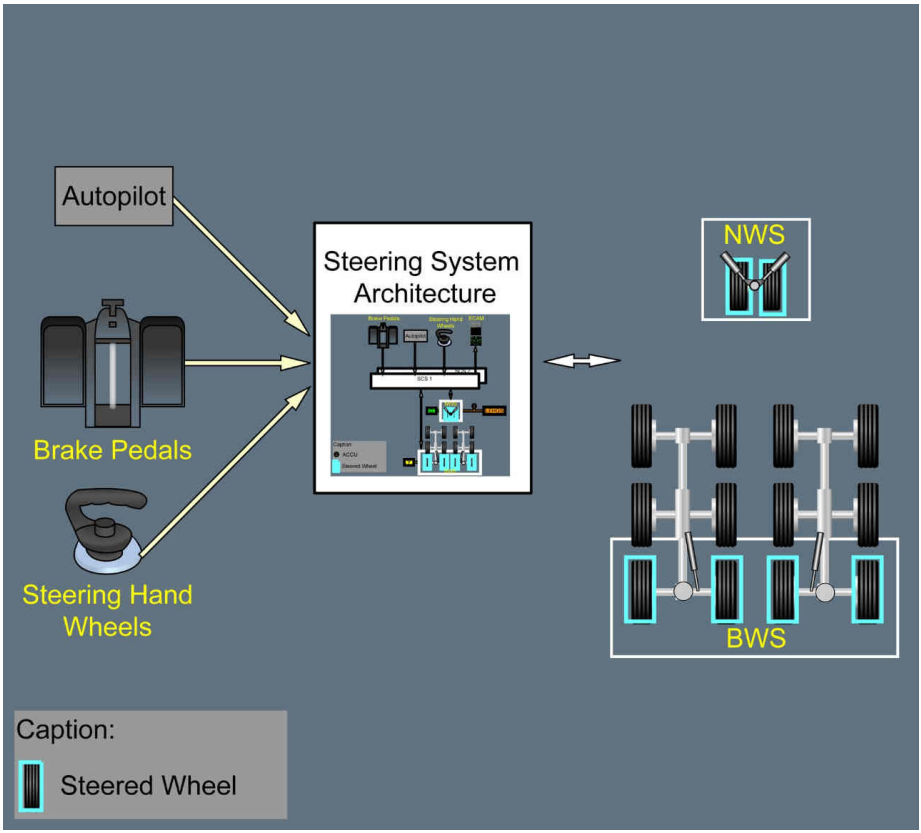
Applicable to: ALL

The steering system enables directional control of the aircraft on ground and combines:
- Nose Wheel Steering (NWS)
- Body Wheel Steering (BWS).

The flight crew can steer the aircraft using:
- The rudder pedals, or
- The steering handwheels.

The autopilot can also generate steering commands during an automatic landing.

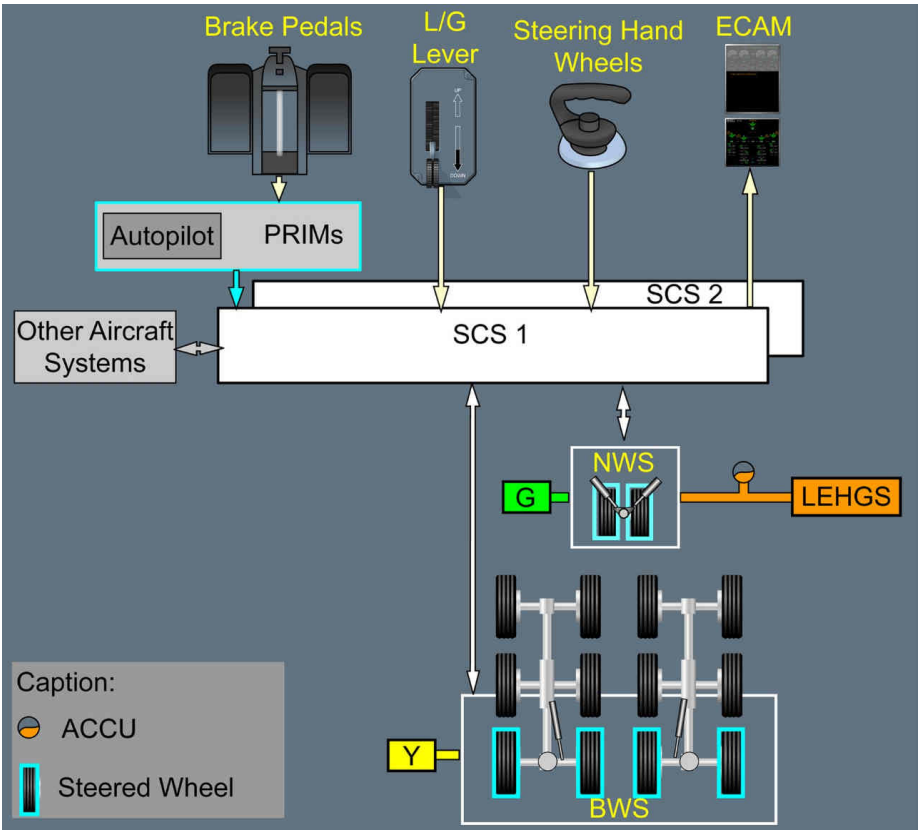
Overview


Autopilot
Brake Pedals
Steering Hand Wheels
Steering System Architecture
NWS
BWS
Caption:
Steered Wheel

ARCHITECTURE

Applicable to: ALL

Architecture



STEERING CONTROL SYSTEM

The steering control system (SCS) controls the Nosewheel Steering (NWS) and the Body Wheel Steering (BWS).

The SCS has two redundant control systems referred to as SCS 1 and SCS 2.

One SCS is active while the other is a backup.

L2 The backup SCS automatically activates, if the active SCS fails.

L3 The active SCS changes after each landing gear extension.
Both SCS are hosted by the CPIOMs G.

L1 Each SCS receives electrical commands from the flight crew via:
- The steering handwheels
L3 The steering handwheels and the rudder pedals have sensors that convert the flight crew commands to electrical commands.
L1 - The rudder pedals
L3 The commands from the rudder pedals are initially sent to the three PRIMs. If the PRIMs fail, the steering handwheels are still available to steer the aircraft (at low speed).
L1 - The autopilot during automatic landings
L3 - The L/G lever.
Each time the landing gear lever is set to the DOWN position, the active SCS changes.

L1 Then, the active SCS computes and sends electrical commands to the hydraulic equipment of the steering system.
At taxi speed, below 50 kt, when the flight crew releases the steering handwheel, the SCS maintains the aircraft in straight line. This steering function is named Heading Control Function (HCF).
L2 The HCF takes into account the external perturbations (crosswind, nose wheel steering offset, taxiway slope). The HCF can order a maximum of +/- 3 ° of nosewheel steering.
At takeoff and landing above 50 kt, the HCF remains inactive.
L1 The SCS also sends data to the ECAM to generate alerts and to display the WHEEL system display.

L3 INTERFACE WITH OTHER SYSTEMS

The SCS sends data to the Digital Flight Data Recorder (DFDR) to BCS, to HSMU (for yellow EMP start) and receives ground speed data from the Air Data and Inertial Reference System (ADIRS).

NOSEWHEEL STEERING

Applicable to: ALL

There are two NWS modes:
- The normal NWS
- The alternate NWS.

L2 The NWS is not available when the engines are shut down.

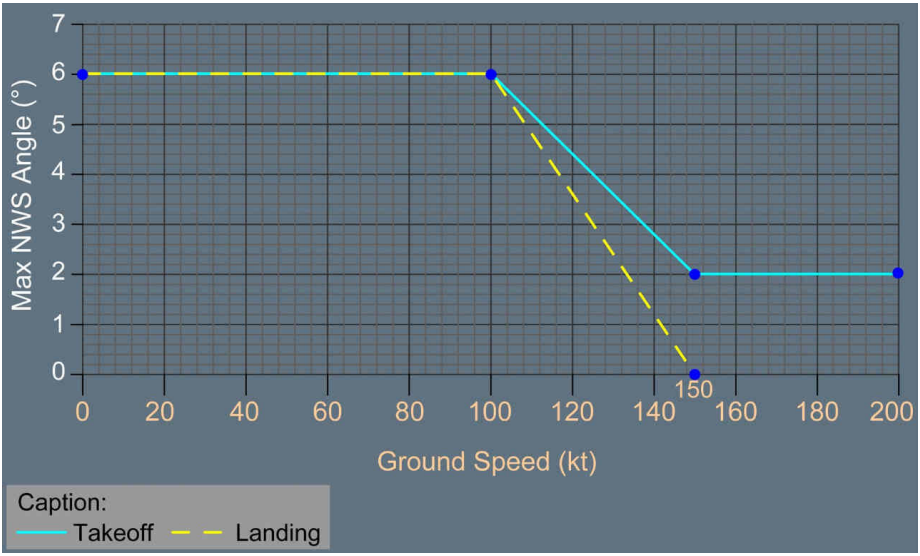
L1 In both modes, the NWS angle is a function of:
- The position of the steering handwheel that is used by the flight crew, or
- The deflection of the rudder pedals

L2 The rudder pedals of the Captain (CAPT) and the First Officer (F/O) are mechanically linked.
- The ground speed of the aircraft.

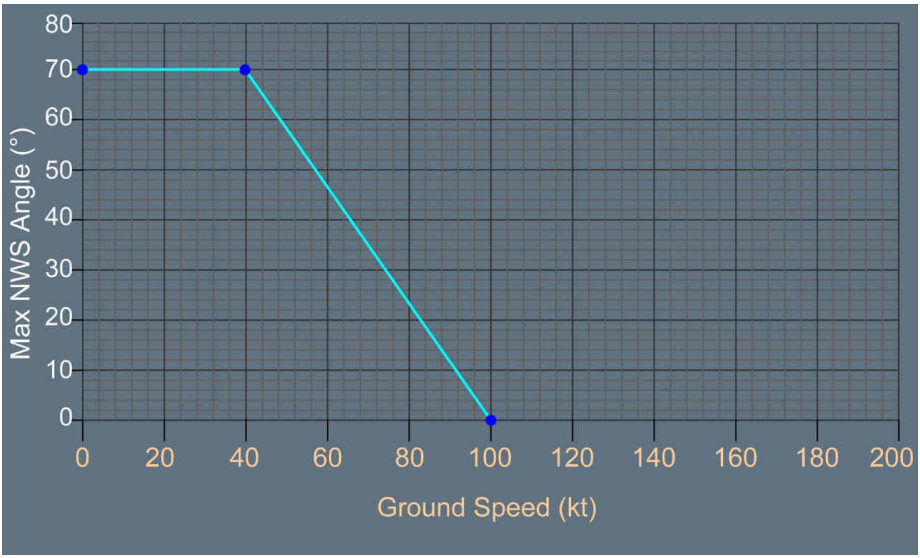
L1 *Note:* *If both steering handwheels are used simultaneously, the steering commands are algebraically added.*

The maximum NWS angle is:
- 6 degrees left or right, via the rudder pedals
- 70 degrees left or right, via the steering handwheels.

Maximum NWS Angle via the Rudder Pedals



Maximum NWS Angle via the Steering Handwheels

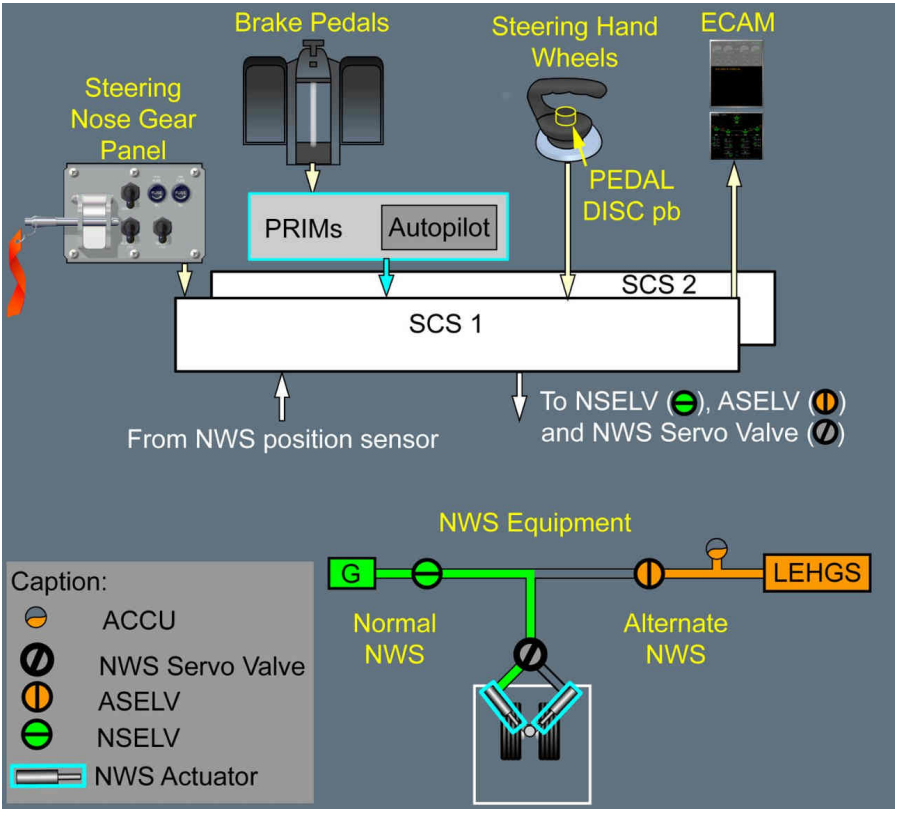


The flight crew can disconnect the NWS from the rudder pedals via the PEDAL DISC pb (e.g. during the flight control checks).

L3 The NLG has a centering cam that automatically returns the nose wheels to the centered position after liftoff. Should the centering cam fail, the steering system will return the nosewheels to the centered position.

NOSEWEEL STEERING ARCHITECTURE

NWS Architecture



NORMAL NOSEWHEEL STEERING (NWS)

In normal NWS:

- The GREEN system supplies hydraulic power
- The number of steering commands is not limited

L3 - The maximum NWS rate is 15 degrees per second.

ALTERNATE NOSEWHEEL STEERING (NWS)

L2 For the steering system, hydraulic supply redundancy is achieved with a dedicated Local Electro-Hydraulic Generation System (LEHGS) to allow NWS at landing and RWY vacate. The LEHGS has its own hydraulic reservoir and uses electrical power to generate hydraulic pressure.

L1 If the GREEN hydraulic supply fails, the alternate NWS activates automatically.
Alternate NWS availability during taxi-in will be limited by the hydraulic fluid of the nose wheel steering overheat (preventive warning, for more information *Refer to PRO-ABN-ECAM-10-32-360 STEER ALTN STEER SYS HOT*).

In alternate NWS , the hydraulic power is supplied by:
- The steering Local Electro-Hydraulic Generation System (LEHGS)

  Note: The steering LEHGS is active when all engines are running.

- The NWS accumulator.

L2 The NWS accumulator stores hydraulic pressure and is kept pressurized by the LEHGS . It provides:
- Additional hydraulic pressure to deal with peak flow demands when the LEHGS operates
- Hydraulic pressure for a limited number of steering commands when the LEHGS fails.

L1 In alternate NWS , the steering performance is degraded. Therefore, the damping of the steering handwheels automatically increases to prevent the flight crew from commanding excessive steering rates.

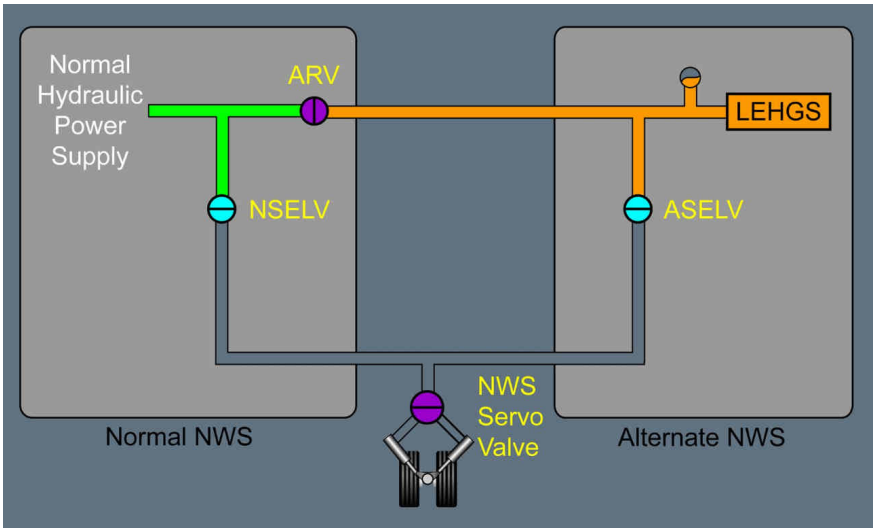
L3 The maximum alternate NWS rate is 10 degrees per second.

L1 The number of steering commands is not limited, unless:
- The STEER ALTN STEER SYS OVHT (*Refer to PRO-ABN-ECAM-10-32-360 STEER ALTN STEER SYS HOT*) alert is displayed, preceded by NWS STEER FAULT (*Refer to PRO-ABN-ECAM-10-32-330 STEER B/W STEER FAULT*), or
- The LEHGS fails (*Refer to PRO-ABN-ECAM-10-32-320 STEER ALTN N/W STEER FAULT*).

L3 **ARV**

The steering system has an Alternate Refill Valve (ARV) that can connect the normal and the alternate hydraulic power supplies. After all engines are started, the ARV automatically opens to charge the NWS accumulator and refill the hydraulic reservoir of the LEHGS .
The ARV automatically closes when the ground speed exceeds 30 kt , and remains closed for the rest of the flight, to segregate normal and alternate hydraulic steering power supplies.

ARV



NOSEWHEEL STEERING EQUIPMENT

The NWS equipment is controlled by the active SCS and uses hydraulic pressure to steer the aircraft in accordance with the flight crew inputs.

The NWS equipment has:

- Two NWS hydraulic actuators on the NLG
- L3 One NWS servo valve
- One Normal Selector Valve (NSELV)
- One Alternate Selector Valve (ASELV)
- A NWS position sensor provides the SCS with steering angle feedback.

L3 NWS SERVO VALVE

The NWS servo valve controls the hydraulic pressure that is supplied to the steering actuators in accordance with the flight crew steering commands.

L3 NORMAL SELECTOR VALVE

The Normal Selector Valve (NSELV) opens when the normal NWS is active.
If the normal NWS fails, the NSELV closes automatically to isolate the NWS from the GREEN hydraulic pressure.

L3 ALTERNATE SELECTOR VALVE

The Alternate Selector Valve (ASELV) opens when the alternate NWS is active.

TOWING

When the aircraft is towed, the TOW sw on the steering nose gear panel must be placed in the towing position to enable the NLG to be free to castor and prevent damages to the structure if engine fuel lever is set ON.

L2 For more information on the nose gear steering panel, *Refer to DSC-32-20-140-90 Steering Nose Gear Panel* .

BODY WHEEL STEERING

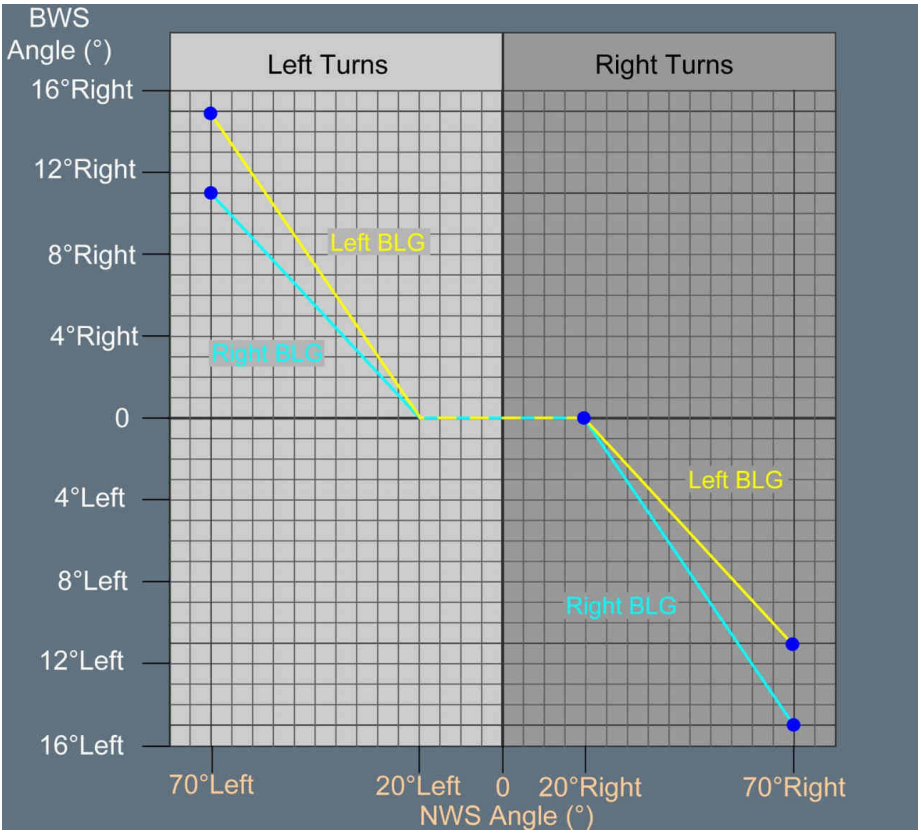
Applicable to: ALL

The BWS reduces the loads on the BLG when the aircraft turns on ground, and activates automatically when the NWS reaches a specific angle.

L2 The BWS activates automatically when the NWS angle is higher than 20 ° and the ground speed is less than 30 kt (*Refer to DSC-32-30-20 NWS and BWS Operation*).

L3 The BWS rate is 4.5 ° per second.

NWS Angle versus BWS Angle



One BWS position sensor per BLG provides the SCS with steering angle feedback.

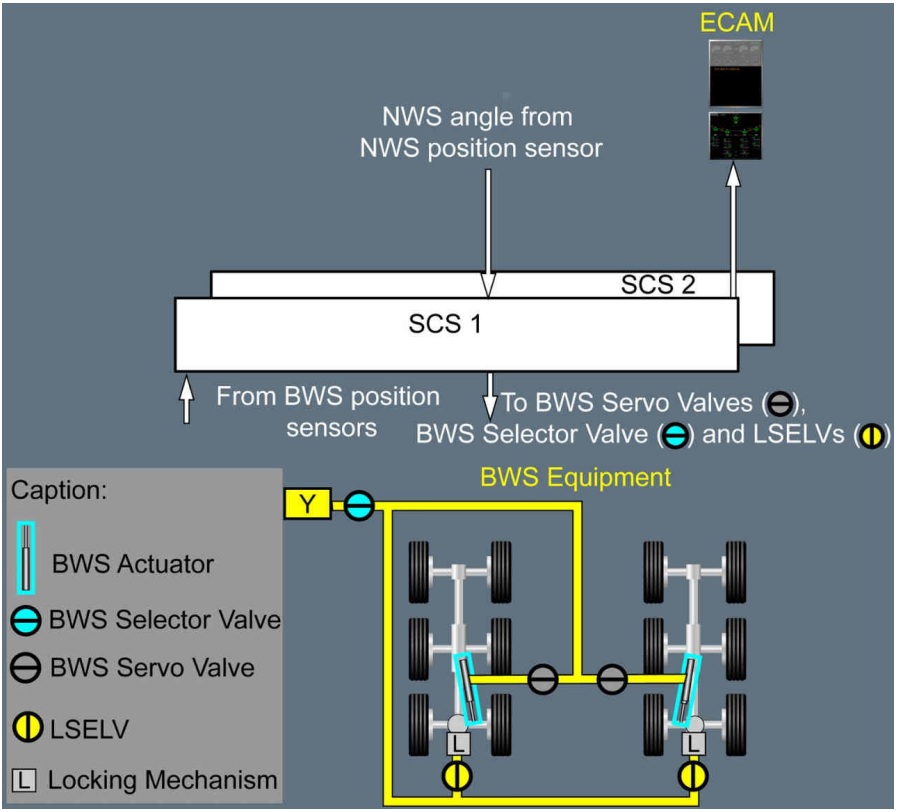
L1 When YELLOW pressure is available to BWS and BWS is not active, both BWS are locked in the center position.

The YELLOW hydraulic system supplies the BWS with hydraulic power.

The BWS can activate when YELLOW hydraulic supply is available, either from yellow engine pumps when engine three or four is running, or from yellow electrical pumps when the engines three and four are not running.

BODY WHEEL STEERING ARCHITECTURE

BWS Architecture



BWS EQUIPMENT

The BWS equipment is controlled by the active SCS and uses hydraulic pressure to actuate the aft axles of both BLGs.

The BWS equipment of each BLG has:
- One BWS actuator
- One locking mechanism

L3 The locking mechanism has:
- One locking spring.
  The locking spring maintains the locking mechanism in the locked position.
- One unlocking hydraulic actuator
  The unlocking actuator extends to cancel the action of the spring and unlock the locking mechanism.

- One BWS servo valve
- One Lock Selector Valve (LSELV)
- One BWS position sensor that provides the SCS with steering angle feedback.

L3 BWS SERVO VALVE

The BWS servo valve controls the hydraulic pressure to extend or retract its associated steering actuator.

L3 BWS SELECTOR VALVE

The BWS selector valve (BSELV) opens when the BWS is active.
When the BWS is not active, the BSELV is closed to prevent unlocking of the locking mechanism.

L3 LOCK SELECTOR VALVE

The Lock Selector Valve (LSELV) controls the hydraulic power that is supplied to the locking mechanism.
It opens to unlock the locking mechanism when the BWS becomes active.
It closes to lock the locking mechanism when the aft axle of the BLG is centered.

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BRAKE TEMPERATURE MONITORING SYSTEM (BTMS)

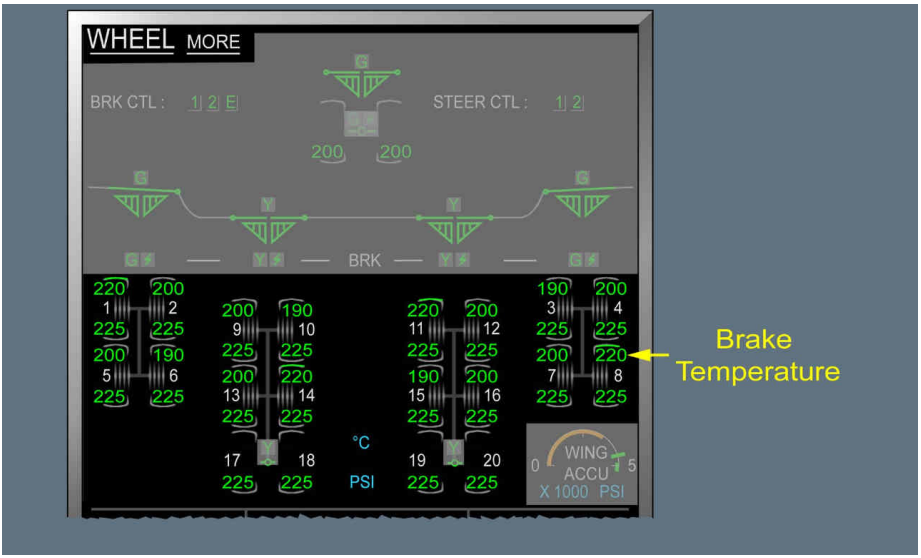
Applicable to: ALL

The Brake Temperature Monitoring System (BTMS) measures the temperature of each brake and sends it to:

- The ECAM to generate the BRAKES BRAKES HOT alert (*Refer to Procedure*) and to display the WHEEL page
- L3 - The Central Maintenance System (CMS) to trigger maintenance messages.

The BTMS displays measured temperatures from 0 °C to 995 °C by 5 °C steps.

BTMS Indications



L1 For information on the BTMS indications on the WHEEL system display, *Refer to DSC-32-20-70-50 WHEEL SD - TPIS and BTMS Indications* .

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TIRE PRESSURE INDICATING SYSTEM (TPIS)

Applicable to: ALL

The Tire Pressure Indicating System (TPIS) measures the pressure of each tire and sends it to:

- The ECAM to generate the WHEEL TIRE PRESS LO alert (*Refer to Procedure*) and to display the WHEEL page

L3 The TPIS can measure pressures from 0 to 400 PSI by 5 PSI steps.

TPIS Indications



L1 For more information on the TPIS indications on the WHEEL system display, *Refer to DSC-32-20-70-50 WHEEL SD - TPIS and BTMS Indications* .

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OLEO PRESSURE MONITORING SYSTEM (OPMS)

Applicable to: ALL

The Oleo Pressure Monitoring System (OPMS) measures the pressure of each landing gear shock absorber and sends it to:

- The ECAM to generate the appropriate ECAM alerts
- The Central Maintenance System (CMS) to trigger maintenance messages.

The pressure indicators on each landing gear indicate the pressure of the shock absorbers.

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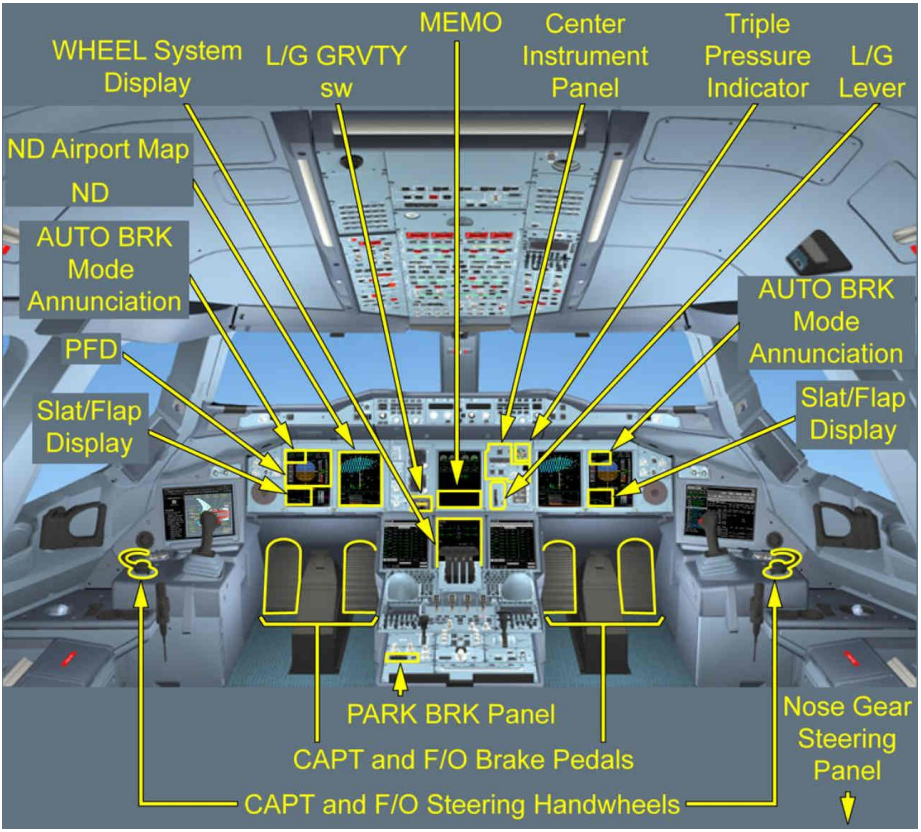
COCKPIT VIEW

Applicable to: ALL

Cockpit View



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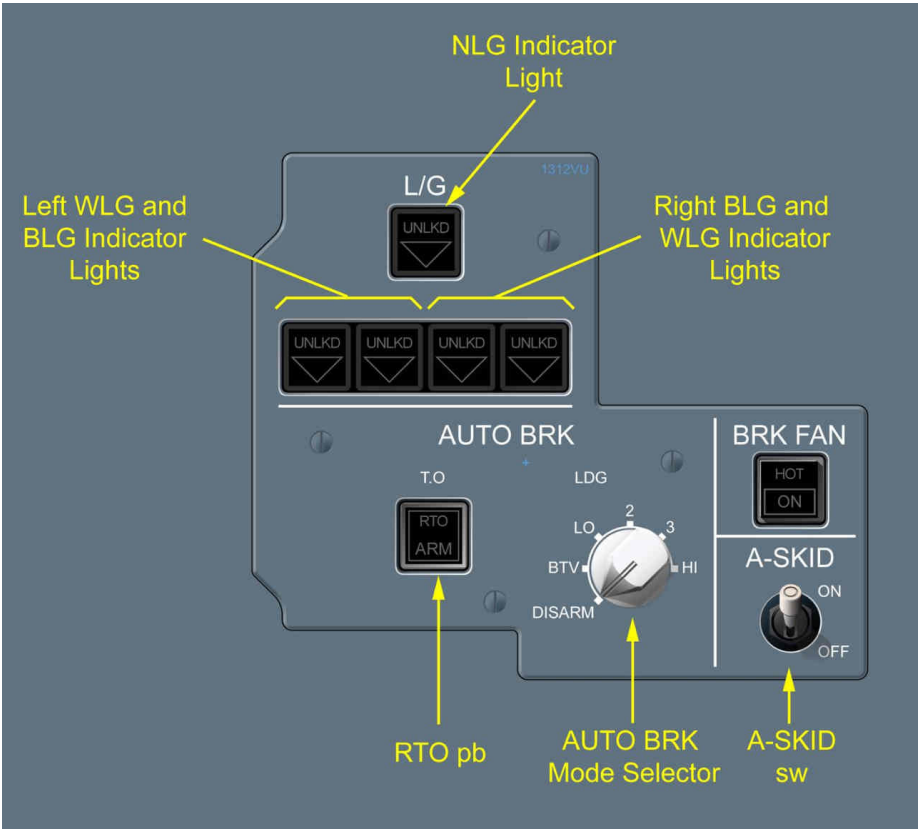
CENTER INSTRUMENT PANEL

Applicable to: ALL



AUTO BRK mode selector

L13



The flight crew arms/disarms a landing AUTO BRK mode, by rotating the AUTO BRK mode selector to the appropriate position.
Each mode corresponds to a deceleration target.
For the basic AUTO BRK mode/deceleration equivalence, *Refer to DSC-32-10-30-20 Autobrake* .
For information on BTV autobrake mode, *Refer to BTV system Description* .
If all the AUTO BRK arming conditions are satisfied, the selector is electrically maintained in the selected position.
If an arming condition is lost or the RTO mode is armed, the selector automatically returns to the DISARM position. For BTV , in the case of a reversion to BRK HI, the selector stays on BTV position even if the FMA displays BRK HI .
Simultaneously, the light of the RTO pb or ACTIV light go off.
For AUTO BRK arming conditions, *Refer to DSC-32-10-30-20 Autobrake* .
For BTV arming conditions, *Refer to BTV System Description* .

Note: A landing AUTO BRK mode can be armed in flight, and on ground.

RTO pb



The AUTO BRK is not armed in the RTO mode.



When the RTO pb is pressed, the RTO mode arms and the RTO ARM light goes on provided all the arming conditions are satisfied. In addition, RTO in blue is displayed on PFD FMA left column.
When the RTO pb is pressed again, the RTO mode disarms.
For AUTO BRK arming and disarming conditions, *Refer to DSC-32-10-30-20 Autobrake* .

Note: The RTO mode can be armed only on ground.

A-SKID sw



The A-SKID is available if normal braking or alternate braking with A-SKID are available.

L12



The A-SKID is off. As a consequence, emergency braking is active.
Refer to DSC-32-10-30-30-40 Emergency Braking

Note: - *A-SKID sw OFF does not cut off NWS*
- *A-SKID sw OFF is to be used only in case of total brake efficiency loss.*

L/G Indicator light

The NLG , the WLG and the BLG indicator lights have the same logic.



The associated landing gear is uplocked and the landing gear lever is in the UP position.



The associated landing gear is downlocked and the landing gear lever is in the DOWN position.

Note: *LGCIS 1 supplies the gear downlock information, via an independent set of proximity sensors. For more information, Refer to DSC-32-10-20-10 Landing Gear Control and Indication System (LGCIS) .*



The associated landing gear is:
- In transit, or
- Not locked in the selected position, after the normal extension/retraction delay.
  In this case, the L/G GEAR NOT LOCKED DOWN (*Refer to Procedure*) or L/G GEAR NOT LOCKED UP (*Refer to Procedure*) alerts are displayed.

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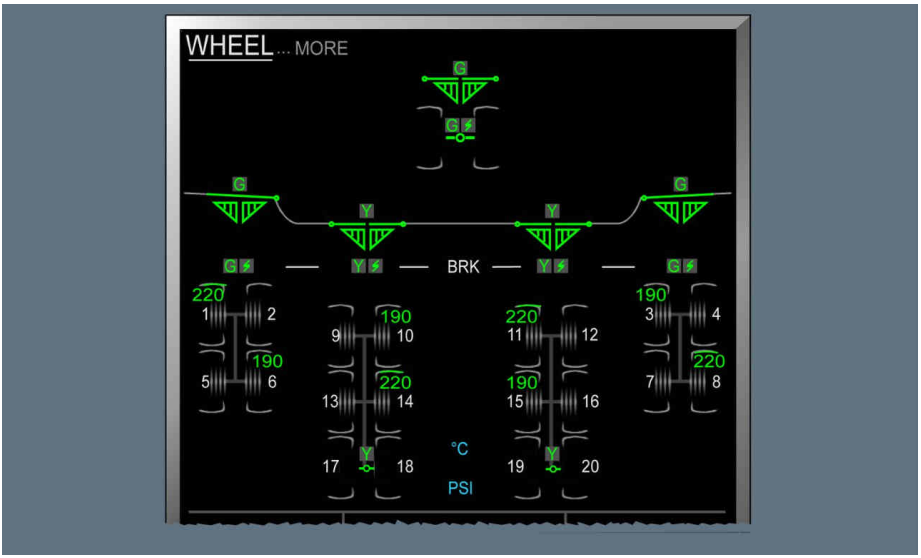
WHEEL SYSTEM DISPLAY

Applicable to: ALL

The WHEEL System Display provides the flight crew with information on the landing gear and the associated systems, such as:

- The position of the landing gear and the landing gear doors
- The available hydraulic power sources
- All the brake temperatures
- The malfunctions.

WHEEL System Display



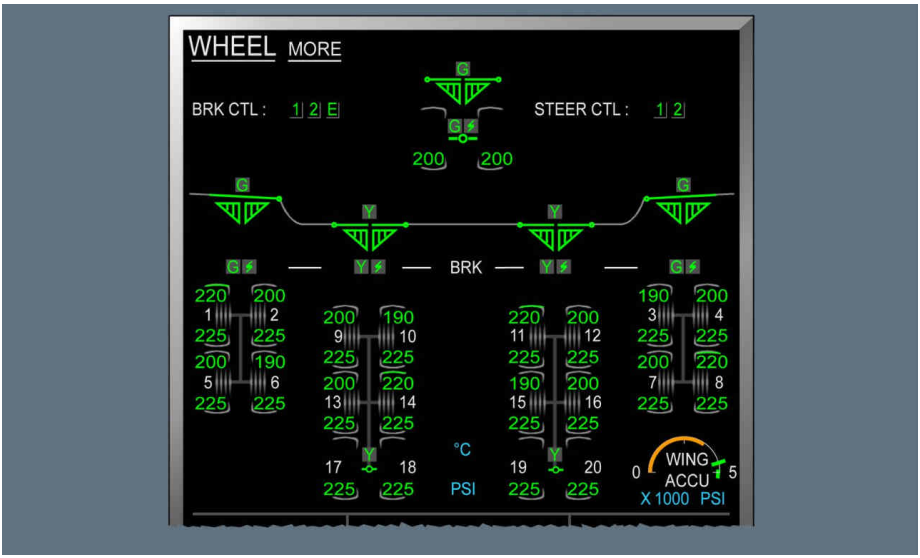
The MORE key on the ECP can be used to display additional landing gear information. When pressed:

- The MORE title changes from 

to 

- The following additional information is displayed:
  - The BRK CTL and the STEER CTL indications
  - The tire pressures
  - The WING ACCU pressure indicator.

WHEEL MORE System Display



For a description of the WHEEL System Display:

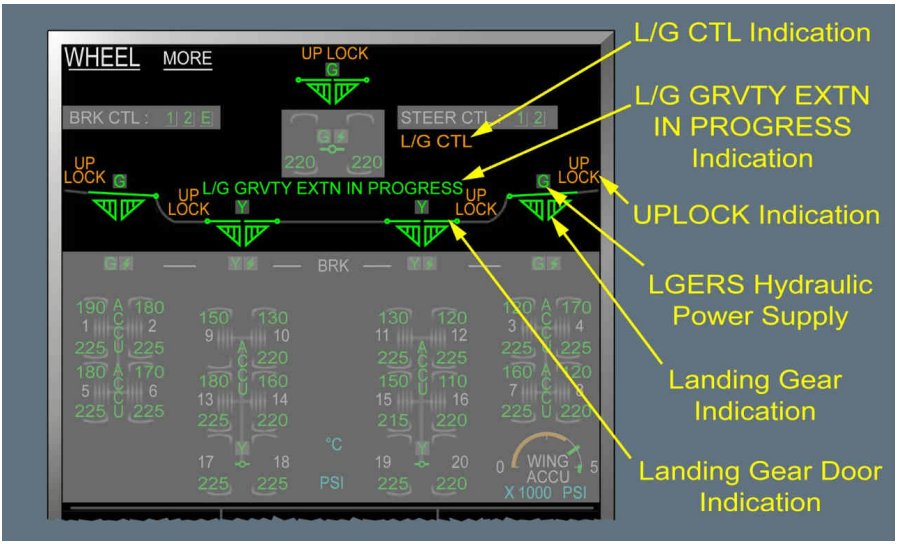
- *Refer to DSC-32-20-40-20 WHEEL SD - LGERS Indications*
- *Refer to DSC-32-20-50-30 WHEEL SD - Braking System Indications*
- *Refer to DSC-32-20-60-40 WHEEL SD - Steering System Indications*
- *Refer to DSC-32-20-70-50 WHEEL SD - TPIS and BTMS Indications* .

WHEEL SD - LGERS INDICATIONS

Applicable to: ALL

LGERS INDICATIONS

LGERS Indications



L/G CTL INDICATION

L/G CTL

Displayed when one or more landing gears are not locked in the selected position, after the normal extension/retraction delay.
The L/G GEAR NOT LOCKED DOWN (*Refer to Procedure*) or L/G GEAR NOT LOCKED UP (*Refer to Procedure*) alerts are also displayed.

UP LOCK INDICATION

UP LOCK

Displayed when the landing gear is extended and one or more uplocks are in the closed position (the normal position is open).
The L/G UPLOCK FAULT alert is displayed also (*Refer to Procedure*).

LGERS HYDRAULIC POWER SUPPLY

G

GREEN hydraulic power is available.

Y — YELLOW hydraulic power is available.

G — GREEN hydraulic pressure is low.

Y — YELLOW hydraulic pressure is low

LANDING GEAR INDICATION

No display: The associated landing gear is uplocked.

L12



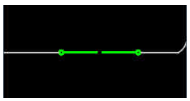
The associated landing gear is downlocked.
LGCIS 1 controls the display of the left triangle and LGCIS 2 controls the display of the right triangle.

L12

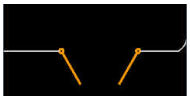


The associated landing gear is in transit.
LGCIS 1 controls the display of the left triangle and LGCIS 2 controls the display of the right triangle.

LANDING GEAR DOORS INDICATIONS



The landing gear doors are closed and uplocked.



The landing gear doors are in transit.



The landing gear doors are open.

L/G GRVTY EXTN IN PROGRESS INDICATION

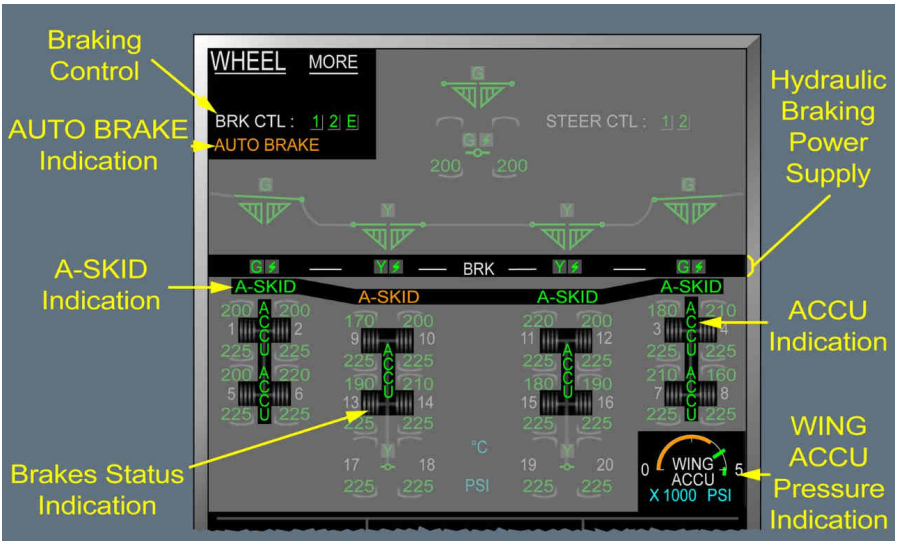
L/G GRVTY EXTN IN PROGRESS appears when the flight crew commands a landing gear gravity extension. The message no longer appears when all gears are down locked, or after 120 s . For more information on landing gear gravity extension panel *Refer to DSC-32-20-90-70 L/G GRVTY Panel* .

WHEEL SD - BRAKING SYSTEM INDICATIONS

Applicable to: ALL

BRAKING SYSTEM INDICATIONS

Braking System Indications



A-SKID INDICATION

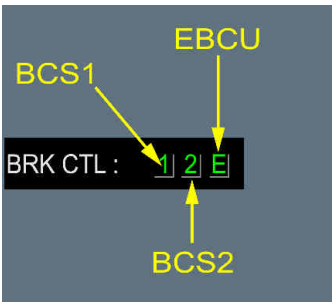
A-SKID

Displays when the associated landing gear A-SKID is failed.
Different combination of landing gear A-SKID failure leads to different ECAM alerts.

- BRAKES A-SKID FAULT ON ALL L/G *Refer to PRO-ABN-ECAM-10-32-130 BRAKES A-SKID FAULT ON ALL L/Gs*
  A-SKID is displayed above each landing gear.
- BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G *Refer to PRO-ABN-ECAM-10-32-135 BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G*
  A-SKID is displays above the right or left body landing gear
- BRAKES A-SKID FAULT ON WING L/G *Refer to PRO-ABN-ECAM-10-32-132 BRAKES A-SKID FAULT ON WING L/Gs*
  A-SKID is displayed above both wing landing gears
- BRAKES A-SKID FAULT ON WING + L(R) BODY L/Gs *Refer to PRO-ABN-ECAM-10-32-136 BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs*
  A-SKID is displayed above both wing landing gear and the right or left body landing gear
- BRAKES A-SKID FAULT ON L + R BODY L/G *Refer to PRO-ABN-ECAM-10-32-134 BRAKES A-SKID FAULT ON L + R BODY L/Gs*
  A-SKID is displayed above both body landing gears

BRAKING CONTROL

Braking Control



The braking control line displays when:
- One or more braking control systems are failed (BCS and/or EBCU), or
- The MORE key on the ECP is pressed.



BCS 1(2) operates normally.



The EBCU is failed.

AUTO BRAKE INDICATION



Displayed when the AUTO BRK is failed.
The BRAKES AUTO BRK FAULT alert is displayed also (*Refer to Procedure*).

HYDRAULIC BRAKING POWER SUPPLY



GREEN hydraulic power is available.



YELLOW hydraulic power is available.



GREEN hydraulic pressure is low.



YELLOW hydraulic pressure is low.



The associated LEHGS hydraulic pressure is available.



The associated LEHGS is failed.

ACCU INDICATION

L12



Displayed when:
- Normal braking is failed on the associated landing gear.
- The associated brake accumulator is available.

The loss of normal braking is detected by the braking system:
- During the pre-land test, at landing gear extension, or
- when braking is applied (manual or autobrake).

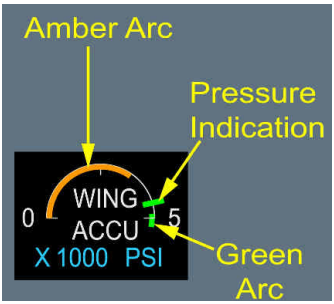


Displayed when the associated brake accumulator is not available (low pressure).

WING ACCU PRESSURE INDICATION

Displayed when:
- The pressure of a wing brake accumulator is low (in the amber arc), or
- The MORE key on the ECP is pressed.

WING ACCU Pressure Indication



PRESSURE INDICATION

The pressure indication shows the lowest wing brake accumulator pressure.
When in the amber arc, the pressure indication is amber.
When outside the amber arc, the pressure indication is green.

GREEN ARC

The green arc represents the high pressure zone.
L3 The green arc ranges from 4872 to more than 5000 PSI.

L1 ### AMBER ARC

The amber arc represents the low pressure zone.
L3 The amber arc ranges from 0 to 3480 PSI.

BRAKES STATUS INDICATION



Residual braking affects the associated pair of brakes.

L12



The associated pair of brakes is released.
A pair of brakes can be released only in normal or alternate braking.
Brakes can be released because of:

- the failure of normal hydraulic valves, or
- An A-SKID failure.

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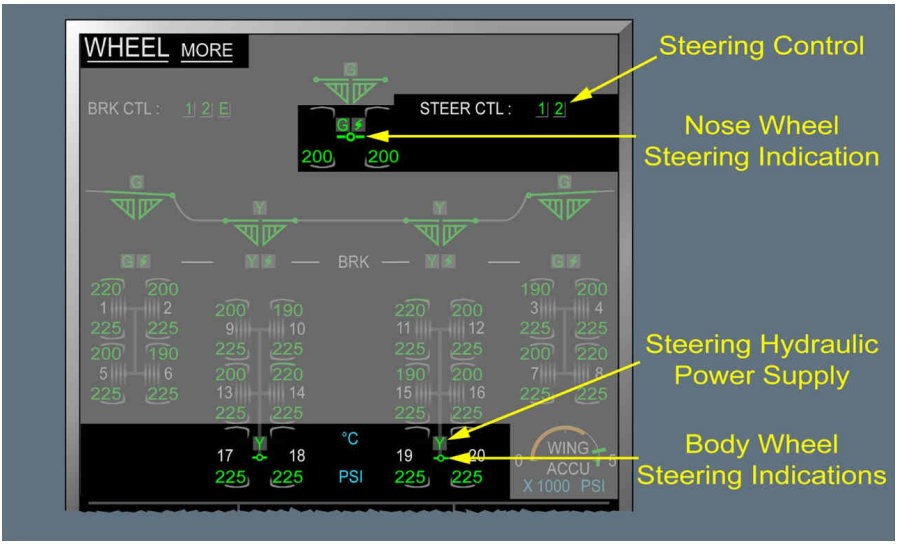
WHEEL SD - STEERING SYSTEM INDICATIONS

Applicable to: ALL

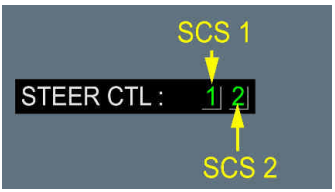
STEERING SYSTEM INDICATIONS

Steering System Indications



STEERING CONTROL

Steering Control



The steering control line displays when:
- At least one steering control system is failed, or
- The MORE key on the ECP is pressed.

1 SCS 1(2) operates normally.



SCS 2(1) is failed.

NOSE/BODY WHEEL STEERING INDICATIONS



The nose/body wheel steering operates normally.



- The nose/body wheel steering is failed, or
- The body wheel locking mechanism is failed.

STEERING HYDRAULIC POWER SUPPLY



GREEN hydraulic power is available.



YELLOW hydraulic power is available.



GREEN hydraulic pressure is low.



YELLOW hydraulic pressure is low.



The associated LEHGS hydraulic pressure is available.



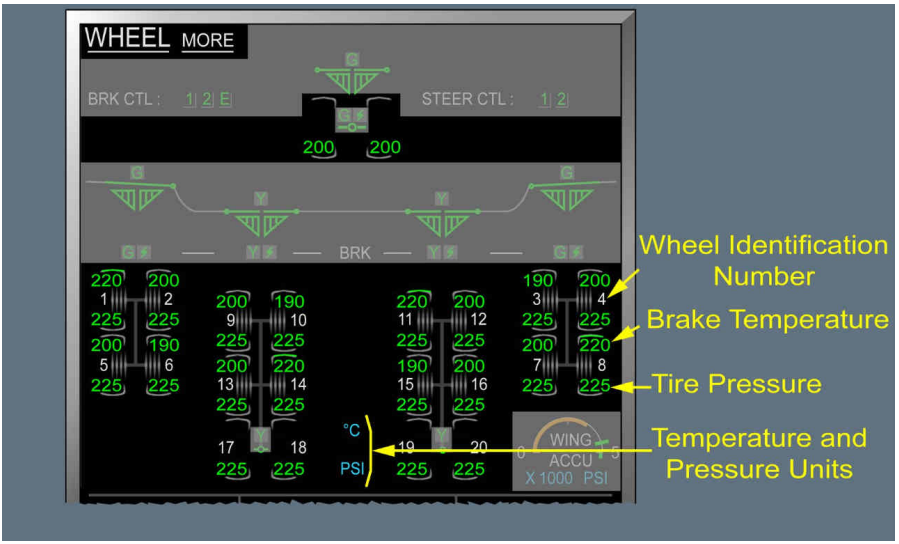
The associated LEHGS is failed.

WHEEL SD - TPIS AND BTMS INDICATIONS

Applicable to: ALL

TPIS AND BTMS INDICATIONS

TPIS and BTMS Indications



BRAKE TEMPERATURE



The brake temperature is normal.

L12



The brake temperature is normal. The green arc indicates that it is the hottest wheel brake on the aircraft.
The green arc displays only if the brake temperature exceeds 100 °C.

L123



The brake temperature is excessive for take off.
In case of excessive temperature, there is a risk of fluid auto-ignition in case of leak, a risk of runway overrun in case of aborted take off.
The brake temperature exceeds 300 °C.



The brake temperature exceeds 300 °C. The amber arc indicates that is the hottest wheel brake on the aircraft.

TIRE PRESSURE



Displayed when:
- The tire pressure is normal
- The MORE key on the ECP is pressed.



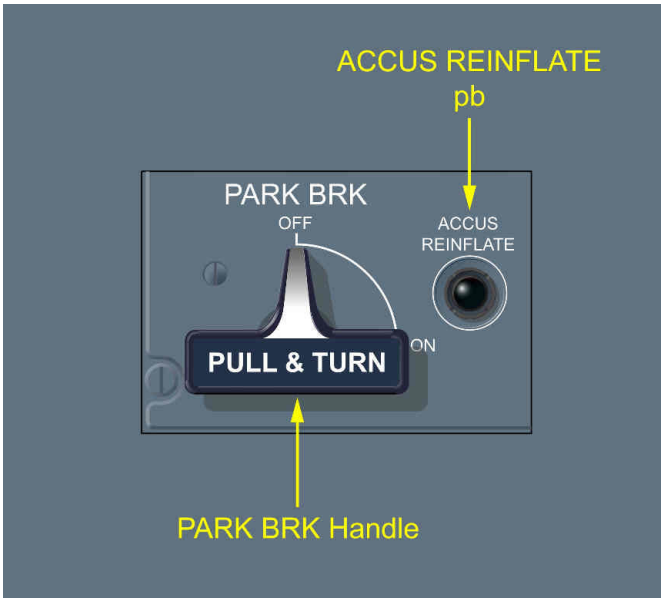
Displayed when:
- The tire pressure is low, or
- The difference between the two tire pressures of the same axle is excessive.

The WHEEL TIRE PRESS LO alert displays simultaneously (*Refer to Procedure*).

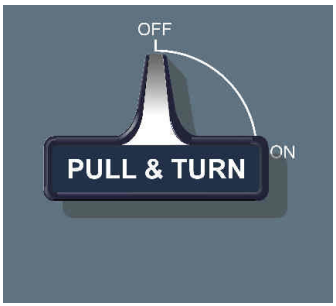
PARK BRK PANEL

Applicable to: ALL

PARK BRK Panel

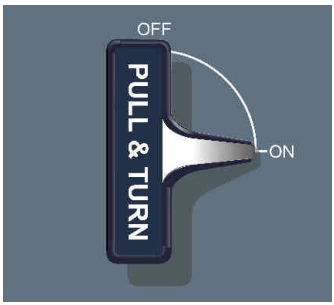


PARK BRK HANDLE



The parking brake is not set.

L12



The parking brake is set (ultimate braking may be activated. For more information *Refer to DSC-32-10-30-30-50 Ultimate Braking* Ultimate Braking.
When PARK BRAKE is ON, there is no need to set it OFF to recover pedal braking.

ACCUS REINFLATE pb

L12



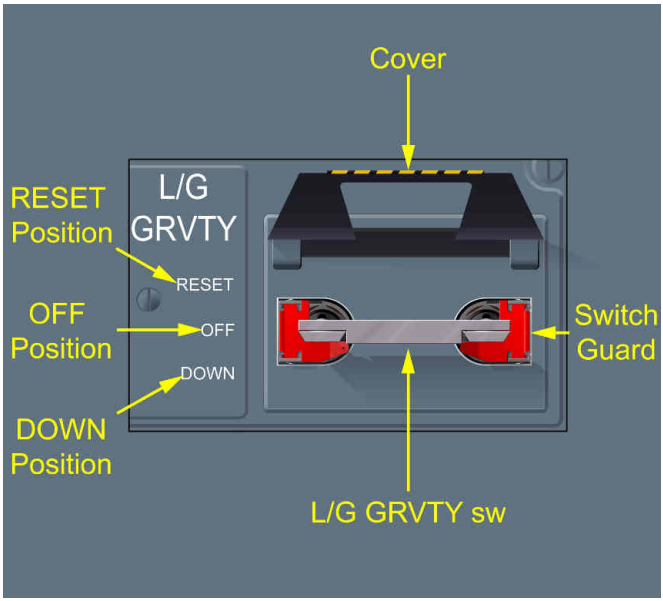
When pressed, the BLG LEHGS and WLG LEHGS activates to pressurize the BLG and WLG brake accumulators. A single push on the ACCUS reinflate pb is enough.

Note: *When any engine is running, associated brake accumulators are automatically pressurized (through ARV in normal taxi-out, or through LEHGS).*

L/G GRVTY PANEL

Applicable to: ALL

L/G GRVTY Panel



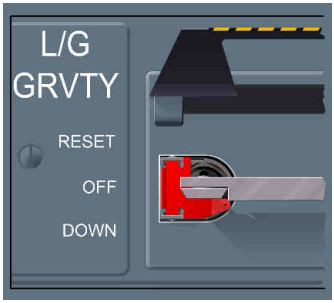
L/G GRVTY sw

The L/G GRVTY panel has two switches that are linked together for simultaneous operation, and protected by a cover.

L2 However, if the link is removed, the switches can be used separately, for maintenance purposes only.

Each switch controls one FFCM.

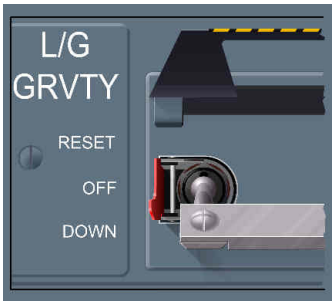
OFF POSITION



When the L/G GRVTY sw is in the OFF position (normal position), the landing gear lever can be used for the normal extension/retraction of the L/G.

DOWN POSITION

L12

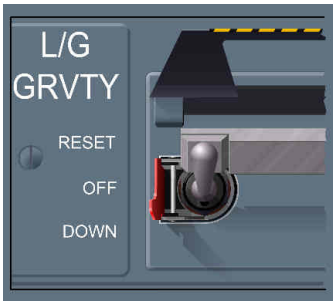


The extension of the landing gear by gravity is selected. The L/G GRVTY sw remains in the DOWN position until the flight crew selects another position.

Note: *Both switch-guards should be removed before the DOWN position is selected.*

RESET POSITION

L123



After a gravity landing gear extension, the RESET position is selected to restore the LGERS in the normal configuration.

When the L/G GRVTY sw is in the RESET position:
- The cut-out valves open (*Refer to DSC-32-40-10-10 Cut-Out Valves*)
- The retraction actuators switch from the gravity mode to the normal mode (*Refer to DSC-32-40-10-10 Landing Gear Gravity Extension Control*).

The L/G GRVTY sw should be back in the OFF position before the L/G lever can be used again to extend/retract the L/G .

CAUTION	The L/G GRVTY sw can be reset either in flight or on ground. However: - A reset on ground of the L/G GRVTY sw must be performed only by maintenance as BLG doors will collide with forward BLG wheels when closing (a specific prior maintenance action is needed before reset) - A reset in flight must be restricted to training in absence of any gear system failure.

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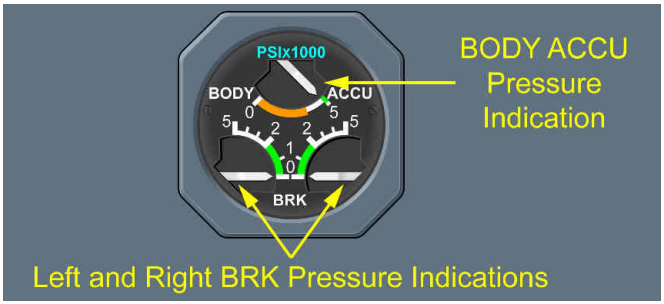
TRIPLE PRESSURE INDICATOR

Applicable to: ALL

Triple Pressure Indicator



BODY ACCU PRESSURE INDICATION

The BODY ACCU pressure indication shows the lowest BLG brake accumulator pressure.

GREEN ARC

In the green arc, full brake pressure is available.

L3 The green arc ranges from 4872 to 5000 PSI.

L1 ### AMBER ARC

The amber arc represents the low pressure zone.

L3 The amber arc ranges from 0 to 3840 PSI.

L1 When the indication is in the amber arc, the flight crew should press the ACCUS REINFLATE pb to reinflate the BLG brake accumulators before towing/push-back and before engine start.

LEFT AND RIGHT BRK PRESSURE INDICATIONS

When the parking brake is applied or in alternate braking, the left and right BRK pressure indications show the hydraulic pressure applied on the left and right BLG brakes.

L3 The APTs measure the pressure applied to the brakes.

L1 When the A-SKID is not available, the brake pressure is automatically limited within the green arc in order to limit risk of wheel lock and tyre burst.

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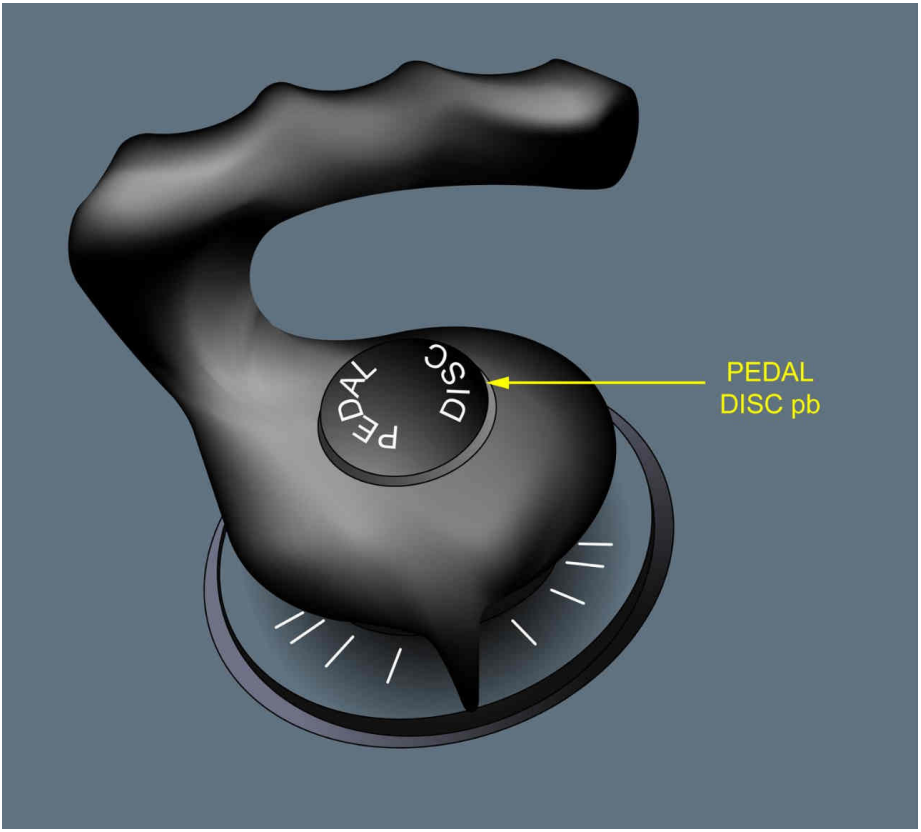
CAPT AND F/O STEERING HANDWHEELS

Applicable to: ALL

Steering Handwheel



The flight crew uses the steering handwheels to steer the aircraft during taxi.
Each steering handwheel controls the NWS angle up to 70 degrees left or right.

PEDAL DISC pb

When held pressed, the PEDAL DISC pb disconnects:

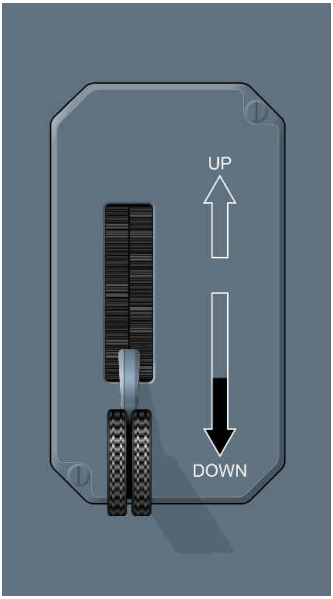
- The NWS from the rudder pedals
- The Heading Control Function.

L2 When the flight crew disconnects HCF, any offset that may occur is not compensated. The flight crew has to compensate the offset with the steering handwheel.

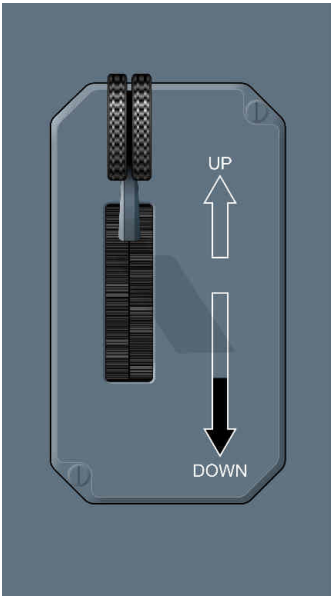
LANDING GEAR LEVER

Applicable to: ALL

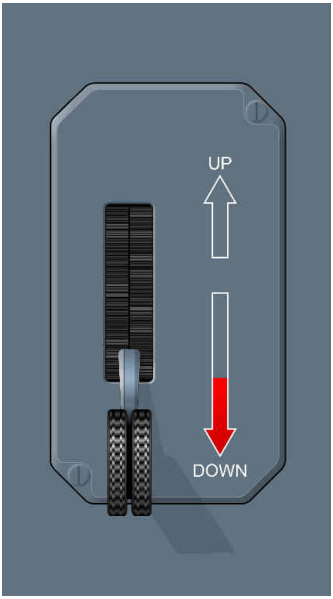
L12



Landing gear extension is selected.
An interlock mechanism (baulk) prevents the retraction of the landing gear, when any gear is seen compressed simultaneously by both LGCIS , by locking the landing gear lever in the DOWN position.



Landing gear retraction is selected.



The red arrow goes on and flash when the aircraft is in a landing configuration below 750 ft radio altimeter and one or more landing gears are not downlocked. The red arrow logic is independent from the position of the landing gear lever. The L/G GEAR NOT DOWN alert displays simultaneously (*Refer to Procedure*).

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DECEL INDICATION

Applicable to: ALL



The AUTO BRK is active and the aircraft decelerates as selected via the AUTO BRK mode selector.

The DECEL indication:
- Goes on when the effective deceleration is, at least, 80 % of the selected deceleration (AUTO-BRK LDG mode)
- Goes off when the effective deceleration is less than 70 % of the selected deceleration (AUTO-BRK LDG mode).

Note:
- *In RTO mode, maximum breaking performance limited by A-SKID is achieved, DECEL indication goes on for 2,7 m/s² and goes off foe 2,0 m/s².*
- *On a slippery runway, the A-SKID may activate before the aircraft reaches the selected deceleration. Therefore, the DECEL light may not go on even if the AUTO BRK is active.*

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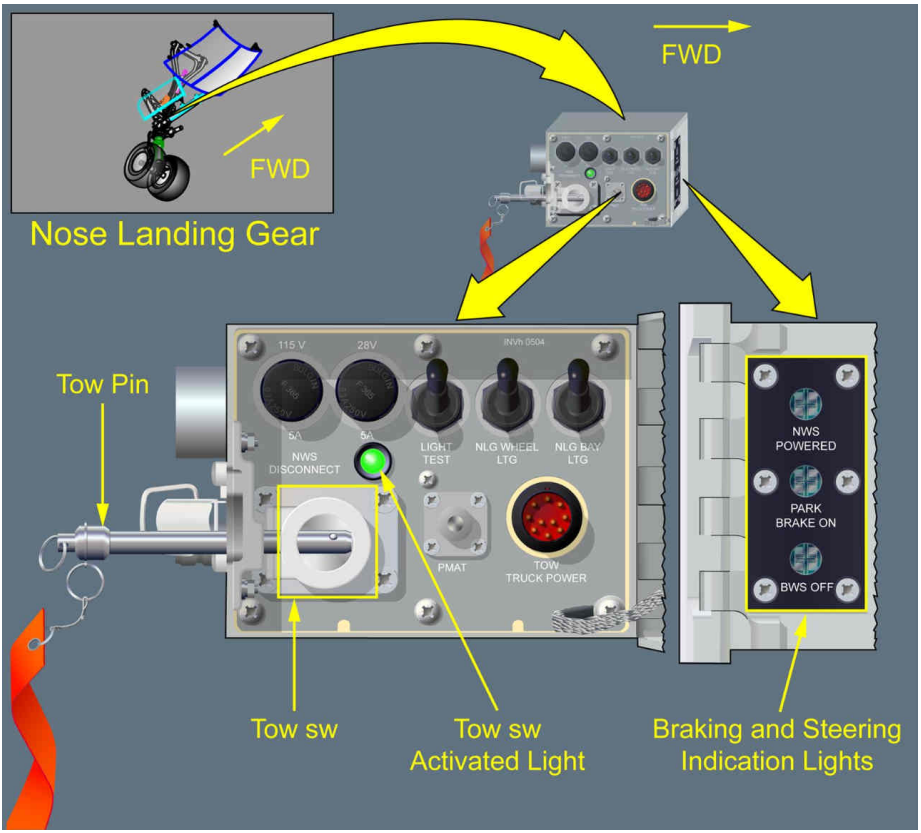
STEERING NOSE GEAR PANEL

Applicable to: ALL

Steering Nose Gear Panel



L2 Tow sw

When the tow pin is installed:

- The tow sw inhibits the NWS. and the TOW SWITCH ACTIVATED light goes on
- The NWS POWERED light goes ON if there is a NWS disconnection failure.

L2 TOW SWITCH ACTIVATED LIGHT

The light inform the ground crew on the activation of TOWING mode for safe towing/push-back..



The tow switch is not activated.



The tow switch is activated.

L2 BRAKING AND STEERING INDICATION LIGHTS

The three lights inform the ground crew on parking brake, Nose Wheel Steering (NWS).and Body Wheel Steering (BWS) status.



- The parking brake is OFF, or
- The NWS is powered, or
- The BWS is available.

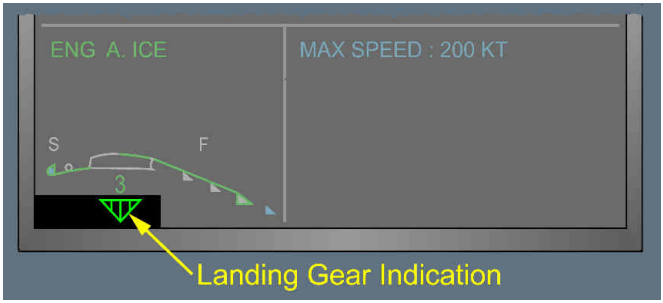


- The parking brake is ON, or
- The NWS is inhibited or not powered, or
- The BWS is not available.

SLAT/FLAP DISPLAY

Applicable to: ALL

Slat/Flap Display



No display: The landing gear is uplocked.



All five landing gear are downlocked.

In case of failure, there is no display.

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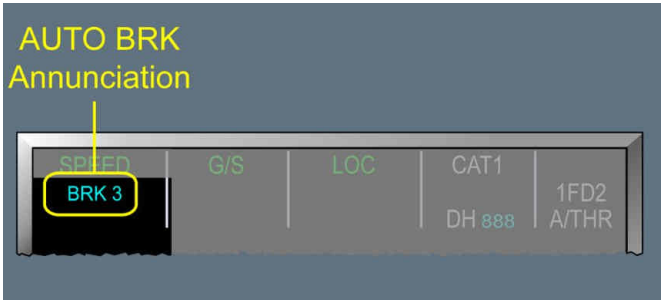
AUTO BRK MODE ANNUNCIATION ON THE FMA

Applicable to: ALL

AUTO BRK MODE ANNUNCIATION ON THE FMA

AUTO BRK Annunciation on the FMA





The AUTO BRK is armed in RTO mode.



The AUTO BRK is armed in AUTO BRK 3 mode.
BTV, BRK LO, BRK 2 or BRK HI may also display.



The AUTO BRK is active in AUTO BRK 3 mode.
BTV, BRK RTO, BRK LO, BRK 2, BRK HI may also display.

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ND AIRPORT MAP

Applicable to: ALL

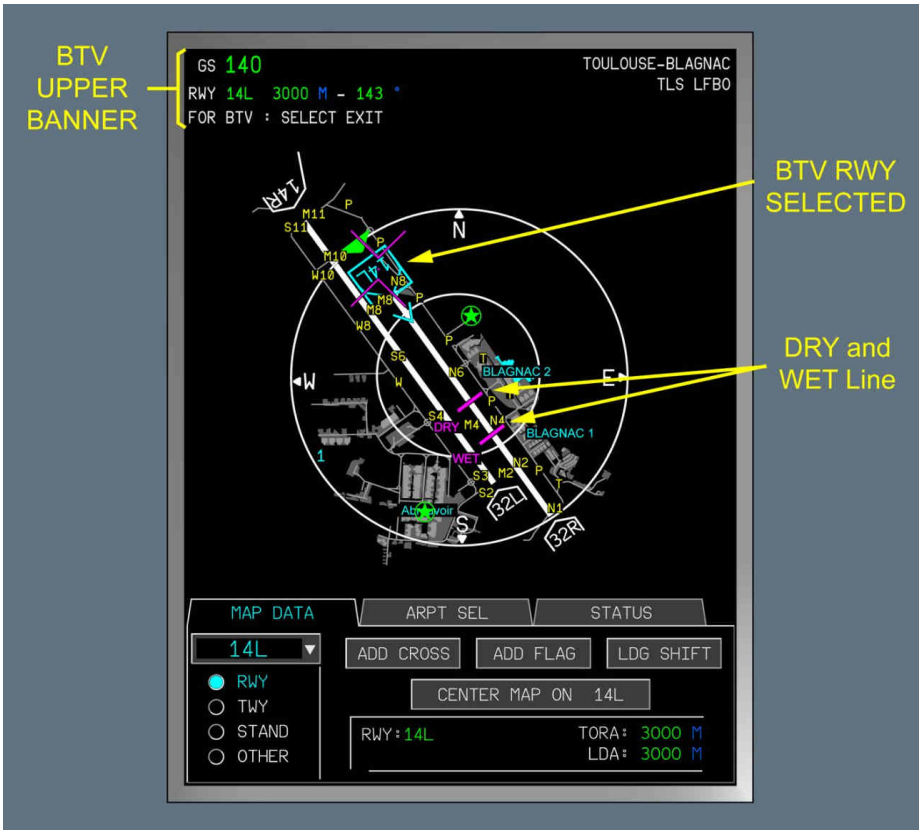
The flight crew configures BTV on the ND via the airport map.

To select the airport map display, the flight crew sets:
- The ND Mode selector to PLAN
- The ND Range selector to ZOOM.

For more information on the airport map display, *Refer to DSC-34-10-70-20-GEFIS EFIS CP* .

Note: *As required (e.g. due to NOTAM), the flight crew can modify the runway length by inserting a threshold shift or end shift (for more information Refer to DSC-34-10-70-20-GND Additional Functions). BTV , ROW and ROP take into account the position of the thresholds to compute the landing distances and protect the aircraft against a runway overrun.*

BTV Selected Runway

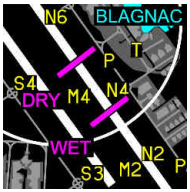


BTV Exit Selected



DRY AND WET LINES

L12

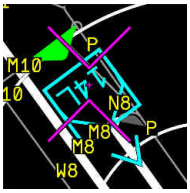


The DRY and WET lines respectively represent the computed landing distance on a dry and a wet runway. The flight crew can select an exit only after the DRY line. On a wet runway, the flight crew should select an exit after the WET line.

The DRY and WET lines are computed taking into account:
- The aircraft weight
- The FMS predicted wind at landing
- The approach speed.

For more information on the DRY and WET lines, *Refer to DSC-32-10-30-20-10 Dry and Wet line concept* .

SELECTED RUNWAY

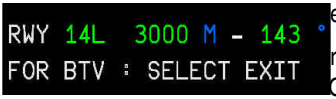


When the flight crew selects a landing runway for BTV , the QFU of the selected runway is displayed in cyan.
If the flight crew selects a runway that is different from the FMS active runway, the message BTV/FMS RUNWAY DISAGREE is displayed on the upper banner. Nevertheless, the flight crew can confirm the BTV runway selection different from the FMS landing runway.
For more information on the FMS active runway, *Refer to DSC-34-10-70-20-GND Moving Airport Map* .

BTV UPPER BANNER

At the different steps of the BTV preparation, the upper banner displays appropriate information.

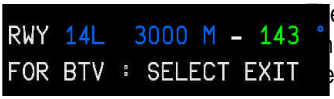
BTV RUNWAY SELECTED



e flight crew selected the runway.

r the selected runway, OANS displays the following data:
QFU .
- Landing distance available (LDA)
- Runway heading.

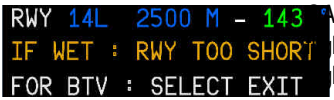
At this step of the BTV preparation, BTV asks the flight crew to select the exit.



e flight crew selected the runway. OANS displays the
nding distance available (LDA) and the QFU in blue, because
e flight crew shifted the runway via the OANS interface (for more information, *Refer to DSC-34-10-70-20-GND Additional Functions*).



e OANS displays the message when BTV ROW / ROP
tects a discrepancy on the runway data.



ANS informs the flight crew that the runway selected by the
ht crew is too short in wet condition. If the runway is dry, the
ht crew can select an exit or the runway end.



ANS informs the flight crew that the runway is too short. The
ht crew cannot select an exit or the runway end and arm
V for the selected runway.

DIFFERENT FMS AND SELECTED BTV RUNWAY



e flight crew selected a runway that is different from the
nway in the active FMS flight plan.
e flight crew can continue to prepare BTV . The message will disappear when the flight crew selects the exit.

BTV EXIT SELECTED

L12



e flight crew selected an exit.
ANS displays the data about the selected exit in addition to
e runway data.
this example, the flight crew selected the N4 exit. The
tance displayed beside the name of the selected exit is
e distance between the selected runway threshold and the selected exit.
ROT is the predicted Runway Occupancy time. BTV predicts the runway occupancy time for an automatic landing with BTV braking mode.
TURNAROUND is for the predicted turnaround time. BTV computes two different turnaround times based on the selected exit and the brake energy used to stop the aircraft with BTV . The first value is the predicted turnaround time with maximum reverse, and the second value is the predicted turnaround time with idle reverse.
The predicted turnaround time computation takes into account a fixed taxi phase in addition to the BTV landing. The turnaround time is the cooling time necessary for the brakes to reach 150 °C after landing.
Taking into account the predicted turnaround time based on the brake temperature, the flight crew can adjust the selected exit, as required.



e flight crew selected an exit and the data linked to the
ected exit are invalid.

BTV EXIT SELECTION: TOO SHORT



e flight crew selected an exit between the selected runway
eshold and the dry line.
ANS displays the data associated with the selected exit. These data are displayed in amber. The flight crew cannot arm BTV because the distance between the runway threshold and the exit is shorter than the minimum landing distance on dry runway.



e flight crew selected an exit after the runway end. OANS splays the data concerning the selected exit. These data e displayed in amber. The flight crew cannot arm BTV because the distance between the runway threshold and the exit is longer than the landing distance available (runway shift situation).

BTV SELECTED EXIT



The flight crew selected the exit N4. The name of the exit is boxed in cyan when selected. OANS displays the data associated to the exit in the upper banner.

BTV PATH



hen the flight crew selects a selectable exit for BTV eparation, OANS displays a path between the selected runway reshold and the selected exit. This path shows the predicted rcraft trajectory on the runway for the BTV braking.

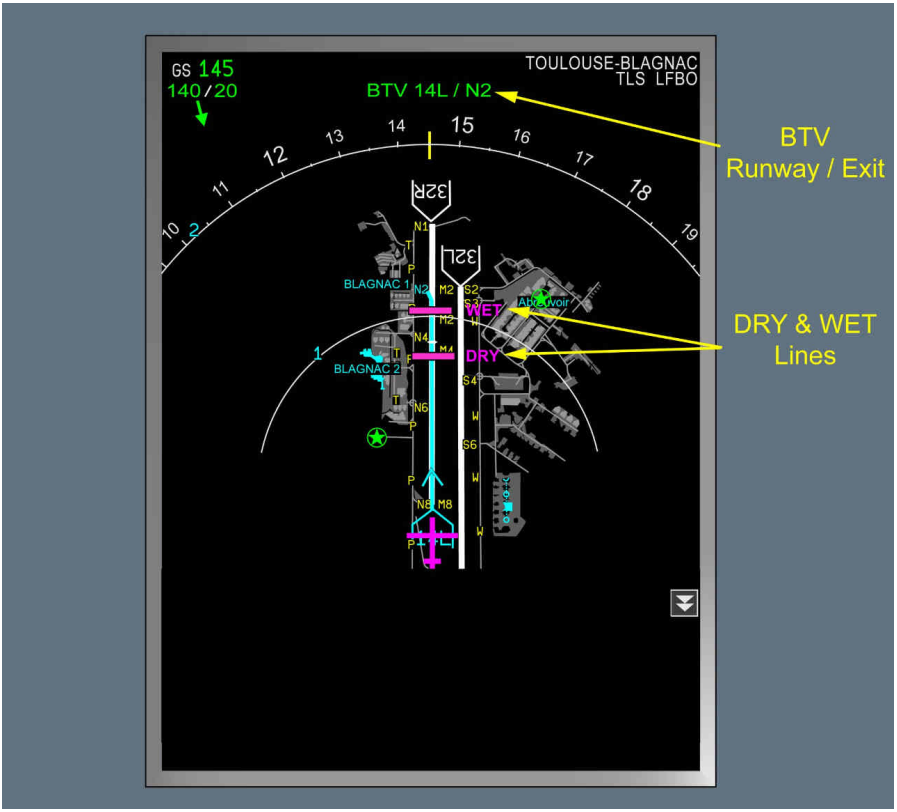
ND BTV ROW ROP

Applicable to: ALL

For approach and landing, the flight crew can monitor via the ND , below 500 ft in real time, the behavior of the DRY and WET lines independently of the braking means (auto-brake or pedal braking). The flight crew can adjust and select the appropriate range (range selector set on ZOOM), as required.

BTV ROW/ROP MONITORING : AIRCRAFT IN FLIGHT

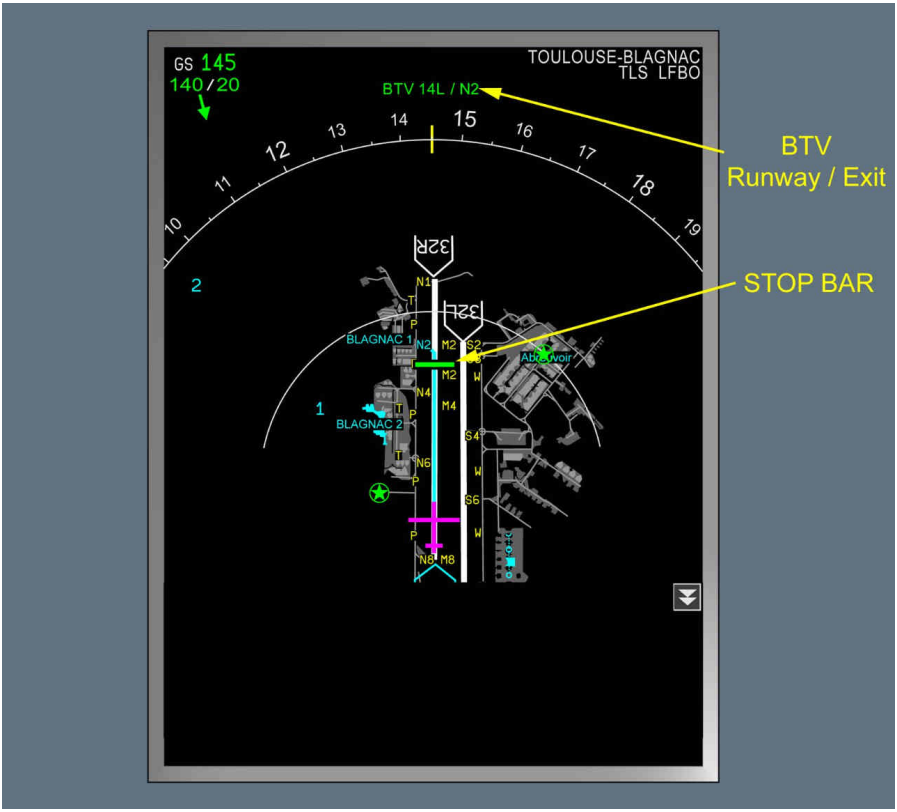
ND BTV Monitoring : BTV Active in flight



The flight crew selects basic auto-brake mode or pedal braking technic for landing.

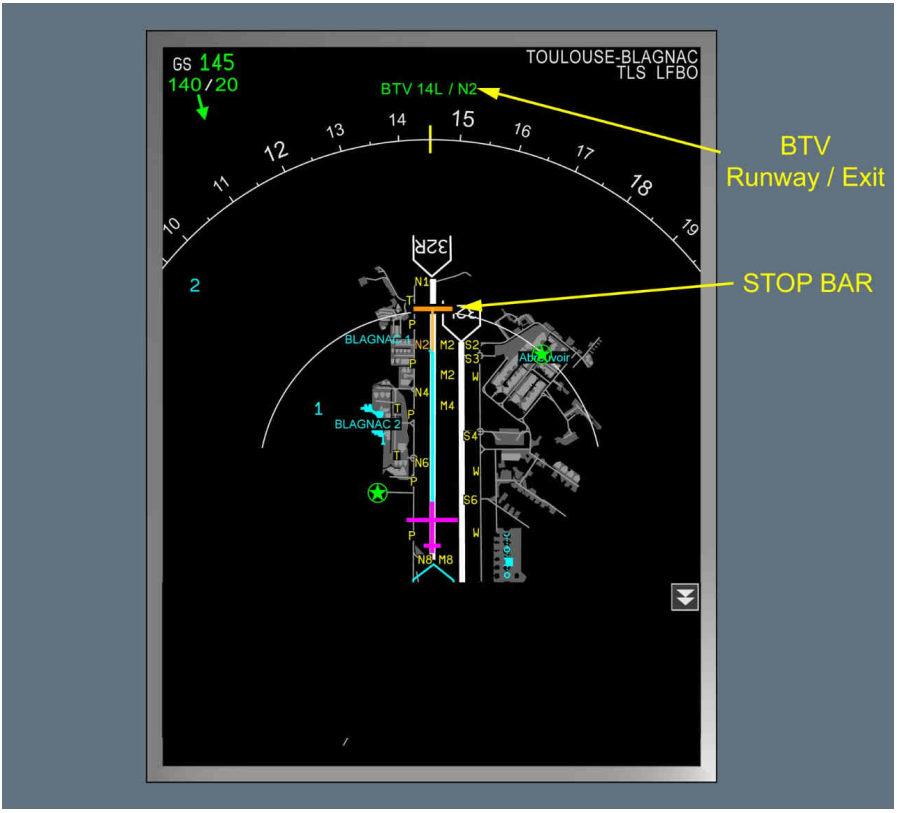
BTV MONITORING: AIRCRAFT ON GROUND

ND BTV Monitoring : BTV Active on Ground



EXIT OVERRUN

ND BTV Monitoring : BTV Active on Ground

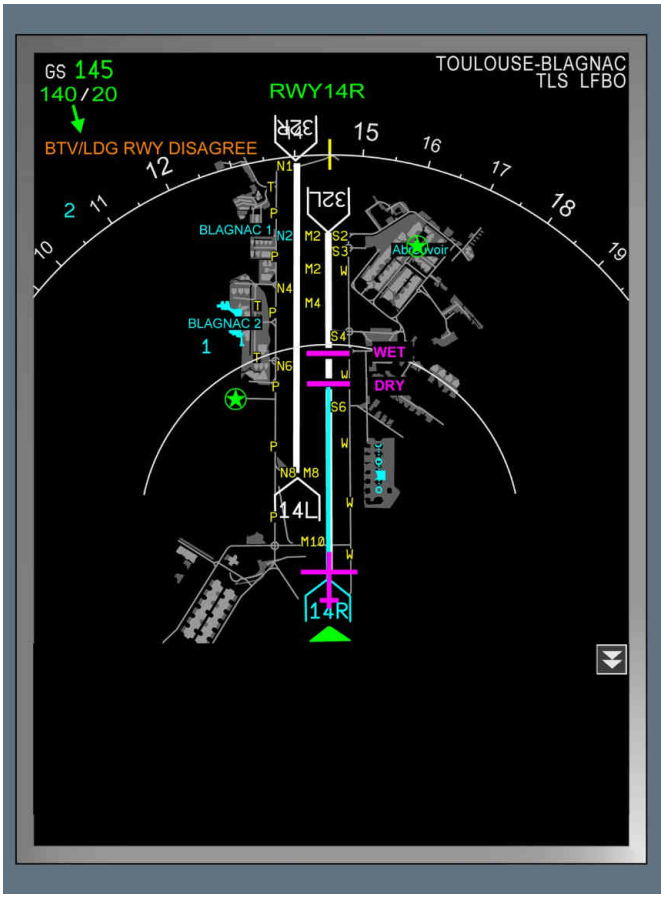


BTV / LDG RWY DISAGREE

When the flight crew lands the aircraft on a runway different from the selected runway for BTV approach and landing, BTV reverts to brake HI and the ND displays the BTV/LDG RWY DISAGREE message in the upper part of the ND. A triple click is associated to the reversion in HI braking mode.

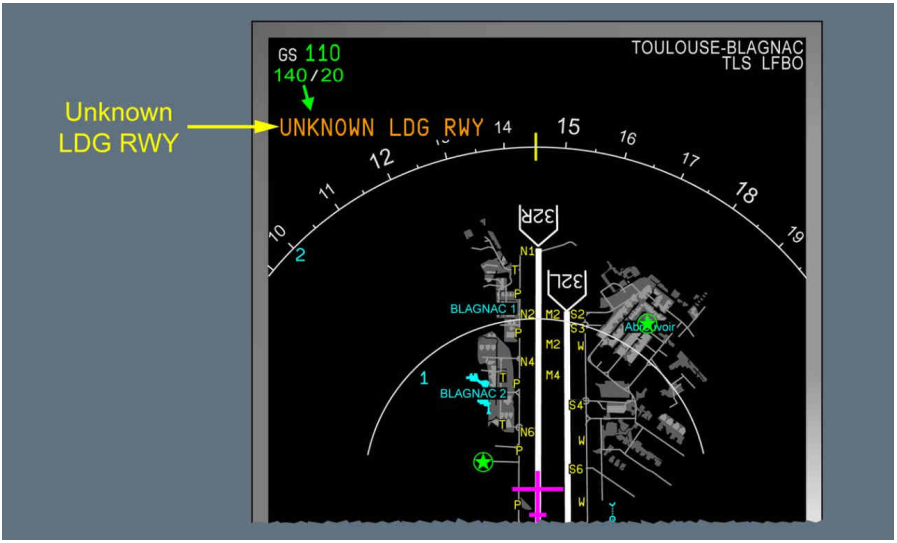
The ND displays the BTV/LDG RWY DISAGREE message below 300 ft when BTV detects the landing runway.

ND BTV Monitoring : BTV / LDG RWY DISAGREE in Flight



UNKNOWN LDG RWY

Unknown Landing Runway

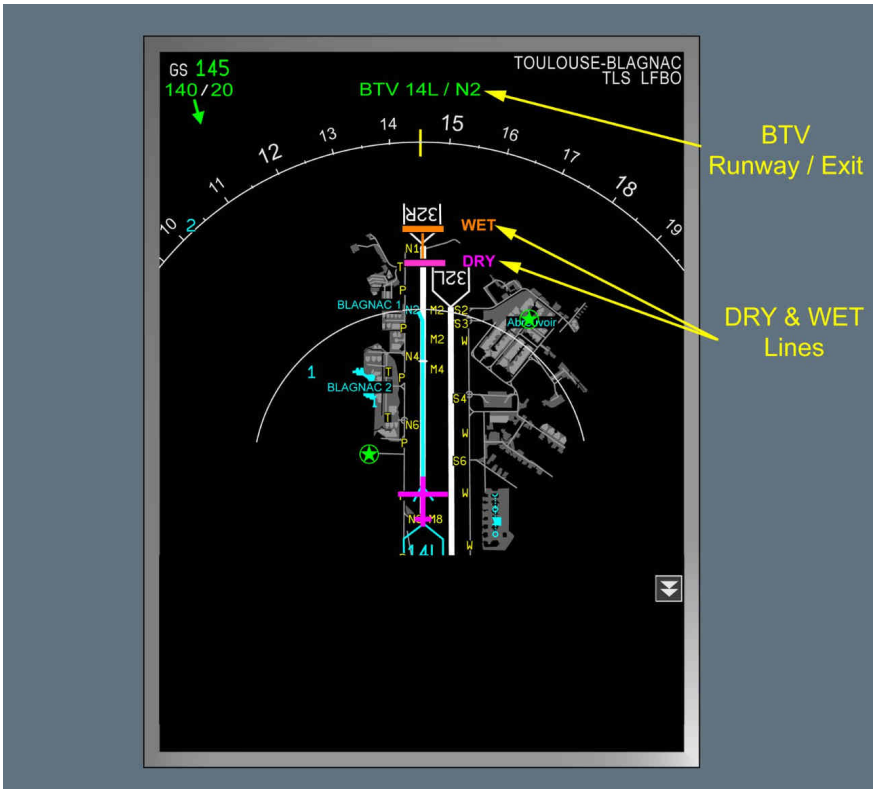


ROW use the Onboard Airport Navigation System database and the aircraft position to detect the landing runways.
If the detected landing runway is not in the Onboard Airport Navigation System database, or ROW failed to detect the landing runway, the ROW and ROP can not detect the landing runway.
In this case, on the upper part of the Airport Navigation display on the ND .the UNKNOWN LDG RWY message is displayed.
When the ND displays the UNKNOWN LDG RWY message, BTV , ROW and ROP are no more available.
In flight, if no alerts impact the autobrake system, the autobrake reverts to HI armed mode.
On ground, when the BRK HI mode becomes active, the flight crew ears a triple click.

ROW ACTIVATION

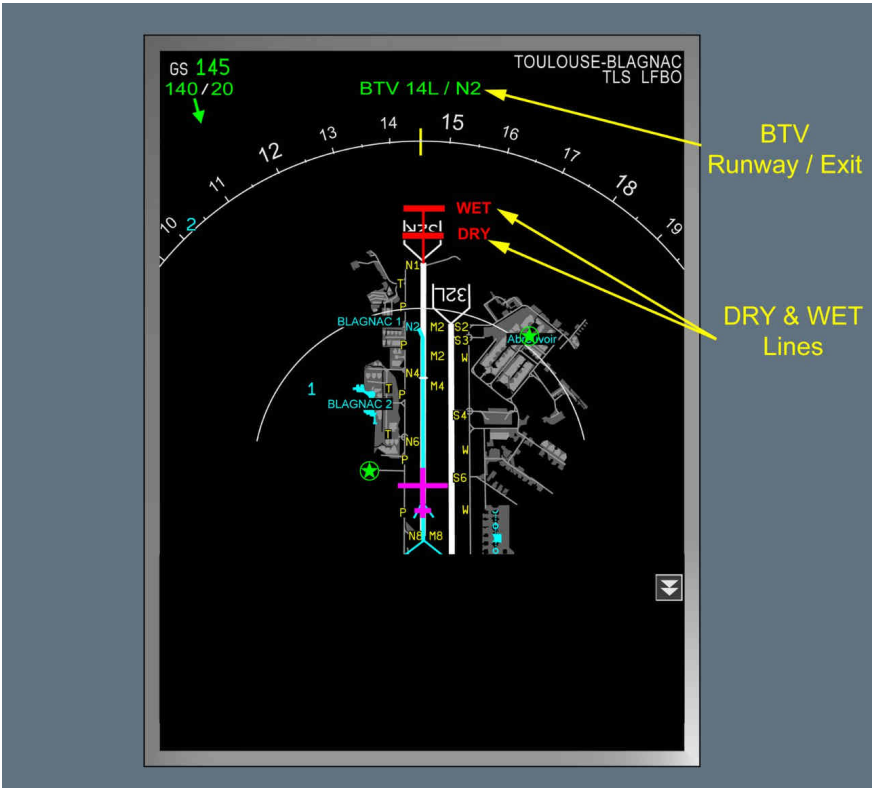
IF WET : RWY TOO SHORT

ND BTV Monitoring



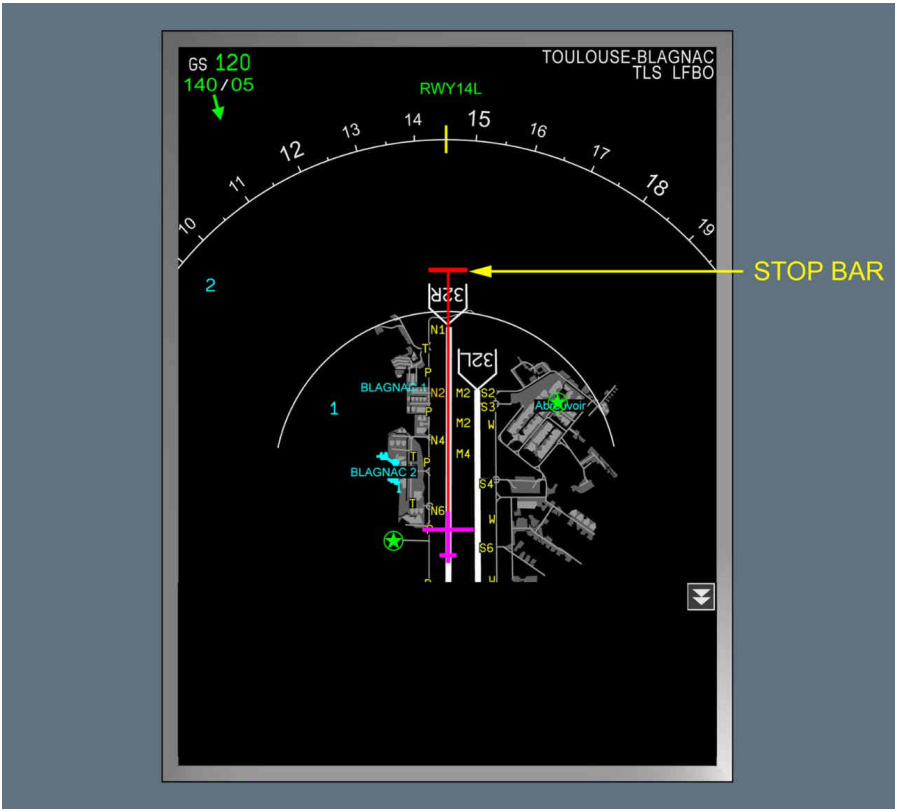
RWY TOO SHORT

ND BTV Monitoring



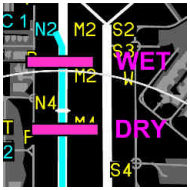
ROP ACTIVATION

ND Monitoring

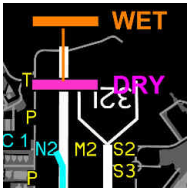


DRY AND WET LINES

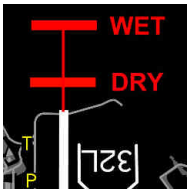
Below 500 ft the DRY and WET lines are alive. In real time, taking into account the aircraft speed, the wind, the trajectory of the aircraft, the DRY and WET lines move accordingly. The DRY and WET lines represent the minimum landing distance achievable by the aircraft.



The ND displays the DRY and WET lines on the runway.



The ND displays the WET line out of the runway. In this situation, the PFD displays IF WET : RWY TOO SHORT .



The ND displays the DRY and WET lines out of the runway. In this situation, the PFD displays RWY TOO SHORT message and the RWY TOO SHORT aural alert triggers.

RUNWAY / EXIT



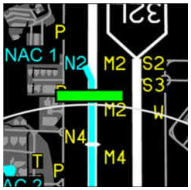
hen the flight crew monitors BTV approach and landing, e ND displays the runway and the exit selected during BTV eparation.

RUNWAY



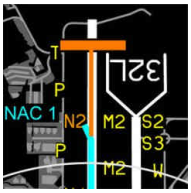
hen the flight crew monitors an approach in basic auto-brake ode or pedal braking, the ND displays the runway that OW/ROP detect and protect for landing.

STOP BAR

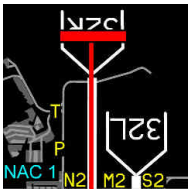


When the aircraft is on ground and an autobrake mode (BTV or basic autobrake mode) is active, the DRY and WET lines disappear and are replaced by one STOP bar.
With BTV active, the STOP bar materializes the point on the runway where BTV will release the brakes at 10 kt . When BTV predicts a stop distance that guaranties that the aircraft will reach the selected exit, the ND displays the STOP bar in green.
With a basic autobrake mode active, the STOP bar materializes the point where the aircraft will stop.

Note: *With a basic autobrake mode active, the blue path stops at the STOP bar. With BTV active, the blue path stops at the selected exit.*
In pedal braking, the STOP bar is not displayed.



When BTV predicts a stop bar after the selected exit, the aircraft will not be able to stop before the selected exit. In this situation, the braking is limited to AUTOBRK HI. The ND displays the STOP bar and the selected exit in amber.
Associated with the display of the STOP bar and the selected exit in amber, a triple click triggers and the CDS displays the message EXIT MISSED on the FMA (For more information on the FMA, *Refer to DSC-32-20-220 FMA BTV*).



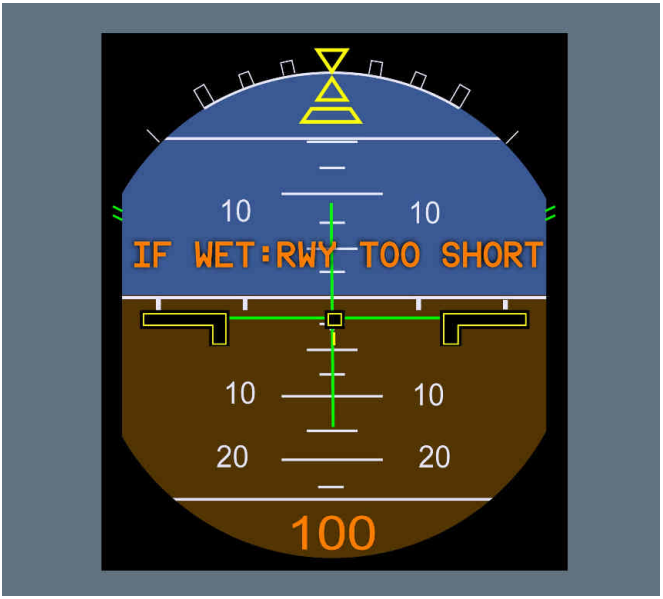
When ROP predicts a STOP bar after the end of the runway, the aircraft is in situation of runway overrun. The ND displays the STOP bar in red.
If an autobrake mode is active, the braking system applies maximum braking, as long as the overrun situation is detected.
The PFD displays the MAX REVERSE message when the situation is detected. The message pulses for 9 s then remains steady. (For PFD view, *Refer to DSC-32-20-220 PFD ROW ROP*)
Associated with the MAX REVERSE message, the aural alert "MAX REVERSE" sounds until the flight crew selects maximum reverse. (For more information, *Refer to DSC-32-10-30-20-20 ROW ROP Operations*)
At 80 kt , "KEEP MAX REVERSE" sounds if BTV still detects a runway overrun situation.

PFD ROW ROP

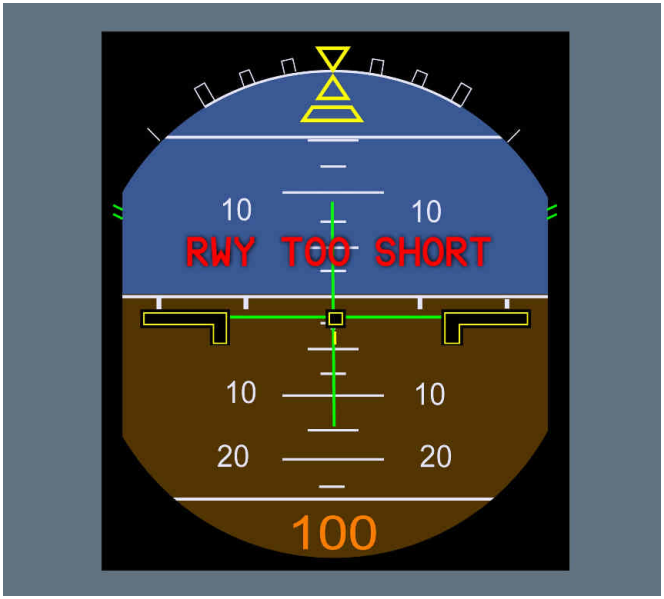
Applicable to: ALL

PFD ROW

Below 300 ft, ROW detects the landing runway. If ROW detects that the minimum landing distance computed on a wet runway is higher than the remaining runway landing distance, the PFD displays IF WET : RWY TOO SHORT.

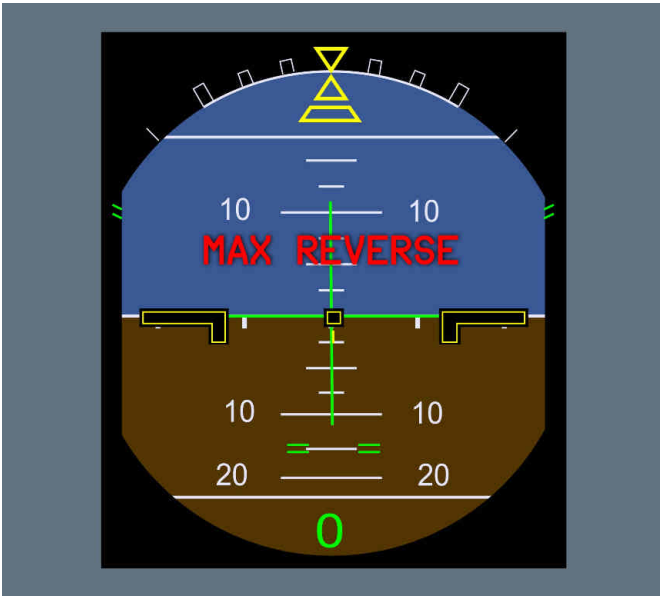


If ROW detects that the minimum landing distance computed on a dry runway is higher than the remaining runway landing distance, the PFD displays RWY TOO SHORT.

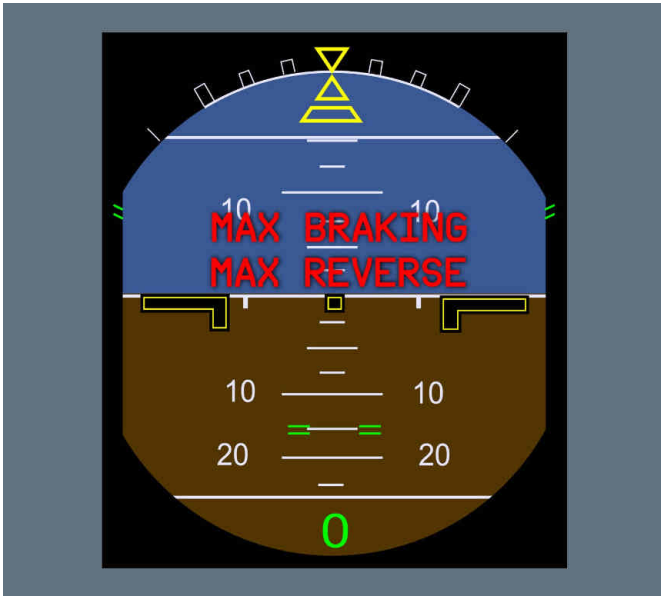


PFD ROP

On ground, when an auto-brake mode (BTV or basic auto-brake mode) is active and ROP detects that the computed braking distance is higher than the remaining runway length, the PFD displays MAX REVERSE. This message pulses for 9 s then remains steady as long as ROP detects that the remaining runway length is too short.



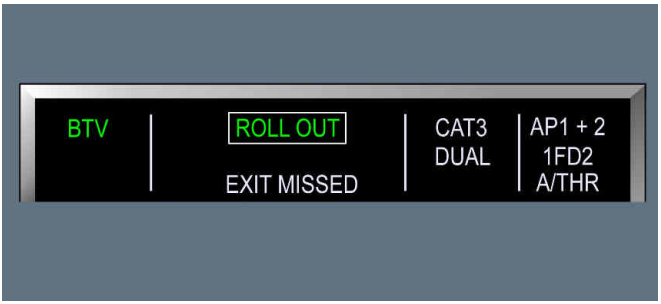
On ground, when the flight crew uses the pedal braking technique and ROP detects that the computed braking distance is higher than the remaining runway length, the PFD displays MAX BRAKING and MAX REVERSE. This message pulses for 9 s then remains steady as long as ROP detects that the remaining runway length is too short



FMA BTV

Applicable to: ALL

EXIT MISSED MESSAGE ON THE FMA



The aircraft is on ground with BTV active.

When BTV detects that the maximum deceleration rate in BTV autobrake mode does not allow to stop the aircrat before the selected exit, the FMA displays the EXIT MISSED message (in addition to the display on the ND of the STOP bar, and the triggering of the audio triple click).

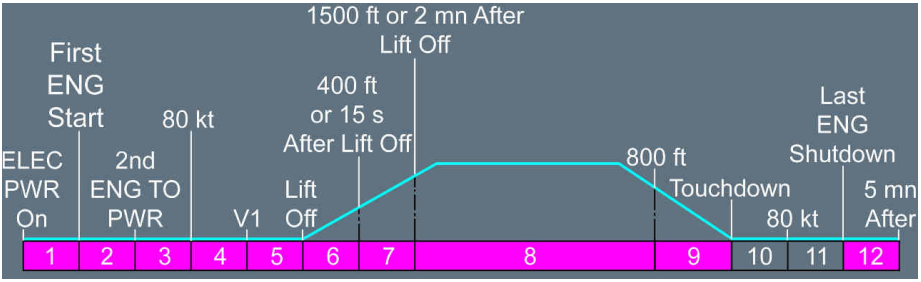
MEMO

Applicable to: ALL

L12

AUTO BRK OFF — The memo indicated that the auto brake has been disconnected.

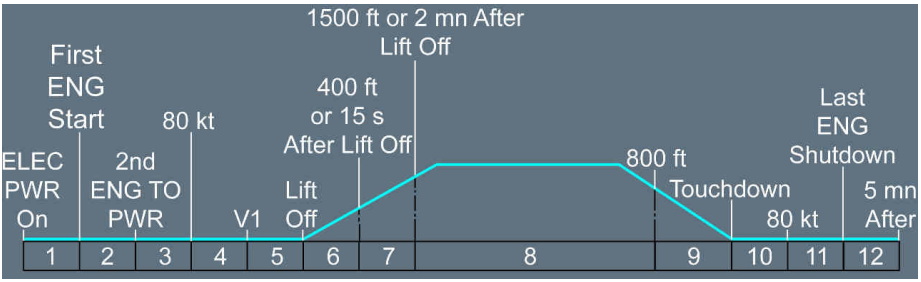
Flight Phase Inhibition



L12

FLT L/G DOWN — The aircraft performs a ferry flight with the landing gear down: I.e. the VMO-MMO sw is set to L/G DOWN.

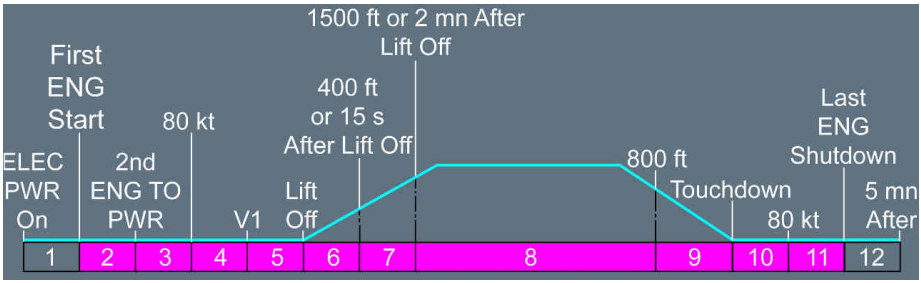
Flight Phase Inhibition



L12

N/W STEER DISC — The tow sw is on. The Nose Wheel Steering is disconnected.

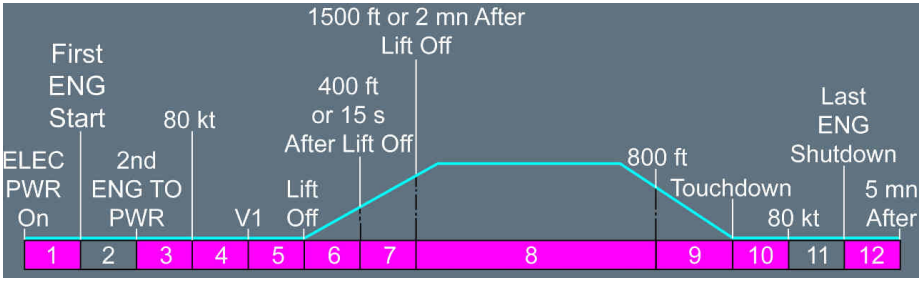
Flight Phase Inhibition



L12

N/W STEER DISC The tow sw is on and at least two engines are running. The Nose Wheel Steering is disconnected.

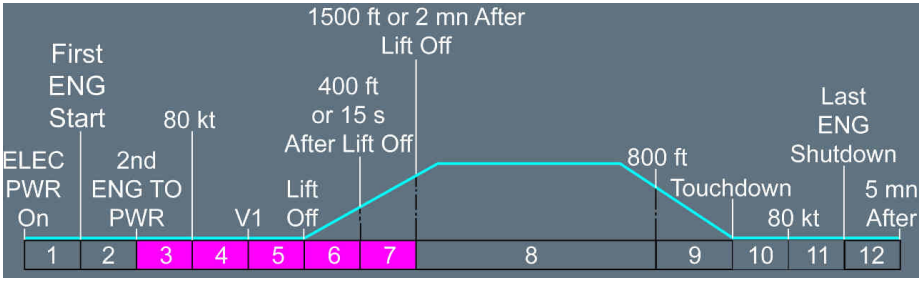
Flight Phase Inhibition



L12

L/G GRVTY EXTN The L/G has been extended by gravity.

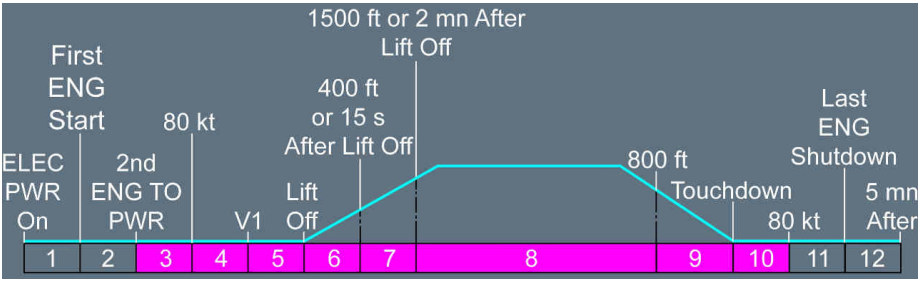
Flight Phase Inhibition



L12

PARK BRK ON The parking brake is ON.

Flight Phase Inhibition



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L/G EXTENSION AND RETRACTION

Applicable to: ALL

NLG EXTENSION/RETRACTION

This animated sequence is not available in pdf format

BLG EXTENSION/RETRACTION

This animation is not available in pdf format.

WLG EXTENSION/RETRACTION

This animation is not available in pdf format.

WLG AND BLG EXTENSION/RETRACTION

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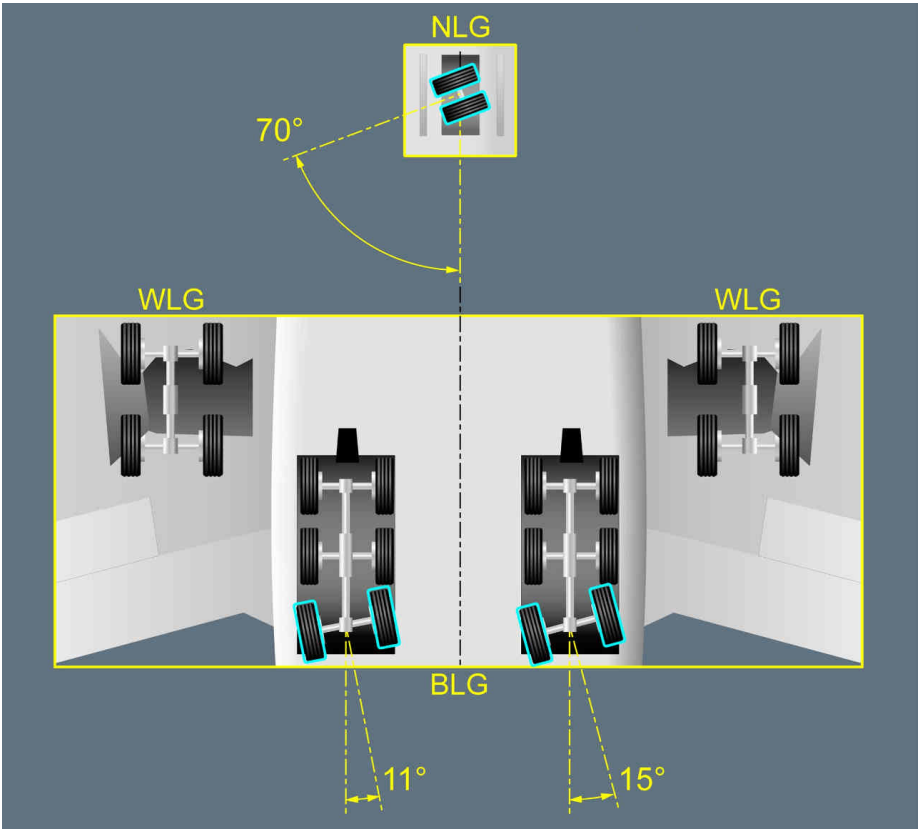
NWS AND BWS OPERATION

Applicable to: ALL

NWS and BWS Operation



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LANDING GEAR GRAVITY EXTENSION

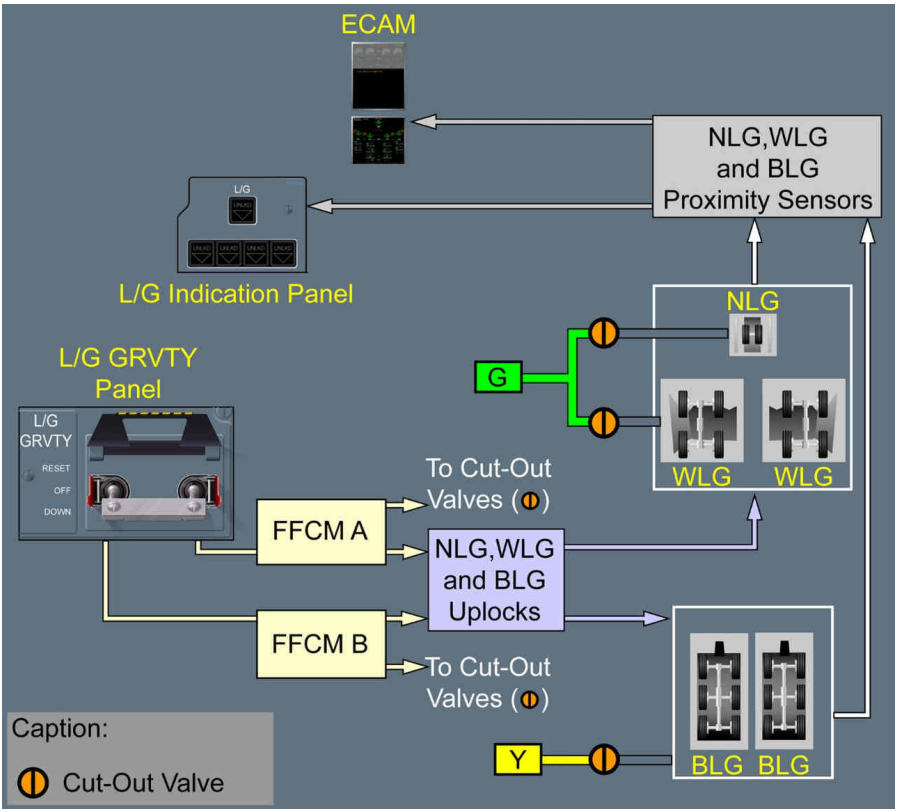
Applicable to: ALL

LANDING GEAR GRAVITY EXTENSION

When the normal extension of the landing gear (L/G) fails, the flight crew can perform a gravity extension via the L/G GRVTY selector.
The gravity extension of the L/G does not use hydraulic power, and the L/G doors remain open.
NORM and ALTN NWS remain available after gravity extension.

LANDING GEAR GRAVITY EXTENSION ARCHITECTURE

Landing Gear Gravity Extension Architecture



LANDING GEAR GRAVITY EXTENSION CONTROL

Two Free Fall Control Modules (FFCM) control the gravity extension of the landing gear.
The FFCMs are independent of the LGCIS.

L3 The FFCMs are active simultaneously.

L1 When the flight crew sets the L/G GRVTY selector to the DOWN position, the FFCMs generate and send the appropriate electrical commands to extend the landing gear by gravity.

L3 The commands are sequenced by a timer and sent in chronological order to:

1. The cut-out valves to isolate the retraction actuators from the hydraulic power
2. The retraction actuators to activate the gravity mode

Note: The gravity mode enables free flow of the hydraulic fluid between the two chambers and prevents any hydraulic lock of the actuator.

3. The landing gear door uplocks to enable the landing gear doors to fall open
4. The landing gear uplocks (NLG and WLG, then BLG) to enable the landing gear to fall and downlock in the extended position.
5. The total duration of gravity extension from L/G GRVTY sw on down to last gear downlock is 70 s in absence of failure.

L1 When the ECAM and the L/G indicator panel operate normally, the landing gear position indications remain available during a gravity extension from the NLG, WLG and BLG proximity sensors.

L3 CUT-OUT VALVES

There are three cut-out valves:

- One for the NLG
- One for the WLG
- One for the BLG

When the L/G GRVTY selector is set to the DOWN position, the cut out valves close and isolate the landing gear from the hydraulic power (GREEN or YELLOW).

L3 LANDING GEAR AND LANDING GEAR DOOR UPLOCKS

The uplocks maintain the landing gear in the retracted position and the landing gear doors in the closed position.

Each uplock has:

- A locking hook
- Two electrical actuators.
  One actuator is controlled by the active LGCIS.
  The other actuator is controlled by the Free Fall Control Modules (FFCMs) for landing gear gravity extension.

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LANDING GEAR RETRACTION WITH ONE HYDRAULIC SYSTEM FAILED

Applicable to: ALL

The YELLOW and the GREEN hydraulic systems power the retraction of the landing gear. If either hydraulic system fails during takeoff, some landing gears (depending on which system fails) will not retract when the flight crew sets the L/G lever to the UP position.

L/G RETRACTION WITH THE YELLOW HYDRAULIC SYSTEM FAILED

If the YELLOW hydraulic system fails, and the flight crew sets the L/G lever to the UP position:

- The NLG retracts, NLG doors will close after NLG uplock
- The BLG and the WLG remain extended, BLG doors will remain closed, but WLG doors will open and stay fully open.

L2 Even if the GREEN hydraulic power is available, the WLG will not retract. This is to prevent any collision with the extended BLG.

L1 L/G RETRACTION WITH THE GREEN HYDRAULIC SYSTEM FAILED

If the GREEN hydraulic system fails, and the flight crew sets the L/G lever to the UP position:

- The BLG retracts
- The NLG and the WLG remain extended (NLG and WLG doors will open by gravity and remain open, with position variable function of airloads).

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BRAKING SYSTEM RECONFIGURATION

Applicable to: ALL

To avoid a general degradation of braking performance, in the case of a local failure, the braking system is divided into three wheel groups:

- The WLG

L3 The WLG brakes operate in the same braking mode to ensure symmetrical braking on the WLG .

L1 - The right BLG
- The left BLG .

Depending on the failure, each wheel group can be degraded separately, and operate in a different braking mode (e.g.: The WLG may be in normal braking, while the left BLG is in alternate braking and the right BLG is in emergency braking).
If a failure occurs on a small number of brakes, the affected brakes are released and the braking system remains in normal mode (*Refer to BRAKES RELEASED procedure).*
If a failure occurs on a large number of brakes, the braking system automatically changes the appropriate wheel group to another braking mode.
The reconfiguration achieves the best braking performance possible, taking into account the actual failures.

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ECAM ALERTS

Applicable to: ALL

BRAKES A-SKID FAULT ON ALL L/G (*Refer to procedure*)

BRAKES A-SKID FAULT ON L + R BODY L/G (*Refer to procedure*)

BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G (*Refer to Procedure*)

BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs (*Refer to Procedure*)

BRAKES A-SKID FAULT ON WING L/G (*Refer to procedure*)

BRAKES A-SKID OFF (*Refer to procedure*)

BRAKES ACCU PRESS LO (*Refer to procedure*)

BRAKES ALTN + EMER BRK FAULT (*Refer to procedure*)

BRAKES ALTN BRK FAULT (*Refer to procedure*)

BRAKES ALTN BRK PRESS MONITORING FAULT (*Refer to procedure*).

BRAKES AUTO BRK FAULT (*Refer to procedure*)

BRAKES BRAKES HOT (*Refer to procedure*)

BRAKES BTV FAULT (*Refer to Procedure*)

BRAKES CTL 1(2) FAULT (*Refer to procedure*)

BRAKES EMER BRK FAULT (*Refer to procedure*)

BRAKES MINOR FAULT (*Refer to procedure*)

BRAKES NORM BRK FAULT (*Refer to procedure*)

BRAKES NORM BRK PRESS MONITORING FAULT (*Refer to procedure)*

BRAKES PARK BRK ON (*Refer to procedure*)

BRAKES PARK BRK PRESS LO (*Refer to procedure*)

BRAKES PEDAL BRAKING FAULT (*Refer to procedure*)

BRAKES RELEASED (*Refer to procedure*)

BRAKES RESIDUAL BRAKING (*Refer to procedure*)

BRAKES SEL VLV JAMMED OPEN (*Refer to procedure*)

BRAKES SYS REDUNDANCY LOST (*Refer to procedure*)

BRAKES SYS SAFETY TEST REQUIRED (*Refer to procedure*).

CONFIG PARK BRAKE ON (*Refer to procedure*)

L/G ABNORM OLEO PRESS (*Refer to procedure*)

L/G BOGIE POSITION FAULT (*Refer to procedure*).

L/G CTL 1(2) FAULT (*Refer to procedure*)

L/G CTL 1+2 FAULT (*Refer to procedure*)

L/G DOORS NOT CLOSED (*Refer to procedure)*

L/G GEAR NOT DOWN (*Refer to procedure*)

L/G GEAR NOT LOCKED UP (*Refer to procedure*)

L/G GRVTY EXTN FAULT (*Refer to procedure*).

L/G LDG WITH 2 ABNORM BODY L/Gs (*Refer to Procedure*)

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE (*Refer to Procedure*)

L/G LDG WITH 2 ABNORM WING L/Gs (*Refer to Procedure*)

L/G LDG WITH ABNORM NOSE L/G (*Refer to procedure*)

L/G LDG WITH ABNORM WING OR BODY L/G (*Refer to procedure*)

L/G GEAR NOT LOCKED DOWN (*Refer to procedure*)

L/G OLEO PRESS MONITORING SYS FAULT (*Refer to procedure*)

L/G RETRACTION FAULT (*Refer to procedure)*

L/G UPLOCK FAULT (*Refer to procedure*)

L/G SYSTEM DISAGREE (*Refer to procedure*)

L/G WEIGHT ON WHEELS FAULT (*Refer to procedure*)

STEER ALTN N/W STEER FAULT (*Refer to procedure*)

STEER ALTN STEER SYS HOT (*Refer to procedure*)

STEER B/W STEER FAULT (*Refer to procedure*)

STEER B/W STEER NOT LOCKED (*Refer to procedure*)

STEER CAPT(FO) STEER TILLER FAULT (*Refer to procedure*)

STEER N/W + B/W STEER FAULT (*Refer to procedure*)

STEER N/W STEER ANGLE LIMIT EXCEEDED (*Refer to procedure*)

STEER N/W STEER DISC FAULT (*Refer to procedure*)

STEER N/W STEER FAULT (*Refer to procedure*)

STEER NORM N/W STEER FAULT (*Refer to procedure*)

STEER PEDAL STEER CTL FAULT (*Refer to procedure*)

STEER STEER CTL 1(2) FAULT (*Refer to Procedure*)

STEER STEER SEL VLV JAMMED OPEN (*Refer to procedure*)

WHEEL TIRE PRESS LO (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
LGERS	LGCIS 1	DC 1 (DC-ESS for L/G position indication on center panel)
	LGCIS 2	DC 2
	FFCM A	DC 1
	FFCM B	DC-ESS
Braking system	BCS 1	DC 1
	BCS 2	DC 2
	EBCU	DC-ESS DC-BATT
	LEHGS	AC 2 and AC 3
Steering system	SCS 1	DC 1
	SCS 2	DC 2
	LEHGS	AC 3
BTMS	N/A	DC 1 and DC 2
TPIS	N/A	DC 1 and DC 2
OPMS	N/A	DC 1 and DC 2

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AIRCRAFT SYSTEMS

33 - LIGHTS

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DSC-33-PLP PRELIMINARY PAGES

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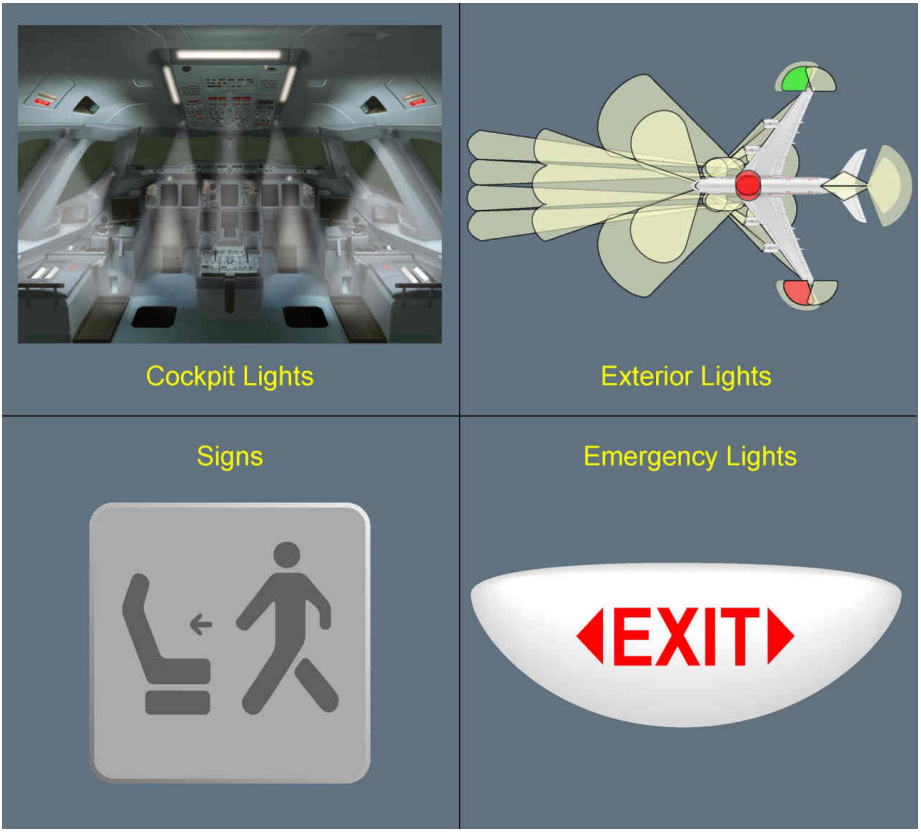
OVERVIEW

Applicable to: ALL

Lights Overview



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GENERAL

Applicable to: ALL

Cockpit lighting provides the flight crew with the most suitable lighting environment, to carry out their mission.

L2 All of the cockpit lights use the Light Emitting Diode (LED) technology.

L1 The flight crew can dim most of the cockpit lights, if necessary.

The cockpit lights have two different colors:

- A white orangey color, that is restful for human eyes

L2 The following lights come on white orangey:

- Eye reference light
- Main instrument panel lights
- Ambient lights
- Console, briefcase, and floor lights
- Center pedestal lights
- Rear console light
- Cockpit occupant reading lights.

L1 - A bluish white color, that facilitates reading.

L2 The following lights come in bluish white color:

- Sliding table lights
- Map lights
- Flight crew reading lights.

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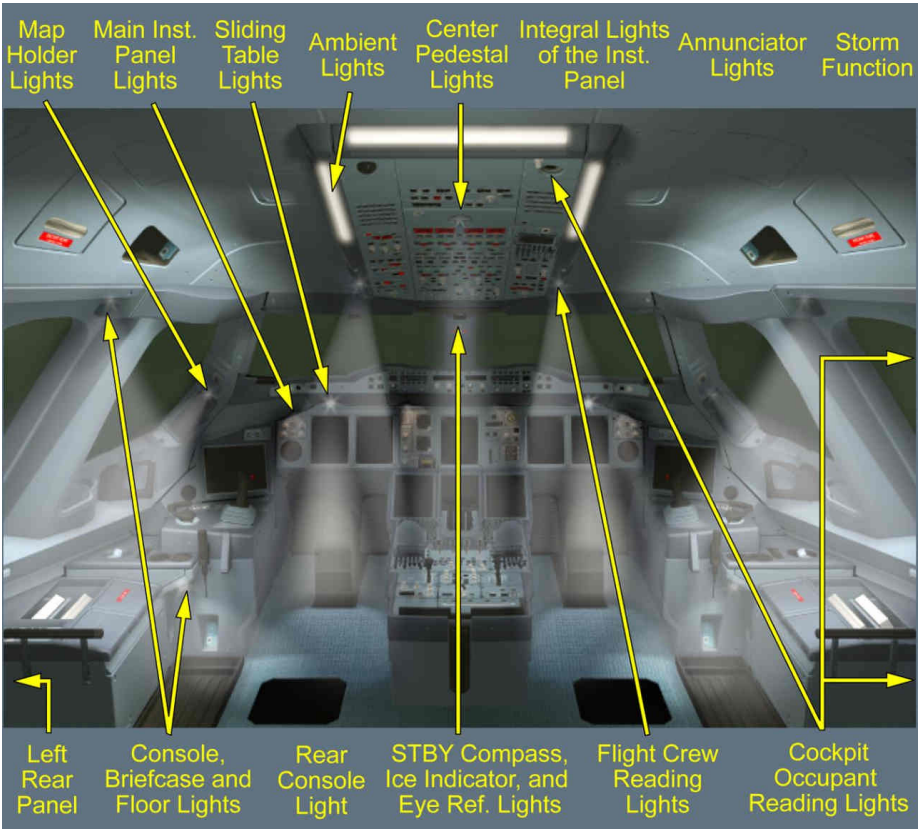
COCKPIT VIEW

Applicable to: ALL

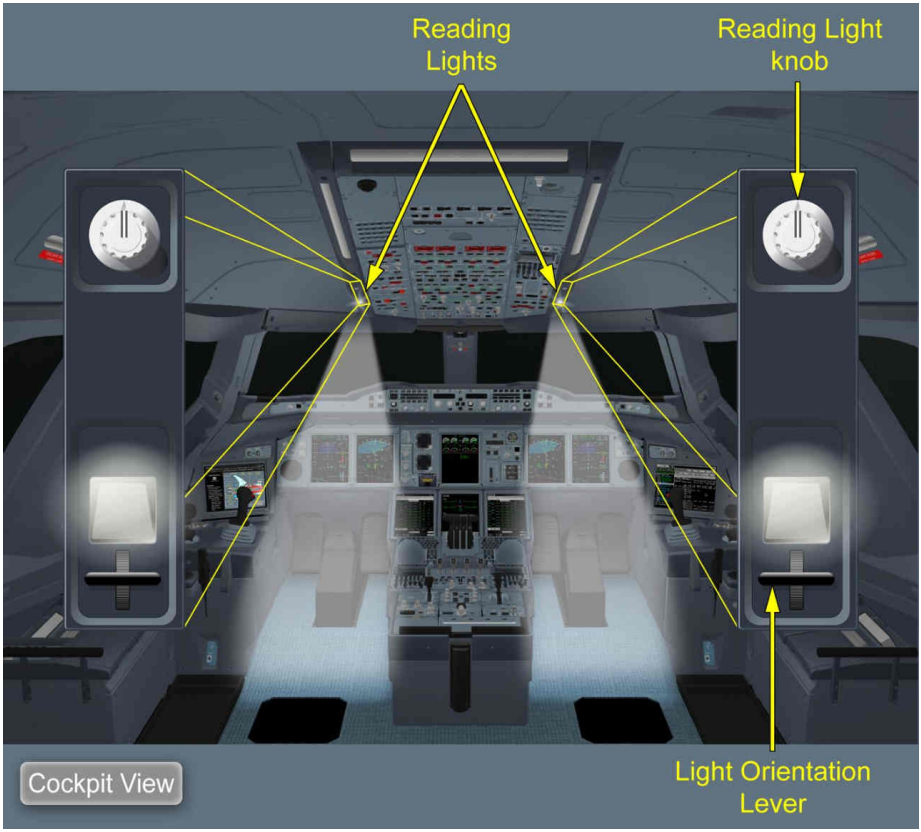
Cockpit View



FLIGHT CREW READING LIGHTS

Applicable to: ALL

Flight Crew Reading Lights & Controls



Each flight crewmember has a reading light. The flight crew can adjust the orientation of the reading light.

READING LIGHT knob

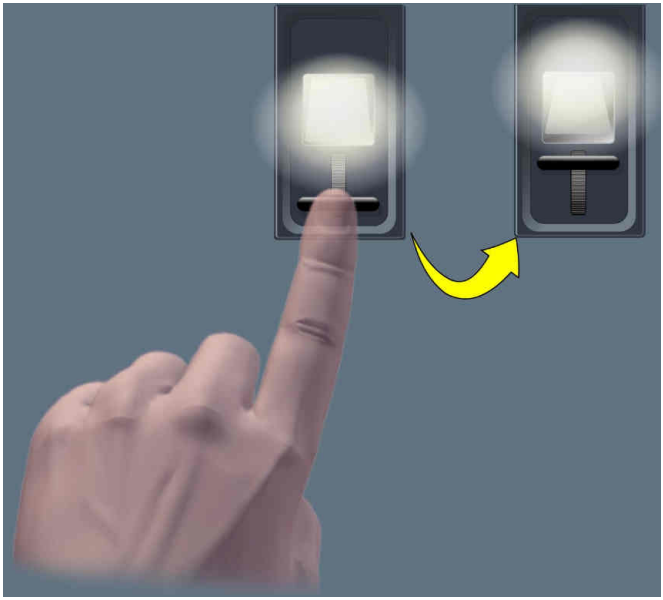


Turns the reading light on or off, and adjusts its brightness.

Light Orientation lever

Adjusts the orientation of the associated reading light.

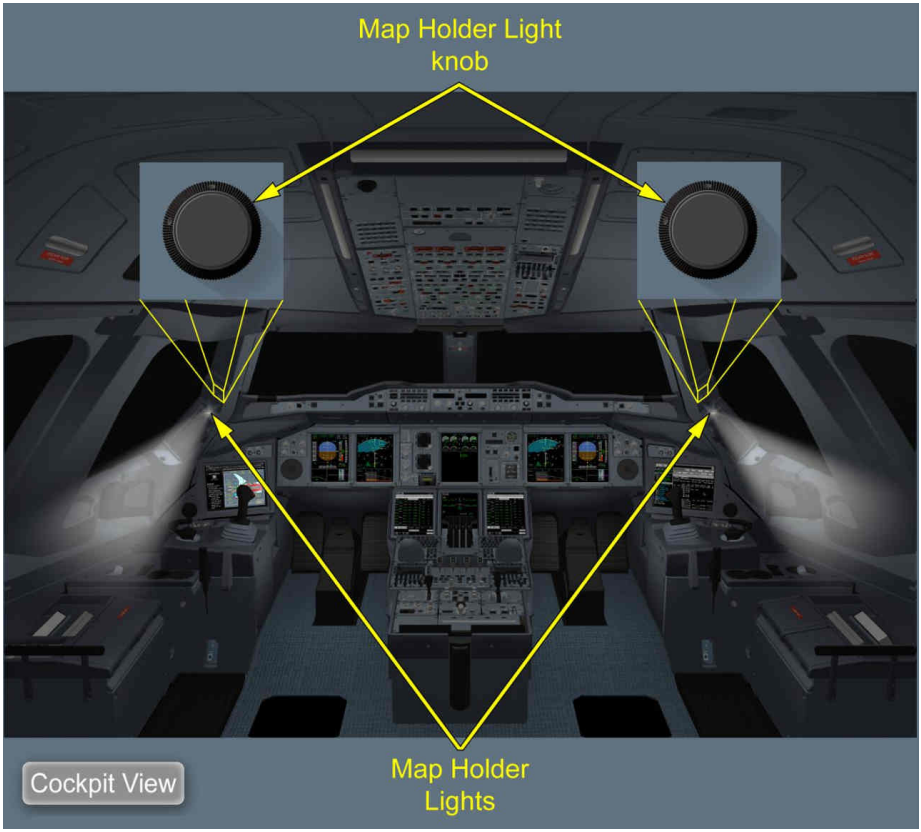
Light Orientation Lever



MAP HOLDER LIGHTS

Applicable to: ALL

Map Holder Lights & Controls



Each flight crewmember has a map holder light.

MAP Holder LIGHT knob

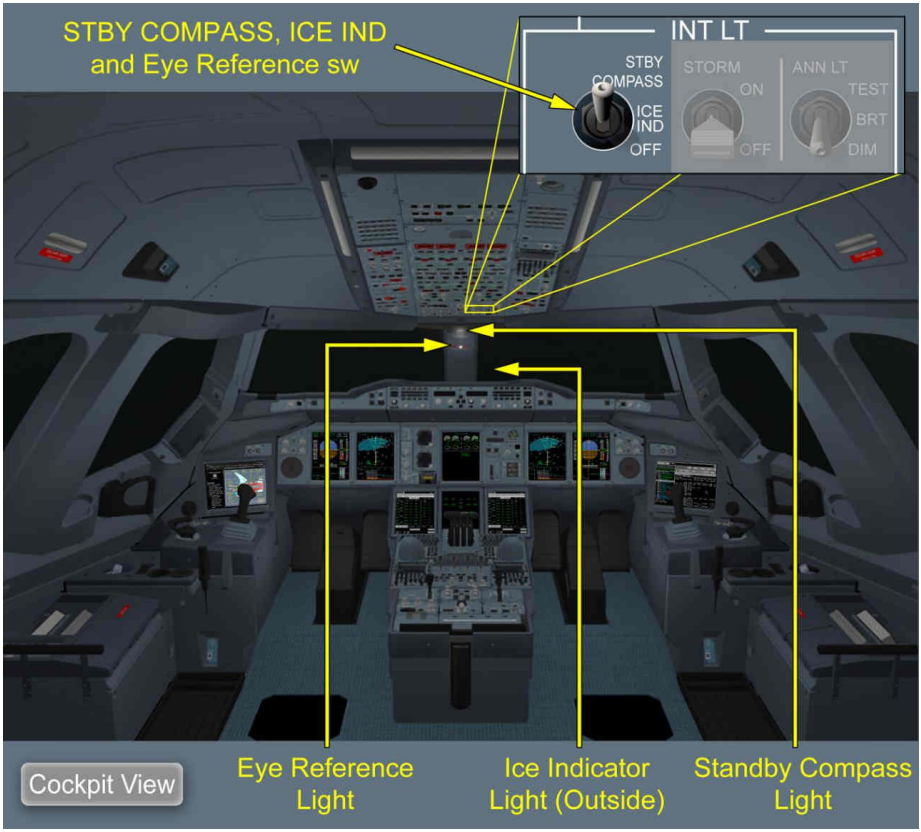


Turns the map holder light on or off, and adjusts its brightness.

STANDBY COMPASS, ICE INDICATOR, AND EYE REFERENCE LIGHTS

Applicable to: ALL

STBY Compass, Ice Indicator, and Eye Reference Lights & Controls



STBY Compass, ICE Indicator, and Eye Reference sw



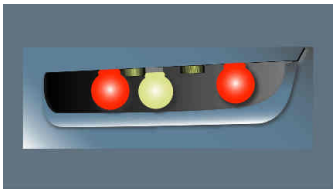
The standby compass light and the eye reference light are on.



The ice indicator light is on.

EYE REFERENCE LIGHT

L13

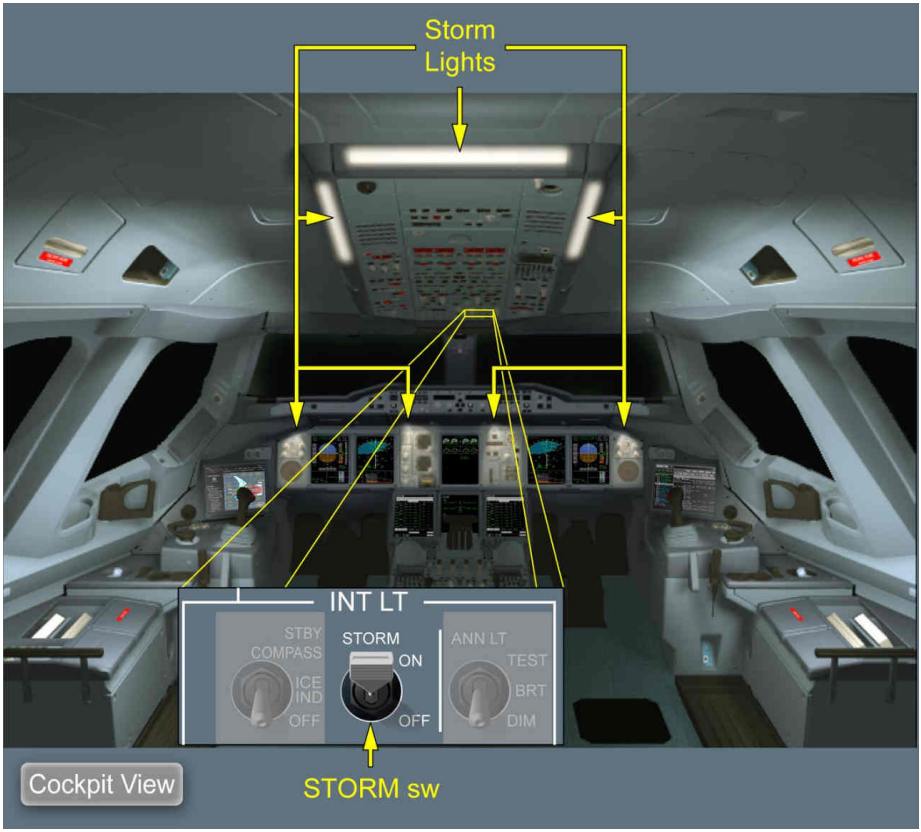


The eye reference light is on.
The eye reference light is in the white ball.

STORM FUNCTION

Applicable to: ALL

Storm Function Lights & Controls



The storm function enables the flight crew to obtain maximum lighting in the cockpit, via the ambient lights and the main instrument panel lights.

STORM sw



Ambient lights on the ceiling, and main instrument panel lights are at their maximum brightness.
Overrides all the other lighting selections, regardless of the position of the AMBIENT LIGHT knob or the MAIN PNL FLOOD LT knob .

ANNUNCIATOR LIGHTS

Applicable to: ALL

Annunciator Lights & Controls



The flight crew can adjust the brightness of all annunciator pushbuttons and pushbutton-switches. The flight crew uses the TEST position of the ANN LT sw in order to ensure that the lighting of all annunciators is operative.

ANN LT sw

L12



- Turns on the lights of the annunciators pushbuttons and pushbutton-switches
- The numbers 8 appear on each Liquid Crystal Display (LCD s).

The LCD s are:
- The BAT voltage indication on the maintenance panel
- All indications on AFS Control Panel (i.e. SPD or MACH , HDG or TRK , ALT , V/S or FPA)
- The barometric reference on the EFIS Control Panel
- The value of the rudder trim on the pedestal.



Dims the annunciator lighting.

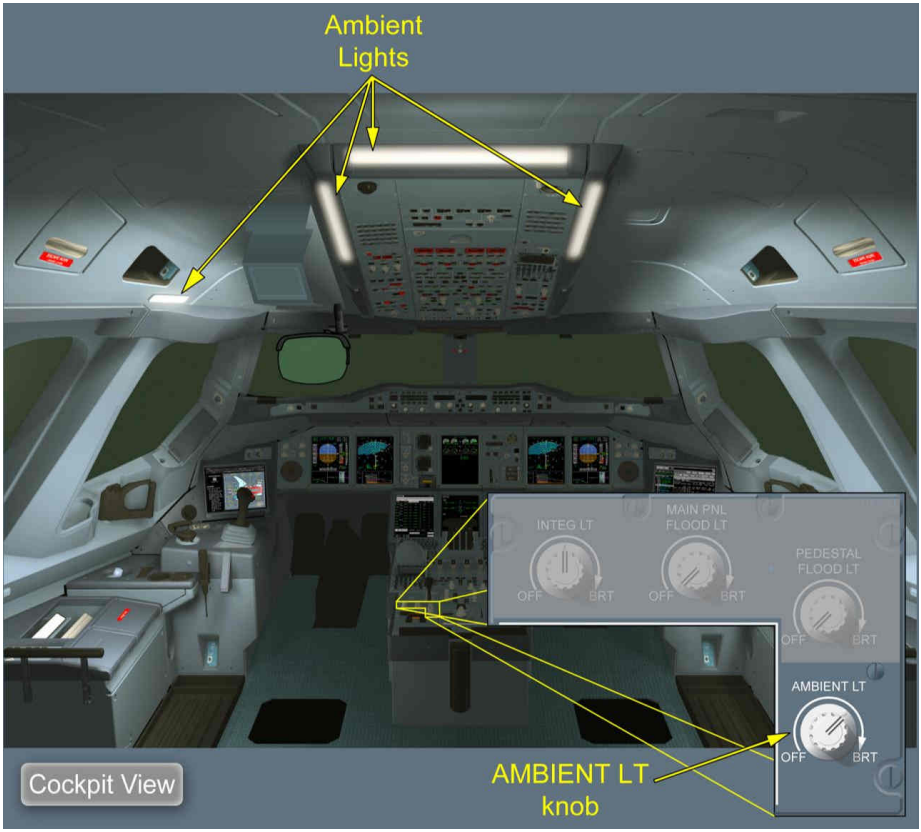


Annunciator lighting is at its maximum brightness.

AMBIENT LIGHTS

Applicable to: ALL

Ambient Lights & Controls



The overhead panel has ambient lights that provide shadow-free lighting in the cockpit.

L2 There are four light strips, that provide the ambient lighting.

When the aircraft is electrically supplied via ground servicing, only the rear ambient light is available.

L1 AMBIENT Lt knob



Turns the ambient lights on or off, and adjusts their brightness.

INTEGRAL LIGHTS OF THE INSTRUMENT PANEL

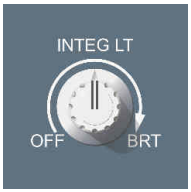
Applicable to: ALL

Integral Lights & Controls of the Instrument Panel



All cockpit panels have integral lighting.

Integ Lt knob

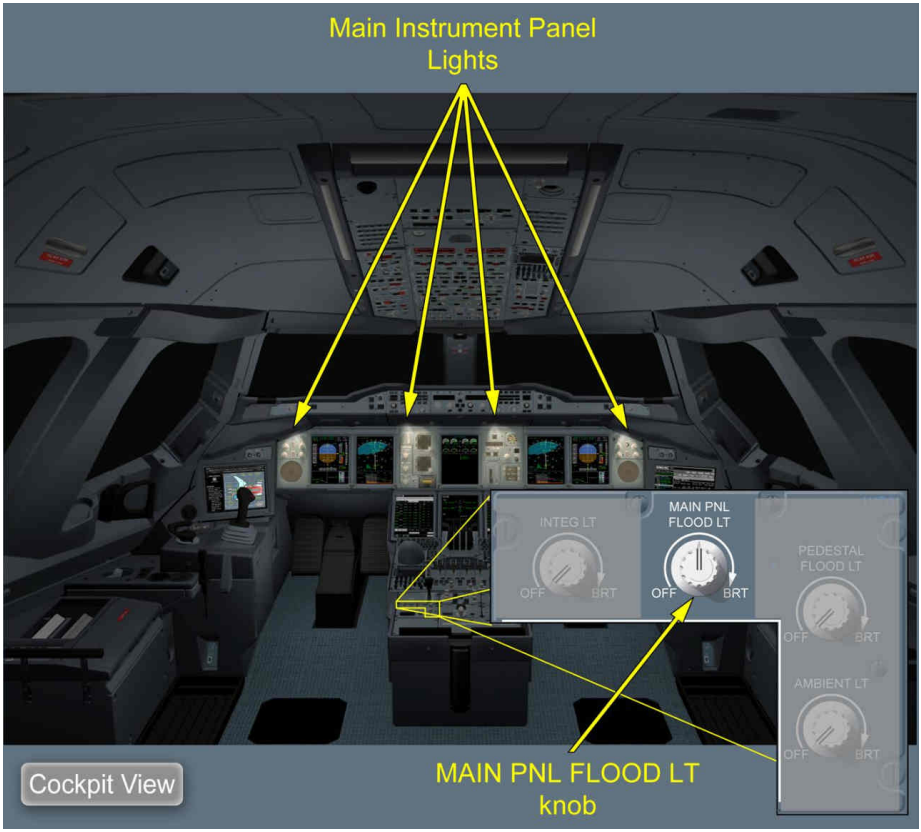


Turns the integral lights of the instrument panels on or off, and adjusts their brightness.

MAIN INSTRUMENT PANEL LIGHTS

Applicable to: ALL

Main Instrument Panel Lights & Controls



Lights under the glareshield provide lighting for the main instrument panel.

MAIN Pnl FLOOD Lt knob

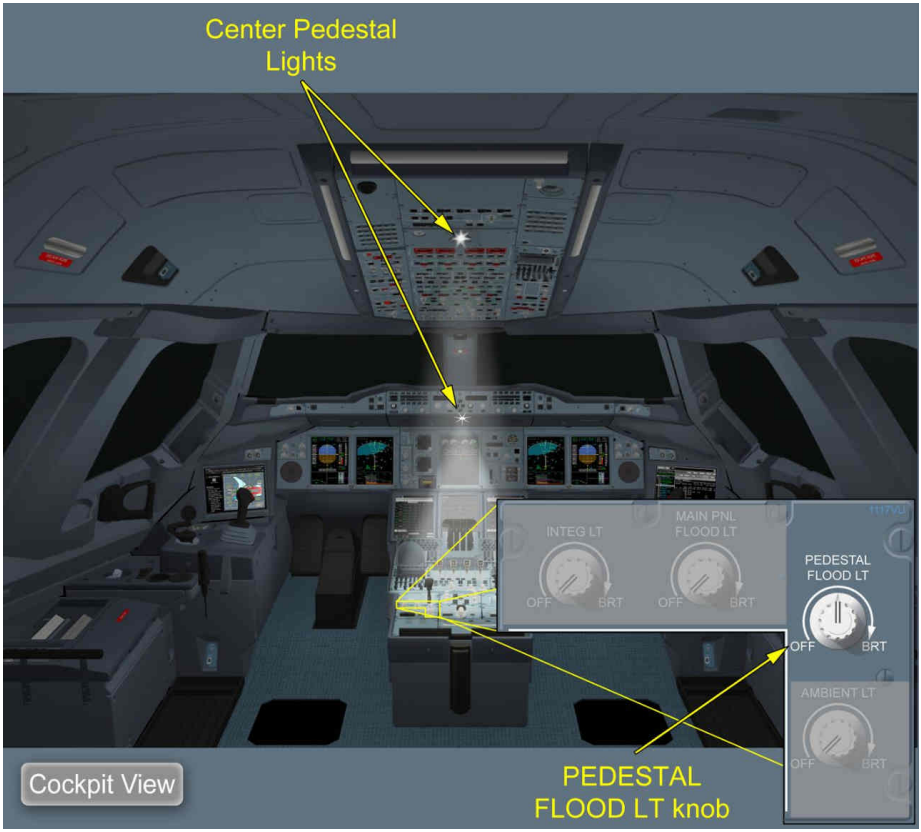


Turns the main instrument panel lights on or off, and adjusts their brightness.

CENTER PEDESTAL LIGHTS

Applicable to: ALL

Center Pedestal Lights & Controls



There are lights on the overhead panel and under the glareshield that provide lighting for the center pedestal.

PEDESTAL FLOOD Lt knob

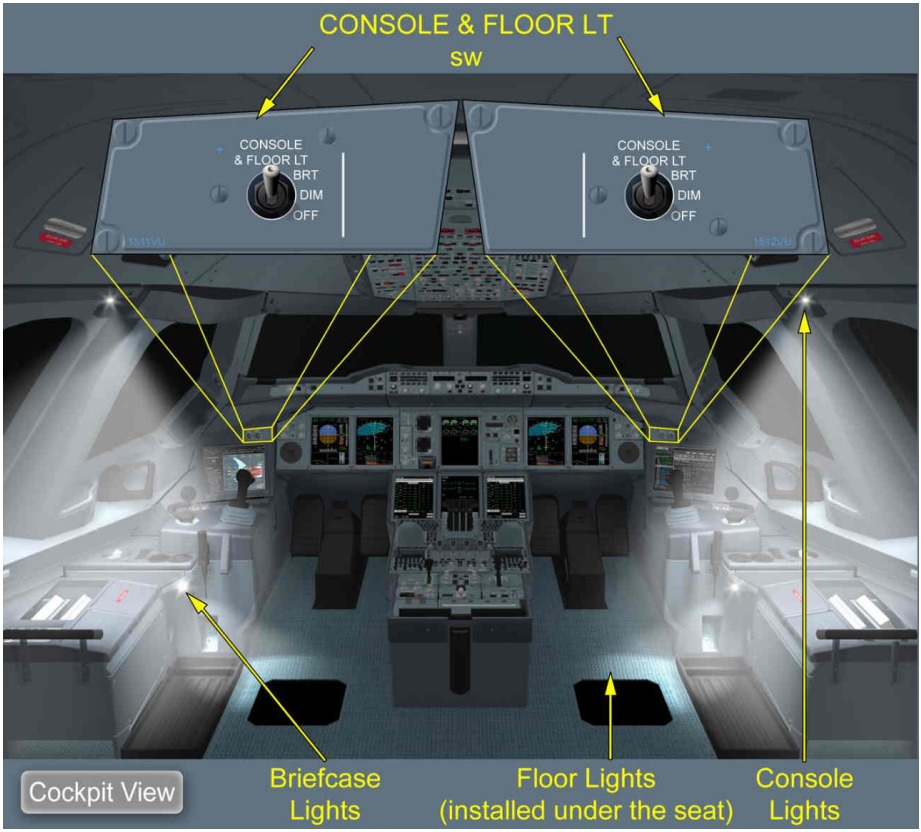


Turns the center pedestal lights on or off, and adjusts their brightness.

CONSOLE, BRIEFCASE, AND FLOOR LIGHTS

Applicable to: ALL

Console, Briefcase, and Floor Lights & Controls



Each flight crew station has:

- Floor area lights, that are under the flight crew seats, and provide lighting for the surrounding floor
- Lateral console lights
- Briefcase lights.

CONSOLE & FLOOR Lt sw



The console, briefcase, and floor lights are at their maximum brightness.

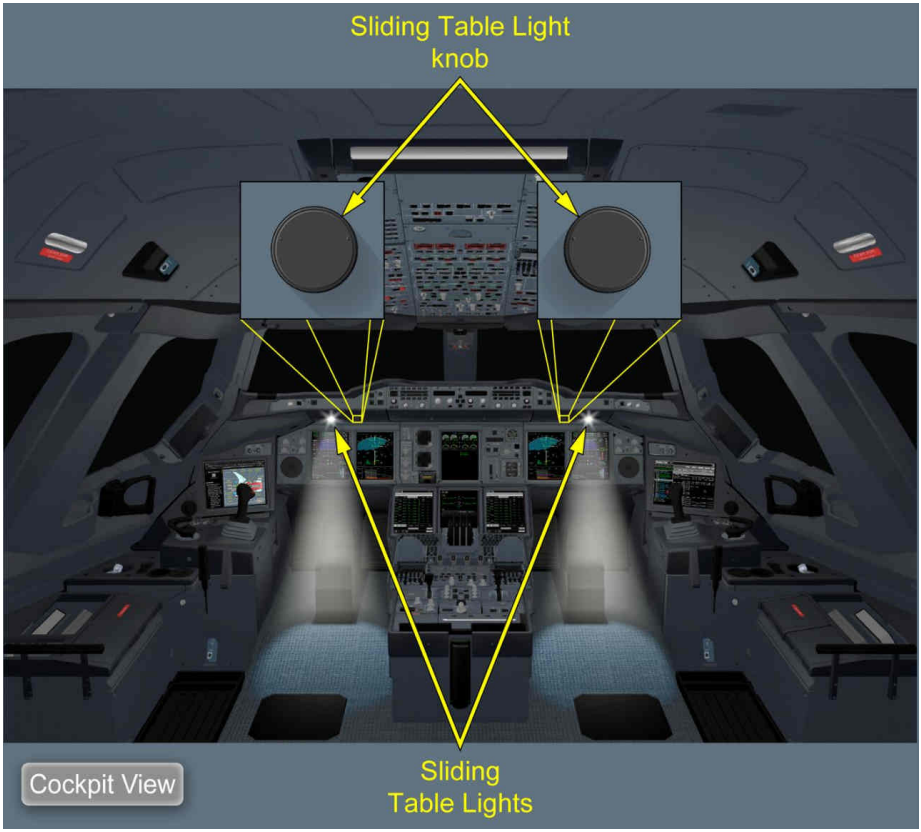


Only the console and briefcase lights are dim. The floor light is turned off.

SLIDING TABLE LIGHTS

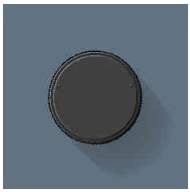
Applicable to: ALL

Sliding Table Lights & Controls



There are lights under the glareshield that provide lighting for the flight crew's sliding tables.

Sliding table Light knob

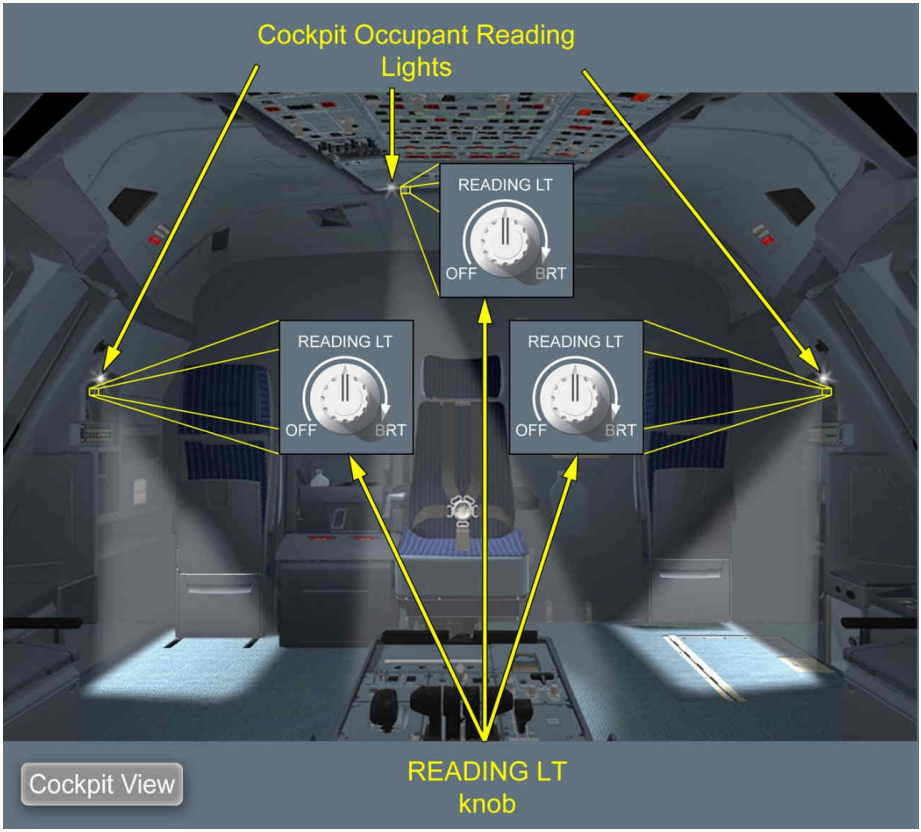


Turns the sliding table light on or off, and adjusts its brightness.

COCKPIT OCCUPANT READING LIGHTS

Applicable to: ALL

Cockpit Occupant Reading Lights & Controls



Reading lights are also available for cockpit occupants. In the cockpit, there are three READING LT knob : one for each cockpit occupant.

READING LT knob

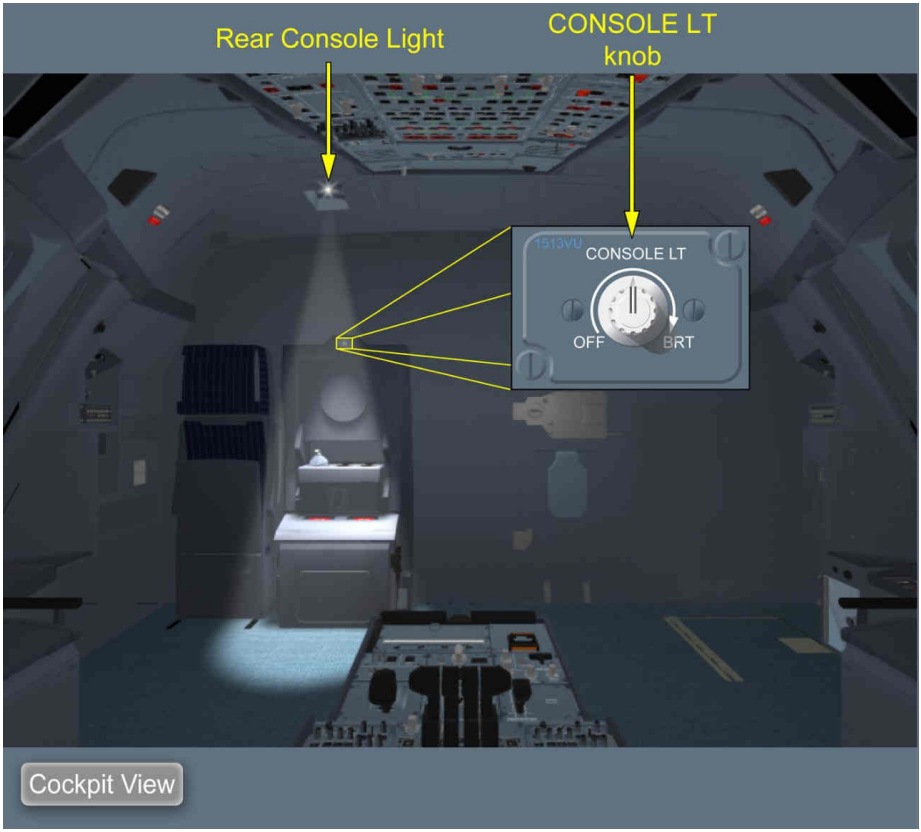


Turns the reading light on or off, and adjusts its brightness.

REAR CONSOLE LIGHT

Applicable to: ALL

Rear Console Light & Control



The light on the rear overhead panel provides lighting for the rear console.

CONSOLE LT knob



Turns the rear console light on or off, and adjusts its brightness.

LEFT REAR PANEL

Applicable to: ALL

Left Rear Panel



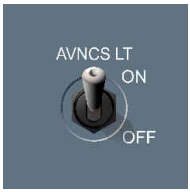
The left rear panel turns on the lighting in the avionics bay, and in the coat stowage.

COAT STWG LT sw



The light in the coat stowage is on.

AVNCS LT sw



The light in the avionics bay is on.

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GENERAL

Applicable to: ALL

The exterior lights increase visibility around the outside of the aircraft during operations, and improve the flight crew's awareness.

L2 Exterior lights use either: Lighting Emitting Diodes (LEDs), High Intensity Discharge (HID) or Xenon lamps.

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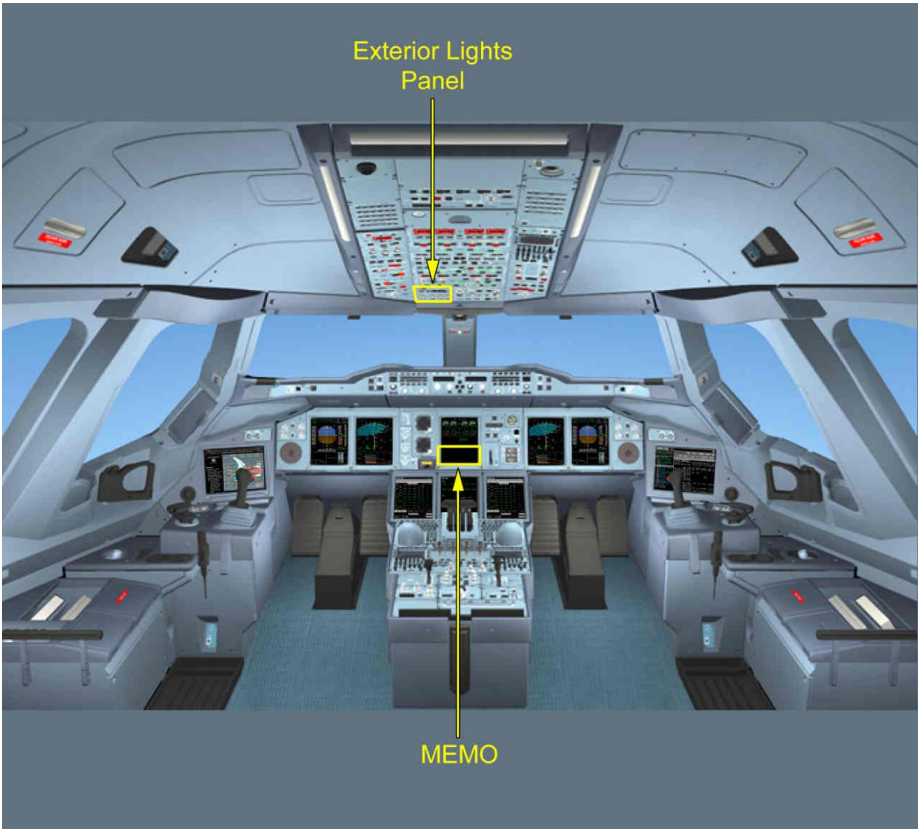
COCKPIT VIEW

Applicable to: ALL

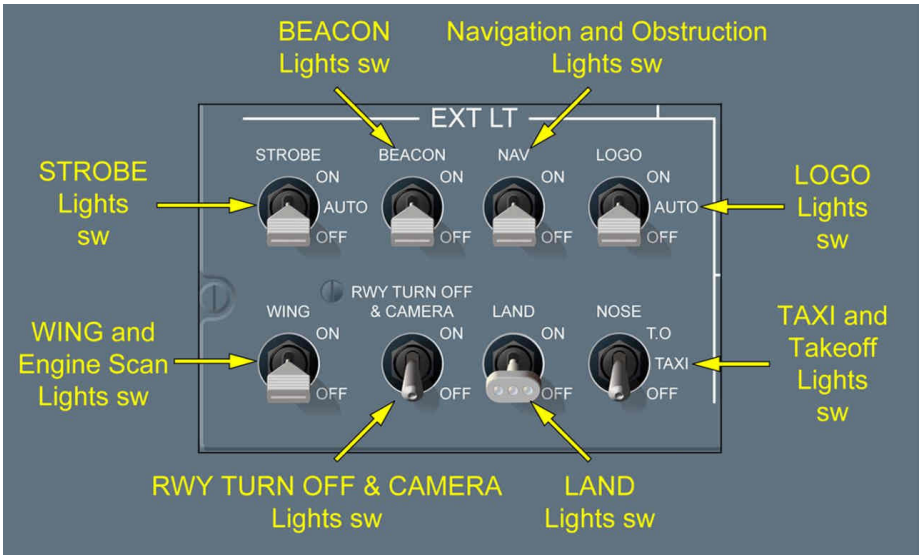
Cockpit View



EXTERIOR LIGHTS

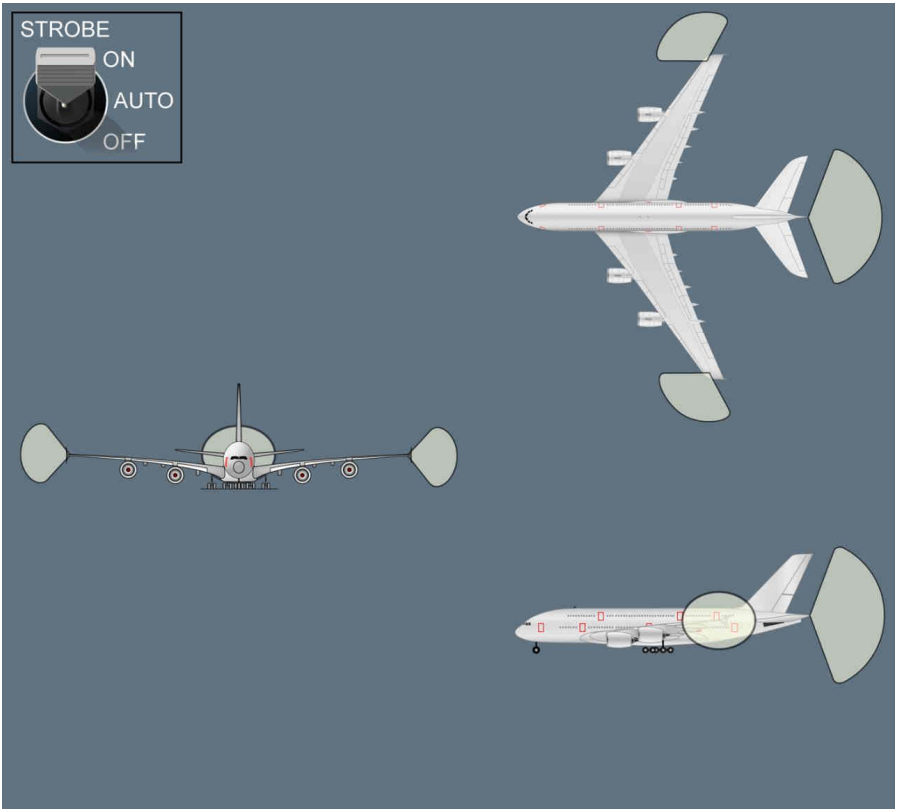
Applicable to: ALL

Exterior Lights Overview



STROBE LIGHTS

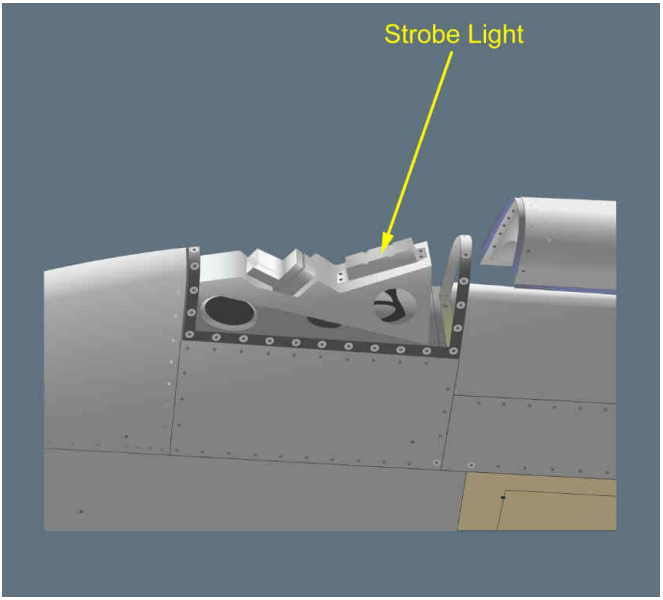
Strobe Lights & Controls



There are three anti-collision strobe lights:

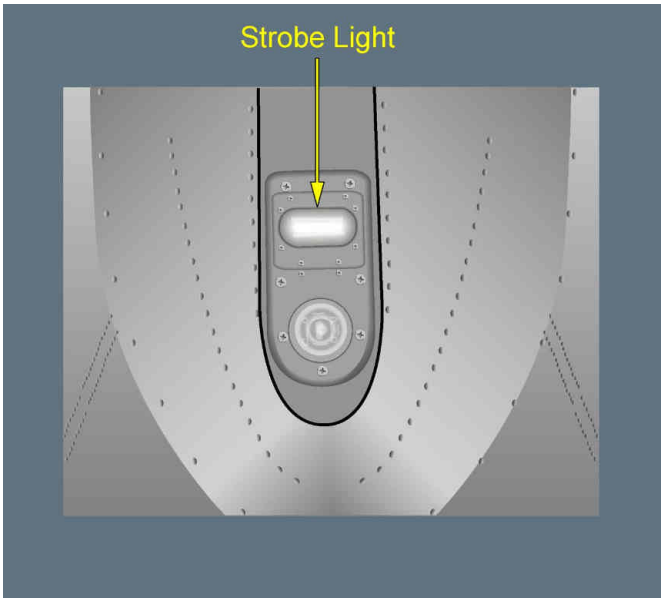
- One on each wing tip

Wing Tip Strobe Light



- One on the tailcone.

Tailcone Strobe Light



The strobe lights flash in white alternately with the beacon lights, when both are turned on.

STROBE sw



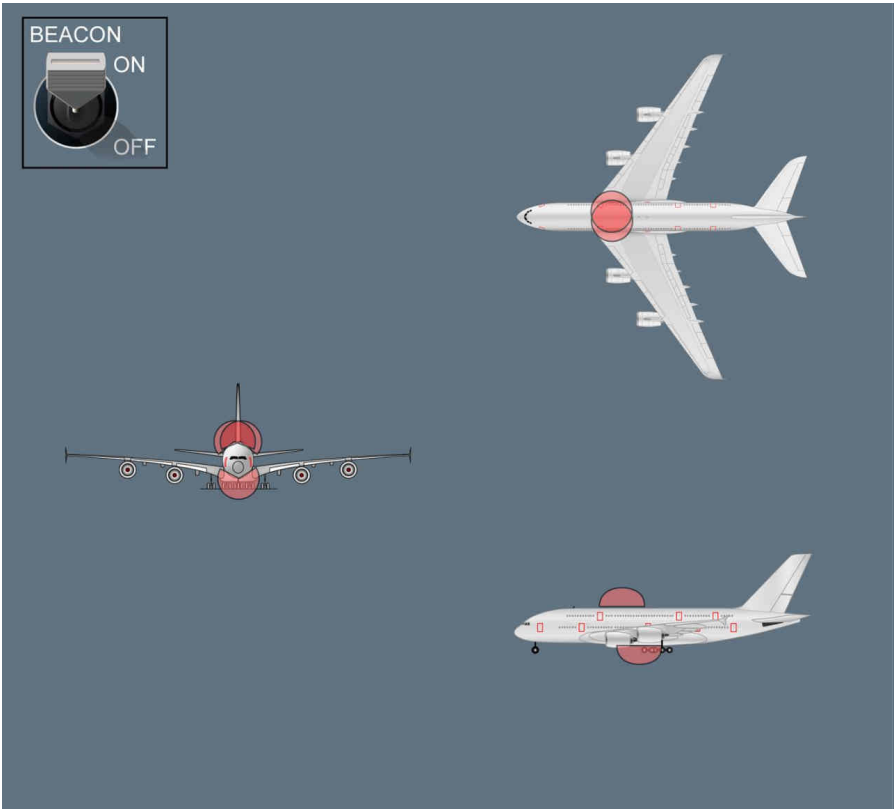
The strobe lights are on.



The strobe lights automatically flash in flight.

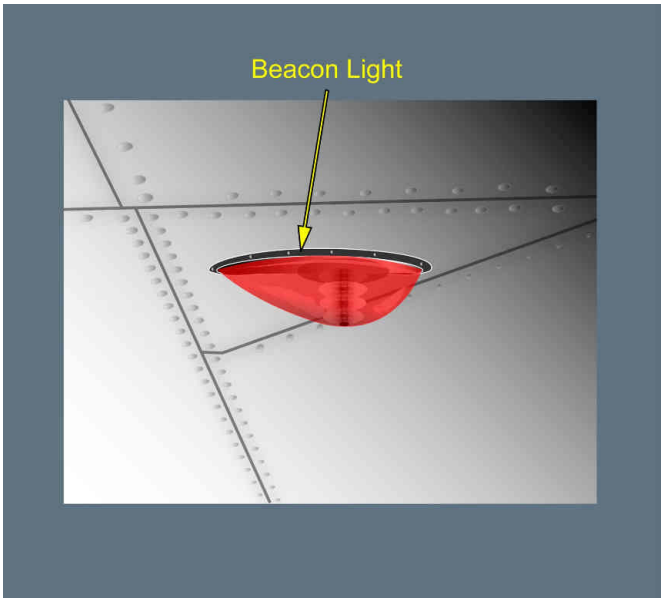
BEACON LIGHTS

Beacon Lights & Controls

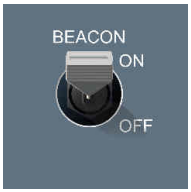


There are three anticollision beacon lights: Two on the top of the fuselage, and one under the fuselage.

Beacon Light



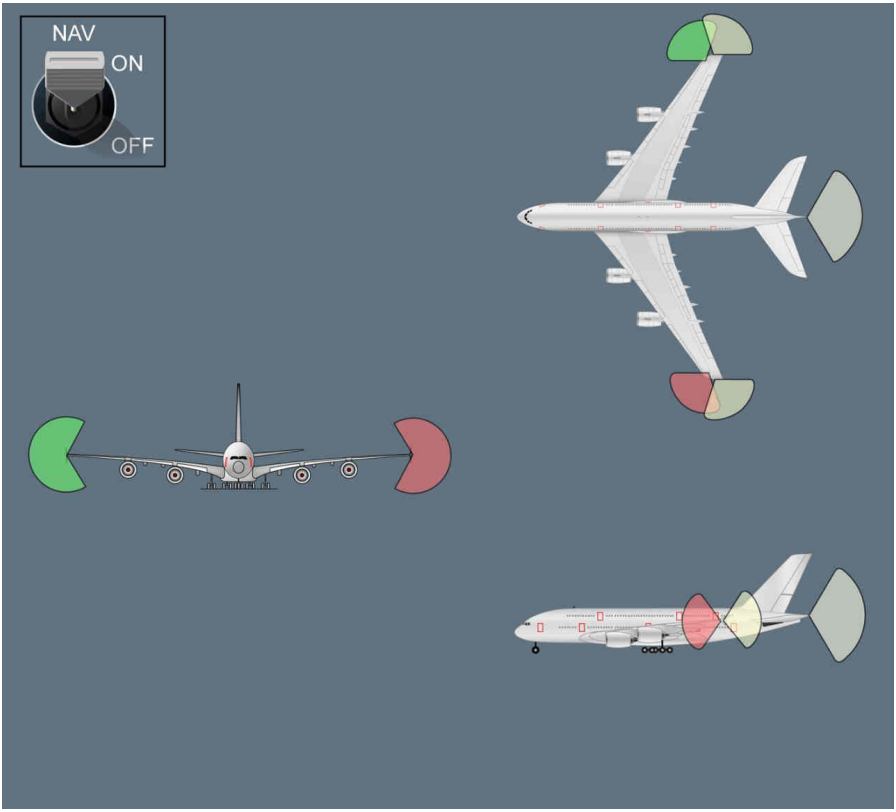
BEACON sw



The beacon lights are on, and flash in red. The beacon lights alternate with the strobe lights, if the strobe lights are on.

NAVIGATION AND OBSTRUCTION LIGHTS

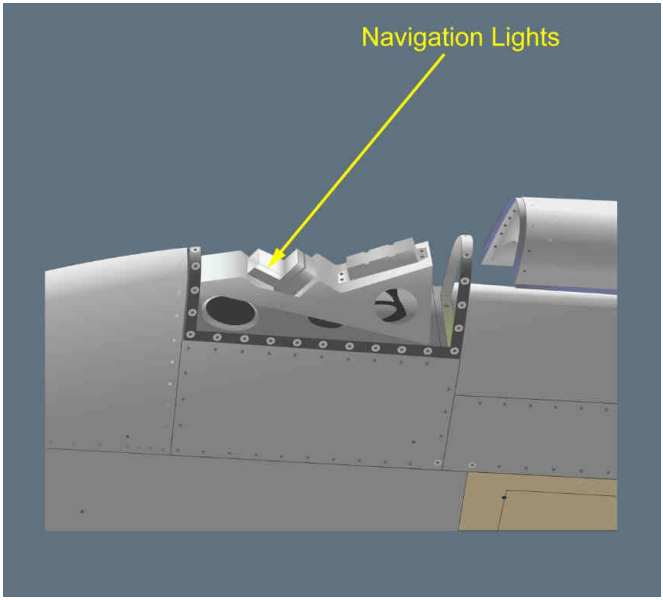
Navigation and Obstruction Lights & Controls



The aircraft has with three navigation lights:

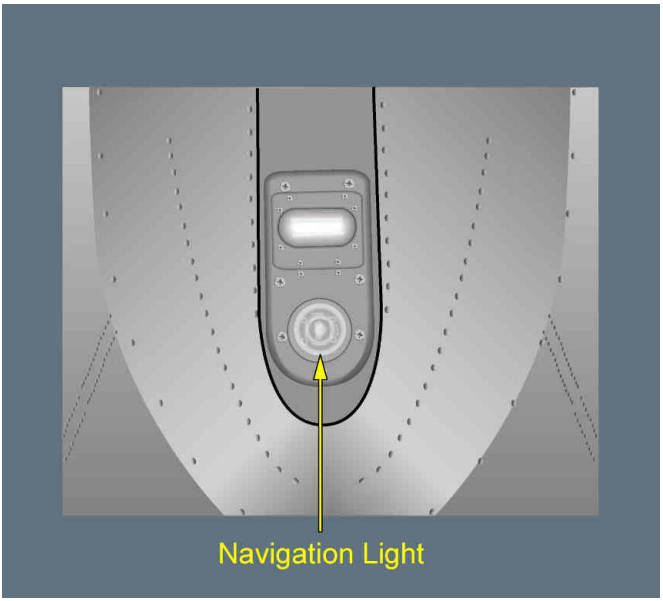
- One red navigation light on the left wing tip

Wing Tip Navigation Light



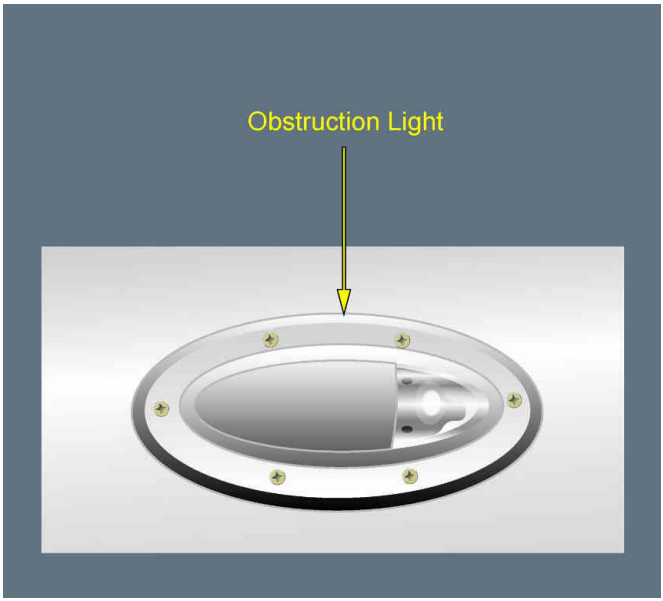
- One green navigation light on the right wing tip
- One white navigation light on the tail cone.

Tail Cone Navigation Light



The aircraft has two white obstruction lights: One on each wing tip.
The obstruction lights helps distinguishing the aircraft on ground.

Obstruction Lights



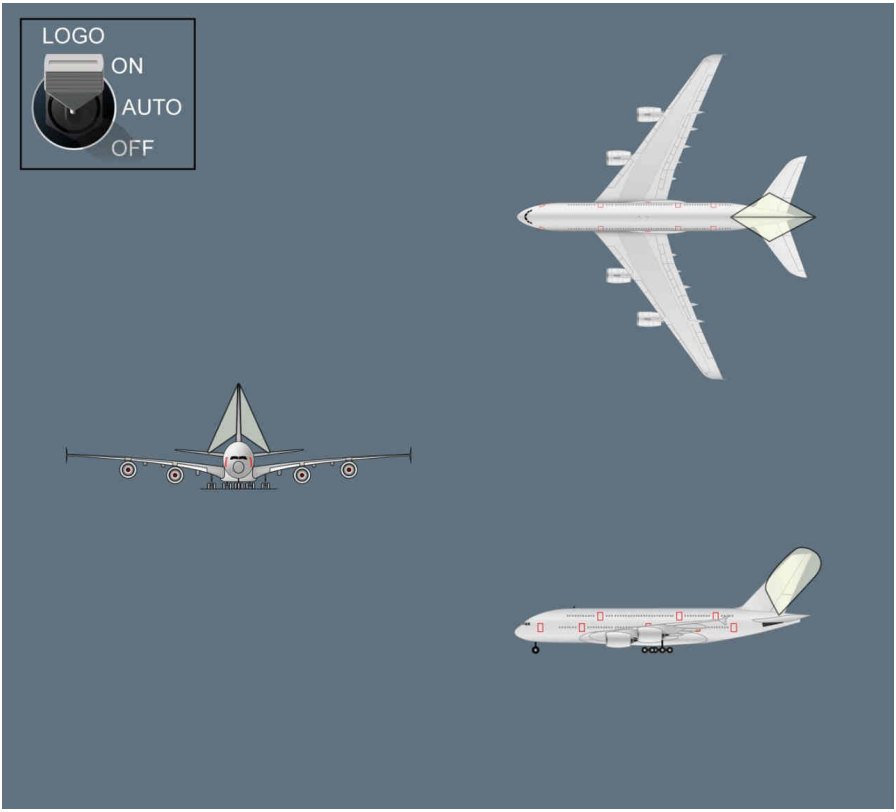
NAV sw



The navigation lights are on.
If the aircraft is on ground, the obstruction lights are also on.

LOGO LIGHTS

Logo Lights & Controls



There are two logo lights: One on the upper surface of each horizontal stabilizer.
These lights provide lighting on the company logo that is on the tail fin.

LOGO sw



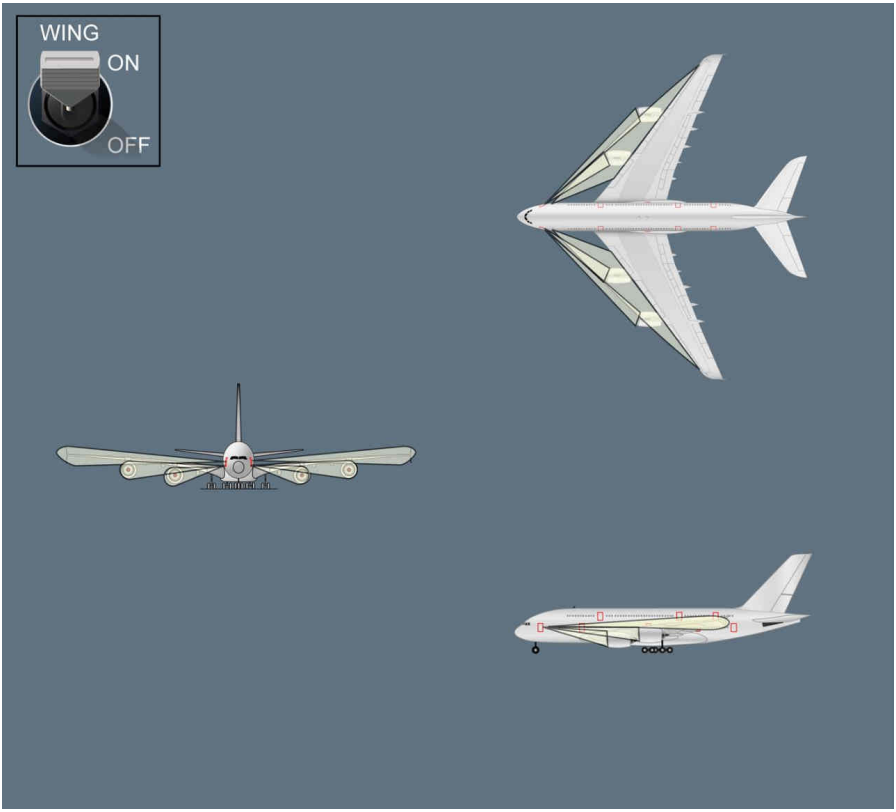
The logo lights are on.



The logo lights come on automatically, when the aircraft is:
- On ground
- In flight, when the slats are extended.

WING AND ENGINE SCAN LIGHTS

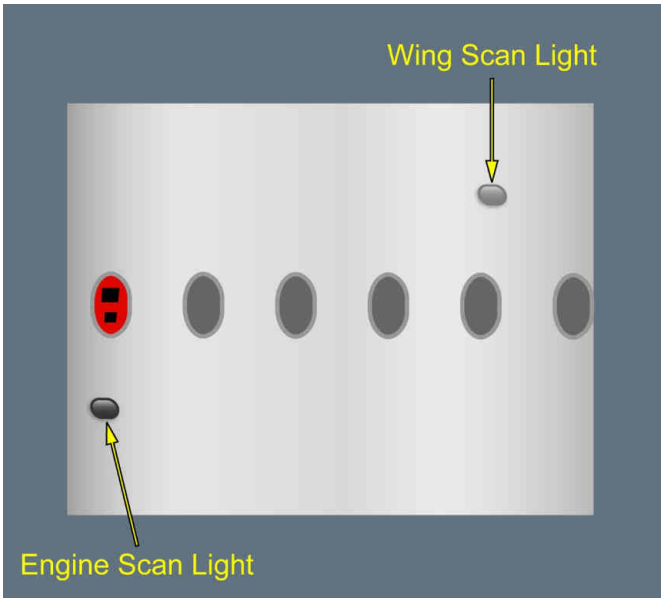
Scan Lights & Controls



The flight crew is able to visually detect ice accretion, due to scan lights that provide lighting on the wings and engines.

There are two scan lights on each side of the fuselage:
- One that provides lighting on the wing leading edge
- One that provides lighting on the engine air intake.

Wing and Engine Scan Lights



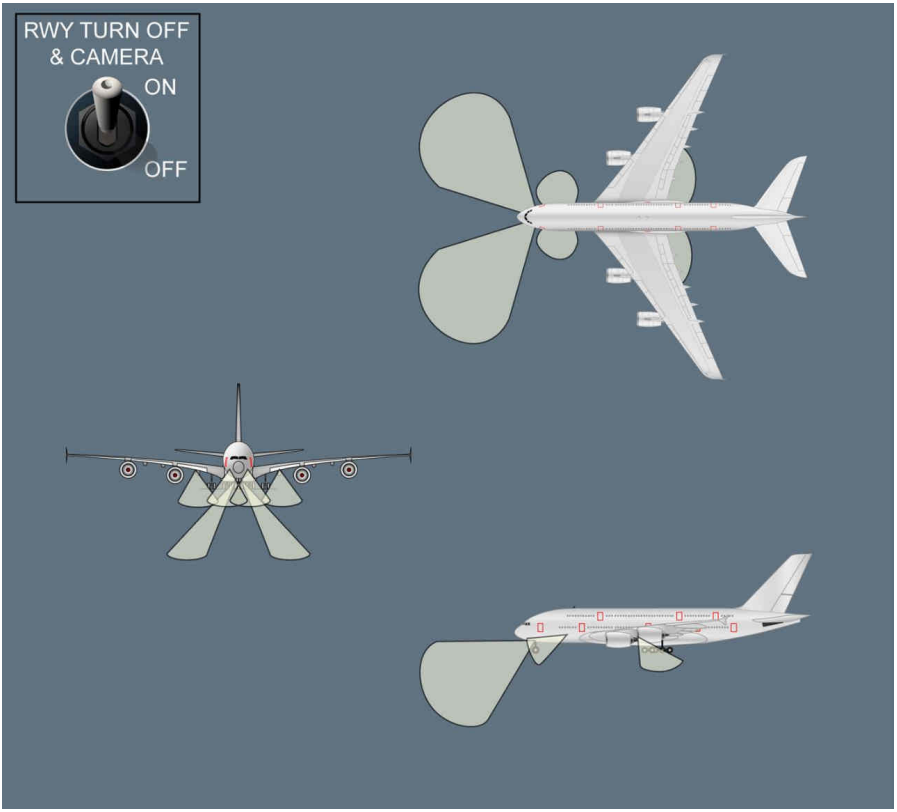
Wing sw



All scan lights are on.

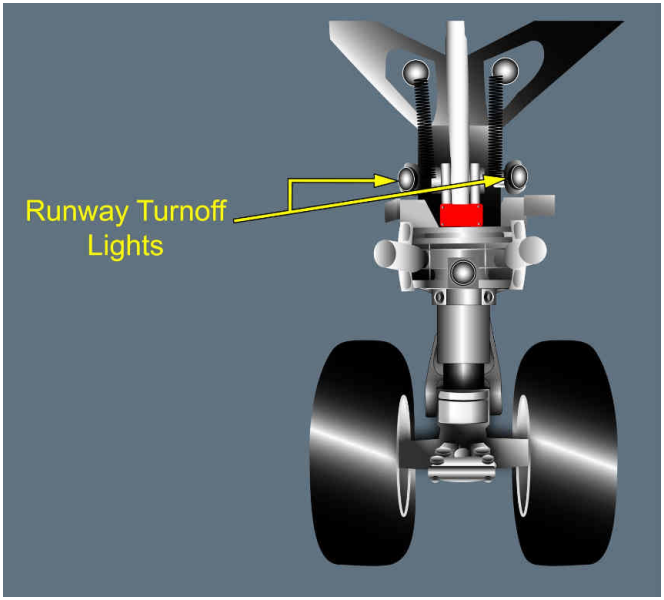
RUNWAY TURNOFF AND CAMERA LIGHTS

Runway Turnoff and Camera Lights & Controls



- The aircraft has two runway turnoff lights on the nose landing gear strut, that provide lighting during taxi, and enable the flight crew to detect any obstacle on the runway and on the taxiway

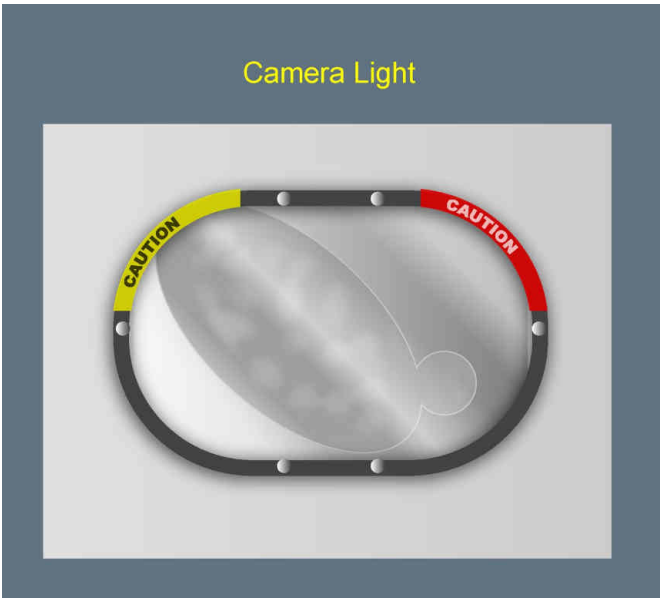
Runway Turnoff Lights



- The aircraft has four camera lights: One camera light on each side of the forward fuselage, and one under each wing.

  When the flight crew uses the taxi cameras at night, the camera lights provide ground lighting for:
  - The nose landing gear
  - The main landing gear.

Camera Lights



RWY TURN OFF & CAMERA sw

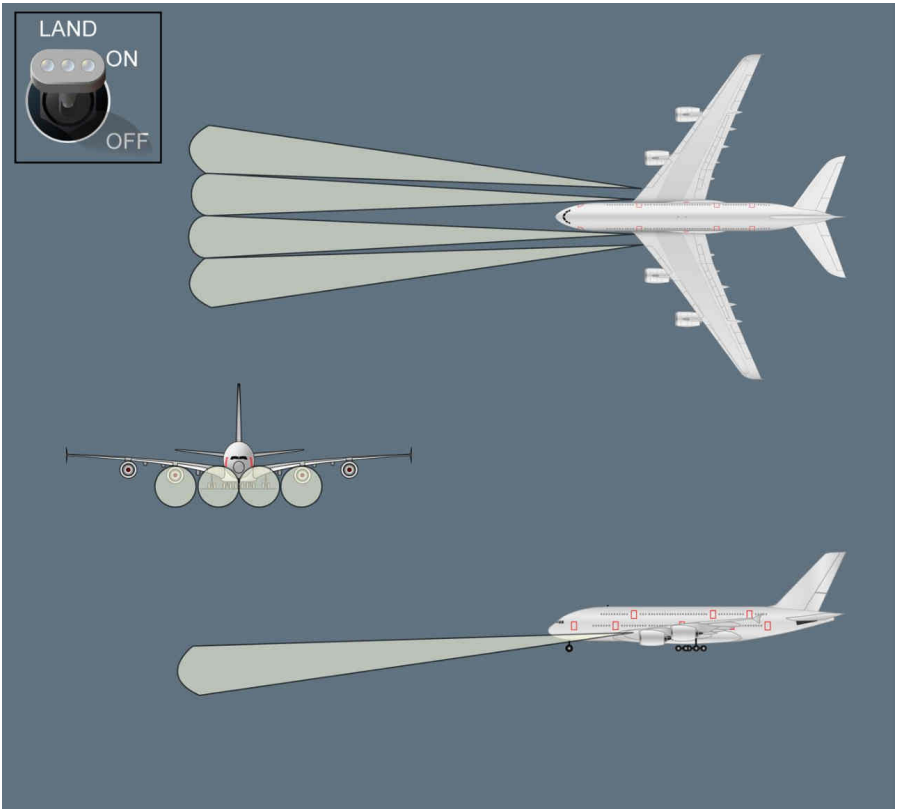


On ground:
- The runway turnoff lights are on
- The camera lights are also on, If ETACS is set to ON.

During takeoff, landing and approach, only the camera lights are on if:
- ETACS is set to ON
- The nose landing gear is extended.

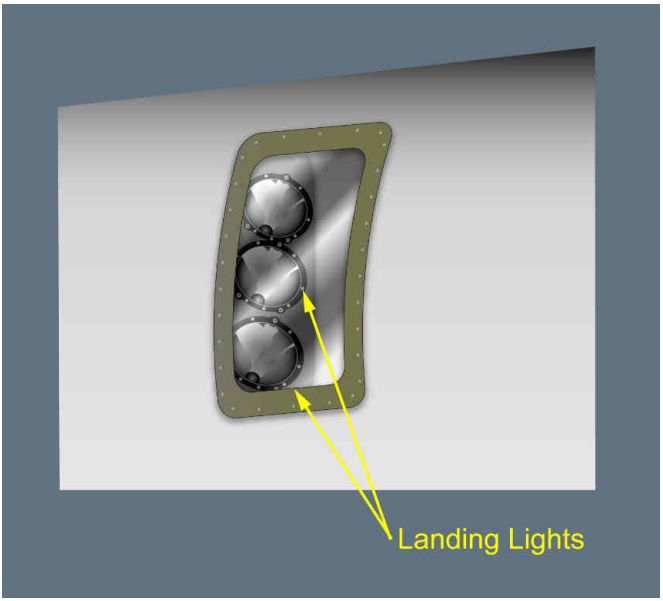
LANDING LIGHTS

Landing Lights & Controls



There are two landing lights near the wing root of each wing leading edge. These lights provide lighting that enables the flight crew to detect any obstacle on the runway.

Landing Lights



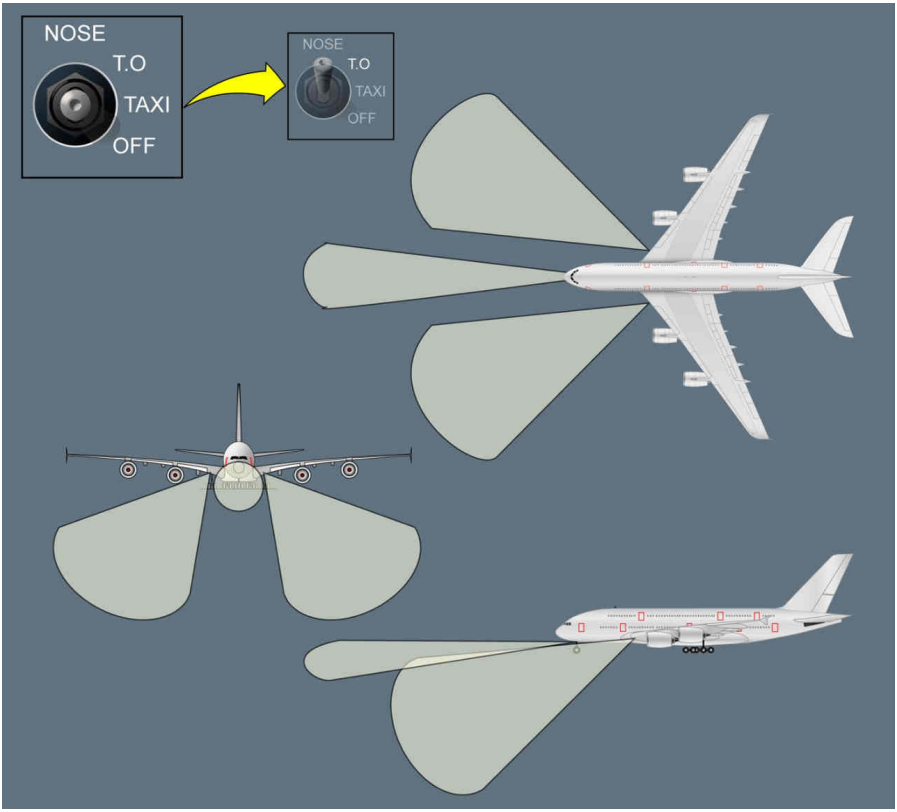
LAND sw



The landing lights are on.

TAKEOFF AND TAXI LIGHTS

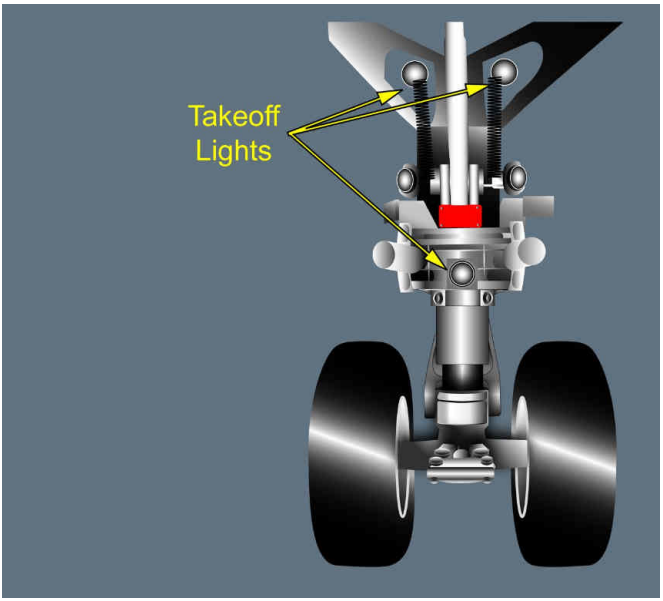
Taxi Lights & Controls



The aircraft has:

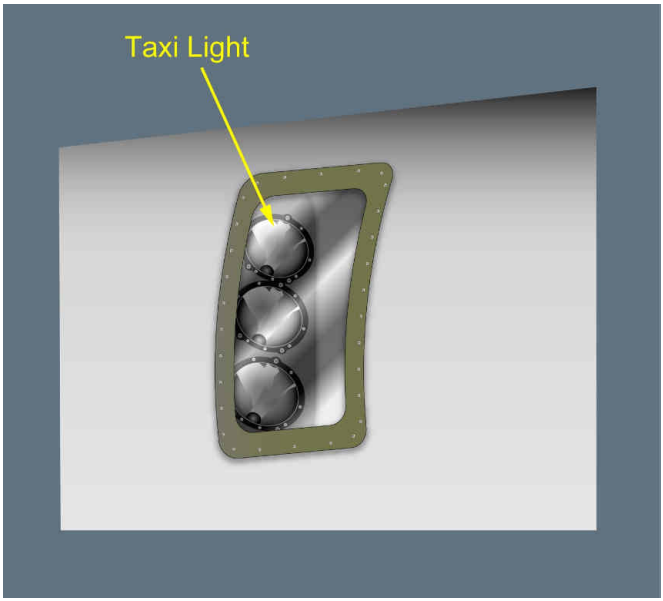
- Three takeoff lights on the nose landing gear strut, that enable the flight crew to detect obstacles on the runway.

Takeoff Lights

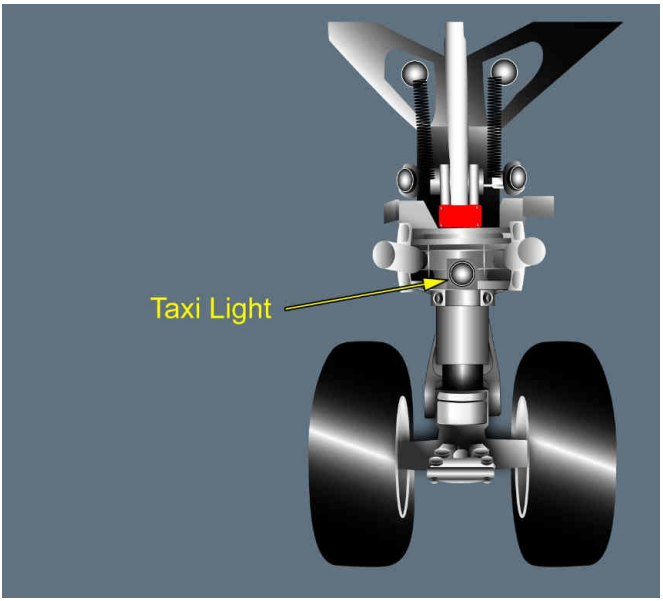


- One taxi light, near the wing root of each leading edge, and one taxi light on the nose landing gear strut.
  The taxi lights enable the flight crew to detect obstacles on the taxiway.

Taxi Lights on the Wing Root



Taxi Light on the Nose Landing Gear



NOSE sw



The taxi and the takeoff lights are on.
The light on the nose landing gear goes off automatically, after landing gear retraction.



Only the taxi lights are on.

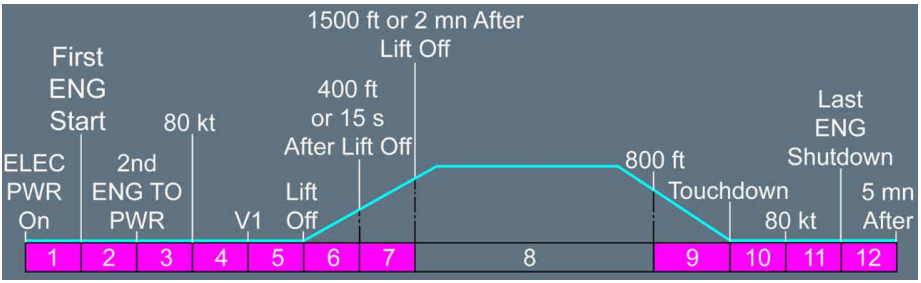
MEMO

Applicable to: ALL

STROBE LT OFF The aircraft is in cruise, and the STROBE sw is set to OFF.

L2 Flight phase inhibition:

Flight phase inhibition



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OVERVIEW

Applicable to: ALL

The emergency lighting has different functions:
- In normal operation or in emergency situation: Shows the way to the exit to leave the aircraft
- In emergency situation: Provides basic illumination if the normal illumination is lost.

The emergency lighting operates independently from the other normal lighting. However some parts of the emergency lighting are integrated in the normal lighting in order to be operative for a normal illumination.

There are emergency lights:
- In the cockpit
  Refer to Emergency Lighting in the cockpit
- In the cabin, and on the escape slides.
  Refer to Emergency Lighting in the cabin .

The emergency lighting comes on automatically in the cabin, when the electrical power is lost. However, the flight crew can manually turn on the emergency lighting.

EMERGENCY LIGHTING IN THE COCKPIT

Applicable to: ALL

EMERGENCY LIGHTING IN THE COCKPIT

Ambient lights and cockpit way lights provide emergency lighting in the cockpit.

AMBIENT LIGHTS

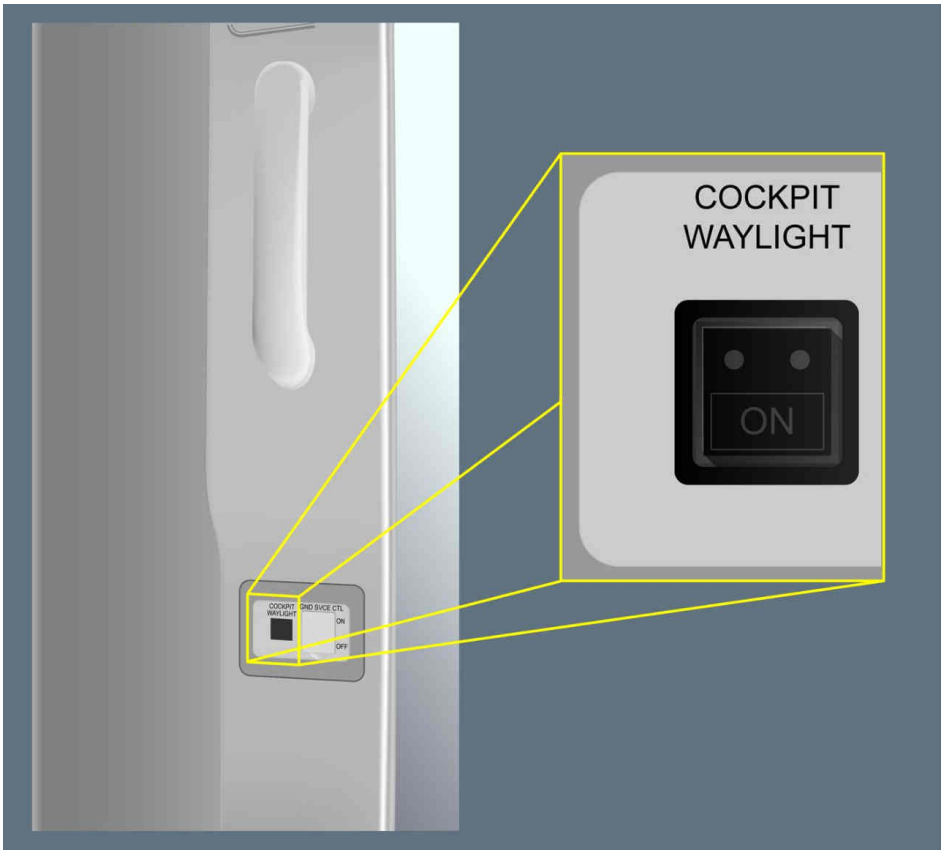
The left and right ambient lights provide emergency lighting in the cockpit, when:
- The aircraft electrical supply comes from the essential power
- The flight crew has set the AMBIENT LT knob to ON.

COCKPIT WAY LIGHTS

If the aircraft is not electrically supplied, the flight crew can manually illuminate:

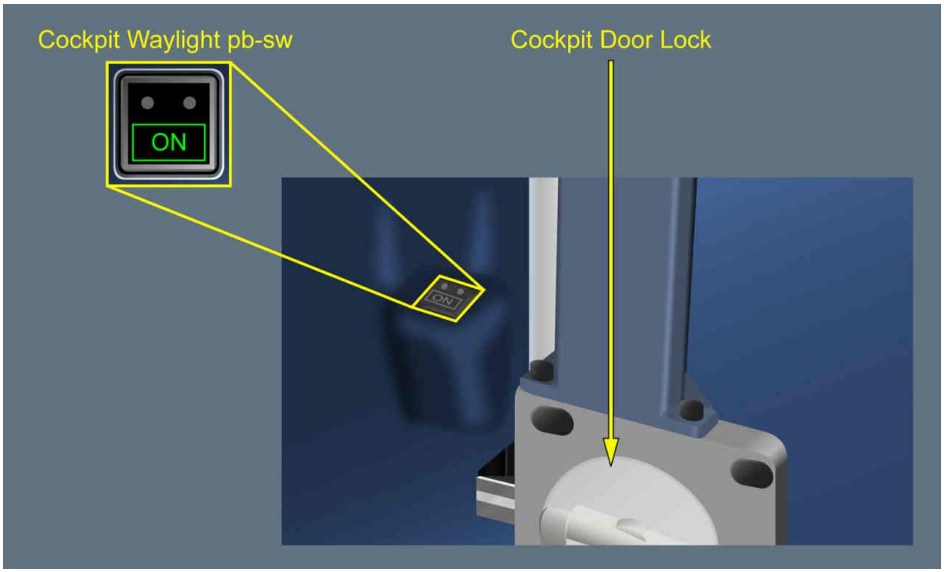
- The way to the cockpit, via the Cockpit Waylight pb-sw, on the main left deck door 1

Cockpit Waylight pb-sw in the cabin



- The way from the cockpit to the deck door, via the Cockpit Waylight pb-sw, near the cockpit door.

Cockpit Waylight pb-sw in the cockpit



A battery supplies the cockpit way light. The cockpit way light goes off automatically after 60 s. The flight crew can turn on the cockpit way light a maximum of ten times, before the first engine start.

EMERGENCY LIGHTING IN THE CABIN

Applicable to: ALL

COMPONENT DESCRIPTION

Emergency lighting is provided in the cabin by:
- The floor path marking
- The exit signs
- The staircase emergency lights
- The overhead emergency lights
- The door lights and slide lights.

All emergency lighting components use Light Emitting Diodes (LEDs).

FLOOR PATH MARKING

The floor path marking will guide passengers to the nearest emergency exit in the event that the overhead emergency lighting and exit signs are no longer visible (e.g. by smoke).

The floor path marking includes:

- Floor path marking lights

  The floor path marking lights are:
  - On the side of the seats
  - On the monuments: Galleys, stowage, partitions, and lavatories.

- Exit identifiers.
  The exit identifier provides illumination of the floor near the door and will provide the exit indication in the event that the exit marker is no longer visible.
  The exit identifier is visible by an EXIT caption on the bottom of each upright exit door.

EXIT SIGNS

The aircraft has different exit signs:

- Exit locators, that indicate the location of the exit areas
  The exit signs are on the cabin ceiling, in order to be visible throughout the aisles.
- Exit markers, that indicate the position of the doors
  They are directly above the emergency exits.
- Additional exit signs, in front of the stairwell, that guide passengers out of the staircases.

STAIRCASE EMERGENCY LIGHTS

The staircase emergency lights are installed under each step in order to provide lighting in the stairwells.

OVERHEAD EMERGENCY LIGHTS

There are ceiling lights and spotlights that provide lighting for the aisles, the entry areas, and the cross-aisles of both decks.

DOOR LIGHTS AND SLIDE LIGHTS

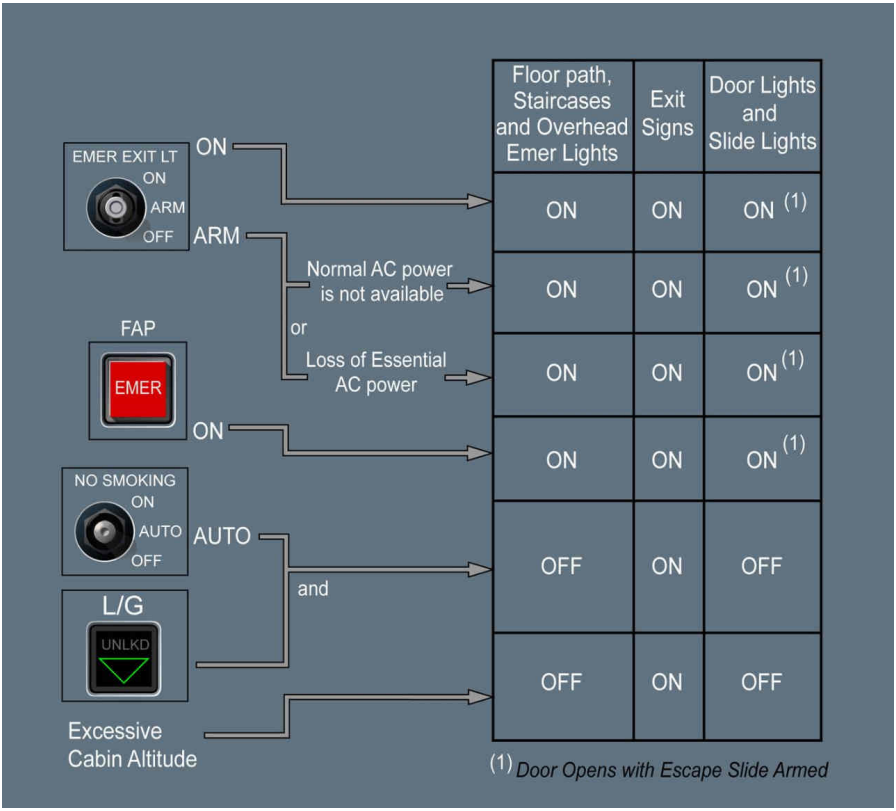
The emergency doors M3R and M3L, that are located above wings, have emergency door lights. The emergency door lights provide lighting for the area of the wing where the evacuating passengers make their first step outside the cabin, in the case of an aircraft evacuation.
Each slide has slide lights that provide lighting for the escape slides and the area in front of the slide.

OPERATION

The emergency lighting system can be controlled from:
- The cockpit via the EMER EXIT LT sw on the overhead panel, or
- The cabin via the Flight Attendant Panels (FAPs).

All emergency lights automatically come on, when:
- The flight crew sets the EMER EXIT LT sw to ARM, and
- All Normal AC power (i.e. ENG GENs, APU GENs, EXTs) is not available, or
- The Essential AC power (i.e. the normal AC is lost and the RAT does not deliver power) is lost.

L2 Other cases could also automatically turn on a part of emergency lighting (i.e. the door and slide lights, or the exit signs):
- Door and slide lights automatically come on:
  - If the EMER EXIT LT sw is set to ON, or ARM, and
  - As soon as the door is open with the escape slide armed.
- Regardless of the position of the EMER EXIT LT sw, the exit signs automatically come on:
  - If the NO SMOKING sw is set to AUTO, and the landing gears are extended, or
  - In the case of excessive cabin altitude.



ELECTRICAL SUPPLY

The emergency lighting system of the cabin has an independent power supply: The Emergency Power Supply Units (EPSUs).

L2 The EPSUs are the control center of the emergency light system and they are the interface between the emergency lights and the Cabin Intercommunication Data System (CIDS).

L1 Several Emergency Power Supply Units (EPSUs) supply all emergency lighting.

L2 Each EPSU controls the power supply of the group of emergency lights (e.g. door emergency lights).

L3 For redundancy purposes, several emergency lighting components are connected to two EPSUs.

L2 When the normal AC power is lost, the essential AC power supplies the emergency lighting system, via the EPSU.

L1 When the essential and the normal ACs power are lost, EPSU batteries automatically take over the power supply of the emergency lights.

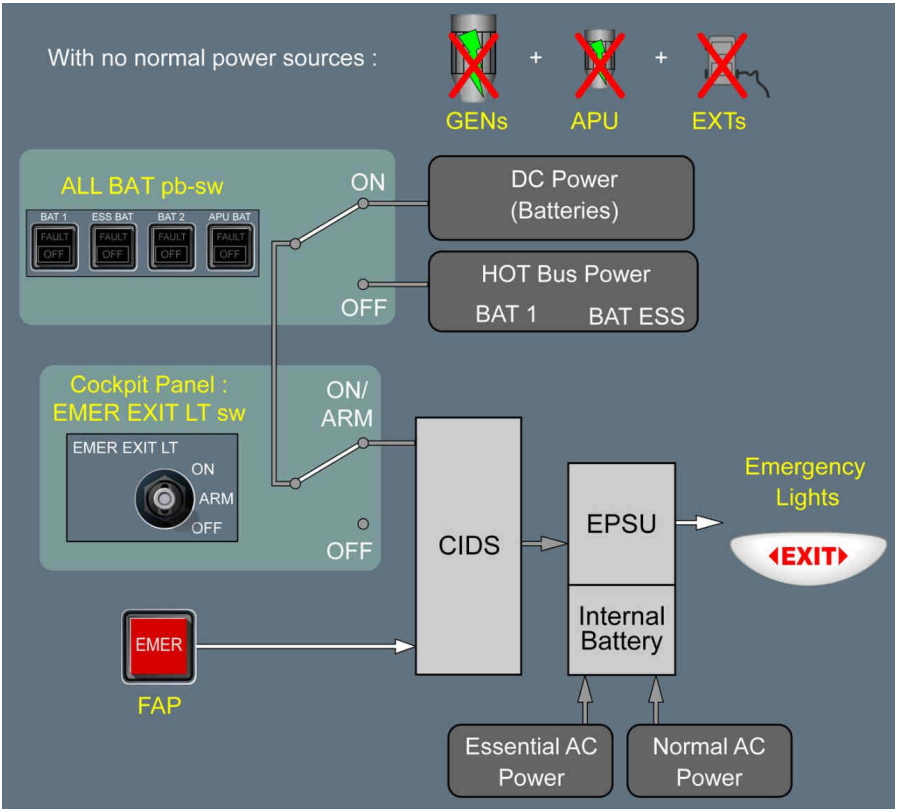
L2 The EPSU batteries enable to supply the emergency lights for at least 10 min.
The EPSU batteries are permanently connected to the electrical network. Therefore the EPSU batteries charge when the Normal AC or the Essential AC is available.

L3 When the EMER EXIT LT sw is set to ON or ARM and if the essential and the normal ACs power are lost, the emergency lights come on. In this case:

- The aircraft batteries (BAT 1, BAT 2, ESS BAT) supply the CIDS

  Note: *If all BAT pb-sw are set to OFF, the HOT bus (i.e. BAT 1 and ESS BAT) takes over the power supply of the CIDS.*

- The EPSU batteries supply the emergency lighting.



When only the aircraft batteries supply the aircraft, if the NO SMOKING sw is set to AUTO and the landing gears are extended, the exit signs come on. In this case:

- The aircraft batteries (BAT 1, BAT 2, ESS BAT) supply the CIDS
- The EPSU batteries supply the exit signs.

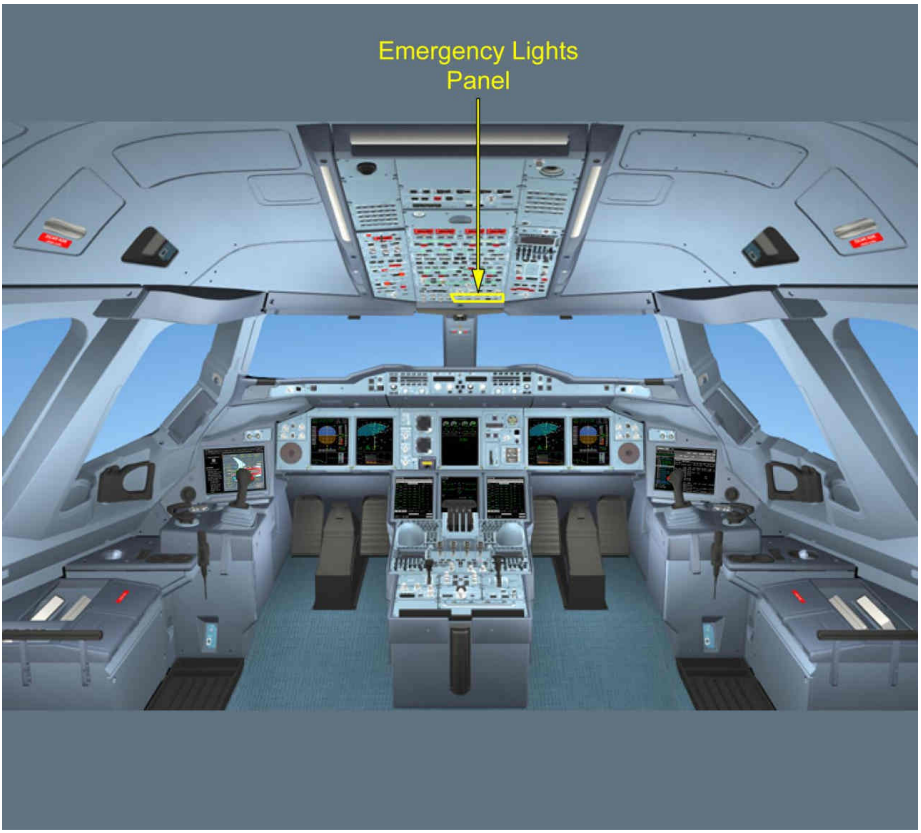
Note: *If all BAT pb-sw are set to OFF, the exit signs do not come on because the CIDS is not supplied.*

COCKPIT VIEW

Applicable to: ALL

The cabin crew can also manually activate the emergency lights in the cabin, via the EMER ON sw that is on the Flight Attendant Panels (FAP).

Cockpit View



CABIN EMERGENCY LIGHTS

Applicable to: ALL

Emergency Lights Overview



EMER EXIT LT sw

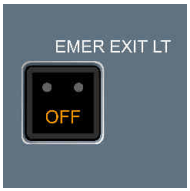


The cabin emergency lights are on.



The cabin emergency lighting system is on standby. In the case of an AC essential or normal power failure, the emergency lights come on automatically in the cabin.

EMERGENCY LIGHTS ANNUNCIATOR



The cabin emergency lighting system is off.

ECAM ALERTS

Applicable to: ALL

CABIN EMER EXIT LT FAULT (*Refer to procedure*)

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GENERAL

Applicable to: ALL

The flight crew can turn on the FASTEN SEAT BELT signs and the NO SMOKING signs in the cabin, from the signs panel in the cockpit.

The FASTEN SEAT BELT signs come on automatically in the cabin, when:
- The landing gear is extended, or
- The slats are extended, or
- The cabin altitude is excessive.

The NO SMOKING signs come on automatically in the cabin, when:
- The landing gear is extended, or
- The cabin altitude is excessive.

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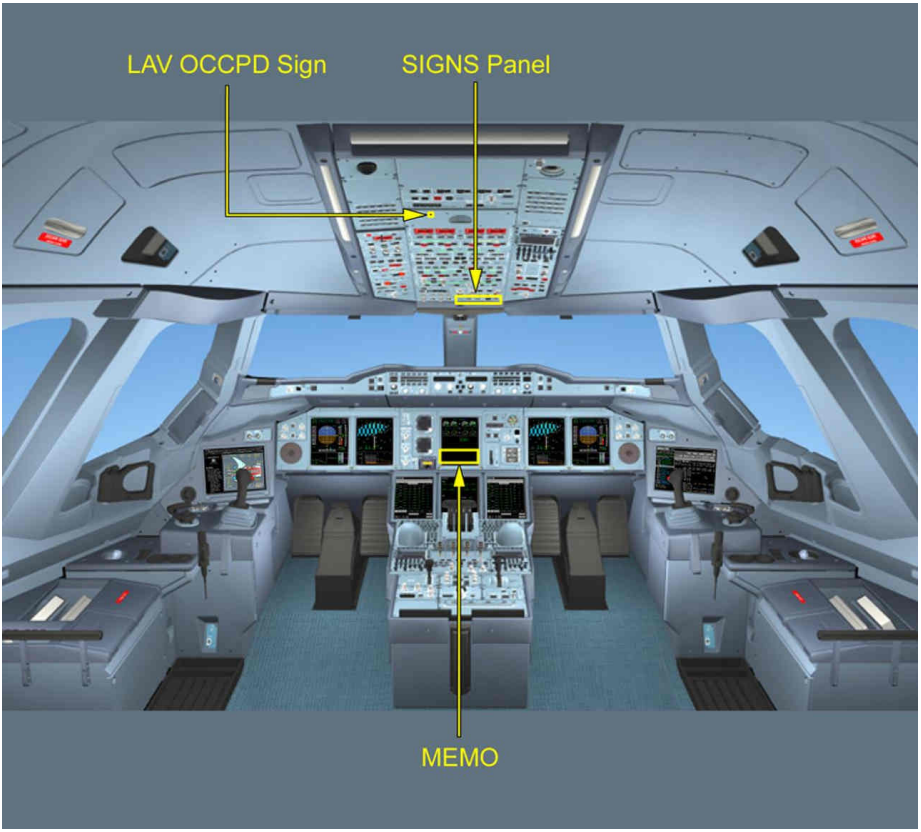
COCKPIT VIEW

Applicable to: ALL

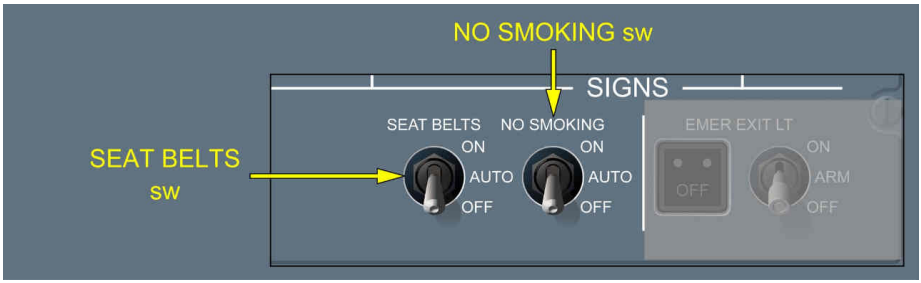
Cockpit View



SIGNS

Applicable to: ALL

Signs Controls Overview



SEAT BELTS sw



The FASTEN SEAT BELT signs and the RETURN TO SEAT signs come on in the cabin.
An associated low tone chime sounds in the cabin.



The FASTEN SEAT BELT signs and the RETURN TO SEAT signs come on automatically in the cabin, when:

- The slats are extended, or
- The main landing gear is extended.

An associated low tone chime sounds in the cabin.



The FASTEN SEAT BELT signs and the RETURN TO SEAT signs go off in the cabin.
Depending on the CIDS programming, an associated low tone chime sounds in the cabin.

NO SMOKING sw



The NO SMOKING signs and the EXIT signs come on in the cabin.
An associated low tone chime sounds in the cabin.



The NO SMOKING signs and the EXIT signs come on automatically in the cabin, when:

- The slats are extended, or
- The main landing gear is extended.

An associated low tone chime sounds in the cabin.



The NO SMOKING signs and the EXIT signs go off in the cabin.
Depending on the CIDS programming, an associated low tone chime sounds in the cabin.

Note: *In the case of excessive cabin altitude (i.e. if the cabin altitude exceeds the maximum of: 9 550 ft and the landing field elevation + 1 000 ft), then the NO SMOKING signs, the FASTEN SEAT BELT signs, and the EXIT signs come on in the cabin, regardless of the position of the SEAT BELT sw and of the NO SMOKING sw.*

LAV OCCPD SIGN

Applicable to: ALL



Illuminates when the lavatory located near the forward left exit is occupied.

MEMO

Applicable to: ALL

L12

SEAT BELTS — The flight crew sets the SEAT BELTS sw to ON.
During take-off (flight phase 2) or landing (flight phases 9 or 10), the SIGNS ON MEMO replaces the SEAT BELTS MEMO.

L12

NO SMOKING — The flight crew sets the NO SMOKING sw to ON.
During take-off (flight phase 2) or landing (flight phases 9 or 10), the SIGNS ON MEMO replaces the NO SMOKING MEMO.

ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Cockpit Lights	Flight Crew Reading Lights	Left Side: DC 1 Right Side: DC 2
	Map Holder Lights	Left Side: DC 1 Right Side: DC 2
	STBY Compass	DC–ESS
	Ice Indicator	DC 1
	Pilot Eye Reference Light	DC 1
	Annunciators	DC 1, DC 2 & DC–ESS
	Integral Lights of the Instrument Panel	DC 1 & DC 2
	Ambient Lights	Left Strips: DC–ESS Right Strip: DC–ESS Aft Strip: DC 2
	Center Pedestal Lights	DC 1
	Console, Briefcase, and Floor Lights	Left Side: DC 1 Right Side: DC 2
	Sliding Table Lights	Left Side: DC 1 Right Side: DC 2
	Cockpit Occupant Reading Lights	Third Occupant: DC 1 Fourth Occupant: DC 2 Fifth Occupant: DC 1
	Third Cockpit Occupant Console Light	DC 2

Continued on the following page

Continued from the previous page

System	Subsystem	Electrical Supply
Exterior Lights	Strobe Lights	Wing Tip: AC 2 Tail Cone: AC 4
	Beacon Lights	Upper Fuselage: AC 4 Lower Fuselage: AC 2
	Navigation & Obstruction Lights	AC 3
	Logo Lights	AC 3 & AC 4
	Wing Scan Lights	Left Side: AC 2 Right Side: AC 4
	Engine Scan Lights	Left Side: AC 2 Right Side: AC 4
	Runway Turnoff Lights	AC 2
	Camera Lights	Under Wings: L/G AC 3 Left Fwd fuselage: AC 2 Right Fwd fuselage:AC 4
	Landing Lights	Left Side: AC 2 Right Side: AC 3
	Takeoff Lights	AC 4
	Taxi Lights	Left Wing: AC 2 Right Wing: AC 4 Nose L/G: AC 4
Emergency Lights		AC–ESS, DC–ESS & EPSU
Signs		AC 1 & AC 2

AIRCRAFT SYSTEMS

34 - NAVIGATION

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OVERVIEW

Applicable to: ALL

In addition to the PFD and ND, the standby instruments provide an independent source of information for:

- Air data and inertial reference parameters
- Navigation information.

The standby instruments consist of:

- Two Integrated Standby Instruments Systems (ISIS), located at the center of the instrument panel:
  - One ISIS is used as the Standby Flight Display (SFD)
  - The other ISIS is used as the Standby Navigation Display (SND).
- One standby compass.

Each ISIS can be either SFD, or SND. It is not possible to display two SFDs, or two SNDs at the same time. One SFD is always displayed.

Both ISIS are connected to fully independent probes:

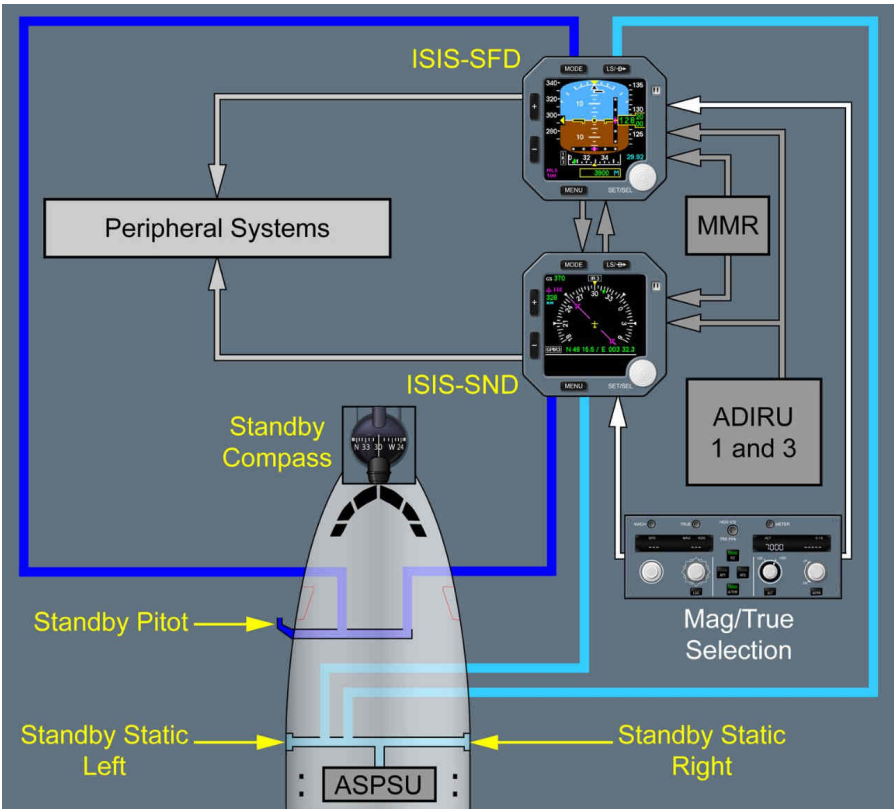
- One standby pitot probe
- Two standby static probes.

ARCHITECTURE

Applicable to: ALL

ARCHITECTURE

Architecture



MMR

ISIS receives GPS data from MMR1.

L3 - Ground speed,
- Latitude and Longitude,
- True track.

ADIRU

ADIRU 1 and 3 provide navigation information to ISIS.

L3
- Heading,
- Track,
- Ground speed,
- Latitude,
- Longitude.

PERIPHERAL SYSTEMS

PRIM s

ISIS provides air data parameters to the PRIM s.

L2 The PRIM s use air data parameters from ISIS for air data monitoring.

For information on air data monitoring by PRIM, *Refer to ADIRS/ADR Monitoring by PRIM* .

ASPSU

Standby static probes provide the Autonomous Standby Power Supply Unit (ASPSU) with differential pressure for door management.

For information on ASPSU , *Refer to Doors/Other Doors/Architecture* .

INDEPENDENT STANDBY INSTRUMENT SYSTEM (ISIS)

There are two ISIS , one Standby Flight Display (SFD) and one Standby Navigation Display (SND).

Each ISIS can be SFD or SND.

L2 ISIS uses fully segregated standby probes to compute air data parameters.

ISIS SFD uses internal gyrometers to compute aircraft attitude.

ISIS PROBES

ISIS has dedicated probes, which are independent from the probes used by the ADIRS:

- One pitot probes on the left part of the fuselage, and
- Two static probes, one on each side of the fuselage.

mag / true pb

The selection of true or magnetic reference using the MAG / TRUE pb also modifies SNS and SFD display.

For more information on MAG /TRUE pb , *Refer to DSC-22-FG-80-20-B TRUE/MAG pb* .

STANDBY COMPASS

The standby compass is on top of the windshield center post.
The deviation card is above it.

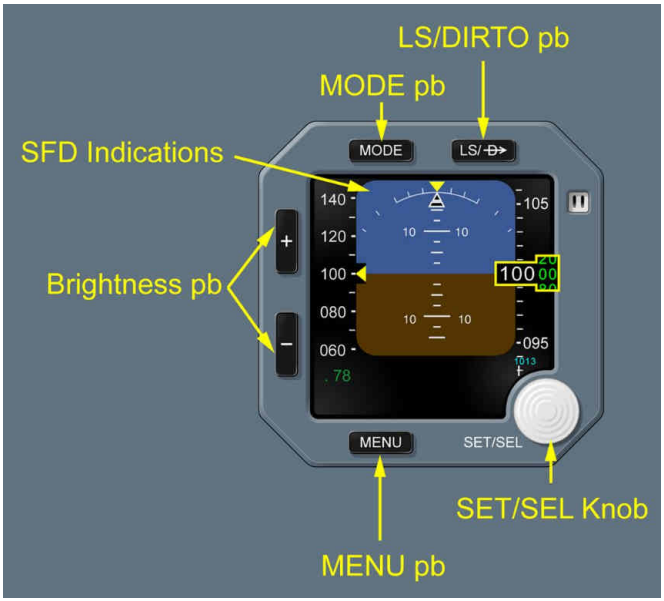
L2 The deviation card enables to correct the value read on the standby compass in order to obtain the magnetic heading of the aircraft.

SFD Overview

SFD OVERVIEW

Applicable to: ALL

SFD general

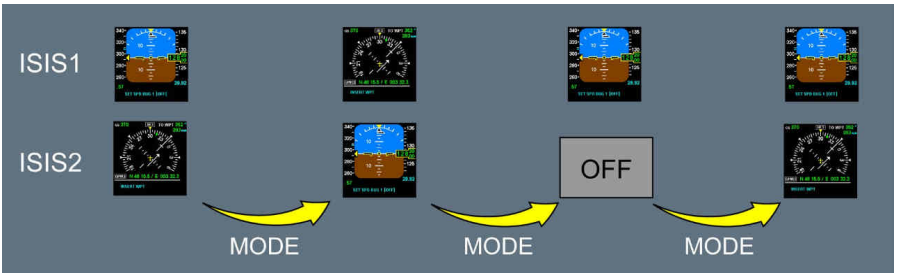


mode pb



enables to switch from SFD to SND display or to switch off the corresponding standby display.

SFD/SND reconfiguration



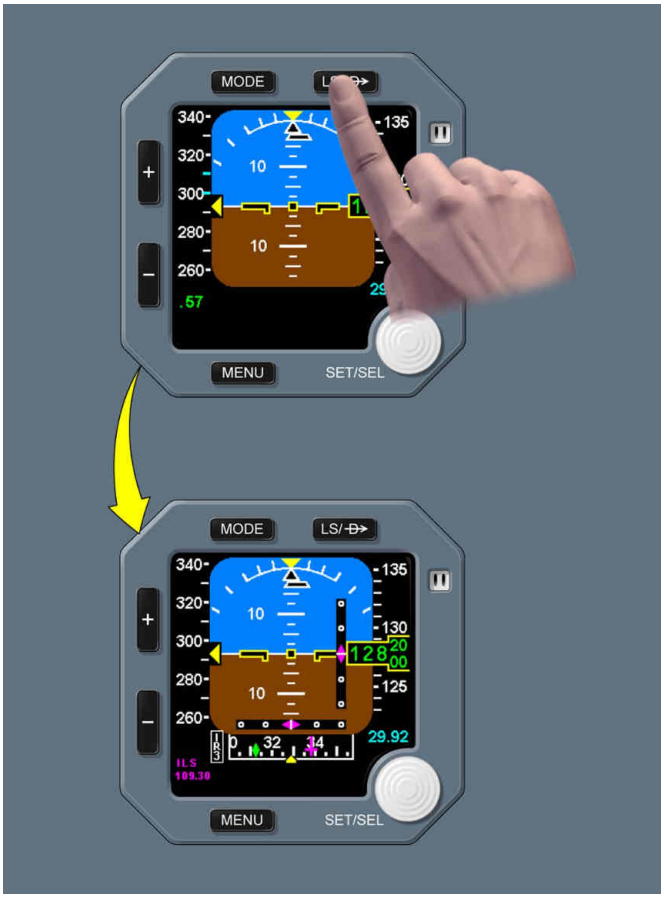
Automatic reconfiguration may occur in the case of display failure affecting the SFD.

ls/dir to pb



When pressed, the SFD displays the following LS indications:
- Localizer scale and index
- Glideslope scale and index
- LS course.

LS/DIR TO pb



menu pb



When pressed the first item of the SFD menu is displayed.

The content of the SFD menu is:
- SET SPD BUG 1 and SET SPD BUG 2 to adjust and display the speed bugs,
- SET ALT BUG to adjust and display an altimeter bug,
- DISPLAY METERS to display aircraft altitude in meter, in addition to the altitude in ft,
- SET BARO UNIT to switch from hPa to inHg,
- DISPLAY NAV to display the aircraft position, heading and track,
- DISPLAY FIX to modify and display a FIX.

For more information on the use of the SFD menu *Refer to DSC-34-10-20-50 How to use the MENU pb in SFD mode* .

SET/SEL knob



: When pressed the displayed item is selected.
When turned the displayed selection is modified

For more information on the use of the SET/SEL knob in SFD mode *Refer to DSC-34-10-20-50 How to use the SET/SEL knob in SFD mode* .

Brightness pb



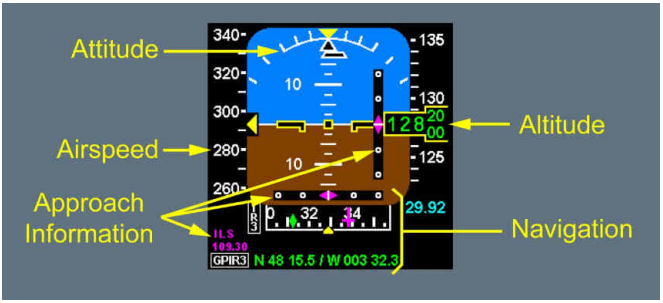
: Adjust the brightness of the display.

SFD Indications

SFD INDICATIONS

Applicable to: ALL

SFD Indications



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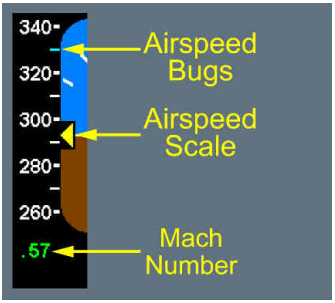
Airspeed

AIRSPEED INDICATIONS

Applicable to: ALL



AIRSPEED SCALE

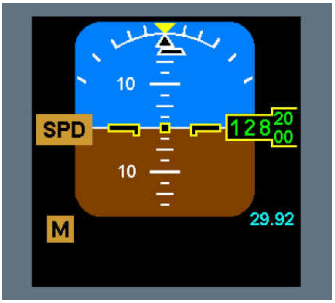
A white scale moves in front of a yellow triangle indicating the airspeed.

L2 The scale ranges from 30 to 250 kt, with a mark every 5 kt, and from 250 to 520 kt, with a mark every 10 kt.

L1 

: Replace the speed scale and mach number when the speed data, is not available.

Speed Flags



MACH NUMBER

The Mach number is displayed in green, when above M .5, it goes off when it is lower than M .45.

SPEED BUG

When a speed bug is entered using the BUGS function, the corresponding speed mark is displayed.
Two speed bugs can be displayed at the same time.
A speed bug is entered using the MENU/ SET SPD BUG 1(2) function. For more information on SFD menu, *Refer to DSC-34-10-20-20-10-10 MENU pb* .

AIRSPEED TOLERANCES

Applicable to: ALL

L2 The following values apply to an aircraft in symmetrical flight (no sideslip), in clean configuration, and in a straight and level flight.
The maximum differences between speed or Mach number indications are:

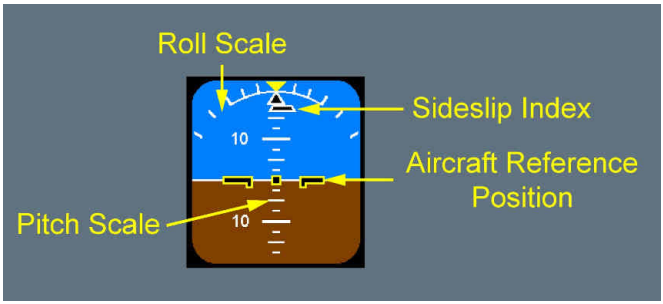
Flight Level	Speed or Mach Number	Speed Comparison between Standby Flight Display (SFD) and ADR 1(2)(3)
FL 50	250 kt	7 kt
FL 100	250 kt	7 kt
FL 200	320 kt	6 kt
FL 300	M 0.85	6 kt
FL 410	M 0.85	6 kt

Attitude

ATTITUDE

Applicable to: ALL

ATTITUDE



AIRCRAFT REFERENCE POSITION

Indicates the fixed reference position of the aircraft.

ROLL

Indicates the bank angle of the aircraft.

L2 The scale has markers at 0,10, 20, 30, 45 and 60 ° of bank.



L1 

: Replaces the roll and the pitch scale when the attitude data is not available.

ATT flag in SFD



PITCH SCALE

The scale indicates the pitch angle of the aircraft.

L2 The scale has markers:
- Every 10 ° between 80 ° nose down, and 80 ° nose up
- Every 2.5 ° between 30 ° nose down , and 30 ° nose up.

L12



Indicates that the pitch angle of the aircraft is too high, and shows the direction to reduce it.
These arrows appear, when the pitch angle is beyond +/-30 °.

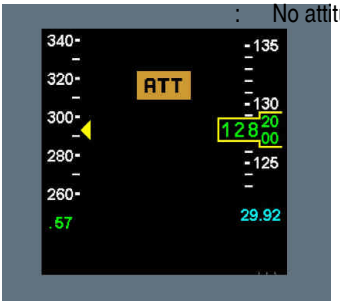
SIDESLIP INDEX



: On ground, indicates the lateral acceleration of the aircraft
In flight, indicates the sideslip of the aircraft

ATT FLAG

Applicable to: ALL



: No attitude information is available.

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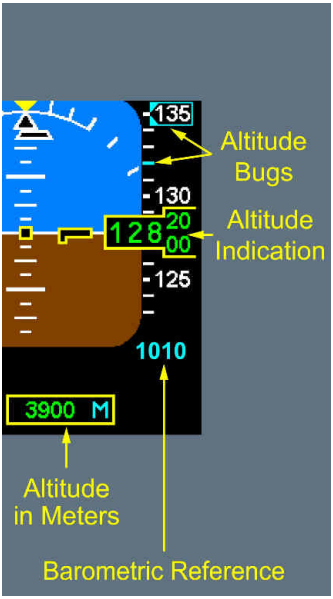
Altitude

ALTITUDE

Applicable to: ALL

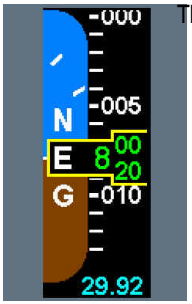


ALTITUDE INDICATION

The altitude indication is given as a white moving scale and a green digital readout surrounded in yellow.

L2 The altitude scale ranges from –2000 ft to 50 000 ft every 100 ft, with altitude digital indications every 500 ft.

L1



The altitude is negative.



: Replaces the altitude scale, when the altitude data, is not available.

Altitude Flag



METERS ALTITUDE

The current altitude can also be displayed in meters.
The display is activated using the MENU/DISPLAY METERS function. For more information on the SFD menu, *Refer to DSC-34-10-20-20-10-10 MENU pb* .

BAROMETRIC REFERENCE

L12

1010 : The barometric reference pressure in hectoPascal (hPa) is selected.
The barometric pressure ranges from 745 hPa to 1 100 hPa .

L12

29.92 : The barometric reference pressure in inches of mercury (inHg) is selected.
The barometric pressure ranges from 22 inHg to 32.48 inHg .

STD : The standard barometric pressure is selected

The display is activated using the MENU/SET BARO UNIT function. For more information on the SFD menu, *Refer to DSC-34-10-20-20-10-10 MENU pb* .

ALTITUDE BUG



: the corresponding altitude mark is indicated by a cyan box.



: The altitude bug is in front of an altitude value.



: The bug is in front of the current altitude.

An altitude bug is entered using the MENU/ SET ALT BUG function. For more information on SFD menu, *Refer to DSC-34-10-20-20-10-10 MENU pb* .

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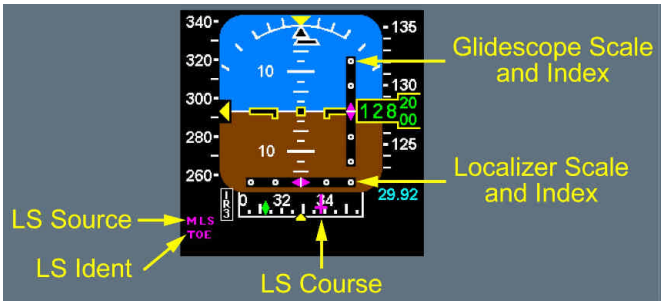
Approach

APPROACH

Applicable to: ALL

Approach



LOCALIZER SCALE AND INDEX

When the flight crew presses the LS/DIR TO pb, the SFD displays the localizer scale and index.



Both appear, when the LOC receiver is failed, and the flight crew pressed the LS/ DIR TO pb.

LOC and LS Flags



GLIDESLOPE SCALE AND INDEX

When the flight crew presses the LS/DIR TO pb, the SFD displays the glideslope scale and index.



Both appear, when the G/S receiver is failed, and the flight crew pressed the LS/DIR TO pb.

G/S and LS Flags



LS SOURCE



The flight crew selects an ILS approach.



The flight crew selects a LOC only approach.

Note: *The flight crew cannot display FLS deviations and FLS information on SFD.*

LS IDENTIFIER OR FREQUENCY



Indicates the identifier of the selected LS station.



Indicates the frequency of the selected LS station.
The frequency appears, if the LS station is not identified.

Note: *The flight crew cannot display FLS deviations and FLS information on SFD.*

LS COURSE



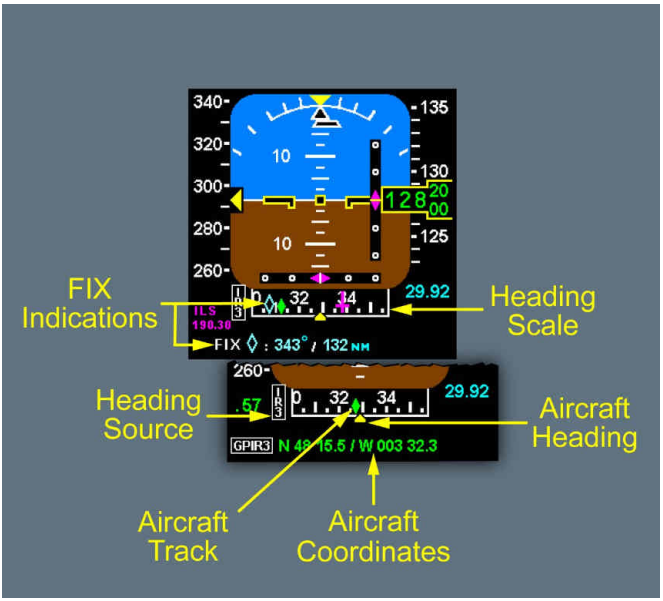
Indicates the course of the localizer.
Appears, when the flight crew tunes an ILS or a LOC, and presses the LS/DIR TO pb.

Navigation

NAVIGATION

Applicable to: ALL

Navigation Indications



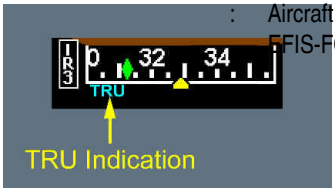
HEADING SCALE

The heading scale is displayed when:

- The approach guidance has been selected (for more information on approach guidance *Refer to DSC-34-10-20-20-50-10 Approach*), or
- The NAV information has been selected, or
- A FIX is displayed.

AIRCRAFT HEADING AND AIRCRAFT TRACK

The heading scale always displays aircraft heading and aircraft track.



: Aircraft heading and aircraft track are true. Use mag/true pb on the FIS-FCU to switch from magnetic heading to true heading.



: Replaces the heading scale, when the heading data, is not available.

HDG Flag



HEADING SOURCE

Represents the current aircraft heading.
Heading data are given by either ADIRU3 or ADIRU1



: Aircraft heading is magnetic and given by ADIRU3



: Aircraft heading is true and given by ADIRU3

FIX INDICATIONS

- FIX bearing on the heading scale,
- Numeric FIX bearing / distance.



llows the FIX bearing, FIX bearing is true.

FIX indications are displayed using the MENU / DISPLAY FIX function. For more information on the SFD menu, *Refer to DSC-34-10-20-20-10-10 MENU pb* .

AIRCRAFT COORDINATES

Selection of DISPLAY NAV item on the SFD menu, displays the heading scale and the aircraft coordinates.



rcraft coordinates in latitude / longitude.

The aircraft position can be either a GPIRS, GPS or IRS position calculated by ADIRS or MMR..



: Aircraft position comes from ADIRU3 (respectively ADIRU1)and is calculated from GPS and IRS3 (respectively IRS1) position.



: Aircraft position comes from MMR.



: Aircraft position comes from ADIRU3 or ADIRU1 and is calculated from GPS position.



: Aircraft position comes from ADIRU3 (respectively ADIRU1).



: The aircraft coordinates are invalid.



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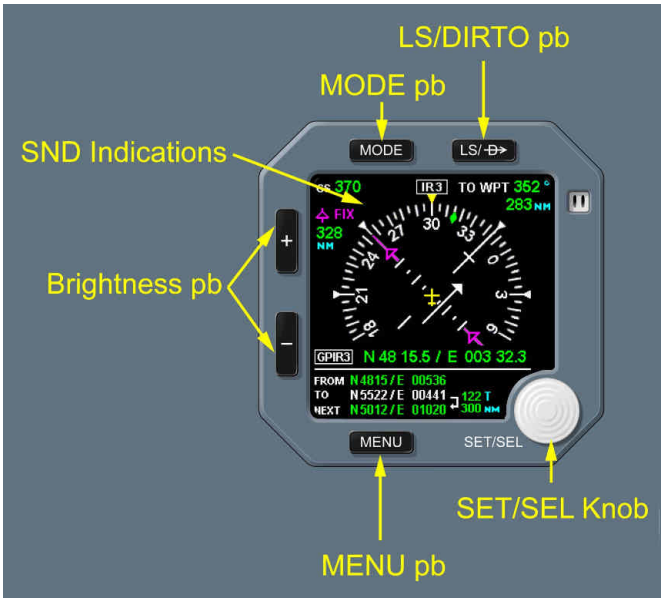
SND Overview

SND OVERVIEW

Applicable to: ALL

SND general

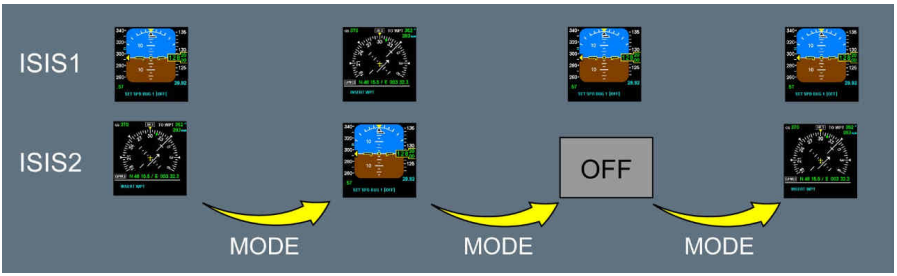


mode pb



enables to switch from SFD to SND display or to switch off the corresponding standby display.

SFD/SND reconfiguration



Automatic reconfiguration may occur in the case of display failure affecting the SFD.

LS/DIR TO pb



: When pressed the DIR TO function is activated.

Note: *If a waypoint list has been defined and the navigation is not active, a DIR TO to any waypoint of the list activates the navigation.*

For more information on the DIR TO function on SND , *Refer to DSC-34-10-20-50 How to perform a DIR TO* .

menu pb



: When pressed the first item of the SND menu is displayed.

The content of the SND menu is:
- INSERT WPT enables to insert waypoint in the waypoint list,
- INSERT FIX enables to insert FIX at the end of the waypoint list,
- EDIT WPT /FIX enables to edit and modify a waypoint or a FIX from the waypoint list,
- CLEAR WPT /FIX enables to delete a waypoint or a FIX from the waypoint list.,

For more information on the use of the SND menu, *Refer to DSC-34-10-20-50 How to use the MENU pb in SND mode*).
For more information on the use of the waypoint list, *Refer to DSC-34-10-20-50 How to insert a WPT in SND mode* ..

SET/SEL knob



: When pressed the displayed item is selected.
When turned the displayed selection is modified

For more information on the use of the SET/SEL knob in SND mode *Refer to DSC-34-10-20-50 How to use SET/SEL knob in SND mode* .

WHEN NO MENU IS DISPLAYED

No action is associated to the SET/SEL knob when the MENU is not displayed.

WHEN A MENU ITEM IS DISPLAYED

When turned scrolls the different items of the menu.
When pressed enables the selection of the displayed item.

WHEN A MENU ITEM IS SELECTED

When turned scrolls the different value of the displayed item.
When pressed enables the selection of the displayed value.

Brightness pb



: Adjust the brightness of the display.

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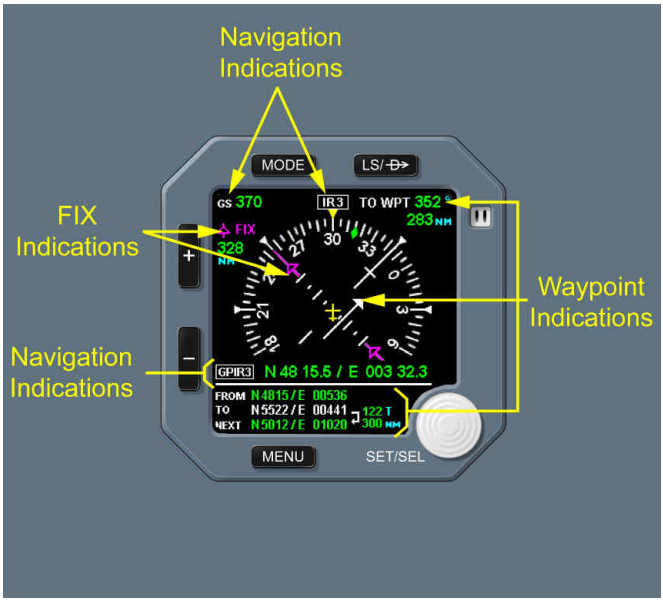
SND Indications

SND INDICATIONS

Applicable to: ALL



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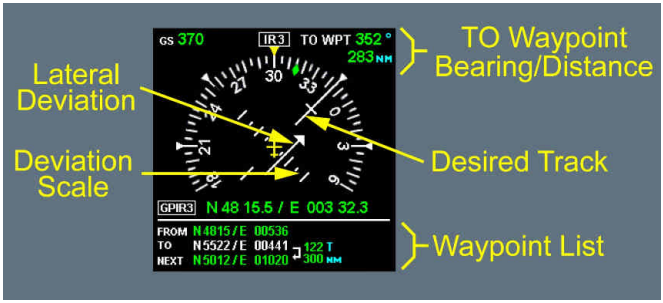
Waypoints

WAYPOINT

Applicable to: ALL

Waypoint indications



DESIRED TRACK

Applicable to: ALL

DESIRED TRACK

Indicates the desired track between the FROM waypoint and the TO waypoint.

DEVIATION BAR

Applicable to: ALL

LATERAL DEVIATION

The lateral deviation bar shows the deviation between the aircraft position and the desired track

DEVIATION SCALE

Applicable to: ALL

DEVIATION SCALE

The deviation scale is made small and large lines.
Each large line represents a 5 nm lateral deviation.
Each small line represents a 2.5 nm lateral deviation.

BEARING DISTANCE

Applicable to: ALL

TO WAYPOINT BEARING / DISTANCE

352 ° : The bearing to the TO waypoint is a magnetic bearing.

352 T : The bearing to the TO waypoint is a true bearing.

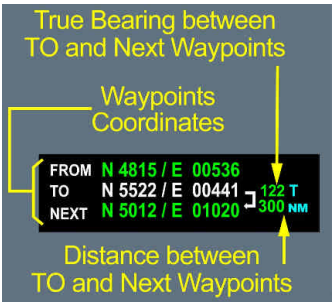
283 NM : The distance to the TO waypoint is greater than 20 NM.

19.7 NM : The distance to the TO waypoint is lower than 20 NM.

WAYPOINT LIST

Applicable to: ALL

WAYPOINTS LIST



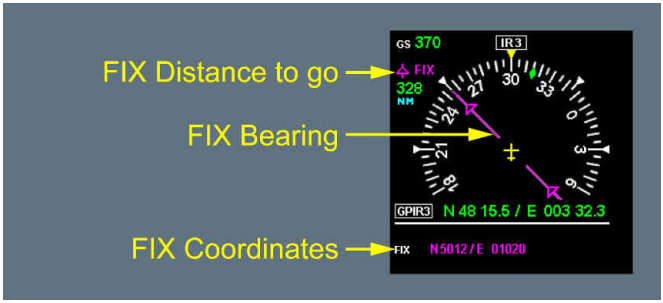
The waypoints list is created by the flight crew by inserting new waypoints in sequence (for more information on waypoint insertion, *Refer to DSC-34-10-20-50 How to insert a WPT in SND mode*).
Each waypoint is defined by its geographical coordinates in latitude / longitude.
Waypoints coordinates are truncated to the minutes when displayed in the waypoints list.
If a FIX is defined it appears at the end of the waypoints list.
The bearing between the TO and the NEXT waypoint is always a true bearing.

Fix

FIX

Applicable to: ALL

Fix indications



BEARING

Applicable to: ALL

FIX BEARING

This pointer represents the bearing of the fix.

DISTANCE TO GO

Applicable to: ALL

DISTANCE TO GO

It represents the distance to go to the FIX.

COORDINATES

Applicable to: ALL

FIX COORDINATES

The FIX coordinates in latitude and longitude are always displayed at the bottom of the waypoints list when defined.

Note: *Fix coordinates can also be displayed on the SFD.*

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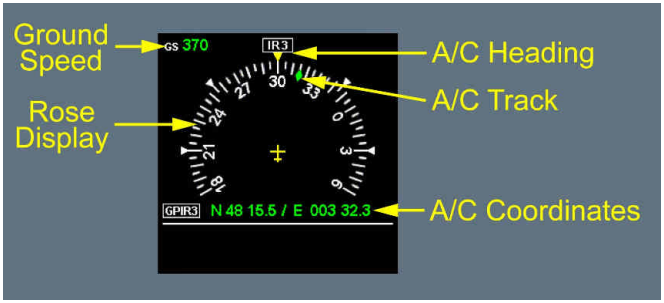
Position

POSITION

Applicable to: ALL

Position indications



ROSE DISPLAY

Applicable to: ALL

ROSE DISPLAY

The rose display shows 240 °.
It is oriented with respect to the aircraft heading.
It is graduated every 5 °, with numeric values every 30 °.

A/C HEADING

Applicable to: ALL

AIRCRAFT HEADING

Represent the current aircraft heading.
Heading data are given either by ADIRU3 or ADIRU1



: Aircraft heading is magnetic and given by ADIRU3.



: Aircraft heading is true and given by ADIRU3.



: Replaces the heading rose, when the heading data, is not available.



A/C TRACK

Applicable to: ALL

AIRCRAFT TRACK

Indicates the aircraft track.

A/C COORDINATES

Applicable to: ALL

AIRCRAFT POSITION

The aircraft position is displayed in latitude / longitude.
The aircraft position can be either a GPIRS, GPS or IRS position calculated by ADIRS or MMR..

GPIR3 : Aircraft position comes from ADIRU3 (respectively ADIRU1)and is calculated from GPS and IRS3 (respectively IRS1) position.

GPS1 : Aircraft position comes from MMR.

GPS : Aircraft position comes from ADIRU3 or ADIRU1 and is calculated from GPS position.

IR3 : Aircraft position comes from ADIRU3 (respectively ADIRU1).

- The aircraft coordinates are invalid.



GROUND SPEED

Applicable to: ALL

GROUND SPEED

Indicates the aircraft ground speed

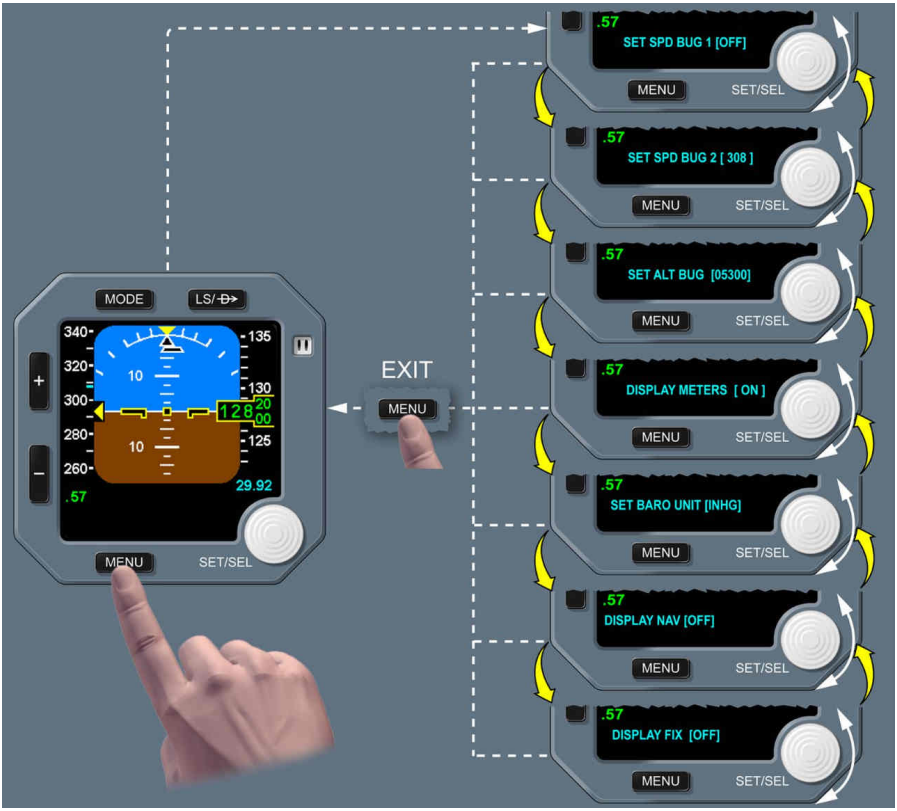
Intentionally left blank

HOW TO USE MENU IN SFD MODE

Applicable to: ALL

HOW TO USE MENU IN SFD MODE

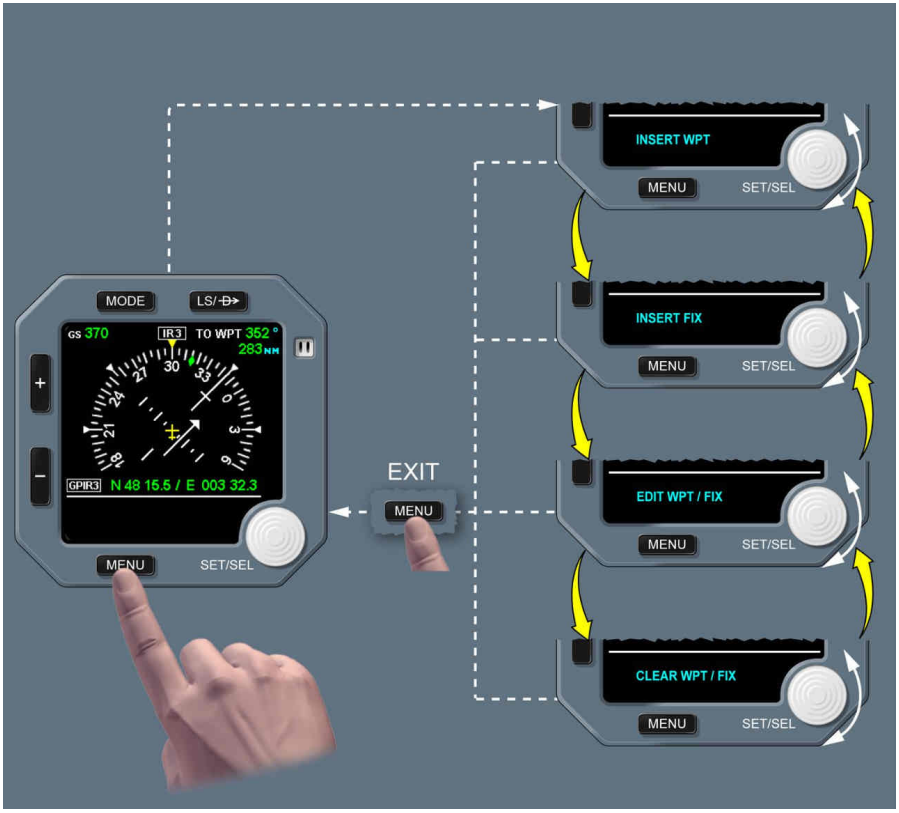
When ISIS is in SFD mode, press MENU pb to display the first item of the menu.
Then, rotate the SET/SEL knob to scroll through the items of the menu.
When the desired item is displayed, press the SET/SEL knob to display the item content.



HOW TO USE MENU IN SND MODE

Applicable to: ALL

HOW TO USE MENU IN SND MODE



HOW TO USE SET/SEL knob IN SFD MODE

Applicable to: ALL

HOW TO USE SET/SEL knob IN SFD MODE

WHEN NO MENU IS DISPLAYED

When pressed enables switching from QNH to standard barometric pressure.



When turned enables the selection of the QNH.



WHEN A MENU ITEM IS DISPLAYED

When turned scrolls the different items of the menu.



When pressed enables the selection of the displayed item.



WHEN A MENU ITEM IS SELECTED

When turned scrolls the different value of the displayed item.



When pressed enables the selection of the displayed item.



HOW TO USE SET/SEL KNOB IN SND MODE

Applicable to: ALL

WHEN NO MENU IS DISPLAYED

No action is associated to the SET/SEL knob when the MENU is not displayed.

WHEN A MENU ITEM IS DISPLAYED

When turned scrolls the different items of the menu.
When pressed enables the selection of the displayed item.

WHEN A MENU ITEM IS SELECTED

When turned scrolls the different value of the displayed item.
When pressed enables the selection of the displayed item.

HOW TO INSERT A WPT IN SND MODE

Applicable to: ALL

HOW TO INSERT A WPT IN SND MODE



HOW TO PERFORM A DIR TO

Applicable to: ALL

DIR TO WITHOUT WAYPOINT LIST AND NAVIGATION NOT ACTIVATED



DIR TO WITH WAYPOINT LIST AND NAVIGATION NOT ACTIVATED



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OVERVIEW

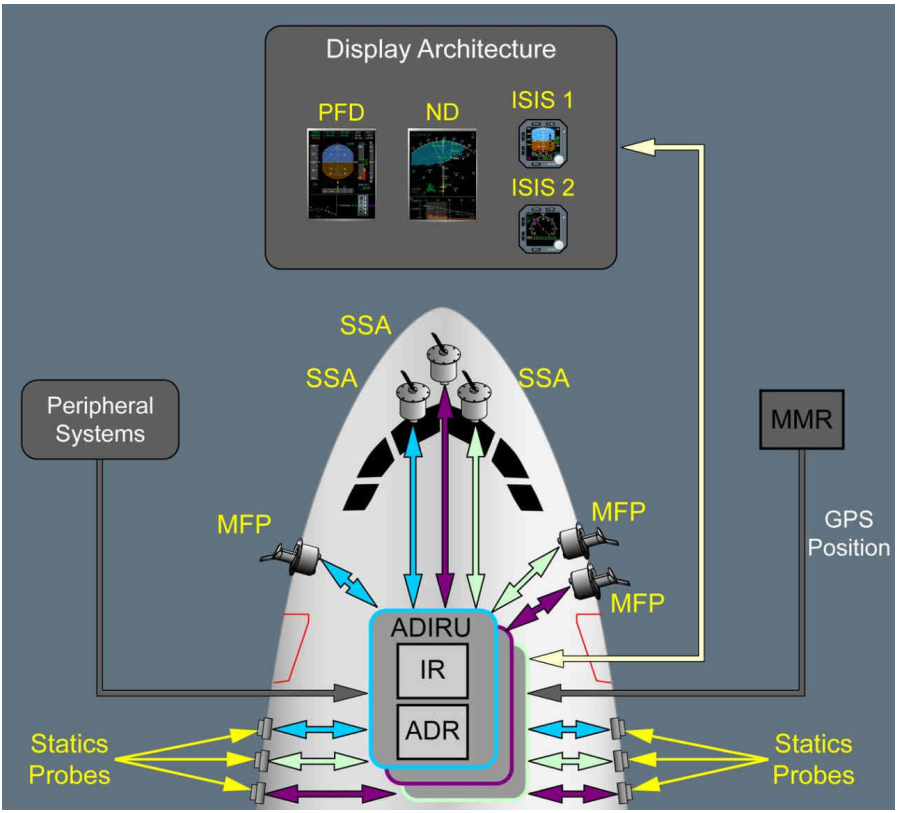
Applicable to: ALL

The Air Data and Inertial Reference System (ADIRS) supplies temperature, anemometric, barometric and inertial parameters to the cockpit display (PFD and ND) as well as to other user systems such as FMS, FADEC, or PRIM.

ARCHITECTURE

Applicable to: ALL

ADIRS ARCHITECTURE



ADIRU s

There are three identical ADIRUs (Air Data and Inertial Reference Units).

Each ADIRU is divided in two parts:
- The ADR (Air Data Reference) part
- The IR (Inertial Reference) part.

Each part (either ADR or IR) can work separately in the case of failure of the other part.

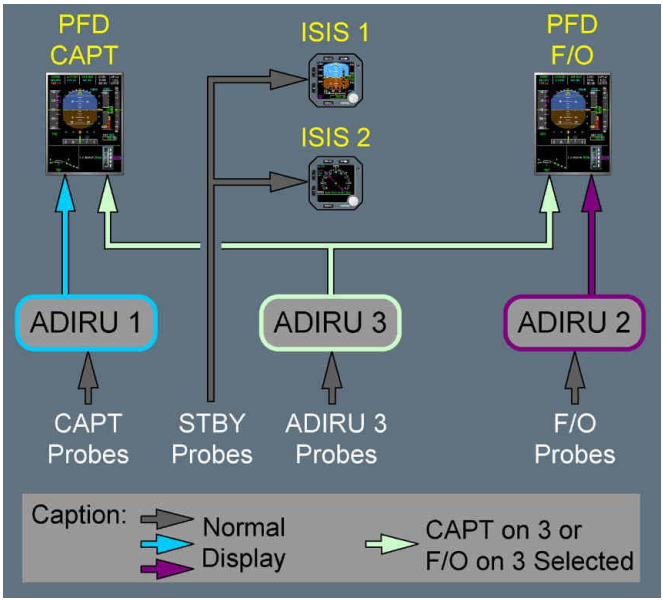
ADR PART

The ADR part of the ADIRU provides air data parameters such as:
- Total pressure
- Static pressure
- Altitude
- Mach number
- Computed airspeed
- True airspeed
- Total air temperature
- Static temperature
- Barometric vertical speed
- Angle of attack
- Side slip angle.

Each ADR part is connected to:
- One Multi Function Probe (MFP)
- Two Static probe
- One Side Slip Angle (SSA) probe
- One Outside Air Temperature (OAT) probe.

As a consequence, the ADIRS system has three fully segregated sources of air data parameters.
Taking into account the ISIS system, that is independent from ADIRS, the aircraft has four fully segregated sources of air data parameters.

display architecture



IR PART

The IR part of the ADIRU provides inertial reference (IR) parameters:

- Navigation information

L3 Such as position, ground speed, baro inertial vertical speed, velocities and accelerations all along the a/c and earth axes.

L1 - Attitude information

L3 Such as pitch angle, roll angle, pitch and roll rotation rates, pitch and roll rotation accelerations.

L1 - Heading information.

L3 Such as magnetic heading, true heading, yaw rotation rates, yaw rotation acceleration.

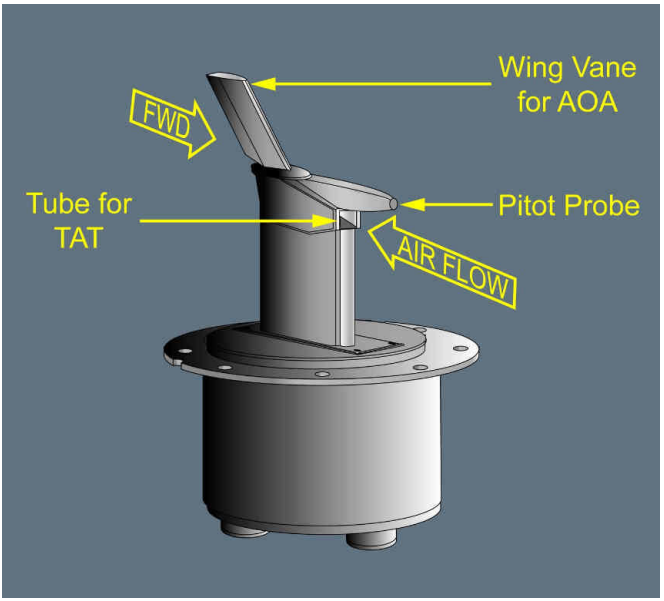
L1 Each IR part is supplied by data coming from its internal gyros and accelerometers sensors. Each IR part also receives GPS data from MMR for initial alignment and computation of the GP/IRS hybrid position.

MULTI FUNCTION PROBES (MFP)

The MFP provides the Angle Of Attack, Total Air Temperature and Total Pressure.
There are three MFPs.

Each ADIRU is connected to one MFP.
One MFP is located on the left side of the aircraft, and the two others are located on the right side.

MFP probe



STATIC PROBES

The static probes provides the local Static Pressure.
There are six static probes.
Three static probes are located on the right side of the aircraft, and three others are located on the left side.
Each ADIRU is connected to two static probes, one on each side of the fuselage.

SIDE SLIDE ANGLE PROBES

The side slip angle probes provides the side slip angle (SSA).
There are three SSA probes.
The SSA probes are located on the aircraft nose, in front of the windshield.
Each ADIRU is connected to one SSA probe.

,

MULTI MODE RECEIVER (MMR)

The MMR provides GPS position to the ADIRS to align the IR part.
The IR part uses also the GPS data to compute the GP / IRS hybrid position.
For more information on GPS data used by ADIRS , *Refer to DSC-34-10-40-10 GPS data to ADIRS* .

ADIRS CONTROLS

ADIRS uses different control gathered on three panels:
- ADR pb, IR pb and IR mode selector on the overhead panel
- ATT HDG and AIR DATA switching on the center instrument panel
- MAG / TRUE pb on the AFS control panel

ADR MONITORING

Applicable to: ALL

GENERAL

Air data parameters, computed by the ADR part of the ADIRS , are of great importance for many aircraft systems. As a consequence they are continuously monitored:
- by the ADR themselves to check the reliability of computed parameters based on:
  - Comparison of left and right static pressure,
  - comparison of ADR and ISIS / GPS / FADEC speed, altitude and pressure,
- by some peripheral systems to check the reliability of received parameters:
  - PRIM
  - FADEC
  - FWC

L2 All monitoring rely on voting principles whereby when one source diverges from the average value, it is automatically rejected and the system continues to operate normally with the remaining sources.

L1 In very extreme and remote situations all ADR s may become unreliable leading to unreliable airspeed or altitude indications.
In such situations the flight crew can switch off all three ADRs to display backup speed and altitude scales.
For information on unreliable airspeed or altitude indications, *Refer to DSC-34-10-30-40 Unreliable airspeed or altitude indications* .

For information on backup speed and altitude scales, *Refer to DSC-34-10-30-10 Backup Speed Scale* .

L2 **COMPARISON OF LEFT AND RIGHT STATIC PRESSURE**

INSIDE EACH ADR

Each ADR compares the static pressure measured on the left side of the aircraft with the static pressure measured on the right side of the aircraft.
If the difference is above a given threshold this may be an indication of an ADR failure, the alert NAV ADR 1(2)(3) FAULT is triggered, *Refer to procedure* .

L3 Static pressure threshold is 30 hPa .

L2 **BETWEEN ALL ADR**

All ADR s compare the three static pressures measured on the left side of the aircraft with the three static pressures measured on the right side of the aircraft.
If the difference is above a given threshold, this may be an indication of a damage on all static pressure probes on one side of the aircraft. As a consequence altitude computation may be affected, the alert NAV AIR DATA ACCURACY DEGRADED is triggered, *Refer to procedure*

L2 **GPS / ISIS / FADEC AND ADR COMPARISON**

The ADR s use air data parameters computed by other systems for internal monitoring.
If one ADR detects a discrepancy the alert NAV ADRx FAULT is triggered (*Refer to procedure*)
If the three ADR s are failed the alert NAV ADR 1+2+3 FAULT is triggered (*Refer to procedure*).

ISIS COMPARISON

Each ADR compares its own computed air speed and altitude with ISIS data.

L3 Air speed threshold is 20 kt .
Altitude threshold is 1 000 ft .

L2 **GPS COMPARISON**

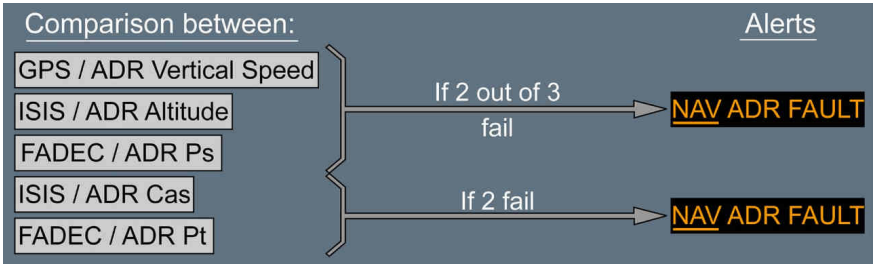
Each ADR compares its own vertical speed with GPS data.

L3 Vertical speed threshold is 1 000 ft/min .

L2 **FADEC COMPARISON**

Each ADR compares its own static and total pressure with the four FADEC data.

L3 Static pressure threshold is 45 hPa .
Total pressure threshold is 50 hPa .



L2 **ADR MONITORING BY PRIM**

The following parameters coming from the ADR s and ISIS are monitored by the PRIM s:
- CAS /Mach / Altitude / Static pressure
- Angle of attack (AOA)
- Side slip angle
- Static and total temperatures (TAS , TAT)

Depending on the erroneous parameter the affected ADR may be rejected by the PRIM s.

CAS / MACH / ALTITUDE / STATIC PRESSURE MONITORING

If one of these parameters is rejected, the ADR (including all other air data parameters) or ISIS is rejected until the end of the flight for flight controls internal use.
Associated with NAV AIR DATA DISAGREE (*Refer to procedure*) and F/CTL ALTN LAW (*Refer to procedure*).

L3 CAS threshold is 16 kt / 50 kt at low / high angle of attack and sideslip.
Mach threshold is M .04 / M .1 at low / high angle of attack and sideslip.
Altitude threshold is 400 ft .
Static pressure threshold is 5 hPa .

L2 **AOA MONITORING**

An AOA monitoring on ground is available to detect during takeoff roll any failure affecting the AOA measured by MFP probes.

L3 AOA threshold for ground monitoring is 8 ° .

L2
- If one AOA parameter is rejected, the AOA and the side slip angle of the affected ADR are rejected. However the other parameters are still used by the flight controls
- If two, or more, AOA parameters are rejected, there is a reversion to alternate law
Associated with NAV AOA DISAGREE (*Refer to procedure*) and F/CTL ALTN LAW (*Refer to procedure*).

L3 AOA threshold is 3.6 ° / 7,2 ° at low / high sideslip.

L2 **SIDE SLIP ANGLE MONITORING**

- If one side slip angle parameter is rejected, the side slip angle and the AOA of the affected ADR are rejected. However the other parameters are still used by the flight controls
- If two or more side slip angle parameters are rejected, there is a reversion to alternate law.

Associated with F/CTL ALTN LAW (*Refer to procedure*).

TAS AND TAT MONITORING

- If either TAT or TAS is rejected, both TAT and TAS of the affected ADR are rejected
- If two or more TAS / TAT parameters are rejected, the A/THR is lost
- If three TAS / TAT parameters are rejected, reactive windshear, low energy and alpha floor protection are lost.

L3 TAS threshold is 16 kt / 50 kt at low / high angle of attack and sideslip.
TAT threshold is 30 °C .

L2 FADEC AIR DATA SELECTION

FADEC uses air data parameters (total pressure, total temperature and static pressure) for thrust computation.
Air data parameters come from the three ADIRUs and from the engine sensors.
In normal operation, the FADEC uses the air data parameters from the ADIRUs.
Depending on the validity of engine and ADIRUs air data, each FADEC decides which source will be used for thrust computation.

L3 Validation of air data is made as follows:

- Each ADIRU compares its air data with the data from the four FADECs. If ADIRU air data is consistent with two or more FADECs, then the ADIRU considers its own air data valid.
- Each ADIRU then sends its air data and a validity signal on its data to each FADEC.
- Each FADEC compares again its data with the data received from the three ADIRUs. The FADEC needs at least two ADIRUs to make this comparison.
  - If FADEC and ADIRUs data are consistent, ADIRUs data are used
  - If FADEC and ADIRUs data are not consistent, the FADEC will use the validity signal from each ADIRU to determine the best source to use between engine and ADIRUs sources.

L2 PFD AND ND AIR DATA MONITORING

The following air data parameters are compared between captain and first officer display units. In case of discrepancy a message is displayed on the associated display unit:

- On PFD:
  - altitude, associated with CHECK ALT,
  - heading, associated with CHECK HDG,
  - attitude, associated with CHECK ATT.
- On ND
  - heading, associated with CHECK HDG

The comparison is performed for all the parameters by the FWS.

BACKUP SPEED AND ALTITUDE SCALE

Applicable to: ALL

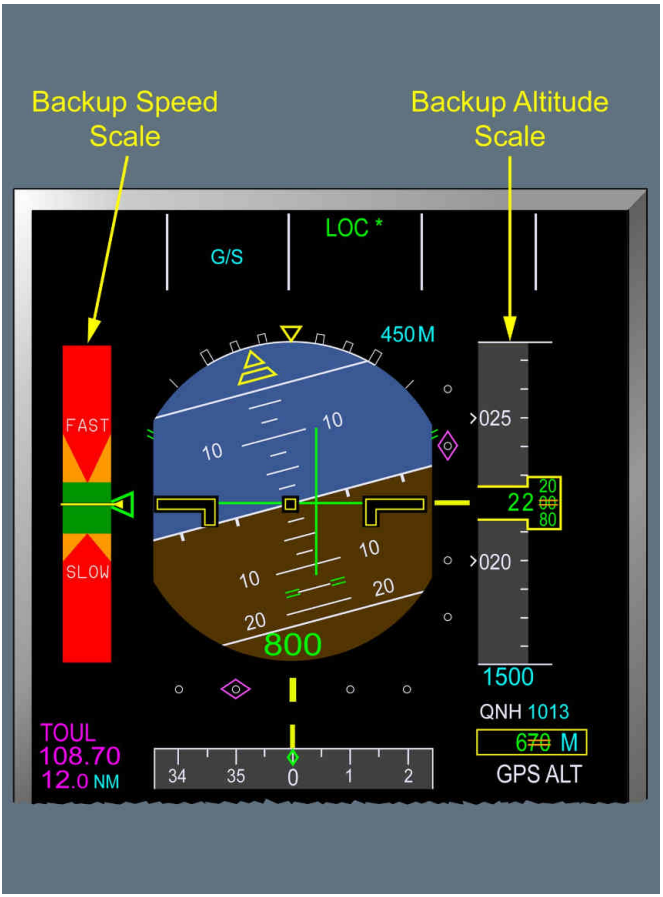
GENERAL

Following unreliable air data detection, the flight crew can display the backup speed and altitude scales by switching off all three ADR s.
The backup speed and altitude scales replace on PFD unreliable speed and altitude by Angle of Attack and GPS altitude.

Unreliable air data situations can be detected either:
- Automatically by the ADR monitoring, associated with NAV ADR 1+2+3 FAULT (*Refer to procedure*) or NAV ALL AIR DATA DISAGREE (*Refer to procedure*), or
- Manually by the flight crew, associated with NAV UNRELIABLE AIRSPEED INDICATIONS (manually displayed by the flight crew).

For more information on unreliable air data situations, *Refer to DSC-34-10-30-40 Unreliable airspeed or altitude indications* .

Backup Scales



BACKUP SPEED SCALE

PRINCIPLE

The backup speed scale is based on the relation between aircraft Angle Of Attack (AOA) and airspeed.

L2 The Multi Function Probes measure the AOA .

L3 Since ADR s are off, the AOA data are sent to the display units via the IR parts of the ADIRU s. When all AOA are available, the AOA displayed on Captain and first officer PFDs is the median value from the three measured AOA.

If one AOA is failed, from the two remaining AOA, one is displayed on captain's PFD and the other on first officer's PFD.

L1 The backup speed scale is designed taking into account a load factor of 1. Since load factor increases with roll, roll manoeuvre must be flown with care.

The BUSS is tuned for the aerodynamic model with the speed brake retracted. The speed brake extension must be avoided as it would affect the relation between Angle of Attack and airspeed, therefore making the BUSS unserviceable.

DISPLAY

The back up speed scale is divided in five colored areas:

- A green area corresponding to the normal speed range.

L2 This area ensures that speed is maintained between VLS and VFE or VMO .

L1 - Two red and two amber areas corresponding to speeds above maximum speed (VFE or VMO) or below VLS .

L2 These areas correspond to speeds above maximum speed (VFE or VMO) or below VLS with increasing levels of intensity from amber to red.

L1 Flying amber is acceptable for a limited period of time but should be avoided.
The red areas must be avoided.

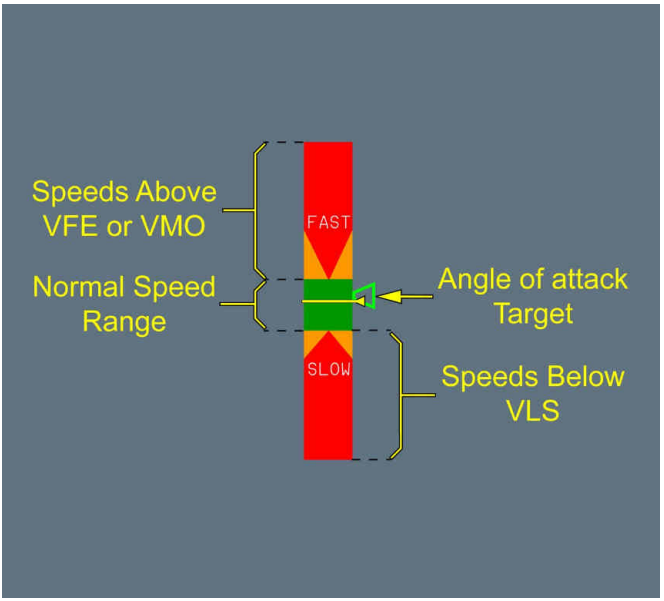
A bug indicates the Angle Of Attack target.

L2 The speed target allow transition from high speeds to low speeds and from one Slats/Flaps configuration to another

L1 The backup speed scale behaves as a normal speed scale : high speeds (“ FAST ”) towards the top, low speeds (“ SLOW ”) towards the bottom.

For more information on backup speed scale indications *Refer to DSC-31-20-20-130-10 Backup Speed Scale* .

Backup Speed Scale Display



BACKUP ALTITUDE SCALE

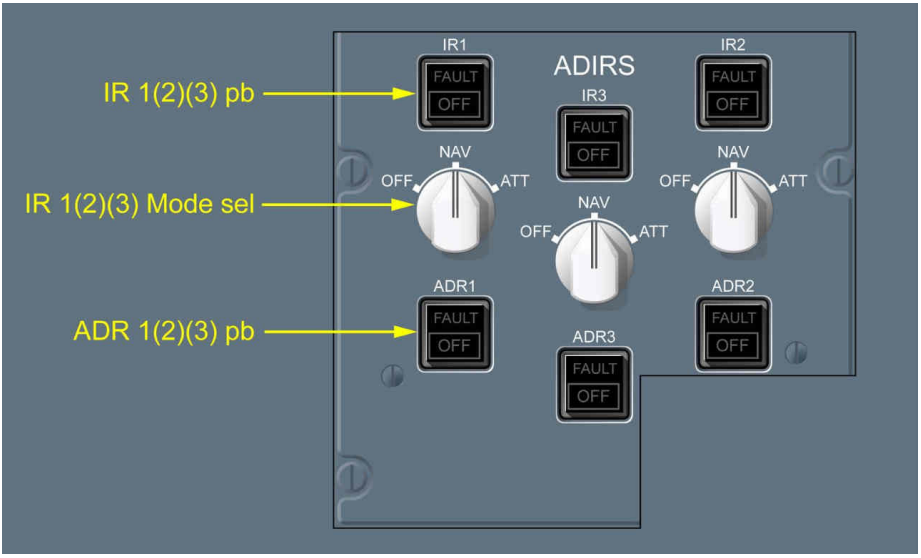
The backup altitude scale is based on GPS altitude information.
Due to GPS altitude imprecision the 2 last digits are dashed.
When the backup altitude scale is displayed, the vertical speed indication is not available.

FLYING TECHNIQUES

For information on how to fly the backup speed altitude scales, *Refer to FCTM/FCTM* .

ADIRS CONTROL PANEL

Applicable to: ALL



IR 1(2)(3) pb



: IR 1(2)(3) is off.
IR 1(2)(3) inertial data output is disconnected.



: IR 1(2)(3) is failed.
Associated with NAV IR 1(2)(3) FAULT (*Refer to procedure*).

ADR 1(2)(3) pb



: The ADR 1(2)(3) is off.
The ADR 1(2)(3) air data output is disconnected.



: The ADR 1(2)(3) is failed.
Associated with NAV ADR 1(2)(3) FAULT (*Refer to procedure*).

IR 1(2)(3) selector



: The ADIRU 1(2)(3)is not energized.
Both IR 1(2)(3) and ADR 1(2)(3) data are not available.



: Normal mode of operation.
IR 1(2)(3) supplies full inertial data to the aircraft systems.
ADR 1(2)(3) supplies full air data to the aircraft systems.

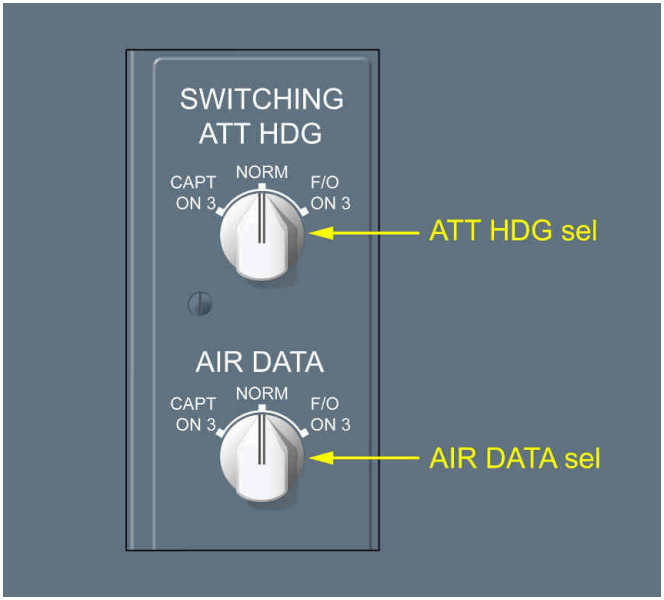
L12



: IR 1(2)(3) only supplies attitude and heading data (if entered by the flight crew). Navigation data are not available.
For more information on IR in ATT mode, *Refer to DSC-34-10-30-40 ATT only operation* .
ADR 1(2)(3) supplies full air data to the aircraft systems.

ADIRS SWITCHING

Applicable to: ALL



ATT HDG selector



IR1 supplies data to captain PFD and captain ND.
IR2 supplies data to first officer PFD and first officer ND.



: IR3 supplies data to captain PFD and captain ND.



: IR3 supplies data to first officer PFD and first officer ND.

AIR DATA selector



: ADR1 supplies data to captain PFD and captain ND.
ADR2 supplies data to first officer PFD and first officer ND.

: ADR3 supplies data to captain PFD and captain ND.



: ADR3 supplies data to first officer PFD and first officer ND.



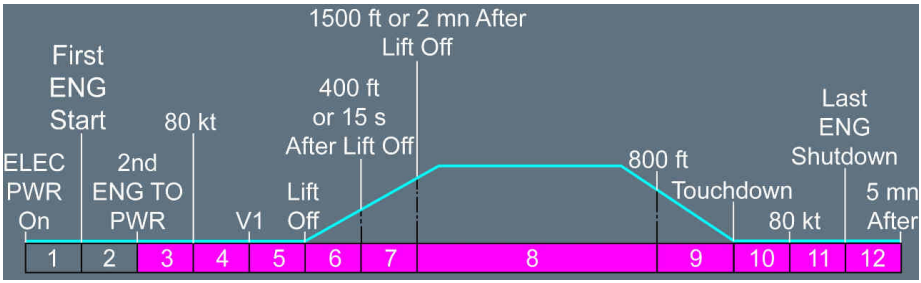
MEMO

Applicable to: ALL

IR IN ALIGN > 7 MIN or IR IN ALIGN X MIN (1<X<6)	- Appears as soon as one IR starts an alignment to recover the NAV mode. - Indicates the remaining time to finish the alignment of the IRs. - Flashes in flight phase 1 if a problem occurs on one IR alignment. The alert NAV IR NOT ALIGNED will then appear on the ECAM, as soon as one engine is running (flight phase 2). - Appears in amber and flashes as soon as one engine is running (flight phase 2).

L2 Flight Phase Inhibition

Flight Phase Inhibition



IR 1(2)(3)(1+2)(2+3)(1+3) IN ATT ALIGN

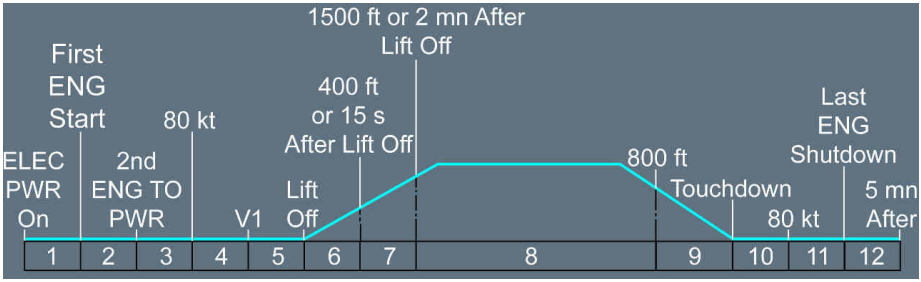
The corresponding IR s started an alignment to recover the ATT mode. For more information, *Refer to DSC-34-10-30-40 ATT only operation* .

ALL IRs IN ATT ALIGN

All IR s started an alignment to recover the ATT mode.

L2 Flight Phase Inhibition

Flight Phase Inhibition

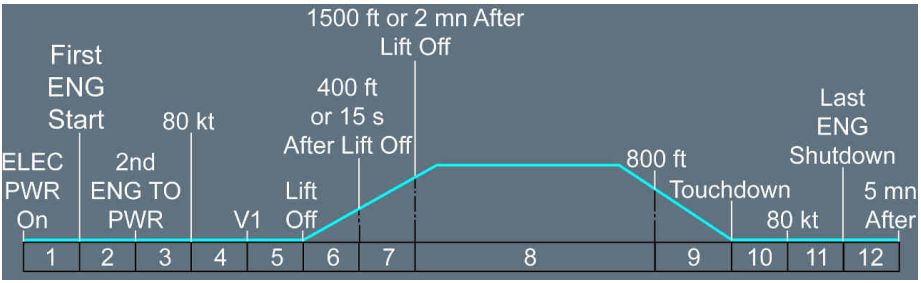


TRUE NORTH REF

- Indicates that the flight crew selected the TRUE north reference.
- Pulses for 10 s during the preflight phase or before approach to remind the flight crew that the TRUE north reference is selected for takeoff or for approach.

L2 Flight Phase Inhibition

Flight Phase Inhibition

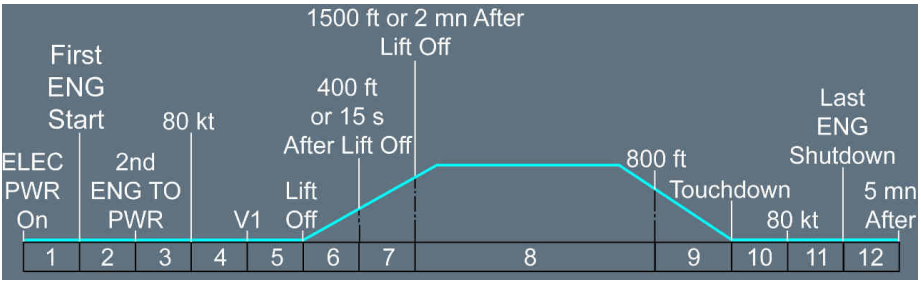


ADIRS SWTG

The flight crew selected the CAPT ON 3 or the F/O ON 3 position on the ATT HDG selector or on the AIR DATA selector.

L2 Flight Phase Inhibition

Flight Phase Inhibition



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IR ALIGNMENT

Applicable to: ALL

GENERAL

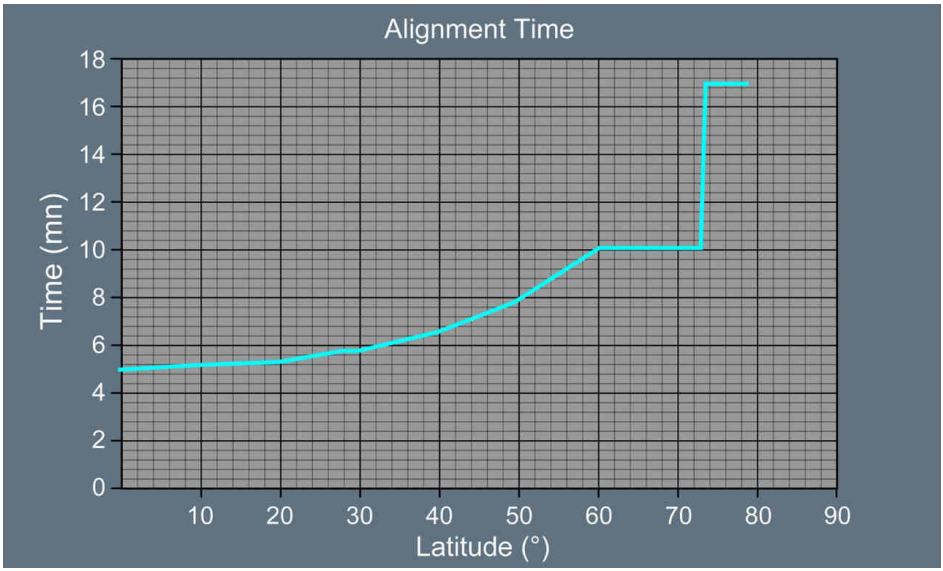
The ADIRS must be aligned. This allows them to operate in NAV mode and continuously provide the aircraft's position.
To complete the alignment, the ADIRS must be initialized to a navigation starting point, from which the ADIRS determine subsequent aircraft positions during flight.
The pilot may check the ADIRS status, and the ADIRS drift, at any moment on the MFD POSITION / IRS page.
For alignment, the aircraft must be stationary on ground. Any aircraft motion will automatically restart the alignment.
Avoid alignment during an engine start, or while the engines are running.

The pilot may choose to perform:

- A complete alignment, or

L2 It takes between 5 to 17 mindepending on the aircraft latitude.

Complete Alignment Time



L1 - A fast alignment.

L2 It takes about 30 s.

L1 In both cases, the ADIRS must be initialized to a navigation starting point.

L3 COMPLETE ALIGNMENT

During a complete alignment, the ADIRS uses gravity to determine the aircraft attitude. It then determines true heading, and estimates the present latitude.

L2 FAST ALIGNMENT

During a fast alignment, the ADIRS resets the ground speed to 0. Therefore, the ADIRS will start the position computation with accurate initial speed.

L3 The ADIRS does not estimate the latitude.

HOW TO ALIGN IRS

Applicable to: ALL

HOW TO PERFORM A FAST IR ALIGNMENT

ALL 3 ADIRS mode selectors..... OFF then NAV within 5 s

HOW TO PERFORM A COMPLETE IR ALIGNMENT

ALL 3 ADIRS mode selectors..... OFF for more than 20 s
ALL 3 ADIRS mode selectors..... back to NAV

POSITION INITIALIZATION

The alignment is completed, when the ADIRS is initialized to an appropriate position.
If the GPS is available, initialization is automatic, using the GPS position. Flight crew intervention is not necessary.
However, if GPS is not available or if the flight crew wants to override the automatic initialization , a manual initialization is possible, at any moment during the alignment phase.
In that case, the flight crew shall:

Enter the required position on the MFD POSITION / IRS page.

ATT ONLY OPERATION

Applicable to: ALL

The ATT mode provides restoration of attitude and heading data in case of ADIRU power shutdown or IR failure leading to the loss of navigation capabilities.
The sensed procedure NAV IR FAULT (*Refer to procedure*) and the not-sensed procedure IR ALGNMT IN ATT MODE (*Refer to PRO-ABN-ECAM-10-34-10-490 NAV IR ALIGNMENT IN ATT MODE*) provide the applicable procedure to recover the ATT mode.

UNRELIABLE AIRSPEED OR ALTITUDE INDICATIONS

Applicable to: ALL

GENERAL

Most failures of the airspeed or altitude system are detected by ADR s or by systems using air data parameters.
These failures lead to the loss of corresponding cockpit indications and the triggering of associated ECAM alerts.
However, there may be cases where the airspeed or altitude is erroneous without being recognized rapidly by ADR s or aircraft systems. In these cases, the cockpit indications appear normal, but are actually false, and flight crew must rely on their basic flying skills to identify the faulty source(s) and take the required corrective actions.
If only one source provides erroneous data, a straightforward crosscheck of the parameters, provided by the 3 ADR s and ISIS allows the faulty system to be identified. This identification becomes more difficult in extreme situations when two, or even three, sources provide erroneous indications.

MAIN REASONS FOR UNRELIABLE AIRSPEED OR ALTITUDE DATA

Unreliable speed or altitude indication may be due to radome damage.
However, the most probable reason for unreliable airspeed or altitude data is obstructed pitot tubes or static ports. Depending on the level of obstruction, the symptoms visible to the flight crew will be different.
However in all cases, the data provided by the obstructed probe will be false. Since it is highly unlikely that the aircraft probes will be obstructed, at the same time, to the same degree and in the same way, the first indication of unreliable airspeed or altitude data available to the flight crew, will most probably be a discrepancy between the various sources.
The following chart provide a non exhaustive list of the consequences of various cases of partially or totally obstructed pitot tubes and static ports on airspeed and altitude indications.
It should be noted that the cases described below cover extreme situations (e.g. totally obstructed or unobstructed drain holes), and that there could be multiple intermediate configurations with similar but not identical consequences.

FAILURE CASE	CONSEQUENCES
Water accumulated due to heavy rain. Drain holes unobstructed	Transient speed drop until water drains. IAS fluctuations and gradual return to normal.
Water accumulated due to heavy rain. Drain holes obstructed.	Permanent speed drop.
Ice accretion due to MFP pitot heat failure, or transient MFP pitot blocked due to severe icing. unobstructed drain holes.	Total pressure leaks towards static pressure. IAS drops until obstruction cleared. Erratic ATHR may be observed.
Ice accretion due to MFP pitot heat failure, or MFP pitot obstruction due to foreign objects. Obstructed drain holes.	Total pressure blocked. Constant IAS in level flight until obstruction is cleared. In climb, IAS increases. In descent, IAS decreases. Abnormal AP/FD/ATHR behavior: a. AP / FD / pitch up in open climb to hold target IAS . b. AP / FD pitch down in open descent to hold target IAS .
Total obstruction of static ports on ground.	Static pressure blocked at airfield level. Normal indications during takeoff roll. After liftoff altitude remains constant. IAS decreases after liftoff. IAS decreases when aircraft climbs. IAS increases, when aircraft descends.

FAILURE SCENARIOS

NORMAL SITUATION

Flight controls receive airspeed and altitude data from the 3 ADR s as well as ISIS .
Flight controls compare the data coming from all sources with the average value of the 3 ADR s. if one airspeed or altitude data exceeds a given threshold the whole source either ADR or ISIS is rejected.
For more information on ADR monitoring by flight controls, *Refer to DSC-34-10-30-10-20 PRIM Monitoring* .

ONE AIRSPEED OR ALTITUDE SOURCE IS ERRONEOUS

The affected source ADR or ISIS is rejected by flight controls.

The alert NAV AIR DATA DISAGREE is displayed with the following subtitle:
- ADR x REJECTED BY PRIMs or
- STBY INSTRUMENTS REJECTED BY PRIMs .

If the affected source is an ADR used to display speed information on either the captain or first officer PFD , a CHECK SPD FLAG is displayed on the PFD .

Note: Flight crew should be aware that in very extreme circumstances, it may happen that two, or even three ADR s may provide identical and erroneous data. Therefore, the suspect ADR should only be switched off, if it is positively confirmed that the other ADR s are correct.
If any doubt apply the not-sensed NAV UNRELIABLE AIRSPEED PROCEDURE procedure.

TWO ADR s ARE ERRONEOUS

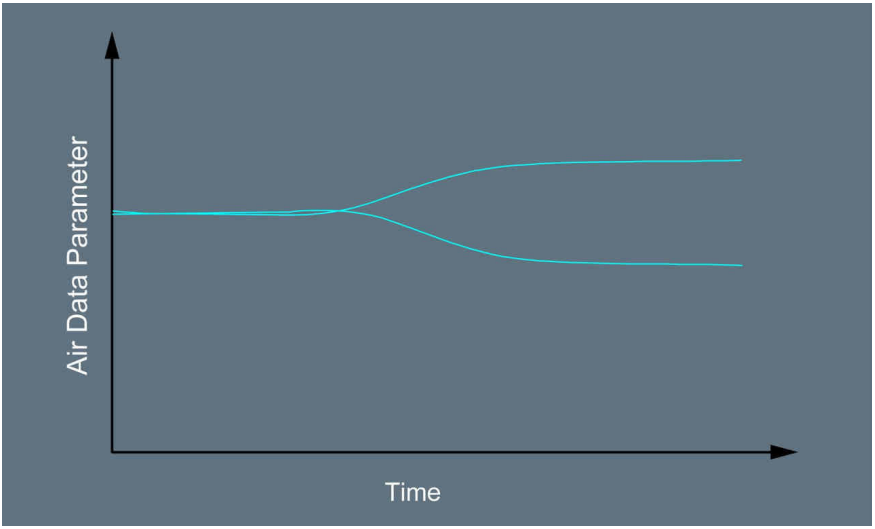
If two ADR s are rejected in sequence , there is a reversion to alternate law.
This also applies, if one ADR is rejected during a flight dispatched under MEL with another ADR failed.

The alert NAV AIR DATA DISAGREE is displayed with the following subtitles:
- ADR x REJECTED BY PRIMs and
- ADR y REJECTED BY PRIMs or STBY INSTRUMENTS REJECTED BY PRIMs

Note: Flight crew should be aware that in very extreme circumstances, it may happen that two, or even three ADR s may provide identical and erroneous data. Therefore, the suspect ADR should only be switched off, if it is positively confirmed that the other ADR s are correct.
If any doubt apply the not-sensed NAV UNRELIABLE AIRSPEED PROCEDURE procedure,

TWO SOURCES ALREADY INVALID AND DETECTION OF CONFLICT BETWEEN THE TWO REMAINING SOURCES

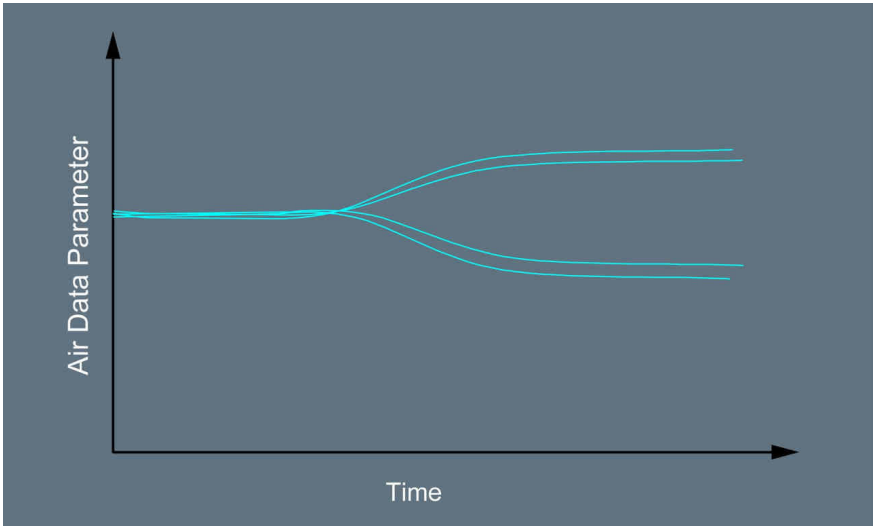
If two airspeed and altitude sources (ADR or ISIS) have been rejected by flight controls, the flight controls continue the monitoring of the two remaining sources.
If a discrepancy higher than a given threshold is detected between the two remaining sources, the flight controls are not able to determine which air data is reliable. As a consequence flight controls do not use anymore any air data parameters.



The alert NAV ALL AIR DATA DISAGREE is displayed (*Refer to procedure*).

TWO SOURCES IN CONFLICT WITH TWO OTHER SOURCES

If a discrepancy higher than a given threshold is detected between a group composed of two ADR s and a group composed of one ADR and ISIS , the flight controls are not able to determine which air data is reliable. As a consequence flight controls do not use anymore any air data parameters.



The alert NAV ALL AIR DATA DISAGREE is triggered (*Refer to procedure*).

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OVERVIEW

Applicable to: ALL

The Global Positioning System (GPS) is a satellite based radio navigation aid.

L2 Worldwide 28 satellites broadcast accurate navigation data that the aircraft can use for the precise determination of its position.

L1 The aircraft has two independent GPS receivers.

Each GPS receiver is integrated a MMR (Multi Mode Receiver) (GPS1 receiver in MMR1, GPS2 receiver in MMR2).

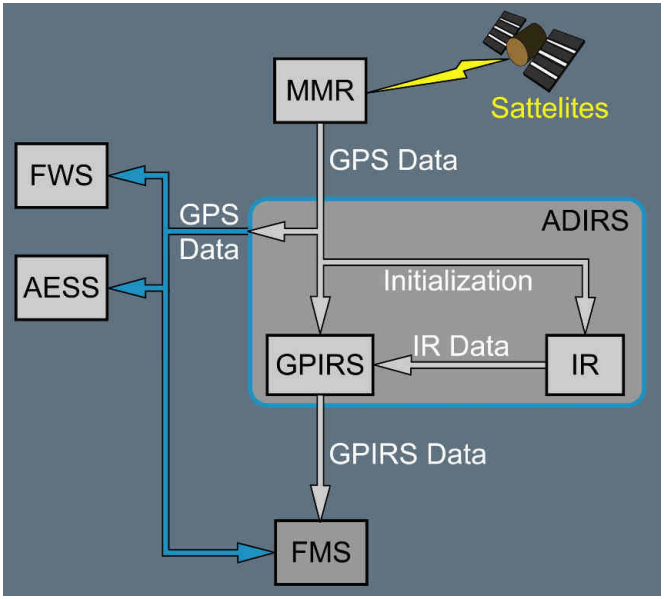
MMR transmit GPS data to ADIRS, FMS, ISIS and clock.

GPS FUNCTION

Applicable to: ALL

L2 GPS DATA TO ADIRS

- The ADIRS uses GPS data from the MMR to compute an hybrid position between IR and GPS data.
  Hybrid GPIRS position is provided by the ADIRS to the FMS, for aircraft position computation and display.
- The ADIRS uses GPS data from the MMR for initialization.
- The ADIRS also transmits GPS data from the MMR to the FMS, the FWS and the AESS



GPS DATA TO FMS

Applicable to: ALL

L2 GPS DATA TO FMS

The following GPS data are transmitted to the FMS via the ADIRS .

- GPS position,
- GPS mode,
- number of tracked satellites,
- accuracy,
- GPS true tracks,
- GPS UTC time,
- GPS altitude,
- GPS ground speed.

GPS MODE

The GPS operates in different mode which are indicated on the POSITION /GPS page (*Refer to DSC-22-FMS-20-30-22FMS5020K POSITION / GPS page - Mode Impact*).

- Initialization mode (INIT): Begins at power up and allows GPS initialization. Ends when the GPS begins satellites acquisition process.
- Acquisition mode (ACQ): The GPS enters in this mode after power up or during long periods of lost satellite signal. It remains in this mode until it is able to track at least four satellites, then transfers to NAV mode. To enter navigation mode more quickly, the GPS uses initial position, time and altitude from ADIRS .
- Navigation mode (NAV): When the GPS can track 4 or more satellites, it enters NAV mode and continuously supplies data to the ADIRS .
- Altitude aiding (ALTAID):
- Fault mode (FAULT): .The fault mode is entered when a failure, which may prevent the MMR from transmitting valid GPS data has been detected.

GPS DATA TO ISIS

Applicable to: ALL

L2 GPS DATA TO ISIS

ISIS displays aircraft position either on the SND or SFD .
Aircraft position comes from GPS 1 or GPS 2 via ADIRU 1 or ADIRU 3.
For information on aircraft position on ISIS SFD *Refer to DSC-34-10-20-20-60-60 Aircraft coordinates* .
For information on aircraft position on ISIS SFD *Refer to DSC-34-10-20-30-50 A/C coordinates* .

GPS DATA TO CLOCK

Applicable to: ALL

L2 GPS DATA TO CLOCK

The clock receives GPS time and date from MMR1 .
For information on clock *Refer to DSC-31-70-10 General* .

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GENERAL

Applicable to: ALL

There are three Radio Altimeters (RA) which provides the height of the aircraft above the ground.

L2 The RA operate below 5 000 ft .

L1 The RA height is displayed on both PFD when the aircraft is below 2 500 ft

Both PFD display the same height (For more information on PFD display, *Refer to DSC-31-20-20-70 Radio Altitude*).

L3 When all three RA are available the displayed height is the median value.

If only two RA are available, the displayed height is the average value.

If only one RA is available the displayed height is the remaining value.

L1 The RA height is the minimum distance between the main landing-gear wheels and the ground.

AUTOMATIC CALLOUTS

Applicable to: ALL

GENERAL

Below 2 500 ft a synthetic voice generates radio height announcement.

These announcements come through the cockpit loudspeakers even if the speakers are turned off.

L3 The Flight warning System (FWS) generates these announcements.

PREDETERMINED CALLOUTS

The altitude callouts use the following predetermined thresholds:

Height (ft)	Callout
2500	TWO THOUSAND FIVE HUNDRED or TWENTY FIVE HUNDRED
2000	TWO THOUSAND
1000	ONE THOUSAND
500	FIVE HUNDRED or Smart FIVE HUNDRED (1)
400	FOUR HUNDRED
300	THREE HUNDRED
200	TWO HUNDRED
100	ONE HUNDRED
90	NINETY
80	EIGHTY
70	SEVENTY
60	SIXTY
50	FIFTY

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40	FORTY
30	THIRTY
20	TWENTY
10	TEN
5	FIVE
DH (or MDA/MDH) +100 (2)	HUNDRED ABOVE or PLUS HUNDRED
DH (or MDA/MDH) (2)	MINIMUM

(1) *The FIVE HUNDRED auto callout is triggered only if the glide deviation exceeds a half dot.*

(2) *The reference altitude for callouts is the radio altitude for precision approaches (DH) and baro altitude (MDA/MDH) for non precision approaches*

Pin programmings allow the operator to select the callouts needed.
If aircraft remains at a height that is in the detection zone for a height callout, the corresponding message is repeated at regular intervals.

INTERMEDIATE CALLOUT

Below 400 ft, if the time between two consecutive predetermined callouts exceeds a certain threshold, an intermediate callout is triggered at regular time intervals.

L3 Between 400 ft and 100 ft, the intermediate callout is triggered 11 safter the previous predetermined callout.
Below 100 ft, the intermediate callout is triggered 4 safter the previous predetermined callout.

L1 The intermediate callout calls out the current aircraft height.

L2 Between 400 ft and 100 ft, the height is rounded to the lower 10 ft (e.g. TWO HUNDRED AND TWENTY).
Below 100 ft, the height is rounded to the lower feet.

RETARD AURAL ALERT

The "RETARD" aural alert is automatically triggered at:
- 10 ft RA , in autoland with the A/THR active
- 20 ft RA , in all other cases.

For more information about aural alerts, *Refer to DSC-31-40-20 FWS Audio Indicators* .

OVERVIEW

Applicable to: ALL

NAVAIDS

VOR

The aircraft has two VOR receivers.
The navigation displays (ND s) show VOR 1 and VOR 2 information in accordance with the position of the VOR/ADF pb EFIS control panel. For more information on the VOR/ADF pb , *Refer to DSC-31-20-50-GEFIS ND Data Display pb* .

ILS

The aircraft has two ILS receivers.

L3 Each ILS receiver is integrated in a MMR (Multi Mode Receiver) (ILS 1 receiver in MMR 1, ILS 2 receiver in MMR 2).

L1 The flight crew can display the ILS information on each PFD by pressing the LS pb on the onside EFIS control panel (deviation scales and deviation indexes are displayed).
The ND s display ILS information, if the flight crew selects the ROSE LS mode on the EFIS control panel (For more information on the ROSE LS mode, *Refer to DSC-31-20-30-60-GROSL ROSE-LS Mode Overview*).

L2 Captain PFD and first officer ND display ILS 1 information, first officer PFD and captain ND display ILS 2 information.

L1 ADF

The aircraft has one ADF receiver.
The ND s display ADF information, depending on the position of the VOR/ADF pb on the EFIS control panel. For more information on the VOR/ADF pb , *Refer to DSC-31-20-50-GEFIS ND Data Display pb* .

DME

The aircraft has two DME s.
The frequency set automatically on the DME corresponds to that set on the VOR or ILS .

L3 Each FMS can tune up to 4 ground stations on its onside DME :
- 2 for FMS radio position in DME / DME mode
- 1 for VOR / DME display
- 1 for ILS / DME display.

L1 The ILS - DME information is displayed on the ND s and PFD s when the flight crew has pressed the LS pushbutton on the EFIS control panel.

MARKER BEACON

One marker beacon system is included in VOR receiver 1.
The PFD displays the outer, middle and inner marker signals. (For more information on marker displays on PFD, *Refer to DSC-31-20-20-110-GILSA ILS Approach*).

NAVAIDS TUNING

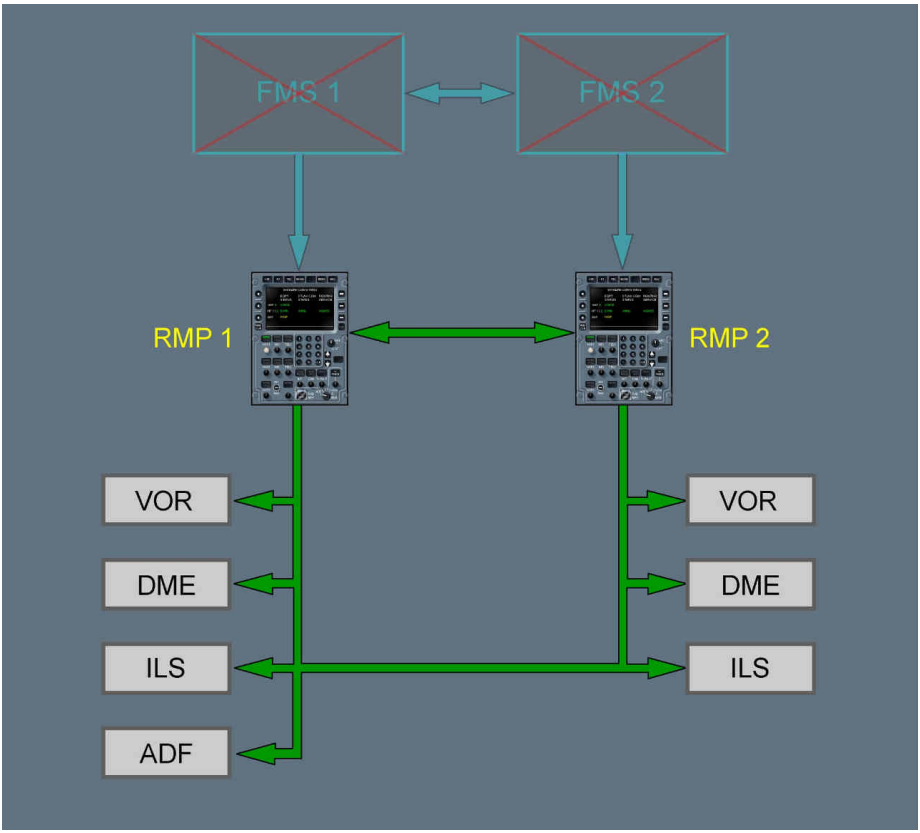
The FMS is the basic means for navaids tuning.
Navaids can be tuned either automatically by the FMS or manually by the flight crew using the FMS . For information on navaids tuning by the FMS, *Refer to DSC-22-FMS-10-30-20-22FMS3020A Radio Navigation Tuning - Introduction* .
The flight crew can also tune the navaids using the RMP in STBY RAD NAV mode. For information on STBY RAD NAV mode, *Refer to DSC-34-10-60-10 Standby RadNav* .

STANDBY RADNAV

Applicable to: ALL

If all three FMC s fail, the flight crew can use the RMP 1 or RMP 2 (Radio Management Panels 1 or 2) on the pedestal for back up tuning.
The RMP backup tuning is available when any of RMP1 or RMP2 is switched to RAD NAV STBY mode by pressing the RAD NAV STDBY . For information on the use of the RMP in RAD NAV STDBY mode, *Refer to DSC-23-20-05 RAD NAV Controls and Indicators* .
The captain RMP controls VOR 1 and ADF 1.
The first officer RMP controls VOR 2.
In RAD NAV STDBY mode each RMP controls both ILS s.
RMP 3 is not used for navaids tuning.

STANDBY RADNAV



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HOW TO TUNE THE NAVAIDS IN STANDBY RADNAV

Applicable to: ALL

CAUTION	The flight crew only activates the STBY RAD NAV mode, if the three FMCs are fault.

Check that both RMPs are on.

01 STBY RAD NAV



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GENERAL

Applicable to: ALL

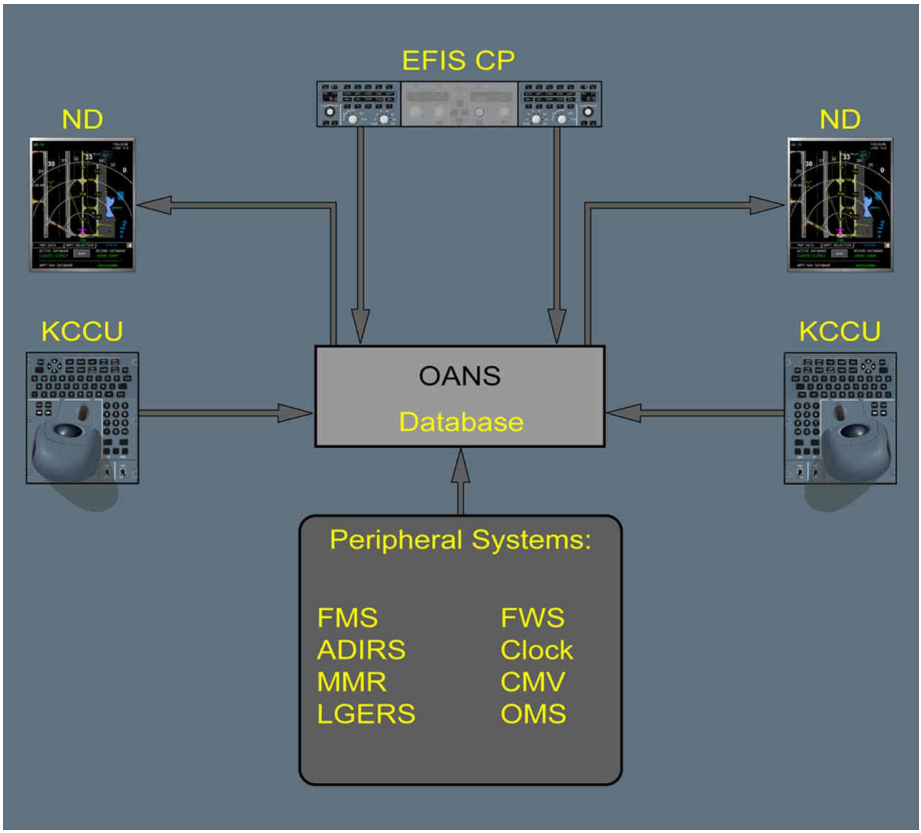
The Onboard Airport Navigation System (OANS) provides the flight crew with a moving airport map on its onside ND.
The OANS is designed to improve the flight crew awareness of airport surfaces. However, the flight crew's primary reference on ground should always be the outside of the aircraft.
The moving airport map is available if the flight crew sets the ND range selector to ZOOM, in the following ND modes: PLAN, ARC and ROSE-NAV.
The flight crew can select five different ranges for the OANS display: 5 nm, 2 nm, 1 nm, 0.5 nm and 0.2 nm.

With the OANS, the flight crew can:
- Display the aircraft position, and find any location within an airport, on the moving airport map
- Move the moving airport map via the KCCU
- Display any airport of the OANS database, when in PLAN mode.

ARCHITECTURE

Applicable to: ALL

OANS Architecture



L2 In normal operations, the Captain's OANS uses inputs from the ADIRS 1, MMR 1 and FMS 1. The First Officer's OANS uses inputs from the ADIRS 2, MMR 2 and FMS 2.

EFIS CP

The flight crew uses the EFIS CP to activate the OANS, and to select the range and mode for the display.

ND

When the flight crew selects the ZOOM position via the onside ND range selector , the onside ND displays the moving airport map.
Some tasks, applicable to the airport navigation function, can also be performed via the interactive functions of the ND . For more information about the interactive functions of the ND , *Refer to DSC-34-10-70-20-GND Overview* .

KEYBOARD AND CURSOR CONTROL UNIT (KCCU)

The flight crew uses the KCCU to activate the interactive functions of the ND, and to enter the ident on the OANS function pages.

L2 **OANS DATABASE**

The OANS database provides the information that appears on the moving airport map.
There are two databases cycles, and each cycle has a validity period. The STATUS panel displays the validity period of both cycles.

L3 The STATUS panel also displays the part number of the OANS database.

L2 If the date of the aircraft clock does not correspond to the validity period of the database cycle, the message area of the STATUS panel displays the DATABASE CYCLE NOT VALID message.
For more information, *Refer to DSC-34-10-70-20-GND Additional Functions* .

L2 **PERIPHERAL SYSTEMS**

The OANS interfaces with the following peripheral systems:

FLIGHT MANAGEMENT SYSTEM (FMS)

The FMS provides flight plan data (e.g. selected runways, origin airport, alternate airport and destination airport) and the GPS PRIMARY status.

L3 The Captain's OANS uses inputs from FMS1, and the First Officer's OANS uses inputs from FMS2.

L2 **AIR DATA AND INERTIAL REFERENTIAL SYSTEM (ADIRS)**

The OANS computes the aircraft position using:
- The ADR and the IR data, that are provided by the ADIRS
- The MMR data.

L3 The Captain's OANS uses inputs from ADIRS1, and the First Officer's OANS uses inputs from ADIRS2. When the flight crew changes the ATT HDG selector, ADIRS3 data may be used instead of the data from one of the two other ADIRS.

L2 **MULTI MODE RECEIVER (MMR)**

The GPS data provided by the MMR, is the primary data source for OANS position computation.

L3 The Captain's OANS uses inputs from MMR1, and the First Officer's OANS uses inputs from MMR2.

L2 **LANDING GEAR EXTRACTION RETRACTION SYSTEM (LGERS)**

The LGERS provides the landing gear position data, if the aircraft is on ground and in flight.

FLIGHT WARNING SYSTEM (FWS)

The OANS interfaces with the FWS1 (or with the FWS2 in case of FWS1 failure) in order to:

- Display failures
- Trigger the annunciations
- Provide the flight phase data.

L3 **CLOCK**

The aircraft clock provides the OANS with the current date and the current time, in order to verify the database validity period.

CONCENTRATOR AND MULTIPLEXER FOR VIDEO (CMV)

The OANS sends video images to the CMV, and the CMV sends this data to the NDs via the Control and Display System (CDS).

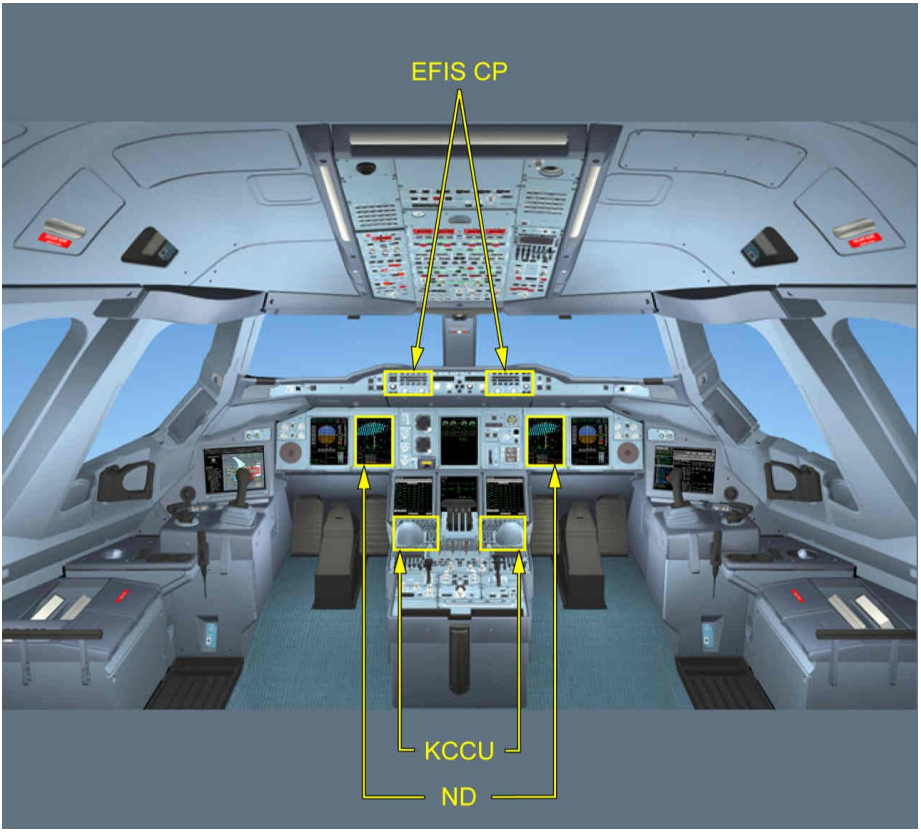
ONBOARD MAINTENANCE SYSTEM (OMS)

The OANS and the OMS share data from the maintenance and the OANS database.

COCKPIT VIEW

Applicable to: ALL

Cockpit View



KCCU

Applicable to: ALL

KCCU



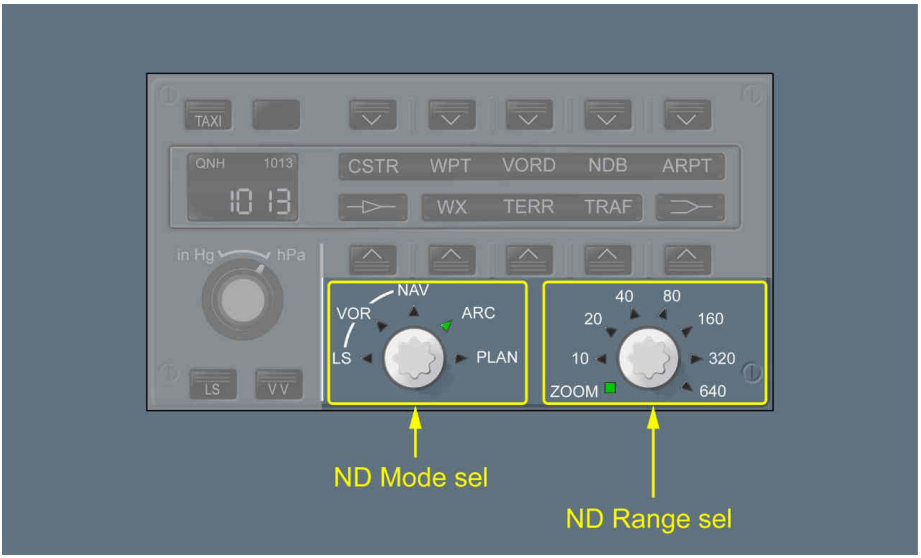
The flight crew uses the Keyboard and Cursor Control Unit (KCCU) to:

- Move the cursor on the ND screen
- Move the moving airport map
- Enter the airport ident or the airport items ident, on the ARPT SEL panel, or on the MAP DATA panel.

EFIS CONTROL PANEL

Applicable to: ALL

EFIS CP

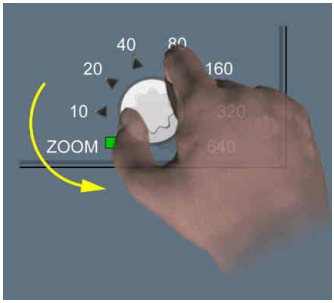


ND mode selector

The moving airport map is only available in PLAN, ARC, or ROSE-NAV mode.
In ROSE-VOR and ROSE-LS modes, the OANS is not displayed, even if the flight crew sets the ND range selector to ZOOM.

ND range selector

If the flight crew sets the ND range selector to ZOOM, the ND displays the moving airport map with a 5 nm range.



If the flight crew turns the ND range selector counterclockwise, the ND range decreases respectively by:
- 2 nm
- 1 nm
- 0.5 nm
- 0.2 nm.

Similarly, each time the flight crew turns the ND range selector clockwise, the ND range increases in the opposite order.

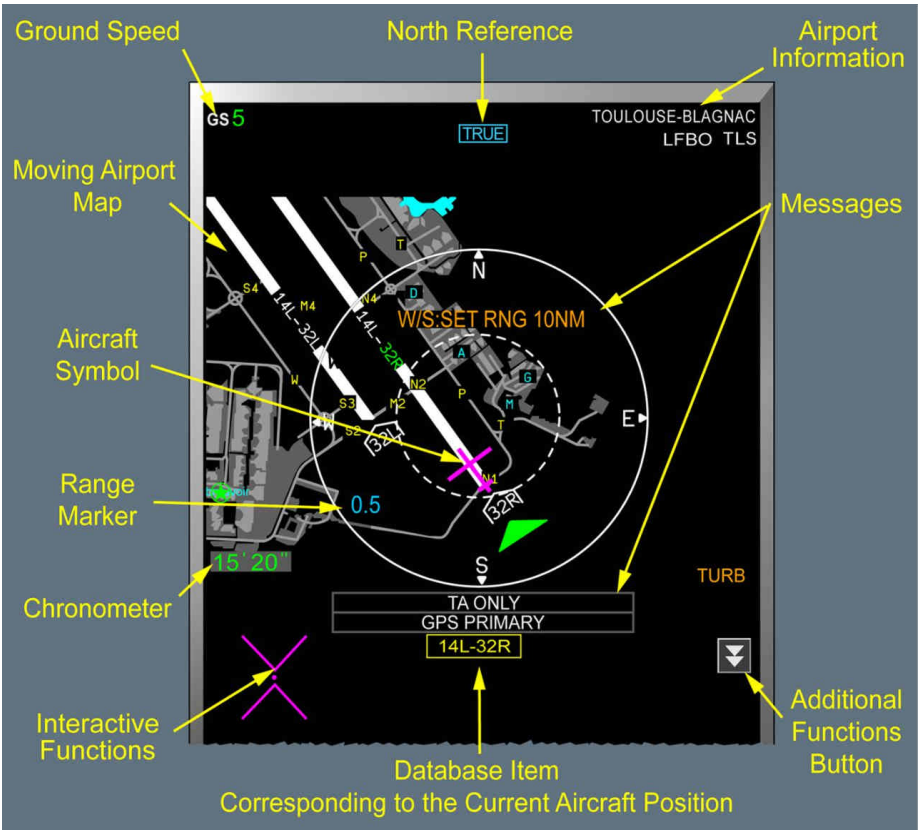
If the flight crew sets the ND range selector to a range other than ZOOM, the ND no longer displays the moving airport map.

L2 In the case of an EFIS CP failure, the ND range selector is automatically set to 5 nm.

ND

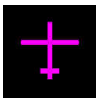
Applicable to: ALL

OANS on the ND



AIRCRAFT SYMBOL

L12



The aircraft symbol is located on the moving airport map.
The OANS computes the aircraft location, using MMR (GPS) and ADIRS data.

L2 The aircraft symbol is displayed with the same scale as the moving airport map, if the flight crew sets the ND range selector to 0.2 nm.

The OANS no longer displays the aircraft symbol, if:
- MMR data is not available, and/or
- IRS data is not available.

MOVING AIRPORT MAP

In normal operation, it is not necessary for the flight crew to manually select an airport. The OANS automatically displays a default airport, based on the current aircraft position and on the FMS flight plan.
The default airport can be either the origin, destination, or alternate airport of the flight plan, depending on the current aircraft position.
In PLAN mode only, the flight crew can display any other airport of the airport database.

ARC OR ROSE-NAV MODE

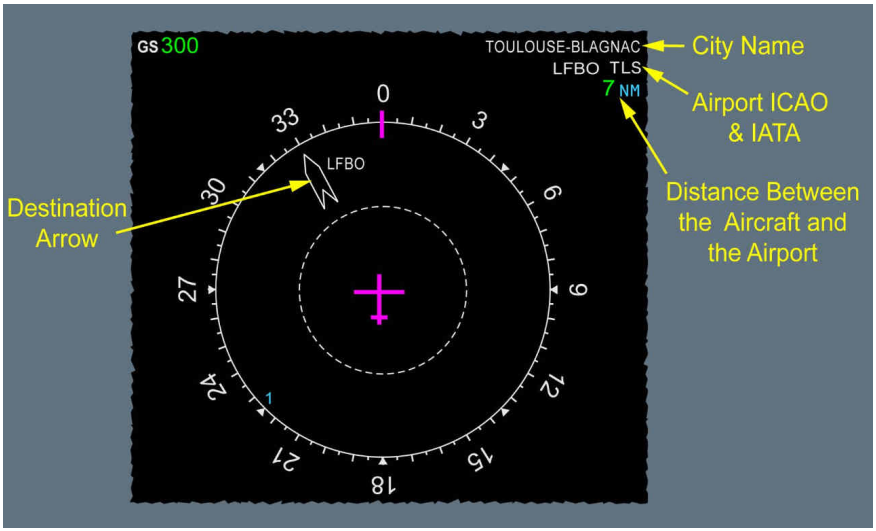
In ARC or ROSE-NAV mode, the OANS displays a default moving airport map, in relation to the fixed aircraft symbol. The default airport is oriented to the magnetic or true heading, depending on the position of the TRUE/MAG pb, on the AFS CP.

L3 The default airport is:
- The current airport, if the aircraft is on ground, or
- The origin, destination, or alternate airport, if the aircraft is in flight. The OANS keeps one of these airports, if the aircraft is within a virtual cylinder, that is centered over this airport. This virtual cylinder has a 20 nm radius, and a 5 000 ft height.

L1 If the moving airport map is out of the ND range and the selected range is 5 nm, a destination arrow indicates the heading of the destination airport. The arrow also has the ICAO code label of the airport.

L2 The destination arrow indicates the airport heading. It does not indicate the runway orientation.

Destination Arrow



L1 **PLAN MODE**

In PLAN mode, the OANS displays:
- The default airport, or
- Any airport of the database, that the flight crew manually selects for consultation.

The moving airport map is oriented to the TRUE north, and is centered on:
- The aircraft, if the aircraft is on ground
- The airport, if the aircraft is in flight.

L2 The displayed airport moves immediately, when the flight crew moves the map via the KCCU.

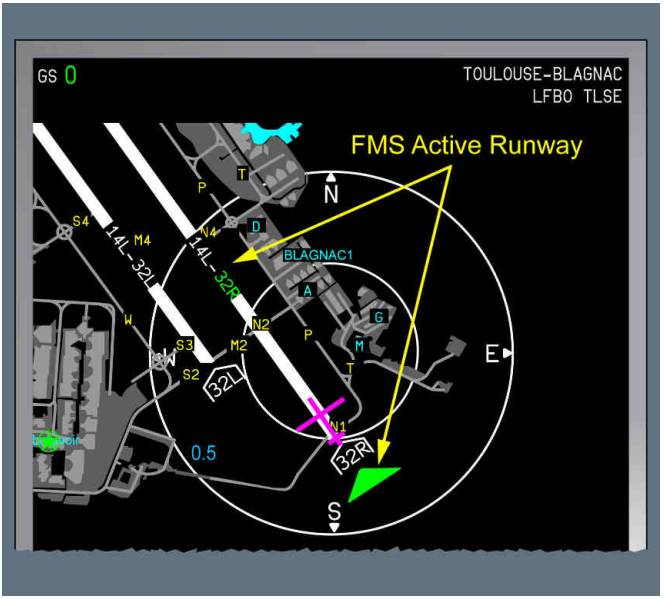
L3 The default airport is:
- The origin airport, if the distance from the origin airport to the aircraft is shorter than 50 nm, or
- The destination airport, in all other cases.
  If the distance from the origin airport to the destination airport is shorter than 300 nm, the destination airport becomes the default airport.

L1 When the aircraft approaches the selected runway, the OANS displays the QFU of the runway approaching advisory in green.

If the flight crew selects an origin runway, or a destination runway in the FMS flight plan, the OANS displays:

- A green triangle next to the QFU threshold label of the selected runway
- The QFU of the selected runway on the runway label in green.

FMS Runway



GROUND SPEED

The aircraft Ground Speed (GS) is indicated in knots. The ADIRS provides the GS of the GPIRS.

L2 If the ground speed is not valid, green dashes appear instead of the speed values.

CHRONOMETER

For more information, *Refer to EFIS / ND / CHRONO* .

NORTH REFERENCE

At high latitudes, the ADIRS automatically changes the MAG north reference to the TRUE north reference.

When the aircraft approaches high latitudes, the ND displays the SELECT TRUE NORTH REF message, in order to request that the flight crew selects TRUE north reference.

The flight crew manually changes the north reference by pressing the TRUE/MAG pb on the AFS CP.

INTERACTIVE FUNCTIONS

MOVE FUNCTION

It is possible to move the moving airport map using the KCCU . The flight crew presses the validation pb and simultaneously moves the trackball. The moving airport map follows the trackball motion, if it is inside the display box.

KCCU



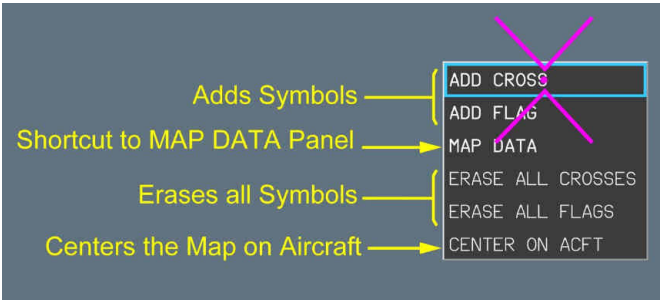
As soon as the validation pb is released:
- In PLAN mode: The moving airport map remains in the position defined by the cursor
- In ARC or ROSE–NAV mode: The moving airport map is automatically centered on the aircraft symbol.

INTERACTIVE MENU

The flight crew can access the airport navigation functions by clicking anywhere on the moving airport map.

L2 The interactive menu automatically disappears if the flight crew:
- Moves the cursor outside of the menu window, or
- Selects one of the functions, or
- Changes the ND range or mode.

Interactive Menu of the ND



L1 Adds Symbols

It is possible to add two types of symbols to the moving airport map:

L12 -



Green flags:
To locate or mark a given point on the airport, for example.

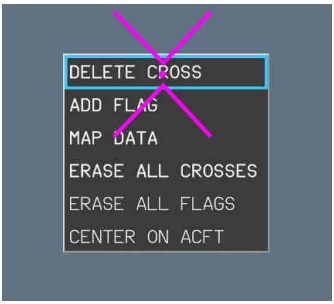
L12 -



White crosses:
Indicate a problem, such as a closed taxiway.

If the flight crew adds a symbol to the onside moving airport map, the symbol appears where the flight crew has clicked the cursor.
If the flight crew clicks on a symbol in the onside moving airport map, the interactive menu of the ND displays the DELETE function instead of the ADD function.

DELETE Function



Shortcut to the MAP DATA Panel

The flight crew can directly access the MAP DATA panel. For more information, *Refer to MAP DATA Panel* .

Erases all Symbols

The flight crew can delete all symbols that appear on the onside moving airport map.
If the flight crew selects the ERASE ALL symbols function, a confirmation action is required.

Erase All Crosses Confirmation Window



If the flight crew selects the CANCEL button, all the symbols remain on the moving airport map, and the confirmation window no longer appears.

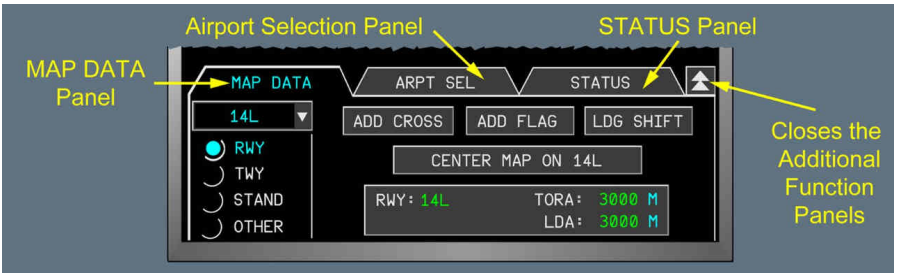
Centers on Aircraft

In PLAN mode, the flight crew can center the moving map of the default airport, on the aircraft position.

ADDITIONAL FUNCTIONS BUTTON

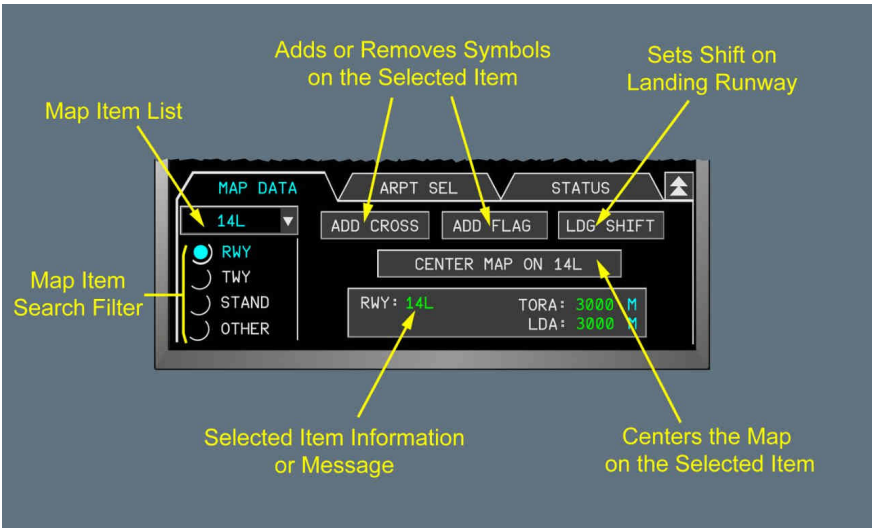
If the flight crew clicks on the additional functions button, additional function panels appear on the lower part of the ND .

Additional Function Panels



MAP DATA PANEL

The MAP DATA panel enables the flight crew to see the airport map data.



The flight crew can select one map item in the list, or enter the item IDENT via the keyboard. It is possible to display the list of one type of item (runway, taxiway, stand, and other items), by using the search filter.

If the flight crew selects one item:

- Additional information is available for:
  - 

The runway
  - 

The runway shift
  - 

The aircraft stands.

  If a map item is not found, because it is either not in airport database or not written correctly, the NOT IN RWY (or other selected filter) DATABASE message appears instead of the item information.
- The flight crew can add a symbol on the selected item location. If a symbol already exists, the flight crew can select the other symbol, or can delete it.
- In PLAN mode, the flight crew can center the moving airport map on the selected item.

LANDING RUNWAY SHIFT

When the flight crew clicks on the LDG SHIFT button, the following landing runway shift panel appears.

Landing Runway Shift Panel

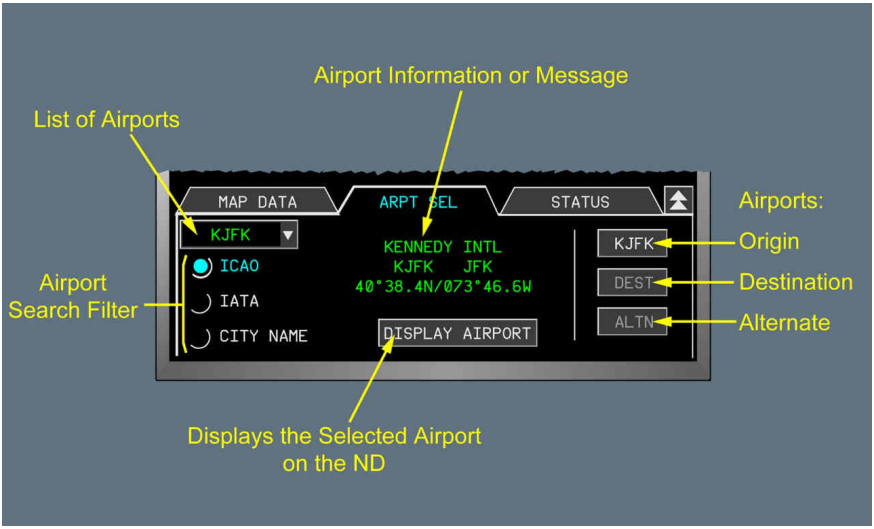


The flight crew can shift the runway threshold and / or the runway end.
The flight crew can shift the threshold and / or end of only one runway of the database.
When the flight crew validates the runway shift with the return button, the map data panel displays the runway shift See .

AIRPORT SELECTION PANEL

The ARPT SEL panel enables the flight crew to display the information that is in the airport database.
In PLAN mode, the flight crew can also select and display airports that are not origin, alternate, or destination airports.

Airport Selection Panel



The flight crew can:
- Select one airport from the list, or
- Use the keyboard to enter the airport ICAO code, or the IATA code.

The airport search filter enables the flight crew to access the list of airports, by selecting one of the following:
- The ICAO code
- The IATA code
- The city name.

If the flight crew selects one airport:

- Additional information appears in green (City name, ICAO and IATA codes, coordinates ...). The information appears in yellow, if the airport is not currently displayed on the ND .
  If an airport is not found, because it is either not in airport database, or not written correctly, the NOT IN ICAO (or other selected filter) DATABASE message appears instead of the airport information.
- In ARC or ROSE-NAV mode, the SET PLAN MODE message appears to request the flight crew to select the PLAN mode, in order to display the selected airport.
- In PLAN mode, the flight crew can display any selected airport on the ND .

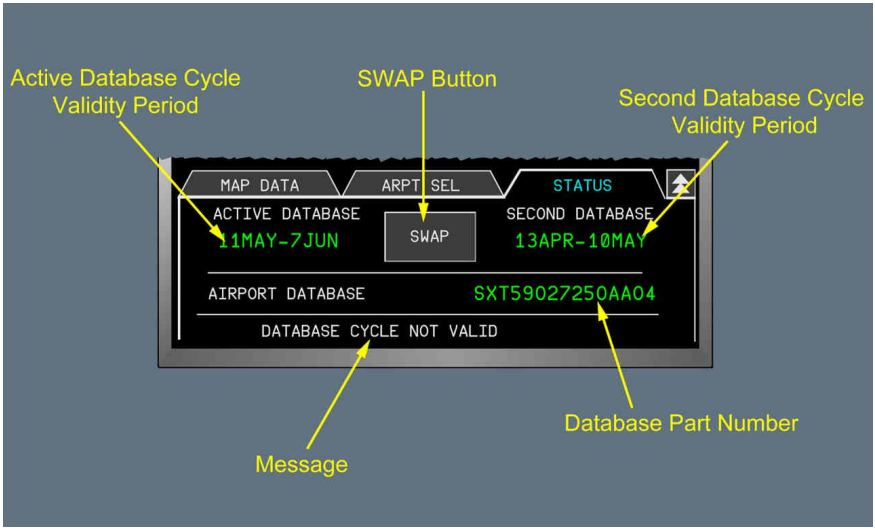
It is always possible to display the origin, destination, or alternate airport of the FMS flight plan, by using the corresponding shortcut buttons that are on the right side of the ARPT SEL panel.

STATUS PANEL

The STATUS panel enables the flight crew to:

- Check the status of the airport database
- Exchange one database cycle with the other.

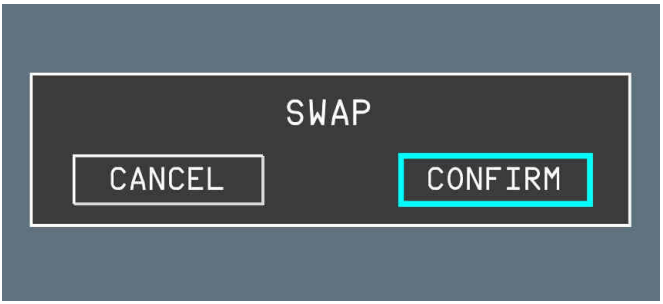
STATUS panel



L2 If the airport database is missing or expired, the OANS automatically displays the STATUS panel, when the flight crew accesses the OANS for the first time.

L1 The flight crew can exchange one database cycle with the other, using the SWAP button. A confirmation action is required.

SWAP Confirmation Window



L2 If a database cycle is changed, all the added symbols will be deleted from the moving airport map.

L1 DATABASE CYCLE NOT VALID — The expiration date of the database cycle is different from the current date.

OANS MESSAGES

ARPT NAV POS LOST

There is
- An IRS source failure, or
- A failure of both MMR s.

ARPT NOT IN ACTIVE F-PLN

In PLAN mode, the flight crew has displayed an airport that is not the origin, destination, or alternate airport.

NOT AVAIL

The airport navigation display is not available.

PLEASE WAIT

The flight crew's request is in progress.

SURV MESSAGES

TA ONLY

Refer to Message

TCAS CHANGE MODE

Refer to Message

TCAS: INCREASE RANGE

Refer to Message

TERR: CHANGE MODE

Refer to Message

TERR: INCREASE RANGE

Refer to Message

TURB

The SURV system (WXR / PWS) has detected turbulence.

W/S: CHANGE MODE

Refer to Message

W/S: SET RNG 10 NM

Refer to Message

FMS MESSAGES

CHECK NORTH REF

Refer to Message

GPS PRIMARY

Refer to Message

GPS PRIMARY LOST

Refer to Message

NAV ACCUR DOWNGRADED

Refer to Message

NAV ACCUR UPGRADED

Refer to Message

SELECT TRUE NORTH REF

Refer to Message

SPECIFIC VOR-D NOT AVAIL

Refer to Message

OTHER MESSAGES

CHECK HDG

Refer to Message

DISPLAY SYSTEM VERSIONS DISAGREE

Refer to Message

GENERAL

Applicable to: ALL

The aircraft has two independent Landing Systems (LS).

L2 Each LS is integrated in a Multi Mode Receiver (MMR) (LS 1 receiver in MMR 1, LS 2 receiver in MMR 2).

L1 Each LS provides the following functions:

- ILS function which enables to fly precision approaches and landings based on vertical and lateral deviations received from the Localizer (LOC) and the Glide Slope (G/S) ground stations

L2 The aircraft has two G/S antennas:

- One is located in the radome
  This antenna is referred to as the G/S radome antenna.
- One is located next to the nose landing gear.
  This antenna is referred to as the G/S lower antenna.

When the landing gear is up, both MMR s use the G/S radome antenna. Then, when the landing gear is down, and the aircraft is below 700 ft RA , both MMR s use the G/S lower antenna.

L1 For more information on ILS approaches, *Refer to DSC-22-FG-70-80-20 ILS Approach* .

- GLS function which enables to fly GLS approaches and landings

  The computation of the GLS deviations is based on:
  - The GPS position that comes from the GPS receiver
  - Data received from the GLS ground station.

  The LOC antenna receives data from the GLS ground station.
  For more information on GLS approaches, *Refer to DSC-22-FG-70-80-25 GLS Approach* .
- FLS function which enables to fly Non-Precision Approaches as well as LOC Back Course or ILS with G/S inoperative approaches.
  The computation of the FLS deviations is based on data coming from the FMS database as well as aircraft FMS position information.
  For more information on FLS approaches, *Refer to DSC-22-FG-70-80-30 VOR, VOR/DME, or RNAV Approach Flown with FLS Function* .

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ECAM ALERTS

Applicable to: ALL

NAV ADR 1(2)(3) FAULT (*Refer to procedure*)

NAV ADR 1+2(1+3)(2+3) FAULT (*Refer to procedure*)

NAV ADR 1+2+3 DATA DEGRADED (*Refer to procedure*)

NAV ADR 1+2+3 FAULT (*Refer to procedure*)

NAV AIR DATA DISAGREE (*Refer to procedure*)

NAV ALL AIR DATA DISAGREE (*Refer to procedure*)

NAV AOA DISAGREE (*Refer to procedure*)

NAV ARPT NAV FAULT (*Refer to procedure*)

NAV CAPT & F/O ALT DISAGREE (*Refer to procedure*)

NAV CAPT & F/O ATT DISAGREE (*Refer to procedure*)

NAV CAPT & F/O BARO REF DISAGREE (*Refer to procedure*)

NAV CAPT & F/O HDG DISAGREE (*Refer to procedure*)

NAV EXTREME LATITUDE (*Refer to procedure*)

NAV FLS 1(2) FAULT (*Refer to procedure*)

NAV FLS 1+2 FAULT (*Refer to procedure*)

NAV FM / GPS POS DISAGREE (*Refer to procedure*)

NAV FM / IR POS DISAGREE (*Refer to procedure*)

NAV GLS 1(2) FAULT (*Refer to procedure*)

NAV GLS 1+2 FAULT (*Refer to procedure*)

NAV GPS 1(2) FAULT (*Refer to procedure*)

NAV GPS 1+2 FAULT (*Refer to procedure)*

NAV G/S 1(2) ON LOWER ANT (*Refer to procedure*)

NAV HUD FAULT (*Refer to procedure*)

NAV HUD FPV DISAGREE (*Refer to procedure*)

NAV ILS 1(2) FAULT (*Refer to procedure*)

NAV ILS 1+2 FAULT (*Refer to procedure*)

NAV IR ALIGNMENT IN ATT MODE (*Refer to procedure*)

NAV IR 1(2)(3) FAULT (*Refer to procedure*)

NAV IR 1+2(1+3)(2+3) FAULT (*Refer to procedure*)

NAV IR NOT ALIGNED (*Refer to procedure*)

NAV LOWER G/S ANT FAULT (*Refer to procedure*)

NAV LS 1(2) FAULT (*Refer to procedure*)

NAV LS 1+2 FAULT (*Refer to procedure*)

NAV LS TUNING DISAGREE (*Refer to procedure*)

NAV SIDESLIP PROBE 1(2)(3) FAULT (*Refer to procedure*)

NAV STATIC PROBE FAULT (*Refer to procedure*)

NAV RA SYS A(B)(C) FAULT (*Refer to procedure*)

NAV RA SYS A+B(A+C)(B+C) FAULT (*Refer to procedure*)

NAV RA SYS A+B+C FAULT (*Refer to procedure*)

NAV RESIDUAL AIR SPEED (*Refer to procedure)*

NAV T.O SPEEDS NOT INSERTED (*Refer to procedure*).

NAV UNRELIABLE AIR SPEED INDICATION (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

L12

System	Subsystem	Electrical Supply
ISIS	ISIS 1	DC 1 DC ESS as backup
	ISIS 2	DC 2 DC ESS as backup
Standby Static Probe	Left	AC 2
	Right	AC 2
Standby Pitot Probe	N/A	AC ESS
Standby Compass	N/A	DC ESS
ADIRU	ADIRU 1	AC EMER DC ESS as backup
	ADIRU 2	AC 4 DC 2 as backup
	ADIRU 3	AC 1 AC EMER as first backup DC ESS as second backup
MFP	MFP 1	AC EMER
	MFP 2	AC 4
	MFP 3	AC 2 AC EMER, if AC 2 is failed, and the flight crew has set the AIR DATA selector to CAPT on 3
SSA Probes	SSA 1	AC ESS
	SSA 2	AC 4
	SSA 3	AC 2 AC ESS, if AC 2 is failed, and the flight crew has set the AIR DATA selector to CAPT on 3
Static Probes	Left and Right Static Probe 1	DC ESS
	Heating of Static Probes 1	AC ESS
	Left and Right Static Probe 2	DC 2
	Heating of Static Probes 2	AC 4
	Left and Right Static Probe 3	DC 1 DC ESS, if DC 1 is failed, and the flight crew has set the AIR DATA selector to CAPT on 3
	Heating of Static Probes 3	AC 2 AC ESS, if AC 2 is failed, and the flight crew has set the AIR DATA selector to CAPT on 3
MMR	MMR 1	AC EMER
	MMR 2	AC 3

Continued on the following page

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System	Subsystem	Electrical Supply
GPS	GPS 1	AC EMER
	GPS 2	AC 3
RA	RA SYS A	AC 2
	RA SYS B	AC 4
	RA SYS C	AC ESS
VOR	VOR 1	AC EMER
	VOR 2	AC 4
LS	LS 1	AC EMER
	LS 2	AC 3
DME	DME 1	AC EMER
	DME 2	AC 4
Standby RADNAV	Standby RADNAV on RMP 1	DC ESS
	Standby RADNAV on RMP 2	DC ESS

AIRCRAFT SYSTEMS

34 - SURVEILLANCE

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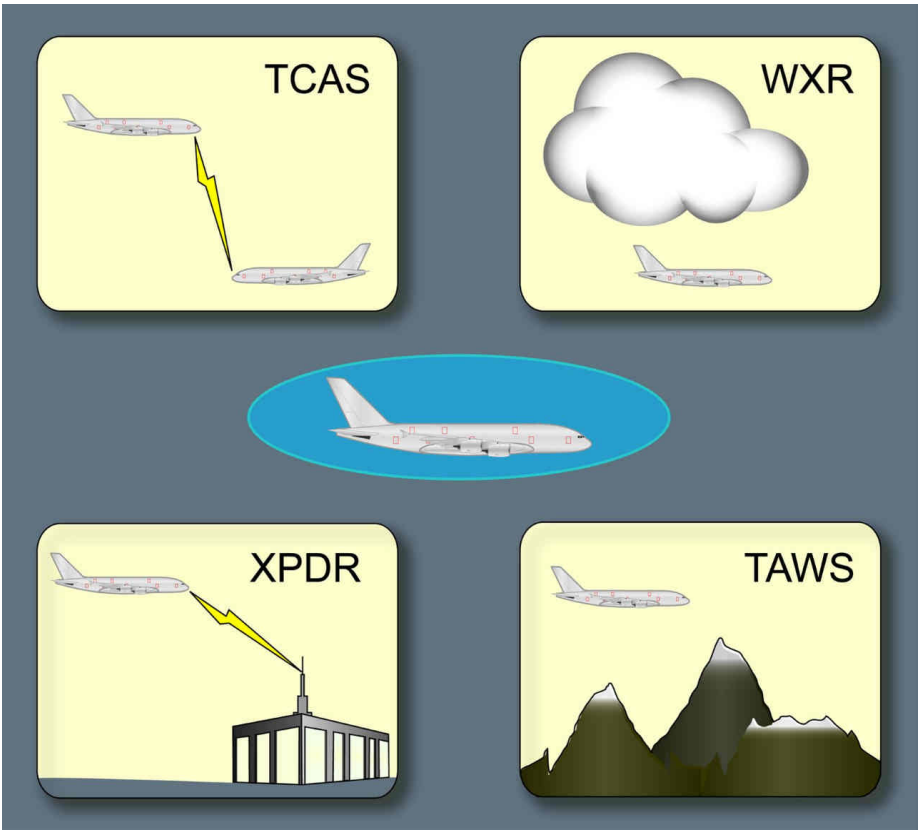
OVERVIEW

Applicable to: ALL

The Surveillance (SURV) system includes the following systems that perform aircraft surveillance functions:

- Terrain Awareness and Warning System (TAWS)
- Weather Radar (WXR) system, including the predictive windshear detection
- Traffic Collision Avoidance System (TCAS)
- Transponder (XPDR).

SURV

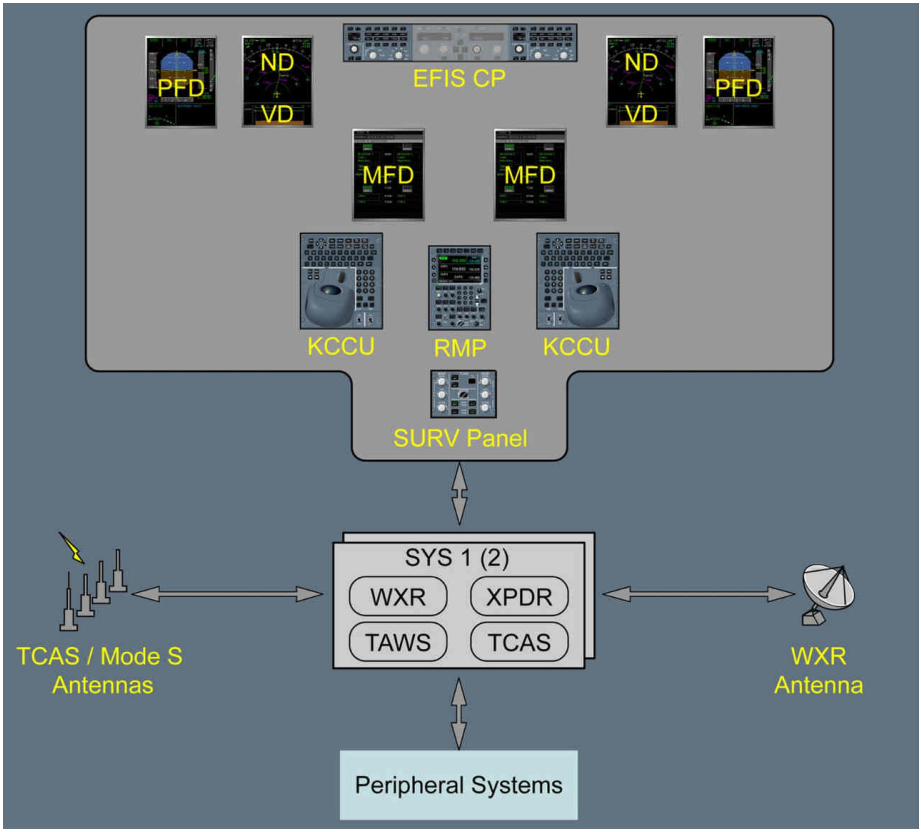


ARCHITECTURE

Applicable to: ALL

The SURV system has:
- Two identical surveillance systems (SYS 1 and SYS 2)
- A Weather Radar (WXR) antenna
- Four identical antennas with TCAS /Mode S combination
- A SURV panel
- A dedicated MFD page.

SURV System Architecture



SURV SYS

The SURV includes two identical surveillance systems, referred to as SYS 1 and SYS 2.

SYS 1 and SYS 2 can both perform all of the environmental surveillance functions that are grouped together as follows:

- The WXR with the TAWS
- The TCAS with the XPDR.

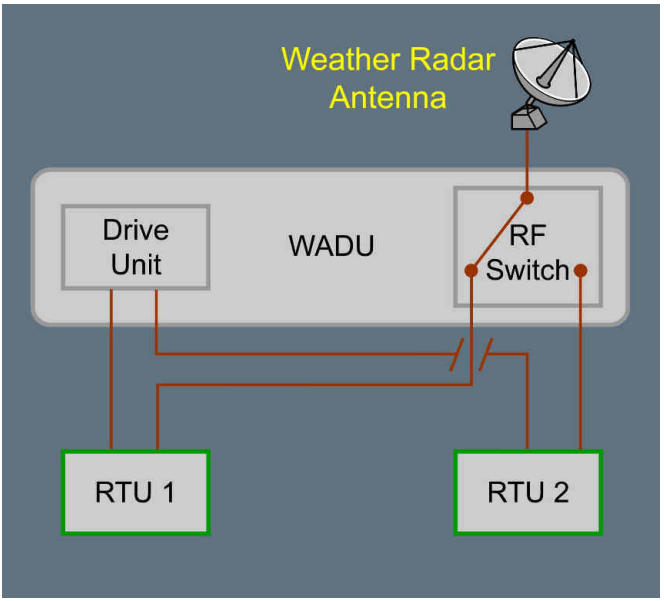
L3 The Environment Surveillance Unit (AESU) 1(2) provides the SURV SYS 1(2) function.
In normal operation, the AESU that has the WXR/TAWS selected is the master AESU. It manages the alerts and displays for all of the surveillance functions.

L2 When the aircraft is on ground, SYS 1(2) is automatically selected as the master AESU if the flight number in the FMS is an odd (even) number. It enables the detection of hidden failures.
In the case of an electrical emergency configuration, SYS 1 is automatically selected as the master AESU.

WEATHER RADAR (WXR) ANTENNA

The WXR antenna is in the radome.
It receives and transmits signals to the AESU, in order to perform WXR functions.

WXR Antenna Architecture



L3 **WEATHER ANTENNA DRIVE UNIT (WADU)**

The WADU is next to the antenna in the radome. It supports and controls the antenna in order to perform the WXR functions.

The WADU has:
- A Radio Frequency (RF) switch, to select the SYS that performs the WXR function
- A drive unit that controls the position of the antenna (tilt and azimuth angles).

RADAR TRANSCEIVER UNITS (RTU)

Two RTUs are connected to the WADU in the radome, and each RTU interfaces with an AESU.

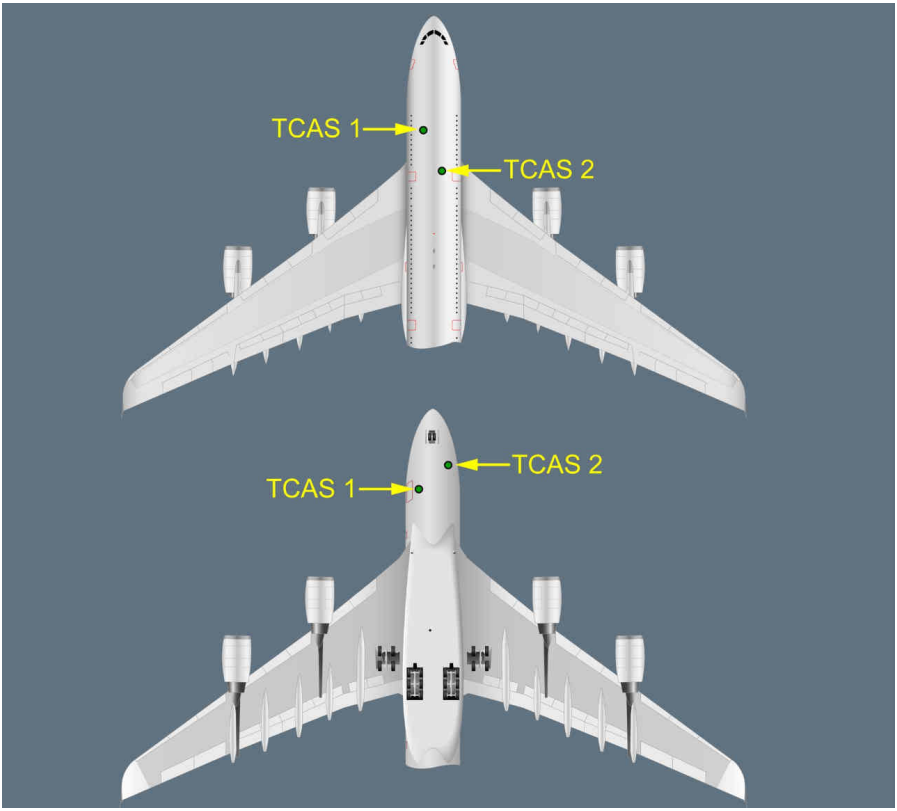
The RTUs:
- Transmit radar pulses
- Receives the return signals from the weather phenomena, and send them to the associated AESU.

TCAS/MODE S ANTENNAS

There are four combined TCAS/Mode S antennas that transmit and receive data to and from the TCAS and Air Traffic Control (ATC).

L3 There are four antennas at the front of the fuselage: Two at the top, and two at the bottom.

Location of TCAS Antennas



SURV PANEL

The flight crew can access the main SURV controls, from the SURV panel.

Note: *All the SURV controls of the SURV panel are also available on the SURV page of the MFD .*

For more information on the applicable sections of the SURV panel:
- *Refer to SURV Overview*
- *Refer to TAWS*
- *Refer to WXR*
- *Refer to TCAS* .

KEYBOARD AND CURSOR CONTROL UNIT (KCCU)

The flight crew uses the KCCU to:
- Access and navigate through the SURV pages on the MFD
- Enter and modify SURV data on the MFD.

MULTIFUNCTION DISPLAY (MFD)

The MFD displays text data provided by the SURV .
The MFD is interactive. Therefore, the flight crew can navigate through the SURV pages, and can consult, enter, or modify data using the Keyboard and Cursor Control Unit (KCCU).

The MFD can display two SURV pages:

- The CONTROLS page, that monitors all surveillance functions

MFD CONTROLS Page



For more information on the applicable sections of the CONTROLS page:

- *Refer to TAWS*
- *Refer to WXR*
- *Refer to TCAS*
- *Refer to XPDR .*

- The STATUS & SWITCHING page, that indicates the status of each SURV function, and enables the flight crew to select the SYS .

STATUS & SWITCHING Page



For more information on the applicable sections of the STATUS & SWITCHING page:

- *Refer to TAWS*
- *Refer to WXR*
- *Refer to TCAS*
- *Refer to XPDR* .

NAVIGATION DISPLAY (ND), VERTICAL DISPLAY (VD) AND PRIMARY FLIGHT DISPLAY (PFD)

The ND , the VD , and the PFD provide situational awareness information, related to the TAWS , WXR , and TCAS surveillance functions.

For more information on the applicable sections of the ND :
- *Refer to TAWS*
- *Refer to WXR*
- *Refer to TCAS* .

For more information on the applicable sections of the VD :
- *Refer to TAWS*
- *Refer to WXR* .

For more information on the applicable sections of the PFD :
- *Refer to TAWS*
- *Refer to WXR*
- *Refer to TCAS* .

EFIS CONTROL PANEL (CP)

The flight crew uses the EFIS CP to display weather, terrain, and traffic information on the ND . For more information on the EFIS CP , *Refer to DSC-34-20-60-30-10 EFIS Control Panel* .

RADIO MANAGEMENT PANEL (RMP)

RMP 1 and RMP 2 are both connected to SYS 1 and SYS 2 of the SURV.

In addition to radio management functions, the RMPs enable the flight crew to control part of the transponder (XPDR). The flight crew can use the RMPs to:
- Change the transponder code (SQWK)
- Perform an IDENT.

L2 RMP 3 is not directly connected to the SURV. However, if the XPDR code is set from RMP 3, the RMP synchronization function enables RMP 1 or RMP 2 to transmit the code to the SURV.

L1 If both RMP 1 and RMP 2 fail, the XPDR control remains available via the SURV/CONTROLS page of the MFD.

L2 PERIPHERAL SYSTEMS

The SURV interfaces with other peripheral systems:
- Mainly via the AFDX network
- Also via other classic connections.

FLIGHT MANAGEMENT SYSTEM (FMS)

The FMS provides navigation and flight plan data.

AIR DATA AND INERTIAL REFERENTIAL UNIT (ADIRU)

The ADIRUs provide ADR, IR, GPS and GPIRS data.

PRIMARY FLIGHT CONTROL COMPUTER (PRIM)

The PRIM provides AFS engagement information.

FLIGHT CONTROL UNIT (FCU)

Both EFIS CPs provides ND settings and the selected altitude.
In the case of an EFIS CP failure, FCU backup provides data to the SURV SYS.

LANDING GEAR EXTRACTION RETRACTION SYSTEM (LGERS)

LGERS provides flight/ground information, and the landing gear position.

FULL AUTHORITY DIGITAL ENGINE CONTROL (FADEC)

The FADEC indicates:
- The running engines
- The takeoff mode selection.

FLIGHT WARNING SYSTEM (FWS)

The SURV interfaces with the FWS for:
- Alert priority management
- Failure display and annunciation.

AIR TRAFFIC COMMUNICATION (ATC)

The SURV provides the ATC with:
- The TCAS system status
- The XPDR system status
- The XPDR altitude reporting.

DIGITAL FLIGHT DATA RECORDER (DFDR)

The SURV provides data required for trouble shooting and accident/incident recording, such as:
- Alerts
- System status.

SLAT FLAP CONTROL COMPUTER (SFCC)

The SFCC provides the flaps position.

RADIO ALTIMETERS

The radio altimeters provide the radio altitudes.

MULTI MODE RECEIVER (MMR)

The MMR provides the information that the aircraft is below the glide slope.

L3 ### ONBOARD MAINTENANCE SYSTEM (OMS)

The SURV and the OMS share data for maintenance purposes.

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OVERVIEW

Applicable to: ALL

The Terrain Awareness and Warning System (TAWS):
- Detects terrain collision threats
- Displays terrain information
- Triggers applicable aural and visual alerts.

The TAWS has:
- A Ground Proximity Warning System (GPWS) function with five basic modes (*Refer to DSC-34-20-20-10-10 GPWS*)
- A Terrain (TERR) and obstacle function with two modes, including the peaks function (*Refer to DSC-34-20-20-10-20 Terrain Function*)
- A TAWS database (*Refer to DSC-34-20-20-10 TAWS Database*).

GPWS

Applicable to: ALL

The purpose of the GPWS function is to warn the flight crew of potentially hazardous situations, such as a collision with terrain.

The GPWS function monitors the flight path of the aircraft and triggers visual and aural alerts, when the aircraft is in one of the following situations:
- Excessive rate of descent (Mode 1)
- Excessive terrain closure rate (Mode 2)
- Altitude loss after takeoff or go-around (Mode 3)
- Terrain clearance not sufficient, if not in landing configuration (Mode 4)
- Excessive descent below the glide slope (Mode 5).

Note: *Stall or windshear alerts override GPWS visual and aural alerts.*

PRINCIPLE

The GPWS function detects terrain collision threats by comparing the geometric altitude of the aircraft and its trajectory with the information provided by the Radio Altimeters (RA).

L3 The TAWS computes the geometric altitude of the aircraft, by using:
- Pressure altitude
- GPS altitude
- Radio-altitude
- Temperature

- Barometric references
- Data from the TAWS database.

L2 The following GPWS envelopes can be slightly modified for some airports, in order to minimize unexpected alerts.

EXCESSIVE RATE OF DESCENT (MODE 1)

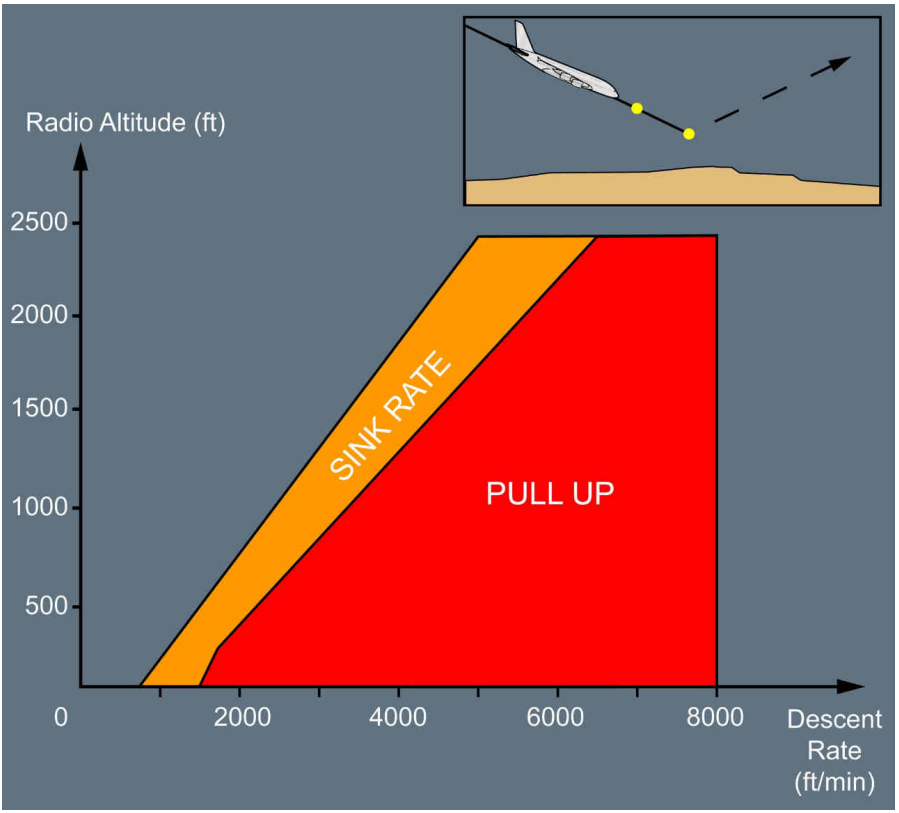
If a high rate of descent is detected at low altitude, the following alerts are triggered:
- The “SINK RATE, SINK RATE” aural alert
- The SINK RATE visual alert on the PFD.

L2 The "SINK RATE, SINK RATE" envelope moves to the right, when the aircraft is above the glide slope beam, in order to avoid any undue alert during a glide slope capture.

L1 If this rate is, or becomes excessive, the alert will change to:
- The “PULL UP” aural alert that repeats as long as the aircraft descends at an excessive rate
- The PULL UP visual alert on the PFD.

L2 Mode 1 is inhibited when the aircraft is close to the ground.

Excessive Rate of Descent



L3 The descent rate data is the barometric vertical speed, or the inertial vertical speed, if the barometric vertical speed is not available.

EXCESSIVE TERRAIN CLOSURE RATE (MODE 2)

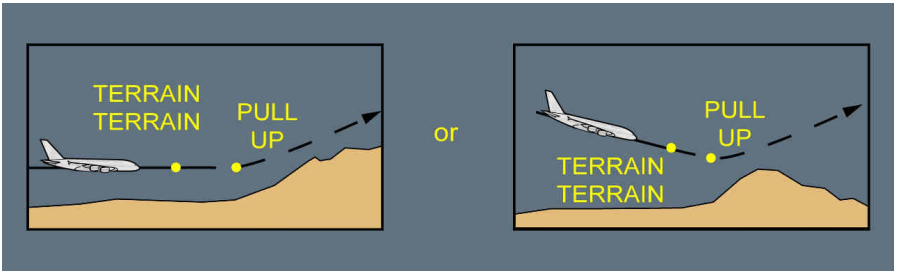
If the aircraft approaches the terrain with an excessive rate, the following alerts are triggered, even if the aircraft is not descending:

- The “TERRAIN, TERRAIN” aural alert
- The TERRAIN visual alert on the PFD.

If the closure rate is not reduced, the alert will change to:

- The “PULL UP” aural alert that repeats as long as the aircraft has an excessive terrain closure rate
- The PULL UP visual alert on the PFD.

Excessive Terrain Closure Rate



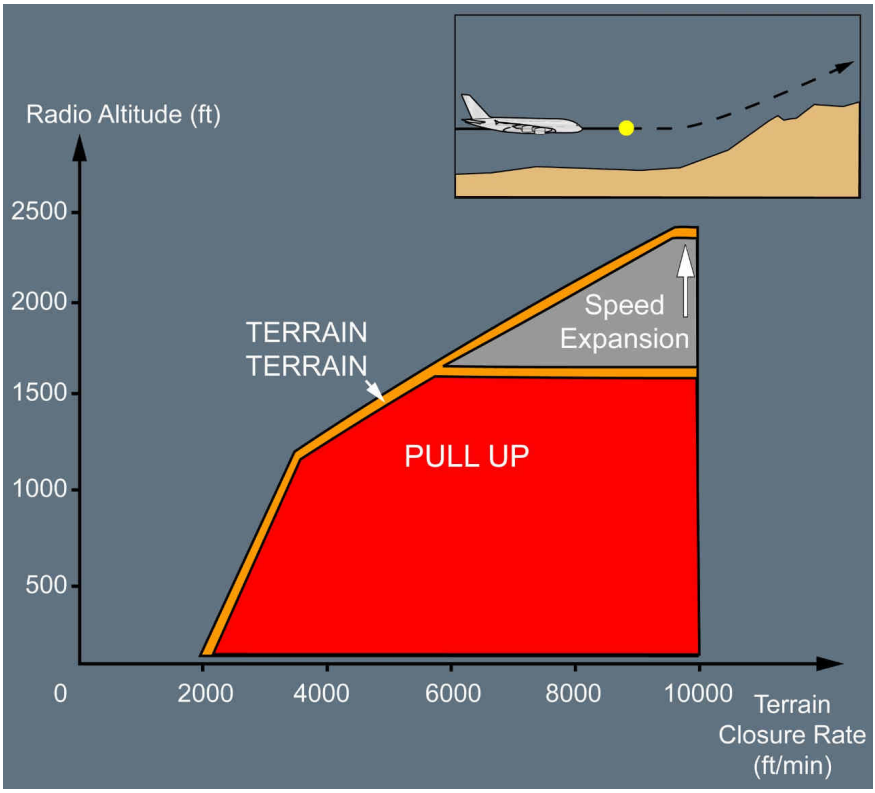
L2 **AIRCRAFT NOT IN LANDING CONFIGURATION (MODE 2A)**

Mode 2A applies, if the aircraft is at low altitude, and:

- The flaps are not extended for landing, or
- The landing gear is not extended, or
- The aircraft is not flying an ILS(GLS) approach.

The upper cutoff limit of the envelope will increase, as applicable, depending on the airspeed.

Excessive Terrain Closure Rate While Aircraft Not in Landing Configuration



The alerts stop, if the aircraft exits the protection envelope, and if:
- The aircraft is no longer in the protection envelope for a minimum of 45 s
- The aircraft increases the altitude at which it exited the protection envelope by 300 ft.

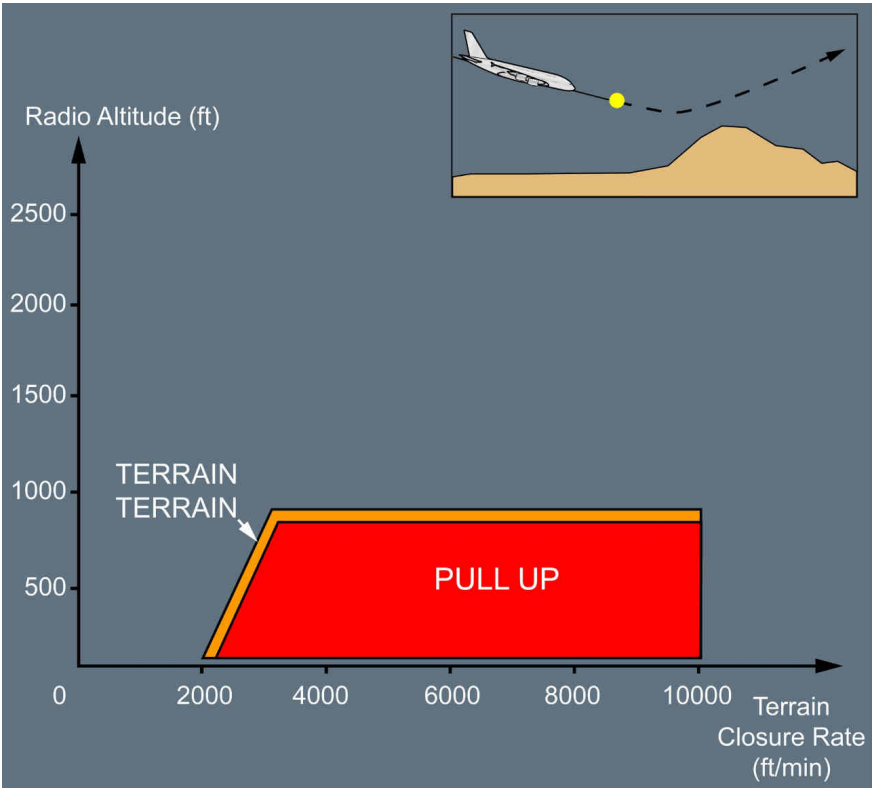
AIRCRAFT AT LANDING OR TAKEOFF (MODE 2B)

Mode 2B applies, if the aircraft is at low altitude, and:
- The flaps are extended for landing, or
- The aircraft is within 5 nm and 3 500 ft height of the destination, or

- The flaps are not extended for landing, the aircraft is flying an ILS(GLS) approach, and both glide slope and LOC deviations are below 2 dots,
- During the first 60 s after takeoff.

L3 This last condition avoids any spurious warnings due to erroneous radio altimeter tracking after takeoff.

Mode 2B



L2 If the aircraft enters the mode 2B envelope, with both the landing gear and the flaps in landing configuration, the “TERRAIN, TERRAIN“ aural alert is repeated until the aircraft exits the protection envelope (No “PULL UP” aural alert).

ALTITUDE LOSS AFTER TAKEOFF (MODE 3)

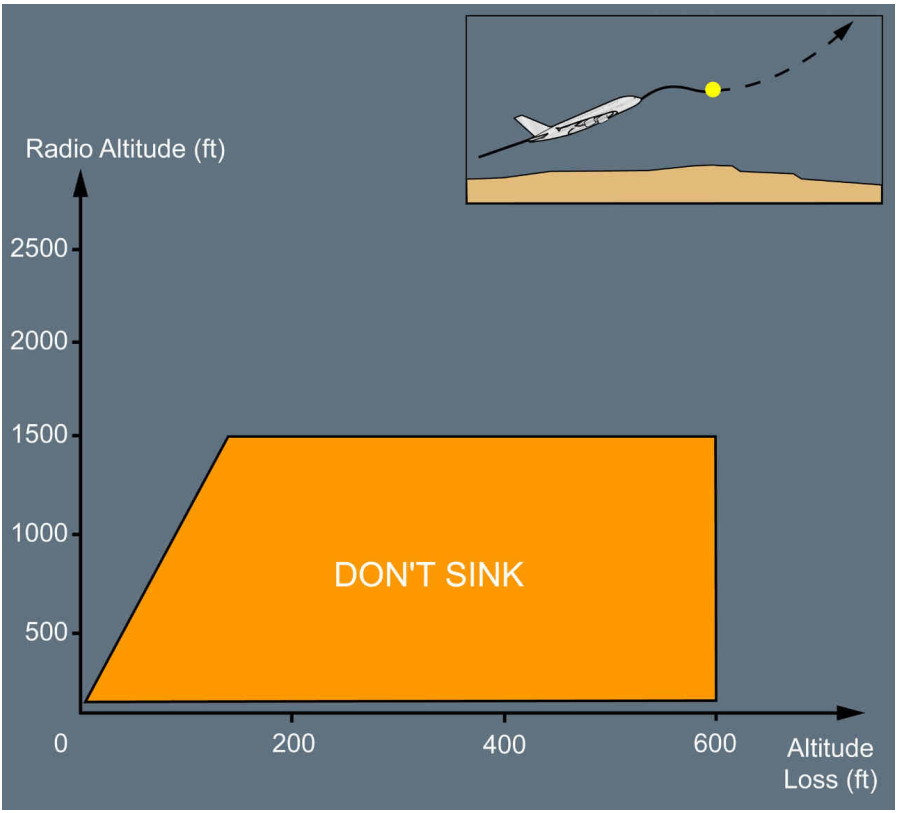
If the GPWS detects an excessive decrease in altitude after takeoff, or during a go-around, when the landing gear or the flaps are not in landing configuration, the following alerts are triggered:

- The “DON’T SINK, DON’T SINK” aural alert
- The DON'T SINK visual alert on the PFD.

Both aural and visual alerts stop, if the aircraft gains sufficient altitude.

L2 Mode 3 is inhibited when the aircraft is close to the ground.

Mode 3



TERRAIN CLEARANCE NOT SUFFICIENT WHEN NOT IN LANDING CONFIGURATION (MODE 4)

During approach, and depending on the aircraft configuration, mode 4 provides various protections if the terrain clearance is not sufficient.

LANDING GEAR UP AND FLAPS NOT IN LANDING CONFIGURATION (MODE 4A)

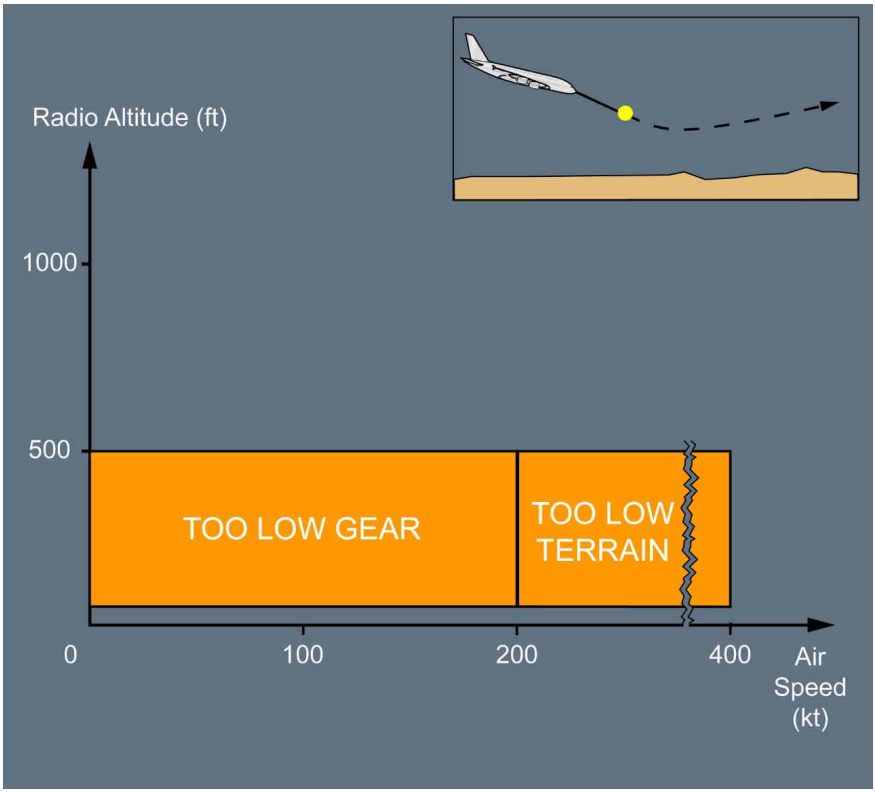
If the aircraft approaches terrain with the landing gear up and the flaps not extended for landing, the following alerts are triggered:

- The “TOO LOW GEAR” aural alert
- The TOO LOW GEAR visual alert on the PFD.

In addition, if the aircraft speed is above 200 kt, the following alerts are triggered:

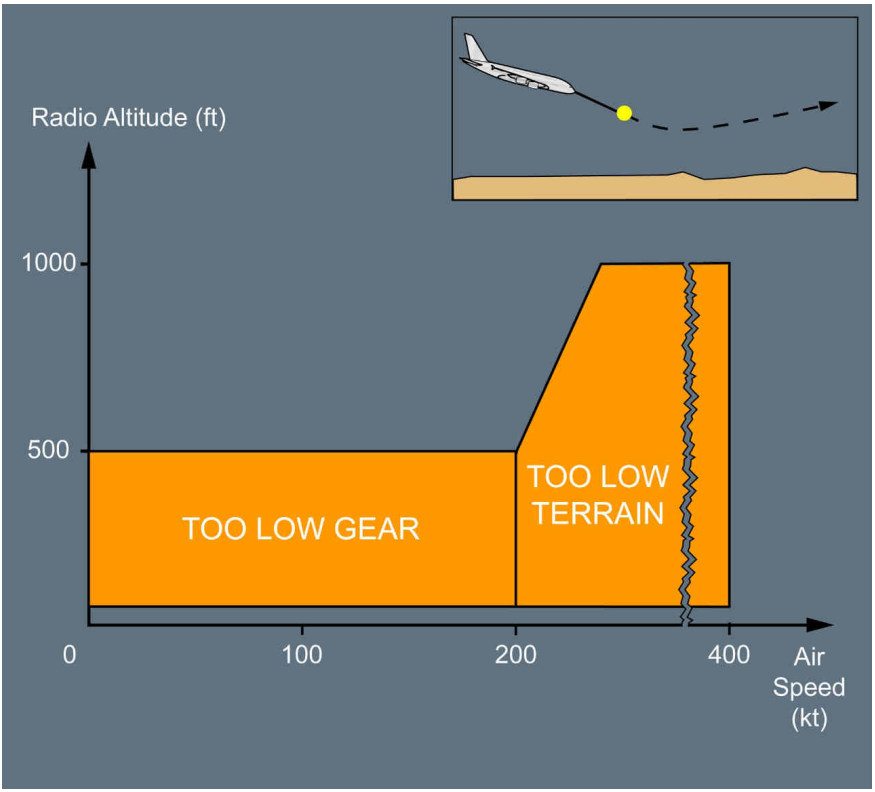
- The “TOO LOW TERRAIN” aural alert
- The TOO LOW TERRAIN visual alert on the PFD.

Mode 4A



L2 In addition, if system data (e.g. aircraft position or terrain database) does not enable the flight crew to rely on the TAD function, the mode 4A protection envelope becomes:

Mode 4A and TERR function not operative

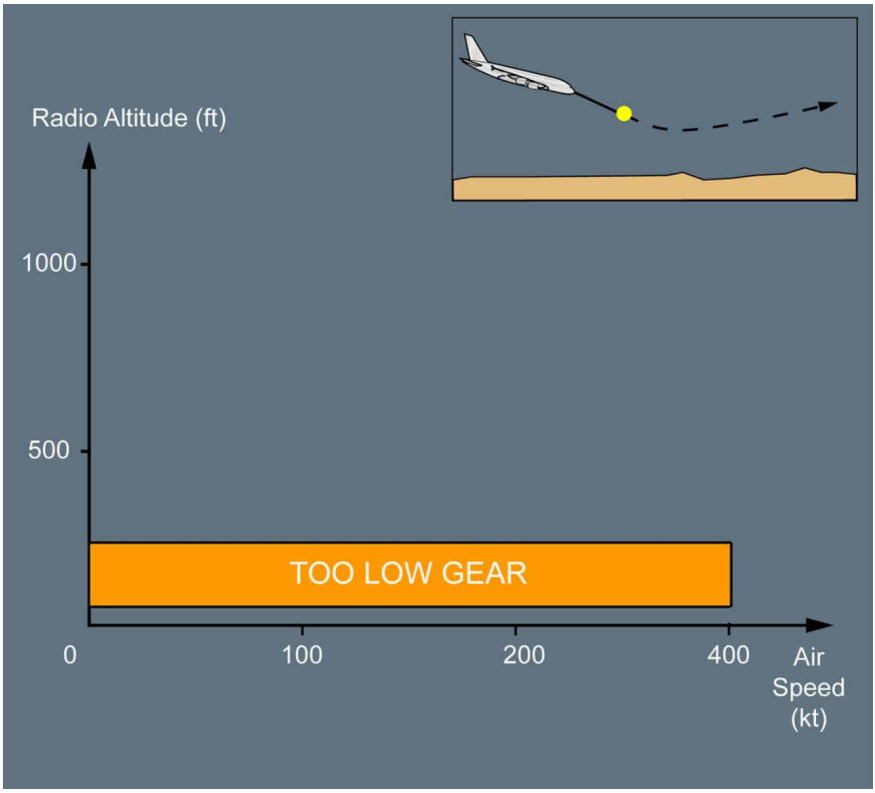


L1 **LANDING GEAR DOWN AND FLAPS NOT IN LANDING CONFIGURATION, OR LANDING GEAR UP AND FLAPS IN LANDING CONFIGURATION (MODE 4B)**

If the aircraft approaches terrain with the landing gear up and the flaps extended for landing, the following alerts are triggered:

- The “TOO LOW GEAR” aural alert
- The TOO LOW GEAR visual alert on the PFD.

Mode 4B Gear Up and Flaps in Landing Configuration



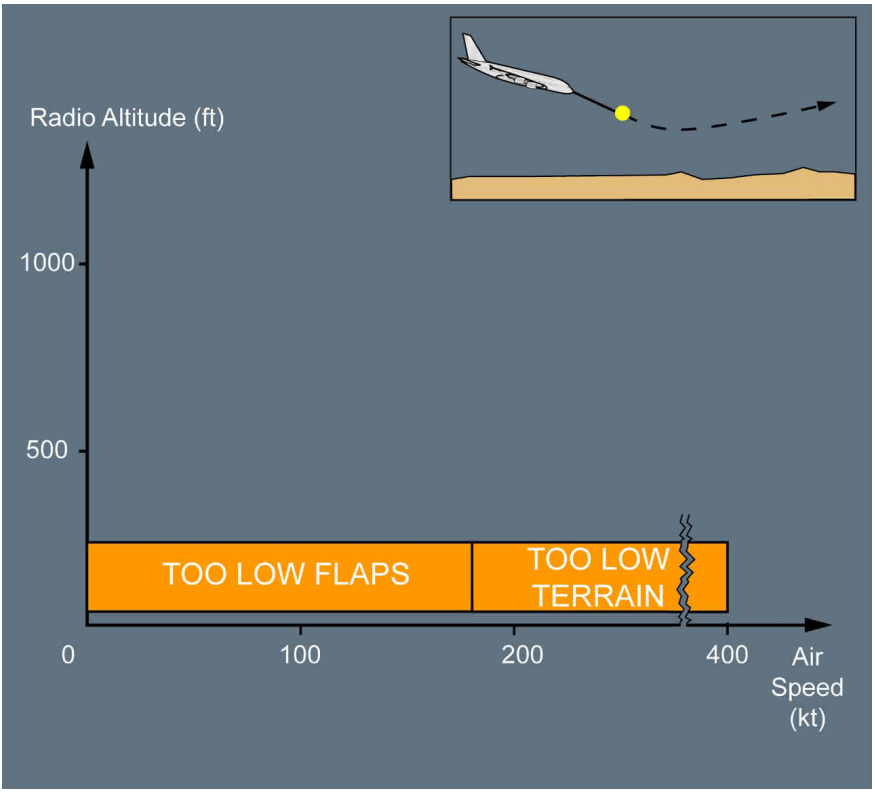
If the aircraft approaches the terrain with the landing gear down and the flaps not extended for landing, the following alerts are triggered:

- The “TOO LOW FLAPS” aural alert
- The TOO LOW FLAPS visual alert on the PFD.

In addition, if the aircraft speed is above 180 kt, the following alerts are triggered:

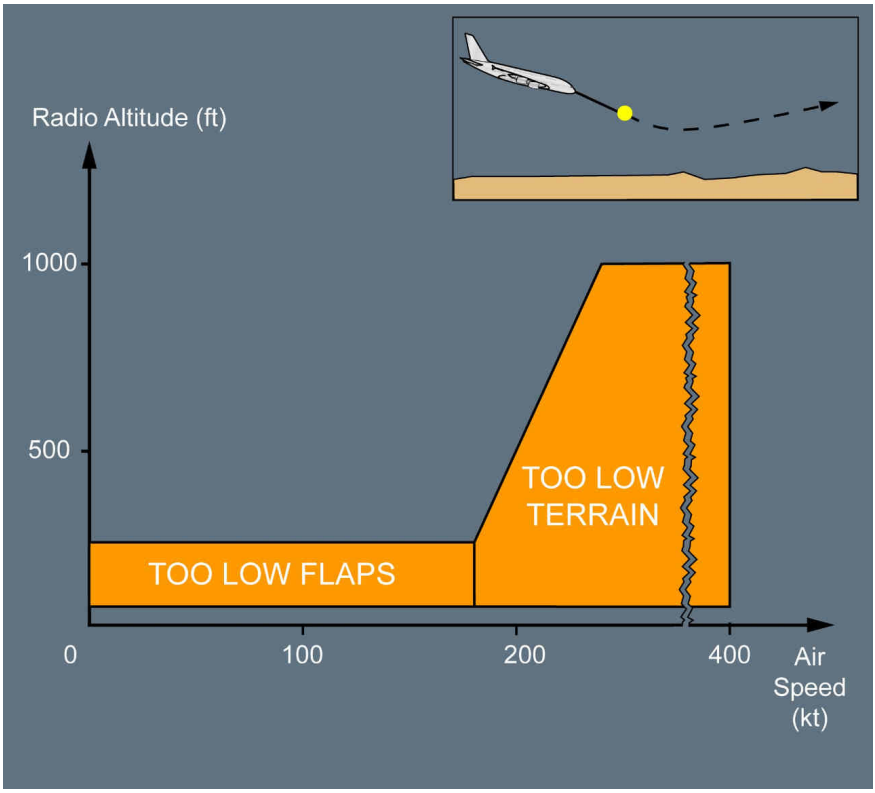
- The “TOO LOW TERRAIN” aural alert
- The TOO LOW TERRAIN visual alert on the PFD.

Mode 4B Gear Down and Flaps Not in Landing Configuration



L2 In addition, if system data (e.g. aircraft position or terrain database) does not enable the flight crew to rely on the TAD function, the mode 4B protection envelope becomes:

Mode 4B Gear Down and Flaps Not in Landing Configuration, and TERR Function Not Operative



L1 The flight crew can inhibit mode 4B by setting the FLAP MODE button to OFF on the SURV/CONTROLS page of the MFD (e.g. in the case of a landing with abnormal flaps configuration).

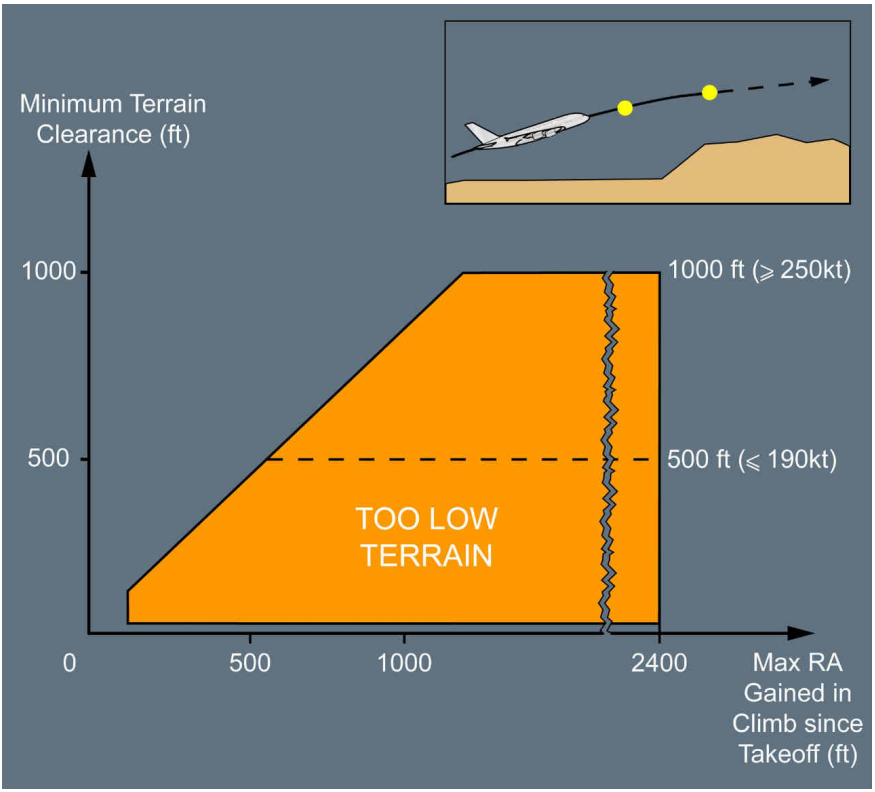
LANDING GEAR UP OR FLAPS NOT IN LANDING CONFIGURATION (MODE 4C)

As an additional protection for mode 3 (decrease in altitude after takeoff), if the aircraft descends towards terrain during takeoff and climb, with the landing gear up, or if the flaps are not in landing configuration, the following alerts are triggered:

- The “TOO LOW TERRAIN” aural alert
- The TOO LOW TERRAIN visual alert on the PFD.

L2 These aural alert are triggered, if the aircraft goes below 75 % of its current radio-altitude, and enters the protection envelope.

Mode 4C



DESCENT BELOW GLIDE SLOPE (MODE 5)

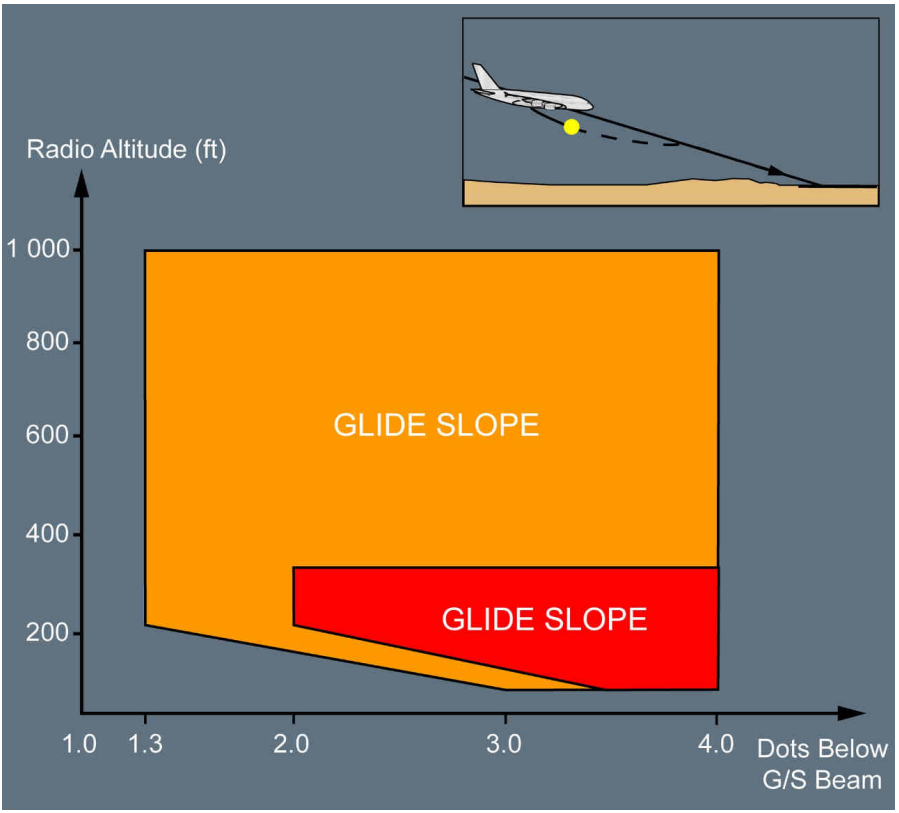
If the aircraft descends below the glide slope by more than 1.3 dots during ILS/GLS approaches, the following alerts are triggered:

- The “GLIDE SLOPE” aural alert that repeats as long as the aircraft remains below the glide slope
  If the glide slope deviation is more than 2 dots below 300 ft, the aural alert becomes louder, and repeats more and more frequently.
- The GLIDE SLOPE visual alert on the PFD.

L2 Mode 5 is active during approach, if the landing gear is down, and the aircraft is below 1 000 ft and above 30 ft AGL.

L1 The flight crew can deactivate mode 5 by:
- Setting the G/S MODE button to OFF on the SURV CONTROLS page of the MFD, or
- Pressing the G/S MODE pb on the SURV panel.

Descent Below Glide Slope



Note: *Usually, the GLIDE SLOPE alert is only triggered, if the landing gear is down. For some airports, the landing gear down condition is not applicable.*

TERRAIN FUNCTION

Applicable to: ALL

In addition to the five basic GPWS modes, TAWS also has a TERR function, based on a worldwide database. The TERR function warns the flight crew of potential hazardous conditions with respect to the surrounding terrain.

The TERR function has the following two modes:
- Terrain Awareness and Display (TAD)
  Refer to DSC-34-20-20-10-20 Terrain Awareness and Display
- Terrain Clearance Floor (TCF).
  Refer to DSC-34-20-20-10-20 Terrain Clearance Floor

PRINCIPLE

The TERR function provides displays and alerts, based on the comparison between the current aircraft position and the TAWS database.

If the flight crew sets the TERR SYS button of the MFD SURV/CONTROLS page to ON, the TERR function provides:
- A horizontal view of the terrain on the ND, if the flight crew presses the TERR pb on the EFIS CP or if the TAWS triggers an alert
  The ND displays terrain in different colors, depending on the terrain altitude in relation to the aircraft altitude.
- A vertical view of the terrain on the VD.

  The VD always displays:
  - Terrain in brown
L2 The color of the terrain does not change depending on relative terrain proximity, nor during terrain or obstacle alerts.
L1 - Water in blue.

L2 The VD always displays the terrain, even if the TERR pb is not pressed on the EFIS CP.

TERRAIN AWARENESS AND DISPLAY (TAD)

If the TAD detects a terrain or an obstacle collision threats ahead of the aircraft, the following are triggered:
- A caution, if the aircraft is approximately 60 s away from the conflict terrain.
- A warning, if the aircraft is approximately 30 s away from the conflict terrain.

The TAD function is available in all flight phases, and for all gear and flap configurations.

L2 PROTECTION ENVELOPE

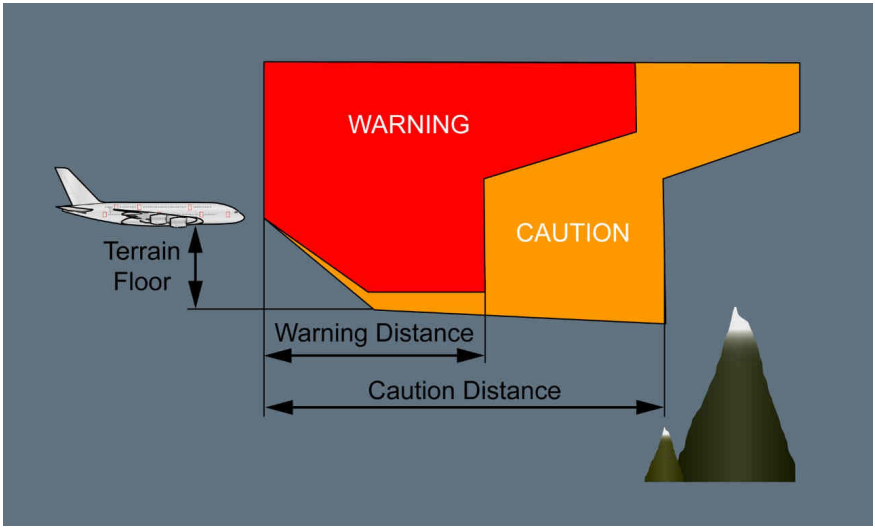
The TAD computes a caution envelope and a warning envelope, based on:

- The aircraft altitude
- The nearest runway altitude
- The range of the nearest collision threats
- The ground speed
- The turn angle.

VERTICAL ENVELOPE

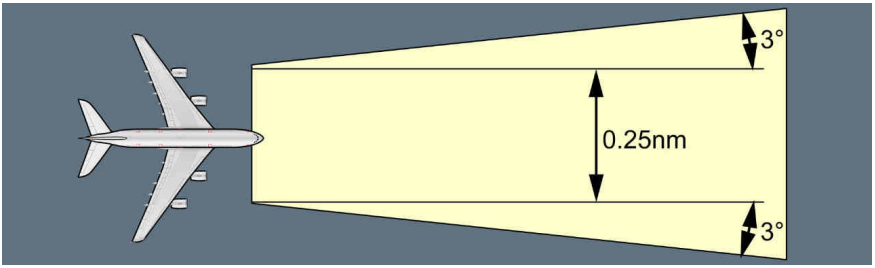
Warning and caution envelopes change, depending on the ground speed and the turn angle.

Vertical Envelope



HORIZONTAL ENVELOPE

Horizontal Envelope



Note: When the aircraft turns, the horizontal envelope changes to take into account the flight path of the aircraft.

L1 TERRAIN ALERTS

If the TAD detects a terrain collision threat ahead of the aircraft, the following are triggered:
- The "TERRAIN AHEAD, TERRAIN AHEAD" aural alert that repeats every 7 s, until the terrain is no longer a threat
- The TERRAIN visual alert on the NDs

L2 The TERR pb is also automatically pressed on the EFIS CP.

L1 - Yellow areas on the NDs, that indicate a terrain conflict with the caution criteria.

If the aircraft continues to approach the terrain, the following are triggered:
- The "TERRAIN AHEAD, PULL UP" aural alert, that repeats continuously, until the terrain is no longer a threat
- The TERRAIN visual alert on the NDs
- Red areas on the NDs, that indicate a terrain conflict with the warning criteria.

OBSTACLE ALERTS

If the TAD detects an obstacle collision threat ahead of the aircraft, the following are triggered:
- The "OBSTACLE AHEAD, OBSTACLE AHEAD" aural alert, that repeats every 7 s until the obstacle is no longer a threat
- The OBST visual alert on the NDs
- The  symbol on the NDs, that indicates an obstacle conflict with the caution criteria.

L2 The point indicates the location of the obstacle.
The TERR pb is also automatically pressed on the EFIS CP.

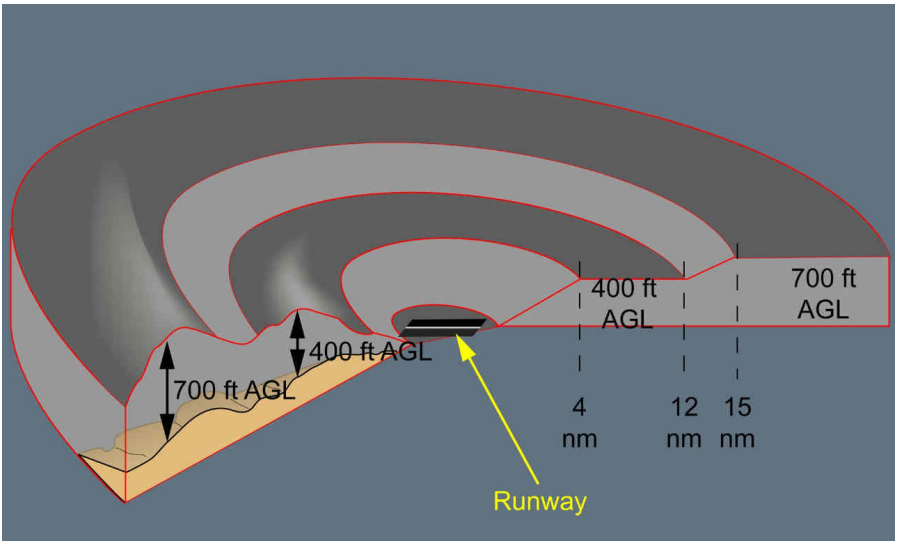
L1 If the aircraft continues to approach the obstacle, the following are triggered:
- The “OBSTACLE AHEAD, PULL UP” aural alert, that repeats continuously until the obstacle is no longer a threat
- The OBST visual alert on the NDs
- The  symbol on the NDs, that indicates an obstacle conflict with the warning criteria.

L2 The point indicates the location of the obstacle.

TERRAIN CLEARANCE FLOOR (TCF)

The TCF function computes a terrain clearance envelope around the airport runway. This function enhances the GPWS mode 4, by triggering an alert if the terrain clearance is not sufficient, even when the aircraft is in landing configuration.
The TCF function also protects against an attempt to land where there is no airfield.
The TAWS database includes the applicable TCF envelope for each airport runway that has terrain data, and that is longer than 3 500 ft.
The TCF function is active during all the following flight phases: Takeoff, cruise and approach.

TCF Envelope



If the aircraft descends below the protection envelope, the following are triggered:

- The “TOO LOW TERRAIN” aural alert, if the aircraft enters the envelope

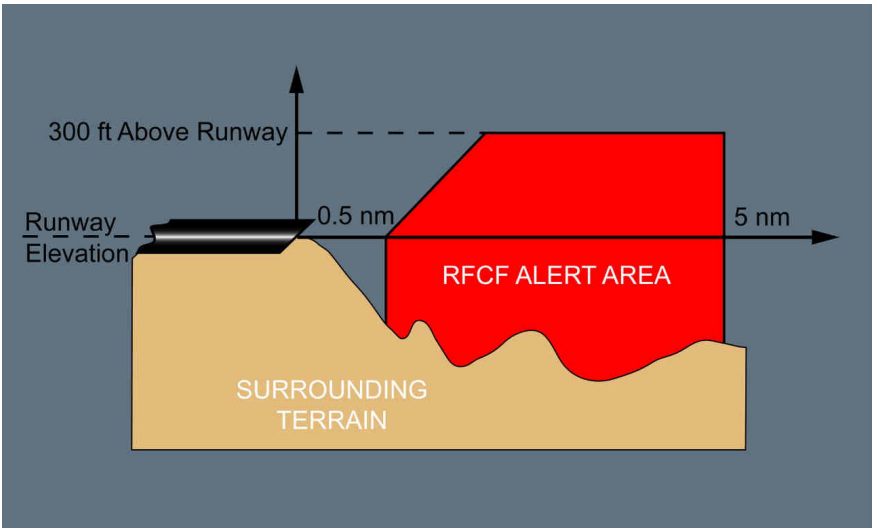
L2 If the aircraft continues to descend below the envelope, the alert is triggered one time for every 20 % degradation in radio altitude.

L1 - The TOO LOW TERRAIN visual alert on the PFD.

L2 RUNWAY FIELD CLEARANCE FLOOR (RFCF)

The RFCF function provides an additional protection envelope for runways that are significantly higher than the surrounding terrain.
The envelope is a circular band within 5 nm of the runway, and it is based on the geometric altitude and the runway elevation.
If the aircraft descends below this protection envelope, the "TOO LOW TERRAIN" aural and visual alerts are triggered.

RFCF



TAWS DATABASE

Applicable to: ALL

The TAWS database divides the earth surface into grid cells.

L3 These cells are defined by longitude and latitude data, in the World Geodetic System WGS 84.

L1 Each cell contains the highest terrain altitude within the associated terrain area.

The grid resolution varies, depending on the geographic location:
- 0.25 nm x 0.25 nm
- 0.5 nm x 0.5 nm
- 1 nm x 1 nm
- 2 nm x 2 nm
- 5 nm x 5 nm.

The highest resolution (0.25 nm x 0.25 nm) is used for airports areas to accurately reflect the terrain. The lowest resolution (5 nm x 5 nm) is used for non-airport areas, where terrain features are not a collision threat.

The TAWS database has:
- A terrain database
- An obstacle database
  The obstacle database includes the location and height of all obstacles that are above 100 ftsurrounding terrains.

L2 In addition, man-made obstacle data can be inserted in the TAWS database.

L1 - A runway database
  The runway database includes the length and name of all hard surface runways worldwide that are 3 500 ft long or more. In addition, this database includes information about the runway orientation, elevation, and surface.
- An envelope modulation database.
  The TAWS uses the envelope modulation database to adapt alert/warning protections to specific areas in the world, in order to improve nuisance margins.

Updating the TAWS database is the vendor's responsibility.

L3 The vendor may use one or more of the following data sources:
- Data from government and/or regulatory agencies
- Data from airlines that have surveyed an airport, while establishing layout, approach, or departure procedures, etc
- Data from commercial vendors that also produce data sets for FMS and other navigation systems
- Data from commercial and military surveying agencies, when available
- Airport layout and physical properties from high resolution maps and/or digitized data sources
- Airport layout and physical properties from imagery.

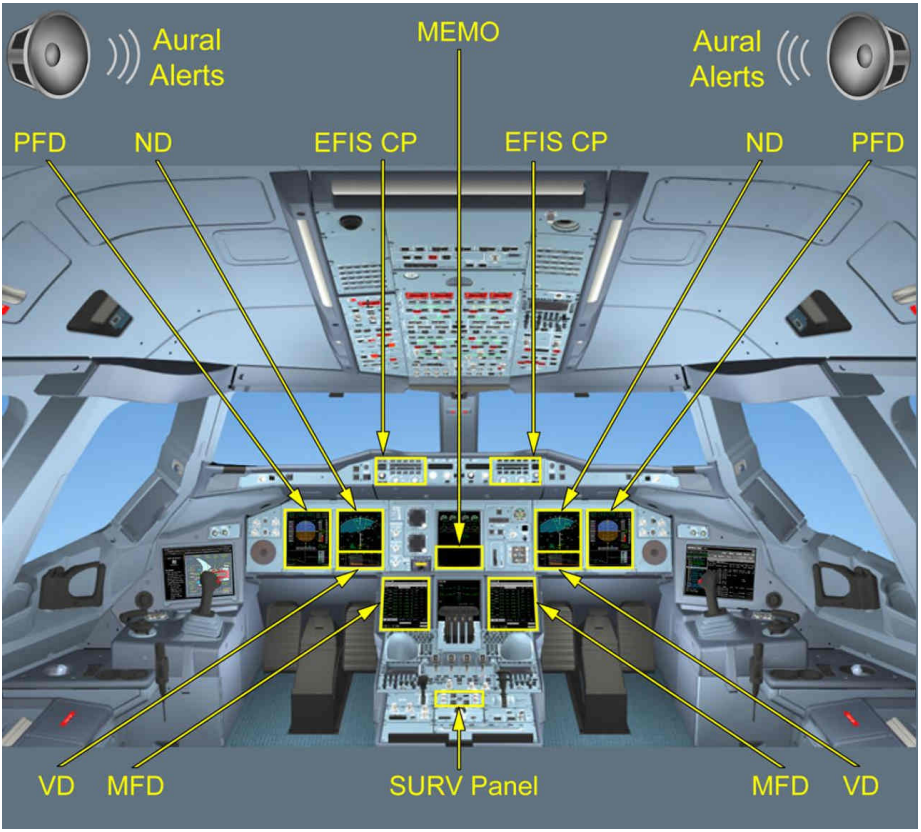
L1 Review the manufacturer document "EGPWS Terrain Database Airport Coverage List", to have official information about the most recent TAWS database, and the list of included airports.
To obtain a copy of this document, please contact:

Honeywell - 1500 NE 36th Street
REDMOND, WA, USA 98073
Website: www.egpws.com

COCKPIT VIEW

Applicable to: ALL

Cockpit View



EFIS CONTROL PANEL (CP)

Applicable to: ALL

EFIS CP



TERR pb

L12



The onside ND displays terrain (TERR) information.
Associated with the TERR message on the ND.
The flight crew cannot press the WXR pb and the TERR pb at the same time.

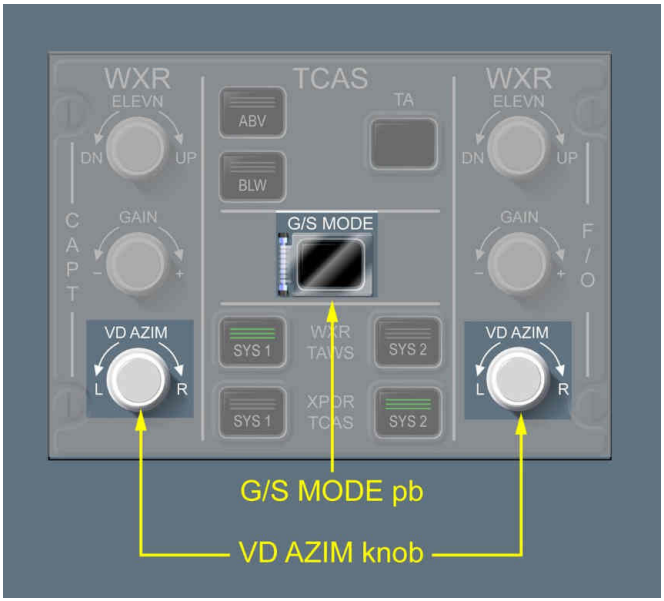


The onside ND does not display terrain (TERR) information.

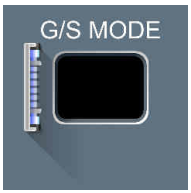
SURV PANEL

Applicable to: ALL

SURV Panel



G/S MODE pb



The G/S mode (mode 5) is active.
This is the default position.
On the SURV/CONTROLS page of the MFD, the G/S MODE button is automatically set to ON.

L12



The flight crew turns off the G/S mode (mode 5).
Associated with the TAWS G/S MODE OFF MEMO.
On the SURV/CONTROLS page of the MFD, the G/S MODE button is automatically set to OFF.

VD AZIM knob

L12



- When pushed, selects the AUTO mode.
  This is the default position.
- When pulled, selects the manual AZIM mode.

  On the VD:
  - The eye symbol appears, instead of the aircraft symbol
  - The terrain appears along the selected azimuth.

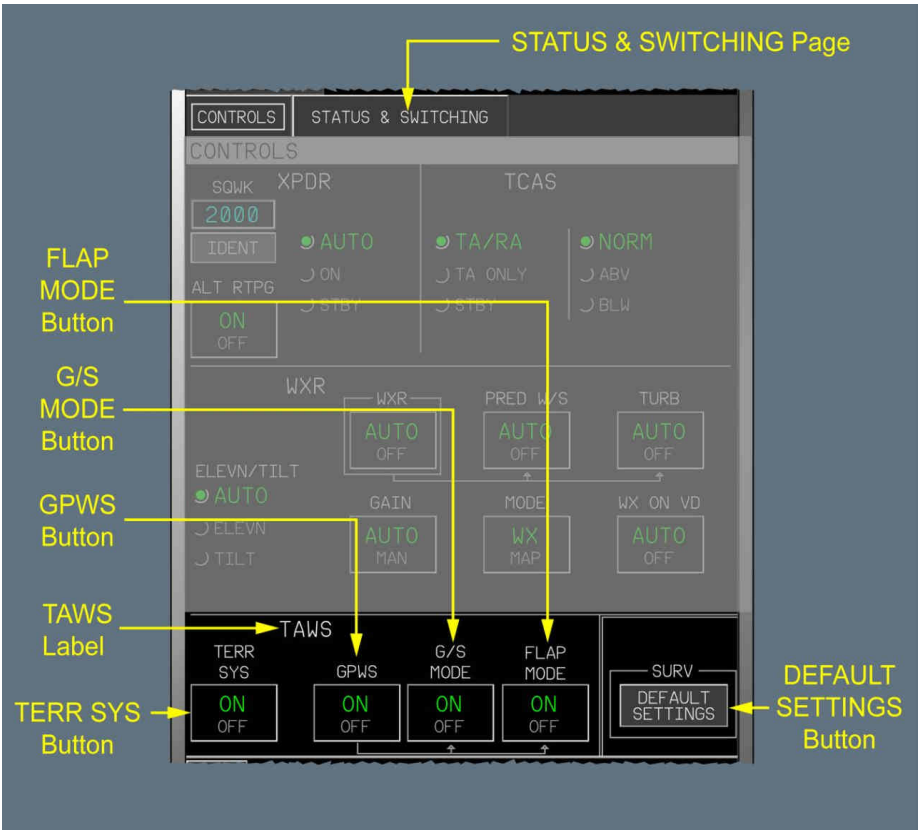
  The ND displays a straight white line based on the selected azimuth value.
- When turned, adjusts the AZIM value in degrees.
  The AZIM value is limited to ±60 ° around the current heading.
  The VD displays the selected AZIM value in the VIEW ALONG AZIMUTH message.
  The AZIM line moves on the ND, based on the flight crew's selection.

  Note: The flight crew can preset the AZIM value before pulling the VD AZIM knob.

MFD

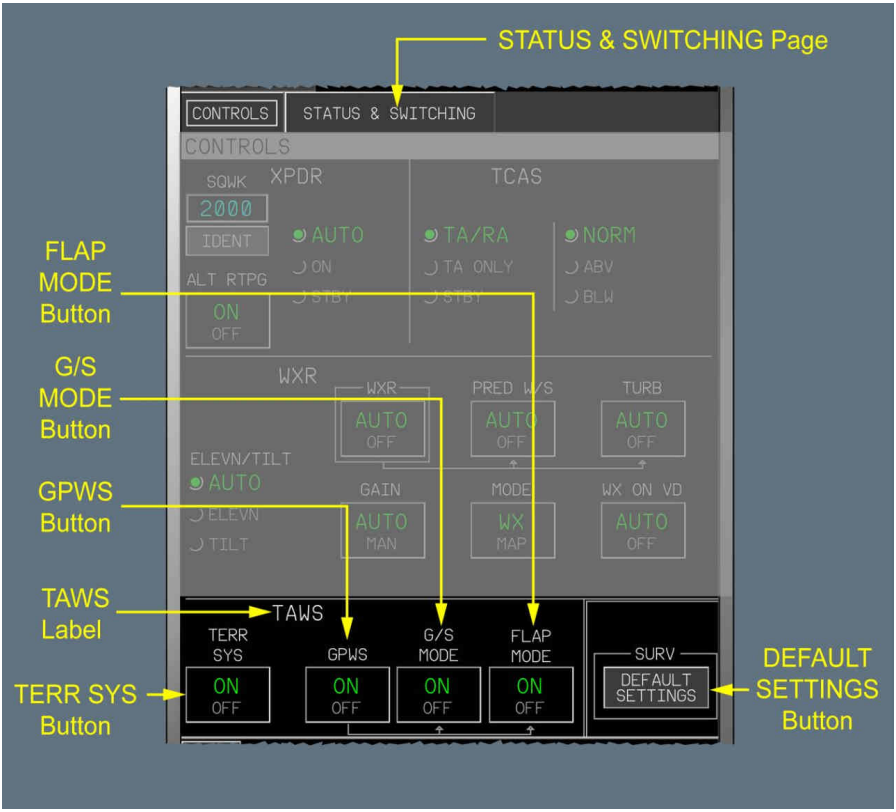
Applicable to: ALL

SURV Pages



CONTROLS PAGE

CONTROLS Page



TAWS LABEL

TAWS — TAWS (GPWS and TERR) is on.

TAWS — TAWS is failed.

TERR SYS BUTTON



The TERR function is on.
TAD and TCF modes are operative.
Both VDs display the terrain profile.

L12



The TERR function is off.
TAD and TCF modes are not available.
None of the VDs display the terrain profile.

Associated with:
- The TERR SYS OFF MEMO
- The TERR SYS OFF message on the ND
- The NO TERR & WX DATA AVAILABLE message on the VD.
  The VD does not display the weather when the TERR function is not available, because it cannot locate the weather vertically (i.e. with respect to the terrain).



The TERR function is failed.

GPWS BUTTON



The GPWS is on.

L12



The flight crew inhibits all GPWS alerts (modes 1 to 5).
Associated with the GPWS OFF MEMO.



TAWS and/or GPWS are failed.

G/S MODE BUTTON



The GPWS mode 5 (DESCENT BELOW GLIDE SLOPE) is on.
On the SURV panel, nothing appears on the G/S MODE pb.

L12

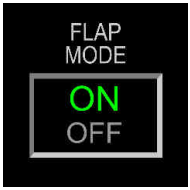


The flight crew inhibits GPWS mode 5 (DESCENT BELOW GLIDE SLOPE) alerts.
Associated with the TAWS G/S MODE OFF MEMO.
On the SURV panel, the G/S MODE pb is set to OFF.



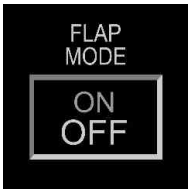
The GPWS mode 5 (DESCENT BELOW GLIDE SLOPE) is failed.

FLAP MODE BUTTON



The GPWS mode 4B (TOO LOW FLAPS) is on.

L12



The flight crew inhibits GPWS mode 4B (TOO LOW FLAPS) alerts. Associated with the TAWS FLAP MODE OFF MEMO.



The GPWS mode 4B (TOO LOW FLAPS) is failed.

DEFAULT SETTINGS BUTTON

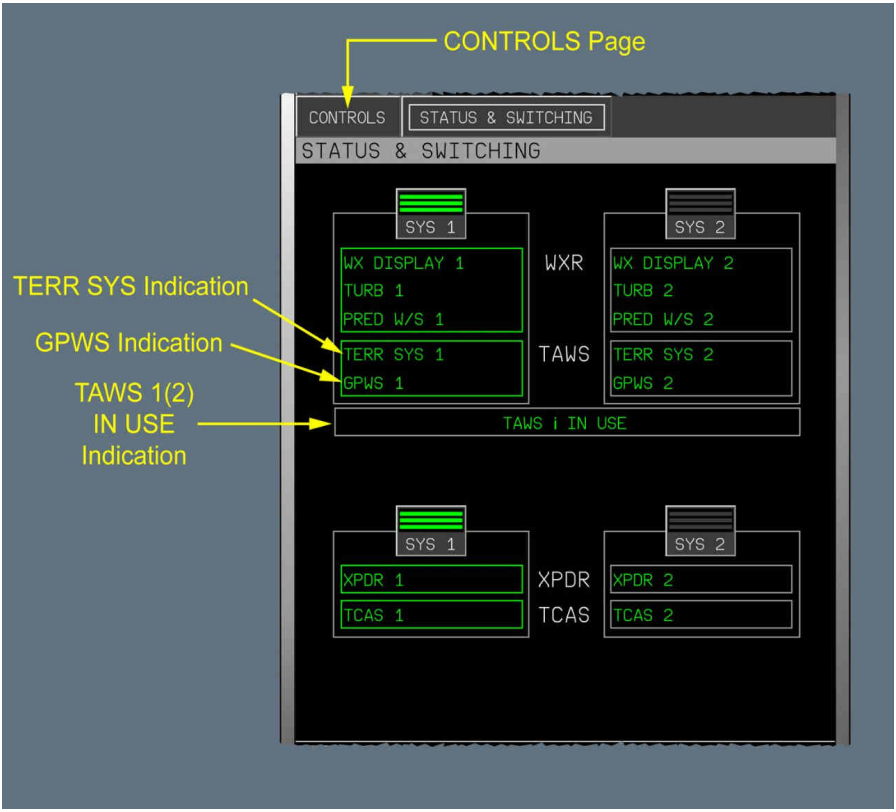


When clicked, automatically sets all the SURV settings to their default position on both MFDs. A confirmation is necessary in order to set the default positions.

- The TERR SYS button is set to ON
- The GPWS button is set to ON
- The G/S MODE button is set to ON
- The FLAP MODE button is set to ON.

STATUS & SWITCHING PAGE

SURV/STATUS & SWITCHING Page



- Green indicates that the function is on
  The green box indicates that the function is selected.
- White indicates that the function is set to OFF, or is on standby
- Amber indicates that the function is failed.

TERR SYS INDICATION



The TERR function is on, on SURV SYS 1(2).



The TERR function is failed on SURV SYS 1(2).



The TERR function is off, on SURV SYS 1(2).



The TERR function is failed, and set to OFF.

GPWS INDICATION



The GPWS is on, on SURV SYS 1(2).



The GPWS is failed on SURV SYS 1(2).



The GPWS is off, on SURV SYS 1(2).



The GPWS is failed, and set to OFF.

TAWS 1(2) IN USE INDICATION

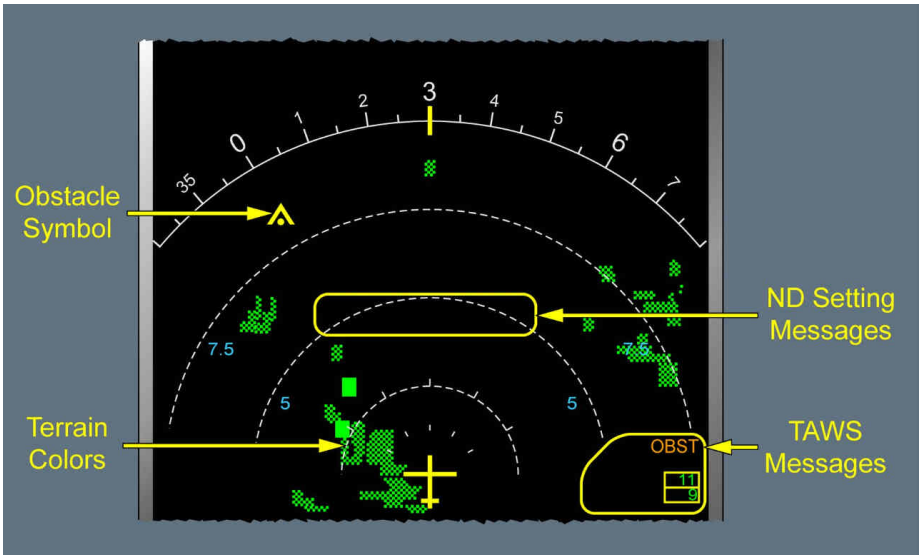


In the case of abnormal operation, indicates that the TAWS and the WXR functions are not provided by the same SYS. The selected SYS provides the WXR function, and the other SYS provides the TAWS function.

ND

Applicable to: ALL

ND

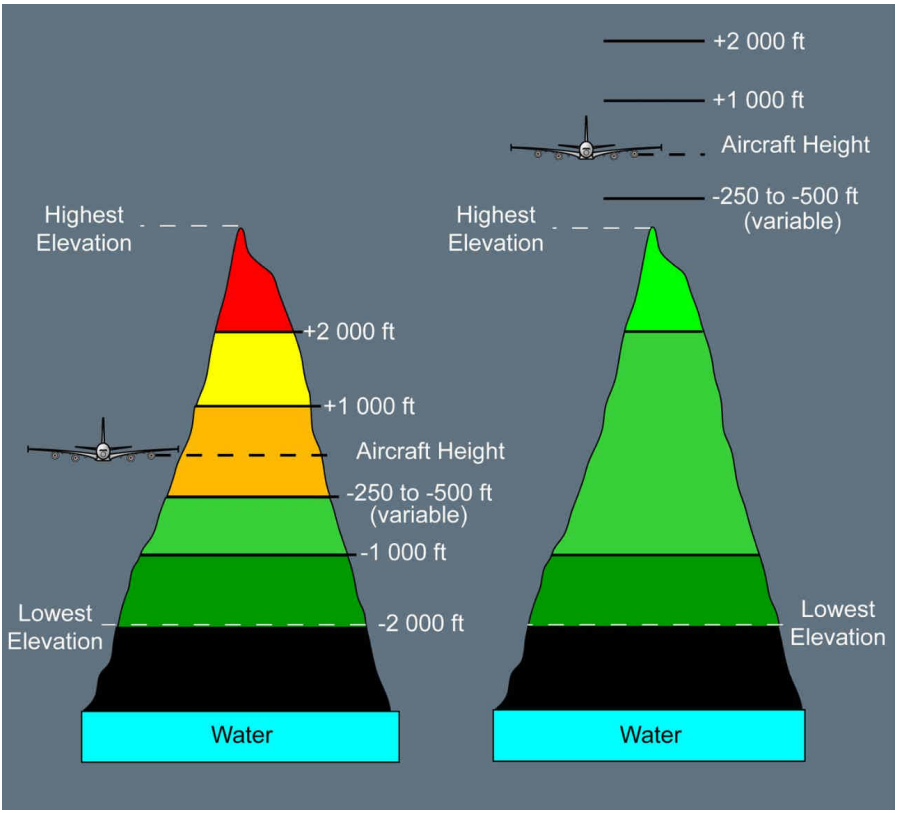


If the TAWS triggers an alert, the ND automatically displays the terrain representation.

TERRAIN COLORS

When in ROSE or ARC mode, the ND displays the terrain in various colors and densities, depending on the height of the aircraft, in relation with the surrounding terrain.

Terrain Colors



L2 *Note:* - *Fields for which no terrain data is available in the TAWS database, appear in magenta.*
- *If the aircraft approaches the south or north pole, some areas may appear in magenta and/or black. The TAWS is able to display the terrain, if the aircraft flies away from the south or north pole.*

OBSTACLE SYMBOL



Indicates an obstacle that conflicts with the caution criteria.



Indicates an obstacle that conflicts with the warning criteria.

TAWS MESSAGES

TERR	The flight crew presses the TERR pb on the EFIS CP, and the TAWS has not triggered any alert.
TERR SYS OFF	The flight crew sets the TERR SYS button to OFF on the SURV/CONTROLS page of the MFD.
TERR INOP	The TERR function is failed, or on standby.
TERR TST	The TERR function is in test mode.
TERR RNG	There is a difference in range between the SURV and the ND.
L12 TERRAIN	The TAWS triggers a terrain warning. Flashes for 9 s, then remains steady.
L12 TERRAIN	The TAWS triggers a terrain caution. Flashes for 9 s, then remains steady.
L12 OBST	The TAWS triggers an obstacle warning. Flashes for 9 s, then remains steady.
L12 OBST	The TAWS triggers an obstacle caution. Flashes for 9 s, then remains steady.
	Indicates the lowest and highest terrain elevations (in Flight Level) within the selected range. The elevation values use the same color code as the terrain displayed on the ND.

ND SETTING MESSAGES

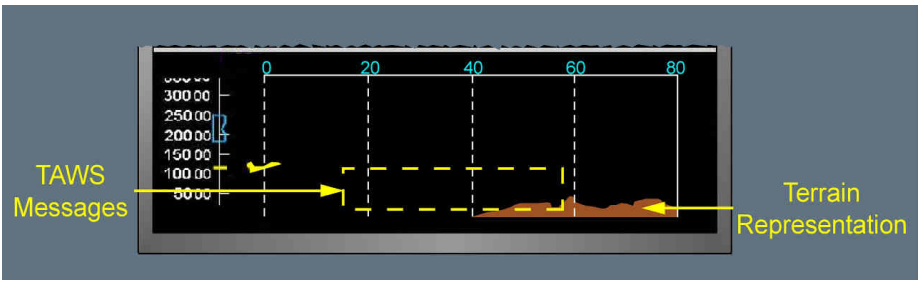
TERR: CHANGE MODE	Appears in PLAN mode, when the TAWS triggers a caution. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES*.
TERR: CHANGE MODE	Appears in PLAN mode, when the TAWS triggers a warning. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES*.
TERR: REDUCE RANGE	Appears in ARC or ROSE mode, when: - The flight crew selects a range on the EFIS CP that is greater than 80 nm - The TAWS triggers a caution. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES*.

TERR: REDUCE RANGE	Appears in ARC or ROSE mode, when: - The flight crew selects a range on the EFIS CP that is greater than 80 nm - The TAWS triggers a warning. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
TERR: INCREASE RANGE	Appears in ARC or ROSE mode, when: - The flight crew sets the range selector to ZOOM - The TAWS triggers a caution. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
TERR: INCREASE RANGE	Appears in ARC or ROSE mode, when: - The flight crew sets the range selector to ZOOM - The TAWS triggers a warning. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .

VD

Applicable to: ALL

VD



Note: *VD range is always limited to 160 nm .*

TERRAIN REPRESENTATION

The VD provides the terrain profile along:
- The solid green line displayed on the ND , or
- The solid white line displayed on the ND , if the flight crew has selected the manual AZIM mode of the WXR .

The VD always displays:

- Terrain in brown

L2 The color of the terrain does not change depending on relative terrain proximity, nor during terrain or obstacle alerts.

L1 - Water in blue.

If the TERR function is operative, the VD continuously displays the terrain.



Indicates the real location of the terrain. The zone elevation in amber is based on the measured radio-altimeter information.
Appears when the aircraft radio-altimeter altitude is below 5 000 ft .

For more information on the terrain profile on the VD , *Refer to 31 / EFIS / VD* .

TAWS MESSAGES

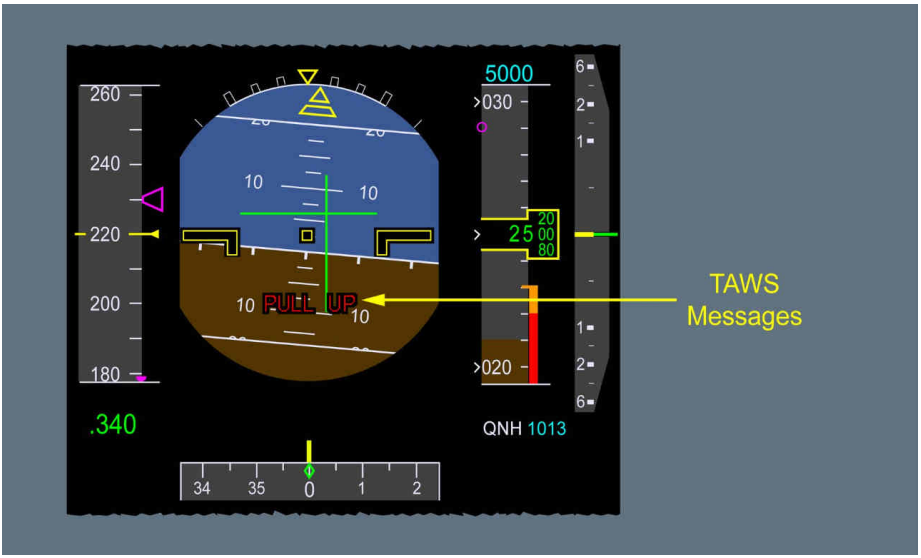
L12

NO TERR & WX DATA AVAILABLE	Appears when the flight crew: - Selects PLAN mode on the EFIS CP, or - Sets to OFF the TERR SYS button on the SURV CONTROLS page of the MFD. The VD does not display the weather when the TERR function is not available, because it cannot locate the weather vertically (i.e. with respect to the terrain).
TERR INOP	Appears when: - The TAWS has failed, or - The flight crew turns off the TAWS, via the SURV page of the MFD, or - The aircraft is flying in the polar zone.
VIEW ALONG AZIM XXX°	The message is associated with the azimuth value, when the flight crew selects the manual AZIM mode.

PFD

Applicable to: ALL

PFD



TAWS MESSAGES

PULL UP	TAWS triggers: - A mode 1 alert (Sink Rate), or - A mode 2 alert (Excessive Terrain Closure Rate), or - Terrain awareness warning, or - Obstacle awareness warning.
SINK RATE	TAWS triggers a mode 1 alert (Sink Rate).
TERRAIN	TAWS triggers a mode 2 alert (Excessive Terrain Closure Rate).
DON'T SINK	TAWS triggers a mode 3 alert (Don't Sink).
TOO LOW TERRAIN	TAWS triggers: - A mode 4 alert (Too Low Terrain), or - A TCF caution.
TOO LOW GEAR	TAWS triggers a mode 4A, or AB alert (Too Low Gear).
TOO LOW FLAPS	TAWS triggers a mode 4B alert (Too Low Flaps).

GLIDE SLOPE TAWS triggers a mode 5 alert (Glide slope).

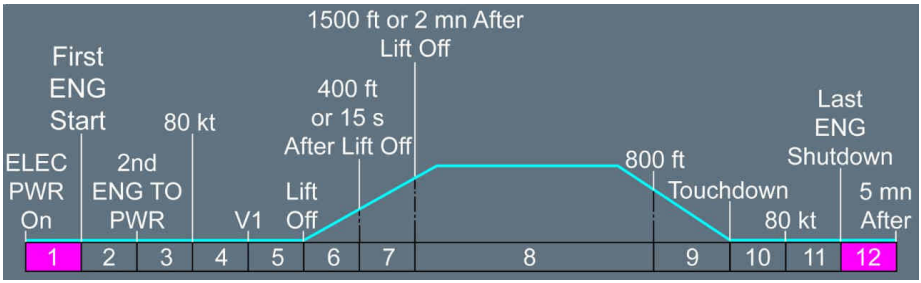
MEMO

Applicable to: ALL

GPWS OFF	The flight crew sets the GPWS button to OFF on the SURV CONTROLS page of the MFD.
TAWS FLAP MODE OFF	The flight crew sets the FLAP MODE button to OFF on the SURV CONTROLS page of the MFD.
TAWS G/S MODE OFF	The flight crew sets the G/S MODE button to OFF on the SURV CONTROLS page of the MFD.
TERR SYS OFF	The flight crew sets the TERR SYS button to OFF on the SURV CONTROLS page of the MFD.
TERR STBY	The TAWS is operative, but the TERR function is not available.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



AURAL ALERTS

Applicable to: ALL

Aural Alert	Sound	Meaning
DON'T SINK, DON'T SINK	*(Audio not available in PDF)*	*Refer to GPWS/Mode 3 .*
GLIDE SLOPE, GLIDE SLOPE	*(Audio not available in PDF)*	*Refer to GPWS/Mode 5 .*
OBSTACLE AHEAD, OBSTACLE AHEAD	*(Audio not available in PDF)*	*Refer to TERR Function .*
OBSTACLE AHEAD, PULL UP	*(Audio not available in PDF)*	*Refer to TERR Function .*

Continued on the following page

Continued from the previous page

Aural Alert	Sound	Meaning
PULL UP	*(Audio not available in PDF)*	- *Refer to GPWS/Mode 1* , or - *Refer to GPWS/Mode 2* .
SINK RATE, SINK RATE	*(Audio not available in PDF)*	*Refer to GPWS/Mode 1* .
TERRAIN	*(Audio not available in PDF)*	*Refer to GPWS/Mode 2* .
TERRAIN, TERRAIN	*(Audio not available in PDF)*	*Refer to GPWS/Mode 2* .
TERRAIN AHEAD, TERRAIN AHEAD	*(Audio not available in PDF)*	*Refer to TERR Function* .
TERRAIN AHEAD, PULL UP	*(Audio not available in PDF)*	*Refer to TERR Function* .
TOO LOW FLAPS	*(Audio not available in PDF)*	*Refer to GPWS/Mode 4* .
TOO LOW GEAR	*(Audio not available in PDF)*	*Refer to GPWS/Mode 4* .
TOO LOW TERRAIN	*(Audio not available in PDF)*	- *Refer to GPWS / Mode 4* , or - *Refer to TERR Function* .

Note: *In the case of simultaneous alerts, the first aural alert may be partially triggered.*

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OVERVIEW

Applicable to: ALL

The Weather Radar (WXR) system has:
- A weather (WX) display function
- A Predictive Windshear (PWS) function
- A Turbulence (TURB) detection function
- A ground mapping function.

The WXR comes on:
- If at least one engine is running, and if the flight crew presses the WX pb on at least one EFIS CP
- Automatically, in flight.

The WXR is turned off:
- Automatically, after landing
- Manually, if the flight crew deselects the WX pb on both EFIS CPs, when the aircraft is on ground.

WX DISPLAY FUNCTION

Applicable to: ALL

The WX display function enables the flight crew to view precipitation in different colors, depending on the intensity of the precipitation.

The WX display function has several modes, that enable the flight crew to analyze the weather along the vertical and horizontal axes:
- The automatic (AUTO) mode
  This is the default mode of the WXR.
- The elevation (ELEVN) mode
- The tilt (TILT) mode
- The azimuth (AZIM) mode
- The gain (GAIN) mode.

The WX display function displays weather data on:
- The ND: For views along the vertical flight path (in AUTO mode), or along the selected altitude (in ELEVN mode), or along the selected tilt angle (in TILT mode)
- The VD: For views along the lateral flight path in (AUTO mode), or along the selected azimuth (in AZIM mode).

PRINCIPLE

The WXR detects precipitation in the surrounding area, by using the WXR antenna.

L2 The WXR does not detect:
- Cloud, fog, or wind (droplets are too small, or no precipitation at all)
- Clear air turbulence (no precipitation)
- Sandstorms (solid particles are almost transparent to the radar beam)
- Lightning.

The WXR detects:
- Rainfall
- Wet hail and wet turbulence
- Ice crystals, dry hail, and dry snow. However, these three elements give small reflections.

L1 The WXR continuously scans a volume of space ahead of the aircraft, and stores this data in a three dimensional (3-D) buffer.

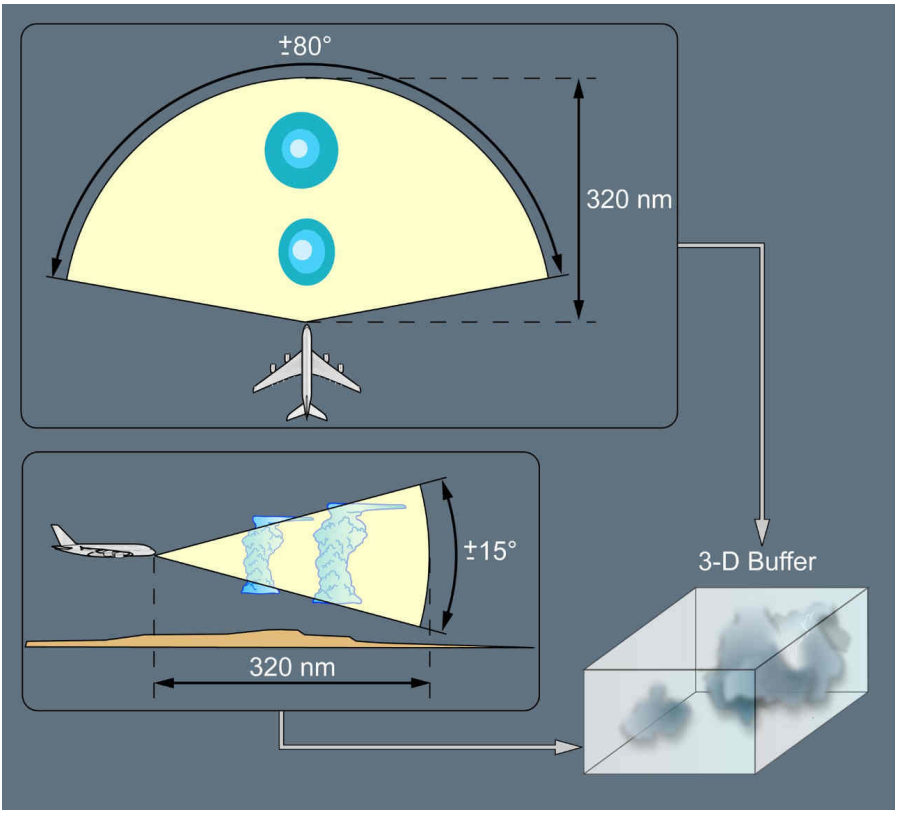
L2 The WXR antenna scans:
- ±80 ° in azimuth
- ±15 ° in tilt
- Up to 320 nm in front of the aircraft.

The 3-D buffer stores the weather data up to 5 min behind the aircraft.

L1 The WXR extracts data from the 3-D buffer, in order to display the weather on the ND, and on the VD.

L3 The WXR takes into account the curvature of the earth, to display an image based on the mean sea level. It also reduces the ground returns from the displayed weather, by using the terrain data provided by the TAWS database.

WXR Principle



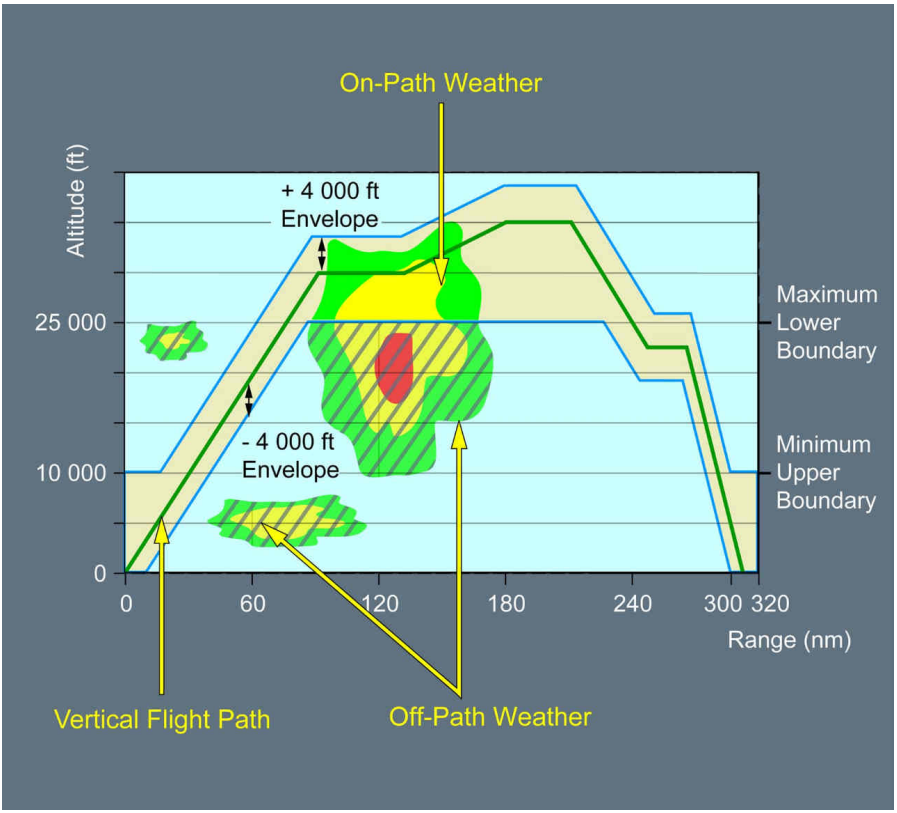
AUTOMATIC (AUTO) MODE

The automatic mode (AUTO) is the default mode of the WXR .
The WXR extracts the weather data from the 3-D buffer, along the aircraft flight path.

The WXR takes into account a vertical envelope along the aircraft vertical flight path, in order to display on the ND :

- The on-path weather that the aircraft will encounter (i.e. weather inside the envelope)
  The on-path weather appears on the ND in the conventional colors.
- The off-path weather that is not on the aircraft trajectory (i.e. weather outside the envelope).
  The off-path weather appears on the ND in black parallel lines, with reduced intensity.

WX Display Envelope



L3 The aircraft vertical flight path is:

- The FMS flight plan limited by the selected altitude on the AFS CP , if the VD is defined along the FMS trajectory, or
- The flight path extrapolated using the current Flight Path Angle (FPA), and limited by the selected altitude on the AFS CP , if the VD is not defined along the FMS trajectory, or
- The flight path extrapolated up to 60 nm , using the Flight Path Angle (FPA), and limited to the altitude at 60 nm , if the selected altitude is not available.

L2 The WXR may not be able to discriminate the on-path and the off-path weather at ranges above 160 nm , because of the angle of the antenna beam width. The WXR could consider some off-path weather as on-path weather.

L1 For the display on the VD , the WXR extracts the data from the 3-D buffer, along the zero-width vertical cut.
For more information about the vertical cut, *Refer to 31 / EFIS / VD* .

MANUAL ELEVN AND TILT MODES

The manual ELEVN mode enables the flight crew to analyze the weather at a selected altitude.
L2 The selected altitude depends on the barometric reference selected by the flight crew.
L1 The manual TILT mode enables the flight crew to analyze the weather at a selected tilt angle.
L2 Zero tilt value indicates the horizon as seen by the ADIRS .

L1 Depending on the flight crew selection, the WXR extracts data from the 3-D buffer:
- At a selected altitude, or
- At a selected tilt angle.

The WXR displays the extracted data on the ND .

The flight crew can select these modes by using:
- The ELEVN knob on the SURV panel
  For more information on the ELEVN knob , *Refer to DSC-34-20-30-20-10 ELEVN Knob* .
- The ELEVN /TILT option list on the SURV/CONTROLS page of the MFD .
  For more information about the ELEVN /TILT option list, *Refer to DSC-34-20-30-20-20 ELEVN/TILT Option List* .

The flight crew must return to the automatic mode when they have completed the analyzis.

MANUAL AZIMUTH (AZIM) MODE

The manual AZIM mode provides a vertical view of the weather along a selected azimuth.
The WXR extracts data from the 3-D buffer along the selected azimuth, and displays the extracted weather on the VD .
The flight crew can select the manual AZIM mode by pulling the VD AZIM knob of the SURV panel.
For more information about the VD AZIM knob , *Refer to DSC-34-20-30-20-10 VD AZIM Knob* .
L2 The WXR automatically returns to the AUTO mode after 30 s , if the flight crew does not select any azimuth value.

MANUAL GAIN MODE

The manual GAIN mode enables the flight crew to adjust sensitivity of the weather display on the ND .

The flight crew can select the manual GAIN mode by using:
- The GAIN knob on the SURV panel
  For more information on the GAIN knob , *Refer to DSC-34-20-30-20-10 GAIN Knob* .
- The GAIN button on the SURV/CONTROLS page of the MFD .
  For more information on the GAIN button, *Refer to DSC-34-20-30-20-20 GAIN Button* .

TURBULENCE DETECTION (TURB) FUNCTION

Applicable to: ALL

The turbulence detection (TURB) function detects wet turbulence in a volume of space ahead of the aircraft.

L3 This function is based on the movement of precipitation.

L2 The TURB detection function scans:
- ±60 ° in azimuth
- Between 0 ft and 60 000 ft MSL
- Up to 40 nm in front of the aircraft.

L1 *Note: The TURB function does not detect clear air turbulence or dry turbulence.*

TURB detection is available, if:
- The WXR is operative
- The flight crew sets the TURB button to AUTO on the SURV/CONTROLS page of the MFD.

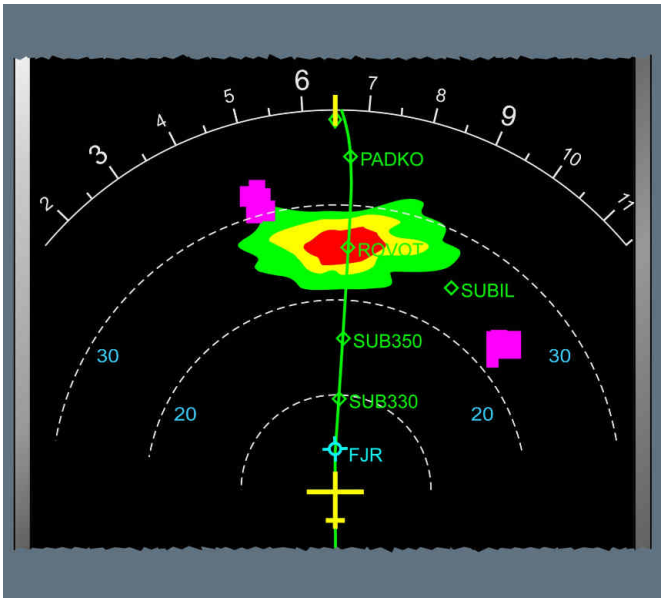
The ND displays the areas of turbulence in magenta.

Note: The VD does not display areas of turbulence.

The ND displays the TURB message, if:
- The flight crew does not press the WX pb on the EFIS CP
- Turbulence is detected close to the aircraft.

L2 The envelope associated with the TURB message is:
- 20 nm on both sides of the aircraft heading
- ± 5 000 ft around the current aircraft altitude.

TURB Area Indication



PREDICTIVE WINDSHEAR (PWS) FUNCTION

Applicable to: ALL

The Predictive Windshear (PWS) function:
- Detects windshears:
  - At least 10 s before a possible encounter
  - Between 0.5 nm and 5 nm in front of the aircraft
- Triggers alerts.

L3 The PWS function can detect and display up to 8 different windshears simultaneously.

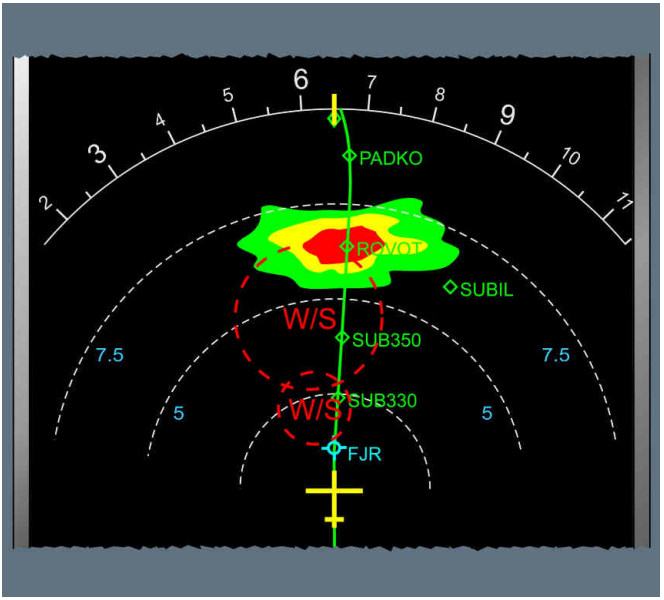
L1 *Note:* *The PRIM s also provide a reactive windshear function (Refer to 22-27 FLIGHT ENVELOPE / PROTECTIONS / REACTIVE WINDSHEAR).*

The PWS function is available, if the PRED W/S button is set to AUTO , and:
- If the WXR is operative, or at takeoff, if the WXR is OFF
- In flight, if the aircraft is below 1 500 ft AGL .

The ND displays the areas with predicted windshear as dashed red circles.

Note: *The VD does not display areas with the windshear.*

PWS Area Indication on ND



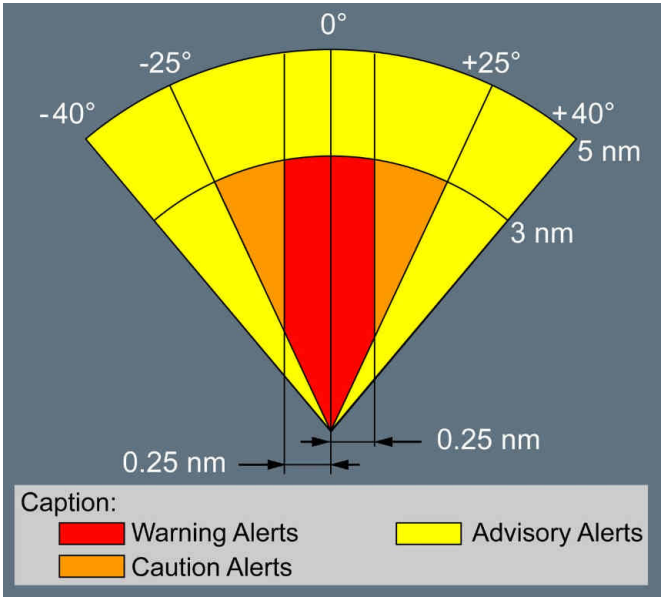
ALERT TRIGGERING CONDITIONS

Depending on the flight phase, and on the aircraft's distance from the windshear, the PWS function will trigger:

- A warning, or
- A caution, or
- An advisory.

DURING TAKEOFF ROLL, UP TO 100 KT

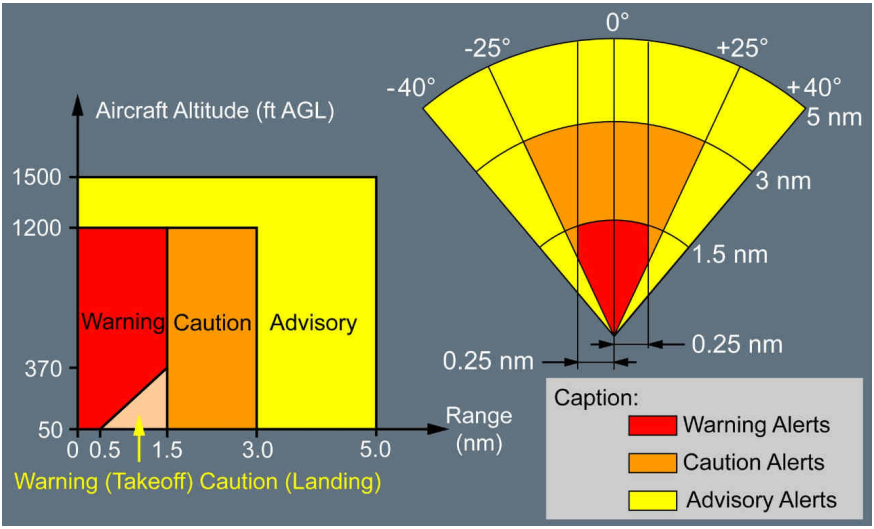
PWS During Takeoff Roll



During the takeoff roll, and within a range of 3 nm , warnings and cautions are available.
At takeoff, all alerts are inhibited, if the aircraft speed is above 100 kt and up to 50 ft .

ABOVE 50 FT

PWS Above 50ft



At landing:

- All alerts are inhibited, if the aircraft is below 50 ft
- Visual and aural warnings are downgraded to cautions from 370 ft AGL to 50 ft AGL , and range from 0.5 nm to 1.5 nm .

TRIGGERING OF ALERTS

WARNING

In the case of a warning, the following are triggered:

- During approach, the “GO AROUND, WINDSHEAR AHEAD” aural alert
- During takeoff, the “WINDSHEAR AHEAD, WINDSHEAR AHEAD” aural alert
- The W/S AHEAD visual alert on the PFD s
- PWS area indication on the ND .

L2 The WX pb is also automatically selected on the EFIS CP .

L1 *Note:* - *If the ND is in PLAN mode, the ND displays the W/S: CHANGE MODE message*
- *If the flight crew selects a range different from 10 nm on the EFIS CP , the ND displays the W/S: SET RNG 10 NM message.*

CAUTION

In the case of a caution, the following are triggered:
- The “MONITOR RADAR DISPLAY” aural alert
- The W/S AHEAD visual alert on the PFD s
- The PWS area indication on the ND .

L2 The WX pb is also automatically selected on the EFIS CP .

L1 *Note:* - *If the ND is in PLAN mode, the ND displays the W/S: CHANGE MODE message*
- *If the flight crew selects a range different from 10 nm on the EFIS CP , the ND displays the W/S: SET RNG 10 NM message.*

ADVISORY

In the case of an advisory, the following is triggered:
- The PWS area indication on the ND .

L2 The WX pb is also automatically selected on the EFIS CP .

GROUND MAPPING FUNCTION

Applicable to: ALL

The ground mapping function enables the flight crew to display a map of terrain features on the ND.

The color code is:
- Black for standing water (no return)
- Green for the terrain
- Amber or red for cities and mountains (strong returns).

L3 The WXR extracts the data from the 3-D buffer, by using the ground returns and the elevation data from the TAWS database.

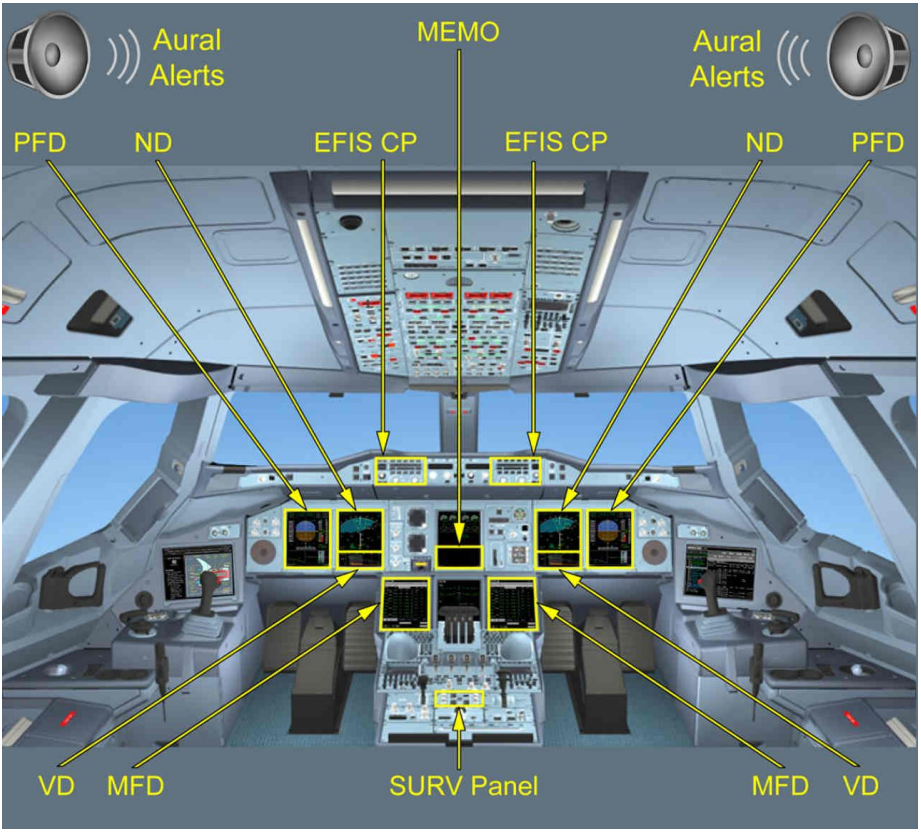
L1 The flight crew can select the ground mapping function via the MODE button on the SURV/CONTROLS page of the MFD, if the WXR is on.

Intentionally left blank

COCKPIT VIEW

Applicable to: ALL

Cockpit View



EFIS CONTROL PANEL

Applicable to: ALL

EFIS CP



WX pb

L12



The onside ND and VD display weather information.
On ground, if one engine is operative, turns on the WXR.
The flight crew cannot press the WXR pb and the TERR pb at the same time.
Associated with the WX message on the ND.

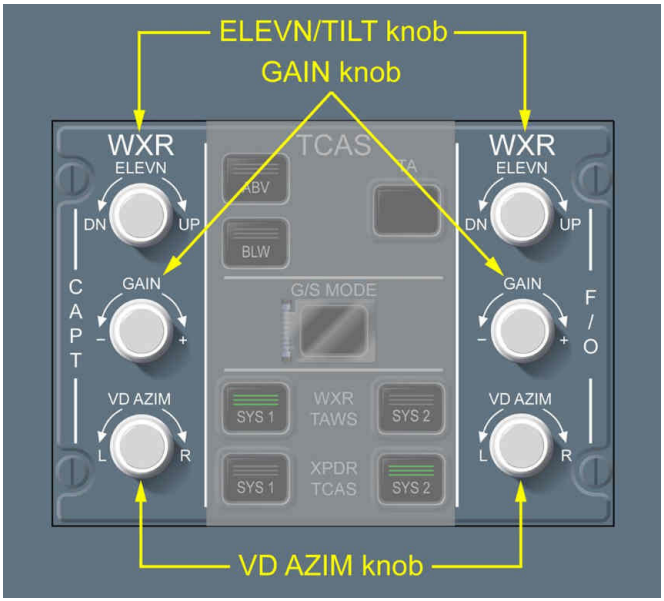


The onside ND and VD do not display weather information.
On ground, if the WX pb of both EFIS CPs are not pressed, turns off the WXR.

SURV PANEL

Applicable to: ALL

SURV Panel



ELEVN knob

L12



- When pushed, selects the AUTO mode.
  This is the default position.
  Associated with the WX message on the ND.
- When pulled:
  - Selects the manual ELEVN mode
  - Selects the manual TILT mode, if the previous manual mode was ELEVN.
- When turned, adjusts the elevation or tilt value.
  The ND displays the elevation or tilt value.
  The VD displays a white line indicating the elevation or tilt value.
  The default ELEVN value is the current aircraft altitude.

  The default TILT value is:
  - On ground: +3.00 °
  - In flight: 0 °.

Note: *On the SURV/CONTROLS page of the MFD, the ELEVN/TILT option list is automatically updated.*

Gain knob



- When pushed, selects the AUTO GAIN mode
  The GAIN function is automatically set to the most appropriate setting.
- When pulled, selects the manual GAIN mode.
- When turned, adjusts the gain value in percentages.
  The ND displays the GAIN value.
  The default GAIN value is 50 %.

Note: *On the SURV/CONTROLS page of the MFD, the GAIN button is automatically updated.*

VD AZIM knob

L12



- When pushed, selects the AUTO mode.
  This is the default position.
- When pulled, selects the manual AZIM mode.

  On the VD:
  - The eye symbol appears, instead of the aircraft symbol
  - The terrain appears along the selected azimuth.

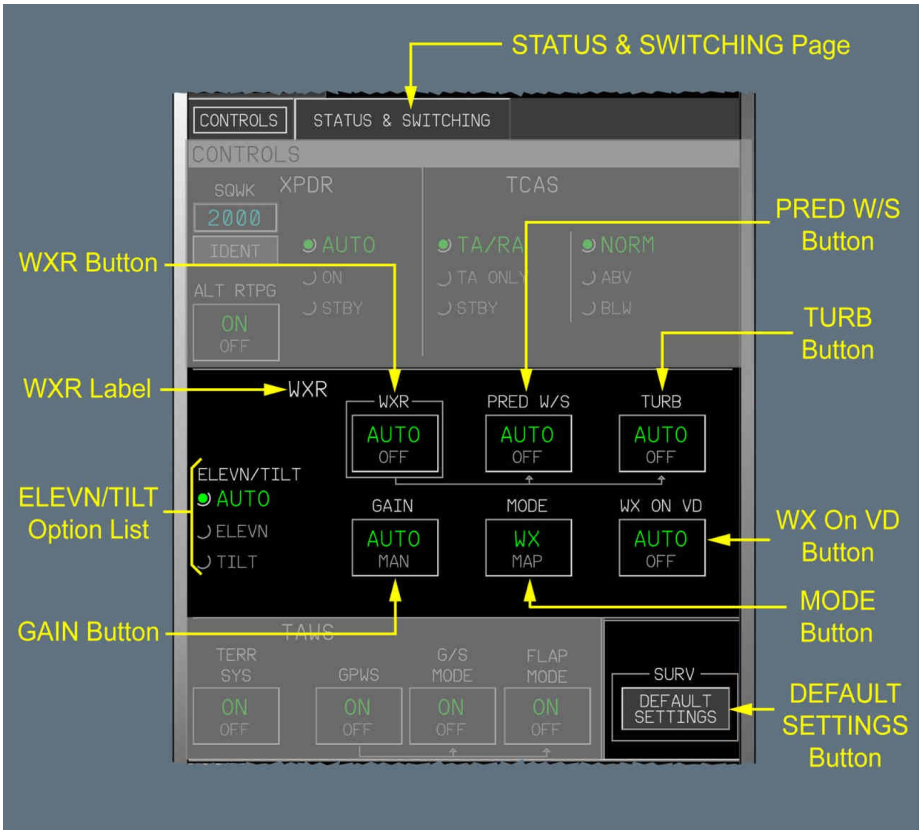
  The ND displays a straight white line based on the selected azimuth value.
- When turned, adjusts the AZIM value in degrees.
  The AZIM value is limited to ±60 ° around the current heading.
  The VD displays the selected AZIM value in the VIEW ALONG AZIMUTH message.
  The AZIM line moves on the ND, based on the flight crew's selection.

  Note: The flight crew can preset the AZIM value before pulling the VD AZIM knob.

MFD

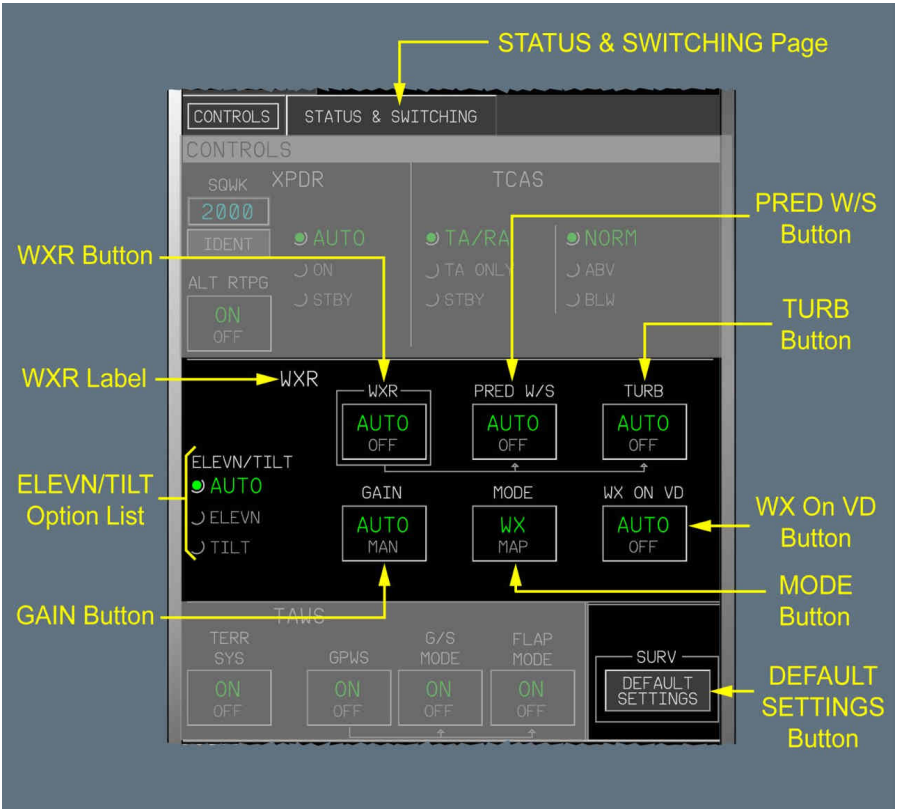
Applicable to: ALL

SURV Pages



CONTROLS PAGE

CONTROLS Page



Note: *Flight crew selections (on the SURV/CONTROLS page of the MFD) that are applicable to the weather display, are valid for the onside ND and/or the onside VD .*

WXR LABEL

WXR — The WXR is on.

WXR — The WXR is failed.

WXR BUTTON

L12



The WXR automatic mode is on.
This is the default position.
On ground, associated with the WXR ON MEMO.
When clicked, a confirmation is necessary in order to turn off the WXR.

When the flight crew sets the WXR button to AUTO:
- The PRED W/S button is automatically set to AUTO, and the function is on
- The TURB button is automatically set to AUTO, and the function is on
- The ELEVN/TILT option list is automatically set to AUTO
- The GAIN button is automatically set to AUTO
- The MODE button is automatically set to WX
- The WX ON VD button is automatically set to AUTO.

L12



The WXR is off.
When clicked, a confirmation is necessary in order to turn on the WXR.

Associated with:
- The WXR OFF MEMO, if the aircraft is in flight phases 2 to 11
- The WXR OFF message on the ND.

When the flight crew sets the WXR button to OFF:
- The PRED W/S button is automatically set to OFF, and the function is inhibited
- The TURB button is automatically set OFF, and the function is inhibited
- The selected option on the ELEVN/TILT option list is deselected, and the option list is inhibited
- The GAIN button no longer appears
- The MODE button no longer appears
- The WX ON VD button is automatically set to OFF.



The WXR is failed.

PRED W/S BUTTON



The PWS function operates automatically.
This is the default position.

L12



The PWS function is off.
Associated with the PRED W/S OFF, or the PRED W/S OFF MEMO.



- The WXR is failed, or
- The PWS function is failed.

TURB BUTTON



The TURB function operates automatically.
This is the default position.

L12



The TURB function is off.
Associated with the WXR TURB OFF MEMO.



- The WXR is failed, or
- The TURB function is failed.

ELEVN/TILT OPTION LIST

L12



The flight crew selects the AUTO mode.
This is the default position.
Associated with the WX message on the ND.

L12



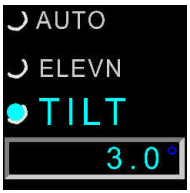
The flight crew selects the ELEVN mode, and the barometric reference is STD.
When selected, an entry field appears below the option list. The flight crew should enter the appropriate FL value in the field.
Associated with the ELEVN message and the selected value on the ND.
Associated with the white line indicating the selected altitude on the VD.

L12



The flight crew selects the ELEVN mode, and the barometric reference is QNH.
When selected, an entry field appears below the option list. The flight crew should enter the appropriate FT value in the field.
Associated with the ELEVN message and the selected value on the ND.
Associated with the white line indicating the selected altitude on the VD.

L12



The flight crew selects the TILT mode.
When selected, an entry field appears below the option list. The flight crew should enter the appropriate degrees value in the field.
Associated with the TILT message and the selected value on the ND.
Associated with the white line indicating the selected tilt value on the VD.



- The WXR is failed, or
- The WX display function is failed.

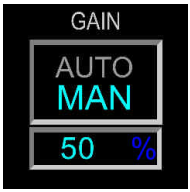
GAIN BUTTON

L12



The GAIN mode operates automatically.
This is the default position.
Associated with the WX message on the ND.

L12



The flight crew manually selects the GAIN value.
When selected, an entry field appears below the GAIN button. The flight crew should enter the applicable GAIN percentage value.
Associated with the GAIN message and the selected value on the ND.



- The WXR is failed or set to OFF, or
- The WX display function is failed.

MODE BUTTON

L12

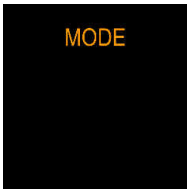


The WX display function is on.
This is the default position.
Associated with the WX message on the ND.

L12



The flight crew selects the ground mapping function.
The ELEVN/TILT option list is no longer available.
Associated with the MAP message on the ND.



- The WXR is failed or set to OFF, or
- The WX display function is failed.

WX ON VD BUTTON



If flight crew presses the WX pb on the EFIS CP, the VD displays weather information.
This is the default position.

L12



If the flight crew presses the WX pb on the EFIS CP, the VD does not display weather information.
Associated with the WX NOT SEL message on the VD.



- The WXR function is failed, or
- The WX display function is failed.

DEFAULT SETTINGS BUTTON

L12



When clicked, automatically sets all the WXR settings to their default position. A confirmation is necessary in order to set the default positions.

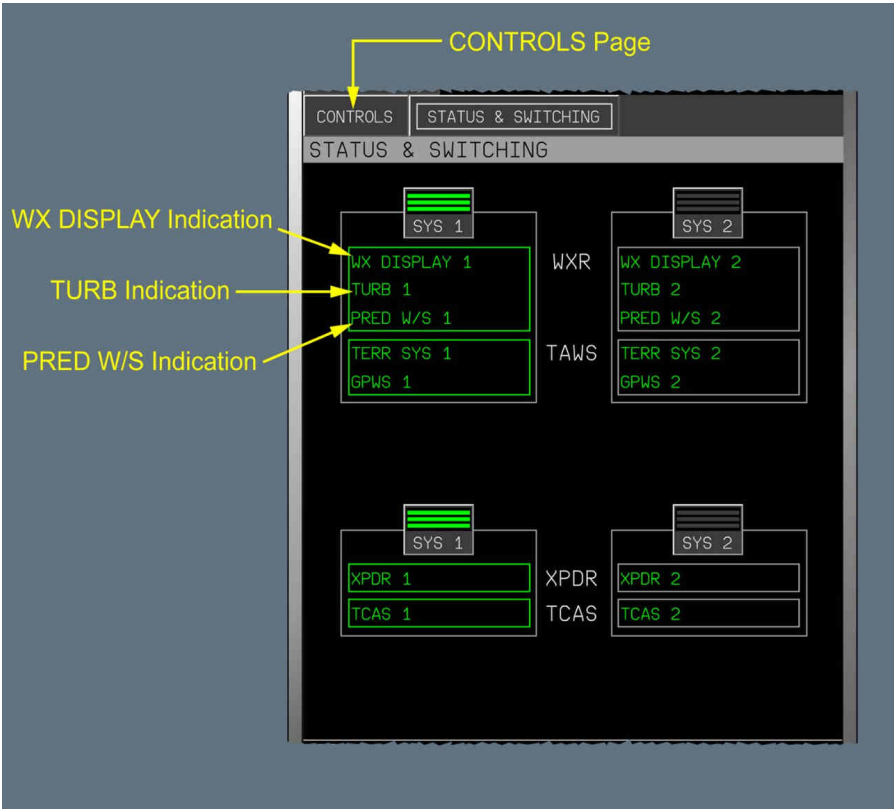
- The ELEVN/TILT option list is set to AUTO
- The WXR button is set to AUTO
- The PRED W/S button is set to AUTO
- The TURB button is set to AUTO
- The GAIN button is set to AUTO
- The MODE button is set to WX
- The WX ON VD button is set to AUTO.

The following default settings are valid only for the onside MFD:

- The ELEVN/TILT option list
- The GAIN button
- The MODE button
- The WX ON VD button.

STATUS & SWITCHING PAGE

STATUS & SWITCHING Page



- Green indicates that the function is on
  The green box indicates that the function is selected.
- White indicates that the function is set to OFF, or is on standby
- Amber indicates that the function is failed.

WX DISPLAY INDICATION



The WX display function is on, on SURV SYS 1(2).



The WX display function is failed on SURV SYS 1(2)



The WX display function is off, on SURV SYS 1(2).



The WX display function is failed, and set to OFF.

TURB INDICATION



The TURB function is on, on SURV SYS 1(2).



The TURB function is failed on SURV SYS 1(2).



The TURB function is off, on SURV SYS 1(2).



The TURB function is failed, and set to OFF.

PRED W/S INDICATION



The PWS function is on, on SURV SYS 1(2).

PRED W/S 1

The PWS function is failed on SURV SYS 1(2).

PRED W/S OFF

The PWS function is off, on SURV SYS 1(2).

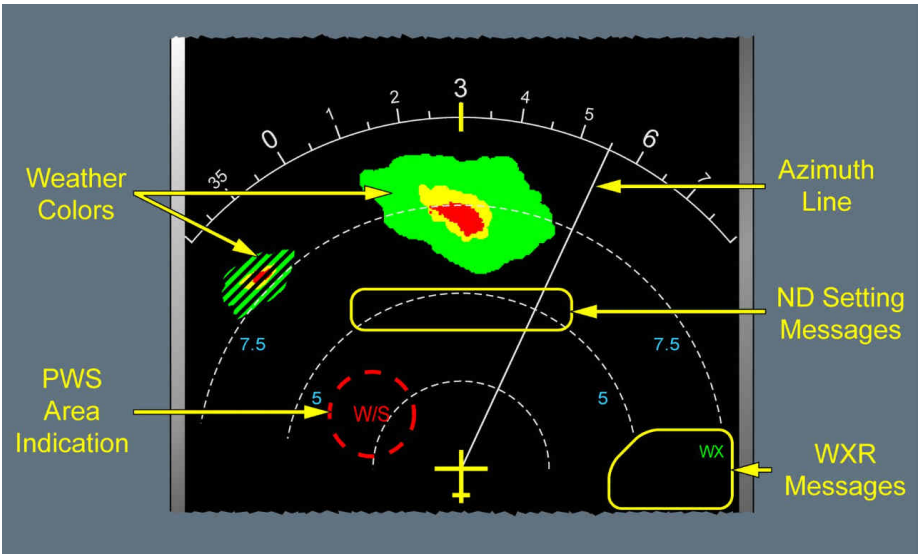
PRED W/S OFF

The PWS function is failed, and set to OFF.

ND

Applicable to: ALL

ND



The ND automatically displays the weather and predictive windshears if the PWS triggers an alert.

WEATHER COLORS

The ND displays the weather precipitation in various colors, depending on the precipitation intensity (black, green, yellow, red, or magenta) if:

- The WXR is on
- In ARC or ROSE mode
- The flight crew presses the WX pb on the EFIS CP.

When in AUTO mode, the ND displays:

- The on-path weather, that the aircraft will encounter, in the conventional colors
- The off-path weather, that is not on the aircraft trajectory, in black parallel lines, with reduced intensity.

AZIMUTH LINE

If the flight crew selects the manual AZIM mode of the WXR, the ND displays a white line to indicate the selected azimuth value.

L2 Flashes for 5 s before the WXR automatically reverts to the automatic mode.

WXR MESSAGES

GAIN 53%	The flight crew selects the manual GAIN mode, by: - Pulling the GAIN knob on the SURV panel, or - Setting the GAIN button to MAN on the SURV CONTROLS page of the MFD.
TILT -12.0°	The flight crew selects the manual TILT mode, by: - Pulling the ELEVN knob two times on the SURV panel, or - Setting the ELEVN/TILT option list to TILT on the SURV CONTROLS page of the MFD page.
ELEVN 12500FT	The flight crew selects the manual ELEVN mode, by: - Pulling the ELEVN knob on the SURV panel, or - Setting the ELEVN/TILT option list to ELEVN on the SURV CONTROLS page of the MFD page. The unit is: - “ft”, if in QNH baro-setting - “FL”, if in STD baro-setting.
WX	The flight crew selects the WX display function, by setting: - The MODE button to WX - The ELEVN/TILT option list to AUTO - The GAIN button to AUTO, on the SURV CONTROLS page of the MFD.

MAP	The flight crew selects the ground mapping function of the WXR, by setting the MODE button to MAP on the SURV CONTROLS page of the MFD.
WXR OFF	The flight crew set the WXR button to OFF on the SURV CONTROLS page of the MFD.
WXR INOP	A WXR failure is detected.
WXR TEST	The WXR is in the test mode.
WXR DEGRADD	The WXR is in a degraded mode. The on-path and off-path weather may not be consistent with the current aircraft trajectory.
L12 WXR GND CLUT	The WXR no longer removes the ground returns from the weather display because: - The WXR does not receive terrain data from the TAWS function, or - There is an aircraft position uncertainty. I.e. the uncertainty of the horizontal aircraft position is above 2.5 nm.
WXR RNG	There is a difference in range between the SURV and the ND.
L12 PRED W/S	The PWS function is failed. Appears when the aircraft is on ground, or when the slats lever position is not set to zero.
TURB	The TURB function detects turbulence. The weather is not displayed on the ND.

ND SETTING MESSAGES

W/S: CHANGE MODE	Appears in PLAN mode, when the PWS (of the SURV system) triggers a warning. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
W/S: SET RNG 10 NM	Appears in ARC or ROSE mode, when: - The flight crew selects a range that is different from 10 nm - The PWS triggers a warning. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
W/S: CHANGE MODE	Appears in PLAN mode, when the PWS (of the SURV system) triggers a caution. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .

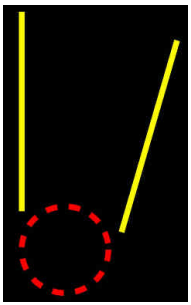
W/S: SET RNG 10 NM

Appears in ARC or ROSE mode, when:
- The flight crew selects a range that is different from 10 nm
- The PWS triggers a caution.
  For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .

PWS AREA INDICATION



The ND range is set to 10 nm in ARC mode, or to 20 nm in ROSE mode, and a windshear is detected.

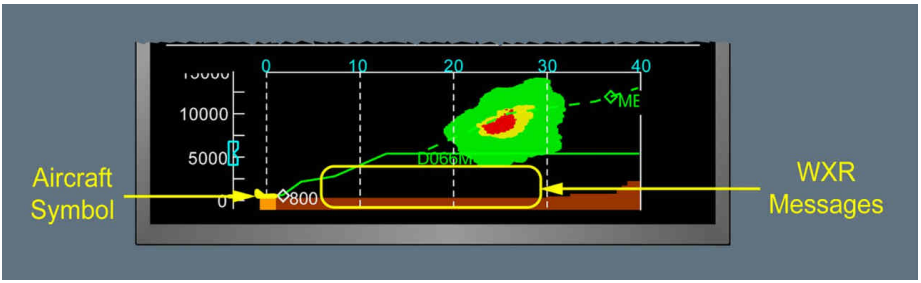


The ND range is more than 10 nm in ARC mode, or more than 20 nm in ROSE mode, and a windshear is detected.

VD

Applicable to: ALL

VD



The VD displays the weather along:
- The solid green line displayed on the ND , or
- The solid white line displayed on the ND , if the flight crew has selected the manual AZIM mode of the WXR .

Note: *VD range is always limited to 160 nm .*

AIRCRAFT/EYE SYMBOL



The WXR is in AUTO mode.



The flight crew selects the manual AZIM mode of the SURV system.

WXR MESSAGES

WXR INOP — Appears, when the flight crew presses the WX pb on the EFIS CP, and:
- The WXR (on the SURV system) is failed, or
- The aircraft is flying in the polar zone.

WX NOT SEL — Appears, when the flight crew:
- Presses the WX pb on the EFIS CP
- Sets the WX ON VD button to OFF on the SURV CONTROLS page of the MFD.

L12

NO TERR & WX DATA AVAILABLE — Appears when the flight crew:
- Selects PLAN mode on the EFIS CP, or
- Sets to OFF the TERR SYS button on the SURV CONTROLS page of the MFD.

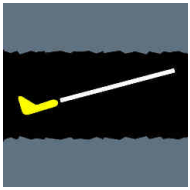
The VD does not display the weather when the TERR function is not available, because it cannot locate the weather vertically (i.e. with respect to the terrain).

VIEW ALONG AZIM XXX° — The message is associated with the azimuth value, when the flight crew selects the manual AZIM mode.

ELEVN AND TILT INDICATIONS



Indicates the selected altitude, in manual elevation mode.

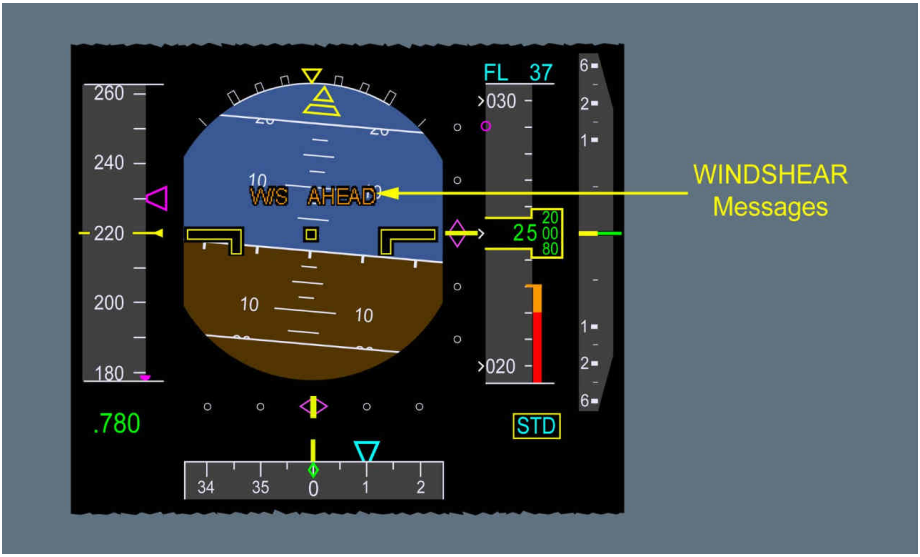


Indicates the selected tilt angle, in manual tilt mode.

PFD

Applicable to: ALL

PFD



WINDSHEAR MESSAGES

L12

W/S AHEAD — PWS detects a windshear in front of the aircraft, and triggers a caution. Flashes for 9 s, then remains steady.

L12

W/S AHEAD — PWS detects a windshear in front of the aircraft, and triggers a warning. Flashes for 9 s, then remains steady.

MEMO

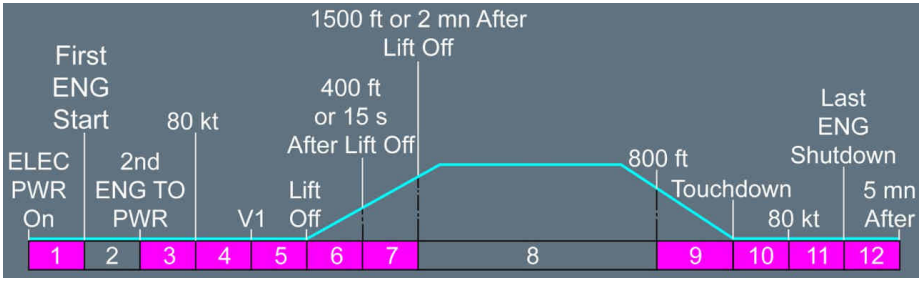
Applicable to: ALL

PRED W/S OFF

The flight crew sets the PRED W/S button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

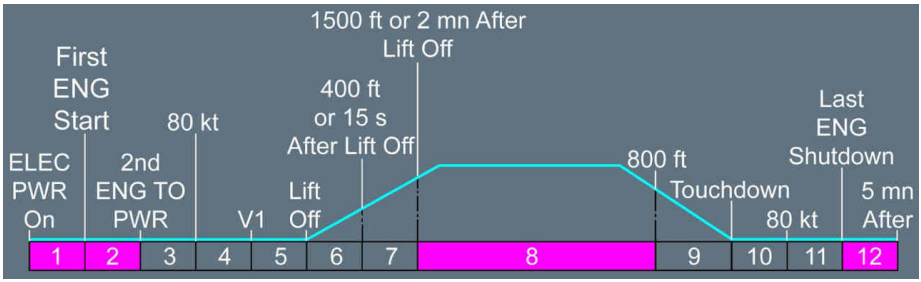


L1 PRED W/S OFF

The flight crew sets the PRED W/S button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

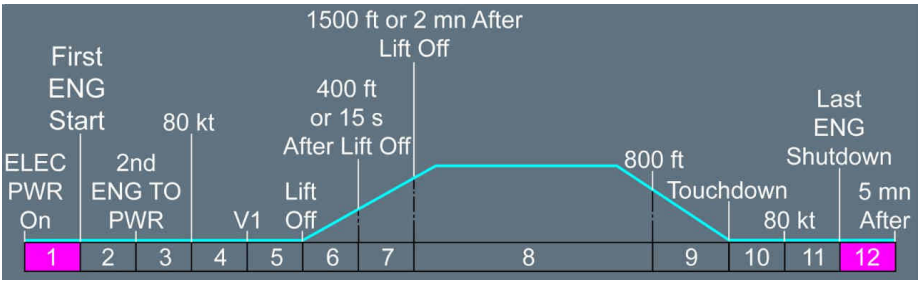


L1 WXR TURB OFF

The flight crew sets the TURB button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



L1 WXR ON

The aircraft is on ground, and the flight crew manually selects the WXR function.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

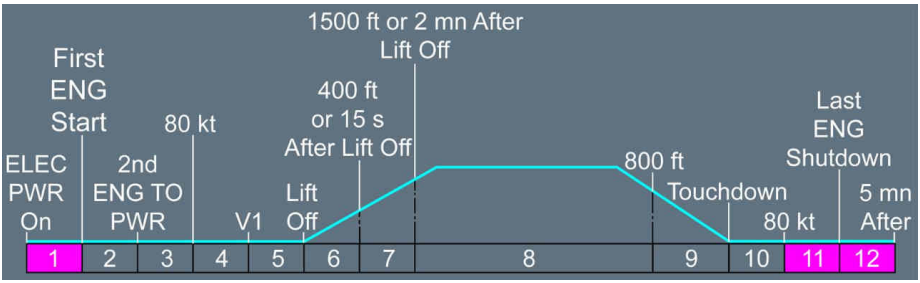


L1 WXR OFF

The flight crew sets the WXR button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



AURAL ALERTS

Applicable to: ALL

Aural Alert	Sound	Meaning
MONITOR RADAR DISPLAY	*(Audio not available in PDF)*	The PWS triggers a windshear caution, and the aircraft is not in a dangerous zone. For more information, *Refer to DSC-34-20-30-10 Predictive Windshear (PWS) Function* .
WINDSHEAR AHEAD, WINDSHEAR AHEAD	*(Audio not available in PDF)*	The PWS triggers a windshear warning during takeoff. For more information, *Refer to DSC-34-20-30-10 Predictive Windshear (PWS) Function* .
GO AROUND, WINDSHEAR AHEAD	*(Audio not available in PDF)*	The PWS triggers a windshear warning during approach. For more information, *Refer to DSC-34-20-30-10 Predictive Windshear (PWS) Function* .

Note: In the case of simultaneous alerts, the first aural alert may be partially triggered.

OVERVIEW

Applicable to: ALL

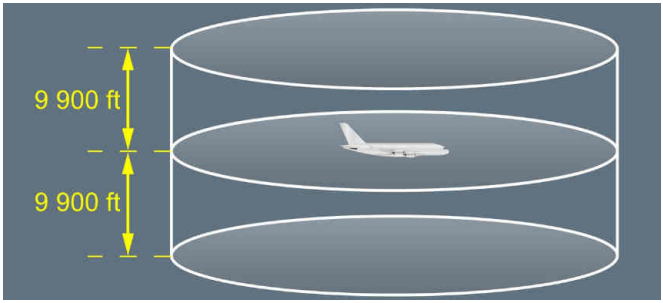
The Traffic Collision Avoidance System (TCAS):
- Detects and displays surrounding aircraft that have a transponder
- Calculates possible collision threats
- Triggers vertical speed orders, in order to avoid collisions.

PRINCIPLE

Applicable to: ALL

The TCAS detects intruders that are flying within a maximum range of 20 nm to 60 nm (depending on the aircraft configuration and external weather conditions), and within a maximum altitude of 9 900 ft above, and 9 900 ft below, the aircraft.

TCAS Range



L2 *Note: In some circumstances, TCAS intruders may be detected up to 100 nm.*

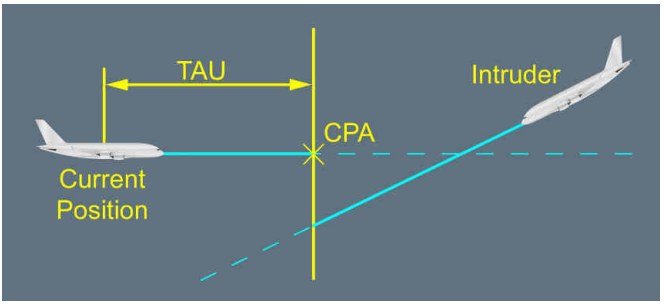
L1 The TCAS obtains data transmitted by the transponders of nearby aircraft, and uses this data to evaluate possible collision threats.

L2 The TCAS determines:
- The bearing of intruders, in relation to the bearing of the aircraft
- The distance between the aircraft and intruders, and the rate of separation or closure
- The relative altitude of intruders, if intruders have a Mode-C or Mode-S transponder.

The TCAS then calculates the intruder trajectory, the Closest Point of Approach (CPA), and the estimated time (TAU), before reaching the CPA.

L3 The TAU is the ratio between the distance that separates both aircraft, and the sum of their speed.

TAU Definition



L1 If the TCAS detects that the trajectory of an intruder may be a collision threat, it triggers:
- Aural and visual alerts
- Vertical speed orders, to ensure there is sufficient distance between the trajectory of the aircraft and the trajectory of the intruders. In addition, the TCAS takes all intruders into account, and adjusts the vertical speed orders, in order to avoid a collision.

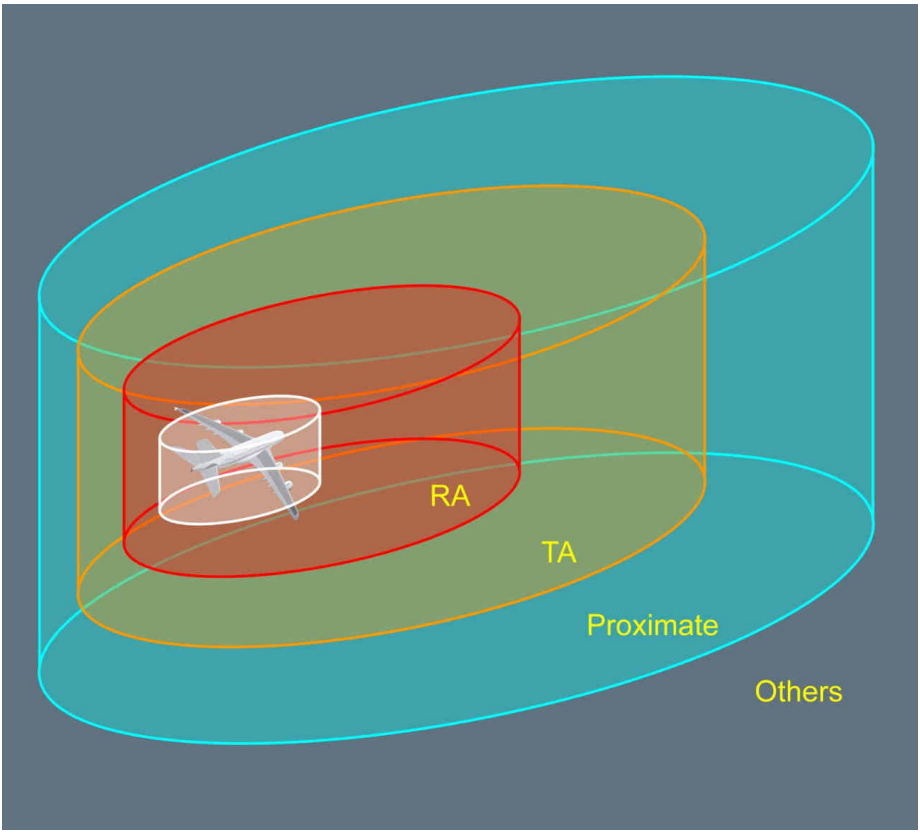
L2 If the aircraft is below 1 650 ft AGL in descent, or above 1 750 ft AGL in climb, the TCAS does not consider aircraft that are descending below 380 ft or below 400 ft while climbing. These aircraft are considered to be on ground.

INTRUDER DETECTION CATEGORIES

Applicable to: ALL

The TCAS divides the space surrounding the aircraft into the following four zones, in order to evaluate and categorize possible collision threats:
- Resolution Advisory (RA)
- Traffic Advisory (TA)
- Proximate intruders
- Other intruders.

TCAS Envelopes



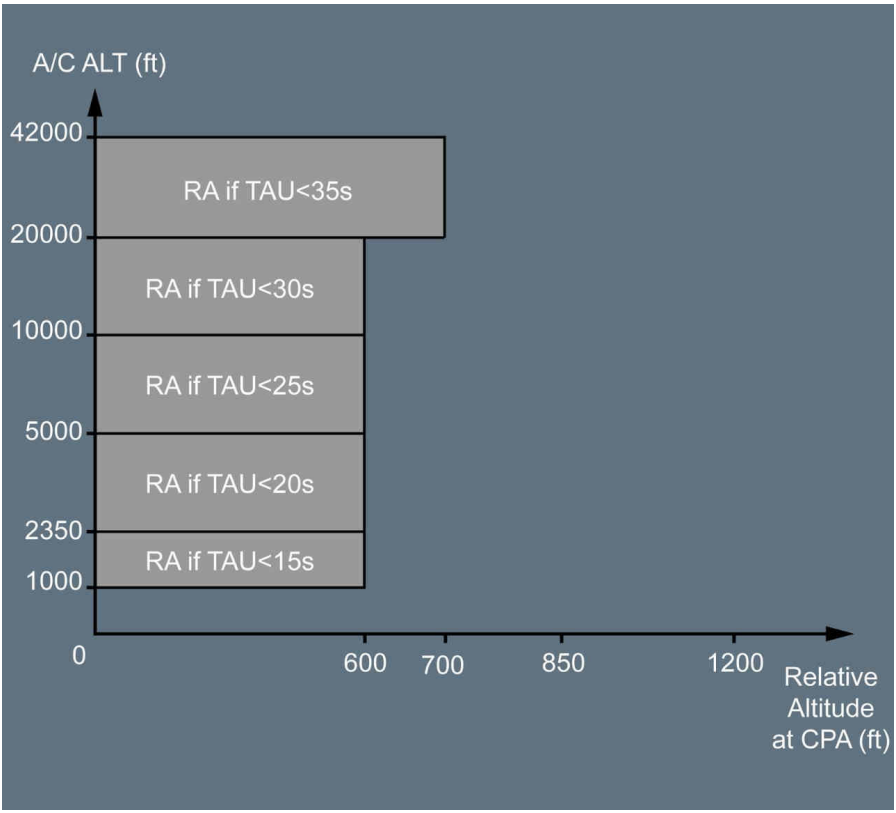
RESOLUTION ADVISORY (RA)

The TCAS triggers a Resolution Advisory (RA) to indicate that there is a high threat of collision.

There are two types of RAs:
- Preventive RA: The flight crew must monitor vertical speed
- Corrective RA: The flight crew must adjust vertical speed.

The PFD displays vertical speed orders that indicate the vertical direction that the aircraft should take, in order to avoid a collision.

RA Intruder



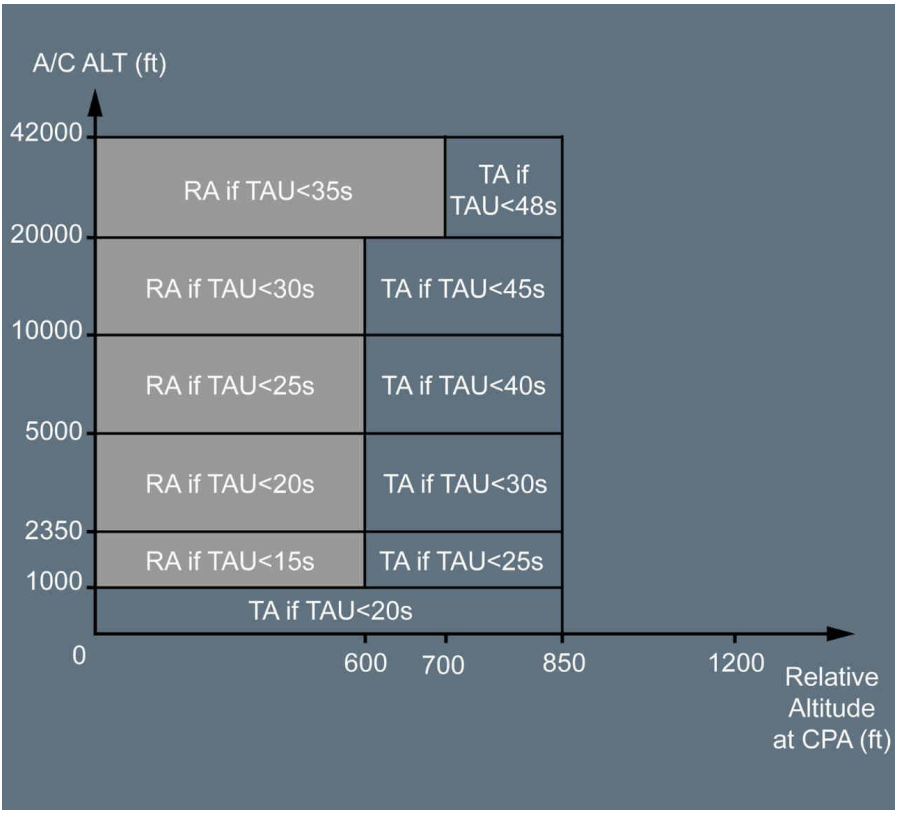
L2 The TCAS does not trigger RAs:
- Below 950 ft AGL in descent
- Below 1 100 ft AGL in climb.

L1 The TCAS associates aural alerts with the RAs.

TRAFFIC ADVISORY (TA)

The TCAS triggers a Traffic Advisory (TA) to indicate a possible collision threat. This advisory helps the flight crew to visually locate the intruder. It also prepares the flight crew for a possible RA. However, a TA may not always occur before an RA.

RA/TA Intruder



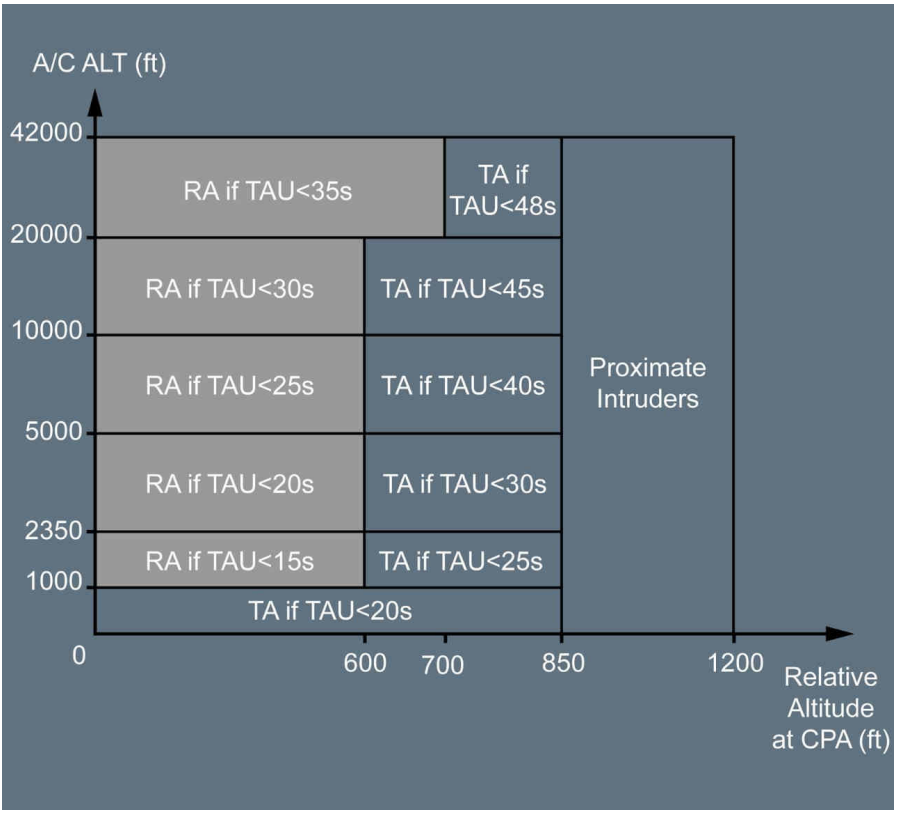
The TCAS associates aural alerts with the TAs.

PROXIMATE INTRUDER

The TCAS monitors intruders that are in proximity of the aircraft, but that are not a collision threat. These are called proximate intruders.

L2 The difference in altitude between the aircraft and the proximate intruder is less than 1 200 ft, and they are within 6 nm of each other.

RA/TA / Proximate Intruder

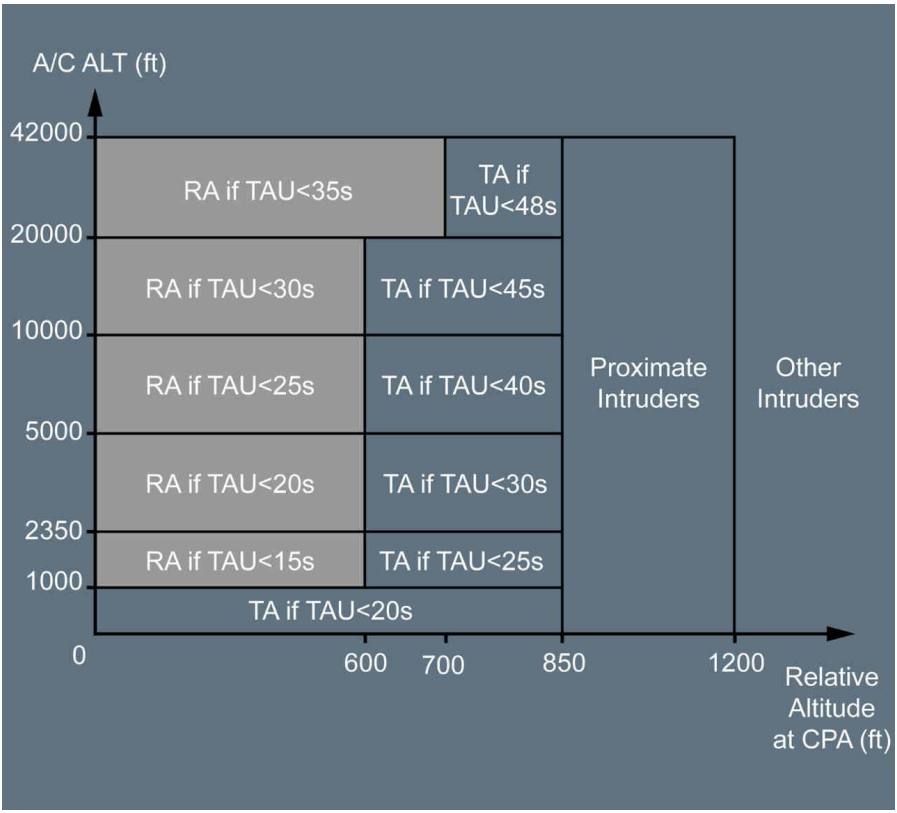


OTHER INTRUDERS

The TCAS monitors intruders that are in the detection envelope of the TCAS, but are not in the proximate intruder, TA, or RA category.
These are called other intruders.

L2 The difference in altitude between the aircraft and the other intruder is between 1 200 ft and 9 900 ft above or below.

Other Intruders



TCAS MODES

Applicable to: ALL

The TCAS has three different modes of operation:
- The Traffic Advisory/Resolution Advisory (TA/RA) mode
- The Traffic Advisory Only (TA ONLY) mode
- The standby (STBY) mode.

TRAFFIC ADVISORY/RESOLUTION ADVISORY (TA/RA) MODE

The Traffic Advisory/Resolution Advisory (TA/RA) mode is the default TCAS mode.

The TA/RA mode enables:
- The ND to display all intruders
- The PFD to display the vertical speed scale
- The triggering of aural alerts.

TRAFFIC ADVISORY ONLY (TA ONLY) MODE

If the TCAS is in TA ONLY mode:
- All RAs are inhibited, and become TAs
- The PFD does not display vertical speed areas
- The ND displays the TA ONLY message
- The TAU is 20 s, regardless of the aircraft altitude.

TA ONLY mode can be selected manually, or automatically.

MANUAL SELECTION

The flight crew can manually select the TA ONLY mode by:
- Pressing the TA pb on the SURV panel, or
- Selecting the TA ONLY option on the SURV CONTROLS page of the MFD.

For more information on the manual selection of the TA ONLY mode, *Refer to FCTM/SUPPLEMENTARY INFORMATION/TCAS*.

AUTOMATIC SELECTION

The TA ONLY mode is automatically selected, if:
- One of the following alerts is triggered, and/or
  - Windshear
  - Stall
  - TAWS.

  The TCAS returns to TA/RA mode, when the alert is finished.
- The aircraft is below 1 000 ft±100 ft, and/or
- The aircraft is in emergency electrical configuration.
  In this case, the flight crew can also select the standby mode.

STANDBY (STBY) MODE

In the standby mode, the TCAS does not perform any TCAS function, and does not trigger any alert.
The PFD and the ND do not display any TCAS information.

The STBY mode is associated with:
- The TCAS STBY message on the ND
- The TCAS STBY MEMO.

TCAS DISPLAY SELECTION

Applicable to: ALL

The ND displays intruders that enter the zone surrounding the aircraft, when:
- In ROSE or ARC mode
- • The flight crew presses the TRAF pb on the EFIS CP, or
  • The flight crew did not press the TRAF pb on the EFIS CP, and the TCAS triggers an alert.

Note: If the ND is in PLAN mode, the ND does not display intruders.

When the aircraft is below 1 700 ft AGL, all advisories indicating intruders below 380 ft AGL are inhibited.

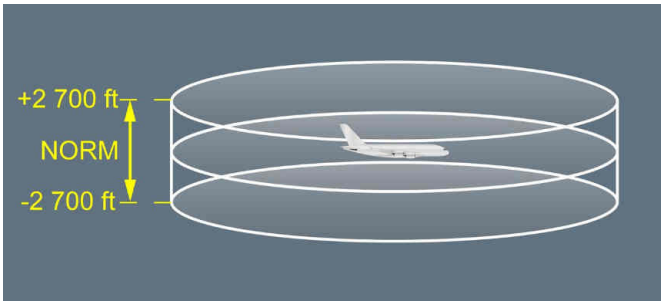
L2 The TCAS manages up to 60 intruders, but the ND displays the 8 most threatening intruders only.

L1 There are three types of TCAS displays:
- Normal (NORM)
- Above (ABV)
- Below (BLW).

NORMAL

NORM is the default selection.
In NORM, the TCAS displays intruders that are between 2 700 ft below, and 2 700 ft, above the aircraft.

Normal Mode

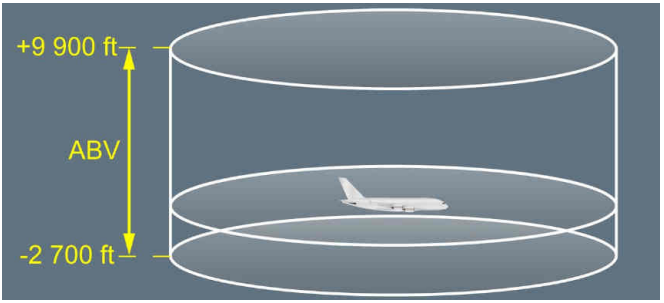


The flight crew can select the NORM TCAS display by:
- Deselecting the ABV pb and the BLW pb on the SURV panel, or
- Selecting the NORM option on the SURV/CONTROLS page of the MFD.

ABOVE (ABV)

In ABV mode, the TCAS displays intruders that are between 2 700 ft below, and 9 900 ft above, the aircraft.

Above Mode

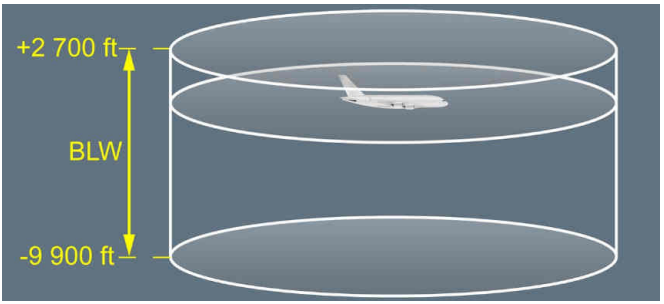


The flight crew can select the ABV TCAS display by:
- Pressing the ABV pb on the SURV panel, or
- Selecting the ABV option on the SURV/CONTROLS page of the MFD.

BELOW (BLW)

In BLW mode, the TCAS displays intruders that are between 9 900 ft below, and 2 700 ft above, the aircraft.

Below Mode



The flight crew can select the BLW TCAS display by:

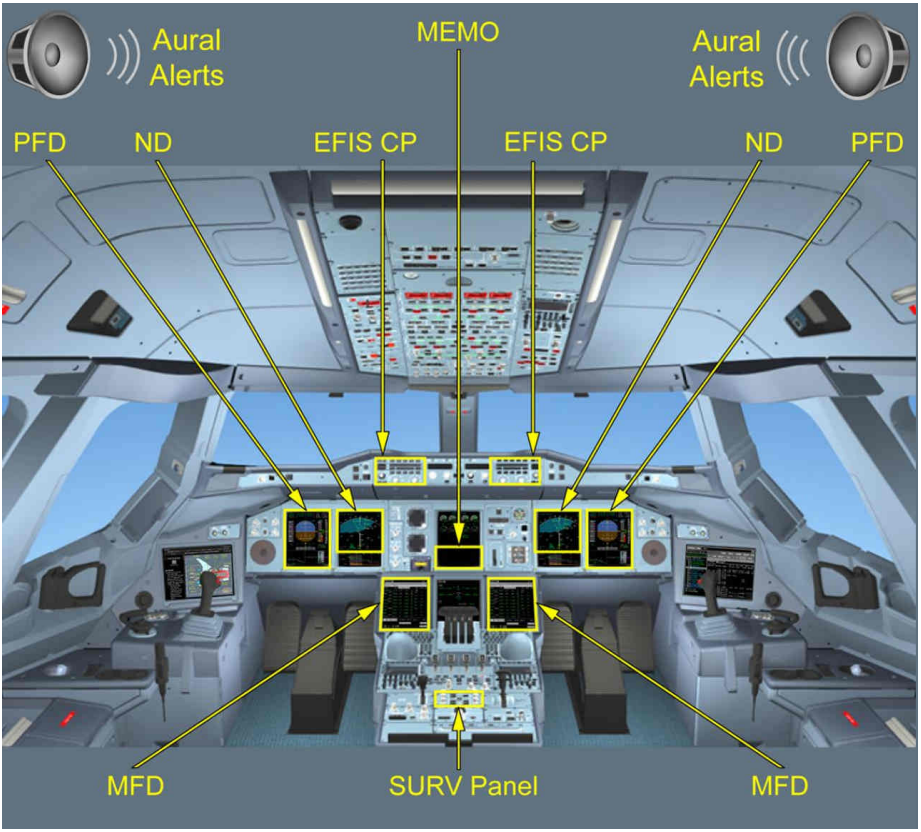
- Pressing the BLW pb on the SURV panel, or
- Selecting the BLW option on the SURV/CONTROLS page of the MFD.

Intentionally left blank

COCKPIT VIEW

Applicable to: ALL

Cockpit View



EFIS CONTROL PANEL

Applicable to: ALL

EFIS CP



TRAF pb



The onside ND displays traffic information.

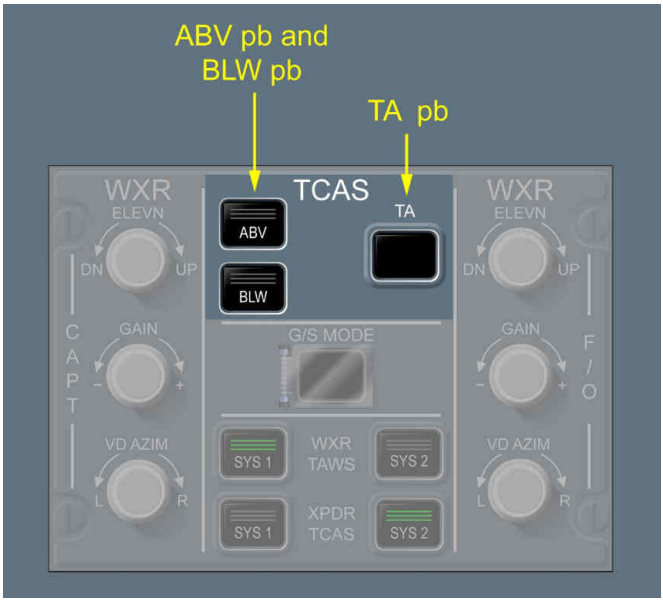


The onside ND does not display traffic information.

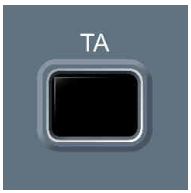
SURV PANEL

Applicable to: ALL

SURV Panel



TA pb



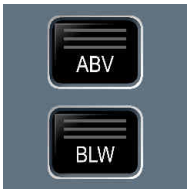
The TCAS is in TA/RA mode.

L12

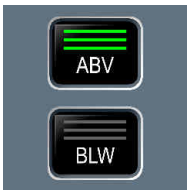


The TCAS is in TA ONLY mode.
Associated with the TA ONLY message on the ND.

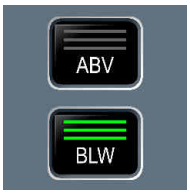
ABV pb AND BLW pb



The TCAS display is in NORM mode.



The TCAS display is in ABV mode.

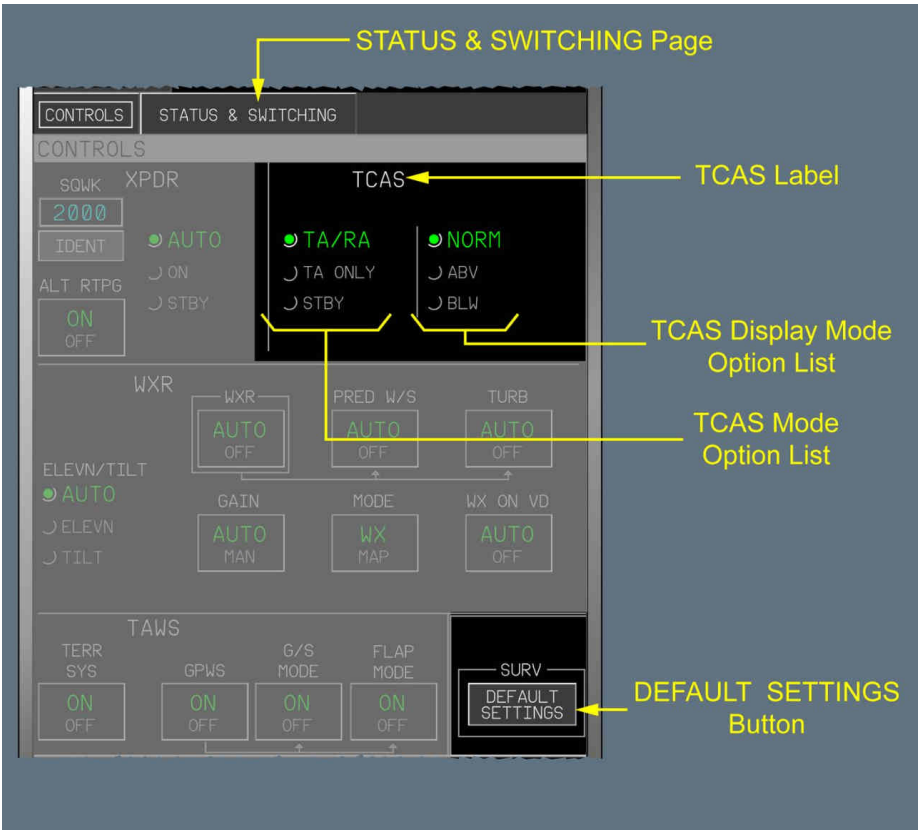


The TCAS display is in BLW mode.

MFD

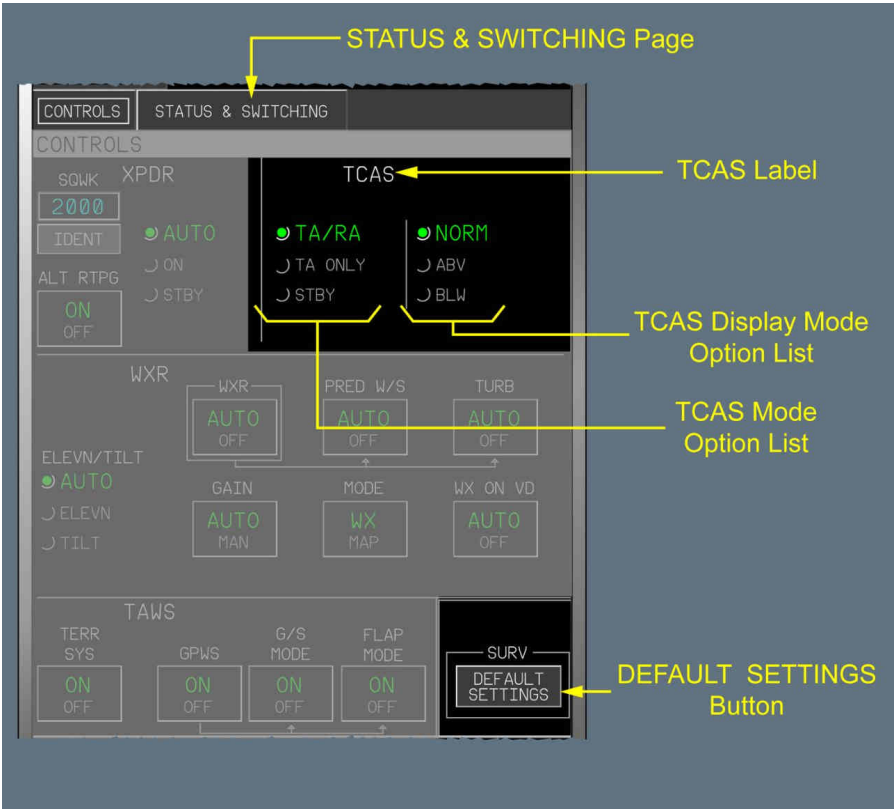
Applicable to: ALL

SURV Pages



CONTROLS PAGE

CONTROLS Page



TCAS LABEL

TCAS is on.

The TCAS or XPDR is failed.

TCAS MODE OPTION LIST



The flight crew selects the TA/RA mode.

L12



The flight crew selects the TA ONLY mode.
Associated with the TA ONLY message on the ND.

L12



The flight crew selects the STBY mode. The TCAS does not provide any alerts or displays.

Associated with:
- The TCAS STBY message on the ND
- The TCAS STBY MEMO.



The XPDR is on standby.

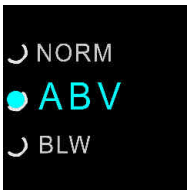


The TCAS or XPDR is failed.

TCAS DISPLAY MODE OPTION LIST



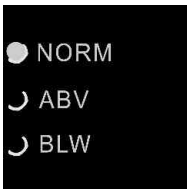
The flight crew selects the NORM mode.



The flight crew selects the ABV mode.



The flight crew selects the BLW mode.



- The XPDR is on standby, or
- The TCAS or XPDR is failed.

DEFAULT SETTINGS BUTTON

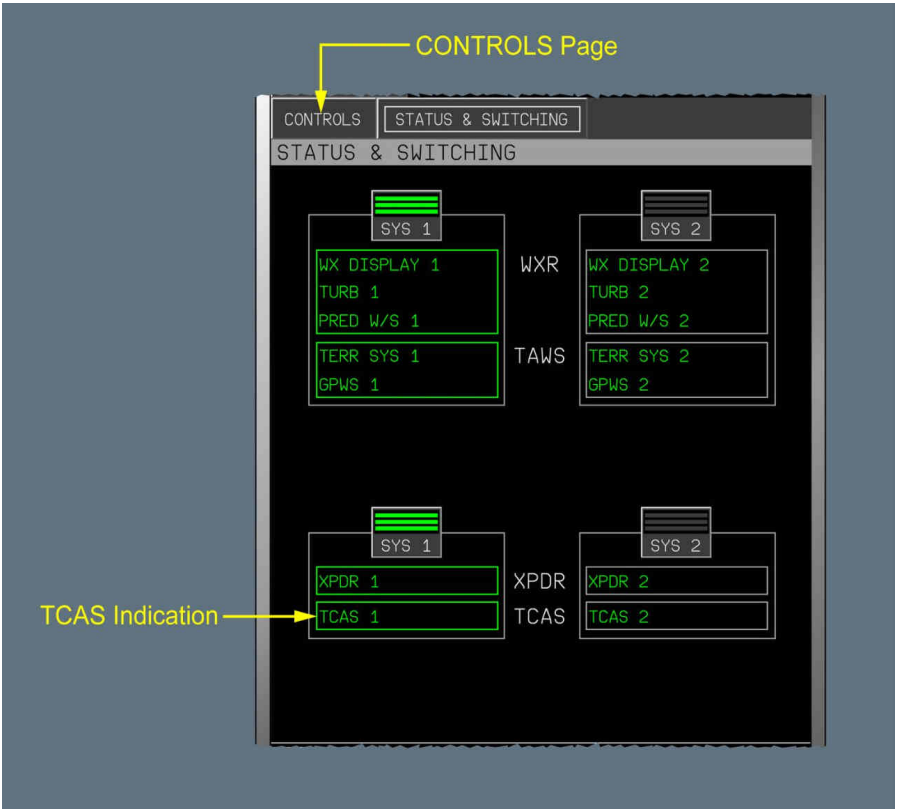


When clicked, automatically sets all the TCAS settings to their default position on both MFDs. A confirmation is necessary in order to set the default positions.

- The TCAS mode option list is set to TA/RA
- The TCAS display mode option list is set to NORM.

STATUS & SWITCHING PAGE

STATUS & SWITCHING Page



- Green indicates that the function is on
  The green box indicates that the function is selected.
- White indicates that the function is set to OFF, or is on standby
- Amber indicates that the function is failed.

TCAS INDICATION



The TCAS is on, on SURV SYS 1(2).



The TCAS is failed on SURV SYS 1(2).



The TCAS is not operating on SURV SYS 1(2).

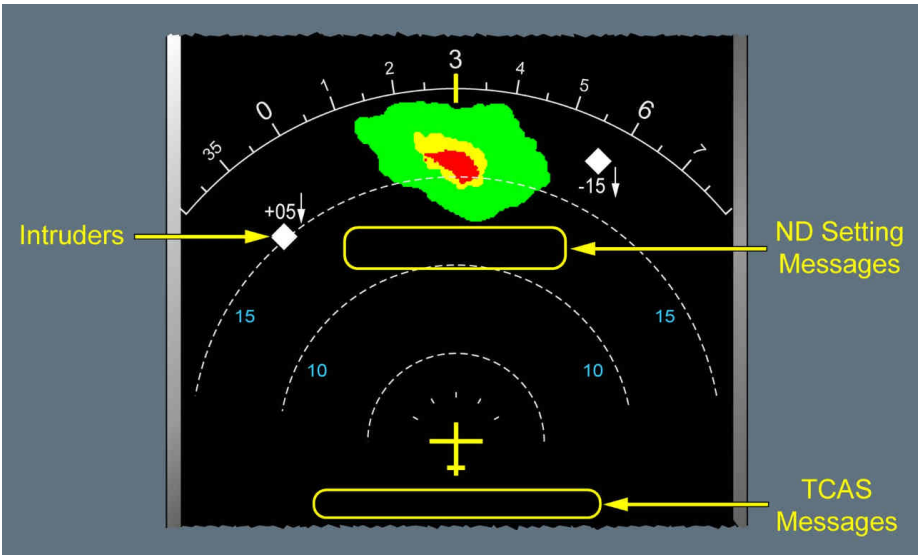


The TCAS is failed, and set to OFF.

ND

Applicable to: ALL

ND



The ND automatically displays the intruders, if the TCAS triggers an alert.
L2 The TRAF pb is automatically selected on the EFIS CP .

INTRUDERS

The following symbols indicate the range and location of intruders:

- An intruder is in the RA range.
- An intruder is in the TA range.
- An intruder is in the proximate range.
- Other intruder.

These symbols appear with:
- Two digits, that indicate the relative altitude of the intruder (in hundreds of feet)
  They appear below the symbol, if the intruder is below the aircraft, and above the symbol if the intruder is above the aircraft.
- A plus (+) or minus (-) symbol that appears to the left of the digits, and that indicates if the intruder is above (+) or below (-) the aircraft
- An arrow, to the right of the digits, that indicates the vertical movement of the intruder.

TCAS MESSAGES

22.1 NM +12↑	Provides information (range, relative altitude, and vertical speed arrow) about the two most dangerous RA intruders without bearing.
22.1 NM +12↑	Provides information (range, relative altitude, and vertical speed arrow) about the two most dangerous TA intruders without bearing.
TA ONLY	The flight crew selects the TA ONLY mode, by: - Pressing the TA pb on the SURV panel, or - Setting the TCAS mode option list to TA ONLY on the SURV CONTROLS page of the MFD.
TCAS	The TCAS is failed, and the TRAF pb is pressed on the EFIS CP.
TCAS STBY	The TRAF pb is pressed on the EFIS CP, and: - The TCAS is on standby, or - The XPDR is on standby, or - The XPDR is failed.
TCAS TEST	The TCAS is in test, and the TRAF pb is pressed on the EFIS CP

ND SETTING MESSAGES

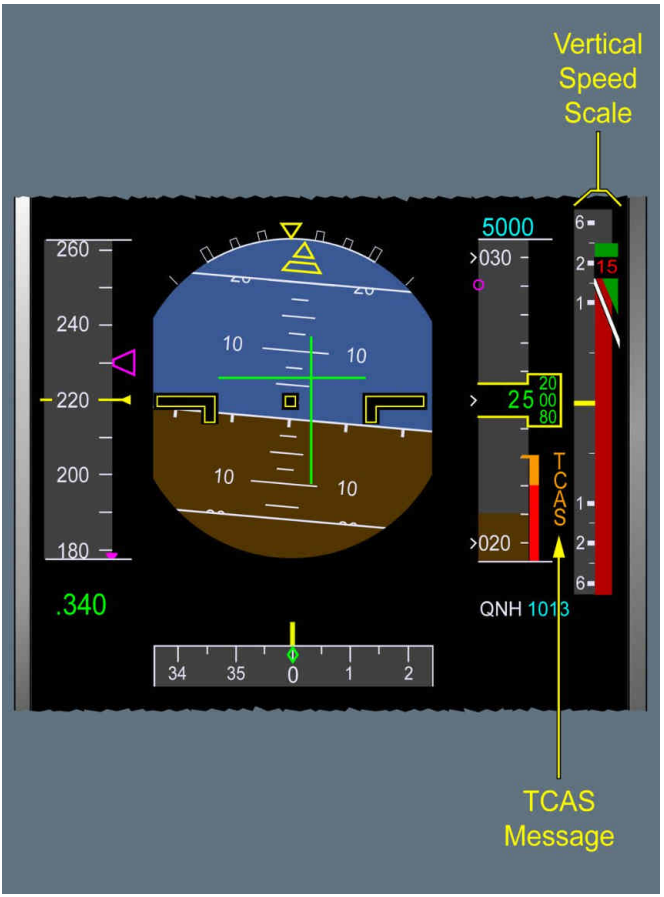
TCAS: INCREASE RANGE	Appears in ROSE-VOR or ROSE-LS mode, when: - The flight crew sets the range selector to ZOOM - The aircraft is not on ground - The TCAS identifies at least one TA intruder. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .

TCAS: INCREASE RANGE	Appears in ROSE-VOR or ROSE-LS mode, when: - The flight crew sets the range selector to ZOOM - The aircraft is not on ground - The TCAS identifies at least one RA intruder. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
TCAS: REDUCE RANGE	Appears, when: - The flight crew selects a range on the EFIS CP that is more than 40 nm - The TCAS identifies at least one TA intruder. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
TCAS: REDUCE RANGE	Appears, when: - The flight crew selects a range on the EFIS CP that is more than 40 nm - The TCAS identifies at least one RA intruder. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
TCAS: CHANGE MODE	Appears in PLAN mode, when the TCAS identifies at least one TA intruder. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .
TCAS: CHANGE MODE	Appears in PLAN mode, when the TCAS identifies at least one RA intruder. For more information, *Refer to 31 / EFIS / ND / ND MESSAGES* .

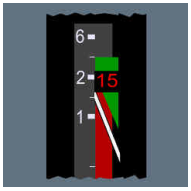
PFD

Applicable to: ALL

PFD



VERTICAL SPEED SCALE



When the TCAS triggers an RA, green and red areas appear instead of the grey background:

- A red area indicates the vertical speed range that is not authorized
- A green area indicates the vertical speed range within which the aircraft should fly, in order to avoid a threat of collision with one or more intruders.

Note: *The aircraft can also fly in the grey vertical speed range area without a threat of collision.*

TCAS MESSAGE



The TCAS is failed.

MEMO

Applicable to: ALL

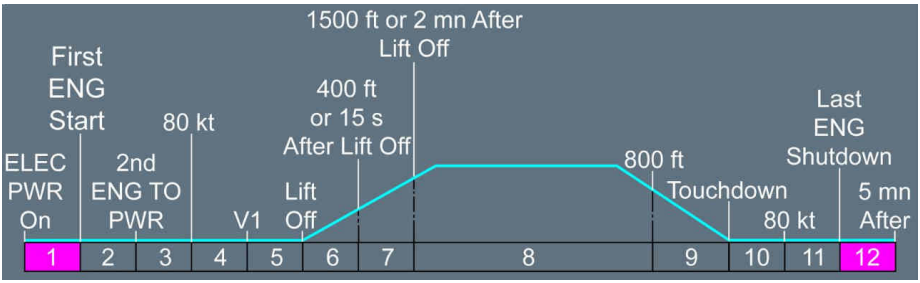
TCAS STBY

The flight crew:

- Selects STBY in the TCAS mode option list on the SURV CONTROLS page of the MFD, or
- Selects STBY in the XPDR mode option list on the SURV CONTROLS page of the MFD, or
- Sets the ALT RPTG button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



AURAL ALERTS

Applicable to: ALL

Aural Alert	Sound	Meaning	Inhibition Condition
TRAFFIC, TRAFFIC	*(Audio not available in PDF)*	The TCAS triggers a TA.	TA is inhibited, if the aircraft is: - Below 400 ft AGL in descent - Below 600 ft AGL in climb.
CLIMB, CLIMB	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The aircraft must climb with the vertical speed that is indicated by the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
CLIMB, CROSSING CLIMB, CLIMB, CROSSING CLIMB	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and the aircraft will cross the intruder's altitude. The aircraft must climb with the vertical speed that is indicated by the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
INCREASE CLIMB, INCREASE CLIMB	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a CLIMB alert. The vertical speed is not sufficient to achieve safe vertical separation.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
CLIMB, CLIMB NOW, CLIMB, CLIMB NOW	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a DESCEND alert. The intruder's trajectory has changed.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
DESCEND, DESCEND	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The aircraft must descend with the vertical speed that is indicated by the green area on vertical speed scale of the PFD.	RAs are inhibited if the aircraft is: - Below 1 000 ft AGL in descent - Below 1 200 ft AGL in climb.

Continued on the following page

Continued from the previous page

Aural Alert	Sound	Meaning	Inhibition Condition
DESCEND, CROSSING DESCEND, DESCEND, CROSSING DESCEND	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and the aircraft will cross the intruder's altitude. The aircraft must descend with the vertical speed that is indicated by the green area on vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
INCREASE DESCENT, INCREASE DESCENT	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a DESCEND alert. The vertical speed is not sufficient to achieve safe vertical separation.	RAs are inhibited if the aircraft is: - Below 1 450 ft AGL in descent - Below 1 650 ft AGL in climb.
DESCEND, DESCEND NOW, DESCEND, DESCEND NOW	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a CLIMB alert. The intruder's trajectory has changed.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
ADJUST VERTICAL SPEED, ADJUST	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The flight crew must adjust the vertical speed in the green area on the vertical speed scale of the PFD, as appropriate.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
MONITOR VERTICAL SPEED	*(Audio not available in PDF)*	The TCAS triggers a preventive RA. The flight crew must ensure that vertical speed remains outside the red area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
MAINTAIN VERTICAL SPEED, MAINTAIN	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The flight crew must maintain the vertical speed that is indicated in the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and the aircraft will cross the intruder's altitude. The flight crew must maintain the vertical speed that is indicated in the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
CLEAR OF CONFLICT	*(Audio not available in PDF)*	The range increases, and separation is sufficient.	

Note: In the case of simultaneous alerts, the first aural alert may be partially triggered.

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OVERVIEW

Applicable to: ALL

The transponder (XPDR) responds to Air Traffic Control (ATC) requests, and helps the ground controller to identify and locate each aircraft, and monitor air traffic.
The XPDR supports the TCAS surveillance function, and uses the TCAS/MODE S antennas.
The MFDs display the XPDR status.

Both SURV SYS 1 and SYS 2 interface with the RMPs, in order to:
- Control the transponder code
- Activate the identification function
- Synchronize data displayed on the MFDs.

PRINCIPLE

Applicable to: ALL

The XPDR automatically responds to requests:
- From the ATC, to ensure effective air traffic surveillance
- From another aircraft that has a TCAS, to ensure that traffic alerts are triggered.

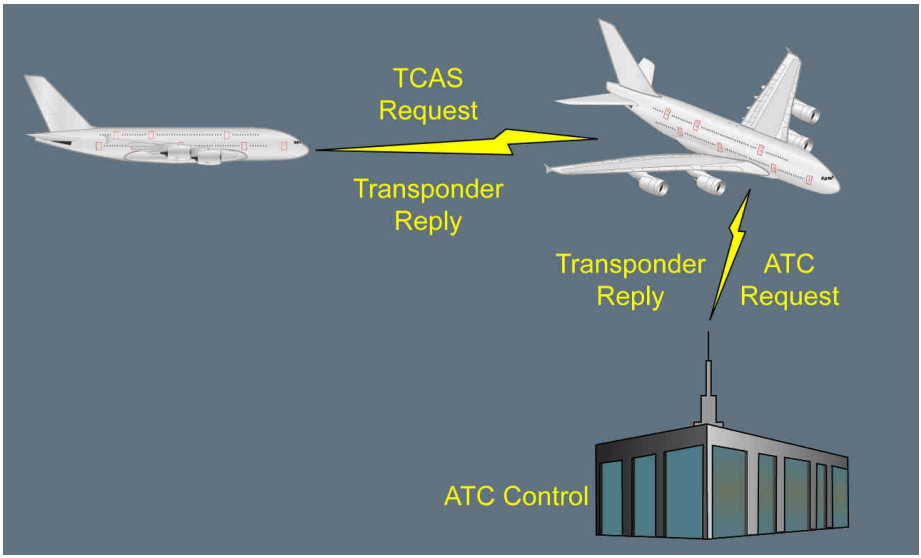
The XPDR provides the ATC with:
- Mode A: Transmission of aircraft identification
- Mode C: Transmission of aircraft barometric altitude
- Mode S: Selective calling.

The XPDR receives information from:
- Aircraft that have a TCAS
- Mode S ground stations.

L2 ADIRU 1 and 2 provide the necessary parameters to each XPDR function on both SURV SYS.

The XPDR transmits the following parameters to the ATC center, upon ground request:
- The indicated airspeed, Mach number, and baro vertical speed, that are supplied by the ADRs
- The magnetic heading, ground speed, track angle, track angle rate, and inertial vertical speed, that are all supplied by the IRs
- The selected altitude and barometric reference settings supplied by the FCUs.

XPDR Principle



XPDR MODES

Applicable to: ALL

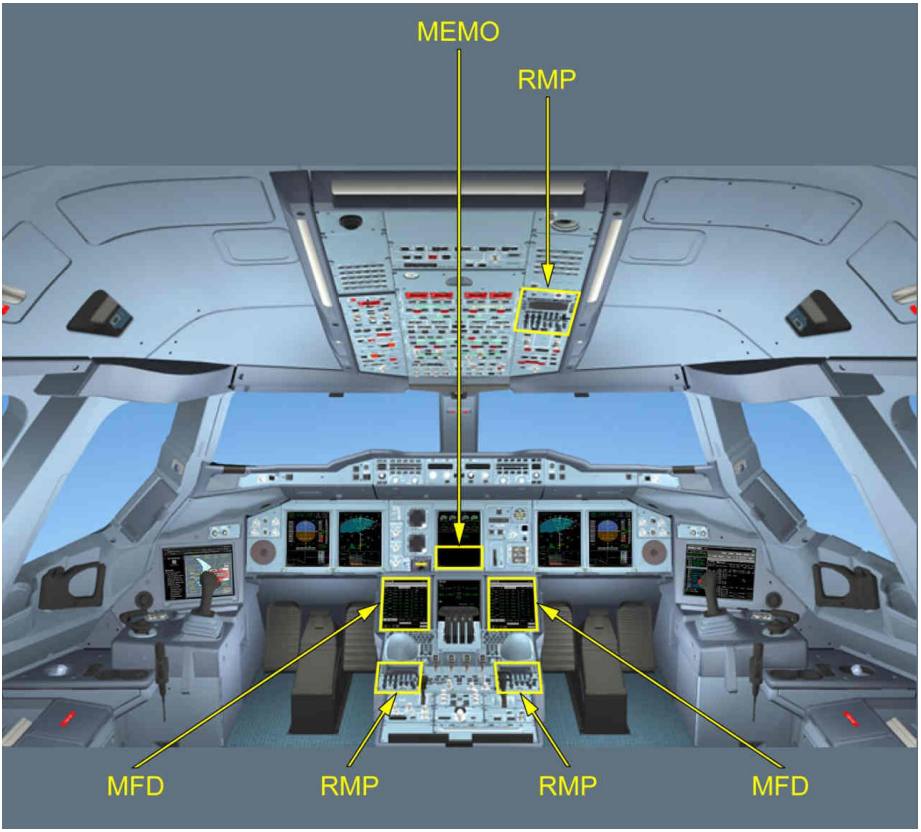
The XPDR has three different modes of operation:

- AUTO
  - In flight, all XPDR functions are operative
  - On ground, modes A and C are inhibited. Mode S is operative (selective calling).
- ON
  Mode S continuously transmits information to other aircraft and replies to requests from aircraft and ground stations. On ground, the XPDR can also reply to MODE A or C requests.
- STBY.
  The XPDR does not transmit either reply to ground stations and other aircraft. The TCAS is also in the standby mode.

COCKPIT VIEW

Applicable to: ALL

Cockpit View



RMP

Applicable to: ALL

RMP

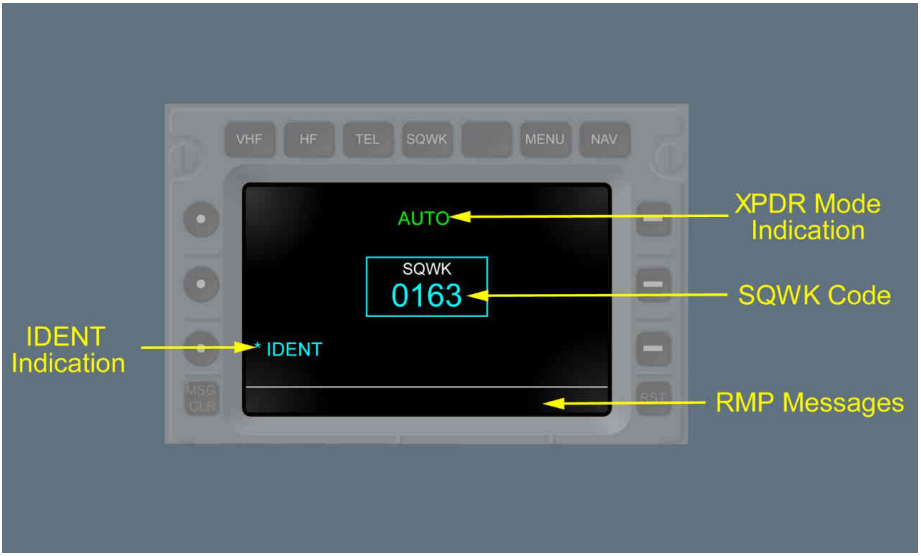


SQWK PAGE ACCESS KEY



When pressed, RMP 1(2)(3) displays the SQWK page. The flight crew can enter the XPDR code on the SQWK page.

SQWK Page



XPDR MODE INDICATION



The flight crew selects the AUTO mode.



The flight crew selects the ON mode.



The flight crew selects the STBY mode.

SQWK CODE



The flight crew enters a SQWK code.



The flight crew enters an erroneous digit in the SQWK code.
Associated with the SQUAWK CODE NOT VALID message in the RMP messages area.

If the flight crew attempts to manually validate the erroneous SQWK code:
- The previous valid code appears, instead of the erroneous SQWK code
- The RMP messages area displays the SQUAWK CODE REVERTED TO PREV ENTRY message.

IDENT INDICATION



The associated ADK key enables the flight crew to send the aircraft identification signal.
This is the default position.



The star symbol disappears for 5 s, after the flight crew presses the ADK 3 key, in order to send the aircraft identification signal.

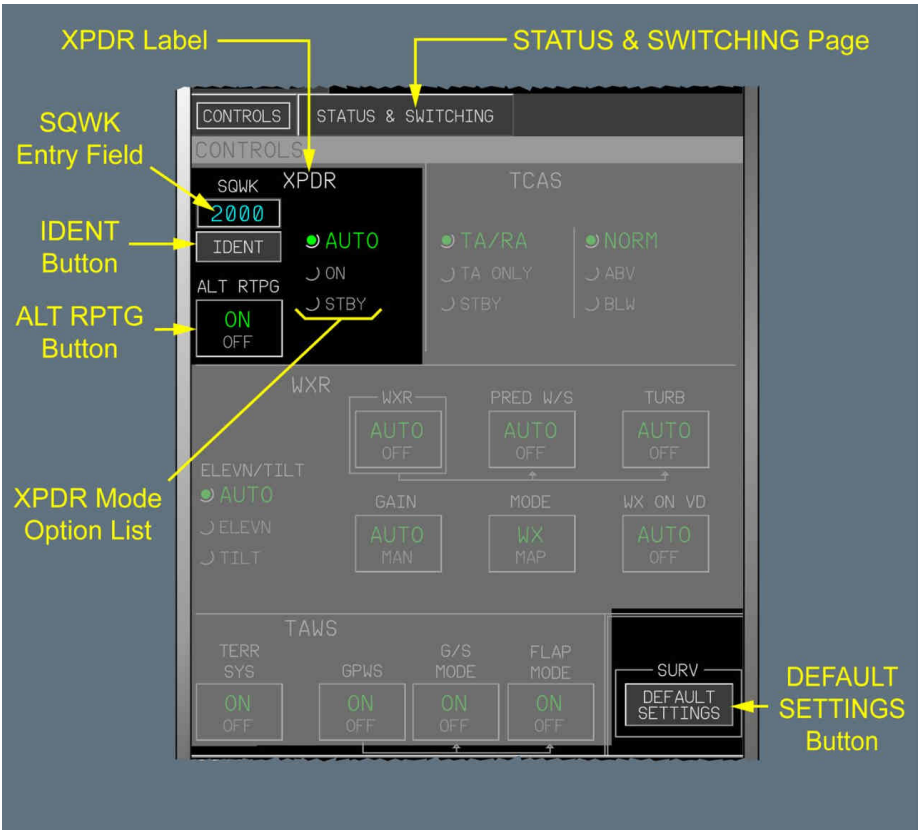
RMP MESSAGES

SQUAWK CODE NOT VALID	The flight crew enters an erroneous SQWK code.
SQUAWK CODE REVERTED TO PREV ENTRY	The flight crew attempts to manually validate an erroneous or incomplete SQWK code.
TRANSMITTING IDENT	The aircraft identification signal has been transmitted.

MFD

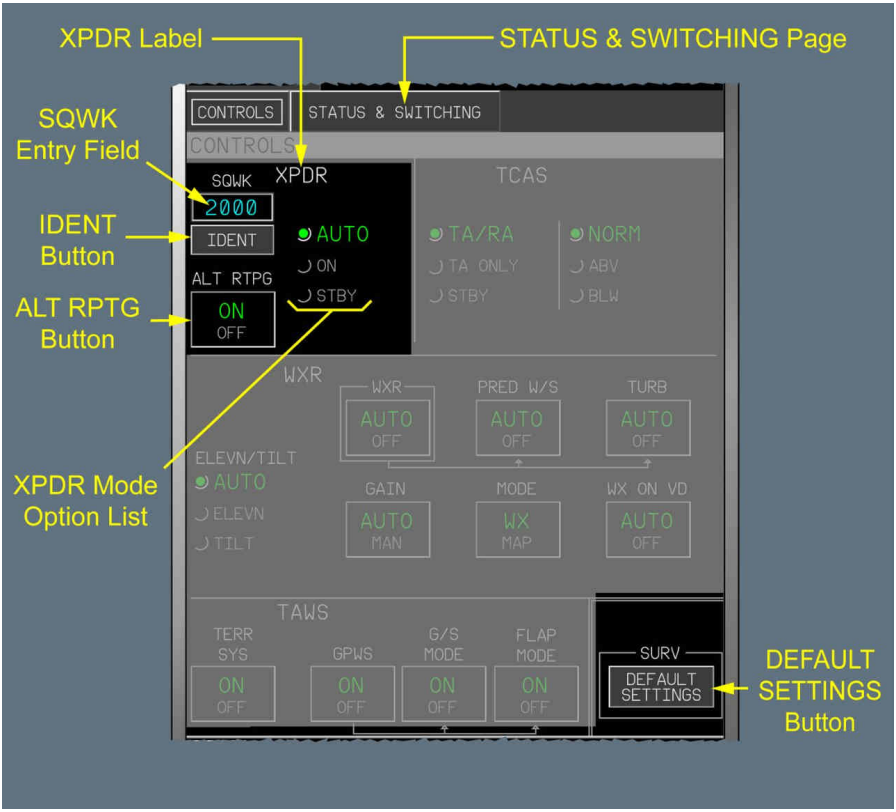
Applicable to: ALL

SURV Pages



CONTROLS PAGE

CONTROLS Page



XPDR LABEL

XPDR The XPDR is on.

XPDR The XPDR is failed.

XPDR MODE OPTION LIST

L12



The flight crew selects the AUTO mode.
Associated with the AUTO message on the RMP SQWK page.

L12



The flight crew selects the ON mode.

Associated with:
- The ON message on the RMP SQWK page
- The ON message on the RMP HF page, RMP VHF page, and RMP TEL page.

L12



The flight crew selects the STBY mode. The XPDR neither transmits information, nor replies to other aircraft or ground stations.

When selected:
- The TCAS display mode option list is no longer available
- The TCAS mode option list is no longer available
- The ALT RPTG button is set to OFF and is no longer available.

Associated with:
- The STBY message on the RMP SQWK page
- The STBY message on the RMP HF page, RMP VHF page, and RMP TEL page
- The TCAS STBY message on the ND
- The XPDR STBY and the TCAS STBY MEMOs.

ALT RPTG BUTTON



The flight crew activates the altitude data transmission.

When selected:
- The TA/RA option is selected on the TCAS mode option list
- The NORM option is selected on the TCAS display mode option list.

L12



The flight crew deactivates the altitude data transmission.

When selected:
- The TCAS mode option list is not available
- The TCAS display mode option list is not available.

Associated with:
- The TCAS STBY message on the ND
- The ALT RPTG OFF and the TCAS STBY MEMOs.



The XPDR is in STBY mode.



The XPDR is failed.

SQWK ENTRY FIELD



The XPDR is on.
The flight crew can enter the XPDR code in the entry field.



The XPDR is on.
The flight crew modifies the XPDR code in the entry field. It automatically updates the SQWK value on the RMP.



The XPDR is failed.

IDENT BUTTON



When clicked, the aircraft identification signal is sent.



The XPDR is failed.

DEFAULT SETTINGS BUTTON

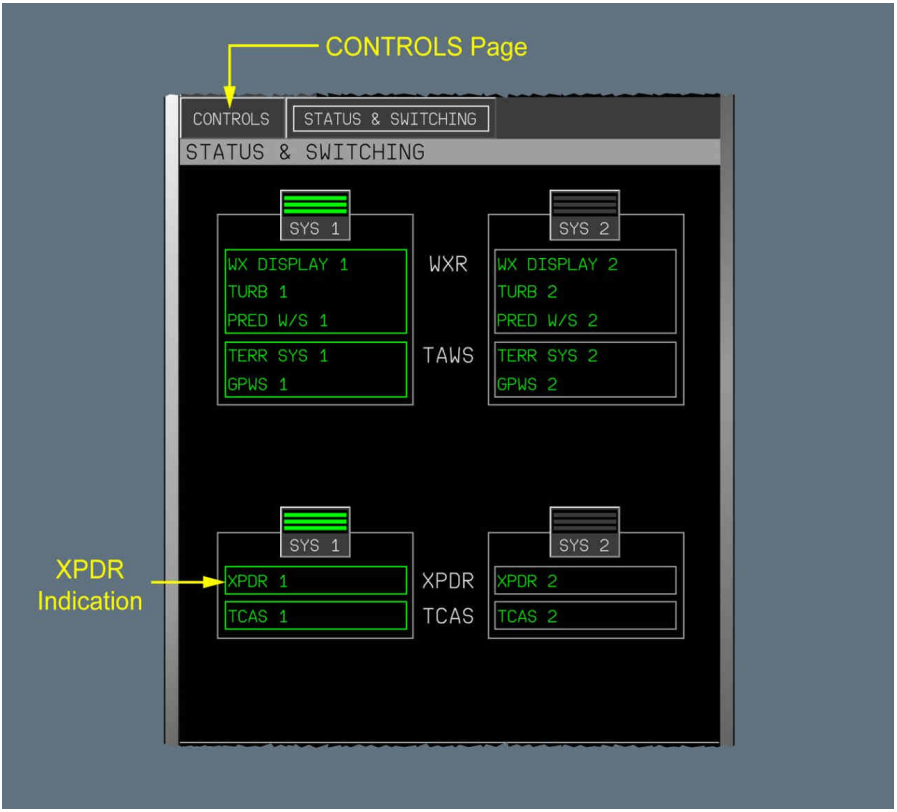


When clicked, automatically sets all the XPDR settings to their default position on both MFDs. A confirmation is necessary in order to set the default positions.

- The XPDR mode option list is set to AUTO
- The ALT RPTG button is set to ON.

STATUS & SWITCHING PAGE

STATUS & SWITCHING Page



- Green indicates that the function is on
  The green box indicates that the function is selected.
- White indicates that the function is set to OFF, or is on standby
- Amber indicates that the function is failed.

XPDR INDICATION



The XPDR is on, on SURV SYS 1(2).



The XPDR is failed on SURV SYS 1(2).



The XPDR is not operating on SURV SYS 1(2).



The XPDR is failed, and set to OFF.

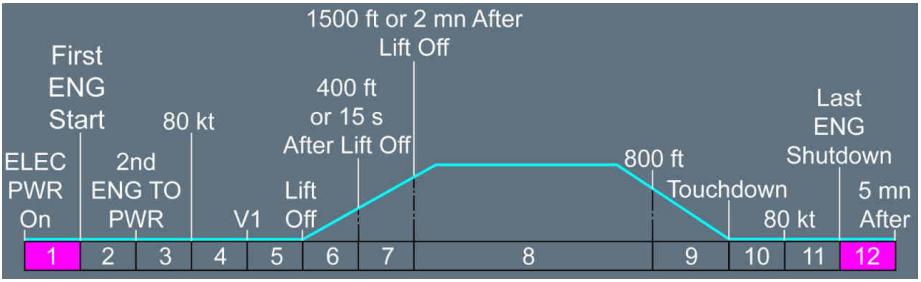
MEMO

Applicable to: ALL

ALT RPTG OFF	The flight crew has set the ALT RPTG button to OFF on the SURV CONTROLS page of the MFD.
XPDR STBY	The flight crew has selected STBY in the XPDR mode option list on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



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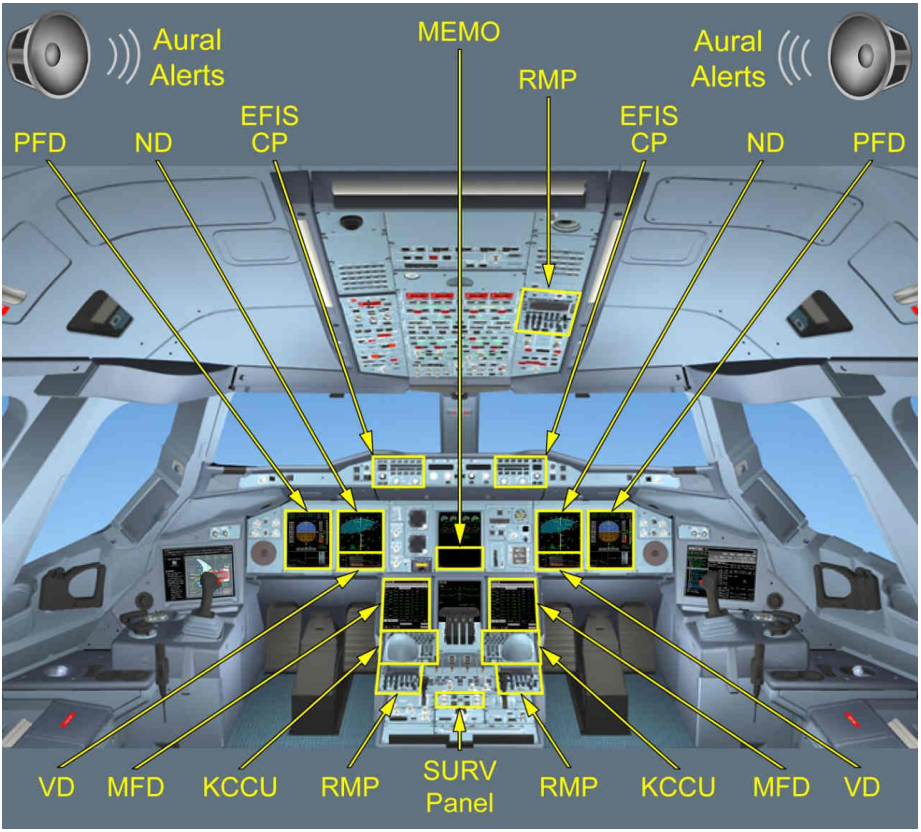
COCKPIT VIEW

Applicable to: ALL

Cockpit View



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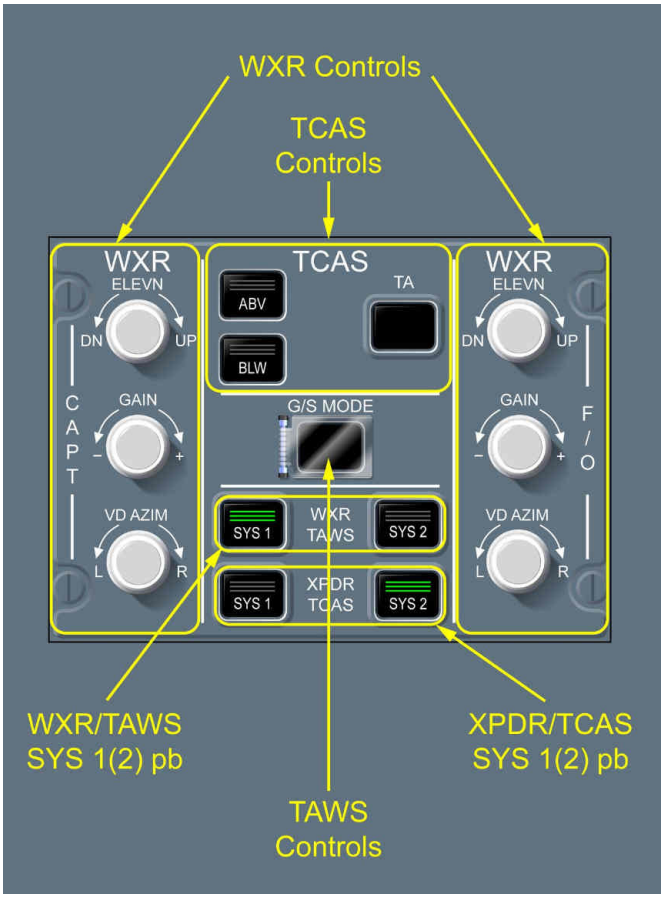
SURV PANEL

Applicable to: ALL

SURV Panel



WXR/TAWS SYS 1(2) pb



SYS 1 provides the WXR/TAWS functions.



SYS 2 provides the WXR/TAWS functions.

Note: On the SURV/STATUS & SWITCHING page of the MFD, the WXR/TAWS SYS 1(2) buttons are automatically updated.

XPDR/TCAS SYS 1(2) pb



SYS 1 provides the XPDR/TCAS functions.



SYS 2 provides the XPDR/TCAS functions.

Note: On the SURV/STATUS & SWITCHING page of the MFD, the XPDR/TCAS SYS 1(2) buttons are automatically updated.

TAWS CONTROLS

The TAWS controls enable the flight crew to monitor the TAWS surveillance function (*Refer to TAWS Controls on SURV Panel*).

WXR CONTROLS

The WXR controls enable the flight crew to monitor the WXR surveillance function (*Refer to WXR Controls on SURV Panel*).

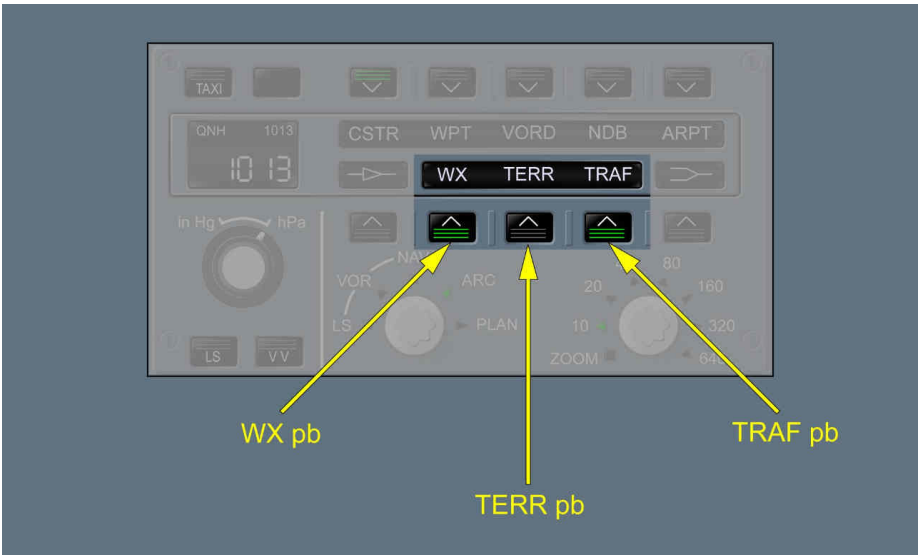
TCAS CONTROLS

The TCAS controls enable the flight crew to monitor the TCAS surveillance function (*Refer to TCAS Controls on SURV Panel*).

EFIS CONTROL PANEL

Applicable to: ALL

EFIS CP



WX pb

L12



The onside ND and VD display weather information.
On ground, if one engine is operative, turns on the WXR.
The flight crew cannot press the WXR pb and the TERR pb at the same time.
Associated with the WX message on the ND.



The onside ND and VD do not display weather information.
On ground, if the WX pb of both EFIS CPs are not pressed, turns off the WXR.

TERR pb

L12



The onside ND displays terrain (TERR) information.
Associated with the TERR message on the ND.
The flight crew cannot press the WXR pb and the TERR pb at the same time.



The onside ND does not display terrain (TERR) information.

TRAF pb



The onside ND displays traffic information.



The onside ND does not display traffic information.

KCCU

Applicable to: ALL

KCCU



SURV KEY



When pressed:

- Displays the SURV /CONTROLS page on the MFD (*Refer to SURV page*)
- The cursor returns to the MFD , if it was previously on another display.

CLR INFO KEY



When pressed, clears the message displayed in the FMS, ATC COM, or surveillance message area.

NAVIGATION KEYS

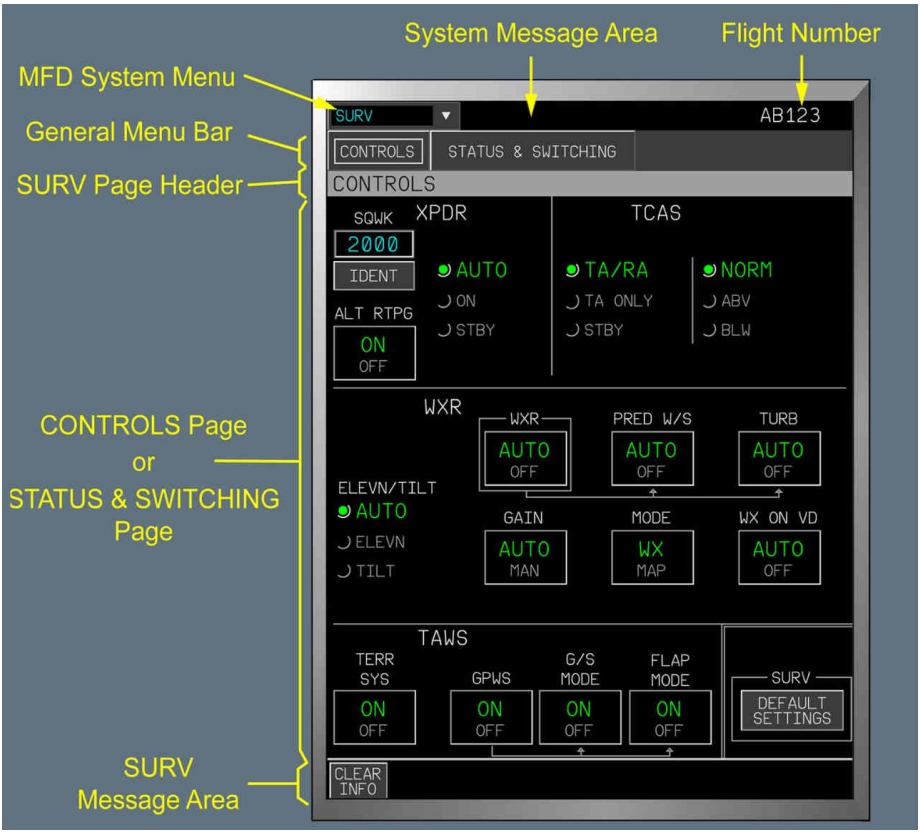


When pressed, moves the cursor to the display unit that is to the right, or to the left, of the one that is currently selected (if applicable).

MFD - SURV PAGES

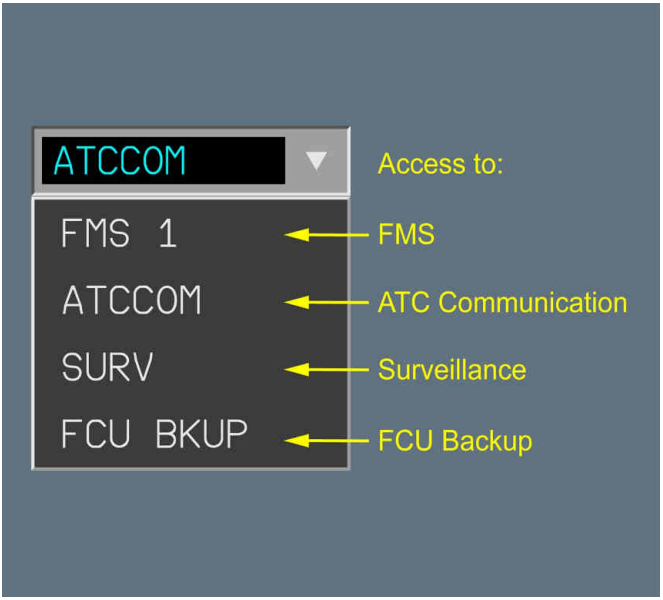
Applicable to: ALL

SURV Pages



MFD SYSTEM MENU

MFD System Menu



Indicates the system that is currently displaying data on the MFD .
The system menu lists all the systems that can display data on the MFD :

FMS

Provides access to the FMS pages.
Refer to 22 / FMS / CONTROLS AND INDICATORS / MFD .

ATC COM

Provides access to the ATC communication pages.
Refer to 46 / ATC / CONTROLS AND INDICATORS / MFD .

SURV

Provides access to the surveillance pages.
Refer to SURV Pages Overview .

FCU BKUP

Provides access to the FCU backup pages.

Refer to 22 / FLIGHT GUIDANCE / CONTROLS AND INDICATORS / FCU BACKUP .

SYSTEM MESSAGE AREA

The system message area displays three different messages to direct the flight crew's attention to an ATC COM or FMS event, when the MFD is currently not displaying an ATC COM or FMS page:

- NEW ATIS RECEIVED:
  Indicates that a new ATIS report is received, and that the MFD is displaying an application other than the ATC COM. This message no longer appears when the flight crew accesses an ATC COM page.
- ATIS SYS MSG:
  Indicates that a ATIS FSM message is received, and that the MFD is displaying an application other than the ATC COM. This message no longer appears when the flight crew accesses an ATC COM page.
- CHECK FMS MESSAGE:
  Indicates that an amber FMS message is pending, and that the MFD is displaying an application other than the FMS. This message no longer appears when the flight crew accesses an FMS page.

FLIGHT NUMBER

Indicates the flight number that the flight crew has entered on the ACTIVE/INIT page of the FMS (*Refer to 22 / FMS / CONTROLS AND INDICATORS / MFD / ACTIVE / INIT Page*).

L2 The Control and Display System (CDS) manages the display of the flight number.

GENERAL MENU BAR

The general menu bar provides the flight crew with access to the following two SURV pages:

- CONTROLS page
- STATUS & SWITCHING page.

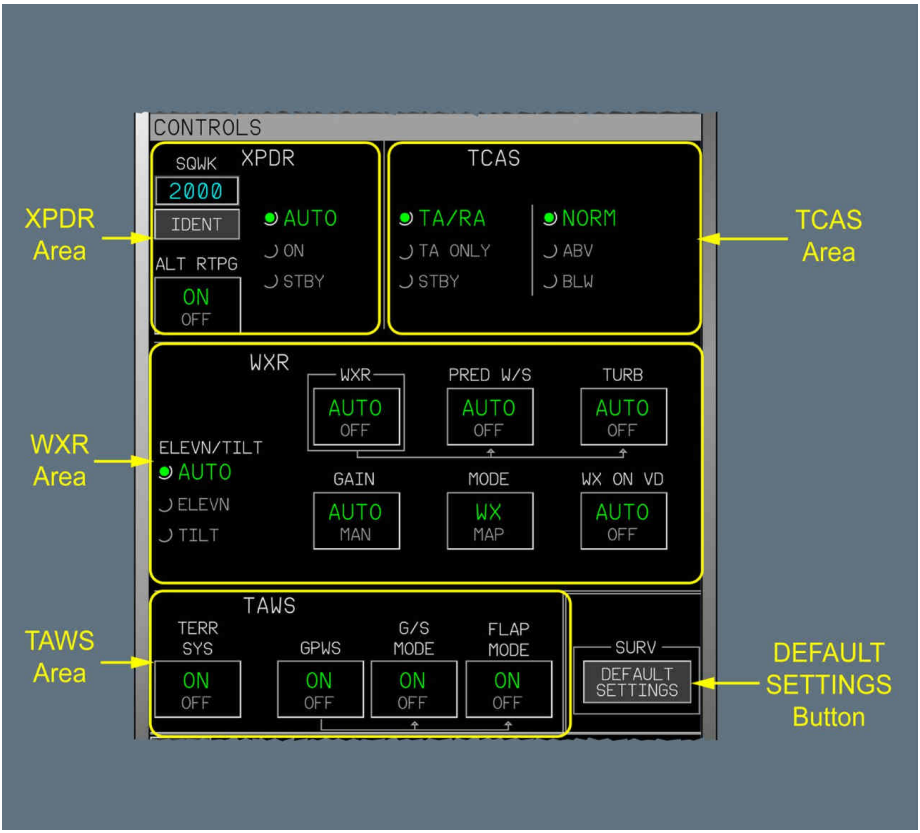
SURV PAGE HEADER

The SURV page header indicates the title of the displayed SURV page.

CONTROLS PAGE

Applicable to: ALL

SURV / CONTROLS Page



XPDR AREA

The XPDR area enables the flight crew to monitor the XPDR function.
For more information, *Refer to the XPDR section on the MFD CONTROLS page* .

TCAS AREA

The TCAS area enables the flight crew to monitor the TCAS surveillance function.

For more information, *Refer to the TCAS section on the MFD CONTROLS page* .

WXR AREA

The WXR area enables the flight crew to monitor the WXR surveillance function.
For more information, *Refer to the WXR section on the MFD CONTROLS page* .

TAWS AREA

The TAWS area enables the flight crew to monitor the TAWS surveillance function.
For more information, *Refer to the TAWS section on the MFD CONTROLS page* .

DEFAULT SETTINGS BUTTON

L12



When clicked, automatically sets all the SURV settings to their default position. A confirmation is necessary in order to set the default positions.

- The XPDR mode option list is set to AUTO
- The ALT RPTG button is set to ON
- The TCAS display mode option list is set to NORM
- The TCAS mode option list is set to TA/RA
- The ELEVN/TILT option list is set to AUTO
- The WXR button is set to AUTO
- The PRED W/S button is set to AUTO
- The TURB button is set to AUTO
- The GAIN button is set to AUTO
- The MODE button is set to WX
- The WX ON VD button is set to AUTO
- The TERR SYS button is set to ON
- The GPWS button is set to ON
- The G/S MODE button is set to ON
- The FLAP MODE button is set to ON.

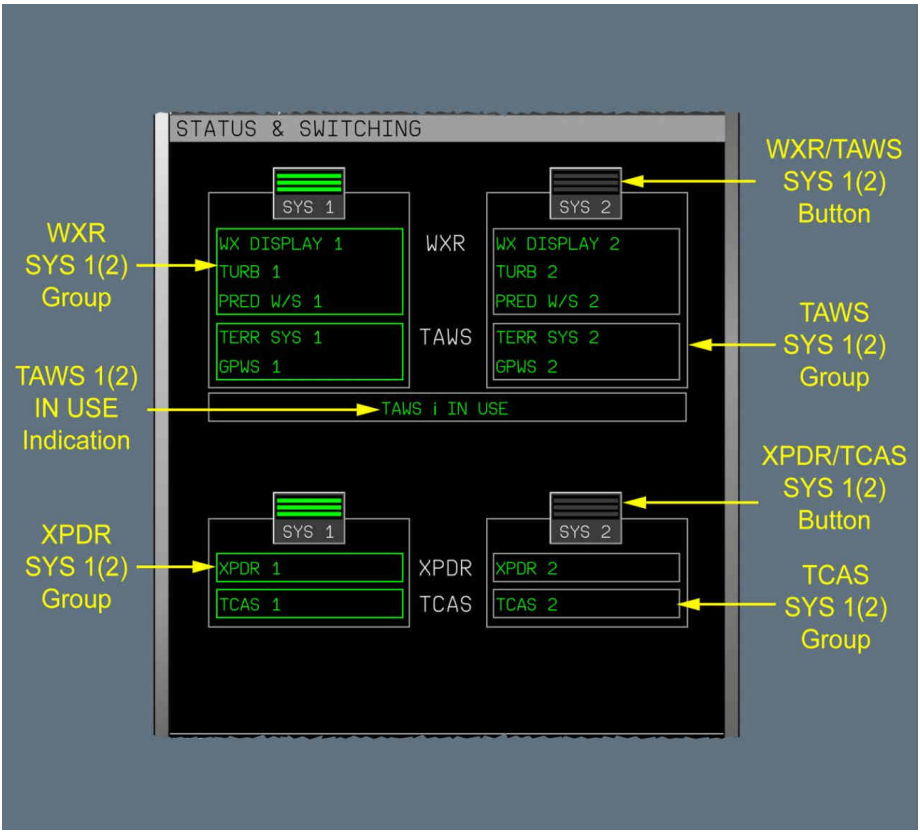
The following default settings are valid only for the onside MFD:

- The ELEVN/TILT option list
- The GAIN button
- The MODE button
- The WX ON VD button.

STATUS & SWITCHING PAGE

Applicable to: ALL

STATUS & SWITCHING Page



- Green indicates that the function is on
  The green box indicates that the function is selected.
- White indicates that the function is set to OFF, or is on standby
- Amber indicates that the function is failed.

WXR/TAWS SYS 1(2) BUTTONS



SYS 1 provides the WXR/TAWS functions.



SYS 2 provides the WXR/TAWS functions.

Note: *On the SURV panel, the WXR/TAWS SYS 1(2) pb is automatically updated.*

WXR SYS 1(2) GROUP



Indicates the status of the WXR functions on SYS 1(2).
For more information, *Refer to WXR / CONTROLS AND INDICATORS / MFD* .

TAWS SYS 1(2) GROUP



Indicates the status of the TAWS functions on SYS 1(2).
For more information, *Refer to TWAS / CONTROLS AND INDICATORS / MFD* .

TAWS 1(2) IN USE INDICATION



In the case of abnormal operation, indicates that the TAWS and the WXR functions are not provided by the same SYS. The selected SYS provides the WXR function, and the other SYS provides the TAWS function.

XPDR/TCAS SYS 1(2) BUTTONS



SYS 1 provides the XPDR/TCAS functions.



SYS 2 provides the XPDR/TCAS functions.

Note: *On the SURV panel, the XPDR/TCAS SYS 1(2) pb is automatically updated.*

XPDR SYS 1(2) GROUP



Indicates the status of the XPDR on SYS 1(2).
For more information, *Refer to XPDR / CONTROLS AND INDICATORS / MFD* .

TCAS SYS 1(2) GROUP



Indicates the status of the TCAS on SYS 1(2).
For more information, *Refer to TCAS / CONTROLS AND INDICATORS / MFD* .

SURV MESSAGE AREA

Applicable to: ALL

The SURV message area displays messages on two lines of 33 characters.
The flight crew can clear the displayed message by clicking on the CLEAR INFO button, or by pressing the CLR INFO key on the KCCU.

ENTRY OUT OF RANGE MESSAGE

If the flight crew enters a value that is not in the correct range, the message area displays:
- The ENTRY OUT OF RANGE message on the first line
- The applicable range on the second line (as indicated in the table below).

Data Type	Out Of Range Messages
ELEVN	■ **If the QNH reference is selected on the EFIS CP baro setting:** RANGE: 0 ft to 60 000 ft ■ **If the STD reference is selected on the EFIS CP baro setting:** RANGE: FL 0 to FL 600
GAIN	RANGE: 0 % to 100 %
TILT	RANGE: -15.0 ° to +15.0 °

FORMAT ERROR MESSAGE

If the flight crew enters an ELEVN, GAIN, or TILT value that is not valid, the message area displays:
- The FORMAT ERROR message on the first line
- The applicable format on the second line (as indicated in the table below).

Data Type	Data Format Help Messages
ELEVN	■ **If the QNH reference is selected on the EFIS CP baro setting:** FORMAT: "XXXXX" FT ■ **If the STD reference is selected on the EFIS CP baro setting:** FORMAT: FL "XXX"
GAIN	FORMAT: "XXX" %
TILT	FORMAT: "+/-XX.X" °

SQWK CODE NOT VALID MESSAGE

If the flight crew enters a SQWK value that is not valid, the message area displays the SQWK CODE NOT VALID message on the first line.

MFD DATA ENTRY FORMAT

Applicable to: ALL

This chapter provides a list of all the data that the flight crew may enter on the MFD .

For each data, the table displays:
- The appropriate format
- The appropriate units
- The appropriate range
- The page(s) on which the flight crew must enter the data.

The following characters are used to indicate the format:
- A: Letters
- B: Magnetic/True reference
- N: Numbers
- X: Letters and Numbers.

Note: *The flight crew can:*
- *Enter the units that are indicated in blue*
- *Omit leading zeros in fields that have numerical data.*

If the flight crew enters an erroneous format, the message area displays the FORMAT ERROR message, followed by the correct format (*Refer to Messages List*).
If the flight crew enters an erroneous value, the message area displays the ENTRY OUT OF RANGE message, followed by the correct range (*Refer to Messages List*).

ELEVN

L12

Format	FL NNN or NNN *Note:* *The flight crew can omit leading zeros.* NNNNN FT or NNNNN *Note:* - *Between 0 ft and 1 000 ft , the flight crew must write "FT"* - *The flight crew can omit leading zeros.*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot
Range	FL NNN *Min* : 0 *Max* : 600 NNNNN FT *Min* : 0 *Max* : 60 000
Resolution	FL NNN: 10 NNNNN FT : 1 000
Page	*Refer to SURV/CONTROLS page .*

GAIN

Format	NNN
Units	NNN: Percent
Range	NNN *Min* : 0 *Max* : 100
Resolution	NNN: 5
Page	*Refer to SURV/CONTROLS page .*

SQWK

Format	NNNN
Range	Each N: *Min* : 0 *Max* : 7
Page	*Refer to SURV/CONTROLS page .*

TILT

L12

Format	±NN.N or ±NN.N ° *Note:* - *"-" may be entered as M* - *If there is "+" or "-" no sign, "+" is displayed by default*
Units	NN.N: Degrees

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Range	NN.N: *Min* : -15.0 *Max* : +15.0
Resolution	NN.N: 0.25
Page	*Refer to SURV/CONTROLS page .*

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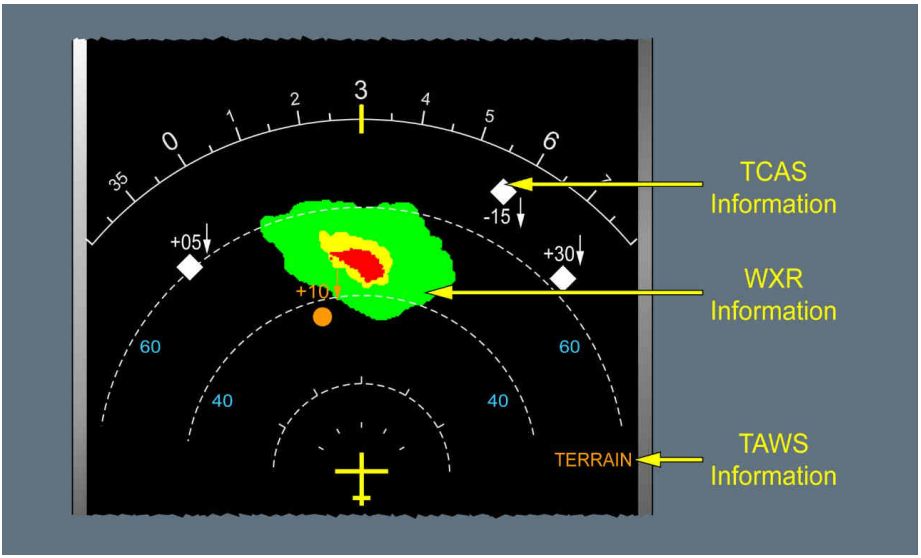
ND

Applicable to: ALL

ND



TAWS INFORMATION

Refer to the ND Section of the TAWS Description .

WXR INFORMATION

Refer to the ND Section of the WXR Description .

TCAS INFORMATION

Refer to the ND Section of the TCAS Description .

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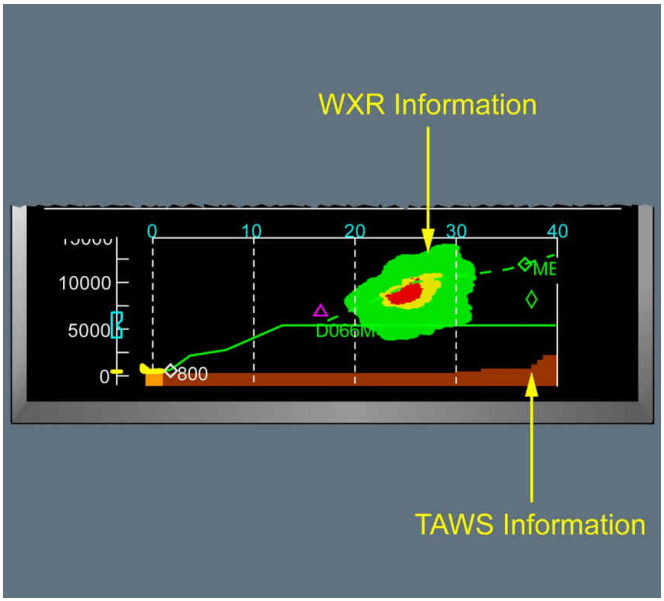
VD

Applicable to: ALL

VD



TAWS INFORMATION

Refer to the VD Section of the TAWS Description .

WXR INFORMATION

Refer to the VD Section of the WXR Description .

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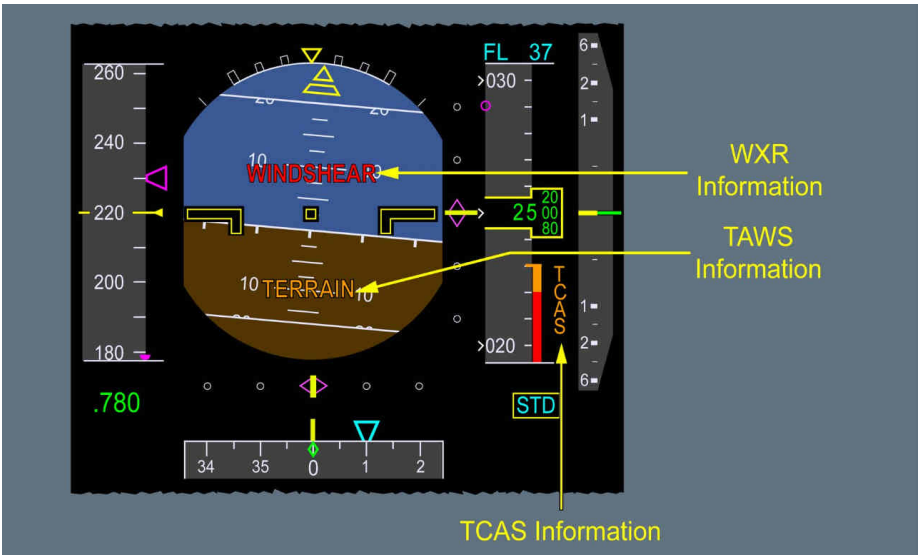
PFD

Applicable to: ALL

PFD



TAWS INFORMATION

Refer to the PFD Section of the TAWS Description .

WXR INFORMATION

Refer to the PFD Section of the WXR Description .

TCAS INFORMATION

Refer to the PFD Section of the TCAS Description .

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RMP

Applicable to: ALL

The RMP enables the flight crew to change the XPDR code or to perform an IDENT .
For more information, *Refer to the RMP Section of the XPDR Description* .

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AURAL ALERTS

Applicable to: ALL

TAWS AURAL ALERTS

Aural Alert	Sound	Meaning
DON'T SINK, DON'T SINK	*(Audio not available in PDF)*	*Refer to GPWS/Mode 3* .
GLIDE SLOPE, GLIDE SLOPE	*(Audio not available in PDF)*	*Refer to GPWS/Mode 5* .
OBSTACLE AHEAD, OBSTACLE AHEAD	*(Audio not available in PDF)*	*Refer to TERR Function* .
OBSTACLE AHEAD, PULL UP	*(Audio not available in PDF)*	*Refer to TERR Function* .
PULL UP	*(Audio not available in PDF)*	- *Refer to GPWS/Mode 1* , or - *Refer to GPWS/Mode 2* .
SINK RATE, SINK RATE	*(Audio not available in PDF)*	*Refer to GPWS/Mode 1* .
TERRAIN	*(Audio not available in PDF)*	*Refer to GPWS/Mode 2* .
TERRAIN, TERRAIN	*(Audio not available in PDF)*	*Refer to GPWS/Mode 2* .
TERRAIN AHEAD, TERRAIN AHEAD	*(Audio not available in PDF)*	*Refer to TERR Function* .
TERRAIN AHEAD, PULL UP	*(Audio not available in PDF)*	*Refer to TERR Function* .
TOO LOW FLAPS	*(Audio not available in PDF)*	*Refer to GPWS/Mode 4* .
TOO LOW GEAR	*(Audio not available in PDF)*	*Refer to GPWS/Mode 4* .
TOO LOW TERRAIN	*(Audio not available in PDF)*	- *Refer to GPWS / Mode 4* , or - *Refer to TERR Function* .

Note: In the case of simultaneous alerts, the first aural alert may be partially triggered.

WXR AURAL ALERTS

Aural Alert	Sound	Meaning
MONITOR RADAR DISPLAY	*(Audio not available in PDF)*	The PWS triggers a windshear caution, and the aircraft is not in a dangerous zone. For more information, *Refer to DSC-34-20-30-10 Predictive Windshear (PWS) Function* .
WINDSHEAR AHEAD, WINDSHEAR AHEAD	*(Audio not available in PDF)*	The PWS triggers a windshear warning during takeoff. For more information, *Refer to DSC-34-20-30-10 Predictive Windshear (PWS) Function* .
GO AROUND, WINDSHEAR AHEAD	*(Audio not available in PDF)*	The PWS triggers a windshear warning during approach. For more information, *Refer to DSC-34-20-30-10 Predictive Windshear (PWS) Function* .

Note: In the case of simultaneous alerts, the first aural alert may be partially triggered.

TCAS AURAL ALERTS

Aural Alert	Sound	Meaning	Inhibition Condition
TRAFFIC, TRAFFIC	*(Audio not available in PDF)*	The TCAS triggers a TA.	TA is inhibited, if the aircraft is: - Below 400 ft AGL in descent - Below 600 ft AGL in climb.
CLIMB, CLIMB	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The aircraft must climb with the vertical speed that is indicated by the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
CLIMB, CROSSING CLIMB, CLIMB, CROSSING CLIMB	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and the aircraft will cross the intruder's altitude. The aircraft must climb with the vertical speed that is indicated by the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
INCREASE CLIMB, INCREASE CLIMB	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a CLIMB alert. The vertical speed is not sufficient to achieve safe vertical separation.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
CLIMB, CLIMB NOW, CLIMB, CLIMB NOW	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a DESCEND alert. The intruder's trajectory has changed.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
DESCEND, DESCEND	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The aircraft must descend with the vertical speed that is indicated by the green area on vertical speed scale of the PFD.	RAs are inhibited if the aircraft is: - Below 1 000 ft AGL in descent - Below 1 200 ft AGL in climb.
DESCEND, CROSSING DESCEND, DESCEND, CROSSING DESCEND	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and the aircraft will cross the intruder's altitude. The aircraft must descend with the vertical speed that is indicated by the green area on vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
INCREASE DESCENT, INCREASE DESCENT	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a DESCEND alert. The vertical speed is not sufficient to achieve safe vertical separation.	RAs are inhibited if the aircraft is: - Below 1 450 ft AGL in descent - Below 1 650 ft AGL in climb.

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Aural Alert	Sound	Meaning	Inhibition Condition
DESCEND, DESCEND NOW, DESCEND, DESCEND NOW	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and has already triggered a CLIMB alert. The intruder's trajectory has changed.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
ADJUST VERTICAL SPEED, ADJUST	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The flight crew must adjust the vertical speed in the green area on the vertical speed scale of the PFD, as appropriate.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
MONITOR VERTICAL SPEED	*(Audio not available in PDF)*	The TCAS triggers a preventive RA. The flight crew must ensure that vertical speed remains outside the red area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
MAINTAIN VERTICAL SPEED, MAINTAIN	*(Audio not available in PDF)*	The TCAS triggers a corrective RA. The flight crew must maintain the vertical speed that is indicated in the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN	*(Audio not available in PDF)*	The TCAS triggers a corrective RA, and the aircraft will cross the intruder's altitude. The flight crew must maintain the vertical speed that is indicated in the green area on the vertical speed scale of the PFD.	RAs are inhibited, if the aircraft is: - Below 900 ft AGL in descent - Below 1 100 ft AGL in climb.
CLEAR OF CONFLICT	*(Audio not available in PDF)*	The range increases, and separation is sufficient.	

Note: TAs are inhibited below 400 ft AGL in descent, and below 600 ft AGL in climb.
RAs are inhibited below 950 ft AGL in descent, and below 1 100 ft AGL in climb.
In the case of simultaneous alerts, the first aural alert may be partially triggered.

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MEMO

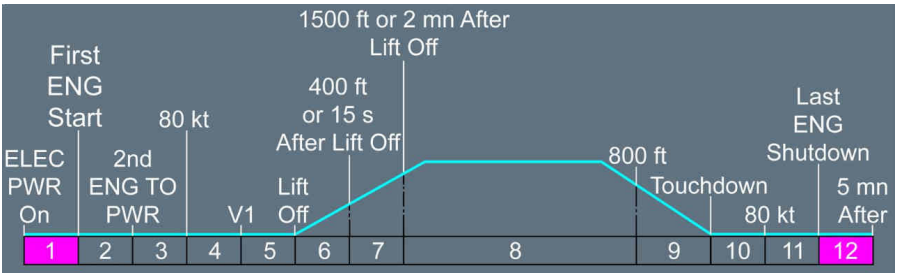
Applicable to: ALL

TAWS MEMO

GPWS OFF	The flight crew sets the GPWS button to OFF on the SURV CONTROLS page of the MFD.
TAWS FLAP MODE OFF	The flight crew sets the FLAP MODE button to OFF on the SURV CONTROLS page of the MFD.
TAWS G/S MODE OFF	The flight crew sets the G/S MODE button to OFF on the SURV CONTROLS page of the MFD.
TERR SYS OFF	The flight crew sets the TERR SYS button to OFF on the SURV CONTROLS page of the MFD.
TERR STBY	The TAWS is operative, but the TERR function is not available.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

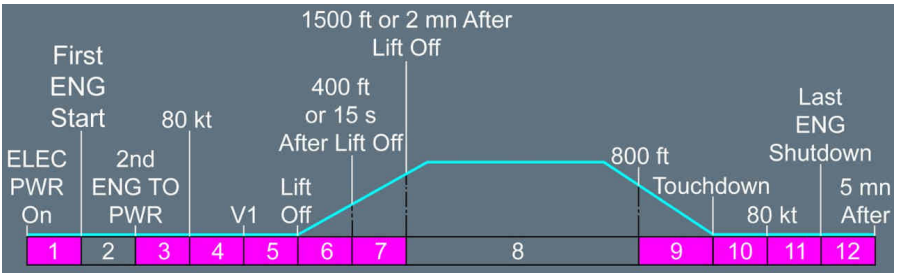


WXR MEMO

PRED W/S OFF	The flight crew sets the PRED W/S button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

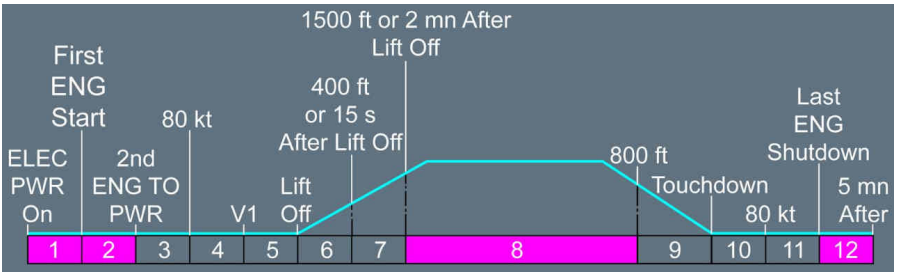


L1 PRED W/S OFF

The flight crew sets the PRED W/S button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

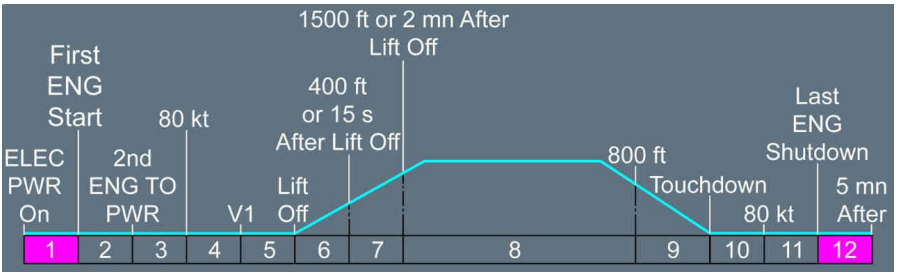


L1 WXR TURB OFF

The flight crew sets the TURB button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



L1 WXR ON

The aircraft is on ground, and the flight crew manually selects the WXR function.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

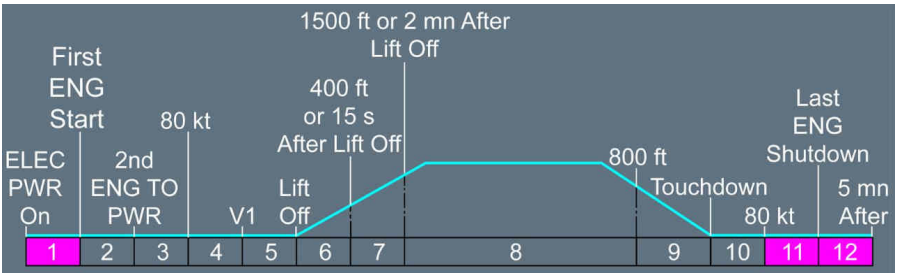


L1 WXR OFF

The flight crew sets the WXR button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



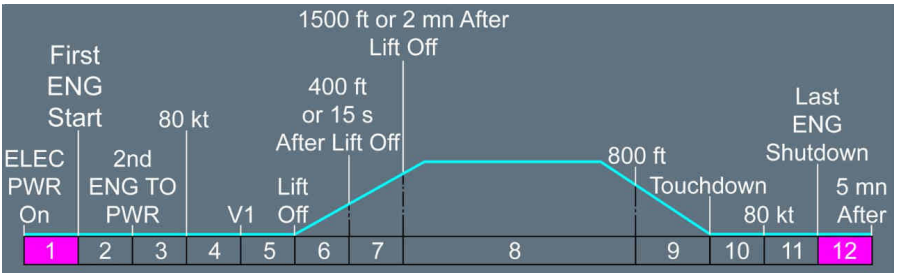
TCAS MEMO

TCAS STBY

The flight crew:
- Selects STBY in the TCAS mode option list on the SURV CONTROLS page of the MFD, or
- Selects STBY in the XPDR mode option list on the SURV CONTROLS page of the MFD, or
- Sets the ALT RPTG button to OFF on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition

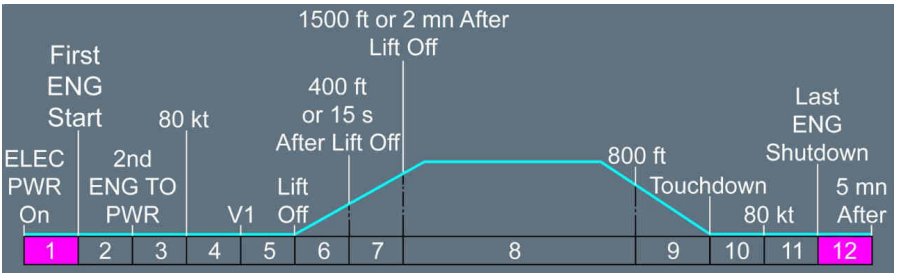


XPDR MEMO

ALT RPTG OFF	The flight crew has set the ALT RPTG button to OFF on the SURV CONTROLS page of the MFD.
XPDR STBY	The flight crew has selected STBY in the XPDR mode option list on the SURV CONTROLS page of the MFD.

L2 Flight Phase Inhibition:

Flight Phase Inhibition



AUTOMATIC OPERATION

Applicable to: ALL

If the flight crew sets the default settings of the SURV system via the DEFAULT SETTINGS button of the SURV/CONTROLS page of the MFD, the SURV system operates as follows:

ON GROUND, AT THE AIRCRAFT POWER-UP

L2 When the aircraft is on ground, SYS 1(2) is automatically selected as the master AESU if the flight number in the FMS is an odd (even) number. It enables the detection of hidden failures.

L1 The TCAS turns on, and the TRAF pb on the EFIS CP is automatically pressed.
The TAWS turns on. The flight crew should press the TERR pb on the EFIS CP to display terrain information.
The XPDR turns on.
The WXR is not operative. The flight crew should press the WX pb on the EFIS CP during the "Before Takeoff" procedure, to turn on the WXR.

TAKEOFF

If the flight crew does not press the WX pb on the EFIS CP:
- The PWS automatically turns on, when thrust is applied
- The WXR automatically turns on, after liftoff.

LANDING

If the aircraft is below 1 000 ft, the TCAS mode is TA ONLY.

ON GROUND, AFTER LANDING

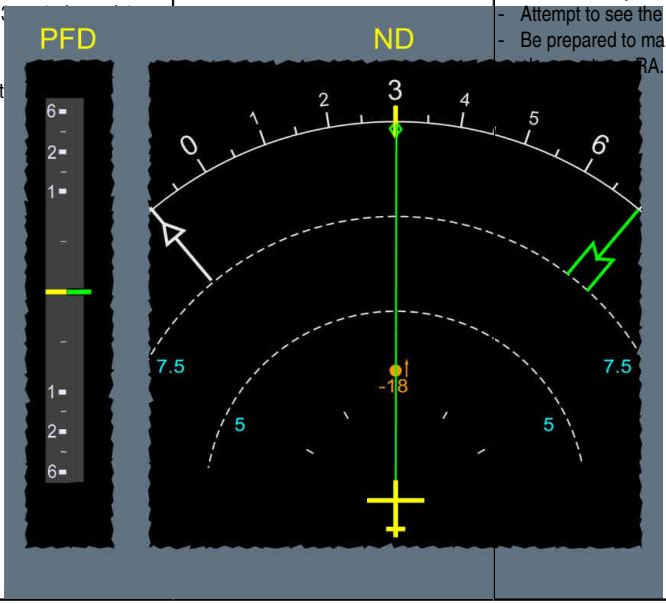
60 s after touchdown, the WX pb on the EFIS CP is automatically deselected and the WXR automatically turns off.
The TCAS remains in TA ONLY mode.
The XPDR is in AUTO mode.
The TAWS is operative.

TCAS SCENARIOS

Applicable to: ALL

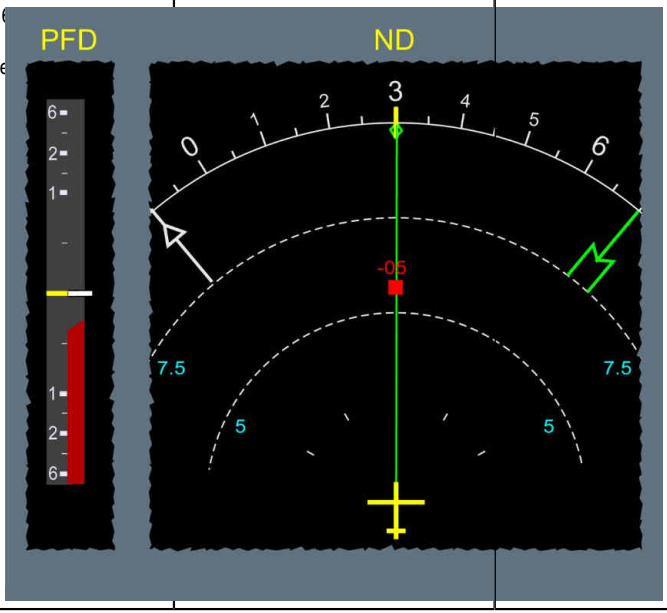
TRAFFIC ADVISORY

Scenario	Aural Alert and Display	Flight Crew Response
TRAFFIC, TRAFFIC One intruder is: - Approximately aircraft - Climbing - 1 800 ft below t	*(Audio not available in PDF)* Traffic, Traffic	- Do not maneuver based on the traffic advisory - Attempt to see the intruder - Be prepared to maneuver, if the TA RA.



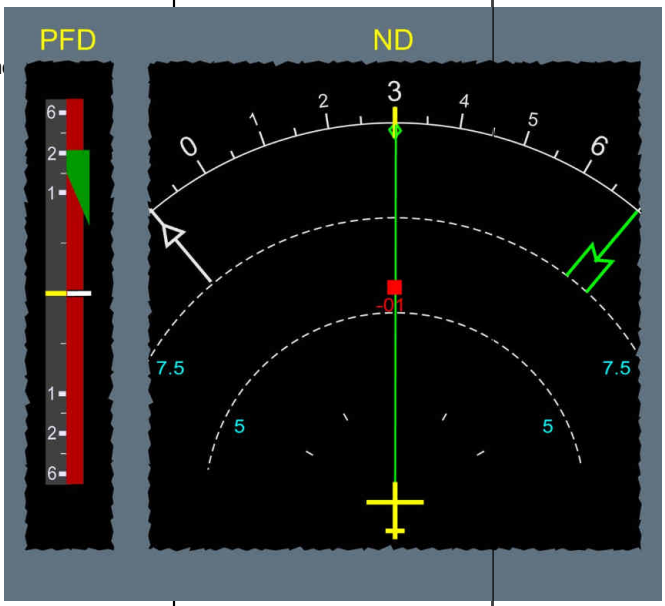
PREVENTIVE RESOLUTION ADVISORY

Scenario	Aural Alert and Display	Flight Crew Response
MONITOR VERTICAL SPEED One intruder is: - Approximately aircraft - 500 ft below the	*(Audio not available in PDF)* MONITOR VERTICAL SPEED	Do not descend.



CORRECTIVE RESOLUTION ADVISORY

Scenario	Aural Alert and Display	Flight Crew Response
CLIMB, CLIMB One intruder is: - Approximately aircraft - 100 ft below th	*(Audio not available in PDF)* CLIMB, CLIMB	Promptly (within 5 s) and smoothly, establish a climb rate of 1 500 ft/min.
CLIMB, CLIMB NOW One intruder is600 ft above the aircraft.	*(Audio not available in PDF)*	Within 2.5 s, initiate a change from a descent to a climb maneuver.



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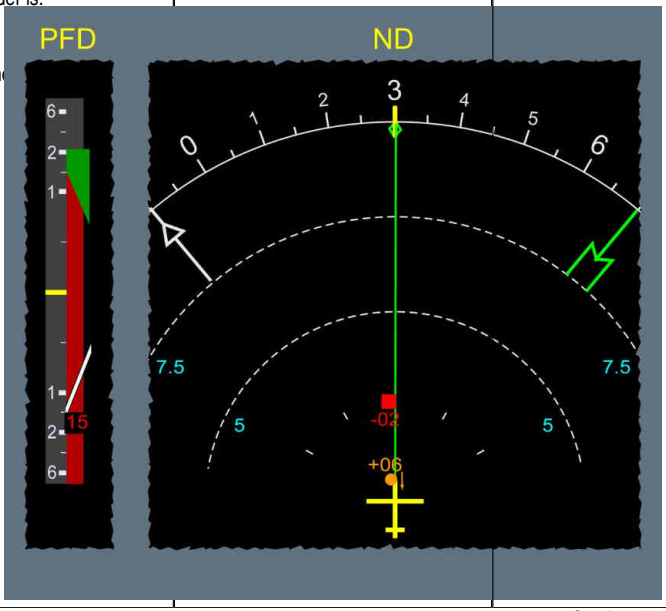
Scenario	Aural Alert and Display	Flight Crew Response
The second intruder is: - Approximately aircraft - 200 ft below th	CLIMB, CLIMB NOW  	

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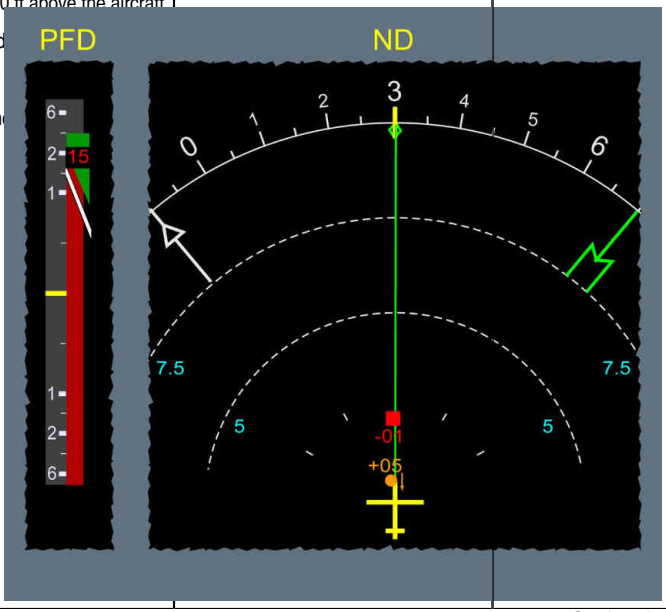
Scenario	Aural Alert and Display	Flight Crew Response
INCREASE CLIMB, INCREASE CLIMB One intruder is500 ft above the aircraft The second intruc - Approximately aircraft - 100 ft below th	*(Audio not available in PDF)* INCREASE CLIMB, INCREASE CLIMB	Immediately (within 2.5 s) and smoothly, increase the climb rate to 2 000 ft/min.



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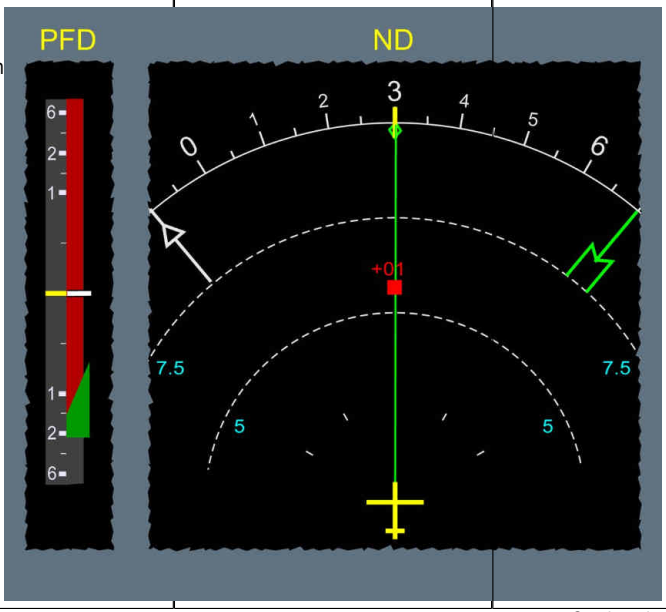
Scenario	Aural Alert and Display	Flight Crew Response
DESCEND, DESCEND One intruder is: - Approximately aircraft - 100 ft above th	*(Audio not available in PDF)* DESCEND, DESCEND  	Promptly (within 5 s) and smoothly, establish a descent rate of 1 500 ft/min.

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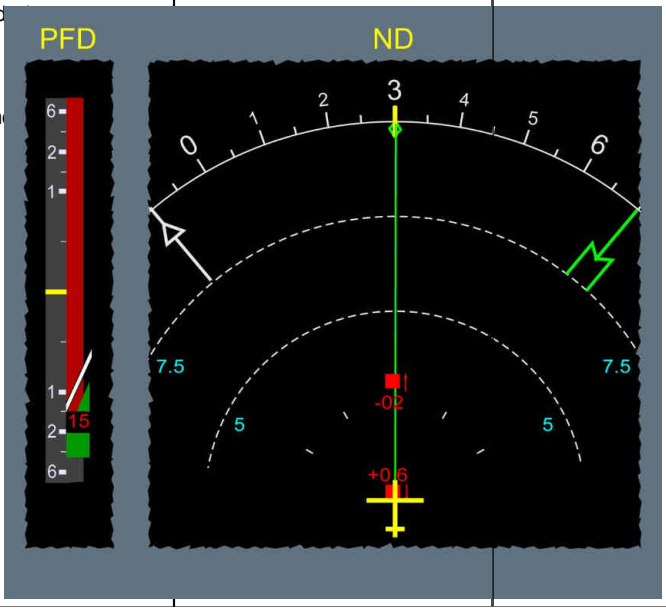
Scenario	Aural Alert and Display	Flight Crew Response
INCREASE DESCEND, INCREASE DESCEND One intruder is600 ft above the aircraft. The second intrud - Approximately aircraft - Climbing - 200 ft below th	*(Audio not available in PDF)* INCREASE DESCEND, INCREASE DESCEND	Immediately (within 2.5 s) and smoothly, increase the descent rate to 2 000 ft/min.



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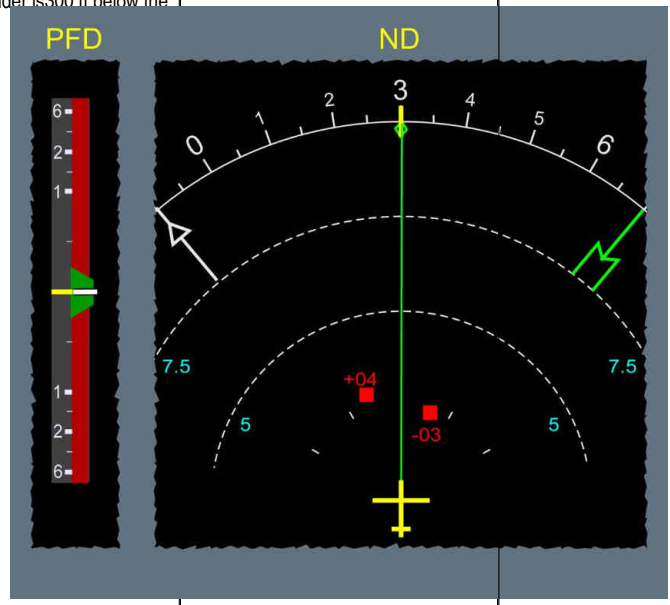
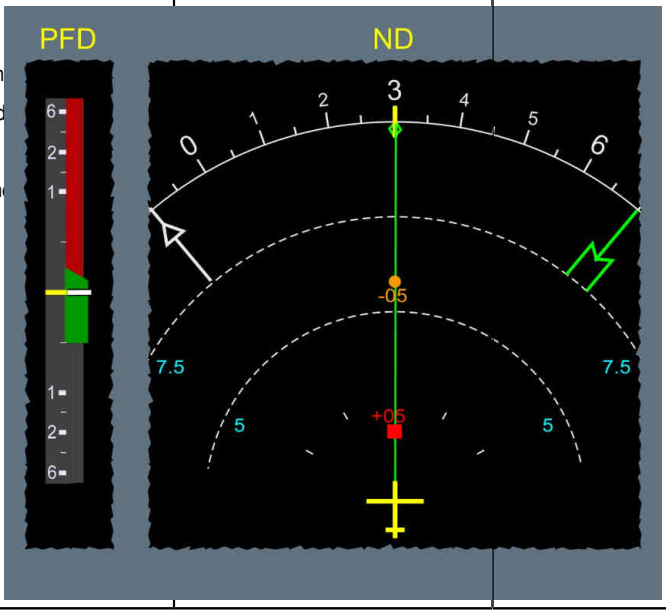
Scenario	Aural Alert and Display	Flight Crew Response
MAINTAIN VERTICAL SPEED, MAINTAIN One intruder is400 ft above the aircraft. The second intruder is300 ft below the aircraft.	*(Audio not available in PDF)* MAINTAIN VERTICAL SPEED, MAINTAIN  	- Remain in level flight - Do not climb or descend.
ADJUST VERTICAL SPEED, ADJUST	*(Audio not available in PDF)*	- Remain in level flight

Continued on the following page

Continued from the previous page

Scenario	Aural Alert and Display	Flight Crew Response
One intruder is: - Approximately aircraft - 500 ft above th The second intruc - Approximately aircraft - 500 ft below th	ADJUST VERTICAL SPEED, ADJUST	- Do not climb or descend.



RECONFIGURATIONS

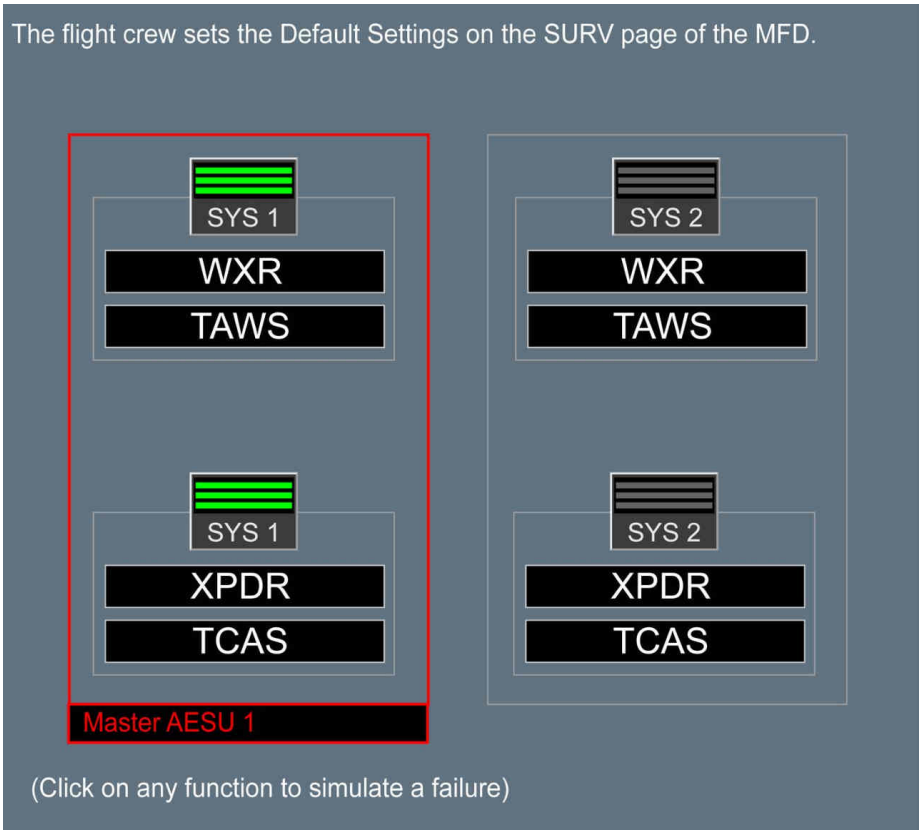
Applicable to: ALL

If one or more functions of the SURV system are failed, the flight crew can manually reconfigure the remaining functions, in order to ensure that the system continues to function correctly.

It is recommended that the flight crew:
- Apply the ECAM procedure corresponding to the failure
- Select the SURV system in which the WXR function is operative.

The illustration below provides some examples of reconfigurations.
Click on a function to set it as failed.
Up to two functions may be set as failed.

No Failure


The flight crew sets the Default Settings on the SURV page of the MFD.
SYS 1
WXR
TAWS
SYS 2
WXR
TAWS
SYS 1
XPDR
TCAS
SYS 2
XPDR
TCAS
Master AESU 1
(Click on any function to simulate a failure)

ECAM ALERTS

Applicable to: ALL

SURV GPWS 1(2) FAULT (*Refer to procedure*)

SURV GPWS 1+2 FAULT (*Refer to procedure*)

SURV PRED W/S 1(2) FAULT (*Refer to procedure*)

SURV PRED W/S 1+2 FAULT (*Refer to procedure*)

SURV SYS 1(2) FAULT (*Refer to procedure*)

SURV SYS 1+2 FAULT (*Refer to procedure*)

SURV SYS DEGRADED (*Refer to procedure*)

SURV TAWS 1(2) FAULT (*Refer to procedure*)

SURV TAWS 1+2 FAULT (*Refer to procedure*)

SURV TCAS 1(2) FAULT (*Refer to procedure*)

SURV TCAS 1+2 FAULT (*Refer to procedure*)

SURV TERR SYS 1(2) FAULT (*Refer to procedure*)

SURV TERR SYS 1+2 FAULT (*Refer to procedure*)

SURV TURB 1(2) FAULT (*Refer to procedure*)

SURV TURB 1+2 FAULT (*Refer to procedure*)

SURV WXR 1(2) FAULT (*Refer to procedure*)

SURV WXR 1+2 FAULT (*Refer to procedure*)

SURV XPDR 1(2) FAULT (*Refer to procedure*)

SURV XPDR 1+2 FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
SURV	SURV SYS 1 (XPDR/TCAS)	115 V AC ESS
	SURV SYS 1 (WXR/TAWS)	115 V AC ESS
	SURV SYS 2 (XPDR/TCAS)	115 V AC 4
	SURV SYS 2 (WXR/TAWS)	115 V AC 4

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AIRCRAFT SYSTEMS

35 - OXYGEN

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DSC-35-30-10 System Description

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How to Don the PBE....A
How to Put off the PBE....B

DSC-35-50 Electrical Supply
Electrical Supply.... A

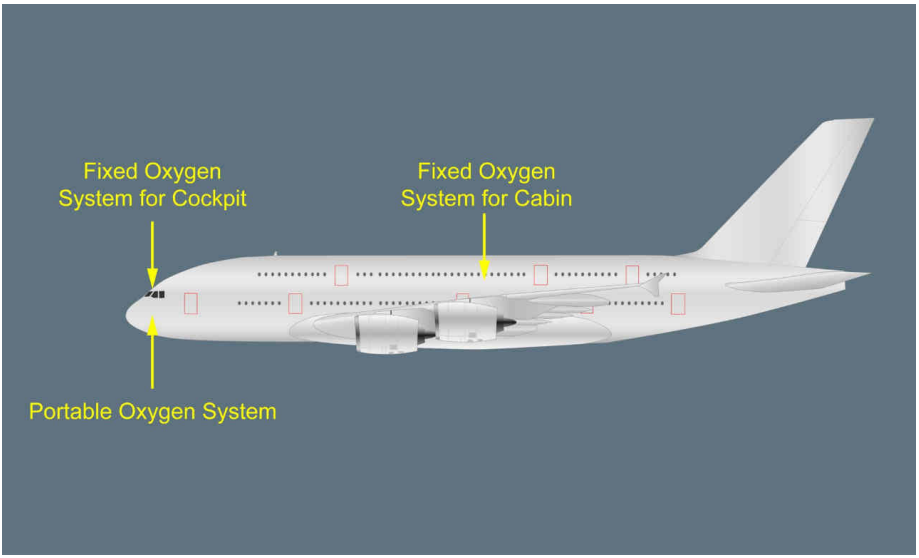
OVERVIEW

Applicable to: ALL

The oxygen system is designed to supply oxygen to the flight crew, cabin crew, and passengers, if necessary (e.g. depressurization).

The oxygen system has a:
- Fixed oxygen system in the cockpit
- Fixed oxygen system in the cabin
- Portable oxygen system for the cockpit and cabin.

General



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FIXED OXYGEN SYSTEM FOR COCKPIT

Applicable to: ALL

The fixed oxygen system in the cockpit has:

- 5 full-face quick-donning masks
  Each mask is stowed in its own stowage box.
  The stowage box is next to each flight crew station.
- One high-pressure oxygen bottle

L3 This high-pressure bottle is in the upper avionics bay. It has a capacity of 118 ft^3.

- A pressure-reducer transmitter
  This pressure-reducer transmitter is connected directly to the high-pressure oxygen bottle, and ensures that oxygen is supplied at low pressure.
  It has a relief valve that can discharge oxygen overboard, in the case of overpressure.
  Overpressure will be indicated by the overboard discharge indicator.

L1 - A supply valve
This valve is normally open. The flight crew can manually close the valve to stop oxygen supply, by using the CREW SUPPLY pb-sw that is on the OXYGEN overhead panel.

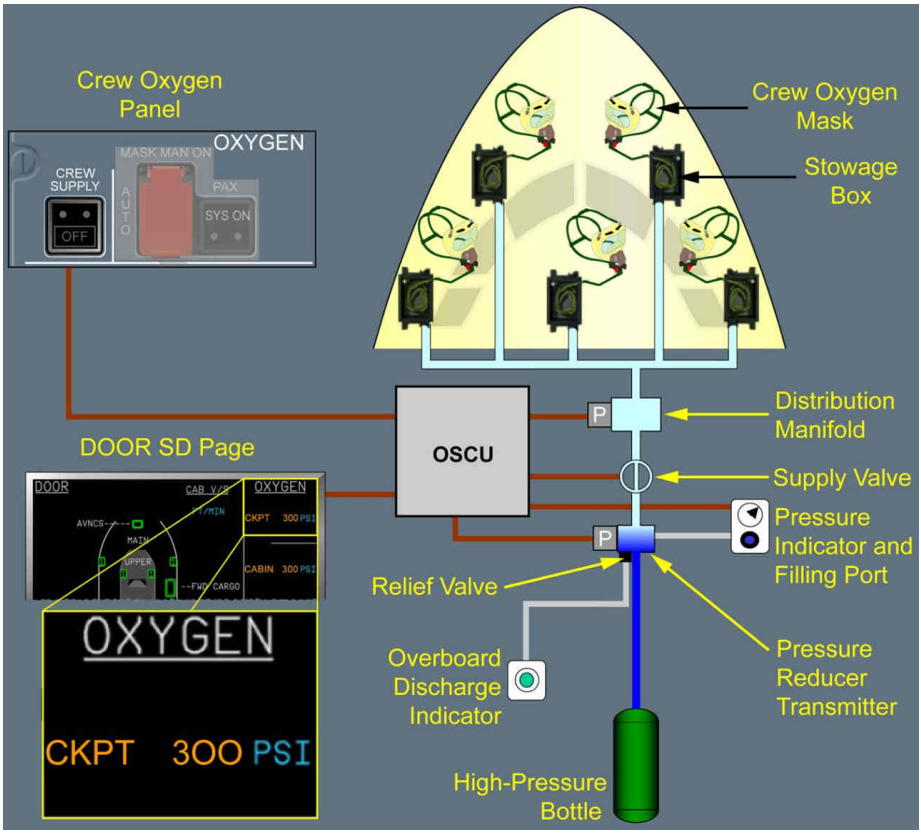
L3 - An Oxygen System Control Unit (OSCU)
The OSCU monitors and controls the cockpit oxygen system.

Note: *The OSCU monitors and controls both cockpit and cabin oxygen system.*

- A filling port with a pressure indicator
  The oxygen bottle can be refilled from the outside via a filling port.
  This filling port is in the forward cargo compartment.

L1 - An overboard discharge indicator.
This indicator is normally green. The indicator turns yellow, if there is any overpressure in the oxygen system.

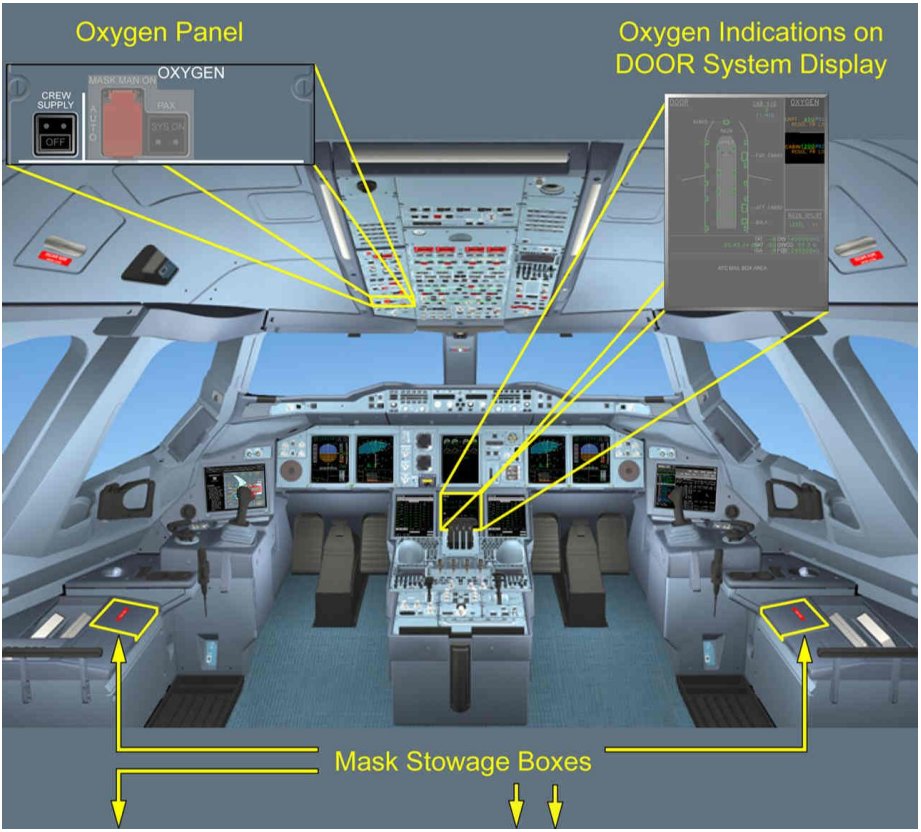
Fixed Oxygen System for the Cockpit



COCKPIT VIEW

Applicable to: ALL

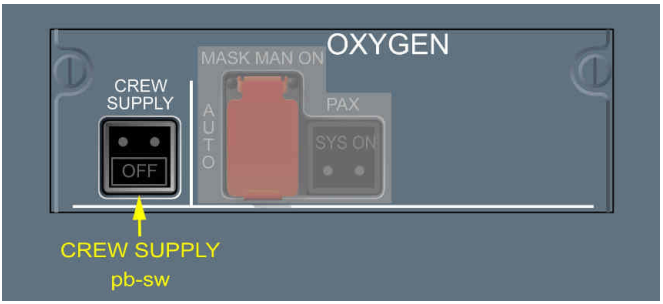
Cockpit View



OXYGEN PANEL

Applicable to: ALL

Oxygen Panel



crew supply pb-sw

The CREW SUPPLY pb-sw controls oxygen supply to the masks in the cockpit.



The supply valve is open, and supplies oxygen to the masks.

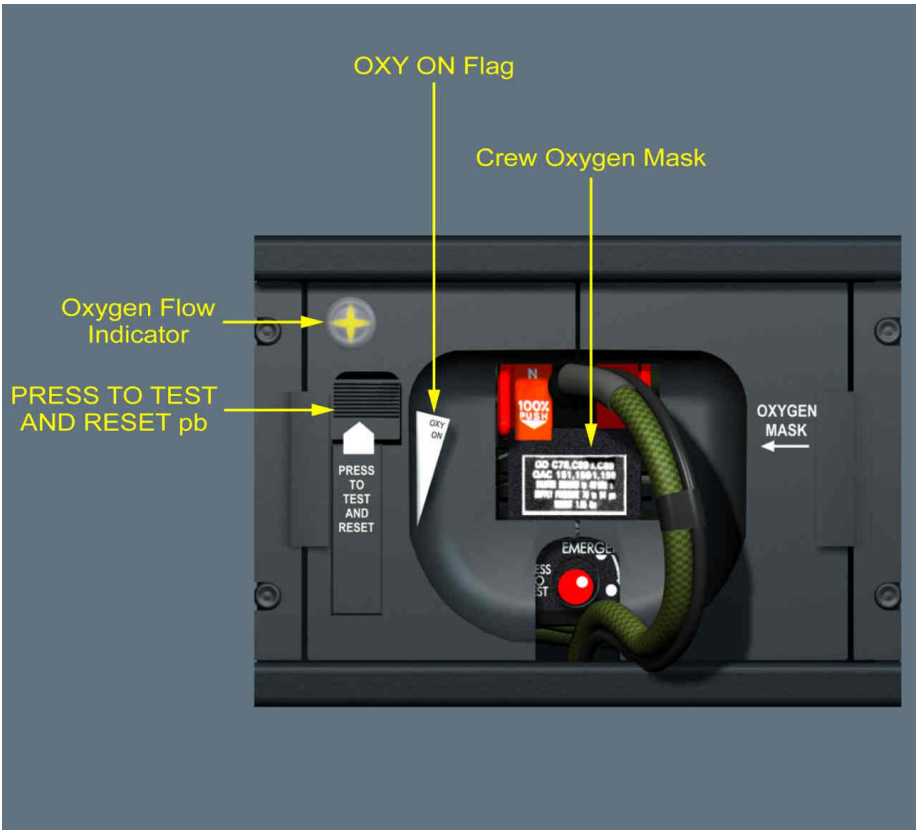


The supply valve is closed.

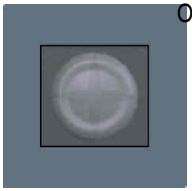
MASK STOWAGE BOX

Applicable to: ALL

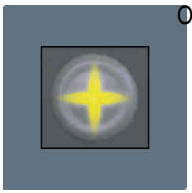
Mask Stowage Box



OXYGEN FLOW INDICATOR



Oxygen is not flowing.



Oxygen is flowing.

Press to TEST and RESET pb



When pressed, the PRESS TO TEST AND RESET pb either tests, or resets, the oxygen system:

- If the mask has not been taken out of the stowage box (OXY ON flag not visible), this pushbutton tests the oxygen system.
  When the system is operating correctly, the oxygen flow indicator will be yellow for a few seconds.
- If the mask has been taken out of the stowage box and restowed (OXY ON flag visible), this pushbutton resets the oxygen system. Therefore:
  - The oxygen supply to the mask is cut off
  - The mask microphone is deactivated
  - The OXY ON flag disappears.

OXY ON FLAG

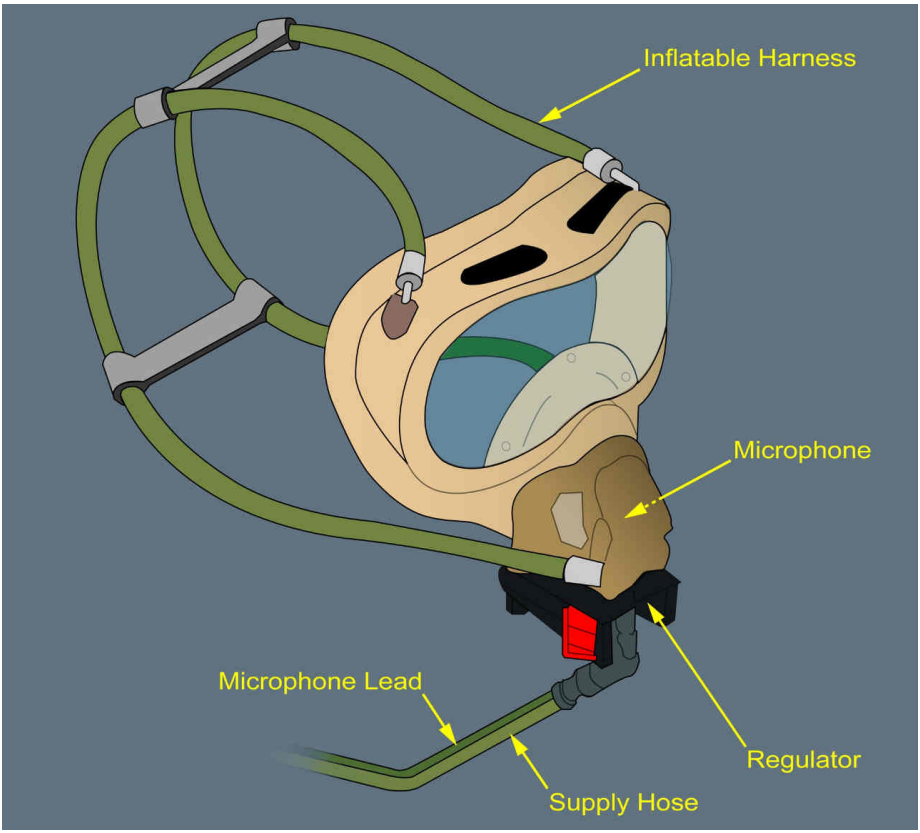


Appears, after the mask is pulled out of its stowage box, and the left door of the stowage box is closed again. Oxygen flows to the mask.

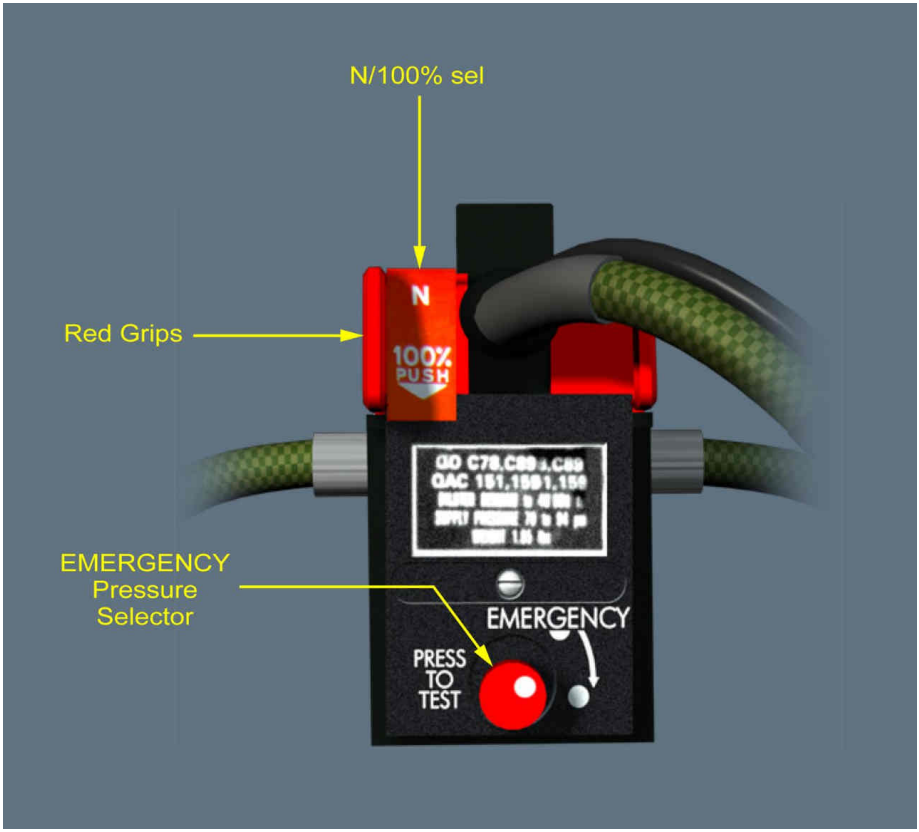
FLIGHT CREW OXYGEN MASK

Applicable to: ALL

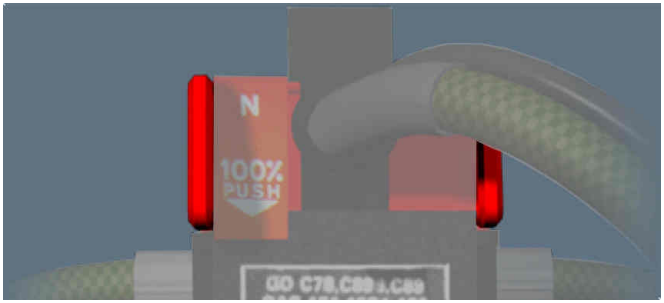
Flight Crew Oxygen Mask



Regulator


N/100% sel
Red Grips
EMERGENCY
Pressure
Selector
N
100%
PUSH
EMERGENCY
PRESS
TO
TEST

RED GRIPS



When the red grips are pressed together, the harness inflates.
When the red grips are released, the harness deflates.

EMERGENCY selector

The EMERGENCY selector provides overpressure, if necessary (e.g. to prevent smoke, smell, or ashes from entering the mask, or to remove condensation).



When pressed, and until released, supplies oxygen overpressure
When turned, permanently supplies oxygen overpressure.

Note: *If the cabin altitude is above 30 000 ft, oxygen overpressure is automatically supplied.*

N/100% selector

The N/100% selector has two positions:



The mask provides 100% pure oxygen at all cabin altitudes.

L13



The mask provides a mixture of ambient air from the cockpit, and oxygen.
The proportion of air and oxygen in the mixture depends on the cabin altitude.

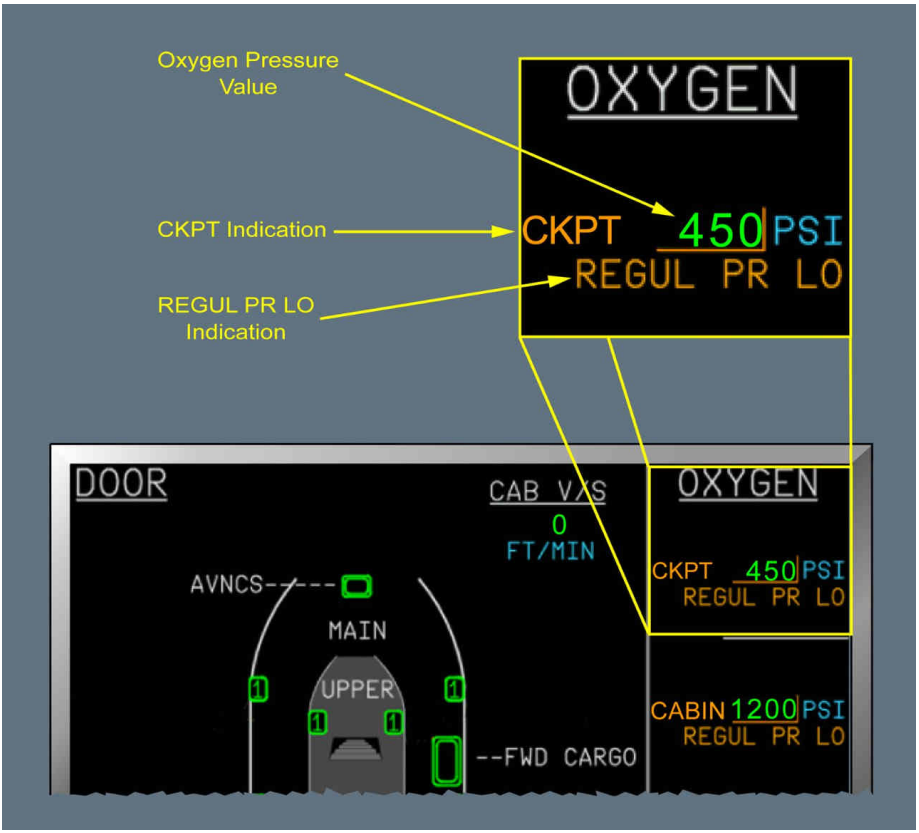
Note: *If the cabin altitude is above 30 000 ft, the mask automatically provides 100% oxygen.*

OXYGEN INDICATIONS ON DOOR SD PAGE

Applicable to: ALL

The DOOR System Display provides the flight crew with information on the oxygen system.

Cockpit Oxygen System Indications



CKPT INDICATION

CKPT

Normal operation of the oxygen system.

L12



- The oxygen system is off (the CREW SUPPLY pb-sw is OFF)
  The REGUL PR LO indication also appears.
  Or
- The oxygen system has low pressure.
  The CKPT indication appears with:
  - The REGUL PR LO indication, on ground, if there is a low pressure in the distribution manifold
  - The oxygen pressure value in amber, because low pressure is detected in the oxygen bottle.
    Associated with the following ECAM alert: OXY CKPT BOTTLE PRESS LO (*Refer to procedure*).

OXYGEN PRESSURE VALUE



The pressure is equal to, or above the minimum necessary to dispatch the aircraft with five flight crewmembers.



On ground only, appears with the amber half-frame, if the pressure is below the minimum necessary to dispatch the aircraft with five flight crewmembers. However, the pressure may be sufficient to dispatch the aircraft with less than five flight crewmembers: *Refer to Cockpit Oxygen Limitations* .

L12



Low pressure is detected in the oxygen bottles.
This occurs, when the pressure is below 350 PSI.
Associated with the following ECAM alert: OXY CKPT BOTTLE PRESS LO (*Refer to procedure*).

L3 *Note: The oxygen pressure is temperature compensated. A temperature sensor, located next to the oxygen bottle, measures the temperature in the area.*

REGUL PR LO INDICATION

L13



Appears on ground, when:

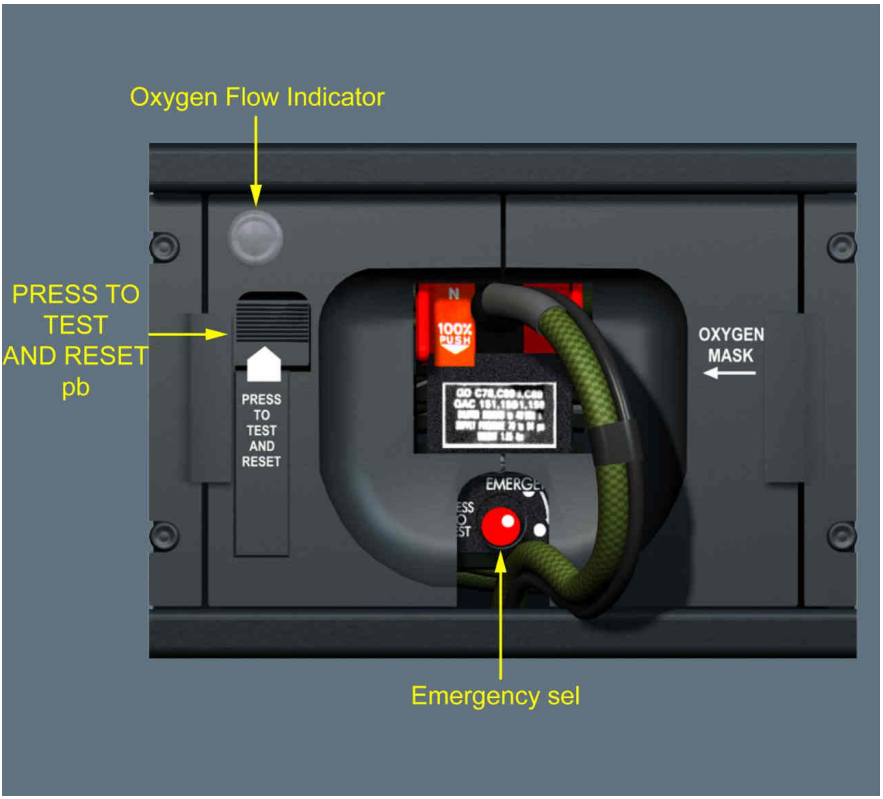
- The oxygen CREW SUPPLY pb-sw is OFF, or
- The oxygen pressure in the oxygen distribution manifold is low.
  Oxygen pressure is low, if it goes below 47 PSI.

HOW TO TEST THE MASK

Applicable to: ALL

- **On the Oxygen Panel:**
  CREW SUPPLY pb-sw ..... CHECK ON
- **On the glareshield:**
  LOUDSPEAKERS..... CHECK ON
- **On the RMP:**
  INT reception knob..... PRESS OUT - ADJUST
  INT/RAD switch..... INT
- **On the mask stowage box:**

Oxygen Mask Stowage Box



PRESS TO TEST AND RESET pb .....PRESS AND HOLD

Check that the oxygen flow indicator turns yellow for a short time, and then goes black.

Hold the PRESS TO TEST AND RESET pb down, and press the EMERGENCY selector.

Check that the oxygen flow indicator turns yellow, and remains yellow, as long as the EMERGENCY selector is pressed.

Listen for oxygen flow through the loudspeakers. Inform any engineer whose headset may be connected to the nose intercom, that a loud noise may be heard.

Check that the PRESS TO TEST AND RESET pb returns to the up position.

Check that the N/100% selector is in the 100% position.

Press the EMERGENCY selector again.

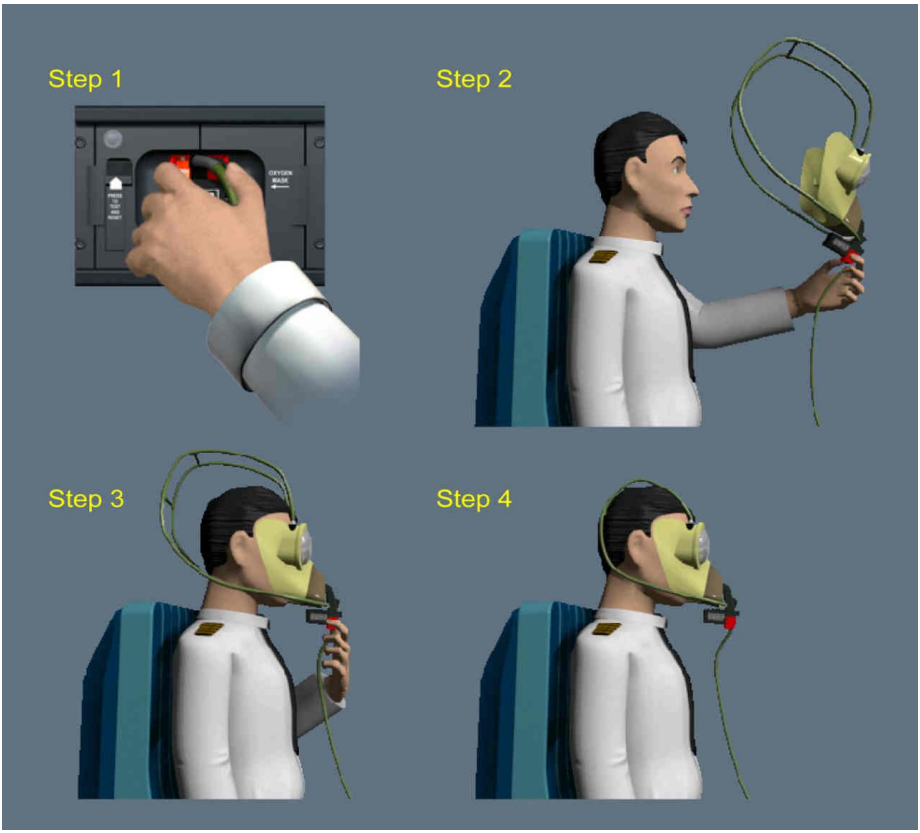
Check that the oxygen flow indicator remains black. This ensures that the mask is not supplied with oxygen.

HOW TO DON THE MASK

Applicable to: ALL

To don the flight crew oxygen mask:

How to Don the Mask



CAUTION	When the HUD is deployed, See also How to don the mask with the HUD.

STEP 1 AND 2

Remove the mask from its stowage box, by squeezing the red grips toward each other, and pulling the mask out of its box.

The stowage box opens, and the:
- Mask is immediately supplied with oxygen
- Mask harness immediately inflates
- Mask microphone is active.

STEP 3 AND 4

Don the mask, and release the red grips. This will deflate the mask harness, and keep the mask in position.

Note: The visor of each mask may have a protective film to help prevent scratches. This film is optional, and can be removed at any time.

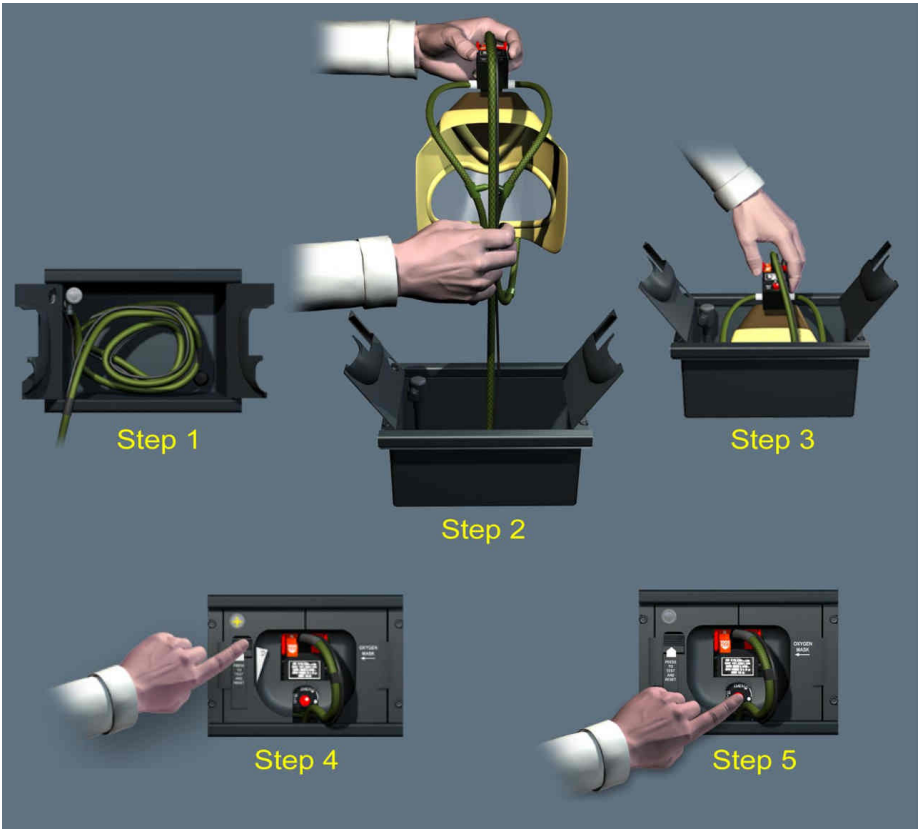
HOW TO DON THE MASK WITH THE HUD

This animation is not available in pdf format.

HOW TO STOW THE MASK

Applicable to: ALL

Mask Stowage



STEP 1

Coil the hose that is connected to the mask, and put it in the bottom of the stowage box.

STEP 2

Hold the mask by the regulator, and pull the inflatable harness downward with care.

Note: *Ensure that the harness is not inside the mask.*

STEP 3

Put the mask in the stowage box.

Make sure that the:
- Mask touches the bottom of the stowage box
- N/100% selector is face up, and at the 100% position.

STEP 4

Close the doors of the mask stowage box.
Firmly press the PRESS TO TEST AND RESET pb.
When released, check that the OXY ON flag disappears.

STEP 5

Press the EMERGENCY selector, and check that the oxygen flow indicator remains black.

ECAM ALERTS

Applicable to: ALL

OXY CKPT BOTTLE PRESS LO (*Refer to procedure*)

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FIXED OXYGEN SYSTEM FOR THE CABIN

Applicable to: ALL

The fixed oxygen system of the cabin provides oxygen to the cabin (passengers and cabin crew), and to the crew rest compartments:

- Automatically, in the case of cabin depressurization, when the cabin altitude is above 13 800 ft.
- Manually, if the flight crew presses the MASK MAN ON pb .

The fixed oxygen system of the cabin has:

- High-pressure oxygen bottles

L3 Each high-pressure bottle is located behind the right-hand sidewall lining of the forward cargo compartment. It has a capacity of 213 ft^3 .

- A pressure-reducer transmitter on each bottle
  This transmitter is connected to the high-pressure oxygen bottle, and supplies oxygen to the regulators for distribution to the entire system.

L1 - Two regulators with supply valves, that provide oxygen to all cabin occupants

L3 These valves provide cabin occupants with a continuous flow of oxygen, and regulate this oxygen flow in accordance with the cabin altitude.

L1 - Two supply lines, one for the main deck, and one for the upper deck

L2 Each supply line has two shutoff valves that can isolate the supply line in the engine-burst area. In case one of the supply lines ruptures in the engine-burst area, both associated shutoff valves will automatically isolate the affected section of the supply line. Oxygen is still supplied to the masks in the affected section, via interconnected lines from the other deck.

L1 - Masks

The masks are stowed in containers, that automatically open to release the masks, when:

- The cabin altitude is above 13 800 ft
- The flight crew opens the MASK MAN ON pb guard, and presses the pushbutton.

L3 These containers are above the passenger seats, in each lavatory, in each galley, at each cabin crew station, in both stairs, and in each crew rest compartment.
When the masks are released, prerecorded instructions are automatically broadcast.

- An Oxygen System Control Unit (OSCU)
  The OSCU monitors and controls the cabin oxygen system.

  Note: *The OSCU monitors and controls both cockpit and cabin oxygen system.*

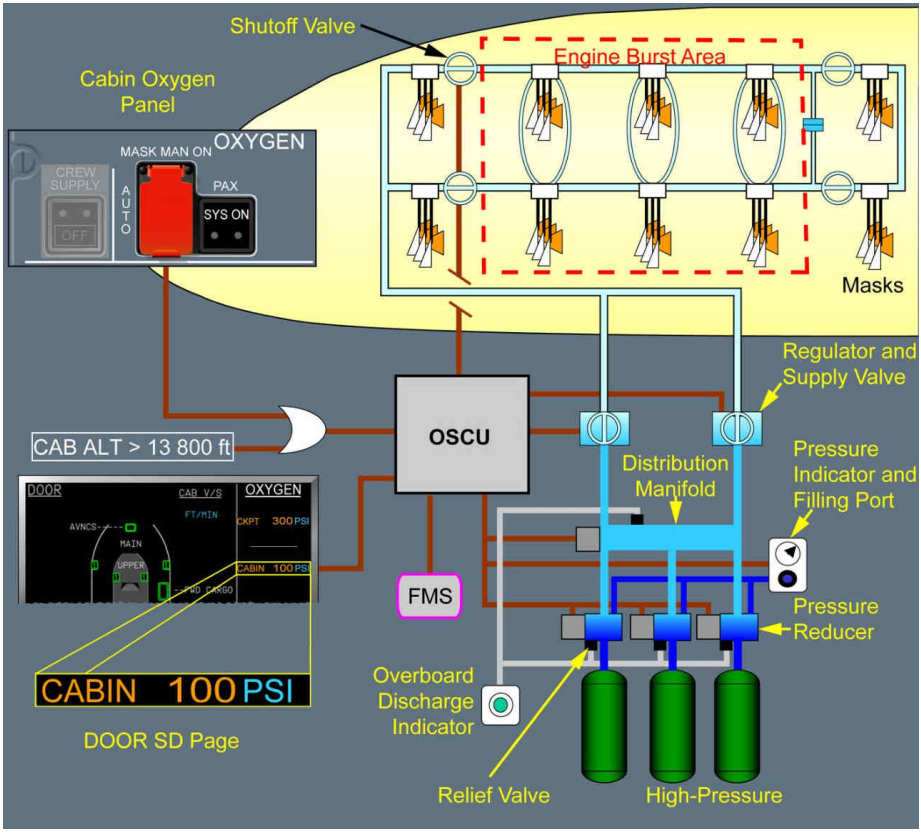
  The OSCU receives the real number of passengers from the FMS , in order to indicate on the ECAM that there is low pressure in the bottles (*Refer to DSC-35-30-20-GOIND Oxygen Pressure Value*).

- A filling port with a pressure indicator
  Oxygen bottles can be refilled from the outside via a filling port.
  This filling port is near the forward cargo door.

L1 - An overboard discharge indicator
  This indicator is normally green. It turns yellow, if there is any overpressure in the oxygen bottles, or in the oxygen distribution system.

L3 When an overpressure occurs, either a pressure reducer transmitter relief valve, or the manifold relief valve opens to discharge oxygen overboard.

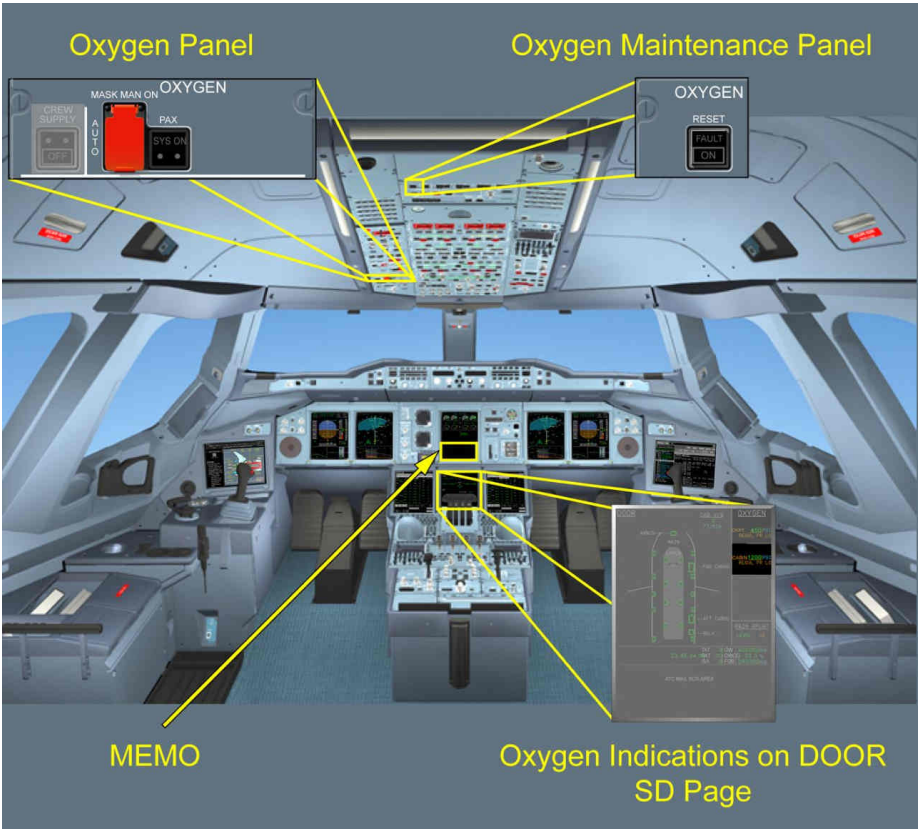
Fixed Oxygen System for the Cabin



COCKPIT VIEW

Applicable to: ALL

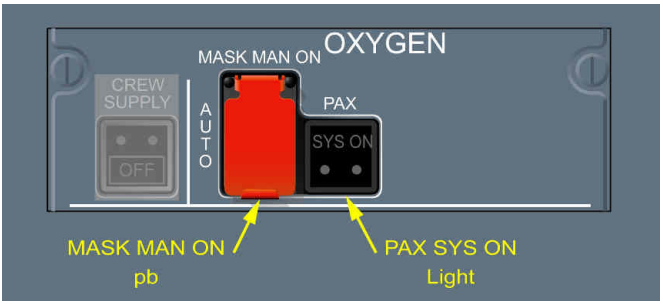
Cockpit View



OXYGEN PANEL

Applicable to: ALL

Oxygen Panel



MASK MAN ON pb

The MASK MAN ON pb is a guarded pushbutton.



Normal position.
If the cabin altitude is above 13 800 ft, the masks drop automatically.



The guard is open, and the pushbutton is pressed: The masks will drop.

PAX SYS ON light

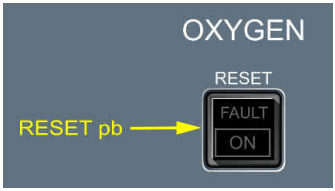


: Oxygen flows toward the passenger masks.
The light remains on, until the RESET pb on the OXYGEN maintenance panel is pressed.

OXYGEN MAINTENANCE PANEL

Applicable to: ALL

Maintenance Panel



RESET pb

Maintenance personnel uses this pushbutton to reset the control circuit, after the oxygen system has been used.

L13



: When pressed, resets the oxygen system: The PAX SYS ON light (on the OXYGEN panel) goes off.
When the reset is completed, ON goes off.
The reset lasts approximately three seconds.



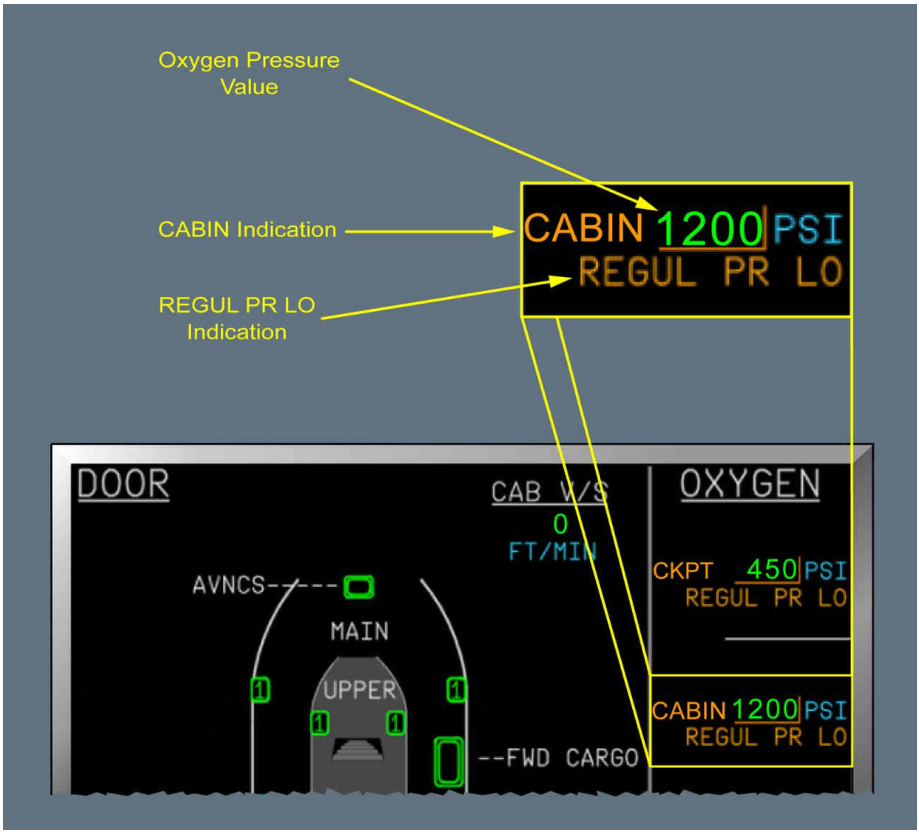
: The reset has failed.

OXYGEN INDICATIONS ON DOOR SD PAGE

Applicable to: ALL

The DOOR System Display provides the flight crew with information on the oxygen system.

Cabin Oxygen System Indications



CABIN INDICATION

CABIN — Normal operation of the oxygen system.

L12



- The oxygen system has low pressure.
  The CABIN indication appears with:
  - The REGUL PR LO indication, on ground, if there is low pressure in the distribution manifold.
  - The oxygen pressure value in amber, if low pressure is detected in the oxygen bottles.
    Associated with the following ECAM alert: OXY CABIN BOTTLE PRESS LO (*Refer to procedure*).

Or

- At least one engine-burst area shutoff valve is closed, or at least one regulator supply valve is closed, however it should be open.
  Associated with the following ECAM alert: OXY CABIN VLV CLOSED (*Refer to procedure*).

OXYGEN PRESSURE VALUE



The pressure is equal to, or above 1 600 PSI .



On ground only, appears with the amber half-frame, if: The pressure is below 1 600 PSI . However, the pressure may be sufficient to dispatch the aircraft with the real number of cabin occupants: *Refer to Cabin Oxygen Limitations* .

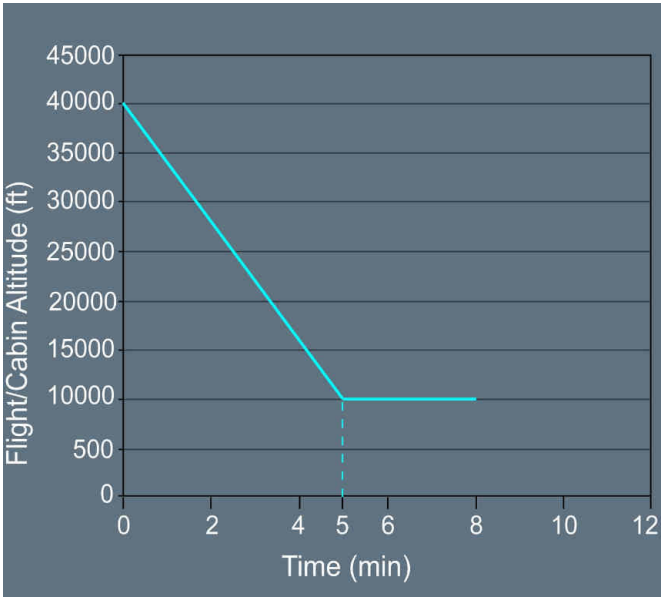
L123

150

Low pressure is detected in the oxygen bottles.

The pressure is below the minimum pressure necessary to fly an emergency descent in the following conditions:

- From 40 000 ft to 10 000 ft for 5 min
  This emergency descent profile is:



- With the real number of cabin occupants.
  The real number of cabin occupants is computed by using the passenger number, provided by the FMS .

This minimum pressure depends on the number of oxygen bottles that are installed: 3.
However, before one engine starts, low pressure is detected in the oxygen bottles, if the pressure is below 800 PSI .
Associated with the following ECAM alert: OXY CABIN BOTTLE PRESS LO (*Refer to procedure*).

L3 *Note:* *The oxygen pressure is temperature compensated. A temperature sensor, located next to the oxygen bottles, measures the temperature in the area.*

REGUL PR LO INDICATION

L13



Appears on ground, if oxygen pressure in the oxygen distribution manifold is low.
Oxygen pressure is low, if it goes below 98 PSI.

MEMO

Applicable to: ALL

OXY PAX SYS ON	The masks are released in flight, either automatically or manually, with the EXCESS CAB ALT alert activated.

L12

OXY PAX SYS ON	The masks are released in flight, either automatically or manually, without the EXCESS CAB ALT alert activated. The amber memo indicates that the Oxygen System Control Unit (OSCU) and the Cabin Pressure Control System (CPCS) are not consistent related to the cabin pressure altitude .

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ECAM ALERTS

Applicable to: ALL

OXY CABIN BOTTLE PRESS LO (*Refer to procedure*)

OXY CABIN VLV CLOSED (*Refer to procedure*)

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PROTECTIVE BREATHING EQUIPMENT (PBE)

Applicable to: ALL

There is one Protective Breathing Equipment (PBE) in the cockpit.

The flight crew can use the PBE in the case of smoke, fire, or toxic gas emissions. The PBE :

- Protects the user's eyes and respiratory system for 15 min
- L2 Enables the user to leave the station
- Enables the user to communicate.

L3 The PBE has a speech transmitter, and a very good acoustic transmission.

L1 The PBE also protects the user against cabin depressurization, when the cabin altitude is below 25 000 ft . However, the flight crew must not don the PBE when the cabin depressurization begins. In this case, the flight crew must don the oxygen mask (*Refer to DSC-35-20-30 How to Don the Mask*).

The PBE is stowed in a stowage box. For location, *Refer to DSC-25-10-20 Left Rear Area* .

The flight crew can remove the PBE from its stowage box, and don it in less than 10 s .

L3 The flight crew can don the PBE , even if having long hair, a beard, or glasses.

The PBE is based on a system of chemical air regeneration, located in the breathing bag. An oronasal mask enables the user to inhale regenerated air, and to exhale air into the regeneration system.

L1 The stowage box has a transparent cover, that enables to check the condition of the vaccum bag.

The PBE is usable as long as:

- The vaccum bag is vaccum sealed, and
- The stowage box is not damaged.

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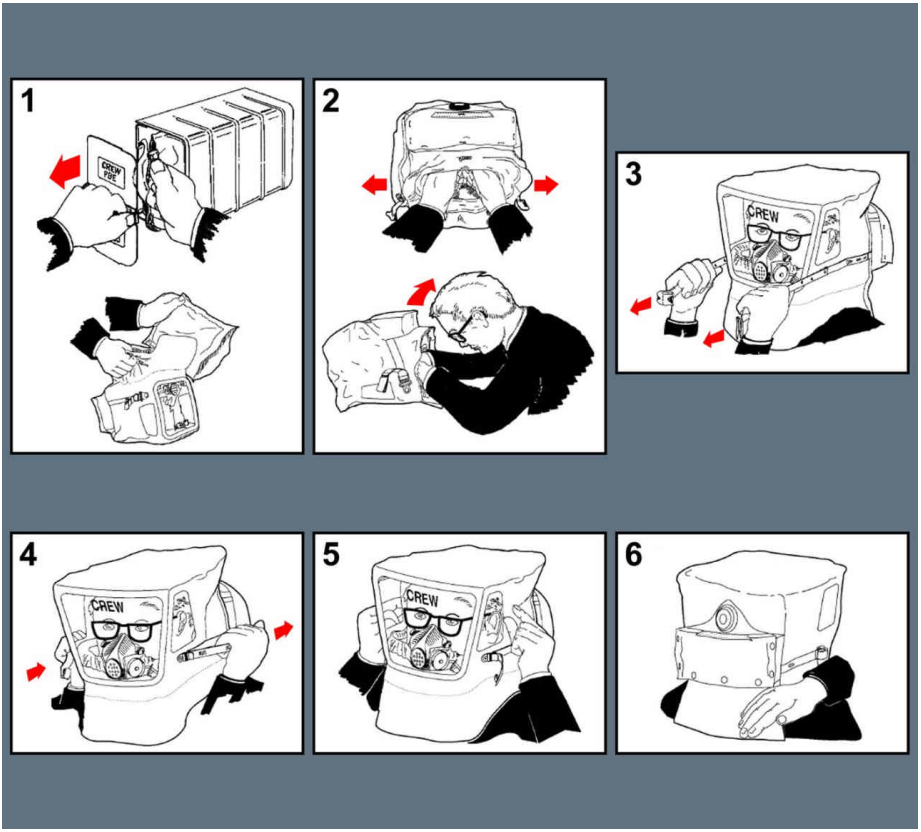
HOW TO DON THE PBE

Applicable to: ALL

How to Don the PBE



1. Firmly pull the red handle to remove the cover.
   Take out the vacuum bag, and remove the PBE from the vacuum bag.
2. Slide both hands, with palm facing each other, inside the neck seal. The PBE visor must be face down.
   Bow the head downward. Adjust the PBE on the head, with the nose and the mouth close to the oronasal mask.

3. Pull the adjustment straps forward to actuate the air regeneration system. Within one to five seconds, the PBE starts to inflate. The flight crew may hear a rushing noise of oxygen entering the hood. The PBE is now operating for 15 min.
4. Pull the adjustment straps back to secure the oronasal mask high on the nose for a tight seal.

WARNING	Put the hair above the neck seal inside the hood. Do not damage the neck seal when putting on the PBE. Be especially careful with eyeglasses, sharp-edged necklaces and earrings.

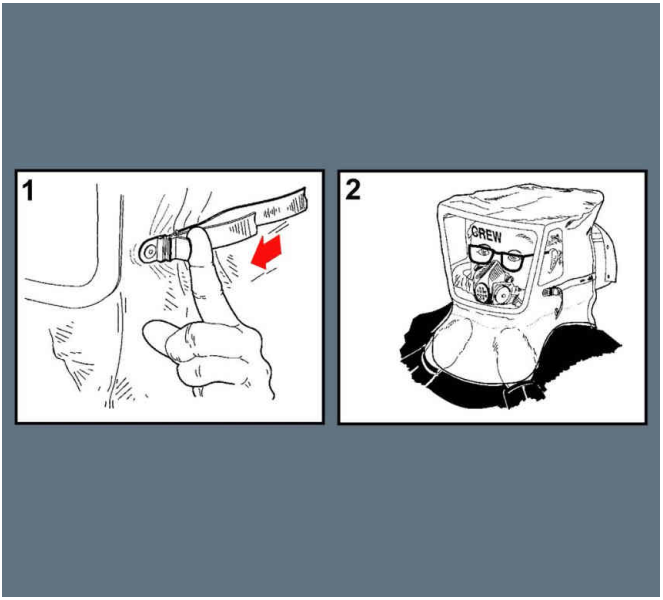
5. If wearing eyeglasses: Move the earpieces of the eyeglasses through the PBE to adjust the eyeglasses over the oronasal mask. Do not adjust the eyeglasses through the neck seal.
6. Adjust the neck seal position for a good seal. Check that there is no clothing or hair trapped in the neck seal. To protect the neck and the shoulders, adjust the material hanging below the neck seal.

Note: *If the flight crew uses the PBE until the end of complete inhalation: The hood tightly collapses around the head, and a rapid increase of heat and moisture occurs.*

HOW TO PUT OFF THE PBE

Applicable to: ALL

How to Put off the PBE



1. Go to a safe area, away from fire, flame, and toxic fumes.
   Reach the adjustment straps with both hands. Push forward the metal tabs of the adjustment straps.
2. Place both hands under the neck seal, and under the chin. Pull up the PBE: Guide the oronasal cone and the neck seal over the face and the eyeglasses.
   Place the PBE in a safe area to cool, away from fire and water.

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
OSCU	N/A	DC ESS
Release of cabin masks	MASK MAN ON pb	DC ESS
	Automatic realease	DC ESS

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AIRCRAFT SYSTEMS

36 - BLEED AIR

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DSC-36-PLP PRELIMINARY PAGES

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Electrical Supply ..... A

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OVERVIEW

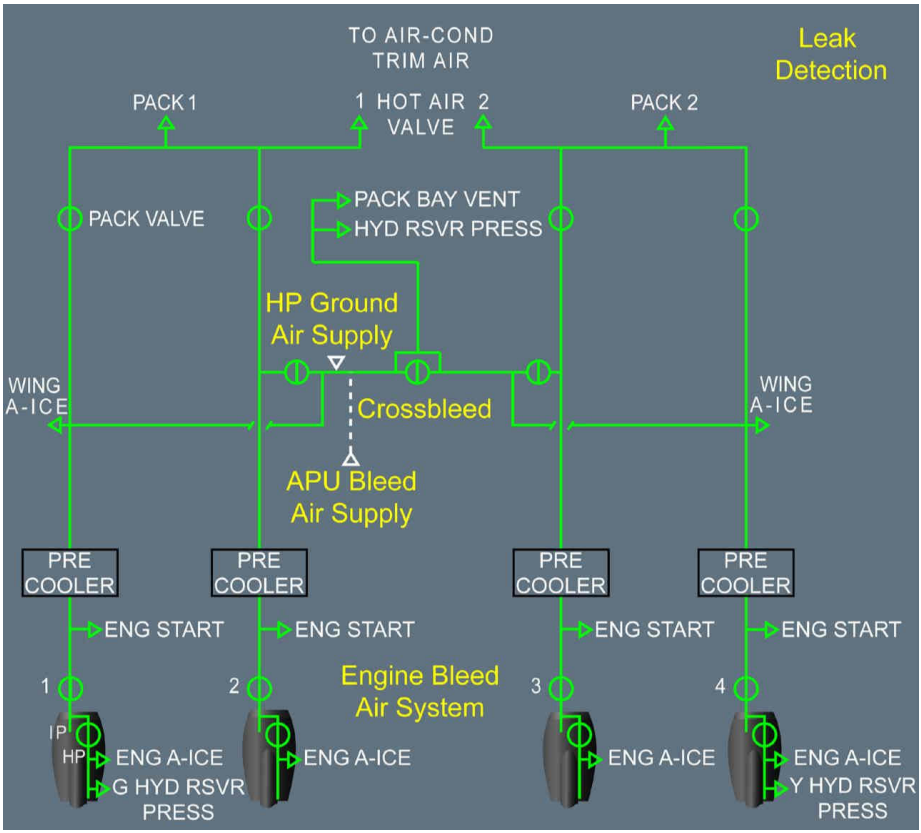
Applicable to: ALL

The bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

High-pressure air is supplied by:
- The engines
- The APU
- Ground-air sources, through three HP ground connectors.

There are three crossbleed valves on the crossbleed duct. These crossbleed valves ensure that bleed air is supplied to the systems, depending on which bleed air sources are available.
A leak detection system detects any overheat near the bleed ducts.
In normal condition, the bleed system operates automatically.
If necessary, the pilot can manually operate the bleed system.
L3 The bleed controller functions of the CPIOM A monitor and control the bleed system.

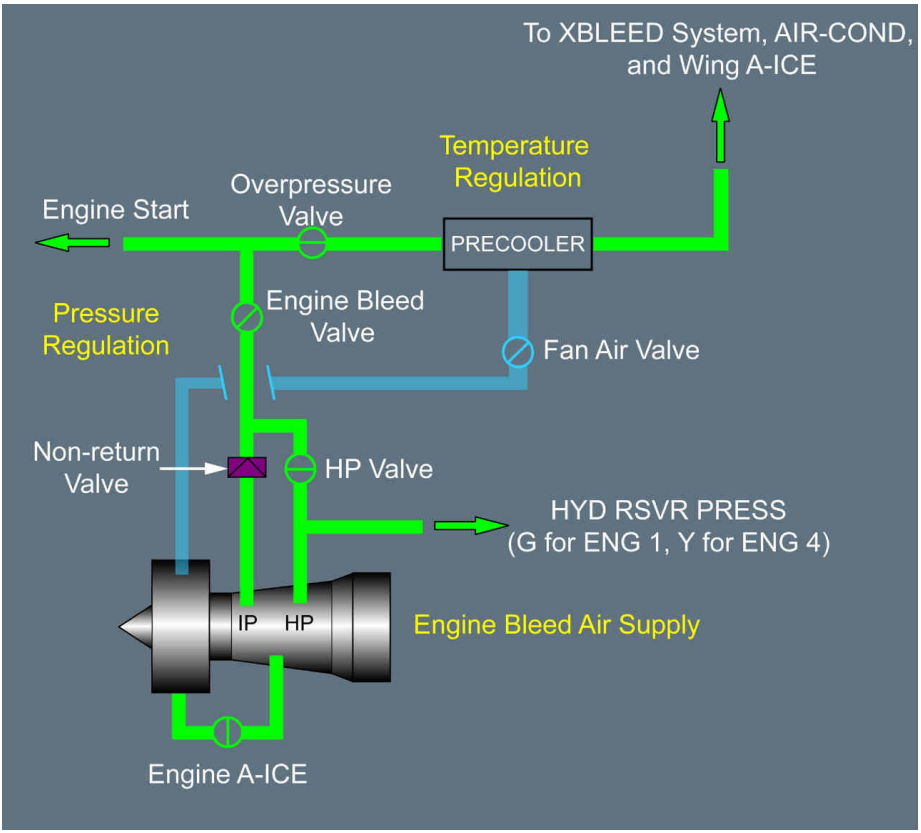
Bleed Air System



ENGINE BLEED AIR SYSTEM

Applicable to: ALL

Engine Bleed Air System



ENGINE BLEED AIR SUPPLY

Engine bleed air usually comes from the Intermediate Pressure (IP) stage of the High Pressure (HP) engine compressor.

L3 Bleed air is usually bled from the fourth stage of the HP engine compressor.

L2 The pressure at this stage of the compressor is sufficiently high to supply pressurized air to the system users at most engine thrust settings, except at low thrust settings. Using air from the IP stage minimizes fuel consumption.

L1 At low engine thrust settings, the air pressure is not sufficiently high, and air is bled from the high (HP) stage of the HP engine compressor, through the HP valve.

L3 HP air is bled from the 9th stage of the HP engine compressor.

L1 The HP valve automatically controls and regulates the pressure of the air supply.

L3 The HP valve limits the downstream bleed pressure to 48.5 lb/in²(PSI).

L1 The HP valve closes automatically in any one of the following cases:

- When the bleed pressure at the IP stage of the compressor is sufficiently high

L3 When pressure is higher than 33.5 lb/in²(PSI).

L1 - When the bleed pressure at the HP stage of the compressor is too low (e.g. at engine start)

L3 When pressure is lower than 15 lb/in²(PSI).

L1 - When the engine bleed valve is selected OFF
- In case of bleed overtemperature.

L3 The temperature downstream of the bleed valve exceeds:

- 260 °C, with a bleed pressure lower or equal to 45 lb/in²(PSI), during more than 55 s
- 245 °C, with a bleed pressure greater than 45 lb/in²(PSI), during more than 55 s.

When the HP valve is open, a pressure non-return valve prevents air from the HP stage of the compressor from circulating to the IP stage. This non-return valve is mounted downstream of the IP stage of the compressor.

PRESSURE REGULATION

For each engine, the engine bleed valve regulates the delivered bleed pressure. This valve can also close, and isolate its applicable engine bleed system.

L3 It is located downstream of the IP and HP bleed junction.

L2 This valve maintains the bleed supply pressure at about 40 PSI, to obtain a 30 PSI pack inlet pressure.
The pressure depends on the bleed airflow. The engine bleed valve regulates the airflow, to balance the pressure of the air bled from the two engines that are on the same side.

L3 In case pressure regulation fails, an OverPressure Valve (OPV) protects the bleed system. This valve automatically closes, if the bleed pressure downstream of the engine bleed valve exceeds 85 PSI. It automatically opens again, when pressure goes below 55 PSI.

L1 **ENGINE BLEED VALVE OPERATION**

Each engine bleed valve automatically operates, when its associated engine is running.
If necessary, each engine bleed valve can be manually-closed, by setting the assigned ENG BLEED pb-sw to OFF.

Additionally, the four engine bleed valves automatically close, when the APU BLEED pb-sw is set to ON.

L2 Automatic Opening

The engine bleed valve automatically opens when the associated engine bleed is available. The engine bleed valve then regulates the engine bleed air pressure.

L3 The valve opens, when the upstream pressure is greater than 15 PSI.

L2 Automatic Closure

The engine bleed valve automatically closes:

- When the associated engine bleed pressure is too low.

L3 The upstream pressure is less than 15 PSI.

L2 - During the start sequence of the associated engine.

L3 It opens again, when the engine start valve closes, and the upstream pressure is greater than 15 PSI.

L2 - In case the associated ENG FIRE pb is pressed.
- In case of associated bleed malfunctions:

  • Bleed air overpressure

L3 The pressure downstream of the bleed valve exceeds:
  ■ 60 PSI, with a bleed temperature lower or equal to 245 °C, during more than 15 s.
  ■ 45 PSI, with a bleed temperature greater than 245 °C, during more than 15 s.

L2 • Bleed air overtemperature

L3 The temperature downstream of the bleed valve exceeds:
  ■ 260 °C, with a bleed pressure lower or equal to 45 PSI, during more than 55 s.
  ■ 245 °C, with a bleed pressure greater than 45 PSI, during more than 55 s.

L2 • A leak detection in the surrounding area

L3 A leak is detected in the associated pylon or wing area.

TEMPERATURE REGULATION

A precooler regulates the temperature of each engine bleed.

L3 The precooler is an air-to-air heat exchanger, mounted downstream of the engine bleed valve. It uses cooling air, that is bled from the engine fan. A fan air valve regulates the airflow.
The fan air valve closes, when there is no bleed pressure.

L2 To obtain the selected temperature in the cabin zones, the precooler regulates bleed air temperature to approximately 200 °C.
However, depending on the demand, the bleed air temperature can be regulated down to 150 °C, provided that wing anti-ice is off.

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APU BLEED AIR

Applicable to: ALL

The APU also provides bleed air to the bleed system, via the APU bleed valve, and the APU isolation valve.

The APU isolation valve operates simultaneously with the APU bleed valve.

L3 These valves are not pressure-regulating valves, since the APU runs at a constant speed.

L1 The APU can supply bleed air to replace engine bleed air:

- On ground, without any restriction
- In flight, up to 22 500 ft , when the aircraft speed is below MACH 0.56 (*Refer to LIM-49-20 Operational Envelope*).

L3 A non-return valve, located near the crossbleed duct, protects the APU when air is bled from another source.

L1 APU BLEED VALVE OPERATION

When the APU BLEED pb-sw is set to ON , provided that the APU is running, and that the aircraft is at or below 22 500 ft , with a speed below MACH 0.56:

- The APU bleed valve opens
- All crossbleed valves open
- All engine bleed valves close.

In the case of an APU bleed leak, or if the APU FIRE pb is pressed, the APU bleed valve will close automatically.

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HP GROUND AIR

Applicable to: ALL

There are three HP ground connectors. An HP ground source can be connected to each HP ground connector, to supply bleed air to the aircraft.

L2 These HP ground connectors are on the belly fairing.

L3 Each connector has a non-return valve, that protects the connector, when air is bled from another source.

L1 When anyone of the HP ground sources is connected, all systems can receive bleed air.

Note: An HP ground source can be used for air conditioning, provided the air supply is free of oil contamination.

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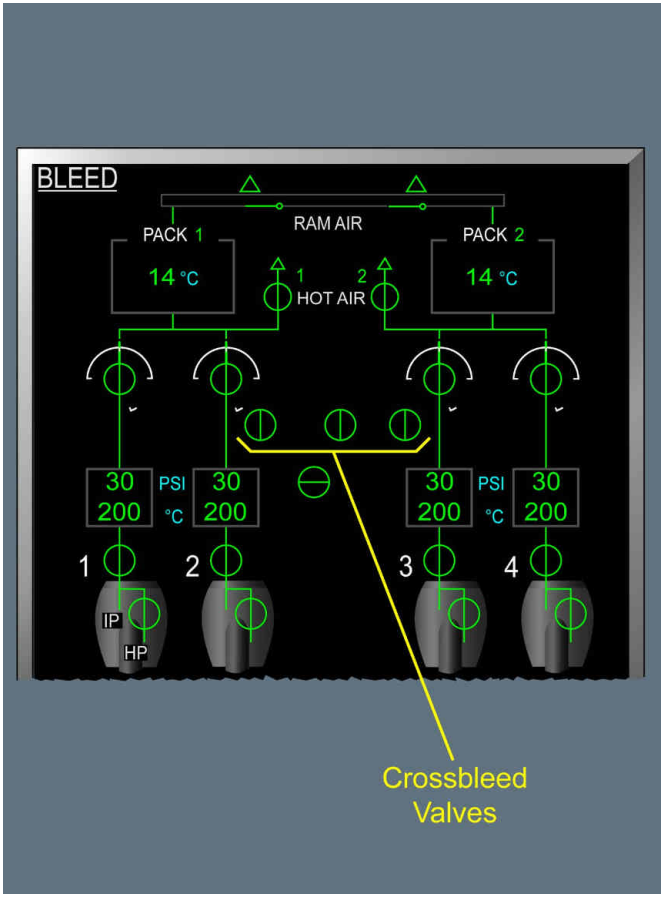
CROSSBLEED

Applicable to: ALL

Crossbleed Valves



A crossbleed duct interconnects the LH and the RH bleed supply systems. This duct has three crossbleed valves, that can isolate or interconnect the various air supply systems:

- The center crossbleed valve interconnects the LH and the RH bleed systems.
- The LH (respectively RH) crossbleed valve interconnects the bleed systems of engines 1 and 2 (respectively 3 and 4).

All these valves are normally closed. They open automatically, and at the same time:
- On ground, at engine start
- When the APU bleed valve is selected open
- In case any engine bleed system fails.

All crossbleed valves can be manually-opened at the same time, when the XBLEED selector is set to OPEN.
In the case of an engine leak: The affected engine bleed duct is isolated, by maintaining the appropriate crossbleed valves closed, provided that the XBLEED selector position is at AUTO (*Refer to DSC-36-10-60-10 Leak Detection*).

LEAK DETECTION

Applicable to: ALL

LEAK DETECTION

On ground and in flight, dual detection loops provide leak detection for the bleed ducts of the:

- Engines

L2 These ducts are located in the engine pylons.

L1
- Outer and inner wings
- APU
- Pack bays
- Air conditioning hot-air system.

L2 The presence of hot air near the ducts indicates a leak in the bleed ducts.

L1 Bleed leak detection is monitored by two bleed leak detection systems (1 and 2).

L3 For each dual loop:

- One is connected to the bleed leak detection system 1.
- The other is connected to the bleed leak detection system 2.

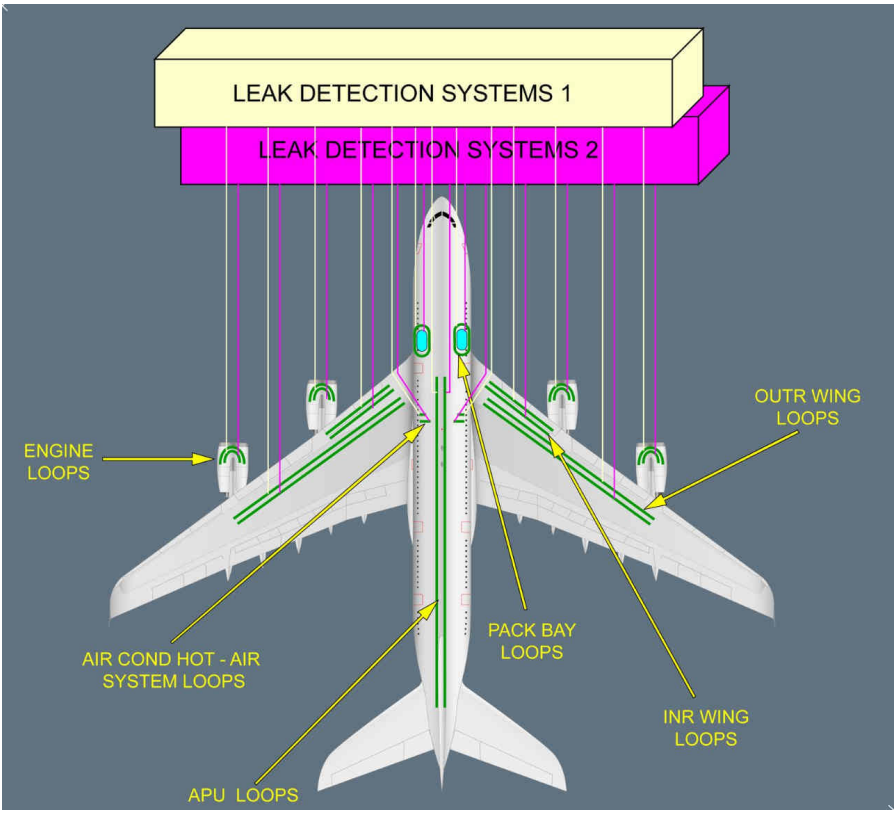
Each bleed leak detection system monitors the bleed overheats detected by its connected loops, and transmit it to the ECAM.

L2 The ECAM will trigger an overheat alert, in case:
- Both loops detect an ambient overheat, or
- One loop detects an ambient overheat, and the other one is inoperative.

L3 An overheat is detected, when the ambient temperature near the bleed ducts is above:
- 180 deg C for the engine pylon ducts
- 124 deg C for all other ducts.

L1 If a leak is detected, the affected bleed duct is automatically isolated:
- When an engine or a wing bleed duct is affected, the applicable bleed source is closed, and the crossbleed valves are closed, as appropriate.
- When the APU bleed duct is affected, APU bleed source is closed.
- When pack bays or air-conditioning hot air systems are affected, the applicable pack valves or hot-air valves close.

Leak Detection



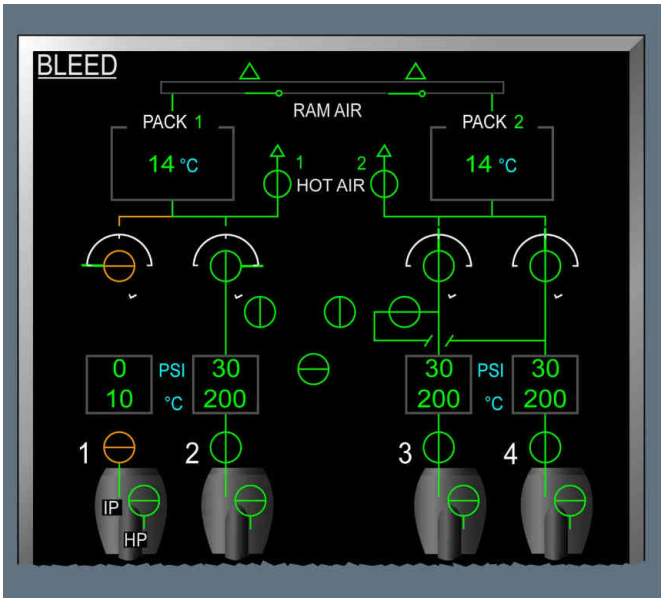
L2 OUTER WING AND ENGINE BLEED LEAKS

If a leak is detected on an outer engine bleed duct, or on an outer wing, the following valves automatically close, provided that the XBLEED selector position is at AUTO:

- The associated engine bleed valve
- The crossbleed valve on the side of the affected engine
- The center crossbleed valve
- The associated pack valve

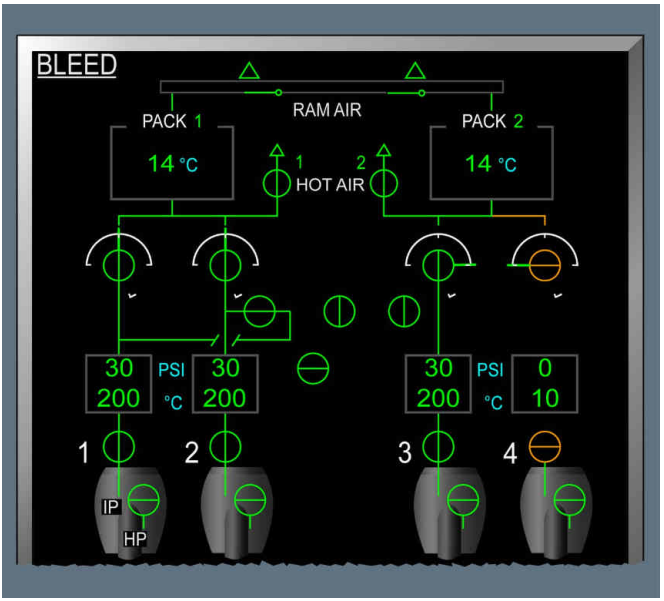
Therefore, if a leak is detected on the engine 1 bleed duct, or on the left outer wing:
- Bleed from the engine 2, 3 and 4, is available
- APU bleed is not available.

Left Outer Wing and Engine 1 Bleed Leak



If a leak is detected on the engine 4 bleed duct, or on the right outer wing:
- Bleed from the engine 1, 2, and 3, is available
- APU bleed remains available for the pack 1.

Right Outer Wing and Engine 4 Bleed Leak



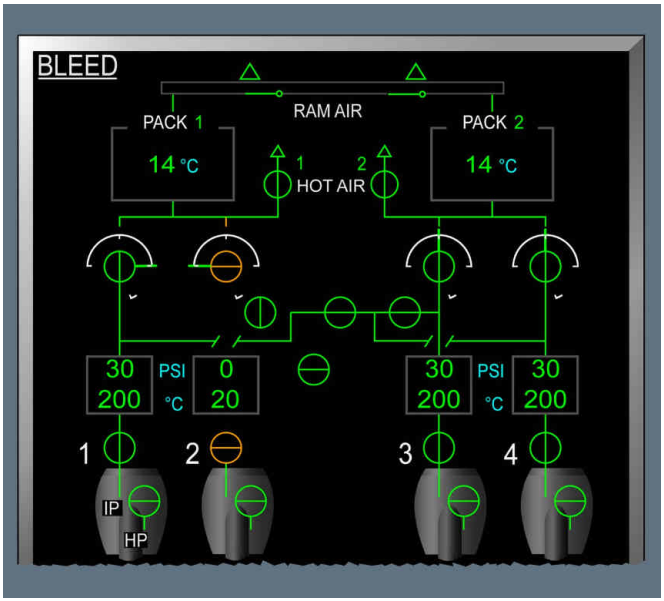
For more information on the associated ECAM procedures: *Refer to PRO-ABN-ECAM-10-36-80 AIR L(R) OUTR WING LEAK/ENG 1(4) BLEED LEAK* .

L2 **INNER WING AND ENGINE BLEED LEAKS**

If a leak is detected on an inner engine, the following valves automatically close:
- The associated engine bleed valve
- The crossbleed valve on the side of the affected engine
- The associated pack valve.

Therefore, if a leak is detected on the engine 2 bleed duct, or on the left inner wing:
- Bleed from the engine 1, 3 and 4, is available
- APU bleed is available.

Engine 2 Bleed Leak

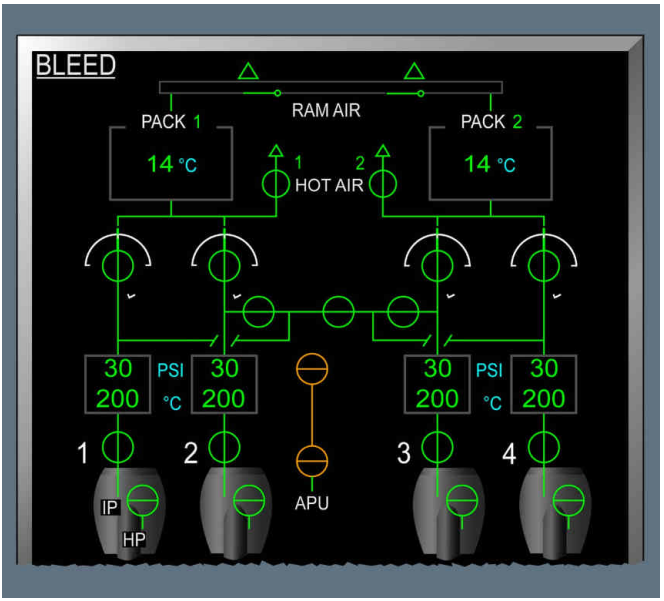


For more information on the associated ECAM procedures: *Refer to PRO-ABN-ECAM-10-36-90 AIR L(R) INR WING LEAK/ENG 2(3) BLEED LEAK* .

L2 APU BLEED LEAK

If a bleed leak is detected in the APU bleed ducts, the APU bleed valve, and the APU isolation valve automatically close. APU bleed is no longer available.

APU Bleed Leak

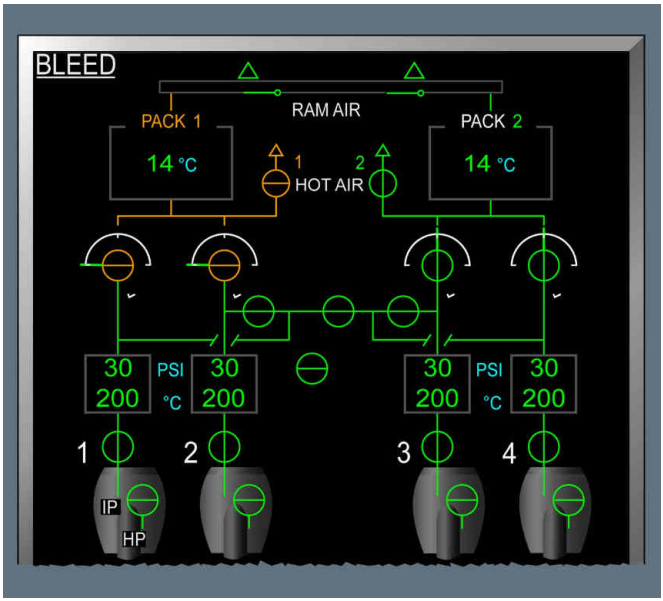


Refer to PRO-ABN-ECAM-10-36-100 AIR APU BLEED LEAK .

L2 PACK LEAKS

If a leak is detected in a pack bay area, the two pack valves of the affected pack and the corresponding hot-air valve automatically close.

Bleed Leak on PACK 1

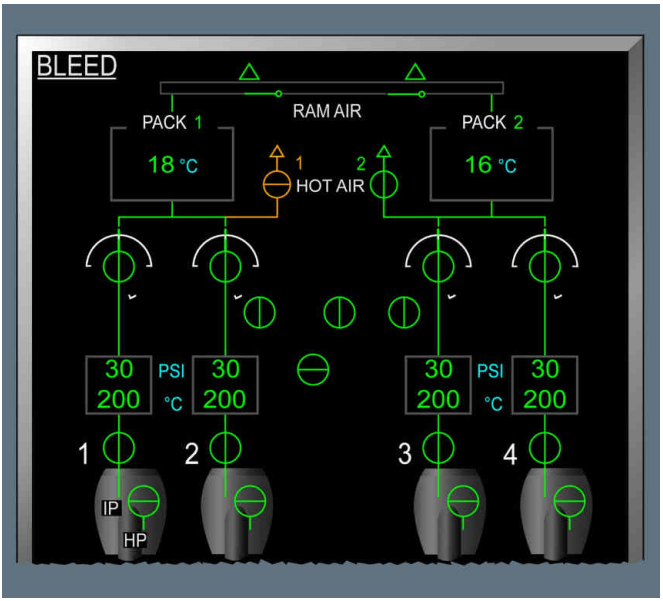


Refer to PRO-ABN-ECAM-10-36-110 AIR PACK 1(2) LEAK .

L2 HOT-AIR LEAKS

If a leak is detected on one of the hot-air ducts of the air conditioning hot-air system, the corresponding hot-air valve automatically closes.

Hot Air 1 Bleed Leak

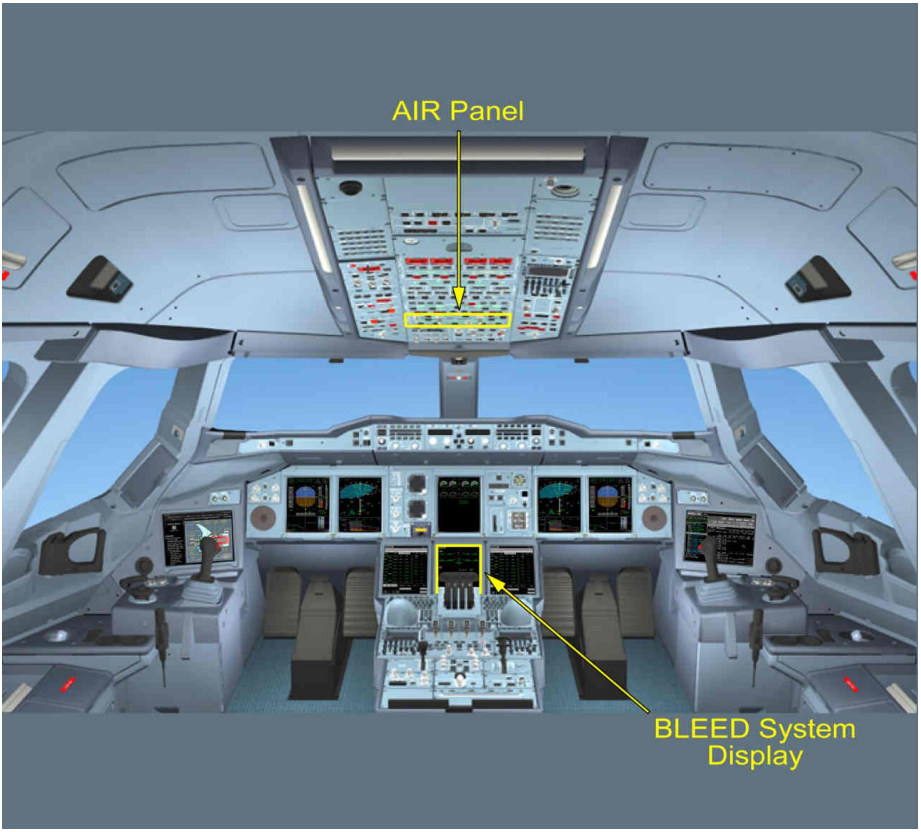


Refer to PRO-ABN-ECAM-10-36-120 AIR HOT AIR 1(2) LEAK

COCKPIT VIEW

Applicable to: ALL

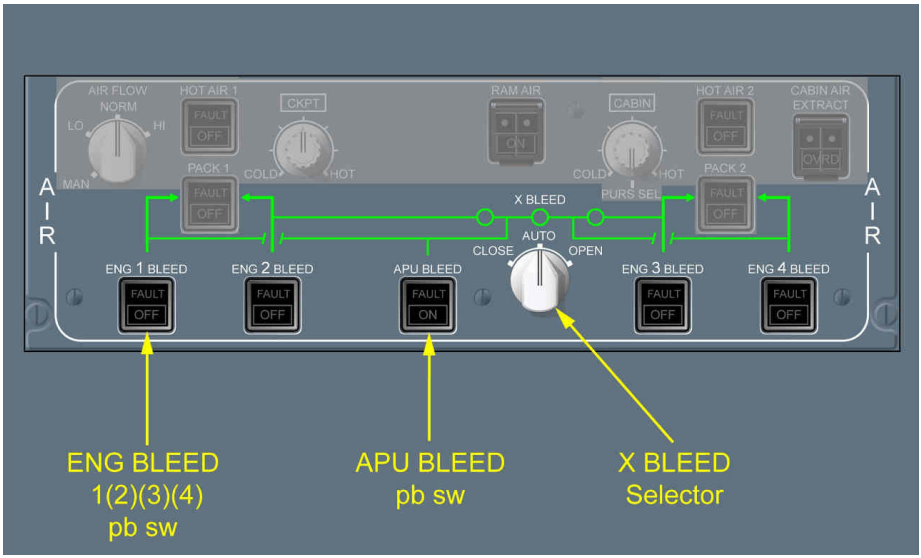
Cockpit View



AIR PANEL

Applicable to: ALL

AIR Panel



ENG 1(2)(3)(4) BLEED pb-sw



The engine bleed valve is automatically-controlled.



The engine bleed valve is closed.

L12



- The engine bleed position disagrees with the requested position, or
- An overpressure is detected, or
- An engine bleed overheat is detected.

Associated with the following ECAM alerts:

AIR ENG 1(2)(3)(4) BLEED FAULT (*Refer to procedure*)

- A leak is detected in the applicable engine or inner (outer) wing.

L2 Associated with the following ECAM alerts:
AIR L (R) INR WING LEAK (*Refer to procedure*)
AIR L (R) OUTR WING LEAK (*Refer to procedure*)
AIR ENG 1(4) BLEED LEAK (*Refer to procedure*)
AIR ENG 2(3) BLEED LEAK (*Refer to procedure*)

L1 The FAULT light goes off, when the flight crew selects OFF , and the applicable failure disappears.

APU BLEED pb-sw



The APU bleed valve is closed.



The APU bleed valve is open, provided that:
- The APU is running
- The aircraft altitude is below 22 500 ft
- No APU leak is detected.



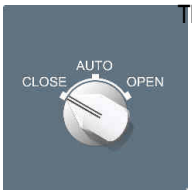
The ECAM detects an APU bleed leak

L2 Associated with the following ECAM alerts:
- AIR APU BLEED LEAK (*Refer to procedure*)

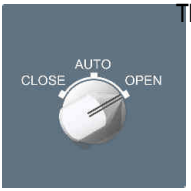
X BLEED selector



The crossbleed valves are automatically-controlled.



The three crossbleed valves are closed.



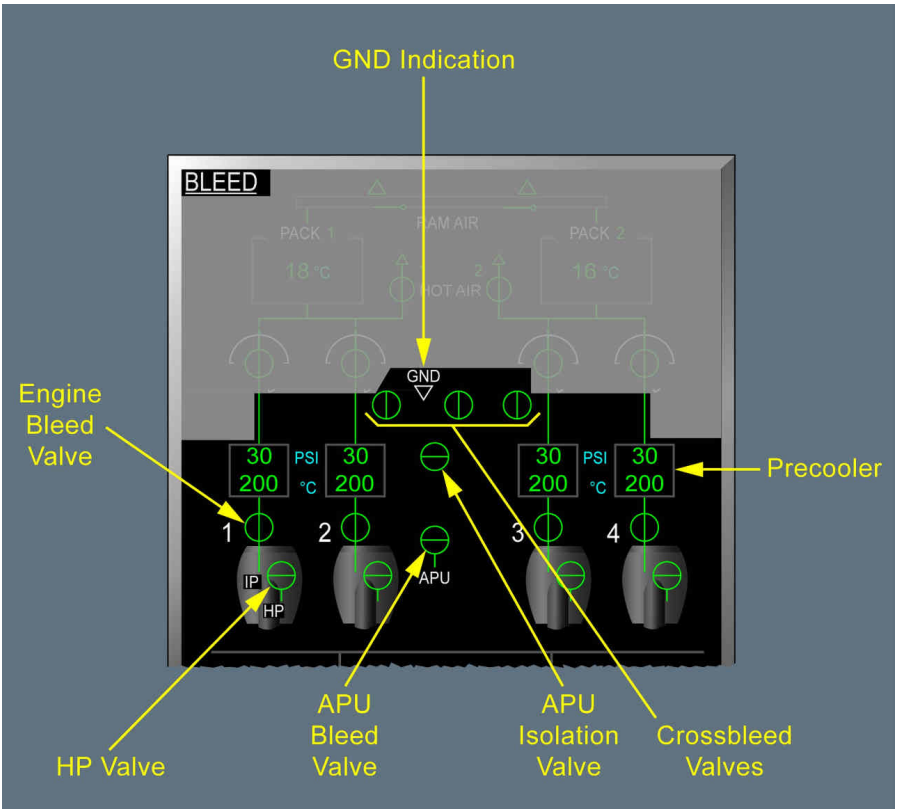
The three crossbleed valves are opened.

BLEED SYSTEM DISPLAY

Applicable to: ALL

BLEED SYSTEM DISPLAY

BLEED System Display



HP VALVE

The HP valve is closed.

The HP valve is open.



The HP valve is abnormally open.



- The HP valve is abnormally closed, or
- The HP valve is closed, and the assigned engine is not running.

ENGINE BLEED VALVES



The engine bleed valve is open.



The engine bleed valve is closed.



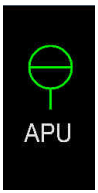
The engine bleed valve is abnormally open.



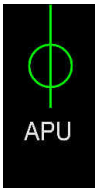
- The engine bleed valve is abnormally closed, or
- The HP valve is closed, and the assigned engine is not running.

APU BLEED VALVE

Appears only if APU pb-sw is ON.



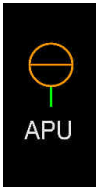
The APU bleed valve is closed.



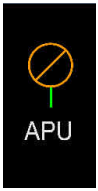
The APU bleed valve is open.



The APU bleed valve is abnormally open, and the APU BLEED pb-sw is ON.



The APU bleed valve is abnormally closed, and the APU BLEED pb-sw is ON.



The APU bleed valve is in transit.

APU ISOLATION VALVE



The APU isolation valve is open.



The APU isolation valve is closed.



The APU isolation valve is abnormally open.

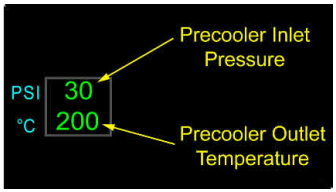


The APU isolation valve is abnormally closed.



The APU isolation valve is in transit (opening or closing).

PRECOOLER





The precooler inlet pressure is normal.



The precooler inlet pressure is abnormal.



The precooler outlet temperature is normal.



The precooler outlet temperature is abnormal.

CROSSBLEED VALVES



The crossbleed valve is open.



The crossbleed valve is closed.



The crossbleed valve is abnormally open.



The crossbleed valve is abnormally closed.

GND INDICATION

L13



Indicates that it is possible to connect the HP ground air supply.
It appears on ground only (main landing gear compressed), and aircraft speed is less than 50 kt.

ECAM ALERTS

Applicable to: ALL

AIR ABNORM BLEED CONFIG (*Refer to procedure*)

AIR APU BLEED FAULT (*Refer to procedure*)

AIR APU BLEED LEAK (*Refer to procedure*)

AIR BLEED LEAK (*Refer to procedure*)

AIR BLEED TEMP LO (*Refer to procedure*)

AIR ENG 1(2)(3)(4) BLEED FAULT (*Refer to procedure*)

AIR ENG 1(2)(3)(4) BLEED NOT CLOSED (*Refer to procedure*)

AIR ENG 1(2)(3)(4) BLEED OFF (*Refer to procedure*)

AIR ENG 1(2)(3)(4) HP VLV NOT OPEN (*Refer to procedure*)

AIR ENG BLEED TEMP LO (*Refer to procedure*)

AIR FWD CARGO DUCT LEAK (*Refer to procedure*)

AIR HOT AIR 1(2) LEAK (*Refer to procedure*)

AIR L (R) OUTR WING LEAK / ENG 1(4) BLEED LEAK (*Refer to procedure*)

AIR L (R) INR WING LEAK / ENG 2(3) BLEED LEAK (*Refer to procedure*)

AIR LEAK DET FAULT (*Refer to procedure*)

AIR PACK 1(2) LEAK (*Refer to procedure*)

AIR X BLEED FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Engine Bleed Valves	Bleed valve 1 and 2	DC 1 or DC ESS
	Bleed valve 3 and 4	DC 2 or DC ESS
HP valves	HP Valve 1 and 2	DC 1 or DC ESS
	HP Valve 1 and 4	DC 1 or DC ESS
X BLEED	Left crossbleed valve	DC 2 or DC ESS
	Center crossbleed valve	
	Right crossbleed valve	
Leak Detection	OHDU 1	DC 2 or DC ESS
	OHDU 2	
APU Bleed	APU Isolation Valve	DC 2 or DC ESS
	APU Bleed valve	DC 1 or DC ESS

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AIRCRAFT SYSTEMS

38 - WATER/WASTE

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Toilet System ..... D
Air Supply System ..... E

DSC-38-20 Electrical Supply

Electrical Supply ..... A

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OVERVIEW

Applicable to: ALL

The water/waste system has the following three main subsystems:
- The potable water system, to supply potable water to the lavatories and galleys.
- The wastewater system, to drain overboard the wastewater from the lavatories, washbasins, and galleys.
- The vacuum toilet system, to drain the waste from the toilets.

On the aircraft:
- The potable water is stored in potable water tanks.
- The toilet waste is stored in the waste storage tanks.

In flight, the cabin crew uses the FAP to control and monitor the waste/water system.

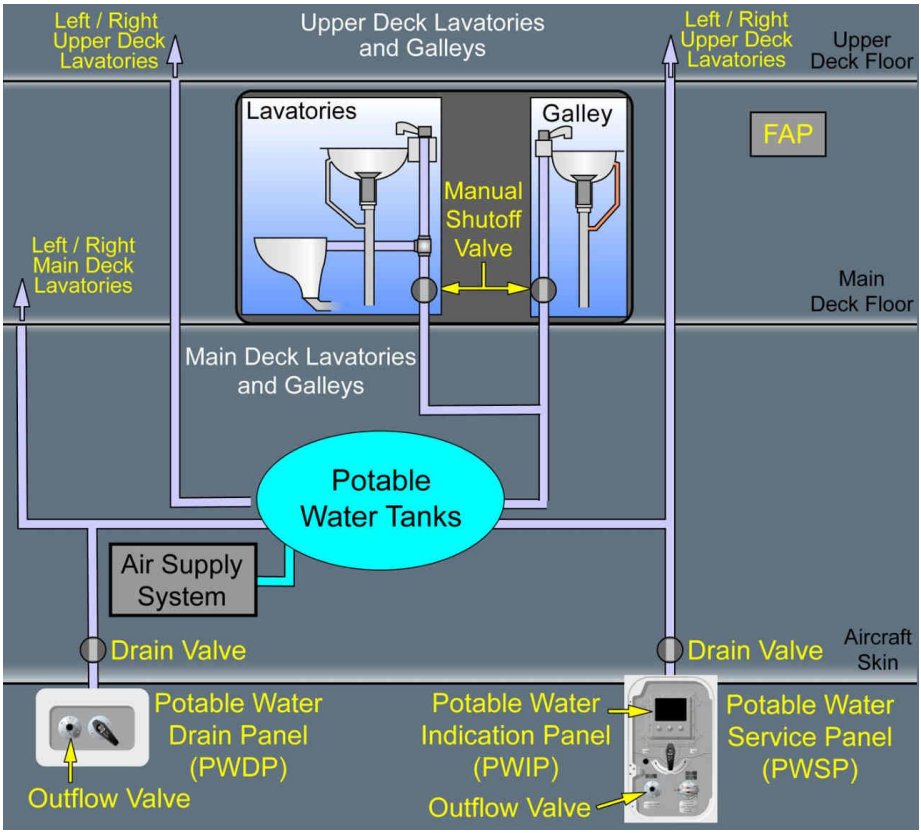
L3 On ground, the ground handling personnel supply the aircraft with potable water and perform waste servicing from:
- The Potable Water Service Panel (PWSP)
- The Potable Water Drain Panel (PWDP)
- The waste service panel.

POTABLE WATER SYSTEM

Applicable to: ALL

The potable water system supplies potable water from the potable water tanks to:
- The lavatories and the galleys
- The toilets for flushing.

Potable Water System



L3 There is an air supply system that supplies pressurized air to the potable water system. This pressurized air forces the potable water to flow from the potable water tanks to the lavatories and galleys.
The potable water tanks are above the landing gear bay, on the left and right sides of the forward area of the aft cargo.
On ground, the ground handling personnel refills the potable water tanks.

The quantity of water to be added to the potable water tanks can either be preselected by:
- The cabin crew from the FAP, or
- The ground handling personnel from the Potable Water Indication Panel (PWIP).

When the quantity of water is preselected, the ground handling personnel must fill the potable water tanks from the PWSP only.

On ground, the potable water tanks and pipes are drained via two drain valves and two outflow valves, when required:

- A drain valve is used to drain the forward water pipes through an outflow valve on the PWDP.
- Another drain valve is used to drain the water tanks and the aft water pipes through an outflow valve on the PWSP.

L1 If required, the cabin crew can isolate the galley, the water faucet, and the toilet, from the potable water supply, by using a manual shutoff valve.

L3 There is a shutoff valve in each galley and behind the access door, that is under the washbasins in each lavatory.

WASTEWATER SYSTEM

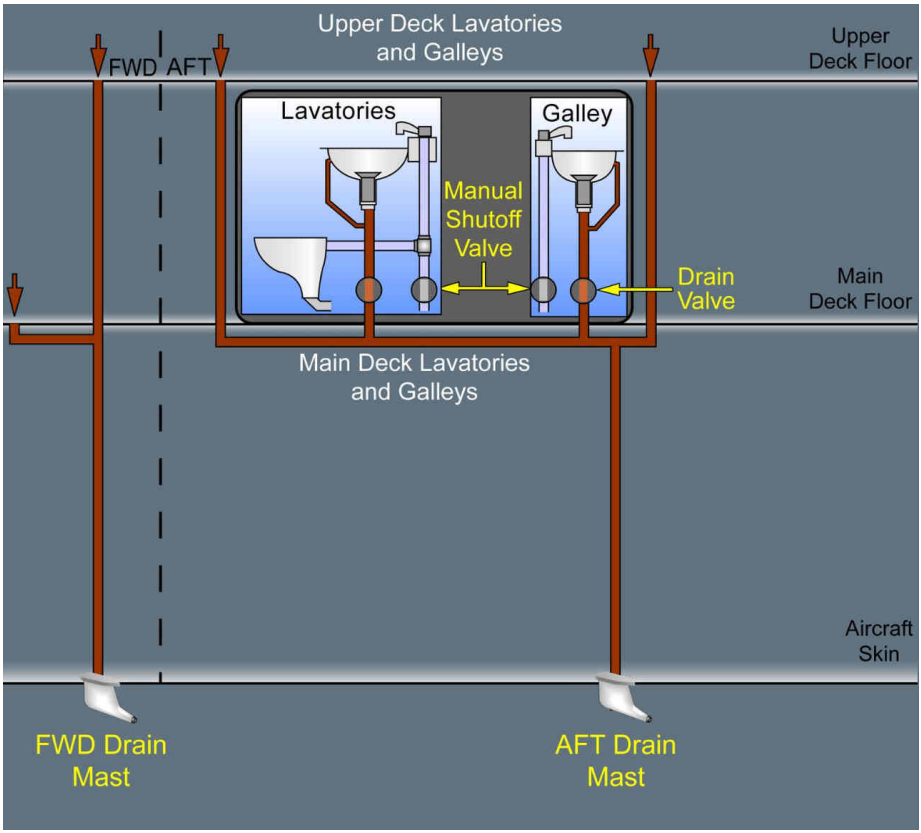
Applicable to: ALL

The wastewater system drains the wastewater from the sinks in the galleys and from the washbasins in the lavatories overboard through two heated drain masts.

L3 Wastewater is drained overboard due to:

- Differential pressure, when the aircraft is in flight<
- Gravity, when the aircraft is on ground.

Wastewater System



In the wastewater system, each lavatory and galley drain pipes have a drain valve that prevents cabin air from leaking through the drain mast.

TOILET SYSTEM

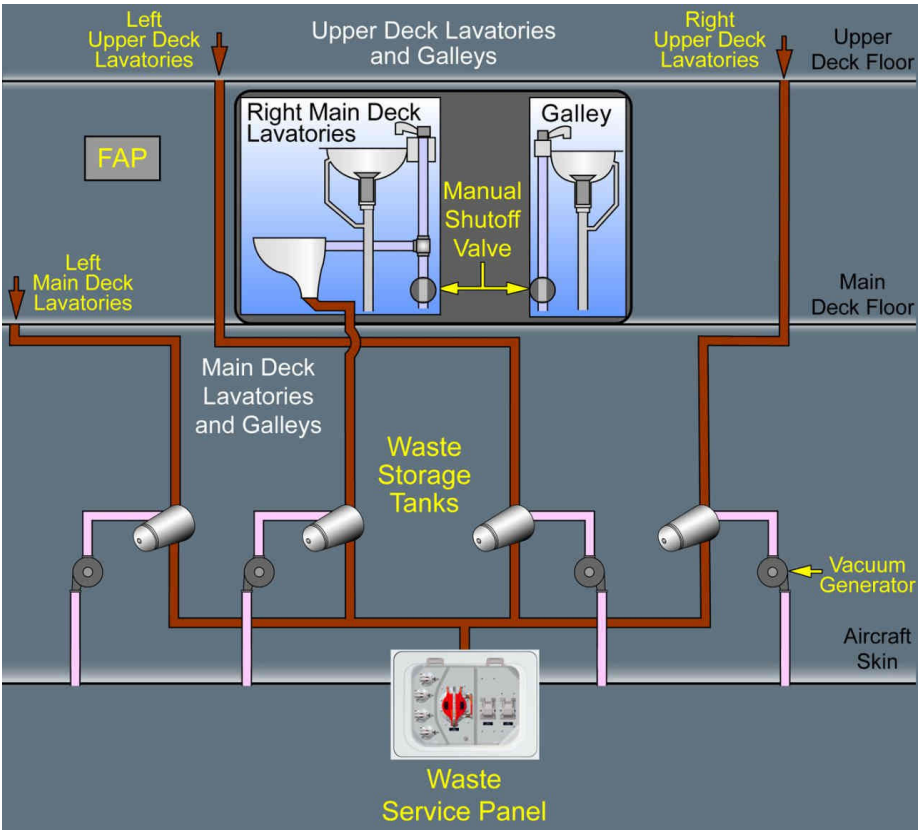
Applicable to: ALL

The aircraft has a vacuum toilet system for the toilets of the main and upper deck and the waste storage tanks.

L3 The waste storage tanks are behind the bulk cargo compartment.

L1 The vacuum toilet system uses potable water to flush the toilets.

Toilet System



- In flight, differential pressure, between the cabin air and the ambient air, forces waste from the toilet into the waste storage tanks.
- On ground, and below 16 000 ft, each waste storage tank has a vacuum generator that provides the necessary pressure difference.

Each lavatory has a manual shutoff valve. The cabin crew can use the manual shutoff valve to isolate an inoperative toilet from the potable water supply.

L3 On ground, ground handling personnel performs waste servicing of the waste storage tanks from the waste service panel.

AIR SUPPLY SYSTEM

Applicable to: ALL

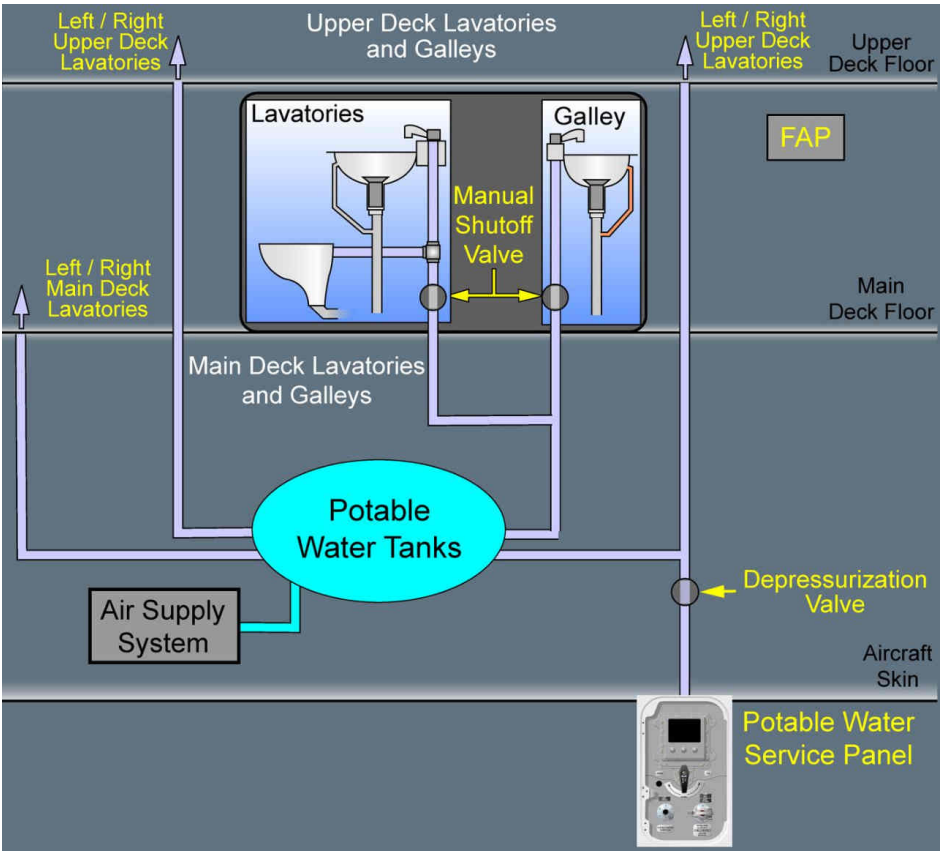
The air supply system:

- Supplies pressurized air to the potable water system, in order to provide potable water from potable water tanks to the cabin.

L3 The normal operating pressure of the potable water system is between35 PSI (2.41 bar) and 41 PSI (2.83 bar).

L2 - Depressurizes the potable water system in order, to shut it down.
If there is a leak in the air supply system in flight, the cabin crew can depressurize and shut down the potable water system via the FAP. This will open a depressurization valve and release the pressure overboard through a vent. The water in the pipes then flows back to the water tanks and the potable water system shuts down.

Air Supply System



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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
Toilet	Vacuum Generator	AC 1
Air Supply	Air-Compressor	AC 4
	Depressurization Valve	DC 2

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AIRCRAFT SYSTEMS

42 - AVIONICS NETWORK

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Failure of a pair of IOMs ..... D
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DSC-42-30 ECAM Alerts

ECAM Alerts ..... A

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OVERVIEW

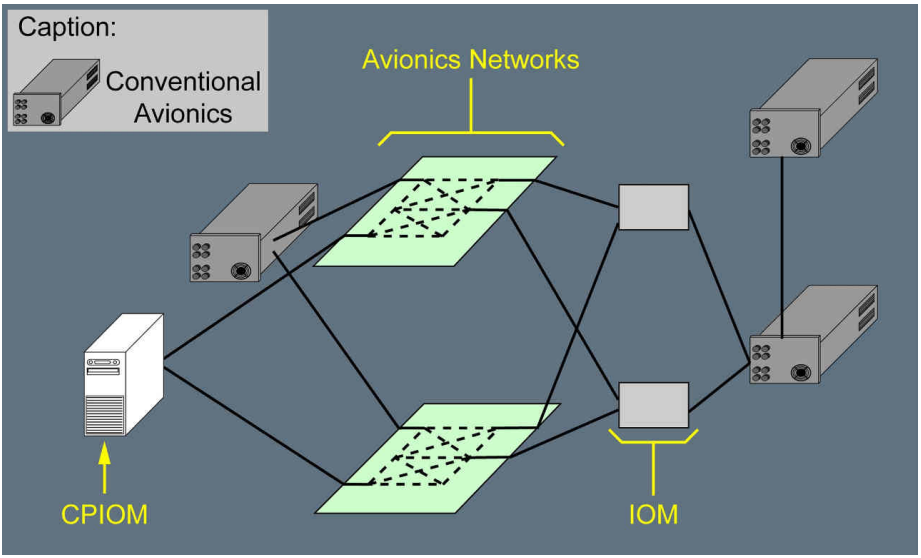
Applicable to: ALL

Instead of conventional cabling, some aircraft systems communicate with each other via two avionics networks.

The aircraft systems are monitored and controlled by:
- Conventional avionics, with computers that are assigned to specific systems, or
- Core Processing Input/Output Modules (CPIOM s), with computers that are assigned to several systems.

The Input/Output Modules (IOM s) are an interface between some conventional avionics, and the avionics networks.
The CPIOM s, and the IOM s are directly connected to the avionics networks.

Avionics Network



AVIONICS NETWORKS

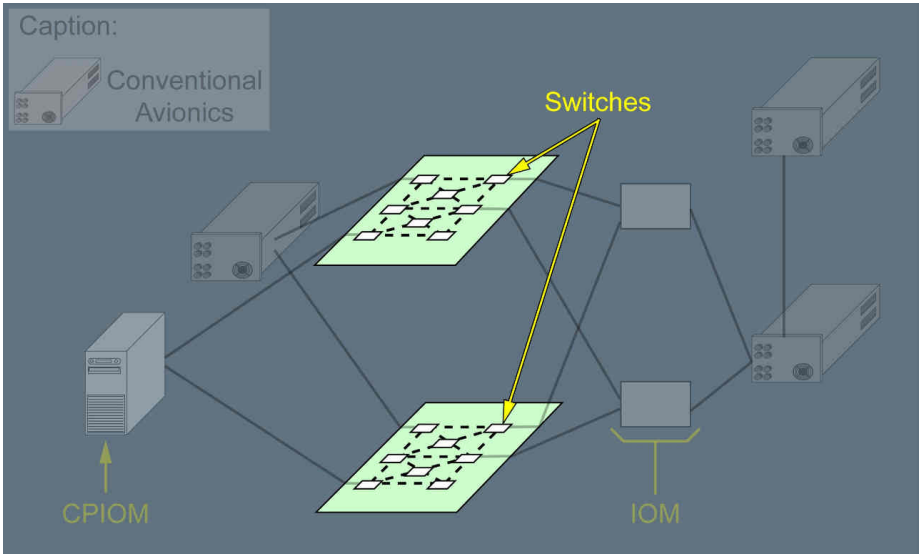
Applicable to: ALL

There are two independent, identical, and redundant avionics networks. The aircraft systems are connected to both of these networks.

The information that comes from the aircraft systems is transmitted to the avionics networks via several transit points, referred to as switches.

Note: *Some aircraft systems can communicate with each other via conventional cabling, independently of the avionics networks, to ensure that some communication remains possible, in case of a failure of both avionics networks.*

Avionics Networks



Switches automatically manage the communication between the aircraft systems, through the avionics network:

- They connect the aircraft systems to the network
- They route the information that is exchanged between the applicable aircraft systems.

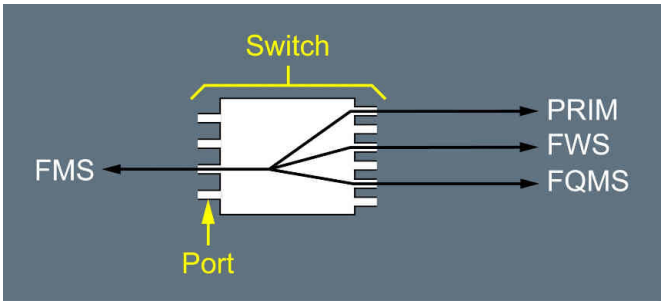
L2 There is a total of 16 switches: 8 switches for each avionics network.

L1 Each switch on one avionics network is paired with a specific switch on the other avionics network. However, the switches of one avionics network are not connected to the switches of the other avionics network.

On each avionics network, there are cables that connect the switches to one another. The cables also connect these switches to the applicable aircraft systems.

L3 The switches transmit information to the applicable aircraft systems via several ports.

Information Transmission Example



IOMS

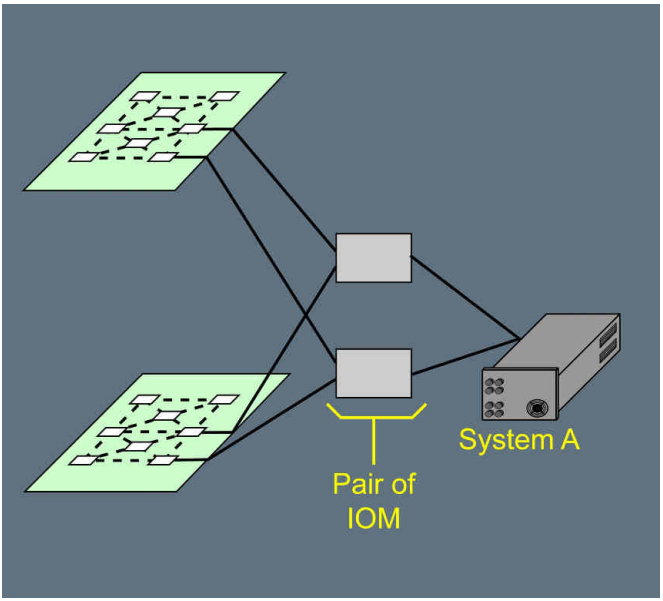
Applicable to: ALL

The IOMs are grouped in pairs. Each avionics system that uses IOMs is connected to a pair of IOMs, to ensure redundancy. The IOMs in each pair interface with both avionics networks.

L2 There are four pairs of IOMs.

L3 The IOMs transform data signals from a specific format (e.g. ARINC 429, discrete signals) into data signals that are compatible with the avionics networks, and vice versa.

IOMs



CPIOMS

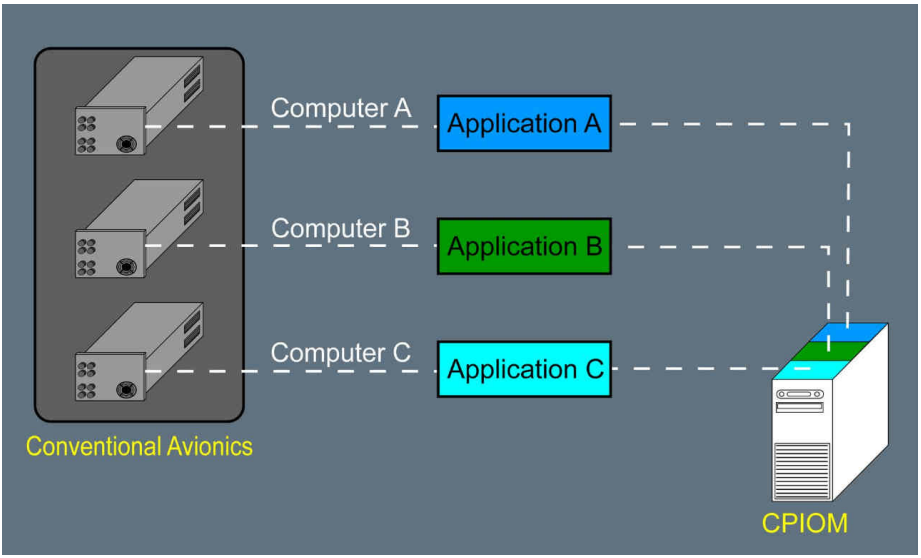
Applicable to: ALL

The CPIOMs host several applications, in order to monitor and control some aircraft systems.

The CPIOMs transmit signals compatible with:
- The avionics networks, and
- The conventional avionics.

L2 One CPIOM replaces several conventional avionics computers.

CPIOMs



L3 There are 7 CPIOM groups.

CPIOM A has four units that monitor and control the following aircraft systems:
- Bleed air
- Pneumatics air distribution
- Overheat detection

CPIOM B has four units that monitor and control the following aircraft systems:
- Cabin pressure
- Cabin and avionics ventilation control
- Air generation and temperature control.

CPIOM C has two units that monitor and control the following aircraft systems:
- Flight warning
- Flight control unit backup
- Weight and balance backup computation
- Flight control data concentrator.

CPIOM D has two units that monitor and control the following aircraft systems:
- Air traffic communication
- Avionics communication router (Datalink).

CPIOM E has two units that monitor and control the following aircraft systems:
- Electrical load management
- Circuit breaker monitoring
- Electrical system BITE.

CPIOM F has four units that monitor and control the following aircraft systems:
- Fuel management
- Fuel measurement.

CPIOM G has four units that monitor and control the following aircraft systems:
- Braking
- Steering
- Landing gear extension/extraction
- Tire pressure/oleo temperature/brake temperature monitoring system.

SWITCH FAILURE AFFECTING ONE NETWORK

Applicable to: ALL

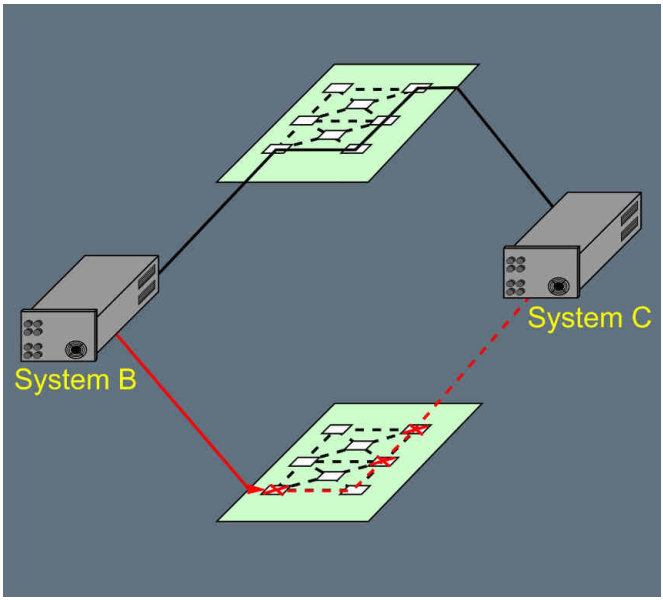
If a single or multiple switch failure affects only one avionics network, the other network will maintain communication between the aircraft systems. There is no operational impact.

L2 A single switch failure will trigger a message for maintenance. It is not associated with any ECAM alert.

A multiple switch failure affecting one network is associated with one of the following ECAM alerts, as applicable:

- AVIONICS NETWORK DOUBLE SWITCH FAULT (*Refer to procedure*)
- AVIONICS NETWORK MULTIPLE SWITCH FAULT (REDUNDANCY DEGRADED) (*Refer to procedure*).

Multiple Switch Failure Affecting One Network



SWITCH FAILURE AFFECTING BOTH NETWORKS

Applicable to: ALL

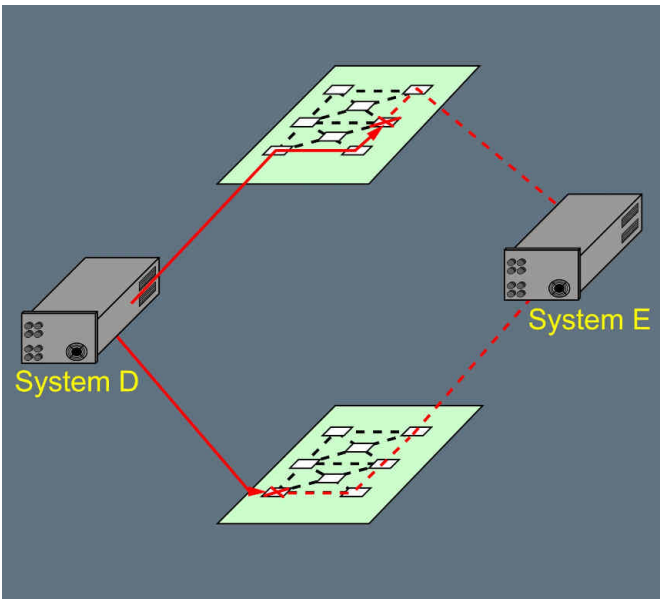
If a multiple switch failure affects both avionics networks, network communication between the systems, that communicate via these switches, will be lost.

Some connected systems may be affected, depending on what information can no longer be transmitted.

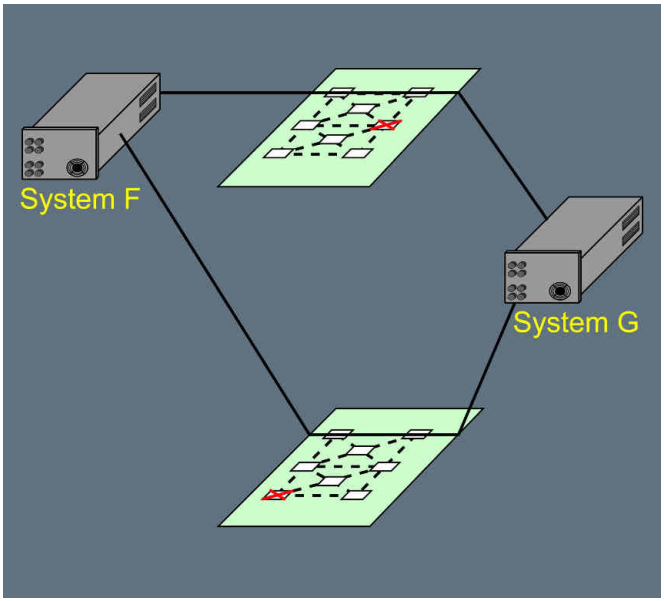
L2 A multiple switch failure affecting both networks is associated with the following ECAM alerts:

- AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) (*Refer to procedure*)
- AVIONICS NETWORK ALL SWITCHES FAULT (*Refer to procedure*).

Double Switch Failure Affecting Both Networks: Communication Between D and E Affected



Double Switch Failure Affecting Both Networks: Communication Between F, and G Not Affected



IOM FAILURE DEGRADING REDUNDANCY

Applicable to: ALL

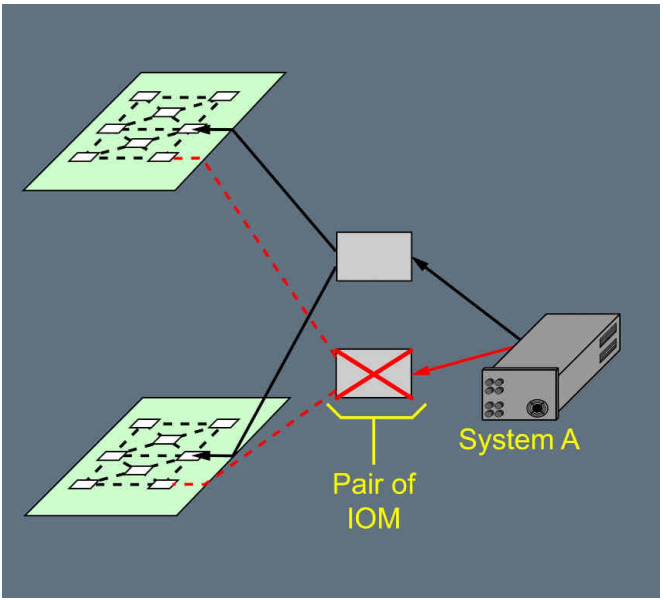
If only one IOM of one (or more) IOM pair(s) fails, the other IOM of the affected pair(s) will maintain communication between connected aircraft systems and avionics networks. There is no operational impact.

L2 A single IOM failure will trigger a message for maintenance. It is not associated with any ECAM alert.

This is associated with one of the following ECAM alerts, as applicable:

- AVIONICS NETWORK DOUBLE IOM FAULT (*Refer to procedure*)
- AVIONICS NETWORK MULTIPLE IOM FAULT (REDUNDANCY DEGRADED) (*Refer to procedure*).

Single IOM Failure



FAILURE OF A PAIR OF IOMS

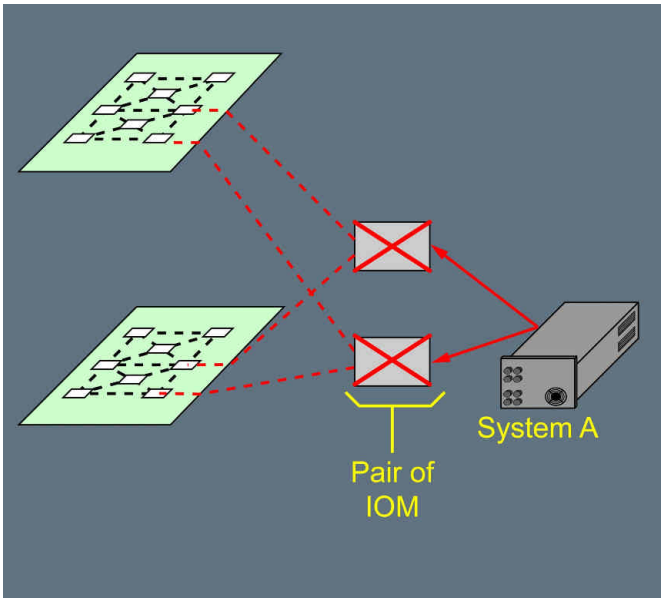
Applicable to: ALL

If one pair of IOM s fails, communication between its connected aircraft systems and both avionics networks will be lost.

L2 This is associated with the following ECAM alert:

- AVIONICS NETWORK MULTIPLE IOM FAULT (NETWORK DEGRADED) (*Refer to procedure*).

Failure of a Pair of IOMs



CPIOM FAILURE

Applicable to: ALL

In case of a CPIOM failure, the ECAM will not trigger a specific CPIOM alert. Aircraft systems, monitored and controlled by this failed CPIOM, may be affected. If this is the case, the ECAM will trigger the applicable system alerts.

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ECAM ALERTS

Applicable to: ALL

AVIONICS NETWORK ALL SWITCHES FAULT (*Refer to procedure*)

AVIONICS NETWORK DOUBLE IOM FAULT (*Refer to procedure)*

AVIONICS NETWORK DOUBLE SWITCH FAULT (*Refer to procedure)*

AVIONICS NETWORK MULTIPLE CABLE FAULT (*Refer to procedure.)*

AVIONICS NETWORK MULTIPLE IOM FAULT
(NETWORK DEGRADED) (*Refer to procedure)*

AVIONICS NETWORK MULTIPLE IOM FAULT
(REDUNDANCY DEGRADED) (*Refer to procedure)*

AVIONICS NETWORK MULTIPLE SWITCH FAULT
(NETWORK DEGRADED) (*Refer to procedure)*

AVIONICS NETWORK MULTIPLE SWITCH FAULT
(REDUNDANCY DEGRADED) (*Refer to procedure)*

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AIRCRAFT SYSTEMS

46 - INFORMATION SYSTEMS

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DEVIATING....U
DIR TO....V
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DIVERTING TO / VIA....X
ENDURANCE....Y
ENSUING WPT....Z
ENTRY POINT....AA
ETA....AB
ETA DEST....AC
FREETEXT....AD
GATE....AE
GROUND speed....AF
GROUND TRACK....AG
HDG....AH
HEADING....AI
ICING....AJ
LEAVING....AK
LEVEL....AL
MACH....AM
MAX UPLINK DELAY....AN
NEXT....AO

NEXT WPT....AP
NEXT WPT ETA....AQ
OCEANIC CENTER....AR
OFFSET....AS
OFFSETTING....AT
OVHD....AU
PASSING....AV
POSITION....AW
PPOS....AX
PRESENT ALTITUDE....AY
PRESENT GROUND TRK....AZ
PRESENT HDG....BA
PRESENT POSITION....BB
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TO....BN
TRACK....BO
TURBULENCE....BP
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System Overview

GENERAL

Applicable to: ALL

The Air Traffic Control (ATC) datalink system provides Communication, Navigation and Surveillance for Air Traffic Management (CNS/ATM) services.
The ATC datalink system is made up of several applications that the flight crew uses to communicate with the ATC center. These applications enable the air traffic controller to follow aircraft navigation, and improve air traffic.

COMMUNICATION AND NAVIGATION FOR AIR TRAFFIC MANAGEMENT

At the beginning of the flight, the flight crew initiates a connection with the air traffic controller in the ATC center by sending notification, via the ATS Facilities Notification (AFN) application. Once the notification is sent, a connection initiated by the air traffic controller can be established between the aircraft and the ATC center. The flight crew and the controller may then exchange predefined and/or freetext messages displayed either on the ATC COM page of the MFD, or the mailbox section on the lower section of the System Display (SD).

Communication is performed by one of the following applications, depending on the type of request:
- Controller/Pilot Data Link Communication (CPDLC) application, or
- ARINC623 (A623) application, for some specific types of requests.

A Message Record application records uplink (from ground-to-air) and downlink (from air-to-ground) messages exchanged between the flight crew and the ground controller. It also provides the flight crew with the possibility to retrieve and display any recorded message.

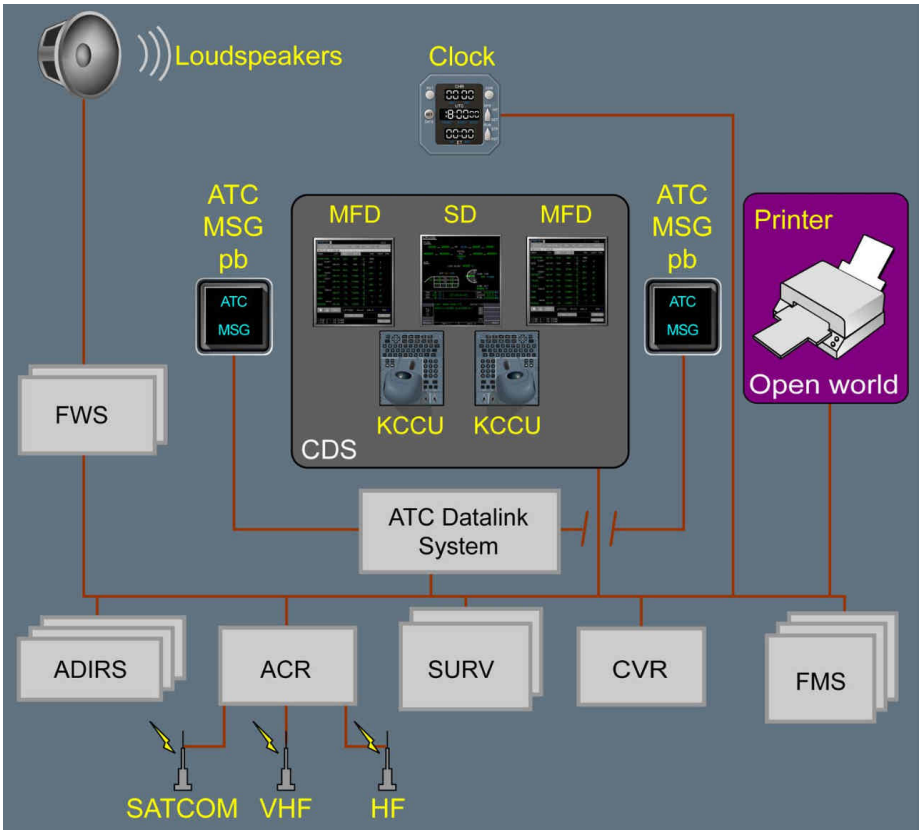
SURVEILLANCE AND NAVIGATION FOR AIR TRAFFIC MANAGEMENT

An automatic aircraft surveillance system sends aircraft position and aircraft navigation data to different ATC centers.
This system uses the Automatic Dependent Surveillance (ADS) application.

ARCHITECTURE

Applicable to: ALL

ATC Datalink System Architecture



L3 The ATC system is installed on CPIOM-D.

MULTI FUNCTION DISPLAY (MFD)

The MFD displays the ATC COM pages, where the flight crew creates requests, manages connection, checks history files and ATIS reports and modifies answers.

SYSTEM DISPLAY (SD)

The lower section of the SD permanently displays the mailbox, where messages exchanged between the flight crew and the air traffic controller are displayed.

L3 *Note: ATIS and ADS messages appear on the MFD only.*

KEYBOARD AND CURSOR CONTROL UNIT (KCCU)

The ATC datalink system interfaces with the two KCCUs.
The KCCU enable the flight crew to interact with the ATC datalink system, e.g. to type or select messages or requests.

The KCCU also have function keys:
- ATC COM key, to display the corresponding ATC page on the MFD, and to position the cursor on the MFD
- MAILBOX key, to position the cursor on the mailbox section of the SD
- CLEAR INFO key, to clear information messages from the message area at the bottom of the ATC COM pages.

PRINTER

The flight crew can print any message exchanged with the ATC center and that is accessible from the MFD or SD.

L12

Note: Each time the flight crew prints a message, they have to check that the printed message is the same as the one on the display unit.
The reference information is the information displayed on the screen.

L3 **FMS**

The ATC datalink system interfaces with the three FMC s.

The ATC link with the FMS enables the flight crew to:
- Directly load a route clearance from the ATC to the secondary flight plan (SEC 3)
  (*Refer to DSC-22-FMS-10-40-70 Secondary Flight Plan Initialization*)
- Generate a route clearance request message from the FMS secondary flight plan pages on the MFD
  The flight crew then transfers the request message to the mailbox on the SD .

- Monitor a flight parameter in the FMS
  The FMS displays a reminder to the flight crew when the parameter is achieved.
  (*Refer to DSC-46-10-10-30-50 Modify Report* for more information)
- Provide FMS parameters for ADS position reporting.

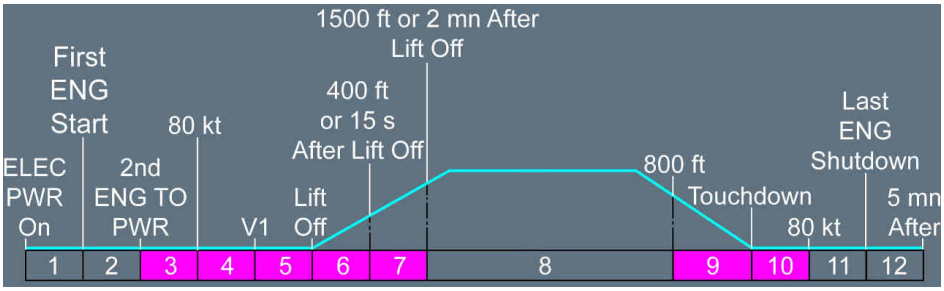
L3 FWS

The ATC link with the FWS enables the flight crew to:

- Turn on the lights of the two visual attention getters ATC MSG pb, when a message is received in the mailbox, or a monitored condition is achieved
  The light flashes at a frequency of 2 Hz.
  Either the Captain or the First Officer can press a pushbutton to stop both visual attention-getters.
- Trigger the aural signal (Ring), when a message is received in the mailbox, or a monitored condition is achieved
  There are two levels of alerts depending on the urgency of the message.
  The air traffic controller assigns the urgency status of the message.
  Urgent messages are repeated every 5 s, other messages are repeated every 15 s.

  The aural signal stops when the flight crew:
  - Presses one of the two ATC MSG pb, or
  - Treats the message in the mailbox, such as writing an answer message or printing the message.
- Inhibit the ATC MSG pb lighting and the aural signal during taxiing, takeoff, and landing.

Flight Phase Inhibition



If the aircraft receives a message during the inhibition period, the ATC center is automatically warned of the uplink message rejection.

L3 AVIONICS COMMUNICATION ROUTER (ACR)

The ACR is the system providing the communication means between the aircraft and the ground facilities. Communication may use satellite communication (SATCOM), or radio frequency (VHF or HF).
Refer to ACR Description in the Communication Chapter .

L3 CLOCK

The ATC datalink system interfaces with the clock, that provides the UTC time reference for all messages.

L3 AIR DATA AND INERTIAL REFERENCE SYSTEM (ADIRS)

The ATC link with the ADIRS provides a backup system to the clock and the FMS.

L3 SURVEILLANCE (SURV) SYSTEM

The ATC datalink system interfaces with the SURV system, that provides the TCAS status that is sent to the ATC center thanks to the ADS application.

L3 COCKPIT VOICE RECORDER (CVR)

In addition to the voice recording function, the CVR interfaces with the ATC datalink system to record exchanged data between the flight crew and the air traffic controller.

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ATS Facilities Notification (AFN)

ATS FACILITIES NOTIFICATION (AFN)

Applicable to: ALL

The AFN application provides the Notification function.
The Notification function enables the aircraft to send notification to a given ATC center. The notification can be sent automatically by the application following a ground request, or manually by the flight crew. The ATC center is identified by its ICAO 4-letter code.

L3 *Note:* *The ATC centers initiate automatic notification when the aircraft crosses from one ATC area to another.*

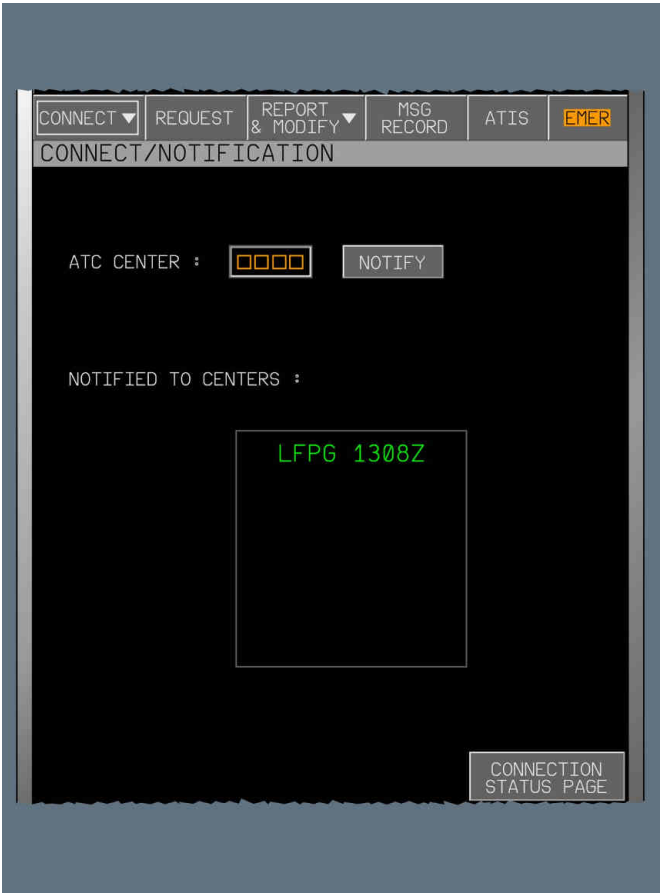
L1 By this notification, the aircraft sends all necessary details to the ATC center, to enable the ATC center to identify the aircraft, and to establish a CPDLC connection between the aircraft and the ATC center.
As soon as notification is sent to, and accepted by an ATC center, this center is considered as notified, and it is added to the list of notified centers. The list contains all notified centers, whether automatically or manually notified.

PILOT'S INTERFACE

The CONNECT/NOTIFICATION page of the MFD :
- Enables the flight crew to enter the ATC center to notify
- Displays a list of notified ATC centers, and the UTC time at which the notification was successful
- Provides a quick access to the CONNECTION STATUS page.

Refer to DSC-46-10-20-30-10 NOTIFICATION Page .

CONNECT/NOTIFICATION Page



Controller/Pilot Data Link Communication (CPDLC)

CONTROLLER/PILOT DATA LINK COMMUNICATION (CPDLC)

Applicable to: ALL

As soon as an ATC center is notified, the CPDLC application enables the flight crew and the air traffic controller to communicate.

The CPDLC application performs the following functions:
- Connection Status (*Refer to DSC-46-10-10-30-10 Connection Status*)
- Max Uplink Delay (*Refer to DSC-46-10-10-30-20 Maximum Uplink Delay*)
- Request (*Refer to DSC-46-10-10-30-30 Request*)
- Position Report (*Refer to DSC-46-10-10-30-40 Position Report*)
- Modify Report (*Refer to DSC-46-10-10-30-50 Modify Report*)
- Other Reports (*Refer to DSC-46-10-10-30-60 Other reports*)
- Emergency (*Refer to DSC-46-10-10-30-70 Emergency*).

The flight crew and the air traffic controller use a set of predefined messages that are received and displayed on the ATC mailbox part of the SD (*Refer to DSC-46-10-10-70-10 Mailbox*).

L3 There are up to 200 messages for uplink communication and 100 for downlink communication.

L1 Both the flight crew and the ground controller are able to send freetext messages.

Note: *When crossing from one air traffic control area to another, the CPDLC enables the air traffic controllers to proceed to an automatic transfer of ATC centers, in order to avoid initiation of a notification by the flight crew.*

CONNECTION STATUS

Applicable to: ALL

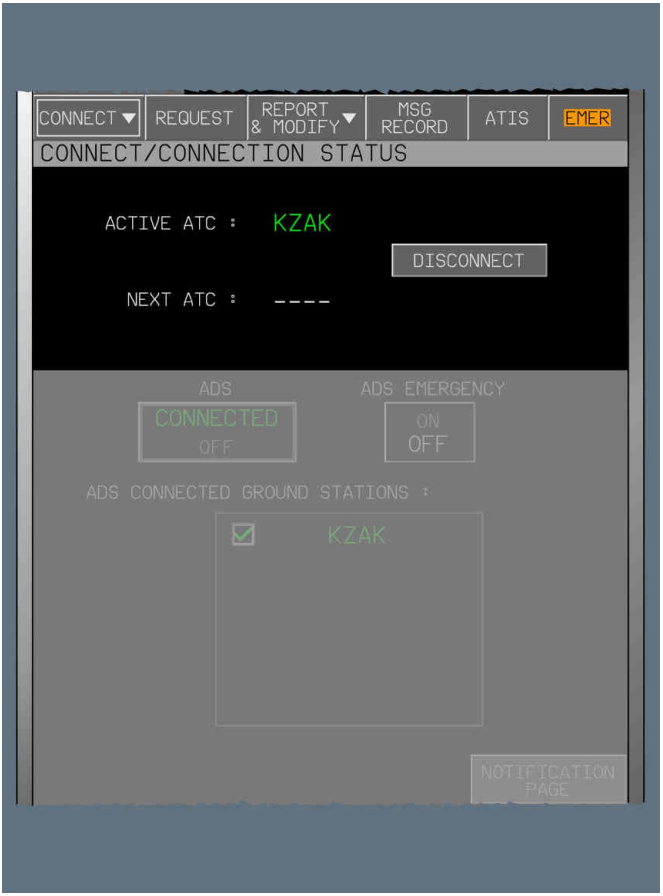
A notified ATC center can initiate a CPDLC connection with the aircraft. This center is then considered as active. There can be only one active ATC center at a given time.
While the aircraft is flying, it can change from one ATC area to another. In anticipation of this change, the next ATC center may initiate a passive connection with the aircraft. Then the next ATC center appears in the NEXT ATC field on the CONNECT/CONNECTION STATUS page.
When the change of control becomes effective, the current active ATC center ends its connection with the aircraft, and the defined next ATC center automatically becomes the active one.

PILOT'S INTERFACE

The upper part of the CONNECT/CONNECTION STATUS page displays the ICAO code of the active, and the next ATC center, if any. The page also provides the possibility to disconnect both the active and the next ATC center.

Refer to DSC-46-10-20-30-20 CONNECTION STATUS Page .

CONNECT/CONNECTION STATUS Page



MAXIMUM UPLINK DELAY

Applicable to: ALL

The MAX UPLINK DELAY function enables the system to reject (without display to the flight crew) any CPDLC uplink messages when the delay between ground emission and onboard reception exceeds the time specified on the CONNECT/MAX UPLINK DELAY page.

The MAX UPLINK DELAY is specified by the air traffic controller. The ground system can automatically uplink the delay value in a specific freetext message.
The flight crew is responsible for entering the uplink value in the system, through the CONNECT/MAX UPLINK DELAY page.

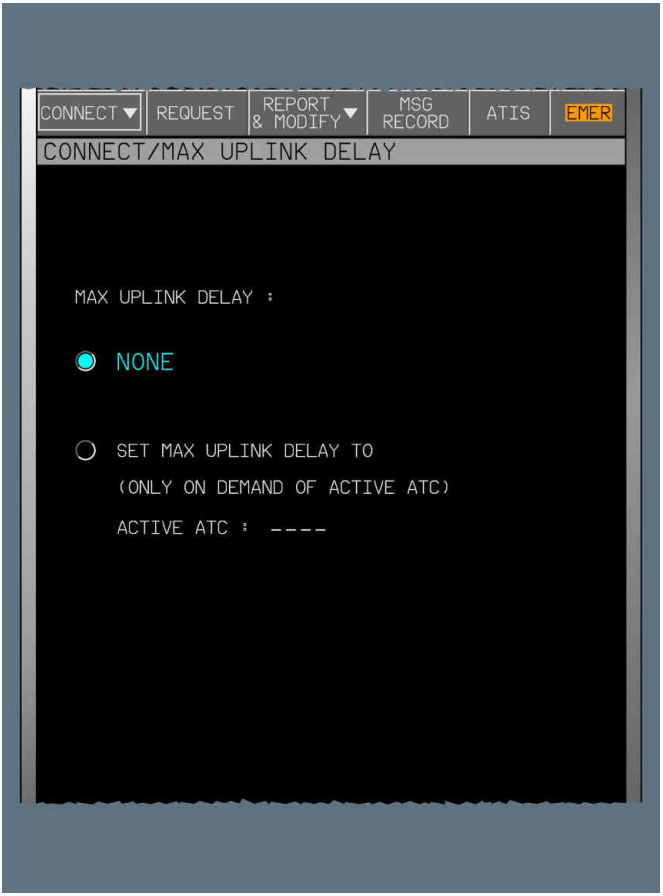
CAUTION	Do not enter a value in the MAX UPLINK DELAY entry field until requested by the air traffic controller.

Note: *The MAX UPLINK DELAY value is reset to NONE when the connection with the current active ATC center ends.*

PILOT'S INTERFACE

The CONNECT/MAX UPLINK DELAY page enables the flight crew to set, at the air traffic controller's request, the maximum uplink value.
Refer to DSC-46-10-20-30-30 MAX UPLINK DELAY Page .

CONNECT/MAX UPLINK DELAY Page



REQUEST

Applicable to: ALL

The flight crew prepares all requests via the REQUEST page on the MFD.
This MFD page enables the flight crew to create a request message, by using items that produce predefined, short and specific frames.
Each frame contains a short message asking for a change or contains freetext.

A message may be a combination of more than one frame.
The message may contain up to 5 different frames. Some combinations are however not valid. For example, requesting to climb and to descend in the same message is not valid.

L3 Some requests may contain only one frame:
- Departure clearance
- Oceanic clearance.

Note: *1. If one of the above frames is selected, and if other frames have previously been selected, the former ones are lost.*
2. Lateral/Rerouting is not a request message but only a reminder for the flight crew to use the FMS in the case of a lateral rerouting.

L1 Requests are part of the CPDLC application, except for departure and oceanic clearances which are part of the A623 application.

PILOT'S INTERFACE

The REQUEST page enables the flight crew to:
- Use predefined frames to create a message
- Delete a selected frame from a message
- Insert a reason in the message, using a predefined frame or freetext, as required
- Transfer the created message to the mailbox, before sending it to the ATC center
- Cancel and delete a created message.

Refer to DSC-46-10-20-30-40 REQUEST Page

REQUEST Page



POSITION REPORT

Applicable to: ALL

The POSITION REPORT function provides useful information to the ATC center on the aircraft past, present and future position, and trend (such as climbing, descending, heading, track, speed).

The position reports can be generated:

- Automatically, each time a waypoint is sequenced
  This function is activated if the AUTO POSITION REPORT in the REPORT/ AUTO & MANUAL POSITION page of the MFD is set to ON.
- Automatically, each time the active ATC center requests for one (through a dedicated uplink message)
- Manually by the flight crew, using the MFD POSITION REPORT page.

L2 The automatic generation of the position reports is not available, if:

- There is no active ATC center
- There is no communication between the FMS and the ATC Datalink System.

L1 When a position report is automatically generated, it appears in the mailbox on the SD. The flight crew can either view and modify the report (on the MFD), or send the report to the ATC center.

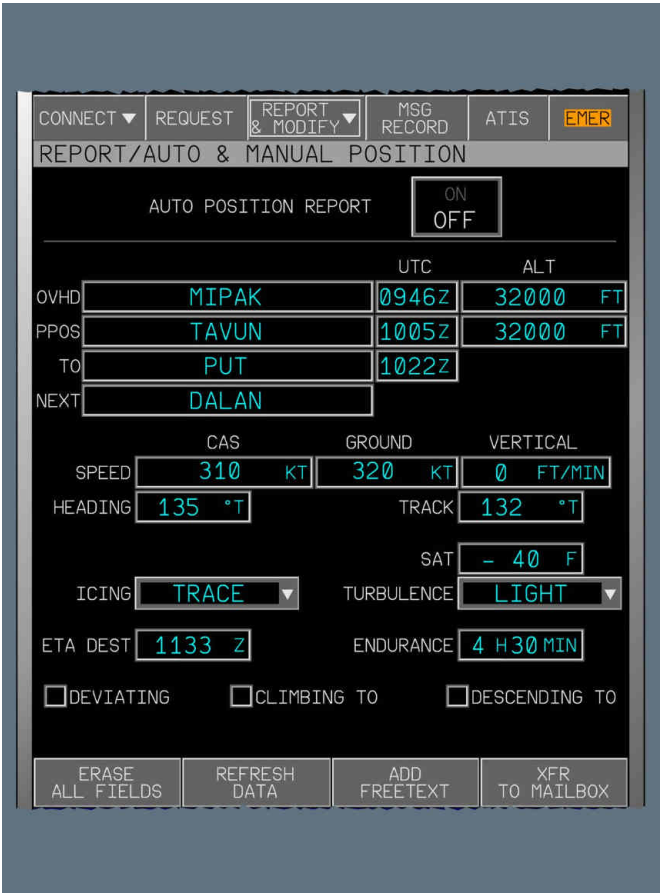
PILOT'S INTERFACE

The REPORT/AUTO & MANUAL POSITION page enables the flight crew to:

- Set the AUTO POSITION REPORT to ON or OFF
- Create a position report.
  When the flight crew displays the REPORT/AUTO & MANUAL POSITION page on the MFD , all fields, except three, are automatically filled with data from the FMS . The three exceptions are ICING, TURBULENCE, and ENDURANCE. These three fields, and the freetext zone are automatically emptied when the page appears.
  The flight crew can modify the fields that are automatically filled by the FMS .

Refer to DSC-46-10-20-30-50 AUTO & MANUAL POSITION Page .

REPORT/AUTO & MANUAL POSITION Page



MODIFY REPORT

Applicable to: ALL

The MODIFY REPORT function enables the flight crew to modify automatic replies, proposed by the CPLDC, to specific requests sent by the air traffic controller to the flight crew.

The CPLDC may propose automatic replies to reply to:
- One or several Confirm request, or
- One or several Report request, or
- One or several Open negotiation request, or
- A combination of the above requests.

The flight crew can send replies directly to the ATC center, or modify them on the MFD.
When the flight crew decides to modify a reply, the REPORT/MODIFY page on the MFD displays only the frames that the flight crew can modify.
L3 The flight crew can modify a number of 5 frames at a given time.

L1 *Note:* *The number of frames displayed for modification may be equal to or less than the number of frames in the reply (on the mailbox), because only modifiable frames appear on the MFD.*

When the flight crew opens the REPORT/MODIFY page for the first time after clicking on the MODIFY button in the mailbox, all modifiable fields are automatically updated with data from the FMS, as applicable.
The flight crew can modify any field that is displayed. All fields are mandatory fields, except if preceded by a selection tick box. In the later case, the field becomes mandatory only when the tick box is active.
The flight crew can add a freetext message (if there is none, and if the maximum number of frames in the reply is not reached), or modify a freetext message (if there is already one).

PILOT'S INTERFACE

The REPORT/MODIFY page displays all the relevant data that the flight crew can modify.
The flight crew can modify or delete any field, but cannot delete mandatory fields.
The flight crew can add or modify a freetext message.
The flight crew must click on the XFR TO MAILBOX button at the end of the modification.

REPORT/MODIFY Page



OTHER REPORTS

Applicable to: ALL

The air traffic controller may ask the flight crew to report back at a later time in flight, such as when reaching a given altitude, crossing a given point, or back on route.

The ATC Datalink System will then ask the FMS to monitor a specific parameter, such as a waypoint, or an altitude, and will automatically generate a downlink message, as required, when the monitored parameter fulfils the condition.
The downlink message is generated in the mailbox. The flight crew then sends the message to the ATC center.
If for any reasons, the downlink message is not automatically generated, the flight crew may create the downlink message on the REPORT/OTHER REPORTS page of the MFD.

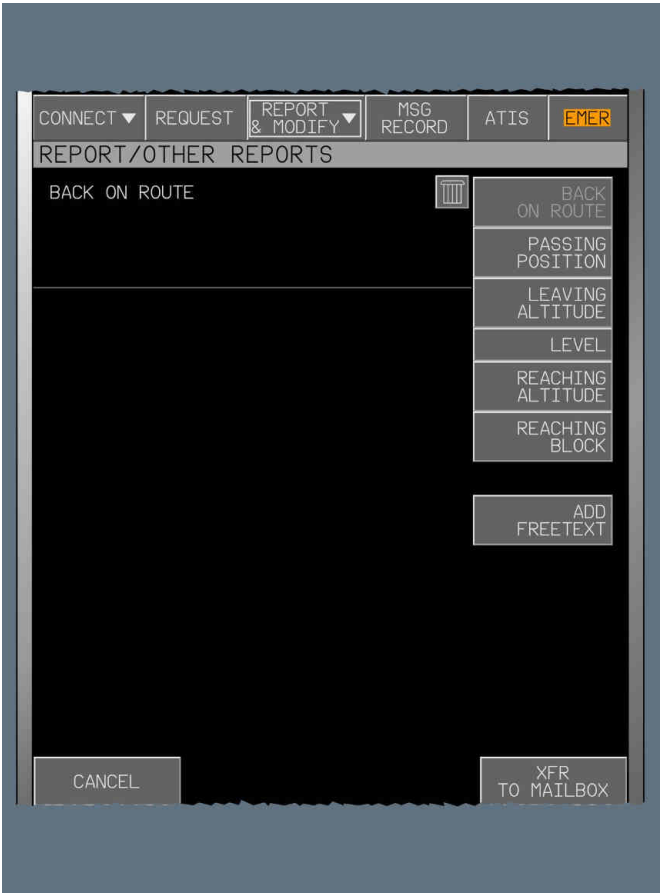
Note: *The BACK ON ROUTE situation cannot be monitored by the FMS.*

PILOT'S INTERFACE

The REPORT/OTHER REPORTS page enables the flight crew to:
- Use predefined frames to create a message
- Delete a selected frame from a message
- Insert a reason in the message (using freetext)
- Transfer the created message to the mailbox, before sending it to the ATC center
- Cancel and delete a created message.

Refer to DSC-46-10-20-30-70 OTHER REPORTS Page .

REPORT/OTHER REPORTS Page



EMERGENCY

Applicable to: ALL

The EMERGENCY page enables the flight crew to generate emergency messages.

PILOT'S INTERFACE

The EMERGENCY page enables the flight crew to:

- Prepare ATC datalink emergency requests
- Activate the " ADS Emergency" mode.

Note: When the flight crew sends a MAYDAY message, the ADS EMERGENCY function automatically comes ON.

Refer to DSC-46-10-20-30-100 EMERGENCY Page .

EMERGENCY Page



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Message Record

MESSAGE RECORD

Applicable to: ALL

The Message Record function enables to store messages exchanged between the aircraft and the ATC center, and enables the flight crew to retrieve and display these recorded messages at any time.
When the flight crew closes a message in the mailbox, the message is stored and disappears from the mailbox. The flight crew can access the stored message via the MSG RECORD/LIST page on the MFD.
ATIS messages and ADS reports are not stored in this application.

L3 *Note:* *When the maximum number of stored messages is reached, any new message will be stored and the oldest message will be deleted. The maximum number of stored messages is 99 CPDLC messages and 20 A623 messages.*

PILOT'S INTERFACE

The MSG RECORD/LIST page enables the flight crew to:

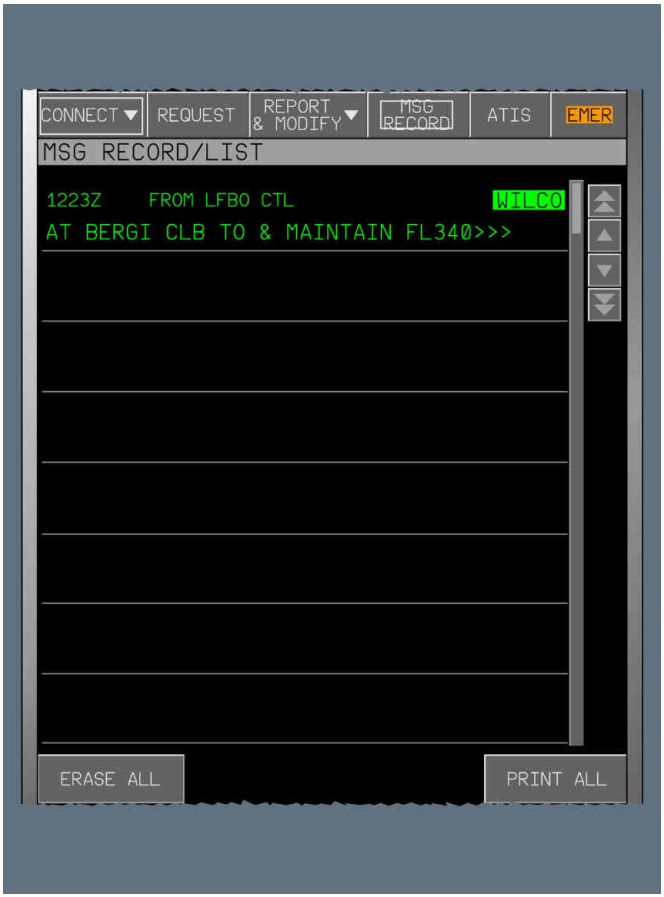
- Access the ATC messages previously processed, including the associated responses
  The message displayed on the MSG RECORD/LIST page may not be complete. To display the full message, the flight crew must click on the message, and the message will appears on a MSG RECORD/ZOOM page.

  Note: *If a downlink message sending has failed, the message appears in amber on the MSG RECORD/LIST page.*

- Print one or all recorded messages
- Erase all recorded messages.

Refer to DSC-46-10-20-30-80 MSG RECORD/LIST Page .

MSG RECORD/LIST Page



A623

A623

Applicable to: ALL

The A623 application performs the following functions:
- Digital ATIS (*Refer to DSC-46-10-10-50-10 Digital ATIS*)
- Departure and Oceanic clearance Requests (*Refer to DSC-46-10-10-50-20 Oceanic/Departure Request*).

Note: Contrary to the CPDLC application, A623 exchanges do not require previous notification.

DIGITAL ATIS

Applicable to: ALL

The digital Automatic Terminal Information Services (ATIS) enables the flight crew to request and obtain information on active terminal conditions, such as runway, approach procedure, or meteorological parameters (wind, visibility, weather, clouds, runway surface conditions, etc). The flight crew can request information for departure, destination, and alternate airports via the ATIS/LIST page on the MFD.

The flight crew can receive the ATIS reports:
- Either manually, by clicking on the SEND REQUEST button on the ATIS/LIST page

L2 The airport sends the most recent version of the ATIS report within 5 min. If the report is not sent within 5 min, the system indicates that the flight crew must submit the request again.

L1 The flight crew then clicks on the UPDATE button to manually update the ATIS information.

- Or automatically, by selecting the AUTO UPDATE option on the ATIS/LIST page.

L2 The airport sends the ATIS report to the aircraft each time a new version is available.

L1 *Note: AUTO UPDATE function is not available for departure airport.*

The ATIS response messages can be read on:
- The ATIS/LIST page
- The ATIS/RECEIVED page
- The printer: The response is directly sent to the printer if the AUTO PRINT function is selected.

PILOT'S INTERFACE

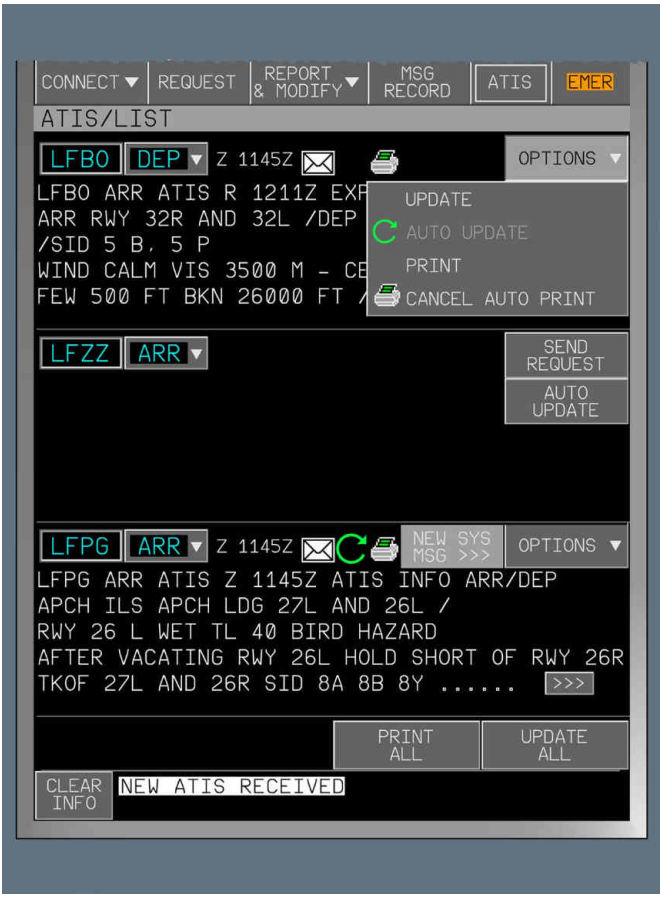
The ATIS /LIST page enables the flight crew to:

- Request, and receive ATIS messages for departure, arrival, and/or alternate airports, as required
- Print each ATIS message individually, or print all displayed messages
- Manually request an update of all currently displayed messages
- Open the ATIS message on a zoom page to display the complete message, if the message is too long and truncated. This is done using the 

button.

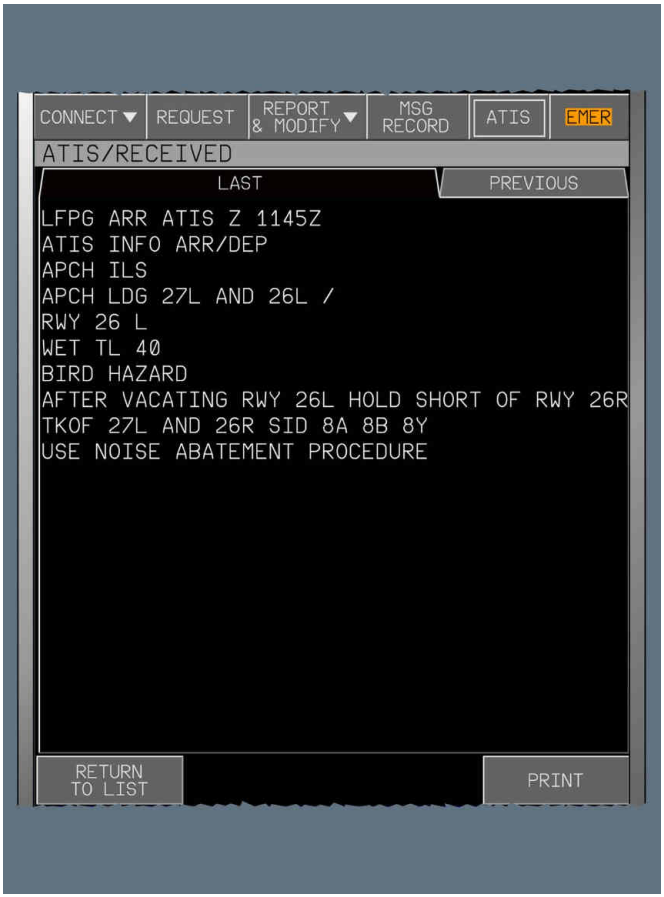
The ATIS /LIST page has three ATIS request areas.
Refer to DSC-46-10-20-30-90 ATIS/LIST Page .

ATIS /LIST Page



The ATIS /RECEIVED page enables the flight crew to display the two most recently received messages.

ATIS /RECEIVED Page



OCEANIC/DEPARTURE REQUEST

Applicable to: ALL

The OCEANIC/DEPARTURE REQUEST function enables the flight crew to request and obtain an oceanic or a departure clearance.

The oceanic or departure request can be initiated by:

- The flight crew, by sending a request to the air traffic controller, or
  The flight crew must wait for the oceanic or departure clearance that will be sent by the air traffic controller.
- The air traffic controller, by sending an oceanic or a departure clearance to the flight crew without request.

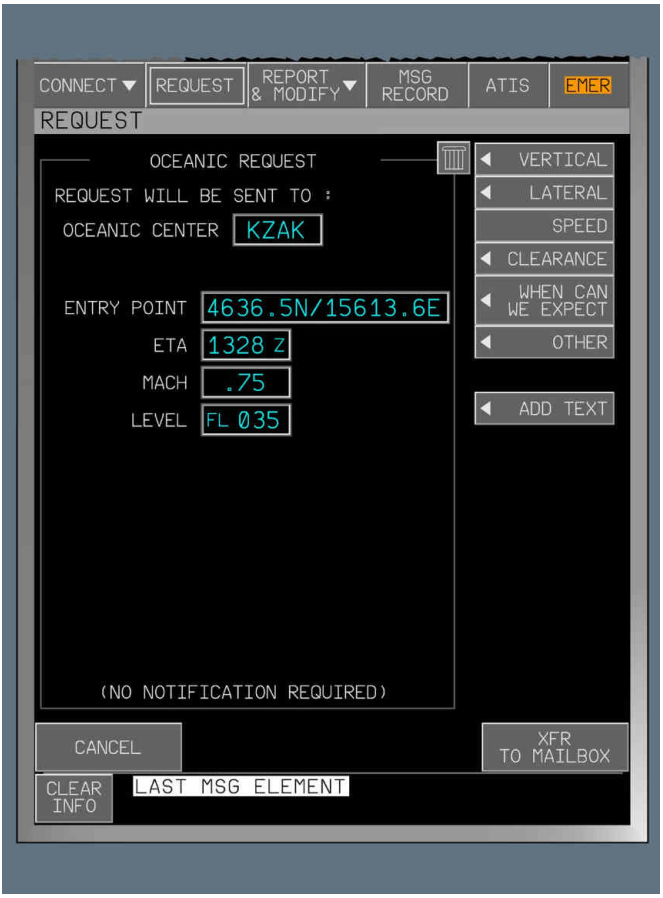
PILOT'S INTERFACE

The DEPARTURE and OCEANIC options of the REQUEST page enable the flight crew to send a departure or an oceanic clearance request.

DEPARTURE REQUEST Page



OCEANIC REQUEST Page



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Automatic Dependent Surveillance (ADS)

AUTOMATIC DEPENDENT SURVEILLANCE (ADS)

Applicable to: ALL

The Automatic Dependent Surveillance (ADS) function provides information reports, without any flight crew action, to one or more ATC centers or AOC centers.
The reports includes data such as the aircraft position, speed, equipment onboard (e.g. TCAS, RNAV capability, RVSM capability).

There are three different types of reports:
- Periodical
- After ATC center request
- After an event, through the monitoring of an aircraft event, such as waypoint sequencing.

The air traffic controller initiates the ADS connection, provided that the ADS status of the aircraft is either “ARMED” or “CONNECTED”.

When at least one ATC center is connected by the ADS:
- The CONNECTION STATUS page of the MFD indicates the “CONNECTED” status of the ADS, and provides a list of all ADS connected centers
- The mailbox indicates the number of ADS connected centers in the mailbox default screen.

A maximum of five ATC or AOC centers may be connected to an aircraft at one time. The flight crew can disconnect one or all ATC or AOC centers. A disconnected center is no longer displayed in the list.

Note: The ADS function does not require any notification nor that an ATC center be active before any ADS reporting.

ADS STATUS

The ADS function may be:
- ARMED
  This is the default status. The ADS function is ready for use, but there is no connected ATC center.
- CONNECTED
  There is at least one ATC center connected for reporting.
  Connected centers are listed on the CONNECTION STATUS page of the MFD.
- OFF
  The ADS function is switched off. Any connected ATC center is disconnected and ATC centers can no longer connect to the aircraft.

ADS EMERGENCY STATUS

The ADS Emergency function may be:

- OFF:
  This is the default status.
- ON:
  This is an emergency status. Any connected ATC center is warned.
  L3 In this status, the frequency of reporting is higher.

L1 *Note: The ADS Emergency is automatically set to ON when the flight crew sends a MAYDAY message via the EMERGENCY page of the MFD.*

PILOT'S INTERFACE

The CONNECT/CONNECTION STATUS page enables the flight crew to:

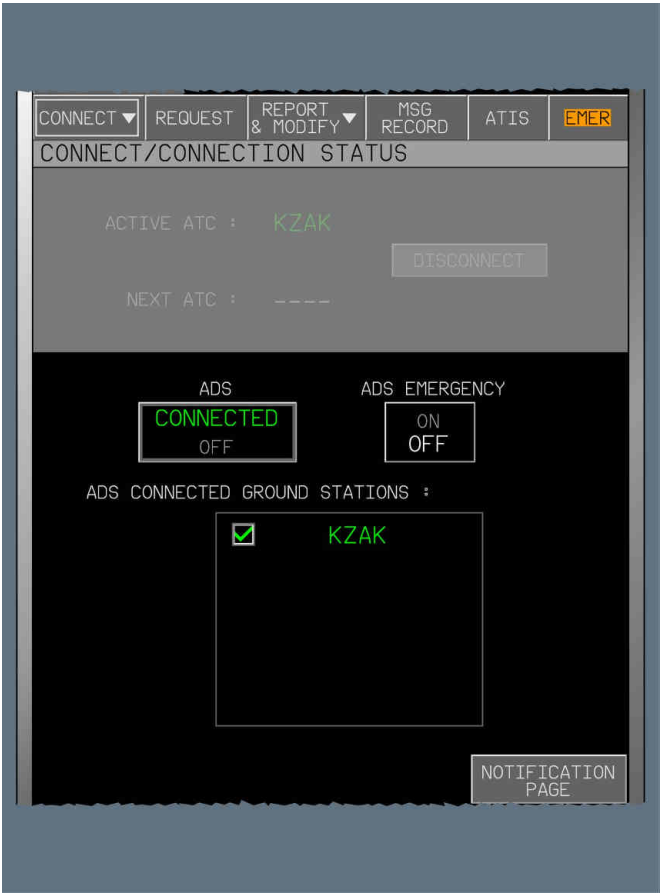
- Set the ADS status to ARMED or OFF
- Set the ADS EMERGENCY to ON or OFF
- List connected ATC center(s) that receive reports, if any
- Disconnect individually, or globally, the connected ATC center(s).

Refer to DSC-46-10-20-30-20 CONNECTION STATUS Page

ADS ARMED


CONNECT
REQUEST
REPORT & MODIFY
MSG RECORD
ATIS
EMER
CONNECT/CONNECTION STATUS
ACTIVE ATC : KZAK
DISCONNECT
NEXT ATC : ----
ADS
ARMED
OFF
ADS EMERGENCY
ON
OFF
ADS CONNECTED GROUND STATIONS : NONE
NOTIFICATION PAGE

ADS CONNECTED



Mailbox

GENERAL

Applicable to: ALL

The ATC mailbox is the dialog interface between the aircraft and the ATC center. Uplink and downlink messages are received or sent via the mailbox.

There are 9 categories of uplink messages:
- Standard clearances
- Loadable clearances
- Deferred clearances
- Information messages
- Report request messages
- Confirm messages
- Negotiation messages
- Open negotiation messages
- No answer messages.

Note: *These categories include the associated answer processing.*

There are 5 categories of downlink messages:
- Request messages
- Route clearance request
- Position report messages
- Text messages
- Emergency messages.

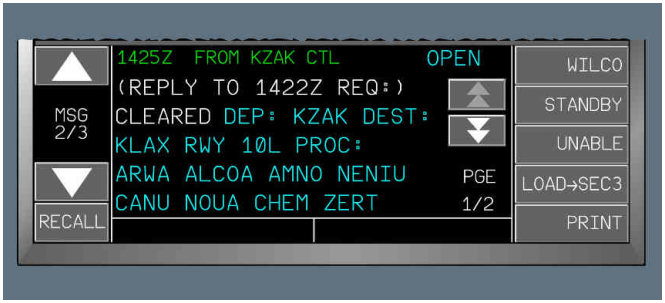
In normal configuration, the mailbox is displayed permanently on the lower part of the System Display (SD) Display Unit (DU).

PILOT'S INTERFACE

When no message is displayed on the mailbox, a default screen appears and indicates:
- The name of the connected ATC center, when a datalink connection is active
- The number of ADS active connections, when at least one ADS centre is connected
- The ADS status, when the ADS is set to OFF.



As soon as there is one message in the mailbox, the mailbox display is automatically modified in order to enable the flight crew to manage the message.



MAILBOX CAPACITY

Applicable to: ALL

The mailbox has a maximum capacity of:

- 5 uplink messages that have not been answered
  If another message is received, it cannot be inserted in the mailbox, and an automatic downlink message will warn the ATC center that the message has been discarded because mailbox maximum capacity has been reached.
- 5 created messages still to be downlinked
  When this limit is reached, the flight crew is no longer able to transfer a newly created message to the mailbox.
- 10 messages not included in the above two categories, for example, sent messages or uplink messages that do not require an answer.
  If an 11th message is filled in the mailbox, the oldest one is closed and is stored in the MSG RECORD page of the MFD.

MAILBOX COLORS

Applicable to: ALL

Uplink messages are displayed on a black background and:

- When received, the message appears in white and the main parameters in blue
- When answered, the message becomes green
- When monitored, the parameters appear in magenta and indicate that they are being monitored by the FMS.
  - When the maximum number of messages is attained, the parameters become green
  - When monitoring fails, the parameter becomes amber.

Downlink messages appear in black:

- On a blue background before sending
- On a green background after sending.

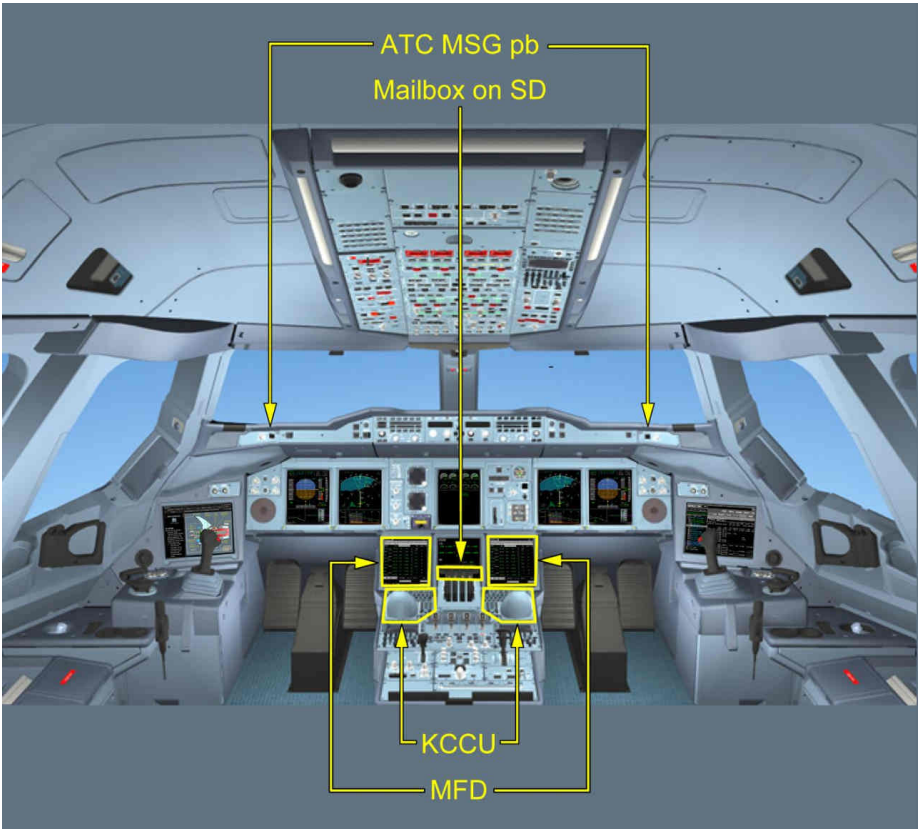
Intentionally left blank

Cockpit View

GENERAL

Applicable to: ALL

Cockpit View



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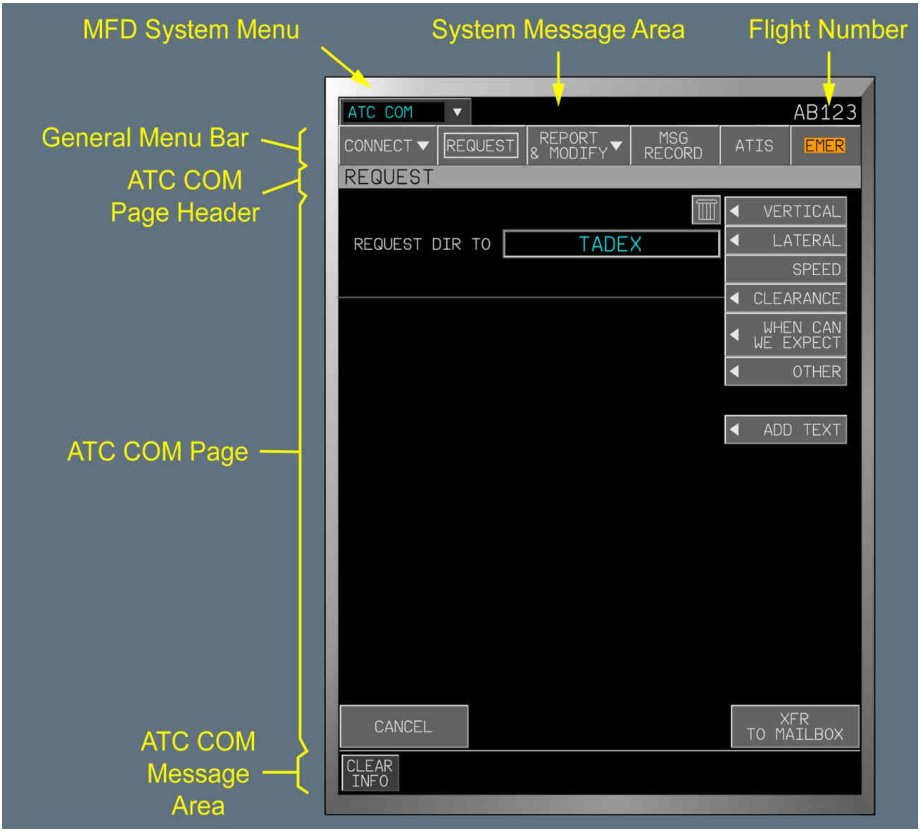
Multi Function Display (MFD) - General

MFD OVERVIEW

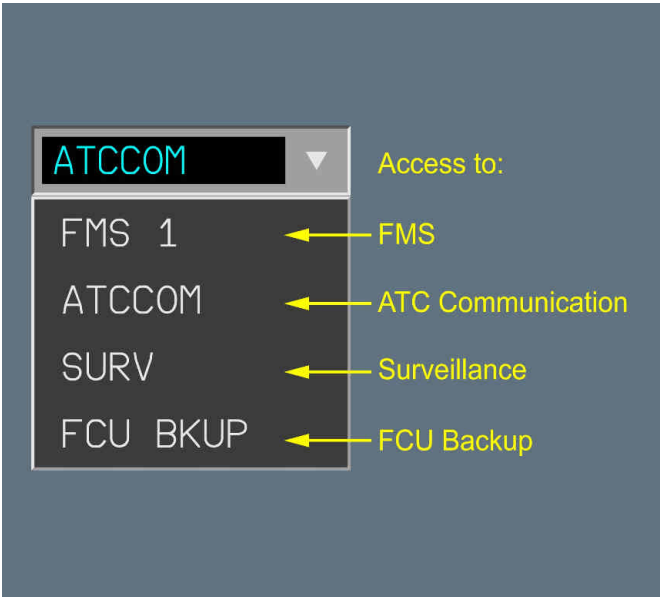
Applicable to: ALL

ATC COM Page



MFD SYSTEM MENU

MFD System Menu



Indicates the system identifier that is currently displaying data on the MFD .
The menu list displays all systems that can display data on the MFD :

FMS

Provides access to the FMS pages.
Refer to FMS Pages Overview .

ATC COM

Provides access to the ATC communication pages.
Refer to ATC COM Pages Overview .

SURV

Provides access to the surveillance pages.
Refer to SURV Pages Overview .

FCU BKUP

Provides access to the FCU backup pages.

Refer to FCU BKUP page Overview .

SYSTEM MESSAGE AREA

The System Message Area displays three different messages to direct the flight crew's attention to an ATC COM or FMS event, when the MFD does not display an ATC COM or FMS page:

- NEW ATIS RECEIVED:
  Indicates that a new ATIS report is received, and that the MFD displays a page other than an ATC COM page. This message disappears when the flight crew accesses an ATC COM page.
- ATIS SYS MSG:
  Indicates that an ATIS FMS message is received, and the MFD displays a page other than an ATC COM page. This message disappears when the flight crew accesses an ATC COM page.
- CHECK FMS MESSAGE:
  Indicates that an amber FMS message is pending, and THAT the MFD displays a page other than an FMS page. This message disappears when the flight crew accesses a FMS page.

FLIGHT NUMBER

Indicates the flight number that the flight crew has entered on the ACTIVE / INIT page of the FMS (*Refer to ACTIVE / INIT Page*).

L2 The Control and Display System (CDS) manages the display of the flight number.

GENERAL MENU BAR

The general menu bar provides the flight crew with access to the main ATC COM pages.
The main ATC COM pages are divided into 6 groups, indicated by the 6 menus of the general menu bar: CONNECT, REQUEST, REPORT & MODIFY, MSG RECORD, ATIS and EMER.

Note: - *The flight crew can access all ATC COM pages via one of these 6 menus.*
- *A box around the menu name indicates that the displayed page belongs to this menu.*

ATC COM PAGE HEADER

The ATC COM page header indicates the title of the ATC COM page currently displayed.
The page title includes the different levels of the page hierarchy, separated by a slash, for example REPORT/AUTO & MANUAL POSITION.

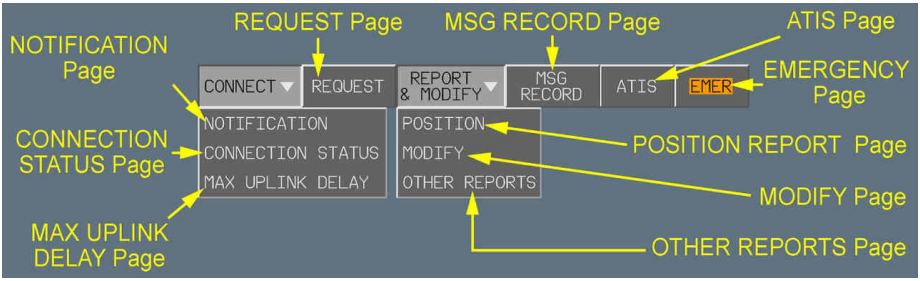
Intentionally left blank

MFD - ATC COM Pages

GENERAL

Applicable to: ALL

MFD ATC COM Pages - General

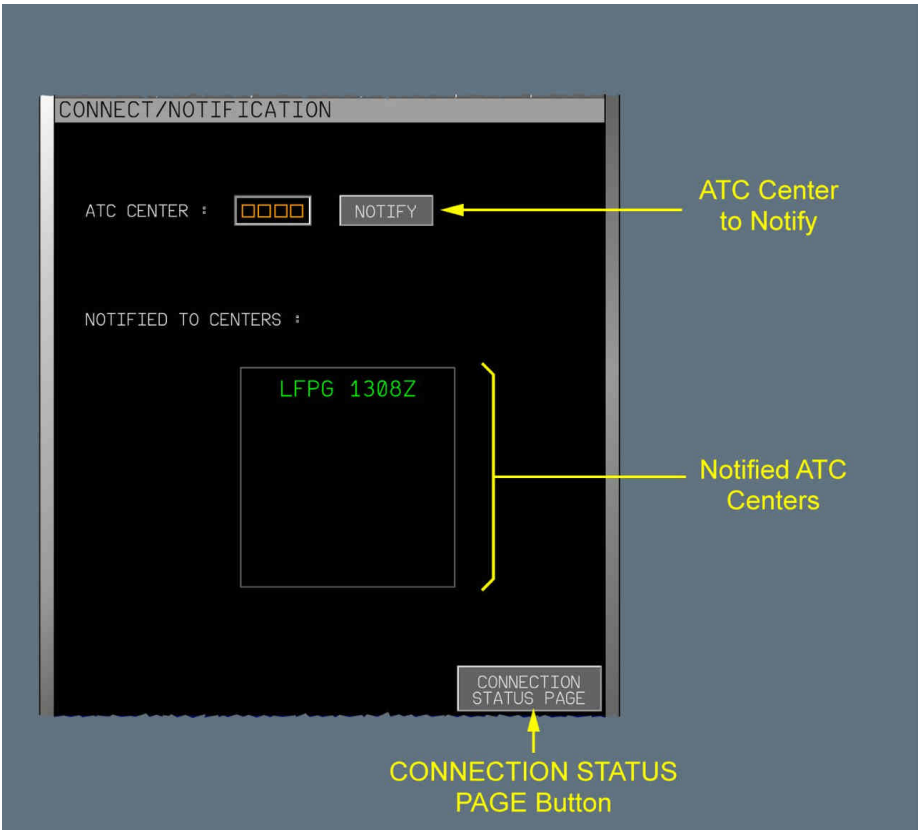


Note: *If the flight crew decides to display an ATC COM page while the ATC is failed, via the KCCU keys (ATC COM key or Navigation keys), the ATC COM NOT AVAIL message appears for 5 s .*

NOTIFICATION PAGE

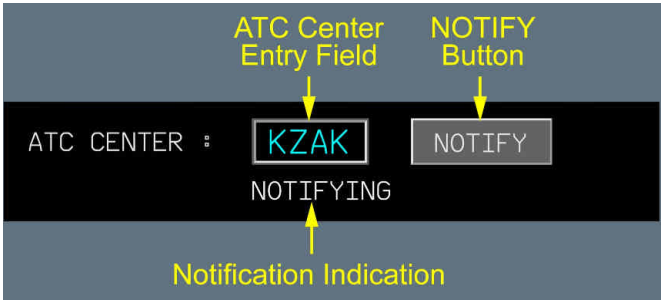
Applicable to: ALL

CONNECT/NOTIFICATION Page



ATC CENTER TO BE NOTIFIED

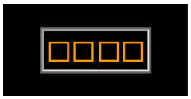
ATC Center To Be Notified



ATC CENTER ENTRY FIELD



Indicates the ATC center to be notified, in ICAO 4-letter code.



The field is blank. Because boxes are amber, it is mandatory to complete it for notification.

Appears:
- At power-up, if there has not been any active ATC centers, nor any manually notified centers
- After a successful notification.

NOTIFY BUTTON



When clicked, a notification is sent to the ATC center entered in the field.

NOTIFICATION INDICATION



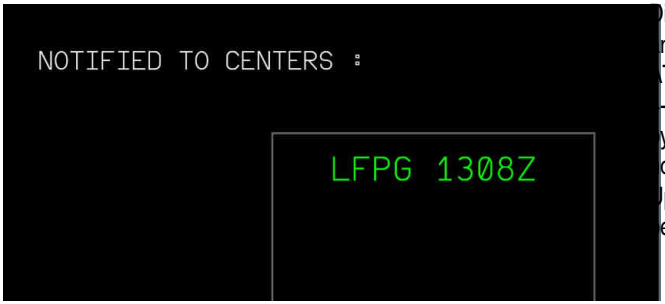
A notification message has just been sent to the entered ATC center, and an answer is expected. The notification process is in progress.



The notification process has failed.

NOTIFIED ATC CENTERS

L12



isplays the list of manually
nd automatically notified
TC centers, in ICAO
-letter code, followed
y the UTC time of the
otification.
p to 6 ATC centers may
e displayed in the list.



ndicates that no ATC
enter has been notified.

CONNECTION STATUS PAGE BUTTON

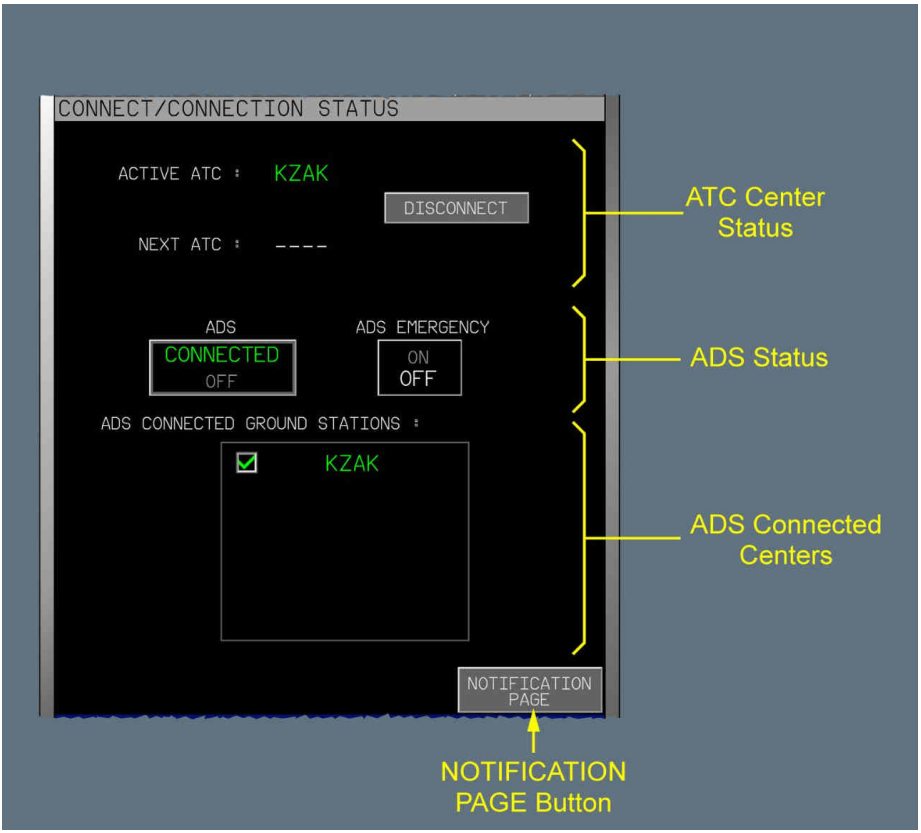


When clicked, displays the CONNECTION STATUS page on the MFD.

CONNECTION STATUS PAGE

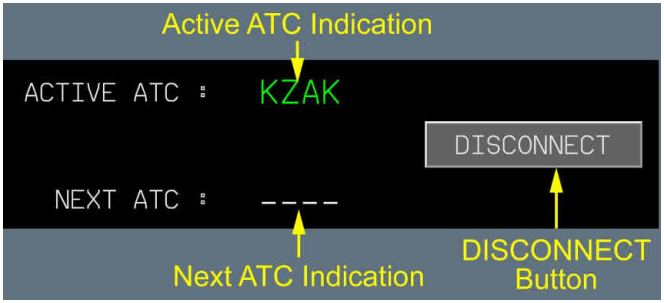
Applicable to: ALL

CONNECT/CONNECTION STATUS Page



ACTIVE ATC CENTER

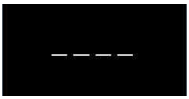
Active ATC Center



ACTIVE ATC INDICATION



Indicates the ICAO code of the active ATC center.

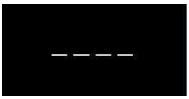


Indicates that no active ATC center is selected.

NEXT ATC INDICATION



Indicates the ICAO code of the next ATC center.
The active ATC center sends this information in anticipation of a change of control.



Indicates that no next ATC center is selected.

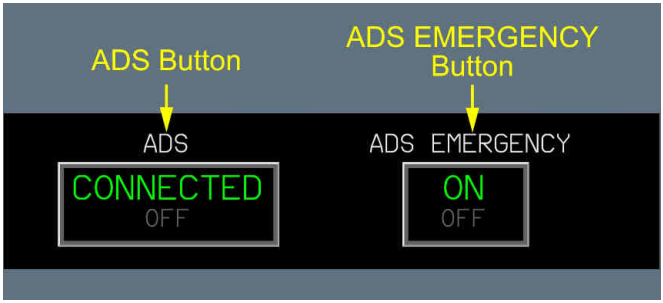
DISCONNECT BUTTON



When clicked, the active and the next ATC centers are disconnected.
A confirmation window appears before the disconnection becomes effective.
If the disconnection is confirmed, both ACTIVE ATC and NEXT ATC fields display white dashes.

ADS STATUS

ADS Status



ADS BUTTON



Indicates that the ADS is armed and awaits a connection from an ATC center.
When clicked and after validating a confirmation window, the ADS goes OFF.



Indicates that the ADS is connected to at least one ATC center.
When clicked and after validating a confirmation window, the ADS goes OFF.



Indicates that the ADS is OFF. No ATC center can connect.
When clicked, the ADS is armed.

ADS EMERGENCY BUTTON



Indicates that the ADS Emergency is OFF.
This is the default state.
When clicked and after validating a confirmation window, the ADS Emergency comes ON.

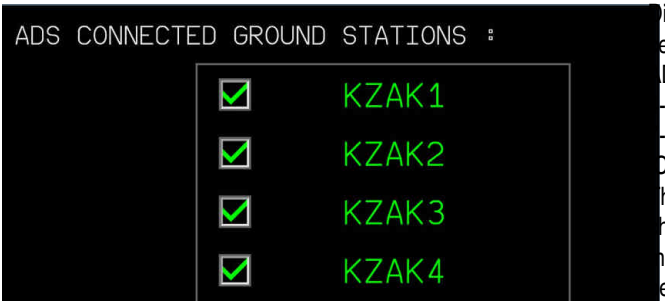


Indicates that the ADS Emergency is ON.

ADS CONNECTED CENTERS



ndicates that no ATC enter is connected for ADS eporting.



isplays the list of ATC enter(s) connected for DS reporting, using -letter ICAO code, or -character code (if the AO code is not available). he centers are listed in hronological order, the ost recently connected eing at the top of the list. Each ATC center can be individually disconnected.

NOTIFICATION PAGE BUTTON

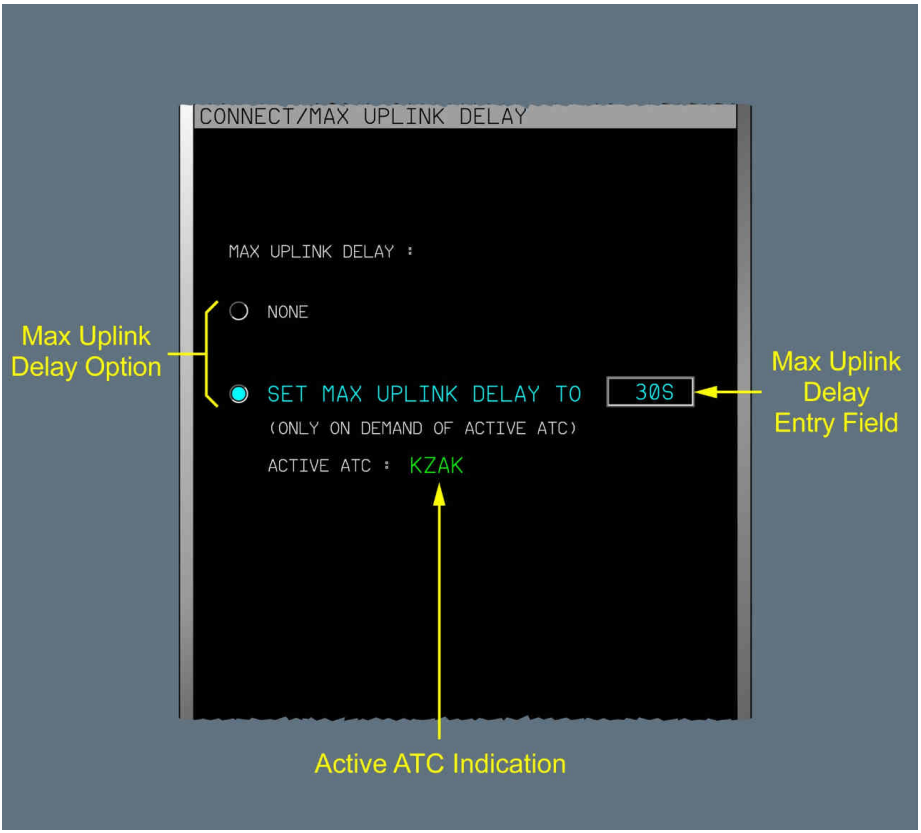


When clicked, displays the NOTIFICATION page on the MFD.

MAX UPLINK DELAY PAGE

Applicable to: ALL

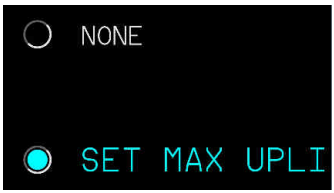
CONNECT/MAX UPLINK DELAY Page



MAX UPLINK DELAY OPTION

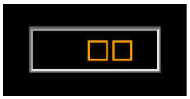


Indicates that no maximum uplink delay is entered.
This is the default position.



Indicates that the SET MAX UPLINK DELAY option is selected.
When selected, the MAX UPLINK DELAY entry field automatically appears.

MAX UPLINK DELAY ENTRY FIELD



Indicates that the SET MAX UPLINK DELAY option has been selected and the flight crew has not entered any value in the MAX UPLINK DELAY entry field.

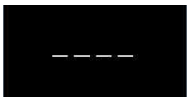


Indicates the value of the maximum uplink delay entered by the flight crew.

ACTIVE ATC INDICATION



Indicates the ICAO code of the active ATC center.

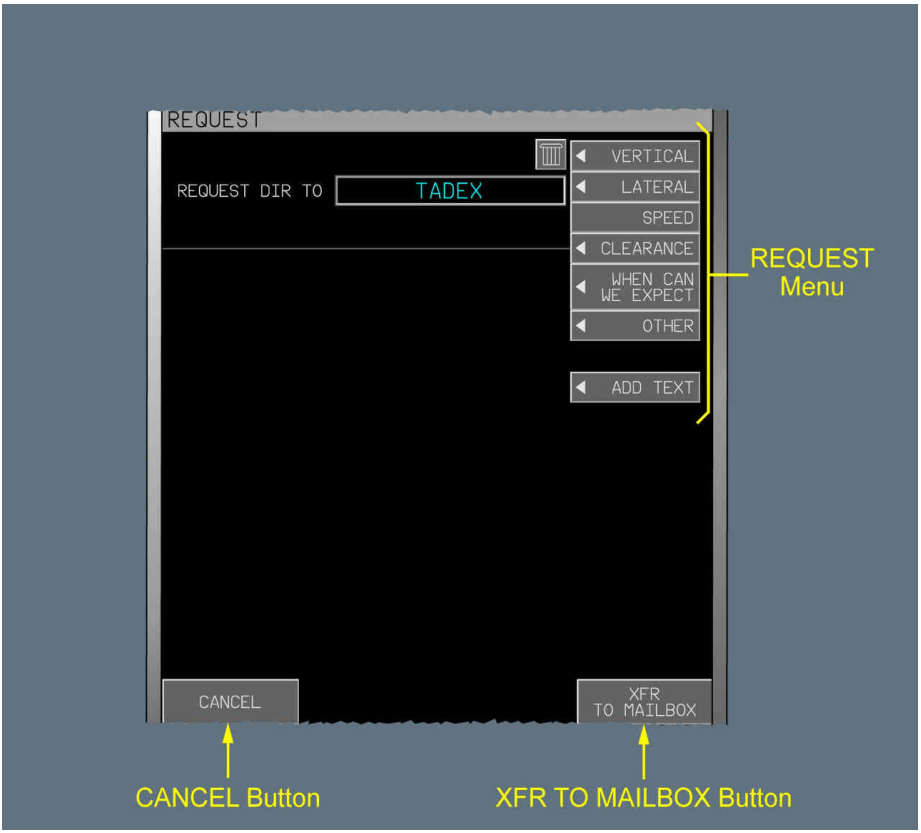


Indicates that there is no active ATC center.

REQUEST PAGE

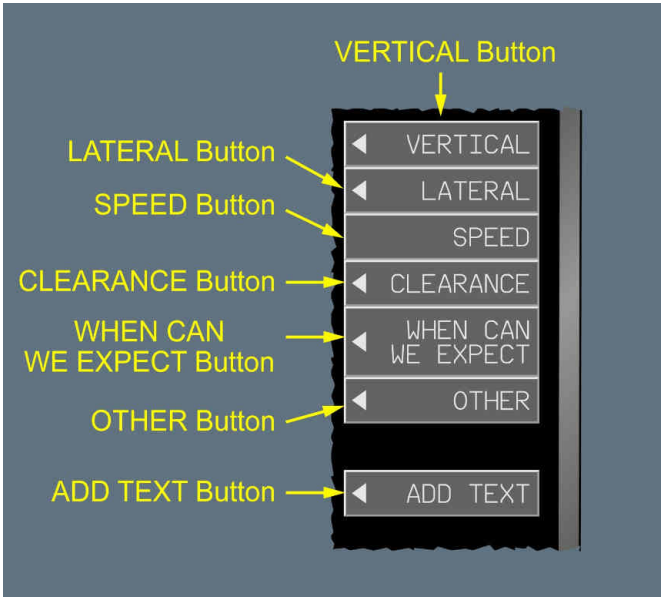
Applicable to: ALL

REQUEST Page



REQUEST MENU

Request Menu



The flight crew uses the REQUEST menu to create the frames that compose a request message.
The menu provides direct access to predefined texts, leaving blank fields where the flight crew must enter complementary information.
The flight crew may select up to five frames in a request message.
Some frame combinations are not permitted.
The REQUEST menu options are:

VERTICAL

- CLIMB TO

L3 The flight crew requests a higher flight altitude at a specified position or time. The position or time information is optional.
CLIMB TO cannot be selected as the same time as DESCEND TO.
Selecting a CLIMB TO after a DESCEND TO selection erases the previous selection.

L1 - DESCEND TO

L3 The flight crew requests a lower flight altitude at a specified position or time. The position or time information is optional.
DESCEND TO cannot be selected as the same time as CLIMB TO.
Selecting a DESCEND TO after a CLIMB TO selection erases the previous selection.

L1 - ALTITUDE

L3 The flight crew requests a specific flight altitude.

L1 - BLOCK ALT

L3 The flight crew requests a range of altitudes, in which they want to fly. Both altitudes are mandatory.

L1 - CRUISE CLIMB

L3 The flight crew requests for a cruise climb to a specified altitude.

L1 **LATERAL**

- DIRECT TO

L3 The flight crew requests a direct routing to a specified waypoint.

L1 - OFFSET

L3 The flight crew requests an offset from the initial route. The offset is defined by a distance and a direction. The offset starts at a specified point on the route. The definition of the starting point is optional.

L1 - WX DEVIATION

L3 The flight crew requests an offset from the initial route due to weather conditions. The offset is defined by a distance and a direction.

L1 - HEADING

L3 The flight crew requests a heading change.

L1 - TRACK

L3 The flight crew requests a track change.

L1 - SID/STAR

L3 The flight crew requests a Standard Instrument Departure (SID) procedure or a Standard Terminal Arrival Route (STAR) procedure, according to the current flight phase.
With the aircraft on ground, the request is made for a SID procedure.
With the aircraft in-flight, the request is made for a STAR procedure.

L1 - REROUTING

L3 This frame cannot be selected with other frames. When selected, the REROUTING frame appears and all other frames disappear. In addition, if the REROUTING frame has already been selected, and if the flight crew selects another frame, the REROUTING frame disappears.

L1 **SPEED**

L3 The flight crew requests a new speed or a range of speed.
To request a range of speed, the flight crew completes the optional TO SPEED field.

L1 **CLEARANCE**

- DEPARTURE

L3 A message with a departure clearance is sent to the departure airport that the flight crew has entered in the FMS.

L2 The following fields may be automatically completed, when the information becomes available:

- Departure airport
- Destination airport
- Aircraft type
- ATIS code.

L1 - OCEANIC

L3 A message with an oceanic clearance is sent to the oceanic ATC center that the flight crew has entered.

L1 - OTHER

L3 The flight crew enters a request for clearance in textual format.

L1 **WHEN CAN WE EXPECT**

- HIGHER ALTITUDE

L3 The flight crew prepares a negotiation message for a higher altitude.
HIGHER ALTITUDE cannot be selected as the same time as LOWER ALTITUDE.
Selecting a HIGHER ALTITUDE after a LOWER ALTITUDE selection erases the previous selection.

L1 - LOWER ALTITUDE

L3 The flight crew prepares a negotiation message for a lower altitude.
LOWER ALTITUDE cannot be selected as the same time as HIGHER ALTITUDE.
Selecting a LOWER ALTITUDE after a HIGHER ALTITUDE selection erases the previous selection.

L1 - CLIMB TO

L3 The flight crew prepares a negotiation message to climb to a specified altitude.
CLIMB TO cannot be selected as the same time as DESCEND TO.
Selecting a CLIMB TO after a DESCEND TO selection erases the previous selection.

L1 - DESCEND TO

L3 The flight crew prepares a negotiation message to descend to a specified altitude.
DESCEND TO cannot be selected as the same time as CLIMB TO.
Selecting a DESCEND TO after a CLIMB TO selection erases the previous selection.

L1 - CRUISE CLIMB

L3 The flight crew prepares a negotiation message to cruise climb to a specified altitude.

L1 - SPEED

L3 The flight crew prepares a negotiation message for a new speed or range of speed.
To request a range of speed, the flight crew completes the optional TO SPEED field.

L1 - BACK ON ROUTE

L3 The flight crew prepares a negotiation message to come back on the initial route.

L1 **OTHER**

The OTHER frame enables the flight crew to prepare requests other than those provided above:

- FREETEXT
- VOICE CONTACT
- OWN SEPARATION & VMC
- VMC DES.

ADD TEXT

The flight crew can add reasons to a request, by using either short predefined messages, or free text messages:

- DUE TO WEATHER
- DUE TO A/C PERFORMANCE

- DUE TO TURBULENCE
- DUE TO TECHNICAL
- DUE TO MEDICAL
- AT PILOTS DISCRETION
- FREETEXT.

Note: The flight crew can only insert an "ADD TEXT" frame if another frame already exists. A message cannot be made up of only an "ADD TEXT" frame.

CANCEL BUTTON



When clicked, deletes any request displayed on the MFD.

XFR TO MAILBOX BUTTON

L12

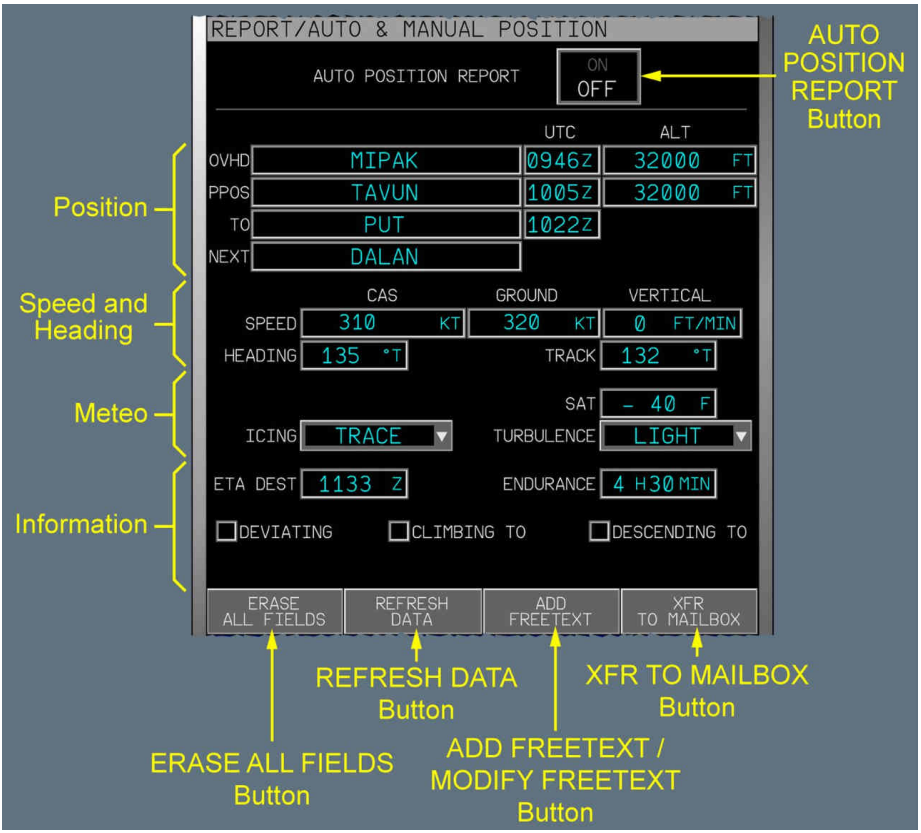


When clicked, transfers any valid request to the mailbox. This is only possible if all mandatory fields, indicated by amber boxes (if empty), are correctly completed.

AUTO & MANUAL POSITION PAGE

Applicable to: ALL

REPORT/AUTO & MANUAL POSITION Page



AUTO POSITION REPORT BUTTON



The AUTO POSITION REPORT is OFF.



The AUTO POSITION REPORT is ON.

POSITION

- OVHD (Overhead)
  Indicates the last FMS-sequenced waypoint. The time and altitude of flying over OVHD are provided.

L3 These fields may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

L1 - PPOS (Present position)
  Indicates the current aircraft position. The time and altitude at this position are also provided. These fields are mandatory.

- TO (To waypoint)
  Indicates the next waypoint to be sequenced in the FMS. The expected time of flying over this waypoint is also provided.

L3 These fields may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

L1 - NEXT
  Indicates the waypoint to be sequenced in the FMS after the TO waypoint.

L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

SPEED AND HEADING

- SPEED/CAS
  Indicates the air speed of the aircraft.

L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

L1 - SPEED/GROUND
  Indicates the aircraft speed at fixed ground reference.

L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

L1 - SPEED/VERTICAL
  Indicates the vertical speed of the aircraft.

L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

L1 - HEADING
Indicates the aircraft current heading.
L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.
L1 - TRACK
Indicates the aircraft current track.
L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.

METEO

- WIND
Indicates the wind direction and speed.
L3 Both fields may remain empty, if no data from the FMS is available, and no data is entered by the flight crew. If any-one field is entered, the other one is mandatory.
L1 - SAT
Indicates the Static Air Temperature (SAT).
L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.
L1 - ICING
This is a flight crew entry.

The flight crew selects one item from a list of possible items:
- " ": empty, no information available
- Trace
- Light
- Moderate
- Severe.

- TURBULENCE
This is a flight crew entry.

The flight crew selects one item from a list of possible items:
- " ": empty, no information available
- Light
- Moderate
- Severe.

INFORMATION

- ETA DEST
  Indicates the Estimated Time of Arrival.
L3 This field may remain empty, if no data from the FMS is available, and no data is entered by the flight crew.
L1 - ENDURANCE
  Indicates the remaining time of flight taking into account long range cruise speed, and the remaining Fuel On Board (FOB). It is expressed in hours and minutes.
  This is a flight crew entry.
- DEVIATING
  Indicates the offset of the aircraft with respect to the defined flight plan. The flight crew selects the DEVIATING information by ticking the box in front of the DEVIATING label. When the box is ticked, the associated DEVIATING field is mandatory.
- CLIMBING/DESCENDING TO
  These two selections are exclusive. The flight crew selects the field by ticking the box in front of the CLIMBING TO, or DESCENDING TO label. When one box is ticked, the associated altitude field is mandatory.
  The target altitude is entered on the FCU, and sent via the FMS.

ERASE ALL FIELDS BUTTON



When clicked, clears all fields of the displayed position report. The flight crew can only click on this button if there is at least one field that is completed with data.

REFRESH DATA BUTTON



When clicked, updates the data displayed on the REPORT/AUTO & MANUAL POSITION page.
All fields are completed with data from the FMS except ICING, TURBULENCE and ENDURANCE fields that are emptied, and the freetext messages that do not change.

ADD FREETEXT BUTTON / MODIFY FREETEXT BUTTON



When clicked, the MFD page changes to FREETEXT.

On this page:
- The AUTO POSITION REPORT indication is not displayed
- All position report data appear in non-modifiable format
- Only the freetext frame can be modified
- There is a RETURN TO REPORT button that enables to go back to the basic page.



Displayed instead of the ADD FREETEXT button, when the flight crew has edited the freetext frame.

XFR TO MAILBOX BUTTON

L12

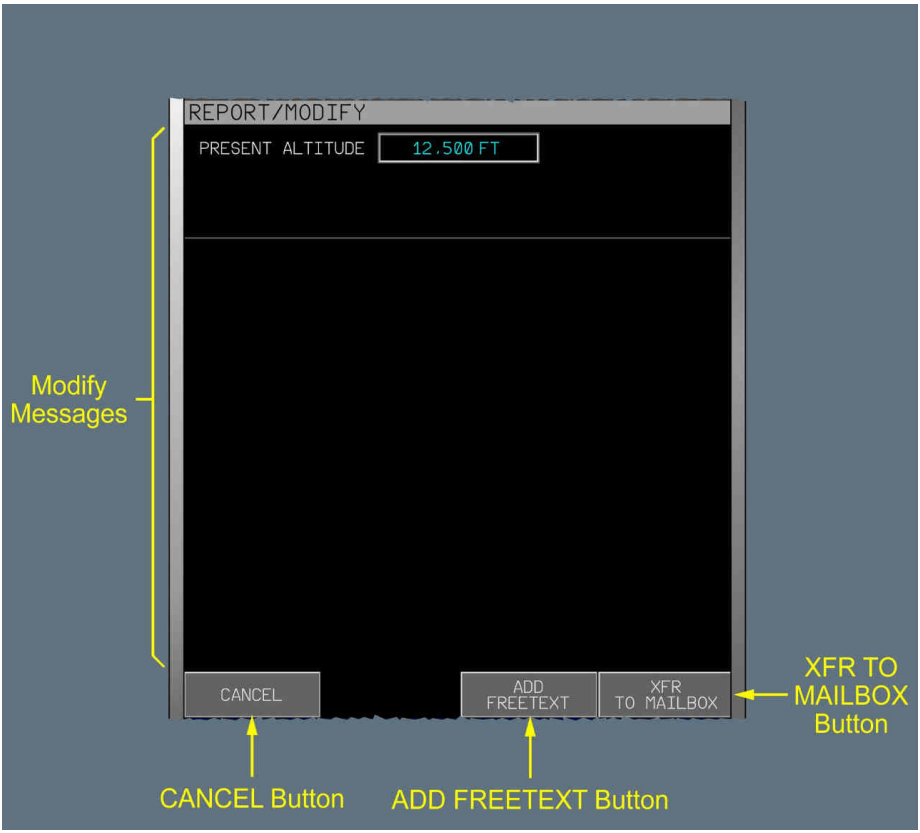


When clicked, the position report is transferred to the mailbox.
This is only possible if all mandatory fields, indicated by amber boxes (if empty), are correctly completed.

MODIFY PAGE

Applicable to: ALL

REPORT/MODIFY Page



MESSAGE MODIFICATION AREA

Enables the flight crew to modify a downlink message that is displayed in the mailbox, before to sending it to the ground.

CANCEL BUTTON



When clicked, closes the MODIFY page, and the default ATC COM page appears.

ADD FREETEXT BUTTON



When clicked, displays a freetext frame at the bottom of the page, if available.
A RETURN TO REPORT button enables the flight crew to go back to the basic MODIFY page.

XFR TO MAILBOX BUTTON

L12

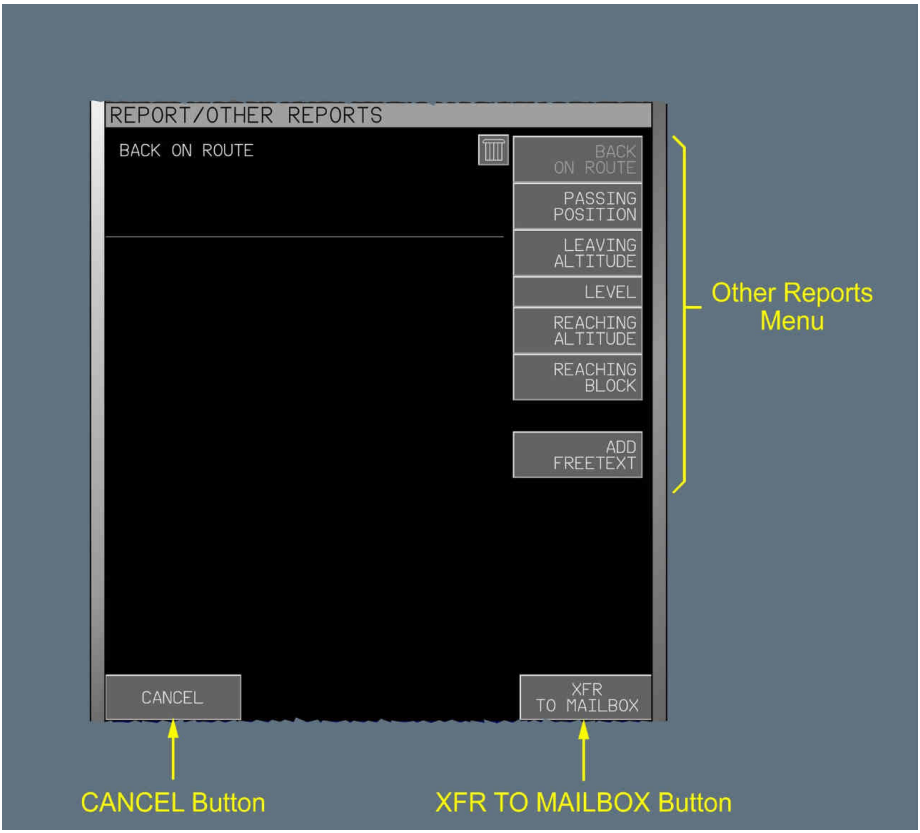


When clicked, transfers the modified data to the mailbox. This is only possible if all mandatory fields, indicated by amber boxes (when empty), are correctly completed.

OTHER REPORTS PAGE

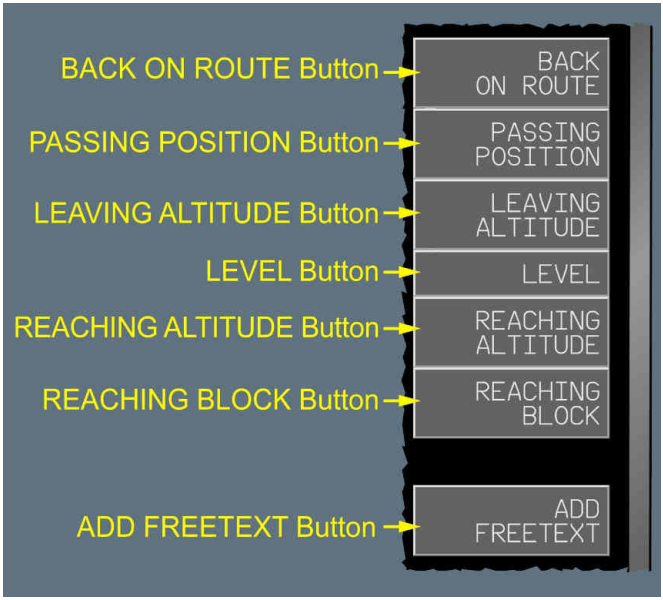
Applicable to: ALL

REPORT/OTHER REPORTS Page



OTHER REPORTS MENU

OTHER REPORTS Menu



BACK ON ROUTE

Indicates that the aircraft has returned to its initial route.

PASSING POSITION

Indicates the current position of the aircraft.

LEAVING ALTITUDE

Indicates that the aircraft is leaving its current altitude.

LEVEL

Indicates the current altitude of the aircraft.

REACHING ALTITUDE

Indicates the altitude that the aircraft has reached.

REACHING BLOCK

Indicates the altitude zone that the aircraft has reached.

ADD FREETEXT

Enables the flight crew to add information in a freetext area displayed at the bottom of the page.

CANCEL BUTTON



When clicked, deletes any report displayed on the MFD.

XFR TO MAILBOX BUTTON

L12

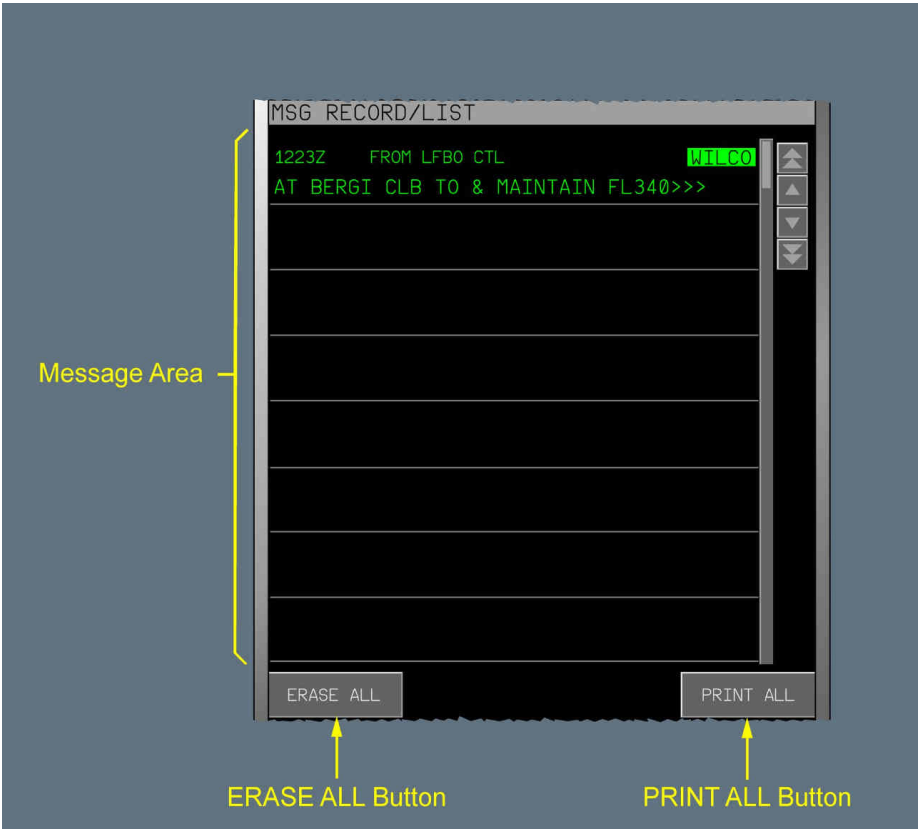


When clicked, transfers any valid report to the mailbox. This is only possible if all mandatory fields, indicated by amber boxes (when empty), are correctly completed.

MSG RECORD/LIST PAGE

Applicable to: ALL

MSG RECORD/LIST Page



MESSAGES AREA

Messages exchanged between ATC centers and the aircraft are stored in this area, starting with the most recent.
When the flight crew clicks on any message, the MSG RECORD / ZOOM page appears and the entire message is displayed.
To display the list again, the flight crew must click on the RETURN TO LIST button.

If no message is stored, a NO STORED MSG message appears in the middle of the page.



TIME

Indicates the UTC time:
- At which the ATC center sends the message, for an uplink message
- At which the flight crew sends the message to the ATC center, for a downlink message.

ORIGIN / DESTINATION

Indicates the active ATC center that sent / received the message.

STATUS

The following indicates the various possible responses of the flight crew to a message from an active ATC center:



The flight crew responds "Yes".



The flight crew responds "No".



Indicates a lost of acknowledgement from a downlink or a response message.



The flight crew has received and understood the uplink message.



The flight crew postpones the decision to accept, or not accept the air traffic controller clearance.



The flight crew is not able to perform the clearance.



The flight crew will comply to perform the clearance.

Note: *The status field is empty for:*
- *A downlink message sent to the active ATC center*
- *An uplink message for which no response is expected.*

ERASE ALL BUTTON



When clicked, and after confirmation, erases all recorded messages from the list.

Note: *If the flight crew clicks on this button while one of the recorded message appears on the other MFD, no message is erased and the MSG RECORD USED OFFSIDE message appears in the ATC COM Message Area.*

PRINT ALL BUTTON

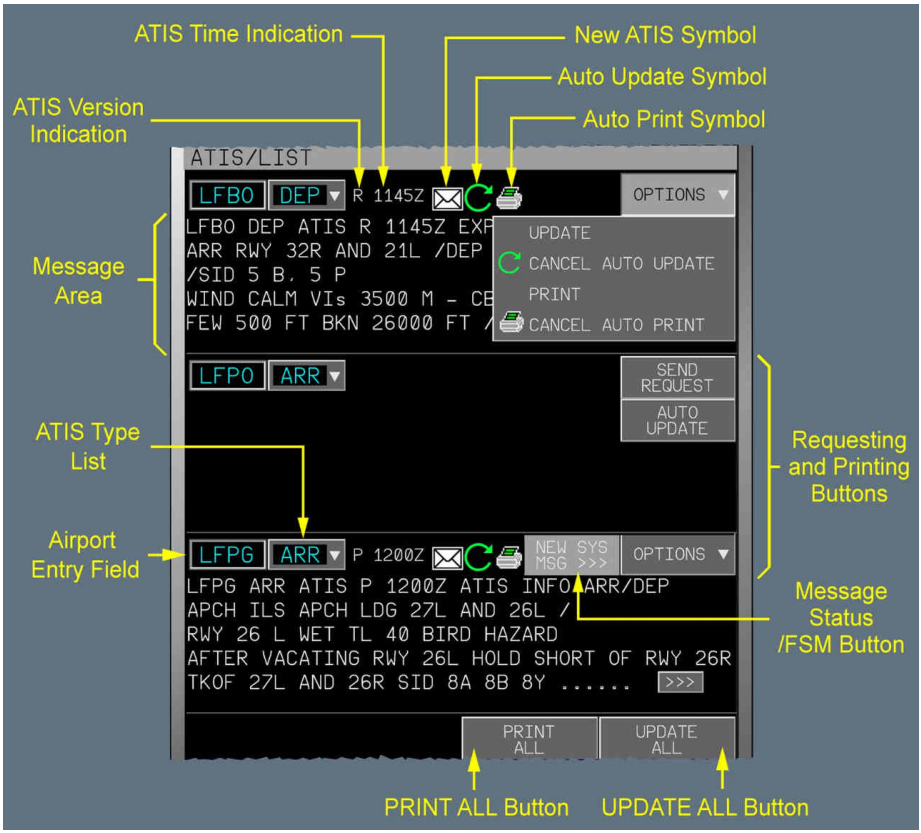


When clicked, prints all saved messages.

ATIS/LIST PAGE

Applicable to: ALL

ATIS/LIST Page



AIRPORT ENTRY FIELD



Enables the flight crew to enter the ICAO code of the airport to which the request is sent.

ATIS TYPE LIST



Enables the flight crew to indicate if the airport selected for the associated request area is the departure airport (DEP), destination airport (ARR), or an alternate airport (ARR).

ATIS VERSION INDICATION

Z — Indicates the version of the ATIS message conveyed by the received ATIS uplink report (e.g. "A").

\- — The version of the ATIS message is not available.

ATIS TIME INDICATION

1245Z — Indicates the time of the ATIS message conveyed by the received ATIS uplink report.

- - - - — The time of the ATIS report is not available.

NEW ATIS SYMBOL



Indicates that an new ATIS message has been received.

The symbol disappears when:
- The flight crew displays the ATIS/LIST page on the MFD, if the new ATIS message is entirely displayed on the ATIS/LIST page, or
- The flight crew displays the ATIS/LIST page on the MFD, and displays the new ATIS message on the ATIS/RECEIVED page, because the new ATIS message cannot be entirely displayed on the ATIS/LIST page.

AUTO UPDATE SYMBOL



Indicates that the flight crew has selected the auto update function from the OPTIONS menu.
The ATIS message is automatically updated when a new ATIS version is available.

AUTO PRINT SYMBOL



Indicates that the flight crew has selected the auto print function from the OPTIONS menu.
The ATIS message is automatically printed when a new ATIS version is available.

MESSAGE STATUS / FSM BUTTON

PREDEFINED MESSAGES

As soon as a predefined message is received, the associated indication appears on the Message Status / FSM (Flight System Message) button.

Indication Displayed	Meaning
SENDING	Appears when the flight crew clicks on: - The REQUEST button, or - The AUTO UPDATE button, or - The UPDATE item of the OPTIONS menu, or - The AUTO UPDATE option of the OPTIONS menu.
SENT	Appears when the message is received on ground.
USE VOICE	Appears when: - The ATC center detects a problem in the ATIS request, or - ATIS is not available at the ATC center.
SEND AGAIN	Appears when: - The request becomes 'downlink lost', or - There is timeout of the operational T_{ATIS} timer, or - There is timeout of the operational T_{ACK} timer, or - There is timeout of the T_{FSM} timer, or - The ATC center receives an ATIS request that is not valid. The flight crew is requested to resubmit a request.
NO AUTO UPDATE	Appears when the ATC center does not support automatic update contract. However, it will send a single ATIS message.
END OF UPDATE	Appears when: - The ATC center has received a message indicating the end of the automatic update contract, and closes the automatic update process, or - The ATC center has deleted the aircraft from its list of "aircraft under ATIS automatic update contract".

NON PREDEFINED MESSAGES

As soon as a message that is not predefined is received, the NEW SYS MSG >>> indication appears on the Message Status / FSM button.
When the flight crew clicks on the button, the ATIS / SYS MSG page appears on the MFD.
The flight crew should click on the RETURN TO LIST button to display the ATIS/LIST page again.
As soon as the flight crew viewed this message, the indication of the Message Status / FSM button becomes SYS MSG >>>.

REQUESTING AND PRINTING BUTTONS

When either the AIRPORT entry field, or the ATIS TYPE list are updated, the SEND REQUEST and AUTO UPDATE buttons appears.
The OPTIONS button appears when the ATIS request has been accepted by the ATC center.

SEND REQUEST BUTTON



When clicked, sends the ATIS request.

AUTO UPDATE BUTTON



When clicked, sends the ATIS auto update request.

OPTIONS BUTTON



When clicked, displays a list including the following options:

UPDATE

When clicked, sends an ATIS update request.

AUTO UPDATE/CANCEL AUTO UPDATE

When clicked, selects or deselects the auto update function.

PRINT

When clicked, prints the last received ATIS message.

AUTO PRINT/CANCEL AUTO PRINT

When clicked, selects or deselects the auto print function.

MESSAGE AREA

The ATIS messages appear in this area.

L3 The message area has a capacity of 5 lines and a maximum capacity of 215 characters cas follows:
- 44 characters on each of the four first lines
- 39 characters on the fifth line.

L1 When the ATIS message cannot be entirely displayed in the message area, dots appear instead of the last 9 characters.
The flight crew can display the ATIS message entirely on the ATIS/RECEIVED page by clicking on the 

button.
To go back to the ATIS/LIST page, the flight crew must click on the RETURN TO LIST button.

PRINT ALL BUTTON



When clicked, prints all the ATIS messages that are currently displayed.

UPDATE ALL BUTTON



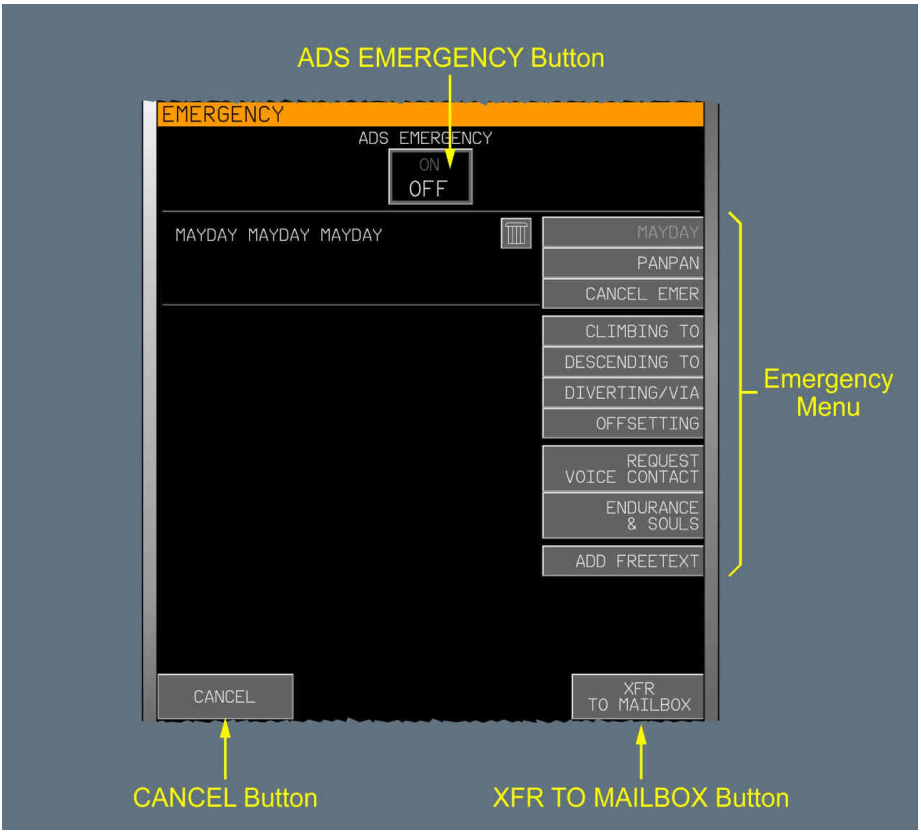
When clicked, initiates a new ATIS request to the ATC center for all ATIS areas, except those for which:
- An auto update contract is already active, or
- An update request is in 'waiting' state.

Note: If communication is not available, when the UPDATE ALL button is clicked, there are no changes on the ATIS/LIST page and the COM DATALINK NOT AVAIL, CHECK RMP COM STATUS PAGE message appears in the ATC COM message area.

EMERGENCY PAGE

Applicable to: ALL

EMERGENCY Page



ADS EMERGENCY BUTTON



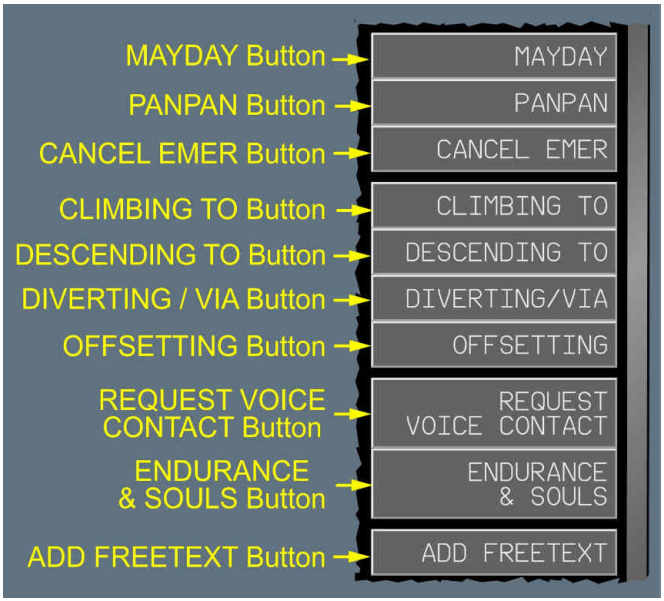
The ADS Emergency is OFF.
This is the default position.



The ADS Emergency is ON.

EMERGENCY MENU

EMERGENCY Menu



MAYDAY BUTTON

When clicked, a downlink message, that indicates a critical failure on board, is generated. The ADS Emergency mode automatically comes on when the MAYDAY message is sent. The "SENDING MAYDAY WILL SWITCH ADS TO EMERGENCY" message appears in the ATC COM message area.

PANPAN BUTTON

When clicked, a downlink message, that indicates a major failure on board, is generated.

CANCEL EMER BUTTON

When clicked, a downlink message, that cancels the previous emergency message that the flight crew has sent, is generated.

At the same time, the ADS emergency mode is deselected.

CLIMBING TO BUTTON

When clicked, displays the FCU-selected altitude for climb.
If the DESCENDING TO option is already displayed on the MFD, it disappears if the flight crew clicks on the CLIMBING TO button.

DESCENDING TO BUTTON

When clicked, displays the FCU-selected altitude for descent.
If the CLIMBING TO option is already displayed on the MFD, it disappears if the flight crew clicks on the DESCENDING TO button.

DIVERTING/VIA BUTTON

When clicked, enables the flight crew to enter the route or airport to which the aircraft is diverting.

OFFSETTING

When clicked, displays the offset value from the flight plan.

REQUEST VOICE CONTACT BUTTON

When clicked, enables the flight crew to request the voice communication with the ATC center.
The entry field enables the flight crew to indicate the frequency at which it requests to contact the ATC center.
The default frequency value is 121.5 MHz.

ENDURANCE & SOULS BUTTON

When clicked, displays the ENDURANCE and SOULS ON BOARD entry fields.
The ENDURANCE entry field enables the flight crew to enter the maximum remaining flight time, limited by fuel autonomy.
The SOULS ON BOARD entry field enables the flight crew to enter the number of people on board.

ADD FREETEXT

When clicked, displays a free text area, that enables the flight crew to add freetext.

XFR TO MAILBOX BUTTON

L12



When clicked, transfers any valid emergency message to the ATC mailbox.
This is only possible if all mandatory fields, indicated by amber boxes (when empty), are correctly completed.

CANCEL BUTTON



When clicked, deletes all emergency message displayed on the MFD.

MFD - ATC COM Messages

ATC COM MESSAGES AREA

Applicable to: ALL

The ATC COM message area displays messages on two lines of 33 characters.
The flight crew can clear the displayed message by clicking on the CLEAR INFO button, or by pressing the CLR INFO key on the KCCU.

ATIS USED OFFSIDE

Applicable to: ALL

Appears when one flight crewmember's MFD displays the ATIS/RECEIVED page, and the other flight crewmember modifies the AIRPORT entry field or the ATIS TYPE list on the ATIS/LIST page on his MFD.

COM DATALINK NOT AVAIL CHECK RMP COM STATUS PAGE

Applicable to: ALL

Appears to check, on the COM STATUS page on the RMP, the availability of the communication means that have datalink capability.

DESELECT AUTO UPDATE

Applicable to: ALL

Appears when an auto update request contract is active and no previous ATIS cancel auto update request has been sent to the ground (i.e. the request is 'in progress' state).

ENTER OR CHECK FLT NUMBER IN FMS INIT PAGE

Applicable to: ALL

Appears when the flight crew clicks on any XFR TO MAILBOX button or clicks on the NOTIFY button of the NOTIFICATION page and the flight number is not available or not valid.

ENTRY OUT OF RANGE

Applicable to: ALL

Appears on the first line If a value entered by the flight crew is not in the correct range.
The data range, as appropriate and according to the data field type, as indicated in the table below, appears on the second line.

Type of data	Out Of Range Messages
Altitude	
Beacon code	RNG: 0000 TO 7777
Distance	RNG: 1 TO 999.9 NM
Flight level	RNG: FL30 TO FL450
Frequency	
Ground speed	RNG: 70 TO 700 KT
Heading or track	RNG: 0 TO 360 °
Hour	RNG: 0 TO 23 H
Latency	RNG: 1 TO 999 S
Mach	RNG: M.61 TO M.92
Minute	RNG: 0 TO 59 MN
Offset	RNG: 1 TO 128 NM
Position	
Position or time	
Remaining fuel	RNG: 0H00MIN TO 23H59MIN
Remaining souls	RNG: 1 TO 1024
Speed	RNG: 70 TO 350 KT
Temperature	RNG: -80 TO 47 C
Time	RNG: 0000Z TO 2359Z
Vertical speed	RNG: -6000 TO 6000 FT/MIN
Weather Deviation	RNG: 1 TO 128 NM
Wind heading	RNG: 1 TO 360 °
Wind speed	RNG: 0 TO 255 KT

FMS ACFT POSITION NOT AVAIL NOTIFICATION NOT AVAIL

Applicable to: ALL

Appears when the flight crew clicks on the NOTIFY button of the NOTIFICATION page, and the aircraft position is not available.

FORMAT ERROR

Applicable to: ALL

Appears on the first line if a value entered by the flight crew is not valid.
The correct format, as indicated in the table below, appears on the second line.

Type of data	Data Format Help Messages
Aircraft type	FORMAT: XXXX
Airport	FORMAT: AAAA
Altitude	FORMAT: FOR ALT XXXXX FOR FL XXX
ATIS code	FORMAT: A

Continued on the following page

Continued from the previous page

Type of data	Data Format Help Messages
Beacon code	FORMAT: XXXX
Distance	FORMAT: XXXXNM/KM
Fix name	FORMAT: XXXXX
Flight level	FORMAT: FLXXX
Frequency	FORMAT: XXXXXX
Gate	FORMAT: XXXXX
Ground speed	FORMAT: XXXKT
Heading or track	FORMAT: XXX°
ICAO code	FORMAT: AAAA
Latency	FORMAT: SSS
Mach	FORMAT: .XX
Offset	FORMAT: XXXL/R
Position	FORMAT: WPT OR LAT/LONG
Position or time	FORMAT: POS XXXXX OR UTC HHMMZ
Procedure	FORMAT: XXXXXX
Remaining fuel	FORMAT: HHMM
Remaining souls	FORMAT: XXX
Speed	FORMAT: FOR CAS XXX FOR MACH .XX
Temperature	FORMAT: +/-XXC/F
Time	FORMAT: HHMMZ
Vertical speed	FORMAT: +/-XXXXFT/MIN OR M/MIN
Weather Deviation	FORMAT: XXXL/R/LR
Wind heading	FORMAT: XXX °
Wind speed	FORMAT: XXXKT/KM

IDENTICAL ATIS REQUEST

Applicable to: ALL

Appears when:

- The flight crew enters the same ATIS type option in two ATIS request areas, and the Airport entry fields in both areas are the same, or
- The flight crew enters the same airport code in two ATIS request areas, and the ATIS type option in both areas are the same.

Note: *In both cases, the most recent modified element does not change.*

LAST MSG ELEMENT

Applicable to: ALL

Appears when:
- There are five frames on the REQUEST page, or
- There is a DEPARTURE or OCEANIC frame on the REQUEST page, or
- There are five frames on the OTHER REPORTS page, or
- There are five frames on the EMERGENCY page.

MAILBOX FULL SEND, CANCEL OR CLOSE SOME MSG

Applicable to: ALL

Appears when the flight crew clicks on any XFR TO MAILBOX button, and the mailbox messages file is full.

MSG RECORD PARTLY LOST

Applicable to: ALL

Appears when there is a storage problem, and the MSG RECORD page is displayed.

MSG RECORD USED OFFSIDE

Applicable to: ALL

Appears when one flight crewmember's MFD displays the MSG RECORD/LIST page, and the other flight cewmember clicks on the ERASE ALL button of the MSG RECORD/LIST page on his MFD.

NEW ATIS RECEIVED

Applicable to: ALL

Appears when a new ATIS message is received and the ATIS/RECEIVED page is displayed.

NO FMS DATA

Applicable to: ALL

Appears when the flight crew clicks on the REFRESH DATA button or the AUTO POSITION REPORT button of the POSITION page, and FMS data are not available.

PLEASE CHECK NOTIFICATION THEN WAIT FOR ATC CONNECTION

Applicable to: ALL

Appears when the flight crew sets the AUTO POSITION REPORT to ON, and there is no active datalink connection.

PLEASE WAIT : IN PROGRESS

Applicable to: ALL

Appears when the flight crew modifies the AIRPORT entry field or the ATIS TYPE list of the ATIS/LIST page, and:

- An ATIS request is in “waiting” mode, or
- An auto update request contract is active and a previous ATIS cancel auto update request has been sent to the ground.

PRINTER NOT AVAIL

Applicable to: ALL

Appears when the flight crew clicks on the auto print button of the ATIS page, and the printer is not available.

SENDING MAYDAY WILL SWITCH ADS TO EMERGENCY

Applicable to: ALL

Appears as soon as the flight crew clicks on the MAYDAY button on the EMERGENCY page.

Intentionally left blank

MFD - Data Entry Format

DATA ENTRY FORMAT

Applicable to: ALL

This chapter lists all data that the flight crew may enter on the MFD .

For all data, the table displays:
- The accepted format
- The accepted units
- The accepted range
- The page(s) where the flight crew enters the data.

The following characters are used to indicate the format:
- A: Letters
- B: Magnetic/ True reference
- N: Numbers
- X: Letters and Numbers.

Note: - *The units that the flight crew can enter are indicated in blue*
- *In fields that have numerical data, leading zeros can be omitted.*

If the format entered is not valid, the "FORMAT ERROR" message appears in the ATC COM message area, followed by the associated correct format (*Refer to DSC-46-10-20-40 FORMAT ERROR*).
If the value entered is not valid, the "ENTRY OUT OF RANGE" message appears in the ATC COM message area, followed by the associated correct range (*Refer to DSC-46-10-20-40 ENTRY OUT OF RANGE*).

AIRPORT ENTRY FIELD

Applicable to: ALL

Format	XXXX
Range	Four alphanumeric characters
Page	ATIS/LIST (*Refer to Page*)

ALT

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written* - *Leading zeros may be omitted.* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	POSITION REPORT (*Refer to Page*)

ALTITUDE

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	REQUEST (*Refer to Page*) MODIFY (*Refer to Page*)

ASSIGNED ALTITUDE

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*)

ASSIGNED SPD

Applicable to: ALL

L12

Format	NNN or NNN KT *Note:* *Leading zeros may be omitted* M .NN or .NN *Note:* *The decimal point must be written, trailing zeros may be omitted*
Units	NNN: Knot M.NN: Mach
Range	NNN: *Min* : 70 *Max* : 350 M .NN: *Min* : .61 *Max* : .92

Continued on the following page

Continued from the previous page

Resolution	NNN: 1 M.NN: 0.01
Page	MODIFY (*Refer to Page*)

AT

Applicable to: ALL

L12

Format	1. XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M Note: *Leading zeros may be omitted* 2. HHMM HHMM Z HH H MM M HH H MM MN HH H MM MIN
Units	1. DD: Latitude Degree EEE: Longitude Degree MM.M: Minute 2. HH: Hour MM: Minute
Range	1. XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9 2. HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	1. DD, EEE: 1 MM.M: 0.1 2. HH: 1 MM: 1
Page	REQUEST (*Refer to Page*) MODIFY (*Refer to Page*)

ATC CENTER

Applicable to: ALL

Format	XXXX
Range	Maximum 4 letters
Page	NOTIFICATION (*Refer to Page*)

ATIS

Applicable to: ALL

Format	A
Range	One letter
Page	MODIFY (*Refer to Page*)

ATIS CODE

Applicable to: ALL

Format	A
Range	One letter
Page	REQUEST (*Refer to Page*)

BLOCK

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter

Continued on the following page

Continued from the previous page

Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	REQUEST (*Refer to Page*)

CAS SPEED

Applicable to: ALL

L12

Format	NNN or NNN KT *Note:* *Leading zeros may be omitted* M .NN or .NN *Note:* *The decimal point must be written, trailing zeros may be omitted*
Units	NNN: Knot M .NN: Mach
Range	NNN: *Min* : 70 *Max* : 350 M .NN: *Min* : .61 *Max* : .92
Resolution	NNN: 1 M .NN: 0.01
Page	POSITION REPORT (*Refer to Page*)

CLB TO

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	REQUEST (*Refer to Page*)

CLBING TO

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	POSITION REPORT (*Refer to Page*)

CLIMBING TO

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*) EMERGENCY (*Refer to Page*)

CRUISE CLB TO

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	REQUEST (*Refer to Page*)

DEPARTURE ARPT

Applicable to: ALL

Format	XXXX
Range	Four alphanumeric characters
Page	REQUEST (*Refer to Page*)

DES TO

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	POSITION REPORT (*Refer to Page*) REQUEST (*Refer to Page*)

DESCENDING TO

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*) EMERGENCY (*Refer to Page*)

DESTINATION

Applicable to: ALL

Format	XXXX
Range	Four alphanumeric characters
Page	REQUEST (*Refer to Page*)

DEVIATING

Applicable to: ALL

L12

Format	NNND, DNNN, NNN NM D or DNNN NM NNN KM D or DNNN KM D: Offsetting Direction *Note:* *Leading zeros may be omitted*
Units	NNN: Nautical Mile NNN KM : Kilometer
Range	D: L (Left), R (Right) or nothing NNN: *Min* : 1 *Max* : 128 NNN KM : *Min* : 1 *Max* : 256
Resolution	NNN: 1 NNN KM : 1
Page	POSITION REPORT (*Refer to Page*) MODIFY (*Refer to Page*)

DIR TO

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9

Continued on the following page

Continued from the previous page

Resolution	DD, EEE: 1 MM.M: 0.1
Page	REQUEST (*Refer to Page*)

DISTANCE

Applicable to: ALL

L12

Format	NNN.N NM or NNN.N NNNN KM *Note:* *Leading zeros may be omitted*
Units	NNN.N NM : Nautical Mile NNNN KM : Kilometer
Range	NNN.N NM : *Min* : 0 *Max* : 999.9 NNNN KM : *Min* : 1 *Max* : 1 024
Resolution	NNN.N NM : 0.1 NNNN KM : 1
Page	MODIFY (*Refer to Page*)

DIVERTING TO / VIA

Applicable to: ALL

L12

Format	XXXXX *Note:* *If one editbox is filled in, the other one must also be filled in*
Range	*Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters
Page	EMERGENCY (*Refer to Page*)

ENDURANCE

Applicable to: ALL

Format	HHMM HH H MM M HH H MM MN HH H MM MIN
Units	HH: Hour MM: Minute

Continued on the following page

Continued from the previous page

Range	HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	HH: 1 MM: 1
Page	POSITION REPORT (*Refer to Page*) EMERGENCY (*Refer to Page*)

ENSUING WPT

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	MODIFY (*Refer to Page*)

ENTRY POINT

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	REQUEST (*Refer to Page*)

ETA

Applicable to: ALL

Format	HHMM HHMM Z HH H MM M HH H MM MN HH H MM MIN
Units	HH: Hour MM: Minute
Range	HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	HH: 1 MM: 1
Page	REQUEST (*Refer to Page*)

ETA DEST

Applicable to: ALL

Format	HHMM HHMM Z HH H MM M HH H MM MN HH H MM MIN
Units	HH: Hour MM: Minute
Range	HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	HH: 1 MM: 1
Page	POSITION REPORT (*Refer to Page*)

FREETEXT

Applicable to: ALL

Format	Any character that belongs to [A..Z], [0..9], [ ], [/], [+], [-], [.]
Range	Maximum of 96 characters
Page	REQUEST (*Refer to Page*) POSITION REPORT (*Refer to Page*) MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*) EMERGENCY (*Refer to Page*)

GATE

Applicable to: ALL

Format	AAAAA
Range	Maximum 5 letters
Page	REQUEST (*Refer to Page*)

GROUND SPEED

Applicable to: ALL

L12

Format	NNN or NNN KT *Note:* *Leading zeros may be omitted*
Units	NNN: Knot
Range	NNN: *Min* : 70 *Max* : 700
Resolution	NNN: 10
Page	POSITION REPORT (*Refer to Page*)

GROUND TRACK

Applicable to: ALL

L12

Format	NNN NNN T *Note:* *Leading zeros may be omitted*
Units	NNN: Magnetic Degree NNN T : True Degree
Range	NNN *Min* : 1 *Max* : 360 *Note:* *360 is displayed as 0* NNN T *Min* : 1 *Max* : 360 *Note:* *360T is displayed as 0T*
Resolution	NNN, NNN T : 1
Page	REQUEST (*Refer to Page*)

HDG

Applicable to: ALL

L12

Format	NNN NNN T *Note:* *Leading zeros may be omitted*
Units	NNN: Magnetic Degree NNN T : True Degree
Range	NNN *Min* : 1 *Max* : 360 *Note:* *360 is displayed as 0* NNN T *Min* : 1 *Max* : 360 *Note:* *360T is displayed as 0T*
Resolution	NNN, NNN T : 1
Page	REQUEST (*Refer to Page*)

HEADING

Applicable to: ALL

L12

Format	NNN NNN T *Note:* *Leading zeros may be omitted*
Units	NNN: Magnetic Degree NNN T : True Degree
Range	NNN *Min* : 1 *Max* : 360 *Note:* *360 is displayed as 0* NNN T *Min* : 1 *Max* : 360 *Note:* *360T is displayed as 0T*
Resolution	NNN, NNN T : 1
Page	POSITION REPORT (*Refer to Page*)

ICING

Applicable to: ALL

Format	X
Range	< >, means that no information about icing conditions is available. TRACE LIGHT MODERATE SEVERE
Page	POSITION REPORT (*Refer to Page*)

LEAVING

Applicable to: ALL

L12

Format	FL NNN or NNN NNNNN FT or NNNNN *Note:* *Between 0 and 1000 feet, "FT" must be written.* NNNNN M
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*)

LEVEL

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *This format is the only one used in the REQUEST page.* NNNNN FT or NNNNN *Note:* *Between 0 and 1000 feet, "FT" must be written.* NNNNN M
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	REQUEST (*Refer to Page*) MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*)

MACH

Applicable to: ALL

L12

Format	M .NN or .NN *Note:* *The decimal point must be written, trailing zeros may be omitted*
Units	M .NN: Mach
Range	M .NN: *Min* : .61 *Max* : .92
Resolution	M .NN: 0.01
Page	REQUEST (*Refer to Page*)

MAX UPLINK DELAY

Applicable to: ALL

Format	NNN or NNN S
Units	NNN: Second
Range	NNN: *Min* : 1 *Max* : 999
Resolution	NNN: 1
Page	MAX UPLINK DELAY (*Refer to Page*)

NEXT

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	POSITION REPORT (*Refer to Page*)

NEXT WPT

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	MODIFY (*Refer to Page*)

NEXT WPT ETA

Applicable to: ALL

Format	HHMM HHMM Z HH H MM M HH H MM MN HH H MM MIN
Units	HH: Hour MM: Minute
Range	HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	HH: 1 MM: 1
Page	MODIFY (*Refer to Page*)

OCEANIC CENTER

Applicable to: ALL

Format	XXXX
Range	Maximum 4 letters
Page	REQUEST (*Refer to Page*)

OFFSET

Applicable to: ALL

L12

Format	NNND, DNNN, NNN NM D or DNNN NM NNN KM D or DNNN KM D: Offsetting Direction *Note:* *Leading zeros may be omitted*
Units	NNN: Nautical Mile NNN KM : Kilometer
Range	D: L (Left), R (Right) or nothing NNN: *Min* : 1 *Max* : 128 NNN KM : *Min* : 1 *Max* : 256
Resolution	NNN: 1 NNN KM : 1
Page	REQUEST (*Refer to Page*) MODIFY (*Refer to Page*)

OFFSETTING

Applicable to: ALL

L12

Format	NNND, DNNN, NNN NM D or DNNN NM NNN KM D or DNNN KM D: Offsetting Direction *Note:* *Leading zeros may be omitted*
Units	NNN: Nautical Mile NNN KM : Kilometer

Continued on the following page

Continued from the previous page

Range	D: L (Left), R (Right) or nothing NNN: *Min* : 1 *Max* : 128 NNN KM : *Min* : 1 *Max* : 256
Resolution	NNN: 1 NNN KM : 1
Page	EMERGENCY (*Refer to Page*)

OVHD

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	POSITION (*Refer to Page*)

PASSING

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*)

POSITION

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute

Continued on the following page

Continued from the previous page

Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	MODIFY (*Refer to Page*)

PPOS

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	POSITION REPORT (*Refer to Page*)

PRESENT ALTITUDE

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*)

PRESENT GROUND TRK

Applicable to: ALL

L12

Format	NNN NNN T *Note:* *Leading zeros may be omitted*
Units	NNN: Magnetic Degree NNN T : True Degree

Continued on the following page

Continued from the previous page

Range	NNN *Min* : 1 *Max* : 360 *Note:* *360 is displayed as 0* NNN T *Min* : 1 *Max* : 360 *Note:* *360T is displayed as 0T*
Resolution	NNN, NNN T : 1
Page	MODIFY (*Refer to Page*)

PRESENT HDG

Applicable to: ALL

L12

Format	NNN NNN T *Note:* *Leading zeros may be omitted*
Units	NNN: Magnetic Degree NNN T : True Degree
Range	NNN *Min* : 1 *Max* : 360 *Note:* *360 is displayed as 0* NNN T *Min* : 1 *Max* : 360 *Note:* *360T is displayed as 0T*
Resolution	NNN, NNN T : 1
Page	MODIFY (*Refer to Page*)

PRESENT POSITION

Applicable to: ALL

L12

Format	XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	DD: Latitude Degree EEE: Longitude Degree MM.M: Minute
Range	XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	DD, EEE: 1 MM.M: 0.1
Page	MODIFY (*Refer to Page*)

PRESENT SPD

Applicable to: ALL

L12

Format	NNN or NNN KT *Note:* *Leading zeros may be omitted* M .NN or .NN *Note:* *The decimal point must be written, trailing zeros may be omitted*
Units	NNN: Knot M .NN: Mach
Range	NNN: *Min* : 70 *Max* : 350 M .NN: *Min* : .61 *Max* : .92
Resolution	NNN: 1 M .NN: 0.01
Page	MODIFY (*Refer to Page*)

REACHING

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*)

REACHING BLOCK

Applicable to: ALL

L12

Format	FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted*
Units	FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter
Range	FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700
Resolution	FL NNN: 10 NNNNN FT : 100 NNNNN M : 100
Page	MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*)

REMAINING FUEL

Applicable to: ALL

Format	HHMM HH H MM M HH H MM MN HH H MM MIN
Units	HH: Hour MM: Minute
Range	HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59

Continued on the following page

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Resolution	HH: 1 MM: 1
Page	MODIFY page (*Refer to Page*)

REPORTED WPT

Applicable to: ALL

L12

Format	1. XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted* 2. HHMM HHMM Z HH H MM M HH H MM MN HH H MM MIN
Units	1. DD: Latitude Degree EEE: Longitude Degree MM.M: Minute 2. HH: Hour MM: Minute
Range	1. XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9 2. HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	1. DD, EEE: 1 MM.M: 0.1 2. HH: 1 MM: 1
Page	MODIFY (*Refer to Page*)

SAT

Applicable to: ALL

L12

Format	±NN or ±NN C ±NNN F *Note:* - *"-" may be entered as M* - *If no sign is entered, "+" is taken by default*
Units	±NN C : Degree Celsius ±NNN F : Degree Fahrenheit
Range	±NN C : *Min* : - 80 *Max* : + 47 ±NNN F : *Min* : - 105 *Max* : + 150
Resolution	±NN C : 1 ±NNN F : 1
Page	POSITION REPORT (*Refer to Page*)

SID/STAR

Applicable to: ALL

Format	XXXXXX
Range	*Min* : 1 alphanumeric character *Max* : 6 alphanumeric characters
Page	REQUEST (*Refer to Page*)

SOULS ON BOARD

Applicable to: ALL

L12

Format	NNNN *Note:* *Leading zeros may be omitted*
Range	*Min* : 1 *Max* : 1 024
Page	MODIFY (*Refer to Page*) EMERGENCY (*Refer to Page*)

SPD

Applicable to: ALL

L12

Format	NNN or NNN KT *Note:* *Leading zeros may be omitted* M .NN or .NN *Note:* *The decimal point must be written, trailing zeros may be omitted*
Units	NNN: Knot M .NN: Mach
Range	NNN: *Min* : 70 *Max* : 350 M .NN: *Min* : .61 *Max* : .92
Resolution	NNN: 1 M .NN: 0.01
Page	REQUEST (*Refer to Page*)

SPEED

Applicable to: ALL

L12

Format	NNN or NNN KT *Note:* *Leading zeros may be omitted* M .NN or .NN *Note:* *The decimal point must be written, trailing zeros may be omitted*
Units	NNN: Knot M .NN: Mach
Range	NNN: *Min* : 70 *Max* : 350 M .NN: *Min* : .61 *Max* : .92
Resolution	NNN: 1 M .NN: 0.01
Page	REQUEST (*Refer to Page*) MODIFY (*Refer to Page*)

SQUAWKING

Applicable to: ALL

Format	NNNN
Range	Each N: *Min* : 0 *Max* : 7
Page	MODIFY (*Refer to Page*)

TO

Applicable to: ALL

L12

Format	1. FL NNN or NNN *Note:* *Leading zeros may be omitted* NNNNN FT or NNNNN *Note:* - *Between 0 and 1000 feet, "FT" must be written.* - *Leading zeros may be omitted* NNNNN M *Note:* *Leading zeros may be omitted* 2. XXXXX DDMM.MB/EEEMM.MC or BDDMM.M/CEEEMM.M *Note:* *Leading zeros may be omitted*
Units	1. FL NNN: Hundreds of Feet (MSL) NNNNN FT : Foot NNNNN M : Meter 2. DD: Latitude Degree EEE: Longitude Degree MM.M: Minute

Continued on the following page

Continued from the previous page

Range	1. FL NNN *Min* : 30 *Max* : 450 NNNNN FT *Min* : 0 *Max* : 25 000 NNNNN M *Min* : 0 *Max* : 13 700 2. XXXXX: *Min* : 1 alphanumeric character *Max* : 5 alphanumeric characters DD: *Min* : 0 *Max* : 90 B: N or S EEE: *Min* : 0 *Max* : 180 C: E or W MM.M: *Min* : 0 *Max* : 59.9
Resolution	1. FL NNN: 10 NNNNN FT : 100 NNNNN M : 100 2. DD, EEE: 1 MM.M: 0.1
Page	REQUEST (*Refer to Page*) POSITION REPORT (*Refer to Page*) MODIFY (*Refer to Page*) OTHER REPORTS (*Refer to Page*)

TRACK

Applicable to: ALL

L12

Format	NNN NNN T <u>Note:</u> *Leading zeros may be omitted*
Units	NNN: Magnetic Degree NNN T : True Degree
Range	NNN *Min* : 1 *Max* : 360 <u>Note:</u> *360 is displayed as 0* NNN T *Min* : 1 *Max* : 360 <u>Note:</u> *360T is displayed as 0T*

Continued on the following page

Continued from the previous page

Resolution	NNN, NNN T : 1
Page	POSITION REPORT (*Refer to Page*)

TURBULENCE

Applicable to: ALL

Format	X
Range	< >, that means no information is available about turbulence conditions LIGHT MODERATE SEVERE
Page	POSITION REPORT (*Refer to Page*)

UTC

Applicable to: ALL

Format	HHMM HHMM Z HH H MM M HH H MM MN HH H MM MIN
Units	HH: Hour MM: Minute
Range	HH *Min* : 0 *Max* : 23 MM *Min* : 0 *Max* : 59
Resolution	HH: 1 MM: 1
Page	POSITION REPORT (*Refer to Page*)

VERTICAL SPEED

Applicable to: ALL

L12

Format	±NNNN, ±NNNN FT , ±NNNN FT/MIN , or ±NNNN FTM ±NNNN M , ±NNNN M/MIN , or ±NNNN MM *Note:* - *"-" may be entered as M* - *If no sign is input, "+" is taken by default*
Units	NNNN: Feet per Minute NNNN M : Meter per Minute

Continued on the following page

Continued from the previous page

Range	NNNN: *Min* : 0 *Max* : 6 000 NNNN M : *Min* : 0 *Max* : 2 000
Resolution	NNNN: 100 NNNN M : 10
Page	POSITION REPORT (*Refer to Page*)

VOICE CONTACT

Applicable to: ALL

L12

Format	NNNNN (HF) *Note:* *Leading zeros may be omitted* NNNNNNNNNNNN *Note:* *SATCHANNEL corresponds to a 12 digits telephone number* NNN.NNN (VHF)
Units	NNNNN (HF): KiloHertz NNN.NNN (VHF): MegaHertz
Range	NNNNN (HF) *Min* : 2 850 *Max* : 28 000 NNNNNNNNNNNN: 12 numbers NNN.NNN (VHF) *Min* : 117 *Max* : 138
Resolution	NNNNN (HF): 1 NNN.NNN (VHF): 0.001
Page	REQUEST (*Refer to Page*) EMERGENCY (*Refer to Page*)

WIND

Applicable to: ALL

L12

Format	DDD/NNN KT DDD ° /NNN KT DDD/NNN DDD ° /NNN DDD/NNN KM DDD ° /NNN KM DDD/NNN KM/H DDD ° /NNN KM/H *Note:* *Leading zeros may be omitted*
Units	DDD and DDD ° : Degree NNN KT and NNN: Knot NNN KM and NNN KM/H : Kilometer per Hour
Range	DDD *Min* : 1 *Max* : 360 NNN KT and NNN *Min* : 0 *Max* : 255 NNN KM and NNN KM/H *Min* : 0 *Max* : 511
Resolution	DDD: 1 NNN: 1
Page	POSITION REPORT (*Refer to Page*)

WX DEV

Applicable to: ALL

L12

Format	NNND, DNNN, NNN NM D or DNNN NM NNN KM D or DNNN KM D: Offsetting Direction *Note:* *Leading zeros may be omitted*
Units	NNN: Nautical Mile NNN KM : Kilometer
Range	D: L (Left), R (Right), LR or nothing NNN: *Min* : 1 *Max* : 128 NNN KM : *Min* : 1 *Max* : 256

Continued on the following page

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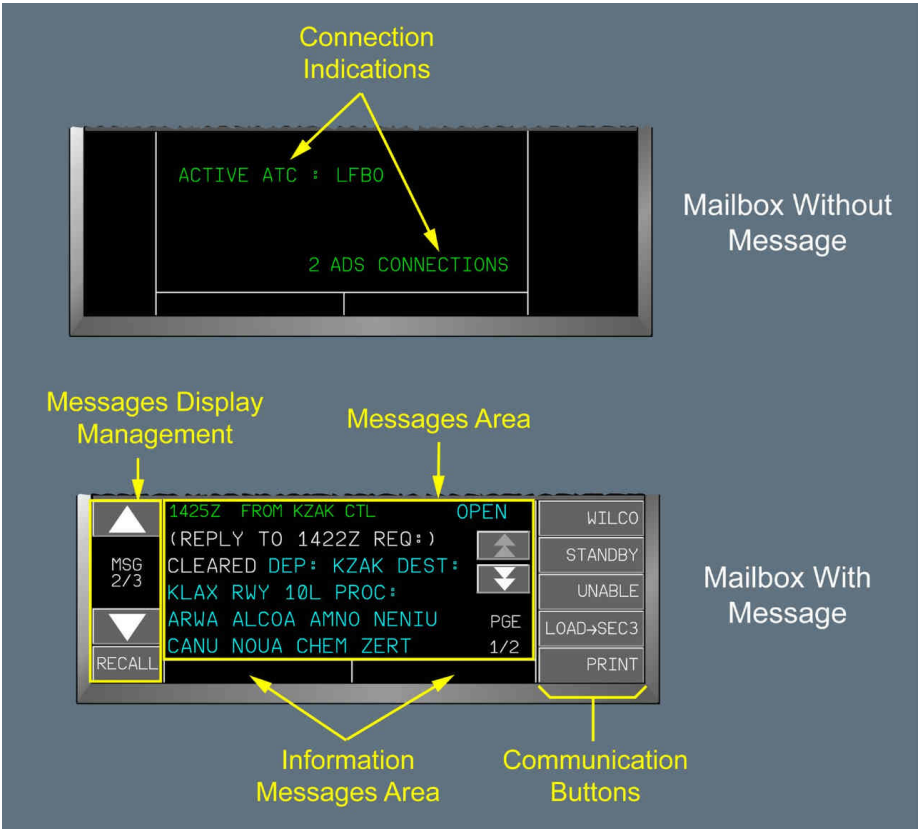
Resolution	NNN: 1 NNN KM : 1
Page	REQUEST (*Refer to Page*)

ATC Mailbox on SD

MAILBOX

Applicable to: ALL

Mailbox



Note: *If the ATC application is failed and the flight crew decides to display the mailbox by selecting one of the KCCU keys (MAIL BOX key or Navigation keys), the MAILBOX NOT AVAIL message appears for 5 seconds.*

CONNECTION INDICATIONS

Applicable to: ALL

CONNECTION STATUS INDICATION

ACTIVE ATC : LFBO — Indicates the ATC center to which the aircraft is connected.

ADS CONNECTED CENTERS INDICATION

ADS OFF — The ADS is OFF.

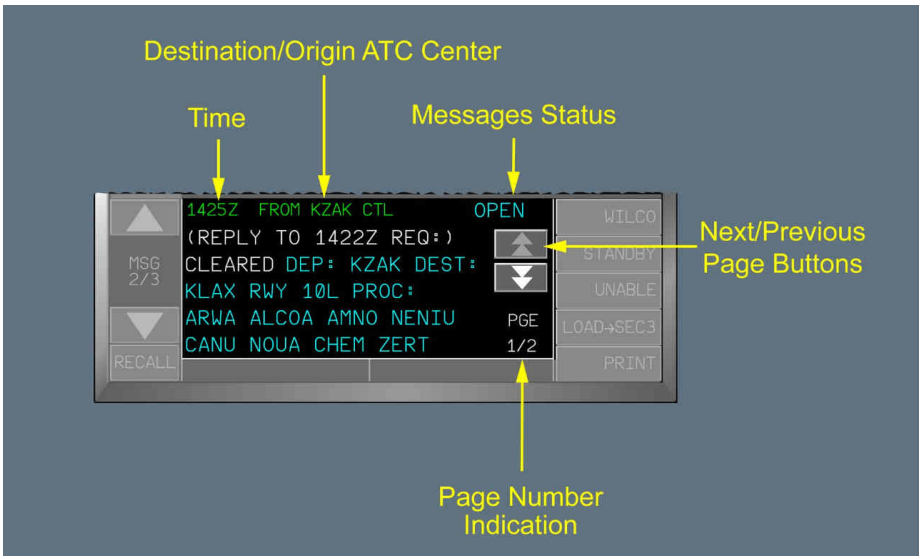
2 ADS CONNECTIONS — When the ADS is CONNECTED, indicates the number of ADS connected centers.

Note: If the ADS is ARMED or not running, no data appears.

MESSAGE AREA

Applicable to: ALL

Message Area



TIME

Indicates the UTC time:
- At which the ATC center sends the message, for an uplink message
- At which the flight crew sends the message to the ATC center, for a downlink message.

Note: - *If the time that the ATC center sent the message is not available :*

- *No time appears in the time area*
- *The "(RECEIVED AT XXXXZ)" indication appears at the end of the message, where XXXX is the time at which the uplink message is received.*

- *If the clock is failed, the time area is:*

- *Empty if no time stamp was previously available, or*
- *Completed with 4 dashes followed by 'Z' ('----Z') in other cases.*

DESTINATION/ORIGIN ATC CENTER

Indicates the active ATC center that sent or received the message.

MESSAGE STATUS

Indicates the response of the flight crew to a message received from the active ATC center.

L3 *Refer to DSC-46-10-20-30-80 Messages Area* for more details on different possible messages.

L1 *Note:* *The status is empty for:*
- *A downlink message sent to the active ATC center*
- *An uplink message for which no response is expected.*

NEXT/PREVIOUS PAGE BUTTONS

When clicked, display the next/previous page of the message, if the message length is more than one page.

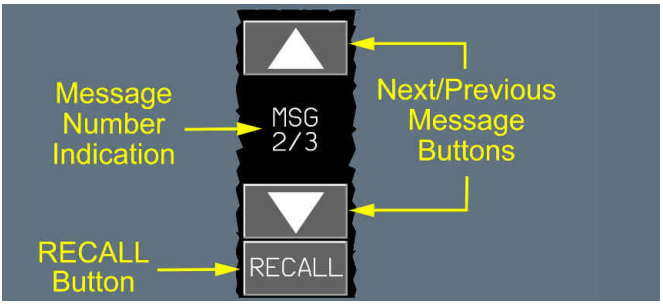
PAGE NUMBER INDICATION

Indicates the page number of the currently displayed page of the message.
If the message contains only one page, no information appears.

MESSAGES DISPLAY MANAGEMENT

Applicable to: ALL

Messages Display Management



MESSAGE NUMBER INDICATION

Indicates the rank of the displayed message in the mailbox queue.
If there is only one message in the mailbox, no information appears.

NEXT / PREVIOUS MESSAGE BUTTONS

When clicked, display the previous/next message in the mailbox queue.
If there is only one message in the mailbox, no button appears.

RECALL BUTTON

When clicked, recalls the message that the flight crew most recently removed from the mailbox using the CLOSE button.

COMMUNICATION BUTTONS

Applicable to: ALL

COMMUNICATION BUTTONS

Depending on the nature of the message, the system automatically displays the appropriate communicaton buttons. The possible communication buttons are:

WILCO BUTTON



When clicked, prepares a response message to comply with an ATC clearance.

ROGER BUTTON



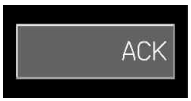
When clicked, prepares a response message to confirm reception and understanding of an ATC information or report request.
The flight crew must only use ROGER in response to an uplink free text message. Under no circumstances will ROGER be used instead of AFFIRM.

AFFIRM BUTTON



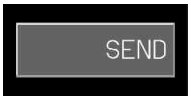
When clicked, prepares a response message to accept an ATC negotiation message.
AFFIRM is an appropriate response to an uplinked negotiation request message (e.g. CAN YOU ACCEPT [altitude] AT [time]).

ACK BUTTON



When clicked, prepares a response message to accept a departure/oceanic clearance.

SEND BUTTON



When clicked, sends a message or a response, that was prepared by using the other command buttons (WILCO, ROGER, STANDBY, ...) to the ATC center.
The SEND button, for a downlink message other than a response selected by a button, is displayed but cannot be selected as long as the flight crew has not displayed all the pages of the corresponding message.

CLOSE BUTTON



When clicked, closes and removes from the mailbox a message that the flight crew has sent to the ATC, or removes from the mailbox a message from the ATC center that has been answered, and send it to the MSG RECORD page of the MFD. This is not applicable when the answer is on standby.

STANDBY BUTTON



When clicked, prepares a response message to inform the ATC center that the flight crew needs to delay the answer.

CANCEL BUTTON



When clicked, enables the flight crew to:
- Remove a prepared downlink message from the mailbox, or
- Cancel a selected reply to an uplink message.

CANNOT BUTTON



When clicked, prepares a response message to send a negative answer to an OPEN negotiation message from the ATC center.

REFUSE BUTTON



When clicked, prepares a response message to send a negative answer to a departure/oceanic clearance.

UNABLE BUTTON



When clicked, prepares a response message to reject an ATC clearance.

NEGATIVE BUTTON



When clicked, prepares a response message to answer “no” to an ATC negotiation message.

DUE TO BUTTON



When clicked, enables the flight crew to add a justification (due to aircraft performance, weather, ...) for a NEGATIVE or UNABLE response.

MODIFY BUTTON



When clicked, displays the MODIFY page on the MFD, to enable the flight crew to modify a message proposed by the FMS. Also used to update the parameters that the FMS provides to the mailbox.

REFRESH BUTTON



When clicked, updates downlink FMS data on the mailbox.

LOAD→SEC3 BUTTON



When clicked, loads a clearance received from the ATC center in the FMS.

Note: If there is a flight plan in SEC 3, this flight plan will be deleted when the ATC flight plan is uploaded.
To avoid loss of a flight plan, the flight crew must copy the SEC 3 flight plan in SEC 1, or SEC 2 before uploading the ATC flight plan.

FREETEXT BUTTON



When clicked, enables the flight crew to add freetext for a NEGATIVE or UNABLE response.

PRINT BUTTON



When clicked, prints the message that is currently displayed in the mailbox.

INFORMATION MESSAGES AREA

Applicable to: ALL

Information Displayed	Conditions for display request	Reasons for display removal
ANSWER MSG	A file of uplink messages to be answered is full	File no more full
CHECK CLRCE	Response lost for a positive reminder of a deferred clearance	
COM FAULT	ATC COM means failed	ATC COM means available

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Information Displayed	Conditions for display request	Reasons for display removal
COM NOT AVAIL	ATC COM means temporarily not available	ATC COM means available
COM NOT INIT	Router not initialized	Router initialized
FILE FULL	A file of 'not ready to be closed' downlink messages generated by the flight crew is full	File no more full
FMS MONITORING	Monitoring in progress	Monitoring result obtained or time out
LINK LOST	"Abnormal" loss of data link connection	
LOAD FAILED	Loading failed due to the content of the data proposed	Other loading requested
LOAD NOT AVAIL	Loading not possible, including when the loading was in progress	Other loading requested
LOAD OK	Successful loading	Other loading requested
LOAD PARTIAL	Partial loading	Other loading requested
LOADING	Loading requested and in progress	Load result obtained or time out
MFD FOR MODIF	Following click on MODIFY button	Sending requested; modified text displayed in the mailbox
MONIT CNCLD	Monitoring canceled	Other monitoring requested
MONIT FAILED	Monitoring requested and failed	Other monitoring requested or monitoring no longer required
MONIT LOST	Loss of monitoring	Other monitoring requested or monitoring no longer required
MONIT NOT AVAIL	Monitoring impossible because of system unavailability	Other monitoring requested or monitoring no longer required
NO ATC REPLY	No reply to a request (operational timer expired) and no link loss (displayed for pending DL only)	
NO FMS DATA	FMS data not available	Other data request requested
NON STD FORMAT	Reception of a partially valid OCL/DCL uplink message with valid ATC-ICAO Designator field	
NON STD SENDER	Reception of a partially valid OCL/DCL uplink message with invalid ATC-ICAO Designator field	
OVERFLW CLOSED	A file of other messages is full and a new message of this category stored in the file	
PARTIAL FMS DATA	FMS data not available for all requests	Other data request requested
PRINT FAILED	Printing requested from mailbox and printing fails	New information belonging to the same category asks for display
PRINT NOT AVAIL	Printing requested from mailbox while printer not available	New information belonging to the same category asks for display
PRINTING	Printing requested from the mailbox and printing in progress	10 seconds after printing requested
RECALL MODE	Recall of the last message removed from the mailbox	Leaving recall mode

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Information Displayed	Conditions for display request	Reasons for display removal
REMINDER	Display of FMS reminder message	
SEND FAILED	- Transmission of reply to uplink message not possible ('Failed DSP' received or timer expired) and no link lost (displayed for UL only), or - Transmission of a downlink not possible ('Failed DSP' received or timer expired) and no link lost (displayed for UL only)	
SENDING	The flight crew pressed the SEND button	Sending result obtained (positive or negative) or timeout
SENT	Reception of ACK from DSP (Service Provider) or associated uplink message for a downlink	
WAIT FMS DATA	Data requested from FMS	Data request result obtained or time out

Intentionally left blank

ATC MSG pb

ATC MSG PB

Applicable to: ALL
Impacted DU: 00011365 ATC MSG pb



No message from the ATC has been received.

L13



Flashing: A message from the ATC has been received.
The pushbutton flashes at a frequency of 2 Hz.

Associated with a RING aural alert that sounds if the flight crew does not press the pushbutton or read the message within:
- 15 s after the reception of a normal message
- 5 s after the reception of an urgent message.

When the flight crew presses either of the pushbutton, the ATC MSG lights of the two ATC MSG pb go off and the aural alert is inhibited.

Note: *ATC MSG pb may not flash and the associated RING aural alert may not sound when a reminder appears in the ATC mailbox.*

ATC MSG PB

Applicable to: ALL
Impacted by TDU: 00023312 ATC MSG pb



No message from the ATC has been received.

L13



Flashing: A message from the ATC has been received.
The pushbutton flashes at a frequency of 2 Hz.

Associated with a RING aural alert that sounds if the flight crew does not press the pushbutton or read the message within:
- 15 s after the reception of a normal message
- 5 s after the reception of an urgent message.

When the flight crew presses either of the pushbutton, the ATC MSG lights of the two ATC MSG pb go off and the aural alert is inhibited.

KCCU

KCCU

Applicable to: ALL

KCCU



ATC COM KEY



When pressed:
- Displays the ATC COM REQUEST page on the MFD (*Refer to ATC COM REQUEST page*)
- Moves the cursor back to the MFD if it was previously on another display.

Mailbox KEY



When pressed, the cursor moves to the mailbox section of the SD (*Refer to Mailbox*), if it was previously on another display.

CLR INFO KEY



When pressed, clears the message that is currently displayed in the ATC COM Message Area (*Refer to Message Area*)

Note: The flight crew also uses this key to clear the FMS and SURV messages.

NAVIGATION KEYS



When pressed, move the cursor to the display unit that is to the right, or to the left, of the display unit that is currently selected (if applicable).

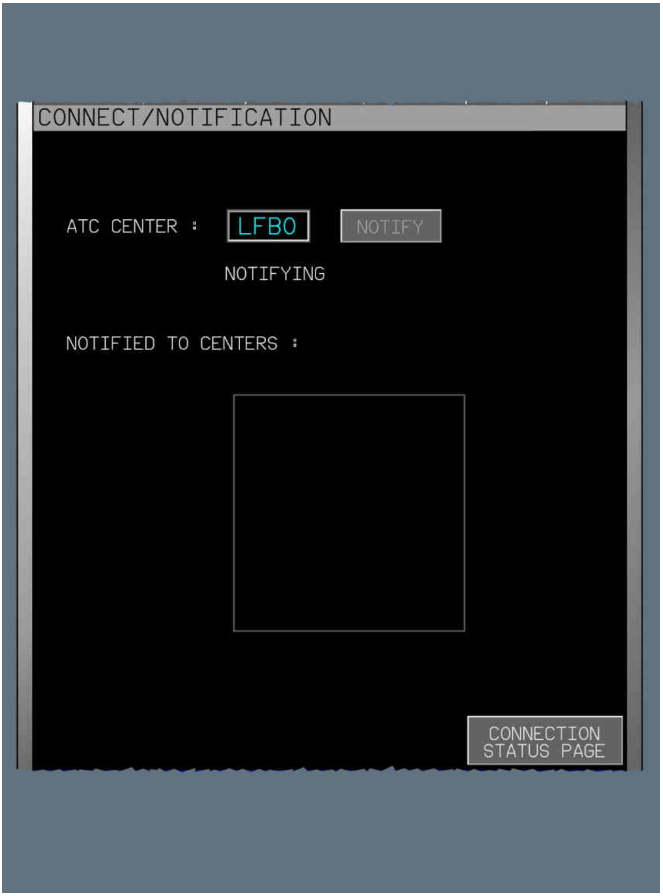
HOW TO MAKE A MANUAL NOTIFICATION TO AN ATC CENTER

Applicable to: ALL

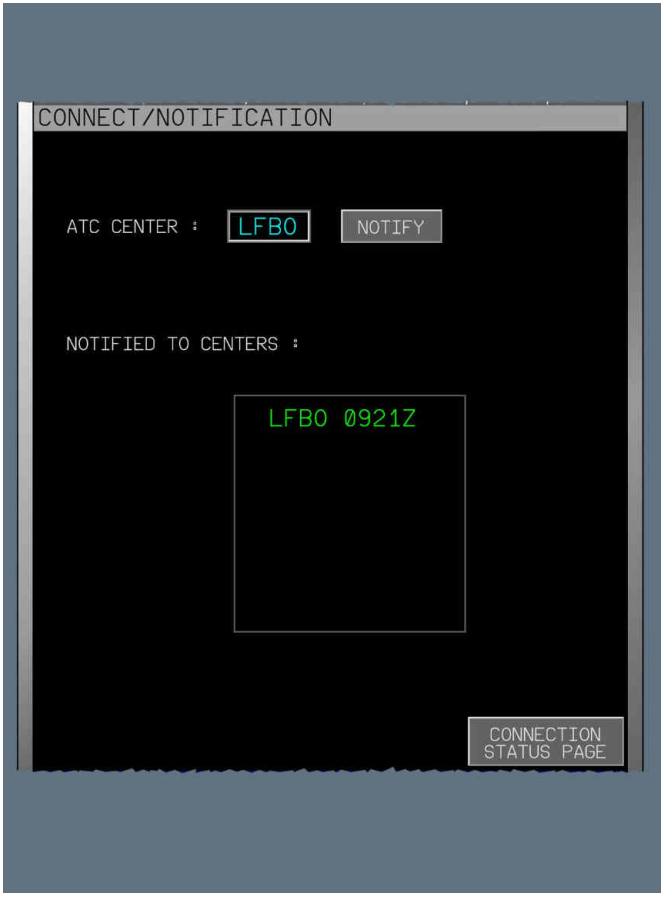
Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU.
Click on the CONNECT button on the general menu bar of the MFD and select NOTIFICATION to open the CONNECT/NOTIFICATION page.



Enter the ICAO code of the ATC center in the ATC center entry field, and click on the NOTIFY button. "NOTIFYING" appears below the ATC center field.



As soon as a notification is sent to, and accepted by the ATC center, the name of the ATC center is added to the list of notified ATC centers.

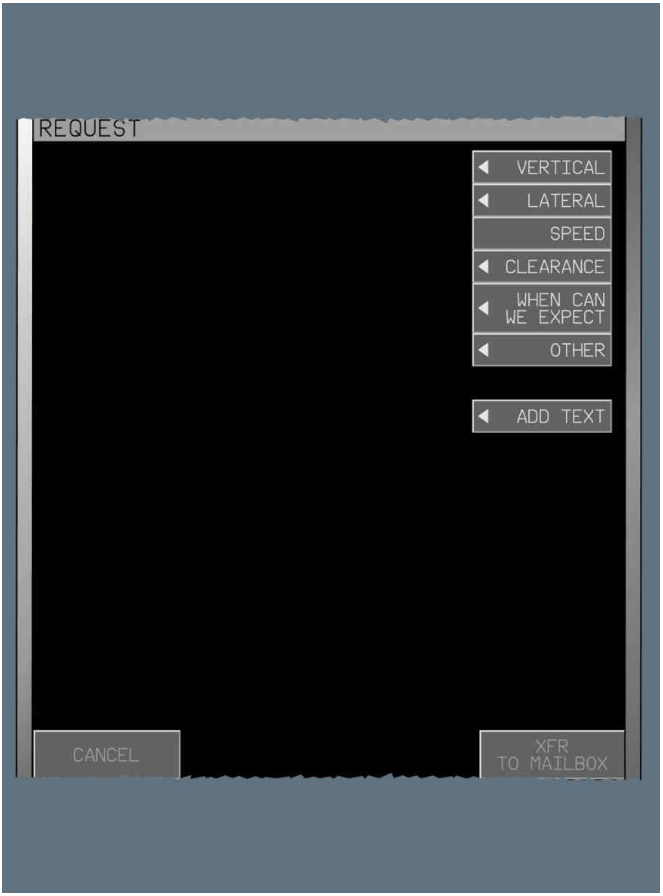


The ATC center can initiate a CPDLC connection.
The transfer from one ATC center to another is usually done automatically.

HOW TO SEND A REQUEST MESSAGE

Applicable to: ALL

Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU .



Use the buttons of the REQUEST menu to select the frames that are in the message. Up to five frames may be selected for one message. Some frame combinations are not possible. For more details about the frames, *Refer to DSC-46-10-20-30-40 Request Page - Request Menu* .

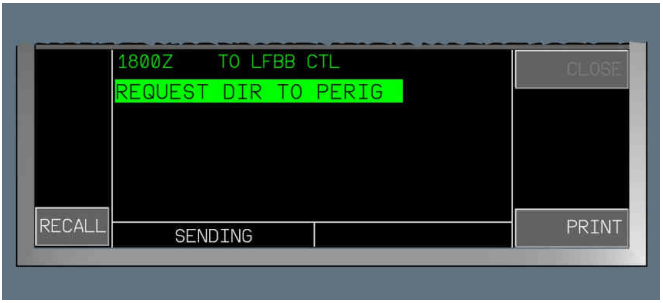


To delete one frame from the message, click on the recycle bin symbol of the frame.
Some frames contain mandatory fields (amber boxes when empty). Complete all the mandatory fields.
Click on the XFR TO MAILBOX button to transfer the request message to the mailbox. The XFR TO MAILBOX button becomes available only when all mandatory fields have been completed.
Clicking on the CANCEL button cancels all frames from the request message.

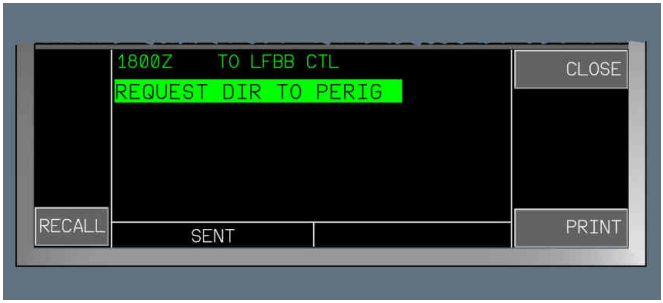


In the mailbox, click on the SEND button to send the request message to the ATC center. "SENDING" appears in the Information Messages Area in the mailbox, and the request message appears in black with green background.

Note: *When a downlink message is in the mailbox but includes more than one page, the flight crew must display all the pages of the message in the mailbox before being allowed to send it to the ATC center (using the page up and page down keys). The SEND button is not active until all the pages have been displayed.*



When the message is received on ground, "SENT" appears in the Information Messages Area in the mailbox.



A timer is automatically triggered when a downlink message is sent. This timer has a total countdown time of 3 min and 30 s .
If the timer ends before the message is received on ground, or before the response of the ATC center is received onboard (only if the downlink message requires an answer), the text "SEND FAILED" appears in the Information Messages Area of the corresponding downlink.
Click on the CLOSE button to remove the message from the mailbox.

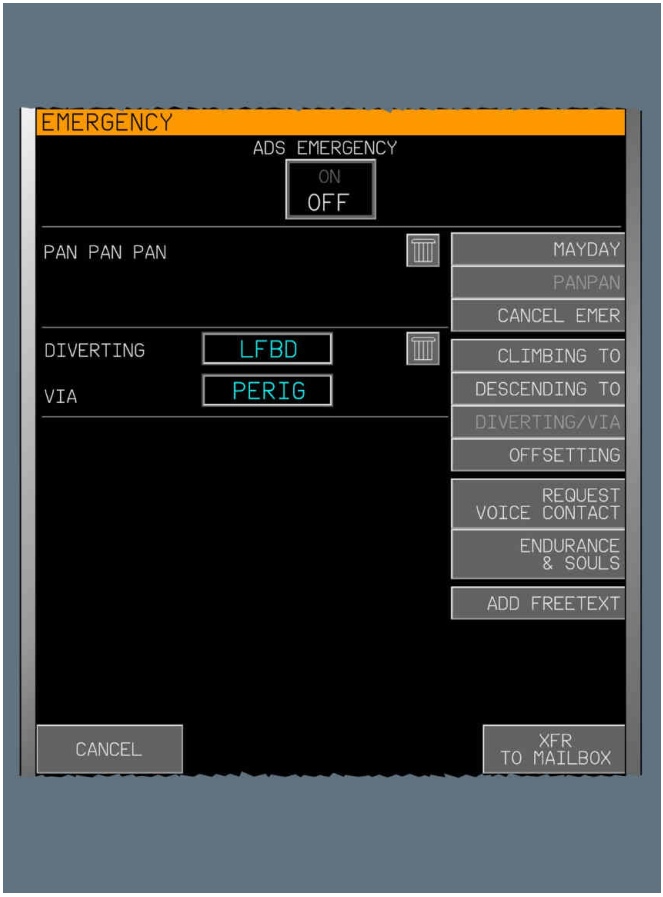
HOW TO SEND AN EMERGENCY MESSAGE

Applicable to: ALL

Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU .
Click on the EMER button on the general menu bar of the MFD to open the EMERGENCY page.



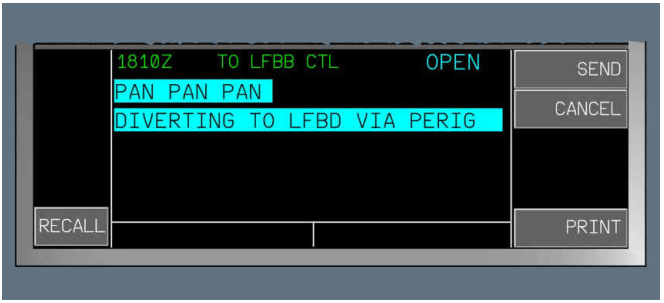
Use the buttons of the EMERGENCY menu to select the frames that are in the message. Some frame combinations are not possible. For more details about the frames, *Refer to DSC-46-10-20-30-100 Emergency Menu* .



Some frames include mandatory fields (amber boxes when empty). Complete all the mandatory fields.

Click on the XFR TO MAILBOX button to transfer the message to the mailbox. The XFR TO MAILBOX button becomes available only when all mandatory fields have been completed.

Clicking on the CANCEL button cancels all frames from the request message.



In the mailbox, click on the SEND button to send the message to the ATC center.

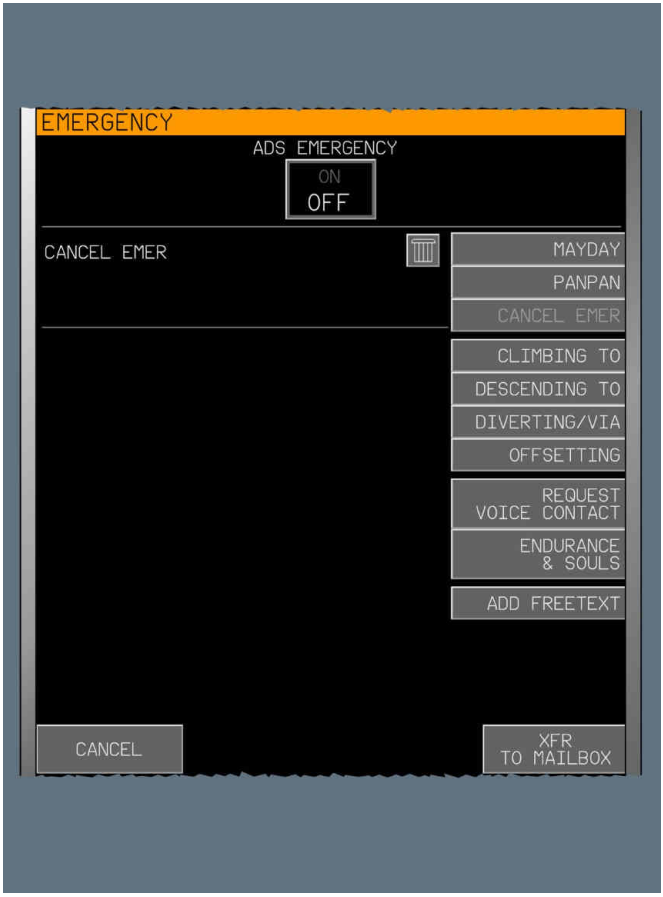


Click on the CLOSE button to remove the message from the mailbox.

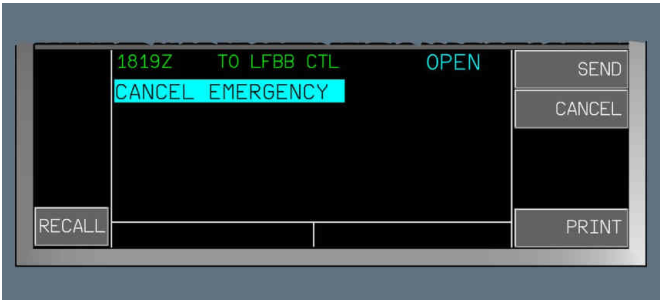
HOW TO CANCEL EMERGENCY

Applicable to: ALL

Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU.
Click on the EMER button on the general menu bar of the MFD to open the EMERGENCY page.
Click on the CANCEL EMER button on the EMERGENCY menu.



Click on the XFR TO MAILBOX button to transfer the message to the mailbox.



In the mailbox, click on the SEND button to send the message to the ATC center.
Then click on the CLOSE button to remove the message from the mailbox.

HOW TO READ AN UPLINK MESSAGE

Applicable to: ALL

When an uplink message is received, the ATC MSG light of the two ATC MSG pb comes up and an aural alert (ring) sounds in the cockpit.



Note: During takeoff and landing, the ATC MSG light and aural alert are inhibited.

Press the ATC MSG pb to switch off the light and cancel the audio signal.
The new message appears immediately in the mailbox if it is an emergency message, or if the message file is empty.
In any other cases, the message is automatically filed in the mailbox. The flight crew can display any next or previous message by clicking on the  and  buttons.
Messages are filed in the mailbox in a chronological order.

The flight crew can access any filed message in the mailbox and can process (i.e. answer or send) the filed message in any order.
When the message appears in the mailbox on more than one page, the flight crew can access any next or previous page of the message by clicking on the  and  buttons.

MESSAGE REPLY

When an uplink message coming from the ATC center appears in the mailbox, all possible replies appear on the right side of the mailbox.



Click on the selected reply then click on the SEND button to send the reply to the ATC center.
Click on the CLOSE button to remove the message from the mailbox.

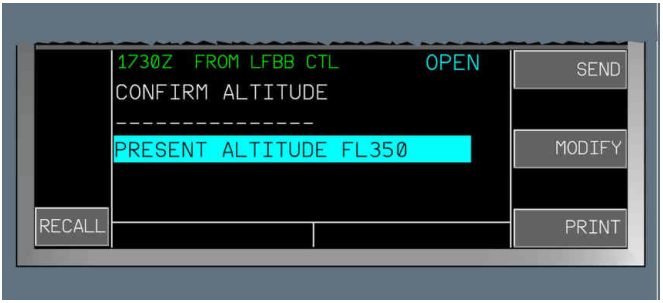
HOW TO MANAGE A CONFIRM MESSAGE

Applicable to: ALL

The air traffic controller may request that the flight crew confirms navigation parameters (altitude, speed,…).
The received message is filed in the mailbox and is associated to a visual alert and an aural alert that is not urgent.
The FMS sends the navigation parameters. The ATC Datalink Applications System automatically proposes a response in the mailbox and "WAIT FM DATA" temporarily appears in the Information Messages Area of the mailbox, indicating that the system is waiting for FMS data.



When the FMS has sent data, “WAIT FM DATA” disappears and the response appears in the mailbox in black with a blue background.



Note: *If the aircraft is not at a stabilized altitude, a message is added to the “PRESENT ALTITUDE” to indicate the vertical aircraft progression (climbing or descending), else “PRESENT ALTITUDE” message appears alone in the mailbox.*

The flight crew can modify the confirm message before sending it to the ATC center. Click on the MODIFY button in the mailbox to open the REPORT/MODIFY page on the MFD.

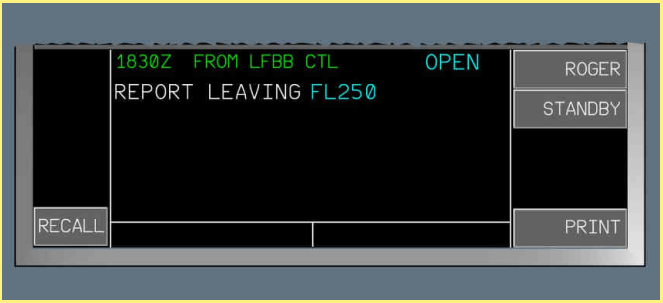


Make the necessary changes and add freetext if needed then click on the XFR TO MAILBOX button to transfer the modified confirm message to the mailbox.
In the mailbox, click on the SEND button to send the confirm message to the ATC center.
Then, click on the CLOSE button to remove the message from the mailbox.

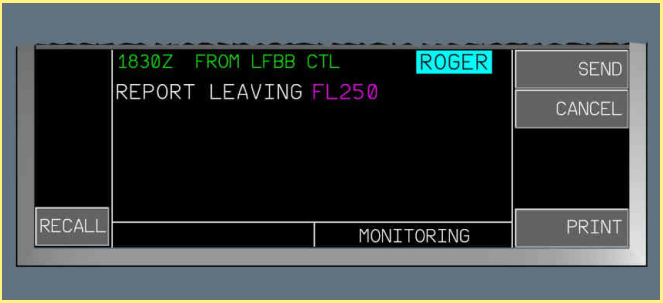
HOW TO MANAGE A REPORT MESSAGE

Applicable to: ALL
Impacted DU: 00018548 How to Manage a Report Message

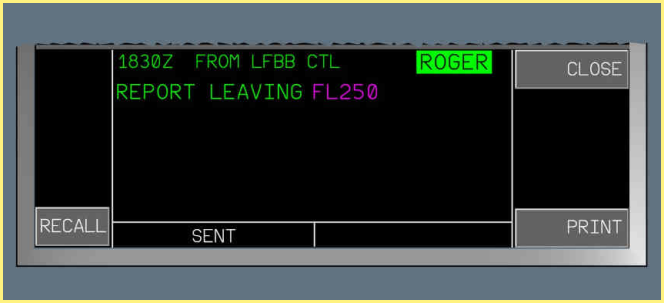
The air traffic controller may require that the flight crew reports back at a later time in flight, for example when reaching a altitude, crossing a point, or when back on route.
The received message is filed in the mailbox and is associated to a visual alert and an aural alert that is not urgent.



Click on the ROGER button in the mailbox. The message status becomes ROGER, and appears in black with a blue background.
The data in the message, displayed first in blue, then appears in magenta, indicating that the condition is being monitored by the FMS. "MONITORING" appears in the Information Message Area of the mailbox.

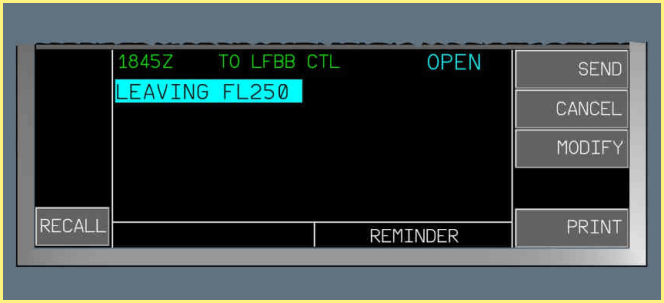


In the mailbox, click on the SEND button to send the ROGER reply to the ATC center, and click on the CLOSE button to remove the message from the mailbox.

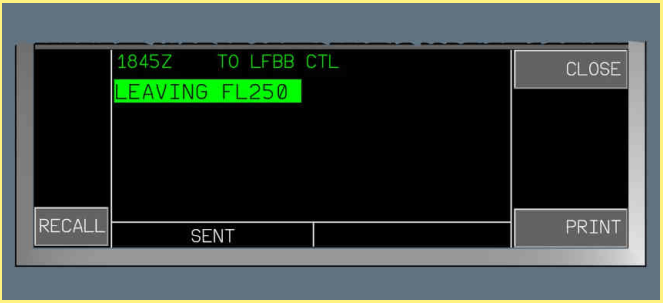


When the condition of the report is met, the FMS sends a reminder to the ATC Datalink Applications System.
Then, the response to the report message is automatically put in the mailbox queue and a visual and aural alerts are triggered. When this message is displayed, "REMINDER" appears in the Information Message Area of the mailbox.

Note: ATC MSG pb may not flash and the associated RING aural alert may not sound when the reminder appears in the ATC mailbox.



The flight crew can modify the report message before sending it to the ATC center. Click on the MODIFY button in the mailbox to open the REPORT/MODIFY page on the MFD.
Add the changes and click on the XFR TO MAILBOX button to transfer the report message to the mailbox again.
In the mailbox, click on the SEND button to send the report message to the ATC center.

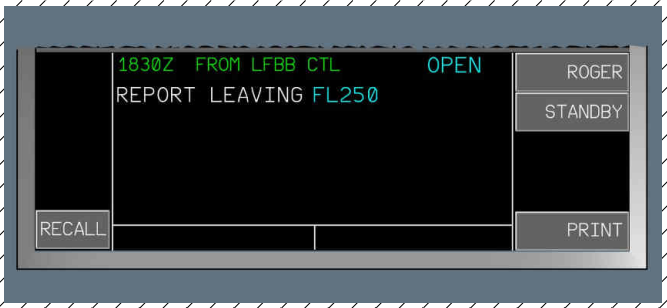


Click on the CLOSE button to remove the message from the mailbox.

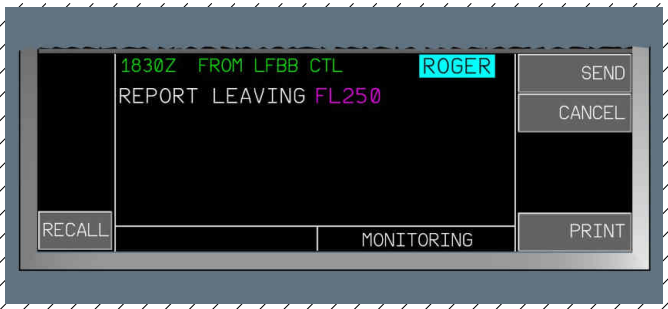
HOW TO MANAGE A REPORT MESSAGE

Applicable to: ALL
Impacted by TDU: 00023313 How to Manage a Report Message

The air traffic controller may require that the flight crew reports back at a later time in flight, for example when reaching a altitude, crossing a point, or when back on route.
The received message is filed in the mailbox and is associated to a visual alert and an aural alert that is not urgent.



Click on the ROGER button in the mailbox. The message status becomes ROGER, and appears in black with a blue background.
The data in the message, displayed first in blue, then appears in magenta, indicating that the condition is being monitored by the FMS. "MONITORING" appears in the Information Message Area of the mailbox.



In the mailbox, click on the SEND button to send the ROGER reply to the ATC center, and click on the CLOSE button to remove the message from the mailbox.



When the condition of the report is met, the FMS sends a reminder to the ATC Datalink Applications System.
Then, the response to the report message is automatically put in the mailbox queue and a visual and aural alerts are triggered. When this message is displayed, "REMINDER" appears in the Information Message Area of the mailbox.



The flight crew can modify the report message before sending it to the ATC center. Click on the MODIFY button in the mailbox to open the REPORT/MODIFY page on the MFD.
Add the changes and click on the XFR TO MAILBOX button to transfer the report message to the mailbox again.
In the mailbox, click on the SEND button to send the report message to the ATC center.

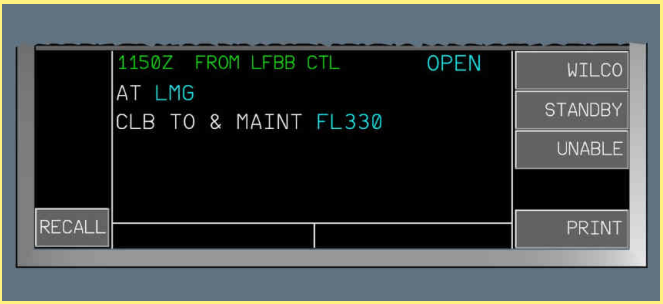


Click on the CLOSE button to remove the message from the mailbox.

HOW TO MANAGE A DEFERRED CLEARANCE MESSAGE

Applicable to: ALL
Impacted DU: 00018549 How to Manage a Deferred Clearance Message

The air traffic controller may send a clearance that is not yet applicable to the flight crew, such as to climb to an altitude when reaching a waypoint.
The received message is filed in the mailbox and is associated to a visual alert and an aural alert that is not urgent.



In the mailbox, click on the WILCO button to accept the clearance. The message status becomes WILCO and appears in black with a blue background.



In the message, the data associated to the clearance becomes magenta, indicating that the FMS is currently monitoring the deferred clearance. This is confirmed by “MONITORING” displayed in the Information Message Area of the mailbox.
Click on the SEND button to send the WILCO reply to the ATC center, and click on the CLOSE button to remove the message from the mailbox.



30 s before the clearance is applicable, the FMS indicates to the ATC Datalink System that the condition to apply the clearance is met.
The clearance message is filed in the mailbox queue and visual and aural alerts are triggered. When the message is displayed, "REMINDER" appears in the Information Message Area of the mailbox.

Note: *ATC MSG pb may not flash and the associated RING aural alert may not sound when the reminder appears in the ATC mailbox.*



Click on the CLOSE button to remove the message from the mailbox.

HOW TO MANAGE A DEFERRED CLEARANCE MESSAGE

Applicable to: ALL
Impacted by TDU: 00023314 How to Manage a Deferred Clearance Message

The air traffic controller may send a clearance that is not yet applicable to the flight crew, such as to climb to an altitude when reaching a waypoint.
The received message is filed in the mailbox and is associated to a visual alert and an aural alert that is not urgent.



In the mailbox, click on the WILCO button to accept the clearance. The message status becomes WILCO and appears in black with a blue background.



In the message, the data associated to the clearance becomes magenta, indicating that the FMS is currently monitoring the deferred clearance. This is confirmed by "MONITORING" displayed in the Information Message Area of the mailbox.
Click on the SEND button to send the WILCO reply to the ATC center, and click on the CLOSE button to remove the message from the mailbox.



30 s before the clearance is applicable, the FMS indicates to the ATC Datalink System that the condition to apply the clearance is met.
The clearance message is filed in the mailbox queue and visual and aural alerts are triggered. When the message is displayed, "REMINDER" appears in the Information Message Area of the mailbox.

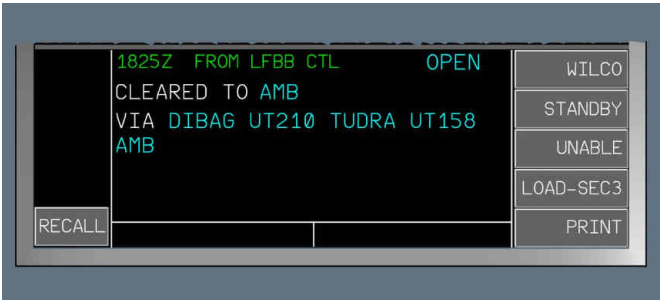


Click on the CLOSE button to remove the message from the mailbox.

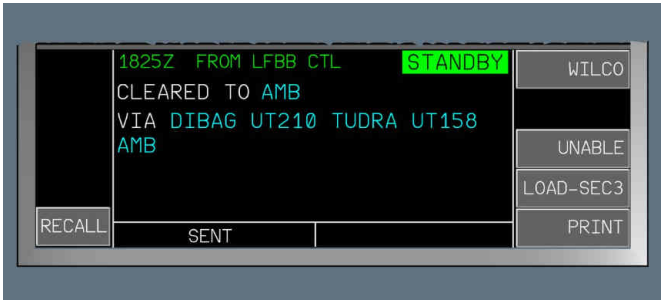
HOW TO MANAGE A LOADABLE MESSAGE

Applicable to: ALL

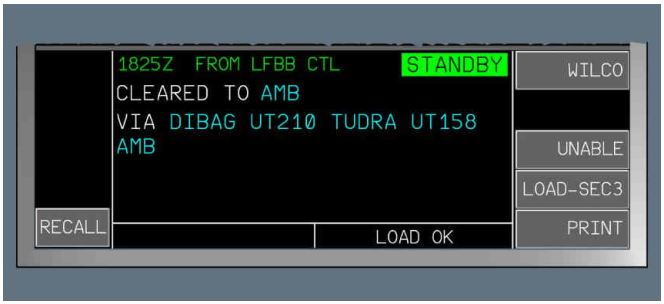
The flight crew can load constraint messages and ATC F-PLN clearances, received from the ATC center, in the third secondary flight plan (SEC3 F-PLN) of the FMS.
The received message is filed in the mailbox and is associated to a visual alert and an aural alert that is not urgent.



It is recommended to send a STANDBY reply to the ATC center to indicate that the final answer will not be immediate. Click on the STANDBY button in the mailbox, then click on the SEND button.



To load the contents of the message in the SEC3 F-PLN of the FMS, click on the LOAD-SEC3 button in the mailbox.
When the load is completed, "LOAD OK" appears in the Information Messages Area of the mailbox.



Access the MFD-FMS secondary F-PLN pages to evaluate the received clearance.
After deciding whether or not to fly this clearance, send the final answer to the ATC center. In the mailbox, click on the WILCO button (to accept) or the UNABLE button (to decline). Then click on the SEND button.



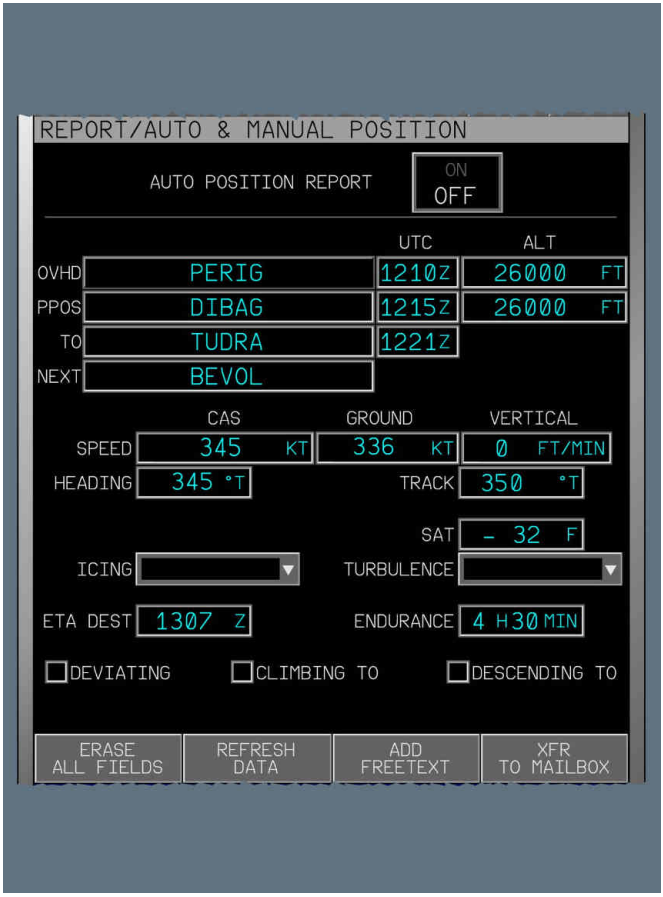
If this route clearance cannot be completely loaded (for instance waypoint not in the FMS database, runway/ILS mismatch,..), access the MFD-FMS secondary F-PLN pages to assess the reasons for the rejected parameters, and take appropriate action.
Finally, click on the CLOSE button to remove the message from the mailbox.

HOW TO USE POSITION REPORT

Applicable to: ALL

AUTOMATIC POSITION REPORT ACTIVATION/DEACTIVATION

Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU.
Click on the REPORT button and select POSITION on the general menu bar of the MFD to open the REPORT/AUTO & MANUAL POSITION page.



To activate the AUTO POSITION REPORT function, set the AUTO POSITION REPORT to ON.
To deactivate the AUTO POSITION REPORT function, set the AUTO POSITION REPORT to OFF.

AUTOMATIC POSITION REPORT

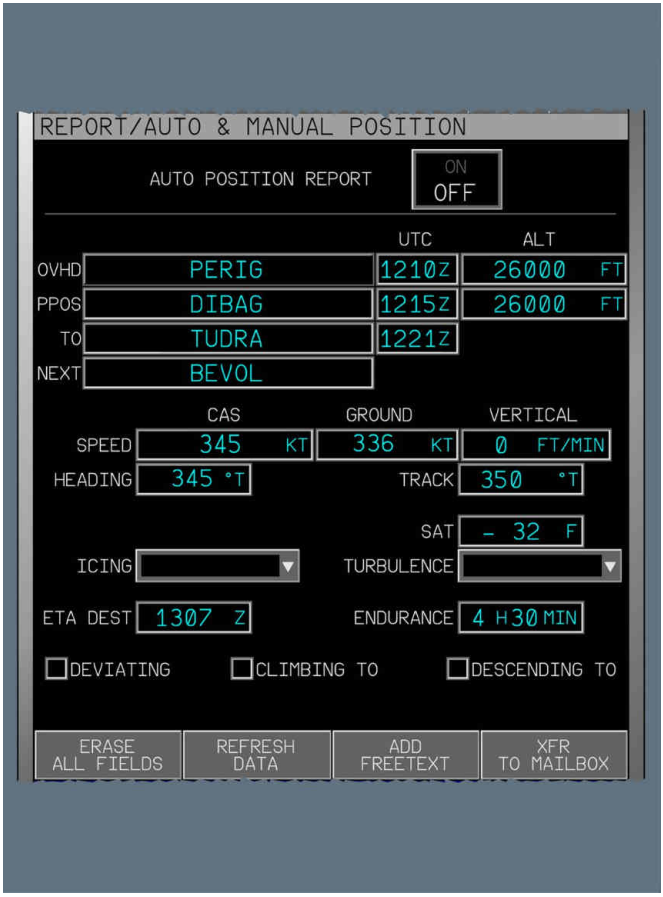
The AUTO POSITION REPORT function is available when the AUTO POSITION REPORT has been set to ON.
Each time a waypoint is sequenced, the automatic report is generated and appears in the mailbox.



The flight crew can modify this report. Click on the MODIFY button in the Mailbox. The REPORT / MESSAGE MODIFY page appears on the MFD.
Add the changes and click on the XFR TO MAILBOX button on the MFD to transfer the message to the mailbox.
In the mailbox, display all the pages of the message and click on the SEND button to send the position report message to the ATC center.
Click on the CLOSE button to remove the message from the mailbox.

MANUAL POSITION REPORT

Select ATC COM on the MFD System Menu or press the ATCCOM key on the KCCU.
Click on the REPORT button and select POSITION on the general menu bar of the MFD to open the REPORT/AUTO & MANUAL POSITION page.



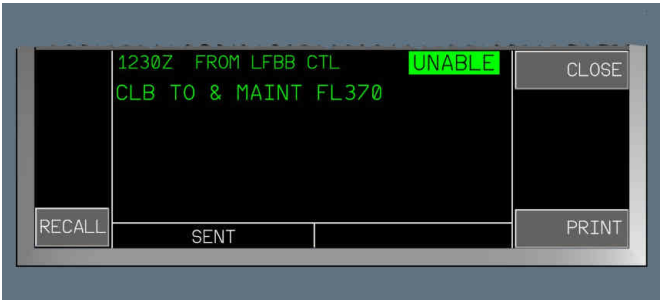
All fields, except ICING, TURBULENCE and ENDURANCE are automatically completed with data from the FMS, but can be modified.
Complete the empty fields and/or modify the fields completed by the FMS.
Click on the XFR TO MAILBOX button on the MFD to transfer the message to the mailbox.



In the mailbox, the flight crew must display all the pages of the message to activate the SEND button.
Then click on the SEND button to send the position report message to the ATC center. Or click on the CANCEL button to cancel the message.
Click on the CLOSE button to remove the message from the mailbox.

HOW TO STORE MESSAGES

Applicable to: ALL



To remove a message from the mailbox when it has been processed, click on the CLOSE button in the mailbox. The message disappears from the mailbox.
It is recommended to remove all processed messages from the mailbox to enable uplink messages to be directly displayed in the mailbox.
Click on the RECALL button to display again the message most recently removed from the mailbox.
All messages removed from the mailbox are recorded and can be reviewed later.
Select ATC COM on the MFD System Menu or press the ATCCOM key on the KCCU.
Click on the MSG RECORD button on the general menu bar of the MFD to open the MSG RECORD/LIST page.



All messages are stored in chronological order with the most recently received at the top.
Click on the ERASE ALL button to erase all the saved messages.
Click on the PRINT ALL button to print all the saved messages.
To display a full message, click on the message. The full message appears on a MSG RECORD/ZOOM page.
In a MSG RECORD/ZOOM page, click on the PRINT button to print the message.
In a MSG RECORD/ZOOM page, click on the RETURN TO LIST button to go back to the list.

HOW TO USE DIGITAL ATIS

Applicable to: ALL

ATIS REQUEST

Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU.
Click on the ATIS button on the general menu bar of the MFD to open the ATIS/LIST page.



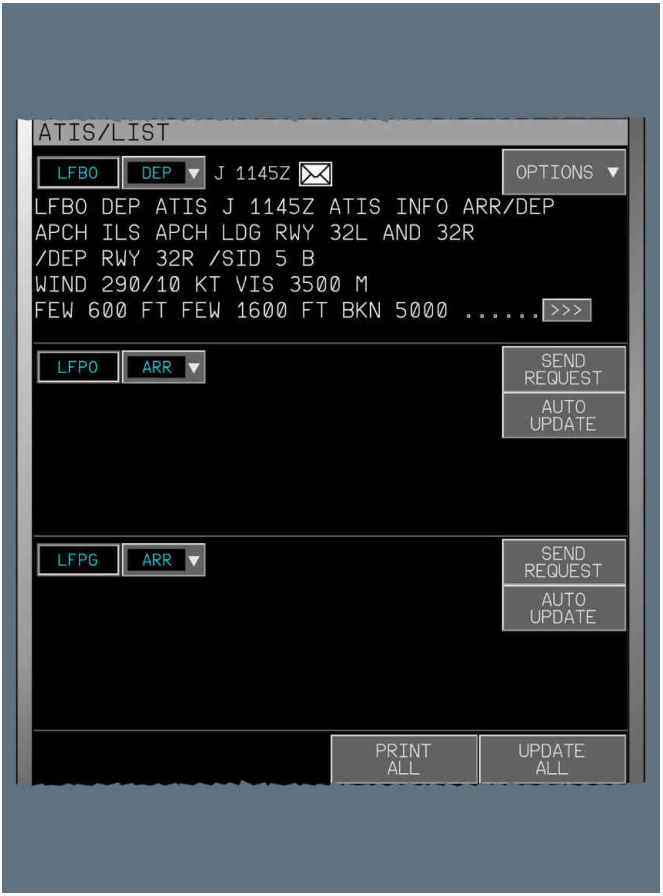
When initially accessing the ATIS/LIST page, the application automatically fills in the three airport names and type of the three ATIS areas with departure, arrival and alternate airport names (whenever they entered in the FMS).

The departure type indicator (DEP) is automatically associated to the departure airport request.
The arrival type indicator (ARR) is automatically associated to the destination and the alternate airport requests.
To make a request for another airport, enter the ICAO code of the airport in one of the three areas.
Click on the SEND REQUEST button to send the ATIS request.
This will send to the ground system a request for an ATIS report. "SENDING" appears on the Message Status / FSM button.
When the ATIS report request is received on ground, "SENT" appears on the Message Status / FSM button.



ATIS RECEPTION

When an ATIS message is received, the  symbol appears in the area from which the request was sent.



When the ATIS message cannot be entirely displayed in the message area, dots appear instead of the last 9 characters. Click on the  button to display the ATIS message entirely on the

ATIS/RECEIVED page. Then click on the RETURN TO LIST button to go back to the ATIS/LIST page.
To print a displayed ATIS message in one area, click on the OPTIONS button and select PRINT.
To print the displayed ATIS messages in the three areas, click on the PRINT ALL button.

ATIS UPDATE

On the ATIS LIST page on the MFD, to request an update of the displayed ATIS, click on the OPTIONS button and select UPDATE. The ATIS update request is sent to the ATC center.
To request an update of the ATIS in the three areas, click on the UPDATE ALL button.

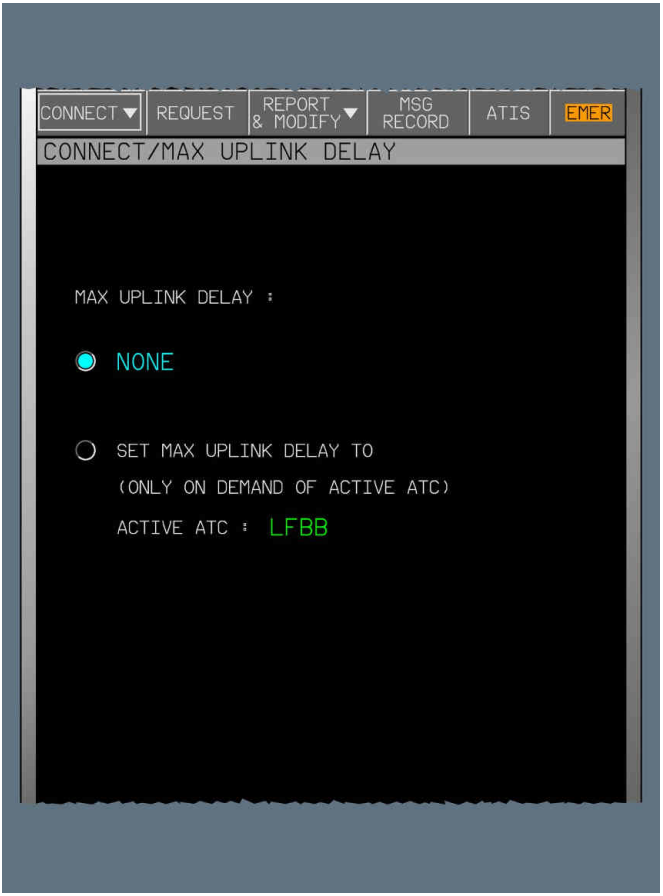
AUTO PRINT FUNCTION

The AUTO PRINT function enables to automatically print the ATIS text when it is received.
To activate the AUTO PRINT function in one area of the ATIS LIST page, click on the OPTIONS button and select AUTO PRINT. The  symbol appears on the area.
To deactivate the AUTO PRINT function in one area, click on the OPTIONS button and select CANCEL AUTO PRINT. The symbol disappears from the area.

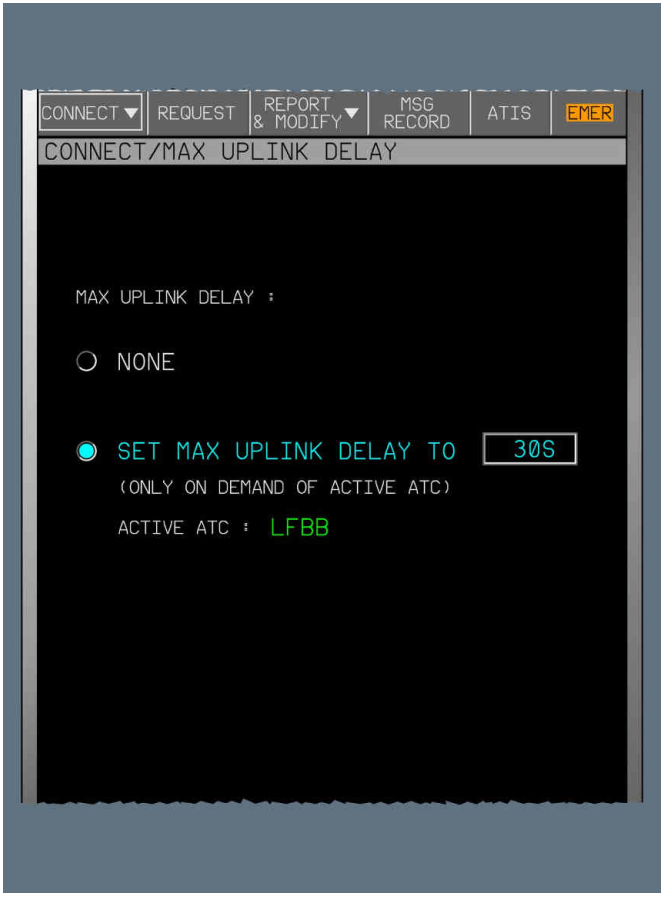
HOW TO SET MAX UPLINK DELAY

Applicable to: ALL

This action must be performed on the air traffic controller's request only.
Select ATC COM on the MFD system menu or press the ATCCOM key on the KCCU.
Click on the CONNECT button on the general menu bar of the MFD and select MAX UPLINK DELAY.



Tick the SET MAX UPLINK DELAY option and enter the delay in seconds.



Note: *This delay applies for the active ATC center only. The value is reset to "NONE" when the connection with the current active ATC center ends.*

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ECAM ALERTS

Applicable to: ALL

COM ADS DATALINK FAULT (*Refer to procedure*)

COM ATC DATALINK FAULT (*Refer to procedure*)

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Overview

OVERVIEW

Applicable to: ALL

The Onboard Information System (OIS) provides tools for the flight crew to operate the aircraft. The OIS includes aircraft technical information, operating manuals, performance computation and mission management information.
The OIS provides information that is similar to the contents of a flight crew's briefcase. The OIS is often related to the Electronic Flight Bag (EFB).

L2 The OIS has the following applications:

- OPS LIBRARY
- T.O PERF
- LDG PERF
- IN-FLT PERF
- LOADSHEET (Weight And Balance)
- FLT FOLDER (Electronic Flight Folder)
- NAV CHARTS (Navigation Charts)
- AOC (Company Communication)
- ELOGBOOK (Electronic Logbook).

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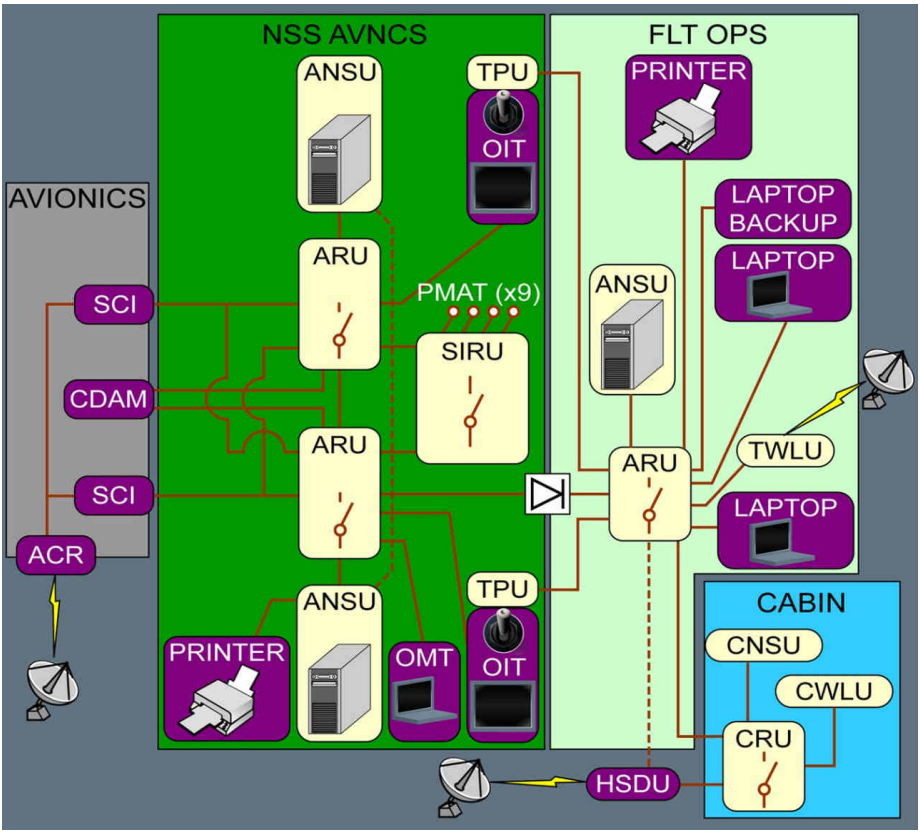
Architecture

ARCHITECTURE

Applicable to: ALL

L3 The OIS is installed on the Network Server System (NSS).



The OIS is installed on the Network Server System (NSS).

L1 The NSS has two sides: The NSS AVNCS side and the FLT OPS side.
The flight crew can select the side to be displayed on the Onboard Information Terminal (OIT) screen via the OIT SIDE sw.

L2 Two-way communication between the NSS AVNCS side and the aircraft avionics system is possible via the Secure Communication Interface (SCI).
One-way communication from the NSS AVNCS side to the FLT OPS side is possible via a diode.
As a result, information can only flow from the NSS AVNCS side to the FLT OPS side, or from the Avionics to the FLT OPS side, via the NSS AVNCS side.

L1 On the NSS AVNCS side, two servers host the OIS applications.
On the FLT OPS side, the laptops in the cockpit host the OIS applications.

NSS AVNCS

L2 The NSS AVNCS side has:
- One printer located on the center pedestal in the cockpit
- Two Aircraft Network Server Unit (ANSU) that host flight crew and maintenance applications
- Two Aircraft Router Units (ARUs) that enable connection between the various components of the NSS AVNCS side
- One Onboard Maintenance Terminal (OMT) that enables the maintenance personnel to access the servers

L3 - A dedicated Secure Interface Router Unit (SIRU) with 9 to 12 plugs distributed throughout the aircraft to enable a Portable Maintenance Access Terminal (PMAT) to be connected to the servers.

L1 The NSS AVNCS side hosts the following flight crew applications:
- The AOC application that the flight crew uses to communicate with the airline flight operations department
- The electronic logbook.

The NSS AVNCS side also hosts maintenance applications.

FLT OPS

The FLT OPS side has:
- One printer located on the Captain's lateral console
- Two laptops that are connected to the network
- One backup laptop that is connected to the network
- One Aircraft Network Server Unit (ANSU), that hosts network applications (printing and data communication capabilities)
- One Aircraft Router Unit (ARU), that enables connection between the various components of the FLT OPS side
- One Terminal area Wireless LAN Unit (TWLU), that enables communication on ground.

The FLT OPS side hosts the following flight crew applications:
- The OPS LIBRARY
- The performance applications (T.O PERF, LDG PERF, IN-FLT PERF, LOADSHEET)
- The mission applications (NAV CHARTS, FLT FOLDER).

Note: *It takes 2 minutes to start the ARU at aircraft power-up. The flight crew should not start the three connected laptops until the ARU is operating. Therefore, the flight crew must wait at least 2 minutes after aircraft power-up before starting the three connected laptops.*

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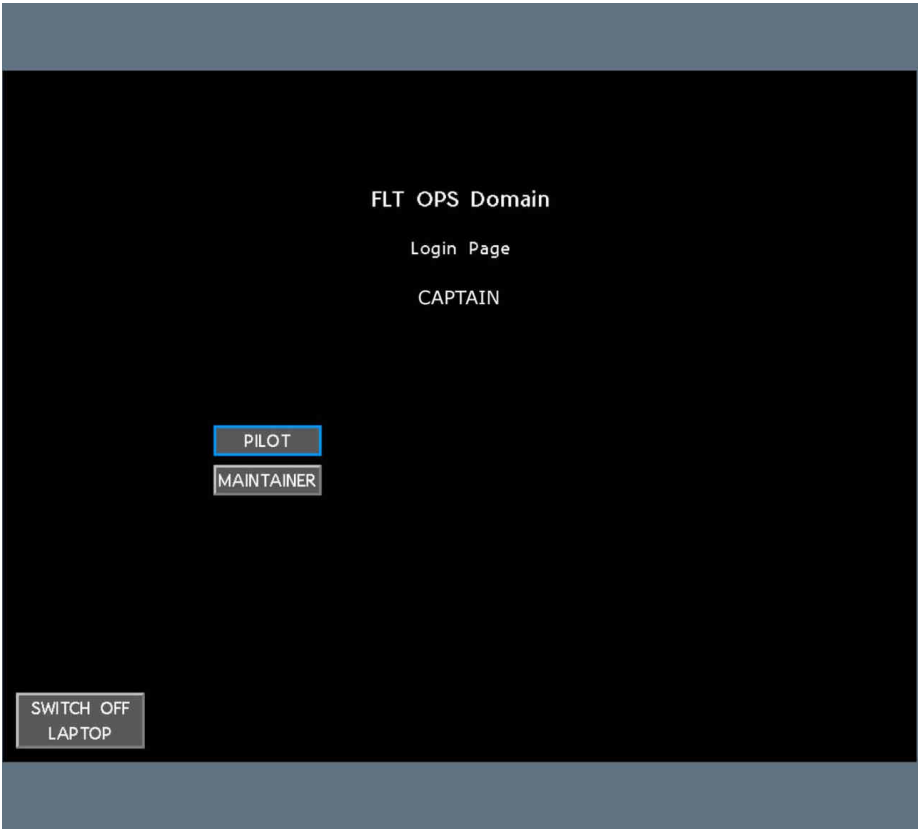
Applications on FLT OPS Side

LOGIN PAGE

Applicable to: ALL

The Login page is the first page that appears after the flight crew turns on the laptop.
The flight crew must click on the PILOT button to log on.

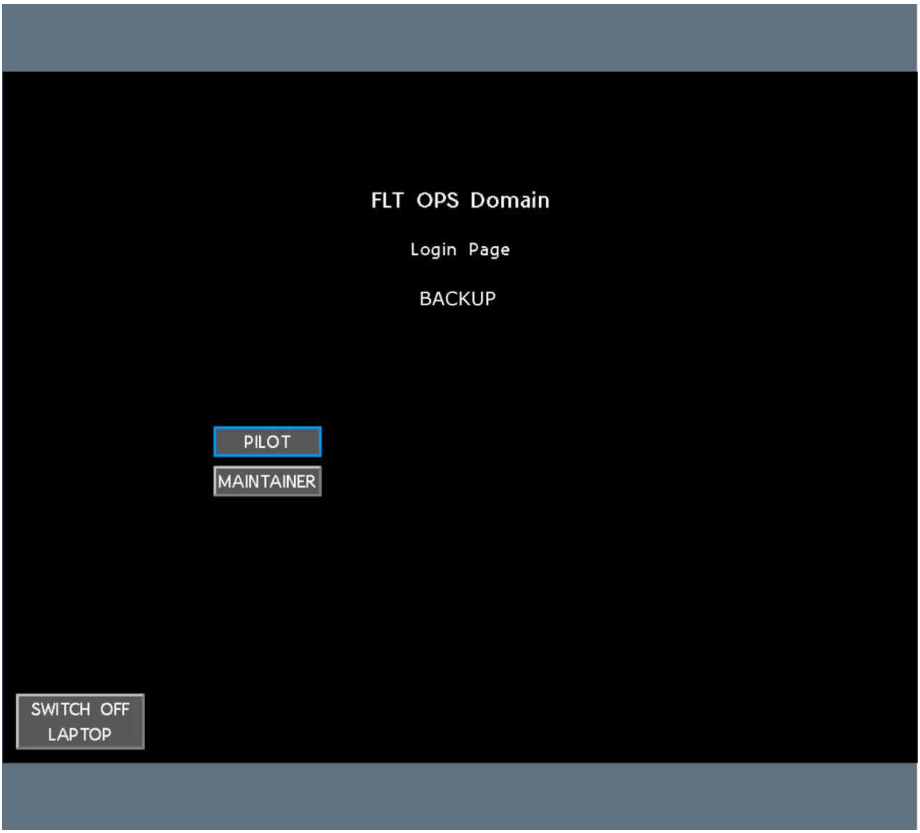
Login Page (Captain's Laptop)



Login Page (First Officer's Laptop)



Login Page (Backup Laptop)



The flight crew should click on the SWITCH OFF LAPTOP button to switch off the laptop.

FLT OPS STS PAGE

Applicable to: ALL

After logon, the FLT OPS STS page automatically starts and appears.

FLT OPS STS Page



The FLT OPS STS page enables the flight crew to:
- Check the following general information:
  - The aircraft registration
  - The Manufacturer Serial Number (MSN)
  - The OIS version.
- Check the navigation charts database validity

  Note: *The navigation charts database validity does not appear until the flight crew starts the NAV CHARTS application.*
- Check or enter the following flight-related information:
  - The flight number (FLT NBR)
  - The departure and destination airports (FROM and TO).

  The OIS synchronizes the FLT OPS STS pages of both OITs: When the flight crew makes a change on one side, the OIS automatically updates the FLT OPS STS page on the other side.

  Note:
  1. *When the flight crew has made a manual entry on the FLT OPS STS page, if they change the parameters in the FMS, the FLT OPS STS page does not automatically retrieve the new parameters.*
     The flight crew must click on the SYNCHRO AVIONICS button on the FLT OPS STS page to retrieve the new FMS parameters.
  2. *When the connection of a laptop to the network is lost, "SYNCHRONIZATION NOT AVAIL" appears on the FLT OPS STS page. When the connection is recovered, the synchronization of the FLT OPS STS page is partially lost between the CAPT and the F/O laptop.*
     In this case, when one flight crewmember makes a manual entry on the FLT OPS STS page of his laptop, the change does not appear on the FLT OPS STS page of the other laptop.
     The flight crew has to restart both laptops to recover the full synchronization on the FLT OPS STS page of both laptops.

FLT OPS MENU PAGE

Applicable to: ALL

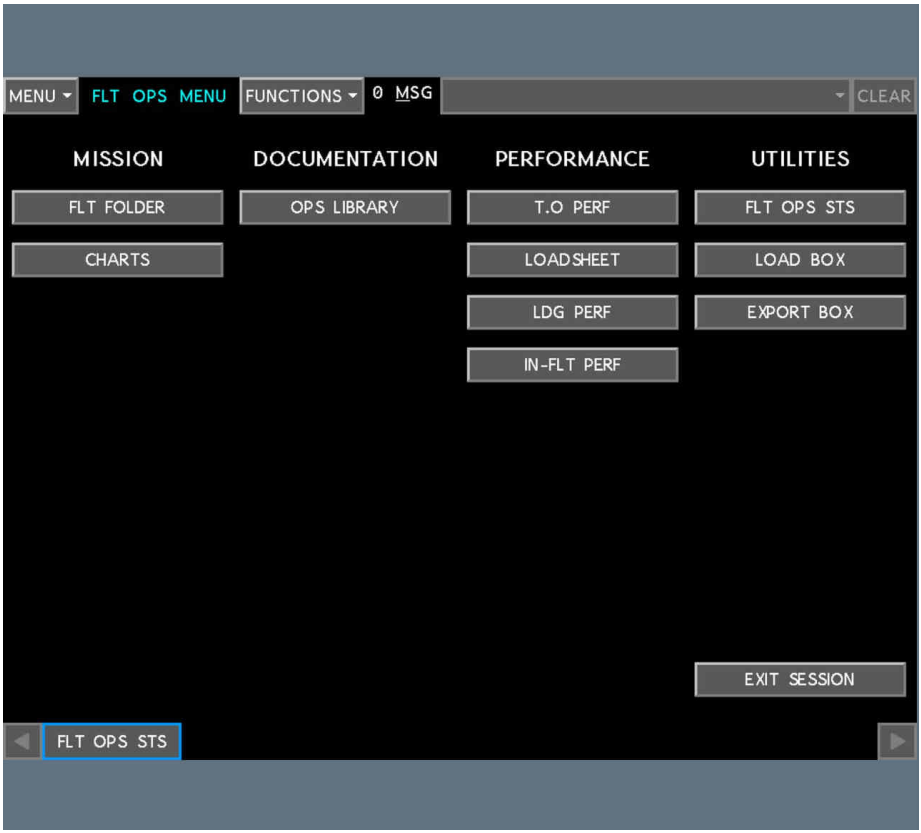
The FLT OPS MENU page enables the flight crew to start the FLT OPS applications.

The flight crew accesses the FLT OPS MENU page by:

- Clicking on the MENU button and selecting FLT OPS MENU, or
- Pressing the 

key on the keyboard, or on the ACD.

FLT OPS MENU Page



LOAD BOX / EXPORT BOX

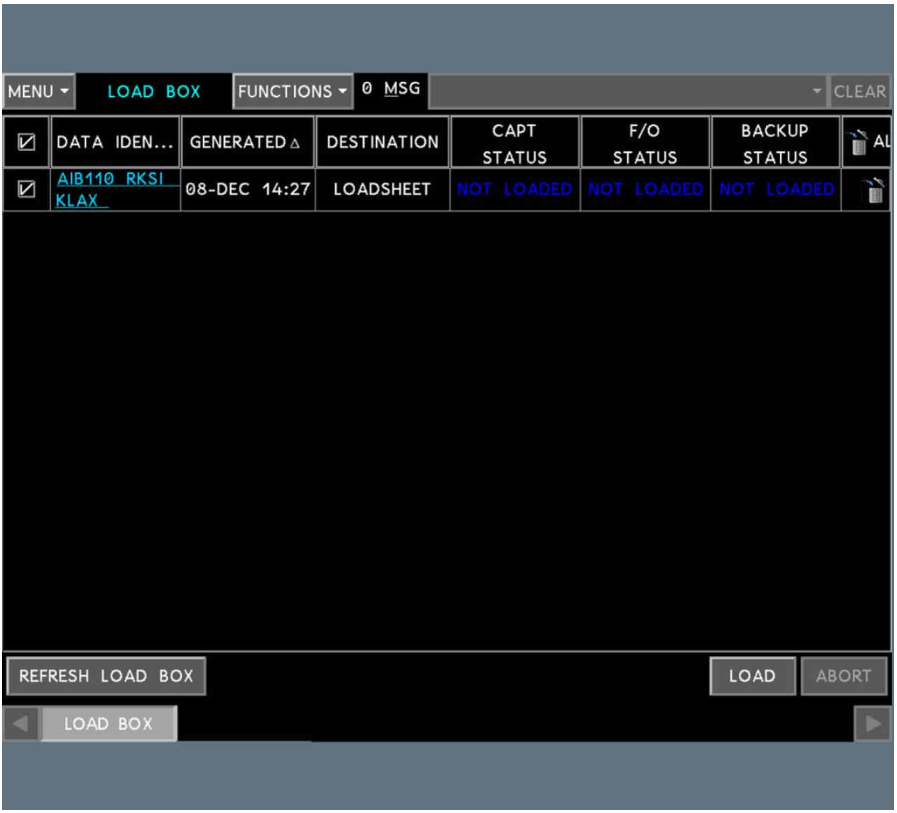
Applicable to: ALL

LOAD BOX

The flight crew uses the LOAD BOX to load data on the laptop (e.g. manual updates, performance data updates, Electronic Flight Folder (EFF)).
The data transfer between the aircraft and the ground can be performed either by a physical device, (e.g. USB device) or by wireless communication (gatelink, SATCOM).
When the flight crew performs data loading from the LOAD BOX on one laptop, data is loaded on all laptops that are connected to the network.

Note:
- *To transfer data to the laptop using a USB device, the flight crew inserts the USB device and presses the REFRESH LOAD BOX button on the LOAD BOX*
- *The flight crew must not use two USB devices at the same time on the same laptop.*

LOAD BOX



OPS LIBRARY

Applicable to: ALL

The OPS LIBRARY application is available on the FLT OPS side and enables the flight crew to access:

- The Flight Crew Operating Manual (FCOM)
- The Flight Crew Training Manual (FCTM)
- The Cabin Crew Operating Manual (CCOM)
- The Minimum Equipment List (MEL)
- The Configuration Deviation List (CDL)

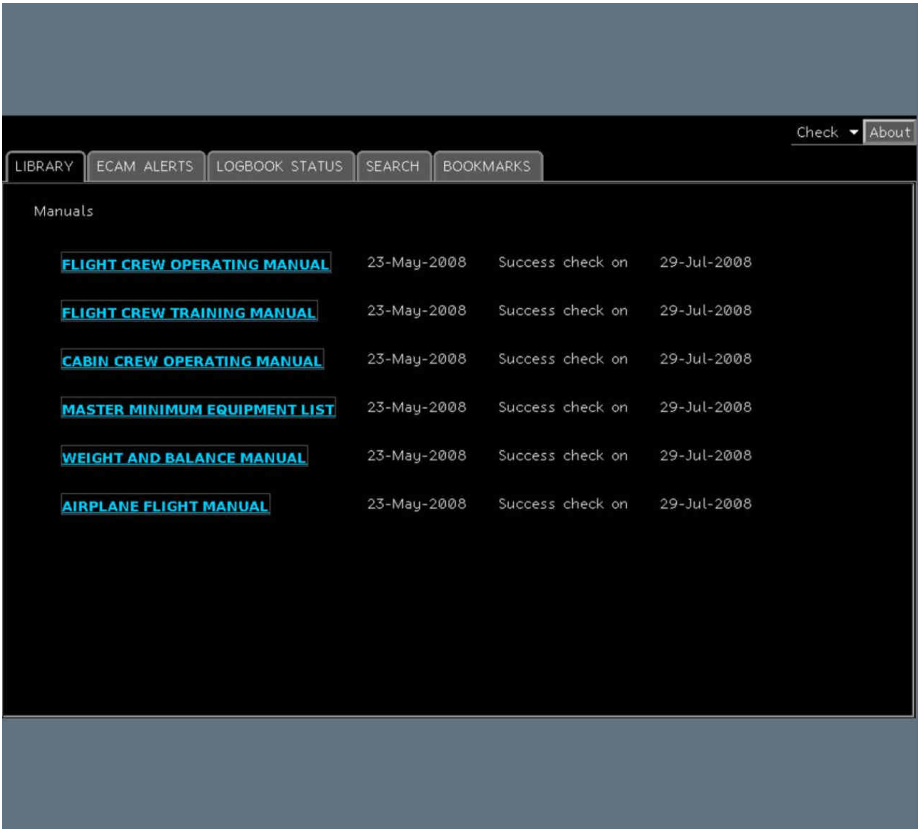
- The Weight and Balance Manual (WBM)
- The Aircraft Flight Manual (AFM).

In accordance with the Airlines policy or as requested by National Authorities, the airline can remove or modify any of these manuals, or add a manual.

Note: *1. The Operator may decide to put PDF files in the OPS LIBRARY application. The flight crew must not attempt to print individual pages of the PDF file onboard the aircraft, in order to avoid that the entire file is printed.*

2. When viewing a PDF file, the flight crew should click on the FULL SCREEN button to view the entire screen width, as necessary.

OPS LIBRARY Home Page



PERFORMANCE

Applicable to: ALL

The Performance applications are available on the FLT OPS side and group the following modules:

- T.O PERF
  This application computes takeoff performance data based on aircraft and environmental entries made by the flight crew.
  Refer to PER-TOF-TOI T.O PERF Interface .
- LDG PERF
  This application computes landing performance data for dispatch or in-flight conditions, based on aircraft and environmental entries made by the flight crew.
  Refer to PER-LND-LDI LDG PERF Interface .
- LOADSHEET
  This application computes aircraft loading data.
  Refer to PER-LOD-GEN Loadsheet Application .
- IN-FLT PERF
  This application computes in-flight performance data based on aircraft and environmental entries made by the flight crew.
  Refer to PER-OPD-GEN IN-FLT PERF Application - ATMO Module .

NAV CHARTS

Applicable to: ALL

The NAV CHARTS application enables the flight crew to consult en route and terminal charts on the OIT.

L2 The operator can choose the NAV CHARTS provider between JEPPESEN and LIDO.

L1 EN ROUTE CHARTS

The en route charts are the high and low altitudes navigation charts.

En route charts can be either static or dynamic:

- Static charts : Digital copy of the paper charts
- Dynamic charts : Offer an adjustable level of details, and lookup features for more information about all objects in the chart.
  The dynamic en route charts can automatically adjust with the aircraft position during the flight.

TERMINAL CHARTS

Terminal charts provide the flight crew with airport charts, and have:

- Airport general information
- Airport, taxi and parking facilities
- Departure, arrival and approach procedures.

The flight crew can make a selection of airports from the application database, to enable a quick access to the charts of these airports.
If the FLT OPS STS page is completed, departure and destination airports automatically appear in the selection.

FLT FOLDER

Applicable to: ALL

ELECTRONIC FLIGHT FOLDER (EFF)

The purpose of an Electronic Flight Folder (EFF) is to provide the flight crew with an electronic means to:
- Consult and store documents with mission-related information
- Monitor and log the flight progress
- Send the documents to a ground archiving system.

An EFF is prepared on ground by airline operations and can be loaded on board using an aircraft-ground communication means. The air-ground communication means includes USB devices, gatelink and Satellite Communication (SATCOM).
After the flight, the flight crew sends the EFF to the airline operations for archiving.
An EFF is organized in a tree structure of folders and documents. The structure is customized by each airline administrator, according to the Airline policy.
One specific type of document is the flight plan. The flight plan is based on the computerized flight plan. It enables the flight crew to record the flight progress (time and fuel progress).

FLT FOLDER APPLICATION

The FLT FOLDER application is available on the FLT OPS side, and is the interface for the flight crew to consult EFFs.
The FLT FOLDER application can store information from other applications from the FLT OPS side (performance computations). Therefore, the FLT FOLDER application provides a means to centralize all the mission-related information into one application. This enables quick and easy consultation.
The FLT FOLDER application enables the synchronization of the EFF between the Captain's laptop and the First Officer's laptop.

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Applications on NSS AVNCS Side

NSS AVNCS LOGIN PAGE

Applicable to: ALL

The LOGIN page is the first page that appears when the NSS is started, and when the OIT SIDE sw is set to NSS AVNCS.
The flight crew must click on the Pilot button to log on.

NSS AVNCS Login Page

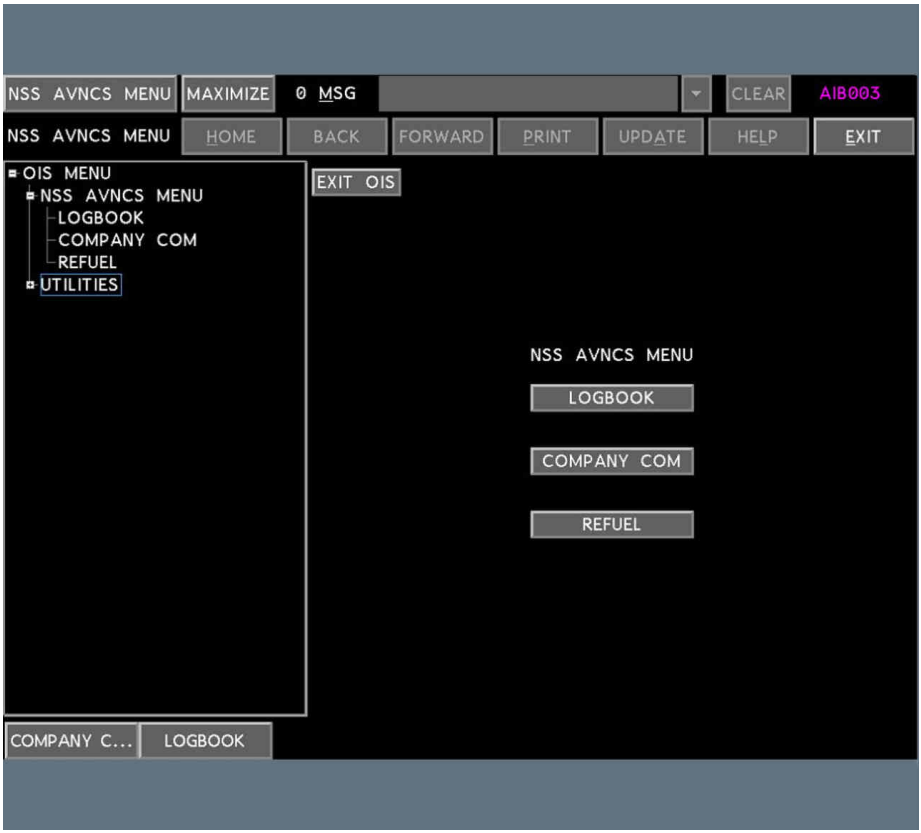


NSS AVNCS MENU PAGE

Applicable to: ALL

After log-on on the NSS AVNCS side, the NSS AVNCS Menu page automatically appears. The NSS AVNCS Menu page enables the flight crew to start NSS AVNCS applications.

NSS AVNCS MENU Page



Note: After log-on, the COMPANY COM and TECHNICAL LOGBOOK applications automatically start.

ELOGBOOK

Applicable to: ALL

The eLogbook application is on the NSS AVNCS side.
The purpose of the eLogbook application is to efficiently manage flight crew and maintenance personnel action, and to optimize the follow-up of the aircraft technical status.
The aircraft logbook information is available in digital format. This format provides standardized reporting means and a direct link to the aircraft information system.

The eLogbook has three domains associated with the three main user profiles:
- Technical logbook, dedicated to the flight crew
- Onboard Maintenance System (OMS) logbook functions, dedicated to maintenance personnel
- Cabin logbook, also called Digital Cabin Logbook (DCL), dedicated to the cabin crew.

The eLogbook data is stored on aircraft in a database hosted by the NSS. This database is duplicated and hosted in a ground station.

TECHNICAL LOGBOOK

Applicable to: ALL

The flight crew can access the technical logbook:

- During flight preparation
  The flight crew must synchronize the eLogbook data with the ground station, to ensure that they have the latest status of the aircraft.

  Then, the flight crew:
  - Checks the status of the aircraft, the maintenance actions and servicing actions reports (if any)
  - Enters the mandatory preflight parameters (if any)
  - Accepts the aircraft.
    When the flight crew has accepted the aircraft, acceptance data is automatically sent to the ground station.

- In flight
  The flight crew can record any defect. If communication between the aircraft and the ground station is available, the flight crew can send defects to the ground station.

L2 As such, the maintenance personnel can anticipate the maintenance action and prepare the spare part in advance.

L1 - In postflight

  After landing, the flight crew:
  - Checks that all necessary entries have been made in the technical logbook
  - Enters the mandatory postflight parameters (if any)
  - Close the flight.
    When the flight is closed, flight data is automatically sent to the ground.

L2 The updating of the technical logbook in the cockpit is performed thanks to the synchronization process.

L1 The technical logbook has four main pages:

- STATUS page
- LOGBOOK ENTRY page
- HISTORY page
- FLIGHT DATA page.

STATUS PAGE

STATUS Page - Aircraft Accepted



The STATUS page provides the flight crew with the following information:

LOGBOOK CONTROL

The logbook control can have two status:

- Control is onboard
  The logbook is controlled from the aircraft: Reading and recording information are authorized for all users working on aircraft database (with technical logbook and OMS logbook functions). The ground personnel cannot make any changes in the eLogbook database of the aircraft. All the displayed information on the OITs is up to date with no need to launch any synchronization process.
- Control is on ground
  The ground personnel has control of the logbook, or the control status is not available due to communication failure: Reading is allowed. Recording information on board is not recommended, because in case of synchronization from ground to board, all data entered onboard will be erased and lost. The displayed information may not be up to date until the synchronization process is initiated.

AIRCRAFT AND FLIGHT INFORMATION DATA

The aircraft and flight information data is:

- The aircraft registration (ACFT REGISTRATION)
- The flight number (FLT NBR)
- The departure and destination airports (FROM and TO)
- The date of flight (DATE).

If the flight crew has already entered the flight information data (except the date of flight) in the FMS, data is automatically transferred from the avionics system and appears when the flight crew starts the technical logbook application.
However, the flight crew can manually enter the flight information data.

TECHNICAL/CABIN ITEMS

The flight crew can access technical and cabin items.

Technical items

- Open items
  Open items are defects that the flight crew recorded during the flight. These items are not yet deferred or fixed. The flight crew cannot delete an open item that is recorded.
  If communication during flight is possible, the flight crew can send open items to the ground, so that the maintenance personnel anticipates the maintenance action and prepares the spare part in advance.
  The maintenance personnel must consider open items
- Deferred items
  Deferred items are items associated to an action or analyse that enables the maintenance personnel to defer them. These items can be MEL items, CDL items or other items.
- Temporary items
  Temporary items are logbook defects that the flight crew recorded and stored in the temporary items list.
  The flight crew can delete or modify temporary items.
  Before the aircraft closure, the flight crew should transfer items they want to record, from the temporary items list to the open items list. Temporary items that are not transferred are deleted when the flight crew closes the flight.

Cabin items

The cabin crew records cabin defects in the DCL. Then, the cabin crew sends to the flight crew some of these defects which have an impact on next dispatch, so that the flight crew can validate them:

- If the flight crew has validated the defect, the defect becomes a technical open item. The cabin crew can consult this item in the DCL.
- If the flight crew has rejected the defect, the defect becomes a cabin item, and appears in the cabin open items list.

ACCEPTANCE

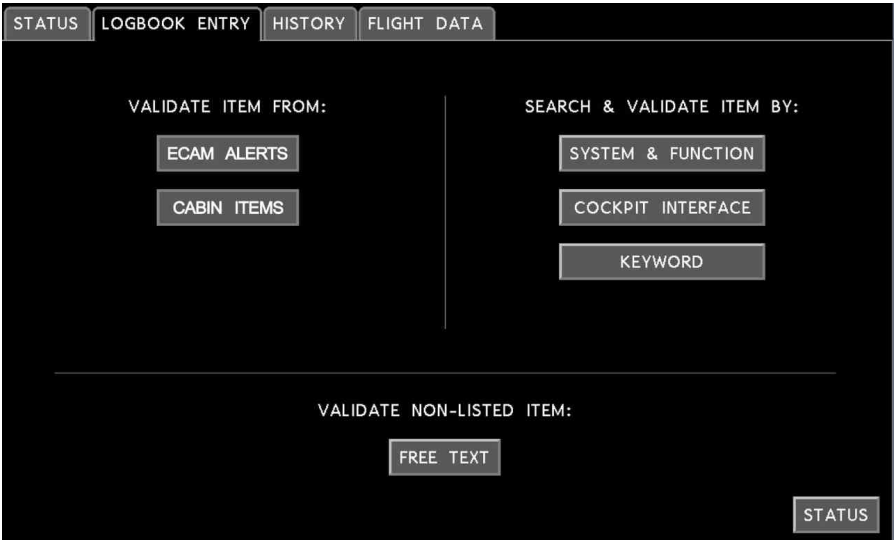
The flight crew can access the maintenance release status and validity, and latest actions that are reported, validated and released through logbook.

This information enables the flight crew to initiate preflight inspections in order to accept the aircraft:

- See maintenance release content
- Check the whole deferred defects list
- See other reports such as Serviced report or Regular checks (Daily, Weekly, Transit...)
- Make walk-around in order to detect potential other defects.

LOGBOOK ENTRY PAGE

LOGBOOK ENTRY Page



The LOGBOOK ENTRY page enables the flight crew to record a defect in the logbook, when a failure is detected.

The technical logbook provides several assistants to record a defect:

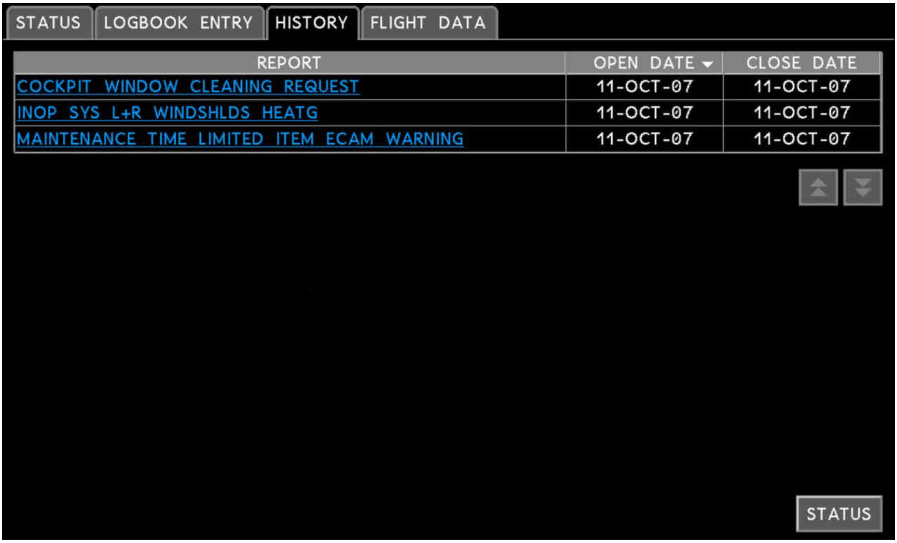
- ECAM ALERTS assistant
  The ECAM ALERTS assistant enables the flight crew to record a defect from the list of ECAM alerts that appeared on the EWD during the flight.
- CABIN ITEMS assistant
  The CABIN ITEMS assistant enables the flight crew to display the list of all defects submitted by the cabin crew for flight crew validation or refusal.
- Standard defects
  The flight crew can record a defect by selecting an item from the standard defects database of the eLogbook. The flight crew can use the SYSTEM & FUNCTION, COCKPIT INTERFACE and KEYWORD assistants to select the item.
- FREE TEXT assistant
  The flight crew can record a free text defect to describe an aircraft failure.

Note: *Free text is an ultimate mean to report a defect, because a free text defect will never be linked to correlation nor documentation and so, dispatch activities around this defect will be longer, even difficult, for maintenance personnel.*

HISTORY PAGE

The HISTORY page enables the flight crew to access all items that have been closed by the maintenance personnel.

HISTORY Page



FLIGHT DATA PAGE

The FLIGHT DATA page enables the flight crew to create a flight data report of the current flight.

Preflight Parameters



AIRCRAFT AND FLIGHT INFORMATION DATA

The aircraft and flight information data is the same as displayed on the STATUS page. *Refer to STATUS PAGE* .

Note: The flight crew can modify the aircraft and flight information data while the aircraft is not accepted. When the flight crew has accepted the aircraft, the flight crew can modify the TO data only.

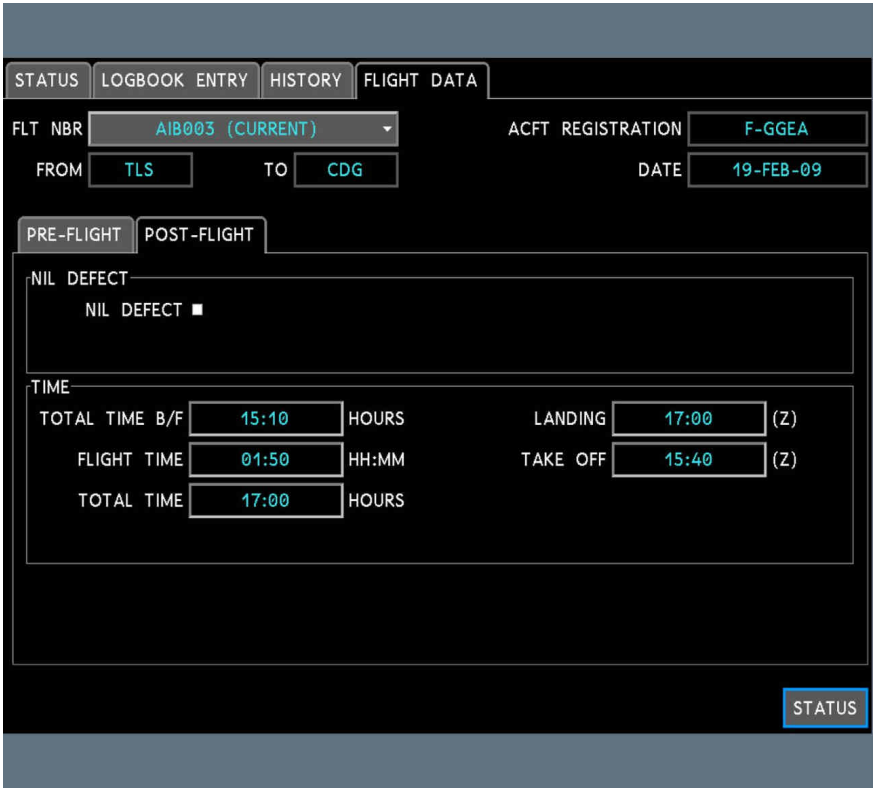
PREFLIGHT DATA

Preflight data is data that the flight crew enters before the departure of the flight.
Some preflight data is mandatory (indicated by amber boxes when empty). The flight crew must enter mandatory data before the acceptance of the aircraft.

L2 *Note: The Operator can fully customize preflight data.*

L1 **POSTFLIGHT DATA**

Post-Flight Parameters



Postflight data is data that the flight crew enters after the arrival of the flight, and before the aircraft closure.

L2 *Note: The Operator can fully customize postflight data.*

AIRLINE OPERATIONAL CONTROL (AOC)

Applicable to: ALL

The Airline Operational Control (AOC) is available on the NSS AVNCS side, and is also referred as company communication.

L2 The AOC uses the Aircraft Communication Addressing and Reporting System (ACARS) messaging system to transmit AOC messages.

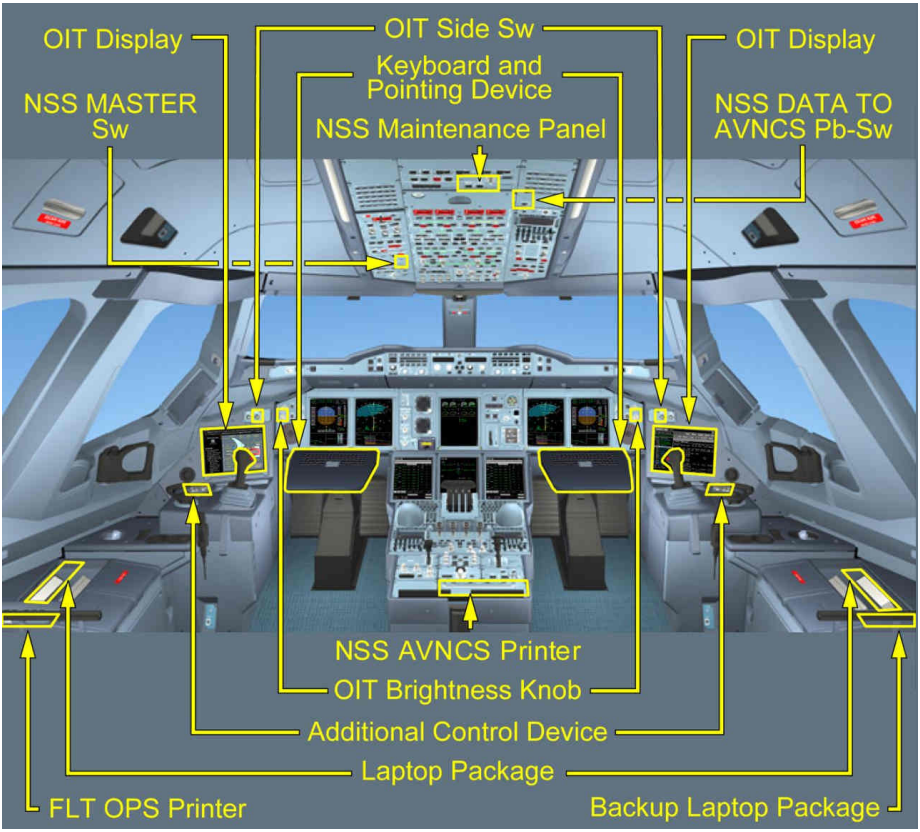
L1 The AOC provides communication functions between the aircraft and the airline ground facilities.

Cockpit View

COCKPIT VIEW

Applicable to: ALL

Cockpit View



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OIT Display

OIT DISPLAY

Applicable to: ALL

The flight crew uses the OIT display to access and display the FLT OPS or the NSS AVNCS applications.

L2 The OIT s enable the flight crew to display:

- The OPS LIBRARY
  Refer to DSC-46-20-20-90 OPS LIBRARY Consultation Page .
- The Performance applications
  Refer to DSC-46-20-20-100 Performance Application Page .
- The FLT FOLDER application
  Refer to DSC-46-20-20-110 FLT FOLDER Page .
- The NAV CHARTS application
- The Technical Logbook application
  Refer to DSC-46-20-20-120 Technical Logbook Page .
- The AOC application.

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OIT SIDE Sw

OIT SIDE SW

Applicable to: ALL

The OIT SIDE sw enable each flight crewmember to display the NSS AVNCS side or the FLT OPS side on their OIT display.



The OIT displays the NSS AVNCS side.



The OIT displays the FLT OPS side.

Note: *The hourglass may appear on the OIT display, when the flight crew switches from the FLT OPS side to the NSS AVNCS side, and vice-versa.*
In this case, the flight crew must click anywhere on the screen to recover the cursor.

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OIT Brightness Knob

OIT BRIGHTNESS KNOB

Applicable to: ALL



Enables each flight crewmember to turn their OIT on or off, and to adjust the brightness of their OIT screen.
When a flight crewmember sets his OIT BRIGHTNESS knob to OFF, the associated OIT, keyboard and pointing device, and Additional Control Device (ACD) are switched off.

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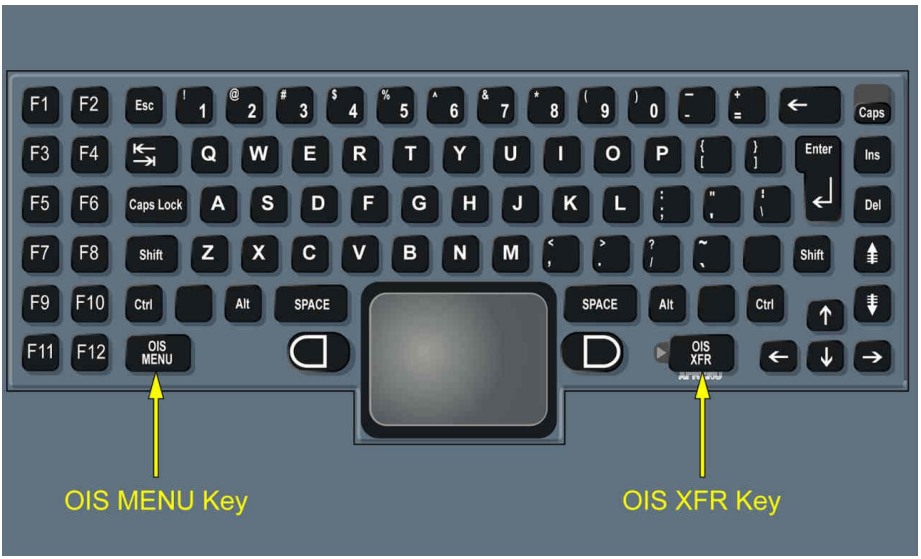
Keyboard and Pointing Device

KEYBOARD AND POINTING DEVICE

Applicable to: ALL

Each flight crewmember can use their keyboard and pointing device that is on the sliding table.

Keyboard and Pointing Device



OIS MENU KEY



On the FLT OPS side, when pressed, the OIT displays the FLT OPS Menu page.

OIS XFR KEY



On the FLT OPS side, when pressed, the OIT displays the current display of the other OIT . *Refer to DSC-46-20-30 X-OIS Function* .

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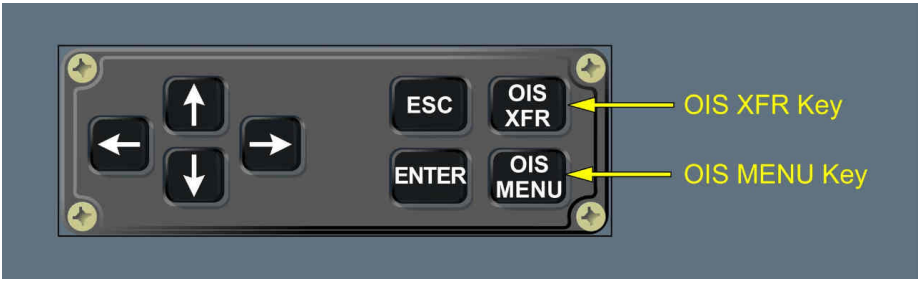
Additional Control Device (ACD)

ADDITIONAL CONTROL DEVICE (ACD)

Applicable to: ALL

Each flight crewmember can use their Additional Control Device (ACD), if their keyboard and pointing device is retracted or not available.

Additional Control Device



OIS XFR KEY



On the FLT OPS side, when pressed, the OIT displays the current display of the other OIT . *Refer to DSC-46-20-30 X-OIS Function* .

OIS MENU KEY



On the FLT OPS side, when pressed, the OIT displays the FLT OPS Menu page.

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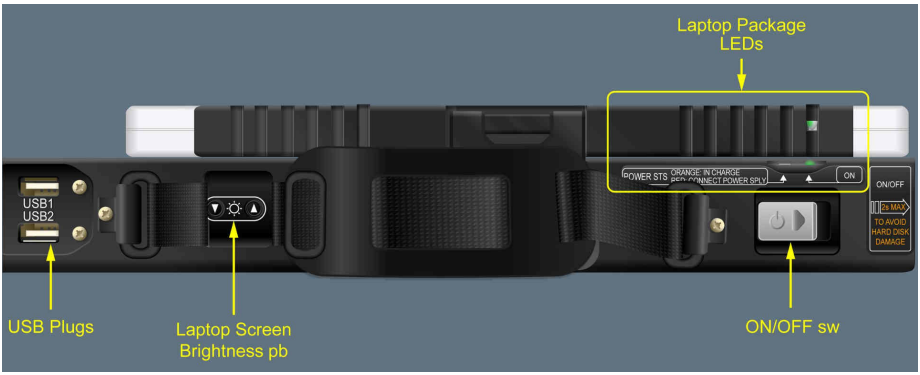
Laptop Package

LAPTOP PACKAGE

Applicable to: ALL



USB PLUGS



Enables the flight crew to plug an USB device, to load or to export data. For more information on the use of the USB plugs, *Refer to DSC-46-20-10-30 LOAD BOX / EXPORT BOX* .

ON/OFF SW

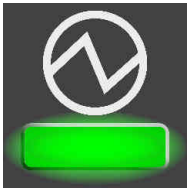


- To turn on the laptop, slide the ON/OFF sw to the right for no more than 2 s.
- To turn off the laptop, slide the ON/OFF sw to the right again for no more than 2 s.

ON LED INDICATION

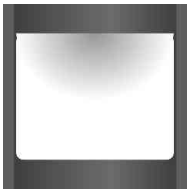


The laptop is off.



The laptop is on.

ON LED MIRROR



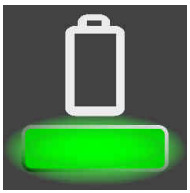
Reflects the indication of the ON LED, and enables the flight crew to see more clearly the ON LED indication, when the laptop is stowed in the package.

PWR STS LED INDICATION



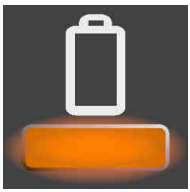
The laptop is either on or off, and is electrically powered by its battery.

L123



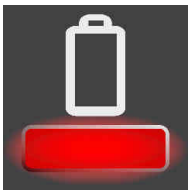
- Steady: The laptop is electrically powered by the aircraft, and the laptop battery is fully charged.
- Flashing: The laptop is on. It is electrically powered by the aircraft and the battery is intentionally not fully charged.
  Due to an internal protection of the laptop, the battery is intentionally discharged to 80%, when the temperature of the laptop is high.

L12



- Steady: The laptop is electrically powered by the aircraft, and the laptop battery is normally on charge.
- Flashing: The laptop is electrically powered by the aircraft, and the charge of the laptop battery is interrupted.

L12



- Steady: The laptop is on, and is electrically powered by its battery. The charge of the laptop battery is low, and the laptop will soon go off.
- Flashing: The laptop is electrically powered by the aircraft, and the laptop battery is faulty or is not charging correctly.

LAPTOP SCREEN BRIGHTNESS PB



When pressed, adjusts the brightness of the laptop screen.

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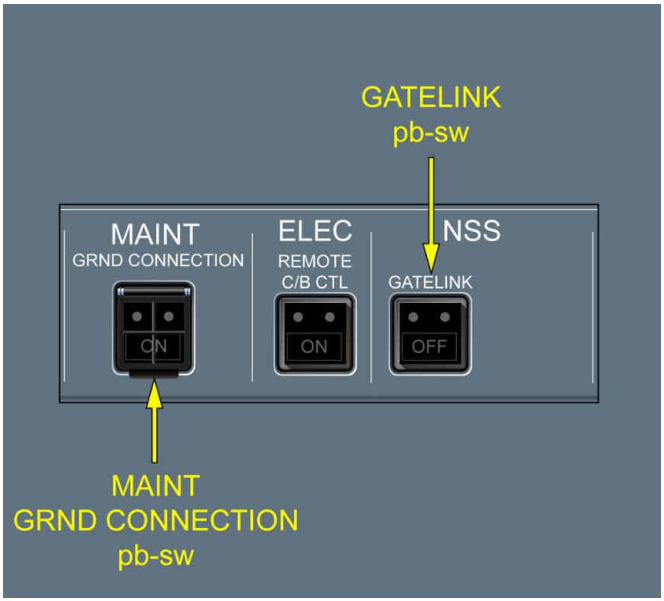
NSS Maintenance Panel

NSS MAINTENANCE PANEL

Applicable to: ALL

NSS Maintenance Panel



MAINT GRND CONNECTION pb-sw



The maintenance personnel cannot connect a PMAT to the NSS AVNCS side via the plugs distributed throughout the aircraft.



The maintenance personnel pressed the MAINT GRND CONNECTION pb-sw .
For maintenance purposes on ground, the maintenance personnel can connect a PMAT to the NSS AVNCS side via the plugs distributed throughout the aircraft.

NSS GATELINK pb-sw



The Terminal Area Wireless LAN Unit (TWLU) is on.
Communication between NSS and ground via gatelink is possible.



The Terminal Area Wireless LAN Unit (TWLU) is off.
Communication between NSS and ground via gatelink is not possible.

NSS DATA TO AVNCS Pb-Sw

NSS DATA TO AVNCS PB-SW

Applicable to: ALL

L12



Communication between the NSS AVNCS side and the aircraft avionics is enabled in both ways.
When pressed, disables communication between the NSS AVNCS side and the aircraft avionics.
The SCIs allow communication only from the aircraft avionics to the NSS AVNCS side.

L12



Communication between the NSS AVNCS side and the aircraft avionics is disabled.
The AOC can no longer send messages to the ground but can still receive some. The logbook communication with the ground is lost.
When pressed, enables communication between the NSS AVNCS side and the aircraft avionics in both ways.

Intentionally left blank

NSS MASTER Sw

NSS MASTER SW

Applicable to: ALL

NSS MASTER sw



Normal operation. No smoke is detected.



Smoke is detected in the NSS.
The SMOKE light remains on, as long as smoke is detected.



All electrical power to the NSS is cut off.



All electrical power to the NSS is cut off, and smoke is detected.

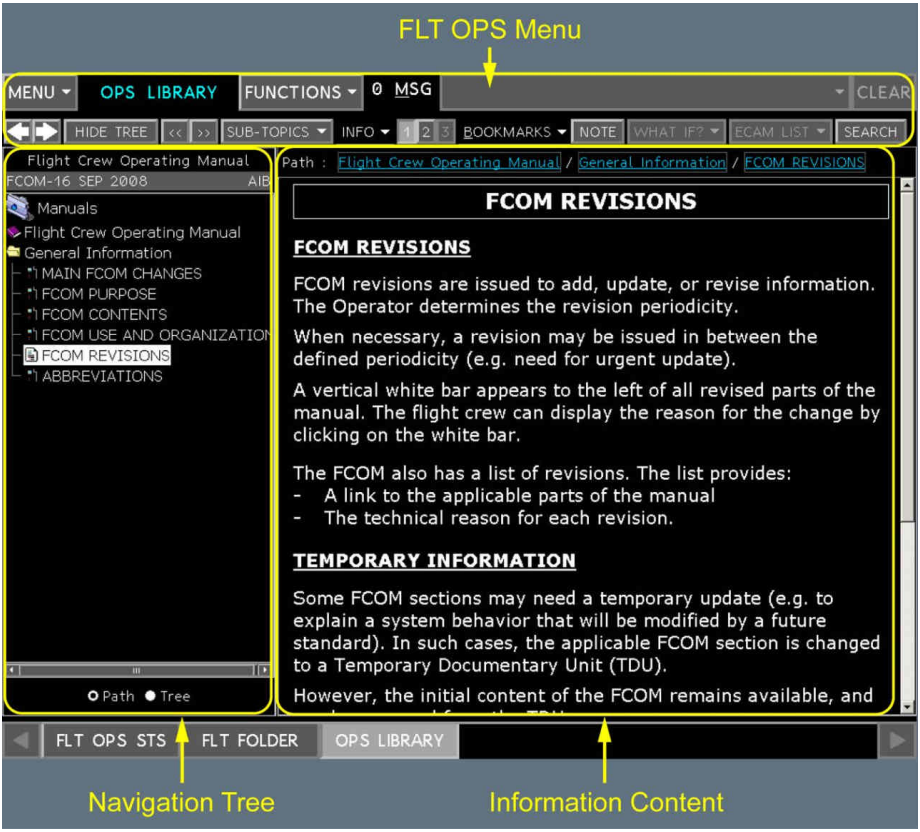
Intentionally left blank

OPS LIBRARY Consultation Page

OPS LIBRARY CONSULTATION PAGE

Applicable to: ALL

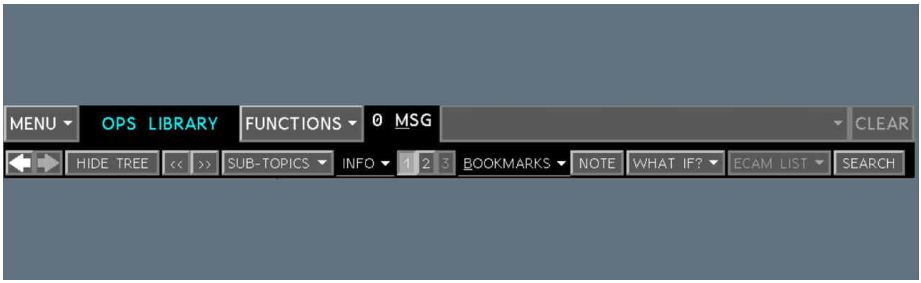
OPS LIBRARY Consultation Page



FLT OPS MENU

Applicable to: ALL

FLT OPS Menu

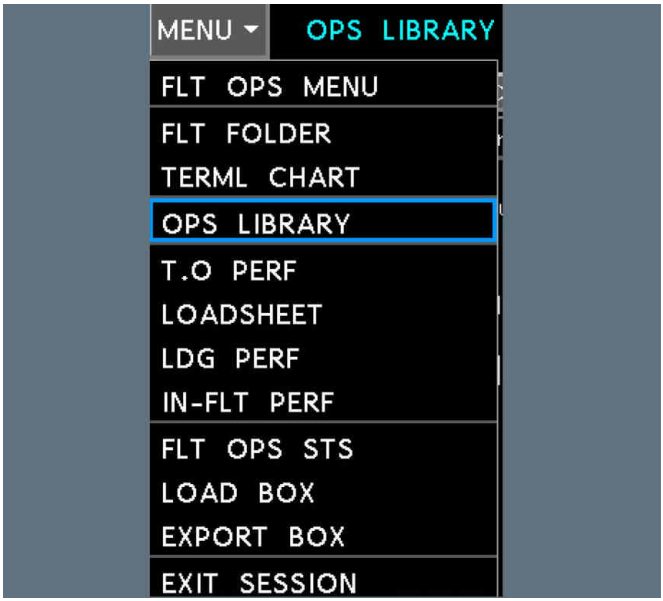


LINE 1



When clicked, displays a drop-down list, that enables to flight crew to access all the applications on the FLT OPS side, and to exit the session.

MENU Drop-Down List





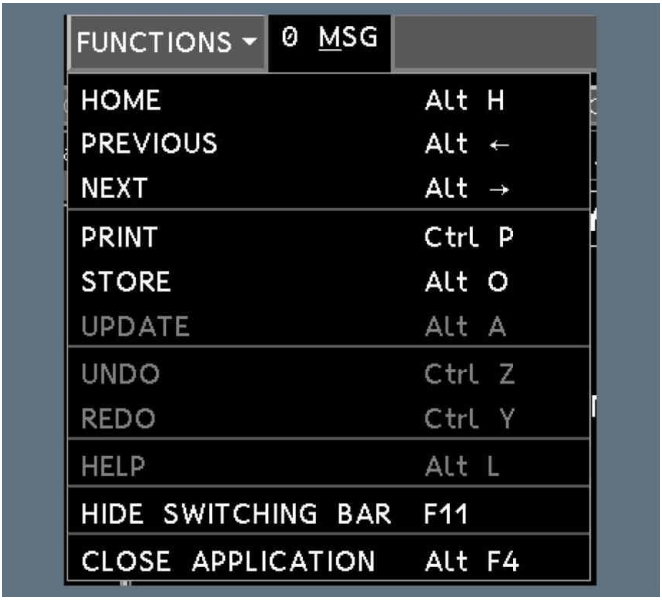
Indicates the active application.

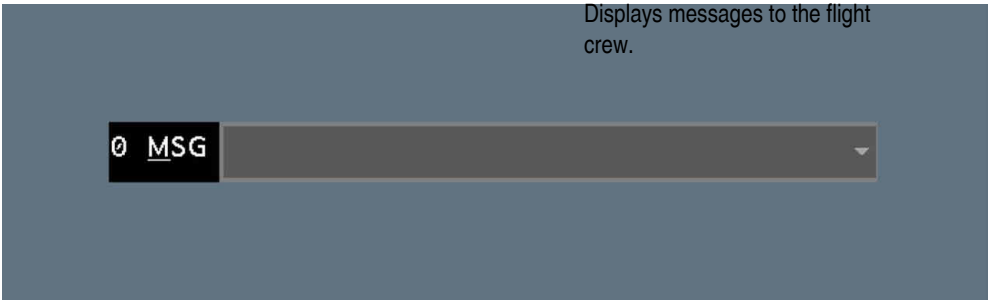


When clicked, displays a drop-down list, that enables the flight crew:

- To display the HOME page of the application, by selecting HOME
- To display the information that was previously displayed, if any, by selecting PREVIOUS
- To display the information that was displayed before the flight crew clicked on the PREVIOUS button, by selecting NEXT
- To print the currently-displayed information, by selecting PRINT
  The Printer for the FLT OPS side is located on the Captain's lateral console.
- To display the manual that is being consulted in full screen, and to hide the navigation tree, by selecting HIDE SWITCHING BAR
- In full screen, to change the display from full screen to normal screen, by selecting SHOW SWITCHING BAR
- To close the application, by selecting CLOSE APPLICATION.

FUNCTIONS Drop-Down List





Displays messages to the flight crew.



When clicked, erases messages that are on the message toolbar.

LINE 2

Appears when the flight crew accesses a manual from the OPS LIBRARY.



When clicked, displays the information that was previously displayed, if any.



When clicked, displays the information that was displayed before the flight crew clicked on the PREVIOUS button.



When clicked, hides the navigation tree.



When clicked, displays the navigation tree in the window, on the left side of the screen.



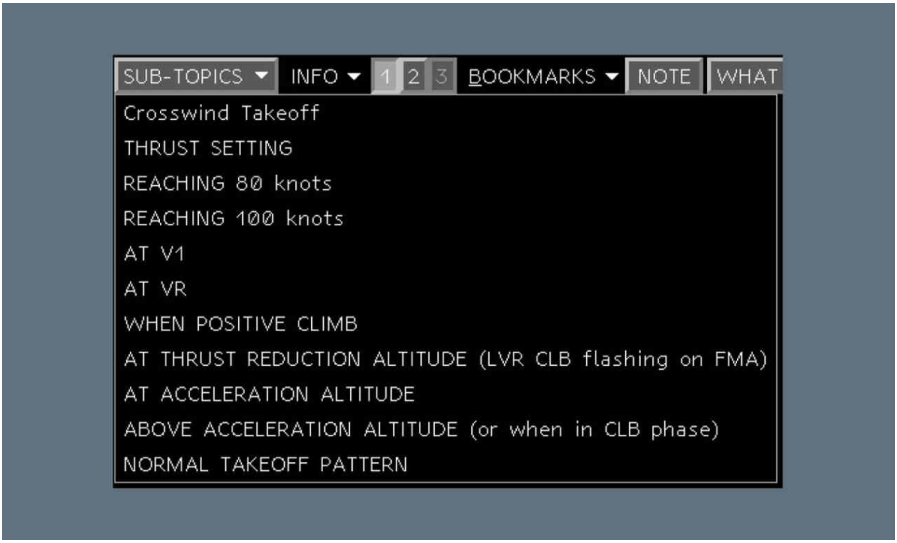
When clicked, displays the preceding information from the cursor position in the navigation tree.



When clicked, displays the following information from the cursor position in the navigation tree.



When clicked, displays a drop-down list, that enables the flight crew to display the different chapters or subchapters of the displayed information, if any.





When clicked, displays a drop-down list that enables the flight crew:
- To expand the applicable conditions or frames (e.g. annunciations), when applicable, by selecting Expand
- To hide the applicable conditions or frames (e.g. annunciations), when applicable, by selecting Collapse
- To display the information reference and the date of release, by selecting DOC REF
  When a Temporary Documentary Unit (TDU) appears, displays also the reason for issue of the TDU .
- To display the revision marks, when applicable, by selecting REV MARKS
- To display the task sharing for the SOP s, by selecting CRM.

INFO Drop-down List





When clicked, displays the selected layers of information. The active buttons indicate the available information layers for the displayed information. For more information, *Refer to How to use Information Layers* .



When clicked, displays a drop-down list, that enables the flight crew:
- To add the displayed information in a list of bookmarks, by selecting ADD TO LIST
- To organize bookmarks by selecting ORGANIZE
- To access the bookmarked information.

For more information, *Refer to How to Use Bookmarks* .

BOOKMARKS Drop-down List





When clicked, displays an area that enables the flight crew to add a note (free text) to the displayed information.



When clicked and when applicable, provides a list of procedures or information that may be related to the information currently displayed. For more information, *Refer to How to Use the What If Function* .



When clicked and when a MMEL item is displayed, displays a drop-down list that provides the ECAM alerts associated with the MMEL item that is displayed.
This drop-down list enables the flight crew to access the ECAM alerts documentary units, in the MMEL Entries chapter of the MMEL .
For more information, *Refer to DSC-46-20-50-10 How to Use the Return to ECAM function* .



When clicked, displays the SEARCH Panel. For more information about the search, *Refer to How to Use the Word Search* .

NAVIGATION TREE

Applicable to: ALL

NAVIGATION TREE

The flight crew uses the navigation tree to rapidly navigate through the manuals from the OPS LIBRARY.

The flight crew can use two modes to display the navigation tree:
- The Path mode, or
- The Tree mode.

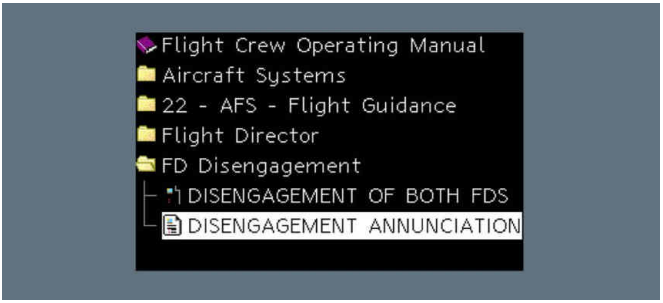
The flight crew can select one of these modes from below the navigation tree.
When the cursor in the navigation tree is on a folder, the contents of the folder appears on the right side of the screen.

PATH MODE



The Path mode provides a filtered structure, displaying only the parent folders of the selection.

The Path mode



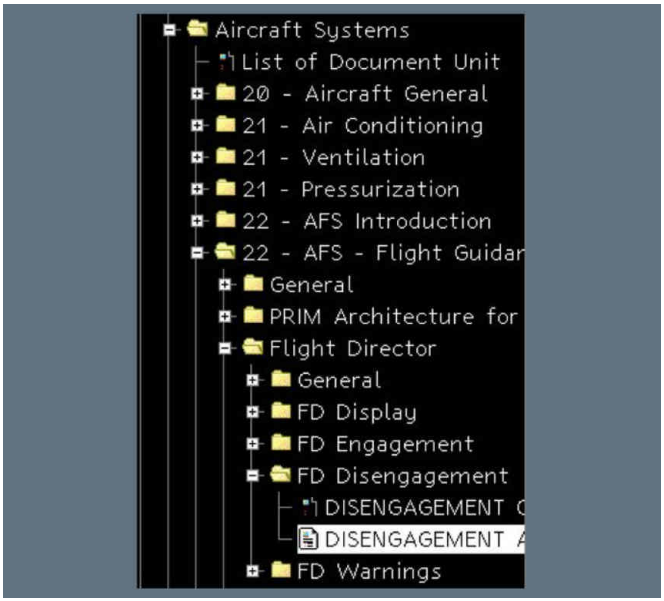
TREE MODE



The Tree mode displays the navigation tree as in a "classic" explorer.

The folders and subfolders are opened by clicking on the  icon and closed by clicking on the  icon.

The Tree Mode



INFORMATION CONTENT

Applicable to: ALL

INFORMATION CONTENT

Information is organized in documentary units.

L2 A documentary unit can include text, illustrations, external objects (audio files, video, pictures) and animated graphics.

Note: *The flight crew cannot watch videos or listen audio files included in a documentary unit, with the onboard OPS LIBRARY.*

When clicking on the 

button and selecting DOC REF, the flight crew can access the reference of the documentary unit, the date of release, and the aircraft effectivity. When consulting a Temporary Documentary Unit (TDU), the reason for issue also appears.

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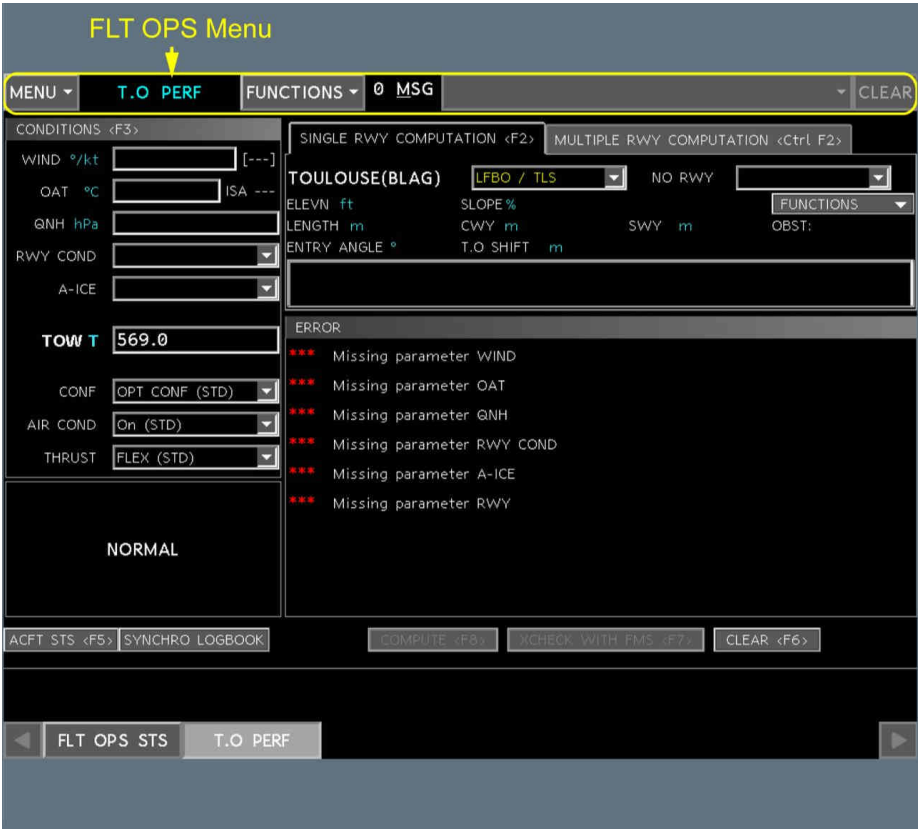
Performance Application Page

PERFORMANCE APPLICATION PAGE

Applicable to: ALL

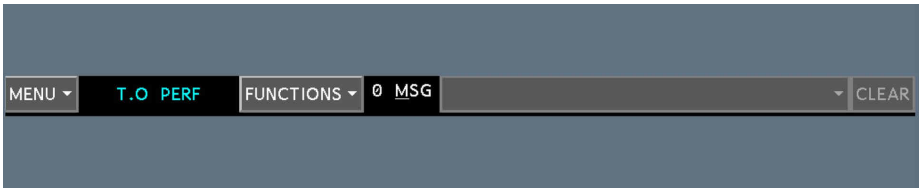
Performance Application Page



FLT OPS MENU

Applicable to: ALL

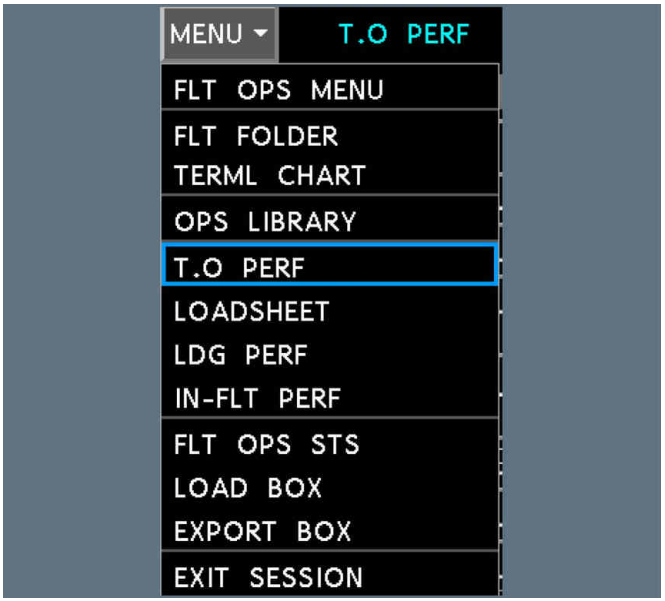
FLT OPS Menu





When clicked, displays a drop-down list, that enables to flight crew to access all the applications on the FLT OPS side, and to exit the session.

MENU Drop-down List





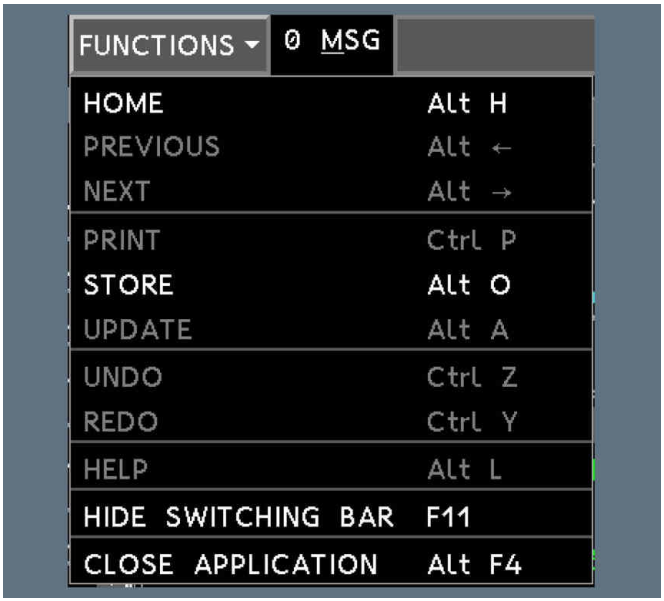
Indicates the active application.

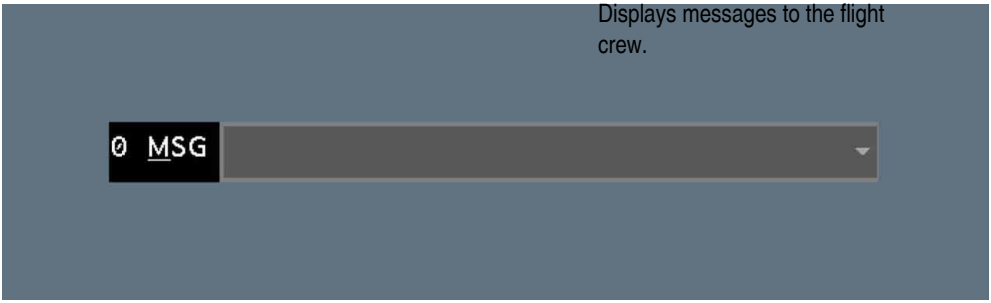


When clicked, displays a drop-down list, that enables the flight crew:

- To display the HOME page of the application, if any, by selecting HOME
- To print the currently-displayed information, by selecting PRINT
  The Printer for the FLT OPS side is located on the Captain's lateral console.
- To copy the displayed performance application page to the EFF, by selecting STORE
- To display the performance application in full screen, by selecting HIDE SWITCHING BAR
- In full screen, to change the display from full screen to normal screen, by selecting SHOW SWITCHING BAR
- To close the application, by selecting CLOSE APPLICATION.

FUNCTIONS Drop-down List







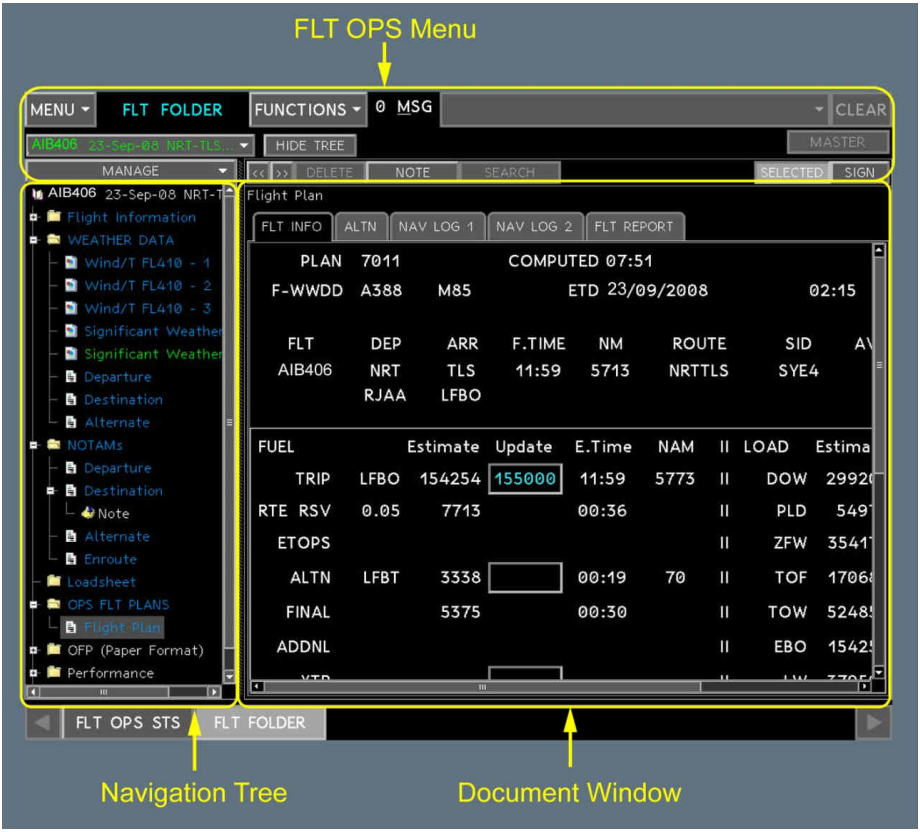
When clicked, erases messages that are on the message toolbar.

FLT FOLDER Page

FLT FOLDER PAGE

Applicable to: ALL

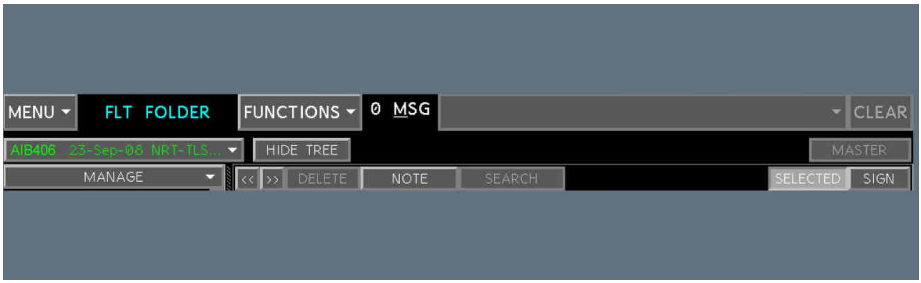
FLT FOLDER Page



FLT OPS MENU

Applicable to: ALL

FLT OPS Menu

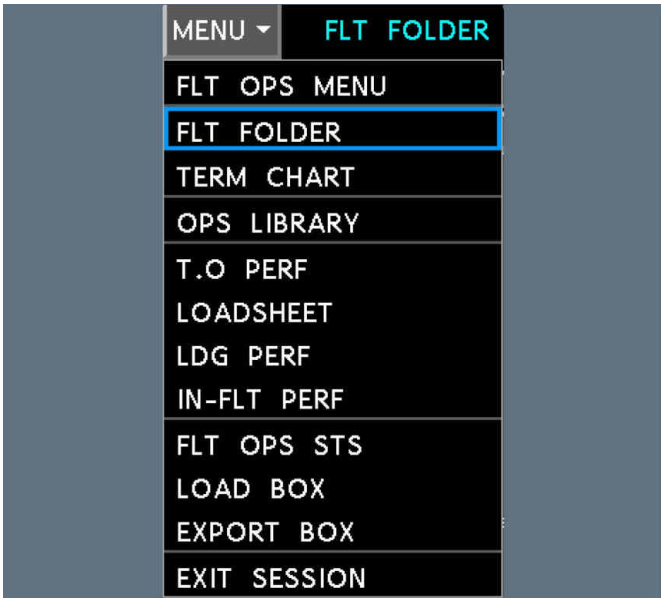


LINE 1



When clicked, displays a drop-down list, that enables to flight crew to access all the applications on the FLT OPS side, and to exit the session.

MENU Drop-Down List





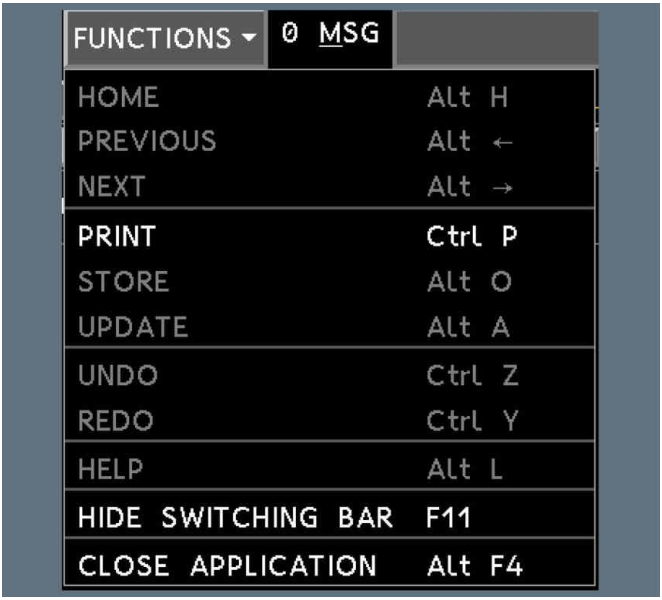
Indicates the active application.

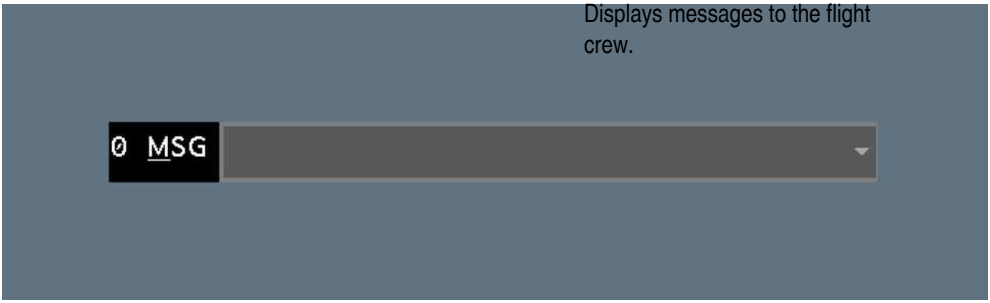


When clicked, displays a drop-down list, that enables the flight crew:

- To print the currently displayed document, by selecting PRINT
  The Printer for the FLT OPS side is located on the Captain's lateral console.
- To display the manual that is being consulted in full screen, and to hide the navigation tree, by selecting HIDE SWITCHING BAR
- In full screen, to change the display from full screen to normal screen, by selecting SHOW SWITCHING BAR
- To close the application, by selecting CLOSE APPLICATION.

FUNCTIONS Drop-Down List





Displays messages to the flight crew.



When clicked, erases messages that are on the message toolbar.

LINE 2



When clicked, displays the list of EFFs that have been imported in the FLT FOLDER application.
When the flight crew selects an EFF in the EFF list, the application asks if the selected EFF must be set as current.

The EFFs are listed according to their identifier:
- Flight Number
- Date of flight
- Departure airport
- Destination airport.



When clicked, hides the navigation tree. The document is then displayed on the full horizontal screen.



When clicked, displays the navigation tree in the window, on the left side of the screen.

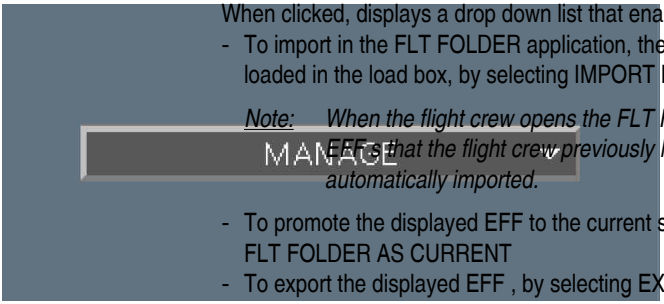


When clicked, the flight crewmember gets the master access for the Flight Follow Up (FFU).
In this case, the other flight crewmember cannot perform the FFU. The flight plan is read only on his laptop.



Indicates that the flight crewmember has the master access for the FFU.

LINE 3

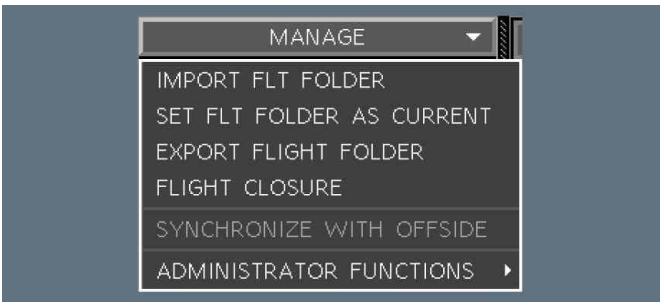


When clicked, displays a drop down list that enables the flight crew:

- To import in the FLT FOLDER application, the EFF that the flight crew loaded in the load box, by selecting IMPORT FLT FOLDER

  Note: When the flight crew opens the FLT FOLDER application, the EFF s that the flight crew previously loaded in the load box are automatically imported.

- To promote the displayed EFF to the current state, by selecting SET FLT FOLDER AS CURRENT
- To export the displayed EFF , by selecting EXPORT FLIGHT FOLDER
- To close the displayed EFF , by selecting FLIGHT CLOSURE
- To synchronize the EFF with the other side, by selecting SYNCHRONIZE WITH OFFSIDE
- To manage the EFF s that are closed, but not exported to the ground, by selecting ADMINISTRATOR FUNCTIONS.





When clicked, displays the preceding document from the cursor position in the navigation tree.



When clicked, displays the following document from the cursor position in the navigation tree.



When clicked, moves the displayed document to the recycle bin.



When clicked, displays a note box that enables the flight crew to add a note (free text) to the displayed document.



When clicked, displays the note associated with the document that is displayed.



When clicked and when a note is displayed, hides the note associated with the document that is displayed.



When clicked, displays an area that enables the flight crew to search for a character string inside a document (*Refer to DSC-46-20-50-30 How to Use Word Search*).

Note: *Word search cannot be performed inside a PDF file.*



When clicked and when the search area is displayed, hides the search area.



When clicked and when relevant, activates the document that is displayed. The SELECT function is only available for the flight plan documents. Activating a flight plan indicates that this flight plan is the applicable one.



When clicked, removes the active status to the document that is activated.



When click, flags the document as signed.



When clicked, removes the signed flag to a document that is signed.



When click, flags the document as checked.



When clicked, removes the checked flag to a document that is checked.



When clicked, refreshes the display of the flight plan with the information of the offside laptop.

NAVIGATION TREE

Applicable to: ALL

The flight crew uses the navigation tree to navigate within an EFF.
When starting the application, the navigation tree displays the current EFF. If no current EFF was selected, it will display the first EFF of the EFF list.

CONTENT

The operator can customize the structure of the EFFs.

However, all EFFs contain the following:
- A root folder, which provides the identifier of the EFF, composed of:
  - The flight number
  - The date of flight
  - The departure airport
  - The Destination airport.
- Subfolders, that contain subfolders and/or documents
- Different types of documents:
  - Text documents

L3 TXT, RTF, PDF, HTML, XML.

L1
  - Graphical documents.

L3 JPEG, PNG, SVG, GIF.

COLOR CODING FOR DOCUMENTS

SIGN CONSTRAINT

Authorities and/or the operator's policy may require the flight crew to sign specific documents in an EFF.
When the flight crewmember signs the document, the document name in the navigation tree turns from blue to green.

CHECK CONSTRAINT

The operator's policy may require the flight crew to check specific documents in an EFF.
When the flight crew checks the document, the document name in the navigation tree turns from blue to green.

NO CONSTRAINT

Documents that do not require a signature or a check appear in white in the navigation tree.

SUMMARY

Color	Indicates
BLUE	Documents that must be signed or checked.
GREEN	Documents that have been flagged as signed or checked.
WHITE	Documents that do not require a signature or a check.

COLOR CODING FOR SUBFOLDERS

The same color code as for document is applied to subfolder names in the navigation tree.

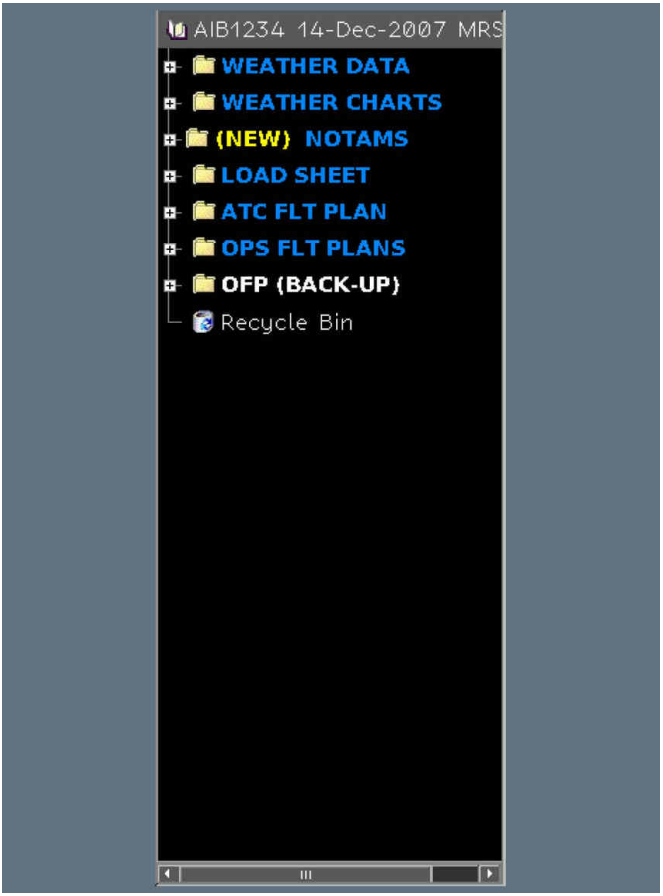
Color	Indicates
BLUE	Subfolders containing one or more documents that must be signed or checked.
GREEN	Subfolders in which all the required actions ('Sign' or 'Check') have been performed.
WHITE	Subfolders with no document that must be signed or checked.

(NEW) INDICATOR

The **(NEW)** indicator before a document name indicates that:
- The document is new
- The flight crew has not read the document.

When the flight crew has read the document, the **(NEW)** indicator is no longer displayed.
If a subfolder contains documents preceded by the **(NEW)** indicator, the **(NEW)** indicator also appears before the subfolder name in the navigation tree. The indicator disappears as soon as the flight crew has read all these documents.

Navigation Tree - (NEW) Indicator



DOCUMENT WINDOW

Applicable to: ALL

When the flight crew selects a subfolder in the navigation tree, the document window displays the list of subfolders and documents inside the selected subfolder.
When the flight crew selects a document in the navigation tree, the document window displays the selected document.

DOCUMENTS TO SIGN

If the flight crew must sign the document that is displayed, the 

button appears on the top right hand corner of the document.



When clicked, flags the document as signed.



Indicates that the document is flagged as signed.
When clicked, flags the document as unsigned.

DOCUMENT TO CHECK

If the flight crew must check the documents that is displayed, the 

button appears on the top right hand corner of the document.



When clicked, flags the document as checked.



Indicates that the document is flagged as checked.
When clicked, flags the document as unchecked.

GRAPHICS

When the displayed document is a graphic, the following buttons appear on the right hand corner of the document window.



When clicked, increases the zoom level on the displayed graphic.



When clicked, decreases the zoom level on the displayed graphic.



When clicked, scrolls the displayed graphic to the left.



When clicked, scrolls the displayed graphic to the right.



When clicked, scrolls the displayed graphic to the bottom.



When clicked, scrolls the displayed graphic to the top.

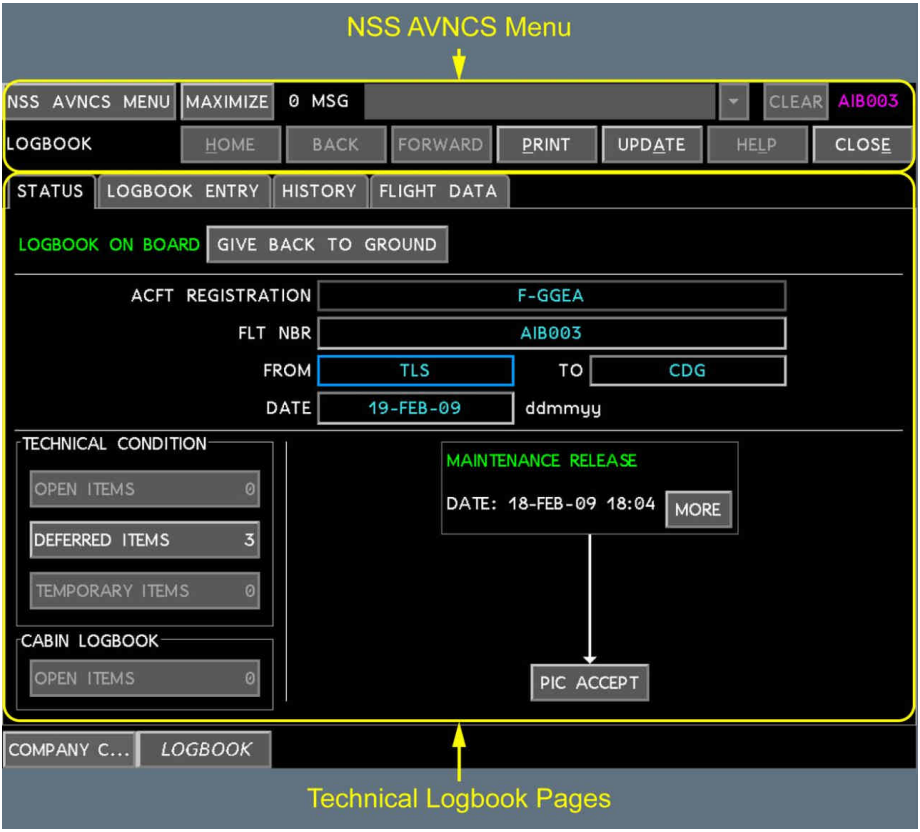
Intentionally left blank

Technical Logbook Pages

TECHNICAL LOGBOOK PAGE

Applicable to: ALL

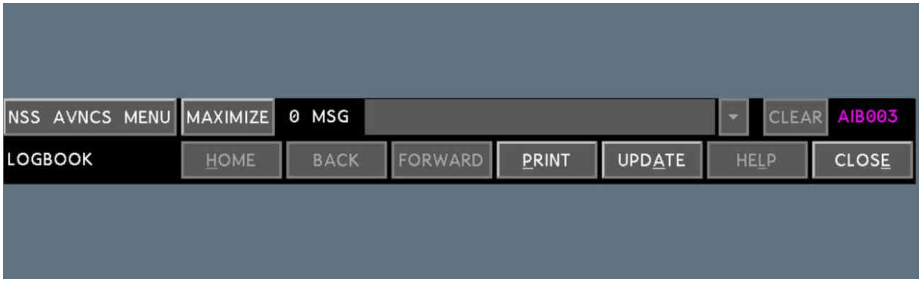
Technical Logbook Page



NSS AVNCS MENU

Applicable to: ALL

NSS AVNCS Menu



LINE 1



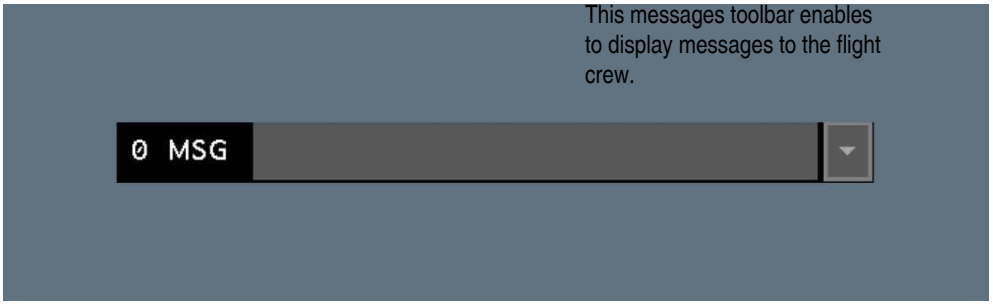
When clicked, displays the NSS AVNCS Menu page.



When clicked, displays the technical logbook application in full screen.



When clicked and when the application is in full screen, changes the display from full screen to normal screen.



This messages toolbar enables to display messages to the flight crew.



When clicked, erases messages that are on the messages toolbar.



Indicates the current flight number.

LINE 2



Indicates the active application.



When clicked, prints the page of the technical logbook that is currently-displayed.
The printer for the NSS AVNCS side is located on the center pedestral console.

Note: *The flight crew can only print the following pages :*
- *The STATUS page*
- *The aircraft acceptance report*
- *The PRE-FLIGHT and POST FLIGHT data panels.*



When clicked, updates the avionics system parameters.



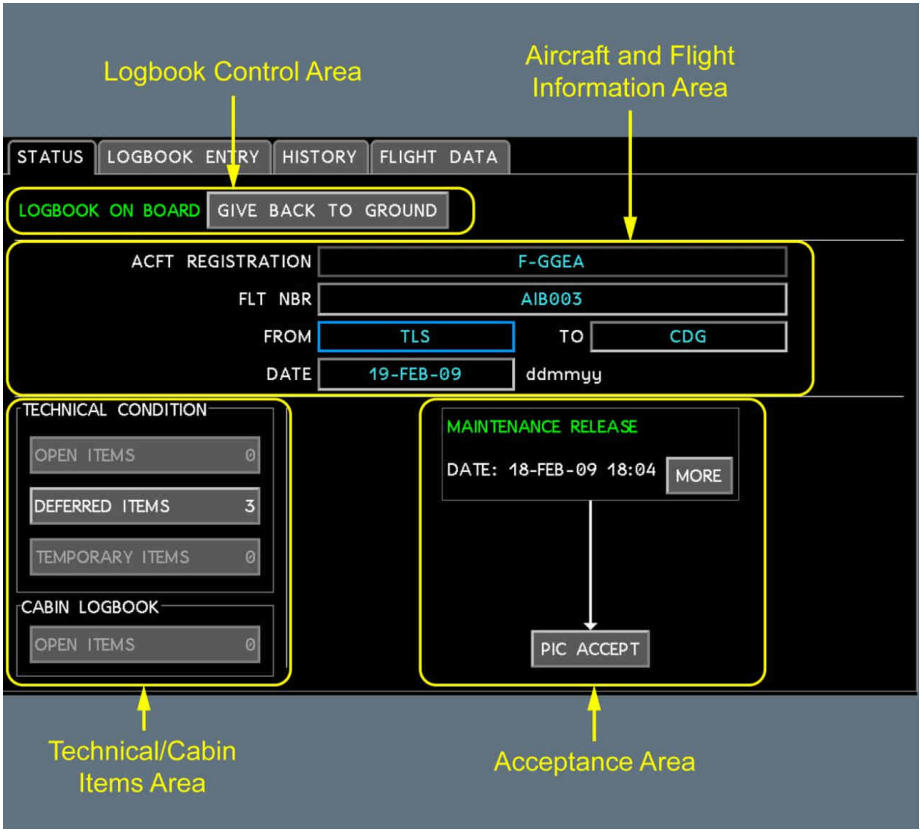
When clicked, closes the active application and displays the NSS AVNCS Menu page.

Note: *The other buttons of line 2 are not active when the flight crew uses the technical logbook application.*

STATUS PAGE

Applicable to: ALL

STATUS Page



LOGBOOK CONTROL AREA

LOGBOOK ON BOARD



LOGBOOK ON BOARD

Indicates that the users onbard the aircraft (flight crew, maintenance personnel) have the control of the logbook.



When clicked, begins synchronization with the ground station. The flight crew has no longer the control of the logbook.

LOGBOOK ON GROUND



LOGBOOK ON GROUND

Indicates that the maintenance personnel on ground has the control of the logbook.
The date and time of the last synchronization with the ground station appears on the right side of the logbook status.



When clicked, begins synchronization with the ground station, and the control status of the logbook becomes onboard if the maintenance personnel on ground has released the logbook.

AIRCRAFT AND FLIGHT INFORMATION AREA

The data of the aircraft and flight information area (except the date of flight) appears in blue if the flight crew manually entered the data, or in magenta when the data comes from the avionics system.

The Aircraft and Flight Information area provides:

- ACFT REGISTRATION
  The aircraft registration.
- FLT NBR
  The flight number.
- FROM
  The departure airport.
- TO
  The destination airport.
- DATE
  The date of flight.

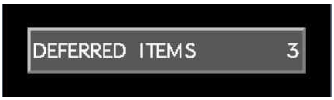
TECHNICAL/CABIN ITEMS AREA

The technical/cabin items area provides a rapid overview of the aircraft condition regarding the existing defect items.
Each button indicates the number of items in the list.

TECHNICAL CONDITION



When clicked, displays the list of open items (2 items).



When clicked, displays the list of deferred items (3 items).



When clicked, displays the list of temporary items (1 item).

CABIN LOGBOOK



When clicked, displays the list of cabin open items (2 items).

ACCEPTANCE AREA

MAINTENANCE RELEASE	Indicates that the maintenance release is valid. The valid maintenance release has the dates of creation and expiration.
MAINTENANCE RELEASE RECEIVED FROM GROUND	Indicates that the maintenance release is valid and received from ground. The valid maintenance release has the dates of creation and expiration.
NO VALID MAINTENANCE RELEASE	Indicates that there is no valid maintenance release.



When clicked, displays the details of release with access to the maintenance release report (See MAINTENANCE RELEASE REPORT).



When clicked, displays the flight acceptance report that enables the Pilot In Command (PIC) to accept the aircraft, thanks to electronic signature. When the aircraft is accepted (i.e. all logbook data sent to the ground, onboard and ground database synchronized and successful acknowledgement received from ground), the "AIRCRAFT ACCEPTED" status appears.



When clicked, displays the flight closure report, that enables the flight crew to close the flight, thanks to electronic signature.

MAINTENANCE RELEASE REPORT

The flight crew accesses the Maintenance Release Report by clicking on the MORE button on the STATUS page.
The maintenance release report has three panels.

REPORTS PANEL

The table on the REPORTS panel provides the defect items closed by the maintenance personnel since the last maintenance release. The table does not include the deferred items.

REPORTS Panel



The REPORTS panel provides for each item:

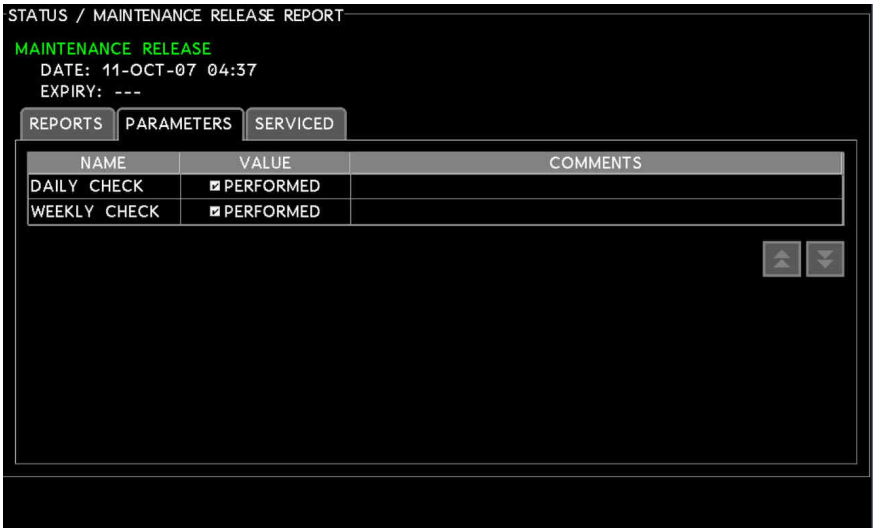
- TITLE
  The title of the item. When the flight crew clicks on the title, the defect record appears.
- OPEN DATE
  The date when the flight crew recorded the defect.

PARAMETERS PANEL

The PARAMETERS table provides actions, that the maintenance personnel performed during the last check of the aircraft. In the COMMENTS column, the maintenance personnel can enter additional information.

Note: *The operator can customize each panel containing specific check list or job cards.*

PARAMETERS Panel

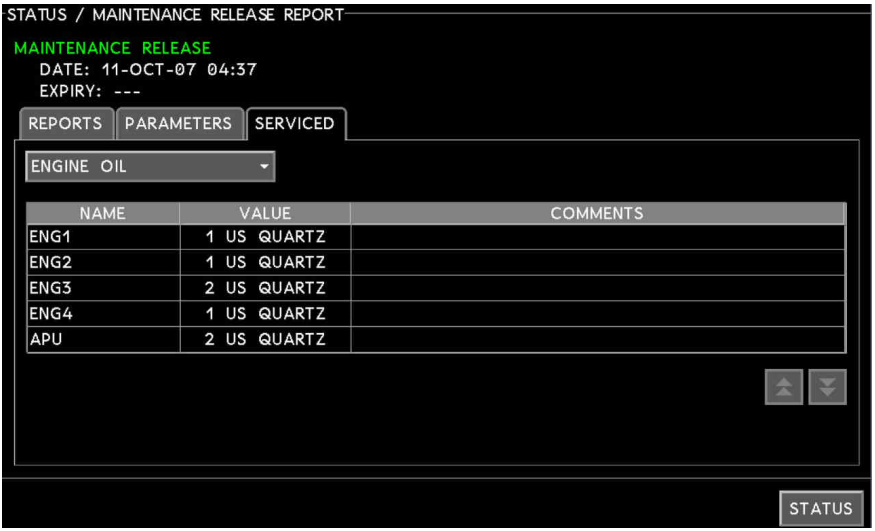


SERVICED PANEL

The SERVICED panel provides a list of parameters associated with servicing procedures, that the maintenance personnel performed.
For each parameter, a table provides the name of the parameter, the values, the units and comments that the maintenance personnel has entered.

Note: *The operator can customize the SERVICED panel content.*

SERVICED Panel



ACTIONS BUTTONS



When clicked, displays the previous page of the table.



When clicked, displays the next page of the table.

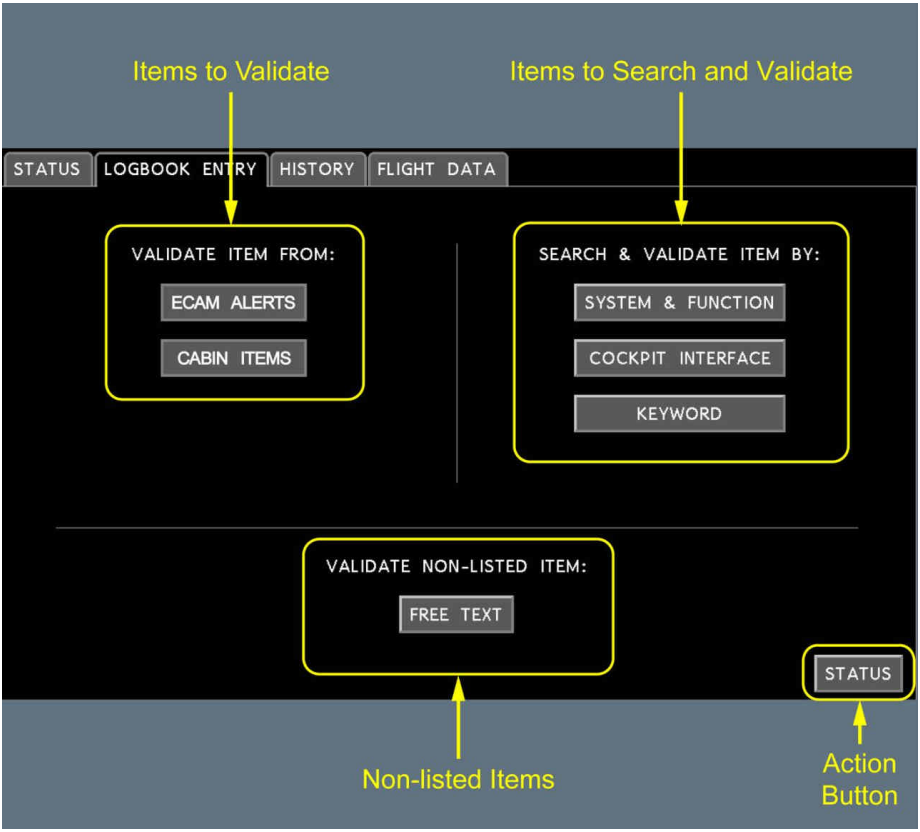


When clicked, returns to the STATUS page.

LOGBOOK ENTRY PAGE

Applicable to: ALL

LOGBOOK ENTRY Page



ITEMS TO VALIDATE



When clicked, displays the list of alerts that appeared on the EWD during the flight.



When clicked, displays the defects items that the cabin crew recorded in the DCL , and submitted to the flight crew for acceptance or refusal.

ITEMS TO SEARCH AND VALIDATE



When clicked, displays a search area that enables the flight crew to record a defect, which belongs to the standard defect database, by selecting:

- The impacted system (e.g. ENGINE)
- Then, the impacted function of the system (e.g. ENG IGNITION)
- Then, the impacted allocation of the function (e.g. INOP SYS).



When clicked, displays a view of the cockpit that enables the flight crew to record a defect, which belongs to the standard defect database, using the cockpit view.



When clicked, displays a search area that enables the flight crew to record a defect, which belongs to the standard defect database, making a word search.

For more information, *Refer to DSC-46-20-50-40 How to Record a Defect in the Logbook* .

NON-LISTED ITEMS



When clicked, displays an area that enables the flight crew to record a free text defect report.

ACTION BUTTON



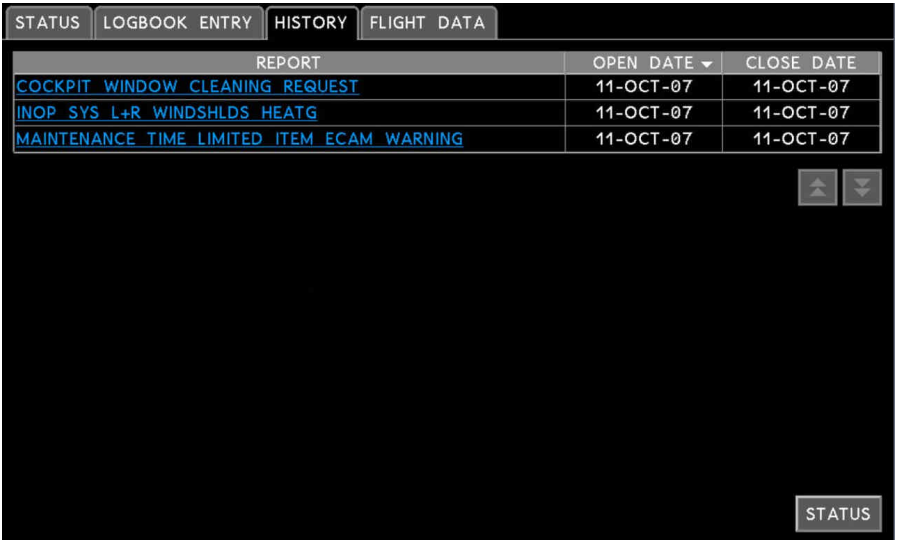
When clicked, returns to the STATUS page.

HISTORY PAGE

Applicable to: ALL

HISTORY TABLE

HISTORY Table



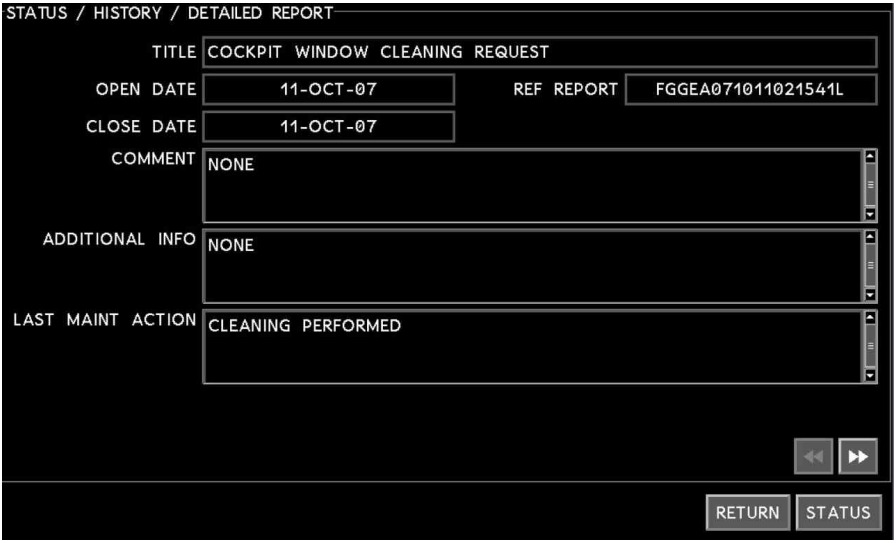
The HISTORY table provides the list of all defect items, that the maintenance personnel has already closed.
Items are listed by “OPEN DATE” criteria: The last open item appears at the top of the table.

The HISTORY table provides for each item:

- REPORT
  The title of the item. When the flight crew clicks on the title, the associated detailed report appears. See Detailed Report.
- OPEN DATE
  The date when the flight crew recorded the defect.
- CLOSE DATE
  The date when the maintenance closed the item.

DETAILED REPORT

Detailed Report



The detailed report provides:

- TITLE
  The title of the item.
- OPEN DATE
  The date when the flight crew recorded the defect.
- REF REPORT
  The internal reference of the item. This reference is created by the eLogbook application.
- CLOSED DATE
  The date when the maintenance personnel closed the item.
- COMMENT
  The comments that the flight crew entered when they recorded the defect.
- ADDITIONAL INFO
  The additional information that the flight crew entered when they recorded the defect.
- LAST MAINT ACTION
  The last action that the maintenance personnel performed, and that enabled to close the item.

ACTIONS BUTTONS



When clicked, displays the previous page of the table.



When clicked, displays the next page of the table.



When clicked and when a detailed report is displayed, displays the detailed report of the previous item in the table.



When clicked and when a detailed report is displayed, displays the detailed report of the next item in the table.



When clicked and when a detailed report is displayed, returns to the HISTORY table.

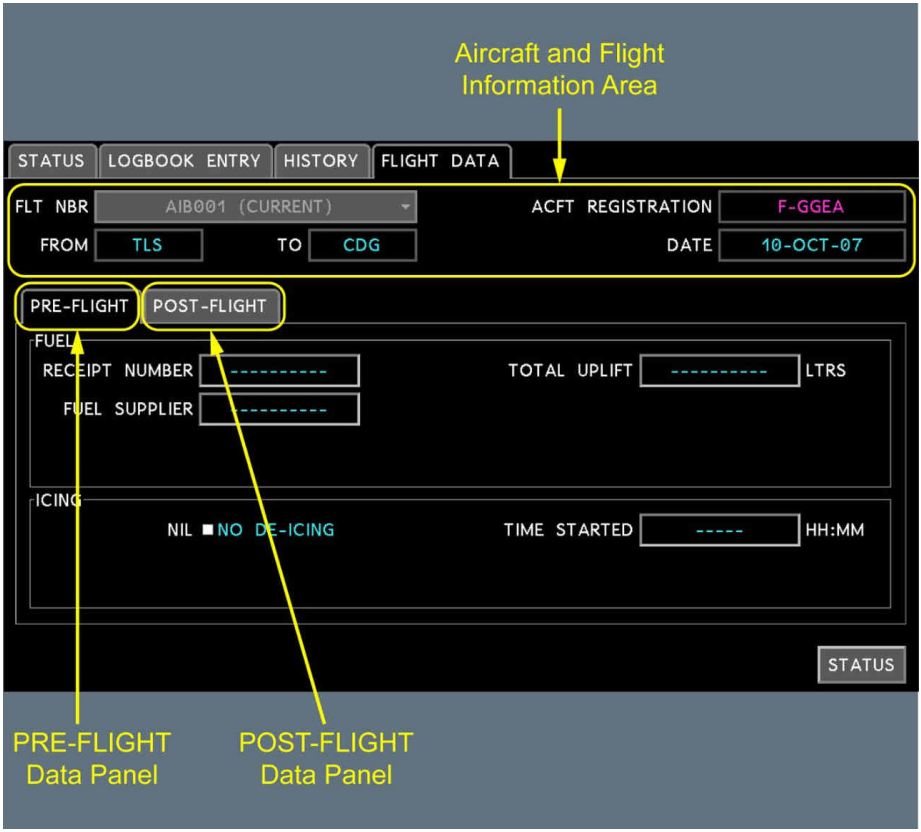


When clicked, returns to the STATUS page.

FLIGHT DATA PAGE

Applicable to: ALL

FLIGHT DATA Page



AIRCRAFT AND FLIGHT INFORMATION AREA

The data of the aircraft and flight information area (except the date of flight) appears in blue if the flight crew manually entered the data, or in magenta when the data comes from the avionics system.

The Aircraft and Flight Information area provides:

- FLT NBR
  The flight number.
- FROM
  The departure airport.
- TO
  The destination airport.
- ACFT REGISTRATION
  The aircraft registration.
- DATE
  The date of flight.

PRE-FLIGHT DATA PANEL

Note: *The Operator can fully customize the PRE-FLIGHT data panel. So this part uses an illustration of possible content with parameters used for example. Final parameters will be defined by the operator.*

PRE-FLIGHT Data Panel



POST-FLIGHT DATA PANEL

Note: The Operator can fully customize the POST-FLIGHT data panel. So this part uses an illustration of possible content with parameters used for example. Final parameters will be defined by the operator.

POST-FLIGHT Data Panel



ACTIONS BUTTONS



When clicked, returns to the STATUS page.

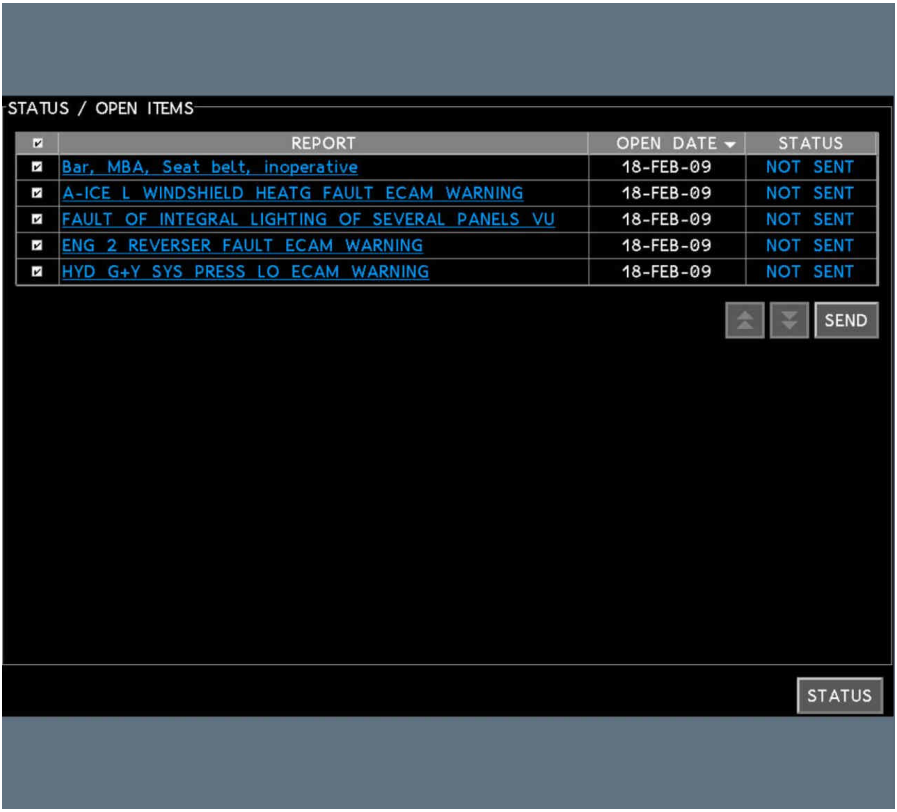
OPEN ITEMS PAGE

Applicable to: ALL

The flight crew accesses the OPEN ITEMS page by clicking on the technical OPEN ITEMS button on the STATUS page.

OPEN ITEMS TABLE

OPEN ITEMS Table



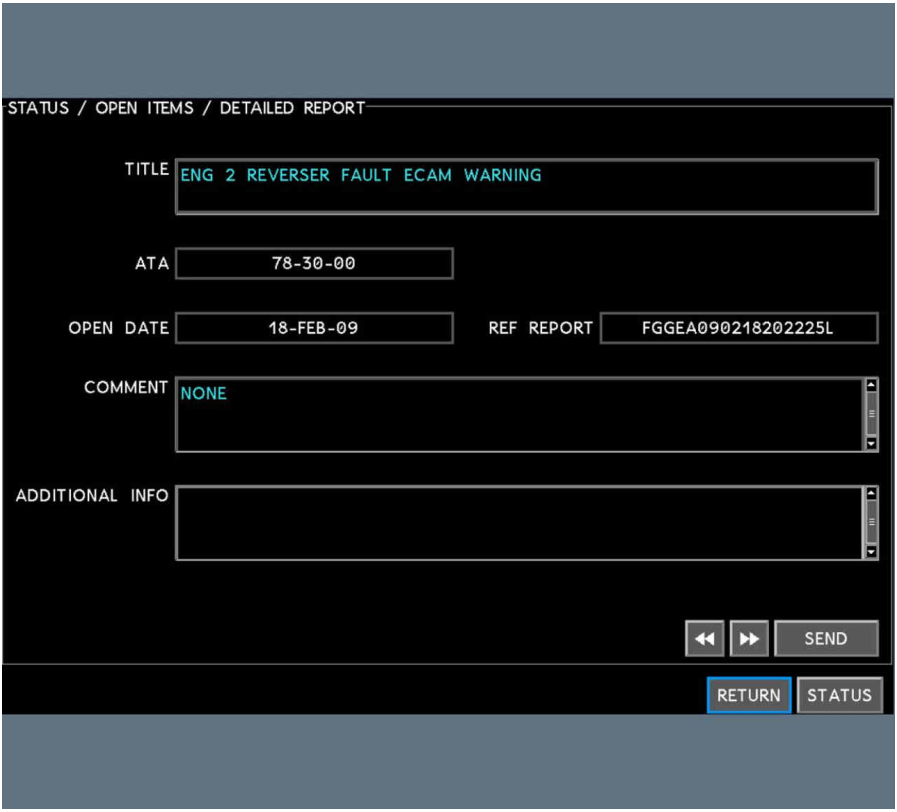
The OPEN ITEMS table provides for each open items:

- REPORT
  The title of the item.
  When the flight crew clicks on the title, the associated detailed report appears.
  See Detailed Report.
- OPEN DATE
  The date when the flight crew recorded the defect.
- STATUS
  The sending status:

SENDING...	The flight crew is sending the item to the ground station (ground acknowledgement is waited).
NOT SENT	The flight crew did not send the item to the ground station, or the flight crew sent the item to the ground station but the ground station has not received it (no acknowledgement from ground was received).
SENT	The flight crew sent the item to the ground station.

DETAILED REPORT

Detailed Report



The detailed report provides:

- TITLE
  The title of the open item.
- ATA
  The associated MEL or CDL item, if any.
- OPEN DATE
  The date when the flight crew recorded the defect.
- REF REPORT
  The reference of the open item. This reference is created by the eLogbook application.

- COMMENT
  The comments that the flight crew entered when they recorded the defect.
- ADDITIONAL INFO
  The additional information that the flight crew entered when they recorded the defect report. The flight crew can change this field after they have recorded the defect report.

ACTIONS BUTTONS



When clicked, displays the previous page of the table.



When clicked, displays the next page of the table.



When clicked, displays the detailed report associated with the previous open item in the table.



When clicked, displays the detailed report associated with the next open item in the table.



When clicked and when the OPEN ITEMS table is displayed, sends to the ground application the open items, that the flight crew has ticked on the first column of the table.
When clicked and when a detailed report is displayed, sends the associated open item to the ground application.



When clicked and when a detailed report is displayed, returns to the OPEN ITEMS table.



When clicked, returns to the STATUS page.

DEFERRED ITEMS PAGE

Applicable to: ALL

The flight crew accesses the DEFERRED ITEMS page by clicking on the DEFERRED ITEMS button on the STATUS page.

The DEFERRED ITEMS page has three panels:
- MEL ITEMS panel
- CDL ITEMS panel
- OTHER panel.

MEL ITEMS PANEL

The MEL ITEMS panel appears when the flight crew clicks on the DEFERRED ITEMS button on the STATUS page.

MEL ITEMS TABLE

MEL ITEMS Table



The MEL items are listed by "EXPIRY DATE" criteria: The item that has the first expiry date appears at the top of the table.

The MEL ITEMS table provides for each MEL items :

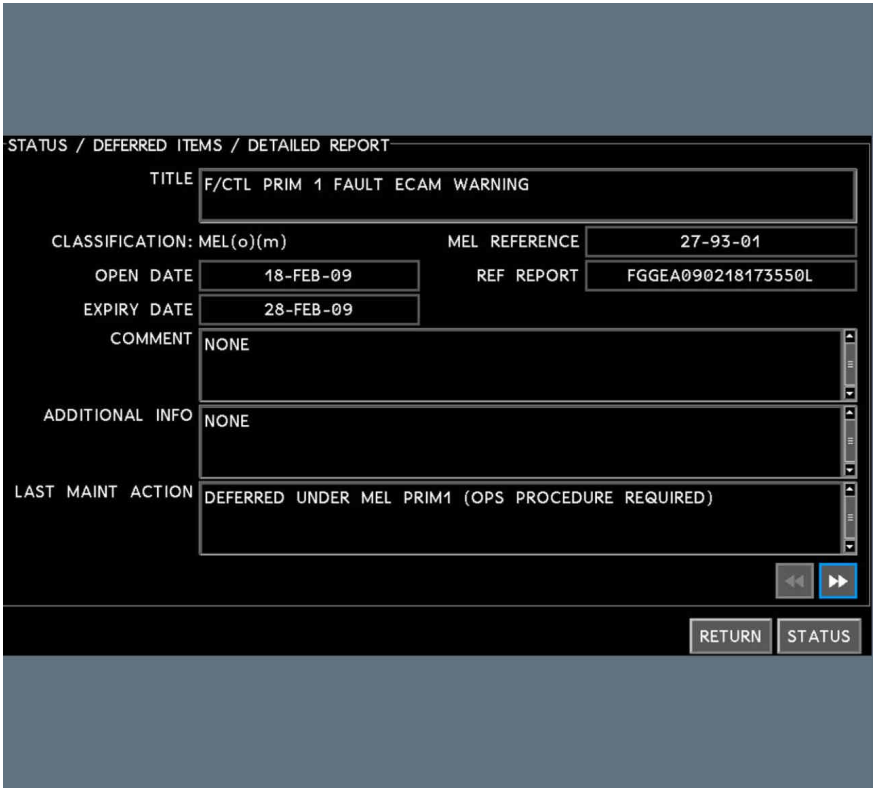
- REPORT
  The title of the item. When the flight crew clicks on the title, the associated detailed report appears. See Detailed Report.
- CLASSIFICATION

MEL	The MEL item is not associated with an operational procedure nor a maintenance procedure.
MEL(o)	The MEL item is associated with an operational procedure.
MEL(m)	The MEL item is associated with a maintenance procedure.
MEL(o)(m)	The MEL item is associated with an operational procedure and a maintenance procedure.

- OPEN DATE
  The date when the MEL item was opened.
- EXPIRY DATE
  The date when the MEL item expires, in accordance with the MEL item classification (A, B, C or D).

DETAILED REPORT

Detailed Report



The detailed report provides:

- TITLE
  The title of the MEL item.
- CLASSIFICATION

MEL	The MEL item is not associated with an operational procedure nor a maintenance procedure.
MEL(o)	The MEL item is associated with an operational procedure.
MEL(m)	The MEL item is associated with a maintenance procedure.
MEL(o)(m)	The MEL item is associated with an operational procedure and a maintenance procedure.

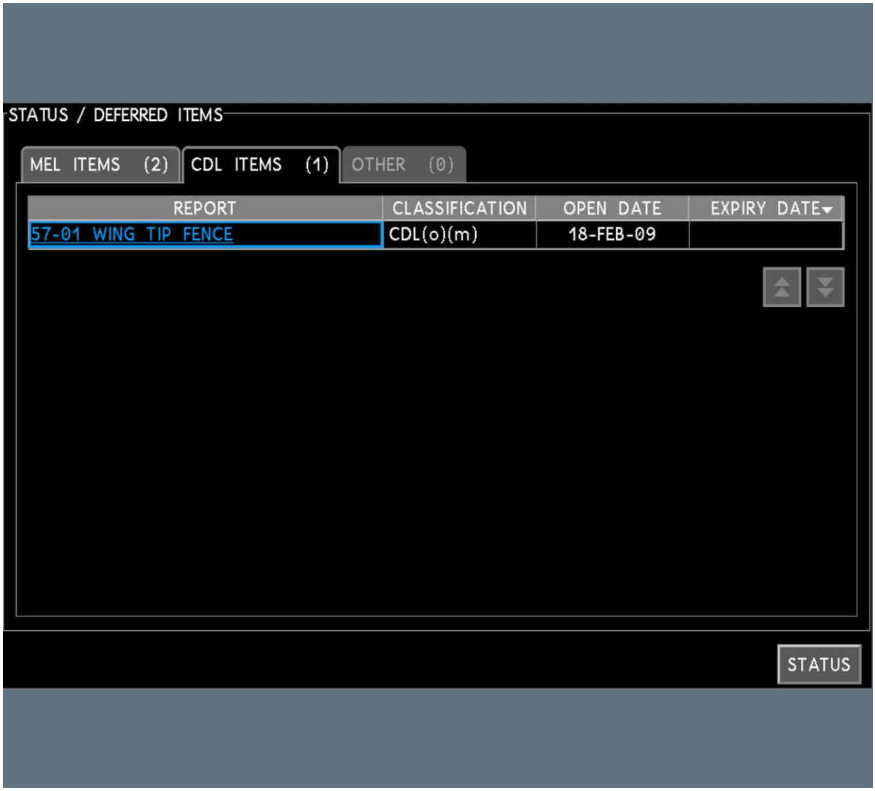
- MEL REFERENCE
  The MEL item reference.
- OPEN DATE
  The date when the MEL item was opened.
- REF REPORT
  The internal reference of the MEL item. This reference is created by the eLogbook application.
- EXPIRY DATE
  The date when the MEL item expires.
- COMMENT
  The comments, that the flight crew has entered, when they recorded the defect.
- ADDITIONAL INFO
  The additional information, that the flight crew has entered, when they recorded the defect.
- LAST MAINT ACTION
  The last maintenance actions, that the maintenance personnel performed, and that are relevant to this MEL item.

CDL ITEMS PANEL

The flight crew accesses this panel by clicking on CDL ITEMS on the DEFERRED ITEMS page.

CDL ITEMS TABLE

CDL ITEMS Table



The CDL ITEMS table provides for each CDL items :

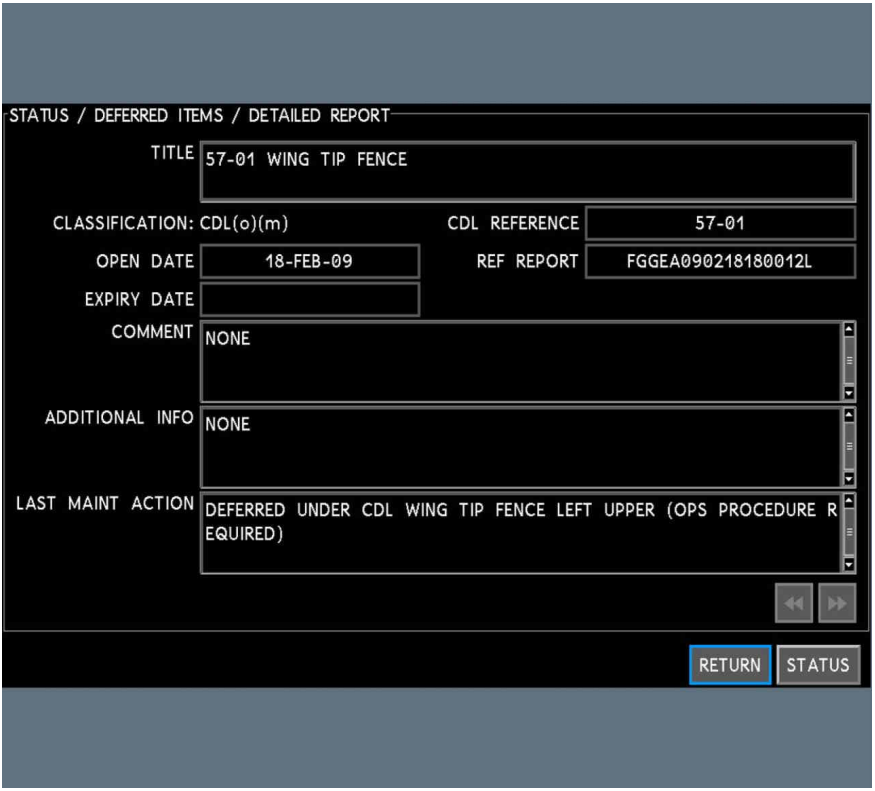
- REPORT
  The title of the item. When the flight crew clicks on the title, the associated detailed report appears. See Detailed Report.
- CLASSIFICATION

CDL	The CDL item is not associated with an operational procedure nor a maintenance procedure.
CDL(o)	The CDL item is associated with an operational procedure.
CDL(m)	The CDL item is associated with a maintenance procedure.
CDL(o)(m)	The CDL item is associated with an operational procedure and a maintenance procedure.

- OPEN DATE
  The date when the CDL item was opened.
- EXPIRY DATE
  The date when the CDL item expires, if any.

DETAILED REPORT

Detailed Report



The detailed report provides:

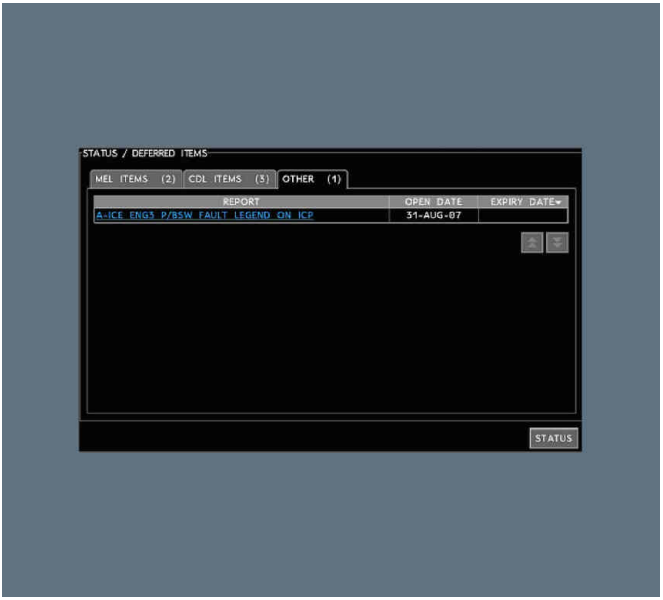
- TITLE
  The title of the CDL item.
- CLASSIFICATION
  CDL — The CDL item is not associated with an operational procedure nor a maintenance procedure.
  CDL(o) — The CDL item is associated with an operational procedure.
  CDL(m) — The CDL item is associated with a maintenance procedure.
  CDL(o)(m) — The CDL item is associated with an operational procedure and a maintenance procedure.
- CDL REFERENCE
  The CDL item reference.
- OPEN DATE
  The date when the CDL item was opened.
- REF REPORT
  The internal reference of the CDL item. This reference is created by the eLogbook application.
- EXPIRY DATE
  The date when the CDL item expires, if any.
- COMMENT
  The comments, that the flight crew has entered, when they recorded the defect.
- ADDITIONAL INFO
  The additional information, that the flight crew has entered, when they recorded the defect.
- LAST MAINT ACTION
  The last maintenance actions, that the maintenance personnel performed, and that are relevant to this CDL item.

OTHER PANEL

The flight crew accesses this panel by clicking on OTHER on the DEFERRED ITEMS page.

OTHER TABLE

OTHER Table



The OTHER table provides for each item:

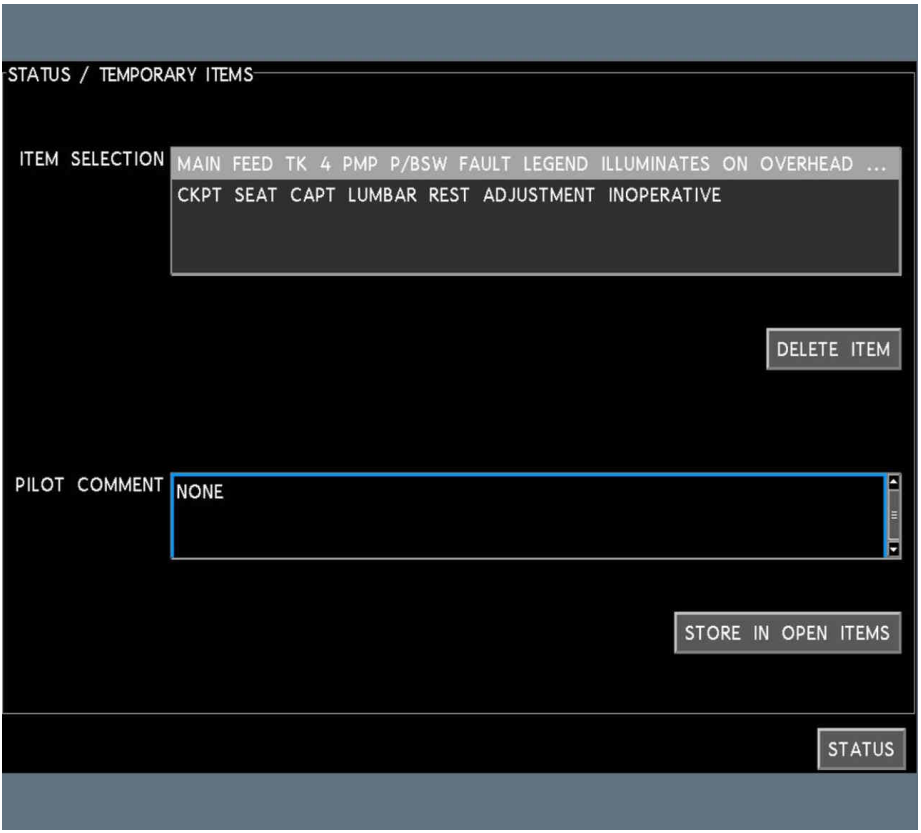
- REPORT
  The title of the item.
- OPEN DATE
  The date when the maintenance personnel deferred the item.
- EXPIRY DATE
  The date when the item expires, if any.

TEMPORARY ITEMS PAGE

Applicable to: ALL

The flight crew accesses the TEMPORARY ITEMS page by clicking on the TEMPORARY ITEMS button on the STATUS page.

TEMPORARY ITEMS Page



ITEM SELECTION List	Provides the list of defect reports that the flight crew stored as temporary items.
PILOT COMMENT Field	Provides the comment, that the flight crew entered when recording the defect, associated with the selected item from the ITEM SELECTION list.



When clicked, deletes the item selected in the ITEM SELECTION list.



When clicked, stores the item selected in the ITEM SELECTION list in the open item list.
The flight crew can access this item on the OPEN ITEMS page.



When clicked, returns to the STATUS page.

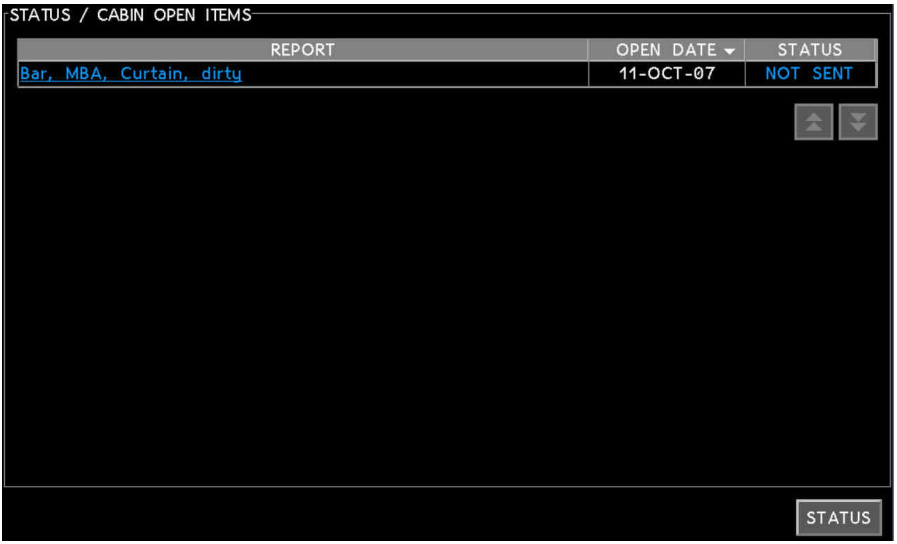
CABIN OPEN ITEMS PAGE

Applicable to: ALL

The flight crew accesses the CABIN OPEN ITEMS page by clicking on the cabin OPEN ITEMS button on the STATUS page.

CABIN OPEN ITEMS TABLE

CABIN OPEN ITEMS Table



The CABIN OPEN ITEMS table provides for each item:

- REPORT
  The title of the item.
  When the flight crew clicks on the title, the associated detailed report appears.
  See DETAILED REPORT.
- OPEN DATE
  The date when the cabin crew recorded the defect in the DCL.
- STATUS column
  The sending status:

SENDING...	The cabin crew is sending the item to the ground station (ground acknowledgement is waited).
NOT SENT	The cabin crew did not send the item to the ground station, or the cabin crew sent the item to the ground station, but the ground station did not receive it (no acknowledgement from ground was received).
SENT	The cabin crew sent the item to the ground station, and the ground station received it

DETAILED REPORT

Detailed Report



The detailed report provides:

- TITLE
  The title of the cabin open items.
- OPEN DATE
  The date when the cabin crew recorded the defect in the DCL.
- REF REPORT
  The reference of the cabin item. This reference is created by the eLogbook application.
- COMMENT
  IThe comments, that the cabin crew entered, when recording the defect.

ACTIONS BUTTONS



When clicked, displays the previous page of the table.



When clicked, displays the next page of the table.



When clicked and when a detailed report is displayed, displays the detailed report associated to the previous cabin item in the table.



When clicked and when a detailed report is displayed, displays the detailed report associated with the next cabin item in the table.



When clicked and when a detailed report is displayed, returns to the CABIN OPEN ITEMS table.



When clicked, returns to the STATUS page.

X-OIS FUNCTION

Applicable to: ALL

The X-OIS function enables one flight crewmember to display on his OIT the current display of the other OIT. The X-OIS function is available on the FLT OPS side only.
The X-OIS function can be activated by pressing the OIS XFR key either on the ACDs or on the keyboards.
The X-OIS function can be deactivated by pressing again the OIS XFR key.
When a flight crewmember presses the OIS XFR key, his OIT displays the display of the other OIT and the message "'X-OIS Activated" appears on his OIT.

Note: *When a flight crewmember deactivates the X-OIS function, two pointers may appear on his OIT. To remove one of the two pointers, the flight crewmember should move the pointing device via the touchpad on the keyboard.*

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LAPTOP START

Applicable to: ALL

"STANDALONE" appears on the Login page of the laptop when:

- The Captain's, First Officer's, or backup laptop is started before the ARU
  In this case, when the ARU is started, the flight crew must restart the affected laptop, in order for the laptop to be connected to the aircraft network.
- The Captain's, First Officer's or backup laptop is not connected to the network.
  In this case, the laptop operates as a stand-alone.

Login Page (Standalone)



LAPTOP OPERATED AS A STAND-ALONE

Applicable to: ALL

When a laptop is operated as a stand-alone, (i.e. not connected to the network), "SYNCHRONIZATION NOT AVAIL" appears on the FLT OPS STS page.
In this case, the synchronization is not possible between the FLT FOLDER application

In this case:

- The synchronization of the EFF between the Captain's laptop and the First Officer's laptop is not possible
- The communication between the NAV CHARTS application of the Captain's laptop and the First Officer's laptop is not possible
- The OPS LIBRARY cannot retrieve the ECAM alerts that occur during the flight, and the MEL and CDL items from the eLogbook.

Laptop in Stand-Alone



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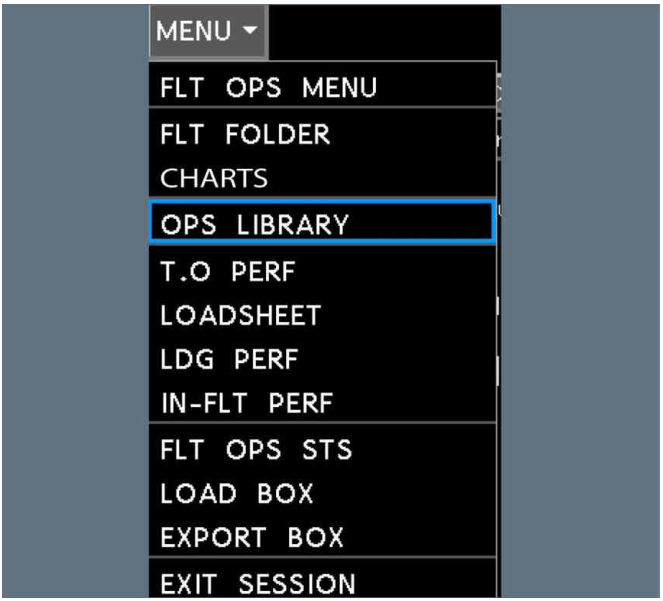
How to Use the OPS LIBRARY

HOW TO START THE OPS LIBRARY

Applicable to: ALL

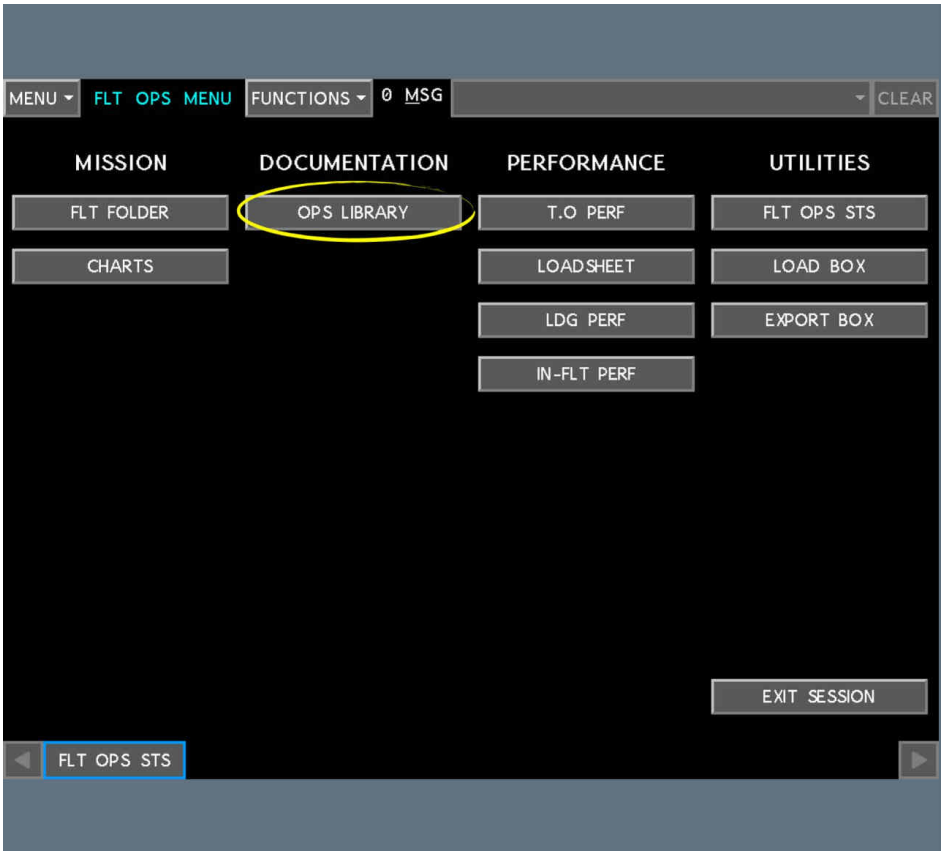
1. Select the application to start by:
   - Clicking on the MENU button and selecting OPS LIBRARY, or

MENU Drop-down List



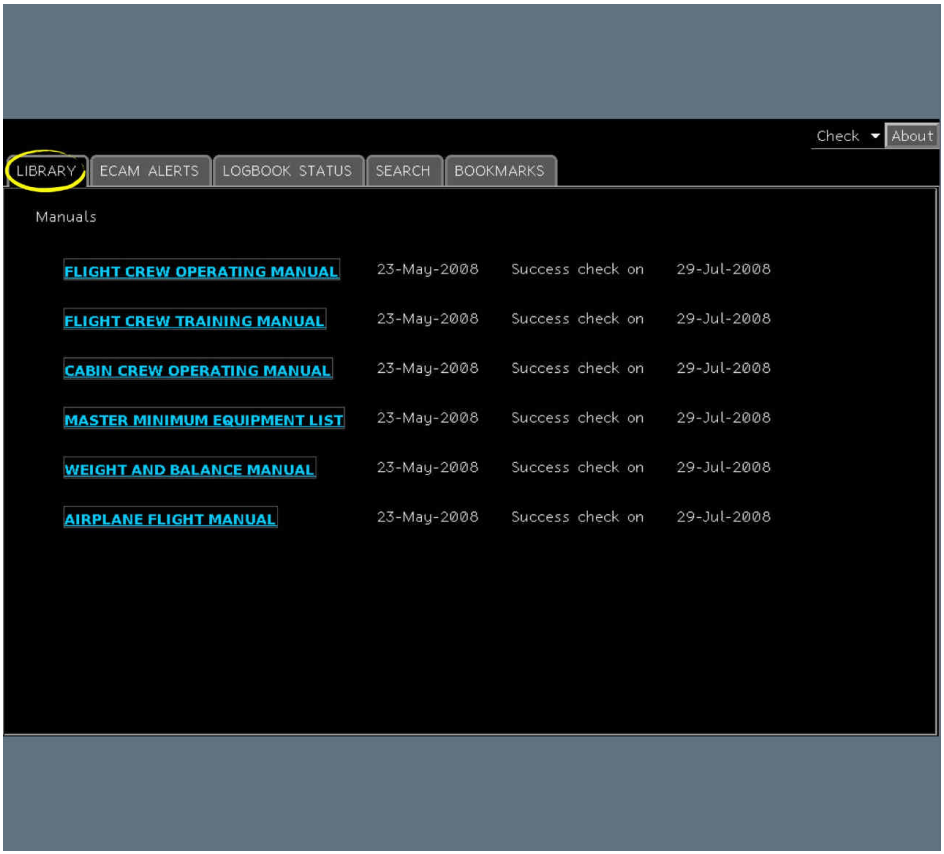
   - On the FLT OPS MENU page, clicking on the OPS LIBRARY button.

FLT OPS MENU Page



2. The OPS LIBRARY starts and will enable the flight crew to consult the manuals that are associated to the MSN from the FLT OPS STS page.
   The LIBRARY panel is active by default, and the accessible manuals are listed on the page.

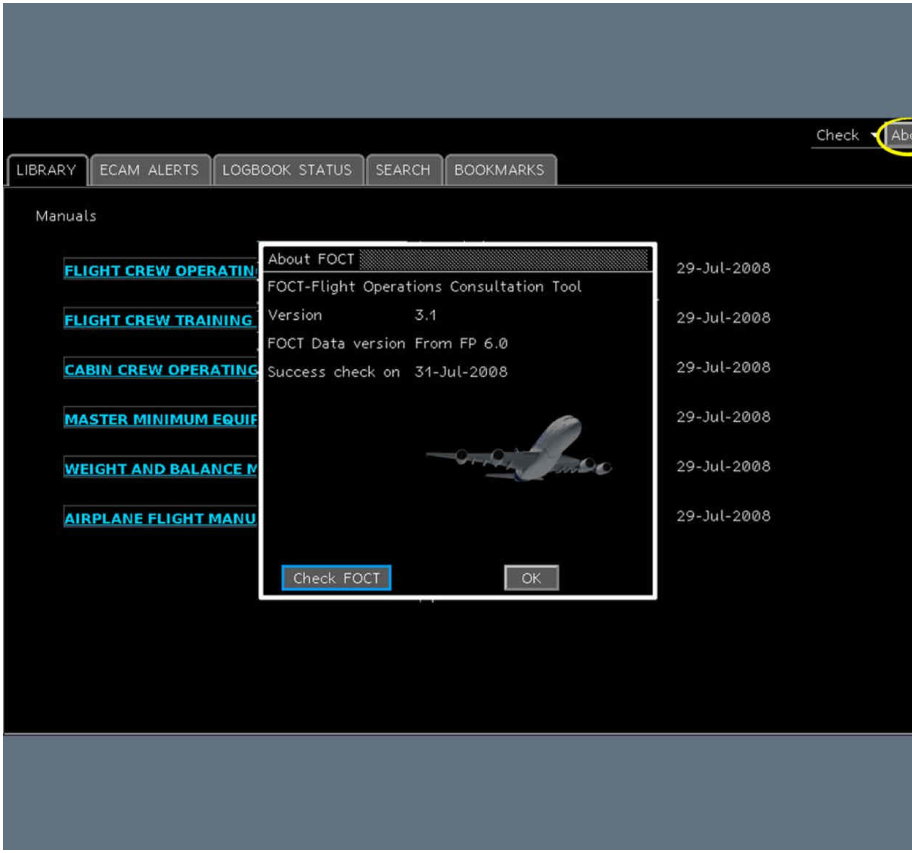
LIBRARY Panel



3. Click on the name of the manual to open.

Note: *1. On the Library panel, the About button provides access to the information on the FOCT, such as the version of the software.*

About FOCT



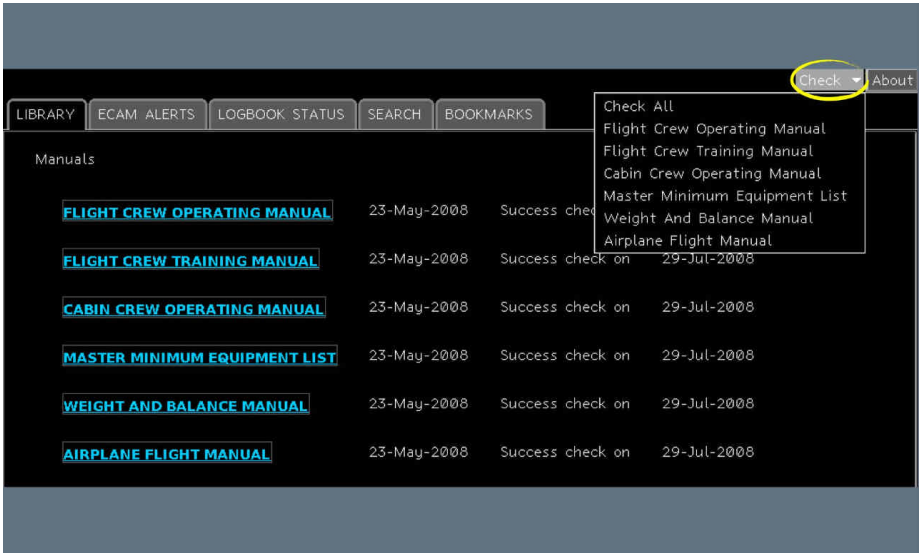
2. After having selected a manual, the first documentary unit that the flight crew has selected to display may not to appear.
in this case, select another documentary unit on the navigation tree, then select again the initial documentary unit to display it.

HOW TO CHECK A MANUAL

Applicable to: ALL

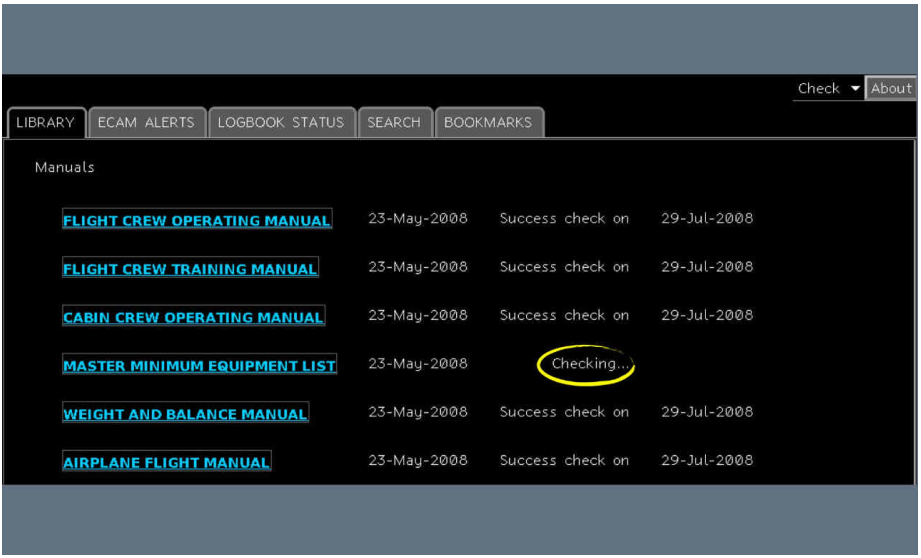
The check manual function enables to check the completeness of the manuals onboard the aircraft.
Click on the FUNCTIONS button and select HOME to access the Library panel.
Then click on the Check button and select the manual to check in the drop-down list.

Check Drop-Down List



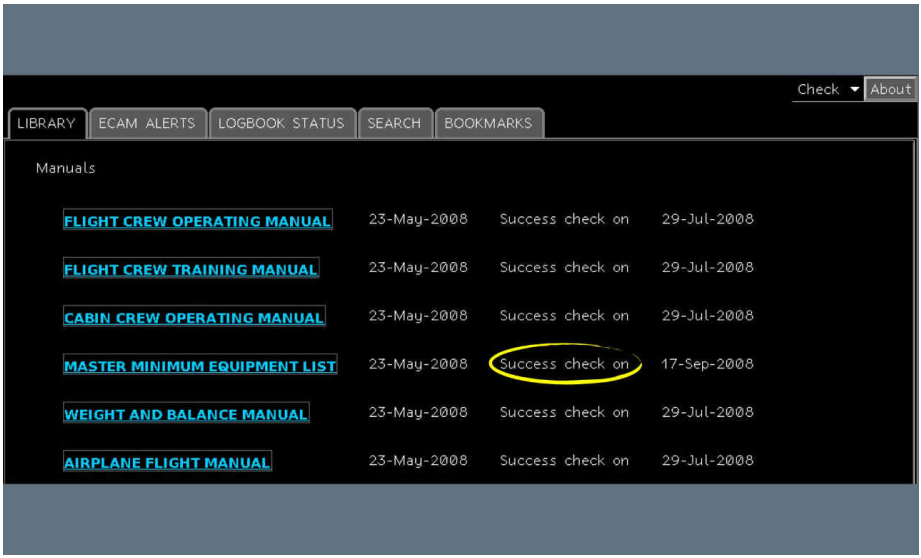
As soon as the check is started, "Checking..." appears on the line of the manual, on the Library Panel.

Check in Progress



When the check of a manual is complete, the results appears on the line of the manual, on the Library Panel.

Check Result



The status of the check can be:
- "Success check on " & Date: The check was performed the date displayed and was successful
- "Failed check on " & Date: The check was performed the date displayed and was not successful
- "Aborted check on" & Date: No check was performed. The date displayed is the current date.

HOW TO ACCESS THE FCOM

Applicable to: ALL

The FCOM has 4 main chapters:
- Aircraft Systems
- Procedures
- Limitations
- Performance.

In addition, the FCOM has the following chapters, as necessary:
- Summary of Highlights
- Organization of the Manual
- Operating Engineering Bulletins (OEB s)
- Temporary Documentary Units (TDU s).

AIRCRAFT SYSTEMS

The Aircraft Systems chapter is divided in ATA chapters for each aircraft system. This chapter includes the specific description of each system, and the associated cockpit interfaces.

Aircraft Systems

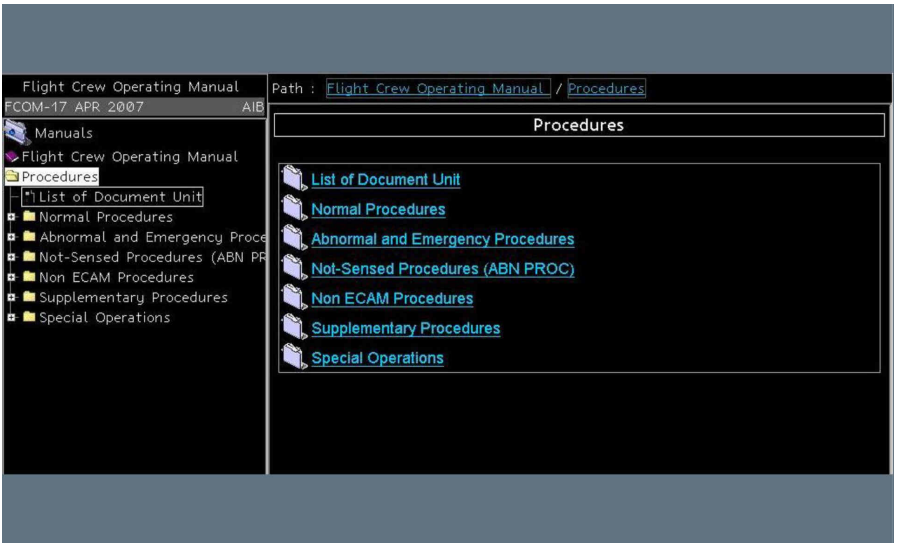


PROCEDURES

The Procedures chapter has 6 subchapters:

- Normal Procedures
- Abnormal and Emergency Procedures
- Not Sensed Procedures
- Non ECAM Procedures
- Supplementary Procedures
- Special Operations.

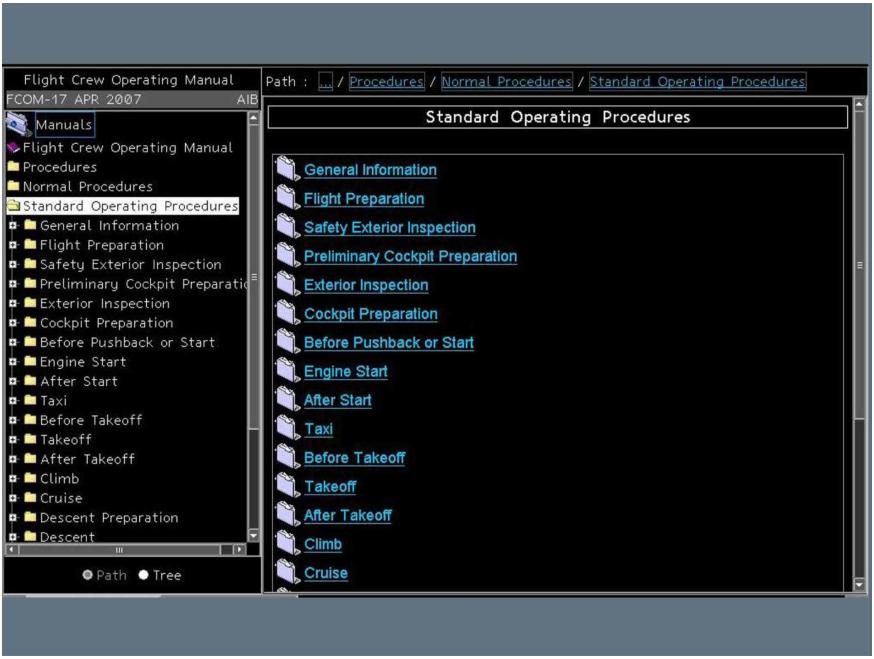
Procedures



NORMAL PROCEDURES

The Normal Procedures subchapter describes the Standard Operating Procedures (SOP s) for each flight phase, the normal checklists as provided on the ECAM , the tasksharing and the systems related procedures.

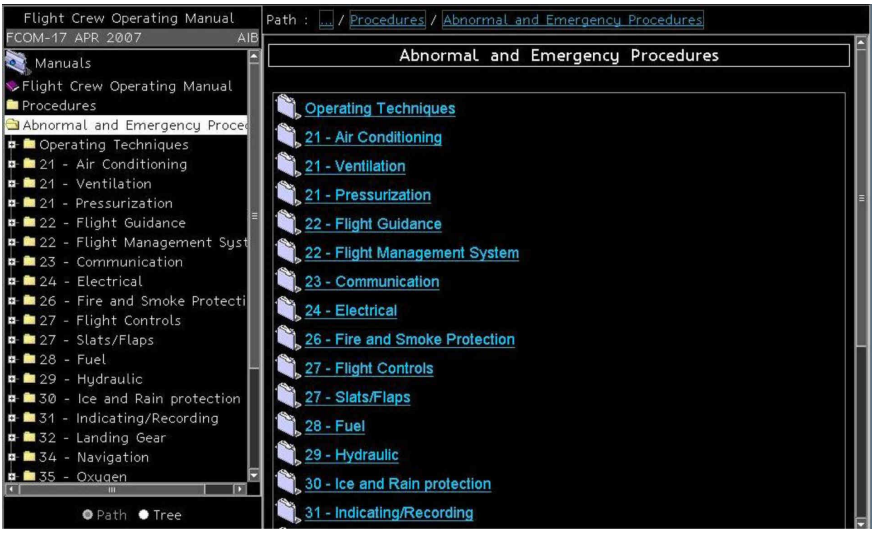
Normal Procedures SOPs



ABNORMAL AND EMERGENCY PROCEDURES

The Abnormal and Emergency Procedures subchapter describes the procedures that appear on the ECAM , in the case of a system failure.
In this subchapter, additional information is provided along with the ECAM procedures, as necessary.

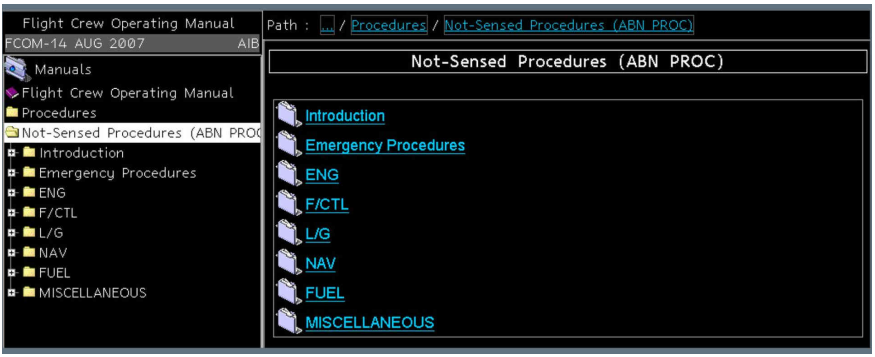
Abnormal and Emergency Procedures



NOT-SENSED PROCEDURES

The Not-Sensed Procedures subchapter describes the abnormal and emergency procedures that are manually requested by the flight crew by pressing the ABN PROC pb on the ECAM Control Panel (ECP). For more information, *Refer to DSC-31-40-50 How to Activate a Not-Sensed ABN PROC* .

Not-Sensed Procedures



NON ECAM PROCEDURES

The Non ECAM Procedures subchapter describes the procedures that are not displayed on the ECAM .

SUPPLEMENTARY PROCEDURES

The Supplementary Procedures subchapter provides all the procedures that are not included in the Normal, Abnormal/Emergency, Not Sensed and Non ECAM Procedures subchapters.
The Supplementary Procedures subchapter includes procedures such as how to operate the aircraft in adverse weather conditions or with particular aircraft configurations.

Supplementary Procedures



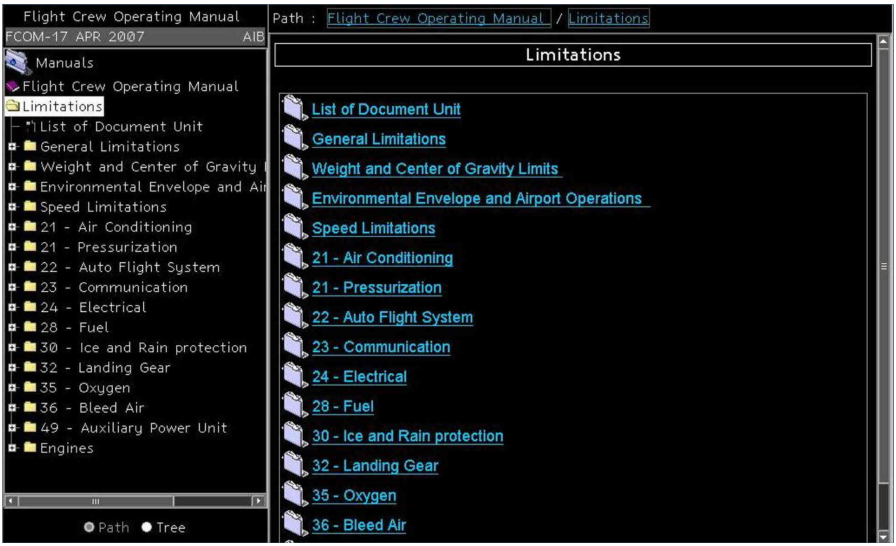
SPECIAL OPERATIONS

The Special Operations subchapter provides procedures that are not considered as standard operations, or that may require special authorization from National Authorities.

LIMITATIONS

The Limitations chapter is divided into ATA chapters.
It includes the aircraft operating limitations that are required by the regulation. These limitations are also included in the Aircraft Flight Manual (AFM).

Limitations



PERFORMANCE

The Performance chapter includes the aircraft performance for each flight phase.

Performances



SUMMARY OF HIGHLIGHTS

This chapter provides all the highlights, with links to the revised documentary units.

ORGANIZATION OF THE MANUAL

This chapter provides information about the contents, the organization and the revisions of the FCOM .
Refer to GEN FCOM Purpose .

OEB

The OEB chapter provides a list and description of all applicable Operational Engineering Bulletins (OEB s).
Refer to OEB-000 Introduction .

TDU

The TDU chapter provides a list of all applicable Temporary Documentary Units (TDU s).
Refer to GEN-GREVI Temporary Information .

HOW TO USE INFORMATION LAYERS

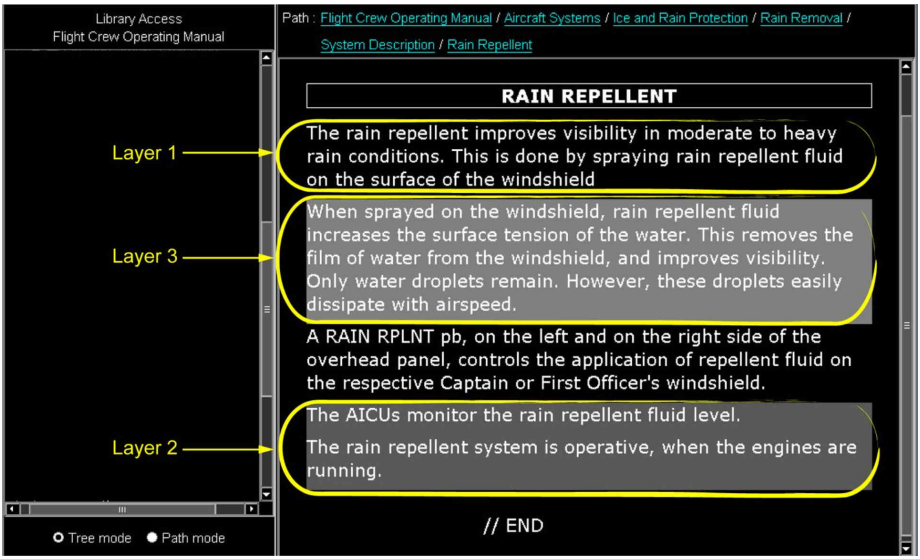
Applicable to: ALL

There are three layers of information:

- Layer 1: "Need to know"
  Layer 1 presents information that is necessary in the cockpit.
- Layer 2: "Nice to know"
  Layer 2 presents information that is used as a reference, in order to fully understand the logic of the aircraft and pilot interfaces.
- Layer 3: "Detailed information".
  Layer 3 provides more detailed explanations, that are not necessarily needed in flight.

The text in each layer appears on a different colored background.
When the flight crew selects a layer of information, it remains selected during the consultation of several documentary units.
When the flight crew selects a layer of information that is not available, the highest available layer of information appears. However, the button that the flight crew uses to select the layer remains selected, but is disabled.

Information Layers



Similar to the text, an illustration can also change, according to the selected layer of information.

HOW TO DISPLAY ILLUSTRATIONS

Applicable to: ALL

Documentary units may include illustrations.

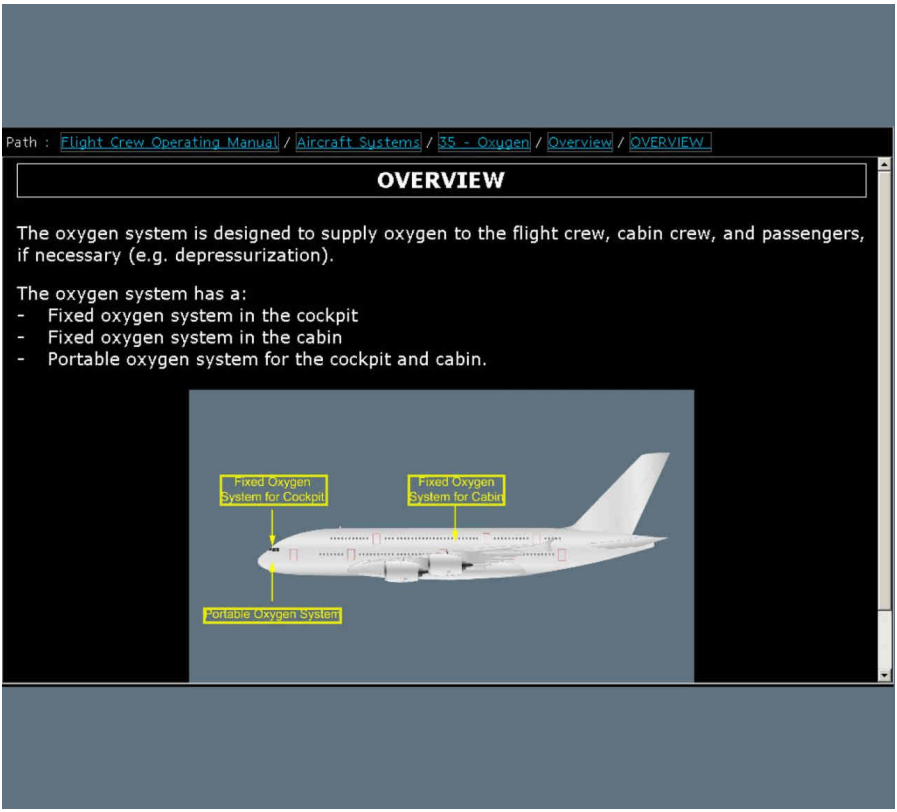
There are two types of illustrations:
- Inline illustrations
- Thumbnail illustrations.

Note: *Symbols are small illustrations or graphics that are embedded in the flow of the text.*

INLINE ILLUSTRATIONS

Inline illustrations appear next to the text. They appear in full size.

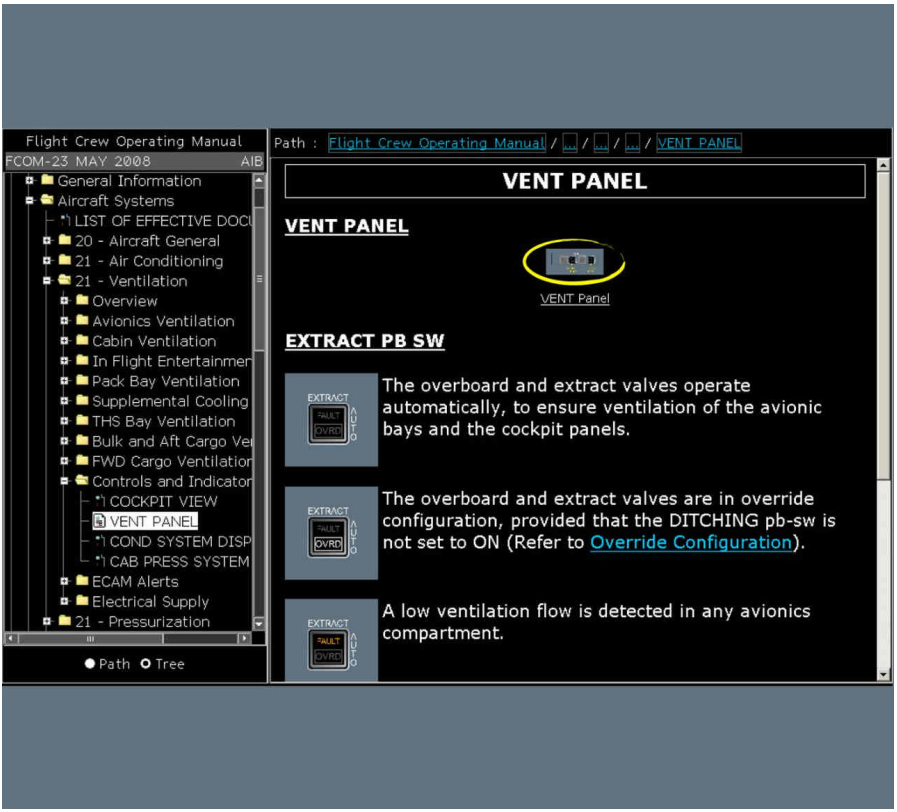
In-line Illustrations



THUMBNAIL ILLUSTRATIONS

Thumbnail illustrations appear as a symbol, on which the flight crew must click in order to display the illustration.

Thumbnail Illustration

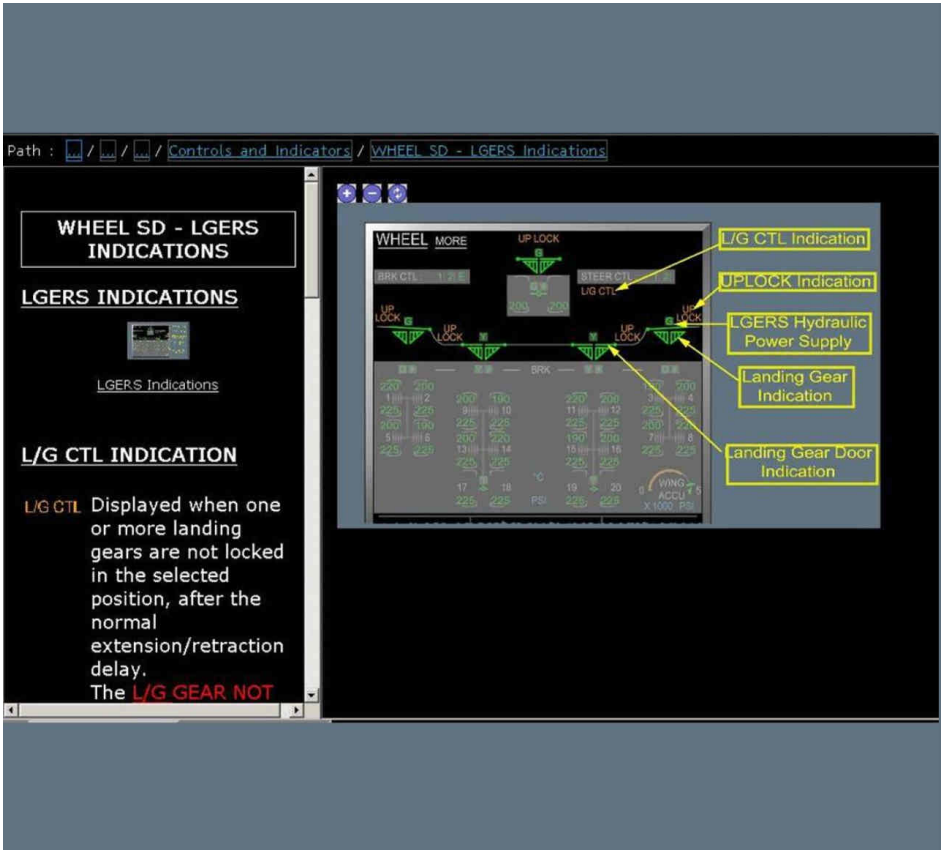


Click on the symbol to display the illustration.
The window is then divided in two frames and the navigation tree no longer appears.

The window can be divided:

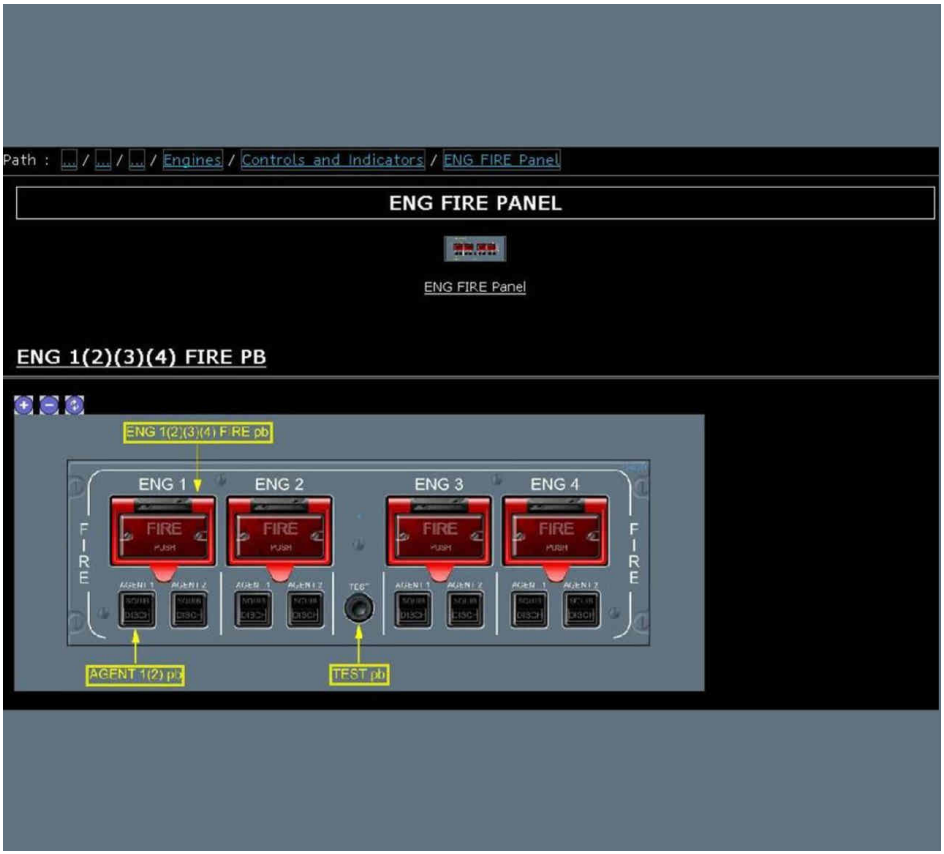
- Vertically: The illustration appears in the right frame, and the text in the left frame.

Thumbnail Illustration - Vertical Split



- Horizontally: The illustration appears in the lower frame, and the text in the upper frame.

Thumbnail Illustration - Horizontal Split



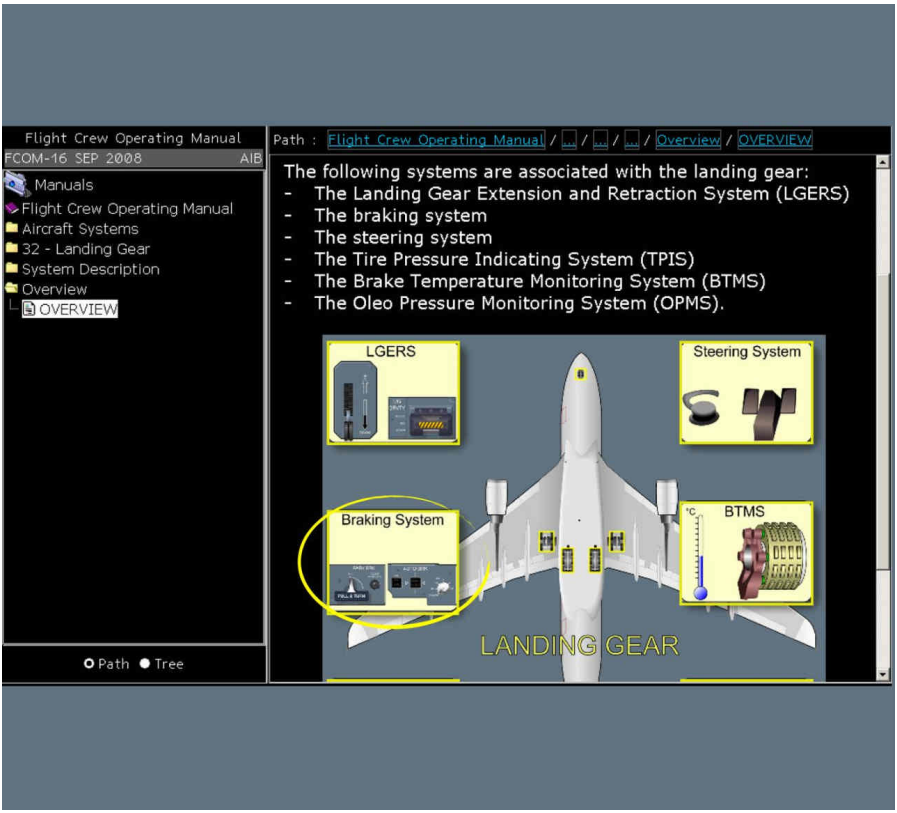
HOTSPOTS

An illustration can include hotspots.

Hotspots are interactive zones. When clicked, they automatically display applicable information:

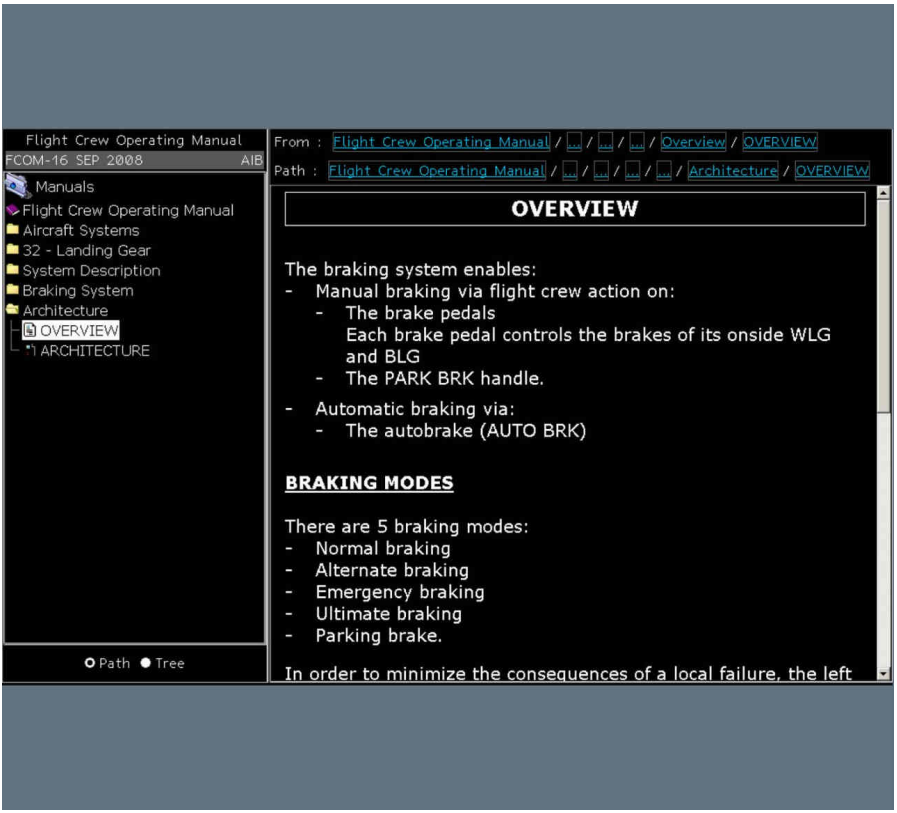
- Either, directly associated with the illustration. In this case, the illustration and text appear simultaneously
- Or, provide access to further information. In this case, the hotspot is a link.

Illustration with Hotspots



Click on the hotspot to display the associated documentary unit.

Linked Documentary Unit with Hotspot

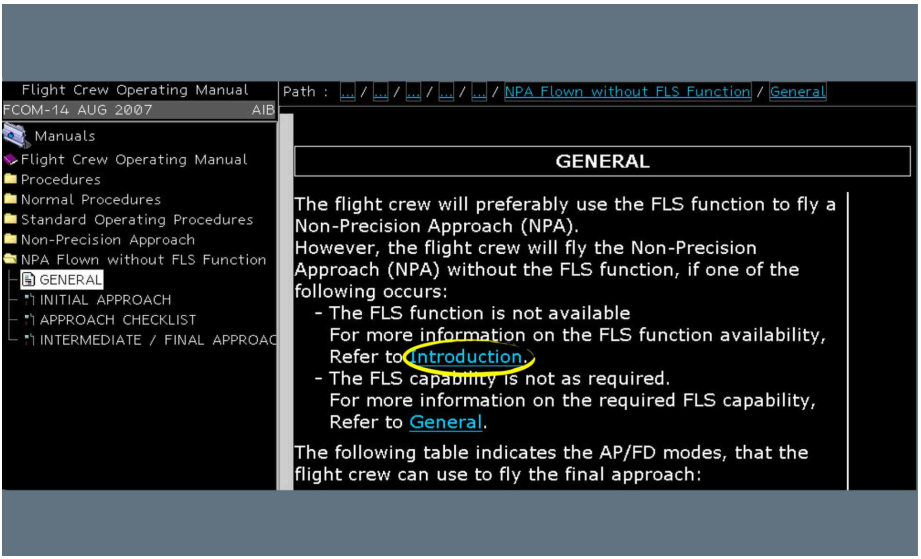


HOW TO USE LINKS

Applicable to: ALL

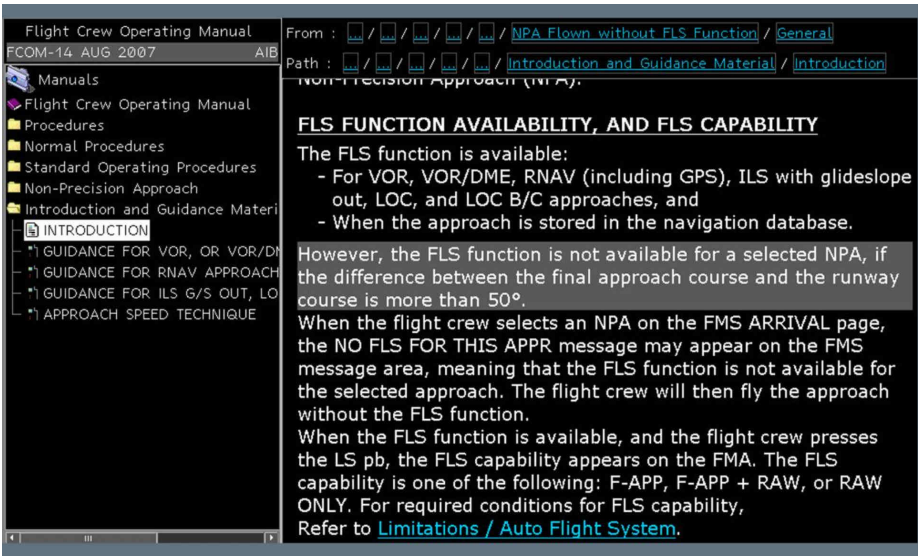
Some documentary units from the FCOM include links with other documentary units in the FCOM or in other manuals (e.g. FCTM, MMEL).

Documentary Unit with a Link



To access the associated documentary unit, click on the link.

Linked Documentary Unit



To return to the documentary unit in the FCOM, click on the PREVIOUS button.

Note: *If the link is not active, an Error message appears, as illustrated below. Click on OK to continue.*

Link Error Message



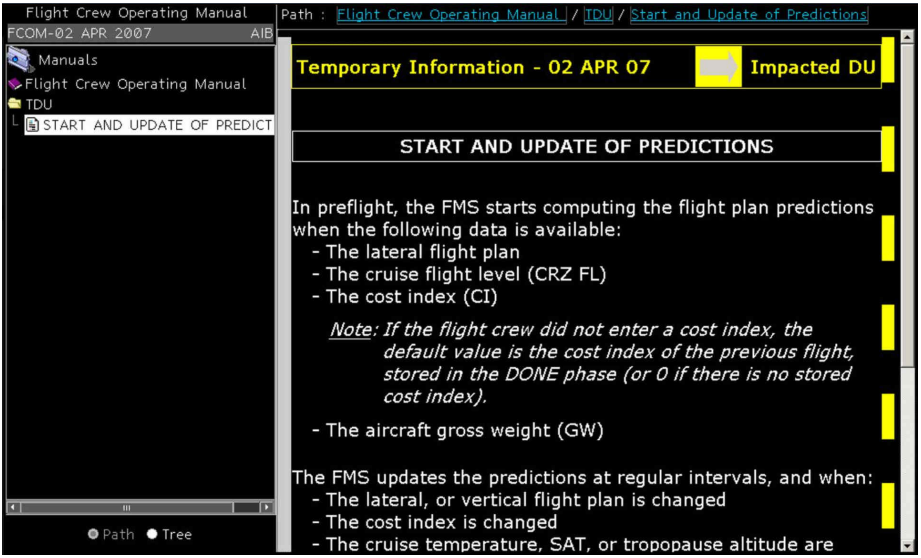
HOW TO USE TEMPORARY DOCUMENTARY UNITS

Applicable to: ALL

A Temporary Documentary Unit (TDU) temporarily replaces the original documentary unit in the navigation tree. When navigating through the manual, the TDU appears instead of the original documentary unit.
A TDU appears with a dashed yellow line on the right side of the window.

Note: *The list of TDU s for the FCOM is in the TDU chapter.*

Temporary Documentary Unit

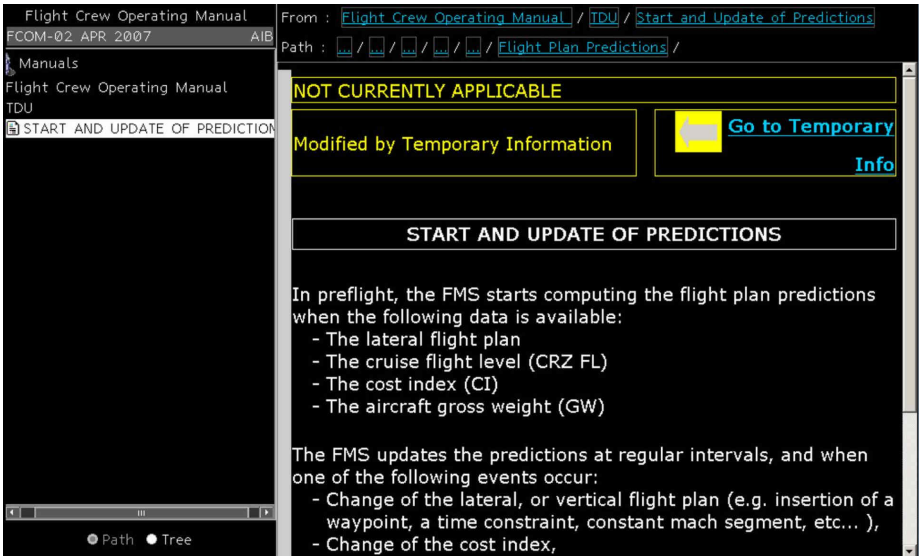


To display the reason for issue of the TDU , click on the 

button and select DOC REF.

To display the original documentary unit, click on the  symbol. The original documentary unit is the one that is temporarily not valid, and which has been replaced by the TDU .

Impacted Documentary Unit



To return to the TDU , click on the  symbol.
When an OEB has a link to a TDU , the associated TDU appears with a secondary dashed line. This secondary dashed line is white, if the TDU is associated with a white OEB , or red, if the TDU is associated with a red OEB . For more information about OEB s, *Refer to OEB-000 Introduction* .

HOW TO USE WORD SEARCH

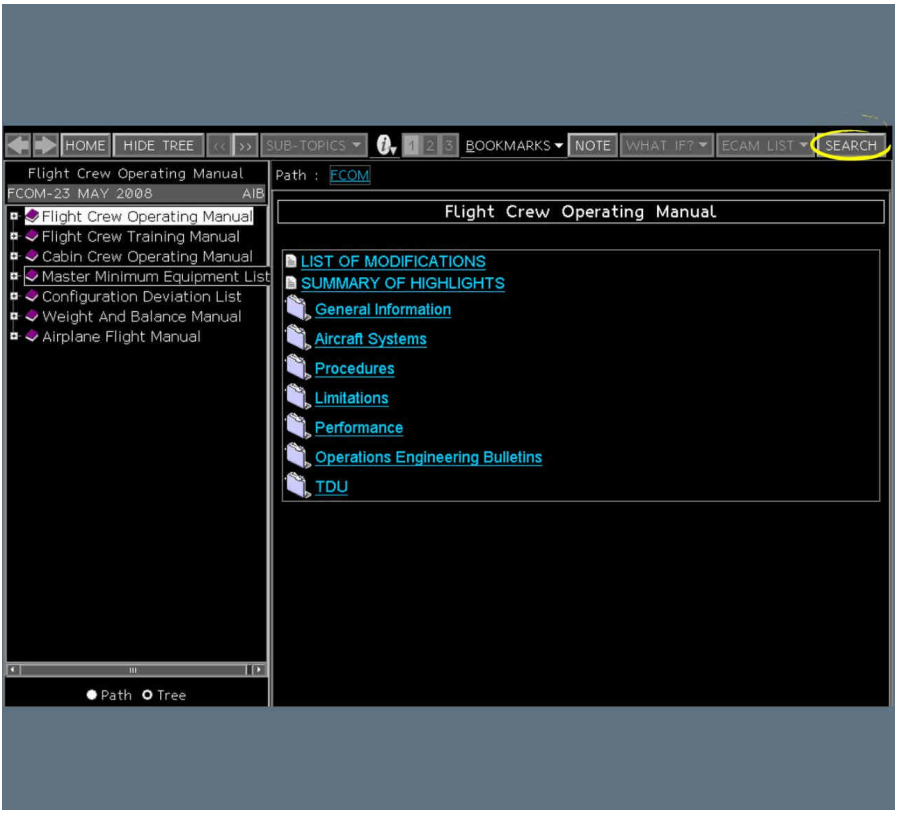
Applicable to: ALL

The WORD SEARCH function enables the flight crew to find specific words in all the manuals.

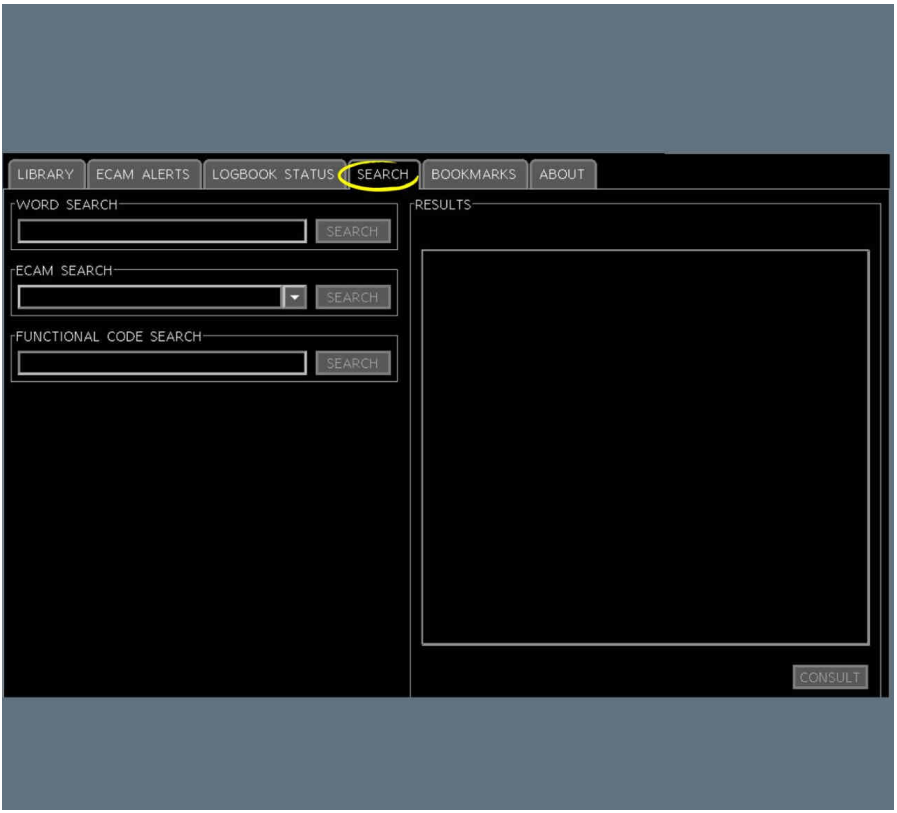
SEARCH PANEL

To access the SEARCH panel, click on the SEARCH button.

OPS LIBRARY


HOME
HIDE TREE
SUB-TOPICS
BOOKMARKS
NOTE
WHAT IF?
ECAM LIST
SEARCH
Flight Crew Operating Manual
FCOM-23 MAY 2008
AIB
Flight Crew Operating Manual
Flight Crew Training Manual
Cabin Crew Operating Manual
Master Minimum Equipment List
Configuration Deviation List
Weight And Balance Manual
Airplane Flight Manual
Path
Tree
Path : FCOM
Flight Crew Operating Manual
LIST OF MODIFICATIONS
SUMMARY OF HIGHLIGHTS
General Information
Aircraft Systems
Procedures
Limitations
Performance
Operations Engineering Bulletins
TDU

SEARCH Panel

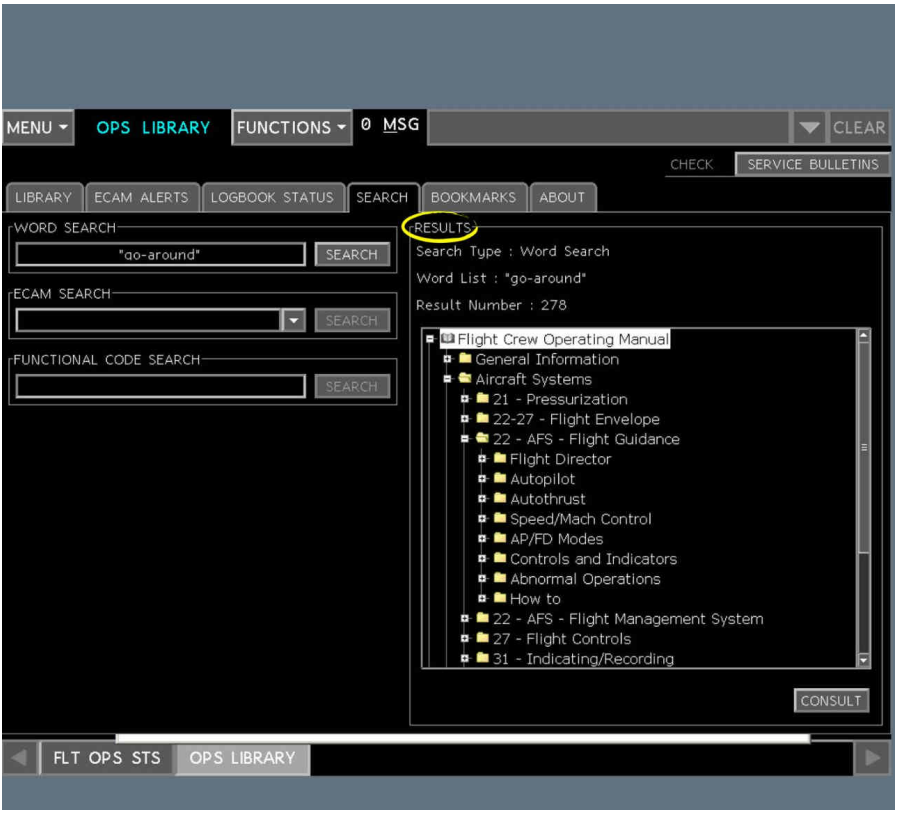


Enter the words in the WORD SEARCH entry field.
If more than one word is entered, the search will look for documentary units that have at least one of the entered words.
Operators (and, or) can be used (e.g. APU and OIS).
To look for an exact word sequence, use quotes (e.g. "FUEL LEAK DET FAULT").
Click on the SEARCH button to start the search.
If more than 50 answers are found, a message appears. Click on OK to perform an advanced search, or to view all the answers.

RESULTS WINDOW

For each manual, the RESULTS window displays the list of documentary units that are retrieved by the search.
The upper area of the RESULTS window displays the search parameters and the number of results.
The list of documentary units appears in a navigation tree in the lower part of the RESULTS window.

RESULTS Window



To access the results in a manual, select the manual, then click on the CONSULT button, or click twice on the title of the manual.
To access the documentary unit, click on the name of the documentary unit and click on the CONSULT button or double click on the name of the documentary unit.

CONSULTATION MODE

In consultation mode, folders and documentary units that have a search result appear in green in the navigation tree.
In the text, the words that have been searched for also appear highlighted.

Consultation Mode



To quit the consultation mode of the search, click on the cross of the WORD SEARCH area.

Consultation Mode - Word Search Area



HOW TO USE ECAM SEARCH

Applicable to: ALL

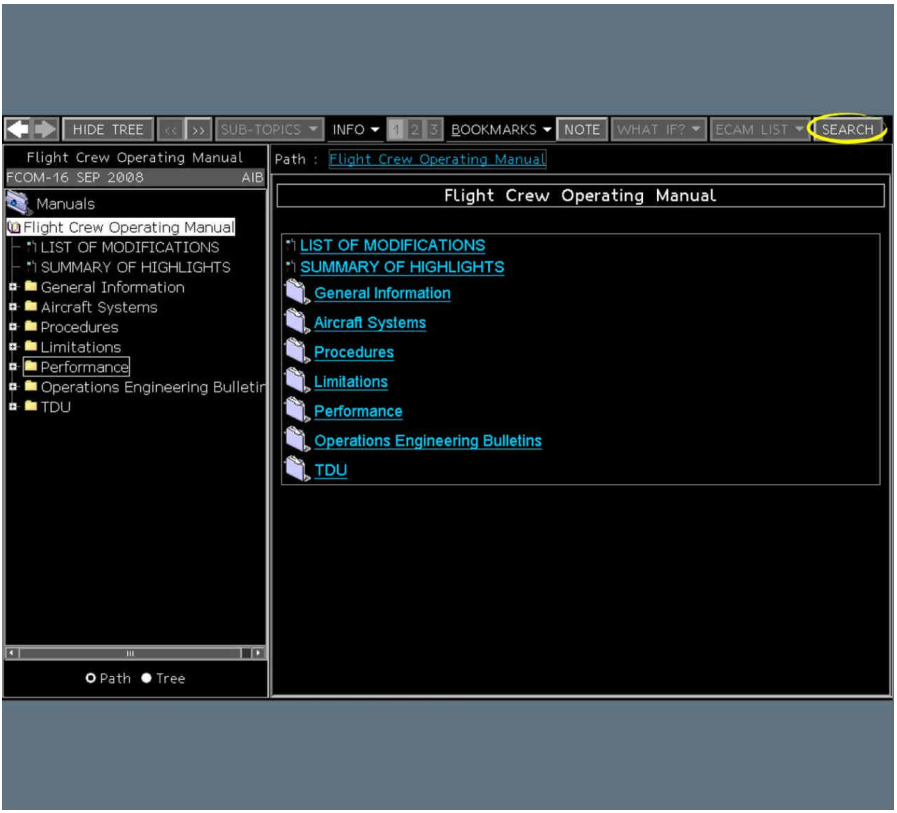
The ECAM SEARCH function enables the flight crew to access documentary units that are associated with an ECAM alert. These documentary units are:

- The associated abnormal or emergency procedure in the FCOM
- The associated documentary unit in the MMEL Entries chapter of the MMEL.

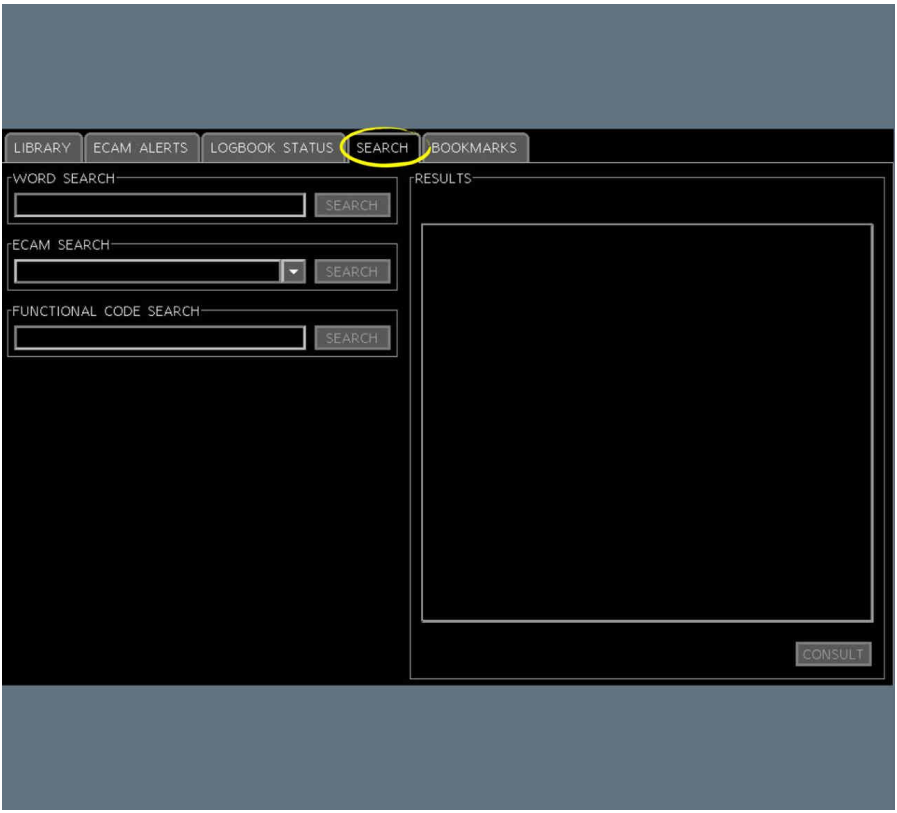
SEARCH PANEL

To access the Search panel, click on the SEARCH button.

OPS LIBRARY

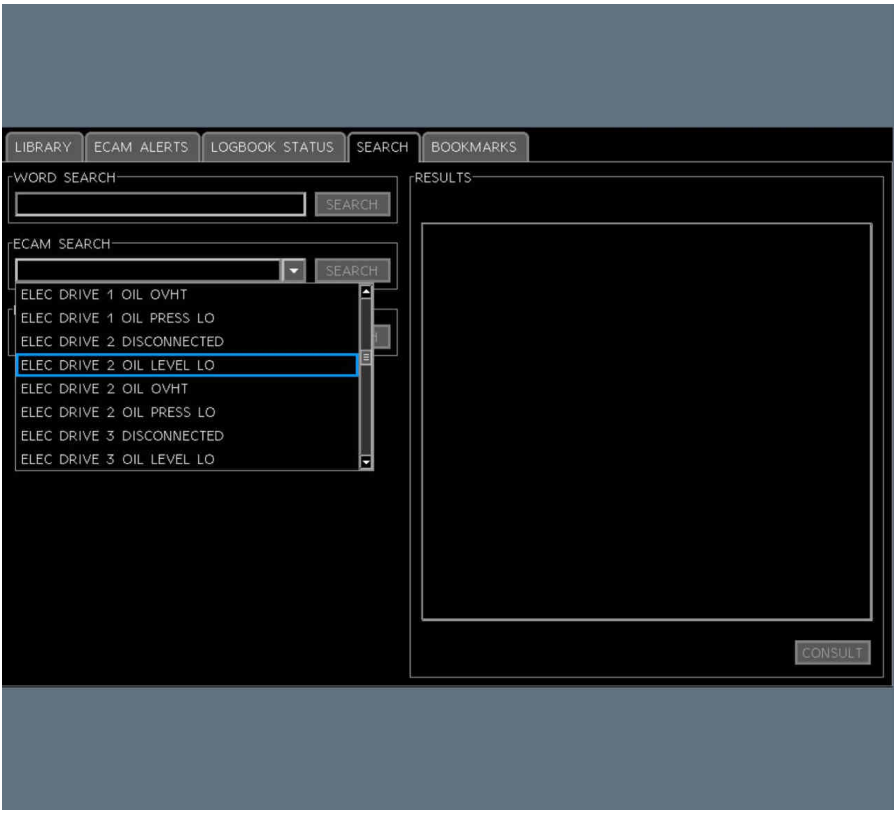

HIDE TREE
SUB-TOPICS
INFO
BOOKMARKS
NOTE
WHAT IF?
ECAM LIST
SEARCH
Flight Crew Operating Manual
FCOM-16 SEP 2008
AIB
Manuals
Flight Crew Operating Manual
LIST OF MODIFICATIONS
SUMMARY OF HIGHLIGHTS
General Information
Aircraft Systems
Procedures
Limitations
Performance
Operations Engineering Bulletin
TDU
Path
Tree
Path : Flight Crew Operating Manual
Flight Crew Operating Manual
LIST OF MODIFICATIONS
SUMMARY OF HIGHLIGHTS
General Information
Aircraft Systems
Procedures
Limitations
Performance
Operations Engineering Bulletins
TDU

SEARCH Panel



Select the ECAM alert in the ECAM SEARCH list.

ECAM Search List

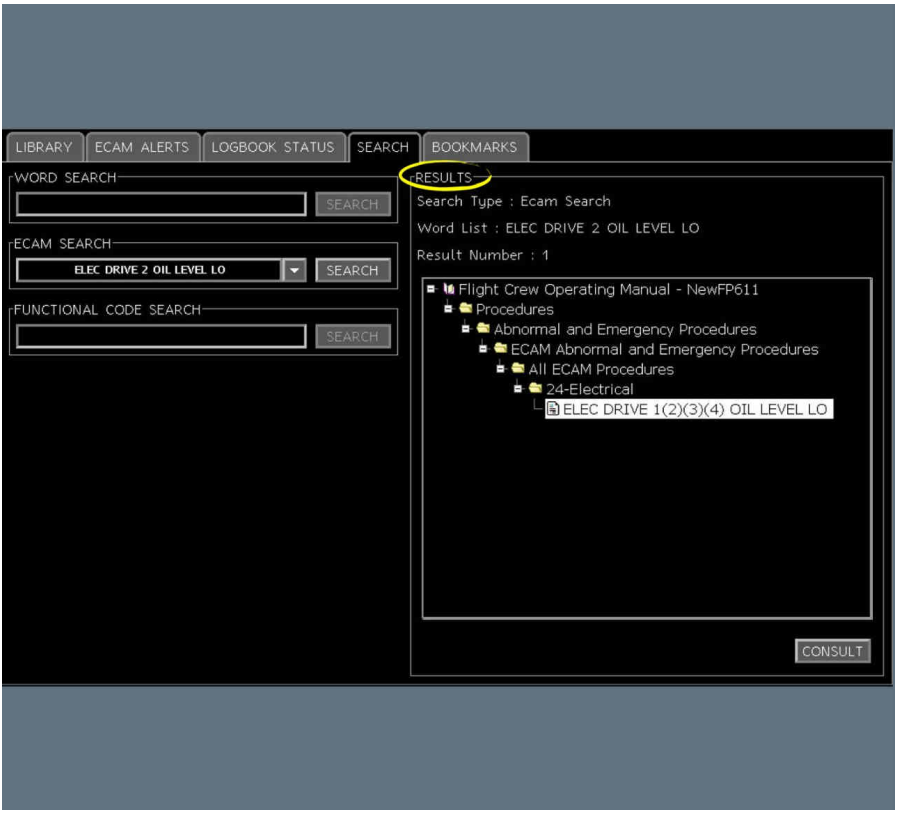


Click on the SEARCH button to start the search.

RESULTS PANEL

The RESULTS window displays the documentary units that are retrieved by the search.
The upper area of the RESULTS window displays the search parameters.
The documentary units appear in a navigation tree in the lower part of the RESULTS window.

RESULT Window

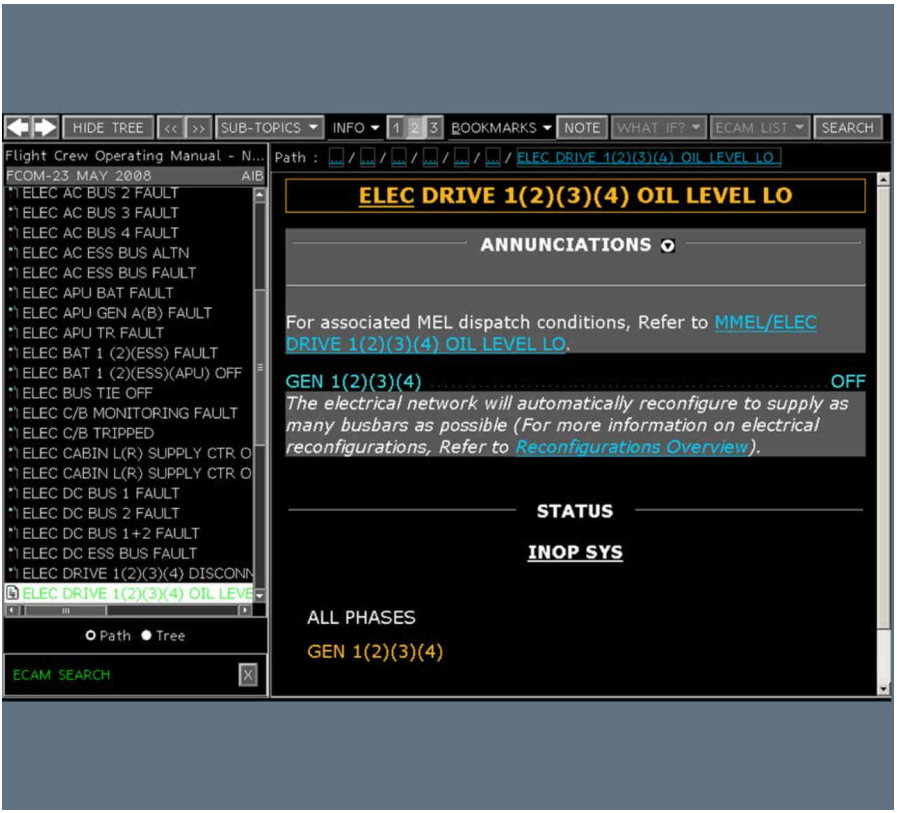


To access the documentary unit, click on the name of the documentary unit and click on the CONSULT button or double click on the name of the documentary unit.

CONSULTATION MODE

In consultation mode, folders and the documentary units that have a search result appear in green in the navigation tree.

Consultation Mode



Note: *The first documentary that the flight crew has selected to display from the RESULT panel may not appear.*
In this case, in the navigation tree, select another documentary unit, then select again the documentary unit that has a search result.

To quit the consultation mode of the search, click on the cross of the ECAM SEARCH area.

Consultation Mode - ECAM Search Area



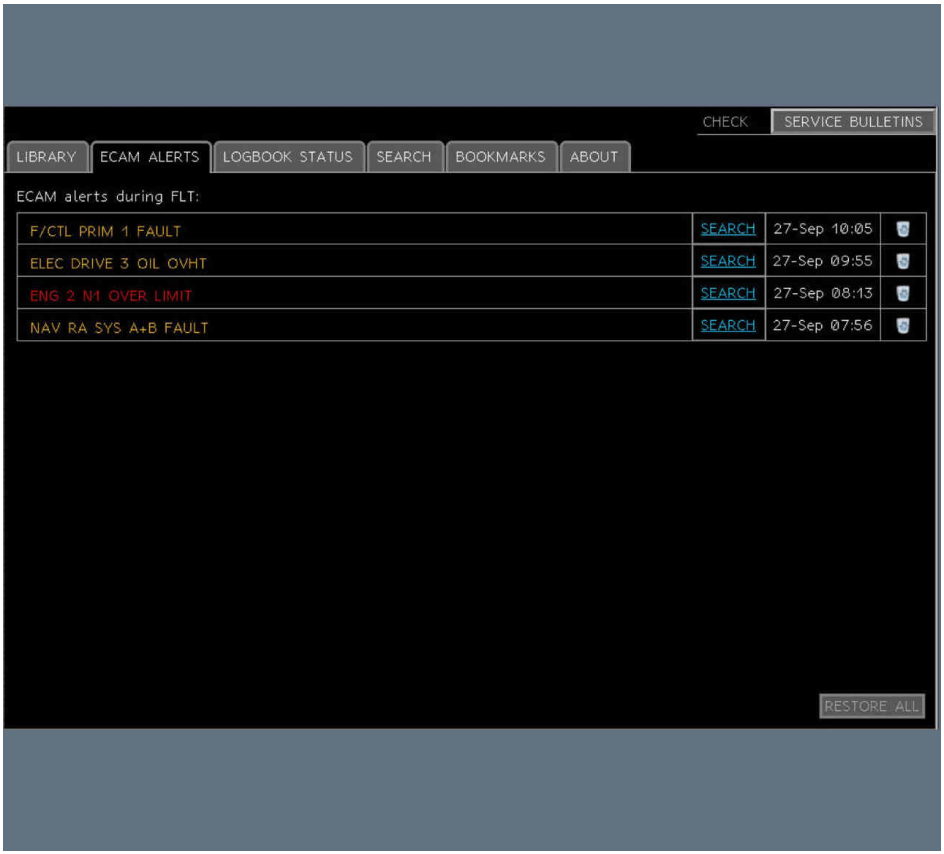
HOW TO USE THE AUTOMATIC CONTEXT

Applicable to: ALL

When an ECAM alert occurs during the flight, the ECAM alert automatically appears on the ECAM ALERTS panel of the OPS LIBRARY.
This enables the flight crew to rapidly access the abnormal or emergency procedure associated with the ECAM alert.

To access the information associated with an ECAM alert that appears in flight:
1. Display the OPS LIBRARY
2. Select the ECAM ALERTS panel.
   All the ECAM alerts that occurred during the flight appear in the chronological order.

ECAM ALERTS Panel



Note: The ECAM alerts appear with the same color as they appear on the ECAM.

3. Select an ECAM alert by clicking on the associated SEARCH button.
   The consultation mode appears. The documentary units associated with the selected ECAM alert and the folders containing these documentary units appear highlighted in green in the navigation tree.

Abnormal & Emergency Procedure



4. To quit the consultation mode of the search, click on the cross of the ECAM SEARCH area.

HOW TO USE THE RETURN TO ECAM FUNCTION

Applicable to: ALL

The Return to ECAM function enables the flight crew to access the documentary units of the MMEL entries chapter of the MMEL(ECAM alerts), that are associated with the MMEL item that is displayed.

1. Display a MMEL item.
2. Click on the ECAM LIST button.

MMEL Item



A drop-down list appears. This drop-down list displays the ECAM alerts, that are associated with the MMEL item that is displayed.

MMEL Item with ECAM LIST



3. Select an ECAM alert in this list.
   The documentary unit from the MMEL Entries chapter of the MMEL, that is associated with the selected ECAM ALERT, appears.

MMEL Entry



4.

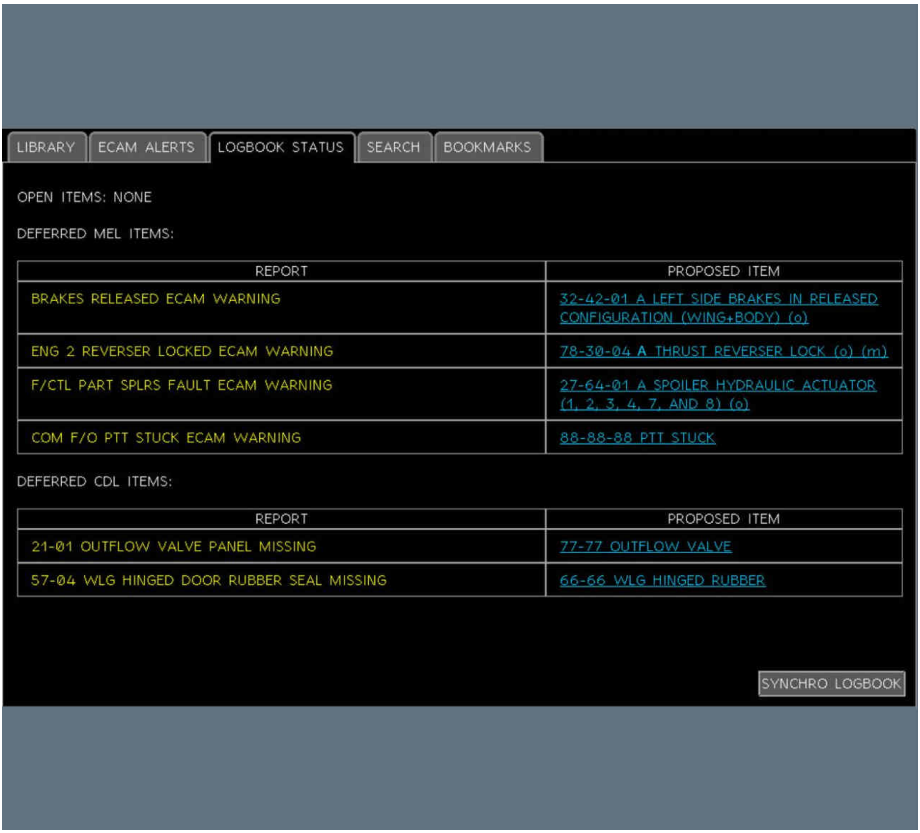
To return to the MMEL item, click on the  button.

HOW TO USE THE LOGBOOK STATUS

Applicable to: ALL

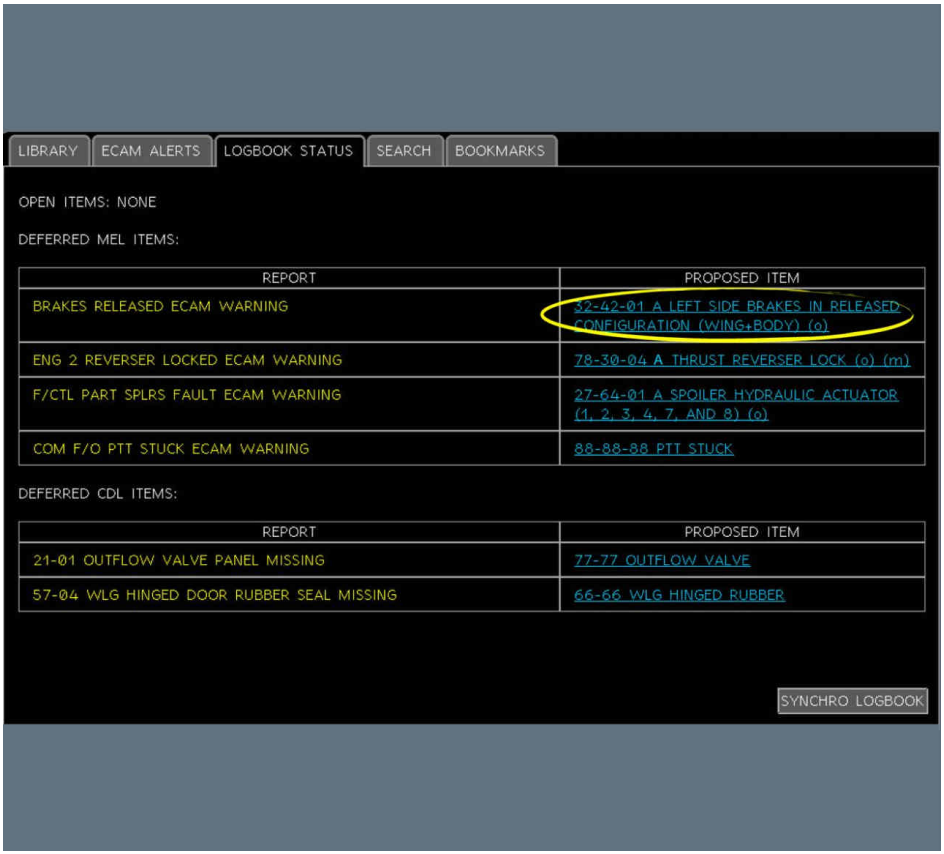
The LOGBOOK STATUS panel enables the flight crew to access the MEL or CDL items, that are associated with the current deferred items of the eLogbook.
The LOGBOOK STATUS panel is active by default.

LOGBOOK STATUS Panel



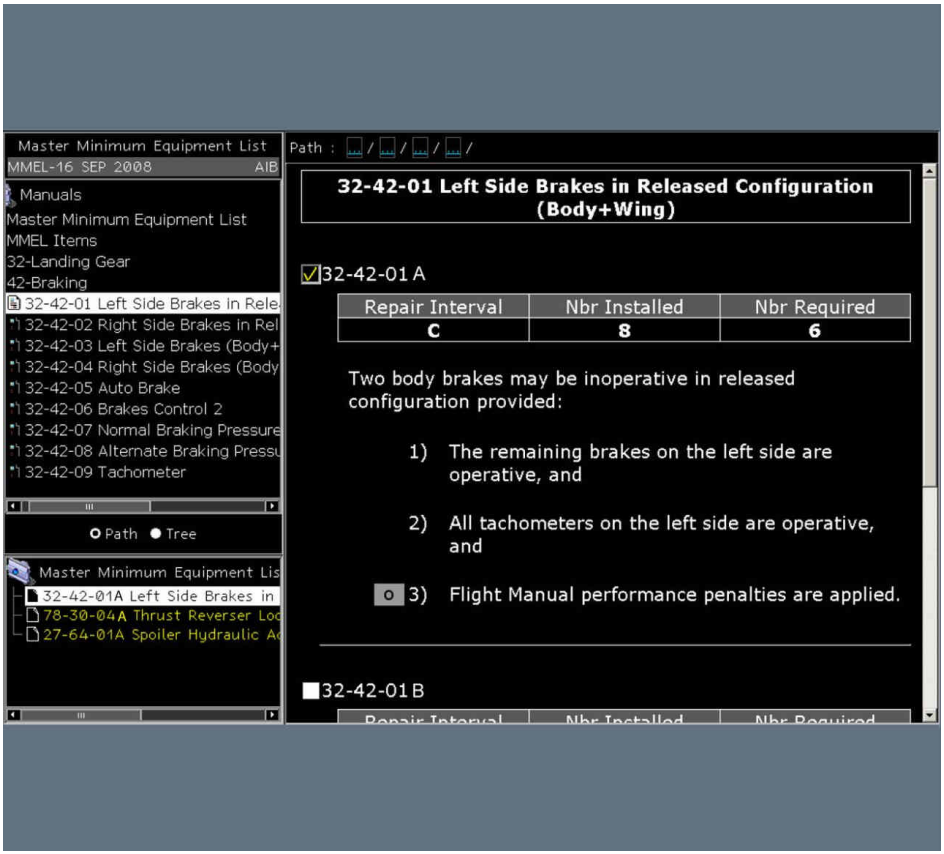
To access the MEL or CDL item associated with a deferred item from the eLogbook:
1. Click on the link located on the row of the item, in the PROPOSED ITEM column.

LOGBOOK STATUS Panel - MEL Link



2. The associated MEL or CDL item appears.
   The box of this MEL or CDL item is automatically ticked.

Deferred Item - Associated MEL Item



Note: *1. The eLogbook application does not send missing parts of the CDL items.*

2. There is no indication to the flight crew when the push/receive function of MEL/CDL items from the eLogbook application to the FLT OPS side is lost. In this case, the LOGBOOK STATUS panel may display an out of date logbook status.
As indicated in the Standard Operating Procedures (SOP), the flight crew must check the dispatch conditions of the aircraft by using the LOGBOOK STATUS panel. If the LOGBOOK STATUS panel disagrees with the aircraft status in the eLogbook application, the flight crew must manually select or unselect the associated MEL/CDL items in the OPS LIBRARY.

HOW TO USE BOOKMARKS

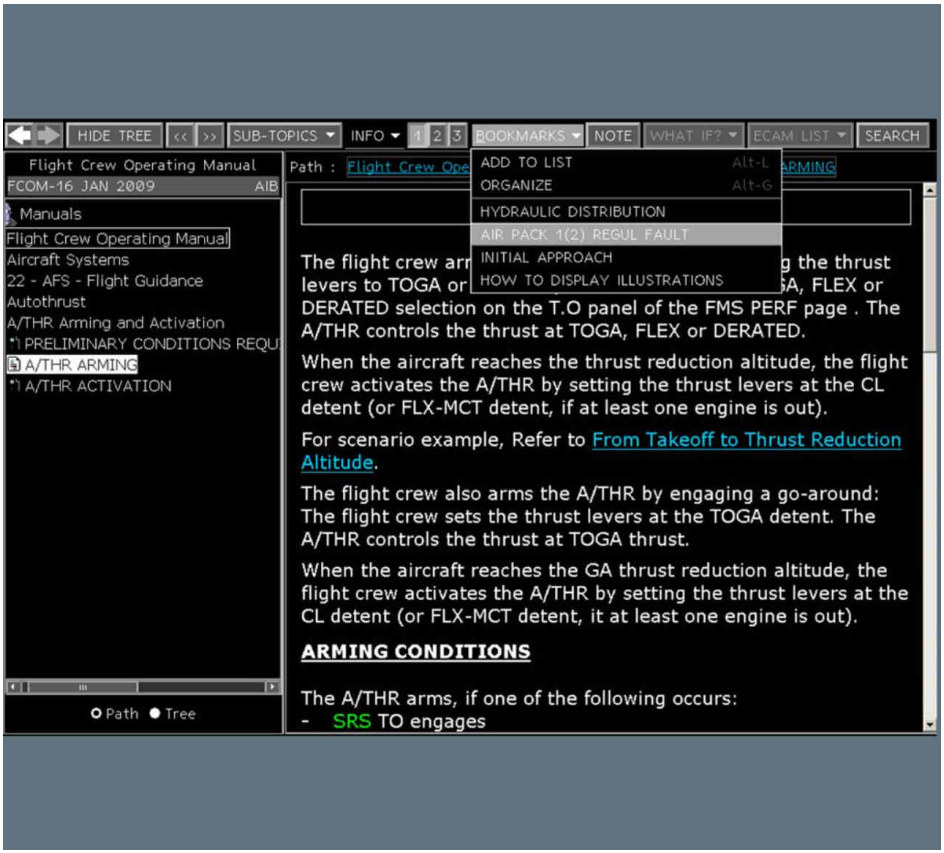
Applicable to: ALL

To add the displayed documentary unit to the list of bookmarks, click on the BOOKMARKS button and select ADD TO LIST.

There are two ways to access documentary units associated with a bookmark:

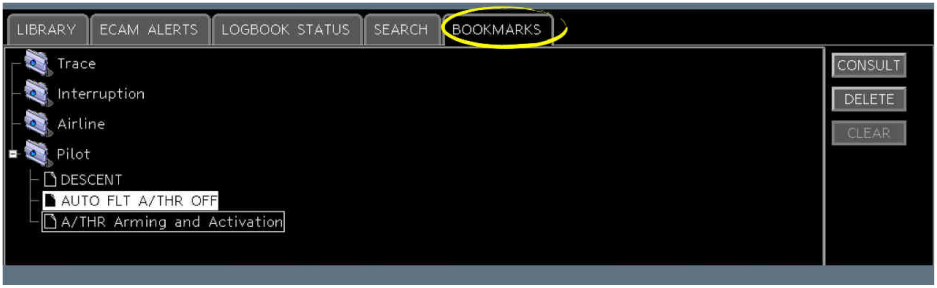
- Click on the BOOKMARKS button and select in the drop-down list the documentary unit, as illustrated below:

Bookmarks Access



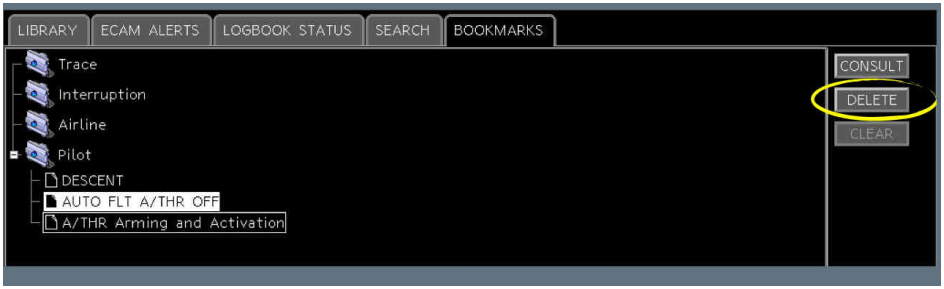
- Click on the FUNCTIONS button and select HOME, then select the BOOKMARKS panel.
  Created bookmarks are saved in the Pilot folder.
  To display a documentary unit, click on the name of the documentary unit in the Pilot folder, then click on the CONSULT button.

Bookmarks - Pilot Folder

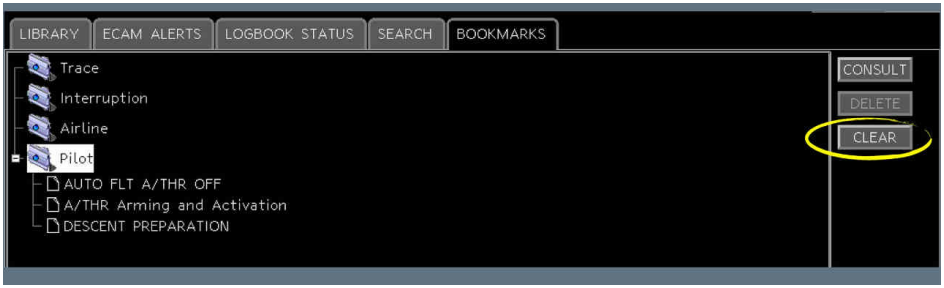


The flight crew can delete the bookmarks:

- To delete one or more bookmarks, select the bookmarks and click on the DELETE button



- To delete all the bookmarks, click on the Pilot folder and on the CLEAR button.



HOW TO USE NOTES

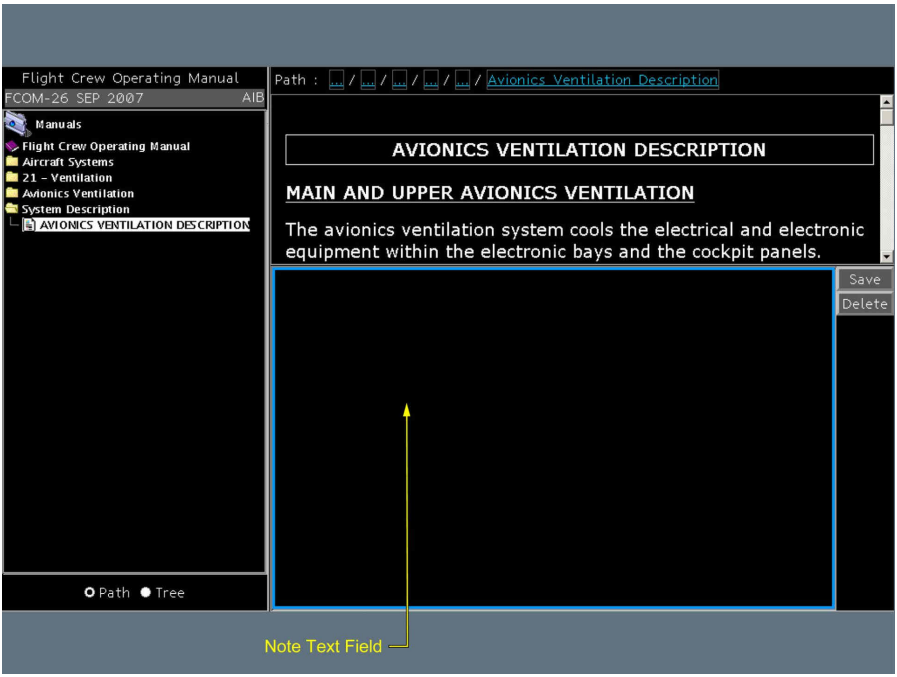
Applicable to: ALL

The flight crew can add notes (free text) to each documentary unit.

CREATE A NOTE

When a documentary unit is displayed, click on the NOTE button to display the Note Text field. Type the text of the note in the field, and click on the Save button to save it.

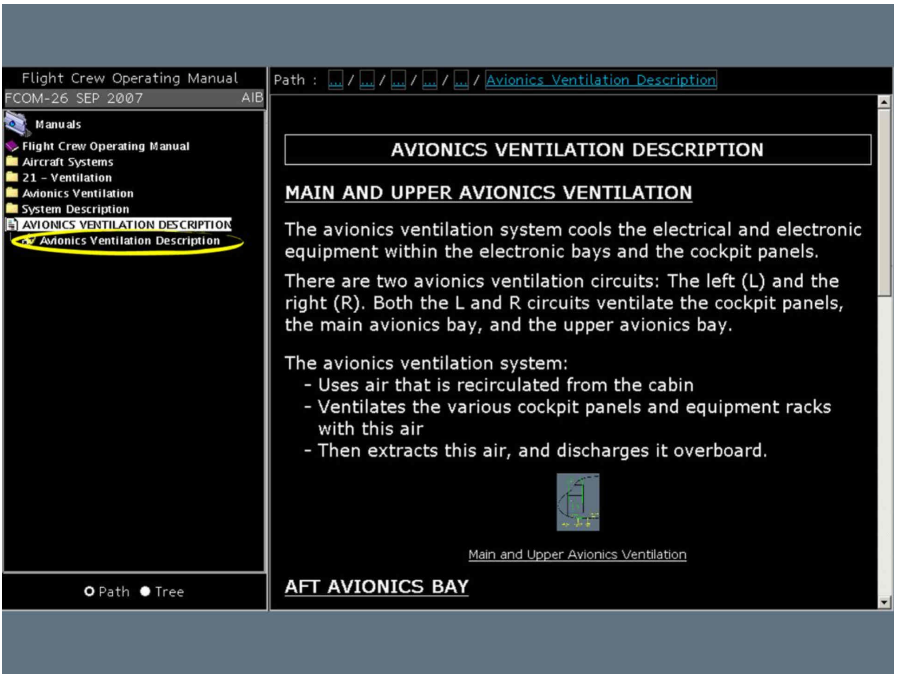
Note Text Field



DISPLAY A NOTE

When a note is associated with a documentary unit, a new element, attached to the documentary unit, appears in the navigation tree. This element includes the note and has the same name as the documentary unit.

Documentary Unit with a Note



To display the note, click on this section in the navigation tree, or click on the NOTE button.
To change the text of the note, type the new text in the text field, and click on the Save button.
To delete the note, click on the Delete button. The element in the navigation tree then disappears.
To hide the note, click again on the NOTE button, or click on the navigation tree to display another documentary unit.

HOW TO USE THE "WHAT IF" FUNCTION

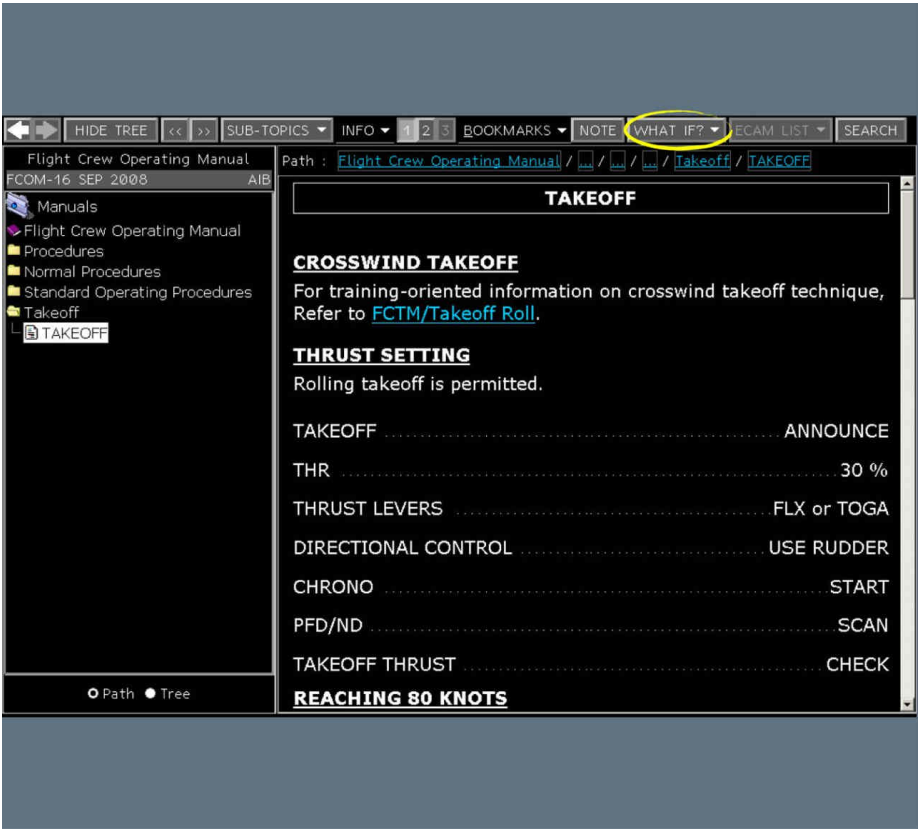
Applicable to: ALL

The "What If" function provides the flight crew with a quick access to possible scenarios and information that are related to the displayed documentary unit.

The associated information may be:
- Procedures to be applied
- Failed system description or abnormal operations
- Status of the controls and indicators on the selected scenarios.

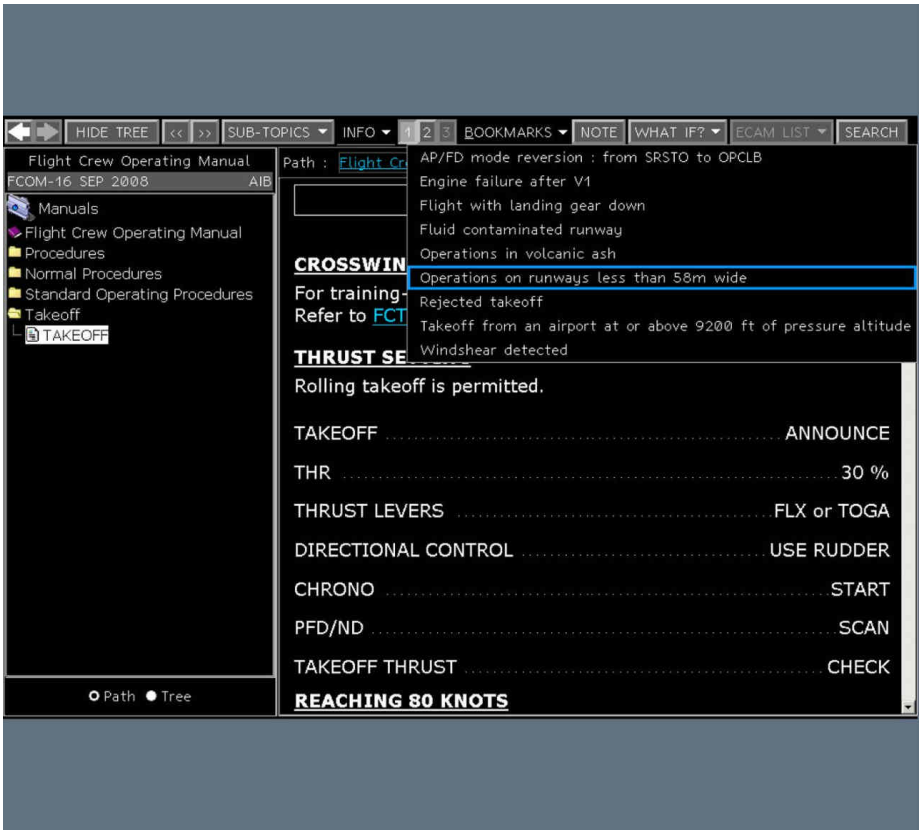
The "What If" function and the WHAT IF button are active when the documentary unit includes such information.

Documentary Unit with the "What If" Function Active



Click on the WHAT IF button to display the drop-down list and select the required documentary unit.

"What If" Drop-Down List



To return to the previous documentary unit, click on the  button, or click on the FUNCTIONS button and select PREVIOUS.

Note: *Some hyperlinks in the drop-down lists are not active. When the flight crew selects a hyperlink in the drop-down list that is not active, an Error message appears, as illustrated below. Click on OK to continue.*

"What If" Error Message



HOW TO CLOSE THE OPS LIBRARY

Applicable to: ALL

To close the OPS LIBRARY, click on the FUNCTIONS button and select CLOSE APPLICATION.

HOW TO EXIT THE OIS SESSION

Applicable to: ALL

There are two ways to exit the current session and return to the Login page:
- Return to the FLT OPS MENU page and click on the EXIT SESSION button, or
- Click on the MENU button and select EXIT SESSION.

Note: *The flight crew cannot exit the OIS session when the FLT FOLDER application is open.*

Intentionally left blank

How to Use Performance Applications

HOW TO START PERFORMANCE APPLICATIONS

Applicable to: ALL

Note: The flight crew cannot start performance applications if all mandatory fields of the FLT OPS STS page are not completed.

TAKEOFF PERFORMANCE APPLICATION

To start the Takeoff performance application:
- Click on the MENU button and select T.O PERF, or
- On the FLT OPS MENU page, click on the T.O PERF button.

Refer to PER-TOF-TOI T.O PERF Interface .

LANDING PERFORMANCE APPLICATION

To start the Landing performance application:
- Click on the MENU button and select LDG PERF, or
- On the FLT OPS MENU page, click on the LDG PERF button.

Refer to PER-LND-LDI LDG PERF Interface .

LOADSHEET APPLICATION

To start the Loadsheet performance application:
- Click on the MENU button and select LOADSHEET, or
- On the FLT OPS MENU page, click on the LOADSHEET button.

Refer to PER-LOD-GEN Loadsheet Application .

IN-FLIGHT PERFORMANCE APPLICATION

To start the In-flight performance application:
- Click on the MENU button and select IN-FLT PERF, or
- On the FLT OPS MENU page, click on the IN-FLT PERF button.

Refer to PER-OPD-GEN IN-FLT PERF Application - ATMO Module .

HOW TO CLOSE PERFORMANCE APPLICATIONS

Applicable to: ALL

To close a performance application, click on the FUNCTIONS button and select CLOSE APPLICATION.

Intentionally left blank

How to Use the FLT FOLDER

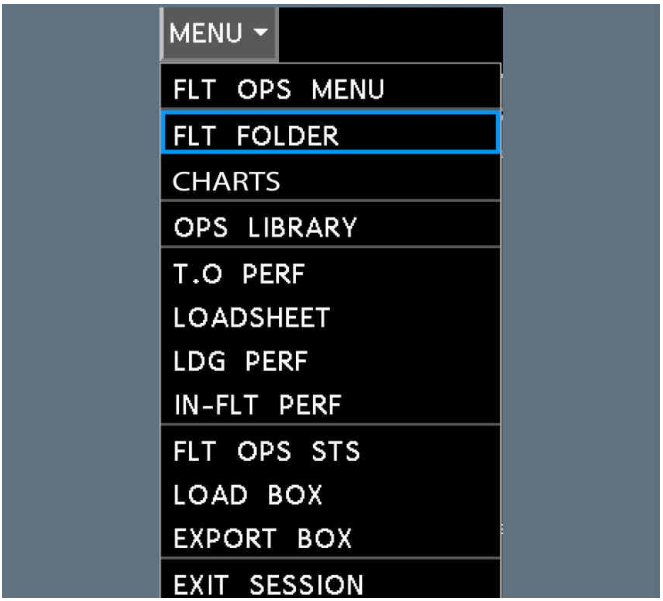
HOW TO START THE FLT FOLDER

Applicable to: ALL

To start the FLT FOLDER application:

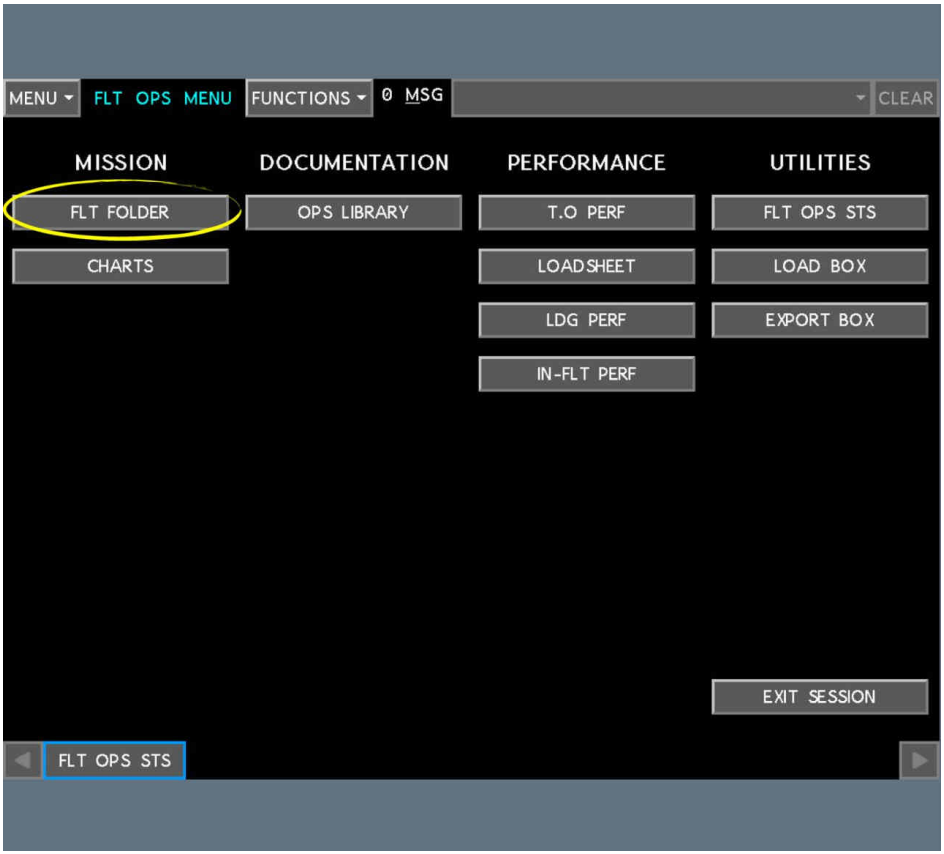
- Click on the MENU button and select FLT FOLDER, or

MENU Drop-down List

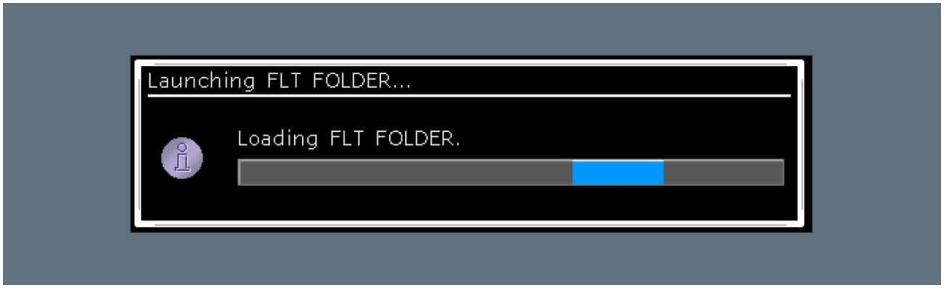


- On the FLT OPS MENU page, click on the FLT FOLDER button.

FLT OPS MENU Page



L2 *Note:* *The FLT FOLDER application takes about 50 s to start. During start, the following popup appears.*



HOW TO ACCESS AN EFF

Applicable to: ALL

GENERAL

An EFF, or an EFF update, is prepared on ground by airline operations.
The transfer of the EFF to the aircraft is done via a USB key or via communication means (gatelink or SATCOM).

There are three steps to access an EFF or an EFF update in the FLT FOLDER application:
1. The flight crew loads the EFF or the EFF update by using the LOAD BOX.

   Note: *As the LOAD BOX loads the EFF or EFF updates on all connected laptops, the flight crew needs to load the EFF or the EFF update on one laptop only.*

2. The EFF or the EFF update is imported into each flight crewmember's FLT FOLDER application.
3. Each flight crewmember selects the EFF to open in the EFF list.

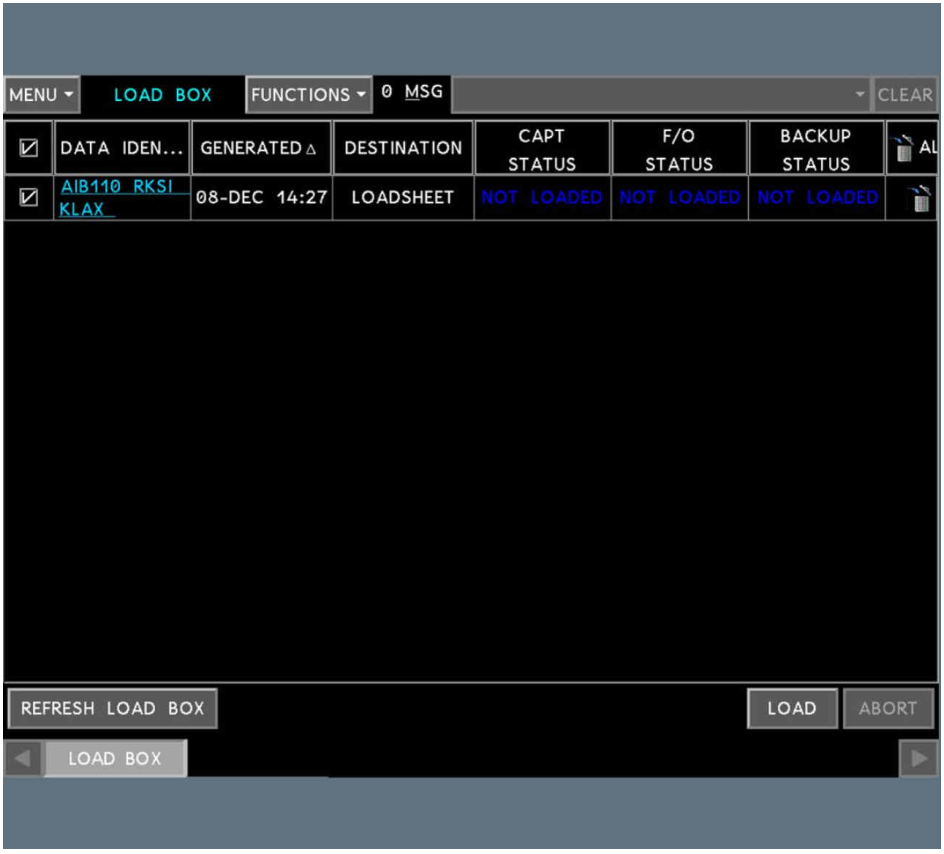
LOAD AN EFF VIA A USB DEVICE

To load an EFF via a USB device:
1. Plug the USB device into one of the available USB ports of the laptop.
2. Click on the MENU button, and select LOAD BOX to open the LOAD BOX.
   The LOAD BOX automatically detects new data to load, and adds this data to the list of data to load.

Note: If the flight crewmember plugs the USB device after having opened the LOAD BOX, the flight crewmember should click on the REFRESH LOAD BOX button to display the content of the USB device.

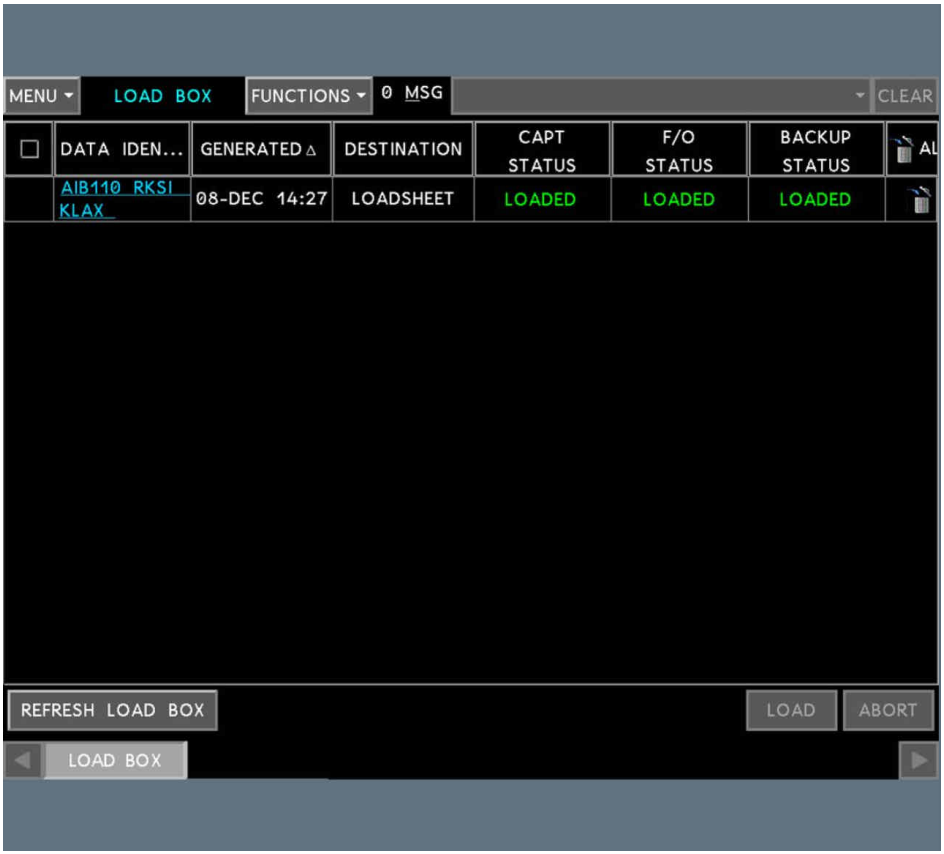
3. Select the EFF to load.

EFF to load



4. Click on the LOAD button to start the loading process.
   When the loading process is completed, "LOADED" appears in the STATUS column for each laptop that is connected to the network.

EFF loaded



Note: *If the loading process fails on one laptop, "FAULT" appears in the associated STATUS column. This indicates that the loading process has not been successful on this laptop. In this case, select again the EFF and restart the data loading process by clicking on the LOAD button.*

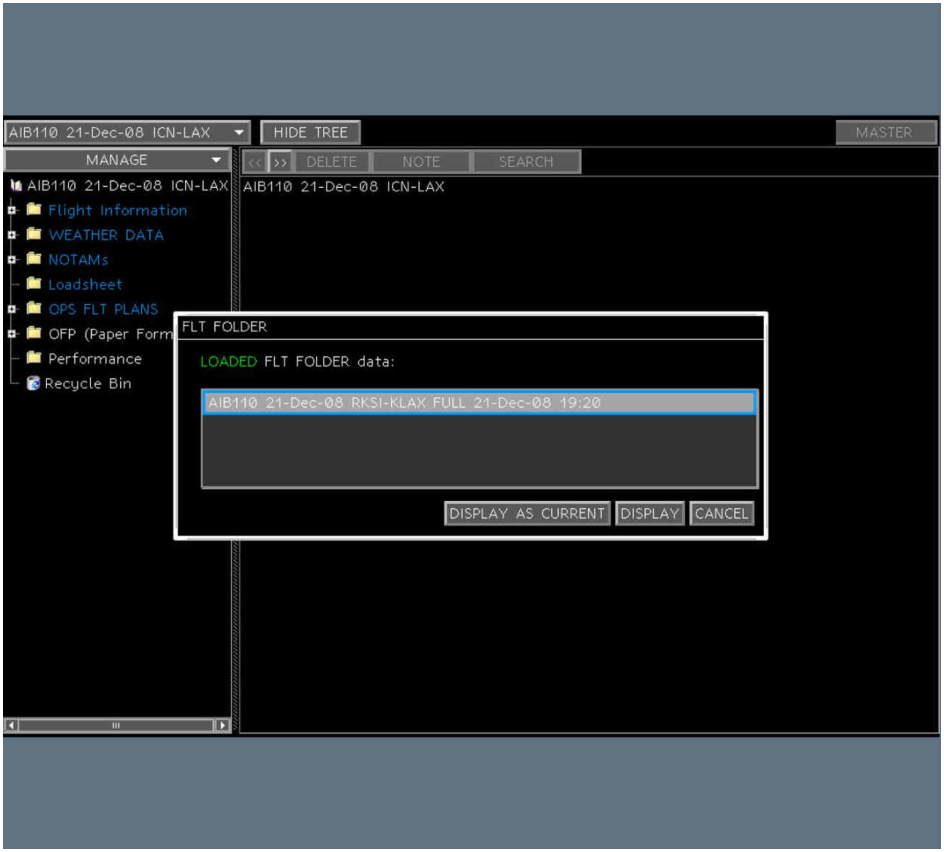
5. Unplug the USB device.

IMPORT AND OPEN THE EFF

1. Start the FLT FOLDER application.

When a flight crewmember starts the FLT FOLDER application, or sets the FLT FOLDER application in foreground, the application automatically imports the EFF that the flight crew loaded from the LOAD BOX.
A pop-up appears, and displays all the EFFs that have been loaded.

Import EFF



2. Select on the pop-up the EFF to use.
3. Click on the DISPLAY AS CURRENT button to display the selected EFF, and promote it as the current one, or click on the DISPLAY button to only display the EFF.

Note: *The current EFF is the EFF corresponding to the flight.*

When a flight crewmember promoted the selected EFF as current, the FLT FOLDER applications synchronizes between the Captain's laptop and the First Officer's laptop. The other flight crewmember does not need to promote the EFF as current.

HOW TO SIGN A DOCUMENT

Applicable to: ALL

SIGN A DOCUMENT

To sign a document that is displayed, click on the SIGN button on the top right hand corner of the document window.
The FLT FOLDER application flags the document as signed. The SIGNED button appears on the top right hand corner of the document window, instead of the SIGN button.
For more information, *Refer to DSC-46-20-20-110 Document Window* .

REMOVE THE SIGNED FLAG TO A SIGNED DOCUMENT

To remove the signed flag to a document that the flight crew already signed, click on the SIGNED button on the top right hand corner of the document window.
The FLT FOLDER applications unflags the document. The SIGN button appears on the top right hand corner of the document window, instead of the SIGNED button.

HOW TO CHECK A DOCUMENT

Applicable to: ALL

TO CHECK A DOCUMENT

To check the documents that is displayed, click on the CHECK button on the top right hand corner of the document window.
The FLT FOLDER application flags the document as checked. The CHECKED button appears on the top right hand corner of the document window, instead of the CHECK button.
For more information, *Refer to DSC-46-20-20-110 Document Window* .

REMOVE THE CHECKED FLAG TO A CHECKED DOCUMENT

To remove the checked flag to a document that the flight crew already checked, click on the CHECKED button on the top right hand corner of the document window.
The FLT FOLDER applications unflags the document. The CHECK button appears on the top right hand corner of the document window, instead of the CHECKED button.

HOW TO USE NOTES

Applicable to: ALL

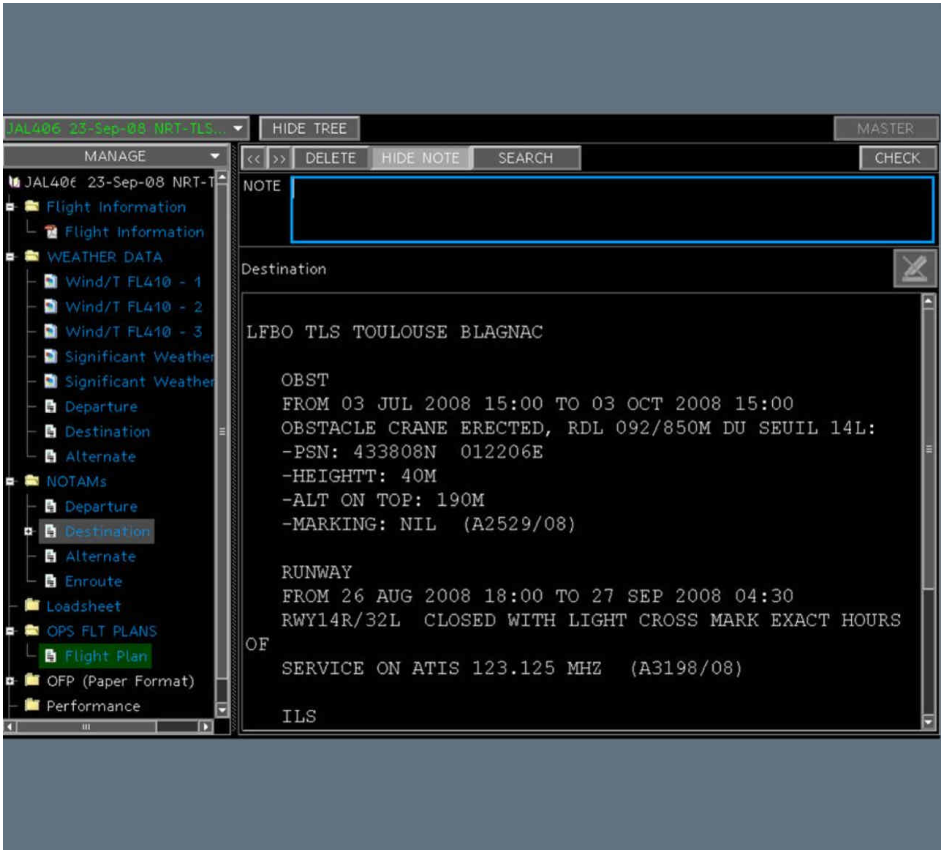
CREATE A NOTE

To add a note to a document:

1. Select the document to add a note to, then click on the NOTE button.

L2 A note box appears on top of the document window. The document content display is resized.

Document with Note Box



L1 2. Type the content of the note.

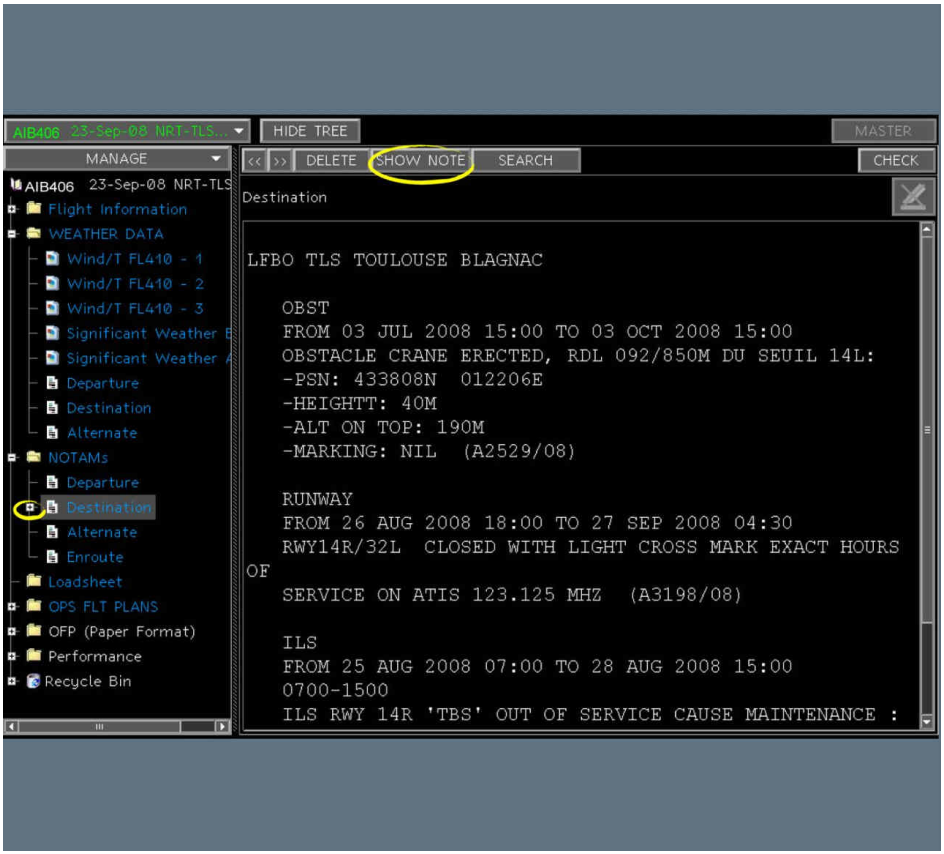
3. Press the ENTER key on the keyboard to save the note.

L2 The note box disappears.

L1

In the navigation tree, the + icon appears in front of the document name, and the SHOW NOTE button appears in the FLT OPS MENU, instead of the NOTE button. This indicates that a note is attached to the document.

Document with a Note



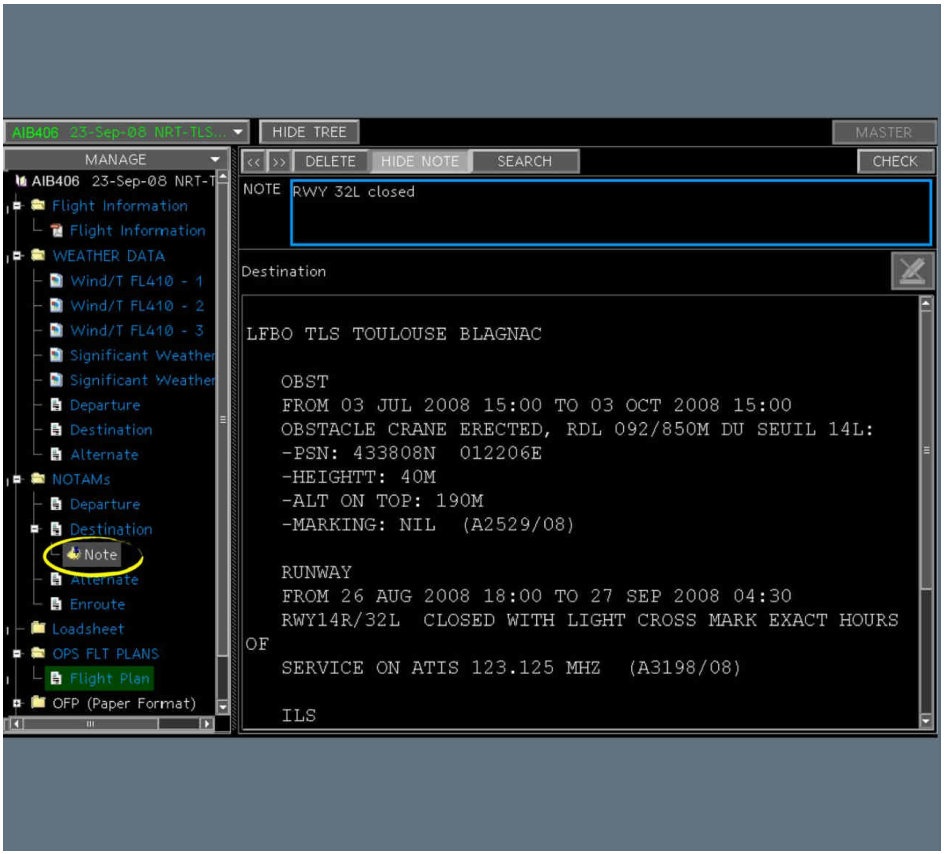
DISPLAY A NOTE

There are two ways to display a note that is attached to a document:

- Click on the note in the navigation tree

L2 The note box appears.

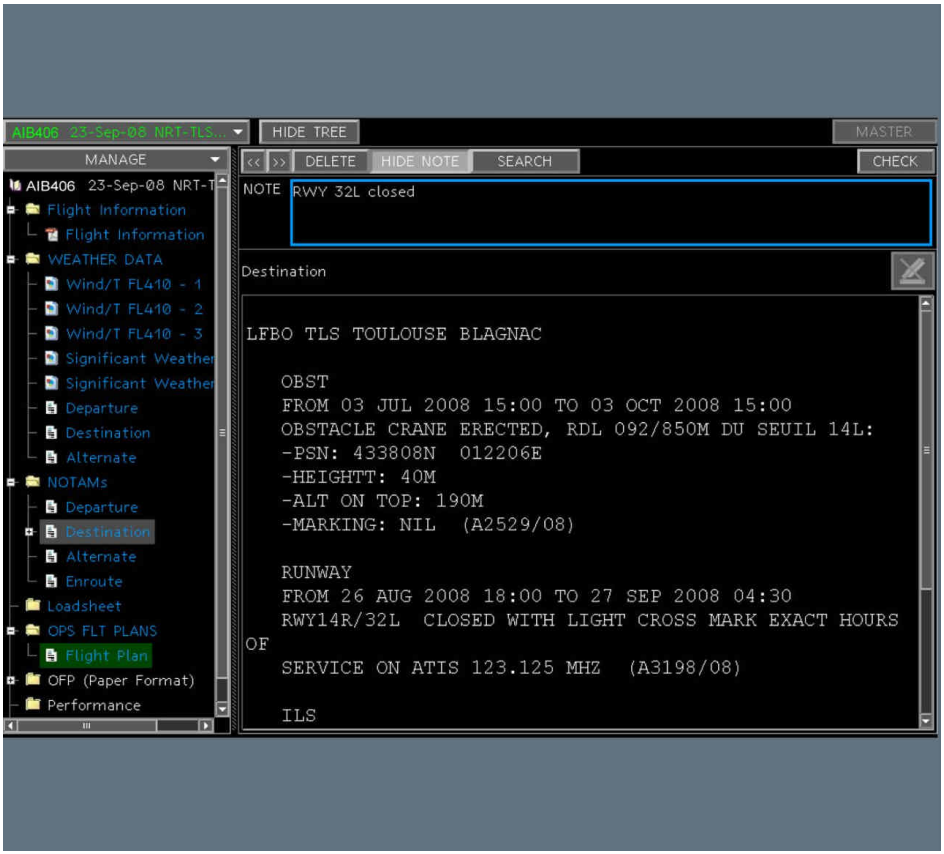
Note in the Navigation Tree



L1 - Select in the navigation tree the document the note is attached to, then click on the NOTE button.

L2 The note box appears.

Document with the Note Displayed



L1 To close the note box at any time, click on the HIDE NOTE button.

CHANGE OR DELETE A NOTE

To change the content of a note:

1. Display the note.
2. Change the content of the note.
3. Press the ENTER key on the keyboard.

L2 The note box disappears.

L1 To delete a note:

1. Display the note.
2. Remove the text in the note box, then press the ENTER key on the keyboard.

The  icon disappears In the navigation tree.

L2 The note box disappears, and the NOTE button appears in the FLT OPS Menu.

HOW TO USE WORD SEARCH

Applicable to: ALL

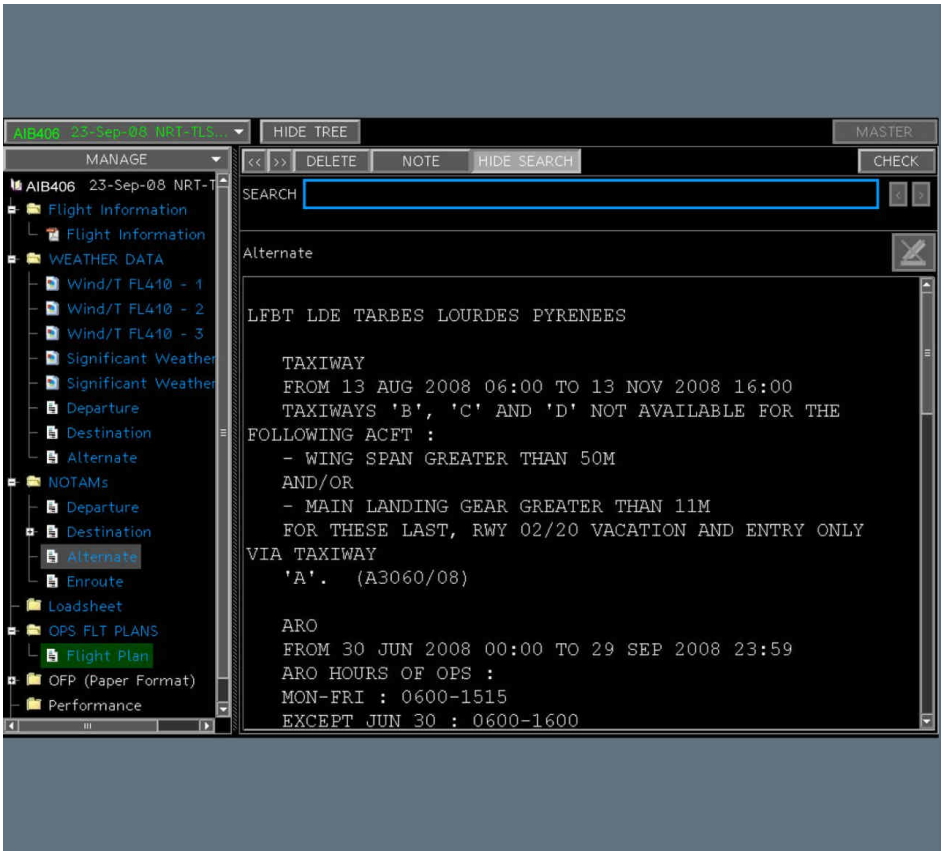
It is possible to search for one or more words in text documents.

To search for text in a document:

1. Select the document to search in.
2. Click on the SEARCH button in the FLT OPS menu.

L2 A search box appears at the top of the document window. The display of the document content is resized.

Document - Search Box



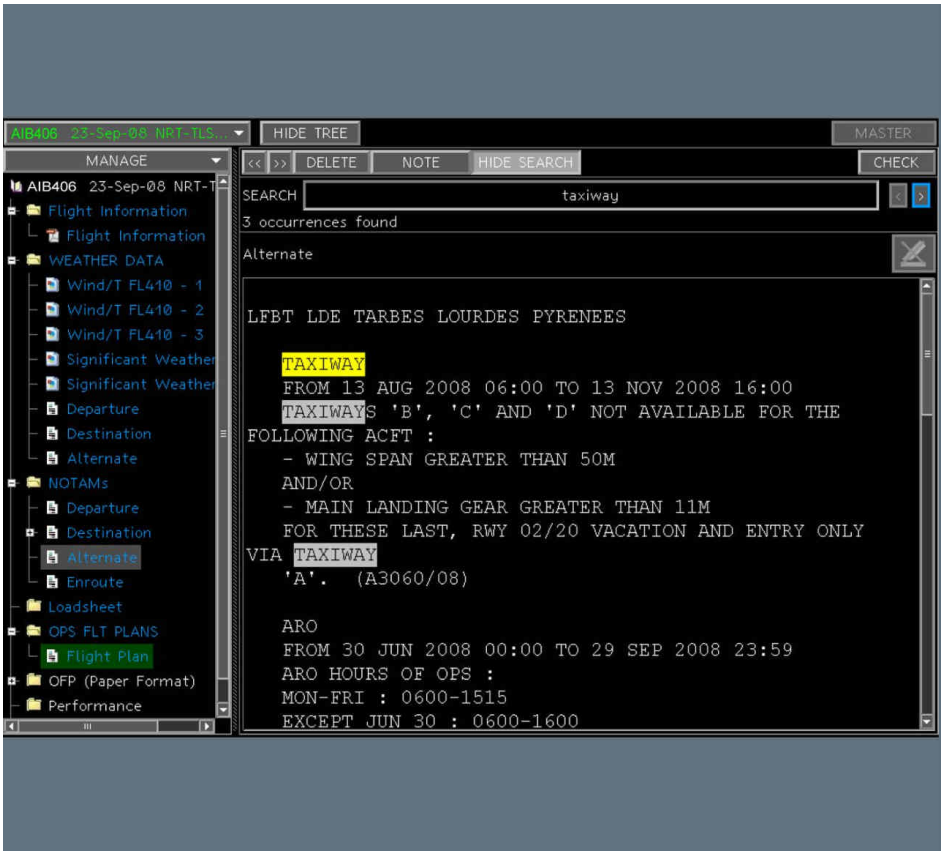
L1 3. Enter the words to search for in the WORD entry field.

L2 The search engine searches for document containing each word of the search string.

L1 4. Press the ENTER key on the keyboard to initiate the search.

L2 The cursor jumps to the first word that matches one of the words searched for.
The number of occurrences appears in the search box.

Document - Search Result



L1 5.

Click on the < and > buttons in the search box to find a previous or following match.

To close the search box, click on the HIDE SEARCH button in the FLT OPS menu.

HOW TO USE A FLIGHT PLAN

Applicable to: ALL

GENERAL

A flight plan document can be composed of multiple panels:
- One panel with data for FMS initlialization (FMS INIT panel)
- One panel with flight information (FLT INFO panel)
- One panel with alternate airports information (ALTN panel)
- One or more panels with a navigation log, that enables the flight crew to perform the flight follow up (NAV LOG panels)
- One panel for flight reporting (FLT REPORT panel).

The operator can customize the flight plan.
The operator can define additional information in relation to the entry fields. Those information appear when the cursor moves over the associated entry field.



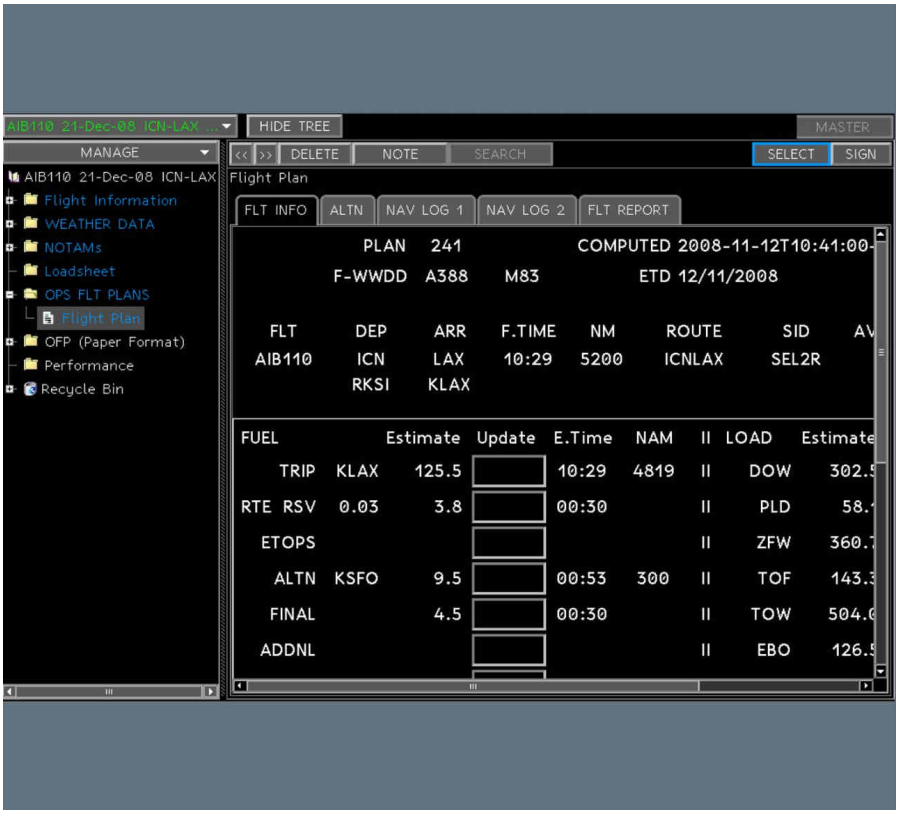
The Operator can define a range associated with some of the parameters. If the parameter exceeds the defined range, it appears in amber.



ACTIVATE A FLIGHT PLAN

An EFF can have various flight plans. However, just like the FMS, only one flight plan can be active.
To active a flight plan, click on the SELECT button.

Flight Plan to Activate



In the navigation tree, the background of the document title changes to green, and the SELECTED button appears, instead of the SELECT button.

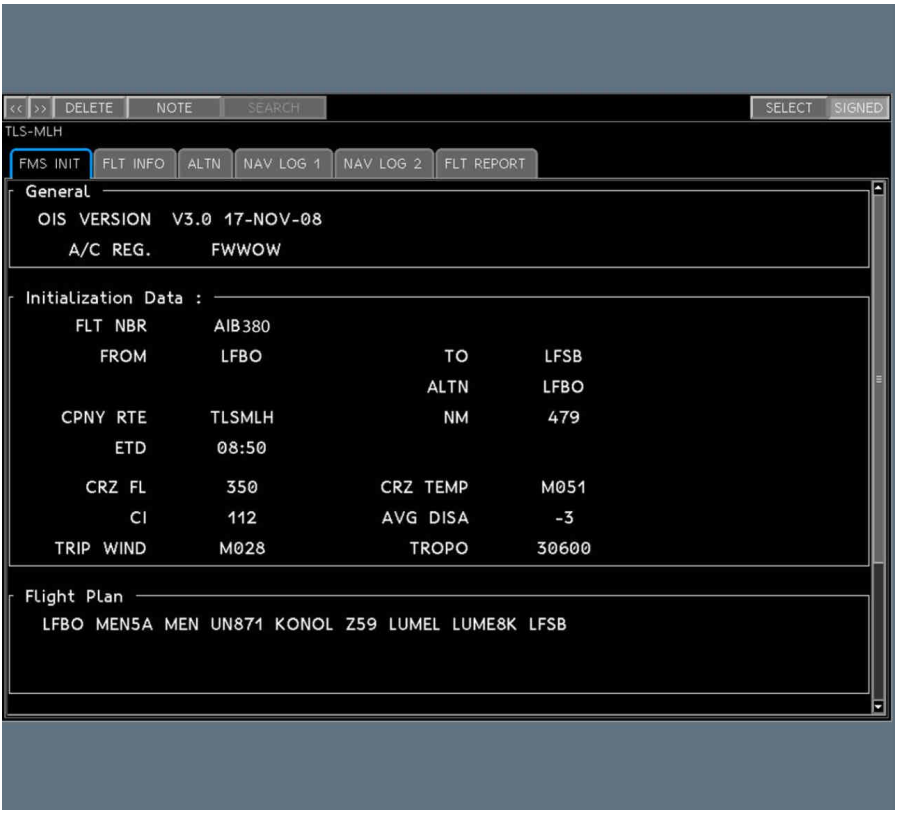
Flight Plan Activated



FMS INIT PANEL

The FMS INIT panel displays information that is necessary for the flight crew to initialize the FMS.

FMS INIT Panel



FLT INFO PANEL

The FLT INFO panel displays the time, fuel and weights predictions for the flight.
This panel has editable fields, that enable the flight crew to enter the actual information (fuel, times, weights).

FLT INFO Panel



ALTN PANEL

The ALTN panel provides the flight crew with the information to perform the flight from the destination airport to the alternate airports, in the case of diversion.

ALTN Panel



NAV LOG PANEL

The NAV LOG panel (Flight Follow-Up) provides a means to log the flight progress (i.e. fuel and time checks).
It is an interactive tabular representation of the flight plan with value labels and entry fields.
If the flight crew wants to change the flight plan, the NAV LOG panel provides several functions that enable the flight crew to record the required information on the flight plan.

NAV LOG Panel



When the flight crew navigates through the flight plan, they can display the flown waypoint by clicking on the FLOWN WPT button.

GET THE MASTER STATUS

To be able to fill in or modify the flight plan on the NAV LOG panel, the flight crewmember who performs the flight follow up must have the master status.
To get the master status, click on the GET MASTER button.
In this case, the flight plan in the EFF of the other flight crewmember is in read-only.

Note: *Only one flight crewmember can have the master status for an EFF.*

INSERT A NEW WAYPOINT FROM A WAYPOINT IN THE FLIGHT PLAN

The air traffic controller can permit the flight crew to perform a direct to a next waypoint, from an initial waypoint.

To record the new clearance in the flight plan on the NAV LOG panel:

1. Click on the arrow on the right of the initial waypoint.

Insert Next Waypoint from Initial Waypoint



2. On the drop-down list, select NEXT WPT.
   The following pop-up appears.

Next Waypoint - Drop down List



On the pop-up, the drop-down list enables the flight crew to select a waypoint from the flight plan.

3. Choose the next waypoint on the drop-down list, or enter the name of the next waypoint, if it does not belong to the flight plan.

Next Waypoint Selected



4. Click on the OK button.

- If the next waypoint belongs to the flight plan, all the waypoints between the initial waypoint and the next waypoint are greyed. The next waypoint appears in the DIRTO field of the initial waypoint.

Next Waypoint from the Flight Plan



- If the next waypoint does not belong to the flight plan, the next waypoint appears on the flight plan just after the initial waypoint.

Next Waypoint Outside the Flight Plan



REMOVE AN INSERTED WAYPOINT FROM THE FLIGHT PLAN

To remove a waypoint, that the flight crew inserted in the flight plan:

1. Click on the arrow on the right of the waypoint to remove.

Waypoint to Remove



2. In the drop-down list, select DELETE.
   The following pop-up appears.

Delete - Pop-up



3. Click on the OK button.
   The waypoint is removed from the flight plan.

Waypoint Removed from the Flight Plan



PERFORM AUTOMATIC FLIGHT FOLLOW-UP (FFU)

The automatic FFU enables the flight crew to collect from the avionics the data that must be recorded on the flight plan for the flight follow-up.
The automatic FFU is performed when the aircraft is in FMS cruise flight phase.
The position of the aircraft is collected by the FLT FOLDER application every minute. When a waypoint from the flight plan is close to the position of the aircraft, the position is collected every 20 s.

To automatic FFU is performed as following:

1. When the distance between the collected position of the aircraft and a waypoint of the flight plan is less than 7 nm, the waypoint is considered as overflown.
   On the navigation log, the line of the flown waypoint, the data that comes from avionics, and the data that is associated with the waypoint, appear in a yellow square.

Waypoint to Check



2. To permanently save the data, the flight crew must validate the data.
   To validate the data, tick the FUEL CHK box.
3. When the flight crew checked the data, the data coming from the avionics is saved.

Waypoint - Checked



HOW TO PRINT A DOCUMENT

Applicable to: ALL

To print a document, select the document to print and click on the PRINT button on the FLT OPS menu.

HOW TO STORE IN AN EFF

Applicable to: ALL

The flight crew can store, in the current EFF, a snapshot of performance computations. The flight crew performs this computation with one of the performance applications.

To store the result page of a computation in the current EFF:
1. Perform the computation in the performance application.
2. Click on the FUNCTIONS button and select STORE.
3. When the document is stored, the following message appears.

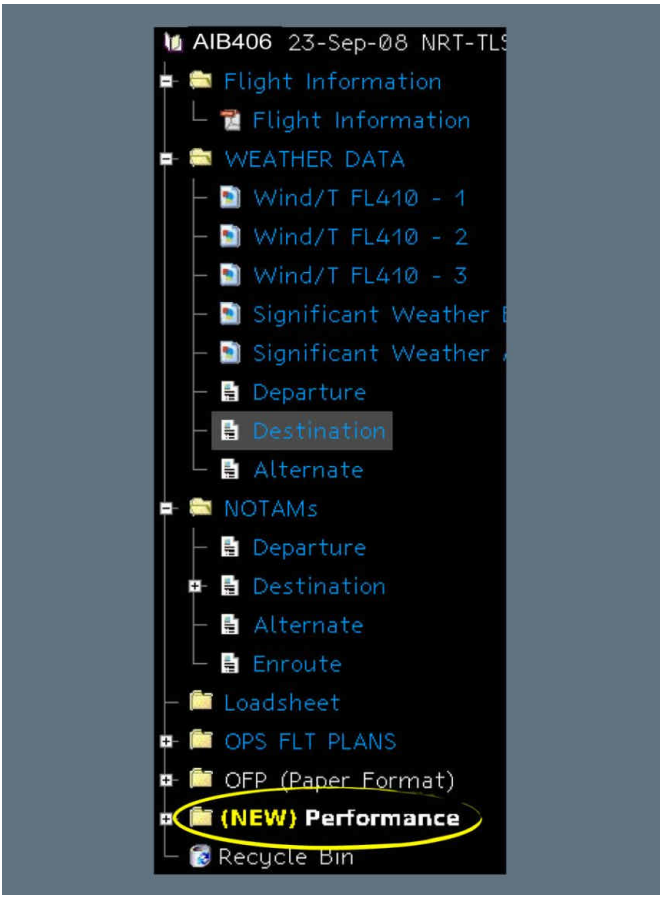
Document Stored Message



Click on the OK button.

4. Display the FLT FOLDER application.
   A new document appears in the navigation tree of the current EFF, with the **(NEW)** symbol.

Navigation Tree



5. Open the folder, and click on the document to display the snapshot.
   The name of the document contains the name of the application that the flight crew used to perform the calculation (TOPA, LDPA, IFPA or WBA).

Document Stored in the EFF



HOW TO EXPORT AN EFF

Applicable to: ALL

GENERAL

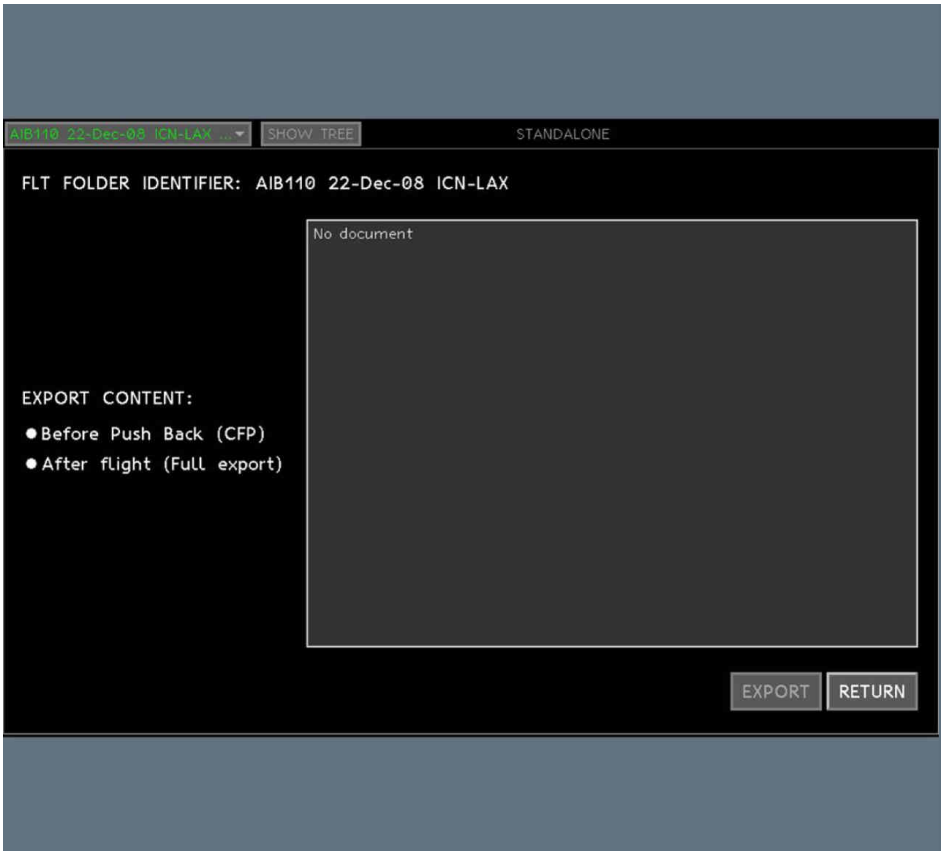
The flight crew can export an EFF:
- Before push-back, in order to send a part of the EFF (e.g. loadsheet) to the airline operations center for regulatory or reporting purposes
- After landing, to close the EFF, and send to the airline operations center all the documents that have to be archived.

There are two main steps to export an EFF:
1. The flight crew exports the EFF from the FLT FOLDER application to the EXPORT BOX.
2. In the EXPORT BOX, the flight crew sends the EFF to the ground via a USB key, or via wireless (gatelink or SATCOM).

SEND THE EFF TO THE GROUND VIA A USB DEVICE

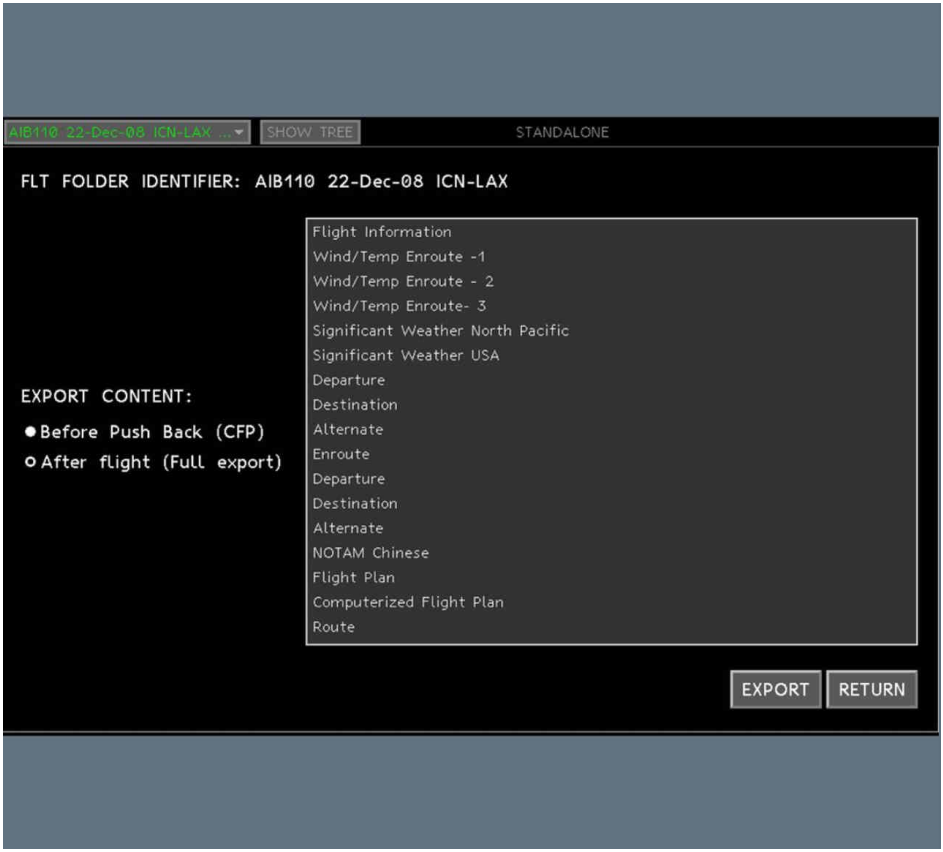
1. Plug the USB device into one of the available USB ports in the laptop package.
2. Click on the MANAGE button and select EXPORT FLIGHT FOLDER.
   The following page appears.

Flight Folder Export



3. Select the type of export to perform:
   - Select "Before Push Back" to send a part of the content of the EFF, that has been defined to be exported before the departure of the flight, to the EXPORT BOX
     In this case, the EFF status does not change: It remains current. The flight crew can still change the content of the EFF.
   - Select "Full Export" to send the whole content of the EFF to the EXPORT BOX, and to change the status of the EFF to closed.
     In this case, the flight is closed. The flight crew cannot make any subsequent change to the content of the EFF.

Export Content



4. Click on the EXPORT button.

The EXPORT BOX appears, and displays the EFF that the flight crew exported from the FLT FOLDER.

EXPORT Box with EFF



L3 The used space on the USB key is indicated at the bottom of the screen.

L1 5. Select USB as destination.

Export - Destination Selected



6. Click on the SEND button to start the export process.
   The EXPORT BOX sends the EFF to the USB key.
   When the export process is completed, "SENT" appears in the STATUS column.

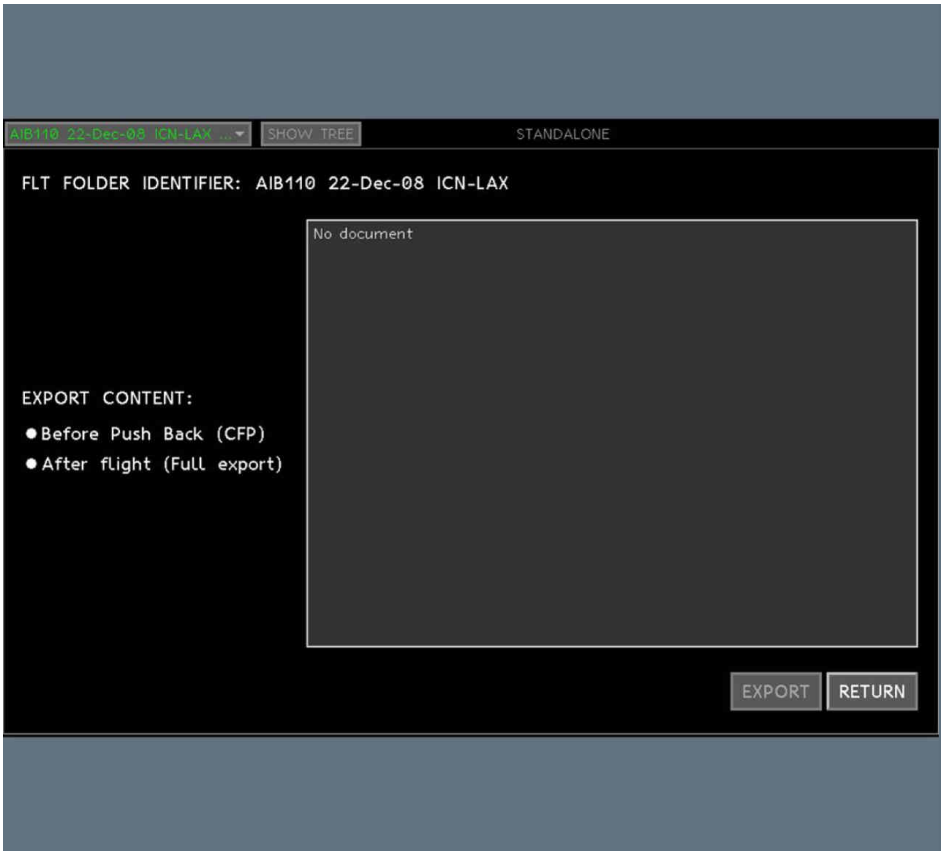
Export Completed



SEND THE EFF TO THE GROUND VIA WIRELESS

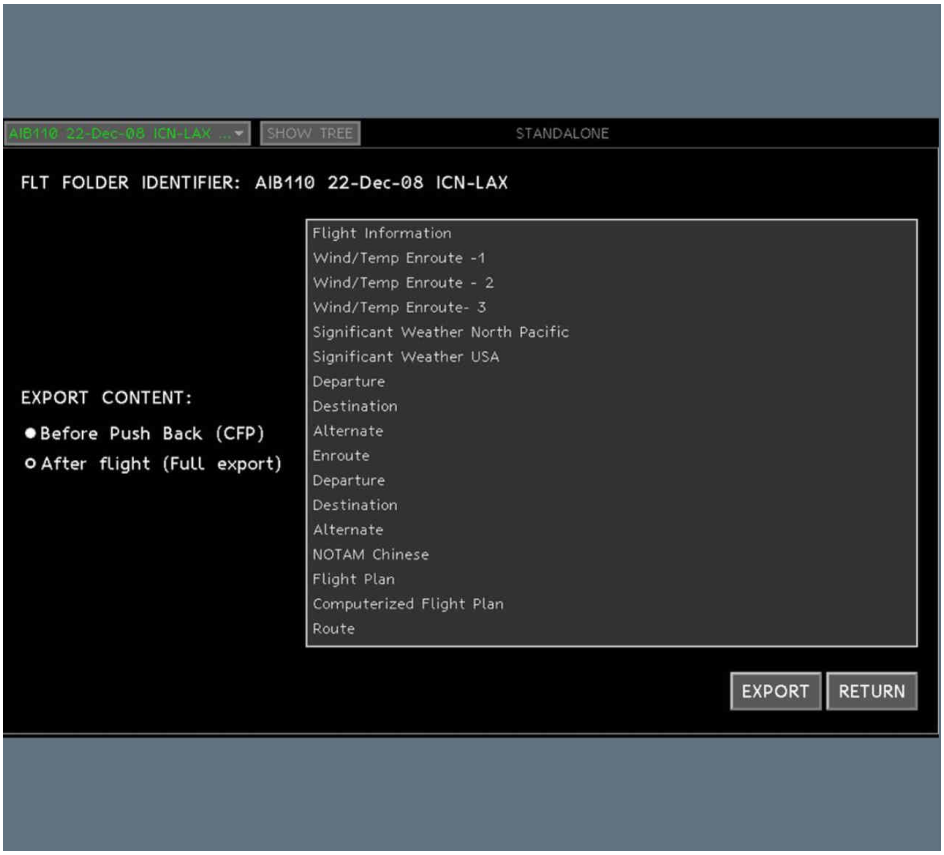
1. Click on the MANAGE button and select EXPORT FLIGHT FOLDER.
   The following page appears.

Flight Folder Export



2. Select the type of export to perform:
   - Select "Before Push Back" to send a part of the content of the EFF, that has been defined to be exported before the departure of the flight, to the EXPORT BOX
     In this case, the EFF status does not change: It remains current. The flight crew can still change the content of the EFF.
   - Select "Full Export" to send the whole content of the EFF to the EXPORT BOX, and to change the status of the EFF to closed.
     In this case, the flight is closed. The flight crew cannot make any subsequent change to the content of the EFF.

Export Content



3. Click on the EXPORT button.
   The EXPORT BOX appears, and displays the EFF that the flight crew exported from the FLT FOLDER.

EXPORT Box with EFF



L2 The gatelink status is indicated at the bottom of the screen.
The SATCOM status is not indicated.

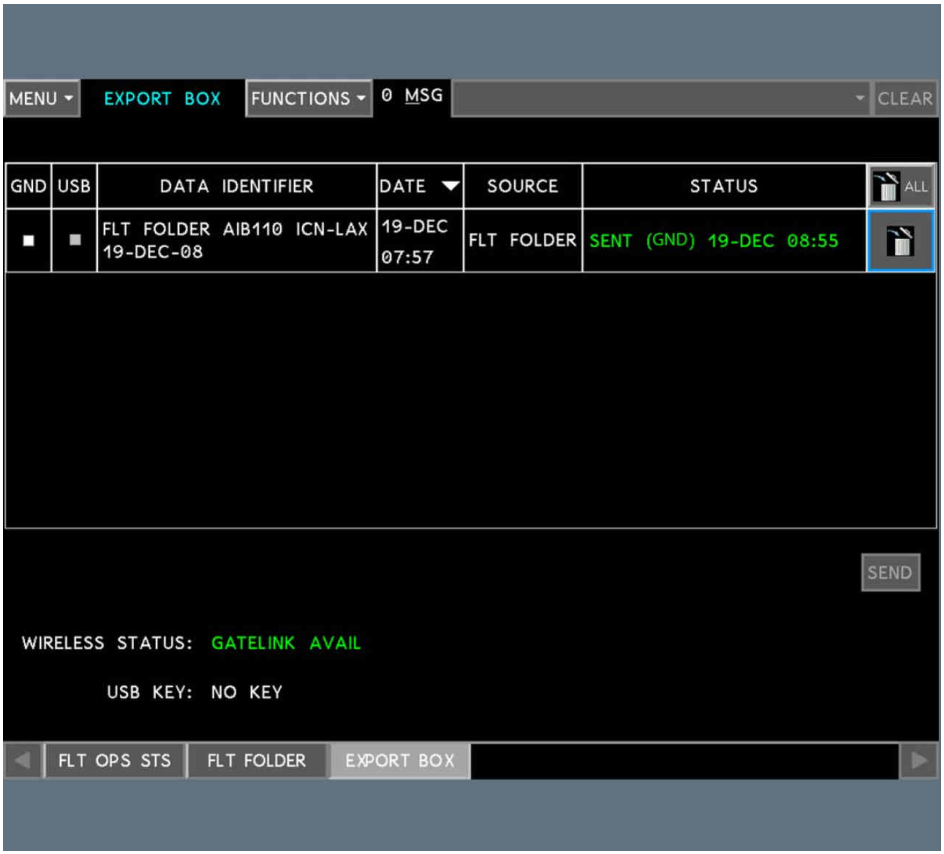
L1 4. Select GND as destination.

Export - Destination Selected



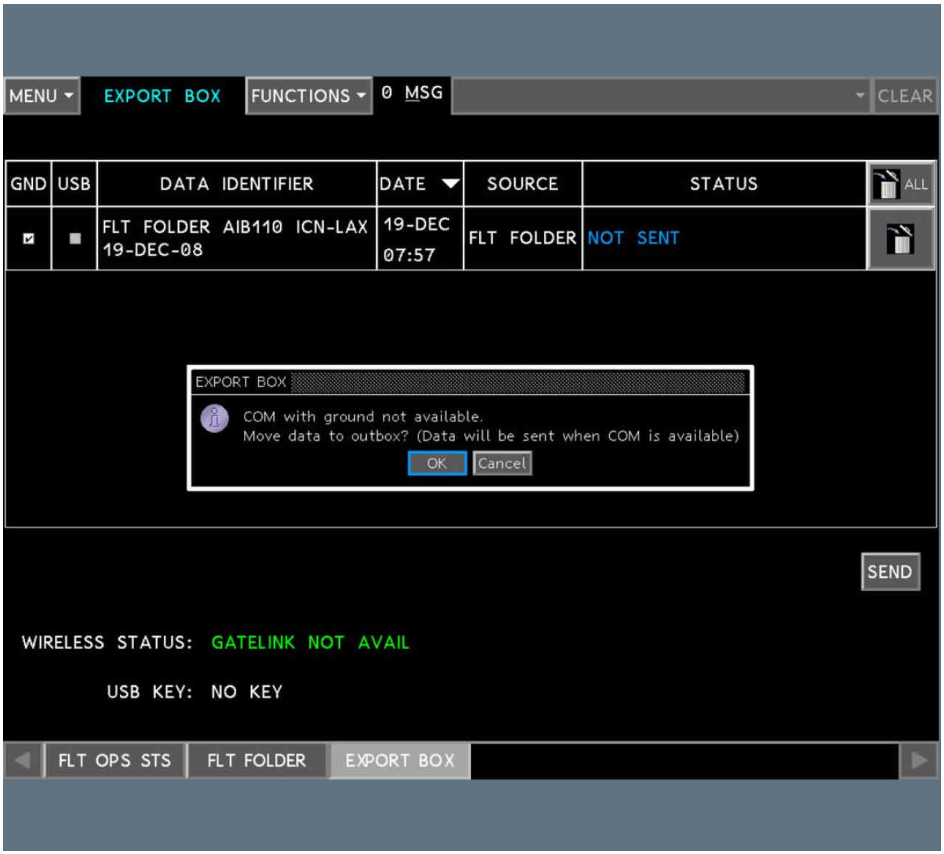
5. Click on the SEND button to start the export process.
   The EXPORT BOX sends the EFF to the USB key.
   When the export process is completed, "SENT" appears in the STATUS column.

Export Completed



If no communication mean (gatelink and SATCOM) is available when the flight crew sends the EFF, the following pop-up appears.

Export - Communication not available



Click on the OK button, and the EFF will be sent to the ground as soon as a communication mean is available.

L12

Note: *When the flight crew starts the export process, if the SATCOM is the only communication means available, the export process may be blocked, because the data file size is bigger than the size permitted by the SATCOM. In this case, "SENDING" remains displayed in the STATUS column. However, the export will be automatically performed by gatelink as soon as the gatelink is available.*
If the gatelink is not available, the flight crew must record a defect in the logbook or contact maintenance.
The flight crew should consider that the export process fails when "SENDING" remains displayed for more than 40 min .

HOW TO CLOSE THE FLT FOLDER

Applicable to: ALL

To close the FLT FOLDER, click on the FUNCTIONS button and select CLOSE APPLICATION.

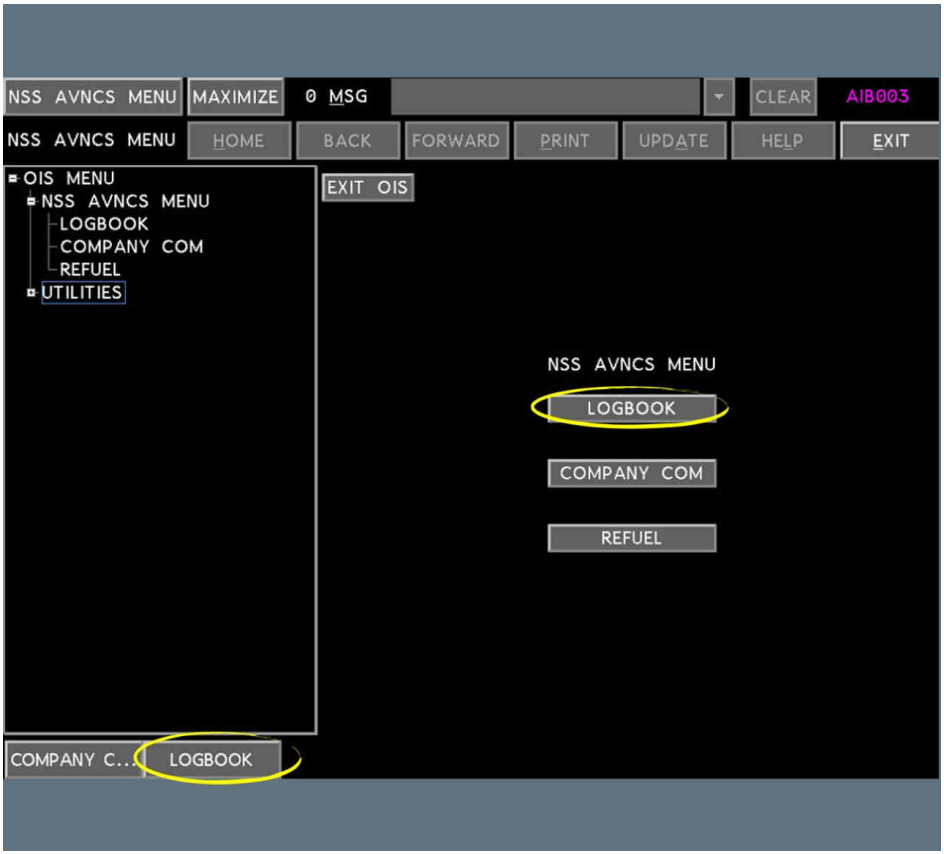
How to Use the Technical Logbook

HOW TO START THE TECHNICAL LOGBOOK

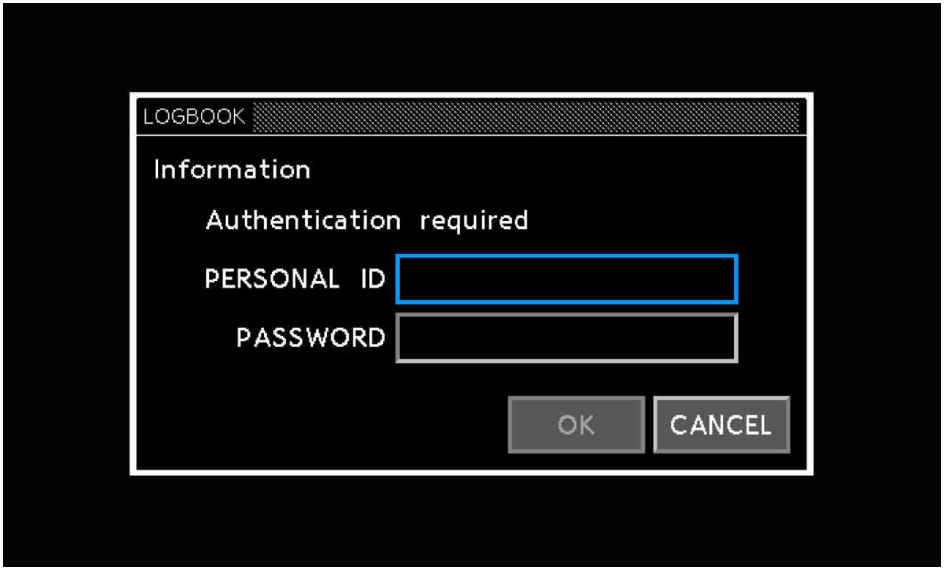
Applicable to: ALL

1. Set the OIT SIDE sw to NSS AVNCS.
2. Log on as Pilot.
   The NSS AVNCS Menu page appears.
   The technical logbook application has already started.
3. To display the technical logbook, click on one of the LOGBOOK buttons.

NSS AVNCS MENU Page



4. When the user identification window appears, enter the personal ID and password, and click on the OK button.



HOW TO ACCEPT THE AIRCRAFT

Applicable to: ALL

The procedure to accept the aircraft has three steps:
- Step 1: Ensure the validity of data
- Step 2: Check the aircraft airworthiness status
- Step 3: Open a flight.

STEP 1: ENSURE THE VALIDITY OF DATA

After the flight crew logons in the technical logbook, check that the displayed information is applicable to the current aircraft, and is the latest available information (up to date information).

AIRCRAFT REGISTRATION

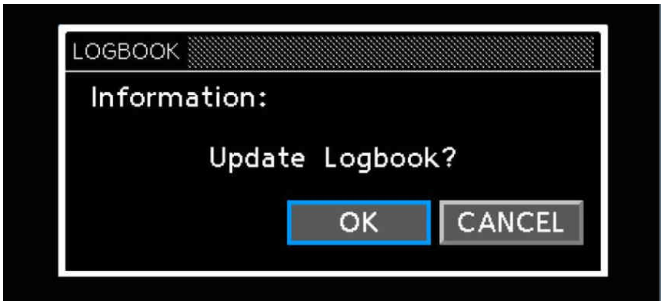
Check that the aircraft registration displayed in the Flight Information area of the STATUS page corresponds to the registration of the aircraft.

CONTROL OF THE ELOGBOOK AND DATA UPDATE

Check who has the control of the logbook, and if data on the aircraft is up to date:

- If the logbook is not onboard (the " LOGBOOK ON GROUND " message appears in the LOGBOOK CONTROL area), start a synchronization process to obtain the control of the logbook. The synchronization process updates data onboard.
  1. Click on the UPDATE button on the STATUS page.
     The following message appears:

Message - Update Logbook



  2. Click on the OK button to begin the update.
     The following message then appears, to indicate that the aircraft status is being updated.

Message - Updating Status



Note: *To enter new data (flight data, defect), the logbook must be onboard.*

  3. When the update is completed, the control of the logbook changes. The " LOGBOOK IS ON BOARD " message appears in the LOGBOOK CONTROL area.
- If the logbook is already onboard (the " LOGBOOK IS ON BOARD " message appears in the LOGBOOK CONTROL area), all the displayed information is applicable , and it's not necessary to begin a synchronization process.

Note: If no valid maintenance release is available, it is not possible to take control of the logbook. The only way to do so is to request that the maintenance personnel retrieves the control onboard via the maintenance logbook, and to wait valid maintenance release pronounced from ground.

STEP 2: CHECK THE AIRCRAFT AIRWORTHINESS STATUS

Before operating the aircraft, it is mandatory to check the aircraft airworthiness status.

CHECK DEFECT ITEMS

1. Check that ECAM alerts that appeared during the previous flight have been recorded in the logbook by the previous flight crew, and have been deferred or closed by the maintenance personnel.

   Crosscheck the ECAM alerts from the previous flight with the deferred items list and the table of the report panel:
   - Press the RCL pb on the ECP for at least 3 s to display the ECAM alerts from the previous flight
   - On the STATUS page, click on the DEFERRED ITEMS button to display the deferred items list
   - On the STATUS page, click on the MORE button to display the REPORTS panel.

   L2 The table of the REPORTS panel provides items that the maintenance personnel has closed since the last maintenance release.

L1 2. Check the STATUS page:
   - Click on the OPEN ITEMS button to display the open items list.
   - Check that there is no open items.
   - Click on the STATUS button to return to the STATUS page.
   - Click on the DEFERRED ITEMS button.
   - Check the current MEL , CDL and other items via the tables on the MEL , CDL and Other panels.
     To display the detailed report for an item, click on the title of the item in the table.

L2 *Note: The MEL and CDL deferred items are automatically retrieved by the OPS LIBRARY application on the FLT OPS side, and appear on the LOGBOOK STATUS panel in the OPS LIBRARY.*
To display the contents of a MEL or CDL item, start the OPS LIBRARY on the FLT OPS side. Refer to DSC-46-20-50-10 How to use The Logbook Status .

L1 - Click on the STATUS button to return to the STATUS page.

CHECK MAINTENANCE RELEASE STATUS

1. Check the maintenance release status on the STATUS page.
2. Click on the MORE button to display the MAINTENANCE RELEASE report.
3. Check the maintenance actions and parameters on the REPORT, PARAMETERS and SERVICED panels.
4. Click on the STATUS button to return to the STATUS page.

CHECK LAST FLIGHT DATA REPORT

1. Click on the FLIGHT DATA panel to access the FLIGHT DATA page.
2. Check the last flight data report on the PRE-FLIGHT and POST-FLIGHT panels.
3. Click on the STATUS button to return to the STATUS page.

STEP 3: OPEN A FLIGHT

CREATE A FLIGHT DATA REPORT

1. Click on the STATUS panel to display the STATUS page.
2. Check and/or enter the flight number, departure and destination airport, and the date of flight in the AIRCRAFT AND FLIGHT INFORMATION area.

Aircraft and Flight Information Data



Note: *The flight crew cannot open a new flight until the previous flight is closed.*

RECORD PREFLIGHT PARAMETERS

1. Click on the FLIGHT DATA panel to display the FLIGHT DATA page.
   The PRE-FLIGHT panel appears.
2. Enter preflight parameters.

Preflight Parameters



Note: *The flight crew must enter the mandatory preflight parameters before accepting the aircraft.*
The flight crew can enter the parameters that are not mandatory later during the flight, but must enter those parameters before closure of the flight.

L2 *Note:* *To correct a erroneous entry, doubleclick on the entry and enter the correct information.*

ACCEPT THE AIRCRAFT

1. Click on the STATUS button to display the STATUS page.
2. Click on the PIC ACCEPT button to accept the aircraft.

After the flight crew clicked on the PIC ACCEPT button, the eLogbook application checks the following parameters:

- The open items
  If the flight crew did not display the OPEN ITEMS page, a message appears.
- The deferred items
  If the flight crew did not display the DEFERRED ITEMS page, a message appears.
- The existence of a valid maintenance release
  If there is no valid maintenance release, a message appears.
- The preflight parameters
  If the flight crew did not enter prefight parameters, a message appears.

The aircraft acceptance report appears. The aircraft acceptance report provides all the information the flight crew must sign off when they accept the aircraft.

Flight Acceptance Report



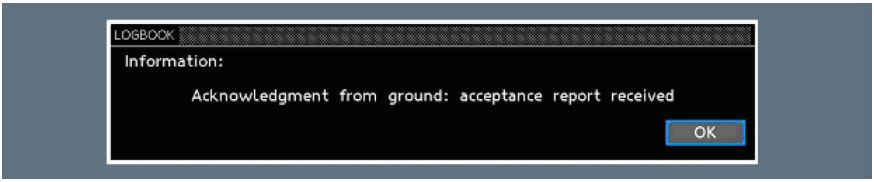
3. Check on the aircraft acceptance report that all the information is valid and in accordance with the airworthiness of the aircraft.
4. Click on the SIGN button to validate the report.
   If some data is not correct, click on the CANCEL button, then make the appropriate changes.
   After validation of the report, the electronic signature window appears.
5. Enter the personal data, then click on the OK button.

GROUND NOTIFICATION OF AN OPEN FLIGHT

When the flight crew successfully opened the flight, the technical logbook performs an automatic synchronization process with the ground application.

When the synchronization process is completed, a message indicates if the synchronization is successful or not.
The following message indicates that the aircraft received the acknowledgment from ground, about the reception by the ground application of the information concerning the flight acceptance.

Acknowledgment Message from Ground



Click on the OK button to close the message.
The " AIRCRAFT ACCEPTED " status appears in the ACCEPTANCE area on the STATUS page.

STATUS Page - Aircraft Accepted



Note:

1. *The flight crew must wait the Acknowledgment message from ground before the push-back.*
   If this message is not received onboard, the flight crew must print the logbook, and give a copy to the maintenance before the push-back.
2. *The flight crew cannot abort the synchronization process. They must wait that the process is completed.*
3. *The flight crew must not use the technical logbook application during the synchronization process.*

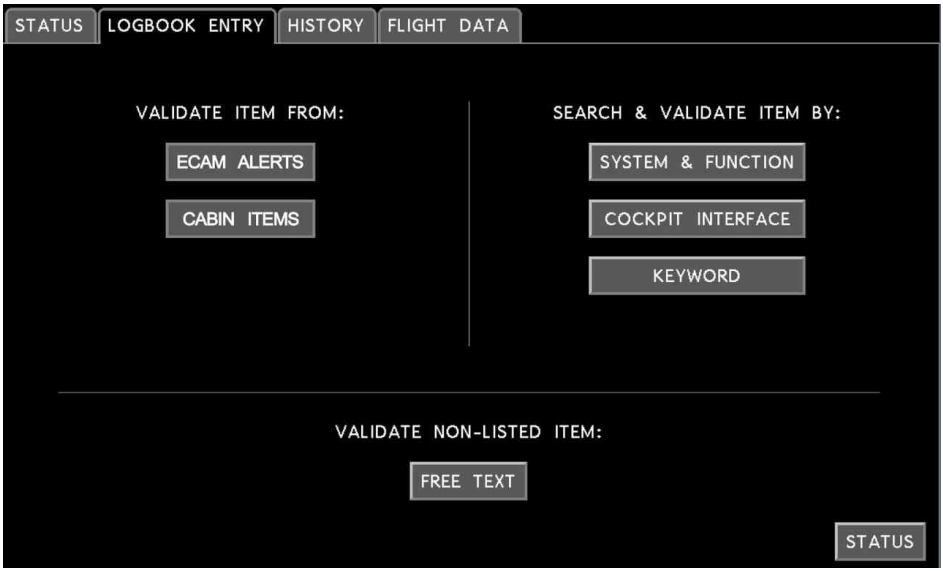
HOW TO RECORD A DEFECT IN THE LOGBOOK

Applicable to: ALL

REPORT A DEFECT

1. Click on the LOGBOOK ENTRY panel to display the LOGBOOK ENTRY page.

LOGBOOK ENTRY Page



2. Choose the appropriate assistant to record the defect.

ECAM ALERT ASSISTANT

1. Click on the ECAM ALERTS button to display the ECAM ALERTS assistant.
   Alerts that appeared on the ECAM during the flight are listed in the ITEM SELECTION list.
   The most recently triggered alert appears at the top of the list.

   Note: *An ECAM alert, that is triggered on ECAM several times during the flight, appears several times in the list.*

2. Select the defect in the ITEM SELECTION list.
3. If necessary, enter free text in the PILOT COMMENT field.

Note: When the title of the alert on ECAM contains two lines, the flight crew must enter the second line of the title in the PILOT COMMENT field, in order for the maintenance personnel to easily find the associated MEL item, when deferring the defect.

4. Select the mode of storage of the defect:
   - OPEN ITEMS: The defect is directly stored in the open items list. The flight crew cannot delete the defect, and cannot modify the PILOT COMMENT field.
   - TEMPORARY ITEMS: The defect is stored in the temporary items list. The flight crew can delete the defect, or modify the PILOT COMMENT field.
5. Click on the STORE button to record the defect.

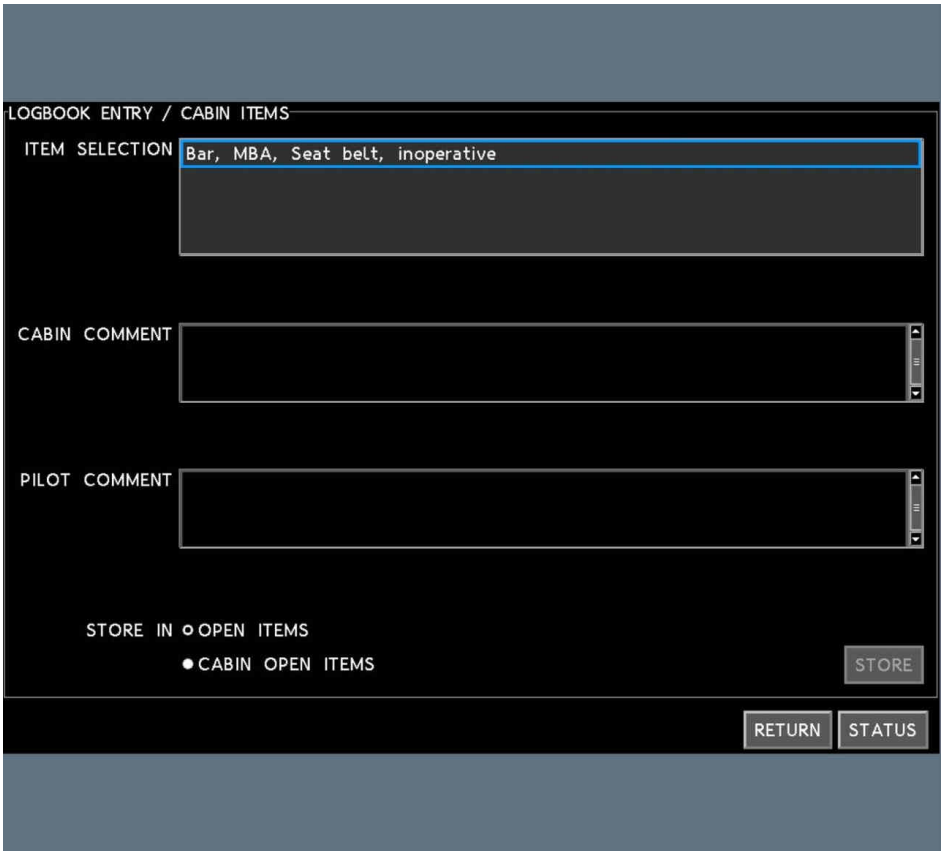
Note: If the defect is not in the ITEM SELECTION list, create a FREE TEXT defect.

CABIN ITEMS ASSISTANT

During the flight, the cabin crew can asks the flight crew to validate or not cabin defects. The cabin crew sends a message to the flight crew. The message appears in the message toolbar.

1. Click on the CABIN ITEMS button to display the CABINS ITEMS assistant.
   The ITEM SELECTION list lists the defects that the cabin crew recorded.

CABIN ITEM Assistant



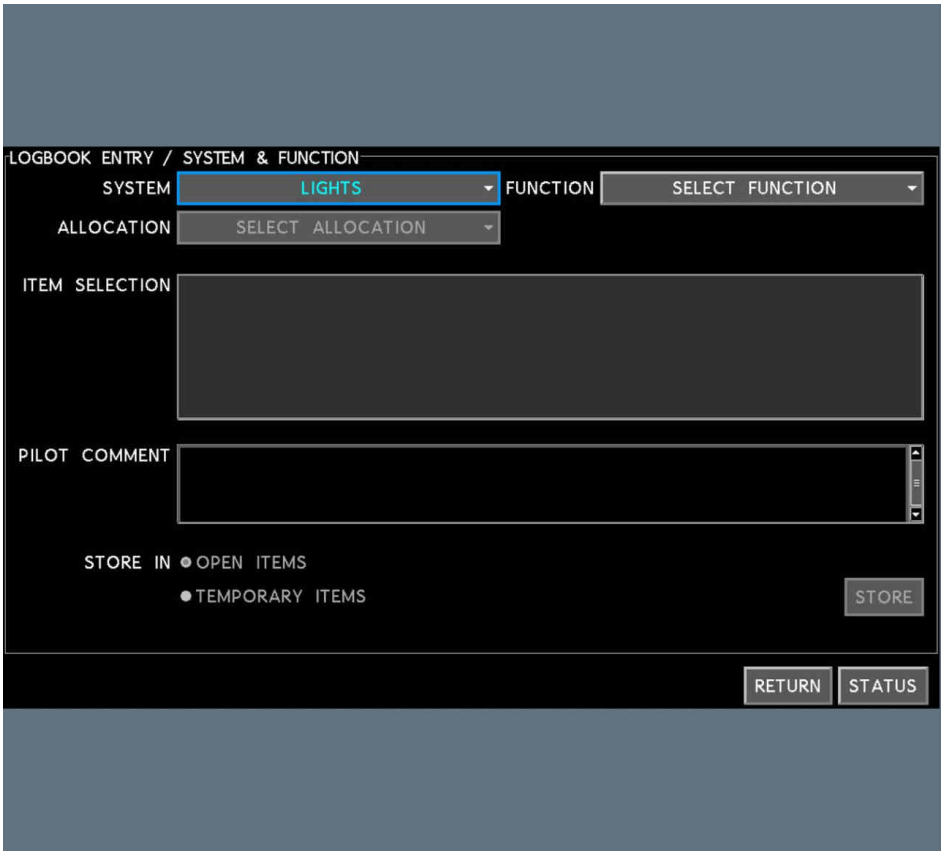
2. Select the defect in the list.
   When the defect is selected, the comment, that the cabin crew entered for the current defect, appears in the CABIN COMMENT area.
3. If necessary, enter free text in the PILOT COMMENT field.

4. Select the mode of storage of the defect:
   - OPEN ITEMS: The defect is stored in the open items list. So this item becomes a mandatory item for next dispatch. The defect will appear in the technical logbook and in the DCL
   - CABIN OPEN ITEMS: The defect is stored in the cabin open items list. The defect will only appear in the DCL.
5. Click on the STORE button to record the defect report.

SYSTEM AND FUNCTION ASSISTANT

1. Click on the SYSTEM & FUNCTION button to display the SYSTEM AND FUNCTION assistant.

SYSTEM AND FUNCTION Assistant



2. Complete the SYSTEM, FUNCTION, and ALLOCATION fields via the associated drop-down list.

L2 As soon as the flight crew completes the fields, the ITEM SELECTION list decreases in size.

L1 3. Select the defect in the ITEM SELECTION list.

4. If necessary, enter free text in the PILOT COMMENT field.

5. Select the mode of storage of the defect: OPEN ITEMS or TEMPORARY ITEMS.

SYSTEM AND FUNCTION Assistant Completed



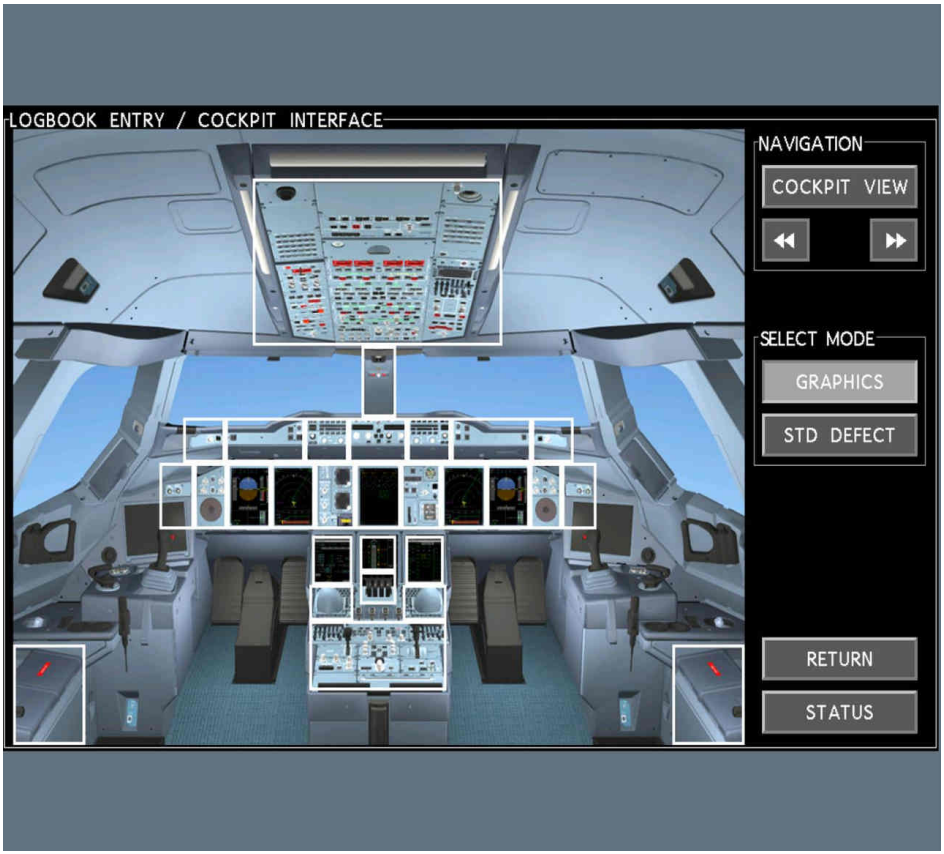
6. Click on the STORE button to record the defect.

Note: *If the defect is not in the ITEM SELECTION list, create a FREE TEXT defect.*

COCKPIT INTERFACE ASSISTANT

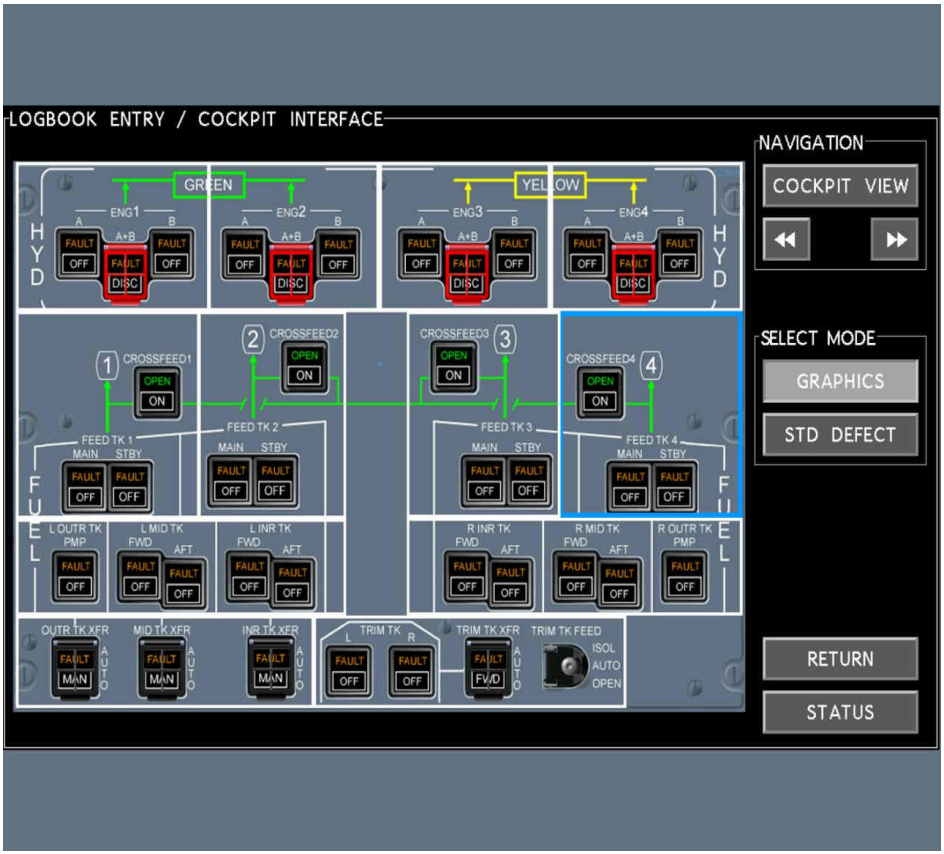
1. Click on the COCKPIT INTERFACE button to display the COCKPIT INTERFACE assistant.

COCKPIT INTERFACE Assistant



2. Find the location of the defect on the displayed window and click on it.
   Successive zooming helps to refine the selection until the STD DEFECT button becomes active.

COCKPIT INTERFACE ASSISTANT - Location



3. Click on the STD DEFECT button.
   Standard defects that correspond to the selected location appear in the standard defect list.

COCKPIT INTERFACE ASSISTANT - Standard Defect List



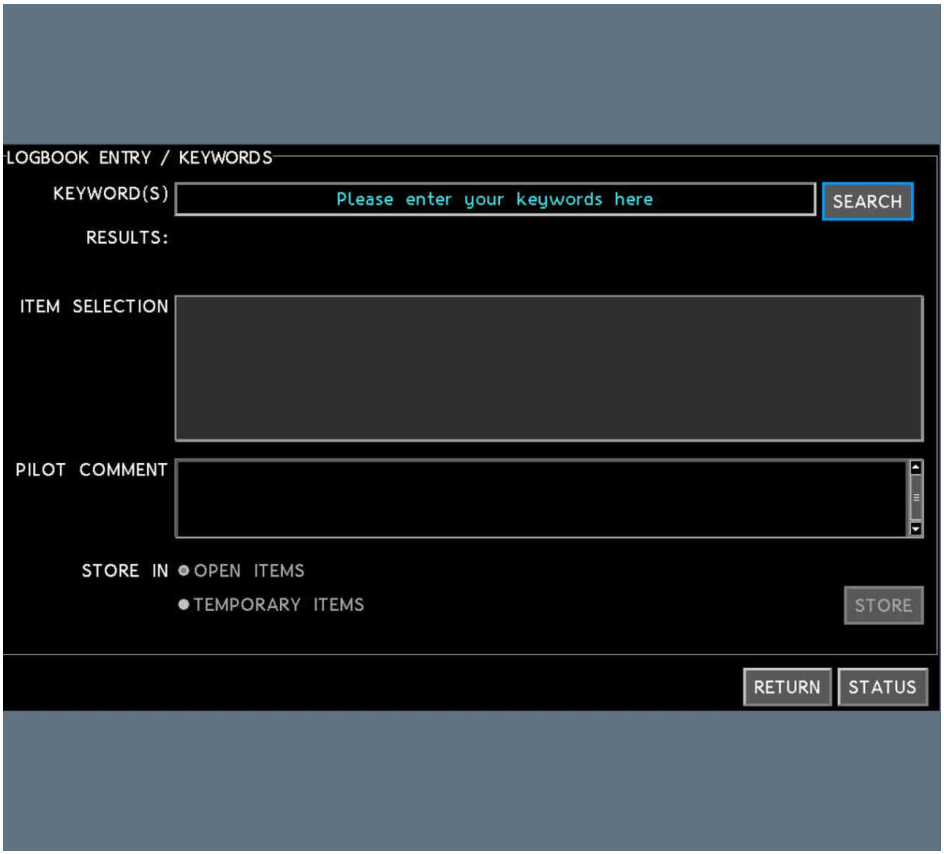
4. Select the defect in the standard defect list.
5. Select the mode of storage of the defect: OPEN ITEMS or TEMPORARY ITEMS.
6. Click on the STORE button to record the defect report.

Note: *If the defect is not in the ITEM SELECTION list, create a FREE TEXT defect.*

KEYWORD ASSISTANT

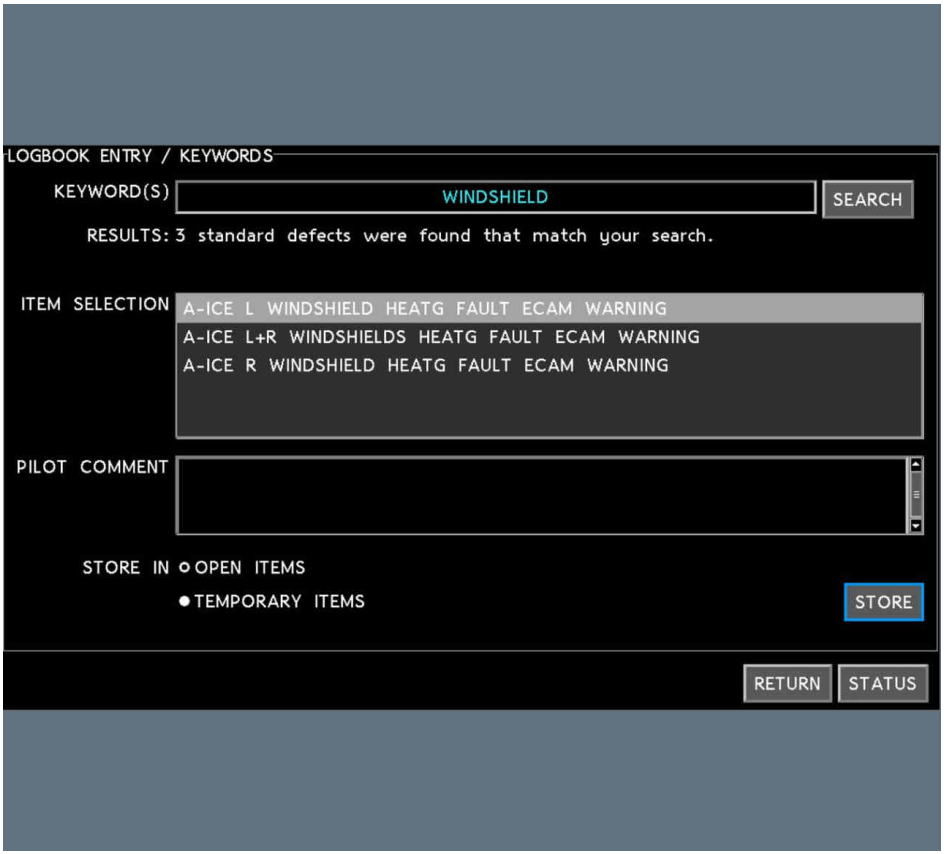
1. Click on the KEYWORD button to display the KEYWORD assistant.

KEYWORD Assistant



2. Enter one or more words that occur in the defect text.
3. Click on the SEARCH button to begin the search.
   Standard defects that correspond to the search appear in the ITEM SELECTION list.
4. Select the defect in the ITEM SELECTION list.
5. Select the mode of storage of the defect: OPEN ITEMS or TEMPORARY ITEMS.

KEYWORD Assistant Completed



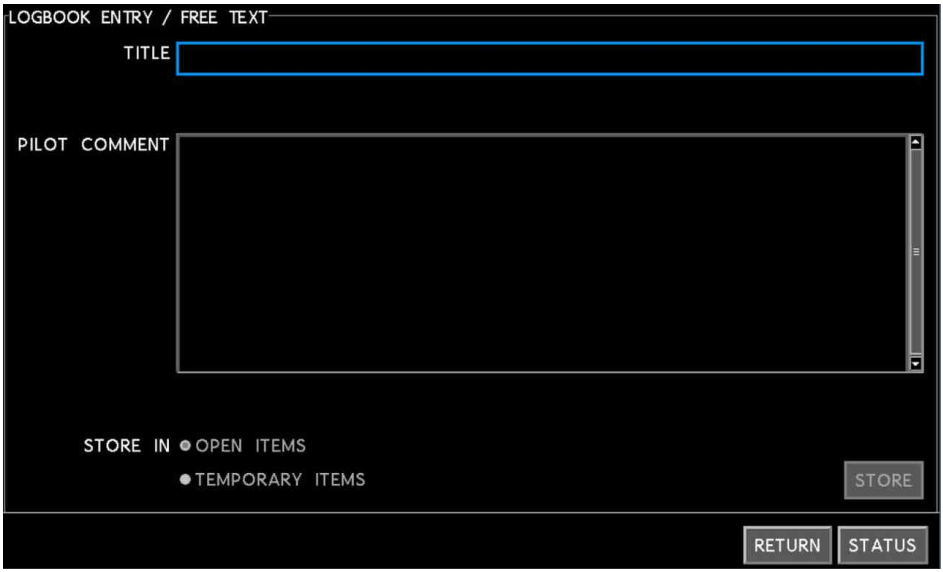
6. Click on the STORE button to store the defect report.

Note: *If the defect is not in the ITEM SELECTION list, create a FREE TEXT defect report.*

FREE TEXT DEFECT

1. Click on the FREE TEXT button to display the FREE TEXT assistant.

FREE TEXT Assistant



2. Type the text of the defect in the FREE TEXT area.
3. Select the mode of storage of the defect: OPEN ITEMS or TEMPORARY ITEMS.

FREE TEXT Assistant Completed

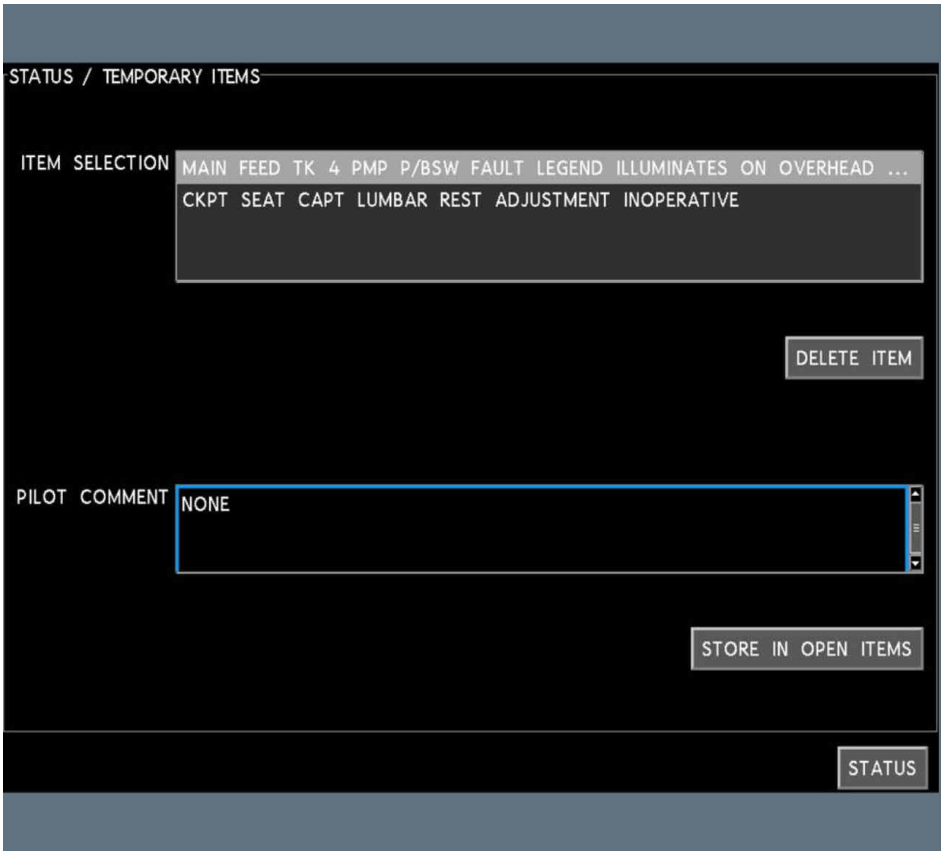


4. Click on the STORE button to record the defect report.

VALIDATE A TEMPORARY ITEM

1. Click on the STATUS button to display the STATUS page.
2. Click on the TEMPORARY ITEMS button.

TEMPORARY ITEMS



3. Select the defect to be validated from the ITEM SELECTION list.
4. If necessary, update the PILOT COMMENT field.
5. Click on the STORE IN OPEN ITEMS button to store the defect in the open items list.

Note: *Remaining temporary items are automatically deleted when the flight crew closes the flight.*

HOW TO CHANGE A DEFECT

Applicable to: ALL

DEFECT FROM THE OPEN ITEMS LIST

For defects that the flight crew stored in the open items list, the flight crew can only complete the ADDITIONAL INFO field. It is not possible to change the PILOT COMMENT field.

1. Click on the STATUS panel or on the STATUS button to display the STATUS page.
2. On the STATUS page, click on the OPEN ITEMS button.
3. Select the appropriate defect in the list.
4. Complete the ADDITIONAL INFO field.
   The change is automatically saved.
5. Click on the RETURN button to return to the STATUS page.

DEFECT FROM THE TEMPORARY ITEMS LIST

For defects that the flight crew stored in the temporary items list, the flight crew can only change the PILOT COMMENT field of the report.

1. Click on the STATUS panel or on the STATUS button to display the STATUS page.
2. On the STATUS page, click on the TEMPORARY ITEMS button.
3. Select the appropriate defect in the list.
4. Change the PILOT COMMENT field.
   The change is automatically saved.
5. Click on the RETURN button to return to the STATUS page.

HOW TO CANCEL A DEFECT

Applicable to: ALL

CANCEL A LOGBOOK DEFECT

Defects that the flight crew stored in the open items list cannot be deleted.

If a defect that the flight crew stored in the open items list is not accurate, proceed as follows:

1. Click on the STATUS panel, or on the STATUS button, to display the STATUS page.
2. On the STATUS page, click on the OPEN ITEMS button.
3. Select the appropriate defect in the list.
4. Enter "Logbook entry inaccurate, new entry made for correction" in the ADDITIONAL INFO field of the selected defect.
5. Create and record a new FREE TEXT defect. In the PILOT COMMENT field, enter the following remark: "New entry made to correct Ref Report ....", with the report reference of the defect that is cancelled.

DELETE A LOGBOOK DEFECT

Defects that the flight crew stored in the temporary items list can be deleted.

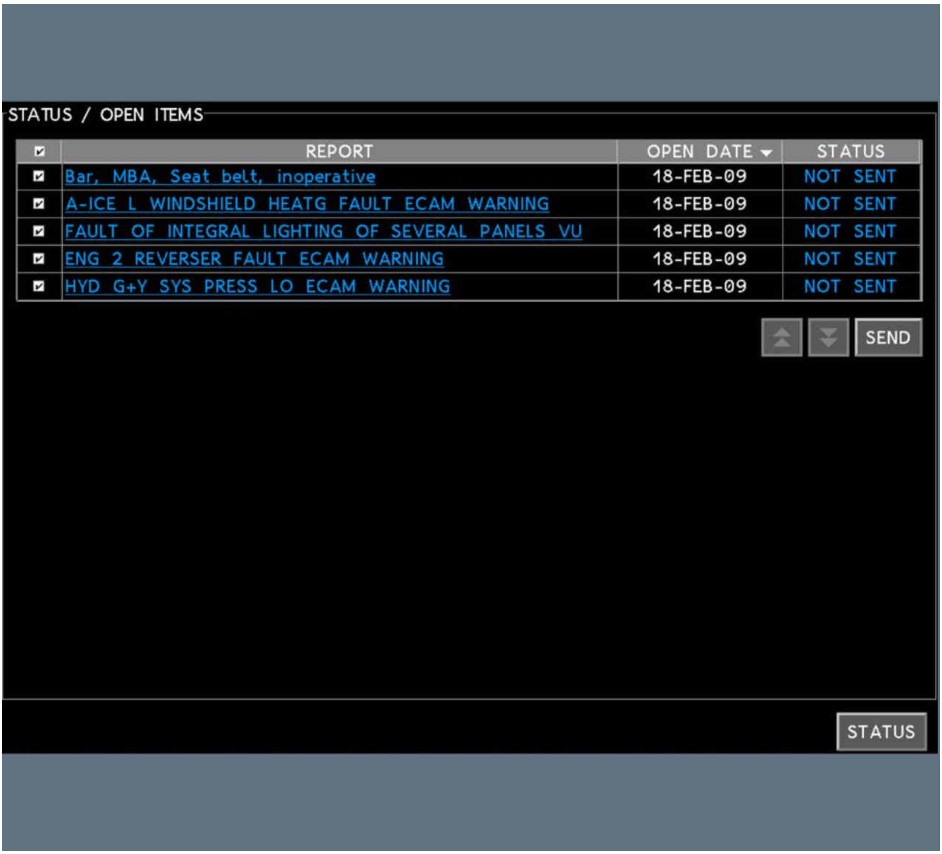
To delete a defect from the temporary items list:
1. Click on the STATUS panel or on the STATUS button to display the STATUS page.
2. On the STATUS page, click on the TEMPORARY ITEMS button.
3. Select the appropriate entry report in the list.
4. Click on the DELETE ITEM button.
5. Click on the YES button on the confirmation window.

HOW TO SEND AN OPEN ITEM TO THE GROUND

Applicable to: ALL

1. Click on the STATUS panel to display the STATUS page.
2. Click on the OPEN ITEMS button to display the open items list.

OPEN ITEMS Table



3. Tick, in the list, the items to be sent to the ground.
4. Click on the SEND button to send the items.
   For each ticked item, "SENDING..." appears in the STATUS column.
   When a item is sent, and acknowledgement is received from ground, "SENT" appears in the STATUS column of the item.

HOW TO CLOSE THE FLIGHT

Applicable to: ALL

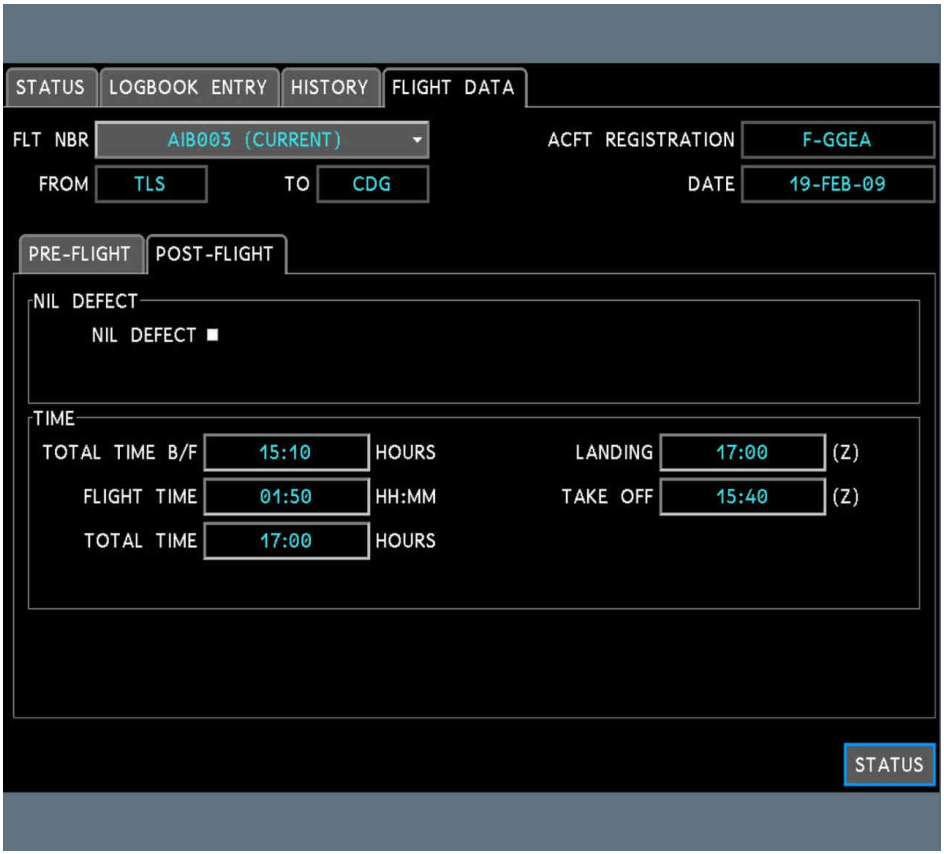
The flight crew closes the flight as soon as possible, when the aircraft is at the gate, in order to transfer the information recorded during the flight to the ground application.

There are three steps in the procedure to close the flight.
- Step 1: Record postflight parameters
- Step 2: Close the flight
- Step 3: Notify ground of flight closure.

STEP 1: RECORD POSTFLIGHT PARAMETERS

1. Click on the STATUS button to display the STATUS page.
2. Check and correct, if necessary, the destination airport (TO field).
3. Click on the FLIGHT DATA panel to display the FLIGHT DATA page.
4. Click on the POST-FLIGHT panel to display the POST-FLIGHT area.
5. Fill in the postflight parameters.

Post-Flight Parameters



L2 *Note: To correct an erroneous entry, doubleclick on the entry and enter the correct information.*

L1 **STEP 2: CLOSE THE FLIGHT**

1. Click on the STATUS button to display the STATUS page.
2. Check that ECAM alerts that appeared during the flight have been recorded in the technical logbook.

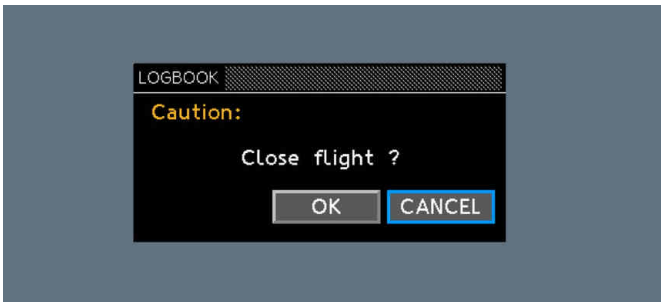
Crosscheck the ECAM alerts with the open items list:
- Press the RCL pb on the ECP for at least 3 sto display the ECAM alerts
- Click on the OPEN ITEMS button to display the open items list.

3. Check that non monitored defects have been recorded in the technical logbook (flight crew observations, structural damages), in the open items list.
4. On the STATUS page, click on the CLOSE FLIGHT button.

L2 5. The eLogbook application checks the following parameters:
- Cabin entries not validated
  If some cabin entries are not validated, the list of cabin items that the flight crew must validate appears.
- Non-recorded ECAM alerts
  If some ECAM alerts are not recorded as defect, the list of ECAM alerts appears.
- Temporary items
  If there are some temporary items, a confirmation message appears. All temporary items are deleted with flight closure.
- Mandatory fields completed.
  If some mandatory fields are not completed, a confirmation message appears.

L1 After the closure check, a confirmation message appears. Click on the OK button.

Message - Close Flight

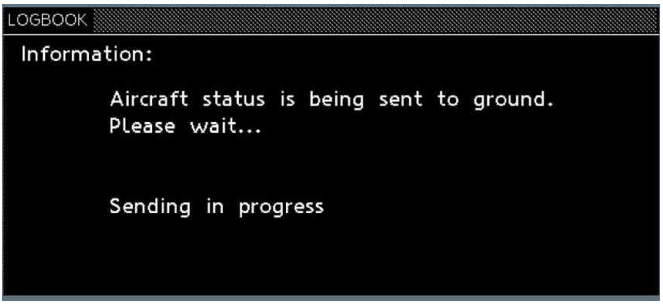


6. A report summary of the flight closure appears. This report includes all the information the flight crew will sign off by closing the flight.
   Check that all the information is valid and in accordance with the airworthiness of the aircraft.
7. Click on the SIGN button to validate the report.
   If some data is not correct, click on the CANCEL button, then make the appropriate changes.
   After validation of the report, the electronic signature window appears.
8. Enter the personal data, then click on the OK button.

STEP 3: NOTIFY GROUND OF FLIGHT CLOSURE

After closure, the technical logbook automatically sends a message to the ground station.
The following message appears to indicate that the aircraft status is being sent to the ground.

Message - Aircraft Status to the Ground



Note: *The flight crew must not record a defect in the technical logbook when the aircraft status is being sent to the ground.*

How to Use the LOAD BOX

HOW TO LOAD DATA WITH THE LOAD BOX

Applicable to: ALL

Impacted DU: 00022220 Load Data via a USB Device

Use of the LOAD BOX only to upload performance database and EFF. Avoid using the LOAD BOX in order to load heavy items, e.g. operational manuals.

L2 In order to load heavy items, the maintenance personnel should use the Data Loading Configuration Manager (DLCM).

L1 LOAD DATA VIA A USB DEVICE

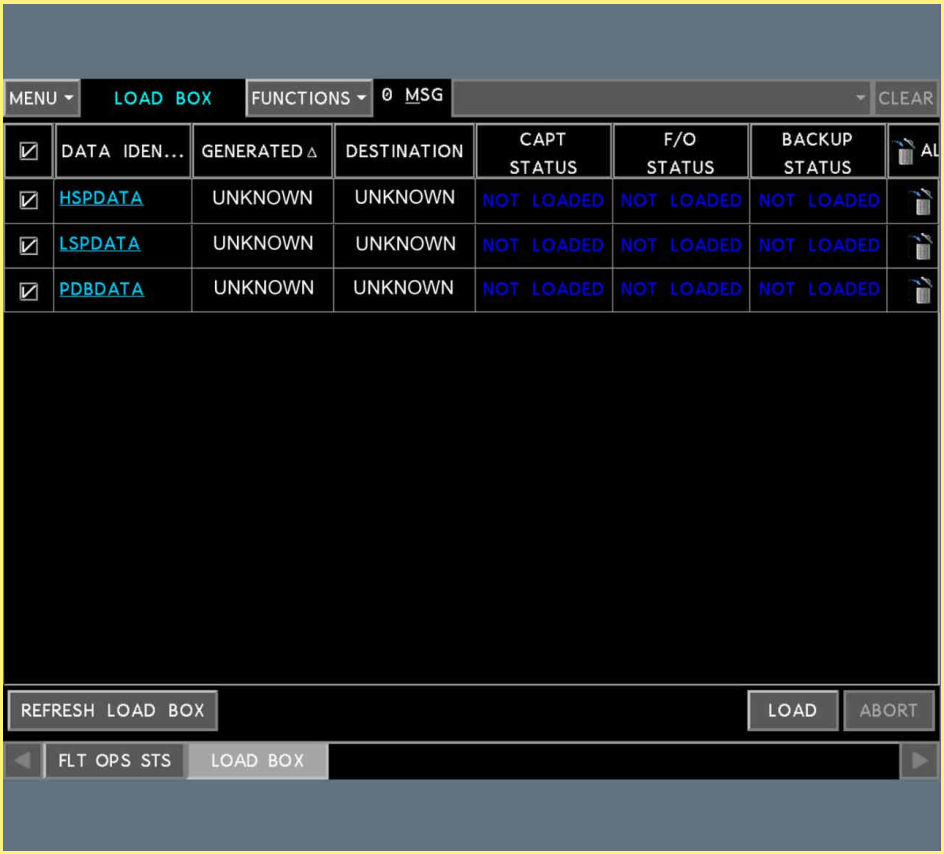
To load data via a USB device:

1. Plug the USB device into one of the available USB ports of the laptop.
2. Click on the MENU button, and select LOAD BOX to open the LOAD BOX.
   The LOAD BOX automatically detects new items to load, and adds these items to the list of items to load.

   Note: If the flight crewmember plugs the USB device after having opened the LOAD BOX, the flight crewmember should click on the REFRESH LOAD BOX button to display the content of the USB device.

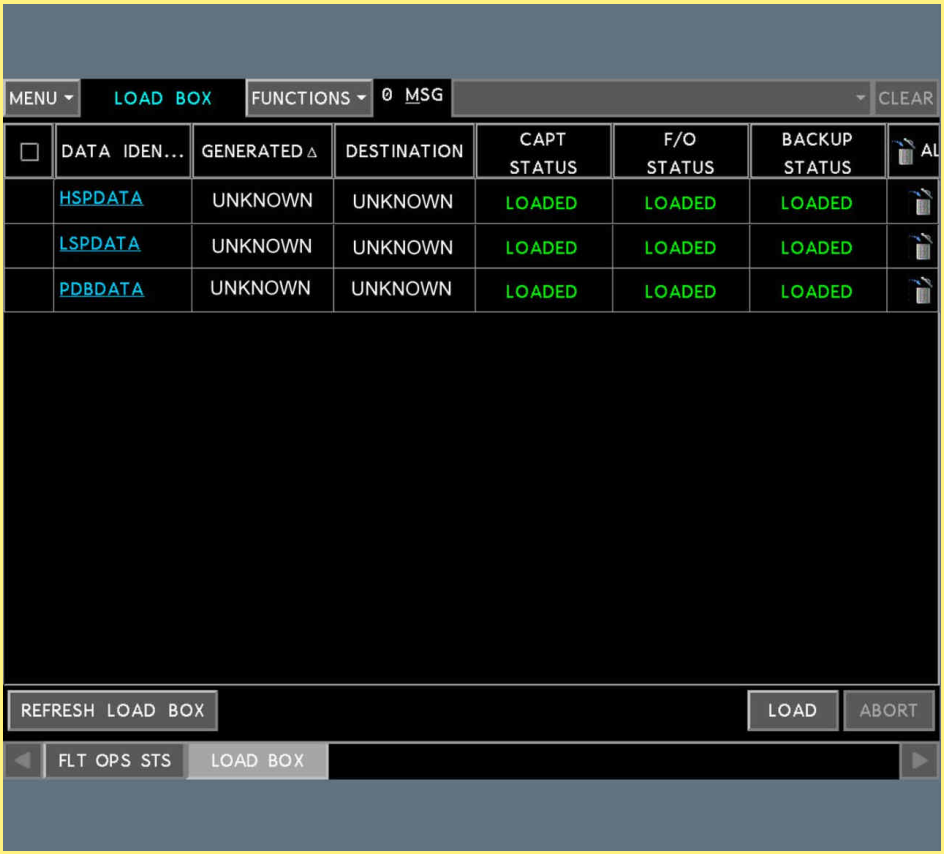
3. Select the items of data to load.

LOAD BOX - Items to Load



4. Click on the LOAD button to start the loading process.
   When the loading process is completed, "LOADED" appears in the STATUS column for each laptop that is connected to the network.

LOAD BOX - Data Loaded



Note: *If the loading process of an item fails on one laptop, "FAULT" appears in the associated STATUS column. This indicates that the loading process has not been successful on this laptop. In this case, select again this item and restart the data loading process by clicking on the LOAD button.*

5. Unplug the USB device.

Impacted by TDU: 00023385 Load Data via a USB Device

LOAD DATA VIA A USB DEVICE

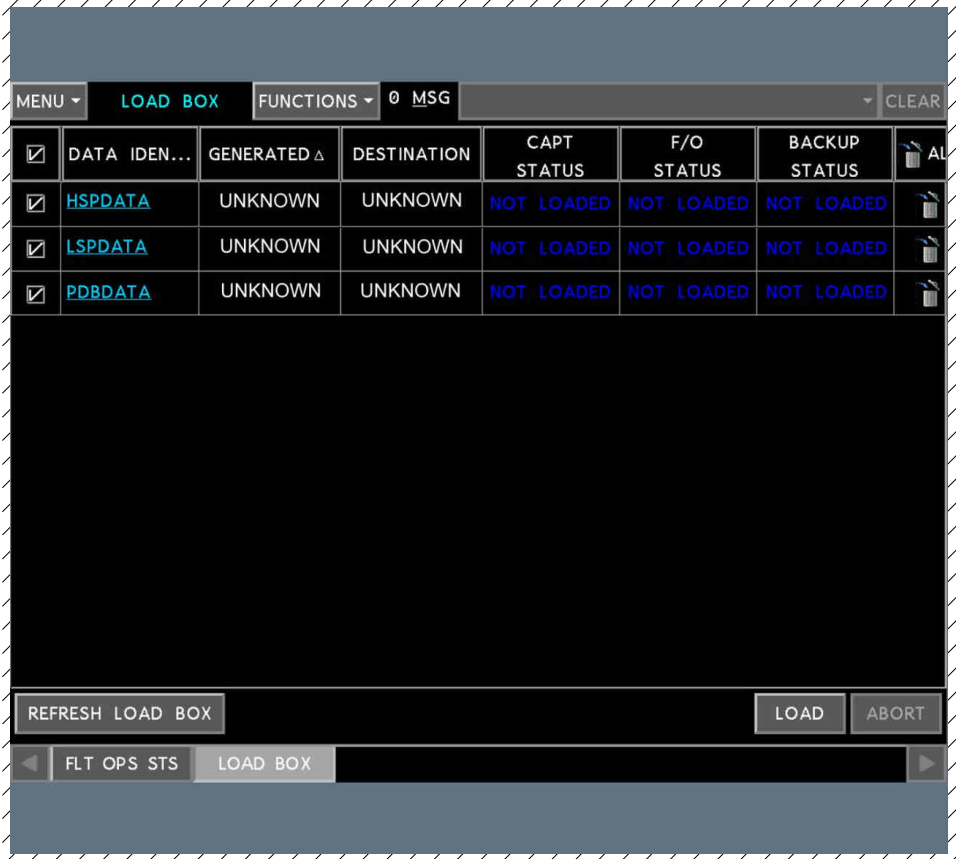
To load data via a USB device:

1. Plug the USB device into one of the available USB ports of the laptop.
2. Click on the MENU button, and select LOAD BOX to open the LOAD BOX.
   The LOAD BOX automatically detects new items to load, and adds these items to the list of items to load.

   Note: If the flight crewmember plugs the USB device after having opened the LOAD BOX, the flight crewmember should click on the REFRESH LOAD BOX button to display the content of the USB device.

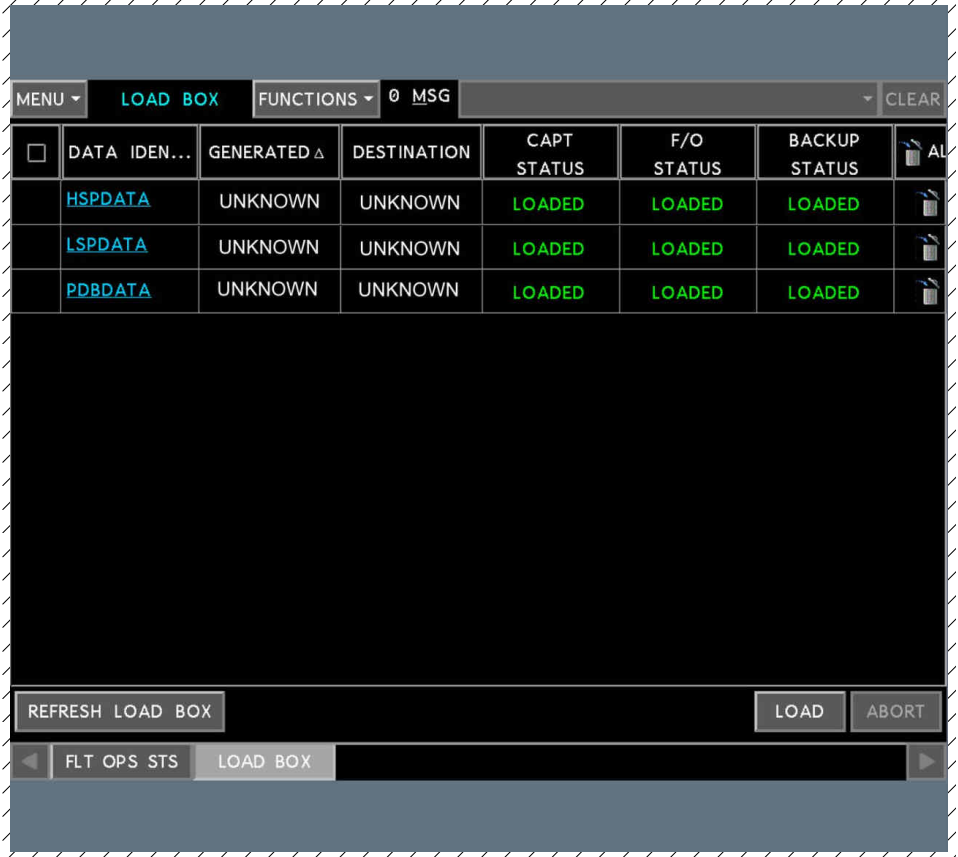
3. Select the items of data to load.

LOAD BOX - Items to Load



4. Click on the LOAD button to start the loading process.
When the loading process is completed, "LOADED" appears in the STATUS column for each laptop that is connected to the network.

LOAD BOX - Data Loaded



Note: If the loading process of an item fails on one laptop, "FAULT" appears in the associated STATUS column. This indicates that the loading process has not been successful on this laptop. In this case, select again this item and restart the data loading process by clicking on the LOAD button.

5. Unplug the USB device.

LOAD DATA VIA WIRELESS

The data to load is sent from ground to the aircraft via wireless (gatelink or SATCOM).

A message is displayed in the message area of the FLT OPS menu. It indicates that data is available for loading in the LOAD BOX.

1. Click on the MENU button, and select LOAD BOX to open the LOAD BOX.
   The LOAD BOX automatically detects items to load which have been sent via wireless, and adds them to the list of items to load.
2. Select the items of data to load.
3. Click on the LOAD button to start the loading process.
   When the loading process is completed for an item, "LOADED" appears in the STATUS column for each laptop that is connected to the network.

   Note: If the loading process of an item fails on one laptop, "FAULT" appears in the associated STATUS column. This indicates that the loading process has not been successful on this laptop. In this case, select again this item and restart the data loading process by clicking on the LOAD button.

4. When the loading process is completed, remove the items that have been loaded from the list of items to load, by clicking on the associated recycle bin symbol.

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ECAM ALERTS

Applicable to: ALL

COM NSS DATA TO AVNCS XFR FAULT (*Refer to procedure*)

COM NSS/AVNCS DATA XFR FAULT (*Refer to procedure*)

MISC OIS FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
NSS AVNCS Side	ANSU 1	AC 2 and BAT 2
	ANSU 2	AC 1 or AC EMER and BAT 1
	ARU 1	AC 2 and DC 2
	ARU 2	AC 1 or AC EMER and DC 1
	SIRU	AC 1 and DC 1
	Printer	AC 1
FLT OPS Side	Captain Laptop	DC 1
	First Officer Laptop	DC 2 or BAT 2
	Back-up Laptop	DC 2
	ANSU	AC ESS and BAT 1
	ARU	AC ESS and DC 1 or DC ESS
	Printer	AC ESS
OIT	Captain OIT	AC 2 and DC 2
	First officer OIT	AC ESS and DC 1 or DC ESS

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Overview

OVERVIEW

Applicable to: ALL

The flight crew and the company ground stations use the Airline Operational Control (AOC) application to exchange messages related to aircraft operations and/or management. The AOC is also called Company Communication (CPNY COM) program.
The AOC application uses the ACARS messaging system, to transmit AOC messages.

The AOC application enables Operators to:
- Manage flight operations: Data initialization, flight log, flight summary, free text, Estimated Time of Arrival (ETA), ramp service requests, in range, or diversion
- Check the weather status: TAF, METAR, or SIGMET
- Manage delays related to: Departure, takeoff, flight, and gates
- Manage flight parameters.

The AOC function is hosted by the OIS / NSS avionics domain.
Due to the fact that Operators can customize the AOC application, this chapter only provides a general description of the application.

AOC APPLICATION

Applicable to: ALL

The onboard AOC application has:
- Associated software
- An AOC database, that can be:
  - A generic database, with the basic AOC functions, or
  - A standard database, with some customized functions, or
  - A customized database.

The Operator manages the customized AOC application, via Ground Support Equipment (GSE).
L2 The GSE enables Operators to create, consult, change and test the customized AOC application.

AOC FUNCTIONS

Applicable to: ALL

The AOC application performs the following:
- Message management function
- Out-Off-On-In (OOOI) function.

MESSAGE MANAGEMENT FUNCTION

The AOC application either warns, or advises, the flight crew that an AOC message is received, depending on the message priority.

L2 Operators use the GSE to customize the ECAM MEMOs and aural alerts, that are associated with the AOC message.

L1 The AOC enables the flight crew to automatically:
- Print specific types of messages
- Send specific types of messages
- Delete all messages from the mailbox at the end of each flight
- Store all messages in the appropriate directory (sent, inbox, or outbox)
- Perform additional functions, as applicable, depending on AOC customization.

The AOC enables the flight crew to manually:
- Print messages
- Edit messages
- Zoom messages
- Store messages, as applicable, depending on AOC customization
- Send pre-defined messages to the company ground station with an associated free text.

Note: In the case of loss of ACARS transmission, the status of AOC downlink messages may be wrong, and uplink messages may not appear in the mailbox.
In this case, the flight crew must record a defect in the logbook.

OUT-OFF-ON-IN (OOOI) FUNCTION

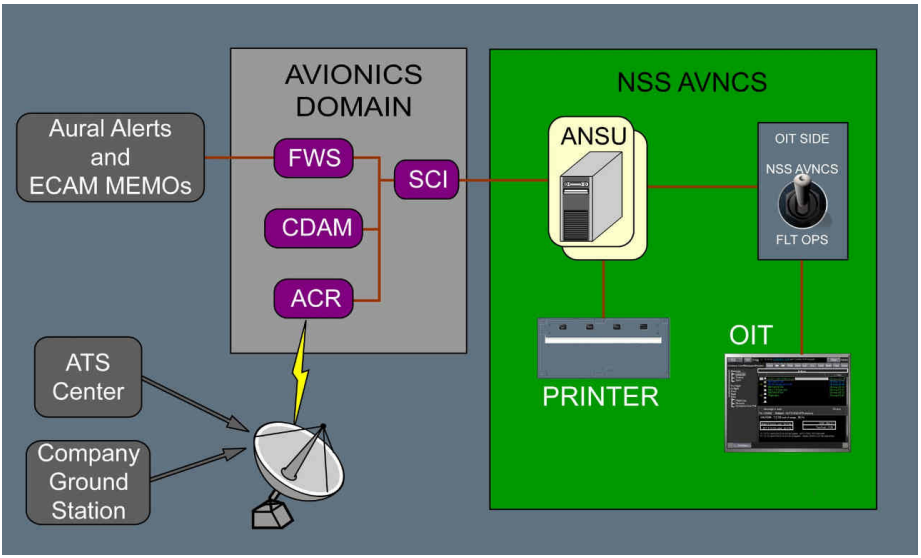
The AOC application computes and sends automatic reports (also called OOOI reports) to provide the Operators with applicable details about aircraft and flight status, progress, and/or delays.
The AOC automatically sends the message at a pre-defined time during the flight (e.g. when the doors are closed, when the parking brake is off, when the landing gear is up (down), etc).
Operators use the GSE to customize the triggering conditions of these messages.
The flight crew can visualize these messages via the OIT.

Architecture

ARCHITECTURE

Applicable to: ALL

Architecture



NSS AVIONICS

The AOC function is hosted by the avionics domain of both Avionics Network Server Units (ANSU 1 and ANSU 2). In the case of an ANSU 1 failure, ANSU 2 provides the AOC application.
The flight crew can use the AOC functions, via the OIT interfaces, if the OIT SIDE sw is set to the NSS AVNCS position.

L3 On ground only, the flight crew can access the AOC functions via the Onboard Maintenance Terminal (OMT).
Refer to Limitations / 45-On Board Maintenance System / OMT)

L1 The AOC can automatically print various received messages, via the printer that is on the center pedestal. The flight crew can use this printer to manually print any message.
Refer to Limitations / 46-Information Systems / Printers)
For more information about the NSS Avionics domain, *Refer to Informations Systems / OIS / Architecture* .

L2 AVIONICS DOMAIN

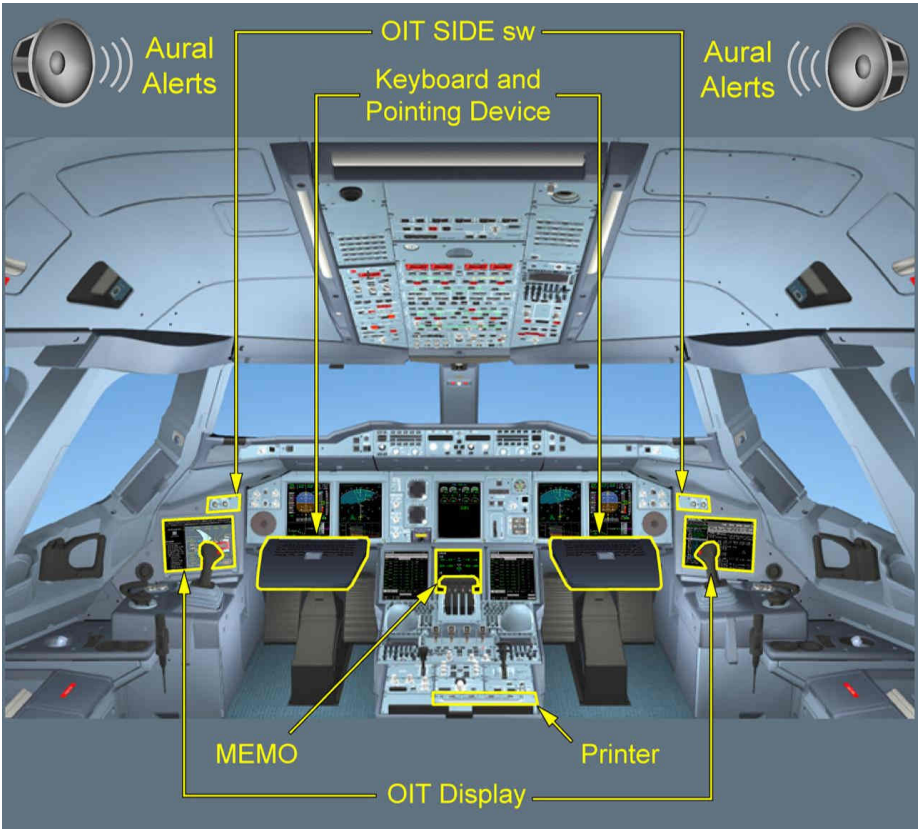
In association with the avionics domain, the AOC application:

- Exchanges information with the FWS via the Secure Communication Interface (SCI), in order to trigger ECAM MEMOs and aural alerts
- Can automatically insert data from the avionics parameters in the messages
  The Centralized Data Acquisition Module (CDAM) records these avionics parameters.
- Receives defined parameters (i.e. company identifier, flight number, etc) from the Avionics Communication Router (ACR).
  The ACR also transmits AOC messages to the company ground station.

COCKPIT VIEW

Applicable to: ALL

Cockpit View



PRINTER

Applicable to: ALL

The AOC automatically prints various received messages, via the printer that is on the center pedestal. The flight crew can also use this printer to manually print any message.

OIT DISPLAY

Applicable to: ALL

The flight crew uses the OIT display to:

- Access the AOC application
- Display, edit, print, send, delete, and/or store AOC messages.

OIT SIDE SW

Applicable to: ALL



The flight crew has access to the AOC function on the onside OIT.

KEYBOARD AND POINTING DEVICE

Applicable to: ALL

The flight crew can use the keyboard and the pointing device that are on the sliding table, in order manage the AOC application.



The flight crew can also consult the AOC application via the additional control panel, if the keyboard is retracted, or not available.

MEMO

Applicable to: ALL

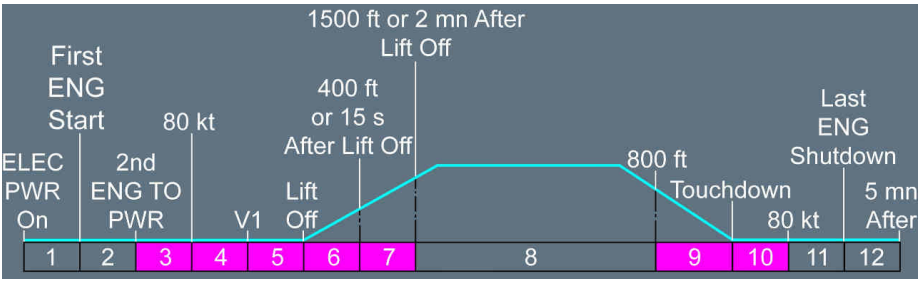
L12

COMPANY MSG

The flight crew received a company message.
No longer appears, when the flight crew read all the received messages.
An aural alert may also be associated with this message. For more information on the aural alert, *Refer to DSC-46-40-20 Aural Alerts* .

L2 Flight phase inhibition:

Flight Phase Inhibition



L12

COMPANY MSG:PRNTR

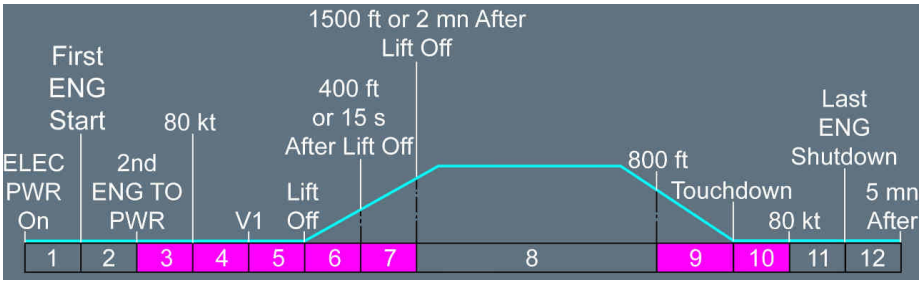
The flight crew received a company message that will be automatically printed.

No longer appears, when:
- The flight crew read all the received messages that are associated with the automatic printout, or
- All the messages, associated with the automatic printout, are printed.

An aural alert may also be associated with this message. For more information on the aural alert, *Refer to DSC-46-40-20 Aural Alerts* .

L2 Flight phase inhibition:

Flight Phase Inhibition



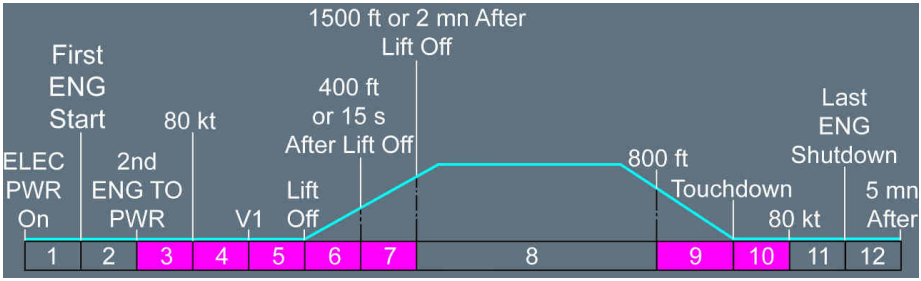
L12

COMPANY ALERT

The flight crew received an urgent company message.
Flashes for 180 s , then remains steady.
No longer appears, when the flight crew read all of the urgent messages.
An aural alert is also associated with this message.
For more information on the aural alert, *Refer to DSC-46-40-20 Aural Alerts* .

L2 Flight phase inhibition:

Flight Phase Inhibition



L12

COMPANY ALERT: PRNTR

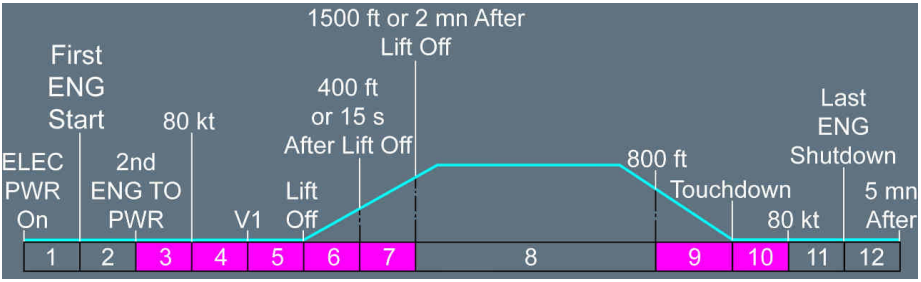
The flight crew received an urgent message that is automatically printed.
Flashes for 180 s , then remains steady.

No longer appears, when:
- The flight crew read all the urgent messages that are associated with the automatic printout, or
- All the urgent messages, associated with the automatic printout, are printed.

An aural alert is also associated with this message.
For more information on the aural alert, *Refer to DSC-46-40-20 Aural Alerts* .

L2 Flight phase inhibition:

Flight Phase Inhibition



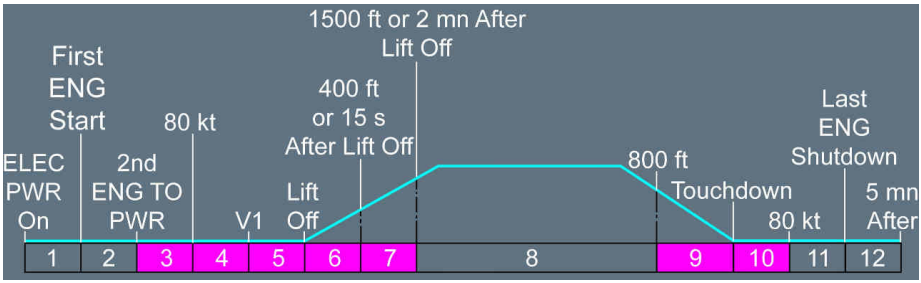
L12

CALL COMPANY

The flight crew received a company message that requires them to contact the company on the specified frequency.
No longer appears, when the flight crew read all the received messages that require them to contact the company on the specified frequency.
An aural alert is also associated with this message.
For more information on the aural alert, *Refer to DSC-46-40-20 Aural Alerts* .

L2 Flight phase inhibition:

Flight Phase Inhibition



AURAL ALERTS

Applicable to: ALL

Aural Alert	Sound	Meaning	Inhibition Condition
COMPANY MESSAGE	*(Audio not available in PDF)*	The flight crew has received a company message. It is associated with: - The COMPANY MSG MEMO, or - The COMPANY MSG: PRNTR MEMO.	The AOC inhibits the aural alert, when the aircraft goes below 10 000 ft in flight phase 8.
COMPANY ALERT	*(Audio not available in PDF)*	The flight crew has received an urgent company message. It is associated with: - The COMPANY ALERT MEMO, or - The COMPANY ALERT: PRNTR MEMO.	The AOC inhibits the aural alert, when the aircraft goes below 10 000 ft in flight phase 8.
CALL COMPANY	*(Audio not available in PDF)*	The flight crew has received a company message that requires them to contact the company on the specified frequency. It is associated with the CALL COMPANY MEMO.	The AOC inhibits the aural alert, when the aircraft goes below 10 000 ft in flight phase 8.

AIRCRAFT SYSTEMS

49 - AUXILIARY POWER UNIT (APU)

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DSC-49-PLP PRELIMINARY PAGES

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DSC-49-20 Controls and Indicators

Cockpit View ..... A
APU Panel ..... B
Maintenance Nose Gear Panel C
Refuel/Defuel Panel ..... D
APU System Display ..... E
MEMO ..... F

DSC-49-30 Normal Operations

Normal Operations ..... A

DSC-49-40 Abnormal Operations

Abnormal Operations ..... A

DSC-49-50 ECAM Alerts

ECAM Alerts ..... A

DSC-49-60 Electrical Supply

Electrical Supply ..... A

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OVERVIEW

Applicable to: ALL

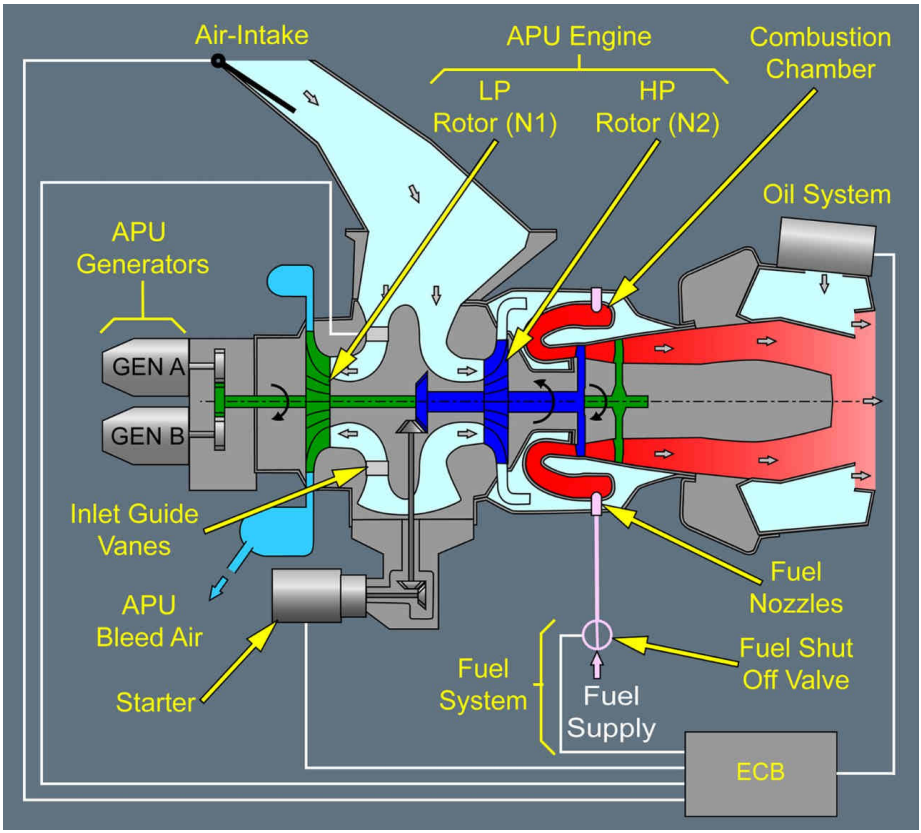
The Auxiliary Power Unit (APU) can provide:

- On ground:
  - Bleed air for engine start, and for air conditioning
  - Electrical power, via two generators.
- During takeoff:
  - Bleed air for air conditioning
    When needed (e.g. when optimum aircraft performance is required), the APU provides bleed air for air conditioning.
- In flight:
  - Bleed air for engine start, or as a backup for air conditioning, up to an altitude of 22 500 ft, when the aircraft speed is below MACH 0.56, and regardless of the aircraft speed, in case of all engine flame out.
  - A backup for electrical power via one generator, up to an altitude of 22 500 ft, when the aircraft speed is below MACH 0.56, and regardless of the aircraft speed, in the case of an all engine flame out.

SYSTEM ARCHITECTURE

Applicable to: ALL

System Architecture



APU ENGINE

The APU has two rotors:

- The Low Pressure (LP) rotor
  The LP provides power for bleed air and electrical generation.
  The N1 indication on the ECAM indicates the rotation speed of the power rotor.

L3
- The LP is made of a turbine that drives the load compressor. The air compressed by the load compressor is delivered to the aircraft's bleed air system.
- The LP is connected to a shaft that drives the two APU electrical generators.

L1 - The High Pressure (HP) rotor.
L3 The HP rotor provides power to the power rotor.
L1 The N2 indication on the ECAM indicates the rotation speed of the HP rotor.

APU GENERATORS

When the aircraft is on ground, the APU simultaneously drives two APU generators: APU GEN A, and APU GEN B.
When the aircraft is in flight, the APU drives one APU generator: APU GEN A. If the APU GEN A fails, the APU drives the APU GEN B.

L3 To determine whether the aircraft is on ground or in flight, the APU uses the ground/flight information from ADR 1 and ADR 3. If ADR 1 and ADR 3 send different ground/flight information, the APU considers that the aircraft is in flight. In addition, if ADR 1(3) fails in flight, ADR 1(3) sends the in-flight information to the APU, even after landing. In this case, after landing, the APU considers that the aircraft is still in flight, and the APU only drives the APU GEN A.

L1 Each APU generator provides a constant frequency of 400 Hz.

L2 Each generator can provide a power of 120 KVA.

L1 Any APU generator can replace any engine generator (within the APU operational envelope). On ground, both APU generators can supply the entire aircraft network.

L2 ELECTRONIC CONTROL BOX (ECB)

The ECB monitors and controls the operation of the APU , and displays the applicable information on the ECAM .

The ECB :

- Sequences and monitors the APU start
  Refer to DSC-49-30-10 APU Start
- Monitors the operating parameters of the APU
  Such parameters include N1, N2, and Exhaust Gas Temperature (EGT).

L3 Other parameters include speed management, speed limitation, temperature limitation, independent overspeed protection, and inlet guide vane control.

L2 - Monitors bleed air
L3 The ECB controls the APU bleed valve and the air intake flap position.
L2 - Sequences the manual or automatic shutdown
Refer to DSC-49-30-10 APU Shutdown
Refer to DSC-49-40-10 APU Automatic Shutdown
- Controls the emergency shutdown.
Refer to DSC-49-40-10 APU Emergency Shutdown

AIR-INTAKE

External air flows into the APU via an air-intake flap. The flap automatically closes, when the APU is not in operation.
L2 The ECB automatically and electrically controls the opening and closure of the flap.

L3 INLET GUIDE VANES (IGV)

The IGVs control the bleed airflow, based on aircraft demand.
They regulate the flow of air that enters and exits the load compressor.
The ECB controls the IGVs.

Impacted by TDU: 00021434 APU Starter

L2 APU STARTER

The APU starter starts the APU, when the air-intake flap is fully open, and the START pb is set to ON.

The APU starter is electrically supplied via the APU DC busbar, that is powered by:
- The APU battery, or
- The APU TR.

The ECB controls the APU starter.

Impacted DU: 00001759 APU Starter

L2 APU STARTER

The APU starter starts the APU, when the air-intake flap is open, and the START pb is set to ON.

Note: The flight crew must check that the FLAP OPEN indication is displayed on the APU SD page before switching the APU START pb to ON.

The APU starter is electrically supplied via the APU DC busbar, that is powered by:
- The APU battery, or
- The APU TR.

The ECB controls the APU starter.

APU BLEED AIR

The APU can provide bleed air to the bleed system, via the APU bleed valve (*Refer to DSC-36-10-30 APU Bleed Air*)

L3 Airflow to the bleed system is controlled by the position of the IGV s, based on aircraft demand.

L2 The ECB controls the bleed air system of the APU .

L2 OIL SYSTEM

The APU has two independent oil systems to lubricate and cool down:

- The APU components
- The two APU generators.

The ECB monitors the oil system (i.e. oil quantity, oil pressure and oil filter).

OIL QUANTITY

On ground, if the oil quantity is low, the APU SD page displays the pulsing OIL LVL LO indication.
Even if the OIL LVL LO indication appears on the APU SD page, the flight crew can operate the APU normally.

L3 The OIL LVL LO indication appears before the oil quantity reaches the minimum level to operate the APU . When the OIL LVL LO indication appears, the APU will continue to operate normally for at least 14 h .

L23

Note: The OIL LVL LO indication is inhibited in flight. Therefore if the flight crew has used the APU in flight and the OIL LVL LO appears after landing, the remaining time for APU operation could be less than 14 h

L2 If the quantity of oil continues to decrease down to the critical oil level, the APU automatically shuts down and the ECAM triggers the APU FAULT alert.

OIL FILTER

One oil filter protects both oil systems from contamination.
When the oil filter is clogged, the ECAM triggers APU OIL FILTER CLOGGED (*Refer to procedure*).

L2 FUEL SYSTEM

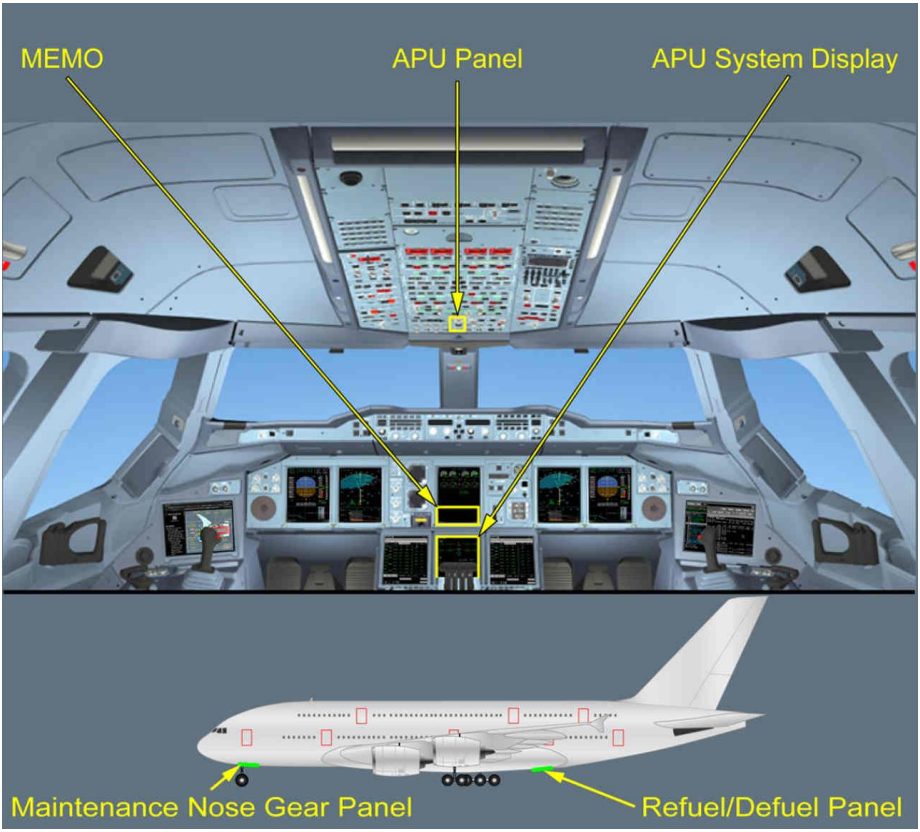
The fuel system supplies the APU with the appropriate quantity of fuel. (*Refer to DSC-28-10 APU FEED*)
In addition to the APU feedline shutoff valve, the APU has a fuel shutoff valve.
The fuel shutoff valve automatically closes when the APU is not in operation, or in the event of an emergency.

The ECB controls fuel flow.

COCKPIT VIEW

Applicable to: ALL

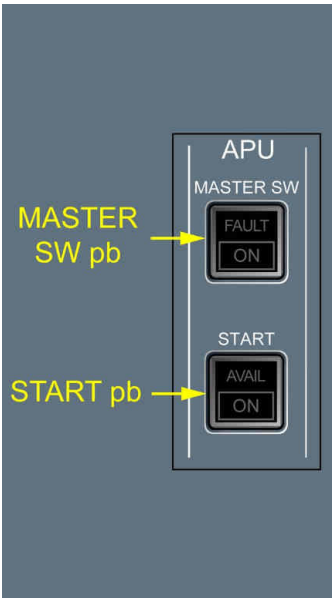
Cockpit View



APU PANEL

Applicable to: ALL

APU Panel



MASTER SW pb-sw



The APU is off.
When pressed, the APU system is powered and the air-intake flap opens.



The APU is in operation.
When pressed, the APU shutdown sequence begins.

L12



- The APU is failed, or
- An automatic shutdown has occurred, or
- An emergency shutdown has occurred.

Associated with the following ECAM alert:
- APU FAULT (*Refer to procedure*)

START pb



The APU is off.



The APU is starting.
When the APU reaches 95 % speed, the ON light goes off and the AVAIL light comes on.

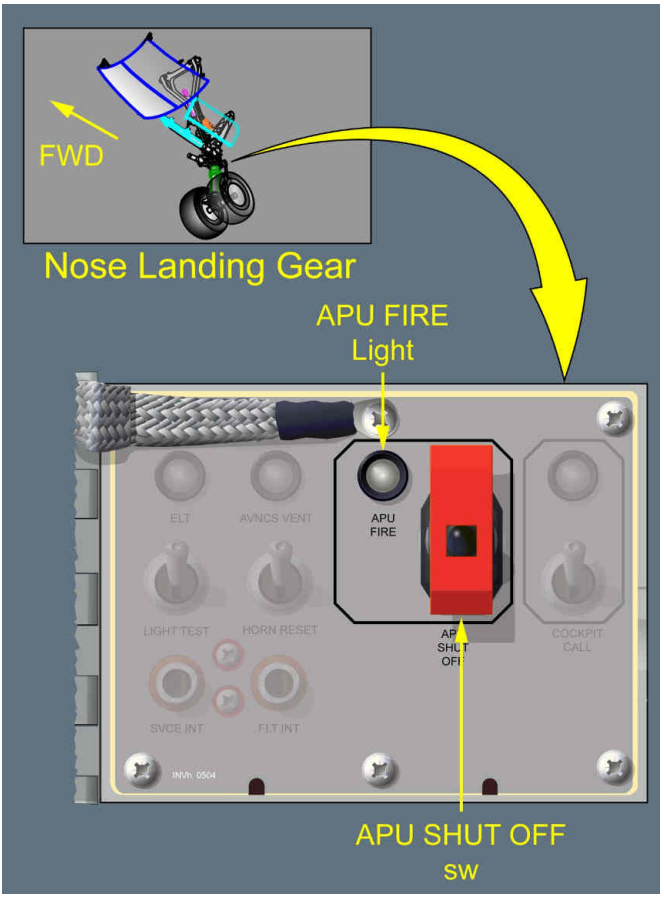


The APU is started, and can provide electrical power, and/or bleed air.

MAINTENANCE NOSE GEAR PANEL

Applicable to: ALL

Maintenance Nose Gear Panel



APU FIRE LIGHT



Normal position. No fire is detected.

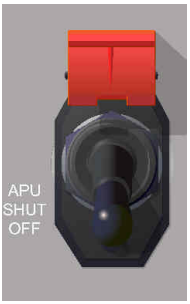


Fire is detected in the APU compartment. In addition of the light, an external horn comes on.
The APU automatically shuts down, the APU fuel valves close, and the APU fire extinguisher discharges the agent.
The light and the horn remain on, until the fire is extinguished.

APU SHUT OFF SW



Normal position.



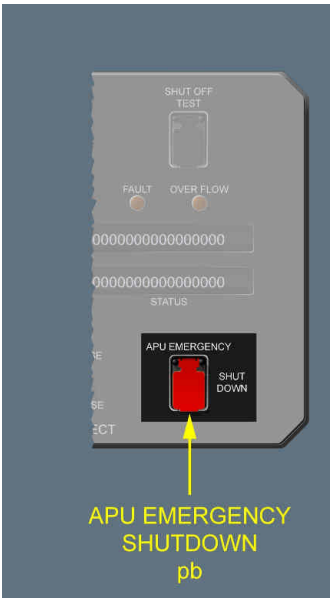
The ground crew has opened the guard.

When pushed down and released:
- Initiates an APU shutdown from outside the aircraft (normal operation), or
- Initiates an emergency shutdown of the APU , due to an APU failure (*Refer to the Emergency Shutdown Description*).

REFUEL/DEFUEL PANEL

Applicable to: ALL

Refuel/Defuel Panel



APU Emergency Shutdown pb



Normal position.

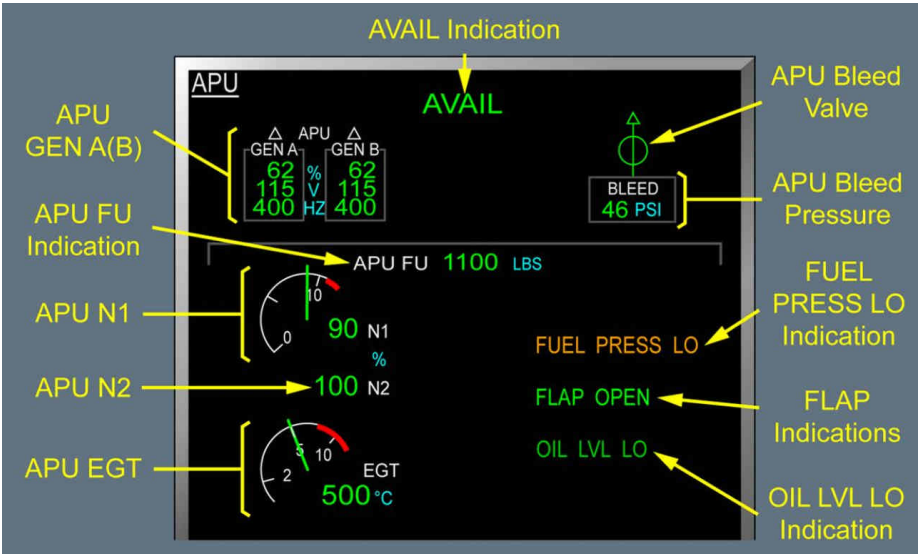


When pressed, the APU shuts down, without a cooling period.

APU SYSTEM DISPLAY

Applicable to: ALL

APU SD Page



AVAIL INDICATION

L12

AVAIL

APU is running, and can provide bleed air and electrical power.
This indication appears, when N1 is greater than 95 %.

APU GEN A(B)

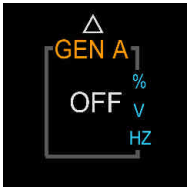
The APU generator indications on the SD differ, when the APU generator is:
- On standby, or
- Off, or
- In operation.

APU GENERATOR ON STANDBY



The APU generator is on standby: The APU is off.

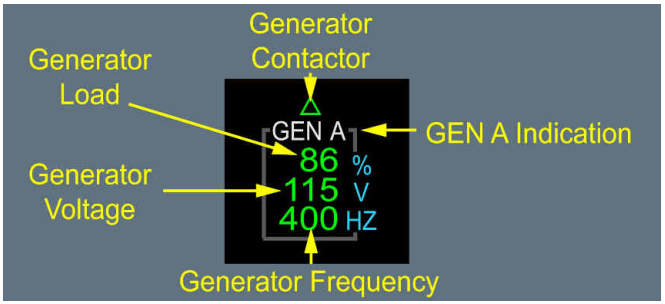
GEN A SET TO OFF



The APU generator is off: The APU is on, and the APU GEN A pb-sw is set to OFF.

APU GENERATOR IN OPERATION

GEN A In Operation



GENERATOR CONTACTOR



The APU generator is connected to the electrical network.



The APU generator is not connected to the electrical network.

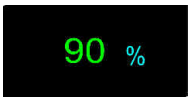
GEN A INDICATION



Normal operation.

GENERATOR LOAD

L12



The APU generator load is normal.
The load is normal, when it is less than 108 %.

L12



There is an overload on the APU generator.
The load is greater than 108 % for more than 10 s.

GENERATOR VOLTAGE

L12



The APU generator voltage is normal.
The voltage is normal between 110 V and 120 V.



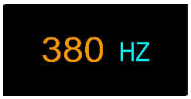
The APU generator voltage is abnormal.

GENERATOR FREQUENCY

L12



The APU generator frequency is normal.
The frequency is between 390 Hz and 410 Hz.



The APU generator frequency is abnormal.

APU FU INDICATION

L12



The quantity of fuel, used by the APU , since the last reset.

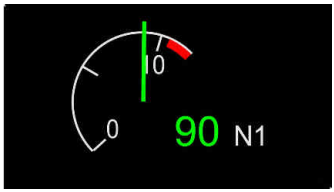
On ground, the APU FU value automatically resets during:
- The first engine-start, if the APU is running
- The touchdown
- The last engine-shutdown, if the APU is running.

In-flight, the APU FU value resets during the APU start.
For more information on the APU fuel consumption, please *Refer to 00011415 **Not found** .*



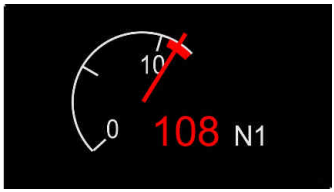
The quantity of fuel used by the APU is no longer calculated by the ECB . The last computed quantity remains displayed with the two amber dashes.

APU N1



The APU N1 rotation speed is normal.

L12



APU N1 rotation speed is equal to, or greater than, the APU N1 red limit.
The APU N1 red limit is the lower border of the red arc.
It is greater than 105 % .
An automatic shutdown sequence begins.

Associated with the following ECAM alert:
- APU FAULT (*Refer to procedure*)

APU N2



The APU N2 rotation speed is normal.

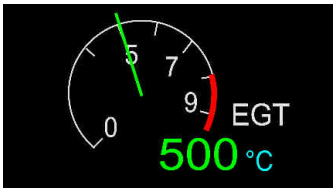
L12



APU N2 rotation speed is equal to, or greater than, the APU N2 red limit. It is greater than 102 % .
An automatic shutdown sequence begins.

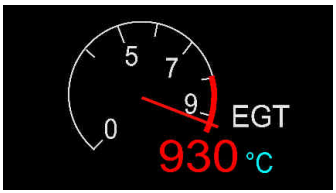
Associated with the following ECAM alert:
- APU FAULT (*Refer to procedure*).

APU EGT INDICATION



The APU EGT is normal.

L123



The APU EGT is at, or greater than, the APU EGT red limit.
The APU EGT red limit is the lower border of the red arc.
An automatic shutdown sequence begins.
The ECB computes the APU EGT red limit. This limit can vary from 600 °C up to 1 280 °C (during APU start), depending on several external parameters (e.g. ambient temperature, pressure).

Associated with the following ECAM alert:
- APU FAULT (*Refer to procedure*)

OIL LVL LO INDICATION

L13



Pulses, and indicates a low quantity of APU oil.
The APU can continue to operate normally for at least 14 h.

Note: *The OIL LVL LO indication is inhibited in flight. Therefore if the flight crew has used the APU in flight and the OIL LVL LO appears after landing, the remaining time for APU operation could be less than 14 h*

When this indication appears, the APU SD page automatically appears.

FLAP INDICATIONS



The air-intake flap moves to the open, or to the closed position.



The air-intake flap is fully open.

FUEL PRESS LO INDICATION



APU fuel pressure is low.

APU BLEED PRESSURE



The current pressure of APU bleed air.

APU BLEED VALVE

Appears only if the MASTER SW pb-sw is ON.



The APU bleed valve is closed.



The APU bleed valve is open.



The APU bleed valve is abnormally closed, and the APU BLEED pb-sw is ON.



The APU bleed valve is abnormally open, and the APU BLEED pb-sw is off.

MEMO

Applicable to: ALL

L12

APU AVAIL — The APU is running.
The APU N1 is greater than 95 %.

APU BLEED The APU supplies bleed air to the air conditioning packs.

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NORMAL OPERATIONS

Applicable to: ALL

L2 The ECB monitors APU start and shutdown.

APU START

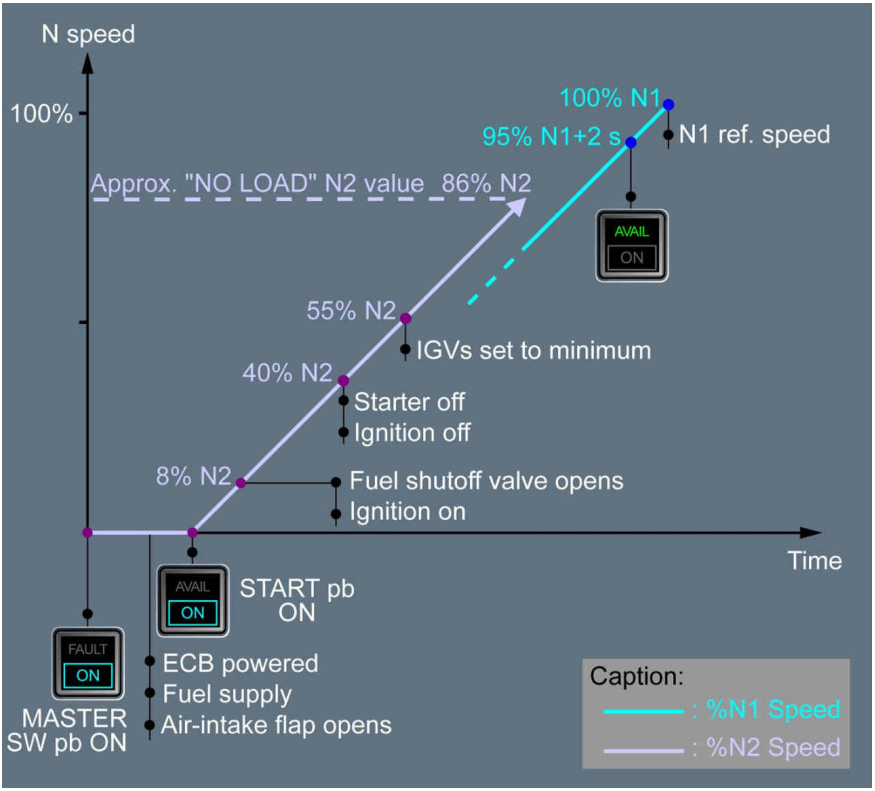
When the MASTER SW pb-sw is set to ON:
- The ON light of the MASTER SW pb-sw comes on
- The APU page appears on the SD, if the aircraft has ground power, or main generator power.

When the START pb is set to on:
- The APU start sequence begins
- When the APU is running:
  - The ON light goes off and the AVAIL light comes on, on the START pb
  - The APU AVAIL memo appears on the EWD.

Note: The MASTER SW pb-sw remains ON.

L3 DETAILED APU START SEQUENCE

Detailed APU Start Sequence



APU START SEQUENCE: ABORT OR INHIBIT CONDITIONS

Abort/Inhibit Condition	Description	Start Abort/Inhibit	On Ground	In Flight	Confirmation Time
Air-intake flap	Air-intake flap fails to open	Inhibit	Yes	Yes	40 s
No N2 rotation	N2 is still less than 8 % , 15 s after APU start	Abort	Yes	Yes	15 s
Oil pressure not available	The oil pressure indication is not available prior to engine rotation.	Inhibit	Yes	Yes	2 s

Continued on the following page

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Abort/Inhibit Condition	Description	Start Abort/Inhibit	On Ground	In Flight	Confirmation Time
No ignition	No ignition within 16 s of fuel on. Ignition is based on a temperature rise of 20 °C.	Abort	Yes	Yes	16 s
Hung start	N2 is less than 40 %, 15 s after APU start.	Abort	Yes	No	0 s
Abnormal N1 rotation	N1 is less than 25 %, or above 125 %, and N2 is greater than 55 %.	Abort	Yes	Yes	0 s
N1 Rise time	N1 is less than 95 %, and N2 has been greater than 30 %, for more than 60 s.	Abort	Yes	Yes	0 s
EGT not available	EGT indication is not available.	Inhibit/Abort	Yes	Yes	3 s
EGT abnormal temperature	EGT is greater 700 °C.	Abort	Yes	Yes	3 s

APU SHUTDOWN

When the MASTER SW pb-sw is set to off:

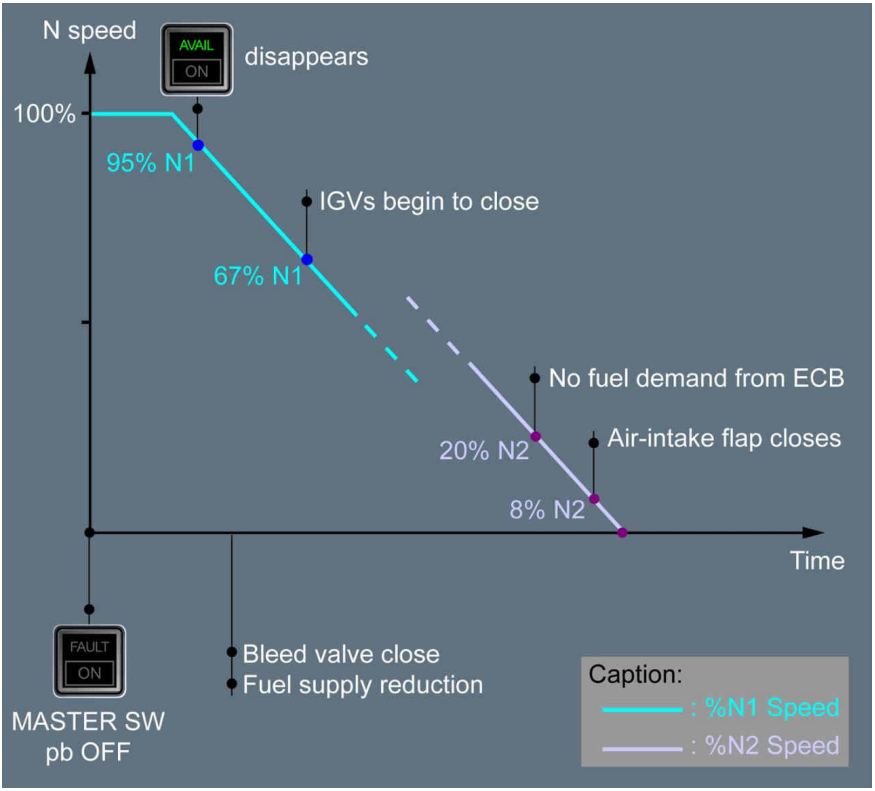
- The ON light of the MASTER SW pb-sw goes off
- The AVAIL light of the START pb goes off
- The APU bleed valve closes (if open)
- A cooling period begins

L3 A 60-second cooling period enables the APU to run with a minimum load, in order to reduce the temperature of the APU's engine.

L1
- Fuel supply to the APU stops
- The air-intake flap closes
- The APU stops.

L3 DETAILED APU SHUTDOWN SEQUENCE

Detailed APU Shutdown Sequence



ABNORMAL OPERATIONS

Applicable to: ALL

APU AUTOMATIC SHUTDOWN

In the case of an APU failure or misbehavior, the APU automatically shuts down, without a cooling period.

L2 Associated with the following ECAM alert:
- APU FAULT (*Refer to procedure*).

L13

Shutdown Conditions	On Ground	In Flight
Aircraft emergency stop	Yes	Not applicable
N1 overspeed: N1 is greater than 105 %	Yes	Yes
N2 overspeed: N2 is greater than 102 %	Yes	Yes
APU oil low pressure	Yes	No
APU Generator oil low pressure	Yes	No
APU oil high temperature	Yes	No
Generator oil high temperature	Yes	No
EGT Limit Exceeded: EGT is higher than 700 °C	Yes	Yes
ECB failure	Yes	Yes
APU fuel system failure	Yes	Yes
No normal DC power	Yes	Yes
N1 underspeed: N1 is less than 88 %	Yes	Yes
Loss of N1 or N2 overspeed protection	Yes	Yes
Bleed air reverse flow	Yes	Yes

APU EMERGENCY SHUTDOWN

An immediate APU shutdown, without a cooling period, can occur when:
- One of the following is pressed:
  - APU FIRE pb on the overhead panel
  - APU Emergency Shutdown pb on the Refuel/Defuel panel
  - APU Shut Off sw on the Maintenance Nose Gear panel.
- An APU fuel feedline damage is detected.

L2 Associated with the following ECAM alert:
- APU FAULT (*Refer to Procedure*)

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ECAM ALERTS

Applicable to: ALL

APU FAULT (*Refer to procedure*)

APU MACH LIMIT EXCEEDED (*Refer to procedure*)

APU OIL FILTER CLOGGED (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem	Electrical Supply
APU	ECB	APU DC (1) / DC ESS (2)
	APU starter	APU DC

(1) *ECB is supplied by APU HOT BUS on ground, if the APU DC busbar is not supplied.*

(2) *Only during APU start, due to a loss of voltage on the APU BAT HOT BUS.*

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AIRCRAFT SYSTEMS

52 - DOORS

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DSC-52-PLP PRELIMINARY PAGES

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DSC-52-20-10 System Description

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Upper avionics bay..... C
Aft Avionics Bay..... D

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DOOR/OXY System Display..... B

DSC-52-60 ECAM Alerts
ECAM Alerts..... A

DSC-52-70 Electrical Supply
Electrical Supply..... A

OVERVIEW

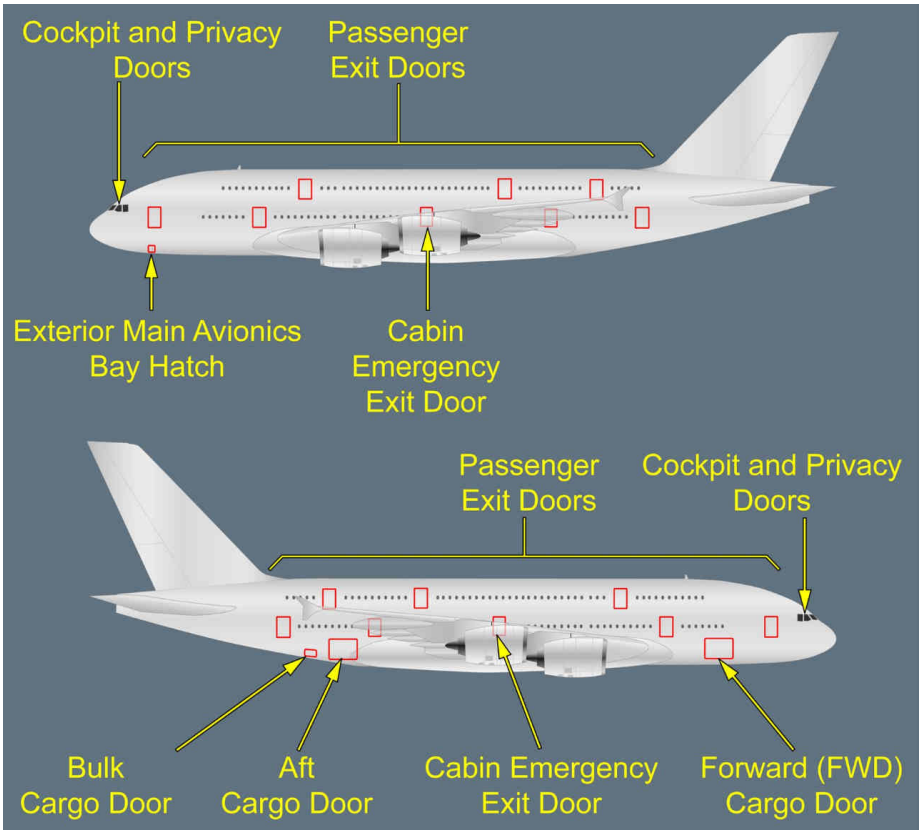
Applicable to: ALL

The aircraft has:

- In the cabin:
  - 14 passenger doors
  - 2 emergency exits.

  The cabin doors are electrically controlled. The crewmember can manually control the cabin doors, if necessary.
- In the cockpit:
  - 1 cockpit door
  - 1 privacy door.
- In the cargo compartments:
  - 3 cargo compartment doors.
- In the avionics bay compartments:
  - 2 avionics bay hatches (one hatch is accessible from the outside of the aircraft)
  - 4 avionics bay access doors.

Overview



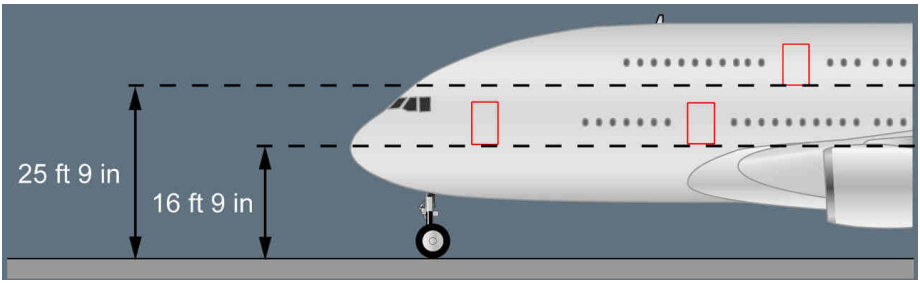
L2 The passenger doors and emergency exits on the main deck are as follows:

- Type A
- Dimensions: Width = 4 ft 2 in , and height = 6 ft 4 in
- Door sill height = 16 ft 9 in .

The passenger doors on the upper deck are as follows:

- Type A
- Dimensions: Width = 4 ft 2 in , and height = 6 ft 4 in
- Door sill height = 25 ft 9 in .

Door Sill Height



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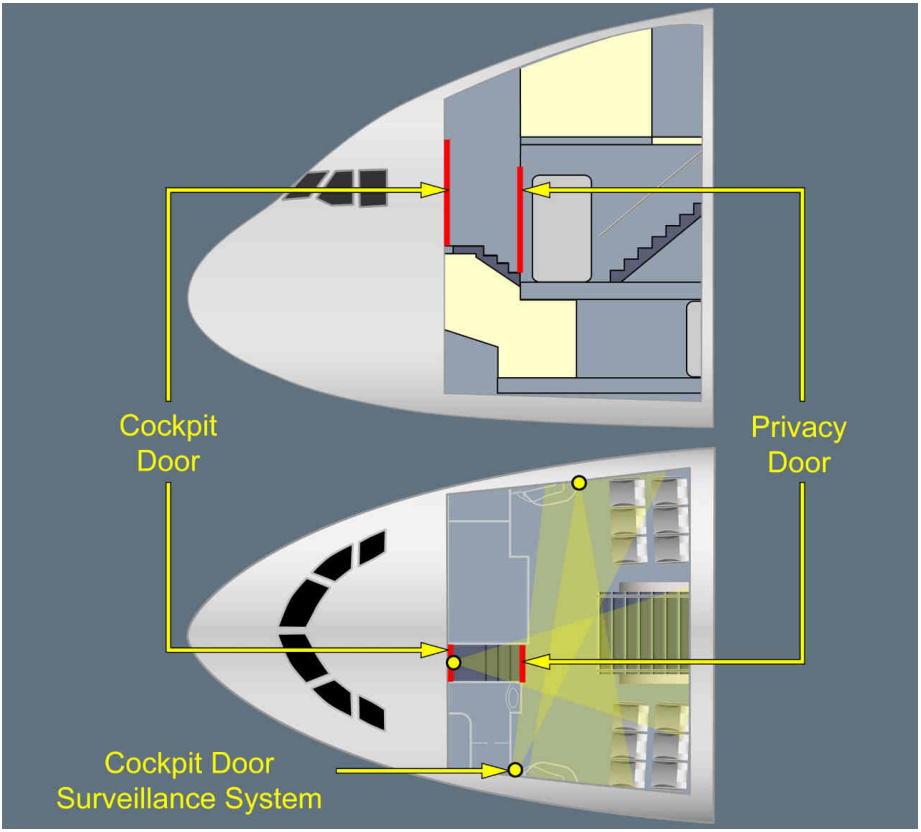
OVERVIEW

Applicable to: ALL

Overview



COCKPIT DOOR

Applicable to: ALL

The cockpit door separates the cockpit from the cabin.
The cockpit door automatically locks, as soon as it closes, when the Cockpit Door Locking System (CDLS) is powered.
L2 A Cockpit Door Lock Control Unit (CDLCU) electrically locks and unlocks the cockpit door.

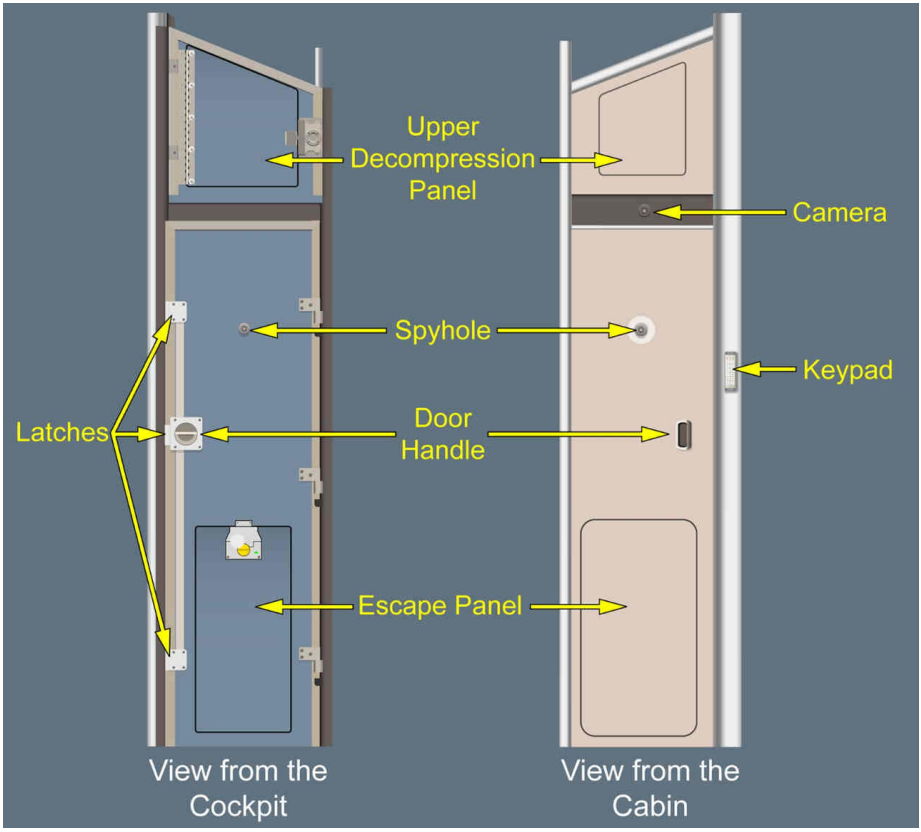
L1 If the CDLS fails, the door unlocks but remains closed.

On the overhead panel, the CKPT DOOR CONT panel indicates any failed electrical latches. For more information on the CKPT DOOR CONT panel, *Refer to DSC-52-20-20-GCKPP CKPT DOOR CONT Panel* .

The flight crew uses the CKPT DOOR sw to either open the cockpit door, or to refuse access to the cockpit. For more information on the CKPT DOOR sw , *Refer to DSC-52-20-20-GCKPD CKPT DOOR sw* .

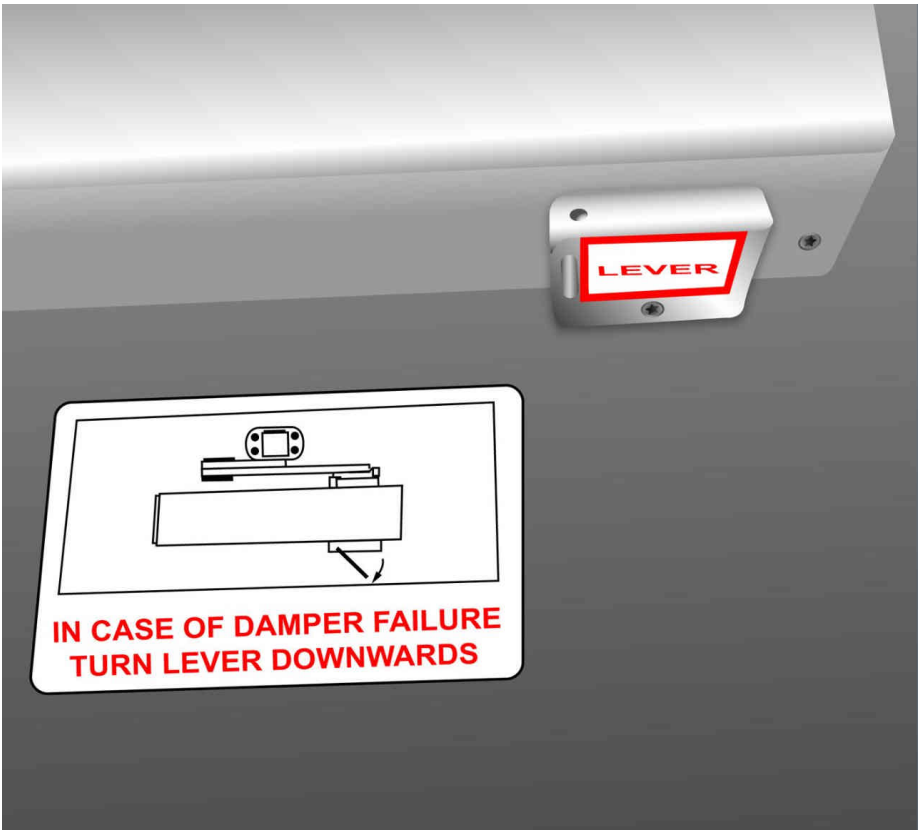
At any time, the flight crew can use the door handle to manually open the cockpit door.

Cockpit Door Description



L2 The cockpit door has a noise damper, that slows down the door during the closing and the opening. In the case of a damper blockage, the flight crew can disengage it by pulling the lever, in order to close the door.

Noise Damper



PROTECTION AGAINST DECOMPRESSION

In the case of rapid decompression in the cockpit:

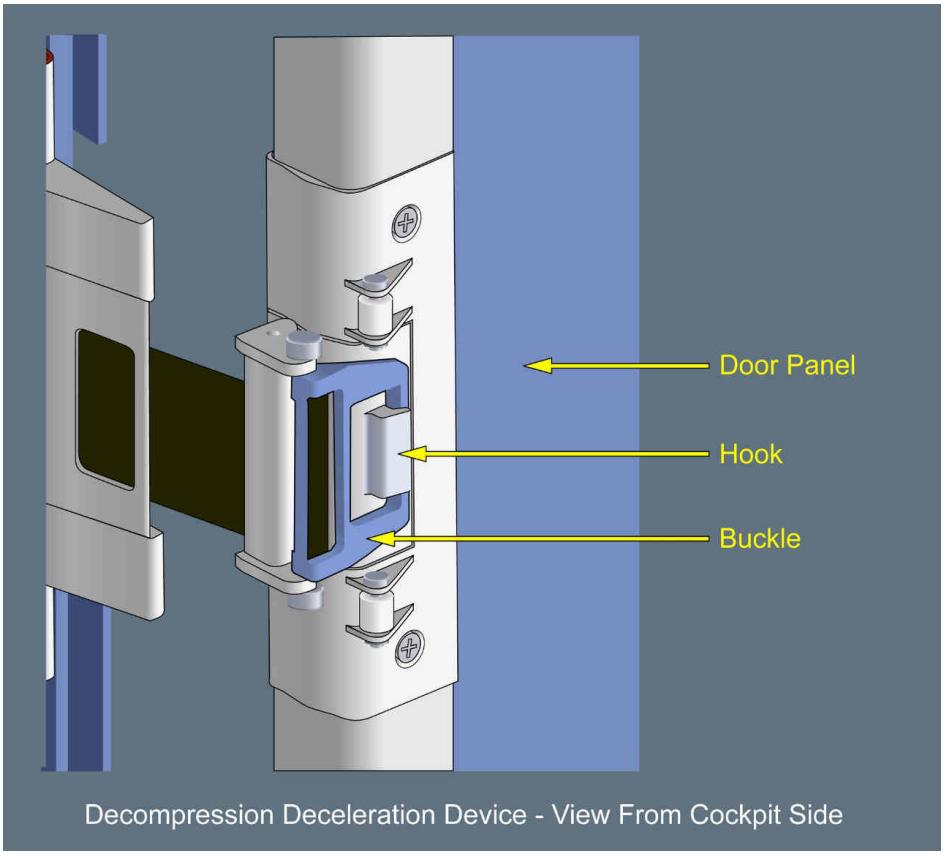
- The upper decompression panel opens

L3 The upper decompression panel automatically opens, if the differential pressure between the cabin and the cockpit is equal to, or more than, 0.145 PSI .

L1 The decompression is detected by the pressure sensors that are located on the CKPT DOOR CONT panel. For more information, *Refer to CKPT DOOR CONT panel* .

- The cockpit door unlocks automatically.
  The Decompression Deceleration Device (DDD) slows down the opening of the cockpit door. After decompression, the flight crew must pull the buckle away from the hook in order to open the cockpit door.

Decompression Deceleration Device



L3 The cockpit door automatically unlocks, if the pressure in the cockpit changes by more than 10 PSI /s.

L1

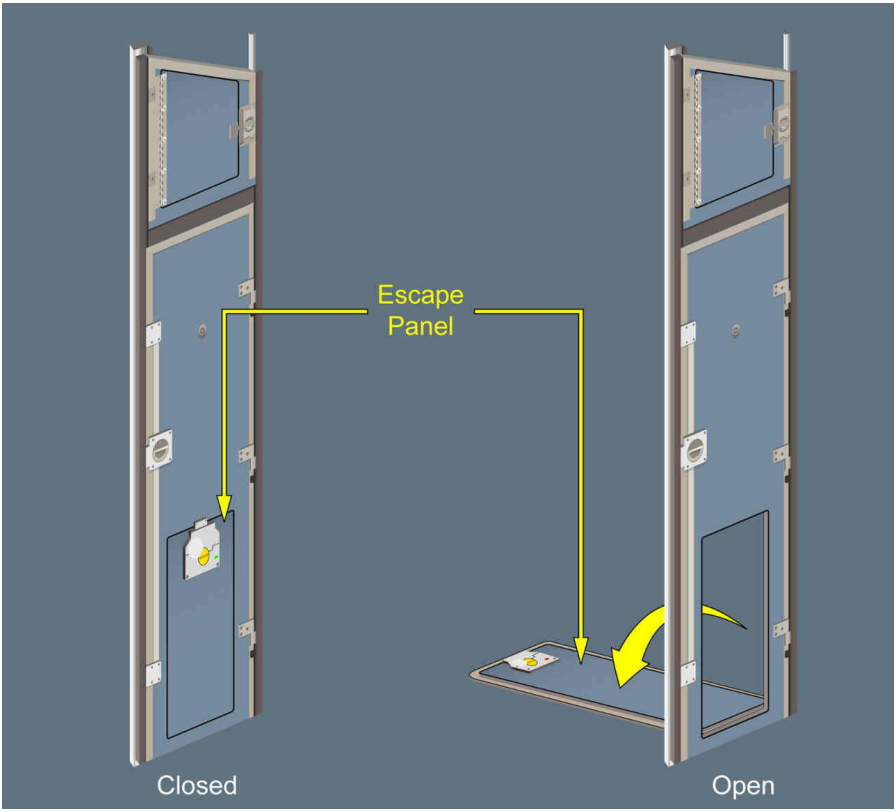
CAUTION	Do not touch the DDD , in order to avoid damage to this device.

In the case of a cabin decompression, the escape panel opens.

L3 The escape panel automatically opens, if the pressure in the cockpit is more than approximately 0.5 PSI (in the range of 0.435 PSI - 0.580 PSI).

ESCAPE PANEL

If required, it is also possible to evacuate the cockpit through the escape panel that is on the cockpit door.



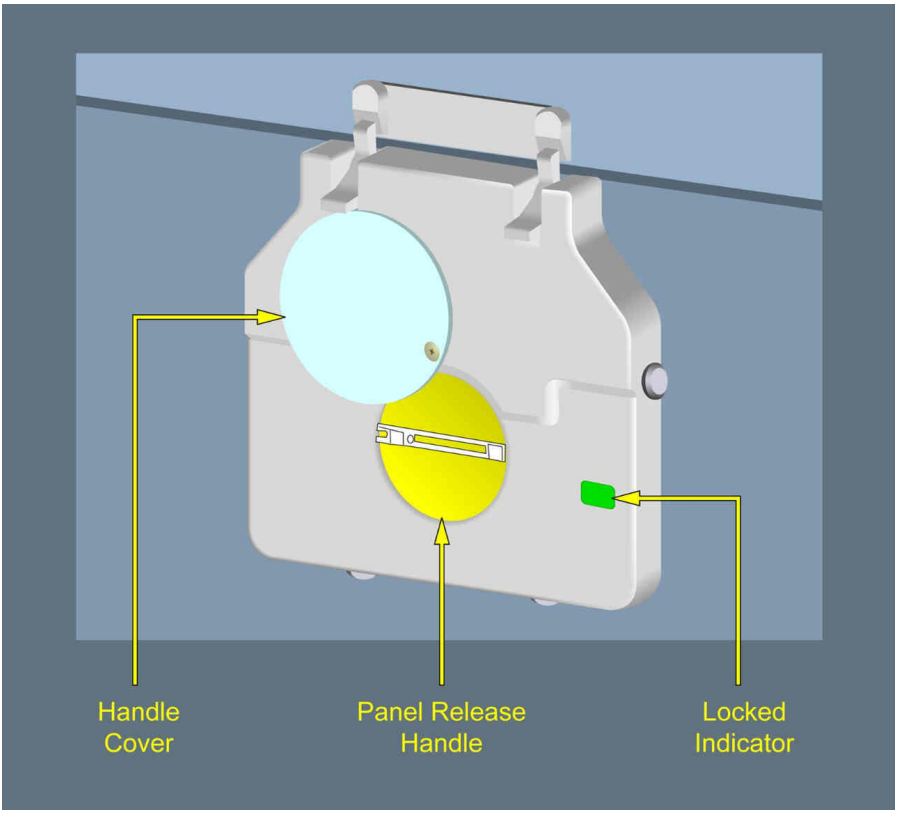
The flight crew can open the escape panel if:

- The cockpit door is jammed in the closed position
- There is an emergency.

The flight crew can open the escape panel by:

- Rotating the handle cover in order to access the panel release handle
- Pushing the panel release handle, and turning it in any direction in order to unlock the escape panel.

L2 If the escape panel is unlocked, the locked indicator is red.

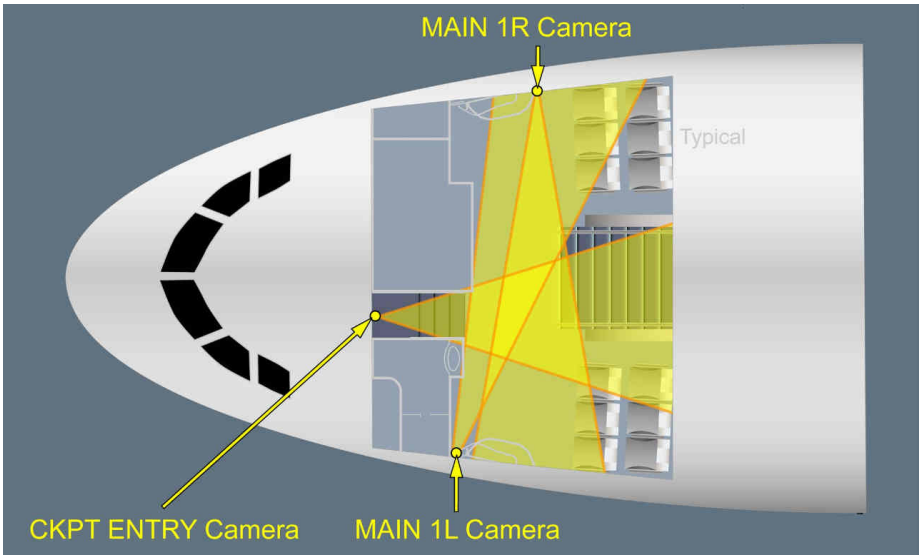


COCKPIT DOOR SURVEILLANCE SYSTEM

Applicable to: ALL

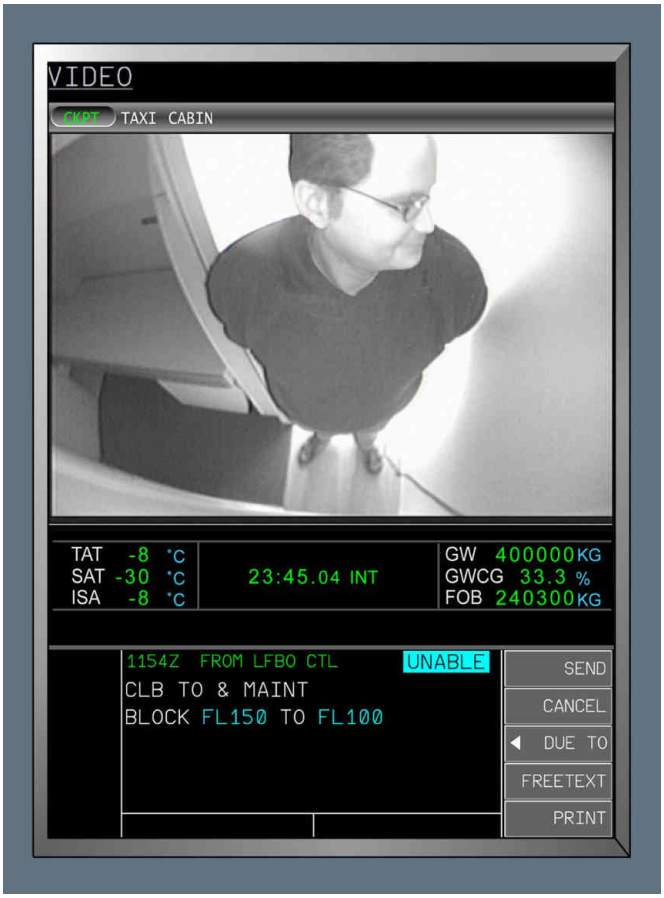
The Cockpit Door Surveillance System (CDSS) has three cameras that enable the flight crew to identify who is requesting entry to the cockpit, before authorizing (or not) their access.

Camera Location



The VIDEO System Display (SD) page automatically displays the CKPT ENTRY camera image, if:
- The emergency cockpit access is requested, or
- In flight, the routine cockpit access is requested, and the ECAM displays the CRUISE page.

SD Page



The flight crew can change the view of CKPT ENTRY camera to two separate images: Views of MAIN 1L camera and MAIN 1R camera.



The flight crew can also display images from these cameras without a request for cockpit access. For a detailed description, *Refer to DSC-31-80-20-10 ECAM Control Panel* .

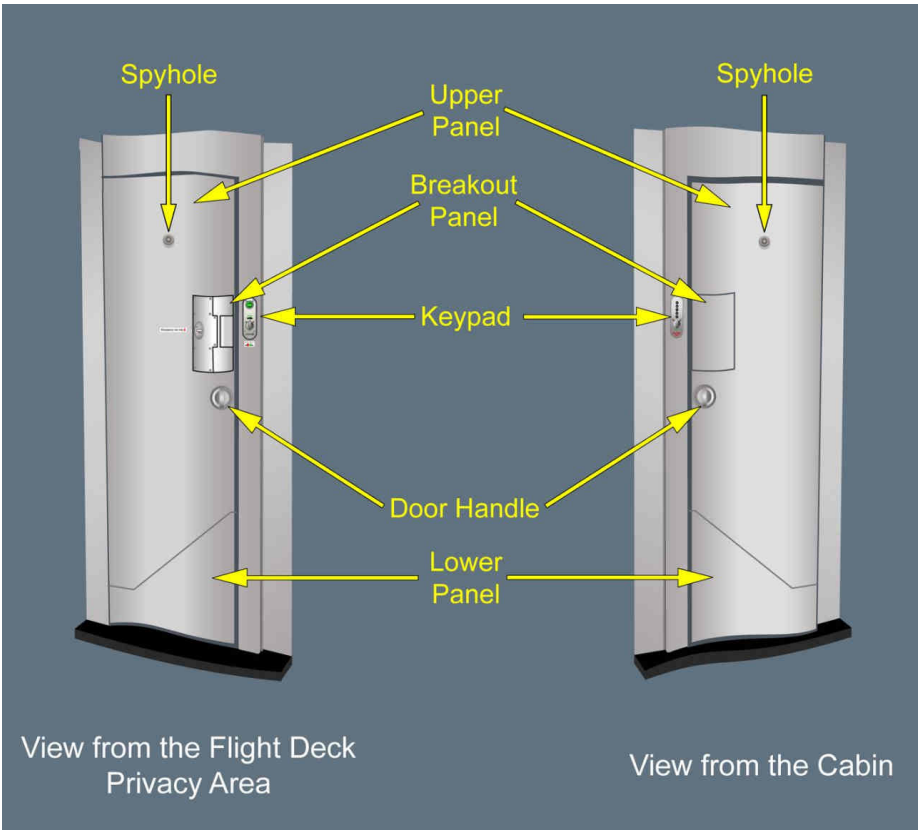
PRIVACY DOOR

Applicable to: ALL

The privacy door separates the flight deck privacy area from the cabin.
The privacy door automatically locks, as soon as it closes, when the Privacy Door Locking System (PDLS) is powered.

L2 A Privacy Door Lock Control Unit (PDLCU) electrically locks and unlocks the privacy door.
L1 The crewmember unlocks the door to access to the flight deck privacy area, via a keypad.

Privacy Door



PROTECTION AGAINST DECOMPRESSION

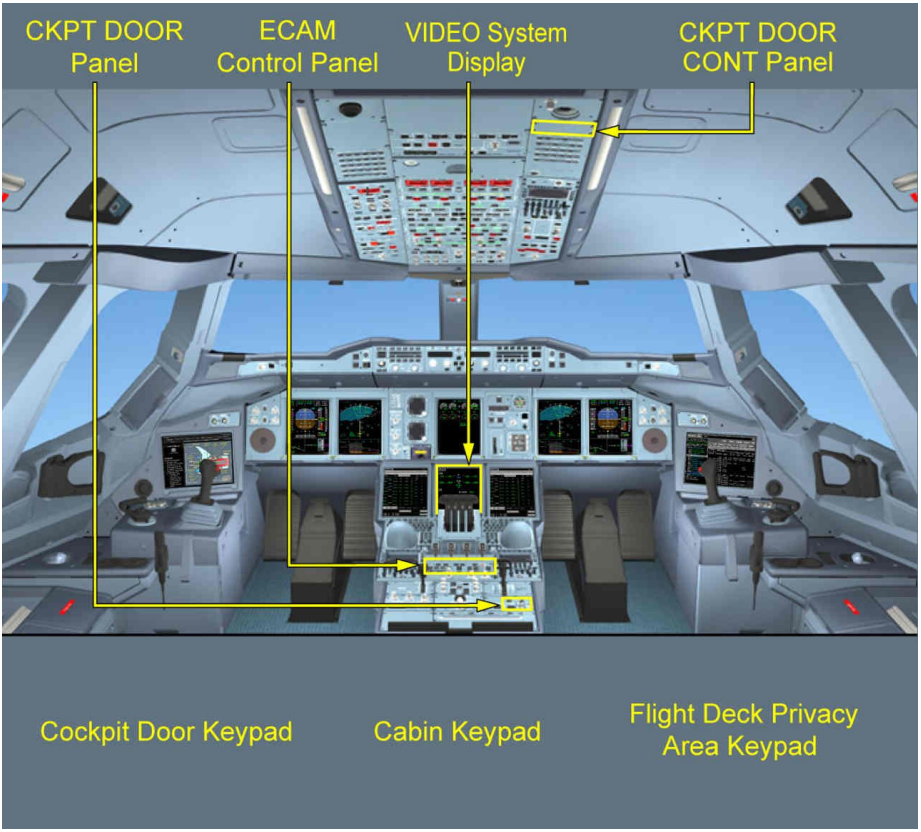
The privacy door opens toward:
- The cabin, in the case of cabin decompression
- The cockpit, in the case of cockpit decompression.
  The lower panel is blocked by the stairs. The upper panel opens fully toward the corridor of the flight deck privacy area.

L2 Decompression devices are automatically released, if the differential pressure between the cabin and the flight deck privacy area/cockpit is at, or above 0.145 PSI.

COCKPIT VIEW

Applicable to: ALL

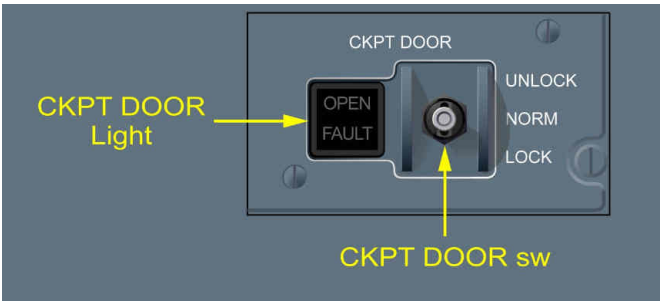
Cockpit View



CKPT DOOR PANEL

Applicable to: ALL

CKPT DOOR Panel



CKPT DOOR sw



Unlocks the door, as long as the flight crew maintains the UNLOCK position.

Note: *When the flight crew releases the switch, it goes back to the NORM position.*

L12



The door is locked. If a crewmember enters a routine access code on the keypad, the door remains locked.

Note: *If a crewmember enters the emergency access code on the keypad, the door automatically unlocks for 5 s, after a defined period of time.*
The Operator defines this period of time.

L12



Locks the door, and inhibits the keypad and the buzzer for a defined period of time.
The Operator defines this period of time (between 5 min and 20 min).

Note: *When the flight crew releases the switch, it goes back to the NORM position.*

CKPT DOOR LIGHT



Steady: The door is open.
Flashing: A crewmember enters an emergency access code on the keypad.

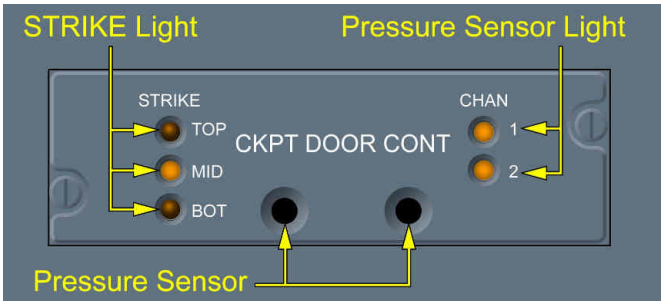


The CDLS is failed.

CKPT DOOR CONT PANEL

Applicable to: ALL

CKPT DOOR CONT Panel



STRIKE LIGHT



The corresponding (upper, mid or lower) locking strike is operative.



The corresponding (upper, mid or lower) locking strike is not maintained in the locked position.
To attempt to recover the CDLS , *Refer to PRO-SUP-24-52 Cockpit Door Locking System (CDLS) Reset* .

After a CDLS reset:
- If the light goes off, the system has resumed normal operation
- If the light remains on, the CDLS is failed.

PRESSURE SENSOR



Two redundant differential pressure sensors enable the detection of a rapid variation in pressure. The pressure sensors enable the simultaneous opening of all latches, when a defined pressure drop is detected.

PRESSURE SENSOR LIGHT



The corresponding (CHAN 1 or CHAN 2) pressure sensor is operative.

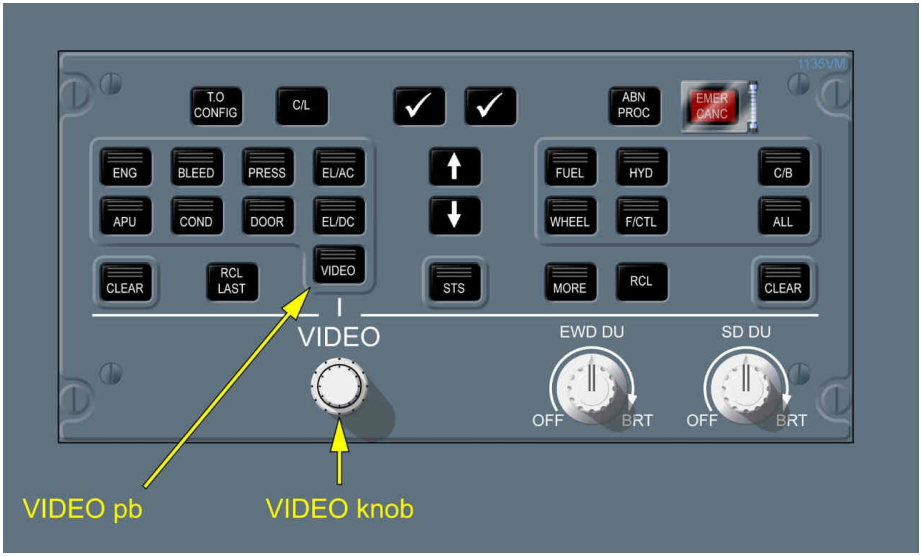


The corresponding (CHAN 1 or CHAN 2) pressure sensor is inoperative.

ECAM CONTROL PANEL

Applicable to: ALL

ECAM Control Panel



Video pb



The SD does not display the VIDEO page.



The SD displays the VIDEO page.

VIDEO knob



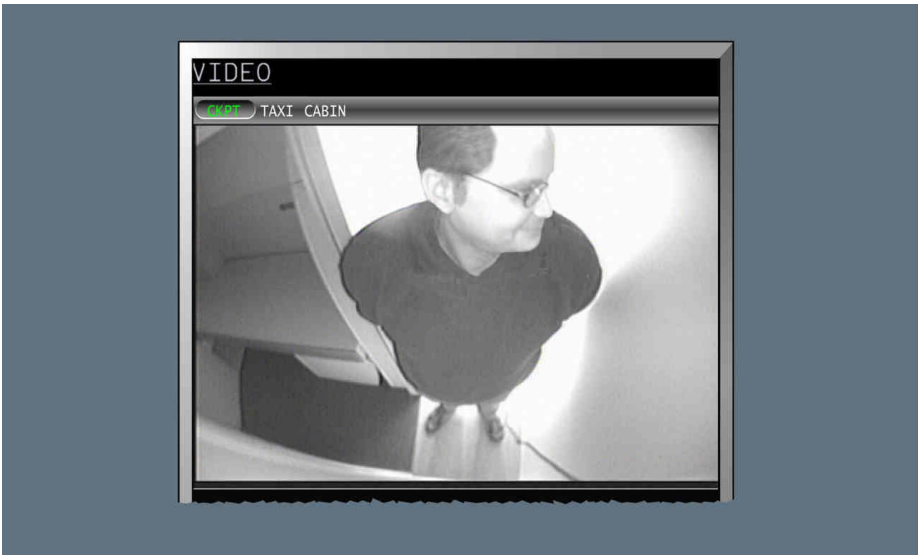
The outer part of the VIDEO knob enables the flight crew to select a different video system to be displayed on the SD.
The inner part of the VIDEO knob enables the flight crew to select a video camera, as applicable.

VIDEO SYSTEM DISPLAY

Applicable to: ALL

The VIDEO system display provides the flight crew with live video images of the cockpit door entrance area.

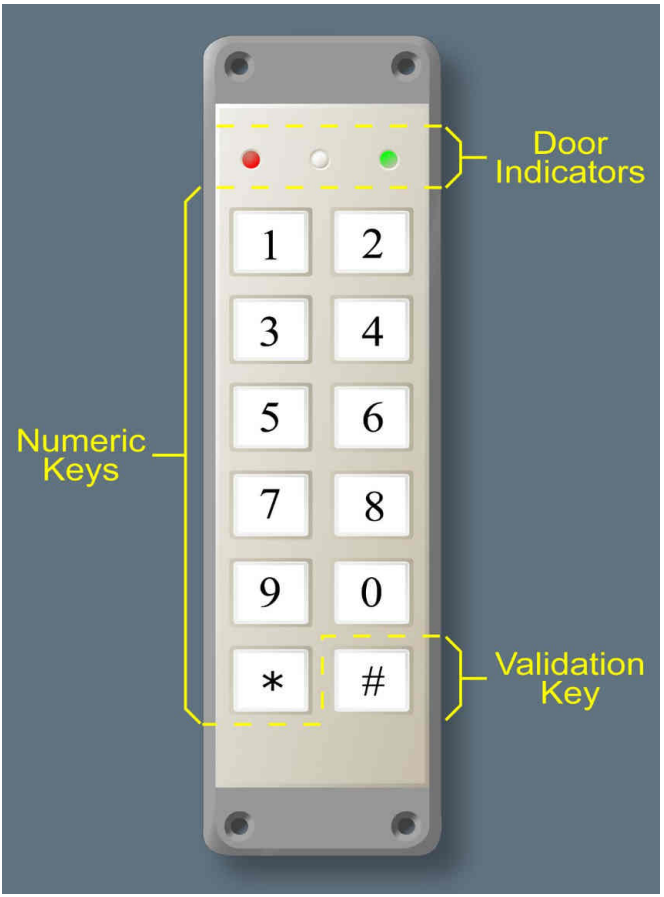
VIDEO System Display



COCKPIT DOOR KEYPAD

Applicable to: ALL

Keypad



DOOR INDICATORS



The CKPT DOOR sw is set to UNLOCK.
The door is not locked, and can be opened.

L12

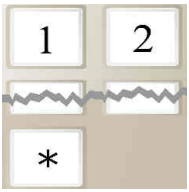


The CKPT DOOR sw is set to LOCK.
The door is locked, and cannot be opened for several minutes.
The keypad is inhibited.
The Operator defines the locking period of time (between 5 min and 20 min).



Any key is pressed.

NUMERIC KEYS



Enables the entry of a code.

VALIDATION KEY

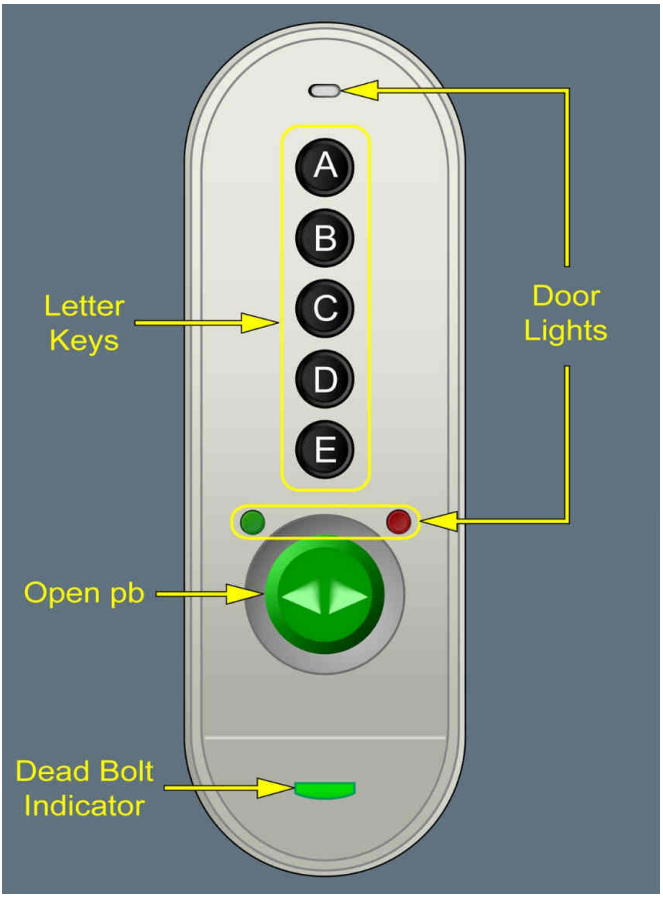


Validates a code.

CABIN KEYPAD

Applicable to: ALL

Cabin Keypad



LETTER KEYS



Enables the entry of a code.

DOOR LIGHTS



Any key is pressed.



The Privacy Door Locking System (PDLS) is failed.



Comes on briefly: The code is successfully entered.
Comes on for 5 s: During this time, the door is unlocked and can be opened.



Comes on briefly: The door is closed and locked.
Comes on for 2 s: The code is not correctly entered.

OPEN PB



When pressed, the door is unlocked for 5 s.

DEAD BOLT INDICATOR



The dead bolt is not engaged and the door can be opened via the keypad.

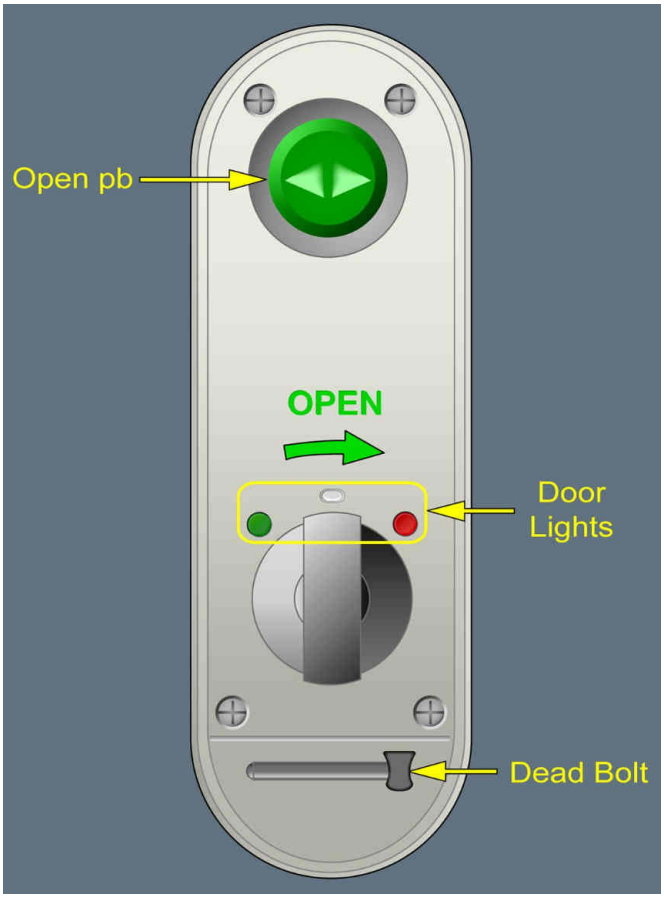


The dead bolt is engaged and the door is locked.

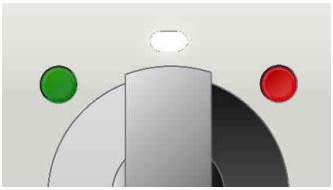
FLIGHT DECK PRIVACY AREA KEYPAD

Applicable to: ALL

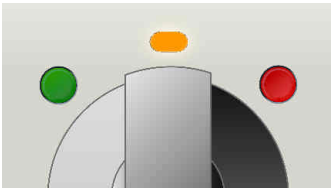
Keypad



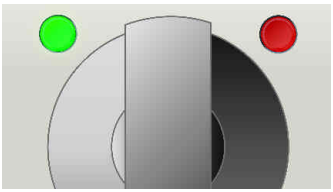
DOORS LIGHTS



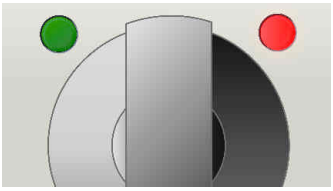
Any key is pressed.



The Privacy Door Locking System (PDLS) is failed.
The privacy door is unlocked.



Comes on for 5 s: During this time, the door is unlocked and can be opened.



Steady: The door is locked.

OPEN PB

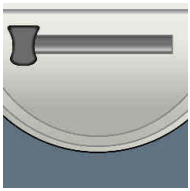


When pressed, the door is unlocked for 5 s.

DEAD BOLT



The dead bolt is not engaged, and the door can be opened via the keypad.



The dead bolt is engaged, and the door is locked.

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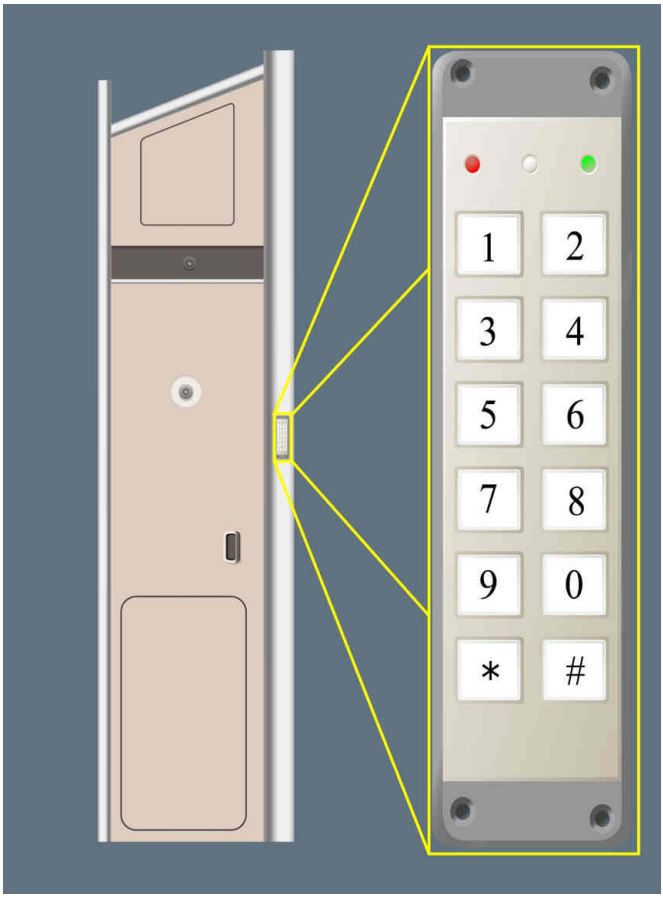
HOW TO OPERATE THE COCKPIT DOOR

Applicable to: ALL

The cabin crew uses the keypad to request access to the cockpit.

Keypad



ROUTINE ACCESS (I.E. NORMAL ACCESS) REQUEST

To request access to the cockpit, type a code, and validate it by using the "#" key, on the keypad

L2 *The Operator defines this code (between 0 and 7 digits).*

L1 *A buzzer sounds in the cockpit for 2 s with a "DOOR PLEASE" audio message .*

(Audio not available in PDF)

After identification of the person that requests access, unlock the door by using the CKPT DOOR SW .

If the flight crew refuses access by setting the CKPT DOOR sw to LOCK, the keypad and the buzzer are inhibited for a defined period of time.

L2 *The Operator defines this period of time (between 5 min and 20 min).*

L1 *If the flight crew does not respond, the door remains locked.*

EMERGENCY ACCESS REQUEST

To request emergency access to the cockpit, type an emergency code, and validate it using the "#" key, on the keypad.

L2 *The Operator defines this emergency code.*

L1 *A buzzer sounds in the cockpit until the flight crew unlocks, or locks the door by using the CKPT DOOR sw .*

(Audio not available in PDF)

The DOOR CKPT DOOR EMER OPENING IN PROGRESS alert is also triggered. For more information, Refer to PRO-ABN-ECAM-10-52-160 DOOR CKPT DOOR EMER OPENING IN PROGRESS .

After identification of the person that requests access, unlock the door by using the CKPT DOOR SW .

If the flight crew refuses access by setting the CKPT DOOR sw to LOCK, the keypad and the buzzer are inhibited for a defined period of time.

L2 *The Operator defines this period of time (between 5 min and 20 min).*

L1 *If the flight crew does not respond, the door automatically unlocks for 5 s after a defined period of time.*

L2 *The Operator can define this period of time (between 15 s and 120 s).*

L1 **EVACUATION THROUGH THE ESCAPE PANEL**

Rotate the handle cover in order to access the panel release handle.
Push the panel release handle, and turn it in any direction in order to unlock the escape panel.
Kick the escape panel toward the cabin.
Evacuate the cockpit on hands and knees.

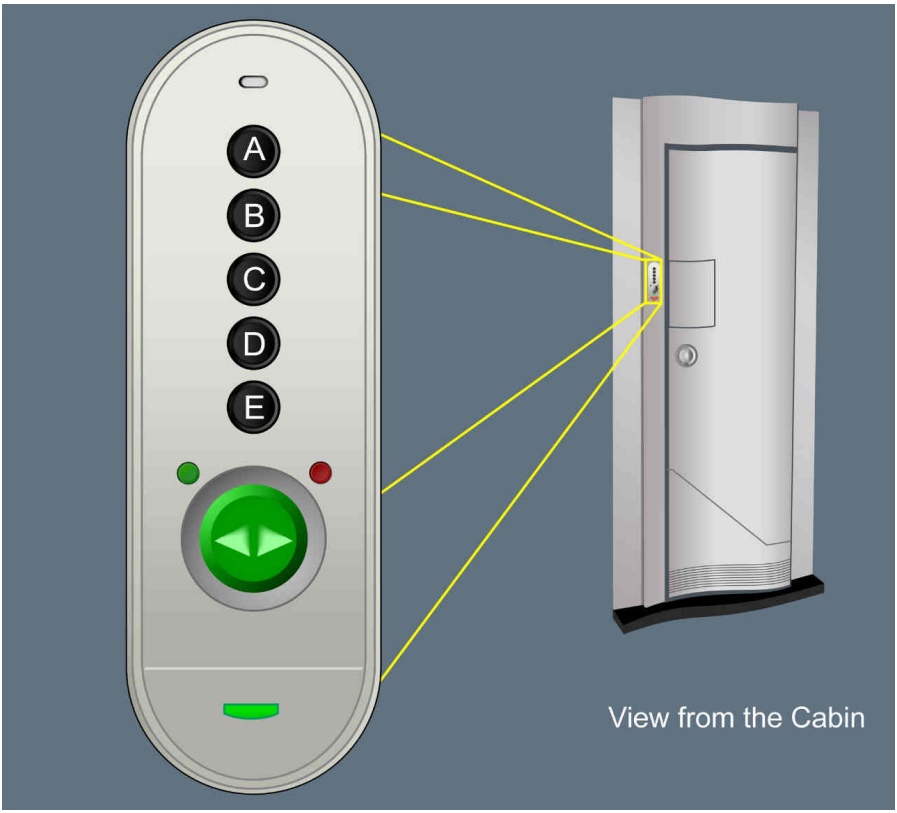
HOW TO OPERATE THE PRIVACY DOOR

Applicable to: ALL

ACCESS FROM THE CABIN SIDE

The crewmember uses the keypad to access the flight deck privacy area.

Keypad



To request access to the flight deck privacy area, type a code on the keypad.

L2 *The Operator defines this code (up to 7 digits).*

L1 The green LED on the left comes on briefly. If the code is not correct, the red LED on the right comes on for 2 s.

Press the open pb, then pull the door toward the cabin.

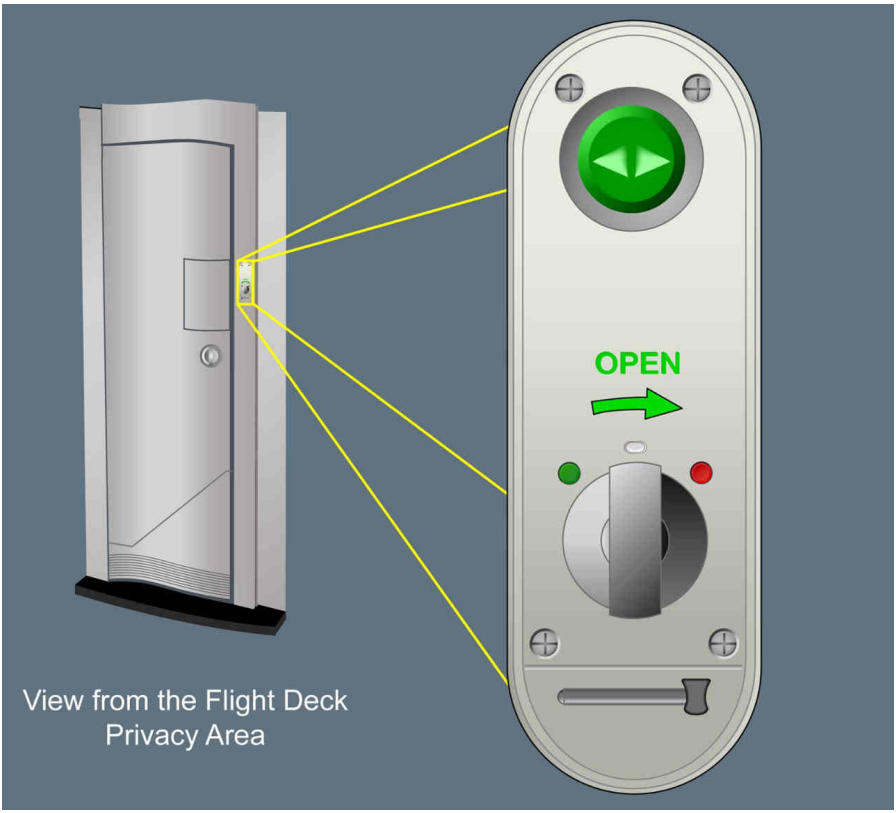
The door is unlocked for 5 s.

The red LED on the right comes on briefly to indicate that the door is locked.

ACCESS FROM THE FLIGHT DECK PRIVACY AREA

The crewmember uses the keypad to access the cabin.

Keypad



It is not necessary to enter an access code in order to unlock, and open the door from the flight deck privacy area side.

To access the cabin, press the open pb or turn the door unlock lever clockwise, then push the door toward the cabin.

Note: *The flight crew can use the dead bolt to lock/unlock the privacy door, in the case of a Privacy Door Locking System (PDLS) failure.*

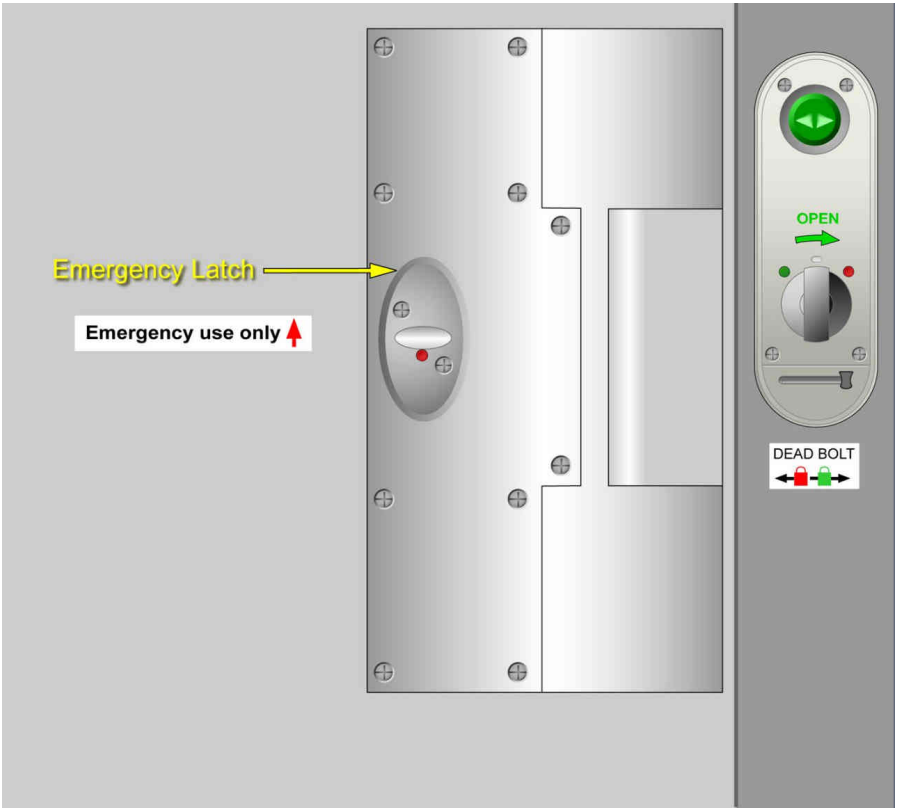
EMERGENCY ACCESS FROM THE FLIGHT DECK PRIVACY AREA

Use the latch on the breakout panel, in order to rapidly open the privacy door.

L2 *The privacy door opens, even if it is electrically closed, or locked by the dead bolt.*

L1

Emergency Latch



EMERGENCY ACCESS FROM THE CABIN

Remove the override cover on the lower part of the keypad.

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OVERVIEW

Applicable to: ALL

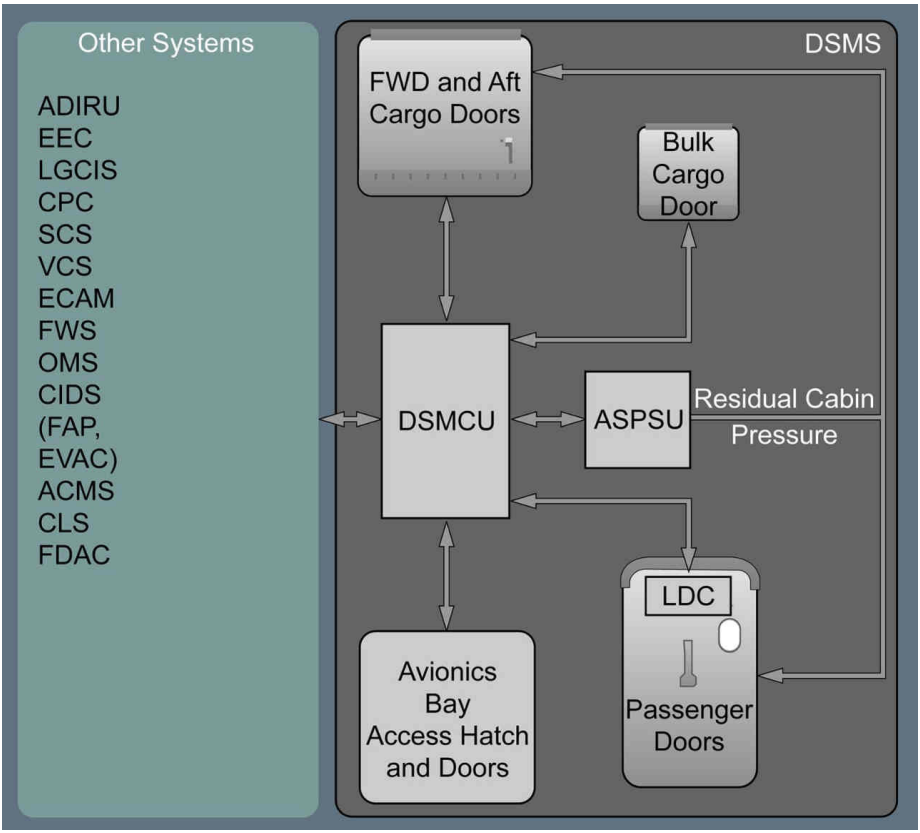
The Door and Slides and Management System (DSMS) monitors and/or controls:

- The passenger doors and the emergency exits
  Refer to DSC-52-30-30-10 Passenger Doors and Emergency Exits
- The cargo doors
  Refer to DSC-52-30-40-10 Overview
- The avionic bay doors.
  Refer to DSC-52-30-50-10 Overview

ARCHITECTURE

Applicable to: ALL

Architecture



L2 DOORS AND SLIDES MANAGEMENT CONTROL UNIT

The Doors and Slides Management Control Unit (DSMCU) interfaces with the aircraft, and communicates mainly via AFDX with other aircraft systems.

The Door and Slides and Management System (DSMS) is a three-channel system and its main functions are to:

- Monitor and display the status of the:
  - Passenger exit doors
  - Avionics bay hatches and doors

    Note: The SD page displays the exterior main avionics bay hatch only.

  - Cargo doors
  - Escape slides.
- Control:
  - Passenger exit doors
  - Forward and aft cargo doors
  - The deployment of the escape slides.
- Manage:
  - The measurement function of the door sill height
  - The residual cabin pressure indication
  - The inhibition of cabin and cargo pressurization, if one or more doors are not locked.

L2 AUTONOMOUS STANDBY POWER SUPPLY UNIT

The Autonomous Standby Power Supply Unit (ASPSU) detects and indicates the residual cabin pressure.
In the case of an electrical power loss, the ASPSU provides electrical power for the residual cabin pressure indication for 2.5 h.

L2 LOCAL DOOR CONTROLLER

A Local Door Controller (LDC) is installed on each passenger door.
The LDC is connected to a set of sensors and switches that enable the monitoring of the door positions and slide status, respectively. The LDC monitors all the actions at the passenger doors, and sends all information to the DSMCU for processing.
If the normal electrical power is lost, there is an energy stowage in the LDC that can provide power for at least 5.30 h.

L3 OTHER SYSTEMS

The DSMS interfaces with other systems via the AFDX network, or other classic connections.

CABIN PRESSURE CONTROL SYSTEM (CPCS)

The DSMS provides the signal for cabin pressurization.

FLIGHT WARNING SYSTEM (FWS)

The DSMS interfaces with the FWS in order to exchange:

- The current door status
- Failure display and annunciations
- Flight phase data.

VENTILATION CONTROL SYSTEM (VCS)

The DSMS provides the cargo door status.

System Description

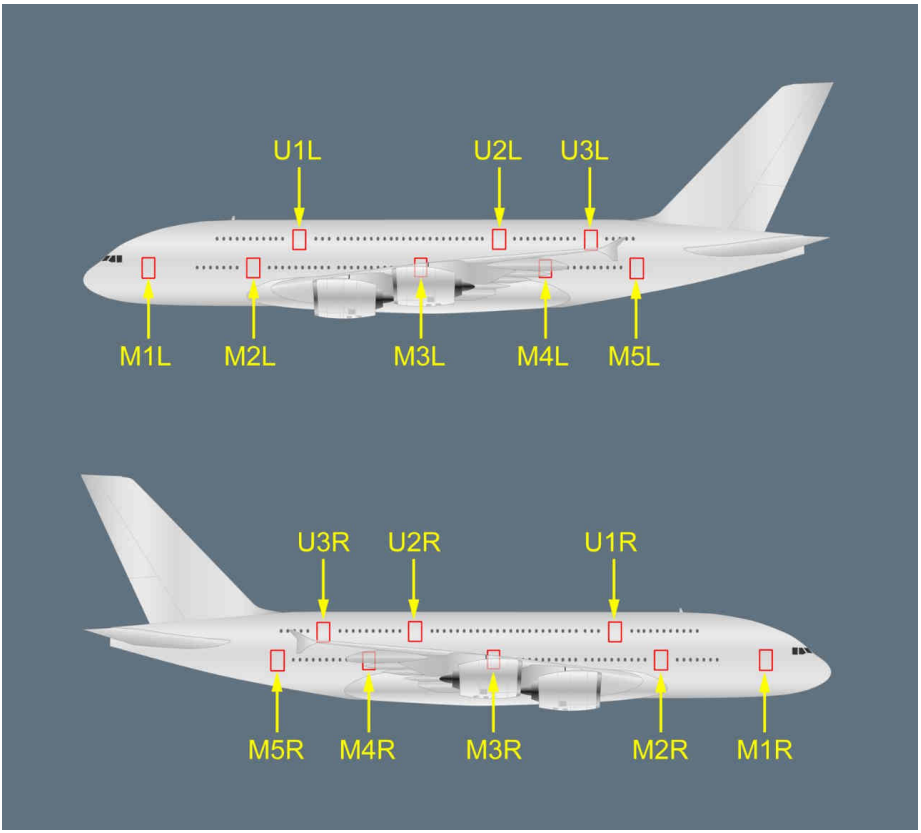
PASSENGER DOORS AND EMERGENCY EXITS

Applicable to: ALL

The aircraft has 16 passenger doors:

- Five doors on each side of the aircraft, for the main deck
- Three doors on each side of the aircraft, for the upper deck.

Door Arrangement



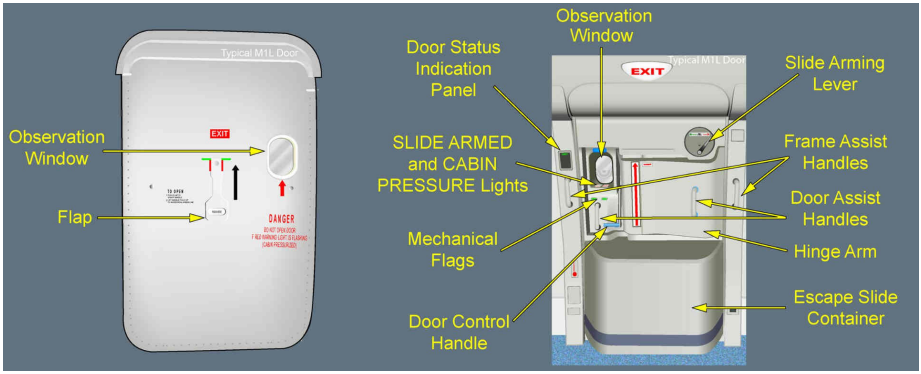
The doors open forward. The opening/locking of the door is performed mechanically by moving the door handle. In normal operation, the door revolves electrically by pressing the OPEN pb, or the CLOSE pb. In emergency operation, the door revolves automatically.
In the case of an electrical power loss, the door can be manually operated.
There is a flight lock actuator in each door that locks the door handle during the climb and descent phases, in order to prevent inadvertent operation during flight.

The flight lock actuator releases the door handle in one of the following cases:
- During cruise, or

L3 During cruise, the differential pressure between the exterior and the interior of the aircraft prevents the doors from opening.

L1 - If the aircraft is on ground, or
- In the case of a cabin differential pressure detection, or
- If there is a failure of the LDC, or of the flight lock actuator.

L2 The flight lock actuator locks the door handle, when the aircraft reaches a speed of 65 kt. The door handle remains locked until the aircraft reaches FL 240.



ESCAPE SLIDES/RAFTS

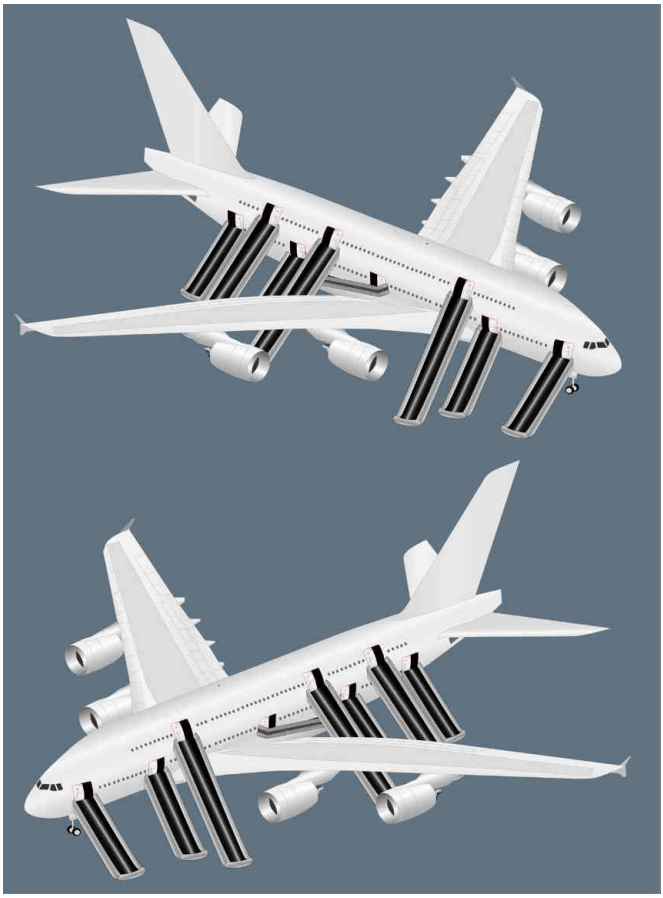
Applicable to: ALL

All passenger/emergency doors have an escape slide.

L2 There are three different types of escape slides:
- The main deck doors M1, M2, M4, and M5, have a door-mounted escape slide
- The main deck door M3 has a belly-fairing integrated escape slide
- All upper deck doors have a fuselage integrated escape slide, below the doors.

L1 At each door, there is a slide arming lever to arm, or disarm, the emergency escape slide.

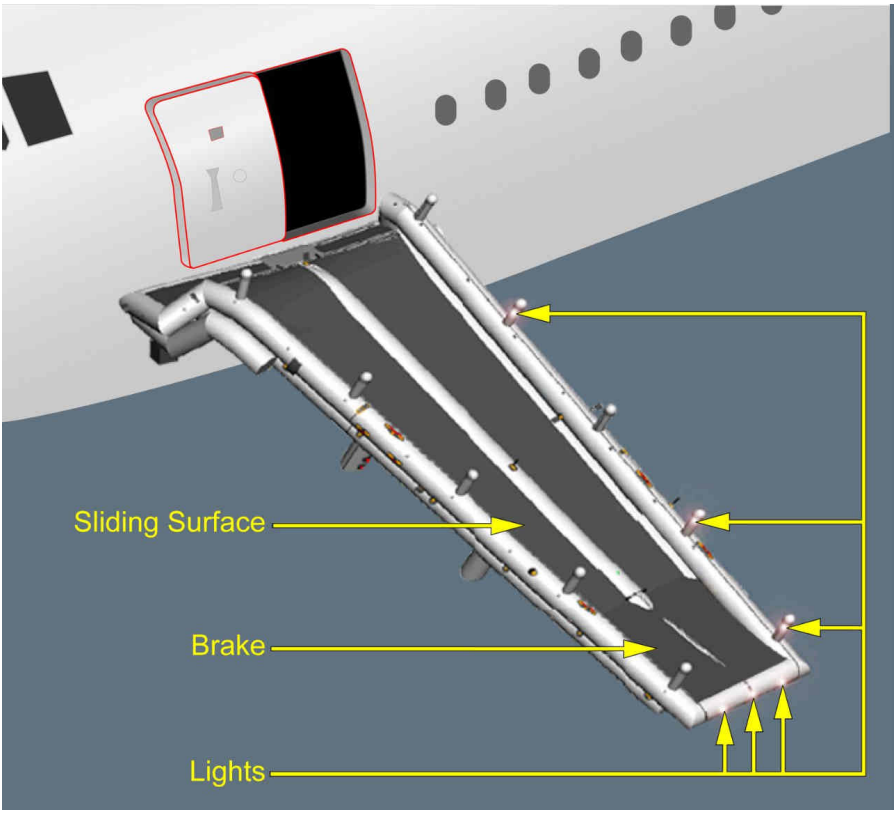
Escape Slide Locations



ESCAPE SLIDES

Each escape slide has:
- Two lanes
- Lights on the upper side and on the bottom part
- Deceleration stripes (only for the upper escape slides).

Escape Slide Description



For more information on the escape slides, *Refer to CCOM/09-20-10 Description of Slides and Sliderafts*.
If the door is opened from the outside, the escape slide automatically disarms.

If the escape slide arming lever is set to ARMED, and the door opens from the inside:
- An advisory SLIDE ARMED light comes on in the door window
- The escape slide automatically inflates.

L2 Each escape slide inflates in approximately 6 s.

If the DITCHING pb-sw is set to ON:
- The automatic inflation of escape slide at the M3 doors is inhibited
- The automatic deployment of the M1 doors extension slide is inhibited.

In the case of an emergency opening, the LDC turns off the slide armed light at each door.

L1 If the automatic deployment of the escape slide fails, the Manual Inflation pb enables the manual inflation of the escape slide.

SLIDERAFTS

It is possible to use each escape slide as a slideraft, except for:
- The escape slide at the M3 doors
- The escape slide at the M1 door, when it is inflated in extended mode.

For more information on sliderafts, *Refer to CCOM/09-20-10 Description of Slides and Sliderafts*.

In the case of ditching, the cabin crew can detach each escape slide from the aircraft by:
- Pulling the disconnect handle
- Cutting the mooring line of the escape slide in order to separate the raft from the aircraft.

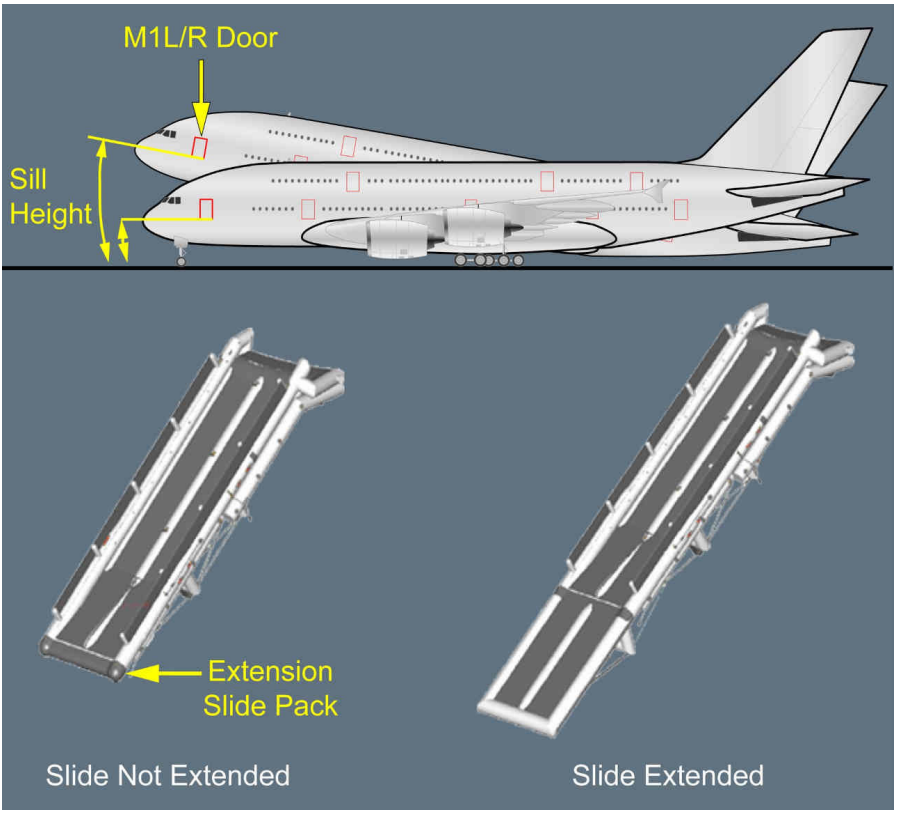
ESCAPE SLIDE EXTENSION

Only the M1 doors have an extension slide.
If the aircraft pitch attitude angle exceeds a specific threshold (e.g. abnormal landing gear configuration), the escape slides deploys with the extension.

L3 The aircraft pitch attitude angle is detected by a pitch attitude sensor that is on each M1 door. If the pitch attitude is more than 2.5 °, the slide extension is deployed.

Note: If the pitch attitude sensor is not available and communication between LH and RH door M1 is not possible, the slide does not have an extension.

Slide Extension

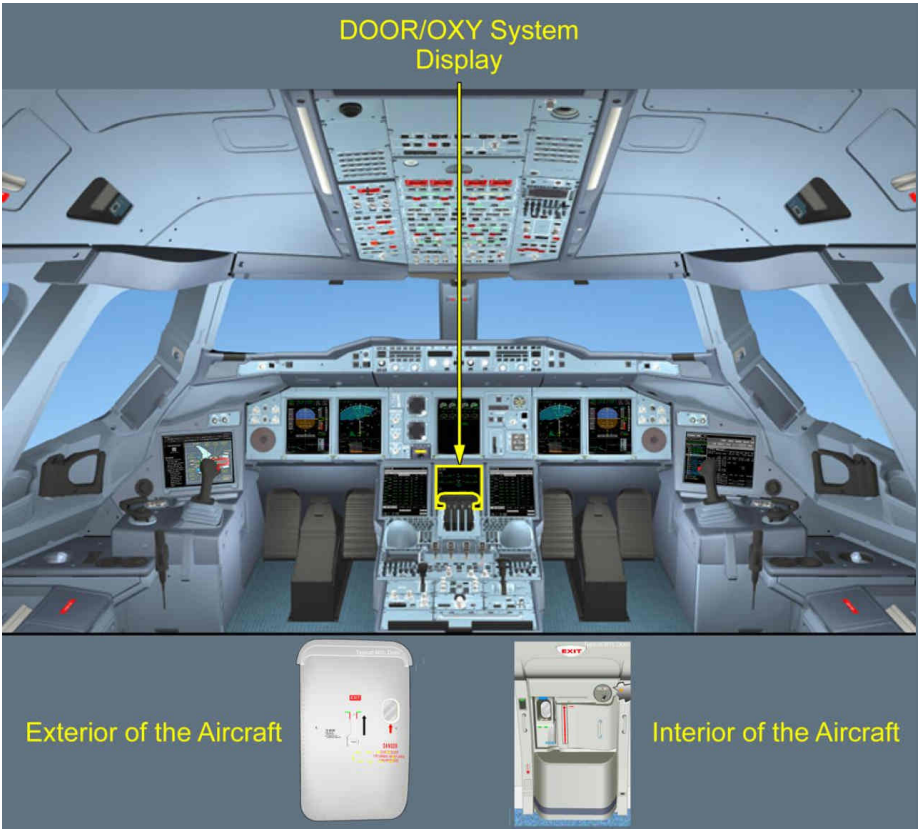


Controls and Indicators

COCKPIT VIEW

Applicable to: ALL

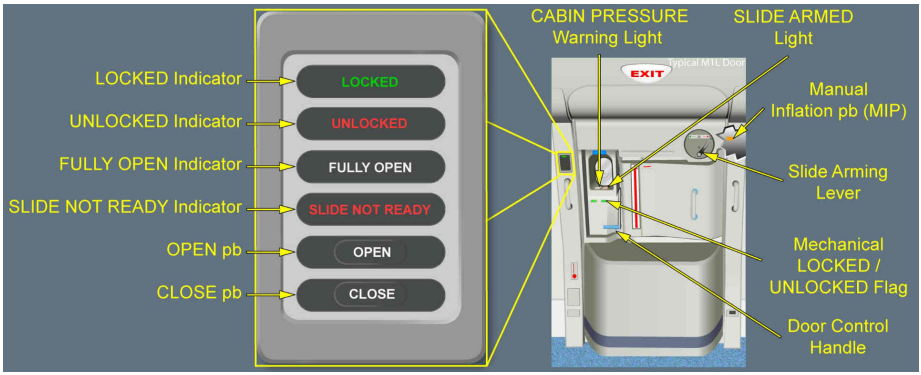
Cockpit View



INTERIOR OF THE AIRCRAFT

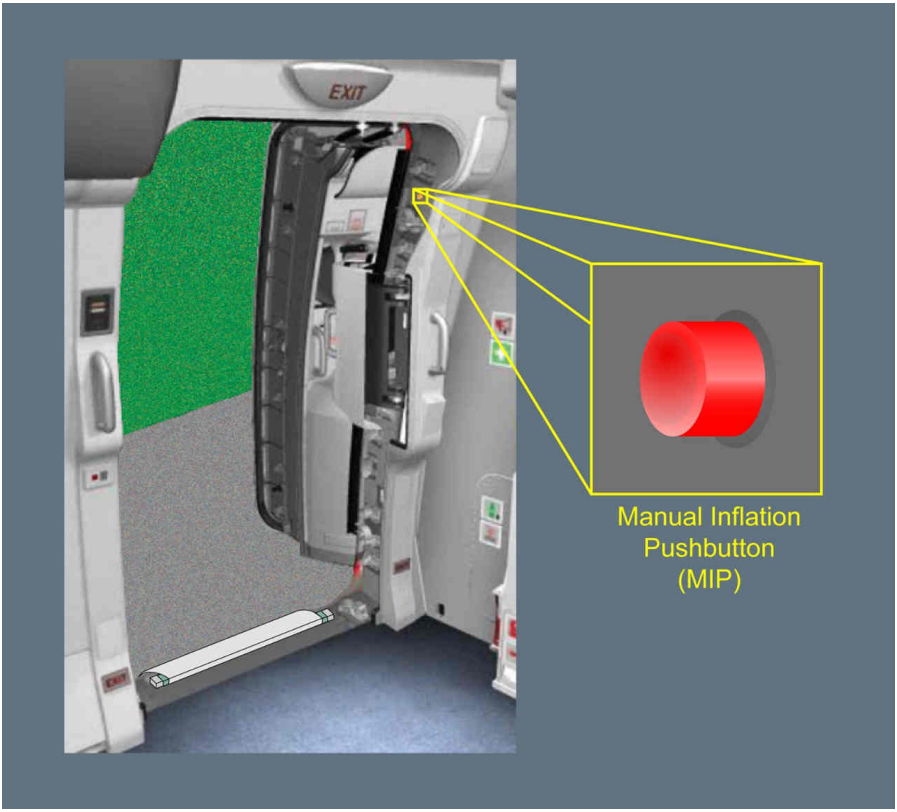
Applicable to: ALL

General



Manual Inflation pb

MIP Location





The door is open, and the escape slide is armed.



When pressed, the escape slide manually inflates.

Note: The MIP is a backup function, and should only be used if the automatic deployment fails.

LOCKED INDICATOR



The door is locked.

UNLOCKED INDICATOR



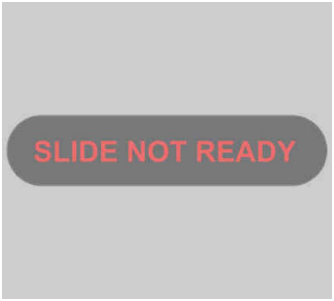
The door is unlocked.

FULLY OPEN INDICATOR



The door is fully open.

SLIDE NOT READY INDICATOR



Steady: The bottle, for slide inflation, has low pressure.
Flashing: Only for M1 door, when the slide is not entirely extended.

OPEN pb



The door is ready to be opened.
When maintained pressed, the door opens electrically. The OPEN indicator goes off when the door is fully open.

CLOSE pb



The door is not closed.
When maintained pressed, the door closes electrically. The CLOSE indicator goes off when the door is fully closed.

MECHANICAL LOCKED/UNLOCKED FLAG



The door is locked.
The door control handle is in the lowest position.



The door is unlocked.
The door control handle is not in the lowest position.

Cabin Pressure Warning light

L12



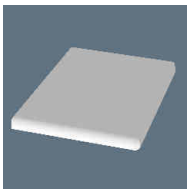
Flashes, in the case of a cabin differential pressure detection, if:
- The aircraft is on ground
- The associated slide is disarmed.

Cabin differential pressure is detected, if the difference between the cabin pressure and the outside pressure is above 0.036 PSI.
Associated with an aural alert, if the door control handle is lifted up.

These aural and visual alerts are inhibited during evacuation:
- Via the EVAC COMMAND pb on the overhead panel or the CIDS EVAC sw on the FAP in the cabin
- If the door is opened while the slide is armed.

WARNING	Do not open the door, if the red warning light is flashing on the door window (cabin pressurized).

SLIDE ARMED light

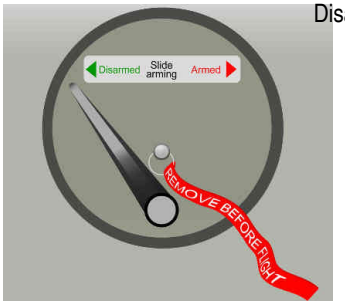


The slide arming lever is set to the Disarmed position.

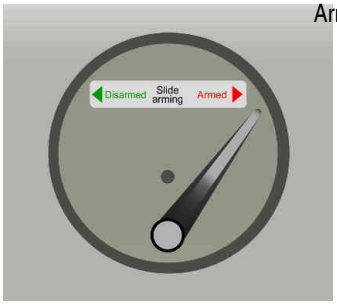


The slide arming lever is not set to the Disarmed position, and someone opens the door.

Slide Arming lever



Disarms the slide.

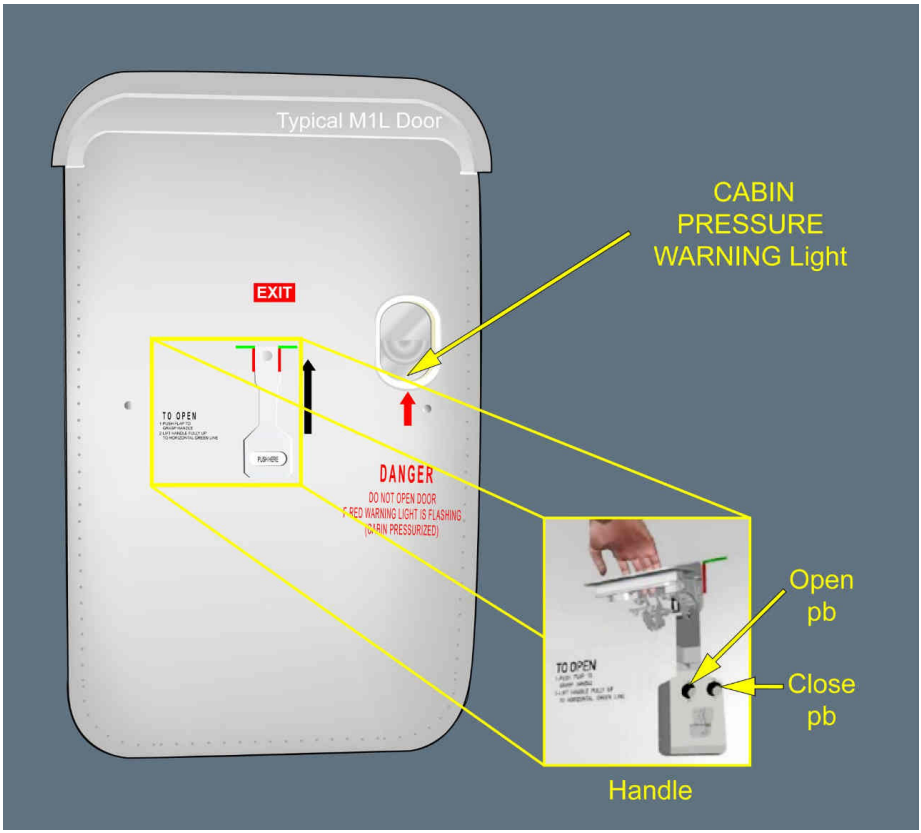


Arms the slide.

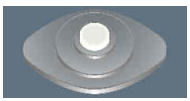
EXTERIOR OF THE AIRCRAFT

Applicable to: ALL

General



Outside Open pb



The light comes on when the door is ready to be opened.



When maintained pressed, the door opens electrically.

OUTSIDE Close pb



The light comes on when the door is ready to be closed.



When maintained pressed, the door closes electrically.

Cabin Pressure Warning light

L12



Flashes, in the case of a cabin differential pressure detection, if:
- The aircraft is on ground
- The associated slide is disarmed.

Cabin differential pressure is detected, if the difference between the cabin pressure and the outside pressure is above 0.036 PSI.
Associated with an aural alert, if the door control handle is lifted up.

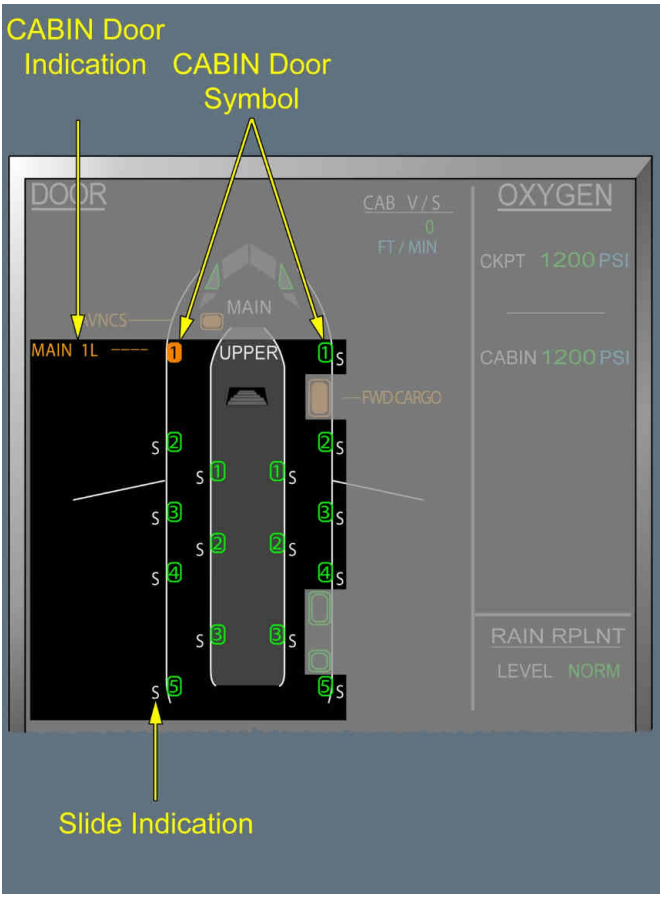
These aural and visual alerts are inhibited during evacuation:
- Via the EVAC COMMAND pb on the overhead panel or the CIDS EVAC sw on the FAP in the cabin
- If the door is opened while the slide is armed.

WARNING	Do not open the door, if the red warning light is flashing on the door window (cabin pressurized).

DOOR/OXY SYSTEM DISPLAY

Applicable to: ALL

DOOR/OXY SD Page - Cabin Door



CABIN DOOR SYMBOL

1	The door is closed and locked.



The door is not locked.

CABIN DOOR INDICATION



The door is not locked, and at least one engine is running.



The information is not valid.

SLIDE INDICATOR



The slide is armed.



The slide is disarmed.



The slide is failed.

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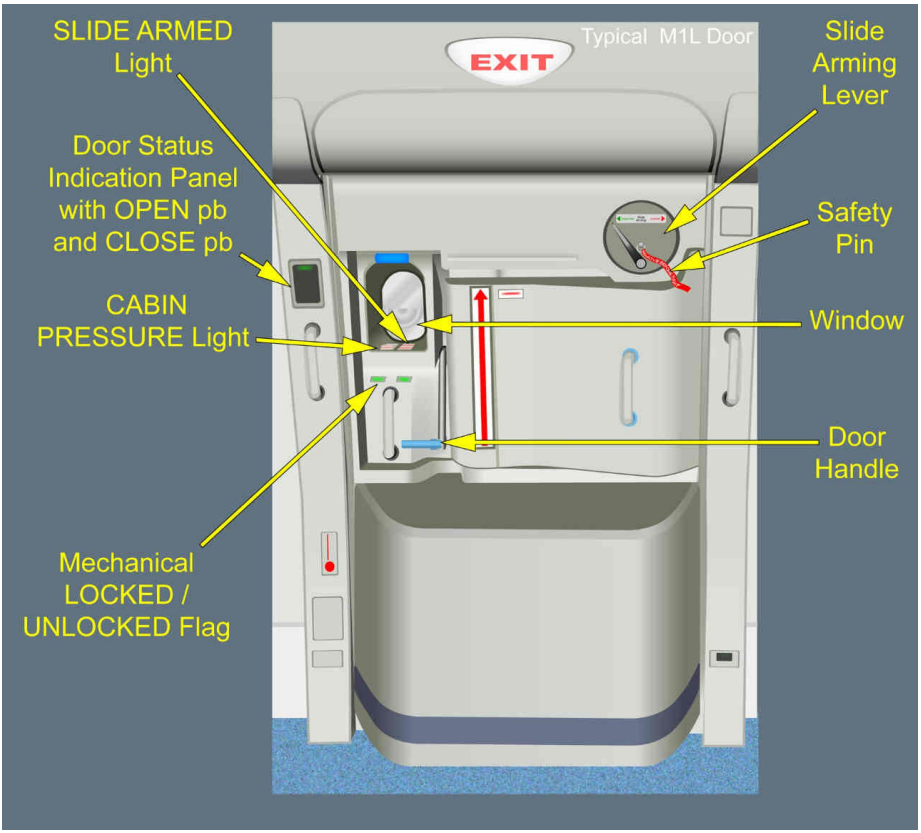
How to

INSIDE THE AIRCRAFT - HOW TO OPERATE PASSENGER DOORS

Applicable to: ALL

Main Deck Passenger Door - Inside



For the detailed operational procedures for door opening or closing, *Refer to CCOM/09-10-30-A Normal Opening from the Inside*.

WARNING	Do not open the door, if the red warning light is flashing (cabin pressurized).

HOW TO OPEN THE DOOR

In normal operation (i.e. no emergency evacuation), disarm the escape slide.
Lift the door handle fully up to unlock the door.
Press and hold the OPEN pb, or manually move the door to the forward direction, until the fully open position is reached.

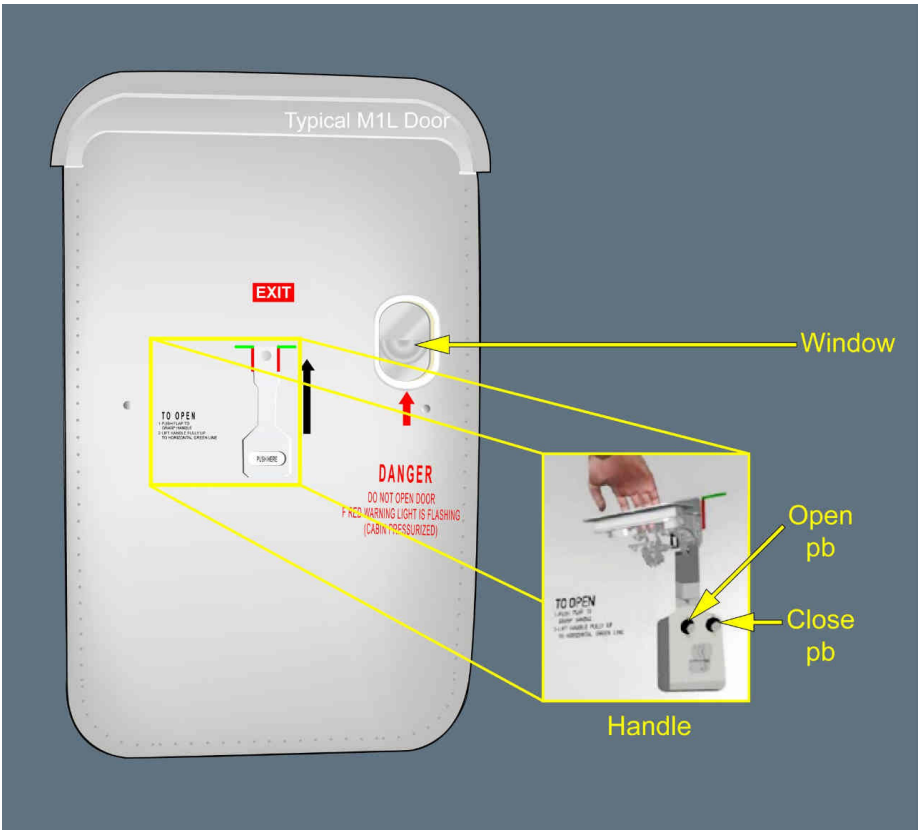
HOW TO CLOSE THE DOOR

Press and hold the CLOSE pb, or manually move the door to the aft direction, and stop the movement when facing the door frame.
When the door is facing the door frame, grasp one of the door handles and pull the door inwards the door frame.
Lower the door handle to lock the door.

OUTSIDE THE AIRCRAFT - HOW TO OPERATE PASSENGER DOORS

Applicable to: ALL

Main Deck Passenger Door - Outside



For the detailed operational procedures for door opening or closing *Refer to CCOM/09-10-30-B Normal Opening from the Outside*.

WARNING	Do not open the door, if the red warning light is flashing on the door window (cabin pressurized).

HOW TO OPEN THE DOOR

Push the flap to grasp the handle.

Lift the door handle fully up to unlock the door.
Press and hold the open pb, or manually pull the door, then move the door forward, until the door is fully open.

HOW TO CLOSE THE DOOR

Press and hold the close pb, or manually move the door in the aft direction, and stop the door movement when facing the door frame.
Push the door toward the door frame.
Lower the handle to lock the door.

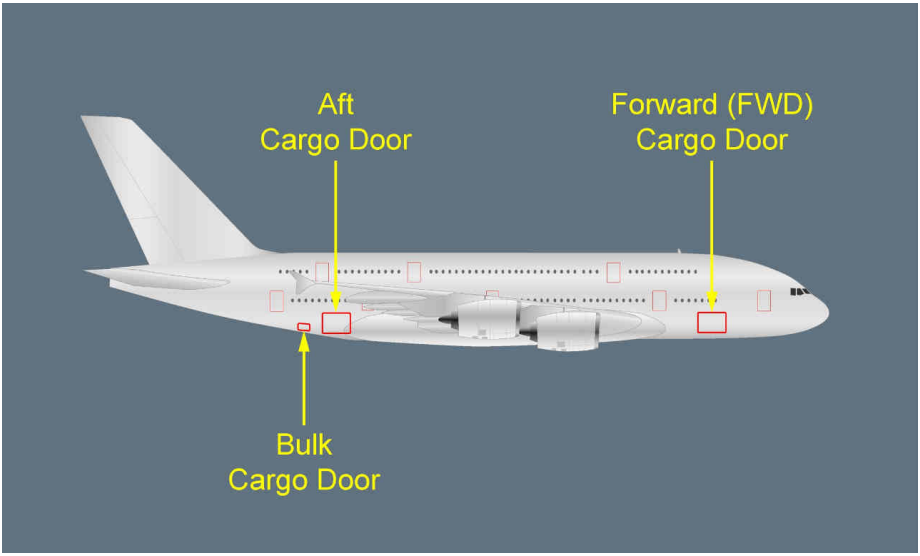
System Description

OVERVIEW

Applicable to: ALL

There are three cargo doors on the right side of the aircraft:
- One forward (FWD) cargo door
- One aft cargo door
- One bulk cargo door.

Cargo Doors



FORWARD (FWD) AND AFT CARGO DOORS

Applicable to: ALL

The forward (FWD) and aft cargo doors provide access to the FWD and aft cargo compartments, respectively.
Both the FWD and aft cargo doors open outward and upward. They are mechanically locked, and hydraulically operated by the green hydraulic system.
The ground crew can manually lock and unlock the cargo doors by using the door handle, located on the door, from outside the aircraft.

The ground crew can use the NORMAL OPERATION sw to open and close the cargo doors via the hydraulic actuator. The NORMAL OPERATION sw is on the cargo door operation panel, that is on the right side of each door (outside the aircraft).
In the case of an electrical or hydraulic pump failure, the ground crew can hydraulically open or close the cargo doors by following the appropriate maintenance actions, and by using:

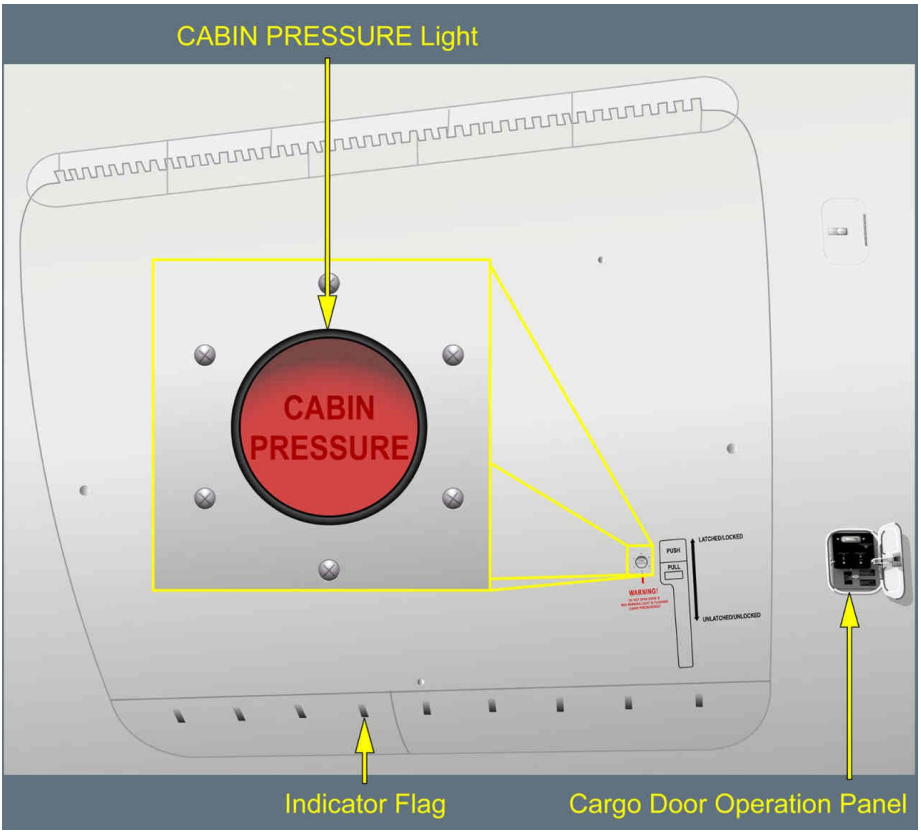
- A lever for manual override, that is also on the cargo door operation panel
- A hand pump, that is on the hydraulic maintenance panel.

When the door is fully open, and locked in the open position, a “FULLY OPEN AND ARRESTED” indicator on the cargo door operation panel, comes on.

The cargo door opening and closing is inhibited:
- During takeoff, flight, landing, or taxi
- When engine 3 and 4 are running
- During cargo loading operation
- When the cargo door is closed and locked.

L3 When the door is inhibited, the hydraulic actuator is isolated from the hydraulic system by an isolation valve. In this case, there is no power to open the door.

Cargo Door - CABIN PRESSURE Light



L1 There are indicator flags, on the lower part of the door (outside the aircraft), to indicate if the door is locked or unlocked.

BULK CARGO DOOR

Applicable to: ALL

The ground crew can access the bulk cargo compartment from the bulk cargo door.
The bulk cargo door opens inward and upward.
The ground crew can manually open or close the bulk cargo door by using one of the door handles that are in the interior and on the exterior of the aircraft.

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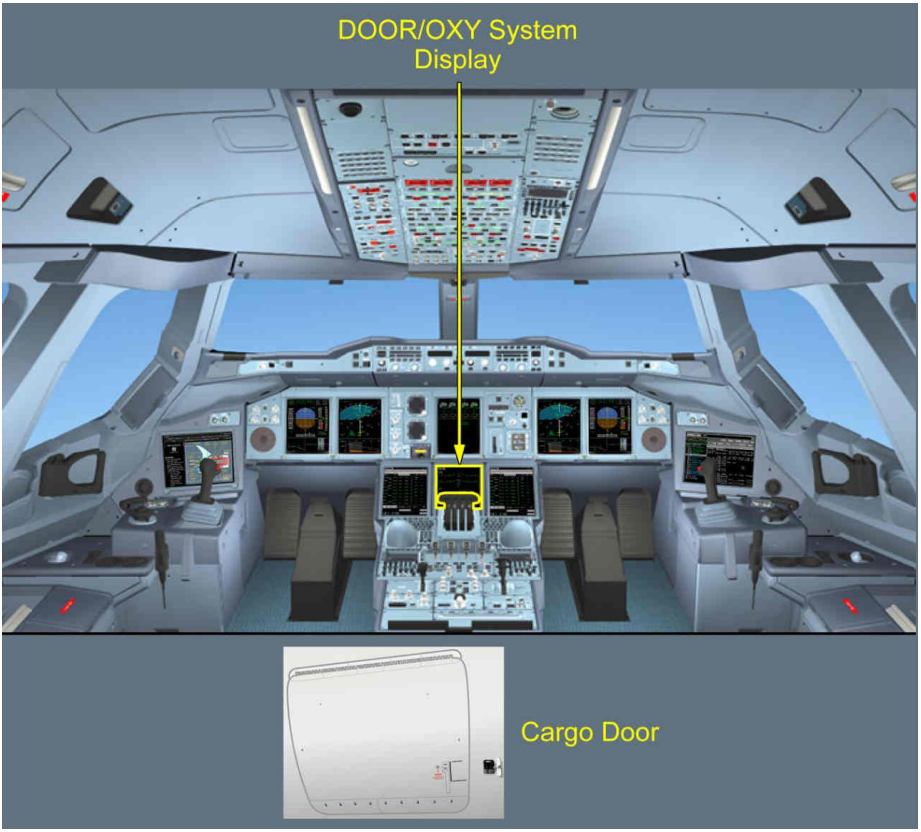
Controls and Indicators

COCKPIT VIEW

Applicable to: ALL

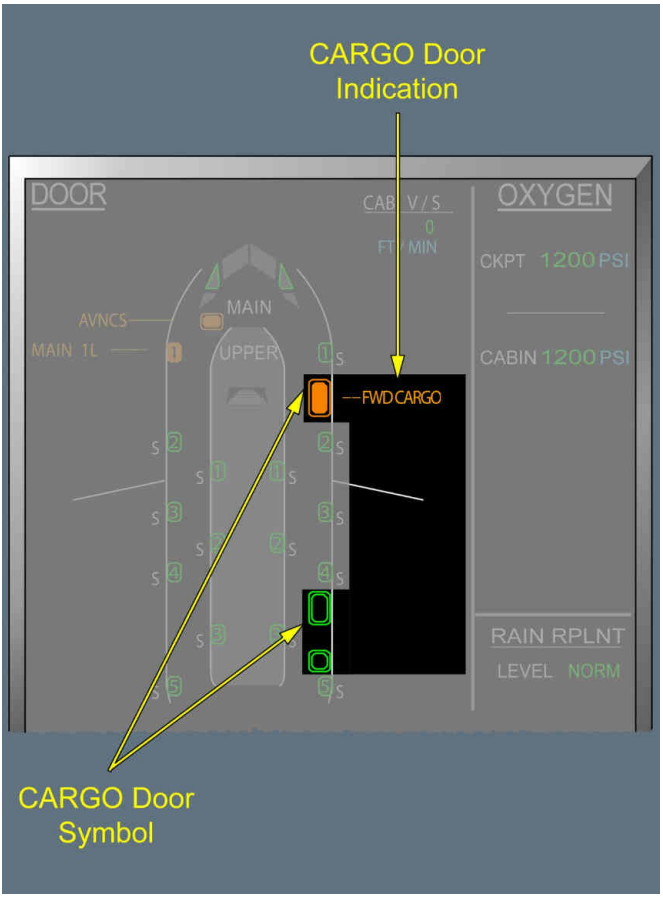
Cockpit View



DOOR/OXY SYSTEM DISPLAY

Applicable to: ALL

DOOR/OXY SD Page - Cargo Door



CARGO DOOR SYMBOL



The door is closed and locked.



The door is not locked.

CARGO DOOR INDICATION



The door is not locked, and at least one engine is running



The information is not valid.

FWD AND AFT CARGO DOORS

Applicable to: ALL

CABIN PRESSURE WARNING light

L12



Flashes, in the case of a cabin differential pressure detection.
Cabin differential pressure is detected if the difference between the cabin pressure and the outside pressure is above 0.036 PSI.

WARNING	Do not open the door, if the red warning light is flashing on the door window (cabin pressurized).

INDICATOR FLAG

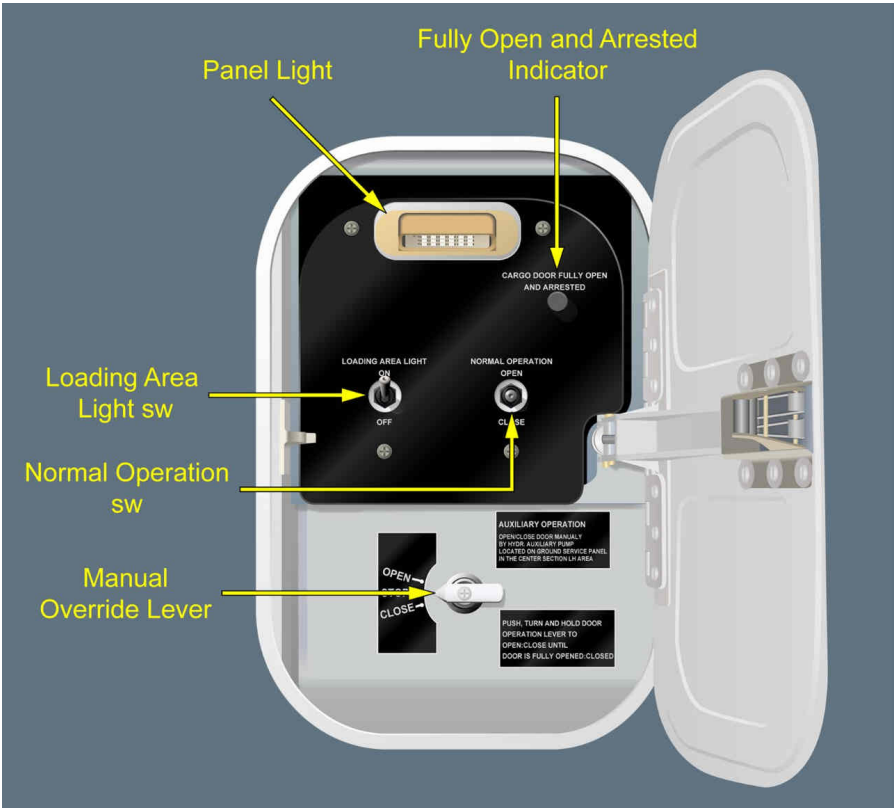


The door is closed and locked.



The door is unlocked.

L3 CARGO DOOR OPERATION PANEL



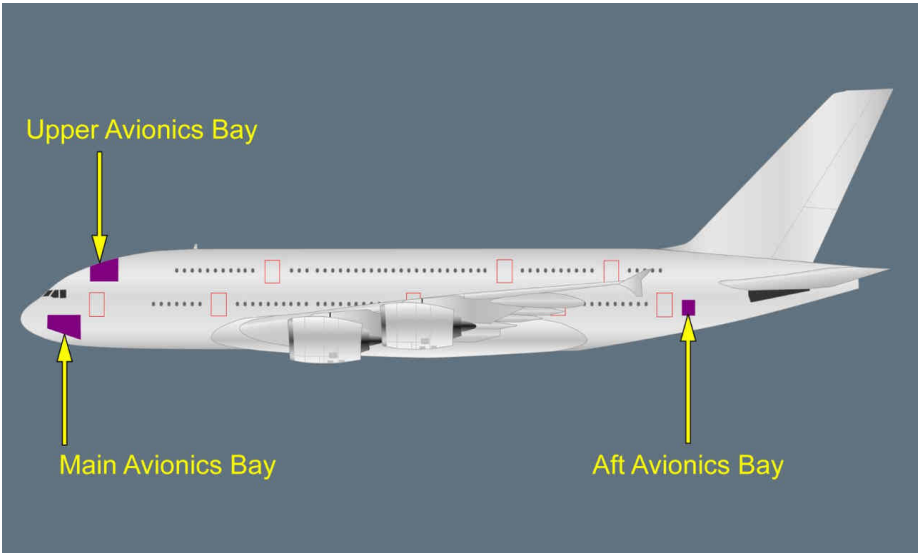
System Description

OVERVIEW

Applicable to: ALL

The aircraft has the following three avionics bays:
- Main avionics bay
- Upper avionics bay
- Aft avionics bay.

Overview



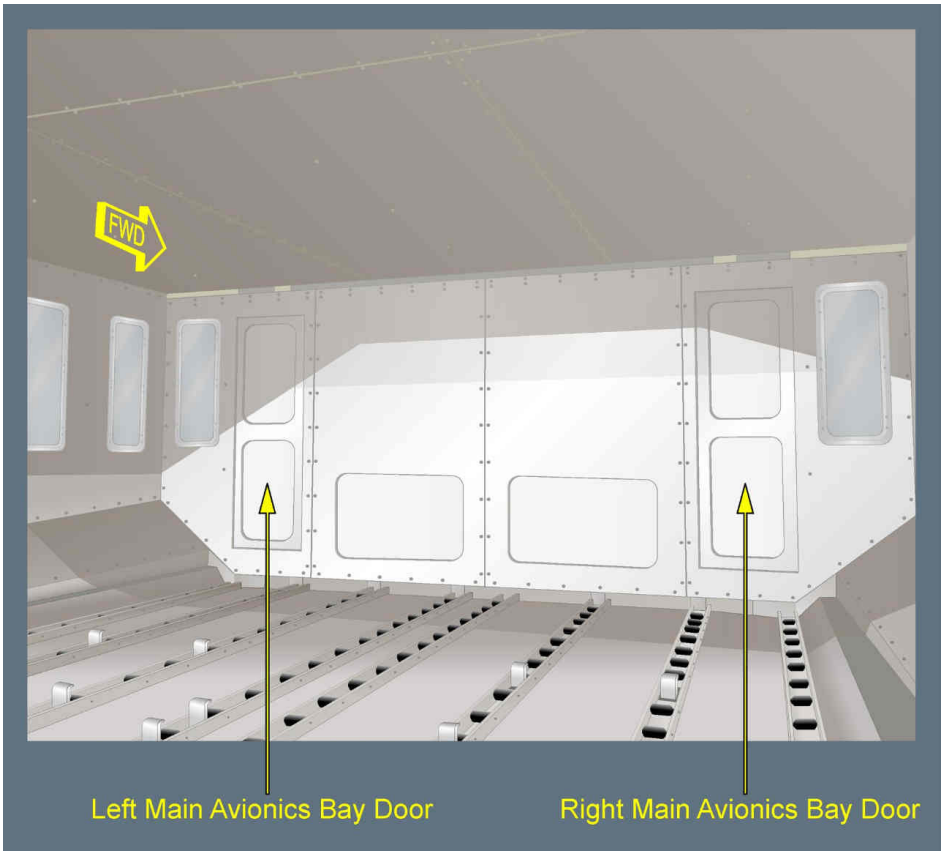
MAIN AVIONICS BAY

Applicable to: ALL

It is possible to access the main avionics bay from:

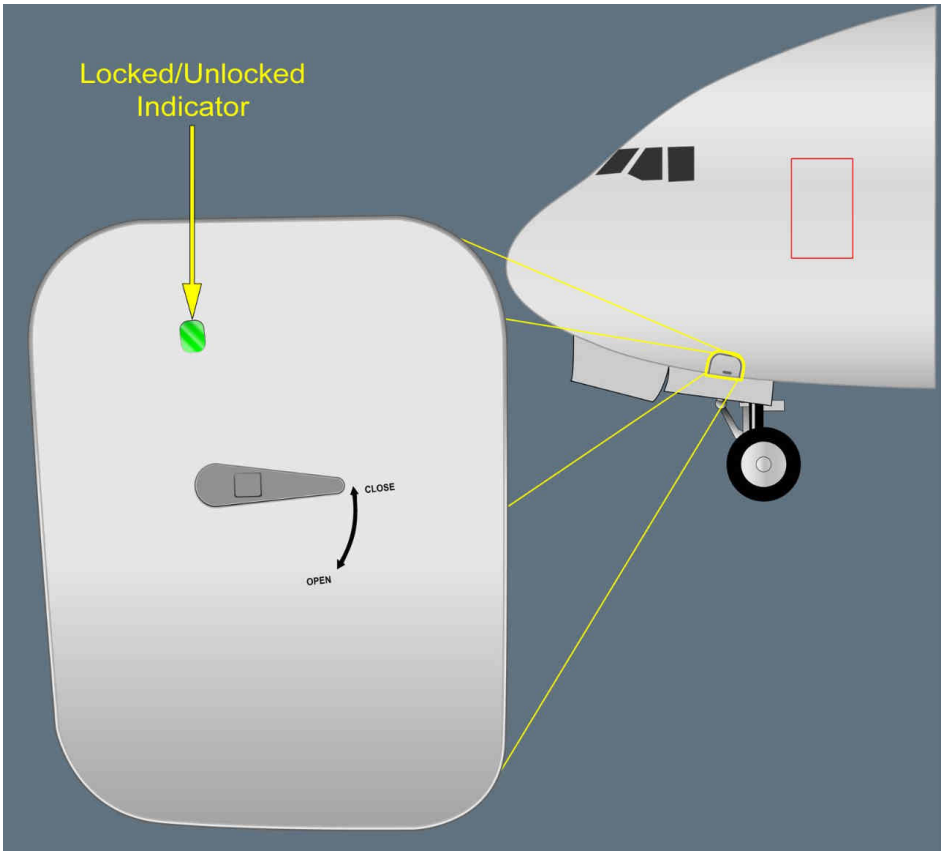
- The forward cargo compartment through two doors

Main Avionics Bay Doors



- Outside the aircraft, via an inward-opening hatch that provides external access to the avionics compartment.
  This hatch can be manually operated from either the interior or the exterior of the aircraft.

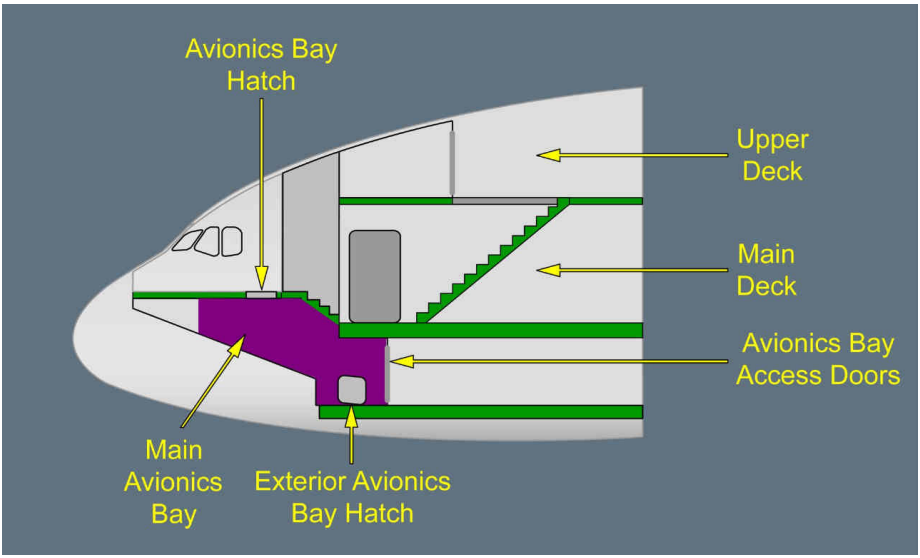
Exterior Main Avionics Bay Hatch



An extensible ladder enables access to/from the ground.

- The cockpit, through a hatch.
  A ladder is available in the avionics compartment for access from the cockpit.

Main Avionics Bay

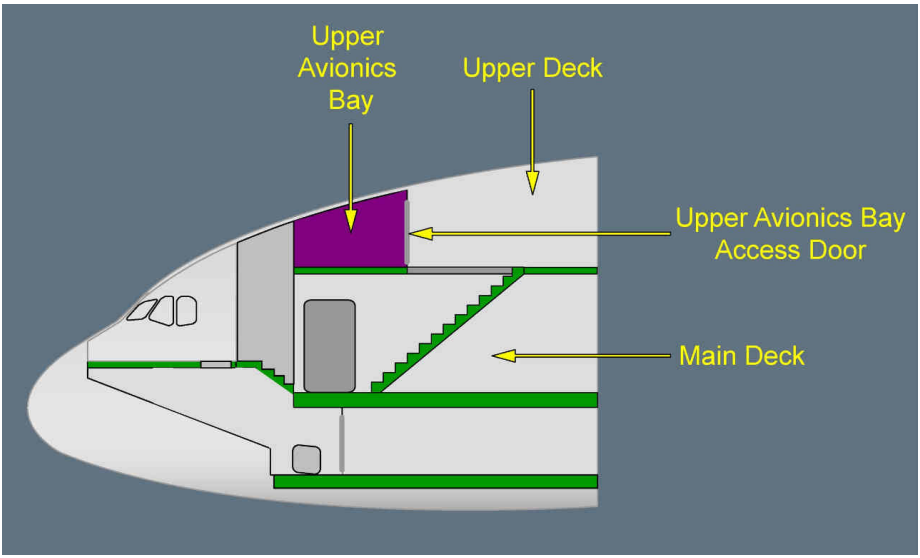


UPPER AVIONICS BAY

Applicable to: ALL

The flight crew can access the upper avionics bay, via the upper avionics bay access door.

Upper Avionics Bay

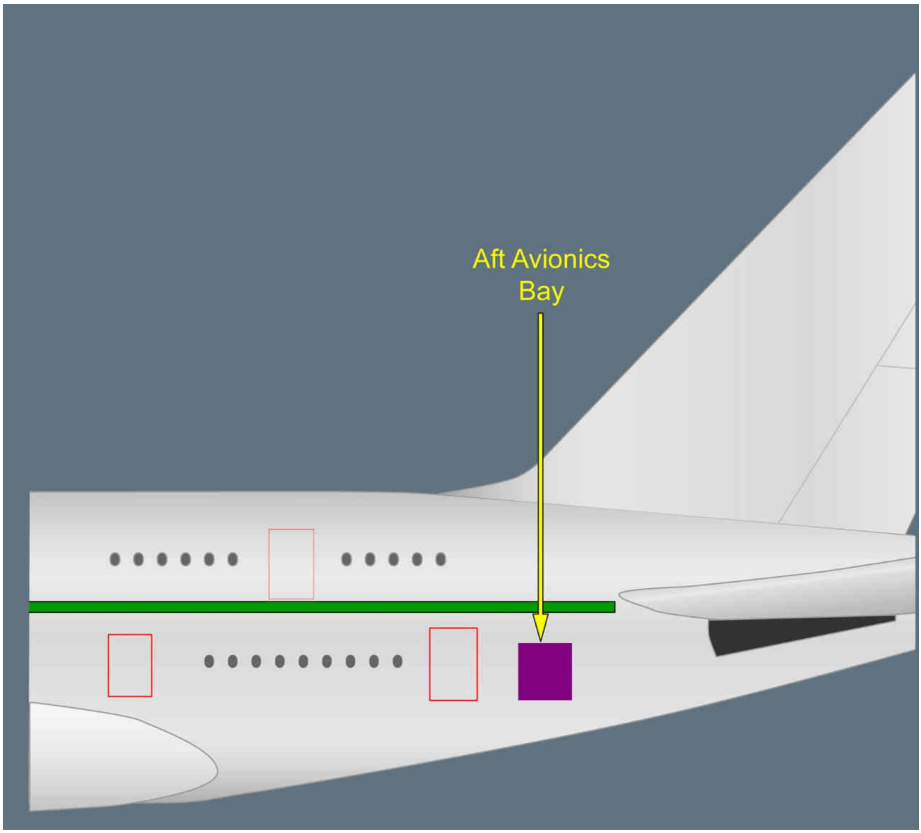


AFT AVIONICS BAY

Applicable to: ALL

The aft avionics bay is accessible from the aft main deck lavatory.

Aft Avionics Bay

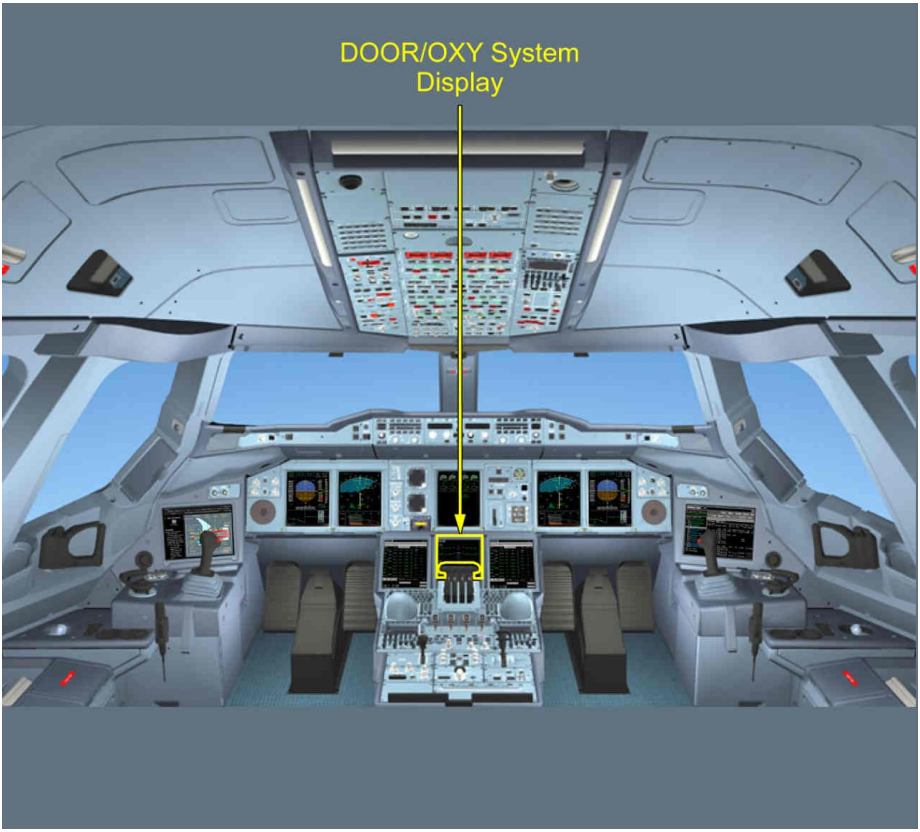


Controls and Indicators

COCKPIT VIEW

Applicable to: ALL

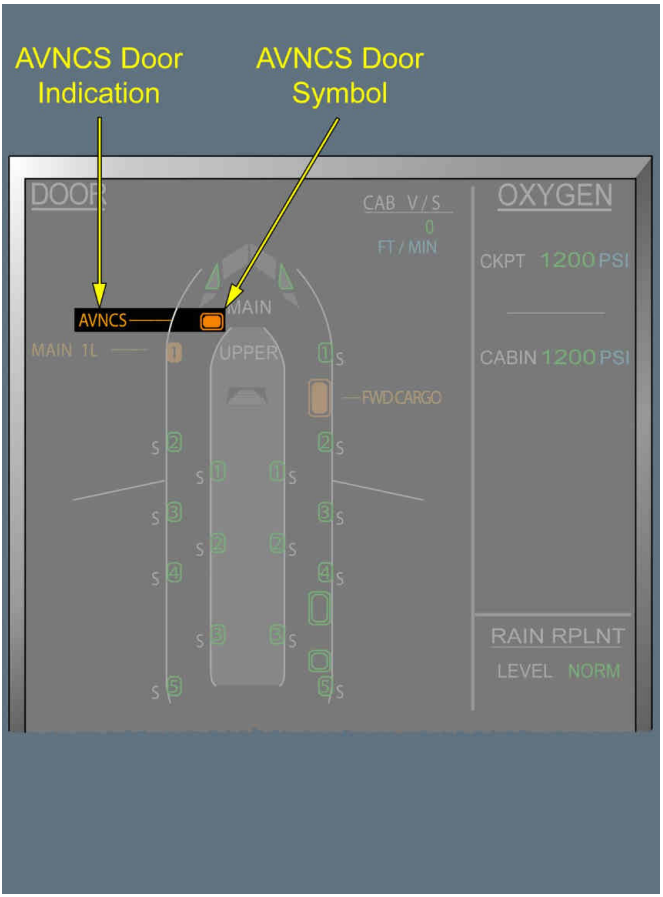
Cockpit View



DOOR/OXY SYSTEM DISPLAY

Applicable to: ALL

DOOR/OXY SD Page - Avionics Door



AVNCS DOOR SYMBOL

The door is closed and locked



The door is not closed.

AVNCS DOOR INDICATION



The door is unlocked.



The information is not valid.

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ECAM ALERTS

Applicable to: ALL

DOOR AFT(UPPER) AVNCS NOT CLOSED (*Refer to procedure*)

DOOR AVNCS NOT CLOSED (*Refer to procedure*)

DOOR CKPT DOOR EMER OPENING IN PROGRESS (*Refer to procedure*)

DOOR FWD(AFT)(BULK) CARGO NOT CLOSED (*Refer to procedure*)

DOOR L(R) MAIN AVNCS NOT CLOSED (*Refer to procedure*)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) ACTUATOR FAULT (*Refer to procedure*)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) FLIGHT LOCK FAULT (*Refer to procedure*)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER1(2)(3)L(R) LATCH MONITORING FAULT (*Refer to procedure*)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) NOT CLOSED (*Refer to procedure*)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) POS DET FAULT (*Refer to procedure*)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) SLIDE FAULT (*Refer to procedure*)

DOOR MAIN 1L(R) SLIDE LENGTHENING FAULT (*Refer to procedure*)

DOOR POS DET FAULT (*Refer to procedure*)

DOOR RESIDUAL DIFF PRESS DET FAULT (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Electrical Supply
Cockpit	
Keypad	
Cockpit Door Surveillance System (CDSS)	AC 3
Cockpit Door Locking Control Unit (CDLCU)	DC 1
Privacy Door Locking System (PDLS)	DC 2
Cabin	
Doors and Slide Management Control Unit (DSMCU)	AC 3, AC 4
Autonomous Standby Power Supply Unit (ASPSU)	AC 3
Local Door Controller (LDC) LH	AC 1, AC 2
Local Door Controller (LDC) RH	AC 3, AC 4

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AIRCRAFT SYSTEMS

56 - COCKPIT WINDOWS

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DSC-56-PLP PRELIMINARY PAGES

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DSC-56-10 System Description

Cockpit Sliding Windows ..... A
Cockpit Windshields and Windows ..... B

DSC-56-20 Controls and Indicators

Sliding Window ..... A
DOOR/OXY System Display ..... B

DSC-56-30 How to

How to Operate the Cockpit Sliding Window ..... A
How to Escape through the Cockpit Window ..... B

DSC-56-40 ECAM Alerts

ECAM Alerts ..... A

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COCKPIT SLIDING WINDOWS

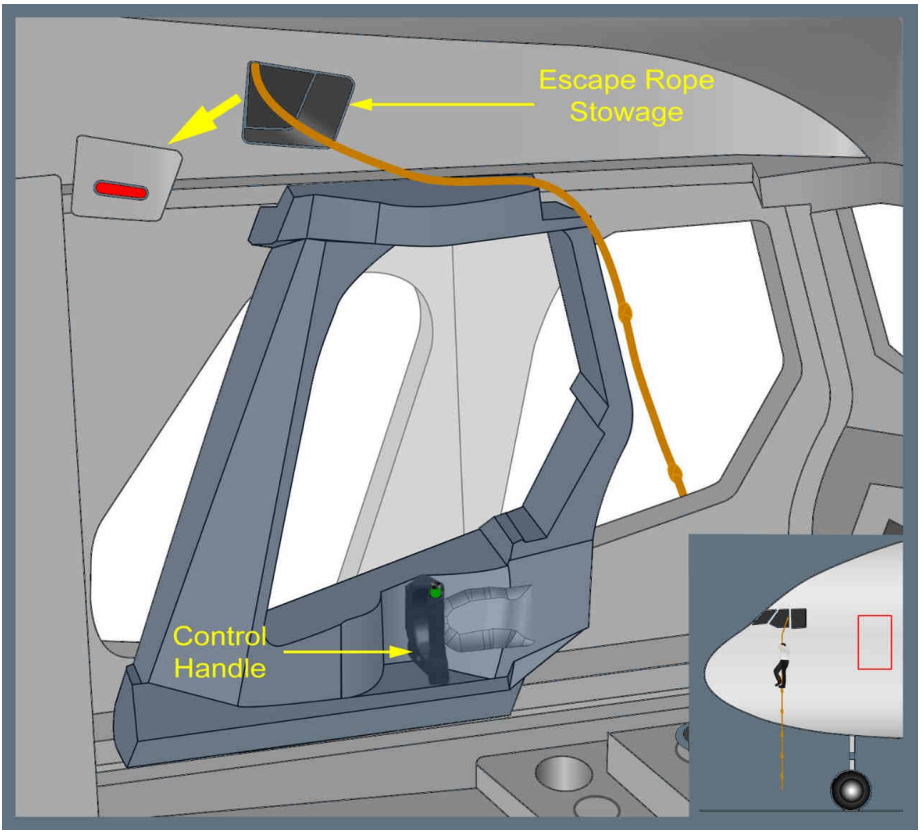
Applicable to: ALL

The flight crew can use the sliding windows as emergency exits. There is one sliding window on the left, and one on the right of the cockpit windows.

Note: *To ensure that the sliding window can be opened when required, do not stow any objects in the sliding window area.*

A small compartment above each fixed lateral window holds an escape rope. The flight crew can evacuate the cockpit by opening the sliding window, and using the escape rope. For more information, *Refer to DSC-56-30 How to Escape through the Cockpit Window* .

Sliding Window



The sliding windows can only be opened from inside the cockpit.

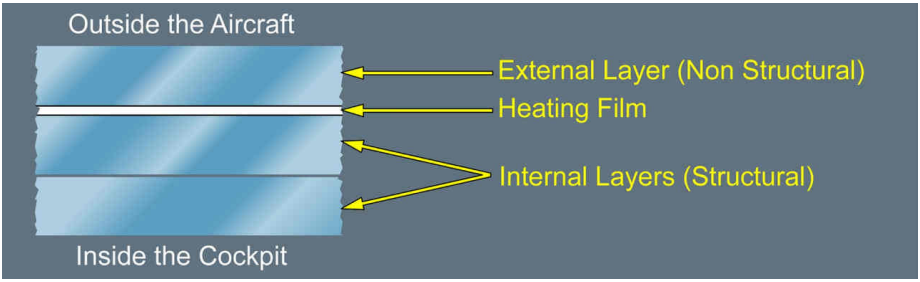
COCKPIT WINDSHIELDS AND WINDOWS

Applicable to: ALL

Each windshield or window has three layers. The external layer is not a structural layer. The two internal layers are structural layers. There is a heating film between the external layer and the internal layers.

Here is a horizontal section of a windshield or window:

Horizontal Section of a Windshield or Window



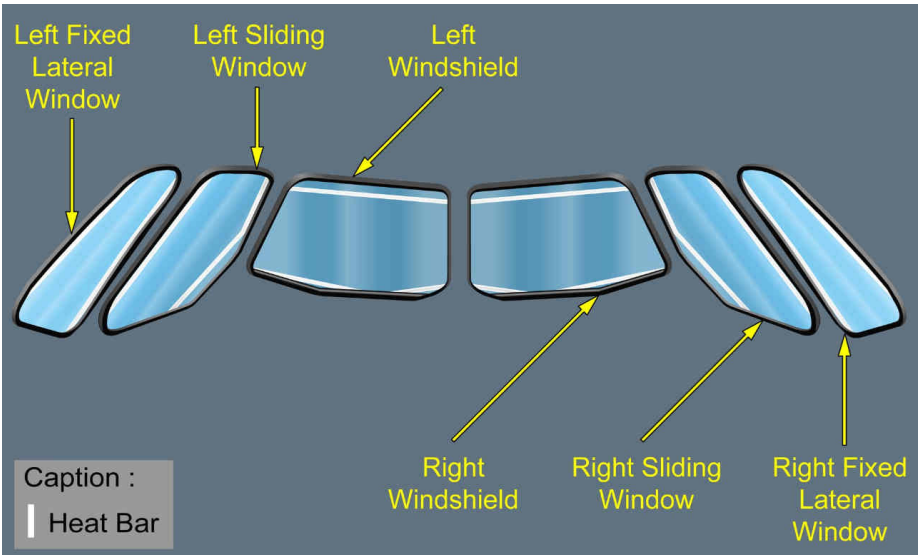
The heating film defogs and/or de-ices the windshield/window.

L2 For more information, *Refer to Ice Protection / Window Heat* .

L1 Each heating film is powered by two heat bars.

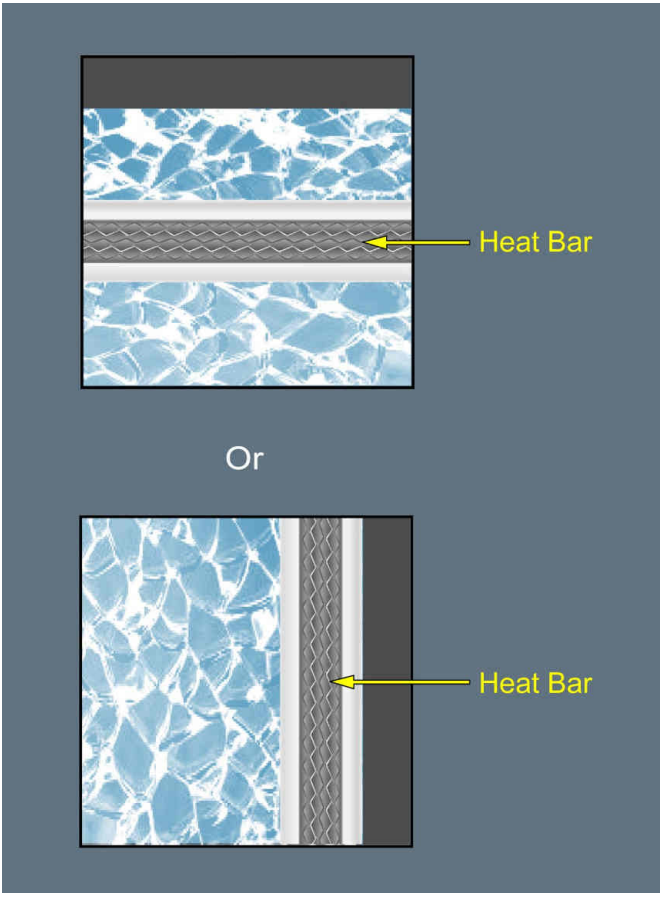
The heat bars are located as follows:

Heat Bars Location

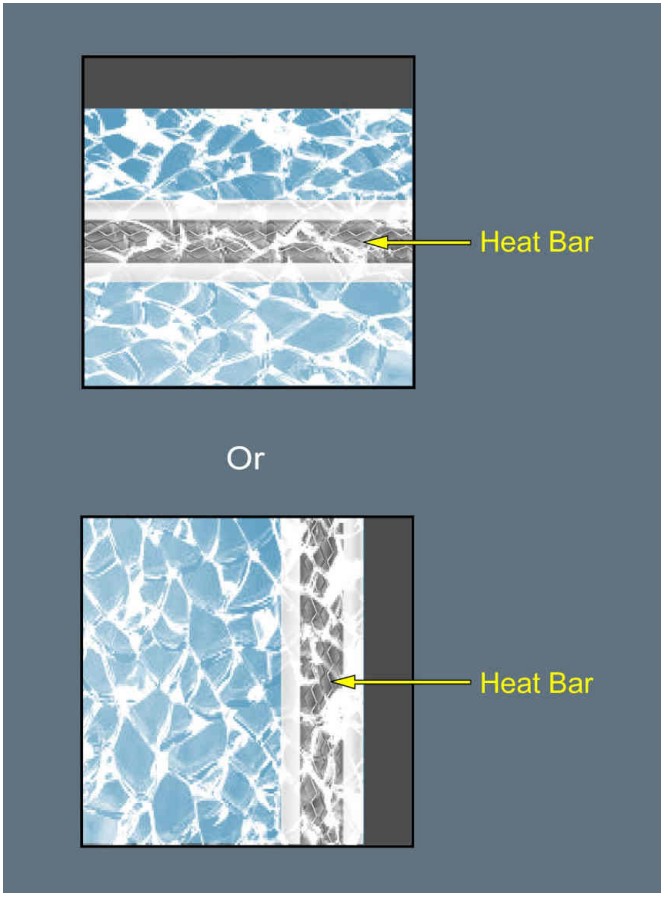


The heat bars also enable the flight crew to detect if a structural layer is damaged, in case of windshield or window cracked.

If a windshield, or a window, is cracked:
- The cracks are on the exterior side of the heat bars, or
- The cracks are on the cockpit side of the heat bars.



If the cracks are on the exterior side of the heats bars, the external layer is broken: The structure is not affected.



If the cracks are on the cockpit side of the heat bars, at least one structural layer is damaged.

If a windshield or a window is cracked, the flight crew must apply the MISC CKPT WINDOW CRACKED Procedure: *Refer to Procedure* .
The flight crew can display this procedure by pressing the ECP ABN PROC pb , then by selecting the MISCELLANEOUS menu.

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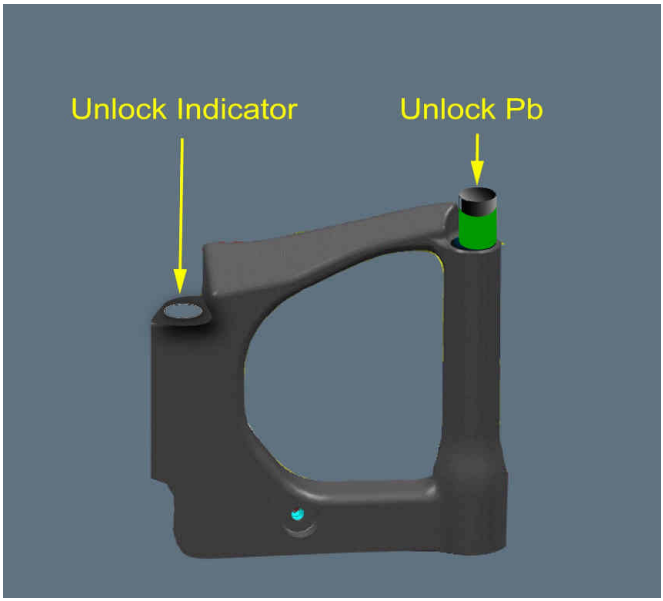
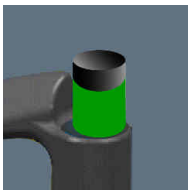
SLIDING WINDOW

Applicable to: ALL

Control Handle



Unlock pb

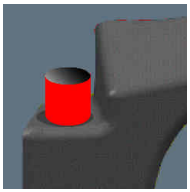


The sliding window is open, or locked in the closed position.



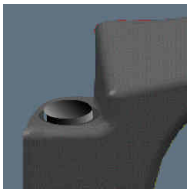
The sliding window is unlocked.
The flight crew can move the window.

UNLOCK INDICATOR



The sliding window is not locked.

Note: *When the window is not in front of its frame, the red part of the unlock indicator is visible, but not entirely.*

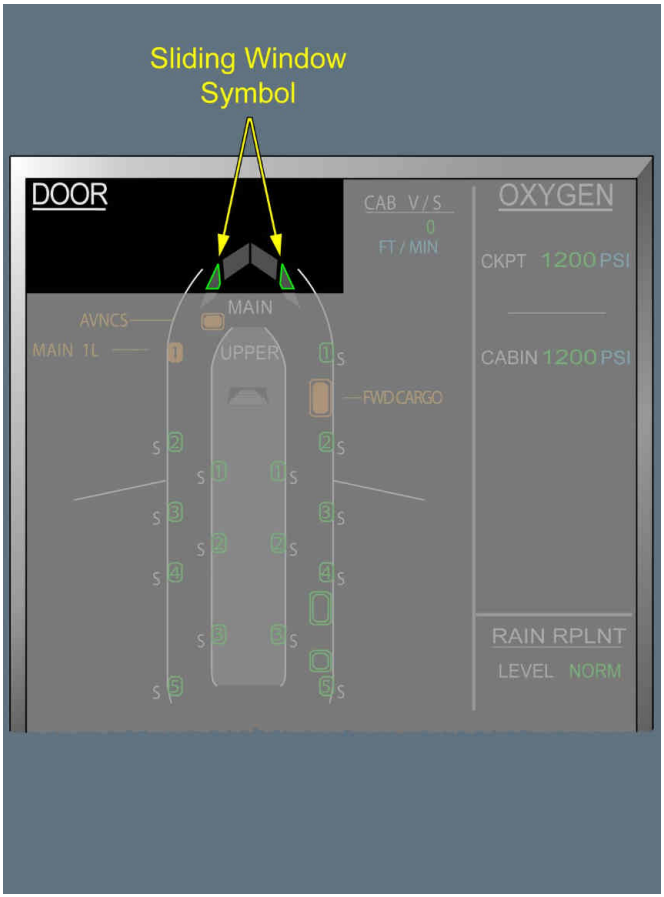


The sliding window is open, or locked in the closed position.

DOOR/OXY SYSTEM DISPLAY

Applicable to: ALL

DOOR/OXY SD Page - Sliding Window



SLIDING WINDOW SYMBOL

The sliding window is locked in the closed position.

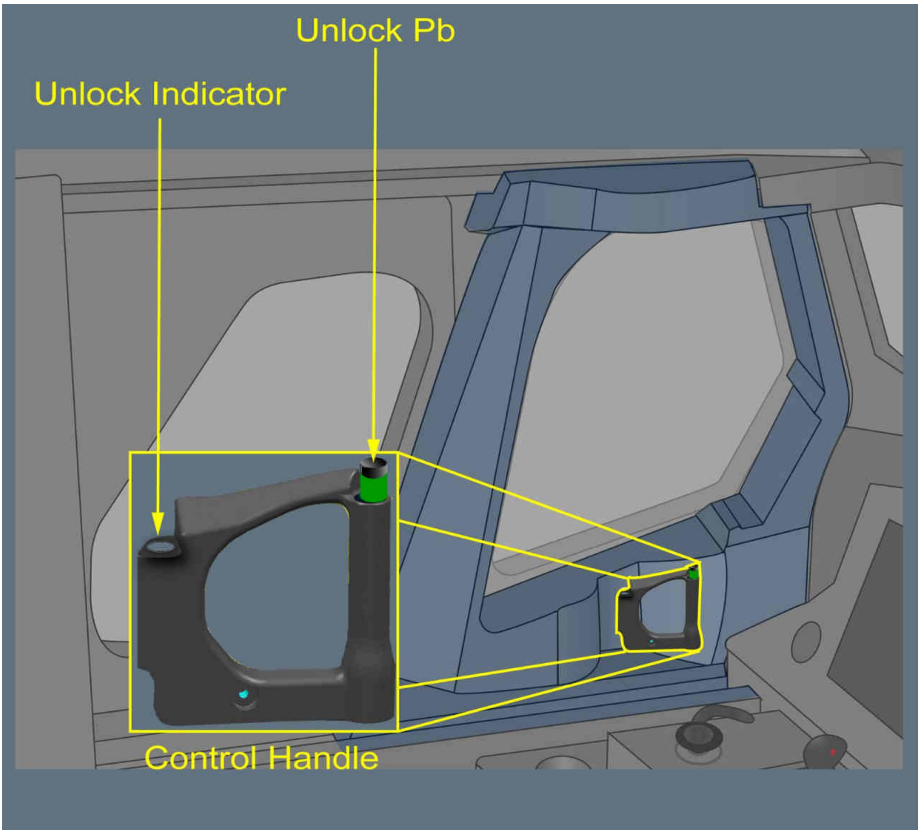
The sliding window is not locked.

HOW TO OPERATE THE COCKPIT SLIDING WINDOW

Applicable to: ALL

Each sliding window has a control handle to open or close the window.

Sliding Window and Control Handle



HOW TO OPEN THE SLIDING WINDOW

1. Press and hold the unlock pb, until the red part of the unlock indicator is entirely visible.
2. Keep pressing the unlock pb, and pull out the control handle.
   This will free the sliding window from its frame.
3. Keep pressing the unlock pb, and slide the window open.
4. Stop pressing the unlock pb.

This will lock the window in its open position.

Note: If the flight crew stops pressing the unlock pb, when the window is not completely open, the window will remain locked in its position.

HOW TO CLOSE THE SLIDING WINDOW

1. Press and hold the unlock pb, until the red part of the unlock indicator is entirely visible.
2. Keep pressing the unlock pb, and slide the window closed.
3. When the window is in front of its fixed frame, push the control handle.
   The window moves into its frame, and becomes locked in the closed position. The red part of the unlock indicator is no longer visible.

HOW TO ESCAPE THROUGH THE COCKPIT WINDOW

Applicable to: ALL

Open the sliding window.

For more details, Refer to DSC-56-30 How to Operate the Cockpit Sliding Window .

Open the escape rope stowage.

The escape rope stowage is located above the fixed lateral window.

Entirely unroll the escape rope, and throw it through the window.
Firmly grasp the escape rope, seat on the window, facing inside the cockpit, and slide down the rope.

The following video shows how to escape through the cockpit window:

This animation is not available in pdf format.

ECAM ALERTS

Applicable to: ALL

DOOR CKPT SLIDING WINDOW NOT CLOSED (*Refer to procedure*)

MISC CKPT WINDOW CRACKED (*Refer to procedure*)

MISC CKPT WINDOW ELEC ARCING (*Refer to procedure*)

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AIRCRAFT SYSTEMS

70 - ENGINES

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OVERVIEW

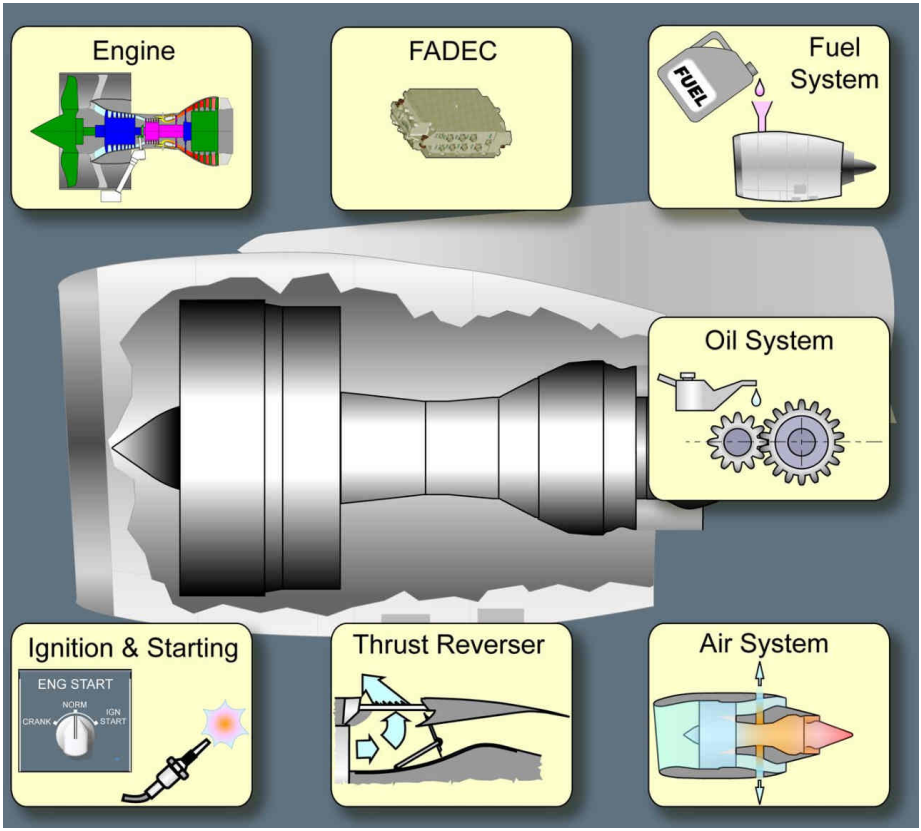
Applicable to: ALL

Four Engine Alliance GP7270 power the aircraft.

L2 Each engine provides up to 70 000 lb takeoff thrust at ISA sea level conditions.

L1 Each engine has:

- A high bypass ratio turbofan engine
- A Full Authority Digital Engine Control (FADEC)
- A fuel system
- An oil system
- An air system
- A thrust reverser system
- An ignition and start system.


Engine
FADEC
Fuel System
FUEL
Oil System
Ignition & Starting
ENG START
NORM
CRANK
IGN START
Thrust Reverser
Air System

ENGINE DESCRIPTION

Applicable to: ALL

The engine has:

- Two compressor-turbine assemblies:
  - Low Pressure (LP)
  - High Pressure (HP)

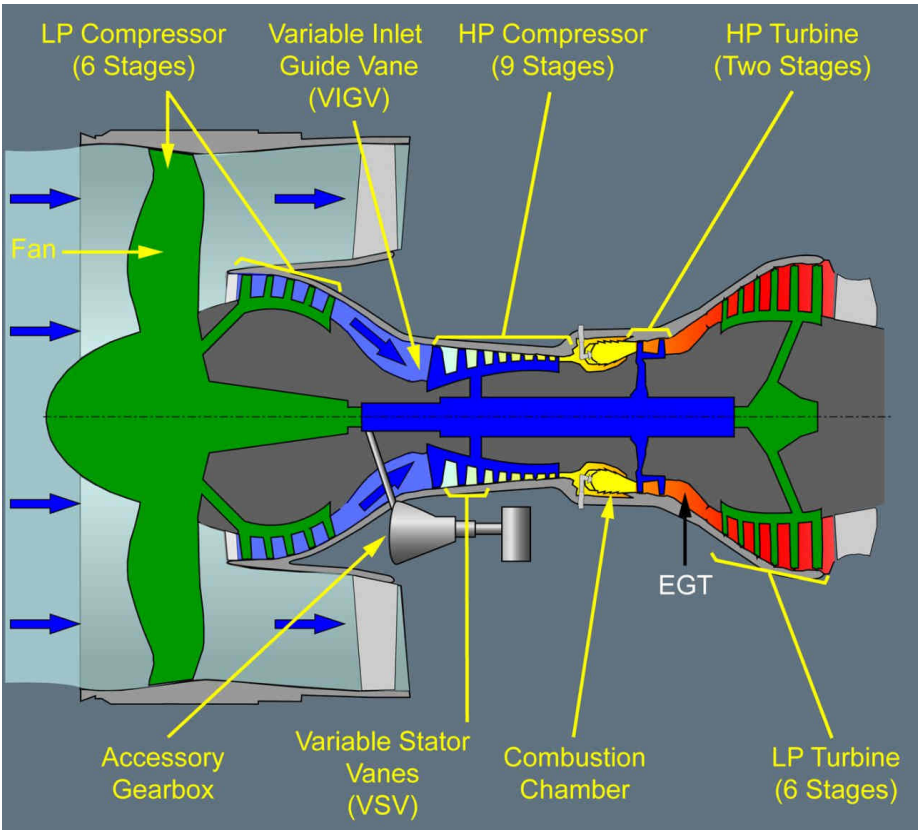
L3 Each turbine drives its assigned compressor via a shaft.
The engine is a counter-rotation type engine, i.e. the LP and the HP compressors turn in opposite directions.

L1 - An accessory gearbox
- A combustion chamber.

The engine operation is as follows:

- At the fan level, the air is separated in two flows: Most of the air flows out of the core engine and provides most of the engine power. The remaining air enters the engine core
- The air that enters the engine core is compressed by the LP and the HP compressors
- Fuel is added and ignited in the combustion chamber
- The resulting gas drives the HP and the LP turbines
- The HP (LP) turbine drives the HP (LP) compressor.

Engine



LOW-PRESSURE (LP) COMPRESSOR-TURBINE ASSEMBLY

The low pressure assembly consists of a LP compressor, including the fan, connected to the LP turbine by the LP shaft.

L3 The LP compressor has six stages including the fan, and the LP turbine has six stages.

L1 At the fan level, the air is separated into two flows:

- Most of the air flows outside the engine core to provide most of the engine thrust
- The remaining air flows through the HP compressor to the combustion chamber.

The rotation speed of the LP rotor provides the N1 engine parameter.

L3 The N1 engine parameter is the current rotation speed of the LP rotor given in percentage of the reference rotation speed.

L1 The FADEC uses this parameter for engine control and monitoring. The N1 parameter appears on the EWD.

The engine applicable thrust is calculated based on the N1 parameter.

L3 Four speed probes located on the front bearing housing of the engine measure the N1 parameter.

HIGH-PRESSURE (HP) COMPRESSOR-TURBINE ASSEMBLY

The high-speed assembly consists of the HP compressor, connected to the HP turbine by the HP shaft.

L3 The HP rotor is contra-rotating compared with the LP rotor. This increases the efficiency of the LP compressor air flow when entering the HP compressor.

The HP compressor has 9 stages and the HP turbine has 2 stages.

L1 The rotation speed of the HP rotor provides the N2 engine parameter.

L3 The N2 engine parameter is the current rotation speed of the HP rotor given in percentage of the reference rotation speed.

L1 The FADEC uses this parameter for engine control and monitoring. The N2 parameter appears on the SD .

L3 A speed probe located between the accessory gearbox and the HP rotor measures the N2 parameter.

VARIABLE STATOR VANES AND VARIABLE INLET GUIDE VANES

The Variable Stator Vanes (VSV) and Variable Inlet Guide Vanes (VIGV) regulate the amount of air that flows inside the compressor.

For more information on VSV s and VIGV s, *Refer to DSC-70-20-20-10 Stall Recovery* .

COMBUSTION CHAMBER

The combustion chamber burns a mixture of HP air and fuel. The FADEC controls the fuel-air mixture in accordance with the engine thrust lever position and the aircraft operating conditions.

L3 The combustion chamber is located between the HP compressor and the HP turbine.

The combustion chamber is an annular assembly fitted with 28 fuel nozzles and 2 igniters.

ACCESSORY GEARBOX

The accessory gearbox drives accessories for engine and aircraft systems operation, using the engine mechanical power (e.g. engine-driven generator for electrical power or the engine-driven pumps for hydraulic power).

L2 The accessory gearbox of each engine drives:

- One engine-driven generator that supplies the AC power
- Two hydraulic engine-driven pumps that supply the hydraulic pressure to the users

- A pneumatic starter. For information on engine starting, *Refer to Starting*
- A FADEC alternator. For more information, *Refer to DSC-70-20-10 Architecture*
- Engine oil pumps. For more information, *Refer to Oil system*
- Engine fuel pumps. For more information, *Refer to Fuel system* .

L3 The accessory gearbox transmits mechanical power to these accessories via the HP rotor.

OVERVIEW

Applicable to: ALL

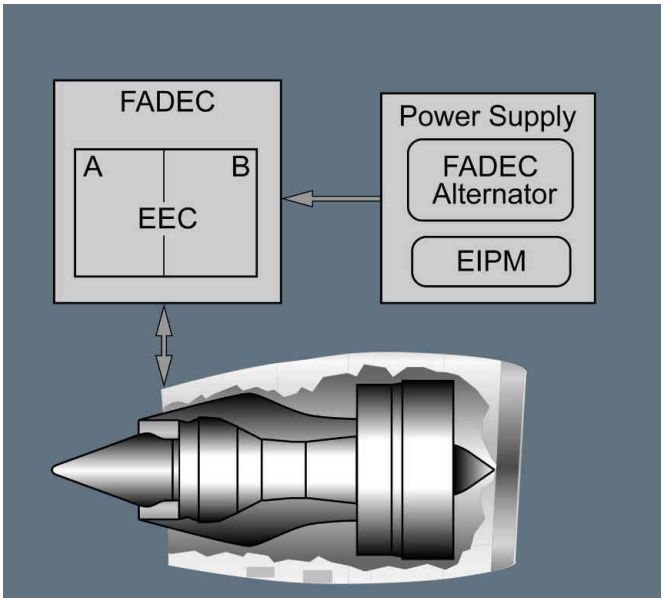
Each engine has a Full Authority Digital Engine Control (FADEC).

The FADEC performs a complete engine management:
- Engine protection
- Engine power management
- Engine ignition and starting control
- Engine parameters monitoring and display.

ARCHITECTURE

Applicable to: ALL

FADEC Architecture



FADEC

Each FADEC has one Engine Electronic Controller (EEC) that provides engine control and cockpit indications.

L3 Each EEC has two fully redundant channels A and B. Only one EEC channel controls the engine. When one EEC channel fails, the other EEC channel controls the engine.

The EEC channel that controls the engine changes at each engine start.

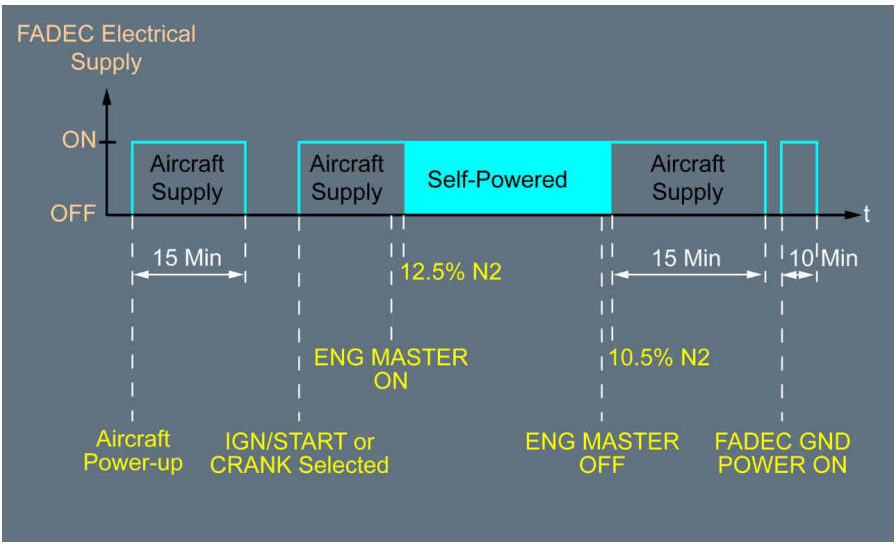
L1 FADEC ELECTRICAL SUPPLY

The FADEC is electrically supplied from:

- The FADEC alternator when the engine rotation speed is sufficient
  - L2 The FADEC alternator supplies the FADEC when the engine rotation is above 12.5 % N2.
  - L3 The FADEC alternator is driven by the accessory gearbox.
- L1 The aircraft electrical network when the engine rotation speed is too low, or if the FADEC alternator is failed.
  - L2 The aircraft electrical network supplies the FADEC when N2 is below 10.5 %.
  - L1 The Engine Interface and Power management (EIPM) controls the electrical power from aircraft electrical network to the FADEC.
  - L3 There is one EIPM for two engines.

The aircraft electrical network supplies the FADEC for 15 min at aircraft power-up.
The aircraft electrical network supplies the FADEC for 10 min when the FADEC GND PWR pb is pressed.

FADEC Electrical Supply

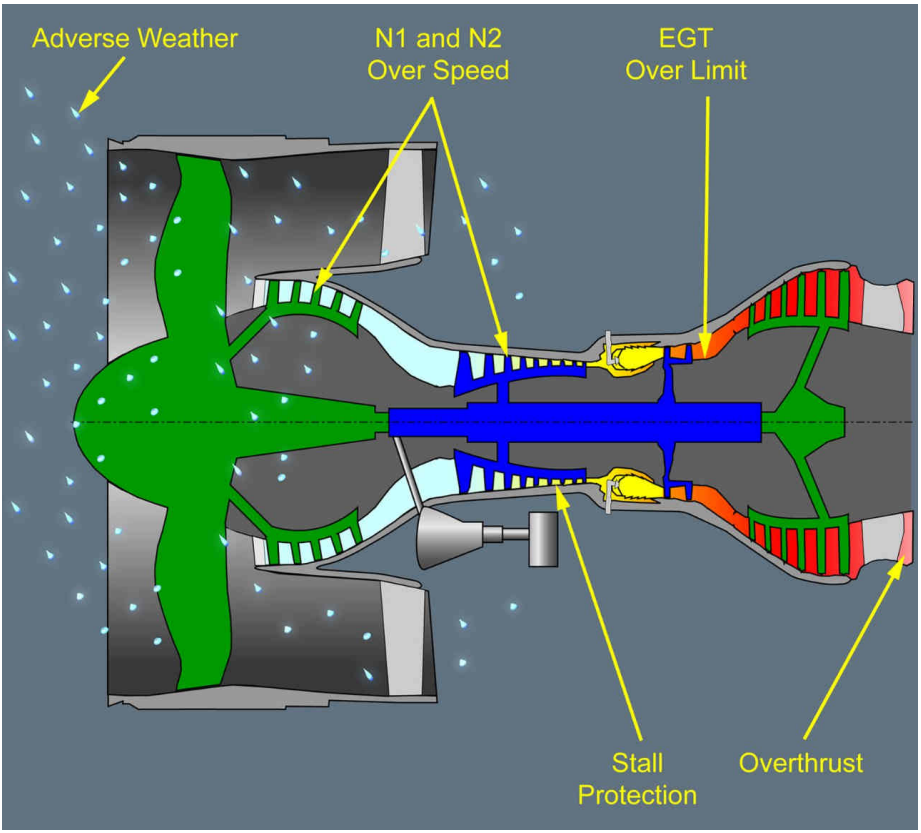


ENGINE PROTECTIONS

Applicable to: ALL

The FADEC provides protections against the following engine malfunctions:
- N1 , N2 over speed, and EGT overlimit
- Overthrust
- Engine flame out in adverse weather conditions
- Engine stall.

General



N1/N2 OVER SPEED AND EGT OVERLIMIT

The FADEC monitors:
- LP and HP compressors speeds, i.e. N1, N2
- EGT.

In the case of over speed of the LP or HP compressor and without flight crew action to reduce or shut down the engine, the FADEC automatically shuts down the engine.
On ground, during an automatic engine start sequence, if the FADEC detects an EGT over limit, the FADEC automatically shuts down the engine. The engine is then motored to clear fuel vapors. After sufficient time, the FADEC automatically attempts a second engine start sequence.

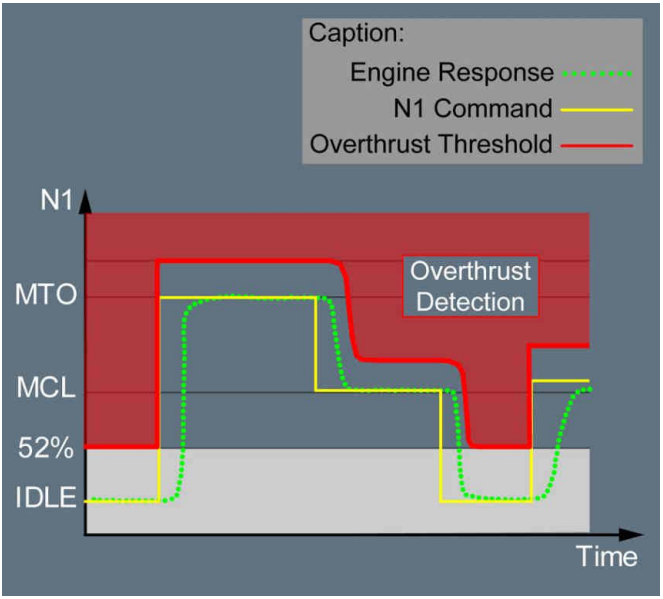
OVERTHRUST PROTECTION

The FADEC protects the engine when the current engine thrust is above the commanded engine thrust. The FADEC ensures that the engine thrust remains within the safe limits in the case of overthrust.
Depending on the aircraft altitude and speed, if the FADEC detects an overthrust, the FADEC shuts down the affected engine, or reduces the thrust within the normal thrust envelope.

L2 If FADEC detects an overthrust on an engine:
- The FADEC shuts down the affected engine, when the aircraft is on ground and the throttle levers are in IDLE detent or in the reverser position (e.g. if the overthrust is detected at touchdown or during a rejected takeoff)
- The FADEC reduces the thrust of the affected engine, when the aircraft is in flight below 15 000 ft.

There is no overthrust protection above 15 000 ft, or when the aircraft speed is above M 0.4.

L1 *Note: If the autopilot is engaged, the AUTOLAND warning triggers upon a N1 asymmetry detection in AP flare mode.*



ADVERSE WEATHER

Heavy rain or hail does not affect the engine operation. However, if the FADEC detects a risk of engine flameout due to excessive rain or hail at low engine power (i.e. idle), the FADEC automatically switches on both igniters.
For more information on the engine flameout detection, *Refer to DSC-70-80-20 Continuous Ignition* .

STALL PROTECTION

To ensure engine stability within the whole engine power and aircraft speed envelope, a smooth airflow in the compressors is necessary.
The FADEC regulates the volume of airflow through the LP and HP compressors to prevent the engine to stall at low engine speed.

L3 The airflow in the compressors is regulated by using:
- Internal bleed valves that adjust the amount of airflow through the LP and HP compressors
- Variable Inlet Guide Vanes (VIGV s) and Variable Stator Vanes (VSV s) that adjust the angle at which the airflow goes into the LP compressor. The VIGV s and VSV s positions change with the engine speed.

For more information on engine stability, *Refer to DSC-70-60-60-10 Engine Stability* .

THRUST CONTROL

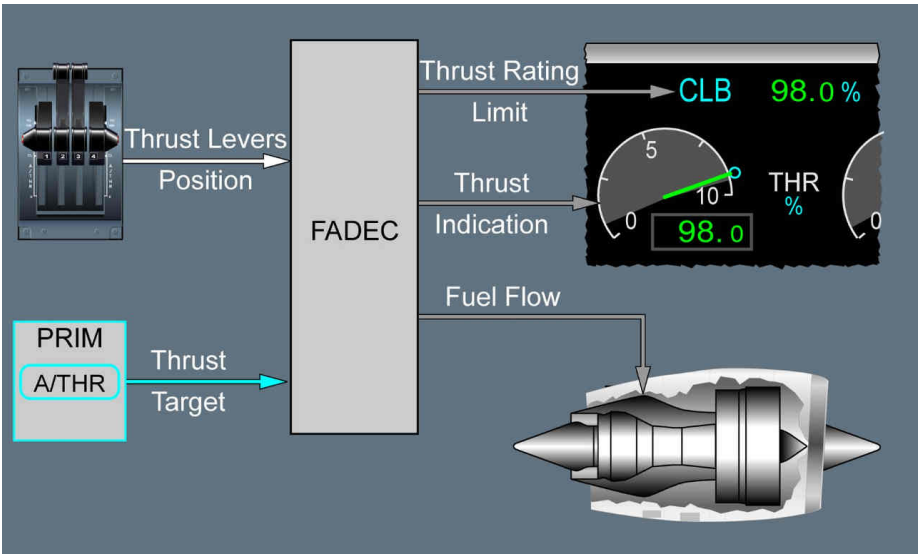
Applicable to: ALL

The FADEC controls the engine thrust.

The FADEC operates in:
- Automatic mode: The FADEC computes the engine thrust in accordance with the A/THR target
- Manual Mode: The FADEC computes each engine thrust in accordance with the associated thrust lever position.

The FADEC adjusts the fuel to command the engine thrust, and computes the thrust rating limit in accordance with the thrust levers position.

Thrust Control



THRUST RATING LIMIT

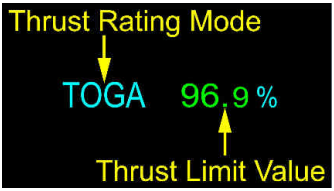
The FADEC computes the applicable thrust rating mode and the corresponding thrust limit value based on:
- The position of the thrust levers
- The data entered in the T.O and CLB panel of the FMS ACTIVE/PERF page.

The thrust limit value corresponds to the maximum available thrust for the thrust levers position and FMS selection.

Note: *If the thrust lever is set between two detents, the FADEC selects the rating limit mode corresponding to the highest detent.*
The engine thrust is always limited by the thrust lever position, with or without A/THR , except when ***A. FLOOR*** *protection is active.*

The EWD displays the thrust rating mode and the corresponding thrust limit value.

Thrust Rating Limit



The following thrust rating modes are available:

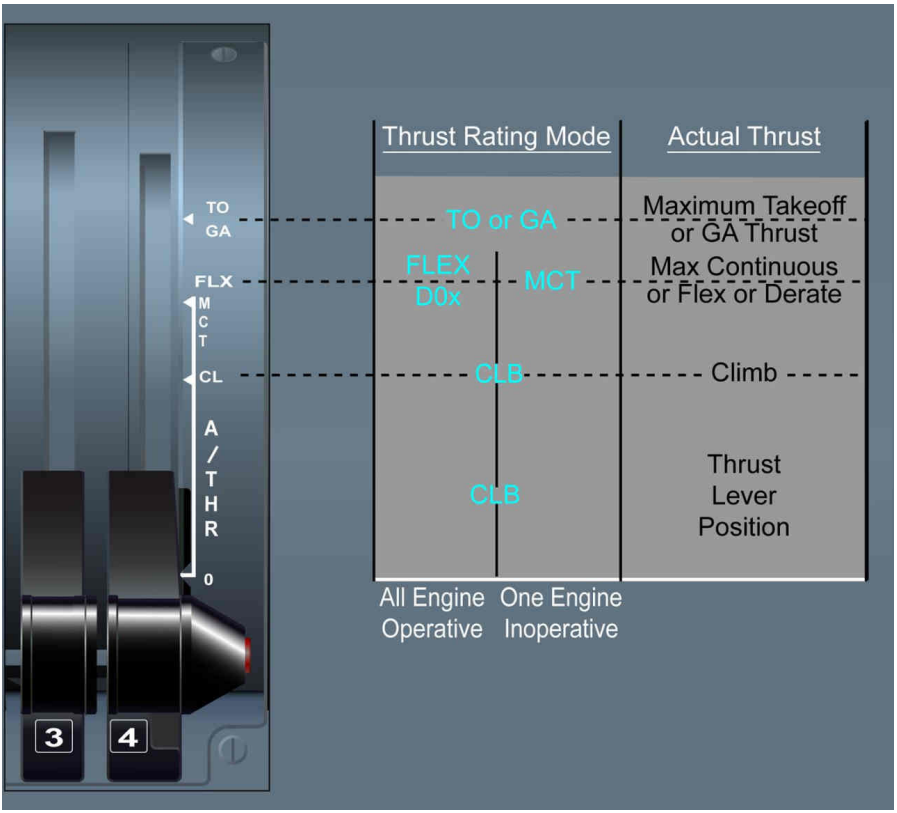
- **TOGA** : Takeoff or go-around mode
  The TOGA mode provides the maximum available thrust at takeoff or go-around.
- **DOx** : Derated takeoff mode
  The DOx mode reduces the maximum thrust at takeoff.
  6 derated takeoff levels are defined: **DO4** , **DO8** , **D12** , **D16** , **D20** , **D24** .
  L2 Each level reduces the maximum thrust from 4 % up to 24 % .
  L1 For more information on the derated takeoff mode, *Refer to PER-TOF-THR-DRT Definition of Derated Takeoff* .
  The flight crew can select the derated takeoff level via the T.O panel of the FMS ACTIVE/PERF page. For more information, *Refer to FMS PERF page - Takeoff thrust* .
- **FLEX** : Flexible takeoff thrust
  The FLEX mode reduces the thrust at takeoff.
  For more information on the flexible takeoff thrust, *Refer to PER-TOF-THR-FLX Definition of FLEX Takeoff* .
  The flight crew can select a flexible takeoff thrust via the T.O panel of the FMS ACTIVE/PERF page. For more information, *Refer to FMS PERF page - Takeoff thrust* .
- **CLB** : Climb mode
  The CLB mode provides the maximum thrust during climb.

- **DCLBx** : Derated climb mode
  The DCLBx reduces the maximum climb thrust.
  3 derated climb levels are defined: **DCL1** , **DCL2** , **DCL3** .
  For more information on the derated climb mode, *Refer to Derated Climb* .
  The flight crew can select a derated climb level via the CLB panel of the FMS ACTIVE/PERF page. For more information, *Refer to FMS PERF page - Derated climb thrust* .
- **MCT** : Maximum continuous thrust mode
  The MCT mode provides the maximum engine thrust with one engine inoperative.

MANUAL THRUST CONTROL

In manual mode, each engine is controlled by the position of the associated thrust lever. The flight crew controls the thrust by moving the thrust lever from IDLE to TOGA detents.
Each position of the thrust lever within the IDLE to TOGA detents range corresponds to a percentage of thrust.

Manual Thrust Control



MANUAL THRUST ON GROUND

Depending on the selected takeoff thrust on the T.O panel of the FMS ACTIVE/PERF page, i.e. TOGA , or FLEX , or DERATED, the associated thrust rating mode, **T.O** , or **DOx** , or **FLEX** is displayed, whatever the position of the thrust levers.

If the A/THR is armed at takeoff, A/THR activates when the flight crew sets the thrust levers to the CLB detent. **CLB** becomes the thrust rating limit mode.

For more information on A/THR , *Refer to Typical A/THR scenario.*

THRUST CONTROL IN AUTOMATIC MODE

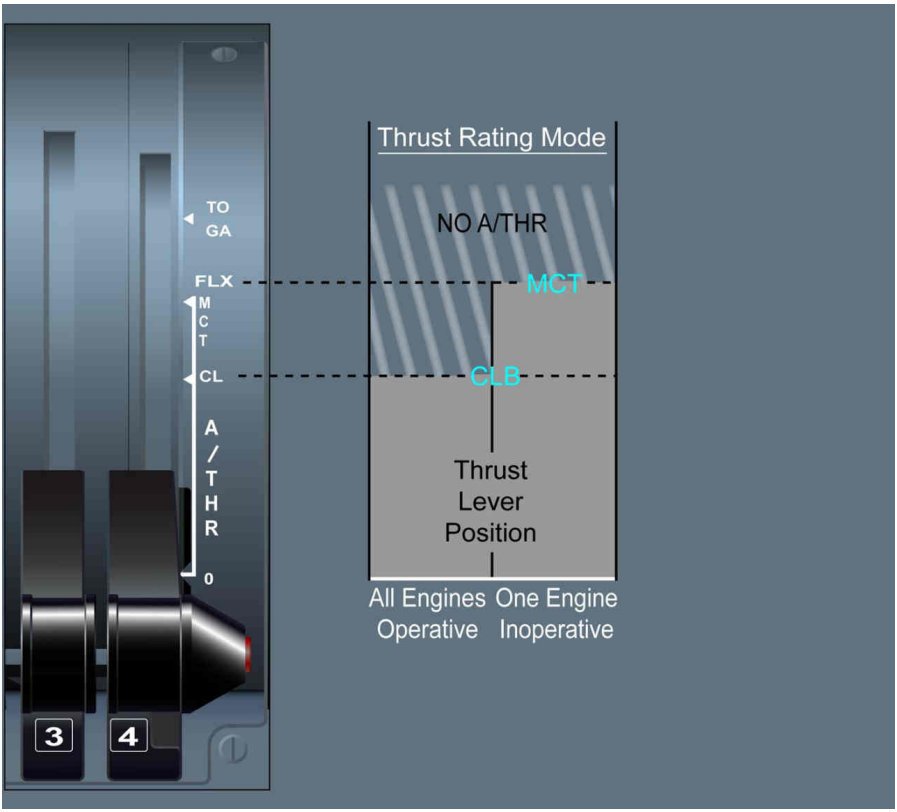
When the A/THR is active, the PRIM s compute the thrust target. The thrust of the engine is limited to the thrust corresponding to the associated thrust lever position, except if the **A. FLOOR** protection is activated.

L3 The A/THR thrust targets are N1 targets.

L2 The thrust lever position determines the maximum thrust that the A/THR can command.

L1 For more information on the A/THR , *Refer to A/THR overview* .

Thrust Automatic mode



THRUST RATING LIMIT ALL ENGINES OPERATIVE

When all engines are operative, the A/THR activates when the thrust levers are between IDLE and CLB detents.

THRUST RATING LIMIT ONE ENGINE OPERATIVE

When one engine is inoperative, A/THR activates when the thrust levers are between IDLE and MCT detents.

ENGINE POWER SETTING

Applicable to: ALL

The FADEC has two modes to manage the engine thrust:
- Normal (NORM)
- Degraded (DEGRADED).

The selection of the operating mode depends on the availability of several air data sources: The static pressure (P0), the total pressure (PT), and TAT.
The NORMAL mode is used when all air data sources are available to the FADEC.

NORMAL MODE

In NORMAL mode, the primary engine parameter displayed on the EWD is the thrust (THR).
The THR parameter represents the percentage of thrust delivered by the engine.
100 % THR corresponds to the engine thrust achieved when the thrust lever is in the TOGA detent and the engine bleed is off.

L3 The FADEC calculates the THR command as a function of:
- The throttle lever position
- The aircraft speed/Mach
- The aircraft altitude
- The outside air temperature.

The THR command is used to adjust the engine fuel flow, and therefore to produce the required thrust.
The FADEC calculates the current THR as a function of N1 , P0 (static pressure), EGT , TAT, and PT (total pressure).
The current THR and THR command are compared for closed loop engine control.
The FADEC calculates TAT , PT, Speed/Mach, altitude and Δ ISA by using air data parameters.
For information on air data selection, *Refer to DSC-70-20-40-20 Air Data Selection* .

DEGRADED MODE

In DEGRADED mode, the N1 parameter is the primary engine parameter. On the EWD , the N1 parameter replaces the THR parameter.
L2 The FADEC reverts to N1 control, and uses the current N1 to control the thrust.

L3 The FADEC computes the N1 command as a function of the thrust levers position, and compares the N1 command with the actual N1 for closed loop engine control.

L1 For more information on primary engine parameter display in DEGRADED mode, *Refer to DSC-70-90-50 N1 Indications (Degraded)* .

The FADEC reverts to DEGRADED mode when some air data parameters are not available.

L3 The automatic reversion to DEGRADED mode occurs when one of the following parameters necessary to compute the THR command is totally lost:
- Static pressure (P0), or
- Total pressure (PT), or
- TAT .

L1 In the case of reversion to DEGRADED mode, a thrust equivalent to the current thrust in NORMAL mode is provided until the flight crew changes the position of the thrust lever.
If three or four engines operate in DEGRADED mode, the A/THR is lost.
In DEGRADED mode, the thrust rating modes are lost.

FADEC AIR DATA SELECTION

The FADEC uses air data parameters for power management.
The three ADIRUs and the engine sensors provide air data parameters to the FADEC.
In normal operation, the FADEC uses the air data parameters from the ADIRUs.
Depending on the validity of the engine and ADIRUs air data, each FADEC selects the source that is used for power management.

L3 Validation of air data is done as follows:
- Each ADIRU compares its air data with the data from the four FADECs. If the ADIRU air data is consistent with two or more FADECs, then the ADIRU considers its own air data as valid and sends a validity signal to each FADEC
- Each FADEC compares its data with the data received from the three ADIRUs. The FADEC needs at least two ADIRUs to do this comparison
  - If the FADEC and the ADIRUs air data are consistent, the ADIRUs data are used
  - If the FADEC and the ADIRUs air data are not consistent, the FADEC uses the validity signal from each ADIRU to determine the best source to use between engine and ADIRUs sources.

IDLE SETTINGS

Applicable to: ALL

When a thrust lever is set to idle, the FADEC adjusts the minimum thrust required to maintain correct engine operation at low speed depending on the flight phase.

There are three idle settings:

- Approach idle
  It enables a rapid engine acceleration from idle to go-around thrust.

L2 This setting is selected during approach when the FLAPS lever is set to 2, 3, or FULL, or when the landing gear is extended.

L1 - Reverse idle
  It enables a rapid engine acceleration from idle to maximum reverse thrust.

L2 This setting is selected on ground, when reverse thrust is selected.

L1 - Normal idle.

L2 This setting is selected in the other flight phases, i.e. in flight with FLAPS lever set to 0, or 1 and landing gear retracted, or on ground with reversers not selected.

The normal idle setting varies according to:

- Bleed demand
- Oil temperature
- Mach number
- Altitude
- SAT.

FUEL FLOW CONTROL

Applicable to: ALL

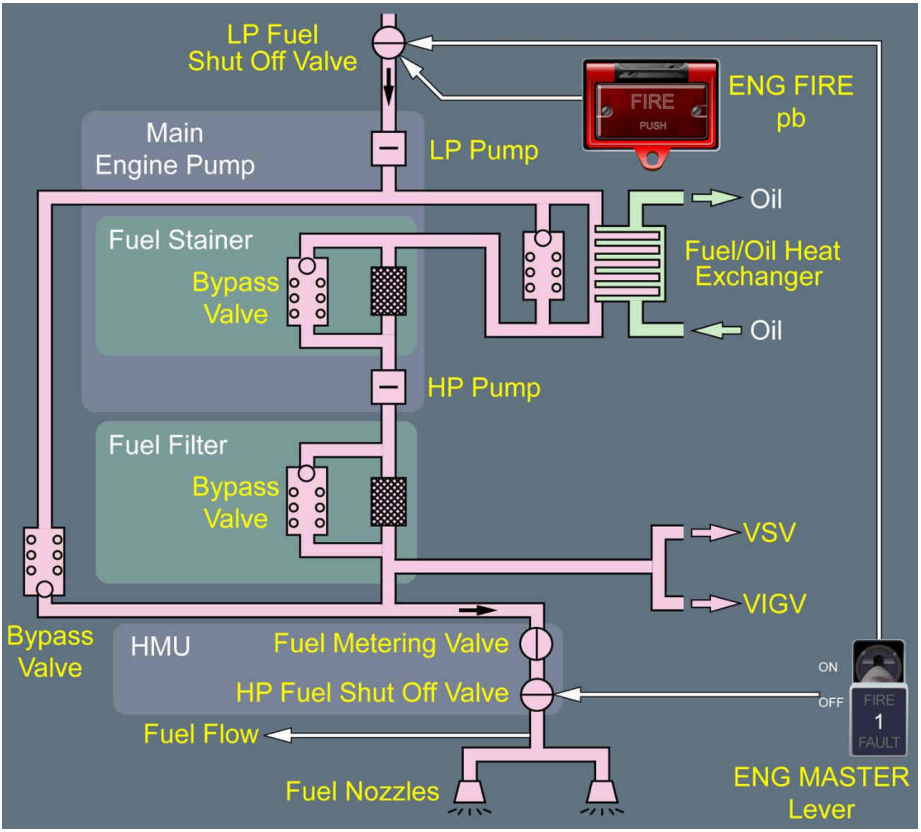
The FADEC controls the fuel flow, via the HMU , as necessary. For more information on the engine fuel system, *Refer to DSC-70-40-40-10 Overview* .

FUEL SYSTEM

Applicable to: ALL

The fuel system supplies fuel to the combustion chamber at the required flow rate, pressure and temperature.

Fuel System



ENGINE FUEL PUMP

The main engine pump delivers fuel coming from the feed tank to the fuel nozzles at the required pressure and temperature.

L3 The accessory gearbox drives the main engine pump.

The main engine pump is made of the LP and HP pumps.

LP PUMP

Fuel supplied from the feed tank flows through the LP pump.
The LP pump then supplies the fuel to the Fuel Oil Heat Exchanger (FOHE).

HP PUMP

The HP pump pressurizes and supplies fuel to the fuel nozzles via the HMU.

L3 **FUEL OIL HEAT EXCHANGER (FOHE)**

The FOHE uses cold LP fuel to decrease the temperature of the engine oil.
Heat is continuously transmitted from the oil to the fuel when the engine is in operation. This increases the fuel temperature at the outlet of the FOHE.

FUEL FILTER AND FUEL STRAINER

The fuel strainer and the fuel filter protect the fuel system from contamination.
L3 The fuel strainer and the fuel filter are upstream and downstream the main engine pump.
L1 The fuel strainer and the fuel filter include a bypass valve. The bypass valve ensures that fuel continuously flows to the fuel nozzles, if the fuel filter or the fuel strainer is clogged.
The opening of the bypass valves may lead to HMU contamination by fuel particles.

FUEL SHUTOFF VALVES

The LP and HP fuel shutoff valves open or close fuel supply to the combustion chamber, when the flight crew sets the ENG MASTER lever to OFF.
LP shutoff valve closes, if the flight crew presses the ENG FIRE pb-sw.

HYDROMECHANICAL METERING UNIT (HMU)

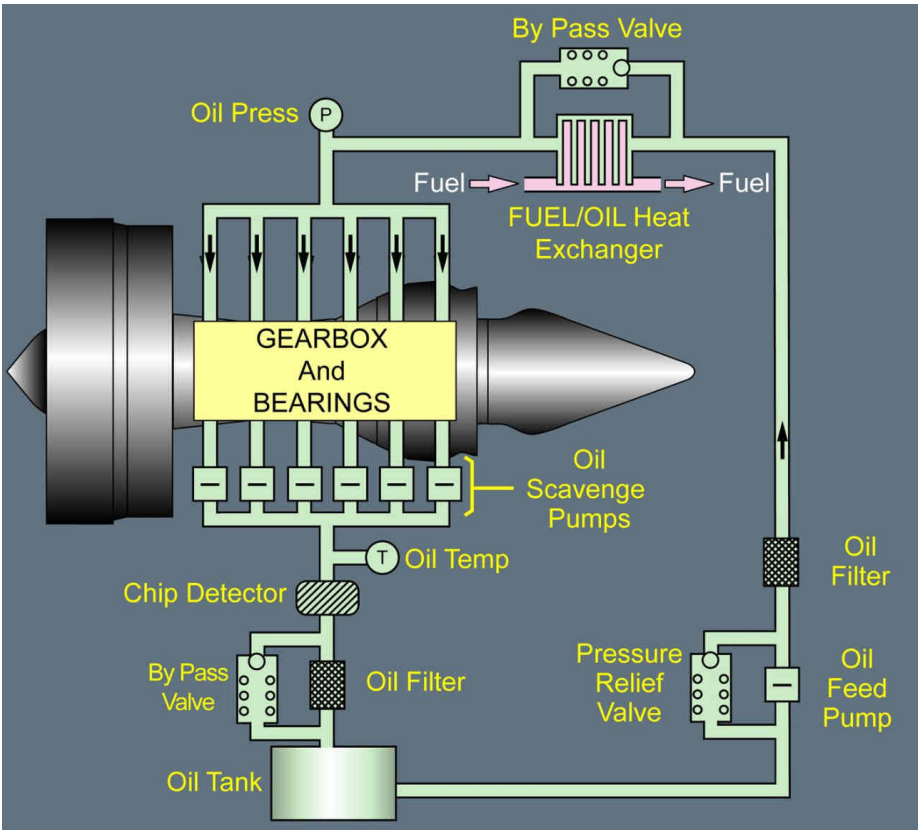
The FADEC controls fuel supply via the Hydromechanical Metering Unit (HMU) in order to obtain the required engine thrust.

L3 The HMU :
- Controls the fuel flow to the engine combustion chamber via the Fuel Metering Valve
- Protects the engine from overspeed by closing the HP shutoff valve
- Operates the HP shutoff valve to start or stop the engine
- Operates the Variable Inlet Guide Vanes (VIGV) and the Variable Stator Vanes (VSV) to regulate the LP and HP compressor flow (*Refer to DSC-70-20-20-10 Stall Recovery*).
  High pressure fuel is used to actuate the VIGV and the VSV .

OIL SYSTEM

Applicable to: ALL

Oil System



The oil system lubricates and cools the engine components such as bearings, gears, and accessory drives.

OIL PUMPS

The oil feed pump supplies oil from the engine oil tank to the engine components to lubricate.
The oil scavenge pumps collect the oil from the return lines to the engine oil tank.
L3 The accessory gearbox drives the oil feed and scavenge pumps.

OIL FILTERS

Two oil filters protect the oil system from contamination.

L3 The oil is filtered in the feed line and in the return line.

L1 The oil filter bypass valve opens, if the oil filter in the return line is totally clogged. It ensures that oil continuously flows to the engine components.

L3 Only the oil filter in the return line has a bypass valve.

CHIP DETECTOR

The chip detector in the oil system gives an indication of the internal condition of the engine.

L3 FUEL OIL HEAT EXCHANGER (FOHE)

The FOHE uses cold LP fuel to decrease the temperature of the engine oil.
Heat is continuously transmitted from the oil to the fuel when the engine is in operation. This increases the fuel temperature at the outlet of the FOHE.

L3 PRESSURE RELIEF VALVE

The oil pressure may be abnormally high at the oil feed pump outlet, if the oil temperature is very low during engine start. In such a case, the pressure relief valve opens to decrease the oil pressure. When the temperature of the oil increases, the pressure decreases, and the pressure relief valve closes.
The pressure relief valve also opens to decrease oil pressure, if the oil filter in the feed line becomes clogged.

AIR SYSTEM

Applicable to: ALL

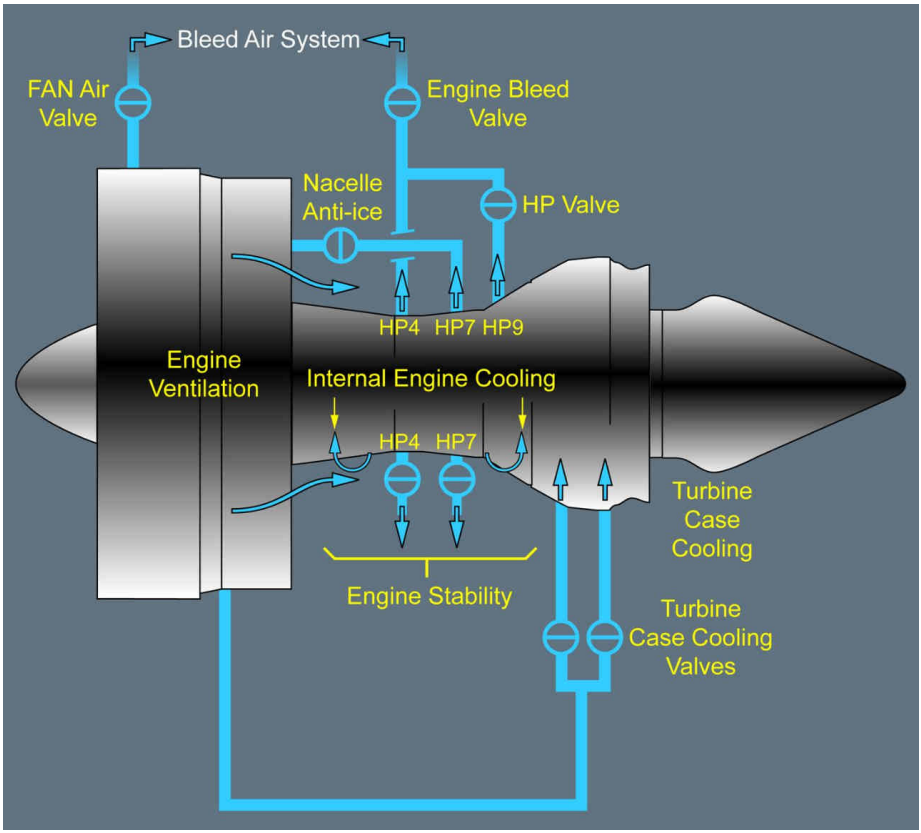
The engine bleed air system ensures:

- The engine stability, by controlling the volume of air flow through the engine compressors
- Engine cooling, by supplying cool air to internally cool the engine and to improve the turbine efficiency.

The engines also provide bleed air to:

- The bleed air system
  For information about engine bleed air system, *Refer to Engine bleed* .
- The wing and nacelle anti-ice.
  For more information, *Refer to Ice Protection* .

Engine Air System



L3 ENGINE STABILITY

The control of the airflow through the LP and HP compressor ensures the engine stability.

The FADEC controls the volume of airflow via:

- Bleed valves at the HP compressor stages 4 and 7
  At low engine speed, the FADEC opens the bleed valves to deviate some airflow from the compressors to the fan airstream.
  At higher engine speed, the FADEC closes the bleed valves to supply the full airflow to the compressors.
- Variable Inlet Guide Vanes (VIGV s) and Variable Stator Vanes (VSV s) in the IP compressor.
  For more information on VIGV s and VSV s, *Refer to DSC-70-20-20-10 Stall Recovery* .

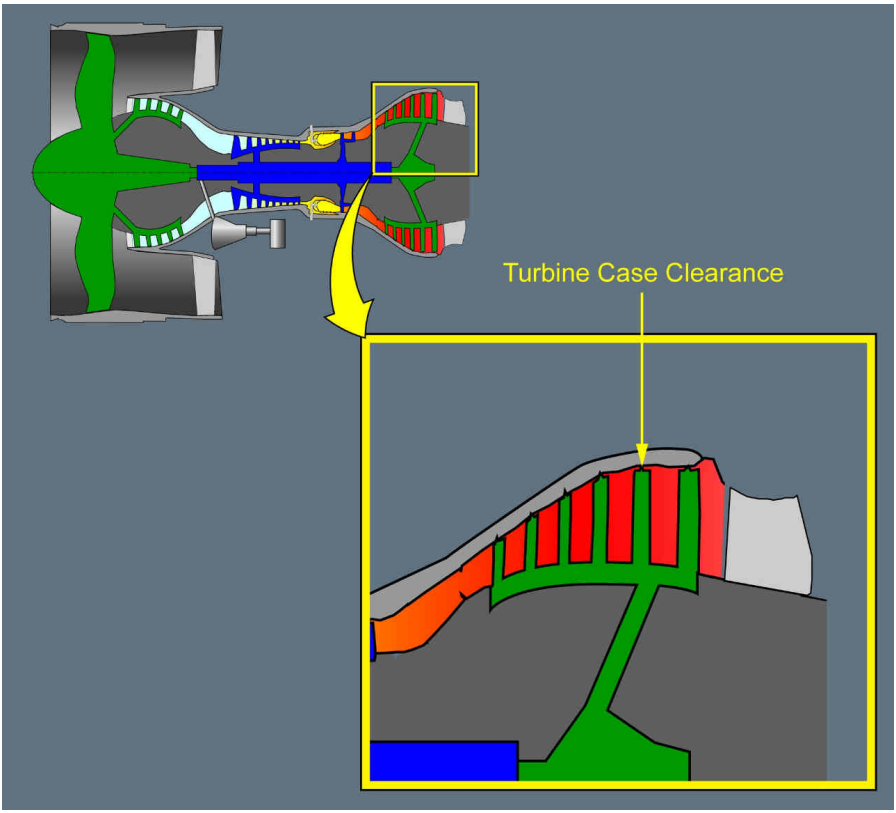
L3 INTERNAL ENGINE COOLING

The engine is internally cooled with air supplied by the LP and HP compressors.
This air is also used to seal bearing chambers and to prevent internal oil leakage.

L3 TURBINE CASE COOLING

To reduce the turbine blade tip clearances, and to improve turbine efficiency, the turbine case is cooled.
The FADEC controls the turbine case cooling by the operation of the Turbine Case Cooling (TCC) valves.
In cruise, the FADEC opens the TCC valves to supply cooling air to HP and LP cases.
In other flight phases, the FADEC closes the TCC valves to stop the flow of cooling air to the HP case, and to reduce the flow to the LP case.
The TCC valves automatically close in the event of control system failure. As a consequence, the HP and LP turbine cases are no longer cooled, and the turbine blade tip clearances increase.

Clearance

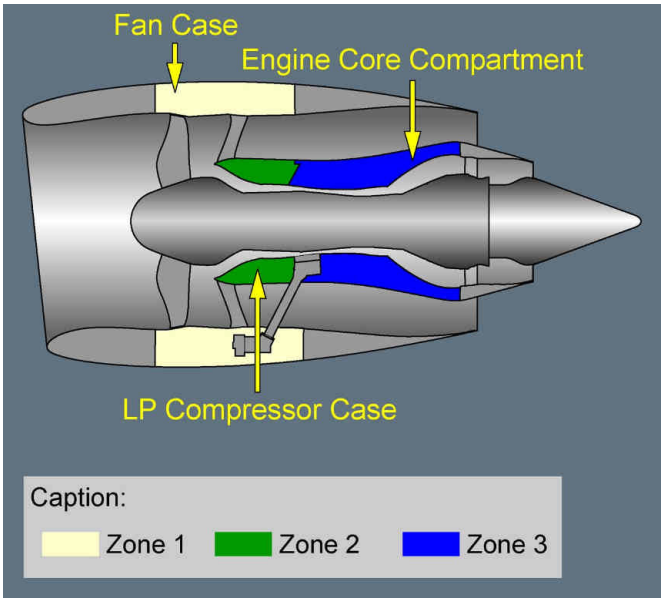


L3 ENGINE VENTILATION

The engine has 3 fire resistant zones that are isolated form each other:
- Zone 1: Fan case compartment
- Zone 2: LP compressor case compartment
- Zone 3: Engine core compartment.

The 3 engine fire zones are ventilated by fan airflow to decrease temperature and to prevent accumulation of fumes.

Engine Fire Zones



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OVERVIEW

Applicable to: ALL

There are two thrust reversers: One on each inboard engine.

The thrust reversers enable to reduce:
- The landing distance by the creation of a reverse thrust
- The energy absorbed by the brakes.

SYSTEM DESCRIPTION

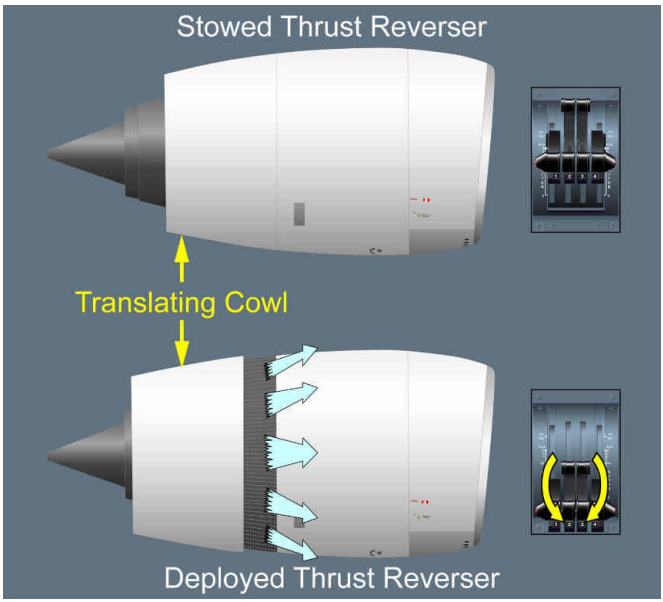
Applicable to: ALL

Each thrust reverser has two translating cowls: One on each side of the engine.

L2 The two translating cowls are mechanically linked.

L1 On ground, the translating cowls open to obtain a reverse thrust when the thrust lever is set to the idle detent and the thrust reverser lever is set to reverse thrust positions, i.e. IDLE REV to MAX REV.

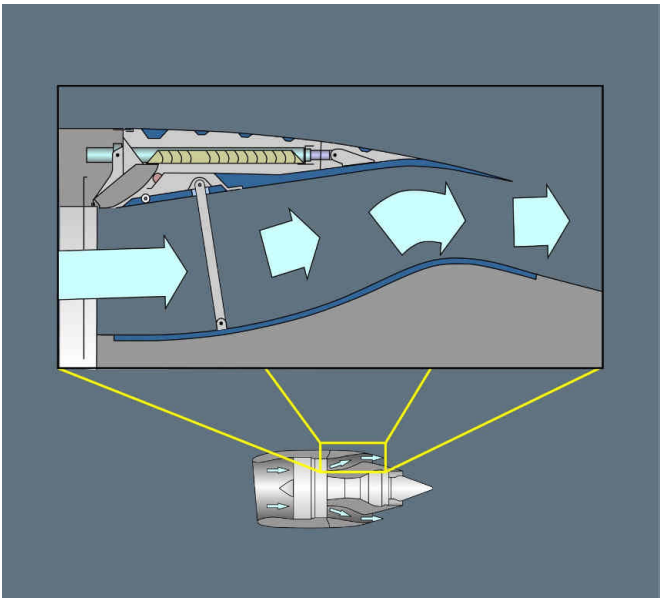
Translating Cowls



STOWED THRUST REVERSER

When the reverser is stowed, the translating cowls are closed and the airflow outside the core engine is not deviated.

Stowed Thrust Reversers

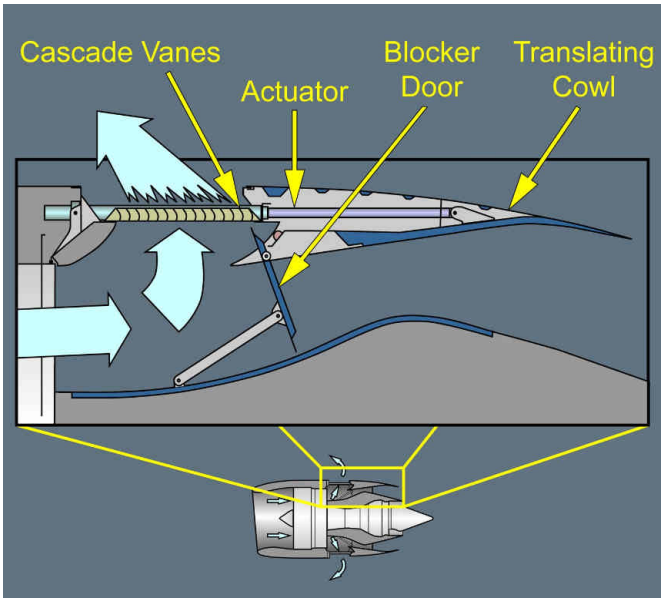


DEPLOYED THRUST REVERSER

When the thrust reverser lever is set from IDLE REV to MAX REV, the reverse thrust is obtained by the deviation of the airflow outside the core engine, as follows:

1. The translating cowls move backward
2. The blocker doors rotate
3. The air flow is diverted forward through the cascade vanes.

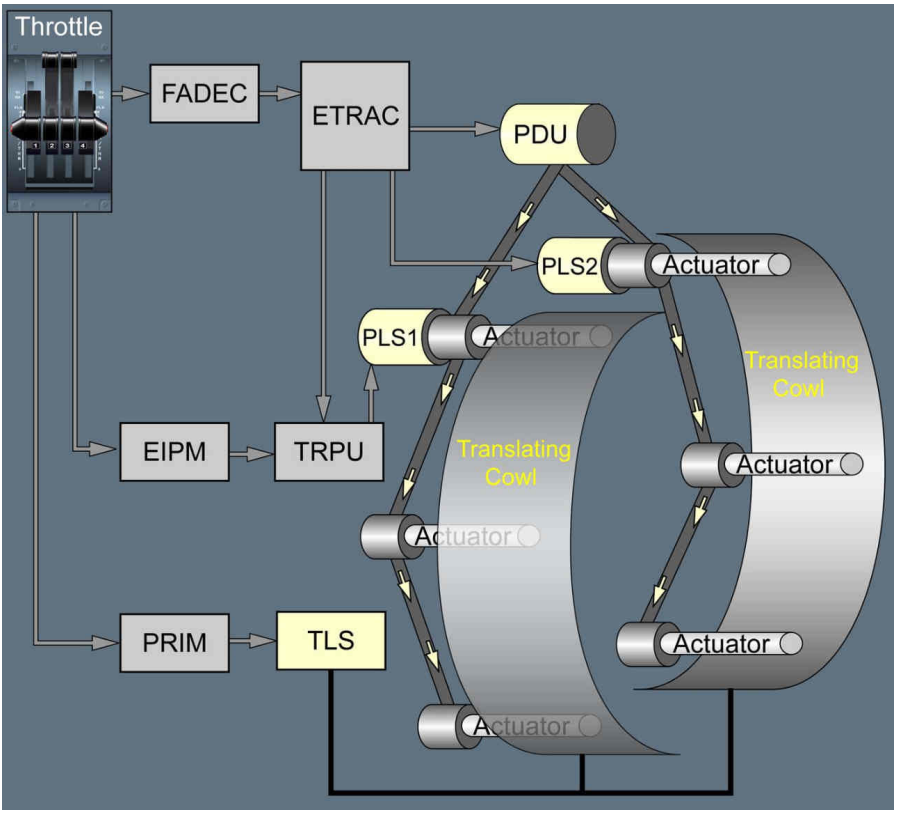
Deployed Thrust Reverser



L3 THRUST REVERSER CONTROL

The thrust reverser mechanism has an Electrical Thrust Reverser Actuation System (ETRAS) that operates and locks the translating cowls.
During thrust reverser operation, the Electrical Thrust Reverser Actuation Controller (ETRAC) controls the translating cowls in deployed or stowed direction.
6 actuators, 3 on each translating cowl, actuate the thrust reverser. The Power Drive Unit (PDU) provides the mechanical power to the thrust reverser actuators.
2 Primary Locking Systems (PLS), one on each upper actuator, lock the translating cowls and avoid the thrust reverser operation when the thrust reverser is not selected. The PLS are part of the first and second lines of defense of the thrust reverser system.
The ETRAS controls one PLS and the Thrust Reverser Power Unit (TPRU) controls the second PLS .
The Tertiary Lock System (TLS) also avoids the thrust reverser operation when the thrust reverser is not selected. The TLS is part of the third line of defense of the thrust reverser system.
The FADEC , EIPM , and the PRIM control the 3 lines of defense.
For more information about the 3 lines of defense, *Refer to DSC-70-70-70-20 Three Lines of Defense* .

Thrust Reverser System



DEPLOYMENT- STOWAGE SEQUENCE

Applicable to: ALL

THRUST REVERSER DEPLOYMENT

The deployment of the reverser starts when the three lines of defense are cleared, i.e. the aircraft is on ground and the flight crew selects the reverse thrust.
For more information on the conditions to clear the three lines of defense, *Refer to DSC-70-70-70-20 Three Lines of Defense* .
During the thrust reverser deployment, the engine reverse thrust is limited to reverse idle.
L3 This limits the loads applied on the thrust reverser system and provides protection against an engine stall.

L1 When the thrust reversers is deployed, the engine reverse thrust increases toward the commanded reverse thrust.

L3 Transition from reverse idle to commanded reverse thrust occurs when thrust reverser is deployed by more than 80 % . This occurs approximately 2 to 3 s after the flight crew selects the reverse thrust.

L1 **THRUST REVERSER STOWAGE**

The stowage of the thrust reverser starts when the thrust reverser lever is set forward REV IDLE .

THRUST REVERSER PROTECTIONS

Applicable to: ALL

LINES OF DEFENSE

The thrust reverser system has three lines of defense to prevent a reverser deployment in flight. The three lines of defense are fully segregated and must be cleared to allow the thrust reverser deployment.

L2 The three lines of defense are controlled as follows:
- The FADEC and the EIPM monitor and control the first and second lines of defense
- The Master PRIM monitors and controls the third line of defense.

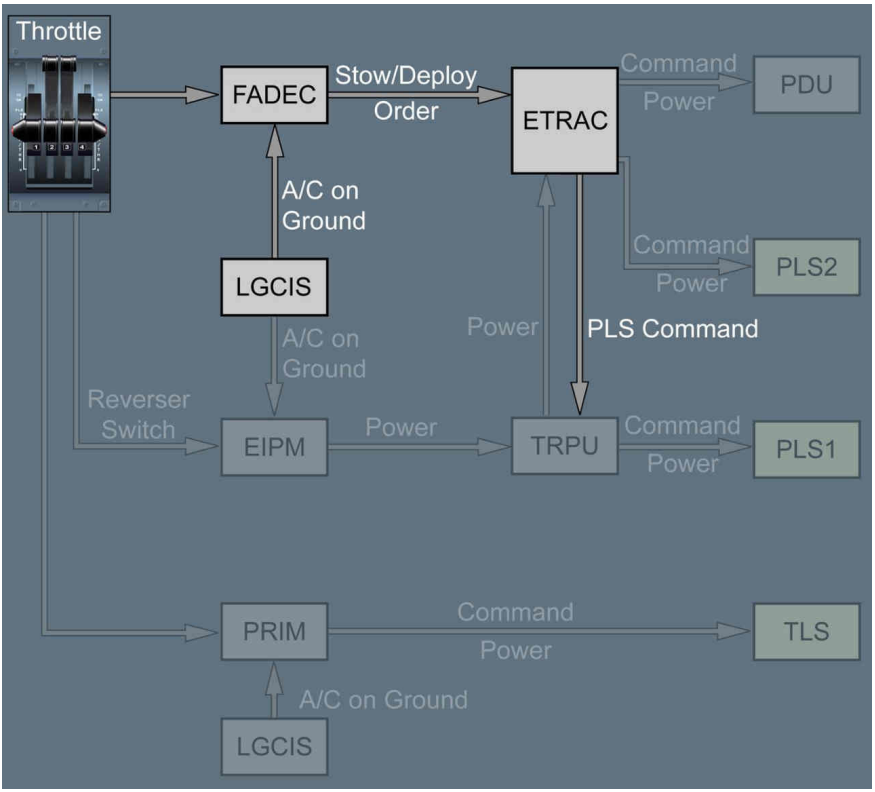
L3 When the thrust lever of the engine 2(3) is set to the reverse position the following logics apply.

FIRST LINE OF DEFENSE

The first line of defense is cleared when:
- The throttle is in the reverse position
- The aircraft is on ground.

When the condition to clear the first line of defence is true:
- The FADEC requests the ETRAC to command the reverse deployment
- The ETRAC commands the TRPU to release the first Primary Lock System (PLS1)
- The ETRAC commands the release of the second Primary Lock System (PLS2).

First Line of Defense



SECOND LINE OF DEFENSE

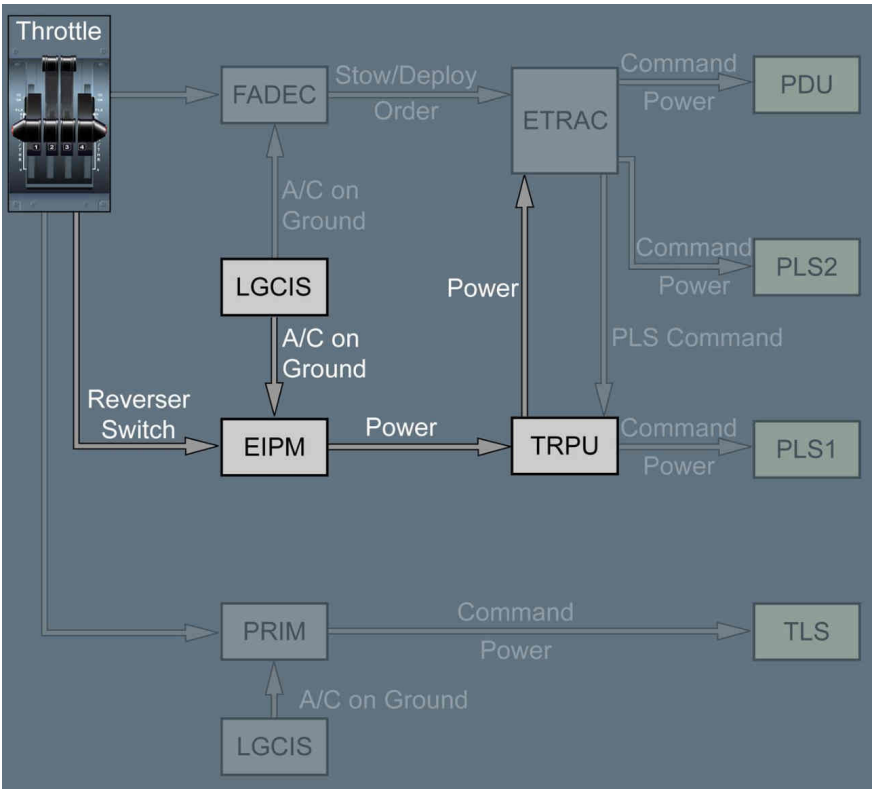
The second line of defense is cleared when:

- The thrust reverser switch activates
  The reverser switch activates when the thrust lever is set to the reverse position.
- The aircraft is on ground.

When the condition to clear the second line of defence is true:

- The EIPM supplies the Thrust Reverser Power Unit (TRPU)
- The TPRU supplies the ETRAC to release the second Primary Lock System (PLS2)
- The TRPU commands the release of the first Primary Lock System (PLS1), when requested by the ETRAC.

Second Line of Defense



THIRD LINE OF DEFENSE

The third line of defense is cleared when:

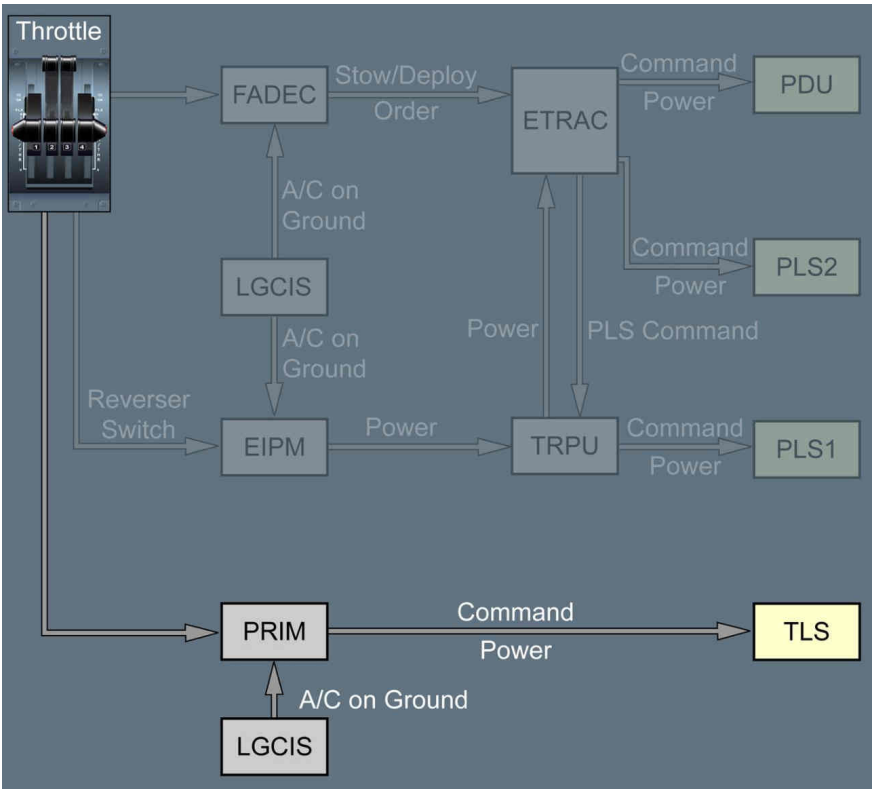
- The Throttle is set to the reverse position

  Note: *The PRIM uses a throttle position independent of the throttle position that the FADEC uses.*

- The aircraft is on ground.

The PRIM commands the power supply of the Tertiary Lock System (TLS) in order to release the tertiary lock when the condition to clear the third line of defence is true.

Third Line of Defense



IDLE PROTECTION

If the FADEC detects an inadvertent deployment of a thrust reverser, the FADEC automatically limits the associated engine thrust to idle.

L3 The FADEC detects an inadvertent reverse deployment when:
- The reverse thrust is not selected
- At least one thrust reverser translating cowl is deployed by more than 5 %.

AUTO-IDLE PROTECTION

The auto-idle protection ensures that the outboard engines are at idle during the thrust reversers operation.

The auto-idle protection activates if at least one outboard engine thrust lever is above idle detent during thrust reverser operation.
This protection covers the inadvertent selection of an outboard engine thrust lever above idle during the thrust reverser operation.

THRUST REVERSER LEVER LOCKING MECHANISM

The thrust reverser lever is mechanically locked when the associated throttle lever is not in the IDLE detent.

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GENERAL

Applicable to: ALL

The ignition and starting system is used on ground or in-flight to start the engine, and to crank the engine.

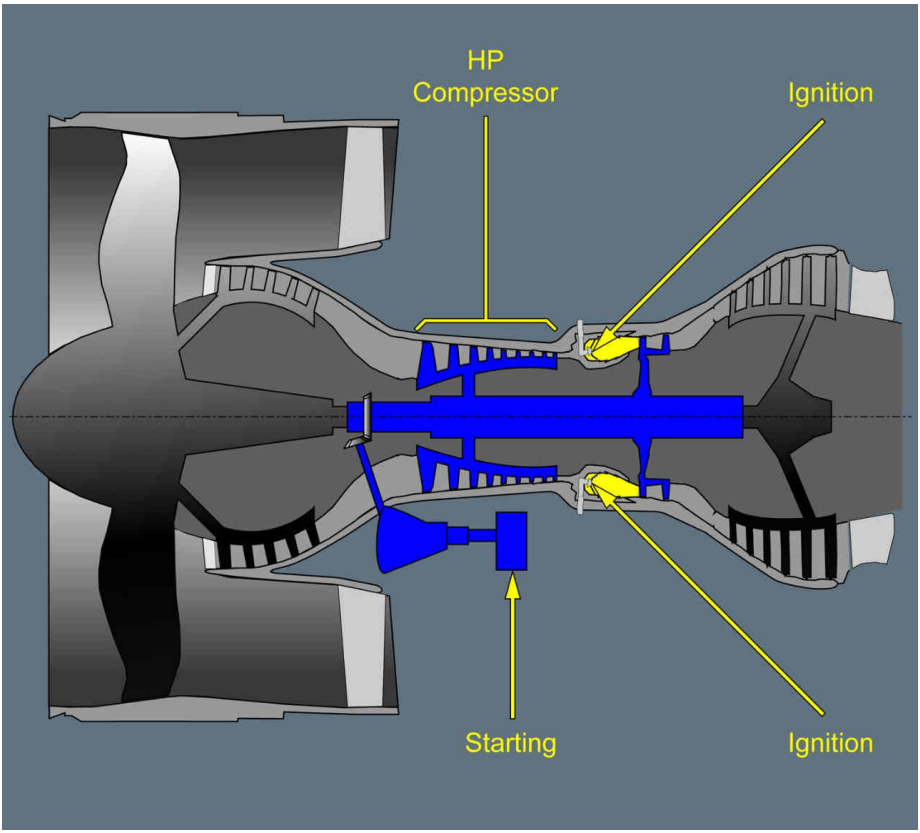
L2 The system uses bleed air to drive the pneumatic starter at high speed.

The pneumatic starter drives the engine High Pressure (HP) rotor via the accessory gearbox.

Then, the fuel is introduced into the combustion chamber for ignition.

The FADEC controls the ignition and starting system.

Ignition



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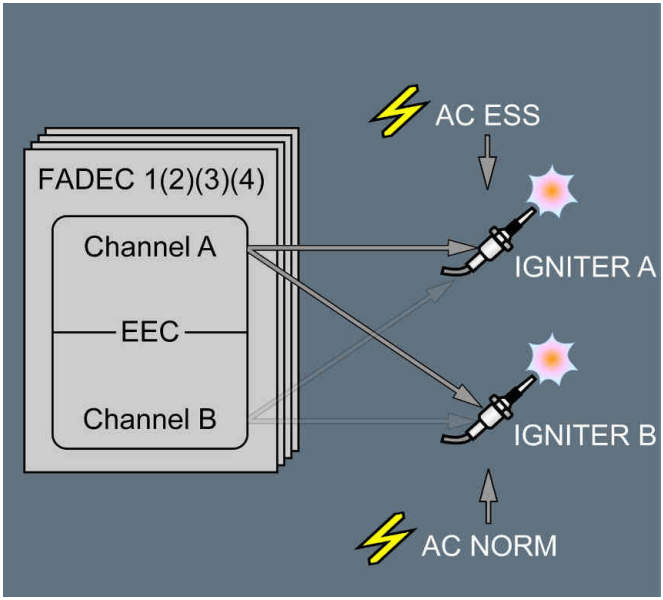
IGNITION SYSTEM

Applicable to: ALL

The ignition system is used for:
- Engine start on ground (automatic or manual)
- Engine relight in flight.

The FADEC controls the ignition system.
The ignition system has two independent igniters A and B for each engine.
L3 Each EEC channel can control both igniters.



IGNITION FOR STARTING

Applicable to: ALL

ON GROUND

AUTOMATIC START

Only one igniter operates for an automatic start.

L2 With ENG MASTER lever set to ON, 20 s after N2 reaches 20 %, the igniter is automatically selected.

L1 In the case of an automatic restart attempt, both igniters are selected at the second attempt.

L2 *Note: Ignition automatically stops at the end of the start sequence, when N2 reaches approximately 58 %. The start valve closes at approximately 63 % N2.*

L1 **MANUAL START**

For a manual start, both igniters are used, when the ENG MASTER lever is set to ON.

L2 *Note: The ignition automatically stops at the end of the start sequence when N2 reaches approximately 56 %. The start valve closes at approximately 58 % N2.*

L1 **IN FLIGHT**

Both igniters are selected, when ENG MASTER lever is set to ON.

CONTINUOUS IGNITION

Applicable to: ALL

MANUAL SELECTION

In flight, the flight crew manually selects the continuous ignition by setting the ENG START selector to IGN START, if the engine is running.
On ground, after the engine start sequence, the FADEC automatically stops the igniters. To activate the continuous ignition, the flight crew must set the ENG START selector to NORM, then back to IGN START. On ground, the continuous ignition operates, if the engine is not at low power.
L2 The engine is at low power when N1 is below 53 % for more than 30 s.
The FADEC uses both igniters, when the continuous ignition operates.
If the pressure in the combustion chamber is too high to enable the igniters to operate, the FADEC inhibits the igniters. In such a case, the IGNITION memo appears on the EWD to recall the flight crew selection but the igniters do not operate.

L1 **AUTOMATIC SELECTION**

FLAMEOUT PREVENTION

When the FADEC detects that the engine has a risk of flameout, the FADEC automatically selects both igniters to quickly recover the engine. When the engine relights, the FADEC maintains both igniters for 60 s.
L3 The engine flameout detection is based on the N2 and on the pressure in the combustion chamber.

L1 **QUICK RELIGHT**

The FADEC automatically selects both igniters when the ENG MASTER lever is cycled and the engine is running: I.e. the ENG MASTER lever is set to ON, the flight crew sets to OFF then to ON the ENG MASTER lever within 30 s.
L2 The quick relight is available if N2 is greater than 45 %.

L1 The FADEC maintains both igniters for 60 s after the ENG MASTER lever is set back to ON, or for 60 s after the engine relights.

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Start System

START SYSTEM

Applicable to: ALL

The start system uses pressurized air to start the engine on ground and to relight the engine in flight.

The start system has:

- A pneumatic starter

L2 The pneumatic starter is on the accessory gearbox.
The pneumatic starter drives the engine HP compressor-turbine assembly.

L1 - An engine start valve.

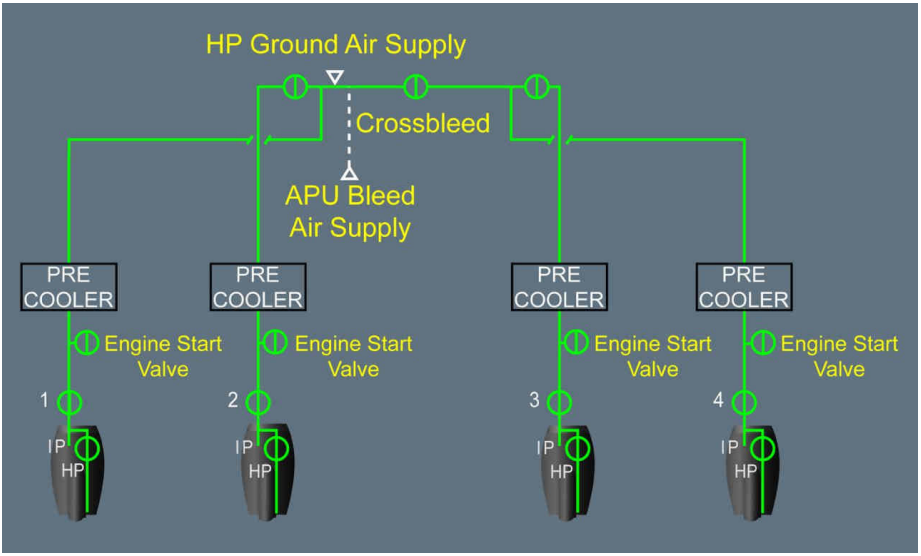
L2 The engine start valve is controlled automatically, or manually by the ground mechanic.

L1 The pneumatic starter can start the engine with air coming from:

- The APU, or
- Other engine running, or
- A HP ground source.

The engine can be started either automatically or manually.

Bleed Sources for Engine Start



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Automatic Starting

AUTOMATIC START SEQUENCE

Applicable to: ALL

In automatic engine start mode, the FADEC controls and sequences:
- The engine start valve
- The igniter(s)
- The FMV .

For more information on the automatic start sequence, *Refer to DSC-70-30-10 Automatic Start Sequence* .

START ABORT DURING AUTOMATIC START

Applicable to: ALL

The FADEC monitors engine parameters for unusual circumstances including:
- Hot start, or hung start
- No light up
- EGT overlimit
- Engine stall
- N1 rotor jamming
- Engine start valve abnormal position
- Engine starter engagement time exceedance
- Engine starter disconnection.

AUTOMATIC ABORT OF AUTOMATIC START ON GROUND

On ground, if the FADEC detects one of the above listed failure, the FADEC interrupts the start sequence and initiates two further attempts of automatic start sequence after cranking, except in the case of N1 rotor jamming or engine starter failure.
If the third start attempt fails, the start sequence is aborted.
In the case of a starter failure or a N1 rotor jamming, the FADEC automatically aborts the engine start without further attempt of automatic start sequence.

When the FADEC aborts an automatic start sequence, the FADEC:
- Closes the engine start valve
- Closes the FMV
- Stops the ignition.

L2 On ground, automatic start is not aborted, when N2 is above 58.4 %.

L1 **AUTOMATIC ABORT OF AUTOMATIC START IN FLIGHT**

In flight, automatic start is not aborted. However, the FADEC monitors the engine parameters and generates the associated ECAM alerts, when necessary. It is the responsibility of the flight crew to initiate corrective action, as necessary.

MANUAL ABORT OF AUTOMATIC START

The flight crew can interrupt an automatic start sequence by setting the ENG MASTER lever to OFF.

L2 This action:
- Closes the fuel HP valve and the engine start valve
- Stops the ignition
- Resets the FADEC.

Note: If the ENG MASTER lever is not set to OFF, setting the ENG START selector to NORM, or CRANK or setting MAN START pb-sw to ON has no effect.

QUICK AND AUTO RELIGHT

Applicable to: ALL

AUTO RELIGHT FUNCTION

If the FADEC detects an engine flame out, on ground or in flight, continuous ignition with both igniters is automatically selected.

L2 The ignition is maintained for 60 s after engine relight.

L1 **QUICK RELIGHT FUNCTION**

In the event of an inadvertent cycling of the ENG MASTER lever with the engine running, from ON position to OFF, then back to ON within 30 s, the FADEC automatically selects the continuous ignition with both igniters.
The quick relight function immediately opens the FMV.

L2 The quick relight function is available provided that N2 is greater than 45 %.

L1 The ignition is maintained for 60 s.

STARTER ASSISTED OR WINDMILLING START

Applicable to: ALL

In flight, depending on engine parameters and flight conditions, the FADEC chooses between a starter assisted or a windmilling engine start.

L2 The FADEC selects a starter assisted engine start (i.e. engine start valve automatically open), when N2 is below 11 %.
An airspeed at or above 260 kt ensures a windmilling start capability.

L1 For a starter assisted engine start, the other running engines or the APU provides bleed air to the pneumatic starter.
For the windmilling engine start, relative wind is used to rotate the engine.

L2 During a windmilling engine start, the FADEC disconnects both hydraulic pumps in order to increase the relight envelope.

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Manual Starting

MANUAL START

Applicable to: ALL

A manual start can be performed on ground, in the case of a not successful automatic start.

In manual start, the FADEC has limited control. Therefore, the flight crew has to:
- Set the ENG MASTER lever to ON, when required
- Monitor the engine acceleration.

In manual engine start, the FADEC does not provide automatic fault correction. However, the FADEC monitors the engine parameters and generates the associated ECAM alerts, when necessary.

In manual starting, the FADEC controls:
- The opening of the engine start valve , when the ENG START selector is set to IGN START and the ENG MAN START pb-sw is set to ON

L2 *Note: The starter engages if N2 is under the starter engagement speed, i.e. 25 % N2 on ground or in flight.*

L1 - The FMV and the igniters, when the ENG MASTER lever is set to ON
- The Engine start valve closure and ignition cut off, when N2 reaches idle.

The FADEC does not automatically abort an abnormal manual start except in the case of an EGT overlimit.

The manual start sequence can be interrupted:
- Before the ENG MASTER lever is set to ON, by setting the ENG MAN START pb-sw to OFF
- After the ENG MASTER lever is set to ON, by setting it back to OFF.

L2 This action:
- Closes the fuel LP and HP valves, and the engine start valve
- Stops the ignition
- Resets the FADEC .

Note: When the ENG MASTER lever is set to ON, setting the ENG MAN START pb-sw to OFF has no effect.

L1 For more information on the manual start sequence, *Refer to PRO-SUP-70-10 Manual Engine Start* .

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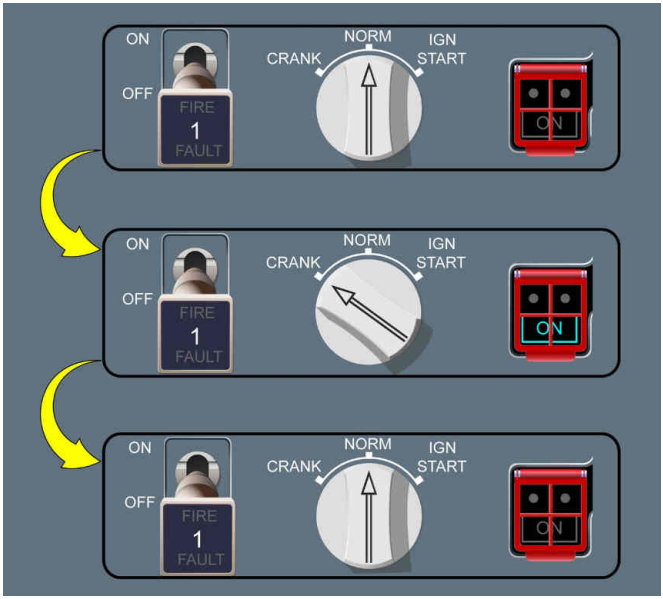
CRANKING

Applicable to: ALL

A dry cranking cycle ventilates the engine to remove fuel vapors after a not successful start attempt on the ground.
To perform a dry crank:

Cranking



The dry crank is stopped by setting either the ENG MAN START pb-sw to OFF or setting the ENG START selector to NORM.

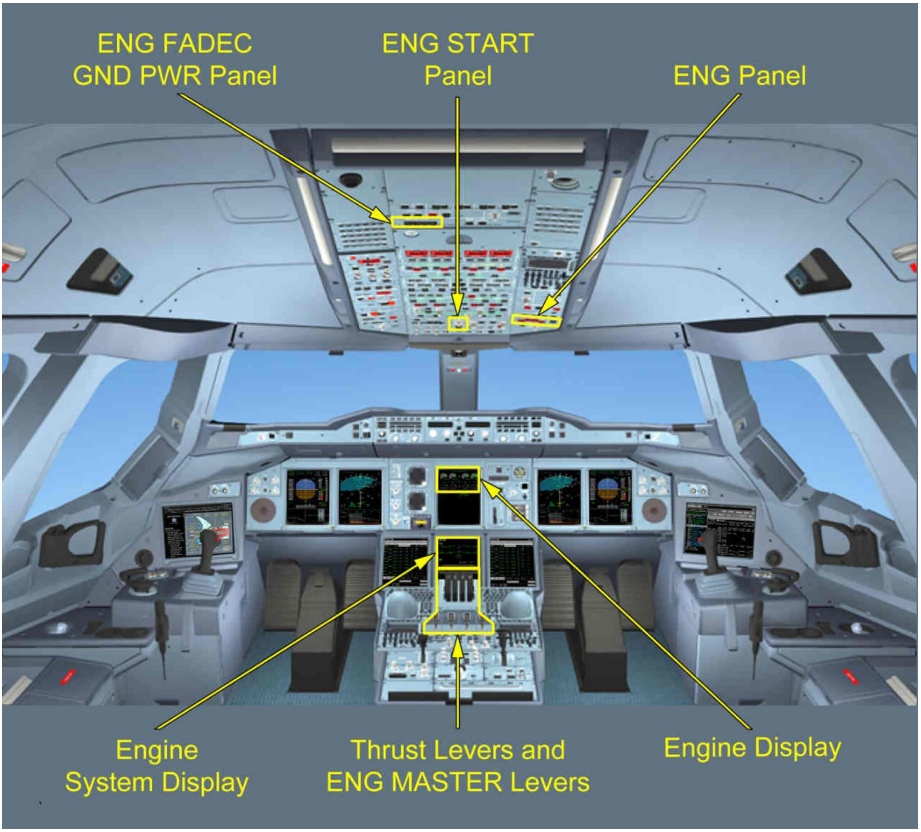
L3 A wet cranking can be also performed by setting the ENG START selector to CRANK and the MAN START pb-sw to ON, then by setting the ENG MASTER lever to ON. In this case, fuel is provided without ignition. The wet crank is stopped by setting the ENG START selector to NORM.

Intentionally left blank

COCKPIT VIEW

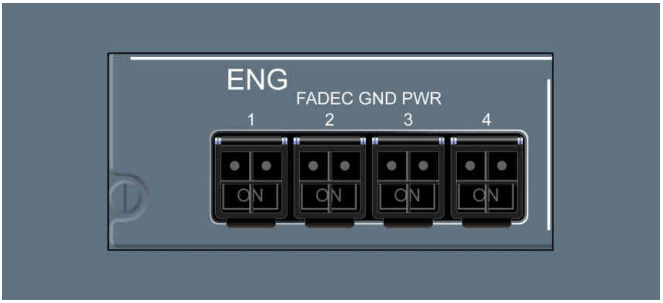
Applicable to: ALL

Cockpit View



ENG FADEC GND PWR PANEL

Applicable to: ALL





The aircraft electrical network or the FADEC alternator automatically supplies the FADEC .

L12



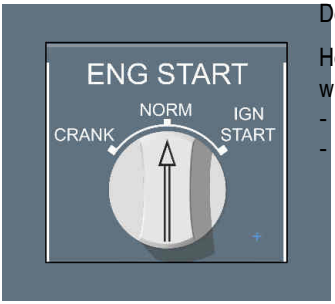
On ground, the aircraft electrical network supplies the FADEC for 10 min , provided that:

- The ENG FIRE pb-sw is not pressed
- The FADEC is not self-powered.
  The FADEC is self-powered when N2 is above 12.5 % .

For more information on FADEC electrical supply, *Refer to DSC-70-20-10 Architecture* .

ENG START PANEL

Applicable to: ALL

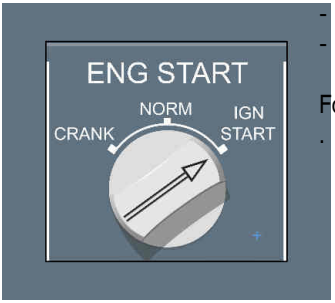


Default position: No ignition.

However, continuous ignition A + B is automatically selected when:

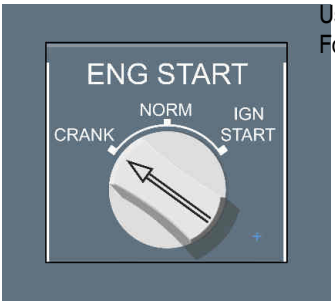
- The FADEC detects that the engine has a risk of flameout, or
- The ENG MASTER lever is cycled and the engine is running.

For more information, *Refer to DSC-70-80-20 Continuous Ignition* .



- Used for engine start, or
- To select the manual continuous ignition when the engine is running.

For more information, *Refer to DSC-70-80-20 Continuous Ignition* .



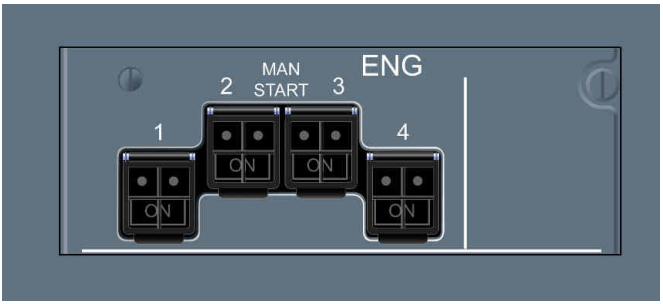
Used for a dry or a wet engine cranking.

For more information, *Refer to DSC-70-80-40 Cranking* .

ENG PANEL

Applicable to: ALL

ENG Panel



ENG MAN START PB-SW

L12



During a manual engine start, the start valve opens, provided ENG START selector is set to IGN/START or CRANK.

Note: The start valve automatically closes when N2 reaches 58.4 %.

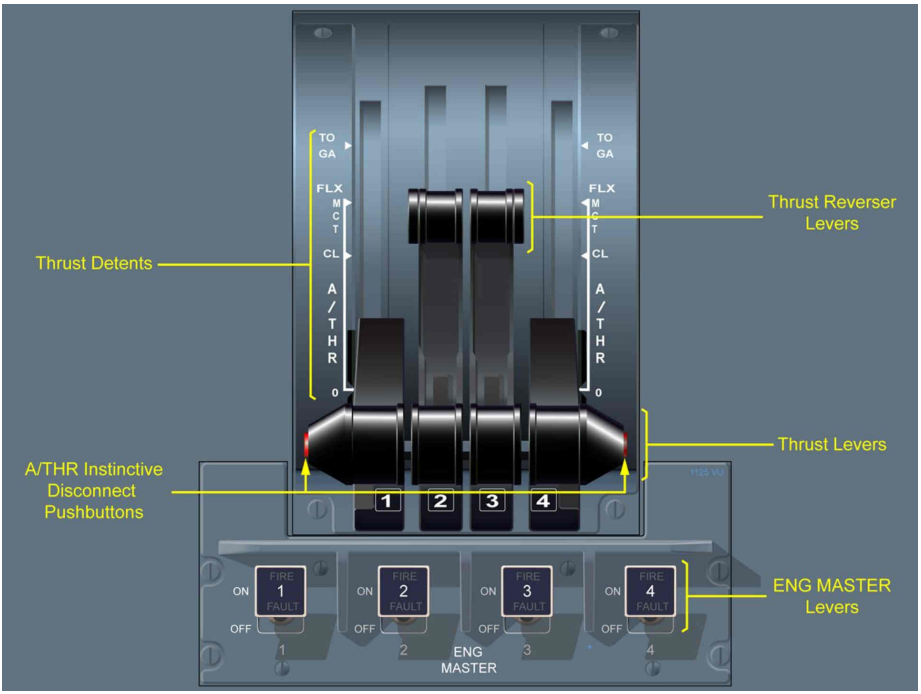


The start valve closes, provided the ENG MASTER lever is set to OFF. This stops the engine start sequence.

ENG MASTER PANEL AND THRUST LEVERS

Applicable to: ALL

Thrust Levers and ENG MASTER Levers



THRUST LEVERS

The thrust levers are used to manually adjust the engine thrust.

Each thrust lever can be moved individually.

L2 The thrust lever position appears on the EWD via a blue circle on the thrust gauge.

THRUST DETENTS

The flight crew can set each thrust lever in one of the following detents:

- Idle (0) detent
- Climb (CLB) detent

- Flexible takeoff thrust (FLX) and Maximum Continuous Thrust (MCT) detent
- Takeoff and Go-Around (TOGA) detent.

Each detent has one or several thrust rating limits. For more information, *Refer to DSC-70-20-40-10 Thrust Rating Limit* .

THRUST REVERSER 2(3) LEVER

The thrust reversers levers are used to control the deployment and the stowing of the reversers, and to adjust the reverse thrust.
Each thrust reverser lever can be moved individually from IDLE REV detent to MAX REV detent, when the associated thrust lever is in the IDLE detent.
L2 The flight crew can monitor the position of the thrust reverser lever on the EWD , via the blue circle on the reverse thrust gauge.
For more information on the reverse thrust gauge, *Refer to DSC-70-90-42 Reverse Thrust Lever Position*

A/THR INSTINCTIVE DISCONNECT PB

Pressing one A/THR Instinctive Disconnect pb disconnects the A/THR and the autobrake.
For information on A/THR disconnection, *Refer to DSC-22-FG-50-40-A A/THR Disconnection* .

ENGINE 1(2)(3)(4) MASTER LEVER





- The FADEC initiates an automatic engine start sequence, provided the ENG START selector is set to IGN START position, or
  For more information, *Refer to DSC-70-30-10 Automatic Start Sequence* .
- Turns on the igniters and the fuel, if the ENG MAN START pb-sw is set to ON.
  For more information, *Refer to DSC-70-80-30-30 Manual Starting* .

Shutdowns the engine or aborts the start sequence.
The FADEC resets.

ENGINE MASTER 1(2)(3)(4) LIGHT

L12



A fire is detected on the corresponding engine.

Associated with the following ECAM alerts:
- ENG 1(2)(3)(4) FIRE (IN FLIGHT) (*Refer to procedure*)
- ENG 1(2)(3)(4) FIRE (ON GROUND) (*Refer to procedure).*

L12



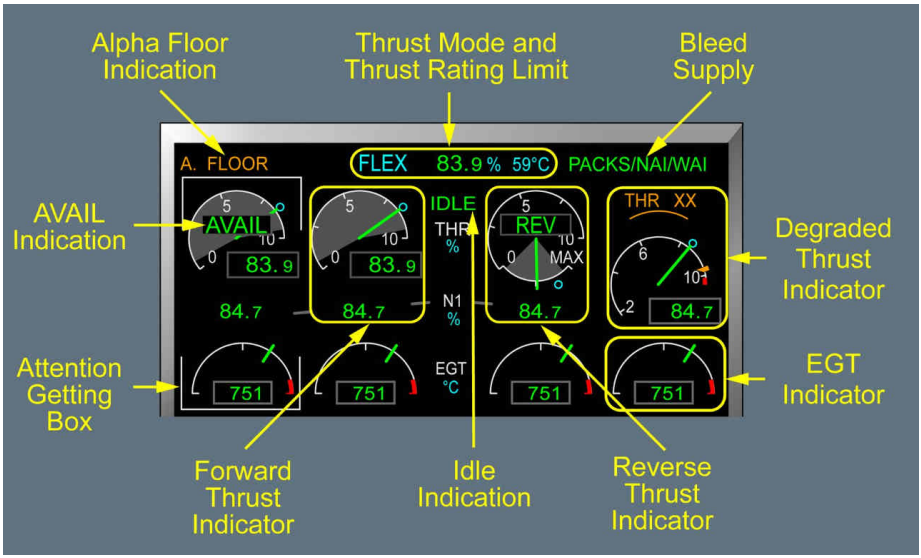
- An automatic start sequence aborts, or
- The HP fuel valve position is abnormal
  Associated with the ECAM alert ENG 1(2)(3)(4) HP FUEL VLV FAULT (*Refer to procedure*)
- The overthrust protection is active and the FADEC automatically shut downs the engine.
  Associated with the ECAM alert ENG 1(2)(3)(4) CTL SYS FAULT (*Refer to procedure)* .

ENGINE DISPLAY

Applicable to: ALL

The primary engine parameters are permanently displayed on the Engine Display (ED) area of the Engine Warning Display (EWD).

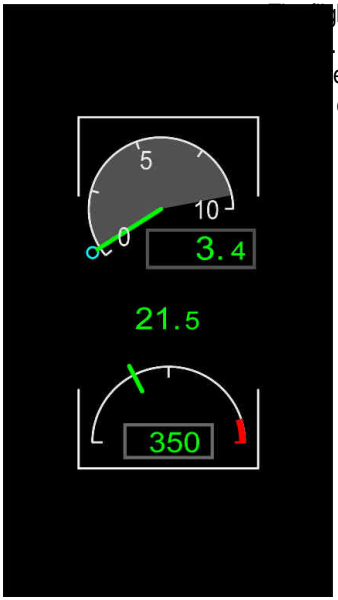
ENGINE DISPLAY



ATTENTION GETTING BOX

The attention getting box appears either in amber or in white.
The attention getting box appears on the EWD and on the ENG SD page.

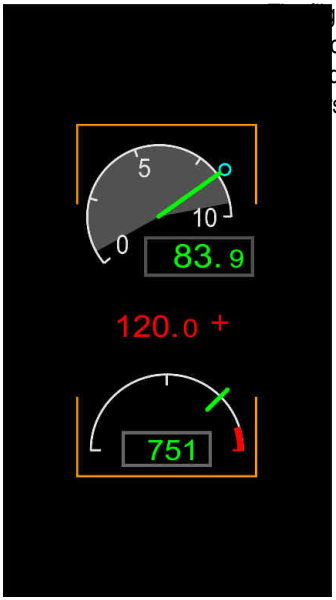
L12



ght crew must monitor the parameters of the corresponding

ention getting box appears in the case of engine start or
crank sequence until AVAIL message appears.

L12



ght crew must pay high attention to the parameters of the
d engine.
dication appears as soon as an amber or red indication
s on EWD and/or on the ENG SD page.

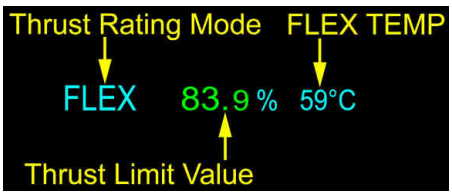
ALPHA FLOOR MESSAGE



The α-floor protection is active.
For more information, *Refer to DSC-22-27-20-20A Alpha Floor Protection* .

THRUST RATING MODE AND THRUST LIMIT VALUE INDICATION

Thrust Rating Mode and Thrust Limit Value



Indicates the thrust limit value and the associated thrust rating mode selected based on:
- The position of the thrust levers
- The data entered in the T.O and CLB panels of the FMS ACTIVE/PERF page

- Engines status, i.e. running or not running
- Aircraft on ground or in flight.

THRUST RATING MODE



Takeoff or go-around thrust rating mode is selected.



Maximum continuous thrust rating mode is selected.



Climb thrust rating mode is selected.



Derated climb thrust rating mode is selected. 3 derated climb levels are defined: DCLB1, DCLB2, DCLB3.



Flexible takeoff thrust rating mode is selected.



Derated takeoff thrust rating mode is selected. 6 derated takeoff levels are defined: D04, D08, D12, D16, D20, D24.

THRUST LIMIT VALUE



Indicates the thrust limit value associated with the thrust rating mode.

FLEX TEMPERATURE



Indicates the flexible temperature entered on the T.O panel of the FMS ACTIVE/PERF page, when the FLEX thrust rating mode is selected.

BLEED SUPPLY



The engine bleeds supply the air conditioning packs.



The engine nacelle anti-ice is on.



The wing anti-ice is on.

All three indications can appear independently.

IDLE INDICATION

L12



In flight, at least three engines are at idle.
Pulses for 10 s then remains steady.

AVAIL INDICATION

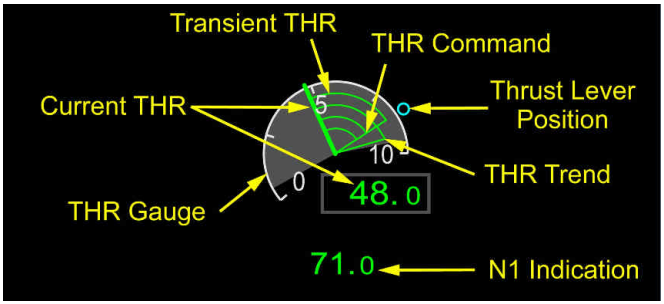
After engine start, the engine is at or above idle.
In the case of an engine relight in flight, the message pulses to indicate a successful relight.

L2 No longer appears:
- After 1 min in flight or 10 s on ground, or
- If the thrust lever is set above idle.

FORWARD THRUST INDICATIONS

Applicable to: ALL

Forward Thrust Indications



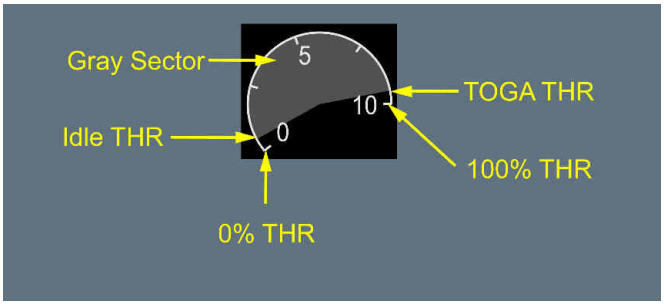
CURRENT THR

The needle and the digital value indicate the current thrust supplied by the engine, as a percentage of the maximum engine thrust achieved with the engine bleed off.

THRUST GAUGE

The thrust gauge indicates the engine thrust, in percentage:
- 0 corresponds to 0 % of THR
- 10 corresponds to 100 % of THR.

Forward Thrust Indications



GRAY SECTOR

The gray sector indicates the usable thrust range.

L2 The gray sector appears if:
- The engine is at, or above idle
- The engine is controlled in NORMAL mode
- The engine is not failed.

L1 **TOGA THR**

The upper position of the gray sector indicates the TOGA thrust.
The TOGA thrust corresponds to the engine thrust when the thrust lever is set to the TOGA detent. The TOGA thrust takes the bleed demand into account.

IDLE THR

The lower position of the gray sector indicates the idle thrust.
The idle thrust corresponds to the engine thrust when the thrust lever is set to the idle detent.

100% THR

100 %corresponds to the maximum thrust, when thrust lever is set to the TOGA detent and all engine bleeds are off.

0% THR

0 % THR is the engine thrust achieved when the engine is not running, or is in windmilling.

THR COMMAND

Indicates the thrust target, when the A/THR is active.

THR TREND

The green triangle indicates the direction of thrust trend, when the A/THR is active.

TRANSIENT THR INDICATIONS

The four green arc indicate the difference between the THR command and the current THR, when the A/THR is active.

THRUST LEVER POSITION

The blue circle indicates the position of the thrust lever:
- In manual mode: Indicates the THR reached after the engine stabilization
- In automatic mode: Indicates the value of the THR rating limit that corresponds to the selected thrust lever detent and the conditions of the flight.

L2 The thrust lever indication moves within the gray sector.

N1 INDICATIONS



N1 value is in normal range.

L12



N1 value is above the red limit.
The N1 red limit value is 111 % .
The red cross no longer appears after an engine restart on ground.
Associated with the ECAM alert ENG 1(2)(3)(4) N1 OVER LIMIT (*Refer to procedure*).

L12



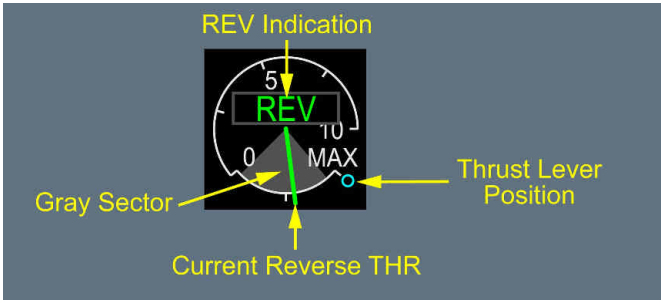
N1 value accuracy is degraded.
Associated with the ECAM alert ENG 1(2)(3)(4) CTL SYS FAULT (*Refer to procedure)* .

REVERSE THRUST INDICATIONS

Applicable to: ALL

The reverse thrust indications appear on inner engines.

Reverse Thrust Indications



CURRENT REVERSE THR INDICATION

The needle indicates the current reverse thrust supplied by the engine, as a percentage of the maximum reverse thrust.

GRAY SECTOR

REVERSE GRAY SECTOR

The gray sector indicates the usable reverse thrust range.

L2 The gray sector appears if:
- The reverser is selected
- The reverser is unlocked
- The engine is at, or above, reverse idle for more than one second
- The engine is not failed
- The aircraft is on ground.

L1 **REVERSE IDLE THRUST**

The upper position of the gray sector indicates the reverse idle thrust.
The reverse idle thrust corresponds to the engine thrust when the thrust reverser lever is set to the IDLE REV detent.

MAXIMUM REVERSE THRUST

The lower position of the gray sector indicates the maximum reverse thrust.
The maximum reverse thrust corresponds to the engine thrust when the thrust reverser lever is set to the MAX REV detent.

THRUST REVERSER LEVER POSITION

The blue circle indicates the position of the thrust reverser lever.

REV 2(3) INDICATIONS

L12

REV 2

On ground, the thrust reverser lever is in the REV detent and the reverse mode is not available.
In the case of a thrust reverser unlocked in flight, the indication pulses.
Pulses for 9 s , then remains steady.
Associated with the ECAM alert ENG 2(3) REV UNLOCKED (*Refer to procedure)* .

REV 2

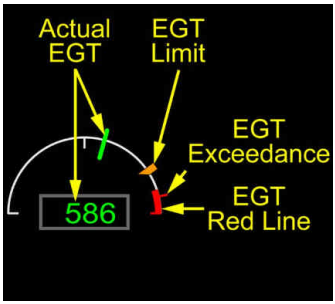
On ground, the reverse mode is selected.

EGT INDICATIONS

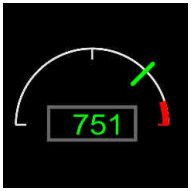
Applicable to: ALL

EGT INDICATIONS

EGT Indications

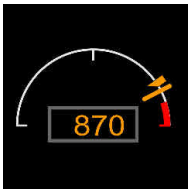


CURRENT EGT



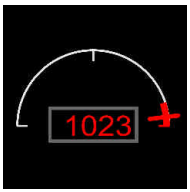
The EGT is normal.

L12



The EGT is above the EGT limit.
Associated with the ECAM alert ENG 1(2)(3)(4) EGT OVERLIMIT (*Refer to procedure)* .

L123



The EGT is above the red line.

The EGT indication appears in red:
- During takeoff, if the EGT is:
  - At or above 1 022 °C , or
  - At or above 1 002 °C , for more than 20 s .
- During all other phases, if the EGT is at or above 1 002 °C .

Associated with the ECAM alert ENG 1(2)(3)(4) EGT OVERLIMIT (*Refer to procedure)* .

EGT LIMIT

The amber line indicates the maximum EGT.

L2 The maximum EGT is:
- 745 °C, during the ground start sequence
- 865 °C, during engine relight in flight
- 970 °C, during all other phases.

The amber indication does not appear:
- During takeoff, or
- When thrust reversers are selected, or
- If alpha floor protection is activated.

EGT RED LINE

A red arc appears above the EGT red line.

L2 The EGT red line is at 1 002 °C.

EGT EXCEEDANCE

If the EGT red line is exceeded, a red mark appears at the highest achieved value.
The red mark no longer appears after a subsequent engine start on ground.

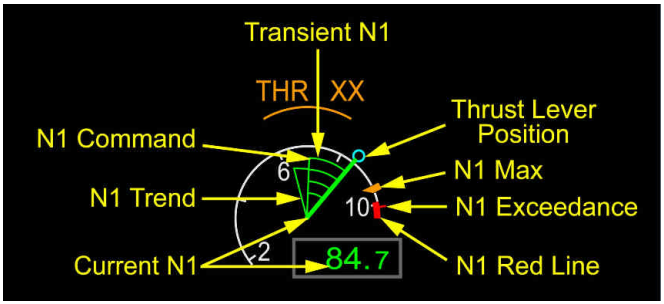
ENGINE DISPLAY IN DEGRADED MODE

Applicable to: ALL

N1 INDICATIONS (DEGRADED)

Replaces the THR gauge, when the engine operates in DEGRADED mode. For more information, *Refer to DSC-70-20-40-20 DEGRADED Mode* .

N1 Indication (Degraded Mode)

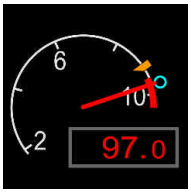


CURRENT N1



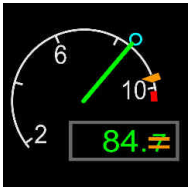
N1 value is in normal range.

L12



N1 value is above the red line.
The N1 red line value is 111 % .
Associated with the ECAM alert ENG 1(2)(3)(4) N1 OVER LIMIT (*Refer to procedure*).

L12



N1 value accuracy is degraded.
Associated with the ECAM alert ENG 1(2)(3)(4) CTL SYS FAULT (*Refer to procedure)* .

N1 COMMAND

Indicates the thrust target, when the A/THR is active.

N1 TREND

The green triangle indicates the direction of N1 trend, when A/THR is active.

THRUST LEVER POSITION

The blue circle indicates the position of the thrust lever. In manual mode, the blue circle corresponds to the N1 value reached after the engine stabilization.
The blue circle does not appear when thrust reversers are selected.

N1 MAX

The N1 Max indication corresponds to the maximum N1 when the thrust levers are in TOGA detent or in MAX REV detent.

N1 RED LINE

A red arc appears above the N1 red line.
L2 The red line is at 111 %.

N1 EXCEEDANCE

If the N1 red line is exceeded, a red mark appears at the highest achieved value.
The red mark no longer appears after a subsequent engine start on ground.

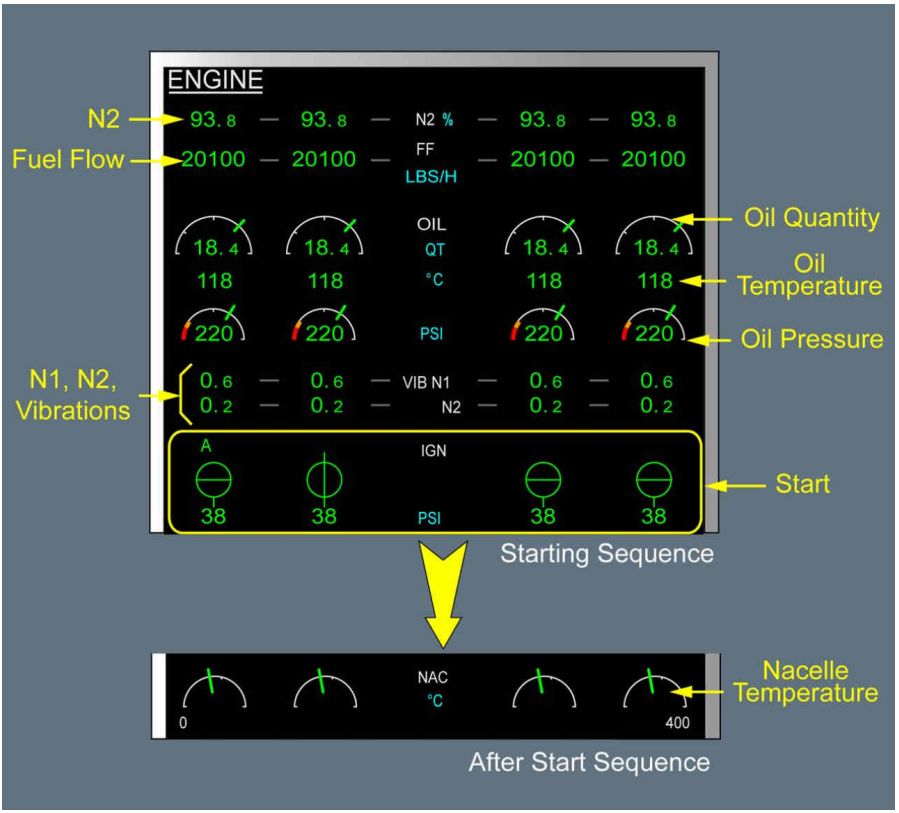
ENG SYSTEM DISPLAY

Applicable to: ALL

ENGINE SYSTEM DISPLAY

The ENG SD page provides the engine secondary parameters.

Engine System Display



N2

93.8 N2 value is in normal range.

L12

119.8 + N2 value is above the red limit.
N2 red limit value is 118.7 % .
The red cross no longer appears after a subsequent engine start on ground.
Associated with the ECAM alert ENG 1(2)(3)(4) N2 OVER LIMIT (*Refer to procedure)* .



Engine start or crank is in progress.

L12



N2 value accuracy is degraded.
Associated with the ECAM alert ENG 1(2)(3)(4) CTL SYS FAULT (*Refer to procedure)* .

FUEL FLOW



Fuel flow is normal.



The accuracy of the fuel flow measurement is degraded.

L12



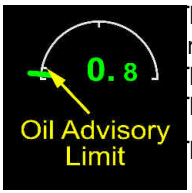
Fuel filter is clogged.
Associated with the ECAM alert ENG 1(2)(3)(4) FUEL FILTER CLOGGED (*Refer to procedure)* .

OIL QUANTITY



The engine oil quantity is in normal range.

L12



The engine oil quantity drops below the oil advisory limit that corresponds to the first white dash.
The needle and the oil quantity value pulse green.
The oil advisory limit is 1.2 quarts.

The advisory is inhibited:
At takeoff or go-around, or
- When the thrust reversers are selected, or
- When the alpha floor protection is active.

OIL TEMPERATURE

L12



The engine oil temperature is in normal range.
If the engine oil temperature is above 163 °C , the oil temperature indication pulses green.

Note: *When the engine is not running, and depending on the outside air temperature (OAT), this indication can be negative.*

L12



The engine oil temperature is abnormal.
If the engine oil temperature is above 177 °C , the oil temperature indication is amber.
Associated with the ECAM alert ENG 1(2)(3)(4) OIL TEMP HI (*Refer to procedure*).

OIL PRESSURE

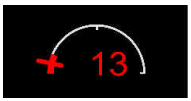
L13



The engine oil pressure is in normal range.

Note: *The scale is not linear:*
- *On the first half of the scale, the engine oil pressure range varies from 0 PSI to 100 PSI*
- *On the second half of the scale, the engine oil pressure range varies from 100 PSI to 440 PSI .*

L12



The engine oil pressure is abnormal.
If the engine oil pressure is equal to or below 25 PSI , the indication is red.
Associated with the ECAM alert ENG 1(2)(3)(4) OIL PRESS LO (*Refer to procedure*).

L12



The engine oil filter is clogged.
Associated with the ECAM alert ENG 1(2)(3)(4) OIL FILTER CLOGGED (*Refer to procedure*).

N1(N2) VIBRATIONS

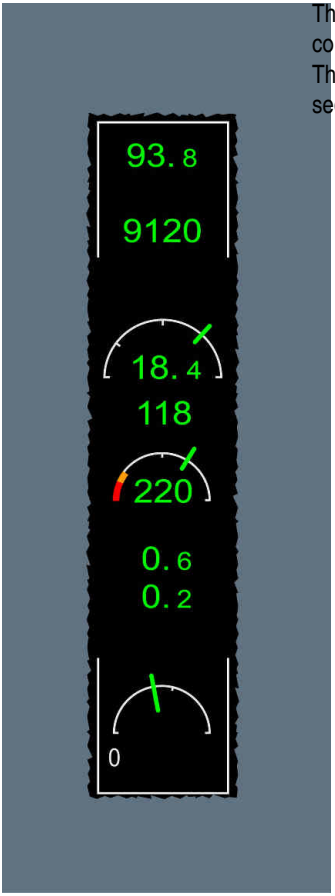


The level of N1(N2) rotor vibration is in normal range.
If the rotor vibration level is above 5 units, the rotor vibration indication pulses green.

ATTENTION GETTING BOX

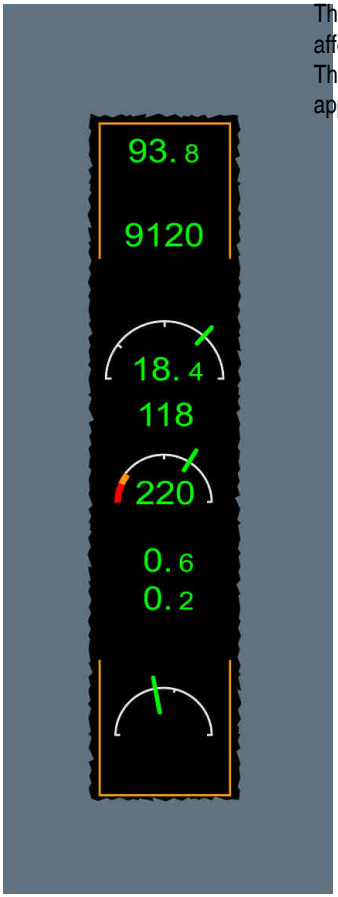
The attention getting box appears either in amber or in white.

L12



The flight crew must monitor the parameters for the corresponding engine.
The attention getting box appears in the case of a start or crank sequence until AVAIL message appears.

L12

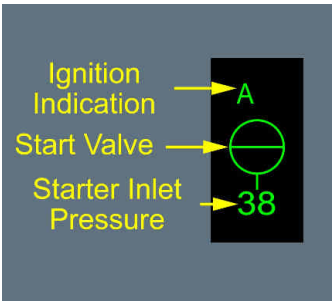


The flight crew must pay high attention to the parameters of the affected engine.
This indication appears as soon as an amber or red indication appears on the EWD and/or on the ENG SD page.

START PARAMETERS

During the engine start sequence, the start indications replace the nacelle temperature indications.

Start Parameters



IGNITION

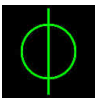


The igniter A(B) is energized.

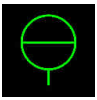


Both igniters A and B are energized.

START VALVE

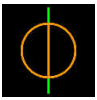


The start valve is open.



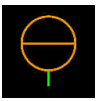
The start valve is closed.

L12



The start valve is abnormally open.
Associated with the ECAM alert ENG 1(2)(3)(4) START VLV FAULT - START VLV NOT CLOSED (*Refer to procedure*).

L12



The start valve is abnormally closed.
Associated with the ECAM alert ENG 1(2)(3)(4) START VLV FAULT - VLV STUCK CLOSED (*Refer to procedure*).

STARTER INLET PRESSURE



The starter inlet pressure is normal.

L12

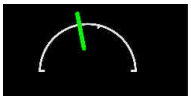


During engine start, the starter inlet pressure is abnormal, either:
- Too high, or
- Too low, for engine start.

If the engine bleed pressure is above 60 PSI during 15 s , the engine bleed pressure is amber.
If the starter inlet pressure is below 15 PSI , the starter inlet pressure is amber.
Associated with the ECAM alert ENG 1(2)(3)(4) START FAULT (*Refer to procedure*).

NACELLE TEMPERATURE

The nacelle temperature indication does not appear during the engines start.



The nacelle temperature is in normal range.

L12



The nacelle temperature is above the nacelle temperature advisory limit that corresponds to the white dash. The needle pulses.
The nacelle temperature advisory limit is 300 °C.

MEMO

Applicable to: ALL

IGNITION — Automatic continuous ignition is in progress, or manual continuous ignition is selected.

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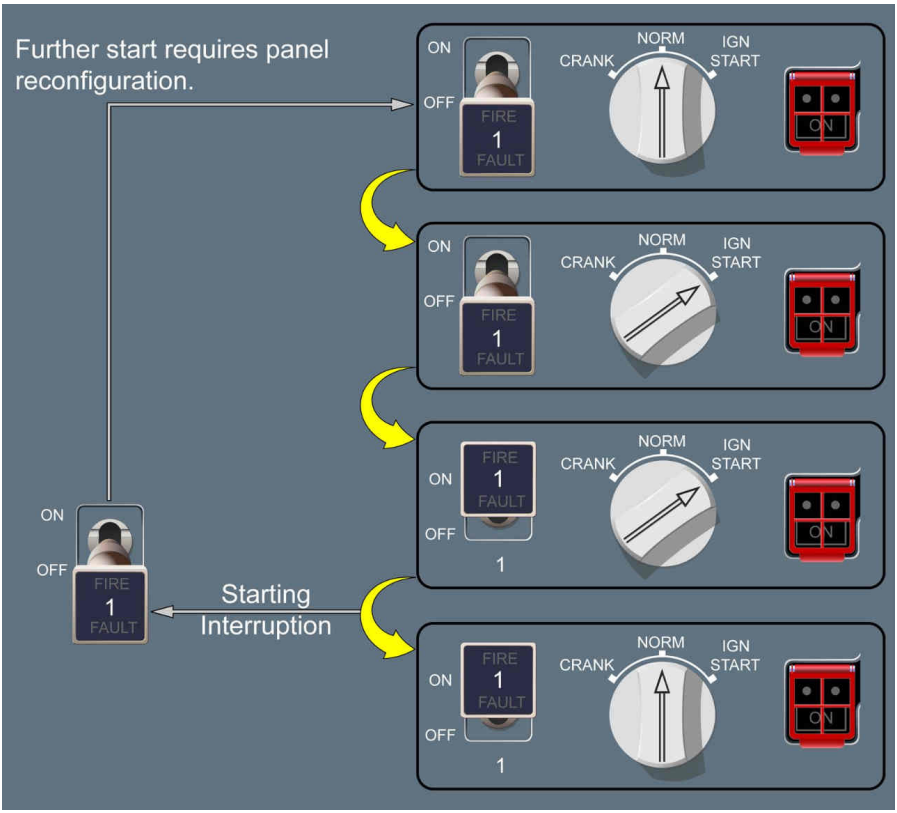
ENGINE START

Applicable to: ALL

AUTOMATIC STARTING SEQUENCE



INITIAL CONFIGURATION OF CONTROLS

- ENG MASTER lever is set to OFF
- ENG START selector is set to NORM
- ENG MAN START pb-sw is set to OFF.

ENG START SELECTOR

Set the ENG START selector to IGN/START:
- ENG SD page appears
- All pack valves close.

Note: After 30 s, if the ENG MASTER lever is not set to ON, the pack valves open again.

ENG MASTER LEVER

ON GROUND

Set the ENG MASTER lever to ON:
- LP fuel valve opens
- Engine start valve opens
- At 20 % N2:
  - Ignition starts (igniters A or B)
  - FMV and HP fuel valve open, and FF increases.
- When N2 is approximately at 56 %: Igniter stops
- When N2 above 58.4 %:
  - Engine start valve closes (fully closed after approximately 10 s)
  - Pack valves open again if no other engine is started within 30 s.
- FADEC stabilizes the engine at idle speed.

IN FLIGHT

Set the ENG MASTER lever to ON:
- LP fuel valve opens
- Engine start valve opens if N2 is below 11 %, or if the aircraft airspeed (CAS) is below 260 kt

  Note: The engine start valve remains closed in the case of a windmilling start sequence, i.e. when aircraft speed is above 260 kt.

- Ignition starts (igniters A + B)
- When N2 is above 20 %: FMV and HP fuel valve open
- When N2 is above 58.4 %:
  - Engine start valve closes (fully closed in approximately10 s)
  - Pack valves open again if no other engine is started within 30 s
  - Igniter is set to off when AVAIL appears.
- FADEC stabilizes the engine at idle speed.

ENG START SELECTOR

At the end of the start sequence, set the ENG START selector to NORM:
- The WHEEL SD page replaces the ENG SD page.

Note: If the ENG START selector is not set to NORM, the WHEEL SD page replaces the ENG SD page after the fourth engine starts.

STARTING INTERRUPTION

If the ENG MASTER lever is set back to OFF:
- LP and HP fuel valves close
- Ignition stops
- START valve closes.

ENGINE SHUTDOWN

Applicable to: ALL

The procedure to shutdown an engine is the following:
- The thrust lever is set to IDLE in order to stabilize the engine at idle thrust
- The ENGINE MASTER lever is set to OFF, when the engine parameters are stabilized.
  The FADEC closes the LP and HP fuel valves.
  The engine decelerates and stops.

L2 The ENG FIRE pb-sw provides a backup engine shutdown capability on ground and in flight.

Intentionally left blank

ECAM ALERTS

Applicable to: ALL

ENG 1(2)(3)(4) CTL SYS FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) CTL VLV FAULT (*Refer to procedure*).

ENG 1(2)(3)(4) EGT OVER LIMIT (*Refer to procedure*)

ENG 1(2)(3)(4) FADEC FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) FADEC IDENT FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) FADEC SYS FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) FADEC TEMP HI (*Refer to procedure*).

ENG 1(2)(3)(4) FAIL (*Refer to procedure*)

ENG 1(2)(3)(4) FUEL FILTER CLOGGED (*Refer to procedure*)

ENG 1(2)(3)(4) FUEL FILTER MONITORING FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) FUEL LEAK (*Refer to procedure*)

ENG 1(2)(3)(4) FUEL STRAINER CLOGGED (*Refer to procedure*)

ENG 1(2)(3)(4) FUEL SYS CONTAMINATION (*Refer to procedure*)

ENG 1(2)(3)(4) HP FUEL VLV FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) IGN A(B) FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) IGN A+B FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) MINOR FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) N1/N2 OVER LIMIT (*Refer to procedure*).

ENG 1(2)(3)(4) OIL CHIP DETECTED (*Refer to procedure*)

ENG 1(2)(3)(4) OIL FILTER CLOGGED (*Refer to procedure*)

ENG 1(2)(3)(4) OIL PRESS LO (Red alert) (*Refer to procedure*)

ENG 1(2)(3)(4) OIL SYS CONTAMINATION (*Refer to procedure*).

ENG 1(2)(3)(4) OIL TEMP HI (*Refer to procedure*)

ENG 1(2)(3)(4) OIL TEMP LO (*Refer to procedure*)

ENG 1(2)(3)(4) OVTHR PROT LOST (*Refer to procedure*)

ENG 1(2)(3)(4) SENSOR FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) SHUT DOWN (*Refer to procedure*)

ENG 1(2)(3)(4) STALL (*Refer to procedure*)

ENG 1(2)(3)(4) START FAULT (*Refer to procedure*).

ENG 1(2)(3)(4) START VLV FAULT (NOT CLOSED) (*Refer to procedure*)

ENG 1(2)(3)(4) START VLV FAULT (NOT OPEN) (*Refer to procedure*)

ENG 1(2)(3)(4) THR LEVER FAULT (*Refer to procedure*)

ENG 1(2)(3)(4) THRUST LOSS (*Refer to procedure*)

ENG 2(3) REVERSER CTL FAULT (*Refer to procedure*)

ENG 2(3) REVERSER ENERGIZED (*Refer to procedure*)

ENG 2(3) REVERSER FAULT (*Refer to procedure*)

ENG 2(3) REVERSER INHIBITED (*Refer to procedure*)

ENG 2(3) REV LOCKED (*Refer to procedure*)

ENG 2(3) REVERSER MINOR FAULT (*Refer to procedure*)

ENG 2(3) REVERSER UNLOCKED (*Refer to procedure*)

ENG ALL ENG FLAME OUT (*Refer to procedure*)

ENG HI VIBRATIONS (*Refer to procedure*)

ENG RELIGHT IN FLIGHT (*Refer to procedure*)

ENG REVERSER SELECTED (*Refer to procedure*)

ENG T.O THRUST DISAGREE (*Refer to procedure*)

ENG TAIL PIPE FIRE (*Refer to Procedure*)

ENG THR LEVERS NOT SET (*Refer to procedure*)

ENG THRUST LOCKED (*Refer to procedure*)

ENG TWO ENG OUT ON SAME SIDE (*Refer to procedure*)

ENG TWO ENG OUT ON OPPOSITE SIDE (*Refer to procedure*)

ENG TYPE DISAGREE (*Refer to procedure*)

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ELECTRICAL SUPPLY

Applicable to: ALL

System	Subsystem		Electrical Supply
FADEC	CHANNEL A	ALL ENGINES	AC ESS
	CHANNEL B	ENG 1 and ENG 3	AC 3
		ENG 2 and ENG 4	AC 2
IGNITION	A	ALL ENGINES	AC ESS
	B	ENG 1 and ENG 3	AC 3
		ENG 2 and ENG 4	AC 2
EMU	ENG 1 and ENG 3		AC 4
	ENG 2 and ENG 4		AC 2
HP VALVES	ALL ENGINES		AC ESS
ETRAC	ENG 2		DC 1
	ENG 3		DC 2
REVERSER THIRD LOCK SYSTEM	ENG 2		AC 2
	ENG 3		AC 4

(1) ECB is supplied by APU HOT BUS on ground, if the APU DC busbar is not supplied.

(2) Only during APU start, due to a loss of voltage on the APU BAT HOT BUS.

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PROCEDURES

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PRO-PLP PRELIMINARY PAGES

TABLE OF CONTENTS
LIST OF EFFECTIVE TEMPORARY DOCUMENTARY UNITS

PRO-NOR Normal Procedures

PRO-ABN Abnormal and Emergency Procedures

PRO-SUP Supplementary Procedures

PRO-SPO Special Operations

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M(1)	Localization	DU Title	DU identification	DU date
	PRO-NOR-SOP-40	**APU and ENG Fire Test/APU Start**	LG01405	
	PRO-NOR-SOP-40	**APU Start**	00021429.0001001	29 MAR 11
	Criteria: T71799, DD **Applicable to: ALL** *Impacted DU: 00000674 APU Start_APU START*			
	Reason for issue: *This TDU is issued to ask the flight crews to monitor the APU flap position before APU start. The flight crew must set to ON the APU START pb-sw when the APU flap is fully open (i.e. FLAP OPEN indication appears on the APU SD page).* *This will be corrected by a future APU ECB standard, that will monitor the flap position before starting the APU .*			
	PRO-NOR-SOP-60	**Glareshield**	LG00465	
	PRO-NOR-SOP-60	**Glareshield_BARO REF**	00021152.0001001	14 JAN 10
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00005474 Glareshield_BARO REF*			
	Reason for issue: *This TDU is issued to inform the flight crew that if the selected barometric unit is mercury inches, there may be a discrepancy of 0.01 inHg between the value selected on the EFIS CPs and the values displayed on the PFDs. This discrepancy is due to the rounding performed by the FCU. This discrepancy does not impact the altitude computations.* *The S5.0 FCU software standard will correct this issue.*			
	PRO-NOR-SOP-80	**Automatic Engine Start**	00023393.0001001	29 MAR 11
	Criteria: EA **Applicable to: ALL** *Impacted DU: 00000807 Automatic Engine Start*			
	Reason for issue: *A380 fitted with GP 7200 engines experienced several cases of thrust reverser fault ECAM alert at engines 2 and 3 start.* *Preliminary investigations point out that the communication between FADEC and ETRAC may be lost during the FADEC and ETRAC electrical power-up. As a result, the thrust reverser function is lost, and the ENG 2(3) REVERSER FAULT ECAM alert appears and remains latched on the EWD .* *The FADEC and ETRAC electrical power-up occurs when the flight crew sets the ENG START selector to IGN/START.* *This TDU intends to modify the procedure for the engines start in order to avoid any potential flight delay linked to this issue and, if possible, to recover the thrust reverser function without maintenance action.*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-NOR-SOP-160	**Descent Preparation**	LG00475	
	PRO-NOR-SOP-160	**Descent preparation_FMS**	00023858.0010001	03 NOV 11

Criteria: T62545, T73428, T77504
Applicable to: ALL
Impacted DU: 00000980 Descent preparation_FMS

Reason for issue:
Due to a misbehavior of the FMS L2 standard, the BARO/RADIO MINIMUM inserted on the APPR panel of the FMS ACTIVE/PERF and SEC/PERF pages is automatically rounded off to the nearest ten feet (e.g. 222 ft becomes 220 ft , 225 ft becomes 230 ft , and 240 ft stays 240 ft , etc.).
The APPR Panel of the FMS PERF pages and the PFD then display the rounded off BARO/RADIO MINIMUM value. The FWS also uses the rounded off BARO/RADIO MINIMUM value to trigger automatic callouts.
To cover this misbehavior, the following recommendation is provided to Operators:
If the BARO/RADIO MINIMUM value is not a multiple of ten, the flight crew should insert on the APPR panel of the FMS PERF pages a BARO/RADIO MINIMUM value rounded up to the nearest ten feet. For example, if the MINIMUM is equal to 91 ft , the flight crew should insert ' 100 ft ' on the APPR panel.

	PRO-NOR-SOP-170	**Descent**	LG00476	
	PRO-NOR-SOP-170	**Descent_AT 10 000 FT**	00021151.0002001	01 JUN 11

Criteria: T73428, DD
Applicable to: ALL
Impacted DU: 00000990 Descent_AT 10 000 FT

Reason for issue:
This TDU is issued to inform the flight crew that if the selected barometric unit is mercury inches, there may be a discrepancy of 0.01 inHg between the value selected on the EFIS CPs and the values displayed on the PFDs. This discrepancy is due to the rounding performed by the FCU. This discrepancy does not impact the altitude computations.
The S5.0 FCU software standard will correct this issue.

	PRO-NOR-SOP-220	**Go-Around**	LG00480	
	PRO-NOR-SOP-220	**Go-Around_AT GO-AROUND ACCELERATION ALTITUDE**	00022944.0001001	01 JUN 11

Criteria: T73183
Applicable to: ALL
Impacted DU: 00001054 Go-Around_AT GO-AROUND ACCELERATION ALTITUDE

Reason for issue:
This TDU is linked to the action performed by the flight crew during the OANS preparation for landing if an airport destination is not in the OANS database.
If the airport destination is not in the OANS database, the flight crew must pull the OANS reset button on the overhead panel. If the flight crew diverts to an alternate airport, the flight crew must push the OANS reset button to activate OANS . During descent preparation, the flight crew will be able to check that the alternate airport is or not in the OANS database.

M(1)	Localization	DU Title	DU identification	DU date
	PRO-NOR-SOP-230	**After Landing**	LG00481	
	PRO-NOR-SOP-230	**After landing_APU**	00022520.0001001	29 MAR 11
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00001062 After landing_APU*			
	Reason for issue: *This TDU is issued to ask the flight crew to monitor the APU flap position before APU start. The flight crew must set to ON the APU START pb-sw when the APU flap is fully open (I.e. FLAP OPEN indication appears on the APU SD page).* *This will be corrected by a future APU ECB standard, that will monitor the flap position before starting the APU .*			
	PRO-NOR-SOP-250	**Securing the aircraft**	LG00483	
	PRO-NOR-SOP-250	**Securing the aircraft_GENERAL**	00021519.0001001	03 SEP 10
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00005212 Securing the aircraft_GENERAL*			
	Reason for issue: *At aircraft power off, the FMS retains data for the next flight, only when the batteries are switched off at least 10 seconds after switching off the external power. For all other power off sequences, the FMS data is lost.*			
	PRO-ABN-ECAM-10-22-FMS	**NAV T.O SPEEDS NOT INSERTED**	LG02196	
	PRO-ABN-ECAM-10-22-FMS	**T.O SPEEDS NOT INSERTED**	00023898.0001001	08 AUG 11
	Criteria: T78651 **Applicable to: ALL** *Impacted DU: 00023835 NAV T.O SPEEDS NOT INSERTED*			
	Reason for issue: *After the flight crew performed the T.O CONFIG test, the ECAM will immediately trigger the T.O SPEEDS NOT INSERTED alert, if V1/VR fields become empty (e.g. because of a change of the takeoff runway).* *The next FWS standard (L52) will cancel this TDU.*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-24	**ELEC APU GEN A(B) FAULT**	LG00564	
	PRO-ABN-ECAM-10-24	**ELEC APU GEN A(B) FAULT - Alert**	00024028.0001001	01 APR 11
	Criteria: T81521 **Applicable to: ALL** *Impacted DU: 00008618 ELEC APU GEN A(B) FAULT - Alert*			
	Reason for issue: *In the case of intermittent short-circuit, the GEN reset may result in the GEN recovery. An intermittent short-circuit may trigger several ELEC APU GEN A(B) FAULT alerts with the recovery of the GEN at each reset.* *A GEN reset on intermittent short-circuits may result in an overvoltage or an overcurrent in the electrical network leading to potential damage on the equipment supplied by this power source.* *Because at the time the ELEC APU GEN A(B) FAULT alert triggers the flight crew cannot identify whether the short-circuit is permanent or intermittent, they should not attempt a GEN reset.* *Therefore, ETC n°39 modifies the ELEC APU GEN A(B) FAULT alert to remove the GEN A(B) reset.* *The future GGPCU standard software 18 will cancel this ETC.*			

	PRO-ABN-ECAM-10-24	**ELEC GEN 1(2)(3)(4) FAULT**	LG00570	
	PRO-ABN-ECAM-10-24	**ELEC GEN 1(2)(3)(4) FAULT - Alert**	00024016.0001001	01 APR 11
	Criteria: T81521 **Applicable to: ALL** *Impacted DU: 00007743 ELEC GEN 1(2)(3)(4) FAULT - Alert*			
	Reason for issue: *In the case of intermittent short-circuit, the GEN reset may result in the GEN recovery. An intermittent short-circuit may trigger several ELEC GEN 1(2)(3)(4) FAULT alerts with the recovery of the GEN at each reset.* *A GEN reset on intermittent short-circuits may result in an overvoltage or an overcurrent in the electrical network leading to potential damage on the equipment supplied by this power source.* *Because at the time the ELEC GEN 1(2)(3)(4) FAULT alert triggers the flight crew cannot identify whether the short-circuit is permanent or intermittent, they should not attempt a GEN reset.* *Therefore, ETC n°39 modifies the ELEC GEN 1(2)(3)(4) FAULT alert to remove the GEN 1(2)(3)(4) reset.* *The future GGPCU standard software 18 will cancel this ETC .*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-27-20	**F/CTL SLAT SYS 1+2 FAULT**	LG00695	
	PRO-ABN-ECAM-10-27-20	**F/CTL SLAT SYS 1+2 FAULT - Alert**	00020643.0004001	10 MAR 11
	Criteria: T76485, T77352, T78651 **Applicable to: ALL** *Impacted DU: 00007964 F/CTL SLAT SYS 1+2 FAULT - Alert*			
	Reason for issue: *In electrical emergency configuration, the SLAT SYS 1 monitors and controls the slats.* *During the reconfiguration of the electrical network in electrical emergency configuration, the SLAT SYS 1 is lost. As a consequence, the slats are lost and the ECAM caution SLAT SYS 1+2 FAULT is triggered.* *This anomaly is due to the SFCC 1 computer that unduly detects that the motor control of the electrical motor is failed when the electrical network reconfigures in electrical emergency configuration. This causes the loss of the SLAT SYS 1.* *In electrical emergency configuration, to recover the slats, the flight crew must reset the SLAT SYS 1 if the ECAM caution SLAT SYS 1+2 FAULT is triggered.* *ECAM procedure is updated via the ATQC database.* *The SFCC S4.0 will correct this issue, and will cancel the TDU .*			
	PRO-ABN-ECAM-10-28	**FUEL TRIM TK XFR FAULT**	LG00734	
	PRO-ABN-ECAM-10-28	**FUEL TRIM TK XFR FAULT**	00023457.0001001	01 SEP 10
	Criteria: T81246 **Applicable to: ALL** *Impacted DU: 00003012 FUEL TRIM TK XFR FAULT*			
	Reason for issue: *Addition of a triggering condition for the FUEL TRIM TK XFR FAULT alert:* *The FQMS uses the landing gear lever feedback for the automatic isolation of the trim tank during takeoff and landing. If the FQMS inputs from the landing gear lever disagree by providing different UP and DOWN information, there is no automatic transfer from the trim tank, the trim line isolation is displayed as normally closed, and the ECAM displays the FUEL TRIM TK XFR FAULT alert. In this case, there are no automatic fuel transfers from the trim tank throughout the flight, but the flight crew is able to perform a manual trim tank transfer.* *This specific failure case also adds a new part to the procedure of the FUEL TRIM TK XFR FAULT alert.*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-28	**FUEL TRIM TK XFR FAULT - Alert**	00023458.0001001	01 SEP 10

Criteria: T81246
Applicable to: ALL
Impacted DU: 00008322 FUEL TRIM TK XFR FAULT - Alert

Reason for issue:
Since April 2010, one A380 has experienced several occurrences of FUEL TRIM TK XFR FAULT alerts in flight with no flight crew procedure on the ECAM. The FUEL SD page indicated the trim line isolation normally closed. The root cause of this FUEL TRIM TK XFR FAULT alert without procedure is the landing gear lever and associated wiring. The FQMS uses the landing gear lever feedback for the automatic isolation of the trim tank during takeoff and landing: If the FQMS inputs from the landing gear lever disagree by providing different UP and DOWN information, there is no automatic transfer from the trim tank, the trim line isolation is displayed as normally closed, and the ECAM displays the FUEL TRIM TK XFR FAULT alert with no further procedure for the flight crew. In this case, there are no automatic fuel transfers from the trim tank throughout the flight, but the flight crew is able to perform a manual trim tank transfer.
The ATQC_L50_V10 database adds a manual trim tank transfer procedure to the FUEL TRIM TK XFR FAULT alert. The ECAM will always display this procedure in order to ensure that the flight crew always has an applicable procedure when the FUEL TRIM TK XFR FAULT alert triggers in flight.

	PRO-ABN-ECAM-10-32	**BRAKES ALTN + EMER BRK FAULT**	LG00854	
	PRO-ABN-ECAM-10-32	**BRAKES ALTN + EMER BRK FAULT - Alert**	00022291.0001001	12 JUN 09

Criteria: T78497
Applicable to: ALL
Impacted DU: 00007175 BRAKES ALTN + EMER BRK FAULT - Alert

Reason for issue:
Because of a corruption of the memory of one Braking Control System (BCS), the affected BCS may take control at landing gear extension. Alternate and emergency braking are declared failed. By resetting the A-SKID, the failed BCS gives again control to the other BCS. Normal braking is restored.
The modification of the BRAKES ALTN + EMER BRK FAULT alert, to consider the above operational recommendations, is done via ATQC.
The future BSCS standard will correct this issue.

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-32	**BRAKES EMER BRK FAULT**	LG00853	
	PRO-ABN-ECAM-10-32	**BRAKES EMER BRK FAULT - Alert**	00022292.0001001	07 MAY 10
	Criteria: T78497 **Applicable to: ALL** *Impacted DU: 00007177 BRAKES EMER BRK FAULT - Alert*			
	Reason for issue: *Because of a corruption of the memory of one Braking Control System (BCS), the affected BCS may take control at landing gear extension. Normal braking and alternate braking are also declared failed (BRAKES A-SKID FAULT ON ALL L/G triggers). In addition, emergency braking is spuriously declared failed. By resetting the A-SKID, the failed BCS gives again control to the other BCS. Normal braking is restored.* *However, if the other BCS is also failed, the alert will persist. The flight crew should check on the WHEEL SD page that emergency braking is available.* *The modification of the BRAKES EMER BRK FAULT alert, to consider the above operational recommendations, is done via ATQC .* *The future BSCS standard will correct this issue.*			

	PRO-ABN-ECAM-10-34-10	**NAV CAPT AND F/O ATT DISAGREE**	LG00893	
	PRO-ABN-ECAM-10-34-10	**NAV CAPT AND F/O ATT DISAGREE - Alert**	00023230.0001001	03 MAY 10
	Criteria: T81119 **Applicable to: ALL** *Impacted DU: 00008408 NAV CAPT AND F/O ATT DISAGREE - Alert*			
	Reason for issue: *With ADIRS L4-1 standard (P/N HNS502198BD01), using the ATT HDG selector may induce jumps in the Vertical Speed (V/S) provided by the IR 3, with consequences on flight control laws and/or on approach capability.* *NAV CAPT & F/O ATT DISAGREE is amended to prevent the V/S jumps on IR 3 when the flight crew uses the ATT HDG selector.* *If the NAV CAPT & F/O ATT DISAGREE alert triggers in flight, as per ECAM procedure, the flight crew should first crosscheck the attitude:* *- If the attitude data on the CAPT PFD are affected, the flight crew should set the AIR DATA selector to CAPT ON 3 before setting the ATT HDG selector to CAPT ON 3.* *- If the attitude data on the F/O PFD are affected, the flight crew should set the AIR DATA selector to F/O ON 3 before setting the ATT HDG selector to F/O ON 3.*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-34-10	**NAV CAPT AND F/O HDG DISAGREE**	LG00892	
	PRO-ABN-ECAM-10-34-10	**NAV CAPT AND F/O HDG DISAGREE - Alert**	00023229.0001001	03 MAY 10
	Criteria: T81119 **Applicable to: ALL** *Impacted DU: 00008407 NAV CAPT AND F/O HDG DISAGREE - Alert*			
	Reason for issue: *With ADIRS L4-1 standard (P/N HNS502198BD01), using the ATT HDG selector may induce jumps in the Vertical Speed (V/S) provided by the IR 3, with consequences on flight control laws and/or on approach capability.* *NAV CAPT & F/O HDG DISAGREE is amended to prevent the V/S jumps on IR 3 when the flight crew uses the ATT HDG selector.* *If the NAV CAPT & F/O HDG DISAGREE alert triggers in flight, as per ECAM procedure, the flight crew should first crosscheck the heading:* *- If the heading on the CAPT PFD is affected, the flight crew should set the AIR DATA selector to CAPT ON 3 before setting the ATT HDG selector to CAPT ON 3.* *- If the heading on the F/O PFD is affected, the flight crew should set the AIR DATA selector to F/O ON 3 before setting the ATT HDG selector to F/O ON 3.*			

	PRO-ABN-ECAM-10-34-10	**NAV IR 1(2)(3) FAULT**	LG00881	
	PRO-ABN-ECAM-10-34-10	**NAV IR 1(2)(3) FAULT - Alert**	00023231.0001001	03 MAY 10
	Criteria: T81119 **Applicable to: ALL** *Impacted DU: 00008385 NAV IR 1(2)(3) FAULT - Alert*			
	Reason for issue: *With ADIRS L4-1 standard (P/N HNS502198BD01), using the ATT HDG selector may induce jumps in the Vertical Speed (V/S) provided by the IR 3, with consequences on flight control laws and/or on approach capability.* *NAV IR 1 (2) FAULT is amended to prevent the V/S jumps on IR 3 when the flight crew uses the ATT SEL selector.* *If the NAV IR 1(2) FAULT alert triggers in flight, the flight crew should set the AIR DATA selector to CAPT ON 3(F/O ON 3) before setting the ATT HDG selector to CAPT ON 3(F/O ON 3).*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-36	**AIR ENG 1(2)(3)(4) BLEED FAULT**	LG00945	
	PRO-ABN-ECAM-10-36	**AIR ENG 1(2)(3)(4) BLEED FAULT - Alert**	00023117.0003001	10 MAR 11
	Criteria: T78651, T78737 **Applicable to: ALL** *Impacted DU: 00007719 AIR ENG 1(2)(3)(4) BLEED FAULT - Alert*			
	Reason for issue: *In the case of takeoff with packs OFF, and no other bleed demand, the AIR ENG 1(2)(3)(4) BLEED FAULT alert may trigger. In this situation, after takeoff, (above 1500ft), a reset of the affected engine bleed allows to clear the corresponding alert and recover the affected engine bleed system.* *The ETC 32 adds the engine bleed reset action line to the ECAM procedure.*			
	PRO-ABN-ECAM-10-42	**AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED)**	LG00960	
	PRO-ABN-ECAM-10-42	**AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) - Alert**	00023228.0001001	03 MAY 10
	Criteria: T81119 **Applicable to: ALL** *Impacted DU: 00007538 AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) - Alert*			
	Reason for issue: *With ADIRS L4-1 standard (P/N HNS502198BD01), using the ATT HDG selector may induce jumps in the Vertical Speed (V/S) provided by the IR 3, with consequences on flight control laws and/or on approach capability.* *AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) is amended to prevent the V/S jumps on IR 3 when the flight crew uses the ATT HDG selector.* *If the AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) alert occurs in flight, the flight crew should switch the AIR DATA selector before the ATT HDG selector.*			
	PRO-ABN-ECAM-10-49	**APU FAULT**	LG00970	
	PRO-ABN-ECAM-10-49	**APU FAULT - Alert**	00020786.0002001	03 SEP 10
	Criteria: T77417 **Applicable to: ALL** *Impacted DU: 00007683 APU FAULT - Alert*			
	Reason for issue: *During the APU start sequence, when the aircraft is at, or approximately at, the maximum altitude for an APU start and, in particular, when the external air temperature is low (e.g. below -30 °C), the Electronic Control Box (ECB - P/N 3900942-03) may command an excessive flow of fuel. In such cases, an EGT over-limit may occur and may result in an automatic shutdown of the APU .* *If the APU FAULT AUTO SHUTDOWN ECAM caution is triggered during an in-flight APU start attempt when the aircraft is at, or approximately at, the maximum altitude for an APU start (i.e. at FL 200), the flight crew should attempt additional APU starts at a lower altitude. An APU start should be successful below FL 150.* *A future APU Fuel Control Unit standard will correct this issue.*			

M(1)	Localization	DU Title	DU identification	DU date
	PRO-ABN-ECAM-10-70	**ENG ALL ENG FLAME OUT**	LG00993	
	PRO-ABN-ECAM-10-70	**ENG ALL ENG FLAME OUT - Alert**	00020793.0010001	16 AUG 11

Criteria: EA, T77417, T78651
Applicable to: ALL
Impacted DU: 00008075 ENG ALL ENG FLAME OUT - Alert

Reason for issue:
During the APU start sequence, when the aircraft is at, or approximately at, the maximum altitude for an APU start and, in particular, when the external air temperature is low (e.g. below -30 °C), the Electronic Control Box (ECB - P/N 3900942-03) may command an excessive flow of fuel. In such cases, an EGT over-limit may occur and may result in an automatic shutdown of the APU.
In the case of all-engine flame out, the flight crew starts the APU to assist an engine start and to supply the normal electrical network. If the APU start sequence fails, the flight crew should attempt additional APU starts at a lower altitude. An APU start should be successful below FL 150.
A future APU Fuel Control Unit standard will correct this issue.

	PRO-ABN-NECA-34-10	**UNRELIABLE AIR SPEED INDICATION - Above FL 250**	LG02135	
	PRO-ABN-NECA-34-10	**UNRELIABLE AIR SPEED INDICATION - Above FL 250 - Alert**	00022817.0001001	25 JUL 11

Criteria: T71998, T78651, T78678
Applicable to: ALL
Impacted DU: NONE

Reason for issue:
The Unreliable Air Speed Indication procedure requests to display the Backup Scales (i.e. BUSS and GPS altitude) until the end of the flight, if the faulty air data cannot be identified.
At high altitude, an overall operational review has shown that the cases of unreliable speed situation were a temporary phenomenon, due to temporary contamination of the total pressure probes, with water or ice, typically above FL 250. In-service experience on Airbus fleet has shown that such a temporary phenomenon disappears after a few minutes, allowing recovery of a normal situation.
Therefore the Unreliable Air Speed Indication procedure is enhanced.

If all air data are unreliable:
- *Above FL 250, the flight crew flies the aircraft using pitch & thrust parameters*
  When contamination of the total pressure probe disappears, the normal flying techniques can be resumed and the normal flight controls law is recovered.
- *Below FL 250, the use of the BUSS remains recommended until the end of the flight.*

With the introduction of the Airbus Temporary Quick Change (ATQC) database L50 V5, the ECAM procedure contains a reminder of the memory items (i.e. the immediate actions that the flight crew should apply if the safe conduct of the flight is affected). Then the ECAM refers to the paper Quick reference handbook (QRH), which provides the complete procedure.
With the next FWS standard, the entire procedure will be available on the ECAM.

M(1)	Localization	DU Title	DU identification	DU date
	PRO-SUP-24-22-FG	**Flight Control Unit (FCU) Reset**	00019639.0001001	14 JAN 10
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00019430 Flight Control Unit (FCU) Reset*			
	Reason for issue: *When on ground, with engines stopped, an FCU reset launches the safety test of the FCU. This safety test may generate erroneous barometric references (values and QNH/STD selection) on both EFIS CPs.* *This will be corrected by the S5.0 FCU software standard.*			
	PRO-SUP-24-22-FMS	**Flight Management Computer FMC A(B)(C) Reset**	00023890.0001001	10 MAR 11
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00019415 Flight Management Computer FMC A(B)(C) Reset*			
	Reason for issue: *In the case of a departure from a runway with no ILS, the CAT 2 message may appear on the INOP SYS section of the STATUS page, with no associated alert. This may happen following a FMS reset. The message should disappear if the flight crew temporarily tune an ILS on the POSITION / NAVAIDS page of the MFD.*			
	PRO-SUP-24-32	**Brake and Steering Control System (BSCS) 1(2) Reset**	00021269.0005001	07 JAN 11
	Criteria: T71998, T77518, DD **Applicable to: ALL** *Impacted DU: NONE*			

(1) Evolution code : N=New, R=Revised, E=Effectivity

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PROCEDURES

NORMAL PROCEDURES

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PRO-NOR-SOP-AIL-00000029 CAT II and CAT III Approach_"DH or AH" setting on MCDU PERF APPR page	N	1	**04 Nov 2011 : Modification of content of the element 20300048.9001001**
PRO-NOR-SOP-AIL-00000029 CAT II and CAT III Approach_"DH or AH" setting on MCDU PERF APPR page	N	2	**04 Nov 2011 : Modification of content of the element 20300048.9001001**
PRO-NOR-SOP-190-20 Intermediate / Final Approach_At MInimum	C	1	**04 Nov 2011 : Modification of content of the element 00014311.0001001**
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PRO-NOR-SOP-190-30 Intermediate / Final Approach_At Minimum	B	1	**04 Nov 2011 : Modification of content of the element 00017674.0001001**
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GENERAL INFORMATION

Applicable to: ALL

L2 FOREWORD

The Standard Operating Procedures (SOPs) contained in this part are recommended by Airbus, and are consistent with the other chapters of this manual.
The authorities do not certify SOPs. Airbus presents them herein as the best way to proceed, from a technical and operational standpoint. Airbus continuously updates the SOPs and the revisions take into account Operators feedback from in-line experience as well as Airbus flight tests and training experience.
In addition, Operators may amend the SOPs as needed, at their own responsibility. Operators should consider with care consistency with other parts of the FCOM when they perform amendments.

CONTENT AND USE OF SOPS

This FCOM chapter contains additional information on normal procedures.
Standard Operating Procedures consist of inspections, preparations, and normal procedures. All items of a given procedure are listed in a sequence that follows a standardized scan of the cockpit panels, unless that sequence goes against the action priority logic, to ensure that the flight crew performs all actions in the most efficient way.
Standard Operating Procedures are divided into flight phases. The flight crew should perform the SOPs actions by memory.
There are flow patterns at the end of some flight phases to indicate where the actions are performed. The flight crewmembers must apply the flow patterns to ensure that they perform the necessary actions for a specific flight phase, before completing the applicable checklist.
The SOPs assume that all systems are operating normally, and that all automatic functions are used normally.
The FCOM also contains normal procedures that are non-routine procedures in the Supplementary Procedures chapter and in the Special Operations chapter.

NORMAL CHECKLIST

For some flight phases, after the flight crew completes appropriate procedures, they use the related ECAM normal checklist to ascertain that they performed the essential actions.

L2 For additional training-oriented information, *Refer to FCTM/OP-40-40-2-40-2-2 Introduction*.

COMMUNICATION

For training-oriented information on cross-cockpit communication, *Refer to FCTM/AO-15 Cockpit/Cabin Communication*

L2 COCKPIT TIDINESS

The flight crew must keep the cockpit in order, because misplaced objects can cause several hazards:

- Coffee cups put on the glareshield, or on the pedestal can fall due to turbulence, or if knocked over by the flight crew. The liquid spilled on the pedestal and on the cockpit control panels can cause equipment damage, and have an immediate impact on the flight.
- Books, if any, put on the glareshield can fall, and inappropriately operate some pushbuttons/switches, or damage equipment
- Books, if any, put on the pedestal can inappropriately operate some pushbuttons/switches, particularly when the flight crew moves the books to operate controls on the pedestal, E.g. rudder trim setting, or radio selection on the RMP.

RECOMMENDATIONS

Therefore, Airbus highly recommends that all objects are put and stored in their assigned place in the cockpit. The flight crew should:

- Put cups in the provided cupholders
- Store books, if any, in the appropriate library space. The flight crew must put them back to this library space, when they finished to use these books.
- Put the briefcases, CDs/DVDs, bottles and coats in their assigned stowage space.

A trash bag should also be available behind the flight crew seats. The flight crew should use it for waste disposal.
The flight crew should also put the meal trays behind their seats, when finished. The flight attendants should then collect the meal trays, as rapidly as possible.

OPERATIONAL POLICY_CREW DUTIES REFERENCE CHART

Applicable to: ALL

CREW DUTIES REFERENCE CHART

The Crew Duties Reference Chart below indicates normal divisions in pilot work load. This chart serves as a guide to help crew members coordinate their duties with regard to a typical flight.

(●) : As required

CREW DUTIES	REFERENCE	CAPT	FO	PF	PM
REPORT					
Report & Sign-in	FOM 6	●	●		
FLIGHT PLANNING					
Review flight plan, weather, route information and NOTAMs	FOM 6	●	●		
Self briefing	FOM 6	●	●		
Take FLT document folder to A/C	FOM 6		●		
Joint Briefing	FOM 6	●	●		
COCKPIT PREPARATION					
Exterior inspection	FOM 6	●	(●)		
Check A/C documents	FOM 6	●	●		
Cockpit preparation/Interior inspection	FOM 6	●	●		
Check FLT and MAINT log Book	FOM 6	●	●		
Set up EFB equipment	FOM 6	●	●		
Set up FMS equipment	FOM 2/6	(●)	●		
Verify FMS equipment	FOM 2/6	●	(●)		
Check final document (GD, NOTOC, W/B and etc.) on board	FOM 2/6	●	●		
Takeoff briefing	FOM 6			●	
ATC clearance	FOM 2/6		●		

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CREW DUTIES	REFERENCE	CAPT	FO	PF	PM
TAXI AND BEFORE TAKEOFF					
Taxi clearance	FOM 2/6		●		
Takeoff briefing if changed	FOM 6			●	
Ensure required fuel for takeoff	FOM 6	●	●		
Takeoff reminder	FOM 6			●	
CLIMB and CRUISE					
Report to Company Radio	FOM 9				●
FMS modification	FOM 2/6				●
AFS CP modification: - Autopilot engaged - Autopilot not engaged	FOM 2/6			● 	 ●
PA announcement	FOM 6/14	●	(●)		
Monitor enroute fuel temperature	FOM 6			●	●
Enroute HF SELCAL check	FOM 6				●
Update Wx (En-route, Destination& Alternate Airport)	FOM 6			●	●
WAYPOINT PASSAGE					
Confirm name of next waypoint, desired track distance & time to next waypoint.	FOM 6			●	●
Transmit position report to ATC, controlling HF facility, or Company Radio	FOM 6/9				●
Record flying data on FLT plan	FOM 6			●	●
BEFORE DESCENT					
Arrival ATIS	FOM 6			●	●

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CREW DUTIES	REFERENCE	CAPT	FO	PF	PM
Set up EFB equipment	FOM 6			●	●
FMS set up for approach	FOM 2/6			(●)	●
Landing briefing	FOM 6			●	
APPROACH AND LANDING					
Report to Company Radio	FOM 9				●
Ground control communication	FOM 6		●		
POSTFLIGHT					
Perform ACARS post flight	FOM 6		●		
FLT and MAINT Log book entries	FOM 6		●		
Log book sign	FOM 6	●			
Report to Company Radio	FOM 6/9	(●)	●		
Return completed master flight plan and log sheet	FOM 6		●		

Pilot Flying and Pilot Monitoring Areas of Responsibilty including taxing
Refer to FCTM/Mormal Operation

Note: *With the airplane stationary on the ground, CAPT cuts off the ENG master Switch(es).*

OPERATIONAL POLICY_NORMAL CHECK LIST INITIATION

Applicable to: ALL

NORMAL CHECK LIST INITIATION

The Captain calls for check lists on the ground. In flight , the PF calls for the check list.

- Before Start Checklist
  Down to the line
  After completion of the cockpit preparation, Load Sheet onboard and completion of the MFD-FMS revise.
  Below the line

  Checklist items will be checked after :
  - Confirm the ground staff and cabin ready or push back.
  - ATC clearance and push back clearance has been received.
  - After complete cockpit preparation for pushback and start.

- After Start Checklist
  When the flight controls check has been completed
- Before Takeoff Checklist
  Down to the line
  After completing takeoff briefing confirmation and checking takeoff memo
  Below the line
  When the cabin report has been received, and after the line –up clearance or takeoff clearance has been received.
- After Takeoff Checklist
  Down to the line
  After completing flap retraction
  Below the line
  After 10,000ft or transition altitude whichever comes later
- Approach Checklist
  Perform while descending 10,000ft. if the transition level is below 10,000ft, perform the approach checklist except altimeter setting. After completion of altimeter setting, the PM calls out “APPROACH CHECKLIST COMPLETE”
- Landing Checklist
  Performing when the landing configuration has been completed and landing memo is displayed on ECAM
- After Landing Checklist
  Perform when clear of the runway.

- Parking Checklist
  After arriving at the ramp/gate, and the Shutdown Procedure complete.
- Securing The Aircraft Checklist
  After the last flight of the day, and the Secure Checklist complete.

OPERATIONAL POLICY_LOWER THAN STANDARD MINIMA

Applicable to: ALL

LOWER THAN STANDARD MINIMA

Refer to FOM chapter 4 - Weather

- Takeoff Minima
  Company Standard Takeoff Minima is RVR 750m (2,400 ft) / VIS 800m (1/2 SM).
  When the reported weather is below the Company Standard Takeoff Minima, the requirements of the Lower Than Standard Takeoff Minima will apply.

  Operating procedures for takeoffs with visibility less than RVR 750m (2,400 ft) / VIS 800m (1/2 SM) are:
  - Captain will take off.
  - The flight crew must check the runway number (designated) prior to taxiing onto the runway.
  - The flight crew must check the airplane heading against the desired runway heading after taxiing on the runway.
  - Standing takeoff should be performed.
  - When the weather conditions at the departure airport are above the airport takeoff minima but at or below the landing minima (including engine out landing minima), or the aircraft cannot return to the departure airport because of other reasons, such as performance, there must be a designated takeoff alternate which can be reached at cruising speed with one engine inoperative within two hours from the departure airport after takeoff.

- Landing Minima
  For instrument approaches, the A380 is classified as Category C. When executing circling approaches, the A380 is classified as a Category C (ICAO) or Category D (FAA).
  A circle-to-land approach shall not be conducted when the ceiling is less than 1,000 feet (300m) or the visibility is less than 3 statute miles (4,800m). If a higher MDH and/or weather restrictions are published it will control.
  If the published MDH is less than 1000 feet, MDA shall be 1000 feet + Airport Elevation.
  If no appropriate category or maximum speed circle-to-land minima are published, the approach is not authorized.

OPERATIONAL POLICY_RADIO COMMUNICATIONS

Applicable to: ALL

RADIO COMMUNICATIONS

- VHF 1 will normally be selected for active ATC communications.
- VHF 2 will normally be selected to 121.5 MHz for emergency.
- VHF 3 will normally be selected to ACARS (also used for ATIS and company radio).

Note: *The speaker volume should be turned on for ATC monitor during flight.*

Note: *Verify that RADIO/AUDIO Control Panel is properly set for Headset off/on, Passenger Announcement, ACC/ FIR boundary etc, to prevent the loss of communication. General callout ("AUDIO Panel Set","Volume Set", etc) should be used as appropriate for Headset off/on, Passenger Announcement.*

OPERATIONAL POLICY_AUTOPILOT, WEATHER RADAR AND TCAS SELECTIONS

Applicable to: ALL

AUTOPILOT, WEATHER RADAR AND TCAS SELECTIONS

It is the basic principal that the PF has to select his/her own side.
During flying in RVSM airspace , the transponder switch must be selected to the same side as the selected Autopilot.

OPERATIONAL POLICY_WEATHER RADAR AND TERRAIN DISPLAY POLICY

Applicable to: ALL

WEATHER RADAR AND TERRAIN DISPLAY POLICY

Whenever the possibility exists for adverse weather and terrain/obstacles near the intended flight path, one pilot should monitor the weather radar display and the other pilot should monitor the terrain display. The use of the terrain display during night or IMC operations, on departure and approach when in proximity to terrain/obstacles, and at all times in non-radar environment is recommended.

Note: *Normally, PM should select TERR mode on his/her ND, if needed to monitor both WXR and TERR.*

Note: *It may be useful to show the terrain display at other times to enhance terrain/situational awareness*

OPERATIONAL POLICY_FMS PAGE SELECT

Applicable to: ALL

FMS PAGE SELECT

The specific page listed below is recommended for each flight phase. But another Selection can be used if necessary

Flight Phase	PF	PM
Takeoff	PERF TAKEOFF	F-PLN
Climb	PERF CLM	F-PLN
Cruise	PERF CRZ	F-PLN
Descent	PERF DES	F-PLN
Approach	PERF APPR	F-PLN

OPERATIONAL POLICY_SCAN POLICY

Applicable to: ALL

SCAN POLICY

Definition

- Inside & outside : As the aircraft descends, outside references are used more than the instruments.
  However , Pilots must also monitor their instruments.
- Inside : Pilots will continuously monitor the instruments.

Conditions	PF	PM
Coupled approach (Below 1000ft)		
IMC (or night)	Inside & Outside	Inside
After visual reference contact	Inside & Outside	Inside
Manual approach (Below 1000ft)		
IMC (or night)	Inside	Inside & Outside
After visual reference contact	Inside & Outside	Inside & Outside
Visual Approach		
After visual reference contact	Inside & Outside	Inside & Outside

Additional Standard Scan Policy Reference
Refer to FOM Chapter 6 – Normal Operations

OPERATIONAL POLICY_STANDARD CALLOUT

Applicable to: ALL

STANDARD CALLOUT

Refer to FCOM/ Procedures/Normal Procedures / Standard Callout
Additional Standard Procedures and Callouts Reference

- Refer to FCOM/ Procedures/Normal Procedures / Standard Callout

OPERATIONAL POLICY_ILS AIRBORNE REQUIRED EQUIPMENTS FOR CAT II/III

Applicable to: ALL

ILS AIRBORNE REQUIRED EQUIPMENTS FOR CAT II/III

Refer to FCOM /Limitations/22 Auto pilot System/ Automatic approach, Landing , Roll-Out/Require equipment for CAT II/III

FLIGHT PREPARATION

Applicable to: ALL

TECHNICAL CONDITION OF THE AIRCRAFT

The flight crew verifies the technical state of the aircraft (I.e. deferred defect list), in accordance with airworthiness, acceptability of malfunctions (I.e. MEL), and influence on the flight plan. Refer to FOM chapter 6 –Normal Operations.

L2 For additional training-oriented information, *Refer to FCTM/Flight Preparation/MEL*.

WEATHER BRIEFING

The flight crew gets a weather briefing.

L2 The briefing should include:

- Actual and expected weather conditions for takeoff including runway conditions, and for climb phases
- Significant weather en route, including winds and temperatures
- Terminal forecasts for destination and alternate airports
- Actual weather for destination and alternate airports, for short range flights and recent past weather, if available
- Survey of the meteorological conditions at airports along the planned route.

L1 Weather can affect the choice of routing (E.g. influence which route is the quickest) and the choice of flight level.
The flight crew must also consider the possibility of contaminated runways at the departure and destination airfields. The flight crew must also verify ISA deviations and en route icing conditions They must consider the possibility of holding due to weather at the destination.

NOTAMS

The flight crew must examine NOTAMs for flight planning impacts, unserviceable NAVAIDS, availability of runways and approach aids, etc, all of which may affect the conduct of the flight.

FLIGHT PLAN AND OPERATIONAL REQUIREMENTS

The flight crew checks the company flight plan for routing, altitudes and flight time.

The Captain checks the ATC flight plan and ensures that the ATC flight plan:

- Is filled in and filed, in accordance with the prescribed procedures
- Agrees with the fuel flight plan routing.

The flight crew checks the loadsheet and the maximum allowable takeoff and landing weights.

OPTIMUM FLIGHT LEVEL

The flight crew should choose a flight level that is as much as possible near the optimum FL . To obtain the optimum flight level, the flight crew should use the IN-FLT PERF CRZ module. For more information on the use of the IN-FLT PERF CRZ module, *Refer to Performance/In-Flight/Cruise/CRZ Module Interface* .

L2 As a general rule:

- An altitude that is 4 000 ft below the optimum FL results in a significant penalty: Approximately 5 % of fuel
- An altitude that is 8 000 ft below the optimum FL results in a significant penalty: Approximately 10 % of fuel, i.e. above the usual contingency allowance that is 5 %
- If the flight crew intends to fly above the optimum FL (up to ceiling), the consumption increase can reach 4 % .

COMPUTERIZED FLIGHT PLAN CHECK

In most cases the flight crew uses a computer-derived flight plan to obtain the correct fuel requirements. Although these computerized requirements are normally accurate, the flight crew may check them in accordance with Operators policy.
To crosscheck the flight plan, the flight crew should use the IN-FLT PERF PLAN Module. For more information on minimum recommended fuel requirements and on the use of the IN-FLT PERF PLAN Module, *Refer to Performance/In-Flight/Flight Planning/Minimum Recommended Fuel Requirements* .
The flight crew should verify that the fuel calculations and the required fuel on board are correct, and that the figure complies with the applicable regulations.

FUEL TRANSPORTATION

The flight crew should check the policy covering the “tankering” of fuel on sectors where there is favorable fuel price differential or operational requirement.
Remember that carrying unnecessary extra fuel increases the fuel consumption for that sector and therefore reduces the economy of the operation (E.g. lower flex temperature, more tire and brake wear, more time in climb phases, lower optimum flight level, etc).

SAFETY EXTERIOR INSPECTION

Applicable to: ALL

GENERAL

Safety exterior inspections ensure that the aircraft and the external environment of the aircraft are safe for operation. When the flight crew arrives at the aircraft, they must check for, or be informed of any obstructions near the aircraft, engineering activity, or refueling activity, etc.

WHEEL CHOCKS

WHEEL CHOCKS.....CHECK IN POSITION | CAPT

LANDING GEAR DOORS

LANDING GEAR DOORS.....CHECK POSITION | CAPT

WARNING	If any landing gear door is open, do not pressurize the hydraulic systems until clearance is obtained from ground personnel.

APU AREA

APU AREA..... CHECK | CAPT

L2 *Check that the APU exhaust is free of obstruction.*

Intentionally left blank

GENERAL

Applicable to: ALL

The flight crew performs the preliminary cockpit preparation to ensure that all required safety checks are completed before applying electrical power.
The safety checks prevent the inadvertent operation of aircraft systems, danger to the aircraft, and danger to the personnel.

The preliminary cockpit preparation includes:
- Aircraft power-up, if the aircraft is not already electrically powered
- OIS initialization
- ECAM/Logbook check
- APU start
- OIS preparation.

AIRCRAFT POWER-UP

Applicable to: ALL

GENERAL

The FO applies the following procedure only if the aircraft is not already electrically supplied.
During the aircraft power-up procedure, the flight crew completes the necessary checks before they put on the electrical power.

L2 For additional training-oriented information, *Refer to FCTM/NO-40 Aircraft Power-Up*.

WARNING	Do not pressurize the hydraulic systems until clearance is obtained from ground personnel.

ENGINES

ENG MASTERS 1, 2, 3, 4 ..... OFF | FO
ENG START selector ..... NORM | FO

WIPERS

BOTH WIPER selector ..... OFF | FO

BATTERIES

ALL BAT pb-sw (BAT 1, ESS, 2, APU BAT) ..... ON | FO

EXT POWER

● **If the AVAIL light is on:**

EXT pb-sw (2, 3, 1, 4).....ON | FO

L2 *The AVAIL light goes off.*

L1 *The EXT power units should be connected, in the following order:*
- *EXT 2*
- *EXT 3*
- *EXT 1*
- *EXT 4.*

L2 *This order ensures the shortest start time of the display units.*

L1 *At least two EXT power units are necessary to supply the entire electrical network.*

L2 *If the flight crew anticipates high electrical demands (e.g. APU start or doors actuation):*
- *A third or a fourth EXT power unit is necessary to supply the entire electrical network, or*
- *The flight crew must temporarily reduce the electrical load when only two EXT power units are available, by setting the:*
  - *CAB FANS pb-sw to OFF, and*
  - *COOLG pb-sw to OFF.*

Note: These temporary actions ensure that enough electrical power is available during a high electrical demand (e.g. to start the APU or to operate the doors).
When the flight crew sets to OFF the CAB FANS pb-sw and the COOLG pb-sw, no degradation of the galley cooling system and of the air conditioning is expected for a few minutes, i.e. the time necessary to start the APU or to operate the doors.
As soon as it is possible, the flight crew should set to ON the CAB FANS pb-sw and the COOLG pb-sw.
When the APU is available, no reduction of load is necessary.

COCKPIT LIGHTS

COCKPIT LIGHTS..... AS RQRD | BOTH

L2 *On the overhead panel, set the STBY COMPASS sw as required, and set to BRT or DIM the ANN LT sw as required.*
On the pedestal, set the PEDESTAL FLOOD LT knob, the AMBIENT LT knob and INTEG LT knob, as required.
Adjust the brightness of the Display Units: PFD, ND, MFD, EWD and SD.

OIS INITIALIZATION

Applicable to: ALL

LAPTOPS START

CAPT & FO LAPTOPS..... ON | BOTH

L2 *If the maintenance personnel did not set to ON the CAPT and FO laptops, on each lateral console, set the CAPT and FO laptops to ON.*
To turn on the laptops, slide the laptops ON/OFF sw to the right for not more than 2 s.
Set the laptop to ON sufficiently early to give enough time for laptop power on. Time for power on is approximately 5 min.

L1 BACKUP LAPTOP ..... ON | FO

L2 *The backup laptop rack is located in the FO lateral console.*
If the maintenance personnel did not set to ON the backup laptop, set the backup laptop to ON.
To turn on the laptop, slide the laptop ON/OFF sw to the right for not more than 2 s.
The backup laptop must be running to perform automatic data loading.

L1 **KEYBOARD AND CURSOR CONTROL UNIT (KCCU)**

CCD sw and KBD sw 1 and 2..... ON | BOTH

OIS APPLICATIONS START

OIT knob ..... ON | BOTH

L2 *Turn the OIT knob in order to start the OIT and adjust the brightness.*

L1 OIT SIDE sw ..... NSS AVNCS | BOTH
LOGIN AS PILOT..... PERFORM | BOTH

L2 The connection to NSS AVNCS takes a few minutes. During that time, the flight crew should launch the FLT OPS applications.

L1 OIT SIDE sw ..... FLT OPS | BOTH
LOGIN AS PILOT..... PERFORM | BOTH
NAV CHARTS..... START | BOTH
OPS LIBRARY..... START | BOTH

COMPANY COM(ACARS)INITIALIZATION

OIT SIDE sw ..... NSS AVNCS | FO
INIT DATA..... SEND | FO

L2 *Send a request to the airline ground station via the INIT DATA button of COMPANY COM application. When the request is delivered on ground (I.e. an acknowledgement from ground is received onboard), the request message appears in the Sent items.*

Note: Send Initialization after check input data and display data.

Note: Check Uplink message : CAT Recency, Full Thrust Recency And SOW Index Range.

Note: SOW Index Range is included for a month only if it is changed.

FLT OPS STATUS

OIT SIDE sw ..... FLT OPS | FO

- **In accordance with Operators policy or if required by operational regulation:**

FLT OPS STS page..... CHECK OIS VERSION | BOTH

L2 *If required, the flight crew performs this check unless a specific procedure is established as per Operators policy to ensure that the correct version is on board.*
On the FLT OPS STS page, check the OIS version number and compare it with the valid version number given as reference by the Operator (e.g. on the company flight plan).

L1 NAV CHARTS..... CHECK VALIDITY DATE | BOTH

L2 *Check the validity date of the NAV CHARTS on the FLT OPS STS page.*

ECAM/LOGBOOK CHECK

Applicable to: ALL

ECAM RCL

RCL pb ..... PRESS | CAPT

L2 *Press the RCL pb for at least 3 s to recall all alerts that were cleared or cancelled.*

L1 CLEARED or CANCELLED ALERTS ..... CHECK | CAPT

LOGBOOK CHECK

OIT SIDE sw ..... NSS AVNCS | CAPT
MEL/CDL ITEMS..... CHECK and NOTE CDL | CAPT

L2
- *Check the deferred items list*
- *Crosscheck with ECAM recall*
- *Note the missing parts of the CDL deferred items*
- *Check the maintenance release status*
- *Enter the pre-flight parameters, in accordance with Operators policy.*

MEL/CDL ITEMS CHECK

OIT SIDE sw ..... FLT OPS | CAPT

MEL/CDL ITEMS (as appropriate).....CHECK DISPATCH CONDITIONS | BOTH

L2 *Access the MEL and CDL items via the LOGBOOK STATUS panel of the OPS LIBRARY.*
MEL items are automatically activated in performance applications.
CDL items are automatically activated in performance applications, but without missing parts.

AIRCRAFT ACCEPTANCE

OIT SIDE sw ..... NSS AVNCS | CAPT
AIRCRAFT ACCEPTANCE.....PERFORM | CAPT

L2 *Before the electronic flight acceptance, check that VHF3 DATA mode is active.*
Accept the aircraft, sign electronically the flight acceptance report.

Note: The aircraft acceptance can be performed later, but must be completed at the end of the Cockpit Preparation.

APU AND ENG FIRE TEST/APU START

Applicable to: ALL

RMP

L2 For additional training-oriented information, *Refer to FCTM/NO-40 APU and ENG Fire Test/APU Start.*

L1 RMP 1 and 2.....ON | FO

L2 *FO switches on both RMPs.*

L1 STBY RAD NAV key..... OFF | FO
COMMUNICATION FREQUENCIES..... TUNE | FO

L2 *Use:*
- *VHFwill normally be selected for the active ATCcommunications*
- *VHFwill normally be selected for the emergency (121.5 MHZ)*

Note: When A/C is parked at the gate, VHF2 can be used for ATIS or company frequencies to ensure that VHF3 is devoted to ACARS.

- *VHF3 will normally be selected for ACARS (also used for ATIS, and company radio in flight)*

Note: When VHF 3 is selected for voice mode, up/down links of all ACARS won't work, so it must be switched to data mode immediately after having finished using the voice.

Note: The Speaker volume should be turned on for monitor during flight.

The flight crew usually uses VHF3 for ACARS.

L1 INT RECEPTION knob ..... RELEASE/ADJUST | BOTH

L2 *Press and release the INT RECEPTION knob to the out position.*
Turn the INT RECEPTION knob to adjust the volume and to enable contact with the ground crew.

APU AND ENG FIRE TEST

Note: The flight crew should apply the APU Start on Batteries supplementary procedure to start the APU on batteries. For more information, Refer to PRO-SUP-49 APU Start on Batteries . The flight crew should perform the APU and ENG fire tests when the APU is available.

APU FIRE pb-sw	CHECK IN and GUARDED	FO
APU AGENT light	OFF	FO
ENG 1(2)(3)(4) FIRE pb-sw	CHECK IN and GUARDED	FO
ENG 1(2)(3)(4) AGENT 1 and 2 light	OFF	FO
FIRE TEST pb	PRESS	FO

L2 *The flight crew should maintain the TEST pb pressed during the time of the test.*

L1 **TEST RESULT**

Check that all ENG FIRE and APU FIRE detection and extinguishing systems are operative:
- The continuous repetitive chime sounds
- The MASTER WARN light flashes
- The ECAM displays the ENG 1(2)(3)(4) FIRE , APU FIRE and MLG BAY FIRE alerts
- All ENG FIRE pb-sw and the APU FIRE pb-sw come on in red
- All SQUIB lights of the ENG and APU AGENT pb come on
- All DISCH lights of the ENG and APU AGENT pb come on
- All FIRE lights on the ENG MASTER panel come on.

Impacted by TDU: 00021429 APU Start

APU START

APU MASTER SW pb-sw	ON	FO
APU START pb	ON	FO

L2 *For more information, Refer to APU Start Sequence .*

L1 *Note: - If only batteries supply the aircraft, Refer to PRO-SUP-49 APU Start on Batteries .*
- If the APU start failed, Refer to APU Start Limitation.

Impacted DU: 00000674 APU Start_APU START

APU START

APU MASTER SW pb-sw	ON	FO

● **When the APU flap is fully open (I.e. FLAP OPEN indication appears on the APU SD page):**

APU START pb ..... ON | FO

L2 *On the APU SD page, check that FLAP OPEN appears before setting to ON the APU START pb .*

For additional informations, Refer to APU Start Sequence .

L1 Note: - *If only batteries supply the aircraft, Refer to PRO-SUP-49 APU Start on Batteries .*
- *If the APU start failed, Refer to APU Start Limitation.*

ELEC

EXT PWR (if ON)..... AS RQRD | FO

L2 *The flight crew should keep ON the external power units to reduce the APU load, particularly in hot weather conditions.*

OIS PREPARATION

Applicable to: ALL

FMS/OIS FLT OPS STS

L2 The flight crew initializes the OIS with the planned city pair (FROM/TO) and flight number (FLT NBR). The OIS can be initialized automatically from the FMS or manually.
Initialization of the FMS enables automatic initialization of the OIS Flight Ops applications (Performance and Navigation charts), the AOC and the Logbook.
At aircraft power-up, the DATA/STATUS page is the default FMS page that appears. Display the FMS ACTIVE/INIT page by pressing the INIT key on the KCCU, or by selecting INIT in the ACTIVE menu on the General Menu Bar on the MFD.

L1 ● **If Company Flight Plan is received via ACARS:**

ACFT STATUS on the FMS DATA/STATUS page..... CHECK | FO

L2 *Check:*
- *The engine and aircraft types*
- *The active database validity period*
- *The pilot stored elements.*

Check if any waypoint, NAVAID, route, and runway appear. Review and delete them, if appropriate.

L1 RECEIVED CPNY F-PLN..... INSERT | FO

L2 *The Company Flight Plan is automatically loaded in the FMS.*

If the flight crew wants to insert the received flight plan in SEC 1(2)(3), they should clear the secondary flight plan by using the Delete button, before inserting the received flight plan.
The Company Flight Plan can be received via ACARS even if the flight crew did not previously select CPNY F-PLN REQUEST.

L1 FLT NBR and FROM/TO on FMS ACTIVE/INIT page..... CHECK | FO
OIT SIDE sw .....FLT OPS | BOTH
FLT OPS STS page.....SELECT | BOTH
FLT OPS STS page.....CHECK UPDATED | BOTH

L2 *Check that FLT NBR and CITY PAIR in the OIS are in accordance with the FMS.*

L1 ● **If Company Flight Plan is not received via ACARS:**
OIT SIDE sw .....FLT OPS | BOTH
FLT OPS STS page.....SELECT | BOTH
FLT NBR and FROM/TO..... INSERT | FO

L2 *Enter the FLT NBR and CITY PAIR on the FLT OPS STS page.*

L1 FLT OPS STS page.....CHECK UPDATED | FO

PRELIMINARY PERFORMANCE DETERMINATION

L2 For additional training-oriented information, *Refer to FCTM/NO-40 OIS Preparation*.
L1 Compute the preliminary performance data in accordance with the technical condition of the aircraft and/or any other criteria that may impact the performance data (e.g. NOTAM, runway condition, aircraft configuration).

T.O PERF.....START | BOTH

L2 *Start the T.O PERF application.*

L1 AIRFIELD DATA.....OBTAIN | BOTH

L2 *Obtain airfield data that are used for preliminary takeoff performance computation.*

L1 ● **If dispatch under MEL or CDL and in accordance with the logbook:**
MEL ITEMS (as appropriate).....CHECK ACTIVATED | BOTH

L2 *As appropriate, check that the MEL items are activated in the applicable performance application.*

L1 CDL ITEMS (as appropriate).....
.....CHECK ACTIVATED and COMPLETE | BOTH

L2 *As appropriate, check that the CDL items are activated in the applicable performance application.*
Complete missing parts of the CDL items in accordance with the logbook.

L1 OIS PRELIMINARY TAKEOFF PERF.....COMPUTE and CROSSCHECK | BOTH

L2 *In the T.O PERF application, enter the selections in accordance with the estimated departure conditions:*

- *In the RUNWAY SELECTION panel, enter the runway characteristics*
  The flight crew should consider any NOTAM that affects the airport data.

  Note: *In anticipation of a possible runway change, select multiple runways, as applicable in the MULTIPLE RWY panel.*

- *In the OUTSIDE CONDITIONS panel, enter the outside conditions*
- *In the MEL/CDL panel, check selected items, if any*
- *In the AIRCRAFT CONFIGURATION panel, enter the aircraft configuration (e.g. aerodynamic configuration, air flow, thrust option)*
  Check the takeoff weight.
- *Launch the computation and check the results.*

L1 ● **In accordance with Operators policy or if required by operational regulation:**
PRELIMINARY TAKEOFF PERFORMANCE.....
..... STORE IN CURRENT EFF | FO

OPERATIONS ENGINEERING BULLETINS (OEB)

OEB in FCOM .....CHECK | BOTH

Review all OEBs in the OEB section of the FCOM, particularly red OEBs, that are applicable to the aircraft.

L2 *Any flight crewmember who operates at the flight deck at any time during the on-going flight should be aware of the applicable OEB(s), e.g. via this OEB review.*

Intentionally left blank

GENERAL

Applicable to: ALL

Exterior walkaround ensures that the general condition of the aircraft is satisfactory and that the visible aircraft components and equipment are safe for the flight:

- There is no impact damage to the structure
- There is no evident fuel, oil, or hydraulic leak
- All ground access doors are closed.

Maintenance personnel usually inspects the aircraft before the flight. In the absence of maintenance personnel, a flight crewmember performs this walkaround before the flight.
Items marked (*) must be performed again by a flight crewmember before the flight.
The parking brake must be set to ON during the exterior walkaround, in order to enable the flight crew to check brake wear indications.

WARNING	If any landing gear door is open, do not apply hydraulic power until clearance is obtained from maintenance personnel.

If any items are missing, or are not in an appropriate condition, use the Configuration Deviation List (CDL) for dispatch assessment.

BEFORE WALKAROUND

Applicable to: ALL

ECAM PAGES

L2 For additional training-oriented information, *Refer to FCTM/NO-50 Before Walkaround* .

L1 ● **On the DOOR SD page:**

CKPT OXYGEN PRESSURE.....CHECK | CAPT

Check that the cockpit oxygen pressure is green, and that there is no amber half-frame.

L2 *If the oxygen pressure appears with an amber half-frame, check that the pressure remains above the minimum necessary to fly the scheduled flight, with the real number of cockpit occupants: Refer to OXYGEN SYSTEM LIMITATIONS .*

L1 CABIN OXYGEN PRESSURE.....CHECK | CAPT

Check that the cabin oxygen pressure is green, and that there is no amber half-frame.

L2 *If the oxygen pressure appears with an amber half-frame, check that the pressure remains above the minimum necessary to fly the scheduled flight, with the real number of cabin occupants: Refer to OXYGEN SYSTEM LIMITATIONS .*

L1

● **On the HYD SD page:**

RESERVOIR FLUID LEVEL.....CHECK WITHIN NORMAL RANGE | CAPT

L13

Note: If the normal filling range appears in white with an amber cross indicating that it is not computed, set to NAV any ADIRS MODE selector .
After the engine start, if required, the hydraulic reservoir of the LEHGS is automatically refilled. The normal filling range of the hydraulic system takes into account the amount of fluid that will be transferred to the LEHGS . However, to compute the fluid level in the LEHGS , temperature information from the ADR s is required.

● **On the ENG SD page:**

ENG OIL QUANTITY.....CHECK NORMAL | CAPT

Note: If the ENG oil quantity indication does not appear on the ENG SD page, press all ENG FADEC GND PWR pb-sw on the overhead maintenance panel.

L2 *Check that the oil quantity is at, or above 6 quarts plus the estimated consumption for the intended flight (average estimated consumption is 0.4 quarts per hour), but not lower than 10 quarts.*

SPEED BRAKE LEVER

SPEED BRAKE lever .....CHECK RETRACTED and DISARMED | CAPT

WARNING	*If the flight control surfaces position does not agree with the SPEED BRAKE lever position, do not apply hydraulic power until clearance is obtained from maintenance personnel.*

PARK BRK

PARK BRK handle .....ON | CAPT

L2 *The flight crew should set to ON the PARK BRK handle during the exterior inspection, in order to check the brake wear indicators.*

BODY ACCU AND BRK PRESSURE INDICATIONS

BODY ACCU and BRK pressure indications.....CHECK | CAPT

L2 *Check for normal indications.*
The BODY ACCU pressure indication must be in the green arc.
L1 *If required, press the ACCUS REINFLATE pb to pressurize the BLG and WLG brake accumulators.*

SLATS/FLAPS POSITION

FLAPS.....CHECK POSITION | CAPT

L2 *Check that the slats/flaps position on the lower part of the PFD agrees with the FLAPS lever position.*

L1

WARNING	*If the flight control surfaces position does not agree with the FLAP lever position, do not apply hydraulic power until clearance is obtained from maintenance personnel.*

EMERGENCY EQUIPMENT

Check that:

- Life vests are stowed
- Crash axe is stowed
- Protective Breathing Equipment (PBE) is stowed and ready for use
- Portable fire extinguisher is lockwired and the pressure gauge indicator is in the green area
- Oxygen masks are stowed
- Flashlights are stowed
- Escape ropes are stowed.

LANDING GEAR PINS AND COVERS

GEAR PINS and COVERS..... CHECK ONBOARD and STOWED | CAPT

SECURITY INSPECTION

This procedure will be performed for security when entering the cockpit before Exterior Inspection and Cockpit preparation.
Check for any suspicious item in the following area :

SECURITY INSPECTION CHECK ITEM
FLOOR
CEILING
AFTER FLIGHT DECK WALL
DOCUMENT STOWAGE
SEATBACK POCKET & LIFE VEST
HEADSET STOWAGE BIN
ESCAPE ROPE STOWAGE
WASTE BIN
OXYGEN MASK STOWAGE
COAT ROOM/SUITCASE STOWAGE

Continued on the following page

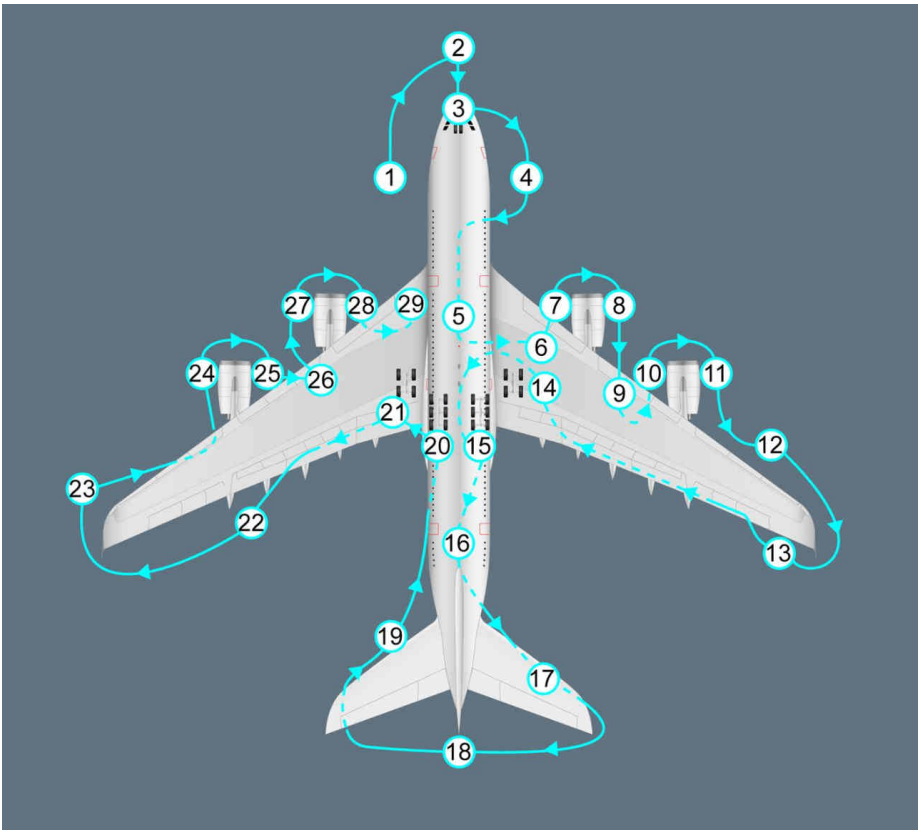
Continued from the previous page

SECURITY INSPECTION CHECK ITEM
SPARE BULB BOX
DISKET BOX
SMOKE HOOD
PRINTER PAPER ROLL STOWAGE
3rd/4th OCCUPANT SEAT
L/G LOCKING PIN BOX
UPPER/UNDER SIDE AREA OF THE SEAT
AREA AROUND RUDDER/BRAKE PEDALS
SLIDING TABLE
CHECKLIST STOWAGE

EXTERIOR WALKAROUND

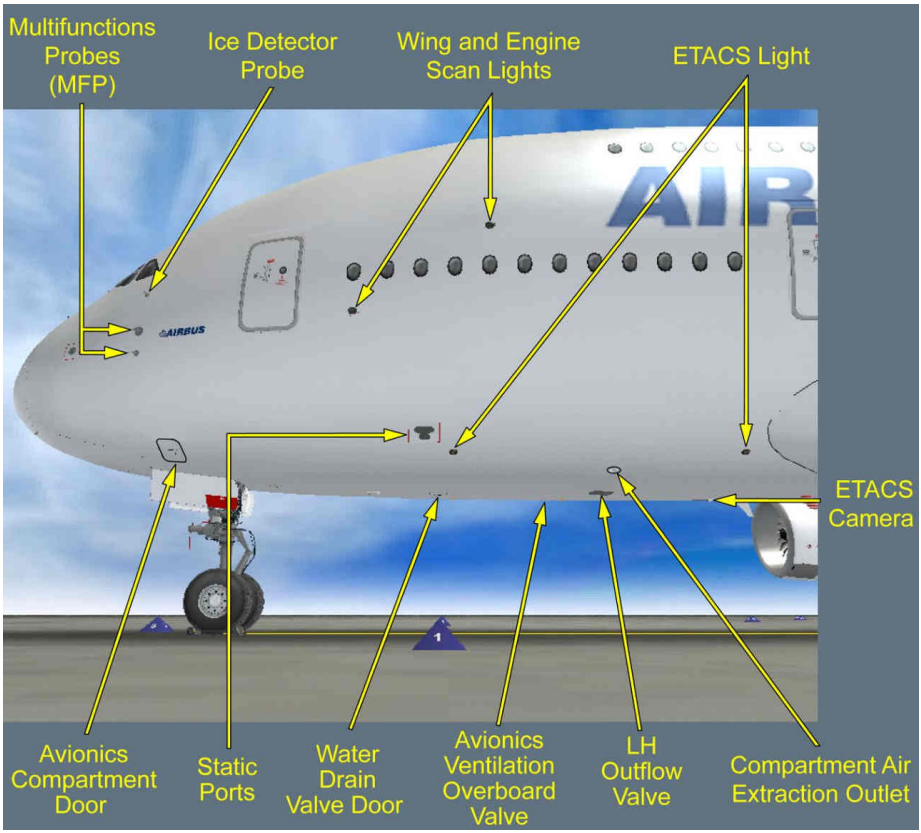
Applicable to: ALL

Exterior Walkaround



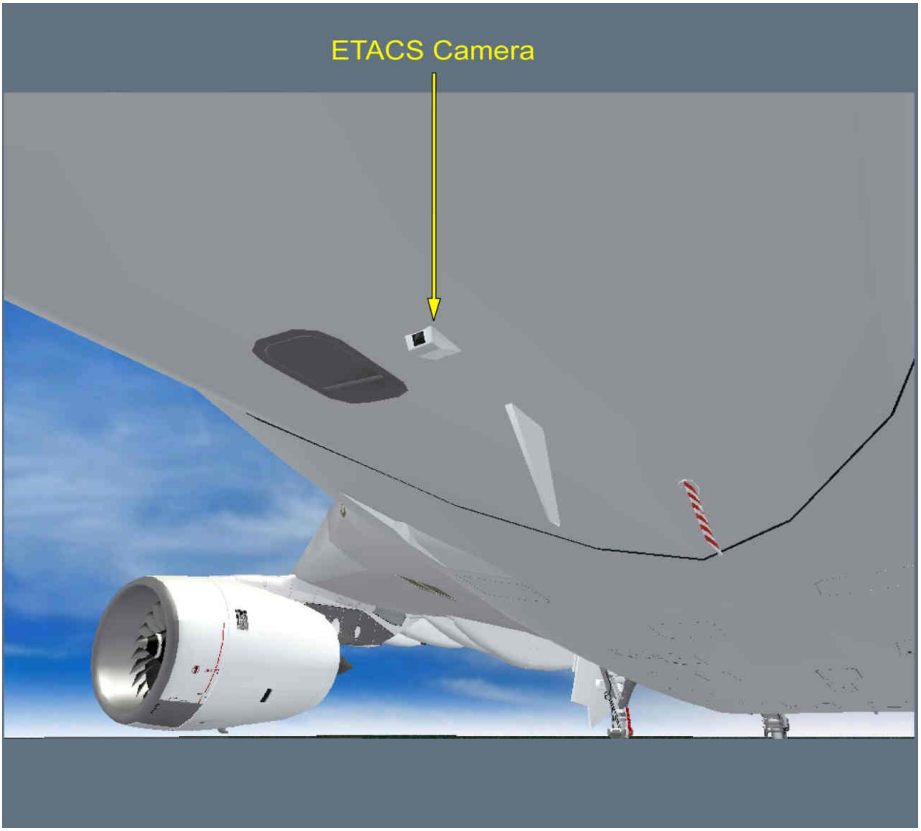
LH FWD FUSELAGE

Applicable to: ALL



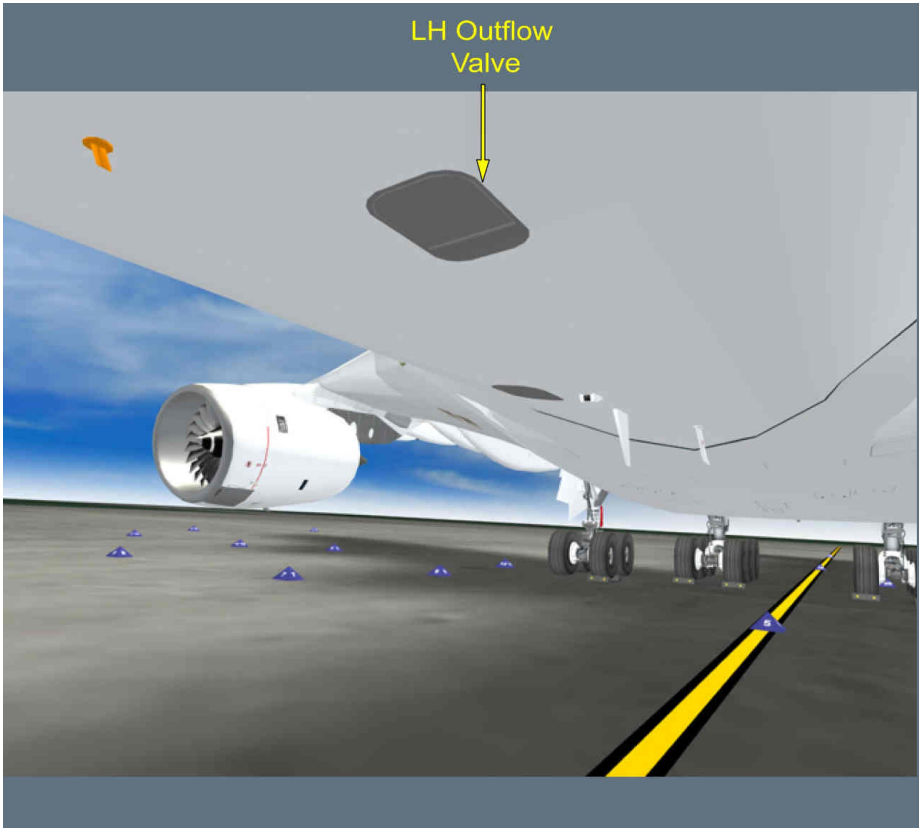
ETACS CAMERA.....CHECK CONDITION

L2 *Check the condition of the ETACS camera, and make sure it is clean and not damaged.*



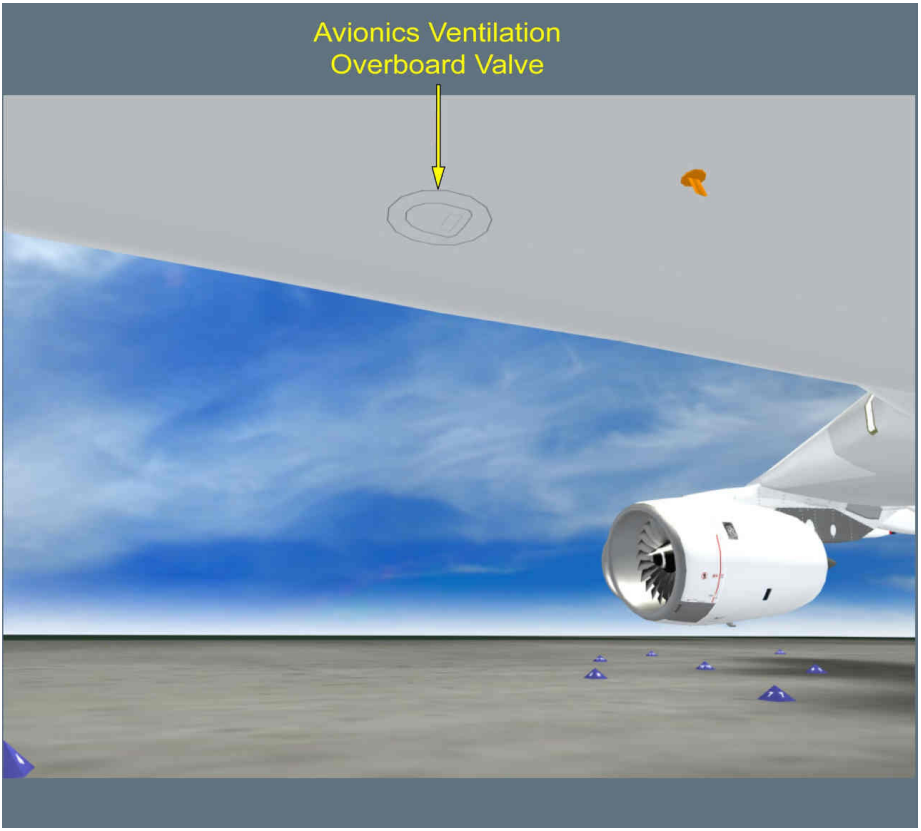
L1 LH OUTFLOW VALVE.....CHECK CONDITION

L2 *Check the condition of the LH forward outflow valve, and make sure it is clear of obstruction.*



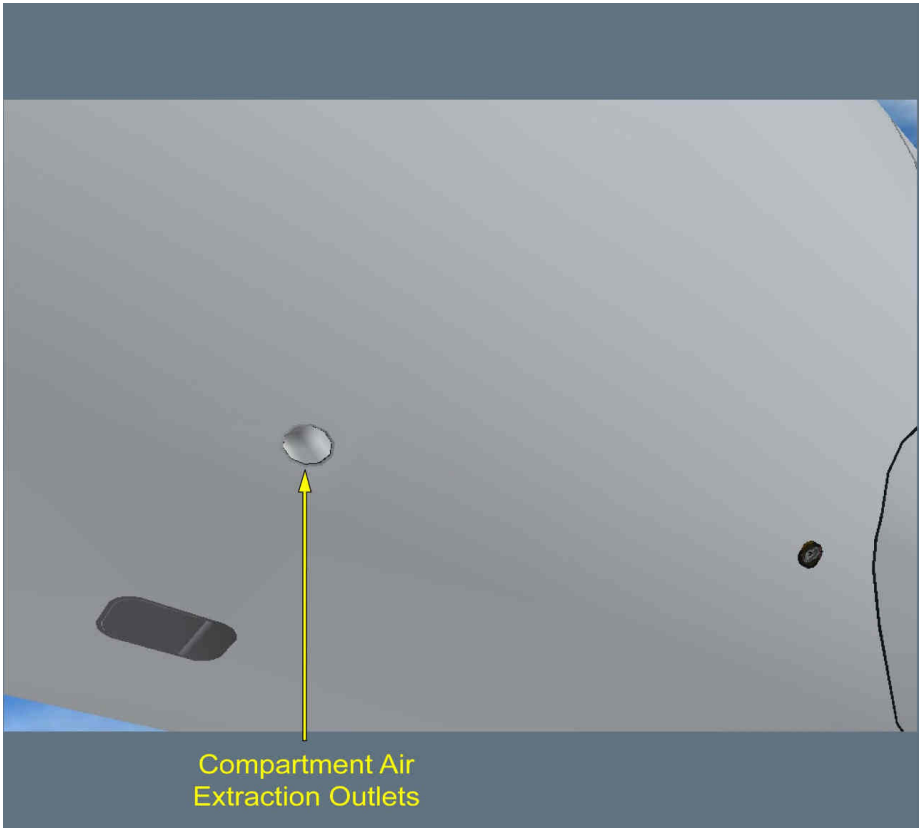
L1 AVIONICS VENTILATION OVERBOARD VALVE.....CHECK CONDITION

L2 *Check the condition of the avionics ventilation overboard valve.*



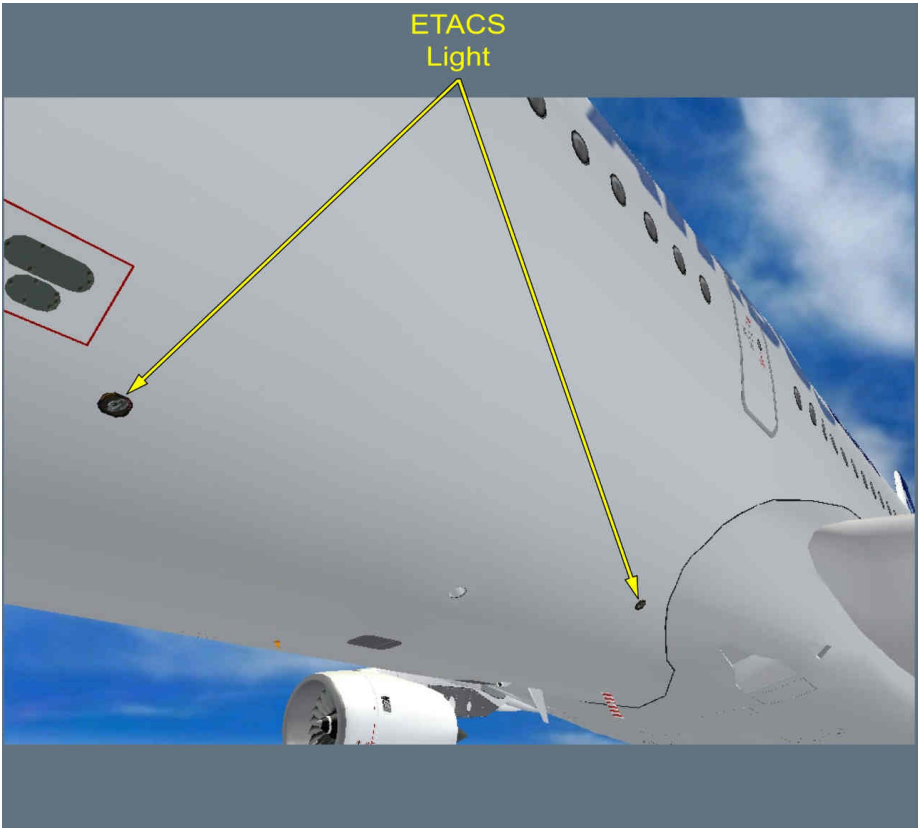
L1 COMPARTMENT AIR EXTRACTION OUTLETS ..... CHECK CONDITION

L2 *Check that the extraction outlets are clear of obstruction.*

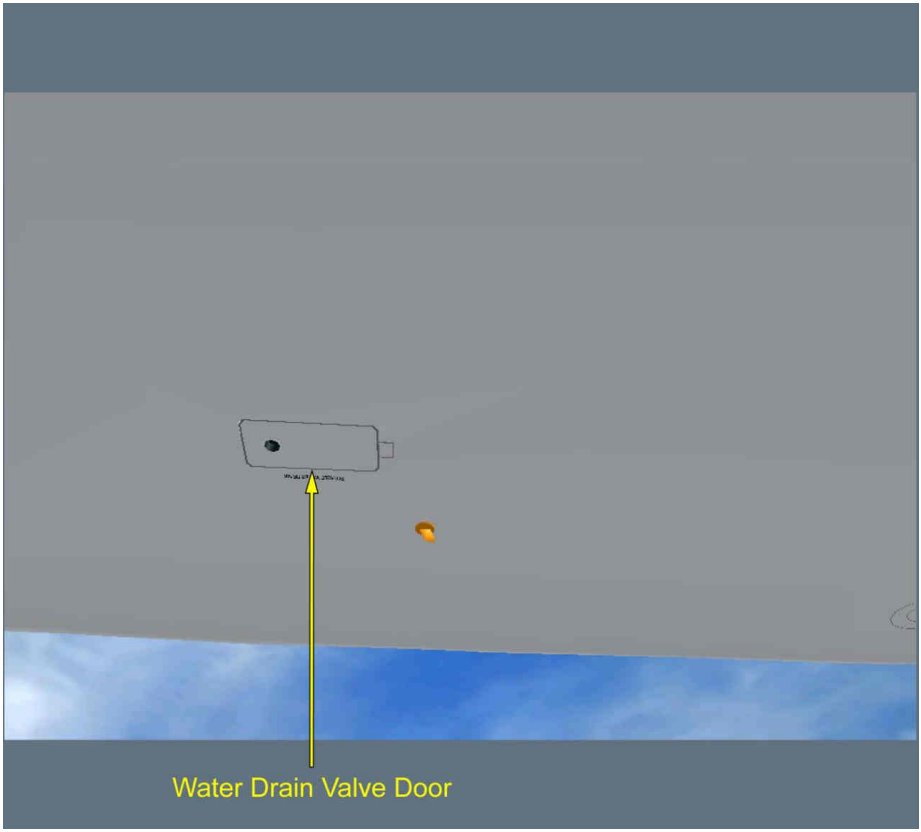


L1 ETACS LIGHT..... CHECK CONDITION

L2 *Check the condition of the LH ETACS light, and make sure it is clean and not damaged.*

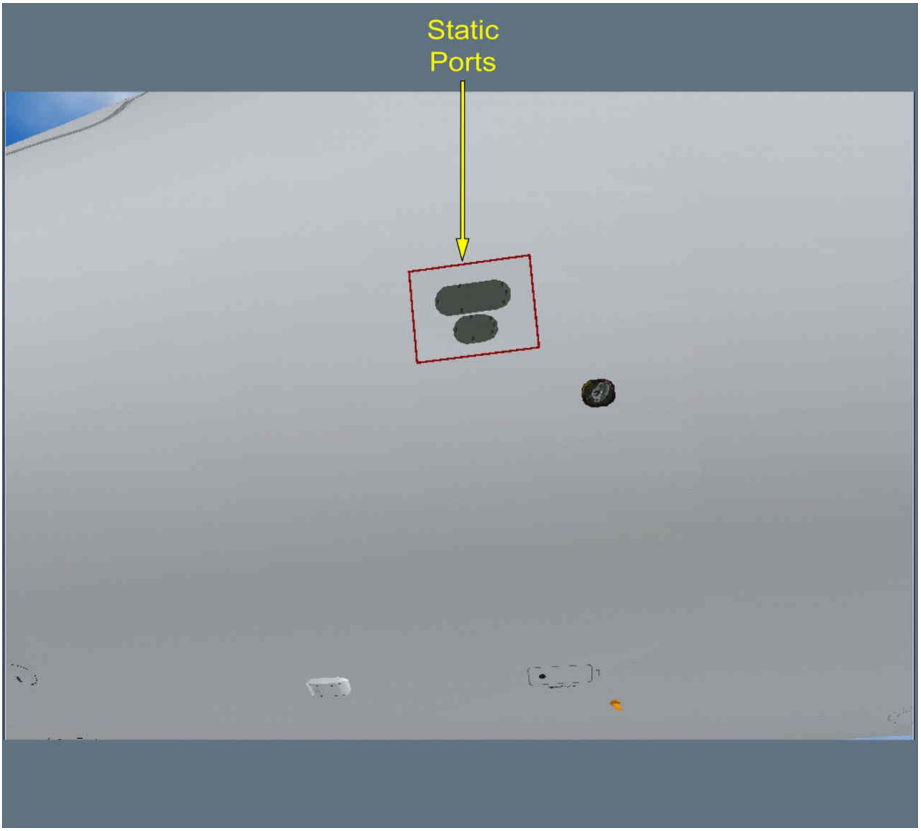

ETACS
Light

L1 WATER DRAIN VALVE DOOR..... CLOSED



STATIC PORTS.....CLEAR

L2 *Check that the CAPT, F/O, standby, and backup static ports are clean, and that the protective covers are removed.*



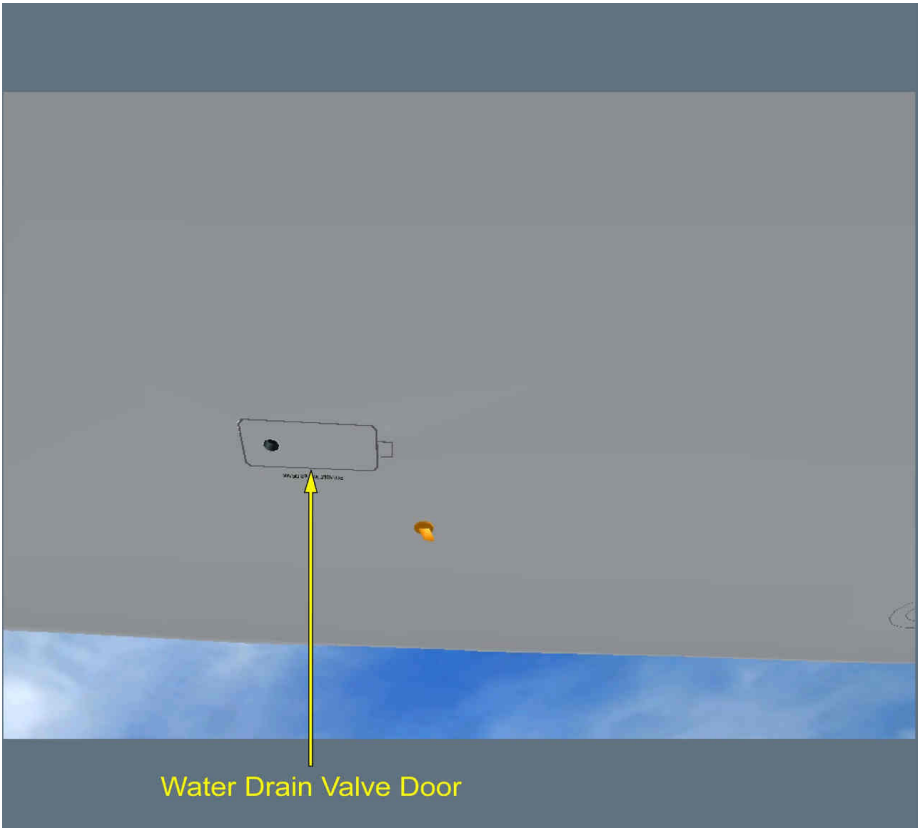
L1 WING AND ENGINE SCAN LIGHTS..... CHECK CONDITION

L2 *Check the condition of the wing and engine scan lights, and make sure that they are clean and not damaged.*



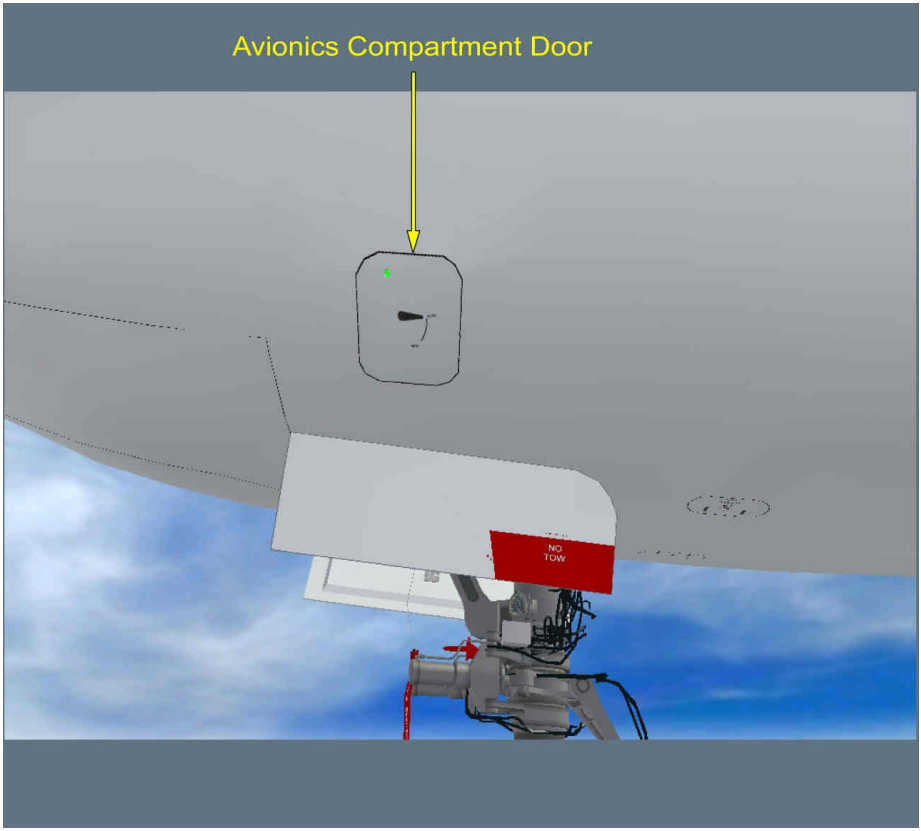
L1 ANTENNAS.....CHECK CONDITION

L2 *While walking around the fuselage, check the condition of the various antennas and make sure that they are not damaged.*



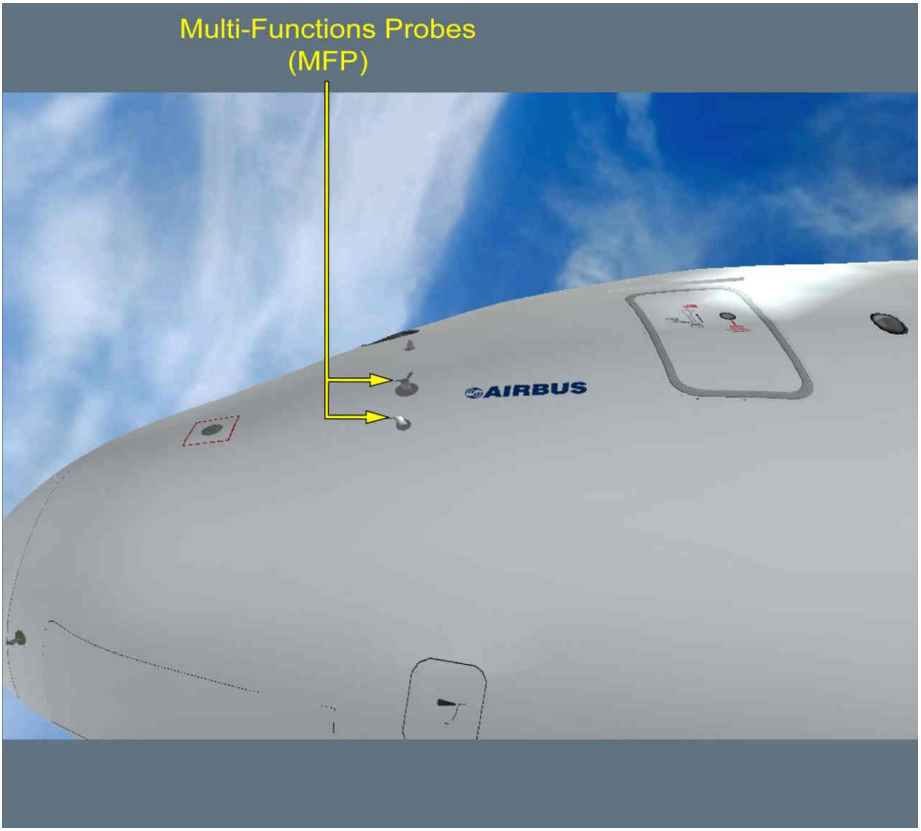
L1 AVIONICS COMPARTMENT DOOR.....CLOSED

L2 *Check that the avionics compartment door is closed. Check that the visual locking indicator is green.*



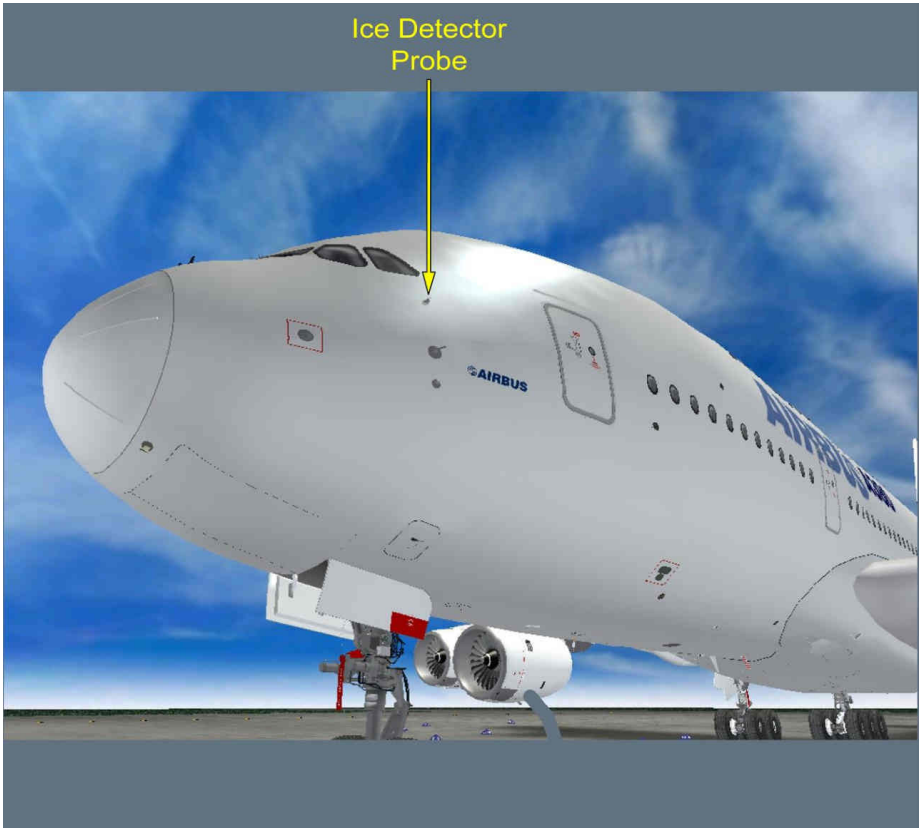
L1 * MULTI-FUNCTIONS PROBE (MFP).....CHECK CONDITION

L2 *Check that the CAPT MFP (PITOT / AOA / TAT) is not damaged.*



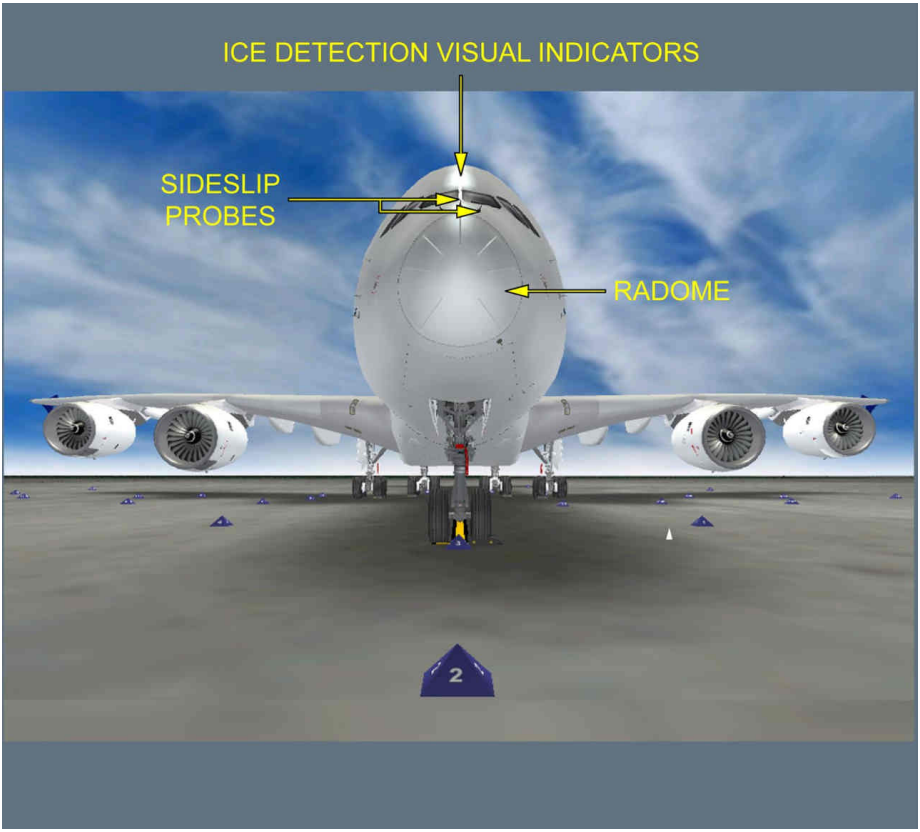
L1 ICE DETECTOR PROBE.....CHECK CONDITION

L2 *Check that the ice detector probe is not damaged.*


Ice Detector
Probe
AIRBUS

NOSE SECTION

Applicable to: ALL



* RADOME.....CHECK CONDITION

L2 *Check the radome for cracks, deformation, or lighting strike.*



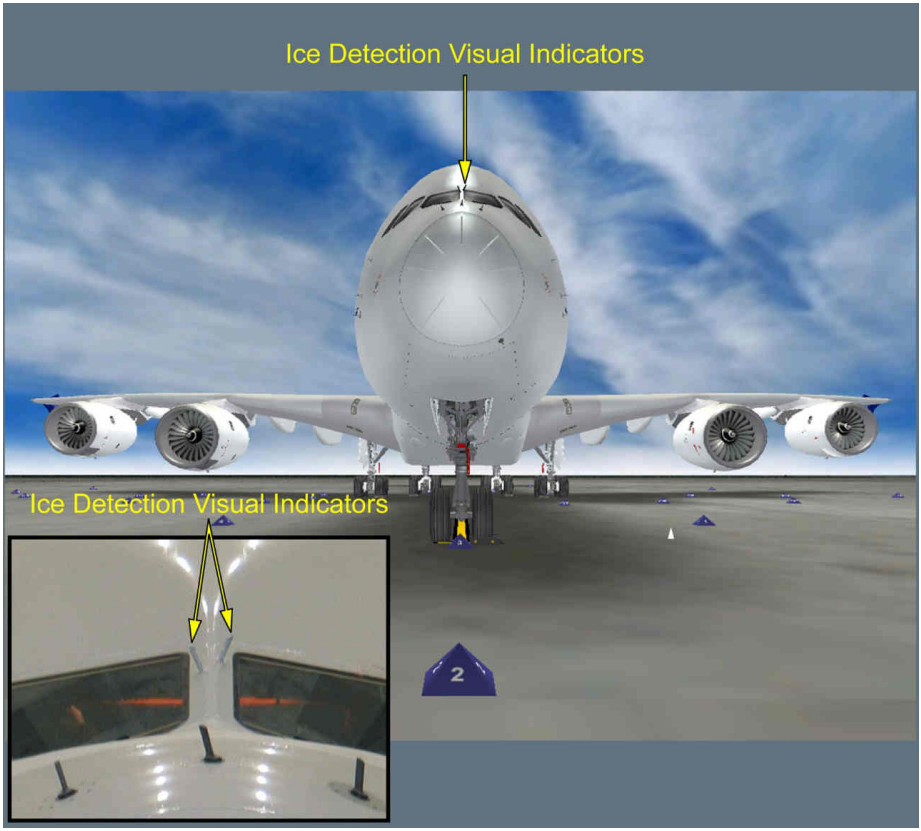
L1 SIDESLIP PROBES.....CHECK CONDITION

L2 *Check that the sideslip probes (3) are not damaged.*



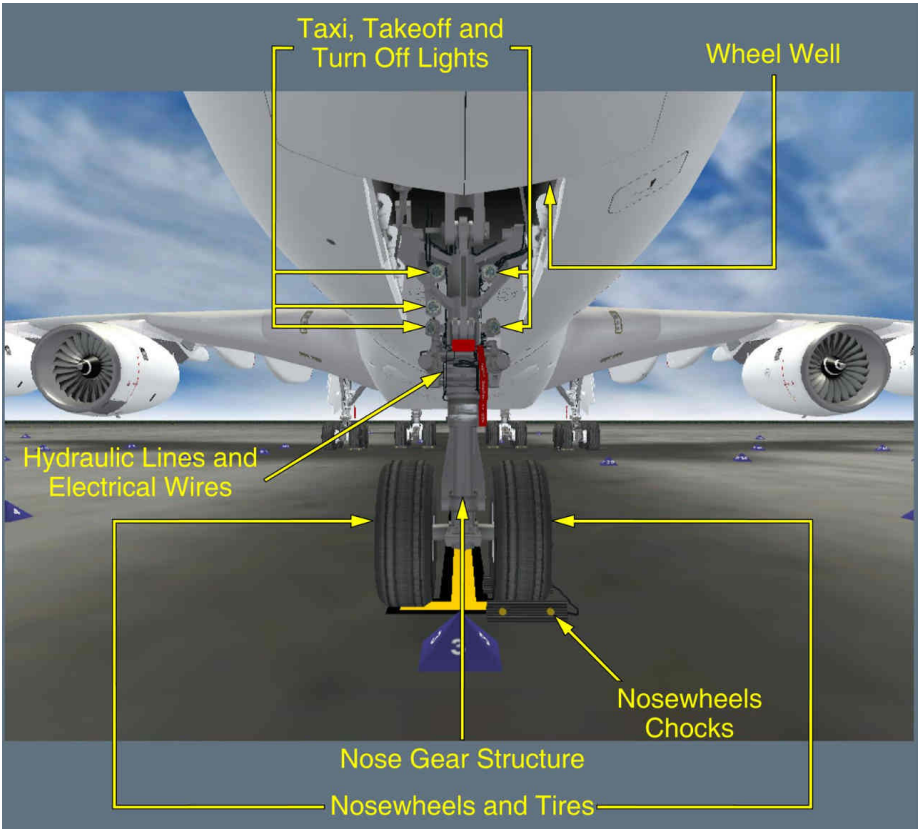
L1 ICE DETECTION VISUAL INDICATORS (2).....CHECK CONDITION

L2 *Check that the ice detection visual indicators are not damaged.*


Ice Detection Visual Indicators
Ice Detection Visual Indicators
2

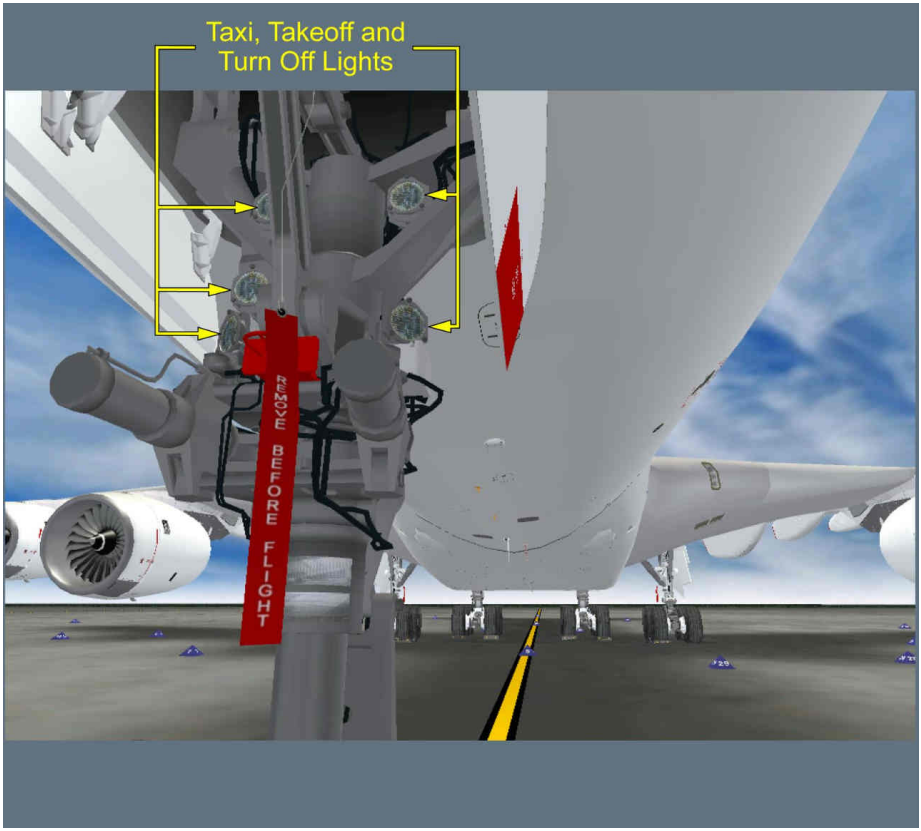
NOSE L/G

Applicable to: ALL

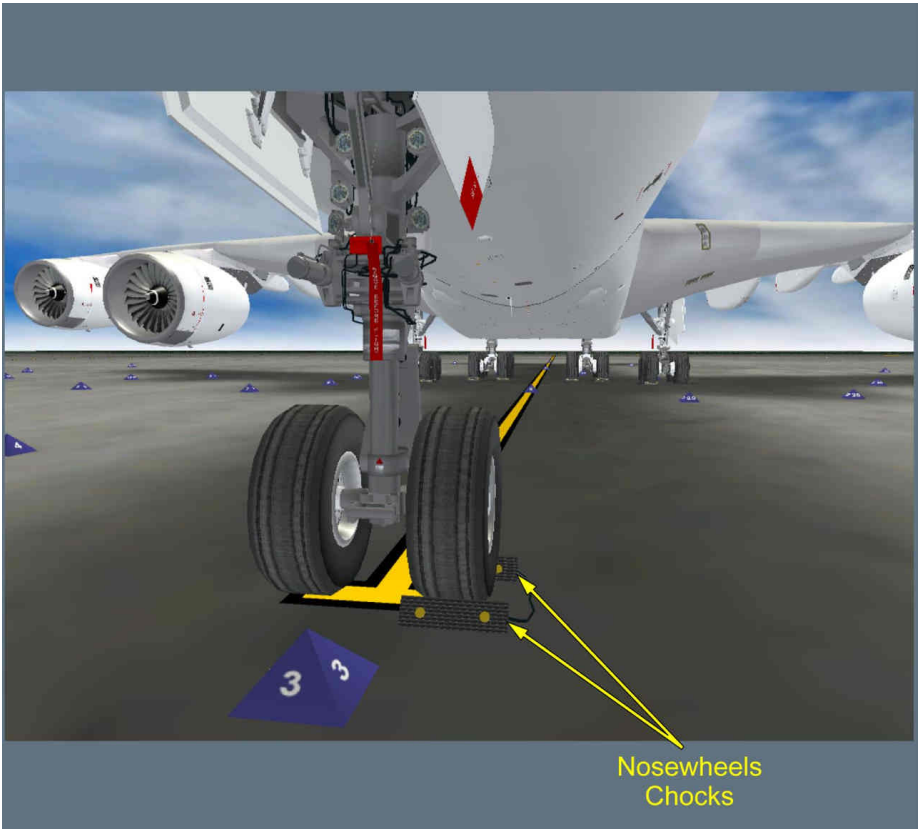


TAXI, TAKEOFF AND TURN OFF LIGHTS..... CHECK CONDITION

L2 *Check the conditions of the taxi, takeoff and turn off lights, and make sure there are clean and not damaged.*

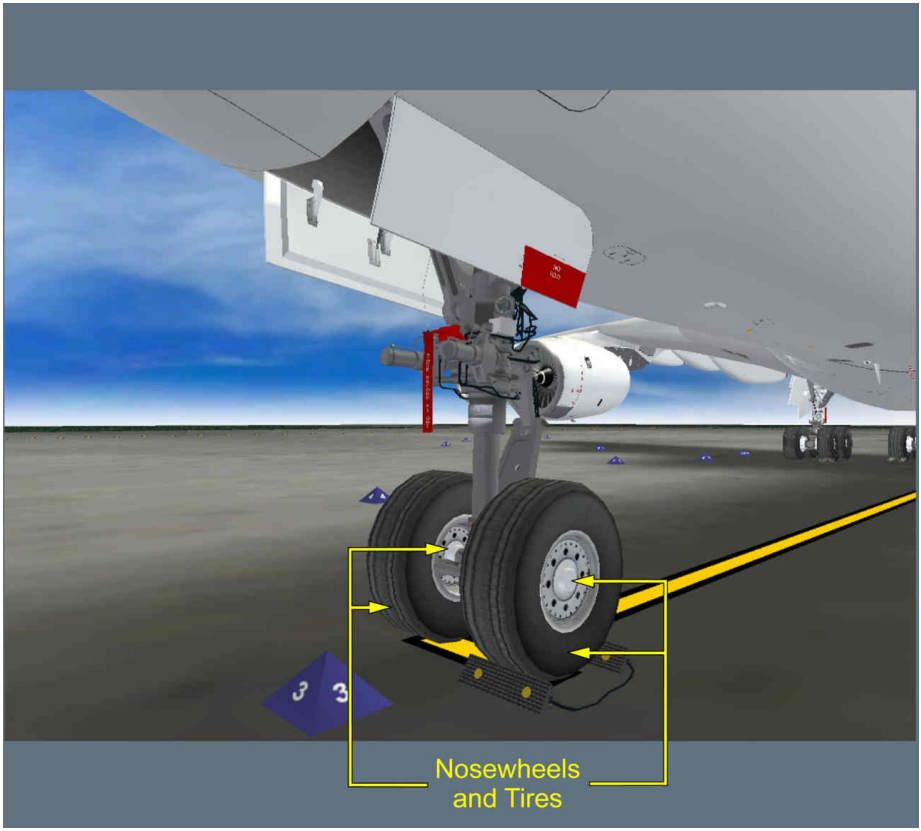

Taxi, Takeoff and
Turn Off Lights
REMOVE BEFORE FLIGHT

L1 * NOSE WHEEL CHOCKS.....IN PLACE



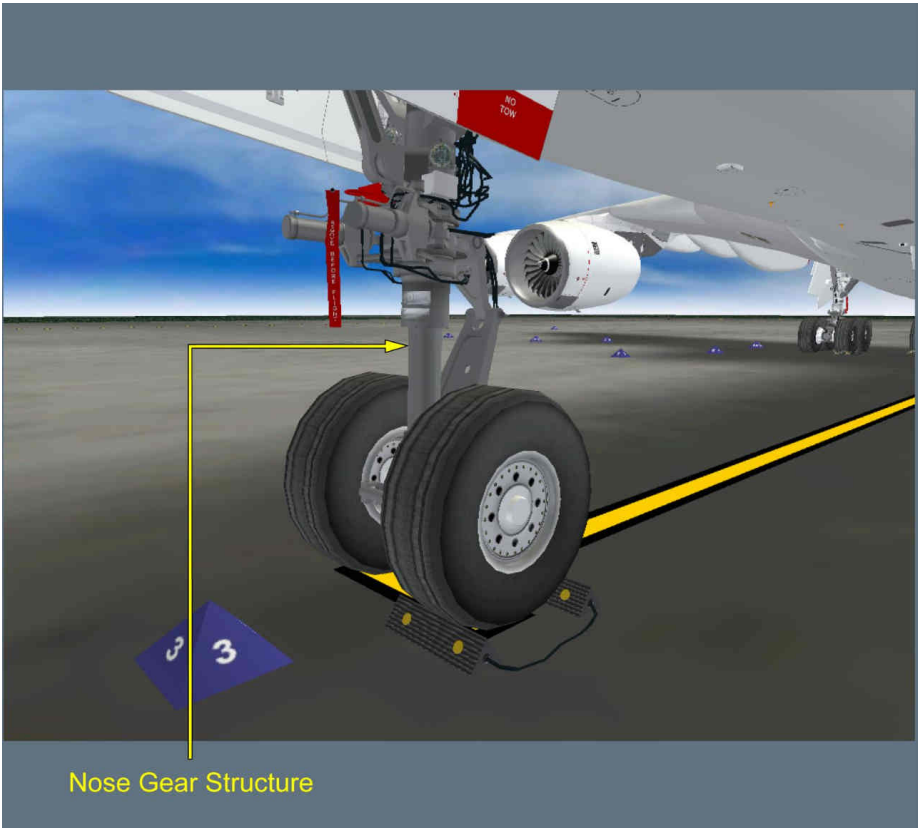
* NOSEWHEELS AND TIRES..... CHECK CONDITION

L2 *Check the nosewheels and tires for wear, cuts, and cracks.*



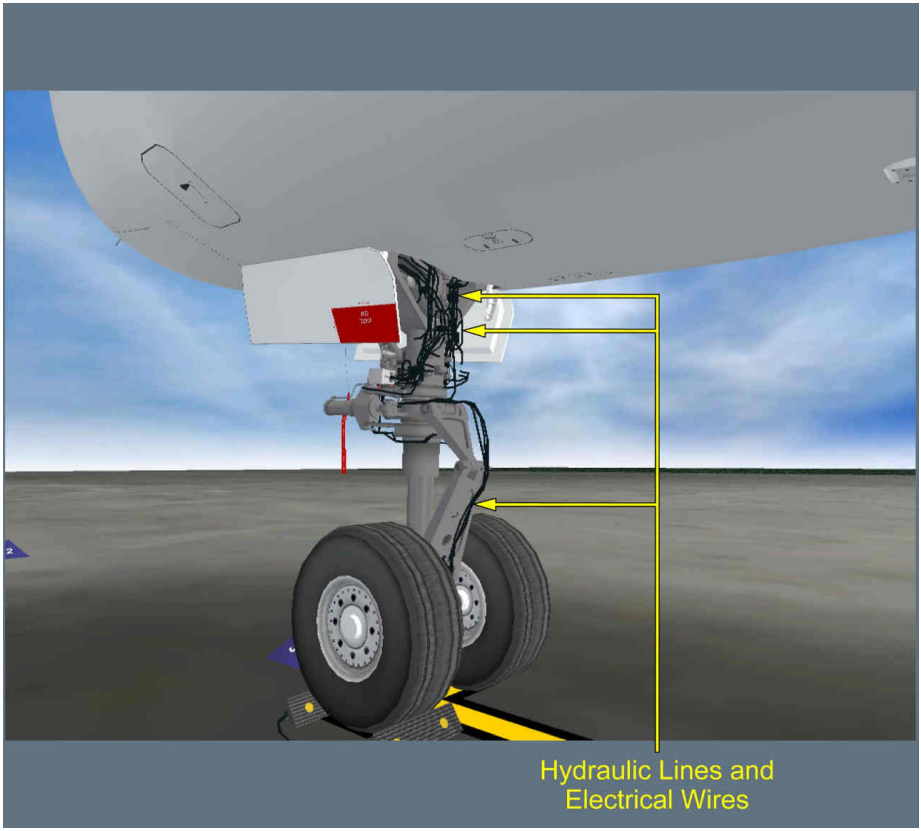
L1 NOSE GEAR STRUCTURE..... CHECK CONDITION

L2 *Check the nose gear structure and check that the shock absorber is inflated. A chrome part should be visible.*



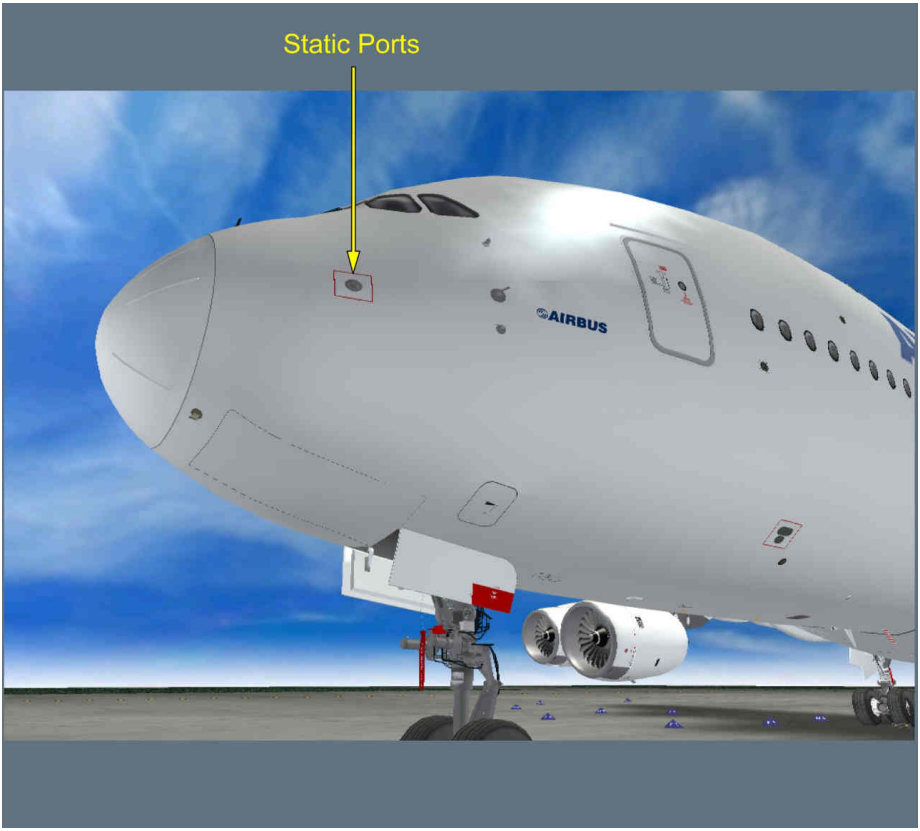
L1 HYDRAULIC LINES AND ELECTRICAL WIRES..... CHECK CONDITION

L2 *Check the hydraulic lines for leaks. Check that the electrical wires are not damaged.*



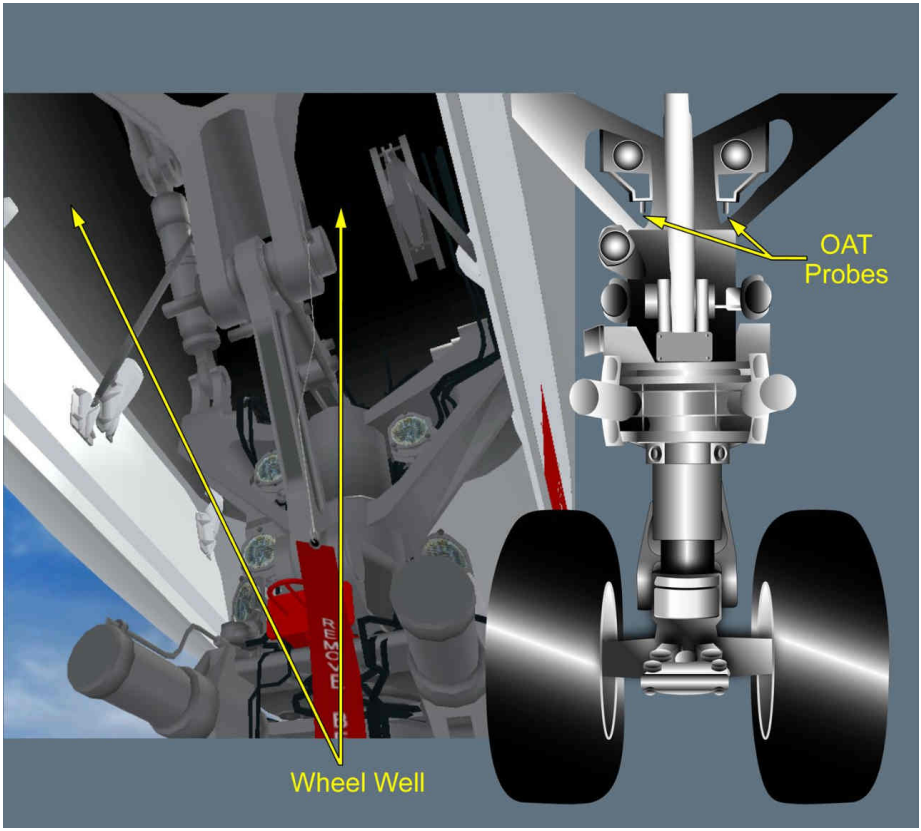
L1 STATIC PORTS .....CLEAR

L2 *Check that the static ports are clean and that the protective covers are removed.*



L1 WHEEL WELL.....CHECK

L2 *Check the wheel well for leaks.*

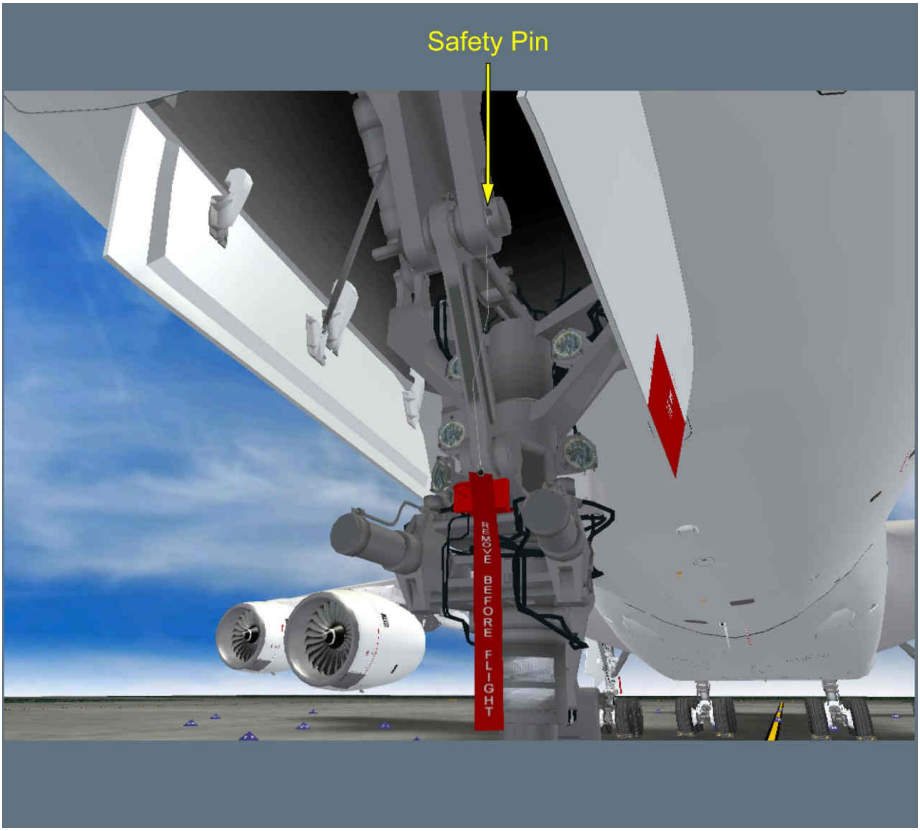


L1 OAT PROBES.....CHECK CONDITION

L2 *Check the OAT probes are not damaged.*

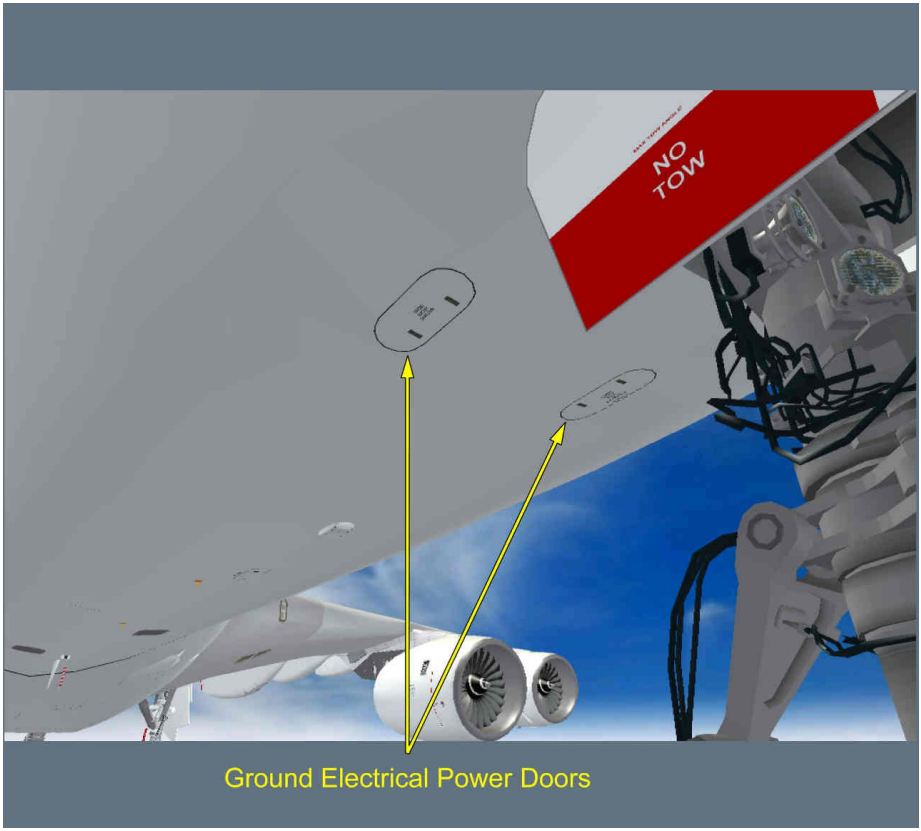
L1 SAFETY PIN.....REMOVED

L2 *Check that the nose wheel safety pin has been removed.*



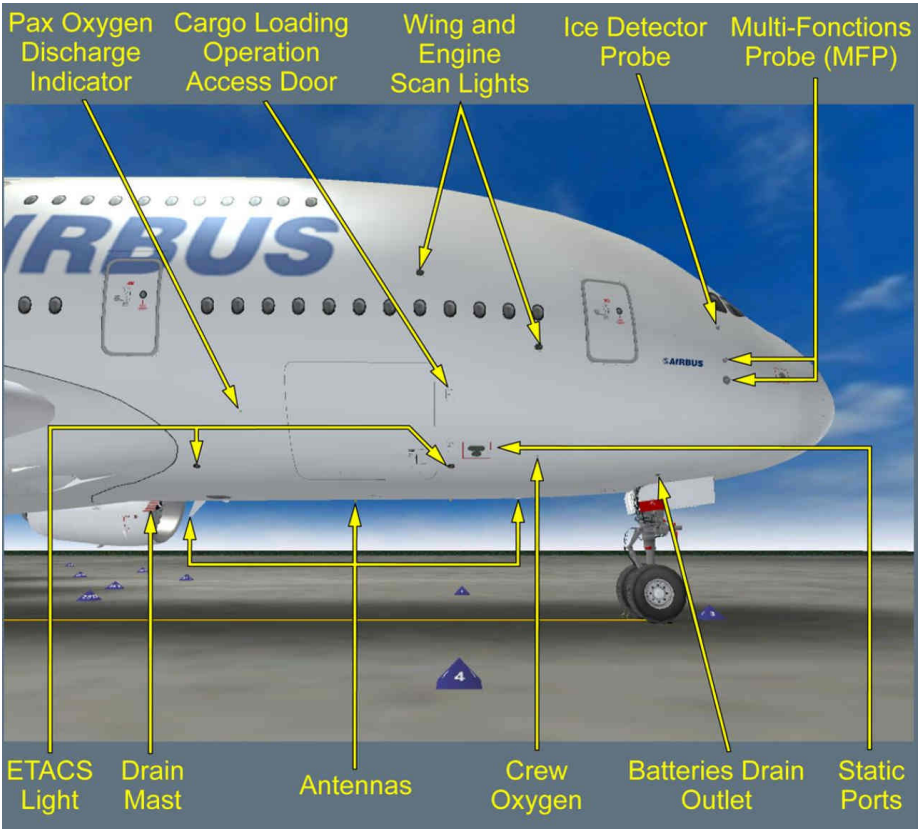
L1 GROUND ELECTRICAL POWER DOORS (if not required)..... CLOSED

L2 *If ground electrical power is required, check that the security strap is tied to prevent the plug from falling. If ground electrical power is not required, check that the door is closed.*


NO
TOW
Ground Electrical Power Doors

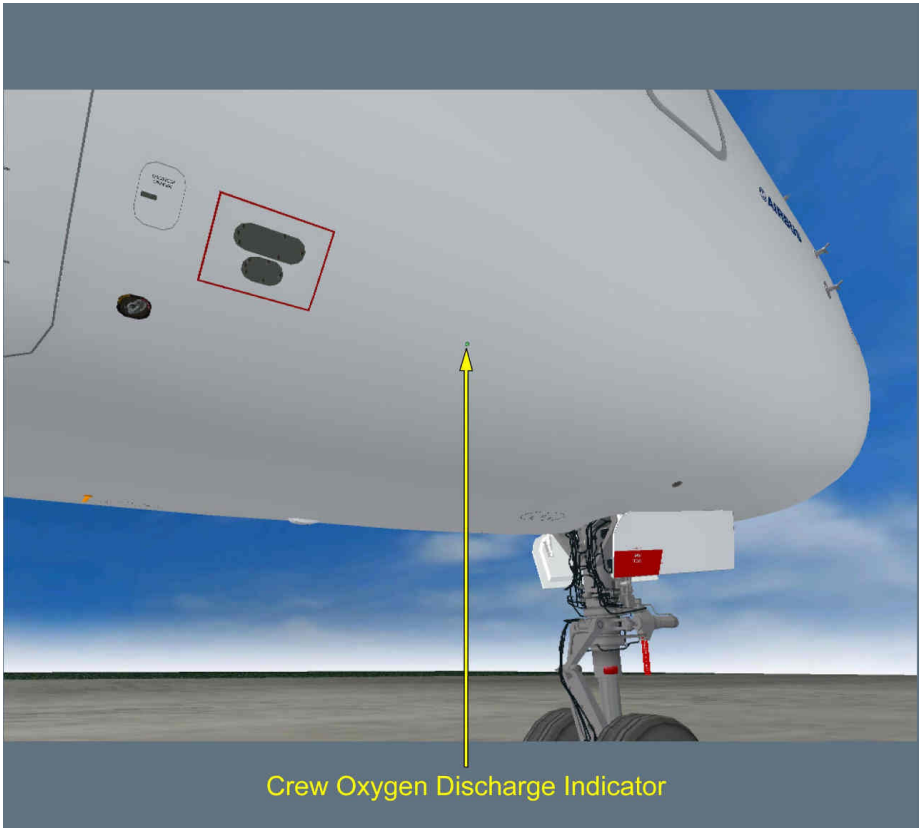
RH FWD FUSELAGE

Applicable to: ALL



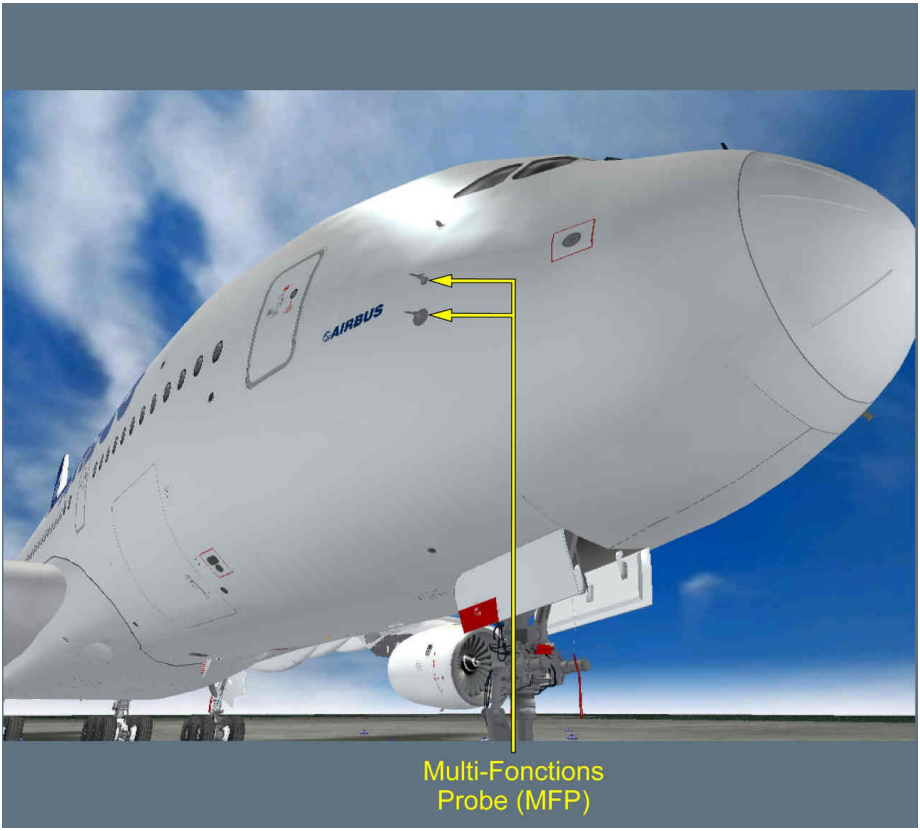
CREW OXYGEN DISCHARGE INDICATOR..... GREEN

L2 *Check that the green oxygen discharge indicator is in place: In the case of an overpressure in the oxygen system, the disk would be missing.*



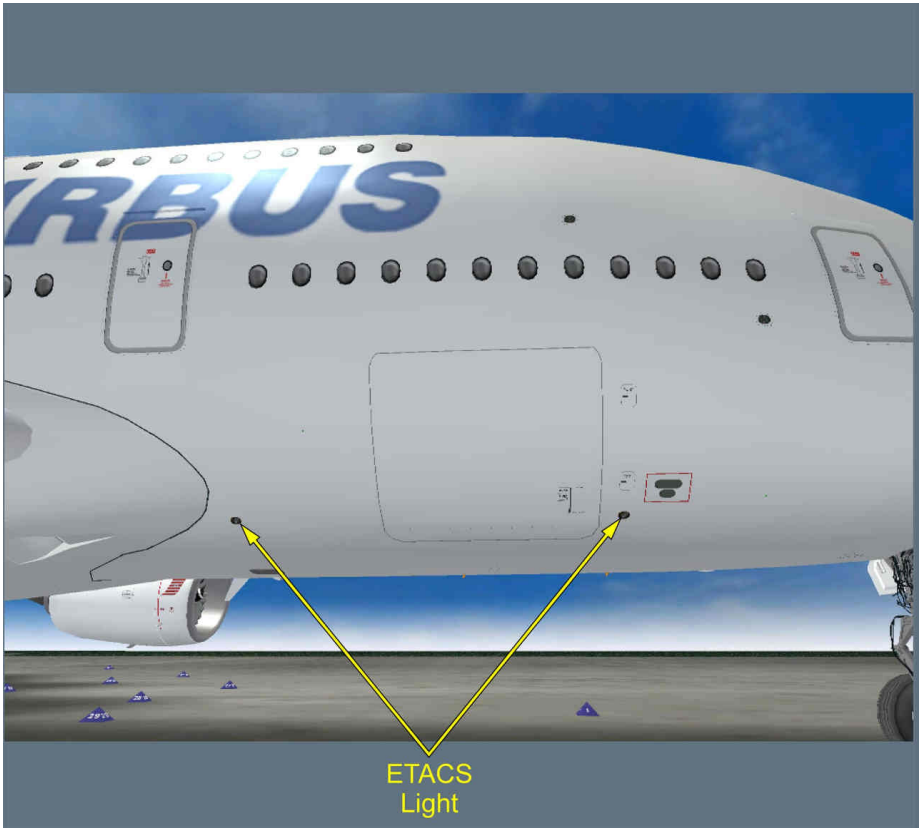
L1 MULTI-FUNCTIONS PROBES (MFP)..... CHECK CONDITION

L2 *Check that the F/O and standby MFP (PITOT / AOA / TAT) are not damaged.*



L1 RH ETACS LIGHT.....CHECK CONDITION

L2 *Check the condition of the RH ETACS light, and make sure it is clean and not damaged.*



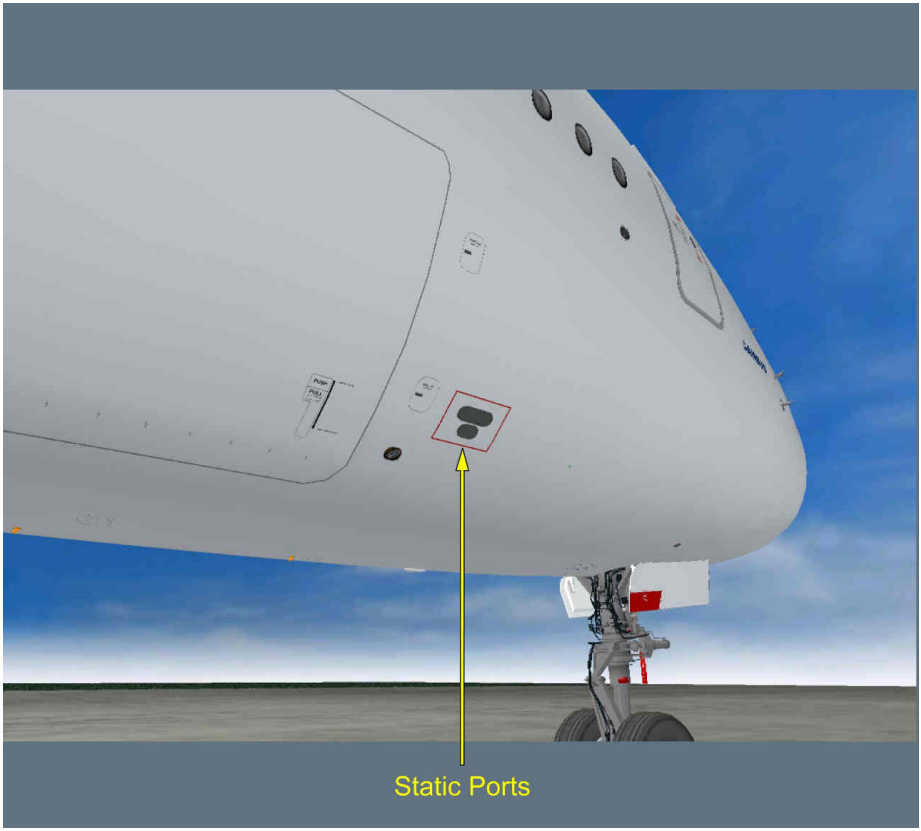
L1 ICE DETECTOR PROBE.....CHECK CONDITION

L2 *Check that the ice detector probe is not damaged.*



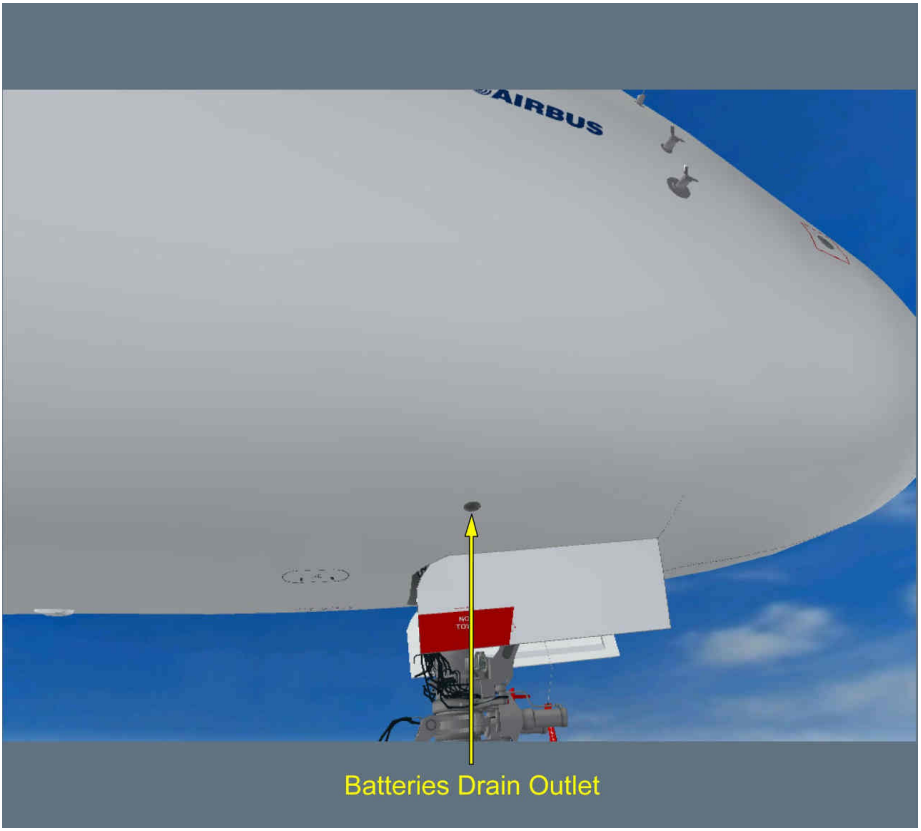
L1 STATIC PORTS..... CLEAR

L2 *Check that the CAPT, F/O standby static ports are clean and that the protective covers have been removed.*



L1 BATTERIES DRAIN OUTLET.....CHECK CONDITION

L2 *Check that there is no leak from the batteries drain outlet.*



L1 CARGO LOADING OPERATION ACCESS DOOR.....CLOSED

L2 *Check that the cargo loading operation access door is closed.*



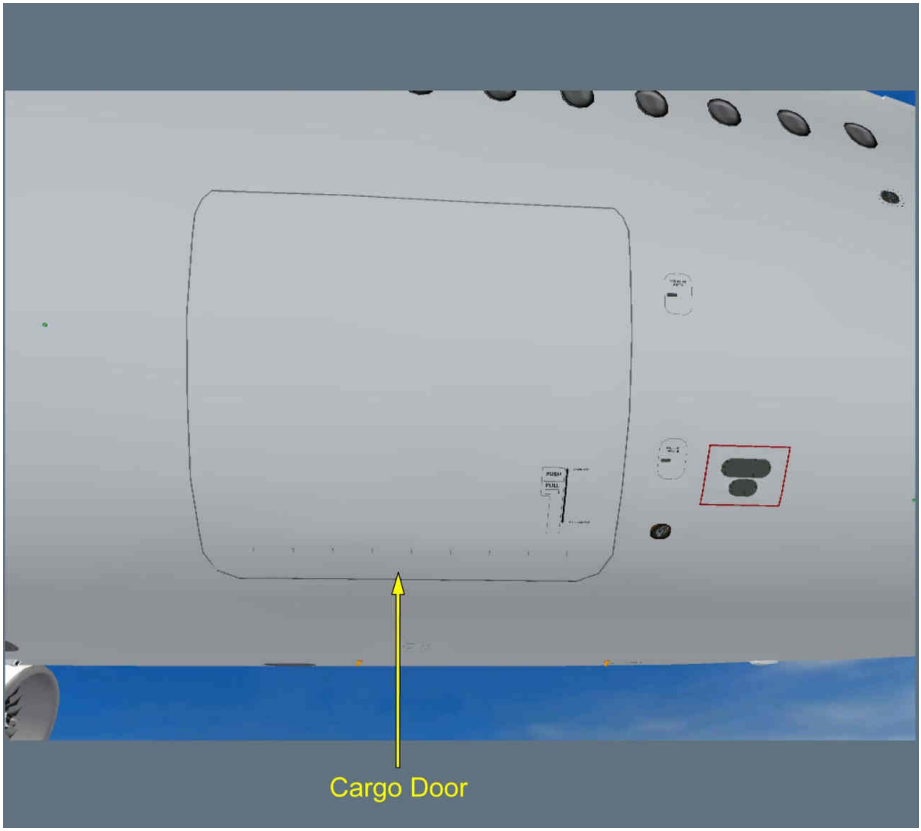
L1 CARGO DOOR OPERATION ACCESS DOOR..... CLOSED

L2 *Check that the cargo door operation access door is closed.*



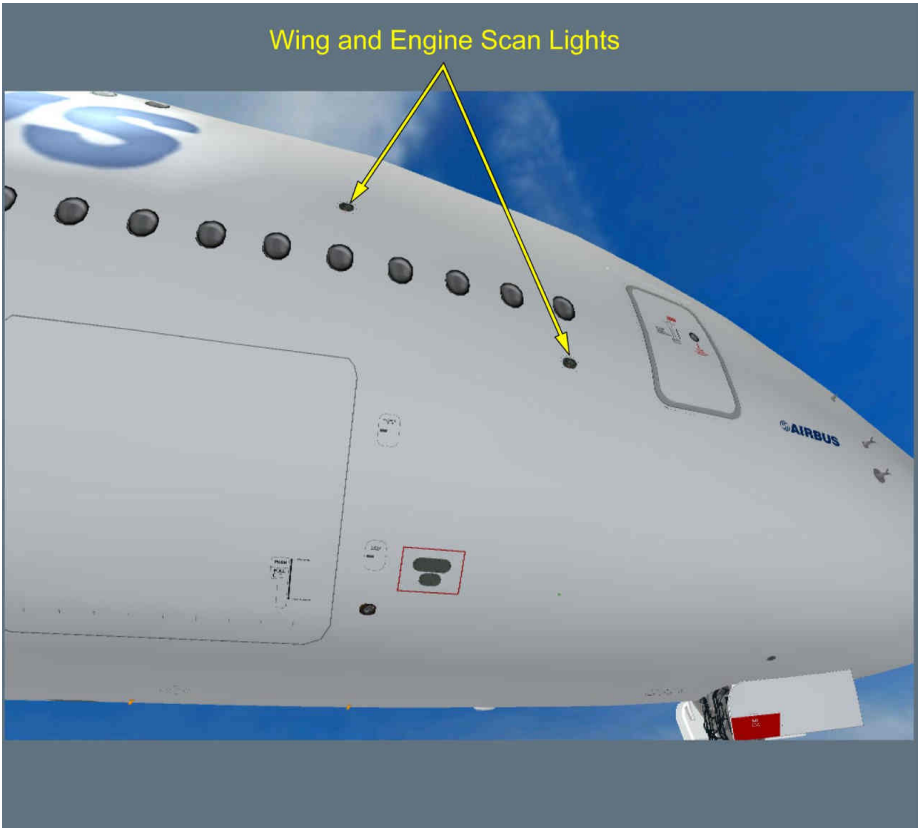
L1 CARGO DOOR..... CLOSED

L2 *Check that the cargo door is closed: The cargo door is correctly closed when there are no red indicator flags visible.*



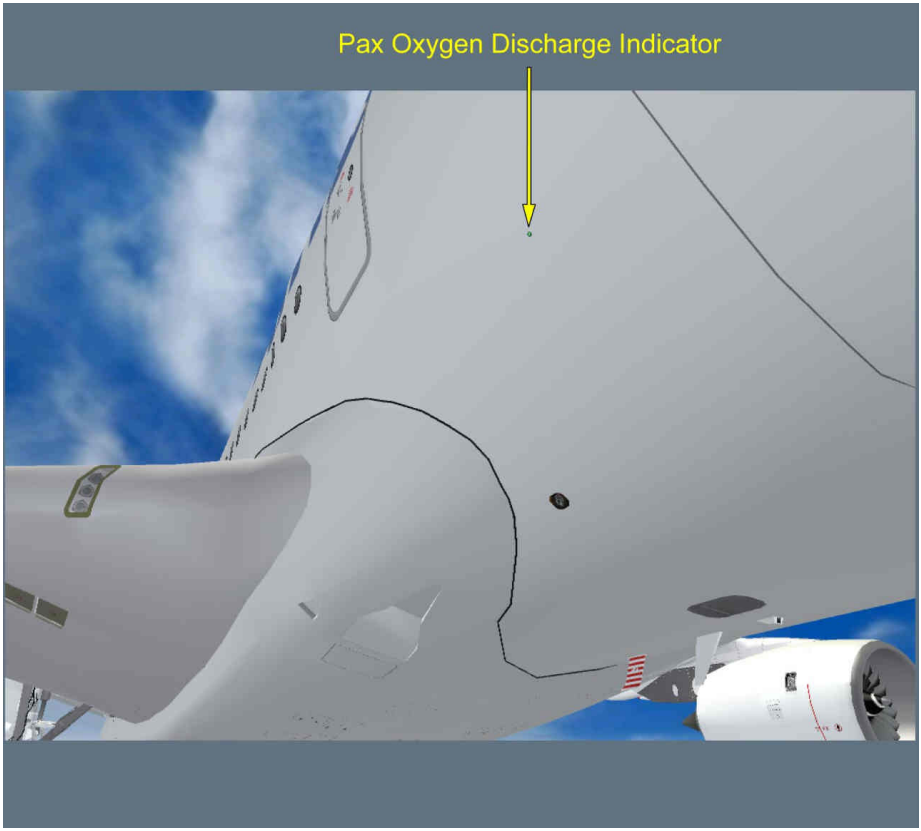
L1 WING AND ENGINE SCAN LIGHTS..... CHECK CONDITION

L2 *Check the conditions of the wing and engine scan lights, and make sure they are clean and not damaged.*



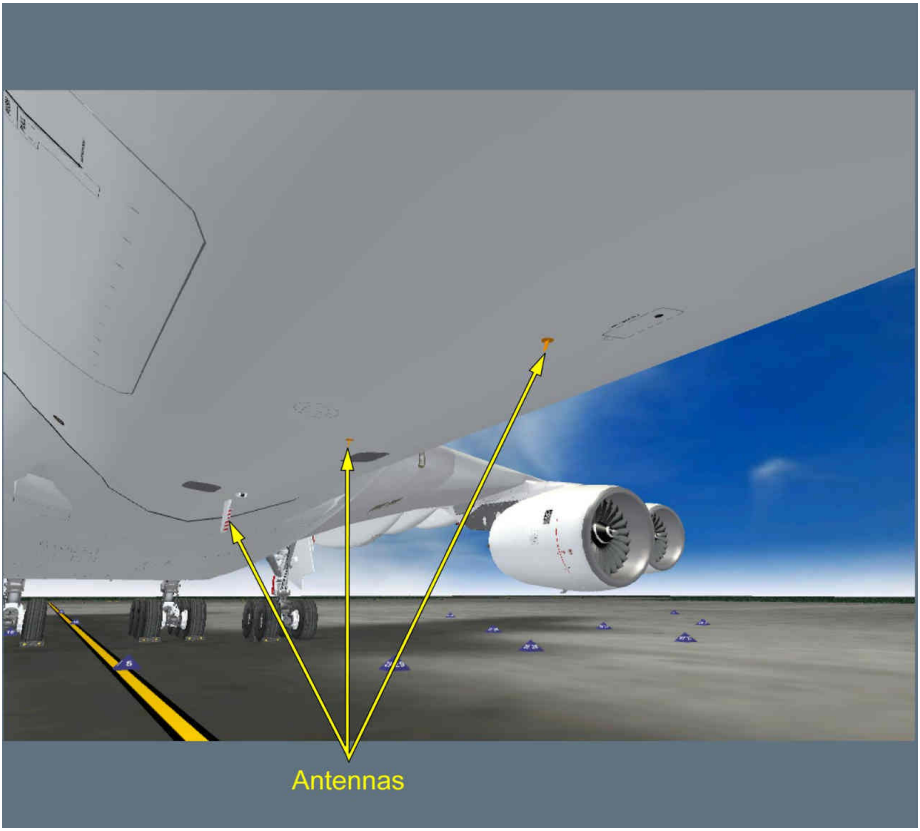
L1 PAX OXYGEN DISCHARGE INDICATOR..... GREEN

L2 *Check that the green oxygen discharge indicator is in place. In case of an overpressure in the oxygen system, the disk would be missing.*



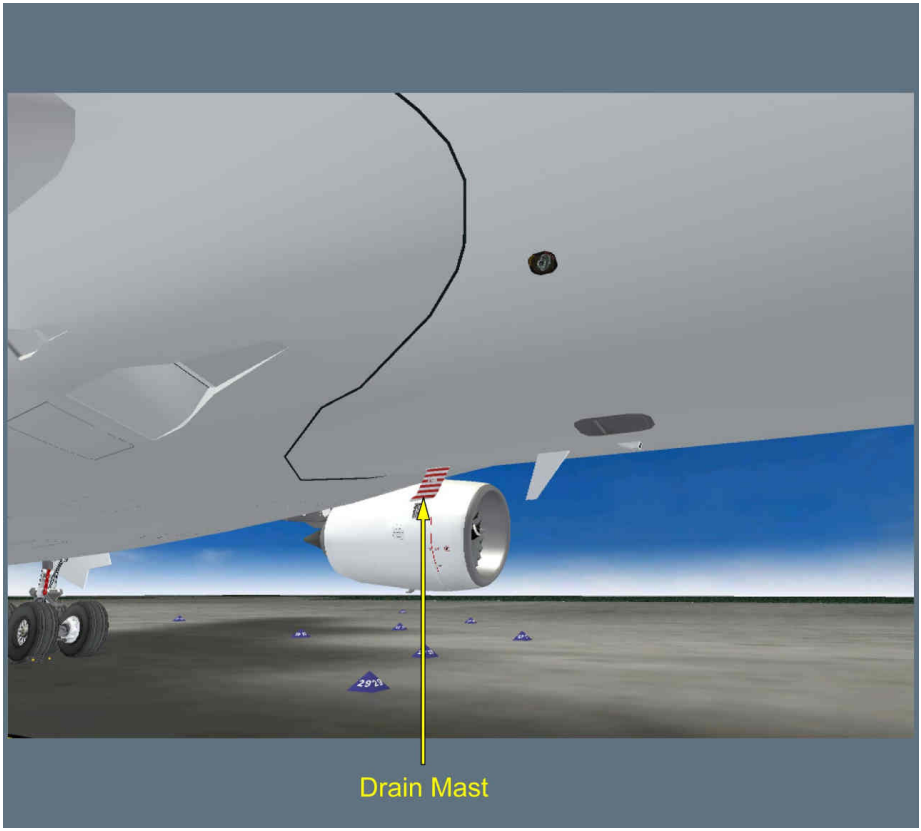
L1 ANTENNAS.....CHECK CONDITION

L2 *While walking around the fuselage, check the condition of the various antennas and make sure that they are not damaged.*



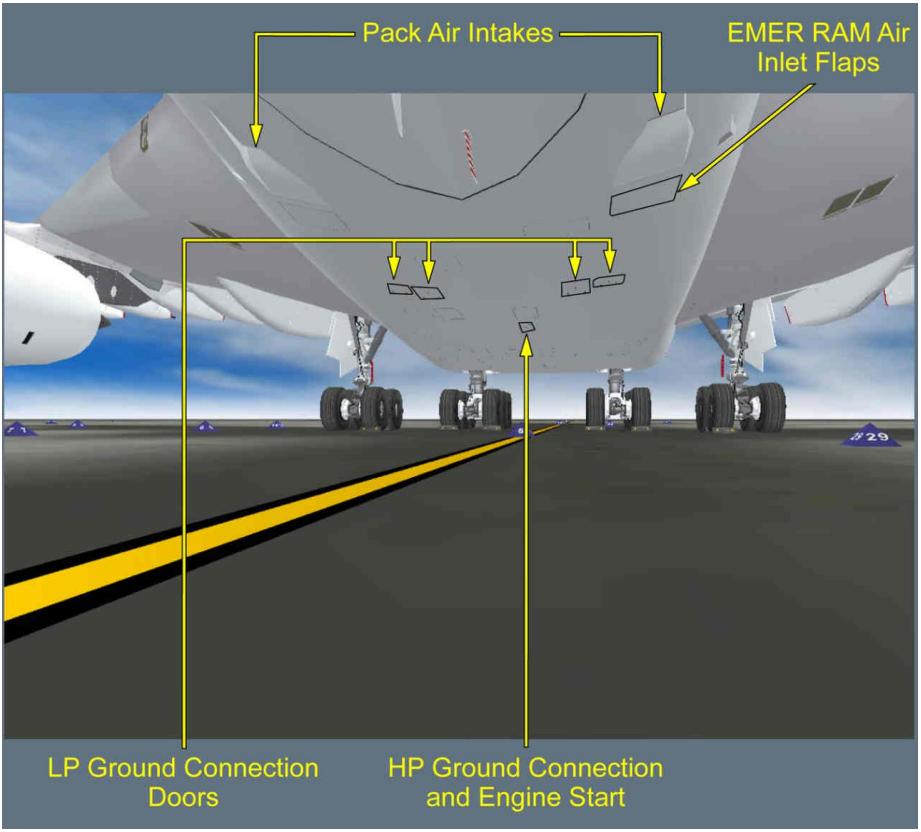
L1 DRAIN MAST.....CHECK CONDITION

L2 *While walking around along the fuselage, check the condition of the drain mast.*


Drain Mast

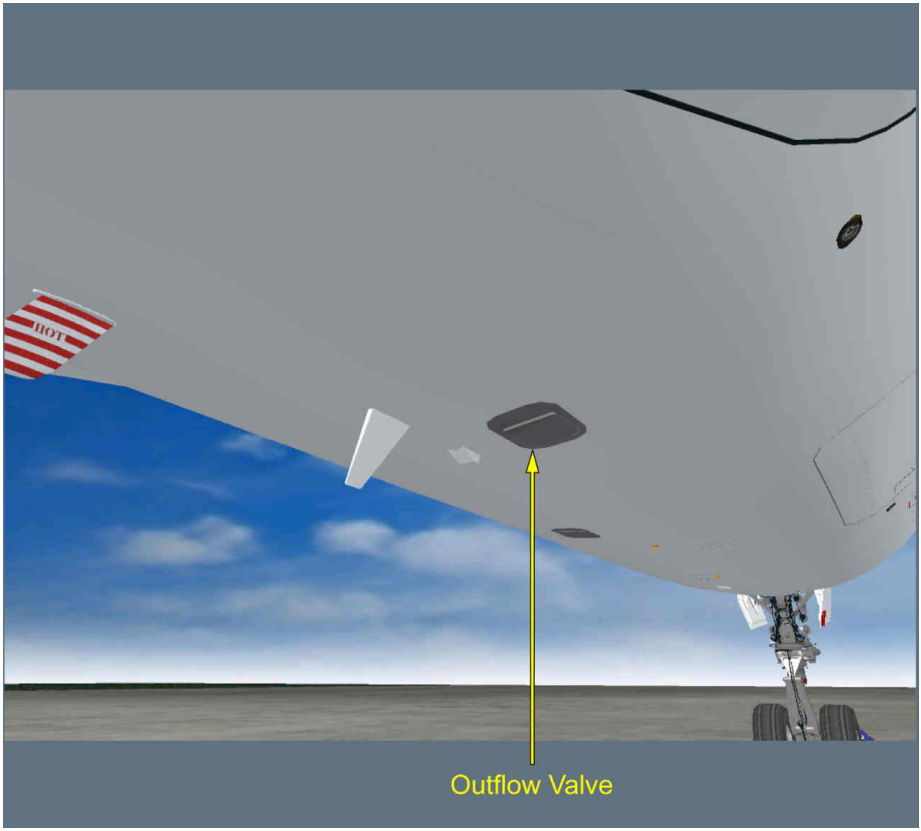
LOWER CENTER FUSELAGE

Applicable to: ALL



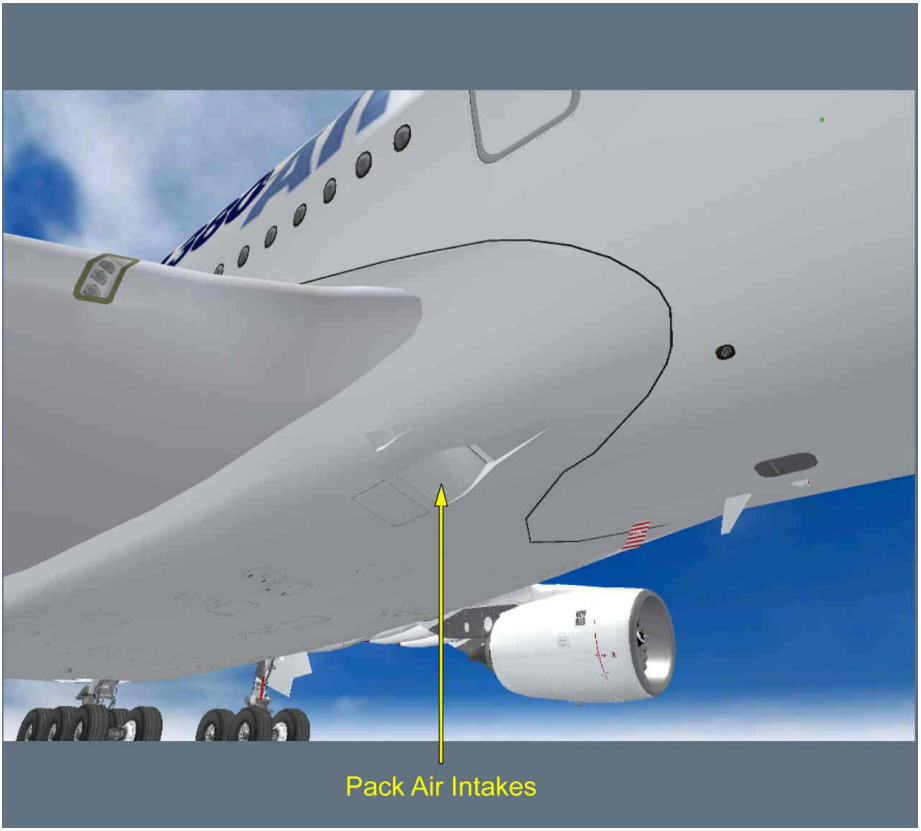
RH OUTFLOW VALVE..... CHECK CONDITION

L2 *Check the RH outflow valve, and make sure it is clear of obstruction.*



L1 PACK AIR INTAKES.....CLEAR

L2 *Check that the pack air intakes are clear of obstruction.*



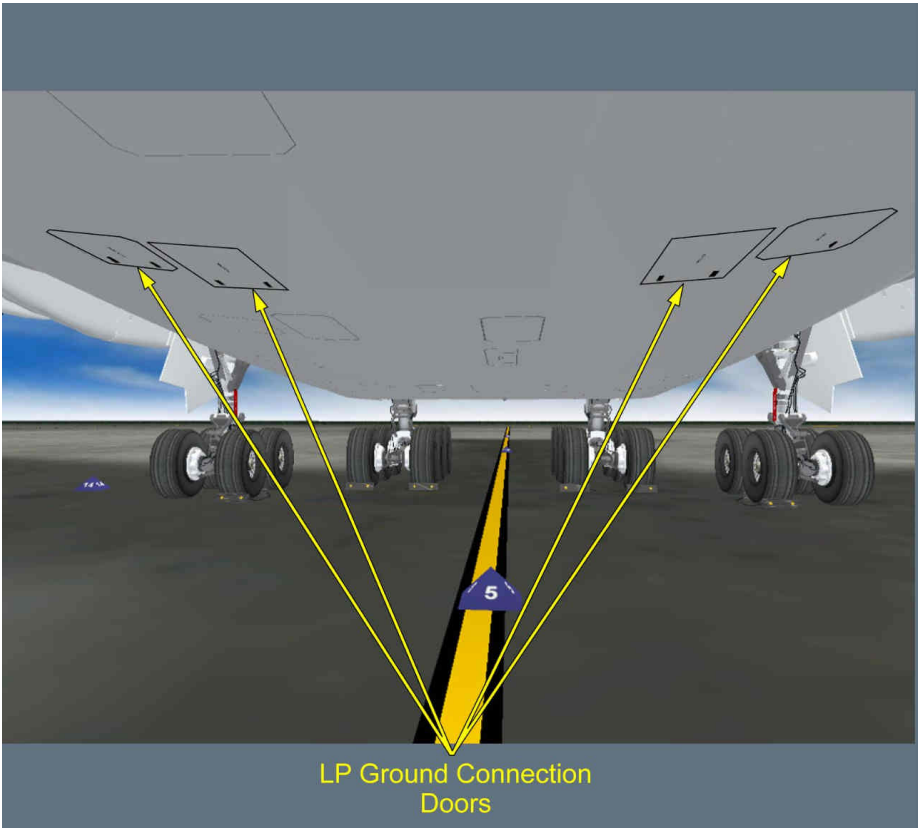
L1 EMER RAM AIR INLET FLAPS.....CHECK CONDITION

L2 *Check the emergency RAM air inlet flaps (2) condition and check that they are closed.*



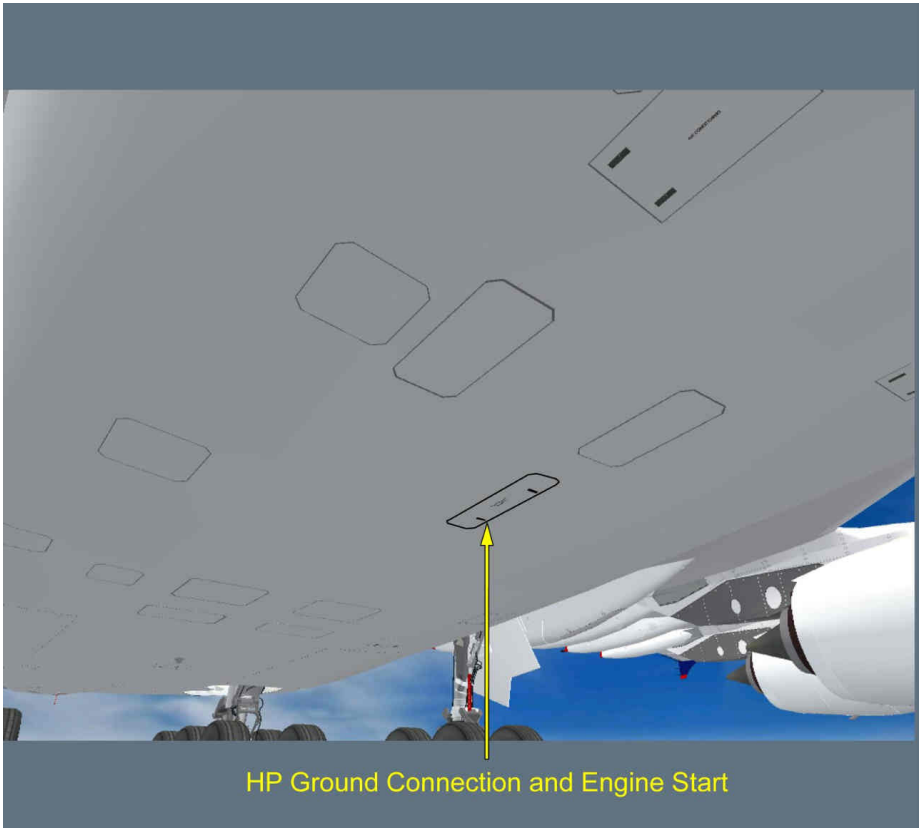
L1 LP GROUND CONNECTION DOORS (4).....CLOSED

L2 *Check that the LP ground connection doors are closed if not in use.*



L1 HP GROUND CONNECTION AND ENGINE START..... CLOSED

L2 *Check that the HP ground connection and engine start door is closed.*



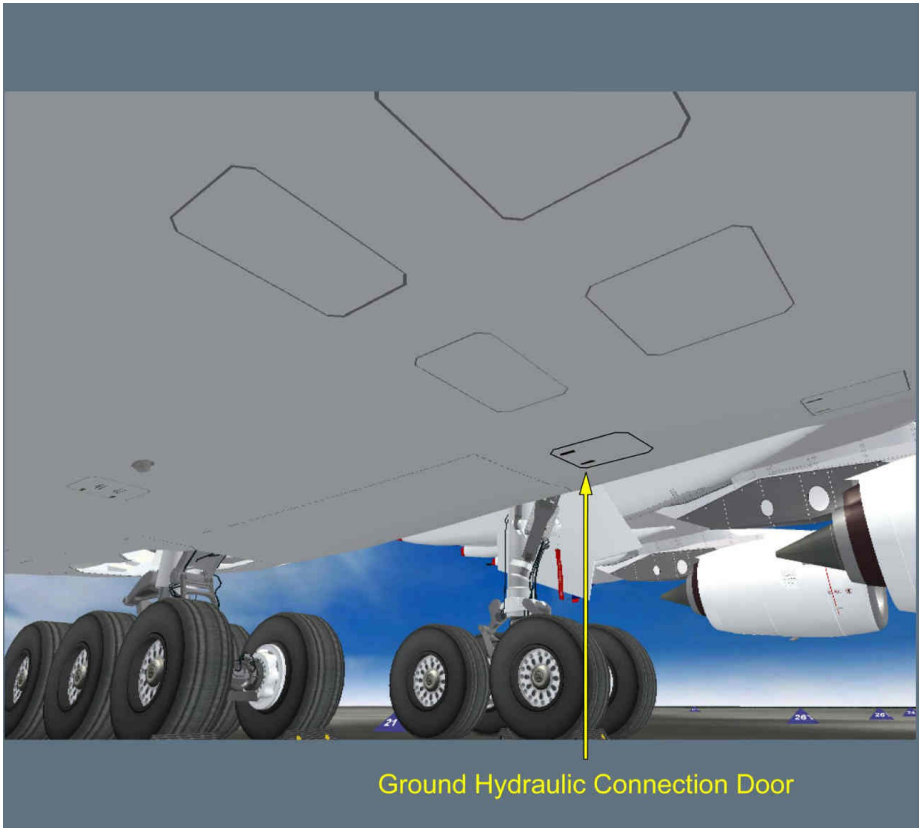
L1 L AND R WING L/G GROUND OPENING HANDLE ACCESS DOOR..... CLOSED

L2 *Check that the access door of the left and right wing L/G ground opening handle is closed.*



L1 GROUND HYDRAULIC CONNECTION DOOR..... CLOSED

L2 *Check that the ground hydraulic connection door is closed.*



L1 ANTICOLLISION LIGHT..... CHECK CONDITION

L2 *Check the anticollision light for condition, and make sure it is clean and not damaged.*



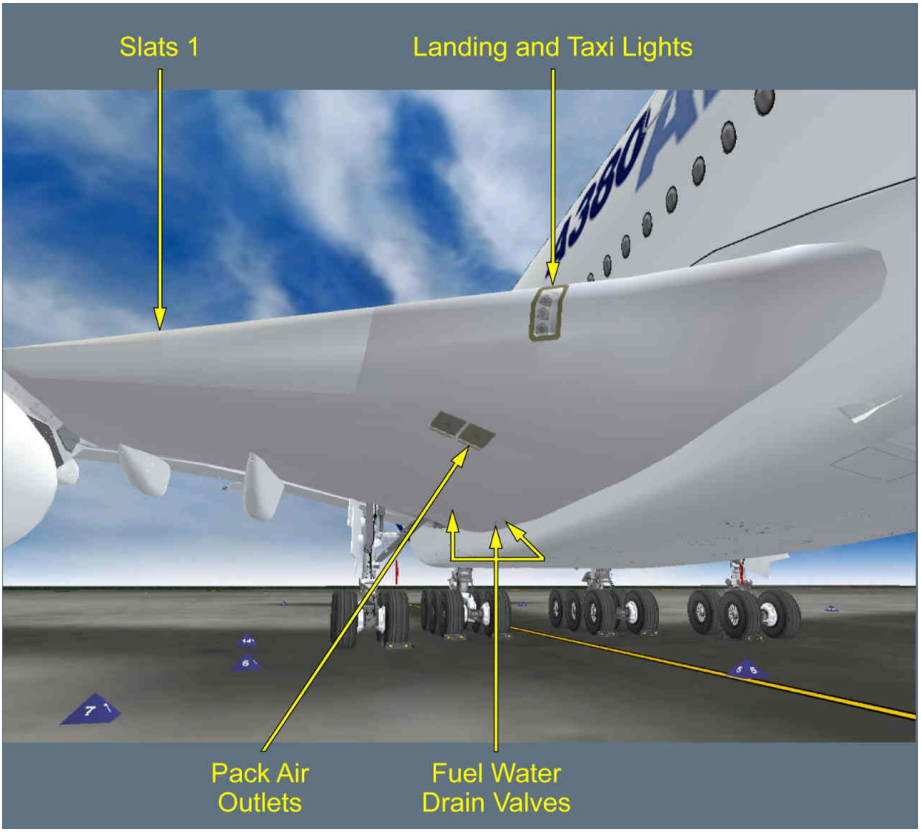
L1 L AND R BODY L/G GROUND OPENING HANDLE ACCESS DOOR.....CLOSED

L2 *Check that the access door of the left and right body L/G ground opening handle is closed.*


L and R Body L/G Ground
Opening Handle Access Door

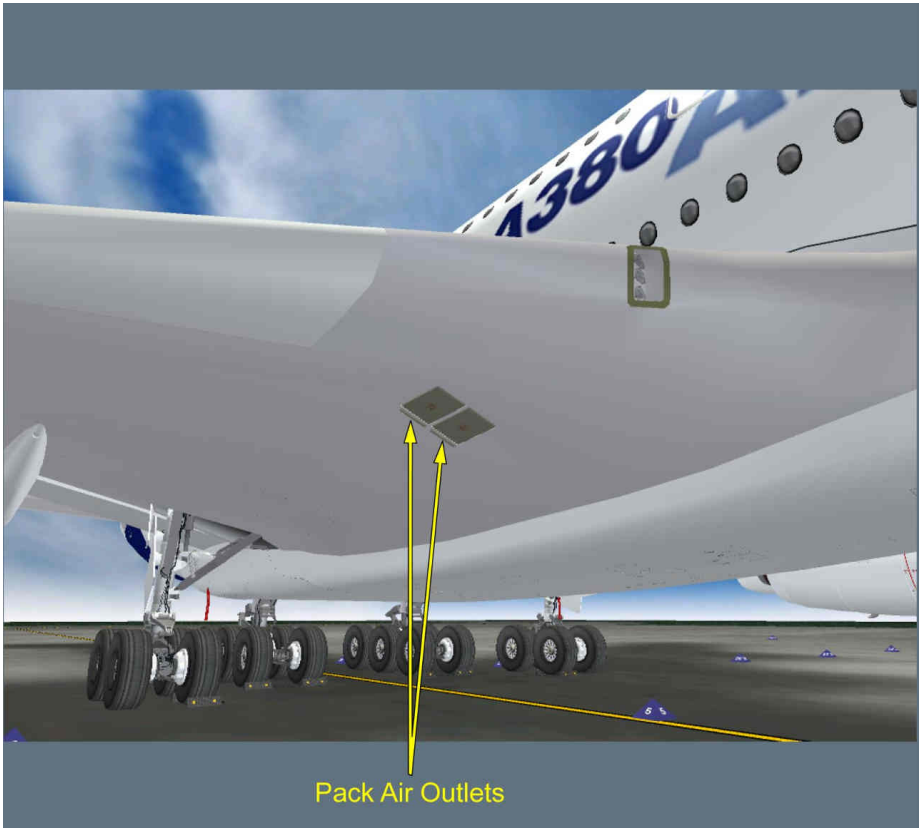
RH CENTER WING

Applicable to: ALL

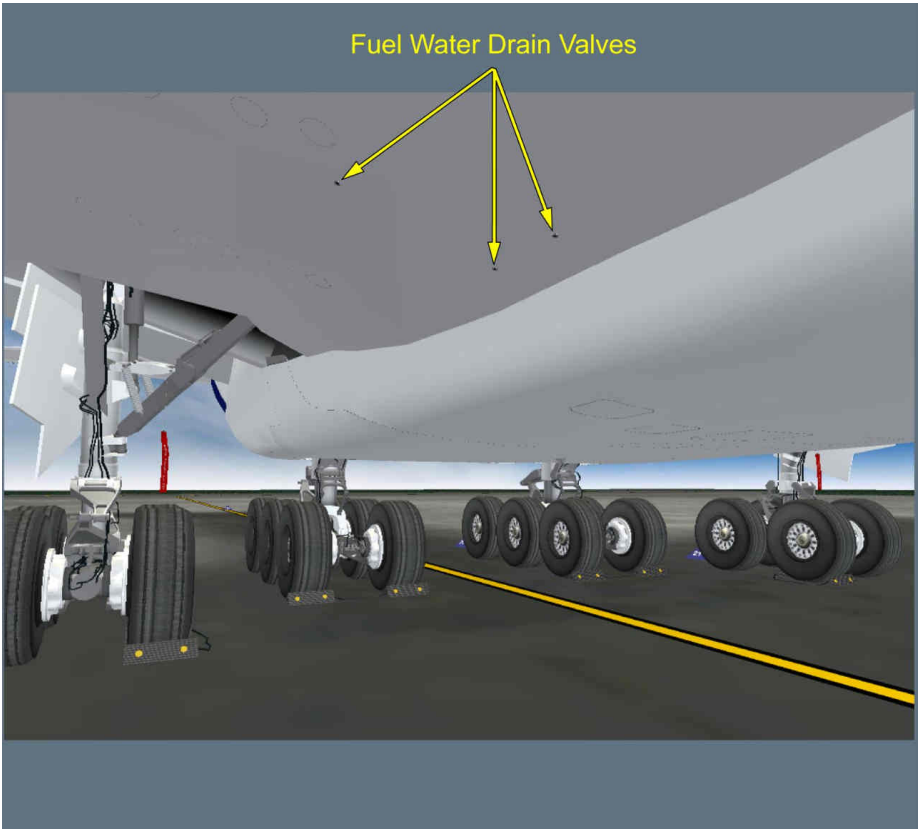


PACK AIR OUTLETS (2).....CHECK CONDITION

L2 *Check that the pack air outlets (2) are clear of obstruction.*


Pack Air Outlets

L1 FUEL WATER DRAIN VALVES..... NO LEAK



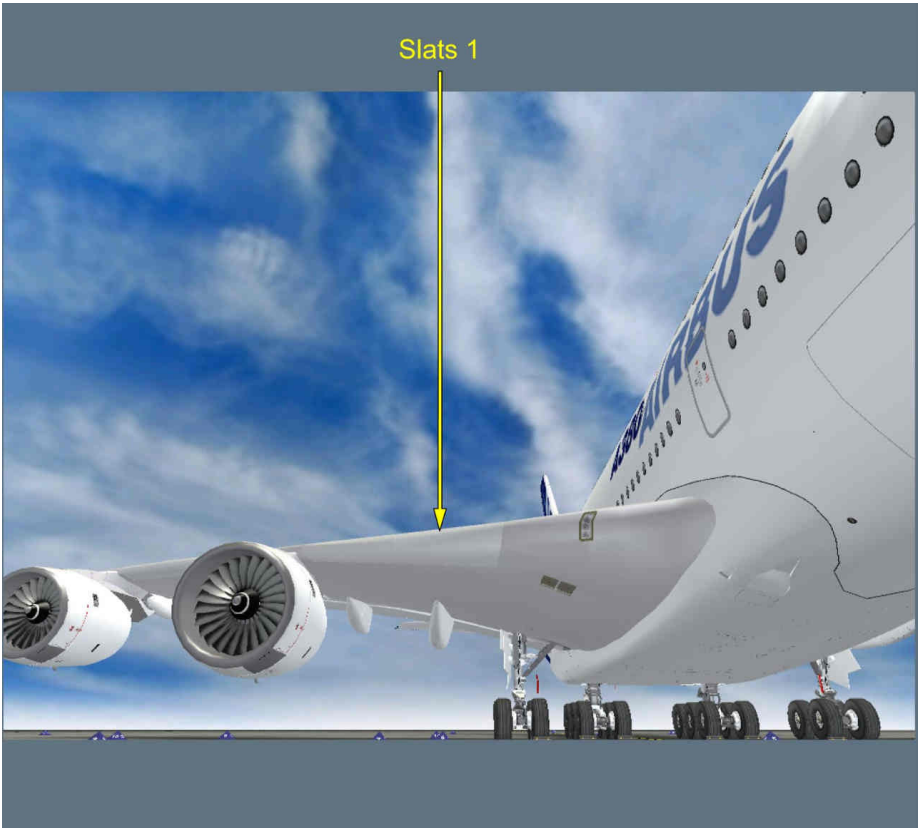
LANDING AND TAXI LIGHTS..... CHECK CONDITION

L2 *Check the condition of the landing and taxi lights, and make sure that the protective cover is not damaged.*



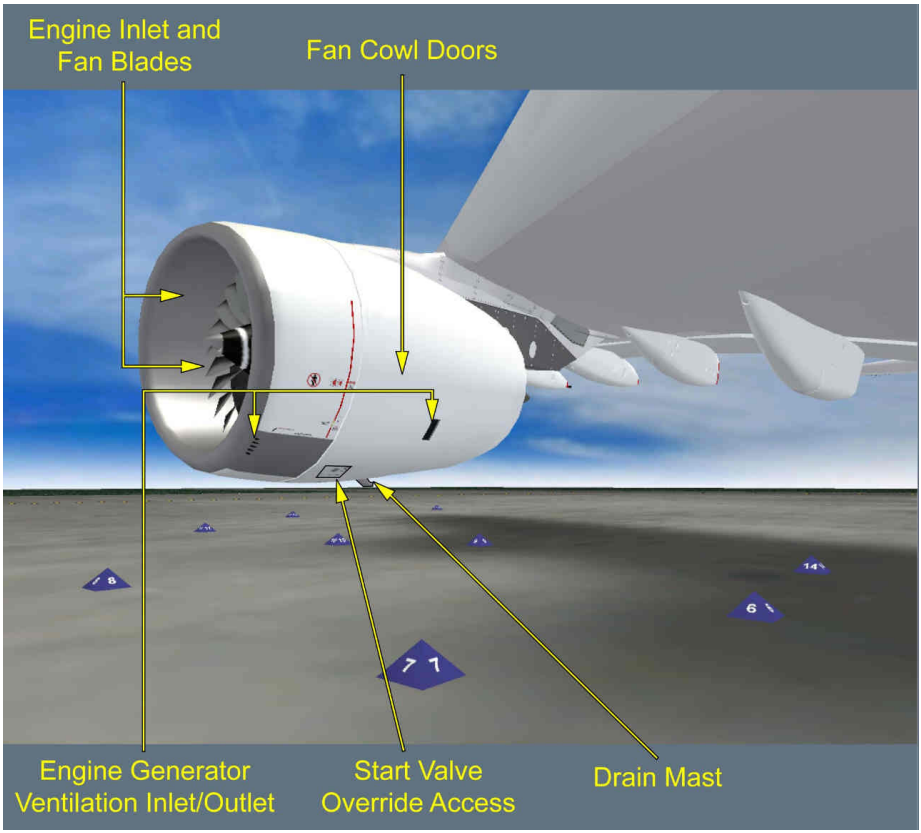
L1 * SLAT 1.....CHECK CONDITION AND POSITION

L2 *Check that the slat 1 is not damaged, and check that its position is in accordance with the slat/flap lever position.*


Slats 1

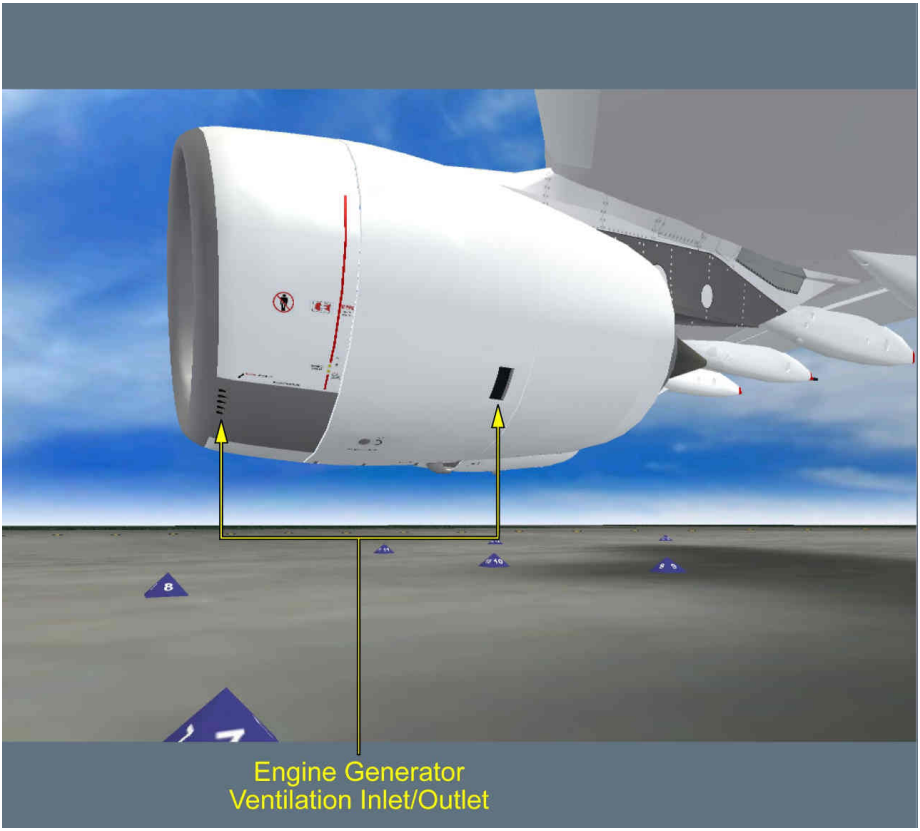
ENG 3 LH SIDE

Applicable to: ALL



ENGINE GENERATOR VENTILATION INLET/OUTLET.....CHECK CONDITION

L2 *Check that the engine generator ventilation inlet/outlet is clear of obstruction.*


Engine Generator
Ventilation Inlet/Outlet

L1 START VALVE OVERRIDE ACCESS..... CLOSED

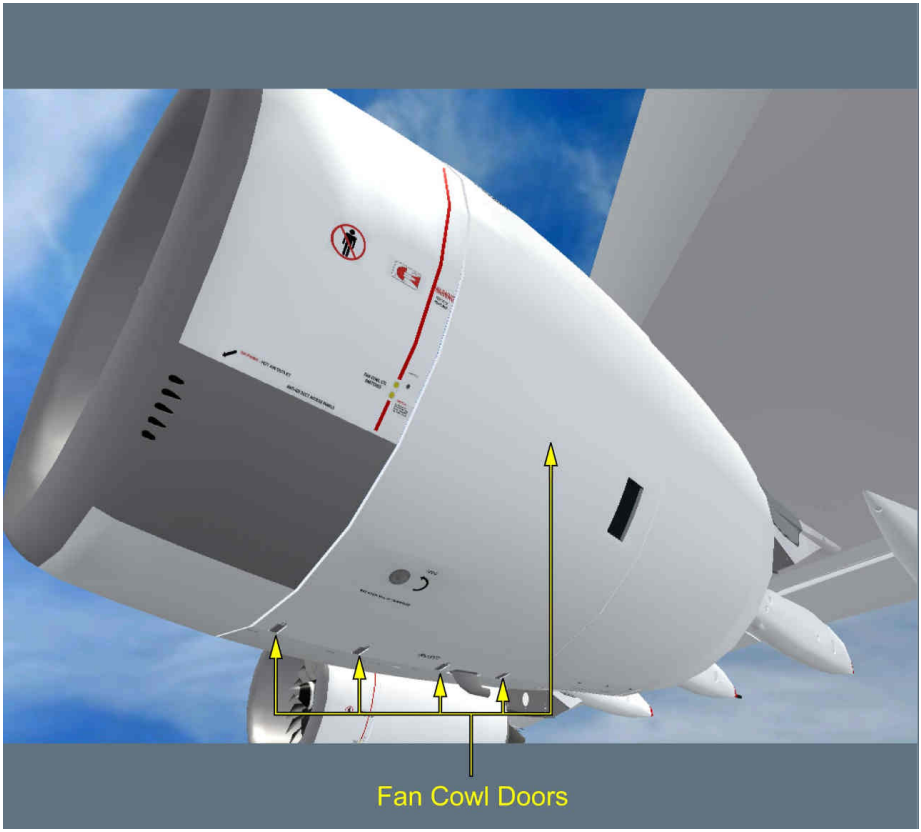


* DRAIN MAST..... CHECK CONDITION/NO LEAK

L2 *Under the engine, check the condition of the drain mast, and make sure that there are no leaks.*

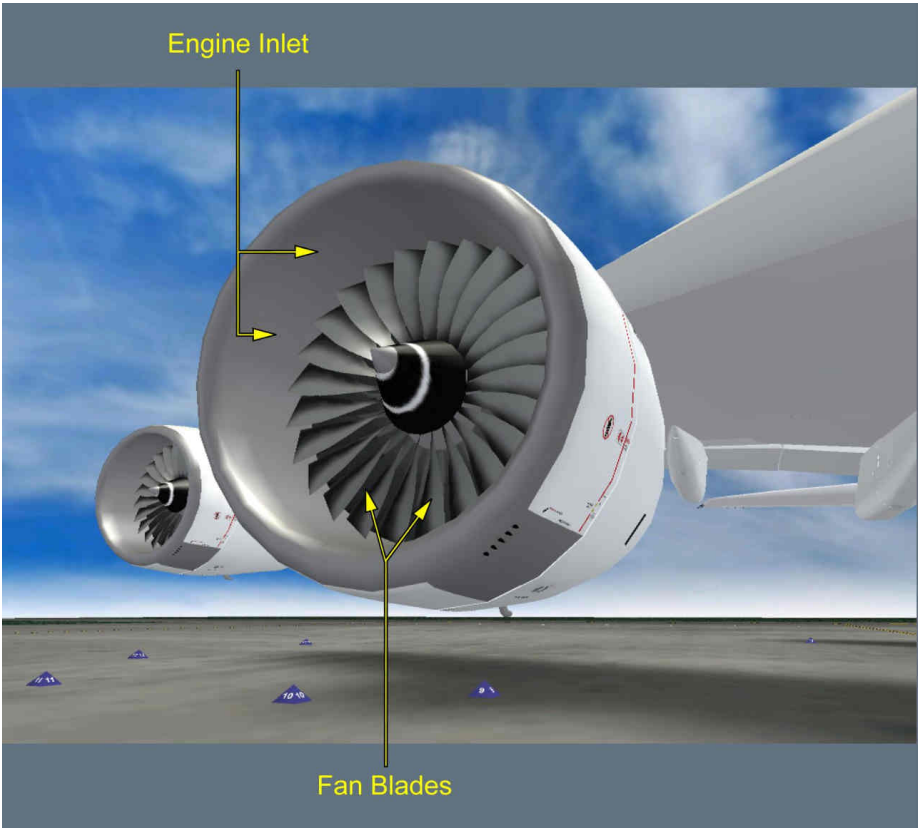

Drain Mast

L1 * FAN COWL DOORS..... CLOSED AND LATCHED



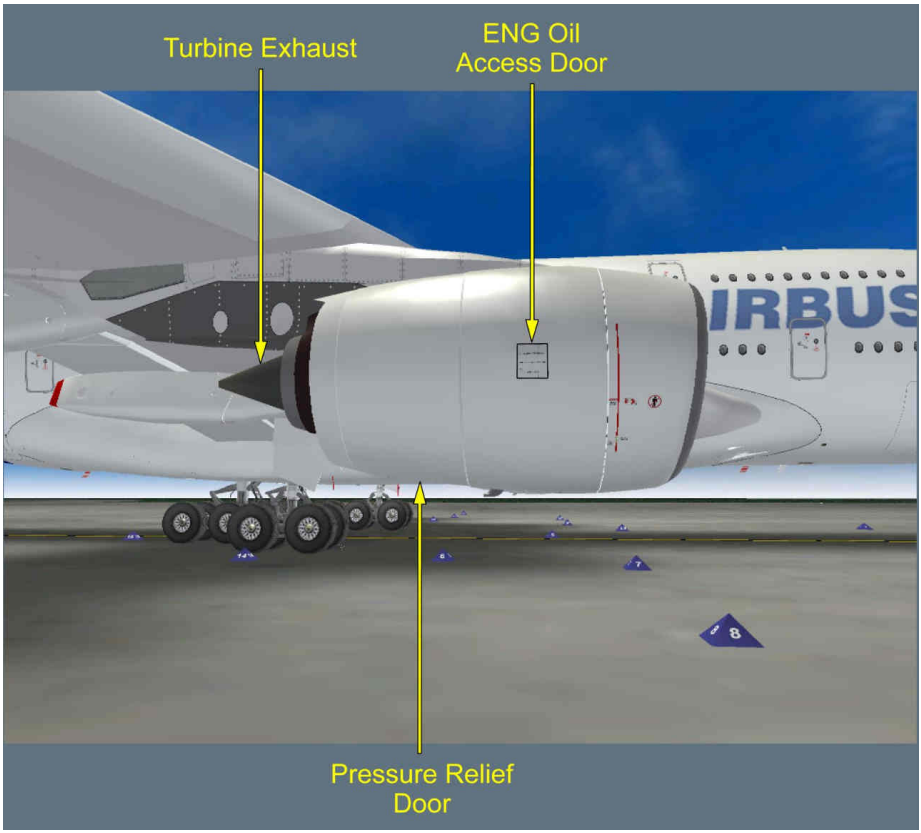
* ENGINE INLET AND FAN BLADES.....CHECK CONDITION

L2 *Check the engine inlet and the fan blades for any significant dents, bending, or damage.*

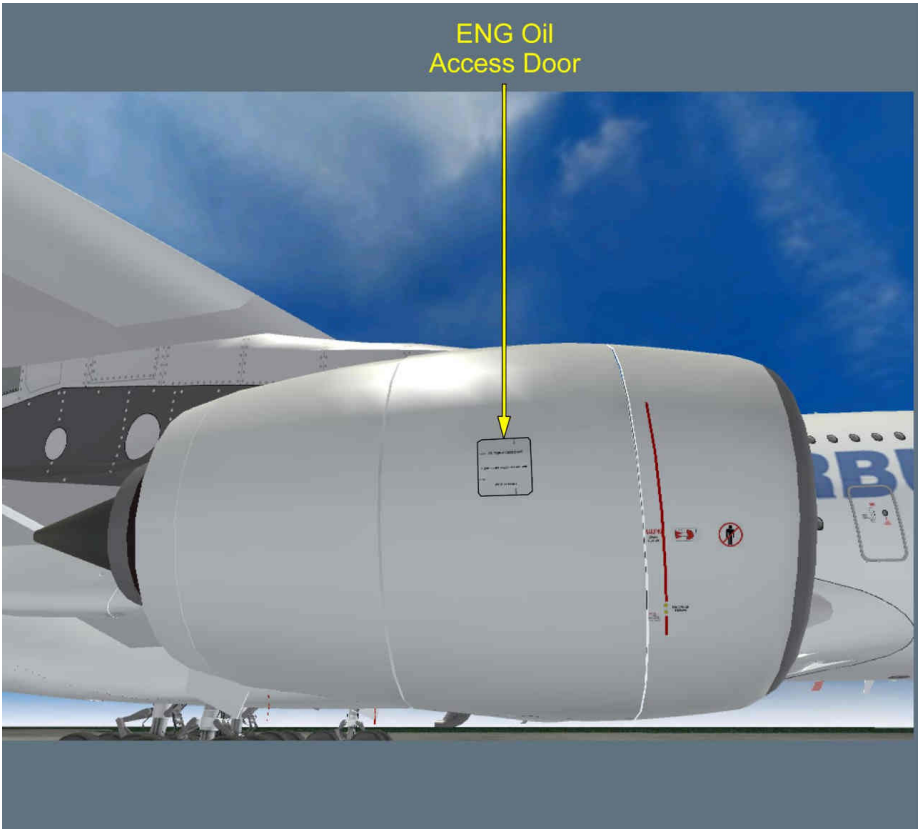

Engine Inlet
Fan Blades

ENG 3 RH SIDE

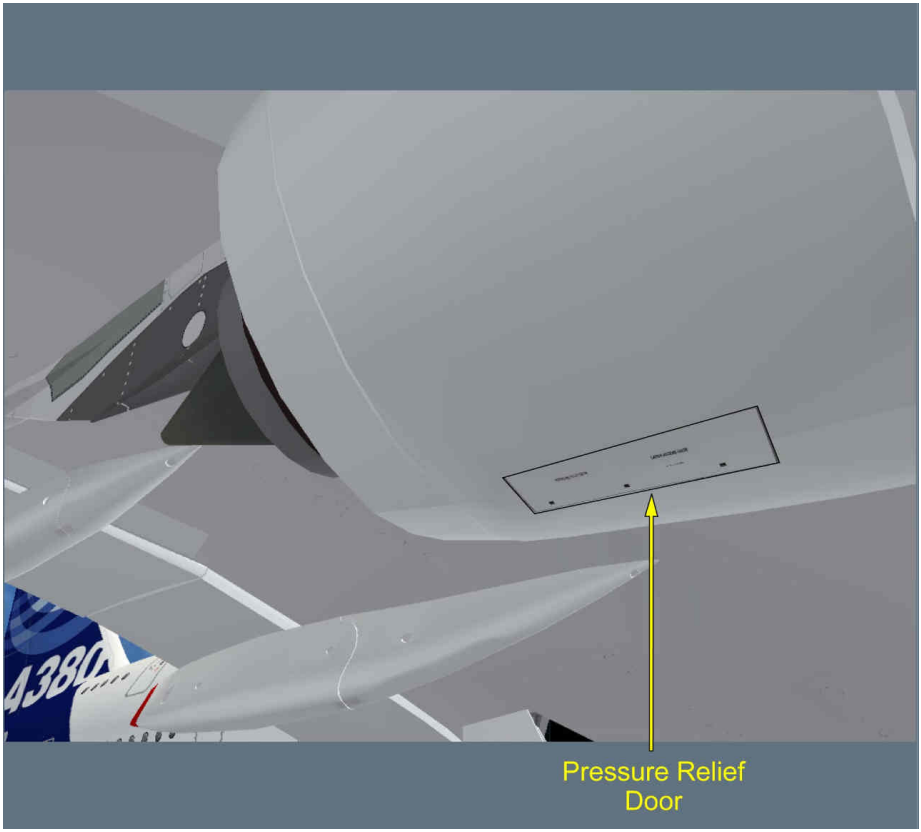
Applicable to: ALL



ENG OIL FILL ACCESS DOOR..... CLOSED

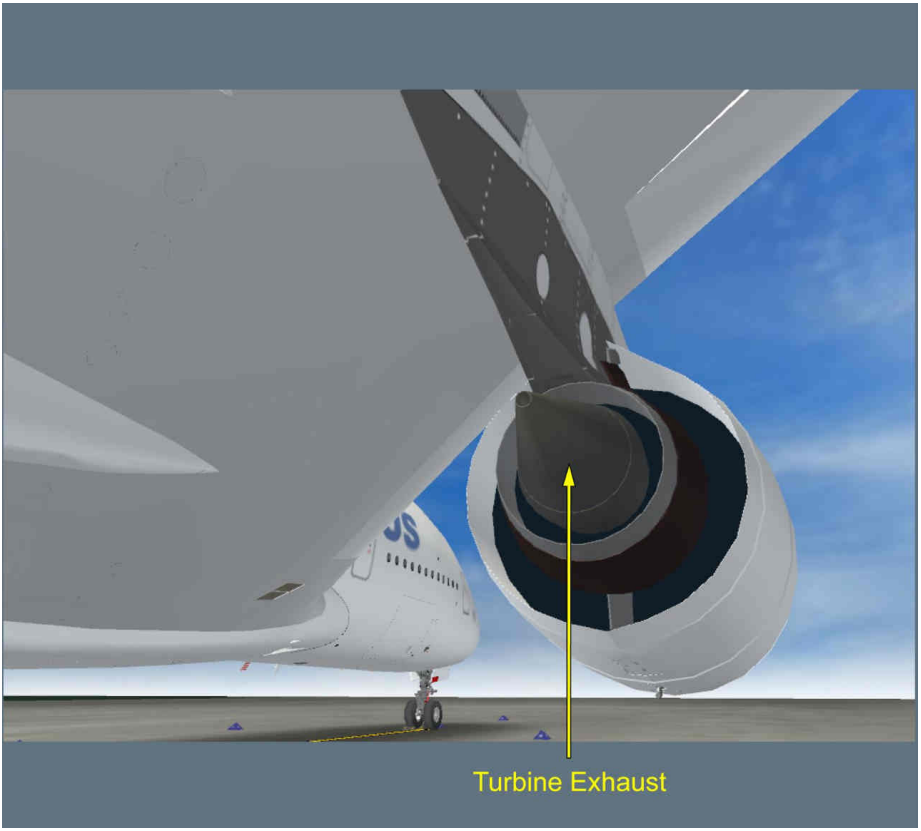


PRESSURE RELIEF DOOR.....CLOSED



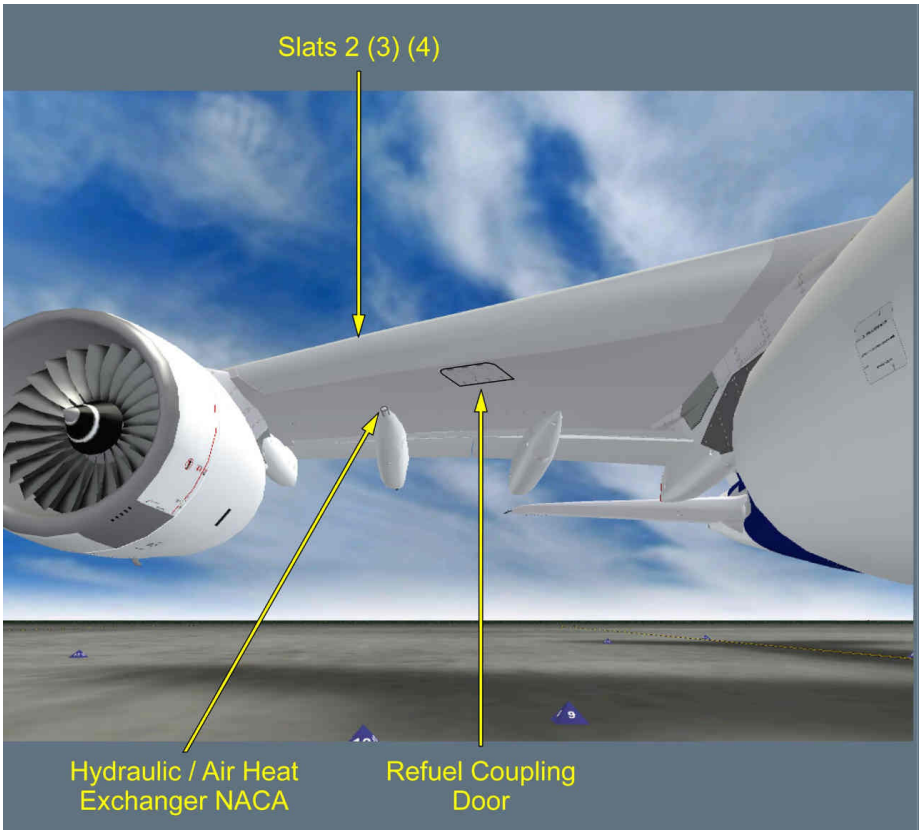
TURBINE EXHAUST..... CLEAR

L2 *Check that the turbine exhaust is clear of obstruction, and that the turbine blades are not damaged.*

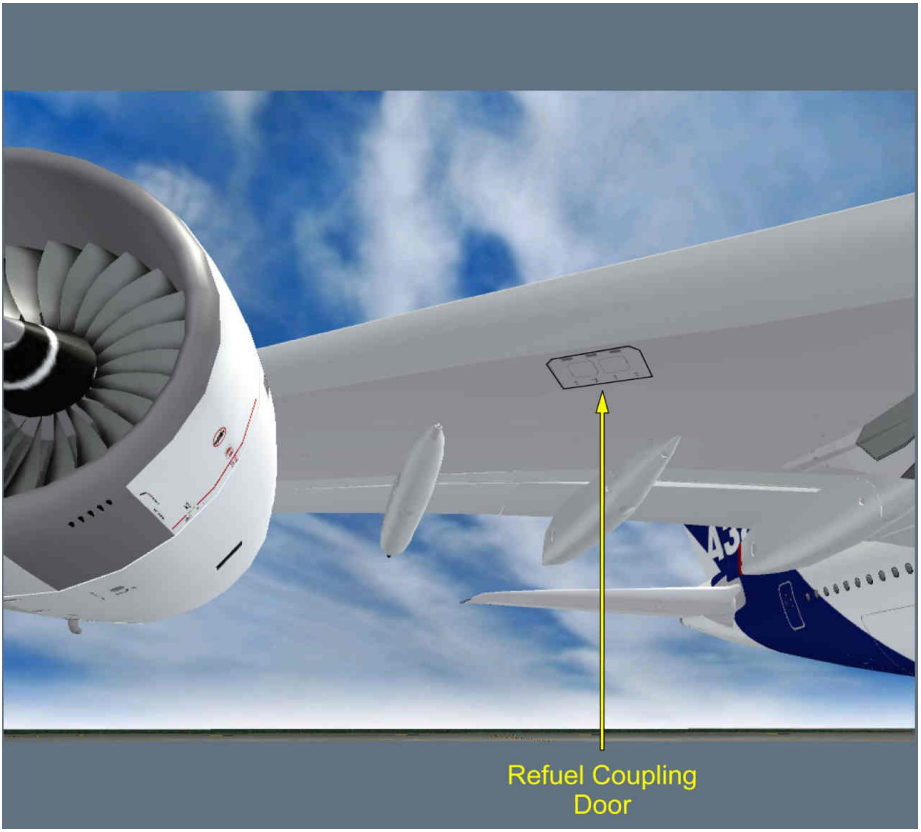

Turbine Exhaust

RH WING LEADING EDGE

Applicable to: ALL

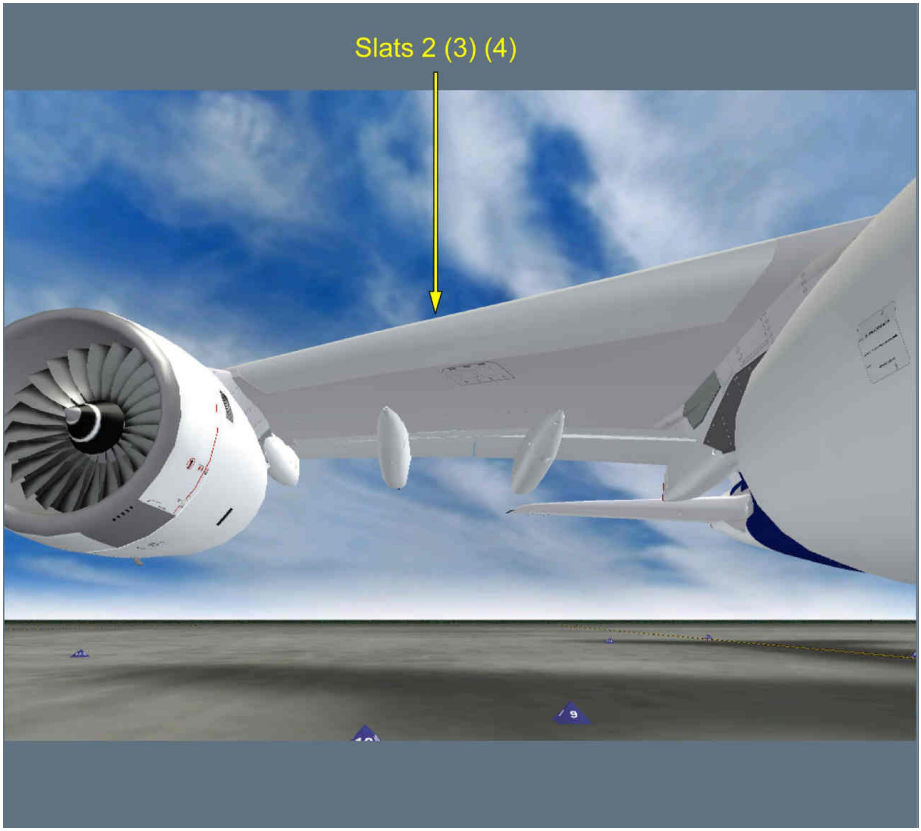


REFUEL COUPLING DOOR..... CLOSED



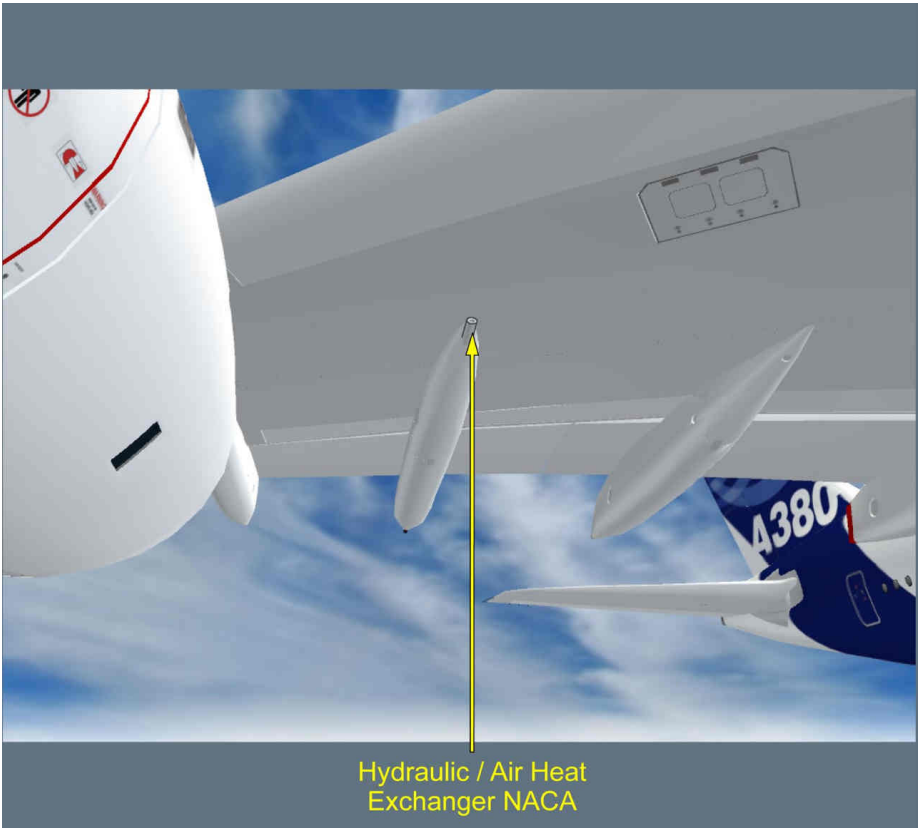
* SLATS 2, 3, 4..... CHECK CONDITION

L2 *Check that the slats are not damaged.*



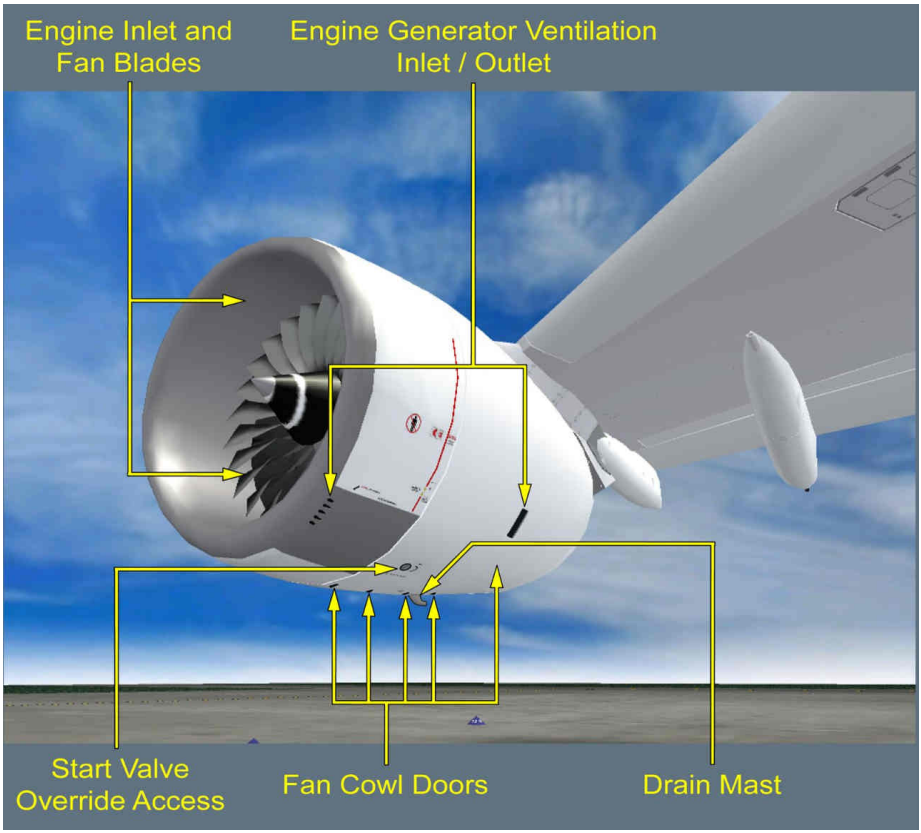
L1 HYDRAULIC/AIR HEAT EXCHANGER NACA.....CHECK CONDITION

L2 *Check that the hydraulic/air heat exchanger NACA on the flap track fairing 4 is clear of obstruction, and that the backup air inlet door is open.*


Hydraulic / Air Heat
Exchanger NACA

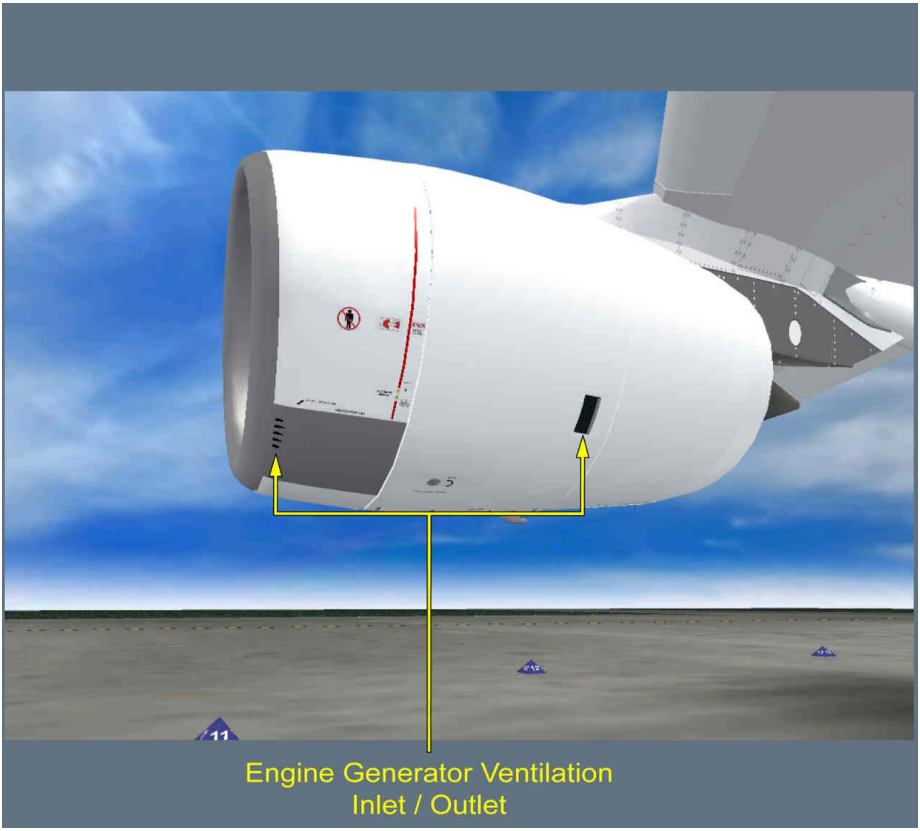
ENG 4 LH SIDE

Applicable to: ALL

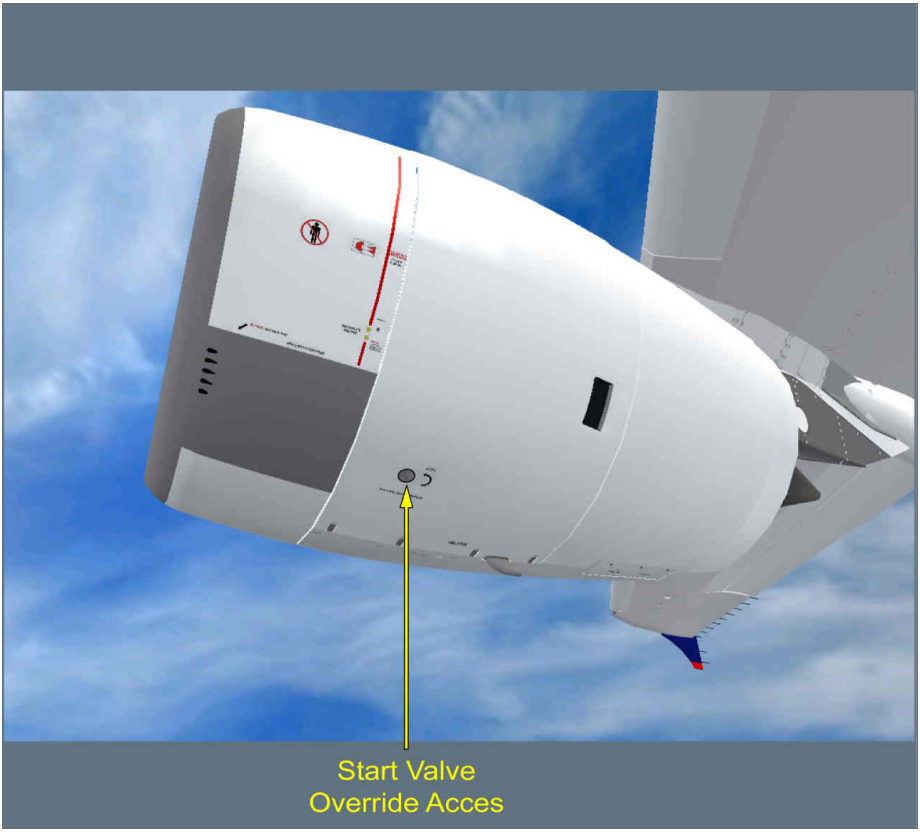


ENGINE GENERATOR VENTILATION INLET/OUTLET.....CHECK CONDITION

L2 *Check that the engine generator ventilation inlet/outlet is clear of obstruction.*

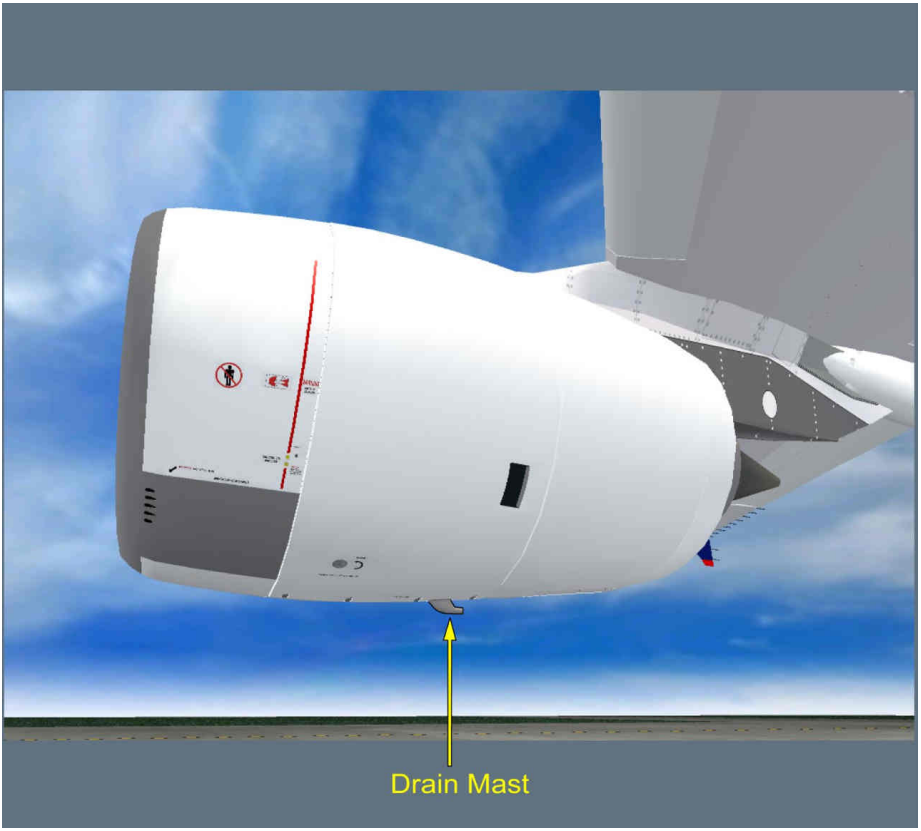

Engine Generator Ventilation
Inlet / Outlet

L1 START VALVE OVERRIDE ACCESS..... CLOSED

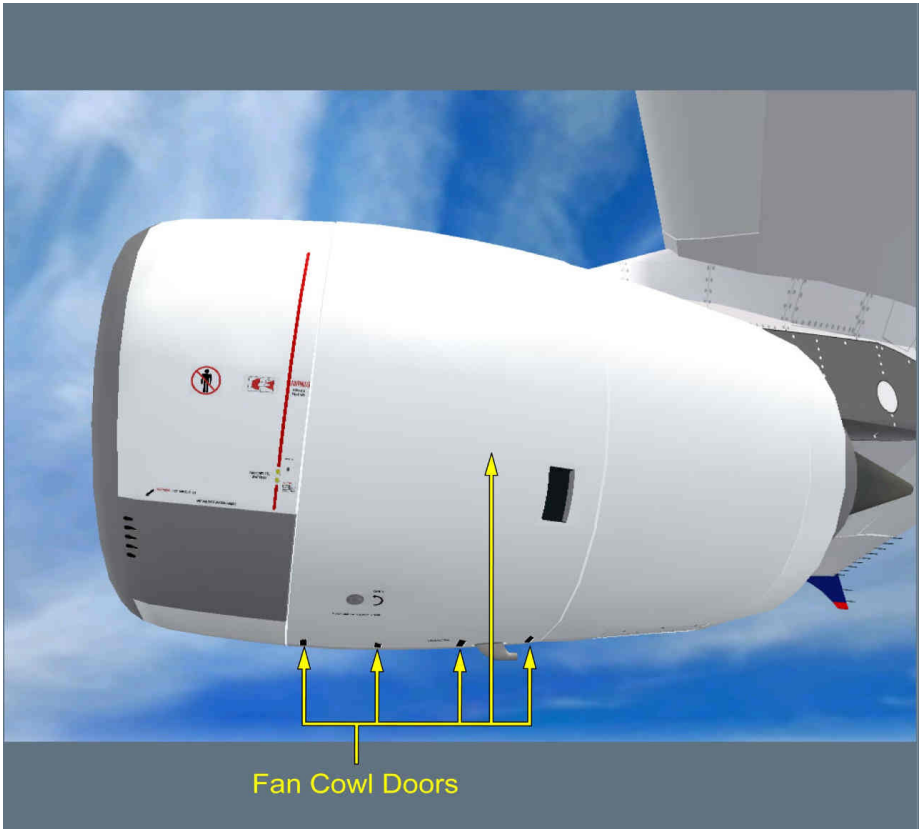


* DRAIN MAST..... CHECK CONDITION/NO LEAK

L2 *Under the engine, check the condition of the drain mast, and make sure that there are no leaks.*

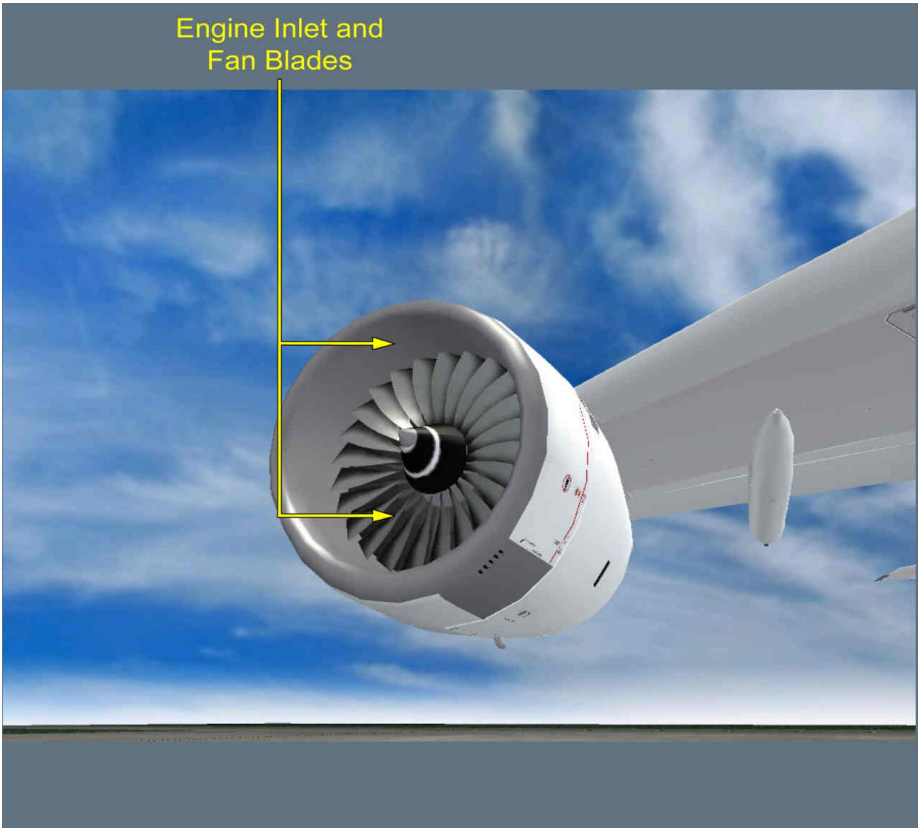

Drain Mast

L1 * FAN COWL DOORS..... CLOSED AND LATCHED



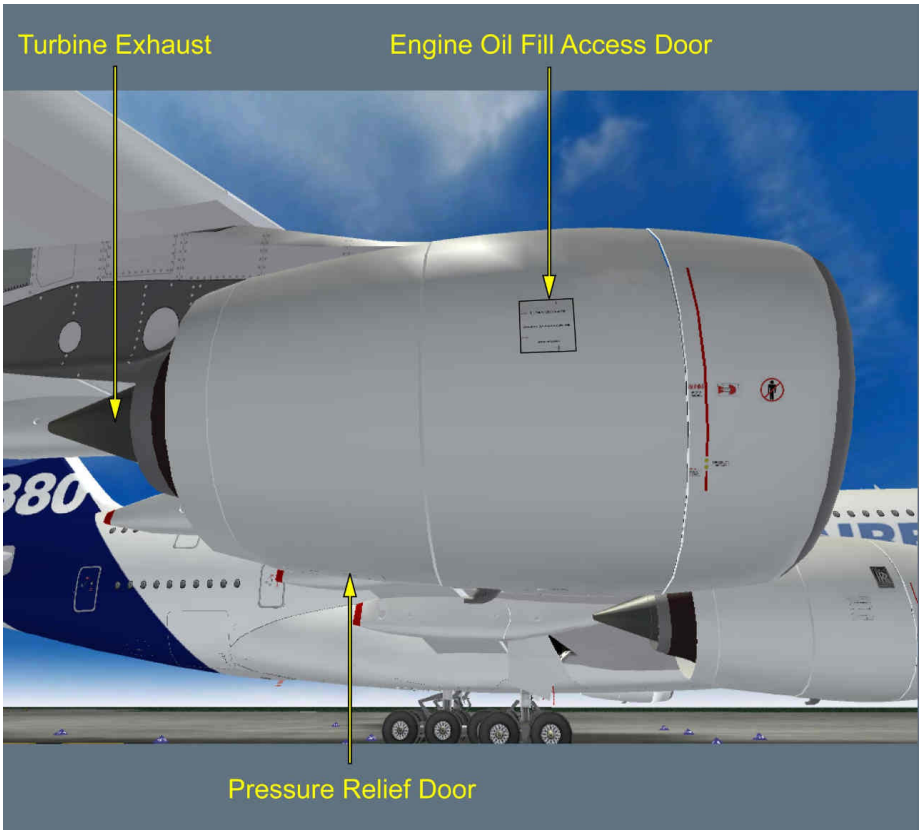
* ENGINE INLET AND FAN BLADES.....CHECK CONDITION

L2 *Check the engine inlet and the fan blades for any significant dents, bending, or damage.*


Engine Inlet and
Fan Blades

ENG 4 RH SIDE

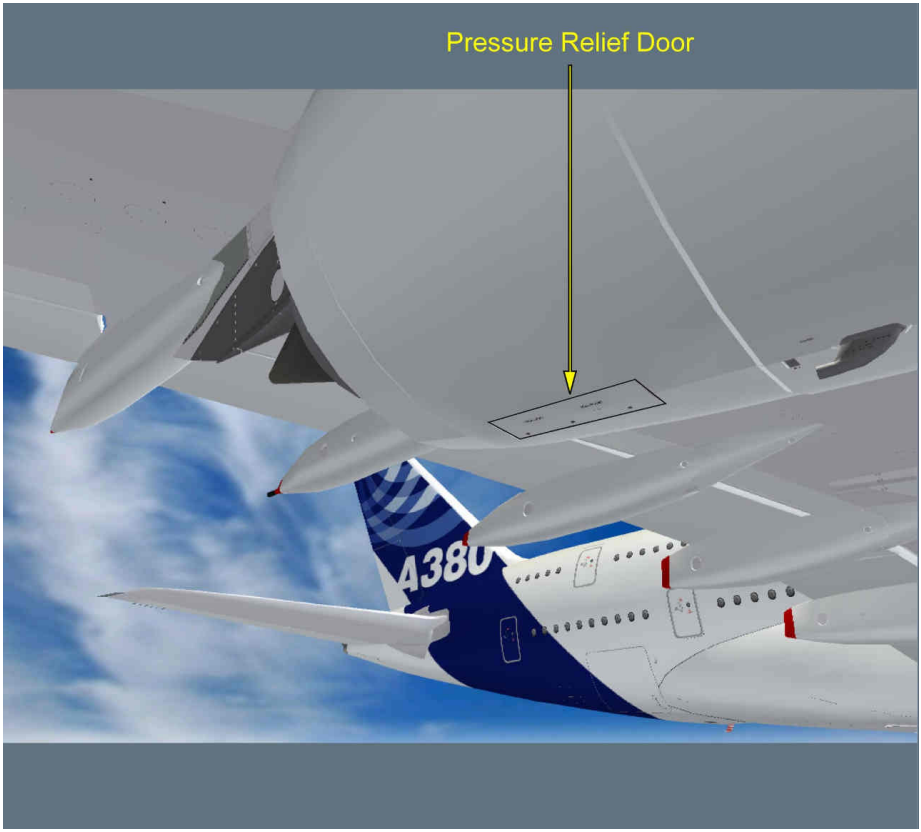
Applicable to: ALL



ENG OIL FILL ACCESS DOOR..... CLOSED



PRESSURE RELIEF DOOR.....CLOSED



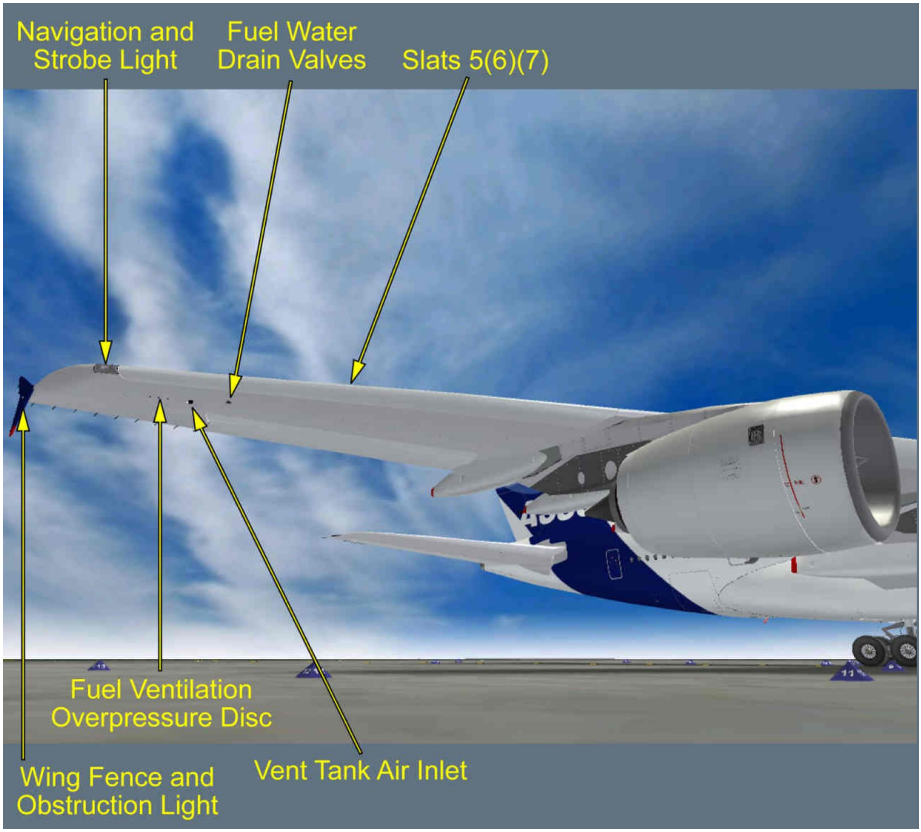
TURBINE EXHAUST..... CLEAR

L2 *Check that the turbine exhaust is clear of obstruction, and that the turbine blades are not damaged.*


Turbine Exhaust

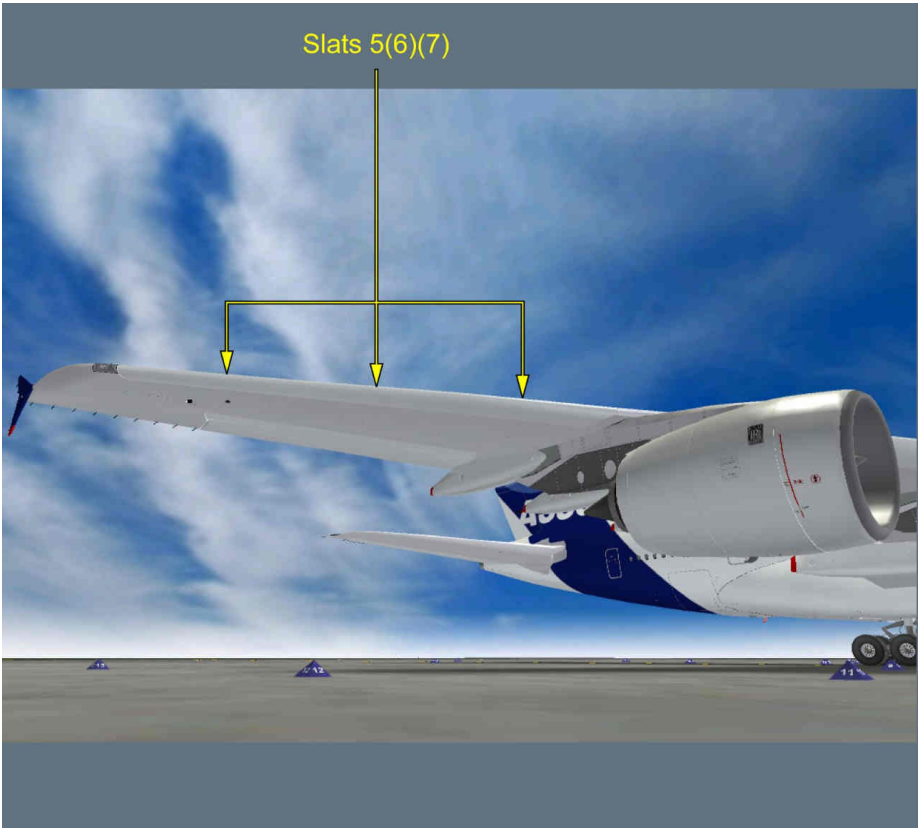
RH WING TIP

Applicable to: ALL



* SLATS 5, 6, 7..... CHECK CONDITION

L2 *Check the slats are not damaged.*


Slats 5(6)(7)

L1 * FUEL VENTILATION OVERPRESSURE DISC.....INTACT



FUEL WATER DRAIN VALVES..... NO LEAK



WING FENCE AND OBSTRUCTION LIGHT..... CHECK CONDITION

L2 *Check the condition of the wing fence and obstruction light, and make sure that the protective cover is not damaged.*



L1 VENT TANK AIR INLET..... CLEAR

L2 *Check that the vent tank air inlet is clear of obstruction. .*



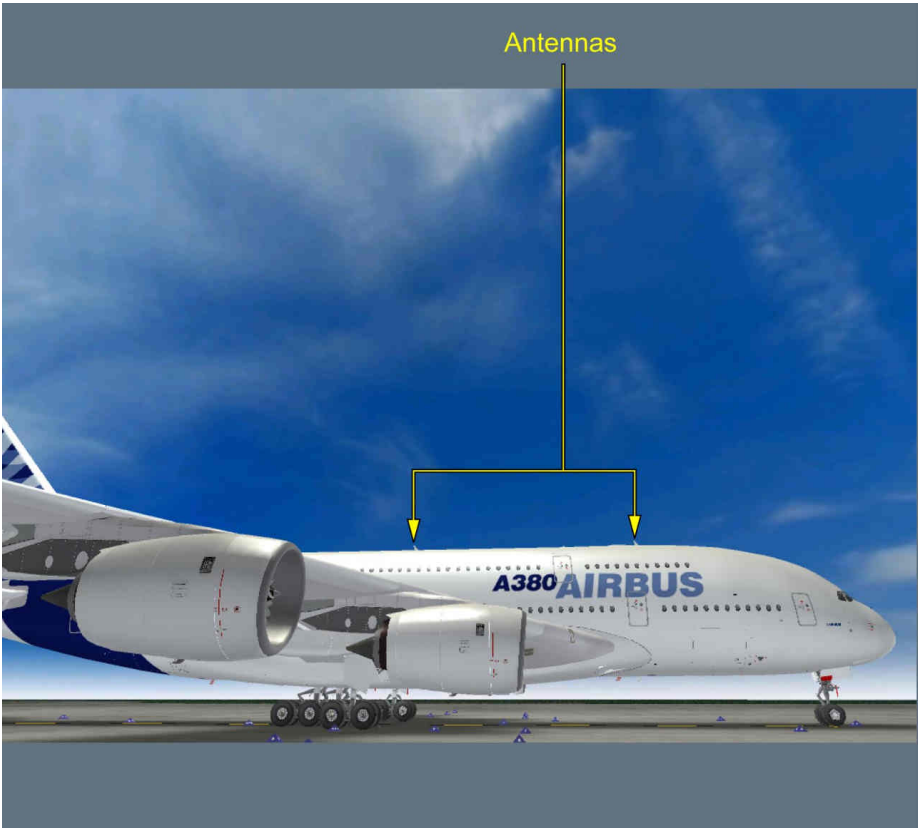
L1 NAVIGATION AND STROBE LIGHT.....CHECK CONDITION

L2 *Check the condition of the navigation and strobe lights, and make sure that the protective cover is not damaged.*



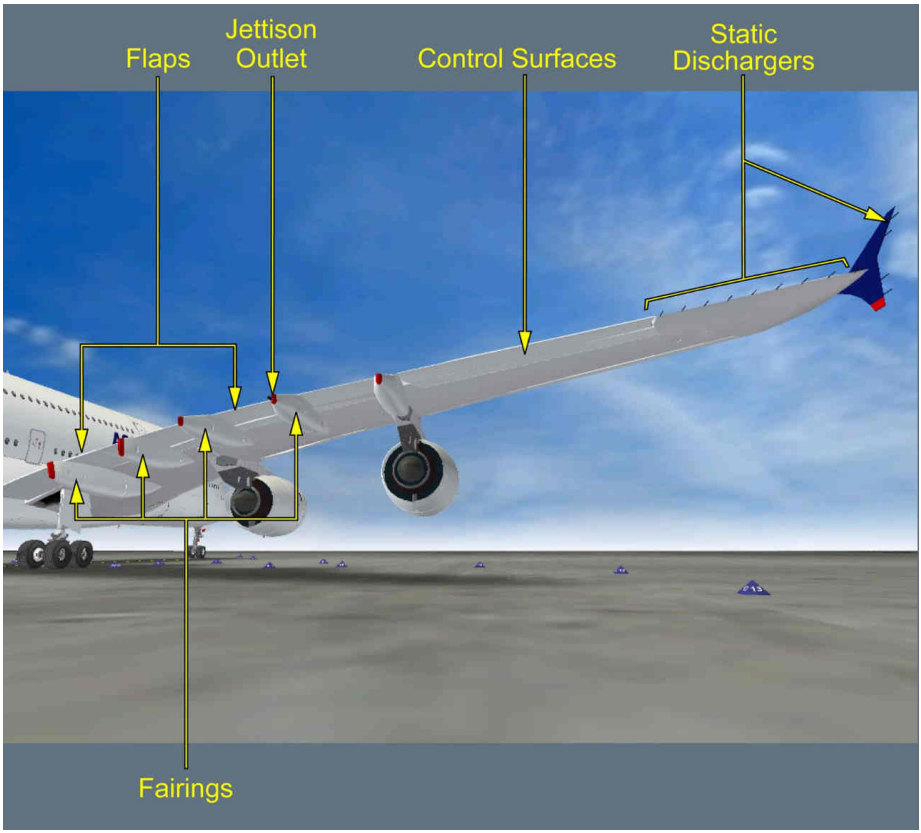
L1 ANTENNAS ON TOP OF FUSELAGE..... CHECK CONDITION

L2 *From this position, check that there is no damage to the VHF antennas on top of the fuselage: VHF 1 on forward fuselage and VHF 3 on the rear fuselage.*


Antennas
A380 AIRBUS

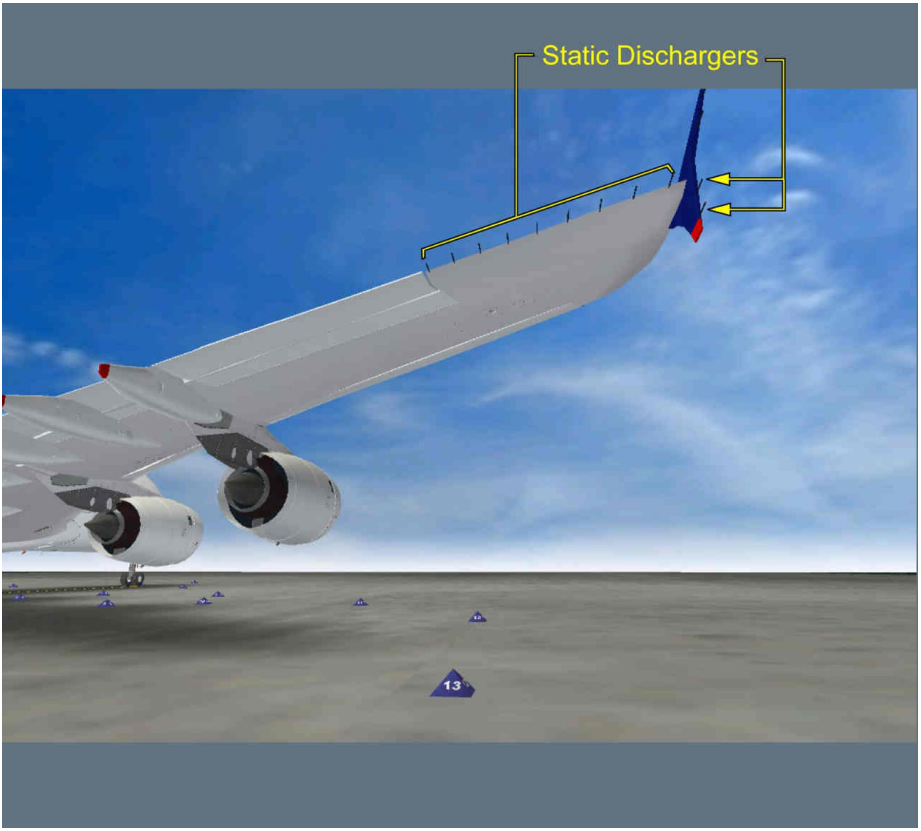
RH WING TRAILING EDGE

Applicable to: ALL



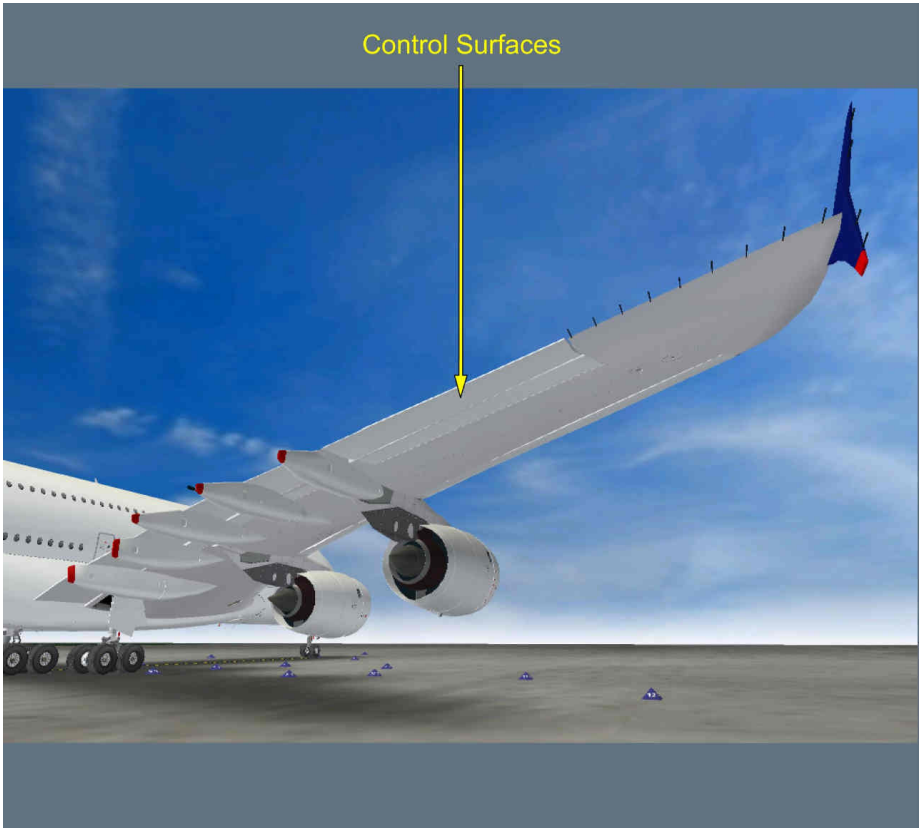
STATIC DISCHARGERS.....CHECK CONDITION

L2 *Check that the static dischargers are not missing or damaged.*



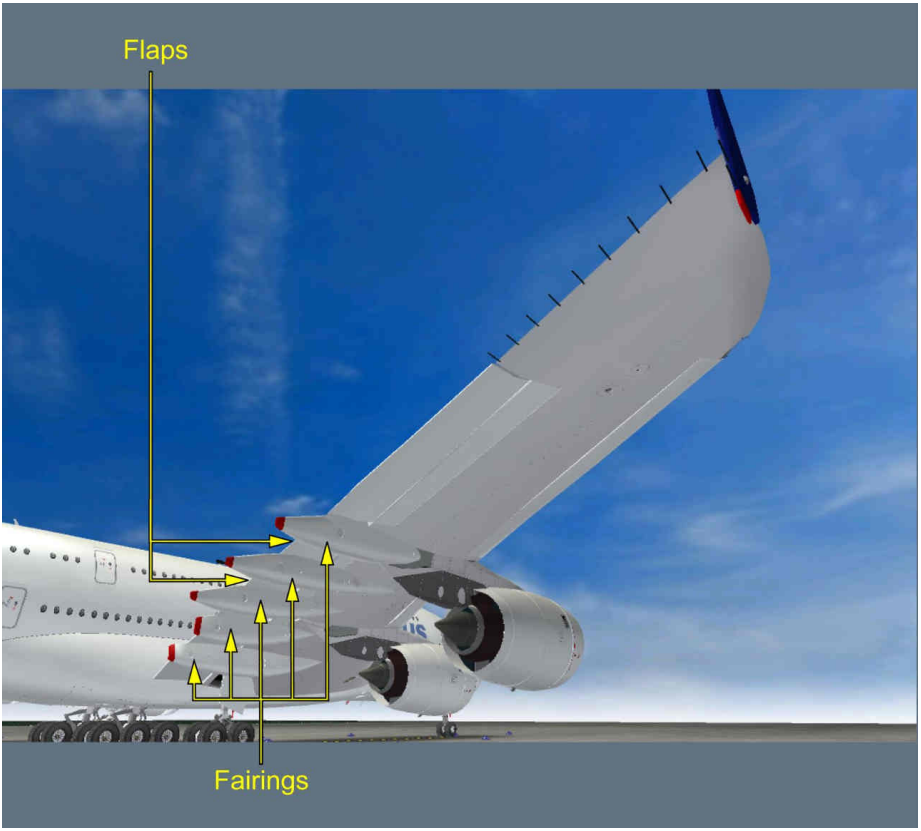
L1 * CONTROL SURFACES..... CHECK CONDITION

L2 *Check that the control surfaces are not damaged.*



L1 * FLAPS AND FAIRINGS..... CHECK CONDITION AND POSITION

L2 *Check that the flaps and flap track fairings are not damaged , and check that the flap position is in accordance with the slat/flap lever position.*

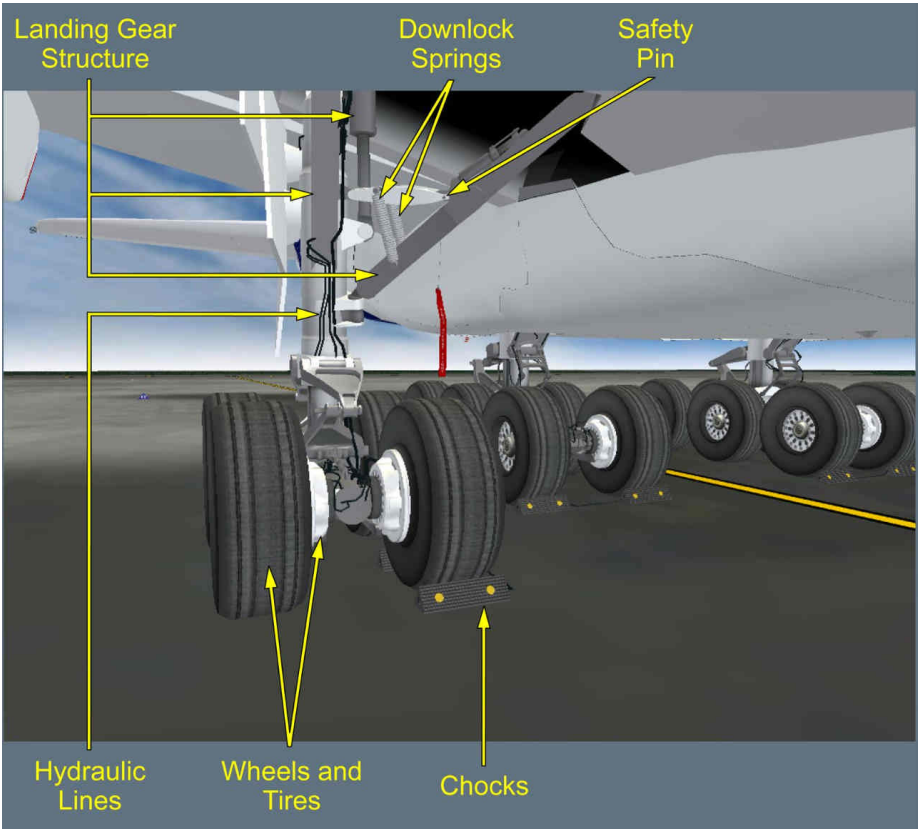

Flaps
Fairings

L1 JETTISON OUTLET.....NO LEAK



RH WING LANDING GEAR

Applicable to: ALL

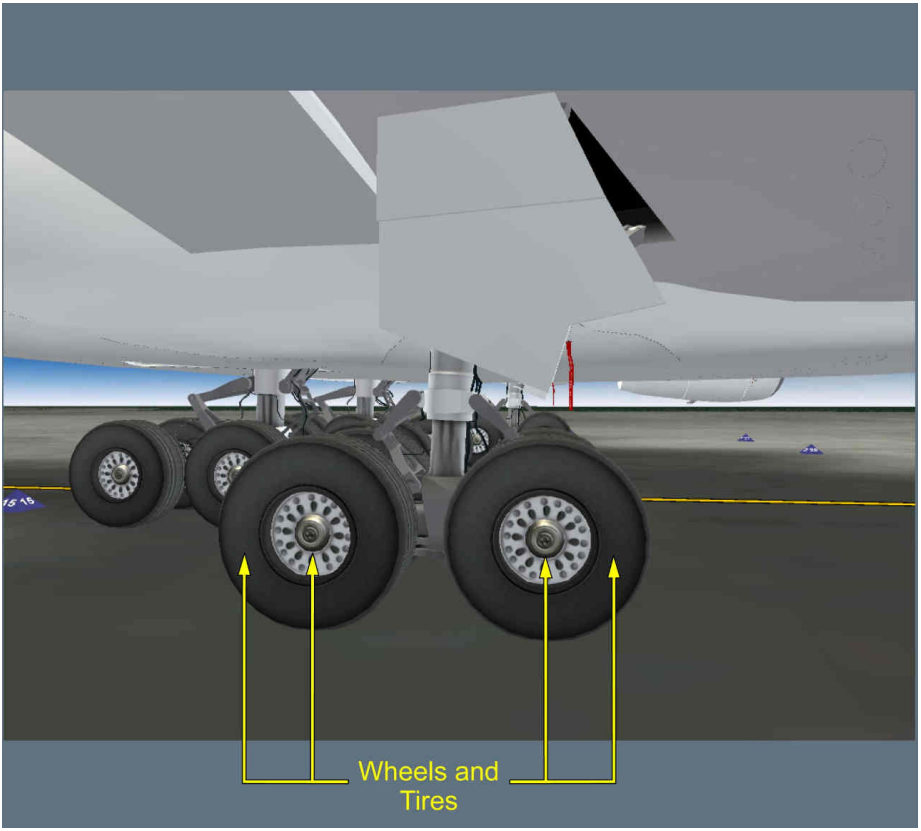


* CHOCKS.....REMOVED



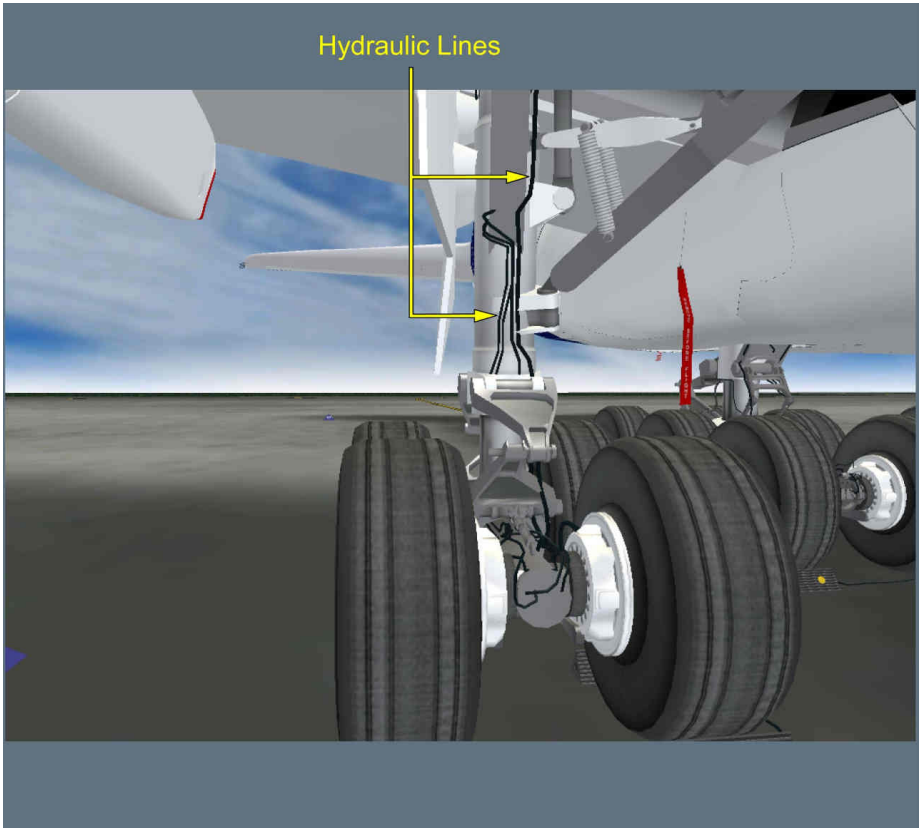
* WHEELS AND TIRES.....CHECK CONDITION

L2 *Check the wheels and tires for wear, cuts, and cracks.*



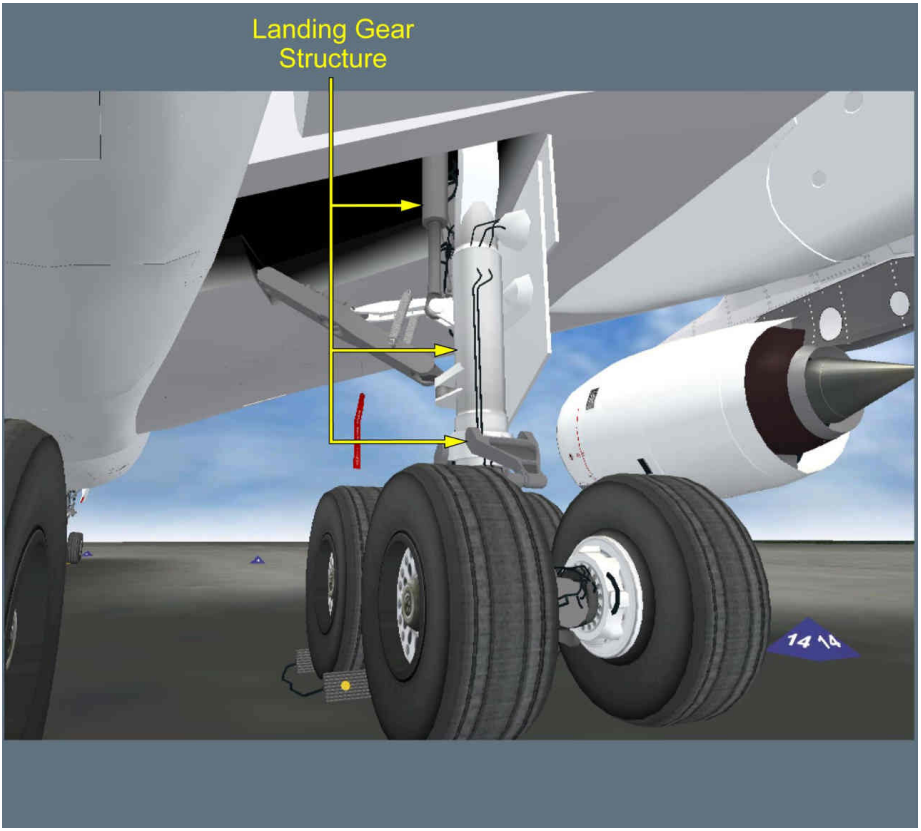
L1 HYDRAULIC LINES.....CHECK CONDITION

L2 *Check the condition of the hydraulic lines, and make sure there are no leaks.*



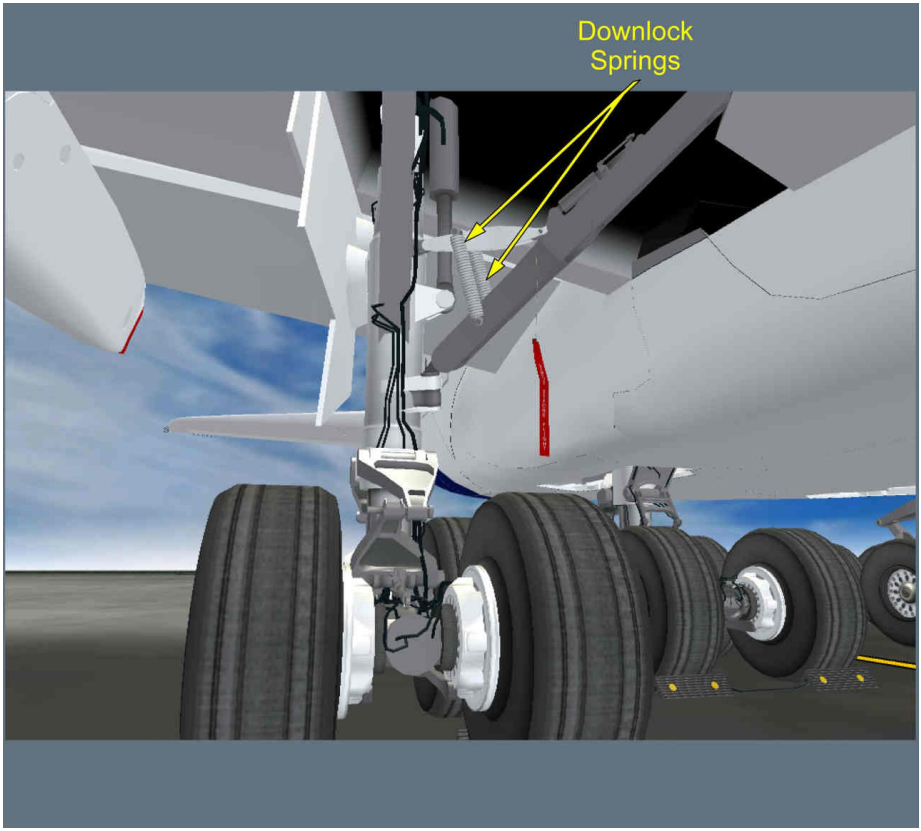
L1 LANDING GEAR STRUCTURE.....CHECK CONDITION

Check that the landing gear structure is not damaged.

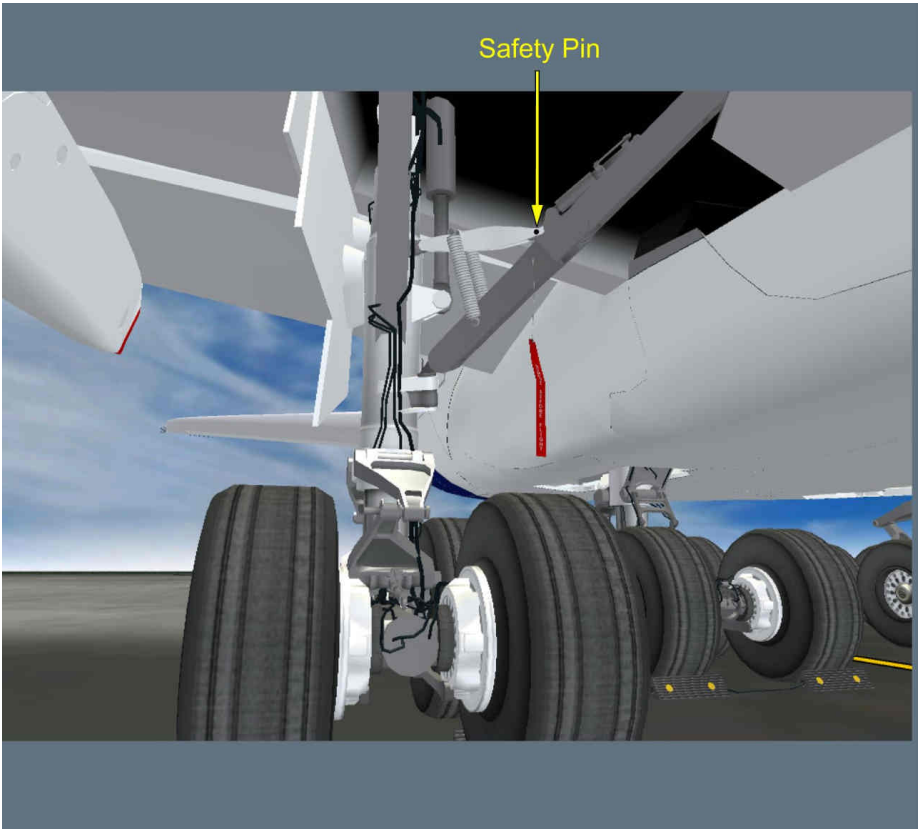


DOWNLOCK SPRINGS.....CHECK CONDITION

L2 *From the front of the landing gear, check the condition of the downlock springs.*

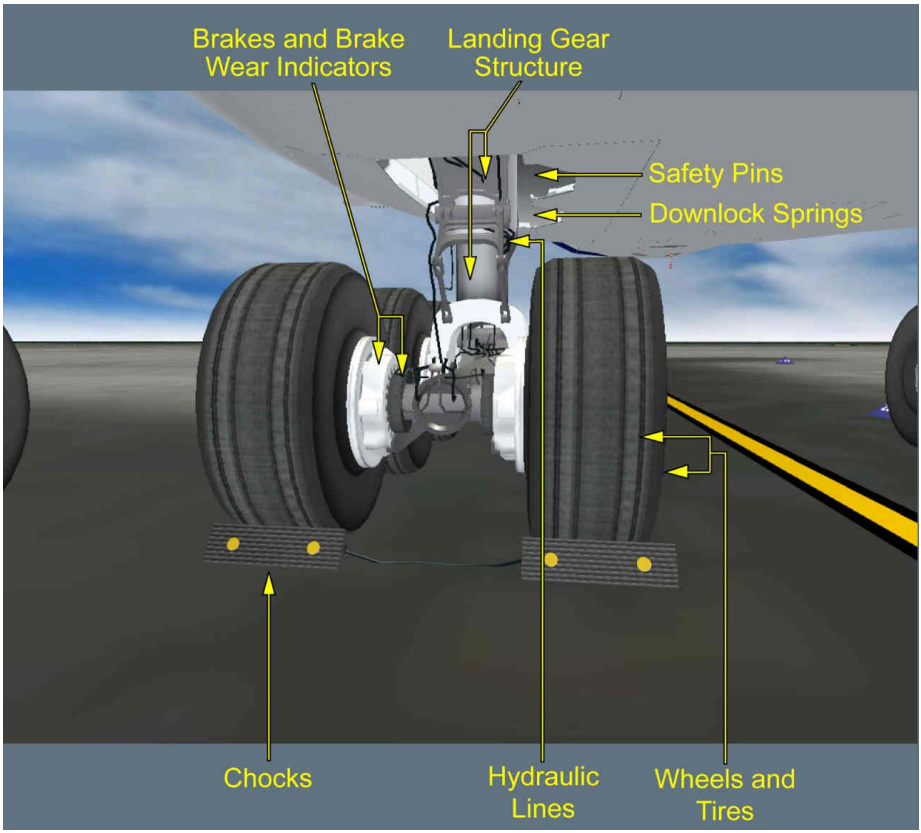

Downlock
Springs

L1 SAFETY PIN.....REMOVED

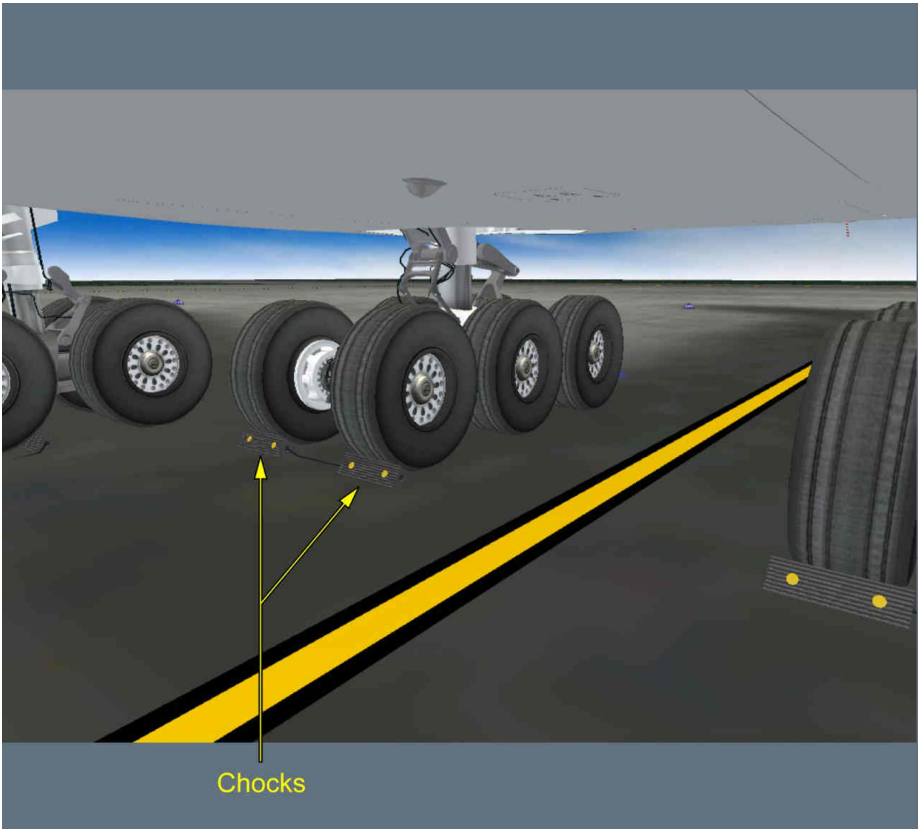


RH BODY LANDING GEAR AND FUSELAGE

Applicable to: ALL

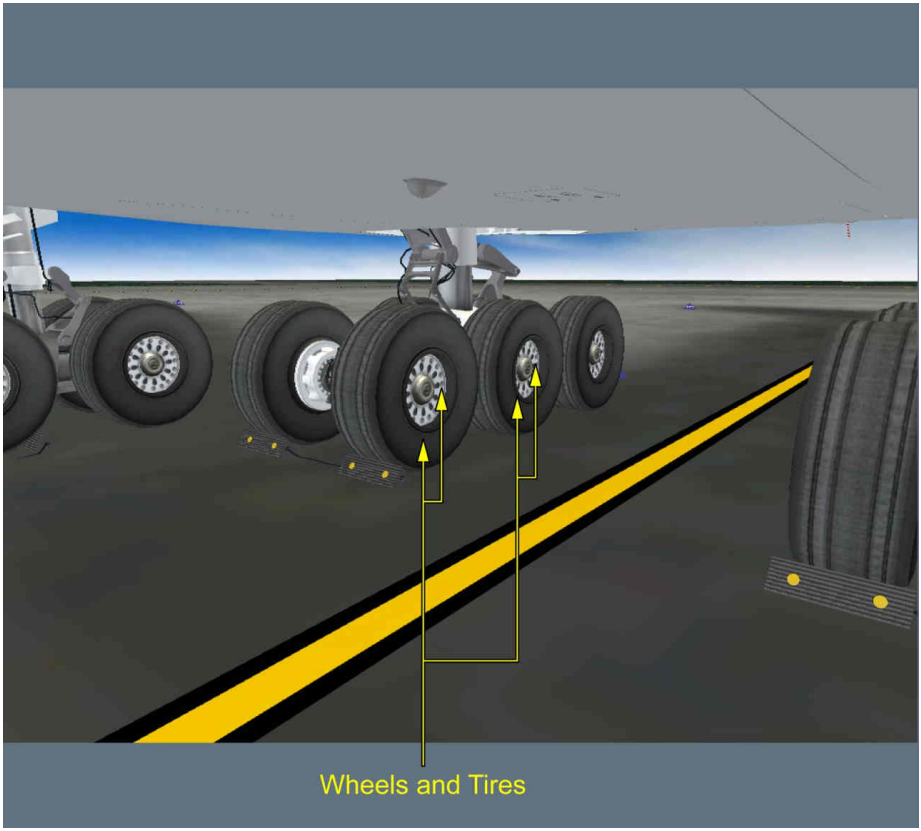


* CHOCKS.....REMOVED



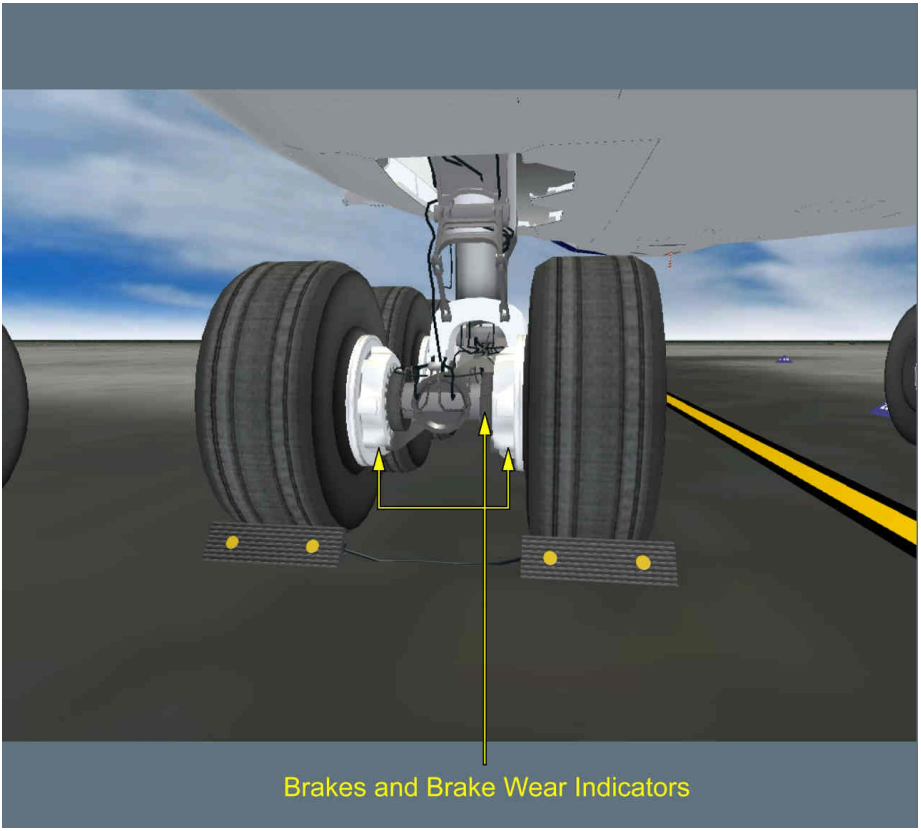
* WHEELS AND TIRES.....CHECK CONDITION

L2 *Check the wheels and tires for wear, cuts, and cracks.*



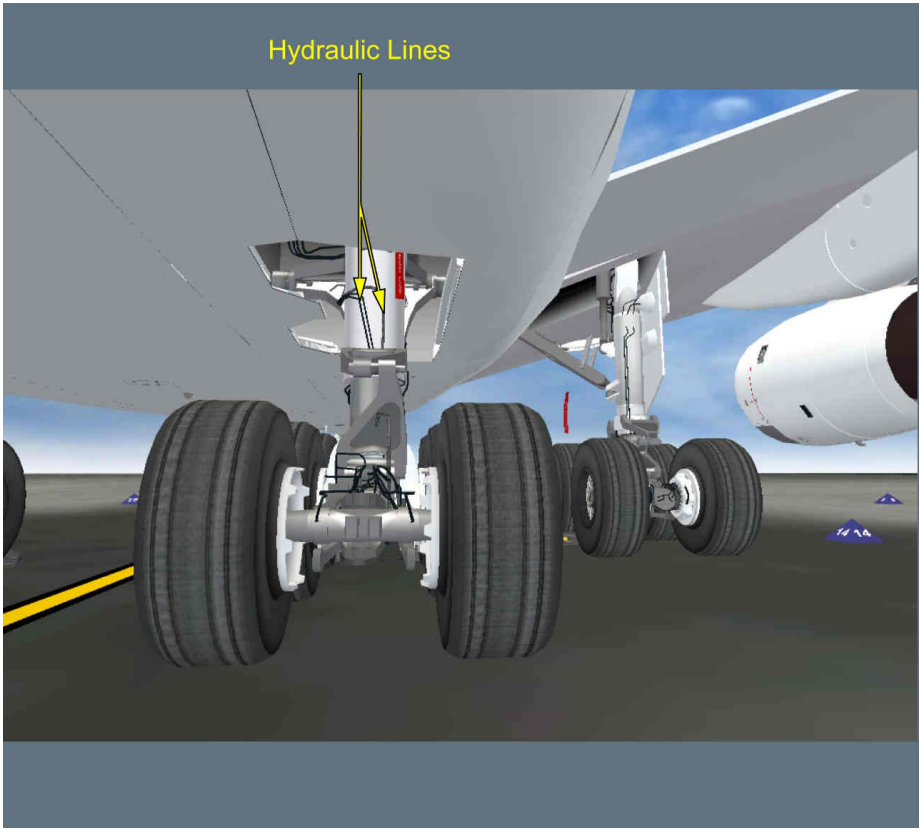
L1 BRAKES AND BRAKE WEAR INDICATORS.....CHECK CONDITION

L2 *Check the brakes for wear and the position of the brake wear pin: If the pin is almost flush with the guide, the brake must be replaced.*



L1 HYDRAULIC LINES.....CHECK CONDITION

L2 *Check the condition of the hydraulic lines, and make sure there are no leaks.*



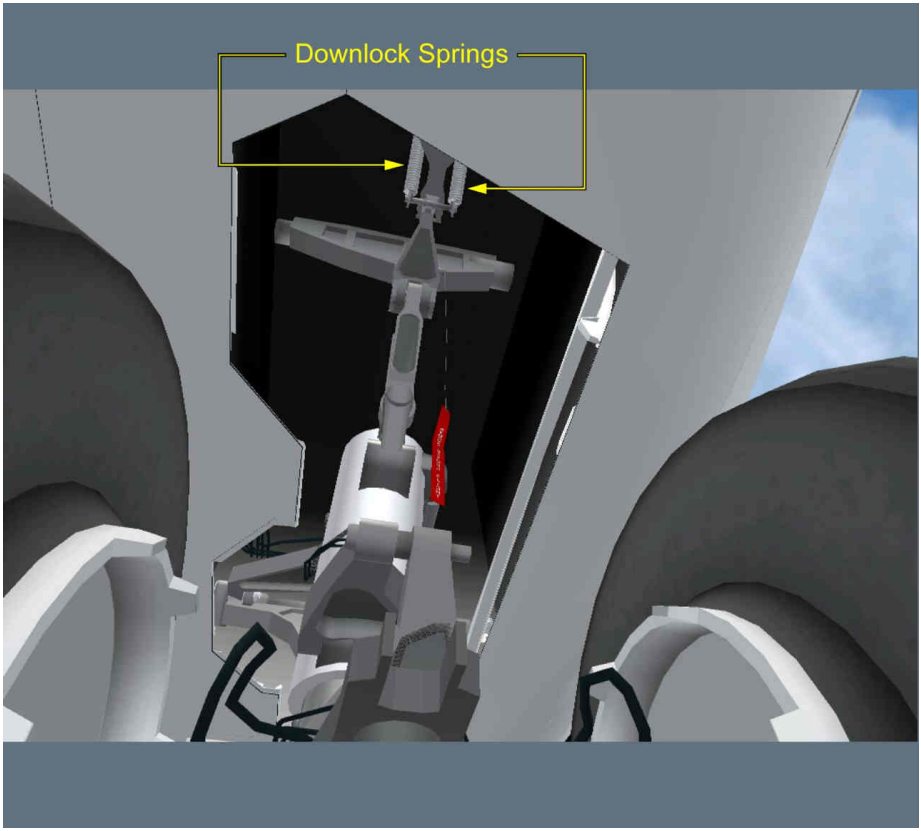
L1 LANDING GEAR STRUCTURE.....CHECK CONDITION

L2 *Check that the landing gear structure is not damaged.*

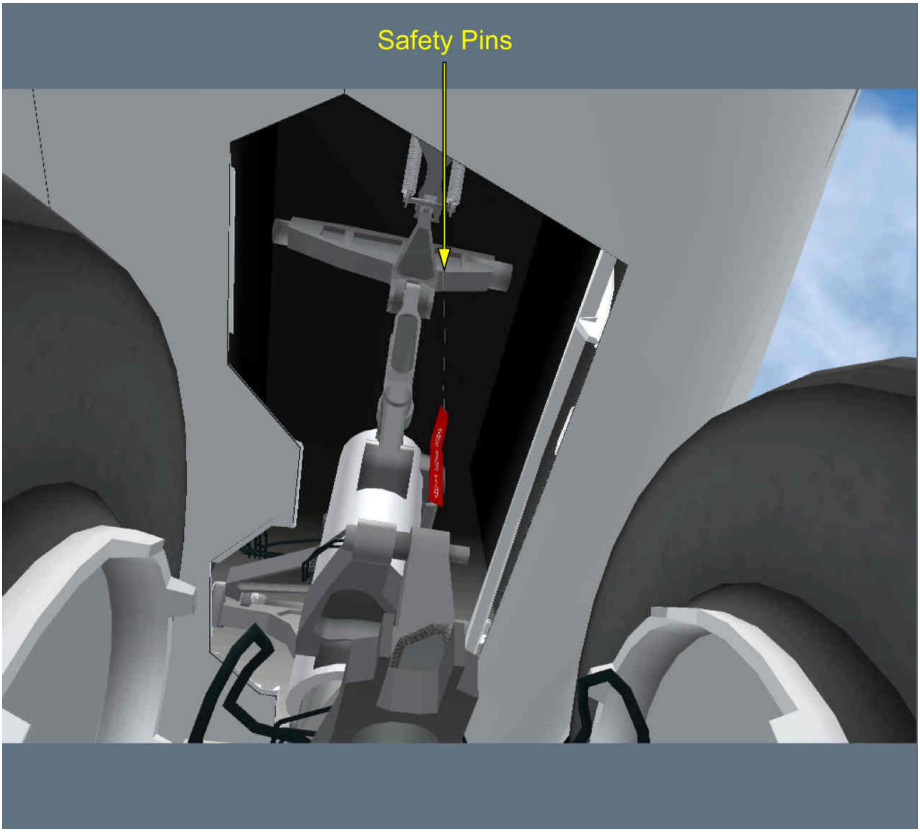


L1 DOWNLOCK SPRINGS.....CHECK CONDITION

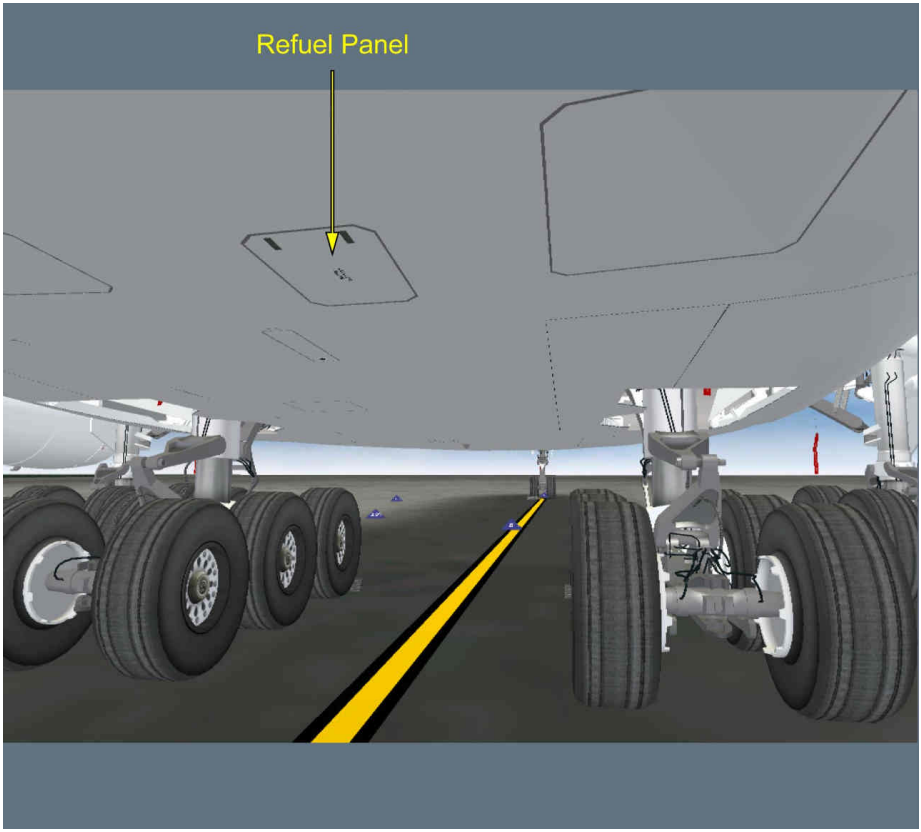
L2 *From the front of the landing gear, check the condition of the downlock springs.*


Downlock Springs

L1 SAFETY PINS.....REMOVED

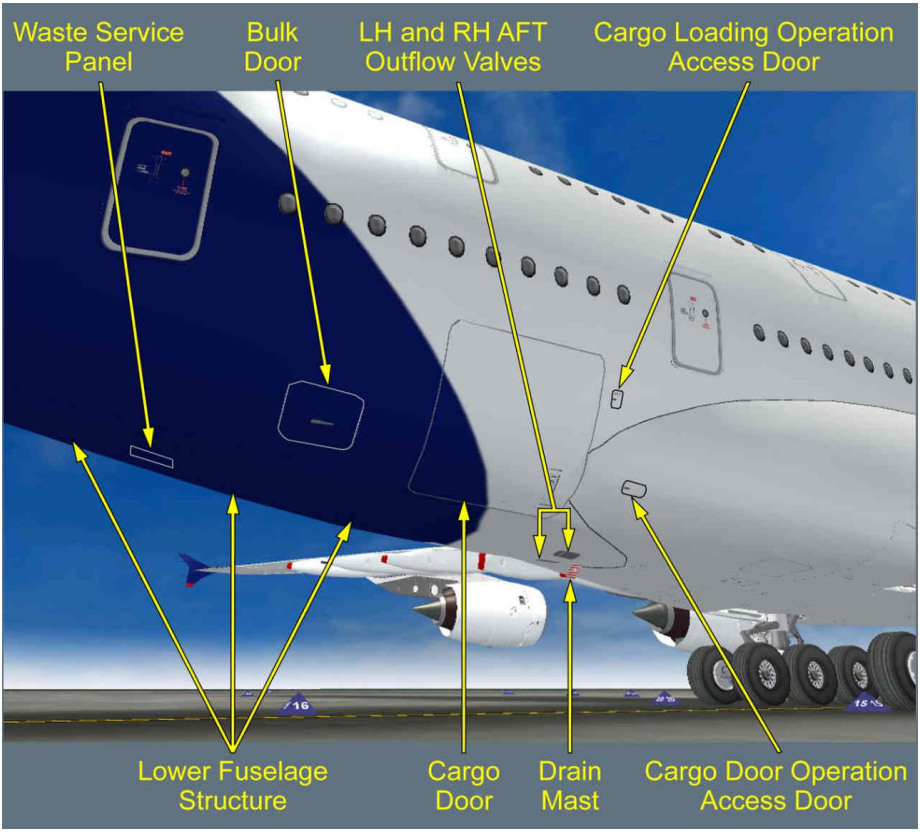


REFUEL PANEL..... CLOSED



AFT FUSELAGE

Applicable to: ALL



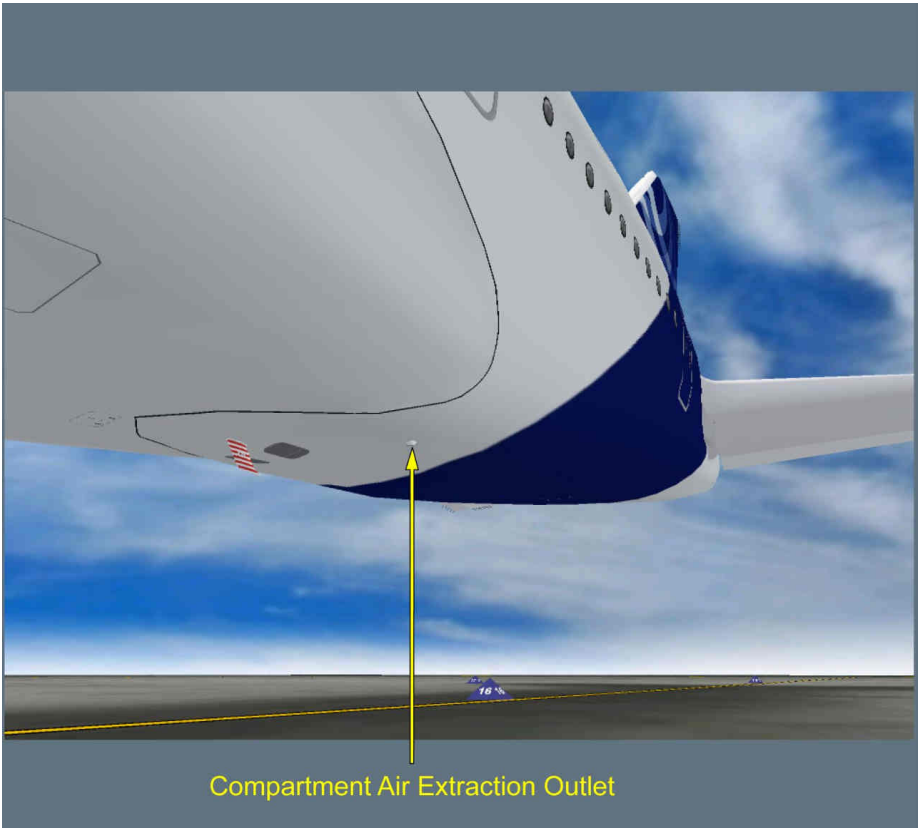
LH AND RH AFT OUTFLOW VALVES..... CHECK CONDITION

L2 *Check the condition of the LH and RH aft outflow valves, and make sure they are clear of obstruction.*



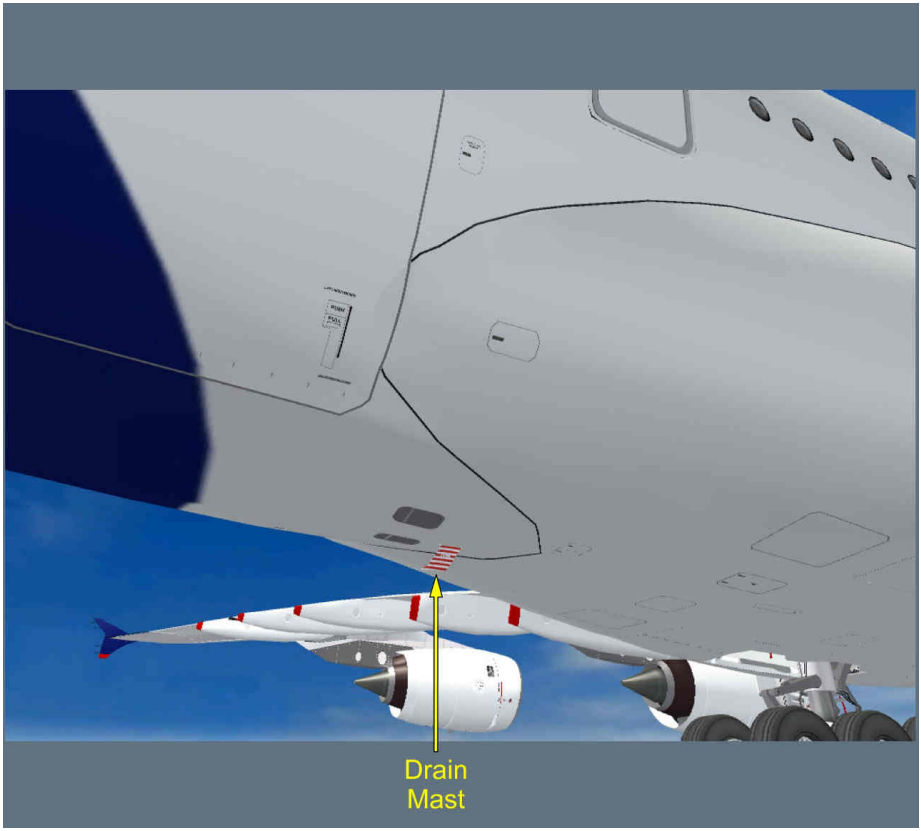
L1 COMPARTMENT AIR EXTRACTION OUTLET ..... CHECK CONDITION

Check the condition of the extraction outlet, and make sure it is clear of obstruction.

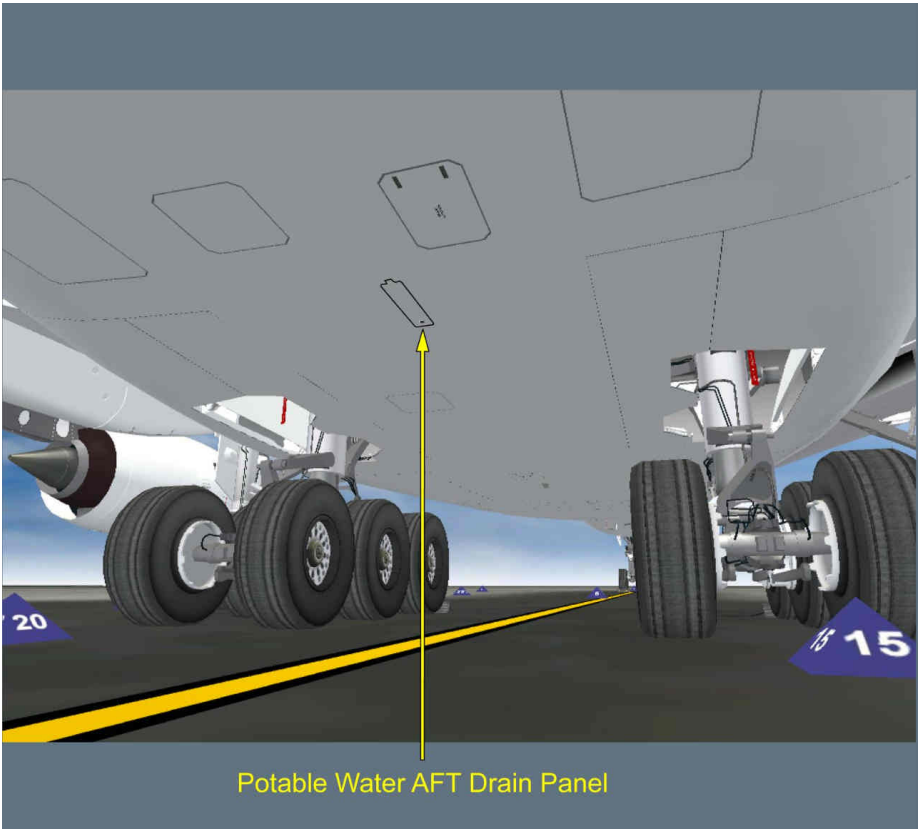


DRAIN MAST.....CHECK CONDITION

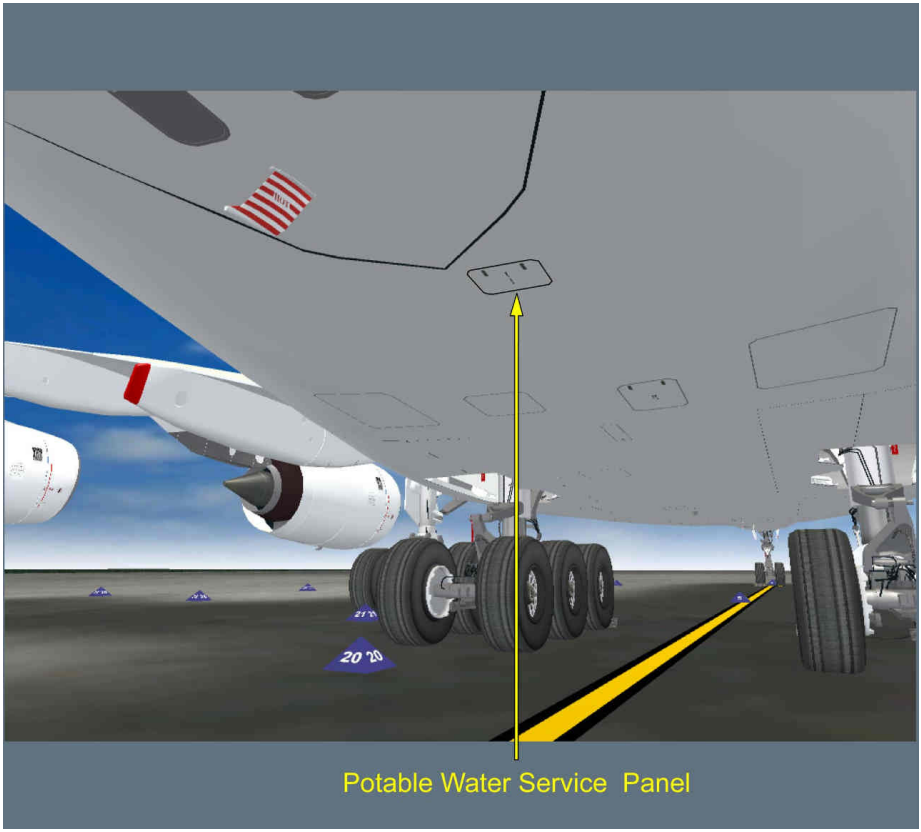
L2 *While walking around the fuselage, check the condition of the drain mast.*


Drain
Mast

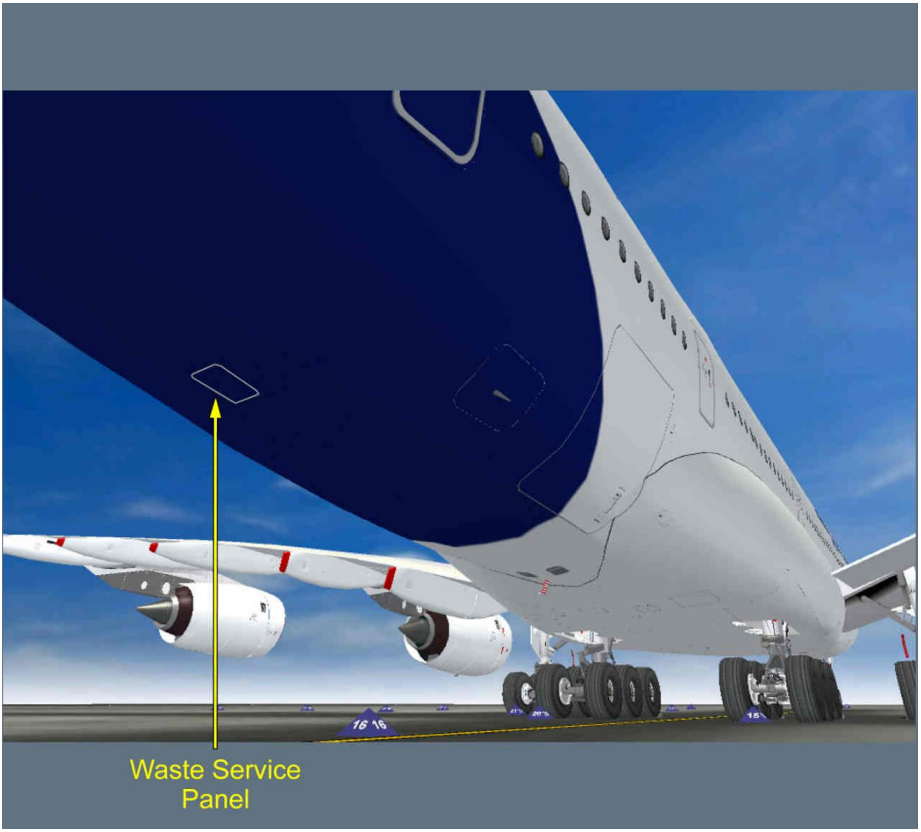
L1 POTABLE WATER AFT DRAIN PANEL..... CLOSED



* POTABLE WATER SERVICE PANEL.....CLOSED



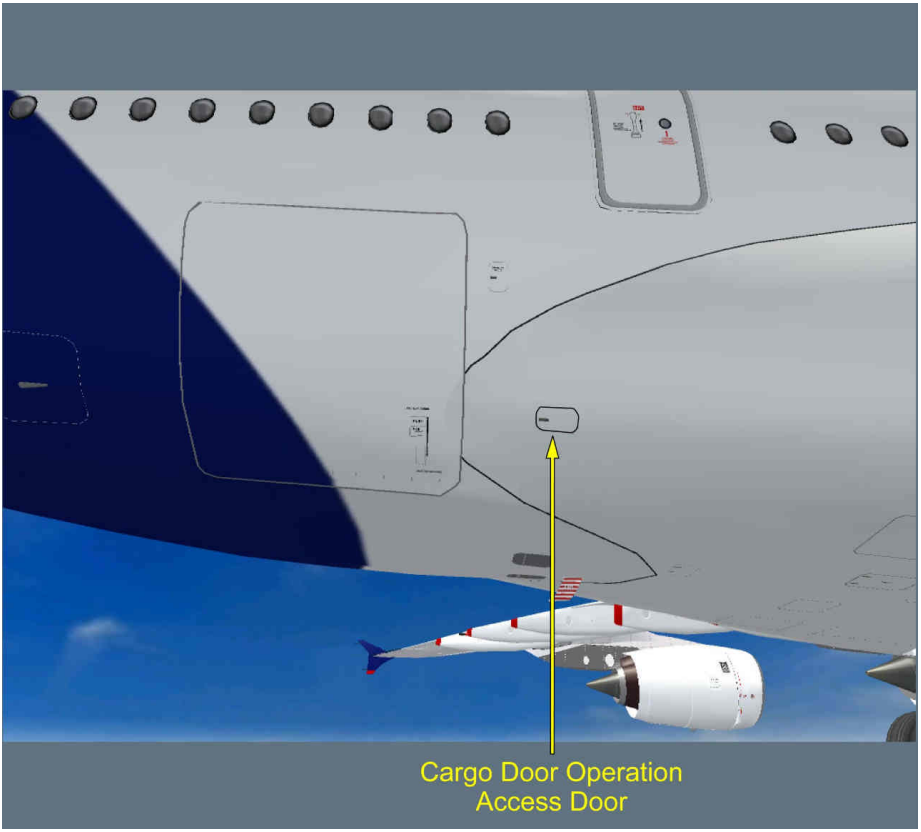
* WASTE SERVICE PANEL.....CLOSED



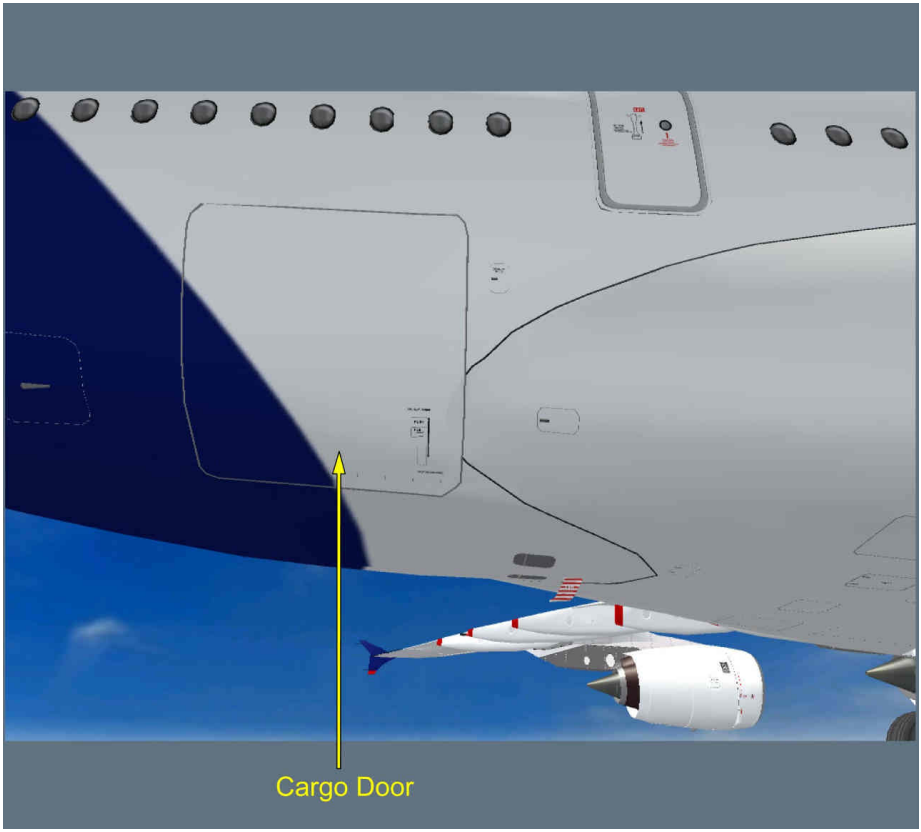
CARGO LOADING OPERATION ACCESS DOOR.....CLOSED



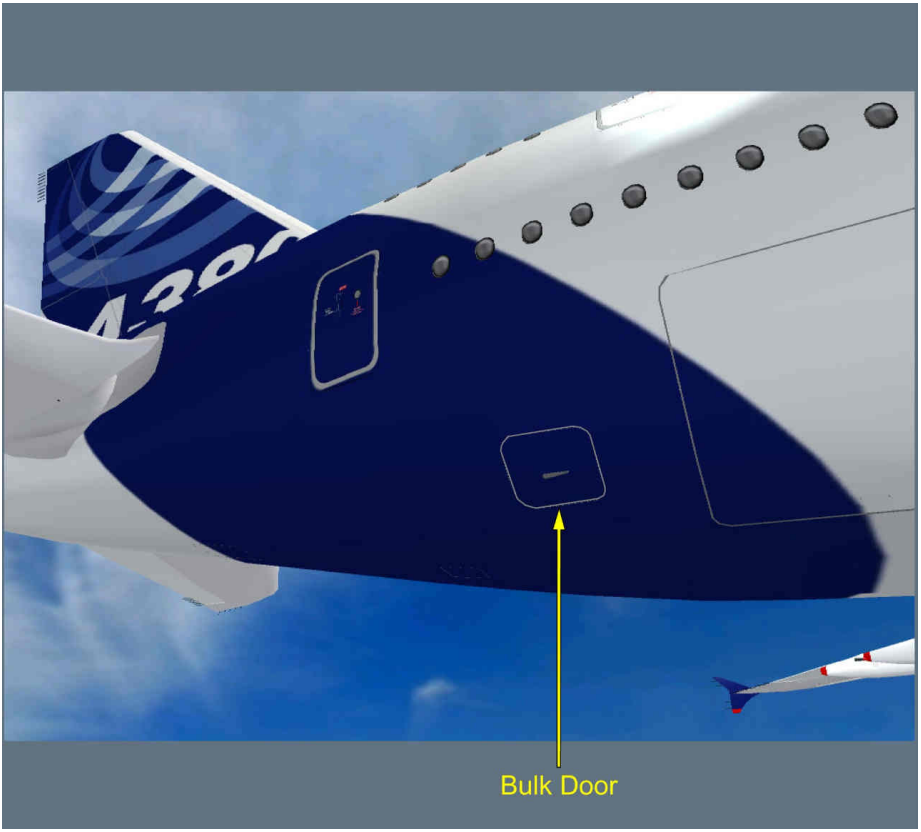
CARGO DOOR OPERATION ACCESS DOOR..... CLOSED



CARGO DOOR..... CLOSED

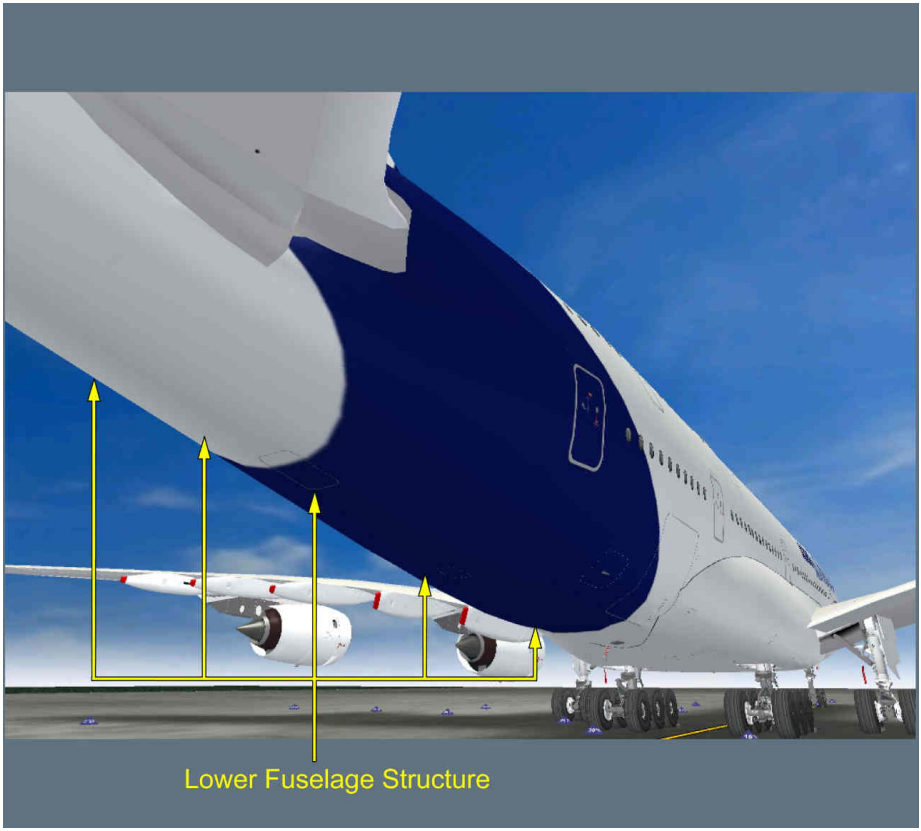


BULK DOOR.....CLOSED



* LOWER FUSELAGE STRUCTURE (TAILSTRIKE).....CHECK CONDITION

L2 *Check the lower fuselage for damage, that would indicate a tailstrike.*

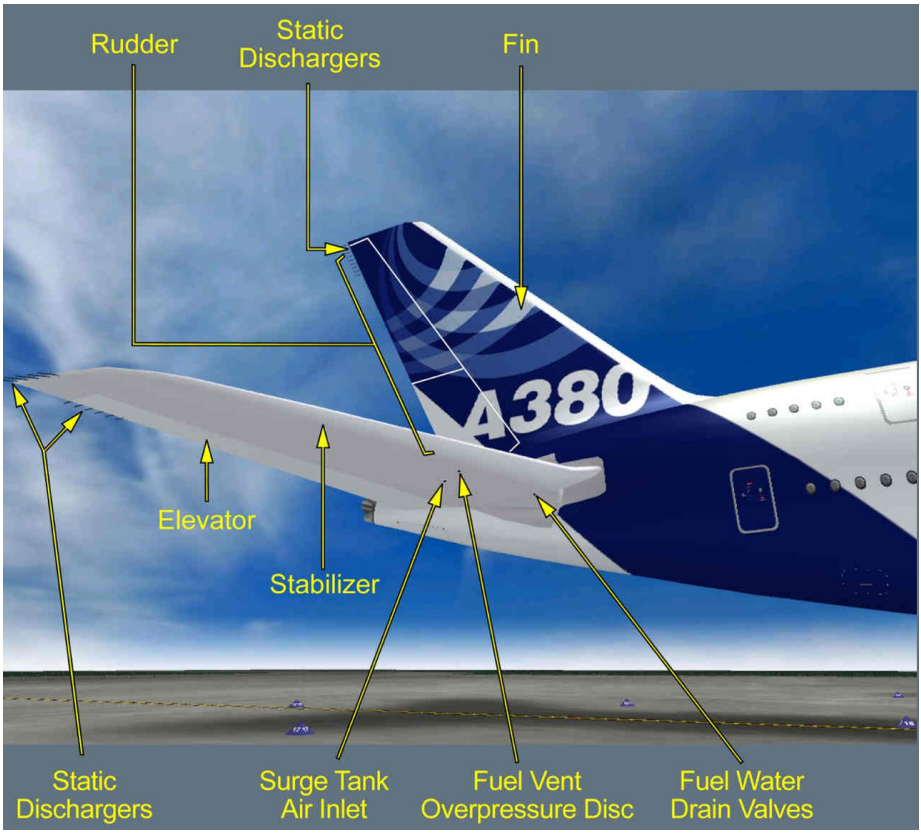

Lower Fuselage Structure

L1 FLIGHT RECORDERS ACCESS DOOR.....CLOSED



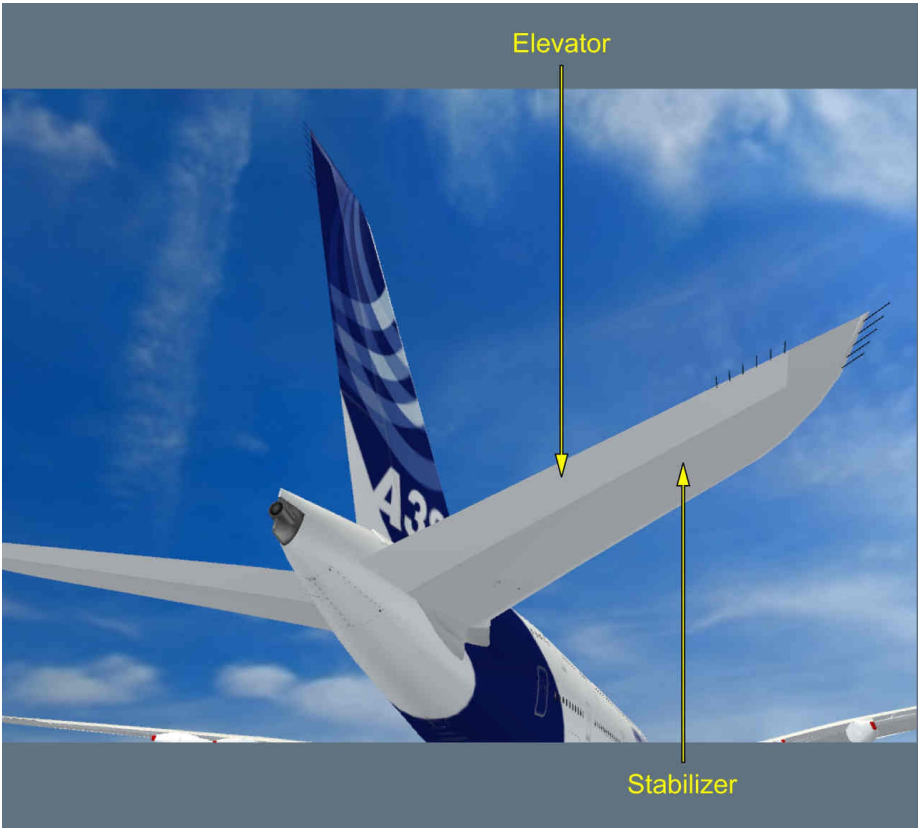
RH TAIL

Applicable to: ALL



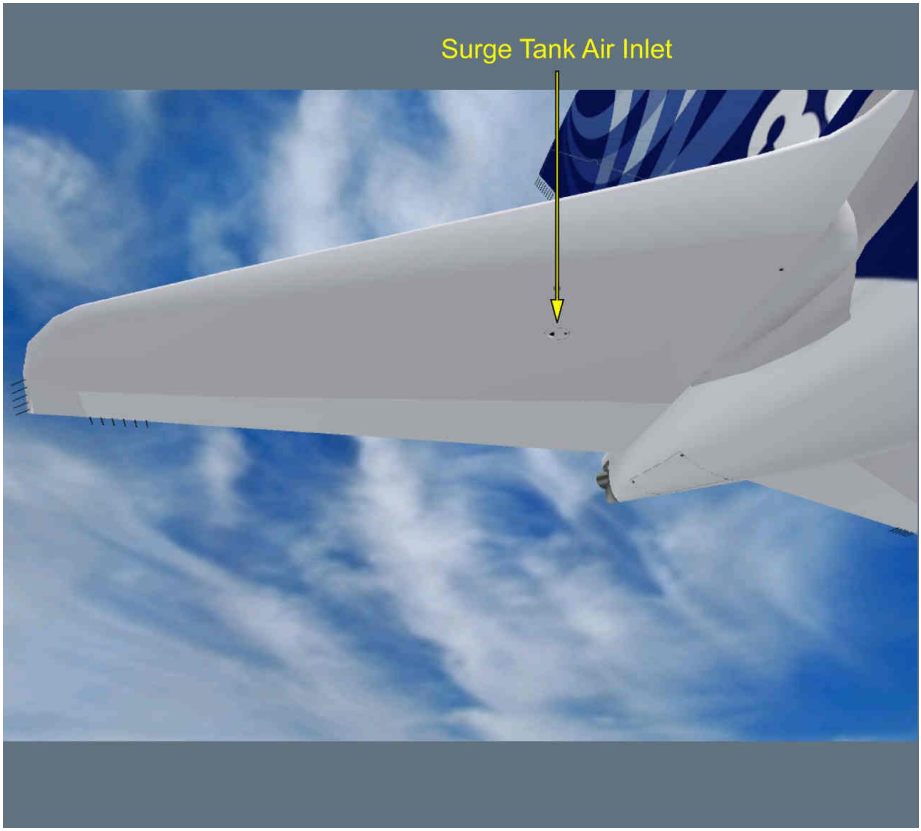
* STABILIZER AND ELEVATOR.....CHECK CONDITION

L2 *Check the right stabilizer, and elevator to make sure that they are not damaged. .*



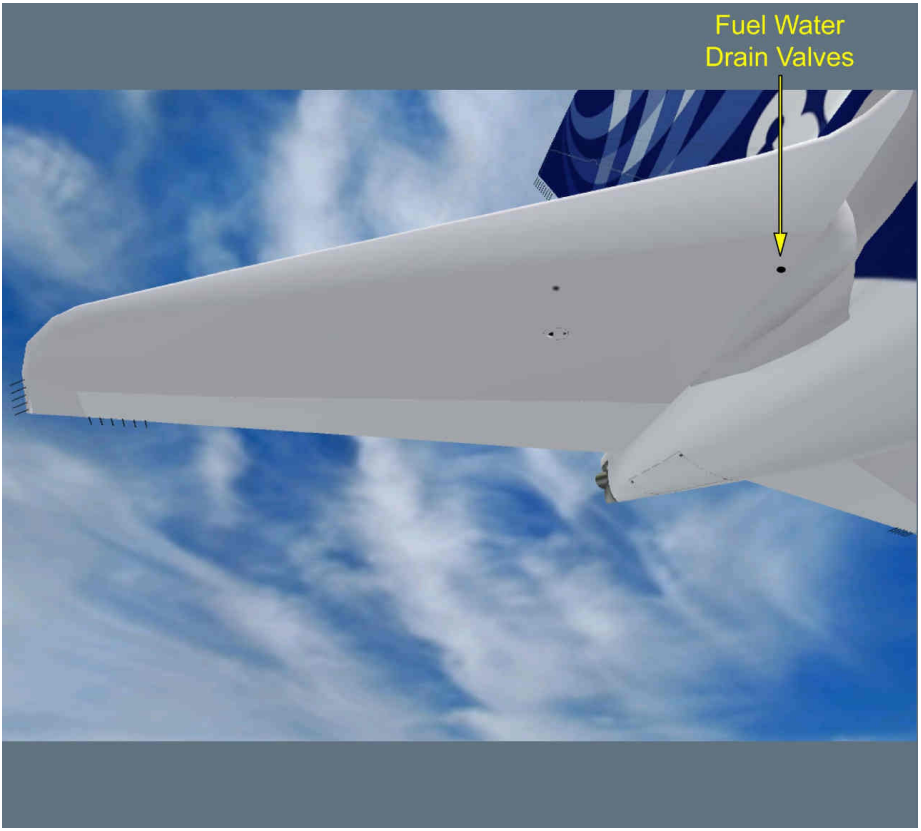
L1 SURGE TANK AIR INLET.....CLEAR

L2 *On the right horizontal stabilizer, check that the surge tank air inlet is clear.*



L1 FUEL WATER DRAIN VALVES..... NO LEAK

L2 *Below the stabilizer, check for leaks from the fuel water drain valves.*

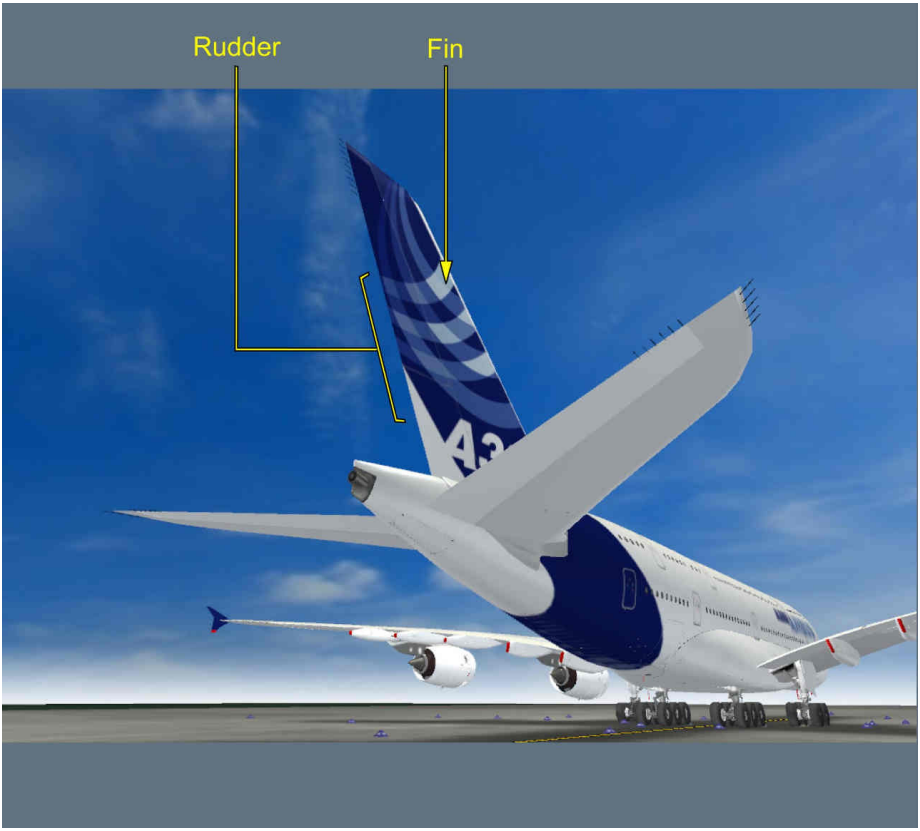

Fuel Water
Drain Valves

L1 * FUEL VENTILATION OVERPRESSURE DISC.....INTACT



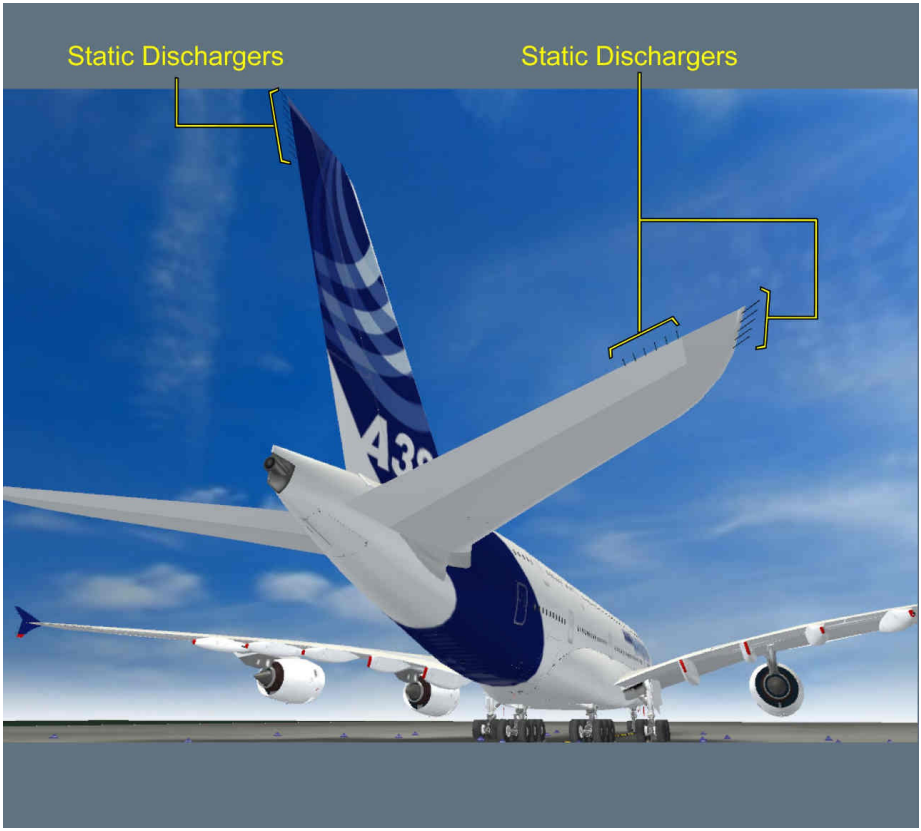
FIN AND RUDDER.....CHECK CONDITION

L2 *Check the rudder, and right fin to make sure that they are not damaged.*



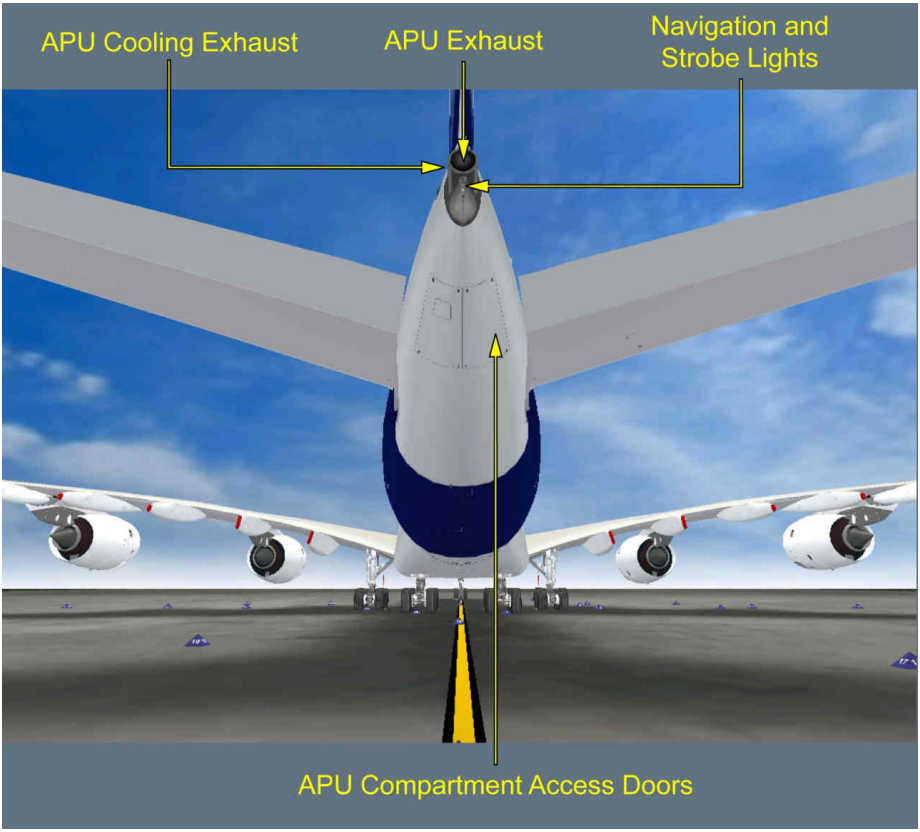
L1 STATIC DISCHARGERS (elevator and rudder)..... CHECK CONDITION

L2 *Check that the static dischargers are not missing or damaged.*

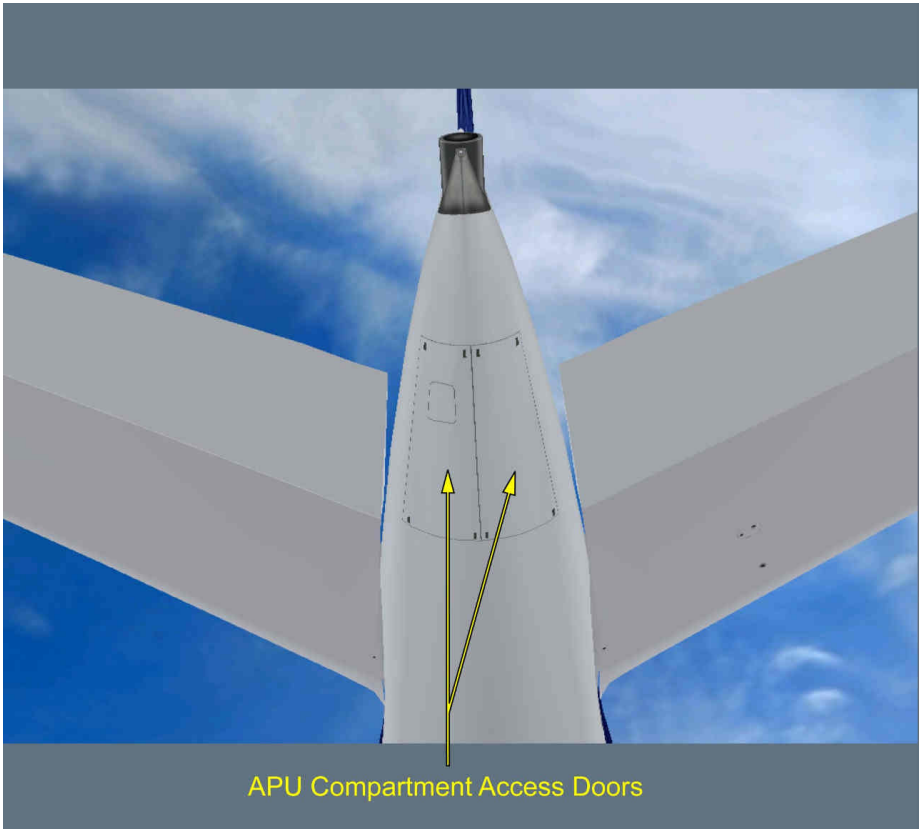

Static Dischargers
Static Dischargers

APU

Applicable to: ALL



APU COMPARTMENT ACCESS DOORS..... CLOSED



APU EXHAUST.....CLEAR

L2 *Check that the APU exhaust is clear of obstruction.*



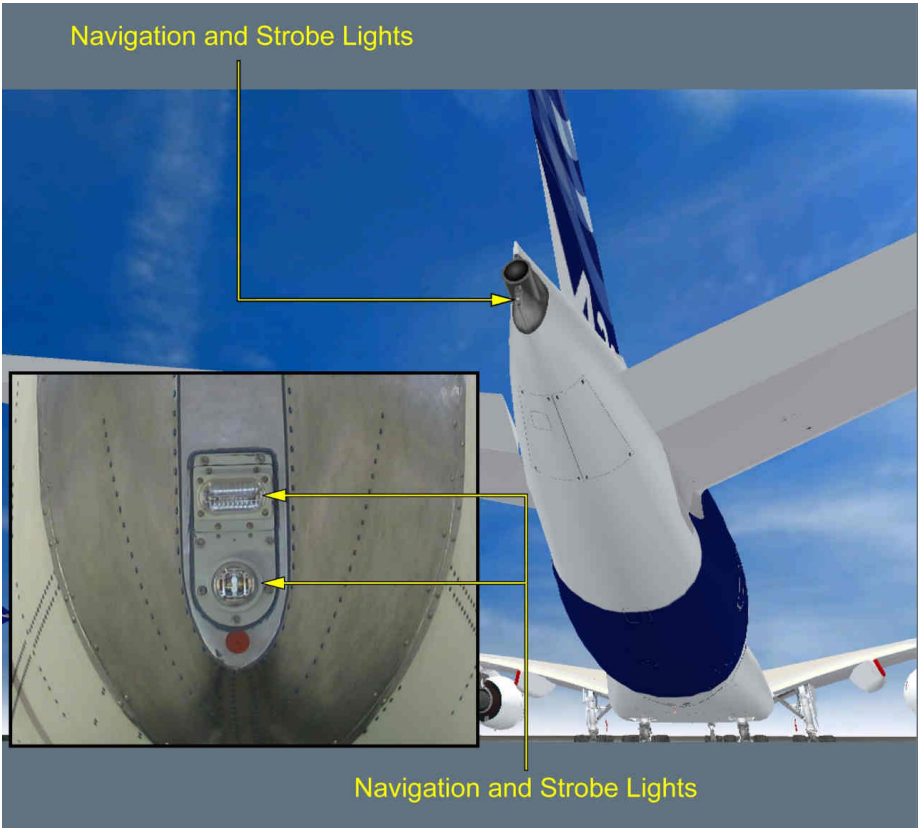
L1 APU COOLING EXHAUST .....CLEAR

Check that the APU cooling exhaust is clear of obstruction.



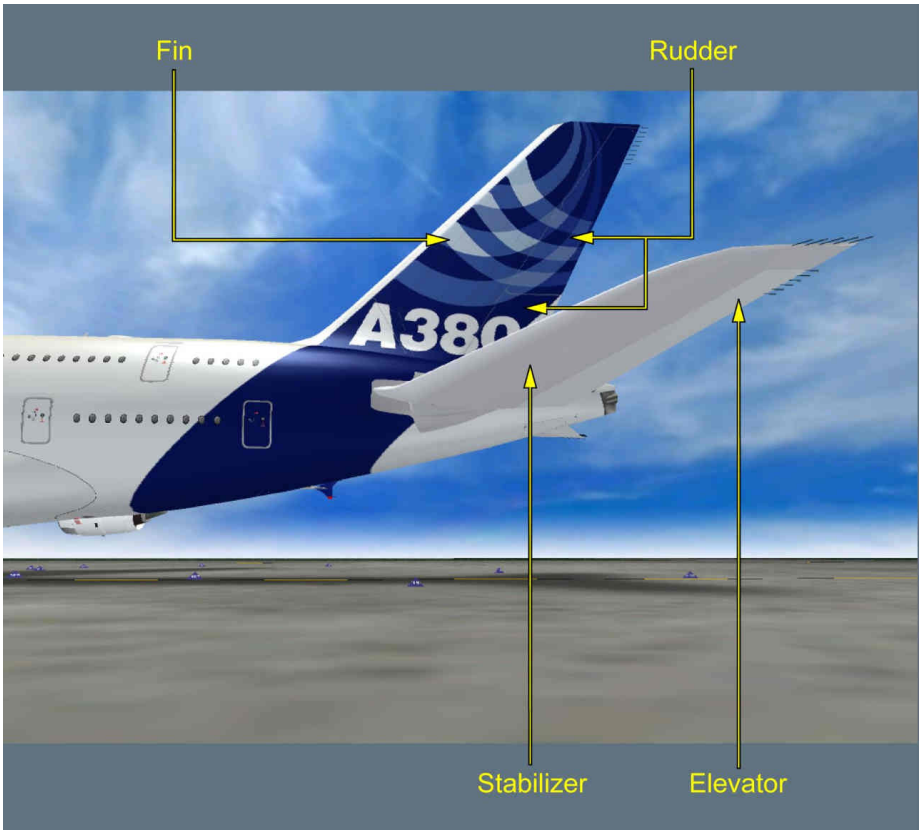
NAVIGATION AND STROBE LIGHTS..... CHECK CONDITION

L2 *Check that the navigation and strobe lights are not damaged.*


Navigation and Strobe Lights
Navigation and Strobe Lights

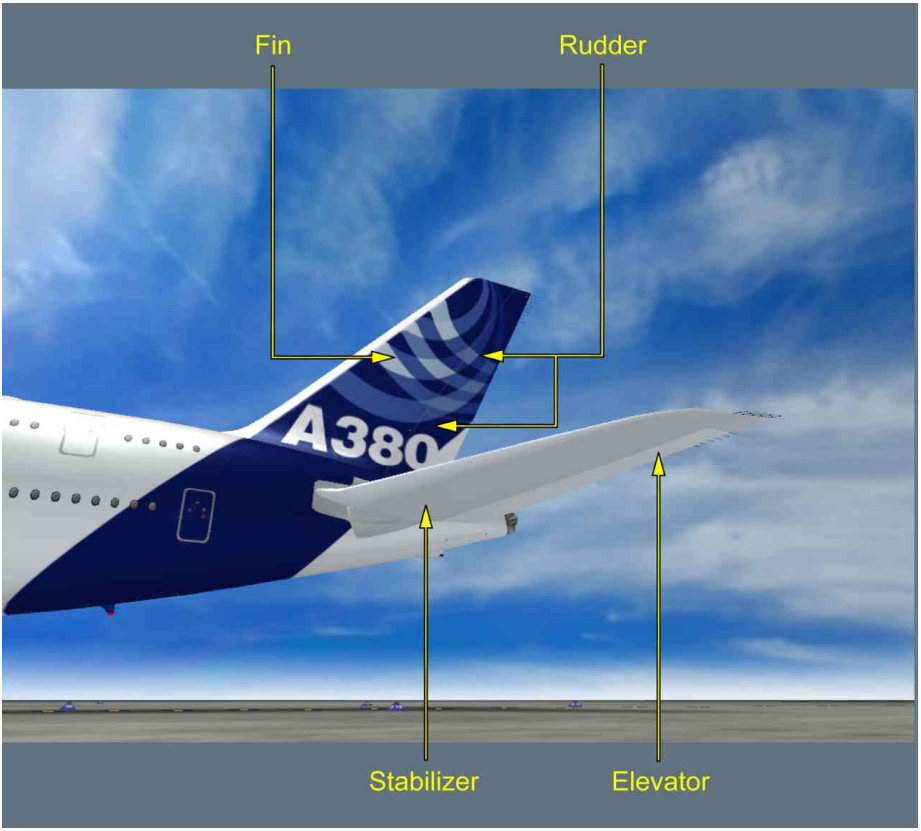
LH TAIL

Applicable to: ALL



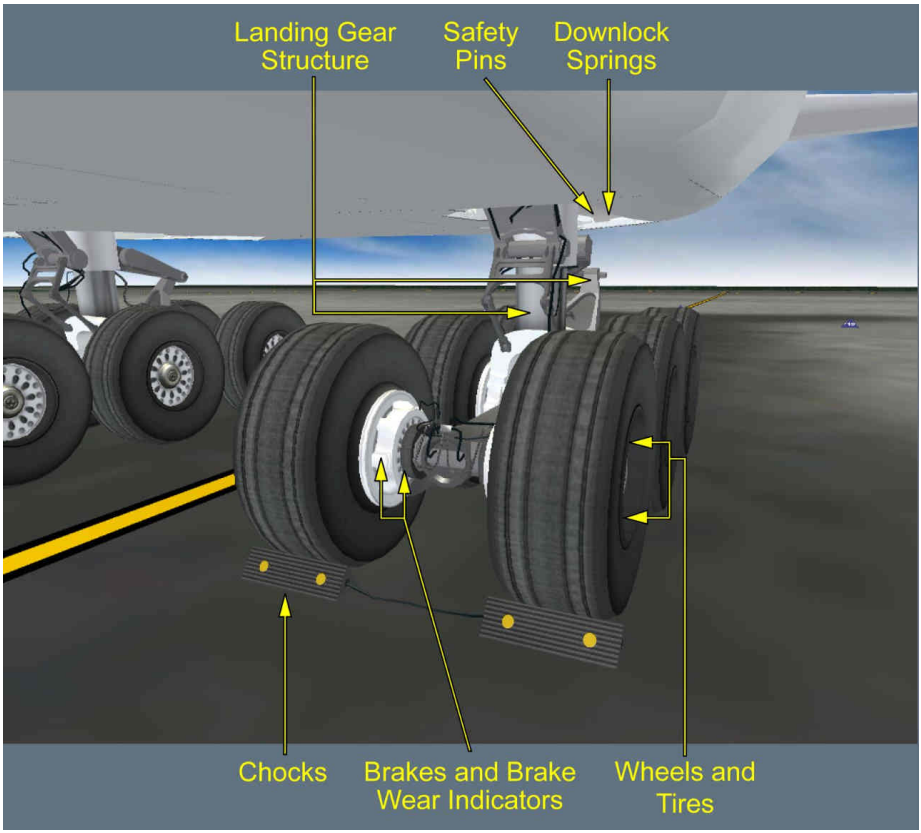
* STABILIZER, ELEVATOR, FIN, AND RUDDER..... CHECK CONDITION

L2 *While walking around the left side of the fuselage, check that the left sides of the stabilizer, fin, and rudder are not damaged.*

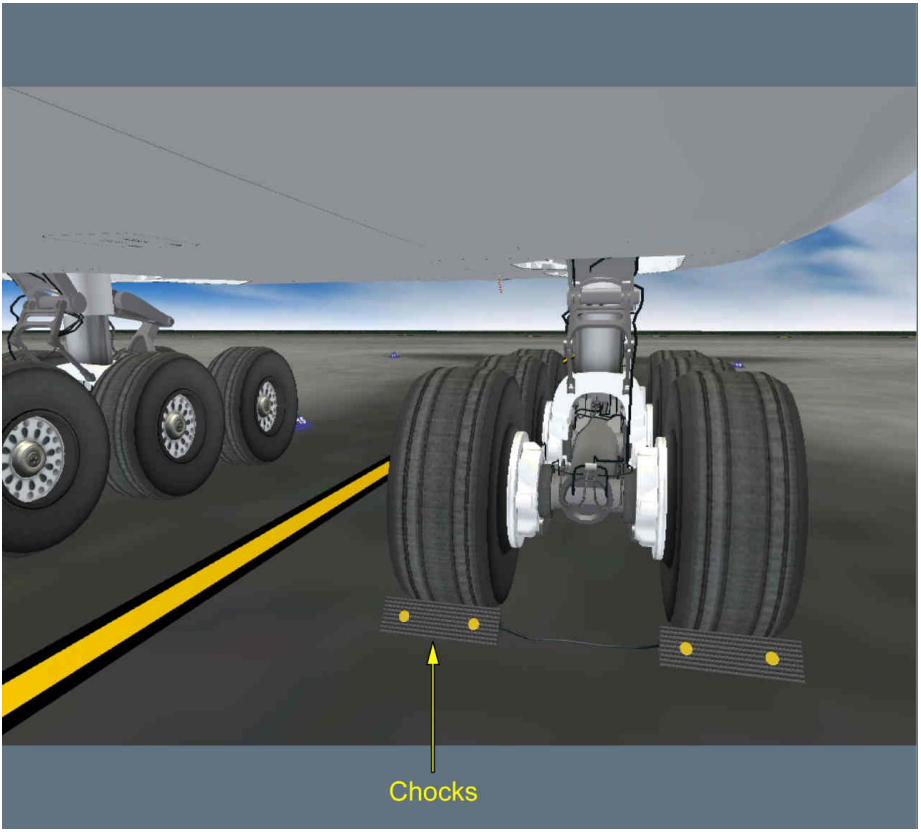

Fin
Rudder
A380
Stabilizer
Elevator

LH BODY LANDING GEAR AND FUSELAGE

Applicable to: ALL



* CHOCKS.....REMOVED



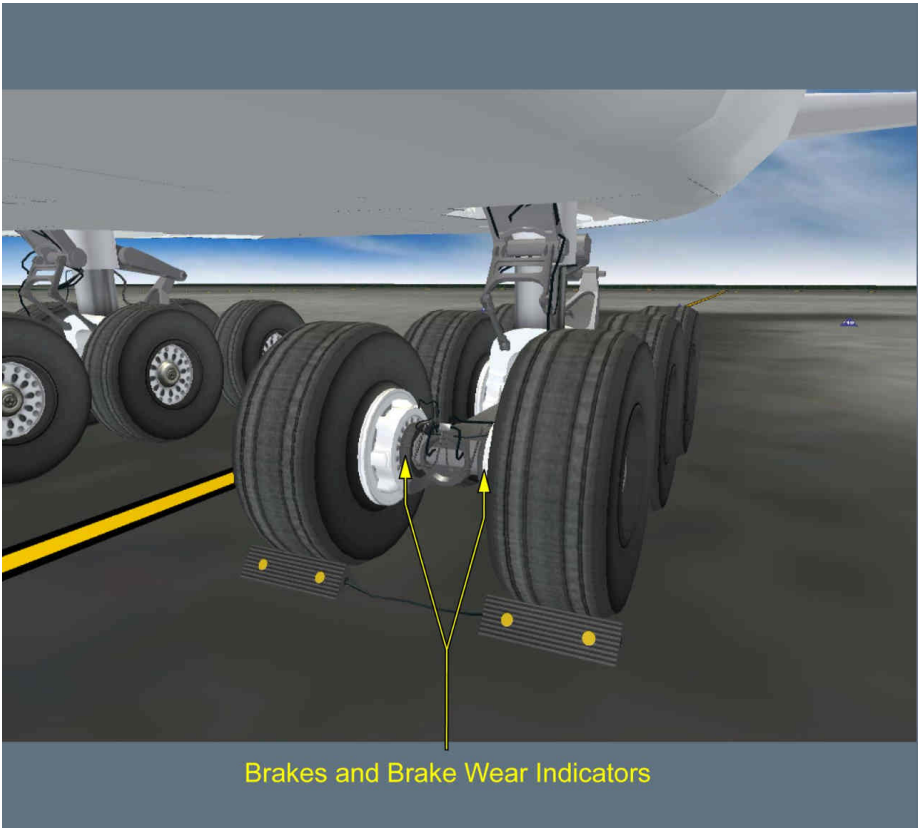
* WHEELS AND TIRES.....CHECK CONDITION

L2 *Check the wheels and tires for wear, cuts, and cracks.*



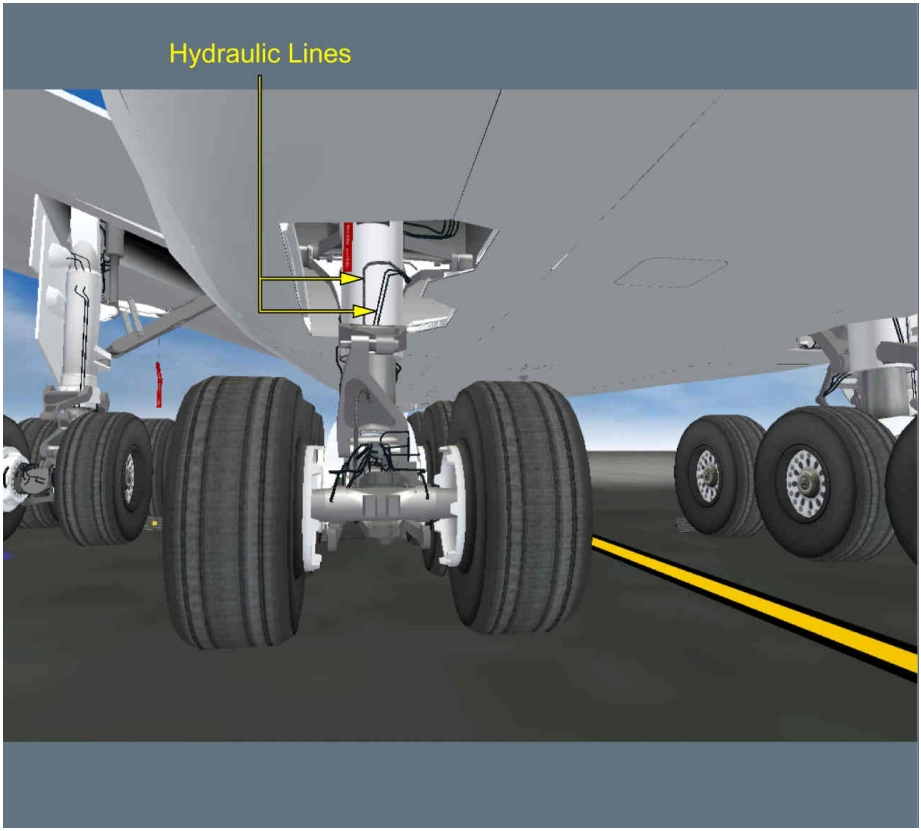
L1 BRAKES AND BRAKE WEAR INDICATORS.....CHECK CONDITION

L2 *Check the brakes for wear and the position of the brake wear pin: If the pin is almost flush with the guide, the brake must be replaced.*



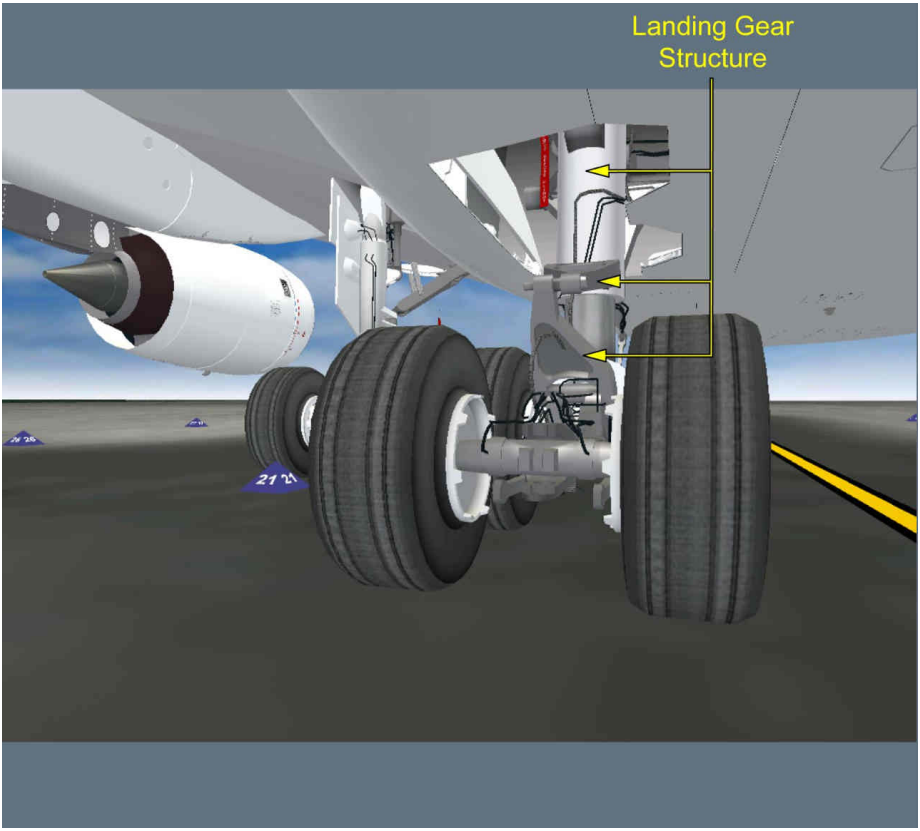
L1 HYDRAULIC LINES.....CHECK CONDITION

L2 *Check the condition of the hydraulic lines, and make sure that there are no leaks.*



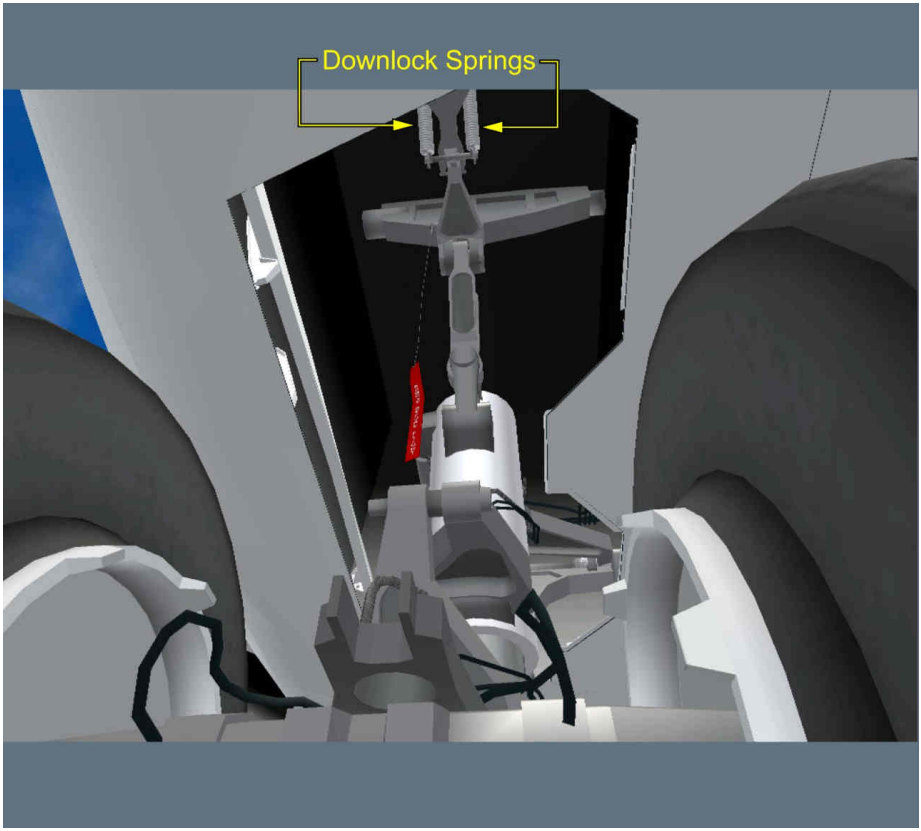
L1 LANDING GEAR STRUCTURE.....CHECK CONDITION

L2 *Check that the landing gear structure is not damaged.*

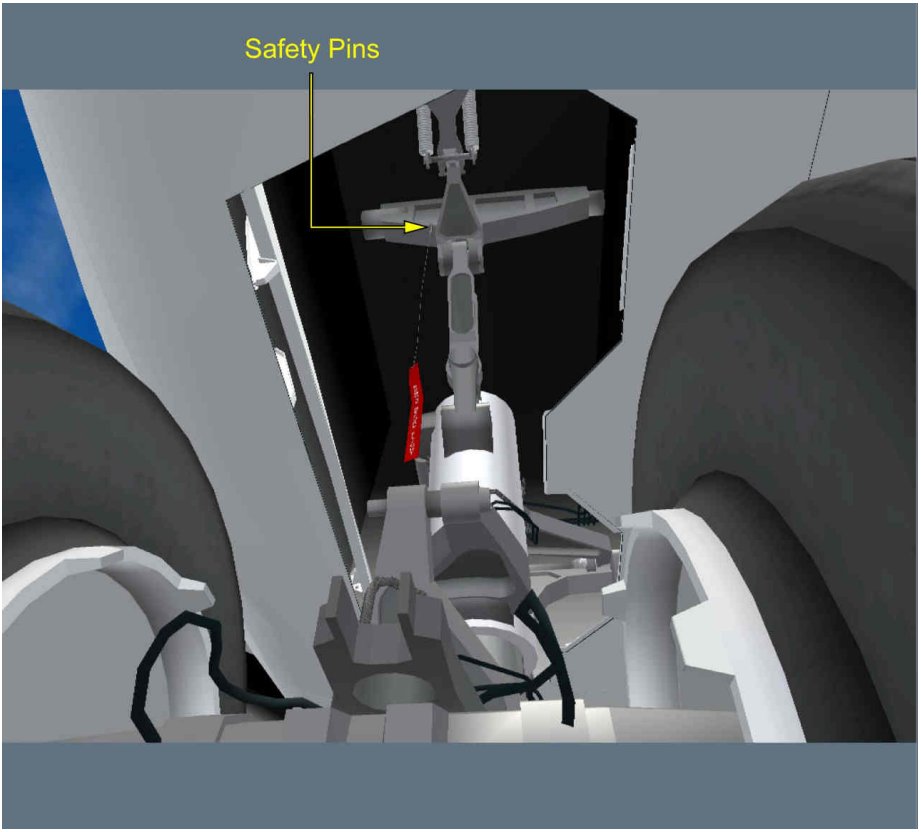


L1 DOWNLOCK SPRINGS.....CHECK CONDITION

L2 *From the front of the landing gear, check the condition of the downlock springs.*

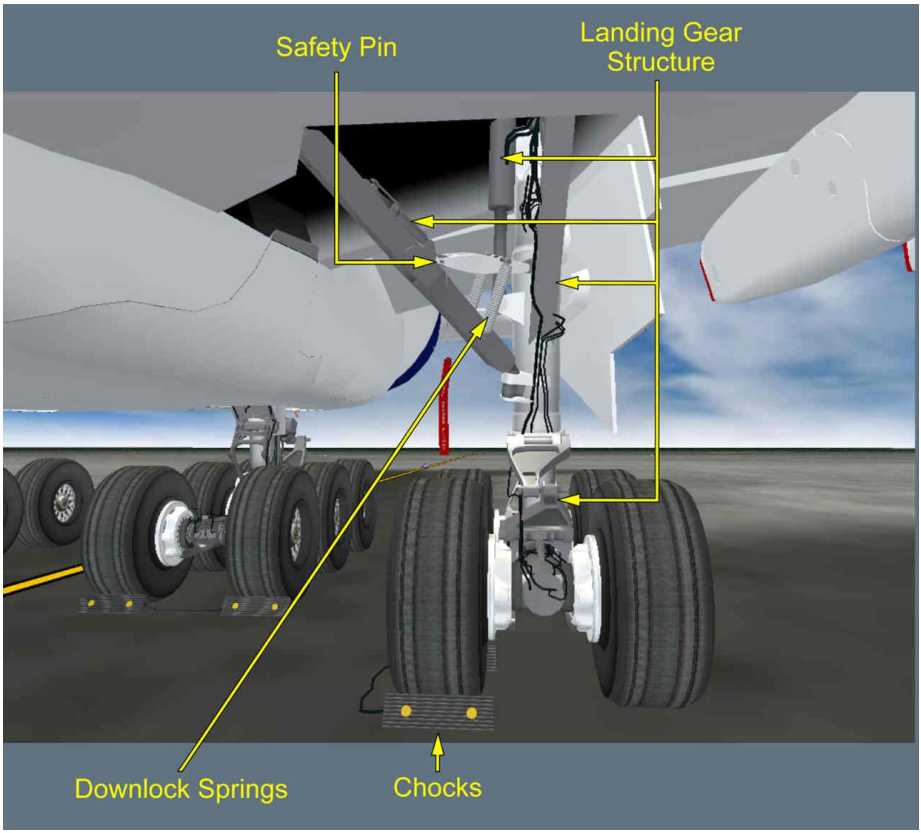

Downlock Springs

L1 SAFETY PINS.....REMOVED



LH WING LANDING GEAR

Applicable to: ALL

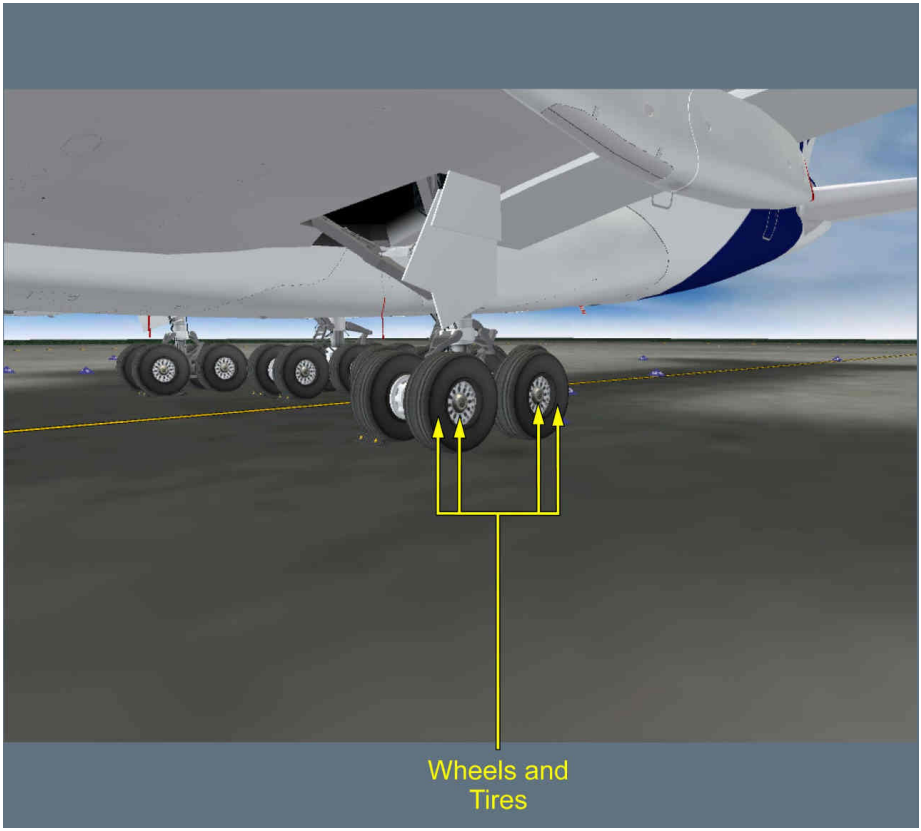


* CHOCKS.....REMOVED



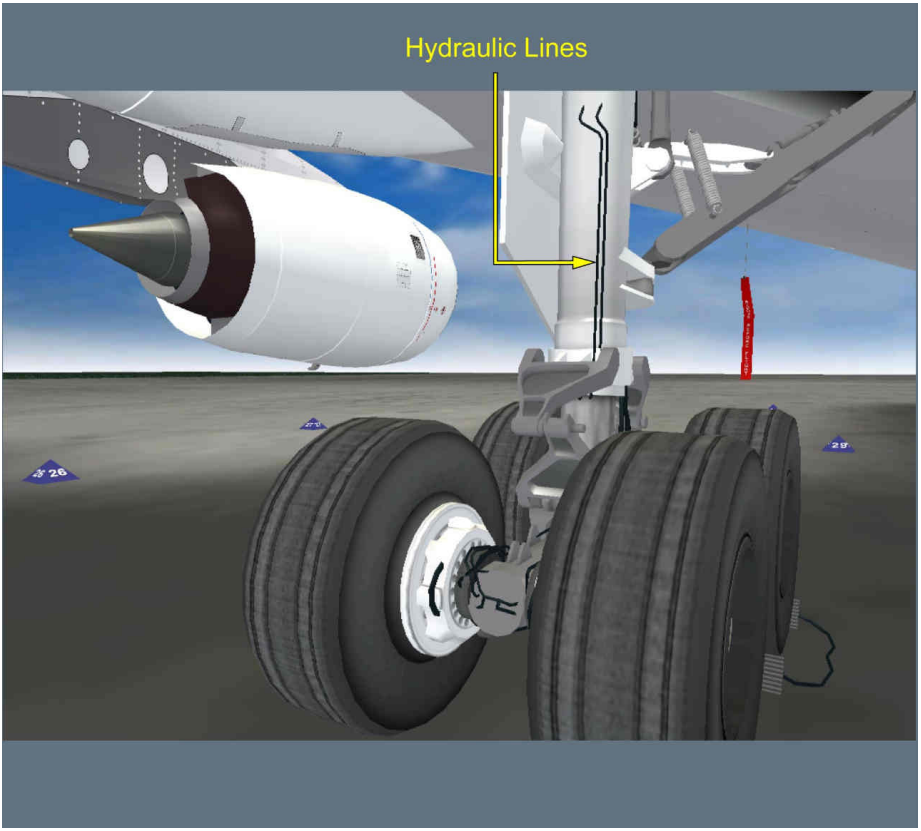
* WHEELS AND TIRES.....CHECK CONDITION

L2 *Check the wheels and tires for wear, cuts, and cracks.*



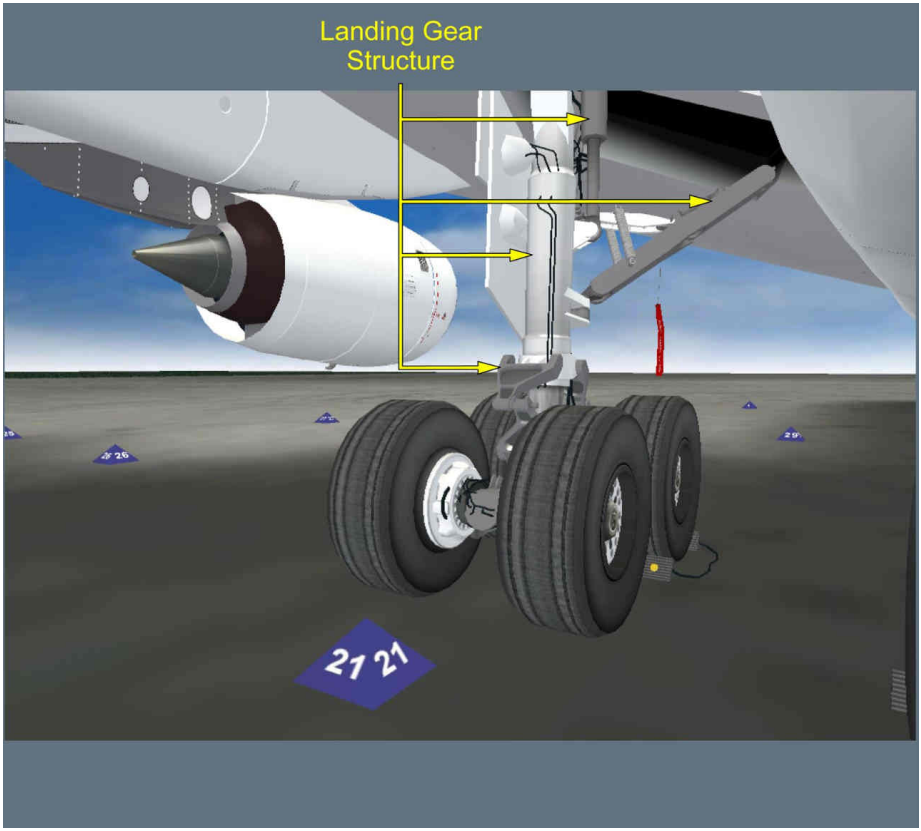
L1 HYDRAULIC LINES.....CHECK CONDITION

L2 *Check the condition of the hydraulic lines, and make sure there are no leaks.*



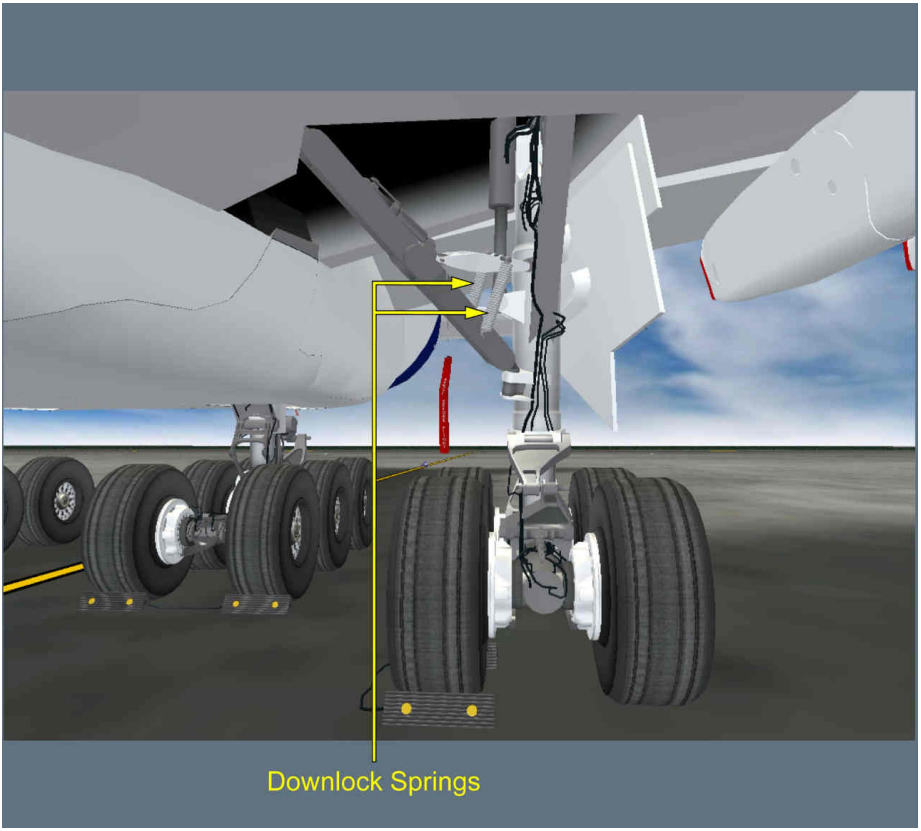
L1 LANDING GEAR STRUCTURE.....CHECK CONDITION

L2 *Check that the landing gear structure is not damaged.*

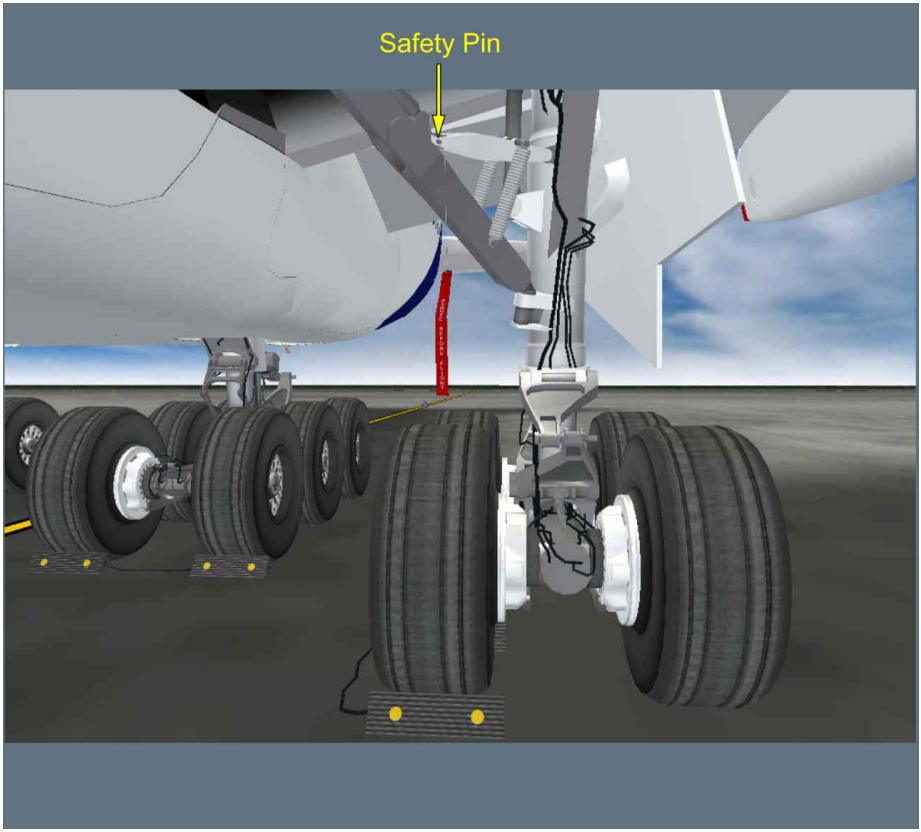


L1 DOWNLOCK SPRINGS.....CHECK CONDITION

L2 *From the front of the landing gear, check the condition of the downlock springs.*

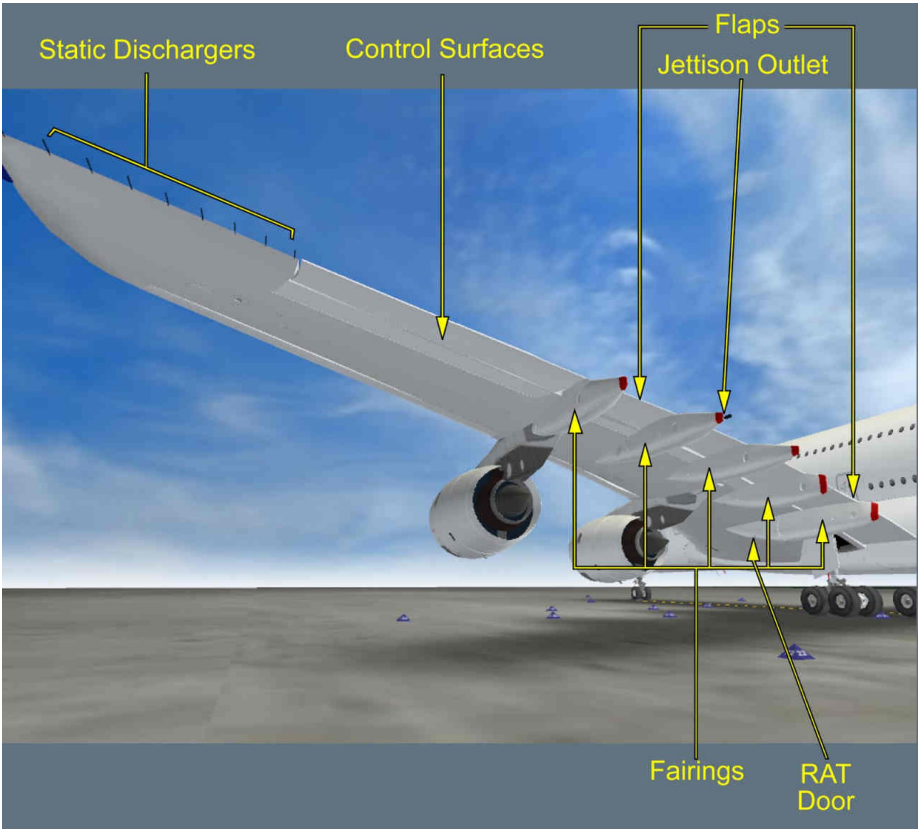

Downlock Springs

L1 SAFETY PIN.....REMOVED



LH WING TRAILING EDGE

Applicable to: ALL



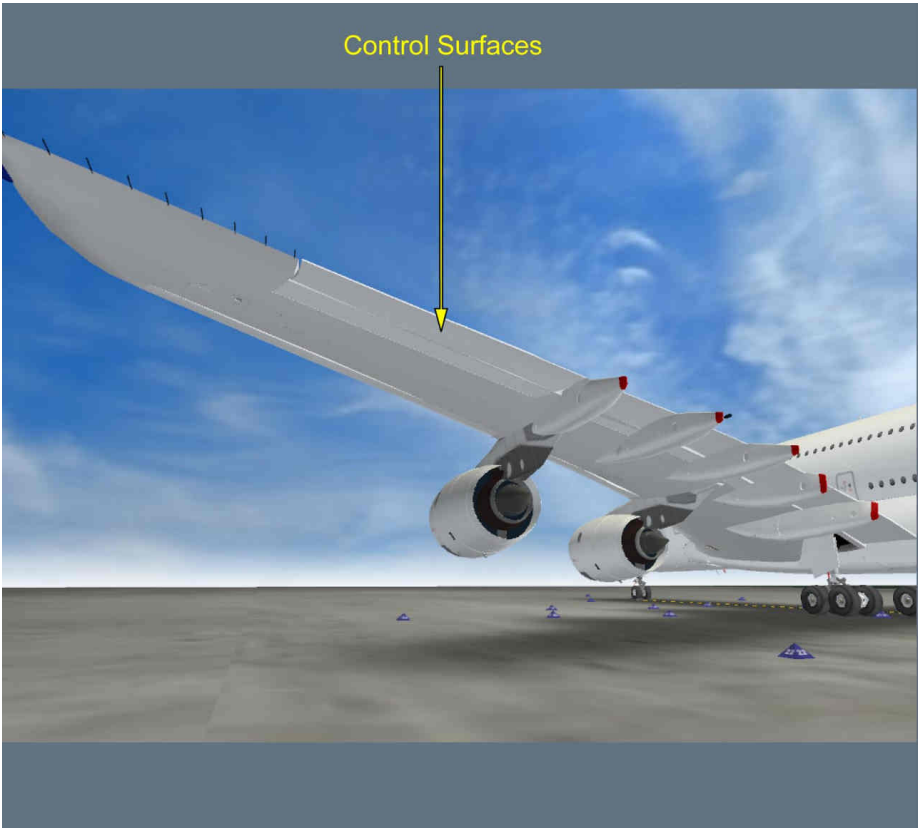
EMERGENCY RAT DOORS.....CLOSED

L2 *Check that the emergency RAT doors on the flap track fairing N° 2 are closed.*



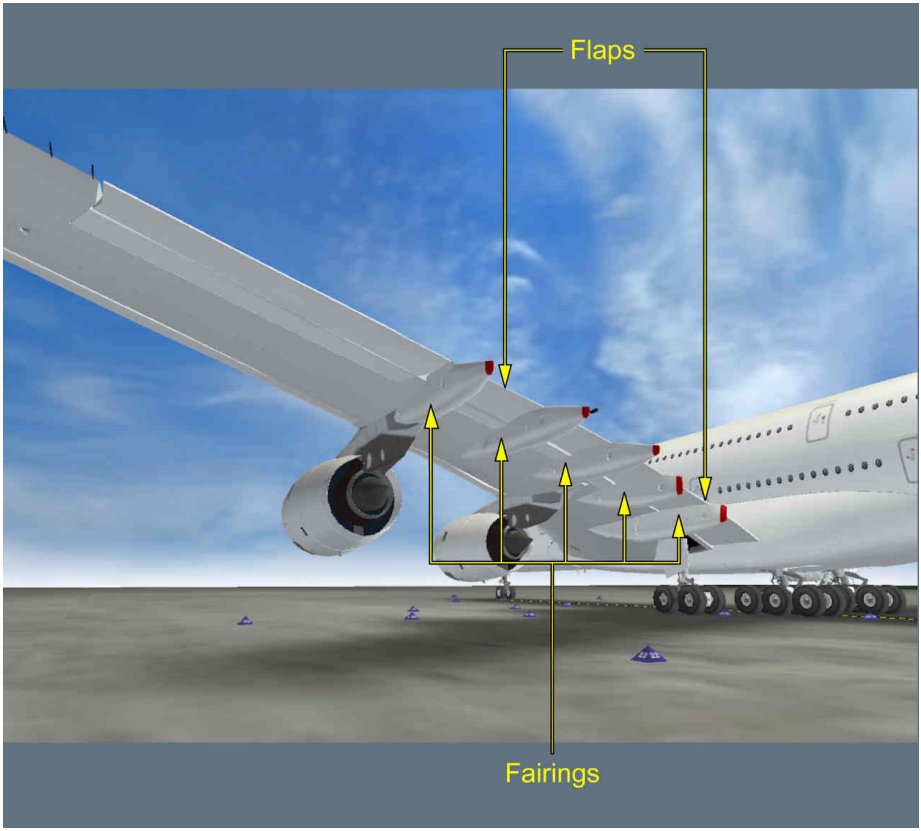
L1 * CONTROL SURFACES..... CHECK CONDITION

L2 *Check that the control surfaces are not damaged.*



L1 * FLAPS AND FAIRINGS.....CHECK CONDITION

L2 *Check that the flaps and flap track fairings are not damaged.*



L1 STATIC DISCHARGERS..... CHECK

L2 *Check that the static dischargers are not missing or damaged.*

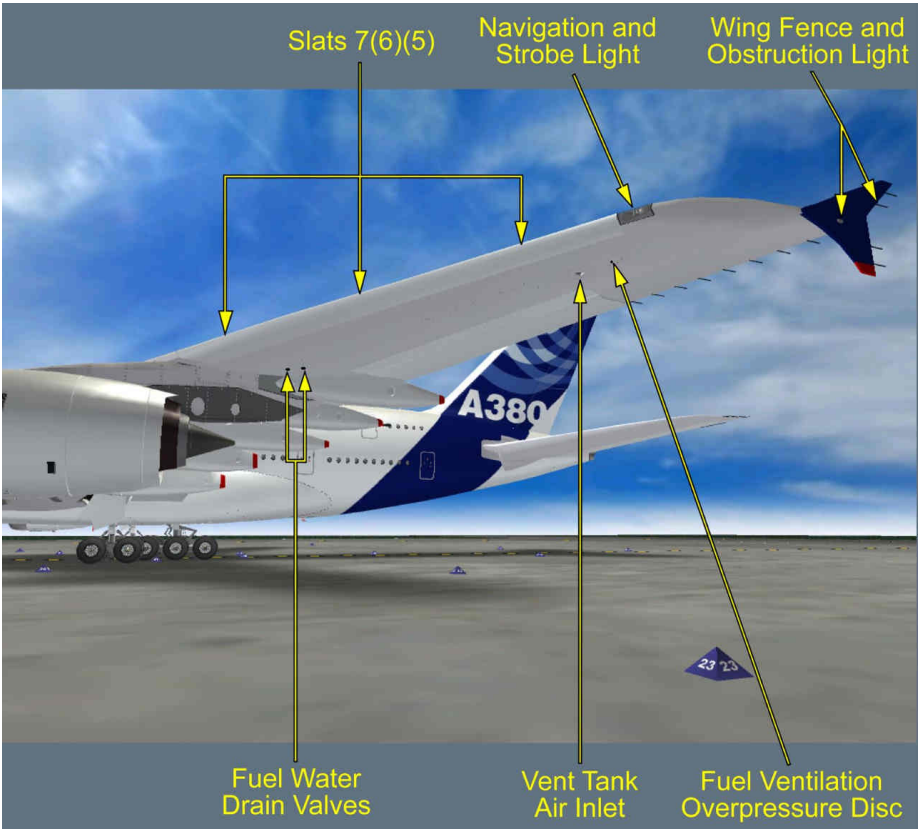

Static
Dishargers

L1 JETTISON OUTLET.....NO LEAK



LH WING TIP

Applicable to: ALL

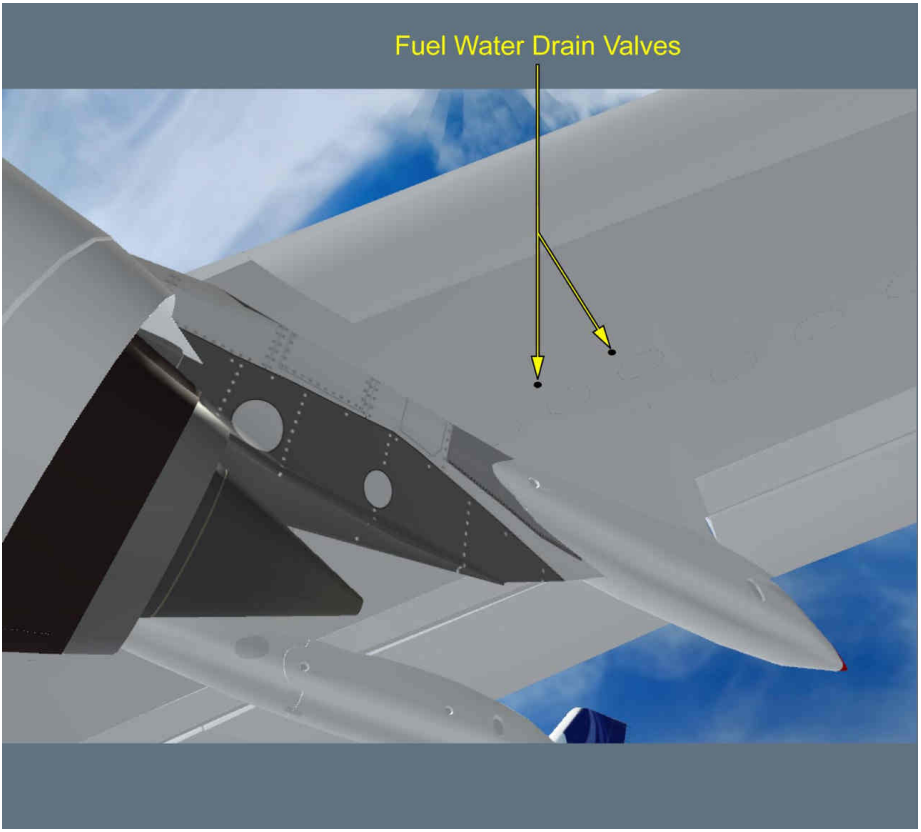


NAVIGATION AND STROBE LIGHT.....CHECK CONDITION

L2 *Check the condition of the navigation and strobe lights, and make sure that the protective cover is not damaged.*


Navigation and Strobe Light
A380

L1 FUEL WATER DRAIN VALVES..... NO LEAK



VENT TANK AIR INLET..... CLEAR

L2 *Check that the vent tank air inlet is clear of obstruction.*


Vent Tank Air Inlet
A380

L1 * FUEL VENTILATION OVERPRESSURE DISC.....INTACT



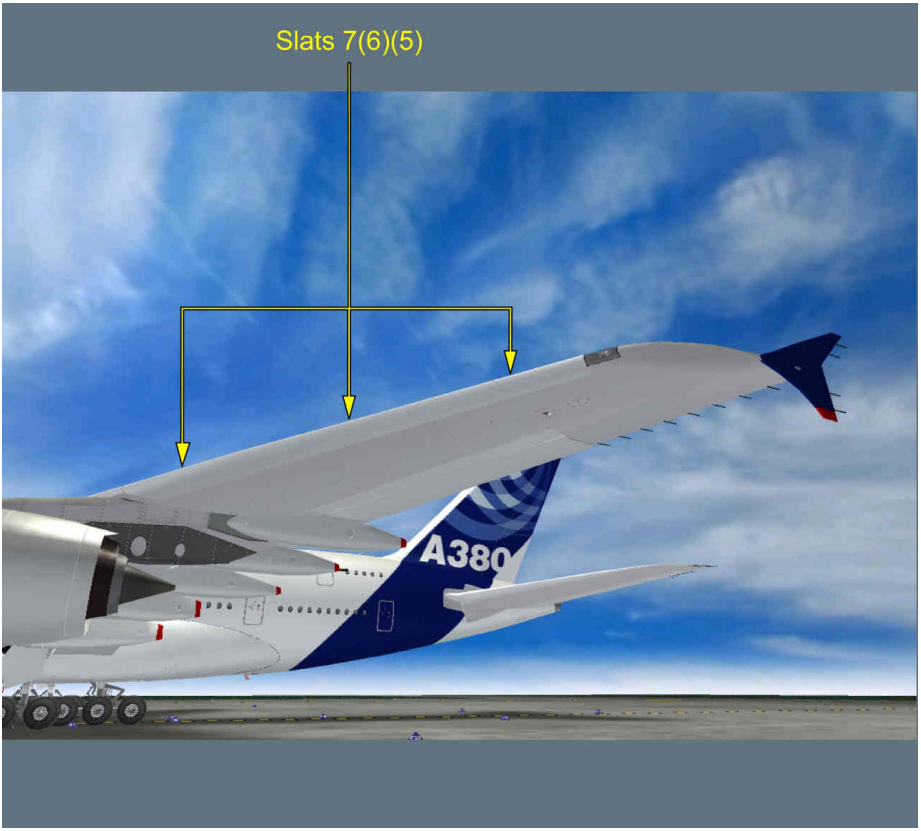
WING FENCE AND OBSTRUCTION LIGHT..... CONDITION

L2 *Check the condition of the wing fence and obstruction light, and make sure that the protective cover is not damaged.*



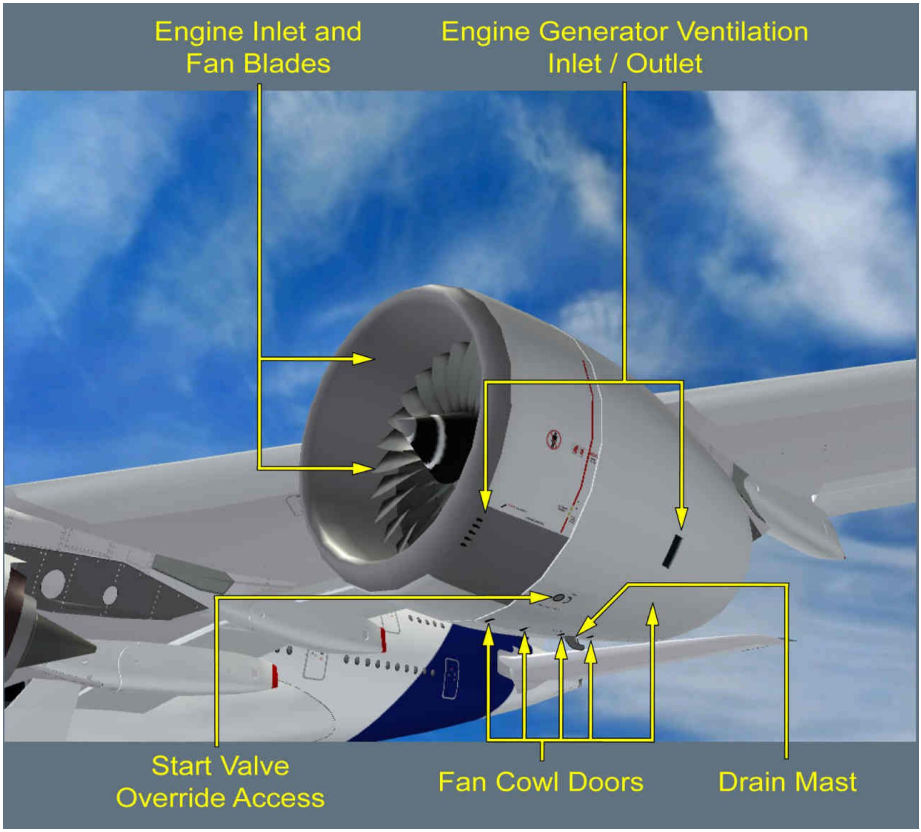
L1 * SLATS 7, 6, 5..... CHECK CONDITION

L2 *Check the slats are not damaged.*


Slats 7(6)(5)
A380

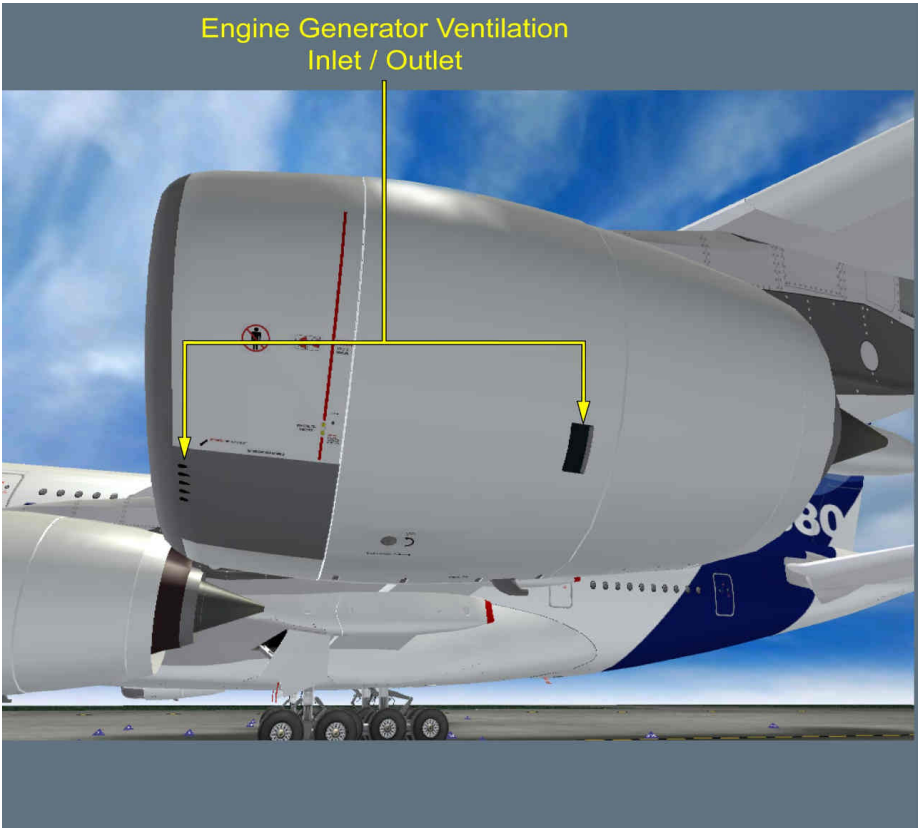
ENG 1 LH SIDE

Applicable to: ALL



ENGINE GENERATOR VENTILATION INLET/OUTLET.....CHECK CONDITION

L2 *Check that the engine generator ventilation inlet/outlet is clear of obstruction.*


Engine Generator Ventilation
Inlet / Outlet

L1 START VALVE OVERRIDE ACCESS..... CLOSED

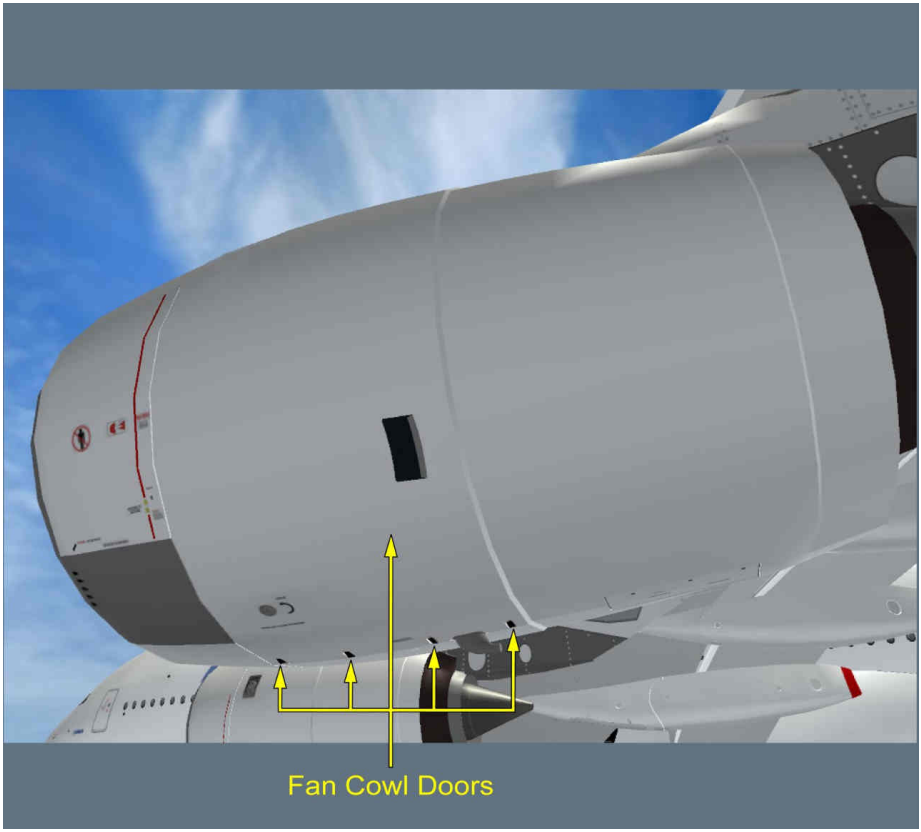


* DRAIN MAST..... CHECK CONDITION/NO LEAK

L2 *Under the engine, check the condition of the drain mast, and make sure that there are no leaks.*

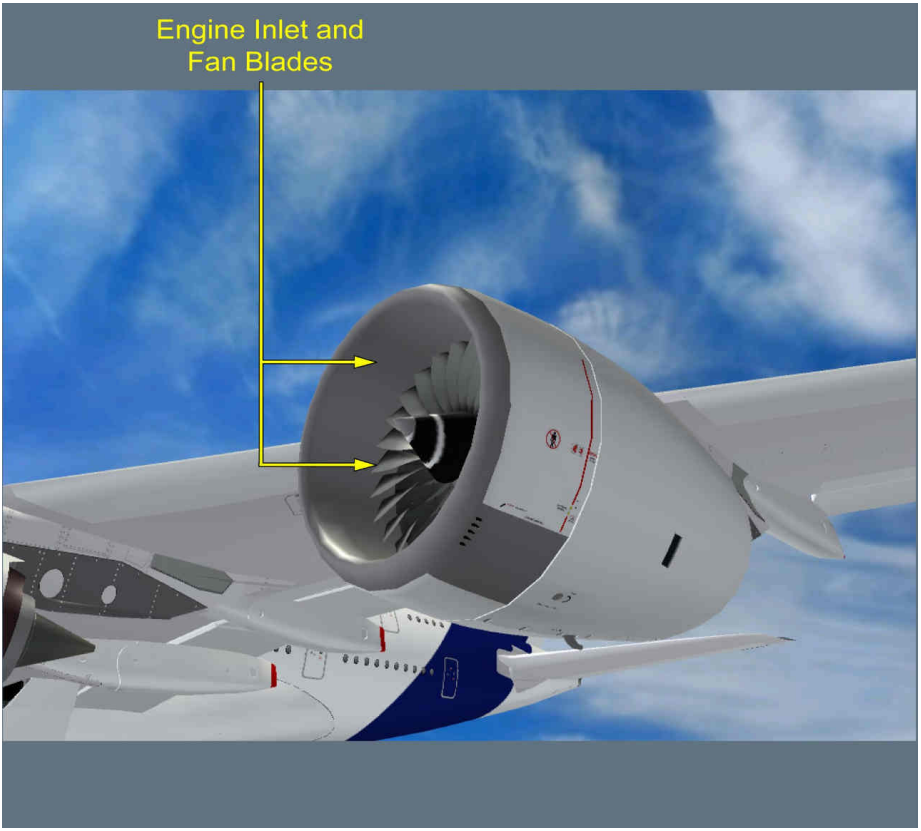

Drain Mast

L1 * FAN COWL DOORS..... CLOSED AND LATCHED



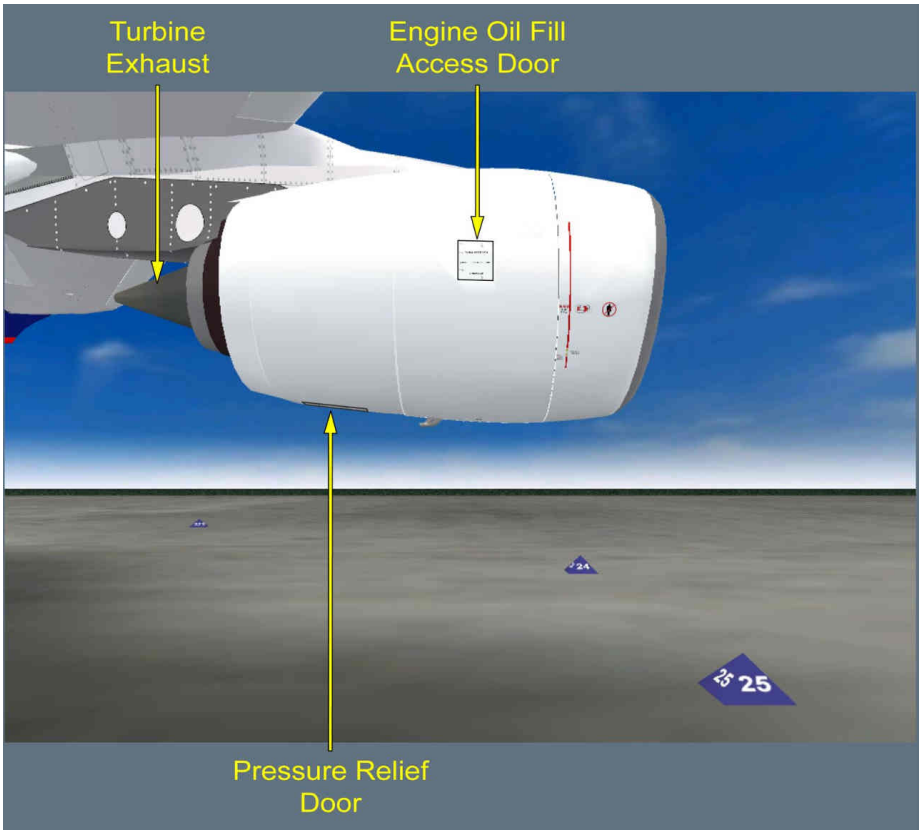
* ENGINE INLET AND FAN BLADES.....CHECK CONDITION

L2 *Check the engine inlet and the fan blades for any significant dents, bending, or damage.*

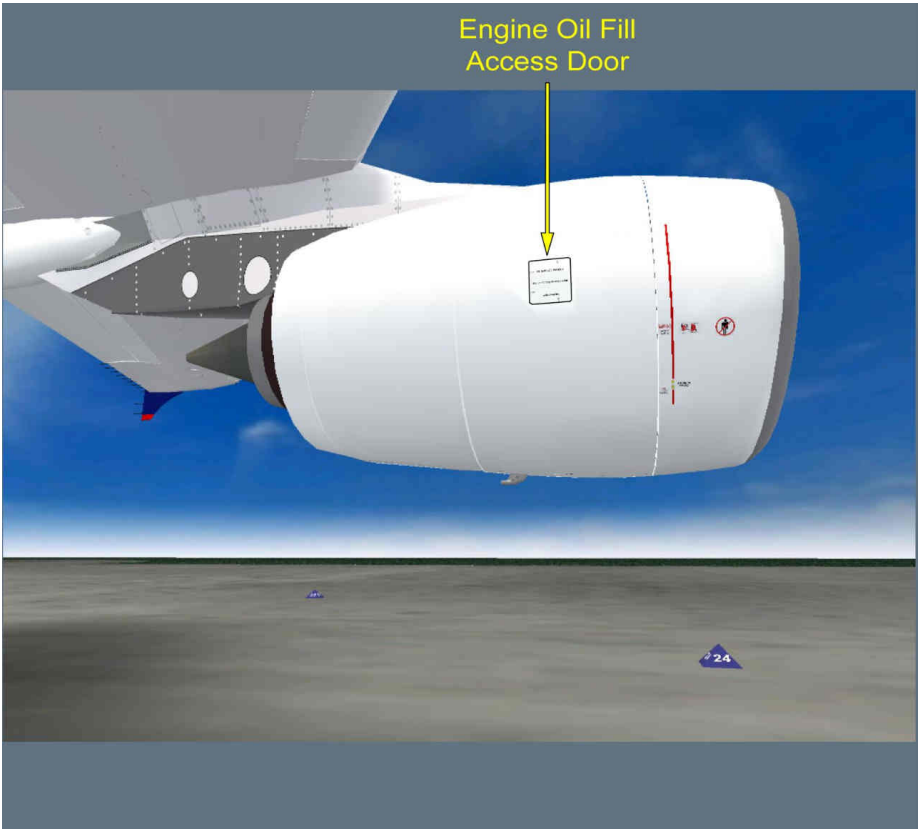

Engine Inlet and
Fan Blades

ENG 1 RH SIDE

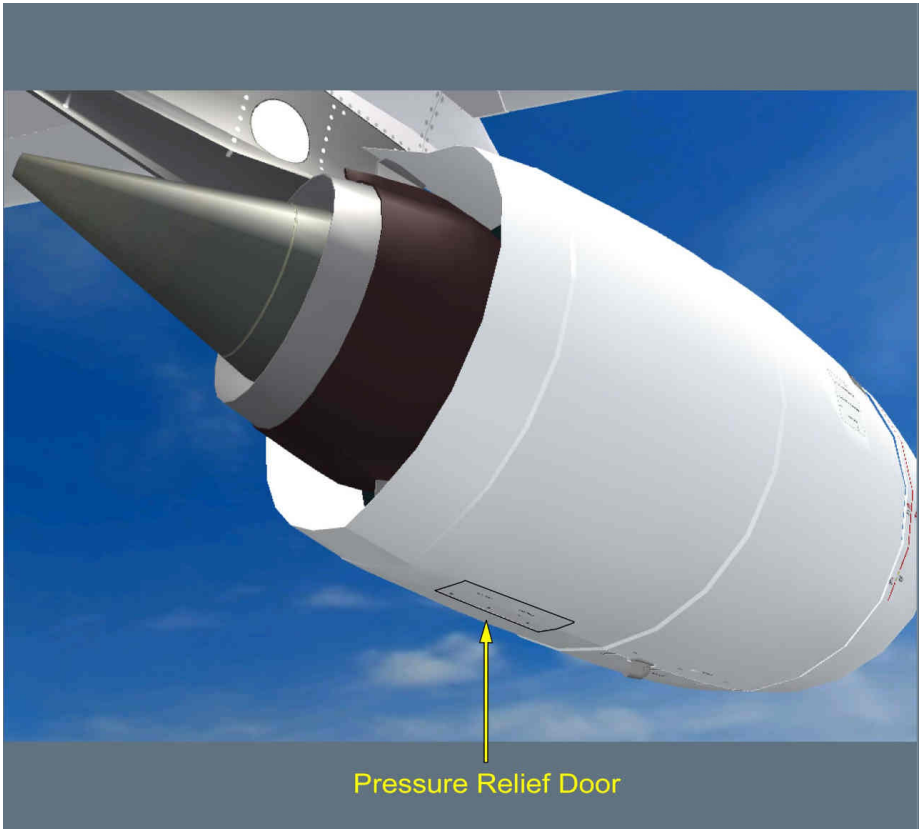
Applicable to: ALL



ENG OIL FILL ACCESS DOOR..... CLOSED

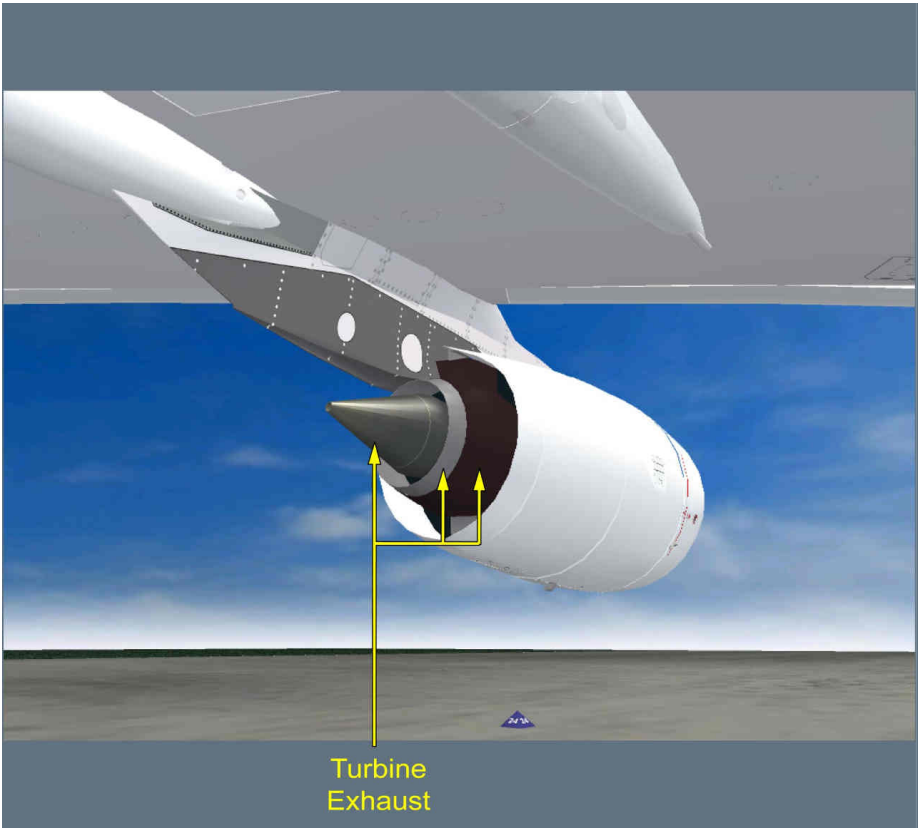


PRESSURE RELIEF DOOR.....CLOSED



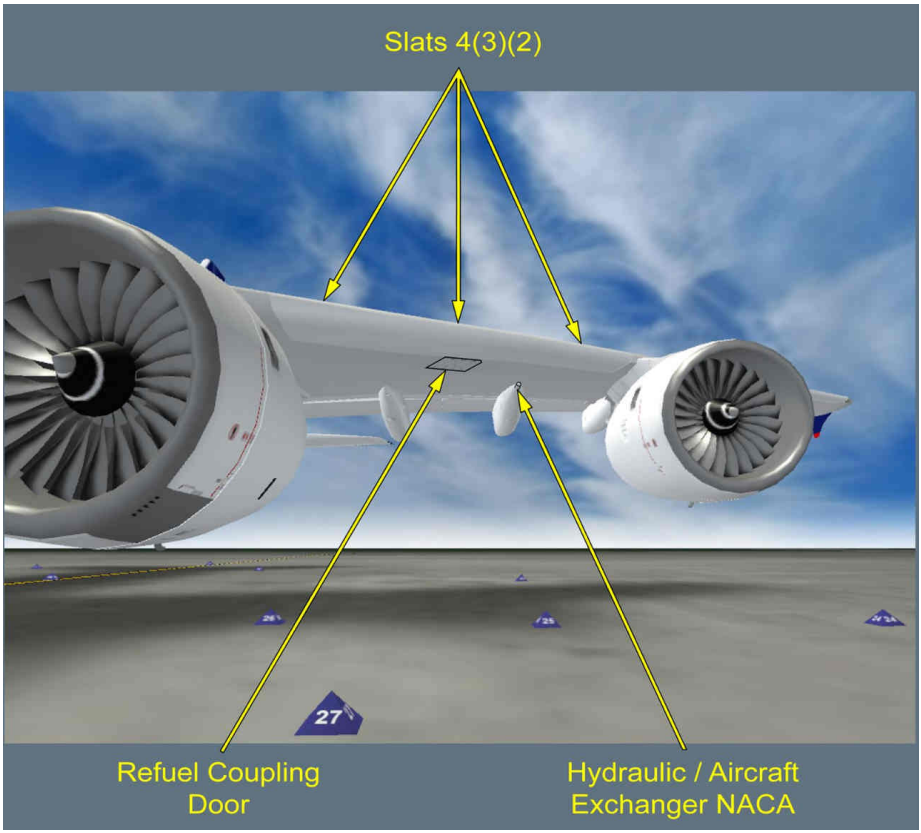
TURBINE EXHAUST..... CLEAR

L2 *Check that the turbine exhaust is clear of obstruction, and that the turbine blades are not damaged.*


Turbine
Exhaust

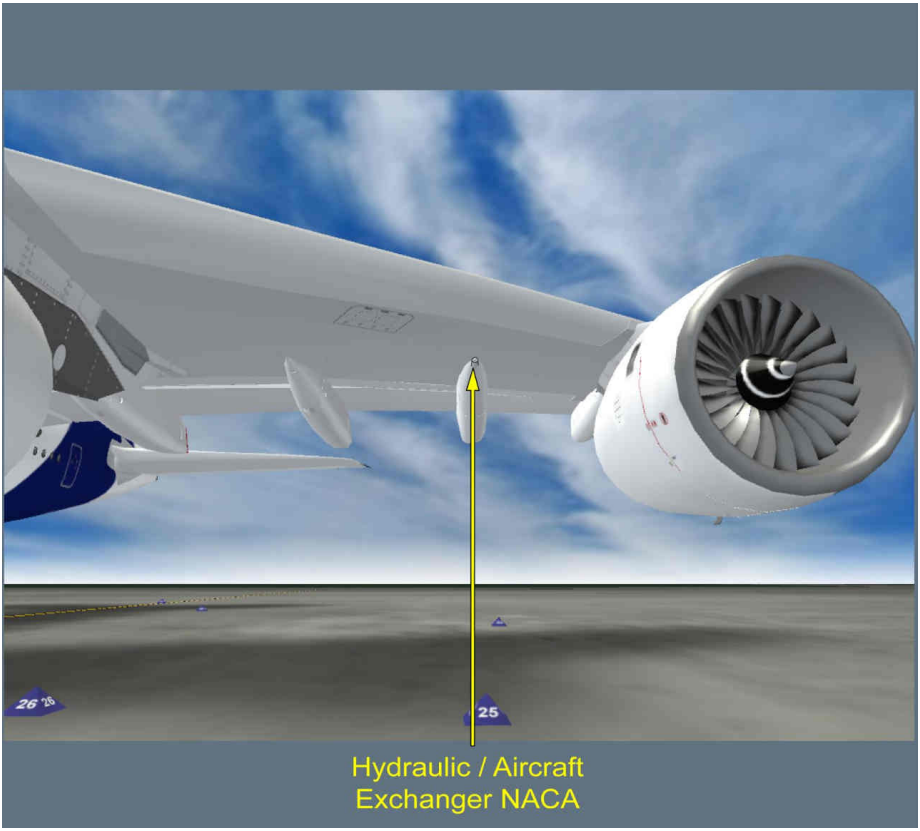
LH WING LEADING EDGE

Applicable to: ALL



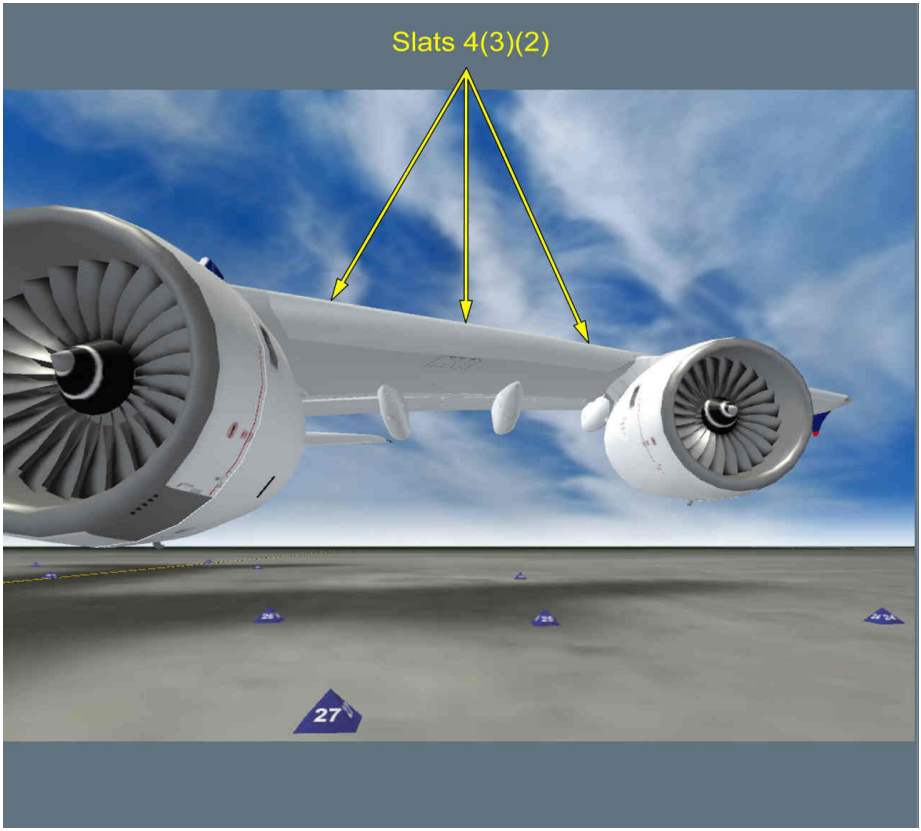
HYDRAULIC / AIR HEAT EXCHANGER NACA.....CHECK CONDITION

L2 *Check that the hydraulic/air heat exchanger NACA on the flap track fairing 4 is clear of obstruction, and that the backup air inlet door is open.*

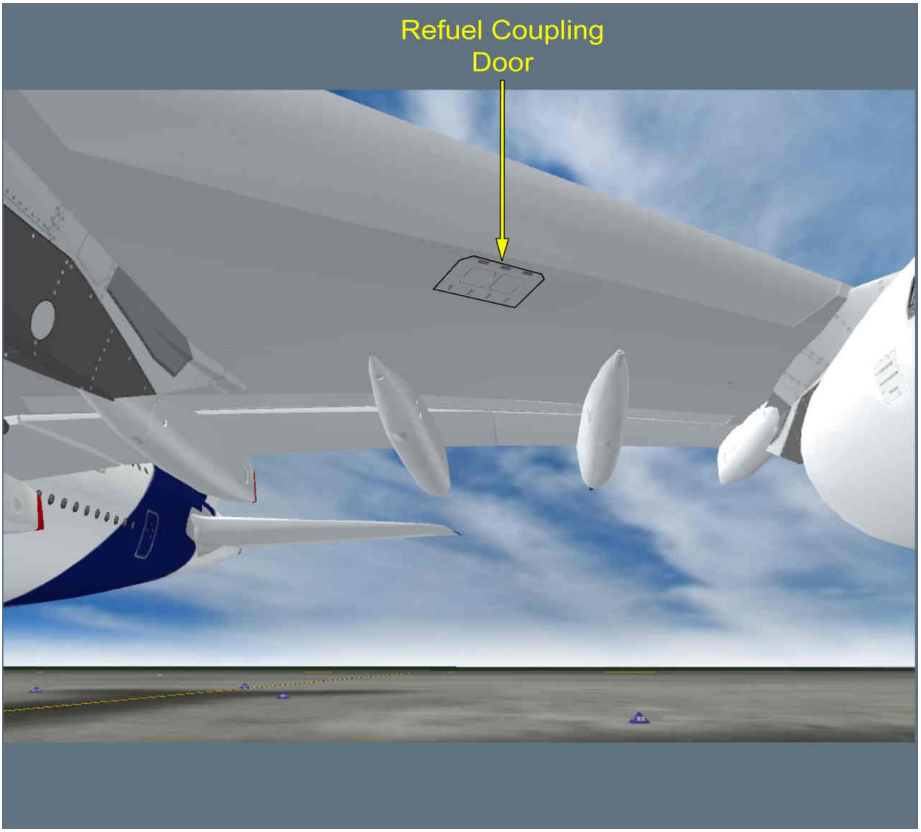


L1 * SLATS 4, 3, 2..... CHECK CONDITION

L2 *Check that the slats are not damaged.*

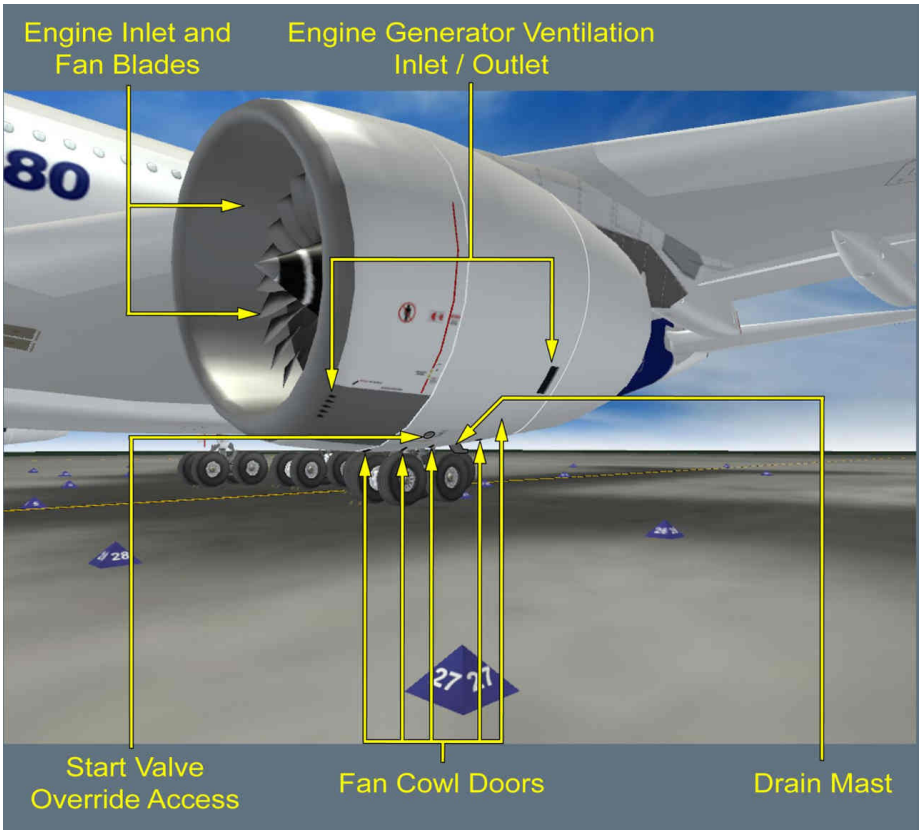

Slats 4(3)(2)
27

L1 REFUEL COUPLING DOOR..... CLOSED



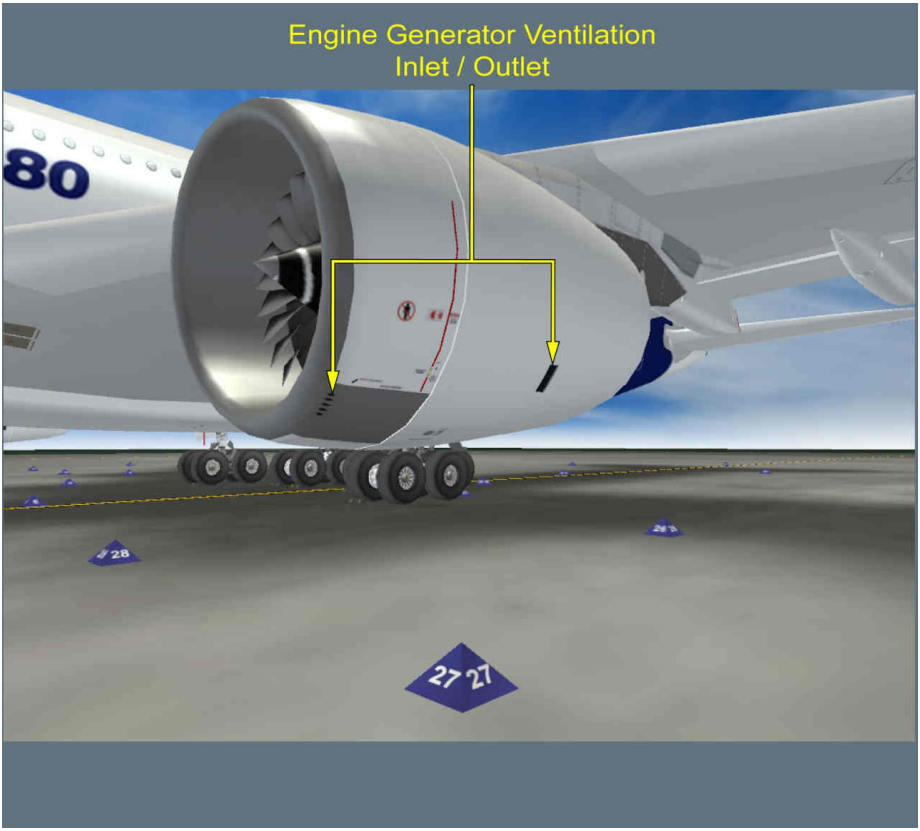
ENG 2 LH SIDE

Applicable to: ALL

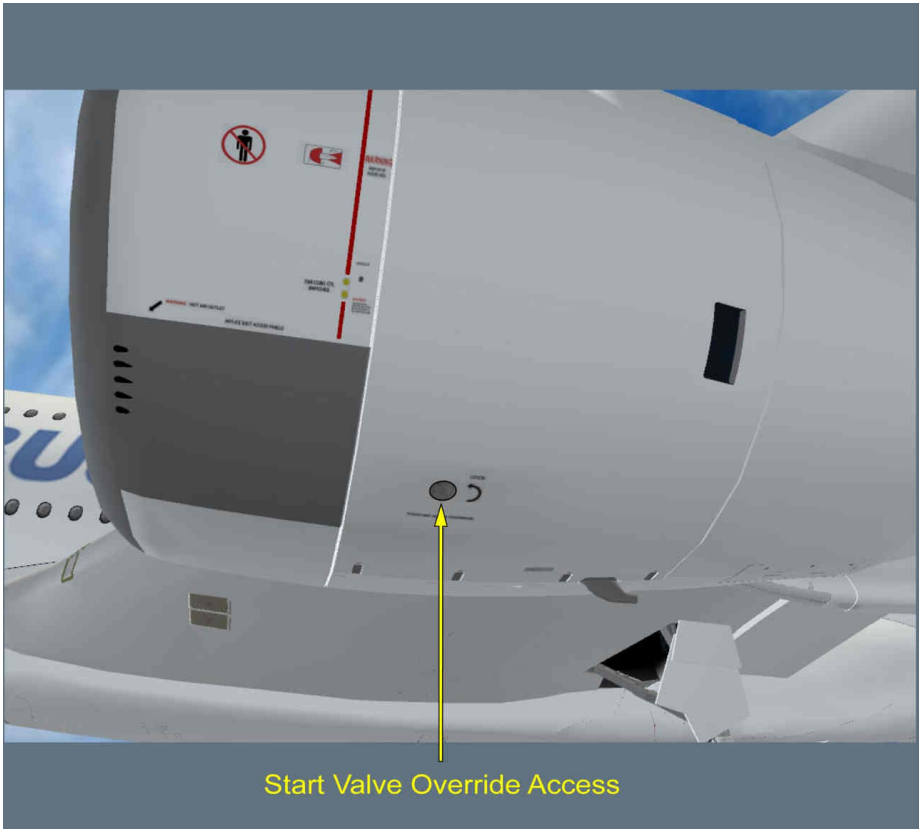


ENGINE GENERATOR VENTILATION INLET/OUTLET.....CHECK CONDITION

L2 *Check that the engine generator ventilation inlet/outlet is clear of obstruction.*

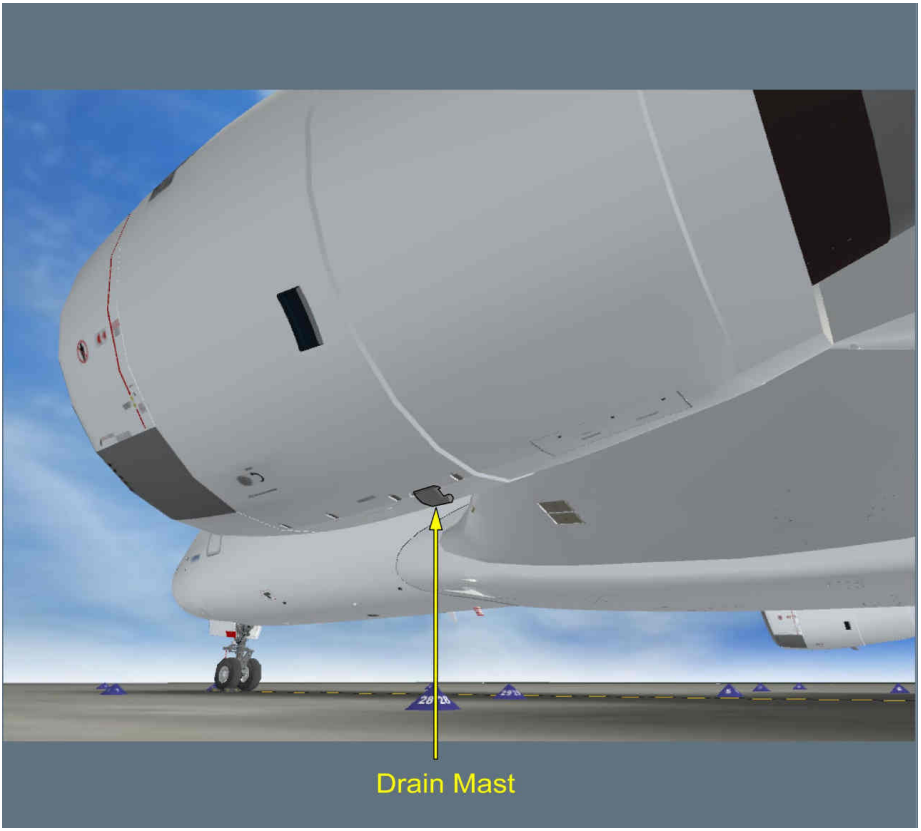

Engine Generator Ventilation
Inlet / Outlet
80
27 27

L1 START VALVE OVERRIDE ACCESS..... CLOSED

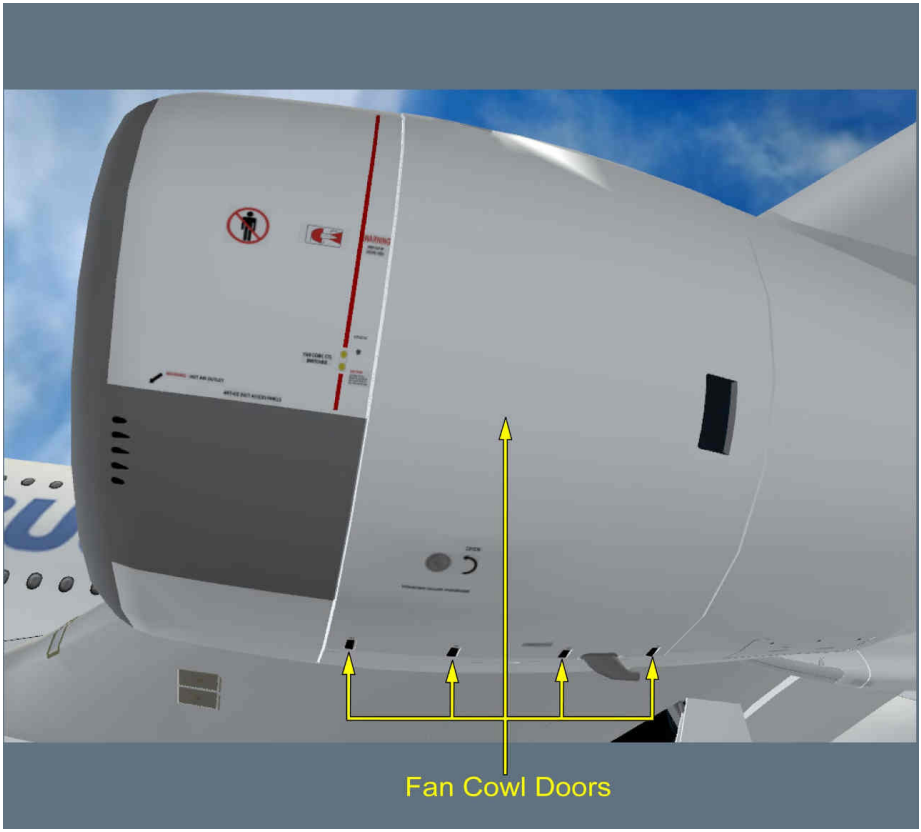


* DRAIN MAST..... CHECK CONDITION/NO LEAK

L2 *Under the engine, check the condition of the drain mast, and make sure that there are no leaks.*

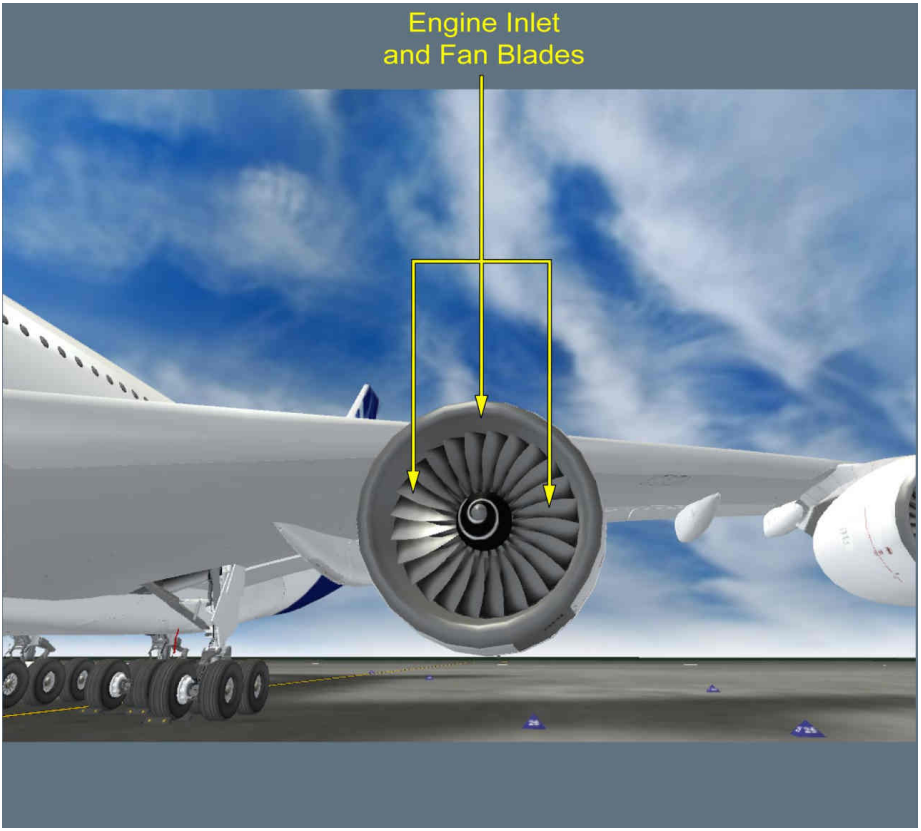

Drain Mast

L1 * FAN COWL DOORS..... CLOSED AND LATCHED



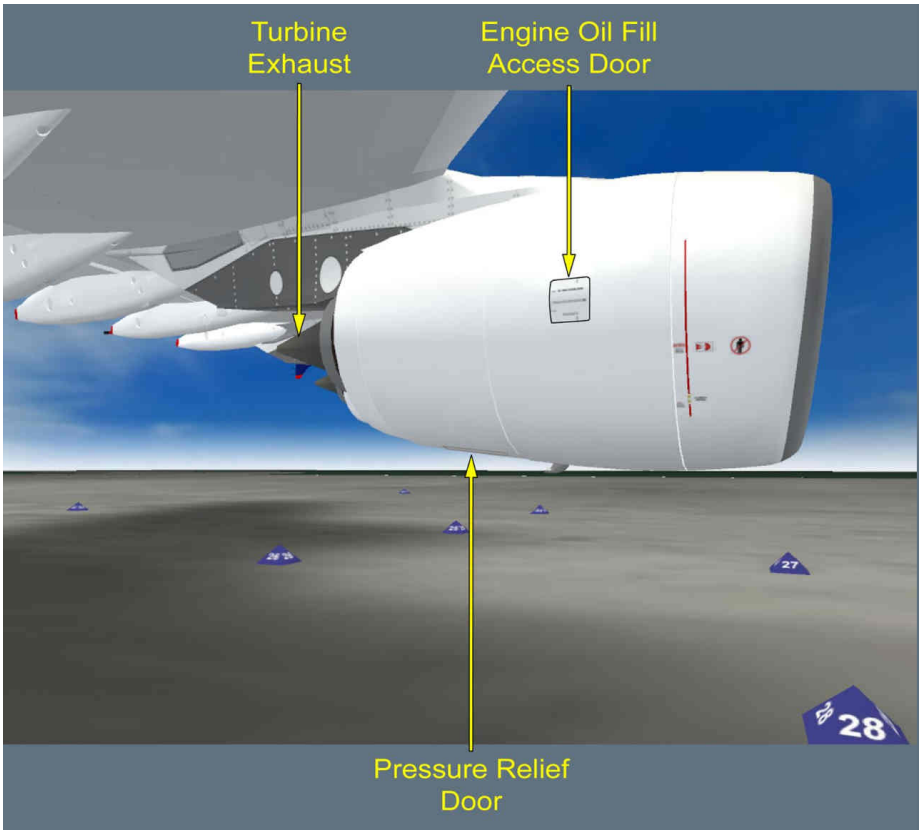
* ENGINE INLET AND FAN BLADES.....CHECK CONDITION

L2 *Check the engine inlet and the fan blades for any significant dents, bending, or damage.*

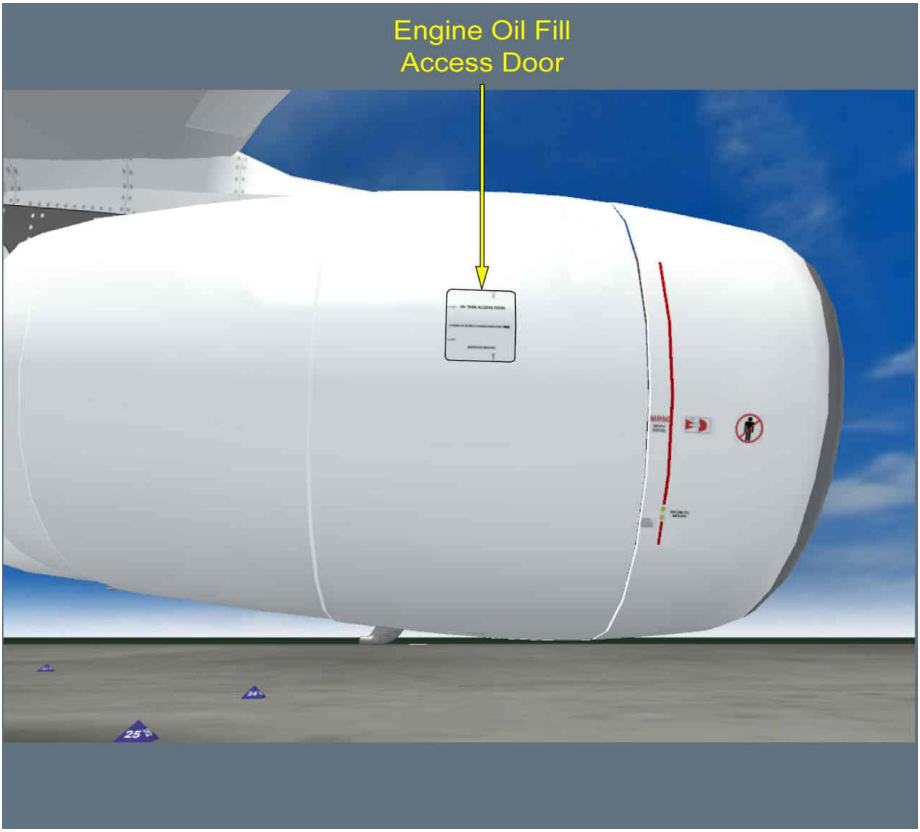

Engine Inlet
and Fan Blades

ENG 2 RH SIDE

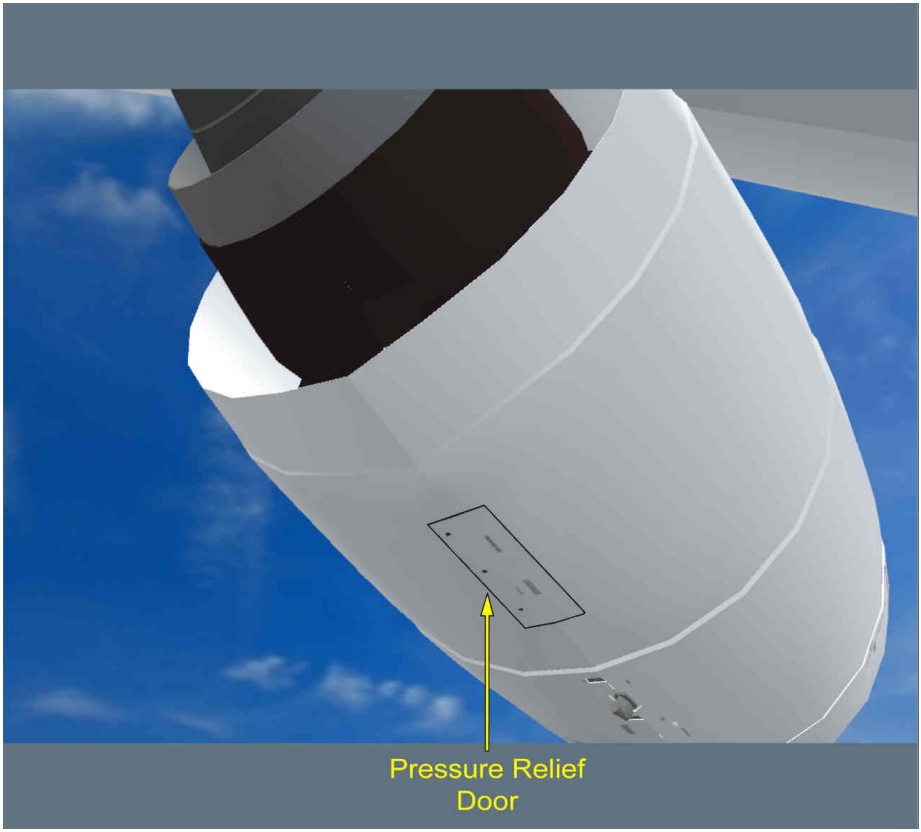
Applicable to: ALL



ENG OIL FILL ACCESS DOOR..... CLOSED

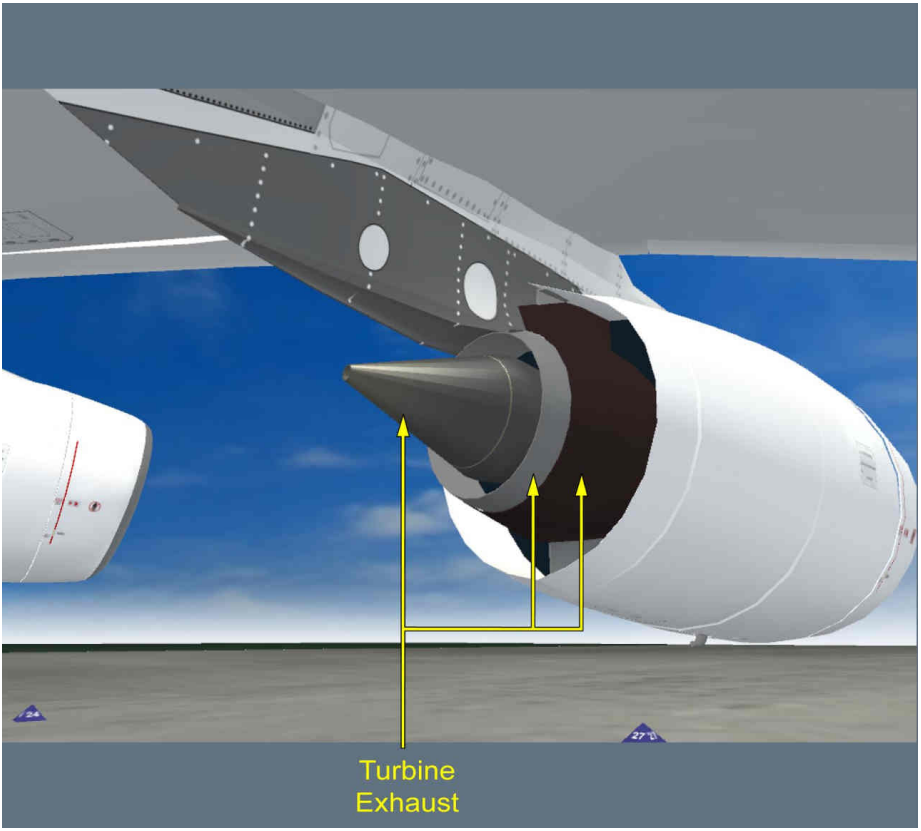


PRESSURE RELIEF DOOR.....CLOSED



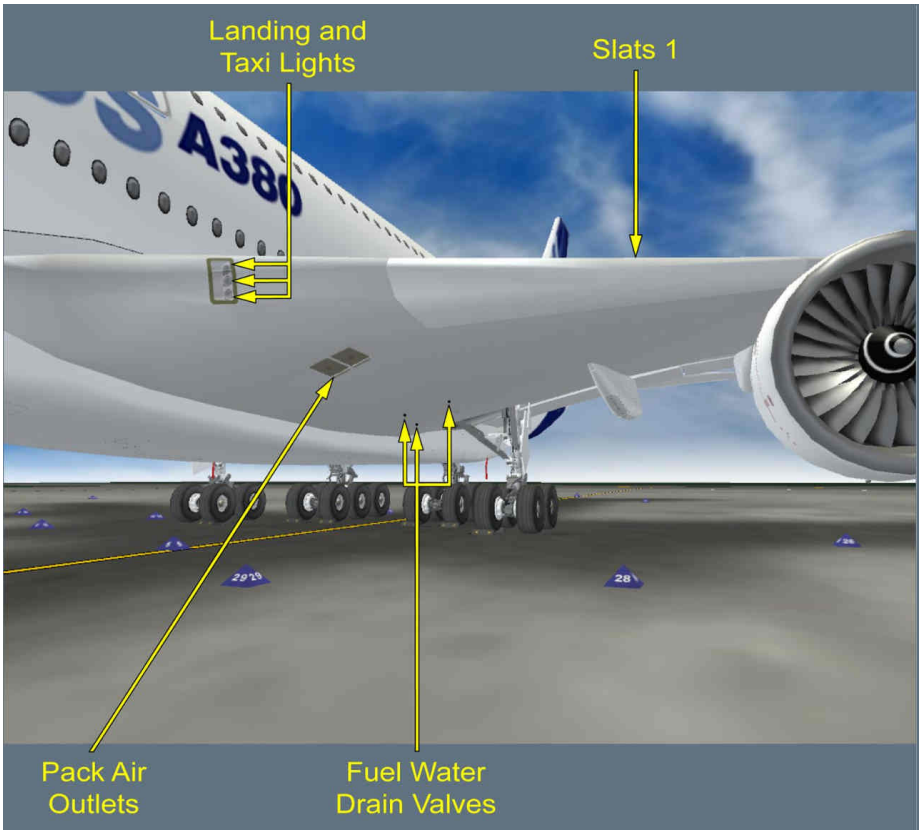
TURBINE EXHAUST..... CLEAR

L2 *Check that the turbine exhaust is clear of obstruction, and that the turbine blades are not damaged.*

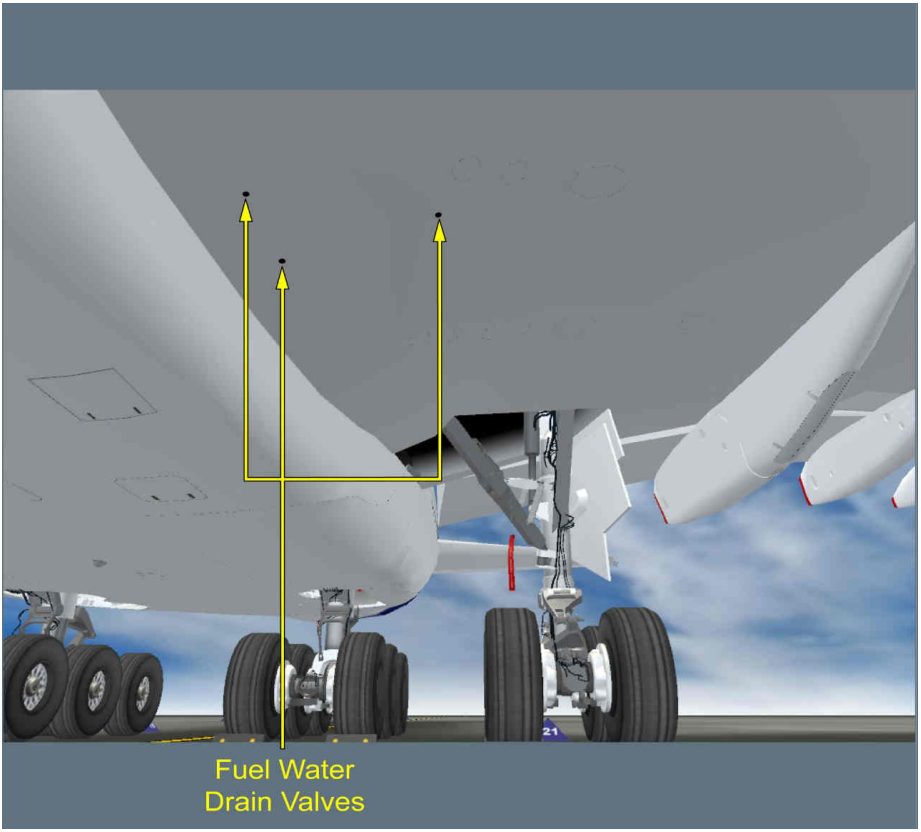

Turbine
Exhaust

LH CENTER WING

Applicable to: ALL

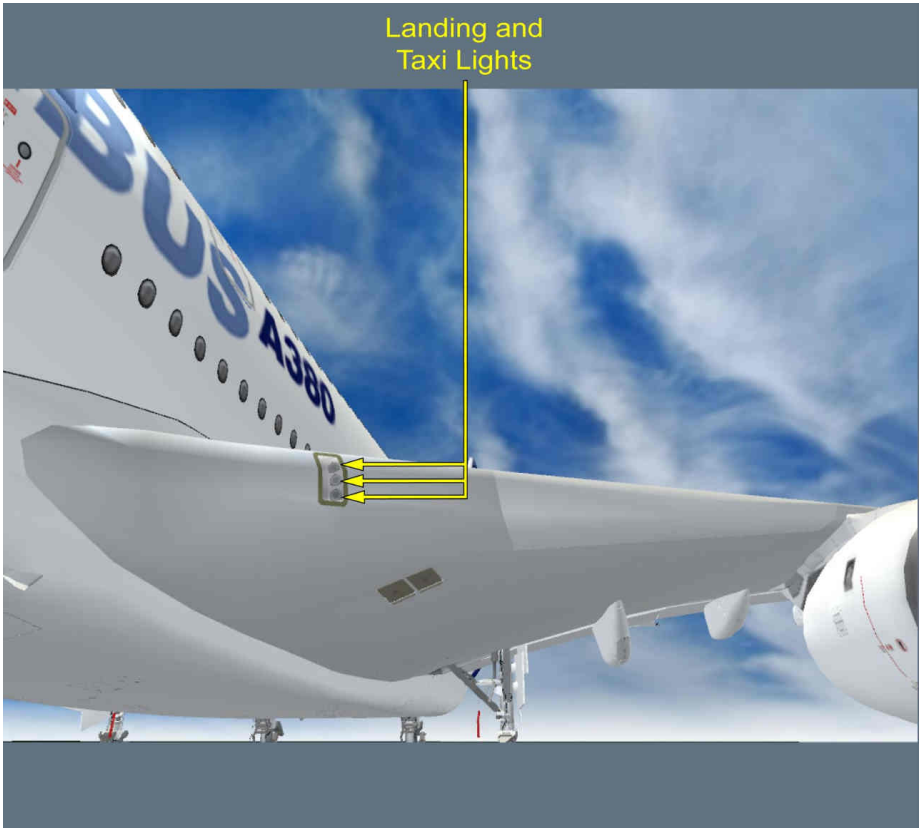


FUEL WATER DRAIN VALVES (inner tank and feed tank 2)..... NO LEAK



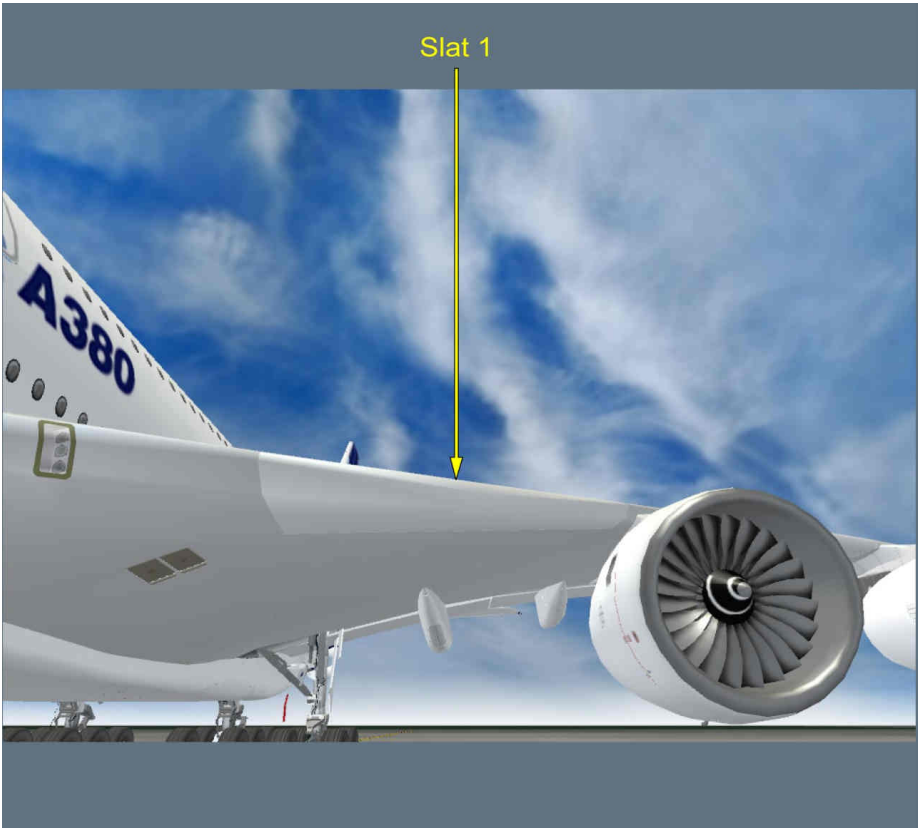
LANDING AND TAXI LIGHTS..... CHECK CONDITION

L2 *Check the condition of the landing and taxi lights, and make sure that the protective cover is not damaged.*



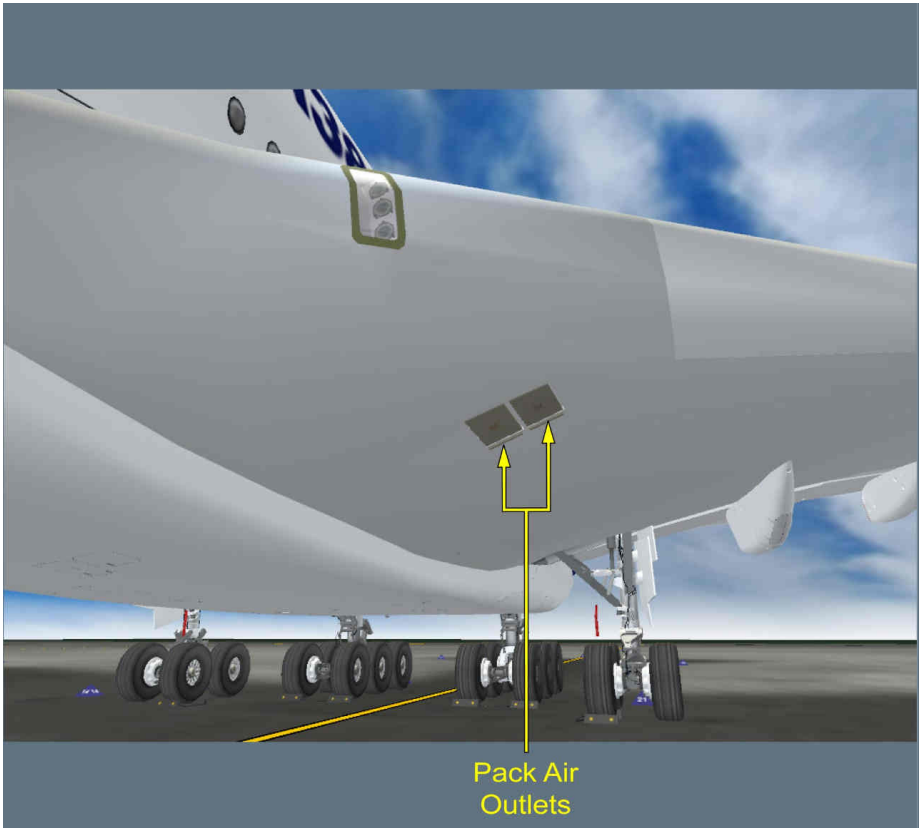
L1 * SLAT 1..... CHECK CONDITION

L2 *Check that the slat 1 is not damaged.*



L1 PACK AIR OUTLETS (2).....CHECK CONDITION

L2 *Check that the pack air outlets (2) are clear of obstruction.*


Pack Air
Outlets

GENERAL

Applicable to: ALL

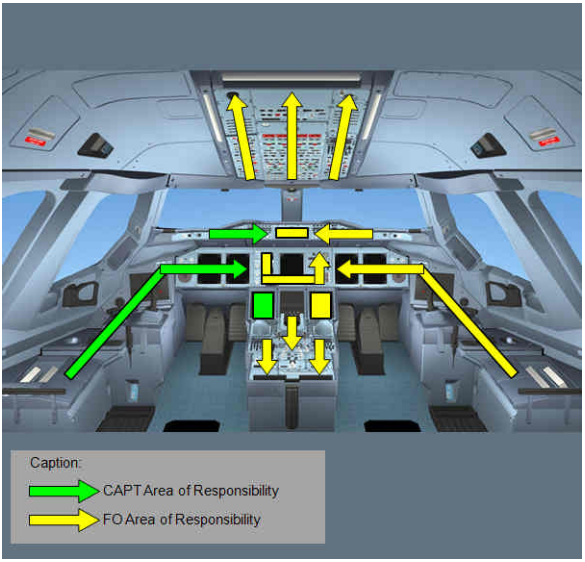
The CAPT and FO should perform the cockpit preparation, in accordance with the defined panel scan sequence and tasksharing.
The FO prepares the overhead panel, the center instrument panel and the pedestal while the CAPT performs the external walkaround. When both pilots are seated and the CAPT checked the FMS , both flight crewmembers continue the cockpit preparation.

WARNING	Do not pressurize the hydraulic systems until clearance is obtained from ground personnel.

PANEL SCAN SEQUENCE

Applicable to: ALL

panel scan sequence



OVERHEAD PANEL

Applicable to: ALL

WHITE LIGHTS ON THE OVERHEAD PANEL

- **During the scan sequence of the overhead panel:**

ALL WHITE LIGHTS.....OFF | FO

L2 *It is a general rule to turn off all white lights for all the systems during the scan sequence.*

L1

Note: - *Depending on Operators policy, the GND CONNECTION pb-sw on the MAINT panel and the REMOTE C/B CTL pb-sw on the maintenance ELEC panel may be kept ON during the cockpit preparation, if the maintenance personnel uses the Portable Multipurpose Access Terminal (PMAT) for maintenance purposes*

- *During the scan of the overhead panel, check also that the only amber lights are the GEN FAULT lights.*

RCDR

RCDR GND CTL pb-sw .....ON | FO

EVAC

CAPT/CAPT & PURS sw .....CAPT | FO

L2 *Set the CAPT/CAPT & PURS sw on the EVAC panel as per Company policy.*

PROBE & WINDOW HEAT

PROBE & WINDOW HEAT pb-sw .....AUTO | FO

L2 *The PROBE & WINDOW HEAT pb-sw should not be set to ON except in cold weather operations. For more information, Refer to PRO-SUP-91-10-10 Overview .*

ADIRS

ALL IR MODE selector .....NAV | FO

L2 *Many aircraft systems use the ADIRS outputs. Therefore, align the IRs as soon as possible in order to provide data to the related systems.*

Perform a complete alignment, if:
- *This is the first flight of the day*
- *There was a change in flight crew*
- *The GPS is not available, and if the flight crew expects long segments in airspaces with poor radio NAVAIDS coverage.*

For other flights, perform a fast alignment.

L1 *Note: During the refuel operations or the Auto Ground Transfer (AGT), at least one IR should remain operative. If the flight crew needs to align the IRs during the refuel operations or the AGT, they should switch off two IRs, then set them to NAV and waitfor 40 s before switching off the third IR.*

L2 *For additional training-oriented information, Refer to FCTM/NO-60 ADIRS Initialization*

ELT

ELT.....ARMED | FO

RESET

RESET BUTTONS (Left side).....CHECK | FO

L2 *Check that all reset buttons are pushed.*

EXTERIOR LIGHTS

STROBE sw ..... AUTO | FO
BEACON sw .....OFF | FO
NAV sw ..... ON | FO

L2 *Set to ON the NAV sw, as required, to turn on the navigation and obstruction lights.*

L1 REMAINING EXTERIOR LIGHTS.....AS RQRD | FO

SIGNS

SEAT BELTS sw .....ON | FO

L2 *Set to ON the SEAT BELTS sw when refueling is complete. For more information, Refer to CCOM/Refueling with passengers onboard procedure.*

L1 NO SMOKING sw .....AUTO | FO
EMER EXIT LT sw .....ARM | FO

ENG START

ENG START selector ..... NORM | FO

AIR

APU BLEED pb-sw ..... ON | PF

L2 *Do not use the APU BLEED, if the maintenance personnel confirms that an HP ground air unit is connected to the aircraft.*
The flight crew should also check on the BLEED SD page, if there is pressure in the bleed air system, to determine if an HP ground air unit is connected.

L1 XBLEED selector ..... AUTO | PF
AIR FLOW selector ..... NORM | FO

L2 *As long as the number of passenger is not entered in the FMS, airflow is automatically adjusted for the maximum number of passengers.*
As soon as the number of passengers is entered, during FMS initialization, airflow is automatically adjusted to the actual number of passengers.

L1 CKPT selector ..... AS RQRD | FO

L2 *The temperature ranges between 18 °C and 30 °C. The recommended temperature selection is approximately 21.5 °C (about 10 o'clock).*

L1 CABIN selector ..... PURS SEL | FO

L2 *Cabin temperature is controlled from the Flight Attendant Panel (FAP) only.*

ELEC

ELEC DC SD PAGE..... DISPLAY | FO
ALL BAT pb-sw (BAT 1, ESS, 2 and APU)..... OFF then ON | FO

- **10 s after setting all BAT pb-sw to ON**

  On the ELEC DC SD page, check that the current charge of each battery is below 60 A, and is decreasing.

FUEL

TRIM TK FEED sw ..... AUTO | FO

MAINTENANCE

ALL LIGHTS ..... OFF | FO

L2 - *Depending on Operators policy, the GND CONNECTION pb-sw on the MAINT panel and the REMOTE C/B CTL pb-sw on the maintenance ELEC panel may be kept ON during the cockpit preparation, if the maintenance personnel uses the Portable Multipurpose Access Terminal (PMAT) for maintenance purposes*

L2 - *Check that all lights are off. If not, select the corresponding pushbutton to turn off the light.*

CARGO AIR COND

CARGO AIR COND selectors..... AS RQRD | FO

RMP 3

RMP 3..... ON | FO
STBY RAD NAV key..... OFF | FO

CVR

CVR TEST pb ..... PRESS | FO

L2 *Press and release the pushbutton. If the test fails, the RECORDER CVR FAULT ECAM alert triggers 5 s after the flight crew presses the CVR TEST pb.*

RESET

RESET BUTTONS (Right side)..... CHECK | FO

L2 *Check that all reset buttons are pushed.*

CENTER INSTRUMENT PANEL

Applicable to: ALL

SWITCHING

SWITCHING selectors..... NORM | FO

L2 *Check that the ATT HDG selector, the AIR DATA selector, and the FMS selector are set to NORM.*

ISIS

ISIS.....CHECK | FO

L2 - *Adjust the brightness, as appropriate*
- *Check:*
  - *The airspeed*
  - *The barometric setting*
  - *The altitude indication*
  - *The attitude indications*
  - *The heading.*

L/G GRVTY

L/G GRVTY sw ..... OFF | FO

CLOCK

CLOCK..... CHECK and SET AS NECESSARY | FO

L2 *Check the time and adjust, if necessary.*
Elapsed time and chronometer should be set to zero.

A-SKID

A-SKID sw .....ON | FO

PEDESTAL

Applicable to: ALL

PARK BRK

PARK BRK..... ON | FO

● **If brakes are hot and chocks are in place:**
PARK BRK .....OFF | FO

L2 *Release the PARK BRK handle to improve brakes cooling.*
L1 *On the triple pressure indicator, check that the left and right brake pressure drops to zero.*

BODY ACCU PRESSURE

BODY ACCU Pressure.....CHECK/REINFLATE | FO

L2 *Check for normal indications.*
The BODY ACCU pressure indication must be in the green band.

L1 *If required, press the ACCU REINFLATE pb to reinflate the BLG brake accumulators.*

ENG

THRUST LEVERS .....IDLE | FO
THRUST REVERSER LEVERS ..... STOWED | FO
ENG MASTERS 1, 2, 3 and 4..... OFF | FO

CKPT DOOR

CKPT DOOR sw .....NORM | FO

MFD ATC COM

Applicable to: ALL

- **On the MFD ATC COM/MSG RECORD page:**

MSG RECORD.....ERASE ALL | FO

L2 *Click on the ERASE ALL button in order to erase the record of all CPDLC messages of the previous flight before starting a new flight. This avoids confusing CPDLC messages from the previous flight with the ones of the current flight.*

L1 - **On the MFD ATC COM/CONNECT/CONNECTION STATUS page:**
  - **If ADS services are expected:**

ADS.....CHECK ARMED | FO

ATC CLEARANCE

Applicable to: ALL

ATC CLEARANCE..... THE MOST PROBABLE/OBTAIN | FO
The flight crew should obtain ATC clearance, or use the probable clearance.
NAV CHARTS CLIPBOARD.....PREPARE | FO

L2 *At ATC clearance, or at any convenient time, the FO prepares the NAV CHARTS clipboard.*

MFD SURV

Applicable to: ALL

On the MFD SURV/CONTROLS page:

SURV DEFAULT SETTINGS..... SELECT | BOTH

L2 - *XPRD is set to AUTO. The SQWK code remains as previously selected*
- *TCAS is set to TA/RA and NORM*
- *WXR is set to AUTO:*
  - *ELEVN/TILT is set to AUTO*
  - *MODE is set to WX*
  - *TURB is set to AUTO*
  - *GAIN is set to AUTO*
  - *WX ON VD is set to ON*
  - *PRED W/S is set to AUTO.*
- *All TAWS modes are set to ON.*

MFD FMS INITIALIZATION

Applicable to: ALL

FLIGHT PLAN INITIALIZATION

FLIGHT PLAN INITIALIZATION..... COMPLETE, AS RQRD | FO

L2 *Complete the FMS ACTIVE/INIT page, as required.*

L1 *Note: For ATC needs, the crew should enter exactly the entire Flight number, as shown on the ICAO flight plan, without inserting any space, on the MFD INIT page*

Note: Enter the Cost Index will be decided in consideration with the economical efficiency by the company.

L2 For additional training-oriented information, *Refer to FCTM/NO-60 FMS Initialization.*

Note: For ATC needs, the crew should enter exactly the entire Flight number, as shown on the ICAO flight plan, without inserting any space, on the MFD INIT page

Note: Enter the Cost Index will be decided in consideration with the economical efficiency by the company.

WINDS

WINDS..... ENTER AS APPROPRIATE | FO

L2 *Choose between the trip wind or the forecasted wind for climb, cruise, or descent, as appropriate. Use the average wind or forecasted wind from the computerized F-PLN.*

IRS ALIGNMENT

■ **If the GPS is available:**

IRS 1, 2, and 3..... | FO
..... CHECK NAV or ALIGN |

L2 *On the FMS POSITION/IRS page, check that the IRS are either aligned or in alignment.*

L1 ■ **If the GPS is not available, or is failed:**

IRS 1, 2 and 3.....ALIGN | FO

L2 *For more information on the IRS alignment, Refer to DSC-34-10-30-30 How to align IRS .*

DEPARTURE SELECTION

DEPARTURE.....SELECT/CHECK | FO

L2 *Select the runway, SID and TRANS, as appropriate, in the FMS DEPARTURE page. If the company route already has the departure procedure, check this departure.*

NAVAIDS

NAVAIDS.....CHECK | PF

L2 *On the FMS POSITION/NAVAIDS page, check the VOR, ILS, and ADF, tuned by the FMS. Change them, if required, and check that the ND and PFD (for the ILS) display the correct ident.*

L1 NAVAID DESELECTION.....AS RQRD | PF

L2 *Check the list of deselected navaids on the FMS POSITION/NAVAIDS page. If the NOTAMs warn that some navaids are not reliable, deselect them.*

FUEL AND LOAD

ZFW/ZFWCG..... INSERT | FO

L2 *If the ZFWCG and ZFW are not available, the flight crew can enter the expected values to enable:*
- *FMS performance predictions*
- *Optimum fuel distribution, if refueling is not completed.*

L1 BLOCK FUEL..... INSERT | FO

CAUTION	*Some of the characteristic speeds that are displayed on the PFD (green dot, F, S, VLS) are based on the ZFW and ZFWCG that the flight crew enters in the FMS . In addition, when the first engine starts, the pitch trim is automatically set to the takeoff target, based on the entered ZFWCG and block fuel. It is therefore the Captain's responsibility to carefully check all of this data.*

L2 *The fuel is automatically distributed, in accordance with the entered ZFWCG and takeoff CG target. Refer to DSC-28-50-20 AUTOMATIC GROUND TRANSFER*
If refuel is not yet completed, the flight crew can enter the expected Fuel On Board (FOB).
When the flight crew enters the ZFWCG , ZFW and BLOCK FUEL, the FMS provides all the predictions, as well as the EXTRA fuel, if any.

L1 RTE RSV/FINAL..... CHECK/INSERT AS APPROPRIATE | FO
MIN FUEL AT DEST..... CHECK/INSERT AS APPROPRIATE | FO

L2 *Check that the minimum fuel at destination is in accordance with the required minimum fuel.*

TAKEOFF PERFORMANCE

PRELIMINARY TAKEOFF PERF DATA..... INSERT | FO

L2 *Insert the preliminary takeoff performance data on the T.O panel of the FMS ACTIVE/PERF page.*

L1 V1, VR and V2..... INSERT | FO
TOGA/FLEX/DERATED..... SELECT/INSERT | FO
FLAPS..... SELECT | FO
T.O SHIFT..... INSERT AS RQRD | FO
PACKS..... INSERT | FO
ANTI-ICE..... INSERT | FO
THR RED/ACCEL ALTITUDE..... SET OR CHECK | FO
NOISE PROCEDURE..... AS APPROPRIATE | FO
TRANS ALTITUDE..... AS APPROPRIATE | FO
EO ACCEL ALTITUDE..... SET OR CHECK | FO

L2 **TAKEOFF DATA REQUEST**

As per company policy, or as deemed necessary, the flight crew can send a CPNY T.O REQUEST to obtain the takeoff data from the ground station.

CLIMB PERFORMANCE

DERATED CLB .....INSERT AS APPROPRIATE | FO

L2 *Check NONE or insert the selected derated climb on the CLB panel of the FMS ACTIVE/PERF page, as appropriate.*

SPEED PRESELECTION

On the CLB and CRZ panels of the FMS ACTIVE/PERF page:

PRESEL SPEEDS.....AS RQRD | FO

ACTIVE F-PLN CHECK

COMPUTERIZED FLIGHT PLAN..... ACCESS | FO

L2 *Use the computerized flight plan in the EFF as reference for routing and fuel predictions.*

L1 ACTIVE F-PLN.....CHECK and COMPLETE AS APPROPRIATE | FO

Modify the active flight plan, as appropriate, depending on the data provided by the ATIS, ATC, or MET.

L2
- *Lateral revision at departure airport*
- *Lateral revision at waypoint for route modification, as appropriate*
- *Vertical revision for climb speed limit/constraints in accordance with ATC clearance. Enter step altitudes as appropriate*
- *Lateral revision for arrival.*

L1 *Check the EOSID on the ND PLAN mode, if applicable.*
Check the F-PLN and the ND PLAN mode vs. the computerized flight plan or the navigation charts.
Check the distance to destination along the F-PLN. Compare it with the total distance computed by the computerized flight plan.

SEC F-PLN

SECONDARY FLIGHT PLANS..... AS APPROPRIATE | FO

L2 *Create the SEC 1, SEC 2, and SEC 3 F-PLN, as appropriate, using the FMS SEC INDEX page.*
The flight crew can use SEC 1 and SEC 2 to copy the active F-PLN, and to anticipate a runway change, an immediate return, or a diversion immediately after takeoff.
For an anticipated takeoff runway change, they must compute the takeoff performance accordingly.
The flight crew can load an ATC flight plan in the SEC 3 only.

L1 *Note: Before the flight crew creates a SEC 1(2)(3) flight plan, they should erase the associated SEC 1(2)(3) data from the previous flight via the DELETE button on the SEC 1(2)(3) panel of the SEC INDEX page.*

ROUTE SUMMARY CHECK

ROUTE SUMMARY.....CHECK versus ATC F-PLN | FO

L2 *Check the route summary via the FMS DATA/ROUTE page.*

FMS DATA CROSSCHECK

FMS INITIALIZATION.....CROSSCHECK | CAPT

After the FO initialized the FMS, the CAPT crosschecks:
- *The airfield data*
- *The IRS alignment*
- *The fuel and load data*
- *The takeoff performance data with the OIS takeoff performance data*
- *The F-PLN.*

NAV CHARTS CLIPBOARD

NAV CHARTS CLIPBOARD.....IMPORT | CAPT

L2 *The CAPT imports the NAV CHARTS clipboard that the FO prepared.*

GLARESHIELD

Applicable to: ALL

GENERAL

Perform the glareshield preparation when both flight crewmembers are seated and after the F/O checked the FMS.

LIGHTING

INTEGRAL LIGHTS..... AS RQRD | BOTH

LOUDSPEAKER

LOUDSPEAKER knob .....SET | BOTH

L2 *Set the LOUDSPEAKER knob to approximately 1 o'clock position.*

Impacted by TDU: 00021152 Glareshield_BARO REF

BAROMETRIC REFERENCE

BAROMETRIC REFERENCE.....SET | BOTH

L2 *Set the QNH on the EFIS CP and on the ISIS.*
Check the barometric reference and altitude indications on the PFD and on ISIS.

The maximum difference is:
- *± 20 ft between both PFDs*
- *± 30 ft between ISIS and PFD*
- *± 25 ft between each PFD and airport elevation.*

Impacted DU: 00005474 Glareshield_BARO REF

BAROMETRIC REFERENCE

BAROMETRIC REFERENCE.....SET | BOTH

L2 *Set the QNH on the EFIS CP and on the ISIS.*
Check the barometric reference and altitude indications on the PFD and on ISIS.

The maximum difference is:
- *± 20 ft between both PFDs*
- *± 30 ft between ISIS and PFD*
- *± 25 ft between each PFD and airport elevation.*

Note: If the barometric unit is mercury inches, the flight crew may notice a discrepancy of 0.01 inHg between the QNH values on the PFDs and the QNH values selected on the EFIS CP. This discrepancy does not impact the altitude computations.

EFIS CONTROL PANEL (EFIS CP)

ND MODE AND RANGE..... AS RQRD | BOTH

L2 *MODE : Display the ARC mode on the ND, if the takeoff direction is in approximately the same direction as the departure clearance.*
Display the NAV mode, if the change in direction will be more than 70 °, after takeoff. This enables the ND to display the area behind the aircraft.

RANGE : Set the minimum range to display the first waypoint after departure, or as required for weather purposes.

L1 WX pb on EFIS CP.....OFF | BOTH

Before pressing the WX pb on any EFIS CP, the flight crew should be sure that:
- *No maintenance personnel is facing the aircraft within a distance less that 20 ft within an arc of 135 ° on either side of the aircraft centerline*

- *The aircraft is not directed towards any large metallic obstacle, such as a hangar, within 20 ft in an arc of 90 ° on either side of the aircraft centerline.*

L2 *The weather radar starts to emit as soon as the first engine is started if WX is selected on the EFIS CP to display weather information.*

L1 OTHER EFIS OPTIONS..... AS RQRD | BOTH

L2 *Select other EFIS options (e.g. constraints, waypoints, navaids, etc.) as required.*

AFS CONTROL PANEL (AFS CP)

- **The FO sets the AFS CP:**

FD.....ON | FO
NORTH REF..... MAG | FO

L2 *Check that TRUE does not appear neither on the HDG/TRK window of the AFS CP, nor on the PFD.*

L1 SPD/MACH window.....DASHED | FO
HDG/TRK window..... DASHED | FO
HDG-V/S / TRK-FPA pb ..... HDG-V/S | FO
ALT window.....INITIAL EXPECTED CLEARANCE ALTITUDE | FO
V/S / FPA window..... DASHED | FO

- **The CAPT crosschecks the AFS CP:**

AFS CP..... CROSSCHECK | CAPT

LATERAL CONSOLES

Applicable to: ALL

OXYGEN MASK TEST

Test the oxygen masks of each occupied station.
During the test, check that the oxygen correctly reaches the oxygen mask by verifying that the oxygen mask blinker becomes yellow, and the flow of oxygen flow can be heard via the loudspeakers.

- **On the RMP :**

INT/RAD sw ..... INT | BOTH

- **On the mask stowage box:**

OXYGEN MASK TEST.....PERFORM | BOTH

L2 *For a detailed test of the mask, Refer to DSC-35-20-30 How to Test the Mask .*

L1 ● **On the DOOR SD page:**

REGUL PR LO indication ..... | BOTH
.....CHECK NOT DISPLAYED

L2 *The flight crew must perform this check after checking the masks of each occupied station, to ensure that the oxygen supply valve is open.*
Due to residual pressure between the oxygen supply valve and the oxygen mask, it may not be possible to detect that a supply valve is failed closed, during the oxygen mask test.

SLIDING WINDOWS

SLIDING WINDOWS.....CLOSED/LOCKED | BOTH

L2 *Check that the green part of the unlock pb is visible on the control handle of the sliding window.*

POLAR OPERATION

Applicable to: ALL

Refer to the Polar Operation Check list in the Reference Checklist.

NOISE ABATEMENT DEPARTURE PROCEDURE

Applicable to: ALL

Refer to FOM Chapter 6 – Normal Operations

JUMP SEAT BRIEFING

Applicable to: ALL

The PIC will ensure that each cockpit jump seat occupant is familiar with the Flight Crew Briefing Card Items
The Flight Crew Briefing Card in the QRH Binder

TAKEOFF BRIEFING

Applicable to: ALL

L2 For additional training-oriented information, *Refer to FCTM/NO-60 Takeoff Briefing.*

L1 TAKEOFF BRIEFING..... PERFORM | PF

L2 *The purpose of the takeoff briefing is for the PF to inform the PM of the planned course of action for both normal and abnormal situations during takeoff, and to identify other operational risks.*

L1 *Use the Flight Crew Briefings Card of the Reference Check list folder.QRHBinder.*
For detail information, refer to FOMChapter 6 – Normal Operations.

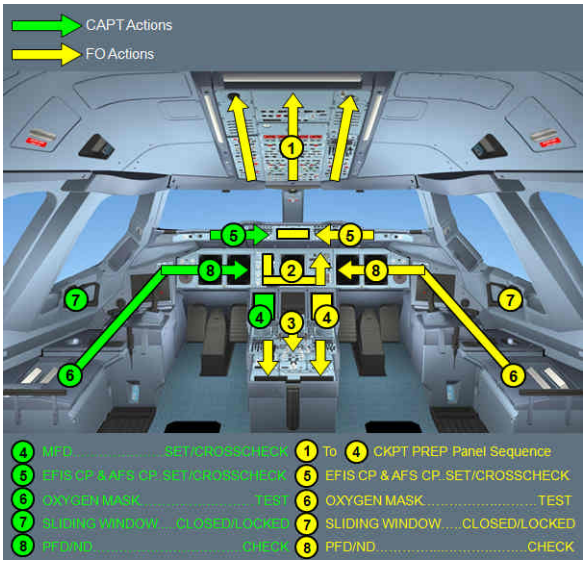
If the departure includes an EOSID, use the EOSID procedure described in the AIRPORT/RWY panel of the takeoff application, to perform the briefing.

FLOW PATTERN

Applicable to: ALL

FLOW PATTERN

flow pattern



BEFORE START CLEARANCE

Applicable to: ALL

LOADSHEET

FINAL LOADSHEET..... CHECK | BOTH

L2 *Carefully check the final loadsheet, particularly for significant errors. Make sure that the loadsheet data is correct (e.g. correct flight number, aircraft, dry operating weight/CG, configuration, fuel on board).*

L1 FUEL ON BOARD.....CHECK | BOTH

L2 *On the permanent data of the SD , check that the Fuel On Board (FOB) corresponds to the F-PLN and to the Loadsheet.*

L1 ZFW/ZFWCG in FMS.....CHECK/REVISE | FO

L2 *The PF compares the ZFW / ZFCG of the loadsheet with the ZFW / ZFWCG entered in the FMS ACTIVE/FUEL & LOAD page, and revises them if necessary.*

L1 ZFW/ZFWCG in FMS.....CROSSCHECK | CAPT

L2 *The CAPT crosschecks the ZFW / ZFWCG entered in the FMS ACTIVE/FUEL& LOAD page.*

L1 LOADSHEET TOCG AND ECAM GWCG.....CROSSCHECK | BOTH

L2 *Check the loadsheet TOCG vs. the ECAM GWCG :*

- *If the difference is less than 1 % , no further action is required*
  The ECAM GWCG is reliable.
- *If there is more than 1 % difference, check that the ZFW and the ZFCG are correctly entered in the FMS .*

1. *If not, revise the ZFW / ZFWCG in the FMS and compare the ECAM GWCG and the loadsheet TOCG*
2. *If the difference is confirmed, compute again the loadsheet using the trim tank fuel quantity displayed on the FUEL SD page*
   For more information on how to compute the loadsheet using trim tank fuel quantity, Refer to PER-LOD-FDC Trim Tank Adjustment .
3. *If the difference between the loadsheet TOCG and the ECAM GWCG is still greater than 1 % , suspect an abnormal fuel distribution. Confirm the fuel distribution with load control and compute again the loadsheet accordingly.*

L1 ECAM GWCG..... CHECK WITHIN OPERATIONAL LIMITS | BOTH

L2 *Check that the Gross Weight CG displayed on the permanent data of the SD is within the operational limits using the OIS Loadsheet application or referring to the loadsheet.*

L1 ● **If the ECAM GWCG is within the operational limits:**

THS FOR _ in FMS ACTIVE/PERF page..... INSERT T.O CG (in %) | FO

L2 *Use the TOCG indicated on the loadsheet as the reference for insertion of the T.O CG in the FMS .*

L1 THS FOR _ in FMS ACTIVE/PERF page.....CROSSCHECK | CAPT

FINAL LOADSHEET.....SIGN and EXPORT | CAPT

L2 *If the loadsheet is modified, or if required by the authorities or by the airline policy, the Captain sends the loadsheet to the ground via the EXPORT function in the LOADSHEET application.*

L1 ● **If the ECAM GWCG is not within the operational limits:**

AUTO GND XFR pb-sw ..... ON | FO

L2 *Ground transfer is activated to automatically obtain the ground CG target in accordance with the final ZFW / ZFWCG values entered in the FMS .*

- *If time permits, continue the Automatic Ground Transfer (AGT) until the FUEL AUTO GND XFR COMPLETED alert triggers*
- *If departure is imminent, monitor the ECAM GWCG during the AGT . The flight crew can manually stop the AGT when the ECAM CG is within the operational limits.*

Note:
- *The flight crew can obtain the amount of fuel that should be transferred from/to the trim tank to be inside the operational envelope, via the Loadsheet application*
- *The flight crew should not launch the automatic ground transfer if the aircraft is moving (e.g. during towing.) The AGT is inhibited as soon as at least two engines are running.*

L1 AUTO GND XFR.....MONITOR | FO

THS FOR _ in FMS ACTIVE/PERF page..... INSERT T.O CG (in %) | FO

L2 *Use the TOCG indicated on the loadsheet as the reference for insertion of the T.O CG in the FMS .*

L1 THS FOR _ in FMS ACTIVE/PERF page.....CROSSCHECK | CAPT

FINAL LOADSHEET.....SIGN and EXPORT | CAPT

L2 *If the loadsheet is modified, or if required by the authorities or by the airline policy, the Captain sends the loadsheet to the ground via the EXPORT function on the LOADSHEET application.*

TAKEOFF DATA

L2 For additional training-oriented information, *Refer to FCTM/NO-70 Takeoff Data*.

L1 OIS FINAL TAKEOFF PERF.....CONFIRM or RECOMPUTE | BOTH

L2 - *If takeoff conditions did not change, verify and confirm that the preliminary takeoff data are still valid*
- *If takeoff conditions changed, calculate the final takeoff performance, using the T.O PERF application on the OIS.*

L1 FMS TAKEOFF DATA..... CHECK/REVISE, AS REQUIRED | FO

L2 *The FO checks or revises the takeoff data in the T.O. panel of the FMS ACTIVE/PERF page.*

L1 REVISED FMS TAKEOFF DATA.....CROSSCHECK | CAPT

L2 *The CAPT crosschecks the takeoff speeds and the flexible temperature.*
The CAPT crosschecks the FMS entries made by the FO, using the XCHECK WITH AVNCS function in the T.O PERF application.

L1 *The flight crew should pay particular attention in determining the takeoff configuration.*

- **In accordance with Airlines policy or if required by operational regulation:**
  FINAL TAKEOFF PERFORMANCE..... STORE IN CURRENT EFF | FO

SEATING POSITION

SEATS, SEAT BELTS, HARNESSES, RUDDER PEDALS, ARMRESTS..... ADJUST | BOTH

L2 *The seat is correctly adjusted when the pilot's eyes are in line with the red ball and the white light.*
For additional training-oriented information, Refer to FCTM/NO-70 Seating Position.

HUD

HUD.....DEPLOY | CAPT
HUD knob .....ADJUST | CAPT

L2 *Turn on the HUD and adjust the brightness according to conditions.*

L1 DISPLAY MODE..... AS RQRD | CAPT

L2 *Select the declutter mode as required.*
The flight crew should select the crosswind mode only in flight, when the FPV is not within the display area of the HUD.

For additional training-oriented information, *Refer to FCTM/SI-90 General.*

L1

CAUTION	In order to avoid head contact with the HUD, the flight crew should: - Tight the seat belts and the fifth strap for takeoff and landing - Maintain the seat belts and the fifth strap fasten, in all other flight phases.

MFD

MFD ..... IN TAKEOFF CONFIGURATION | BOTH

L2 - *ACTIVE/F-PLN page on the PM side*
- *T.O panel of the ACTIVE/PERF page on the PF side.*

EXTERNAL POWER

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 EXT PWR ..... CHECK AVAIL | BOTH

L2 *Check that the EXT PWR pb-sw are set to AVAIL before the request of the external power disconnection.*

L1 EXT PWR DISCONNECTION .....REQUEST | CAPT

LP GROUND CARTS

LP GROUND CARTS.....CHECK DISCONNECTED | BOTH

L2 *If LP ground carts are used for air conditioning, request disconnection before engine start.*
If LP ground carts are connected during the engine start, air pressure in the mixer unit may be detected out of range, and the associated alert COND MIXER PRESS REGUL FAULT may trigger.

BEFORE START CHECKLIST DOWN TO THE LINE

BEFORE START C/L down to the line.....COMPLETE | BOTH

Refer to PRO-NOR-C-L Before Start .

L2 *For additional information on the associated standard callout, Refer to PRO-NOR-SCO Summary for Each Flight Phase .*
For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .

AT START CLEARANCE

Applicable to: ALL

PUSHBACK/START UP CLEARANCE

PUSHBACK/START UP CLEARANCE.....OBTAIN | FO

L2 *Obtain ATC pushback/start up clearance and ground crew clearance.*

VIDEO

TAXI VIDEO..... AS RQRD | BOTH

L2 *As required, set the TAXI video on the PFD or on the SD to see the aircraft vicinity.*

WINDOWS AND DOORS

WINDOWS AND DOORS..... CHECK CLOSED | BOTH

L2
- *On the DOOR SD page, check that all doors and windows are closed*
- *When required by local authorities, check that the cockpit door is closed and locked (I.e. OPEN does not appear on the CKPT DOOR light).*

L1 SLIDES.....CHECK ARMED | CAPT

LIGHTS

BEACON sw .....ON | CAPT

L2 *When cleared for start or pushback, set to ON the BEACON sw.*

THRUST LEVERS

THR LEVERS..... IDLE | CAPT

CAUTION	*The engines start regardless of the thrust lever position. If the thrust levers are not set to IDLE, then thrust rapidly increases to the corresponding thrust lever position, causing a hazardous situation.*

PARKING BRAKE AND NOSEWHEEL STEERING

■ **If pushback is not required:**

PARK BRK.....ON | CAPT

L2 *On the triple pressure indicator, the left and right BRK pressure indications should be above 3 500 PSI .*

L1 ■ **If pushback is required:**

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 PARK BRK..... OFF | CAPT

CAUTION	*Do not use the brakes during pushback, unless required due to an emergency.*

N/W STEER DISC MEMO ..... | CAPT
.....CHECK DISPLAYED

L2 *In the case of a pushback (towbarless or conventional), the ground crew should set the tow pin to the towing position on the steering nose gear panel. The N/W STEER DISC memo on the ECAM indicates this position.*

L1

CAUTION	*If the ECAM does not display the N/W STEER DISC memo, but the ground crew confirms that the tow pin is in the towing position, the flight crew should not perform the pushback in order to avoid possible damage to the nose landing gear upon green hydraulic pressurization.* *To dispatch the aircraft in such a case, Refer to MEL/MI-32-50 NWS Disconnection Function .*

When the pushback is completed, set to ON the PARK BRK handle, and ask the ground crew for towbar disconnection.

BEFORE START CHECKLIST BELOW THE LINE

BEFORE START C/L below the line..... COMPLETE | BOTH

Refer to PRO-NOR-C-L Before Start .

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callout, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

AUTOMATIC ENGINE START

Applicable to: ALL
Impacted DU: 00000807 Automatic Engine Start

L2 For additional training-oriented information, *Refer to FCTM/NO-80 General* .
For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 ENG START selector .....IGN START | CAPT

L2 *The ENG SD page appears.*

L1 WAIT FOR 10 s

L2 *The flight crew should wait approximately for 10 s before the ENG MASTER lever of the engines 2 and 3 are set to ON.*
A 10 s delay permits to detect the loss of a thrust reverser function.

L1 ● **If no ENG 2(3) REVERSER FAULT ECAM alert appears:**
START ENGINES 1 and 2..... ANNOUNCE | CAPT

Note: For any operational reason, any engine can be started first.

ENG MASTER 1, then 2..... ON | CAPT

L2 *Set the ENG MASTER levers to ON when all amber crosses and messages no longer appear on the engine parameters of the EWD and of the ENG SD page.*

Note: Parameter callouts are not mandatory.

On the EWD	*On the SD*
	The corresponding start valve is open. *The bleed pressure is green.* *The engine LP valve is open.*
	N2 increases. *Oil pressure increases.*
	20 s after N2 reaches 20 % : - *FF increases* - *The indication of the active igniter (A or B) appears.*
30 s (maximum) after FF increases: - *EGT increases* - *N1 increases.*	
	At 56 % N2 : - *The corresponding start valve is closed* - *Ignition indication no longer appears.*

L1 L123

Note: The level of N2 vibration may exceed 5 units and the indication may pulse for a short period of time during the engine start sequence.
Depending on the time between the engine is shutdown and the next engine start, the HP rotor can bow due to the thermal stabilization of the engine. As a result, during the engine start sequence, the N2 vibration indication may exceed 5 units.
In order to minimize the rotor bow effect during the engine automatic start sequence, the FADEC cranks the engine for 20 s after the N2 reaches 20 % .

- **When the engine reaches idle (I.e. AVAIL appears on the EWD):**

ENG IDLE PARAMETERS ..... | CAPT
.....CHECK NORMAL

L2 *At ISA , sea level, with bleed off, check that:*
- *THR is approximately 3 %*
- *EGT is approximately 455 °C*
- *N1 is approximately 20 %*
- *N2 is approximately 66 %*
- *FF is approximately 1 400 lbs/h .*

L1 START ENGINES 3 and 4..... ANNOUNCE | CAPT
ENG MASTER 3 then 4..... ON | CAPT

Apply the same procedure as indicated for engines 1 and 2.

- **If ENG 2(3) REVERSER FAULT ECAM alert appears:**

ENG START selector .....NORM | CAPT

- **When XX appears on ENG parameters:**

ENG START selector .....IGN START | CAPT

L2 *The action to set the ENG START selector to NORM then to IGN START enables to reset the electrical power of the FADEC and ETRAC , and to clear thrust reverser failure.*

L1 ■ **If ENG 2(3) REVERSER FAULT ECAM alert no longer appears after 10 s :**

ENGINES 1 and 2..... START | CAPT

Apply the same procedure as previously indicated under the condition "If no ENG 2(3) REVERSER FAULT ECAM alert appears" .

ENGINES 3 and 4..... START | CAPT

Apply the same procedure as previously indicated under the condition "If no ENG 2(3) REVERSER FAULT ECAM alert appears" .

■ **If ENG 2(3) REVERSER FAULT ECAM alert appears again after 10 s :**

Consider thrust reverser failure.

AUTOMATIC ENGINE START

Applicable to: ALL
Impacted by TDU: 00023393 Automatic Engine Start

L2 For additional training-oriented information, *Refer to FCTM/NO-80 General .*
For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 ENG START selector .....IGN START | PF
L2 *The ENG SD page appears.*
L1 START ENGINES 1 and 2.....ANNOUNCE | PF

Note: For any operational reason, any engine can be started first.

ENG MASTER 1 then 2.....ON | PF
L2 *Set the ENG MASTER levers to ON when all amber crosses and messages no longer appear on the engine parameters of the EWD and of the ENG SD page.*

Note: Parameter callouts are not mandatory.

On the EWD	*On the SD*
	The corresponding start valve is open. *The bleed pressure is green.* *The engine LP valve is open.*
	N2 increases. *Oil pressure increases.*
	20 s after N2 reaches 20 % : *- FF increases* *- The indication of the active igniter (A or B) appears.*
30 s (maximum) after FF increases: *- EGT increases* *- N1 increases.*	
	At 56 % N2 : *- The corresponding start valve is closed* *- Ignition indication no longer appears.*

L1 ● **When the engine reaches idle (i.e. AVAIL appears on the EWD)**

ENG IDLE PARAMETERS ..... CHECK NORMAL | PF

L2 *At ISA , sea level, with bleed off, check that:*

- *THR is approximately 3 %*
- *EGT is approximately 455 °C*
- *N1 is approximately 20 %*
- *N2 is approximately 66 %*
- *FF is approximately 1 400 lb/h .*

L1 START ENGINES 3 and 4..... ANNOUNCE | PF

ENG MASTER 3 then 4..... ON | PF

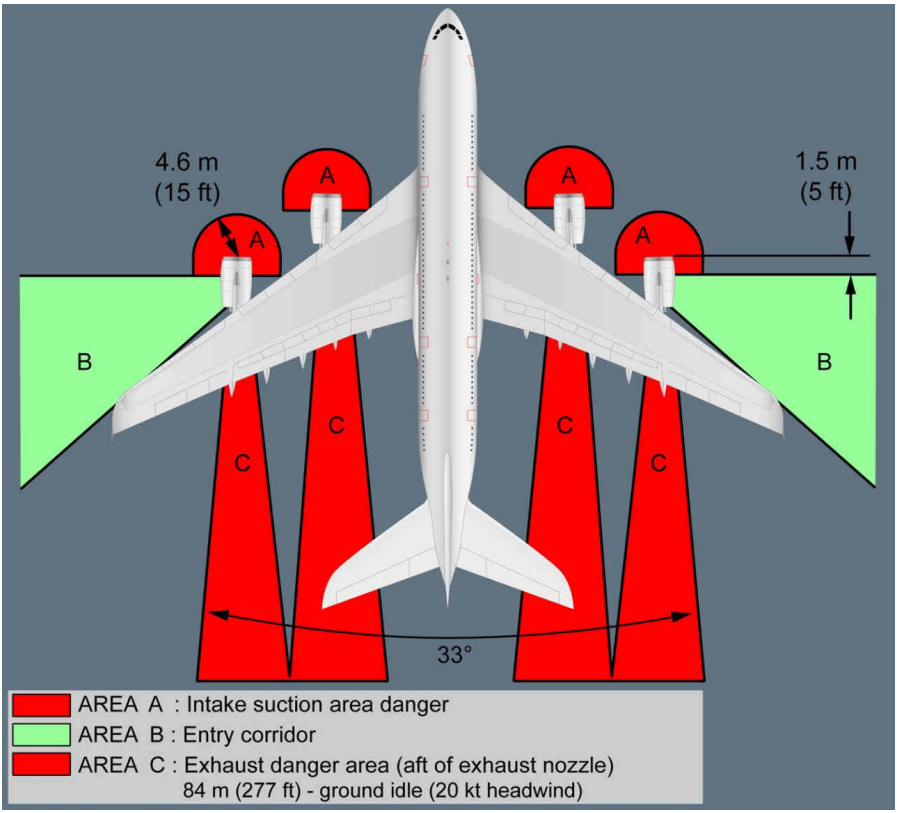
Apply the same procedure as indicated for engines 1 and 2.

GROUND RUN UP - DANGER AREAS

Applicable to: ALL

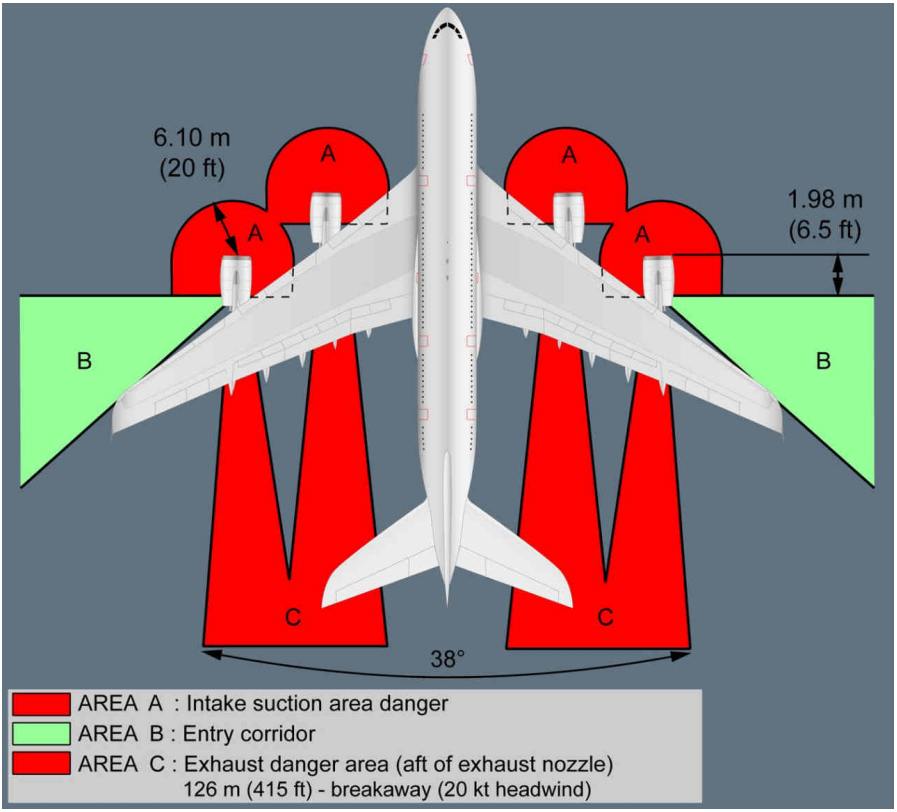
MINIMUM IDLE THRUST

Minimum Idle Thrust



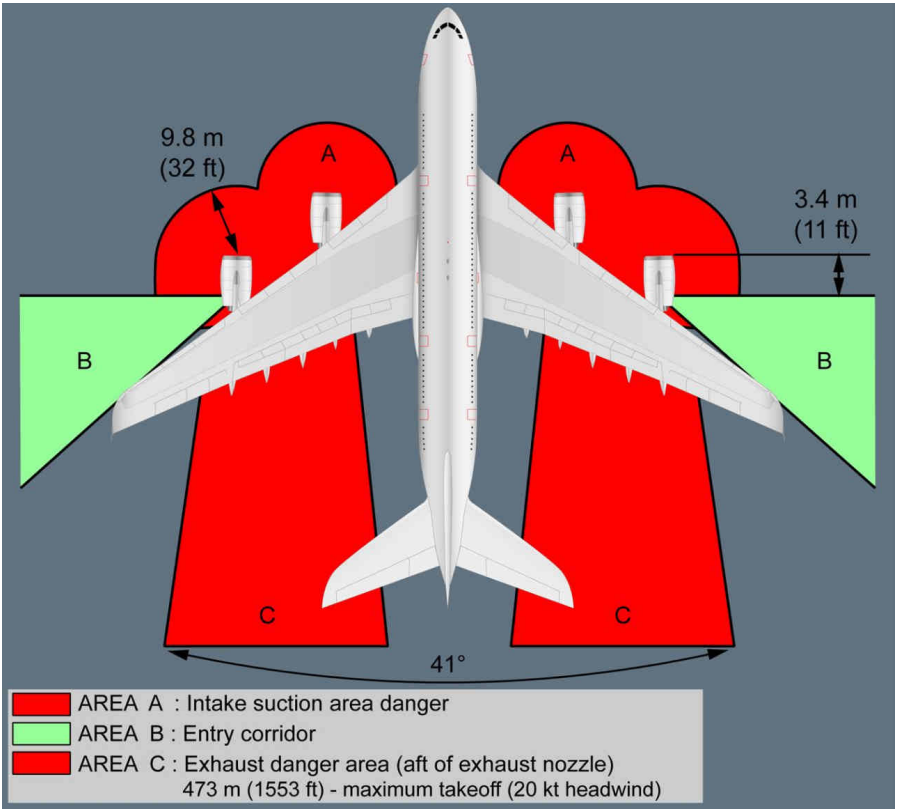
BREAKAWAY POWER

Breakaway Power



TAKEOFF THRUST

Takeoff Thrust



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AFTER START

Applicable to: ALL

ENG START SELECTOR

L2 For additional training-oriented information, *Refer to FCTM/NO-90 ENG START Selector* .

L1 ENG START selector ..... NORM | CAPT

L2 - *Setting to NORM the ENG START selector indicates the end of the start sequence*

L3 *If the ENG START selector remains in the IGN START position, this prevents a continuous ignition on ground. The flight crew should set the ENG START selector to NORM then to IGN START to activate continuous ignition on ground.*

L2 *The flight crew should then perform the AFTER START actions.*

- *The WHEEL SD page appears instead of the ENG SD page*

Note: If the flight crew does not set the ENG START selector to NORM, the WHEEL SD page automatically appears instead of the ENG SD page 30 s after the last engine start.

To prevent thermal shock, the engine should run at idle or taxi thrust for a minimum of 3 min (5 min recommended) prior to takeoff .

APU BLEED

APU BLEED pb-sw ..... OFF | CAPT

L2 - *The APU bleed valve closes*
- *All engine bleed valves open*
- *All crossbleed valves close.*

ENG ANTI-ICE

All ENG ANTI-ICE pb-sw .....AS RQRD | CAPT

- *Set to ON the ENG ANTI-ICE pb-sw , if:*
  - *Icing conditions exist or are anticipated (Refer to PRO-SUP-30 Definition of Icing Conditions), or*
  - *Standing water, slush, ice, or snow is on the taxiways or runway when the OAT is less than 10 °C .*
- *When taxiing in icing conditions, if temperature is less than + 3 °C :*
  - *With freezing fog conditions: the flight crew must apply the ice shedding procedure, Refer to PRO-SUP-70-20 Ground Ice Shedding Procedure In Case Of Freezing Fog*
  - *Without freezing fog conditions: In order to shed any possible ice on the fan, the flight crew must increase the thrust to 60 % N1 momentarily on two symmetric engines at a time (i.e. 1 and 4, 2 and 3) with parking brake on (or brake with pedals). The engines run-up must be performed at least every 30 min of total taxi time (including taxi-in and taxi-out time) and when lined-up before applying the takeoff thrust.*

CAUTION	*Pay particular attention to the aircraft movement during this procedure. If during thrust increase, the aircraft starts to move, immediately retard the thrust levers to IDLE.*

If the aircraft moves, apply the thrust on only one engine at a time.

APU

● **If the APU is not required:**

APU MASTER SW pb-sw .....OFF | CAPT

GROUND SPOILERS

GND SPLRS..... ARM | FO

RUDDER TRIM

RUDDER TRIM.....ZERO | FO

L2 *If the rudder trim position is not zero, press the RESET pb on the RUDDER TRIM panel.*

FLAPS

FLAPS.....SET | FO

L2 - *Set the FLAPS for takeoff*
- *Check the slats and flaps position on the slats/flaps display of the PFD*
- *If taxiing in icing conditions with rain, slush, or snow, maintain the slats/flaps retracted, until the aircraft reaches the holding point of the takeoff runway, in order to prevent contamination of the slats/flaps mechanism.*

PITCH TRIM

PITCH TRIM.....CHECK | FO

L2 *Check that the pitch trim is set to the takeoff target on the pitch trim display of the PFD.*

ECAM STATUS

ECAM STATUS.....CHECK | BOTH

L2 - *The F/O checks and the CAPT crosschecks that there is no status reminder (STS) on the EWD*
- *If STS appears on the EWD, press the STS pb on the ECP to display the STATUS page.*

GROUND CREW

CLEAR TO DISCONNECT.....ANNOUNCE | CAPT

L2 *The ground crew will:*
- *Remove the chocks*
- *Remove the tow pin*
- *Disconnect the interphone*
- *Make the hand signal on the left or right side.*

For additional information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

N/W STEER DISC MEMO

N/W STEER DISC MEMO..... CHECK NOT DISPLAYED | CAPT

FLIGHT CONTROLS

FLIGHT CONTROLS.....CHECK | BOTH

The flight crew should perform the flight control check when the slats/flaps are set to the takeoff configuration.

1. *The CAPT remains silent, and applies full longitudinal and lateral sidestick deflection.*
   On the F/CTL SD page, the FO checks full travel of all elevators and all ailerons, and the correct deflection and retraction of all spoilers.
   The FO announces "full up", "full down", "neutral", "full left", "full right", "neutral", when each applicable full travel/neutral position is reached.
   The CAPT remains silent, and checks that the FO calls are in accordance with the sidestick order.

   Note: To reach full travel, maintain full sidestick for a sufficient period of time.

2. *The CAPT remains silent, presses the PEDAL DISC pb to disconnect the NWS and applies full left rudder, full right rudder, and neutral. The FO follows on the rudder pedals and announces "full left", "full right", "neutral" as each full travel/neutral position is reached.*

   Note: To reach full travel, apply full rudder for a sufficient period of time.

3. *The FO applies full longitudinal and lateral sidestick deflection, remains silent, and checks full travel and the correct sense of all elevators and all ailerons, and the correct deflection and retraction of all spoilers, on the F/CTL SD page.*

L2 *Note:*
- *The F/CTL SD page automatically appears during 20 s after any flight crew action on the sidestick or on the rudder pedals*
- *After the F/CTL checks, the rudder trim returns to a position between ±3 °. As a result, the rudder trim check at neutral in the AFTER START C/L may appear as not completed (I.e. in blue).*

AFTER START CHECKLIST

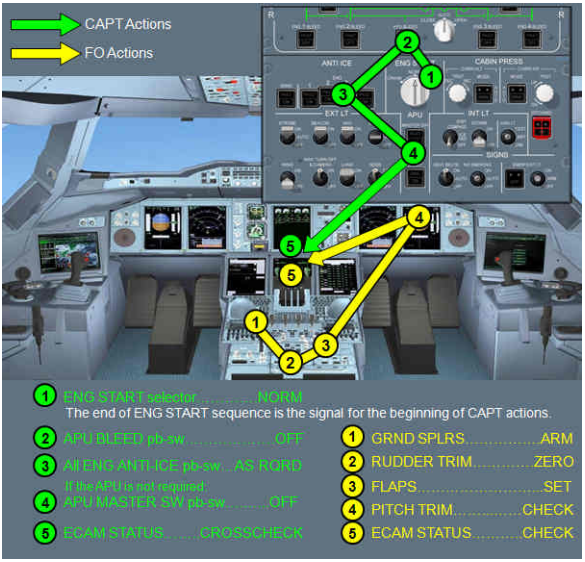
AFTER START C/L.....COMPLETE | BOTH

Refer to PRO-NOR-C-L After Start .

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L2 FLOW PATTERN

after engine start



L1 After Start Procedure and Call out

EVENT	CAPTAIN	FO
After ECAM Status Check	Announce to Ground Crew "Clear to Disconnect"	
After Check "NW STRG DISC" MEMO not displayed		
	"Flight Control Check"	
The Capt . silently checks that the F/O calls are in accordance with the sidestick order		
	Elevator : Ailerons: The Capt. Presses PEDAL DISC pb on the nosewheel tiller and silently applies full left rudder , full right rudder, and neutral. Rudder : "AFTER START CHECK LIST"	F/O will call this checks as it is carried out: "FULL UP, FULL DOWN, NEUTRAL" "FULL LEFT, FULL RIGHT, NEUTRAL" " FULL LEFT, FULL RIGHT NEUTRAL" "AFTER START CHECK LIST COMPLETE"

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TAXI

Applicable to: ALL

The Captain will turn ON then OFF the Landing Light /Taxi Light/Turnoff Light in response to the Ramp Coordinator's signal.

CLEARANCE

TAXI CLEARANCE.....OBTAIN | FO

EXTERNAL AND TAXI AID CAMERA SYSTEM (ETACS)

TAXI pb on EFIS CP .....AS RQRD | BOTH

L2 *For additional training-oriented information, Refer to FCTM/NO-100 External Taxi Aid Camera System.*

AIRPORT NAVIGATION

Direct visual observation out of the cockpit windows remains the primary means of taxiing. If there is a conflict between outside and the OANS display, the reference must be the outside view.

ND RANGE selector .....ZOOM, AS APPROPRIATE | BOTH

L2 - *If necessary, set the ND RANGE selector to ZOOM to activate the Onboard Airport Navigation System (OANS). Then, select ARC, ROSE, or PLAN mode, as appropriate.*

L2 - *If the DATABASE CYCLE NOT VALID message appears on the STATUS panel, check the active database cycle validity period, and swap the active and second database.*

For additional training-oriented information, Refer to FCTM/NO-100 Airport Navigation .

EXTERIOR LIGHTS

NOSE sw .....TAXI | CAPT

L2 *During the day and during the night, set the NOSE sw to TAXI.*

L1 RWY TURN OFF & CAMERA sw .....AS RQRD | CAPT

PARK BRK

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 PARK BRK.....OFF | CAPT

L2 *Check that the left and right brake pressure is zero on the triple pressure indicator.*

Small residual pressure can be indicated for a short period of time.

THRUST LEVERS

THRUST LEVERS.....AS RQRD | CAPT

L2 - *Little, if any, power above idle thrust can be necessary to move the aircraft (e.g. approximately up to 10 % THR at heavy weight, with a uphill taxi slope). Excessive thrust application on engines can result in exhaust-blast damage (e.g. on airport signs). The flight crew should use symmetrical thrust. When the aircraft begins to move, less thrust is necessary.*
- *If the inner engines are located over unconsolidated or unprepared ground during taxi, avoid high thrust settings on the inner engines (i.e. engine ingestion (FOD) risk increases). If additional thrust is necessary, the flight crew should preferably use the outer engines.*
- *The use of engine anti-ice increases the ground idle thrust*
- *If the aircraft was parked for a long time (i.e. more than 6 h) in high tire temperature conditions and with a high aircraft weight, then the flight crew can feel a "square wheel effect" when the aircraft begins to move.*

BRAKES

L2 For additional training-oriented information, *Refer to FCTM/NO-100-100-2 Brakes .*
For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 BRAKES..... CHECK | CAPT

CAUTION	*If the aircraft was parked in wet conditions for a long time, the first brake application at low speed is less effective.*

L2 - *When the aircraft begins to move, the PF smoothly presses the brake pedals to check the braking efficiency of the normal braking system*
The FO checks that the left and right BRK pressure on the triple pressure indicator remains at zero.
- *The maximum taxi speed should be 30 kt in a straight line on long taxiways, and 8 to 10 kt on a sharp turn. It is difficult to assess the ground speed. Therefore, monitor the ground speed on the ND or on the ETACS video. Avoid continuous brake application. When the aircraft exceeds 30 kt with idle thrust, smoothly brake, and decelerate to 10 kt . Release the brakes, to enable the aircraft to accelerate again.*

NOSEWHEEL STEERING

L2 For additional training-oriented information, *Refer to FCTM/NO-100-100-1 Tiller and Rudder Pedals Use*.

L1 NOSEWHEEL STEERING..... AS RQRD | CAPT

L2 - *Use smooth and progressive handwheel inputs*
- *The nosewheel steering angle is limited to 70 °.*

ATC CLEARANCE

ATC CLEARANCE..... CONFIRM | FO

TAKEOFF DATA

If the takeoff data changed, or in the case of a runway change, prepare updated takeoff data and recompute takeoff performance, as appropriate.

TAKEOFF DATA COMPUTATION

■ **If multiple runway selection was used in anticipation of the runway change:**

T.O PERF..... ACCESS | FO
SELECTED RWY AND INPUT DATA..... CHECK | FO

L2 *Check that the new runway was previously selected and check that the conditions used for takeoff performance computation are still valid.*

L1 TAKEOFF DATA..... CHECK | FO

L2 *Check the takeoff data for the selected runway.*

L1 ■ **If multiple runway selection was not used, or if the takeoff conditions changed:**

T.O PERF..... ACCESS | FO
NEW RUNWAY/NEW CONDITIONS..... SELECT/ENTER | FO
TAKEOFF PERF..... COMPUTE | FO

L2 *Launch the computation for the new selected runway or the new takeoff conditions.*

L1 TAKEOFF PERFORMANCE RESULTS..... CROSSCHECK | CAPT

IN THE FMS ACTIVE/PERF PAGE

● **In the case of ATC clearance or takeoff runway change:**

TAKEOFF PERF DATA..... UPDATE | FO

L2 *Update the FMS in accordance with the new results of the takeoff performance computation: I.e. update the T.O panel of the FMS ACTIVE/PERF page, and the FMS ACTIVE F-PLN page.*

If the flight crew anticipated the runway change in a secondary flight plan, activate this SEC F-PLN.

L1 V1, VR AND V2.....UPDATE | FO
FLX T.O TEMPERATURE.....UPDATE | FO
FLAPS.....UPDATE | FO
FMS UPDATES.....CROSSCHECK | CAPT

L2 *The CAPT crosschecks the new FMS inputs.*

L1 FLAPS lever.....AS APPROPRIATE | CAPT

L2 *Set the FLAPS for takeoff.*

AFS/FLIGHT INSTRUMENTS

● **In the case of ATC clearance or takeoff runway change:**

F-PLN (SID, TRANS).....REVISE or CHECK | FO

L2 *Carefully confirm that the ATC clearance agrees with the FMS , if NAV mode is to be used.*

L1 INITIAL CLIMB SPEED AND SPEED LIMIT.....REVISE or CHECK | FO

L2 *Revise the SPD panel of the FMS ACTIVE/VERT REV page associated with the departure, or the CLB waypoint.*

L1 CLEARED ALTITUDE ON AFS CP.....SET | FO

L2 *On the PFD , crosscheck and confirm the first cleared altitude.*

L1 HDG ON AFS CP.....PRESET, AS RQRD | FO

L2
- *If the ATC requires a heading after takeoff, or in the case of a radar vector departure, preset the heading on the AFS CP . NAV disarms. For more information, Refer to DSC-22-FG-100-GHOW How to Define a HDG/TRK Preset for Takeoff .*
- *RWY TRK mode maintains the aircraft on the runway track until HDG engages.*

L1 FD.....CHECK SELECTED ON | FO
PFD/ND.....CHECK | BOTH

L2 *Check that the PFD and the ND indications (e.g. airspeeds, initial target altitude, heading, slats/flaps configuration, FMA modes) are in accordance with the departure.*

L1 MFD.....IN TAKEOFF CONFIGURATION | BOTH

L2
- *The PF displays the T.O panel of the FMS ACTIVE/PERF page*
- *The PM displays the FMS ACTIVE/F-PLN page.*

TAKEOFF BRIEFING

L2 For additional training-oriented information, *Refer to FCTM/NO-100 Takeoff Briefing.*

L1 TAKEOFF BRIEFING.....CONFIRM | PF

L2 *The takeoff briefing should usually be only a brief confirmation of the entire takeoff briefing that is done at the gate. The flight crew should address any clearance changes at this time.*

AUTO BRK

RTO pb .....ARM | FO

L2
- *The RTO ARM light comes on*
- *BRK RTO appears on the FMA*
- *The flight crew can arm the AUTO BRK in the RTO mode, even if the PARK BRK is set to ON*
- *The RTO mode improves the safety in the case of an aborted takeoff.*
  If the takeoff is aborted, the AUTO BRK system applies maximum braking as soon as the thrust levers are set to idle, and if the speed is above 72 kt (i.e. corresponding to the order of ground spoiler extension). Below 72 kt , the AUTO BRK does not activate, because the ground spoilers do not automatically extend.

ATC

ATC CODE.....CONFIRM/SET | FO

FINAL CHECK

TO CONFIG pb .....TEST | FO

L2 *Press the TO CONFIG pb on the ECP, and check that the EWD displays the T.O CONFIG NORMAL memo.*

L1 T.O MEMO..... NO BLUE LINE | FO

L2 *Check that the EWD does not display any blue line in the T.O memo section.*

L1 CABIN.....READY | BOTH

L2 *Check CABIN READY on the EWD, or obtain the report from the chief purser: "Cabin ready for takeoff".*

BEFORE TAKEOFF CHECKLIST DOWN TO THE LINE

BEFORE TAKEOFF C/L down to the line .....
.....COMPLETE | BOTH

Refer to PRO-NOR-C-L Before Takeoff .

TAXI PROCEDURE AND CALL OUT

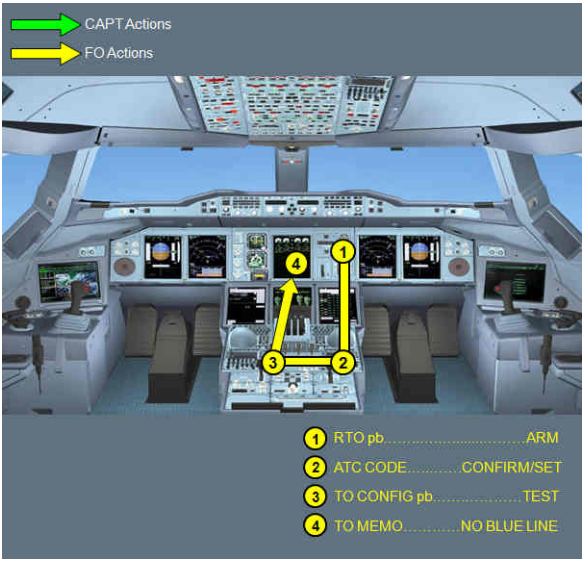
EVENT	CAPTAIN	FO
Obtain TAXI Clearance	Nose Light ---------- TAXI Turn on nosewheel light to TAXI day and night. RWY TURNOFF & LANDING lights may be switched on, As required.	
Verify clearing of own side		
	Release parking brake and check brake pressure Zero (triple indicator). Slight residual pressure may be indicated for a short period of time "BRAKE CHECK"	"PRESSURE ZERO"

..... | BOTH

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

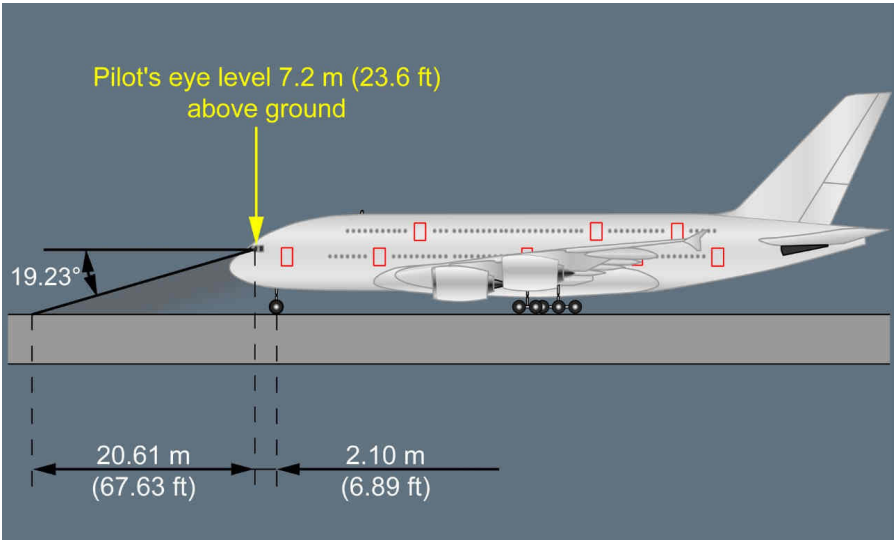
L2 FLOW PATTERN

taxi flow pattern



L2 VISUAL GROUND GEOMETRY

VISUAL GROUND GEOMETRY



TURN ON TURNING PAD

Applicable to: ALL

OVERVIEW

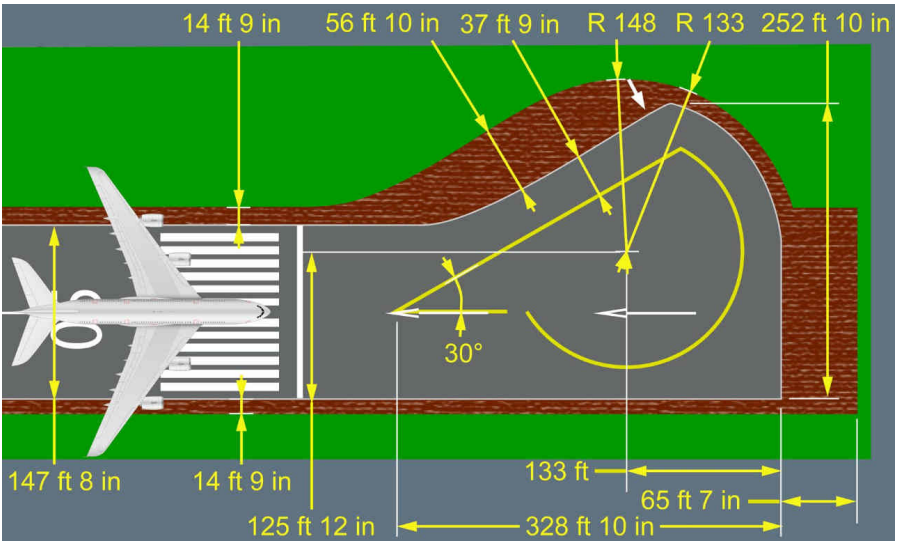
On runways with a width of less than 200 ft , it is not possible to perform a U-turn (for U-turns on a 200 ft wide runway, *Refer to PRO-NOR-SOP-100-A 180 Deg Turn On 60 M (200 FT) Wide Runway_GENERAL*). If a runway does not have a taxiway to access the runway threshold or to exit at the end of the runway, or if the taxiway is not usable, the runway may have a turn pad. The type of turn pad used as a reference in this procedure is a Technical Instruction on Civil Airports (ITAC) turn pad that was defined for B747 aircraft.

Note: *In the case of a BWS fault:*

- *The flight crew must slightly increase the THR settings*
- *It is not recommended to turn on a turn pad, if the runway is wet.*

CAUTION	This procedure is not permitted on a contaminated runway.

ITAC turn pad



L3 Dimensions in degrees and feet.

L1 **PROCEDURE**

Taxi on the runway centerline.

Use the ETACS belly camera to monitor the maneuver.

L2 However, it is possible to perform the maneuver without a belly camera.

L1 When the aircraft approaches the turn pad, reduce and maintain the speed to 5 kt .
Use the GPS ground speed displayed on the ETACS camera display, if possible.

L2 At a very low speed, GPS ground speed is more accurate than the IRS ground speed displayed on the ND .

L1

- **When the aircraft is in straight line, aligned with the yellow turn pad line (30 ° divergence heading from the runway axis):**
  THR ON OUTER ENGINE OPPOSITE THE TURNSIDE.....10% SET | PF

  Note: *An asymmetric thrust increase causes left (right) yaw momentum. This requires the flight crew to slightly adjust the tiller in the opposite direction, in order to maintain the aircraft alignment.*

L2 *In the lower range of thrust, engines have a high level of inertia.*

A 10 % THR preset enables rapid engine thrust adjustment and good speed control before the turn.
When the aircraft is at the maximum takeoff weight, a 15 % THR can be preset.

Note: On wet runways, less thrust may be required.

L1 SPEED..... MAINTAIN 5 KT | PF

L2 *If the aircraft speed is more than 5 kt , control the speed by smoothly applying the brakes in a symmetrical manner.*

L1 The flight crew begins the turn using the arrows painted at the outside of the ITAC turn pad. The flight crew must start the turn when the virtual line indicated by the direction of the arrow crosses the shoulder of the Pilot Flying (PF).

- **When the PF reaches the arrow:**

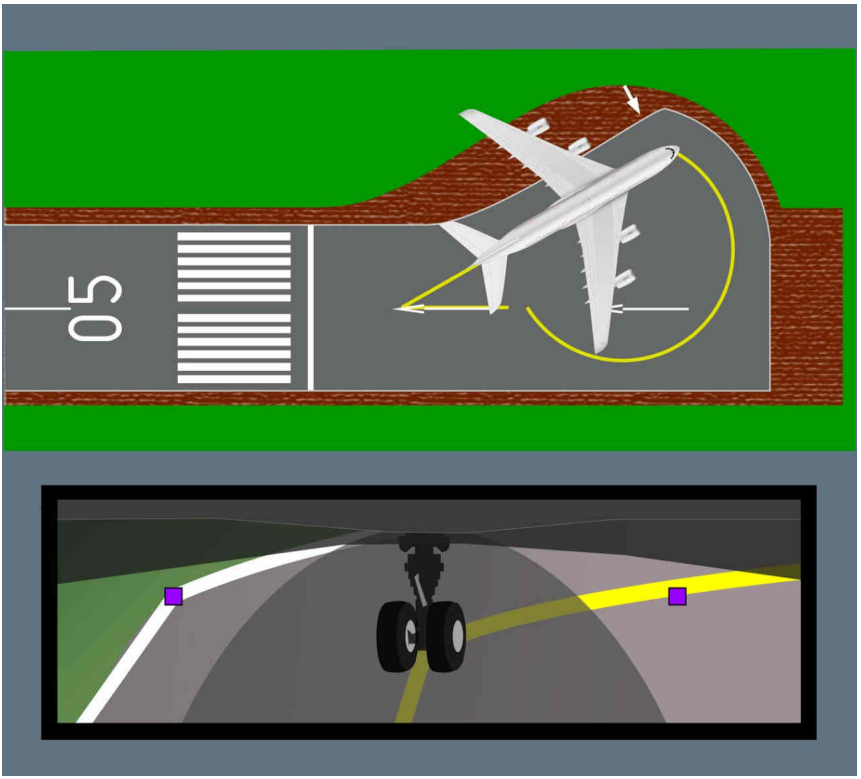
L2 *Note: If there is no arrow to start the turn on the turn pad, the flight crew can use the belly camera to start the turn. Start the turn when the turn side dot on the belly camera display reaches the turn line of the turn pad.*

L1 FULL TILLER.....APPLY AND MAINTAIN | PF

L2 *The flight crew can use differential braking to shorten the turn, if necessary.*

L1 THR ON OUTER ENG ..... PF
.....ADJUST TO MAINTAIN 5 KT

Belly Camera View and (Arrow) Position at the Beginning of the Turn



SPEED..... MAINTAIN 5 KT PF

L2 *If 5 kt is exceeded with full tiller applied, there is a risk that the nose wheel tires skid on the runway.*
If the aircraft decelerates below 5 kt , or stops during the maneuver, gently increase THR on the outer engine of the external turn side.
In the lower range of thrust, the engines have a high level of inertia.
If the aircraft is at maximum takeoff weight, the flight crew can adjust the THR by approximately 15 % , according to external conditions (e.g. wind, runway condition).

Note: On wet runways, less thrust may be required.

L1 ● **When the turn is completed :**

BRAKE PEDAL RELEASED	CONFIRM	PF
THR ON OUTER ENGINE	IDLE SET	PF
TILLER	SMOOTHLY RELEASE	PF

180 DEG TURN ON 60 M (200 FT) WIDE RUNWAY

Applicable to: ALL

GENERAL

The approximate turn width (without margin) is 55 m (180 ft) taking into account the maximum nosewheel steering angle (i.e. 70 °).
This 55 m (180 ft) turn width is based on the below procedure for U-turn on 60 m (200 ft) wide runway, using either the ETACS belly camera or external visual references as a guideline.

CAUTION	This procedure is not permitted in the case of BWS Fault.

CAUTION	This procedure is not permitted on contaminated runway.

180° TURN USING THE ETACS BELLY CAMERA

Taxi on the runway centerline.

During the maneuver:
- Maintain a ground speed of 5 kt
L2 - Prefer the use of the ETACS camera display to monitor the GPS ground speed that is more accurate than the IRS ground speed displayed on the ND
L1 - Monitor the approaching runway edge.

Turn toward the edge of the runway with a 20 ° intercept angle, and maintain a 20 ° angle.

L2 *On the PFD, check the 20 ° divergence from the runway axis.*

L1 ● **When the aircraft approaches the runway edge, and approximately 3 s before starting the turn:**

THR ON OUTER ENGINE OPPOSITE THE TURNSIDE	20% SET	CAPT

Note: An asymmetric thrust increase causes left (right) yaw momentum. This requires the flight crew to slightly adjust the tiller in the opposite direction, in order to maintain the 20 ° aircraft divergence from the runway axis.

L2 *In the lower range of thrust, the engines have a high level of inertia.*
A 20 % THR preset enables rapid engine thrust adjustment and good speed control before the turn.

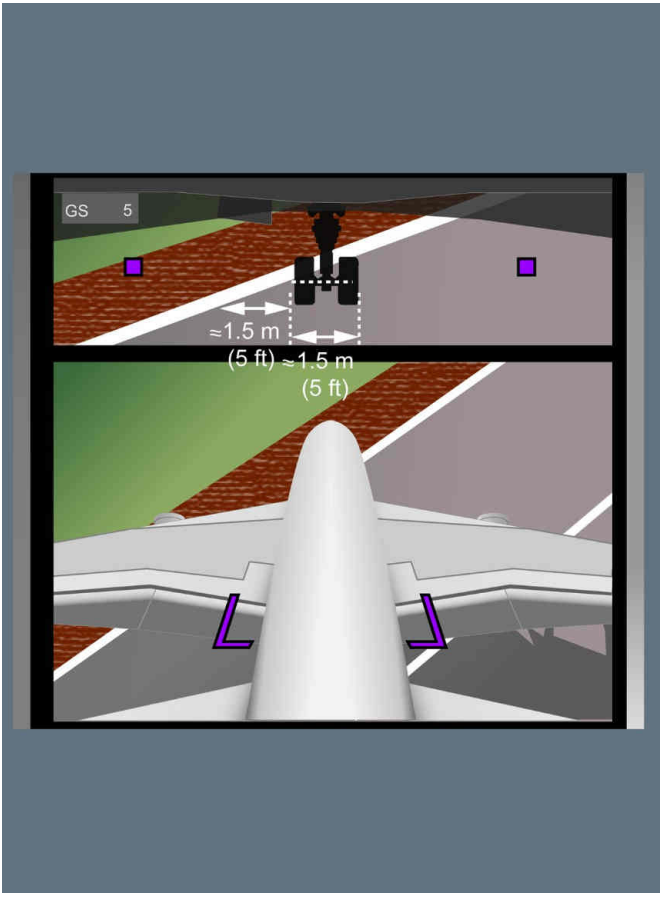
Note: On wet runways, less thrust may be required.

L1 SPEED..... MAINTAIN 5 KT | CAPT

L2 *If the aircraft speed goes above 5 kt, control the speed by smoothly applying the brakes in a symmetrical manner.*

L1 ● **When the outer end of the nose landing gear is approximately 1.5 m (5 ft) away from the edge of the runway:**
FULL TILLER.....APPLY AND MAINTAIN | CAPT

L2 *1.5 m (5 ft) is the approximate width of the nose landing gear width. Use this measurement as the ETACS reference to begin to turn without delay.*



L1 ● **When the aircraft is stabilized in turn, and the tiller and the NWS are at their maximum steering angle:**
MAXIMUM INSIDE TURN PEDAL BRAKING..... APPLY SMOOTHLY | CAPT

L2 *The flight crew must use the brake pivot turn technique.*

L3 *Note: In the case of the use of the brake pivot turn technique, if the nose wheel steering angle is more than 20 °, the BCS releases the body landing gear brakes and the rear wheel of the wing landing gear brakes.*

L1 THR ON OUTER ENGINE.....ADJUST TO MAINTAIN 5 KT | CAPT

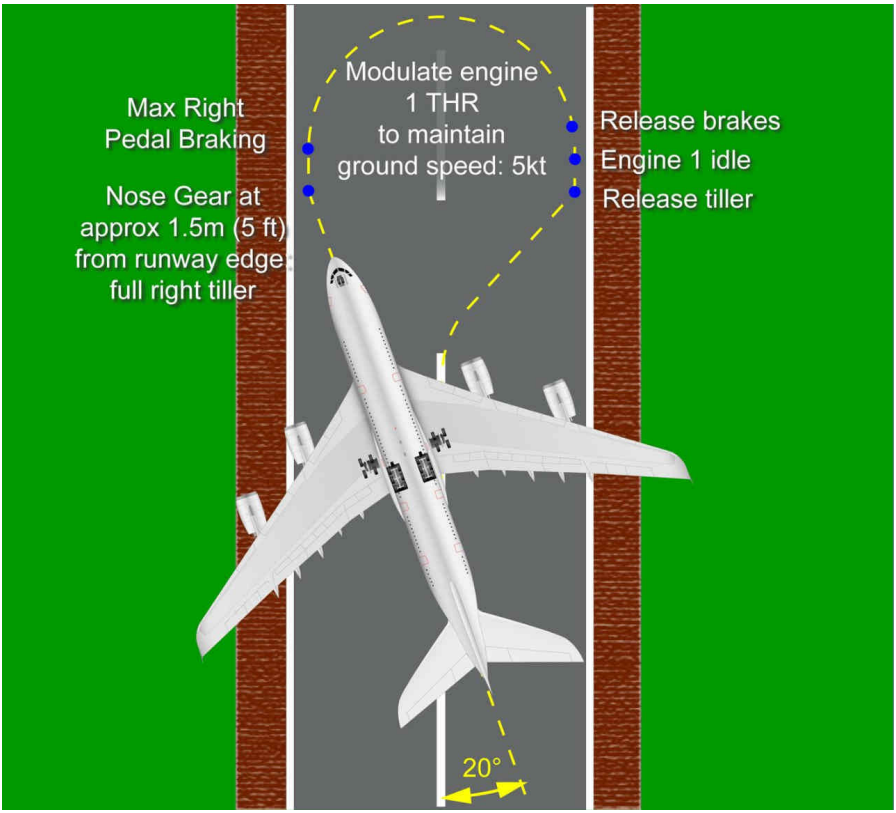
L2 *If 5 kt is exceeded with full tiller applied, there is a risk that the nose wheel tires skid on the runway.*
If the aircraft decelerates below 5 kt or stops during the maneuver, gently increase the THR on the outer engine.
Adjust the thrust setting according to the aircraft behavior.
If the aircraft is at maximum takeoff weight, the flight crew can adjust by around 25 % the needed THR , according to external conditions (e.g. wind, runway condition).

Note: For wet runways, less thrust may be required.

L1 ● **When the turn is completed, and to return to the runway centerline:**

BRAKE PEDAL.....RELEASE | CAPT
THR ON OUTER ENGINE.....IDLE SET | CAPT
TILLER.....SMOOTHLY RELEASE | CAPT

180° Right Turn



180° TURN USING EXTERNAL VISUAL REFERENCES

Note: *This procedure does not require the use of the ETACS.*

However, if ETACS is available, it is recommended that during the turn maneuver the FO uses the ETACS:

- *To monitor the nose landing gear margin in comparison to the runway edge*
- *The GPS ground speed, that is more accurate than the IRS ground speed displayed on the ND.*

Taxi on the runway centerline.

During the maneuver:
- Maintain a ground speed of 5 kt
- Monitor the approaching runway edge.

Turn toward the edge of the runway with a 20 ° intercept angle, and maintain a 20 ° angle.

L2 *On the PFD, check the 20 ° divergence from the runway axis.*

L1 ● **When the aircraft approaches the runway edge, and approximately 3 s before starting the turn:**
THR ON OUTER ENGINE OPPOSITE THE TURNSIDE.....20% SET | CAPT

Note: An asymmetric thrust increase causes left (right) yaw momentum. This requires the flight crew to slightly adjust the tiller in the opposite direction, in order to maintain the 20 ° aircraft divergence from the runway axis.

L2 *In the lower range of thrust, the engines have a high level of inertia.*
A 20 % THR preset enables rapid engine thrust adjustment and good speed control before the turn.

Note: On wet runways, less thrust may be required.

L1 SPEED..... MAINTAIN 5 KT | CAPT

L2 *If the aircraft speed is more than 5 kt, control the speed by smoothly applying the brakes in a symmetrical manner.*

L1 ● **Use the following visual references to determine the position at which to begin the turn, in comparison to the runway edge:**

For a 180° Turn to the Right:

CAPT: The CAPT's view of the runway edge corresponds to a diagonal line that is in the pilot's field of view, and that passes through the CAPT glareshield at the bottom of the hump, then through the CAPT PFD all the way to the right lower corner of the OIT.
FO: The FO's view of the runway edge corresponds to a diagonal line that is in the pilot's field of view, and that passes through the FO PFD to the upper right corner of the glareshield.

180 turn right

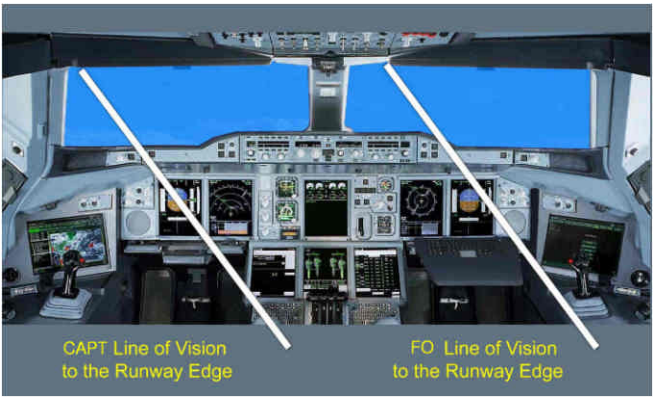


For a 180° Turn to the Left:

CAPT: The CAPT's view of the runway edge corresponds to a diagonal line that is in the pilot's field of view, and that passes through the CAPT PFD to the upper left corner of the glareshield.

FO: The FO's view of the runway edge corresponds to a diagonal line that is in the pilot's field of view, and that passes through the FO glareshield at the bottom of the hump, then through the FO PFD all the way to the left lower corner of the OIT.

180 turn left



- **When the runway edge reaches the reference line:**
  FULL TILLER.....APPLY AND MAINTAIN | CAPT

● **When the aircraft is stabilized in turn, and the tiller and the NWS are at their maximum steering angle:**

MAXIMUM INSIDE TURN PEDAL BRAKING..... APPLY SMOOTHLY | CAPT

L2 *The flight crew must use the brake pivot turn technique.*

L3 *Note: In the case of the use of the brake pivot turn technique, if the nose wheel steering angle is more than 20 °, the BCS releases the body landing gear brakes and the rear wheel of the wing landing gear brakes.*

L1 THR ON OUTER ENGINE.....ADJUST TO MAINTAIN 5 KT | CAPT

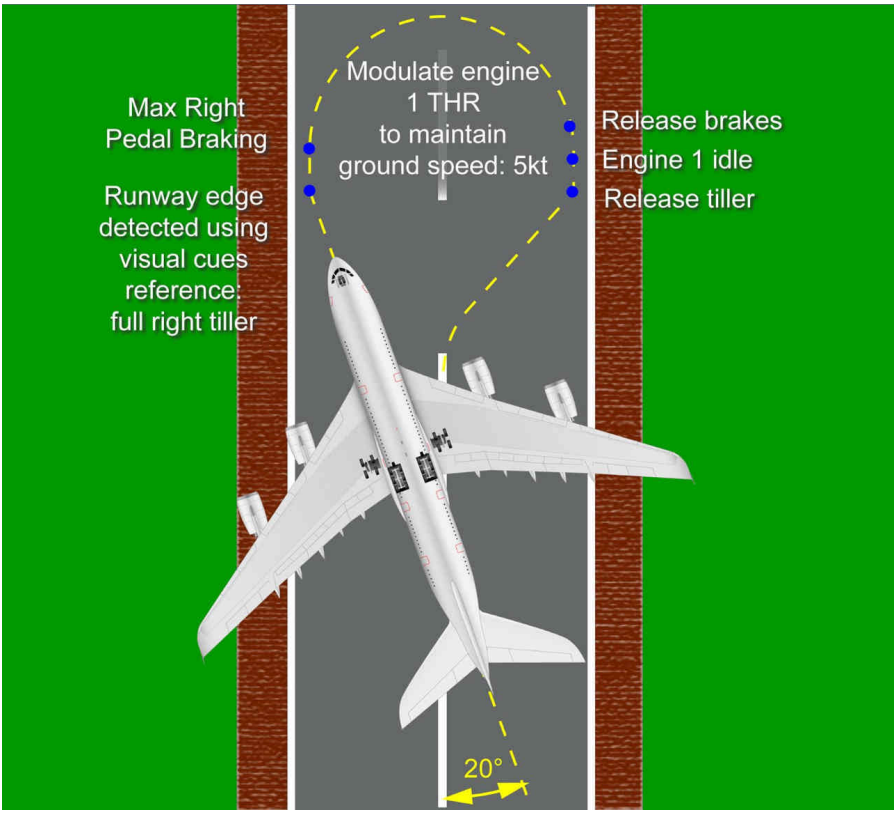
L2 *If 5 kt is exceeded with full tiller applied, there is a risk that the nose wheel tires skid on the runway.*
If the aircraft decelerates below 5 kt or stops during the maneuver, gently increase the THR on the outer engine.
Adjust the thrust setting according to the aircraft behavior.
If the aircraft is at maximum takeoff weight, the flight crew can adjust by around 25 % the needed THR, according to external conditions (e.g. wind, runway condition).

Note: For wet runways, less thrust may be required.

L1 ● **When the turn is completed, and to return to the runway centerline:**

BRAKE PEDAL.....RELEASE | CAPT
THR ON OUTER ENGINE.....IDLE SET | CAPT
TILLER.....SMOOTHLY RELEASE | CAPT

180° Right Turn



BEFORE TAKEOFF

Applicable to: ALL

TAKEOFF OR LINE UP CLEARANCE

TAKEOFF OR LINE UP CLEARANCE..... OBTAIN | FO

CABIN CREW

CABIN CREW.....ADVISE | FO

L2 *About 3 minitues prior to the estimated takeoff time, captain call "TAKEOFF SIGNAL"*

PACKS

L2 For additional training-oriented information, *Refer to FCTM/NO-110-110-1 Packs.*

L1 PACKS 1 and 2..... AS RQRD | FO

L2 - *Consider setting the packs to OFF, or setting the APU BLEED pb-sw to ON:*

L2 • *This improves aircraft performance when using TOGA thrust*

L2 • *In the case of a FLEX takeoff, this reduces the EGT and therefore, reduces the maintenance costs.*

L2 - *It is not authorized to use the APU bleed, if wing anti-ice is used.*

EXTERIOR LIGHTS

EXTERIOR LIGHTS.....SET | FO

L2 *In order to minimize bird strike hazard during takeoff:*
- *Set the RWY TURN OFF & CAMERA sw to ON*
- *Set the LAND sw to ON*
- *Set the NOSE sw to T.O.*

ETACS

● **If the ETACS was used during the taxi:**

TAXI pb on EFIS CP..... OFF | BOTH

EFIS CP

ND RANGE selector ..... AS RQRD | BOTH

L2 *On the ND, when Airport Navigation is no longer used, set the minimum range to display the first waypoint after departure, or as required for weather purposes.*

L1 EFIS OPTIONS (WX pb or TERR pb) ..... AS RQRD | BOTH

L2 *Consider the following settings:*
- *WX pb set to ON, on the PF side*
- *TERR pb set to ON, on the PNF side.*

L1 TRAF pb ..... ON | BOTH

BEFORE ENTERING THE RUNWAY

APPROACH PATH..... CHECK CLEAR OF TRAFFIC | BOTH
STROBE sw ..... ON | FO

L2 *Set the STROBE sw to ON to cross or enter a runway.*

L1 TAKEOFF RUNWAY..... CONFIRM | BOTH

L2 *Confirm that the line up is performed on the intended runway. Useful aids are:*
- *The runway markings*
- *The runway lights*
  Be careful that in low visibility, edge lights could be mixed up with the center line lights.
- *The ILS signal*
  If the runway is ILS equipped, the flight crew can press the LS pb: The LOC deviation should be centered after line up.
- *The runway symbol on the ND.*

SLIDING TABLE

SLIDING TABLE..... STOWED | BOTH

TCAS

TA pb ..... TA ONLY or TA/RA | FO

L2 *TA/RA is the default mode of the TCAS.*
The flight crew may use the TA ONLY mode in specific airports, and for specific procedures (identified by Operators) that may provide resolution advisories that are neither wanted nor appropriate (e.g. closely-spaced parallel or converging runways).

BEFORE TAKEOFF CHECKLIST BELOW THE LINE

BEFORE TAKEOFF C/L below the line..... COMPLETE | BOTH

Refer to PRO-NOR-C-L Before Takeoff .

L2 *Read the checklist below the line, when the flight crew obtains the line up clearance.*
For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .

For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

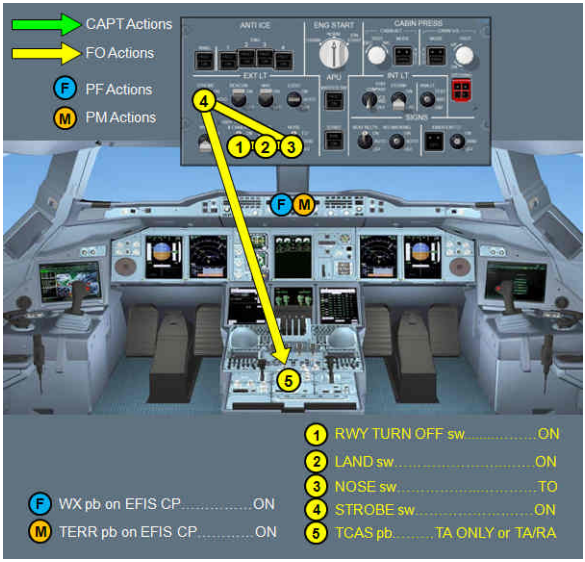
Before Takeoff Procedure and Call out

L1

EVENT	CAPTAIN	FO
During taxi	"BEFORE TAKEOFF C/L"	"DOWN TO THE LINE"
At about 3 minutes prior to the estimated takeoff time,	"TAKEOFF SIGNAL"	Notify the cabin crew to prepare for takeoff (make 4 chimes) then position the seat belts signal ON
	Check the "CABIN READY" message on the ECAM MEMO , or at least obtain the cabin report from the purser: : CABIN SECURED FOR TAKEOFF	
Note: *Do not takeoff until cabin readiness confirmation is received from the purser*		
Takeoff /Line up clearance		Obtain Exterior Lights ---------- Set Set the RWY TURN OFF, LAND and NOSE switches to ON/TO, in order to minimize bird strike hazard during takeoff and set the STROBE lights to ON, before entering the runway.
	WX RDR ON ---------- EFIS CP (PF) TERR ON ---------- EFIS CP AS RQRD (PM)	
Lining up on the runway	"BELOW THE LINE"	"BEFORE TAKEOFF C/L COMPLETE"
Each pilot checks his/her side approach path, and call "FINAL CLEAR" "RUNWAY CLEAR"		
Prior to taxiing onto the runway the flight crews will check the runway number on a holding position sign and cross check against the ND (if applicable)		

BEFORE TAKEOFF FLOW PATTERN

before takeoff



TAKEOFF

Applicable to: ALL

CROSSWIND TAKEOFF

For training-oriented information on crosswind takeoff technique, *Refer to FCTM/NO-120 Takeoff Roll* .

THRUST SETTING

L2 For additional training-oriented information on thrust setting, *Refer to FCTM/NO-120 Thrust Setting* .
For additional training-oriented information on takeoff roll, *Refer to FCTM/NO-120 Takeoff Roll* .
For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 Rolling takeoff is permitted.

TAKEOFF	ANNOUNCE	PF
THR	25 %	PF

L2 *Apply 25 % THR on all four engines with brakes set to on. However, the flight crew can release the brakes to perform a rolling takeoff.*

L1 ■ **If the crosswind is at, or below 23 kt , and there is no tailwind:**

BRAKES	RELEASE	PF
THRUST LEVERS	FLX or TOGA	PF

L2 *Note: The ECAM displays the ENG SD page, instead of the WHEEL SD page.*

L1 ■ **If the crosswind is above 23 kt , and/or in the case of tailwind:**

BRAKES	RELEASE	PF
THRUST LEVERS	50 %	PF

● **At 20 kt ground speed:**

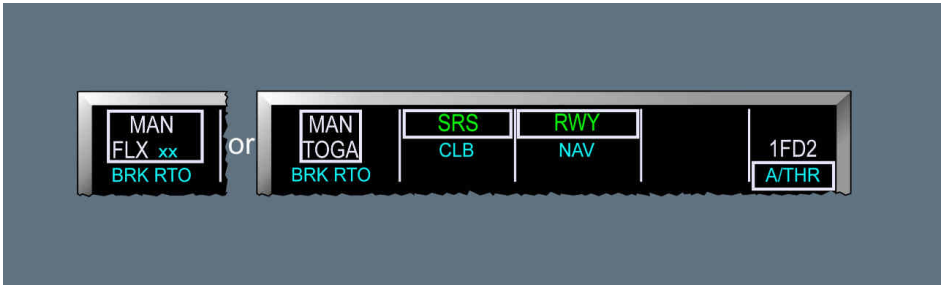
THRUST LEVERS	FLX or TOGA	PF

Note: When FO is PF , After calling FMA " MAN FLEX ....", the Captain's hand must be on the thrust levers until V1 .and FO's hand must be removed from the thrust levers.

CHRONO	START	PM
DIRECTIONAL CONTROL	USE RUDDER	PF

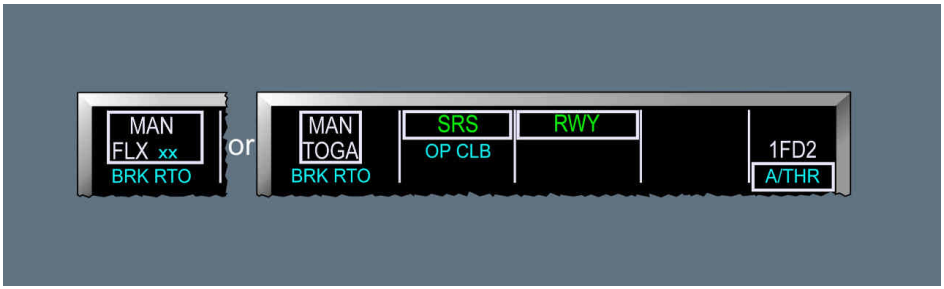
PFD/ND.....SCAN | PM

L2 - *Check the FMA on the PFD :*



Note: *If an ILS is tuned associated with the departure runway, RWY mode appears. In all other cases, no lateral mode appears until the aircraft lifts off.*

If the flight crew presets HDG or TRK on the AFS CP :



L2 - *If GPS PRIMARY LOST , check on the ND the FMS position: I.e. that the aircraft is on the runway centerline.*

L3 *The FMS updates the aircraft position at takeoff, only if GPS PRIMARY LOST .*

L1 TAKEOFF THRUST.....CHECK | PM

L2 *Before the aircraft reaches 80 kt , check the thrust setting, i.e. check that the actual THR of each engine reached the thrust rating limit and the thrust target indicated by the blue dot.*

BEFORE REACHING 80 KT

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 THRUST SET.....ANNOUNCE | PM

PFD and ENG indications..... SCAN | PM

L2 *Scan the airspeed and the THR throughout the takeoff.*

AT 100 KT

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 ONE HUNDRED KNOTS..... ANNOUNCE | PM
ONE HUNDRED KNOTS..... CROSSCHECK | PF

L2 - *Below 100 kt , the PF can decide to abort the takeoff, depending on the circumstances*
- *Above 100 kt , rejecting the takeoff is a more serious matter.*

AT V1

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 V1.....MONITOR or ANNOUNCE | PM

AT VR

L2 For additional training-oriented information, *Refer to FCTM/NO-120 Rotation Technique* .
For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 ROTATION.....ORDER | PM
ROTATION.....PERFORM | PF

L2 *If the PF uses the HUD :*
- *At VR , initiate the rotation, and bring the inverted T toward the horizon line*
- *After liftoff, fly the velocity vector and follow the SRS using the flight path director.*

If the PF does not use the HUD :
- *At VR , initiate the rotation toward a pitch attitude of 12.5 ° (10 ° , if one engine is failed)*
- *After liftoff, follow the SRS pitch command bar.*

Note: *If a tail strike occurs, the ECAM triggers the TAIL STRIKE alert. For more information, Refer to procedure .*

- *At 30 ft , if NAV is armed (i.e. the flight crew did not preset any HDG or TRK), NAV automatically engages*



- *If NAV is not armed, RWY TRK engages at 50 ft and remains displayed until the flight crew selects another lateral mode*



WHEN POSITIVE CLIMB

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 POSITIVE CLIMB.....ANNOUNCE | PM

L2 *Announce positive climb, when the vertical speed indication is positive and the radio altitude has increased.*

L1 L/G UP.....ORDER | PF
L/G.....UP | PM
AP.....AS RQRD | PF

L2 *The flight crew can engage AP 1 or AP 2 above 100 ft AGL .*
For additional training-oriented information on flight guidance, Refer to FCTM/NO-120-120-1 Vertical Profile .

For additional information on the FMA display during this phase of flight, Refer to DSC-22-FG-70-120-20 Introduction .

AT THE THRUST REDUCTION ALTITUDE (I.E. LVR CLB FLASHES ON THE FMA)

L2 For additional training-oriented information, *Refer to FCTM/NO-120 Thrust Reduction Altitude .*

L1 THRUST LEVERS.....CL | PF

L2 *Autothrust automatically activates: A/THR appears on the FMA .*

Note: When the aircraft reaches 1 500 ft , or at the thrust reduction altitude, whichever occurs the first, the CRUISE SD page appears instead of the ENG SD page.
For more information on the FMA display during this phase of flight, Refer to DSC-22-FG-70-120-20 Introduction .

L1 PACKS 1 and 2 (if applicable).....ON | PM

L2 **AT THE ACCELERATION ALTITUDE**

For additional training-oriented information, *Refer to FCTM/NO-120 Acceleration Altitude .*
For additional training-oriented information, *Refer to FCTM/NO-120 Low Altitude Level Off .*
For more information on the FMA display during this phase of flight, *Refer to DSC-22-FG-70-120-20 Introduction .*

ABOVE THE ACCELERATION ALTITUDE (OR WHEN IN CLB PHASE)

L2 The following procedure ensures that the aircraft correctly accelerates toward the climb speed.

L1 ● **At F speed:**

L2 *Note: For takeoffs in CONF 1+F, F speed does not appear.*

L1 FLAPS 1.....ORDER | PF
FLAPS 1.....SET | PM

● **At S speed:**
FLAPS ZERO.....ORDER | PF
FLAPS ZERO.....SET | PM
EXTERIOR LIGHTS.....SET | PM

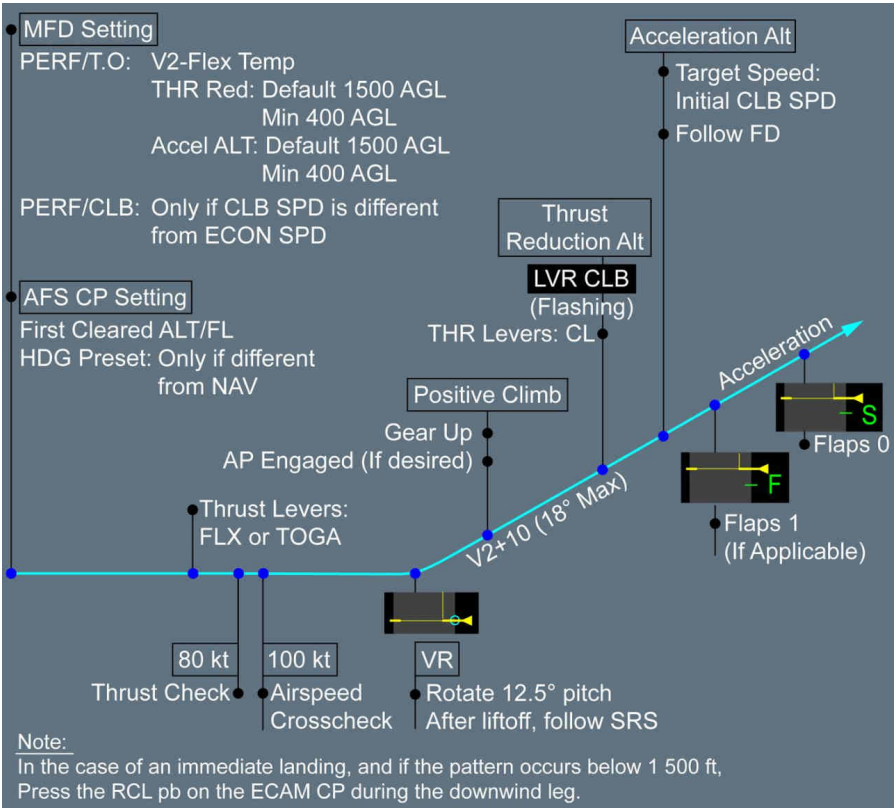
L2 - *Set to OFF the NOSE sw and the RWY TURN OFF & CAMERA sw*

L1 GND SPLRS.....DISARM | PM

NORMAL TAKEOFF PATTERN

L2 For additional training-oriented information on immediate turn after takeoff, *Refer to FCTM/NO-120 Immediate Turn After Takeoff*
For additional training-oriented information on takeoff at heavy weight, *Refer to FCTM/NO-120-120-2 General*

Normal Takeoff Pattern



AFTER TAKEOFF

Applicable to: ALL

APU

- **If the APU was used to supply the air conditioning during takeoff:**

  APU BLEED pb-sw .....OFF | PM

  APU MASTER SW pb-sw .....OFF | PM

TCAS

- **If the takeoff was performed with TA ONLY:**

  TA pb .....TA/RA | PM

L2 *Deselect TA ONLY on the TA pb of the SURV panel.*

ANTI-ICE PROTECTION

ANTI-ICE pb-sw .....AS RQRD | PM

L2 *The flight crew should set to ON the ENG ANTI-ICE pb-sw , when icing conditions are expected with a TAT at, or below 10 °C (Refer to PRO-SUP-30 Definition of Icing Conditions).*

SLIDING TABLE

SLIDING TABLE..... RELEASE, AS NECESSARY | BOTH

AFTER TAKEOFF/CLIMB CHECKLIST DOWN TO THE LINE

AFTER TAKEOFF/CLIMB C/L down to the line.....COMPLETE | BOTH

Refer to PRO-NOR-C-L After Takeoff/Climb

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

Takeoff Procedure and Call out

L1

TAKEOFF		
EVENT	**PF**	**PM**
Align airplane with the runway		
Check the Runway Heading and Runway Designator		

Continued on the following page

Continued from the previous page

TAKEOFF

EVENT	PF	PM
	Confirm takeoff reminder (HAA)	Verify takeoff reminder
	Announce type of takeoff	
After obtain takeoff clearance	Repeat ATC Clearance " CLEARED FOR TAKEOFF"	Read back ATC takeoff clearance "CLEARED FOR TAKEOFF" Run the ELAPSED TIME "TIME SET"
At brake release or while rolling .Setting thrust levers to initial stabilization value about 25% THR	"TAKE OFF"	"TIME CHECK" - Start the CHRONO
When thrust levers set to FLEX/TOGA, check the FMA on the PFD.	"MAN FLEX XX (TOGA),SRS,RWY(or blank) ATHR Blue"	"CHECKED"
Note: *If the F/O conduct T/O, after Thrust set FLX or TOGA", the captain's hand must be on the thrust levers until V1. And F/O's hands must be removed from the thrust levers.*		
Before passing 80kt	"CHECKED"	"THRUST SET"
If Auto thrust has failed: (Refer to MANUAL THRUST CONTROL)	"SET THRUST"	Thrust levers set to the Thrust limit "THRUST SET"
At 100kt	"CHECKED"	"ONE HUNDRED KNOTS"
At V1		"V ONE"
At VR		"ROTATE"
When the VSI is positive and the radio altimeter has increased	"GEAR UP"	"POSITIVE CLIMB" "GEAR UP"
LVR CLB flashing on FMA	"LEVER CLIMB, THRUST CLIMB, AUTO THRUST"	"CHECKED" "TIME RESET" Reset the CHRONO
At Acceleration Altitude	"CLIMB" or "OPEN CLIMB"	"CHECKED" - Check target speed change from V2+10 to the first CLB speed(either preselected or managed) "MANAGED (or SELECTED) SPEED XXX"
At F Speed	"FLAPS 1"	"SPEED CHECKED, FLAP 1"
At S Speed	"FLAPS ZERO"	

Continued on the following page

Continued from the previous page

TAKEOFF		
EVENT	**PF**	**PM**
		"SPEED CHECKED, FLAPS ZERO" Exterior Lights -Set NOSE sw and RWY TURN OFF sw to OFF -LAND lights may be left ON -GND SPLRS lever ---- DISARM
	"AFTER TAKEOFF/CLIMB CHECK LIST"	"DOWN TO THE LINE"

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CLIMB

Applicable to: ALL

INITIAL CLIMB

The usual vertical mode is CLB or OP CLB, with managed speed active.

L2 For additional training-oriented information on the FMS pages during the initial climb phase, *Refer to FCTM/NO-140 Initial Climb*.
For additional training-oriented information on lateral navigation, *Refer to FCTM/NO-140 Lateral Mode*.
For additional training-oriented information on climb thrust, *Refer to FCTM/NO-140 Climb Thrust*.
For additional training-oriented information on AP/FD modes in climb, *Refer to FCTM/NO-140 AP/FD Climb Modes*.
For additional training-oriented information on small altitude changes during the climb, *Refer to FCTM/NO-140 Small Altitude Changes*.

L1 CRZ FL..... SET AS RQRD | PF

L2
- *If the ATC clears the aircraft to the scheduled CRZ FL or above, it is not necessary to modify the CRZ FL that was inserted on the ACTIVE/INIT page during the cockpit preparation. The flight guidance automatically takes into account any altitude that the flight crew selects on the AFS CP above the CRZ FL.*
- *If the ATC limits the CRZ FL to a lower level than the one entered on the ACTIVE/INIT page (or than the one that appears on the PERF page) insert this lower CRZ FL on the PERF page. If the flight crew does not enter this lower CRZ FL on the PERF page, there is no transition to the CRZ phase. Therefore, the managed speed/Mach targets are not modified and A/THR SOFT mode is not available. In that case, the FMA displays ALT instead of ALT CRZ in the second column.*

L1 CLIMB SPEED MODIFICATIONS.....AS RQRD | PF

L2 *If ATC requests, or operational considerations lead to change the speed:*
1. *Select the new speed with the SPD/MACH knob on the AFS CP and pull*
2. *The new speed target is now activated*
3. *Press the SPD/MACH knob to return to the managed speed profile. The speed target becomes managed.*

Note: - *The best speed (and rate of climb) for long-term situations is between Green Dot (GD) and the ECON speed. At high altitude, an acceleration from GD to ECON speed can take a long time*
- *At high altitude and depending on the Mach (selected or computed by the FMS), the airspeed can be below GD.*

For additional training-oriented information on speed considerations during climb, Refer to FCTM/NO-140 Speed Considerations.

AFTER TAKEOFF/CLIMB CHECKLIST BELOW THE LINE

AFTER TAKEOFF/CLIMB C/L below the line.....COMPLETE | BOTH

Refer to PRO-NOR-C-L After Takeoff/Climb

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

ANTI-ICE PROTECTION

ANTI-ICE pb-sw .....AS RQRD | PM

L2 *The flight crew should set to ON the ENG ANTI-ICE pb-sw , when the aircraft encounters icing conditions, unless the SAT is below - 40 °C (Refer to PRO-SUP-30 Definition of Icing Conditions).*

AT 10 000 FT

LAND sw ..... OFF | PM
SEAT BELTS sw ..... AS RQRD | CAPT
EFIS OPTIONS..... AS RQRD | BOTH
ECAM MEMO..... REVIEW | PM

- **On PF request, or at least with PF approval:**

NAVAIDS.....CLEAR | PM

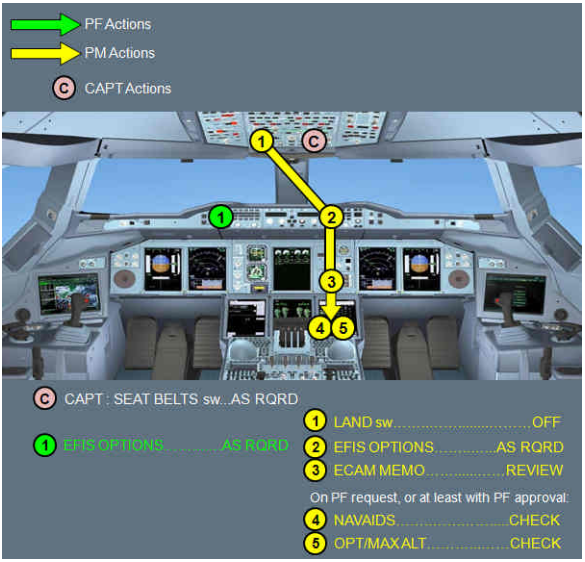
L2 *Clear the manually tuned NAVAIDS in the TUNED FOR DISPLAY panel of the POSITION/NAVAIDS page.*

L1 OPT/MAX ALT.....CHECK | PM

L2 *Check the optimum and maximum altitude capability.*

L2 AT 10000 FT FLOW PATTERN

climb



AT THE TRANSITION ALTITUDE

BAROMETRIC REFERENCE..... SET STD/CROSSCHECK | BOTH

L2
- *At the transition altitude, the barometric setting flashes on the PFD . The flight crew should set STD on the EFIS CP and on the ISIS SFD*
- *Crosscheck the barometric settings and the altitude indications*
  For additional training-oriented information on the VD in relation to the barometric reference setting, Refer to FCTM/NO-140 Vertical Display .
- *For additional information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

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CRUISE

Applicable to: ALL

ALT CRZ

ALT CRZ on FMA ..... CHECK | PF

L2 *Check that the aircraft flies at the cruise flight level that was entered on the CRZ panel of the FMS ACTIVE/PERF page.*

This enables the aircraft to:
- *Fly at the ECON cruise Mach/speed*
  The cruise Mach/speed is targeted and cruise fuel consumption is optimized.
- *Benefit from the A/THR SOFT mode*
- *Have accurate predictions.*

Note: *If the selected AFS CP altitude is below the FMS CRZ FL , then change the CRZ to the current altitude.*

For additional training-oriented information on FMS , Refer to FCTM/NO-150 FMS Use .
For additional training-oriented information on Cost Index (CI), Refer to FCTM/NO-150 Cost Index .
For additional training-oriented information on speed considerations, Refer to FCTM/NO-150 Speed Considerations .
For additional training-oriented information on altitude considerations, Refer to FCTM/NO-150 Altitude Considerations .

ECAM

L2 In cruise, the tasksharing is left to the flight crew's appreciation.

L1 ECAM MEMO..... REVIEW | PF-PM
SD PAGES..... REVIEW | PF-PM

L2 *Periodically review the SD pages, and particularly monitor the ENG oil pressure.*

L123

Note: *During the cruise, the oil quantity variation is not linear. The flight crew can notice a rapid decrease, particularly at the beginning of the flight.*
This rapid decrease is due to an oil temperature decrease that leads to a longer oil transit time in the sumps (i.e. more oil is retained in the sumps).

Periodically review the following SD pages:
- *BLEED: For bleed parameters*
- *ELEC: For electrical parameters and GEN load*

- *HYD: For fluid quantity. After landing gear retraction, the indicated fluid quantities are higher than on ground*
- *COND: For duct temperature, compared to zone temperature. Avoid large differences between both temperatures for passenger comfort*
- *F/CTL: Note any abnormal control surface position*
- *FUEL: For fuel quantity and distribution.*

FLIGHT PROGRESS

FLIGHT PROGRESS..... CHECK | PF-PM

L2 Note: *VLS on the PFD ensures a 0.3 g margin with respect to the buffet. No additional margin is necessary in cruise.*

L1 Monitor the flight progress, the navigation, the fuel quantity and the fuel distribution, as usual.

L2 For additional training-oriented information on fuel monitoring, *Refer to FCTM/NO-150 Fuel Monitoring* .

For additional training-oriented information on fuel temperature, *Refer to FCTM/NO-150 Fuel Temperature* .

L1 **WHEN OVERFLYING A MANUALLY ENTERED WAYPOINT:**

- Check the track and distance to the next waypoint
- Check the wind and update it when the current wind is significantly different.

WHEN OVERFLYING A WAYPOINT, OR EVERY 30 MIN:

- Check the fuel: Check the FOB on the permanent data, and the fuel predictions in the FMS ACTIVE/FUEL & LOAD page, and , or compare with the CRZ Module of the IN-FLT PERF application

L2 For more information on the CRZ Module of the IN-FLT PERF application, *Refer to PER-IFT-CRZ-GEN IN-FLT PERF Application - CRZ Module* .

L1 - Check that the sum of the FOB and the FU is consistent with the FOB at departure.
If the sum is much less than the FOB at departure, or if the sum decreases, then suspect a fuel leak, *Refer to PRO-ABN-ECAM-10-28-120 FUEL LEAK DETECTED* .

CAUTION	The flight crew must also check the fuel, if they intend to apply a lateral fuel balancing procedure, i.e. before they apply the following procedures: - *Refer to PRO-ABN-ECAM-10-28-390 FUEL WINGS NOT BALANCED* , or - *Refer to PRO-ABN-ECAM-10-28-GMAN FUEL MAN BALANCING PROCEDURE* If the flight crew suspects a fuel leak, apply the FUEL LEAK DETECTED procedure, *Refer to procedure* .

STEP FLIGHT LEVEL

L2 For additional training-oriented information, *Refer to FCTM/NO-150 Step Climb.*

L1 STEP FLIGHT LEVEL.....AS APPROPRIATE | PF-PM

NAVIGATION ACCURACY

- **If GPS PRIMARY LOST:**

NAVIGATION ACCURACY.....MONITOR | PF-PM

L2 *The flight crew must monitor the navigation accuracy, particularly if any of the following occurs:*
- *IRS only navigation*
- *FMS POSITION/MONITOR page displays ACCURACY LOW*
- *The NAV ACCURACY DOWNGRADED message appears on the FMS message area, and on the ND.*

For more information, Refer to FCTM/Navigation Accuracy Crosscheck and Crew Strategy

OXYGEN MASKS

- **If the oxygen mask was used:**

OXYGEN MASK.....CHECK | PF-PM

L2 *Check that the oxygen mask is stowed correctly. Refer to DSC-35-20-30 How to Stow the Mask .*

LEAVING THE COCKPIT

If a flight crew needs to leave the cockpit , a briefing should be conducted to other crew For detail refer to FOM Chapter 6 – Normal Operation

ENROUTE CREW CHANGE BRIEFING

Prior to changing duty stations, the flight crew going off duty will brief the other flight crew . For detail refer to FOM Chapter 6 – Normal Operation

RVSM, RNP-5/10, MNPS ENROUTE PROCEDURES

Refer to FOM Chapter 1- - Navigation

ENROUTE HF SELCAL CHECK

Check SELCAL before entering class II airspace . If unable SELCAL check , it will be necessary to maintain a listening watch until back within VHF communication coverage

CPDLC(CONTROLLER PILOT DATA LINK COMMUNICATIONS) OPERATIONS PROCEDURE

Refer to FOM Chapter 9 – Communication, and FCRM Chapter 1 – Operations information.

POLAR OPERATION

Refer to the Polar Operation check list in the QRH

DESCENT PREPARATION

Applicable to: ALL

LANDING INFORMATION

The Descent Preparation and Approach Briefings can take approximately 10 min. Therefore, the flight crew should begin the briefings approximately 80 nm before the top of descent.

WEATHER AND LANDING INFORMATION.....OBTAIN | PM

L2 *The flight crew can receive the landing information update via either AOC, ATIS, ATC, etc. Check the weather reports at ALTERNATE and DESTINATION airports. Airfield data, if any, should include the runway to be used for arrival.*

L1 LDG ELEVN.....CHECK | PF

L2 *Check that LDG ELEVN appears on the CRUISE page, and check the associated value.*

BAROMETRIC REFERENCE

BAROMETRIC REFERENCE.....PRESET | BOTH

L2 *Preset the QNH on the EFIS CP.*

ECAM

STATUS PAGE/STATUS MORE PAGE.....CHECK | PM

L2
- *Check the STATUS page before completing the approach briefing. Review the active DEFERRED PROCs (i.e. ALL PHASES, APPR and LDG) and LIMITATIONS, and take particular note of any degradation in landing capability, or any other aspect affecting the approach and landing*
- *The STATUS page also automatically appears, if not empty, when the flight crew sets the barometric reference, or when the slats are extended*
- *Check the ALERTS IMPACTING LDG PERF on the STATUS MORE page, in order to verify if any alert triggered during the flight has an impact on the landing performance.*

LANDING PERFORMANCE

Perform an in-flight landing performance assessment if:
- Landing conditions have changed, e.g. due to runway or weather conditions or in-flight failure affecting the performance, or
- No preliminary landing performance was established before departure, e.g. in the case of a diversion, if the LDG PERF application was initialized with the destination airport only.

SYNCHRO ECAM button.....CLICK | PM

L2 *Click on the SYNCHRO ECAM button in order to update the last ECAM alerts that occurred during the flight.*

L1 LANDING PERFORMANCE.....CHECK | PM

L2 *Check that the initial landing conditions are applicable to the estimated arrival conditions.*

L1 ● **If landing conditions changed:**

LANDING PERFORMANCE.....COMPUTE | PM

L2 *In the LDG PERF application, modify the selections in accordance with the estimated arrival conditions:*

- *In the AIRPORT/RUNWAY part, select the applicable runway*
- *In the CONDITIONS part, enter the estimated landing conditions*
- *In the AIRCRAFT STATUS part, check the selected items, if any*
- *Launch the computation and check the results versus Airline policy or applicable regulations.*

L1 LANDING PERFORMANCE..... CROSSCHECK | PF

Impacted DU: 00000980 Descent preparation_FMS

FMS

L2 For additional training-oriented information, *Refer to FCTM/NO-160 Approach Preparation* .

L1 The PM prepares the arrival in the FMS .

L2 *For more information on the associated standard callouts, Refer to PRO-NOR-SCO PF/PNF Duties Transfer .*
The following tasksharing remains the one decided at the beginning of the flight.

L1 FMS ACTIVE/F-PLN/ARRIVAL page ....INSERT/CHECK | PM

L2 - *Insert APPR, STAR, TRANS, and APPR VIA, if applicable*
- *If the NO FLS FOR THIS APPR message appears on the FMS message area, the flight crew will fly the NPA without the FLS function.*

L1 DES panel of the FMS ACTIVE/PERF page ....INSERT/CHECK | PM

- *Before the descent, check the MANAGED MACH/ SPD*
- *If a speed different from the ECON Mach/speed is required, insert that Mach/speed in the ECON entry fields.*

L2 *The FMS uses this new managed MACH/ SPD target (instead of ECON) to compute the descent profile.*

The managed speed profile of the descent has a default speed limit of 250 kt below 10 000 ft . The flight crew can delete or modify this speed limit, if necessary, on the SPD panel of the VERT REV page.

L1 APPR panel of the FMS ACTIVE/PERF page ..... PM
.....INSERT/CHECK

L2 *Insert and check the approach data on the APPR panel of the FMS ACTIVE/PERF page.*

L1 - *Enter the destination QNH , temperature, and wind*

L2 *The entered wind should be the average wind value provided by the ATC or ATIS . Do not enter the gust values (e.g. if the wind is 150/20-25, insert the lower speed 150/20. In the managed speed mode, the ground speed mini function takes into account the gusts).*

L1 - *Insert the MINIMUM (i.e. BARO or RADIO), as applicable. If the BARO/RADIO MINIMUM value is not a multiple of ten, round up the MINIMUM (BARO or RADIO) to the nearest ten feet. For example, if the MINIMUM is equal to 91 ft , insert ' 100 ft ' on the APPR panel.*

L2 *Note:* - *Any change of the RWY or the type of arrival (e.g. VOR , ILS) automatically deletes the previous MINIMUM*

- *To avoid undershooting the published MDA (MDH) during a go-around due to the aircraft inertia during the pull-up, some Authorities may require Operators to add a specific number of feet to the published MDA (MDH).*
  For information, the following table provides the height loss after the initiation of a go-around with the AP engaged:

Height at which the Automatic Go-Around is initiated	*10 ft*	*20 ft*	*40 ft*	*60 ft*	*80 ft*	*100 ft*
Height Loss	*10 ft*	*15 ft*	*24 ft*	*34 ft*	*34 ft*	*34 ft*

These height losses are average values based on flight tests results. The flight tests were performed at medium weight, medium CG , with all engines operative, and in ISA conditions.

L1 - *Check or modify the landing configuration.*

Always select the landing configuration on the APPR panel of the PERF page:

L2 • *The flight crew can choose FLAPS 3 rather than FLAPS FULL for landing, depending on the available runway length or go-around performance, or if they expect windshear or severe turbulence during the approach*

L2 • *In the case of a system failure, the ECAM can require a specific landing configuration. Select the correct landing configuration on the APPR panel.*

- *Select CONF 3 on the APPR panel for landing in CONF 3*
- *Select FULL for all other slats/flaps configurations.*

As a general rule, the flight crew can use the managed speed if the landing configuration and the configuration selected on the APPR panel are the same (if they are not the same, the managed speed will not drop down to the approachspeed).

L1 - *In the case of an in-flight failure that affects the landing performance and increases the VAPP , use the LDG PERF application for VAPP computation. Insert the computed VAPP in the APPR panel of the FMS ACTIVE/PERF page.*

L2 *The flight crew can modify VAPP. The ground speed mini function takes into account this new value.*

L1 GA panel of the FMS ACTIVE/PERF page ..... CHECK | PM

L2 *Check the THR RED and ACCEL altitudes, and modify them if necessary.*

L1 FMS POSITION/NAVAIDS page ..... CHECK | PM

L2 - *Set the NAVAIDS as required, and check the VOR / ADF idents on the ND s and the ILS (GLS) ident on the PFD s*
- *For an ILS (GLS) approach, check the frequency(channel) and the course of the selected ILS (GLS)*
- *If a VOR / DME exists close to the airfield, select it and enter the associated ident in the BRG / DIST TO entry fields of the POSITION/MONITOR page, for NAV ACCURACY monitoring during descent.*

L1 SEC pages..... AS RQRD | PM

L2 *The flight crew should prepare a SEC F-PLN before the top of descent, either to an alternative runway for destination, or to the landing runway in the case of circling. In all cases, the routing to the alternate should be available. If there is a last-minute runway change, then the flight crew only needs to activate the appropriate SEC F-PLN , without forgetting to set the new MINIMUM and NAVAIDS.*

L1 FMS..... CROSSCHECK | PF

Impacted by TDU: 00023858 Descent preparation_FMS

FMS

L2 For additional training-oriented information, *Refer to FCTM/NO-160 Approach Preparation .*

L1 The PM prepares the arrival in the FMS .

L2 *For more information on the associated standard callouts, Refer to PRO-NOR-SCO PF/PNF Duties Transfer .*

The following tasksharing remains the one decided at the beginning of the flight.

L1 FMS ACTIVE/F-PLN/ARRIVAL page ..... INSERT/CHECK | PM

L2 - *Insert APPR, STAR, TRANS, and APPR VIA, if applicable*
- *If the NO FLS FOR THIS APPR message appears on the FMS message area, the flight crew will fly the NPA without the FLS function.*

L1 DES panel of the FMS ACTIVE/PERF page ..... INSERT/CHECK | PM

- *Before the descent, check the MANAGED MACH/ SPD*
- *If a speed different from the ECON Mach/speed is required, insert that Mach/speed in the ECON entry fields.*

L2 *The FMS uses this new managed MACH/ SPD target (instead of ECON) to compute the descent profile.*

The managed speed profile of the descent has a default speed limit of 250 kt below 10 000 ft . The flight crew can delete or modify this speed limit, it necessary, on the SPD panel of the VERT REV page.

L1 APPR panel of the FMS ACTIVE/PERF page ..... INSERT/CHECK | PM

L2 *Insert and check the approach data on the APPR panel of the FMS ACTIVE/PERF page.*

L1 - *Enter the destination QNH , temperature, and wind*
L2 *The entered wind should be the average wind value provided by the ATC or ATIS . Do not enter the gust values (e.g. if the wind is 150/20-25, insert the lower speed 150/20. In the managed speed mode, the ground speed mini function takes into account the gusts).*
L1 - *Insert the MINIMUM (i.e. BARO or RADIO), as applicable*

L2 *Note:* - *Any change of the RWY or the type of arrival (e.g. VOR , ILS) automatically deletes the previous MINIMUM*
- *To avoid undershooting the published MDA (MDH) during a go-around due to the aircraft inertia during the pull-up, some Authorities may require Operators to add a specific number of feet to the published MDA (MDH).*
For information, the following table provides the height loss after the initiation of a go-around with the AP engaged:

Height at which the Automatic Go-Around is initiated	*10 ft*	*20 ft*	*40 ft*	*60 ft*	*80 ft*	*100 ft*
Height Loss	*10 ft*	*15 ft*	*24 ft*	*34 ft*	*34 ft*	*34 ft*

These height losses are average values based on flight tests results. The flight tests were performed at medium weight, medium CG , with all engines operative, and in ISA conditions.

L1 *- Check or modify the landing configuration.*

Always select the landing configuration on the APPR panel of the PERF page:

L2 *• The flight crew can choose FLAPS 3 rather than FLAPS FULL for landing, depending on the available runway length or go-around performance, or if they expect windshear or severe turbulence during the approach*

L2 *• In the case of a system failure, the ECAM can require a specific landing configuration. Select the correct landing configuration on the APPR panel.*

- *Select CONF 3 on the APPR panel for landing in CONF 3*
- *Select FULL for all other slats/flaps configurations.*

As a general rule, the flight crew can use the managed speed if the landing configuration and the configuration selected on the APPR panel are the same (if they are not the same, the managed speed will not drop down to the approach speed).

L1 *- In the case of an in-flight failure that affects the landing performance and increases the VAPP , use the LDG PERF application for VAPP computation. Insert the computed VAPP in the APPR panel of the FMS ACTIVE/PERF page.*

L2 *The flight crew can modify VAPP. The ground speed mini function takes into account this new value.*

L1 GA panel of the FMS ACTIVE/PERF page ..... CHECK | PM

L2 *Check the THR RED and ACCEL altitudes, and modify them if necessary.*

L1 FMS POSITION/NAVAIDS page ..... CHECK | PM

L2 *- Set the NAVAIDS as required, and check the VOR / ADF idents on the ND s and the ILS (GLS) ident on the PFD s*

- For an ILS (GLS) approach, check the frequency(channel) and the course of the selected ILS (GLS)

- If a VOR / DME exists close to the airfield, select it and enter the associated ident in the BRG / DIST TO entry fields of the POSITION/MONITOR page, for NAV ACCURACY monitoring during descent.

L1 SEC pages..... AS RQRD | PM

L2 *The flight crew should prepare a SEC F-PLN before the top of descent, either to an alternative runway for destination, or to the landing runway in the case of circling. In all cases, the routing to the alternate should be available. If there is a last-minute runway change, then the flight crew only needs to activate the appropriate SEC F-PLN , without forgetting to set the new MINIMUM and NAVAIDS.*

L1 FMS..... CROSSCHECK | PF

OANS

RUNWAY SHIFT.....AS RQRD | PM

The flight crew must shift the runway threshold and/or the runway end, as required (e.g. due to NOTAM).

L2 - *BTV locates the dry and wet lines according to the runway threshold and to ensure that the flight crew will select an achievable runway exit*
The dry and wet lines computation takes into account the current weight of the aircraft (i.e. not the predicted landing weight).
- *ROW/ROP needs the real position of the runway end to ensure the aircraft protection against runway excursion.*

BTV

The use of the BTV autobrake mode is recommended in the case of dry or wet runway conditions.

CAUTION	Do not use BTV in the case of: - Contaminated runway - Any reverse inoperative, or in the case of any aircraft failure affecting landing performance.

ND MODE selector .....PLAN | PM
ND RANGE selector .....ZOOM | PM
RUNWAY.....SELECT | PM
RUNWAY EXIT.....SELECT | PM

L2 *Select the exit in accordance with the runway conditions, i.e. wet or dry.*

It is recommended to select an exit beyond the WET line, even on a dry runway, in order to:
- *Anticipate the last minute change of the runway condition from dry to damp or wet*
- *Provide a smooth deceleration for passenger comfort.*

The flight crew chooses the exit by taking into account:
- *The destination airport gate (if known)*
- *The airport ground circulation*
- *The runway exit configuration (i.e. high speed turn off on dry runway)*
- *The predictive turn around times displayed on the ND.*

AUTOBRAKE

AUTO BRK/BTV.....SELECT, AS RQRD | PM

L2 *Set the AUTO BRK Mode selector to the appropriate autobrake mode, depending on the condition and the length of the runway.*

L1 *To use BTV, set the AUTO BRK Mode selector to BTV before removing the Airport Navigation display from the ND (i.e. before the selection of a ND range different from ZOOM). If the flight crew sets another ND range before arming the BTV autobrake mode, the BTV preparation is lost.*

On contaminated runways, use autobrake mode 3. Do not use BTV.

L2 If BTV is not available, the HI mode produces a smooth but high level of deceleration on dry runways, that can be useful in short runway situations.

L1 ● **If the flight crew selected BTV:**

OANS RUNWAY LENGTH Vs CHARTS RUNWAY LENGTH..... CROSSCHECK | BOTH

L2 *The flight crew crosschecks the runway length displayed on the Airport Navigation display with the LDA published in the charts, when BTV is armed.*
The difference between the runway length displayed on the Airport Navigation display and the LDA published in the charts must not exceed 115 ft.

LANDING BRIEFING

L2 For additional training-oriented information, FCTM Landing Briefing.

LANDING BRIEFING..... PERFORM | PF

The main objective of the landing briefing is for the PF to inform the PM of the planned course of action for the approach.
It is recommended to use the FMS pages as a guide for the descent and approach briefing.

DESCENT CLEARANCE

DESCENT CLEARANCE.....OBTAIN | PM
CLEARED ALTITUDE ON AFS CP.....SET | PF

L2 *When the flight crew obtains the ATC clearance, they should set the cleared altitude(FL) on the AFS CP taking into account the safe altitudes.*
If the lowest safe altitude is above the cleared altitude, check with the ATC to determine if this constraint applies.
If the ATC confirms that this constrain applies, set the safe altitude on the AFS CP until it is safe to reach the cleared altitude.

ANTI-ICE PROTECTION

ANTI ICE pb-sw .....AS RQRD | PM

L2 *During the descent, the flight crew should set to ON the ENG ANTI-ICE pb-sw when they expect or encounter icing conditions. For more information on icing conditions, Refer to PRO-SUP-30 Definition of Icing Conditions .*
When the engines are at idle, the use of the anti-ice reduces the descent path angle. If needed, the flight crew can compensate this behavior by increasing the descent speed, or by extending the speed brakes, as necessary.

DESCENT

Applicable to: ALL

DESCENT INITIATION

DESCENT..... INITIATE | PF

L2 *The standard method to initiate a descent is to engage the DES mode at the Top of Descent (T/D) computed by the FMS .*

The FMS computes the T/D based on the following assumptions:
- The aircraft will begin the descent in DES mode with managed speed
- The FMS will guide the aircraft along the descent profile computed with all the vertical F-PLN data (i.e. ALT CSTR , MANAGED MACH / SPD , SPD CSTR , SPD LIMIT) to reach VAPP at 1 000 ft AGL .

The T/D appears on the ACTIVE/F-PLN page and on the ND  .

Note: *The ND does not display the Top of Descent*  *when HDG (or TRACK) mode is engaged.*

For additional training-oriented information on T/D and profile computation, *Refer to FCTM/NO-170 Computation Principle* .

● **When the aircraft reaches the T/D :**

ALT knob .....PUSH | PF

DES mode engages.

■ **If the ATC requires an early descent:**

Use the DES mode.

The DES mode guides the aircraft down to a lower vertical speed, in order to converge with the required descent path. (The flight crew may use a V/S of 1 000 ft/min).

■ **If the ATC delays the descent:**

Beyond the T/D , the T/D REACHED message appears on the PFD and MFD . This suggests that the flight crew should reduce the speed toward green dot speed with ATC permission.

When cleared for descent, engage DES mode with the managed speed active.

DESCENT MONITORING

L2 For additional training-oriented information on the FMS pages during the descent, *Refer to FCTM/NO-170 Descent Monitoring.*

For additional training-oriented information on descent profile monitoring and adjustment, *Refer to FCTM/NO-170 Guidance and Monitoring*.

L1 DESCENT..... MONITOR | PF

L2 - *When flying in NAV mode, use the DES mode*
The aircraft descends along the descent flight path. The aircraft guidance takes into account all the constraints of the flight plan.
For additional training-oriented information on descent constraint, Refer to FCTM/NO-170 Descent Constraints.

- *Monitor the VERT DEV*
The VERT DEV appears on the PFD and on the DES panel of the ACTIVE/PERF page. The VERT DEV indicates if the aircraft is on, above, or below the descent profile. The aircraft is considered to be on the vertical profile when the VERT DEV is less than 50 ft. In that case, the FMS predicts that it will respect the constraints until the aircraft levels off at the next AFS CP altitude.
- *Monitor the speed change that occurs when the aircraft reaches the speed change symbol in managed speed*
- *Monitor the FMA when the aircraft reaches the level-off symbol (i.e. or)*

  Note: *The NDs display a level-off symbol along the flight path. The position of this symbol is based on the current active modes: I.e. AP/FD and A/THR.*

- *Monitor the predicted descent point after the next level-off.*

- *When flying in HDG or TRACK mode and therefore, out of the lateral F-PLN, the DES mode is not available. Only V/S / FPA or OP DES mode is available for descent.*
The target altitude is the AFS CP selected altitude, and the altitude constraints are not taken into account.

  Note: *When the lateral mode changes from NAV to HDG or TRACK, V/S / FPA engages on the current vertical speed or current flight path angle.*

  For additional training-oriented information on mode reversion to V/S, Refer to FCTM/NO-170 Mode Reversion.
  FMS predictions assume a return to the lateral F-PLN and to the descent flight path.

  - *Monitor the VERT DEV*
  The PFD displays the VERT DEV. The flight crew can use the VERT DEV to monitor the descent provided that the crosstrack error is less than 5 nm. To monitor the descent, the flight crew should use the level-off symbol in addition to the energy circle on the ND.
  - *Monitor the speed change that occurs, when the aircraft reaches the speed change symbol in managed speed.*
  - *Monitor the FMA when the aircraft reaches level-off symbol .*

- *Check the predictions before engaging again the DES mode, in order to resume the descent profile.*

Periodically during the stabilized descent, the flight crew can check that the remaining distance to destination is approximately the difference between the current FL and the airfield FL divided by the FPA in degrees. If the flight crew did not select TRK-FPA, they can display the Velocity Vector (VV) in order to obtain the FPA.
FPA (°)= △ FL / DIST (NM)

L1 **DESCENT ADJUSTMENT**

RATE of DESCENT..... ADJUST, AS RQRD | PF

L2 *To increase the rate of descent, increase the descent speed by using the selected speed, if comfort and the ATC permit. It is more cost-effective (Time/Fuel) than using the speed brakes:*
- *Maintain a high speed as long as possible, provided that the ATC permits to fly above the speed limits*
- *If the aircraft is high and at high speed, it is more efficient to keep the high speed until ALT* then to decelerate at level-off, instead of combining descent and deceleration.*

If the aircraft goes below the desired profile, use the selected speed and the V/S mode to adjust the rate of descent.

L1 SPEED BRAKES.....AS RQRD | PF

L2 *In the OP DES mode, the flight crew can use the speed brakes to increase the rate of descent. The flight crew can also use the speed brakes to maintain the required rate of descent, when engine anti-ice is used.*
In the DES mode, if the aircraft is on, or below the flight path and the ATC requires a higher rate of descent, do not use the speed brakes because the rate of descent is imposed by the planned flight path. Therefore, the A/THR may increase thrust to compensate for the increase in drag. In this case, use the OP DES mode with speed brakes.

AT 20 000FT

Cabin Crew ..... Advice | CAPT

Note: The Captain Use Seat Belt Selector 3 chimes then Auto or On and make PA " Cabin Crew, Prepare for Landing"

TAWS AND WXR

TERR pb on EFIS CP.....AS RQRD | BOTH
WX pb on EFIS CP.....AS RQRD | BOTH

L2 If use of the weather radar is required, consider displaying the weather data on the PF side, and the terrain data on the PM side.

Impacted DU: 00000990 Descent_AT 10 000 FT

AT 10 000 FT

LAND sw ..... ON | PM

L2 *The flight crew may set to ON the landing lights, depending on the airline policy, or following regulatory recommendations.*

L1 SEAT BELTS sw ..... ON | CAPT
CSTR pb on EFIS CP ..... ON | BOTH
LS pb ..... AS RQRD | BOTH

L2 *Press the LS pb , if one of the following approaches is planned:*
- *ILS / GLS*
- *ILS G/S out, LOC only, or LOC B/C*
- *NPA with the FLS function.*

The PFD displays the landing system data, in accordance with the approach selected on the FMS ARRIVAL page: Deviation scales, deviation signals, course pointer, information. If an NPA is selected on the FMS ARRIVAL page, the FMA displays the FLS capability.

L1 ● **For NPA flown with the FLS function:**
FLS CAPABILITY..... CHECK | PM

L2 *The FLS capability does not appear, if one of the following conditions occurred:*
- *The NO FLS FOR THIS APPR has appeared on the FMS message area*
- *The required conditions to display the FLS capability are not met.*
  For more information, Refer to LIM-22-20 Required Conditions for F-APP, F-APP + RAW, or RAW ONLY Capability .

L1 FLS DATA..... CHECK | PM

L2 *Check the following data against the published approach chart:*
- *For RNAV (including GPS), VOR, or VOR/DME approach:*
  - *The anchor point location*
  - *The F-LOC beam course*
  - *The F-LOC compatibility with the lateral flight plan.*
- *For ILS G/S out, LOC only, or LOC B/C approach:*
  - *The LOC or LOC B/C beam course*

- *The flight path angle of the F-G/S beam*

  Note: *The published approach chart may provide the slope of the final leg in %: 3 ° of flight path angle is equal to 5.2% of slope.*

- *The F-G/S beam compatibility with the vertical flight plan.*

L1 NAVAIDS..... AS RQRD/CHECK | PF

L2 *Ensure that the appropriate navaids are tuned and identified.*

L1 ● **If GPS PRIMARY LOST :**
NAVIGATION ACCURACY.....CHECK | PF

L2 *Crosscheck the navigation accuracy by using the POSITION/MONITOR page (i.e. BRG / DIST TO computed data) and the ND (i.e. VOR / DME raw data).*
The navigation accuracy check determines the autopilot mode that the flight crew should use for the approach, and the type of ND displays.

L1 ● **When the aircraft approaches the transition level, and when cleared for an altitude:**
BAROMETRIC REFERENCE..... SET/CROSSCHECK | BOTH

L2
- *When the aircraft approaches the transition level, and when the ATC cleared for an altitude, set the preset QNH on the EFIS CP and on the ISIS PFD*
- *Crosscheck the barometric reference settings and the altitude indications.*

Note:
- *The flight crew must take into account any QNH change on the EFIS CP s, ISIS PFD , and on the APPR panel of the FMS ACTIVE/PERF page*
- *When the aircraft operates in low OAT conditions, the flight crew should consider altitude corrections for low temperature.*
- *If the barometric unit is mercury inches, the flight crew may notice a discrepancy of 0.01 inHg between the QNH values on the PFD s and the QNH values selected on the EFIS CP . This discrepancy does not impact the altitude computations.*

For more information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

Impacted by TDU: 00021151 Descent_AT 10 000 FT

AT 10 000 FT

LAND sw ..... ON | PNF

L2 *The flight crew may set to ON the landing lights, depending on the airline policy, or following regulatory recommendations.*

L1 SEAT BELTS sw ..... 3 CHIMES THEN ON | CAPT
CSTR pb on EFIS CP ..... ON | BOTH

LS pb ..... AS RQRD | BOTH

L2 *Press the LS pb , if one of the following approaches is planned:*
- *ILS / GLS*
- *ILS G/S out, LOC only, or LOC B/C*
- *NPA with the FLS function.*

The PFD displays the landing system data, in accordance with the approach selected on the FMS ARRIVAL page: Deviation scales, deviation signals, course pointer, information. If an NPA is selected on the FMS ARRIVAL page, the FMA displays the FLS capability.

L1 ● **For NPA flown with the FLS function:**

FLS CAPABILITY.....CHECK | PNF

L2 *The FLS capability does not appear, if one of the following conditions occurred:*
- *The NO FLS FOR THIS APPR has appeared on the FMS message area*
- *The required conditions to display the FLS capability are not met.*
  For more information, Refer to LIM-22-20 Required Conditions for F-APP, F-APP + RAW, or RAW ONLY Capability .

L1 FLS DATA.....CHECK | PNF

L2 *Check the following data against the published approach chart:*
- *For RNAV (including GPS), VOR, or VOR/DME approach:*
  - *The anchor point location*
  - *The F-LOC beam course*
  - *The F-LOC compatibility with the lateral flight plan.*
- *For ILS G/S out, LOC only, or LOC B/C approach:*
  - *The LOC or LOC B/C beam course*
- *The flight path angle of the F-G/S beam*

  Note: The published approach chart may provide the slope of the final leg in %; 3 ° of flight path angle is equal to 5.2% of slope.

- *The F-G/S beam compatibility with the vertical flight plan.*

L1 NAVAIDS.....AS RQRD/CHECK | PF

L2 *Ensure that the appropriate navaids are tuned and identified.*

L1 ● **If GPS PRIMARY LOST :**

NAVIGATION ACCURACY.....CHECK | PF

L2 *Crosscheck the navigation accuracy by using the POSITION/MONITOR page (i.e. BRG / DIST TO computed data) and the ND (i.e. VOR / DME raw data).*
The navigation accuracy check determines the autopilot mode that the flight crew should use for the approach, and the type of ND displays.

L1 ● **When the aircraft approaches the transition level, and when cleared for an altitude:**
BAROMETRIC REFERENCE.....SET/CROSSCHECK | BOTH

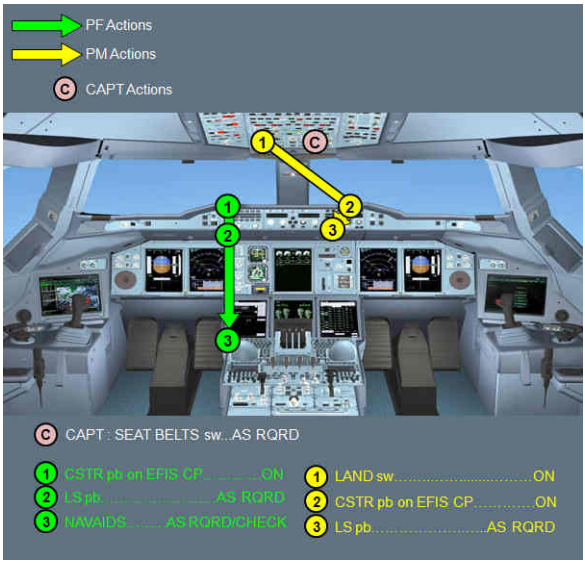
L2 - *When the aircraft approaches the transition level, and when the ATC cleared for an altitude, set the preset QNH on the EFIS CP and on the ISIS PFD*
- *Crosscheck the barometric reference settings and the altitude indications.*

Note: - *The flight crew must take into account any QNH change on the EFIS CP s, ISIS PFD , and on the APPR panel of the FMS ACTIVE/PERF page*
- *When the aircraft operates in low OAT conditions, the flight crew should consider altitude corrections for low temperature.*

For more information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L2 **FLOW PATTERN**

descent at 10000 ft



HOLDING

HOLDING PATTERN..... AS RQRD | PM

L2 *The flight crew can insert an holding pattern in the FMS if required during the descent. For more information on the HOLD revision, * Refer to DSC-22-FMS-10-40-50-22FMS4030G HOLD - Purpose .*

APPROACH CHECKLIST

APPROACH C/L..... COMPLETE | BOTH

Refer to PRO-NOR-C-L Approach

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

Descent / Approach Procedure and Call out

L1

DESCENT		
EVENT	**CAPT**	**PM**
Approximately 20,000ft (Consider airport field elevation) or TOD ,whichever lower.	- SEAT BELTS ---------- AS RQRD (3 chimes then Auto or On) - Make PA “CABIN CREW PREPARE FOR LANDING” (Refer to FOM Chapter 2- Operational policy)	
When approaching or passing Transition level	When cleared to descent to an altitude below Transition Level in relatively low Transition level area compared to other regions (Europe etc.) from ATC flight crew should reset immediately Altimeter setting to QNH. However if ATC instruction is received to level off at or above Transition Level , flight crew shall reset applicable Altimeter back to QNE.	
	PF	“TRANSITION , ALTIMETER RESET ---------- in Hg/hPa”
	“--------- inHg/hPa RESET”	
APPROACH		
When operating in low OAT ,altitude corrections should be considered Refer to FOM Chapter 4 – Weather > Altimeter		

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DESCENT

EVENT	CAPT	PM
At 10,000 ft	" CHECKED" - CSTR pb on EFIS CP ---- ON - LS pb---------- AS RQRD - NAVAIDS --------- AS RQRD/CHECK	" ONE ZERO THOUSAND" - LAND sw ---------- ON - CSTR pb on EFIS CP --- ON - LS pb ---------- AS RQRD
	CAPT "SEAT BELTS --------- ON" (3 Chimes then on)"	
	PF "Approach Check List"	Accomplish APPROACH check list (Performed while descending through 10,000ft in case of transition level below 10,000ft, performed approach check list except altimeter(s) Setting)
Approach phase activation	"ACTIVATE APPROACH PHASE" "CONFIRM"	"CONFIRM ?" - Check target speed change on PFD "MANAGED SPEED XXX"

GENERAL

Applicable to: ALL

GENERAL

The following approach procedures are based on the assumption that the flight crew uses the recommended speed guidance: Managed.

Note: *It is possible to perform an ILS approach, when a non ILS approach was previously scheduled. This can be done by either using a SEC F-PLN , or by modifying the primary F-PLN .*

NOS

Considerations

- Review all messages.
- Confirm ILS identification. The requirement to tune and identify navaids can be satisfied by aurally identifying the navaid or by confirming that the tuned navaid frequency is replaced by the correct alphabetical identifier on the PFD.
- Set DA or DH(RA).
- For all approaches, regardless of who is flying the aircraft, the Captain will make the final decision to continue and land or go-around, and make the appropriate callout
- The PM should continue standard callouts during final approach and the PF should acknowledge callouts.

INITIAL APPROACH

Applicable to: ALL

INITIAL APPROACH

L2 For additional training-oriented information, *Refer to FCTM/NO-180 Initial Approach.*

L1 APPROACH PHASE.....CHECK/ACTIVATE | PM with PF'S order

L2
- *If the aircraft overflies the DECEL pseudo waypoint in NAV mode, the APPR phase activates automatically*
- *If the aircraft is in HDG or TRACK mode approximately 15 nm from touchdown, activate and confirm the APPR phase on the FMS ACTIVE/PERF page.*

L1 POSITIONING.....MONITOR | PF

L2 - *In NAV mode, use the VERT DEV on the PFD and on the DES panel of the ACTIVE/PERF page*
- *In HDG or TRACK mode, use the energy circle on the ND that shows the required distance to land.*

L1 MANAGED SPEED.....CHECK | PF

L2 *Check that the managed speed is active and monitor the target speed.*

Note:

The aircraft decelerates automatically at the DECEL pseudo waypoint (D) *when managed speed is active and NAV, LOC* or LOC mode is engaged.*

During the approach, the autothrust maintains the maneuvering speed of the current configuration (O, S, F, VAPP).
If ATC requires a particular speed, use selected speed. Adjust the aircraft configuration accordingly. When the ATC speed constraint (e.g. "maintain 170 kt to the outer marker") no longer applies, return to managed speed.
If ATC orders successive step descents down to the final approach flight path, use V/S or FPA mode and monitor the VERT DEV.

L1 SPEED BRAKES.....AS RQRD | PF

NAVIGATION ACCURACY

● **If GPS PRIMARY LOST:**

NAVIGATION ACCURACY.....MONITOR | PM

L2 *On the POSITION/MONITOR page, check that the required navigation accuracy is appropriate to the phase of flight.*
Monitor the navigation accuracy and be prepared to change the approach strategy. If the NAV ACCUR DOWNGRADED message appears on the FMS message area and on the ND, use raw data to check the navigation accuracy.
The navigation accuracy determines the autopilot modes that the flight crew should use for the approach, the type of ND displays, and the use of TAWS.

NAVIGATION ACCURACY	ND		AP/FD mode	TERR function
	PF	PM		
GPS PRIMARY ACCURACY HIGH ACCURACY LOW and ACCURACY check ≤ 1 nm	ARC or ROSE-NAV with navaid raw data		NAV	ON

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NAVIGATION ACCURACY	ND		AP/FD mode	TERR function
	PF	PM		
GPS PRIMARY LOST and ACCURACY LOW and ACCURACY check >1 nm	*ROSE-LS*	*ARC or ROSE-NAV or ROSE-LS with navaid raw data*	*HDG or TRACK*	*Automatically OFF*
GPS PRIMARY LOST and aircraft flying within an unreliable radio navaid area				

INTERMEDIATE/FINAL APPROACH

Applicable to: ALL

INTERMEDIATE/FINAL APPROACH

L2 For additional training-oriented information, *Refer to FCTM/NO-180 Intermediate Approach*

L1 **GENERAL**

The preferred technique for flying an ILS(GLS) approach is to fly a decelerated approach using the AP / FD s, the LOC and G/S modes, the autothrust in SPEED mode, and the managed speed target.
The objective is to stabilize the aircraft on the final descent path at VAPP in the landing configuration, at 1 000 ft above airfield elevation in instrument conditions, or at 500 ft above airfield elevation in visual conditions, after continuous deceleration on the glide slope.

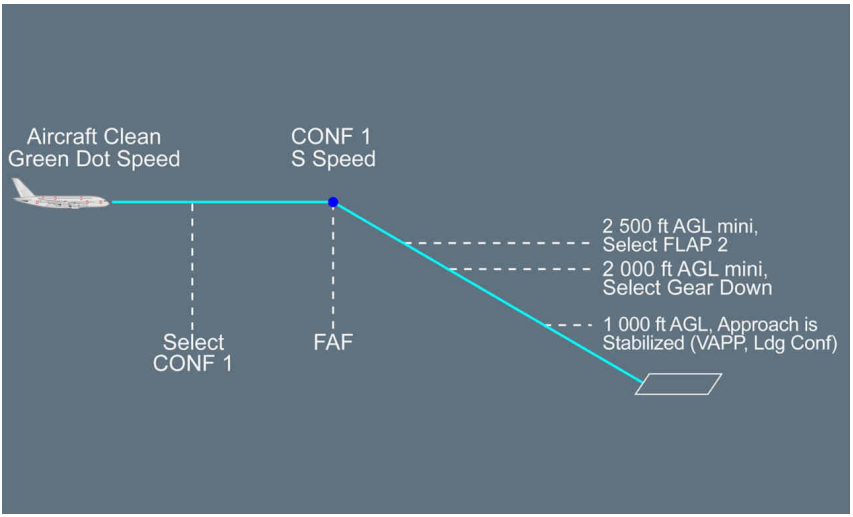
To be stabilized, all of the following conditions must be achieved prior to, or upon reaching this stabilization height:
- The aircraft is on the correct lateral and vertical flight plan,
- The aircraft is in the desired landing configuration,
- The thrust is stabilized, usually above idle, to maintain the target approach speed along the desired final approach path,
- There is no excessive flight parameter deviation.

If the aircraft is not stabilized on the approach path in landing configuration, at 1 000 ft above airfield elevation in instrument conditions, or at 500 ft above airfield elevation in visual conditions, or as restricted by Operator policy/regulations, a go-around must be initiated unless the crew estimates that only small corrections are necessary to rectify minor deviations from stabilized conditions due, amongst others, to external pertubations.

L2 Decelerated Approach

The decelerated approach technique descends the aircraft to 1 000 ft , at VAPP . In most cases, the interception of the final descent path is achieved with CONF 1 at S speed.

Decelerated Approach



L3 The advantages are:

- Decrease in fuel consumption
- Decrease in the noise level
- Time saving
- Flexibility and ability to vary speed, to be in accordance with ATC requests.

Note: *For ILS approach, the ICAO defines the envelope in which the quality of the G/S signal ensures a normal capture. This envelope is within 10 nm , ± 8 ° from the centerline of the ILS glide path, and up to 1.75 teta (teta, being the nominal glide path angle).*
*If the approach is armed when the aircraft is far outside from the standard glideslope (G/S) capture envelope, a spurious G/S * engagement may occur, due to an incorrect G/S deviation signal. This spurious G/S capture will order a pitch up, if the aircraft is below the glide beam, and a pitch down, if the aircraft is above the glide beam.*
*Each time that the flight crew notices pitch movement, or a spurious G/S *, or a trajectory deviation, they must immediately disconnect the AP, if engaged, in order to re-establish a normal attitude and disengage APPR mode. It is then recommended to arm/rearm the APP (ILS) mode within the normal capture zone.*

L1 **COLD WEATHER CONDITIONS**

For altitude correction in low temperature conditions, *Refer to PER-OPD-AMILA ATMO Module Interface (Low altitude temperature corrections)* .

APPR MODE ACTIVATION

L2 For additional information on the FMA display during this phase of flight, *Refer to DSC-22-FG-70-120-90 ILS Approach and Autoland* .
For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 ● **When the ATC clears the aircraft for the approach:**
APPR pb on AFS CP ..... PRESS | PF

L2 - *The flight crew should press the APPR pb only after the ATC clears the aircraft for the approach*

When pressed, the LOC and G/S modes arm provided that the flight crew:
- *Selected an ILS(GLS) approach on the FMS ARRIVAL page, or*
- *Manually-tuned an ILS(GLS) in the POSITION/NAVAIDS page and did not select an approach or only selected a runway on the FMS ARRIVAL page, or*
- *Set the RAD NAV key to STBY and selected the LS on RMP 1 or 2.*

- *LOC and/or G/S modes engage not sooner than 3 s after being armed.*

Note: *If the flight crew selects a non-precision approach in the active flight plan, and if they manually tune an ILS(GLS) on the POSITION/NAVAIDS page, the MFD and PFD display CHECK APPR SEL . This message is a reminder to the flight crew that, although an ILS(GLS) is tuned in the POSITION/NAVAIDS page, the available approach guidance modes are F-LOC and F-G/S modes (for NPA flown with the FLS function) when the APPR pb is pressed on the AFS CP .*

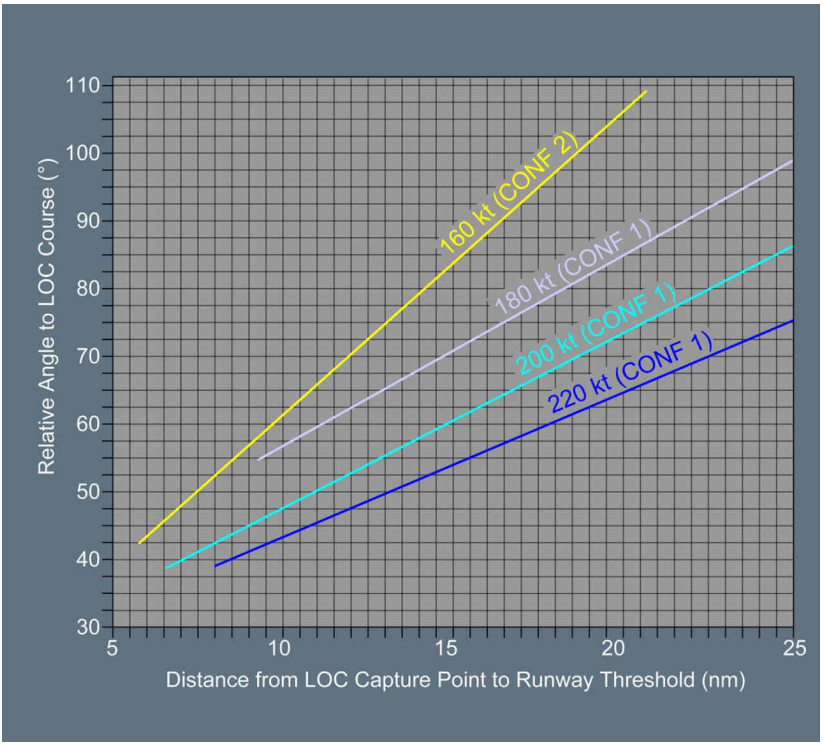
- **If GPS PRIMARY LOST :**

The pre-capture zone of the LOC beam is not available. Therefore, the LOC capture performance may be degraded, and overshoot of the LOC beam may occur.

L3 For more information on the capture zone and pre-capture zone of the LOC beam, *Refer to LOC* Engagement Conditions* .

The following graph illustrates the angle of interception vs. the distance, that ensures a capture with a single overshoot. This overshoot is less than 1.3 dots.

LOC Capture Domain



The LOC capture point is the point at which the aircraft track projection intercepts the LOC centerline.

L1 AP 1+2.....ON | PF

L2 *When the APPR mode is selected, the flight crew should engage both AP s.*

L1 FMA.....CHECK | PM

Check that the FMA displays the approach capability (CAT2 , CAT3 SINGLE , CAT3 DUAL , or AUTO LAND) for the intended ILS(GLS) approach.

APPROACHING GREEN DOT SPEED

L2 For additional training-oriented information on final approach, *Refer to FCTM/NO-180 Final Approach* .

For additional information on the FMA display during this phase of flight, *Refer to DSC-22-FG-70-120-90 ILS Approach and Autoland* .

For additional information on the associated standard callouts:
- *Refer to PRO-NOR-SCO Flaps or Gear Configuration*
- *Refer to PRO-NOR-SCO Flight Parameters* .

L1 FLAPS 1.....ORDER | PF
FLAPS 1.....SET | PM

L2 - *The flight crew should not set FLAPS 1 later than 3 nm from the Final Approach Fix (FAF)*
L1 - *Check the aircraft deceleration toward S speed*
L2 - *The aircraft must reach, or be established on, the glideslope with FLAPS 1 and S speed at or above 2 500 ft AGL*
- *If the aircraft speed is significantly above S on the glideslope, or if the aircraft does not decelerate on the glideslope, extend the landing gear in order to decelerate the aircraft. The flight crew can also use the speed brakes. However, the flight crew should be aware of the VLS increase, and the limited effect of the speed brakes at low speeds.*

L1 TA pb .....TA ONLY or TA/RA | PM

L2 *The flight crew may use the TA ONLY mode in specific airports, and for specific procedures (identified by Operators) that may provide resolution advisories that are neither wanted or appropriate (e.g. closely-spaced parallel or converging runways).*

L1 LOC CAPTURE..... MONITOR | PF

L2 *The flight crew must always monitor the capture of a LOC beam. During the capture phase, when the LOC deviation is within the LOC scale, the LOC deviation on the PFD and the ND should move toward the center of the scale.*
If GPS PRIMARY is lost, the LOC capture performance may be degraded, and overshoot of the LOC beam may occur.

L3 *Note: For ILS approach, the ICAO requires the LOC beam to ensure a normal capture within 10 nm , and ± 35 ° from the centerline of the course. Some current ILS systems just meet the requirement and are subject to an erroneous capture outside these limits.*

L1 G/S CAPTURE.....MONITOR | PF

L2 *Note: The glideslope may be captured independently of the LOC beam capture, depending on the PRIM pin program.*

L1 ● **If above the glideslope:**
V/S MODE .....
..... AS RQRD | PF

Do not exceed 2 000 ft/min .

AFS CP ALTITUDE ..... | PF
..... SET ABOVE A/C ALTITUDE |

L2 *Select an altitude above the aircraft altitude, in order to prevent inadvertent ALT* engagement.*

L1 ● **When G/S Capture (G/S*):**
GO-AROUND ALTITUDE.....SET | PF-PM

L2 *Note:* - *This procedure prevents from an undesired level off at the G/S intercept altitude*
- *If the aircraft intercepts the ILS(GLS) above the validity range of the radio altimeter (i.e. when the radio altitude indication is not yet available on the PFD),* CAT 1 *appears on the FMA . Check that the FMA displays the correct capability for the intended approach when the aircraft is below 5 000 ft .*

BELOW VFE NEXT, AT 2500 FT AGL MINIMUM

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 FLAPS 2.....ORDER | PF
FLAPS 2.....SET | PM

- *Check the aircraft deceleration toward F speed*

L2 - *If the aircraft intercepts the ILS(GLS) glideslope below 2 500 ft AGL , select FLAPS 2 at one dot below the glideslope*
- *If the aircraft speed is significantly above F on the glideslope, or if the aircraft does not decelerate on the glideslope, extend the landing gear in order to decelerate the aircraft. The use of the speed brakes is not recommended.*

AFTER FLAPS 2 SELECTION, AT 2000 FT AGL MINIMUM

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 L/G DOWN.....ORDER | PF
L/G..... DOWN | PM
AUTO BRK.....CONFIRM | PM

L2 *If the runway conditions deteriorated since the approach briefing, consider the impact on the landing performance assessment and if there is a need for another braking mode.*
When BTV is selected, if the aircraft lands on a runway different from the runway selected for BTV settings, the autobrake reverts automatically toautobrake mode Hi in short final.

L1 GND SPLRS..... ARM | PM
EXTERIOR LIGHTS.....SET | PM

AFTER LANDING GEAR DOWN SELECTION

L2 For more information on the FMA display during this phase of flight, *Refer to DSC-22-FG-70-120-90 ILS Approach and Autoland .*

L1 ● **Below VFE NEXT:**

L2 For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration .*

L1 FLAPS 3.....ORDER | PF
FLAPS 3.....SET | PM

WHEEL SD PAGE.....CHECK | PM

L2 - *The WHEEL SD page appears below 800 ft , or at landing gear extension*
- *Check the five landing gear green indications. At least one green triangle on each landing gear strut is sufficient to indicate that this landing gear strut is down and locked.*

L1 ● **Below VFE NEXT:**

L2 For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration .*

L1 FLAPS FULL.....ORDER | PF
FLAPS FULL.....SET | PM

Check that the aircraft decelerates to VAPP .

A/THR.....CHECK IN SPEED MODE or OFF | PF

L2 *For GLS CAT I with autoland, if the A/THR is available, activate the A/THR .*

L1 SLIDING TABLE.....STOWED | BOTH
LDG MEMO.....NO BLUE LINE | PM
CABIN.....READY | BOTH

L2 *Check CABIN READY on the EWD , or obtain the report from the chief purser: "Cabin ready for landing".*

L1 LANDING C/L.....COMPLETE | BOTH

Refer to PRO-NOR-C-L Landing

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L1 FLIGHT PARAMETERS.....CHECK | PF

The PF announces any modification to the FMA .

The PM announces any flight parameter deviation. For more information on the associated callouts, Refer to PRO-NOR-SCO Flight Parameters .

- **At 500 ft AGL (or RA) and below and if the flight crew selected BTV autobrake mode:**
  The PM may take advantage to adjust the ND RANGE selector to display the dry and wet lines on the Airport Navigation display, when the landing is positively considered.

- **At 350 ft AGL (or RA):**
  LAND ON FMA .....ANNOUNCE | PF
  ILS(GLS) COURSE.....CHECK | PF

L2 *Check the ILS(GLS) course on the PFD .*

AT MINIMUM+100 FT

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 ONE HUNDRED ABOVE.....MONITOR or ANNOUNCE | PM

1
2 **AT MINIMUM**

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 MINIMUM.....MONITOR or ANNOUNCE | PM
LANDING or GO-AROUND.....ANNOUNCE | CAPT

L2 *Maintain the aircraft on a stabilized flight path up to the flare.*
At 50 ft , one dot below the glide slope means that the aircraft is 7 ft below the glide slope.
Do not duck under the glide slope.

ALL ILS APPROACHES (CAT I) Procedure and Call out

L1

ILS CAT - I Approach		
EVENT	**PF**	**PM**
If GPWS does not call indications, such as "RADIO ALTIMETER", "ONE THOUNSAND", "FIVE HUNDRED", "MINIMUM", "ONE HUNDRED", "FIFTY", etc,the PM shall call as appropriate *Note:* - *"CHECKED"(1*) : I have checked NAVAID identifier on PFD or ND* - *"ROGER (2*) : I didn't check NAVAID identifier on PFD or ND , but I have received all of your last transmission.* - *"LANDING(3*) : The captain shall announce his/her decision to allow to the A/C to continue to a landing at MDA/DA , if the visual references are distinctly visible and identifiable.* - *"GO-AROUND/FLAPS"(4*) : Refer to the Go around Phase*		
After identification of ILS by display or morse code	Verify ILS Identified "CHECKED(1*) or ROGER(2*)"	"0000 IDENTIFIED"
When flaps required at green dot speed or below VFE	" FLAPS 1"	Confirm VFE speed and select FLAPS 1 "SPEED CHECKED" "FLAPS 1"
At 2,500ft AGL Minimum	" FLAPS 2"	Confirm VFE speed and select FLAPS 2 "SPEED CHECKED" "FLAPS 2"
When on localizer intercept heading: - Verify that the ILS is tuned and identified - Verify that the LOC and G/S pointers are shown - Verify that the approach clearance is received		
When ILS approach clearance received from ATC, Select APP mode and call	" APPROACH ARM "	
※: Manual Flight	"ARM APPROACH"	"APPROACH ARM"
	"GS, LOC BLUE , CAT1"	"CHECKED"
Engage both APs or remaining AP	"AP 1 &2 ON" or AP 2 &1 ON"	"CHECKED"
When localizer, glide slope armed	"GS,LOC BLUE,CAT3 ( ), AP 1&2"	"CHECKED"
When the first positive movement of Localizer index	"CHECKED"	"LOCALIZER ALIVE"
When localizer is captured	"LOC STAR" "LOC"	"CHECKED" "CHECKED"
When the first positive movement of Glide slope index	"CHECKED"	"GLIDE SLOPE ALIVE"

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ILS CAT - I Approach

EVENT	PF	PM
When glide slope is captured	"GS STAR" "GO AROUND ALTITUDE 0000 SET" "GS"	"CHECKED" "0000 BLUE" "CHECKED"
×: Manual Flight	"SET GO AROUND ALTITUDE 0,000" "0,000 BLUE"	" 0,000 SET"
After flaps 2 selection, at 2,000ft AGL minimum	"GEAR DOWN"	L/G DOWN -- SELECT "GEAR DOWN" - Ground Spoiler ---- ARM - EXTERIOR LIGHTS -- SETSet NOSE SW to T.O, RWY TURN OFF & CAMERA SW to ON - AUTO BRK ------ CONFIRM
After Landing Gear down , When below VFE NEXT	"FLAPS 3"	Confirm VFE speed and select FLAPS 3 "SPEED CHECKED" "FLAPS 3"
When below VFE NEXT	"FLAPS FULL"	Confirm VFE speed and select FLAPS 3 "SPEED CHECKED" "FLAPS FULL"
	"LANDING CHECK LIST"	Accomplish LANDING CHECK LIST "LANDING CHECK LIST COMPLETE"
At OM or FAF	Check as publish altitude with actual passing altitude "CHECK/TIMING"	"OUTER MAKER,(Published altitude)" or AT Final Fix ,Other than OM "( ) DME (Published altitude)" or "VOR name (Published altitude)" or "NDB name (Published altitude)"
×: Manual Flight	"IN SIGHT"	ABOVE DA(H), When in visual "STROBE LIGHT INSIGHT" "APPROACH LIGHT INSIGHT" "RUNWAY INSIGHT"
At 1,000 ft above HAT ,	"STABILIZED" or "VMC –CORRECTING" in VMC or "GO-AROUND/FLAPS"(*4)	"ONE THOUSAND , CLEARED TO LAND" or (Call out any unstable conditions) "ONE THOUSAND ,CONTINUE" (Call out any unstable conditions)

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ILS CAT - I Approach

EVENT	PF	PM
At 500ft HAT ,	"STABILIZED" or "GO-AROUND/FLAPS"(*4)	Monitor AUTO CALLOUT "FIVE HUNDRED"* (Call out any unstable conditions)
At 350ft AGL(or RA)	Check ILS course on the PFD when displayed on FMA "LAND"	"CHECKED"
At 100ft above entered MDA/DA(H)	"CHECKED"	Monitor AUTO CALLOUT "HUNDRED ABOVE"
Before reaching DH When in visual call	"INSIGHT"	"STROBE LIGHT INSIGHT" "APPROACH LIGHT INSIGHT" "RUNWAY INSIGHT"
At DA(H)	CAPT "LANDING or GO-AROUND"	Monitor Auto callout "MINIMUM"
If PF calls "GO-AROUUND/FLAPS" , PM retracts FLAPS one step and call " Flaps 1 step"		
After 2nd Auto Pilot On(If used)	"CAT 3 DUAL "or "CAT3 SINGLE"	"CHECKED"
Above DA(H), When in visual	"STROBE LIGHT IN SIGHT" "APPROACH LIGHT IN SIGHT" "RUNWAY INSIGHT"	"ROGER"
At 100ft above entered MDA/DA(H)	"CHECKED"	Monitor Auto callout "HUNDRED ABOVE"
At Entered MDA/DA(H)	CAPT "LANDING or GO-AROUND"	Monitor Auto Callout 'MINIMUM"
At 40ft RA, When displayed on FMA	PF Check FLARE on FMA	"FLARE"
At 30ft RA	Monitor thrust reduction & flare by flight instruments	thrust "IDLE" is displayed on the FMA
At 10ft RA	- Retard both thrust to IDLE - Monitor lateral guidance by external reference	Monitor engine parameters
At touch down		Check ROLLOUT on FMA "ROLL OUT"

Note: If the Auto callouts are not called by FWC, PM should call these items.

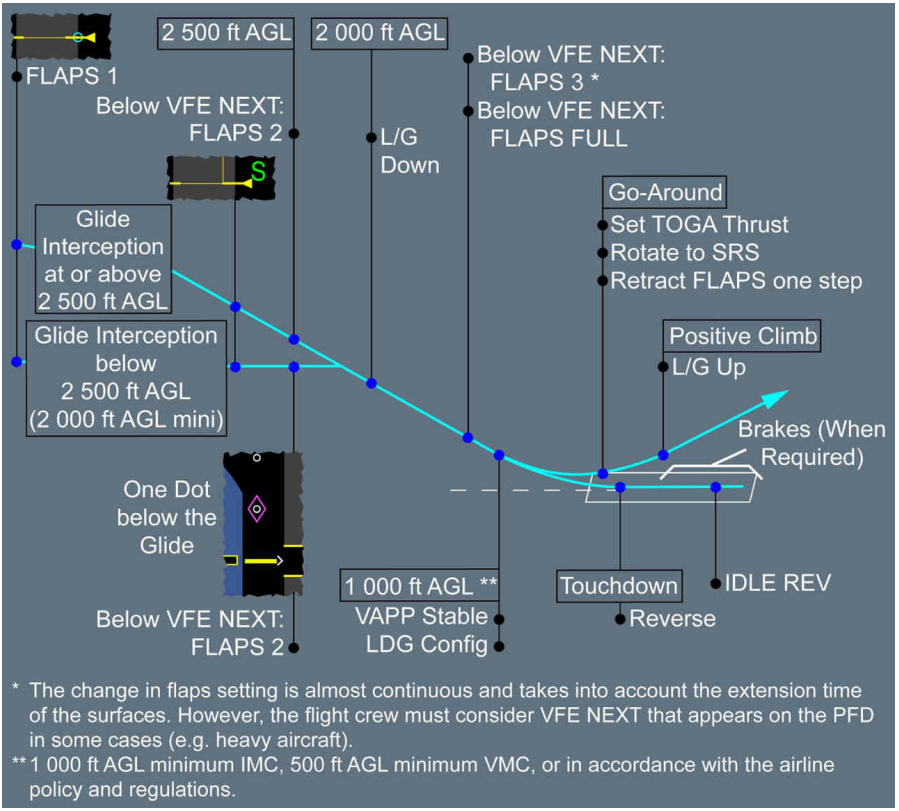
ILS(GLS) APPROACH PATTERN

Applicable to: ALL

ILS(GLS) APPROACH PATTERN

The following approach pattern is based on the assumption that managed speed is used:

ILS Approach



* The change in flaps setting is almost continuous and takes into account the extension time of the surfaces. However, the flight crew must consider VFE NEXT that appears on the PFD in some cases (e.g. heavy aircraft).

** 1 000 ft AGL minimum IMC, 500 ft AGL minimum VMC, or in accordance with the airline policy and regulations.

If in selected speed, select:

- S speed after FLAPS 1 selection
- F speed after FLAPS 2 selection
- VAPP after landing FLAPS selection.

Note: *If earlier stabilization at VAPP is required, start the deceleration at a higher altitude.*

GENERAL

Applicable to: ALL

GENERAL

The A380 is certified for CATIIIb precision approach and landing. It incorporates a Fail Operational Dual –Autopilot system with rollout control.

DECISION HEIGHT

Decision height is the wheel height above the runway elevation by which a go-around must be initiated unless adequate visual reference has been established and the aircraft position and approach path have been assessed as satisfactory to continue the approach and landing in safety.

ALERT HEIGHT

An Alert Height is a height above the runway, based on the characteristics of the airplane and its fail-operational automatic landing system, above which a Category III approach would be discontinued and a missed approach initiated if a failure occurred in one of the redundant parts of the automatic landing system, or in the relevant ground equipment.

FAIL PASSIVE

An automatic landing system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition or deviation of flight path or attitude. A DA(H) is used as approach minimums.

An automatic landing system is fail-operational if, in the event of a failure below alert height, the approach, the flare and landing can be completed by the remaining part of the automatic system. In the event of failure, the automatic landing system will operate as a fail-passive system

CAT II/III OPERATING REQUIREMENT

Applicable to: ALL

Refer to Ground/Runway Equipment Required for Precision Instrument Approaches in this Chapter. Review NOTAMS to make sure that the destination airport still meets visual or non-visual CAT II or CAT III requirements:

- Runway and approach lighting,
- Radio navaid availability,
- RVR equipment availability, etc.

To commence a CATII/III approach, the reported weather must be at or above the approach minima. Once an aircraft has passed a Final Approach Fix (or commenced the final approach segment if there is no Final Approach Fix), it may continue the approach to the DA(H)/AH even if the weather deteriorates below the approach minima.

Note: *Policy regarding an approach ban may differ from country to country. Flight crew must confirm and apply the procedures specific to that country.*

Unless LVP are reported active by ATIS, clearance to carry out a CAT II or CAT III approach must be requested from ATC, who will check the status of the ILS and lighting and protect the sensitive areas from incursion by aircraft or vehicles. Such an approach may not be undertaken until the clearance has been received.

Correct adjustment of pilot's seat prior to approach in low visibility conditions is very important in order to take full advantage of existing Visibility, The seat should be adjusted to confirm the external visual Reference over the airplane nose.

At night in low visibility conditions, landing lights can be detrimental to the acquisition of visual references. Reflected light from water droplets or snow may actually reduce visibility. Landing lights would therefore not normally be used in CAT II or CAT III weather conditions.

CAT II AND CAT III APPROACH_OPERATING LIMITATIONS

Applicable to: ALL

OPERATING LIMITATIONS

Subject to the operating procedures herein, the A380 is authorized to be operated to the following minima:

- Approach and Landing Minima
  Check weather conditions at destination and at alternate. Refer to the FOM Chapter 4, Weather and the Airway manual (Green page) for specific weather minima for the runway.
- Wind Limitations
  The maximum surface wind components for CAT II/III autoland are :

Winds	Headwind	Crosswind	Tailwind
Component	38 kts	15 kts	10 kts

- Braking Action
  A CAT II/III approach is not permitted in windshear or turbulent conditions or when braking action is reported to be poor than "MEDIUM (or FAIR)" for any part of the runway.

- Landing Distance
  The landing distance required for a CAT II/III landing is 1.15 times the dry runway landing distance required determined from the Landing Performance Chart
- Pilot Seating
  An approach and landing in conditions below for CATI minima shall be accomplished by the PIC occupying the left hand seat.
- Mode of Operation (On the FMA)
  Conduct an autoland using autopilot coupled approach.

CAT II		CAT 3 DUAL, CAT 3 SINGLE, CAT 2
CAT III	Fail Passive	CAT 3 DUAL, CAT 3 SINGLE
	Fail Operational	CAT 3 DUAL

- Flight Crew Duties
  - The captain will conduct all CAT II/III approaches as a PF.
  - An approach and landing in conditions below CAT I minima will be accomplished by the captain occupying the left seat.
  - The captain may only operate as a PM in the right seat in actual CAT II / III conditions if he has been trained for CAT II/III PM duties and has a certificate.

CAT II AND CAT III APPROACH_CERTIFICATION OF PILOTS

Applicable to: ALL

CERTIFICATION OF PILOTS

Refer to the FOM Chapter 6, Normal Operations.

CAT II AND CAT III APPROACH_AIRCRAFT STATUS

Applicable to: ALL

AIRCRAFT STATUS

Refer to FOM Chapter 6 – Normal Operations

CAT II AND CAT III APPROACH_REQUIRED EQUIPMENT FOR CAT I, II, III

Applicable to: ALL

REQUIRED EQUIPMENT FOR CAT I, II, III

Refer to FCOM /Limitation/Auto Flight System/Automatic Approach, Landing and Roll-Out/Required Equipments for CAT II, or CATIII Operation

CAT II AND CAT III APPROACH_PRACTICE CAT III APPROACH

Applicable to: ALL

PRACTICE CAT III APPROACH

- A Practice CAT II/ III Approach can only be accomplished if both the PIC and F/O have completed CAT II/III training.
- An auto-coupled approach and landing utilizing CAT II/ III procedures in weather conditions at or above CAT I approach minima shall be deemed a practice CAT II/III approach. Use the DH/AH on a Practice CAT II/III Approach as appropriate for the approach.
- Since the ILS critical area is not protected from ground vehicles or other aircraft during auto coupled approach or landing when the weather is above ceiling 800 feet and visibility 2 miles, the flight crew shall notify ATC at the commencement of "Auto Land".
  e.g. "We are conducting Autoland"

CAT II AND CAT III APPROACH_AUTOMATIC SYSTEMS USAGE

Applicable to: ALL

AUTOMATIC SYSTEMS USAGE

- Autopilot
  An approach in conditions below Category I weather minima shall be autocoupled using all available autopilots and shall be completed by auto-land. The autopilots shall be engaged such that localizer capture would occur no later than the Final Approach Fix (FAF) and the airplane shall be fully configured for landing by 1,500ft HAT. The autopilot should only be disengaged after landing on reaching a safe taxi speed or stopping aircraft.
- Autothrust
  Autothrust is mandatory for all CAT III operations . For all other low visibility landings, the autothrust shall be used, if available.
- Autobrake
  Autobrakes are mandatory for CAT III operations . For all other low visibility landings, the autobrakes, if available, shall be used. Setting low or medium should be selected to expedite stopping when landing in low visibility.

CAT II AND CAT III APPROACH_CAT II OPERATIONS

Applicable to: ALL

CAT II OPERATIONS

Category II approaches may be conducted using two autopilots, with two engines (1 on the right side , and 1 on the left side)or three engines.

Note: If an aircraft has an engine failure prior to 1,000ft HAT, the aircraft may continue approach, when completed engine failure procedure prior to descent below 1,000ft HAT, and unless otherwise conflict with CAT II approach condition

CAT II AND CAT III APPROACH_NON-NORMAL OPERATIONS FOR CAT II

Applicable to: ALL

NON-NORMAL OPERATIONS FOR CAT II

The airplane is approved for dual autopilot operations to CAT II minimums with an engine inoperative prior to 1,000ft HAT, and the airplane trimmed for the condition. Autoland requires use of CONF 3 or Full.

CAT II AND CAT III APPROACH_CAT III OPERATIONS

Applicable to: ALL

CAT IIIA/IIIB OPERATIONS:

- **In CAT III operations with DH,** the condition required at DH is that there should be visual references, which confirm that the aircraft is over the touchdown zone. Go around is mandatory if the visual references do not confirm this.
- **For CAT III operations with AH,** the decision to continue does not depend on visual references, even though a minimum RVR is specified. The decision depends only on the operational status of the aircraft and ground equipment. If a failure occurs prior to reaching the AH, a go-around will be made. A go-around must nevertheless be performed if "AUTOLAND" warning light flashes or "FLARE" is not annunciated on the PFD below AH

  Note: Operations based on an AH may continue to land regardless of reported weather conditions if equipped with a fail operational rollout system which did not indicate a malfunction prior to passing alert height, and the flight crew considers continuation a safe course of action.

CAT II AND CAT III APPROACH_AUTO COUPLED NON-NORMAL OPERATIONS FOR CAT III

Applicable to: ALL

AUTO COUPLED NON-NORMAL OPERATIONS FOR CAT III

- **Downgrading conditions**

  - If the following conditions are met Above 1000ft HAT, a flight crew can perform an approach(CAT I/II/IIIa) with a higher minima when downgrading conditions exist (including downgrading to fail passive system).

    - Briefing for approach procedure with a new minima,
    - Reported RVR is at or above the approach minima,
    - Decision to downgrade is completed above 1000ft HAT,

    Note: *If an automatic landing system has downgraded to Fail passive (CAT 2 / CAT 3 SINGLE) while approaching with AH, use DH as a minimum.*

    Note: *If DH is not published for CAT III approach and the aircraft is fail passive automatic landing system, set Radio Altimeter Minimum at 50 ft RA as a CAT IIIa decision height.*

CAT II AND CAT III APPROACH_CAT II/III LANDING BRIEFING

Applicable to: ALL

CAT II/III LANDING BRIEFING

In addition to the normal briefing , the PIC should include items for CATII/III operation.
Refer to the FOM Chapter 6 – Normal Operations.

CAT II AND CAT III APPROACH_"DH OR AH" SETTING ON MCDU PERF APPR PAGE

Applicable to: ALL

1
2 ### "DH OR AH" SETTING ON MCDU PERF APPR PAGE

Approach		Decision Height Setting
CAT II		DH/RA value
CAT III	with DH	DH/RA value If DH is published, set RA as depicted, or if not, set RA 50ft.
	with AH	"NO"

MISSED APPROACH (CAT II)

Applicable to: ALL

MISSED APPROACH (CAT II)

A missed approach must be executed when any of the following conditions exist:

- At or below 1,000ft HAT and above 200ft RA
  - ALPHA FLOOR activation,
  - Loss of AP (cavalry charge),
  - Downgrading of capability (triple click).
    changes from "CAT 3 DUAL", "CAT 3 SINGLE", "CAT 2" to "CAT 1",
  - Amber caution (single chime),
  - Engine failure
  - "LAND" mode does not appear on the FMA at 350ft RA
  - Any of the airborne equipment required for the particular CAT II operation being conducted becomes inoperative
  - Before arriving at DH, any of the required elements of the CAT II ground system becomes inoperative
  - Crew incapacitation is evident (recommended to continue if below 100 ft AGL).
- At or below 200ft RA and before touchdown
  - The rate of descent exceeds 1000fpm.
  - "LAND" mode disappear on the FMA.
  - FLARE is not annunciated on the PFD.
    FLARE is not annunciated on the PFD.
  - Crew incapacitation is evident (recommended to continue if below 100 ft).
  - "AUTOLAND" warning light flashes.
  - There are insufficient visual cues at DH to continue to a safe landing
  - Loss of visual cues occurs after DH.
  - The pilot determines that a landing cannot be safety accomplished within the touch down zone.
  - Engine failure unless engine failure procedures are completed by 1000ft HAT (Recommended to continue if below 100ft AGL).
  - Directed by ATC.
- After a go-around, if another approach is planned:
  - Re-assess the capability of the airplane (i.e. refer to the Required Equipment List).
  - Re-assess the weather and runway conditions.
  - Consider another approach at a different category if necessary.

MISSED APPROACH (CAT III)

Applicable to: ALL

MISSED APPROACH (CAT III)

A missed approach must be executed when any of the following conditions exist:

- **At or below 1000ft HAT and prior to AH or DH**

  - ALPHA FLOOR activation,
  - Loss of AP (cavalry charge),
  - Amber caution (single chime),
  - Engine is inoperative (Recommended to continue if below 100ft AGL).
    - CAT IIIa: Unless engine failure procedures are completed by 1000 ft HAT (recommended to continue if below 100 ft AGL).
    - CAT IIIb: Engine is inoperative (recommended to continue if below 100 ft AGL).
  - "LAND" mode does not appear on the FMA at 350ft RA.
  - CAT IIIa Fail Passive Approach : Downgrading of capability from "CAT 3 DUAL", "CAT 3 SINGLE" to "CAT 2", "CAT 1".
  - CAT IIIb Fail Operational Approach : Downgrading of capability from "CAT 3 DUAL" to "CAT 3 SINGLE", "CAT 2", "CAT 1".
  - Any of the required elements of the ground system becomes inoperative. However, CAT III approaches and landings may be continued even though the sequence flashers become inoperative,
  - Any of the airborne equipment required for the particular CAT III operation being conducted becomes inoperative.
  - Crew incapacitation is evident (recommended to continue if below 100 ft AGL).

- **Prior to Touchdown**

  - "AUTOLAND" warning light flashes.
  - The rate of descent exceeds 1000fpm
  - FLARE is not annunciated on the PFD.
  - "LAND" mode disappears on the FMA.
  - There are insufficient visual cues at DH to continue to a safe landing (CAT IIIa with DH)
  - Loss of visual cues occurs after DH (CAT IIIa with DH).
  - The pilot determines that a landing cannot be safely accomplished within the touchdown zone.
  - Directed by ATC.

- **After a go-around, if another approach is planned :**

  - Re-assess the capability of the airplane (i.e. refer to the Required Equipment List).

- Re-assess the weather and runway conditions.
- Consider another approach at a different category if necessary.

CAT II AND CAT III APPROACH_ENGINE INOPERATIVE

Applicable to: ALL

ENGINE INOPERATIVE

- ILS CAT II/III Fail Passive : One or Two Engine (On the opposite side) Inoperative for CAT II, One Engine for CAT III.
  An autoland may be accomplished as long as the quality of the approach is satisfactory. Additional engine-out logic is incorporated during runway alignment to ensure the downwind wing is not low at touchdown. If the crosswind is from the side opposite the failed engine, a failed-engine high (upwind wing low) attitude is maintained during the approach. An additional sideslip is induced proportional to the engine-out crab and the crosswind sideslip.
- Approach
  Directional control (yaw) is not affected by rudder trim with 1 or 2 autopilots in the LOC or ROLLOUT modes, but it may be desirable to trim the rudder to zero to facilitate manual directional control when the autopilots are disengaged on the runway.
  To maintain wings level on final, in addition to sideslip used for wind correction to the autopilot may maintain a slight sideslip.
  The amount of Go-Around (CAT III) rudder input is calculated from angle of attack and elevator displacement, which is “washed out” to zero during the flare. If the autopilots are disengaged, be prepared to maintain rudder pedal pressure.

CAT II AND CAT III APPROACH_CAT II APPROACH

Applicable to: ALL

CAT II APPROACH

The use of AP with FD with or without A/THR is approved in APPR modes (GS*, LOC*, GS, LOC, LAND). At least One AP engagement is approved.
Refer to ILS Auto Coupled Approach & Landing Procedure and Callouts.

EVENT	CAPT	FO
Above 1,000 ft HAT; Refer to Failure and Associated Actions above 1,000 ft for CAT II ((Refer to FCTM/NORMAL OPERATIONS/Precision Approach/Failure and associated actions)		
If Auto land status has changed from CAT3/2 to CAT 1	The approach may be continued reverting to higher DH, "CHANGE MINIMUMS"	"CAT 1"

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EVENT	CAPT	FO
	Check as appropriate the correct minimum "CHECKED" Briefing is amended to include CAT I or higher minimum approach procedure & DH/MDA	Change DH/MDA on the appropriate field of the PERF APPR page "DH/MDA (__) SET"
At or below 1,000 ft HAT		
If Auto land status has changed from CAT3 SINGLE/DUAL or CAT 2 to CAT 1	"GO-AROUND/FLAPS"(*4)	"CAT 1"
At 1,000ft HAT	"STABILIZED" "GO-AROUND/FLAPS"(*4)	"ONE THOUSAND, CLEARED TO LAND" or "ONE THOUSAND, CONTINUE"
At 500 ft HAT	"STABILIZED" "GO-AROUND/FLAPS"(*4)	Monitor AUTO CALLOUT " FIVE HUNDRED"
At 350 ft RA	"LAND " when displayed on FMA	LAND must be displayed on FMA and runway course must be checked "CHECKED"
If LAND does not appear or runway course is incorrect,	"GO-AROUND/FLAPS"(*4)	"NO LAND"
At 200 ft RA and below, Any AUTO LAND light flashing on glareshield requires an immediate go-around. First officer should call out "NO AUTOLAND". Note: *Whenever the LAND mode is lost, the AUTO LAND light comes on.*		
At 100 ft above DH	"CHECKED"	Monitor AUTO CALLOUT "MINIMUM"*
DH	If external visual references are sufficient, "LANDING"(*3) or if not, "GO-AROUND/FLAPS"(*4)	Monitor AUTO CALLOUT "MINIMUM"*
At flare height (40 ft RA: the precise value is a function of v/s),	If FLARE does not comes up on FMA, a go-around must be performed. "GO-AROUND/FLAPS"(*4)	call "FLARE" or "NO FLARE"
At 10 ft RA,	Monitor A/THR commands IDLE thrust during the flare and the FMA and EWD show 'IDLE'. If RETARD mode is not available, the Captain has to reduce thrust manually.	Monitor AUTO CALLOUT "RETARD"

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EVENT	CAPT	FO
At touchdown,	If nosewheel steering or antiskid failed, or automatic roll out control is not satisfactory, disengage AP at touchdown immediately	The FMA displays 'ROLL OUT' in green, and the PFD displays the yaw bar and no FD bars. Call "ROLL OUT"
When disengage the APs	"AUTO PILOTS OFF" - Use rudder pedal for directional control - Do not use nose wheel steering control handle before taxi speed is reached - Do not use nose wheel steering control handle before taxi speed is reached	If off center line during roll out, Call "STEER RIGHT/LEFT" (as appropriate)

CAT II AND CAT III APPROACH_CAT IIIA APPROACH

Applicable to: ALL

CAT IIIA APPROACH

The use of AP with FD, with A/THR for CAT III is approved using APPR modes (GS*, LOC*, GS, LOC, LAND, FLARE, ROLL OUT) in CONF FULL and CONF 3.
At least One AP engagement is approved.
Refer to CAT II Approach Procedure and Callouts
In the case of a CAT III approach without DH, the flight crew should enter NONE, NO, NO DH, or NODH in the RADIO entry field of the APPR panel of the ACTIVE/PERF page. This avoids the undue triggering of the HUNDRED ABOVE and MINIMUM auto callouts.
For more information on the assoicated callouts, Refer to Summary for Each Flight Phase.
Below 200ft, the flight crew should perform a go-around if the AUTOLAND light comes on and they have no visual contact.

EVENT	CAPT	FO
Above 1,000 ft HAT		
If ILS capability change conditions required for CAT III is no longer fulfilled, activated TRIPLE CLICK aural warning Refer to FCOM/Limitations/22 Auto Flight System/Automatic Approach, Landing, and Approach/APPROACH CAPABILITY Perform associated ECAM actions, if necessary.		
If Auto land status has changed from CAT 3 DUAL or CAT 3 SINGLE to CAT 2 The approach may be continues reverting to higher DH,	"CHANGE MINIMUMs"	"CAT 2"
		Change DH on the appropriate field of the PERF APPR page

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EVENT	CAPT	FO
	Check as appropriate and correct minimum "CHECKED" Briefing is amended to include CATII procedure and DH	"DH (__) SET"
At or below 1,000 ft HAT		
If Auto land status has changed from CAT3 DUAL, to CAT 3 SINGLE or CAT 2	"GO-AROUND/FLAPS"(*4)	"CAT 2"
At 1,000 HAT	"STABILIZED" "GO-AROUND/FLAPS"(*4)	"ONE THOUSAND",CLEARED TO LAND" or, "ONE THOUSAND ,CONTINUE"
At 500 HAT	"STABILIZED" "GO-AROUND/FLAPS"(*4)	Monitor AUTO CALLOUT "FIVHUNDRED"
At 350 ft RA,	"LAND" "GO-AROUND/FLAPS"(*4)	LAND must be displayed on FMA and runway course must be checked "CHECKED"
If CAT IIIa with Fail Operational At Alert Height (100ft RA) “ONE HUNDRED” Auto Call Out by FWC	“CAT 3 DUAL” If any deviation “GO – AROUND /FLAPS” "(*4)	“ALERT HEIGHT”
If CAT IIIa with Fail Passive , At 100ft above DH,	“CHECKED”	Monitor AUTO CALLOUT “HUNDRED ABOVE”
The pilot must have contact at least one of the runway visual reference before descent below DH		
At DH	"LANDING"(*3) or "GO-AROUND/FLAPS"(*4)	Monitor AUTO CALLOUT “MINIMUM”

CAT II AND CAT III APPROACH_CAT IIIB APPROACH

Applicable to: ALL

CAT IIIB APPROACH

The use of AP with FD, with A/THR for CAT III is approved using APPR modes (GS*, LOC*, GS, LOC, LAND, FLARE, ROLL OUT) in CONF FULL and CONF 3.
Dual AP engagement is approved.
Refer to CATII Approach Procedure and Callouts
In the case of a CAT III approach without DH, the flight crew should enter NONE, NO, NO DH, or NODH in the RADIO entry field of the APPR panel of the ACTIVE/PERF page.

This avoids the undue triggering of the HUNDRED ABOVE and MINIMUM auto callouts.
For more information on the assoicated callouts, Refer to Summary for Each Flight Phase.
Below 200ft, the flight crew should perform a go-around if the AUTOLAND light comes on and they have no visual contact.

EVENT	CAPT	FO
Above 1,000 ft HAT		
If ILS capability change conditions required for CAT III is no longer fulfilled, activated TRIPLE CLICK aural warning Refer to FCOM/Limitations/22 Auto Flight System/Automatic Approach,Landing, and Approach/APPROACH CAPABILITY Perform associated ECAM actions, if necessary.		
If Auto land status has changed from CAT 3 DUAL or CAT 3 SINGLE to CAT 2 The approach may be continues reverting to higher DH,	"CHANGE MINIMUMs"	"CAT 3 SINGLE" or "CAT 2"
	Check as appropriate and correct minimum "CHECKED" Briefing is amended to include CATII /CATIIIa procedures and DH	Change DH on the appropriate field of the PERF APPR page "DH (__) SET"
At or below 1,000 ft HAT : If DH is not published		
If Auto land status has changed from CAT3 DUAL, to CAT 3 SINGLE or CAT 2	"GO-AROUND/FLAPS"(*4)	"CAT 3 SINGLE" or "CAT 2"
At 1,000 HAT,	"STABILIZED" "GO-AROUND/FLAPS"(*4)	"ONE THOUSAND, CLEARED TO LAND" or, "ONE THOUSAND ,CONTINUE"
At 500 ft HAT,	"STABILIZED" "GO-AROUND/FLAPS"(*4)	Monitor AUTO CALLOUT "FIVE HUNDRED"
At 350 ft RA,	"LAND" when displayed on FMA	LAND must be displayed on FMA and runway course must be checked "CHECK"
At Alert Height (100ft RA) "ONE HUNDRED" Auto Call Out by FWC	"CAT 3 DUAL" If any deviation "GO – AROUND /FLAPS" "(*4)	"ALERT HEIGHT"
At flare height (40 ft RA: the precise value is a function of V/S),	If FLARE does not comes up on FMA, a go-around must be performed. "GO – AROUND /FLAPS" "(*4)	"FLARE" or "NO FLARE"

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EVENT	CAPT	FO
At 10 ft RA,	Monitor A/THR commands IDLE thrust during the flare and the FMA and EWD show 'IDLE'. If RETARD mode is not available, the Captain has to reduce thrust manually.	Monitor Auto callout "RETARD"
At touchdown,		The FMA displays 'ROLL OUT' in green, and the PFD displays the yaw bar and no FD bars. Call "ROLL OUT"
When disengage the APs	"AUTO PILOTS OFF" - Use rudder pedal for directional control - Do not use nose wheel steering control handle before taxi speed is reached	If off center line during roll out, Call "STEER RIGHT/LEFT" (as appropriate)

- Check Airport Signs and Markings (*SMGCS)
- The F/O should assist the Captain in runway and taxiway identification.

Introduction and Guidance Material

INTRODUCTION

Applicable to: ALL

The flight crew will preferably use the FLS function to fly a Non-Precision Approach (NPA).

FLS FUNCTION AVAILABILITY, AND FLS CAPABILITY

The FLS function is available:
- For VOR, VOR/DME, NDB, NDB/DME, RNAV (including GPS), ILS with glideslope out, LOC, and LOC B/C approaches, and
- When the approach is stored in the navigation database.

L2 However, the FLS function is not available for a selected NPA , if the difference between the final approach course and the runway course is more than 50°.

L1 When the flight crew selects an NPA on the FMS ARRIVAL page, the NO FLS FOR THIS APPR message may appear on the FMS message area, meaning that the FLS function is not available for the selected approach. The flight crew will then fly the approach without the FLS function. When the FLS function is available, and the flight crew presses the LS pb , the FLS capability appears on the FMA . The FLS capability is one of the following: F-APP , F-APP + RAW , or RAW ONLY . For required conditions for FLS capability, *Refer to Limitations / Auto Flight System* . In accordance with the type of NPA , the FLS capability must be F-APP , or F-APP + RAW .

AP / FD MODES IN FINAL APPROACH

The following table indicates the AP / FD modes, that the flight crew can use to fly the final approach:

Approach	Approach Selection in the FMS ARRIVAL Page	AP / FD Modes		For more information:
		With FLS Function	Without FLS Function	
VOR VOR/DME	VOR	F-LOC and F-G/S	- NAV and FPA , or - TRACK and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for VOR, or VOR/DME approach*
NDB, NDB/DME	NDB	F-LOC and F-G/S	- NAV and FPA , or - TRACK and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for VOR, or VOR/DME approach*

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Approach	Approach Selection in the FMS ARRIVAL Page	AP / FD Modes		For more information:
		With FLS Function	Without FLS Function	
RNAV (including GPS)	RNV or GPS	F-LOC and F-G/S	NAV and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for RNAV Approach*
ILS with glideslope out LOC only	ILS (1) LOC	LOC and F-G/S	LOC and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for ILS G/S out, LOC only, LOC B/C approach*
LOC B/C	BAC	LOC B/C and F-G/S	LOC B/C and FPA	

(1) *The flight crew selects an ILS approach on the FMS ARRIVAL page, then clicks on the DESELECT GLIDE button on the FMS POSITION / NAVAIDS page.*

To use the FLS function, the flight crew must press the APPR pb . This action will arm, or engage:

- F-LOC, LOC or LOC B/C mode, and
- F-G/S mode.

COMMON PROCEDURES FOR USE OF NAV MODE, OR FLS FUNCTION

Extract the approach from the navigation database, and insert it in the primary flight plan.

The approach stored in the navigation database has been either:
- Produced by an approved supplier compliant with ED76/DO200A requirements, or
- Validated, and approved by the operator.

Do not modify the final approach, and the associated altitude constraints.
Before starting the approach, check the lateral and vertical flight plan against the published approach chart.
Before the FAF, or equivalent waypoint on the FMS flight plan, check that the approach trajectory is laterally intercepted. A correct interception ensures that the aircraft is correctly established on the final approach course before starting the descent.

FLYING REFERENCE

The recommended flying reference is TRK-FPA. This reference should be selected during the initial approach.

GUIDANCE FOR VOR, VOR/DME, NDB, OR NDB/DME APPROACH

Applicable to: ALL

To perform the final approach, the flight crew can use:
- The FLS function: F-LOC and F-G/S modes
  The flight crew presses the APPR pb.
- Managed lateral guidance, and selected vertical guidance: NAV and FPA modes (or NAV and V/S modes)
- Selected lateral and vertical guidance: TRACK and FPA modes (or HDG and V/S modes).

WITH THE FLS FUNCTION

The flight crew can use the FLS function to perform a VOR, VOR/DME, NDB, or NDB/DME approach procedure, when:

1. Either, F-APP is displayed on FMA.

   In addition, the flight crew should:
   - Tune the reference VOR, VOR/DME, NDB, or NDB/DME, and
   - Select the VOR needles on the ND.

2. Or, F-APP + RAW is displayed on FMA.
   In addition, the flight crew must tune and monitor the reference VOR, VOR/DME, NDB, or NDB/DME, and check that these navaids indicate correct navigation.

- **If the FLS capability downgrades from F-APP to F-APP + RAW:**

  The flight crew can continue to perform the NPA, if they monitor the reference navaids, and these navaids indicate correct navigation.

- **If the FLS capability downgrades to RAW ONLY:**

  Do not use the FLS function.

  Press the APPR pb off, and the LS pb off.

  If the reference navaids are monitored, and indicate correct navigation: The flight crew can continue the approach in selected vertical and lateral modes, or without the AP and FDs.

  Otherwise, the flight crew must stop the approach, unless the flight crew obtains the necessary visual conditions.

WITHOUT THE FLS FUNCTION

In order to use the NAV mode during the final approach, the flight crew must tune and monitor the reference navaids. The flight crew must use the reference navaids and the altimeter as the primary means of navigation, to laterally and vertically monitor the approach.

- **During the approach:**
  - **If GPS PRIMARY is lost, or if high accuracy is lost:**

    The flight crew can continue the approach in NAV mode, if the navigation accuracy is confirmed against radio navaid raw data. Otherwise, the flight crew must stop the approach, unless the flight crew obtains the necessary visual conditions.
  - **If the NAV FM / GPS POS DISAGREE alert triggers during the approach:**

    The flight crew must stop the approach, unless the flight crew obtains the necessary visual conditions.

    However, if the navigation accuracy is confirmed against radio navaid raw data: The flight crew can continue the approach by using selected lateral and vertical modes, or without the AP and FDs.

GUIDANCE FOR RNAV APPROACH

Applicable to: ALL

RNAV approach includes GPS approach.
For RNAV approach requiring GPS PRIMARY, the flight crew must check the GPS PRIMARY availability prior the flight.

Note: If 24 or more GPS satellites are operative, GPS PRIMARY is available worldwide. If the number of satellite is 23 or less: Check the GPS PRIMARY availability at the destination, by using an approved ground based prediction software.

To fly the final approach, the flight crew can use:
- The FLS function: F-LOC and F-G/S modes
  The flight crew will press the APPR pb.
- Managed lateral guidance, and selected vertical guidance: NAV and FPA modes (or NAV and V/S modes).

WITH THE FLS FUNCTION

To fly an RNAV approach with the FLS function, the FLS capability must be F-APP.

- **Before starting the approach:**

  Check that the FLS capability is F-APP.
- **During the approach:**
  - **If the FLS capability downgrades to F-APP + RAW, or RAW ONLY:**

    Do not use the FLS function.

    Press the APPR pb off, and the LS pb off.

    Discontinue the approach, unless visual reference are obtained.

WITHOUT THE FLS FUNCTION

- **For RNAV approach requiring GPS PRIMARY:**
  - **Before starting the approach:**
    Check that GPS PRIMARY is available.
  - **During the approach:**
    - **If the GPS PRIMARY LOST message appears on the ND:**
      If GPS PRIMARY appears on only one FMS: Continue the approach by using the AP/FD associated to the FMS that has GPS PRIMARY.
      Otherwise, discontinue the approach, unless visual conditions are obtained.
- **For RNAV approach not requiring GPS PRIMARY:**
  - **Before starting the approach:**
    Check that the navigation accuracy is HIGH with the appropriate RNP value.
- **If the accuracy is LOW:**
  If only one FMS is in LOW accuracy, the flight crew can continue the approach by using the AP/FD associated to the other FMS.
  Otherwise, discontinue the approach, unless visual conditions are obtained.
- **If the NAV FM / GPS POS DISAGREE alert triggers during the approach:**
  Discontinue the approach, unless visual conditions are obtained.
- **During final approach:**
  Laterally monitor the final approach by using the cross track error on the ND.
  Fly the vertical flight path in FPA mode, and crosscheck the altitude and distance to the runway with the appropriate chart.

GUIDANCE FOR ILS G/S OUT, LOC ONLY, LOC B/C APPROACH

Applicable to: ALL

The NAV mode can be used down to LOC or LOC B/C interception.

For intermediate and final approach, the flight crew can use:
- LOC or LOC B/C mode with the FLS function for the vertical guidande: F-G/S mode
  The flight crew will press the APPR pb.
- LOC or LOC B/C, and selected vertical guidance: FPA (or V/S) mode.
  The flight crew will press the LOC pb.

WITH THE FLS FUNCTION

The flight crew can use the FLS function, when one between both cases occurs:

1. The FLS capability is F-APP.
   In addition, the reference navaids must be tuned.
2. The FLS capability is F-APP + RAW
   In addition, the reference navaids must be tuned, monitored, and indicate correct navigation.
   The flight crew must monitor the altitude and DME distance with regards to the approach chart.

- **If the FLS capability downgrades to F-APP + RAW:**
  Continue the approach, if the reference navaid is monitored, and indicate correct navigation with regards to the published altitudes.

- **If the FLS capability downgrades to RAW ONLY:**
  Do not use the FLS function.
  Press the LOC pb to disarm/disengage the AP/FD F-G/S mode.
  Disregard the F-G/S deviation.
  The LOC or LOC B/C deviation remains trustful.
  Continue the approach in selected vertical guidance (FPA or V/S mode), or without AP and FDs. Otherwise, discontinue the approach, unless visual conditions are obtained.

WITHOUT THE FLS FUNCTION

When using LOC or LOC B/C mode with FPA (or V/S) mode: Fly the vertical flight path by using the altimeter, and the DME distance to the runway threshold, as indicated on the approach chart.

APPROACH SPEED TECHNIQUE

Applicable to: ALL

In all cases, the flight crew should use managed speed.

WITH THE FLS FUNCTION

The preferred speed technique is to make a decelerated approach. The aircraft should intercept the final descent path at S speed in CONF 1.
The objective is to stabilize the aircraft on the final descent path at 1 000 ft AGL.

WITHOUT THE FLS FUNCTION

The preferred speed technique is to make a stabilized approach. The aircraft should intercept the final descent path in landing configuration, and at VAPP. For this purpose, the flight crew should insert VAPP as a speed constraint at the FAF.

NPA Flown with FLS Function

GENERAL

Applicable to: ALL

The FLS function allows the flight crew to fly the Non-Precision Approach (NPA) in an ILS look alike way.

REQUIRED FLS CAPABILITY

In accordance with the type of NPA , the FLS capability must be F-APP , or F-APP + RAW :

Approach	Required FLS Capability	For more information:
VOR, VOR/DME, NDB, NDB/DME	F-APP or F-APP + RAW	*Refer to PRO-NOR-SOP-190-10 Guidance for VOR, or VOR/DME approach*
RNAV (including GPS)	F-APP	*Refer to PRO-NOR-SOP-190-10 Guidance for RNAV Approach*
ILS G/S out, LOC, LOC B/C (1)	F-APP or F-APP + RAW	*Refer to PRO-NOR-SOP-190-10 Guidance for ILS G/S out, LOC only, LOC B/C approach*

(1) The ILS G/S out approach is an ILS approach for which the G/S ground station is out of service.
To fly an ILS G/S out: Select an ILS approach on the FMS ARRIVAL page, then deselect the G/S by clicking on the DESELECT GLIDE button on the FMS POSITION / NAVAIDS page.

If the FLS capability is not as required, the FLS function must not be used.

USE OF LS pb

To fly the NPA with the FLS function, the flight crew presses the LS pb:
- The landing system deviations appear on the PFD, in accordance with the NPA selected on the FMS ARRIVAL page:
  - F-LOC, LOC or LOC B/C deviation
  - F-G/S deviation.
- The FLS capability appears on the FMA.

L2 However, if the direct distance to the destination airport is more than 300 nm, only the deviation scales appear on the PFD.

OAT, AND BARO SETTING

Check that the OAT is inserted on the FMS PERF page – APPR panel. If the temperature is below the ISA temperature, the FMS ensures the correction of the FLS beam.

L2 For more information, *Refer to Indicating/Recording / Cold Weather* .

L1 Check that QNH baro setting is selected.

WARNING	Obstacle clearance is not guaranteed: - If erroneous baro setting is selected - If FLS guidance is used outside the published approach.

FLYING TECHNIQUE

The flight crew can fly the approach in several ways:
- By referring to the FLS deviations, without the FDs, and without the AP
- By referring to the FLS deviations, and by using the FDs, with or without the AP.

Below MDA (or DA):
- If the F-LOC(LOC)(LOC B/C) beam is aligned with the runway, the LS pb may be kept on
  In this case, the visual reference must always prevail.
- If the F-LOC(LOC)(LOC B/C) beam is not aligned with the runway, the LS pb should be set to off.

INITIAL APPROACH

Applicable to: ALL

L2 For additional training-oriented information, *Refer to FCTM/NO-180 Initial Approach* .

L1 APPROACH PHASE..... CHECK/ACTIVATE | PM with PF's order

L2 - *If the aircraft overflies the DECEL pseudo waypoint in NAV mode, the APPR phase activates automatically*
- *If the aircraft is in HDG or TRACK mode approximately 15 nm from touchdown, activate and confirm the APPR phase on the FMS ACTIVE/PERF page.*

L1 POSITIONING.....MONITOR | PF

L2 - *In NAV mode, use the VERT DEV on the PFD and on the DES panel of the ACTIVE/PERF page*
- *In HDG or TRACK mode, use the energy circle on the ND that shows the required distance to land.*

L1 MANAGED SPEED.....CHECK | PF

L2 *Check that the managed speed is active and monitor the target speed.*

Note:

The aircraft decelerates automatically at the DECEL pseudo waypoint  *when managed speed is active and NAV , LOC* or LOC mode is engaged.*

During the approach, the autothrust maintains the maneuvering speed of the current configuration (O , S, F, VAPP).
If ATC requires a particular speed, use selected speed. Adjust the aircraft configuration accordingly. When the ATC speed constraint (e.g. "maintain 170 kt to the outer marker") no longer applies, return to managed speed.
If ATC orders successive step descents down to the final approach flight path, use V/S or FPA mode and monitor the VERT DEV .

L1 SPEED BRAKES ..... AS RQRD | PF
RNP on the FMS ..... AS RQRD | PM

L2 *On the FMS POSITION/MONITOR page, check that the Required Navigation Accuracy is appropriate to the phase of flight.*

L1 FLS CAPABILITY ..... CHECK | PF

L2 *Check that the FLS capability is appropriate to the selected NPA, and be prepared to change the approach strategy. For more information on the required FLS capability, Refer to PRO-NOR-SOP-190-20-GGEN Required FLS Capability .*

L1 On each ND : Select ARC, or ROSE-NAV.
VOR(ADF) NEEDLES (VOR pb (ADF pb)) .....
..... AS RQRD | BOTH

INTERMEDIATE / FINAL APPROACH

Applicable to: ALL

L2 For additional training-oriented information, *Refer to FCTM/NO-180 Intermediate Approach*

L1 GENERAL

The preferred technique for flying an NPA approach with the FLS function is to fly a decelerated approach by using:
- The AP and FD s
- The following modes:
  - F-LOC , LOC , or LOC B/C
  - F-G/S
- The A/THR in SPEED mode
- The managed speed target.

The objective is to stabilize the aircraft on the final descent path at VAPP in the landing configuration, at 1 000 ft above airfield elevation in instrument conditions, or at 500 ft above airfield elevation in visual conditions, after continuous deceleration on the F-G/S beam.

To be stabilized, all of the following conditions must be achieved prior to, or upon reaching this stabilization height:

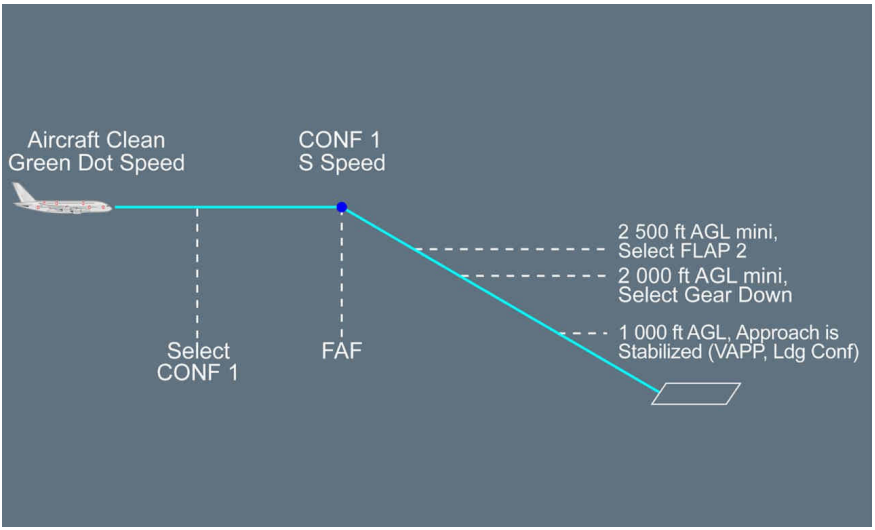
- The aircraft is on the correct lateral and vertical flight plan,
- The aircraft is in the desired landing configuration,
- The thrust is stabilized, usually above idle, to maintain the target approach speed along the desired final approach path,
- There is no excessive flight parameter deviation.

If the aircraft is not stabilized on the approach path in landing configuration, at 1 000 ft above airfield elevation in instrument conditions, or at 500 ft above airfield elevation in visual conditions, or as restricted by Operator policy/regulations, a go-around must be initiated unless the flight crew estimates that only small corrections are necessary to rectify minor deviations from stabilized conditions due, amongst others, to external perturbations.

L2 **DECELERATED APPROACH**

The decelerated approach technique descends the aircraft to 1 000 ft , at VAPP . In most cases, the interception of the final descent path is achieved with CONF 1 at S speed.

Decelerated Approach



L3 The advantages are:

- Decrease in fuel consumption
- Decrease in the noise level

- Time saving
- Flexibility and ability to vary speed, to be in accordance with ATC requests.

L1 **COLD WEATHER CONDITIONS**

For altitude correction in low temperature conditions, *Refer to PER-OPD-AMILA ATMO Module Interface (Low altitude temperature corrections)* .

APPR MODE ACTIVATION

L2 For more information on the FMA display during this phase of flight:
- *Refer to DSC-22-FG-70-120-90 VOR Approach Flown with FLS Function* , or
- *Refer to DSC-22-FG-70-120-90 LOC only Approach Flown with FLS Function* .

For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 Note: *The flight crew can intercept the FLS beam in HDG , or TRACK , in a similar way to an ILS beam.*

● **When the ATC clears the aircraft for the approach:**

APPR pb on AFS CP ..... PRESS | PF

L2 *The flight crew should press the APPR pb only after the ATC clears the aircraft for the approach.*

When pressed, the F-LOC / LOC / LOC B/C and F-G/S modes arm if:
- *The flight crew selected an NPA approach on the FMS ARRIVAL page, and*
- *The NO FLS FOR THIS APPR message did not appear on the MFD .*

L1
FLYING REFERENCE..... TRK-FPA | PF-PM
AP ENGAGEMENT..... CONSIDER | PF
FLS CAPABILITY..... CHECK | PF

L2 *Check that the FMA displays F-APP , or F-APP + RAW , in accordance with the type of approach.*

APPROACHING GREEN DOT SPEED

L2 For additional training-oriented information on final approach, *Refer to FCTM/NO-180 Final Approach* .

For more information on the FMA display during this phase of flight:
- *Refer to DSC-22-FG-70-120-90 VOR Approach Flown with FLS Function* , or
- *Refer to DSC-22-FG-70-120-90 LOC only Approach Flown with FLS Function* .

For additional information on the associated standard callouts:
- *Refer to PRO-NOR-SCO Flaps or Gear Configuration*
- *Refer to PRO-NOR-SCO Flight Parameters .*

L1 FLAPS 1.....ORDER | PF
FLAPS 1.....SET | PM

L2 - *The flight crew should not set FLAPS 1 later than 3 nm from the Final Approach Fix (FAF)*
L1 - *Check the aircraft deceleration toward S speed*
L2 - *The aircraft must reach, or be established on, the F-G/S beam with FLAPS 1 and S speed at or above 2 500 ft AGL*
- *If the aircraft speed is significantly above S on the F-G/S beam, or if the aircraft does not decelerate on the F-G/S beam, extend the landing gear in order to decelerate the aircraft. The flight crew can also use the speed brakes. However, the flight crew should be aware of the VLS increase, and the limited effect of the speed brakes at low speeds.*

L1 TA pb .....TA ONLY or TA/RA | PM

L2 *The flight crew may use the TA ONLY mode in specific airports, and for specific procedures (identified by Operators) that may provide resolution advisories that are neither wanted or appropriate (e.g. closely-spaced parallel or converging runways).*

L1 F-LOC, LOC or LOC B/C CAPTURE..... MONITOR | PF

L2 *The flight crew must always monitor the capture of the F-LOC / LOC / LOC B/C beam. During the capture phase, the associated deviation on the PFD and ND should move toward the center of the scale.*

L1 F-G/S CAPTURE..... MONITOR | PF

● **If above the F-G/S beam:**

FPA MODE .....
..... AS RQRD | PF

Do not exceed 2 000 ft/min .

AFS CP ALTITUDE .....
..... SET ABOVE A/C ALTITUDE | PF

L2 *Select an altitude above the aircraft altitude, in order to prevent from inadvertent ALT* engagement.*

L1 ● **At F-G/S* engagement:**

GO-AROUND ALTITUDE.....SET | PF-PM

L2 *This procedure prevents from an undesired level off at F-G/S intercept altitude.*

BELOW VFE NEXT, AT 2500 FT AGL MINIMUM

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 FLAPS 2.....ORDER | PF
FLAPS 2.....SET | PM

- *Check the aircraft deceleration toward F speed*

L2
- *If the aircraft intercepts the F-G/S beam below 2 500 ft AGL , select FLAPS 2 at one dot below the F-G/S beam*
- *If the aircraft speed is significantly above F on the F-G/S beam, or if the aircraft does not decelerate on the F-G/S beam, extend the landing gear in order to decelerate the aircraft. The use of the speed brakes is not recommended.*

AFTER FLAPS 2 SELECTION, AT 2000 FT AGL MINIMUM

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 L/G DOWN.....ORDER | PF
L/G..... DOWN | PM
AUTO BRK.....CONFIRM | PM

L2 *If the runway conditions deteriorated since the approach briefing, consider the impact on the landing performance assessment and if there is a need for another braking mode.*
When BTV is selected, if the aircraft lands on a runway different from the runway selected for BTV settings, the autobrake reverts automatically to autobrake mode Hi in short final.

L1 GND SPLRS..... ARM | PM
EXTERIOR LIGHTS.....SET | PM

AFTER LANDING GEAR DOWN SELECTION

L2 For more information on the FMA display during this phase of flight:
- *Refer to DSC-22-FG-70-120-90 VOR Approach Flown with FLS Function* , or
- *Refer to DSC-22-FG-70-120-90 LOC only Approach Flown with FLS Function* .

L1 ● **Below VFE NEXT:**

L2 For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 FLAPS 3.....ORDER | PF
FLAPS 3.....SET | PM

WHEEL SD PAGE..... CHECK | PM

L2 - *The WHEEL SD page appears below 800 ft , or at landing gear extension*
- *Check the five landing gear green indications. At least one green triangle on each landing gear strut is sufficient to indicate that this landing gear strut is down and locked.*

L1 ● **Below VFE NEXT:**

L2 For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration .*

L1 FLAPS FULL..... ORDER | PF
FLAPS FULL..... SET | PM

Check that the aircraft decelerates to VAPP .

A/THR.....CHECK IN SPEED MODE or OFF | PF
SLIDING TABLE..... STOWED | BOTH
LDG MEMO.....NO BLUE LINE | PM
CABIN.....READY | BOTH

L2 *Check CABIN READY on the EWD , or obtain the report from the chief purser: "Cabin ready for landing".*

L1 LANDING C/L.....COMPLETE | BOTH

Refer to PRO-NOR-C-L Landing

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

● **At FAF :**

F-G/S MODE .....CHECK ENGAGED | PF

Check that the aircraft sequences the waypoint associated with the FAF , at the altitude specified on the published approach chart.

L1 FLIGHT PARAMETERS.....CHECK | PM

L2 *The PF announces any modification to the FMA .*
The PM announces any flight parameter deviation. For more information on the associated callouts, Refer to PRO-NOR-SCO Flight Parameters .

● **At 500 ft AGL (or RA) and below and if the flight crew selected BTV autobrake mode:**

The PM may take advantage to adjust the ND RANGE selector to display the dry and wet lines on the Airport Navigation display, when the landing is positively considered.

AT MINIMUM+100 FT

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 ONE HUNDRED ABOVE.....MONITOR or ANNOUNCE | PM

1
2 ## AT MINIMUM

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 MINIMUM.....MONITOR or ANNOUNCE | PM

■ **If the flight crew obtains appropriate visual references:**

LANDING or GO-AROUND..... ANNOUNCE | CAPT
AP.....OFF | PF

L2 *At MDA / MDH - 50 ft (DA / DH - 50 ft), if the AP is still engaged, the DISCONNECT AP FOR LDG message pulses on the FMA .*

L1 FD OFF..... ORDER | PF
FD.....OFF | PM
RUNWAY TRACK.....CHECK/ORDER | PF

L2 *If needed, the PF orders the PM to set the runway track on the AFS CP .*

L1 RUNWAY TRACK..... SET, AS RQRD | PM
LS pb .....ORDER, AS RQRD | PF

L2 *If required, the PF orders the PM to set the LS pb .*
If the F-LOC(LOC)(LOC B/C) beam is aligned with the runway, the flight crew may keep the LS pb set to on. In this case, the visual reference must always prevail.
If the F-LOC(LOC)(LOC B/C) beam is not aligned with the runway, the flight crew should set to off the LS pb .

L3 *The F-LOC(LOC)(LOC B/C) beam can be considered as aligned with the runway, if the difference between the final approach course and the runway course is less than 4 ° .*

L1 LS pb .....SET, AS RQRD | PM

L2 Maintain the aircraft at a stabilized flight path to flare.

At 50 ft , one dot below the F-G/S beam is 7 ft below the F-G/S beam.
Do not duck under the F-G/S beam.

L1 ■ **If the flight crew did not obtain appropriate visual references:**

GO-AROUND.....ANNOUNCE | CAPT

NPA Flown with FLS Function Procedure and Callouts

NPA Flown with FLS Function		
EVENT	**PF**	**PF**
Insert MDA +50ft on FMS MFD PERF Page or, insert DA Auto pilot should remain engaged until suitable visual reference is established		
After identification of RAW data signals by display or morse code	"CHECKED or ROGER"	"0000 IDENTIFIED" – LOC "00 IDENTIFIED" – NDB "000 IDENTIFIED" -VOR
When cleared for approach	"APPROACH ARM"	
⁄: Manual Flight	"APPROACH APP"	"APPROACH ARM"
Flying Reference change to TRK-FPA	"TRK-FPA SET"	
⁄: Manual Flight	"SET TRK-FPA"	"TRK-FPA SET"
When F-LOC is armed	"F-LOC BLUE"	"CHECKED"
When F-GS is armed	"F-GS BLUE"	"CHECKED"
When the first positive movement of F-LOC index	"CHECKED"	"F-LOC ALIVE"
When the first positive movement of F-GS index	"CHECKED"	"F-GS ALIVE"
When F-LOC is captured When the first positive movement of F-GS index	"F-LOC STAR" "F-LOC"	"CHECKED"
When F-GS is captured	"F-GS STAR" "GO AROUND ALTITUDE 0,000ft SET" "F-GS"	"CHECKED" "0,000ft BLUE "CHECKED"
⁄: Manual Flight	"SET GO AROUND ALTITUDE 0,000ft" "0,000 BLUE"	"GO AROUND, 0,000 SET"
After flaps 2 selection, at 2,00ft AGL minimum	"GEAR DOWN"	L/G DOWN – SELECT "GEAR DOWN" - Ground Spoiler ---- ARM - EXTERIOR LIGHTS -- SET Set NOSE SW to T.O, RWY TURN OFF & CAMERA SW to ON - AUTO BRK --------- CONFIRM

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NPA Flown with FLS Function		
EVENT	**PF**	**PF**
After Landing Gear down , When below VFE NEXT	" FLAPS 3"	Confirm VFE speed and select FLAPS 3 "SPEED CHECKED" "FLAPS 3"
When below VFE NEXT	"FLAPS FULL"	Confirm VFE speed and select FLAPS 3 "SPEED CHECKED" "FLAPS FULL"
At least before FAF or 1,500ft HAT Accomplish LANDING CHECK LIST	"LANDING CHECK LIST"	"LANDING CHECK LIST COMPLETE"
At FAF or 1,500ft HAT	"CHECKED or ROGER"	"( ) DME (Published altitude)" or "VOR name (Published altitude)" or "NDB name (Published altitude)"
At 1,000 ft HAT,	"STABILIZED" or "VMC –CORRECTING" "GO-AROUND/FLAPS"(*4)	"ONE THOUSAND ,CLEARED TO LAND" or "ONE THOUSAND ,CONTINUE" Call out any unstable conditions
At 500ft HAT,	"STABILIZED" or "GO-AROUND/FLAPS"	Monitor AUTO CALLOUT "FIVE HUNDRED" Call out any unstable conditions
At 100ft above entered MDA/DA	"CHECKED"	Monitor AUTO CALLOUT "ONE HUNDRED ABOVE"
If ground reference are visible : Continue , as for a visual approach	AP-- Off "SET RUNWAY TRACK"	- FD—Off (With PF's order) "RUNWAY TRACK 000 SET" - LS pb--- As Required (With PF's Order)
At Entered MDA/DA	CAPT "LANDING or GO-AROUND"	Monitor AUTO CALLOUT "MINIMUM"
If ground reference are not visible : Initiate a go around		
Note: *At MDA(H)/DA(H) -50ft , If the AP is still engaged the "DISCONNECTED AP FOR LDG" message will pulse on the FMA*		

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NPA Flown without FLS Function

GENERAL

Applicable to: ALL

The flight crew will preferably use the FLS function to fly a Non-Precision Approach (NPA).

However, the flight crew will fly the Non-Precision Approach (NPA) without the FLS function, if one of the following occurs:

- The FLS function is not available
  For more information on the FLS function availability, *Refer to PRO-NOR-SOP-190-10-GINT FLS Function Availability, and FLS Capability* .
- The FLS capability is not as required.
  For more information on the required FLS capability, *Refer to PRO-NOR-SOP-190-20-GGEN Required FLS Capability* .

The following table indicates the AP / FD modes, that the flight crew can use to fly the final approach:

Approach	Approach Selection in the FMS ARRIVAL Page	AP / FD Modes	For more information:
VOR VOR/DME	VOR	- NAV and FPA , or - TRACK and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for VOR, or VOR/DME approach*
NDB NDB/DME	NDB	- NAV and FPA , or - TRACK and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for VOR, or VOR/DME approach*
RNAV (including GPS)	RNV or GPS	NAV and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for RNAV Approach*
ILS G/S out	ILS	LOC and FPA	*Refer to PRO-NOR-SOP-190-10 Guidance for ILS G/S out, LOC only, LOC B/C approach*
LOC only	LOC		
LOC B/C	BAC	LOC B/C and FPA	

For ILS G/S out, LOC only, or LOC B/C approach, the flight crew will press the LOC pb to arm the LOC or LOC B/C mode.

INITIAL APPROACH

Applicable to: ALL

INITIAL APPROACH

L2 For additional training-oriented information, *Refer to FCTM/NO-180 Initial Approach.*

L1 APPROACH PHASE.....CHECK/ACTIVATE | PF-PM

L2
- *If the aircraft overflies the DECEL pseudo waypoint in NAV mode, the APPR phase activates automatically*
- *If the aircraft is in HDG or TRACK mode approximately 15 nm from touchdown, activate and confirm the APPR phase on the FMS ACTIVE/PERF page.*

L1 POSITIONING.....MONITOR | PF

L2
- *In NAV mode, use the VERT DEV on the PFD and on the DES panel of the ACTIVE/PERF page*
- *In HDG or TRACK mode, use the energy circle on the ND that shows the required distance to land.*

L1 MANAGED SPEED.....CHECK | PF

L2 *Check that the managed speed is active and monitor the target speed.*

Note:

The aircraft decelerates automatically at the DECEL pseudo waypoint  *when managed speed is active and NAV, LOC* or LOC mode is engaged.*

During the approach, the autothrust maintains the maneuvering speed of the current configuration (O, S, F, VAPP).
If ATC requires a particular speed, use selected speed. Adjust the aircraft configuration accordingly. When the ATC speed constraint (e.g. "maintain 170 kt to the outer marker") no longer applies, return to managed speed.
If ATC orders successive step descents down to the final approach flight path, use V/S or FPA mode and monitor the VERT DEV.

L1 SPEED BRAKES.....AS RQRD | PF

NAVIGATION ACCURACY

● **If GPS PRIMARY LOST:**

NAVIGATION ACCURACY.....MONITOR | PM

L2 *On the POSITION/MONITOR page, check that the required navigation accuracy is appropriate to the phase of flight.*
Perform a navigation accuracy check.

If the approach is stored in the navigation database, determine the strategy to be used in final approach, in accordance with the following table:

NAVIGATION ACCURACY	ND		AP/FD mode	TERR function
	PF	PM		
GPS PRIMARY ACCURACY HIGH ACCURACY LOW and ACCURACY check ≤ 1 nm	ARC or ROSE-NAV (1) with navaid raw data		NAV	ON
GPS PRIMARY LOST and ACCURACY LOW and ACCURACY check >1 nm	ROSE-VOR (2)	ARC or ROSE-NAV or ROSE-VOR with navaid raw data (3)	TRACK and FPA	Automatically OFF
GPS PRIMARY LOST and aircraft flying within an unreliable radio navaid area				

(1) For VOR, VOR/DME, NDB, or NDB/DME approach, one flight crewmember may select ROSE-VOR.
(2) For ILS G/S out, LOC only, or LOC B/C approach, select ROSE-LS.
(3) For ILS G/S out, LOC only, or LOC B/C approach, the flight crew will select ROSE-LS instead of ROSE-VOR.

Note: 1. During approach in overlay to a conventional radio navaid procedure, monitor raw data. If raw data indicates unsatisfactory managed guidance, use selected guidance.
2. The flight crew can continue to fly a managed approach, after the display of the NAV ACCUR DOWNGRADED message, if raw data indicates that the guidance is satisfactory.

L1 FLYING REFERENCE.....TRK-FPA | PF-PM

INTERMEDIATE / FINAL APPROACH

Applicable to: ALL

GENERAL

The preferred technique for flying an NPA approach without the FLS function is to fly a stabilized approach using:
- The AP and FD s
- The A/THR in SPEED mode
- The managed speed target.

The aircraft should intercept the final descent path in landing configuration, and at VAPP. For this purpose, the flight crew should insert VAPP, as a speed constraint, at the FAF .

The aircraft should be stabilized on the final descent path at VAPP in the landing configuration.

To be stabilized, all of the following conditions must be achieved prior to, or upon reaching this stabilization height:

- The aircraft is on the correct lateral and vertical flight plan,
- The aircraft is in the desired landing configuration,
- The thrust is stabilized, usually above idle, to maintain the target approach speed along the desired final approach path,
- There is no excessive flight parameter deviation.

If the aircraft is not stabilized on the approach path in landing configuration, at 1 000 ft above airfield elevation in instrument conditions, or at 500 ft above airfield elevation in visual conditions, or as restricted by Operator policy/regulations, a go-around must be initiated unless the flight crew estimates that only small corrections are necessary to rectify minor deviations from stabilized conditions due, amongst others, to external perturbations.

COLD WEATHER CONDITIONS

For altitude correction in low temperature conditions, *Refer to PER-OPD-AMILA ATMO Module Interface (Low altitude temperature corrections)* .

INTERMEDIATE APPROACH

■ **For RNAV Approach:**

GPS PRIMARY ON POSITION/MONITOR PAGE..... CHECK AVAILABLE | PM

● **If GPS PRIMARY LOST:**

RNP FOR APPROACH..... CHECK/ENTER | PM
HIGH ACCURACY..... CHECK | PM

L2 *Note: RNAV approach without GPS is subject to a specific operational approval.*

L1 ■ **For ILS G/S out, LOC only, or LOC approach:**

LOC pb ..... PRESS | PF-PM

L2 *The flight crew should press the LOC pb after the ATC clears the aircraft for the approach.*

L1 AP ENGAGEMENT..... CONSIDER | PF

APPROACHING GREEN DOT SPEED

L2 For additional training-oriented information on final approach, *Refer to FCTM/NO-180 Final Approach* .

For additional information on the associated standard callouts:
- *Refer to PRO-NOR-SCO Flaps or Gear Configuration*
- *Refer to PRO-NOR-SCO Flight Parameters* .

L1 FLAPS 1.....ORDER | PF
FLAPS 1.....SET | PM

Check the aircraft deceleration toward S speed.

TA pb .....TA ONLY or TA/RA | PM

L2 *The flight crew may use the TA ONLY mode in specific airports, and for specific procedures (identified by Operators) that may provide resolution advisories that are neither wanted or appropriate (e.g. closely-spaced parallel or converging runways).*

L1 ● **For ILS G/S out, LOC only, or LOC B/C approach:**
LOC or LOC B/C CAPTURE.....MONITOR | PF

L2 *The flight crew must always monitor the capture of the LOC / LOC B/C beam. During the capture phase, the associated deviation on the PFD and ND should move toward the center of the scale.*

BELOW VFE NEXT

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 FLAPS 2.....ORDER | PF
FLAPS 2.....SET | PM

Check the aircraft deceleration toward F speed.

AFTER FLAPS 2 SELECTION

L2 For additional information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 L/G DOWN.....ORDER | PF
L/G..... DOWN | PM
AUTO BRK.....CONFIRM | PM

L2 *If the runway conditions deteriorated since the approach briefing, consider the impact on the landing performance assessment and if there is a need for another braking mode.*
When BTV is selected, if the aircraft lands on a runway different from the runway selected for BTV settings, the autobrake reverts automatically to autobrake mode Hi in short final.

L1 GND SPLRS..... ARM | PM

EXTERIOR LIGHTS.....SET | PM

L2 *Set:*
- *The NOSE sw to T.O*
- *The RWY TURN OFF & CAMERA sw to ON*

AFTER LANDING GEAR DOWN SELECTION

● **Below VFE NEXT:**

L2 For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 FLAPS 3.....ORDER | PF
FLAPS 3.....SET | PM

WHEEL SD PAGE.....CHECK | PM

L2
- *The WHEEL SD page appears below 800 ft , or at landing gear extension*
- *Check the five landing gear green indications. At least one green triangle on each landing gear strut is sufficient to indicate that this landing gear strut is down and locked.*

L1 ● **Below VFE NEXT:**

L2 For more information on the associated standard callouts, *Refer to PRO-NOR-SCO Flaps or Gear Configuration* .

L1 FLAPS FULL.....ORDER | PF
FLAPS FULL.....SET | PM

Check that the aircraft decelerates to VAPP .

POSITION/FLIGHT PATH.....MONITOR/ADJUST | BOTH

L2 *For approach in overlay to a conventional radio navaid procedure:*
- *Use radio navaid raw data to monitor the lateral navigation*
- *Use altitude indication versus radio navaid position, adjust the FPA , as necessary, to follow the published descent profile, taking into account the minimum altitudes*
- *Do not use the VDEV on the PFD*
- *If the lateral navigation is not satisfactory, use the TRACK mode.*

For RNAV approach:
- *Monitor the crosstrack error on the ND*
- *Use altitude indication versus distance to the runway, adjust the FPA , as necessary to follow the published descent profile, taking into account the minimum altitudes*
- *If the lateral guidance is not satisfactory, perform a go-around.*

L1 A/THR.....CHECK IN SPEED MODE or OFF | PF

SLIDING TABLE..... STOWED | BOTH
LDG MEMO..... NO BLUE LINE | PM
CABIN..... READY | BOTH

L2 *Check CABIN READY on the EWD , or obtain the report from the chief purser: "Cabin ready for landing".*

L1 LANDING C/L..... COMPLETE | BOTH

Refer to PRO-NOR-C-L Landing

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L1
- **At FAF :**
  FPA..... SET | PF-PM
- **After the FAF :**
  GO-AROUND ALTITUDE..... SET | PF-PM

L2 *Set the go-around altitude on the AFS CP when the aircraft is below the go-around altitude.*

L1 FLIGHT PARAMETERS..... CHECK | PM

L2 *The PF announces any modification to the FMA .*
The PM announces any flight parameter deviation. For more information on the associated callouts, Refer to PRO-NOR-SCO Flight Parameters .

- **At 500 ft AGL (or RA) and below and if the flight crew selected BTV autobrake mode:**
  The PM may take advantage to adjust the ND RANGE selector to display the dry and wet lines on the Airport Navigation display, when the landing is positively considered.

AT MINIMUM+100 FT

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 ONE HUNDRED ABOVE..... MONITOR or ANNOUNCE | PM

1
2 **AT MINIMUM**

L2 For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 MINIMUM..... MONITOR or ANNOUNCE | PM

■ **If the flight crew obtains appropriate visual references:**

LANDING..... ANNOUNCE | CAPT

L2 *In selected guidance, if ground references are not visible when the aircraft reaches MDA / MDH , the pilot should make an immediate go-around. However, if the distance to the runway is not properly assessed, a step descent approach may be considered, and a level-off at MDA / MDH may be performed while searching for visual references. If the flight crew has no visual reference at the MAP , at the latest, the flight crew must initiate a go-around.*

L1 AP.....OFF | PF

L2 *At MDA / MDH - 50 ft , if the AP is still engaged, the DISCONNECT AP FOR LDG message pulses on the FMA .*

L1 FD OFF..... ORDER | PF
FDs.....OFF | PM
RUNWAY TRACK.....CHECK/ORDER | PF

L2 *If needed, the PF orders the PM to set the runway track on the AFS CP .*

L1 RUNWAY TRACK..... SET, AS RQRD | PM

L2 Maintain the aircraft at a stabilized flight path to flare.

L1 ■ **If the flight crew did not obtain appropriate visual references:**

GO-AROUND.....ANNOUNCE | CAPT

NPA Flown without FLS Function Procedure and Callouts

Initial Approach Procedure and Callout		
Localizer Approach		
EVENT	**PF**	**PM**
After LOC signal is identified by display or morse code	“CHECKED (*1) or ROGER(*2)	“0000 IDENTIFIED”
When cleared for approach	“LOCALIZER ARM”	
※: Manual Flight	“ARM LOCALIZER”	“LOCALIZER ARM”
Flying Reference change to TRK-FPA	“TRK-FPA SET”	
※: Manual Flight	“SET TRK-FPA”	“TRK-FPA SET”
When localizer is armed	“LOC BLUE”	“CHECKED”
When the first positive movement of localizer index	“CHECKED”	“LOCALIZER ALIVE”
When localizer is captured	“LOC STAR” “LOC”	“CHECKED” “CHECKED”
LS pb must on from 10,000ft for identify LOC display on the PFD		

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Initial Approach Procedure and Callout		
Localizer Approach		
EVENT	**PF**	**PM**
VOR/NDB/GPS Approach		
EVENT	PF	PM
After VOR/NDB signal is identified by display or morse code	"CHECKED (*1) or ROGER(*2)	"000 IDENTIFIED" "00 IDENTIFIED"
Approach clearance is received Flying Reference change to TRK-FPA	Follow lateral /vertical guidance NAV(TRK)/FPA "TRK / FPA ( ) SET"	 "CHECKED"
×: Manual Flight	"SET TRK-FPA( )"	
Intermediate Approach Procedure and Callouts		
In descent, Set intermediate altitude constraints on FCU	"NEXT ALTITUDE ( ) SET"	 "( ) BLUE"
After passing each step down fix, call out the next DME fix and altitude limits		
	"CHECKED"	"( ) DME ( )FEET"
At least before FAF or 1,500ft HAT	"LANDING CHECK LIST"	 "LANDING CHECK LIST COMPLETE"
Final Approach Procedure and Callouts		
At FAF	" FPA ( ) SET"	 "CHECKED"
×: Manual Flight	"SET FPA ( ) "	 "FPA ( ) SET" "CHECKED"
After the FAF	"GO AROUND ALTITUDE 0,000 SET"	 "0,000 BLUE"
×: Manual Flight	"SET GO AROUND ALTITUDE 0,000" "0,000 BLUE"	AFS CP ALT –Set GA ALT "0,000 SET" "0,000 SET"
At 1,000 ft HAT	 " STABILIZED" or "VMC –CORRECTING" " GO-AROUND/FLAPS"(*4)	"ONE THOUSAND ,CLEARED TO LAND" or "ONE THOUSAND ,CONTINUE" Call out any unstable conditions
At 500ft HAT ,	 " STABILIZED" or " GO-AROUND/FLAPS"	Monitor AUTO CALLOUT "FIVE HUNDRED" Call out any unstable conditions
At 100ft above entered MDA/DA	 "CHECKED"	Monitor AUTO CALLOUT "ONE HUNDRED ABOVE"

Continued on the following page

Continued from the previous page

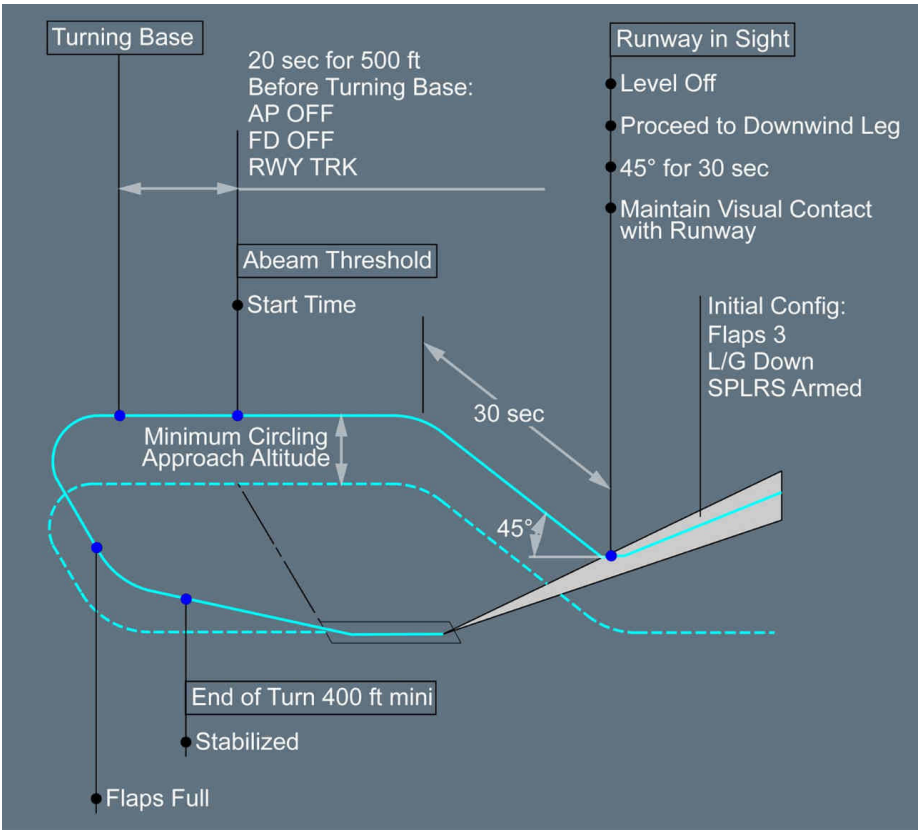
Initial Approach Procedure and Callout		
Localizer Approach		
EVENT	**PF**	**PM**
If ground reference are visible : Continue , as for a visual approach	- AP-- Off “SET RUNWAY TRACK”	- FD—Off (With PF’s order) “RUNWAY TRACK 000 SET” - LS pb--- As Required (With PF’s Order)
At Entered MDA/DA	CAPT “LANDING or GO-AROUND”	Monitor AUTO CALLOUT ‘MINIMUM”
• If ground reference are not visible : Initiate a go around Note : At MDA(H)/DA(H) -50ft , If the AP is still engaged the “DISCONNECTED AP FOR LDG” message will pulse on the FMA		

Circling Approach

LOW VISIBILITY CIRCLING APPROACH

Applicable to: ALL

Low Visibility Circling Approach



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VISUAL APPROACH

Applicable to: ALL

INTRODUCTION

L2 For training-oriented information, *Refer to FCTM/NO-200 Initial Approach* .

L1 Perform the approach on a nominal 3 ° glideslope using visual references. The approach should be stabilized by 500 ft above airfield elevation on the correct approach path, in the landing configuration at VAPP.

Method for Visual approach:
- The autopilot is not used
- FD s are OFF
- Use of FPV is recommended
- Use of A/THR is recommended with managed speed.

L2 This enables the ground speed mini function. For more information on ground speed mini function principle, *Refer to DSC-22-FG-60-20-A Introduction* .

L1 Bear in mind the possible risk of optical illusions due to hindered nightvision.

INITIAL/INTERMEDIATE APPROACH

The flight plan selected on the FMS should include the selection of the landing runway.
The downwind leg may also be part of the flight plan. This may produce a useful indication of the aircraft position in the circuit, on the ND.
However, the flight crew must use the appropriate visual references.

AT THE BEGINNING OF THE DOWNWIND LEG

APPROACH PHASE..... ACTIVATE | PM

L2 *On the APPR panel of the ACTIVE/PERF page, use the ACTIVATE APPR button to activate the approach phase.*

L1
FD OFF..... ORDER | PF
FD..... OFF | PM
FLYING REFERENCE..... TRK-FPA | PM
A/THR ACTIVE..... CHECK | PM

ON THE DOWNWIND LEG

Abeam threshold, extend the downwind leg to 45 s (± wind correction).
Turn into the base leg with a maximum of 30 ° of bank.
Descend with the appropriate FPA.

● **Below VFE NEXT:**

FLAPS 2..... ORDER	PF
FLAPS 2..... SET	PM

Check the aircraft deceleration toward F speed.

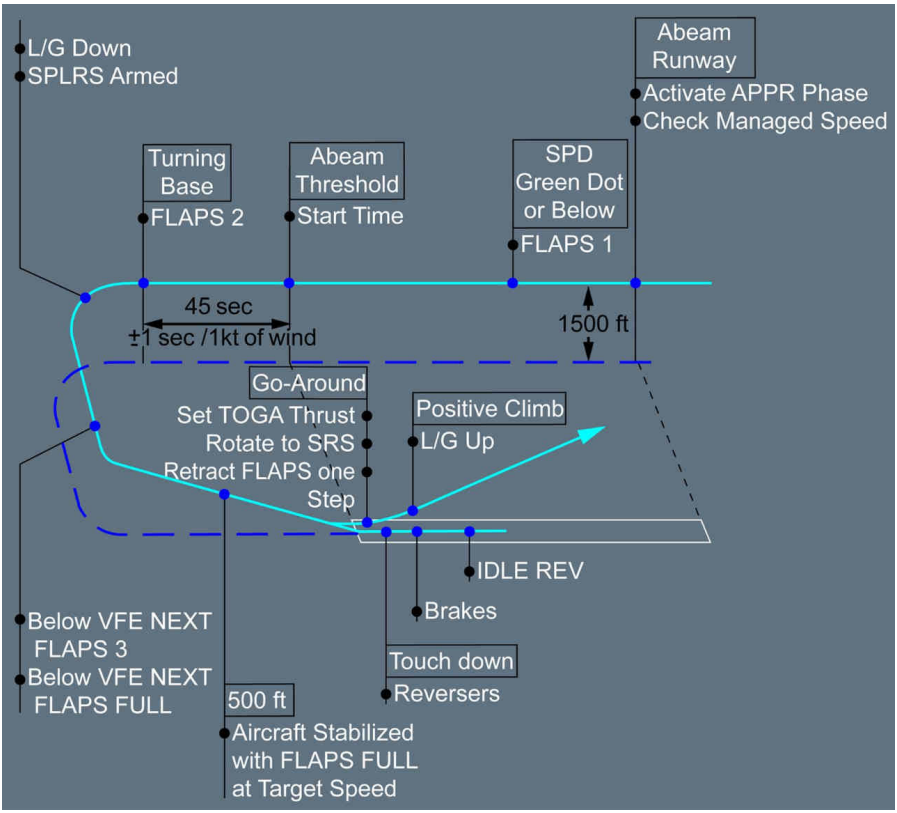
FINAL APPROACH

- The speed trend arrow and FPV help the flight crew to make timely and correct thrust settings (if in manual thrust) and approach path corrections. Avoid descent through the correct approach path with idle thrust. (Late recognition of this situation without a prompt thrust increase may lead to considerable speed decay and altitude loss).
- Have the aircraft stabilized by 500 ft AGL, on the correct approach path at VAPP (or ground speed mini) with the appropriate thrust applied.
  If the aircraft is not stabilized on the approach path in landing configuration at 500 ft above airfield elevation, or as restricted by Operator policy/regulations, a go-around must be initiated unless the crew estimates that only small corrections are necessary to rectify minor deviations from stabilized conditions due, amongst others, to external pertubations.
- Avoid any tendency to duck under in the late stages of the approach.
- Avoid destabilizing the approach in the last 100 ft to have the best chance of making a good touchdown at the desired position.

VISUAL APPROACH PATTERN

The following approach pattern is based on the assumption that managed speed is used:

Visual Approach Pattern



If in selected speed, select:
- S speed after FLAPS 1 selection
- F speed after FLAPS 2 selection
- VAPP after FLAPS FULL selection.

RECOMMENDED VISUAL APPROACH(KAL)

Applicable to: ALL

RECOMMENDED VISUAL APPROACH(KAL)

Background

As opening new runway in the Incheon International Airport, SRAA will plan to establish the Charted Visual Approach, and the company also has a plan to activate Visual Approach with the fuel save policy. Therefore, it is required to make a standard (recommended) procedure for Visual Approach.
* SRAA : Seoul Regional Aviation Administration

Objective
It is provided with stable Flight Pattern, Procedure, Callouts and the Automation Use Guidance for the safe visual approach and landing.

General

- This is the Recommended Visual Approach Procedure provided for the stabilized approach.
- Refer to K-Page and Airway Manual for the (Charted) Visual Approach Pattern, Procedure, etc. for each airport.
- For the box pattern approach, maintain downwind width of 2.5 mile (altitude 1,500 feet HAT) and adjust the pattern to make a final roll out at 3 NM from the threshold (altitude 1,000 ft HAT).
- If decided not to apply the Recommended Pattern and Procedure due to weather, traffic or a non-normal condition of an airplane, etc., fly in accordance with the Visual Pattern and procedure of POM.
- Use the automation system (FMGS, Autopilot, Flight Director, Autothrottle, etc.) as needed.
- GS/LOC can be used on final if ILS is operative normally and the required visual references for landing are identified.

Automation Use Policy

- Reference points for the approach can be inserted into FMGS and then used.
- Use of FINAL APP mode is not recommended.
- Disengage AP and turn off FD before starting descent on the base leg.
- LOC/GS can be used after final rollout.

CAUTION	Do not descend with following GS indication only although ILS is operative normally. If referring to LOC only to intercept final, it could be overshot.

Procedure and Callouts

- The PM provides the required information (altitude, airspeed, descent rate, etc.) at a right time with Standard Callouts and General Callouts.
- 'BEFORE LANDING Checklist' could be completed before base turning.
- When descending, make the continuous descent with approximate 3˚ FPA (700-800fpm).
- Accomplish the Standard Callout at 1,000 feet HAT and 500 feet HAT as same as the instrument approach.
- The PM uses the Recommended General Callouts properly to make a stable approach.

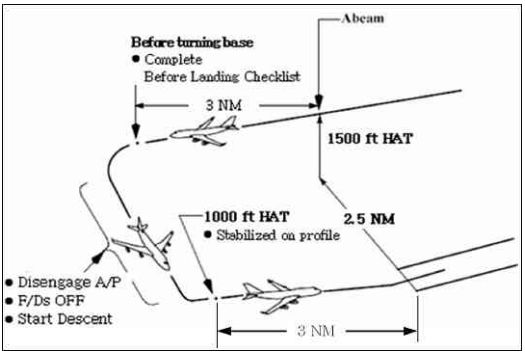
Recommened General Callouts

Position	PF	PM
DOWN WIND	"CHECK" or "TIME CHECK" (if needed)	"ABEAM END OF RUNWAY"
	"RH (LH) TURN, SET TRK OOO"	"BASE TURNING POINT" "TIME OUT, START TURN" (if needed)
BASE LEG	"CORRECTING"	Verify track miles. Call present altitude and vertical deviation("1,000, LOW")
FINAL TURN	"ROGER"	When approaching the final course. "APPROACHING FINAL COURSE"
ON FINAL	"STABILIZED" or "CORRECTING"	At 1000 feet HAT, called by GPWS "ONE THOUSAND" call, "CLEAR TO LAND (or CONTINUE)"
	"ROGER"	When intercepting the vertical profile. "APPROACHING GLIDE PATH"
	"STABILIZED" "CORRECTING" or "GO-AROUND /FLAPS"	At 500 feet HAT, called by GPWS "FIVE HUNDRED"
	"CORRECTING"	If required, call present V/S and vertical deviation with trend as appropriate. "V/S 1,000, (GOING) BELOW" "V/S 500, (GOING) ABOVE"
	"CORRECTING"	If required, call lateral deviation as appropriate. "LEFT (or RIGHT) OF COURSE"

RECOMMENDED VISUAL APPROACH PATTERN

Note: *The recommended visual approach pattern with one engine inoperative, note that the aircraft cannot maintain flight level with CONF-3 and landing gear down.*

Recommended visual approach pattern

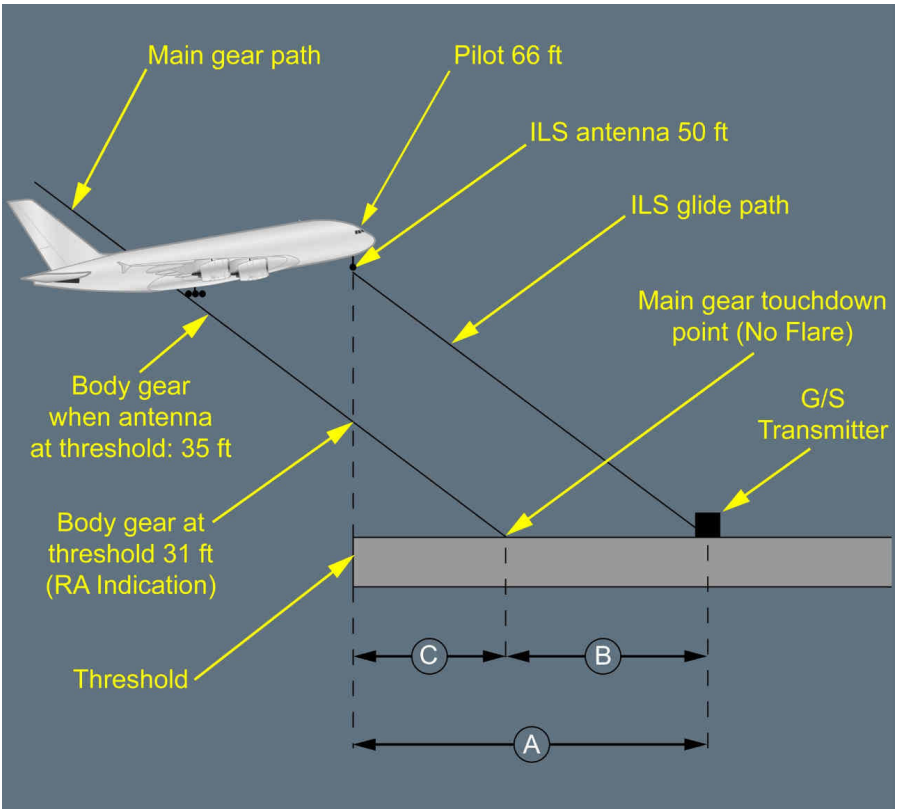


VISUAL SEGMENTS AND GEOMETRY

Applicable to: ALL

L2 ILS FINAL APPROACH AND LANDING GEOMETRY

ILS FINAL APPROACH AND LANDING GEOMETRY

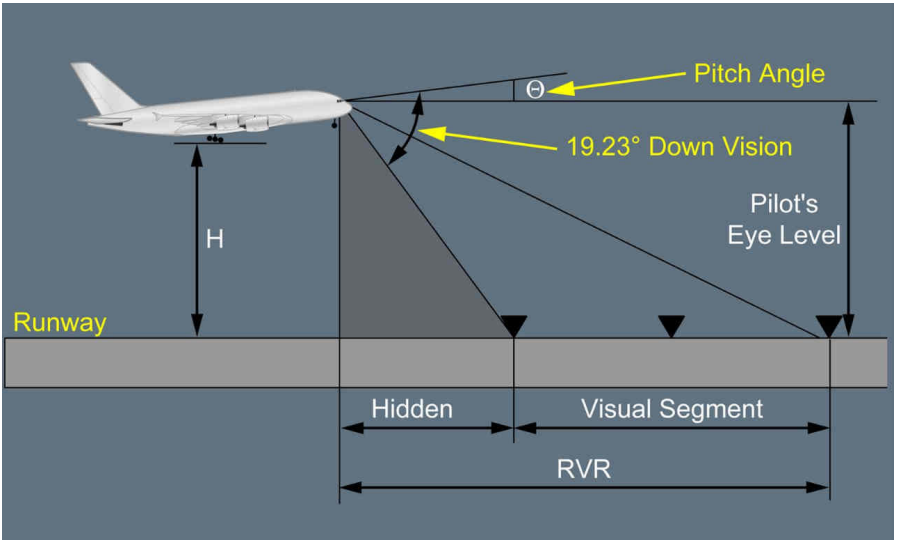


GLIDE PATH (°)	G/S TRANS [A]	[B]	TOUCHDOWN POINT [C]
2.5 °	349 m (1 145 ft)	130 m (427 ft)	219 m (718 ft)
3 °	291 m (955 ft)	118 m (389 ft)	173 m (567 ft)

Conditions:
- ILS antenna at 50 ft at runway threshold
- No flare
- Pitch angle: 2 °

L2 MINIMUM VISUAL GROUND SEGMENTS

MINIMUM VISUAL GROUND SEGMENTS



	CAT III		CAT II
H	15 ft	50 ft	100 ft
Pitch	3 °	2 °	2 °
Pilot's Eye Level	15 m (49 ft)	25 m (82 ft)	40 m (131 ft)
Visual Segment	30 m (98 ft)	60 m (197 ft)	90 m (295 ft)
Hidden	52 m (171 ft)	81 m (266 ft)	129 m (423 ft)
Minimum RVR	82 m (269 ft)	141 m (463 ft)	219 m (718 ft)

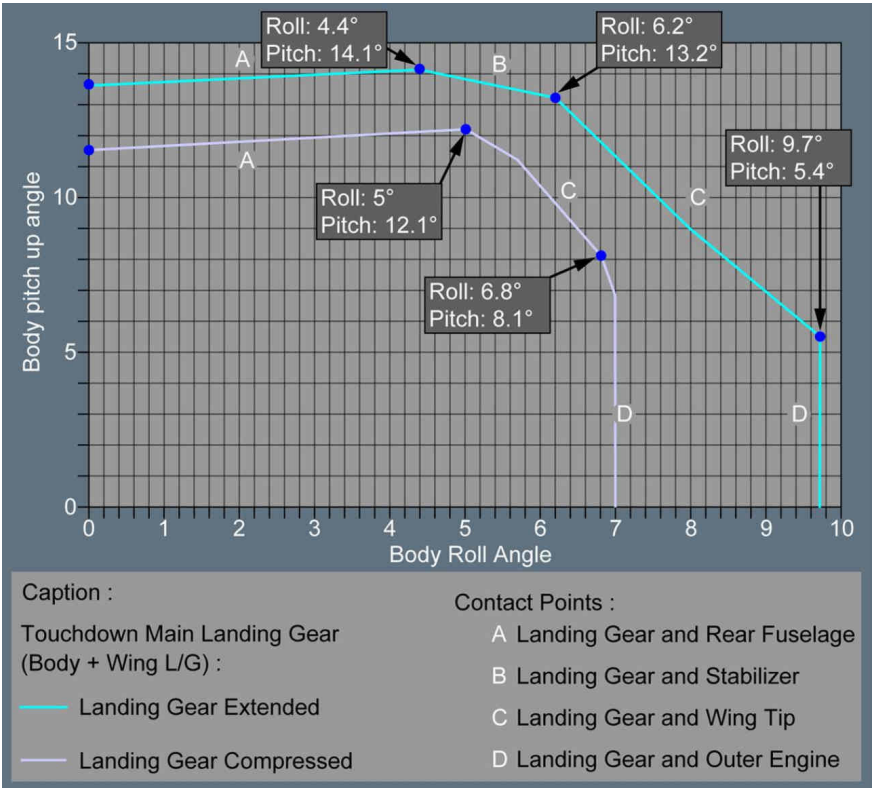
Example:
For a CAT III fail-operational landing with DH, and a minimum visual segment of 30 m, the Runway Visual Range (RVR) required at 20 ft RA is RVR = Obscured area (57 m (187 ft)) + visual segment (30 m (98 ft)) = 87 m (285 ft).

GROUND CLEARANCE

Avoid a high flare.
A tail strike occurs, if the pitch attitude exceeds 11.5 ° with the landing gear compressed, or 13.5 ° with the landing gear extended.
A wing tip or engine scrape occurs, if the roll angle exceeds 7 °.

L2 GROUND CLEARANCE DIAGRAM

Ground Clearance Diagram



LANDING

Applicable to: ALL

FOR MANUAL LANDING

AP..... OFF | PF

L2 *The flight crew should disengage the AP whatever the type of approach is.*
A/THR SPEED mode remains engaged.

L1 **AT AROUND 40 FT RA**

From a stabilized approach, the flare height is approximately 40 ft .

FLARE..... INITIATE | PF

L2 *For additional training-oriented information, Refer to FCTM/NO-220 Flare .*

L1 ATTITUDE..... MONITOR | PF

L2 *Rely on the "PITCH - PITCH" auto callout for pitch monitoring.*
If the bank angle reaches 5 ° , the PM should call out "BANK - BANK".

L1 THRUST LEVERS..... IDLE | PF

L2 *Move the thrust levers to idle, and begin a gentle progressive flare to enable the aircraft to touch down without a prolonged float.*
If the autothrust is engaged, it automatically disconnects when all the thrust levers are set to idle detent.
At 20 ft , an automatic "RETARD" callout will trigger, as a reminder.

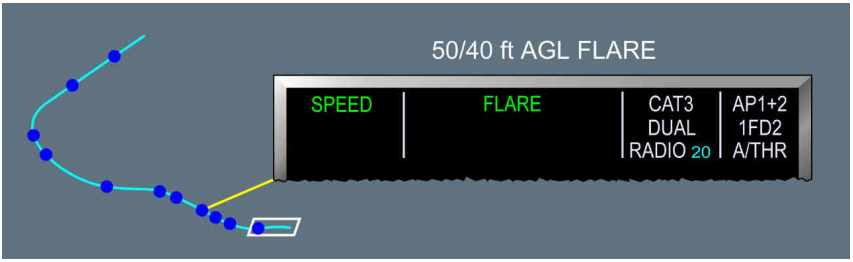
Note: *Ground spoilers extension is inhibited if two or more thrust levers remain above the IDLE detent.*

FOR AUTOMATIC LANDING

BETWEEN 50 FT AND 40 FT RA

FMA..... CHECK FLARE | PM

50/40 FT AGL FLARE



FLARE..... MONITOR | PF

L2 *For additional training-oriented information, Refer to FCTM/NO-220 Flare*

L1 **AT APPROXIMATELY 30 FT RA**

FMA..... CHECK THR IDLE | PM

L2 *The autothrust begins to decrease thrust to idle.*

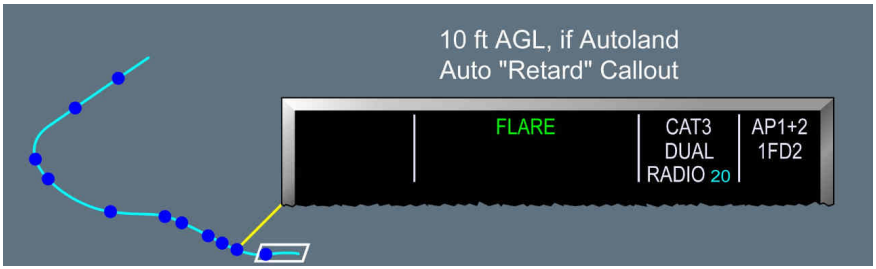
30 FT AGL IDLE



L1 **AT 10 FT RA**

L2 An automatic “RETARD” callout triggers.

20 FT AGL (or 10 FT) AUTO "RETARD" CALLOUT



L1 THRUST LEVERS..... IDLE | PF

L2 *The autothrust disconnects.*

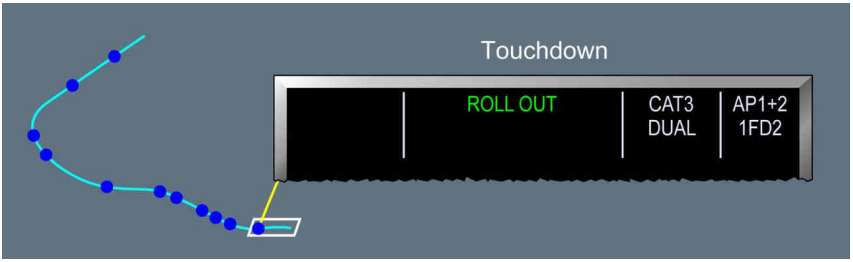
L1 LATERAL GUIDANCE..... MONITOR | PF

L2 *Monitor the lateral guidance by using external references.*

L1 **AT TOUCHDOWN**

FMA.....CHECK ROLL OUT | PM

TOUCHDOWN



- **If AUTO ROLL OUT:**

  AP..... KEEP ENGAGED, UNTIL END OF ROLL OUT | PF

DEROTATION

L2 For additional training-oriented information, *Refer to FCTM/NO-220 Derotation.*

L1
- **As soon as the main landing gear touches down:**

  DEROTATION..... INITIATE | PF

CROSSWIND LANDING

For training-oriented information on crosswind landing technique, *Refer to FCTM/FCTM.*

LANDING ROLL

L2 For additional training-oriented information, *Refer to FCTM/NO-220 Roll Out* .
For additional training-oriented information, *Refer to FCTM/NO-220-220-1 General* .
For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 REVERSER LEVERS..... PULL | PF

- *Select MAX REV immediately after the main landing gear touches down*

L2
- *If the airport regulations limit the use of the thrust reversers and if landing performance permits, select and maintain IDLE REV until the aircraft reaches the taxi speed*
- *In the case of a failure of one reverser, it is possible to use the opposite reverser*
- *If required for performance reasons, braking may begin before the nosewheel touchdown. However, if passenger comfort is the priority, the flight crew should delay braking on dry runways only, until the nosewheel touches down*

- *During rollout, avoid sidestick inputs (either lateral or longitudinal). If the flight crew encounters directional control problems, they should reduce the thrust to reverse idle until directional control is satisfactory*

L1 - *After the flight crew selects reverse thrust, they should perform a full stop landing.*

GND SPLRS EXTENDED.....ANNOUNCE | PM

L2 *Check the slats/flaps display on the lower part of the PFD , to ensure that the ground spoilers are extended.*

If no ground spoilers are extended:
- *Check that all thrust levers are set to IDLE detent*
- *Set both thrust reverser levers to MAX REV, and fully press the brake pedals.*

Note: If ground spoilers are not armed, ground spoilers will extend at reverser thrust selection.

L1 REVERSERS.....CHECK/ANNOUNCE | PM

L2 *Check that the EWD displays the expected reverser deployment (i.e. REV).*

L1 DIRECTIONAL CONTROL..... MONITOR/ENSURE | PF

L2 - *Monitor directional control, if the rollout is automatic*
- *Ensure directional control, if the rollout is manual. Use the rudder pedals for directional control.*

L1 *Do not use the nosewheel steering control handle before reaching taxi speed.*

● **If autobrake is selected:**

AUTO BRK.....CHECK/ANNOUNCE | PM

L2 *Check and announce BTV , BRK LO , BRK 2 , BRK 3 or BRK HI on the FMA .*

Note: If no ground spoilers are extended, the autobrake is not activated.

L1 ● **If no autobrake:**

BRAKES..... AS RQRD | PF

DECELERATION..... CHECK/ANNOUNCE | PM

L2 *The flight crew feels the deceleration. They confirm the deceleration by using the speed trend on the PFD*

L1 ● **If AUTO ROLLOUT, before 20 kt :**

AP..... DISCONNECT | PF

AT 80 KT

L2 For additional information on the associated callouts, *Refer to 00023038 **Not found** .*

EIGHTY KNOTS.....ANNOUNCE | PF

REVERSER LEVERS.....IDLE | PF-CAPT

CAUTION	*Avoid using high levels of reverse thrust at low speed, unless required due to an emergency or if "KEEP MAX REVERSE" sounds. The distortion of the airflow caused by gases that re-enter the compressor can cause engine stalls that may result in excessive EGT .*

FOR CAT II & CAT III OPERATIONS WITH BTV

- **If the aircraft ground speed is more than 10 kt when the aircraft enters the last 1 000 ft of the runway (i.e. the centerline runway lights are continuously red):**

L2 The runway center line is color coded. Continuous red lights mark the last 1 000 ft of a runway designed for CATII and CATIII operations.
In low visibility condition, the flight crew must select an exit 1 000 ft before the runway end.
In normal BTV operation, BTV deactivates when the aircraft reaches 10 kt ground speed. If the aircraft ground speed is more than 10 kt when the aircraft enters the last 1 000 ft of the runway, the flight crew must override BTV and apply manual braking as required.

L1 BTV AUTOBRAKE MODE.....OVERRIDE | PF
MANUAL BRAKING.....APPLY AS RQRD | PF

AT TAXI SPEED

REVERSER LEVERS.....STOW | PF

L2 *When the aircraft reaches the taxi speed, and before it leaves the runway, stow the reversers.*

L1

CAUTION	*Except in an emergency, do not use reverse thrust to control the aircraft speed while on taxiways.*

L2 *On taxiways, the use of reversers, even restricted to idle thrust, may have the following effects:*
- *The engines may ingest fine sand and debris that may be detrimental to the engines and airframe systems*
- *On snow-covered areas, snow will recirculate into the air inlet, and may cause an engine flameout or rollback.*

L1 AUTO BRK.....DISARM | PF

L2
- *The autobrake may be disarmed at pilot's discretion.*
- *The flight crew should use one of the A/THR Instinctive Disconnect pb to disarm the autobrake*
- *If BTV is active and the flight crew did not disarm manually the autobrake, the autobrake disarms automatically at 10 kt.*

LANDING ROLL PROCEDURE /CALLOUTS

L1

EVENT	PF	PM
After Touch Down		Check ground spoilers deployed on ECAM "GROUND SPOILERS"
If spoilers are not deployed automatically	Spoilers shall be deployed manually by Captain	" NO SPOILERS"
	Select MAX REV immediately after the main landing gear touches down	Check that the EWD displays the expected reverse deployment "REVERSE GREEN" If reverse deployment is not as expected, call 'NO REVERSE ENGINE2(3) or NO REVERSE" as appropriate
If auto brake is selected		Check and call the auto brake function on the FMA "BTV" "BRK LO" "BRK 2" "BRK 3" "BRK HI"
If auto brake is not selected	BRAKES ---------- as RQRD	"BRK HI"
		Deceleration check " DECEL" or "NO DECEL"
At 80kts	Reverse lever to IDLE	"EIGHT KNOTS"
At Taxi speed	Reverse STOW	
Before Taxi Speed	'AUTO PILOT OFF" - AUTO BRAKE disengage	
CAT II/III only	Use rudder pedals for directional control Do not use wheel steering control handle before taxi speed is reached	If off center line during roll out Call "STEER RIGHT / LEFT" (as appropriate)

Note: When using standard high speed turn off after landing , the aircraft speed must be reduced to at or below 50kts Before vacating a dry runway or at a safe taxi speed on a wet runway . For perpendicular turnoffs of approximately 90 degrees , the aircraft must be reduced to a safe taxi speed.

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GO-AROUND

Applicable to: ALL

GO-AROUND INITIATION

L2 For additional training-oriented information on considerations about initiation of go-around, *Refer to FCTM/NO-210 Considerations About Go-Around*
For additional training-oriented information on rejected landing, *Refer to FCTM/NO-210 Rejected Landing*
For additional information on the associated callouts, *Refer to PRO-NOR-SCO Summary for Each Flight Phase* .

L1 Simultaneously apply the following three actions:

THRUST LEVERS.....TOGA | PF

If TOGA thrust is not required, set the thrust levers to the TOGA detent then, retard the thrust levers as required. This enables to engage the GO-AROUND phase with the associated AP / FD modes.

L2 *Note: If the thrust levers are not briefly set to the TOGA detent, the FMS does not engage the GO-AROUND phase, and when the aircraft flies over, or close to the airport (less than 7 nm) the FMS will sequence the destination waypoint in the F-PLN .*

The GO-AROUND phase engages. The previously-flown approach is automatically strung back into the flight plan at the end of the missed approach procedure.
For additional training-oriented information on go-around phase, Refer to FCTM/NO-210 Go-Around Phase

L1 ROTATION.....PERFORM | PF

L2 *Initiate the rotation toward a pitch attitude of 12.5 ° (10 ° , if one engine is failed) to obtain a positive rate of climb, then follow the SRS pitch command bar.*

L1 GO-AROUND..... ANNOUNCE | PF

FLAPS..... RETRACT ONE STEP | PM
FMA.....CHECK/ANNOUNCE | PF

L2 *If the flight crew decides not to fly the flight plan after the go-around, they can use the HDG/TRK preset function. For more information, Refer to DSC-22-FG-100-GHOW How to Define a HDG/TRK Preset for Go-Around .*

L1 POSITIVE CLIMB.....ANNOUNCE | PM

L2 - *If the pitch attitude goes above 20 ° , or below 10 ° up:*
The PM announces: "PITCH"
- *If there is no climb rate:*
The PM announces: "SINK RATE"

L1 L/G UP.....ORDER | PF
L/G.....UP | PM
NAV or HDG.....AS RQRD | PF

AT GO-AROUND THRUST REDUCTION ALTITUDE (LVR CLB FLASHING ON FMA)

THRUST LEVERS.....CL | PF

Impacted DU: 00001054 Go-Around_AT GO-AROUND ACCELERATION ALTITUDE

AT GO-AROUND ACCELERATION ALTITUDE

Monitor that the speed target increases to initial CLB speed.

L2 *The FMS predictions are recovered, therefore:*
- *If HDG or TRACK mode is selected, OP CLB engages*
- *If NAV mode is engaged, CLB engages.*

● **If the speed target does not increase to initial CLB speed:**
AFS CP ALTITUDE .....CHECK | PF
ALT pb .....PRESS | PF

L1 FLAPS.....ORDER RETRACTION ON SCHEDULE | PF
FLAPS.....RETRACT ON SCHEDULE | PM
GND SPLRS.....DISARM | PM
EXTERIOR LIGHTS.....SET | PM
AFTER TAKEOFF/CLIMB C/L down to the line.....COMPLETE | BOTH

Refer to PRO-NOR-C-L After Takeoff/Climb

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L1 ● **If necessary, at the transition altitude:**

BAROMETRIC REFERENCE.....SET STD/CROSSCHECK | BOTH

L2 - *At the transition altitude, the barometric setting flashes on the PFD . The flight crew should set STD on the EFIS CP and on the ISIS SFD*
- *Crosscheck the barometric settings and the altitude indications*
  For additional training-oriented information on the VD in relation to the barometric reference setting, Refer to FCTM/NO-140 Vertical Display .
- *For additional information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 AFTER TAKEOFF/CLIMB C/L below the line.....COMPLETE | BOTH

Refer to PRO-NOR-C-L After Takeoff/Climb

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L1 Fly the published missed approach procedure, or prepare for a second approach, or divert as required.

L2 For additional training-oriented information on leaving the go-around phase, *Refer to FCTM/NO-210-210-1 General .*

L1 ● **To fly the published missed approach:**

Engage the NAV or the HDG mode.

L2 *NAV , HDG , or TRACK modes can be engaged only above 100 ft .*

L1 ● **When the flight crew established the aircraft path and obtained the clearance:**

The PF transfers his/her duties to the PM .

L2 *The PF can request the PM to update the FMS , depending on the situation.*
The following tasksharing remains the one decided since the beginning of the flight.

L1 ● **To prepare for a second approach:**

APPROACH PHASE.....ACTIVATE | PM with PF's order

L2 *Activate the APPR phase on the FMS ACTIVE/PERF page.*

If the APPR phase is not activated :
- *Managed approach speed is not available*
- *BARO/RADIO indications do not appear on the PFD .*

L1 ● **To divert to the alternate:**

FMS.....UPDATE | PM

L2 - *If the flight crew prepared an alternate flight plan, they should use ENABLE ALTN in the revision menu of the TO waypoint on the ACTIVE/F-PLN page*
- *If the flight crew prepared a SEC/F-PLN to the diversion airfield, they should swap the SEC F-PLN to the ACTIVE F-PLN.*
- *If the flight crew did not prepare any alternate, they should:*
  - *Initiate a selected climb*
  - *Perform a lateral revision to insert the new destination.*

L1 ● **When cleared to a waypoint:**

DIRECT TO.....PERFORM | PM with PF's order

L2 *The FMS automatically reverts to the CLB phase.*
The FMS automatically sets the CRZ FL at the default alternate CRZ FL (FL 220, or FL 310), and maintains the previous cost index.
The flight crew may adjust these targets if necessary.

L1 FMS.....CROSSCHECK | PF

● **If the ARPT NAV reset button on the overhead panel is pulled because the initial destination airport is not in the OANS database:**

Push the ARPT NAV reset button on the overhead panel.

L2 *This action enables the flight crew to check if the alternate airport is in the OANS database.*

GO – AROUND PROCEDURE AND CALLOUTS

L1

EVENT	PF	PM
At Go-Around initiation	Apply the three following action simultaneously - THRUST LEVER --- TO GA - ROTATION ------ PERFORM Call "GO-AROUND FLAPS" - Check and Call FMA "MAN TOGA SRS (GA TRK ATHR BLUE)"	 Flaps retract one step "FLAPS ONE STEP" "CHECK"
When the vertical speed indication is positive and the RA has increased		"POSITIVE CLIMB"

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EVENT	PF	PM
	"GEAR UP" Consider retarding to CL detent if TOGA thrust is not required	"GEAR UP"
Select NAV or HDG mode	"NAV MANAGE or HDG PULL"	"CHECKED"
x: Manual Flight	"MANAGE NAV or PULL HDG" "CHECKED"	"NAV MANAGE" or "HDG PULL"
At GA thrust reduction altitude LVR CLB flashing on FMA	Reduce thrust levers to CL position "LEVER CLIMB,THRUST CLIMB,AUTO THRUST"	
At GA acceleration altitude	Monitor that the speed target increases to initial CLB speed Retract flaps on schedule	
		Exterior Lights - Set NOSE sw and RWY TURN OFF sw to OFF - LAND lights may be left ON GNS SPLRS lever ---- DISARM
	"AFTER TAKEOFF/CLIMB CHECK LIST "	"DOWN TO THE LINE"

Impacted by TDU: 00022944 Go-Around_AT GO-AROUND ACCELERATION ALTITUDE

AT GO-AROUND ACCELERATION ALTITUDE

Monitor that the speed target increases to initial CLB speed.

L2 ● **If the speed target does not increase to initial CLB speed:**

AFS CP ALTITUDE	CHECK	PF
ALT pb	PRESS	PF
L1 FLAPS	ORDER RETRACTION ON SCHEDULE	PF
FLAPS	RETRACT	PM
GND SPLRS	DISARM	PM
EXTERIOR LIGHTS	SET	PM
AFTER TAKEOFF/CLIMB C/L down to the line	COMPLETE	BOTH

Refer to PRO-NOR-C-L After Takeoff/Climb

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L1 ● **If necessary, at the transition altitude:**

BAROMETRIC REFERENCE.....SET STD/CROSSCHECK | BOTH

L2 - *At the transition altitude, the barometric setting flashes on the PFD . The flight crew should set STD on the EFIS CP and on the ISIS SFD*
- *Crosscheck the barometric settings and the altitude indications*
  For additional training-oriented information on the VD in relation to the barometric reference setting, Refer to FCTM/NO-140 Vertical Display .
- *For additional information on the associated callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .*

L1 AFTER TAKEOFF/CLIMB C/L below the line.....COMPLETE | BOTH

Refer to PRO-NOR-C-L After Takeoff/Climb

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L1 Fly the published missed approach procedure, or prepare for a second approach, or divert as required.

L2 For additional training-oriented information on leaving the go-around phase, *Refer to FCTM/NO-210-210-1 General .*

L1 ● **To fly the published missed approach:**

Engage the NAV or the HDG mode.

L2 *NAV , HDG , or TRACK modes can be engaged only above 100 ft .*

L1 ● **When the flight crew established the aircraft path and obtained the clearance:**

The PF transfers his/her duties to the PM .

L2 *The PF can request the PM to update the FMS , depending on the situation.*
The following tasksharing remains the one decided since the beginning of the flight.

L1 ● **To prepare for a second approach:**

APPROACH PHASE.....ACTIVATE | PM with PF's order

L2 *Activate the APPR phase on the FMS ACTIVE/PERF page.*

If the APPR phase is not activated :
- *Managed approach speed is not available*
- *BARO/RADIO indications do not appear on the PFD .*

L1 ● **To divert to the alternate:**

FMS.....UPDATE | PM

L2 - *If the flight crew prepared an alternate flight plan, they should use ENABLE ALTN in the revision menu of the TO waypoint on the ACTIVE/F-PLN page*
- *If the flight crew prepared a SEC/F-PLN to the diversion airfield, they should swap the SEC F-PLN to the ACTIVE F-PLN.*
- *If the flight crew did not prepare any alternate, they should:*
  - *Initiate a selected climb*
  - *Perform a lateral revision to insert the new destination.*

L1 ● **When cleared to a waypoint:**

DIRECT TO.....PERFORM | PM with PF's order

L2 *The FMS automatically reverts to the CLB phase.*
The FMS automatically sets the CRZ FL at the default alternate CRZ FL (FL 220, or FL 310), and maintains the previous cost index.
The flight crew may adjust these targets if necessary.

L1 FMS.....CROSSCHECK | PF

GO – AROUND PROCEDURE AND CALLOUTS

EVENT	PF	PM
At Go-Around initiation	Apply the three following action simultaneously - THRUST LEVER --- TO GA - ROTATION ----- PERFORM Call "GO-AROUND FLAPS" - Check and Call FMA "MAN TOGA SRS (GA TRK ATHR BLUE)"	Flaps retract one step "FLAPS ONE STEP" "CHECK"
When the vertical speed indication is positive and the RA has increased	"GEAR UP" Consider retarding to CL detent if TOGA thrust is not required	"POSITIVE CLIMB" "GEAR UP"
Select NAV or HDG mode	"MANAGE NAV" or "PULL HDG XXX"	"CHECKED" or "HDG XXX BLUE"
×: Manual Flight	"MANAGE NAV" or "PULL HDG XXX"	"CHECKED" or "HDG XXX BLUE"

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EVENT	PF	PM
	"NAV" or "HDG XXX BLUE"	
At GA thrust reduction altitude LVR CLB flashing on FMA	Reduce thrust levers to CL position "LEVER CLIMB,THRUST CLIMB,AUTO THRUST"	
At GA acceleration altitude	Monitor that the speed target increases to initial CLB speed Retract flaps on schedule	
		Exterior Lights - Set NOSE sw and RWY TURN OFF sw to OFF - LAND lights may be left ON GNS SPLRS lever ---- DISARM
	"AFTER TAKEOFF/CLIMB CHECK LIST "	"DOWN TO THE LINE"

AFTER LANDING

Applicable to: ALL

GROUND SPOILERS

GND SPLRS..... DISARM | CAPT

FLAPS

FLAPS..... RETRACT | FO

Retract flaps, unless ice accretion is suspected.

L2 - *Set the FLAPS lever to 0*
- *If the approach was performed in icing conditions, or if the runway was contaminated with slush or snow, do not retract the flaps until after engine shutdown, and after the ground crew confirmed that the flaps and slats are clear of obstruction due to ice.*

Impacted DU: 00001062 After landing_APU

APU

APU MASTER SW pb-sw ..... ON | FO

APU START may be delayed until just prior to engine shutdown

● **If the APU flap is fully open (i.e. FLAP OPEN appears on the APU SD page):**

APU START pb ..... ON | FO

L2 *On the APU SD page, check that FLAP OPEN appears before setting to ON the APU START pb .*

For additional information, Refer to APU Start Sequence .

Note: If the APU start failed, Refer to APU Start Limitation.

Impacted by TDU: 00022520 After landing_APU

APU

APU MASTER SW pb-sw ..... ON | FO

APU START may be delayed until just prior to engine shutdown

APU START pb ..... ON | FO

L2 *Note: If the APU start failed, Refer to APU Start Limitation.*

ENG START

ENG START selector ..... CHECK NORM | FO

ANTI-ICE

ANTI ICE..... AS RQRD | FO

L2 *If engine anti-ice is used, carefully control taxi speed, particularly on wet or slippery surfaces because ground idle is increased.*

L1 *When taxiing in freezing fog conditions, if temperature is less than + 3 °C (37 °F), ice may accumulate on the engines fans.*
In order to shed the ice, the flight crew must apply the ice shedding procedure at least every 30 min of total taxi time before takeoff. The total taxi time is the cumulative time of the taxi-in time of the previous flight and taxi-out time of the next flight.
Therefore, because it is necessary to determine the remaining taxi-out time that is allowed for the next flight, the flight crew must record in the logbook the taxi-in time in freezing fog conditions. For more information, Refer to PRO-SUP-70-20 Ground Ice Shedding Procedure In Case Of Freezing Fog .

EXTERIOR LIGHTS

LAND sw ..... OFF | FO

L2 *Turn off the LAND lights, if they are not necessary.*

L1 STROBE sw ..... AUTO | FO

L2 *When leaving the runway, set the STROBE sw to AUTO.*

L1 OTHER EXTERIOR LIGHTS..... AS RQRD | FO

L2 *Set the NAV sw to ON, as required, to turn on the navigation and obstruction lights.*

L1 NOSE sw ..... TAXI | FO

L2 *Set NOSE sw to TAXI, when the aircraft leaves the runway.*

L1 RWY TURN OFF & CAMERA sw ..... AS RQRD | FO

L2 *Turn on the RWY TURN OFF& CAMERA sw at night for ETACS purpose.*

AIRPORT NAVIGATION

Direct visual observation out of the cockpit windows remains the primary means of taxiing. If there is a conflict between outside and the OANS display, the reference must be the outside view.

ND RANGE selector ..... ZOOM, AS APPROPRIATE | BOTH

L2 *If necessary, set the ND RANGE selector to ZOOM to activate the Onboard Airport Navigation System (OANS). Then, select ARC, ROSE, or PLAN mode, as appropriate.*

EFIS CONTROL PANEL (EFIS CP)

TAXI pb .....AS RQRD | BOTH

L2 *When the TAXI pb is set to ON, the ETACS appears on the PFD.*

L1 WX pb .....CHECK OFF | BOTH

L2 *The weather radar automatically switches off 60 s after landing.*

BODY WHEEL STEERING

After the last turn to the gate or the parking, ensure that the aircraft is rolling straight for at least 20 ft, in order to realign the Body Wheel Steering (BWS).

L2 *If the BWS is not aligned for parking, the L/G B/W STEER LOCK FAULT alert triggers.*

BRAKE TEMPERATURE

L2 For additional training-oriented information, *Refer to FCTM/NO-230 Brake Temperature.*

L1 BRAKE TEMPERATURE.....MONITOR | FO

L2 - *Check the brake temperature for discrepancies and high temperature on the WHEEL SD page*
- *Maintenance action is due in the following cases:*
  - *The temperature difference between two brakes on a same gear is above 150 °C, and the temperature of either brake is above or equal to 600 °C, or*
  - *The temperature difference between two brakes on a same gear is above 150 °C, and the temperature of either brake is below or equal to 60 °C, or*
  - *The difference between the average temperature of the left and right brakes is above or equal to 200 °C, or*
  - *A fuse plug has melt, or*
  - *The brake temperature exceeds 800 °C.*

AFTER LANDING CHECKLIST

AFTER LANDING C/L.....COMPLETE | BOTH

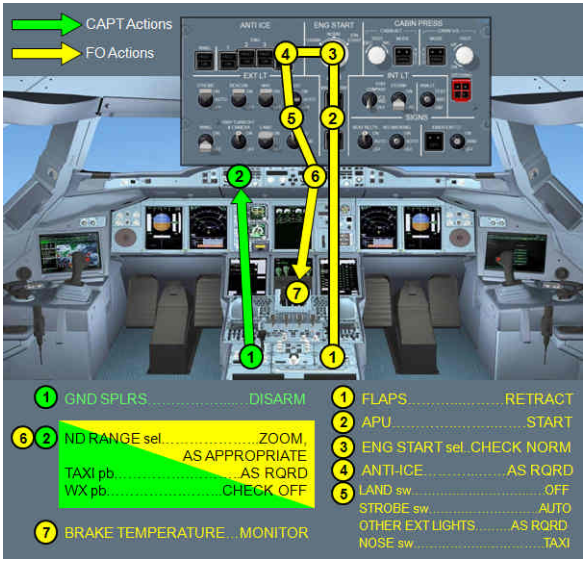
Refer to PRO-NOR-C-L After Landing

.

L2 *Ensure that the after-landing checks are completed after the aircraft cleared the runway.*
For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

L2 FLOW PATTERN

After Landing



AFTER LANDING PROCEDURE AND CALLOUTS

L1

EVENT	PF	PM
After Landing Check List should be commenced after vacating the active runway or entering taxiway		
	• Ground spoilers --- Disarm. (Signal for F/O to commence after landing items)	• Flaps ---------- Retract • APU ---------- Start (APU START may be delayed until just prior To engine shutdown) • ENG START selector ------- Check Normal • ANTI ICE --------- AS RQRD • LAND sw ---------- AS RQRD • STROBE sw ---------- Auto • NOSE sw ---------- Taxi
	• ND RANGE Selector -------- ZOOM , Appropriate • TAXI pb ------ AS RQRD (For ETACS Operation) • WX pb ---------- Check OFF • Brake Temperature ---------- Monitor	

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EVENT	PF	PM
	"AFTER LANDING CHECK LIST"	"AFTER LANDING CHECK LIST COMPLETE"

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PARKING

Applicable to: ALL

ANTI-ICE

ANTI-ICE.....OFF | FO

APU BLEED

APU BLEED pb .....ON | FO

L2 *Set the APU BLEED pb to ON immediately before engine shutdown to prevent engine exhaust fumes from entering the air conditioning.*

PARK BRK

PARK BRK..... ON | CAPT

L2 - *If the temperature of one brake is above 500 °C, avoid applying the parking brake, unless operationally necessary*
- *On the triple pressure indicator, check the left and right brakes pressures.*

ENG MASTERS 1, 2, 3 AND 4

ENG MASTERS 1, 2, 3 and 4..... OFF | CAPT

L2 - *After high thrust operations, such as the use of maximum reverse thrust at landing, operate the engine at idle for 3 min before shutting down the engine*

L3 *This 3 min period thermally stabilizes the hot section of the engine.*

L2 *This 3 min period can include operational time at idle, such as taxiing.*
Depending on the circumstances (e.g. urgent need to open a cargo door or to connect the stairs), the flight crew may decide to shut down the engines regardless of the time at idle.
- *Check that engine parameters decrease*
- *The DOOR/OXY SD page appears*
- *If the APU is not available, connect external power before shutting down the engines*
- *After the last engine shutdown, an automatic test of the fuel crossfeed valves, the LP valves, and the heat exchanger valves, begins. If a failure is detected, the associated ECAM alert triggers, and should be entered in the logbook. This test lasts approximately 2 min.*

ELAPSED TIME

ELAPSED TIME (if applicable)..... STOP | FO

SEAT BELTS

SEAT BELTS sw .....OFF | CAPT

SLIDES

SLIDES DISARMED.....CHECK | CAPT

L2 *Check that the slides are disarmed on the DOOR/OXY SD page. If any slide is not disarmed, warn the cabin crew*

EXTERIOR LIGHTS

BEACON sw .....OFF | CAPT

L2 *Turn off the BEACON lights when all engines spooled down.*

L1 OTHER EXTERIOR LIGHTS..... AS RQRD | CAPT

GROUND CONTACT

GROUND CONTACT.....ESTABLISH | CAPT

L2 - *The flight crew should establish communication with the ground crew*
- *Check that chocks are in place.*

FUEL PUMPS

FUEL PUMPS.....OFF | PM

HUD

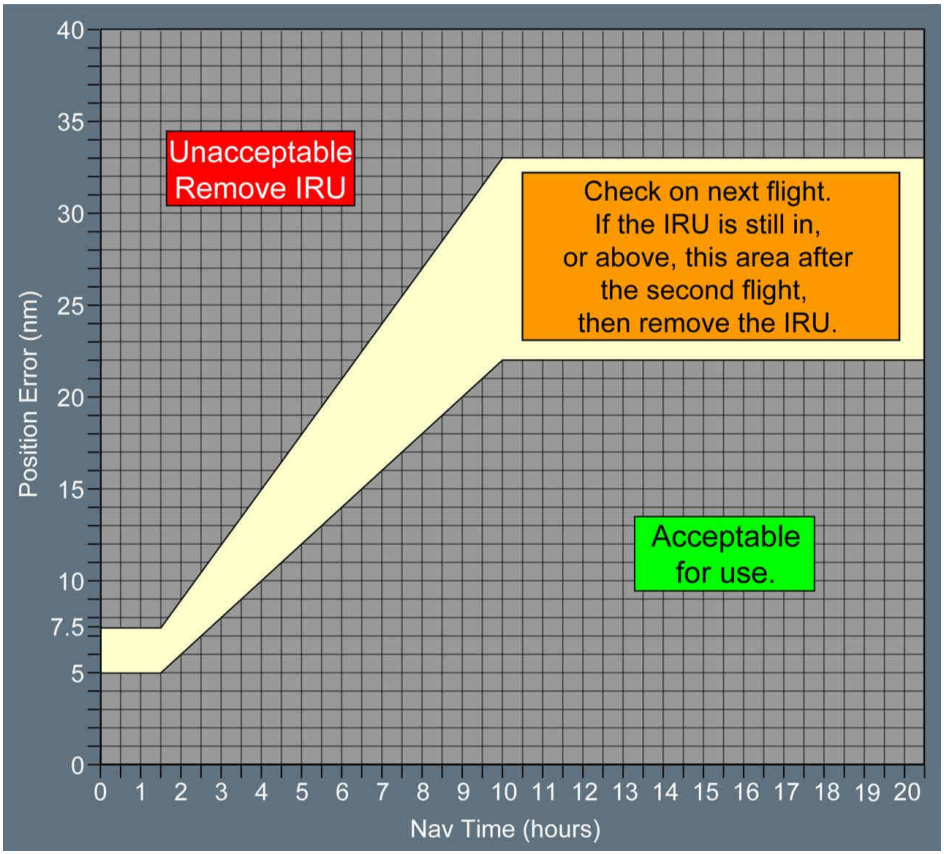
HUD.....STOW | CAPT

IRS PERFORMANCE

IRS PERFORMANCE..... CHECK | PM

- *Drift check:*
  - *On the FMS POSITION/MONITOR page, check that the drift does not exceed the following:*

IRS Performance



- *Residual ground speed check:*

  On the FMS POSITION/IRS page, select IRS1, IRS2, IRS3 and check the GND SPD:
  - *If the GND SPD is above 15 kt: Report. The excessive deviation must be confirmed after two consecutive flights*

- *If the GND SPD is above 21 kt: Report. The IRU must be removed.*

FUEL QUANTITY

FUEL QUANTITY..... CHECK | PNF

L2 *Check that the sum of the fuel on board and the fuel used is consistent with the fuel on board at departure. If the flight crew detects a discrepancy that is not usual, maintenance action is due.*

PARKING CHECKLIST

PARKING C/L..... COMPLETE | BOTH

Refer to PRO-NOR-C-L Parking

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

PARK BRK

PARK BRK..... AS RQRD | CAPT

If the ECAM displays the BRAKES BRAKE HOT alert, the flight crew should release the parking brake when the wheel chocks are in position.

Note: When winds including gusts exceed 30 knots or, if slope of parking ramp is excessive, leave parking brake set.

L2 *Releasing the parking brake prevents the critical structures from being exposed to high temperatures for an extended period of time. However, the flight crew may keep the parking brake applied if operationally required (e.g. slippery tarmac).*

ONBOARD INFORMATION SYSTEM (OIS) CLOSURE

OIT SIDE sw ..... FLT OPS | BOTH
ALL APPLICATIONS..... CLOSE | BOTH

L2 *Close all the applications on the laptops.*

L1 EXIT SESSION..... PERFORM | BOTH

L2 *The exit session initializes again the FLT OPS STS page on the laptops for the next flight.*

LOGBOOK

OIT SIDE sw ..... NSS AVNCS | BOTH

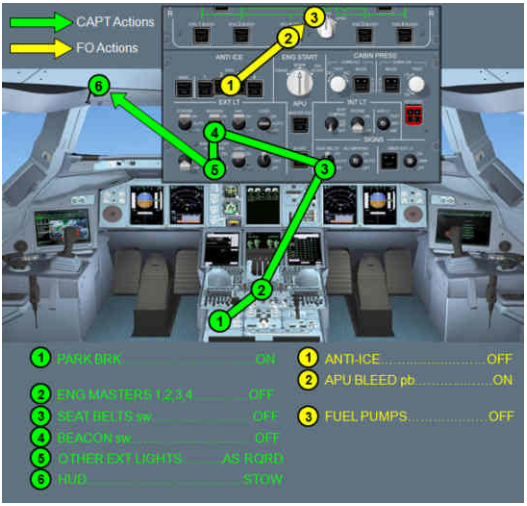
L2 *Set the OIT SIDE sw to NSS AVNCS in order to access the Logbook.*

L1 FLIGHT CLOSURE.....PERFORM | CAPT

L2 *Before the electronic flight closure, check that VHF 3 DATA mode is active.*

On the Technical Logbook:
- *Enter the postflight parameters*
- *Ensure that the cabin crew finished recording all cabin defects*
- *Check that all defects have been recorded*
- *Record the taxi-in time in freezing fog conditions. For more information, Refer to PRO-SUP-70-20 Ground Ice Shedding Procedure In Case Of Freezing Fog*
- *Close the flight, sign electronically the flight closure report.*

Parking



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2 **PARKING PROCEDURE / CALLOUTS**

EVENT	CAPT	F/O
When approaching GATE	"CHECK"	"APPROACHING GATE_____"
		"MARSHALLER INSIGHT" (in the event a marshaller's guidance is provided)
	"CHECK" "LEFT CLEAR"	"RIGHT CLEAR"
		"BRAKE PRESSURE NORMAL" (after checking accumulator pressure)

Continued on the following page

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EVENT	CAPT	F/O
	"CHECK"	
Verify displayed aircraft type (if available)	"CHECK"	"A380-800"
	"CHECK"	"SPEED_____" (Make a speed callout whenever necessary)
When Approaching to STOP	"CHECK"	"AMBER" (In case of a color indicator, when green turns to amber), or "APPROACHING TO STOP POSITION"
At stop position	"STOP" "PARKING BRAKE SET"	"STOP" "CHECK"

SECURING THE AIRCRAFT

Applicable to: ALL

Impacted by TDU: 00021519 Securing the aircraft_GENERAL

GENERAL

The fight crew should apply the following procedure as per company policy.
Airbus recommends performing the following procedure when the aircraft is left unattended: I.e. no qualified flight crew or ground crew are in the cockpit to supervise and monitor the aircraft systems.
If the aircraft is secured for cold soak: *Refer to PRO-SUP-91-10-40 Securing the Aircraft for Cold Soak* .

Impacted DU: 00005212 Securing the aircraft_GENERAL

GENERAL

The fight crew should apply the following procedure as per company policy.
Airbus recommends performing the following procedure when the aircraft is left unattended: I.e. no qualified flight crew or ground crew are in the cockpit to supervise and monitor the aircraft systems.
If the aircraft is secured for cold soak: *Refer to PRO-SUP-91-10-40 Securing the Aircraft for Cold Soak* .

FMS DATA RETENTION AT AIRCRAFT POWER OFF

When the APU is off and all the batteries are switched off at least 10 s after switching off the external power, the FMS records the following data for the next flight:
- PERF and IDLE factors
- Stored waypoints, routes, navaids and runways
- Entered climb and descent winds
- Entered data on the INIT page, PERF page, SEC INDEX page, etc.

However, if the batteries are switched off less than 10 s after switching off the external power, or if the batteries are switched off before switching off the external power, the FMS does not record these data.

PARK BRK

PARK BRK..... ON | CM1

L2 *Keep the parking brake on in order to reduce the rate of the hydraulic leak in the LEHGS accumulators.*

OXYGEN CREW SUPPLY

OXYGEN CREW SUPPLY pb-sw ..... OFF | CM2

ADIRS (1+2+3)

ADIRS (1+2+3)..... OFF | CM1

L2 *The flight crew should not turn off the ADIRS during transits at latitudes above 70 °N, in order to avoid excessive alignment time.*
After turning off the ADIRS, wait at least 10 s before turning off the electrical supply, in order to ensure that the ADIRS will memorize the latest data.

EXTERIOR LIGHTS

EXTERIOR LIGHTS..... OFF | CM2

GROUND SERVICING

GND SERVICING pb-sw ..... AS RQRD | CM2

L2 *If the ground crew or the servicing personnel requires electrical power, consider setting to ON the GND SERVICING pb-sw (in the forward cabin, near the M1 door), before powering off the aircraft.*

APU BLEED

APU BLEED pb-sw ..... OFF | CM2

EXT POWER

EXT pb-sw ..... AS RQRD | CM2

At least two EXT power units are necessary to supply the entire electrical network.

L2 *If the electrical charge of at least one APU generator is above 50 %:*
- *At least three EXT power units are necessary to supply the aircraft with the APU OFF*
- *If only two EXT power units are available, it is recommended to keep the APU ON or to reduce the load demand for a while (e.g. by setting to OFF the CAB FANS pb-sw and COOLG pb-sw).*

Note: These temporary actions ensure that enough electrical power is available during a high electrical demand (e.g. to operate the cargo doors).
When the flight crew sets to OFF the CAB FANS pb-sw and the COOLG pb-sw, no degradation of the galley cooling system and of the air conditioning is expected for a few minutes, i.e. the time necessary to operate the doors.
As soon as it is possible, the flight crew should set to ON the CAB FANS pb-sw and the COOLG pb-sw.

APU

APU MASTER SW pb-sw ..... OFF | CM2

L2 *Turn off the APU after all passengers disembarked.*

EMER LIGHTS AND SIGNS

EMER EXIT LT sw ..... OFF | CM2

L2 *The flight crew must set to OFF the EMER EXIT LT sw to avoid battery discharge, when:*
- *Only batteries supply the aircraft, or*
- *No electrical power supplies the aircraft (i.e. external power, APU and all batteries are set to OFF).*

L3 *When EMER EXIT LT sw is set to ARM or ON and the aircraft is not supplied, the Emergency lighting in cabin operates. In this case the HOT BUS via the BAT 1, the ESS BAT and the internal EPSU batteries supply the emergency lighting.*
For more information about emergency lighting, Refer to DSC-33-40-10-GCABI Electrical Supply .

L1 NO SMOKING sw ..... OFF | CM2

L2 *The flight crew must set to OFF the NO SMOKING sw to avoid battery discharge, when only the batteries supply the aircraft.*

ONBOARD INFORMATION SYSTEM (OIS)

ALL LAPTOPS..... OFF | BOTH

L2 *Switch off all laptops only if the aircraft is left unattended.*
To turn off the laptops, click on the SWITCH OFF LAPTOP button on the LOGIN page of the FLT OPS Domain.

Note: The Network Server System (NSS) automatically shuts down at aircraft power down.

L1 OIT knob .....OFF | BOTH

L2 *The flight crew should switch off both OITs.*

SECURING THE AIRCRAFT CHECKLIST

SECURING THE AIRCRAFT C/L..... COMPLETE | BOTH

Refer to PRO-NOR-C-L Securing the Aircraft

L2 *For additional training-oriented information, Refer to FCTM/OP-40-40-2-40-2-2 Introduction .*
For additional information on the associated standard callouts, Refer to PRO-NOR-SCO Summary for Each Flight Phase .

BAT 1, ESS, 2 AND APU BAT

ALL BAT pb-sw (BAT 1, ESS, 2, APU BAT).....OFF | CM2

L2 *Wait until the APU flap is fully closed (i.e. around 2 min after the APU is set to OFF) before turning off the APU battery. This ensures that the APU shutdown sequence is entirely completed.*

COCKPIT WAY LIGHT

COCKPIT WAYLIGHT pb-sw ..... ON, IF NECESSARY | CM2

L2 *If the aircraft is not electrically supplied, the flight crew can use the cockpit way light in order to leave the aircraft. The cockpit way light goes off automatically after 60 s . For more information, Refer to DSC-33-40-10 Emergency Lighting in the Cockpit .*

INTRODUCTION

Applicable to: ALL

The following normal checklists illustrate:
- Detected items already completed
- Non-detected items, before they are manually selected with the tick pb on the ECAM Control Panel (ECP).

L2 For additional training-oriented information, *Refer to FCTM/OP-40-40-2-40-2-2 Introduction* .
For additional information on the checklist content, *Refer to DSC-31-40-10 Checklists (C/L)* .

BEFORE START

Applicable to: ALL

SECURITY INSPECTION ..... COMPLETE (BOTH)
CKPT PREP..... COMPLETE (BOTH)
OXYGEN..... _____SET (BOTH)
GEAR PINS & COVERS.....REMOVE
FUEL QTY..... ___ LBS ± ___ LBS
T.O DATA..... SET
ALTIMETER..... _____INHG/HPA SET & X-CHECKED (BOTH)
PARK BRK.....SET
SIGNS ON/AUTO
ADIRS NAV

WINDOWS/DOORS..... CLOSE (BOTH)
BEACON ON
C/L COMPLETE

AFTER START

Applicable to: ALL

A-ICE.....AS RQRD

- **If ECAM status not normal:**
  ECAM STS.....CHECK
- **If ECAM status normal:**
  ECAM STS: NORMAL

F/CTL..... CHECK (BOTH)

Continued on the following page

AFTER START (Cont'd)

RUDDER TRIM NEUTRAL

L2 *The rudder trim at neutral appears completed (i.e. in green) when the rudder trim position is below ± 0.2 °.*

L1 PITCH TRIM.....CHECK
GROUND EQUIPMENT .....CLEAR(BOTH)
C/L COMPLETE

BEFORE TAKEOFF

Applicable to: ALL

FLIGHT INSTRUMENTS.....CHECK (BOTH)
TAKEOFF BRIEFING.....CONFIRM
V1 / VR / V2 / FLEX TEMP.....CHECK (BOTH)

T.O

SIGNS ON
SPLRs : ARM
FLAPS T.O
AUTO BRAKE RTO
T.O CONFIG NORMAL

CABIN CREW.....ADVISE
PACK 1+2..... AS RQRD
EXTERIOR LIGHTS ..... SET
C/L COMPLETE

AFTER TAKEOFF/CLIMB

Applicable to: ALL

LDG GEAR UP
FLAPS 0
PACK 1+2 ON
APU MASTER SW OFF

LAND SW..... OFF
ALTIMETER.....STANDARD SET & X-CHECKED (BOTH)
C/L COMPLETE

APPROACH

Applicable to: ALL

CABIN CREW .....ADVISE
LANDING DATA ..... SET (BOTH)
AUTO BRAKE / BTV ..... AS RQRD
LANDING BRIEFING ..... CONFIRM

- **If ECAM status not normal:**
  ECAM STS.....CHECK

- **If ECAM status normal:**
  eCAM STS: NORMAL

ALTIMETER..... _____INHG/HPA SET & X-CHECKED (BOTH)
LAND SW .....ON
MINIMA..... _____SET (BOTH)
SEAT BELTS ON
C/L COMPLETE

LANDING

Applicable to: ALL

A/THR MODE.....AS RQRD

LDG

SIGNS ON
LDG GEAR DOWN
FLAPS LDG

L2 *The FLAPS LDG appears completed (i.e. in green), when the flaps lever position is in accordance with the landing configuration, entered on the APPR panel of the FMS ACTIVE PERF page.*

L1 SPLRs : ARM
C/L COMPLETE

AFTER LANDING

Applicable to: ALL

EXTERIOR LIGHTS ..... SET
SPLRs : DISARM
FLAPS 0
APU : START

Continued on the following page

AFTER LANDING (Cont'd)

C/L COMPLETE

PARKING

Applicable to: ALL

PARK BRK ..... ON
EXT LT..... AS RQRD
APU BLEED ON
ALL ENGs OFF
FUEL PMPs OFF
SEAT BELTS OFF
C/L COMPLETE

SECURING THE AIRCRAFT

Applicable to: ALL

ADIRS..... OFF
OXYGEN OFF
APU BLEED OFF
EMER EXIT LT OFF
SIGNS OFF
APU..... OFF
ALL 3 LAPTOPS..... OFF
ALL 4 BATs ..... OFF
C/L COMPLETE

COMMUNICATIONS AND STANDARD TERMS

Applicable to: ALL

Standard phraseology is essential to ensure an effective flight crew communication. The phraseology should be concise and exact. The following section lists the callouts that the flight crew should use as standard callouts. They supplement the callouts identified in the SOP. These standard Airbus callouts are also designed to promote situational awareness, and to ensure the flight crew understanding of systems and their use in line operation.

CHECKLIST CALLOUTS

Applicable to: ALL

- "CHECK" is a command for the other flight crewmember to check an item
- "CHECKED" is a response to indicate that an item is checked
- "CROSSCHECKED" is a callout verifying information from both flight crew's stations.
- "ROGER" is a response that an item has been understood.

If a checklist should to be interrupted, announce "STANDBY CHECKLIST".
Announce "CONTINUE CHECKLIST" for the continuation of the checklist.
After a checklist is completed, announce "__CHECKLIST COMPLETE".

ACTIONS COMMANDED BY PF

Applicable to: ALL

The following commands do not necessarily initiate a guidance mode change, e.g. selected to managed, or managed to selected. The intent is to ensure clear, consistent, and standard communication between crewmembers. All actions performed on the AFS CP and FMS must be checked on the PFD and ND: E.g. "FL 350 blue", "FL 200 magenta". The flight crew should ensure that the correct AFS CP control is used, then verify the indications on the PFD/ND.

"SET"

The "SET" command means using an AFS CP knob to set a value, but not to change a mode. "SET" is performed by only rotating the appropriate knob.

Examples:
- "SET GO AROUND ALTITUDE__"
- "SET QNH __"
- "SET FL __"
- "SET HDG __".

"MANAGE/PULL"

The “MANAGE” command means pushing an AFS CP knob to engage, or arm, a managed mode or target.
The “PULL” command means pulling an AFS CP knob to engage a selected mode or target.

Examples:
- “PULL HDG 090”: The flight crew pulls and turns the HDG/TRK knob
- "MANAGE NAV": The flight crew pushes the HDG/TRK knob
- “FL 190 PULL”: The flight crew turns and pulls the ALT knob
- “FL 190 MANAGE”: The flight crew turns and pushes the ALT knob
- “PULL SPEED 250 kt ”: The flight crew pulls and turns the SPD/MACH knob
- “MANAGE SPEED”: The flight crew pushes the SPD/MACH knob.

Note: If the value was previously set, there is no requirement to repeat the figure. Simply announce e.g. "PULL HDG", "PULL SPEED", "FL PULL".

The V/S / FPA knob has no managed function. The standard callouts for the use of this knob are the followings:
- "V/S Plus(Minus) 700 PULL", or
- "FPA Minus 3 ° PULL": The flight crew turns and pulls the V/S / FPA knob.

"PRESS ALT"

The ALT pb enables to immediately start a level off. The standard callout for the use of the ALT pb is "PRESS ALT".

"ARM"

The “ARM __” command means arming a system by pushing the specified AFS CP control.

Examples:
- “ARM APPROACH”
- “ARM LOC.”

"ON/OFF"

The simple "ON" or "OFF" command is used for the autopilot, the flight director, the A/THR and the velocity vector.

FMA

Applicable to: ALL

The PF should announce any FMA change, unless specified differently (e.g. CAT II & III task sharing).

Therefore, the PF should announce:
- All armed modes with their associated color (e.g. blue, magenta): E.g. “G/S blue”, “LOC blue”
- All active modes without their associated color (e.g. green, white): E.g. “NAV”, “ALT”.

The PM should check and respond “CHECKED” to all FMA changes announced by the PF.

ALTITUDE

Applicable to: ALL

The PM announces “ONE THOUSAND TO LEVEL” when passing 1 000 ft before the cleared altitude or FL, and the PF announces “CHECKED”.

FLAPS OR GEAR CONFIGURATION

Applicable to: ALL

FLAPS CALLOUTS

FLAPS Configuration	Callout
1	"FLAPS ONE"
1+F	"FLAPS ONE"
0	"FLAPS ZERO"

The flight crewmember replies the following callout when he/she selects the new FLAPS position, e.g.:

	Callout	Remark
PF	″FLAPS ONE″	
PM	″SPEED CHECKED″	The PM checks that the speed is: - Above S or F speed and accelerating, during takeoff - Below VFE next and decelerating during approach.
	″FLAPS ONE″	The PM selects the FLAP lever position. The PM checks the blue FLAPS lever position on the PFD to confirm the correct selection, then replies.

GEAR CALLOUTS

	Callout	Remark
PF	″GEAR UP(DOWN)″	
PM	″GEAR UP(DOWN)″	The PM selects the landing gear lever position. The PM checks the red lights landing gear indicator lights on the centre instrument panel to confirm the landing gear operation, then replies.

FLIGHT PARAMETERS

Applicable to: ALL

The PM announces:
- “SPEED” if the speed decreases below the speed target -5 kt, or increases above the speed target +10 kt
- “PITCH” if the pitch attitude increases above 7 ° nose up, or below -3 ° nose down
- “BANK” if the bank angle increases above 5 °
- “SINK RATE” if the descent rate increases above 1 000 ft/min
- "LOC" if the LOC, F-LOC or LOC B/C deviation increases above 1/4 dot
- “GLIDE” if G/S or F-G/S deviation increases above 1 dot
- “COURSE” if the course increases above 1/2 dot VOR or 5 ° ADF
- "XX FT HIGH(LOW)" at altitude checks point.

Note: The PM announces the attitude deviations until landing.

If the PM announces a flight parameter deviation, the appropriate PF response should be:
- Acknowledge the PM callout, for appropriate flight crew coordination
- Take immediate corrective action to bring the parameter back into the defined stabilized conditions
- Assess whether stabilized conditions will be recovered early enough prior to landing. If not, initiate a go-around.

PF/PM DUTIES TRANSFER

Applicable to: ALL

Both flight crewmembers must use the following callouts in order to transfer the controls:
To give control: The PF announces “YOU HAVE CONTROL”. The other flight crewmember accepts this transfer by announcing “I HAVE CONTROL”, before assuming the PF duties.
To take control: The PM announces “I HAVE CONTROL”. The other flight crewmember accepts this transfer by announcing “YOU HAVE CONTROL”, before assuming the PM duties.

SUMMARY FOR EACH FLIGHT PHASE

Applicable to: ALL

To Remove the External Power Units		
Event	**CAPTAIN or FIRST OFFICER**	**Ground Personnel**
Initial ground contact	GROUND (from) COCKPIT	COCKPIT (from) GROUND
External __ disconnection	REMOVE EXTERNAL __	EXTERNAL__ REMOVED

Before Pushback or Start		
Event	**CAPTAIN**	**FIRST OFFICER**
Before pushback/start up clearance is received	BEFORE START C/L	DOWN TO THE LINE
After pushback/start up clearance is received	BELOW THE LINE	BEFORE START C/L COMPLETE

Pusback/Engine Start		
Event	**CAPTAIN**	**Ground Personnel**
When ready for pushback, and pushback clearance received from ATC	GROUND (from) COCKPIT, CLEARED FOR PUSHBACK (or PUSHBACK APPROVED)	COCKPIT (from) GROUND, RELEASE PARKING BRAKE
Start of pushback	PARKING BRAKE RELEASED	
When ready to start engines	READY TO START ENGINES ? STARTING ENG(S)__	CLEARED TO START ENGINES
When pushback complete	PARKING BRAKE SET	PUSHBACK COMPLETED. SET PARKING BRAKE
When ready to disconnect (i.e. after engine are started and parameters are stabilized)	CLEAR TO DISCONNECT	STAND BY HAND SIGNAL ON THE LEFT (or RIGHT)

After Engine Start		
Event	**CAPTAIN**	**FIRST OFFICER**
Flight control check in the following sequence:	FLIGHT CONTROL CHECK	
1. Elevators		FULL UP, FULL DOWN, NEUTRAL
2. Ailerons/Spoilers		FULL LEFT, FULL RIGHT, NEUTRAL
3. Rudder (1)	RUDDER	FULL LEFT, FULL RIGHT, NEUTRAL
All engines are started and stabilized, and external power units are disconnected	AFTER START C/L	AFTER START C/L COMPLETE

(1) *The FIRST OFFICER should follow the pedal movements with his/her feet.*

Taxi		
Event	**CAPTAIN**	**FIRST OFFICER**
When taxi clearance obtained	CLEAR LEFT SIDE	CLEAR RIGHT SIDE
Brake transfer check	BRAKE CHECK	PRESSURE ZERO
During taxi	BEFORE TAKEOFF C/L	DOWN TO THE LINE
When takeoff or line-up clearance obtained	FINAL CLEAR, RUNWAY CLEAR (Verify clearing of own side)	
Lining up on the runway	BELOW THE LINE	BEFORE TAKEOFF C/L COMPLETE

TAKEOFF AND CLIMB		
Event	**PF**	**PM**
After obtaining takeoff clearance	"CLEARED FOR TAKEOFF"	"CLEARED FOR TAKEOFF"
	"TAKE OFF"	"TIME SET"
When thrust lever set to FLEX or TOGA, check FMA on PFD	MAN FLEX XX (or TOGA), SRS, RWY (or Blank), A/THR Blue	"TIME CHECK"
Before reaching 80 kt	CHECKED	THRUST SET
At 100 kt	CHECKED	ONE HUNDRED KNOTS
At V1		V1 (1)
At VR		ROTATE
Landing gear retraction	GEAR UP	POSITIVE CLIMB GEAR UP
If AP is engaged by PM	AP 1(2) ON	
Checklist	AFTER TAKEOFF/CLIMB C/L	DOWN TO THE LINE
At 10,000 feet	CHECK	ONE ZERO THOUSAND
When approaching or passing transition altitude	STANDARD RESET	TRANSITION, ALTIMETER RESET STANDARD
At 10,000ft or transition altitude whichever comes up later	BELOW THE LINE	AFTER TAKEOFF/CLIMB C/L COMPLETE

(1) *The PM monitors the auto callout, or announces if it is inoperative.*

For more information on callouts associated with a malfunction before V1 at takeoff, *Refer to FCTM/AO-90 Abnormal and Emergency Callouts*.

DESCENT		
Event	**PF**	**PM**
At 20,000feet (or TOD if CRZ LEVEL is below 20,000feet)	SEAT BELTS ---------- AS RQRD (3 chimes then Auto or On)	
	CABIN CREW PREPARE FOR LANDING (PA by captain)	
When approaching or passing transition level	_____ inHg or hPa RESET	TRANSITION, ALTIMETER RESET _____ inHg or hPa
At 10,000 feet	CHECKED	ONE ZERO THOUSAND
	APPROACH C/L	APPROACH C/L COMPLETE

Approach and Landing		
Event	**PF**	**PM**
Activation of approach phase	ACTIVATE APPROACH PHASE	APPROACH PHASE ACTIVATED
RA alive	CHECKED	monitors pin-programmed auto callout "TWO THOUSAND FIVE HUNDRED" or announces if inoperative(1) (2)
At G/S* or below GA altitude for NPA, without AP	SET GA ALTITUDE_FT	GA ALTITUDE__SET
Landing checklist	LANDING C/L	LANDING C/L COMPLETE
FAF	CHECKED	PASSING__(Fix Name),__FT
1 000 ft HAT	"STABILIZED" or "VMC-CORRECTING" in VMC or "GO-AROUND FLAPS" GA	"ONE THOUSAND, CLEARED TO LAND" or "ONE THOUSAND, CONTINUE" (Call out any unstable conditions)(2)
100 ft above MDA/DH	CHECKED	ONE HUNDRED ABOVE (2)
Visual references at MDA/DH	CONTINUE	MINIMUM (2)
No visual reference at MDA/DH	GO-AROUND - FLAPS	MINIMUM (2)
		ONE HUNDRED (2) FIFTY (2)
After touchdown		

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Approach and Landing		
Event	**PF**	**PM**
Ground spoilers extended REV on EWD		SPOILERS (3) REVERSE GREEN (4)
Deceleration		DECEL (5)
At 80 kt	CHECKED	EIGHTY KNOTS

(1) *Crew awareness: The flight crew should now keep RA in scan to landing.*

(2) *The PM monitors the pin-programmed auto callouts, or announces if they are inoperative.*

(3) *If the spoilers are not extended, announce "NO SPOILER".*

(4) *If the reverse deployment is not as expected, announce "NO REVERSE ENGINE_" or "NO REVERSE", as appropriate.*

(5) *In the case of failure or no positive deceleration: "NO DECEL"*
"DECEL" callout means that the deceleration is felt by the flight crew, and confirmed by the speed trend on the PFD. It can also be confirmed by the DECEL indication on the PFD, if the autobrake is active.
However, the DECEL indication appears when the current deceleration reaches 80 % of the selected deceleration rate. Therefore it is not an indication of the correct autobrake functioning, but it indicates that the deceleration rate is reached. E.g. the DECEL indication may not appear on a contaminated runway, with the autobrake active, due to the effect of the anti-skid.
The DECEL indication may also appear on a dry runway, with the autobrake set to LO: In this case, the deceleration may be reached due to the only use of reversers, and without the autobrake activation.

Go-Around		
Event	**PF**	**PM**
GO-AROUND EXECUTION	GO-AROUND – FLAPS	
Flaps retraction		FLAPS__
Gear retraction	GEAR UP	POSITIVE CLIMB GEAR UP
Checklist	AFTER TAKEOFF/CLIMB C/L	DOWN TO THE LINE
At transition altitude	BELOW THE LINE	AFTER TAKEOFF/CLIMB C/L COMPLETE

After Landing		
Event	**CAPTAIN**	**FIRST OFFICER**
Checklist	AFTER LANDING C/L	AFTER LANDING C/L COMPLETE

Parking		
Event	**CAPTAIN**	**FIRST OFFICER**
Checklist	PARKING C/L	PARKING C/L COMPLETE

Securing the Aircraft		
Event	**CAPTAIN**	**FIRST OFFICER**
Checklist	SECURING THE AIRCRAFT C/L	SECURING THE AIRCRAFT C/L COMPLETE

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SAFETY EXTERIOR INSPECTION

Applicable to: ALL

CAPT	FO
WHEEL CHOCKS..... CHECK IN POSITION	
LANDING GEAR DOORS..... CHECK POSITION	
APU AREA..... CHECK	

PRELIMINARY COCKPIT PREPARATION

Applicable to: ALL

POWER-UP (IF AIRCRAFT NOT ELECTRICALLY SUPPLIED):

CAPT	FO
	ENG MASTERS 1, 2, 3, 4..... OFF
	ENG START selector ..... NORM
	BOTH WIPER selector ..... OFF
	ALL BAT pb-sw (BAT 1, ESS, 2 and APU BAT)..... ON
	EXT pb-sw (2, 3, 1, 4)..... ON
COCKPIT LIGHTS..... AS RQRD	COCKPIT LIGHTS..... AS RQRD

OIS INITIALIZATION:

CAPT	FO
LAPTOP..... ON	LAPTOP..... ON
	BACKUP LAPTOP..... ON
KCCU CCD sw and KBD sw ..... ON	KCCU CCD sw and KBD sw ..... ON
OIT knob ..... ON	OIT knob ..... ON
OIT SIDE sw ..... NSS AVNCS	OIT SIDE sw ..... NSS AVNCS
LOGIN AS PILOT..... PERFORM	LOGIN AS PILOT..... PERFORM
OIT SIDE sw ..... FLT OPS	OIT SIDE sw ..... FLT OPS
LOGIN AS PILOT..... PERFORM	LOGIN AS PILOT..... PERFORM
FLT FOLDER..... START	FLT FOLDER..... START
NAV CHARTS..... START	NAV CHARTS..... START
OPS LIBRARY..... START	OPS LIBRARY..... START
COMPANY COM :	**FLIGHT FOLDER APPLICATION** :
OIT SIDE sw ..... NSS AVNCS	LOAD BOX..... START
INIT DATA..... SEND	EFF..... LOAD
OIT SIDE sw ..... FLT OPS	EFF..... DISPLAY AS CURRENT
•In accordance with Operators policy or if required by operational regulation:	
FLT OPS STS page..... CHECK OIS VERSION	FLT OPS STS page..... CHECK OIS VERSION
NAV CHARTS..... CHECK VALIDITY DATE	NAV CHARTS..... CHECK VALIDITY DATE

ECAM/LOGBOOK CHECK:	
CAPT	**FO**
RCL pb .....PRESS	.....
CLEARED or CANCELLED ALERTS .....CHECK	.....
OIT SIDE sw .....NSS AVNCS	
MEL/CDL ITEMS.....CHECK AND NOTE CDL	
OIT SIDE sw .....FLT OPS	
MEL/CDL ITEMS.....CHECK DISPATCH CONDITIONS	MEL/CDL ITEMS.....CHECK DISPATCH CONDITIONS
OIT SIDE sw .....NSS AVNCS	
AIRCRAFT ACCEPTANCE.....PERFORM	

APU AND ENG FIRE TEST/APU START:	
CAPT	**FO**
	RMP 1 and 2..... ON/SET
	APU and ENG FIRE TEST..... PERFORM
	APU MASTER SW pb-sw .....ON
	APU START pb ..... ON
	EXT PWR (if ON)..... AS RQRD

OIS PREPARATION:	
CAPT	**FO**
FMS/OIS FLT OPS STS :	
•If F-PLN is received via ACARS:	
	ACFT STATUS.....CHECK
	RECEIVED CPNY F-PLN.....INSERT
	FLT NBR and FROM/TO..... CHECK
OIT SIDE sw ..... FLT OPS	OIT SIDE sw ..... FLT OPS
FLT OPS STS page.....SELECT	FLT OPS STS page..... SELECT
FLT OPS STS page.....CHECK UPDATED	FLT OPS STS page.....CHECK UPDATED
•If F-PLN is not received via ACARS:	
OIT SIDE sw ..... FLT OPS	OIT SIDE sw ..... FLT OPS
FLT OPS STS page.....SELECT	FLT OPS STS page..... SELECT
FLT OPS STS page.....CHECK UPDATED	FLT NBR and FROM/TOFLT OPS STS page..... INSERT
EFF :	
EFF.....CHECK, AS RQRD	EFF.....CHECK, AS RQRD
PRELIMINARY PERFORMANCE DETERMINATION :	
T.O PERF.....START	T.O PERF..... START
AIRFIELD DATA.....OBTAIN	AIRFIELD DATA.....OBTAIN
MEL ITEMS.....CHECK ACTIVATED	MEL ITEMS.....CHECK ACTIVATED
CDL ITEMS..... CHECK ACTIVATED and COMPLETE	CDL ITEMS..... CHECK ACTIVATED and COMPLETE

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OIS PREPARATION:

CAPT	FO
OIS PRELIMINARY T.O PERF.....COMPUTE and CROSSCHECK	OIS PRELIMINARY T.O PERF.....COMPUTE and CROSSCHECK
	•In accordance with Operators policy or if required by operational regulation: PRELIMINARY TAKEOFF PERFORMANCE..... STORE IN CURRENT EFF
OEB :	
OEB in FCOM.....CHECK	OEB in FCOM.....CHECK

EXTERIOR WALKAROUND

Applicable to: ALL

CAPT	FO
ECAM OXY PRESS/HYD QTY/ENG OIL QTY.....CHECK	
SPEED BRAKE lever .....CHECK RETRACTED/DISARMED	
PARK BRK handle ..... ON	
BODY ACCU and BRK pressure indications.....CHECK	
FLAPS..... CHECK POSITION	
EMER EQPT.....CHECK	
GEAR PINS and COVERS.....ONBOARD and STOWED	
EXTERIOR WALKAROUND..... PERFORM	

COCKPIT PREPARATION

Applicable to: ALL

OVERHEAD PANEL:

CAPT	FO
	ALL WHITE LIGHTS.....OFF
	RCDR GND CTL pb-sw .....ON
	CAPT/CAPT & PURS sw ..... AS RQRD
	PROBE & WINDOW HEAT pb-sw ..... AUTO
	ALL IR MODE selector .....NAV
	ELT.....ARMED
	RESET BUTTONS (left side).....CHECK
	STROBE sw .....AUTO
	BEACON sw ..... OFF
	REMAINING EXT LIGHTS..... AS RQRD
	SEAT BELTS sw ..... ON

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OVERHEAD PANEL:	
CAPT	**FO**
	NO SMOKING sw ..... ON
	EMER EXIT LT sw ..... ARM
	ENG START selector ..... NORM
	APU BLEED pb-sw ..... ON
	XBLEED selector ..... AUTO
	AIR FLOW selector ..... NORM
	CKPT selector ..... AS RQRD
	CABIN selector ..... PURS SEL
	BAT ..... CHECK
	TRIM TK FEED sw ..... AUTO
	ALL LIGHTS on MAINTENANCE panel ..... OFF
	CARGO AIR COND selectors ..... AS RQRD
	RMP 3 ..... ON
	STBY RAD NAV key ..... OFF
	CVR TEST pb ..... PRESS
	RESET BUTTONS (right side) ..... CHECK

CENTER INSTRUMENT PANEL:	
CAPT	**FO**
	SWITCHING selectors ..... NORM
	ISIS ..... CHECK
	L/G GRVTY sw ..... OFF
	CLOCK ..... CHECK/SET
	A-SKID sw ..... ON

PEDESTAL:	
CAPT	**FO**
	PARK BRK ..... ON
	•If brakes are hot and chocks are in place: PARK BRK ..... OFF
	BODY ACCU Pressure ..... CHECK/REINFLATE
	THRUST LEVERS ..... IDLE
	THRUST REVERSER LEVERS ..... STOWED
	ENG MASTERS 1, 2, 3 and 4 ..... OFF
	CKPT DOOR sw ..... NORM

MFD ATC COM :	
	MSG RECORD ..... ERASE ALL

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	•If ADS services are expected:
	ADS.....CHECK ARMED
	ATC CLEARANCE.....THE MOST PROBABLE/OBTAIN
	NAV CHARTS CLIPBOARD.....PREPARE
MFD SURV :	
	SURV DEFAULT SETTINGS.....SELECT
FMS INITIALIZATION :	
	FMS.....INITIALIZE
	ACTIVE F-PLN..... CHECK/COMPLETE
	SEC F-PLN(s)..... AS APPROPRIATE
MFD SURV :	
SURV DEFAULT SETTINGS.....SELECT	
FMS INITIALIZATION :	
FMS INITIALIZATION.....CROSSCHECK	
NAV CHARTS CLIPBOARD.....IMPORT	

GLARESHIELD:	
CAPT	**FO**
• When both flight crewmembers are seated:	
INTEGRAL LIGHTS.....AS RQRD	INTEGRAL LIGHTS.....AS RQRD
LOUDSPEAKER knob ..... SET	LOUDSPEAKER knob ..... SET
BAROMETRIC REFERENCE..... SET	BAROMETRIC REFERENCE..... SET
EFIS CP.....AS RQRD	EFIS CP.....AS RQRD
WX pb on EFIS CP.....OFF	WX pb on EFIS CP.....OFF
AFS CP..... CROSSCHECK	AFS CP.....CHECK/SET

LATERAL CONSOLE AND CAPT / FO INSTRUMENT PANELS:	
CAPT	**FO**
INT/RAD sw ..... INT	INT/RAD sw ..... INT
OXYGEN MASK TEST.....PERFORM	OXYGEN MASK TEST.....PERFORM
REGUL PR LO indication.....CHECK NOT DISPLAYED	REGUL PR LO indication.....CHECK NO DISPLAYED
SLIDING WINDOW.....CLOSED/LOCKED	SLIDING WINDOW.....CLOSED/LOCKED
PFD.....CHECK	PFD.....CHECK
ND.....CHECK	ND.....CHECK

TAKEOFF BRIEFING:	
PF	**PM**
TAKEOFF BRIEFING..... PERFORM	

BEFORE PUSHBACK OR START

Applicable to: ALL

BEFORE START CLEARANCE:

CAPT	FO
FINAL LOADSHEET.....CHECK	FINAL LOADSHEET.....CHECK
FOB.....CHECK	FOB.....CHECK
ZFW/ZFWCG in FMS.....CROSSCHECK	ZFW/ZFWCG in FMS.....CHECK/REVISE
LOADSHEET TOCG/ECAM GWCG.....CROSSCHECK	LOADSHEET TOCG/ECAM GWCG.....CROSSCHECK
ECAM GWCG.....CHECK WITHIN LIMITS	ECAM GWCG.....CHECK WITHIN LIMITS
•If ECAM GWCG is within the operational limits:	
THS FOR _ in FMS.....CROSSCHECK	THS FOR _ in FMS.....INSERT T.O CG
FINAL LOADSHEET.....SIGN and EXPORT	
•If ECAM GWCG is not within the operational limits:	
AUTO GND XFR.....MONITOR	AUTO GND XFR pb-sw .....ON
THS FOR _ in FMS.....CROSSCHECK	THS FOR _ in FMS.....INSERT T.O CG
FINAL LOADSHEET.....SIGN and EXPORT	
OIS FINAL T.O PERF.....CONFIRM or RECOMPUTE	OIS FINAL T.O PERF.....CONFIRM or RECOMPUTE
REVISED FMS T.O DATA.....CROSSCHECK	FMS T.O DATA.....CHECK/REVISE AS RQRD
	•In accordance with Airline policy or if required by operational regulation:
	FINAL T.O PERF.....STORE IN CURRENT EFF
SEATING POSITION.....ADJUST	SEATING POSITION.....ADJUST
HUD.....DEPLOY/ADJUST	
FMS ACTIVE/PERF page (PF) / FMS ACTIVE/F-PLN page (PM).....SET	
	EXT PWR.....CHECK AVAIL
	EXT PWR DISCONNECTION.....REQUEST
	LP GROUND CARTS.....CHECK DISCONNECTED
BEFORE START C/L down to the line.....COMPLETE	BEFORE START C/L down to the line.....COMPLETE

AT START CLEARANCE:

CAPT	FO
	PUSHBACK/START UP CLEARANCE.....OBTAIN
BEACON sw .....ON	
TAXI VIDEO .....AS RQRD	TAXI VIDEO .....AS RQRD
WINDOWS AND DOORS.....CHECK CLOSED	WINDOWS AND DOORS.....CHECK CLOSED
SLIDES ARMING.....ORDER	
SLIDES.....CHECK ARMED	
THR LEVERS.....IDLE	
•If pushback is not required:	
PARK BRK.....ON	

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AT START CLEARANCE:

CAPT	FO
•If pushback is required:	
PARK BRK.....OFF	
N/W STEER DISC MEMO.....CHECK DISPLAYED	
BEFORE START C/L below the line..... COMPLETE	BEFORE START C/L below the line..... COMPLETE

ENGINE START

Applicable to: ALL

CAPT	FO
ENG START selector .....IGN START	
START ENGINES 1 and 2.....ANNOUNCE	
ENG MASTER 1 then 2.....ON	
ENG IDLE PARAMETERS.....CHECK NORMAL	
START ENGINES 3 and 4.....ANNOUNCE	
ENG MASTER 3 then 4.....ON	
ENG IDLE PARAMETERS.....CHECK NORMAL	

AFTER START

Applicable to: ALL

CAPT	FO
ENG START selector .....NORM	
APU BLEED pb-sw .....OFF	GND SPLRS.....ARM
All ENG ANTI-ICE pb-sw .....AS RQRD	RUDDER TRIM..... ZERO
•If the APU is not required:	FLAPS..... SET
APU MASTER SW pb-sw .....OFF	
	PITCH TRIM..... CHECK
ECAM STATUS.....CROSSCHECK	ECAM STATUS..... CHECK
CLEAR TO DISCONNECT..... ANNOUNCE	
N/W STEER DISC MEMO..... CHECK NOT DISPLAYED	
FLIGHT CONTROLS..... CHECK	FLIGHT CONTROLS..... CHECK
AFTER START C/L..... COMPLETE	AFTER START C/L..... COMPLETE

TAXI

Applicable to: ALL

CAPT	FO
	TAXI CLEARANCE....OBTAIN
TAXI pb on EFIS CP ....AS RQRD	TAXI pb on EFIS CP ....AS RQRD
ND RANGE selector ....ZOOM, AS APPROPRIATE	ND RANGE selector .... ZOOM, AS APPROPRIATE
NOSE sw ....TAXI	
RWY TURN OFF & CAMERA sw ....AS RQRD	
PARK BRK....OFF	
THRUST LEVERS....AS RQRD	
BRAKES....PRESS	LH & RH BRK PRESSURE....CHECK ZERO
NOSEWHEEL STEERING....AS RQRD	
	ATC CLEARANCE....CONFIRM
•If takeoff data or conditions changed:	
TAKEOFF PERF RESULTS.... CROSSCHECK	TAKEOFF PERF....REVISE/COMPUTE
FMS UPDATES....CROSSCHECK	FMS TAKEOFF PERF DATA....UPDATE
	FLAPS lever....AS APPROPRIATE
	F-PLN (SID, TRANS)....REVISE or CHECK
	INITIAL CLIMB SPEED AND SPEED LIMIT... REVISE or CHECK
	AFS CP....SET
	FD.... CHECK SELECTED ON
PFD/ND....CHECK	PFD/ND....CHECK
FMS ACTIVE/PERF page (PF) / FMS ACTIVE/F-PLN page (PM)....SET	
TAKEOFF BRIEFING....CONFIRM	
CABIN.... READY	CABIN.... READY
	RTO pb .... ARM
	ATC CODE....CONFIRM/SET
	TO CONFIG pb ....TEST
	T.O MEMO....NO BLUE LINE
BEFORE TAKEOFF C/L down to the line...COMPLETE	BEFORE TAKEOFF C/L down to the line.... COMPLETE

BEFORE TAKEOFF

Applicable to: ALL

CAPT	FO
	TAKEOFF OR LINE UP CLEARANCE....OBTAIN
	CABIN CREW.... ADVISE
	PACKS 1 and 2....AS RQRD
	EXTERIOR LIGHTS.... SET
TAXI pb on EFIS CP.... OFF	TAXI pb on EFIS CP.... OFF
ND RANGE selector ....AS RQRD	ND RANGE selector ....AS RQRD

Continued on the following page

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CAPT	FO
EFIS CP OPTIONS..... AS RQRD	EFIS CP OPTIONS..... AS RQRD
TRAF pb on EFIS CP.....ON	TRAF pb on EFIS CP.....ON
APPROACH PATH.....CHECK CLEAR OF TRAFFIC	APPROACH PATH.....CHECK CLEAR OF TRAFFIC
	STROBE sw ..... ON
TAKEOFF RUNWAY..... CONFIRM	TAKEOFF RUNWAY..... CONFIRM
SLIDING TABLE.....STOWED	SLIDING TABLE.....STOWED
	TA pb .....TA ONLY or TA/RA
BEFORE TAKEOFF C/L below the line.....COMPLETE	BEFORE TAKEOFF C/L below the line.....COMPLETE

TAKEOFF

Applicable to: ALL

PF	PM
CONFIRM TAKEOFF REMINDER (HAA)	VERIFY TAKEOFF REMINDER
ANNOUNCE TYPE OF TAKEOFF	
•After obtaining takeoff clearance:	
CLEARED FOR TAKEOFF	CLEARED FOR TAKEOFF
	"TIME SET"
TAKEOFF.....ANNOUNCE	
THR..... 25 %	"TIME CHECK" START THE CHRONO
•If the crosswind is at, or below 23 kt, and there is no tailwind:	
BRAKES.....RELEASE THRUST LEVERS.....FLX or TOGA	
•If the crosswind is above 23 kt, and/or in the case of tailwind:	
BRAKES.....RELEASE THRUST LEVERS..... 50 % **•At 20 kt ground speed:** THRUST LEVERS.....FLX or TOGA	
DIRECTIONAL CONTROL..... USE RUDDER	
	PFD/ND..... SCAN
	TAKEOFF THRUST.....CHECK
•Before reaching 80 kt:	
	THRUST SET .....ANNOUNCE PFD and ENG indications.....SCAN
•At 100 kt:	
ONE HUNDRED KNOTS..... CROSSCHECK	ONE HUNDRED KNOTS..... ANNOUNCE
•At V1:	
	V1.....MONITOR or ANNOUNCE

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PF	PM
•At VR:	
ROTATION..... PERFORM	ROTATION..... ORDER
•When positive climb:	
	POSITIVE CLIMB..... ANNOUNCE
L/G UP..... ORDER	L/G..... UP
AP..... AS RQRD	
•At the thrust reduction altitude:	
THRUST LEVERS CL	PACKS 1 and 2 (if applicable)..... ON
	CHRONO..... RESET
FLAPS 1..... ORDER	FLAPS 1..... SET
•At S speed:	
FLAPS ZERO..... ORDER	FLAPS ZERO..... SET
	EXTERIOR LIGHTS..... SET
	GND SPLRS..... DISARM

AFTER TAKEOFF

Applicable to: ALL

PF	PM
•If the APU was used to supply the air conditioning during takeoff:	
	APU BLEED pb-sw ..... OFF
	APU MASTER SW pb-sw ..... OFF
	•If the takeoff was performed with TA ONLY:
	TA pb ..... TA/RA
	ANTI-ICE pb-sw ..... AS RQRD
SLIDING TABLE..... RELEASE, AS NECESSARY	SLIDING TABLE..... RELEASE, AS NECESSARY
AFTER TAKEOFF/CLIMB C/L down to the line COMPLETE	AFTER TAKEOFF/CLIMB C/L down to the line.... COMPLETE

CLIMB

Applicable to: ALL

PF	PM
•At 10 000 ft:	
	LAND sw ..... OFF
SEAT BELTS sw ..... OFF/AUTO (CAPT)	
EFIS OPTIONS..... AS RQRD	EFIS OPTIONS..... AS RQRD
	ECAM MEMO..... REVIEW
	•On PF request, or at least with PF approval:
	NAVAIDS..... CLEAR
	OPT/MAX ALT..... CHECK

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•At transition altitude:	
ALTIMETER.....RESET STD	
CRZ FL..... SET AS RQRD	
CLIMB SPEED MODIFICATIONS..... AS RQRD	
AFTER TAKEOFF/CLIMB C/L below the line..... COMPLETE	AFTER TAKEOFF/CLIMB C/L below the line.....COMPLETE
	ANTI-ICE pb-sw ..... AS RQRD

CRUISE

Applicable to: ALL

PF	PM
ALT CRZ on FMA.....CHECK	
In cruise, the tasksharing is left to the flight crew's appreciation.	
ECAM MEMO.....REVIEW	
SD PAGES.....REVIEW	
FLIGHT PROGRESS.....CHECK	
FUEL.....MONITOR	
STEP FLIGHT LEVEL..... AS APPROPRIATE	
•If GPS PRIMARY LOST: NAVIGATION ACCURACY..... MONITOR	
•If the oxygen mask was used: OXYGEN MASK .....CHECK	

DESCENT PREPARATION

Applicable to: ALL

PF	PM
	WEATHER AND LANDING INFORMATION.....OBTAIN
LDG ELEVN..... CHECK	
BAROMETRIC REFERENCE.....PRESET	BAROMETRIC REFERENCE..... PRESET
	STATUS page/STATUS MORE page.....CHECK
	SYNCHRO ECAM button.....CLICK
LANDING PERFORMANCE..... CROSSCHECK	LANDING PERFORMANCE..... CHECK
	•In accordance with Airlines policy or if required by operational regulation: LANDING PERFORMANCE.....STORE IN CURRENT EFF
FMS..... CROSSCHECK	FMS..... PREPARE
	RUNWAY SHIFT.....AS RQRD
	ND MODE selector ..... PLAN
	ND RANGE selector .....ZOOM
	RUNWAY..... SELECT

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PF	PM
	RUNWAY EXIT.....SELECT
	AUTO BRK/BTV.....SELECT, AS RQRD
•If the flight crew selected BTV:	
OANS RUNWAY LENGTH Vs CHARTS RUNWAY LENGTH.....CROSSCHECK	OANS RUNWAY LENGTH Vs CHARTS RUNWAY LENGTH.....CROSSCHECK
LANDING BRIEFING..... PERFORM	
	DESCENT CLEARANCE..... OBTAIN
CLEARED ALTITUDE ON AFS CP.....SET	
	ANTI ICE pb-sw .....AS RQRD

DESCENT

Applicable to: ALL

PF	PM
DESCENT.....INITIATE	
DESCENT.....MONITOR	
RATE of DESCENT.....ADJUST, AS RQRD	
SPEED BRAKES.....AS RQRD	
WX pb/TERR pb on EFIS CP.....AS RQRD	WX pb/TERR pb on EFIS CP.....AS RQRD
AT 20000 FT :	
CAPT	
SEAT BELTS.....AS RQRD (3 chimes then Auto or On) PA "CABIN CREW PREPARE FOR LANDING"	
•When the aircraft approaches the transition level, and when cleared for an altitude:	
AT 10000 FT :	
	LAND sw .....ON
SEAT BELTS sw .....ON(CAP)	
CSTR pb on EFIS CP..... ON	CSTR pb on EFIS CP..... ON
LS pb .....AS RQRD	LS pb .....AS RQRD
•For NPA flown with the FLS function:	
	FLS CAPABILITY.....CHECK FLS DATA.....CHECK
NAVAIDS.....AS RQRD/CHECK	
•If GPS PRIMARY LOST: NAVIGATION ACCURACY.....CHECK	
ALTIMETER..... RESET ____InHg/hPa	
HOLDING PATTERN.....AS RQRD	
APPROACH C/L.....COMPLETE	APPROACH CHECKLIST..... COMPLETE

PRECISION APPROACH

Applicable to: ALL

INITIAL APPROACH:

PF	PM
SEAT BELTS sw ..... ON(CAP)	
APPROACH PHASE.....CHECK/ACTIVATE (1)	
POSITIONING..... MONITOR	
MANAGED SPEED.....CHECK	
SPEED BRAKES..... AS RQRD	
	•If GPS PRIMARY LOST:
	NAVIGATION ACCURACY.....MONITOR

(1)
- *If AP is engaged, the PF checks or activates the approach on the AFS CP*
- *If AP is not engaged, the PNF checks or activates the approach on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

INTERMEDIATE/FINAL APPROACH:

PF	PM
•When the ATC clears the aircraft for the approach:	
APPR pb on AFS CP.....PRESS	
AP 1+2.....ON	
	FMA.....CHECK
•Approaching Green Dot speed:	
FLAPS 1.....ORDER	FLAPS 1.....SET
	TA pb .....TA ONLY or TA/RA
LOC CAPTURE.....MONITOR	
G/S CAPTURE.....MONITOR	
•If above the glide slope:	
V/S MODE..... AS RQRD	
AFS CP ALTITUDE..... SET ABOVE A/C ALTITUDE	
•When G/S capture (G/S*):	
GO-AROUND ALTITUDE.....SET (1)	
•Below VFE next, at 2 500 ft AGL minimum:	
FLAPS 2.....ORDER	FLAPS 2.....SET
•After FLAPS 2 selection, at 2 000 ft AGL minimum:	
L/G DOWN..... ORDER	L/G.....DOWN
	AUTO BRK .....CONFIRM
	GND SPLRS.....ARM
	EXTERIOR LIGHTS.....SET
•Below VFE next:	
FLAPS 3.....ORDER	FLAPS 3.....SET
	WHEEL SD PAGE.....CHECK

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INTERMEDIATE/FINAL APPROACH:	
PF	**PM**
•Below VFE next:	
FLAPS FULL..... ORDER	FLAPS FULL..... SET
	A/THR.....CHECK IN SPEED MODE or OFF
SLIDING TABLE.....STOWED	SLIDING TABLE.....STOWED
	LDG MEMO.....NO BLUE LINE
CABIN..... READY	CABIN..... READY
LANDING C/L..... COMPLETE	LANDING C/L..... COMPLETE
	FLIGHT PARAMETERS..... CHECK
•At 350 ft AGL (or RA):	
LAND ON FMA..... ANNOUNCE	
ILS(GLS) COURSE.....CHECK	
•During a CAT III Approach without DH:	
•At 200 ft RA, if the flight crew did not detect any failure:	
CONTINUE..... ANNOUNCE	
	•At 100 ft RA:
	ONE HUNDRED.....MONITOR or ANNOUNCE
•At MINIMUM+100 ft:	
	ONE HUNDRED ABOVE.....MONITOR or ANNOUNCE
•At MINIMUM:	
	MINIMUM..... MONITOR or ANNOUNCE
LANDING or GO-AROUND.....ANNOUNCE(CAPT)	

(1)
- *If AP is engaged, the PF sets the go-around altitude on the AFS CP*
- *If AP is not engaged, the PNF sets the go-around altitude on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

NON-PRECISION APPROACH WITH FLS FUNCTION

Applicable to: ALL

INITIAL APPROACH:	
PF	**PM**
SEAT BELTS sw ..... ON(CAP)	
APPROACH PHASE.....CHECK/ACTIVATE *(1)*	
POSITIONING..... MONITOR	
MANAGED SPEED.....CHECK	
SPEED BRAKES..... AS RQRD	
	RNP on the FMS ..... AS RQRD

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INITIAL APPROACH:

PF	PM
FLS CAPABILITY.....CHECK	
VOR(ADF) NEEDLES (VOR pb(ADF pb)).AS RQRD	VOR(ADF) NEEDLES (VOR pb(ADF pb))..... AS RQRD

(1)
- *If AP is engaged, the PF checks or activates the approach on the AFS CP*
- *If AP is not engaged, the PNF checks or activates the approach on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

INTERMEDIATE/FINAL APPROACH:

PF	PM
•When the ATC clears the aircraft for the approach:	
APPR pb on AFS CP.....PRESS	
FLYING REFERENCE.....TRK-FPA (1)	
AP ENGAGEMENT..... CONSIDER	
FLS CAPABILITY.....CHECK	
•Approaching Green Dot speed:	
FLAPS 1..... ORDER	FLAPS 1.....SET
	TA pb .....TA ONLY or TA/RA
F-LOC, LOC or LOC B/C CAPTURE..... MONITOR	
F-G/S CAPTURE.....MONITOR	
•If above the F-G/S beam:	
FPA MODE.....AS RQRD	
AFS CP ALTITUDE..... SET ABOVE A/C ALTITUDE	
•At F-G/S* engagement:	
GO-AROUND ALTITUDE.....SET (2)	
•Below VFE next, at 2 500 ft AGL minimum:	
FLAPS 2..... ORDER	FLAPS 2.....SET
•After FLAPS 2 selection, at 2 000 ft AGL minimum:	
L/G DOWN..... ORDER	L/G.....DOWN
	AUTO BRK .....CONFIRM
	GND SPLRS.....ARM
	EXTERIOR LIGHTS..... SET
•Below VFE next:	
FLAPS 3..... ORDER	FLAPS 3.....SET
	WHEEL SD PAGE.....CHECK
•Below VFE next:	
FLAPS FULL..... ORDER	FLAPS FULL..... SET
	A/THR.....CHECK IN SPEED MODE or OFF
SLIDING TABLE.....STOWED	SLIDING TABLE.....STOWED
	LDG MEMO.....NO BLUE LINE
CABIN..... READY	CABIN..... READY
LANDING C/L..... COMPLETE	LANDING C/L..... COMPLETE

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INTERMEDIATE/FINAL APPROACH:	
PF	**PM**
	FLIGHT PARAMETERS..... CHECK
•At FAF	
F-G/S MODE.....	CHECK ENGAGED
•At MINIMUM+100 ft:	
	ONE HUNDRED ABOVE.....MONITOR or ANNOUNCE
•At MINIMUM:	
	MINIMUM..... MONITOR or ANNOUNCE
•If the flight crew obtains appropriate visual references:	
LANDING.....	ANNOUNCE(CAPT)
AP.....OFF	
FD OFF..... ORDER	FD.....OFF
RUNWAY TRACK.....CHECK/ORDER	RUNWAY TRACK.....SET, AS RQRD
LS pb .....ORDER, AS RQRD	LS pb .....AS RQRD
•If the flight crew did not obtain appropriate visual references:	
GO-AROUND.....	ANNOUNCE(CAPT)

(1)
- *If AP is engaged, the PF sets the flying reference on the AFS CP*
- *If AP is not engaged, the PNF sets the flying reference on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

(2)
- *If AP is engaged, the PF sets the go-around altitude on the AFS CP*
- *If AP is not engaged, the PNF sets the go-around altitude on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

NON-PRECISION APPROACH WITHOUT FLS FUNCTION

Applicable to: ALL

INITIAL APPROACH:	
PF	**PM**
SEAT BELTS sw	ON(CAP)
APPROACH PHASE.....	CHECK/ACTIVATE (1)
POSITIONING..... MONITOR	
MANAGED SPEED.....CHECK	
SPEED BRAKES..... AS RQRD	

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INITIAL APPROACH:	
PF	**PM**
	•If GPS PRIMARY LOST
	NAV ACCURACY.....MONITOR
FLYING REFERENCE.....TRK-FPA(2)	

(1)
- *If AP is engaged, the PF checks or activates the approach on the AFS CP*
- *If AP is not engaged, the PNF checks or activates the approach on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

(2)
- *If AP is engaged, the PF sets the flying reference on the AFS CP*
- *If AP is not engaged, the PNF sets the flying reference on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

INTERMEDIATE/FINAL APPROACH:	
PF	**PNF**
•For RNAV Approach:	
	GPS PRIMARY..... CHECK AVAILABLE
	•If GPS PRIMARY LOSS
	RNP FOR APPROACH..... CHECK/ENTER
	HIGH ACCURACY.....CHECK
•For ILS G/S out, LOC only, or LOC Approach:	
LOC pb .....PRESS(1)	
FMA.....ANNOUNCE	
AP ENGAGEMENT..... CONSIDER	
•Approaching Green Dot speed:	
FLAPS 1..... ORDER	FLAPS 1..... SELECT
	TA pb .....TA ONLY or TA/RA
•For ILS G/S out, LOC only, or LOC B/C Approach:	
LOC or LOC B/C CAPTURE.....MONITOR	
•Below VFE next:	
FLAPS 2..... ORDER	FLAPS 2..... SELECT
•After FLAPS 2 selection:	
L/G..... ORDER	L/G..... SET DOWN
	AUTO BRK .....CONFIRM
	GND SPLRS.....ARM
	EXTERIOR LIGHTS..... SET
•Below VFE next:	
FLAPS 3..... ORDER	FLAPS 3..... SET
	WHEEL SD PAGE.....CHECK
•Below VFE next:	
FLAPS FULL..... ORDER	FLAPS FULL..... SET
CABIN..... READY	CABIN..... READY

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INTERMEDIATE/FINAL APPROACH:

PF	PNF
LANDING C/L..... COMPLETE	LANDING C/L..... COMPLETE
	FLIGHT PARAMETERS..... CHECK
•At the FAF:	
FPA..... SET (2)	
•After the FAF:	
GO-AROUND ALTITUDE.....SET (3)	
POSITION/FLIGHT PATH..... ADJUST	POSITION/FLIGHT PATH..... MONITOR
	A/THR.....CHECK IN SPEED MODE or OFF
SLIDING TABLE..... STOWED	SLIDING TABLE..... STOWED
	LDG ECAM MEMO..... NO BLUE
•At MINIMUM+100 ft:	
	ONE HUNDRED ABOVE.....MONITOR or ANNOUNCE
•At MINIMUM:	
	MINIMUM..... MONITOR or ANNOUNCE
•If the flight crew obtains appropriate visual references:	
LANDING.....ANNOUNCE (CAPT)	
AP.....OFF	
FDs OFF.....ORDER	FDs.....OFF
RUNWAY TRACK.....CHECK/ORDER	RUNWAY TRACK.....SET, AS RQRD
•If the flight crew did not obtain appropriate visual references:	
GO-AROUND..... ANNOUNCE (CAPT)	

(1)
- *If AP is engaged, the PF presses the LOC pb on the AFS CP*
- *If AP is not engaged, the PNF presses the LOC pb on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

(2)
- *If AP is engaged, the PF sets the FPA on the AFS CP*
- *If AP is not engaged, the PNF sets the FPA on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

(3)
- *If AP is engaged, the PF sets the go-around altitude on the AFS CP*
- *If AP is not engaged, the PNF sets the go-around altitude on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

(4)
- *If AP is engaged, the PF adjusts the flight path on the AFS CP*
- *If AP is not engaged, the PNF adjusts the flight path on the AFS CP.*

The PF can request the PNF to perform this action depending on the situation.

MANUAL LANDING

Applicable to: ALL

PF	PM
AP.....OFF	
•At about 40 ft RA:	
FLARE..... INITIATE	ATTITUDE..... MONITOR
THRUST LEVERS.....IDLE	
•At touchdown:	
REVERSER LEVERS.....PULL	
DIRECTIONAL CONTROL.....MONITOR/ENSURE	
	GND SPLRS EXTENDED.....CHECK/ANNOUNCE
	REVERSERS..... CHECK/ANNOUNCE
•If no autobrake:	**•If autobrake is selected:**
BRAKES..... AS RQRD	AUTO BRK.....CHECK/ANNOUNCE
	DECELERATION.....CHECK/ANNOUNCE
•At 80 kt:	
	EIGHTY KNOTS..... ANNOUNCE
REVERSER LEVERS.....IDLE	
•At taxi speed:	
REVERSER LEVERS.....STOW	
AUTO BRK..... DISARM	

AUTOMATIC LANDING

Applicable to: ALL

PF	PM
•Between 50 ft and 40 ft RA:	
	FMA.....CHECK FLARE
FLARE..... MONITOR	
•At approximately 30 ft RA:	
	FMA.....CHECK THR IDLE
•At 10 ft RA: "Retard"	
THRUST LEVERS.....IDLE	
LATERAL GUIDANCE.....MONITOR	
•At touchdown:	
	FMA.....CHECK ROLL OUT
	•If AUTO ROLLOUT:
	AP.....KEEP ENGAGED, UNTIL END OF ROLL OUT
REVERSER LEVERS.....PULL	
DIRECTIONAL CONTROL.....MONITOR/ENSURE	
	GND SPLRS EXTENDED.....CHECK/ANNOUNCE
	REVERSERS..... CHECK/ANNOUNCE

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PF	PM
•If no autobrake:	**•If autobrake is selected:**
BRAKES..... AS RQRD	AUTO BRK..... CHECK/ANNOUNCE
	DECELERATION..... CHECK/ANNOUNCE
•If AUTO ROLLOUT:	
AP..... DISCONNECT	
•At 80 kt:	
	EIGHTY KNOTS..... ANNOUNCE
REVERSER LEVERS..... IDLE	
•At taxi speed:	
REVERSER LEVERS..... STOW	
AUTO BRK..... DISARM	

GO-AROUND

Applicable to: ALL

PF	PM
•Simultaneously apply the following three actions:	
THRUST LEVERS..... TOGA	
ROTATION..... PERFORM	
GO-AROUND..... ANNOUNCE	FLAPS..... RETRACT ONE STEP
FMA ..... CHECK/ANNOUNCE	
	POSITIVE CLIMB..... ANNOUNCE
L/G UP..... ORDER	L/G..... UP
NAV or HDG..... AS RQRD	
•At go-around thrust reduction altitude:	
THRUST LEVERS..... CL	
•At go-around acceleration altitude:	
SPEED TARGET..... MONITOR	
FLAPS..... ORDER RETRACTION ON SCHEDULE	FLAPS..... RETRACT
	GND SPLRS..... DISARM
	EXTERIOR LIGHTS..... SET
AFTER TAKEOFF/CLIMB C/L down to the line..... COMPLETE	AFTER TAKEOFF/CLIMB C/L down to the line..... COMPLETE
Fly the published missed approach procedure, or prepare for a second approach, or divert as required.	
•If necessary, at the transition altitude:	
BAROMETRIC REFERENCE.. SET STD/CROSSCHECK	BAROMETRIC REFERENCE..... SET STD/CROSSCHECK
AFTER TAKEOFF/CLIMB C/L below the line COMPLETE	AFTER TAKEOFF/CLIMB C/L below the line..... COMPLETE

AFTER LANDING

Applicable to: ALL

CAPT	FO
GND SPLRS.....DISARM	FLAPS..... RETRACT
	APU MASTER SW pb-sw .....ON
	APU START pb ..... ON
	ENG START selector ..... CHECK NORM
	ANTI ICE.....AS RQRD
	LAND sw .....OFF
	STROBE sw .....AUTO
	NOSE sw ..... TAXI
	OTHER EXTERIOR LIGHTS.....AS RQRD
ND RANGE selector .....ZOOM, AS APPROPRIATE	ND RANGE selector .....ZOOM, AS APPROPRIATE
TAXI pb ..... AS RQRD	TAXI pb ..... AS RQRD
WX pb ..... CHECK OFF	WX pb ..... CHECK OFF
	BRAKE TEMPERATURE..... MONITOR
AFTER LANDING C/L..... COMPLETE	AFTER LANDING C/L..... COMPLETE

PARKING

Applicable to: ALL

CAPT	FO
	ANTI-CE..... OFF
PARK BRK.....ON	APU BLEED pb ..... ON
ENG MASTERS 1, 2, 3 and 4..... OFF	ELAPSED TIME..... STOP
SLIDES DISARMED..... CHECK	
SEAT BELTS sw ..... OFF	
BEACON sw ..... OFF	
OTHER EXTERIOR LIGHTS.....AS RQRD	FUEL PUMPS..... OFF
HUD..... STOW	
GROUND CONTACT..... ESTABLISH	IRS PERFORMANCE.....CHECK
PARK BRK.....AS RQRD	FUEL QUANTITY.....CHECK
PARKING C/L.....COMPLETE	PARKING C/L.....COMPLETE
OIT SIDE sw .....FLT OPS	OIT SIDE sw .....FLT OPS
ALL OIS APPLICATIONS..... CLOSE	ALL OIS APPLICATIONS..... CLOSE
EXIT SESSION.....PERFORM	EXIT SESSION.....PERFORM
OIT SIDE sw ..... NSS AVNCS	OIT SIDE sw ..... NSS AVNCS
	FLIGHT CLOSURE..... PERFORM

SECURING THE AIRCRAFT

Applicable to: ALL

CAPT	FO
PARK BRK.....ON	OXYGEN CREW SUPPLY pb-sw .....OFF
ADIRS (1+2+3).....OFF	EXTERIOR LIGHTS.....OFF
	GND SERVICING pb-sw .....AS RQRD
	APU BLEED pb-sw .....OFF
	EXT pb-sw .....AS RQRD
	APU MASTER SW pb-sw .....OFF
	EMER EXIT LT sw .....OFF
	NO SMOKING sw .....OFF
OIT knob .....OFF	OIT knob .....OFF
CM1 LAPTOP.....OFF	CM2 + BACKUP LAPTOPS.....OFF
SECURING THE AIRCRAFT C/L.....COMPLETE	SECURING THE AIRCRAFT C/L.....COMPLETE
	ALL BAT pb-sw (BAT 1, ESS, 2, APU BAT).....OFF
	COCKPIT WAYLIGHT pb-sw .....ON, IF NECESSARY

HOW TO USE THE ATC DATALINK SYSTEM

Applicable to: ALL

Refer to DSC-46-10-40 How to Make a Manual Notifcation to an ATC Center
Refer to DSC-46-10-40 How to Send a Request Message
Refer to DSC-46-10-40 How to Send an Emergency Message
Refer to DSC-46-10-40 How to Cancel Emergency
Refer to DSC-46-10-40 How to Read an Uplink Message
Refer to DSC-46-10-40 How to Manage a Confirm Message
Refer to DSC-46-10-40 How to Manage a Report Message
Refer to DSC-46-10-40 How to Manage a Deferred Clearance Message
Refer to DSC-46-10-40 How to Manage a Loadable Message
Refer to DSC-46-10-40 How to Use Position Report
Refer to DSC-46-10-40 How to Store Messages
Refer to DSC-46-10-40 How to Use Digital ATIS
Refer to DSC-46-10-40 How to Set MAX UPLINK DELAY

HOW TO USE THE OPS LIBRARY

Applicable to: ALL

Refer to DSC-46-20-50-10 How to Start the OPS LIBRARY
Refer to DSC-46-20-50-10 How to Check a Manual
Refer to DSC-46-20-50-10 How to Access the FCOM
Refer to DSC-46-20-50-10 How to Use Information Layers
Refer to DSC-46-20-50-10 How to Display Illustrations
Refer to DSC-46-20-50-10 How to Use Links
Refer to DSC-46-20-50-10 How to Use Temporary Documentary Units
Refer to DSC-46-20-50-10 How to Use Word Search
Refer to DSC-46-20-50-10 How to Use Bookmarks
Refer to DSC-46-20-50-10 How to Use Notes
Refer to DSC-46-20-50-10 How to Use the "What If" Function
Refer to DSC-46-20-50-10 How to Close the OPS LIBRARY
Refer to DSC-46-20-50-10 How to Exit the OIS Session

HOW TO USE PERFORMANCE APPLICATIONS

Applicable to: ALL

Refer to DSC-46-20-50-20 How to Start Performance Applications
Refer to DSC-46-20-50-20 How to Close Performance Applications

HOW TO USE THE FLT FOLDER

Applicable to: ALL

Refer to DSC-46-20-50-30 How to Start the FLT FOLDER
Refer to DSC-46-20-50-30-10 How to Access an EFF
Refer to DSC-46-20-50-30-20 How to Sign a Document
Refer to DSC-46-20-50-30-30 How to Check a Document
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Applicable to: ALL

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Applicable to: ALL

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COND BULK CARGO HEATER FAULT..... O
COND BULK CARGO ISOL FAULT..... P
COND BULK CARGO VENT FAULT..... Q
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COND FWD CARGO ISOL FAULT..... S
COND FWD CARGO VENT FAULT..... T
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PRO-ABN-ECAM-10-21-20 21-Ventilation

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AIR PACK BAY 1+2 VENT FAULT ..... B
COND AFT VENT CTL 1(2) FAULT C
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COND AFT VENT CTL REDUNDANCY LOST ..... F
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COND FWD(AFT) CREW REST VENT FAULT ..... H
COND FWD VENT CTL 1(2) FAULT I
COND FWD VENT CTL DEGRADED ..... J
COND FWD VENT CTL FAULT ..... K
COND FWD VENT CTL REDUNDANCY LOST L
COND PART SECONDARY CABIN FANS FAULT ..... M
COND SECONDARY CABIN FANS FAULT ..... N
VENT AVNCS BLOWING DEGRADED ..... O
VENT AVNCS BLOWING FAULT ..... P
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VENT AVNCS L (R) BLOWING FAULT ..... R
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VENT COOLG SYS 1(2) OVHT ..... U
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VENT IFE BAY ISOL FAULT ..... W
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CAB PRESS DIFF PRESS HI C
CAB PRESS DIFF PRESS LO ..... D
[redacted] CAB PRESS EXCESS CAB ALT [redacted] ..... E
[redacted] CAB PRESS EXCESS DIFF PRESS [redacted] ..... F
[redacted] CAB PRESS EXCESS NEGATIVE DIFF PRESS [redacted] ..... G
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CAB PRESS INHIBITED BY DOORS I
CAB PRESS LDG ELEVN FAULT ..... J
CAB PRESS MAN CTL FAULT ..... K
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CAB PRESS OUTFLW VLV CTL FAULT OUTFLW VLV 1+2+3(1+2+4)(1+3+4)(2+3+4)(1+2)(1+3)(1+4)(2+3)(2+4)(3+4) ..... M
CAB PRESS SENSORS FAULT ..... N
CAB PRESS SYS FAULT ..... O
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PRO-ABN-ECAM-10-22-FG 22-Flight Guidance

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AUTO FLT A/THR OFF ..... B
AUTO FLT AFS CTL PNL FAULT C
[redacted] AUTO FLT AP OFF [redacted] ..... D
AUTO FLT APPROACH CAPABILITY DOWNGRADED ..... E
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AUTO FLT ENG 1(2)(3)(4) A/THR OFF ..... G
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PRO-ABN-ECAM-10-23 Communication

CAB COM CIDS 1+2+3 FAULT....A
CAB COM CIDS CABIN COM FAULT....B
CAB COM COM DEGRADED....C
COM CAPTAIN (F/O)(THIRD OCCUPANT) PTT STUCK....D
COM DATALINK FAULT....E
COM HF 1(2) DATALINK FAULT....F
COM HF 1(2) EMITTING....G
COM RMP 1(2)(3) FAULT....H
COM RMP 1+2(1+3)(2+3) FAULT....I
COM RMP 1+2+3 FAULT....J
COM SATCOM DATALINK FAULT....K
COM SATCOM FAULT....L
COM SATCOM VOICE FAULT....M
COM VHF 1(2)(3) EMITTING....N
COM VHF 2(3) DATALINK FAULT....O

PRO-ABN-ECAM-10-24 Electrical

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ELEC AC Bus 1 Fault....B
ELEC AC BUS 1+2 & DC BUS 1 FAULT....C
ELEC AC BUS 2 FAULT....D
ELEC AC BUS 2+3 & DC BUS 1+2 FAULT....E
ELEC AC BUS 2+4 FAULT....F
ELEC AC BUS 3 FAULT....G
ELEC AC BUS 3+4 & DC BUS 2 FAULT....H
ELEC AC BUS 4 FAULT....I
ELEC AC ESS BUS ALTN....J
ELEC AC ESS BUS FAULT....K
ELEC APU BAT FAULT....L
ELEC APU GEN A(B) FAULT....M
ELEC APU TR FAULT....N
ELEC BAT 1 (2)(Ess) FAULT....O
ELEC BAT 1 (2)(Ess)(APU) OFF....P
ELEC BUS TIE OFF....Q
ELEC C/B MONITORING FAULT....R
ELEC C/B TRIPPED....S
ELEC CABIN L(R) SUPPLY CENTER OVHT....T
ELEC CABIN L(R) SUPPLY CENTER OVHT DET FAULT....U

ELEC DC BUS 1 FAULT....V
ELEC DC BUS 1+2 FAULT....W
ELEC DC BUS 1+ESS FAULT....X
ELEC DC BUS 2 FAULT....Y
ELEC DC ESS BUS FAULT....Z
ELEC DC ESS BUS PART FAULT....AA
ELEC DRIVE 1(2)(3)(4) DISC FAULT....AB
ELEC DRIVE 1(2)(3)(4) DISCONNECTED....AC
ELEC DRIVE 1(2)(3)(4) OIL LEVEL LO....AD
ELEC DRIVE 1(2)(3)(4) OIL OVHT....AE
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ELEC ELEC NETWORK MANAGEMENT 1(2) FAULT....AG
ELEC EMER C/B MONITORING FAULT....AH
[redacted] ELEC EMER CONFIG [redacted]....AI
ELEC EXT PWR 1(2)(3)(4) FAULT....AJ
ELEC F/CTL ACTUATOR PWR SUPPLY FAULT....AK
ELEC GEN 1(2)(3)(4) FAULT....AL
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ELEC LOAD MANAGEMENT FAULT....AN
ELEC PRIMARY supply CENTER 1(2) FAULT....AO
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ELEC SECONDARY SUPPLY CENTER 1(2) FAULT....AS
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ELEC SECONDARY SUPPLY CTR 1(2) REDUND LOST....AU
ELEC STATIC INV FAULT....AV
ELEC TR 1(2)(ESS) FAULT....AW
ELEC TR 1(2)(ESS) MONITORING FAULT....AX

PRO-ABN-ECAM-10-26 Fire and Smoke Protection

[redacted] APU FIRE [redacted]....A
APU FIRE DET FAULT....B
APU FIRE LOOP A(B) FAULT....C
[redacted] ENG 1(2)(3)(4) FIRE (In flight) [redacted]....D
[redacted] ENG 1(2)(3)(4) FIRE (On ground) [redacted]....E
ENG 1(2)(3)(4) FIRE DET FAULT....F
ENG 1(2)(3)(4) FIRE LOOP A(B) FAULT....G
[redacted] MLG BAY FIRE [redacted]....H

MLG BAY FIRE DET FAULT....I
MLG BAY FIRE LOOP A(B) FAULT....J
SMOKE AFT AVNCS DET FAULT....K
[redacted] SMOKE AFT AVNCS SMOKE [redacted]....L
SMOKE AFT LWR CAB REST BTL 1(2) FAULT....M
SMOKE AFT LWR CAB REST DET FAULT....N
[redacted] SMOKE AFT LWR CAB REST SMOKE [redacted]....O
SMOKE DET FAULT....P
SMOKE IFE BAY DET FAULT....Q
[redacted] SMOKE IFE BAY SMOKE [redacted]....R
SMOKE L(R) MAIN (UPPER) AVNCS DET FAULT....S
[redacted] SMOKE L(R) MAIN AVNCS SMOKE [redacted]....T
[redacted] SMOKE L(R) UPPER AVNCS SMOKE [redacted]....U
SMOKE FACILITIES DET FAULT....V
SMOKE FLT REST DET FAULT....W
[redacted] SMOKE FLT REST SMOKE [redacted]....X
SMOKE FWD (AFT) CARGO BOTTLES FAULT....Y
[redacted] SMOKE FWD (AFT/BULK) CARGO SMOKE [redacted]....Z
SMOKE FWD (AFT/BULK) CARGO DET FAULT....AA
SMOKE FWD+AFT CARGOS BOTTLES FAULT....AB
SMOKE FWD+AFT CARGOS BTL 1(2) FAULT....AC
SMOKE MAIN (UPPER) (LOWER) DECK LAVATORY DET FAULT....AD
[redacted] SMOKE MAIN (UPPER) (LOWER) DECK LAVATORY SMOKE [redacted]....AE
SMOKE MAIN(UPPER) XX CWS(RCC) DET FAULT....AF
[redacted] SMOKE MAIN(UPPER) XX CWS(RCC) SMOKE [redacted]....AG
SMOKE SAFETY TEST REQUIRED....AH
[redacted] FIRE SMOKE/FUMES [redacted]....AI

PRO-ABN-ECAM-10-27-10 27-Flight Controls

[redacted] CONFIG L(R) SIDESTICK FAULT (BY TAKE-OVER) [redacted]....A
[redacted] CONFIG PITCH TRIM NOT IN T.O RANGE [redacted]....B
[redacted] CONFIG RUDDER TRIM NOT IN T.O RANGE [redacted]....C
[redacted] CONFIG SPEED BRAKEs NOT RETRACTED [redacted]....D
F/CTL AILERON ACTUATOR FAULT....E
F/CTL AILERON ELEC ACTUATOR FAULT....F
F/CTL ALTN LAW (PROT LOST)....G
F/CTL Direct Law....H
F/CTL DOUBLE ELEVATOR FAULT....I
F/CTL DOUBLE RUDDER PRESSURE SENSOR FAULT....J

F/CTL ELEVATOR ACTUATOR FAULT....K
F/CTL ELEVATOR ELEC ACTUATOR FAULT....L
F/CTL FCDC 1(2) FAULT....M
F/CTL FCDC 1+2 FAULT....N
F/CTL GND SPLR s FAULT....O
F/CTL GND SPLRs NOT ARMED....P
F/CTL LOAD ALLEVIATION FAULT....Q
F/CTL L(R) INR(MID)(OUTR) AILERON FAULT....R
F/CTL L(R) SIDESTICK FAULT....S
F/CTL PART (MOST) SPLRs FAULT....T
F/CTL PITCH TRIM/FMS/CG DISAGREE....U
F/CTL PRIM 1(2)(3) FAULT....V
F/CTL PRIM 1(2)(3) ELEVATOR ACTUATOR FAULT....W
F/CTL PRIM 1(2)(3) RUDDER ACTUATOR FAULT....X
F/CTL PRIM 1(2)(3) SIDESTICK SENSOR FAULT....Y
F/CTL PRIM(SEC) VERSIONS DISAGREE....Z
F/CTL PRIMs PIN PROG DISAGREE....AA
F/CTL RUDDER ACTUATOR FAULT....AB
F/CTL RUDDER ELEC ACTUATOR FAULT....AC
F/CTL RUDDER PEDAL FAULT....AD
F/CTL RUDDER PEDAL JAMMED....AE
F/CTL RUDDER PEDAL SENSOR FAULT....AF
F/CTL RUDDER PRESSURE SENSOR FAULT....AG
F/CTL RUDDER TRIM 1(2) FAULT....AH
F/CTL RUDDER TRIM FAULT....AI
F/CTL RUDDER TRIM RUNAWAY....AJ
F/CTL SEC 1(2)(3) FAULT....AK
F/CTL SIDESTICK PRIORITY FAULT....AL
F/CTL SIDESTICK SENSOR FAULT....AM
F/CTL SINGLE ELEVATOR FAULT....AN
F/CTL SINGLE RUDDER FAULT....AO
F/CTL SPEED BRAKES FAULT....AP
F/CTL SPEED BRAKES POS/LEVER DISAGREE....AQ
F/CTL SPEED BRAKES STILL EXTENDED....AR
F/CTL STABILIZER ACTUATOR FAULT....AS

F/CTL STABILIZER ELEC ACTUATOR FAULT ..... AT
F/CTL STABILIZER FAULT ..... AU
F/CTL TWO GYROMETER s FAULT ..... AV
[redacted] OVERSPEED [redacted] ..... AW
TAIL STRIKE ..... AX
TAIL STRIKE DET FAULT ..... AY

PRO-ABN-ECAM-10-27-20 27-Slats/Flaps

[redacted] CONFIG SLATS (FLAPS) NOT IN T.O CONFIG [redacted] ..... A
F/CTL FLAP CTL 1(2) FAULT ..... B
F/CTL FLAP SYS 1(2) FAULT C
F/CTL FLAP SYS 1+2 FAULT ..... D
F/CTL FLAP(SLAT) 1(2) SAFETY TEST REQUIRED ..... E
[redacted] F/CTL FLAPS LEVER NOT ZERO [redacted] ..... F
F/CTL FLAPS LEVER OUT OF DETENT ..... G
F/CTL FLAPS LEVER SYS 1(2) FAULT ..... H
F/CTL FLAPS LOCKED I
F/CTL LDG WITH FLAPS LEVER JAMMED ..... J
F/CTL LDG WITH NO SLATS NO FLAPS ..... K
F/CTL SLAT CTL 1(2) FAULT L
F/CTL SLAT SYS 1(2) FAULT ..... M
F/CTL SLAT SYS 1+2 FAULT ..... N
F/CTL SLATS LOCKED ..... O
F/CTL SLATS(FLAPS) TIP BRK TEST REQUIRED ..... P
F/CTL T.O FLAPS/FMS DISAGREE ..... Q

PRO-ABN-ECAM-10-28 Fuel

FUEL ABNORM AUTO REFUEL DISTRIBUTION ..... A
FUEL ALL FEED TKs LEVEL LO ..... B
FUEL APU FEED FAULT C
FUEL APU FEED VLV NOT CLOSED ..... D
FUEL AUTO GND XFR COMPLETED ..... E
FUEL AUTO GND XFR FAULT ..... F
FUEL CG AT FWD LIMIT ..... G
FUEL CG DATA DISAGREE ..... H
FUEL CG OUT OF RANGE I
FUEL COLLECTOR CELL 1(2)(3)(4) NOT FULL ..... J
FUEL CROSSFEED VLV 1(2)(3)(4) FAULT ..... K
FUEL ENG 1(2)(3)(4) LP VLV FAULT L
[redacted] FUEL EXCESS AFT CG [redacted] ..... M

FUEL FEED TK 1(2)(3)(4) LEVEL LO ..... N
FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPs FAULT ..... O
FUEL FEED TK 1(2)(3)(4) MAIN PMP FAULT ..... P
FUEL FEED TK 1(2)(3)(4) STBY PMP FAULT ..... Q
FUEL FEED TK 1(2)(3)(4) TEMP HI ..... R
FUEL FEED TKs 1+2(3+4) LEVEL LO ..... S
FUEL FQDC 1(2) FAULT ..... T
FUEL FQI FAULT ..... U
FUEL FQMS 1(2) FAULT V
FUEL FQMS 1+2 FAULT ..... W
FUEL GAUGING FAULT X
FUEL INR TKs MAN XFR COMPLETED ..... Y
FUEL INR TKs QTY LO ..... Z
FUEL JETTISON ..... AA
FUEL JETTISON COMPLETED ..... AB
FUEL JETTISON FAULT ..... AC
FUEL JETTISON VLV NOT CLOSED ..... AD
FUEL L(R) INR TK FWD+AFT PMPs FAULT ..... AE
FUEL L(R) INR(MID) TK AFT PMP FAULT ..... AF
FUEL L(R) INR(MID) TK FWD PMP FAULT ..... AG
FUEL L(R) MID TK FWD+AFT PMPs FAULT ..... AH
FUEL L(R) OUTR TK PMP FAULT ..... AI
FUEL L(R) WING FEED PMPs FAULT ..... AJ
FUEL LEAK DET FAULT ..... AK
FUEL LEAK DETECTED ..... AL
FUEL MAN BALANCING PROCEDURE ..... AM
FUEL MAN XFR PROCEDURE ..... AN
FUEL MID TKs MAN XFR COMPLETED ..... AO
FUEL NO ZFW OR ZFWCG DATA ..... AP
FUEL NORM + ALTN XFR FAULT ..... AQ
FUEL NORM XFR FAULT ..... AR
FUEL OUTR TK XFR FAULT ..... AS
FUEL OUTR TKs MAN XFR COMPLETED ..... AT
FUEL PREDICTED CG OUT OF T.O RANGE ..... AU
FUEL REFUEL / DEFUEL SYS FAULT ..... AV
FUEL REFUEL DATA / FMS DISAGREE ..... AW
FUEL REFUEL FAULT ..... AX
FUEL SYS COMPONENT FAULT ..... AY
FUEL TEMP LO ..... AZ

FUEL TRIM & APU LINES FAULT....BA
FUEL TRIM TK GRVTY FWD XFR FAULT....BB
FUEL TRIM TK L(R) PMP FAULT....BC
FUEL TRIM TK L+R PMPs FAULT....BD
FUEL TRIM TK MAN XFR COMPLETED....BE
FUEL TRIM TK OVERFLOW....BF
FUEL TRIM TK XFR FAULT....BG
FUEL WEIGHT & BALANCE BKUP FAULT....BH
FUEL WEIGHT DATA DISAGREE....BI
FUEL WING TK OVERFLOW....BJ
FUEL WINGS BALANCED....BK
FUEL WINGS MAN BALANCING PROCEDURE....BL
FUEL WINGS NOT BALANCED....BM
FUEL ZFW OR ZFWCG FMS DISAGREE....BN

PRO-ABN-ECAM-10-29 Hydraulic System

HYD G (Y) ELEC PMP A or (B) FAULT....A
HYD G (Y) ENG 1 or 2 (3 or 4) PMP A or B PRESS LO....B
HYD G(Y) FUEL HEAT EXCHANGER VLV FAULT....C
HYD G(Y) HEAT EXCHANGER AIR LEAK....D
HYD G(Y) HEAT EXCHANGER AIR LEAK DET FAULT....E
HYD G(Y) RSVR AIR PRESS LO....F
HYD G (Y) RSVR LEVEL LO....G
HYD G(Y) SYS CHAN A or B OVHT DET FAULT....H
HYD G (Y) SYS COOLING FAULT....I
HYD G (Y) SYS MONITORING FAULT....J
HYD G (Y) SYS OVHT....K
HYD G(Y) SYS OVHT DET FAULT....L
HYD G (Y) SYS PRESS LO....M
HYD G(Y) SYS TEMP EXCESS HI....N
HYD G+Y SYS PRESS LO....O
HYD Y ELEC PMP A+B OFF....P

PRO-ABN-ECAM-10-30 Ice and Rain protection

A-ICE ALL PROBES 1(2)(3) NOT DEICED....A
A-ICE CTL SYS FAULT....B
A-ICE ENG 1(2)(3)(4) VLV CLOSED....C
A-ICE ENG 1(2)(3)(4) VLV MONITORING FAULT....D
A-ICE ENG 1(2)(3)(4) VLV OPEN....E
A-ICE ICE DET FAULT....F

A-ICE ICE DETECTED ..... G
A-ICE L(R) FIXED WINDOW HEATG FAULT ..... H
A-ICE L(R) SLIDING WINDOW HEATG FAULT I
A-ICE L(R) WINDSHIELD HEATG FAULT ..... J
A-ICE L(R) WING VLV CLOSED ..... K
A-ICE L(R) WING VLV OPEN L
A-ICE L(R) WING VLV PRESS HI ..... M
A-ICE L(R) WING VLV PRESS LO ..... N
A-ICE L+R WINDSHIELDS HEATG FAULT ..... O
A-ICE PITOT TAT AOA PROBE 1(2)(3) HEATG FAULT ..... P
A-ICE PITOT TAT AOA PROBE 1+2(1+3)(2+3) HEATG FAULT ..... Q
A-ICE SEVERE ICE DETECTED ..... R
A-ICE SIDESLIP PROBE 1(2)(3) HEATING FAULT ..... S
A-ICE STATIC PROBE 1(2)(3) HEATING FAULT ..... T
A-ICE STBY PITOT PROBE HEATG FAULT ..... U
A-ICE STBY STATIC PROBE HEATG FAULT V
CABIN DRAIN MASTS HEATING FAULT ..... W

PRO-ABN-ECAM-10-31 Indicating/Recording

CDS & AUTO FLT FCU SWITCHED OFF ..... A
CDS BACKUP DATA NOT AVAIL ..... B
CDS CAPT (F/O) CURSOR CTL FAULT C
CDS CAPT (F/O) CURSOR CTL+KEYBOARD FAULT ..... D
CDS CAPT (F/O) EFIS BKUP CTL FAULT ..... E
CDS CAPT (F/O) EFIS CTL PNL FAULT ..... F
CDS CAPT (F/O) KEYBOARD FAULT ..... G
CDS CAPT (F/O) MAILBOX ACCESS FAULT ..... H
CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD)(F/O PFD)(F/O ND)(F/O MFD) DU FAULT I
CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD)(F/O PFD)(F/O ND)(F/O MFD) DU NOT MONITORED ..... J
CDS CAPT+F/O EFIS CTL PNLs FAULT ..... K
CDS DISPLAY DISAGREE L
CDS EFIS ADR SINGLE SOURCE ..... M
CDS EFIS IR SINGLE SOURCE ..... N
CDS FWS 1+2 & CPIOM FAULT ..... O
CDS FWS 1+2 & FCDC 1+2 FAULT ..... P
FWS FWS 1+2 FAULT ..... Q
FWS AIRLINE CUSTOMIZATION REJECTED FWS 1 (2) (1+2) DATABASE REJECTED ..... R
FWS ATQC DATABASE REJECTED FWS 1 (2) (1+2) ATQC DATABASE REJECTED ..... S
FWS AUDIO FUNCTION LOSS ..... T

FWS ECP FAULT....U
FWS FWS 1(2) FAULT....V
MAINTENANCE TIME LIMITED ITEM....W
NAV HUD FAULT....X
NAV HUD FPV DISAGREE....Y
RECORDER ACCELMTR FAULT....Z
RECORDER CVR FAULT....AA
RECORDER DFDR FAULT....AB
RECORDER SYS FAULT....AC
VIDEO MULTIPLEXER FAULT....AD

PRO-ABN-ECAM-10-32 Landing Gear

BRAKES A-SKID FAULT ON ALL L/G....A
BRAKES A-SKID FAULT ON L + R BODY L/G....B
BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G....C
BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs....D
BRAKES A-SKID FAULT ON WING L/Gs....E
BRAKES A-SKID OFF....F
BRAKES ACCU PRESS LO....G
BRAKES ALTN + EMER BRK FAULT....H
BRAKES ALTN BRK FAULT....I
BRAKES ALTN BRK PRESS MONITORING FAULT....J
BRAKES AUTO BRK FAULT....K
BRAKES BRAKES HOT....L
BRAKES BTV FAULT....M
BRAKES CTL 1(2) FAULT....N
BRAKES EMER BRK FAULT....O
BRAKES MINOR FAULT....P
BRAKES NORM BRK FAULT....Q
BRAKES NORM BRK PRESS MONITORING FAULT....R
BRAKES PARK BRK ON....S
BRAKES PARK BRK PRESS LO....T
BRAKES PEDAL BRAKING FAULT....U
BRAKES RELEASED....V
BRAKES RESIDUAL BRAKING....W
BRAKES SEL VLV JAMMED OPEN....X
BRAKES SYS REDUNDANCY LOST....Y
BRAKES SYS SAFETY TEST REQUIRED....Z
[redacted] CONFIG PARK BRK ON [redacted]....AA

L/G ABNORM OLEO PRESS..... AB
L/G BOGIE POSITION FAULT..... AC
L/G CTL 1(2) FAULT..... AD
L/G CTL 1+2 FAULT..... AE
L/G DOORS NOT CLOSED..... AF
[redacted] L/G GEAR NOT DOWN [redacted]..... AG
[redacted] L/G GEAR NOT LOCKED DOWN [redacted]..... AH
L/G GEAR NOT LOCKED UP..... AI
L/G GEAR UPLOCK FAULT..... AJ
L/G GRVTY EXTN FAULT..... AK
L/G LDG WITH 1 ABNORM WING OR BODY L/G..... AL
L/G LDG WITH 2 ABNORM BODY L/Gs..... AM
L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE..... AN
L/G LDG WITH 2 ABNORM WING L/Gs..... AO
L/G LDG WITH ABNORM NOSE L/G..... AP
L/G OLEO PRESS MONITORING SYS FAULT..... AQ
L/G RETRACTION FAULT..... AR
L/G SYSTEM DISAGREE..... AS
L/G WEIGHT ON WHEELS FAULT..... AT
STEER ALTN N/W STEER FAULT..... AU
STEER ALTN STEER SYS HOT..... AV
STEER B/W STEER FAULT..... AW
STEER B/W STEER NOT LOCKED..... AX
STEER CAPT(FO) STEER TILLER FAULT..... AY
STEER STEER CTL 1 (2) FAULT..... AZ
STEER N/W + B/W STEER FAULT..... BA
STEER N/W STEER ANGLE LIMIT EXCEEDED..... BB
STEER N/W STEER DISC FAULT..... BC
STEER N/W STEER FAULT..... BD
STEER N/W STEER NOT DISC..... BE
STEER NORM N/W STEER FAULT..... BF
STEER PEDAL STEER CTL FAULT..... BG
STEER STEER SEL VLV JAMMED OPEN..... BH
SURV ROW/ROP LOST..... BI
WHEEL TIRE PRESS LO..... BJ

PRO-ABN-ECAM-10-33 Lights

CABIN EMER EXIT LT FAULT..... A

PRO-ABN-ECAM-10-34-10 34-Navigation

NAV ADR 1(2)(3) FAULT ..... A
NAV ADR 1+2 (1+3) (2+3) FAULT ..... B
NAV ADR 1+2+3 DATA DEGRADED C
[redacted] NAV ADR 1+2+3 FAULT [redacted] ..... D
NAV AIR DATA DISAGREE ..... E
[redacted] NAV ALL AIR DATA DISAGREE ALL AIR DATA REJECTED BY PRIMs [redacted] ..... F
NAV AOA DISAGREE ..... G
NAV ARPT NAV FAULT ..... H
NAV CAPT AND F/O ALT DISAGREE I
NAV CAPT AND F/O ATT DISAGREE ..... J
NAV CAPT AND F/O BARO REF DISAGREE ..... K
NAV CAPT AND F/O HDG DISAGREE L
NAV EXTREME LATITUDE ..... M
NAV FLS 1(2) FAULT ..... N
NAV FLS 1+2 FAULT ..... O
NAV FM / GPS POS DISAGREE ..... P
NAV FM / IR POS DISAGREE ..... Q
NAV GLS 1(2) FAULT ..... R
NAV GLS 1+2 FAULT ..... S
NAV GPS 1(2) FAULT ..... T
NAV GPS 1+2 FAULT ..... U
NAV G/S 1(2) ON LOWER ANT V
NAV HUD FAULT ..... W
NAV HUD FPV DISAGREE X
NAV ILS 1(2) FAULT ..... Y
NAV ILS 1+2 FAULT ..... Z
NAV IR 1(2)(3) FAULT ..... AA
NAV IR 1+2 (1+3) (2+3) FAULT ..... AB
NAV IR ALIGNMENT IN ATT MODE ..... AC
NAV IR NOT ALIGNED ..... AD
NAV LOWER G/S ANT FAULT ..... AE
NAV LS 1(2) FAULT ..... AF
NAV LS 1+2 FAULT ..... AG
NAV LS TUNING DISAGREE ..... AH
NAV RA SYS A(B)(C) FAULT ..... AI

NAV RA SYS A+B (A+C) (B+C) FAULT....AJ
NAV RA SYS A+B+C FAULT....AK
NAV RESIDUAL AIR SPEED ON ADR 1(2)(3)....AL
NAV SIDESLIP PROBE 1(2)(3) FAULT....AM
NAV STATIC PROBE FAULT....AN
[redacted] NAV UNRELIABLE AIR SPEED INDICATION [redacted]....AO

PRO-ABN-ECAM-10-34-20 34-Surveillance

SURV GPWS 1(2) FAULT....A
SURV GPWS 1+2 FAULT....B
SURV PRED W/S 1(2) FAULT....C
SURV PRED W/S 1+2 FAULT....D
SURV REACTIVE W/S DET FAULT....E
SURV ROW/ROP LOST....F
SURV SYS 1(2) FAULT....G
SURV SYS 1+2 FAULT....H
SURV SYS DEGRADED....I
SURV TAWS 1(2) FAULT....J
SURV TAWS 1+2 FAULT....K
SURV TCAS 1(2) FAULT....L
SURV TCAS 1+2 FAULT....M
SURV TCAS STBY....N
SURV TERR SYS 1(2) FAULT....O
SURV TERR SYS 1+2 FAULT....P
SURV TURB 1(2) FAULT....Q
SURV TURB 1+2 FAULT....R
SURV WXR 1(2) FAULT....S
SURV WXR 1+2 FAULT....T
SURV XPDR 1(2) FAULT....U
SURV XPDR 1+2 FAULT....V
SURV XPDR STBY....W

PRO-ABN-ECAM-10-35 Oxygen

OXY CABIN BOTTLE PRESS LO....A
OXY CABIN VLV CLOSED....B
OXY CKPT BOTTLE PRESS LO....C

PRO-ABN-ECAM-10-36 Bleed Air

AIR ABNORM BLEED CONFIG....A
AIR APU BLEED FAULT....B
AIR APU BLEED LEAK....C
[redacted] AIR BLEED LEAK [redacted]....D
AIR ENG 1(2)(3)(4) BLEED FAULT....E
AIR ENG 1(2)(3)(4) BLEED NOT CLOSED....F
AIR ENG 1(2)(3)(4) BLEED OFF....G
AIR ENG 1(2)(3)(4) HP VLV NOT OPEN....H
AIR ENG BLEED TEMP LO ON BLEED 1(2)(3)(4)....I
AIR FWD CARGO DUCT LEAK....J
AIR HOT AIR 1(2) LEAK....K
AIR L(R) INR WING LEAK / ENG 2(3) BLEED LEAK....L
AIR L(R) OUTR WING LEAK / ENG 1(4) BLEED LEAK....M
AIR LEAK DET FAULT....N
AIR PACK 1(2) LEAK....O
AIR XBLEED FAULT....P

PRO-ABN-ECAM-10-42 Avionics Network

AVIONICS NETWORK ALL SWITCHES FAULT....A
AVIONICS NETWORK DOUBLE IOM FAULT....B
AVIONICS NETWORK DOUBLE SWITCH FAULT....C
AVIONICS NETWORK MULTIPLE CABLE FAULT....D
AVIONICS NETWORK MULTIPLE IOM FAULT (Network Degraded)....E
AVIONICS NETWORK MULTIPLE IOM FAULT (Redundancy Degraded)....F
AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED)....G
AVIONICS NETWORK MULTIPLE SWITCH FAULT (REDUNDANCY DEGRADED)....H

PRO-ABN-ECAM-10-46 Information System

COM ADS DATALINK FAULT....A
COM ATC DATALINK FAULT....B
COM NSS DATA TO AVNCS XFR FAULT....C
COM NSS/AVNCS DATA XFR FAULT....D
MISC OIS FAULT....E

PRO-ABN-ECAM-10-49 APU

APU FAULT....A
APU MACH LIMIT EXCEEDED....B
APU OIL FILTER CLOGGED....C

PRO-ABN-ECAM-10-52 Doors

DOOR AFT(UPPER) AVNCS NOT CLOSED....A
DOOR AVNCS NOT CLOSED....B
DOOR CKPT DOOR EMER OPENING IN PROGRESS....C
DOOR CKPT SLIDING WINDOW NOT CLOSED....D
DOOR FWD(AFT)(BULK) CARGO NOT CLOSED....E
DOOR L(R) MAIN AVNCS NOT CLOSED....F
DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) ACTUATOR FAULT....G
DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) FLIGHT LOCK FAULT....H
DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER1(2)(3)L(R) LATCH MONITORING FAULT....I
DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) NOT CLOSED....J
DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) POS DET FAULT....K
DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) SLIDE FAULT....L
DOOR MAIN 1L(R) SLIDE LENGTHENING FAULT....M
DOOR POS DET FAULT....N
DOOR RESIDUAL DIFF PRESS DET FAULT....O

PRO-ABN-ECAM-10-56 Cockpit Windows

DOOR CKPT SLIDING WINDOW NOT CLOSED....A
MISC CKPT WINDOW CRACKED....B
MISC CKPT WINDOW ELEC ARCING....C

PRO-ABN-ECAM-10-70 Engines

ENG 1(2)(3)(4) CTL SYS FAULT....A
ENG 1(2)(3)(4) CTL VLV FAULT....B
ENG 1(2)(3)(4) EGT OVER LIMIT....C
ENG 1(2)(3)(4) FADEC FAULT....D
ENG 1(2)(3)(4) FADEC IDENT FAULT....E
ENG 1(2)(3)(4) FADEC SYS FAULT....F
ENG 1(2)(3)(4) FADEC TEMP HI....G
ENG 1(2)(3)(4) FAIL....H
ENG 1(2)(3)(4) FUEL FILTER CLOGGED....I
ENG 1(2)(3)(4) FUEL FILTER MONITORING FAULT....J
ENG 1(2)(3)(4) FUEL LEAK....K
ENG 1(2)(3)(4) FUEL STRAINER CLOGGED....L
ENG 1(2)(3)(4) FUEL SYS CONTAMINATION....M
ENG 1(2)(3)(4) HP FUEL VLV FAULT....N
ENG 1(2)(3)(4) IGN A(B) FAULT....O
ENG 1(2)(3)(4) IGN A+B FAULT....P
ENG 1(2)(3)(4) LP SHAFT PROT LOST - Alert....Q

ENG 1(2)(3)(4) MINOR FAULT....R
[redacted] ENG 1(2)(3)(4) N1/N2 OVER LIMIT [redacted]....S
ENG 1(2)(3)(4) OIL CHIP DETECTED....T
ENG 1(2)(3)(4) OIL FILTER CLOGGED....U
ENG 1(2)(3)(4) OIL FILTER MONITORING FAULT....V
[redacted] ENG 1(2)(3)(4) OIL PRESS LO (Red alert) [redacted]....W
ENG 1(2)(3)(4) OIL SYS CONTAMINATION....X
ENG 1(2)(3)(4) OIL TEMP HI....Y
ENG 1(2)(3)(4) OIL TEMP LO....Z
ENG 1(2)(3)(4) OVERTHRUST PROT LOST....AA
ENG 1(2)(3)(4) SENSOR FAULT....AB
ENG 1(2)(3)(4) SHUT DOWN....AC
ENG 1(2)(3)(4) STALL....AD
ENG 1(2)(3)(4) START FAULT....AE
ENG 1(2)(3)(4) START VLV FAULT (NOT CLOSED)....AF
ENG 1(2)(3)(4) START VLV FAULT (NOT OPEN)....AG
[redacted] ENG 1(2)(3)(4) THR LEVER ABOVE IDLE [redacted]....AH
ENG 1(2)(3)(4) THR LEVER FAULT....AI
ENG 1(2)(3)(4) THRUST LOSS....AJ
ENG 1(2)(3)(4) TIME LIMITED ITEM....AK
ENG 2(3) REVERSER CTL FAULT....AL
ENG 2(3) REVERSER ENERGIZED....AM
ENG 2(3) REVERSER FAULT....AN
ENG 2(3) REVERSER INHIBITED....AO
ENG 2(3) REVERSER LOCKED....AP
ENG 2(3) REVERSER MINOR FAULT....AQ
ENG 2(3) REVERSER UNLOCKED....AR
[redacted] ENG ALL ENG FLAME OUT [redacted]....AS
ENG HI VIBRATIONS....AT
ENG RELIGHT IN FLIGHT....AU
ENG REVERSER SELECTED....AV
ENG T.O THRUST DISAGREE....AW
[redacted] ENG TAIL PIPE FIRE [redacted]....AX
ENG THR LEVERS NOT SET....AY
ENG THRUST LOCKED....AZ
ENG TWO ENGs OUT ON SAME SIDE....BA
ENG TWO ENGs OUT ON OPPOSITE SIDE....BB
ENG TYPE DISAGREE....BC

PRO-ABN-ECAM-10-80 Miscellaneous

MISC BOMB ON BOARD ..... A
MISC CKPT WINDOW CRACKED ..... B
MISC CKPT WINDOW ELEC ARCING C
[redacted] MISC DITCHING [redacted] ..... D
[redacted] MISC EMER DESCENT [redacted] ..... E
[redacted] MISC EMER EVAC [redacted] ..... F
[redacted] MISC FORCED LANDING [redacted] ..... G
MISC OVERWEIGHT LDG ..... H
MISC SEVERE TURBULENCE IN CRUISE I
MISC VOLCANIC ASH ENCOUNTER ..... J

PRO-ABN-ECAM-20 Not-Sensed Procedures (ABN PROC)

PRO-ABN-ECAM-20-00 Introduction

Introduction ..... A

PRO-ABN-ECAM-20-10 Emergency Procedures

Emergency Procedures ..... A

PRO-ABN-ECAM-20-70 ENG

ENG ..... A

PRO-ABN-ECAM-20-27 F/CTL

F/CTL ..... A

PRO-ABN-ECAM-20-32 L/G

L/G ..... A

PRO-ABN-ECAM-20-34 NAV

NAV ..... A

PRO-ABN-ECAM-20-28 FUEL

FUEL ..... A

PRO-ABN-ECAM-20-80 MISCELLANEOUS

MISCELLANEOUS ..... A

PRO-ABN-NECA Non-ECAM Abnormal and Emergency Procedures

PRO-ABN-NECA-10 Operating Techniques

Engine Failure after V1 - Continued Takeoff ..... A
Rejected takeoff ..... B
[redacted] STALL RECOVERY [redacted] C
VMC Landing Following Engine Failure at Takeoff ..... D

PRO-ABN-NECA-20 Incapacitation
Flight Crewmember Incapacitation ..... A

PRO-ABN-NECA-22-FG 22-Flight Guidance
[redacted] AUTOLAND [redacted] ..... A

PRO-ABN-NECA-26 Fire and Smoke Protection
[redacted] FIRE SMOKE / FUMES REMOVAL [redacted] ..... A
[redacted] FIRE SMOKE/FUMES [redacted] ..... B

PRO-ABN-NECA-32 Landing Gear
[redacted] LOSS OF BRAKING [redacted] ..... A
[redacted] RUNWAY Overrun Warning [redacted] ..... B
[redacted] RWY Overrun Protection [redacted] C

PRO-ABN-NECA-34-10 34-Navigation
[redacted] UNRELIABLE AIR SPEED INDICATION - Above FL 250 - Alert [redacted] ..... A

PRO-ABN-NECA-34-20 34-Surveillance
SURV GLIDE SLOPE, GLIDE SLOPE Alert ..... A
SURV GO AROUND, WINDSHEAR AHEAD ..... B
SURV MONITOR RADAR DISPLAY C
SURV PULL UP Alerts ..... D
SURV Resolution Advisory Alerts ..... E
SURV SINK RATE, SINK RATE - DON'T SINK, DON'T SINK Alerts ..... F
SURV TERRAIN AHEAD, TERRAIN AHEAD- OBSTACLE AHEAD, OBSTACLE AHEAD Alerts ..... G
SURV TERRAIN TERRAIN - TOO LOW TERRAIN Alerts ..... H
SURV TOO LOW GEAR - TOO LOW FLAPS Alerts I
SURV Traffic Advisory Alert ..... J
SURV WINDSHEAR AHEAD, WINDSHEAR AHEAD ..... K
SURV WINDSHEAR, WINDSHEAR, WINDSHEAR L

OPERATIONAL RECOMMENDATIONS

Applicable to: ALL

OVERVIEW

Abnormal and Emergency procedures involve actions that the flight crew must perform in order to ensure adequate safety, and help to make the remainder of the flight easier.
Abnormal and Emergency procedures are actions that the flight crew performs:

- After failures, that the ECAM detects (sensed procedures), or
- After failures or situation, that the flight crew detects or encounters (not-sensed ABN PROC , e.g. CKPT WINDOW CRACKED, OVERWEIGHT LANDING), or
- After an aural alert (e.g. OBSTACLE AHEAD, PULL UP).

When the flight crew performs procedures that appear on the ECAM , the flight crew uses the “READ” and “DO” principle (oral reading).

INITIATION OF PROCEDURES

The Pilot Flying (PF) initiates the abnormal and emergency procedures. For training-oriented information on the role of the PF in the initiation of the procedure, *Refer to FCTM/ECAM/Tasksharing Rules* .
However the PF must not take any action (except canceling aural alerts, by pressing the MASTER WARN light) until:

- The appropriate flight path is established
- The aircraft is at least 400 ft above the runway, if a failure occurs during takeoff, approach, or go-around.

A height of 400 ft is recommended, because it is a good compromise between the necessary time to stabilize the aircraft, and excessive delay in procedure initiation.
In some emergency cases, provided that the appropriate flight path is established, the Pilot Flying may initiate actions before reaching 400 ft above the runway.

LAND ASAP/LAND ANSA

In some emergency cases, LAND ASAP (As Soon As Possible) is part of the procedure. In this case, the flight crew should land as soon as possible at the nearest suitable airport at which a safe approach and landing can be performed.
In some abnormal cases, LAND ANSA (At Nearest Suitable Airport) is part of the procedure. In this case, the flight crew should consider landing at the nearest suitable airport.

USE OF AUTOPILOT (AP)

It is possible to use the AP in most failure cases, unless specified in:
- Some failure cases provided in the Aircraft Systems / 22-FG / Abnormal Operation chapter (*Refer to Failures and Associated Actions for CAT II or CAT III Approach*), or
- ECAM procedures.

However, the AP is not certified in all configurations. Therefore, if the flight crew decides to use the AP in the case of failures, extra vigilance is required. If the aircraft deviates from the desired, or safe flight path, the flight crew must disconnect the AP .

LANDING DISTANCE

The ECAM indicates when it is necessary to increase the landing distance, due to the abnormal or emergency situation. The ECAM provides the flight crew with the applicable information to compute landing performance. For more information, *Refer to DSC-31-40-10 Landing Performance Indications* .

MEMORY ITEMS

Memory Items are items that the flight crew must memorize, in order to be able to rapidly apply them, without referring to the ECAM and/or to the FCOM .
The flight crew can easily identify the required memory items because they are surrounded by a white box (*Refer to PRO-ABN-00-100 Introduction*).

The following is a list of the abnormal and emergency procedures requiring the flight crew to memorize items.
- WXR alerts:
  - *Refer to PRO-ABN-NECA-34-20-620 GO AROUND, WINDSHEAR AHEAD*
  - *Refer to PRO-ABN-NECA-34-20-610 WINDSHEAR AHEAD, WINDSHEAR AHEAD*
  - *Refer to PRO-ABN-NECA-34-20-630 WINDSHEAR, WINDSHEAR, WINDSHEAR*
- TCAS alerts:
  - *Refer to PRO-ABN-NECA-34-20-520 SURV Traffic Advisory Alert*
  - *Refer to PRO-ABN-NECA-34-20-570 SURV Resolution Advisory Alerts*

- TAWS alerts:
  - *Refer to PRO-ABN-NECA-34-20-510 SURV GLIDE SLOPE, GLIDE SLOPE Alert*
  - *Refer to PRO-ABN-NECA-34-20-650 SURV PULL UP Alerts*
  - *Refer to PRO-ABN-NECA-34-20-680 SURV SINK RATE, SINK RATE - DON'T SINK, DON'T SINK Alerts*
  - *Refer to PRO-ABN-NECA-34-20-660 SURV TERRAIN, TERRAIN - TOO LOW TERRAIN Alerts*
  - *Refer to PRO-ABN-NECA-34-20-670 SURV TERRAIN AHEAD, TERRAIN AHEAD - OBSTACLE AHEAD, OBSTACLE AHEAD Alerts*
  - *Refer to PRO-ABN-NECA-34-20-690 SURV TOO LOW GEAR - TOO LOW FLAPS Alerts*
- The immediate actions of the EMER DESCENT procedure, *Refer to PRO-ABN-ECAM-10-80-40 EMER DESCENT*
- The immediate actions of the UNRELIABLE AIRSPEED INDICATION procedure, *Refer to PRO-ABN-ECAM-20-10-10 UNRELIABLE AIRSPEED INDICATION*
- LOSS OF BRAKING procedure, *Refer to PRO-ABN-NECA-32-130 LOSS OF BRAKING*
- STALL RECOVERY procedure, *Refer to PRO-ABN-NECA-10 Stall Recovery* .

FCOM PROCEDURE LAYOUT

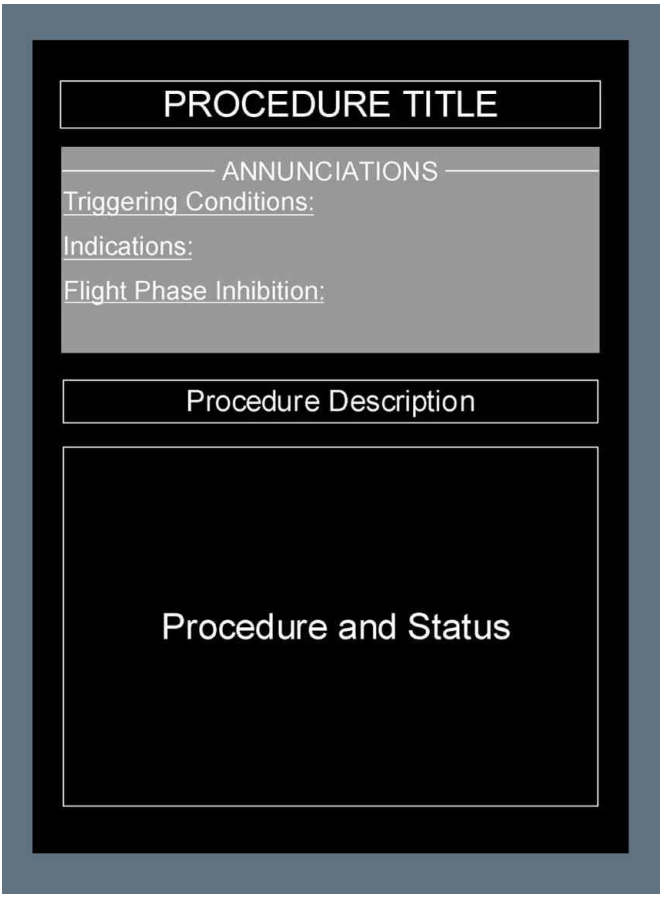
Applicable to: ALL

The Abnormal and Emergency Procedures section includes:
- Sensed procedures: Procedures that automatically appear on the ECAM in the case of a failure
- Not-sensed ABN PROC : Procedures that are manually called by the flight crew on the ECAM
- Procedures not displayed on ECAM that are performed by the flight crew as basic airmanship (e.g. STALL, OVERSPEED)
- Aural alerts that guide the flight crew (e.g. Pull up).

The ECAM procedures provided in the FCOM are identical to the procedures that appear on the ECAM . However, the FCOM also provides additional operational information (comments).
The FCOM displays in uppercase letters the information that appears on the ECAM and uses the same color as the ECAM . All the additional comments appears in the FCOM in lowercase letters.

In accordance with the rules regarding the use of the ECAM , and if time permits, the flight crew can refer to the FCOM , after they have:
- Completed the ECAM actions,
- Reviewed the STATUS pages.

FCOM Presentation of ABN or EMER procedures



PROCEDURE TITLE

The title of an abnormal or emergency procedure, that appears on the ECAM, is:

- Red for a warning
- Amber for a caution
- On a black background.

ABN or EMER Procedure Title Displayed on the ECAM



The title of an abnormal or emergency procedure, that does not appear on the ECAM, is:

- Red for a warning
- Amber for a caution
- On a grey background.

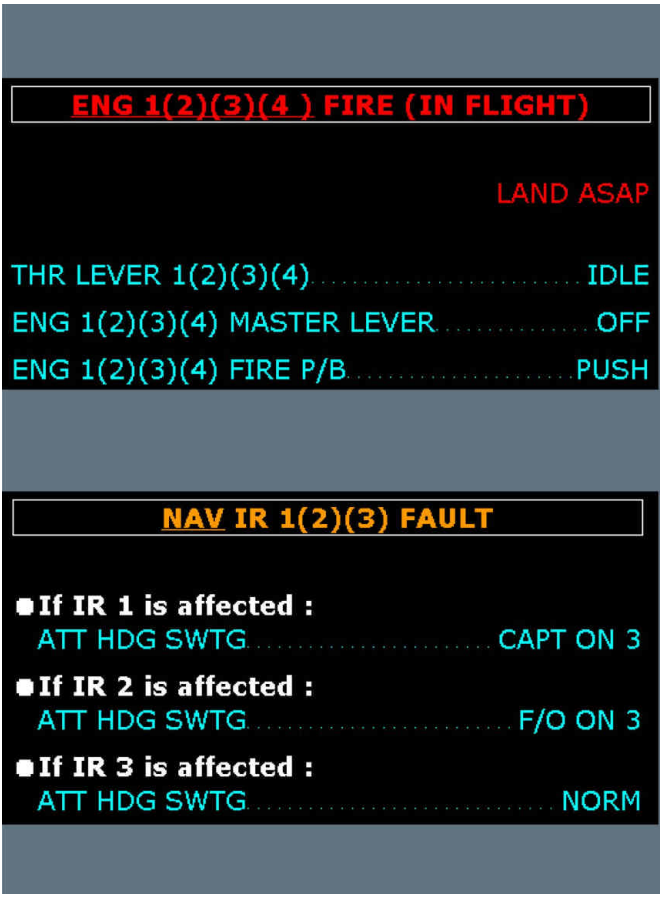
ABN or EMER Procedure Title not Displayed on the ECAM



SEVERAL ALERTS UNDER THE SAME TITLE

When applicable, several alerts may be grouped under the same procedure title. However, depending on the failure, the actions that the flight crew should perform may differ.

Several Alerts Grouped Under the Same Title

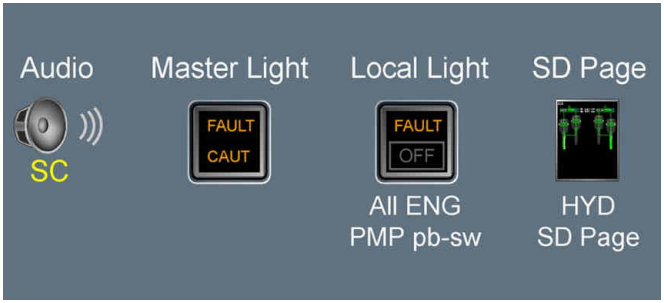


ANNUNCIATIONS

The annunciations section provides:

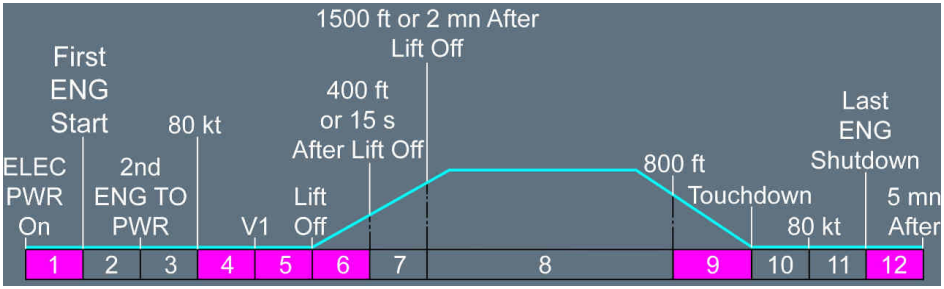
- The triggering conditions, that describe the cause of the alert activation
- The following indications associated with the alert:
  - Audio effect such as Single Chime (SC), or Continuous Repetitive Chime (CRC)
  - The local lights
  - MASTER lights (MASTER WARN or MASTER CAUT)
  - The applicable SD page.

Indications



- The Flight Phase Inhibition diagram, that indicates the flight phases during which the alert is inhibited. For more information about the flight phases, *Refer to DSC-31-40-10 ECAM Flight Phases* .

Flight Phase Inhibition



In the above example, the alert is inhibited in the aircraft flight phase 1, 4, 5, 6, 9, 12.

PROCEDURE DESCRIPTION

The Procedure Description section provides:

- A summary of the procedure, when necessary. Particularly when the procedure is quite complex.
- A link to the MEL for relevant dispatch conditions, if applicable.

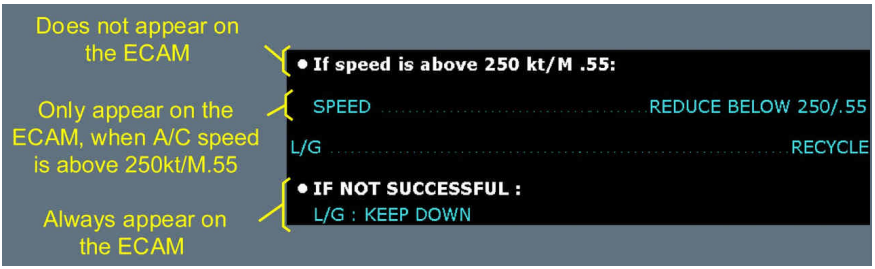
PROCEDURE AND STATUS

The Procedure and Status section provides the procedure and additional comments.

CONDITIONS

A white bullet appears in front of lines that are conditions. These lines are also referred to as condition lines.
The conditions that appear on the ECAM are in uppercase bold letters in the FCOM.
There are conditions, that are automatically managed by the ECAM, and do not appear on the ECAM, or that are part of non-ECAM procedures. Such conditions appear in the FCOM in lowercase letters.

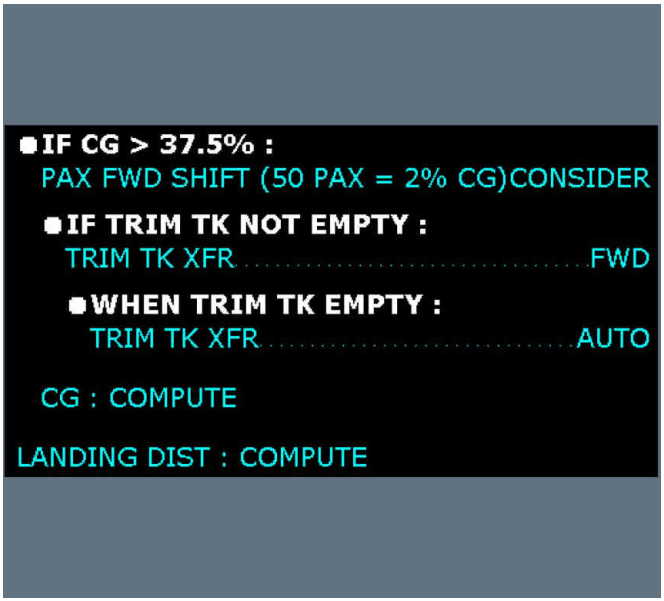
Condition



INDENTATION

When a procedure line depends on several conditions, these conditions are indented on the ECAM and in the FCOM.

Sample of an Indented Procedure Line



ASSOCIATED PROCEDURES

Some alerts, also referred to as primary alerts, automatically trigger other associated alerts. Associated alerts appear in the FCOM below the primary procedure.

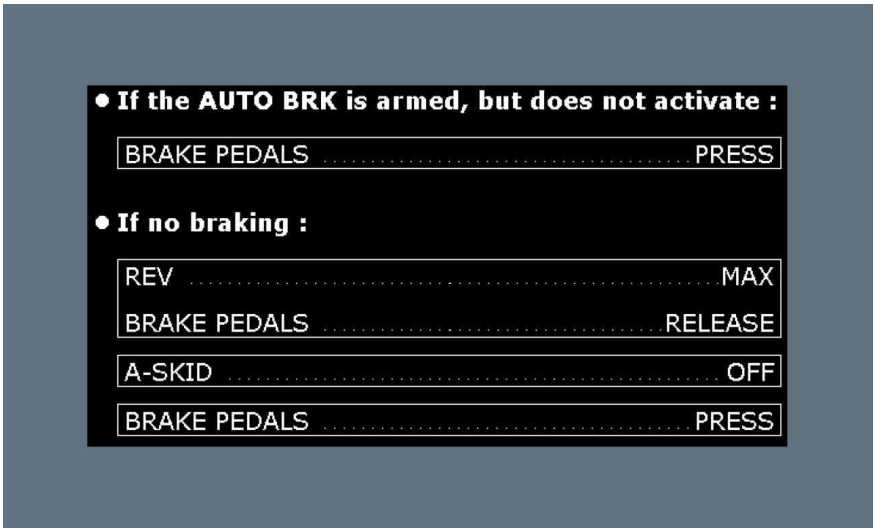
Associated Alerts Sample



MEMORY ITEMS

Memory items are items that the flight crew must memorize, in order to be able to rapidly apply them, without referring to the ECAM, and/or to the FCOM.
Memory items are surrounded by a white box in the FCOM procedure, in order to enable the flight crew to easily identify them.

Memory Items



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21-Air Conditioning

AIR PACK 1(2) CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One channel of the pack controller is failed.

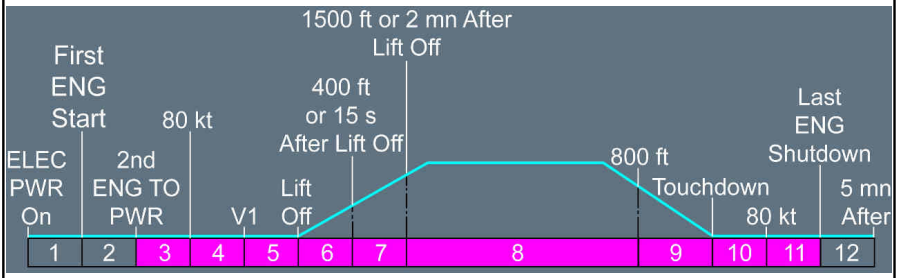
Indications:

SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-36-21 AIR PACK 1 CTL 1 FAULT*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 1 CTL 2 FAULT*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 2 CTL 1 FAULT*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 2 CTL 2 FAULT* .

Crew awareness.

Continued on the following page

AIR PACK 1(2) CTL 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

PACK 1(2) CTL 1(2)

AIR PACK 1(2) CTL DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pack 1(2) control is degraded.
L3 The two applications of the pack 1(2) control hosted in the CPIOM B are failed.

Indications:

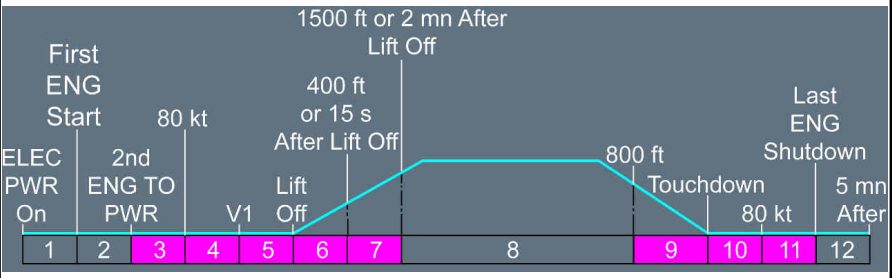
L2

SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

AIR PACK 1(2) CTL DEGRADED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK 1(2) CTL DEGRADED* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
PACK 1(2) CTL DEGRADED

AIR PACK 1(2) CTL REDUNDANCY LOST

Applicable to: ALL

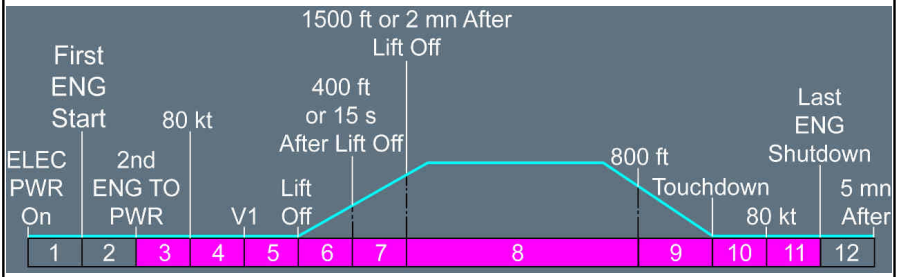
ANNUNCIATIONS

Triggering Conditions:

L2 One redundant application of the pack 1(2) control is failed.
L3 This application is hosted in the CPIOM B.

Indications:

Flight Phase Inhibition:



Continued on the following page

AIR PACK 1(2) CTL REDUNDANCY LOST (Cont'd)

L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-36-21 AIR PACK 1 CTL REDUNDANCY LOST*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 2 CTL REDUNDANCY LOST*.

Crew awareness.

MORE INFO

REDUND LOSS

PACK 1(2) CTL REDUND

AIR PACK 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pack is failed.

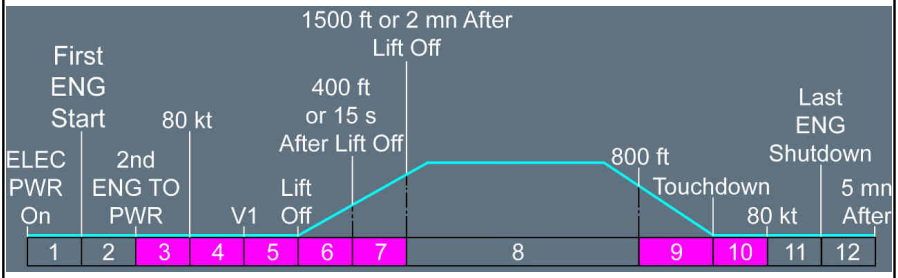
L3 The pack fails, when:
- The associated pack valves are abnormally closed, or
- Both channels of the associated pack controller are failed.

Indications:

L2

Audio	Master Light	Local light	SD page
			
		PACK 1(2) pb	BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-36-21 AIR PACK 1(2) FAULT .*

PACK 1(2)..... OFF

L2 *The airflow of the remaining pack is automatically set to HIGH.*

Continued on the following page

AIR PACK 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

PACK 1(2)

AIR PACK 1(2) OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PACK 1(2) pb is abnormally set to OFF.

Indications:

Audio



Master Light



Local light



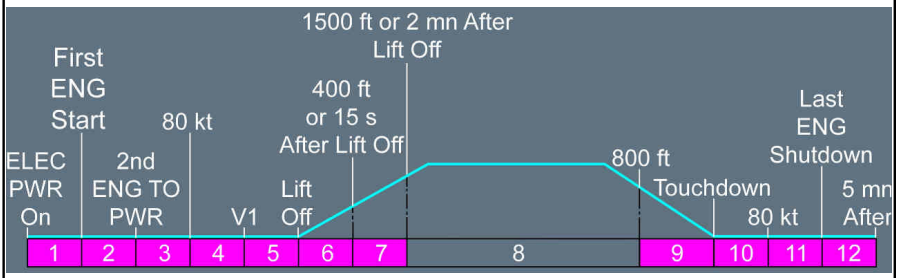
PACK 1(2) pb

SD page



BLEED SD Page

Flight Phase Inhibition:



L2 This alert is also inhibited the first 60 s of the phase 8.

Continued on the following page

AIR PACK 1(2) OFF (Cont'd)

Crew awareness.

STATUS

INOP SYS

ALL PHASES

PACK 1(2)

AIR PACK 1(2) OVHT

Applicable to: ALL

ANNUNCIATIONS

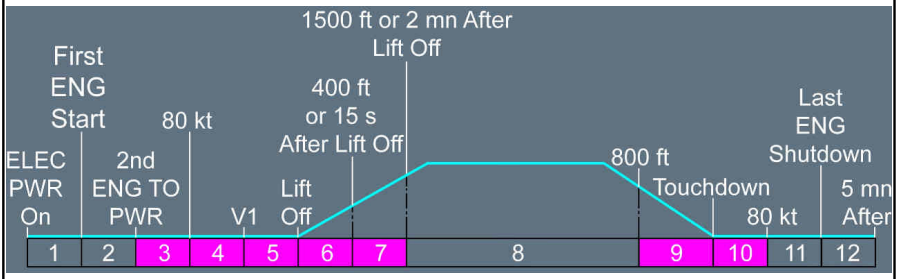
Triggering Conditions:

L2 The pack outlet temperature is above 95 °C.

Indications:

Audio	Master Light	Local light	SD page
			
		PACK 1(2) pb	BLEED SD Page

Flight Phase Inhibition:



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AIR PACK 1(2) OVHT (Cont'd)

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK 1(2) OVHT*.

PACK 1(2)..... OFF

L2 *On ground, before any engine start, the pack valves of the affected pack, automatically close. The airflow of the remaining pack is automatically set to HIGH.*

DEFERRED PROC

ALL PHASES

- **WHEN PACK OVHT OUT :**
  PACK 1(2).....ON

STATUS

INOP SYS

ALL PHASES

PACK 1(2)

AIR PACK 1(2) REGUL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Pack performance is degraded.

L3 – The pack is in bypass mode, or
– The water extraction system inside both ACMs is failed, or
– The ram air inlet or outlet doors are failed, or
– The turbine isolation valve is failed, or
– The Turbine Bypass Valve (TBV) is failed.

Indications:

L2

Audio



Master Light

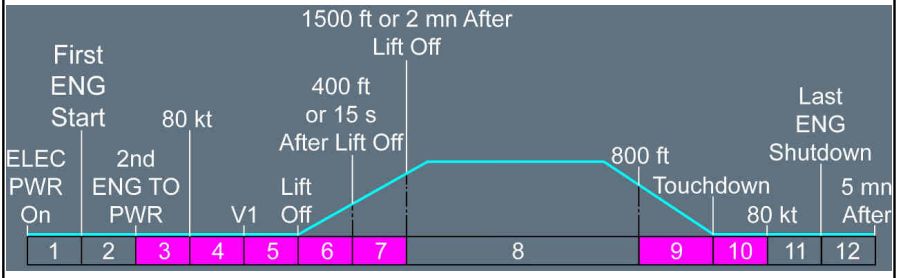


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-36-21 AIR PACK 1(2) REGUL FAULT*.

Continued on the following page

AIR PACK 1(2) REGUL FAULT (Cont'd)

● **Depending on the failure, one of the following messages will appear:**

PACK 1(2) IN BYPASS MODE

PACK 1(2) WATER EXTRACT FAULT

PACK 1(2) RAM AIR DOOR CLOSED

L2 *No aural warning, or master caution is associated to this message.*

L1 TURBINE ISOL VLV FAULT

L2 - *This message is inhibited in flight, and*
- *No aural warning, or master caution is associated with this message.*

L1 TURBINE BYPASS VLV OPEN

L2 - *This message is inhibited in flight, and*
- *No aural warning, or master caution is associated with this message.*

L1 ● **Only if the PACK 1(2) IN BYPASS MODE or PACK WATER EXTRACT FAULT message is displayed:**

PACK 1(2) AVAIL ABOVE FL 290

● **WHEN BELOW FL 290 (AUTO RCL) :**

PACK 1(2)..... OFF

L2 *This message is recalled, when the aircraft goes below FL 290.*

STATUS

INOP SYS

ALL PHASES

PACK 1(2)

INFO

- If the PACK 1(2) IN BYPASS MODE or PACK WATER EXTRACT FAULT message is displayed:
  PACK 1(2) AVAIL ABOVE FL 290
  PACK 1(2) REGUL DEGRADED

AIR PACK 1(2) VLV 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2

- One pack valve is failed open, or
- One pack valve is failed closed, and:
  - At least one pack valve on the other pack is failed closed, or
  - The other pack is failed.

Indications:

Local light



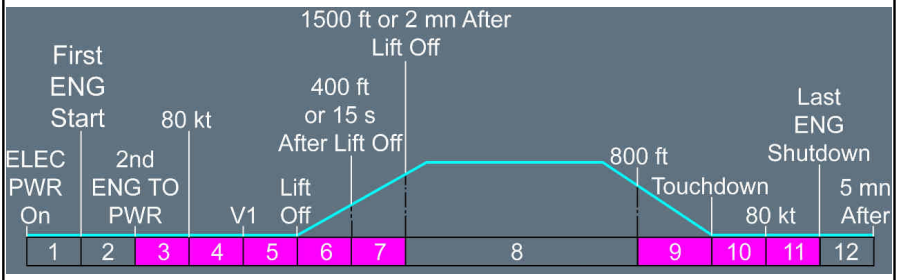
PACK 1(2) pb

SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

AIR PACK 1(2) VLV 1(2) FAULT (Cont'd)

L3 *Note:* *The FAULT light of the PACK 1(2) pb illuminates, when:*
- *The pack valve is failed open, and*
- *The PACK 1(2) pb is set to OFF .*

L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 1 VLV 1 FAULT*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 1 VLV 2 FAULT*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 2 VLV 1 FAULT*
- *Refer to MEL/ME-ECAM-36-21 AIR PACK 2 VLV 2 FAULT .*

Crew awareness.

AIR PACK 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

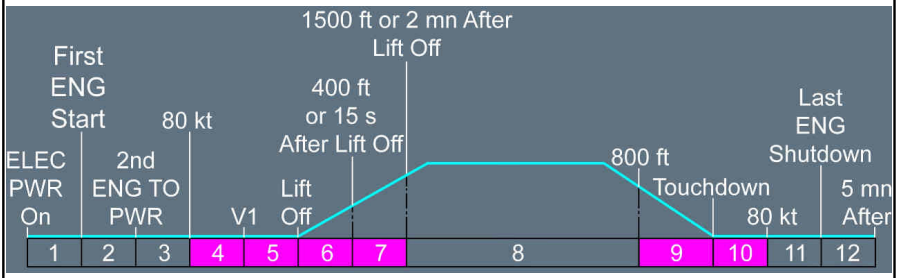
Triggering Conditions:

L2 Both packs do not operate.
The packs do not operate, if:
– They are failed, or
– The associated PACK pb is set to OFF, or
– They overheat.

Indications:

Audio	Master Light	Local light	SD page
			
		PACK pb	BLEED SD Page

Flight Phase Inhibition:



L3 This alert is also inhibited during the first 180 s of the flight phase 8.
L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK 1+2 FAULT* .

Continued on the following page

AIR PACK 1+2 FAULT (Cont'd)

- **If at least one door is not closed or is not locked, and at least one engine is running:**
  PACK 1+2 INHIBITED BY DOORS
  MAX FL : 100/MEA
- **Otherwise:**
  PACK 1.....OFF
  PACK 2.....OFF
  - **If there is a pack overheat:**
    - **IF PACK OVHT OUT :**
      PACK 1.....ON
      PACK 2.....ON

L2 *The overheat disappears, when the fault light of the PACK pb goes off.*

L1
  - **In flight, if the alert was triggered above FL 100:**
    DESCENT TO FL 100/MEA..... INITIATE
    MAX FL : 100/MEA
    - **WHEN DIFF PRESS < 1 PSI & FL < 100/MEA :**
      RAM AIR.....ON
      - **If PACK 1+2 pbs requested OFF by CAB PRESS EXCESS DIFF PRESS, or CAB PRESS SYS FAULT:**
        CABIN AIR EXTRACT..... OVRD
  - **In flight, if the alert was triggered below FL 100**
    MAX FL : 100/MEA
    RAM AIR..... ON
    - **If PACK 1+2 pbs requested OFF by CAB PRESS EXCESS DIFF PRESS, or CAB PRESS SYS FAULT:**
      CABIN AIR EXTRACT.....OVRD

L2 *This opens the cabin air extract valve, to ventilate the cabin.*

Continued on the following page

AIR PACK 1+2 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA
MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

LAND ANSA
MAX FL : 100/MEA

DEFERRED PROC

ALL PHASES

- **If there is a pack overheat:**
  - **WHEN PACK OVHT OUT :**
    PACK 1.....ON
    PACK 2.....ON
- **In flight, if the alert was triggered above FL 100:**
  - **WHEN DIFF PRESS < 1 PSI & FL < 100/MEA :**
    RAM AIR..... ON
    - **If PACK 1+2 pbs requested OFF by CAB PRESS EXCESS DIFF PRESS, or CAB PRESS SYS FAULT:**
      CABIN AIR EXTRACT.....OVRD

STATUS

INOP SYS

ALL PHASES

PACK 1+2

AIR PACK 1+2 REGUL REDUNDANCY LOST

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The performance of both packs is degraded due to several valve and sensor failures.
L3 On each pack, at least one of the following systems is failed:
– The ACM
– The Altitude Valve (AV)
– The ACM Isolating Valve (AIV)
– The Temperature Control Valve (TCV)
– Turbine Bypass Valve (TBV).
– The ram air inlet valve of the heat exchanger
– One of the ram air outlet valves of the heat exchanger
– The temperature sensors inside the pack.

Indications:

L2

Audio



Master Light

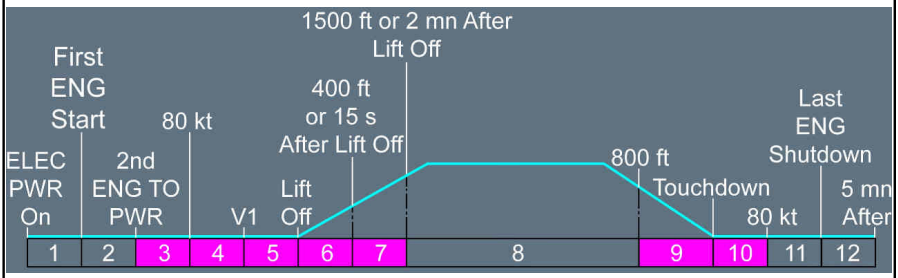


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK 1+2 REGUL REDUNDANCY LOST* .

Continued on the following page

AIR PACK 1+2 REGUL REDUNDANCY LOST (Cont'd)

Crew awareness.

STATUS

INFO

PACK 1+2 REGUL DEGRADED

AIR PACK REGUL DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One pack is failed and the remaining pack air flow is no longer sufficient to ensure the satisfactory regulation of the temperature in the forward cargo compartment.

Indications:

Audio



Master Light

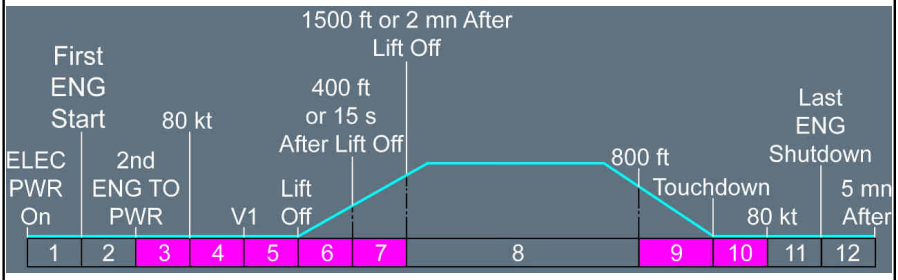


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK REGUL DEGRADED* .

PACK FLOW INSUFFICIENT FOR FWD CRG
FWD CARGO TEMP REGUL..... OFF

Continued on the following page

AIR PACK REGUL DEGRADED (Cont'd)

STATUS

INOP SYS

ALL PHASES

PACK REGUL DEGRADED
FWD CRG TEMP REGUL
FWD CRG 1 TEMP REGUL
FWD CRG 2 TEMP REGUL

COND FWD CARGO TEMP REGUL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The temperature regulation in the forward cargo is lost, or degraded.

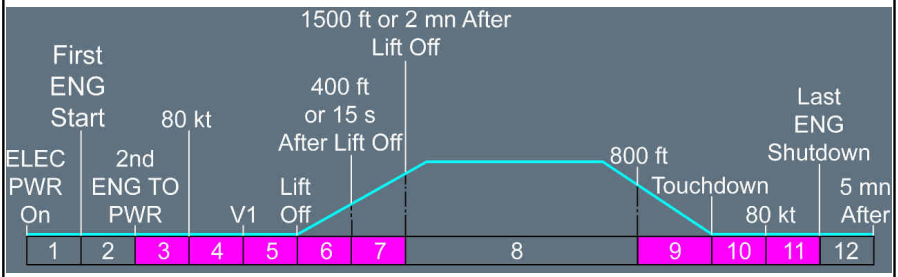
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



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COND FWD CARGO TEMP REGUL FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND FWD CARGO TEMP REGUL FAULT* .

- **In the case of trim air valve failure:**
  CARGO TRIM AIR VLV FAULT
- **If the temperature regulation of the cargo compartment is degraded:**
  CARGO TEMP..... MONITOR

STATUS

INOP SYS

ALL PHASES

FWD CARGO TEMP REGUL (If the temperature regulation in the forward cargo compartment is lost)

INFO

- If the temperature regulation in the forward cargo compartment is degraded:
  FWD CRG TEMP REGUL DEGRADED

COND ALL PRIMARY CABIN FANS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The four primary fans are failed. The pack airflow is automatically set to HIGH.

Indications:

Audio



Master Light

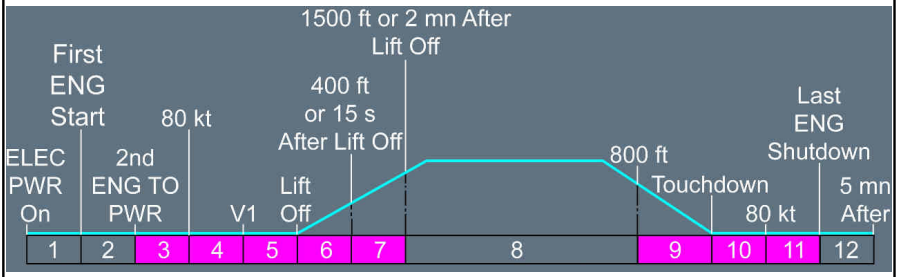


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND ALL PRIMARY CABIN FANS FAULT* .

Crew awareness.

Continued on the following page

COND ALL PRIMARY CABIN FANS FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

ALL PRIMARY CAB FANS

INFO

CABIN TEMP REGUL DEGRADED

The temperature in some cabin zones may be abnormally low.

COND BULK CARGO DUCT OVHT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is an overheat in the bulk cargo duct.

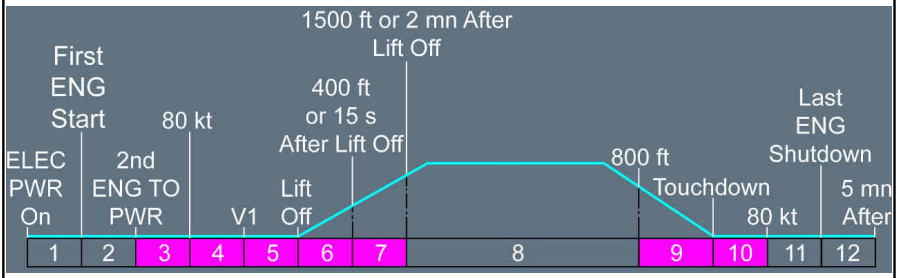
L3 There is a bulk cargo duct overheat when the air temperature inside the duct exceeds 70 °C.

Indications:

L2

Audio	Master Light	Local light	SD page
		 HEATER pb-sw	 COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND BULK CARGO DUCT OVHT*.

BULK HEATER.....OFF

Continued on the following page

COND BULK CARGO DUCT OVHT (Cont'd)

DEFERRED PROC

ALL PHASES

- **WHEN BULK CARGO DUCT OVHT OUT :**
  BULK HEATER..... ON

STATUS

INOP SYS

ALL PHASES
BULK CRG HEATER

COND BULK CARGO HEATER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heater of the bulk cargo compartment is failed.

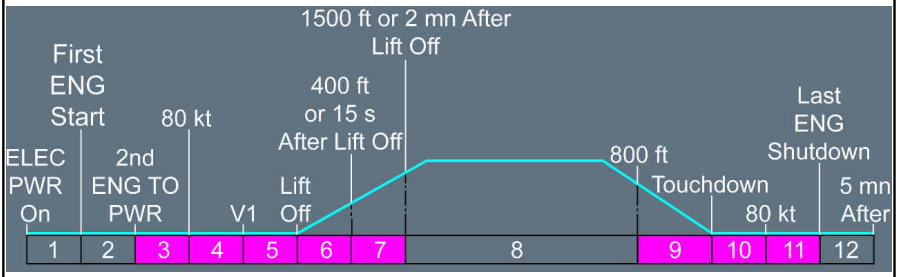
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND BULK CARGO HEATER FAULT* .

Crew awareness.

L2 Temperature regulation of the bulk cargo compartment is lost.

Continued on the following page

COND BULK CARGO HEATER FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

BULK CRG HEATER

COND BULK CARGO ISOL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the bulk cargo isolation valves of is failed open: The bulk cargo compartment is not isolated.

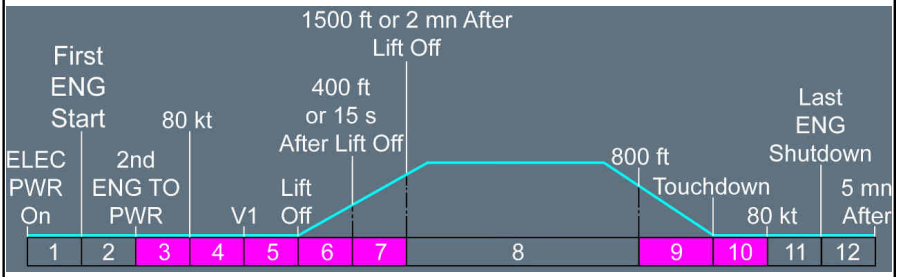
L3 This alert is inhibited, if the alert COND BULK CARGO VENT FAULT is triggered.

Indications:

L2

Audio	Master Light	Local light	SD page
		 BULK ISOL VALVES pb	 COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND BULK CARGO ISOL FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND BULK CARGO ISOL FAULT*.

BULK ISOL VALVES.....OFF

STATUS

INOP SYS

ALL PHASES
BULK CRG ISOL

COND BULK CARGO VENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one of the of the bulk cargo isolation valves is abnormally closed: The bulk cargo compartment is no longer ventilated.

Indications:

Local light



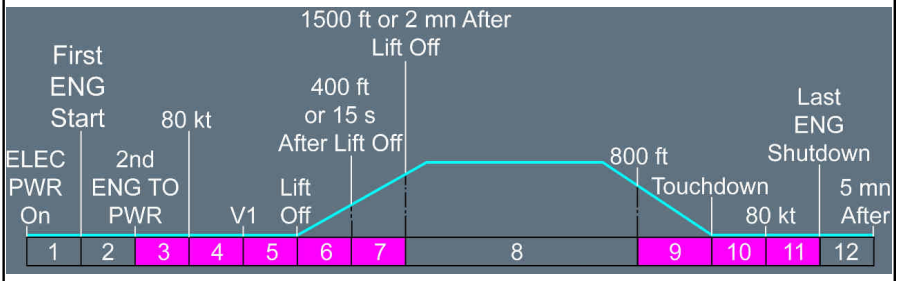
BULK ISOL VALVES pb

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND BULK CARGO VENT FAULT*.

Crew awareness.

Continued on the following page

COND BULK CARGO VENT FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

BULK CRG VENT
BULK CRG HEATER

COND DUCT OVHT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

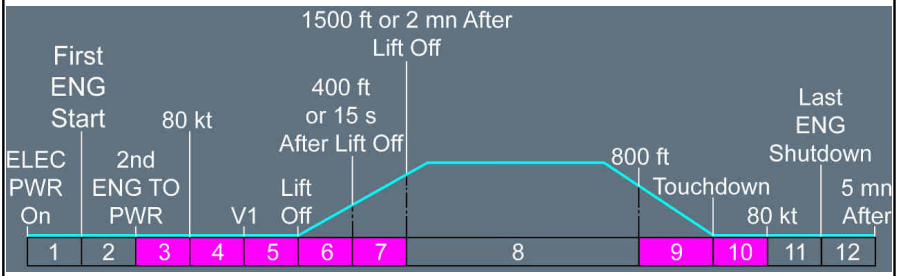
L2 There is an overheat in a cockpit duct, or a cabin duct.
L3 There is a duct overheat, when the air temperature inside the applicable duct exceeds 70 °C.

Indications:

L2

Audio	Master Light	Local light	SD page
		 HOT AIR 1(2) pb	 COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND DUCT OVHT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND DUCT OVHT* .

- **In the case of a cockpit duct overheat:**

  CKPT DUCT OVHT
  HOT AIR 2.....OFF

  - **IF HOT AIR JAMMED OPEN :**
    PACK 2.....OFF

- **In the case of a cabin duct overheat:**

  CABIN DUCT OVHT
  HOT AIR 1(2).....OFF

L2 *The hot-air valve that must be closed depends on the affected cabin duct.*

L1
- **IF HOT AIR JAMMED OPEN :**
  PACK 1(2).....OFF

L2 *The pack that must be set to off depends on the hot-air valve that is jammed open.*

L1 CARGO TEMP.....MONITOR

- **In the case of a forward cargo duct overheat:**

  FWD CARGO DUCT OVHT
  HOT AIR 1.....OFF

  - **IF HOT AIR JAMMED OPEN :**
    PACK 1.....OFF

Continued on the following page

COND DUCT OVHT (Cont'd)

L12

DEFERRED PROC

ALL PHASES

- **WHEN DUCT OVHT OUT :**
  HOT AIR 1(2).....ON
  The hot-air valve that must be closed depends on the affected cabin duct.
  - **If the hot-air valve is jammed open:**
    PACK 1(2)..... ON

L12

STATUS

INOP SYS

ALL PHASES

CKPT TEMP REGUL (in the case of a cockpit duct overheat)
CAB PART TEMP REGUL (in the case of a cabin duct overheat)
FWD CRG TEMP REGUL (in the case of a forward cargo duct overheat)

INFO

CABIN TEMP REGUL DEGRADED
Temperature regulation in some cabin zones is degraded.

- If the forward cargo temperature regulation is affected:
  FWD CRG TEMP REGUL DEGRADED

COND FWD CARGO ISOL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the forward cargo isolation valves of is failed open: The forward cargo compartment is not isolated.

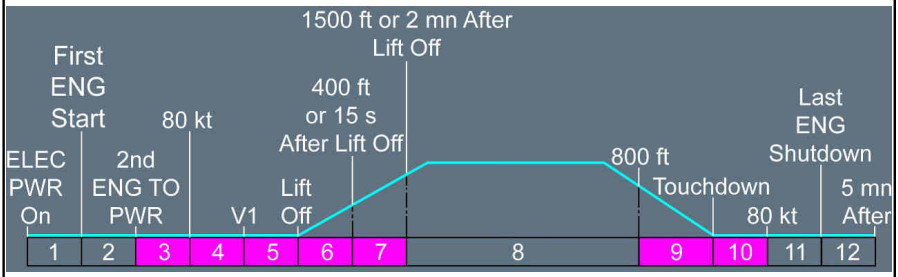
L3 This alert is inhibited, if the alert COND FWD CARGO VENT FAULT is triggered.

Indications:

L2

Audio	Master Light	Local light	SD page
			
		FWD ISOL VALVES pb	COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND FWD CARGO ISOL FAULT*.

FWD ISOL VALVES.....OFF

Continued on the following page

COND FWD CARGO ISOL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FWD CRG ISOL

COND FWD CARGO VENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one of the of the forward cargo isolation valves is abnormally closed: The forward cargo compartment is no longer ventilated.

Indications:

Local light



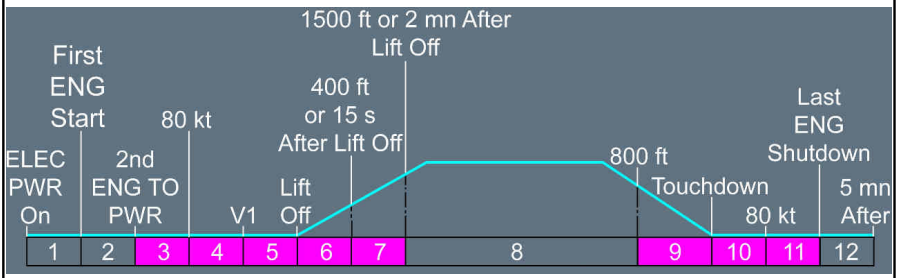
FWD ISOL VALVES pb

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND FWD CARGO VENT FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND FWD CARGO VENT FAULT*.

Crew awareness.

STATUS

INOP SYS

ALL PHASES

FWD CRG VENT
FWD CRG TEMP REGUL

INFO

FWD CRG VENT DEGRADED
FWD CRG TEMP REGUL DEGRADED

COND HOT AIR 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 – The hot-air valve is failed closed, or
– The HOT AIR pb is abnormally set to OFF.

Indications:

Audio



Master Light

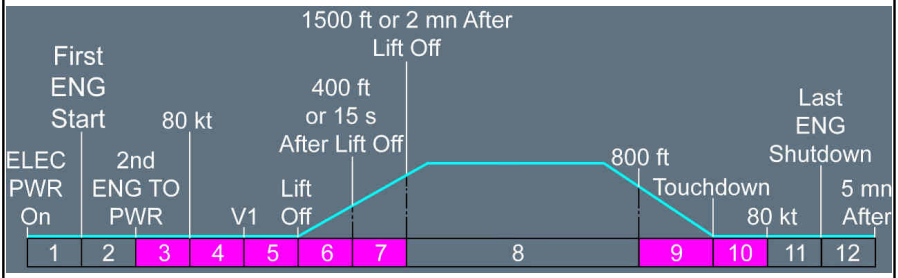


SD page



COND SD Page

Flight Phase Inhibition:



L2 When the ECAM does not require the flight crew to perform any action: No single chime, and no master caution is triggered.
For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND HOT AIR 1(2) FAULT*.

Continued on the following page

COND HOT AIR 1(2) FAULT (Cont'd)

L3 The temperature regulation in some cockpit or cabin zones will be affected, if at least one TASOV remains closed: For more information on this failure case, *Refer to DSC-21-10-10-30 Cabin, Cockpit Zones, and Crew Rest Compartments*).

L1
- **If the temperature regulation of the cargo zones is affected:**
  CARGO TEMP..... MONITOR
- **If the hot-air valve 1(2) is not failed closed:**
  HOT AIR 1(2)..... ON

STATUS

INOP SYS

ALL PHASES

CKPT TEMP REGUL (if the temperature regulation in the cockpit is affected)
CAB PART TEMP REGUL (if the temperature regulation in some cabin zones is affected)
FWD CRG TEMP REGUL (if the temperature regulation in forward cargo zone is affected)

INFO

- If the temperature regulation in some cockpit or cabin zones is affected:
  CABIN TEMP REGUL DEGRADED
- If the temperature regulation in the forward cargo zone is affected:
  FWD CRG TEMP REGUL DEGRADED

COND MIXER PRESS REGUL FAULT

Applicable to: ALL

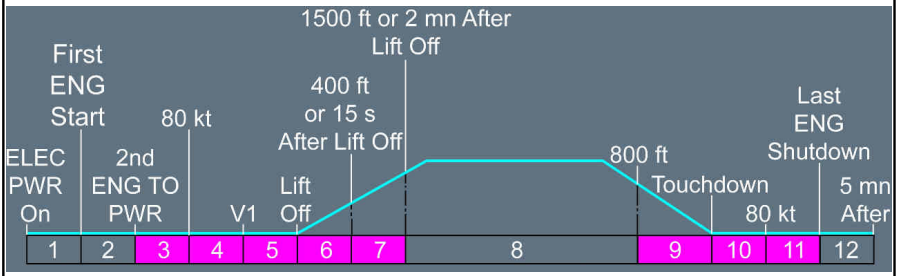
ANNUNCIATIONS

Triggering Conditions:

L2 The air pressure in the mixer unit is abnormally high, or abnormally low.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND MIXER PRESS REGUL FAULT*.

- **When pressure in the mixer unit is too high:**
  MIXER PRESS HI
- **When pressure in the mixer unit is too low, and the aircraft is on ground, before engine start:**
  MIXER PRESS LO

L3 *Displayed only in the flight phase 1.*

L1 RISK OF REDUCED CABIN AIR FLOW

Continued on the following page

COND MIXER PRESS REGUL FAULT (Cont'd)

STATUS

INFO

RISK OF REDUCED CABIN AIR FLOW

COND ONE PRIMARY CABIN FAN FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One primary fan is failed.

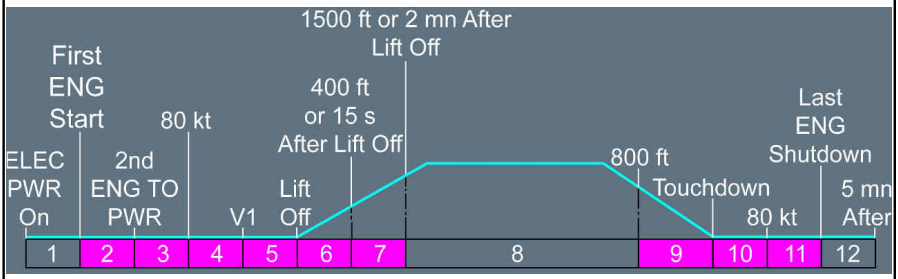
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND ONE PRIMARY CABIN FAN FAULT*.

Continued on the following page

COND ONE PRIMARY CABIN FAN FAULT (Cont'd)

Crew awareness.

MORE INFO

REDUND LOSS

1 PRIMARY CAB FAN

COND PURSER TEMP SEL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The CABIN selector on the AIR panel is set to PURS SEL, and the temperature cannot be selected on the Flight Attendant Panel (FAP).

L3 The temperature selected on the FAP cannot be transmitted to the CIDS.

Indications:

L2

Audio



Master Light

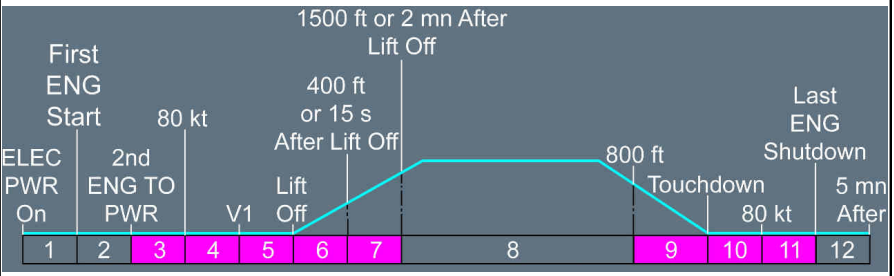


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND PURSER TEMP SEL FAULT*.

CABIN TEMP.....ADJUST

L2 *The selected temperature is the same in all the cabin zones.*

COND RAM AIR 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The RAM air inlets are no longer controlled by the RAM AIR pb .

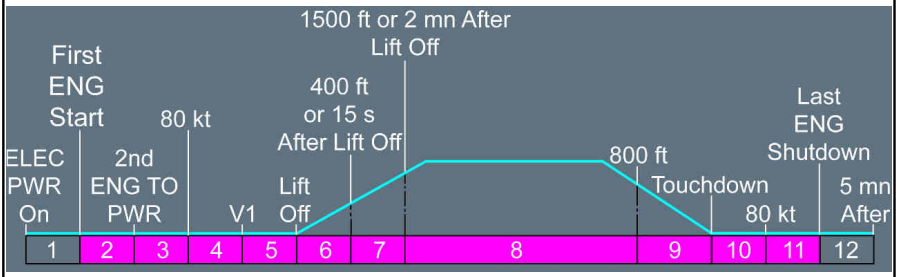
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND RAM AIR 1(2) FAULT* .

Crew awareness.

L2 In flight, the failed RAM air inlet is indicated on the COND system display.

Continued on the following page

COND RAM AIR 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

RAM AIR 1(2)

COND TEMP CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One channel of the temperature controller is failed.

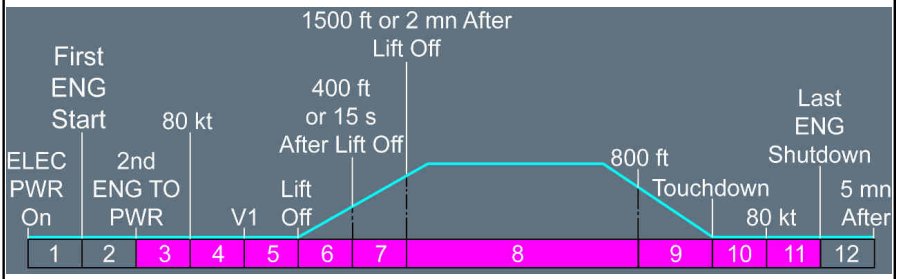
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND TEMP CTL 1(2) FAULT* .

Continued on the following page

COND TEMP CTL 1(2) FAULT (Cont'd)

Crew awareness.

MORE INFO

REDUND LOSS

TEMP CTL 1(2)

COND TEMP CTL DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The temperature control in two or three cabin zones is lost. The temperature control in the affected zones is automatically set by default to the average temperature in the other cabin zones.

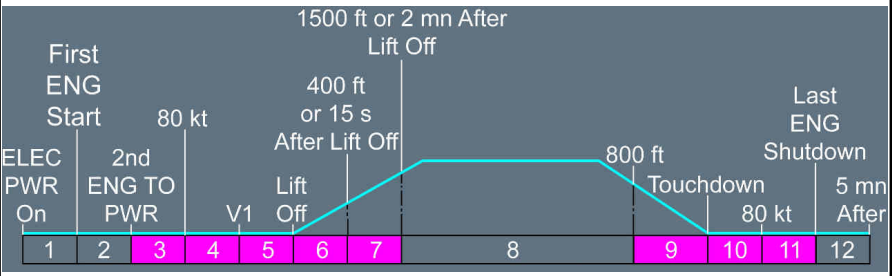
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND TEMP CTL DEGRADED* .

Crew awareness.

Continued on the following page

COND TEMP CTL DEGRADED (Cont'd)

STATUS

INOP SYS

ALL PHASES

TEMP CTL DEGRADED

COND TEMP CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 – Both channels of the temperature controller are failed, or
– Both pack controllers are failed, or
– The trim air system is failed.

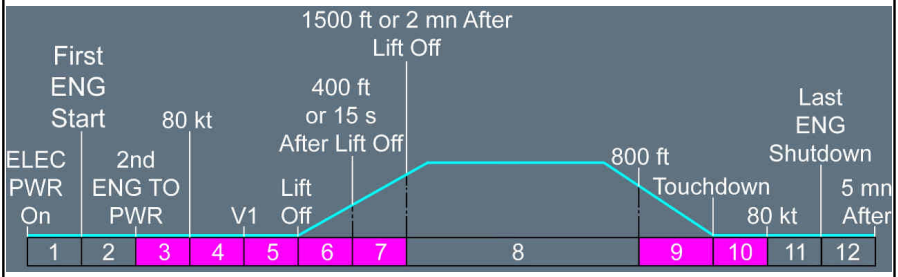
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND TEMP CTL FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND TEMP CTL FAULT* .

● **If cargo temperature regulation is affected:**
CARGO TEMP..... MONITOR

L12

STATUS

INOP SYS

ALL PHASES

ALL ZONES TEMP REGUL
The temperature in some cockpit or cabin zones may be abnormally low.

INFO

- When both pack controllers are failed:
  ENG IDLE HI
  PACKS 1+2 AT FIXED TEMP
  When the thrust levers are at idle, the engines are automatically set to idle high.
  The packs deliver a fixed 20 °C temperature.
  FWD CRG TEMP REGUL DEGRADED

COND TEMP CTL REDUNDANCY LOST

Applicable to: ALL

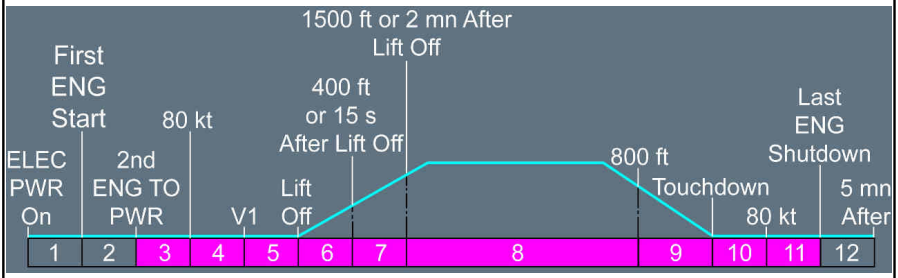
ANNUNCIATIONS

Triggering Conditions:

L2 One redundant application of the temperature control is failed.
L3 This application is hosted in the CPIOM B.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND TEMP CTL REDUNDANCY LOST* .

Crew awareness.

MORE INFO

REDUND LOSS

TEMP CTL REDUND

COND THREE PRIMARY CABIN FANS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Three primary fans are failed. The pack airflow is automatically set to HIGH.

Indications:

Audio



Master Light

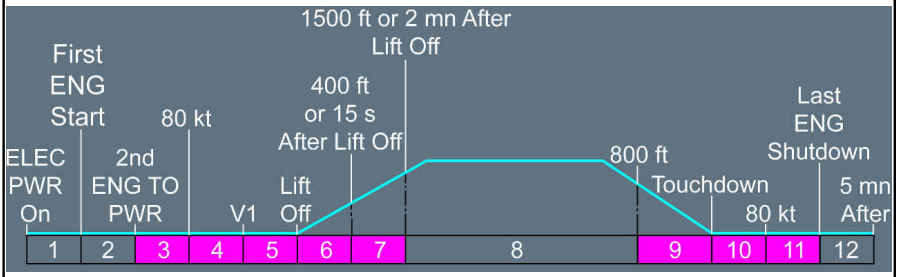


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND THREE PRIMARY CABIN FANS FAULT*.

Crew awareness.

Continued on the following page

COND THREE PRIMARY CABIN FANS FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

3 PRIMARY CAB FANS

INFO

CABIN TEMP REGUL DEGRADED

The temperature in some cabin zones may be abnormally low.

COND TWO PRIMARY CABIN FANS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Two primary fans are failed. The airflow is automatically set to HIGH.

Indications:

Audio



Master Light

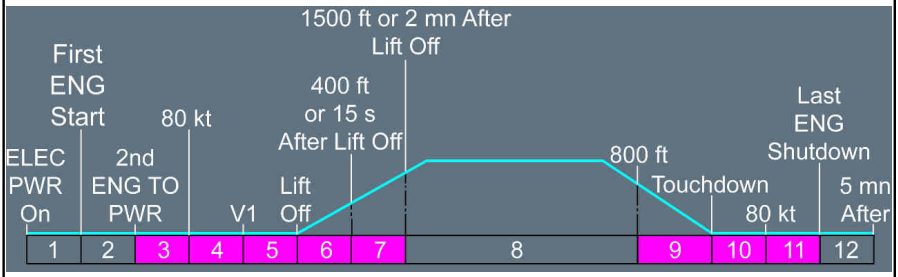


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND TWO PRIMARY CABIN FANS FAULT*.

Crew awareness.

Continued on the following page

COND TWO PRIMARY CABIN FANS FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

2 PRIMARY CAB FANS

INFO

CABIN TEMP REGUL DEGRADED

The temperature in some cabin zones may be abnormally low.

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21-Ventilation

AIR PACK BAY 1(2) VENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pack bay ventilation of one pack is failed on ground.
L3 The blowing fan, that is assigned to the ventilation of one pack bay, is failed.

Indications:

L2

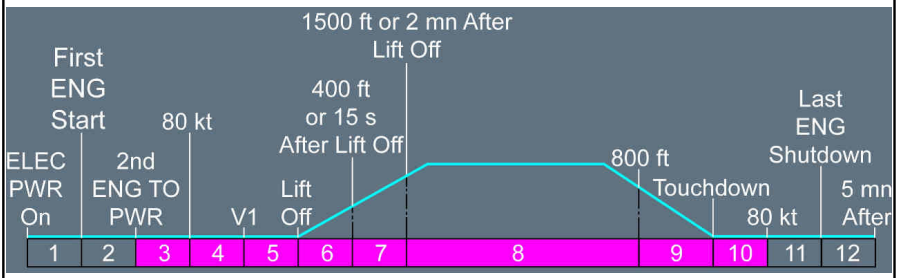
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-36-21 AIR PACK BAY 1(2) VENT FAULT .*

- **On ground:**
  PACK 1(2).....OFF
  PACK 1(2) AVAIL IN FLT

Continued on the following page

AIR PACK BAY 1(2) VENT FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

PACK 1(2) (On ground)
PACK BAY 1(2) VENT (On ground)

INFO

- On ground:
  PACK 1(2) AVAIL IN FLT

AIR PACK BAY 1+2 VENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pack bay ventilation of both packs is failed on ground.

L3 Both blowing fans, that are assigned to the ventilation of the pack bays, are failed.

Indications:

L2

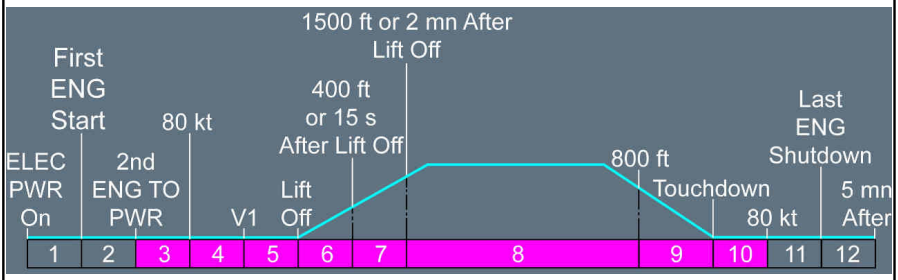
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK BAY 1+2 VENT FAULT*.

- **On ground:**
  PACK 1..... OFF
  PACK 2..... OFF
  PACK 1+2 AVAIL IN FLT

L2 This alert is recalled after touchdown, when the aircraft speed is below 80 kt, to remind the flight crew to set both PACK pb to OFF.

Continued on the following page

AIR PACK BAY 1+2 VENT FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

PACK 1+2 (On ground)
PACK BAY 1+2 VENT (On ground)

INFO

- On ground:
  PACK 1+2 AVAIL IN FLT

COND AFT VENT CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The channel 1(2) of the aft ventilation controller is failed.

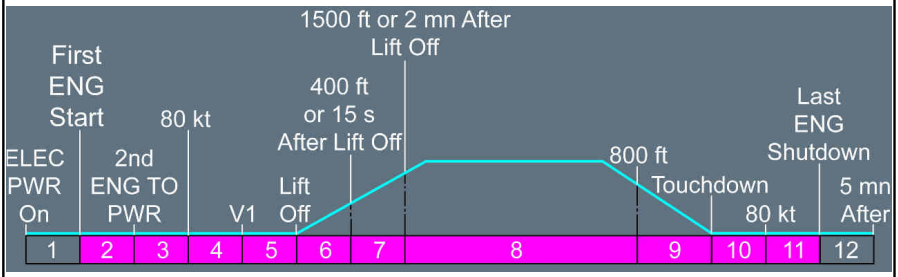
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND AFT VENT CTL 1(2) FAULT*.

Crew awareness.

Continued on the following page

COND AFT VENT CTL 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

AFT VENT CTL 1(2)

COND AFT VENT CTL DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Two applications of the aft ventilation controller are lost.
L3 These applications are hosted on the CPIOM B.

Indications:

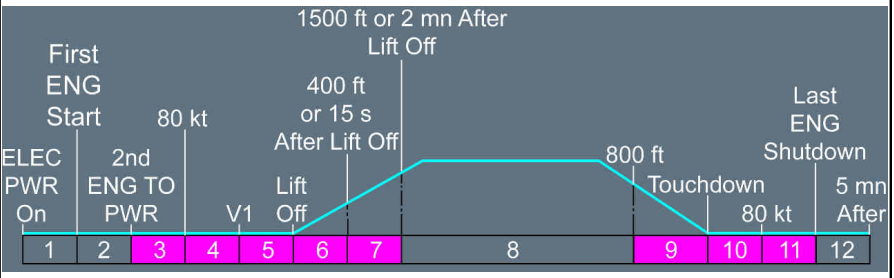
L2

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND AFT VENT CTL DEGRADED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND AFT VENT CTL DEGRADED* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
AFT VENT CTL DEGRADD

COND AFT VENT CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both channels of the aft ventilation controller are failed.

Indications:

Audio



Master Light

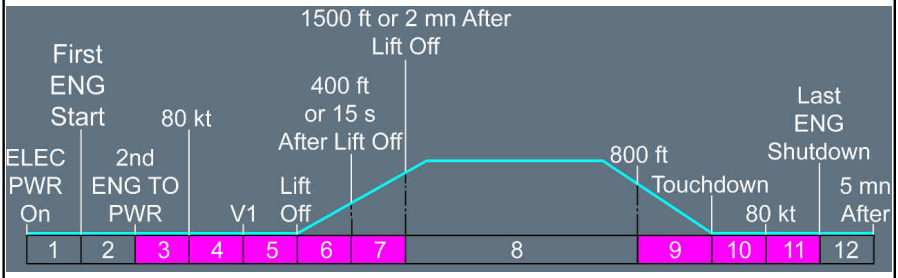


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND AFT VENT CTL FAULT* .

Crew awareness.

Continued on the following page

COND AFT VENT CTL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

CAB AIR EXTRACT VLV
AFT VENT CTL

INFO

CABIN TEMP REGUL DEGRADED

COND AFT VENT CTL REDUNDANCY LOST

Applicable to: ALL

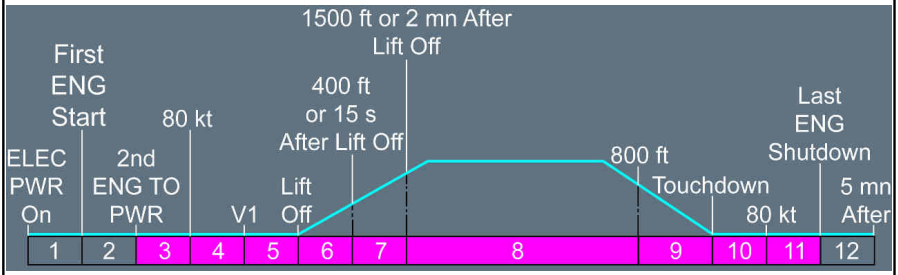
ANNUNCIATIONS

Triggering Conditions:

L2 A redundant application of the aft ventilation controller is failed. There is no operational impact.
L3 This application is hosted on the CPIOM B.

Indications:

Flight Phase Inhibition:



Continued on the following page

COND AFT VENT CTL REDUNDANCY LOST (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND AFT VENT CTL REDUNDANCY LOST* .

Crew awareness.

MORE INFO

REDUND LOSS

AFT VENT CTL REDUND

COND FWD(AFT) CREW REST ISOL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The isolation of the lower deck cabin crew rest compartment is lost.

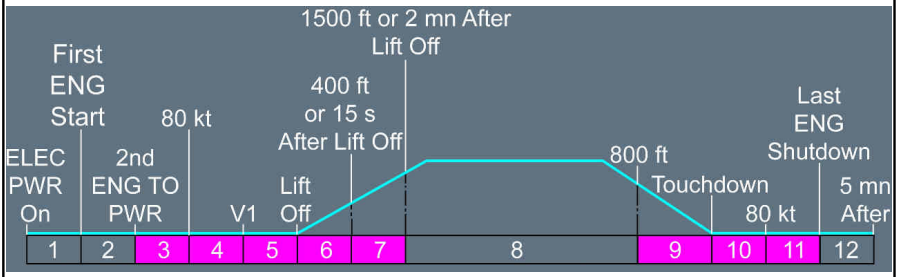
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND FWD(AFT) CREW REST ISOL FAULT (If Installed)*

Crew awareness.

Continued on the following page

COND FWD(AFT) CREW REST ISOL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FWD(AFT) CREW REST ISOL

COND FWD(AFT) CREW REST VENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ventilation of the cabin crew rest compartment is lost.

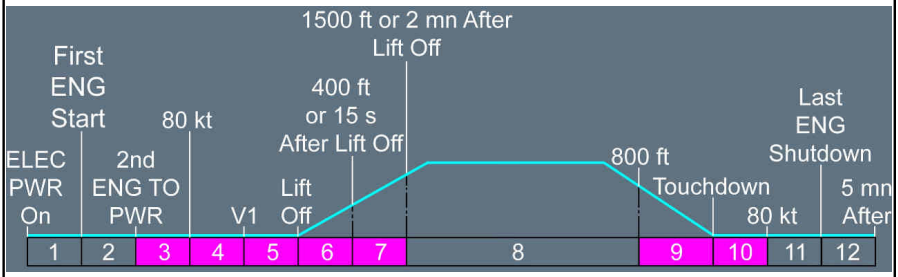
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND FWD(AFT) CREW REST VENT FAULT (Cont'd)

L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND FWD(AFT) CREW REST VENT FAULT (If Installed)*

Crew awareness.

STATUS

INOP SYS

ALL PHASES
FWD(AFT) CREW REST VENT

COND FWD VENT CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The channel 1(2) of the forward ventilation controller is failed.

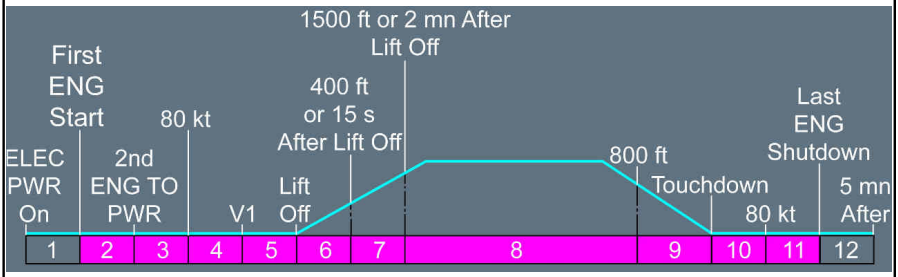
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-3 COND FWD VENT CTL 1(2) FAULT* .

Crew awareness.

Continued on the following page

COND FWD VENT CTL 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

FWD VENT CTL 1(2)

COND FWD VENT CTL DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Two applications of the forward ventilation controller are failed.
L3 These applications are hosted on the CPIOM B.

Indications:

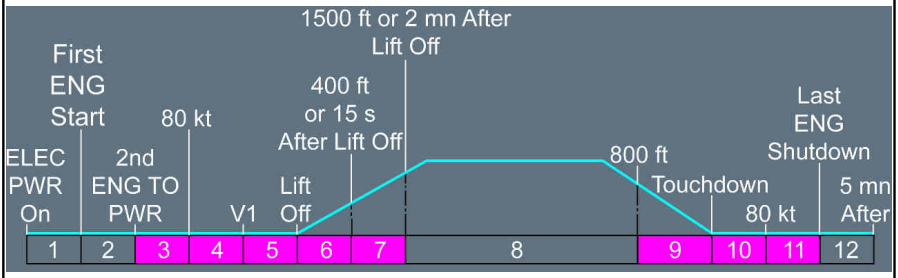
L2

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND FWD VENT CTL DEGRADED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND FWD VENT CTL DEGRADED* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
FWD VENT CTL DEGRADD

COND FWD VENT CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both channels of the forward ventilation controller are failed.

Indications:

Audio



Master Light

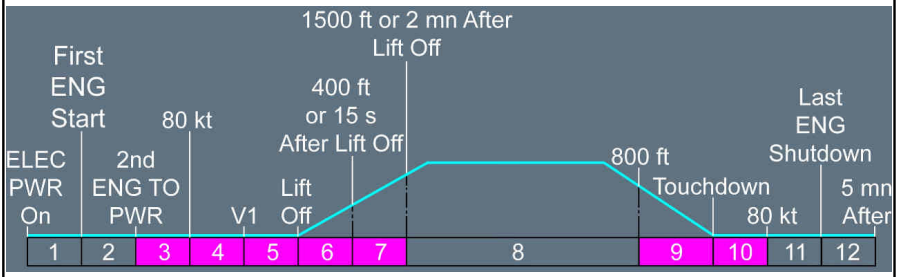


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND FWD VENT CTL FAULT*.

- **If IFEC pb-sw is ON:**
  IFEC..... OFF

Continued on the following page

COND FWD VENT CTL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

IFE BAY VENT
RAM AIR
FWD VENT CTL

INFO

CABIN TEMP REGUL DEGRADED

COND FWD VENT CTL REDUNDANCY LOST

Applicable to: ALL

ANNUNCIATIONS

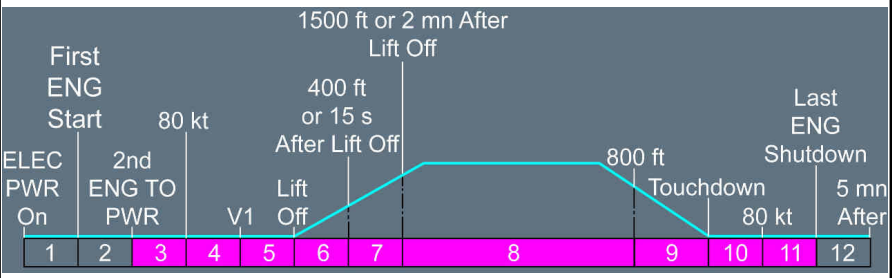
Triggering Conditions:

L2 A redundant application of the forward ventilation controller is failed. There is no operational impact.

L3 This application is hosted on the CPIOM B.

Indications:

Flight Phase Inhibition:



Continued on the following page

COND FWD VENT CTL REDUNDANCY LOST (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND FWD VENT CTL REDUNDANCY LOST* .

Crew awareness.

MORE INFO

REDUND LOSS

FWD VENT CTL REDUND

COND PART SECONDARY CABIN FANS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 – One secondary fan is failed, or
– Two not adjacent secondary fans are failed.

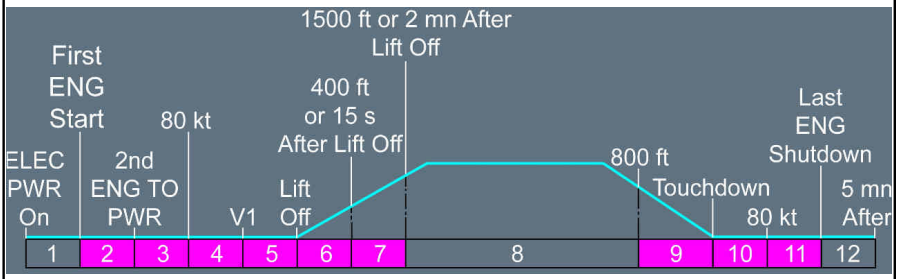
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND PART SECONDARY CABIN FANS FAULT*.

Crew awareness.

Continued on the following page

COND PART SECONDARY CABIN FANS FAULT (Cont'd)

MORE INFO

REDUND LOSS

PART SECONDARY CAB FANS

COND SECONDARY CABIN FANS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 – Two adjacent secondary fans are failed, or
– More than two secondary fans are failed.

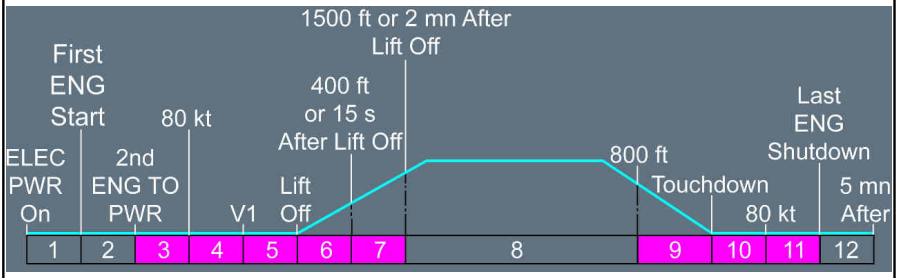
Indications:

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

COND SECONDARY CABIN FANS FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND SECONDARY CABIN FANS FAULT*.

Crew awareness.

STATUS

INOP SYS

ALL PHASES

SECONDARY CAB FANS

INFO

CABIN TEMP REGUL DEGRADED

VENT AVNCS BLOWING DEGRADED

Applicable to: ALL

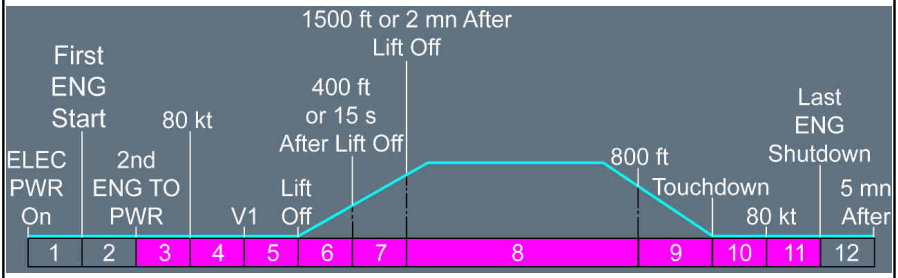
ANNUNCIATIONS

Triggering Conditions:

L2 On both avionics ventilation circuits (left and right), the blowing fans are failed or the filters are clogged.

Indications:

Flight Phase Inhibition:



L2 Both backup valves automatically open and ventilate the avionics bay with air from the mixer unit.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT AVNCS BLOWING DEGRADED* .

Crew awareness.

VENT AVNCS BLOWING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both L and R ventilation circuits are not ventilated.

Indications:

Audio



Master Light

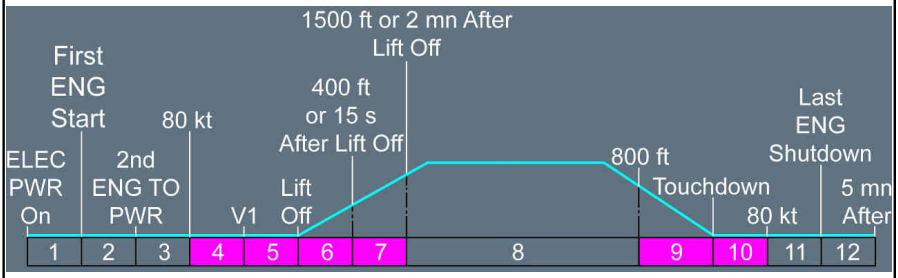


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT AVNCS BLOWING FAULT* .

AIR FLOW.....HI
CAB FANS..... ON

- **IF ALERT PERSISTS AFTER 5 MIN :**

  MAX FLT TIME : 5 HR

Continued on the following page

VENT AVNCS BLOWING FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the alert persists after 5 min:
  MAX FLT TIME : 5 HR

STATUS

INOP SYS

ALL PHASES

VENT AVNCS BLOWING

VENT AVNCS EXTRACT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Air in the main and upper avionics bays, is not extracted overboard:
– The extraction fan is failed, or
– The extract valve is abnormally closed.

Indications:

Audio



Master Light



Local light



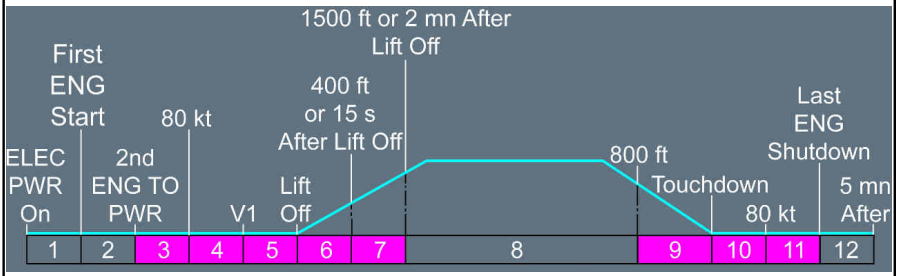
EXTRACT pb-sw

SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT AVNCS EXTRACT FAULT* .

Continued on the following page

VENT AVNCS EXTRACT FAULT (Cont'd)

VENT AVNCS EXTRACT..... OVRD

L2 *Air that ventilates the main and upper avionics bays is extracted by differential pressure via the overboard valve.*

STATUS

INOP SYS

ALL PHASES
VENT AVNCS EXTRACT

VENT AVNCS L (R) BLOWING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The L (R) ventilation circuit is not ventilated.

Indications:

Audio



Master Light

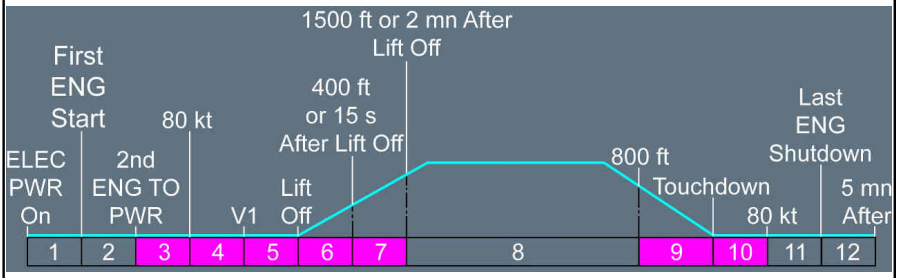


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-21-4 VENT AVNCS L(R) BLOWING FAULT*

AIR FLOW.....HI
CAB FANS..... ON

Continued on the following page

VENT AVNCS L (R) BLOWING FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES
VENT AVNCS L (R) BLOWING

VENT AVNCS OVBD VLV FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The avionics overboard valve is abnormally:
– Open
– Closed, or
– Partially open.

Indications:

Audio



Master Light

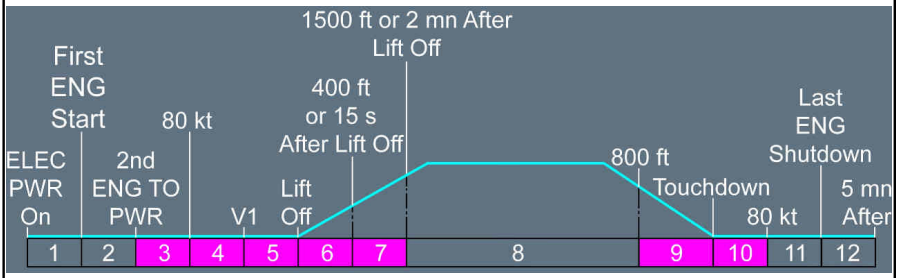


SD page



COND SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT AVNCS OVBD VLV FAULT* .

Continued on the following page

VENT AVNCS OVBD VLV FAULT (Cont'd)

VENT AVNCS EXTRACT..... OVRD

L2 *Air that ventilates the main and upper avionics bays is extracted by differential pressure via the overboard valve.*

L1 ● **IF OVBD VLV STILL FULL OPEN :**

MAX FL : 100/MEA
CABIN ALT MODE.....MAN

L2 *The flight crew manually controls the cabin altitude.*

L1 CAB V/S TRGT.....+2500 FT/MIN

L3 *All outflow valves open, to prevent cabin depressurization via the overboard valve, as this may damage the avionics bays.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, if the avionics overboard valve is fully open:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- In flight, if the avionics overboard valve is fully open:
  MAX FL : 100/MEA

STATUS

INOP SYS

ALL PHASES

VENT AVNCS OVBD VLV

VENT AVNCS VENT CTL FAULT

Applicable to: ALL

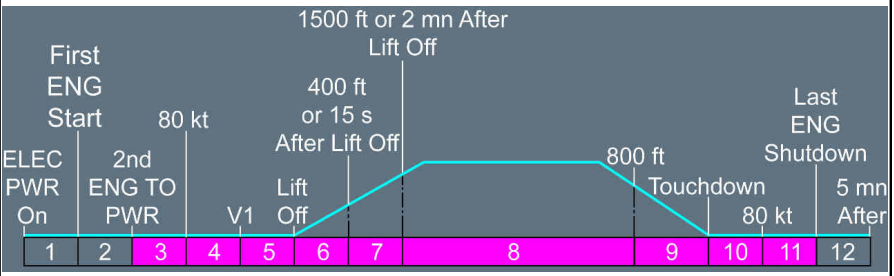
ANNUNCIATIONS

Triggering Conditions:

L2 The avionics ventilation controller is failed.

Indications:

Flight Phase Inhibition:



L2 When the avionics ventilation controller is lost:

- The avionics compartment remains ventilated.

L3 The avionics ventilation blowing fans, and the extraction fan are set to the maximum speed.

L2 - The ECAM alerts associated to the avionics ventilation system are no longer monitored.
- The indications on the COND SD page associated to the avionics ventilation system are lost.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT AVNCS VENT CTL FAULT* .

Crew awareness.

Continued on the following page

VENT AVNCS VENT CTL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

AVNCS VENT CTL

VENT COOLG SYS 1(2) OVHT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is an overheat on the system 1(2) of the supplemental cooling system.

Indications:

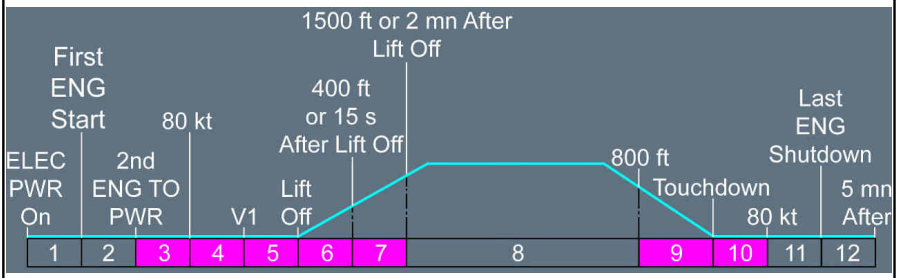
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

VENT COOLG SYS 1(2) OVHT (Cont'd)

L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-21-4 VENT COOLG SYS 1 OVHT*
- *Refer to MEL/ME-ECAM-21-4 VENT COOLG SYS 2 OVHT .*

● **If the supplemental cooling system 1(2) overheat is isolated:**
COOLG SYS 1(2) OVHT ISOLATED

L2 *The supplemental cooling system part that is not isolated, continues to operate normally.*

L1 ● **If the system 1(2) of the supplemental cooling system 1(2) automatically shuts down:**
COOLG SYS 1(2) AUTO SHUTDOWN

● **If the automatic shutdown of the supplemental cooling system 1(2) failed:**
VENT COOLG..... OFF

L2 *Both supplemental cooling systems no longer operate.*

STATUS

INOP SYS

ALL PHASES
VENT COOLG SYS
VENT COOLG SYS 1(2)

VENT COOLG SYS PROT FAULT

COOLG SYS 1(2) OVHT PROT

Applicable to: ALL

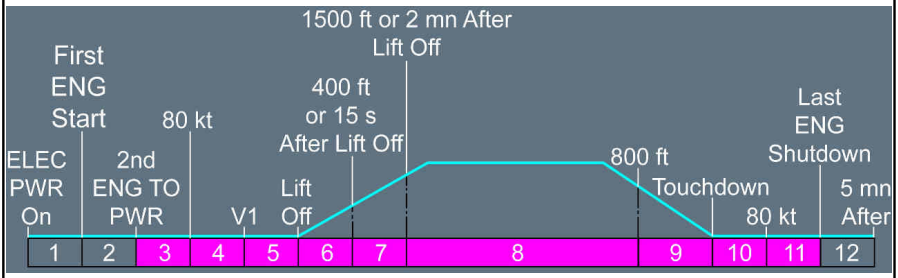
ANNUNCIATIONS

Triggering Conditions:

L2 The overheat detection system of the supplemental cooling system 1(2), is lost.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT COOLG SYS PROT FAULT*.

Crew awareness.

VENT IFE BAY ISOL FAULT

Applicable to: ALL

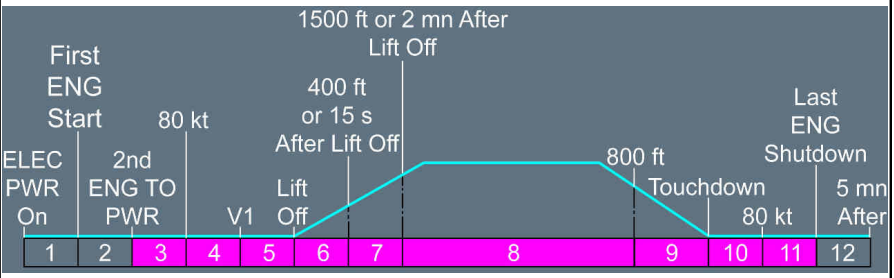
ANNUNCIATIONS

Triggering Conditions:

L2 The IFE bay ventilation system can no longer be isolated from the air-conditioning system.
L3 The IFE bay backup valve is failed open.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT IFE BAY ISOL FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

IFE BAY ISOL

VENT IFE BAY VENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The IFE bay is not ventilated.
L3 – The blowing fan of the IFE bay is failed, or
– On ground, the IFE backup valve is failed.

Indications:

L2

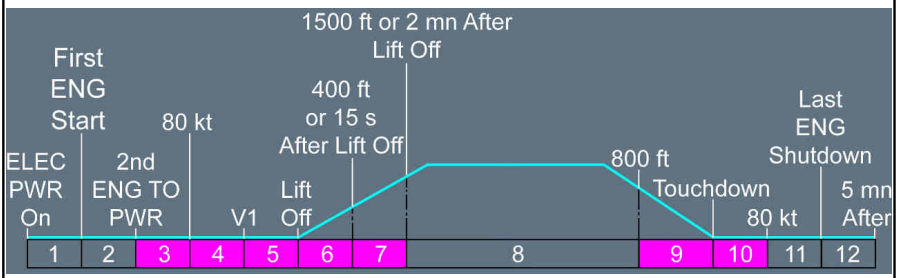
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT IFE BAY VENT FAULT*.

IFEC.....OFF

- **When the IFEC pb-sw is set to OFF:**
  IFE BAY VENT AVAIL IN FLT

Continued on the following page

VENT IFE BAY VENT FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

IFE BAY VENT

INFO

- When the IFEC pb-sw is set to OFF:
  IFE BAY VENT AVAIL IN FLT

VENT LAV & GALLEYS EXTRACT FAULT

Applicable to: ALL

ANNUNCIATIONS

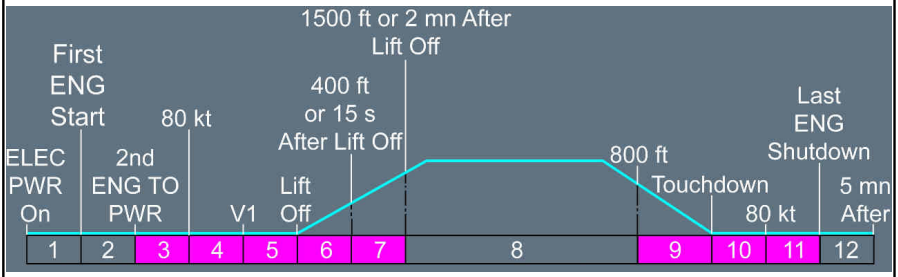
Triggering Conditions:

L2 The lavatory and galley's air extraction system does not operate.

L3
- On ground only, when the two extraction fans of the lavatory and galleys air extraction system are failed.
- On ground and in flight, when the air extraction system of the lavatory and galleys, is clogged.

Indications:

Flight Phase Inhibition:



L2 The aft avionics bays is not ventilated on ground.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT LAV & GALLEYS EXTRACT FAULT*.

- **On ground, if the in-flight function of the lavatory and galleys extraction is not lost:**
  LAV & GALLEYS EXTRACT AVAIL IN FLT

Continued on the following page

VENT LAV & GALLEYS EXTRACT FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

LAV & GALLEYS EXTRACT

INFO

- On ground, when lavatory and galleys ventilation is available in flight:
  LAV & GALLEYS EXTRACT AVAIL IN FLT
  AFT AVNCS SMOKE DET DEGRADED
  MAIN + UPPER CWS SMOKE DET DEGRADED

VENT THS BAY VENT FAULT

Applicable to: ALL

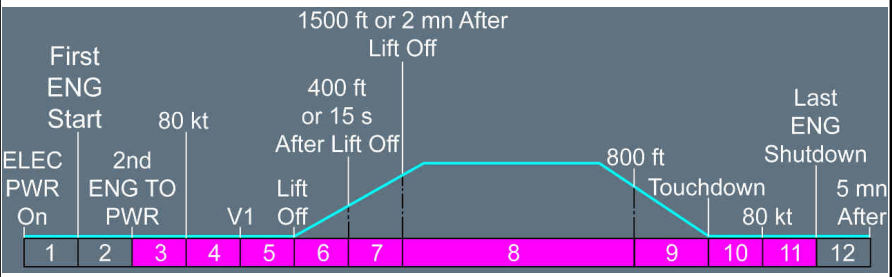
ANNUNCIATIONS

Triggering Conditions:

L2 The ventilation system of the THS bay is failed.

Indications:

Flight Phase Inhibition:



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VENT THS BAY VENT FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-4 VENT THS BAY VENT FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
THS BAY VENT

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21-Pressurization

CAB PRESS AUTO CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- The automatic control of at least one outflow valve controller is failed, inhibited during taxi and cruise phases
- The CPIOM B is failed, or
- The pressure sensors are failed, or the ambient pressure data is no longer available.

For more information on the automatic control system, *Refer to DSC-21-30-10-10 Outflow Valve Controllers* .

Indications:

Audio



Master Light

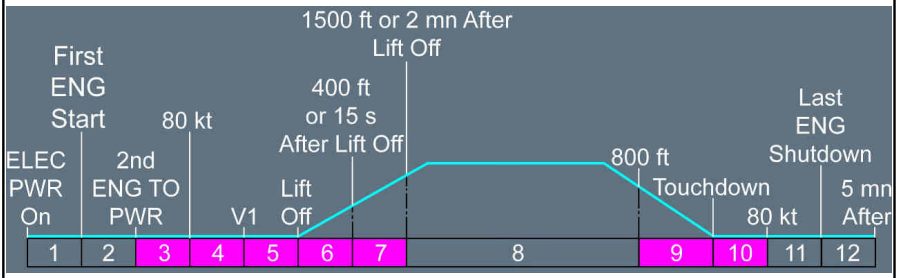


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



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CAB PRESS AUTO CTL FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS AUTO CTL FAULT* .

Depending on the failure or the combination of failures, the consequences on the cabin pressurization system may be different:

- The cabin pressurization system continues to operate automatically, there is no operational impact:
  If the automatic control of at least one outflow valve controller continues to operate.

  Note: - *If the automatic control system of only one outflow valve controller is failed:*

    - *This caution is also inhibited during the taxi and cruise phase*
    - *No aural warning is triggered*
    - *No master caution is triggered.*

  - *If the automatic control system of only two outflow valve controllers are failed:*

    - *This caution is also inhibited during the cruise phase.*

- The cabin pressurization system is in backup mode, there is no operational impact before the top of descent:
  - If the automatic control of all the outflow valve controllers is failed, or
  - If the CPIOM-B is failed, or
  - If all the pressure sensors are failed, or
  - If all the ambient pressure sensors are failed.

In backup mode, the landing field elevation is set by default to 7 000 ft :

- If the manual pressurization system is available (e.g. if all the pressure sensors or If the ambient pressure sensors are failed), at top of descent, the flight crew uses the manual system of the cabin pressurization to set the cabin altitude target to the landing field elevation.
- If the manual pressurization system is not available (e.g. If the automatic control of all the outflow valve controllers is failed, or if the CPIOM-B is failed), at top of descent, the landing field elevation is fixed at 7 000 ft (or 7 500 ft if, in addition, the ambient pressure is no longer available).
  Thus, below 7 000 ft (7 500 ft), the outflow valves are opened, and the cabin altitude is the same as the aircraft altitude: Therefore, high descent rate must be avoided.

  Note: *When the CPIOM B is failed, the cabin altitude target no longer appears on the SD page: Therefore, the flight crew must not use the cabin pressurization manual system.*

Continued on the following page

CAB PRESS AUTO CTL FAULT (Cont'd)

- **If the automatic control of one outflow valve controller is lost:**
  AUTO CTL SYS 1(2)(3)(4) FAULT
- **If the automatic control of all the outflow valve controllers is failed**
  or
  if the CPIOM-B is failed
  or
  If all the pressure sensors are failed
  or
  If the ambient pressure sensors are failed
  - **If the manual pressurization system is not available:**
    AUTO CTL SYS 1+2+3+4 FAULT
    CAB PRESS IN BACKUP MODE

L2 *There is no operational impact before top of descent.*

L1 CAB PRESS MAN MODES : DO NOT USE

L2 *The pressurization system no longer receives the landing field elevation information, and the cabin altitude targets no longer appear on the SD. Therefore, the flight crew must not use the cabin pressurization manual system.*

L1 IN DES : CAB ALT REGULATED TO 7000 FT

L2 *In backup mode, the cabin altitude is regulated to 7 000 ft in descent.*

L1 BELOW 7000 FT : CAB ALT = ACFT ALT

L2 *Below 7 000 ft, the outflow valves open: The cabin altitude is the same as the aircraft altitude.*

L1 BELOW 7000 FT : AVOID HI DES V/S

L2 *Below 7 000 ft, avoid high descent rate to limit uncomfortable variations of cabin pressure.*

L1

- **If the ambient pressure information is also no longer available**
  CABIN ALT REGULATED TO 7500FT
  CAB PRESS MAN MODES : DO NOT USE
  BELOW 7500 FT : CAB ALT = ACFT ALT
  BELOW 7500 FT : AVOID HI DES V/S

- **If the manual pressurization system is available:**
  CABIN ALT MODE.....MAN

L2 *The flight crew manually controls the cabin altitude.*

Continued on the following page

CAB PRESS AUTO CTL FAULT (Cont'd)

L1

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700
250	2900
200	2150
150	1500
100	900

CABIN ALT TRGT..... AS RQRD

Continued on the following page

CAB PRESS AUTO CTL FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the manual pressurization system is not available::
  MAN PRESS : DO NOT USE

LIMITATIONS ON PFD

APPR & LDG

- If manual pressurization system is not available:
  AVOID HI DESCENT V/S

DEFERRED PROC

ALL PHASES

● **If the manual pressurization system is available:**

AT TOP OF DESCENT :

CAB ALT TRGT.....LDG ELEVN

STATUS

INOP SYS

ALL PHASES

CAB PRESS AUTO CTL (1)(2)(3)(4)

INFO

- If the manual pressurization system is available:

ACFT FL	CABIN ALT TRGT
430	8000
400	7000

Continued on the following page

CAB PRESS AUTO CTL FAULT (Cont'd)

350	5500
300	3700
250	2900
200	2150
150	1500
100	900

- If the manual pressurization system is not available:
  CAB PRESS IN BACKUP MODE
  IN DES : CAB ALT REGULATED TO 7000 FT
  BELOW 7000 FT : CAB ALT = ACFT ALT
- If the manual pressurization system is not available and if the ambient pressure is no longer available:
  CAB ALT REGULATED TO 7500 FT
  BELOW 7500 FT : CAB ALT = ACFT ALT

CAB PRESS CTL REDUNDANCY LOST

Applicable to: ALL

ANNUNCIATIONS

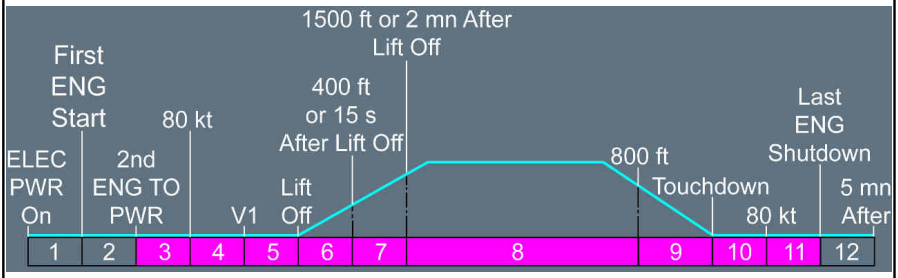
Triggering Conditions:

L2 One of the following failure occurred:

- Two applications of the CPIOM B are lost. The third, and fourth CPIOM B applications, ensure that there is no impact on cabin pressurization.
- Only three pressure sensors are available. The remaining pressure sensors ensure that there is no impact on cabin pressurization.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS CTL REDUNDANCY LOST* .

Crew awareness.

CAB PRESS DIFF PRESS HI

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 In automatic mode, the cabin differential pressure is above 8.92 PSI, and is below 9.2 PSI.

Indications:

Audio



Master Light

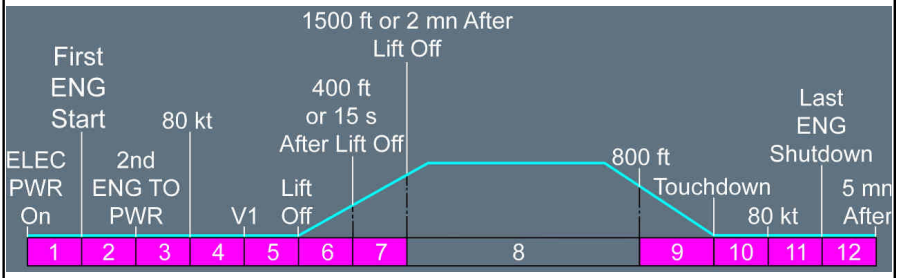


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



Continued on the following page

CAB PRESS DIFF PRESS HI (Cont'd)

■ **If the manual pressurization system is available:**

CABIN ALT MODE.....MAN

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700
250	2900
200	2150
150	1500
100	900

CABIN ALT TRGT.....AS RQRD

■ **If the manual pressurization system is not available:**

EXPECT HI CAB RATE

Continued on the following page

CAB PRESS DIFF PRESS HI (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- If the manual pressurization system is not available:
  AVOID HI DESCENT V/S

DEFERRED PROC

ALL PHASES

● **If the manual pressurization system is available:**

AT TOP OF DESCENT :

CABIN ALT TRGT..... LDG ELEVN

STATUS

INFO

- If the manual pressurization system is available:

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700
250	2900
200	2150
150	1500
100	900

CAB PRESS DIFF PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 During descent, and if the aircraft altitude is at least 1 500 ft above the landing field elevation, the cabin differential pressure is almost at 0 PSI.

L3 The cabin differential pressure will reach 0 PSI in approximately 1.5 min.

Indications:

L2

Audio



Master Light

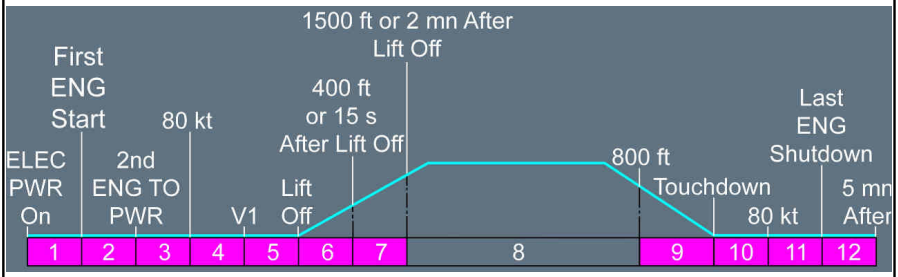


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



EXPECT HI CAB RATE

L2 *To protect the aircraft from negative differential pressure, a sudden change in the cabin vertical speed may occur.*

L1 ACFT DESCENT RATE..... REDUCE

CAB PRESS EXCESS CAB ALT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - In climb (or descent), the cabin altitude of the aircraft is above the higher of the following altitudes:

- 9 550 ft
- 1 000 ft above the takeoff (or landing) field elevation.

- In cruise, the cabin altitude of the aircraft is above 9 550 ft.

Indications:

Audio



Master Light

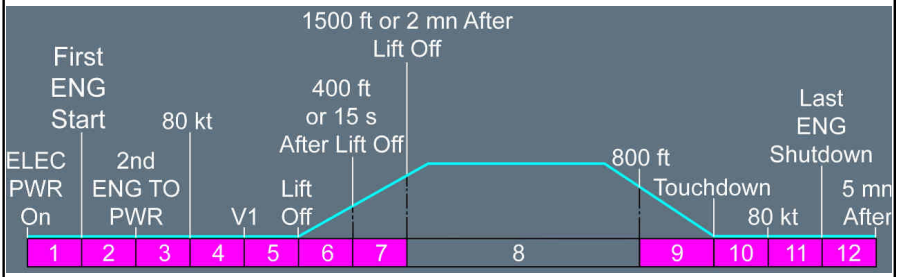


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For additional training-oriented information, *Refer to FCTM/Emergency Descent.*

Continued on the following page

CAB PRESS EXCESS CAB ALT (Cont'd)

- **If the aircraft is above FL 100:**
  CREW OXY MASKS..... USE
- **If the aircraft is above FL 100, and below FL 160:**
  DESCENT.....INITIATE
- **If the aircraft is above FL 160:**
  EMER DESCENT :

  SIGNS..... ON
  - **If A/THR is neither armed nor active:**
    ALL THR LEVERS..... IDLE

L2 *If A/THR is armed or active, check A/THR is at IDLE on the E/WD.*

L1 SPEED BRAKE LEVER.....FULL
SPEED..... MAX / APPROPRIATE

L2 *If structural damage is suspected, use the flight controls with care and reduce speed as appropriate.*
If the aircraft speed is below VLO and the aircraft altitude is below 21 000 ft, the landing gear can be extended.

L1 ATC..... NOTIFY

L2 *Notify the ATC of the nature of the emergency, and state intentions.*

If the ATC cannot be contacted:
- *Set the squawk code to 7700, on the SQWK page of the RMP, or*
- *Set the ADS emergency status to ON, on the COM page of the ATC, or*
- *Transmit a distress message on one of the following frequencies:*
  - *(VHF) 121.5 MHz*
  - *(HF) 2182 kHz*
  - *(HF) 8364 kHz.*

L1 MAX FL : 100/MEA

L2 *The minimum altitude must take into account:*
- *The Minimum Safe Altitude (MSA)*
- *Oxygen requirements*
- *The turbulence, that can be uncomfortable for passengers*

Continued on the following page

CAB PRESS EXCESS CAB ALT (Cont'd)

- *The low Outside Air Temperature (OAT), that can be uncomfortable for the passengers, when the aircraft cabin is ventilated with RAM air.*

L1 ● **IF CAB ALT ABOVE 14000 FT :**

PAX OXY MASK MAN ON.....PRESS

L2 *If the cabin altitude of the aircraft is above 13 800 ft, the passenger oxygen masks will automatically drop.*
If the automatic drop did not operate, pressing the PAX OXY MASK MAN ON pb confirms will release the passenger masks. In addition, contact the cabin crew to confirm that passenger oxygen masks are released.
Notify the cabin crew when the aircraft reaches a safe flight level, and the use of oxygen masks is no more necessary.

L1 ● **If the aircraft is above FL 160:**

● **WHEN DESCENT ESTABLISHED :**

CREW OXY MASKS DILUTION.....N

L2 *To save oxygen, set the N/100% selector to N.*
With the N/100% selector set to 100 %, oxygen quantity may be insufficient to cover the entire emergency descent profile.
Ensure that crew communication is established with oxygen masks. Avoid the continuous use of the interphone to minimize interference with the breathing noise in the oxygen mask.

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- In flight:
  MAX FL : 100/MEA

CAB PRESS EXCESS DIFF PRESS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The cabin differential pressure is above 9.65 PSI.

Indications:

Audio



Master Light

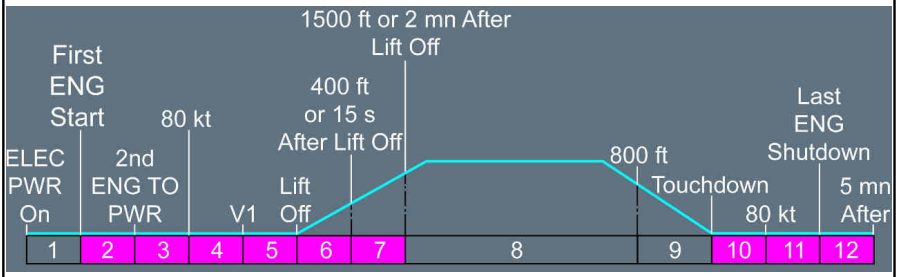


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS EXCESS DIFF PRESS* .

Continued on the following page

CAB PRESS EXCESS DIFF PRESS (Cont'd)

- **In flight:**

  PACK 1..... OFF
  PACK 2..... OFF

  - **In flight, if the alert was triggered above FL 100:**

    DESCENT TO FL 100/MEA..... INITIATE

  MAX FL : 100/MEA

  - **WHEN DIFF PRESS < 1 PSI & FL < 100/MEA :**

    RAM AIR..... ON
    CABIN AIR EXTRACT..... OVRD

L12

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX FL : 100/MEA
LAND ANSA

The outflow valves may be abnormally closed. Therefore, the flight crew must land at the next suitable airport, due to the lack of cabin air renewal.

LIMITATIONS ON PFD

ALL PHASES

MAX FL : 100/MEA
LAND ANSA

CAB PRESS EXCESS NEGATIVE DIFF PRESS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The cabin differential pressure is lower than –0.72 PSI.
This warning disappears, when the cabin differential pressure goes above –0.32 PSI.

Indications:

Audio



Master Light

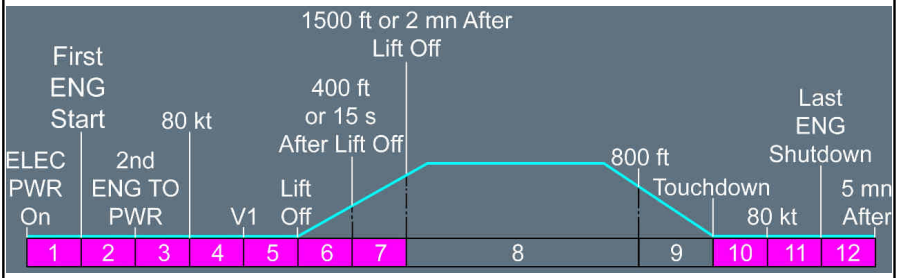


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



ACFT IMMEDIATE LEVEL OFF.....INITIATE

- **If at least one pack is operating:**
  AIR FLOW.....HI
- **If no pack is operating:**
  RAM AIR.....ON

L2 *External air ventilates the cockpit and cabin zones. Cabin and cockpit temperature will increase.*

Continued on the following page

CAB PRESS EXCESS NEGATIVE DIFF PRESS (Cont'd)

DEFERRED PROC

ALL PHASES

- **WHEN NORMAL DIFF PRESS RECOVERED :**
  - **If at least one pack is operating:**
    AIR FLOW.....NORM
  - **If no pack is operating:**
    RAM AIR.....OFF

MEMOPAGE

MEMO ON ECAM

- If the RAM AIR pb is set to ON:
  RAM AIR

CAB PRESS EXCESS RESIDUAL DIFF PRESS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The cabin residual pressure is above 0.072 PSI:
- On ground, with no engine running, or
- 90 s after touchdown.

Indications:

Audio



Master Light

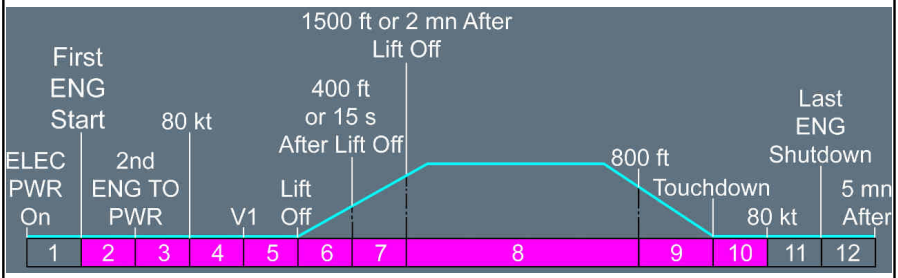


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



Continued on the following page

CAB PRESS EXCESS RESIDUAL DIFF PRESS (Cont'd)

PACK 1.....OFF
PACK 2.....OFF
CABIN CREW..... ALERT

- **BEFORE OPENING ANY CABIN DOOR :**

  RESIDUAL DIFF PRESS..... CHECK

L2 *The cabin differential pressure is indicated on the CRUISE SD page and on the CAB PRESS SD page.*

Before opening any cabin door, the residual differential pressure indication must be 0 PSIon SD pages.

L3 *The maximum differential pressure allowed before opening any cabin door is 0.036 PSI, corresponding to 0 PSIindicated on the SD pages.*

CAB PRESS INHIBITED BY DOORS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one door is not closed, and locked, at takeoff power application.

Indications:

Audio



Master Light

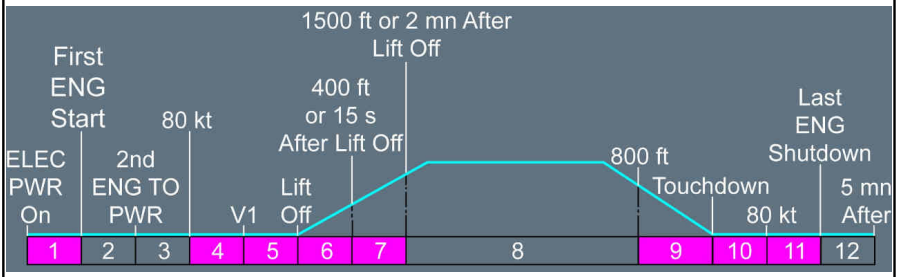


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 The four outflow valve controllers will prevent cabin pressurization, by maintaining the four outflow valves open.

L3 In addition, the pack controller will maintain the four pack valves closed.

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS INHIBITED BY DOORS* .

MAX FL : 100/MEA

Continued on the following page

CAB PRESS INHIBITED BY DOORS (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

MAX FL : 100/MEA

CAB PRESS LDG ELEVN FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The outflow valve controllers do not receive the landing field elevation from the FMS.

L3 The CPIOM B is failed.

Indications:

L2

Audio



Master Light

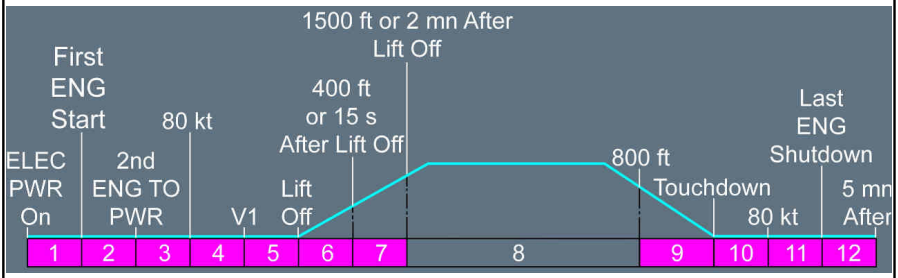


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS LDG ELEVN FAULT*.

Continued on the following page

CAB PRESS LDG ELEVN FAULT (Cont'd)

■ **If the manual pressurization system is not available**

IN DES : CAB ALT REGULATED TO 7000 FT

L2 *In backup mode, the cabin altitude is regulated to 7 000 ft in descent.*

L1 BELOW 7000 FT : CAB ALT = ACFT ALT

L2 *Below 7 000 ft, the outflow valves open: The cabin altitude is the same as the aircraft altitude.*

L1 BELOW 7000 FT : AVOID HI DES V/S

L2 *Below 7 000 ft, avoid high descent rate to limit uncomfortable variations of cabin pressure.*

L1 ■ **If the manual pressurization system is available**

See deferred procedure.

Continued on the following page

CAB PRESS LDG ELEVN FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON PFD

APPR & LDG

- If manual pressurization system is not available:
  AVOID HI DESCENT V/S

L12

DEFERRED PROC

ALL PHASES

● **If manual pressurization system is available:**

AT TOP OF DESCENT :

CABIN ALT MODE.....MAN

The flight crew manually controls the cabin altitude.

CABIN ALT TRGT..... LDG ELEVN

Check the LDG ELEVN indication on the CAB PRESS system display, or on the CRUISE system display, and adjust the landing field elevation, if necessary.

STATUS

INFO

- If manual pressurization is not available:
  IN DES : CAB ALT REGULATED TO 7000 ft
  BELOW 7000 FT : CAB ALT = ACFT ALT

CAB PRESS MAN CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The manual cabin pressurization mode is failed.

Indications:

Audio



Master Light

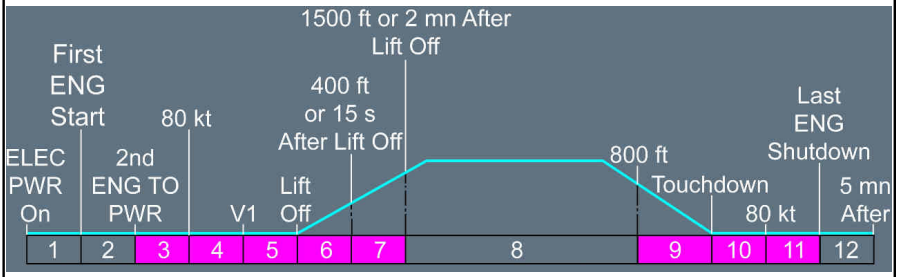


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS MAN CTL FAULT* .

CAB PRESS MAN MODES : DO NOT USE

Continued on the following page

CAB PRESS MAN CTL FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAN PRESS : DO NOT USE

STATUS

INOP SYS

ALL PHASES

CAB PRESS MAN CTL

CAB PRESS OUTFLW VLV CTL 1(2)(3)(4) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One outflow valve is not controlled by its assigned outflow valve controller: The outflow valve automatically closes.

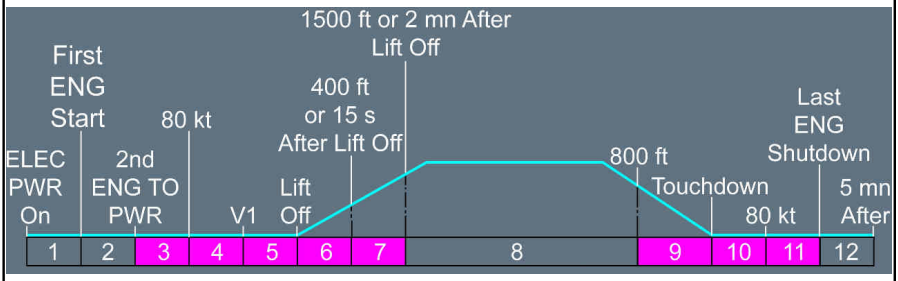
Indications:

SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS OUTFLW VLV CTL 1(2)(3)(4) FAULT*.

Crew awareness.

Continued on the following page

CAB PRESS OUTFLW VLV CTL 1(2)(3)(4) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

OUTFLW VLV CTL 1(2)(3)(4) FAULT

CAB PRESS OUTFLW VLV CTL FAULT

OUTFLW VLV 1+2+3(1+2+4)(1+3+4)(2+3+4)(1+2)(1+3)(1+4)(2+3)(2+4)(3+4)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Two, or three outflow valves are not controlled by their assigned outflow valve controller: The applicable outflow valves close automatically.

Indications:

Audio



Master Light

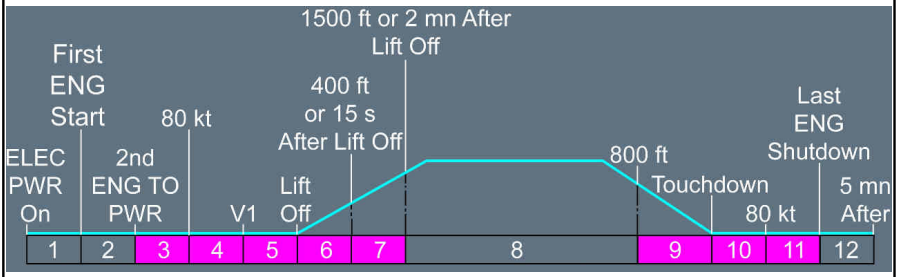


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



Continued on the following page

CAB PRESS OUTFLW VLV CTL FAULT (Cont'd)

OUTFLW VLV 1+2+3(1+2+4)(1+3+4)(2+3+4)(1+2)(1+3)(1+4)(2+3)(2+4)(3+4)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS OUTFLW VLV CTL FAULT*.

- **If outflow valves 1+3+4 are affected**
  and
  If manual pressurization system is available
  CABIN ALT MODE.....MAN

L2 *The flight crew manually controls the cabin altitude.*

L1

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700
250	2900
200	2150
150	1500
100	900

CABIN ALT TRGT.....AS RQRD

- **If outflow valves 1+3+4 are affected**
  and
  If manual pressurization system is available
  and
  If ambient pressure information is not available
  CABIN ALT REGULATED TO 7500FT
  CAB PRESS MAN MODES : DO NOT USE
  BELOW 7500 FT : CAB ALT = ACFT ALT
  BELOW 7500 FT : AVOID HI DES V/S

Continued on the following page

CAB PRESS OUTFLW VLV CTL FAULT (Cont'd)

OUTFLW VLV 1+2+3(1+2+4)(1+3+4)(2+3+4)(1+2)(1+3)(1+4)(2+3)(2+4)(3+4)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	1
• If outflow valves 1+3+4 are affected and If the manual pressurization system is not available and If ambient pressure information is not available MAN PRESS : DO NOT USE	• If outflow valves 1+3+4 are affected and If the manual pressurization system is not available and If ambient pressure information is not available AVOID HI DES V/S

DEFERRED PROC

ALL PHASES

● **If outflow valves 1+3+4 are affected**
and
If the manual pressurization system is available

AT TOP OF DESCENT :

CAB ALT TRGT.....LDG ELEVN

STATUS

INOP SYS

ALL PHASES
OUTFLW VLV CTL (1+2) (1+3) (1+4) (2+3) (2+4) (3+4) (1+2+3) (2+3+4) (1+3+4) (1+2+4)

INFO

Continued on the following page

CAB PRESS OUTFLW VLV CTL FAULT (Cont'd)

OUTFLW VLV 1+2+3(1+2+4)(1+3+4)(2+3+4)(1+2)(1+3)(1+4)(2+3)(2+4)(3+4)

- If outflow valves 1+3+4 are affected
  and
  If the manual pressurization system is available

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700
250	2900
200	2150
150	1500
100	900

- If outflow valves 1+3+4 are affected
  and
  If the manual pressurization system is not available
  and
  If ambient pressure information is not available
  CABIN ALT REGULATED TO 7500FT
  BELOW 7500 FT : CAB ALT = ACFT ALT

CAB PRESS SENSORS FAULT

Applicable to: ALL

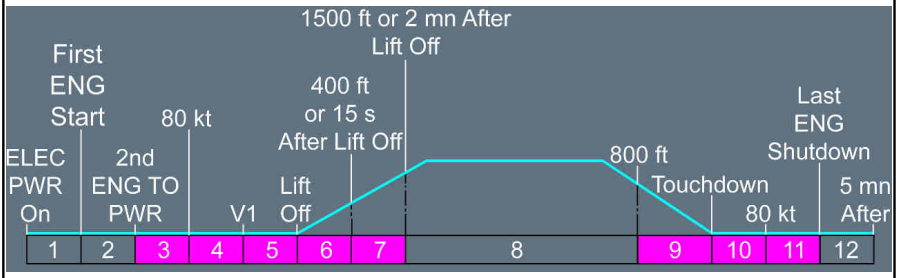
ANNUNCIATIONS

Triggering Conditions:

L2 Only one or two pressure sensors remain available.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS SENSORS FAULT*.

Crew awareness.

CAB PRESS SYS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pressurization system of the aircraft is no longer operative.

L3
- The four outflow valve controllers are failed, or
- The four outflow valves are failed.

Indications:

L2

Audio



Master Light

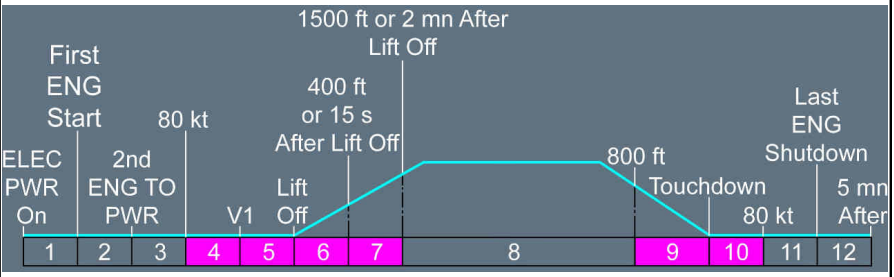


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-2 CAB PRESS SYS FAULT*.

Continued on the following page

CAB PRESS SYS FAULT (Cont'd)

■ **In flight:**

AIR FLOW.....NORM
DIFF PRESS.....MONITOR

● **IF DIFF PRESS > 9.6 PSI :**

PACK 1.....OFF
PACK 2.....OFF

● **If the alert was triggered above FL 100:**

DESCENT TO FL 100/MEA.....INITIATE

MAX FL : 100/MEA

● **If the alert was triggered above FL 100:**

● **WHEN FL < 100 / MEA :**

RAM AIR.....ON
CABIN AIR EXTRACT.....OVRD

● **If the alert was triggered below FL 100:**

RAM AIR.....ON
CABIN AIR EXTRACT.....OVRD

■ **On ground:**

● **BEFORE OPENING ANY CABIN DOOR :**

PACK 1.....OFF
PACK 2.....OFF

CABIN CREW.....ADVISE
RESIDUAL DIFF PRESS.....CHECK

Continued on the following page

CAB PRESS SYS FAULT (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, when both packs are off:
  MAX FL : 100 / MEA
  LAND ANSA
  The outflow valves may be abnormally closed. Therefore, the flight crew must land at next suitable airport, due to the lack of cabin air renewal.

LIMITATIONS ON PFD

ALL PHASES

- In flight, when both packs are off:
  MAX FL : 100 / MEA
  LAND ANSA

L12

DEFERRED PROC

ALL PHASES

● **If at least one pack operates, the following deferred procedure will appear:**

● **IF DIFF PRESS > 9.6 PSI :**
PACK 1.....OFF
PACK 2.....OFF

● **If the alert was triggered above FL 100:**
DESCENT TO FL 100/MEA.....INITIATE

MAX FL : 100/MEA

Continued on the following page

CAB PRESS SYS FAULT (Cont'd)

- **If the alert was triggered above FL 100:**
  - **WHEN FL < 100 / MEA :**
    RAM AIR..... ON
    CABIN AIR EXTRACT..... OVRD
- **If the alert was triggered below FL 100:**
  RAM AIR..... ON
  CABIN AIR EXTRACT..... OVRD

AT TOP OF DESCENT

- **When both packs operate:**
  PACK 2..... OFF
  VENT AVNCS EXTRACT..... OVRD

  Set pack 2 to off, and the EXTRACT pb-sw to OVRD, to ensure that cabin altitude does not decrease too rapidly.
- **IF CABIN V/S EXCEEDS 1000 FT/MIN :**
  PACK 1+2..... OFF
  VENT AVNCS EXTRACT..... AUTO
  - **If the alert was triggered above FL 100:**
    DESCENT TO FL 100/MEA..... INITIATE

  MAX FL : 100/MEA
  - **If the alert was triggered above FL 100:**
    - **WHEN FL < 100 / MEA :**
      RAM AIR..... ON
      CABIN AIR EXTRACT..... OVRD
  - **If the alert was triggered below FL 100:**
    RAM AIR..... ON
    CABIN AIR EXTRACT..... OVRD
- **WHEN CABIN ALT = LDG ELEVN :**
  PACK 1+2..... OFF
  VENT AVNCS EXTRACT..... AUTO

STATUS

INOP SYS

Continued on the following page

CAB PRESS SYS FAULT (Cont'd)

ALL PHASES

CAB PRESS SYS
PACK 1(2)(1+2)

COND CABIN AIR EXTRACT VLV FAULT

Applicable to: ALL

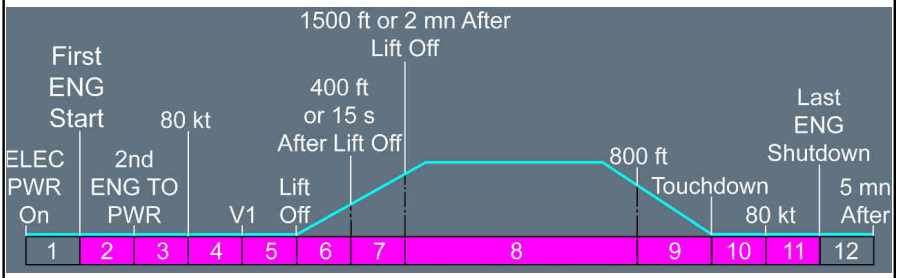
ANNUNCIATIONS

Triggering Conditions:

L2 The cabin air extract valve is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-21-3 COND CABIN AIR EXTRACT VLV FAULT*.

Crew awareness.

Continued on the following page

COND CABIN AIR EXTRACT VLV FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES
CABIN AIR EXTRACT VLV

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22-Flight Guidance

AUTO FLT A/THR LIMITED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The A/THR is active, and:
- With all engines operative, all the thrust levers are below the CL detent, or
- In engine-out, the thrust lever of the engine-out is in the 0 detent, and the three other thrust levers are below the MCT detent.

The alert triggers every 5 seconds, until the flight crew applies the following procedure.

Indications:

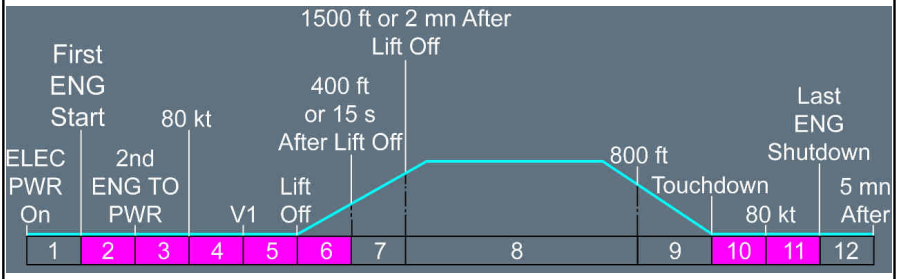
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

AUTO FLT A/THR LIMITED (Cont'd)

■ **When all engines are operative :**

ALL THR LEVERS.....CLB

L2 *All thrust levers must be set to the CL detent.*

L1 ■ **In the case of engine-out :**

THR LEVERS.....MCT

L2 *All of the thrust levers, for which the engine is operative, must be set to the MCT detent.*

AUTO FLT A/THR OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 An involuntary A/THR disconnection occurs:
- The flight crew presses the A/THR pb on the AFS CP , or
- The A/THR becomes inoperative.

One of the preliminary conditions required for A/THR arming or activation is no longer met:
Refer to DSC-22-FG-50-30 Preliminary Conditions Required for A/THR Arming or Activation .

Note: *The flight crew can cancel the alert by:*
- *Pressing one A/THR instinctive disconnect pushbutton, or*
- *Arming, or activating the A/THR .*

According to the way of disconnection, different warnings trigger. For information on the sequence of the warnings, Refer to A/THR Disconnection Annunciations and Warnings .

Indications:

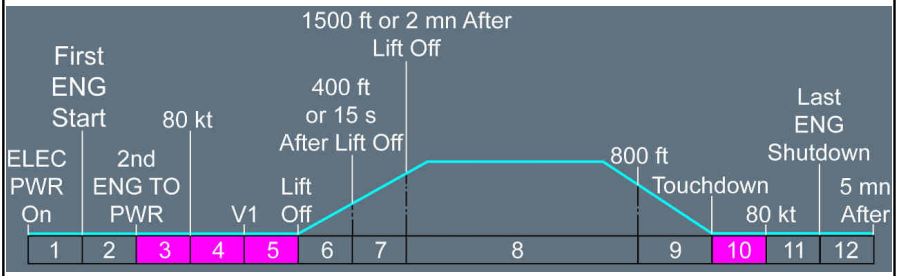
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT A/THR OFF .*

Continued on the following page

AUTO FLT A/THR OFF (Cont'd)

ALL THR LEVERS.....MOVE

L2 *The thrust freezes after A/THR disconnection (THR LK flashes on FMA), and until the flight crew moves the thrust levers. The flight crew should put the thrust reference on the actual thrust.*
During all flight phases, except takeoff: If the flight crew does not move the thrust levers within 5 s , the ENG THRUST LOCKED alert will trigger every 5 s (Refer to PRO-ABN-ECAM-10-70-280 ENG THRUST LOCKED).

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If A/THR failed, and avionics network failed:
  A/THR NOT USABLE

STATUS

INOP SYS

ALL PHASES	APPR_AND_LDG
A/THR (If failed)	CAT 3 (If A/THR failed)

INFO

- If A/THR failed:
  CAT 2 ONLY

MEMOPAGE

MEMO ON PFD

A/THR OFF

AUTO FLT AFS CTL PNL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AFS control panel is failed.

Indications:

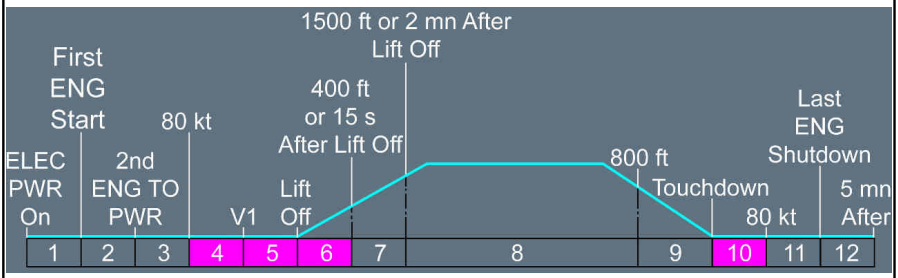
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT AFS CTL PNL FAULT*.

- **If FCU BKUP is available on the CAPT and F/O sides :**
  USE MFD FCU BKUP
- **If FCU BKUP is available on the CAPT (F/O) side only :**
  USE CAPT (F/O) MFD FCU BKUP

Continued on the following page

AUTO FLT AFS CTL PNL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

AFS CTL PNL

AUTO FLT AP OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The last AP disengages after one of the following occurs:

- An involuntary manual AP disconnection:
  - The flight crew has pressed the sidestick pushbutton once, or
  - The flight crew has pressed the AP1(2) pb when AP 1(2) was engaged, or
  - The flight crew has moved a sidestick, or
  - The flight crew has moved the rudder pedals.
- An automatic AP disconnection.
  For information on conditions leading to an automatic AP disconnection, *Refer to AP Automatic Disengagement* .

According to the way of disconnection, different warnings trigger. For information on the sequence of the warnings, *Refer to AP Disengagement Annunciations and Warnings* .

Indications:

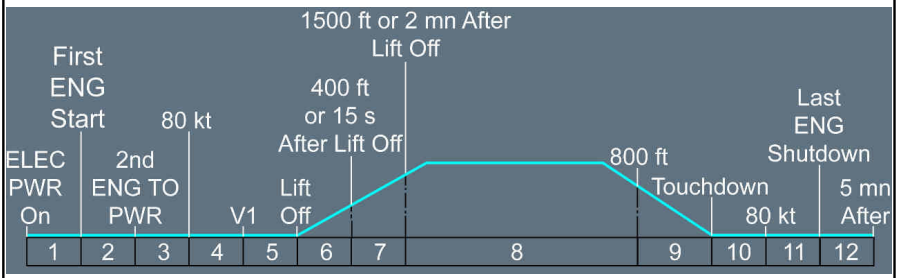
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT AP OFF* .

Continued on the following page

AUTO FLT AP OFF (Cont'd)

Crew awareness.

STATUS

INOP SYS

ALL PHASES

AP 1(2) (1+2) (If failed)

MEMOPAGE

MEMO ON ECAM

- If the flight crew has pressed the sidestick pushbutton one time:
  AP OFF

MEMO ON PFD

- When not failed:
  AP OFF

AUTO FLT APPROACH CAPABILITY DOWNGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the following conditions is met:

- One, or two flight control gyrometer(s) is(are) failed
  L3 For more information, *Refer to DSC-27-10-10-10 PRIM* .
- L2 One, or two flight control vertical accelerometer(s), used for the computation of the normal pitch law, is(are) failed
  L3 For more information, *Refer to DSC-27-10-10-10 PRIM* .
- L2 The PRIM s detect a discrepancy:
  - Between one AOA , and the two others
    However, the NAV AOA DISAGREE alert does not trigger.
  - Between one sideslip, and the two others
    However, the NAV SIDESLIP PROBE 1(2)(3) FAULT alert does not trigger.
  - Between one IRS , and the two others.
    However, the NAV IR 1(2)(3) FAULT alert does not trigger.
- The RA B is failed
- One PFD cannot display the radio altitude, or the ILS(GLS) deviations.

Note: *Depending on failure case, ILS CAT 3 DUAL, ILS CAT 2, or GLS AUTOLAND becomes inoperative. For more information, Refer to LIM-22-30 Required Equipment for CAT II, or CAT III Operation , or Refer to LIM-22-30 Required Equipment for GLS CAT I Automatic Approach and Automatic Landing .*

Indications:

Audio



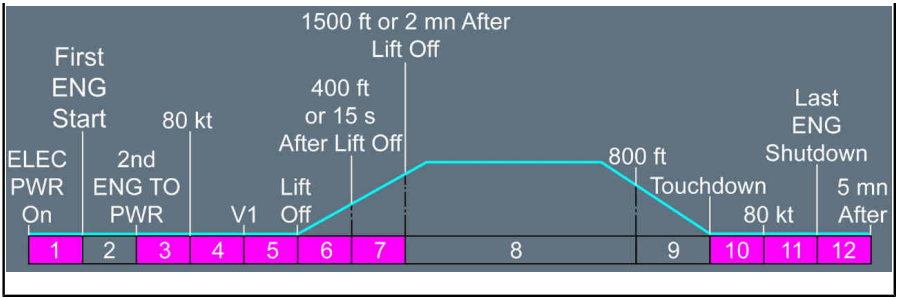
Master Light



Flight Phase Inhibition:

Continued on the following page

AUTO FLT APPROACH CAPABILITY DOWNGRADED (Cont'd)



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT APPROACH CAPABILITY DOWNGRADED* .

Crew awareness.

STATUS

INOP SYS

APPR_AND_LND

CAT 2 (Depending on failure case)
CAT 3 DUAL (Depending on failure case)
GLS AUTOLAND (Depending on failure case)

INFO

- If CAT 3 DUAL is inoperative:
  CAT 3 SINGLE ONLY

AUTO FLT CAPT (F/O) AFS BKUP CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AFS control panel is failed, and the CAPT (F/O) AFS page on the FCU backup is failed.

Indications:

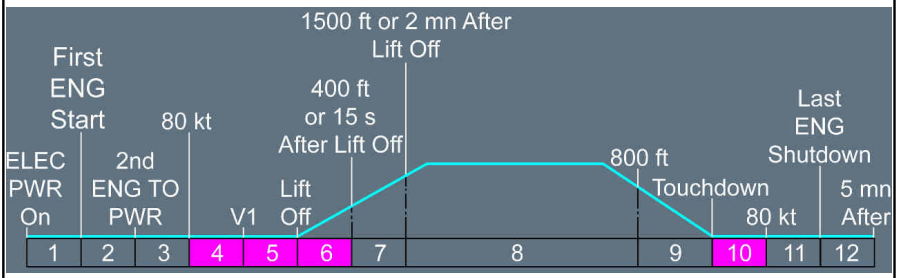
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT CAPT AFS BKUP CTL FAULT* and *Refer to MEL/ME-ECAM-22-1 AUTO FLT F/O AFS BKUP CTL FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
CAPT (F/O) AFS BKUP CTL

AUTO FLT ENG 1(2)(3)(4) A/THR OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The A/THR is armed or active, but failed on the indicated engine.

Indications:

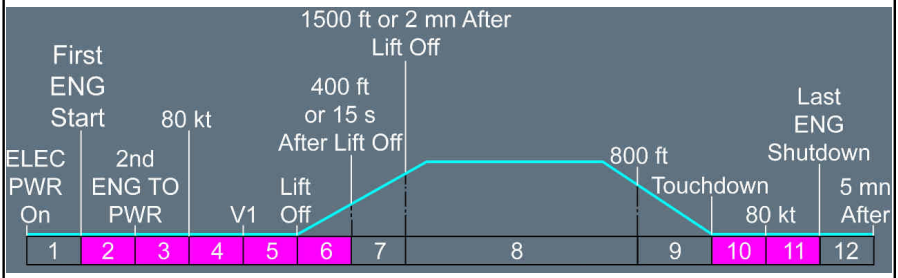
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT ENG 1(2)(3)(4) A/THR OFF* .

Continued on the following page

AUTO FLT ENG 1(2)(3)(4) A/THR OFF (Cont'd)

● **If in flight :**

THR LEVER 1(2)(3)(4)..... MAN ADJUST

L2 *The flight crew can continue to use A/THR. When the A/THR is used, adjust THR LEVER 1(2)(3)(4), in order to set the thrust (or N1) target to an average value, corresponding to the flight conditions. Continuous adjustment is not necessary.*

Note: If the A/THR is active, the flight crew should avoid setting the THR LEVER 1(2)(3)(4) to idle, because this will cause the ECAM to trigger the AUTO FLT A/THR LIMITED alert every 5 seconds.

STATUS

INOP SYS

ALL PHASES
ENG 1(2)(3)(4) A/THR

AUTO FLT ROLL OUT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The nosewheel steering is not able to receive the AP guidance orders.
The AP/FD ROLL OUT mode is not operative for autoland. The flight crew must perform the rollout manually.

Note: *The alert does not prevent the ROLL OUT mode from engaging. If ROLL OUT is engaged:*
- *The FMA displays the mode*
- *The FDs, if engaged, display the yaw bar. The yaw order is valid.*

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT ROLL OUT FAULT* .

FOR AUTOLAND : MAN ROLL OUT ONLY

Continued on the following page

AUTO FLT ROLL OUT FAULT (Cont'd)

STATUS

INOP SYS

0

CAT 3 DUAL
ROLL OUT

INFO

FOR AUTOLAND : MAN ROLL OUT ONLY
CAT 3 SINGLE ONLY

AUTO FLT TCAS MODE FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AP/FD TCAS mode is failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT TCAS MODE FAULT* .

The ECAM reminds that the AP / FD TCAS mode is not available, and in the case of a Resolution Advisory (RA), the flight crew must apply the BASIC TCAS PROCEDURE. For more information, *Refer to PRO-ABN-NECA-34-20-570 TCAS Procedure* .

- **FOR TCAS ALERT:**

  AP & FD.....OFF

  FLY MANUALLY TCAS RA ORDER

Continued on the following page

AUTO FLT TCAS MODE FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

AP/FD TCAS MODE

CDS & AUTO FLT FCU SWITCHED OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FCU is switched off: The EFIS CPs and the AFS CP are electrically shutoff.

Indications:

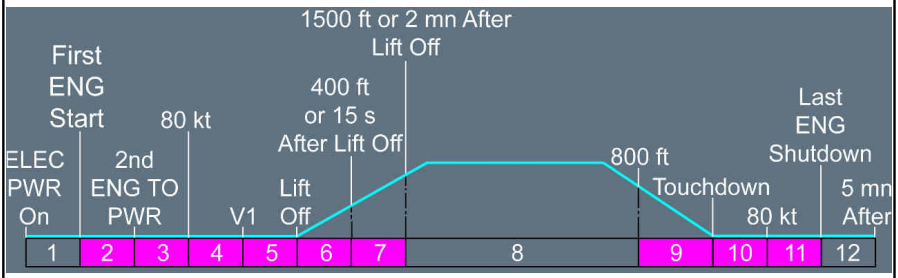
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

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22-Flight Management System

AUTO FLT FMC-A(B)(C) FAULT

Applicable to: ALL

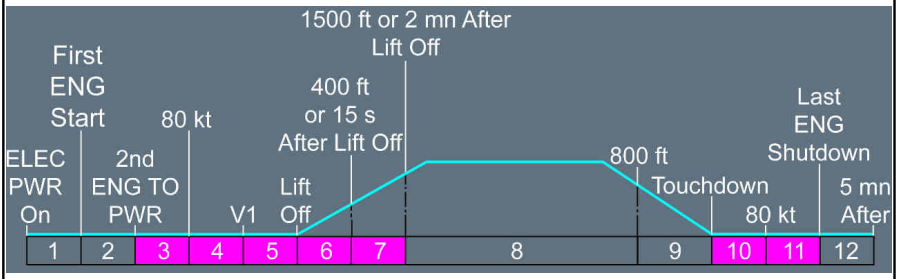
ANNUNCIATIONS

Triggering Conditions:

L2 This caution is triggered, when one FMC (FMC-A, FMC-B, or FMC-C) fails.
FMS 1 and FMS 2 remain available.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions,
Refer to MEL/ AUTO FLT FMC -A FAULT
Refer to MEL/ AUTO FLT FMC -B FAULT
Refer to MEL/ AUOT FLT FMC -C FAULT

FMS SWTG ..... NORM

L2 *When FMC -A(B) fails, the standby FMC -C takes over from the failed FMC -A(B), and synchronizes with the not affected FMC -B(A). After synchronization, FMC -C performs the FMS 1(2) functions.*
Refer to FMS Abnormal Operation

Continued on the following page

AUTO FLT FMC-A(B)(C) FAULT (Cont'd)

L12

STATUS

INFO

- If FMC-A fails:
  FMS 1 ON FMC-C
- If FMC-B fails:
  FMS 2 ON FMC-C

Note: *If FMC-C fails, no INOP SYS is displayed.*

MORE INFO

REDUND LOSS

FMC-A(B)(C)

AUTO FLT FMS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 FMS 1 is FAULT, if one of the following occurs:
- FMC -A and FMC -C fail
- FMC -A and FMC -B fail, and FMS 2 uses FMC -C
- FMC -A fails, and FMS 2 uses FMC -C (FMC -B is a valid standby computer for FMS 2 only)

(*Refer to FMS Abnormal Operation)*

FMS 2 is FAULT, if one of the following occurs:
- FMC -B, and FMC -C fail
- FMC -A and FMC -B fail, and FMS 1 uses FMC -C
- FMC -B fails, and FMS 1 uses FMC -C (FMC -A is valid standby computer for FMS 1 only)

(*Refer to FMS Abnormal Operation)*

Indications:

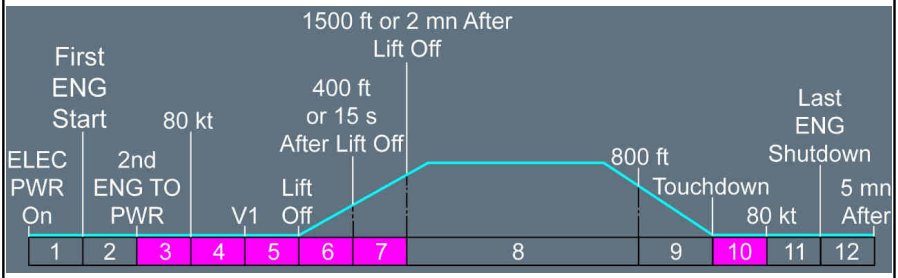
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

AUTO FLT FMS 1(2) FAULT (Cont'd)

L2 For associated MEL dispatch conditions,
Refer to MEL/AUTO FLT FMS 1 FAULT
Refer to MEL/AUTO FLT FMS 2 FAULT

Continued on the following page

AUTO FLT FMS 1(2) FAULT (Cont'd)

■ **If FMS 1 FAULT:**

FMC A+C (A+B)(A) FAULT
FMS SWTG.....BOTH ON 2

L2 The PFD, ND, and MFD display FMS 2 data on both sides.

Note that AP 1 still can be used: AP 1 uses then long-term guidance data from FMS 2.

L3 After setting the FMS selector:

- The Captain's MFD displays the ACTIVE / F-PLN page.
  The MFD System Menu displays the same label as on the First Officer's MFD. This indicates that both sides display data from the same FMS.
- The Captain's ND displays the OFFSIDE FM CONTROL label: This message indicates that the First Officer's side provides the FMS data for the Captain's side.
- On the Captain's EFIS CP, the flight crew can no longer select:
  - The FMS display options: CSTR, WPT, VORD, NDB, and ARPT
  - The ND mode (except the ROSE-VOR, and ROSE-LS modes)
  - The ND range (except the ZOOM position).

  From now on, these display options are driven by the First Officer's EFIS CP.
- The Captain's ND displays the weather (terrain) data, if the WXR (TERR) option is selected on the Captain's EFIS CP, and:
  - The Captain's or First Officer's ND is in ROSE-VOR, or ROSE-LS mode, or
  - The First Officer's ND is in ROSE-NAV mode, and the range is 80 nm.

  In all other cases, the Captain's ND displays the WXR RNG (TERR RNG) message.
- The Captain's VD displays the terrain (weather, if the WXR option is selected on the Captain's EFIS CP) data, if the First Officer's ND is in ROSE-NAV mode, and the range is 80 nm.
  If not, the Captain's VD displays the TERR INOP (WXR INOP) message.

L1 ■ **If FMS 2 FAULT:**

FMC B+C (A+B)(B) FAULT
FMS SWTG.....BOTH ON 1

L2 The PFD, ND, and MFD display FMS 1 data on both sides.

Note that AP 2 still can be used: AP 2 uses then long-term guidance data from FMS 1.

L3 After setting the FMS selector:

- The First Officer's MFD displays the ACTIVE / F-PLN page.

Continued on the following page

AUTO FLT FMS 1(2) FAULT (Cont'd)

The MFD System Menu displays the same label as on the Captain's MFD. This indicates that both sides display data from the same FMS.

- The First Officer's ND displays the OFFSIDE FM CONTROL label: This message indicates that the Captain's side provides the FMS data for the First Officer's side.
- On the First Officer's EFIS CP, the flight crew can no longer select:
  - The FMS display options: CSTR, WPT, VORD, NDB, and ARPT
  - The ND mode (except the ROSE-VOR, and ROSE-LS modes)
  - The ND range (except the ZOOM position).

  From now on, these display options are driven by the Captain's EFIS CP.
- The First Officer's ND displays the weather (terrain) data, if the WXR (TERR) option is selected on the First Officer's EFIS CP, and:
  - The First Officer's or Captain's ND is in ROSE-VOR, or ROSE-LS mode, or
  - The Captain's ND is in ROSE-NAV mode, and the range is 80 nm.

  In all other cases, the First Officer's ND displays the WXR RNG (TERR RNG) message.
- The First Officer's VD displays the terrain (weather, if the WXR option is selected on the First Officer's EFIS CP) data, if the Captain's ND is in ROSE-NAV mode, and the range is 80 nm. If not, the First Officer's VD displays the TERR INOP (WXR INOP) message.

Continued on the following page

AUTO FLT FMS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
FMS 1(2)	GPWS 1(2)

INFO

- If FMS 2 uses FMC-C:
  FMS 2 on FMC-C
- If FMS 1 uses FMC-C:
  FMS 1 on FMC-C

MORE INFO

REDUND LOSS

- If FMS 1 FAULT:
  FMC A+C (A+B)(A)
- If FMS 2 FAULT:
  FMC B+C (A+B)(B)

AUTO FLT FMS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 FMC-A, FMC-B, and FMC-C fail. Therefore, FMS 1 and FMS 2 are not available.

Indications:

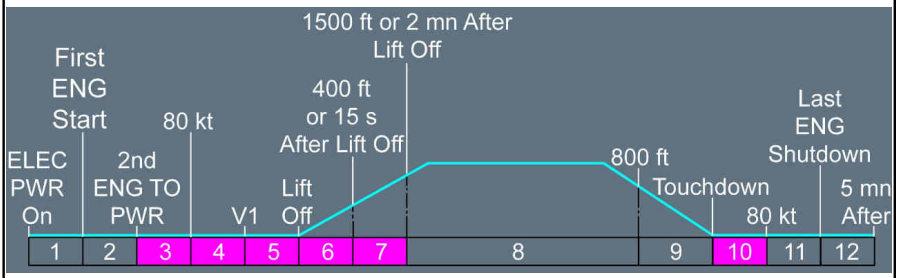
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-22-1 AUTO FLT FMS 1+2 FAULT*

For more information about the handling of FMS 1+2 FAULT, refer to *Refer to FCTM/AO-22 Auto FLT FMS 1+2 Fault* .

ALL FMCs FAULT

FMS SWTG..... NORM

FOR NAV : USE STBY INSTRUMENTS

FOR NAVAID TUNING : USE RMP

Continued on the following page

AUTO FLT FMS 1+2 FAULT (Cont'd)

DEFERRED PROC

ALL PHASES

- **AT TOP OF DESCENT:**
  CABIN ALT MODE.....MAN
  CABIN ALT TRGT..... LDG ELEVN

STATUS

INOP SYS

ALL PHASES	APPR & LDG
FMS 1+2	GPWS 1+2

INFO

STBY INSTRUMENTS NAV AVAIL

T.O SPEEDS NOT INSERTED

Applicable to: ALL

Impacted DU: 00023835 NAV T.O SPEEDS NOT INSERTED

ANNUNCIATIONS

Triggering Conditions:

L2 V1 or VR are not inserted on the T.O panel of the FMS ACTIVE/PERF page, when the TO CONFIG pb of the ECP is pressed, or when the engines are set to takeoff power.

Note: After the flight crew performed the T.O CONFIG test, the ECAM will immediately trigger the alert, if V1/VR fields become empty (e.g. because of a change of the takeoff runway).

Indications:

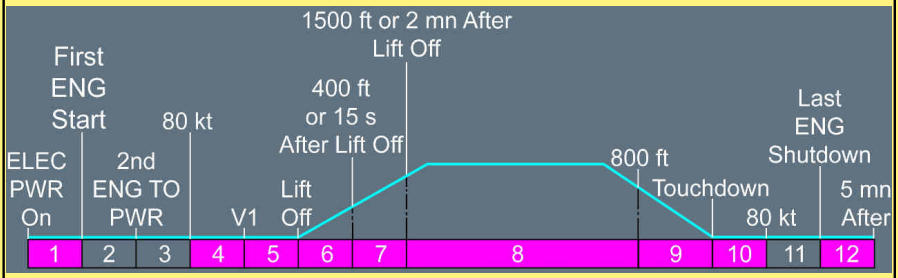
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

T.O SPEEDS NOT INSERTED (Cont'd)

Impacted by TDU: 00023898 NAV T.O SPEEDS NOT INSERTED

ANNUNCIATIONS

Triggering Conditions:

L2 V1 or VR are not inserted on the T.O panel of the FMS ACTIVE/PERF page, when the TO CONFIG pb of the ECP is pressed, or when the engines are set to takeoff power.

Indications:

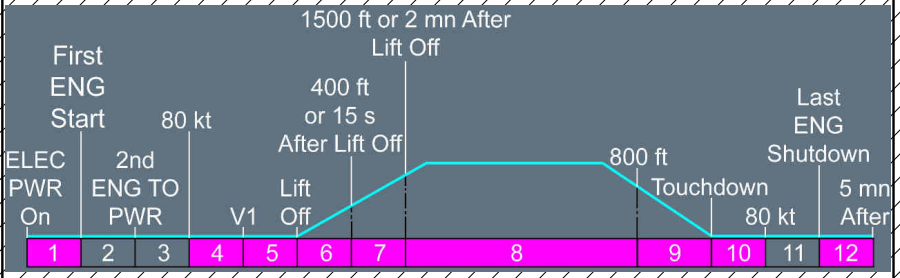
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/00023611 **Not found** .*

Crew awareness.

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Communication

CAB COM CIDS 1+2+3 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Cabin Data Communication Systems (CIDS) 1, 2 and 3 are failed.

Indications:

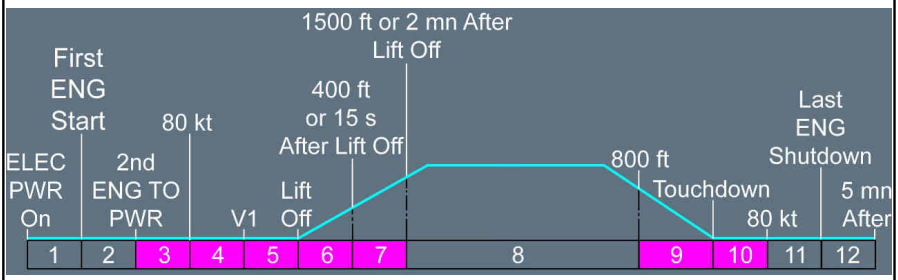
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-44 CAB COM CIDS 1+2+3 FAULT*.

Continued on the following page

CAB COM CIDS 1+2+3 FAULT (Cont'd)

Crew awareness.

L2 The following systems are failed (on the upper and the main decks):
- The flight interphone
- The cabin interphone
- The Passenger Address (PA)
- The passenger signs.

STATUS

INOP SYS

ALL PHASES
CIDS 1+2+3

CAB COM CIDS CABIN COM FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one of the following functions of the CIDS is failed:
- The cabin interphone
- The upper deck Passenger Address (PA)
- The main deck PA.

Indications:

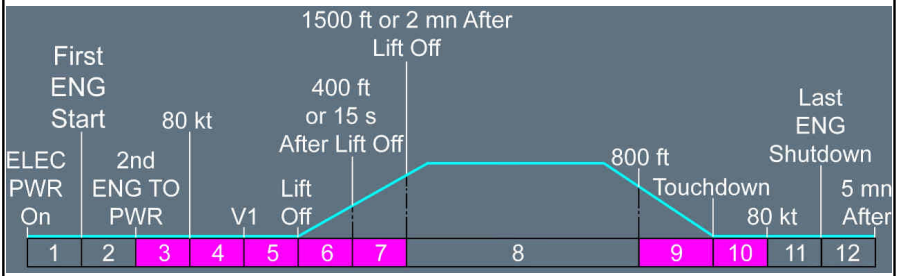
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-44 CAB COM CIDS CABIN COM FAULT*

Continued on the following page

CAB COM CIDS CABIN COM FAULT (Cont'd)

Depending on the failure, one or all of the following messages may appear:
- UPPER DECK PA FAULT
- MAIN DECK PA FAULT
- LOWER DECK PA FAULT
- CABIN INTERPHONE FAULT

STATUS

INOP SYS

ALL PHASES
UPPER DECK PA (If affected)
MAIN DECK PA (If affected)
LOWER DECK PA (if affected)
CABIN INTERPHONE (If affected)

CAB COM COM DEGRADED

Applicable to: ALL

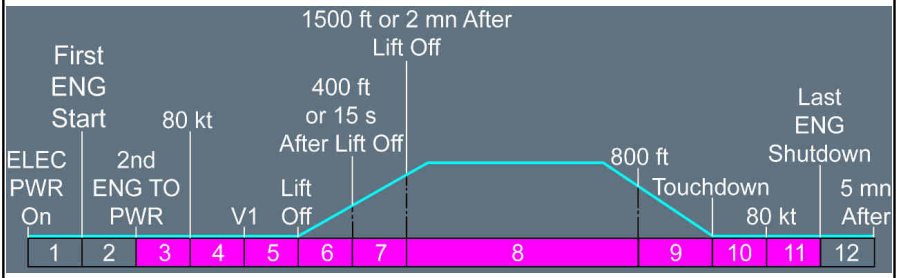
ANNUNCIATIONS

Triggering Conditions:

L2 Some functions of the Passenger Address (PA) or the cabin interphone are failed in some areas of the cabin (e.g. PA announcements not available in a lavatory, cabin interphone not available at a flight attendant station).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-44 CAB COM COM DEGRADED*

Depending on the failure, one or both messages may appear:

- PA DEGRADED
- CABIN INTERPHONE DEGRADED

COM CAPTAIN (F/O)(THIRD OCCUPANT) PTT STUCK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Captain (F/O)(Third Occupant) PTT sw is stuck in the transmit position for more than 40 s, and no transmission key is selected on the associated RMP.

Indications:

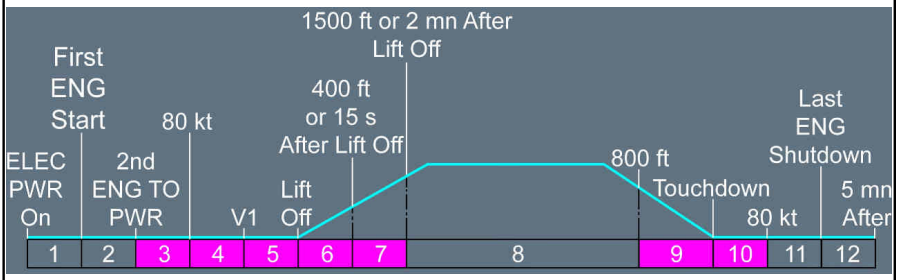
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions,

L1 *Refer to MEL/Captain*
Refer to MEL/F/O
Refer to MEL/Third Occupant .

Crew awareness.

L2 Try to release the stuck PTT sw to cancel the alert.

COM DATALINK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ACR is failed, or cannot be initialized.
This alert may also be triggered if all means of data communication (VHF 3, both HF transceivers and the SATCOM) are failed, or in voice mode. In this case, no Single Chime is generated, and the Master Caution does not go on.

Indications:

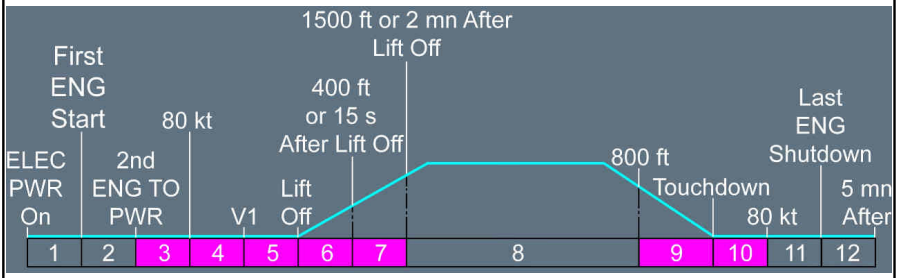
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/DEL-23-ME COM DATALINK FAULT*.

Continued on the following page

COM DATALINK FAULT (Cont'd)

- **If the ACR cannot be initialized :**
  DATALINK INIT FAULT
  ATC COM VOICE ONLY
- **If the ACR fails :**
  ATC COM VOICE ONLY
- **If all means of data communication are failed, or in voice mode :**
  VHF & HF & SATCOM DATA NOT AVAIL

L2 *Try to activate any transceiver in data mode to recover data communication.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the ACR is not available:
  ATC COM VOICE ONLY

STATUS

INOP SYS

ALL PHASES

DATALINK (If the ACR is not available)

COM HF 1(2) DATALINK FAULT

Applicable to: ALL

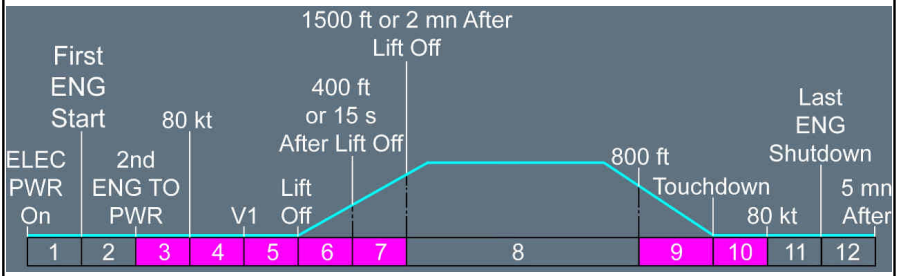
ANNUNCIATIONS

Triggering Conditions:

L2 HF 1(2) is failed, or HF 1(2) data mode is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions :

- *Refer to MEL/ME-ECAM-23-46 COM HF 1(2) DATALINK FAULT*

Crew awareness.

STATUS

INOP SYS

ALL PHASES

HF 1(2) DATALINK

COM HF 1(2) EMITTING

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 HF 1(2) transmits (associated transmission key and PTT sw pressed) during more than 60 s.

Indications:

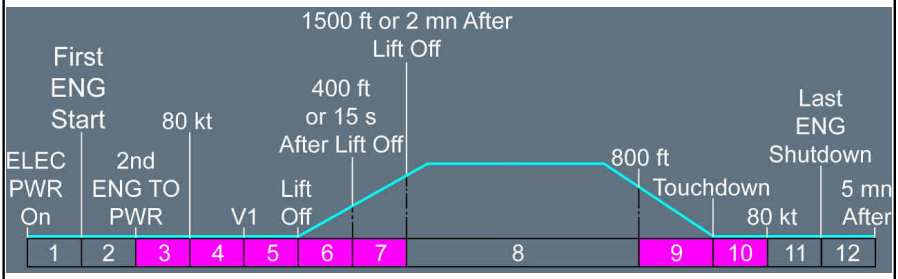
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/DEL-23-ME COM HF 1 EMITTING* .

Crew awareness.

COM RMP 1(2)(3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 RMP 1(2)(3) is failed.

Indications:

Audio



Master Light

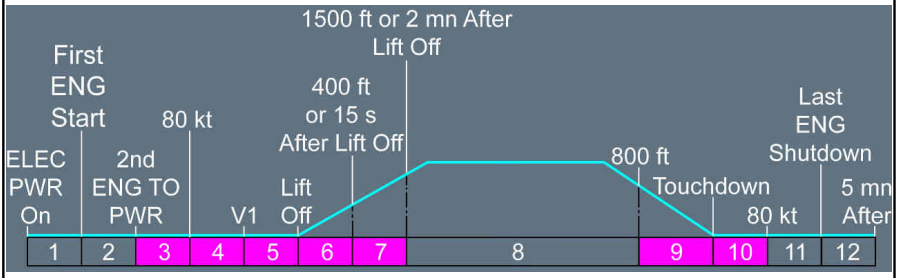


Local light



BRT/OFF knob on the RMP.

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM RMP 1 FAULT*.

RMP 1(2)(3).....OFF

L2 *When the failed RMP is set to OFF, the reconfiguration of the communication system occurs and control is maintained, via the two operative RMP s (Refer to Single RMP Failure).*
After RMP 1(2) is set to OFF, the CAPT (F/O) ON RMP3 memo displays to indicate that the Captain (First Officer) should use RMP 3.

Continued on the following page

COM RMP 1(2)(3) FAULT (Cont'd)

MORE INFO

REDUND LOSS

RMP 1(2)(3)

COM RMP 1+2(1+3)(2+3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 RMPs 1 and 2(1 and 3)(2 and 3) are failed.

Indications:

Audio



Master Light

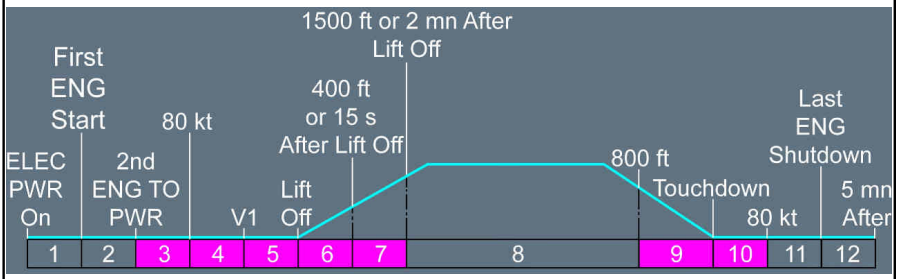


Local light



BRT/OFF knob on the RMP1 and 2 (1 and 3)(2 and 3).

Flight Phase Inhibition:



Continued on the following page

COM RMP 1+2(1+3)(2+3) FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM RMP 1+2(1+3)(2+3) (1+2+3) FAULT* .

RMP 1(1)(2).....OFF
RMP 2(3)(3).....OFF

L2 *When the failed RMP s are set to OFF, the reconfiguration of the communication system occurs and control is maintained, via the remaining RMP (Refer to DSC-23-30-10 Dual RMP Failure).*

If RMP s 1+2 are failed:
- *The CAPT+F/O ON RMP 3 memo displays after both RMP s are turned OFF.*

Note: *STBY RAD NAV is not available.*

If RMP s 1+3(2+3) are failed:
- *STBY RAD NAV is available via RMP 2(1).*

STATUS

INOP SYS

ALL PHASES
RMP 1+2(1+3)(2+3)
STBY RAD NAV (If RMPs 1+2 are failed)

COM RMP 1+2+3 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 RMPs 1, 2, and 3 are failed.

Indications:

Audio



Master Light

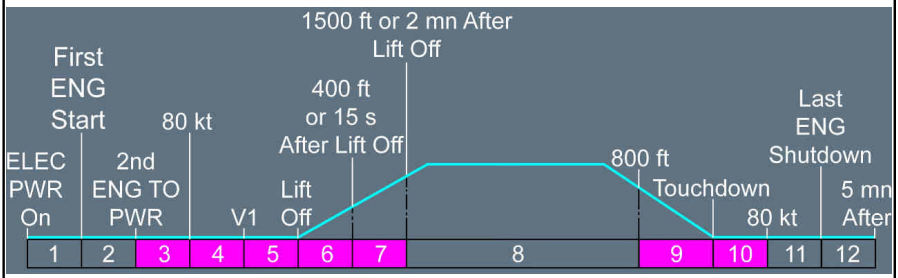


Local light



BRT/OFF knob on the RMP 1, 2 and 3.

Flight Phase Inhibition:



L2 For associated dispatch conditions, *Refer to MEL/DEL-23-ME COM RMP 1+2+3 FAULT* .

Continued on the following page

COM RMP 1+2+3 FAULT (Cont'd)

RMP 1.....OFF
RMP 2.....OFF
RMP 3.....OFF

L2 *After all three RMPs are turned off, the RMP 1+2+3 OFF memo appears.*
Use the cockpit handset to communicate via the PA, or the cabin interphone.
If the SATCOM was logged on automatically before the failure of all the RMPs, SATCOM datalink remains available (AOC, ATC communication). Otherwise, the relevant communication failure procedure should be applied.

STATUS

INOP SYS

ALL PHASES
RMP 1+2+3
STBY RAD NAV

COM SATCOM DATALINK FAULT

Applicable to: ALL

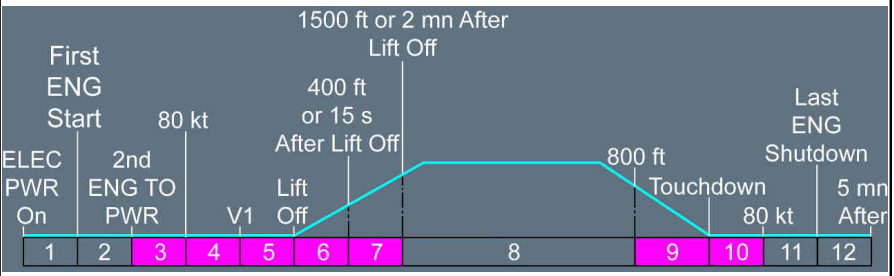
ANNUNCIATIONS

Triggering Conditions:

L2 Data communication, via the SATCOM, is not available.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM SATCOM DATALINK FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
SATCOM DATALINK

COM SATCOM FAULT

Applicable to: ALL

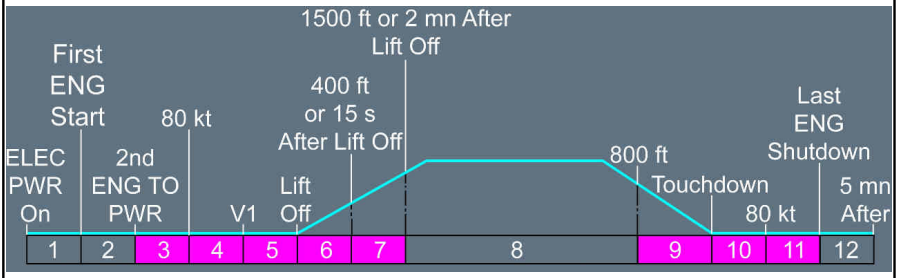
ANNUNCIATIONS

Triggering Conditions:

L2 Voice and data communication, via the SATCOM, are not available.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM SATCOM FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
SATCOM

COM SATCOM VOICE FAULT

Applicable to: ALL

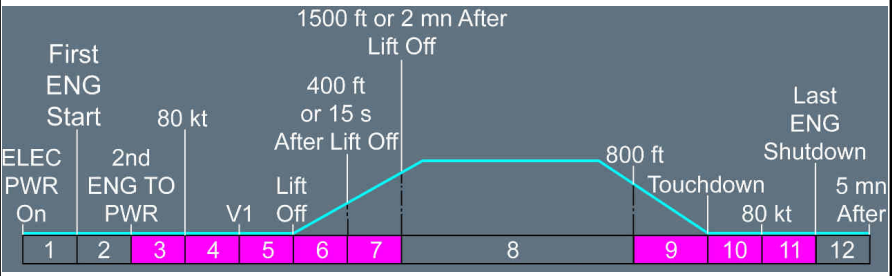
ANNUNCIATIONS

Triggering Conditions:

L2 Voice communication, via the SATCOM, is not available.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM SATCOM VOICE FAULT* .

Crew awareness.

COM VHF 1(2)(3) EMITTING

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 VHF 1(2)(3) transmits (associated transmission key and PTT sw pressed) during more than 35 s.

After 60 s:
- A single chime sounds
- The master caution light goes on.

Indications:

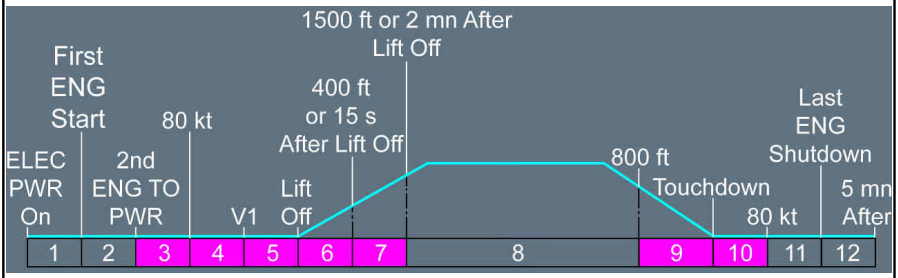
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM VHF 1(2)(3) EMITTING*.

- **After 60 s of VHF emitting:**
  RMP TX KEY..... DESELECT

COM VHF 2(3) DATALINK FAULT

Applicable to: ALL

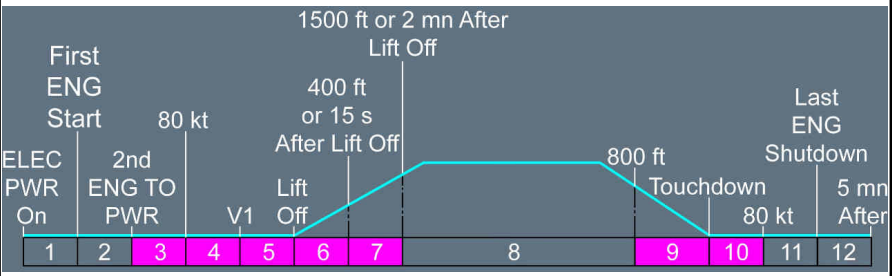
ANNUNCIATIONS

Triggering Conditions:

L2 VHF 2(3) is failed, or VHF 2(3) data mode is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions :

- *Refer to MEL/ME-ECAM-23-46 COM VHF 3 DATALINK FAULT*

Crew awareness.

STATUS

INOP SYS

ALL PHASES

VHF 2(3) DATALINK

Electrical

ELEC ABNORMAL FLIGHT OPS SUPPLY

Applicable to: ALL

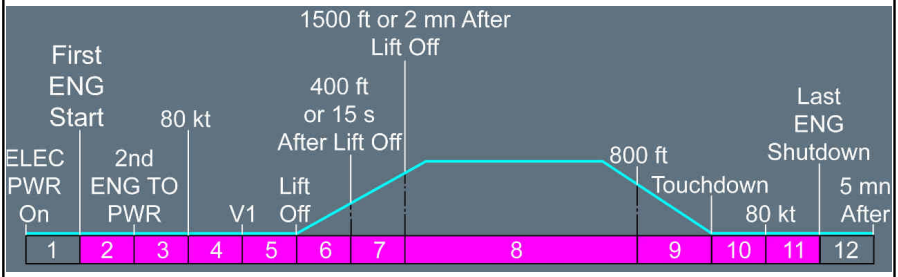
ANNUNCIATIONS

Triggering Conditions:

L2 The OITs have been abnormally supplied by the DC ESS busbar in flight.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC ABNORMAL FLIGHT OPS SUPPLY*.

Crew awareness.

ELEC AC BUS 1 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 1 busbar is lost.

Indications:

Audio



Master Light

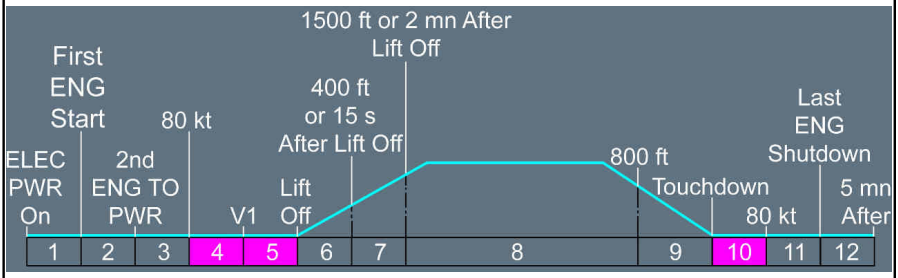


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 1(2)(3)(4) FAULT* .

- **On ground:**

  FOR ENG STOP : KEEP ENG 4 LAST

L2 *Engine 4 must be the last engine to be shut down, to ensure that the HP fuel valves continue to be electrically supplied.*

L3 *The HP fuel valves are supplied via the AC ESS busbar, that remains powered by the AC 4 busbar, when the AC 1 busbar is lost.*

Continued on the following page

ELEC AC BUS 1 FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

MID TKs AFT PMPs
FWD CRG VENT
FWD CRG TEMP REGUL

APPR & LDG

CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

MORE INFO

REDUND LOSS

1 PRIMARY CAB FAN

ELEC AC BUS 1+2 & DC BUS 1 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 1, AC 2, and DC 1 busbars are lost.

Indications:

Audio



Master Light

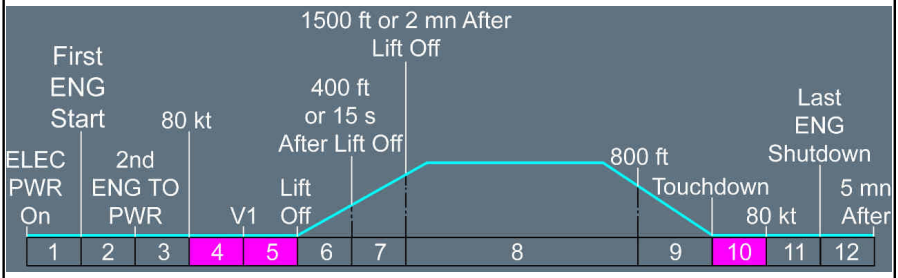


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 1+2 & DC BUS 1 FAULT*.

Continued on the following page

ELEC AC BUS 1+2 & DC BUS 1 FAULT (Cont'd)

ATC COM VOICE ONLY

L2 *The ATC function is failed. Therefore, use the communication voice mode via the RMP s.*

L1 AP : SIDESTICK LOCKING DEVICE NOT AVAIL
LDG DIST : AFFECTED

L2 *Landing distance is affected due to:*
- *The loss of three pairs of ground spoilers*
- *The loss of one reverser for computation on wet runways.*

L1

ASSOCIATED PROCEDURES

FUEL NORM+ALTN XFR FAULT

Refer to PRO-ABN-ECAM-10-28-320 FUEL NORM + ALTN XFR FAULT

SECONDARY FAILURES

*F/CTL

Continued on the following page

ELEC AC BUS 1+2 & DC BUS 1 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	APPR & LDG
ATC COM VOICE ONLY	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
PART SPLRs *The spoilers 2, 3, 5, 6, and 7 operate.* PRIM 3 SEC 3 ADR 3 RMP 3 VHF 3 SATCOM DATALINK FEED TK 4 MAIN PUMP MOST FUEL XFR PMPs Y ELEC PMP A+B (Only on ground, with no engine running) STBY STATIC HEATG FWD CREW REST VENT	AUTO BRK ROW/ROP ALTN BRK ENG 2 REVERSER RA SYS A+C GLS AUTOLAND CAT 2 ARPT NAV

Inop Sys (Not displayed on ecam)

ALL PHASES
INR TKs AFT PMPs MID TKs AFT PMPs

Continued on the following page

ELEC AC BUS 1+2 & DC BUS 1 FAULT (Cont'd)

L+R OUTR TK PMPs
TRIM TK R PMP

INFO

AP : SIDESTICK LOCKING DEVICE NOT AVAIL
CABIN TEMP REGUL DEGRADED
Cabin air recirculation is degraded because the secondary fans are lost.
OUTR TKs XFR BY GRVTY ONLY

MORE INFO

REDUND LOSS

RUDDER TRIM 2
BRK CTL 1
STEER CTL 1
L/G CTL 1
ALTN N/W STEER
FMC-C
FEED TK 1 STDY PMP
FQDC 2
ENG 2 IGN B
ENG 4 IGN B
PACK 1 CTL 2
TEMP CTL 1
FWD VENT CTL REDUND

ELEC AC BUS 2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 2 busbar is lost.

Indications:

Audio



Master Light

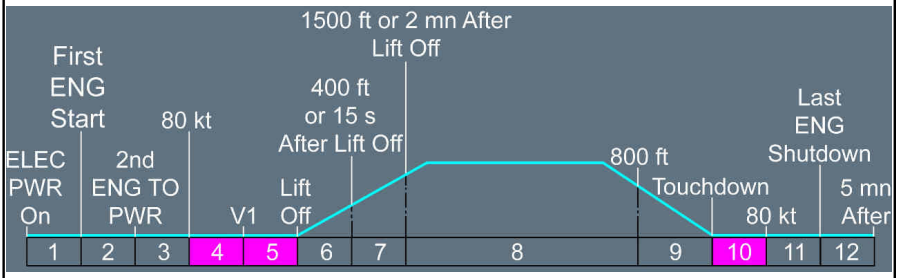


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 1(2)(3)(4) FAULT* .

Continued on the following page

ELEC AC BUS 2 FAULT (Cont'd)

LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *One reverser is inoperative. Landing distance computation on dry runways does not take into account, the impact of the reversers.*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb :**
EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

L1 ● **After landing:**
BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Because the AC BUS 2 supplies the ADR 3, in the case of AC BUS 2 FAULT , the ADR 3 is inoperative.*
Following an ADR 3 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.

L3 *For more information on the relation between ADR 3 and the APU GEN B, Refer to DSC-24-10-20-10 APU Generators .*

Continued on the following page

ELEC AC BUS 2 FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

ADR 3
HUD
SATCOM
FEED TK 4 MAIN PMP
PART FUEL XFR PMPs
STBY STATIC HEATG
L FIXED WINDOW HEATG
L SLIDG WINDOW HEATG
SECONDARY CAB FANS

APPR AND LDG

BTV
ALTN BRK
ENG 2 REVERSER
CAT 3

Inop Sys (Not displayed on ecam)

ALL PHASES

HF 1
L OUTR TK PMP
R OUTR TK PMP
INR TKs AFT PMPs
TRIM TK R PMP

INFO

OUTR TKs XFR BY GRVTY ONLY
CABIN TEMP REGUL DEGRADED

Cabin air recirculation is degraded because the secondary fans are lost.

CAT 2 ONLY

MORE INFO

REDUND LOSS

RA SYS A
FEED TK 1 STBY PMP

Continued on the following page

ELEC AC BUS 2 FAULT (Cont'd)

ENG 2 IGN B
ENG 4 IGN B
PACK 1 CTL 2
TEMP CTL 1
1 PRIMARY CAB FAN

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 2, AC 3, DC 1, and DC 2 busbars are lost.

Indications:

Audio



Master Light

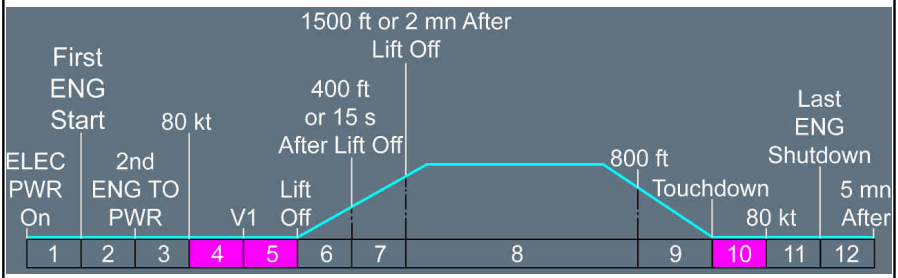


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 2+3 & DC BUS 1+2 FAULT* .

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

CROSSFEED 3.....ON
CROSSFEED 4.....ON
USE VHF 1
WXR & TAWS.....SYS 1
WPDR & TCAS.....SYS 1
ATC COM VOICE ONLY

L2 *The ATC function is failed. Therefore, use the communication voice mode via the RMP s.*

L1 AVOID ICING COND s

L2 *Wing anti-ice is not available, and F/O windshield heating is lost. Captain windshield heating remains operative.*

L1 FOR SD : SELECT "MAILBOX" ON CAPT KCCU
INR TK s NOT USABLE
MID TK s NOT USABLE
TRIM TK NOT USABLE
OIS ON BAT
USE TRIM TK XFR FOR CG IF NECESSARY

L2 *The fuel in the trim tank transfers into the inner tanks, and remains unusable.*
If the flight crew transfers fuel from the trim tank to the inner tanks, the CG of the aircraft moves forward by around 0.5 % per 2 200 lb of transferred fuel (heavy aircraft) or 0.9 % per 2 200 lb of transferred fuel (light aircraft).

L1 FEED TK 4 : 2900 LBS MAX NOT USABLE

L2 *The feed tank 4 pumps are inoperative, and 2 900 lb of fuel in the feed tank 4 cannot be transferred by gravity to the feed tank 3.*

L1 ■ **If flight time above FL 300 since departure is less than 30 min :**
DESCENT TO FL 50/MEA.....INITIATE
MAX FL : 50/MEA

L2 *If the aircraft has been flying less than 30 min , fuel gravity feeding is ensured below FL 50 . However, if the MEA is above FL 50 , do not fly below the MEA .*

L1 ● **WHEN BELOW FL 50/MEA:**
CROSSFEED 3.....OFF
CROSSFEED 4.....OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

L1 AVOID NEG G LOAD

■ **If flight time above FL 300 since departure is greater than 30 min :**

DESCENT TO FL 280..... INITIATE

MAX FL : 280

L2 *If the aircraft has been flying more than 30 min above FL 300 , fuel gravity feeding is ensured below FL 280 .*

L1 ● **WHEN BELOW FL 280:**

CROSSFEED 3..... OFF

CROSSFEED 4..... OFF

EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

■ **If L/G is not down and locked:**

L/G GRVTY EXTN ONLY

L2 *Both LGCIS are not electrically supplied. As a consequence, the normal extension of the landing gear is not possible. Only L/G position on center panel is available.*

L1 ■ **If L/G is down and locked:**

NO L/G RETRACTION

L2 *Both LGCIS are not electrically supplied. As a consequence, the retraction of the landing gear is not possible.*
If the flight is continued (E.g. to alternate), there is a high impact on the fuel consumption. For performance impact, refer to below comment associated with FUEL CONSUMPT INCRSD : FMS PRED DISREGARD in INFO part.

L1 ● **If fuel quantity in feed tanks 1 and 4 is below 42 000 lb :**

L2 If the feed tank quantity is greater than 42 000 lb when the alert is initially triggered, the alert is automatically recalled when appropriate.

L1 OUTR TK s PMP s ..... OFF

OUTR TK XFR..... MAN

L2 *When the OUTR TKs PMPs are OFF, the manual transfer allows a fuel transfer from the OUTR TKS to:*

- *The FEED TK 1 and FEED TK 4 by gravity via the emergency transfer valves.*

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

- *The FEED TK 2 and FEED TK 3 by gravity via the aft gallery.*

For more information, Refer to DSC-28-40-DSC2840A Manual transfer from the outer tanks to the feed tanks .

L1 LDG DIST AFFECTED

L2 *Landing distance is affected due to:*
- *The loss of 6 pairs of ground spoilers and 2 ailerons (used as ground spoilers)*
- *The loss of the reversers for computation, on wet runways.*

L1 ● **After landing, below 80 kt with at least one engine running:**
If the failure occurs in flight, the ECAM will automatically recall the alert after landing.

● **BEFORE OPENING ANY CABIN DOOR:**
RESIDUAL DIFF PRESS.....CHECK

L2 *The cabin differential pressure is indicated on the CRUISE SD page, and on the CAB PRESS SD page.*
The differential pressure indication must be below 0.036 PSI .

L1 CABIN CREW.....ADVISE

L2 *Advise the cabin crew, when the cabin differential pressure equals 0 PSI .*

L13

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)
Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)
The flight control law is direct.

L1

SECONDARY FAILURES

*FUEL

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310/.86
- If flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- If flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
  AVOID NEG G LOAD
  MANEUVER WITH CARE
- If L/G is down and locked:
  NO L/G RETRACTION
  ATC COM VOICE ONLY
  AVOID ICING CONDs
  FUEL PARTLY UNUSABLE

APPR & LDG

MAX SPEED : 220 KT
- If severe ice accretion:
  FOR LDG : FLAP LVR 3
- If L/G is not down and locked:
  L/G GRVTY EXTN ONLY
  LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 310/.86
- If flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- If flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
  AVOID NEG G LOAD
  MANEUVER WITH CARE
  AVOID ICING CONDs
  MAX SPEED : 220 KT

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

L12

DEFERRED PROC

FOR APPROACH

- **IF SEVERE ICE ACCRETION :**

  FOR LDG : FLAP LVR 3

LDG DIST COMPUTATION.....CONFIRM

FOR LANDING

FOR L/G GRVTY EXTN : MAX SPEED 220 KT

- **FOR L/G EXTN :**

  L/G LEVER.....UP
  L/G GRVTY (EXTN MAX 2 MIN).....DOWN

  Landing gear gravity extension takes approximately 70 s.

  - **WHEN L/G LOCKED DOWN OR AFTER 120S :**

    L/G LEVER.....DOWN

    The UNLKD red lights are not electrically supplied. The green triangles illuminate, when the landing gear is currently locked down.

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
PRIM 2+3
SEC 2+3
MOST SPLRs

The spoilers 3 and 6 operate.

AP 1+2
A/THR
FD 1+2
SATCOM
FUEL NORM+altn xfr
JETTISON
FEED TK 4 PMPs

APPR & LDG

L/G CTL 1+2
A-SKID
AUTO BRK
Row/rop
N/W + B/W STEER
ENG 2+3 REVERSERS
CAT 2
GLS AUTOLAND
LS 2
GPWS 1+2
ARPT NAV

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

FEED TK 3 MAIN PMP
MOST FUEL XFR PMPs
WING A-ICE

INFO

DIRECT LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Fuel consumption is increased, and FMS predictions are not correct due to :
- *The two outer ailerons*
- *One elevator at zero-hinge moment*
- *The landing gear, if the landing gear is down when the alert is triggered.*

As consequence:
- *If the landing is retracted when the alert is triggered, the fuel consumption is increased by approximately 6 %.*
- *If the landing gear is down and locked on departure or on approach followed by an alternate, the fuel consumption is increased by 110 %.*

To optimize the fuel consumption, set the Cost Index (CI) to zero and use managed speed.

USE TRIM TK XFR FOR CG IF NECESSARY
FEED TK 4 BY GRVTY ONLY
OUTR TKs XFR BY GRVTY ONLY
FEED TK 4 : 4400 lbs MAX NOT USABLE
TRIM TK NOT USABLE
INR TKs NOT USABLE
MID TKs NOT USABLE
EXPECT NORM COLLECTOR CELL DEPLETION
BRK WITH ACCU ONLY ON ALL L/Gs
BRK PRESS AUTO LIMITED ON ALL L/Gs
DELAY BRAKING UNTIL NLG TOUCHDOWN

MORE INFO

REDUND LOSS

RA SYS A
FEED TK 1 STBY PMP

Continued on the following page

ELEC AC BUS 2+3 & DC BUS 1+2 FAULT (Cont'd)

FEED TK 2 STBY PMP
FQMS 2
FQDC 2
ENG 1 IGN B
ENG 2 GN B
ENG 3 IGN B
ENG 4 IGN B
PACK 1 CTL 1
TEMP CTL 1
PACK 2 CTL REDUND
ENGs+APU FIRE LOOP B
MLG BAY FIRE LOOP B
FWD VENT CTL REDUND
AFT VENT CTL REDUND

ELEC AC BUS 2+4 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 2 and AC 4 busbars are lost.

Indications:

Audio



Master Light

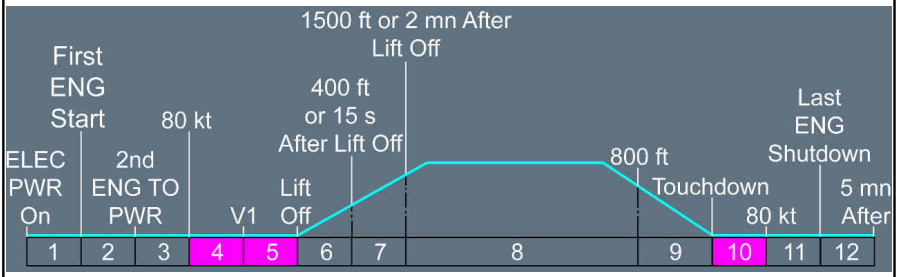


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 2+4 FAULT* .

Continued on the following page

ELEC AC BUS 2+4 FAULT (Cont'd)

● **After landing:**

FOR ENG STOP: KEEP ENG 1 LAST

L2 *Because the AC BUS ESS is supplied by the AC BUS 1, the flight crew must keep the ENG 1 at least during the engine shot down.*

L1 ALL CROSSFEEDS..... ON

L2 *Because the feed tank 1 pumps and feed tank 4 pumps are not electrical supplied, the flight crew should switch on all the crossfeeds to feed engines 1 and 4 with fuel from feed tanks 2 and 3.*

L1 A/THR.....DISCONNECT

L2 *Only one Multi Probe Function (MFP) is electrically supplied and provides parameters to the ADIRS . With only one MFP , the ADIRS cannot monitor the reliability of received parameters. As a consequence, the A/THR , if engaged, automatically disconnects after 3 min .*

L1 ● **In flight:**

VENT AVNCS EXTRACT.....OVRD

L2 *The extraction fan is not electrically supplied: Air that ventilates the main and upper avionics bays is extracted by differential pressure via the overboard valve.*

L1 WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1
INR TK s NOT USABLE
MID TK s NOT USABLE
TRIM TK NOT USABLE
USE TRIM TK XFR FOR CG IF NECESSARY

L2 *The fuel in the trim tank transfers into the inner tanks, and remains unusable.*
If the flight crew transfers fuel from the trim tank to the inner tanks, the CG of the aircraft moves forward by around 0.5 % per 2 200 lb of transferred fuel (heavy aircraft) or 0.9 % per 2 200 lb of transferred fuel (light aircraft).

L1 FEED TK 1: 2900 LBS MAX NOT USABLE
FEED TK 4 : 2900 LBS MAX NOT USABLE

■ **If flight time above FL 300 since departure is less than 30 min :**

DESCENT TO FL 50/MEA.....INITIATE

MAX FL : 50/MEA

L2 *If the aircraft has been flying less than 30 min , fuel gravity feeding is ensured below FL 50 . However, if the MEA is above FL 50 , do not fly below the MEA .*

Continued on the following page

ELEC AC BUS 2+4 FAULT (Cont'd)

L1 ● **WHEN BELOW FL 50/MEA:**
ALL CROSSFEEDS..... OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

■ **If flight time above FL 300 since departure is greater than 30 min :**
DESCENT TO FL 280..... INITIATE
MAX FL : 280

L2 *If the aircraft has been flying more than 30 min above FL 300 , fuel gravity feeding is ensured below FL 280 .*

L1 ● **WHEN BELOW FL 280:**
ALL CROSSFEEDS..... OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Both reversers 2 and 3 are inoperative.*

L1 ● **If fuel quantity in feed tanks 1 and 4 is below 42 000 lb :**

L2 If the feed tank quantity is greater than 42 000 lb when the alert is initially triggered, the alert is automatically recalled when appropriate.

L1 OUTR TK s PMP s ..... OFF
OUTR TK XFR.....MAN

L2 *When the OUTR TK s PMP s are OFF, the manual transfer allows a fuel transfer from the OUTR TK s to:*
- *The FEED TK 1 and FEED TK 4 by gravity via the emergency transfer valves.*
- *The FEED TK 2 and FEED TK 3 by gravity via the aft gallery.*

For more information, Refer to DSC-28-40-DSC2840A Manual transfer from the outer tanks to the feed tanks .

Continued on the following page

ELEC AC BUS 2+4 FAULT (Cont'd)

L1

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

SECONDARY FAILURES

*FUEL

Continued on the following page

ELEC AC BUS 2+4 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310 KT
- If flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- If flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
  AVOID NEG G LOAD
  FUEL PARTLY UNUSABLE

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 310 KT
- If flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- If flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
  AVOID NEG G LOAD

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
AP 1+2
A/THR
FD 1+2
ADR 2+3
TCAS 1+2

APPR & LDG

BTV
ROW/ROP
ALTN BRK
ENG 2+3 REVERSERS
RA SYS A+B+C
AUTO CALLOUT

Continued on the following page

ELEC AC BUS 2+4 FAULT (Cont'd)

SATCOM	CAT 2
FUEL NORM+altn xfr	GLS AUTOLAND
JETTISON	GPWS 1+2
FEED TK 1 PMPs	PRED W/s 1+2
FEED TK 4 PMPs	REACTIVE W/s det
MOST FUEL XFR PMPs	ARPT NAV

INFO

ALTN LAW : PROT LOST
USE TRIM TK XFR FOR CG IF NECESSARY
FEED TK 1 BY GRVTY ONLY
FEED TK 4 BY GRVTY ONLY
OUTR TKs XFR BY GRVTY ONLY
FEED TK 1 : 2900 lbs MAX NOT USABLE
FEED TK 4 : 2900 lbs MAX NOT USABLE
TRIM TK NOT USABLE
INR TKs NOT USABLE
MID TKs NOT USABLE
EXPECT NORM COLLECTOR CELL DEPLETION

MORE INFO

REDUND LOSS

ENG 2 iGN B
ENG 4 IGN B
PACK 1 CTL 1
PACK 2 CTL 2

ELEC AC BUS 3 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 3 busbar is lost.

Indications:

Audio



Master Light

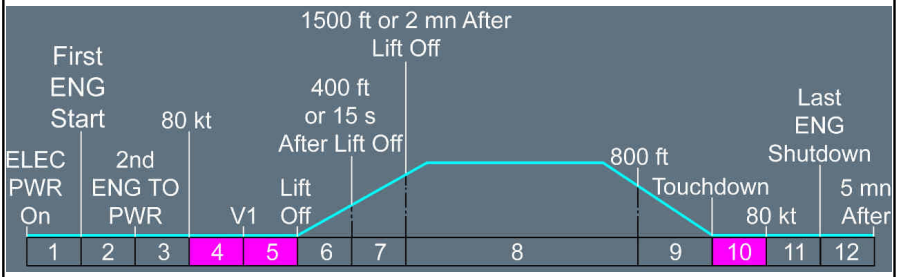


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 1(2)(3)(4) FAULT*.

Continued on the following page

ELEC AC BUS 3 FAULT (Cont'd)

- **On ground:**
  - **BEFORE OPENING ANY CABIN DOOR:**

RESIDUAL DIFF PRESS.....CHECK

L2 *The cabin differential pressure is indicated on the CRUISE SD page, and on the CAB PRESS SD page.*
The differential pressure indication must be below 0.036 PSI.

L1 CABIN CREW.....ADVISE

L2 *Advise the cabin crew, when the cabin differential pressure equals 0 PSI.*

Continued on the following page

ELEC AC BUS 3 FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
GPS 2	CAT 2
HF 2	GLS AUTOLAND
FEED TK 3 MAIN PMP	LS 2
MID TKs FWD PMPs	
R WINDSHIELD HEATG	
DOOR RES PRESS DET	

INFO

- If the MID TKs are not empty:
  FUEL ALTN XFR IN USE
  Fuel transfers from the mid tanks via the aft gallery.

MORE INFO

REDUND LOSS

ALTN N/W STEER
FEED TK 2 STBY PMP
ENG 1 IGN B
ENG 3 IGN B
1 PRIMARY CAB FAN

ELEC AC BUS 3+4 & DC BUS 2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 3, AC 4, and DC 2 busbars are lost.

Indications:

Audio



Master Light

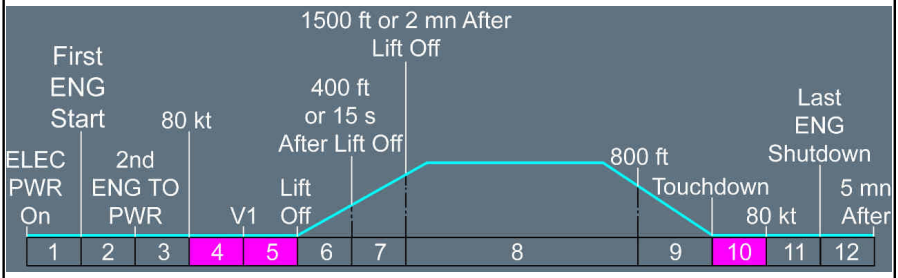


SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 3+4 & DC BUS 2 FAULT* .

Continued on the following page

ELEC AC BUS 3+4 & DC BUS 2 FAULT (Cont'd)

● **In flight:**

VENT AVNCS EXTRACT.....OVRD

L2 *The extraction fan is not electrically supplied: Air that ventilates the main and upper avionics bays is extracted by differential pressure via the overboard valve.*

L1 ATT HDG SWTG.....F/O ON 3
AIR DATA SWTG.....F/O ON 3
F/O BARO REF : STD ONLY
USE VHF 1 OR 3
WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1
DU RECONF PB AVAIL

L2 *The SD and F/O PFD display units are lost. Therefore, use the RECONF pb to display the applicable information on the remaining display units.*

L1 F/O KEYBOARD CURSOR CTL AVAIL
LDG DIST AFFECTED

L2 *Landing distance is affected due to:*
- *The loss of three pairs of ground spoilers*
- *The loss of one reverser for computation on wet runways.*

L1 ● **After landing, below 80 kt with at least one engine running:**

If the failure occurs in flight, the ECAM will automatically recall the alert after landing.

● **BEFORE OPENING ANY CABIN DOOR:**

RESIDUAL DIFF PRESS.....CHECK

L2 *The cabin differential pressure is indicated on the CRUISE SD page, and on the CAB PRESS SD page.*
The differential pressure indication must be below 0.036 PSI .

L1 CABIN CREW.....ADVISE

L2 *Advise the cabin crew, when the cabin differential pressure equals 0 PSI .*

L1

ASSOCIATED PROCEDURES

FUEL NORM+ALTN XFR FAULT

Refer to PRO-ABN-ECAM-10-28-320 FUEL NORM + ALTN XFR FAULT

Continued on the following page

ELEC AC BUS 3+4 & DC BUS 2 FAULT (Cont'd)

F/ CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

SECONDARY FAILURES

*F/CTL

Continued on the following page

ELEC AC BUS 3+4 & DC BUS 2 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR AND LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
PART SPLRs

The spoilers 1, 3, 4, 6, and 8 operate.

PRIM 2
SEC 2
ADR 2
IR 2
GPS 2
VHF 2
HF 2
FEED TK 1 MAIN PMP
FEED TK 3 MAIN PMP
PART FUEL XFR PMPs
G ELEC PMP A+B (Only on ground, with no engine running)
R WINDSHIELD HEATG
VENT AVNCS EXTRACT
DOOR RES PRESS DET

The cabin differential pressure is indicated on the CRUISE SD page, and on the CAB PRESS SD page.

APPR AND LDG

BTV
ROW/ROP
ALTN BRK
ENG 3 REVERSER
CAT 2
GLS AUTOLAND
LS 2
ARPT NAV

Continued on the following page

ELEC AC BUS 3+4 & DC BUS 2 FAULT (Cont'd)

Before opening any cabin door, the cabin differential pressure indication must be 0 PSI.
Advise the cabin crew, when the cabin differential pressure equals 0 PSI.

F/O EFIS CTL

Inop Sys (Not displayed on ecam)

ALL PHASES

INR TKs FWD PMPs
MID TKs FWD PMPs

INFO

ALTN LAW : PROT LOST
F/O BARO REF : STD ONLY
F/O KEYBOARD CURSOR CTL AVAIL
CABIN TEMP REGUL DEGRADED

Cabin air recirculation is degraded because the secondary fans are lost.

MORE INFO

REDUND LOSS

FCDC 2
SLAT CTL 2
FLAP CTL 2
BRK CTL 2
STEER CTL 2
L/G CTL 2
ALTN N/W STEER
FMC-B
RA SYS B
FEED TK 2 STBY PMP
FEED TK 4 STBY PMP
FQMS 2
ENG 1 IGN B

Continued on the following page

ELEC AC BUS 3+4 & DC BUS 2 FAULT (Cont'd)

ENG 3 IGN B
PACK 2 CTL 2
TEMP CTL 2
FWS 2
ENGs + APU FIRE LOOP B
MLG BAY FIRE LOOP B
AFT VENT CTL REDUND

ELEC AC BUS 4 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 4 busbar is lost.

Indications:

Audio



Master Light

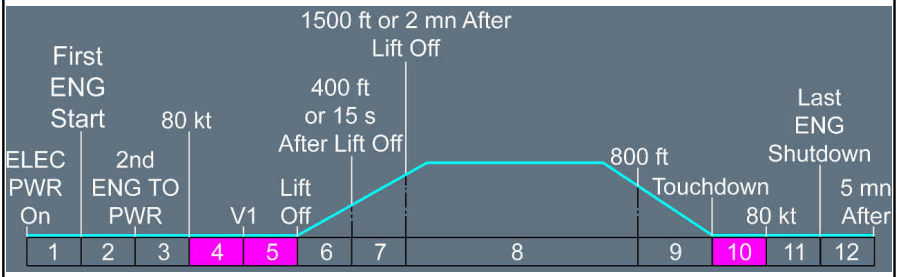


SD page



ELEC AC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC AC BUS 4 FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC BUS 1(2)(3)(4) FAULT*.

- **On ground:**

FOR ENG STOP : KEEP ENG 1 LAST

L2 *Engine 1 must be the last engine to be shut down, to ensure that the HP fuel valves continue to be electrically supplied.*

L3 *The HP fuel valves are supplied via the AC ESS busbar, that can be powered by the AC 1 busbar only, when the AC 1 busbar is lost.*

L1 ● **In flight:**

VENT AVNCS EXTRACT.....OVRD

L2 *The extraction fan is not electrically supplied: Air that ventilates the main and upper avionics bays is extracted by differential pressure via the overboard valve.*

L1 AIR DATA SWTG.....F/O ON 3
WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1
LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *One reverser is inoperative. Landing distance computation on dry runways does not take into account the impact of the reversers.*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb:**

EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h, so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

Continued on the following page

ELEC AC BUS 4 FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

ADR 2
WXR 2
XPDR 2
TCAS 2
FEED TK 1 MAIN PMP
INR TKs FWD PMPs
R FIXED WINDOW HEATG
R SLIDG WINDOW HEATG
VENT AVNCS EXTRACT
SECONDARY CAB FANS
BULK CRG vent
BULK CRG HEATER
AFT CREW REST VENT

APPR AND LDG

BTV
Row/rop
ALTN BRK
ENG 3 REVERSER
CAT 3 DUAL
TAWS 2
ARPT NAV

INFO

- If the INR TKs are not empty:
  FUEL ALTN XFR IN USE
  Fuel transfers from the inner tanks via the aft gallery.
  CABIN TEMP REGUL DEGRADED

Cabin air recirculation is degraded because the secondary fans are lost.

CAT 3 SINGLE ONLY

MORE INFO

REDUND LOSS

RA SYS B
FEED TK 4 STBY PMP
PACK 2 CTL 2
TEMP CTL 2

Continued on the following page

ELEC AC BUS 4 FAULT (Cont'd)

1 PRIMARY CAB FAN

ELEC AC ESS BUS ALTN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The emergency network is supplied via the AC 4 busbar.

Indications:

Audio



Master Light

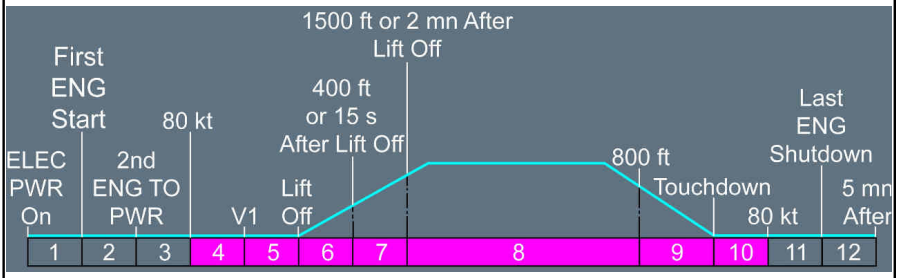


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC ESS BUS ALTN* .

Crew awareness.

ELEC AC ESS BUS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC ESS busbar is lost.

Indications:

Audio



Master Light

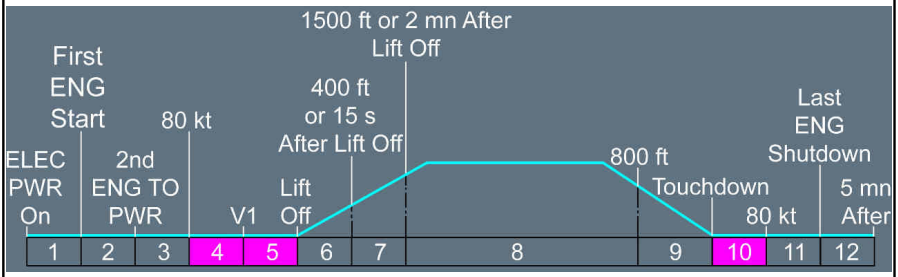


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC AC ESS BUS FAULT* .

Continued on the following page

ELEC AC ESS BUS FAULT (Cont'd)

AC ESS FEED..... ALTN

L2 *Confirms that the AC 4 busbar supplies manually the AC ESS busbar in the case of the automatic bus reconfiguration failed.*

L1 ● **IF NOT SUCCESSFUL :**

AIR DATA SWTG.....CAPT ON 3
WXR & TAWS..... SYS 2
XPDR & TCAS..... SYS 2

SLATS SLOW

L2 *The time necessary for slats retraction is increased: During transition phases, use the PFD speed scale to check that the aircraft speed does not exceed the VFE .*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb :**

EMER OUTR TK XFR..... ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC.....CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

L1 ● **After landing:**

BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Because the AC ESS BUS supplies the ADR 1, in the case of AC ESS BUS FAULT , the ADR 1 is inoperative.*
Following an ADR 1 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.

L3 *For more information on the relation between ADR 1 and the APU GEN B, Refer to DSC-24-10-20-10 APU Generators .*

Continued on the following page

ELEC AC ESS BUS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR AND LDG

SLATS SLOW

STATUS

INOP SYS

ALL PHASES

ADR 1
GPS 1
WXR 1
XPDR 1
TCAS 1
HF 1
FEED TK 2 MAIN PMP
STBY PITOT HEATG
L WINDSHIELD HEATG
DFDR

APPR & LDG

SLAT SYS 1
CAT 2
GLS AUTOLAND
LS 1
TAWS 1

MORE INFO

REDUND LOSS

RA SYS C
FEED TK 3 STBY PMP
TRIM TK L PMP
ENG 1+2+3+4 IGN A
PACK 1 CTL 1
PACK 2 CTL 1

ELEC APU BAT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The APU battery is failed.

L3 The APU battery fails, in the case of:

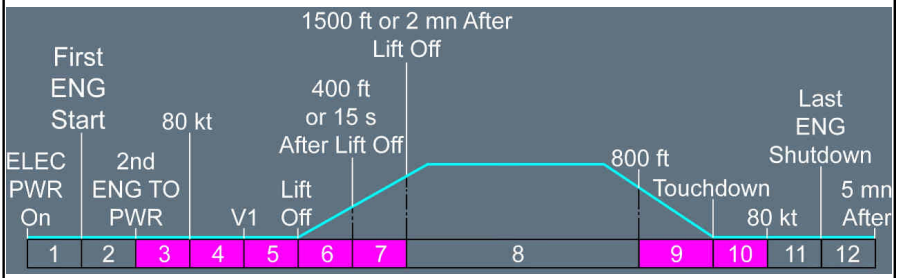
- An overcurrent
- An abnormally low current intensity (lower than –7 A)
- An abnormally low battery voltage:
- Lower than, or equal to, 25 V and current intensity is greater than 0 A, or
- Lower than 20 V.
- A short-circuit
- A failure of the battery contactor
- An overheat.

Indications:

L2

Audio	Master Light	Local light	SD page
			
		APU BAT pb-sw	ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC BAT 1(2) FAULT* .

Continued on the following page

ELEC APU BAT FAULT (Cont'd)

APU BAT..... OFF

L12

STATUS

INOP SYS

ALL PHASES

APU BAT

INFO

- If APU TR is failed:
  APU BAT START NOT AVAIL
  APU start is available, when the APU DC busbar is electrically supplied.

ELEC APU GEN A(B) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The APU GEN A(B) is failed.

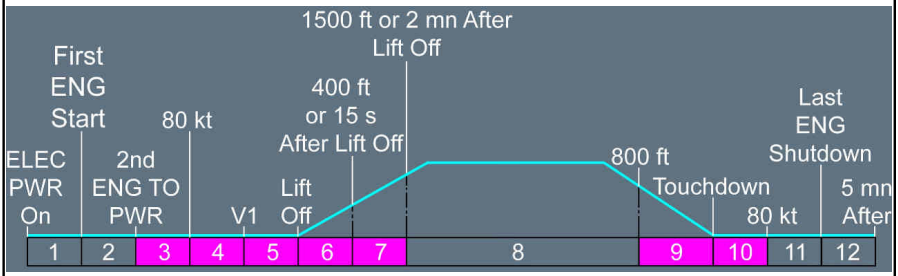
L3 The APU generator fails, in the case of:
- An overload (if load shedding is not sufficient)
- Abnormally low intensity of the current (lower than 2 A)
- Abnormally low APU generator voltage (lower than 103 V)
- Abnormally high APU generator voltage (higher than 128.5 V)
- A short-circuit
- A failure of the APU generator contactor
- An overheat.

Indications:

L2

Audio	Master Light	Local light	SD page
			
		APU GEN A(B) pb-sw	ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC APU GEN A(B) FAULT* .

Continued on the following page

ELEC APU GEN A(B) FAULT (Cont'd)

Impacted DU: 00008618 ELEC APU GEN A(B) FAULT - Alert

APU GEN A(B).....OFF

L2 In flight, in order to prevent any further damage to the failed APU generator, restrict use of the APU to abnormal operations.

Impacted by TDU: 00024028 ELEC APU GEN A(B) FAULT - Alert

APU GEN A(B).....OFF THEN ON

- **IF NOT SUCCESSFUL :**
  APU GEN A(B).....OFF

L2 In flight, in order to prevent any further damage to the failed APU generator, restrict use of the APU to abnormal operations.

STATUS

INOP SYS

ALL PHASES
APU GEN A(B)

ELEC APU TR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The APU TR is failed.

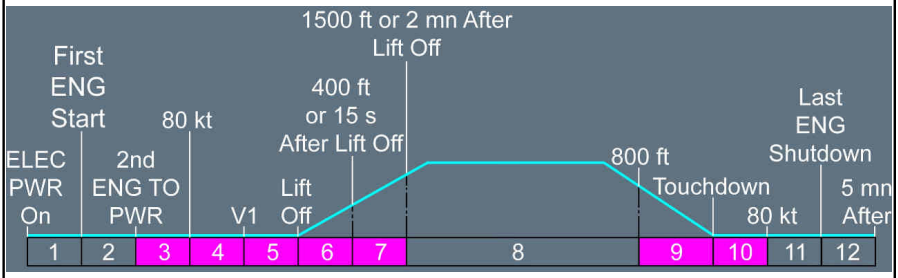
Indications:

SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC APU TR FAULT* .

- **If the APU is off, and the APU battery is on:**
  - **WHEN APU NOT RQRD :**

    APU BAT..... OFF

L2 *To prevent the APU battery from discharging, set the APU BAT pb-sw to OFF, when the APU is not required. Set the APU battery to on, when the APU start is required.*

Continued on the following page

ELEC APU TR FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

APU TR

INFO

- If APU BAT is failed:
  APU START NOT AVAIL
  APU start is available, when the APU DC busbar is electrically supplied.

ELEC BAT 1 (2)(ESS) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 BAT 1, BAT 2, or BAT ESS is failed.

L3 The battery fails, in the case of:
- An overcurrent
- An abnormally low intensity of the current (lower than –7 A)
- An abnormally low battery voltage:
- Lower than, or equal to, 25 V and current intensity is greater than 0 A, or
- Lower than 20 V.
- An abnormally high battery voltage
- A short-circuit
- A failure of the battery contactor
- An overheat.

Indications:

L2

Audio



Master Light



Local light



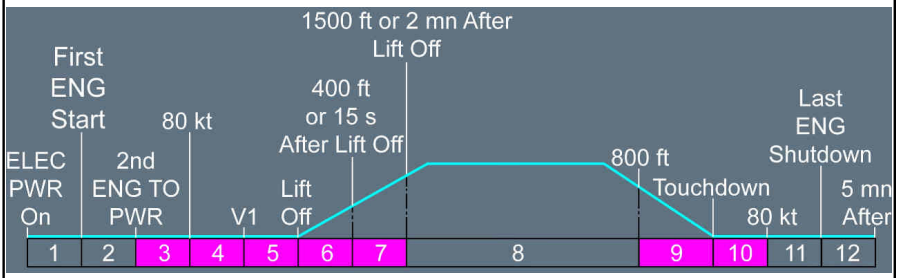
BAT 1(2)(ESS) pb-sw

SD page



ELEC DC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC BAT 1 (2)(ESS) FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC BAT 1(2) FAULT* .

BAT 1 (2)(ESS)..... OFF

STATUS

INOP SYS

ALL PHASES

BAT 1 (2)(ESS)
BAT 1+2 (If BAT 1 and BAT 2 Fault)

ELEC BAT 1 (2)(ESS)(APU) OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 BAT 1, BAT 2, BAT ESS, or APU BAT is abnormally OFF.

Indications:

Audio



Master Light



Local light



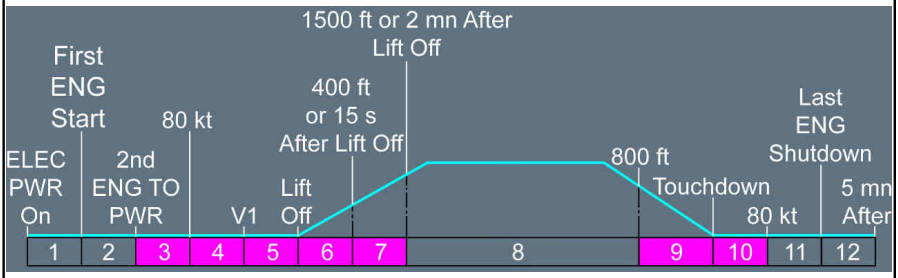
BAT 1(2)(ESS)(APU) pb-sw

SD page



ELEC DC SD Page

Flight Phase Inhibition:



BAT 1(2)(ESS)(APU).....ON

ELEC BUS TIE OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The BUS TIE pb-sw is abnormally set to OFF.

Indications:

Audio



Master Light

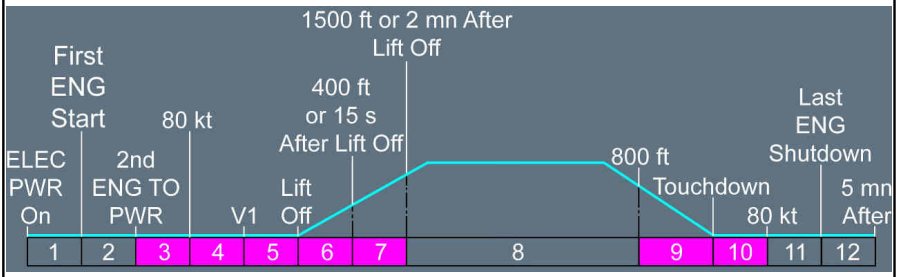


Local light



BUS TIE pb-sw

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC BUS TIE OFF* .

Crew awareness.

ELEC C/B MONITORING FAULT

Applicable to: ALL

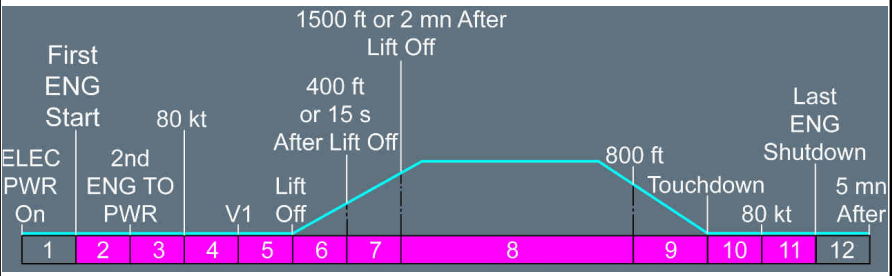
ANNUNCIATIONS

Triggering Conditions:

L2 The C/B monitoring function is failed (*Refer to DSC-24-10-60 Circuit Breaker Monitoring*).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC C/B MONITORING FAULT* .

Crew awareness.

L2 There is no C/B monitoring on the normal network.

STATUS

INOP SYS

ALL PHASES

C/B MONITORING

ELEC C/B TRIPPED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One (or more) C/B(s) has (have) tripped.

Indications:

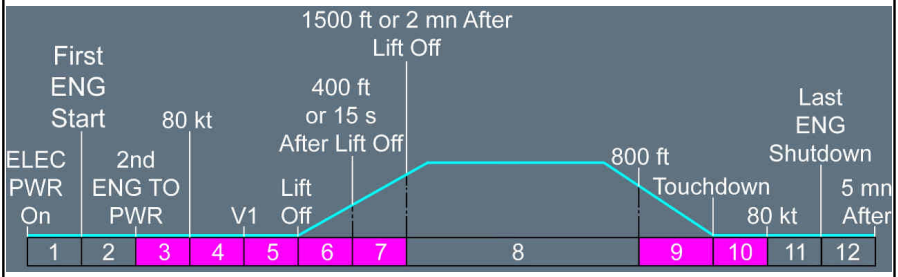
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC C/B TRIPPED* .

Crew awareness.

L2 The C/B system display enables the flight crew to identify the tripped C/B on the normal and emergency network.

ELEC CABIN L(R) SUPPLY CENTER OVHT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The overheat detectors have detected an overheat in one cabin supply center.

Indications:

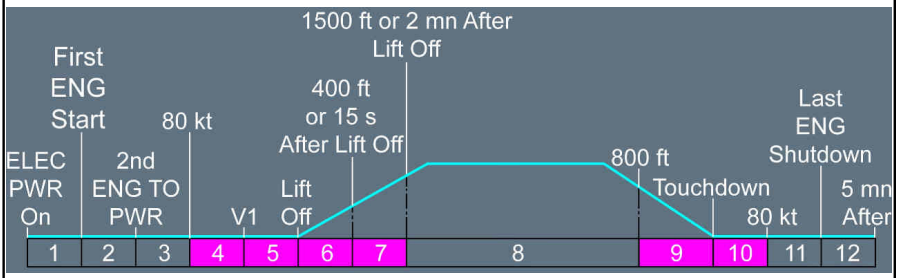
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-24 ELEC CABIN L(R) SUPPLY CTR OVHT .*

- **When the left cabin supply center overheats:**
  COMMERCIAL 1.....OFF
- **When the right cabin supply center overheats:**
  COMMERCIAL 2.....OFF

ELEC CABIN L(R) SUPPLY CENTER OVHT DET FAULT

Applicable to: ALL

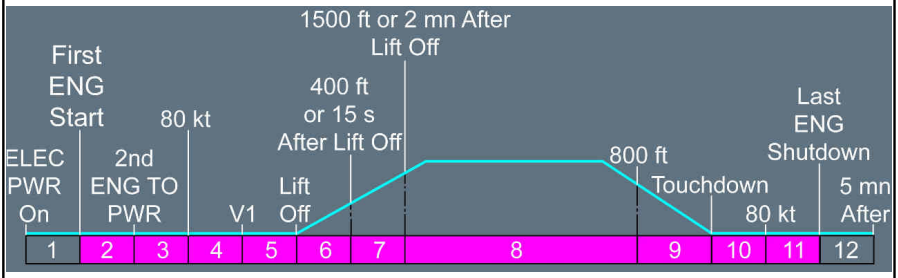
ANNUNCIATIONS

Triggering Conditions:

L2 The overheat detectors of at least one cabin supply center is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-24 ELEC CABIN L SUPPLY CTR OVHT DET FAULT*
- *Refer to MEL/ME-ECAM-24 ELEC CABIN R SUPPLY CTR OVHT DET FAULT* .

Crew awareness.

ELEC DC BUS 1 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The DC 1 busbar is lost.

Indications:

Audio



Master Light

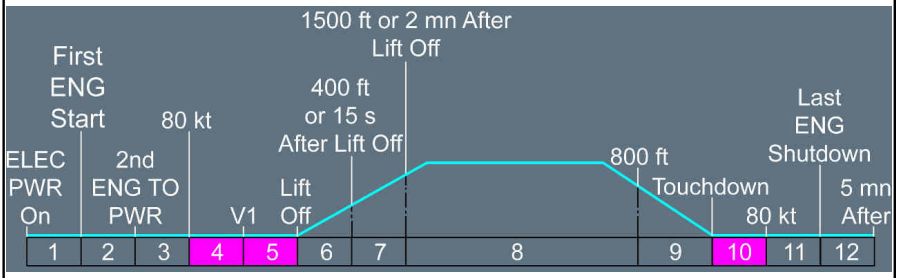


SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DC BUS 1(2) FAULT* .

Continued on the following page

ELEC DC BUS 1 FAULT (Cont'd)

● **During taxi-in, one minute after the FLAPS lever is set to 0:**

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5 ° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers.*
When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.

L1 ATC COM VOICE ONLY

L2 *The ATC function is failed. Therefore, use the communication voice mode via the RMP s.*

L1 AP: SIDESTICK LOCKING DEVICE NOT AVAIL
LDG DIST AFFECTED

L2 *Landing distance is affected due to:*
- *The loss of three pairs of ground spoilers*
- *The loss of one reverser for computation on wet runways.*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb :**
EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

L1 ● **After landing:**

BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Because the DC BUS 1 supplies the ADR 3, in the case of DC BUS 1 FAULT , the ADR 3 is inoperative.*
Following an ADR 3 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units

Continued on the following page

ELEC DC BUS 1 FAULT (Cont'd)

before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.

L3 *For more information on the relation between ADR 3 and the APU GEN B, Refer to DSC-24-10-20-10 APU Generators .*

L1

SECONDARY FAILURES

*F/CTL

Continued on the following page

ELEC DC BUS 1 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	APPR & LDG
ATC COM VOICE ONLY	LDG DIST AFFECTED

L12

STATUS

INOP SYS

ALL PHASES

PART SPLRs
The spoilers 2, 3, 5, 6, and 7 operate.
PRIM 3
SEC 3
ADR 3
RMP 3
VHF 3
DATALINK
MOST FUEL XFR PMPs
Y ELEC PMP A+B (Only on ground, with no engine running)
VIDEO

APPR & LDG

AUTO BRK
ROW/ROP
ALTN BRK
ENG 2 REVERSER
CAT 2
GLS AUTOLAND
ARPT NAV

Inop Sys (Not displayed on ecam)

ALL PHASES

INR TKs AFT PMPs
MID TKs AFT PMPs
L+R OUTR TK PMP
TRIM TK R PMP

INFO

LDG DIST COEF < 1.45 ON DRY RUNWAY
AP : SIDESTICK LOCKING DEVICE NOT AVAIL
OUTR TKs XFR BY GRVTY ONLY

Continued on the following page

ELEC DC BUS 1 FAULT (Cont'd)

MORE INFO

REDUND LOSS

RUDDER TRIM 2
BRK CTL 1
STEER CTL 1
L/G CTL 1
ALT N/W STEER
FMC-C
FQDC 2
PACK 1 CTL REDUND
TEMP CTL REDUND
FWD VENT CTL REDUND

ELEC DC BUS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both DC 1 and DC 2 busbars are lost.

Indications:

Audio



Master Light

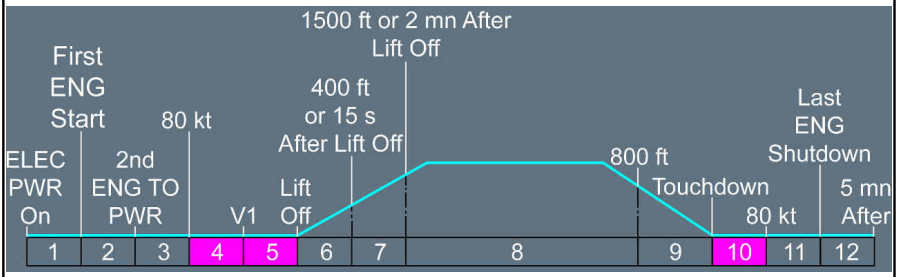


SD page



ELEC DC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DC BUS 1+2 FAULT* .

When DC 1+2 busbars are lost:

- Autothrust and autopilot are lost
- The flight controls are in direct law: Protections are lost
- The following DU s remain available: CAPT PFD, CAPT ND, CAPT MFD, and the EWD.
  In order to display the SD ECAM pages on the MFD, the First Officer can press the MAILBOX pb on CAPT KCCU. The RECONF pb on the CAPT side remains available.
- When possible, icing conditions must be avoided
- Only VHF 1 is operative, and the ATC can only be used in voice mode
- Fuel inner and mid and trim tanks are not usable
- Manual pitch trim must be used.
- **In approach**
  - CAT 2 and CAT 3 approaches cannot be performed
    CAT 1 approach can be performed.
  - Landing gear extension is available by gravity only.
- **During landing**
  - The reversers are no longer operative
  - Only two spoilers per wing remain operative
  - Anti-skid is not available
  - Only the emergency braking system remains available: Brake pressure is auto-limited to 1 000 PSI
  - The nosewheel steering is no longer available
    For landing, use rudder and differential braking to steer the aircraft on the runway because the nose landing gear can steer freely
    After landing, the aircraft has to be towed out of the runway.
- **In case of go around**
  - Landing gear cannot be retracted.

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers. When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.*

L1 WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1
USE VHF 1
ATC COM VOICE ONLY

L2 *The ATC function is failed. Therefore, use the communication voice mode via the RMP s.*

L1 AVOID ICING COND s

L2 *Wing anti-ice is not available, and F/O windshield heating is lost.*
Captain windshield heating remains operative.

L1 FOR SD : SELECT " MAILBOX" ON CAPT KCCU
OIS ON BAT
INR TK s NOT USABLE
MID TK s NOT USABLE
TRIM TK NOT USABLE
USE TRIM TK XFR FOR CG IF NECESSARY

L2 *The fuel in the trim tank transfers into the inner tanks, and remains unusable.*
If the flight crew transfers fuel from the trim tank to the inner tanks, the CG of the aircraft moves forward by around 0.5 % per 2 200 lb of transferred fuel (heavy aircraft) or 0.9 % per 2 200 lb of transferred fuel (light aircraft).

L1 ■ **If L/G is retracted:**
L/G GRVTY EXTN ONLY

■ **If L/G is down and locked:**
NO L/G RETRACTION

LDG DIST AFFECTED

L2 *Landing distance is affected due to:*
- *The loss of 6 pairs of ground spoilers and 2 ailerons (used as ground spoilers)*
- *The loss of the reversers for computation, on wet runways.*

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb :**
EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

L13

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)
Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)
The flight control law is direct.

L1

SECONDARY FAILURES

*F/CTL

*FUEL

*WHEEL

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310/.86
MANEUVER WITH CARE

- If L/G is down and locked when the failure appears:
  NO L/G RETRACTION
  ATC COM VOICE ONLY
  AVOID ICING CONDs
  TRIM TK NOT USABLE
  MID TKs NOT USABLE
  INR TKs NOT USABLE

APPR & LDG

- For gravity extension :
  MAX SPEED : 220 KT
- If severe ice accretion :
  FOR LDG : FLAP LVR 3
  L/G GRVTY EXTN ONLY
  LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES

MAX SPD : 310/.86
MANEUVER WITH CARE
AVOID ICING CONDs

- For gravity extension :
  MAX SPEED : 220 KT

L12

DEFERRED PROC

FOR APPROACH

● **IF SEVERE ICE ACCRETION :**
FOR LDG : FLAP LVR 3

LDG DIST COMPUTATION.....CONFIRM

FOR LANDING

FOR L/G GRVTY EXTN : MAX SPEED 220 KT

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

- **FOR L/G EXTN :**

  L/G LEVER.....UP

  L/G GRVTY (EXTN MAX 2 MIN).....DOWN

  Landing gear gravity extension takes approximately 70 s.

  - **WHEN L/G LOCKED DOWN OR AFTER 120S :**

    L/G LEVER.....DOWN

    The UNLK red lights are not electrically supplied. The green triangles illuminate, when the landing gear is currently locked down.

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
PRIM 2+3
SEC 2+3
MOST SPLRs

The spoilers 3, and 6 operate.

AP 1+2
A/THR
FD 1+2
TCAS 2
FUEL NORM + ALTN XFR
JETTISON
MOST FUEL XFR PMPs
WING A-ICE

APPR & LDG

L/G CTL 1+2
A-SKID
AUTO BRK
ROW/rop
N/W + B/W STEER
ENG 2+3 REVERSERS
CAT 2
GLS AUTOLAND
GPWS 1+2
ARPT NAV

Inop Sys (Not displayed on ecam)

ALL PHASES

FMC B+C
RMP 3
VHF 2+3
DATALINK
C/B MONITOR
ELEC LOAD MANAGT
CG MANAGEMENT
INR TKs PMPs

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

MID TKs PMPs
L+R OUTR TK PMPs
L+R OUTR AILERONS
R INNER ELEVATOR
ADR 2
CKPT DOOR LOCK
G+Y HSMU
R WINDSHIELD HEATG
R SLIDG WINDOW HEATG
R FIXED WINDOW HEATG
F/O CCD + KBD
F/O EFIS CTL
RUDDER TRIM 2
FCDC 2
FLAP SYS 2
SLAT SYS 2

INFO

DIRECT LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Because of the loss of the two outer ailerons, fuel consumption is increased and FMS predictions are not correct. As a consequence, the fuel consumption is increased by approximately 7 %.

To optimize fuel consumption:
- *Set Cost Index (CI) to zero and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL-4 000 ft.*

USE TRIM TK XFR FOR CG IF NECESSARY
BRK WITH ACCU ONLY ON ALL L/G
BRK PRESS AUTO LMTD ON ALL L/G
DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the runway conditions are standard (dry runway) and that the aircraft's weight rests on the wheels: Before the NLG touches down, the wings generate significant lift, so the wheels carry only a portion of the aircraft's total weight. Therefore, the flight crew should delay braking until the wheels carry the aircraft's weight, in order to prevent the wheels from blocking and the tires from bursting.
In the case of wet runway or more than wet, tire will burst.

Continued on the following page

ELEC DC BUS 1+2 FAULT (Cont'd)

FLS LIMITED TO F-APP + RAW

MORE INFO

REDUND LOSS

FQMS 2
FQDC 2
PACK 1 CTL REDUND
PACK 2 CTL REDUND
TEMP CTL REDUND
ENGs + APU FIRE LOOP B
MLG BAY FIRE LOOP B
FWD VENT CTL REDUND
AFT VENT CTL REDUND

ELEC DC BUS 1+ESS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

The DC 1 and the DC ESS busbars are lost.

Indications:

Audio



Master Light

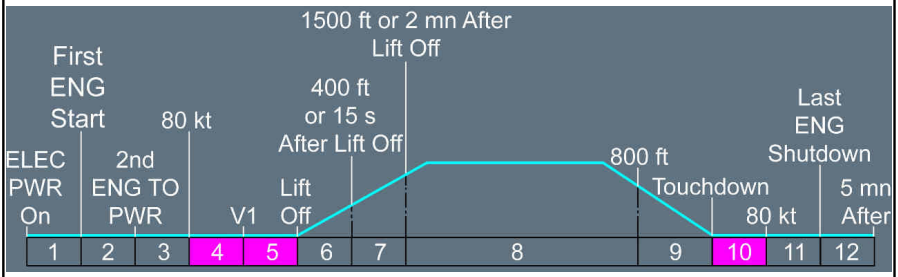


SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 If both pumps in a feed tank are failed, the fuel in that feed tank can only be fed by gravity.

However, fuel gravity feeding is only possible when the aircraft is below FL 280 (FL 50 / MEA if the flight time above FL 300 is less than 30 min), therefore, as required by ECAM, the flight crew must perform the following actions in order to keep engine 2 running:

1. Open the crossfeed valves 1 and 2, to feed engine 2. Feed tank 2 remains full. Feed tank 1 is emptied.
2. Descend to the gravity feed ceiling. Close the crossfeed valves. Engine 2 is fed by gravity.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DC BUS 1+ESS FAULT* .

Continued on the following page

ELEC DC BUS 1+ESS FAULT (Cont'd)

LAND ANSA

CROSSFEED 1.....ON
CROSSFEED 2.....ON
WXR & TAWS.....SYS 2
XPDR & TCAS.....SYS 2
NO COM AVAILABLE
F/O HEADSETS.....ON (FOR AUDIO ALERTS)
SQUAWK AVAIL ON MFD SURV PAGE ONLY
DU RECONF P/B AVAIL
ECP KEYS NOT AVAIL :
SYSTEMS, MORE, TO CONFIG, RCL LAST
FOR SYS PAGES : "ALL" AVAIL
INR TK s NOT USABLE
MID TK s NOT USABLE
OUTR TK s NOT USABLE
TRIM TK NOT USABLE
FEED TK 2: 4400 LBS MAX NOT USABLE

L2 *Both feed tank 2 pumps are failed, therefore, the fuel in feed tank 2 is available for gravity feeding only. However, up to 4 400 lb of fuel may remain trapped in the feed tank. .*

L1 ■ **If flight time above FL 300 since departure is less than 30 min :**
DESCENT TO FL 50/MEA.....INITIATE
MAX FL : 50/MEA

L2 *If the aircraft has been flying less than 30 min , fuel gravity feeding is ensured below FL 50 . However, if the MEA is above FL 50 , do not fly below the MEA .*

L1 ● **WHEN BELOW FL 50/MEA:**
CROSSFEED 1.....OFF
CROSSFEED 2.....OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

■ **If flight time above FL 300 since departure is greater than 30 min :**
DESCENT TO FL 280.....INITIATE

Continued on the following page

ELEC DC BUS 1+ESS FAULT (Cont'd)

MAX FL : 280

L2 *If the aircraft has been flying more than 30 min above FL 300 , fuel gravity feeding is ensured below FL 280 .*

L1 ● **WHEN BELOW FL 280:**
CROSSFEED 1..... OFF
CROSSFEED 2..... OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

FOB COMPUTED FROM FU
SLATS SLOW

L2 *The time necessary for slats retraction is increased: During transition phases, use the PFD speed scale to check that the aircraft speed does not exceed the VFE .*

L1 LDG DIST AFFECTED

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

SECONDARY FAILURES

*FUEL

Continued on the following page

ELEC DC BUS 1+ESS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA
MAX SPEED : 310/.86
- If flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- If flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
  AVOID NEG G LOAD
  MANEUVRE WITH CARE
  NO COM AVAILABLE
  FUEL PARTLY UNUSABLE

APPR AND LDG

SLATS SLOW
LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES

LAND ANSA
MAX SPEED : 310/.86
- If flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- If flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
  AVOID NEG G LOAD
  MANEUVER WITH CARE

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

Continued on the following page

ELEC DC BUS 1+ESS FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
PRIM 1+3
SEC 1+3
RUDDER TRIM
MOST SPLRs

The spoilers 2, 5 and 7 operate.

AP 1+2
A/THR
FD 1+2
ADR 1+3
RMP 1+2+3
VHF 1+2+3
HF 1+2
SATCOM
DATALINK
FUEL NORM+ALTN XFR
FQMS 1+2
FQDC 1+2
JETTISON
FEED TK 2 PMPs
MOST FUEL XFR PMPs
FUEL LEAK DET
CG MANAGEMENT
AUTO REFUEL (Before the second engine start)
FUEL AUTO GND XFR (Before the second engine start)
L+R+CTR XBLEED CTL

APPR & LDG

SLAT SYS 1
AUTO BRK
ROW/ROP
ALTN BRK
EMER BRK
ENG 2 REVERSER
CAT 2
GLS AUTOLAND
ARPT NAV

INFO

DIRECT LAW : PROT LOST
FOB COMPUTED FROM FU

- In flight
  FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Continued on the following page

ELEC DC BUS 1+ESS FAULT (Cont'd)

Because of the loss of the two mid ailerons, and one elevator at zero-hinge moment, fuel consumption is increased and FMS predictions are not correct. As a consequence, the fuel consumption is increased by approximately 9 %.
To optimize fuel consumption, set Cost Index (CI) to zero and use managed speed.

FEED TK 2 BY GRVTY ONLY
FEED TK 2 : 4400 LBS MAX NOT USABLE
INR TKs NOT USABLE
MID TKs NOT USABLE
OUTR TKs NOT USABLE
EXPECT NORM COLLECTOR CELL DEPLETION

ELEC DC BUS 2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The DC 2 busbar is lost.

Indications:

Audio



Master Light

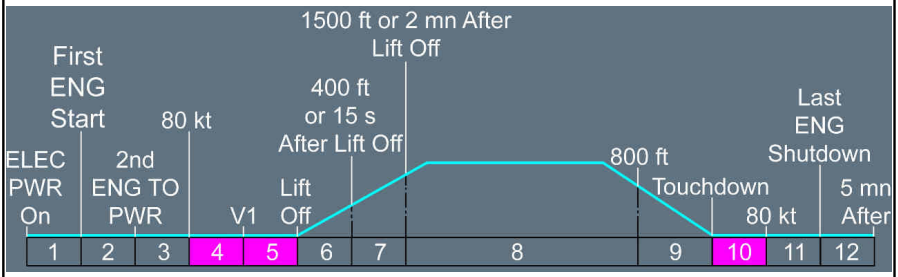


SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DC BUS 1(2) FAULT* .

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

● **During taxi-in, one minute after the FLAPS lever is set to 0:**

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5 ° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers.*
When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.

L1 AIR DATA SWTG .....F/O ON 3
F/O BARO REF : STD ONLY
USE VHF 1 OR 3
DU RECONF P/B AVAIL

L2 *The SD and F/O PFD display units are lost. Therefore, use the RECONF pb to display the applicable information on the remaining display units.*

L1 F/O KEYBOARD CURSOR CTL AVAIL
LDG DIST AFFECTED

L2 *Landing distance is affected due to:*
- *The loss of three pairs of ground spoilers*
- *The loss of one reverser for computation on wet runways.*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb:**

EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h, so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

L1

SECONDARY FAILURES

*F/CTL

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR AND LDG
LDG DIST AFFECTED

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
PART SPLRs *The spoilers 1, 3, 4, 6, and 8 operate.* PRIM 2 SEC 2 ADR 2 VHF 2 PART FUEL XFR PMPs G ELEC PMP A+B (Only on ground, with no engine running) F/O EFIS CTL	BTV ROW/ROP ALTN BRK ENG 3 REVERSER CAT 2 GLS AUTOLAND

Inop Sys (Not displayed on ecam)

ALL PHASES
INR TKs FWD PMPs MID TKs FWD PMPs R WINDSHIELD HEATG R SLDG WINDOW HEATG R FIXED WINDOW HEATG F/O CCD

INFO

LDG DIST COEF < 1.45 ON DRY RUNWAY
F/O BARO REF : STD ONLY

- If the INR TKs are not empty:

Continued on the following page

ELEC DC BUS 2 FAULT (Cont'd)

FUEL ALTN XFR IN USE

Fuel transfers from the inner tanks via the aft gallery.

F/O KEYBOARD CURSOR CTL AVAIL

On the ND, MFD, and SD, all functions remain fully available using the keyboard. Navigation through the different fields of the display unit is done via the direction arrow keys of the keyboard.

MORE INFO

REDUND LOSS

FCDC 2
SLAT CTL 2
FLAP CTL 2
BRK CTL 2
STEER CTL 2
L/G CTL 2
ALTN N/W STEER
FMC-B
FQMS 2
PACK 2 CTL REDUND
TEMP CTL REDUND
FWS 2
ENGs + APU FIRE LOOP B
MLG BAY FIRE LOOP B
AFT VENT CTL REDUND

ELEC DC ESS BUS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The DC ESS busbar is lost.

Indications:

Audio



Master Light

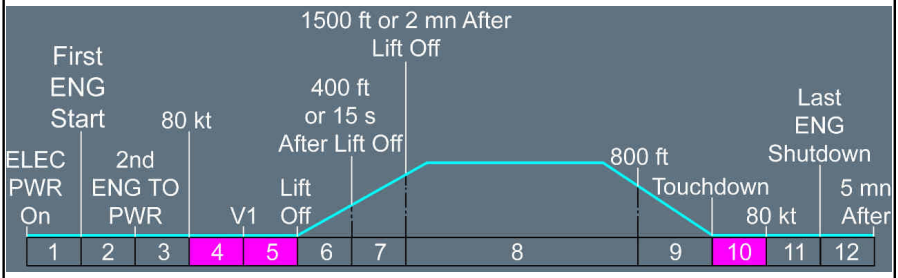


SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DC ESS BUS FAULT* .

Continued on the following page

ELEC DC ESS BUS FAULT (Cont'd)

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers. When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.*

L1 AIR DATA SWTG..... CAPT ON 3
CAPT BARO REF : STD ONLY
HEADSETS..... ON
USE RMP 3
USE VHF 2 OR 3

L2 *VHF 1 is lost.*

L1 WXR & TAWS.....SYS 2
SQUAWK AVAIL ON MFD SURV PAGE ONLY
DU RECONF P/B AVAIL
CAPT KEYBOARD CURSOR CTL AVAIL
ECP KEYS NOT AVAIL :
SYSTEMS, MORE, TO CONFIG, RCL LAST
FOR SYS PAGES : "ALL" AVAIL
SLATS SLOW

L2 *The time necessary for slats retraction is increased: During transition phases, use the PFD speed scale to check that the aircraft speed does not exceed the VFE .*

L1 LDG DIST AFFECTED

L2 *Landing distance is degraded due to the loss of two pairs of ground spoilers.*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb :**
EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

Continued on the following page

ELEC DC ESS BUS FAULT (Cont'd)

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

L1 ● **After landing:**

BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Because the DC ESS BUS supplies the ADR 1, in the case of DC ESS BUS FAULT , the ADR 1 is inoperative.*
Following an ADR 1 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.

L3 *For more information on the relation between ADR 1 and the APU GEN B, Refer to DSC-24-10-20-10 APU Generators .*

L1

SECONDARY FAILURES

*F/CTL

Continued on the following page

ELEC DC ESS BUS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR AND LDG
	SLATS SLOW LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
PART SPLRs *The spoilers 1, 2, 4, 5, 7, and 8 operate.* PRIM 1 SEC 1 ADR 1 WXR 1 RMP 1+2 VHF 1 HF 1 STBY RAD NAV CAB PRESS MAN CTL JETTISON FEED TK 2 MAIN PMP L+R+CTR XBLEED CTL L WINDSHIELD HEATG LOUDSPEAKERS CAPT EFIS CTL RECORDER SYS	SLAT SYS 1 BTV CAT 2 GLS AUTOLAND TAWS 1

Continued on the following page

ELEC DC ESS BUS FAULT (Cont'd)

INFO

LDG DIST COEF < 1.45 ON DRY RUNWAY
CAPT BARO REF : STD ONLY
FUEL ALTN XFR IN USE
CAPT KEYBOARD CURSOR CTL AVAIL

MORE INFO

REDUND LOSS

FCDC 1
RUDDER TRIM 1
FLAP CTL 1
L/G CTL 1
FMC-A
FEED TK 3 STBY PMP
TRIM TK L PMP
FQMS 1
FQDC 1
PACK 1 CTL REDUND
PACK 2 CTL REDUND
TEMP CTL REDUND
FWS 1
ENGs + APU FIRE LOOP A
MLG BAY FIRE LOOP a
FWD VENT CTL redund
AFT VENT CTL redund

ELEC DC ESS BUS PART FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The DC ESS bus is partially lost.

Indications:

Audio



Master Light

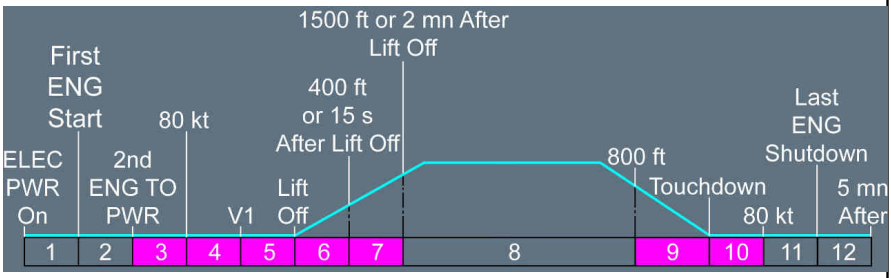


SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DC ESS BUS PART FAULT*.

Continued on the following page

ELEC DC ESS BUS PART FAULT (Cont'd)

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers. When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.*

L1 HEADSETS..... ON
WXR & TAWS.....SYS 2
DU RECONF P/B AVAIL
CAPT KEYBOARD CURSOR CTL AVAIL
ECP KEYS NOT AVAIL :
SYSTEMS, MORE, TO CONFIG, RCL LAST
FOR SYS PAGES : "ALL" AVAIL
SLATS SLOW

L2 *The time necessary for slats retraction is increased: During transition phases, use the PFD speed scale to check that the aircraft speed does not exceed the VFE .*

L1 LDG DIST AFFECTED

L2 *Landing distance is degraded due to the loss of two pairs of ground spoilers.*

L1 ● **If fuel quantity in feed tank 1 and 4 is below 42 000 lb :**
EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

L1 ● **After landing:**
BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Because the DC ESS BUS supplies the ADR 1, in the case of DC ESS BUS PART FAULT , the ADR 1 is inoperative.*

Continued on the following page

ELEC DC ESS BUS PART FAULT (Cont'd)

Following an ADR 1 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.

L3 *For more information on the relation between ADR 1 and the APU GEN B, Refer to DSC-24-10-20-10 APU Generators .*

L1

SECONDARY FAILURES

*F/CTL

Continued on the following page

ELEC DC ESS BUS PART FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR AND LDG

SLATS SLOW
LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

ALL PHASES

PART SPLRs
The spoilers 1, 2, 4, 5, 7, and 8 operate.
PRIM 1
SEC 1
ADR 1
WXR 1
FEED TK 2 MAIN PMP
AUTO REFUEL
FUEL AUTO GND XFR
LOUDSPEAKERS
CAPT EFIS CTL
RECORDER SYS

APPR & LDG

SLAT SYS 1
BTV
CAT 2
TAWS 1

INFO

LDG DIST COEF < 1.45 ON DRY RUNWAY
CAPT KEYBOARD CURSOR CTL AVAIL

ELEC DRIVE 1(2)(3)(4) DISC FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The disconnection function of the engine generator from its assigned engine failed.

Indications:

Audio



Master Light

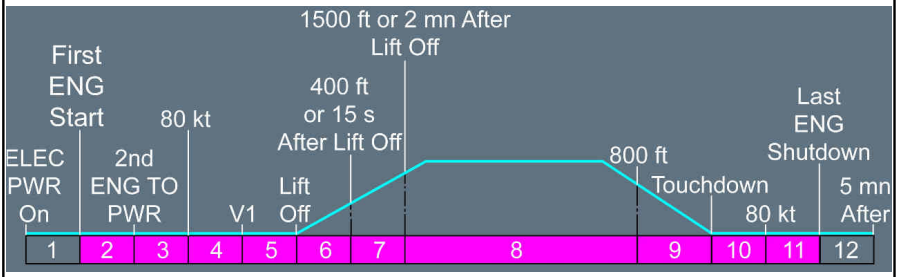


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DRIVE 1(2)(3)(4) DISC FAULT*.

Crew awareness.

ELEC DRIVE 1(2)(3)(4) DISCONNECTED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The engine generator disconnects from its assigned engine while the engine generator was operating.

Note: The alert also triggers if the above triggering condition is still applicable when the flight crew:
- *Presses T.O CONFIG, pb, or*
- *Sets the takeoff power.*

Indications:

Audio



Master Light



Local light



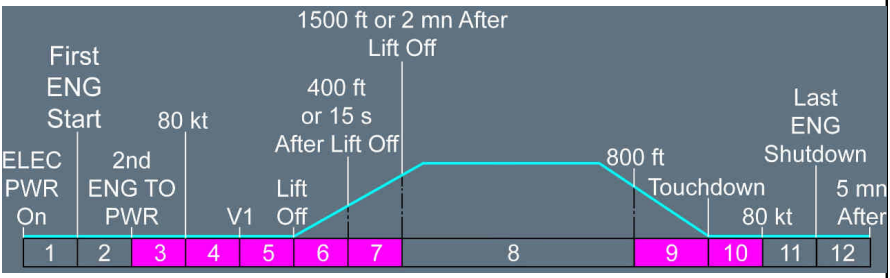
DRIVE 1(2)(3)(4) pb

SD page



ELEC AC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC DRIVE 1(2)(3)(4) DISCONNECTED (Cont'd)

L2 The engine generator is disconnected from the engine, and can only be reconnected by a maintenance action on ground. The electrical network will automatically reconfigure to supply as many busbars as possible (For more information on the electrical reconfigurations, *Refer to DSC-24-40 Reconfigurations Overview*).
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DRIVE 1(2)(3)(4) DISCONNECTED* .

Crew awareness.

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
GEN 1(2)(3)(4)	CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Thus, the APU generator will directly supply the AC 1(2)(3)(4) busbar.

ELEC DRIVE 1(2)(3)(4) OIL LEVEL LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The oil level of the engine driven generator is low.

Indications:

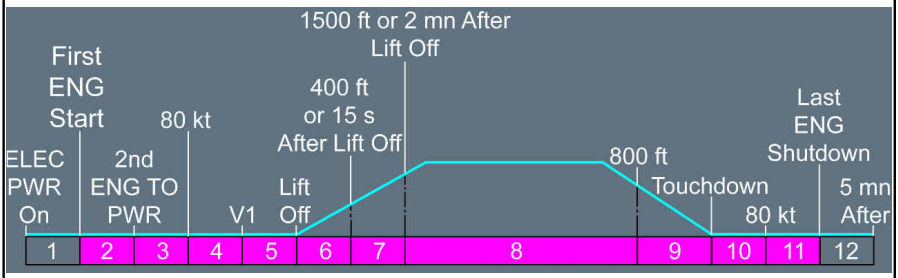
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DRIVE 1(2)(3)(4) OIL LEVEL LO* .

GEN 1(2)(3)(4).....OFF

L2 *The electrical network will automatically reconfigure to supply as many busbars as possible (For more information on electrical reconfigurations, Refer to DSC-24-40 Reconfigurations Overview).*

L1
L13

Note: *After 5 min , the engine generator automatically disconnects, if:*

- *The flight crew has not disconnected the applicable engine generator, and*
- *The oil level remains too low.*

Continued on the following page

ELEC DRIVE 1(2)(3)(4) OIL LEVEL LO (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
GEN 1(2)(3)(4)	CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Thus, the APU generator will directly supply the AC 1(2)(3)(4) busbar.

ELEC DRIVE 1(2)(3)(4) OIL OVHT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The temperature, in the oil system that drives the applicable generator, is too high.
L3 The temperature in the oil system, is higher than 200 °C.

Indications:

L2

Audio	Master Light	Local light	SD page
		 DRIVE pb	 ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DRIVE 1(2)(3)(4) OIL OVHT*.

Continued on the following page

ELEC DRIVE 1(2)(3)(4) OIL OVHT (Cont'd)

DRIVE 1(2)(3)(4)..... DISC

L2 The generator can only be reconnected by a maintenance action on ground. The electrical network will automatically reconfigure to supply as many busbars as possible (For more information on electrical reconfigurations, *Refer to DSC-24-40 Reconfigurations Overview*).

L3 *Note:* *The engine generator automatically disconnects, if:*
- *The flight crew has not disconnected the applicable engine generator, and*
- *The temperature in the oil system goes above 250 °C .*

L12

STATUS

INOP SYS

ALL PHASES	**APPR & LDG**
GEN 1(2)(3)(4)	CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Thus, the APU generator will directly supply the AC 1(2)(3)(4) busbar.

ELEC DRIVE 1(2)(3)(4) OIL PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pressure, in the oil system that drives the applicable generator, is abnormally low (lower than 35 PSI).

Indications:

Audio



Master Light



Local light



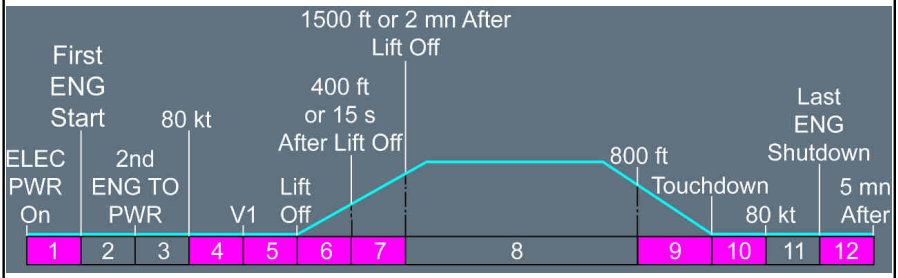
DRIVE pb

SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC DRIVE 1(2)(3)(4) OIL PRESS LO* .

Continued on the following page

ELEC DRIVE 1(2)(3)(4) OIL PRESS LO (Cont'd)

DRIVE 1(2)(3)(4)..... DISC

L2 *The generator can only be reconnected by a maintenance action on ground. The electrical network will automatically reconfigure to supply as many busbars as possible (For more information on electrical reconfigurations, Refer to DSC-24-40 Reconfigurations Overview).*

L1
L13

Note: After 5 min , the engine generator automatically disconnects, if:
- *The flight crew has not disconnected the applicable engine generator, and*
- *The oil pressure remains too low.*

L12

STATUS

INOP SYS

ALL PHASES	**APPR & LDG**
GEN 1(2)(3)(4)	CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Thus, the APU generator will directly supply the AC 1(2)(3)(4) busbar.

ELEC ELEC NETWORK MANAGEMENT 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ENMU 1(2) is failed (For more information on the ENMU definition, *Refer to DSC-24-10-60 Electrical Network Management and Load Shedding*).

Indications:

Audio



Master Light

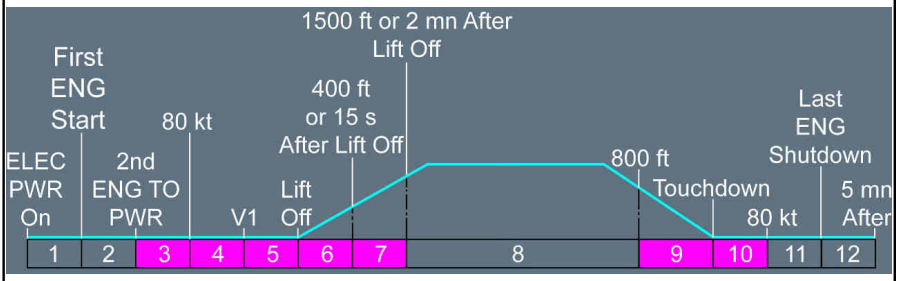


SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-24 ELEC ELEC NETWORK MANAGEMENT 1 FAULT*
- *Refer to MEL/ME-ECAM-24 ELEC ELEC NETWORK MANAGEMENT 2 FAULT* .

GEN 1+2(3+4) : KEEP ON

L2 No reconfiguration of the electrical network can occur on the affected side of the electrical network.

Continued on the following page

ELEC ELEC NETWORK MANAGEMENT 1(2) FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

ENMU 1(2)
APU GEN A (When ENMU 1 is failed)
APU GEN B (When ENMU 2 is failed)
EXT PWR 1 (On ground, when ENMU 1 is failed)
EXT PWR 2 (On ground, when ENMU 1 is failed)
EXT PWR 3 (On ground, when ENMU 2 is failed)
EXT PWR 4 (On ground, when ENMU 2 is failed)
PART GALLEY

The galleys, controlled by the affected ENMU, will be shed.

ELEC EMER C/B MONITORING FAULT

Applicable to: ALL

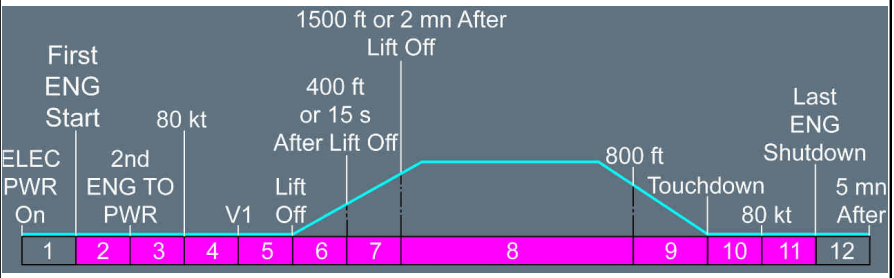
ANNUNCIATIONS

Triggering Conditions:

L2 The emergency part of the C/B monitoring function is failed (*Refer to DSC-24-10-60 Circuit Breaker Monitoring*).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC EMER C/B MONITORING FAULT* .

Crew awareness.

L2 There is no C/B monitoring on the emergency network.

STATUS

INOP SYS

ALL PHASES
EMER C/B MONITORING

ELEC EMER CONFIG

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The AC 1, AC 2, AC 3, and AC 4 busbars are lost.

Indications:

Audio



Master Light

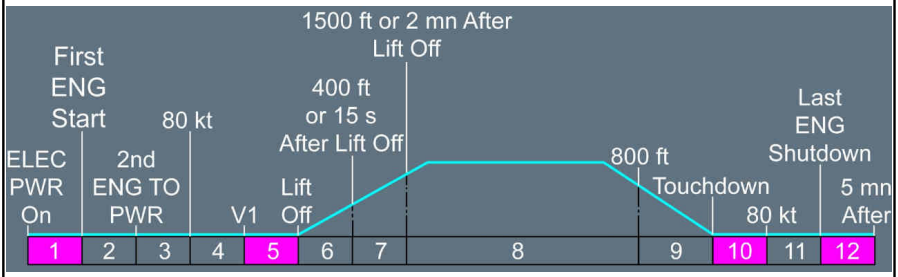


SD page



ELEC AC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC EMER CONFIG (Cont'd)

L2 In electrical emergency configuration:

- Autothrust and autopilot are lost
- The flight controls are in direct law: Protections are lost
- The following DU s remain available: CAPT PFD , CAPT ND , CAPT MFD , and the EWD
  In order to display the SD ECAM pages on the MFD , the First Officer can press the MAILBOX pb on CAPT KCCU . The RECONF pb on the CAPT side remains available.
- When possible, icing conditions must be avoided
- Only VHF 1 and HF 1 are operative in voice mode only.
  The flight crew can use the RMP 1 or RMP 2 (VHF 1, HF 1 ,intercom , CAB and PA). As the display of RMP 2 is not available, the flight crew must use the RMP 1 to tune the VHF 1 or HF 1.
- The only remaining feed tank pumps are in feed tank 2 and in feed tank 3 only when slats are retracted. Fuel inner and mid tanks are not usable. For more information on fuel transfers in electrical emergency configuration, *Refer to DSC-28-40 Fuel System in Electrical Emergency Configuration* .
- When some light is necessary, the flight crew must set the STORM selector to ON, on the INT LT panel, in order to turn on the ambient light on the overhead panel
- Manual pitch trim must be used
- The XPDR / TCAS and WXR / TAWS are automatically set to SYS 1, and are available.
- **In approach**
  - Slats are slow
  - CAT 2 and CAT 3 approaches cannot be performed
    CAT 1 approach can be performed.
  - Landing gear extension is available by gravity only
  - Both BCS are lost. As a consequence, both GPWS functions are lost. The terrain function remains available.
- **During landing**
  - The reversers are no longer operative
  - Only two spoilers per wing remain operative
  - Anti-skid is not available
  - Only the emergency braking system remains available: Brake pressure is auto-limited to 1 000 PSI
  - The nosewheel steering is no longer available
    For landing, use rudder and differential braking to steer the aircraft on the runway because the nose landing gear can steer freely.
    After landing, the aircraft has to be towed out of the runway.

Continued on the following page

ELEC EMER CONFIG (Cont'd)

- **In the case of go around**
  - Landing gear cannot be retracted.

Continued on the following page

ELEC EMER CONFIG (Cont'd)

LAND ASAP

RAT MAN ON.....PRESS

L2 *Confirms the automatic deployment of the RAT . If the automatic deployment fails, this will manually extend the RAT .*
The deployment of the RAT takes between 2 s and 6 s depending on the aircraft speed.

L1 MIN RAT SPEED : 140 KT

- **If the flight crew did not activate the FIRE SMOKE/FUMES alert:**

ALL GEN s ..... OFF THEN ON

L2 *Reset the generators unless the flight crew applies the ELEC EMER CONFIG procedure following a FIRE SMOKE/FUMES procedure.*
If one (or more) generator(s) is (are) recovered, the emergency generator continues to supply the emergency network.

L1
- **IF NOT SUCCESSFUL :**

BUS TIE..... OFF

L2 *The segregation of the AC 1 and AC 2 busbars from the AC 3 and AC 4 busbars, and the DC 1 busbar from the DC 2 busbar limits the automatic electrical reconfiguration, and increases the chance of recovery.*

L1 ALL GEN s .....OFF THEN ON

USE VHF 1 OR HF 1

L2 *Only VHF 1 and HF 1 are electrically supplied regardless of the electrical source.*
As the display of RMP 2 is not available, use RMP 1 to tune VHF 1 (or HF 1).
Communications can be done on both sides.

L1 A/THR.....DISCONNECT

L2 *Only one Multi Probe Function (MFP) is electrically supplied and provides parameters to the ADIRS . With only one MFP , the ADIRS can not monitor the reliability of received parameters. As a consequence, the A/THR , if engaged, automatically disconnects after 3 min .*

L1 ATC COM VOICE ONLY
VENT AVNCS EXTRACT..... OVRD

L3 *The extraction fan is not electrically supplied: Air that ventilates the main and upper avionics bays is extracted by differential pressure via the overboard valve.*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L1 ● **If the alert triggers at or below FL 230 :**

● **If the maximum flight level is not restricted below FL 200 by an other alert:**
DESCENT TO FL 200/MEA..... INITIATE

L2 *Fuel gravity transfer from feed tank 1 to feed tank 2, and from feed tank 4 to feed tank 3, is only available at, and below FL 200 .*

L1 MAX FL : 200/MEA

● **If the flight crew did not activate the FIRE SMOKE/FUMES alert:**
WHEN BELOW FL 200 : APU.....CONSIDER

L2 *If the APU is available, when the aircraft is below FL 200 , start the APU , unless the flight crew applies the electrical emergency configuration procedure following a SMOKE/FUMES procedure.*

Note: In flight, only one APU generator is available, whatever the aircraft altitude.

L1 ● **If the maximum flight level is restricted below FL 200 by an other alert, and the flight crew did not activate the FIRE SMOKE/FUMES alert:**
APU.....CONSIDER

L2 *If the APU is available, when the aircraft is below FL 200 , start the APU , unless the flight crew applies the electrical emergency configuration procedure following a SMOKE/FUMES procedure.*

Note: In flight, only one APU generator is available, whatever the aircraft altitude.

L1 SLATS SLOW
L/G GRVTY EXTN ONLY

L2 *Both LGCIS are not electrically supplied. As a consequence, the normal extension of the landing gear is not possible. Only L/G position on center panel is available.*

L1 AVOID ICING COND s

L2 *Wing anti-ice is not available, windows heating, and F/O windshield heating is lost. Captain windshield heating remains operative. Engine anti-ice is on, regardless of the pushbutton's position.*

L1 FOR SD : SELECT "MAILBOX" ON CAPT KCCU
INR TK s NOT USABLE
MID TK s NOT USABLE
FEED TK 1 : 2900 LBS MAX NOT USABLE

L2 *The feed tank 1 pumps are inoperative, and 2 900 lb of fuel in the feed tank 1 cannot be transferred by gravity to the feed tank 2.*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L1 FEED TK 4 : 2900 LBS MAX NOT USABLE

L2 *The feed tank 4 pumps are inoperative, and 2 900 lb of fuel in the feed tank 4 cannot be transferred by gravity to the feed tank 3.*

L1 ● **If the alert triggers above FL 230 or the altitude is not valid:**

● **If the maximum flight level is not restricted below FL 200 by an other alert:**
DESCENT TO FL 200/MEA..... INITIATE

L2 *Fuel gravity transfer from feed tank 1 to feed tank 2, and from feed tank 4 to feed tank 3, is only available at, and below FL 200 .*

L1 MAX FL : 200/MEA

● **If the flight crew did not activate the FIRE SMOKE/FUMES alert:**
WHEN BELOW FL 200 : APU.....CONSIDER

L2 *If the APU is available, when the aircraft is below FL 200 , start the APU , unless the flight crew applies the electrical emergency configuration procedure following a SMOKE/FUMES procedure.*

Note: In flight, only one APU generator is available, whatever the aircraft altitude.

L1 ● **If the maximum flight level is restricted below FL 200 by an other alert, and the flight crew did not activate the FIRE SMOKE/FUMES alert:**
APU.....CONSIDER

L2 *If the APU is available, when the aircraft is below FL 200 , start the APU , unless the flight crew applies the electrical emergency configuration procedure following a SMOKE/FUMES procedure.*

Note: In flight, only one APU generator is available, whatever the aircraft altitude.

L1 LDG PERF AFFECTED

L2 *Landing performance is affected due to:*
- *The loss of 6 pairs of ground spoilers and of 2 ailerons (used as ground spoilers)*
- *The loss of the reversers for computation on wet runways*
- *The increased approach speed, to consider the abnormal configuration and the minimum RAT speed.*

L1 ● **When the fuel quantity in feed tanks 1 and 4 is below 42 000 lb :**
EMER OUTR TK XFR.....ON

Continued on the following page

ELEC EMER CONFIG (Cont'd)

L13

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

The flight control law is direct.

SECONDARY FAILURES

*F/CTL
*FUEL
*WHEEL

Continued on the following page

ELEC EMER CONFIG (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP
MAX SPEED : 310/.86
MAX FL : 200/MEA
MANEUVER WITH CARE
ATC COM VOICE ONLY
AVOID ICING CONDs
FUEL PARTLY UNUSABLE

APPR AND LDG

- For gravity extension :
  MAX SPEED : 220 KT
  MIN RAT SPD : 140 KT
- If severe ice accretion :
  FOR LDG : FLAP LVR 3
  SLATS SLOW
  L/G GRVTY EXTN ONLY
  LDG PERF AFFECTED

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP
MAX SPEED : 310/.86
MAX FL : 200/MEA
MANEUVER WITH CARE
AVOID ICING CONDs

- For gravity extension :
  MAX SPEED : 220 KT
  MIN RAT SpD : 140 KT

L12

DEFERRED PROC

FOR APPROACH

● **IF SEVERE ICE ACCRETION :**
FOR LDG : FLAP LVR 3

LDG PERF COMPUTATION..... CONFIRM
BRK PRESS AUTO LIMITED ON ALL L/Gs
BRK WITH ACCU ONLY ON ALL L/Gs

Continued on the following page

ELEC EMER CONFIG (Cont'd)

FOR LANDING

FOR L/G GRVTY EXTN : MAX SPEED 220 KT

- **FOR L/G EXTN :**

  L/G LEVER.....UP

  L/G GRVTY (EXTN MAX 2 MIN).....DOWN

  Landing gear gravity extension takes approximately 70 s.

  - **WHEN L/G LOCKED DOWN OR AFTER 120S :**

    L/G LEVER.....DOWN

    The UNLK red lights are not electrically supplied. The green triangles illuminate, when the landing gear is currently locked down.

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
PRIM 2+3
SEC 2+3
MOST SPLRs

The spoilers 3, and 6 operate.

AP 1+2
A/THR
FD 1+2
JETTISON
ALL FUEL FEED PMPs (When slats extended)

At low altitude, fuel is transferred by gravity to the engines.

MOST FUEL FEED PMPs (Before slats extended)

Only feed tank 2 main pump, feed tank 3 standby pump, and the left trim tank pump operate.

MOST FUEL XFR PMPs
CG MANAGEMENT
WING A-ICE

APPR & LDG

A-SKID
AUTO BRK
N/W + B/W STEER
ENG 2+3 REVERSERs
RA SYS A+B
CAT 2
GLS AUTOLAND
LS 2

Continued on the following page

ELEC EMER CONFIG (Cont'd)

Inop Sys (Not displayed on ecam)

ALL PHASES

AVNCS EXTRACT
ALL ZONES TEMP REGUL
ALL PRIMARY CAB FANS

The temperature regulation is degraded.

BULK CRG HEAT
IFE
F/O EFIS CTL
FMS 2
DATALINK
VHF 2+3
HF 2
ELEC LOAD MANAGT
C/B MONITOR
RMP 3
R TRIM TK PMP
INR TKs PMPs
MID TKs PMPs
L+R OUTR TK PMPs
G+Y HSMU
L+R WINDOWS HEATG
R WINDSHIELD HEATG
F/O CCD + KBD
F/O MAILBOX
VIDEO
GPS 2
IR 2
ADR 2
WXR 2
XPDR 2
TCAS 2
DOOR POSITION
CKPT DOOR LOCK
FMC B+C
FLAP CTL 2
FQMS 2
FQDC 2
RUDDER TRIM 2
FCDC 2
STBY STATIC HEATG
L+R OUTR AILERONS

APPR & LDG

FLAP SYS 2
SLAT SYS 2
TAWS 2

Continued on the following page

ELEC EMER CONFIG (Cont'd)

R INNER ELEVATOR

INFO

DIRECT LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Fuel consumption is increased, and FMS predictions are not correct, due to:
- *Two outer ailerons and one elevator at zero-hinge moment*
- *The extension of the RAT.*

As the consequence the fuel consumption is increased by approximately 16 %.
Flying at FL 200 also increases the fuel consumption.
To optimize fuel consumption, set the Cost Index (CI) to zero and use managed speed.
The following table provides a quick assessment of the required fuel to destination.

1. Descent: M 0.85/300 kt
2. Cruise at FL 200 at CI= 0 (Max Range)
3. Descent: M 0.85/300 kt/250 kt
4. Approach/Landing (IFR) : 1 764 lb (6 min)

Initial Weight = 992 080 lb / Initial FL: FL 370
Anti-Ice OFF / ISA / CG = 41% / Fuel consumption increased by 16%

AIR DIST (NM)	FUEL CONSUMP (LBS)	TIME (H.MIN)
500	32578	1.22
750	52025	2.01
1000	71249	2.41
1250	90249	3.2
1500	109233	4
1750	127610	4.41
2000	145986	5.21
2250	164161	6.02
2500	182133	6.43
2750	199902	7.24
3000	217473	8.04
3250	234843	8.45
3500	252017	9.29

Corrections
- *Engine Anti-ice: +1.5%*
- *Total Anti-ice: +2%*
- *+1 100 lb per +6 000 ft above FL 370*
- *- 1 100 lb per -6 000 ft below FL 370*

Continued on the following page

ELEC EMER CONFIG (Cont'd)

- *Weight before descent: +1.2%/22 046 lb*

In cruise quick check from point of event to landing

FEED TK 1 : 2900 lbS MAX NOT USABLE
FEED TK 4 : 2900 lbS MAX NOT USABLE
INR TKs NOT USABLE
MID TKs NOT USABLE
FLS LIMITED TO F-APP + RAW

L2 SYSTEMS REMAINING IN EMERGENCY ELECTRICAL CONFIGURATION

	Available Systems	Remarks
Air Conditioning Pressurization Ventilation	Automatic Pressurization Control	The four outflow valve controllers are operative.
	Manual Pressurization Control	
	Both Packs	
	RAM Air	
	Avionics Ventilation via the overboard valve	
	Cargo Ventilation	
Autoflight	FMS 1	Autothrust and autopilot are lost.
	CAPT EFIS CPs	
	AFS control panel	
Communication	RMP 1 and audio controls on RMP 2	Tune VHF 1 and HF 1 on RMP 1 (RMP 2 display is not available).
	VHF 1	
	HF 1	
	EVAC	
	Flight interphone, cabin interphone, Passenger Address (PA)	
	Loudspeakers 1+2	
	ELT	
Fire and Smoke Detection	ENG 1, 2, 3 and 4 Extinguishing Function.	1 Squib of each Bottle of ENG 1, 2, 3 and 4.
	APU	1 Squib of the APU Bottle.
	Smoke Detectors	
Flight Controls	Direct Law Only	PRIM 1 is operative
		SEC 1 is operative
	Slats/Flaps	SFCC 1 is operative

Continued on the following page

ELEC EMER CONFIG (Cont'd)

Fuel System	Feed Tank 2 Main Pump	Only when slats are retracted.
	Feed Tank 3 Standby Pump	
	Crossfeed Valves are open	
	Left Trim Tank Pump	
	Engine LP Valves	
	FQMS 1	
Hydraulic System	Green and Yellow Hydraulic Circuits	
Ice and Rain Protection	Captain's Wiper	
	Captain Windshield Heating	
	Engine anti-ice remains on	
Indicating/Recording	PFD 1	Press MAIL BOX pb on the KCCU keyboard, or the RECONF pb on captain side, in order to display the SD pages on the MFD.
	ND 1	
	MFD 1	
	EWD	
	ECAM Control Panel	
	KCCU 1	
	FWS 1	
	Clock	
Landing Gear	Landing Gear Extension by Gravity	FFCM B only is available.
	Emergency Braking	
	Parking Brake	
	Ultimate Braking	
	L/G position on Center Instrument Panel	
Lights	Landing Lighting	
	Emergency Lighting	
	Auxiliary Lighting	
	Left and Right Strip of the Ambient Light	Only if the AMBIENT LT knob is turned on.
	STBY Compass Light	

Continued on the following page

ELEC EMER CONFIG (Cont'd)

Navigation	ADIRU 1 and 3	ADR 1 or ADR 3 depending on captain's selection IR 1 or IR 3 depending on captain's selection
	SQWK on RMP 1, and on MFD 1	
	DME 1	
	SFD and SND	
	LS 1	
	VOR 1	
	ADF 1	
	WXR/TAWS 1	The XPDR/TCAS and WXR/TAWS are automatically set to SYS 1.
	XPDR/TCAS 1	
	RA SYS C	The radio height callouts and indications are available.
Information System	OIS on F/O Side	
APU	APU	
Engines	FADEC Channel A	
	Ignition System A	
	HP Valves Closure	

ELEC EXT PWR 1(2)(3)(4) FAULT

Applicable to: ALL

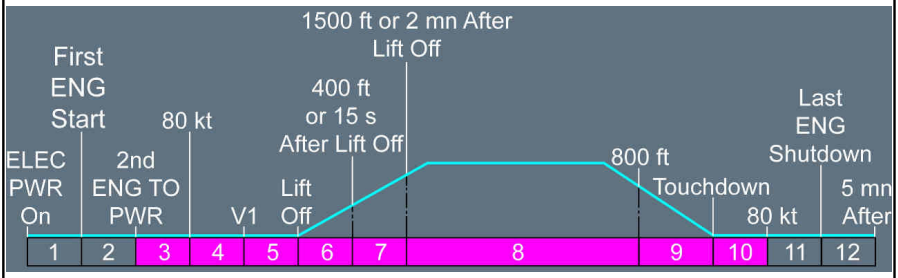
ANNUNCIATIONS

Triggering Conditions:

L2 The external power unit, or its associated GGPCU, is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC EXT PWR 1(2)(3)(4) FAULT*.

EXT PWR 1(2)(3)(4) P/B.....RECYCLE

L2 *The recycle will be successful, if the failure is due to the associated GGPCU.*
Perform only one recycle attempt. If the recycle attempt is not successful, contact maintenance personnel.

STATUS

INOP SYS

ALL PHASES

EXT PWR 1(2)(3)(4)

ELEC F/CTL ACTUATOR PWR SUPPLY FAULT

Applicable to: ALL

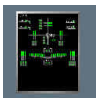
ANNUNCIATIONS

Triggering Conditions:

L2 Some EHA/EBHA are no longer electrically supplied.

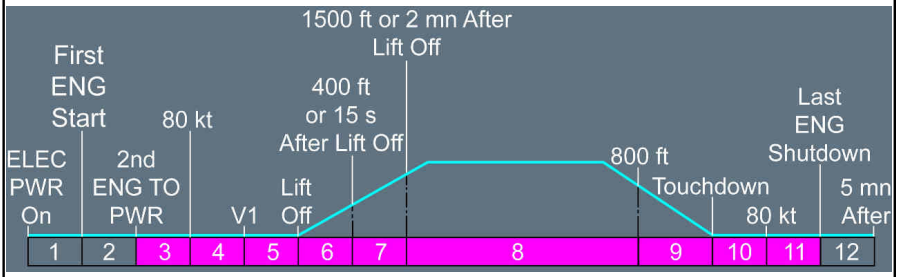
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC F/CTL ACTUATOR POWER SUPPLY FAULT* .

Crew awareness.

ELEC GEN 1(2)(3)(4) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The applicable engine generator is failed.

L3 The engine generator fails, in the case of:

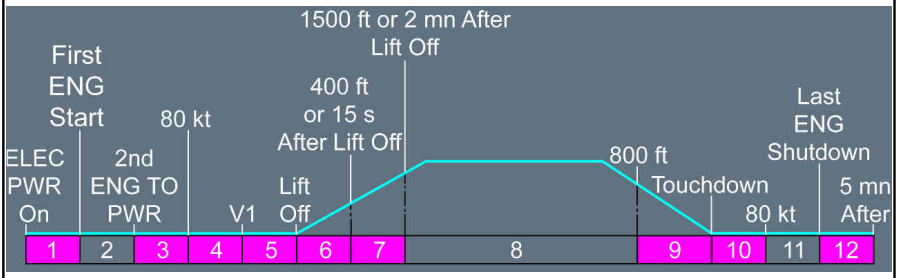
- An overload (if load shedding is not sufficient)
- An abnormally low intensity of the current (lower than 2 A)
- An abnormally low engine generator voltage (lower than 103 V)
- An abnormally high engine generator voltage (higher than 128.5 V)
- A short-circuit
- A failure of the engine generator contactor
- An overheat.

Indications:

L2

Audio	Master Light	Local light	SD page
			
		GEN 1(2)(3)(4) pb-sw	ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC GEN 1(2)(3)(4) FAULT* .

Continued on the following page

ELEC GEN 1(2)(3)(4) FAULT (Cont'd)

Impacted DU: 00007743 ELEC GEN 1(2)(3)(4) FAULT - Alert

GEN 1(2)(3)(4).....OFF

L2 *The electrical network will automatically reconfigure to supply the electrical network (for more information on electrical reconfigurations, Refer to DSC-24-40 Reconfigurations Overview).*

Impacted by TDU: 00024016 ELEC GEN 1(2)(3)(4) FAULT - Alert

GEN 1(2)(3)(4).....OFF THEN ON

- **IF NOT SUCCESSFUL :**

  GEN 1(2)(3)(4).....OFF

  L2 *The electrical network will automatically reconfigure to supply the electrical network (for more information on electrical reconfigurations, Refer to DSC-24-40 Reconfigurations Overview).*

L12

STATUS

INOP SYS

ALL PHASES	**APPR & LDG**
GEN 1(2)(3)(4)	CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Thus, the APU generator will directly supply the AC 1(2)(3)(4) busbar.

ELEC GEN 1(2)(3)(4) OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The GEN 1(2)(3)(4) pb-sw is abnormally set to OFF.

Note: The alert also triggers if the above triggering condition is still applicable when the flight crew:
- *Presses T.O CONFIG, pb, or*
- *Sets the takeoff power.*

Indications:

Audio



Master Light



Local light



GEN 1(2)(3)(4) pb-sw

SD page



ELEC AC SD Page

Flight Phase Inhibition:



Crew awareness.

L2 The electrical network will automatically reconfigure to supply as many busbars as possible (*Refer to DSC-24-40 Reconfigurations Overview*).

Continued on the following page

ELEC GEN 1(2)(3)(4) OFF (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
GEN 1(2)(3)(4)	CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Thus, the APU generator will directly supply the AC 1(2)(3)(4) busbar.

ELEC LOAD MANAGEMENT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ELMU is failed (For more information on the definition of the ELMU, *Refer to DSC-24-10-60 Electrical Network Management and Load Shedding*).

Indications:

Audio



Master Light



Local light



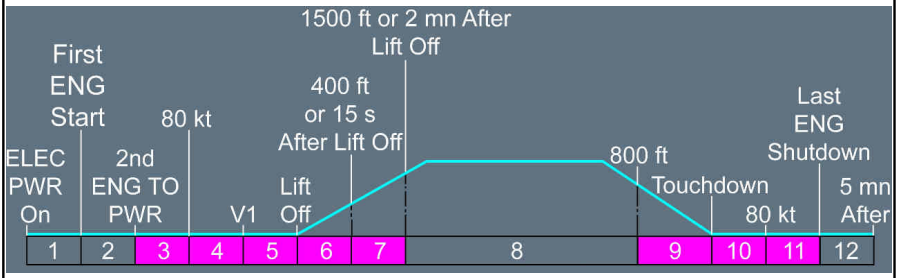
ELMU pb-sw

SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC LOAD MANAGEMENT FAULT* .

ELMU.....OFF

L2 *Load shedding on low commercial loads (e.g. IFE, lavatory and cabin lights) is no longer available: Only load shedding on high loads (e.g. galleys) remains available.*

Continued on the following page

ELEC LOAD MANAGEMENT FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

ELEC LOAD MANAGT

ELEC PRIMARY SUPPLY CENTER 1(2) FAULT

Applicable to: ALL

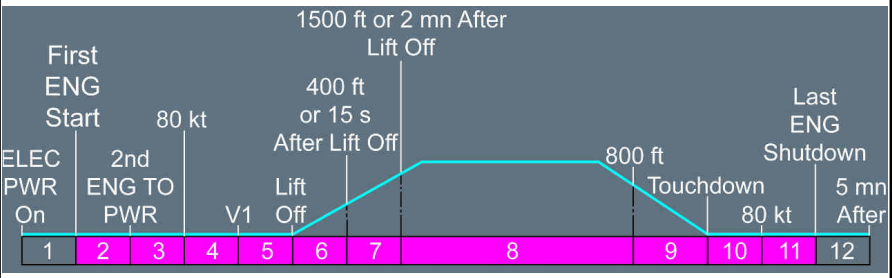
ANNUNCIATIONS

Triggering Conditions:

L2 Some loads are abnormally disconnected from the primary supply center (For more information on the definition of the primary center, *Refer to DSC-24-10-50 Supply Centers*).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC PRIMARY SUPPLY CENTER 1(2) FAULT* .

Crew awareness.

Continued on the following page

ELEC PRIMARY SUPPLY CENTER 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

ELEC PRIMARY CTR 1(2)
COMMERCIAL (Depending on the failure)
PART COMMERCIAL (Depending on the failure)

ELEC RAT FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- The RAT is failed, or
- The RAT is stowed, but not locked up, or
- The heater of the RAT is failed, or

L3
The RAT fails, in the case of:
- An overload (if load shedding is not sufficient)
- An abnormally low intensity of the current
- An abnormally low RAT voltage (lower than 103 V)
- An abnormally high RAT voltage (higher than 128.5 V)
- A short-circuit
- A failure of the RAT generator contactor
- An overheat.

Indications:

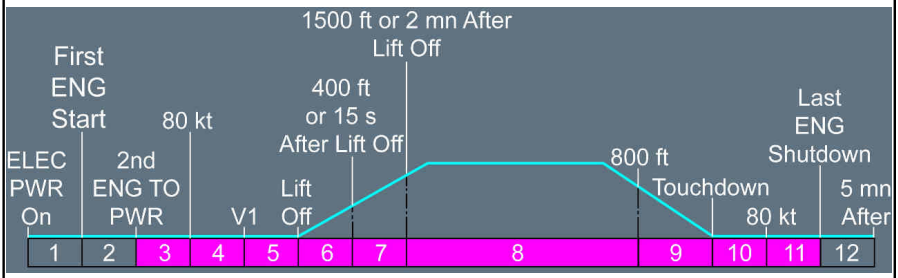
L2

SD page



ELEC AC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC RAT FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC RAT FAULT* .

- **Depending on the failure, the following may appear:**

RAT NOT LOCKED UP

L2 *The RAT is stowed, but not locked up.*

L1 HEATER FAULT

L2 *The heater of the RAT is failed.*

L1 Crew awareness.

STATUS

INOP SYS

ALL PHASES
RAT

ELEC REMOTE C/B CTL ACTIVE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L3 Maintenance personnel left the REMOTE C/B CTL pb (on the maintenance panel) set to ON (For more information on the definition of the remote C/B controller, *Refer to DSC-24-10-60 Electrical Network Management and Load Shedding*).

Indications:

L2

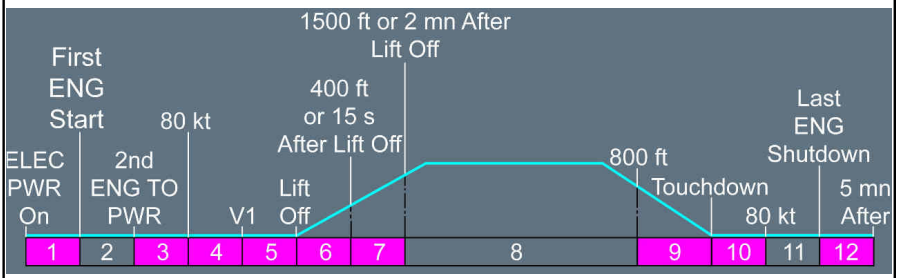
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC REMOTE C/B CTL ACTIVE* .

REMOTE C/B CTL..... OFF

ELEC SECONDARY SUPPLY CENTER 1(2) DEGRADED

Applicable to: ALL

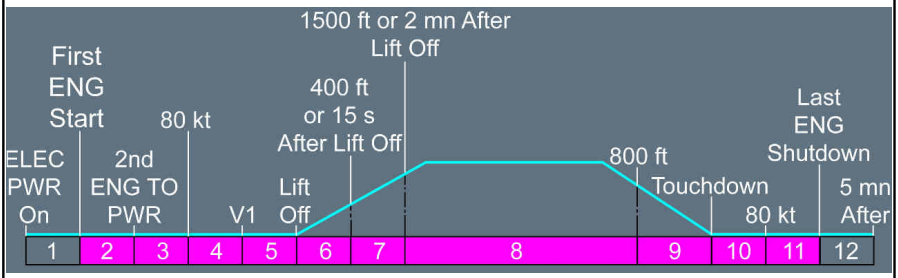
ANNUNCIATIONS

Triggering Conditions:

The communication is degraded between:
- SEPDC and CPIOM E
- SEPDC and other aircraft systems.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-24 ELEC SECONDARY SUPPLY CENTER 1 DEGRADED*
- *Refer to MEL/ME-ECAM-24 ELEC SECONDARY SUPPLY CENTER 2 DEGRADED*

Crew awareness.

STATUS

INOP SYS

ALL PHASES

ELEC SECONDARY CTR 1(2)

ELEC SECONDARY SUPPLY CENTER 1(2) FAULT

Applicable to: ALL

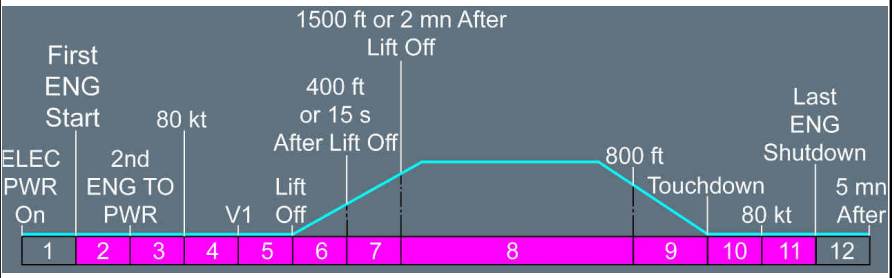
ANNUNCIATIONS

Triggering Conditions:

L2 Some systems are no longer supplied by the secondary supply center (1 or 2). Depending on the failure, there may not be any operational impact. (For more information on the definition of the secondary supply center (1 or 2), *Refer to DSC-24-10-50 Supply Centers*).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-24 ELEC SECONDARY SUPPLY CENTER 1 FAULT*
- *Refer to MEL/ME-ECAM-24 ELEC SECONDARY SUPPLY CENTER 2 FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

ELEC SECONDARY CTR 1(2)

ELEC SECONDARY SUPPLY CENTER 1(2) FAN FAULT

Applicable to: ALL

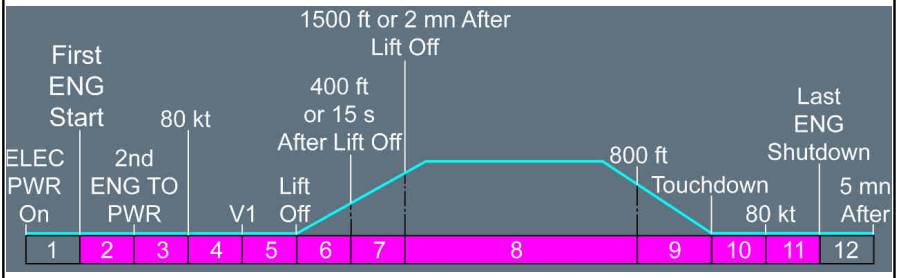
ANNUNCIATIONS

Triggering Conditions:

L2 The blowing fan that ventilates the secondary supply center is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-24 ELEC SECONDARY SUPPLY CENTER 1 FAN FAULT*
- *Refer to MEL/DEL-24-ME ELEC PRIMARY SUPPLY CENTER 2 FAULT .*

Crew awareness.

STATUS

INOP SYS

ALL PHASES
ELEC SEC CTR 1(2) FAN

ELEC SECONDARY SUPPLY CTR 1(2) REDUND LOST

Applicable to: ALL

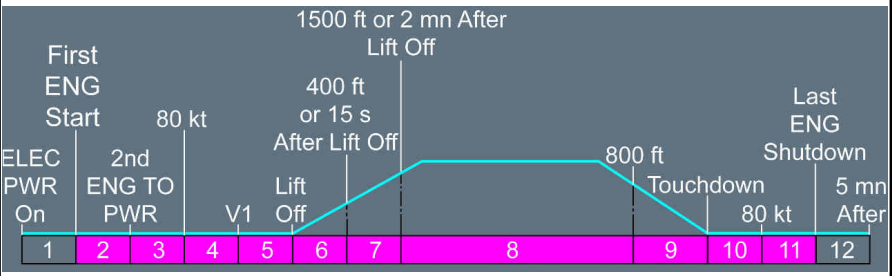
ANNUNCIATIONS

Triggering Conditions:

L2 The redundancy of some system electrical supply is lost. There is no operational impact.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, refer to MEL.

Crew awareness.

MORE INFO

REDUND LOSS

PART ELEC SEC CENTER 1(2)

ELEC STATIC INV FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The static inverter is failed.

L3 The static inverter fails, in the case of:

- An overcurrent
- An abnormally low intensity of the current
- An abnormally low battery voltage (lower than 27 V)
- An abnormally high battery voltage (greater than 32 V)
- A short-circuit
- A failure of the static inverter contactor
- An overheat.

Indications:

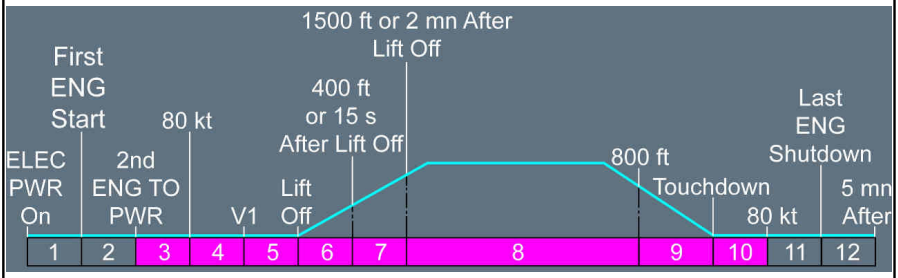
L2

SD page



ELEC AC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC STATIC INV FAULT* .

Continued on the following page

ELEC STATIC INV FAULT (Cont'd)

Crew awareness.

ELEC TR 1(2)(ESS) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TR 1(2)(ESS) is failed.

L3 The TR fails, in the case of:

- An overcurrent
- An abnormally low intensity of the current (lower than 2 A)
- An abnormally low TR voltage (lower than 27 V)
- An abnormally low TR voltage (lower than 27 V)
- An abnormally high TR voltage (higher than 32 V)
- A short-circuit
- A failure of the TR contactor
- An overheat.

Indications:

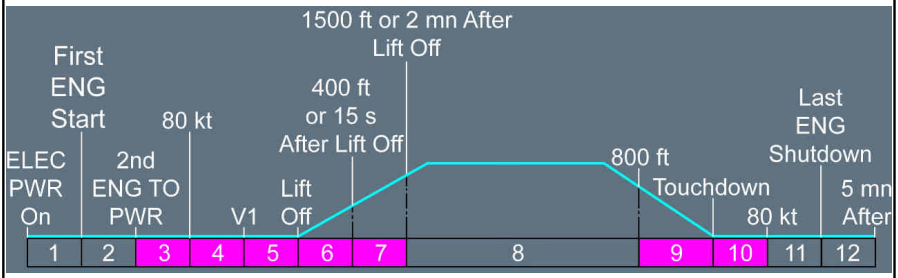
L2

SD page



ELEC DC SD Page

Flight Phase Inhibition:



Continued on the following page

ELEC TR 1(2)(ESS) FAULT (Cont'd)

L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-24 ELEC TR 1 FAULT*
- *Refer to MEL/ME-ECAM-24 ELEC TR 2 FAULT*
- *Refer to MEL/ME-ECAM-24 ELEC ESS TR FAULT*.

Crew awareness.
L2 The electrical network automatically reconfigures to ensure that all the busbars remain electrically supplied (For more information on electrical reconfigurations, *Refer to DSC-24-40 Reconfigurations Overview*).
L3 No reconfiguration occurs, if the applicable TR is failed due to an overcurrent.

STATUS

INOP SYS

ALL PHASES
TR 1(2)(ESS)

ELEC TR 1(2)(ESS) MONITORING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The monitoring function of TR 1(2)(ESS) is failed.

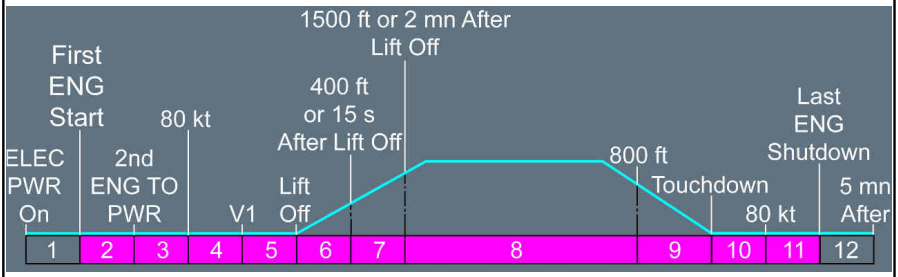
Indications:

SD page



ELEC DC SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-24 ELEC TR 1(2)(ESS) MONITORING FAULT*.

Crew awareness.

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Fire and Smoke Protection

APU FIRE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

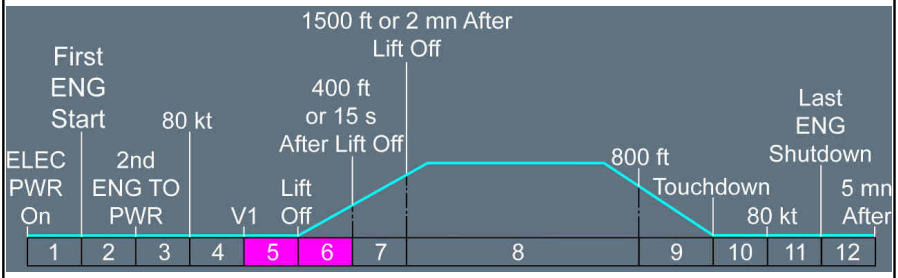
L2 Fire is detected in the APU :
- Both loops A and B have detected a fire, or
- One loop has detected a fire while the other is failed, or
- Both loops are failed within 5 s .

Refer to DSC-26-30-10-10 APU Fire Protection - Detection Logic

Indications:

Audio	Master Light	Local light	SD page
			
		APU Fire pb	APU SD Page

Flight Phase Inhibition:



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APU FIRE (Cont'd)

LAND ASAP

APU FIRE P/B.....PUSH

L2
- *APU LP valve closes.*
- *Aural warning stops.*
- *APU FIRE pb remains lit, as long as fire is detected.*

L1 APU AGENT AFTER 10 S.....DISCH

L2 *The 10-second delay allows the airflow to decrease, which increases the effect of the agent. An automatic countdown on the ECAM.*

L1 APU MASTER SW.....OFF

L2 *Do not attempt to restart the APU.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

APU FIRE DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The APU fire detection is failed. Both loops A and B are failed at an interval greater than 5 s .
Refer to DSC-26-30-10-10 APU Fire Protection - Detection Logic

Indications:

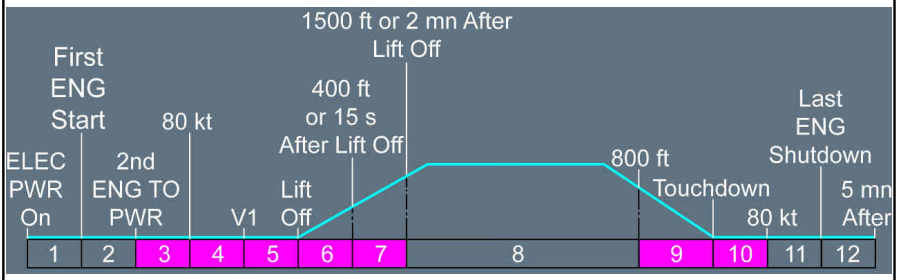
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

STATUS

INOP SYS

ALL PHASES

APU FIRE DET

APU FIRE LOOP A(B) FAULT

Applicable to: ALL

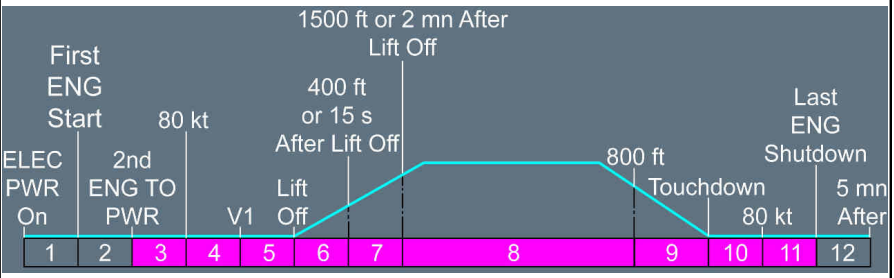
ANNUNCIATIONS

Triggering Conditions:

L2 The APU fire detection loop A or B is failed. *Refer to DSC-26-30-10-10 APU Fire Protection - Detection Logic*

Indications:

Flight Phase Inhibition:



Crew awareness.

MORE INFO

REDUND LOSS

APU FIRE LOOP A(B)

ENG 1(2)(3)(4) FIRE (IN FLIGHT)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

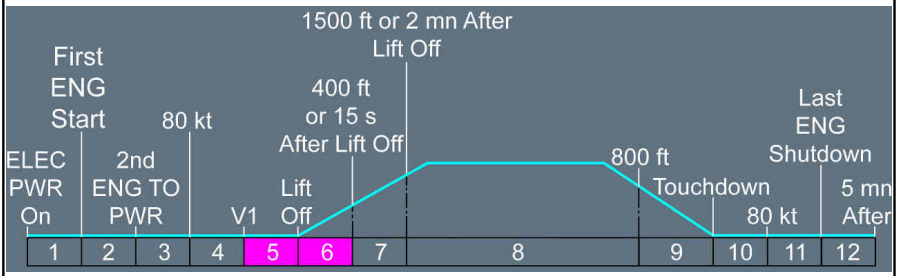
L2 Fire is detected in engine 1(2)(3)(4):
- Both loops A and B have detected a fire, or
- One loop has detected a fire while the other is failed, or
- Both loops are failed within 5 s .

Refer to DSC-26-20-10-10 Engine Fire Protection - Detection Logic

Indications:

Audio	Master Light	Local light	SD page
			
		ENG Fire pb	ENGINE SD Page

Flight Phase Inhibition:



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ENG 1(2)(3)(4) FIRE (IN FLIGHT) (Cont'd)

LAND ASAP

THR LEVER 1(2)(3)(4)..... IDLE
ENG 1(2)(3)(4) MASTER..... OFF

L2 *Associated low pressure and high pressure valves close.*

L1 ENG 1(2)(3)(4) FIRE P/B..... PUSH

L2
- *Aural warning stops.*
- *ENG FIRE pb remains on, as long as fire is detected.*
- *FADEC is no longer supplied. So, the THR LEVER 1(2)(3)(4) ... IDLE line reappears, even if the thrust lever is at idle.*

L1 ● **If engine 1 failed:**

APU BLEED..... OFF

L2 *When engine 1 is failed and ENG 1 FIRE pb is pushed, the left crossbleed valve and the pack flow valve of the engine 1 close. As a consequence, the APU bleed cannot supply the packs.*

L1 APU BLEED : DO NOT USE

AGENT 1 AFTER 10 S..... DISCH

L2 *The 10-second delay allows the airflow to decrease, which increases the effect of the agent.*
An automatic countdown on the ECAM starts when the Engine Master is switched off.
At the end of the countdown, the action becomes AGENT 1 ... DISCH .

L1 ATC..... NOTIFY

● **IF STILL FIRE AFTER 30 S :**

AGENT 2..... DISCH

L2 *An automatic countdown on the ECAM starts when the bottle 1 is low press.*
At the end of the countdown, the condition becomes AS STILL FIRE AFTER 30 S .

L1 ENG 1(2)(3)(4) SHUT DOWN procedure apply. *Refer to procedure .*
Do not attempt to restart the engine.

Continued on the following page

ENG 1(2)(3)(4) FIRE (IN FLIGHT) (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

- If ENG 1 FIRE pb is pressed:
  APU BLEED DO NOT USE

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

STATUS

INOP SYS

ALL PHASES

ENG 1, (2), (3), (4) BLEED (If ENG 1, (2), (3), (4))
APU BLEED (If ENG 1)

ENG 1(2)(3)(4) FIRE (ON GROUND)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

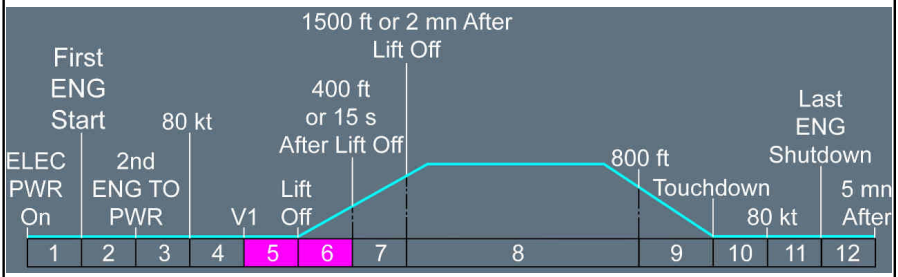
L2 Fire is detected in engine 1(2)(3)(4):
- Both loops A and B have detected a fire, or
- One loop has detected a fire while the other is failed, or
- Both loops are failed within 5 s .

Refer to DSC-26-20-10-10 Engine Fire Protection - Detection Logic

Indications:

Audio	Master Light	Local light	SD page
			
		Engine Fire pb	ENGINE SD Page

Flight Phase Inhibition:



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ENG 1(2)(3)(4) FIRE (ON GROUND) (Cont'd)

ALL THR LEVERS..... IDLE

L2 *Full reverse may be used to stop the aircraft.*

L1 ● **WHEN ACFT STOPPED :**

PARK BRK.....ON
ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*

L1 CABIN CREW.....ALERT
ENG 1(2)(3)(4) MASTER.....OFF

L2 *Associated HP and LP valves close.*

L1 ENG 1(2)(3)(4) FIRE P/B.....PUSH

L2
- *Aural warning stops.*
- *ENG FIRE pb remains on, as long as fire is detected.*
- *FADEC is no longer supplied. So, the THR LEVER 1(2)(3)(4) ... IDLE line reappears, even if the thrust lever is at idle.*

L1 ENG 1(2)(3)(4) AGENT 1+2..... DISCH
ALL ENG MASTERS..... OFF
ALL FIRE P/BS (ENG & APU)..... PUSH

■ **IF EVAC RQRD :**

EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND.....ON
ALL 4 BATS..... OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

L1 ■ **IF EVAC NOT RQRD :**

CABIN CREW.....ADVISE

Continued on the following page

ENG 1(2)(3)(4) FIRE (ON GROUND) (Cont'd)

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) BLEED
L(R)(CTR) X BLEED AUTO CTL (If X BLEED valve failed)

ENG 1(2)(3)(4) FIRE DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The engine 1(2)(3)(4) fire detection is failed. Both loops A and B are failed at an interval greater than 5 s . *Refer to DSC-26-20-10-10 Engine Fire Protection - Detection Logic*

Indications:

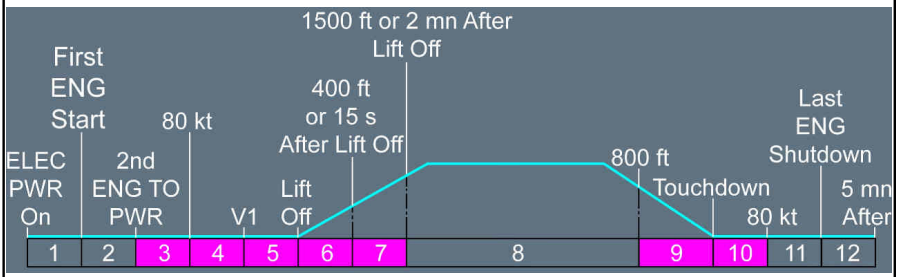
Audio



Master Light



Flight Phase Inhibition:



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ENG 1(2)(3)(4) FIRE DET FAULT (Cont'd)

Crew awareness.

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) FIRE DET

ENG 1(2)(3)(4) FIRE LOOP A(B) FAULT

Applicable to: ALL

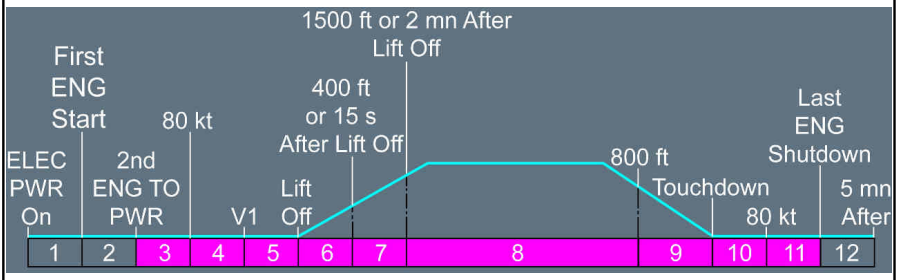
ANNUNCIATIONS

Triggering Conditions:

L2 The engine 1(2)(3)(4) fire detection loop A or B is failed.

Indications:

Flight Phase Inhibition:



Crew awareness.

Continued on the following page

ENG 1(2)(3)(4) FIRE LOOP A(B) FAULT (Cont'd)

MORE INFO

REDUND LOSS

ENG 1(2)(3)(4) FIRE LOOP A(B)

MLG BAY FIRE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Fire is detected in the main landing gear bay:
- Both loops A and B have detected a fire, or
- One loop has detected a fire while the other is failed, or
- Both loops are failed within 5 s .

Refer to DSC-26-40-10-10 MLG Fire Protection - Detection Logic

Indications:

Audio



Master Light

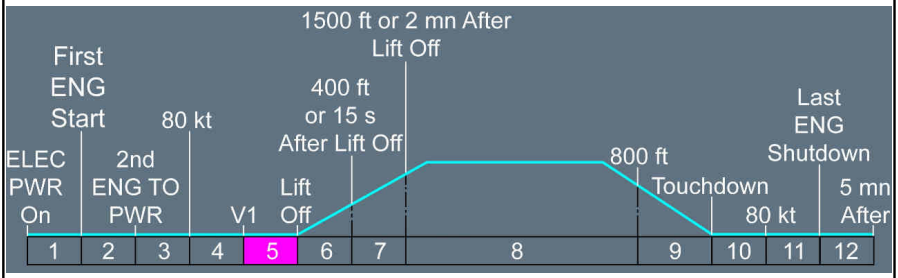


SD page



WHEEL SD Page

Flight Phase Inhibition:



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MLG BAY FIRE (Cont'd)

■ **In flight :**

LAND ASAP

● **If speed is above 250/.55 :**

SPEED..... REDUCE BELOW 250/.55

L/G LEVER..... DOWN

L/G : KEEP DOWN

ATC..... NOTIFY

MAX SPEED : 250/.55

■ **On ground :**

ALL THR LEVERS..... IDLE

● **WHEN ACFT STOPPED :**

PARK BRK..... ON

ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*

L1 CABIN CREW..... ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation may be required.*

L1 ALL ENG MASTERS..... OFF

L2 *Associated LP and HP valves close.*

L1 ■ **IF EVAC RQRD :**

EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND..... ON

APU MASTER SW..... OFF

ALL 4 BATS..... OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

L1 ■ **IF EVAC not RQRD :**

CABIN CREW..... ADVISE

Continued on the following page

MLG BAY FIRE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight
  LAND ASAP
  MAX SPEED : 250/.55

LIMITATIONS ON PFD

ALL PHASES

- In flight
  LAND ASAP
  MAX SPEED : 250/.55

MLG BAY FIRE DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The main landing gear fire detection is failed. Both loops A and B are failed at an interval greater than 5 s . *Refer to DSC-26-40-10-10 MLG Fire Protection - Detection Logic*

Indications:

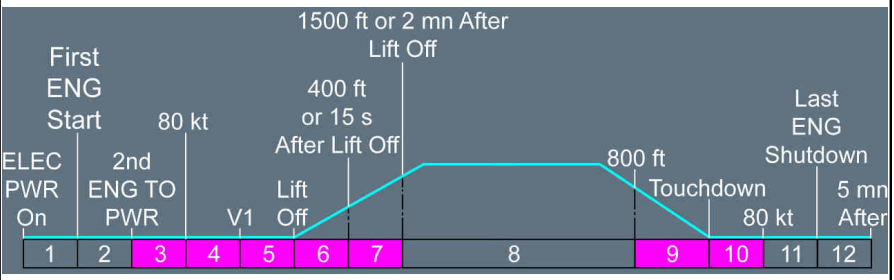
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-26-2 MLG BAY FIRE DET FAULT* .

Crew awareness.

Continued on the following page

MLG BAY FIRE DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

MLG BAY FIRE DET

MLG BAY FIRE LOOP A(B) FAULT

Applicable to: ALL

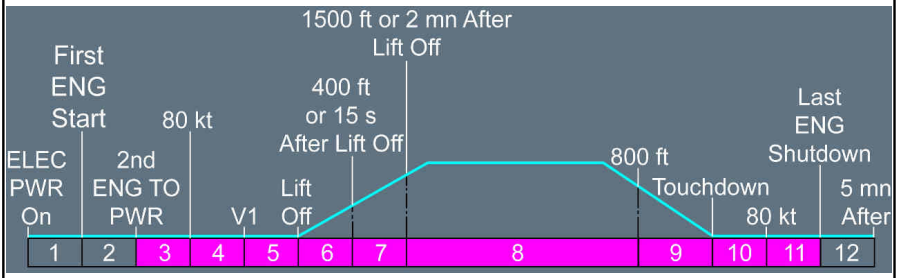
ANNUNCIATIONS

Triggering Conditions:

L2 The main landing gear bay fire detection loop A or B is failed. *Refer to DSC-26-40-10-10 MLG Fire Protection - Detection Logic*

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-26-2 MLG BAY FIRE LOOP A(B) FAULT*.

Crew awareness.

Continued on the following page

MLG BAY FIRE LOOP A(B) FAULT (Cont'd)

MORE INFO

REDUND LOSS

MLG BAY FIRE LOOP A(B)

SMOKE AFT AVNCS DET FAULT

Applicable to: ALL

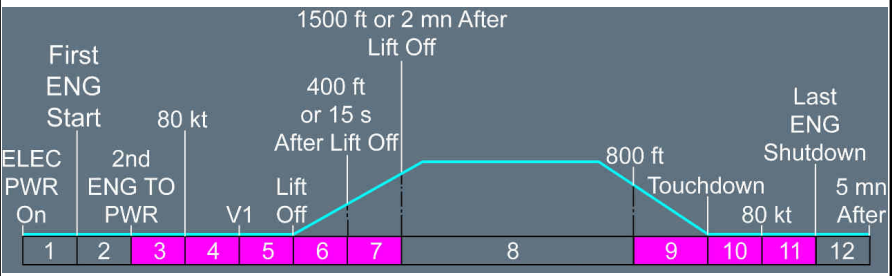
ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection in the aft avionics compartment is failed.

Indications:

Flight Phase Inhibition:



Crew awareness.

Continued on the following page

SMOKE AFT AVNCS DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

AFT AVNCS SMK DET

SMOKE AFT AVNCS SMOKE

Applicable to: ALL

ANNUNCIATIONS

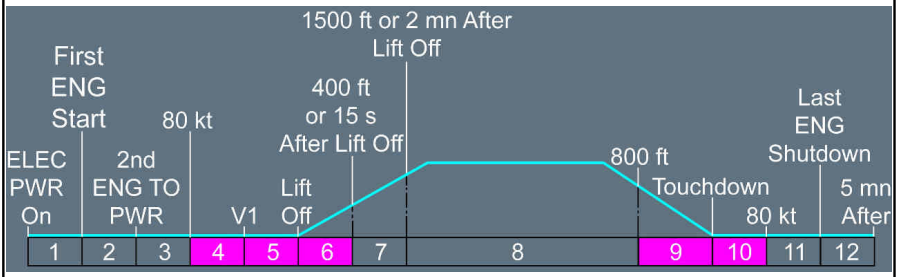
Triggering Conditions:

L2 Smoke is detected in the aft avionics compartment.

Indications:

Audio	Master Light	Local light	SD page
			
		AVNCS Light	COND SD Page

Flight Phase Inhibition:



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SMOKE AFT AVNCS SMOKE (Cont'd)

LAND ASAP

CAB FANS.....OFF

L2 *Switching OFF the recirculation cabin fans reduces the risk of the propagation of the smoke.*

L1 GALLEY.....OFF
SIGNS.....ON
CKPT / CABIN COM.....ESTABLISH
CREW OXY MASKS (IF RQRD).....USE / 100% / EMER

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

STATUS

INOP SYS

ALL PHASES

ALL PRIMARY CAB FANS

SMOKE AFT LWR CAB REST BTL 1(2) FAULT

Applicable to: ALL

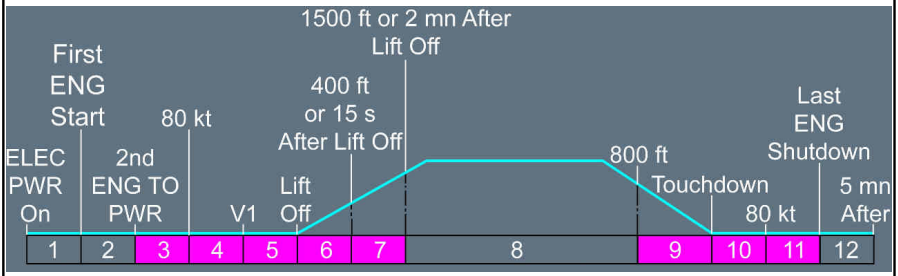
ANNUNCIATIONS

Triggering Conditions:

L2 The fire extinguishing bottle 1(2) in the aft lower deck cabin crew rest compartment is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-26-1 SMOKE AFT LWR CAB REST BTL 1 FAULT (If Installed)*
- *Refer to MEL/ME-ECAM-26-1 SMOKE AFT LWR CAB REST BTL 2 FAULT (If Installed)* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
AFT LWR REST BTL 1(2)

SMOKE AFT LWR CAB REST DET FAULT

Applicable to: ALL

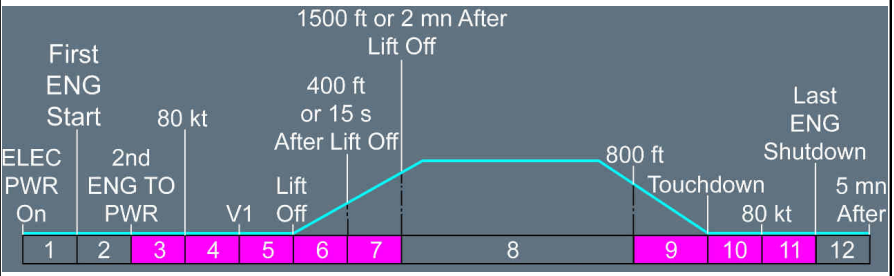
ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection in the aft lower deck cabin crew rest compartment is failed.

Indications:

Flight Phase Inhibition:



L2 For MEL dispatch conditions, *Refer to MEL/ME-ECAM-26-1 SMOKE AFT LWR CAB REST(LWR CCRC) DET FAULT (If Installed)* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

AFT LWR REST SMK DET

SMOKE AFT LWR CAB REST SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke is detected in the aft lower deck cabin crew rest compartment.

Indications:

Audio



Master Light

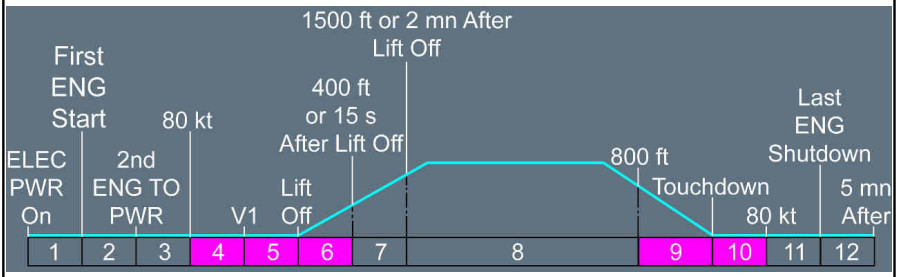


SD page



COND SD Page

Flight Phase Inhibition:



CAB FANS.....OFF

L2 *Switching OFF the recirculation cabin fans reduces the risk of the propagation of the smoke and extinguishing gas to other areas.*

L1 CKPT / CABIN COM..... ESTABLISH

● **IF FIRE PERSISTS :**

LAND ASAP..... CONSIDER

Continued on the following page

SMOKE AFT LWR CAB REST SMOKE (Cont'd)

STATUS

INOP SYS

ALL PHASES

ALL PRIMARY CAB FANS

SMOKE DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Smoke Detection Function (SDF) is failed.

Indications:

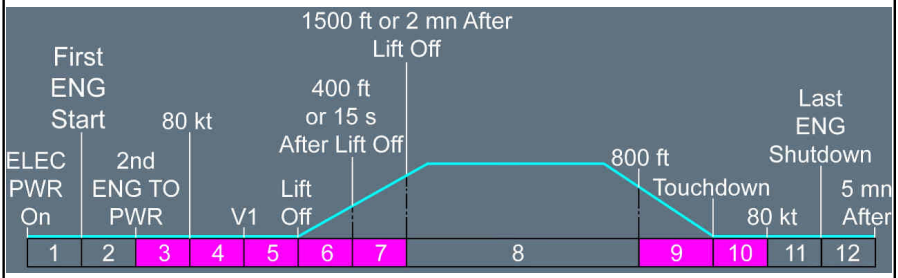
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

SMOKE DET FAULT (Cont'd)

L2 Smoke detection is lost in:
- The avionics compartments (including IFE Center and NSS)
- The cargo compartments
- The cabin areas.

IFEC.....OFF

● **IF NO LIVESTOCK :**
FWD ISOL VALVES..... OFF
BULK ISOL VALVES..... OFF
BULK CARGO HEATER.....OFF

STATUS

INOP SYS

ALL PHASES

ALL SMOKE DET
FWD CRG VENT
FWD CGR TEMP REGUL
BULK CRG VENT
BULK CRG HEATER

SMOKE IFE BAY DET FAULT

Applicable to: ALL

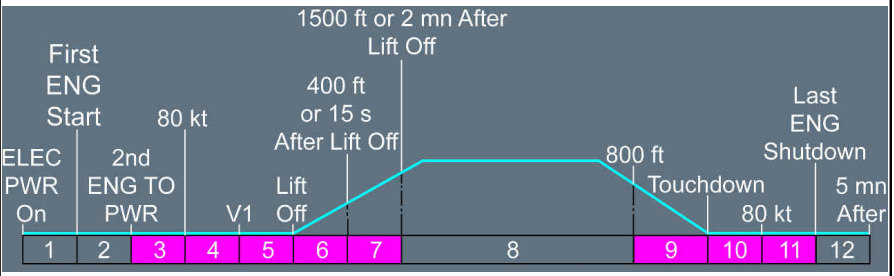
ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection in the In-Flight Entertainment center is failed.

Indications:

Flight Phase Inhibition:



IFEC.....OFF

STATUS

INOP SYS

ALL PHASES

IFE BAY SMK DET

SMOKE IFE BAY SMOKE

Applicable to: ALL

ANNUNCIATIONS

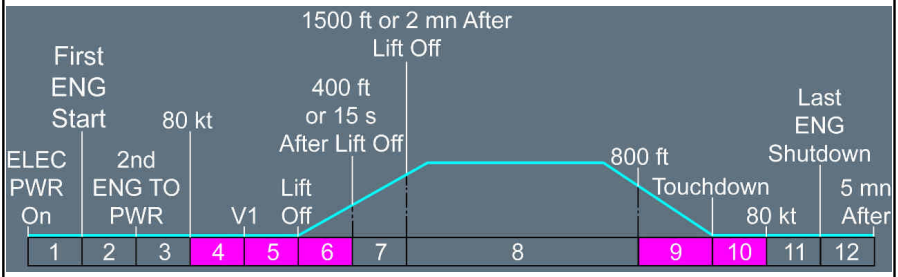
Triggering Conditions:

L2 Smoke is detected in the In-Flight Entertainment center.

Indications:

Audio	Master Light	Local light	SD page
			
		IFEC pb-sw	COND SD Page

Flight Phase Inhibition:



LAND ASAP

IFEC.....OFF
CKPT / CABIN COM..... ESTABLISH

Continued on the following page

SMOKE IFE BAY SMOKE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

SMOKE L(R) MAIN (UPPER) AVNCS DET FAULT

Applicable to: ALL

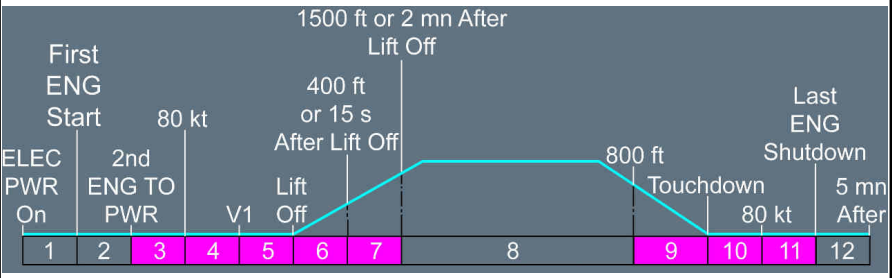
ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection in left (right) hand area of main (upper) avionics compartment is failed.

Indications:

Flight Phase Inhibition:



Crew awareness.

Continued on the following page

SMOKE L(R) MAIN (UPPER) AVNCS DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

L(R) MAIN (UPPR) AVNCS SMK DET

SMOKE L(R) MAIN AVNCS SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke is detected in the left (right) hand area of the main avionics compartment.

Indications:

Audio



Master Light



Local light



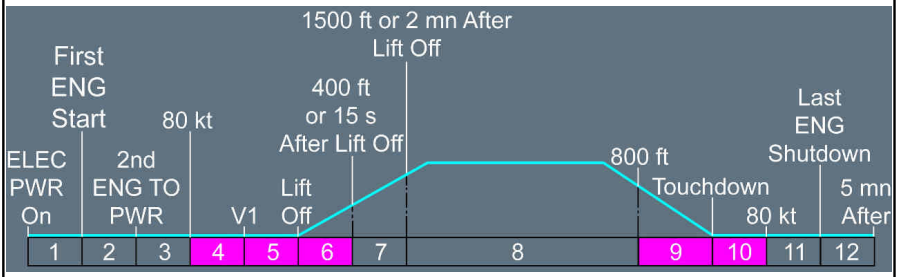
AVNCS Light

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

SMOKE L(R) MAIN AVNCS SMOKE (Cont'd)

LAND ASAP

CAB FANS.....OFF
GALLEY.....OFF
SIGNS.....ON
CKPT / CABIN COM..... ESTABLISH
CREW OXY MASKS (IF RQRD).....USE / 100% / EMER
[QRH] SMOKE/FUMES PROC.....APPLY

L2 *Refer to PRO-ABN-NECA-26-120 FIRE SMOKE/FUMES*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

STATUS

INOP SYS

ALL PHASES

ALL PRIMARY CAB FANS

SMOKE L(R) UPPER AVNCS SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke is detected in the left (right) hand area of the upper avionics compartment.

Indications:

Audio



Master Light



Local light



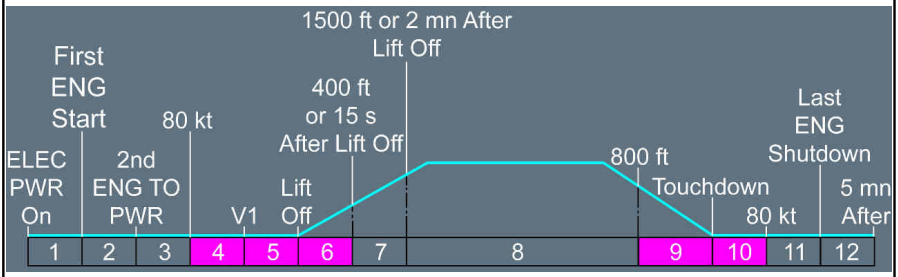
AVNCS Light

SD page



COND SD Page

Flight Phase Inhibition:



Continued on the following page

SMOKE L(R) UPPER AVNCS SMOKE (Cont'd)

LAND ASAP

CAB FANS.....OFF
GALLEY.....OFF

- **If L UPPER AVNCS compartment affected :**
  NSS MASTER.....OFF

SIGNS.....ON
CKPT / CABIN COM.....ESTABLISH
CREW OXY MASKS (IF RQRD).....USE / 100% / EMER

- **IF SMOKE PERSISTS :**
  [QRH] SMOKE / FUMES PROC.....APPLY

L2 *Refer to PRO-ABN-NECA-26-120 FIRE SMOKE/FUMES*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

STATUS

INOP SYS

ALL PHASES

ALL PRIMARY CAB FANS

SMOKE FACILITIES DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 SDF does not detect the correct cabin configuration and the smoke detectors in the cabin.

Indications:

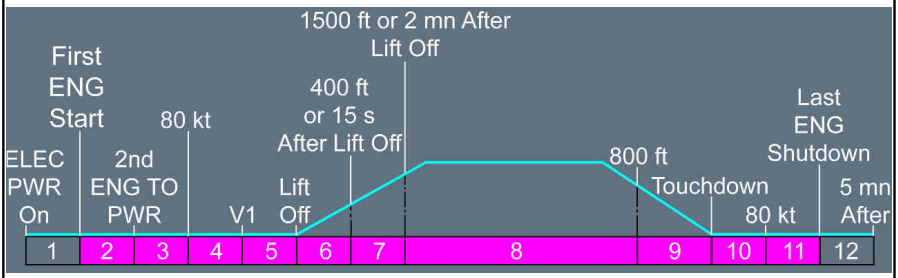
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch condition, *Refer to MEL/ME-ECAM-26-1 SMOKE FACILITIES DET FAULT*

CKPT / CABIN COM..... ESTABLISH

STATUS

INOP SYS

ALL PHASES

FACILITIES SMK DET

SMOKE FLT REST DET FAULT

Applicable to: ALL

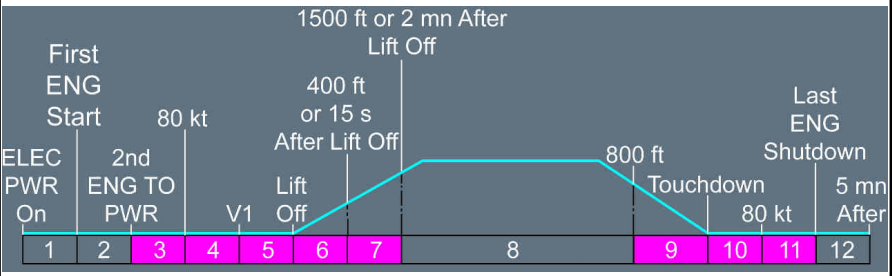
ANNUNCIATIONS

Triggering Conditions:

L2 The smoke detection in flight crew rest compartment 1 or 2 is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-26-1 SMOKE FLT REST(FWD FCRCUP)(FWD FCRCDN) DET FAULT (If Installed)* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

FLT REST SMK DET

SMOKE FLT REST SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke is detected in flight crew rest compartment 1 or 2.

Indications:

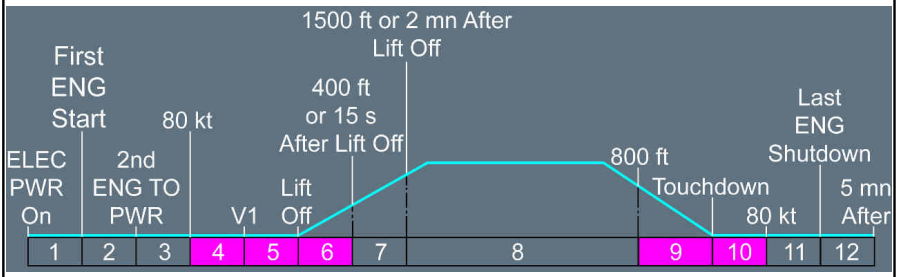
Audio



Master Light



Flight Phase Inhibition:



CKPT / CABIN COM..... ESTABLISH

SMOKE FWD (AFT) CARGO BOTTLES FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FWD (AFT) position of the diverter valve is failed.

Indications:

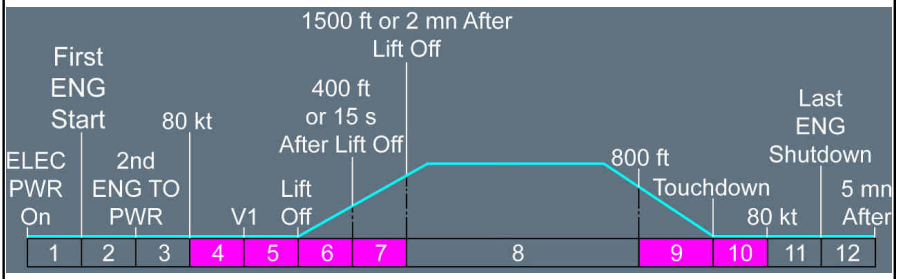
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

STATUS

INOP SYS

ALL PHASES

FWD (AFT) CARGO BTLs

SMOKE FWD (AFT/BULK) CARGO SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke is detected in the forward (aft/bulk) cargo compartment.

Indications:

Audio



Master Light



Local light



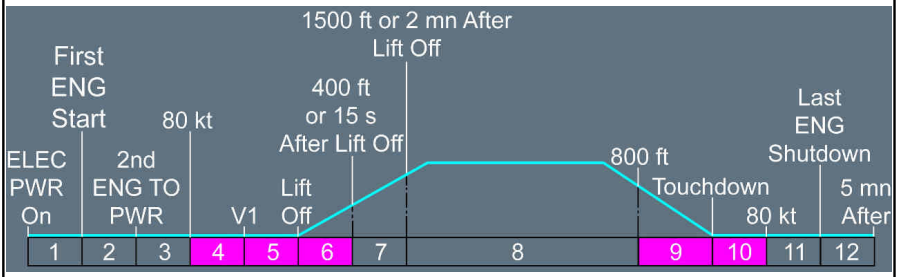
AGENT TO FWD (AFT) pb

SD page



COND SD Page

Flight Phase Inhibition:



L2 Expect the SMOKE warning to remain after agent discharge, even if the smoke source is extinguished. Gases from the smoke source are not evacuated and smoke detectors are sensitive to the extinguishing agent, as well.
Once isolation valves are closed, the cargo is no more ventilated; cargo temperature is no more reliable.

Continued on the following page

SMOKE FWD (AFT/BULK) CARGO SMOKE (Cont'd)

LAND ASAP

- **If smoke is detected in FWD :**
  FWD ISOL VALVES..... OFF
- **If smoke is detected in AFT/BULK :**
  BULK ISOL VALVES..... OFF
- **When all engines are shut down :**
  - **IF FWD (AFT+BULK) CRG CLOSED :**
    AGENT TO FWD (AFT)..... DISCH

L2 *If the SMOKE warning is displayed on ground with cargo compartment door open, do not initiate AGENT TO FWD (AFT) ... DISCH . Request that ground crew investigates and eliminates the smoke source. This warning may be due to humidity high level or insecticide spraying: In this case, when the warning disappears, the flight crew can perform a VCS 1 and 2 reset to enable cargo ventilation. For more information on this reset, Refer to PRO-SUP-24-21-20 Ventilation Control System (VCS) 1(2) Reset .*

L1 ■ **When at least one engine running :**
AGENT TO FWD (AFT)..... DISCH

CAB FANS..... OFF

L2 *The flight crew should switch off the cabin fans to avoid smoke propagation.*

L1 ● **If smoke is detected in AFT/BULK :**
BULK CARGO HEATER..... OFF

SIGNS..... ON
CKPT / CABIN COM..... ESTABLISH
LOWER CAB REST..... EVACUATE
LOWER CAB REST DOORS..... CLOSE

- **On ground :**
  BEFORE CARGO DOOR OPENING : PAX DISEMBARK

L2 *Note: Order the ground crew not to open the door of the affected cargo compartment unless the passengers have disembarked and fire services are present.*

Continued on the following page

SMOKE FWD (AFT/BULK) CARGO SMOKE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

STATUS

INOP SYS

ALL PHASES

FWD CRG VENT (If forward compartment is affected)
FWD CRG TEMP REGUL (If forward compartment is affected)
BULK CRG VENT (If aft/bulk compartment is affected)
BULK CRG HEATER (If aft/bulk compartment is affected)

SMOKE FWD (AFT/BULK) CARGO DET FAULT

Applicable to: ALL

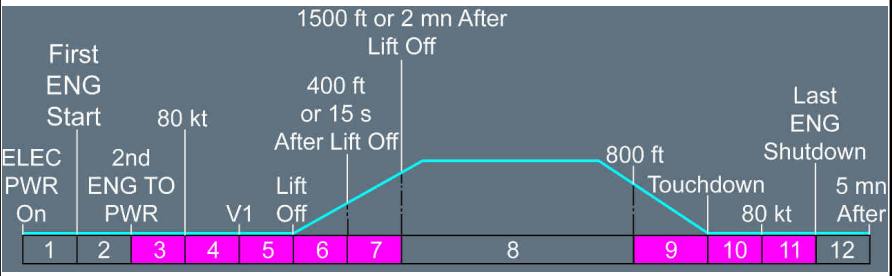
ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection in forward (aft/bulk) cargo compartment is failed.

Indications:

Flight Phase Inhibition:



- **IF NO LIVESTOCK :**
  - **For AFT/BULK alert :**
    BULK ISOL VALVES.....OFF
    BULK CARGO HEATER.....OFF
  - **For FWD alert :**
    FWD ISOL VALVES.....OFF

Continued on the following page

SMOKE FWD (AFT/BULK) CARGO DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FWD (AFT) CARGO SMK DET
FWD CRG VENT (If smoke detection is lost in forward cargo compartment)
FWD CRG TEMP REGUL (If smoke detection is lost in forward cargo compartment)
BULK CRG VENT (If smoke detection is lost in aft/bulk cargo compartment)
BULK CRG HEATER (If smoke detection is lost in aft/bulk cargo compartment)

SMOKE FWD+AFT CARGOS BOTTLES FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- The system that controls the fire extinguishing bottles is failed, or
- The diverter valve that directs the extinguisher agent to either the forward or the aft/bulk cargo compartment is failed.

Indications:

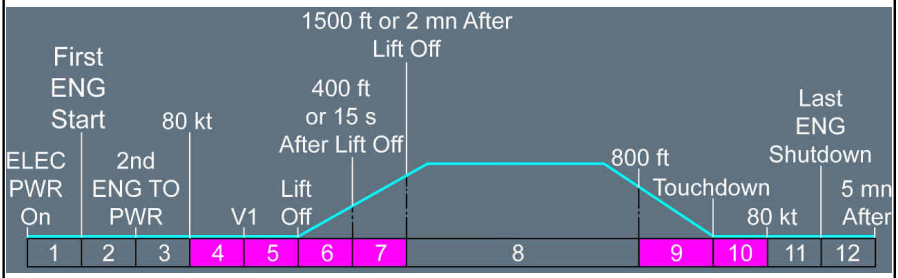
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

STATUS

INOP SYS

ALL PHASES	
FWD CARGO BTLs	
AFT CARGO BTLs	

SMOKE FWD+AFT CARGOS BTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Fire extinguishing bottle 1(2) of the cargo compartments is failed.

Indications:

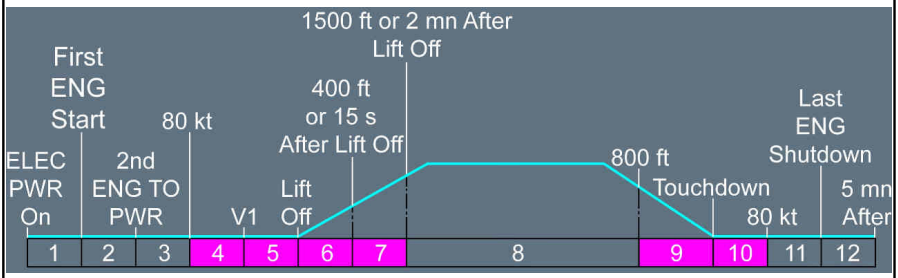
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

STATUS

INOP SYS

ALL PHASES

FWD+AFT CRGs BTL 1(2)

SMOKE MAIN (UPPER) (LOWER) DECK LAVATORY DET FAULT

Applicable to: ALL

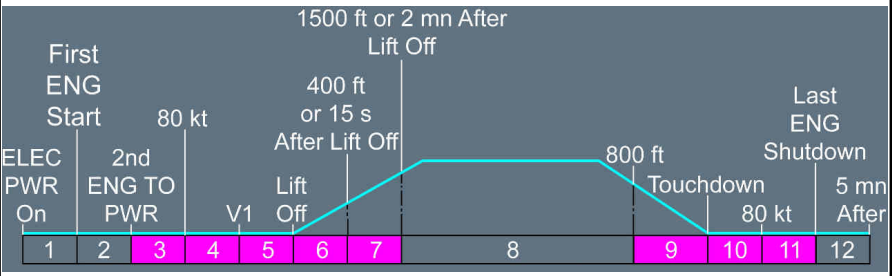
ANNUNCIATIONS

Triggering Conditions:

L2 The smoke detection in a main (upper) (lower) deck lavatory is failed.

Indications:

Flight Phase Inhibition:



Crew awareness.

STATUS

INOP SYS

ALL PHASES

MAIN (UPPER)(LOWER) LAV SMK DET

SMOKE MAIN (UPPER) (LOWER) DECK LAVATORY SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke is detected in a lavatory of the main (upper) (lower) deck.

Indications:

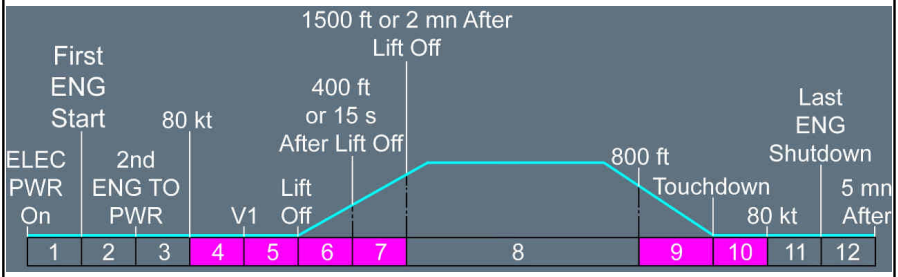
Audio



Master Light



Flight Phase Inhibition:



CKPT / CABIN COM..... ESTABLISH

SMOKE MAIN(UPPER) XX CWS(RCC) DET FAULT

Applicable to: ALL

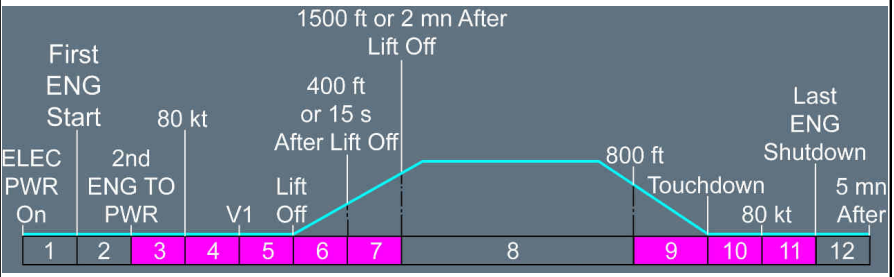
ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection is failed in the corresponding In-Flight Entertainment (IFE) control center.
For more information on the IFE control centers, *Refer to CCOM/In-Flight Entertainment System / IFE Control Centers / Overview*

Indications:

Flight Phase Inhibition:



XX means 1L or 3R and indicates the location of the affected Cabin Work Station (CWS) or Remote Control Center (RCC).

CKPT / CABIN COM..... ESTABLISH

STATUS

INOP SYS

ALL PHASES

M1L(U1L)(U3R) CWS(CWS)(RCC) SMK DET

SMOKE MAIN(UPPER) XX CWS(RCC) SMOKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Smoke detection is failed in the corresponding In-Flight Entertainment (IFE) control center. For more information on the IFE control centers, *Refer to CCOM/In-Flight Entertainment System / IFE Control Centers / Overview*

Indications:

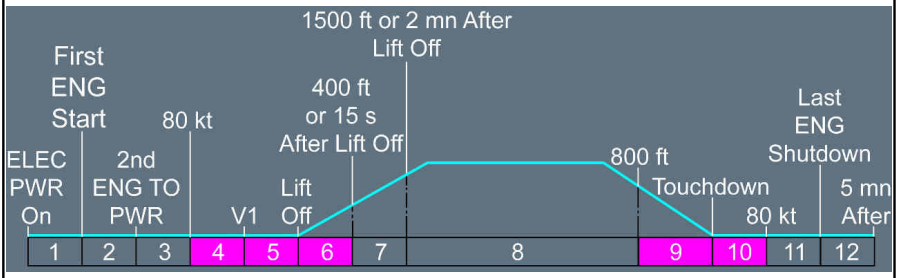
Audio



Master Light



Flight Phase Inhibition:



XX means 1L or 3R and indicates the location of the affected Cabin Work Station (CWS) or Remote Control Centre (RCC).

CKPT / CABIN COM..... ESTABLISH

SMOKE SAFETY TEST REQUIRED

Applicable to: ALL

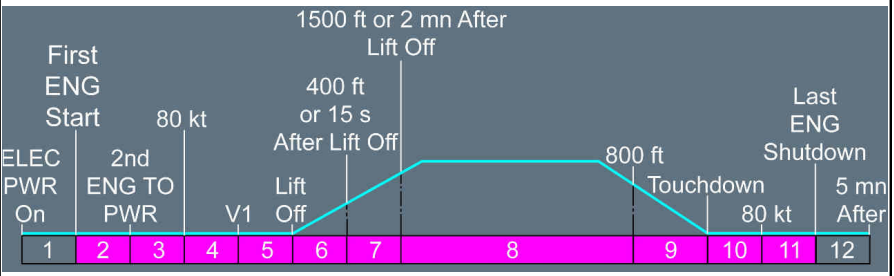
ANNUNCIATIONS

Triggering Conditions:

L2 The SDF did not perform an automatic safety test in the last 50 h.

Indications:

Flight Phase Inhibition:



L2 On ground, the SDF performs an automatic safety test every 10 h .
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-26-1 SMOKE DET SAFETY TEST REQUIRED* .

FIRE SMOKE/FUMES

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the SMOKE/FUMES procedure.

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

LAND ASAP

CAB FANS.....OFF
GALLEY.....OFF
SIGNS.....ON
CKPT / CABIN COM..... ESTABLISH
CREW OXY MASKS (IF RQRD).....ON / 100% / EMER
[QRH] SMOKE/FUMES PROC.....APPLY

Refer to PRO-ABN-NECA-26-120 FIRE SMOKE/FUMES

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ASAP

LIMITATIONS ON PFD

ALL PHASES

LAND ASAP

STATUS

INOP SYS

ALL PHASES

ALL PRIMARY CAB FANS

Intentionally left blank

27-Flight Controls

CONFIG L(R) SIDESTICK FAULT (BY TAKE-OVER)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The L(R) sidestick is deactivated (because the take over pb on the opposite sidestick has been pressed for more than 30 s), when the TO CONFIG pb on the ECP is pressed, or when the thrust levers are set to FLEX or TOGA.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L(R) TAKEOVER..... DEPRESS

L2 *The sidestick priority is released by pressing on either sidestick pb.*

CONFIG PITCH TRIM NOT IN T.O RANGE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pitch trim is not in the green band, when the T.O CONFIG pb.on the ECP is pressed, or when the thrust levers are set to FLEX or TOGA.

Indications:

Audio



Master Light

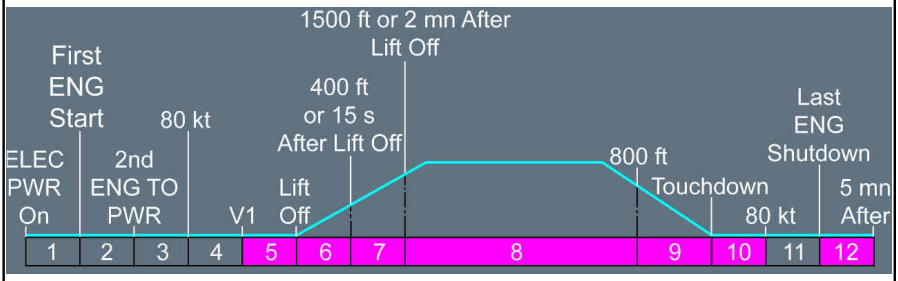


SD page



F/CTL SD Page

Flight Phase Inhibition:



Crew awareness.

CONFIG RUDDER TRIM NOT IN T.O RANGE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The rudder trim is not in the takeoff range, when the TO CONFIG pb of the ECP is pressed, or when the thrust levers are set to TOGA or FLEX.

Indications:

Audio



Master Light

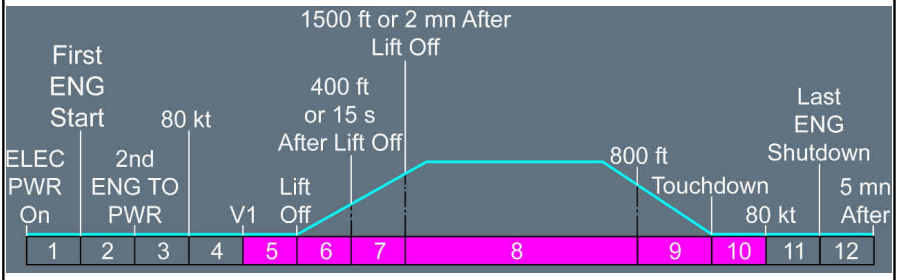


SD page



F/CTL SD Page

Flight Phase Inhibition:



Crew awareness.

CONFIG SPEED BRAKES NOT RETRACTED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The speed brakes are not retracted, when the TO CONFIG pb of the ECP is pressed, or when the thrust levers are set to FLEX or TOGA.

Indications:

Audio



Master Light

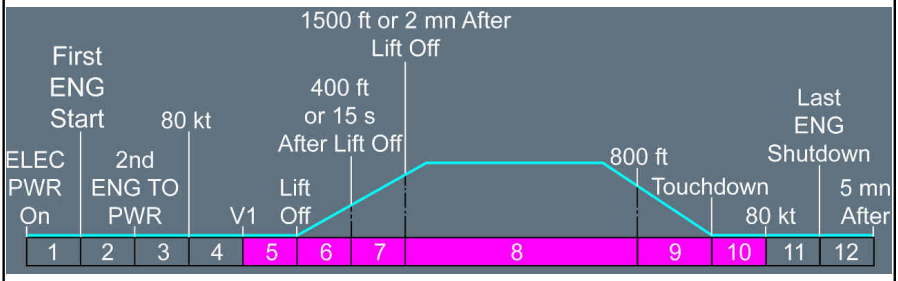


SD page



F/CTL SD Page

Flight Phase Inhibition:



Crew awareness.

F/CTL AILERON ACTUATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- One actuator of one aileron is failed, or
- There is a discrepancy between two position sensors on at least one aileron.

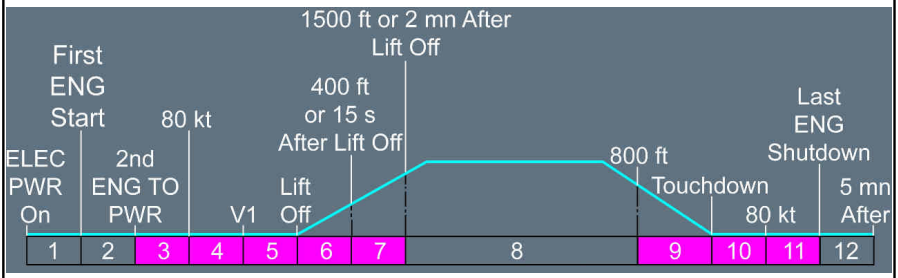
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Each aileron has two actuators (For more information: *Refer to DSC-27-10-10 Roll Control*).
When one actuator fails, the aileron remains fully functional.
For associated MEL dispatch conditions, refer to *Refer to MEL/ME-ECAM-27-1 F/CTL AILERON ACTUATOR FAULT* .

- **If there is a discrepancy between two position sensors on at least one aileron:**
  POSITION DISAGREE

Crew awareness.

Continued on the following page

F/CTL AILERON ACTUATOR FAULT (Cont'd)

L12

STATUS

INFO

- If there is a discrepancy between two position sensors on at least one aileron:
  FUEL CONSUMPT INCRSD : FMS PRED DISREGARD
  The affected aileron might be in a position that creates additional drag, and therefore increases fuel consumption.

F/CTL AILERON ELEC ACTUATOR FAULT

Applicable to: ALL

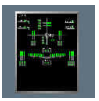
ANNUNCIATIONS

Triggering Conditions:

L2 One EHA of one aileron is failed.

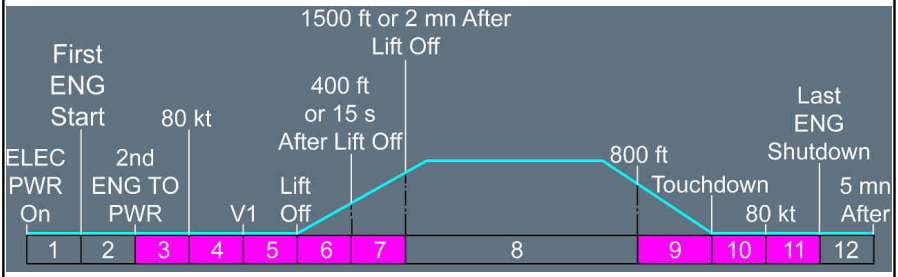
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Each mid and inner aileron has a conventional actuator and an EHA . In normal operations, when the hydraulic systems are available, the conventional actuator is active. The EHA is a redundancy. For associated MEL dispatch conditions, refer to *Refer to MEL/ME-ECAM-27-1 F/CTL AILERON ELEC ACTUATOR FAULT* .

Crew awareness.

F/CTL ALTN LAW (PROT LOST)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The alternate law is active.

Indications:

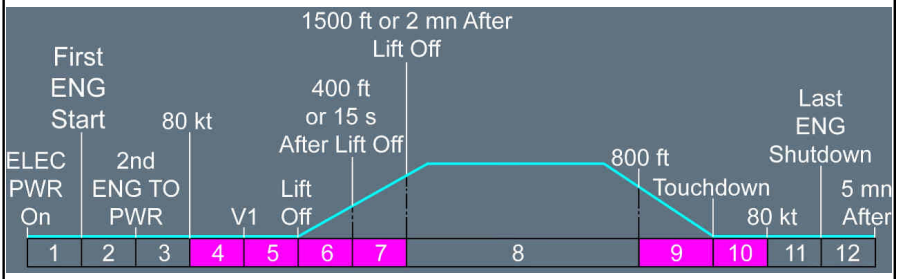
Audio



Master Light



Flight Phase Inhibition:



L2 For the list of failures leading to alternate law: *Refer to Flight Control Law Reconfiguraton* .
For information on the alternate law's characteristics: *Refer to DSC-27-10-40-DSC271040A Alternate Law* .
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL ALTN LAW (PROT LOST)* .

- **Depending on the initial failure, the following limitation may appear:**

  MAX SPEED : 310 KT

  L2 *The limitation is not applicable in ALT 1A.*
  Speed is limited due to the degraded high speed protection.

Continued on the following page

F/CTL ALTN LAW (PROT LOST) (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310 KT

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 310 KT

L13

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
AP 1+2 (Depending on the failure case:)
FD 1+2 (Depending on the failure case:)
APs and FDs are lost in ALT 1C and ALT 2.

APPR & LDG

CAT 2
GLS AUTOLAND

INFO

ALTN LAW : PROT LOST

L13

MORE INFO

REDUND LOSS

- If the failure that leads to the reversion in alternate law has no associated alert: F/CTL REDUNDANCY

The following failures have no associated alert but lead to a reversion in alternate law:
- Sideslip disagree

Continued on the following page

F/CTL ALTN LAW (PROT LOST) (Cont'd)

- *IR data disagree*
- *Accelerometer failures*

F/CTL DIRECT LAW

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The direct law is active.

Indications:

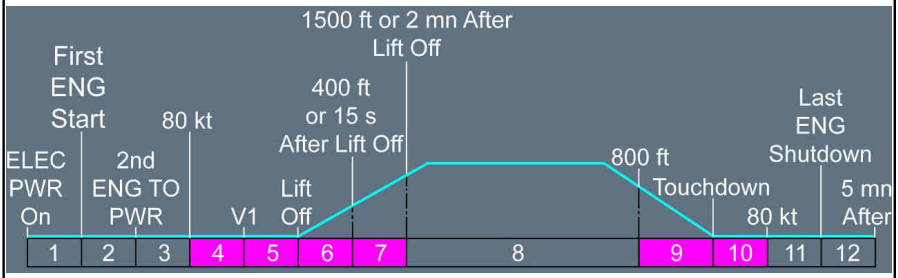
Audio



Master Light



Flight Phase Inhibition:



L2 For the list of failures leading to direct law: *Refer to Flight Control Law Reconfiguraton* .
For information on the direct law's characteristics: *Refer to DSC-27-10-40 Direct Law* .
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL DIRECT LAW (PROT LOST)* .

Continued on the following page

F/CTL DIRECT LAW (Cont'd)

MAX SPEED : 310/.86
MANEUVER WITH CARE

- **If all PRIMs are failed:**
  AFS CTL PNL KNOB AVAIL FOR BUG SETTING

L2 *The indications on the AFS CP become blank. However, the SPD/MACH knob, the HDG/TRK knob and the ALT knob remain available. The flight crew can select speed target, heading target, and altitude target with the AFS CP, or with the AFS CP backup (after activation).*

L1 - **If all the flight control computers are failed:**
  F/CTL BKUP CTL ACTIVE

Continued on the following page

F/CTL DIRECT LAW (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

MAX SPEED : 310/.86
MANEUVER WITH CARE

LIMITATIONS ON PFD

APPR & LDG

MAX SPEED : 310/.86
MANEUVER WITH CARE

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
LOAD ALLEVIATION
AP 1+2
FD 1+2

APPR & LDG

CAT 2
GLS AUTOLAND

INFO

DIRECT LAW : PROT LOST
- If all the flight control computers are failed
  F/CTL BKUP CTL ACTIVE

F/CTL DOUBLE ELEVATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Two of the four elevators are failed.

Indications:

Audio



Master Light

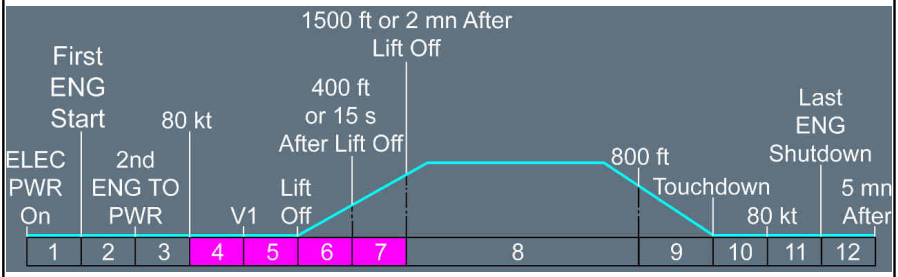


SD page



F/CTL SD Page

Flight Phase Inhibition:



L3 If they are not jammed, the elevators that are failed move to their zero hinge moment position.

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL DOUBLE ELEVATOR FAULT*.

Continued on the following page

F/CTL DOUBLE ELEVATOR FAULT (Cont'd)

- **If the left(right) outer elevator is failed and jammed, and the slats or flaps are not at 0 ° :**
  - **WHEN ACFT STABLE :**
    L(R) OUTR ELEVR POSITION..... CHECK
    - **IF L(R)(L+R) OUTR ELEVATOR POS NOT AT 0°:**
      MAX SPEED : 200 KT

LDG PERF AFFECTED

L2 *Approach speed is increased to compensate for the degraded pitch control.*

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and ATHR remain available.
Pitch manoeuvrability is significantly reduced but remains sufficient.

Continued on the following page

F/CTL DOUBLE ELEVATOR FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	APPR & LDG
• If an outer elevator is failed and jammed, and its position is not at 0°: MAX SPEED : 200KT	LDG PERF AFFECTED

LIMITATIONS ON PFD

ALL PHASES
• If an outer elevator is failed and jammed, and its position is not at 0°: MAX SPEED : 200KT

L12

DEFERRED PROC

APPROACH

LDG PERF COMPUTATION..... CONFIRM
INITIATE FLARE AT 50FT

Because of the degraded pitch control, the flight crew must anticipate the flare.

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F/CTL PROT L(R) INR(OUTR) ELEVATOR	BTV CAT 2 GLS AUTOLAND

INFO

ALTN LAW : PROT LOST

Continued on the following page

F/CTL DOUBLE ELEVATOR FAULT (Cont'd)

FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Fuel consumption is increased by approximately 3%. FMS predictions are not correct.

F/CTL DOUBLE RUDDER PRESSURE SENSOR FAULT

Applicable to: ALL

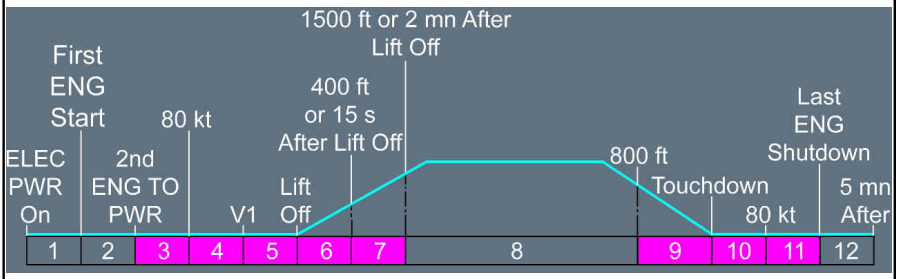
ANNUNCIATIONS

Triggering Conditions:

L2 During takeoff, approach and landing, both actuators of a rudder simultaneously control the surface. Because of the failure of a rudder pressure sensor on each rudder, only one actuator can control each rudder.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL DOUBLE RUDDER PRESSURE SENSOR FAULT* .

Crew awareness.

F/CTL ELEVATOR ACTUATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One actuator of one elevator is failed.

Indications:

Audio



Master Light

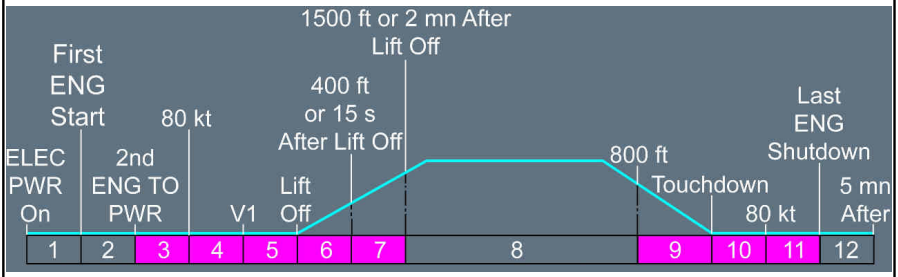


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Each elevator has two actuators (For more information: *Refer to DSC-27-10-10 Pitch control*).
When one actuator fails, the elevator remains fully functional.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL ELEVATOR ACTUATOR FAULT* .

Crew awareness.

F/CTL ELEVATOR ELEC ACTUATOR FAULT

Applicable to: ALL

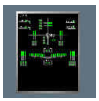
ANNUNCIATIONS

Triggering Conditions:

L2 One EHA of one elevator is failed.

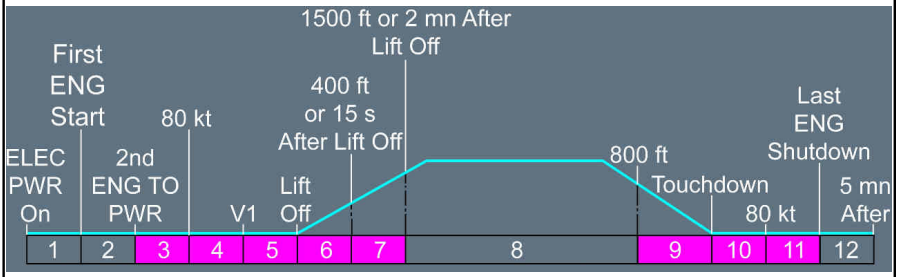
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Each elevator has a conventional actuator and an EHA . In normal operations, when the hydraulic systems are available, the conventional actuator is active. The EHA is a redundancy.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL ELEVATOR ELEC ACTUATOR FAULT* .

Crew awareness.

F/CTL FCDC 1(2) FAULT

Applicable to: ALL

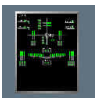
ANNUNCIATIONS

Triggering Conditions:

L2 FCDC 1(2) is failed.

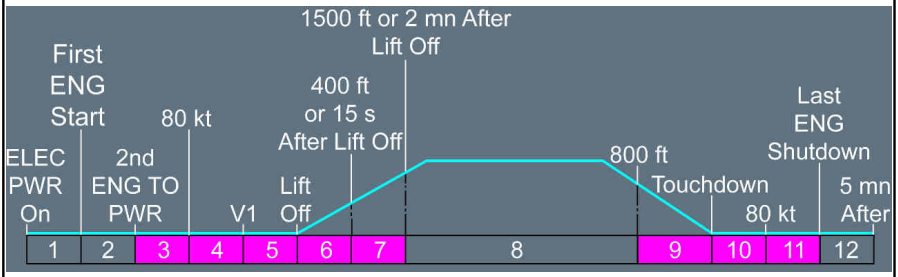
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL FCDC 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL FCDC 2 FAULT* .

Crew awareness.

Continued on the following page

F/CTL FCDC 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

MORE INFO

REDUND LOSS

FCDC 1(2)

F/CTL FCDC 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both FCDC are failed.

Indications:

Audio



Master Light

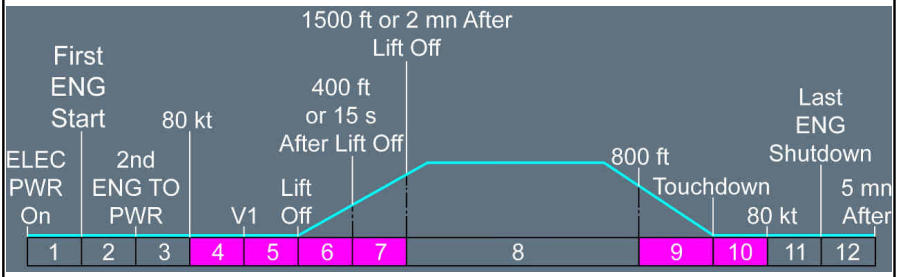


SD page



F/CTL SD Page

Flight Phase Inhibition:



Continued on the following page

F/CTL FCDC 1+2 FAULT (Cont'd)

L2 The FCDC s acquire data from the PRIMs and SECs for:
- The Flight Warning System (FWS)
- The FCTL system display.

Therefore, if both FCDC s are failed:
- All the F/CTL and AUTO FLT alerts can no longer be triggered

  Note: OVERSPEED , STALL and AUTO FLT AP OFF warnings remain available.

- All indications on the F/CTL system display are lost (replaced by amber crosses). Only the status of the slats/flaps control units remain available.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL FCDC 1+2 FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES	APPR & LDG
FCDC 1+2	CAT 2 GLS AUTOLAND

INFO

F/CTL INDICATIONS LOST

F/CTL GND SPLR s FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This caution is triggered when the ground spoiler function is lost.
The caution is triggered when the PRIM s do not have enough information (e.g. wheel speed) to extend the ground spoilers (*Refer to DSC-27-10-10-30 Speedbrake and ground spoiler control*).
The speed brake function remains available.

Indications:

Audio



Master Light

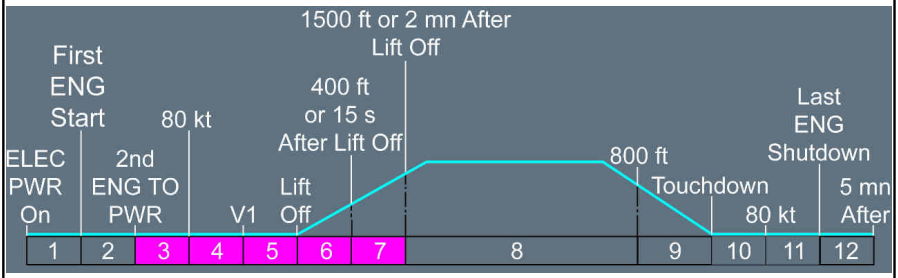


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL GND SPLRs FAULT* .

Continued on the following page

F/CTL GND SPLR s FAULT (Cont'd)

LDG DIST AFFECTED
AUTO BRK : DO NOT USE

L2 *The flight crew can arm the AUTO BRK via the AUTO BRK MODE selector.*
However, the AUTO BRK will not activate because the ground spoilers will not extend at landing.

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED AUTO BRK : DO NOT USE

DEFERRED PROC

APPROACH
LDG DIST COMPUTATION.....CONFIRM

STATUS

INOP SYS

	APPR & LDG
	GND SPLRs BTV RWY OVERRUN PROT CAT 2

F/CTL GND SPLRs NOT ARMED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

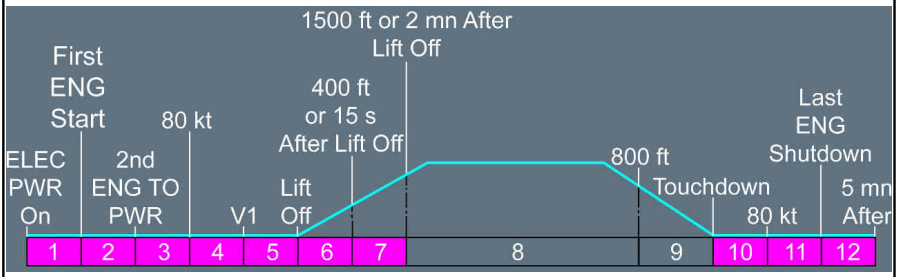
L2 The aircraft is below 500 ft RA for landing, and the ground spoilers are not armed.

Indications:

Audio



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL GND SPLRs NOT ARMED* .

Crew awareness.

F/CTL LOAD ALLEVIATION FAULT

Applicable to: ALL

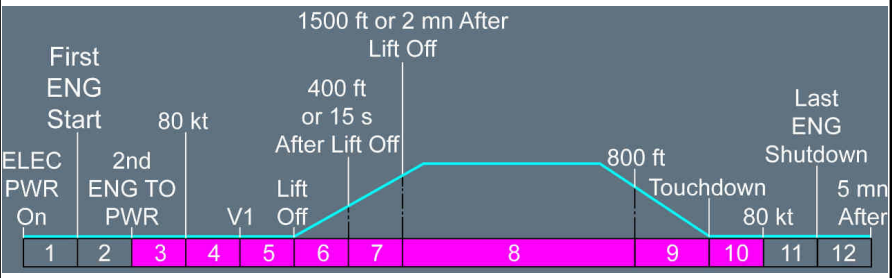
ANNUNCIATIONS

Triggering Conditions:

L2 The load alleviation function (LAF) is failed. *Refer to DSC-27-10-30 Load Alleviation Function*
L3 Two out of three accelerometers used for the LAF are failed in one wing.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL LOAD ALLEVIATION FAULT* .

Crew awareness

STATUS

INOP SYS

ALL PHASES

LOAD ALLEVIATION

F/CTL L(R) INR(MID)(OUTR) AILERON FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 An aileron is failed.

Indications:

Audio



Master Light

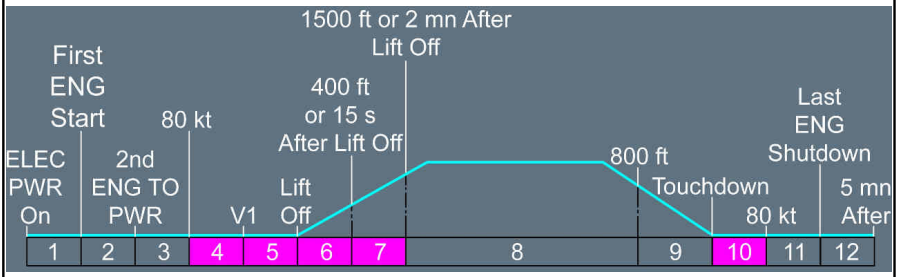


SD page



F/CTL SD Page

Flight Phase Inhibition:



L3 The aileron that is failed moves to its zero hinge moment position.

L2 In the case of the loss of two pairs of ailerons, the flight control laws revert to Alternate 1. AP , FD and ATHR remain available.

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL L(R) INR AILERON FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL L(R) MID AILERON FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL L(R) OUTR AILERON FAULT* .

Continued on the following page

F/CTL L(R) INR(MID)(OUTR) AILERON FAULT (Cont'd)

LDG DIST AFFECTED

L2 *The landing distance is increased due to the loss of one aileron used as a ground spoiler.*

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

L12

STATUS

INOP SYS

ALL PHASES	**APPR & LDG**
L(R) INR(MID)(OUTR) AILERON	BTV

INFO

FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Fuel consumption is increased and FMS predictions are not correct.

- *If the aileron is not fully extended upwards (zero-hinge moment position), fuel consumption is increased by approximately 8%*
- *If the aileron is fully extended (upwards or downwards), fuel consumption is increased by more than 25%.*

To optimize fuel consumption:

- *Set Cost Index (CI) to 0 and use managed speed*
- *Fly within 4 000 ft of the optimum flight level of the FMS.*

In this case, fuel consumption is increased by approximately 18%.

LDG DIST COEF < 1.40 ON DRY RUNWAY

F/CTL L(R) SIDESTICK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The left (right) sidestick is failed.

Indications:

Audio



Master Light

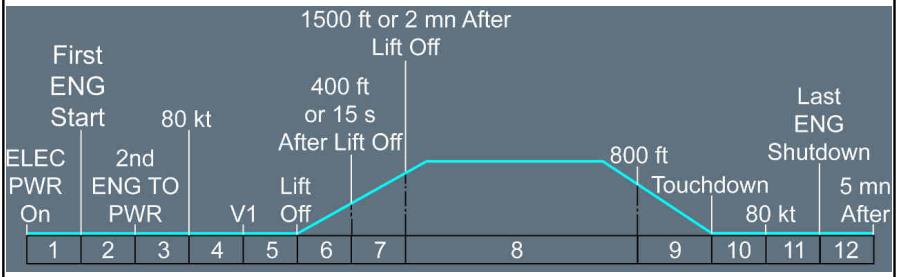


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL L(R) SIDESTICK FAULT*.

Crew awareness.

Continued on the following page

F/CTL L(R) SIDESTICK FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

L(R) SIDESTICK

F/CTL PART (MOST) SPLRs FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- PART SPLRs : Between one and eight spoilers are failed
- MOST SPLRs : More than nine spoilers are failed;

Indications:

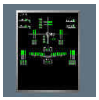
Audio



Master Light

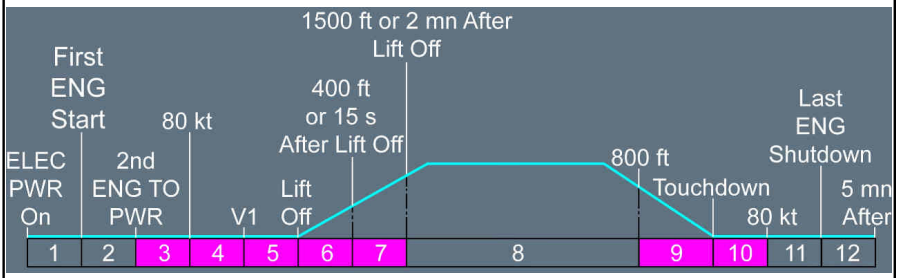


SD page



F/CTL SD Page

Flight Phase Inhibition:



Continued on the following page

F/CTL PART (MOST) SPLRs FAULT (Cont'd)

L2 If a spoiler is failed, the symmetric spoiler is inhibited, except for spoilers 5 and 6 (EBHA s).

After the failure, the spoiler:
- Remains retracted if it was retracted before the failure
- Retracts, if its associated flight control computer is failed
- Retracts to zero hinge moment position, if its associated power supply is lost.

L3 An anti-extension device stops the spoiler from extending.

L2 In case of the loss of four pairs of roll spoilers (spoilers 3 to 8), the flight control laws revert to Alternate 1. AP , FD and ATHR remain available.

For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-27-1 F/CTL PART SPLRs FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL MOST SPLRs FAULT* .

● **During taxi-in, one minute after the FLAPS lever is set to 0:**

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers.*
When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.

L1 LDG DIST AFFECTED

● **If at least four pairs of roll spoilers (spoilers 3 to 8) are failed:**

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and ATHR remain available.

Continued on the following page

F/CTL PART (MOST) SPLRs FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

LDG DIST AFFECTED

DEFERRED PROC

APPROACH

- **In the case of F/CTL MOST SPLRs FAULT:**
  LDG DIST COMPUTATION ..... CONFIRM

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT (If at least four pairs of roll spoilers (spoilers 3 to 8) are failed:)
PART(MOST) SPLRs

APPR & LDG

BTV
CAT 2 (If at least four pairs of roll spoilers (spoilers 3 to 8) are failed:)
GLS AUTOLAND

INFO

- If at least four pairs of roll spoilers (spoilers 3 to 8) are failed:
  ALTN LAW : PROT LOST
- If at least one spoiler is lost and not retracted:
  FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

  If at least one spoiler is lost and not retracted, fuel consumption is increased and FMS predictions are not correct.

- *If one spoiler is partially extended (zero-hinge moment position), fuel consumption is increased by approximately 2.5%*
- *If a pair of spoilers is partially extended (zero-hinge moment position), fuel consumption is increased by approximately 5%*

Continued on the following page

F/CTL PART (MOST) SPLRs FAULT (Cont'd)

- *If a spoiler is fully extended, fuel consumption is increased by more than 30%.*

  To optimize fuel consumption:
  - *Set Cost Index (CI) to 0 and use managed speed*
  - *Fly within 4 000 ft of the optimum flight level of the FMS.*

  In this case, fuel consumption is increased by approximately 27%.
- *If a pair of spoilers is fully extended, fuel consumption is increased by more than 45%.*

  To optimize fuel consumption:
  - *Set Cost Index (CI) to 0 and use managed speed*
  - *Fly within 4 000 ft of the optimum flight level of the FMS.*

  In this case, fuel consumption is increased by approximately 38%.

- In the case of F/CTL PART SPLRs FAULT:
  LDG DIST COEF < 1.50 ON DRY RUNWAY

F/CTL PITCH TRIM/FMS/CG DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

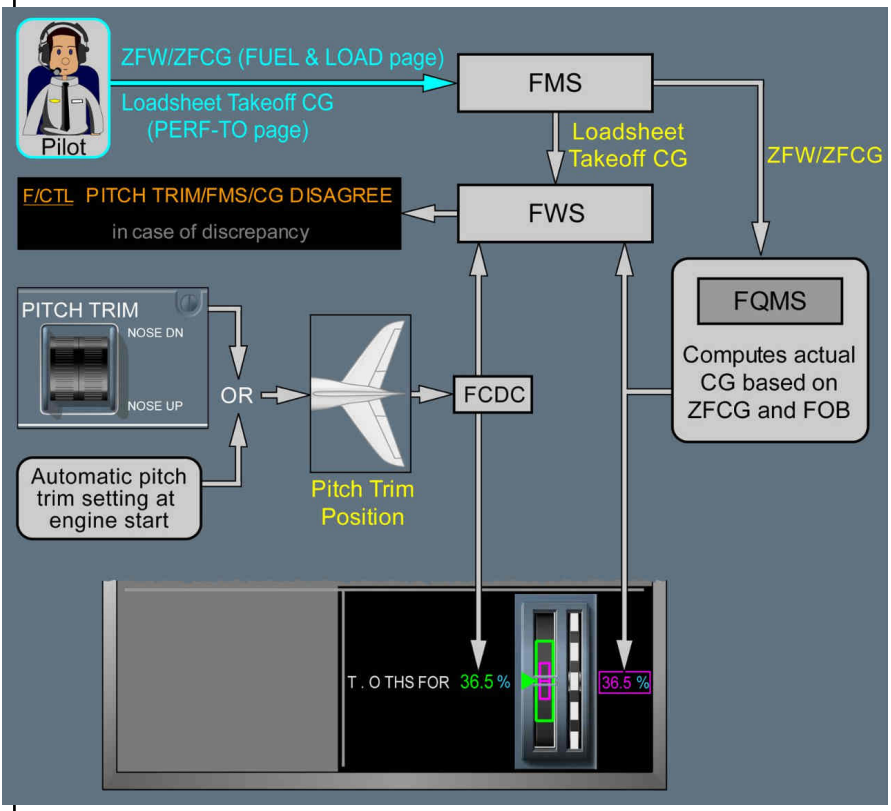
L2 When the TO CONFIG pb on the ECP is pressed, or when the thrust levers are set to FLEX or TOGA, there is a discrepancy between:

- The position of the pitch trim for takeoff, displayed on the Pitch Trim Display, at the bottom of the PFD
- The takeoff CG of the load and trim sheet, entered in the FMS (*Refer to THS Setting on the T.O panel of the FMS PERF page*)
- The actual CG , computed by the FQMS , displayed in the permanent data of the System Display, and also displayed on the Pitch Trim Display, at the bottom of the PFD .

Continued on the following page

F/CTL PITCH TRIM/FMS/CG DISAGREE (Cont'd)

Pitch Tim/FMS/CG Disagree



Indications:

Audio



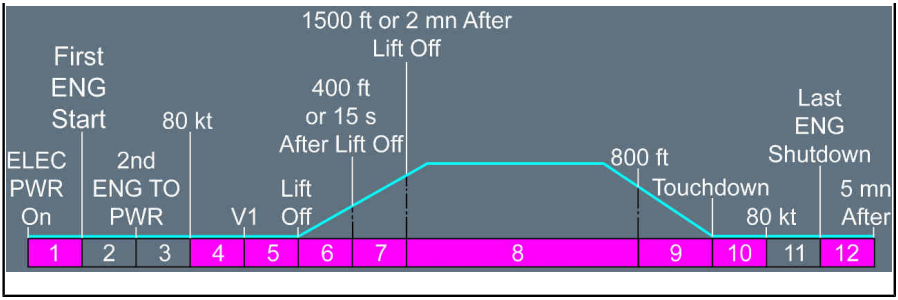
Master Light



Flight Phase Inhibition:

Continued on the following page

F/CTL PITCH TRIM/FMS/CG DISAGREE (Cont'd)



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL PITCH TRIM/FMS/CG DISAGREE* .

Crew awareness.

F/CTL PRIM 1(2)(3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 PRIM 1(2)(3) is failed.

Indications:

Audio



Master Light

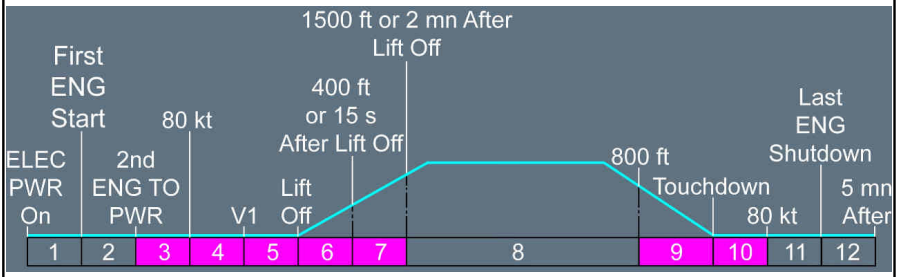


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL PRIM 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL PRIM 2 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL PRIM 3 FAULT* .

Continued on the following page

F/CTL PRIM 1(2)(3) FAULT (Cont'd)

● **During taxi-in, one minute after the FLAPS lever is set to 0:**

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers.*
When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.

L1 PRIM 1(2)(3)..... OFF THEN ON

● **IF NOT SUCCESSFUL:**

PRIM 1(2)(3)..... OFF

L2 *Note: PRIM 2 is powered by the EHA busbar of the DC 2 busbar. If the contactor between the EHA busbar and the DC 2 busbar is failed, the F/CTL PRIM 2 FAULT and F/CTL SEC 2 FAULT alerts are triggered. In this case, the ECAM procedure is:*

PRIM 2..... KEEP ON

In the event of an all engine flameout, the EHA busbar is powered by the DC ESS busbar. This enables to recover PRIM 2.

L1 ● **If two PRIM s are failed:**

SPD BRK: DO NOT USE

L2 *When all PRIM s are failed, the speedbrakes are lost because the SEC s do not have the speedbrakes lever position.*
Therefore, if the speedbrakes are extended when the third PRIM fails, the speedbrakes automatically retract, creating a significant pitch up effect, which is not compensated for by the remaining flight control computers.

L1 ● **If all PRIM s are failed:**

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

LDG DIST AFFECTED

L2 *Landing distance is increased due to the loss of at least one pair of ground spoilers.*

Continued on the following page

F/CTL PRIM 1(2)(3) FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	APPR & LDG
• If two PRIM s are failed: SPD BRK : DO NOT USE	LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES
• If two PRIM s are failed: SPD BRK : DO NOT USE

L12

DEFERRED PROC

FOR APPROACH

● **If all PRIM s are failed:**
GREEN DOT, S, F, VAPP AVAILABLE ON FMS
When all PRIM s are failed, the characteristic speeds on the PFD are lost. Only VMO / MMO remains displayed on the speed scale.

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
PART SPLR s PRIM 1(2)(3) L OUTR AILERON (If PRIM 2+3 failed) R OUTR AILERON (If PRIM 2+3 failed) F/CTL PROT (If PRIM 1+2+3 failed) AP 1+2 (If PRIM 1+2+3 failed) FD 1+2 (If PRIM 1+2+3 failed) A/THR (If PRIM 1+2+3 failed) SPEED BRAKES (If PRIM 1+2+3 failed)	BTV ENG 2 REVERSER (If PRIM 2+3 failed) *PRIM s 2 and 3 control the third line of defense of engine 2 (For more information, Refer to DSC-70-70-70-20 Three Lines of Defense).* ENG 3 REVERSER (If PRIM 1+2 failed)

Continued on the following page

F/CTL PRIM 1(2)(3) FAULT (Cont'd)

PRIM s 1 and 2 control the third line of defense of engine 3 (For more information, Refer to DSC-70-70-70-20 Three Lines of Defense).

CAT 3 DUAL (If PRIM 1 or two PRIM s are failed)
AUTO BRK (If two PRIM s are failed)
ROW/ROP (If two PRIM s are failed)
ENG 2+3 REVERSERS (If PRIM 1+2+3 failed)
PEDAL STEER CTL (If PRIM 1+2+3 failed)
GND SPLRs (If PRIM 1+2+3 failed)
REACTIVE W/S DET (If PRIM 1+2+3 failed)
CAT 2 (If PRIM 1+2+3 failed)

The SEC s do not receive the position of the SPEED BRAKE lever . Therefore, the flight crew cannot extend the speed brakes or arm the ground spoilers. However, the ground spoilers partially extend, at body landing gear touchdown. (For more information, Refer to ground spoiler control)

INFO

LDG DIST COEF < 1.45 ON DRY RUNWAY

- If PRIM 1 or two PRIMs are failed:
  CAT 3 SINGLE ONLY
- If two PRIM s are failed:
  FUEL CONSUMPTION INCREASED
  Because of the loss of the two outer ailerons, fuel consumption is increased and FMS predictions are not correct.
  Fuel consumption is increased by approximately 5%.
- If all PRIMs are failed:
  DIRECT LAW : PROT LOST

F/CTL PRIM 1(2)(3) ELEVATOR ACTUATOR FAULT

Applicable to: ALL

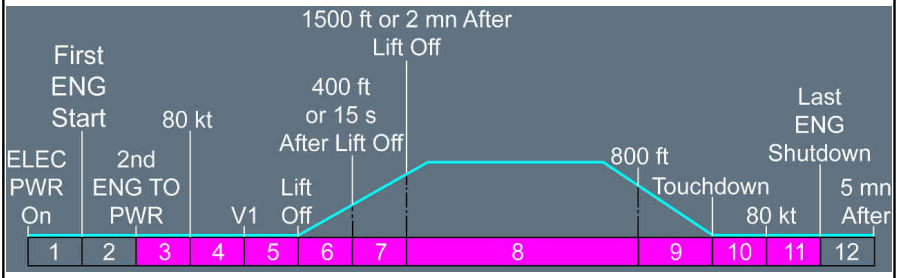
ANNUNCIATIONS

Triggering Conditions:

L2 PRIM 1(2)(3) has lost the capacity to control an elevator actuator.

Indications:

Flight Phase Inhibition:



L2 Each elevator actuator is controlled by one PRIM and one SEC (*Refer to DSC-27-10-10 Pitch control*).
If the PRIM is not able to control an elevator actuator, the associated SEC will take over.
For dispatch conditions, refer to MMEL .

Crew awareness.

F/CTL PRIM 1(2)(3) RUDDER ACTUATOR FAULT

Applicable to: ALL

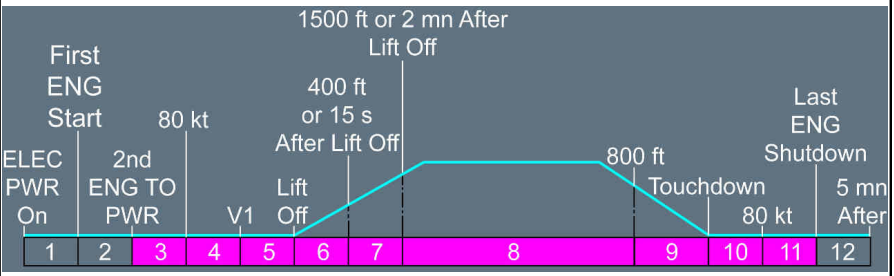
ANNUNCIATIONS

Triggering Conditions:

L2 PRIM 1(2)(3) has lost the capacity to control a rudder actuator.

Indications:

Flight Phase Inhibition:



L2 Each rudder actuator is controlled by one PRIM and one SEC (*Refer to DSC-27-10-10-20 Yaw control*).
If the PRIM is not able to control a rudder actuator, the associated SEC will take over.
For associated MEL dispatch conditions, refer to MMEL.

Crew awareness.

F/CTL PRIM 1(2)(3) SIDESTICK SENSOR FAULT

Applicable to: ALL

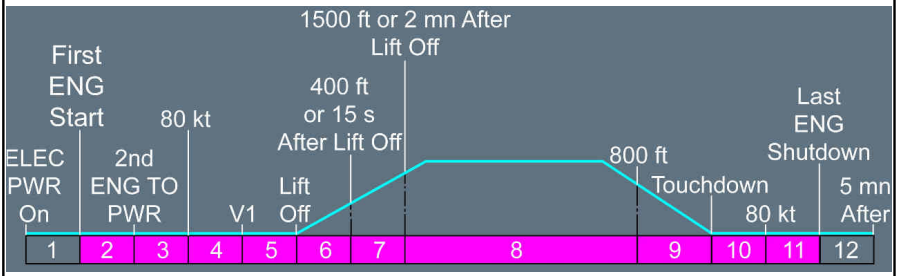
ANNUNCIATIONS

Triggering Conditions:

L2 PRIM 1(2)(3) detects that one sidestick sensor is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL PRIM 1 RUDDER ACTUATOR FAULT*.

Crew awareness.

F/CTL PRIM(SEC) VERSIONS DISAGREE

Applicable to: ALL

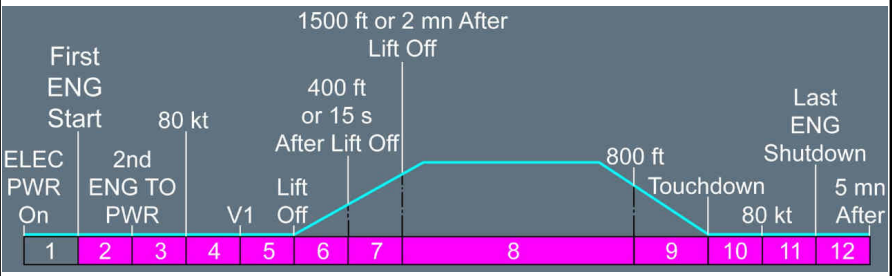
ANNUNCIATIONS

Triggering Conditions:

L2 There is a discrepancy between the versions of the different PRIMs (SECs).

Indications:

Flight Phase Inhibition:



L2 For MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL PRIM VERSIONS DISAGREE*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SEC VERSIONS DISAGREE*

L2 Crew awareness.

F/CTL PRIMS PIN PROG DISAGREE

Applicable to: ALL

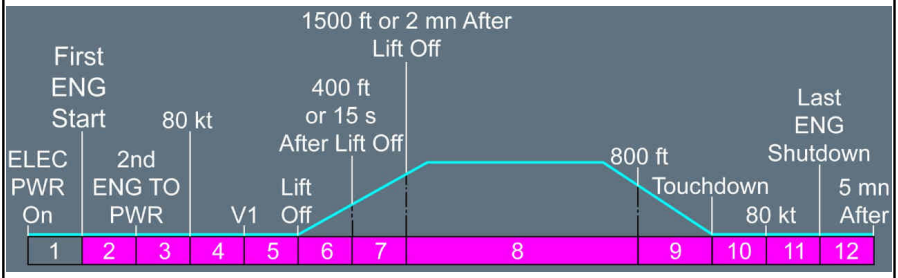
ANNUNCIATIONS

Triggering Conditions:

L2 There is a discrepancy between the pin programmings of the different PRIMs.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL PRIMs PIN PROG DISAGREE* .

L2 Crew awareness.

STATUS

INOP SYS

ALL PHASES	APPR & LDG
AP/FD TCAS MODE	BTV RWY OVERRUN PROT

F/CTL RUDDER ACTUATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One actuator of the upper or lower rudder is failed.

Indications:

Audio



Master Light

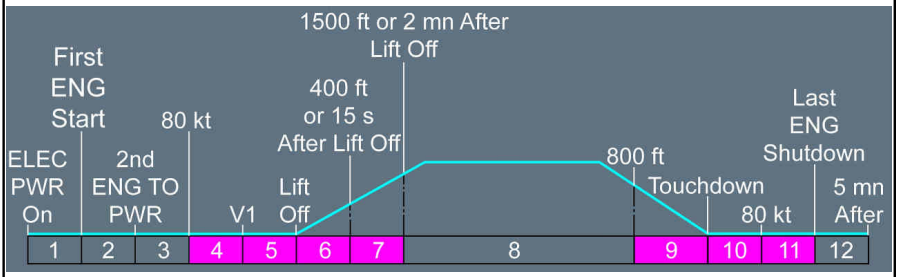


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Each rudder has two actuators (*Refer to DSC-27-10-10-20 Yaw control*).
When one actuator fails, the rudder remains fully functional.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER ACTUATOR FAULT* .

Crew awareness.

F/CTL RUDDER ELEC ACTUATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The electrical part of the EBHA of a rudder is failed.

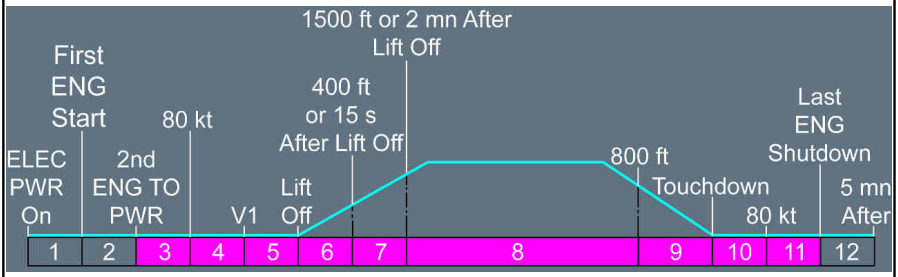
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Each rudder has two EBHA s. In normal operations, when both hydraulic systems are available, the EBHA s work as conventional actuators. The electrical part of the EBHA is a redundancy.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER ELEC ACTUATOR FAULT* .

Crew awareness.

F/CTL RUDDER PEDAL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The rudder pedals are failed.
L3 The failure is due to a discrepancy between the rudder pedal sensors.

Indications:

L2

Audio



Master Light

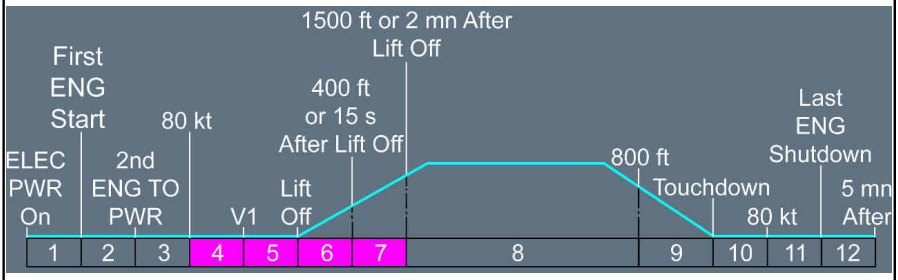


SD page



F/CTL SD Page

Flight Phase Inhibition:



Continued on the following page

F/CTL RUDDER PEDAL FAULT (Cont'd)

L2 When the AP is not engaged:
- The pedals are easy to move but do not command the rudders
- The manual rudder trim is lost

Note: For some failure cases, the rudder pedals may reflect the manual rudder trim setting but do not command the rudders.

- Yaw damping and turn coordination remain available.

When the AP is engaged, for some failure cases, the rudder pedals no longer reflect the AP orders. NWS control via the rudder pedals is lost. The tiller remains available for NWS control.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER PEDAL FAULT*.

AP : KEEP ON

L2 *The rudder operates normally and can be controlled by the autopilot.*

L1 LDG DIST AFFECTED

L2 *The landing distance is affected because the flight crew will use differential braking to control the aircraft on the runway.*

Continued on the following page

F/CTL RUDDER PEDAL FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

L12

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM
AUTOLAND : RECOMMENDED

Because the rudder operates normally with the AP engaged, an autoland is recommended.

AUTO BRK : DO NOT USE
USE DIFF BRAKING AS RQRD

Rudder and NWS control via the rudder pedals is lost. However, the flight crew may apply rudder deflection and NWS is applied in the case of important differential braking. For more information, Refer to DSC-27-10-30-271030B Ground Law .

N/W STEER TILLER (< 70 KT).....AS RQRD
REVERSER : SYMMETRIC USE ONLY

STATUS

INOP SYS

ALL PHASES	APPR & LDG
RUDDER PEDAL	BTV

F/CTL RUDDER PEDAL JAMMED

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the F/CTL menu.
When the flight crew activates the procedure, the F/CTL SD page is automatically displayed.
When the rudder pedal is jammed, rudder trim is lost. Yaw damping and turn coordination remain available.
NWS control via the rudder pedals is lost. The tiller remains available for NWS control.

AP : KEEP ON

L2 *The rudder operates normally and can be controlled by the autopilot.*

L1 LDG DIST AFFECTED

L2 *The landing distance is affected because the flight crew will use differential braking to control the aircraft on the runway.*

Continued on the following page

F/CTL RUDDER PEDAL JAMMED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG
LDG DIST AFFECTED

L12

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM
MINIMIZE XWIND
AUTOLAND : RECOMMENDED

Because the rudder operates normally with the AP engaged, an autoland is recommended.

AUTO BRK : DO NOT USE
USE DIFF BRAKING AS RQRD

Rudder and NWS control via the rudder pedals is lost. However, the flight crew may apply rudder deflection and NWS is applied in the case of important differential braking. For more information, Refer to DSC-27-10-30-271030B Ground Law .

N/W STEER TILLER (< 70 KT).....AS RQRD
REVERSER : SYMMETRIC USE ONLY

STATUS

INOP SYS

ALL PHASES	APPR & LDG
RUDDER PEDAL	BTV

F/CTL RUDDER PEDAL SENSOR FAULT

Applicable to: ALL

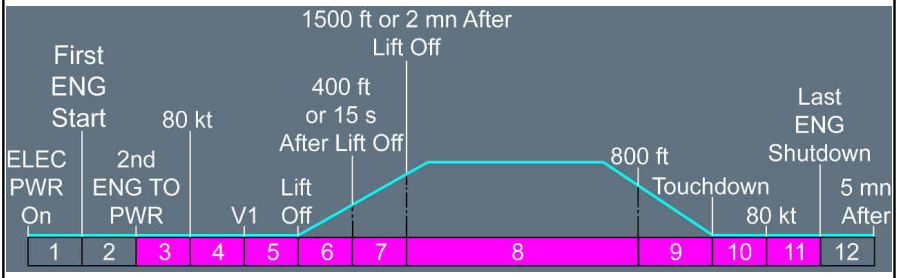
ANNUNCIATIONS

Triggering Conditions:

L2 A rudder pedal sensor is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER PEDAL SENSOR FAULT* .

Crew awareness.

F/CTL RUDDER PRESSURE SENSOR FAULT

Applicable to: ALL

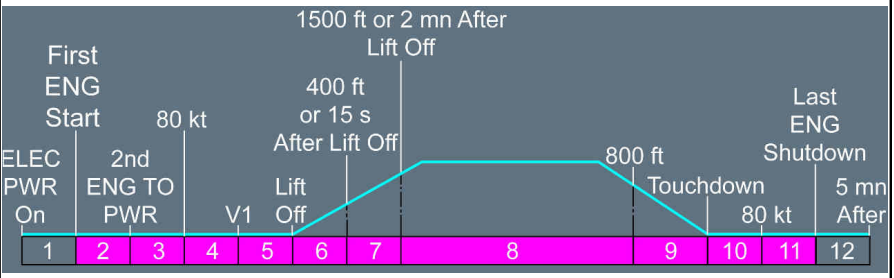
ANNUNCIATIONS

Triggering Conditions:

L2 During takeoff, approach and landing, both actuators of a rudder simultaneously control the surface. Because of the failure of a rudder pressure sensor, only one actuator can control the rudder.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER PRESSURE SENSOR FAULT*.

Crew awareness.

F/CTL RUDDER TRIM 1(2) FAULT

Applicable to: ALL

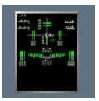
ANNUNCIATIONS

Triggering Conditions:

L2 One rudder trim motor is failed.

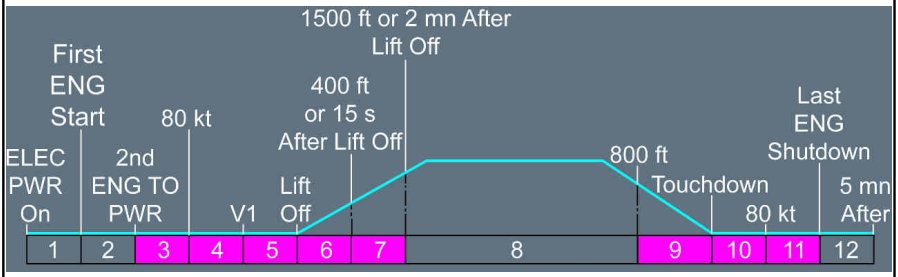
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER TRIM 1(2) FAULT*.

Crew awareness.

Continued on the following page

F/CTL RUDDER TRIM 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

RUDDER TRIM 1(2)

F/CTL RUDDER TRIM FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both rudder trim motors are failed. The rudder trim is lost.

Indications:

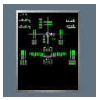
Audio



Master Light

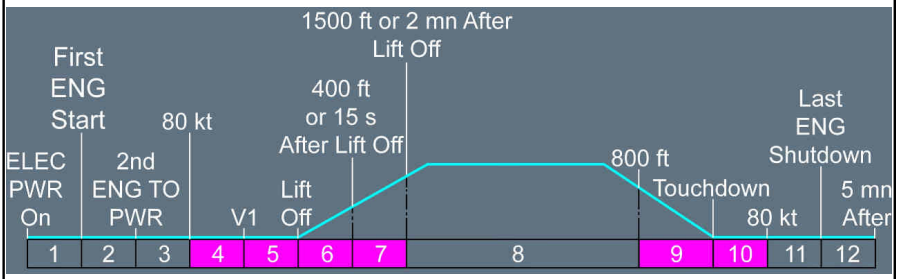


SD page



F/CTL SD Page

Flight Phase Inhibition:



Continued on the following page

F/CTL RUDDER TRIM FAULT (Cont'd)

L2 The rudder trim is lost. The neutral point of the rudder pedals remains at the last rudder trim selection.
When the AP is engaged, the rudder movements are not reflected in the pedal movement. This means that the rudder position and the rudder pedals position may differ. This can result in a jerk at AP disconnection.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL RUDDER TRIM FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES	APPR & LDG
RUDDER TRIM	CAT 2

F/CTL RUDDER TRIM RUNAWAY

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the F/CTL menu.
When the flight crew activates the procedure, the F/CTL SD page is automatically displayed.

USE RUDDER WITH CARE
USE RUDDER PEDALS TO CENTER RUDDER
FOR CONTINUED FLT : CONSIDER AP USE

Continued on the following page

F/CTL RUDDER TRIM RUNAWAY (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

USE RUDDER WITH CARE

LIMITATIONS ON PFD

ALL PHASES

USE RUDDER WITH CARE

DEFERRED PROC

FOR APPROACH

- **IF MANUAL LANDING ANTICIPATED:**
  HOLD RUDDER PEDALS BEFORE AP OFF
  KEEP RUDDER PEDALS CENTERED
  USE PEDALS AS RQRD FOR DECRAB & LDG

F/CTL SEC 1(2)(3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 SEC 1(2)(3) is failed.

Indications:

Audio



Master Light

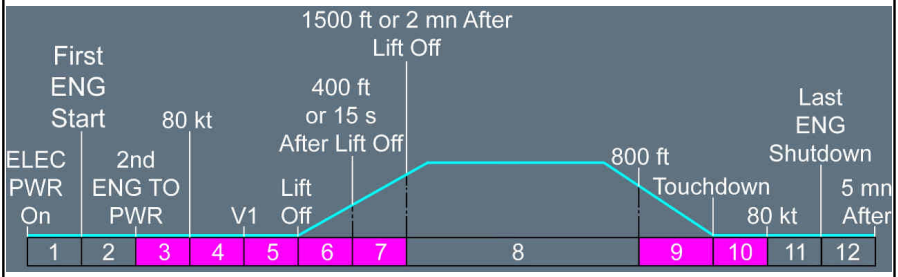


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL SEC 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SEC 2 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SEC 3 FAULT*.

Continued on the following page

F/CTL SEC 1(2)(3) FAULT (Cont'd)

- **During taxi-in, one minute after the FLAPS lever is set to 0:**

  FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers.*
When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.

L1 SEC 1(2)(3).....OFF THEN ON

- **IF NOT SUCCESSFUL:**

  SEC 1(2)(3).....OFF

L2 *Note: SEC 2 is powered by the EHA busbar of the DC 2 busbar. If the contactor between the EHA busbar and the DC 2 busbar is failed, the F/CTL PRIM 2 FAULT and F/CTL SEC 2 FAULT alerts are triggered. In this case, the ECAM procedure is:*

SEC 2.....KEEP ON

In the event of an all engine flameout, the EHA busbar is powered by the DC ESS busbar. This enables to recover SEC 2.

L1 LDG DIST AFFECTED

L2 *Landing distance is increased due to the loss of two pairs of ground spoilers (one pair of ground spoilers if SEC 1 is failed).*

Continued on the following page

F/CTL SEC 1(2)(3) FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR
	LDG DIST AFFECTED

STATUS

INOP SYS

ALL PHASES	APPR & LDG
SEC 1(2)(3) PART SPLRs (If at least one SEC is operative) MOST SPLRs (If SEC 1+2+3 failed) RUDDER TRIM (If SEC 1 and SEC 3 are failed)	CAT 2 (If SEC 1+2+3 failed) BTV

INFO

LDG DIST COEF < 1.45 ON DRY RUNWAY

MORE INFO

REDUND LOSS

- If SEC 1(3) is failed:
  RUDDER TRIM 1(2)

F/CTL SIDESTICK PRIORITY FAULT

Applicable to: ALL

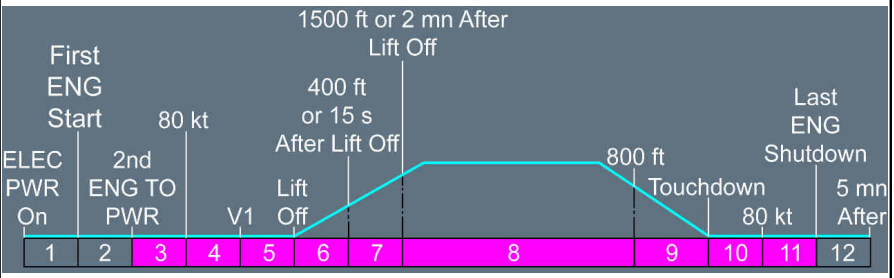
ANNUNCIATIONS

Triggering Conditions:

L2 One or two PRIM(s) lost the sidestick priority function on one sidestick. The remaining PRIM(s) still have the sidestick priority function on both sidesticks.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SIDESTICK PRIORITY FAULT*.

Crew awareness.

F/CTL SIDESTICK SENSOR FAULT

Applicable to: ALL

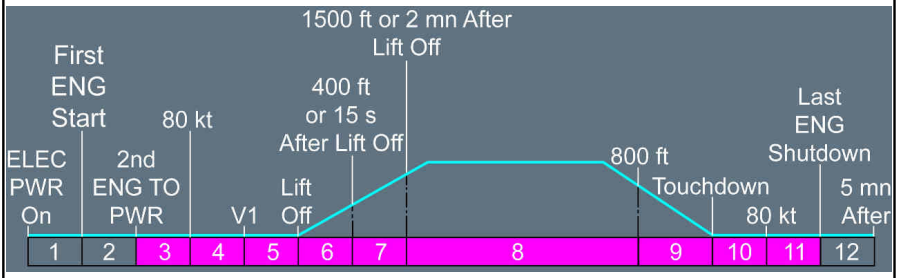
ANNUNCIATIONS

Triggering Conditions:

L2 Two, or three PRIMs detect that one sidestick sensor is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SIDESTICK SENSOR FAULT* .

Crew awareness.

F/CTL SINGLE ELEVATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the four elevators is failed.

L3 *Note: The alert is not inhibited in flight phase 7, if the elevator is jammed.*

Indications:

L2

Audio



Master Light

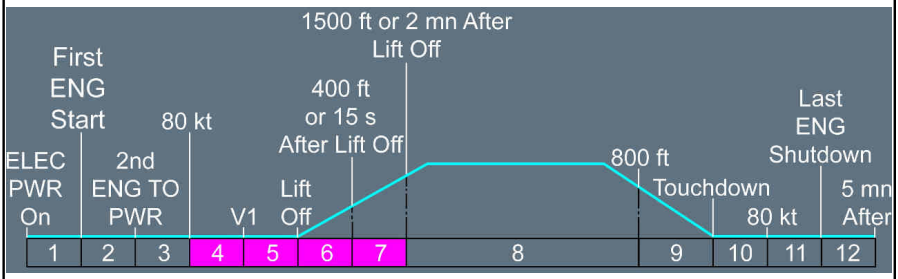


SD page



F/CTL SD Page

Flight Phase Inhibition:



L3 If it is not jammed, the elevator that is failed moves to its zero hinge moment position.

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SINGLE ELEVATOR FAULT* .

Continued on the following page

F/CTL SINGLE ELEVATOR FAULT (Cont'd)

- **If the left(right) outer elevator is failed and jammed, and the slats or flaps are not at 0:**
  - **WHEN ACFT STABLE :**
    L(R) OUTR ELEVR POSITION..... CHECK
    - **IF L(R) OUTR ELEVATOR POS NOT AT 0°:**
      MAX SPEED : 200 KT

L2 *If the elevator is jammed and is not at 0 ° , the maximum speed is limited to avoid overstressing the stabilizer.*

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and ATHR remain available. Pitch maneuverability is slightly reduced.

Continued on the following page

F/CTL SINGLE ELEVATOR FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If an outer elevator is failed and jammed, and its position is not at 0°: MAX SPEED : 200KT

LIMITATIONS ON PFD

ALL PHASES

- If an outer elevator is failed and jammed, and its position is not at 0°: MAX SPEED : 200KT

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F/CTL PROT	CAT 2
L(R) INR(OUTR) ELEVATOR	GLS AUTOLAND

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Fuel consumption is increased by approximately 1%. FMS predictions are not correct.

F/CTL SINGLE RUDDER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The upper or lower rudder is failed.

Indications:

Audio



Master Light



SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SINGLE RUDDER FAULT*.

Crew awareness.

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and ATHR remain available.

Continued on the following page

F/CTL SINGLE RUDDER FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F/CTL PROT	CAT 2
UPPR(LWR) RUDDER	GLS AUTOLAND

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

F/CTL SPEED BRAKES FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The speed brake function is lost.
The ground spoiler function remains available.
The loss of the SPEED BRAKES lever triggers this failure. The ground spoilers will extend when the reversers are deployed (*Refer to DSC-27-10-10-30 Speedbrake and ground spoiler control*).

Indications:

Audio



Master Light

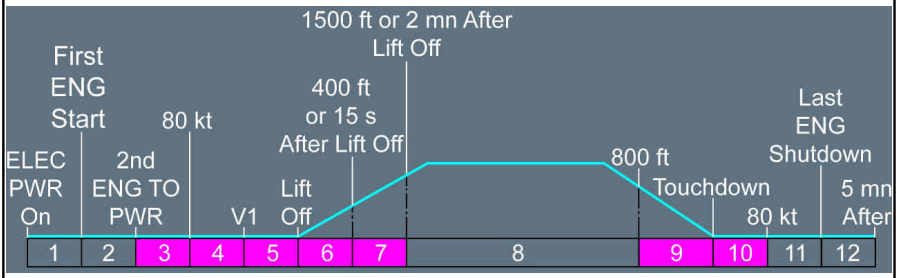


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SPEED BRAKES FAULT* .

Crew awareness.

Continued on the following page

F/CTL SPEED BRAKES FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

SPEED BRAKES

F/CTL SPEED BRAKES POS/LEVER DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is a disagree between the position of the speed brakes and the position of the SPEEDBRAKE lever.

Indications:

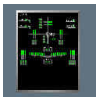
Audio



Master Light

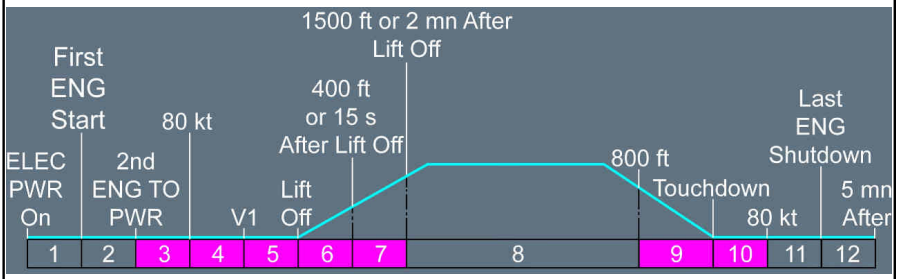


SD page



F/CTL SD Page

Flight Phase Inhibition:



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F/CTL SPEED BRAKES POS/LEVER DISAGREE (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SPEED BRAKES POS/LEVER DISAGREE* .

SPEED BRAKE LEVER..... RETRACT

F/CTL SPEED BRAKES STILL EXTENDED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - In cruise:

- If 80 s after speed brakes have been extended, at least one engine is not at idle, or
- 7 s after a nose-up TCAS resolution advisory.

- Below 800 ft, 5 s after speed brakes are extended.

Indications:

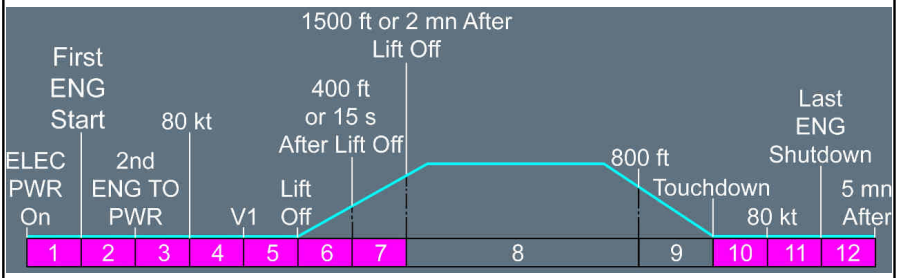
Audio



Master Light



Flight Phase Inhibition:



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F/CTL SPEED BRAKES STILL EXTENDED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SPEED BRAKES STILL EXTENDED* .

Crew awareness.

F/CTL STABILIZER ACTUATOR FAULT

Applicable to: ALL

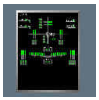
ANNUNCIATIONS

Triggering Conditions:

L2 One hydraulic actuator of the trimmable horizontal stabilizer is failed.

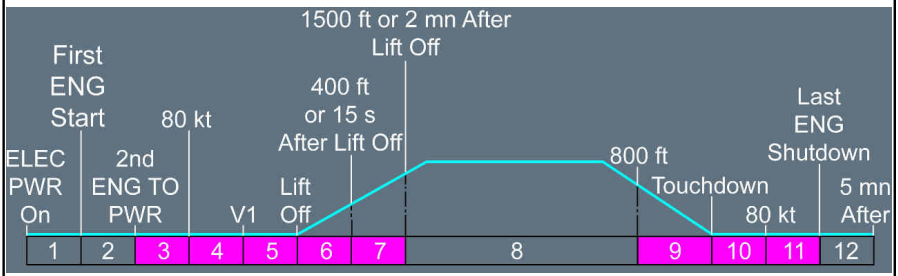
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



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F/CTL STABILIZER ACTUATOR FAULT (Cont'd)

L2 The stabilizer has three actuators (For more information: *Refer to DSC-27-10-10 Pitch control*):

- Two hydraulic actuators
- One electric motor (used only in the event of a dual hydraulic failure)

When one actuator fails, the stabilizer remains fully functional.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL STABILIZER ACTUATOR FAULT* .

Crew awareness.

F/CTL STABILIZER ELEC ACTUATOR FAULT

Applicable to: ALL

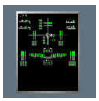
ANNUNCIATIONS

Triggering Conditions:

L2 The electric motor of trimmable horizontal stabilizer is failed.

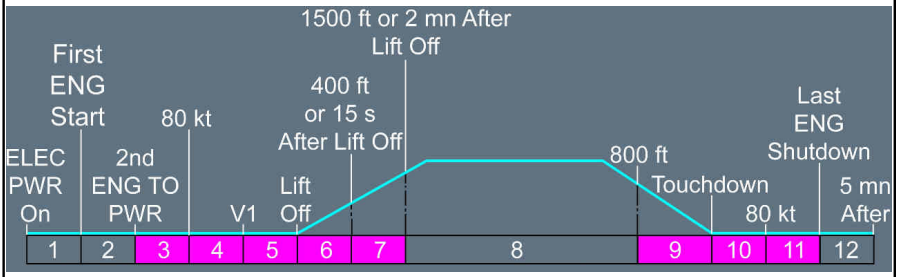
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL STABILIZER ELEC ACTUATOR FAULT* .

Crew awareness.

F/CTL STABILIZER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The stabilizer is failed. The pitch trim is locked.

Indications:

Audio



Master Light



SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL STABILIZER FAULT*
.

Continued on the following page

F/CTL STABILIZER FAULT (Cont'd)

- **If the speed is below 240 kt when the failure is detected:**
  - **IF STAB POS NOT AVAIL OR > 3.9° UP :**

L2 The trim will be locked above 3.9° UP if the failure occurs at low speeds (take-off or approach).

L3 During cruise, the trim is usually between 1° UP and 2° UP.

L1 MAX SPEED : 260KT

L2 *The maximum speed is limited to maintain sufficient pitch down authority.*

L3 *When the trim is locked, autotrim is performed using the elevators. Flying at high speed, with the trim locked in a pitch up position, requires important elevator deflections, and reduces pitch down authority.*

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and ATHR remain available.

Continued on the following page

F/CTL STABILIZER FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If stabilizer position not available or above 3.9° UP:
  MAX SPEED : 260KT

LIMITATIONS ON PFD

ALL PHASES

- If stabilizer position not available or above 3.9° UP:
  MAX SPEED : 260KT

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F/CTL PROT STABILIZER	CAT 2 GLS AUTOLAND

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Fuel consumption is increased and FMS predictions are not correct.

- *If the stabilizer position is below 3.9 ° UP, fuel consumption is increased by approximately 8%*
- *If the stabilizer position is above 3.9 ° UP, fuel consumption is increased up to more than 25%.*

F/CTL TWO GYROMETER s FAULT

Applicable to: ALL

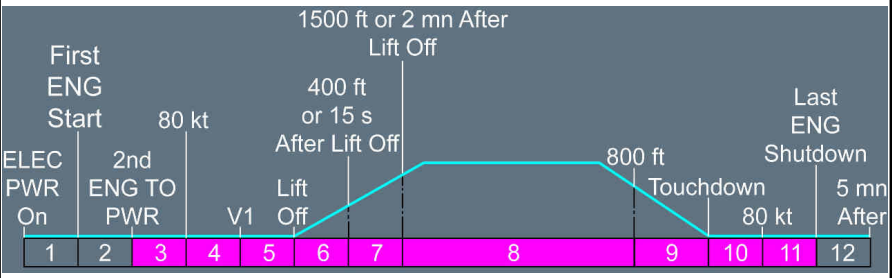
ANNUNCIATIONS

Triggering Conditions:

L2 Two gyrometers, used by the PRIM s for the computation of the flight controls laws, are failed (*Refer to DSC-27-10-10-10 PRIM*).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL TWO GYROMETERS FAULT* .

Crew awareness.

OVERSPEED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The aircraft speed has exceeded the maximum speed.

The aircraft speed is above:
- VMO + 4 kt or MMO + M 0.006, in clean configuration, gear up
- VLE + 4 kt or MLE + M 0.006, in clean configuration or CONF 1, gear down
- VFE + 4 kt in CONF 1+F, 2, 3 or FULL

The warning disappears when the speed goes below the associated limitation.

Indications:

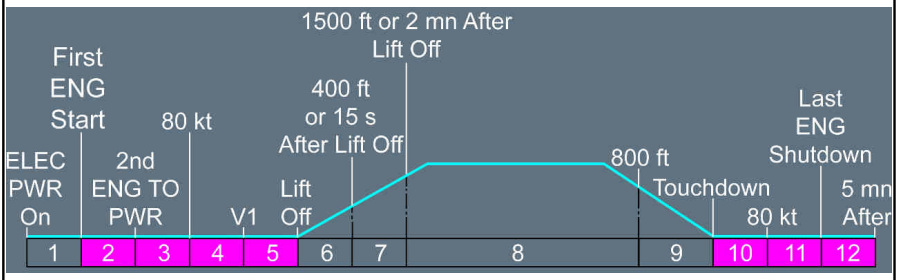
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

OVERSPEED (Cont'd)

- **If VMO / MMO is exceeded:**

VMO/MMO.....340/.89

L2 *Note: For revenue flights with gear down, the VMO / MMO is 245/.62*

L1
- **If VLE / MLE is exceeded:**

VLE/MLE..... 250/.55

L2 *Note: The VLE / MLE limitation is inhibited for revenue flights with gear down.*

L1
- **If VFE is exceeded:**

VFE..... see below

The VFE corresponding to the current slats/flaps configuration is displayed on the ECAM .

L2 *Note: If the Flap Load Relief System is active (Refer to DSC-27-20-20-27-20-20 Flap Load Relief System), the overspeed warning is triggered when the speed exceeds the VFE of the actual configuration (i.e. the overspeed warning does not consider the selected lever position).*

L1

VFE NORM CONF (kt)	
CONF 1	*263*
CONF 1+ F	*222*
CONF 2	*220*
CONF 3	*196*
CONF FULL	*182*

If the slats or flaps are jammed, the overspeed warning is triggered according to the VFE of the abnormal configuration.
The abnormal configuration VFE is displayed on the ECAM .

L2

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

TAIL STRIKE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A contact of the rear fuselage with ground is detected by the TAIL STRIKE DETECTOR.

Indications:

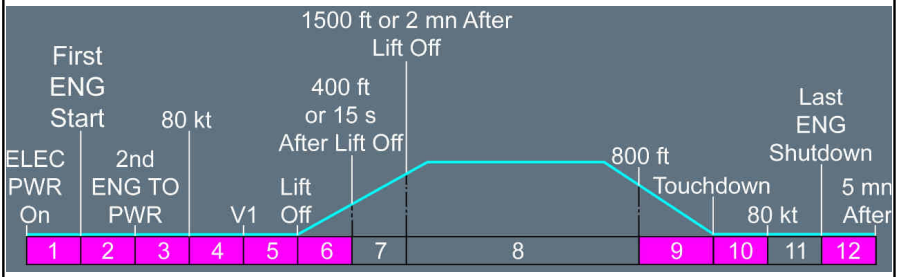
Audio



Master Light



Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-4 TAIL STRIKE* .

LAND ANSA

If a tail strike occurs at takeoff, limit FL to 100 or MSA to minimize pressure change.

L2 *Note:* *500 ft/min should be targeted for climb, to minimize pressure changes, and for passenger and crew comfort. Similarly, the rate of descent should be limited to about 1 000 ft/min, except for the final approach that must be performed normally.*

L1 Turn off PACK 1 and 2, open the RAM AIR, and return to the airport for damage assessment.

Continued on the following page

TAIL STRIKE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA

TAIL STRIKE DET FAULT

Applicable to: ALL

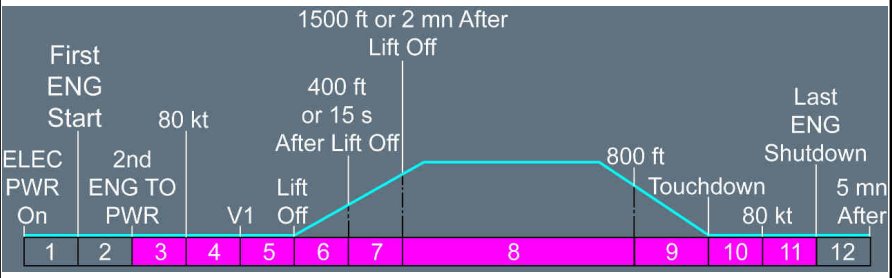
ANNUNCIATIONS

Triggering Conditions:

L2 The tail strike detector is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-4 TAIL STRIKE DET FAULT* .

Crew awareness.

Continued on the following page

TAIL STRIKE DET FAULT (Cont'd)

STATUS

INOP SYS

	APPR
	TAIL STRIKE DET

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27-Slats/Flaps

CONFIG SLATS (FLAPS) NOT IN T.O CONFIG

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The slats (flaps) are not in a takeoff configuration, when the TO CONFIG pb of the ECP is pressed, or when the engines are set to takeoff power.

The takeoff configurations are:
- CONF 1+F
- CONF 2
- CONF 3.

Indications:

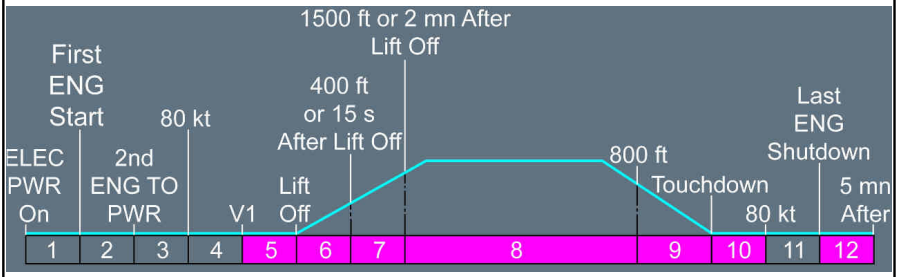
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

F/CTL FLAP CTL 1(2) FAULT

Applicable to: ALL

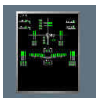
ANNUNCIATIONS

Triggering Conditions:

L2 The flap control unit 1(2) is failed.

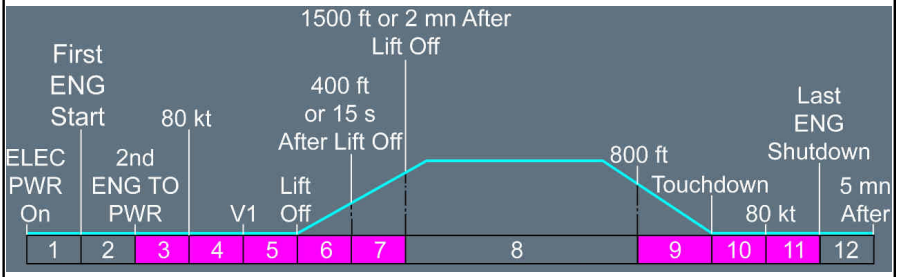
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 When both flap control units are operative, they each control one flap motor.
When one flap control unit fails, the operative flap control unit controls both flap motors, and the flaps continue to operate at normal speed.
For more information: *Refer to Slats/Flaps System Architecture*

For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP CTL 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP CTL 2 FAULT*

Crew awareness.

Continued on the following page

F/CTL FLAP CTL 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

L12

MORE INFO

REDUND LOSS

FLAP CTL 1(2)

Both flap motors are controlled by the remaining flap control unit. Flaps continue to operate at normal speed.

F/CTL FLAP SYS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flap system 1(2) is failed.

Indications:

Audio



Master Light

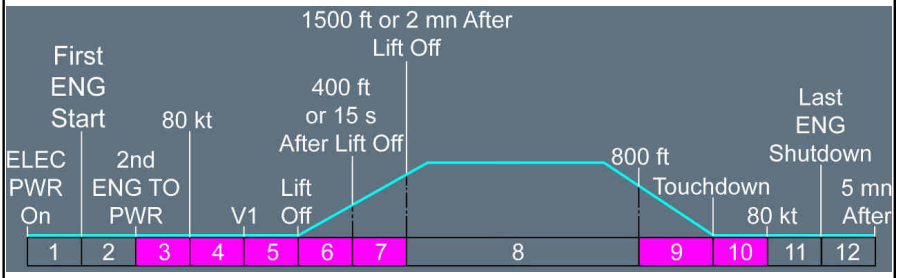


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Only one flap motor remains available. Flaps operate at half speed.

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP SYS 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP SYS 2 FAULT*

FLAPS SLOW

Continued on the following page

F/CTL FLAP SYS 1(2) FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

FLAPS SLOW

STATUS

INOP SYS

APPR & LDG

FLAP SYS 1(2)
CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

F/CTL FLAP SYS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both flap control units are failed, or the flaps are jammed.

Indications:

Audio



Master Light

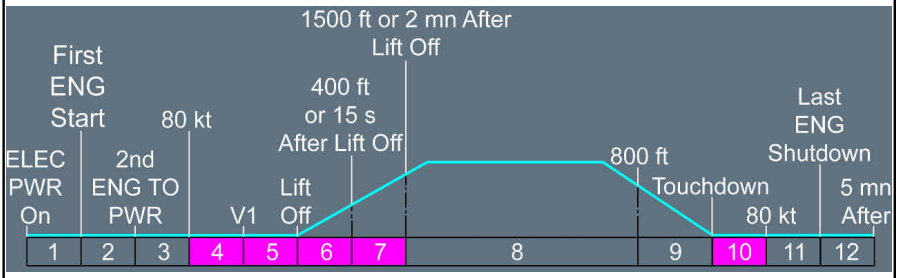


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 The Flap Load Relief System (FLRS), the Auto Retraction System (ARS) and Auto Extension System (AES) are lost.
The cruise baulk and alpha-lock functions remain available.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP SYS 1+2 FAULT* .

Continued on the following page

F/CTL FLAP SYS 1+2 FAULT (Cont'd)

FOR VFE : USE PFD

L2 *The PFD speed scale displays the VFE that is associated with the current abnormal configuration.*

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

L3 *If the slats or flaps are jammed, the VFE s of CONF 1+F and CONF 2 displayed on the PFD and on the ECAM are increased vs. the placard speeds. This is operationally necessary to get a minimum margin between VLS and VFE NEXT, when the slats/flaps are jammed in an intermediate position and flaps lever is in position 0 or 1.*
Example: When the slats are jammed at 0.5 ° (0<S≤1) and flap lever is in position 1, the VFE NEXT displayed on the PFD is 243 kt instead of 222 kt , because the VLS may reach 225 kt depending on the A/C weight and altitude when the failure occurs.

L1 ● **WHEN SPEED BELOW VFE:**
FLAPS LEVER..... RECYCLE

L2 *For recycling, set the FLAPS lever to 0. Then, immediately set the FLAPS lever to the position at the time the failure occurred.*
In the case of high friction or a jam (e.g. ice accretion), the movement of the flaps is automatically stopped to prevent overload. Recycling the FLAPS lever restores the movement of the flaps if the reason for the overload is no longer present.

L1 USE SELECTED SPEED

L2 *In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Therefore, the managed speed is not in accordance with the FLAPS lever position. As a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.*

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:
- *Decelerate the aircraft toward the VFE NEXT- 5 kt . In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS .*
- *When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.*

Continued on the following page

F/CTL FLAP SYS 1+2 FAULT (Cont'd)

The above steps are repeated until the FLAPS lever is set to 3.
When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.

L1 LDG PERF AFFECTED
L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and A/THR remain available.

Continued on the following page

F/CTL FLAP SYS 1+2 FAULT (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

APP & LDG

FOR LDG : FLAP LVR 3
NO AUTOLAND
As ILS CAT 2 is not available, the flight crew must not perform an automatic landing.
LDG PERF AFFECTED

L123

DEFERRED PROC

APPROACH

- **If flaps position is less than 3:**
  [MFD SURV] TAWS FLAP MODE.....OFF
- **If flaps position is not available:**
  [MFD SURV] GPWS .....OFF
  The position of the flaps is not available and therefore, the GPWS has to be set to OFF to avoid any spurious alert.
  If the flap control units are failed, the GPWS does not receive the position of the flaps that is necessary to trigger GPWS alerts.

FOR LDG : FLAP LVR 3

Note: *The reduced drag causes the aircraft to decelerate more slowly. Therefore, it is recommended that the aircraft is at the landing configuration and approach speed before starting the final approach.*

LDG PERF COMPUTATION..... CONFIRM
NO AUTOLAND
FOR GA : MAINTAIN S/F CONF
In the case of a diversion, the slats can be retracted after a go-around.

Continued on the following page

F/CTL FLAP SYS 1+2 FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F/CTL PROT	FLAPS BTV CAT 2 GLS AUTOLAND GPWS 1+2 (If FLAPS position not available)

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD
FOR GA : MAINTAIN S/F CONF

F/CTL FLAP(SLAT) 1(2) SAFETY TEST REQUIRED

Applicable to: ALL

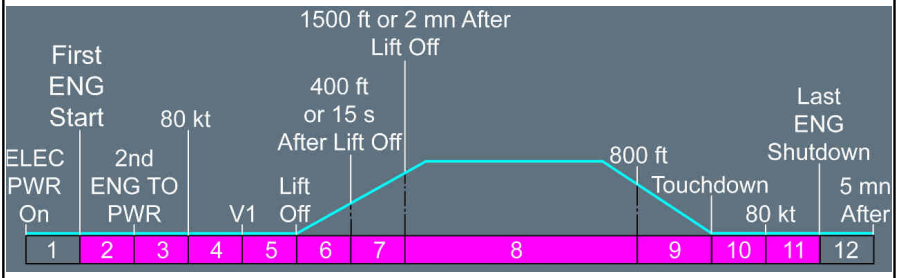
ANNUNCIATIONS

Triggering Conditions:

L2 An automatic internal safety test has not been performed in the previous 150 operating hours.

Indications:

Flight Phase Inhibition:



L3 This automatic test is performed every 120 flight hours, in flight phase 1 or 12.
The CMS performs the automatic internal safety test, to detect internal failures, that cannot be detected by the continuous monitoring.

L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP 1 SAFETY TEST REQUIRED*
- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAP 2 SAFETY TEST REQUIRED*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT 1 SAFETY TEST REQUIRED*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT 2 SAFETY TEST REQUIRED*

Crew awareness.

F/CTL FLAPS LEVER NOT ZERO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FLAPS lever is not at zero and:
- The aircraft altitude is above 22 000 ft, or
- The aircraft speed is above VFE $_{CONF\ 1}$ + 2.5 kt.

Indications:

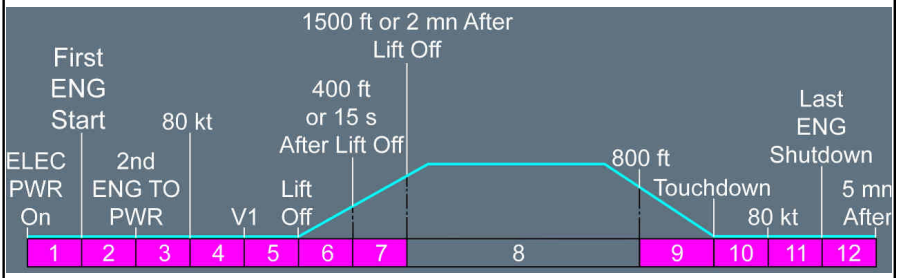
Audio



Master Light



Flight Phase Inhibition:



L2 If the slats and flaps are retracted when the warning is triggered, the slats/flaps cruise baulk function will maintain the slats and flaps in their fully retracted position. *Refer to DSC-27-20-20 Slat/Flap Cruise Baulk Function*

Crew awareness.

F/CTL FLAPS LEVER OUT OF DETENT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FLAPS lever is between two detents.

Indications:

Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

F/CTL FLAPS LEVER SYS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Communication between the FLAPS lever and SFCC 1(2) is lost. (*Refer to DSC-27-20-10-01 SLAT (FLAP) SYSTEM*).

Indications:

Audio



Master Light

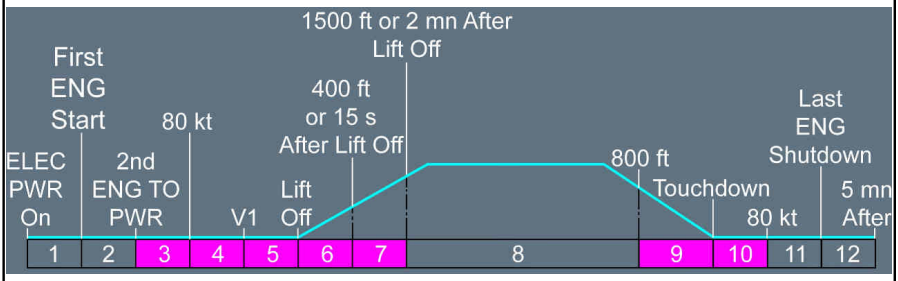


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 The SFCC 1(2) does not receive inputs from the FLAPS lever , therefore SLATS SYS 1(2) and FLAPS SYS 1(2) cannot move the slats and flaps respectively. SLATS SYS 1(2) and FLAPS SYS 1(2) are considered as inoperative.

The slats and flaps are operated via the remaining systems, at half speed.

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAPS LEVER SYS 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAPS LEVER SYS 2 FAULT*

Continued on the following page

F/CTL FLAPS LEVER SYS 1(2) FAULT (Cont'd)

SLATS SLOW / FLAPS SLOW

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

SLATS SLOW / FLAPS SLOW

STATUS

INOP SYS

ALL PHASES

FLAP SYS 1(2)
SLAT SYS 1(2)

F/CTL FLAPS LOCKED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The wing-tip brakes have locked the flaps to avoid surface runaway, overspeed or asymmetry. Once locked, the wing-tip brakes cannot be unlocked in flight.

Indications:

Audio



Master Light

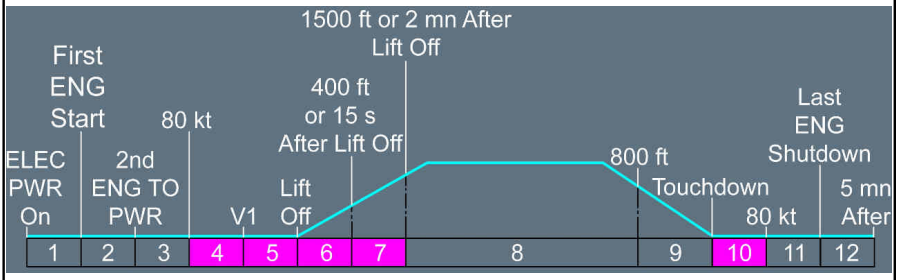


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Once locked, the wing-tip brakes cannot be unlocked in flight. Therefore the procedure is the same as the FLAPS 1+2 SYS FAULT, without recycling the FLAPS lever.
The Flap Load Relief System (FLRS), the Auto Retraction System (ARS) and Auto Extension System (AES) are lost.
The cruise baulk and alpha-lock functions remain available.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL FLAPS LOCKED* .

Continued on the following page

F/CTL FLAPS LOCKED (Cont'd)

FOR VFE : USE PFD

L2 *The PFD speed scale displays the VFE that is associated with the current abnormal configuration.*

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

L3 *If the slats or flaps are jammed, the VFE s of CONF 1+F and CONF 2 displayed on the PFD and on the ECAM are increased vs. the placard speeds. This is operationally necessary to get a minimum margin between VLS and VFE NEXT, when the slats/flaps are jammed in an intermediate position and flaps lever is in position 0 or 1.*
Example: When the slats are jammed at 0.5 ° (0<S≤1) and flap lever is in position 1, the VFE NEXT displayed on the PFD is 243 kt instead of 222 kt , because the VLS may reach 225 kt depending on the A/C weight and altitude when the failure occurs.

L1 USE SELECTED SPEED

L2 *In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Therefore, the managed speed is not in accordance with the FLAPS lever position. As a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.*

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:

- *Decelerate the aircraft toward the VFE NEXT- 5 kt . In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS .*
- *When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.*

The above steps are repeated until the FLAPS lever is set to 3.
When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.

L1 LDG PERF AFFECTED

Continued on the following page

F/CTL FLAPS LOCKED (Cont'd)

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and A/THR remain available.

Continued on the following page

F/CTL FLAPS LOCKED (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

APP & LDG

FOR LDG : FLAP LVR 3
NO AUTOLAND
As ILS CAT 2 is not available, the flight crew must not perform an automatic landing.
LDG PERF AFFECTED

L12

DEFERRED PROC

APPROACH

- **If flaps position is less than 3:**
  [MFD SURV] TAWS FLAP MODE.....OFF

FOR LDG : FLAP LVR 3

Note: *The reduced drag causes the aircraft to decelerate more slowly. Therefore, it is recommended that the aircraft is at the landing configuration and approach speed before starting the final approach.*

LDG PERF COMPUTATION..... CONFIRM
NO AUTOLAND
FOR GA : MAINTAIN S/F CONF
In the case of a diversion, the slats can be retracted after a go-around.

STATUS

INOP SYS

ALL PHASES

F/CTL PROT

APPR & LDG

FLAPS
BTV

Continued on the following page

F/CTL FLAPS LOCKED (Cont'd)

CAT 2
GLS AUTOLAND

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD
FOR GA : MAINTAIN S/F CONF

F/CTL LDG WITH FLAPS LEVER JAMMED

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the F/CTL menu.

Continued on the following page

F/CTL LDG WITH FLAPS LEVER JAMMED (Cont'd)

■ **If the FLAPS lever is jammed at 0, 1 or 2**

FLAPS LEVER..... FORCE ONE STEP DOWN

L2 *The FLAPS lever has an override mechanism that the flight crew can use, if the FLAPS lever is jammed. The override mechanism allows to extend the slats/flaps one step (for example from 0 to 1, from 3 to FULL).*
To use the override mechanism, the flight crew should apply a strong force to the lever, without pulling the lever out of detent.
The override mechanism is reversible.

L1 ■ **If the FLAPS lever is jammed at 3**

FOR LDG : FLAP LVR 3

L2 *The slats/flaps configuration is maintained in the case of a go-around, therefore the approach should not be performed in CONF FULL.*

L1 ■ **If the FLAPS lever is jammed at 0 or 1**

[MFD SURV] TAWS FLAP MODE..... OFF

LDG PERF : COMPUTE

● **If the FLAPS lever is jammed at 0 or 1**

NO AUTOLAND

L2 *As the flaps are not in configuration 3 or full, the flight crew must not perform an automatic landing.*

L1 FOR GA : MAINTAIN CURRENT S/F CONF

Continued on the following page

F/CTL LDG WITH FLAPS LEVER JAMMED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- If the FLAPS lever is jammed at 3
  FOR LDG : FLAP LVR 3
  LDG PERF AFFECTED

STATUS

INOP SYS

APPR & LDG

BTV

F/CTL LDG WITH NO SLATS NO FLAPS

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the F/CTL menu.

Continued on the following page

F/CTL LDG WITH NO SLATS NO FLAPS (Cont'd)

● **IF FLAPS LEVER JAMMED:**

FLAPS LEVER..... FORCE ONE STEP DOWN

L2 *The FLAPS lever has an override mechanism that the flight crew can use, if the FLAPS lever is jammed. The override mechanism allows to extend the slats/flaps one step (for example from 0 to 1, from 3 to FULL).*

To use the override mechanism, the flight crew should apply a strong force to the lever, without pulling the lever out of detent.

The override mechanism is reversible.

L1 [MFD SURV] TAWS FLAP MODE.....OFF

USE SELECTED SPEED

L2 *In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Therefore, the managed speed is not in accordance with the FLAPS lever position. As a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.*

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:

- *Decelerate the aircraft toward the VFE NEXT-5 kt. In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS.*
- *When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.*

The above steps are repeated until the FLAPS lever is set to 3.

When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.

L1 ■ **If the FLAPS lever is not jammed:**

FLAP LVR 1.....SELECT

■ **If the FLAPS lever is jammed:**

NO AUTOLAND

FOR GA : MAINTAIN S/F CONF

L2 *In the case of a diversion, the slats can be retracted after a go-around.*

L1 LDG PERF: COMPUTE

Continued on the following page

F/CTL LDG WITH NO SLATS NO FLAPS (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- If the FLAPS lever is not jammed:
  FOR LDG : FLAP LVR 1
  LDG PERF AFFECTED

STATUS

INOP SYS

APPR & LDG

BTV

F/CTL SLAT CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The slat control unit 1(2) is failed.

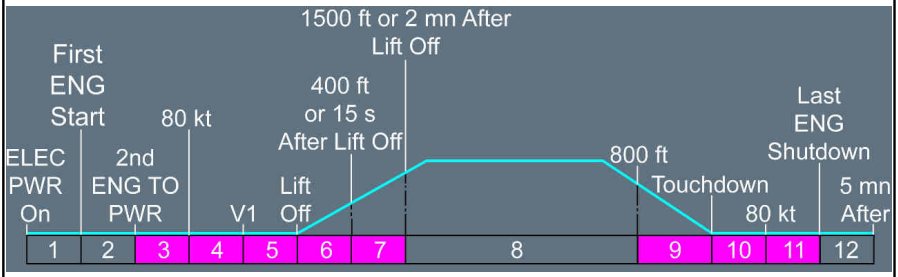
Indications:

SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 When both slat control units are operative, they each control one slat motor.
When one slat control unit fails, the operative slat control unit controls both slats motors, and the slats continue to operate at normal speed.
For more information: *Refer to Slats/Flaps System Architecture*

For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT CTL 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT CTL 2 FAULT*

Crew awareness.

Continued on the following page

F/CTL SLAT CTL 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

L12

MORE INFO

REDUND LOSS

SLAT CTL 1(2)

Both slat motors are controlled by the remaining slat control unit. Slats continue to operate at normal speed.

F/CTL SLAT SYS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The slat system 1(2) is failed.

Indications:

Audio



Master Light

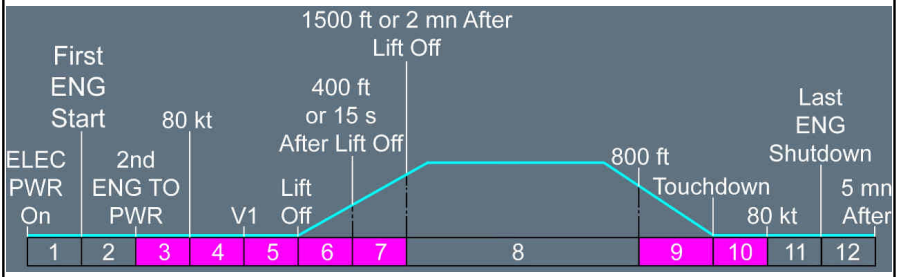


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 Only one slat motor remains available. Slats operate at half speed.

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT SYS 1 FAULT*
- *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT SYS 2 FAULT*

SLATS SLOW

Continued on the following page

F/CTL SLAT SYS 1(2) FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

SLATS SLOW

STATUS

INOP SYS

APPR & LDG

SLAT SYS 1(2)
CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

F/CTL SLAT SYS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both slat control units are failed, or the slats are jammed.

Indications:

Audio



Master Light

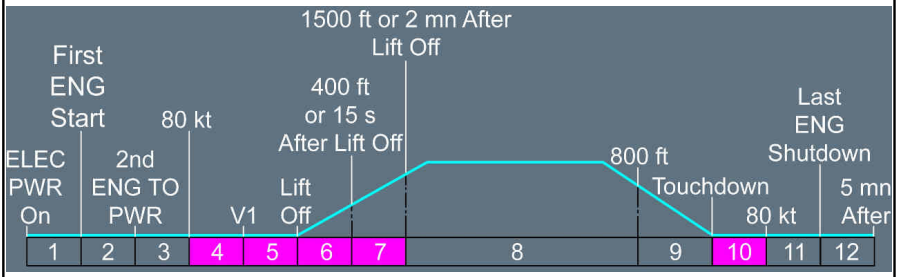


SD page



F/CTL SD Page

Flight Phase Inhibition:

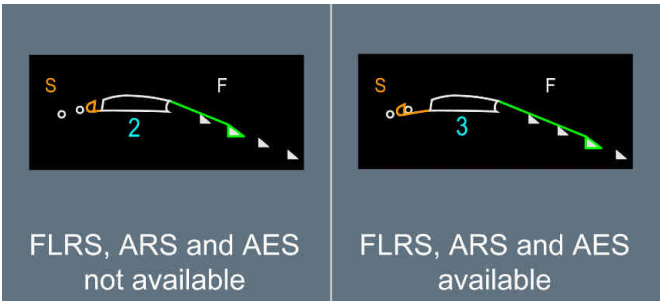


Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

L2 The alpha/speed lock function is lost.
The Flaps Load Relief System (FLRS), the Auto Retraction System (ARS) and Auto Extension System (AES) remain available, if the slats' position is greater than their position in CONF 2 (first dot on the slats' scale of the PFD).

FLRS, ARS and AES availability



The cruise baulk function remains available for the flaps.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SLAT SYS 1+2 FAULT* .

Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

Impacted by TDU: 00020643 F/CTL SLAT SYS 1+2 FAULT - Alert

FOR VFE : USE PFD

L2 *The PFD speed scale displays the VFE that is associated with the current abnormal configuration.*

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

L3 *If the slats or flaps are jammed, the VFE s of CONF 1+F and CONF 2 displayed on the PFD and on the ECAM are increased vs. the placard speeds. This is operationally necessary to get a minimum margin between VLS and VFE NEXT, when the slats/flaps are jammed in an intermediate position and flaps lever is in position 0 or 1.*
Example: When the slats are jammed at 0.5 ° (0<S≤1) and flap lever is in position 1, the VFE NEXT displayed on the PFD is 243 kt instead of 222 kt , because the VLS may reach 225 kt depending on the A/C weight and altitude when the failure occurs.

L1 ● **WHEN SPEED BELOW VFE:**
FLAPS LEVER.....RECYCLE

L2 *For recycling, set the FLAPS lever to 0. Then, immediately set the FLAPS lever to the position at the time the failure occurred.*
In the case of high friction or a jam (e.g. ice accretion), the movement of the slats is automatically stopped to prevent overload. Recycling the FLAPS lever restores the movement of the slats if the reason for the overload is no longer present.

L1 USE SELECTED SPEED

L2 *In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Therefore, the managed speed is not in accordance with the FLAPS lever position. As a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.*

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:
- Decelerate the aircraft toward the VFE NEXT - 5 kt . In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS .

Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

- When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.

The above steps are repeated until the FLAPS lever is set to 3.
When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.

L1 LDG PERF AFFECTED
L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and A/THR remain available.

Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

Impacted DU: 00007964 F/CTL SLAT SYS 1+2 FAULT - Alert

● **If in electrical emergency configuration**

SLATS 1.....RESET

FOR VFE : USE PFD

L2 *The PFD speed scale displays the VFE that is associated with the current abnormal configuration.*

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

L3 *If the slats or flaps are jammed, the VFE s of CONF 1+F and CONF 2 displayed on the PFD and on the ECAM are increased vs. the placard speeds. This is operationally necessary to get a minimum margin between VLS and VFE NEXT, when the slats/flaps are jammed in an intermediate position and flaps lever is in position 0 or 1.*

Example: When the slats are jammed at 0.5 ° (0<S≤1) and flap lever is in position 1, the VFE NEXT displayed on the PFD is 243 kt instead of 222 kt , because the VLS may reach 225 kt depending on the A/C weight and altitude when the failure occurs.

L1 ● **WHEN SPEED BELOW VFE:**

FLAPS LEVER.....RECYCLE

L2 *For recycling, set the FLAPS lever to 0. Then, immediately set the FLAPS lever to the position at the time the failure occurred.*

In the case of high friction or a jam (e.g. ice accretion), the movement of the slats is automatically stopped to prevent overload. Recycling the FLAPS lever restores the movement of the slats if the reason for the overload is no longer present.

L1 USE SELECTED SPEED

L2 *In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Therefore, the managed speed is not in accordance with the FLAPS lever position. As a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.*

Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:

- *Decelerate the aircraft toward the VFE NEXT- 5 kt . In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS .*
- *When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.*

The above steps are repeated until the FLAPS lever is set to 3.
When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.

L1 LDG PERF AFFECTED
L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and A/THR remain available.

Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

APP & LDG

FOR LDG : FLAP LVR 3
NO AUTOLAND
As ILS CAT 2 is not available, the flight crew must not perform an automatic landing.
LDG PERF AFFECTED

L12

DEFERRED PROC

APPROACH

FOR LDG : FLAP LVR 3

Note: *The reduced drag causes the aircraft to decelerate more slowly. Therefore, it is recommended that the aircraft is at the landing configuration and approach speed before starting the final approach.*

LDG PERF COMPUTATION..... CONFIRM
NO AUTOLAND
FOR GA : MAINTAIN S/F CONF
In the case of a diversion, the flaps can be retracted after a go-around.

STATUS

INOP SYS

ALL PHASES

F/CTL PROT

APPR & LDG

SLATS
BTV
CAT 2
GLS AUTOLAND

Continued on the following page

F/CTL SLAT SYS 1+2 FAULT (Cont'd)

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD
FOR GA : MAINTAIN S/F CONF

F/CTL SLATS LOCKED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The wing-tip brakes have locked the slats to avoid surface runaway, overspeed or asymmetry. Once locked, the wing-tip brakes cannot be unlocked in flight.

Indications:

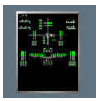
Audio



Master Light

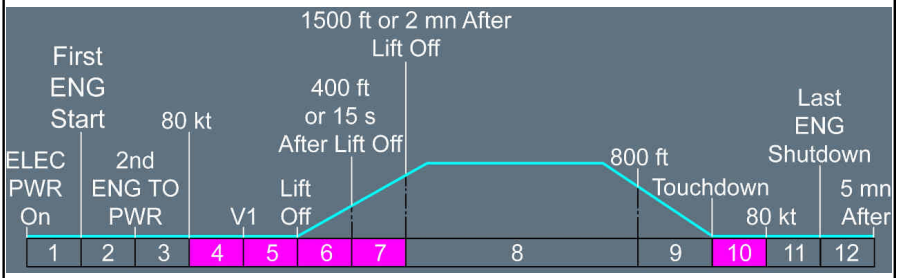


SD page



F/CTL SD Page

Flight Phase Inhibition:



Continued on the following page

F/CTL SLATS LOCKED (Cont'd)

L2 Once locked, the wing-tip brakes cannot be unlocked in flight. Therefore the procedure is the same as the SLATS 1+2 SYS FAULT, without recycling the FLAPS lever.
The alpha/speed lock function is lost.
The Flaps Load Relief System (FLRS), the Auto Retraction System (ARS) and Auto Extension System (AES) remain available, if the slats' position is greater than their position in CONF 2 (first dot on the slats' scale of the PFD).

FLRS, ARS and AES availability



The cruise baulk function remains available for the flaps.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL SLATS LOCKED* .

Continued on the following page

F/CTL SLATS LOCKED (Cont'd)

FOR VFE : USE PFD

L2 *The PFD speed scale displays the VFE that is associated with the current abnormal configuration.*

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

L3 *If the slats or flaps are jammed, the VFE s of CONF 1+F and CONF 2 displayed on the PFD and on the ECAM are increased vs. the placard speeds. This is operationally necessary to get a minimum margin between VLS and VFE NEXT, when the slats/flaps are jammed in an intermediate position and flaps lever is in position 0 or 1.*
Example: When the slats are jammed at 0.5 ° (0<S≤1) and flap lever is in position 1, the VFE NEXT displayed on the PFD is 243 kt instead of 222 kt , because the VLS may reach 225 kt depending on the A/C weight and altitude when the failure occurs.

L1 USE SELECTED SPEED

L2 *In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Therefore, the managed speed is not in accordance with the FLAPS lever position. As a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.*

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:
- *Decelerate the aircraft toward the VFE NEXT- 5 kt . In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS .*
- *When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.*

The above steps are repeated until the FLAPS lever is set to 3.
When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.

L1 LDG PERF AFFECTED

Continued on the following page

F/CTL SLATS LOCKED (Cont'd)

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and A/THR remain available.

Continued on the following page

F/CTL SLATS LOCKED (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

APP & LDG

FOR LDG : FLAP LVR 3
NO AUTOLAND
As ILS CAT 2 is not available, the flight crew must not perform an automatic landing.
LDG PERF AFFECTED

L12

DEFERRED PROC

APPROACH
FOR LDG : FLAP LVR 3

Note: The reduced drag causes the aircraft to decelerate more slowly. Therefore, it is recommended that the aircraft is at the landing configuration and approach speed before starting the final approach.

LDG PERF COMPUTATION..... CONFIRM
NO AUTOLAND
FOR GA : MAINTAIN S/F CONF
In the case of a diversion, the flaps can be retracted after a go-around.

STATUS

INOP SYS

ALL PHASES

F/CTL PROT

APPR & LDG

SLATS
BTV
CAT 2
GLS AUTOLAND

Continued on the following page

F/CTL SLATS LOCKED (Cont'd)

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD
FOR GA : MAINTAIN S/F CONF

F/CTL SLATS(FLAPS) TIP BRK TEST REQUIRED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2

Slats

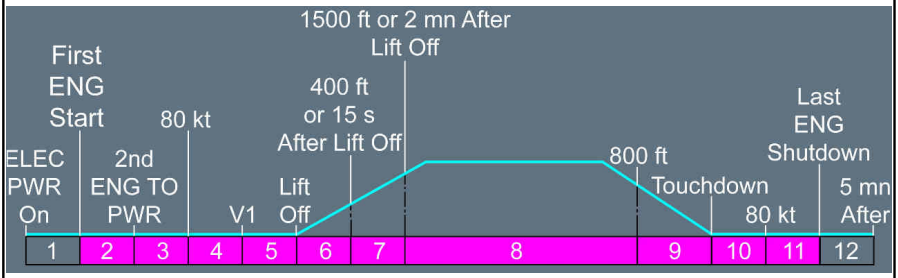
- The SFCC has not performed the automatic test of the slats wing tip brakes in the last 5 days, or
- The automatic test of the slats wing tip brakes has failed for 5 consecutive days.

Flaps

- The SFCC has not performed the automatic test of the flaps wing tip brakes in the last 10 days.

Indications:

Flight Phase Inhibition:



Continued on the following page

F/CTL SLATS(FLAPS) TIP BRK TEST REQUIRED (Cont'd)

L2 The wing tip brakes are automatically tested at the end of each flight. The test lasts 10 s , and starts when the aircraft speed goes below 80 kt at landing. The test is stopped if the FLAPS lever is moved during the test.

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-27-1 F/CTL SLATS TIP BRK TEST REQUIRED*
- *Refer to MEL/ME-ECAM-27-1 F/CTL FLAPS TIP BRK TEST REQUIRED*

Crew awareness.

F/CTL T.O FLAPS/FMS DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 When the TO CONFIG pb of the ECP is pressed, or when the engines are set to takeoff power, there is a difference between:

- The FLAPS lever position
- The takeoff flaps configuration entered in the FMS (*Refer to FLAPS setting on the T.O panel of the FMS PERF page*),

The caution will not trigger, if the flight crew has not entered the takeoff configuration on the TO panel of the MFD PERF page MFD TO PERF page.

Indications:

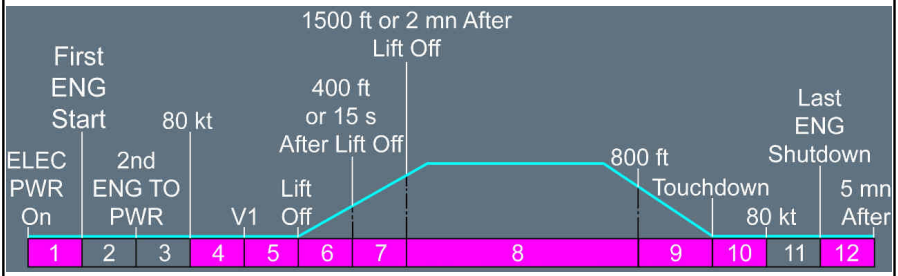
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL conditions, *Refer to MEL/ME-ECAM-27-1 F/CTL T.O FLAPS/FMS DISAGREE* .

Crew awareness.

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Fuel

FUEL ABNORM AUTO REFUEL DISTRIBUTION

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The fuel distribution in the tanks does not correspond to the standard fuel distribution after refuelling.

L3 The caution triggers only if the difference between the current distribution and the standard distribution for any given tank is more than 900 lb.

Indications:

L2

Audio



Master Light

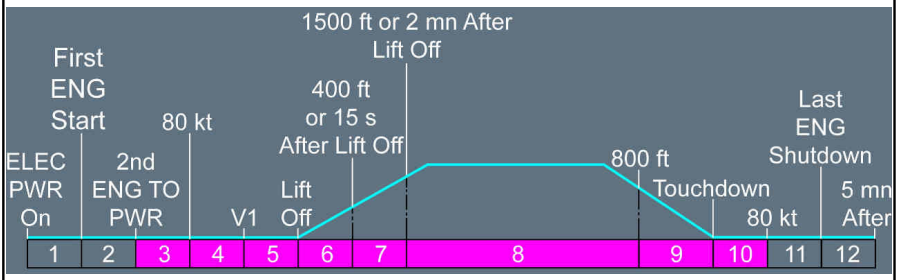


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL ABNORM AUTO REFUEL DISTRIBUTION* .

Continued on the following page

FUEL ABNORM AUTO REFUEL DISTRIBUTION (Cont'd)

- **WHEN REFUEL COMPLETED (AUTO RCL) :**

  AUTO GND XFR..... ON

L2 *An automatic ground transfer enables to recover a standard fuel distribution.*

FUEL ALL FEED TKs LEVEL LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is less than 3 030 lb in each feed tank.

Indications:

Audio



Master Light



Local light



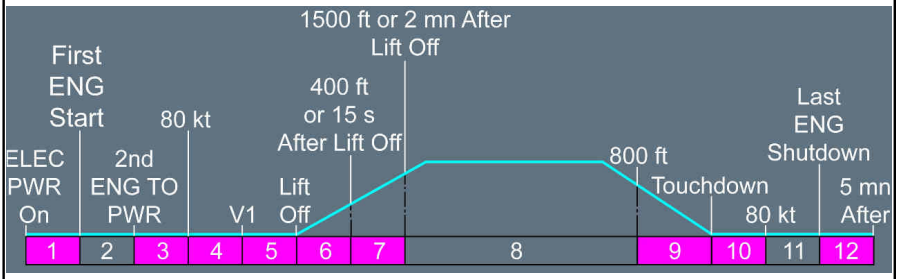
All TK XFR pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL ALL FEED TKs LEVEL LO (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL ALL FEED TKs LEVEL LO*.

LAND ANSA

ALL CROSSFEEDs ..... ON

L2 *Note: If the refuel/defuel valve is failed in the open position, the ECAM will not request to open the crossfeed valves, in order to prevent a fuel transfer from the feed tanks to the transfer tanks.*

L1 ALL FEED TKs PMPs ..... ON

L2 *For each feed tank, the flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 ● **If gravity transfer from the trim tank is in progress:**
TRIM TK FEED.....AUTO

● **For transfer tanks containing fuel:**
OUTR TK XFR.....MAN

● **If at least one trim tank pump is running:**
TRIM TK XFR.....FWD

INR TK XFR.....MAN
MID TK XFR..... MAN

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA

LIMITATIONS ON PFD

ALL PHASES

LAND ANSA

FUEL APU FEED FAULT

Applicable to: ALL

ANNUNCIATIONS

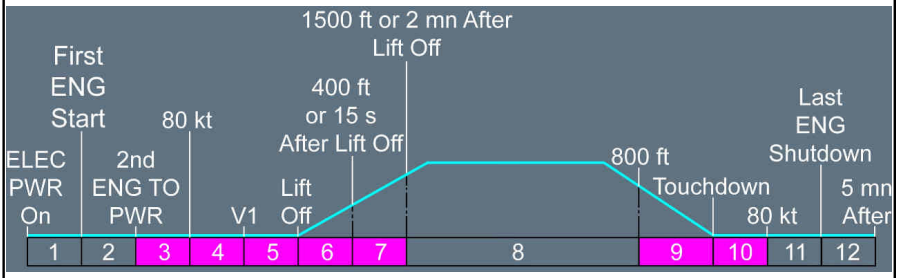
Triggering Conditions:

L2 The APU isolation valve, or the APU LP valve is abnormally closed.

Indications:

Audio	Master Light	Local light	SD page
			
		APU MASTER pb-sw	FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL APU FEED FAULT*

APU MASTER SW..... OFF

STATUS

INOP SYS

ALL PHASES

APU

FUEL APU FEED VLV NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The APU isolation valve, or the APU LP valve is abnormally open.

Indications:

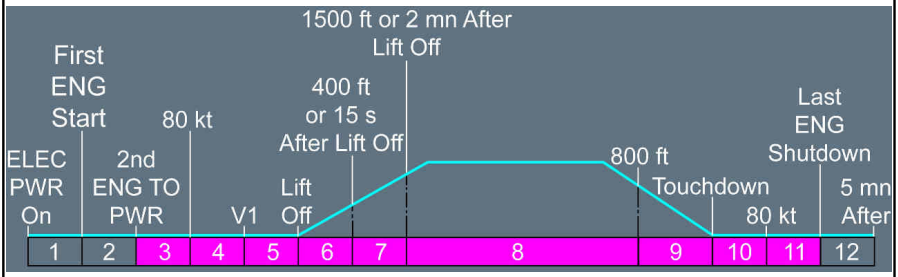
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL APU FEED VLV NOT CLOSED* .

Crew awareness.

FUEL AUTO GND XFR COMPLETED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The automatic ground transfer has successfully completed.

Indications:

Audio



Master Light



Local light



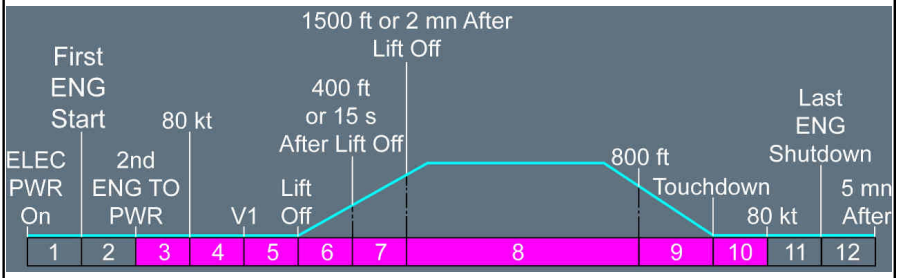
AUTO GND XFR pb

SD page



FUEL SD Page

Flight Phase Inhibition:



AUTO GND XFR..... OFF

FUEL AUTO GND XFR FAULT

Applicable to: ALL

ANNUNCIATIONS

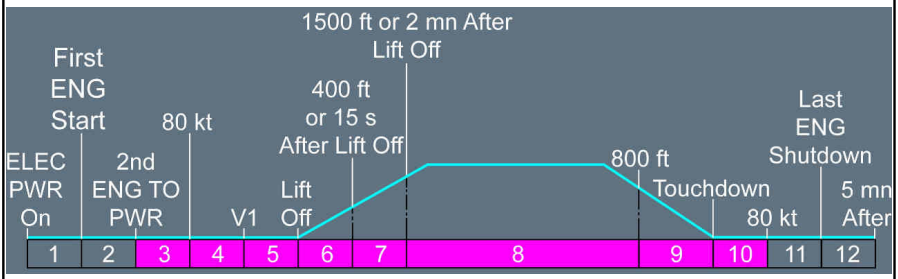
Triggering Conditions:

L2 The automatic ground transfer cannot start or complete, or two engines have been started before the end of the automatic ground transfer.

Indications:

Audio	Master Light	Local light	SD page
			
		AUTO GND XFR pb	FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL AUTO GND XFR FAULT*.

Continued on the following page

FUEL AUTO GND XFR FAULT (Cont'd)

■ **If two or more engines are running:**

INHIBITED BY SECOND ENG START

L2 *The automatic ground transfer is automatically inhibited, when two or more engines are running.*

L1 GW & GWCG.....CHECK

L2 *The automatic ground transfer has been interrupted before completion. The flight crew must check that the resulting GW and GWCG are within the takeoff envelope.*

L1 AUTO GND XFR..... OFF

■ **If the automatic ground transfer is failed:**

● **If ZFW and ZFCG are not entered in the FMS:**

FMS ZFW OR ZFWCG VALUES.....INITIALIZE

L2 *An automatic ground transfer is not possible, if the flight crew did not enter the ZFW and ZFCG in the FMS.*

L1 ALL TKs PMPs .....ON

L2 *All the transfers pumps must be on to perform an automatic ground transfer.*

L1 ALL CROSSFEEDS.....OFF

OUTR TK XFR.....AUTO

MID TK XFR..... AUTO

INR TK XFR.....AUTO

TRIM TK XFR..... AUTO

TRIM TK FEED.....AUTO

STATUS

INOP SYS

ALL PHASES

FUEL AUTO GND XFR

FUEL CG AT FWD LIMIT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The aircraft Center of Gravity (CG) exceeds the forward certified flight limit (*Refer to LIM-11 Center of Gravity Limits*).

Indications:

Audio



Master Light

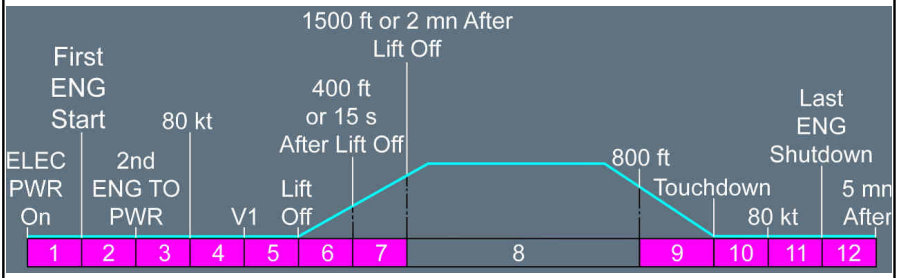


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL CG AT FWD LIMIT* .

Continued on the following page

FUEL CG AT FWD LIMIT (Cont'd)

● **IF NO TRIM TK COLD FUEL:**

L2 If there is cold fuel in the trim tank, the priority is to recover the fuel in the trim tank before it freezes. In this case, the following procedure does not apply.

L1 TRIM TK XFR..... AUTO
TRIM TK FEED.....ISOL

● **WHEN CG ALLOWS TRIM TK FWD XFR (AUTO RCL) :**

L2 The ECAM automatically recalls the procedure, when the CG moved sufficiently aft to allow to transfer all the fuel in the trim tank with a single forward transfer.

L1 ■ **If a pumped manual transfer can be performed:**

L2 A pumped manual transfer can be performed if:
- At least one trim tank pump is available, and
- The trim tank isolation valve is not failed in the closed position.

L1 TRIM TK FEED.....AUTO
TRIM TK XFR.....FWD

■ **If only a gravity forward transfer is possible:**

PITCH ATT < 3° FOR GRVTY FWD XFR
TRIM TK FEED.....OPEN

Continued on the following page

FUEL CG AT FWD LIMIT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If only a gravity forward transfer is possible:
  FOR TRIM TK FWD XFR:
  PITCH ATT < 3°

STATUS

INFO

- If only a gravity forward transfer is possible:
  TRIM TK GRVTY XFR : AROUND 3000 KG / HR

FUEL CG DATA DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PRIMs have detected a difference of more than 8%, between the aircraft's center of gravity (CG) computed by the FQMS and the aircraft's CG computed by the WBBC.

Indications:

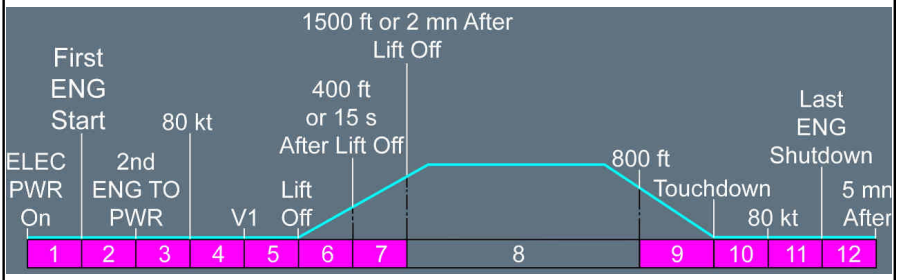
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL CG DATA DISAGREE*.

Continued on the following page

FUEL CG DATA DISAGREE (Cont'd)

ERROR > 8% DETECTED BY F/CTL
FMS ZFWCG VALUE..... CONFIRM
L123

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and ATHR remain available.
The PRIMs use the most aft computed CG to compute the flight control laws.

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F/CTL PROT	CAT 2 GLS AUTOLAND

INFO

ALTN LAW : PROT LOST

FUEL CG OUT OF RANGE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - The CG computed by the FQMS exceeds the certified takeoff limits, when the flight crew sets the ENG MODE selector to IGN/START, or
- The CG computed by the alternate gauging system is greater than 54 % after the second engine start.

Indications:

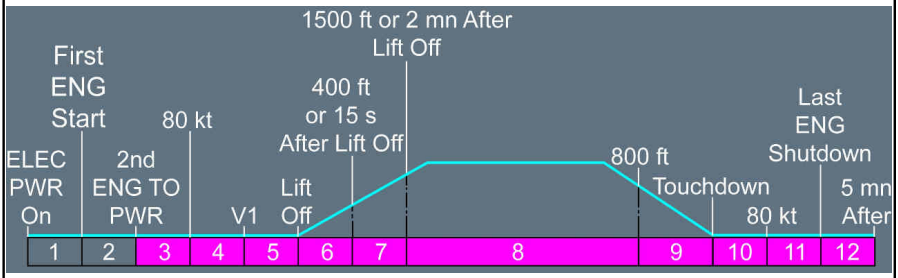
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL CG OUT OF RANGE* .

Continued on the following page

FUEL CG OUT OF RANGE (Cont'd)

■ **If the CG computed by the FQMS exceeds the certified takeoff limits, when the flight crew sets the ENG MODE selector to IGN/START:**

DELAY ENG START
AUTO GND XFR..... ON

■ **If the CG computed by the alternate gauging system is above 54 % after the second engine start:**

DELAY T.O

L2 *A difference between the alternate gauging CG and the FQMS CG can be the result of a hidden failure of the FQMS.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the CG computed by the alternate gauging system is above than 54 % after the second engine start:
  DELAY T.O

FUEL COLLECTOR CELL 1(2)(3)(4) NOT FULL

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Collector cell 1(2)(3)(4) is not full.
There is less than 265 US Gal (1 735 lb) in the collector cell. The alert no longer appears, when the fuel quantity exceeds 317 US Gal (2 076 lb). (fuel density: 6.55 lb/US Gal)

L3 The alert is inhibited in the case the associated feed tank level is low, or if both associated feed tank pumps are not running.

Indications:

L2

Audio



Master Light

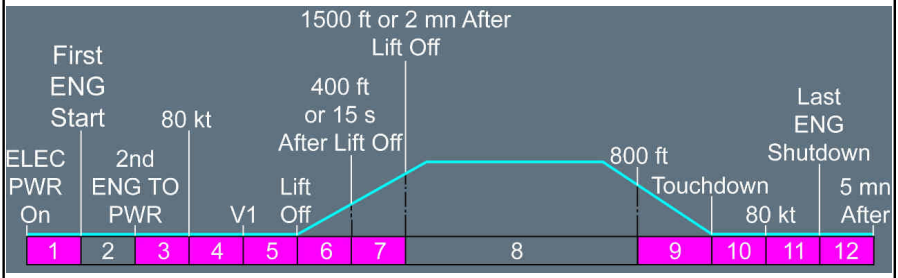


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL COLLECTOR CELL 1(2)(3)(4) NOT FULL* .

Continued on the following page

FUEL COLLECTOR CELL 1(2)(3)(4) NOT FULL (Cont'd)

- **IF NO FUEL LEAK**

  FEED TK 1(2)(3)(4) MAIN PMP.....ON
  FEED TK 1(2)(3)(4) STBY PMP.....ON
  FEED TK 4(3)(2)(1) MAIN PMP.....ON
  FEED TK 4(3)(2)(1) STBY PMP.....ON
  CROSSFEED 1(2).....ON
  CROSSFEED 4(3).....ON

- **If COLLECTOR CELL 2(3) NOT FULL:**

  FEED TK 2(3) : 2000 KG MAX NOT USABLE

FUEL CROSSFEED VLV 1(2)(3)(4) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The crossfeed valve 1(2)(3)(4) is:
- Abnormally closed, or
- Abnormally open.

Indications:

Audio



Master Light



Local light



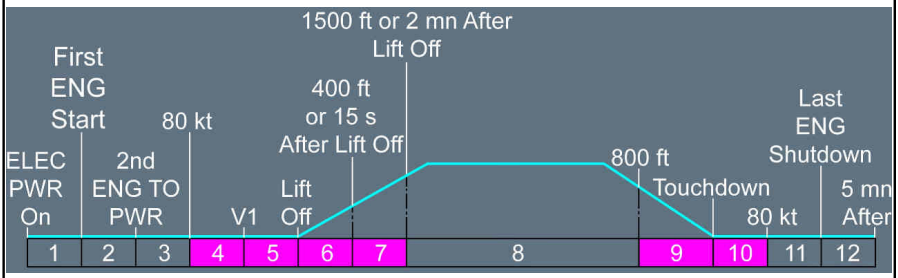
CROSSFEED
1(2)(3)(4) pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL conditions, *Refer to MEL/ME-ECAM-28 FUEL CROSSFEED VLV 1(2)(3)(4) FAULT*.

Continued on the following page

FUEL CROSSFEED VLV 1(2)(3)(4) FAULT (Cont'd)

■ **If the crossfeed valve is abnormally open and/or ENG 1(2)(3)(4) is running:**

Crew awareness.

■ **If the crossfeed valve is abnormally closed and ENG 1(2)(3)(4) is not running:**

FEED TK 1(2)(3)(4) NOT USABLE

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the crossfeed valve is abnormally closed and ENG 1(2)(3)(4) is not running:
  FEED TK 1(2)(3)(4) NOT USABLE

STATUS

INOP SYS

ALL PHASES

CROSSFEED VLV 1(2)(3)(4)

FUEL ENG 1(2)(3)(4) LP VLV FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Engine 1(2)(3)(4) LP valve is:
- Abnormally closed on ground, during engine start, or
- Abnormally open on ground, during engine shutdown.

Indications:

Audio



Master Light

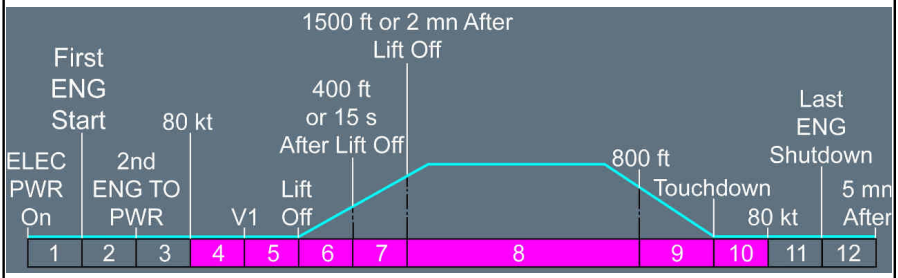


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL ENG 1(2)(3)(4) LP VLV FAULT*.

Continued on the following page

FUEL ENG 1(2)(3)(4) LP VLV FAULT (Cont'd)

■ **Before takeoff:**

ENG 1(2)(3)(4) MASTER.....OFF

L2 *When the LP valve is failed in the closed position, it is not possible to start the associated engine.*

L1 ■ **After landing:**

Crew awareness.

L2 *When the master lever is set to OFF, the HP valve also closes, to ensure the associated engine shuts down.*

STATUS

INOP SYS

ALL PHASES
ENG 1(2)(3)(4) LP VLV

FUEL EXCESS AFT CG

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The aircraft center of gravity (CG), computed by the Weight and Balance Backup Computer (WBBC) exceeds 50 % while the fuel system is in automatic mode.

Indications:

Audio



Master Light



Local light



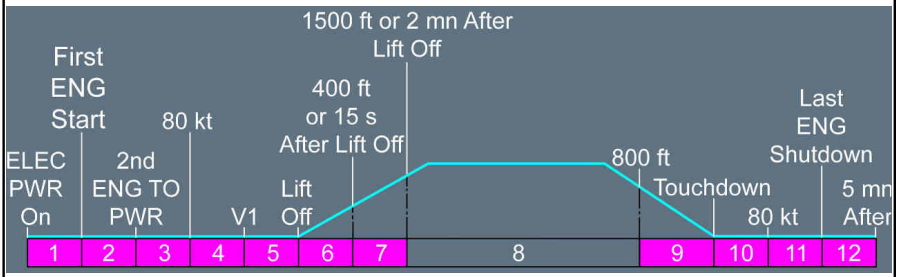
TRIM TK XFR pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL EXCESS AFT CG* .

Continued on the following page

FUEL EXCESS AFT CG (Cont'd)

- **If the trim tank is isolated:**
  TRIM TK FEED.....AUTO

- **If the trim tank is not empty:**
  TRIM TK XFR.....FWD
  - **IF NOT SUCCESSFUL :**
    TRIM TK XFR.....AUTO
    PITCH ATT < 3° FOR GRVTY FWD XFR
    TRIM TK FEED.....OPEN
    - **IF NOT SUCCESSFUL :**
      MAX FLT TIME : 4 HR

L2 *Provided that the flight time remains less than four hours, the CG will not exceed the ultimate CG (i.e. the CG at which the aircraft is no longer controllable).*

L1 TRIM TK NOT USABLE

- **If the outer tanks are not empty:**
  OUTR TK XFR.....MAN

L2 *The manual fuel transfer from the outer tanks to the feed tanks shifts the CG forward by approximately 3 %.*

L1 - **If the trim tank is empty, or if the FUEL TRIM & APU LINES FAULT previously triggered:**
MAX FLT TIME : 4 HR

L2 *Provided that the flight time remains less than four hours, the CG will not exceed the ultimate aft CG (i.e. the CG at which the aircraft is no longer controllable).*

L1
- **If the outer tanks are not empty:**
  OUTR TK XFR.....MAN

L2 *The manual fuel transfer from the outer tanks to the feed tanks shifts the CG forward by approximately 3 %.*

Continued on the following page

FUEL EXCESS AFT CG (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If a gravity transfer is required:
  FOR TRIM TK FWD XFR : PITCH ATT < 3°
- If fuel is trapped in the trim tank, or if the trim tank is empty when the alert triggers:
  MAX FLT TIME : 4 HR
- If fuel is trapped in the trim tank:
  TRIM TK NOT USABLE

STATUS

INFO

- If a gravity trim tank transfer is in progress:
  TRIM TK GRVTY XFR : AROUND 3000 KG/HR

FUEL FEED TK 1(2)(3)(4) LEVEL LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is less than 3 030 lb of fuel in feed tank 1(2)(3)(4).

Indications:

Audio



Master Light



Local light



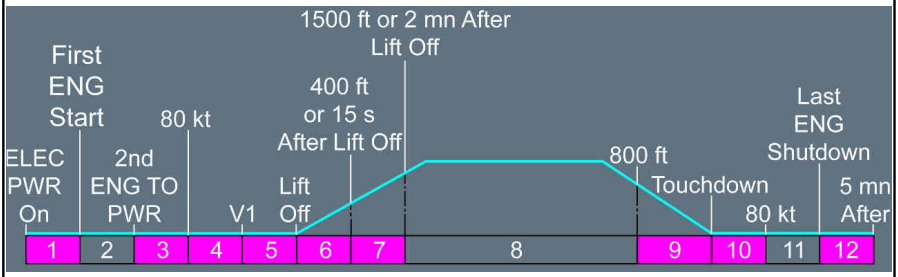
All TK XFR pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL FEED TK 1(2)(3)(4) LEVEL LO* .

Continued on the following page

FUEL FEED TK 1(2)(3)(4) LEVEL LO (Cont'd)

- **IF NO FUEL LEAK :**

  CROSSFEED 1(3)..... ON
  CROSSFEED 2(4)..... ON

L2 *Note:* *If the refuel/defuel valve is failed in the open position, the ECAM will not request to open the crossfeed valves. This avoids transferring fuel from the feed tanks into the transfer tanks.*

L1
- **If gravity transfer from the trim tank is in progress:**

  TRIM TK FEED..... AUTO

- **For transfer tanks containing fuel :**

  OUTR TK XFR..... MAN

  - **If at least one trim tank pump is running:**

    TRIM TK XFR..... FWD

  INR TK XFR..... MAN
  MID TK XFR..... MAN

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

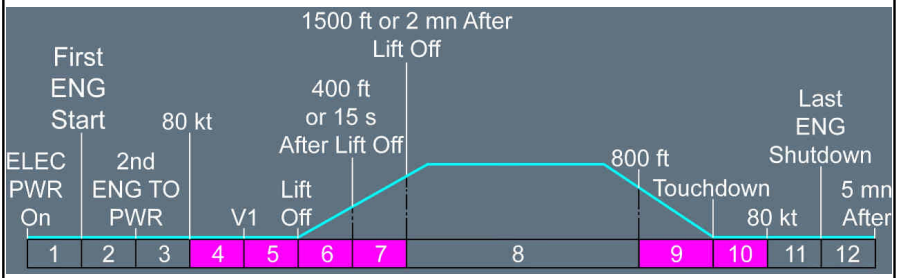
L2 One of the following has occurred:

- The main pump and the standby pump of feed tank 1(2)(3)(4) are:
  - Operating at low pressure, or
  - Abnormally not running, or
  - Turned off by the flight crew (except in flight phase 1 and 12, or, if required by another ECAM procedure (e.g. FUEL WINGS NOT BALANCED)).
- The main pump of feed tank 1(2)(3)(4) is operating either at low pressure or is abnormally off and the standby pump of feed tank 1(2)(3)(4) is not powered,
- The standby pump of feed tank 1(2)(3)(4) is operating either at low pressure or is abnormally off and the main pump of feed tank 1(2)(3)(4) is not powered.

Indications:

Audio	Master Light	Local light	SD page
			
		FEED TK 1(2)(3)(4) MAIN and STBY PMP pb-sw	FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT (Cont'd)

L2 If both pumps in a feed tank are failed, the fuel in that feed tank can only be fed by gravity.

However, fuel gravity feeding is only possible when the aircraft is below FL 280 (FL 50 / MEA if the flight time above FL 300 is less than 30 min), therefore, as required by ECAM, the flight crew must perform the following actions in order to maintain cruise altitude as long as possible:

1. Open the crossfeed valves, to feed engine 1(2)(3)(4). During this time, feed tank 1(2)(3)(4) remains full. The other feed tanks receive fuel from the inner, mid and trim tanks, via normal transfers.
   Lateral balance is maintained.
2. Descend to the gravity feed ceiling, when the inner and mid tanks are empty. Close the crossfeed valves. Engine 1(2)(3)(4) is fed by gravity.
   All feed tanks are emptied simultaneously.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL FEED TK 1(2)(3)(4) MAIN+STBY PMPs FAULT* .

Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT (Cont'd)

● **Before takeoff:**

FEED TK 1(2)(3)(4) MAIN PMP.....OFF
FEED TK 1(2)(3)(4) STBY PMP.....OFF

■ **If the failures affect feed tank 1 or 4:**

FEED TK 1(4) : 2900 LBS MAX NOT USABLE

L2 *Both feed tank pumps are failed, therefore, the fuel in feed tank 1(4) is available for gravity feeding only. However, up to 2 900 lb of fuel may remain trapped in the feed tank.*

L1 ■ **If the failures affect feed tank 2 or 3:**

FEED TK 2(3) : 4400 LBS MAX NOT USABLE

L2 *Both feed tank pumps are failed, therefore, the fuel in feed tank 2(3) is available for gravity feeding only. However, up to 4 400 lb of fuel may remain trapped in the feed tank.*

L1 ● **After takeoff:**

■ **If FUEL L(R) WING FEED PMPs FAULT was not triggered during the last 5 min:**

CROSSFEED 1(3).....ON
CROSSFEED 2(4).....ON
FEED TK 1(2)(3)(4) MAIN PMP .....OFF
FEED TK 1(2)(3)(4) STBY PMP .....OFF

■ **If the failures affect feed tank 1 or 4:**

FEED TK 1(4) : 2900 LBS MAX NOT USABLE

L2 *Both feed tank pumps are failed, therefore, the fuel in feed tank 1(4) is available for gravity feeding only. However, up to 2 900 lb of fuel may remain trapped in the feed tank.*

L1 ■ **If the failures affect feed tank 2 or 3:**

FEED TK 2(3) : 4400 LBS MAX NOT USABLE

L2 *Both feed tank pumps are failed, therefore, the fuel in feed tank 2(3) is available for gravity feeding only. However, up to 4 400 lb of fuel may remain trapped in the feed tank.*

L1 ● **WHEN INR & MID TKs EMPTY:**

■ **If flight time above FL 300 since departure is greater than 30 min:**

DESCENT TO FL 280.....INITIATE
MAX FL : 280

Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT (Cont'd)

L2 *If the aircraft has been flying more than 30 min above FL 300, fuel gravity feeding is ensured below FL 280.*

L1 ■ **If flight time above FL 300 since departure is less than 30 min:**
DESCENT TO FL 50/MEA..... INITIATE
MAX FL : 50/MEA

L2 *If the aircraft has been flying less than 30 min above FL 300, fuel gravity feeding is ensured below FL 50.*
However, if the MEA is above FL 50, do not fly below the MEA.

L1 ENG START SEL.....IGN START
CROSSFEED 1(3)..... OFF
CROSSFEED 2(4)..... OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

■ **If FUEL L(R) WING FEED PMPs FAULT was triggered during the last 5 min:**

L2 If the FUEL L(R) WING FEED PMPs FAULT alert was previously triggered, it was probably caused by a pipe break on an engine feed line.

L1 FEED TK 1(2)(3)(4) MAIN PMP ..... OFF
FEED TK 1(2)(3)(4) STBY PMP .....OFF

■ **If flight time above FL 300 since departure is greater than 30 min:**
DESCENT TO FL 280..... INITIATE
MAX FL : 280

L2 *If the aircraft has been flying more than 30 min above FL 300, fuel gravity feeding is ensured below FL 280.*

L1 ■ **If flight time above FL 300 since departure is less than 30 min:**
DESCENT TO FL 50/MEA.....INITIATE
MAX FL : 50/MEA

L2 *If the aircraft has been flying less than 30 min above FL 300, fuel gravity feeding is ensured below FL 50.*
However, if the MEA is above FL 50, do not fly below the MEA.

L1 ENG START SEL.....IGN START

Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT (Cont'd)

■ **If the failures affect feed tank 1 or 4:**

FEED TK 1(4) : 2900 LBS MAX NOT USABLE

L2 *Both feed tank pumps are failed, therefore, the fuel in feed tank 1(4) is available for gravity feeding only. However, up to 2 900 lb of fuel may remain trapped in the feed tank.*

L1 ■ **If the failures affect feed tank 2 or 3:**

FEED TK 2(3) : 4400 LBS MAX NOT USABLE

L2 *Both feed tank pumps are failed, therefore, the fuel in feed tank 2(3) is available for gravity feeding only. However, up to 4 400 lb of fuel may remain trapped in the feed tank.*

L1 EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- When inner and mid tanks are empty, and flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
- When inner and mid tanks are empty, and flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- When inner and mid tanks are empty:
  AVOID NEG G LOAD
  FUEL PARTLY UNUSABLE

LIMITATIONS ON PFD

ALL PHASES

- When inner and mid tanks are empty, and flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
- When inner and mid tanks are empty, and flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- When inner and mid tanks are empty:
  AVOID NEG G LOAD

Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN + STBY PMPS FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FEED TK 1(2)(3)(4) PMPs

INFO

FEED TK 1(2)(3)(4) BY GRVTY ONLY
FEED TK 1(2)(3)(4) : 4400 lbS MAX NOT USABLE

- When inner and mid tanks are empty:
  EXPECT NORM COLLECTOR CELL DEPLETION

FUEL FEED TK 1(2)(3)(4) MAIN PMP FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

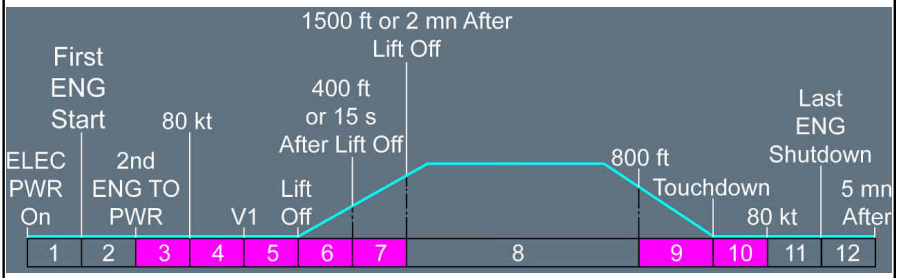
L2 The main pump of feed tank 1(2)(3)(4) is:

- Operating at Low Pressure, or
- Abnormally not running, or
- Turned off by the flight crew (except in flight phase 1 and 12, or, if required by another ECAM procedure (e.g. FUEL WINGS NOT BALANCED).

Indications:

Audio	Master Light	Local light	SD page
			
		FEED TK 1(2)(3) (4) MAIN PMP pb-sw	FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL FEED TK 1(2)(3)(4) MAIN PMP FAULT (Cont'd)

L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 1 MAIN PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 2 MAIN PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 3 MAIN PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 4 MAIN PMP FAULT*

FEED TK 1(2)(3)(4) MAIN PMP.....OFF

STATUS

INOP SYS

ALL PHASES
FEED TK 1(2)(3)(4) MAIN PMP

FUEL FEED TK 1(2)(3)(4) STBY PMP FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The standby pump of feed tank 1(2)(3)(4) is:

- Operating at Low Pressure, or
- Abnormally not running, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio



Master Light



Local light



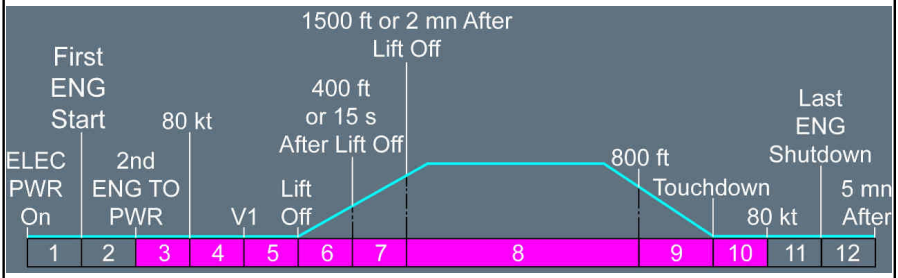
FEED TK 1(2)(3)
(4) STBY PMP pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 1 STBY PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 2 STBY PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 3 STBY PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 4 STBY PMP FAULT*

Continued on the following page

FUEL FEED TK 1(2)(3)(4) STBY PMP FAULT (Cont'd)

Crew awareness.

MORE INFO

REDUND LOSS

FEED TK 1(2)(3()(4) STBY PMP

FUEL FEED TK 1(2)(3)(4) TEMP HI

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The fuel temperature in feed tank 1(2)(3)(4) is above 53 °C.

Indications:

Audio



Master Light

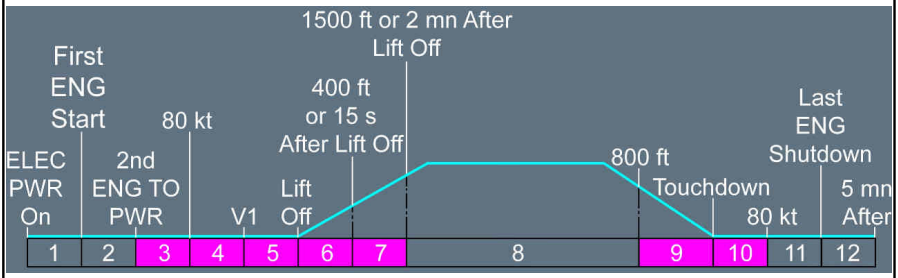


SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL FEED TK 1(2)(3)(4) TEMP HI (Cont'd)

L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 1 TEMP HI*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 2 TEMP HI*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 3 TEMP HI*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TK 4 TEMP HI .*

■ **On ground:**

DELAY TO

■ **In flight:**

L2 In flight, the fuel temperature in feed tank 1(4) will increase if the green(yellow) hydraulic fuel heat exchanger is active. This occurs when one green(yellow) hydraulic air heat exchanger is failed. For more information on the hydraulic heat exchangers: *Refer to Hydraulic System Description*

L3 When the alert triggers, the hydraulic fuel heat exchanger valve automatically closes, to avoid further fuel temperature increase. The exchanger valve will reopen automatically when the fuel temperature is below 48 °C .

L1 ENG 1(2)(3)(4) PARAMETERS..... MONITOR

● **IF ABNORMAL:**

THR LEVER 1(2)(3)(4).....IDLE

L2 *Hot fuel in the engine can lead to engine stall, engine shutdown, or engine overspeed. The flight crew should not shut down the affected engine, unless the associated ECAM alert is triggered.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- On ground:
  DELAY TO

FUEL FEED TKs 1+2(3+4) LEVEL LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is less than 3 030 lb in feed tank 1(3) and feed tank 2(4).

Indications:

Audio



Master Light



Local light



All TK XFR pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-28 FUEL FEED TKs 1+2 LEVEL LO*
- *Refer to MEL/ME-ECAM-28 FUEL FEED TKs 3+4 LEVEL LO .*

Continued on the following page

FUEL FEED TKs 1+2(3+4) LEVEL LO (Cont'd)

- **IF NO FUEL LEAK :**

ALL CROSSFEEDs ..... ON

L2

Note: *If the refuel/defuel valve is failed in the open position, the ECAM will not request to open the crossfeed valves, in order to prevent a fuel transfer from the feed tanks to the transfer tanks.*

L1

- **If gravity transfer from the trim tank is in progress:**

TRIM TK FEED..... AUTO

- **For transfer tanks containing fuel :**

OUTR TK XFR..... MAN

- **If at least one trim tank pump is running:**

TRIM TK XFR..... FWD

INR TK XFR..... MAN
MID TK XFR..... MAN

FUEL FQDC 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 FQDC 1(2) is failed

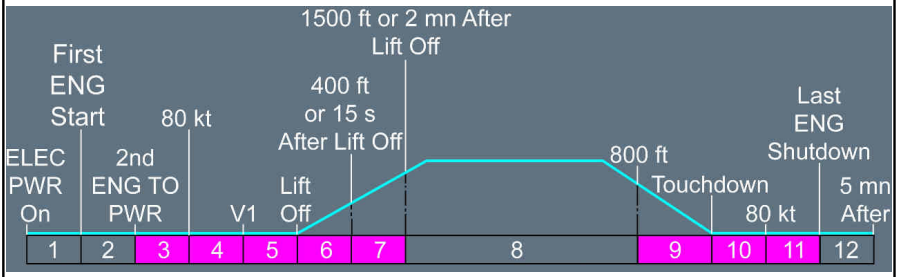
Indications:

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-28 FUEL FQDC 1(2) FAULT* .

Crew awareness.

L2 If FQDC 1(2) is failed, the temperature indications for the left(right) wing tanks are lost.

Continued on the following page

FUEL FQDC 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

FQDC 1(2)

FUEL FQI FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- The Fuel Quantity Indication (FQI) of at least one tank is lost, or
- The feed tank low level detection is failed, or
- The wing or trim tank overflow detection is failed (in flight phase 12 only).

Indications:

Audio



Master Light

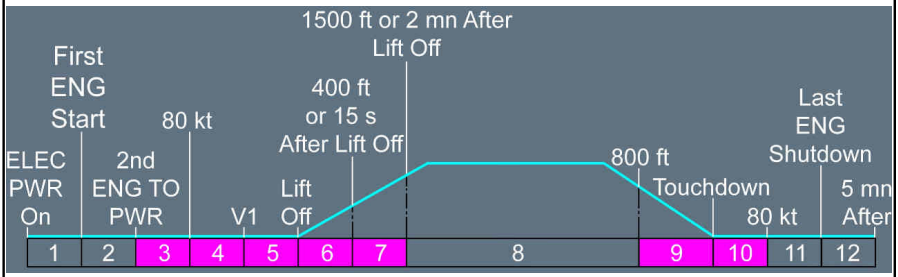


SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL FQI FAULT (Cont'd)

L2 In the case of FQI failure in one feed tank, the FUEL MAN XFR PROCEDURE alert is simultaneously triggered.
In the case of multiple tanks FQI failures, the FUEL FQMS 1+2 FAULT and the FUEL MAN XFR PROCEDURE alerts are simultaneously triggered.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL FQI FAULT* .

Continued on the following page

FUEL FQI FAULT (Cont'd)

- **If the fuel quantity indication of one or more tanks, is lost:**
  - **Depending on the failure case, the following may appear:**

L3 When the difference between the fuel quantity measured by the FQMS and the fuel quantity computed by the AGP is more than approximately 10 % , the integrity of the fuel quantity is not sufficient.

L1 FUEL XFR : MAN ONLY
FOB COMPUTED FROM FU

  - **In flight:**
    GWCG FROM WBBC
    GW FROM WBBC

ASSOCIATED PROCEDURES

FUEL MAN XFR PROCEDURE
Refer to procedure

- **If the fuel quantity indication in at least all the feed tanks is lost:**

LAND ANSA

  - **IF NO FQI AVAIL :**
    INR TK s NOT USABLE
    MID TK s NOT USABLE
    TRIM TK NOT USABLE
    USE TRIM TK XFR FOR CG IF NECESSARY

L2 *The fuel in the trim tank transfers into the inner tanks, and remains unusable.*
If the flight crew transfers fuel from the trim tank to the inner tanks, the CG of the aircraft moves forward by around 0.5 % per ton of transferred fuel (heavy aircraft) or 0.9 % per ton of transferred fuel (light aircraft).

L1 OUTR TK s PMP s ..... OFF
OUTR TK XFR..... MAN

L2 *When the outer tank pumps are off, setting the OUTR TK XFR pb-sw to MAN transfers fuel from to outer tanks to:*
- *Feed tanks 1 & 4 via the emergency outer tank transfer valves*
- *Feed tanks 2 & 3 via the forward and aft galleries.*

L1 FOB COMPUTED FROM FU

Continued on the following page

FUEL FQI FAULT (Cont'd)

- **In flight:**
  GWCG FROM WBBC
  GW FROM WBBC

- **On ground, if the feed tank low level detection, trim overflow detection, or wing overflow detection is failed:**

  Crew awareness.

Continued on the following page

FUEL FQI FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the fuel quantity indication in at least all the feed tanks is lost:
  LAND ANSA
  INR TKs NOT USABLE
  MID TKs NOT USABLE
  TRIM TK NOT USABLE

LIMITATIONS ON PFD

ALL PHASES

- If the fuel quantity indication in at least all the feed tanks is lost:
  LAND ANSA

STATUS

INOP SYS

ALL PHASES

JETTISON
FUEL LEAK DET
CG MANAGEMENT
FEED TK 1(2)(3)(4) LO LVL DET (If the feed tank low level detection is failed)
TRIM TK OVERFLOW DET (If the trim tank overflow detection is failed)
L(R) WING OVERFLOW DET (If the left(right) wing overflow detection is failed)
AUTO REFUEL (Before second engine start)
FUEL AUTO GND XFR (Before second engine start)

Continued on the following page

FUEL FQI FAULT (Cont'd)

INFO

- Depending on the failure case, the following may appear:
  FOB COMPUTED FROM FU
  USE TRIM TK XFR FOR CG IF NECESSARY
  GWCG FROM WBBC
  GW FROM WBBC
  FUEL XFR : MAN ONLY

MORE INFO

REDUND LOSS

- If the left(right) wing overflow detection is failed:
  L(R) SURGE(VENT) OVERFLOW DET

FUEL FQMS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 FQMS 1(2) is failed.

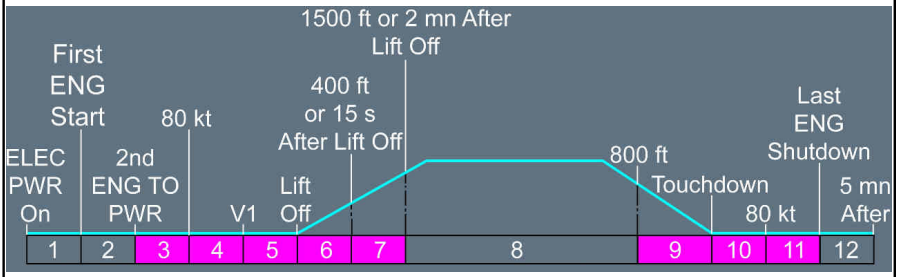
Indications:

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-28 FUEL FQMS 1 FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL FQMS 2 FAULT* .

Continued on the following page

FUEL FQMS 1(2) FAULT (Cont'd)

■ **If the alert is due to a difference between the ZFW and ZFCG values of the FQMS1(2) channels:**

FMS ZFW OR ZFWCG VALUES..... REENTER

● **AFTER 120 S:**

FQMS 1(2)..... RESET

L2 *The FQMS 1 reset switch is on the left RESET panel.*
The FQMS 2 reset switch is on the right RESET panel.

L1 ■ **In all other cases:**

FQMS 1(2)..... RESET

L2 *The FQMS 1 reset switch is on the left RESET panel.*
The FQMS 2 reset switch is on the right RESET panel.

MORE INFO

REDUND LOSS

FQMS 1(2)

FUEL FQMS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- Both FQMS are failed, or
- Both FQDCs are failed, or
- Both Alternate Gauging Processors (AGP) are failed, or
- The FQMS can no longer compare the FOB it has computed to the FOB computed by the AGPs.

Indications:

Audio



Master Light

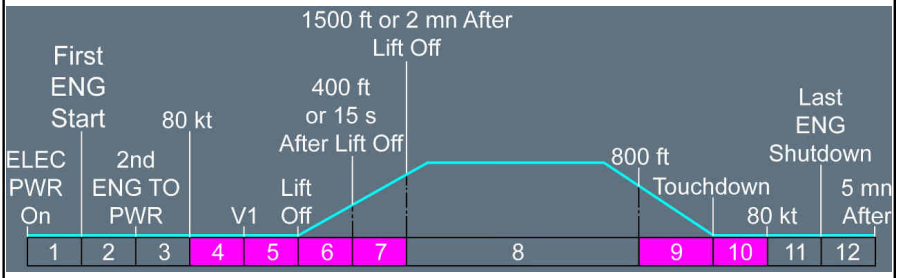


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL FQMS 1+2 FAULT* .

Continued on the following page

FUEL FQMS 1+2 FAULT (Cont'd)

■ **If the alert is due to a difference between the ZFW and ZFCG values of the FQMS channels:**
FMS ZFW OR ZFWCG VALUES..... REENTER

● **AFTER 120 S:**
FQMS 1+2 (ONE BY ONE).....RESET

L2 *The flight crew should reset one FQMS at a time.*
The FQMS 1 reset button is on the left RESET panel.
The FQMS 2 reset button is on the right RESET panel.

L1 ■ **In all other cases:**

■ **On ground, if the FQMS cannot compare the FOB it has computed to the FOB computed by the alternate gauging:**
GAUGING MONITORING FAULT

● **When engines are not running:**
FOB INVALID

■ **In all other cases:**
FQMS 1+2 (ONE BY ONE).....RESET

L2 *The flight crew should reset one FQMS at a time.*
The FQMS 1 reset button is on the left RESET panel.
The FQMS 2 reset button is on the right RESET panel.

L1 *Note: The MFD displays REENTER ZFW/ZFWCG in the FMS Message Area. Disregard this message, Refer to Message .*

WAIT FOR 1 MIN AFTER RESET

● **IF ALERT PERSISTS:**
FQMS 1 RESET..... PULL

■ **IF ALERT CLEARS WITHIN 3 MIN:**
-LEAVE FQMS 1 RESET PULLED
-DISREGARD FUEL FQMS 1 FAULT

■ **IF ALERT PERSISTS:**
FQMS 1 RESET.....PUSH
FQMS 2 RESET.....PULL

Continued on the following page

FUEL FQMS 1+2 FAULT (Cont'd)

■ **IF ALERT CLEARS WITHIN 3 MIN:**
-LEAVE FQMS 2 RESET PULLED
-DISREGARD FUEL FQMS 2 FAULT

■ **IF ALERT PERSISTS:**
FQMS 2 RESET..... PUSH

LOSS OF FUEL XFR INDICATIONS
ALTN GAUGING ONLY

L2 *The alternate gauging is used for display on the FUEL SD page: I.e. fuel quantities of all the tanks appear with amber dashes.*

L1 FOB COMPUTED FROM FU

● **Depending on the failure case, the following may appear:**
FUEL XFR : MAN ONLY
GW FROM WBBC
GWCG FROM WBBC

■ **If both FQDC s are failed:**

ASSOCIATED PROCEDURES

FUEL FQI FAULT
Refer to PRO-ABN-ECAM-10-28-550 FUEL FQI FAULT

■ **If both FQMS or both AGP s are failed:**

ASSOCIATED PROCEDURES

FUEL MAN XFR PROCEDURE
Refer to PRO-ABN-ECAM-10-28-330 FUEL MAN XFR PROCEDURE

Continued on the following page

FUEL FQMS 1+2 FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
FQMS 1+2 JETTISON FQDC 1+2 (if the alternate gauging system is failed)	CAT 2 GLS AUTOLAND

INFO

FOB COMPUTED FROM FU

The ECAM continues to display the Fuel On Board (FOB) with amber dashes. The CDS computes the FOB, based on the FOB at departure and the Fuel Used.

FUEL XFR : MAN ONLY
LOSS OF FUEL XFR INDICATIONS

- Depending on the failure case, the following may appear:
  GWCG FROM WBBC
  GW FROM WBBC
- When the engines are not running and if the FQMS cannot compare the FOB it has computed to the FOB computed by the secondary gauging:
  FOB INVALID
  ALTN GAUGING ONLY

FUEL GAUGING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The accuracy of the fuel quantity indication (FQI) of at least one tank is degraded.

L3 The accuracy error is:
- In low degradation:
  - Between 1 % and 2 % of maximum tank capacity on ground
  - Between 2 % and 4 % of maximum tank capacity in flight.
- In medium degradation:
  - Between 2 % and a value between 5 % and 10 % of maximum tank capacity on ground
  - Between 4 % and a value between 5 % and 10 % of maximum tank capacity in flight.

L2 As a consequence, the accuracy of the FOB, GW, and CG is also degraded.

Indications:

Audio



Master Light

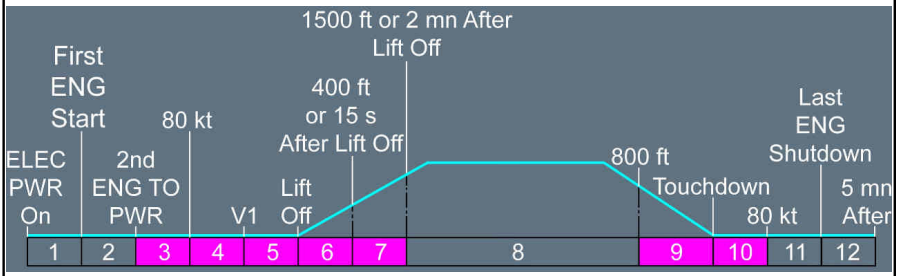


SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL GAUGING FAULT (Cont'd)

L2 On the FUEL SD page, the last two digits of the fuel quantity indication of the affected tank are dashed.

As a result:
- The last three digits of the FOB and GW indications are dashed
- The last digit of the GWCG indication is dashed.

Note: *FOB , GW , and GWCG remains degraded in flight, even if the affected tank becomes empty.*

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL GAUGING FAULT* .

■ **If the accuracy error is between 1 % and 2 % of the maximum tank capacity on ground:**
GAUGING LO DEGRADATION

■ **If the accuracy error is between 2 % and a value between 5 % and 10 % of maximum tank capacity on ground:**
GAUGING MEDIUM DEGRADATION

STATUS

INOP SYS

ALL PHASES

FUEL LEAK DET (If medium degradation)
AUTO REFUEL (If medium degradation, on ground:)
FUEL AUTO GND XFR (If medium degradation, on ground:)

FUEL INR TKs MAN XFR COMPLETED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The manual transfer of fuel from the inner tanks to the feed tanks is completed.

Indications:

Audio



Master Light

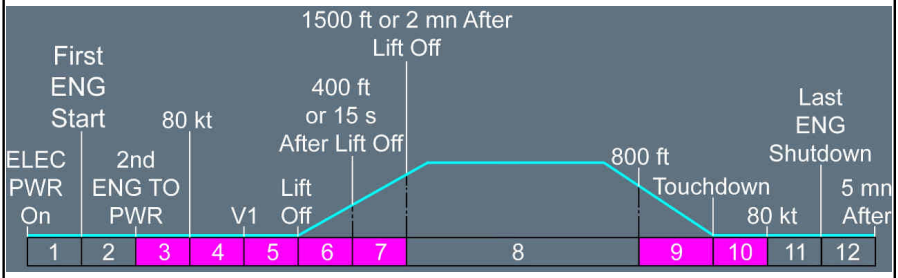


SD page



FUEL SD Page

Flight Phase Inhibition:



- **If the left(right) inner tank aft pump was turned off during the FUEL MAN XFR PROCEDURE:**

  L(R) INR TK AFT PMP..... ON

L2 *If there is fuel in the trim tank, the FUEL MAN XFR PROCEDURE will request a manual transfer from the trim tank into the inner tanks. the pump will therefore be necessary for a second manual inner tank transfer.*

L1 INR TK XFR..... AUTO

L2 *As long as the INR TK XFR pb-sw is set to MAN, all automatic transfers are inhibited. Setting the INR TK XFR pb-sw to AUTO, enables the FQMS to resume automatic transfers from the other tanks, unless the FUEL MAN XFR PROCEDURE caution previously triggered.*

FUEL INR TKs QTY LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 On ground, when the flight crew enters the ZFW and ZFCG in the FMS, the Fuel On Board (FOB) is more than 110 200 lb, and the quantity in any inner tank is less than 11 200 lb.
The alert is inhibited when the outer tanks are full, or when the refuel panel door is open, or if the flight crew presses the REFUEL pb-sw.

Indications:

Audio



Master Light

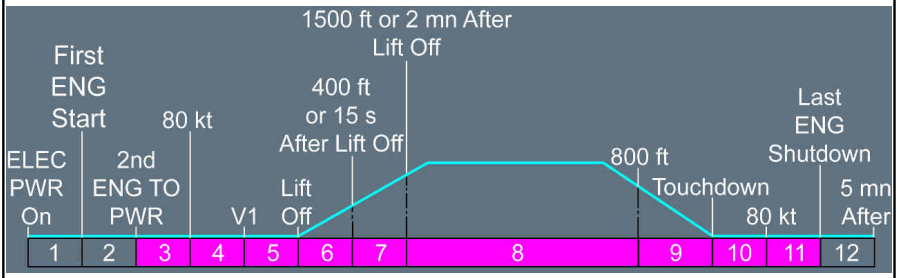


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL INR TKs QTY LO* .

- **IF REFUEL NOT PLANNED :**

  AUTO GND XFR..... ON

L2 *Redistribute the fuel before takeoff to ensure that there is sufficient fuel in the inner tanks to fill the outer tanks after takeoff (load alleviation transfer).*

Continued on the following page

FUEL INR TKs QTY LO (Cont'd)

STATUS

INFO

EACH INR TK : 5100 KG MIN FOR T.O

FUEL JETTISON

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the FUEL menu.
When the flight crew activates the procedure, the FUEL SD page automatically appears.

Fuel jettison enables a rapid reduction of aircraft gross weight in order to:
- Comply with the approach and landing climb requirements, or
- Obtain the maximum landing weight (if time permits), or
- Obtain the planned flight profile in the case of engine failure enroute.

It is possible to jettison in any aircraft configuration, and at any speed. However, the height should be sufficient to avoid contamination on the ground (5 000 ft AGL is considered as adequate). The flight crew should coordinate with ATC, and adapt the jettison altitude also depending on local regulations, and/or the emergency of the situation.
Do not jettison in a thunderstorm.
During jettison, avoid flying into the jettisoned fuel (which descends at above 500 ft/min).
The average weight reduction in aircraft weight, due to jettison only, is approximately 5 500 lb/min (330 700 lb/h).

Continued on the following page

FUEL JETTISON (Cont'd)

FMS FUEL & LOAD PAGE.....SELECT
JETTISON GW.....ENTER

L2 *Fuel jettison will automatically stop when the JETTISON GW is reached.*
If the flight crew does not enter JETTISON GW, fuel jettison will stop when all usable fuel has been jettisoned from the transfer tanks.

L1 ● **If the TRIM TK is not empty, and the FUEL TRIM & APU LINE FAULT caution is not triggered:**
TRIM TK FEED.....AUTO

JETTISON ARM.....ON
JETTISON ACTIVE.....ON
JETTISON & CG.....MONITOR

● **WHEN JETTISON COMPLETED (AUTO RCL) :**
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

● **IF RQRD TO MANUALLY STOP JETTISON :**
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

FUEL JETTISON COMPLETED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Jettison is completed: The jettison final Gross Weight (GW) is reached, or all usable fuel has been jettisoned from the transfer tanks.

Indications:

Audio



Master Light

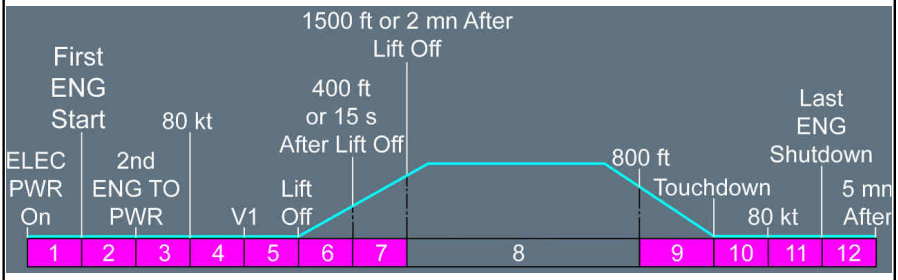


SD page



FUEL SD Page

Flight Phase Inhibition:



JETTISON ACTIVE..... OFF
JETTISON ARM..... OFF

FUEL JETTISON FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Jettison is not available, or one jettison valve is failed in the closed position.

Indications:

Audio



Master Light

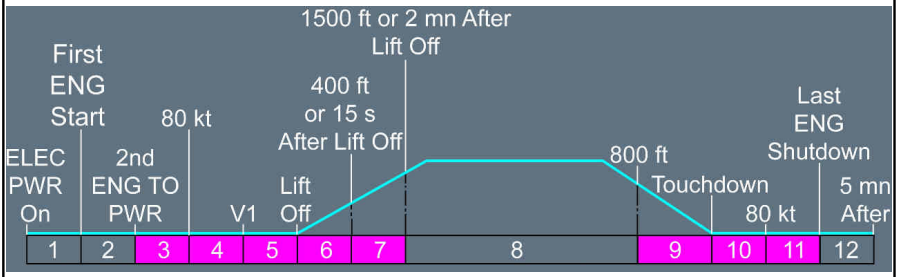


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL JETTISON FAULT* .

Continued on the following page

FUEL JETTISON FAULT (Cont'd)

■ **On ground, if one jettison valve is failed in the closed position:**

JETTISON L(R) VLV FAULT

L2 *Appears at the end of the flight, if jettison was used during the flight, and one jettison valve is failed in the closed position.*

L1 ■ **If jettison is selected but is not available (e.g.: both jettison valves are failed closed):**

JETTISON NOT AVAIL
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

STATUS

INOP SYS

ALL PHASES
JETTISON

FUEL JETTISON VLV NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Either jettison valve is abnormally open.

Indications:

Audio



Master Light



Local light



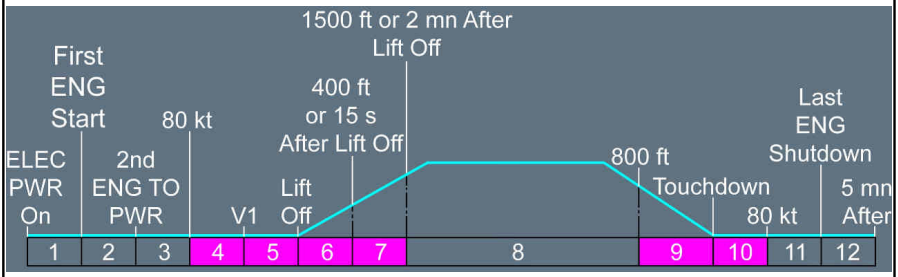
JETTISON ACTIVE pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL JETTISON VLV NOT CLOSED* .

JETTISON ACTIVE..... OFF
JETTISON ARM..... OFF

FUEL L(R) INR TK FWD+AFT PMPs FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both transfer pumps of the left (right) inner tank are:
- Failed, or
- Running, when the associated tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio



Master Light



Local light



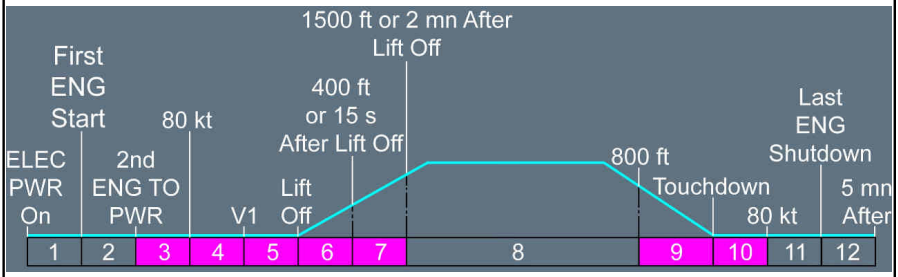
L(R) INR TK FWD
+AFT PMP pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL L(R) INR TK FWD +AFT PMPs FAULT* .

Continued on the following page

FUEL L(R) INR TK FWD+AFT PMPs FAULT (Cont'd)

L(R) INR TK FWD PMP.....OFF
L(R) INR TK AFT PMP.....OFF

L2 The FQMS automatically turns off the symmetric pumps, to prevent fuel imbalance. The symmetric pumps remain available for manual transfers.

L1 ● **If the left(right) inner tank is not empty:**
L(R) INR TK NOT USABLE

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the left(right) inner tank is not empty:
  L(R) INR TK NOT USABLE

STATUS

INOP SYS

ALL PHASES

L(R) INR TK PMPs

INFO

- If the right(left) inner tank aft pump is not failed:
  R(L) INR TK MAN XFR AVAIL

FUEL L(R) INR(MID) TK AFT PMP FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The L(R) INR(MID) TK AFT PMP is:
- Failed, or
- Running, when the associated tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio



Master Light



Local light



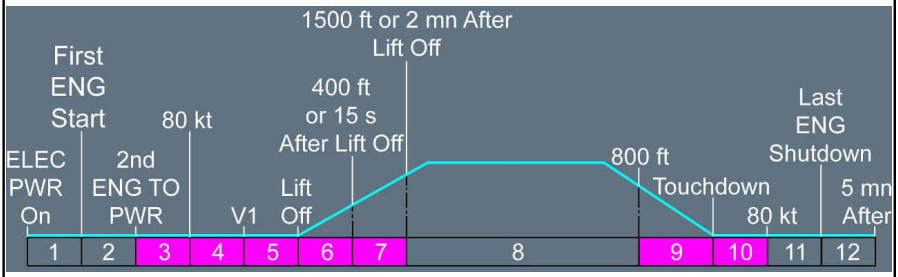
L(R) INR(MID) TK AFT PMP pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-28 FUEL L(R) INR TK AFT PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL L(R) MID TK AFT PMP FAULT*

Continued on the following page

FUEL L(R) INR(MID) TK AFT PMP FAULT (Cont'd)

L(R) INR(MID) TK AFT PMP..... OFF

L2 *The FQMS automatically turns off the symmetric pump, to prevent fuel imbalance. However, the symmetric pump remains available for manual transfers.*

L1 ● **If the FUEL MAN XFR PROCEDURE triggered:**

L(R) INR(MID) TK NOT USABLE

L2 *The manual transfers use the pumps of the aft gallery. If this pump is not available, fuel in the associated tank is not usable.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the FUEL MAN XFR PROCEDURE triggered:
  L(R) INR(MID) TK NOT USABLE

STATUS

INOP SYS

ALL PHASES

L(R) INR(MID) TK AFT PMP

INFO

- If the FUEL MAN XFR PROCEDURE triggered:
  R(L) INR(MID) TK MAN XFR AVAIL

FUEL L(R) INR(MID) TK FWD PMP FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The L(R) INR(MID) TK FWD PMP is:
- Failed, or
- Running, when the corresponding tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio



Master Light



Local light



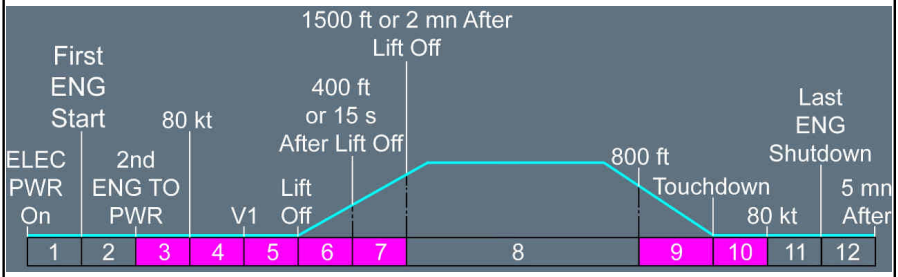
L(R) INR(MID) TK FWD PMP pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-28 FUEL L(R) INR TK FWD PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL L(R) MID TK FWD PMP FAULT*

Continued on the following page

FUEL L(R) INR(MID) TK FWD PMP FAULT (Cont'd)

L(R) INR(MID) TK FWD PMP.....OFF

L2 *The FQMS automatically turns off the symmetric pump, to prevent fuel imbalance.*

L12

STATUS

INOP SYS

ALL PHASES

L(R) INR(MID) TK FWD PMP

INFO

- If the L(R) INR(MID) TK FWD PMP is failed, and the INR(MID) TKs are not empty:
  FUEL ALTN XFR IN USE

Fuel transfers:
- *From the inner (mid) tanks via the aft gallery*
- *From the trim tank to the inner tanks via the forward gallery.*

Alternate transfers are inhibited, if the alert triggered because the flight crew turned off the pump. Alternate transfers are only active if the pump is failed.
For more information on alternate transfers: Refer to Fuel System Description

FUEL L(R) MID TK FWD+AFT PMPs FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both transfer pumps of the left (right) mid tank are:
- Failed, or
- Running, when the associated tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio



Master Light



Local light



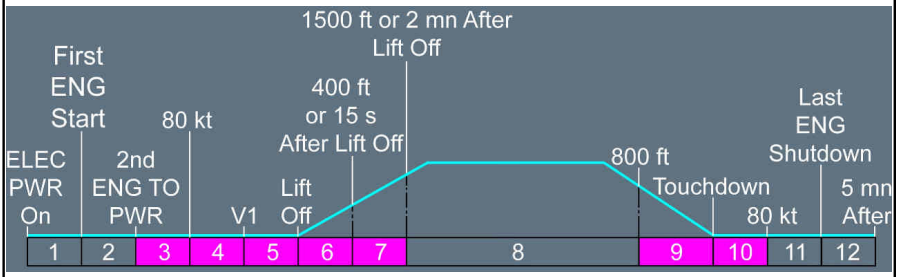
L(R) MID TK FWD
+AFT PMP pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL L(R) MID TK FWD +AFT PMPs FAULT* .

Continued on the following page

FUEL L(R) MID TK FWD+AFT PMPs FAULT (Cont'd)

L(R) MID TK FWD PUMP.....OFF
L(R) MID TK AFT PUMP.....OFF

● **If the left(right) mid tank is not empty:**
L(R) MID TK NOT USABLE

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the left(right) mid tank is not empty:
  L(R) MID TK NOT USABLE

STATUS

INOP SYS

ALL PHASES

L(R) MID TK PMPs

INFO

- If the right(left) mid tank aft pump is not failed:
  R(L) MID TK MAN XFR AVAIL

FUEL L(R) OUTR TK PMP FAULT

Applicable to: ALL

ANNUNCIATIONS

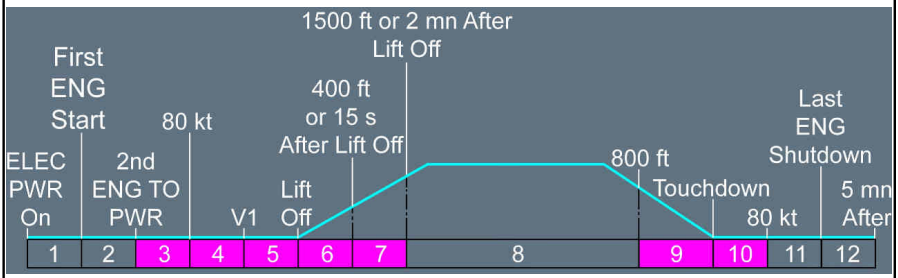
Triggering Conditions:

L2 The pump of the left (right) outer tank is:
- Failed, or
- Running, when the associated tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio	Master Light	Local light	SD page
			
		L(R) OUTR TK PMP pb-sw	FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL L(R) OUTR TK PMP FAULT*.

L(R) OUTR TK PMP..... OFF

L2 *The FQMS automatically turns off the symmetric pump, to prevent fuel imbalance.*

Continued on the following page

FUEL L(R) OUTR TK PMP FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

L(R) OUTR TK PMP

INFO

- If the outer tanks are not empty:
  OUTR TKs XFR BY GRVTY ONLY

  Load alleviation transfers from the outer tanks are inhibited.
  The FQMS will start a gravity transfer from the outer tanks to the feed tanks, as soon as the lowest feed tank quantity goes below 28 700 lb. Simultaneously, the FUEL NORM XFR FAULT alert will trigger, to request the use of the outer tank emergency transfer valves.

FUEL L(R) WING FEED PMPS FAULT

Applicable to: ALL

ANNUNCIATIONS

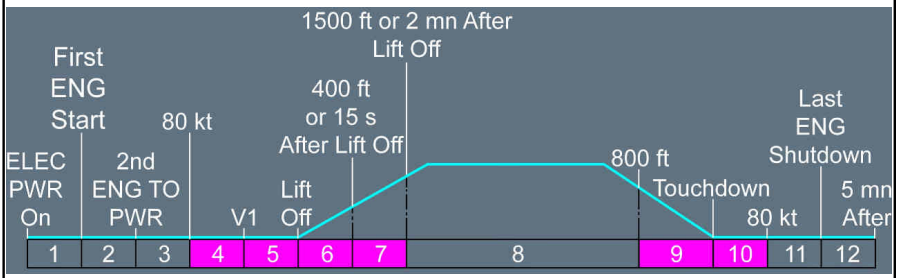
Triggering Conditions:

L2 All left(right) wing feed tank pumps are either:
- Operating either at low pressure, or
- Abnormally not running, or
- Turned off by the flight crew (except in flight phase 1 and 12, or, if required by another ECAM procedure (e.g. FUEL WINGS NOT BALANCED)).

Indications:

Audio	Master Light	Local light	SD page
		 FEED TK 1+2(3+4) MAIN and STBY PMP pb-sw	 FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL L(R) WING FEED PMPS FAULT (Cont'd)

L2 If both pumps in a feed tank are failed, the fuel in that feed tank can only be fed by gravity.

However, fuel gravity feeding is only possible when the aircraft is below FL 280 (FL 50 / MEA if the flight time above FL 300 is less than 30 min), therefore, as required by ECAM, the flight crew must perform the following actions, in order to maintain cruise altitude as long as possible:

1. Open the crossfeed valves, to feed the left(right) wing engines. During this time, the left(right) wing feed tanks remains full. The other feed tanks receive fuel from the inner, mid and trim tanks, via normal transfers.
   Lateral balance is maintained.
2. Descend to the gravity feed ceiling, when the inner and mid tanks are empty. Close the crossfeed valves. The left(right) wing engines are fed by gravity.
   All feed tanks are emptied simultaneously.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL L(R) WING FEED PMPs FAULT* .

Continued on the following page

FUEL L(R) WING FEED PMPS FAULT (Cont'd)

■ **Before takeoff:**

FEED TK 1(3) MAIN PMP.....OFF
FEED TK 1(3) STBY PMP.....OFF
FEED TK 2(4) MAIN PMP.....OFF
FEED TK 2(4) STBY PMP.....OFF

FEED TK 1(4) : 2900 LBS MAX NOT USABLE

L2 *Both feed tank pumps in feed tank 1(4) are failed, therefore, the fuel in feed tank 1(4) is available for gravity feeding only. However, up to 2 900 lb of fuel may remain trapped in feed tank 1(4).*

L1 FEED TK 2(3) : 4400 LBS MAX NOT USABLE

L2 *Both feed tank pumps in feed tank 2(3) are failed, therefore, the fuel in feed tank 2(3) is available for gravity feeding only. However, up to 4 400 lb of fuel may remain trapped in feed tank 2(3).*

L1 ■ **After takeoff:**

L2 A fuel pipe break on the engine feed line may cause a fuel leak rate that may lead to LOW PRESS conditions of the main and standby pumps associated with the affected engine feed line. The ECAM triggers the FUEL FEED TK 1(2)(3)(4) MAIN+STBY PMPs FAULT alert. If the alert is triggered following a pipe break, the opening of the crossfeed valves may also depressurize the main and standby pumps of the adjacent feed tank because they are now connected to the broken pipe. As a result, the ECAM will trigger the FUEL L(R) WING FEED PMPs FAULT alert. If there is a pipe break on an engine feed line, closing all the crossfeed valves pressurizes again the main and standby pumps in the adjacent feed tank. The FUEL L(R) WING FEED PMPs FAULT alert no longer appears, and is replaced again by the FUEL FEED TK 1(2)(3)(4) MAIN+STBY PMPs FAULT alert.

L1 ALL CROSSFEEDS.....OFF

● **IF NO FUEL LEAK:**

L2 If the FUEL L(R) WING FEED PMPs FAULT alert remains displayed on the ECAM following the closure of all the crossfeed valves, the flight crew should apply the following procedure.
If the flight crew did not previously identify a fuel leak, they should open all the crossfeed valves in order to feed the engines on the affected wing with fuel from the other wing.

L1 ALL CROSSFEEDS.....ON
FEED TK 1(3) MAIN PMP.....OFF

Continued on the following page

FUEL L(R) WING FEED PMPS FAULT (Cont'd)

FEED TK 1(3) STBY PMP.....OFF
FEED TK 2(4) MAIN PMP.....OFF
FEED TK 2(4) STBY PMP.....OFF

FEED TK 1(4) : 2900 LBS MAX NOT USABLE

L2 *Both feed tank pumps in feed tank 1(4) are failed, therefore, the fuel in feed tank 1(4) is available for gravity feeding only. However, up to 2 900 lb of fuel may remain trapped in feed tank 1(4).*

L1 FEED TK 2(3) : 4400 LBS MAX NOT USABLE

L2 *Both feed tank pumps in feed tank 2(3) are failed, therefore, the fuel in feed tank 2(3) is available for gravity feeding only. However, up to 4 400 lb of fuel may remain trapped in feed tank 2(3).*

L1 ● **WHEN INR & MID TKs EMPTY:**

■ **If flight time above FL 300 since departure is greater than 30 min:**
DESCENT TO FL 280.....INITIATE
MAX FL : 280

L2 *If the aircraft has been flying more than 30 min above FL 300, fuel gravity feeding is ensured below FL 280.*

L1 ■ **If flight time above FL 300 since departure is less than 30 min:**
DESCENT TO FL 50/MEA.....INITIATE
MAX FL : 50/MEA

L2 *If the aircraft has been flying less than 30 min, fuel gravity feeding is ensured below FL 50.*
However, if the MEA is above FL 50, do not fly below the MEA.

L1 ENG START SEL.....IGN START

L2 *Continuous ignition helps to prevent an engine flameout.*

L1 ALL CROSSFEEDS.....OFF
EXPECT NORM COLLECTOR CELL DEPLETION

L2 *In the case of collector cell depletion, the associated collector cell quantity appears in amber on the FUEL SD page.*

L1 AVOID NEG G LOAD

Continued on the following page

FUEL L(R) WING FEED PMPS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- When inner and mid tanks are empty, and flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
- When inner and mid tanks are empty, and flight time above FL 300 since departure is less than 30 min
  MAX FL : 50/MEA
- When inner and mid tanks are empty:
  AVOID NEG G LOAD
  FUEL PARTLY UNUSABLE

LIMITATIONS ON PFD

ALL PHASES

- When inner and mid tanks are empty, and flight time above FL 300 since departure is greater than 30 min:
  MAX FL : 280
- When inner and mid tanks are empty, and flight time above FL 300 since departure is less than 30 min:
  MAX FL : 50/MEA
- When inner and mid tanks are empty:
  AVOID NEG G LOAD

Continued on the following page

FUEL L(R) WING FEED PMPS FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FEED TK 1(3) PMPs
FEED TK 2(4) PMPs

INFO

L(R) WING FEED TKs BY GRVTY ONLY
FEED TK 1(4) : 2900 LBS MAX NOT USABLE
FEED TK 2(3) : 4400 LBS MAX NOT USABLE

- When inner and mid tanks are empty:
  EXPECT NORM COLLECTOR CELL DEPLETION

FUEL LEAK DET FAULT

Applicable to: ALL

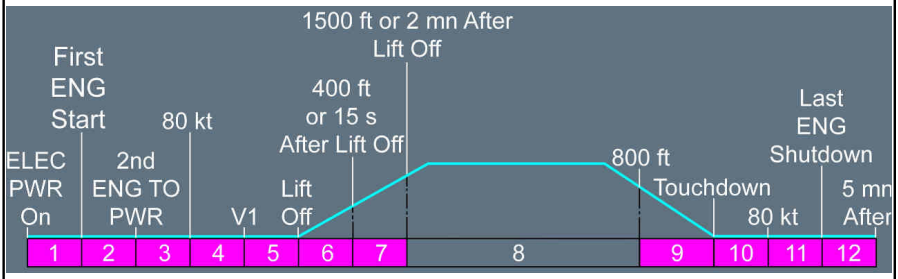
ANNUNCIATIONS

Triggering Conditions:

L2 The fuel system leak detection is not available, because:
- The fuel quantity indication is degraded in more than one tank, or
- The fuel quantity indication is lost in any tank, or
- The Fuel Used (FU) indication of an engine is lost, or
- Fuel jettison is in progress.

Depending on the reason for the failure of the fuel leak detection, detection of fast leaks (more than 4 tons per hour) may be available. For more information : *Refer to DSC-28-40-2840A Fuel system leak detection*
The leak detection of the engine fuel system remains available.
Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL LEAK DET FAULT* .

Crew awareness.

Continued on the following page

FUEL LEAK DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FUEL LEAK DET

FUEL LEAK DETECTED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FQMS has detected a fuel leak.
For more information on the fuel leak detection logic, *Refer to DSC-28-40-2840A Fuel leak detection* .
If the flight crew detects the fuel leak before the ECAM caution is triggered (e.g. visual detection or periodic fuel check), the flight crew can also display this procedure by pressing the ECP ABN PROC pb , and selecting the FUEL menu.

Indications:

Audio



Master Light

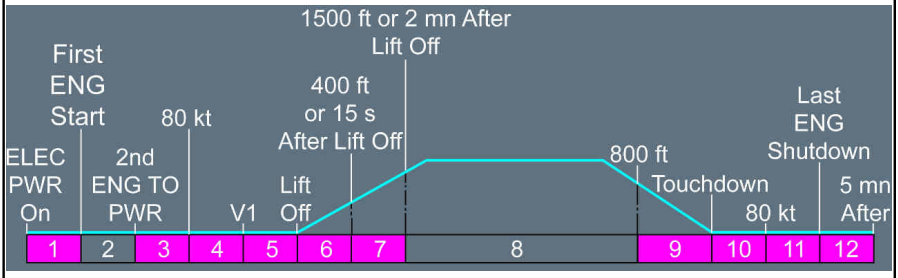


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL LEAK DETECTED* .

Continued on the following page

FUEL LEAK DETECTED (Cont'd)

LAND ANSA

ALL TK s QTY & FOB & FU ..... CHECK

● **IF FOB+FU / BLOCK DISAGREE :**

L2 To identify the source of the fuel leak, the flight crew must stop all fuel transfers, by turning off all the transfer pumps.

L1 ALL CROSSFEEDS..... OFF
INR TK s PMP s ..... OFF
MID TK s PMP s ..... OFF
OUTR TK s PMP s ..... OFF
TRIM TK PMP s ..... OFF

EXPECT FUEL IMBALANCE

● **IF FEED TK 1(2)(3)(4) LEAK SUSPECTED :**

L2 The flight crew can suspect a leak in feed tank 1(2)(3)(4), if its quantity decreases faster than the quantity in the other feed tanks.
Most feed tank fuel leaks are due to a leak in the engine fuel system. To identify if the leak is due to the engine fuel system, the flight crew must shut down the associated engine.

L1 THR LEVER 1(2)(3)(4)..... IDLE
ENG 1(2)(3)(4) MASTER..... OFF
FEED TK 1(2)(3)(4) PMP s ..... OFF

■ **IF LEAK STOPS :**

L2 If the leaks stops after engine shutdown, this confirms that the leak is in the engine fuel system. The engine must remain shutdown, and the flight crew can use the crossfeed valves to use the fuel in the affected feed tank.

L1 ENG 1(2)(3)(4) MASTER : KEEP OFF
FEED TK 1(2)(3)(4) PMP s ..... ON

L2 *For each feed tank, the flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 FOR TK BALANCING : XFEED AS RQRD

■ **IF LEAK CONTINUES :**

L2 If the leak continues after engine shutdown, this indicates that the fuel leak is in the feed tank. The flight crew can restart the engine.

L1 FEED TK 1(2)(3)(4) PMP s ..... ON

Continued on the following page

FUEL LEAK DETECTED (Cont'd)

L2 *For each feed tank, the flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 MIN FUEL USABLE : FEED TK s 2+3+4(1+3+4)(1+2+4)(1+2+3)

(ALL OTHER FUEL MAYBE LOST)

L2 *When the transfer tank pumps will be turned on again, the normal transfer sequence will resume, including transfers to the leaking feed tank. This will lead to additional lost fuel.*

However, as there is no transfer from the feed tanks, the minimum usable fuel cannot be lower than the fuel quantity in the remaining feed tanks.

L1 FOR TK BALANCING : XFEED AS RQRD

- **FOR ENG 1(2)(3)(4) RELIGHT :**

  MAX GUARANTEED ALTITUDE : 30000 FT

  MIN SPD (WINDML RELIGHT) : 260 KT

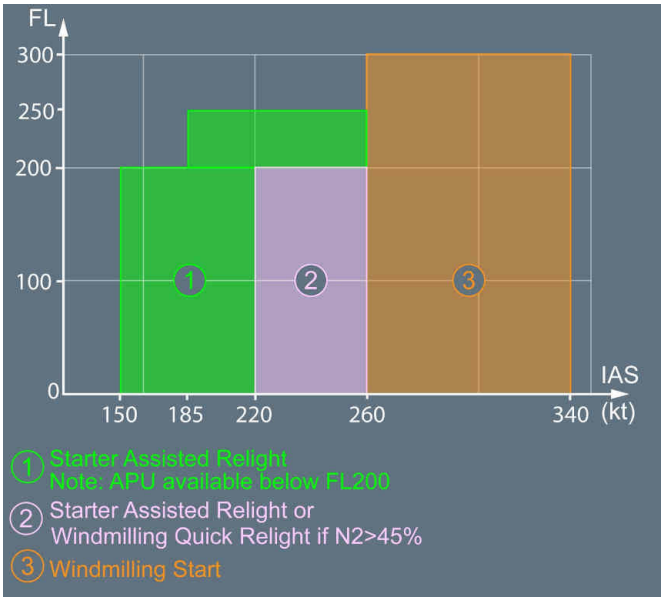
  XBLEED.....OPEN
  WING A-ICE.....OFF
  ENG START SEL..... IGN START

L2 - *The FADEC selects a starter assisted start (i.e. start valves automatically open), when N2 is below 11 %*
  An airspeed at or above 260 kt ensures a windmilling start.

Continued on the following page

FUEL LEAK DETECTED (Cont'd)

In Flight Relight Envelope



- *In flight, automatic start abort does not operate. The flight crew must perform the start sequence and initiate corrective actions, if necessary.*
  For more information on engine start abort, Refer to DSC-70-80-30-20 Start Abort during Automatic Start .

L1 ENG 1(2)(3)(4) MASTER..... ON
ENG RELIGHT..... MONITOR

L2 *The engine must relight within 30 s after fuel flow increases.*

L1 ■ **If N2 is less than 50 % and airspeed is less than 200 kt :**
MAX EGT : 640 °C

■ **In all other cases:**
MAX EGT :865 °C

● **WHEN IDLE REACHED (ENG AVAIL) :**
ENG START SEL..... NORM
TCAS MODE..... TA/RA

Continued on the following page

FUEL LEAK DETECTED (Cont'd)

L2 *If the flight crew applied the ENG SHUT DOWN procedure (Refer to procedure), the TCAS mode is TA ONLY.*

L1 XBLEED..... AUTO
A-ICE..... AS RQRD

● **IF TRIM TK LEAK SUSPECTED :**

L2 Based on the normal transfer sequence, if the leak is detected late in the flight:
- The fuel quantity in each feed tank may be as low as 13 200 lb
- The outer tanks are full.

Therefore, to minimize the loss of fuel, and ensure a safe diversion, the flight crew must transfer the fuel in the trim tank.

L1 TRIM TK PARTLY NOT USABLE
TRIM TK PMP s ..... ON
TRIM TK XFR.....FWD

● **IF OUTR TK s LEAK SUSPECTED :**

L2 Based on the normal transfer sequence, If the leak is detected late in the flight, according to the normal transfer sequence, the fuel quantity in each feed tank may be as low as 8 800 lb .
Therefore, to minimize the loss of fuel, and ensure a safe diversion, the flight crew must transfer the fuel from the outer tanks earlier than the normal transfer sequence.

L1 OUTR TK s PARTLY NOT USABLE
OUTR TK XFR..... MAN

● **IF INR / MID TK s LEAK SUSPECTED :**

L2 Based on the normal fuel transfer sequence, when there is fuel in the inner and/or mid tanks, the feed tanks and outer tanks are full, and some fuel remains in the trim tank.

Therefore:
- A manual inner or mid tank transfer is not possible because the feed tanks are full
- There is sufficient fuel in the remaining tanks to perform a diversion.

L1 LEAKING TK PARTLY NOT USABLE

INR TK s PMP s ..... ON
MID TK s PMP s .....ON
OUTR TK s PMP s ..... ON
TRIM TK PMP s .....ON

Continued on the following page

FUEL LEAK DETECTED (Cont'd)

REMAINING FUEL AT DEST..... CHECK

REVERSERS : DO NOT USE

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA

- Except in the case of an engine fuel leak:
  FUEL PARTLY UNUSABLE

LIMITATIONS ON PFD

ALL PHASES

LAND ANSA

STATUS

INFO

- If there is a leak in feed tank 1(2)(3)(4):
  MIN FUEL USABLE : FEED TKs 2+3+4 (1+3+4) (1+2+4) (1+2+3)
  (ALL OTHER FUEL MAYBE LOST)

FUEL MAN BALANCING PROCEDURE

Applicable to: ALL

L2 The flight crew may detect:

- A wings imbalance, before the ECAM triggers the FUEL WINGS MAN BALANCING PROCEDURE alert or the FUEL WINGS NOT BALANCED alert, or
- An imbalance between feed tanks 1/2 and 3/4.

This procedure enables the flight crew to manually correct the imbalance.
The flight crew can access and display this procedure by pressing the ABN PROC pb on the ECP, then by selecting the FUEL menu.

Continued on the following page

FUEL MAN BALANCING PROCEDURE (Cont'd)

■ **On ground:**

DELAY T.O

■ **In flight:**

● **IF FEED TKs NOT BALANCED :**

L2 The flight crew should first consider fuel imbalance between two symmetric tanks (i.e. feed tanks 1 and 4, or 2 and 3), as this imbalance creates a lateral moment, and then leads to the extension of flight control surfaces.

L3 *Note: Due to the different sizes of the feed tanks, there is a normal imbalance around 3 300 lb between feed tanks 1/4 and 2/3.*

L1 ● **IF NO FUEL LEAK :**

● **IF FEED TKs 1 & 4 NOT BALANCED:**

FUEL CONSUMPTION INCREASED : FMS PREDICTION DISREGARD

L2 *The flight control laws extend control surfaces in order to counter the lateral moment due to the wings imbalance. The extension of the flight control surfaces increases the fuel consumption.*
Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is 35 % for the feed tanks 1 and 4.

To optimize the fuel consumption:
- *Set the Cost Index (CI) to zero, and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL -4 000 ft.*

L1 CROSSFEED 1.....ON
CROSSFEED 4.....ON

● **FOR LIGHTER TK:**

FEED TK PMPs ..... OFF

● **WHEN FEED TKs 1 & 4 BALANCED :**

FEED TK PMPs ..... ON

L2 *The flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 CROSSFEED 1.....OFF
CROSSFEED 4.....OFF

Continued on the following page

FUEL MAN BALANCING PROCEDURE (Cont'd)

● **IF FEED TKs 2 & 3 NOT BALANCED:**

FUEL CONSUMPTION INCREASED : FMS PREDICTION DISREGARD

L2 *The flight control laws extend control surfaces in order to counter the lateral moment due to the wings imbalance. The extension of the flight control surfaces increases the fuel consumption.*
Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is 6 % for the feed tanks 2 and 3.

To optimize the fuel consumption:
- *Set the Cost Index (CI) to zero, and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL -4 000 ft.*

L1 CROSSFEED 2.....ON
CROSSFEED 3.....ON

● **FOR LIGHTER TK:**

FEED TK PMPs ..... OFF

● **WHEN FEED TKs 2 & 3 BALANCED :**

FEED TK PMPs ..... ON

L2 *The flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 CROSSFEED 2.....OFF
CROSSFEED 3.....OFF

● **IF FEED TK 2 LIGHTER THAN 1 AND FEED TK 3 LIGHTER THAN 4:**

ALL CROSSFEEDS.....ON
FEED TK 2 PMPs .....OFF
FEED TK 3 PMPs .....OFF

● **WHEN FEED TKs BALANCED:**

FEED TK 2 PMPs .....ON

L2 *The flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 FEED TK 3 PMPs .....ON

L2 *The flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 ALL CROSSFEEDS.....OFF

Continued on the following page

FUEL MAN BALANCING PROCEDURE (Cont'd)

● **IF FEED TK 1 LIGHTER THAN 2 AND FEED TK 4 LIGHTER THAN 3:**
ALL CROSSFEEDS.....ON
FEED TK 1 PMPs .....OFF
FEED TK 4 PMPs .....OFF

● **WHEN FEED TKs BALANCED:**
FEED TK 1 PMPs .....ON

L2 *The flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 FEED TK 4 PMPs .....ON

L2 *The flight crew should switch on the main feed tank pump before the standby feed tank pump.*

L1 ALL CROSSFEEDS.....OFF

● **IF INR TKs NOT BALANCED :**
TKs BALANCING : ONE PAIR AT A TIME
FUEL CONSUMPTION INCREASED : FMS PREDICTION DISREGARD

L2 *The flight control laws extend control surfaces in order to counter the lateral moment due to the wings imbalance. The extension of the flight control surfaces increases the fuel consumption.*
Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is 20.5 % for the inner tanks.

To optimize the fuel consumption:
- *Set the Cost Index (CI) to zero, and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL -4 000 ft.*

L1 CHECK FEED TKs QTY TO AVOID OVERFLOW

● **FOR LIGHTER TK :**
INR TK AFT PMP.....OFF
INR TK XFR.....MAN

● **WHEN INR TKs BALANCED :**
INR TK XFR.....AUTO
INR TK AFT PMP.....ON

● **IF MID TKs NOT BALANCED :**
TKs BALANCING : ONE PAIR AT A TIME
FUEL CONSUMPTION INCREASED : FMS PREDICTION DISREGARD

Continued on the following page

FUEL MAN BALANCING PROCEDURE (Cont'd)

L2 *The flight control laws extend control surfaces in order to counter the lateral moment due to the wings imbalance. The extension of the flight control surfaces increases the fuel consumption.*
Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is 30 % for the mid tanks.

To optimize the fuel consumption:
- *Set the Cost Index (CI) to zero, and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL -4 000 ft.*

L1 CHECK FEED TKs QTY TO AVOID OVERFLOW

● **FOR LIGHTER TK :**
MID TK AFT PMP..... OFF
MID TK XFR..... MAN

● **WHEN MID TKs BALANCED :**
MID TK XFR..... AUTO
MID TK AFT PMP..... ON

OUTR TKS MAN BALANCING NOT AVAIL

Continued on the following page

FUEL MAN BALANCING PROCEDURE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- On ground:
  DELAY T.O

L12

STATUS

INFO

- If the fuel imbalance creates a lateral moment:
  FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

  The flight control laws extend control surfaces in order to counter the lateral moment due to the high wings imbalance. The extension of the flight control surfaces increases the fuel consumption.

Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is:
- *20.5 % for the inner tanks*
- *18.5 % for the outer tanks*
- *30.1 % for the mid tanks*
- *34.8 % for the feed tanks 1 and 4*
- *6.1 % for the feed tanks 2 and 3.*

To optimize the fuel consumption:
- *Set the Cost Index (CI) to zero, and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL -4 000 ft.*

- If inner(mid)) tanks not balanced:
  TKs BALANCING : ONE PAIR AT A TIME

FUEL MAN XFR PROCEDURE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A fuel system failure requires to manually transfer fuel.

The alert requires to transfer forward fuel from the trim tank if:
- The aircraft center of gravity (CG) computed by the Weight and Balance Backup Computer (WBBC) exceeds 48 % , or
- The CG is aft of the certified CG limit (I.e. 43 %) for more than 5 min .

The procedure is triggered, after one of the following alerts:
- FUEL FQMS 1+2 FAULT (*Refer to procedure*)
- FUEL WING TK OVERFLOW (*Refer to procedure*)
- FUEL WINGS MAN BALANCING (*Refer to procedure*)
- FUEL FQI FAULT (*Refer to procedure*).

Indications:

Audio



Master Light

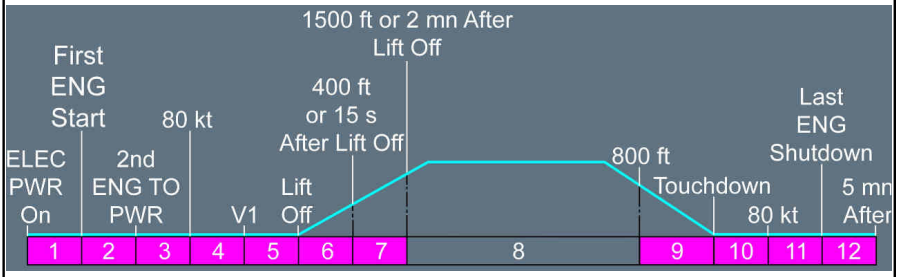


SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL MAN XFR PROCEDURE (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL MAN XFR PROCEDURE* .

Continued on the following page

FUEL MAN XFR PROCEDURE (Cont'd)

- **If the FUEL WINGS MAN BALANCING alert also triggered:**
  WAIT FOR WINGS BALANCING COMPLETION
- **If the inner tanks are not empty:**

NEXT : INR TKs MAN XFR PROCEDURE

- **WHEN ANY FEED TK < 28700 LBS (AUTO RCL) :**
  INR TK XFR..... MAN
  - **WHEN ANY FEED TK FULL (AUTO RCL) :**
    INR TK XFR.....AUTO

L2 The ECAM will automatically display the procedure again, when the fuel quantity in any feed tanks goes below 28 700 lb .

L1 - **If one inner tank is empty before the other:**

L2 If one inner tank is empty before the other (more than 120 s difference), the alert will be automatically recalled.

L1 (empty side) INR TK AFT PMP .....
..... OFF

L2 *The pump is turned off, to avoid having a running pump in an empty tank.*

L1 - **When the inner tanks are empty:**

ASSOCIATED PROCEDURES

FUEL INR TK MAN XFR COMPLETED
Refer to PRO-ABN-ECAM-10-28-340 FUEL INR TKs MAN XFR COMPLETED

- **If the mid tanks are not empty:**

NEXT : MID TKs MAN XFR PROCEDURE

- **WHEN ANY FEED TK < 28700 LBS (AUTO RCL)**
  MID TK XFR.....MAN
  - **WHEN ANY FEED TK FULL (AUTO RCL)**
    MID TK XFR..... AUTO

Continued on the following page

FUEL MAN XFR PROCEDURE (Cont'd)

L2 The ECAM will automatically display the procedure again, when the fuel quantity in any feed tanks goes below 28 700 lb .

L1 ● **When the mid tanks are empty:**

ASSOCIATED PROCEDURES

FUEL MID TK MAN XFR COMPLETED
Refer to PRO-ABN-ECAM-10-28-350 FUEL MID TKs MAN XFR COMPLETED

● **If the outer tanks are not empty:**

NEXT : OUTR TKs MAN XFR PROCEDURE

● **WHEN ANY FEED TK < 28700 LBS (AUTO RCL)**
OUTR TK XFR..... MAN

● **When the outer tanks are empty:**

ASSOCIATED PROCEDURES

FUEL OUTR TK MAN XFR COMPLETED
Refer to PRO-ABN-ECAM-10-28-370 FUEL OUTR TKs MAN XFR COMPLETED

● **If the trim tank is not empty:**

NEXT : TRIM TK MAN XFR PROCEDURE

TRIM TK XFR..... FWD

L2 *Fuel transfers from the trim tank fuel to the inner tanks.*

L1 ● **When the trim tank is empty:**

ASSOCIATED PROCEDURES

FUEL TRIM TK MAN XFR COMPLETED
Refer to PRO-ABN-ECAM-10-28-360 FUEL TRIM TK MAN XFR COMPLETED

● **WHEN ANY FEED TK < 28700 LBS (AUTO RCL) :**
INR TK XFR..... MAN

L2 *After completion of the manual transfer from the trim tank to the inner tanks, the flight crew must transfer the fuel from the inner tanks to the feed tanks.*

Continued on the following page

FUEL MAN XFR PROCEDURE (Cont'd)

L1

- **When the inner tanks are empty:**

ASSOCIATED PROCEDURES

FUEL INR TK MAN XFR COMPLETED
Refer to PRO-ABN-ECAM-10-28-340 FUEL INR TKs MAN XFR COMPLETED

- **If the CG computed by the WBBC exceeds 48 % , or if the CG is above 43 % for more than 5 min :**
  - **If a manual inner(mid) tank transfer is in progress:**
    INR(MID) TK XFR..... AUTO
    TRIM TK XFR..... FWD

STATUS

INOP SYS

ALL PHASES

JETTISON

INFO

FUEL XFR : MAN ONLY

FUEL MID TKs MAN XFR COMPLETED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The manual transfer from the mid tanks to the feed tanks is completed.

Indications:

Audio



Master Light

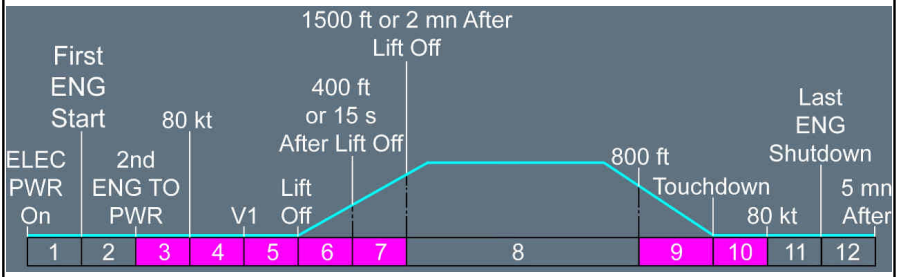


SD page



FUEL SD Page

Flight Phase Inhibition:



MID TK XFR.....AUTO

L2 *As long as the MID TK XFR pb-sw is set to MAN, all automatic transfers are inhibited. Setting the MID TK XFR pb-sw to AUTO, enables the FQMS to resume automatic transfers from the other tanks, unless the FUEL MAN XFR PROCEDURE caution previously triggered.*

FUEL NO ZFW OR ZFWCG DATA

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FQMS did not receive a valid Zero Fuel Weight (ZFW) and/or Zero Fuel Center of Gravity (ZFCG) information, from the FMS.

Indications:

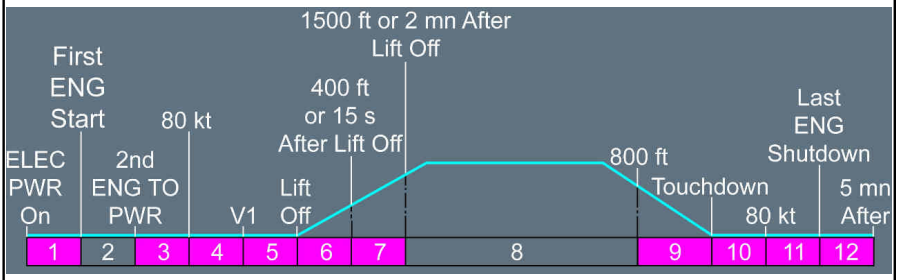
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL NO ZFW OR ZFWCG DATA* .

FMS ZFW OR ZFWCG VALUES..... INITIALIZE

FUEL NORM + ALTN XFR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A combination of equipment failures has occurred. They cannot be solved with alternate fuel transfers.

Indications:

Audio



Master Light

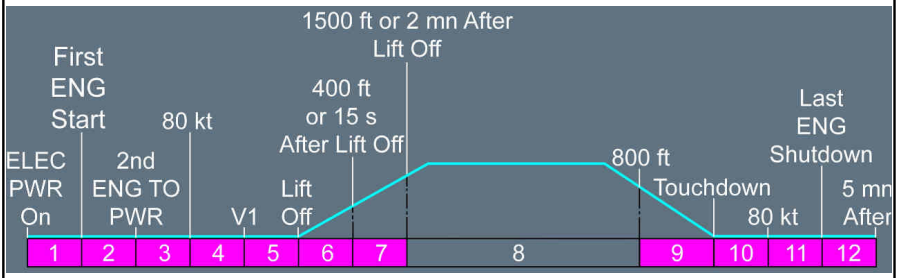


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL NORM+ALTN XFR FAULT*.

Continued on the following page

FUEL NORM + ALTN XFR FAULT (Cont'd)

IF XFR PMPs OFF: ALL XFR PMPs RESELECT
FQMS 1+2 (ONE BY ONE).....RESET

L2 *Reset one FQMS at a time.*
The FQMS 1 reset button is on the left RESET panel.
The FQMS 2 reset button is on the right RESET panel.

L1 INR TKs NOT USABLE
MID TKs NOT USABLE
TRIM TK NOT USABLE
USE TRIM TK XFR FOR CG IF NECESSARY

L2 *The fuel in the trim tank transfers into the inner tanks, and remains unusable.*
If the flight crew transfers fuel from the trim tank to the inner tanks, the CG of the aircraft moves forward by around 0.5 % per 2 200 lb of transferred fuel (heavy aircraft) or 0.9 % per2 200 lb of transferred fuel (light aircraft).

L1 ● **If the fuel quantity in feed tanks 1 and 4 is less than 33 000 lb:**

L2 If the fuel quantity in feed tanks 1 and is greater than 33 000 lb when the alert is initially triggered, the alert is automatically recalled when appropriate.

L1 EMER OUTR TK XFR.....ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This increases the rate of the outer tank transfer.*

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h, so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC..... CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

Continued on the following page

FUEL NORM + ALTN XFR FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

FUEL NORM + ALTN XFR
JETTISON

INFO

USE TRIM TK XFR FOR CG IF NECESSARY
INR TKs NOT USABLE
MID TKs NOT USABLE
TRIM TK NOT USABLE

FUEL NORM XFR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Normal fuel transfers are lost.
Depending on the failure case, this caution:
- Informs the flight crew that normal transfers are lost, but no crew action is required, or
- Provides the procedure to enable alternate transfers, or
- Provides information for MEL dispatch.

Indications:

Audio



Master Light

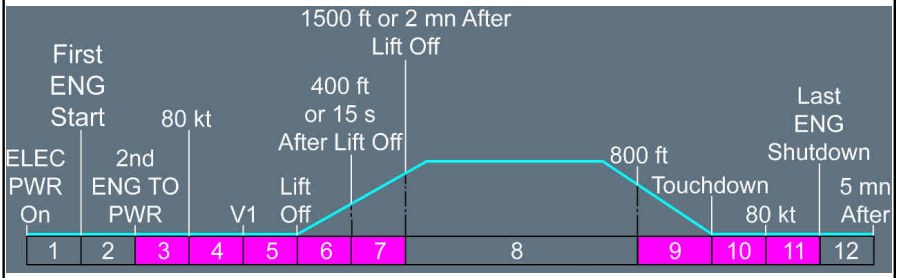


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL NORM XFR FAULT*.

Continued on the following page

FUEL NORM XFR FAULT (Cont'd)

■ **On ground:**

L2 No aural warning or Master Caution light is associated to this caution.

L1 Depending on the failure, one of the following messages may appear:

FEED TK 1(2)(3)(4) AFT INLET VLV FAULT
FEED TK 1(2)(3)(4) FWD INLET VLV FAULT
L(R) OUTR TK AFT INLET VLV FAULT
L(R) OUTR TK FWD INLET VLV FAULT
L(R) MID TK AFT INLET VLV FAULT
L(R) MID TK FWD INLET VLV FAULT
L(R) INR TK AFT INLET VLV FAULT
L(R) INR TK FWD INLET VLV FAULT
TRIM LINE L(R) ISOL VLV FAULT

■ **In flight, if the failure does not require flight crew action:**

L2 If an inlet valve of a wing tank is failed (closed or open), or if a jettison valve is abnormally open, the normal fuel transfers are no longer available.
Alternate fuel transfers take over, without any flight crew action (*Refer to DSC-28-40-2840B Alternate Transfers*).
In this case, no Single Chime is generated, and the Master Caution light does not come on.

L1 Crew awareness.

■ **In flight, if the failure requires flight crew action:**

● **If a normal outer tank transfer is not available, and the fuel quantity in feed tank 1 and 4 is less than 33 000 lb :**

L2 If an outer tank pump is failed, or if the forward gallery is not usable (e.g. any inlet valve failed open on the forward gallery), the outer tanks will be automatically transferred by gravity when the lowest feed tank quantity goes below 28 700 lb .

Fuel transfers from the outer tanks via:
- The forward gallery to the feed tanks 1 and 4
- The aft gallery to the feed tanks 2 and 3.

L1 EMER OUTR TK XFR..... ON

L2 *The emergency outer tank transfer valves between the outer tank and feed tanks 1 and 4 open. This will increase the rate of the outer tank transfer.*

Continued on the following page

FUEL NORM XFR FAULT (Cont'd)

L1 EXPECT FEED TKS IMBALANCE

L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

L1 FUEL MAN BALANCING PROC.....CONSIDER

L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

STATUS

INOP SYS

ALL PHASES

JETTISON
CG MANAGEMENT (Unless an outer inlet valve on the forward gallery is failed closed)

INFO

- If any inlet valve is abnormally open on the forward gallery, or if any feed tank inlet valve is failed in the closed position on the forward gallery:
  OUTR TKs XFR BY GRVTY ONLY
  FUEL ALTN XFR IN USE

FUEL OUTR TK XFR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The fuel transfer (automatic or manual) from either outer tank is failed.

Indications:

Audio



Master Light



LOCALLIGHT



OUTR TK XFR pb-sw



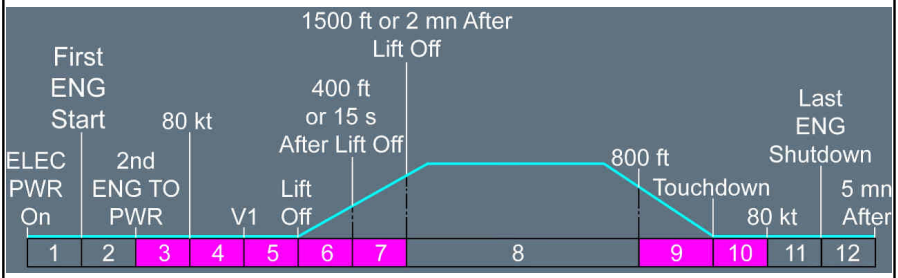
L(R) OUTR TK PMP pb-sw (if a manual gravity transfer is required)

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL OUTR TK XFR FAULT* .

Continued on the following page

FUEL OUTR TK XFR FAULT (Cont'd)

- **If an automatic transfer from the outer tanks was in progress:**
  OUTR TK XFR.....MAN
- **If a pumped manual or automatic transfer from the outer tanks is not possible (i.e. because the associated pumps or valves are failed):**
  L OUTR TK PMP.....OFF
  R OUTR TK PMP.....OFF

L2 *If any outer tank pumps pb-sw is set to OFF, and the OUTK TK XFR pb-sw is set to MAN, fuel will transfer from the outer tanks:*
- *To feed tanks 1 and 4, via the emergency outer tank transfer valves*
- *To feed tanks 2 and 3, via both transfer galleries.*

L1
- **If the manual gravity transfer is successful:**
  - **In the case the manual transfer creates imbalance between the feed tanks pairs:**
    EXPECT FEED TKS IMBALANCE

    L2 *Because the emergency outer tank transfer valves are open, more fuel is transferred in feed tanks 1 and 4, than in feed tanks 2 and 3. The entire transfer of full outer tanks in feed tanks 1 and 4 may last around 1 h , so the flight crew should monitor the fuel quantities in the feed tanks.*

    L1 FUEL MAN BALANCING PROC..... CONSIDER

    L2 *The flight crew should consider if it is necessary to correct the fuel imbalance, depending on the fuel quantity in the lightest tanks and on the remaining time to destination.*

  L1
  - **When both outer tanks are empty:**

ASSOCIATED PROCEDURES

FUEL OUTR TK s MAN XFR COMPLETED
Refer to procedure

- **If the manual gravity transfer from the left(right) outer tank fails:**
  OUTR TK XFR..... AUTO
  L(R) OUTR TK NOT USABLE
- **If the emergency transfer from the left(right) outer tank fails:**
  EMER OUTR TK XFR..... OFF

Continued on the following page

FUEL OUTR TK XFR FAULT (Cont'd)

L(R) OUTR TK NOT USABLE

STATUS

INFO

- If a manual gravity transfer from the left(right) outer tank transfer fails:
  R(L) OUTR TK MAN XFR AVAIL
  R(L) OUTR TK NOT USABLE

FUEL OUTR TKs MAN XFR COMPLETED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The manual transfer from the outer tanks to the feed tanks is completed.

Indications:

Audio



Master Light



SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL OUTR TKs MAN XFR COMPLETED (Cont'd)

OUTR TK XFR..... AUTO

L2 *As long as the OUTR TK XFR pb-sw is set to MAN, all automatic transfers are inhibited. Setting the OUTR TK XFR pb-sw to AUTO, enables the FQMS to resume automatic transfers from the other tanks, unless the FUEL MAN XFR PROCEDURE caution previously triggered.*

L1 ● **If the outer tank emergency transfer valves are open:**
EMER OUTR TK XFR..... OFF

FUEL PREDICTED CG OUT OF T.O RANGE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FQMS detects that, after refuel, the CG will exceed the certified takeoff limits.

Indications:

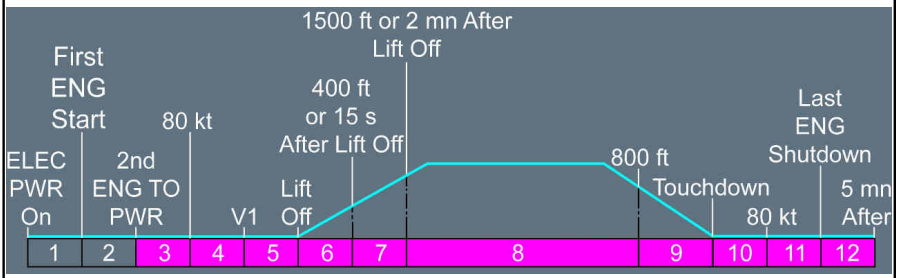
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

FUEL PREDICTED CG OUT OF T.O RANGE (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL PREDICTED CG OUT OF T.O RANGE* .

- **WHEN REFUEL COMPLETED (AUTO RCL) :**
  AUTO GND XFR..... ON

FUEL REFUEL / DEFUEL SYS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A valve that has no impact on the in-flight operations of the fuel system has failed.

Indications:

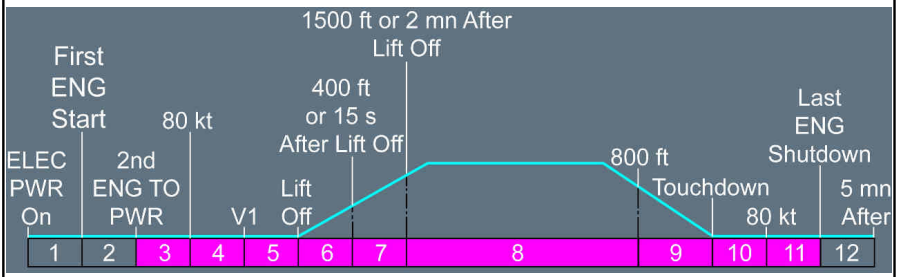
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL REFUEL / DEFUEL SYS FAULT* .

Continued on the following page

FUEL REFUEL / DEFUEL SYS FAULT (Cont'd)

- **Depending on the failure, the ECAM may display one of the following messages:**

  REFUEL L(R) AUXILIARY VLV FAULT
  XFR & DEFUEL VLV FAULT
  L(R) OUTR TK XFR VLV FAULT
  L(R) OUTR TK AFT INLET VLV FAULT
  L(R) MID TK FWD INLET VLV FAULT
  L(R) INR TK FWD INLET VLV FAULT
  TRIM TK L(R) INLET VLV FAULT
  TRIM LINE R ISOL VLV FAULT
  REFUEL L(R) ISOL VLV FAULT
  TRIM TK ISOL VLV FAULT

FUEL REFUEL DATA / FMS DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight crew has entered the ZFW and ZFCG in the FMS, and the ZFW and/or ZFCG used by the FQMS for refuel or automatic ground transfer have been subsequently updated via the REFUEL application.

Indications:

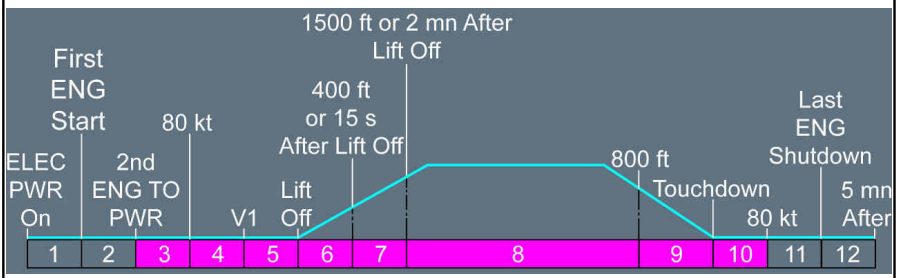
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL REFUEL DATA / FMS DISAGREE* .

REFUEL DATA..... CONFIRM

L2 *Check the load and trim sheet to confirm ZFW and ZFCG.*

L1 FMS FUEL & LOAD..... CONFIRM

FUEL REFUEL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A failure prevents the start or completion of a manual or automatic refueling.

Indications:

Local light



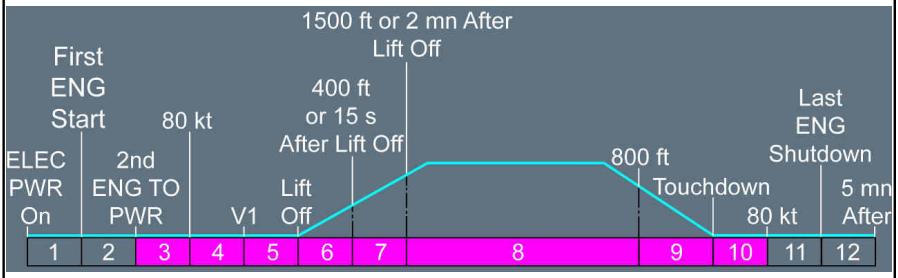
Refuel pb

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL REFUEL FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
REFUEL

FUEL SYS COMPONENT FAULT

Applicable to: ALL

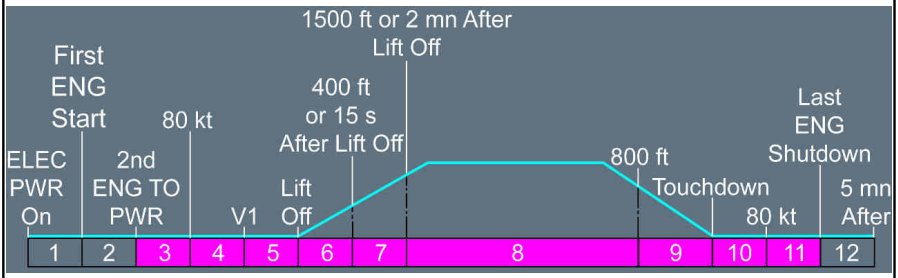
ANNUNCIATIONS

Triggering Conditions:

L2 A fuel system component, that has no impact on the in-flight operations of the fuel system, has failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL SYS COMPONENT FAULT*.

FQDC 1(2) AGP FAULT
WIRING SHORT TO STRUCTURE
FQDC 2 TSP2A FAULT
FQDC 2 TSP2B FAULT

FUEL TEMP LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A low fuel temperature (-40 °C) is detected in any outer tank, the trim tank, or in any feed tank. If both FQMS are failed, or if the temperature sensors are failed in an outer tank, or in feed tanks 1 and 4, the alert is triggered when the Total Air Temperature (TAT) is below -40 °C for 60 min.

Indications:

Audio



Master Light



Local light



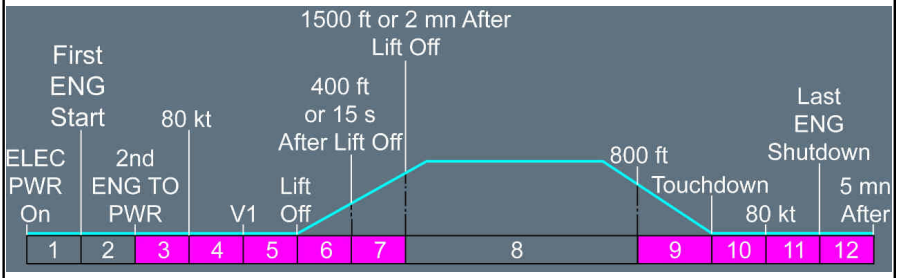
Associated TK XFR pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL TEMP LO* .

Continued on the following page

FUEL TEMP LO (Cont'd)

■ **On ground:**

DELAY TO

■ **In flight:**

● **If the flight crew selected a manual transfer of the inner (mid) tanks:**

INR(MID) TK XFR..... AUTO

L2 *The flight crew must stop the manual transfer from the inner (mid) tanks to the feed tanks in order to minimize the risk of overflow from a feed tank.*

L1 ● **If the fuel temperature in one or both outer tank is below -40 °C:**

● **WHEN ANY FEED TK < 35300 LBS (AUTO RCL):**

OUTR TK XFR.....MAN

● **If the fuel temperature in the trim tank is below -40 °C:**

TRIM TK XFR.....FWD

● **If the fuel temperature in any feed tank is below -40 °C:**

FUEL FREEZE POINT..... CHECK

L2 *Increasing the TAT increases the fuel consumption. Check that the fuel temperature is below the fuel freezing point before increasing the TAT.*

L1 TAT.....INCREASE

L2 *To increase the TAT, the flight crew must consider:*
- *Descending to a lower altitude, and/or*
- *Increasing Mach number.*

L1 ■ **In flight, if the TAT is below -40 °C for 60 min:**

● **If the flight crew selected a manual transfer of the inner (mid) tanks:**

INR(MID) TK XFR..... AUTO

L2 *The flight crew must stop the manual transfer from the inner (mid) tanks to the feed tanks in order to minimize the risk of overflow from a feed tank.*

L1 ● **If both FQMS are failed, or if the temperature sensors in an outer tank are failed:**

● **WHEN ANY FEED TK < 28700 LBS (AUTO RCL):**

OUTR TK XFR.....MAN

● **If both FQMS are failed, or if the temperature sensors in feed tanks 1 and 4 are failed:**

FUEL FREEZE POINT..... CHECK

Continued on the following page

FUEL TEMP LO (Cont'd)

L2 *Increasing the TAT increases the fuel consumption. Check that the fuel temperature is below the fuel freezing point before increasing the TAT.*

L1 TAT.....INCREASE

L2 *To increase the TAT, the flight crew must consider:*
- *Descending to a lower altitude, and/or*
- *Increasing Mach number.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- On ground:
  DELAY T.O

FUEL TRIM & APU LINES FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Damage to the trim line or APU line has been detected.

Indications:

Audio



Master Light



Local light



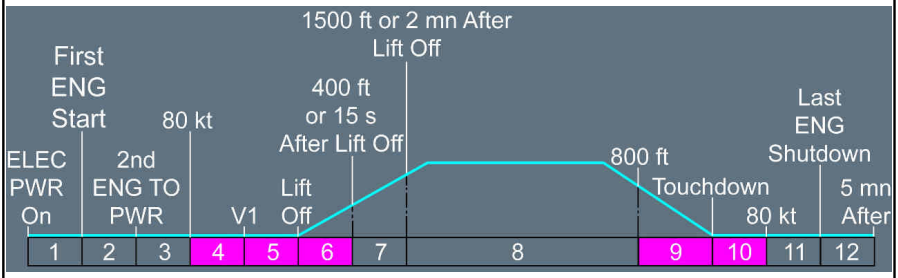
Both TRIM TK PMP pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL TRIM & APU LINES FAULT*.

TRIM TK FEED..... ISOL
TRIM TK L PMP.....OFF
TRIM TK R PMP..... OFF
APU MASTER SW..... OFF

- **If the trim tank is not empty:**

  TRIM TK NOT USABLE

L2 *The FQMS inhibits all automatic transfers from the trim tank.*

Continued on the following page

FUEL TRIM & APU LINES FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the trim tank is not empty:
  TRIM TK NOT USABLE

STATUS

INOP SYS

ALL PHASES

APU

FUEL TRIM TK GRVTY FWD XFR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TRIM TK FEED selector is set to OPEN, but the aircraft's pitch attitude does not permit a gravity transfer from the trim tank.

Indications:

Audio



Master Light

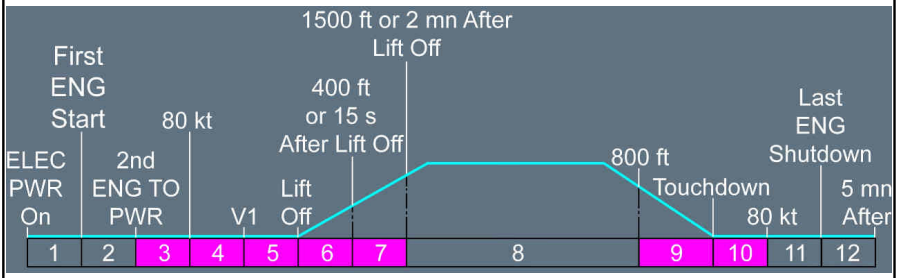


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL TRIM TK GRVTY FWD XFR FAULT*.

Continued on the following page

FUEL TRIM TK GRVTY FWD XFR FAULT (Cont'd)

■ **When the pitch attitude does not permit a gravity transfer from the trim tank:**

EXCESS PITCH ATT
TRIM TK FEED.....AUTO

L2 *The TRIM TK FEED selector is set to AUTO, to prevent an inadvertent aft transfer.*

L1 PITCH ATT < 3° FOR GRVTY FWD XFR

■ **When the pitch attitude permits gravity transfers (The alert is automatically recalled):**

TRIM TK FEED.....OPEN

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES
FOR TRIM TK FWD XFR: PITCH ATT < 3°

FUEL TRIM TK L(R) PMP FAULT

Applicable to: ALL

ANNUNCIATIONS

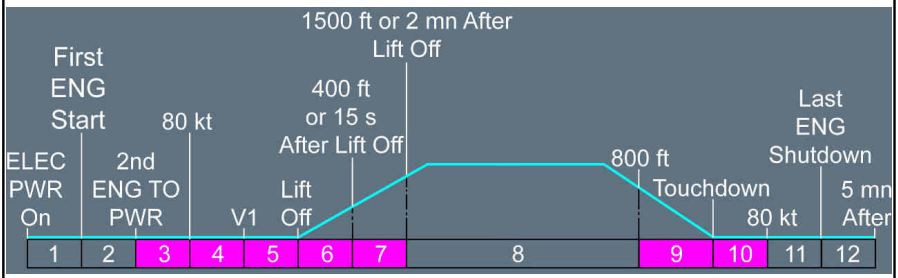
Triggering Conditions:

L2 The left(right) pump of the trim tank is:
- Failed, or
- Running, when the associated tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio	Master Light	Local light	SD page
			
		L(R) TRIM TK PMP pb-sw	FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-28 FUEL TRIM TK L PMP FAULT*
- *Refer to MEL/ME-ECAM-28 FUEL TRIM TK R PMP FAULT* .

TRIM TK L(R) PMP.....OFF

Continued on the following page

FUEL TRIM TK L(R) PMP FAULT (Cont'd)

MORE INFO

REDUND LOSS

TRIM TK L(R) PMP

FUEL TRIM TK L+R PMPs FAULT

Applicable to: ALL

ANNUNCIATIONS

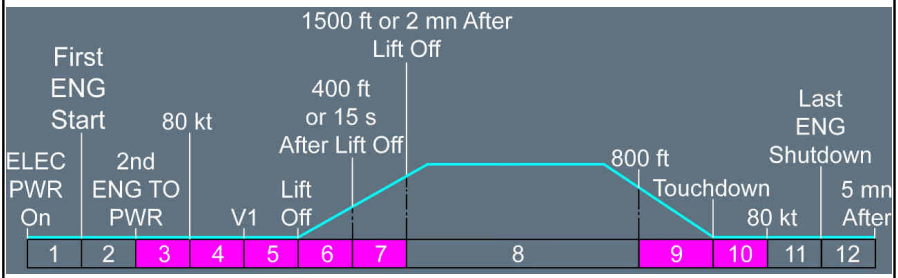
Triggering Conditions:

L2 Both trim tank pumps are:
- Failed, or
- Running, when the associated tank is empty, or
- Turned off by the flight crew (except in flight phase 1 and 12).

Indications:

Audio	Master Light	Local light	SD page
			
		Both TRIM TK PMP pb-sw	FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL TRIM TK L+R PMPs FAULT*.

Continued on the following page

FUEL TRIM TK L+R PMPs FAULT (Cont'd)

TRIM TK L PMP.....OFF
TRIM TK R PMP.....OFF

- **In flight:**

  PITCH ATT < 3° FOR GRVTY FWD XFR

L2 *The pitch attitude must be less than 3° to enable fuel to transfer by gravity from the trim tank into the inner tanks.*

L1 TRIM TK FEED.....OPEN

- **If the pumps are failed:**

  TRIM TK : 2300 KG MAX NOT USABLE

L2 *Some fuel will remain trapped in the trim tank, after the gravity transfer.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

FOR TRIM TK FWD XFR:
PITCH ATT < 3°
- If the pumps are failed:
  FUEL PARTLY UNUSABLE

STATUS

INOP SYS

ALL PHASES

TRIM TK PMPs

INFO

TRIM TK XFR BY GRVTY ONLY
TRIM TK GRVTY XFR : AROUND 3000 KG / HR
- If the pumps are failed:
  TRIM TK : 2300 KG MAX NOT USABLE

FUEL TRIM TK MAN XFR COMPLETED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The manual transfer from the trim tank to the inner tanks is completed.

Indications:

Audio



Master Light

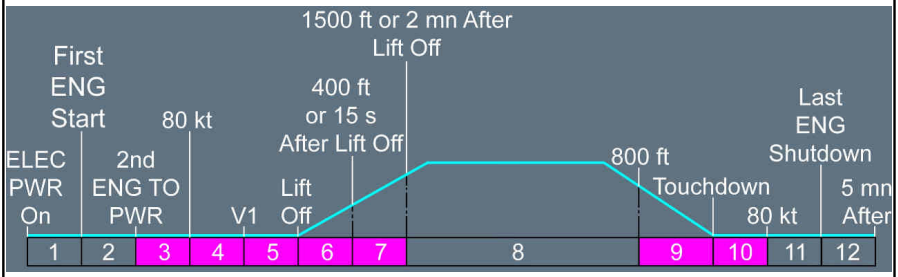


SD page



FUEL SD Page

Flight Phase Inhibition:



TRIM TK XFR.....AUTO

L2 *As long as the TRIM TK XFR pb-sw is set to FWD, all automatic transfers on the aft gallery are inhibited. Setting the TRIM TK XFR pb-sw to AUTO, enables the FQMS to resume automatic transfers on the aft gallery, unless the FUEL MAN XFR PROCEDURE alert previously triggered.*

L1 TRIM TK FEED.....AUTO

FUEL TRIM TK OVERFLOW

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Fuel has spilled into the trim surge/vent tank.
There is more than 80 US Gal (524 lb) (fuel density: 6.55 lb/US Gal)

Indications:

Audio



Master Light



Local light



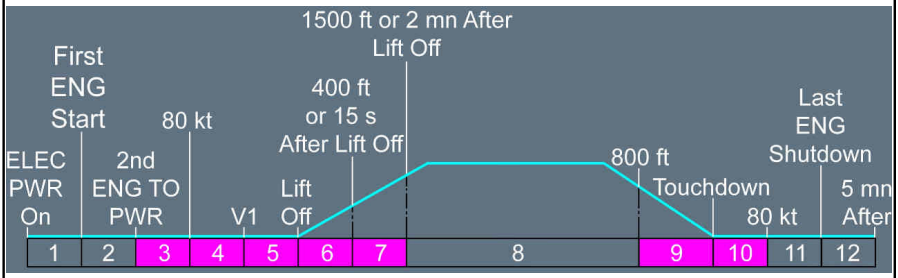
TRIM TK XFR pb-sw

SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL TRIM TK OVERFLOW*
.

Continued on the following page

FUEL TRIM TK OVERFLOW (Cont'd)

L2 If refuel is in progress, the ECAM also triggers the FUEL REFUEL FAULT alert.
If an automatic ground transfer is in progress, the ECAM also triggers the FUEL AUTO GND XFR FAULT alert.

L1 TRIM TK XFR.....FWD

FUEL TRIM TK XFR FAULT

Applicable to: ALL

Impacted by TDU: 00023457 FUEL TRIM TK XFR FAULT

ANNUNCIATIONS

Triggering Conditions:

L2
- A failure of the trim tank transfer system requires a manual pumped trim tank transfer, or a manual gravity trim tank transfer, or
- Fuel is trapped in the trim tank due to failures, or because the flight crew has set the TRIM TK FEED selector to ISOL, or
- The FQMS detects that the trim tank transfers are not operating normally, or
- The trim tank isolation valve is failed in the closed position.

Indications:

Audio



Master Light



LOCALLIGHT



TRIM TK XFR pb-sw



L(R) TRIM TK PMP
pb-sw (if a manual gravity
transfer is required)

SD page

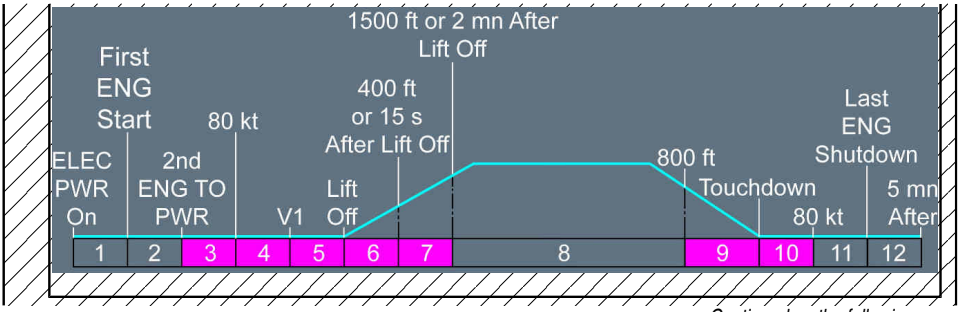


FUEL SD Page

Flight Phase Inhibition:

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)



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FUEL TRIM TK XFR FAULT (Cont'd)

Impacted DU: 00003012 FUEL TRIM TK XFR FAULT

ANNUNCIATIONS

Triggering Conditions:

L2
- A failure of the trim tank transfer system requires a manual pumped trim tank transfer, or a manual gravity trim tank transfer, or
- Fuel is trapped in the trim tank due to failures, or because the flight crew has set the TRIM TK FEED selector to ISOL, or
- The FQMS detects that the trim tank transfers are not operating normally, or
- The trim tank isolation valve is failed in the closed position, or
- The landing gear lever provides inconsistent UP and DOWN information to the FQMS.

Indications:

Audio



Master Light



LOCALLIGHT



TRIM TK XFR pb-sw



L(R) TRIM TK PMP pb-sw (if a manual gravity transfer is required)

SD page

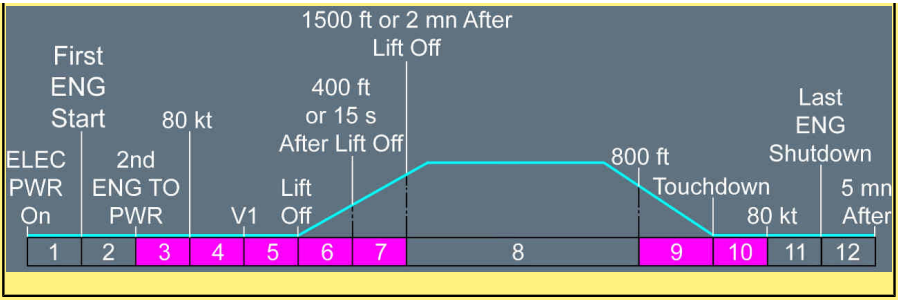


FUEL SD Page

Flight Phase Inhibition:

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL TRIM TK XFR FAULT* .

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)

Impacted by TDU: 00023458 FUEL TRIM TK XFR FAULT - Alert

- **If the trim tank isolation valve is failed in the closed position:**

TRIM TK ISOL VLV FAULT

L2 *No flight crew action is required. The ECAM alert triggers on ground for MMEL entry.*

L1
- **If a gravity fuel transfer is required (e.g. the trim tank isolation valve is failed in the closed position in flight):**

TRIM TK L PMP.....OFF
TRIM TK R PMP.....OFF
TRIM TK XFR.....AUTO

PITCH ATT < 3° FOR GRVTY FWD XFR
TRIM TK FEED.....OPEN
TRIM TK : 2300 KG MAX NOT USABLE

  - **During jettison:**

JETTISON SUSPENDED BY TRIM TK XFR

  - **When the trim tank is empty:**

ASSOCIATED PROCEDURES

FUEL TRIM TANK MAN XFR COMPLETED

Refer to PRO-ABN-ECAM-10-28-360 FUEL TRIM TK MAN XFR COMPLETED

- **If a manual pumped fuel transfer is required (e.g. if a trim line inlet valve is abnormally open):**

TRIM TK XFR.....FWD

  - **During jettison:**

JETTISON SUSPENDED BY TRIM TK XFR

  - **When the trim tank is empty:**

ASSOCIATED PROCEDURES

FUEL TRIM TANK MAN XFR COMPLETED

Refer to PRO-ABN-ECAM-10-28-360 FUEL TRIM TK MAN XFR COMPLETED

- **If the trim tank is not usable:**

L2 The trim tank is not usable, if:
- Failures prevent a trim tank transfer (automatic or manual), or

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)

- The flight crew set the TRIM TK FEED selector to ISOL, or
- The flight crew selected a gravity fuel transfer, but the FQMS detects that there is no fuel flow.

L1 TRIM TK XFR.....AUTO
TRIM TK FEED.....ISOL
TRIM TK NOT USABLE

● **If the FQMS detects that the trim tank transfers are not operating normally:**

L2 The FQMS detects that the trim tank transfers are not operating normally if the CG computed by the FQMS is greater than 49.5 % (48.5 %, if one FQMS is failed).

L1 The ECAM displays the FUEL FQMS 1+2 FAULT alert before the FUEL TRIM TK XFR FAULT alert.

■ **On ground:**

DELAY T.O

■ **In flight:**

● **If the flight crew selected a manual transfer of the inner(mid) tanks:**

INR(MID) TK XFR.....AUTO

L2 *The flight crew must stop the manual transfer from the inner(mid) tanks to the feed tanks in order to minimize the risk of overflow of the feed tank.*

L1 TRIM TK XFR.....FWD

ASSOCIATED PROCEDURES

FUEL MAN XFR PROCEDURE
Refer to procedure

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)

Impacted DU: 00008322 FUEL TRIM TK XFR FAULT - Alert

- **If the trim tank isolation valve is failed in the closed position:**

TRIM TK ISOL VLV FAULT

L2 *No flight crew action is required. The ECAM alert triggers on ground for MMEL entry.*

L1 - **If a gravity fuel transfer is required (e.g. the trim tank isolation valve is failed in the closed position in flight):**

TRIM TK L PMP..... OFF
TRIM TK R PMP..... OFF
TRIM TK XFR..... AUTO

PITCH ATT < 3° FOR GRVTY FWD XFR
TRIM TK FEED.....OPEN

TRIM TK : 2300 KG MAX NOT USABLE

- **During jettison:**

JETTISON SUSPENDED DURING TRIM TK XFR

- **When the trim tank is empty:**

ASSOCIATED PROCEDURES

FUEL TRIM TANK MAN XFR COMPLETED

Refer to PRO-ABN-ECAM-10-28-360 FUEL TRIM TK MAN XFR COMPLETED

- **If a manual pumped fuel transfer is required (e.g. if a trim line inlet valve is abnormally open):**

TRIM TK XFR..... FWD

- **During jettison:**

JETTISON SUSPENDED DURING TRIM TK XFR

- **When the trim tank is empty:**

ASSOCIATED PROCEDURES

FUEL TRIM TANK MAN XFR COMPLETED

Refer to PRO-ABN-ECAM-10-28-360 FUEL TRIM TK MAN XFR COMPLETED

- **If the trim tank is not usable:**

L2 The trim tank is not usable, if:
- Failures prevent a trim tank transfer (automatic or manual), or

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)

- The flight crew set the TRIM TK FEED selector to ISOL, or
- The flight crew selected a gravity fuel transfer, but the FQMS detects that there is no fuel flow.

L1 TRIM TK XFR..... AUTO
TRIM TK FEED.....ISOL
TRIM TK NOT USABLE

● **If the FQMS detects that the trim tank transfers are not operating normally:**

L2 The FQMS detects that the trim tank transfers are not operating normally if the CG computed by the FQMS is greater than 49.5 % (48.5 % , if one FQMS is failed).

L1 The ECAM displays the FUEL FQMS 1+2 FAULT alert before the FUEL TRIM TK XFR FAULT alert.

■ **On ground:**

DELAY T.O

■ **In flight:**

● **If the flight crew selected a manual transfer of the inner(mid) tanks:**

INR(MID) TK XFR.....AUTO

L2 *The flight crew must stop the manual transfer from the inner(mid) tanks to the feed tanks in order to minimize the risk of overflow of the feed tank.*

L1 TRIM TK XFR.....FWD

ASSOCIATED PROCEDURES

FUEL MAN XFR PROCEDURE
Refer to procedure

● **In flight:**

L2 If the FUEL TRIM TK XFR FAULT alert triggers because of a failure that is different from the inconsistent UP and DOWN information from the landing gear lever:

- The ECAM displays the procedure to perform a manual trim tank transfer (via the pumps or by gravity), or to isolate the trim tank, as described here above
- The ECAM will also display the procedure below. As the flight crew has isolated the trim tank or has initiated a manual pumped or gravity transfer just before, they will not confirm the condition “IF TRIM TK NOT ISOLATED & NO TRIM TK XFR IN PROGRESS” and as a consequence they will not perform the associated action line.

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)

If the FUEL TRIM TK XFR FAULT alert triggers because of the inconsistent UP and DOWN information from the landing gear lever, there is no other associated procedure than the one below. In this case, the flight crew confirms the "IF TRIM TK NOT ISOLATED & NO TRIM TK XFR IN PROGRESS" condition and performs the manual trim tank transfer as soon as the inner tanks are empty.

L1 ● **IF TRIM TK NOT ISOLATED & NO TRIM TK XFR IN PROGRESS :**
WHEN INR TKS EMPTY: TRIM TK XFR..... FWD

L2 *The flight crew should wait for the inner tanks to be empty before they perform the manual trim tank transfer. If they perform the manual trim tank transfer earlier, the FUEL CG AT FWD LIMIT alert may trigger.*

L1 ● **When the trim tank is empty:**

L2 When the trim tank is empty, and after a confirmation time of 5 min , the FQMS logic detects that there is fuel in the inner tanks and starts the automatic transfer from the inner to the feed tanks.

L1

ASSOCIATED PROCEDURES

FUEL TRIM TANK MAN XFR COMPLETED
Refer to PRO-ABN-ECAM-10-28-360 FUEL TRIM TK MAN XFR COMPLETED

Continued on the following page

FUEL TRIM TK XFR FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the trim tank fuel is not usable:
  TRIM TK NOT USABLE
- If a gravity fuel transfer is required:
  FOR TRIM TK FWD XFR:
  PITCH ATT < 3°
  FUEL PARTLY UNUSABLE
- On ground, if the FQMS detects that the trim transfers are not operating normally:
  DELAY T.O

STATUS

INOP SYS

ALL PHASES

CG MANAGEMENT

INFO

- If a gravity transfer is required:
  TRIM TK : 2300 KG MAX NOT USABLE
  TRIM TK GRVTY XFR : AROUND 3000 KG / HR
- If a trim tank transfer is required during jettison:
  JETTISON SUSPENDED BY TRIM TK XFR
- If the trim tank transfer goes into only one inner tank:
  IMBALANCE CREATED IN INR TKs

FUEL WEIGHT & BALANCE BKUP FAULT

Applicable to: ALL

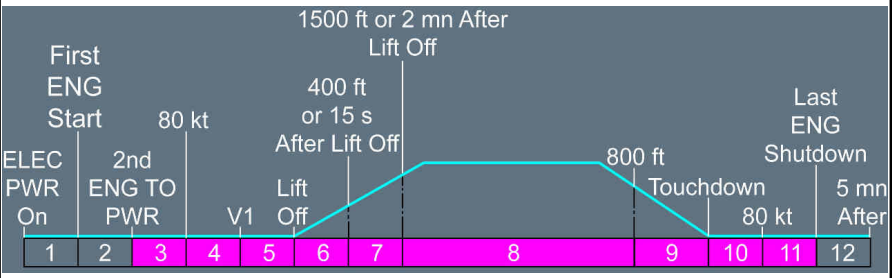
ANNUNCIATIONS

Triggering Conditions:

L2 The backup weight and balance computation is not available.
L3 WBBC 1 and WBBC 2 are failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL WEIGHT & BALANCE BKUP FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

WBBC

FUEL WEIGHT DATA DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PRIMs detected a difference of more than 198 400 lb between the Gross Weight (GW) of the aircraft computed by the FQMS and the GW of the aircraft computed by the WBBC.

Indications:

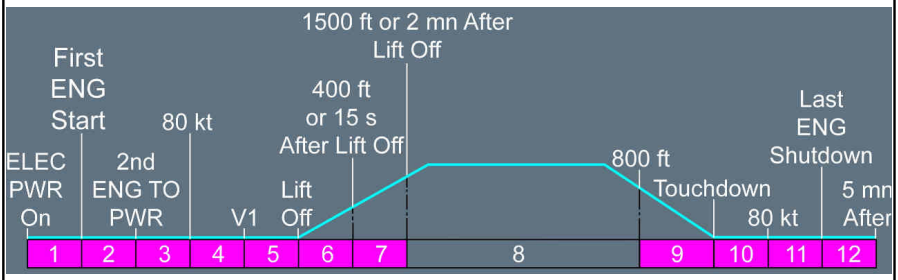
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL WEIGHT DATA DISAGREE* .

Continued on the following page

FUEL WEIGHT DATA DISAGREE (Cont'd)

ERROR > 198400 LBS DETECTED BY F/CTL
FMS ZFW VALUE.....CONFIRM

L2 *The weight data disagree can be due to an incorrect ZFW entry in the FMS . If the ZFW entered in the FMS is not correct, entering the correct ZFW will clear the alert.*

L1 ECAM GW.....CHECK

L2 *The flight crew can compute the aircraft gross weight (ZFW + FOB) and compare it to the ECAM GW . A difference indicates that the GW computed by the FQMS , and displayed on the ECAM is not correct.*

L1 ● **IF ECAM GW NOT CORRECT :**

L2 If the ECAM GW is not correct, the characteristics speeds (Green dot, F, S and VLS) displayed on the ECAM and FMS , and the fuel predictions of the FMS are not correct.

L1 DATA NOT CORRECT :
VLS, VAPP, GREEN DOT, EFOB

L2 *The characteristic speeds are available in the FCOM :*
- *Refer to PER-OPS Operating Speeds During Approach*
- *Refer to PER-OPS VLS During Approach*
- *Refer to PER-OPS Green DOT*
- *Refer to PER-OPS VLS CONF 0*

L1 LDG PERF AFFECTED

L2 *The landing performance application is used to compute a correct approach speed.*

L123

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP , FD and A/THR remain available.
The PRIMs compute an estimation of the gross weight. This estimation of the gross weight is based on the aircraft GW at slats retraction and an average fuel consumption. It is used for flight control laws computation, in the case of a weight data disagree.

Continued on the following page

FUEL WEIGHT DATA DISAGREE (Cont'd)

L1 ● **If the alert is triggered at slats retraction, and the weight data disagree is still detected after 10 min :**

L13

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

In the case of a weight data disagree at slats retraction, the PRIMs are not able to initialize their estimation of the aircraft gross weight. The flight control laws revert to direct law.

Continued on the following page

FUEL WEIGHT DATA DISAGREE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

LDG PERF AFFECTED

DEFERRED PROC

APPR & LDG

LDG PERF COMPUTATION..... CONFIRM

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
AP 1+2
FD 1+2
A/THR (If the flight control laws revert to direct law)

APPR & LDG

BTV
CAT 2
GLS AUTOLAND

INFO

- If the ECAM GW is not correct:
  DATA NOT CORRECT :
  VLS, VAPP, GREEN DOT, EFOB
  ALTN LAW : PROT LOST
- If the flight control laws revert to direct law:
  DIRECT LAW : PROT LOST

FUEL WING TK OVERFLOW

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Fuel has spilled into a wing surge tank or a wing vent tank.

L3 There is more than:
- 198 US Gal (1 297 lb) in the left or right vent tank, or
- 264 US Gal (1 730 lb) in the left or right surge tank. (fuel density: 6.55 lb/US Gal)

Indications:

L2

Audio



Master Light

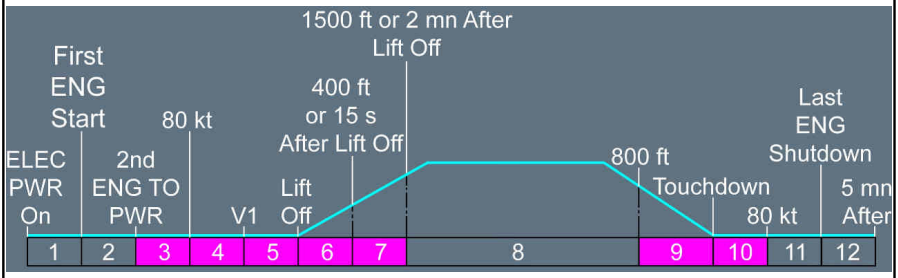


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL WING TK OVERFLOW*
.

Continued on the following page

FUEL WING TK OVERFLOW (Cont'd)

- **On ground before takeoff:**
  DELAY TO

L2 *If refuel is in progress, the ECAM will also trigger the FUEL REFUEL FAULT alert.*
If an automatic ground transfer is in progress, the ECAM will also trigger the FUEL AUTO GND XFR FAULT alert.

L1 - **If the corresponding manual transfer is selected when the alert is triggered:**
  OUTR TK XFR.....AUTO
  EMER OUTR TK XFR.....OFF
  TRIM TK XFR.....AUTO
  INR TK XFR.....AUTO
  MID TK XFR.....AUTO

- **If no manual transfer was selected:**
  FUEL XFR : MAN ONLY

ASSOCIATED PROCEDURES

FUEL MAN XFR PROCEDURE
Refer to procedure

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- Only on ground before takeoff:
  DELAY TO

FUEL WINGS BALANCED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Following the FUEL WINGS NOT BALANCED alert, the corrective actions to balance the fuel in the feed tanks are successful.

Indications:

Audio



Master Light

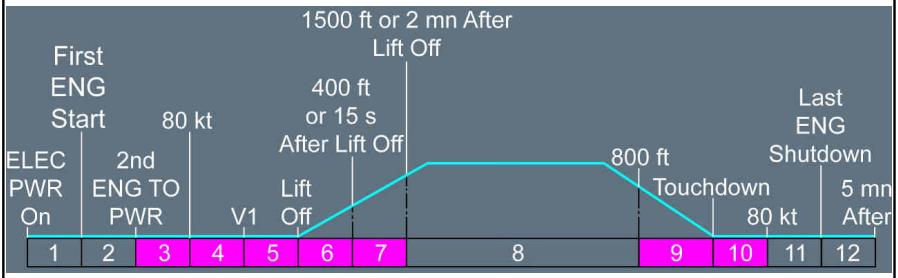


SD page



FUEL SD Page

Flight Phase Inhibition:



FEED TK 1 & 4 (2 & 3) BALANCED
FEED TK 1(2) MAIN PMP.....ON
FEED TK 1(2) STBY PMP.....ON
FEED TK 4(3) MAIN PMP.....ON
FEED TK 4(3) STBY PMP.....ON
CROSSFEED 1(2).....OFF
CROSSFEED 4(3).....OFF

FUEL WINGS MAN BALANCING PROCEDURE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 An FQMS failure caused a fuel imbalance.
The ECAM displays this procedure at the same time as FUEL FQMS 1+2 FAULT (displayed first) and FUEL MAN XFR PROCEDURE (displayed third).

Indications:

Audio



Master Light

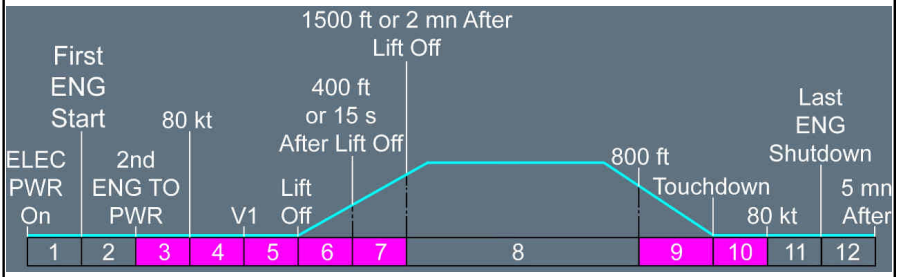


SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL WINGS MAN BALANCING PROCEDURE* .

Continued on the following page

FUEL WINGS MAN BALANCING PROCEDURE (Cont'd)

■ **On ground:**

DELAY T.O

■ **In flight:**

● **In the case of an imbalance between feed tanks 1 and 4:**

FEED TK 1 & 4 NOT BALANCED
TKS BALANCING : ONE PAIR AT A TIME

● **IF NO FUEL LEAK :**

FEED TK 1 & 4 MAN BALANCING :

CROSSFEED 1..... ON
CROSSFEED 4..... ON
FEED TK (lighter side) STBY PMP..... OFF
FEED TK (lighter side) MAIN PMP..... OFF

● **WHEN FEED TKs 1 & 4 BALANCED :**

FEED TK (lighter side) MAIN PMP..... ON
FEED TK (lighter side) STBY PMP..... ON
CROSSFEED 1..... OFF
CROSSFEED 4..... OFF

● **In the case of an imbalance between feed tanks 2 and 3:**

FEED TK 2 & 3 NOT BALANCED
TKS BALANCING : ONE PAIR AT A TIME

● **IF NO FUEL LEAK :**

FEED TK 2 & 3 MAN BALANCING :

CROSSFEED 2..... ON
CROSSFEED 3..... ON
FEED TK (lighter side) STBY PMP..... OFF
FEED TK (lighter side) MAIN PMP..... OFF

● **WHEN FEED TKs 2 & 3 BALANCED :**

FEED TK (lighter side) MAIN PMP..... ON
FEED TK (lighter side) STBY PMP..... ON
CROSSFEED 2..... OFF
CROSSFEED 3..... OFF

Continued on the following page

FUEL WINGS MAN BALANCING PROCEDURE (Cont'd)

- **In the case of an imbalance between the inner tanks:**

  INR TKs NOT BALANCED
  TKS BALANCING : ONE PAIR AT A TIME

  - **IF NO FUEL LEAK :**

    INR TKs MAN BALANCING:

    - **WHEN ANY FEED TK < 15000 KG :**
      (lighter side) INR TK AFT PMP..... OFF
      INR TK XFR..... MAN

      - **WHEN INR TKs BALANCED :**
        INR TK XFR.....AUTO
        (lighter side) INR TK AFT PMP.....ON

- **In the case of an imbalance between the mid tanks:**

  MID TKs NOT BALANCED
  TKS BALANCING : ONE PAIR AT A TIME

  - **IF NO FUEL LEAK :**

    MID TKs MAN BALANCING:

    - **WHEN ANY FEED TK < 15000 KG :**
      (lighter side) MID TK AFT PMP.....OFF
      MID TK XFR.....MAN

      - **WHEN MID TKs BALANCED :**
        MID TK XFR..... AUTO
        (lighter side) MID TK AFT PMP..... ON

- **In the case of an imbalance between the outer tanks:**

  OUTR TKs NOT BALANCED
  TKS BALANCING : ONE PAIR AT A TIME

  - **IF NO FUEL LEAK :**

    OUTR TKs MAN BALANCING:

    - **WHEN ANY FEED TK < 15000 KG :**
      OUTR TK XFR..... MAN

      - **WHEN BOTH OUTR TKs EMPTY :**
        OUTR TK XFR.....AUTO

Continued on the following page

FUEL WINGS MAN BALANCING PROCEDURE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- On ground:
  DELAY T.O

L12

STATUS

INFO

FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

The flight control laws extend control surfaces in order to counter the lateral moment due to the wings imbalance. The extension of the flight control surfaces increases the fuel consumption.

Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is:

- *20.5 % for the inner tanks*
- *18.5 % for the outer tanks*
- *30.1 % for the mid tanks*
- *34.8 % for the feed tanks 1 and 4*
- *6.1 % for the feed tanks 2 and 3.*

TKs BALANCING : ONE PAIR AT A TIME

FUEL WINGS NOT BALANCED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - On ground, the FQMS detects:
- An imbalance of more than 6 600 lb between the symmetric feed tanks (feed tanks 1 and 4, or feed tanks 2 and 3), or
- An imbalance of more than 6 600 lb between the inner tanks, or
- An imbalance of more than 5 500 lb between the mid tanks, or
- An imbalance of more than 2 600 lb between the outer tanks.

Note: The caution is inhibited during refueling, ground fuel transfers, and defueling.

- In flight, the FQMS detects an imbalance of more than 6 600 lb between the symmetric feed tanks.

Note: The FQMS automatically corrects any imbalance between the inner tanks, and/or between the mid tanks. There is no associated ECAM alert.

Indications:

Audio



Master Light

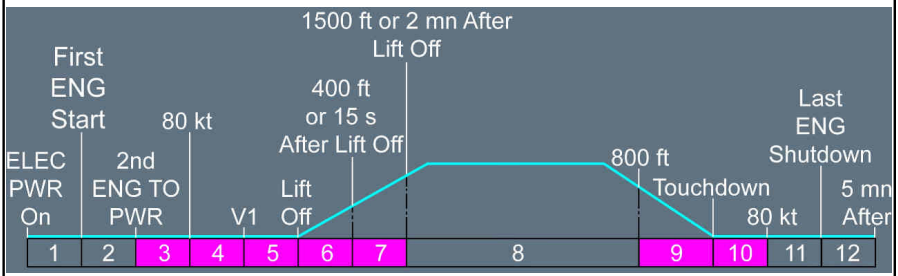


SD page



FUEL SD Page

Flight Phase Inhibition:



Continued on the following page

FUEL WINGS NOT BALANCED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL WINGS NOT BALANCED* .

■ **On ground:**

● **IF T.O PLANNED :**

■ **Before the first engine start:**

AUTO GND XFR..... ON

L2 *The flight crew should use the automatic ground transfer to compensate the imbalance.*

L1 ■ **After the first engine start:**

WINGS IMBALANCE..... COMPENSATE

L2 *The automatic ground transfer is inhibited, after the second engine start.*

L1 DELAY T.O

■ **In flight:**

● **In the case of an imbalance between feed tanks 1 and 4:**

FEED TK 1 & 4 NOT BALANCED

● **IF NO FUEL LEAK :**

CROSSFEED 1..... ON
CROSSFEED 4..... ON
FEED TK (lighter side) STBY PMP ..... OFF
FEED TK (lighter side) MAIN PMP .....OFF

● **In the case of an imbalance between feed tank 2 and feed tank 3:**

FEED TK 2 & 3 NOT BALANCED

● **IF NO FUEL LEAK :**

CROSSFEED 2..... ON
CROSSFEED 3..... ON
FEED TK (lighter side) STBY PMP ..... OFF
FEED TK (lighter side) MAIN PMP .....OFF

L2 *Note: When the tanks are balanced, the FUEL WINGS BALANCED alert triggers (Refer to procedure).*

Continued on the following page

FUEL WINGS NOT BALANCED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- On ground:
  DELAY T.O

L12

STATUS

INFO

FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

The flight control laws extend control surfaces in order to counter the lateral moment due to the high wings imbalance. The extension of the flight control surfaces increases the fuel consumption.

Considering the trapped tank as full and the other tanks as empty, the maximum increase of the fuel consumption is:

- *20.5 % for the inner tanks*
- *18.5 % for the outer tanks*
- *30.1 % for the mid tanks*
- *34.8 % for the feed tanks 1 and 4*
- *6.1 % for the feed tanks 2 and 3.*

FUEL ZFW OR ZFWCG FMS DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FMS 1 and FMS 2 do not provide the same ZFW or ZFCG data to the FQMS.

Indications:

Audio



Master Light



SD page



FUEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-28 FUEL ZFW OR ZFWCG FMS DISAGREE* .

FMS ZFW OR ZFWCG VALUES.....REENTER

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Hydraulic System

HYD G (Y) ELEC PMP A OR (B) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The electric pump is failed.

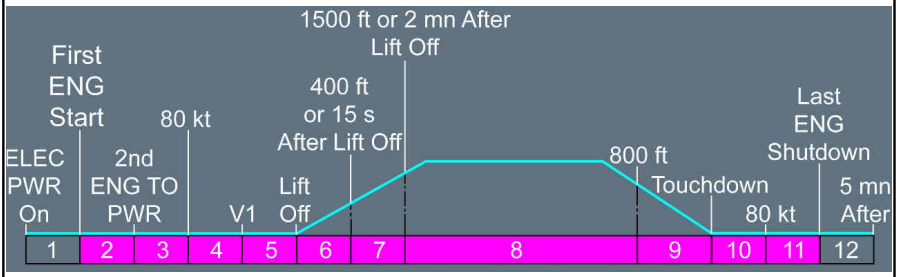
L3
- The electric pump is failed, or
- The temperature of the electric pump motor is above180 °C, or
- The electric pump pressure is below 1 885 PSI.

Indications:

L2

Audio	Master Light	Local light	SD page
		 G(Y) ELEC PMP A or B pb-sw	 HYD SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions
- *Refer to MEL/ME-ECAM-29 HYD G ELEC PMP A(B) FAULT*
- *Refer to MEL/ME-ECAM-29 HYD Y ELEC PMP A(B) FAULT*

Continued on the following page

HYD G (Y) ELEC PMP A OR (B) FAULT (Cont'd)

G (Y) ELEC PMP A or B..... OFF

MORE INFO

REDUND LOSS

G (Y) ELEC PMP A or B

HYD G (Y) ENG 1 OR 2 (3 OR 4) PMP A OR B PRESS LO

Applicable to: ALL

ANNUNCIATIONS

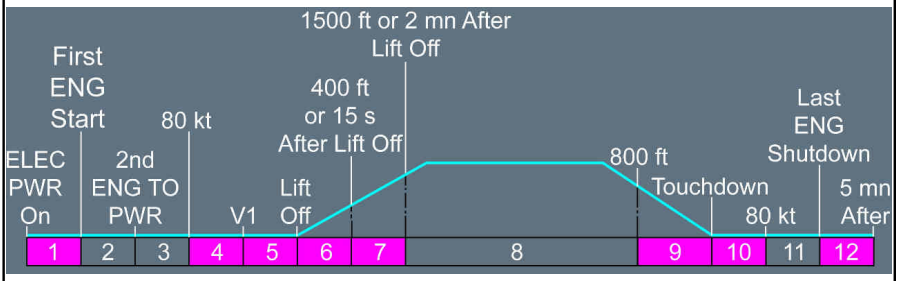
Triggering Conditions:

L2 Engine 1 or 2 (3 or 4) pump pressure is below 2 500 PSI.

Indications:

Audio	Master Light	Local light	SD page
			
		G(Y) ENG 1 or 2 (3 or 4) PMP A or B pb-sw	HYD SD Page

Flight Phase Inhibition:



Continued on the following page

HYD G (Y) ENG 1 OR 2 (3 OR 4) PMP A OR B PRESS LO (Cont'd)

L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-29 HYD G ENG 1(2) PMP A(B) PRESS LO*
- *Refer to MEL/ME-ECAM-29 HYD Y ENG 3(4) PMP A(B) PRESS LO*

G(Y) ENG 1 or 2 (3 or 4) PMP A or B.....OFF

- **If on ground and a low pressure is detected on three yellow hydraulic pumps:**
  MOVE FLAPS/SPLRS IN STRAIGHT LINE ONLY

L2 *A low pressure can be detected on three yellow hydraulic pumps if engine 3(4) is failed, and a pump pressurized by engine 4(3) is failed.*
With only one remaining pump on the yellow hydraulic system, there might not be sufficient pressure for bodywheel steering and to move the flaps and spoilers.

STATUS

INOP SYS

ALL PHASES

G (Y) ENG 1 or 2 (3 or 4) PMP A or B (If at least two pumps are failed:)

L12

MORE INFO

REDUND LOSS

- If only one pump is failed:
  G (Y) ENG 1 or 2 (3 or 4) PMP A or B
- If a low pressure is detected on three yellow hydraulic pumps:
  WHEN ON GROUND:
  MOVE FLAPS/SPLRS IN STRAIGHT LINE ONLY
  A low pressure can be detected on three yellow hydraulic pumps if engine 3(4) is failed, and a pump pressurized by engine 4(3) is failed.
  With only one remaining pump on the yellow hydraulic system, there might not be sufficient pressure for bodywheel steering and to move the flaps and spoilers.

HYD G(Y) FUEL HEAT EXCHANGER VLV FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The green (yellow) fuel/hydraulic heat exchanger valve is abnormally open or abnormally closed.

Indications:

Audio



Master Light

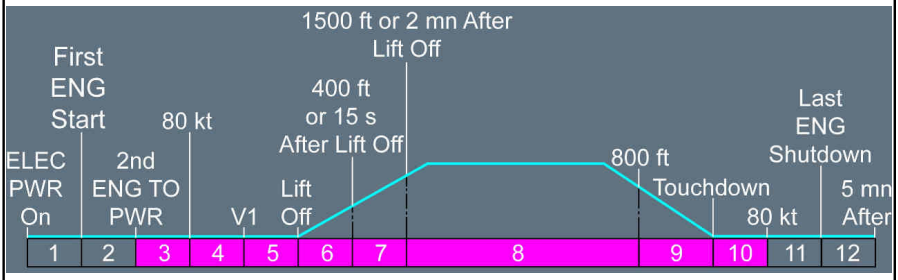


SD page



F/CTL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-29 HYD G FUEL HEAT EXCHANGER VLV FAULT*
- *Refer to MEL/ME-ECAM-29 HYD Y FUEL HEAT EXCHANGER VLV FAULT*

Crew awareness

HYD G(Y) HEAT EXCHANGER AIR LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The green (yellow) air/hydraulic heat exchanger is leaking hot air into the flap track fairing.

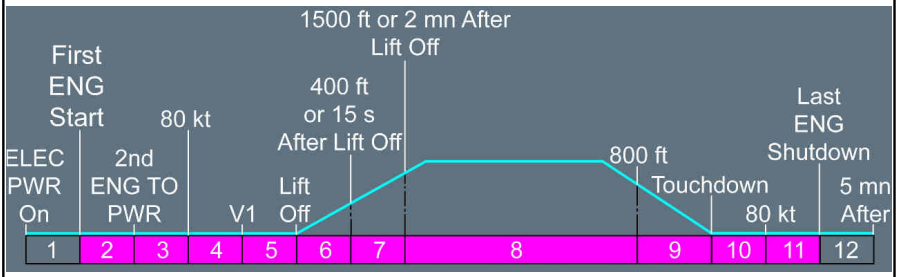
Indications:

SD page



HYD SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) HEAT EXCHANGER AIR LEAK* .

Crew awareness.

HYD G(Y) HEAT EXCHANGER AIR LEAK DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The hot air leak detection system around the air/hydraulic heat exchanger is failed.

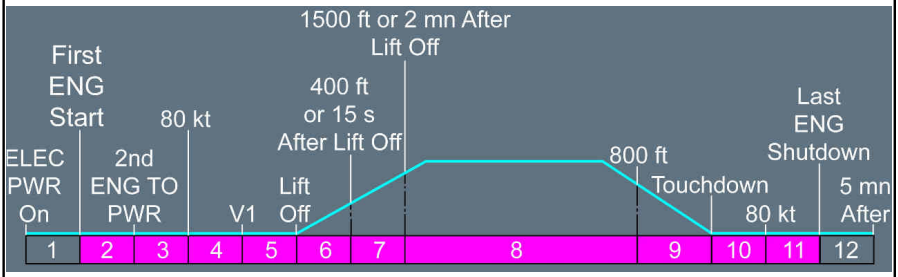
Indications:

SD page



HYD SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) HEAT EXCHANGER AIR LEAK DET FAULT* .

Crew awareness.

HYD G(Y) RSVR AIR PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The air pressure in the green (yellow) reservoir is below 21.8 PSI.

Indications:

Audio



Master Light



Local light



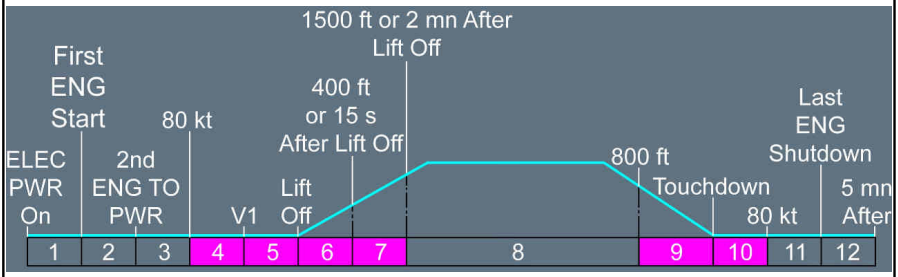
All G(Y) ENG PMP pb-sw

SD page



HYD SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) RSVR AIR PRESS LO* .

Continued on the following page

HYD G(Y) RSVR AIR PRESS LO (Cont'd)

- **IF G(Y) SYS PRESS FLUCTUATES:**

  G(Y) ENG 1(3) PMP A and B ..... OFF
  G(Y) ENG 2(4) PMP A and B ..... OFF

  - **If on ground, and all engines are off:**

    G(Y) ELEC PMP A and B ..... OFF

ASSOCIATED PROCEDURES

HYD G(Y) SYS PRESS LO
Refer to PRO-ABN-ECAM-10-29-20 HYD G (Y) SYS PRESS LO

L12

DEFERRED PROC

FOR APPROACH

The probability of pump cavitation increases as the altitude increases. Therefore, it may be possible to restore the green (yellow) hydraulic system after descending to a lower altitude.

G (Y) ENG 1(3) PMP A and B..... ON
G (Y) ENG 2(4) PMP A and B..... ON

HYD G (Y) RSVR LEVEL LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There are less than 2.6 US Gal of hydraulic fluid in the green (yellow) hydraulic reservoir.

Indications:

Audio



Master Light



LOCALLIGHT



All G(Y) ENG PMP pb-sw

SD page

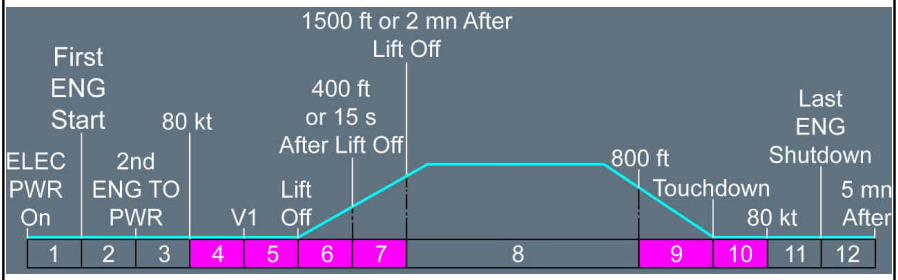


HYD SD Page



Both G(Y) ENG
PMP A+B DISC pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) RSVR LEVEL LO* .

Continued on the following page

HYD G (Y) RSVR LEVEL LO (Cont'd)

G(Y) ENG 1(3) PMP A and B ..... OFF
G(Y) ENG 2(4) PMP A and B ..... OFF
G(Y) ENG 1(3) PMP A+B.....DISC

L2 *It is not possible to recover the hydraulic system after a reservoir low level. Therefore, the flight crew must press the G(Y) ENG PMP A+B DISC pb , to disconnect the engine-driven pumps from the engine accessory gearbox, in order to prevent pump damage.*

L1 G(Y) ENG 2(4) PMP A+B.....DISC

- **If on ground, and all engines are off:**
  G(Y) ELEC PMP A and B .....OFF

ASSOCIATED PROCEDURES

HYD G(Y) SYS PRESS LO
Refer to PRO-ABN-ECAM-10-29-20 HYD G (Y) SYS PRESS LO

HYD G(Y) SYS CHAN A OR B OVHT DET FAULT

Applicable to: ALL

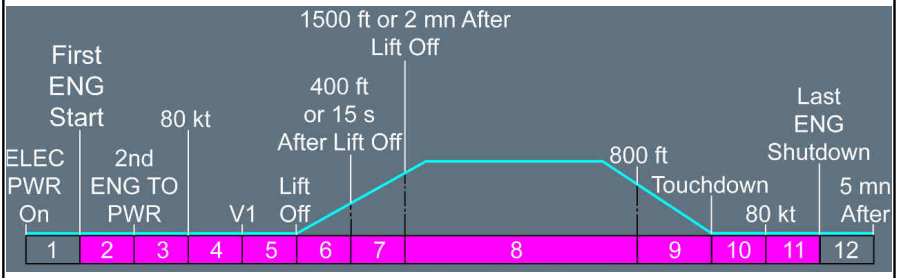
ANNUNCIATIONS

Triggering Conditions:

L2 The overheat detection sensors for the green (yellow) HSMU Channel A or B are failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-29 HYD G SYS CHAN A(B) OVHT DET FAULT*
- *Refer to MEL/ME-ECAM-29 HYD Y SYS CHAN A(B) OVHT DET FAULT*

Crew awareness.

MORE INFO

REDUND LOSS

G(Y) SYS CHAN A or B OVHT DET

HYD G (Y) SYS COOLING FAULT

Applicable to: ALL

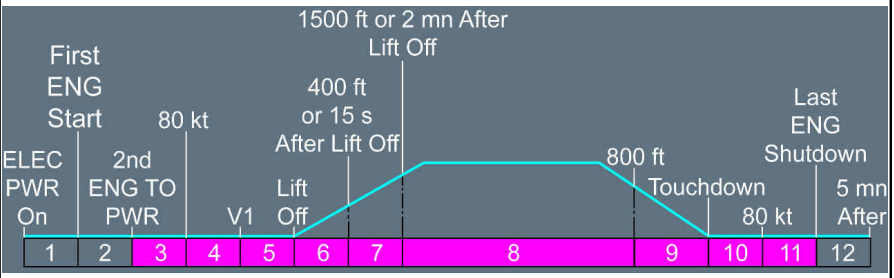
ANNUNCIATIONS

Triggering Conditions:

L2 The fuel/hydraulic heat exchanger of the green (yellow) hydraulic system was used during the previous flight. This indicates an air/hydraulic heat exchanger failure.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-29 HYD G SYS COOLING FAULT*
- *Refer to MEL/ME-ECAM-29 HYD Y SYS COOLING FAULT*

Crew awareness.

HYD G (Y) SYS MONITORING FAULT

Applicable to: ALL

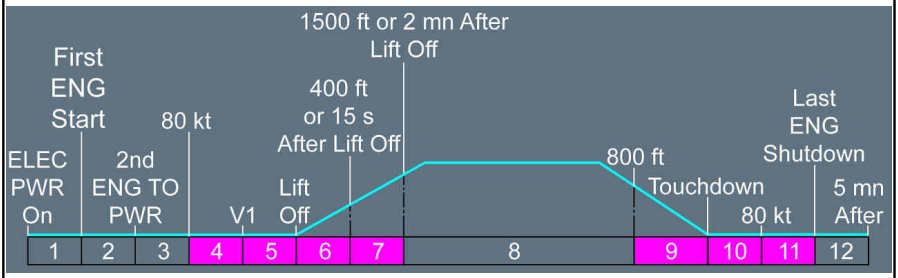
ANNUNCIATIONS

Triggering Conditions:

L2 The green (yellow) Hydraulic System Monitoring Unit (HSMU) is failed, or is not in its rack (on ground only).

Indications:

Flight Phase Inhibition:



L2 If the green(yellow) HSMU , of the affected system, fails:

- The hydraulic system continues to operate
- Most of the indications on the HYD System Display are lost
- Overheat detection is lost
- System pressure, reservoir air pressure, and pumps pressure remain monitored, and the associated ECAM alerts can trigger, if necessary
- The electric pumps are inoperative.

For more information: *Refer to HSMU Description* .
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) SYS MONITORING FAULT* .

Crew awareness.

Continued on the following page

HYD G (Y) SYS MONITORING FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

G (Y) HSMU

HYD G (Y) SYS OVHT

Applicable to: ALL

ANNUNCIATIONS

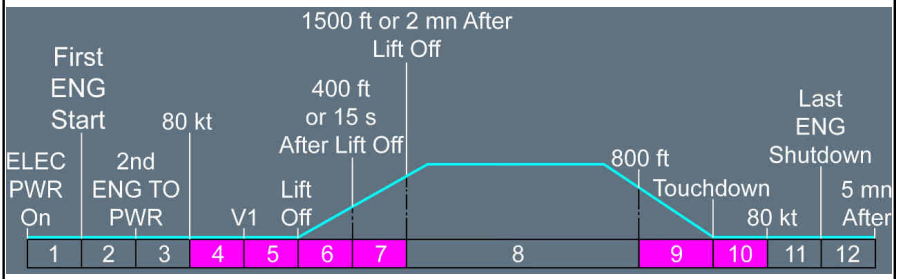
Triggering Conditions:

L2 The temperature of the green (yellow) hydraulic reservoir is above 95 °C, or an engine pump case drain temperature is above 120 °C

Indications:

Audio	Master Light	Local light	SD page
			
		All G(Y) ENG PMP pb-sw	HYD SD Page

Flight Phase Inhibition:



Continued on the following page

HYD G (Y) SYS OVHT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) SYS OVHT*.

G(Y) ENG 1(3) PMP A and B ..... OFF
G(Y) ENG 2(4) PMP A and B ..... OFF

- **If on ground, and all engines are off:**
  G(Y) ELEC PMP A and B ..... OFF
- **If turning off G (Y) ENG 1 (3) PMP A or B is not successful:**
  G(Y) ENG 1(3) PMP A+B ..... DISC
- **If turning off G (Y) ENG 2 (4) PMP A or B is not successful:**
  G(Y) ENG 2(4) PMP A+B ..... DISC

ASSOCIATED PROCEDURES

HYD G(Y) SYS PRESS LO
Refer to PRO-ABN-ECAM-10-29-20 HYD G (Y) SYS PRESS LO

L12

DEFERRED PROC

APPROACH

- **IF G(Y) SYS OVHT OUT:**

  Note: *The ECAM does not display the following procedure, if the flight crew disconnected the engine pumps.*

  G(Y) ENG 1(3) PMP A and B ..... ON
  G(Y) ENG 2(4) PMP A and B ..... ON

HYD G(Y) SYS OVHT DET FAULT

Applicable to: ALL

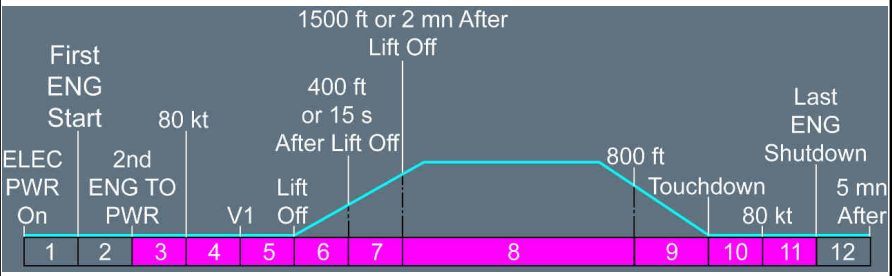
ANNUNCIATIONS

Triggering Conditions:

L2 All the overheat detection sensors for the green (yellow) hydraulic system are failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) SYS OVHT DET FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES	
G (Y) SYS OVHT DET	

HYD G (Y) SYS PRESS LO

Applicable to: ALL

ANNUNCIATIONS

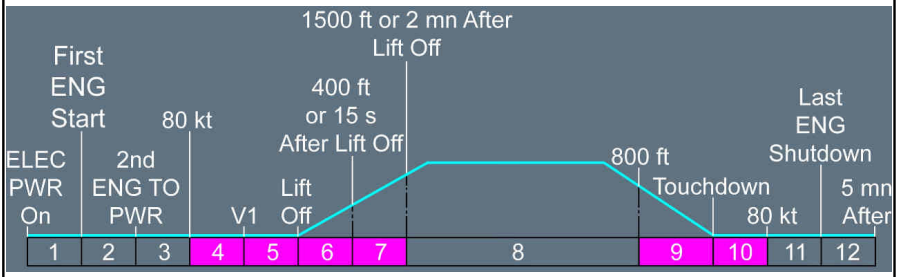
Triggering Conditions:

L2 The pressure of the green (yellow) hydraulic system is below 2 900 PSI.

Indications:

Audio	Master Light	Local light	SD page
			
		All G(Y) ENG PMP pb-sw	HYD SD Page

Flight Phase Inhibition:



Continued on the following page

HYD G (Y) SYS PRESS LO (Cont'd)

L2 In the case of a green (yellow) hydraulic system failure:

- The flight controls are actuated by the remaining hydraulic system, or by the Electrico-Hydrostatic Actuators (EHA) and the Electrical Backup Hydraulic Actuators (EBHA)
- The flaps operate at half-speed. The slats operate at half-speed if the green hydraulic system is failed
- If the failure of the green (yellow) hydraulic system occurs before landing gear retraction:
  - The Body Landing Gear retracts, if the green hydraulic system is failed
  - The Nose Landing Gear retracts, if the yellow hydraulic system is failed.
    For more information : *Refer to DSC-32-40-20 Landing gear retraction with one hydraulic system failed*
- Landing gear extension is performed by gravity.

Continued on the following page

HYD G (Y) SYS PRESS LO (Cont'd)

● **During taxi-in, one minute after the FLAPS lever is set to 0:**

FOR TAXI : FLAPS SELECT CONF 1+F

L2 *On ground, when the flaps are retracted and if at least one engine is running, the spoilers extend 5° up. This prevents friction between the spoilers and the flaps, which could damage the spoilers.*
When some spoilers are failed, the flaps should remain extended as long as the aircraft is taxiing in order to prevent this friction.

L1 FLAPS SLOW

L2 *Due to the failure of the green (yellow) hydraulic system, only the remaining hydraulic system is available to move the flaps. As a result, the flaps operate at half-speed.*

L1 ● **If G SYS PRESS LO:**

SLATS SLOW

L2 *Due to the failure of the green hydraulic system, only the electric motor is available to move the slats. As a result, the slats operate at half-speed.*

L1 L/G GRVTY EXTN ONLY
LDG DIST AFFECTED

L2 *Landing distance is increased due to the loss of 3 pairs of ground spoilers.*

L1 ● **If G SYS PRESS LO:**

FOR TAXI : STEER ENDURANCE LIMITED

L2 *Normal nose wheel steering (NWS) is lost. ALTN NWS is available.*
The ALTN NWS is designed to be used until the runway is cleared (i.e. to land and to exit the runway). Therefore, the flight crew should anticipate the use of a tug to tow the aircraft to the gate.
The flight crew should avoid a prolonged use of the ALTN NWS because it would result in an ALTN NWS overheat and a disconnection of the NWS.

In alternate nose wheel steering:
- *The maximum steering rate is limited to 10 °/s (instead of 15 °/s for normal NWS)*
- *Damping of the CAPT and the F/O tillers is increased to prevent the flight crew from commanding excessive steering rates.*

Continued on the following page

HYD G (Y) SYS PRESS LO (Cont'd)

L1

SECONDARY FAILURES

F/CTL

Continued on the following page

HYD G (Y) SYS PRESS LO (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- For gravity extension :
  MAX SPEED : 220 KT
- If G SYS PRESS LO:
  SLATS SLOW
  FLAPS SLOW
  L/G GRVTY EXTN ONLY
  LDG DIST AFFECTED
  STEER ENDUR LIMITED

  The normal nose wheel steering (NWS) is lost. ALTN NWS is available.
  The ALTN NWS is designed to be used until the runway is cleared (i.e. to land and to exit the runway). Therefore, the flight crew should anticipate a tug to tow the aircraft back to the gate.

The flight crew should avoid a prolonged use of the ALTN NWS because it would result in:
- *An ALTN NWS overheat and its associated ECAM alert followed by*
- *A disconnection of the NWS itself.*

In alternate nose wheel steering:
- *The maximum steering rate is limited to 10 °/s (instead of 15 °/s for normal NWS)*
- *Damping of the CAPT and the F/O tillers is increased to prevent the flight*

Continued on the following page

HYD G (Y) SYS PRESS LO (Cont'd)

crew from commanding excessive steering rates.

LIMITATIONS ON PFD

ALL PHASES

- For gravity extension :
  MAX SPEED : 220 KT

L12

DEFERRED PROC

FOR LANDING

FOR L/G GRVTY EXTN : MAX SPEED 220 KT

● **FOR L/G EXTN :**

L/G LEVER.....UP
L/G GRVTY (EXTN MAX 2 MIN).....DOWN

Landing gear gravity extension takes approximately 70 s .

● **WHEN L/G LOCKED DOWN OR AFTER 120S :**

L/G LEVER.....DOWN

Note: *After a L/G gravity extension, a maintenance action is required to reset the LGERS (Refer to DSC-32-40-10-10 Landing Gear Gravity Extension).*

L12

STATUS

INOP SYS

ALL PHASES

PART SPLR s
PART L/G RETRACTION
Refer to DSC-32-40-20 Landing gear retraction with one hydraulic system failed .
G(Y) HYD SYS

APPR & LDG

FLAPS SYS 1 (2)
SLATS SYS 2 (In the case of a G SYS PRESS LO)
BTV
NORM N/W (B/W) STEER
CAT 3 DUAL

Continued on the following page

HYD G (Y) SYS PRESS LO (Cont'd)

INFO

LDG DIST COEF < 1.50 ON DRY RUNWAY

The landing distance increases, due to the loss of the three pairs of spoilers.

- In the case of a Y SYS PRESS LO:
  TAXI WITH CARE
  AVOID MAX TILLER ANGLE TURN ON WET/CONTAM RWY
  NO BRAKED PIVOT TURN

  The body wheel steering is lost.

When the body wheel steering is inoperative:
- *The body landing gear aft wheels remain centered and locked*
- *Wheel skid and turn radius are increased.*

As a consequence, do not perform brake pivot turn. On wet or contaminated runways, minimize the tiller angle.

CAT 3 SINGLE ONLY

HYD G(Y) SYS TEMP EXCESS HI

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The temperature of the green (yellow) hydraulic reservoir is above than 130 °C, or an engine pump case drain temperature is above 140 °C.

Indications:

Audio



Master Light



LOCALLIGHT



All G(Y) ENG PMP pb-sw

SD page

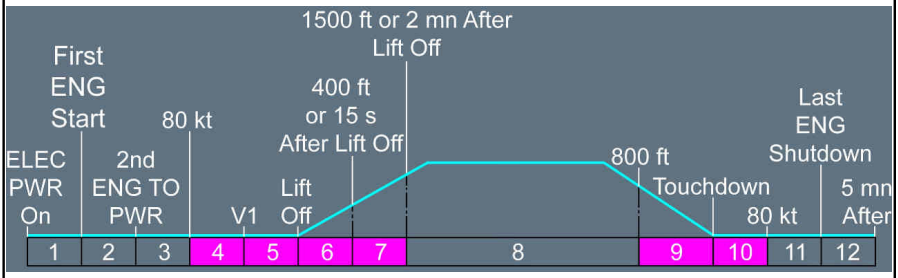


HYD SD Page



Both G(Y) ENG
PMP A+B DISC pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD G(Y) SYS TEMP EXCESS HI* .

Continued on the following page

HYD G(Y) SYS TEMP EXCESS HI (Cont'd)

G(Y) ENG 1(3) PMP A and B ..... OFF
G(Y) ENG 2 (4) PMP A and B ..... OFF
G(Y) ENG 1(3) PMP A+B..... DISC
G(Y) ENG 2(4) PMP A+B..... DISC

- **If on ground, and all engines are off:**
  G(Y) ELEC PMP A and B ..... OFF

ASSOCIATED PROCEDURES

HYD G(Y) SYS PRESS LO
Refer to PRO-ABN-ECAM-10-29-20 HYD G (Y) SYS PRESS LO

HYD G+Y SYS PRESS LO

Applicable to: ALL

ANNUNCIATIONS

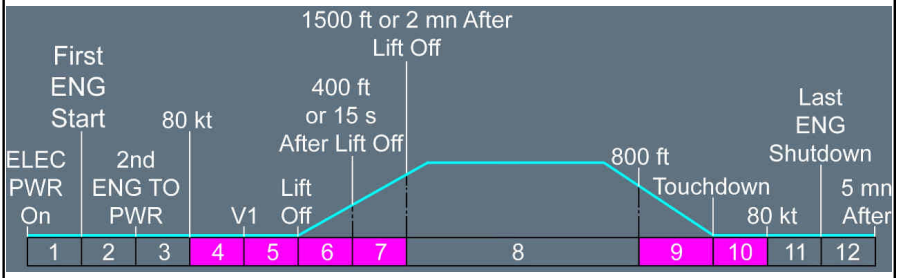
Triggering Conditions:

L2 The pressure of both the green and yellow hydraulic systems is below 2 900 PSI.

Indications:

Audio	Master Light	Local light	SD page
			
		All ENG PMP pb-sw	HYD SD Page

Flight Phase Inhibition:



Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

L2 In the case of a green and yellow hydraulic system failure:

- The flight controls revert to alternate law.
  The autopilot remains available.
  The flight controls are actuated by the Electrico-Hydrostatic Actuators (EHA) and the Electrical Backup Hydraulic Actuators (EBHA).
- The flaps are inoperative.
  The slats are slow.
  The PFD displays the VFE that corresponds to the abnormal slats/flaps configuration.
- Landing gear extension is performed by gravity.
- Normal braking is lost.
  Alternate braking with anti-skid is available.
  Autobrake remains available.

Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

ALL ENG PMP s .....OFF
SLATS SLOW

L2 *Due to the failure of the green hydraulic system, only the electric motor is available to move the slats. As a result, the slats operate at half-speed.*

L1 L/G GRVTY EXTN ONLY
LDG PERF AFFECTED

L2 *Landing performance is degraded due to:*
- *The loss of 6 pairs of ground spoilers and 2 ailerons (used as ground spoilers)*
- *The increased approach speed, because of the abnormal configuration, and to provide adequate margin against tailstrike.*

Note: All pitch control surfaces are available and the approach speed is increased. Therefore, the pitch authority of the aircraft during approach is greater than usual.

L1 FOR TAXI : STEER ENDURANCE LIMITED

L2 *Body wheel steering and normal nose wheel steering (NWS) are lost. ALTN NWS is available. The ALTN NWS is designed to be used until the runway is cleared (i.e. to land and to exit the runway). Therefore, the flight crew should anticipate the use of a tug to tow the aircraft to the gate. The flight crew should avoid a prolonged use of the ALTN NWS because it would result in an ALTN NWS overheat and in a disconnection of the NWS .*

In alternate nose wheel steering:
- *The maximum steering rate is limited to 10 °/s (instead of 15 °/s for normal NWS)*
- *Damping of the CAPT and the F/O tillers is increased to prevent the flight crew from commanding excessive steering rates.*

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)
Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)
The flight control laws revert to ALT 1. AP , FD and ATHR remain available.

L1

SECONDARY FAILURES

F/CTL

Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

WHEEL

Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- For gravity extension :
  MAX SPEED : 220 KT
  FOR LDG : FLAP LVR 3
  SLATS SLOW
  L/G GRVTY EXTN ONLY
  NO AUTOLAND
  LDG PERF AFFECTED
  STEER ENDUR LIMITED

LIMITATIONS ON PFD

ALL PHASES

- For gravity extension :
  MAX SPEED : 220 KT

L123

DEFERRED PROC

FOR APPROACH:

USE SELECTED SPEED

In some abnormal slats/flaps configurations (e.g. SLATS SYS failure), the FMS does not receive the FLAPS lever position. Thus, the managed speed is not in accordance with the FLAPS lever position. Therefore, as a general rule, when the slats/flaps are in abnormal configuration (e.g. following a dual hydraulic failure, or when slats/flaps are locked), the flight crew must use the selected speed to configure the aircraft for approach and landing.

To prepare the aircraft for landing the flight crew must decelerate the aircraft to the approach speed, as follows:

- *Decelerate the aircraft toward the VFE NEXT- 5 kt . In the case of turbulence, to avoid VFE exceedance, the flight crew may decide to decelerate to a lower speed but above the VLS .*

Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

- *When the aircraft reaches the selected speed, the FLAPS lever can be set one step down.*

The above steps are repeated until the FLAPS lever is set to 3.
When the landing configuration is established, aircraft can be decelerated to the computed approach speed.

Note: *The VFE NEXT displayed on the PFD takes into account the abnormal slats/flaps configuration.*

● **If flaps position is less than 3:**
[MFD SURV] TAWS FLAP MODE.....OFF

FOR VFE : USE PFD

The PFD speed scale displays the VFE that is associated with the current abnormal configuration.

VFE ABN CONF (kt)			
	S=0	*0<S≤1*	*S>1*
F=0	*No limitation*	*263*	*220*
0<F≤1	*245*	*243*	*218*
1<F≤2	*243*	*241*	*216*
2<F≤3	*219*	*216*	*196*
F>3	*186*	*184*	*182*

If the slats or flaps are jammed, the VFE s of CONF 1+F and CONF 2 displayed on the PFD and on the ECAM are increased vs. the placard speeds. This is operationally necessary to get a minimum margin between VLS and VFE NEXT, when the slats/flaps are jammed in an intermediate position and flaps lever is in position 0 or 1.
Example: When the slats are jammed at 0.5 ° (0<S≤1) and flap lever is in position 1, the VFE NEXT displayed on the PFD is 243 kt instead of 222 kt , because the VLS may reach 225 kt depending on the A/C weight and altitude when the failure occurs.

FOR LDG : FLAP LVR 3

Note: *The reduced drag causes the aircraft to decelerate more slowly. Therefore, it is recommended that the aircraft is at the landing configuration and approach speed before starting the final approach.*

NO AUTOLAND

As ILS CAT 2 is not available, the flight crew must not perform an automatic landing.

FOR GA : MAINTAIN CURRENT S/F CONF
LDG PERF COMPUTATION..... CONFIRM

Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

FOR LANDING:

- **IF HYD NOT RECOVERED :**

  FOR L/G GRVTY EXTN : MAX SPEED 220 KT

- **FOR L/G EXTN :**

  L/G LEVER.....UP
  L/G GRVTY (EXTN MAX 2 MIN).....DOWN

  Landing gear gravity extension takes approximately 70 s .

  - **WHEN L/G LOCKED DOWN OR AFTER 120S :**

    L/G LEVER.....DOWN

    Note: *After a L/G gravity extension, a maintenance action is required to reset the LGERS (Refer to DSC-32-40-10-10 Landing Gear Gravity Extension).*

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
L OUTR AILERON
R OUTR AILERON
MOST SPLRs
L/G RETRACTION
G HYD SYS
Y HYD SYS

Due to the loss of the green and yellow hydraulic systems, the outer ailerons move upward to their zero-hinge moment position.

APP & LDG

FLAPS
SLAT SYS 2
BTV
NORM BRK
B/W STEER
NORM N/W STEER
CAT 2
GLS AUTOLAND

INFO

ALTN LAW : PROT LOST
FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

Because of the loss of 2 outer ailerons and 6 pairs of ground spoilers, fuel consumption is increased and FMS predictions are not correct. During the flight, the spoilers may gradually extend by approximately 1 ° /h.

Continued on the following page

HYD G+Y SYS PRESS LO (Cont'd)

As a consequence, fuel consumption is increased by approximately 31 % .

To optimize fuel consumption:

- *Set Cost Index (CI) to zero and use managed speed*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum -4 000 ft .*

ALTN BRK WITH A-SKID
AVOID MAX TILLER ANGLE TURN ON WET/CONTAM RWY

When the body wheel steering is inoperative:

- *The body landing gear aft wheels remain centered and locked*
- *Wheel skid and turn radius are increased.*

As a consequence, do not perform brake pivot turn. On wet or contaminated runways, minimize the tiller angle.

NO BRAKED PIVOT TURN

HYD Y ELEC PMP A+B OFF

Applicable to: ALL

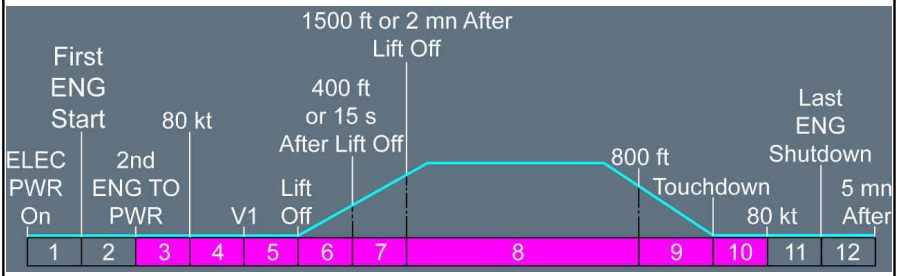
ANNUNCIATIONS

Triggering Conditions:

L2 The flight crew switched off both yellow electric hydraulic pumps.

Indications:

Flight Phase Inhibition:



Continued on the following page

HYD Y ELEC PMP A+B OFF (Cont'd)

L2 If engines 3 and 4 are not running, body wheel steering is not available.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-29 HYD Y ELEC PMP A+B OFF* .

Crew awareness.

Ice and Rain protection

A-ICE ALL PROBES 1(2)(3) NOT DEICED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one probe is not automatically deiced.
L3 This is due to a communication failure between the ADIRU and the affected probe(s).

Indications:

L2

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE ALL PROBES 1(2)(3) NOT DEICED* .

Continued on the following page

A-ICE ALL PROBES 1(2)(3) NOT DEICED (Cont'd)

PROBE & WINDOW HEAT P/B..... ON

L2 *Due to the fact that automatic probe heating is failed, the flight crew must manually turn on probe heating.*

L1 ● **If probes 1(2) are still not deiced 3 s after the PROBE & WINDOW HEAT pb-sw is set to ON:**

AIR DATA SWTG.....CAPT(F/O) ON 3

STATUS

INOP SYS

ALL PHASES	1
ADR 1(2)(3) PROBES HEATG (If probes are still not deiced 3 after the PROBE & WINDOW HEAT is set to ON)	CAT 3 DUAL (If probes are still not deiced 3 after the PROBE & WINDOW HEAT is set to ON)

INFO

CAT 3 SINGLE ONLY

A-ICE CTL SYS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- An Anti-Ice Control Unit (AICU) channel is failed, or
- The power supply of the AICU was interrupted for more than 2 s.

Indications:

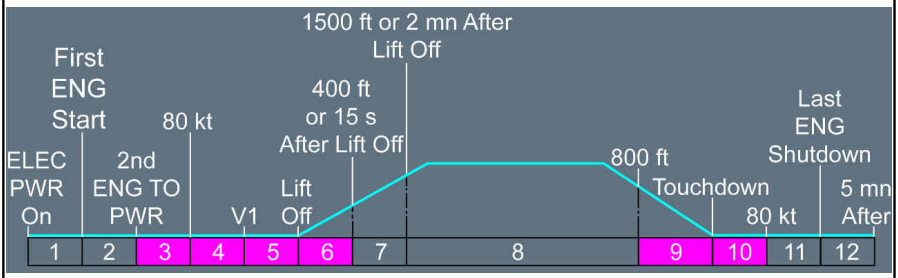
Audio



Master Light



Flight Phase Inhibition:



L2 Two AICU s control and monitor the anti-ice system. Each AICU has two channels (*Refer to DSC-30-10-10 Anti-ice Control System*).
If three AICU channels fail, wing anti-ice is lost. Therefore, icing conditions must be avoided.

Note: *A dedicated AICU channel controls each engine anti-ice valve. If this channel fails, the engine anti-ice valve opens.*

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE CTL SYS FAULT* .

Continued on the following page

A-ICE CTL SYS FAULT (Cont'd)

CHANNEL 1A(1B)(2A)(2B)(1 A+B)(2 A+B), ENG 1(2)(3)(4) A-ICE FAULT

- **If at least one AICU channel is failed for more than 5 s:**
  AVOID ICING CONDs
- **If the power supply of the AICU was interrupted for more than 2 s:**
  ALL ENGs & WING A-ICE.....ON THEN OFF
  ENG & WING A-ICE..... AS RQRD

Continued on the following page

A-ICE CTL SYS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If at least one AICU channel is failed for more than 5 s:
  AVOID ICING CONDs

APPR

- If wing anti-ice is failed:
  FOR LDG : FLAP LVR 3

LIMITATIONS ON PFD

ALL PHASES

- If at least one AICU channel is failed for more than 5 s:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **If wing anti-ice is failed:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

STATUS

INOP SYS

ALL PHASES

L(R) WINDSHIELD HEATG (If AICU 1(2)B is failed)
L(R) SLIDG WINDOW HEATG (If AICU 1(2)B is failed)
L(R) FIXED WINDOW HEATG (If AICU 1(2)B is failed)
ENG 2(1) A-ICE (If AICU 1(2)B is failed)
ENG 4(3) AICE (If AICU 1(2)A is failed)
WING A-ICE (If both AICU A(B) are failed)

A-ICE ENG 1(2)(3)(4) VLV CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ENG 1(2)(3)(4) anti-ice valve is abnormally closed.

Indications:

Audio



Master Light

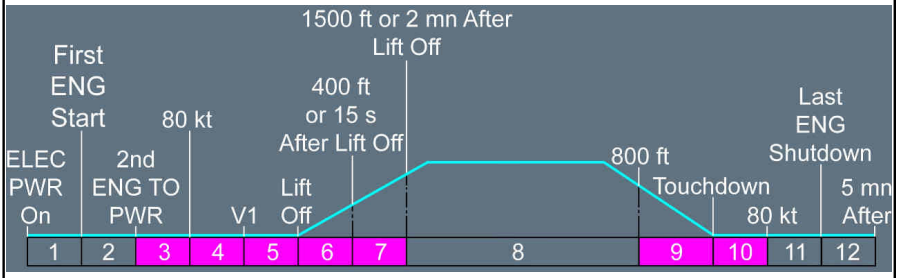


Local light



ENG 1(2)(3)
(4) ANTI ICE pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE ENG 1(2)(3)(4) VLV CLOSED* .

AVOID ICING CONDs

Continued on the following page

A-ICE ENG 1(2)(3)(4) VLV CLOSED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

AVOID ICING CONDs

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) A-ICE

A-ICE ENG 1(2)(3)(4) VLV MONITORING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Anti-Ice Control Unit (AICU) lost the monitoring of at least one engine anti-ice valve. Therefore, the AICU does not know the position of the affected engine anti-ice valve.

Indications:

Audio



Master Light

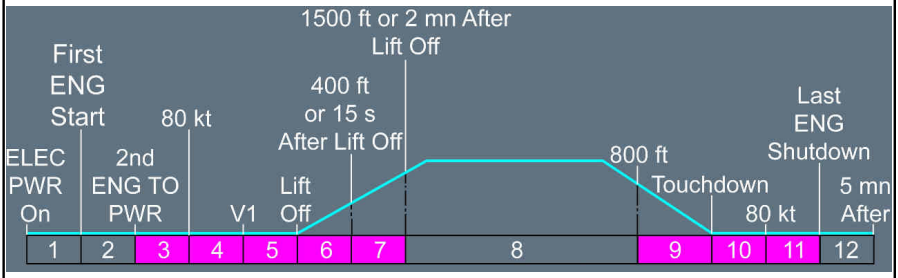


Local light



ENG 1(2)(3)
(4) ANTI ICE pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE ENG 1(2)(3)(4) VLV MONITORING FAULT* .

AVOID ICING CONDs

Continued on the following page

A-ICE ENG 1(2)(3)(4) VLV MONITORING FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

AVOID ICING CONDs

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) A-ICE MONITORING

A-ICE ENG 1(2)(3)(4) VLV OPEN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ENG 1(2)(3)(4) anti-ice valve is abnormally open.

Indications:

Audio



Master Light

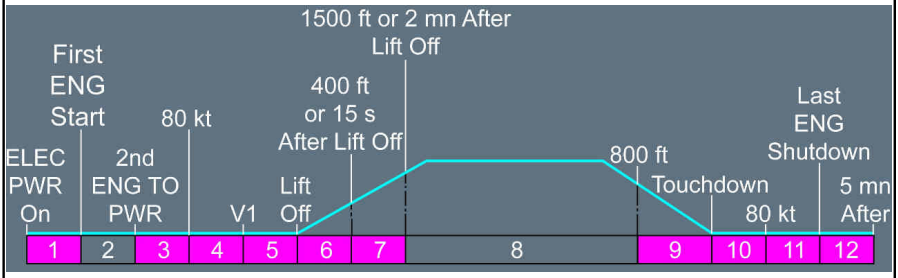


Local light



ENG 1(2)(3)
(4) ANTI ICE pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE ENG 1(2)(3)(4) VLV OPEN*.

Crew awareness.

A-ICE ICE DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both ice detectors are failed.

Indications:

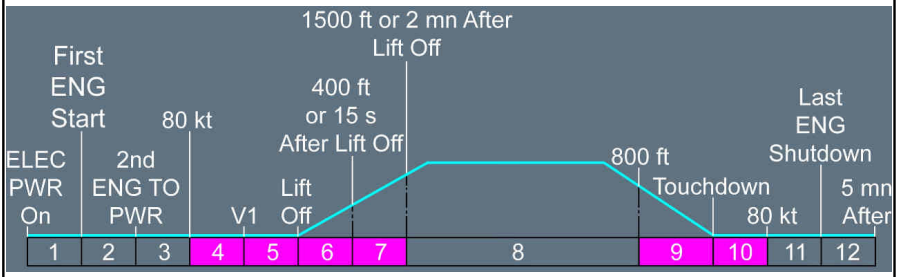
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE ICE DET FAULT* .

A-ICE.....AS RQRD

L2 *When icing conditions exist or are anticipated (Refer to PRO-SUP-30 Definition of Icing Conditions), engine anti-ice must be on during all ground and flight operations, except during climb and cruise when the Static Air Temperature (SAT) is below -40 °C .*

The flight crew must turn on wing anti-ice if there is an indication the airframe is icing up (the indication may be an ice accumulation on the visual ice detectors (between the two windshields), or on the windshield wipers).

Continued on the following page

A-ICE ICE DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

ICE DET

A-ICE ICE DETECTED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Approximately 0.5 mm (0.020 in) of ice is detected.
The caution is inhibited, when all ENG A-ICE pb are set to ON.
The caution no longer appears, when all ENG A-ICE pb are set to ON.

Indications:

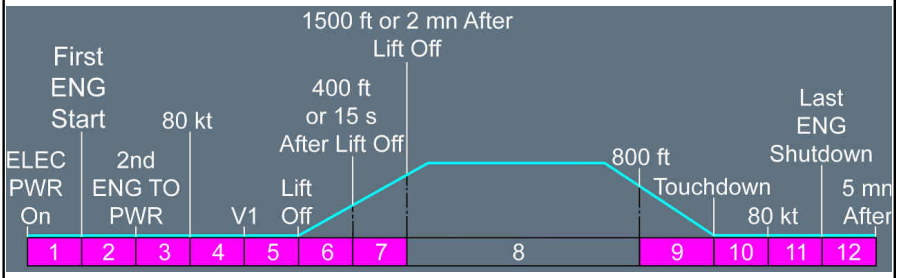
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

A-ICE ICE DETECTED (Cont'd)

ENG 1 A-ICE.....ON
ENG 2 A-ICE.....ON
ENG 3 A-ICE.....ON
ENG 4 A-ICE.....ON

A-ICE L(R) FIXED WINDOW HEATG FAULT

Applicable to: ALL

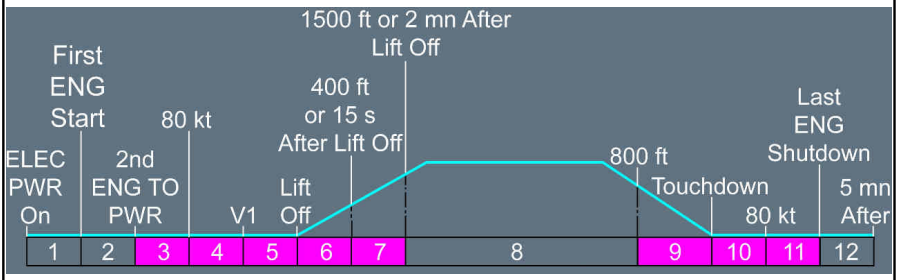
ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the left (right) fixed cockpit window is failed.
This failure may be due to an overheat, a short-circuit, or a failure of the fixed cockpit window temperature sensors.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE L(R) FIXED WINDOW HEATG FAULT* .

Crew awareness.

Continued on the following page

A-ICE L(R) FIXED WINDOW HEATG FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

L(R) FIXED WINDOW HEATG

A-ICE L(R) SLIDING WINDOW HEATG FAULT

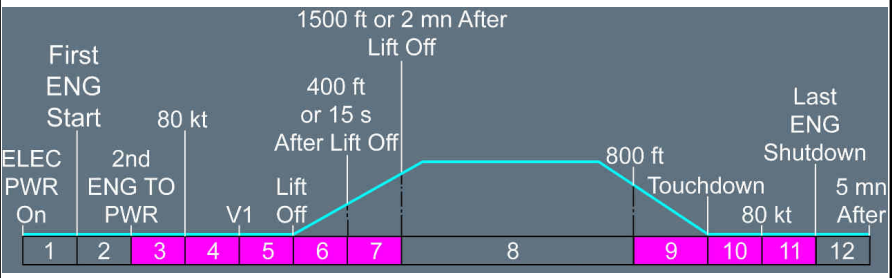
Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the left (right) sliding cockpit window is failed.
This failure may be due to an overheat, a short-circuit, or a failure of the sliding cockpit window temperature sensors.
Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE L(R) SLIDING WINDOW HEATG FAULT*.

Continued on the following page

A-ICE L(R) SLIDING WINDOW HEATG FAULT (Cont'd)

Crew awareness.

STATUS

INOP SYS

ALL PHASES
L(R) SLIDG WINDOW HEATG

A-ICE L(R) WINDSHIELD HEATG FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the left (right) windshield is failed.
This failure may be due to an overheat, a short-circuit or a failure of the windshield temperature sensors.

Indications:

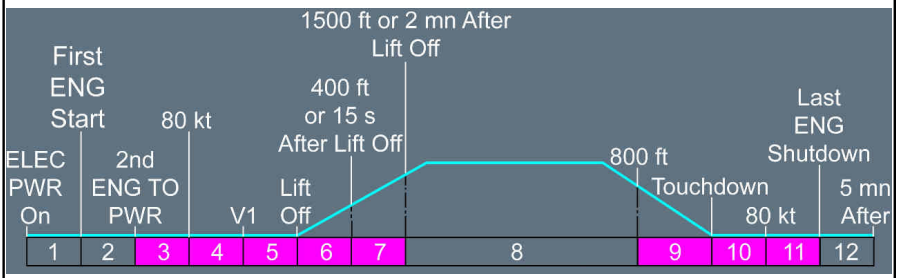
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE L(R) WINDSHIELD HEATG FAULT* .

Crew awareness.

Continued on the following page

A-ICE L(R) WINDSHIELD HEATG FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

L(R) WINDSHIELD HEATG

A-ICE L(R) WING VLV CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both left (right) wing anti-ice valves are abnormally closed.

Indications:

Audio



Master Light



Local light



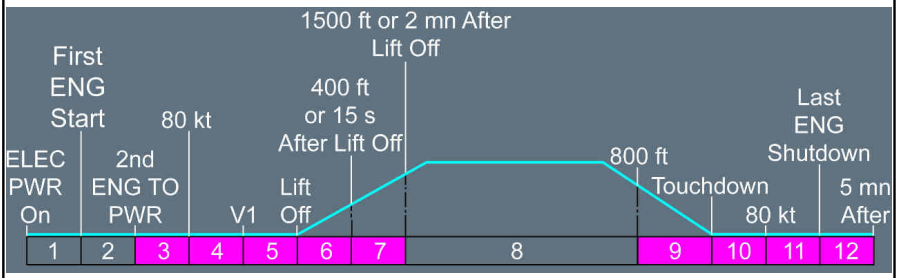
WING ANTI ICE pb

SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

A-ICE L(R) WING VLV CLOSED (Cont'd)

L2 For associated MEL dispatch conditions:
- *Refer to MEL/ME-ECAM-30-34 A-ICE L WING VLV CLOSED*
- *Refer to MEL/ME-ECAM-30-34 A-ICE R WING VLV CLOSED*

WING A-ICE..... OFF

L2 *Both left (right) wing anti-ice valves are failed.*

L1 AVOID ICING CONDs

Continued on the following page

A-ICE L(R) WING VLV CLOSED (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	APPR
AVOID ICING CONDs	• If wing anti-ice is failed: FOR LDG : FLAP LVR 3 *Appears if the flight crew validates IF SEVERE ICE ACCRETION in the deferred procedure.*

LIMITATIONS ON PFD

ALL PHASES
AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **If wing anti-ice is failed:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

STATUS

INOP SYS

ALL PHASES
WING A-ICE

A-ICE L(R) WING VLV OPEN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The left(right) inner and(or) outer wing anti-ice valve is abnormally open.
If the caution triggered on ground, it will automatically trigger again, when the aircraft is above 1 500 ft AGL.

Indications:

Audio



Master Light



Local light



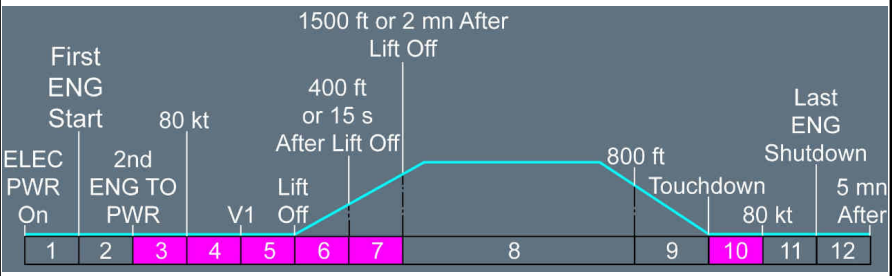
WING ANTI ICE pb

SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-30-34 A-ICE L WING VLV OPEN*
- *Refer to MEL/ME-ECAM-30-34 A-ICE R WING VLV OPEN*

Continued on the following page

A-ICE L(R) WING VLV OPEN (Cont'd)

■ **Before takeoff and after landing:**

L2 To avoid overheating the slats on the affected side, the bleed sources must be closed, as follows:

L1 X BLEED.....CLOSE
PACK 1(2).....OFF
ENG 1(3) BLEED.....OFF
ENG 2(4) BLEED.....OFF

- **If L WING VLV OPEN:**
  APU BLEED..... OFF
- **Before takeoff:**
  BLEEDS/ PACK/ WING A-ICE AVAIL IN FLT

■ **In flight:**

L2 When the aircraft is in flight, all bleed systems can be turned on again.

L1 ENG 1(3) BLEED..... ON
ENG 2(4) BLEED..... ON
PACK 1(2).....ON
X BLEED.....AUTO

STATUS

INOP SYS

ALL PHASES

PACK 1(2) (When PACK1(2) OFF)
ENG 1(3) BLEED (When ENG 1(3) BLEED OFF)
ENG 2(4) BLEED (When ENG 2(4) BLEED OFF)
APU BLEED (When APU BLEED OFF)

INFO

- Before takeoff:
  BLEEDS/ PACK/ WING A-ICE AVAIL IN FLT

A-ICE L(R) WING VLV PRESS HI

Applicable to: ALL

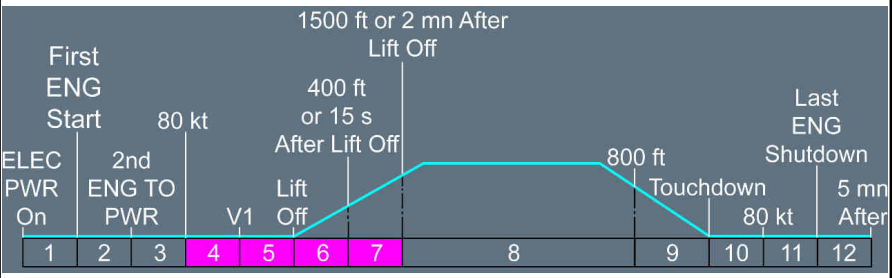
ANNUNCIATIONS

Triggering Conditions:

L2 The WING A-ICE pb is set to ON and the pressure sensor (downstream of the valve) indicates there is high pressure in the duct.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-30-34 A-ICE L WING VLV PRESS HI*
- *Refer to MEL/ME-ECAM-30-34 A-ICE R WING VLV PRESS HI .*

Crew awareness.

A-ICE L(R) WING VLV PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both left (right) wing anti-ice valves are set to ON, however both pressure sensors (downstream of the valves) indicate that the pressure is low.

Indications:

Audio	Master Light	Local light	SD page
			
		WING ANTI ICE pb	BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-30-34 A-ICE L WING VLV PRESS LO*
- *Refer to MEL/ME-ECAM-30-34 A-ICE R WING VLV PRESS LO*

Continued on the following page

A-ICE L(R) WING VLV PRESS LO (Cont'd)

■ **On ground:**

WING A-ICE.....OFF

AVOID ICING CONDs

■ **In flight :**

THRUST.....INCREASE

L2 *An increase in thrust increases the bleed pressure. This may help to open the wing anti-ice valves and therefore, clear the ECAM alert.*

L1

● **IF NOT SUCCESSFUL:**

L2 If the thrust increase does not clear the ECAM alert, then the wing anti-ice system is inoperative.

L1 WING A-ICE.....OFF

AVOID ICING CONDs

Continued on the following page

A-ICE L(R) WING VLV PRESS LO (Cont'd)

L12

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If wing anti-ice is failed:
  AVOID ICING CONDs

APPR

- If wing anti-ice is failed:
  FOR LDG : FLAP LVR 3
  Appears if the flight crew validates the line IF SEVERE ICE ACCRETION in the deferred procedure.

LIMITATIONS ON PFD

ALL PHASES

- If wing anti-ice is failed:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **If wing anti-ice is failed:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

STATUS

INOP SYS

ALL PHASES

WING A-ICE (On ground, or if wing anti-ice is failed)

A-ICE L+R WINDSHIELDS HEATG FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of both windshields is inoperative.

Indications:

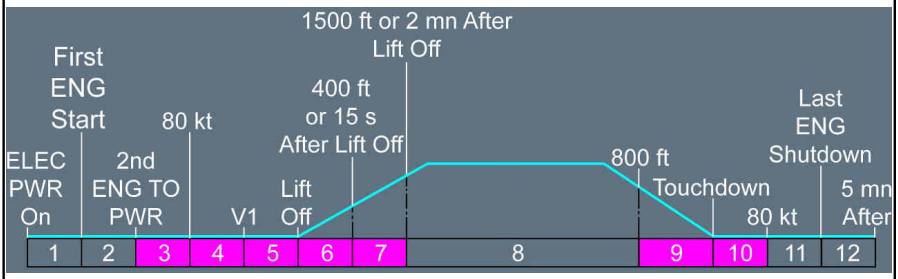
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE L+R WINDSHIELDS HEATG FAULT* .

AVOID ICING CONDs

Continued on the following page

A-ICE L+R WINDSHIELDS HEATG FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

AVOID ICING CONDs

STATUS

INOP SYS

ALL PHASES

L+R WINDSHLDs HEATG

A-ICE PITOT TAT AOA PROBE 1(2)(3) HEATG FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the pitot TAT AOA probe(s) of ADR 1(2)(3) is failed.

Indications:

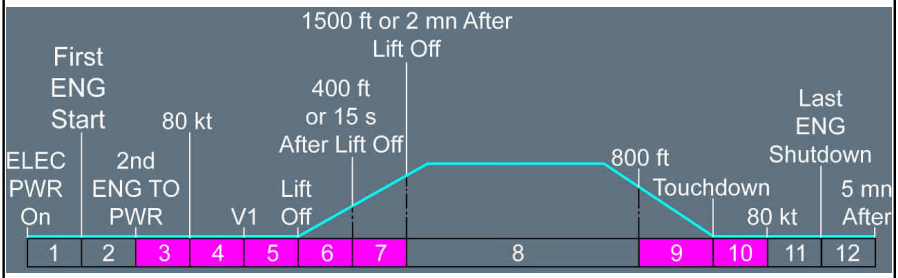
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE PITOT TAT AOA PROBE 1(2)(3) HEATG FAULT* .

- **If PITOT TAT AOA PROBE 1(2) HEATG FAULT:**
  AIR DATA SWTG.....CAPT(F/O) ON 3
- **If PITOT TAT AOA PROBE 3 HEATG FAULT:**

  Crew awareness.

Continued on the following page

A-ICE PITOT TAT AOA PROBE 1(2)(3) HEATG FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
ADR 1(2)(3) PROBES HEATG	CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

A-ICE PITOT TAT AOA PROBE 1+2(1+3)(2+3) HEATG FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the pitot TAT AOA probe(s) of ADR 1+2(1+3)(2+3) is failed.

Indications:

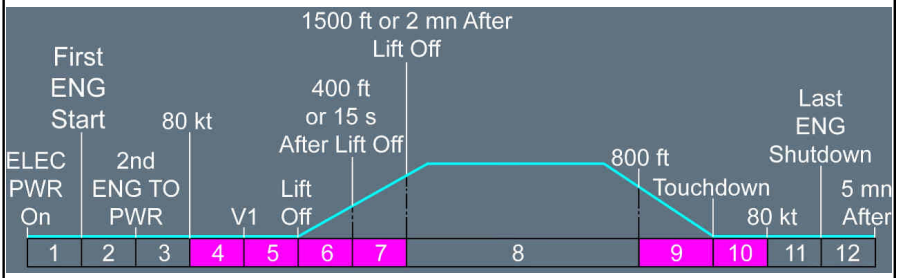
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-30-34 A-ICE PITOT TAT AOA PROBE 1+2(1+3)(2+3) HEATG FAULT* .

Continued on the following page

A-ICE PITOT TAT AOA PROBE 1+2(1+3)(2+3) HEATG FAULT (Cont'd)

- **If PITOT TAT AOA PROBE 1+2 HEATG FAULT :**
  AIR DATA SWTG.....CAPT ON 3
  AVOID ICING COND s
- **If PITOT TAT AOA PROBE 1+3(2+3) HEATG FAULT :**
  AVOID ICING CONDs

L13

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control law is alternate.

Continued on the following page

A-ICE PITOT TAT AOA PROBE 1+2(1+3)(2+3) HEATG FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310KT
AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 310 KT
AVOID ICING CONDs

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
ADR 1+2(1+3)(2+3) PROBES HEATG

APPR & LDG

CAT 2
BTV
ROW/ROP

INFO

ALTN LAW : PROT LOST

A-ICE SEVERE ICE DETECTED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Approximately 5 mm (0.20 in) of ice is detected.
The alert no longer appears when the WING A-ICE pb is set to ON.

Indications:

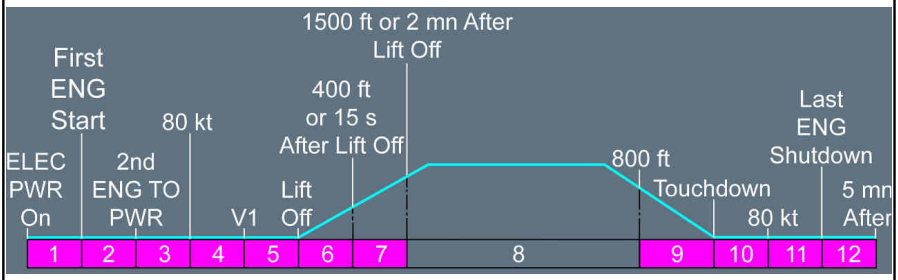
Audio



Master Light



Flight Phase Inhibition:



ENG 1 A-ICE.....ON
ENG 2 A-ICE.....ON
ENG 3 A-ICE.....ON
ENG 4 A-ICE.....ON
WING A-ICE.....ON

A-ICE SIDESLIP PROBE 1(2)(3) HEATING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the sideslip probe of ADR 1(2)(3) is failed.

Indications:

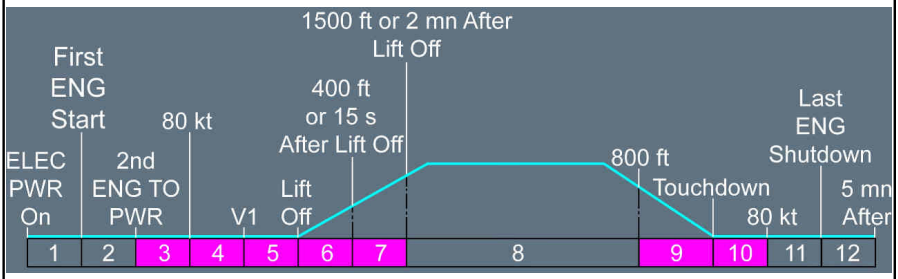
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-30-34 A-ICE SIDESLIP PROBE 1(2)(3) HEATING FAULT* .

Crew awareness.

Continued on the following page

A-ICE SIDESLIP PROBE 1(2)(3) HEATING FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
SIDESLIP PROBE1(2)(3) HEAT	CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

A-ICE STATIC PROBE 1(2)(3) HEATING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the left or right static probe of ADR 1(2)(3) is failed.

Indications:

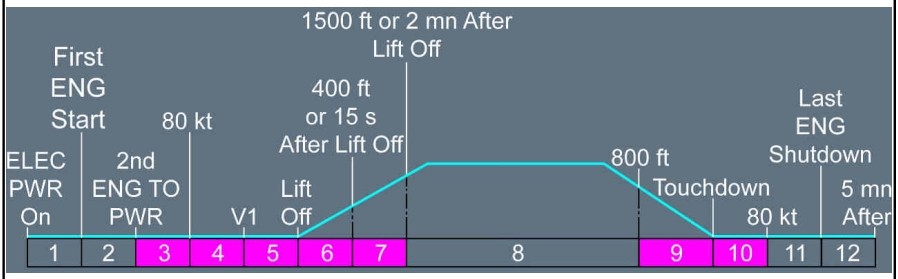
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-30-34 A-ICE STATIC PROBE 1(2)(3) HEATING FAULT* .

- **If STATIC PROBE 1(2) HEATG FAULT**
  AIR DATA SWTG..... CAPT (F/O) ON 3
- **If STATIC PROBE 3 HEATG FAULT**

  Crew awareness.

Continued on the following page

A-ICE STATIC PROBE 1(2)(3) HEATING FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
ADR 1(2)(3) PROBES HEATG	CAT 3 DUAL

A-ICE STBY PITOT PROBE HEATG FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the standby pitot probe (used by the Integrated Standby Instrument System (ISIS)) is failed.

Indications:

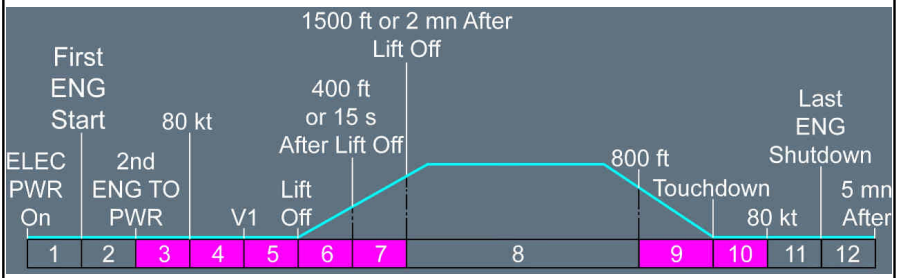
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

A-ICE STBY PITOT PROBE HEATG FAULT (Cont'd)

L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-30-34 A-ICE STBY PITOT PROBE HEATG FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
STBY PITOT HEATG

A-ICE STBY STATIC PROBE HEATG FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The heating system of the standby static probes (used by the Integrated Standby Instrument System (ISIS)) is failed.

Indications:

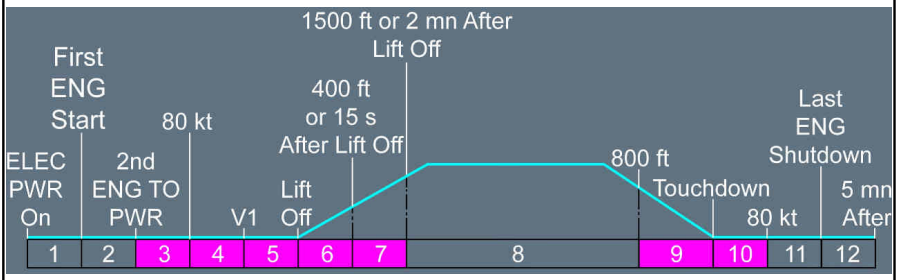
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-30-34 A-ICE STBY STATIC PROBE HEATG FAULT* .

Crew awareness.

Continued on the following page

A-ICE STBY STATIC PROBE HEATG FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

STBY STATIC HEATG

CABIN DRAIN MASTS HEATING FAULT

Applicable to: ALL

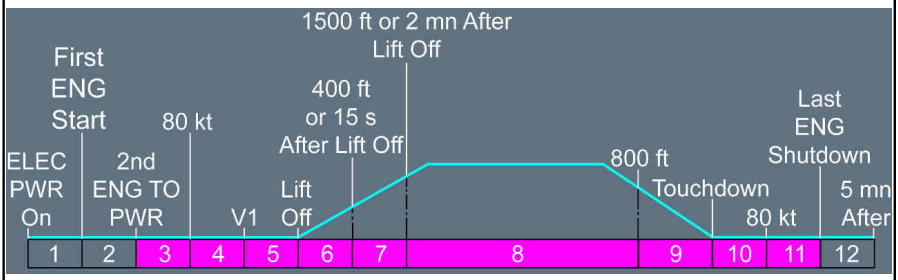
ANNUNCIATIONS

Triggering Conditions:

L2 The drain mast heater of the water/waster anti-ice system is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-44-30-33 CABIN DRAIN MASTS HEATING FAULT* .

Crew awareness.

Continued on the following page

CABIN DRAIN MASTS HEATING FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES
DRAIN MASTS HEATG

Intentionally left blank

Indicating/Recording

CDS & AUTO FLT FCU SWITCHED OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FCU is switched off: The EFIS CPs and the AFS CP are electrically shutoff.

Indications:

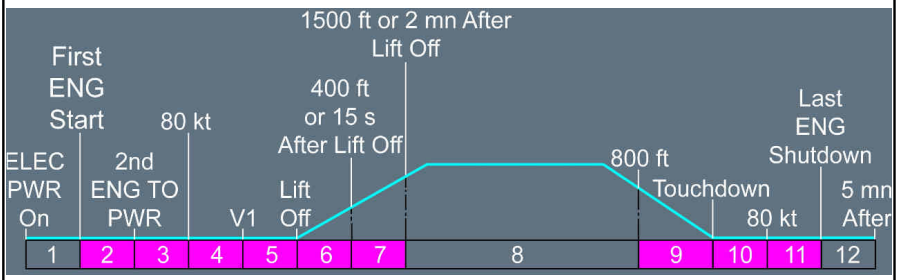
Audio



Master Light



Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-22-2 CDS & AUTO FLT FCU SWITCHED OFF* .

Crew awareness.

CDS BACKUP DATA NOT AVAIL

Applicable to: ALL

ANNUNCIATIONS

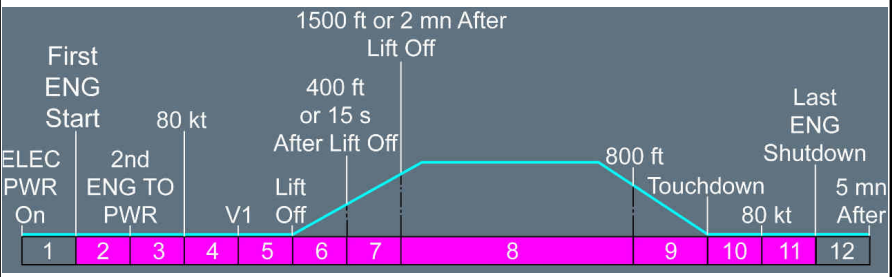
Triggering Conditions:

L3 The communication between the FQDC, or FWS, and the display units is normally achieved via the avionics network. A backup communication (conventional link) ensures a minimum level of communication in the event of an avionics network failure.

L2 The backup communication between the FQDC, or FWS, and the display units is lost.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS BACKUP DATA NOT AVAIL* .

- **If backup fuel data are not available :**
  BACKUP FUEL DATA NOT AVAIL
- **If backup FWS data are not available :**
  BACKUP FWS DATA NOT AVAIL

Crew Awareness.

CDS CAPT (F/O) CURSOR CTL FAULT

Applicable to: ALL

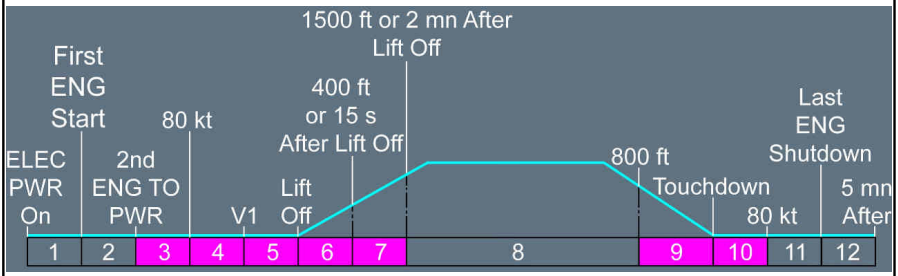
ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT (F/O) Cursor Control Device (CCD) is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT(F/O) CURSOR CTL FAULT*.

CAPT (F/O) KEYBOARD CURSOR CTL AVAIL

L2 *On the ND, MFD, and SD, all functions remain fully available using the keyboard. Navigation through the different fields of the display unit is done via the direction arrow keys of the keyboard.*

Continued on the following page

CDS CAPT (F/O) CURSOR CTL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

CAPT (F/O) CCD

INFO

CAPT (F/O) KEYBOARD CURSOR CTL AVAIL

CDS CAPT (F/O) CURSOR CTL+KEYBOARD FAULT

Applicable to: ALL

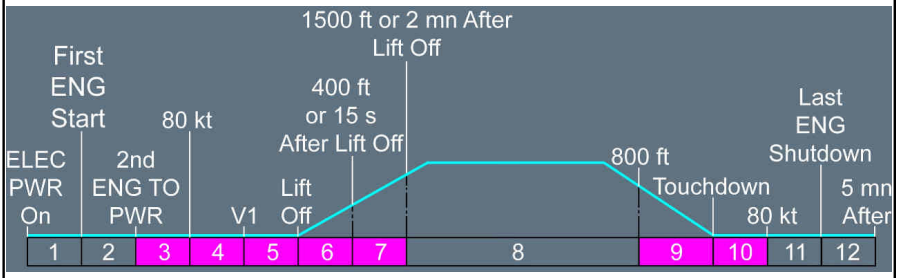
ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT (F/O) Keyboard and Cursor Control Unit (KCCU) is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT(F/O) CURSOR CTL+KEYBOARD FAULT*

Continued on the following page

CDS CAPT (F/O) CURSOR CTL+KEYBOARD FAULT (Cont'd)

Crew awareness.

L2 Consider transfer of PF/PM responsibilities.

STATUS

INOP SYS

ALL PHASES
CAPT (F/O) CCD+KBD

CDS CAPT (F/O) EFIS BKUP CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT (F/O) EFIS CP is failed and the CAPT (F/O) EFIS page on the FCU BKUP is failed.

Indications:

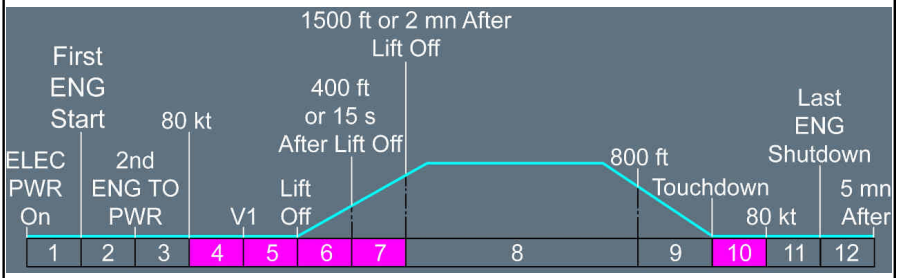
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT(F/O) EFIS BKUP CTL FAULT* .

CAPT (F/O) BARO REF : STD ONLY

Continued on the following page

CDS CAPT (F/O) EFIS BKUP CTL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

CAPT (F/O) EFIS CTL

INFO

CAPT (F/O) BARO REF : STD ONLY

CDS CAPT (F/O) EFIS CTL PNL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT (F/O) EFIS CP is failed.

Indications:

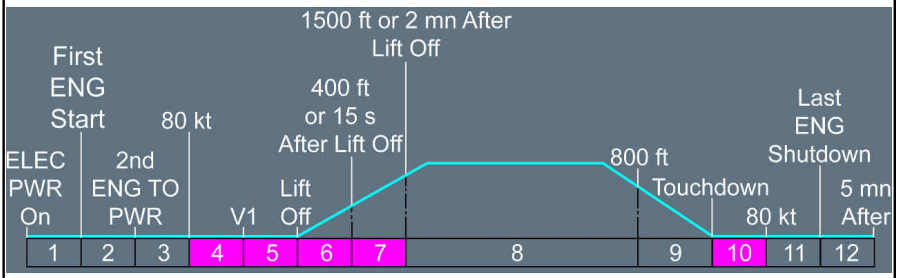
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT(F/O) EFIS CTL PNL FAULT*.

- **If CAPT (F/O) FCU BKUP is available :**

  USE CAPT (F/O) MFD FCU BKUP

Continued on the following page

CDS CAPT (F/O) EFIS CTL PNL FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

CAPT (F/O) EFIS CTL PNL

CDS CAPT (F/O) KEYBOARD FAULT

Applicable to: ALL

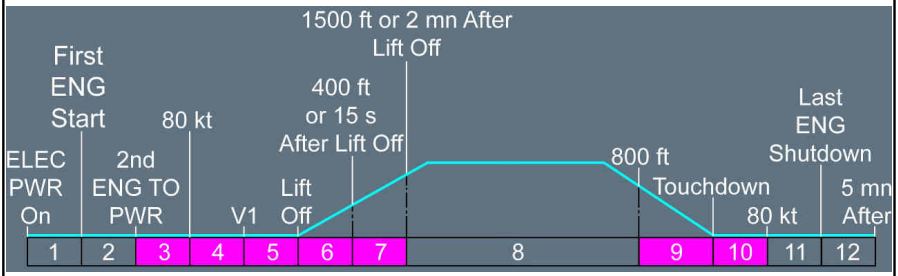
ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT (F/O) Keyboard is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT(F/O) KEYBOARD FAULT*

Continued on the following page

CDS CAPT (F/O) KEYBOARD FAULT (Cont'd)

CAPT (F/O) SOFT KEYBOARD AVAIL

L2 *The soft keyboard is available on the MFD only.*
The soft keyboard automatically displays on the MFD when the flight crew edits a field, or can be manually launched, via the 

key on the cursor control device.
Use the FMS functions on the MFD instead of the ND.
Using the soft keyboard and the cursor control device, all functions remain available on the MFD, but not on the SD and not on the ND.

STATUS

INOP SYS

ALL PHASES

CAPT (F/O) KBD

INFO

CAPT (F/O) SOFT KEYBOARD AVAIL

CDS CAPT (F/O) MAILBOX ACCESS FAULT

Applicable to: ALL

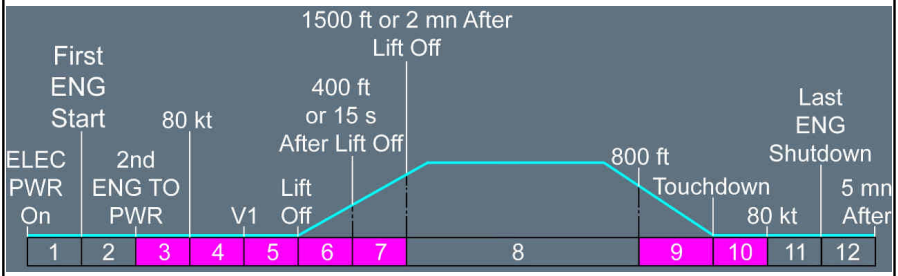
ANNUNCIATIONS

Triggering Conditions:

L2 Access to the mailbox on the SD is no longer possible from the affected side.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT(F/O) MAILBOX ACCESS FAULT*

Crew Awareness.

L2 Consider transfer of PF/PM responsibilities.

STATUS

INOP SYS

ALL PHASES
CAPT (F/O) MAILBOX ACCESS

CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD)(F/O PFD)(F/O ND)(F/O MFD) DU FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- The DU is failed, or,
- The CDS sends the information to be displayed to the relevant display unit, and also to another display unit for monitoring purposes.
  The affected display unit has monitored successively two other display units, and has declared them faulty. In this case the monitoring display unit is the faulty one.

Indications:

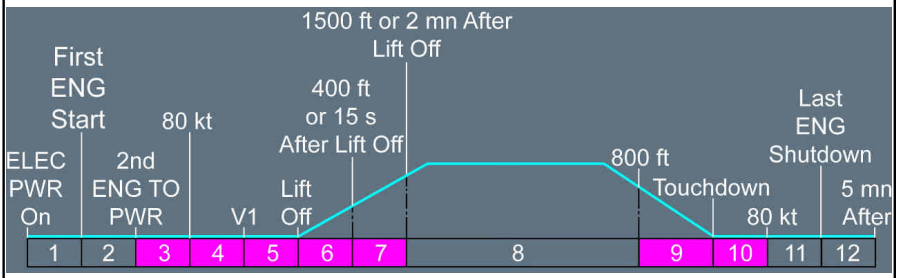
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD) (F/O PFD)(F/O ND)(F/O MFD) DU FAULT (Cont'd)

L2 For associated dispatch condition,

- If CDS CAPT PFD DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT PFD DU FAULT*
- If CDS CAPT ND DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT ND DU FAULT*
- If CDS CAPT MFD DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT MFD DU FAULT*
- If CDS EWD DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS EWD DU FAULT*
- If CDS SD DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS SD DU FAULT*
- If CDS F/O PFD DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS F/O PFD DU FAULT*
- If CDS F/O ND DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS F/O ND DU FAULT*
- If CDS F/O MFD DU FAULT , *Refer to MEL/ME-ECAM-31-1-22 CDS F/O MFD DU FAULT*

■ **If monitoring function on affected DU is not detected faulty :**

AFFECTED DU (PFD, ND, MFD, EWD, SD).....OFF 5 S THEN ON

L2 *The ECAM procedure indicates the affected DU.*

L1 ● **IF NOT SUCCESSFUL :**

AFFECTED DU (PFD, ND, MFD, EWD, SD)..... OFF

L2 *If the EWD DU is turned OFF, the EWD is automatically displayed on the SD DU.*

L1 *If the PFD DU is turned OFF, the PFD is automatically displayed on the ND DU*

■ **If monitoring function on affected DU is detected faulty :**

AFFECTED DU (PFD, ND, MFD, EWD, SD).....OFF

L2 *If the EWD DU is turned OFF, the EWD is automatically displayed on the SD DU.*
If the PFD DU is turned OFF, the PFD is automatically displayed on the ND DU

L1 DU RECONF P/B AVAIL

L2 *Press the pushbutton to access the necessary display.*

L1 *If the SD DU is turned OFF, use the F/O DU RECONF P/B for ATC mailbox.*

Continued on the following page

CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD) (F/O PFD)(F/O ND)(F/O MFD) DU FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

EWD DU (If EWD DU fault)
CAPT PFD DU (If CAPT PFD DU fault)
F/O PFD DU (If F/O PFD DU fault)
CAPT ND DU (If CAPT ND DU fault)
F/O ND DU (If F/O ND DU fault)
CAPT MFD DU (If CAPT MFD DU fault)
F/O MFD DU (If F/O MFD DU fault)

CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD) (F/O PFD)(F/O ND)(F/O MFD) DU NOT MONITORED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The affected DU is no longer monitored.

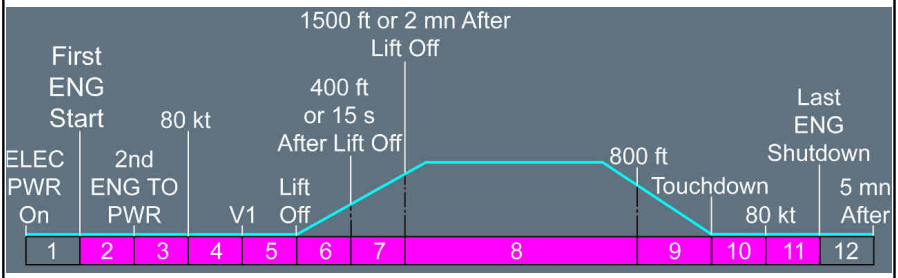
L3 The CDS sends the information to be displayed to the relevant display unit, and also to another display unit for monitoring purposes.

L2

Impacted DU	Associated ECAM alerts
CAPT PFD	CDS CAPT PFD NOT MONITORED
CAPT ND	CDS CAPT ND DU NOT MONITORED
CAPT MFD	None
EWD	CDS EWD DU NOT MOINTORED
SD	None
F/O PFD	CDS F/O PFD DU NOT MONITORED
F/O ND	CDS F/O ND DU NOT MONITORED
F/O MFD	None

Indications:

Flight Phase Inhibition:



Continued on the following page

CDS CAPT PFD(CAPT ND)(CAPT MFD)(EWD)(SD)(F/O PFD)(F/O ND)(F/O MFD) DU NOT MONITORED (Cont'd)

L2 For associated dispatch condition,

- If CDS CAPT PFD DU NOT MONITORED , *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT PFD DU NOT MONITORED*
- If CDS CAPT ND DU NOT MONITORED , *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT ND DU NOT MONITORED*
- If CDS EWD DU NOT MONITORED , *Refer to MEL/ME-ECAM-31-1-22 CDS EWD DU NOT MONITORED*
- If CDS F/O PFD DU NOT MONITORED , *Refer to MEL/ME-ECAM-31-1-22 CDS F/O PFD DU NOT MONITORED*
- If CDS F/O ND DU NOT MONITORED , *Refer to MEL/ME-ECAM-31-1-22 CDS F/O ND DU NOT MONITORED*

Crew Awareness.

CDS CAPT+F/O EFIS CTL PNLs FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both EFIS CPs are failed.

Indications:

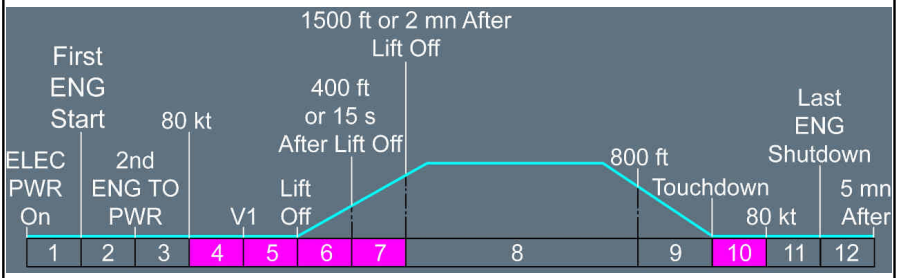
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-1-22 CDS CAPT+F/O EFIS CTL PNLs FAULT* .

USE MFD FCU BKUP

Continued on the following page

CDS CAPT+F/O EFIS CTL PNLs FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

CAPT EFIS CTL PNL
F/O EFIS CTL PNL

CDS DISPLAY DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L3 The CDS sends the information to be displayed to the relevant display unit, and also to another display unit for monitoring purposes.

L2 There is a discrepancy between the display and the monitor.

Discrepancies detected on	Display
CAPT PFD	"CHECK CAPT PFD" displayed on CAPT PFD and PFD F/O
CAPT ND	None
CAPT MFD	None
EWD	"CHECK EWD" displayed on CAPT ND, and F/O ND. If ND is not displayed on one side, "CHECK EWD" is displayed on onside PFD .
SD	"CHECK SD" displayed on CAPT ND, and F/O ND.
F/O PFD	"CHECK F/O PFD" displayed on CAPT PFD, and F/O PFD.
F/O ND	None
F/O MFD	None

Indications:

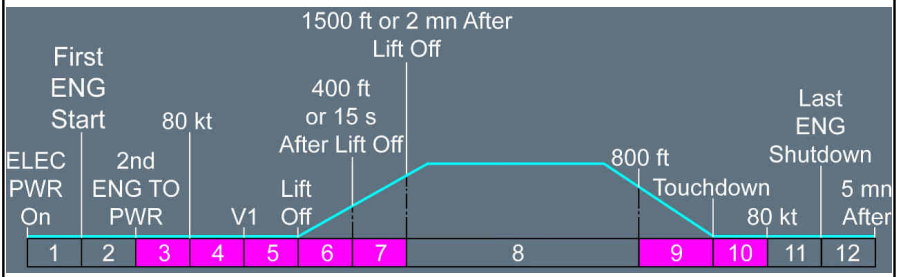
Audio



Master Light



Flight Phase Inhibition:



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CDS DISPLAY DISAGREE (Cont'd)

L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS DISPLAY DISAGREE*

AFFECTED DU (PFD, ND, MFD, EWD, SD).....OFF 5 S THEN ON

L2 *The ECAM procedure indicates the affected DU.*

L1 ● **IF NOT SUCCESSFUL :**

AFFECTED DU (PFD, ND, MFD, EWD, SD).....OFF

L2 *If the EWD DU is turned OFF, the EWD is automatically displayed on the SD DU.*

L1 *If the PFD DU is turned OFF, the PFD is automatically displayed on the ND DU*

DU RECONF P/B AVAIL

L2 *Press the pushbutton to access the necessary display.*

L1 *If the SD DU is turned OFF, use the F/O DU RECONF P/B for ATC mailbox.*

CDS EFIS ADR SINGLE SOURCE

Applicable to: ALL

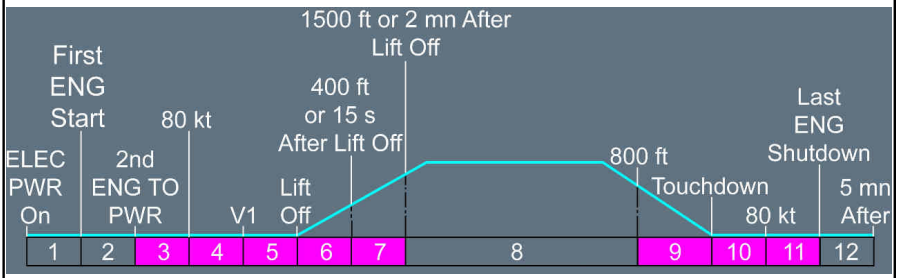
ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT PFD/ND, and F/O PFD/ND, are displaying ADR data from a unique source.

Indications:

Flight Phase Inhibition:



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CDS EFIS ADR SINGLE SOURCE (Cont'd)

For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS EFIS ADR SINGLE SOURCE*

Crew Awareness.

CDS EFIS IR SINGLE SOURCE

Applicable to: ALL

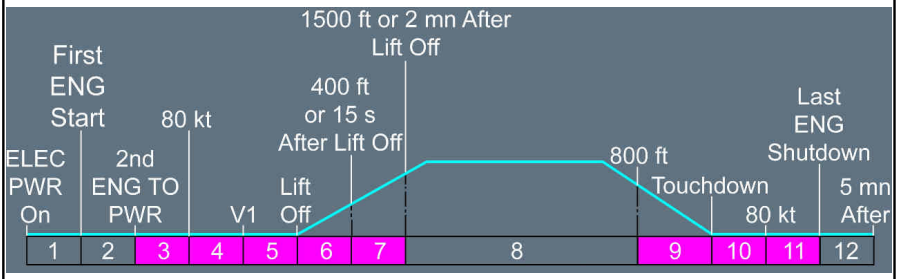
ANNUNCIATIONS

Triggering Conditions:

L2 The CAPT PFD/ND, and F/O PFD/ND, are displaying IR data from a unique source.

Indications:

Flight Phase Inhibition:



For associated dispatch condition, *Refer to MEL/ME-ECAM-31-1-22 CDS EFIS IR SINGLE SOURCE*

Crew Awareness.

CDS FWS 1+2 & CPIOM FAULT

Applicable to: ALL

ANNUNCIATIONS

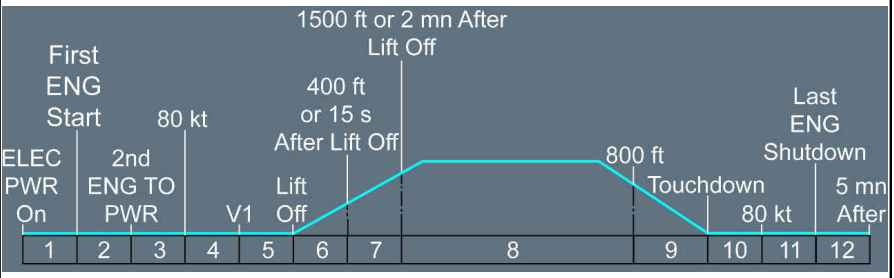
Triggering Conditions:

L2 Both CPIOM groups C, that controls FWS 1+2, are failed.
One or more of the following CPIOM group(s) is (are) failed:

- CPIOM A
- CPIOM B
- CPIOM D
- CPIOM E
- CPIOM F
- CPIOM G

For more details on CPIOM groups, *Refer to DSC-42-10 CPIOMs*
Indications:

Flight Phase Inhibition:



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CDS FWS 1+2 & CPIOM FAULT (Cont'd)

L2 *Note: If the ECAM caution FWS 1+2 & CPIOM FAULT is triggered while neither FWS 1 FAULT nor FWS 2 FAULT was previously triggered, the caution may be due to a spurious failure of the CDS display. In this case, the ECAM may be still available (aural alerts, master caution, master warn, memos and limitations on PFD, and automatic display of SD pages in case of failure are still available), but can no more display any further alert and procedure on the WD . If occurs, this case is may be due to the display unit itself. Therefore, full ECAM would be recovered, if either the EWD DU is reset (OFF 5 S THEN ON), or the EWD is reconfigured on the SD DU .*

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-1-22 CDS FWS 1+2 & CPIOM FAULT* .
When both CPIOM groups C are failed :

- ECAM alerts, aural warnings, and MASTER lights will no longer be triggered
- The F/CTL SD page is no longer available
- The WBBC and FCU backup functions are failed.
- CAT 2 approach capability is lost.

During descent and approach preparation, the flight crew must check regularly the general status of the systems on:

- The overhead panels
- The available SD pages

FWS 1+2 are failed. Therefore, the FWS will no longer manage the space between the action lines, and it will vary according to the affected groups of CPIOM s.

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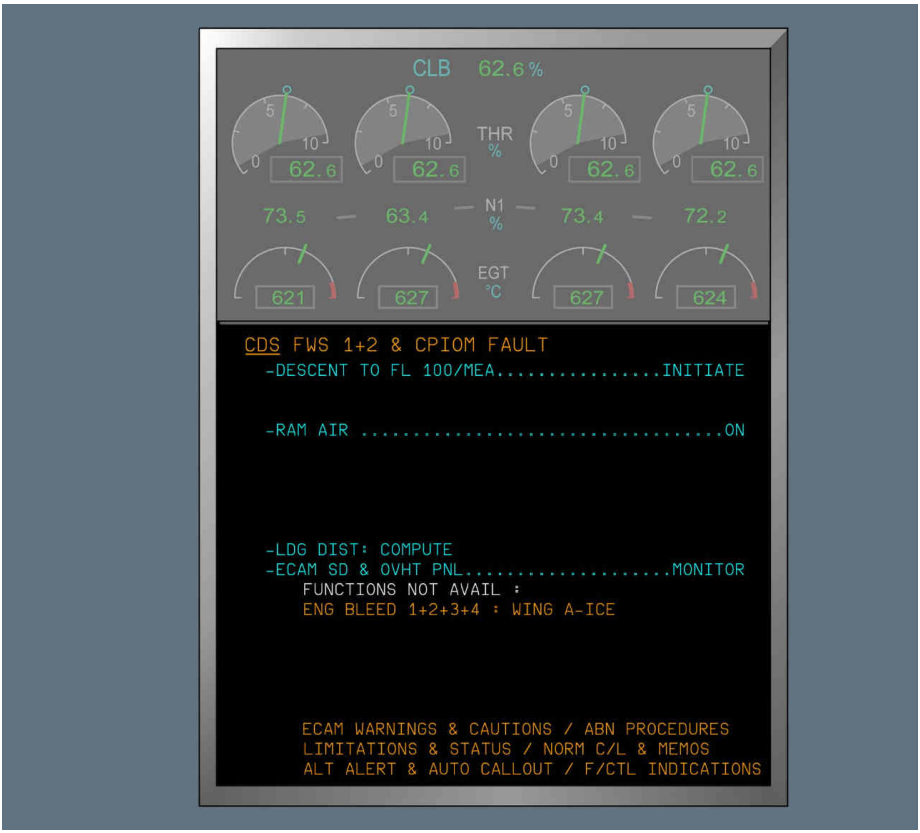
CDS FWS 1+2 & CPIOM FAULT (Cont'd)

CPIOM Group C and A Failures



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CDS FWS 1+2 & CPIOM FAULT (Cont'd)

- **If CPIOM group F is failed:**

LAND ANSA

- **If CPIOM group A is failed:**

DESCENT TO FL 100/MEA.....INITIATE

L2 *The following aircraft system and function are failed:*
- *Bleed air system*
- *Bleed overheat detection.*

The bleed air do not supply the wing anti-ice. Therefore, avoid icing conditions.

L1 - **If CPIOM group B is failed:**

CAB PRESS MAN MODES: DO NOT USE

L2 *The following aircraft functions are failed:*
- *Automatic cabin pressure control*
- *Cabin, and avionics ventilation control*
- *Air generation and temperature control.*

When the CPIOM B is failed, the cabin pressurization system is in backup mode. The cabin altitude target is no longer displayed on the SD: Therefore, the flight crew must not use the cabin pressurization manual system.

L1 IN DES, ABV 7000FT: CAB ALT REGULATED TO 7000FT

L2 *The landing field elevation is fixed at 7 000 ft. Therefore, below 7 000 ft, the outflow valves are open. The cabin altitude is the same as the aircraft altitude, and high descent rate must be avoided.*

L1 BLW 7000FT: CAB ALT = A/C ALT: AVOID HI DES RATE

- **If CPIOM group A is failed:**

RAM AIR.....ON

L2 *Emergency RAM AIR inlets will open to ventilate the cockpit and cabin when the differential pressure goes below 1 PSI .*

L1 - **If CPIOM group F is failed:**

ALL CROSSFEEDS.....OPEN

L2 *The crossfeed valves are open.*

L1 OUTR TK XFR.....MAN / EMER OUTR TK XFR.....MAN

Continued on the following page

CDS FWS 1+2 & CPIOM FAULT (Cont'd)

L2 *FQMS 1+2 are failed. Therefore, manually transfers fuel from the outer tanks to the feed tanks.*
The fuel SD page is failed, therefore the flight crew cannot monitor fuel transfer.
CDS computes the FOB.

L1 INR TKS + MID TKS + TRIM TK: NOT USABLE

● **If CPIOM D group is failed:**

ATC COM VOICE ONLY

L2 *All ATC datalink functions are failed (i.e. ADS, CPDLC, Digital ATIS).*

L1 ● **If CPIOM group G is failed:**

L/G GRVTY EXTN ONLY (MAX SPEED: 220 KT)

L2 *The following aircraft system and functions are failed:*
- *Normal and Alternate braking, Anti-skid*
- *Steering*
- *Normal Landing gear extension/extraction*
- *Tire Pressure Indicating System/Oleo Pressure Monitoring System/Brake Temperature Monitoring System.*

Therefore, landing gear extension is available by gravity only. Use the L/G GRVTY selector to extend by the landing gear by gravity. The maximum speed to extend the landing gear by gravity is 220 kt.

L1 LDG DIST: COMPUTE
ECAM SD & OVHD PNL.....MONITOR

L2 *ECAM SD pages are no longer available for systems hosted by the failed CPIOM groups, or information displayed on the ECAM SD might be affected for other systems.*
Regularly check the cockpit panels for local warnings, and the ECAM SD pages for system checks.
The flight crew should consider using the FCOM on the OIS to display any necessary procedure(s).
Notify the cabin crew that only warnings on the FAP are available.

L1 FUNCTIONS NOT AVAIL :

L2 *The inoperative functions are:*

L1 ● **If CPIOM group A is failed:**

ENG BLEED 1+2+3+4 / WING A-ICE

L2 *Wing anti-ice is not available. Therefore, avoid icing conditions.*

L1 ● **IF CPIOM group F is failed:**

FQMS 1+2 / Jettison

Continued on the following page

CDS FWS 1+2 & CPIOM FAULT (Cont'd)

● **If CPIOM group G is failed:**

LG CTL 1+2 / A-SKID / N/W + B/W STEER

L2 *The emergency braking mode is active, and the landing distance is increased. Refer to performance module.*
For landing, use the rudder and/or the differential braking to steer the aircraft on the runway, because the nose landing gear is free to caster.
After landing, the aircraft must be towed off the runway.

L1 ● **If CPIOM B group is failed:**

FWD + AFT VENT CTL / TEMP CTL

L2 *Temperature regulation in the cabin is degraded. The temperature in some zones may be abnormally low.*

L1 ECAM WARNINGS & CAUTIONS / ABN PROCEDURES
LIMITATIONS & STATUS / NORM C/L & MEMOS
ALT ALERT & AUTO CALLOUT / F/CTL INDICATIONS

CDS FWS 1+2 & FCDC 1+2 FAULT

Applicable to: ALL

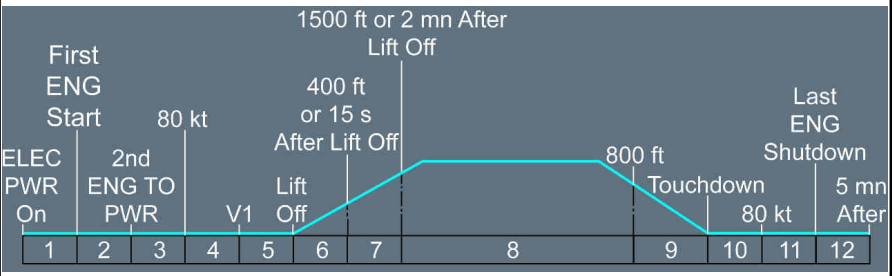
ANNUNCIATIONS

Triggering Conditions:

L2 Both CPIOM C1 and C2 are lost. For more details on CPIOM , *Refer to DSC-42-10 CPIOMs* .

Indications:

Flight Phase Inhibition:



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CDS FWS 1+2 & FCDC 1+2 FAULT (Cont'd)

L2 *Note: If the ECAM caution FWS 1+2 & FCDC 1+2 FAULT is triggered while neither FWS 1 FAULT nor FWS 2 FAULT was previously triggered, the caution may be due to a spurious failure of the CDS display. In this case, the ECAM may be still available (aural alerts, master caution, master warn, memos and limitations on PFD, and automatic display of SD pages in case of failure are still available), but can no more display any further alert and procedure on the WD . If occurs, this case is may be due to the display unit itself. Therefore, full ECAM would be recovered, if either the EWD DU is reset (OFF 5 S THEN ON), or the EWD is reconfigured on the SD DU .*

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-1-22 CDS FWS 1+2 & FCDC 1+2 FAULT* .

L1 ECAM alerts, aural warnings, and master lights are no longer triggered.

L2 F/CTL system page is failed.

WBBC and FCU backup functions are failed.

CAT 2 approach capability is lost.

During descent and approach preparation, the flight crew must check the general status of the systems on:

- The overhead panels
- The available SD pages.

Continued on the following page

CDS FWS 1+2 & FCDC 1+2 FAULT (Cont'd)

ECAM SD..... MONITOR

L2 *ECAM system pages remain available. Regularly check the cockpit panels for local warnings, and ECAM SD pages for system checks.*

L1 OVHD PNL..... MONITOR

L2 *Regularly check (more than usual) the cockpit panels for local warnings, and ECAM system pages for system checks.*
The flight crew should consider using the FCOM on the OIS to display any necessary procedure(s).
Notify the cabin crew that only local warnings on the FAP are available.

L1 FUNCTIONS NOT AVAIL :
F/CTL INDICATIONS
ECAM WARNINGS & CAUTIONS
ABN PROCEDURES
LIMITATIONS & STATUS
ALTITUDE ALERT
AUTO CALLOUT
NORM C/L & MEMO

FWS FWS 1+2 FAULT

Applicable to: ALL

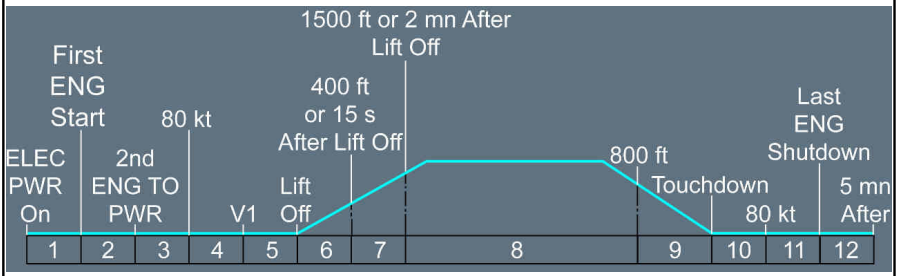
ANNUNCIATIONS

Triggering Conditions:

L2 Both FWS 1 and 2 are failed.

Indications:

Flight Phase Inhibition:



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FWS FWS 1+2 FAULT (Cont'd)

L2 *Note: If the ECAM caution FWS 1+2 FAULT is triggered while neither FWS 1 FAULT nor FWS 2 FAULT was previously triggered, the caution may be due to a spurious failure of the CDS display. In this case, the ECAM may be still available (aural alerts, master caution, master warn, memos and limitations on PFD, and automatic display of SD pages in case of failure are still available), but can no more display any further alert and procedure on the WD . If occurs, this case is may be due to the display unit itself. Therefore, full ECAM would be recovered, if either the EWD DU is reset (OFF 5 S THEN ON), or the EWD is reconfigured on the SD DU .*

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-2 FWS FWS 1+2 FAULT* .
Aural and visual ECAM alerts, and MASTER lights will no longer be triggered.
CAT 2 approach capability is lost.
During descent and approach preparation, the flight crew must check the general status of the systems on:

- The overhead panels
- The available SD pages.

The flight crew should consider using the FCOM on the OIS to display any necessary procedure(s).

ECAM SD..... MONITOR
OVHD PNL..... MONITOR

L2 ECAM system pages remain available. Regularly check the cockpit panels for local warnings, and ECAM SD pages for system checks.

Notify the cabin crew that only warnings are available on the FAP.

L1 FUNCTIONS NOT AVAIL :
ECAM WARNINGS & CAUTIONS
ABN PROCEDURES
LIMITATIONS & STATUS
ALTITUDE ALERT
AUTO CALLOUT
NORM C/L & MEMO

FWS AIRLINE CUSTOMIZATION REJECTED

FWS 1 (2) (1+2) DATABASE REJECTED

Applicable to: ALL

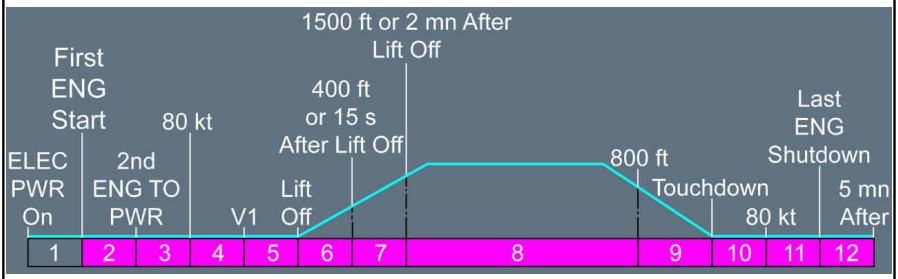
ANNUNCIATIONS

Triggering Conditions:

L2 FWS 1(2)(1+2) rejects the Operator Customized ECAM Database (OCED).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-2 FWS AIRLINE CUSTOMIZATION REJECTED* .

Crew awareness.

L2 FWS 1 (2) (1+2) rejects the OCED. The affected FWS 1(2)(1+2) remains operative but the ECAM displays the Airbus procedures by default.

FWS ATQC DATABASE REJECTED

FWS 1 (2) (1+2) ATQC DATABASE REJECTED

Applicable to: ALL

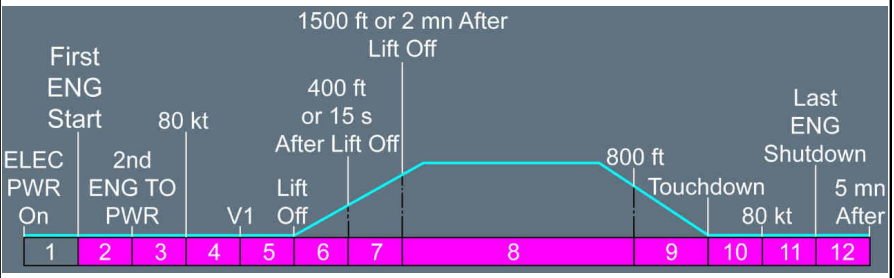
ANNUNCIATIONS

Triggering Conditions:

L2 Airbus Temporary Quick Change (ATQC) database is rejected by FWS 1(2), or by both FWS 1+2

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-2 FWS ATQC DATABASE REJECTED* .

Crew awareness.

L2 FWS 1 (2), (1+2) has rejected the ATQC database. The affected FWS 1(2), (1+2) remain operative but the displayed ECAM procedures are not up to date.

FWS AUDIO FUNCTION LOSS

Applicable to: ALL

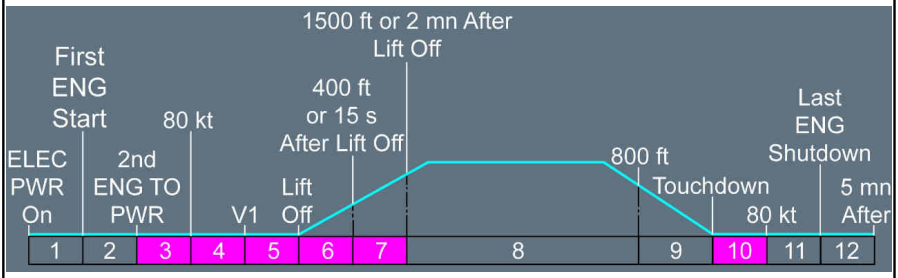
ANNUNCIATIONS

Triggering Conditions:

L2 Both FWS cannot trigger any aural alerts.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-2 FWS AUDIO FUNCTION LOST* .

AUDIOS NOT AVAIL :
ALTITUDE ALERT
AUTO CALLOUT
AURAL ATTENTION GETTERS

L2 Aural alerts produced by other systems remain available (e.g. SURV).

STATUS

INOP SYS

0

CAT 2

FWS ECP FAULT

Applicable to: ALL

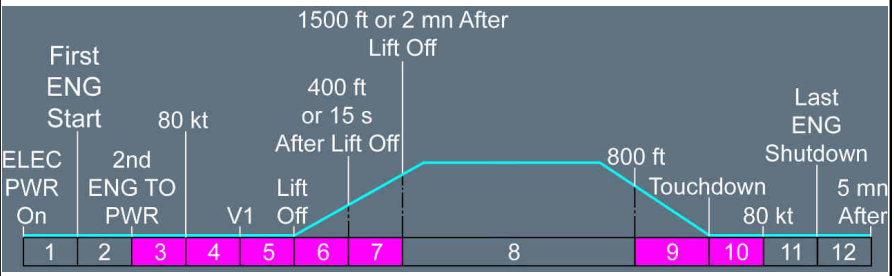
ANNUNCIATIONS

Triggering Conditions:

L2 There is a loss of communication, between the ECP and the two FWS on the avionics network.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-31-2 FWS ECP FAULT* .

Continued on the following page

FWS ECP FAULT (Cont'd)

ECP KEYS NOT AVAIL :
SYSTEMS, MORE, TO CONFIG, RCL LAST
FOR SYS PAGES : "ALL" AVAIL

L2 The above listed ECP keys are not hardwired to the ECAM, and are not available.

ECP Keys Available



FWS FWS 1(2) FAULT

Applicable to: ALL

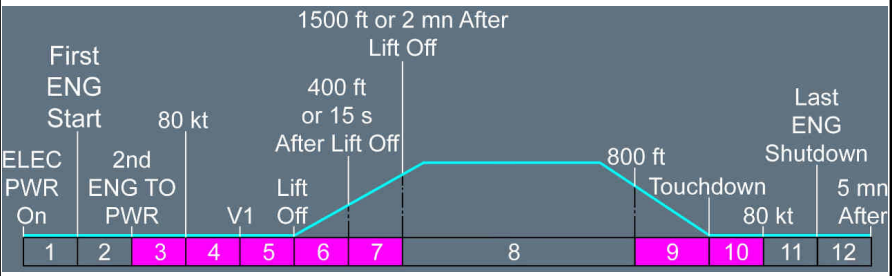
ANNUNCIATIONS

Triggering Conditions:

L2 FWS 1(2) is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-31-2 FWS FWS 1 FAULT*
- *Refer to MEL/ME-ECAM-31-2 FWS FWS 2 FAULT* .

● **If FWS 1 (2) failed:**

Crew awareness.

L2 All ECAM functions remain available on the not affected FWS.

L1 ● **If FWS 1(2) can no longer generate aural alerts:**

AUDIO FUNCTION REDUND LOSS

L2 *Aural alerts remain available on the not affected FWS.*

Continued on the following page

FWS FWS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

0

CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

MORE INFO

REDUND LOSS

- If FWS 1(2) is failed
  FWS 1(2)

MAINTENANCE TIME LIMITED ITEM

Applicable to: ALL

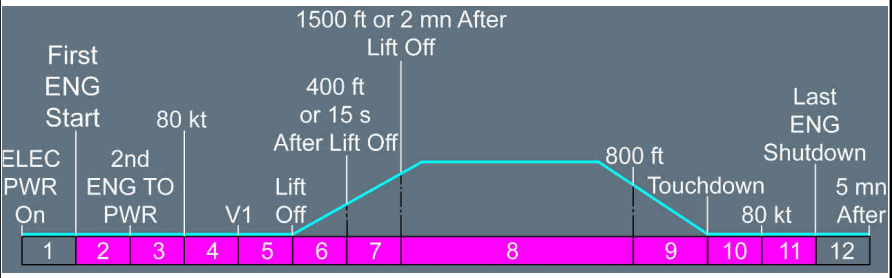
ANNUNCIATIONS

Triggering Conditions:

L2 Time limited failures are expired. For more information, *Refer to DSC-31-40-10 Time Limited Failure* .

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-45 MAINTENANCE TIME LIMITED ITEM* .

Crew awareness.

NAV HUD FAULT

Applicable to: ALL

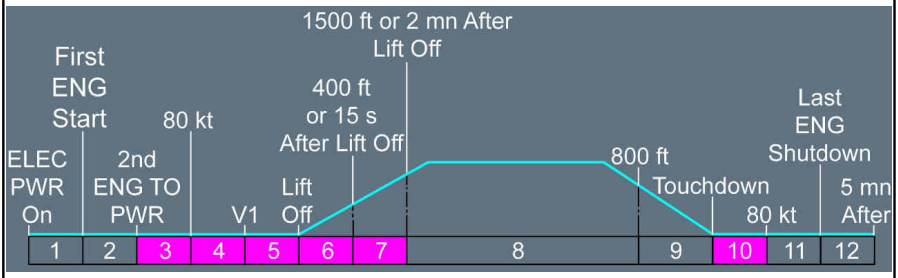
ANNUNCIATIONS

Triggering Conditions:

L2 The HUD is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV HUD FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
HUD

NAV HUD FPV DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

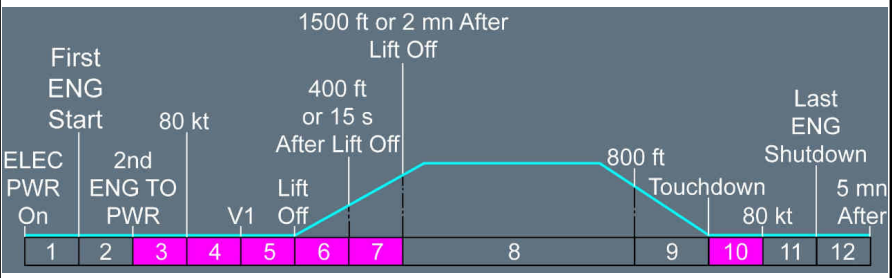
L2 The HUD detects a discrepancy between the IRS sources of the flight path angle information.

Indications:

Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV HUD FPV DISAGREE*.

USE PFD

RECORDER ACCELMTR FAULT

Applicable to: ALL

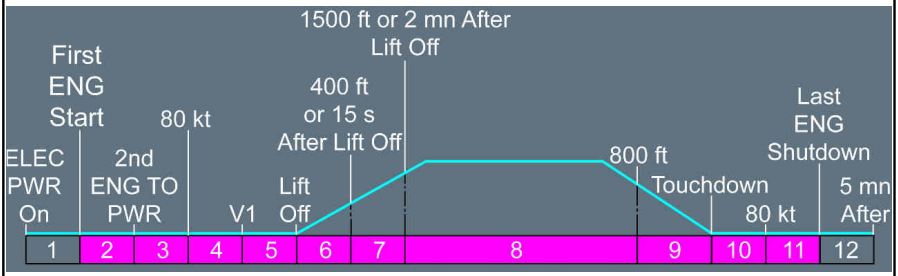
ANNUNCIATIONS

Triggering Conditions:

L2 The accelerometer used by the DFDR is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-3-23 RECORDER ACCELMTR FAULT*.

Crew awareness.

STATUS

INOP SYS

ALL PHASES

RECORDER ACCELMTR

RECORDER CVR FAULT

Applicable to: ALL

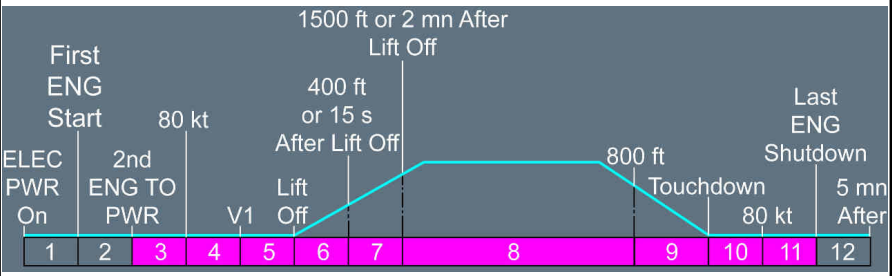
ANNUNCIATIONS

Triggering Conditions:

L2 The CVR is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-3-23 RECORDER CVR FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

CVR

RECORDER DFDR FAULT

Applicable to: ALL

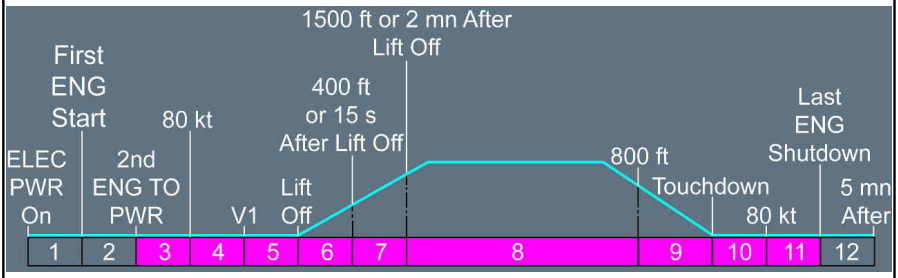
ANNUNCIATIONS

Triggering Conditions:

L2 The DFDR is failed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-3-23 RECORDER DFDR FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
DFDR

RECORDER SYS FAULT

Applicable to: ALL

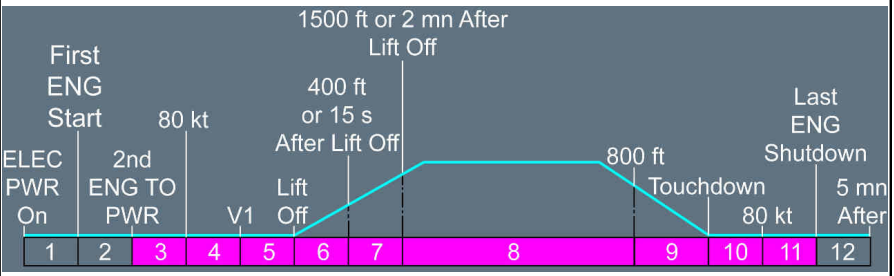
ANNUNCIATIONS

Triggering Conditions:

L2 The FDIU is failed and does not transmit any information to the recorders (DFDR).

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-3-23 RECORDER SYS FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

RECORDER SYS

VIDEO MULTIPLEXER FAULT

Applicable to: ALL

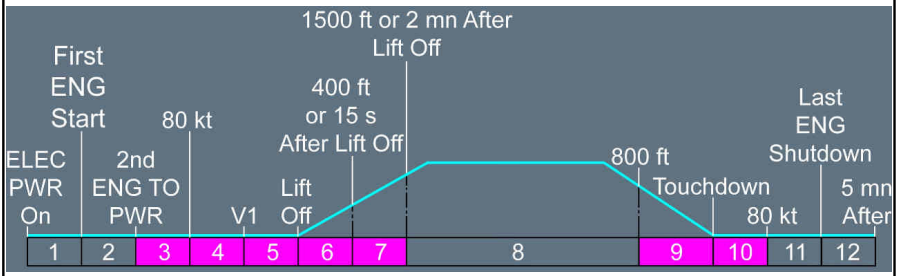
ANNUNCIATIONS

Triggering Conditions:

L2 The CMV is failed and no video can be displayed.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch condition, *Refer to MEL/ME-ECAM-31-5 VIDEO MULTIPLEXER FAULT* .

Crew Awareness.

L2 No video displayed, including ETACS and Airport NAV.

STATUS

INOP SYS

ALL PHASES	APPR
VIDEO	BTV AIRPORT NAV

Intentionally left blank

Landing Gear

BRAKES A-SKID FAULT ON ALL L/G

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The antiskid is not available on all landing gears (i.e. BCS 1 and BCS 2 failed, or LEHGS failed when in alternate braking).

Indications:

Audio



Master Light

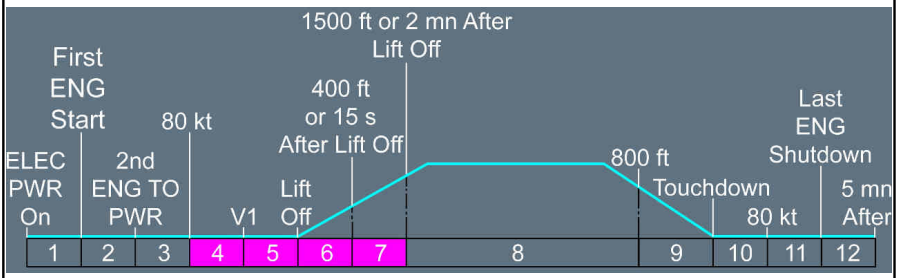


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON ALL L/G .*

LDG DIST AFFECTED

L2 *The emergency braking mode is active, therefore the braking performance is degraded. For more information on the emergency braking mode, Refer to DSC-32-10-30-30-40 Emergency Braking .*

Continued on the following page

BRAKES A-SKID FAULT ON ALL L/G (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH
LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

	APPR & LDG
	A-SKID AUTO BRK CAT 3

INFO

- If the Body L/G and Wing L/G LEHGS are failed:
  BRK WITH ACCU ONLY ON ALL L/Gs
  The number of brake applications is limited.
- If the Wing(Body) L/G LEHGS is failed:
  BRK WITH ACCU ONLY ON WING (L + R BODY) L/Gs
  BRK PRESS AUTO LIMITED ON ALL L/Gs

Even if the flight crew applies maximum deflection on the brake pedals, the braking pressure is automatically limited to reduce the risk of tire burst.
In the case of wet runway or more than wet, tire may burst.

DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the landing gears carry the total aircraft weight. Before the NLG touches down, the wings generate significant lift. So the

Continued on the following page

BRAKES A-SKID FAULT ON ALL L/G (Cont'd)

flight crew should delay the braking until the NLG touches down to have the maximum load on the wheel gear to minimize the risk of tire burst.

- If at least one engine is running:
  TAXI WITH CARE
  NO BRAKED PIVOT TURN
  CAT 2 ONLY

BRAKES A-SKID FAULT ON L + R BODY L/G

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The anti-skid is not available on wing landing gear (left and right) and on body landing gear (right or left) caused by combination of failures in normal and alternate braking systems. (loss of normal hydraulics and LEHGS, loss of RDC 2 or 3 (side A and B)).

Indications:

Audio



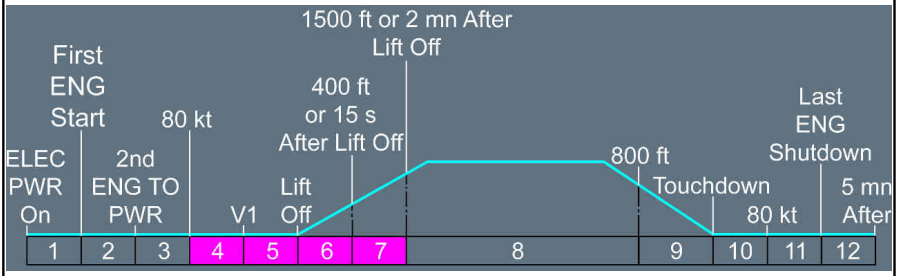
Master Light



SD page



Flight Phase Inhibition:



Continued on the following page

BRAKES A-SKID FAULT ON L + R BODY L/G (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON L + R BODY L/G .*

LDG DIST AFFECTED

L2 *The emergency braking mode is active on the left and right body landing gear brakes. Therefore, the braking performance is degraded. For more information on the emergency braking mode, Refer to DSC-32-10-30-30-40 Emergency Braking .*

L3 *Under some conditions, the alternate braking mode without antiskid is active on the left and right body landing gear brakes with the same braking performance degradation as emergency braking. For more information on alternate braking without antiskid, Refer to DSC-32-10-30-30-30 Alternate Braking .*

Continued on the following page

BRAKES A-SKID FAULT ON L + R BODY L/G (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

	APPR & LDG
	PART A-SKID AUTO BRK CAT 3

INFO

- If the Body L/G LEHGS is failed:
  BRK WITH ACCU ONLY ON L + R BODY L/Gs
  The number of brake applications is limited on left and right body landing gears.
  BRK PRESS AUTO LMTD ON L + R BODY L/Gs

Even if the flight crew applies maximum deflection on the brake pedals, the braking pressure is automatically limited to reduce the risk of tire burst.
In the case of wet runway or more than wet, tire may burst.

DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the landing gears carry the total aircraft weight. Before the NLG touches down, the wings generate significant lift. So the flight crew should delay the braking until the NLG touches down to have the maximum load on the wheel gear to minimize the risk of tire burst.

Continued on the following page

BRAKES A-SKID FAULT ON L + R BODY L/G (Cont'd)

- If at least one engine is running:
  TAXI WITH CARE
  NO BRAKED PIVOT TURN
  CAT 2 ONLY

BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The anti-skid is not available on one body landing gear (left or right) caused by combination of failures in normal and alternate braking systems. (loss of normal hydraulics and LEHGS, loss of RDC 2 or 3 (side A and B)).

Indications:

Audio



Master Light

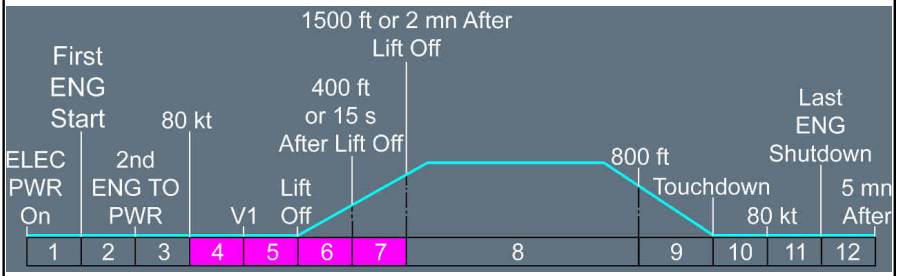


SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON LEFT BODY L/G* (*Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON RIGHT BODY L/G*).

LDG DIST AFFECTED

Continued on the following page

BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH
LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

	APPR & LDG
	PART A-SKID AUTO BRK CAT 3

INFO

- If body L/G LEHGS is failed:
  BRK WITH ACCU ONLY ON LEFT (RIGHT) BODY L/G

The number of brake applications is limited on left or right body landing gear.

BRK PRESS AUTO LMTD ON LEFT (RIGHT) BODY L/G

Even if the flight crew applies maximum deflection on the brake pedals, the braking pressure is automatically limited to reduce the risk of tire burst.
In the case of wet runway or more than wet, tire may burst.

DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the landing gears carry the total aircraft weight. Before the NLG touches down, the wings generate significant lift. So the flight crew should delay the braking until the NLG touches down to have the maximum load on the wheel gear to minimize the risk of tire burst.

Continued on the following page

BRAKES A-SKID FAULT ON LEFT (RIGHT) BODY L/G (Cont'd)

- If at least one engine is running:
  TAXI WITH CARE
  NO BRAKED PIVOT TURN
  CAT 2 ONLY

BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The anti-skid is not available on wing landing gear (left and right) and on body landing gear (right or left) caused by combination of failures in normal and alternate braking systems. (loss of normal hydraulics and LEHGS, loss of RDC 2 or 3 (side A and B)).

Indications:

Audio



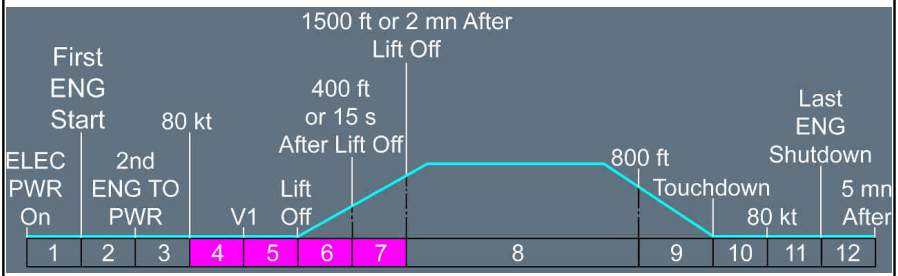
Master Light



SD page



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON WING + L BODY L/Gs* (*Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON WING + R BODY L/Gs*).

Continued on the following page

BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs (Cont'd)

LDG DIST AFFECTED

Continued on the following page

BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

	APPR & LDG
	PART A-SKID AUTO BRK CAT 3

INFO

- If wing L/G LEHGS is failed:
  BRK WITH ACCU ONLY ON WING L/Gs
- If body L/G and wing L/G LEHGS are failed:
  BRK WITH ACCU ONLY ON WING + L(R) BODY L/Gs
- If body L/G LEHGS is failed:
  BRK WITH ACCU ONLY ON LEFT(RIGHT) BODY L/G
  BRK PRESS AUTO LMTD ON WING + L (R) BODY L/Gs

Even if the flight crew applies maximum deflection on the brake pedals, the braking pressure is automatically limited to reduce the risk of tire burst.
In the case of wet runway or more than wet, tire may burst.

DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the landing gears carry the total aircraft weight. Before the NLG touches down, the wings generate significant lift. So the

Continued on the following page

BRAKES A-SKID FAULT ON WING + L (R) BODY L/Gs (Cont'd)

flight crew should delay the braking until the NLG touches down to have the maximum load on the wheel gear to minimize the risk of tire burst.

- If at least one engine is running:
  TAXI WITH CARE
  NO BRAKED PIVOT TURN
  CAT 2 ONLY

BRAKES A-SKID FAULT ON WING L/Gs

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The anti-skid is not available on the wing landing gears (left and right) caused by a combination of failures in normal and alternate braking systems (loss of normal hydraulics and LEHGS, loss of RDC 2 or 3 (side A and B)).

Indications:

Audio



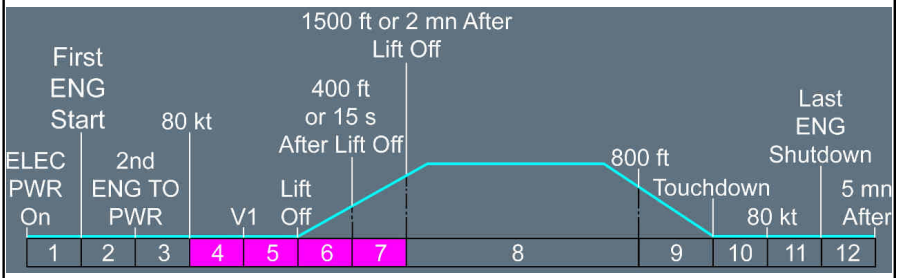
Master Light



SD page



Flight Phase Inhibition:



Continued on the following page

BRAKES A-SKID FAULT ON WING L/Gs (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID FAULT ON WING L/G* .

LDG DIST AFFECTED

L2 The emergency braking mode is active on the wing landing gear brakes. Therefore, the braking performance is degraded. For more information on the emergency braking mode, *Refer to DSC-32-10-30-30-40 Emergency Braking* .

L3 Under some conditions, the alternate braking mode without antiskid is active on the wing landing gear brakes with the same braking performance degradation as emergency braking. For more information on alternate braking without antiskid, *Refer to DSC-32-10-30-30-30 Alternate Braking* .

Continued on the following page

BRAKES A-SKID FAULT ON WING L/Gs (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

	APPR & LDG
	PART A-SKID AUTO BRK CAT 3

INFO

- If wing L/G LEHGS is failed:
  BRK WITH ACCU ONLY ON WING L/Gs

The number of brake applications is limited on wing landing gears.

BRK PRESS AUTO LMTD ON WING L/Gs

Even if the flight crew applies maximum deflection on the brake pedals, the braking pressure is automatically limited to reduce the risk of tire burst.
In the case of wet runway or more than wet, tire may burst.

DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the landing gears carry the total aircraft weight. Before the NLG touches down, the wings generate significant lift. So the flight crew should delay the braking until the NLG touches down to have the maximum load on the wheel gear to minimize the risk of tire burst.

Continued on the following page

BRAKES A-SKID FAULT ON WING L/Gs (Cont'd)

- If at least one engine is running:
  TAXI WITH CARE
  NO BRAKED PIVOT TURN
  CAT 2 ONLY

BRAKES A-SKID OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The A-SKID sw is in the OFF position.

Indications:

Audio



Master Light

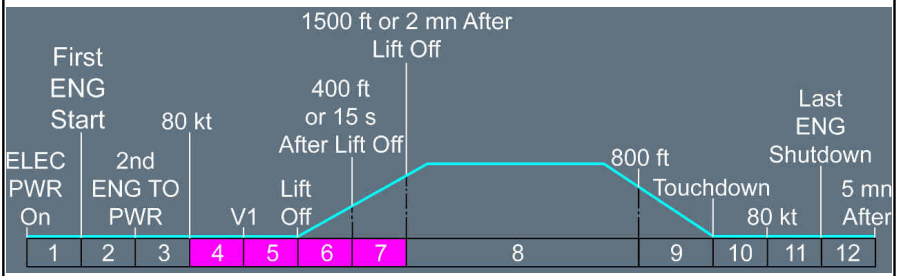


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES A-SKID OFF* .

Continued on the following page

BRAKES A-SKID OFF (Cont'd)

LDG DIST AFFECTED

L2 *Refer to the performance module.*

The emergency braking mode is active, therefore the braking performance is degraded. For more information on the emergency braking mode, Refer to DSC-32-10-30-30-40 Emergency Braking .

Continued on the following page

BRAKES A-SKID OFF (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

L12

STATUS

INOP SYS

	APPR & LDG
	A-SKID AUTO BRK CAT 3

INFO

- Depending on which LEHGS is failed, one of the following may appear:
  BRK WITH ACCU ONLY ON ALL L/Gs
  BRK WITH ACCU ONLY ON L+R BODY L/Gs
  BRK WITH ACCU ONLY ON WING L/Gs

  The number of brake applications is limited on the affected landing gears.

  BRK PRESS AUTO LIMITED ON ALL L/Gs

Even if the flight crew applies maximum deflection on the brake pedals, the braking pressure is automatically limited to reduce the risk of tire burst.
In the case of wet runway or more than wet, tire may burst.

DELAY BRAKING UNTIL NLG TOUCHDOWN

The braking pressure limitation is based on the assumption that the landing gears carry the total aircraft weight. Before the NLG touches down, the wings generate significant lift.

Continued on the following page

BRAKES A-SKID OFF (Cont'd)

Therefore, the flight crew should delay the braking until the NLG touches down to have the maximum load on the wheel gear to minimize the risk of tire burst.

- If at least one engine is running:
  TAXI WITH CARE
  NO BRAKED PIVOT TURN
  CAT 2 ONLY

BRAKES ACCU PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pressure of, at least, one brake accumulator is below the minimum value.

Indications:

Audio



Master Light

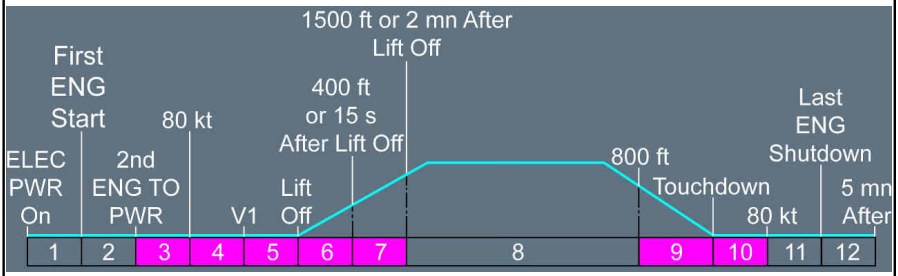


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES ACCU PRESS LO*.

Continued on the following page

BRAKES ACCU PRESS LO (Cont'd)

- **If the alert is triggered before engine start or after the last engine shutdown:**

ACCUS REINFLATE..... ON

L2 *The BLG LEHGS does not automatically pressurize the BLG accumulators when the engines are shutdown. The lowest pressure of the BLG brake accumulators can be monitored on the triple pressure indicator.*

L1 CHOCKS..... CONSIDER

- **If the alert is triggered after landing and before the last engine shutdown:**
  - **BEFORE ENG SHUTDOWN:**

CHOCKS.....CONSIDER

STATUS

INOP SYS

	0
BRK ACCU	

BRAKES ALTN + EMER BRK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Alternate braking and emergency braking fail on one or more wheel groups and the normal braking remains available.

A wheel group is defined as:
- Wing landing gear wheel group
- Left body landing gear wheel group
- Right body landing gear wheel group.

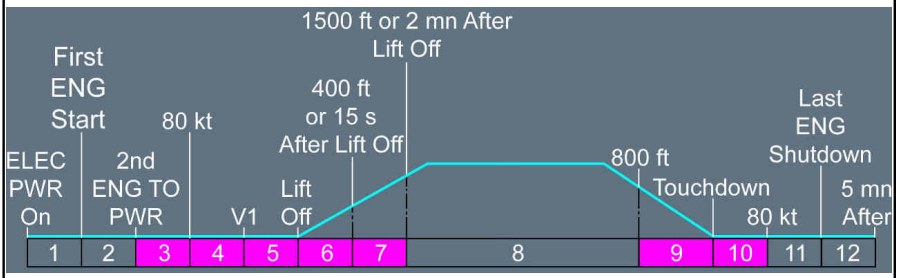
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES ALTN + EMER BRK FAULT*.

Continued on the following page

BRAKES ALTN + EMER BRK FAULT (Cont'd)

Impacted DU: 00007175 BRAKES ALTN + EMER BRK FAULT - Alert

- **In cruise or after landing, if braking is not affected:**
  NO LOSS IN BRK EFFICIENCY
- **IF BRAKES A-SKID FAULT ON ALL L/G :**

L2 The flight crew should apply the following action if the BRAKES A-SKID FAULT ON ALL L/G also triggered.

L1 A-SKID..... OFF THEN ON

Impacted by TDU: 00022291 BRAKES ALTN + EMER BRK FAULT - Alert

Crew awareness

- **Only in cruise or after landing:**
  NO LOSS IN BRK EFFICIENCY

L2 *The normal braking mode remains active.*

STATUS

INOP SYS

0

ALTN BRK
EMER BRK

INFO

- Only in cruise or after landing:
  NO LOSS IN BRK EFFICIENCY

BRAKES ALTN BRK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Alternate braking fails on one or more wheel groups (i.e. the alternate hydraulic equipment fails, or any braking LEHGS fails) and the normal or alternate braking is available on the other wheel groups.

A wheel group is defined as:
- Wing landing gear wheel group
- Left body landing gear wheel group
- Right body landing gear wheel group.

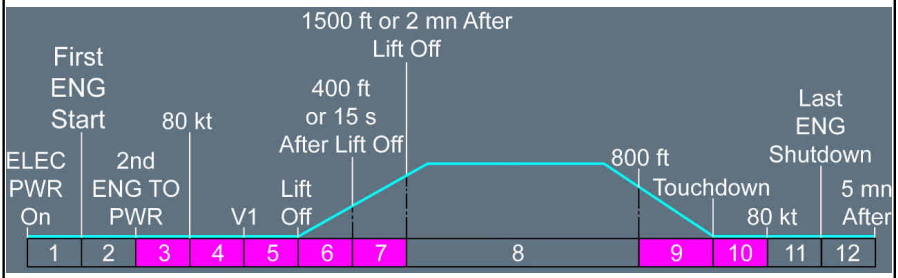
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch procedures, *Refer to MEL/ME-ECAM-32-1 BRAKES ALTN BRK FAULT* .

Continued on the following page

BRAKES ALTN BRK FAULT (Cont'd)

Crew awareness.

- **In cruise or after landing, and if the normal braking is failed on another wheel group:**
  NO LOSS IN BRK EFFICIENCY

L2 *There is no loss of braking efficiency if one(two) wheel group(s) lost the alternate braking and another wheel group lost the normal braking. In that case the BRAKES NORM BRK FAULT also appears on the ECAM.*

L12

STATUS

INOP SYS

APPR_AND_LDG

ALTN BRK

INFO

- In cruise or after landing, and if the normal braking is failed on another wheel group:
  NO LOSS IN BRK EFFICIENCY
  There is no loss of braking efficiency if one(two) wheel group(s) lost the alternate braking and another wheel group lost the normal braking. In that case the BRAKES NORM BRK FAULT also appears on the ECAM.

BRAKES ALTN BRK PRESS MONITORING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

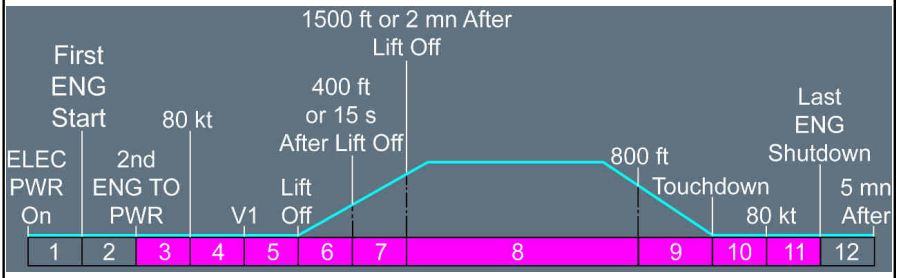
L2 One or more alternate hydraulic pressure transmitters are failed. The associated valves continue to operate but pressure feedback to the BCS is lost.

Indications:

SD page



Flight Phase Inhibition:



L2 For associated dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES ALTN BRK PRESS MONITORING FAULT*

Crew awareness.

L2 All braking modes remain available.

BRAKES AUTO BRK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The autobrake is failed (e.g. RTO pb failed, AUTO BRK selector failed, position of spoilers not available).

Indications:

Audio



Master Light

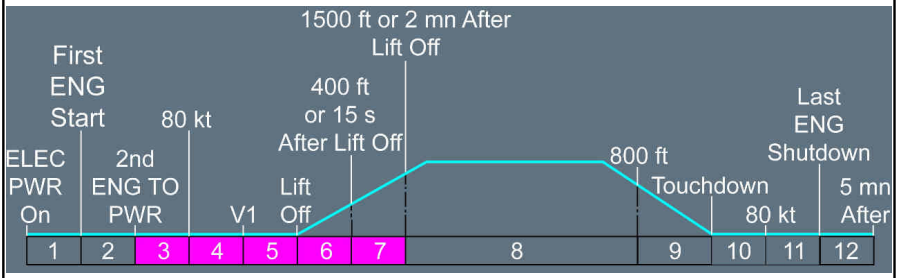


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES AUTO BRK FAULT*.

Crew awareness.

Continued on the following page

BRAKES AUTO BRK FAULT (Cont'd)

STATUS

INOP SYS

AUTO BRK	0

BRAKES BRAKES HOT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one brake temperature is equal to, or higher than 300 °C.

Indications:

Audio



Master Light

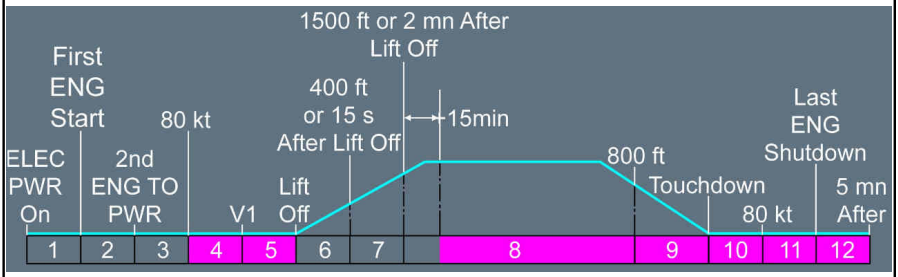


SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

BRAKES BRAKES HOT (Cont'd)

- **Before engine start, or after landing:**

PARK BRK.....PREFER CHOCKS

L2 *The parking brake should not be set to ON in order to improve the brake cooling.*

L1 - **On ground**

DELAY T.O FOR COOLG

L2 *Delay the takeoff until the brake temperature is below 290 °C.*

Current Hottest Brake Temp.		*300 °C*	*350 °C*	*400 °C*	*450 °C*	*500 °C*	*550 °C*	*600 °C*	*650 °C*	*700 °C*
Temp. target	*SAT*									
300 °C	*-54 °C*	*0*	*16*	*29*	*42*	*53*	*63*	*72*	*81*	*89*
	15 °C	*0*	*19*	*35*	*50*	*63*	*74*	*85*	*94*	*103*
	55 °C	*0*	*22*	*40*	*56*	*70*	*83*	*94*	*104*	*114*

Estimated Brake Cooling Time Table

The flight crew uses the brake cooling time table to estimate a minimum brake cooling time based on the current brake temperature.
The flight crew uses the table when the aircraft is stopped. When the aircraft is stopped for at least 15 min, the flight crew notes the hottest brake temperature displayed on the WHEEL SD page. The flight crew enters the table with this value by the top of the table. Function of the outside temperature displayed on the permanent data of the SD page (SAT), the flight crew reads the time value at the intersection of the line and the column.

Note: Example:
- *SAT= 15 °C*
- *Current maximum brake temperature red on the WHEEL SD page=550 °C*

The flight crew estimated the brake cooling time for a target brake temperature of 300 °C

They read the value at the intersection of:
- *The 550 °C current temperature column*
- *The line associated with the 15 °C SAT.*

74 min is the estimated time corresponding to the brake cooling time for the condition of the day.

For intermediate values, the flight crew interpolates linearly.
The brake cooling time does not take into account the effect of the wind.

Continued on the following page

BRAKES BRAKES HOT (Cont'd)

To increase the precision of the estimated brake cooling time, the flight crew can use the table several times during the brake cooling, taking the hottest brake temperature as a reference.

L1 ● **In flight**

● **IF PERF PERMIT:**

L/G.....DOWN FOR COOLG

MAX SPEED : 250/.55

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 250/.55

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 250/.55

BRAKES BTV FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The BTV auto-brake mode is failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES BTV FAULT*.

Crew awareness.

STATUS

INOP SYS

APPR & LDG

BTV

BRAKES CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Braking Control System (BCS) 1 or BCS 2 is failed.
Refer to DSC-32-10-30-10-10 Braking Control System .

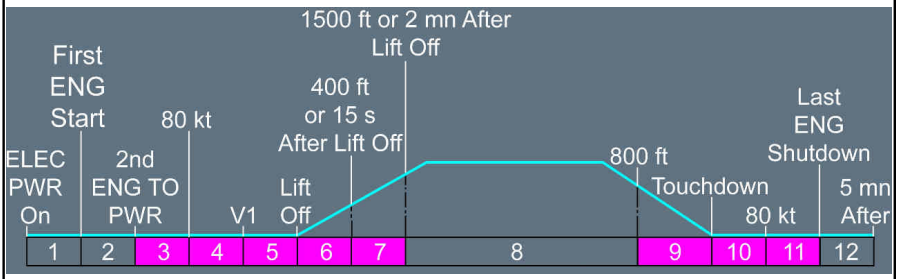
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES CTL 1 FAULT* and *Refer to MEL/ME-ECAM-32-1 BRAKES CTL 2 FAULT* .

Crew awareness

L2 The normal braking mode remains active, and all other braking modes are available.

Continued on the following page

BRAKES CTL 1(2) FAULT (Cont'd)

MORE INFO

REDUND LOSS

BRK CTL 1(2)

BRAKES EMER BRK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Emergency braking fails on all the landing gears (i.e. EBCU failed) and the normal and the alternate braking modes remain available.

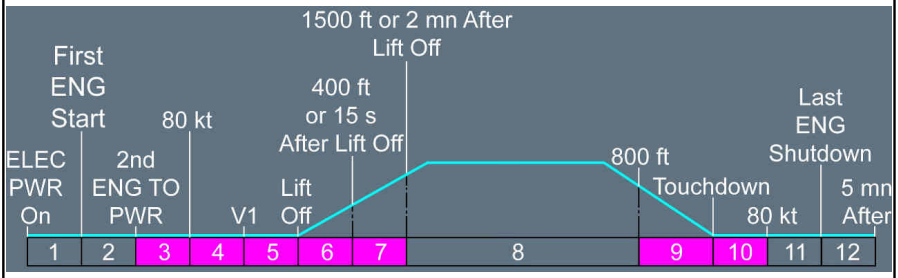
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

BRAKES EMER BRK FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES EMER BRK FAULT* .

Impacted DU: 00007177 BRAKES EMER BRK FAULT - Alert

● **In cruise or after landing, if braking is not affected:**
NO LOSS IN BRK EFFICIENCY

L2 *The normal and the alternate braking modes remain available.*
For more information on the normal braking mode, Refer to DSC-32-10-30-30-20 Normal Braking .
For more information on the alternate braking mode, Refer to DSC-32-10-30-30-30 Alternate Braking .

If braking is affected, the ECAM also triggers:
- A BRAKES A-SKID FAULT alert, or
- A BRAKES A-SKID OFF alert, or
- A BRAKES PEDAL BRAKING FAULT alert, or
- A BRAKES RELEASED alert.

L1 ● **IF BRAKES A-SKID FAULT ON ALL L/G :**
L2 The flight crew should apply the following action if the BRAKES A-SKID FAULT ON ALL L/G previously or also triggered.

L1 A-SKID..... OFF THEN ON

● **IF ALERT PERSISTS :**
A-SKID.....OFF
WHEEL SD PAGE..... DISPLAY

● **IF BRK CTL EMER GREEN :**
L2 The flight crew should check if the Emergency Brake Control Unit is operative, by checking if the associated indication is green.



L1 DISREGARD BRAKES EMER BRK FAULT

Continued on the following page

BRAKES EMER BRK FAULT (Cont'd)

Impacted by TDU: 00022292 BRAKES EMER BRK FAULT - Alert

Crew awareness.

- **In cruise or after landing, if braking is not affected:**
  NO LOSS IN BRK EFFICIENCY

L2 *The normal and the alternate braking modes remain available.*
For more information on the normal braking mode, Refer to DSC-32-10-30-30-20 Normal Braking .
For more information on the alternate braking mode, Refer to DSC-32-10-30-30-30 Alternate Braking .

L1 L2 If braking is affected, the ECAM also triggers:
- A BRAKES A-SKID FAULT alert, or
- A BRAKES A-SKID OFF alert, or
- A BRAKES PEDAL BRAKING FAULT alert, or
- A BRAKES RELEASED alert.

STATUS

INOP SYS

APPR_AND_LDG

EMER BRK

INFO

- In cruise or after landing, if braking is not affected:
  NO LOSS IN BRK EFFICIENCY

BRAKES MINOR FAULT

Applicable to: ALL

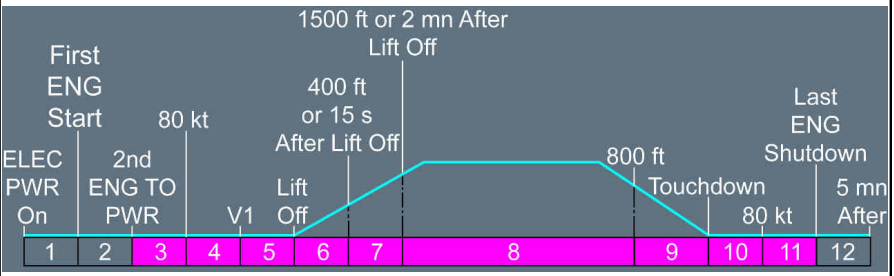
ANNUNCIATIONS

Triggering Conditions:

L2 Minor BCS faults require maintenance action.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES MINOR FAULT*

Crew Awareness.

BRAKES NORM BRK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Normal braking fails on one or more wheel groups (i.e. GREEN or YELLOW hydraulic power failed, or normal hydraulic equipment failed).

A wheel group is defined as:
- Wing landing gear wheel group
- Left body landing gear wheel group
- Right body landing gear wheel group.

L3 In flight, the alert is triggered only when normal braking is failed on all landing gears.

Indications:

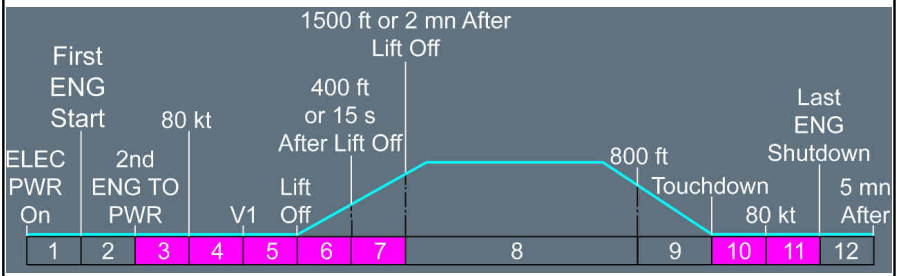
L2

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES NORM BRK FAULT*.

Continued on the following page

BRAKES NORM BRK FAULT (Cont'd)

Crew awareness.

- **In cruise up to after landing, and if the alternate braking is failed on another wheel group:**
  NO LOSS IN BRK EFFICIENCY

L2 *There is no loss of braking efficiency if one(two) wheel group(s) lost the normal braking and another wheel group lost the alternate braking. In that case the BRAKES ALTN BRK FAULT also appears on the ECAM.*

L12

STATUS

INOP SYS

APPR AND LDG

NORM BRK

INFO

- In cruise up to after landing, and if the alternate braking is failed on another wheel group:
  NO LOSS IN BRK EFFICIENCY
  There is no loss of braking efficiency if one(two) wheel group(s) lost the normal braking and another wheel group lost the alternate braking. In that case the BRAKES ALTN BRK FAULT also appears on the ECAM.
  ALTN BRK WITH A-SKID

BRAKES NORM BRK PRESS MONITORING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One or more normal hydraulic pressure transmitters are failed. The associated valves continue to operate but pressure feedback to the BCS is lost.

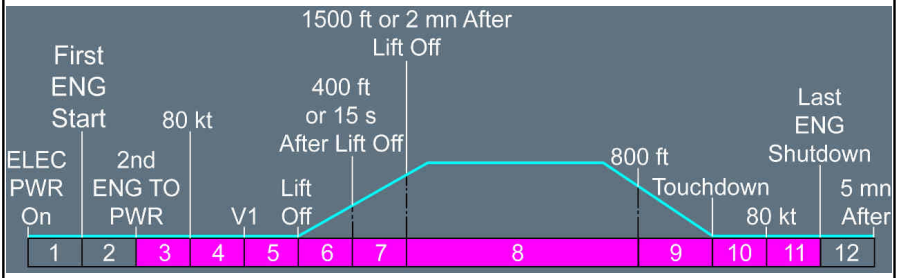
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated dispatch conditions, refer to MEL.

Crew awareness.

L2 All braking modes remains available.

BRAKES PARK BRK ON

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PARK BRK sw is set to the ON position, and the aircraft is in flight.

Indications:

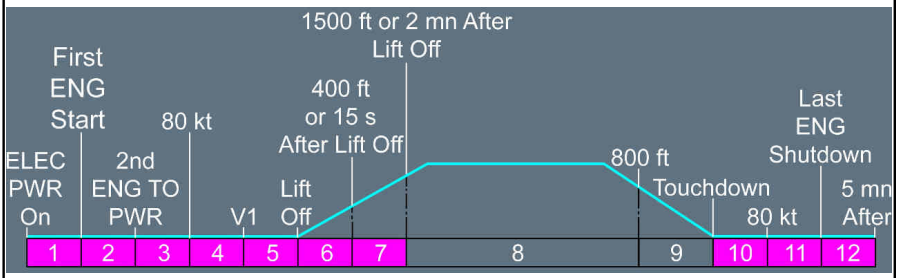
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES PARK BRK ON* .

PARK BRK..... OFF

BRAKES PARK BRK PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Parking brake pressure is low on at least one body landing gear when the parking brake is on.

Indications:

Audio



Master Light

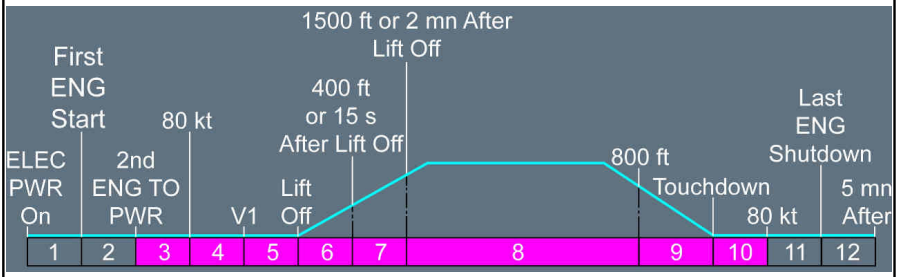


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES PARK BRK PRESS LO*.

Continued on the following page

BRAKES PARK BRK PRESS LO (Cont'd)

- **Before engine start, or after engine shutdown:**

  ACCUS REINFLATE..... ON

L2 *The pressure applied to the BLG brakes can be monitored on the triple pressure indicator.*

L1 CHOCKS..... CONSIDER

- **After landing:**
  - **BEFORE ENG SHUTDOWN :**

    CHOCKS.....CONSIDER

STATUS

INOP SYS

	0
	PARK BRK

BRAKES PEDAL BRAKING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The normal, the alternate and the emergency braking modes are failed.

Indications:

Audio



Master Light

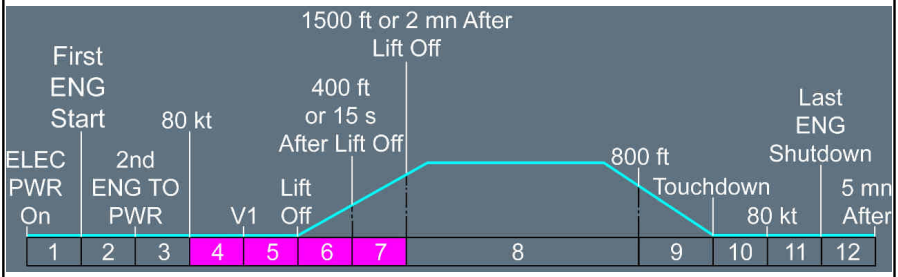


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES PEDAL BRAKING FAULT*.

Continued on the following page

BRAKES PEDAL BRAKING FAULT (Cont'd)

PARK BRK ONLY

L2 *Pedal braking is not available.*

L1 LDG DIST AFFECTED

L2 *Refer to the performance module.*

The flight crew cannot use the brake pedals. Ultimate braking, via the PARK BRK handle, is the only braking mode available, therefore braking performance is degraded. When landing, expect burst of the BLG tires.

For more information on the ultimate braking mode, Refer to DSC-32-10-30-30-50 Ultimate Braking .

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	PARK BRK ONLY LDG DIST AFFECTED

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

STATUS

INOP SYS

	APPR & LDG
	PEDAL BRAKING AUTO BRK

BRAKES RELEASED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one pair of brakes is released in normal and/or alternate braking modes because of local failures (i.e. a tachometer is failed or a servo valve is jammed in the closed position).

Indications:

Audio



Master Light

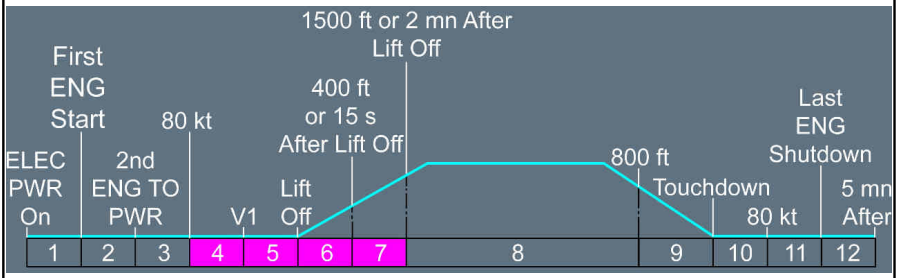


SD page



WHEEL SD Page

Flight Phase Inhibition:



For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES RELEASED* .

Continued on the following page

BRAKES RELEASED (Cont'd)

L2 Depending on the failure, one or both messages may appear:
L1 - BRK (1/2)(3/4)...(15/16) NORM RELEASED
L2 Appears when the brakes are released and normal braking is active.
L1 - BRK (1/2)(3/4)...(15/16) ALTN RELEASED
L2 Appears when the brakes are released and alternate braking is active.

L1 LDG DIST AFFECTED
L2 *Refer to the performance module.*

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

L12

DEFERRED PROC

APPR
LDG DIST COMPUTATION.....CONFIRM
Refer to the performance module.

STATUS

INOP SYS

	APPR & LDG
	BTV

BRAKES RESIDUAL BRAKING

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Hydraulic pressure remains applied, on one or more brakes, without braking command from the flight crew (i.e. leaking servo valve).

Indications:

Audio



Master Light

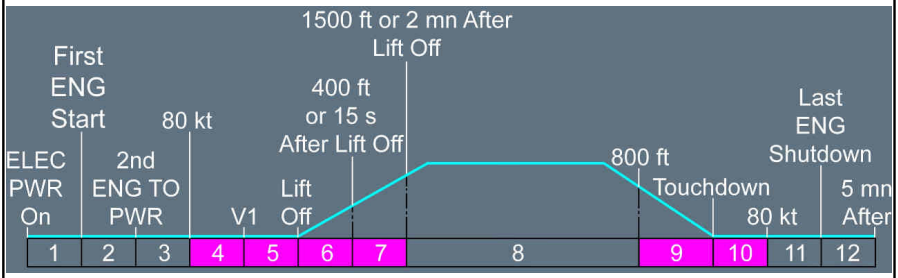


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES RESIDUAL BRAKING* .

ON BRK (1/2)(3/4)...(15/16)

L2 *The temperature of the affected brakes rises.*

Note: In the case deflated or damaged tires after landing, Refer to PRO-SUP-95-40 Taxi with Deflated Tires .

BRAKES SEL VLV JAMMED OPEN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One hydraulic valve of the braking system is jammed open (i.e. NBSELV , ABSELV or ARV).
L3 For information on NSELV, *Refer to DSC-32-10-30-30-20 Normal Brake Selector Valves* .
For information on ABSELV, *Refer to DSC-32-10-30-30-30 Alternate Brake Selector Valves* .
For information on ARV, *Refer to DSC-32-10-30-10-10 Alternate Hydraulic Power Supply* .
Indications:

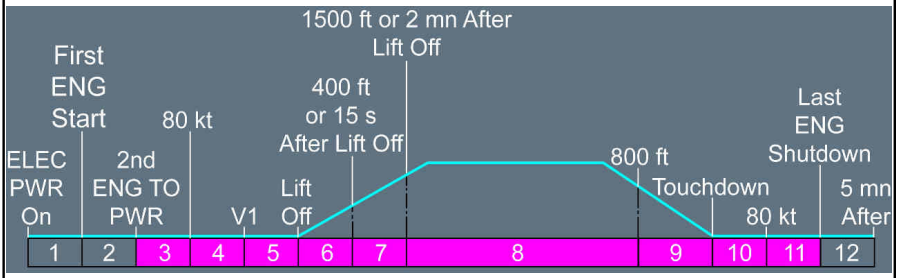
L2

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES SEL VLV JAMMED OPEN* .

Crew awareness

BRAKES SYS REDUNDANCY LOST

Applicable to: ALL

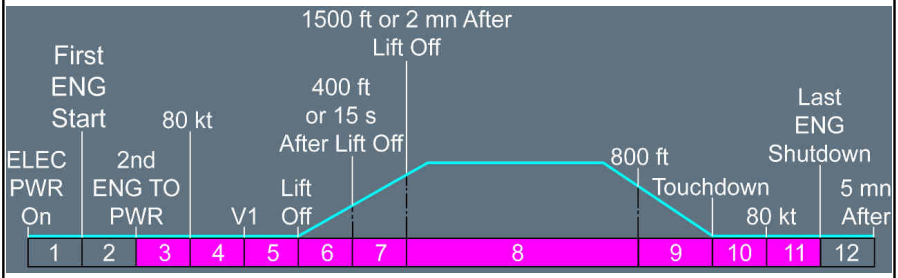
ANNUNCIATIONS

Triggering Conditions:

L2 A failure affects a Braking Control System (BCS 1 or BCS 2). The active BCS continues to operate normally but an additional failure may result in an A-SKID failure (partial, or total).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES SYS REDUNDANCY LOSS* .

- **If one or more RDC channels A(B) are lost:**
  SYS A(B) REDUNDANCY LOST

BRAKES SYS SAFETY TEST REQUIRED

Applicable to: ALL

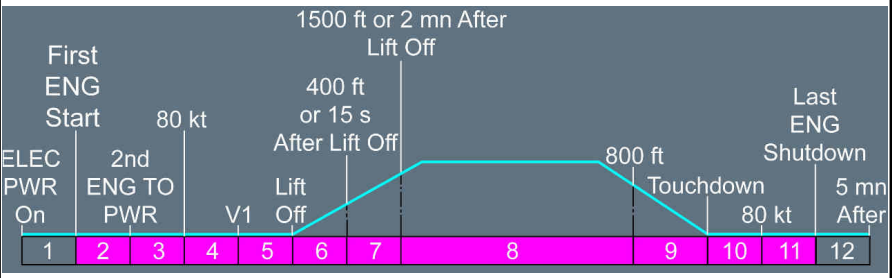
ANNUNCIATIONS

Triggering Conditions:

L2 The braking system safety test has not been performed in the required interval. This test performs automatically at aircraft power up.

Indications:

Flight Phase Inhibition:



L2 For associated dispatch conditions, *Refer to MEL/ME-ECAM-32-1 BRAKES SYS SAFETY TEST REQUIRED* .

Crew awareness.

L2 A maintenance action is required.

CONFIG PARK BRK ON

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PARK BRK is ON, and takeoff power is set.

Indications:

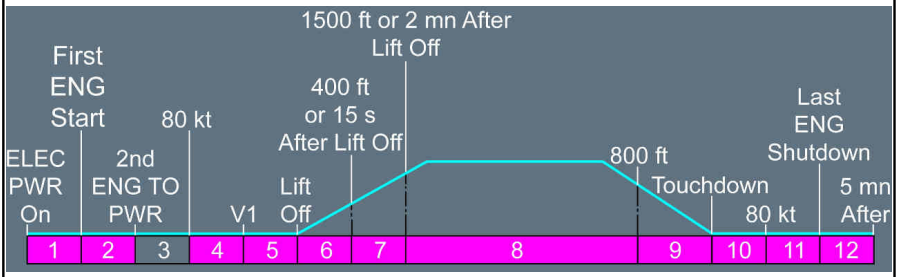
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

L2 Check that the parking brake handle is in the OFF position.

If the parking brake handle is in the OFF position, check that there is no pressure applied on the BLG brakes, via the triple pressure indicator.

L/G ABNORM OLEO PRESS

Applicable to: ALL

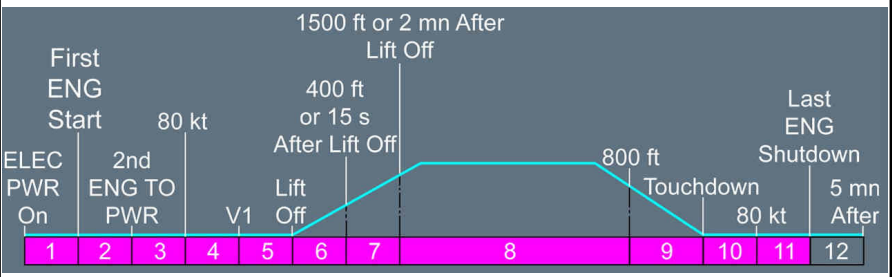
ANNUNCIATIONS

Triggering Conditions:

L2 Any of the following events occurs:
- Any landing gear shock-absorber oleo pressure exceeds the normal range
- The difference of shock-absorber oleo pressure between two symmetrical landing gears (body or wing) exceeds the normal range.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G ABNORM OLEO PRESS* .

Depending on the failure, one or more of the following messages may appear:
- ON NOSE L/G
- ON L WING L/G
- ON R WING L/G
- ON L BODY L/G
- ON R BODY L/G

L2 A maintenance action is required.

L/G BOGIE POSITION FAULT

Applicable to: ALL

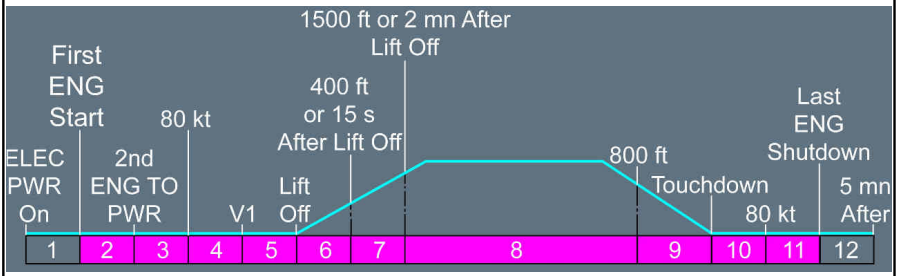
ANNUNCIATIONS

Triggering Conditions:

L2 During the last L/G extension, a wing or a body L/G bogie was not in the proper pitch attitude.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G BOGIE POSITION FAULT* .

L3 A bogie position (pitch attitude) fault does not prevent the normal L/G extension. However, if the alert is triggered and a retraction of the L/G is attempted later on, the landing gear will not retract and the L/G RETRACTION FAULT alert will be displayed (For information on the L/G RETRACTION FAULT , *Refer to Procedure*).

- **If one engine is running and all L/Gs are already locked down when the alert is activated**
  NO L/G RETRACTION

Continued on the following page

L/G BOGIE POSITION FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If one engine is running and all L/Gs are already locked down when the alert is activated
  NO L/G RETRACTION

L/G CTL 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Landing Gear Control and Indicating System (LGCIS) 1 or LGCIS 2 is failed.

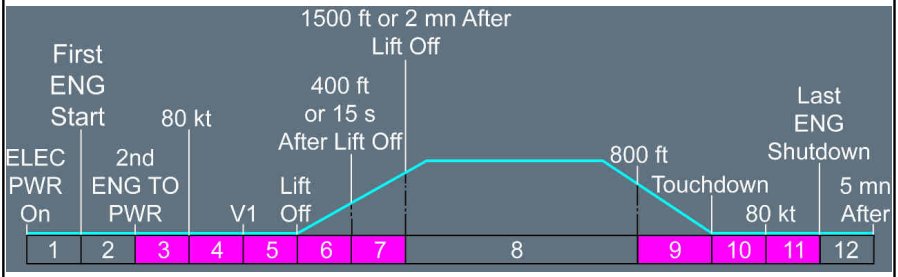
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G CTL 1 FAULT* .

Crew awareness.

MORE INFO

REDUND LOSS

L/G CTL 1(2)

L/G CTL 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Landing Gear Control and Indicating System (LGCIS) 1 and LGCIS 2 are failed, or the FWS receives invalid data from both LGCIS.

Indications:

Audio



Master Light

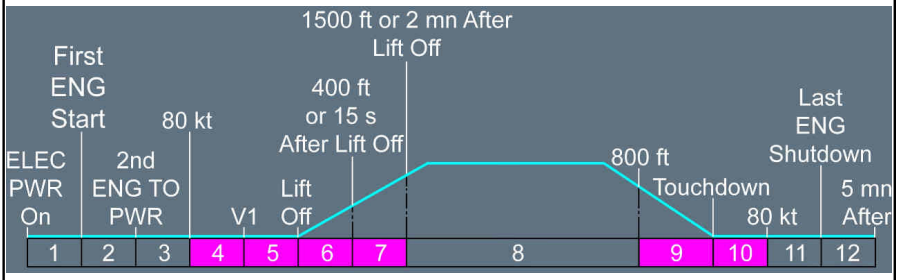


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G CTL 1+2 FAULT*

[MFD SURV] GPWS..... OFF

L2 *The position of the landing gear is not available and therefore, the GPWS has to be selected OFF to avoid any spurious alert.*

L1 ● **If one engine is running and if all L/Gs are already locked down when the alert is activated**

NO L/G RETRACTION

Continued on the following page

L/G CTL 1+2 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	0
• If all L/Gs are already locked down when the failure appears NO L/G RETRACTION	• For L/G gravity extension: MAX SPEED : 220KT L/G GRVTY EXTN ONLY

LIMITATIONS ON PFD

ALL PHASES
• For L/G gravity extension: MAX SPEED : 220KT

L12

DEFERRED PROC

LDG

● **FOR L/G EXTN :**

USE L/G NORM EXTN

● **IF NOT SUCCESSFUL :**

The normal extension of the landing gear is not possible if both LGCIS are failed or when both LGCIS detect failures affecting normal landing gear control.

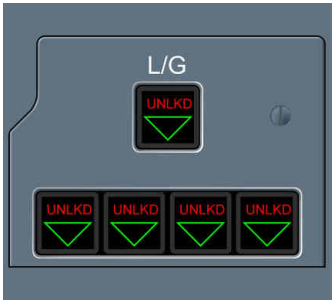
FOR L/G GRVTY EXTN : MAX SPEED 220 KT
L/G LEVER..... UP
L/G GRVTY (EXTN MAX 2 MIN)..... DOWN

Gravity extension takes approximately 70 s .

Continued on the following page

L/G CTL 1+2 FAULT (Cont'd)

● WHEN L/G LOCKED DOWN OR AFTER 120S



After a landing gear gravity extension the landing gear is downlocked when the associated green triangle is illuminated.
With the landing gear downlocked, the UNLKD red indication will remain illuminated together with the green triangle until the landing gear control lever position is set to down position.

L/G LEVER..... DOWN

Note: After a L/G gravity extension, a maintenance action is required to reset the LGERS (For information on the L/G gravity extension, Refer to DSC-32-40-10-10 Landing Gear Gravity Extension).

STATUS

INOP SYS

APPR & LDG

L/G CTL 1+2
GPWS 1+2

L/G DOORS NOT CLOSED

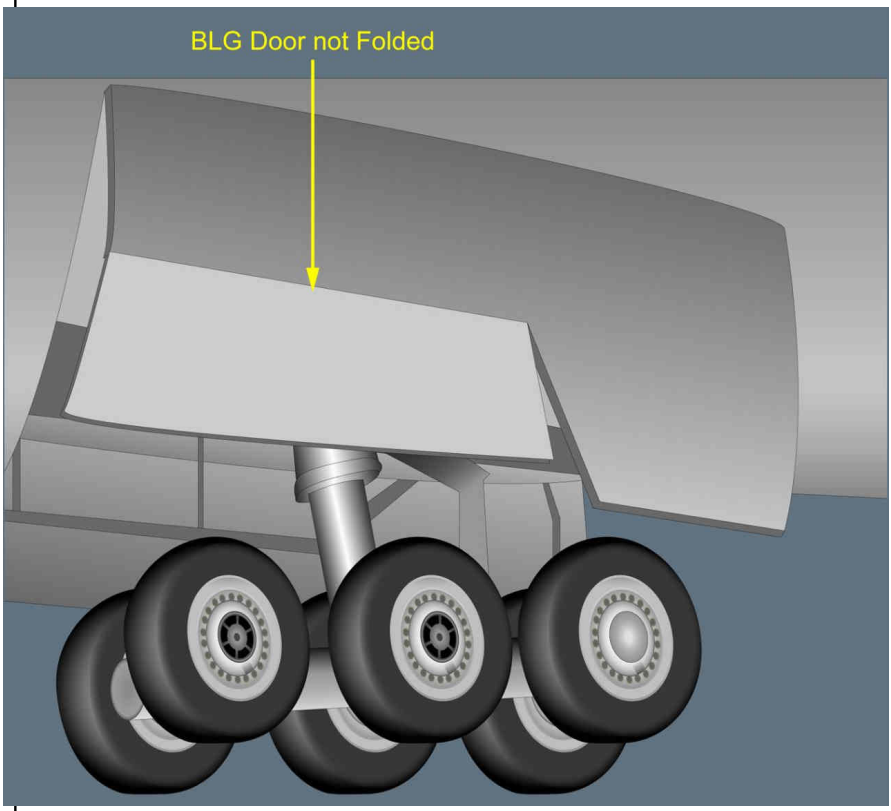
Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one landing gear doors is not closed and locked or/and at least one body landing gear door is not folded.

Body Landing Gear door being folded or not



Indications:

Continued on the following page

L/G DOORS NOT CLOSED (Cont'd)

Audio



Master Light

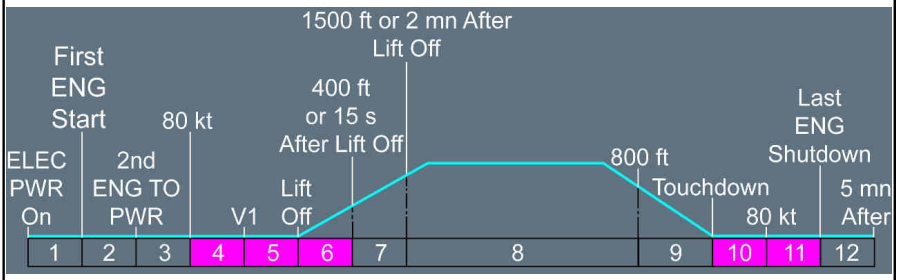


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G DOORS NOT CLOSED*

L1 One BLG door of each BLG are made in two parts. When the landing gear is extended the second part of the door is folded as shown on the previous picture.

Continued on the following page

L/G DOORS NOT CLOSED (Cont'd)

■ **If the engines are not running, and if at least one BLG door is not folded:**

Crew Awareness

■ **If at least one engine is running:**

■ **If at least one L/G door is not closed, and the BLG doors are folded:**
Crew Awareness

■ **In flight, if the speed is below 250 kt or M 0.55 when the alert is triggered:**
MAX SPEED : 250/.55
L/G.....RECYCLE

L2 *The active LGCIS changes when the landing gear is recycled.*
Recycle one time only.

L1 ■ **In flight, if the speed is above 250 kt or M 0.55 when the alert is triggered:**
SPEED.....REDUCE BELOW 250/.55
L/G.....RECYCLE

L2 *The active LGCIS changes when the landing gear is recycled.*
Recycle one time only.

L1 MAX SPEED : 250/.55

■ **If at least one BLG door is not folded:**
NO L/G RETRACTION

● **In flight:**
MAX SPEED : 250/.55

Continued on the following page

L/G DOORS NOT CLOSED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If at least one engine is running, and at least one BLG door is not folded:
  NO L/G RETRACTION
- If in flight:
  MAX SPEED: 250/.55

LIMITATIONS ON PFD

ALL PHASES

- If in flight:
  MAX SPEED: 250/.55

L12

STATUS

INOP SYS

APPR & LDG

L/G DOORS

INFO

FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

If the flight is continued (to destination or to alternate) :
- *Disregard FMS fuel predictions. Refer to the performance module for fuel predictions*
- *Disregard FMS altitude and speed predictions. Time predictions are valid only in cruise*
- *Do not use the managed speed mode (except in approach)*
- *Do not use the CLB and the DES autopilot modes.*

In the case of L/G doors not closed alert situation, fuel consumption is increased by approximately 11 %.

Continued on the following page

L/G DOORS NOT CLOSED (Cont'd)

To optimize fuel consumption:
- *Set the Cost Index (CI) to zero and use managed speed,*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum FL-4 000 ft*

L/G GEAR NOT DOWN

Applicable to: ALL

ANNUNCIATIONS

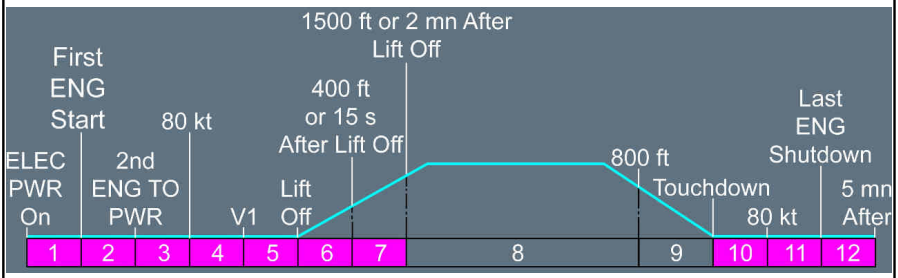
Triggering Conditions:

L2 The flaps are in CONF 2, 3, or FULL, and one or more landing gears are not downlocked below 700 ft AGL.

Indications:

Audio	Master Light	Local light	SD page
		*Refer to DSC-32-20-120 Landing Gear Lever* Red arrow light on the landing gear lever panel.	 WHEEL SD Page

Flight Phase Inhibition:



Crew awareness.

L/G GEAR NOT LOCKED DOWN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The landing gear lever is in the DOWN position, and one or more landing gears are not downlocked after approximately 60 s.

Indications:

Audio



Master Light

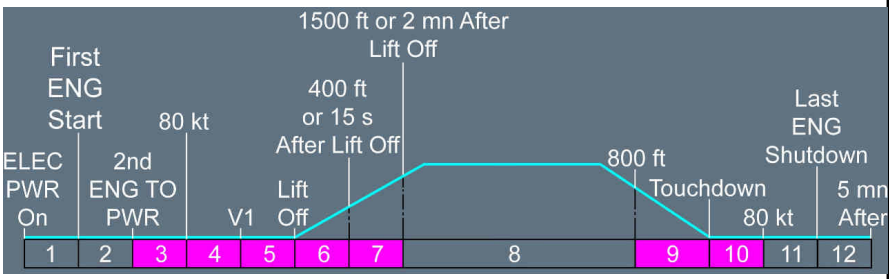


SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

L/G GEAR NOT LOCKED DOWN (Cont'd)

● **In flight:**

L/G (AFTER "60" S).....RECYCLE

L2 *The chronometer decreases from 60 to 0.*
The flight crew should wait 60 s before recycling the L/G .
The active LGCIS changes when the landing gear is recycled. Recycle one time only.

L1 L/G.....RECYCLE

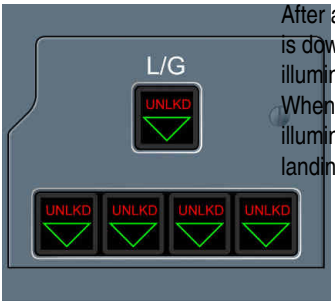
● **IF L/G STILL NOT DOWN AFTER 120 S :**

FOR L/G GRVTY EXTN : MAX SPEED 220 KT
L/G LEVER.....UP
L/G GRVTY.....DOWN

L2 *The gravity extension of the landing gear takes approximately 70 s .*

L1 ● **WHEN L/G LOCKED DOWN OR AFTER 120 S :**

L2



After a landing gear gravity extension, the landing gear is downlocked when the associated green triangle is illuminated.
When the landing gear is downlocked, UNLKD remains illuminated together with the green triangle until the landing gear control lever is set to DOWN.

L1 L/G LEVER.....DOWN

L2 Note: *A maintenance action is required after a L/G gravity extension (For more information on the L/G gravity extension, Refer to DSC-32-40-10-10 Landing Gear Gravity Extension).*

L1 ● **IF GRVTY EXTN NOT SUCCESSFUL:**

LDG WITH ABNORM L/G PROC.....APPLY

L2 *If the landing gear cannot be locked down:*
- *Refer to LDG WITH ABNORM NOSE L/G Procedure , or*
- *Refer to LDG WITH ABNORM WING+BODY L/G Procedure , or*
- *Refer to LDG WITH ABNORM WING OR BODY L/G Procedure .*

Continued on the following page

L/G GEAR NOT LOCKED DOWN (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

0

- For gravity extension :
  MAX SPEED : 220KT

LIMITATIONS ON PFD

ALL PHASES

- For gravity extension :
  MAX SPEED : 220KT

L/G GEAR NOT LOCKED UP

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The landing gear lever is in the UP position, and one or more landing gears are not locked up after approximately 40 s.

Indications:

Audio



Master Light

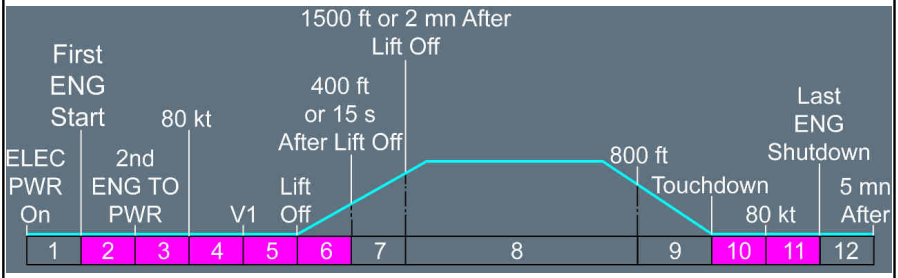


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G GEAR NOT LOCKED UP* .

Continued on the following page

L/G GEAR NOT LOCKED UP (Cont'd)

- **If the landing gear is not locked up, and any landing gear door is not closed:**
  - **If speed is above 250 kt/M .55:**
    SPEED..... REDUCE BELOW 250/.55

  L/G.....RECYCLE

L2 *The active LGCIS changes when the landing gear is recycled. Recycle one time only.*

L1
  - **IF NOT SUCCESSFUL :**
    L/G LEVER.....DOWN
    MAX SPEED : 250/.55

- **If the landing gear is not locked up and all landing gear doors are closed :**
  AVOID EXCESS G LOAD

L2 *The landing gear may be resting on the landing gear door. Excessive G load may damage the doors.*

Continued on the following page

L/G GEAR NOT LOCKED UP (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the landing gear is down locked and at least one landing gear door is not closed:
  MAX SPEED : 250/.55
  AVOID EXCESS G LOAD

LIMITATIONS ON PFD

ALL PHASES

- If the landing gear is down locked and at least one landing gear door is not closed :
  MAX SPEED : 250/.55
  AVOID EXCESS G LOAD

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
L/G RETRACTION	L/G DOORS (If at least one landing gear door is open)

INFO

FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

If the flight is continued (to destination or to alternate) :

- *Disregard FMS fuel predictions. Refer to the performance module for fuel predictions*
- *Disregard FMS altitude and speed predictions. Time predictions are valid only in cruise*
- *Do not use the managed speed mode (except in approach)*

Continued on the following page

L/G GEAR NOT LOCKED UP (Cont'd)

- *Do not use the CLB and the DES autopilot modes.*

In the case of L/G not locked up alert situation, a landing gear may remain partially or fully extended.
In the case of only one landing gear affected, fuel consumption is increased by approximately 20 %.
In the case of 2 or more landing gear affected, fuel consumption is increased by 110 %.

L/G GEAR UPLOCK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The landing gear is extended and one or more uplocks are in the closed position (the normal position is open).

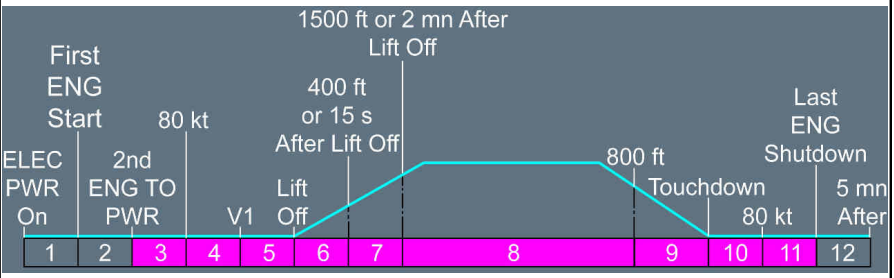
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

L/G GEAR UPLOCK FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G GEAR UPLOCK FAULT* .

- **If one engine is running and all L/Gs are already locked down when the alert is activated**
  NO L/G RETRACTION

Crew awareness.
L2 The landing gear cannot be retracted.
If a landing gear retraction is attempted, the L/G RETRACTION FAULT alert will be generated.
Refer to L/G RETRACTION FAULT procedure.

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If one engine is running and all L/Gs are already locked down when the alert is activated
  NO L/G RETRACTION

L/G GRVTY EXTN FAULT

Applicable to: ALL

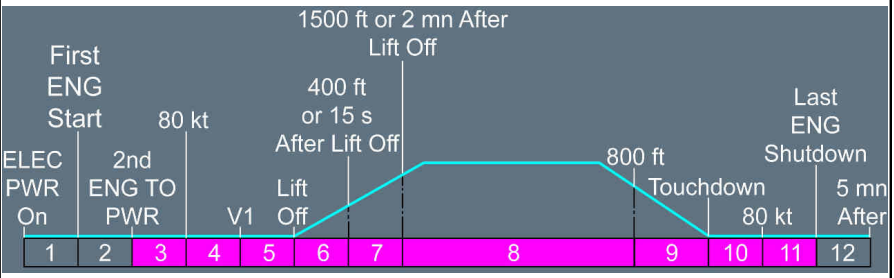
ANNUNCIATIONS

Triggering Conditions:

L2 Landing Control and Indicating System (LGCIS) 1 or LGCIS 2 senses that a Free Fall Control Module (FFCM) is not installed under MMEL dispatch condition only for flight with gear locked down, or the LGERS built-in test of the gravity extension has failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G GRVTY EXTN FAULT* .

Crew awareness.

L/G LDG WITH 1 ABNORM WING OR BODY L/G

Applicable to: ALL

L2 Apply the L/G LDG WITH 1 ABNORM WING OR BODY L/G procedure if one WLG or one BLG is not downlocked for landing.

L1

CAUTION	Do not apply this procedure if at least one green triangle is displayed by landing gear strut on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked.

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then by selecting the L/G menu.
After the flight crew activates the procedure, the WHEEL SD page automatically appears.

LDG LIMITED TO MAX LDG WEIGHT

- **IF GW DECREASE RQRD :**
  JETTISON ARM..... ON
  JETTISON ACTIVE..... ON

LDG DIST AFFECTED

Continued on the following page

L/G LDG WITH 1 ABNORM WING OR BODY L/G (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- If "LDG LIMITED TO MAX LDG WEIGHT" ticked:
  MAX LDG WEIGHT
  LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES

- If "LDG LIMITED TO MAX LDG WEIGHT" ticked:
  MAX LDG WEIGHT

L12

DEFERRED PROC

FOR APPROACH

If heavy crosswind is expected for landing with an abnormal WLG, try to select the runway that places the affected L/G, upwind.

● **If jettison is on going:**
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

LDG DIST COMPUTATION.....CONFIRM
AUTO BRK : DO NOT ARM

The flight crew will use manual braking to control the aircraft trajectory for landing. Nevertheless, try to avoid asymmetrical braking.

STATUS

INOP SYS

APPR & LDG

Continued on the following page

L/G LDG WITH 1 ABNORM WING OR BODY L/G (Cont'd)

BTV

L/G LDG WITH 2 ABNORM BODY L/Gs

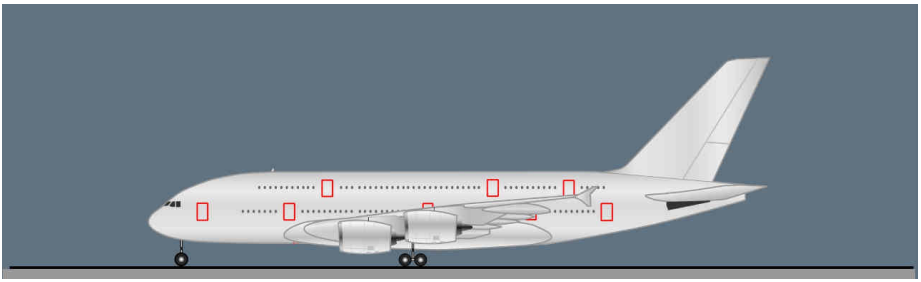
Applicable to: ALL

L2 Apply the L/G LDG WITH 2 ABNORM BODY L/Gs procedure, if both BLGs are not downlocked for landing.

L1

CAUTION	Do not apply this procedure if at least one green triangle is displayed by landing gear strut on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked.

Two Abnormal BLG



L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then by selecting the L/G menu.
After the flight crew activates the procedure, the WHEEL SD page automatically appears.

Continued on the following page

L/G LDG WITH 2 ABNORM BODY L/Gs (Cont'd)

CABIN CREW.....ADVISE

L2 *Inform the cabin crew of the nature of the emergency, the actions planned and the remaining time to prepare the cabin for landing.*

L1 ATC.....NOTIFY

L2 *Inform ATC of the nature of the emergency, and the actions planned.*

L1 LDG LIMITED TO MAX LDG WEIGHT

- **IF GW DECREASE RQRD :**
  JETTISON ARM..... ON
  JETTISON ACTIVE..... ON

- **IF CG > 37.5% :**
  TRIM TK XFR.....FWD
  OUTER TK XFR.....AS RQRD
  CG FWD SHIFT (50 PAX = 2% CG).....CONSIDER

L2 *Aim for forward CG to avoid tail strike.*
The CG shifts 2% forward when 50 passengers move from aft to forward of the wing root.
Refer to the weight and balance module for accurate calculation.

L1 LDG DIST AFFECTED

L2 *Refer to the performance module.*

Continued on the following page

L/G LDG WITH 2 ABNORM BODY L/Gs (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	2
	• If "LDG LIMITED TO MAX LDG WEIGHT" ticked: MAX LDG WEIGHT LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES
• If "LDG LIMITED TO MAX LDG WEIGHT" ticked MAX LDG WEIGHT

L12

DEFERRED PROC

FOR APPROACH

● **If jettison is on going:**
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

LDG DIST COMPUTATION.....CONFIRM
USE REVERSERS WITH CARE
After touchdown, maintain full forward stick and use reversers with care to avoid tail strike.

STATUS

INOP SYS

	APPR & LDG
	BTV

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE

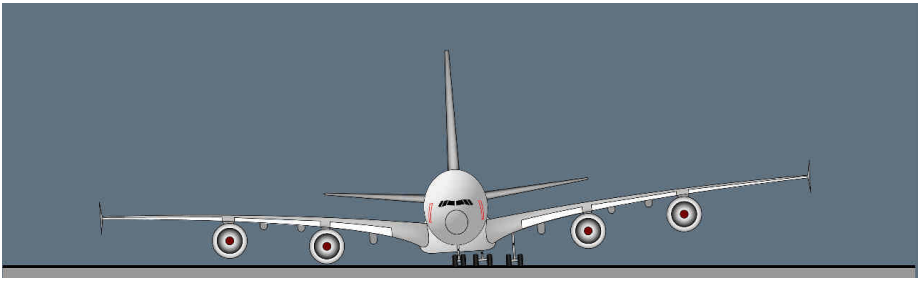
Applicable to: ALL

L2 Apply the L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE procedure, if the WLG and the BLG on the same side are not downlocked for landing.

L1		
	CAUTION	Do not apply this procedure if at least one green triangle is displayed by landing gear strut on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked.

L2 *Note:* *The flight crew should consider requesting that foam be spread on the runway.*

Abnormal Wing + Body L/G



The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the L/G menu.
After the flight crew activates the procedure, the WHEEL SD page automatically appears.

Continued on the following page

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE (Cont'd)

CABIN CREW.....ADVISE

L2 *Inform the cabin crew of the nature of the emergency, the actions planned and the remaining time to prepare the cabin for landing.*

L1 ATC.....NOTIFY

L2 *Inform ATC of the nature of the emergency, and the actions planned.*

L1 LDG LIMITED TO MAX LDG WEIGHT

- **IF GW DECREASE RQRD:**

  JETTISON ARM..... ON

  L2 *Consider jettison to a safe minimum in order to reduce the approach speed.*

  L1 JETTISON ACTIVE..... ON

OXYGEN CREW SUPPLY.....OFF

L2 *Reduces the risk of fire when the aircraft lands.*

L1 DISREGARD NORM APPR & LDG C/Ls

SIGNS.....ON

CABIN & CKPT (LOOSE EQPT)..... SECURE

LDG DIST AFFECTED

- **FOR APPROACH:**

  ECAM STS..... CHECK

  BARO REF.....SET

  MINIMA.....SET

  [MFD SURV] GPWS.....OFF

  AUTO BRK : DO NOT ARM

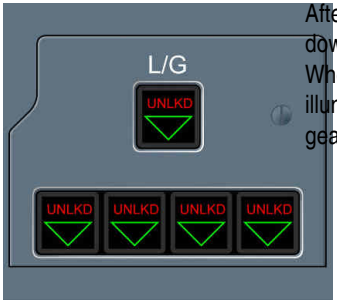
  L2 *Manual braking enables better pitch and yaw control.*

  L1 L/G GRVTY.....CHECK DOWN

Continued on the following page

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE (Cont'd)

L2



After a landing gear gravity extension, the landing gear is downlocked when the associated green triangle is illuminated. When the landing gear is downlocked, UNLKD remains illuminated together with the green triangle until the landing gear control lever is set to DOWN.

L1 L/G LEVER..... CHECK DOWN

- **If jettison is on-going:**
  - JETTISON ACTIVE..... OFF
  - JETTISON ARM..... OFF

TRIM TK FEED.....ISOL

L2 *Reduces the risk of fire when the aircraft lands.*

L1 CABIN REPORT.....OBTAIN
EMER EXIT LT.....ON
COMMERCIAL 1+2.....OFF
A/THR.....AS RQRD
FLAPS.....LDG
GND SPLRs .....ARM

- **BEFORE LANDING:**

REVERSER : DO NOT USE
BRACE FOR IMPACT..... ORDER

- **AT TOUCHDOWN:**

L2 Use the ailerons to maintain the wings level as long as possible.

L1 ENG 1 + 4 MASTERS.....OFF

- **BEFORE NACELLE IMPACT:**
  - **If left L/G affected:**
    - ENG 2 MASTER..... OFF
    - ENG 3 MASTER..... OFF

Continued on the following page

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE (Cont'd)

● **If right L/G affected:**

ENG 3 MASTER..... OFF
ENG 2 MASTER..... OFF

L2 *After all engines are shut down:*
- *The emergency braking mode activates*
- *The number of brake applications is limited*
- *The NWS is not available.*

L1 ● **WHEN AIRCRAFT STOPPED:**

PARK BRK.....ON
ALL FIRE P/Bs (ENG & APU).....PUSH

L2 *Shuts off all hydraulic supply.*

L1 ALL AGENTS (ENG & APU).....AS RQRD

● **IF EVAC RQRD:**

EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND.....ON
ALL 4 BATS..... OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

Continued on the following page

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

APPR & LDG

- If "LDG LIMITED TO MAX LDG WEIGHT" ticked:
  MAX LDG WEIGHT
  LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES

- If "LDG LIMITED TO MAX LDG WEIGHT" ticked:
  MAX LDG WEIGHT

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

STATUS

INOP SYS

APP AND LDG

BTV

L/G LDG WITH 2 ABNORM WING L/Gs

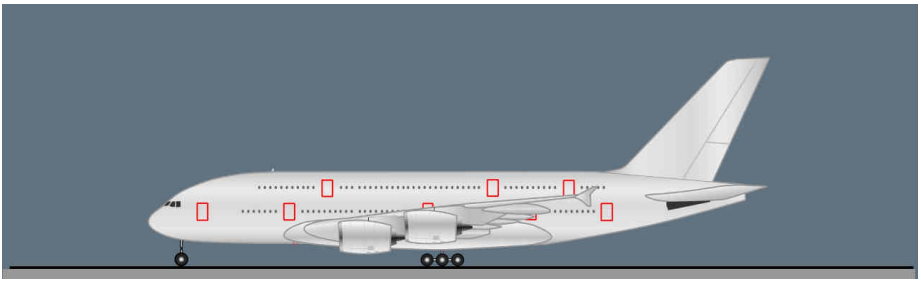
Applicable to: ALL

L2 Apply the L/G LDG WITH 2 ABNORM WING L/Gs procedure, if both WLGs are not downlocked for landing.

L1

CAUTION	Do not apply this procedure if at least one green triangle is displayed by landing gear strut on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked.

Two Abnormal WLG



L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then by selecting the L/G menu.
After the flight crew activates the procedure, the WHEEL SD page automatically appears.

CABIN CREW.....ADVISE

L2 *Inform the cabin crew of the nature of the emergency, the actions planned, and the remaining time to prepare the cabin for landing.*

L1 ATC.....NOTIFY

L2 *Inform ATC of the nature of the emergency, and the actions planned.*

L1 LDG LIMITED TO MAX LDG WEIGHT

- **IF GW DECREASE RQRD :**
  JETTISON ARM..... ON
  JETTISON ACTIVE..... ON

LDG DIST AFFECTED

Continued on the following page

L/G LDG WITH 2 ABNORM WING L/Gs (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	2
	• If "LDG LIMITED TO MAX LDG WEIGHT" ticked: MAX LDG WEIGHT LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES
• If "LDG LIMITED TO MAX LDG WEIGHT" ticked: MAX LDG WEIGHT

L12

DEFERRED PROC

FOR APPROACH

● **If jettison is on going**
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

LDG DIST COMPUTATION.....CONFIRM
FOR ROLLOUT : EXPECT ROLL INSTABILITY

When the wing landing gears are in an abnormal configuration, the trace of the remained landing gears (body lading gears) is narrow. Because of this landing gear configuration, the aircraft is unstable in roll for rollout and more sensible to lateral wind. For taxi, the flight crew should monitored the ground speed very carefully to avoid excessive taxi turn speed.

STATUS

INOP SYS

0

Continued on the following page

L/G LDG WITH 2 ABNORM WING L/Gs (Cont'd)

BTV

L/G LDG WITH ABNORM NOSE L/G

Applicable to: ALL

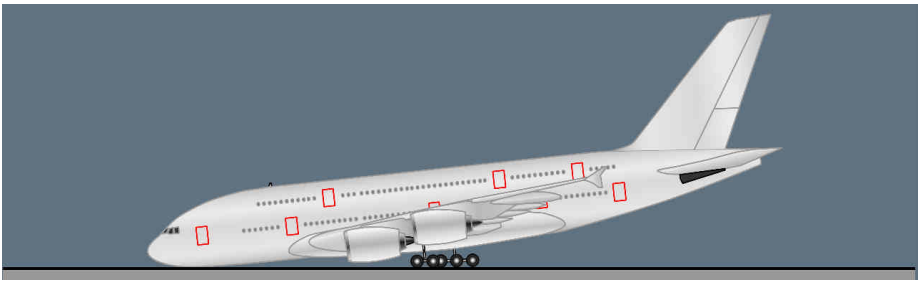
L2 Apply the L/G LDG WITH ABNORM NOSE L/G procedure, if the NLG is not downlocked for landing.

Note: The flight crew should consider requesting that foam be spread on the runway.

L1

CAUTION	Do not apply this procedure if at least one green triangle is displayed by landing gear strut on the WHEEL SD page. This is sufficient to confirm that the landing gear is downlocked.

Abnormal Nose L/G



L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then by selecting the L/G menu.
After the flight crew activates the procedure, the WHEEL SD page automatically appears.

Continued on the following page

L/G LDG WITH ABNORM NOSE L/G (Cont'd)

CABIN CREW.....ADVISE

L2 *Inform the cabin crew of the nature of the emergency, the actions planned and the remaining time to prepare the cabin for landing.*

L1 ATC.....NOTIFY

L2 *Inform ATC of the nature of the emergency, and the actions planned.*

L1 LDG LIMITED TO MAX LDG WEIGHT

- **IF GW DECREASE RQRD:**

  JETTISON ARM..... ON

  L2 *Consider jettison to a safe minimum in order to reduce the approach speed.*

  L1 JETTISON ACTIVE..... ON

OXYGEN CREW SUPPLY.....OFF

L2 *Reduces the risk of fire when the aircraft lands.*

L1 CG AFT SHIFT (50 PAX = 2% CG).....CONSIDER

L2 *Aim for aft CG in order to delay nose impact and minimize structural damages.*
The CG shifts 2 % aft when 50 passengers move from forward to aft of the wing root.
Refer to the weight and balance module for accurate calculation.

L1 DISREGARD NORM APPR & LDG C/Ls
SIGNS.....ON
CABIN & CKPT (LOOSE EQPT)..... SECURE
LDG DIST AFFECTED

- **FOR APPROACH:**

  ECAM STS..... CHECK
  BARO REF.....SET
  MINIMA.....SET

  AUTO BRK : DO NOT ARM

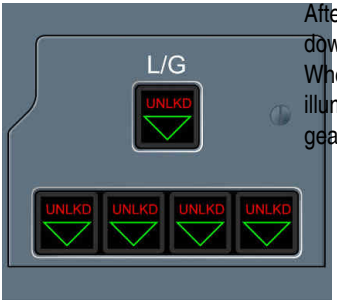
  L2 *Manual braking enables better pitch and yaw control.*

  L1 L/G GRVTY.....CHECK DOWN

Continued on the following page

L/G LDG WITH ABNORM NOSE L/G (Cont'd)

L2



After a landing gear gravity extension, the landing gear is downlocked when the associated green triangle is illuminated. When the landing gear is downlocked, UNLKD remains illuminated together with the green triangle until the landing gear control lever is set to DOWN.

L1 L/G LEVER..... CHECK DOWN

- **If jettison is on-going:**
  JETTISON ACTIVE..... OFF
  JETTISON ARM..... OFF

TRIM TK FEED.....ISOL

L2 *Reduces the risk of fire when the aircraft lands.*

L1 CABIN REPORT.....OBTAIN
EMER EXIT LT.....ON
COMMERCIAL 1+2.....OFF
A/THR.....AS RQRD
FLAPS.....LDG
GND SPLRs .....ARM

- **BEFORE LANDING:**

RAM AIR.....ON

REVERSERS : DO NOT USE
BRACE FOR IMPACT..... ORDER

- **BEFORE NOSE IMPACT:**

L2 After touchdown:
- Use the elevators to keep the nose off the runway
- Adapt braking to the efficiency of the elevators
- Lower the nose on the runway before elevator control is lost.

When the nose is on the runway:
- Resume braking as necessary

Continued on the following page

L/G LDG WITH ABNORM NOSE L/G (Cont'd)

- Use differential braking to steer the aircraft
- Maintain the stick in the full back position to minimize structural damage.

L1 ALL ENG MASTERS..... OFF

L2 *After all engines are shut down, the emergency braking mode activates, and the number of brake applications is limited.*

L1 ● **WHEN AIRCRAFT STOPPED:**

PARK BRK.....ON
ALL FIRE P/Bs (ENG & APU).....PUSH

L2 *Shuts off all hydraulic supply.*

L1 ALL AGENTS (ENG & APU).....AS RQRD

● **IF EVAC RQRD:**

EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND.....ON
ALL 4 BATs ..... OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

L1 ● **IF EVAC NOT RQRD:**

CABIN CREW.....ADVISE

Continued on the following page

L/G LDG WITH ABNORM NOSE L/G (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	• If "LDG LIMITED TO MAX LDG WEIGHT" ticked: MAX LDG WEIGHT LDG DIST AFFECTED

LIMITATIONS ON PFD

ALL PHASES	
• if "LDG LIMITED TO MAX LDG WEIGHT" ticked: MAX LDG WEIGHT	

DEFERRED PROC

FOR APPROACH

LDG DIST COMPUTATION.....CONFIRM

STATUS

INOP SYS

	APPR & LDG
	BTV

L/G OLEO PRESS MONITORING SYS FAULT

Applicable to: ALL

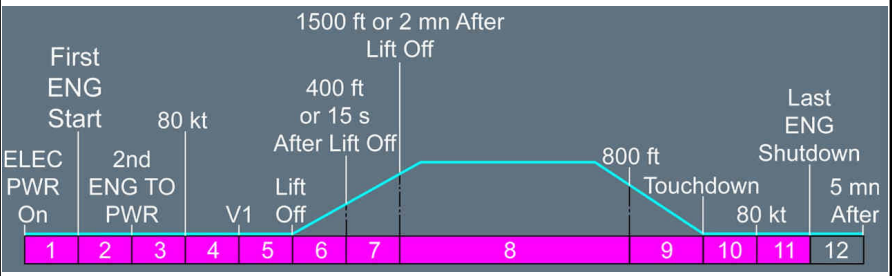
ANNUNCIATIONS

Triggering Conditions:

L2 The Oleo Pressure Monitoring System (OPMS) is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G OLEO PRESS MONITORING FAULT* .

Depending on the failure, one or more messages may appear:

- ON NOSE L/G
- ON L WING L/G
- ON R WING L/G
- ON L BODY L/G
- ON R BODY L/G

Continued on the following page

L/G OLEO PRESS MONITORING SYS FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

OLEO PRESS MONIT SYS

L/G RETRACTION FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The landing gear lever is in the UP position, and one or more landing gears are not in the normal retraction configuration, i.e.:

- Shock absorber not fully extended, or
- Nose wheel not centered, or
- Body wheel steering not locked, or
- Wing or body landing gears not tilted.

Indications:

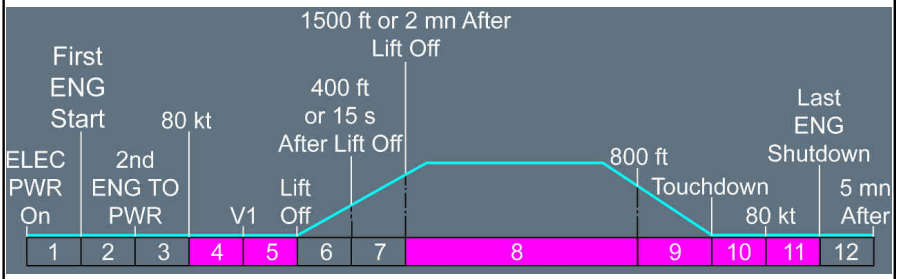
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G RETRACTION FAULT*).

Continued on the following page

L/G RETRACTION FAULT (Cont'd)

Crew Awareness

- **If in flight:**
  - **If speed is below 250 kt or M 0.55:**

    MAX SPEED : 250/.55

    L/G..... RECYCLE

L2 *The active LGCIS changes when the landing gear is recycled.*
Recycle one time only.

L1
- **IF NOT SUCCESSFUL**

  L/G : KEEP DOWN

  - **If speed is above 250 kt or M 0.55:**

    SPEED..... REDUCE BELOW 250/.55

    L/G..... RECYCLE

L2 *The active LGCIS changes when the landing gear is recycled.*
Recycle one time only.

L1
- **IF NOT SUCCESSFUL**

  L/G : KEEP DOWN

  MAX SPEED : 250/.55

  - **If at least one BLG door is not folded:**

    MAX SPEED : 250/.55

Continued on the following page

L/G RETRACTION FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If in flight :
  MAX SPEED : 250/.55
  L/G : KEEP DOWN

L12

STATUS

INOP SYS

ALL PHASES

L/G RETRACTION

INFO

- If at least one engine is running :
  FUEL CONSUMPT INCRSD : FMS PRED DISREGARD

If the flight is continued (to destination or to alternate):
- *Disregard FMS fuel predictions. Refer to the performance module for fuel predictions*
- *Disregard FMS altitude and speed predictions. Time predictions are valid only in cruise*
- *Do not use the managed speed mode (except in approach)*
- *Do not use the CLB and the DES autopilot modes.*

In the case of L/G retraction fault alert situation, a landing gear may remain partially or fully extended.
In the case of only one landing gear affected, fuel consumption is increased by approximately 20 %.
In the case of 2 or more landing gear affected, fuel consumption is increased by 110 %.

L/G SYSTEM DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The position sensed by any proximity sensor of Landing Gear Control and Indicating System (LGCIS) 1 is not consistent with the position sensed by the redundant proximity sensor of LGCIS 2.

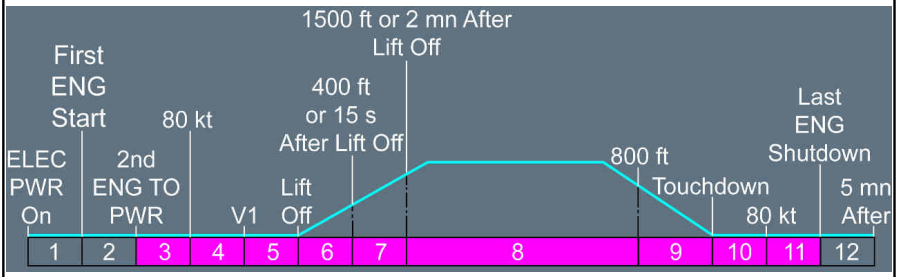
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G SYSTEM DISAGREE* .

Crew awareness.

L/G WEIGHT ON WHEELS FAULT

Applicable to: ALL

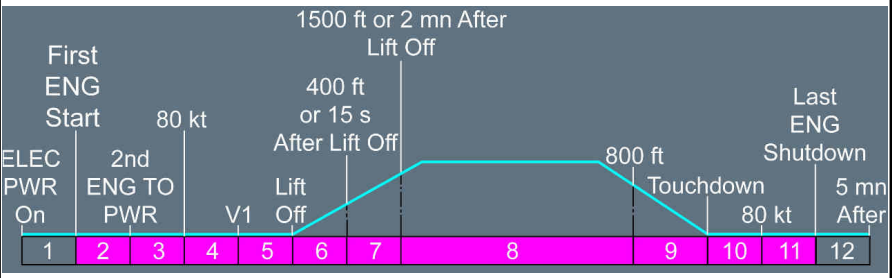
ANNUNCIATIONS

Triggering Conditions:

L2 Several proximity sensors are failed, and the Landing Gear Control and Indication System (LGCIS) cannot compute the ground/flight condition.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-3 L/G WEIGHT ON WHEELS FAULT* .

Crew awareness.

STEER ALTN N/W STEER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The alternate nose wheel steering mode is failed.

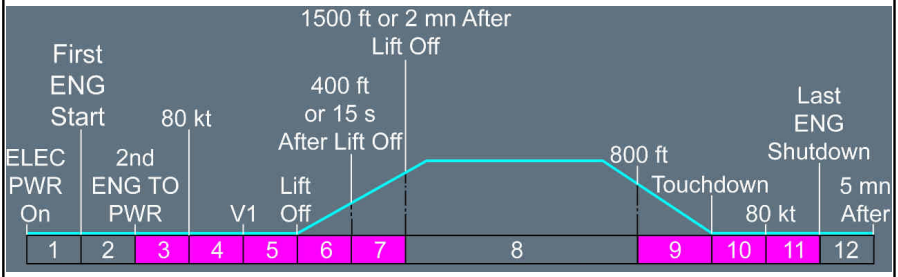
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER ALTN N/W STEER FAULT*).

Crew awareness.

L2 Normal nose wheel steering is still available.

Continued on the following page

STEER ALTN N/W STEER FAULT (Cont'd)

MORE INFO

REDUND LOSS

ALTN N/W STEER

STEER ALTN STEER SYS HOT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The hydraulic fluid of the nose wheel steering LEHGS is abnormally hot.

Indications:

Audio



Master Light

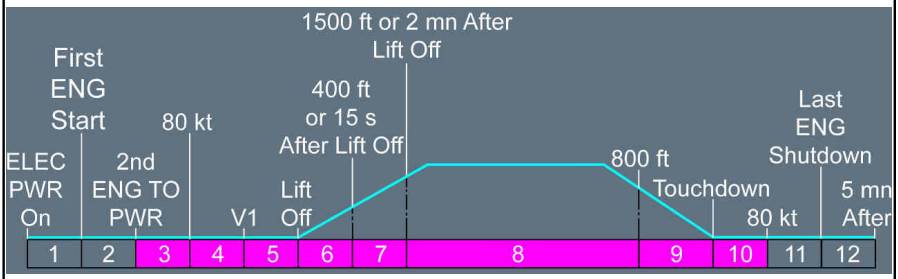


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER ALTN STEER SYS HOT* .

Continued on the following page

STEER ALTN STEER SYS HOT (Cont'd)

EXPECT N/W STEER LOSS

L2 Alternate nose wheel steering remains available but expect the failure of the nose wheel steering any time. Consider asking for a tug to tow the aircraft back to the gate.

STEER B/W STEER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The body wheel steering is failed in the centered and locked position.

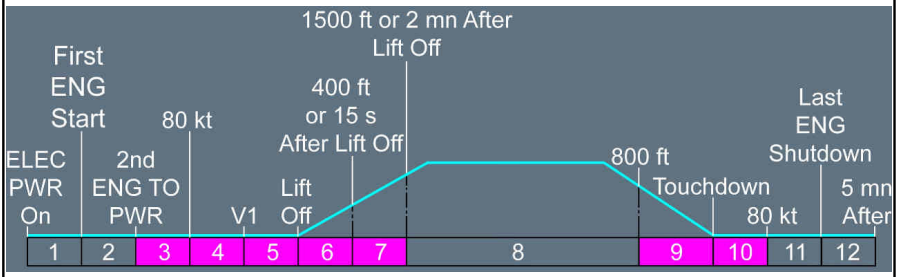
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER B/W STEER FAULT* .

Continued on the following page

STEER B/W STEER FAULT (Cont'd)

Crew awareness.

L12

STATUS

INOP SYS

APPR AND LDG

B/W STEER

INFO

- If at least one engine is running:
  TAXI WITH CARE

When the body wheel steering is inoperative:
- *The body landing gear aft wheels remain centered and locked*
- *Wheel skid and turn radius are increased.*

As a consequence:
- *Do not perform brake pivot turn*
- *On wet or contaminated runways, minimize the tiller angle.*

AVOID MAX TILLER ANGLE TURN ON WET/CONTAM RWY
NO BRAKED PIVOT TURN

STEER B/W STEER NOT LOCKED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One or both body wheel steering locking mechanisms are failed, and the associated body wheel axel(s) is(are) not centered and locked.

L3 *Refer to DSC-32-10-40-30 Lock Selector Valve* .

Indications:

L2

Audio



Master Light

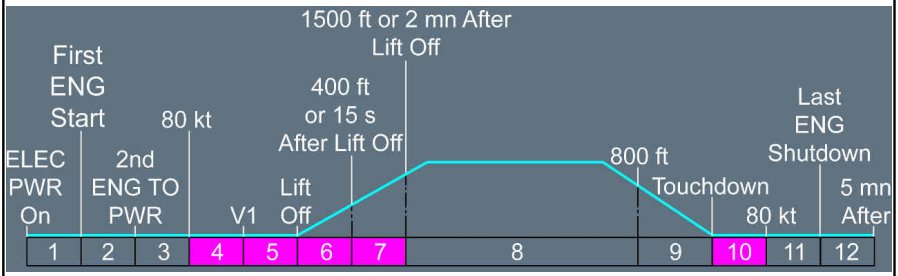


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER B/W STEER LOCKING FAULT(NOT LOCKED)* .

Continued on the following page

STEER B/W STEER NOT LOCKED (Cont'd)

B/W STEER NOT CENTERED

- **If all L/G are already locked down when the alert is activated, and at least one engine is running:**
  NO L/G RETRACTION

L2 If this alert is generated in flight, consider the impossibility to extend the landing gear, or expect BLG shimmy after touchdown.

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If all L/G are already locked down when the alert is activated, and if at least one engine is running:
  NO L/G RETRACTION

STATUS

INOP SYS

APPR_AND_LDG

B/W STEER

INFO

- If at least one engine is running:
  TAXI WITH CARE
  AVOID MAX TILLER ANGLE TURN ON WET/CONTAM RWY
  NO BRAKED PIVOT TURN

STEER CAPT(FO) STEER TILLER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Captain's or the First Officer's steering handwheel is failed.

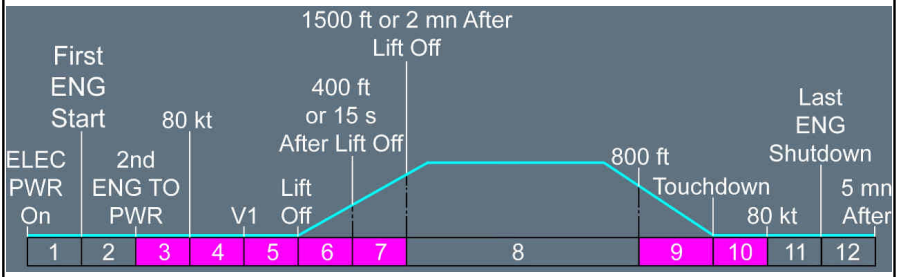
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER CAPT STEER TILLER FAULT* .

Crew awareness.

Continued on the following page

STEER CAPT(FO) STEER TILLER FAULT (Cont'd)

STATUS

INOP SYS

	0
	CAPT(FO) STEER TILLER

STEER STEER CTL 1 (2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

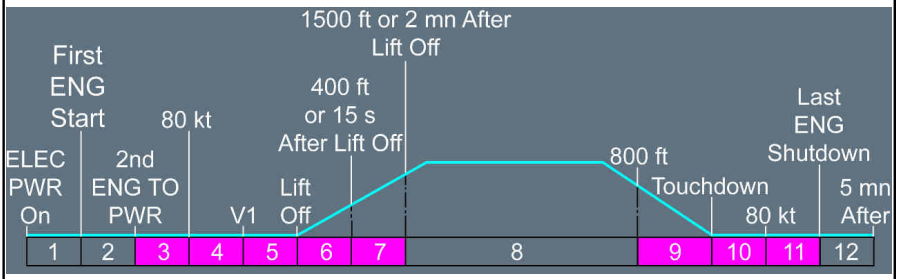
L2 Steering Control System (SCS) 1 or SCS 2 is failed.
For information on the SCS , *Refer to DSC-32-10-40-10 Steering Control System* .
Indications:

SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

STEER STEER CTL 1 (2) FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER CTL 1(2) FAULT*

Crew awareness.

L2 The NWS and the BWS are still available.

MORE INFO

REDUND LOSS

STEER CTL 1 (2)

STEER N/W + B/W STEER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - Steering Control System (SCS) 1 and SCS 2 are failed, or
- Both the NWS and the BWS are failed.

For information on the SCS, *Refer to DSC-32-10-40-10 Steering Control System* .

Indications:

Audio



Master Light

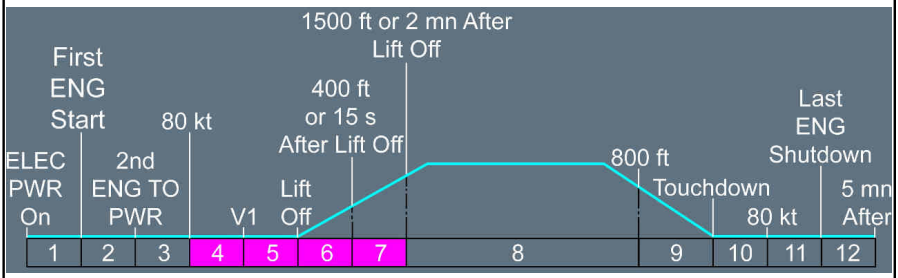


SD page



WHEEL SD Page

Flight Phase Inhibition:



Crew awareness.

L2 For landing, use rudder and differential braking to steer the aircraft on the runway because the nose landing gear is free to caster.
After landing, the aircraft has to be towed out of the runway.

Continued on the following page

STEER N/W + B/W STEER FAULT (Cont'd)

STATUS

INOP SYS

APPR_AND_LDG

N/W + B/W STEER
CAT 3 DUAL

INFO

CAT 3 SINGLE ONLY

STEER N/W STEER ANGLE LIMIT EXCEEDED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The nose wheel steering angle has exceeded the maximum value (73.5 °).

Indications:

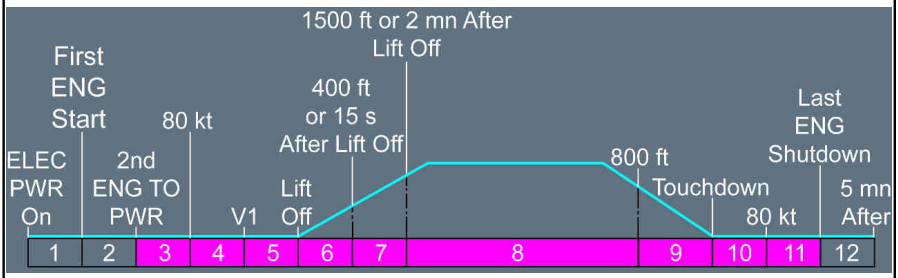
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER N/W STEER ANGLE LIMIT EXCEEDED* .

POTENTIAL DAMAGE TO NOSE L/G

STEER N/W STEER DISC FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The nose wheel steering cannot be disconnected via the TOW sw, on the steering nose gear panel.

Indications:

Audio



Master Light

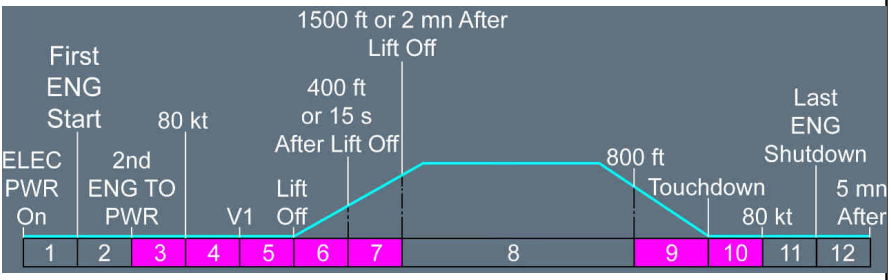


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER N/W STEER DISC FAULT*

- **On ground:**
  N/W STEER POWERED

L2 Unless the GREEN hydraulic system is not pressurized, the aircraft cannot be towed or pushed back to prevent any damage to the nose landing gear.

L1 IF TOW : ALL ENG MASTERS OFF

Continued on the following page

STEER N/W STEER DISC FAULT (Cont'd)

STATUS

INOP SYS

0

N/W STEER DISC

INFO

- On ground :
  N/W STEER POWERED

STEER N/W STEER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The normal and alternate nose wheel steering modes are failed.

Indications:

Audio



Master Light

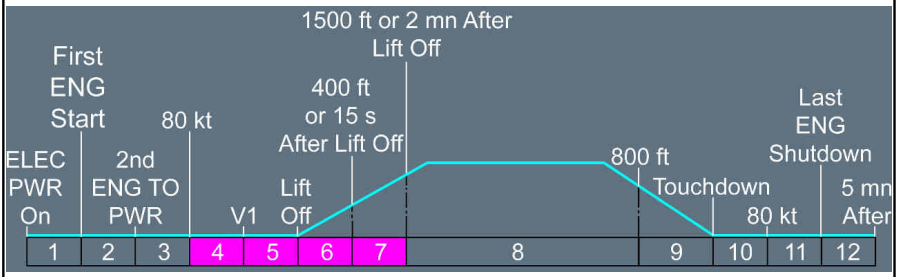


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER N/W STEER FAULT*

Crew awareness.

L2 For landing, use rudder and differential braking to steer the aircraft on the runway because the nose landing gear is free to caster.
After landing, the aircraft has to be towed out of the runway.

Continued on the following page

STEER N/W STEER FAULT (Cont'd)

STATUS

INOP SYS

0

N/W STEER
CAT 3 DUAL

INFO

B/W STEER AVAIL FOR TOW & PUSHBACK
CAT 3 SINGLE ONLY

STEER N/W STEER NOT DISC

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight crew is warned that the nose wheel steering is still connected before aircraft towing.
Prior aircraft towing, the nose wheel steering has to be disconnected.

Indications:

Audio



Master Light

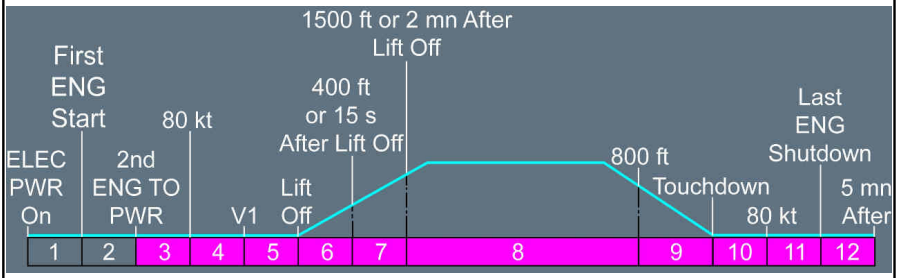


SD page



WHEEL SD Page

Flight Phase Inhibition:



N/W STEER POWERED
IF TOW : ALL ENG MASTERS OFF

STATUS

INFO

N/W STEER POWERED

STEER NORM N/W STEER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The normal nose wheel steering mode is failed.

Indications:

Audio



Master Light

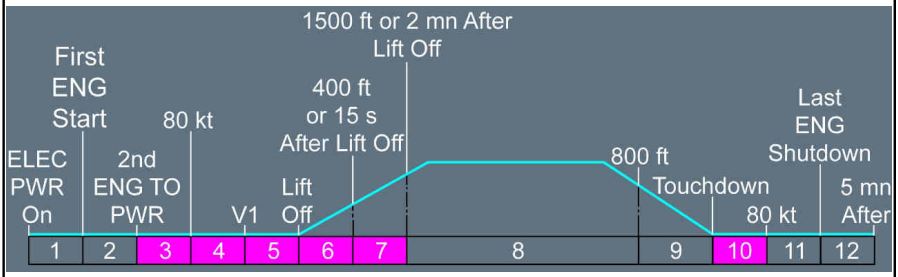


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER NORM N/W STEER FAULT* .

Continued on the following page

STEER NORM N/W STEER FAULT (Cont'd)

FOR TAXI : STEER ENDURANCE LIMITED

L2 Alternate nose wheel steering is still available.

In alternate steering:
- The flight crew can steer the aircraft during landing and taxi for a limited time, then, the N/W steering overheats
- The maximum steering rate is limited to 10 °/s (normally 15 °/s)
- Damping of the CAPT and the F/O tillers is increased to prevent the flight crew from commanding excessive steering rates.

LIMITATIONS

LIMITATIONS ON ECAM

	APPR AND LDG
	STEER ENDUR LIMITED

STATUS

INOP SYS

	APPR AND LDG
	NORM N/W STEER

STEER PEDAL STEER CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The steering system does not receive the steering orders from the rudder pedals.

Indications:

Audio



Master Light

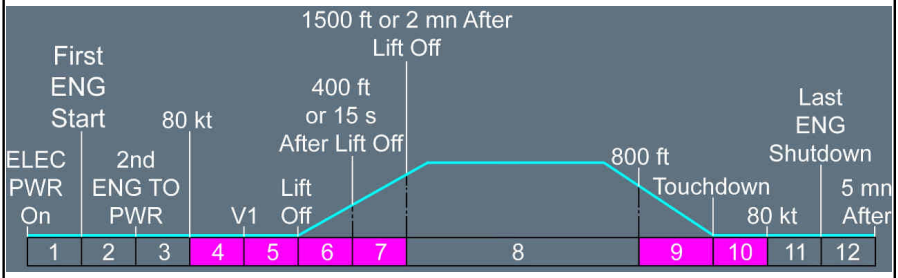


SD page



WHEEL SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER PEDAL STEER CTL FAULT* .

Crew awareness.

L2 Ground directional control for taxi is available, via the Captain's and the First Officer's steering handwheels.

Continued on the following page

STEER PEDAL STEER CTL FAULT (Cont'd)

STATUS

INOP SYS

PEDAL STEER CTL	0

STEER STEER SEL VLV JAMMED OPEN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The steering system remains pressurized when it should not be.

L3 A nose wheel or body wheel steering selector valve is jammed open .

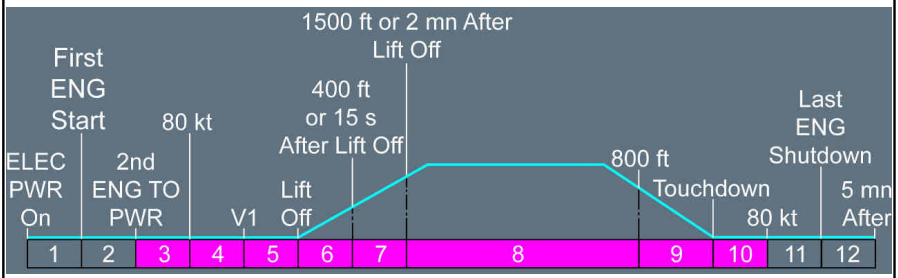
For information on the normal selector valve, *Refer to DSC-32-10-40-20 Normal Selector Valve* .

For information on the alternate selector valve, *Refer to DSC-32-10-40-20 Alternate Selector Valve* .

For information on the BWS selector valve, *Refer to DSC-32-10-40-30 BWS Selector Valve* .

Indications:

Flight Phase Inhibition:



Continued on the following page

STEER STEER SEL VLV JAMMED OPEN (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-2 STEER SEL VLV JAMMED OPEN* .

L2 The nose wheel steering and the body wheel steering are still available.

L1
- **If the normal or the alternate N/W steering selector valves is stuck open**
  N/W STEER POWERED
- **If only the normal N/W steering selector valve is stuck open**
  IF TOW : ALL ENG MASTERS OFF
- **If the alternate N/W steering selector valve is stick open**
  NO TOWING

STATUS

INFO

- If the normal or the alternate N/W steering selector valves is stuck open
  N/W STEER POWERED

SURV ROW/ROP LOST

Applicable to: ALL

SURV ROW/ROP LOST (*Refer to procedure*)

WHEEL TIRE PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Any of the following events occurs:

- Any tire pressure is lower than the minimum value

L3 The minimum value is a percentage of the normal tire pressure:

L3 - 11 % during flight phases 1 to 5

L3 - 26 % during flight phases 6 to 11.

The normal tire pressure is 217.5. PSI

L2 - The pressures of two tires on the same axle are different.

L3 The minimum difference that triggers the alert is:

L3 - 15 % during flight phases 1 to 5

L3 - 21 % during flight phases 6 to 11.

Indications:

L2

Audio



Master Light

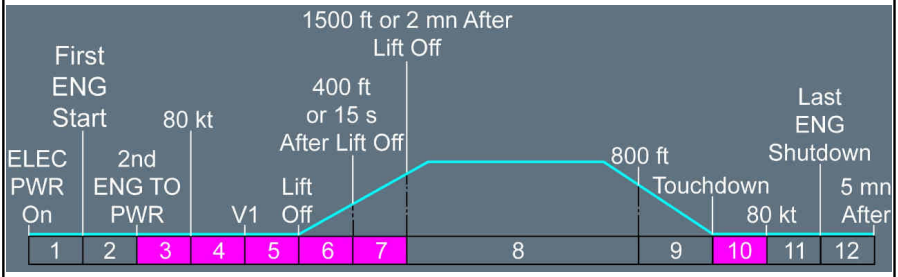


SD page



WHEEL SD Page

Flight Phase Inhibition:



Continued on the following page

WHEEL TIRE PRESS LO (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-32-4 WHEEL TYRE PRESS LO* .

Crew awareness.

Lights

CABIN EMER EXIT LT FAULT

Applicable to: ALL

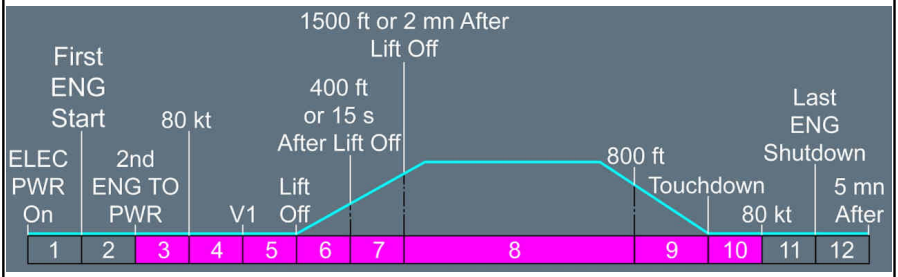
ANNUNCIATIONS

Triggering Conditions:

L2 The Cabin Emergency Lighting System is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/Emergency Lighting* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES

EMER EXIT LT

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34-Navigation

NAV ADR 1(2)(3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ADR part of ADIRU 1(2)(3) is failed.

Indications:

Audio



Master Light

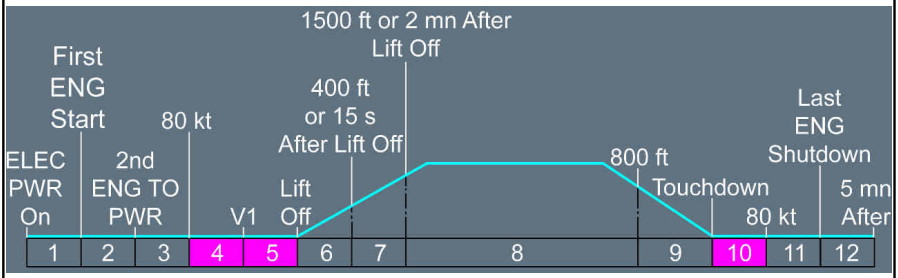


Local light



ADR1(2)(3) pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ADR 1(2)(3) FAULT*.

Continued on the following page

NAV ADR 1(2)(3) FAULT (Cont'd)

■ **If ADR 1 is affected :**

AIR DATA SWTG.....CAPT ON 3

L2 *Select ADR 3 to captain side.*

L1 ADR 1 P/B.....OFF

■ **If ADR 2 is affected :**

AIR DATA SWTG.....F/O ON 3

L2 *Select ADR 3 to first officer side.*

L1 ADR 2 P/B.....OFF

■ **If ADR 3 is affected :**

AIR DATA SWTG.....NORM

ADR 3 P/B.....OFF

● **After landing, if ADR 1 or ADR 3 failed:**

BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Following an ADR 1 or ADR 3 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.*

Continued on the following page

NAV ADR 1(2)(3) FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
ADR 1(2)(3)	GPWS 1 (If ADR 1 is failed)
TCAS 1 (If ADR 1 is failed)	GPWS 2 (If ADR 2 is failed)
TCAS 2 (If ADR 2 is failed)	CAT 3 DUAL

Note: The INOP SYS GPWS 1 and TCAS 1 (GPWS 2 and TCAS 2) appear as long as ADR 3 has not been selected on CAPT (F/O) side.

INFO

CAT 3 SINGLE ONLY

NAV ADR 1+2 (1+3) (2+3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ADR part of ADIRU 1+2 (1+3) (2+3) is failed.

Indications:

Audio



Master Light

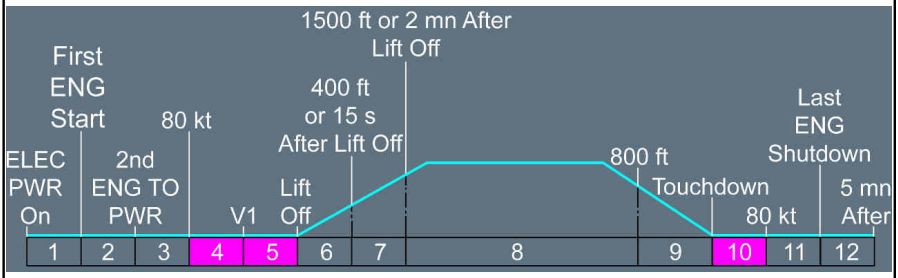


Local light



ADR 1 pb and ADR 3 pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ADR 1+2(1+3)(2+3) FAULT* .

Continued on the following page

NAV ADR 1+2 (1+3) (2+3) FAULT (Cont'd)

■ **If ADR 1 and ADR 2 are affected :**

AIR DATA SWTG.....CAPT ON 3
ADR 1 P/B.....OFF
ADR 2 P/B.....OFF

● **If WXR / TAWS or XPDR / TCAS are selected on SYS 2:**

L2 When ADR 1+2 are lost and AIR DATA selector is set to CAPT ON 3, only SURV SYS 1 is available.

L1 WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1

■ **If ADR 1 and ADR 3 are affected :**

AIR DATA SWTG.....NORM
ADR 1 P/B.....OFF
ADR 3 P/B.....OFF

● **If WXR / TAWS or XPDR / TCAS are selected on SYS 1:**

L2 When ADR 1+3 are lost only SURV SYS 2 is available.

L1 WXR & TAWS.....SYS 2
XPDR & TCAS.....SYS 2

■ **If ADR 2 and ADR 3 are affected :**

AIR DATA SWTG.....NORM
ADR 2 P/B.....OFF
ADR 3 P/B.....OFF

● **If WXR / TAWS or XPDR / TCAS are selected on SYS 2:**

L2 When ADR 2+3 are lost, only SURV SYS 1 is available.

L1 WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1

● **After landing :**

BEFORE LAST ENG STOP : ELEC EXT PWR ON

L2 *Following an ADR 1 or ADR 3 failure in flight, the APU GEN B does not connect after engines shutdown. On ground, the flight crew should connect and supply the aircraft with the external power units before the last engine is shutdown. This ensures that the aircraft electrical network is entirely supplied.*

Continued on the following page

NAV ADR 1+2 (1+3) (2+3) FAULT (Cont'd)

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 2. AP and FD are not available.

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
F / CTL PROT	BTV
AP 1+2	ROW/ROP
FD 1+2	CAT 2
ADR 1+2 (If ADR 1 and 2 are failed)	GLS AUTOLAND
TCAS 2 (If ADR 1 and 2 are failed)	GPWS 2 (If ADR 1+2 or 2+3 are failed)
ADR 1+3 (If ADR 1 and 3 are failed)	GPWS 1 (If ADR 1 and 3 are failed)
TCAS 1 (If ADR 1 and 3 are failed)	
ADR 2+3 (If ADR 2 and 3 are failed)	
TCAS 2 (If ADR 2 and 3 are failed)	

Note: *When ADR 1+2 are failed, the INOP SYS TCAS 1+2 and GPWS 1+2 are replaced by TCAS 2 and GPWS 2 since SURV systems on captain's side are recovered after the action AIR DATA SWTG ..... CAPT ON 3.*

INFO

ALTN LAW : PROT LOST
FLS LIMITED TO F-APP + RAW

NAV ADR 1+2+3 DATA DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A damage is detected on the three left or the three right static pressure probes.
It may be an indication of a bird strike.

Indications:

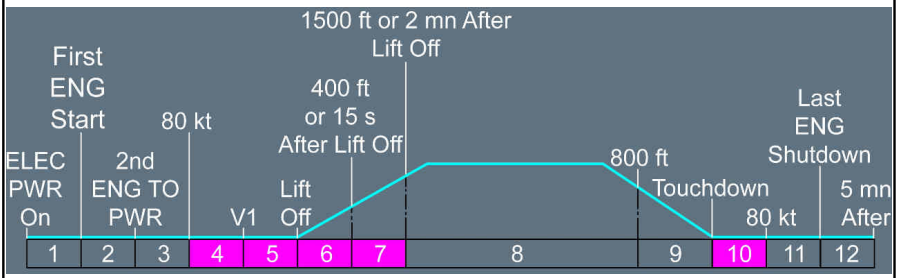
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ADR 1+2+3 DATA DEGRADED* .

L1 The RVSM capacity is degraded since altitudes computed by the ADR s are degraded.
For information on RVSM abnormal procedures, *Refer to PRO-SPO-RVS-GPROC Abnormal and Emergency* .

USE STBY INSTRUMENTS
[MFD SURV] ALT RPTG.....OFF
The flight crew has to disconnect the Altitude Reporting because the altitude provided may be erroneous.

NAV ADR 1+2+3 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - A triple "internal" ADR failure (i.e. The ADR part of ADIRU 1, 2 and 3 are failed, or
- Three ADRs are set to OFF (not authorized if not requested by an procedure), or
- An anemometric failure detection on the three ADRs.

L3 The ADIRUs triggers this alert.

Indications:

L2

Audio



Master Light

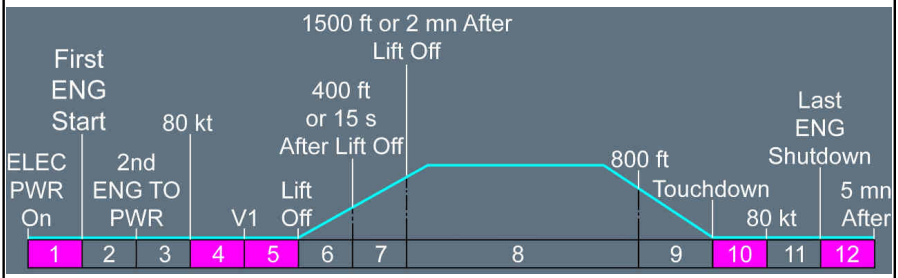


Local light



ADR pb

Flight Phase Inhibition:



Continued on the following page

NAV ADR 1+2+3 FAULT (Cont'd)

L2 If the alert triggers due to a triple “internal” ADR failure or because the three ADRS are OFF, the procedure requests to:

- Use Standby Flight Display (SFD) of the ISIS
- Set all ADR s to OFF to display the backup scales (i.e BUSS and GPS altitude) on the PFD .

If the alert triggers due to an anemometric failure detection on the three ADR s, the procedure request to:

- Apply immediate pitch attitude and thrust values
  These values allow safe flight conditions to be rapidly established in all flight phases (takeoff, climb, cruise) and aircraft configurations (weight and slats/flaps setting).
- Set all ADR s to OFF to display the backup scales (i.e BUSS and GPS altitude) available on the PFD .
- The SFD of ISIS may be reliable.

Note: *If the flight crew sets the three ADR s to OFF during an UNRELIABLE AIR SPEED INDICATION or an ALL AIR DATA DISAGREE procedure the NAV ADR 1+2+3 FAULT alert is inhibited.*

The flight control law reverts to direct law.
For more information on the backup scales *Refer to DSC-31-20-20-130-10 Backup Scales* .
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ADR 1+2+3 FAULT* .

Continued on the following page

NAV ADR 1+2+3 FAULT (Cont'd)

■ **In the case of triple internal ADR failure:**

USE STBY INSTRUMENTS
ADR 1+2+3 P/B s .....OFF

L2 *Set all ADR s to OFF, in order to replace the PFD 's normal speed scale and altitude indication by the backup scales (i.e. BUSS and GPS altitude). For more information on the backup speed and altitudes scales, Refer to DSC-31-20-20-130-10 Backup Scales .*

L1 PFD BKUP SPEED & ALT AVAIL

CAUTION	*The PFD displays a GPS altitude.*

■ **In the case of triple ADR anemometric failure detection:**

■ **Before thrust reduction:**

ALL THR LEVERS..... TOGA

Apply the following PITCH ATTITUDE TRGT :

GPS Altitude	*Below 10 000 ft*	*Above 10 000 ft*
Pitch	*12.5 °*	*10 °*

Only the appropriate action is displayed on the ECAM .

■ **After thrust reduction:**

ALL THR LEVERS..... CLB

Apply the following PITCH ATTITUDE TRGT :

GPS Altitude	*Below 10 000 ft*	*Between 10 000 ft and 25 000 ft*	*Above 25 000 ft*
Pitch	*12.5 °*	*10 °*	*5 °*

Only the appropriate action is displayed on the ECAM .

FLAPS & L/G : MAINTAIN CURRENT CONF
SPEED BRAKES.....CHECK RETRACTED
ADR 1+2+3 P/B s .....OFF

L2 *Set all ADR s to OFF, in order to replace the PFD 's normal speed scale and altitude indication by the backup scales (i.e. BUSS and GPS altitude). For more information on the backup speed and altitudes scales, Refer to DSC-31-20-20-130-10 Backup Scales .*

L1 SPEED.....FLY THE GREEN

L2 *Fly within the green area of the speed scale to ensure safe flight.*
For slats/flaps retraction, it is better to fly at the top of the green area of the speed scale.

Continued on the following page

NAV ADR 1+2+3 FAULT (Cont'd)

Before extending the slats/flaps, it is better to fly at the bottom of the speed scale green area, and to be in straight flight.

L1 STBY INSTRUMENTS : MAY BE RELIABLE

SPD BRK : DO NOT USE

L2 *The BUSS is tuned for the aerodynamic model with the speed brake retracted. The flight crew must not extend the speed brake because it would affect the relation between Angle of Attack and airspeed, therefore making the BUSS unreliable.*

L1 ● **If the heating of two MFP s is failed:**

AVOID ICING COND s

CABIN ALT MODE..... MAN

L2 *The flight crew manually controls the cabin altitude.*

L1

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700
250	2900
200	2150
150	1500
100	900

CABIN ALT TRGT..... AS RQRD

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

● **AT TOP OF DESCENT**

CABIN ALT TRGT..... LDG ELEVN

Continued on the following page

NAV ADR 1+2+3 FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

SPD BRK : DO NOT USE
- If the heating of two MFPs is failed
  AVOID ICIND CONDs

LIMITATIONS ON PFD

ALL PHASES

SPD BRK : DO NOT USE
- If the heating of two MFPs is failed
  AVOID ICIND CONDs

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
AP 1+2
A/THR
FD 1+2
ADR 1+2+3
TCAS 1+2
CAB PRESS AUTO CTL

APPR & LDG

CAT 2
GLS AUTOLAND
TAWS 1+2
REACTIVE W/S DET

INFO

DIRECT LAW : PROT LOST
PFD BKUP SPEED & ALT AVAIL

ACFT FL	CABIN ALT TRGT
430	8000
400	7000
350	5500
300	3700

Continued on the following page

NAV ADR 1+2+3 FAULT (Cont'd)

250	2900
200	2150
150	1500
100	900

NAV AIR DATA DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A conflict is detected by the PRIM s concerning one air data parameter (CAS , P_S , Mach or pressure altitude) between one source (ADIRS or ISIS) and :

- The three other ones (which are coherent), or
- The two other available ones, knowing that the fourth one (ADIRS or ISIS) has already been rejected before.

Note: It can also be understood as a degradation of the previous scenario, or to the same scenario in the case of one ADIRS MMEL .

For more information on ADR monitoring by PRIMs, *Refer to DSC-34-10-30-10-20 PRIM Monitoring .*

Indications:

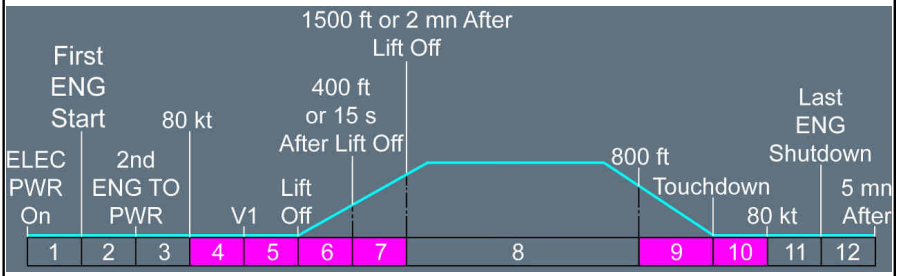
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV AIR DATA DISAGREE .*

Continued on the following page

NAV AIR DATA DISAGREE (Cont'd)

■ **If ADR 1 rejected by PRIMs:**
ADR 1 REJECTED BY PRIMs

■ **If ADR 2 rejected by PRIMs:**
ADR 2 REJECTED BY PRIMs

■ **If ADR 3 rejected by PRIMs:**
ADR 3 REJECTED BY PRIMs

■ **If standby instruments rejected by PRIMs:**
STBY INSTRUMENTS REJECTED BY PRIMs

● **If two air data sources are rejected by PRIMs:**
RISK OF UNDUE OVERSPEED WARNING

AIR DATA..... XCHECK

● **If ADR 1(2)(3) rejected by PRIMs:**
AIR DATA SWTG.....AS RQRD

STATUS

INFO

- If two air data sources are rejected by PRIM s
  RISK OF UNDUE OVERSPEED WARNING

NAV ALL AIR DATA DISAGREE
ALL AIR DATA REJECTED BY PRIMs

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight control computers detect that one air data parameter (e.g. CAS, Mach number, Static pressure) is not consistent between all air data sources (ADRs and ISIS), without being able to determine which air data source is unreliable.

Indications:

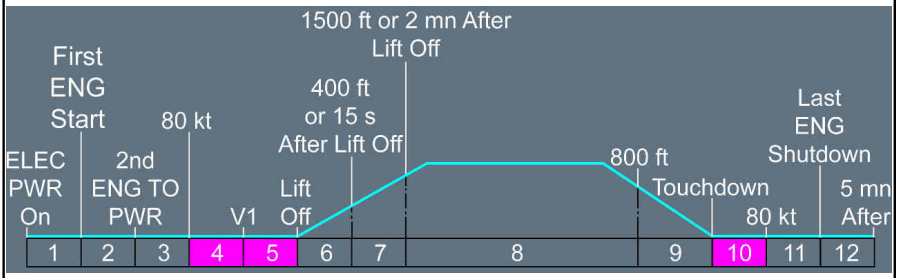
Audio



Master Light



Flight Phase Inhibition:



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NAV ALL AIR DATA DISAGREE (Cont'd)

ALL AIR DATA REJECTED BY PRIMs

L2 The flight control computers reject erroneous speed or altitude source (ADR and/or ISIS) that provides a significant difference. However the NAV ALL AIR DATA DISAGREE alert triggers when the flight control computers are not able to identify the unreliable sources.
For more information on ADR monitoring by PRIM s *Refer to DSC-34-10-30-10-20 PRIM Monitoring* .
For more information on unreliable airspeed or altitude indications, *Refer to DSC-34-10-30-40 Unreliable airspeed or altitude indications* .
The flight control law reverts to direct law, and remain in direct law until the end of the flight.

The procedure includes the following main steps:

- Apply immediate pitch attitude and thrust values
  The flight crew must apply these immediate actions if safe conduct of the flight is impacted.
  The pitch attitude and thrust values allow safe flight conditions to be rapidly established in all flight phases (takeoff, climb, cruise) and aircraft configurations (weight and slats/flaps setting).
  In the mean time a quick troubleshooting may help determine whether or not one air data source (i.e. ADR or ISIS) is reliable.
- If no air data is reliable:
  - Below FL 250 : Switch off the three ADR s to display the backup scales on the PFD (i.e. BUSS and GPS altitude scale) and fly the green area of the speed scale
  - Above FL 250 : Fly pitch and thrust.

L23

Note: *At high altitude, most of unreliable airspeed situations are temporary phenomenons, and are caused by temporary contamination of the total pressure probes, with water or ice. Such temporary phenomenons, should disappear after a few minutes, allowing the recovery of the speed data.*
Because the PRIM s latches the rejection of the ADR s, only the speed data can be recovered. The direct law remains until the end of the flight. The flight crew cannot reconnect the AP s, and A/THR , until the end of the flight.

For more information on the backup scales (i.e. BUSS and GPS altitude), *Refer to DSC-31-20-20-130-10 Backup Scales* .
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ALL AIR DATA DISAGREE* .

Continued on the following page

NAV ALL AIR DATA DISAGREE (Cont'd)
ALL AIR DATA REJECTED BY PRIMs

● **IF SAFE CONDUCT OF FLIGHT IMPACTED :**

■ **Before thrust reduction:**

ALL THR LEVERS..... TOGA
PITCH ATT TRGT..... see below

The ECAM displays only the appropriate pitch.

Altitude	*Below 10 000 ft*	*Above 10 000 ft*
Pitch ATT TRGT	*12.5 °*	*10 °*

■ **After thrust reduction:**

ALL THR LEVERS..... CLB
PITCH ATT TRGT..... see below

The ECAM displays only the appropriate pitch.

Altitude	*Below 10 000 ft*	*Between 10 000 ft and 25 000 ft*	*Above 25 000 ft*
Pitch ATT TRGT	*12.5 °*	*10 °*	*5 °*

● **Below FL 250 :**

FLAPS & L/G : MAINTAIN CURRENT CONF

SPEED BRAKES.....CHECK RETRACTED

RISK OF UNDUE OVERSPEED WARNING

L2 *The overspeed warning is not inhibited, if ADR s are rejected by flight controls.*

L1 HUD : DO NOT USE

FMS POSITION / GPS PAGE.....SELECT

■ **Below FL 250 :**

AIR DATA (ADR s /STBY INSTR) ..... XCHECK

L2 *Crosscheck all speeds and altitudes indications.*

Alternates sources may be used to evaluate the air data:
- *GPS altitude*
- *GPS and IRS Ground Speeds, taking into account altitude and wind effect.*

L1 ■ **IF AT LEAST ONE AIR DATA IS RELIABLE:**

RELIABLE AIR DATA..... USE

Continued on the following page

NAV ALL AIR DATA DISAGREE (Cont'd)
ALL AIR DATA REJECTED BY PRIMs

■ **IF NO AIR DATA RELIABLE:**

ADR 1+2+3 P/B s ..... OFF

L2 *All ADR s must be switched off to replace the PFD 's normal speed scale and altitude indication by the backup speed scale and GPS altitude indication.*

L1 SPEED..... FLY THE GREEN

L2 *Fly within the green area of the speed scale to ensure safe flight.*
For slats/flaps retraction, it is recommended to fly at the top of the green area of the speed scale.
Before extending the slats/flaps, it is recommended to fly at the bottom of the speed scale green area, and to be in straight flight.

L1 SPD BRK : DO NOT USE

L2 *The BUSS is tuned for the aerodynamic model with the speed brake retracted. The speed brake extension must be avoided as it would affect the relation between Angle of Attack and airspeed, therefore making the BUSS unreliable.*

L1 ● **If at least two MFP heating are failed:**

AVOID ICING COND s

CABIN ALT MODE..... MAN

L2 *The flight crew manually controls the cabin altitude.*

L1

ACFT FL	CABIN ALT TRGT
250	2900
200	2150
150	1500
100	900

CABIN ALT TRGT..... AS RQRD

■ **Above FL 250 :**

FOR LEVEL OFF & TROUBLESHOOTING :

PITCH ATT TRGT..... 2°

ALL ENG THR..... see below

The ECAM displays only the appropriate thrust value in accordance with the aircraft weight and the flight level.

L2 *Because the thrust evolution is linear within a range of flight levels, the ECAM displays the thrust that results from the weight interpolation (e.g. At FL 340 , with an aircraft weight of 975 klb , the ECAM displays 78 %).*

Continued on the following page

NAV ALL AIR DATA DISAGREE (Cont'd)

ALL AIR DATA REJECTED BY PRIMs

L1

THRUST (% THR)		
FL	*1 200 klb*	*750 klb*
Above FL 370	*98 %*	*78 %*
FL 340 - FL 370	*88 %*	*68 %*
FL 300 - FL 330	*78 %*	*58 %*
FL 250 - FL 290	*68 %*	*48 %*

RESULTING SPEED/MACH : 300KT / M.85

AIR DATA (ADR s /STBY INSTR) ..... XCHECK

L2 *Crosscheck all speeds and altitudes indications.*

Alternates sources may be used to evaluate the air data:

- *GPS altitude*
- *GPS and IRS Ground Speeds, taking into account altitude and wind effect.*

L1

■ **IF AT LEAST ONE AIR DATA IS RELIABLE :**

RELIABLE AIR DATA..... USE

■ **IF NO AIR DATA RELIABLE :**

fly pitch and thrust

● **If ADR 1+2+3 are set to OFF:**

The flight control laws revert to direct laws.

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

Continued on the following page

NAV ALL AIR DATA DISAGREE (Cont'd)

ALL AIR DATA REJECTED BY PRIMs

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310/.86

- If all ADRs are set to OFF:
  SPD BRK : DO NOT USE
  MANEUVER WITH CARE
- If all ADRs are set to OFF, and at least two MFP heating are failed:
  AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 310/.86

- If all ADRs are set to OFF:
  SPD BRK : DO NOT USE
  MANEUVER WITH CARE
- If all ADRs are set to OFF, and at least the heating of three MFPs is failed:
  AVOID ICING CONDs

DEFERRED PROC

ALL PHASES

- **AT TOP OF DESCENT:**
  - **If below FL 250:**
    CABIN ALT TRGT.....LDG ELEVN
  - **If above FL 250, and if no air data reliable:**
    - **IF REMAINING AIR DATA RELIABLE :**
      RELIABLE AIR DATA.....USE

Continued on the following page

NAV ALL AIR DATA DISAGREE (Cont'd)

ALL AIR DATA REJECTED BY PRIMs

- **IF NO AIR DATA RELIABLE :**

  CABIN ALT MODE.....MAN
  CABIN ALT TRGT..... LDG ELEVN

  - **WHEN BELOW FL 250 :**

    ADR 1+2+3 P/Bs .....OFF
    SPEED.....FLY THE GREEN
    SPD BRK : DO NOT USE

    - **If at least two MFP heating are failed:**

      AVOID ICING CONDs

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
LOAD ALLEVIATION
AP 1+2
A/THR
FD 1+2
ADR 1+2+3 (If all ADRs are set to OFF)
TCAS 1+2 (If all ADRs are set to OFF)
CAB PRESS AUTO CTL (If below 250, or all ADRs are set to OFF)

APPR & LDG

CAT 2
GLS AUTOLAND
TAWS 1+2 (If all ADRs are set to OFF)
REACTIVE W/S DET

INFO

DIRECT LAW : PROT LOST

- If below FL 250:
  RISK OF UNDUE OVERSPEED WARNING

ACFT FL	CABIN ALT TRGT
250	2900
200	2150
150	1500
100	900

- If above FL 250:

Continued on the following page

NAV ALL AIR DATA DISAGREE (Cont'd)
ALL AIR DATA REJECTED BY PRIMs

RISK OF UNDUE OVERSPEED WARNING

FOR CRUISE:
PITCH ATT TRGT : 2°
ALL ENG THR : THR (%) FROM TABLE

FL	1 200 klb	750 klb
> 370	98 %	78 %
340 - 370	88 %	68 %
300 - 330	78 %	58 %
250 - 290	68 %	48 %

FOR DESCENT:
PITCH ATT TRGT : 0°
ALL THR LEVERS IDLE

IF RADOME DESTRUCTION :
INCREASE THRUST BY 5 %
FUEL CONSUMPT INCRSD
FMS FUEL PRED DISREGARD

Note: *Because of radome destruction, the fuel consumption is increased and FMS predictions are not correct.*
As a consequence, fuel consumption is increased by approximately 10 %.

To optimise fuel consumption:

- *Set Cost Index (CI) to zero*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum - 4 000 ft.*

NAV AOA DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PRIMs detect a discrepancy between the angles of attack.

Indications:

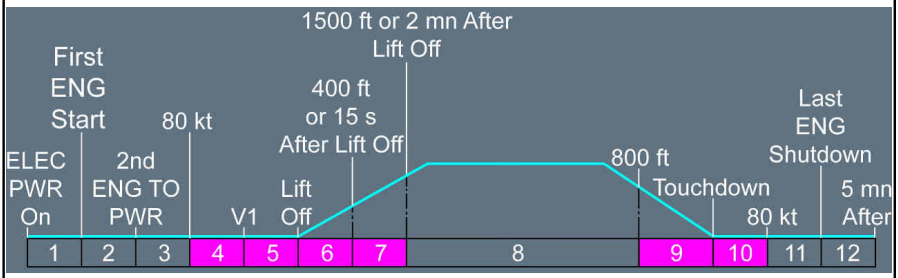
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV AOA DISAGREE* .

RISK OF UNDUE STALL WARNING

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. AP and FD are not available.

Continued on the following page

NAV AOA DISAGREE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

MAX SPEED : 310 KT

LIMITATIONS ON PFD

ALL PHASES

MAX SPEED : 310 KT

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
AP 1+2
A/THR
FD 1+2

APPR & LDG

CAT 2
GLS AUTOLAND
REACTIVE W/S DET

INFO

ALTN LAW : PROT LOST
RISK OF UNDUE STALL WARNING

NAV ARPT NAV FAULT

Applicable to: ALL

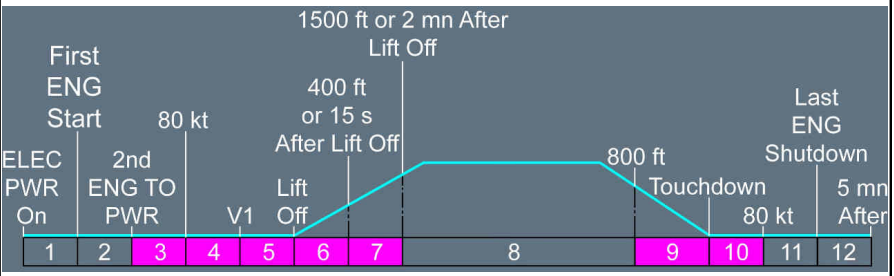
ANNUNCIATIONS

Triggering Conditions:

L2 The Airport Navigation System (OANS) is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ARPT NAV FAULT* .

Crew Awareness.

STATUS

INOP SYS

APPR & LDG

BTV
RWY OVERRUN PROT
ARPT NAV

NAV CAPT AND F/O ALT DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is a difference between the altitude displayed on CAPT and F/O PFD greater than:
- 500 ft if baro ref STD is selected, or
- 250 ft if QNH is selected.

Indications:

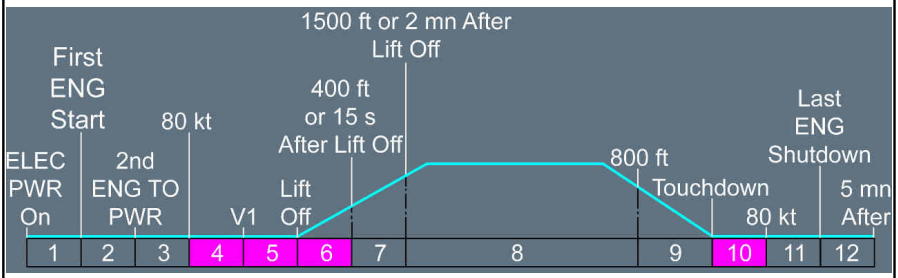
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV CAPT & F/O ALT DISAGREE* .

ALT..... X CHECK

L2 *Crosscheck with the ISIS SFD.*

L1 AIR DATA SWTG..... AS RQRD

L2 *Select ADR 3 on the failed side.*

NAV CAPT AND F/O ATT DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A discrepancy is detected between ATT parameters (more than 5 ° in pitch or roll) displayed on CAPT and F/O sides.

Indications:

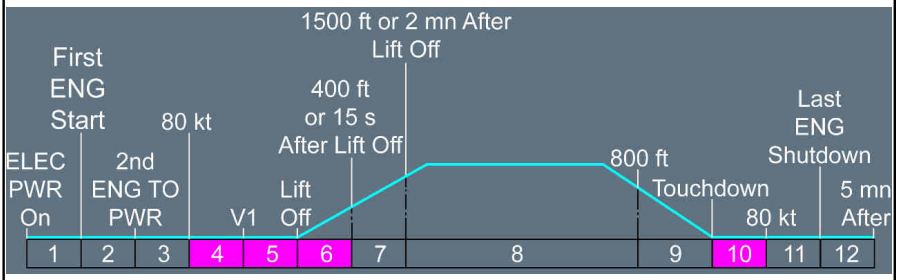
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV CAPT & F/O ATT DISAGREE* .

Continued on the following page

NAV CAPT AND F/O ATT DISAGREE (Cont'd)

Impacted DU: 00008408 NAV CAPT AND F/O ATT DISAGREE - Alert

ATT.....X CHECK

L2 *Crosscheck the attitude, by comparing the attitude data displayed on the CAPT PFD, the F/O PFD and the ISIS SFD.*

L1 ● **IF IR 3 AVAIL :**

● **IF CAPT ATT AFFECTED :**

● **If ADR 3 and MFP 3 heater are available:**

● **IF AIR DATA SWTG ON NORM :**

AIR DATA SWTG..... CAPT ON 3

L2 *Select ADR 3 on CAPT side.*

L1 ATT HDG SWTG..... CAPT ON 3

L2 *Select IR 3 on CAPT side.*

L1 ● **IF F/O ATT AFFECTED :**

● **If ADR 3 and MFP 3 heater are available:**

● **IF AIR DATA SWTG ON NORM :**

AIR DATA SWTG.....F/O ON 3

L2 *Select ADR 3 on F/O side.*

L1 ATT HDG SWTG.....F/O ON 3

L2 *Select IR 3 on F/O side.*

Impacted by TDU: 00023230 NAV CAPT AND F/O ATT DISAGREE - Alert

ATT.....X CHECK

L2 *Crosscheck with the ISIS SFD.*

L1 ATT HDG SWTG.....AS RQRD

L2 *Select IR 3 on the failed side.*

NAV CAPT AND F/O BARO REF DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Captain's barometric reference is QNH(STD), and the First Officer's barometric reference is STD(QNH).

Indications:

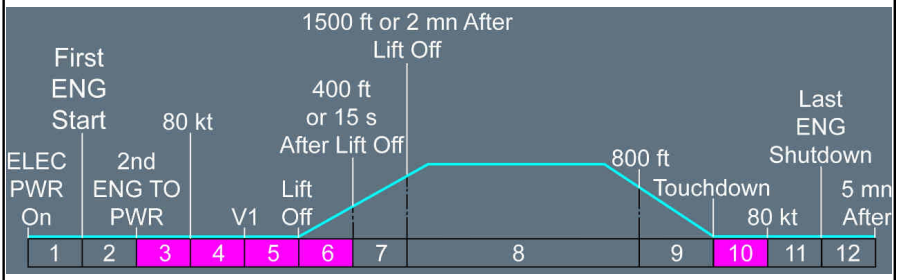
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/00004738 **Not found** .*

BARO REF..... XCHECK

NAV CAPT AND F/O HDG DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A discrepancy is detected between HDG parameters (more than 5 ° in TRUE reference or 7 ° in MAGNETIC reference) displayed on CAPT and F/O sides.

L3 The comparison is made by the CDS.

Indications:

L2

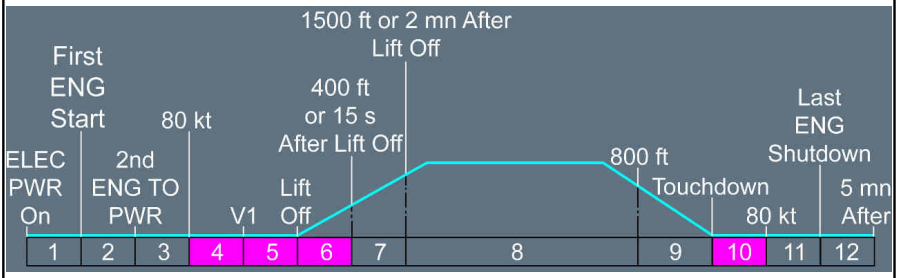
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV CAPT & F/O HDG DISAGREE* .

Continued on the following page

NAV CAPT AND F/O HDG DISAGREE (Cont'd)

Impacted DU: 00008407 NAV CAPT AND F/O HDG DISAGREE - Alert

HDG.....X CHECK

L2 *Crosscheck the heading:*
- *By comparing the three IRs' heading on the FMS / POSITION / IRS page, or*
- *By comparing the heading displayed on the CAPT PFD, the F/O PFD and the standby compass.*

L1 ● **IF IR 3 AVAIL :**

● **IF CAPT HDG AFFECTED :**

● **If ADR 3 and MFP 3 heater are available:**

● **IF AIR DATA SWTG ON NORM :**

AIR DATA SWTG..... CAPT ON 3

L2 *Select ADR 3 on CAPT side.*

L1 ATT HDG SWTG..... CAPT ON 3

L2 *Select IR 3 on CAPT side.*

L1 ● **IF F/O HDG AFFECTED :**

● **If ADR 3 and MFP 3 heater are available:**

● **IF AIR DATA SWTG ON NORM :**

AIR DATA SWTG.....F/O ON 3

L2 *Select ADR 3 on F/O side.*

L1 ATT HDG SWTG.....F/O ON 3

L2 *Select IR 3 on the F/O side.*

Impacted by TDU: 00023229 NAV CAPT AND F/O HDG DISAGREE - Alert

HDG.....X CHECK

L2 *Compare the three IRs heading on the FMS / POSITION / IRS page, or crosscheck with the standby compass.*

L1 ATT HDG SWTG.....AS RQRD

L2 *Select IR 3 on the failed side.*

NAV EXTREME LATITUDE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TRUE NORTH reference is not selected when extreme latitudes are reached.

Indications:

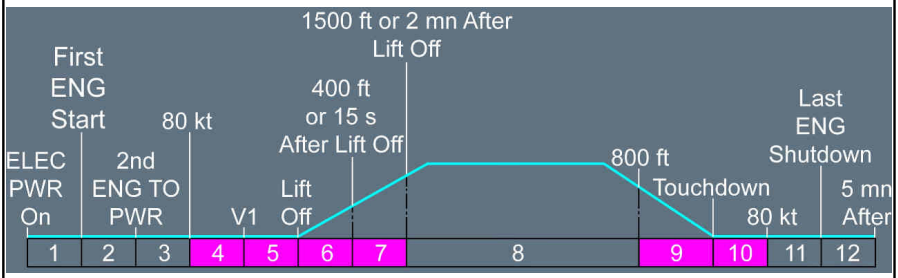
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV EXTREME LATITUDE*.

NORTH REF SEL.....TRUE

NAV FLS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FLS function within MMR 1(2) is failed.

Indications:

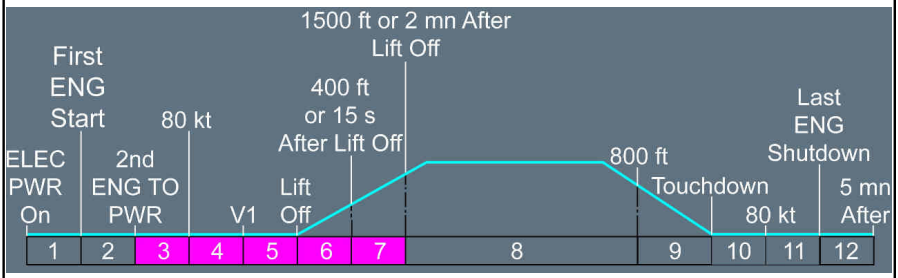
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV FLS 1(2)(1+2) FAULT* .

Crew awareness.

STATUS

INOP SYS

APPR & LDG

FLS 1(2)

NAV FLS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FLS function within both MMRs is failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV FLS 1(2)(1+2) FAULT* .

Crew awareness.

STATUS

INOP SYS

APPR & LDG

FLS 1+2

NAV FM / GPS POS DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A discrepancy is detected between FMS and GPS position.

L3 The FMS and GPS positions differ by more than :
- A longitude threshold that depends on the latitude :
  - 0.5 minutes for latitudes below 45 degrees
  - 0.7 minute for latitudes at, or above, 45 degrees, and below 60 degrees
  - 1 minute for latitudes at, or above, 60 degrees, and below 70 degrees
- A latitude threshold of 0.5 minute, regardless of the longitude

Indications:

L2

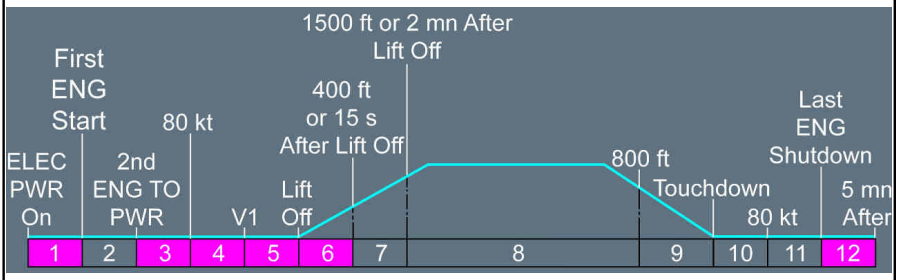
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV FM / GPS POS DISAGREE* .

Continued on the following page

NAV FM / GPS POS DISAGREE (Cont'd)

ACFT POS..... CHECK

L2 *Use the FMS POSITION / MONITOR page (Refer to DSC-22-FMS-20-30-22FMS5020C POSITION / MONITOR page).*
For flight continuation, consider periodic NAV ACCURACY check.

STATUS

INFO

FLS: RAW ONLY

NAV FM / IR POS DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A significant drift is detected between any of the FMS positions and any of the IR positions.
L3 The alert is inhibited when GPS PRIMARY.

Indications:

L2

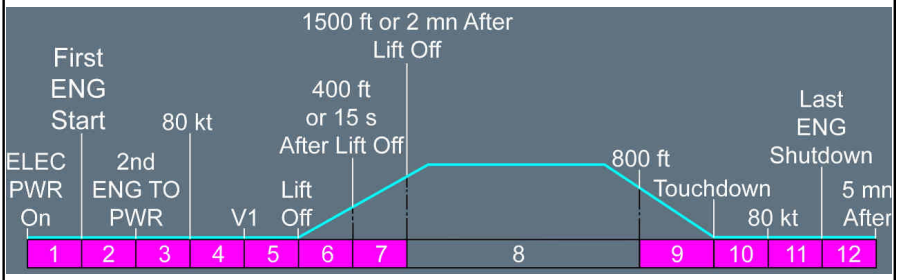
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV FM / IR POS DISAGREE* .

ACFT POS..... CHECK

L2 *Use the FMS POSITION / MONITOR page (Refer to DSC-22-FMS-20-30-22FMS5020C POSITION / MONITOR page).*
For flight continuation, consider periodic NAV ACCURACY check.

NAV GLS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The GLS receiver 1(2) is failed.

Indications:

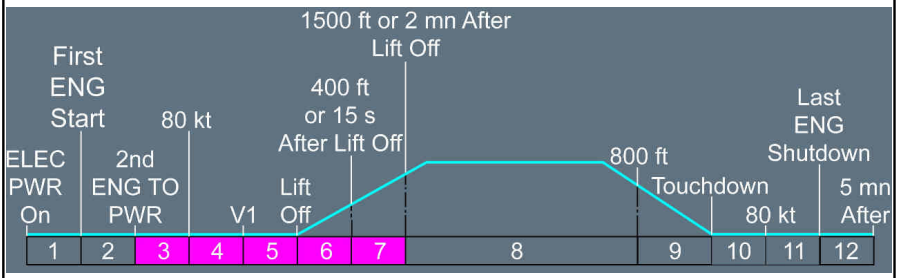
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV GLS 1(2)(1+2) FAULT* .

Crew awareness.

Continued on the following page

NAV GLS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

GLS AUTOLAND
GLS 1(2)

NAV GLS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both GLS receivers are failed.

Indications:

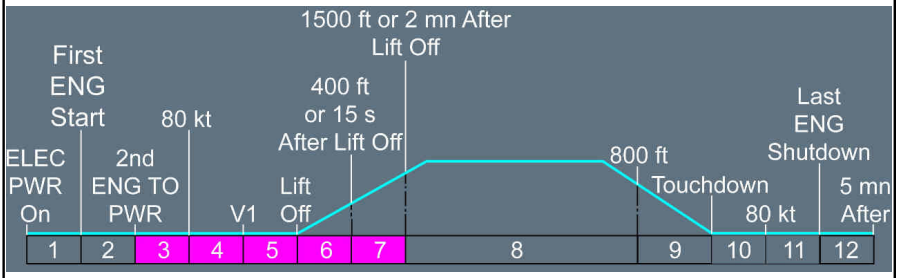
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch condition, *Refer to MEL/ME-ECAM-34-1 NAV GLS 1(2)(1+2) FAULT*.

Continued on the following page

NAV GLS 1+2 FAULT (Cont'd)

Crew awareness.

STATUS

INOP SYS

APPR & LDG

GLS 1+2

NAV GPS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The GPS part of MMR 1(2) is failed.

Indications:

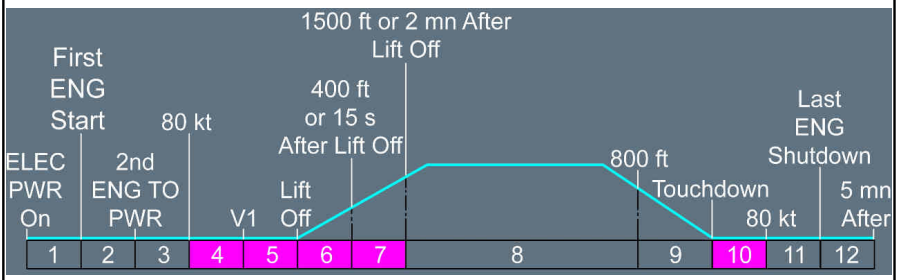
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

NAV GPS 1(2) FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV GPS 1(2) FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
GPS 1(2)

NAV GPS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The GPS part of both MMR 1 and MMR 2 is failed.

Indications:

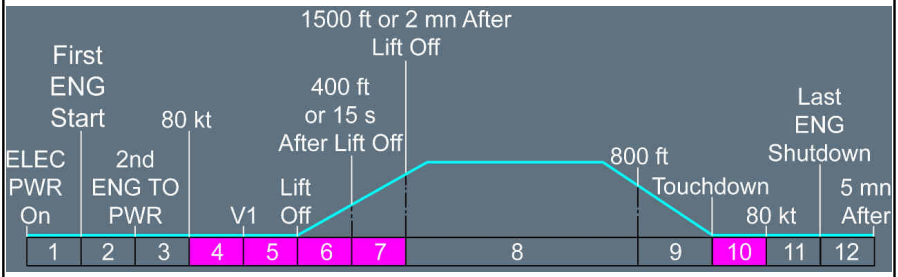
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV GPS 1(2) FAULT*.

Crew awareness.

STATUS

INOP SYS

ALL PHASES	APPR & LDG
GPS 1+2	BTV ROW/ROP

NAV G/S 1(2) ON LOWER ANT

Applicable to: ALL

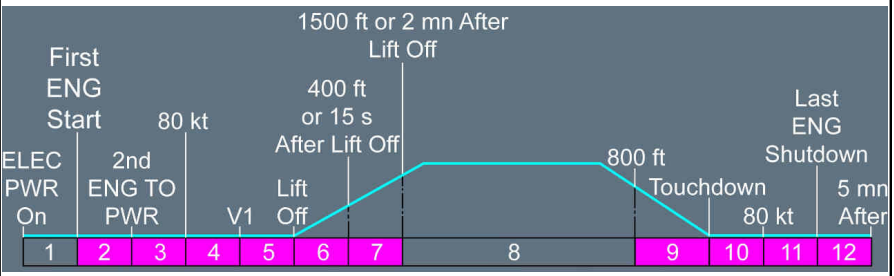
ANNUNCIATIONS

Triggering Conditions:

L2 An erroneous switching of MMR 1(2) from radome antenna to gear antenna is detected.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV GS 1(2) ON LOWER ANT* .

UNREL G/S 1(2) RAW DATA ABOVE 700 FT AGL

NAV HUD FAULT

Applicable to: ALL

NAV HUD FAULT (*Refer to procedure*)

NAV HUD FPV DISAGREE

Applicable to: ALL

NAV HUD FPV DISAGREE (*Refer to procedure*)

NAV ILS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ILS receiver 1(2) is failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ILS 1(2)(1+2) FAULT*.

Crew awareness.

STATUS

INOP SYS

APPR & LDG

CAT 2
ILS 1(2)

NAV ILS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both ILS receivers are failed.

Indications:

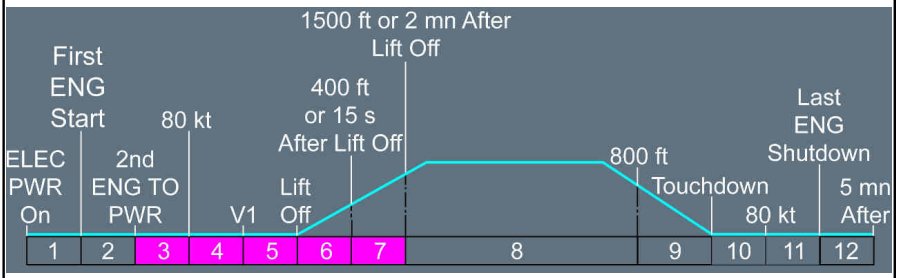
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV ILS 1(2)(1+2) FAULT*.

Crew awareness.

STATUS

INOP SYS

APPR & LDG

ILS 1+2

NAV IR 1(2)(3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The IR part of ADIRU 1(2)(3) is failed.

Indications:

Audio



Master Light

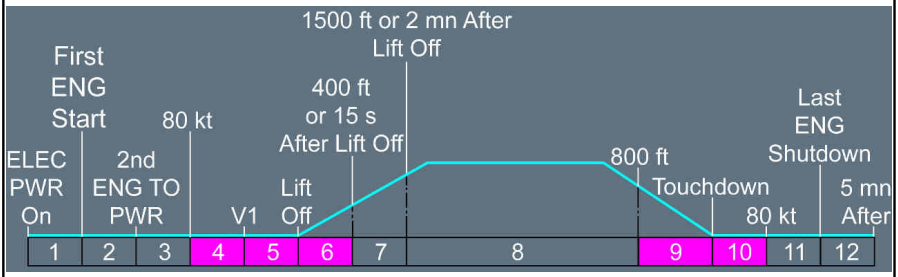


Local light



IR1(2)(3) pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV IR 1(2)(3) FAULT*.

Continued on the following page

NAV IR 1(2)(3) FAULT (Cont'd)

Impacted DU: 00008385 NAV IR 1(2)(3) FAULT - Alert

■ **If IR 1 is affected:**

● **If ADR 3 and MFP 3 heater are available:**

● **IF AIR DATA SWTG ON NORM :**

AIR DATA SWTG.....CAPT ON 3

L2 *Select ADR 3 on CAPT side.*

L1 ATT HDG SWTG.....CAPT ON 3

■ **If IR 2 is affected:**

● **If ADR 3 and MFP 3 heater are available:**

● **IF AIR DATA SWTG ON NORM :**

AIR DATA SWTG..... F/O ON 3

L2 *Select ADR 3 on F/O side.*

L1 ATT HDG SWTG..... F/O ON 3

■ **If IR 3 is affected:**

ATT HDG SWTG..... NORM

■ **If IR 1(2)(3) is available in ATT mode:**

IR 1(2)(3) MODE SEL.....ATT

SPEED, HDG & FL : KEEP CONST FOR 30 S

FMS POSITION / IRS PAGE.....SELECT

HDG..... ENTER

■ **If IR 1(2)(3) is not available in ATT mode:**

L2

Before setting the IR OFF, the flight crew can try to recover the IR in ATT mode: Set the ADIRS 1(2)(3) selector to OFF for 10 s, and then to ATT.

L1 IR 1(2)(3) P/B..... OFF

Continued on the following page

NAV IR 1(2)(3) FAULT (Cont'd)

Impacted by TDU: 00023231 NAV IR 1(2)(3) FAULT - Alert

■ **If IR 1 is affected:**

ATT HDG SWTG.....CAPT ON 3

■ **If IR 2 is affected:**

ATT HDG SWTG.....F/O ON 3

■ **If IR 3 is affected:**

ATT HDG SWTG.....NORM

■ **If IR 1(2)(3) is available in ATT mode:**

IR 1(2)(3) MODE SEL.....ATT

SPEED, HDG & FL : KEEP CONST FOR 30 S

FMS POSITION / IRS PAGE.....SELECT

HDG.....ENTER

■ **If IR 1(2)(3) is not available in ATT mode:**

L2 Before setting the IR OFF, the flight crew can try to recover the IR in ATT mode: Set the ADIRS 1(2)(3) selector to OFF for 10 s, and then to ATT.

L1 IR 1(2)(3) P/B.....OFF

Continued on the following page

NAV IR 1(2)(3) FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
IR 1(2)(3)	TERR SYS 1 (If IR 1 is failed)
TCAS 1 (If IR 1 is failed)	TERR SYS 2 (If IR 2 is failed)
WXR 1 (If IR 1 is failed)	CAT 3 DUAL
TCAS 2 (If IR 2 is failed)	
WXR 2 (If IR 2 is failed)	

Note: *If IR 1(2) is failed, the INOP SYS TERR SYS 1, WXR 1 and TCAS 1 (TERR SYS 2, WXR 2 and TCAS 2) appear as long as IR 3 has not been selected on CAPT (F/O) side.*

INFO

CAT 3 SINGLE ONLY

NAV IR 1+2 (1+3) (2+3) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The IR parts of two ADIRUs are failed.

Indications:

Audio



Master Light

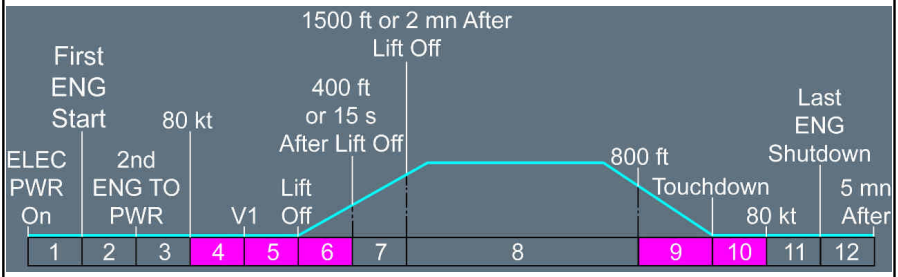


Local light



IR pb

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV IR 1+2(1+3)(2+3) FAULT*.

Continued on the following page

NAV IR 1+2 (1+3) (2+3) FAULT (Cont'd)

■ **If IR 1+2 are affected :**
ATT HDG SWTG.....CAPT ON 3

● **If WXR / TAWS or XPDR / TCAS are selected on SYS 2 :**

L2 When IR 1+2 are failed, and the ATT HDG selector is set to CAPT ON 3, only SURV SYS 1 is available.

L1 WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1

■ **If IR 1+3 are affected :**
ATT HDG SWTG..... NORM

● **If WXR / TAWS or XPDR / TCAS are selected on SYS 1 :**

L2 When IR 1+3 are failed, only SURV SYS 2 is available.

L1 WXR & TAWS.....SYS 2
XPDR & TCAS.....SYS 2

■ **If IR 2+3 are affected :**
ATT HDG SWTG..... NORM

● **If WXR / TAWS or XPDR / TCAS are selected on SYS 2 :**

L2 When IR 2+3 are failed, only SURV SYS 1 is available.

L1 WXR & TAWS.....SYS 1
XPDR & TCAS.....SYS 1

■ **If one of the affected IR is available in ATT mode :**
IR (AFFECTED) MODE SEL..... ATT
SPEED, HDG & FL : KEEP CONST FOR 30 S
FMS POSITION / IRS PAGE.....SELECT
HDG..... ENTER

■ **If one of the affected IR is not available in ATT mode :**
IR (AFFECTED) P/B.....OFF

● **If IR 1+3 are not available in ATT mode :**
STANDBY NAV IN TRUE GPS TRK

L2 *When IR 1 and 3 are lost, the standby navigation only displays true track information from GPS .*

Continued on the following page

NAV IR 1+2 (1+3) (2+3) FAULT (Cont'd)

L12

ASSOCIATED PROCEDURES

F/CTL ALTN LAW (PROT LOST)

Refer to PRO-ABN-ECAM-10-27-10-390 F/CTL ALTN LAW (PROT LOST)

The flight control laws revert to Alternate 1. A/THR and at least one AP and one FD remain available.

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT
IR 1+2 (If IR 1 and 2 are failed)
WXR 2 (If IR 1 and 2 are failed)
TCAS 2 (If IR 1 and 2 are failed)
IR 1+3 (If IR 1 and 3 are failed)
AP 1 (If IR 1 and 3 are failed)
FD 1 (If IR 1 and 3 are failed)
WXR 1 (If IR 1 and 3 are failed)
TCAS 1 (If IR 1 and 3 are failed)
IR 2+3 (If IR 2 and 3 are failed)
AP 2 (If IR 2 and 3 are failed)
FD 2 (If IR 2 and 3 are failed)
WXR 2 (If IR 2 and 3 are failed)
TCAS 2 (If IR 2 and 3 are failed)

APPR & LDG

BTV
ROW/ROP
CAT 2
GLS AUTOLAND
TERR SYS 2 (If IR 1+2 or 2+3 are failed)
TERR SYS 1 (If IR 1+3 are failed)

Note: When IR 1+2 are failed, the inop sys TERR SYS 1+2, WXR 1+2 and TCAS 1+2 are replaced by TERR SYS 2, WXR 2 and TCAS 2 because the systems on captain's side are recovered after the action ATT HDG SWTG ..... CAPT ON 3.

INFO

ALTN LAW : PROT LOST

- If IR 1 and 3 are failed, and not available in ATT mode :
  STANDBY NAV IN TRUE GPS TRK

NAV IR ALIGNMENT IN ATT MODE

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the NAV menu.
If IR alignment is lost in flight, the navigation mode is inoperative (red ATT flag on the PFD, and red HDG flag on the ND).
Aircraft attitude and heading may be recovered by applying the following procedure.
The aircraft must stay wings level, with a constant speed for 30 seconds.

IR MODE SEL (AFFECTED).....ATT
SPEED, HDG & FL : KEEP CONST FOR 30 S
FMS POSITION / IRS PAGE..... SELECT
HDG..... ENTER

L2 *Note:* *Due to IR drift, the magnetic heading must be periodically crosschecked with the standby compass and updated, if required.*

L1

DEAC

NAV IR NOT ALIGNED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One IR is not aligned because of:
- An IR alignment fault (position mismatch), or
- The aircraft present position is missing after 9 min of alignment, or
- An aircraft excessive motion.

Indications:

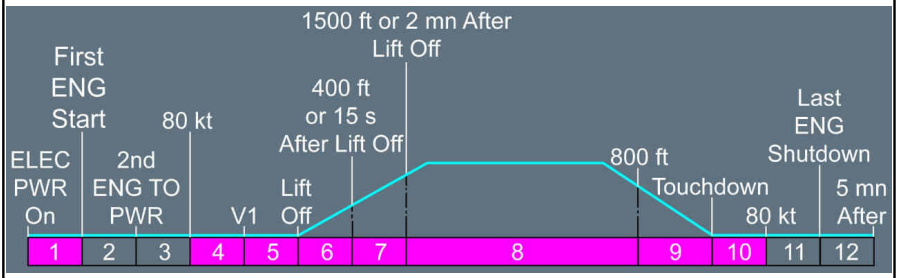
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV IR NOT ALIGNED* .

Continued on the following page

NAV IR NOT ALIGNED (Cont'd)

■ **POSITION DISAGREE**

ACFT PPOS.....REENTER

L2 *The IR alignment failed.*

L1 ■ **POSITION MISSING**

ACFT PPOS.....INSERT

L2 *After 9 min of alignment the aircraft present position is still missing.*

L1 ■ **EXCESS MOTION**

IR 1(2)(3)(1+2)(1+3)(2+3)(1+2+3) IN ALIGN

L2 *The aircraft moved excessively during IR alignment.*

NAV LOWER G/S ANT FAULT

Applicable to: ALL

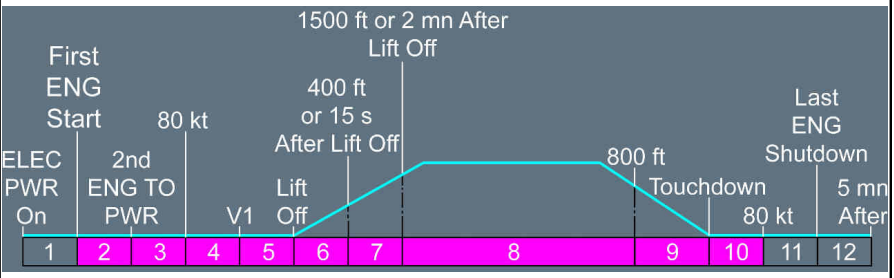
ANNUNCIATIONS

Triggering Conditions:

L2 The switching from radome antenna to gear antenna does not occur when the landing gear is extended.

Indications:

Flight Phase Inhibition:



Continued on the following page

NAV LOWER G/S ANT FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV LOWER GS ANT FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
LOWER G/S ANT

NAV LS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - The ILS receiver 1(2) is failed, and
- The GLS receiver 1(2) is failed, and
- The FLS function within MMR 1(2) is failed.

Note: If MMR 1(2) is failed, the NAV LS 1(2) FAULT alert is triggered.

Indications:

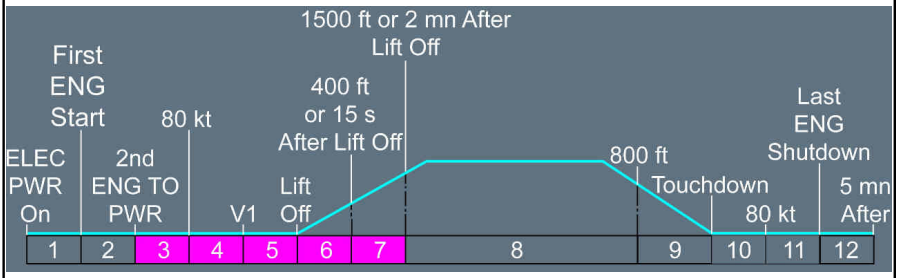
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV LS 1(2)(1+2) FAULT*.

Crew awareness.

Continued on the following page

NAV LS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

	APPR & LDG
	CAT 2 GLS AUTOLAND LS 1(2)

NAV LS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- Both ILS receivers are failed, and
- Both GLS receivers are failed, and
- The FLS function within both MMRs is failed.

Note: If both MMRs are failed, the NAV LS 1+2 FAULT alert is triggered.

Indications:

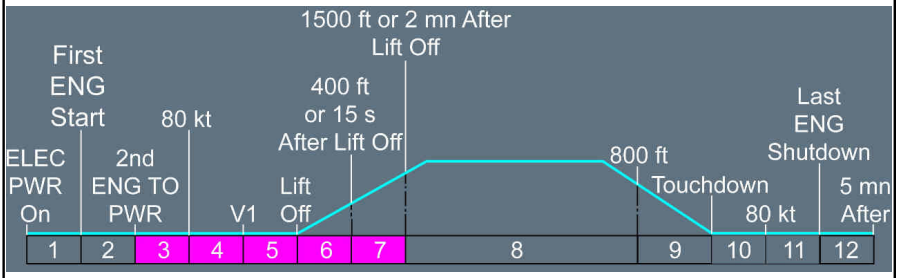
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV LS 1(2)(1+2) FAULT*.

Crew awareness.

Continued on the following page

NAV LS 1+2 FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

LS 1+2

NAV LS TUNING DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 There is a discrepancy between both MMRs, on one of the following parameters: Approach mode (ILS mode, FLS mode, ILS/FLS mode, or GLS mode), frequency/channel, or course.

Indications:

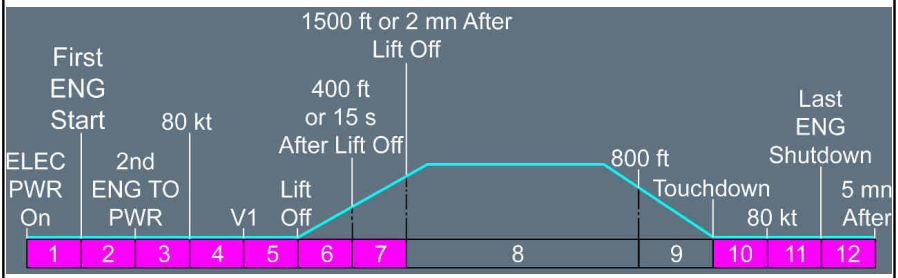
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

NAV LS TUNING DISAGREE (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV LS TUNING DISAGREE* .

Crew Awareness.

STATUS

INOP SYS

APPR & LDG

CAT 2
GLS AUTOLAND

NAV RA SYS A(B)(C) FAULT

Applicable to: ALL

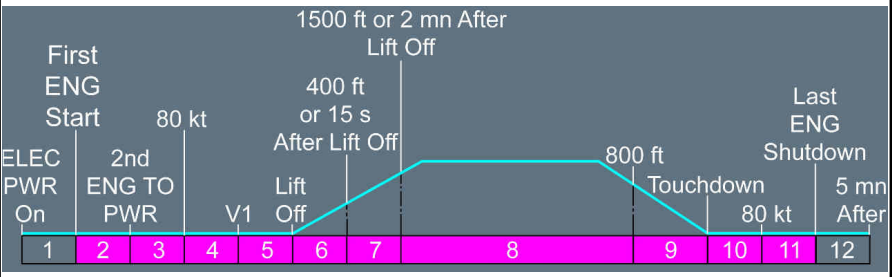
ANNUNCIATIONS

Triggering Conditions:

L2 RA SYS A(B)(C) is failed.

Indications:

Flight Phase Inhibition:



Continued on the following page

NAV RA SYS A(B)(C) FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV RA SYS A(B)(C) FAULT*.

Crew awareness.

MORE INFO

REDUND LOSS

RA SYS A(B)(C)

NAV RA SYS A+B (A+C) (B+C) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Radio Altimeters A and B (A and C)(B and C) are failed.

Indications:

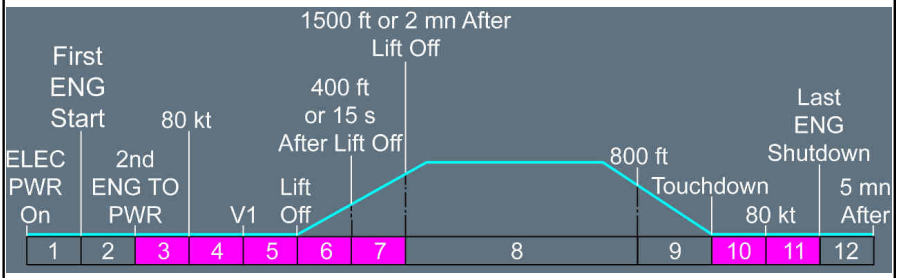
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV RA SYS A+B(A+C)(B+C) FAULT* .

Crew awareness.

Continued on the following page

NAV RA SYS A+B (A+C) (B+C) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

RA SYS A+B (A+C) (B+C)
CAT 3

INFO

CAT 2 ONLY

NAV RA SYS A+B+C FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 RA SYS A, RA SYS B and RA SYS C are failed.

Indications:

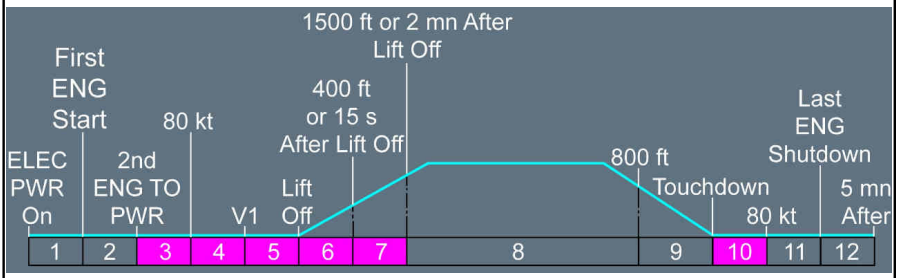
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV RA SYS A+B+C FAULT* .

Crew awareness.

Continued on the following page

NAV RA SYS A+B+C FAULT (Cont'd)

L12

DEFERRED PROC

FOR APPROACH

APPR MODE NOT AVAIL : LOC MODE AVAIL ONLY

LOC, LOC, F-LOC* and F-LOC modes are available. G/S*, G/S, F-G/S* and F-G/S modes are not available.*

WHEN L/G DOWN AND AP OFF : USE MAN PITCH TRIM

L12

STATUS

INOP SYS

ALL PHASES	APPR & LDG
TCAS 1+2	BTV ROW/ROP RA SYS A+B+C AUTO CALLOUT CAT 2 GLS AUTOLAND GPWS 1+2 PRED W/S 1+2 REACTIVE W/S DET

INFO

APPR MODE NOT AVAIL : LOC MODE AVAIL ONLY

LOC, LOC, F-LOC* and F-LOC modes are available. G/S*, G/S, F-G/S* and F-G/S are not available.*

WHEN L/G DOWN AND AP OFF : USE MAN PITCH TRIM

NAV RESIDUAL AIR SPEED
ON ADR 1(2)(3)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 On ground, with engines shut down, ADR 1(2)(3) provides a residual airspeed above 80 kt.

Indications:

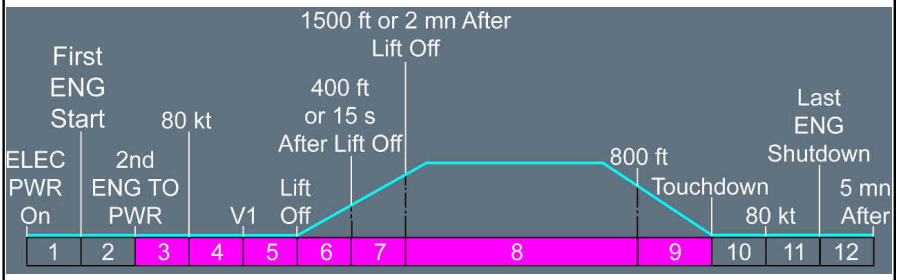
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV RESIDUAL AIR SPEED* .

Crew awareness.

NAV SIDESLIP PROBE 1(2)(3) FAULT

Applicable to: ALL

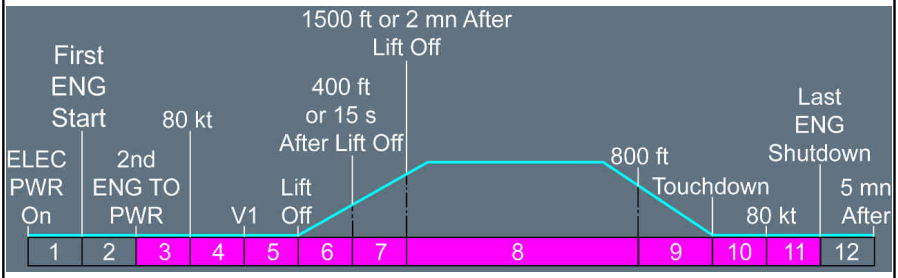
ANNUNCIATIONS

Triggering Conditions:

L2 One sideslip probe is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV SIDESLIP PROBE 1(2)(3) FAULT*.

Crew Awareness.

STATUS

INOP SYS

ALL PHASES

SIDESLIP PROBE 1(2)(3)

NAV STATIC PROBE FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The static pressure probe is obstructed.

Indications:

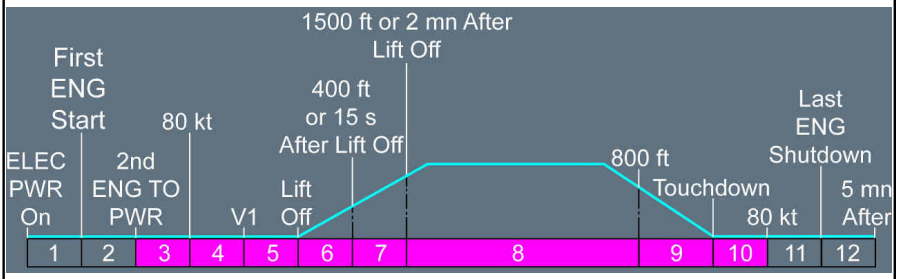
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-1 NAV STATIC PROBE FAULT* .

L(R)(L+R) ADR 1(2)(3) STAT PROBE

L2 *Indicates the affected probe.*

L1 IAS/ALT MAYBE NOT RELIABLE

Continued on the following page

NAV STATIC PROBE FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

L(R)(L+R) ADR 1(2)(3) STAT PROBE

INFO

IAS/ALT MAYBE NOT RELIABLE

NAV UNRELIABLE AIR SPEED INDICATION

Applicable to: ALL

L2 Internal ADR monitoring or flight control computers monitoring automatically detect an unreliable airspeed situation. However depending on the monitoring threshold, the flight crew may be aware of an air data drift before any warning is triggered.
In such a situation, the flight crew can display this procedure by pressing the ECP ABN PROC pb , then selecting the NAV UNRELIABLE AIR SPEED INDICATION procedure.

Unreliable speed indications may be suspected by :
- Speed discrepancies (between ADR 1, 2, 3, and ISIS), or
- Fluctuating or unexpected increase/decrease/steady indicated speed, or pressure altitude, or
- Abnormal correlation of the basic flight parameters (speed, pitch attitude, thrust, climb rate), or
- Abnormal AP , FD , A/THR behavior, or
- OVERSPEED warnings or a F RELIEF ECAM message, that contradicts with at least one of the indicated speeds.
  Depending on the failure, the OVERSPEED warning may be false or justified. Buffet, associated with the OVERSPEED VFE warning, is a symptom of a real overspeed condition.

CAUTION	Always rely on the stall warning that could be triggered. It is not affected by unreliable speeds, because it is based on angle of attack.

- Inconsistency between radio altitude and pressure altitude, or
- Reduction in aerodynamic noise with increasing speed, or increase in aerodynamic noise with decreasing speed.

The content of the procedure is similar to the NAV ALL AIR DATA DISAGREE procedure:
- Apply immediate pitch attitude and thrust values
  The flight crew must apply these immediate actions if safe conduct of the flight is impacted.
  The pitch attitude and thrust values allow safe flight conditions to be rapidly established in all flight phases (takeoff, climb, cruise) and aircraft configurations (weight and slats/flaps setting).
  In the mean time a quick troubleshooting may help determine whether or not one air data source (i.e. ADR or ISIS) is reliable.
- If no air data is reliable:
  - Below FL 250 : Switch off the three ADR s to display the backup scales on the PFD (i.e. BUSS and GPS altitude scale) and fly the green area of the speed scale
  - Above FL 250 : Fly pitch and thrust.

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

L23

Note: *At high altitude, most of unreliable airspeed situations are temporary phenomenons, and are caused by temporary contamination of the total pressure probes, with water or ice. Such temporary phenomenons, should disappear after a few minutes, allowing the recovery of the speed data.*

For more information on the backup scales (i.e. BUSS and GPS altitude), *Refer to DSC-31-20-20-130-10 Backup Scales* .

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

● **IF SAFE CONDUCT OF FLIGHT IMPACTED :**

AP.....DISCONNECT
A/THR.....DISCONNECT
FD..... OFF

■ **Before thrust reduction:**

ALL THR LEVERS.....TOGA
PITCH ATT TRGT..... see below

The ECAM displays only the appropriate pitch

Altitude	*Below 10 000 ft*	*Above 10 000 ft*
Pitch ATT TRGT	*12.5 °*	*10 °*

■ **After thrust reduction:**

ALL THR LEVERS.....CLB
PITCH ATT TRGT..... see below

The ECAM displays only the appropriate pitch

Altitude	*Below 10 000 ft*	*Between 10 000 ft and 25 000 ft*	*Above 25 000 ft*
Pitch ATT TRGT	*12.5 °*	*10 °*	*5 °*

● **Below FL 250 :**

FLAPS & L/G : MAINTAIN CURRENT CONF

SPEED BRAKES..... CHECK RETRACTED

RISK OF UNDUE OVERSPEED WARNING

L2 *The overspeed warning is not inhibited, if ADR s are rejected by flight controls.*

L1 HUD : DO NOT USE

FMS POSITION / GPS PAGE.....SELECT

■ **Below FL 250 :**

AIR DATA (ADR s /STBY INSTR) ..... XCHECK

L2 *Crosscheck all speeds and altitudes indications.*

Alternates sources may be used to evaluate the air data:

- *GPS altitude*
- *GPS and IRS Ground Speeds, taking into account altitude and wind effect.*

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

L1 ■ **IF AT LEAST ONE AIR DATA IS RELIABLE:**

RELIABLE AIR DATA..... USE

AT LEAST ONE ADR : keep on

UNRELIABLE ADR s ..... OFF

■ **IF NO AIR DATA RELIABLE:**

ADR 1+2+3 P/B s ..... OFF

L2 *All ADR s must be switched off to replace the PFD 's normal speed scale and altitude indication by the backup speed scale and GPS altitude indication.*

L1 SPEED..... FLY THE GREEN

L2 *Fly within the green area of the speed scale to ensure safe flight.*
For slats/flaps retraction, it is recommended to fly at the top of the green area of the speed scale.
Before extending the slats/flaps, it is recommended to fly at the bottom of the speed scale green area, and to be in straight flight.

L1 SPD BRK : DO NOT USE

L2 *The BUSS is tuned for the aerodynamic model with the speed brake retracted. The speed brake extension must be avoided as it would affect the relation between Angle of Attack and airspeed, therefore making the BUSS unreliable.*

L1 ● **If at least two MFP heating are failed:**

AVOID ICING COND s

CABIN ALT MODE..... MAN

L2 *The flight crew manually controls the cabin altitude.*

L1

ACFT FL	CABIN ALT TRGT
250	2900
200	2150
150	1500
100	900

CABIN ALT TRGT..... AS RQRD

■ **Above FL 250 :**

FOR LEVEL OFF & TROUBLESHOOTING :

AP..... DISCONNECT

A/THR..... DISCONNECT

FD..... OFF

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

PITCH ATT TRGT.....2°
ALL ENG THR..... see below

The ECAM displays only the appropriate thrust value in accordance with the aircraft weight and the flight level.

L2 *Because the thrust evolution is linear within a range of flight levels, the ECAM displays the thrust that results from the weight interpolation (e.g. At FL 340 , with an aircraft weight of 450 t , the ECAM displays 78 %).*

L1

THRUST (% THR)		
FL	*1 200 klb*	*750 klb*
Above FL 370	*98 %*	*78 %*
FL 340 - FL 370	*88 %*	*68 %*
FL 300 - FL 330	*78 %*	*58 %*
FL 250 - FL 290	*68 %*	*48 %*

RESULTING SPEED/MACH : 300KT / M.85
AIR DATA (ADR s /STBY INSTR) ..... XCHECK

L2 *Crosscheck all speeds and altitudes indications.*

Alternates sources may be used to evaluate the air data:
- *GPS altitude*
- *GPS and IRS Ground Speeds, taking into account altitude and wind effect.*

L1

■ **IF AT LEAST ONE AIR DATA IS RELIABLE :**
RELIABLE AIR DATA..... USE
AT LEAST ONE ADR : keep on
UNRELIABLE ADR s ..... OFF

■ **IF NO AIR DATA RELIABLE :**
ONE ADR : keep on
TWO ADR P/B s ..... OFF

● **If ADR 1+2+3 are set to OFF:**

The flight control laws revert to direct laws.

ASSOCIATED PROCEDURES

F/CTL DIRECT LAW (PROT LOST)
Refer to PRO-ABN-ECAM-10-27-10-400 F/CTL DIRECT LAW (PROT LOST)

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If ADR 1+2+3 are set to OFF:
  SPD BRK : DO NOT USE
- If ADR 1+2+3 are set to OFF, and at least two MFP heating are failed:
  AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

- If ADR 1+2+3 are set to OFF:
  SPD BRK : DO NOT USE
- If ADR 1+2+3 are set to OFF, and at least the heating of three MFPs is failed:
  AVOID ICING CONDs

DEFERRED PROC

ALL PHASES

- **AT TOP OF DESCENT:**
  - **If below FL 250:**
    CABIN ALT TRGT.....LDG ELEVN
  - **If above FL 250, and if no air data is reliable:**
    - **IF REMAINING AIR DATA RELIABLE :**
      RELIABLE AIR DATA.....USE
    - **IF NO AIR DATA RELIABLE :**
      CABIN ALT MODE.....MAN
      CABIN ALT TRGT.....LDG ELEVN
      - **WHEN BELOW FL 250 :**
        ADR 1+2+3 P/Bs .....OFF

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

SPEED.....FLY THE GREEN
SPD BRK : DO NOT USE

- **If at least two MFP heating are failed:**
  AVOID ICING CONDs

L12

STATUS

INOP SYS

ALL PHASES

F/CTL PROT (If all ADRs are set to OFF)
LOAD ALLEVIATION (If all ADRs are set to OFF)
AP 1+2 (If all ADRs are set to OFF)
A/THR (If all ADRs are set to OFF)
FD 1+2 (If all ADRs are set to OFF)
ADR 1+2+3 (If all ADRs are set to OFF)
TCAS 1+2 (If all ADRs are set to OFF)
CAB PRESS AUTO CTL (If below 250, or all ADRs are set to OFF)

APPR & LDG

CAT 2 (If ADR 1+2+3 are set to OFF)
GLS AUTOLAND (If ADR 1+2+3 are set to OFF)
TAWS 1+2 (If ADR 1+2+3 are set to OFF)
REACTIVE W/S DET (If ADR 1+2+3 are set to OFF)

INFO

- If below FL 250:
  RISK OF UNDUE OVERSPEED WARNING

ACFT FL	CABIN ALT TRGT
250	2900
200	2150
150	1500
100	900

- If above FL 250:
  RISK OF UNDUE OVERSPEED WARNING

  FOR CRUISE:
  PITCH ATT TRGT : 2°
  ALL ENG THR : THR (%) FROM TABLE

FL	1 200 klb	750 klb
> 370	98 %	78 %

Continued on the following page

NAV UNRELIABLE AIR SPEED INDICATION (Cont'd)

340 - 370	88 %	68 %
300 - 330	78 %	58 %
250 - 290	68 %	48 %

FOR DESCENT:
PITCH ATT TRGT : 0°
ALL THR LEVERS IDLE

IF RADOME DESTRUCTION :
INCREASE THRUST BY 5 %
FUEL CONSUMPT INCRSD
FMS FUEL PRED DISREGARD

Note: *Because of radome destruction, the fuel consumption is increased and FMS predictions are not correct.*
As a consequence, fuel consumption is increased by approximately 10 %.

To optimise fuel consumption:

- *Set Cost Index (CI) to zero*
- *Fly the aircraft preferably at FMS optimum FL, or between FMS optimum FL and FMS optimum - 4 000 ft.*

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34-Surveillance

SURV GPWS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The GPWS function of the TAWS system 1(2) is failed.

Indications:

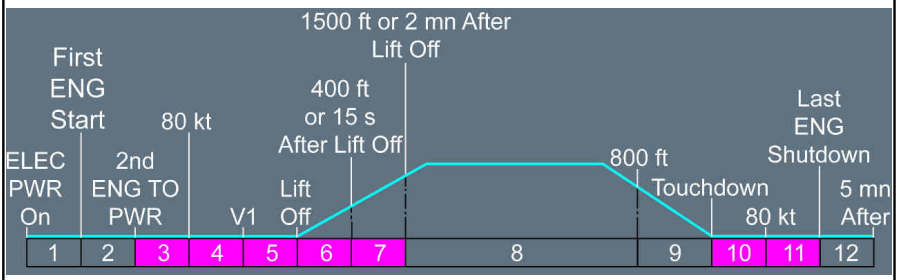
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV GPWS 1(2)(1+2) FAULT*.

Continued on the following page

SURV GPWS 1(2) FAULT (Cont'd)

■ **If the WXR/TAWS is selected on SYS 1(2), and if the WXR/TAWS on SYS 2(1) is operative:**
WXR & TAWS.....SYS 2(1)

■ **If the WXR or TAWS, on SYS 2(1) is failed:**
[MFD SURV] STATUS & SWTG PAGE.....CHECK
WXR & TAWS.....AS RQRD

L2 *The flight crew must select the most appropriate system, depending on available functions and flight conditions, to recover the required function(s).*

STATUS

INOP SYS

	APPR & LDG
	GPWS 1(2)

SURV GPWS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The GPWS function of both TAWS surveillance functions is failed.

Indications:

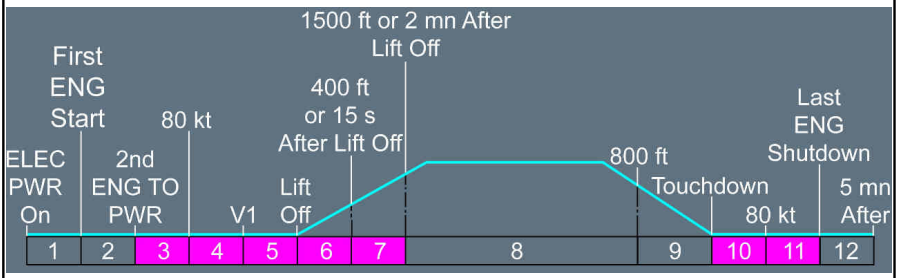
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV GPWS 1(2)(1+2) FAULT*.

[MFD SURV] GPWS..... OFF

STATUS

INOP SYS

	APPR & LDG
GPWS 1+2	

SURV PRED W/S 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

The predictive windshear function of SURV SYS 1(2) is failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV PRED W/S 1(2) (1+2) FAULT*.

- **If the WXR, PRED W/S and TURB functions on SYS 2(1) are operative:**
  WXR & TAWS.....SYS 2(1)
- **If the TURB function on SYS 2(1) is failed:**
  [MFD SURV] STATUS & SWTG PAGE.....CHECK
  WXR & TAWS.....AS RQRD

L2 *The flight crew must select the most appropriate SYS, depending on available functions and flight conditions, to recover the required function(s).*

Continued on the following page

SURV PRED W/S 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

PRED W/S 1(2)

SURV PRED W/S 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

The predictive windshear function of both SURV systems is failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV PRED W/S 1(2) (1+2) FAULT*.

Continued on the following page

SURV PRED W/S 1+2 FAULT (Cont'd)

[MFD SURV] STATUS & SWTG PAGE..... CHECK
WXR & TAWS..... AS RQRD

L2 *The flight crew must select the most appropriate SYS, depending on available functions and flight conditions, to recover the required function(s).*

STATUS

INOP SYS

APPR & LDG

PRED W/S 1+2

SURV REACTIVE W/S DET FAULT

Applicable to: ALL

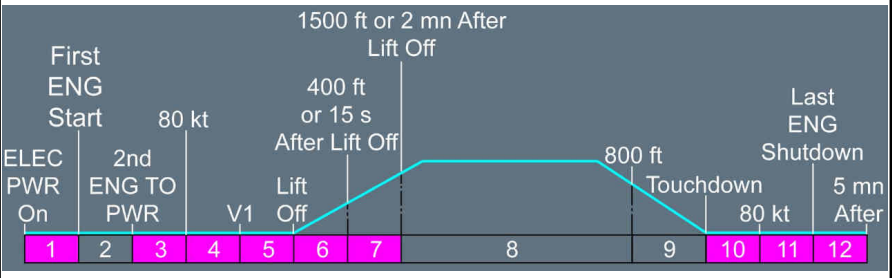
ANNUNCIATIONS

Triggering Conditions:

L2 The reactive windshear detection, done by the PRIMs, is failed.

Indications:

Flight Phase Inhibition:



Continued on the following page

SURV REACTIVE W/S DET FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV REACTIVE W/S DET FAULT*.

Crew awareness.

STATUS

INOP SYS

	APPR & LDG
	REACTIVE W/S DET

SURV ROW/ROP LOST

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 ROW and ROP functions are lost.

Indications:

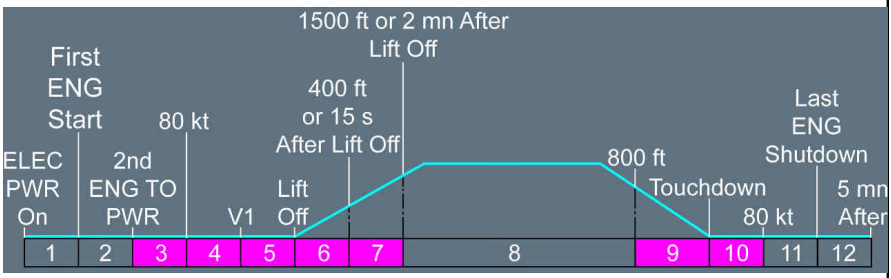
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV ROW/ROP LOST*.

Crew awareness.

STATUS

INOP SYS

0

BTV
ROW/ROP

SURV SYS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 SURV SYS 1(2) is failed.

Indications:

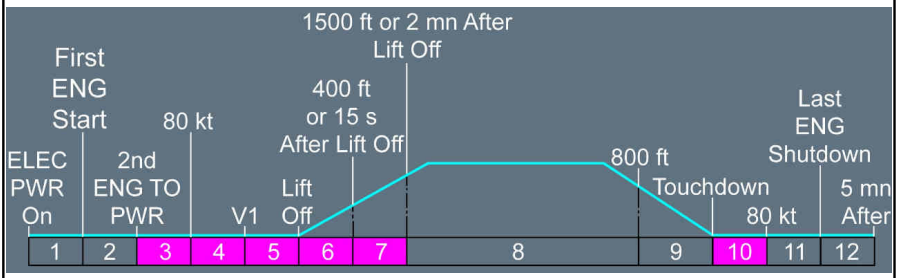
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV SYS 1(2) FAULT*.

- **If the WXR/TAWS is selected on SYS1(2), and if the WXR/TAWS on SYS 2(1) is operative:**
  WXR & TAWS.....SYS 2(1)
- **If the XPDR/TCAS is selected on SYS1(2), and if the XPDR/TCAS on SYS 2(1) is operative:**
  XPDR & TCAS.....SYS 2(1)

Continued on the following page

SURV SYS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES	APPR & LDG
WXR 1(2) XPDR 1(2) TCAS 1(2) AP/FD TCAS MODE (If WXR/TAWS or XPDR/TCAS is selected on SYS 1(2))	TAWS 1(2)

SURV SYS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Both SURV systems are failed. All surveillance functions are lost.

Indications:

Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

SURV SYS 1+2 FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV SYS 1+2 FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES	APPR & LDG
WXR 1+2	TAWS 1+2
XPDR 1+2	
TCAS 1+2	

SURV SYS DEGRADED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The links between both SURV systems are failed.

Indications:

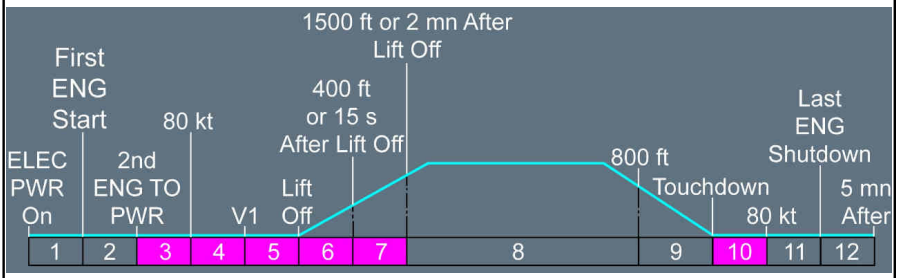
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV SYS DEGRADED* .

USE SURV SYS CTL PNL FOR SWITCHING
WXR / TAWS & XPDR / TCAS.....ON SAME SYS

STATUS

INOP SYS

ALL PHASES

SURV SYS DEGRADED

SURV TAWS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS surveillance function (GPWS and TERR SYS) on SURV SYS 1(2) is failed.

Indications:

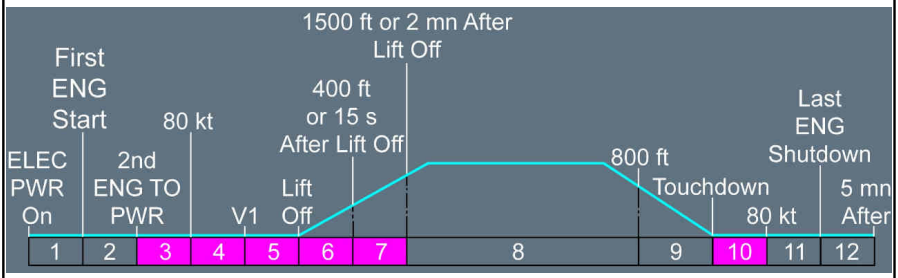
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TAWS 1(2)(1+2) FAULT*.

■ **If the WXR/TAWS is selected on SYS 1(2), and if WXR on SYS 2(1) is operative:**
WXR & TAWS.....SYS 2(1)

■ **If the WXR on SYS 2 is failed:**
[MFD SURV] STATUS & SWTG PAGE.....CHECK

L2 *An automatic reconfiguration has occurred:*
- *WXR surveillance function is on SYS 1(2)*
- *TAWS surveillance function is on SYS 2(1).*

Continued on the following page

SURV TAWS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

TAWS 1(2)

SURV TAWS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS surveillance functions (GPWS and TERR SYS) of both SURV systems are failed.

Indications:

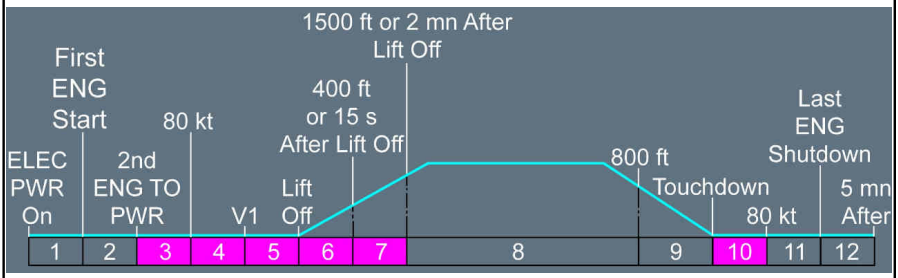
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TAWS 1(2)(1+2) FAULT* .

Continued on the following page

SURV TAWS 1+2 FAULT (Cont'd)

[MFD SURV] TERR SYS..... OFF
[MFD SURV] GPWS..... OFF

STATUS

INOP SYS

APPR & LDG

TAWS 1+2

SURV TCAS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

The TCAS surveillance function of SURV system 1(2) is failed.

Indications:

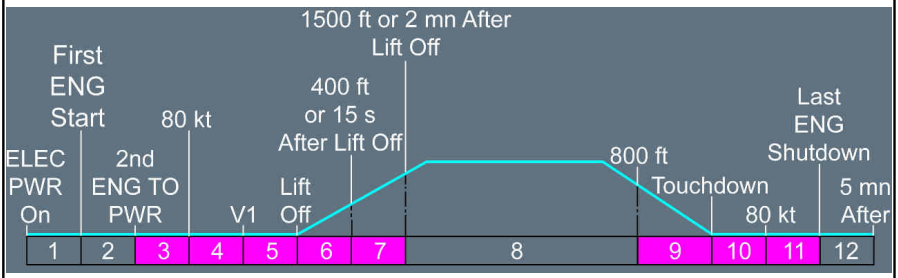
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

SURV TCAS 1(2) FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TCAS 1(2)(1+2) FAULT* .

- **If the XPDR/TCAS is selected on SYS 1(2), and if the XPDR/TCAS on SYS 2(1) is operative:**
  XPDR & TCAS.....SYS 2(1)

STATUS

INOP SYS

ALL PHASES

TCAS 1(2)
AP/FD TCAS MODE (If the XPDR/TCAS is selected on SYS 1(2))

SURV TCAS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

The TCAS surveillance function of both SURV systems is failed.

Indications:

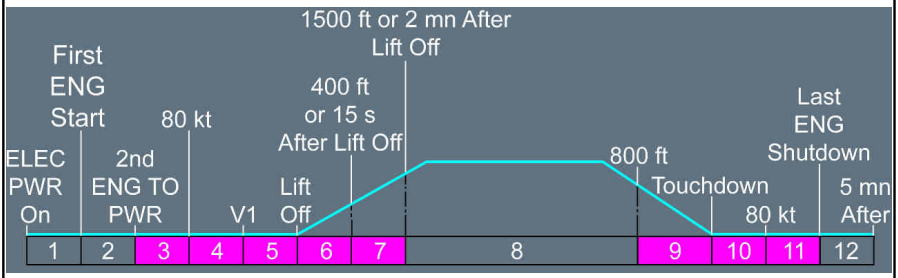
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TCAS 1(2)(1+2) FAULT*.

Crew awareness.

STATUS

INOP SYS

ALL PHASES

TCAS 1+2

SURV TCAS STBY

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TCAS function is in standby mode and not faulty, or the altitude reporting function is switched off.

Indications:

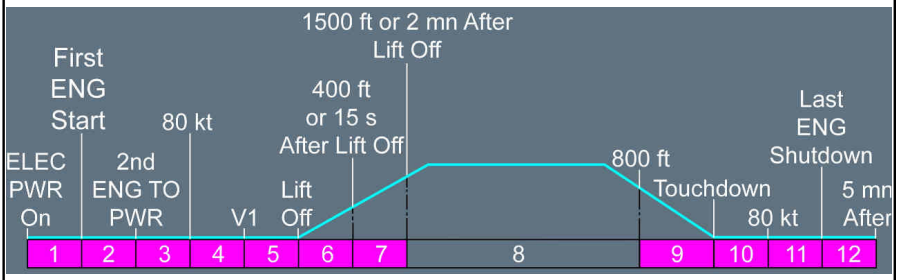
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TCAS STBY* .

Crew awareness.

SURV TERR SYS 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The terrain function of the TAWS system 1(2) is failed.

Indications:

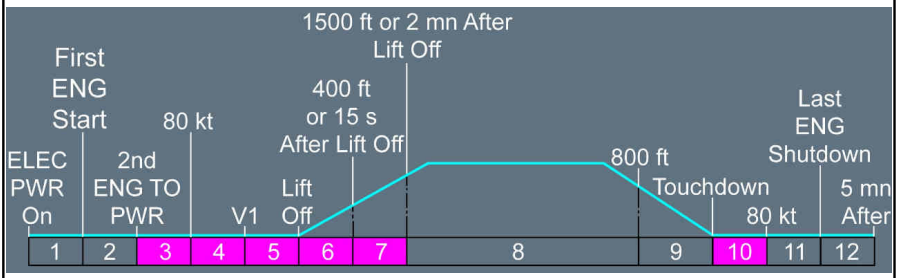
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TERR SYS 1(2) (1+2) FAULT*.

- **If the WXR/TAWS is selected on SYS 1(2), and if the WXR/TAWS on SYS 2(1) is operative:**
  WXR & TAWS.....SYS 2(1)
- **If the WXR or TAWS, on SYS 2(1) is failed:**
  [MFD SURV] STATUS & SWTG PAGE.....CHECK
  WXR & TAWS.....AS RQRD

L2 *The flight crew must select the most appropriate system, depending on the available functions and flight conditions, in order to recover the required function(s).*

Continued on the following page

SURV TERR SYS 1(2) FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

TERR SYS 1(2)

SURV TERR SYS 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The terrain functions (Terrain Clearance Floor and Terrain/Obstacle Awareness Display) of both SURV systems are failed.

Indications:

Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

SURV TERR SYS 1+2 FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TERR SYS 1(2) (1+2) FAULT* .

[MFD SURV] TERR SYS..... OFF
The basic GPWS modes remain operative.

STATUS

INOP SYS

APPR & LDG
TERR SYS 1+2

SURV TURB 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The turbulence detection function of SURV SYS 1(2) is failed.

Indications:

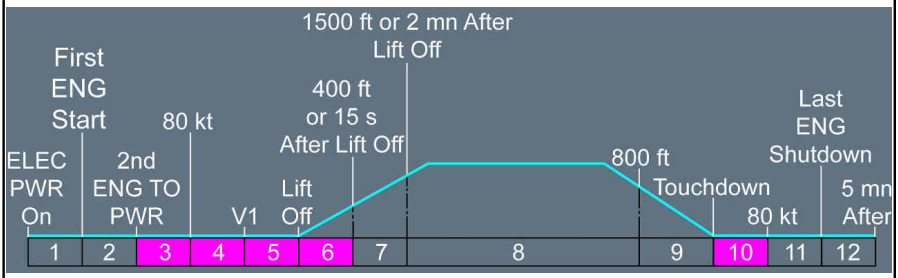
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TURB 1(2)(1+2) FAULT*.

- **If the WXR, PRED W/S and TURB functions on SYS 2(1) are operative:**
  WXR & TAWS.....SYS 2(1)
- **If the PRED W/S function on SYS 2(1) is failed:**
  [MFD SURV] STATUS & SWTG PAGE.....CHECK
  WXR & TAWS.....AS RQRD

L2 *The flight crew must select the most appropriate SYS, depending on available functions and flight conditions, to recover the required function(s).*

Continued on the following page

SURV TURB 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

TURB 1(2)

SURV TURB 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The turbulence detection function of both SURV systems is failed.

Indications:

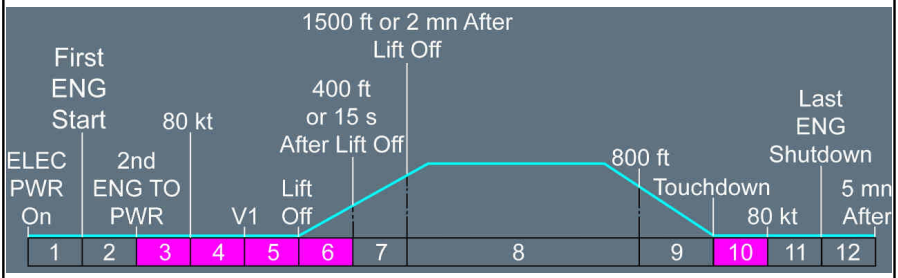
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV TURB 1(2)(1+2) FAULT*.

Continued on the following page

SURV TURB 1+2 FAULT (Cont'd)

[MFD SURV] STATUS & SWTG PAGE..... CHECK
WXR & TAWS..... AS RQRD

L2 *The flight crew must select the most appropriate SYS, depending on available functions and flight conditions, to recover the required function(s).*

STATUS

INOP SYS

ALL PHASES
TURB 1+2

SURV WXR 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The WX display function of SURV SYS 1(2) is failed

Indications:

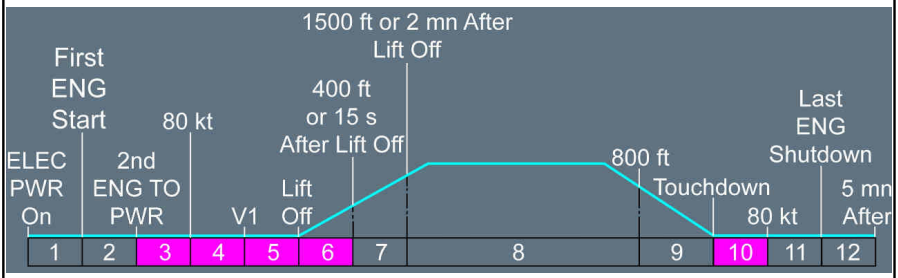
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV WXR 1(2)(1+2) FAULT*.

- **If the WXR/TAWS is selected on SYS 1(2), and if the WXR on SYS 2(1) is operative:**
  WXR & TAWS.....SYS 2(1)

Continued on the following page

SURV WXR 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

WXR 1(2)

SURV WXR 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least, the WX display functions of both SURV systems is failed.

Indications:

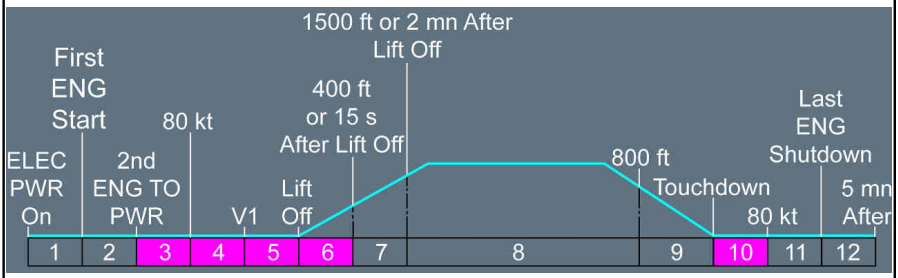
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV WXR 1(2)(1+2) FAULT* .

Continued on the following page

SURV WXR 1+2 FAULT (Cont'd)

● **If at least one WXR function (TURB, or PWS) is operative:**
[MFD SURV] STATUS & SWTG PAGE.....CHECK
WXR & TAWS.....AS RQRD

L2 *The flight crew must select the most appropriate SYS, depending on available functions and flight conditions, to recover the required function(s).*

STATUS

INOP SYS

ALL PHASES
WXR 1+2

SURV XPDR 1(2) FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The XPDR function of SURV SYS 1(2) is failed.

Indications:

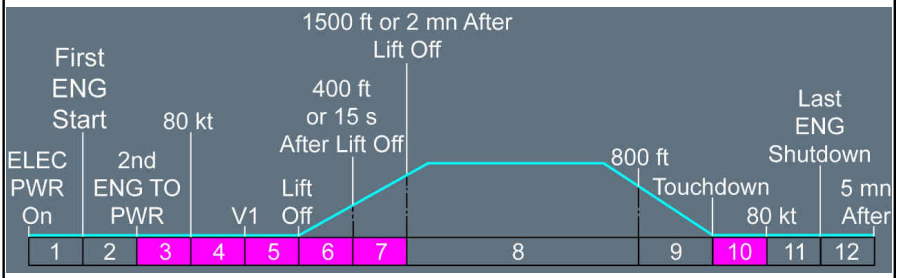
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV XPDR 1(2)(1+2) FAULT*.

- **If the XPDR/TCAS is selected on SYS 1(2), and if the XPDR 2(1) is operative:**
  XPDR & TCAS.....SYS 2(1)

Continued on the following page

SURV XPDR 1(2) FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

XPDR 1(2)
TCAS 1(2)
AP/FD TCAS MODE (If XPDR/TCAS is selected on SYS 1(2))

SURV XPDR 1+2 FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The XPDR function of both SURV systems is failed.

Indications:

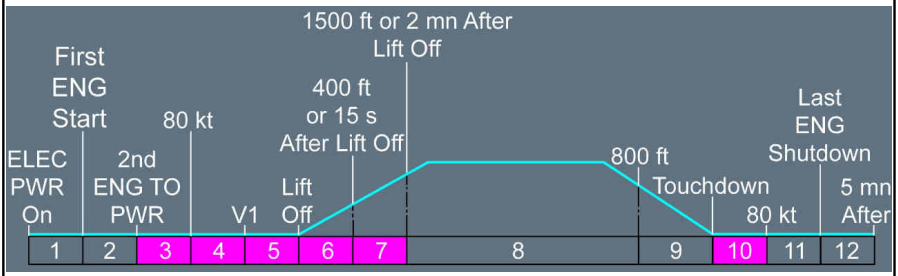
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

SURV XPDR 1+2 FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV XPDR 1(2)(1+2) FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
XPDR 1+2
TCAS 1+2

SURV XPDR STBY

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The XPDR function is in standby mode and not faulty.

Indications:

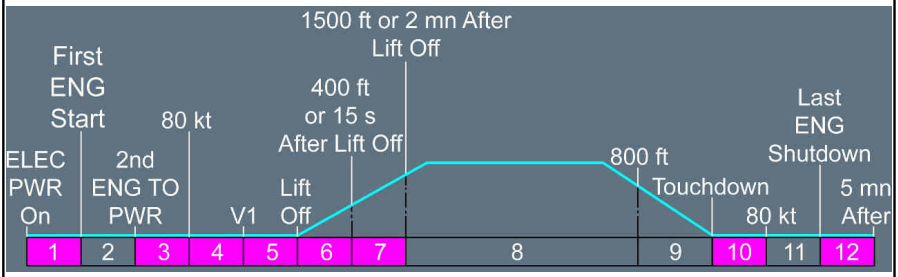
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-34-2 SURV XPDR STBY* .

Crew awareness.

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Oxygen

OXY CABIN BOTTLE PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The pressure in the cabin oxygen bottles is below the minimum pressure that is required in order to fly an emergency descent:
- From 40 000 ft to 10 000 ft for 5 min
  For the emergency descent profile, *Refer to DSC-35-30-20-GOIND Oxygen Pressure Value* .
- With the real number of cabin occupants
  L3 The real number of cabin occupants is computed by using the number of passengers, provided by the FMS .

L2 However, before one engine starts, the alert triggers, if the pressure in the cabin oxygen bottles is below 800 PSI .

The alert is inhibited, in the case of depressurization:
- The cabin altitude is above 13 800 ft , or
- The flight crew pressed the MASK MAN ON pb .

Indications:

Audio



Master Light

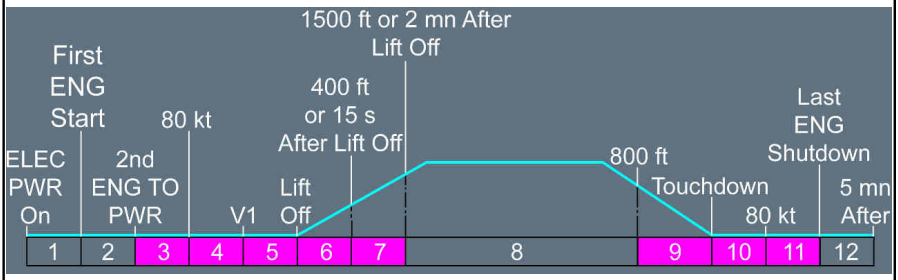


SD page



DOOR/OXYGEN SD Page

Flight Phase Inhibition:



Continued on the following page

OXY CABIN BOTTLE PRESS LO (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-35 OXY CABIN BOTTLE PRESS LO* .

Before departure, check that the oxygen bottle pressure is above the minimum necessary to fly the scheduled flight, considering the greater number between:

- The real number of cabin occupants
  The number of cabin occupants equals the number of passengers, plus the number of cabin crew.
- Half of: The number of passenger seats, plus the number of cabin crew seats.

For the minimum bottle pressure, *Refer to LIM-35 Minimum Cabin Oxygen Pressure* .

OXY CABIN VLV CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - One engine-burst area shutoff valve is closed, or
- One regulator supply valve is failed in the closed position.

For information on the engine-burst area shutoff valves, and the regulator supply valves, *Refer to DSC-35-30-10 Fixed Oxygen System for the Cabin* .

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-35 OXY CABIN VLV CLOSED* .

Crew awareness.

OXY CKPT BOTTLE PRESS LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Low pressure is detected in the cockpit oxygen bottle.
The pressure in the cockpit oxygen bottle is below 350 PSI.

The alert is inhibited, in the case of depressurization:
- The cabin altitude is above 13 800 ft, or
- The flight crew pressed the MASK MAN ON pb.

Indications:

Audio



Master Light

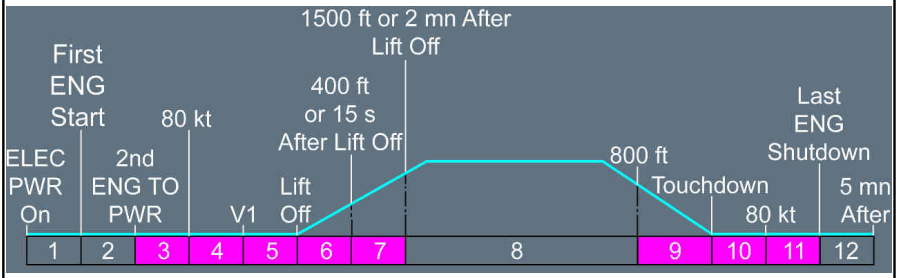


SD page



DOOR/OXYGEN SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-35 OXY CKPT BOTTLE PRESS LO* .

Crew awareness.

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Bleed Air

AIR ABNORM BLEED CONFIG

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

One (or more) bleed is lost, and one of the following alerts has been triggered:
- AIR ENG 1(2)(3)(4) BLEED FAULT
- AIR ENG BLEED TEMP LO
- ENG 1(2)(3)(4) SHUT DOWN
- ENG 1(2)(3)(4) FIRE.

The title of this alert (AIR ABNORM BLEED CONFIG) is not displayed on the EWD.
Indications:

Continued on the following page

AIR ABNORM BLEED CONFIG (Cont'd)

- **The following is displayed after AIR ENG 1(2)(3)(4) BLEED FAULT, AIR ENG BLEED TEMP LO, or ENG 1(2)(3)(4) SHUT DOWN, if the appropriate XBLEED valves did not open automatically:**
  XBLEED..... OPEN
  - **IF XBLEED OPEN :**
    - **When one bleed is inoperative, and one engine is shut down:**
      - **IF MAX THR RQRD :**
        AIR FLOW..... LO
        L2 *The bleed demand on the remaining engines must be reduced, to keep a sufficient engine thrust.*
        L1 FWD CARGO TEMP REGUL..... OFF
    - **When two bleeds are inoperative:**
      PACK 1(2)..... OFF
      L2 *When two bleeds are inoperative, one pack is more efficient than two packs.*
  - L1 **If bleed 1, or bleed 4 is inoperative:**
    - **IF XBLEED STILL CLOSED :**
      WING A-ICE..... OFF
      ENGs A-ICE..... AS RQRD
      AVOID ICING CONDs
- **The following is displayed after ENG 1(2)(3)(4) FIRE , if the appropriate XBLEED valves did not close automatically:**
  XBLEED..... CLOSE
  - **If bleed 1, or bleed 4 is inoperative:**
    WING A-ICE..... OFF
    AVOID ICING CONDs
  - **If two bleeds on the same side are inoperative:**
    PACK 1(2)..... OFF
    L2 *The pack on the affected side will be switched off.*

Continued on the following page

AIR ABNORM BLEED CONFIG (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If the WING A-ICE is off:
  AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

- If the WING A-ICE is off:
  AVOID ICING CONDs

STATUS

INOP SYS

ALL PHASES

PACK 1(2) (Depending on failure cases)
L(R)(CTR) XBLEED AUTO CTL (Depending on failure cases)
FWD CRG TEMP REGUL (Depending on failure cases)
WING A-ICE (Depending on failure cases)

INFO

- If only the manual control of the XBLEED valves is available:
  XBLEED MAN CTL ONLY

AIR APU BLEED FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the following occurs:

- The APU is running, and:
  - The APU bleed valve is abnormally open(closed), or
  - The APU isolation valve is abnormally open(closed), or
  - The APU bleed valve and the APU isolation valve are abnormally open.
- The APU BLEED pb-sw is ON, while the altitude is not within the APU operational envelope.

Indications:

Audio



Master Light

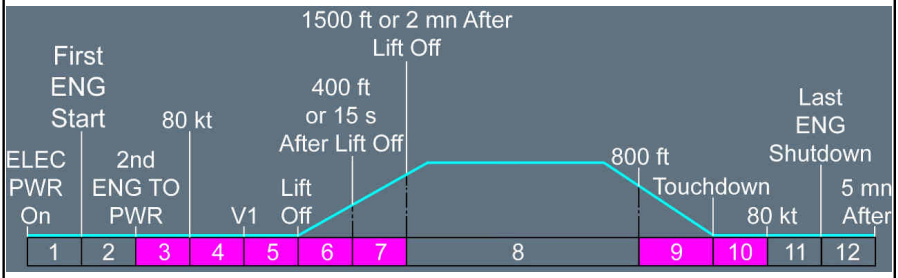


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR APU BLEED FAULT* .

Continued on the following page

AIR APU BLEED FAULT (Cont'd)

■ **If the APU isolation valve is abnormally open:**
APU ISOL VLV NOT CLOSED

■ **If the APU bleed valve is abnormally open:**
APU BLEED VLV NOT CLOSED

■ **Otherwise:**
APU BLEED.....OFF

● **If the APU bleed valve, or the APU isolation valve is closed, and the aircraft is above FL 225:**
APU BLEED AVAIL BELOW FL 225

STATUS

INOP SYS

ALL PHASES
APU BLEED (When applicable)

AIR APU BLEED LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 If a bleed leak is detected in the APU bleed ducts.

Indications:

Audio



Master Light

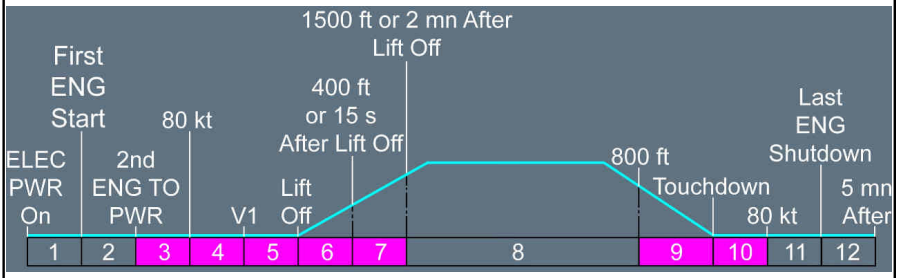


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 The APU bleed valve, and the APU isolation valve automatically close (For more information on the bleed system reconfiguration in the case of an APU bleed leak, *Refer to DSC-36-10-60-10 APU Bleed Leak*).

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR APU BLEED LEAK* .

Continued on the following page

AIR APU BLEED LEAK (Cont'd)

- **On ground, before any engine start:**
  ENG 1 MASTER LEVER.....KEEP OFF
  ENG 2 MASTER LEVER.....KEEP OFF
  ENG 3 MASTER LEVER.....KEEP OFF
  ENG 4 MASTER LEVER.....KEEP OFF

- **If the APU bleed valve, or the APU isolation valve did not close automatically:**
  APU BLEED.....OFF

L2 *If the APU BLEED pb-sw is set to ON, the FAULT light remains.*
If the APU BLEED pb-sw is off, the FAULT light goes off when the overheat due to the bleed leak disappears.

L1 - **If two (or more) bleeds are inoperative:**
  PACK 1(2).....OFF

L2 *If there are one, or two bleeds available, one pack will be more efficient than two packs.*

L1 - **In flight, if two bleeds on the same side are inoperative:**
  WING A-ICE.....OFF
  ENGs A-ICE.....AS RQRD
  AVOID ICING CONDs

- **When the leak is isolated:**
  AIR LEAK ISOLATED

Continued on the following page

AIR APU BLEED LEAK (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

APPR & LDG

- If the wing anti-ice is off, and in case of severe ice accretion:
  FOR LDG : FLAP LVR 3

LIMITATIONS ON PFD

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **In flight, if the wing anti-ice is off:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

L12

STATUS

INOP SYS

ALL PHASES

ENG 1 BLEED (If the APU bleed valve is abnormally open)
APU BLEED
PACK 1(2) (If the PACK 1(2) is set to OFF)
ENG 1 STARTER (If the APU bleed valve is abnormally open)
WING A-ICE (In flight, if the APU bleed valve is abnormally open)

Continued on the following page

AIR APU BLEED LEAK (Cont'd)

Note: *If the alert appears on ground, before any engine start, these inoperative systems will not be displayed.*

AIR BLEED LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A leak was detected in a bleed duct, and the XBLEED selector is set to OPEN.

Indications:

Audio



Master Light

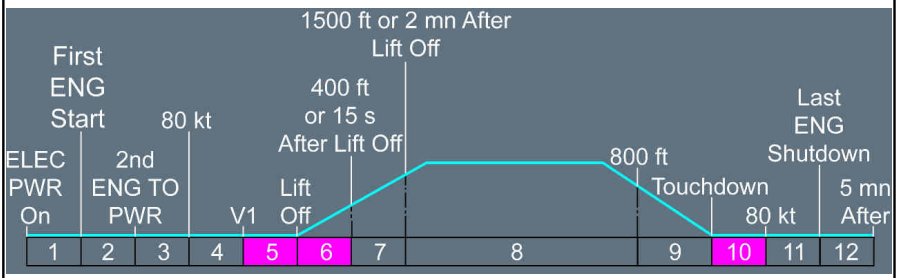


SD page



BLEED SD Page

Flight Phase Inhibition:



XBLEED.....CLOSE

L2 *Closing the XBLEED valves will isolate the bleed leak (For more information on the leak detection system, Refer to DSC-36-10-60-10 Leak Detection).*

AIR ENG 1(2)(3)(4) BLEED FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The engine bleed supply is lost:

- In the case of a bleed overtemperature.

L3 When the temperature downstream of the bleed valve is:

- Between 254 °C and 270 °C, during more than 55 s, or
- Between 270 °C and 290 °C, during more than 15 s, or
- Above 290 °C, during more than 5 s.

L2 - In the case of a bleed overpressure: When the bleed pressure at the IP stage of the compressor is sufficiently high.

L3 When the pressure is:

- Above 45 PSI, and the temperature downstream of the bleed valve is between 254 °C, and 270 °C , during more than 15 s, or
- Between 55 PSI, and 60 PSI the temperature downstream of the bleed valve is above 245 °C, during more than 15 s, or
- Above 60 PSI, during more than 15 s.

L2 - When the bleed pressure at the HP stage of the compressor is too low (e.g. at engine start)
L3 When pressure is lower than 15 PSI.
L2 - When the HP valve is abnormally open, or
- When the bleed controller is failed, or
- When the reverse flow protection is lost.

Indications:

Audio	Master Light	Local light	SD page
		 ENG 1(2)(3)(4) BLEED pb-sw (In the case of an engine bleed overheat, overpressure, or if the	 BLEED SD Page

Continued on the following page

AIR ENG 1(2)(3)(4) BLEED FAULT (Cont'd)

engine bleed valve
is abnormally open).

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR ENG 1(2)(3)(4) BLEED FAULT* .

Impacted DU: 00007719 AIR ENG 1(2)(3)(4) BLEED FAULT - Alert

- **If the HP valve is abnormally open:**

  HP VLV NOT CLOSED

  ENG 1(2)(3)(4) BLEED..... OFF 3S THEN ON

L2 *In the case of takeoff with packs OFF, and no other bleed demand, the AIR ENG 1(2)(3)(4) BLEED FAULT alert may trigger. In this situation, after takeoff (above 1 500 ft) , a reset of the affected engine bleed allows to clear the corresponding alert and recover the affected engine bleed system.*

L1 - **If the affected bleed valve does not close automatically:**

  - **IF NOT SUCCESSFUL :**

    ENG 1(2)(3)(4) BLEED..... OFF

L2 *The affected bleed valve does not close automatically, when:*

- *When the bleed pressure at the HP stage of the compressor is too low (e.g. at engine start).*
- *When the bleed controller is failed.*

L1 - **If the XBLEED valves do not open automatically:**

  Refer to PRO-ABN-ECAM-10-36-170 AIR ABNORM BLEED CONFIG

Continued on the following page

AIR ENG 1(2)(3)(4) BLEED FAULT (Cont'd)

Impacted by TDU: 00023117 AIR ENG 1(2)(3)(4) BLEED FAULT - Alert

- **If the HP valve is abnormally open:**

  HP VLV NOT CLOSED

- **If the affected bleed valve does not close automatically:**

  ENG 1(2)(3)(4) BLEED.....OFF

L2 *The affected bleed valve does not close automatically, when:*
- *When the bleed pressure at the HP stage of the compressor is too low (e.g. at engine start).*
- *When the bleed controller is failed.*

L1
- **If the XBLEED valves do not open automatically:**

  Refer to PRO-ABN-ECAM-10-36-170 AIR ABNORM BLEED CONFIG

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) BLEED
PACK 1(2) (If two or more engine bleed air supply are failed)
L(R)(CTR) XBLEED AUTO CTL (If at least one crossbleed valve failed to open automatically)
WING A-ICE (If wing anti-ice is not supplied with bleed air)

AIR ENG 1(2)(3)(4) BLEED NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

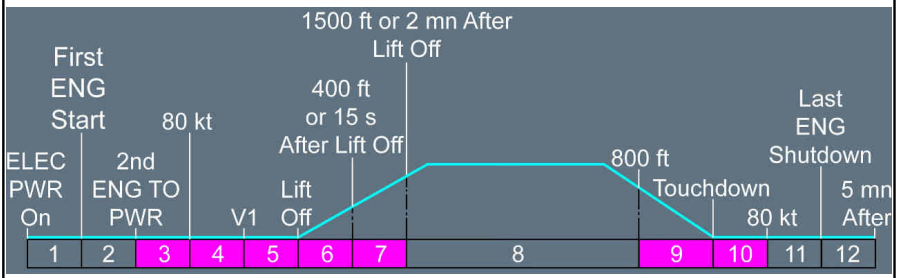
Triggering Conditions:

L2 The engine bleed valve is not closed during APU, or engine start.

Indications:

Audio	Master Light	Local light	SD page
			
		ENG 1(2)(3)(4) BLEED pb-sw	BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR ENG 1(2)(3)(4) BLEED NOT CLOSED* .

Continued on the following page

AIR ENG 1(2)(3)(4) BLEED NOT CLOSED (Cont'd)

ENG 1(2)(3)(4) BLEED.....OFF

- **WHEN ENG 1(2)(3)(4) STARTED :**
  ENG 1(2)(3)(4) BLEED.....ON

L2 This alert is recalled, when:
- The engine is started, and the APU is off, to remind the flight crew that he can switch on the affected bleed.
- The affected bleed is switched on, and the engine (or APU) start sequence is not completed.

STATUS

INOP SYS

ALL PHASES
ENG 1(2)(3)(4) BLEED

AIR ENG 1(2)(3)(4) BLEED OFF

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The ENG 1(2)(3)(4) BLEED pb-sw is abnormally set to OFF.

Indications:

Audio



Master Light

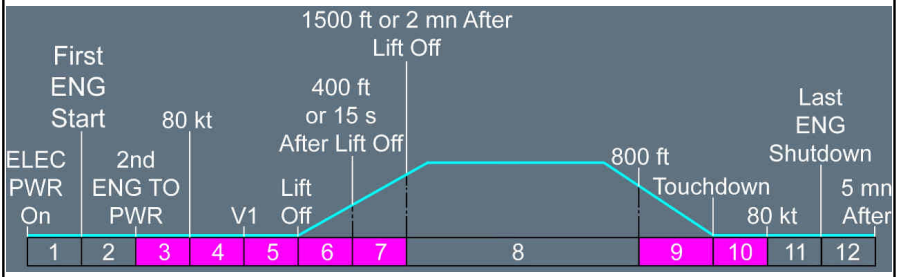


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR ENG 1(2)(3)(4) BLEED OFF* .

Crew awareness.

Continued on the following page

AIR ENG 1(2)(3)(4) BLEED OFF (Cont'd)

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) BLEED

AIR ENG 1(2)(3)(4) HP VLV NOT OPEN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The HP valve is abnormally closed.

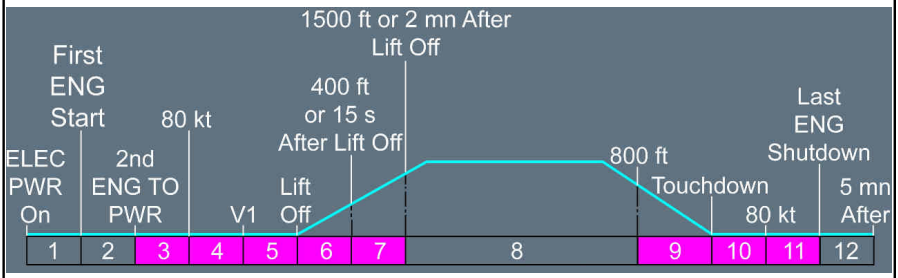
Indications:

SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

AIR ENG 1(2)(3)(4) HP VLV NOT OPEN (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR ENG 1(2)(3)(4) HP BLEED VLV NOT OPEN* .

Crew awareness.

L12

STATUS

INFO

NO BLEED 1(2)(3)(4) AT LO ENG PWR

At low engine thrust settings, the air pressure from the IP stage is not sufficiently high: Therefore, no bleed is available from the affected engine.

AIR ENG BLEED TEMP LO

ON BLEED 1(2)(3)(4)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 In flight, engine bleed temperature is too low for wing deicing.

L3 The WING A-ICE pb is set to ON, and:

- One bleed supplies bleed air at a temperature lower than 150 °C, during more than 60 s, or
- Every 60 s, and during at least 9 min, the bleed air supplied to the wing anti-ice system, is below 150 °C .

Indications:

L2

Audio



Master Light

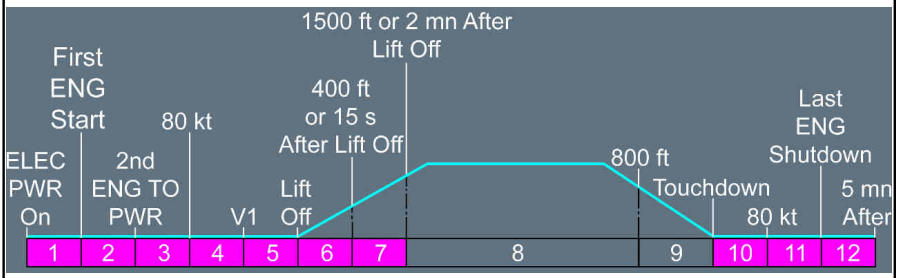


SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

AIR ENG BLEED TEMP LO (Cont'd)

ON BLEED 1(2)(3)(4)

L2 The temperature of the engine bleed air is too low for wing anti-ice.

When one bleed provides low temperature bleed air:
- The flight crew must increase the engine thrust.
- If the bleed continues to supply low temperature bleed air, the affected bleed is deficient, and the flight crew must switch off this bleed, provided that at least two bleeds remain operative.
  The temperature of the bleed air supplied to the wing anti-ice will increase.

When more than one bleed provide low temperature bleed air:
- The flight crew must increase the engine thrust.
- If the bleeds continue to supply low temperature bleed air, the flight crew must switch off the wing anti-ice system.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR ENG BLEED TEMP LO* .

ENG THRUST..... INCREASE

L2 *The thrust lever of the affected engine must be increased, with the autothrust off. Low bleed temperature may be due to low outside air temperature: Therefore, increasing the engine thrust may increase the bleed air temperature, and clear the alert.*

L1 ● **IF NOT SUCCESSFUL :**

■ **If one bleed is LO TEMP:**

ENG 1(2)(3)(4) BLEED..... OFF

L2 *The three crossbleed valves automatically open, when at least one bleed is set to OFF .*

L1 ■ **If more than one bleed is LO TEMP:**

WING A-ICE..... OFF

ENG s ANTI-ICE ..... AS RQRD

AVOID ICING COND s

L2 *Engine bleed temperature is too low, for wing deicing.*

L1 ● **If the XBLEED valves do not open automatically:**

Refer to PRO-ABN-ECAM-10-36-170 AIR ABNORM BLEED CONFIG .

Continued on the following page

AIR ENG BLEED TEMP LO (Cont'd)
ON BLEED 1(2)(3)(4)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If more than one bleed is LO TEMP:
  AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

- If more than one bleed is LO TEMP:
  AVOID ICING CONDs

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) BLEED (If the assigned ENG BLEED is set to OFF)
PACK 1(2) (If the assigned PACK is set to OFF)
L(R)(CTR) XBLEED AUTO CTL (If the assigned crossbleed valve failed to open automatically)
WING A-ICE (If the WING A-ICE is set to OFF)

AIR FWD CARGO DUCT LEAK

Applicable to: ALL

ANNUNCIATIONS

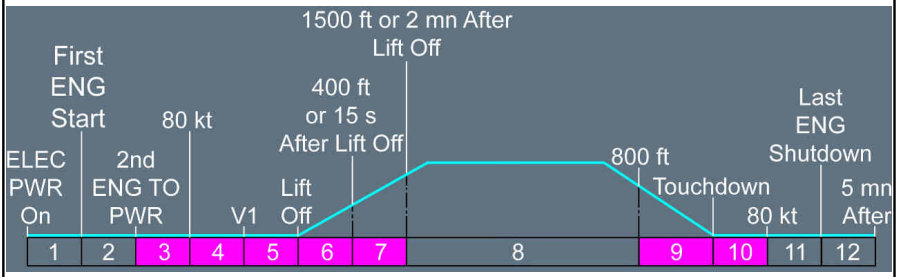
Triggering Conditions:

L2 If a bleed leak is detected in the forward cargo bleed ducts.

Indications:

Audio	Master Light	Local light	SD page
		 HOT AIR 1(2) pb	 BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR FWD CARGO DUCT LEAK*.

- **If the hot-air valve 1 did not close automatically:**
  HOT AIR 1 ..... OFF
- **When the leak is isolated:**
  AIR LEAK ISOLATED

Continued on the following page

AIR FWD CARGO DUCT LEAK (Cont'd)

STATUS

INOP SYS

ALL PHASES

PACK 1(2) (If the hot-air valve 1(2) is failed open)
ALL ZONES TEMP REGUL (If both hot-air valves are closed)
CKPT TEMP REGUL (If the hot-air valve 2 only is closed)
CAB PART TEMP REGUL (If one hot-air valve is closed)
FWD CRG TEMP REGUL (If the hot-air valve 1 only is closed)

INFO

CABIN TEMP REGUL DEGRADED

- If the hot-air valve 1 is closed:
  FWD CRG TEMP REGUL DEGRADED

AIR HOT AIR 1(2) LEAK

Applicable to: ALL

ANNUNCIATIONS

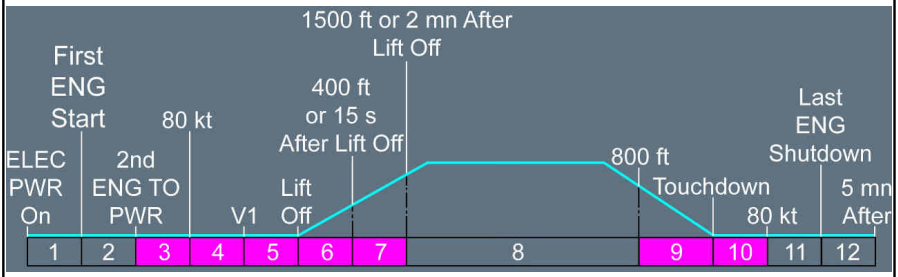
Triggering Conditions:

L2 A bleed leak is detected on one of the hot-air ducts of the air conditioning hot-air system.

Indications:

Audio	Master Light	Local light	SD page
		 HOT AIR 1(2) pb	 BLEED SD Page

Flight Phase Inhibition:



L2 The corresponding hot-air valve closes automatically (For more information on the bleed system reconfiguration in the case of a hot air bleed leak, *Refer to DSC-36-10-60-10 Hot-Air Leaks*).

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-36-21 AIR HOT AIR 1 LEAK*
- *Refer to MEL/ME-ECAM-36-21 AIR HOT AIR 2 LEAK* .

Continued on the following page

AIR HOT AIR 1(2) LEAK (Cont'd)

- **If the appropriate hot-air valve did not close automatically:**
  HOT AIR 1(2).....OFF
- **When the leak is isolated:**
  AIR LEAK ISOLATED

STATUS

INOP SYS

ALL PHASES

ALL ZONES TEMP REGUL (If both hot-air valves are closed)
PACK 1(2) (If the hot-air valve 1(2) only is failed open)
CAB PART TEMP REGUL (If one hot-air valve is closed)
CKPT TEMP REGUL (If the hot-air valve 2 only is closed)
FWD CRG TEMP REGUL (If the hot-air valve 1 only is closed)

INFO

CABIN TEMP REGUL DEGRADED
- If the hot-air valve 1 only is closed:
  FWD CRG TEMP REGUL DEGRADED

AIR L(R) INR WING LEAK / ENG 2(3) BLEED LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A leak is detected on an inner wing, or on an inner engine bleed duct.

Indications:

Audio



Master Light

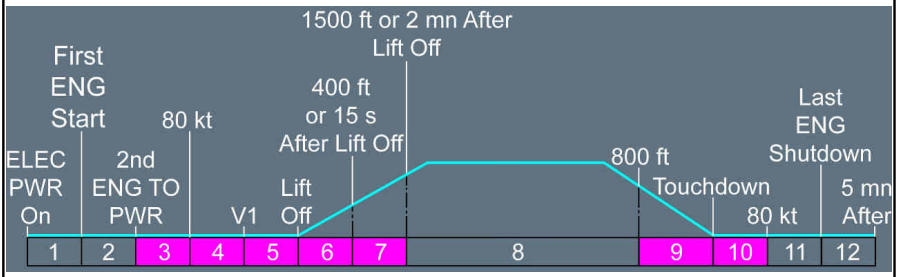


SD page



BLEED SD Page

Flight Phase Inhibition:



L2 The following valves automatically close:

- The associated engine bleed valve
- The crossbleed valve on the side of the affected engine
- The associated pack valve.

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-36-21 AIR L(R) INR WING LEAK*
- *Refer to MEL/ME-ECAM-36-21 AIR ENG 1(2)(3)(4) BLEED LEAK .*

Continued on the following page

AIR L(R) INR WING LEAK / ENG 2(3) BLEED LEAK (Cont'd)

- **On ground, before any engine start:**
  ENG 1 MASTER : KEEP OFF
  ENG 2 MASTER : KEEP OFF
  ENG 3 MASTER : KEEP OFF
  ENG 4 MASTER : KEEP OFF

- **When at least one engine is started, and the applicable bleed valve did not close automatically:**
  ENG 2(3) BLEED.....OFF

L2 *If the ENG 2(3) BLEED pb-sw is set to ON, the FAULT light remains.*
If the ENG 2(3) BLEED pb-sw is off, the FAULT light goes off when the overheat due to the bleed leak disappears.

L1 - **If two (or more) bleeds are off:**
  PACK 1(2).....OFF

L2 *If there are one or two bleeds available, one pack will be more efficient than two packs.*

L1 - **If the appropriate XBLEED valves did not close automatically:**
  XBLEED..... CLOSE

- **In flight, if two bleeds on the same side are inoperative:**
  WING A-ICE.....OFF
  ENGs A-ICE..... AS RQRD
  AVOID ICING CONDs

- **When the leak is isolated:**
  AIR LEAK ISOLATED

Continued on the following page

AIR L(R) INR WING LEAK / ENG 2(3) BLEED LEAK (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

APPR & LDG

- If the wing anti-ice is off, and in case of severe ice accretion:
  FOR LDG : FLAP LVR 3

LIMITATIONS ON PFD

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **In flight, if the wing anti-ice is off:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

L12

STATUS

INOP SYS

ALL PHASES

ENG 2(3) BLEED
PACK 1(2) (If two bleeds (or more) are lost)
ENG 2(3) STARTER
L(R)(CTR) XBLEED AUTO CTL (If the automatic control of the XBLEED valve is lost)
WING A-ICE (In flight, if two bleeds on the same side are lost)

Continued on the following page

AIR L(R) INR WING LEAK / ENG 2(3) BLEED LEAK (Cont'd)

Note: *If the alert appears on ground, before any engine start, these inoperative systems will not be displayed.*

AIR L(R) OUTR WING LEAK / ENG 1(4) BLEED LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A leak is detected on an outer wing, or on an outer engine bleed duct.

Indications:

Audio



Master Light



Local light



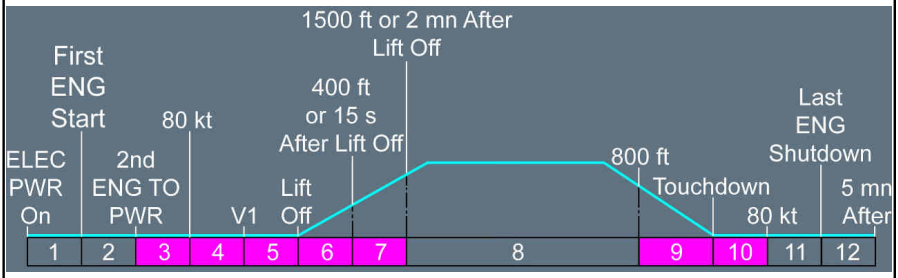
ENG BLEED 1(4) pb-sw

SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

AIR L(R) OUTR WING LEAK / ENG 1(4) BLEED LEAK (Cont'd)

L2 The following valves automatically close, provided that the XBLEED selector position is at AUTO:

- The associated engine bleed valve
- The crossbleed valve on the side of the affected engine
- The center crossbleed valve
- The associated pack valve.

For more information on the bleed system reconfigurations, *Refer to DSC-36-10-60-10 Outer Wing and Engine Bleed Leaks* .

For associated MEL dispatch conditions:

- *Refer to MEL/ME-ECAM-36-21 AIR L(R) OUTR WING LEAK*
- *Refer to MEL/ME-ECAM-36-21 AIR ENG 1(2)(3)(4) BLEED LEAK* .

Continued on the following page

AIR L(R) OUTR WING LEAK / ENG 1(4) BLEED LEAK (Cont'd)

- **On ground, before any engine start:**
  ENG 1 MASTER : KEEP OFF
  ENG 2 MASTER : KEEP OFF
  ENG 3 MASTER : KEEP OFF
  ENG 4 MASTER : KEEP OFF

- **When at least one engine is started, and the applicable bleed valve did not close automatically:**
  ENG 1(4) BLEED.....OFF

L2 *If the ENG 1(4) BLEED pb-sw is set to ON, the FAULT light remains.*
If the ENG 1(4) BLEED pb-sw is off, the FAULT light goes off when the overheat due to the bleed leak disappears.

L1
- **If two (or more) bleeds are off:**
  PACK 1(2)..... OFF

L2 *If there are one or two bleeds available, one pack will be more efficient than two packs.*

L1 - **If the applicable XBLEED valves did not close automatically:**
  XBLEED..... CLOSE

  - **If there is a bleed leak on the left outer wing:**
    APU BLEED..... OFF

- **In flight:**
  WING A-ICE.....OFF
  ENGs A-ICE..... AS RQRD
  AVOID ICING CONDs

- **When the leak is isolated:**
  AIR LEAK ISOLATED

Continued on the following page

AIR L(R) OUTR WING LEAK / ENG 1(4) BLEED LEAK (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

APPR & LDG

- If the wing anti-ice is off, and in case of severe ice accretion:
  FOR LDG : FLAP LVR 3

LIMITATIONS ON PFD

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **In flight, if the wing anti-ice is off:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

L12

STATUS

INOP SYS

ALL PHASES

ENG 1(4) BLEED
APU BLEED (If there is a bleed leak on the left outer wing)
PACK 1(2) (If the PACK 1(2) is set to OFF)
ENG 1(4) STARTER
L(R)(CTR) XBLEED AUTO CTL (If the automatic control of the XBLEED valve is lost)
WING A-ICE (In flight)

Continued on the following page

AIR L(R) OUTR WING LEAK / ENG 1(4) BLEED LEAK (Cont'd)

Note: *If the alert appears on ground, before any engine start, these inoperative systems will not be displayed.*

AIR LEAK DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Bleed leak detection is lost on one (or more) bleed duct(s):
- A dual loop is lost on one (or more) bleed duct, or
- Both leak detection systems are failed, and bleed leak detection is lost on all the bleed ducts.

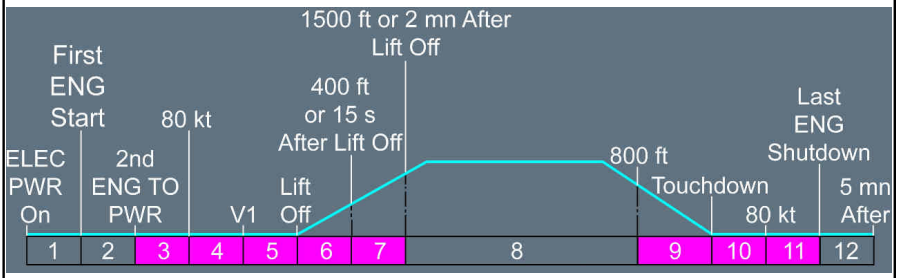
Indications:

SD page



BLEED SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR LEAK DET FAULT*.

Continued on the following page

AIR LEAK DET FAULT (Cont'd)

- **Depending on the affected bleed duct, one of the following messages may appear:**

ON L(R) OUTR WING

L2 *Leak detection is lost on the left (right) outer wing bleed duct.*

L1 ON L(R) INR WING

L2 *The dual loop is lost on the left (right) inner wing bleed duct.*

L1 ON ENG 1(2)(3)(4) BLEED

L2 *Leak detection is lost on the engine bleed duct.*

L1 ON APU BLEED

L2 *Leak detection is lost on the APU bleed duct.*

L1 ON PACK 1(2)

L2 *Leak detection is lost on the bleed duct of the pack bay area.*

L1 ON HOT AIR 1(2)

L2 *Leak detection is lost on the bleed ducts of the air conditioning hot-air system.*

L1 ON AFT CARGO DUCT

L2 *Leak detection is lost on the bleed ducts of the aft cargo.*

L1 ON FWD CARGO DUCT

L2 *Leak detection is lost on the bleed ducts of the forward cargo.*

L1 Crew awareness.

Continued on the following page

AIR LEAK DET FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

L(R) INR WING LEAK DET (Depending on the affected bleed duct)
L(R) OUTR WING LEAK DET (Depending on the affected bleed duct)
ENG 1(2)(3)(4) BLEED LEAK DET (Depending on the affected bleed duct)
APU BLEED LEAK DET (Depending on the affected bleed duct)
PACK 1(2) LEAK DET (Depending on the affected bleed duct)
HOT AIR 1(2) LEAK DET (Depending on the affected bleed duct)
AFT CRG LEAK DET (Depending on the affected bleed duct)
FWD CRG LEAK DET (Depending on the affected bleed duct)
AIR LEAK DET (Bleed leak detection is lost on all the bleed ducts)

AIR PACK 1(2) LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 If a leak is detected in the pack bay area.

Indications:

Audio



Master Light



Local light



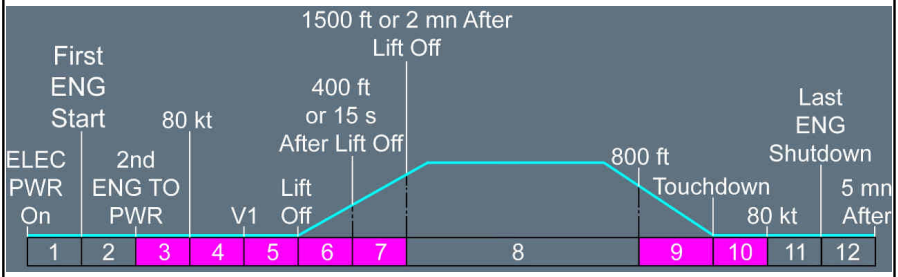
PACK 1(2) pb

SD page



BLEED SD Page

Flight Phase Inhibition:



L2 The two pack valves of the affected pack and the corresponding hot-air valve automatically close (For more information on the bleed system reconfiguration in the case of a pack leak, *Refer to DSC-36-10-60-10 Pack Leaks*).

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR PACK 1(2) LEAK* .

Continued on the following page

AIR PACK 1(2) LEAK (Cont'd)

- **If the appropriate pack valves did not close automatically:**
  PACK 1(2).....OFF
- **In flight, if two bleeds on the same side are inoperative:**
  WING A-ICE.....OFF
  ENGs A-ICE..... AS RQRD
  AVOID ICING CONDs
- **When the leak is isolated:**
  AIR LEAK ISOLATED

Continued on the following page

AIR PACK 1(2) LEAK (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

APPR & LDG

- If the wing anti-ice is off, and in case of severe ice accretion:
  FOR LDG : FLAP LVR 3

LIMITATIONS ON PFD

ALL PHASES

- In flight, if two bleeds on the same side are lost:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **In flight, if the wing anti-ice is off:**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

L12

STATUS

INOP SYS

ALL PHASES

ENG 1 BLEED (If the pack valve 1 is failed open)
ENG 1 STARTER (If the pack valve 1 is failed open)
APU BLEED (If the pack valve 1 is failed open)

The APU bleed valve is closed: No bleed will be supplied to the affected pack.

Continued on the following page

AIR PACK 1(2) LEAK (Cont'd)

ENG 4 BLEED (If the pack valve 4 is failed open)
ENG 4 STARTER (If the pack valve 4 is failed open)
PACK 1(2)
WING A-ICE (In flight, if two bleeds on the same side are lost)

AIR XBLEED FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One (or more) XBLEED valve(s):
- Has an abnormal position, or
- Is no longer controlled automatically by the bleed controller.

Indications:

Audio



Master Light

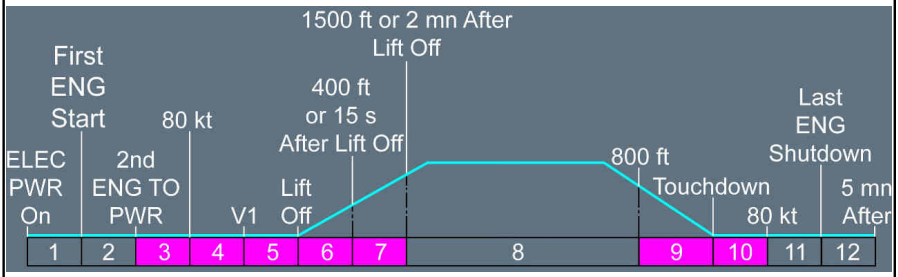


SD page



BLEED SD Page

Flight Phase Inhibition:



Continued on the following page

AIR XBLEED FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-36-21 AIR XBLEED FAULT* .

- **If the automatic control of one (or more) XBLEED valve, is lost:**
  XBLEED MAN CTL ONLY

L2 *Open the XBLEED valves:*
- *When the APU BLEED pb-sw is set to ON ,*
- *For engine start, and*
- *When the WING A-ICE is on, with one bleed inoperative.*

L1
- **If the manual control of one (or more) XBLEED valve, is lost:**
  XBLEED..... AUTO
- **If manual opening is inoperative, and one (or more) bleed is off:**

  Refer to PRO-ABN-ECAM-10-36-170 AIR ABNORM BLEED CONFIG .

STATUS

INOP SYS

ALL PHASES

L(R)(CTR)(L+R+CTR) XBLEED (If the applicable XBLEED valve(s) is(are) failed)
L(R)(CTR) XBLEED AUTO CTL (If the automatic control of the applicable XBLEED valve(s), is lost)

INFO

- If the automatic control of one (or more) XBLEED valve, is lost:
  XBLEED MAN CTL ONLY
- If the manual control of one (or more) XBLEED valve, is lost:
  XBLEED AUTO CTL ONLY

Intentionally left blank

Avionics Network

AVIONICS NETWORK ALL SWITCHES FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 All the switches of both avionics networks are failed: The aircraft systems can no longer communicate via the avionics networks.

Indications:

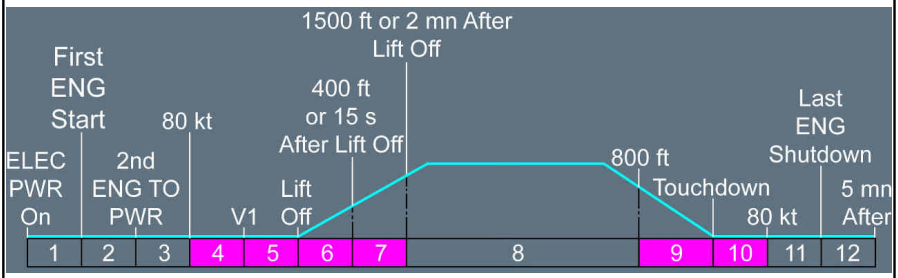
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

AVIONICS NETWORK ALL SWITCHES FAULT (Cont'd)

L2 When all switches are failed:

- Both FMS are no longer available.
- AP 1, and AP 2 are available. Only selected modes are available. AP 1 is also available for an ILS approach.
  - The GPS position of the aircraft, and ILS 1 remain available on the ISIS SND only.
  - NAVAIDS tuning is available via the RMP .
- Autothrust is inoperative.
- ADIRU 1, ADIRU 2, and ADIRU 3 remain available.
- Only the ECAM FUEL SD page is available on the SD display unit. The ECAM FUEL SD page is also displayed on both MFD display units. Therefore, the STATUS page is not available.

  On the ECAM FUEL SD page, the following indications remain available:
  - The FOB , and
  - The fuel quantity in every fuel tank.

  However, the precision of these indications, is degraded.
- On the PFD , the following indications are lost:
  - The Flight Director (FD)
    However, the Flight Path Vector(Velocity Vector) remains available on the PFD.
  - The FMA
  - The radio altitude indication. However, the autocallouts are available.
- The flight controls remain in normal law. However, the pitch and bank angle protections are indicated on the PFD, as in alternate law.
- The characteristic speeds are no longer displayed on the PFD speed scale. VMAX indicates only the VMO / MMO , whatever the aircraft configuration (landing gear or slats/flaps).
  The flight crew can use the speed placard, when the landing gear, or the slats/flaps are extended.
- Cabin pressure automatic regulation remains available. However, no information about the aircraft pressurization is available, and the landing field elevation has a default value fixed at 7 000 ft .
- Datalink communication is lost.
  ATC voice communication remains available. Voice communication tuning is available via the RMP .
- The transponder is available in mode A only: Altitude reporting is no longer available. The SQWK code can be modified via the RMP.

Continued on the following page

AVIONICS NETWORK ALL SWITCHES FAULT (Cont'd)

All the other surveillance functions are lost.

- Automatic fuel transfers, and jettison are no longer available. If an overweight landing is necessary, *Refer to PRO-ABN-ECAM-10-80-50 MISC OVERWEIGHT LDG* .
- CG position monitoring is not available: Flight time is limited to 4 hours.

During approach and landing

- Engine anti-ice remains available.
- Landing gear extension is available by gravity only.
- CAT 2 and CAT 3 approaches are no longer available.
  CAT 1 approach remains available.
- Normal and alternate braking are lost. Anti-skid is not available.
  Emergency braking remains available. The landing distance is increased.
- N/W and B/W steering are no longer available.

For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK ALL SWITCHES FAULT* .

Continued on the following page

AVIONICS NETWORK ALL SWITCHES FAULT (Cont'd)

LAND ANSA

A/THR NOT USABLE
ALL THR LEVERS.....MOVE
FMA NOT AVAIL
AP MODES AVAIL : LOC, G/S
CONSIDER BASIC AP MODES ONLY : V/S, FPA, ALT

L2 *Both FMS are lost: Therefore, the autopilot operates, with selected modes only: The appropriate speed, heading, and altitude targets can be selected on the AFS CP. These targets do not appear on the PFD.*

L1 FOR NAV : STBY INSTRUMENTS ONLY
XPDR MODE A ONLY

L2 *Altitude reporting via the transponder is no longer available. The SQWK code can be modified via the RMP.*

L1 ATC COM VOICE ONLY
ATC.....NOTIFY

L2 *The ADS and the ATC mailbox are no longer available.*

L1 CABIN CREW.....ADVISE
OVHD PNL..... MONITOR

L2 *Only local warnings on the overhead panel, and on the FAP are available: Notify cabin crew.*

L1 CAB PRESS MAN MODES : DO NOT USE

L2 *The CPIOM B communication is no longer available: The pressurization system is in automatic backup mode. The pressurization system no longer receives the landing field elevation information, and the cabin altitude targets no longer appear on the SD. Therefore, the flight crew must not use the cabin pressurization manual system.*

L1 IN DES : CAB ALT REGULATED TO 7000 FT

L2 *In automatic backup mode, the cabin altitude is regulated to 7 000 ft in descent.*

L1 BELOW 7000 FT : CAB ALT = ACFT ALT

L2 *Below 7 000 ft, the outflow valves open: The cabin altitude is the same as the aircraft altitude.*

L1 BELOW 7000 FT : AVOID HI DES V/S

L2 *Below 7 000 ft, avoid high descent rate to limit uncomfortable variations of cabin pressure.*

L1 JETTISON NOT USABLE
L/G GRVTY EXTN ONLY
LDG DIST AFFECTED

Continued on the following page

AVIONICS NETWORK ALL SWITCHES FAULT (Cont'd)

L2 *The emergency braking mode is active, therefore the braking performance is degraded.*

L1 ● **WHEN ANY FEED TK<13000 KG (AUTO RCL) :**
OUTR TK XFR.....MAN

Continued on the following page

AVIONICS NETWORK ALL SWITCHES FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA
A/THR NOT USABLE
XPDR MODE A ONLY
ATC COM VOICE ONLY
MAN PRESS: DO NOT USE

APPR AND LDG

AVOID HI DESCENT V/S
MAX SPEED : 220 KT
JETTISON NOT USABLE
L/G GRVTY EXTN ONLY
CAT 1 ONLY
A-SKID NOT USABLE ON ALL L/Gs
LDG DIST AFFECTED
N/W STEER NOT USABLE

L12

DEFERRED PROC

FOR APPROACH

ILS 1 / GLS 1 ON STBY INSTRUMENTS ONLY
FOR ILS 1 / GLS 1 TUNING : USE RMP
LDG DIST COMPUTATION.....CONFIRM
A-SKID NOT USABLE ON ALL L/GS
BRK PRESS AUTO LIMITED ON ALL L/GS

Even if the flight crew applies maximum pressure on the brake pedals, the braking pressure is automatically limited to 1 000 PSI, to prevent any tire burst.
To avoid any wheel lock, delay braking until NLG touches down.

N/W STEER NOT USABLE

B/W steering is not available neither.

FOR LANDING

FOR L/G GRVTY EXTN : MAX SPEED 220 KT

FOR L/G EXTN :

L/G LEVER..... UP
L/G GRVTY (EXTN MAX 2 MIN)..... DOWN

● **WHEN L/G LOCKED DOWN OR AFTER 120 S :**
L/G LEVER..... DOWN

Continued on the following page

AVIONICS NETWORK ALL SWITCHES FAULT (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

None.

The ECAM STATUS page is not available, when all the switches are failed.

Inop Sys (Not displayed on ecam)

ALL PHASES

A/THR
FMS 1+2
ATC DATALINK
FQMS 1+2
JETTISON
TAWS 1+2
WXR 1+2
TCAS 1+2
DATALINK
L/G CTL SYS 1+2
GPWS 1+2
DOORS POS DET
FCDC 1+2

No slats/flaps monitoring is available.

ELEC LOAD MANAGT

Load shedding on low commercial loads (e.g. IFE, lavatory and cabin lights) is no longer available: Only load shedding on high loads (e.g. galleys) remains available.

PACKS TEMP REGUL
ALL ZONES TEMP REGUL

The temperature in the cockpit and cabin zones is fixed at 24 °C.

VIDEO
C/B MONITOR
FUEL AUTO XFRS
CARGO & LAVATORY SMOKE DET
BLEED LEAK DET

APPR AND LDG

ENG GROUND IDLE
ALTN BRK SYS
NORM BRK SYS
A-SKID
N/W + B/W STEER

AVIONICS NETWORK DOUBLE IOM FAULT

Applicable to: ALL

ANNUNCIATIONS

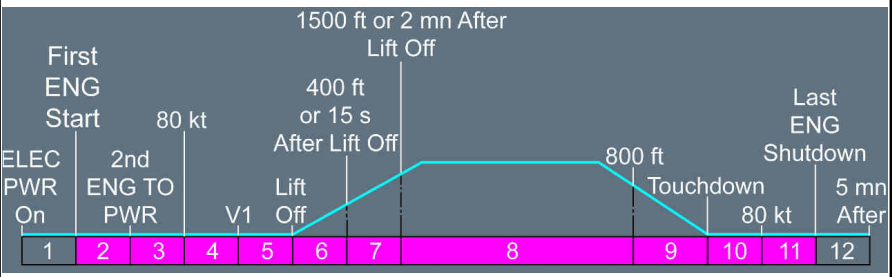
Triggering Conditions:

L2 Two specific IOM s are failed. On each affected IOM pair, one redundant IOM remains available: Communication between the aircraft systems remains available (For more information on this configuration, *Refer to DSC-42-20 IOM Failure Degrading Redundancy*).

L3 A combination of two IOM s has been identified, to trigger this alert for MMEL purposes.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK DOUBLE IOM FAULT* .

Crew awareness.

AVIONICS NETWORK DOUBLE SWITCH FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Two specific switches are failed, on the same avionics network: Communication between the aircraft systems remains available (For more information on the configuration of the avionics networks , *Refer to DSC-42-20 Switch Failure Affecting One Network*).

Indications:

Flight Phase Inhibition:



L3 This specific combination of two switches has been identified, to trigger this alert for MEL purposes.

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK DOUBLE SWITCH FAULT* .

Crew awareness.

AVIONICS NETWORK MULTIPLE CABLE FAULT

Applicable to: ALL

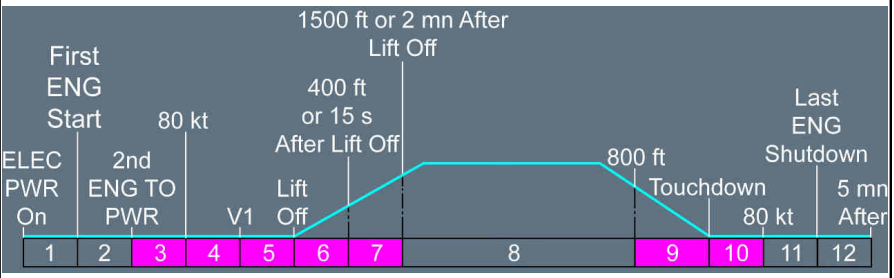
ANNUNCIATIONS

Triggering Conditions:

L2 Two (or more) cables of the avionics networks, are failed: Communication between the aircraft systems may be affected.

Indications:

Flight Phase Inhibition:



L2 Depending on the affected cables, other alerts can be triggered.
For associated dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK MULTIPLE CABLE FAULT* .

Crew awareness.

AVIONICS NETWORK MULTIPLE IOM FAULT
(NETWORK DEGRADED)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One, or more pair of IOM s is failed: Communication between some aircraft systems is lost (For more information on this configuration, *Refer to DSC-42-20 IOM Pair Failure*).

Indications:

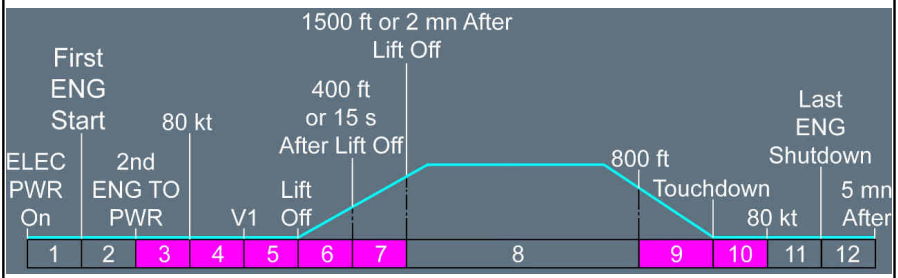
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK MULTIPLE IOM FAULT (NETWORK DEGRADED)* .

Continued on the following page

AVIONICS NETWORK MULTIPLE IOM FAULT (Cont'd)

(NETWORK DEGRADED)

- **Depending on the affected IOMs, one (or more) of the following may appear:**

AVOID ICING CONDs

USE EFIS CP BKUP ON CAPT MFD

L2 *Appears, when: On the CAPT EFIS CP, only the barometric reference selector operates.*

L1 USE EFIS CP BKUP ON F/O MFD

L2 *Appears, when: On the F/O EFIS CP, only the barometric reference selector operates.*

L1 FMS NAVAID TUNING NOT AVAIL

FOR NAVAID TUNING : USE RMP

L2 *NAVAIDS tuning via the FMS is no longer available.*

L1 ECP KEYS NOT AVAIL :
SYSTEMS, MORE, TO CONFIG, RCL LAST
FOR SYS PAGES : "ALL" AVAIL

L2 *Appears, when some keys of the ECAM CP are no longer available.*

Continued on the following page

AVIONICS NETWORK MULTIPLE IOM FAULT (Cont'd)
(NETWORK DEGRADED)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- Depending on the affected pair of IOMs:
  AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

- Depending on the affected pair of IOMs:
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH
ILS 1 / GLS 1 ON STBY INSTRUMENTS ONLY
ILS 2 / GLS 2 ON F/O PFD & CAPT ND ONLY
FOR ILS 1 / GLS 1 TUNING : USE RMP
RA DISPLAY NOT AVAIL
AUTO CALL OUT AVAIL

STATUS

INOP SYS

ALL PHASES

TCAS 1+2
ENG A-ICE

APPR AND LDG

CAT 2 (May appear, depending on the affected pair of IOMs)
GLS AUTOLAND (May appear, depending on the affected pair of IOMs)
FLS 1+2 (May appear, depending on the affected pair of IOMs)

Continued on the following page

AVIONICS NETWORK MULTIPLE IOM FAULT (Cont'd)
(NETWORK DEGRADED)

LS 2 (May appear, depending on the affected pair of IOMs)
GPWS 1+2 (May appear, depending on the affected pair of IOMs)
PRED W/S 1+2 (May appear, depending on the affected pair of IOMs)

INFO

- Depending on the affected pair of IOMs, the following may appear:
  ILS 1 / GLS 1 ON STBY INSTRUMENTS ONLY
  ILS 2 / GLS 2 ON F/O PFD & CAPT ND ONLY

MORE INFO

REDUND LOSS

- Depending on the affected pair of IOMs:
  STEER CTL 1
  STEER CTL 2

AVIONICS NETWORK MULTIPLE IOM FAULT
(REDUNDANCY DEGRADED)

Applicable to: ALL

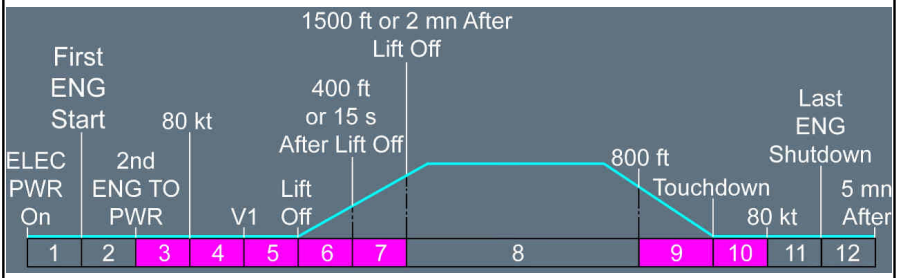
ANNUNCIATIONS

Triggering Conditions:

L2 Two or more IOM s are failed. For each affected pair of IOM , one IOM is available: Communication between the aircraft systems remains available (For more information on this configuration, *Refer to DSC-42-20 IOM Failure Degrading Redundancy*).

Indications:

Flight Phase Inhibition:



L2 Depending on the affected IOM s, some indications can be lost:

- Some indications on the ELEC AC page of the SD
  However, the AC electrical system continues to operate normally.
- The Estimated Time of Arrival (ETA), and
- The Estimated Fuel On Board (EFOB) on the CAPT 's MFD .
  However, this indication remains available on the F/O 's MFD .

For associated dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK MULTIPLE IOM FAULT (REDUNDANCY DEGRADED)* .

Crew awareness.

AVIONICS NETWORK MULTIPLE SWITCH FAULT
(NETWORK DEGRADED)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One or more switches are failed on both avionics networks: Communication between the aircraft systems may be affected (*Refer to DSC-42-20 Switch Failure Affecting Both Networks*).

Indications:

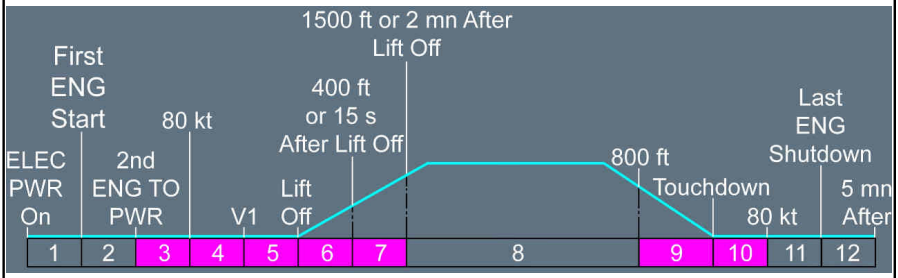
Audio



Master Light



Flight Phase Inhibition:



L2 Depending on the failed switches, if the communication between some aircraft systems is no longer possible, the applicable system alerts will be triggered.
Some indications, on several displays (e.g. on the SD) may be lost: However, the corresponding systems may continue to operate normally.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED)* .

Continued on the following page

AVIONICS NETWORK MULTIPLE SWITCH FAULT (Cont'd)
(NETWORK DEGRADED)

Impacted DU: 00007538 AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) - Alert

● **Depending on the affected switches, the following may appear:**
AIR DATA SWTG.....CONSIDER

L2 *In some failure cases, the air data display on the PFD and ND can be recovered by setting the AIR DATA selector to CAPT ON 3 (or F/O on 3).*

L1 ATT HDG SWTG..... CONSIDER

L2 *In some failure cases, the inertial data display on the PFD and ND can be recovered by setting the ATT HDG selector to CAPT ON 3 (or F/O on 3).*

L1 DU RECONF P/B AVAIL

Impacted by TDU: 00023228 AVIONICS NETWORK MULTIPLE SWITCH FAULT (NETWORK DEGRADED) - Alert

● **Depending on the affected switches, the following may appear:**
ATT HDG & AIR DATA SWTG.....CONSIDER

L2 *In some failure cases, the PFD and ND displays can be recovered by setting the SWITCHING ATT HDG selector , and the AIR DATA selector to CAPT ON 3 (or F/O on 3).*

L1 DU RECONF P/B AVAIL

STATUS

INFO

- Depending on the switches affected, one (or more) of the following messages appear(s):
  SMOKE DET AVAIL ON OVHD PNL & FAP ONLY
  CG POSITION NOT MONITORED
  SLATS & FLAPS NOT MONITORED

AVIONICS NETWORK MULTIPLE SWITCH FAULT
(REDUNDANCY DEGRADED)

Applicable to: ALL

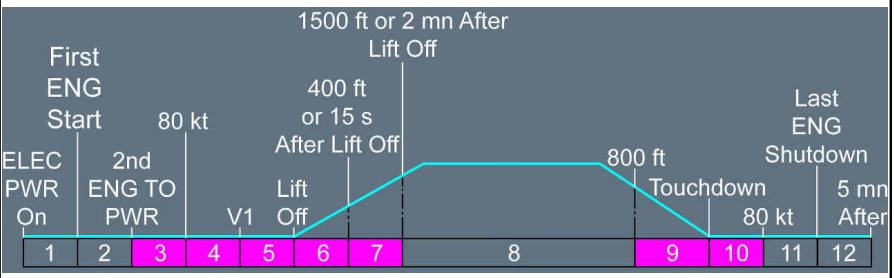
ANNUNCIATIONS

Triggering Conditions:

L2 Two or more switches are failed on the same avionics network: Communication between the aircraft systems remains available (For more information on the configuration of the avionics networks, *Refer to DSC-42-20 Switch Failure Affecting One Network*).

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-42 AVIONICS NETWORK MULTIPLE SWITCH FAULT (REDUNDANCY DEGRADED)* .

Crew awareness.

Information System

COM ADS DATALINK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Automatic Dependance Surveillance (ADS) function is stopped.

Indications:

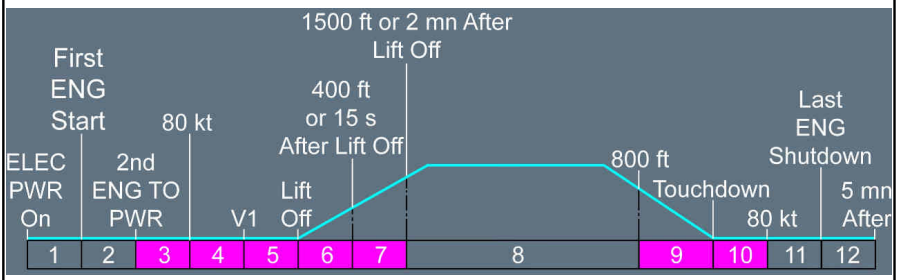
Audio



Master Light



Flight Phase Inhibition:



Crew awareness.

STATUS

INOP SYS

ALL PHASES
ADS DATALINK

COM ATC DATALINK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 All ATC data-link application are stopped or when controller pilot data-link communication application is stopped.

Indications:

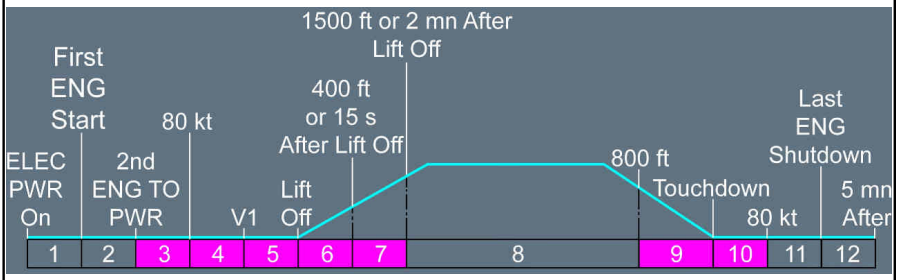
Audio



Master Light



Flight Phase Inhibition:



ATC COM VOICE ONLY

Continued on the following page

COM ATC DATALINK FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

ATC COM VOICE ONLY

STATUS

INOP SYS

ALL PHASES

ATC DATALINK

INFO

- If ADS is operative
  ADS DATALINK STILL AVAIL

COM NSS DATA TO AVNCS XFR FAULT

Applicable to: ALL

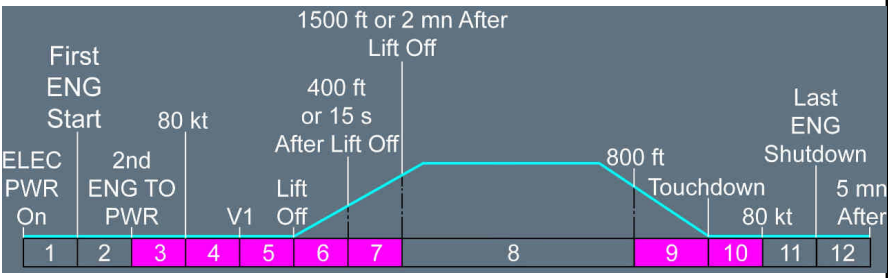
ANNUNCIATIONS

Triggering Conditions:

L2 The SCIs are declared faulty, or the NSS DATA TO AVNCS pb-sw is set to OFF.
In this case, the AOC and the eLogbook applications cannot send data to the ground.

Indications:

Flight Phase Inhibition:



L2 The SCI s only allow communication from the avionics to the NSS .
The AOC can no longer send messages to the ground but can still receive some. The logbook communication with the ground is lost.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM NSS DATA TO AVNCS XFR FAULT(OFF)* .

Crew awareness

STATUS

INOP SYS

ALL PHASES
NSS DATA TO AVNCS

COM NSS/AVNCS DATA XFR FAULT

Applicable to: ALL

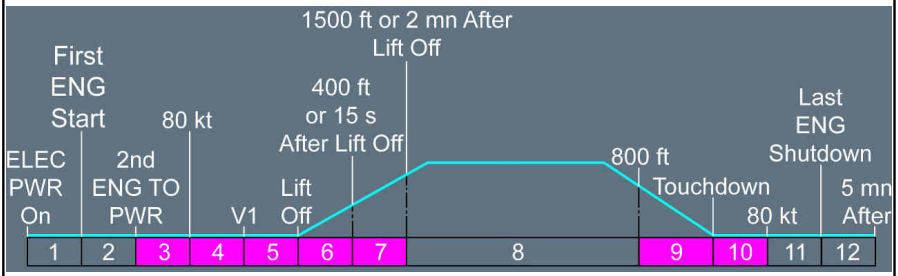
ANNUNCIATIONS

Triggering Conditions:

L2 Both SCIs are lost.

Indications:

Flight Phase Inhibition:



L2 The AOC is inoperative. It can no longer send and receive messages to/from the ground. The logbook communication with the ground is lost.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-23-46 COM NSS/AVNCS DATA XFR FAULT* .

Crew awareness

STATUS

INOP SYS

ALL PHASES
NSS/AVNCS DATA XFR

MISC OIS FAULT

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the MISCELLANEOUS menu.

L2 The flight crew applies this procedure for any malfunction relative to the OIS (for e.g. OIT, keyboard, ACD, or laptop).

AFFECTED SIDE LAPTOP..... UNSTOW & VERIFY

L2 *Check that the laptop is still running.*

L3 *Move the cursor with the touchpad. If the cursor moves, consider the laptop is running.*

L1 ● **IF LAPTOP NOT AFFECTED:**

OIT (AFFECTED)..... OFF 5 S THEN ON

L2 *The OIT takes approximately 4 min to restart.*

L1 ● **IF NOT SUCCESSFUL AFTER 4 MIN:**

use laptop as rqrd

L2 *The onside laptop is still running and can be removed from its stowage and used directly on the sliding table, as required. Stow the laptop, before landing gear extension.*

L1 ● **IF LAPTOP AFFECTED:**

LAPTOP (AFFECTED).....OFF

L2 *To turn off the laptop, slide the laptop ON/OFF sw to the right for no more than 2 s.*

L1 ● **AFTER 30 S:**

LAPTOP (AFFECTED).....ON

L2 *The laptop takes approximately 5 min to restart.*

L1 ● **IF NOT SUCCESSFUL AFTER 5 MIN:**

use backup laptop as rqrd

L2 *Remove the backup laptop from its stowage for use on the sliding table, as required. Stow the laptop, before landing gear extension.*

Continued on the following page

MISC OIS FAULT (Cont'd)

L12

MORE INFO

MORE INFO - MORE INFO

IF CAPT + F/O OITs AFFECTED, CONSIDER NSS FLT OPS RESET PROCEDURE.

Consider the reset procedure, if both OIT s are affected but both laptops are running. Refer to PRO-SUP-24-46 Network Server System (NSS) Flight Operations (FLT OPS) Reset

Intentionally left blank

APU

APU FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the following has occurred:
1. An APU emergency shutdown.

L3 An APU emergency shutdown will occur, if:
- The flight crew presses the APU FIRE pb, or
- The ground crew presses:
  - The APU SHUT OFF sw on the Maintenance nose gear panel, or
  - The APU EMER SHUT DOWN pb on the Refuel/Defuel panel.

L2 2. An APU automatic shutdown.

L3 An APU automatic shutdown will occur, in the case of :
- An aircraft emergency stop
- N1 overspeed: N1 is greater than 105 %
- N2 overspeed: N2 is greater than 102 %
- Low APU oil pressure
- Low generator oil pressure
- High APU oil temperature
- High generator oil temperature
- EGT limit exceeded: EGT is higher than 700 °C
- An ECB failure
- An APU fuel system failure
- Loss of normal DC power
- N1 underspeed: N1 is less than 88 %
- Loss of N1 or N2 overspeed protection
- Bleed air reverse flow

L2 3. The ECB detects a failure, but the APU is still available. In this case, neither an automatic nor emergency shutdown occurs.

Indications:

Audio	Master Light	Local light	SD page

Continued on the following page

APU FAULT (Cont'd)





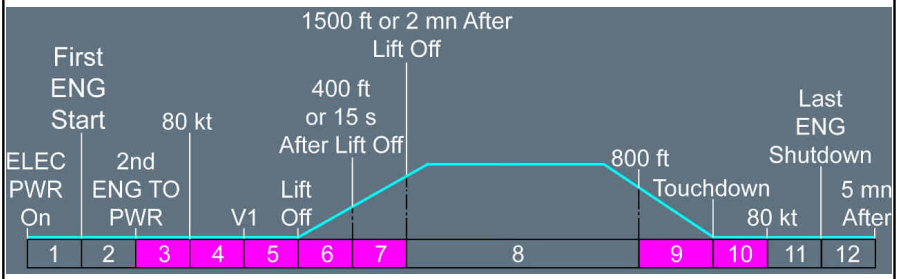


MASTER SW pb-sw



APU SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-49-26 APU FAULT* .

Impacted by TDU: 00020786 APU FAULT - Alert

- **In the event of an emergency shutdown :**
  EMER SHUTDOWN
  APU MASTER SW.....OFF
- **In the event of an automatic shutdown :**
  AUTO SHUTDOWN
  APU MASTER SW.....OFF
- **If the APU failure does not lead to an automatic, or emergency shutdown:**
  - **IF APU NOT ABSOLUTELY RQRD :**
    APU MASTER SW.....OFF

L2 *Note: Manually shut down the APU, unless the APU is required for electrical or pneumatic purposes during the flight.*

Continued on the following page

APU FAULT (Cont'd)

Impacted DU: 00007683 APU FAULT - Alert

- **In the event of an emergency shutdown :**

  EMER SHUTDOWN
  APU MASTER SW.....OFF

- **In the event of an automatic shutdown :**

  AUTO SHUTDOWN
  APU MASTER SW.....OFF

  - **IF APU START FAILED AND FL > 150 :**

    BELOW FL 150 : TRY A NEW APU START

    L2 *The APU start should be successful below FL 150.*

    Note: If the APU start failed, Refer to APU Start Limitation.

L1 - **If the APU failure does not lead to an automatic, or emergency shutdown:**

  - **IF APU NOT ABSOLUTELY RQRD :**

    APU MASTER SW.....OFF

    L2 *Note: Manually shut down the APU , unless the APU is required for electrical or pneumatic purposes during the flight.*

STATUS

INOP SYS

ALL PHASES
APU

APU MACH LIMIT EXCEEDED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The APU is running, and the aircraft speed is above M 0.5.

Indications:

Audio



Master Light

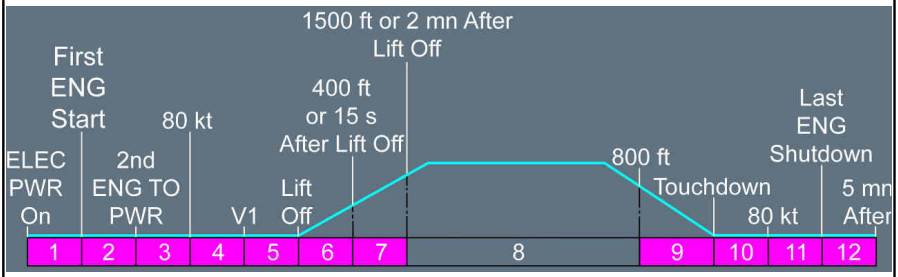


SD page



APU SD Page

Flight Phase Inhibition:



● **IF APU NOT ABSOLUTELY RQRD :**

APU MASTER SW.....OFF

L2 *The APU must be switched off unless the ENG ALL ENGs FLAME OUT alert is triggered.*

STATUS

INOP SYS

ALL PHASES
APU

APU OIL FILTER CLOGGED

Applicable to: ALL

ANNUNCIATIONS

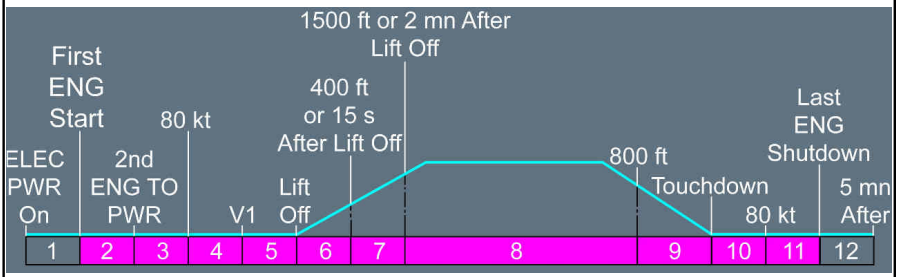
Triggering Conditions:

L2 An APU oil filter clogging is impending. The APU is still available.

Note: If an APU oil filter is entirely clogged when the APU is running, the APU automatically shutdowns, and the APU FAULT - AUTO SHUTOWN alert appears. Refer to PRO-ABN-ECAM-10-49-10 APU FAULT .

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-49-26 APU OIL FILTER CLOGGED* .

Crew awareness.

Doors

DOOR AFT(UPPER) AVNCS NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The avionics bay access door is not closed.

Indications:

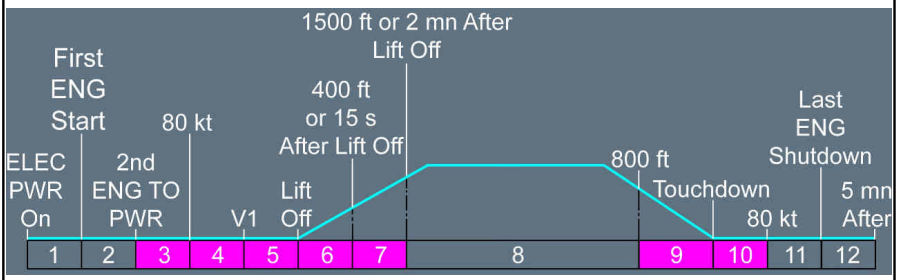
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR AFT(L MAIN)(R MAIN)(UPPER) AVNCS NOT CLOSED* .

CABIN CREW.....ADVISE

L2 *The flight crew should advise the cabin crew that the affected door is open.*

DOOR AVNCS NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The external avionics access door is not closed and is not locked.

Indications:

Audio



Master Light



SD page



DOOR/OXY SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR AVNCS NOT CLOSED* .

Continued on the following page

DOOR AVNCS NOT CLOSED (Cont'd)

● **In flight:**

L2 No flight crew action is required, as long as cabin pressure is normal.

L1 ● **IF ABNORM CAB V/S :**

MAX FL: 100/MEA
CABIN CREW.....ADVISE
ATC.....NOTIFY
DESCENT TO FL100/MEA.....INITIATE
FLT PLANNING.....REVIEW

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL :100/MEA

DOOR CKPT DOOR EMER OPENING IN PROGRESS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The cabin crew enters an emergency code on the keypad, in order to request emergency access to the cockpit.
If the flight crew does not lock the cockpit door within the defined period of time, the door automatically opens.

Indications:

Audio



Local light

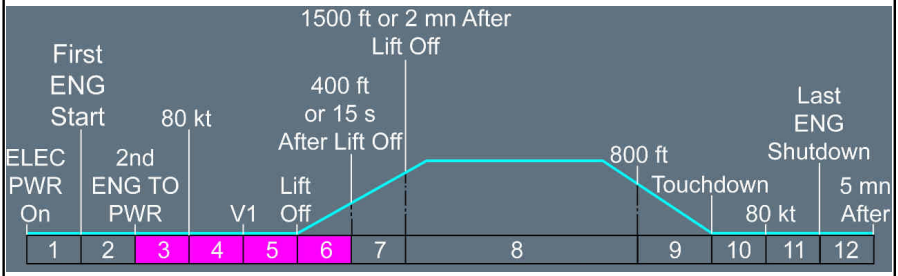


SD page



VIDEO SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR CKPT DOOR EMER OPENING IN PROGRESS* .

Continued on the following page

DOOR CKPT DOOR EMER OPENING IN PROGRESS (Cont'd)

CKPT DOOR.....LOCK AS RQRD

L2 *Use the CKPT DOOR sw to lock the cockpit door, as required.*
The flight crew can also open the door by setting the CKPT DOOR sw to the UNLOCK position.

DOOR CKPT SLIDING WINDOW NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 At least one cockpit sliding window is not locked in the closed position.

Indications:

Audio



Master Light

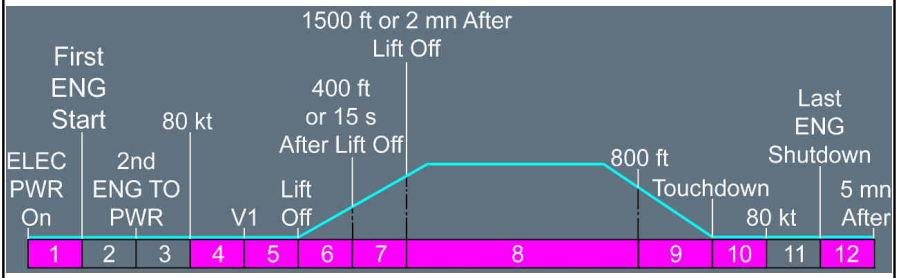


SD page



DOOR/OXY SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR CKPT SLIDING WINDOW NOT CLOSED* .

Continued on the following page

DOOR CKPT SLIDING WINDOW NOT CLOSED (Cont'd)

CKPT SLIDING WINDOW.....CLOSE

L2 *An amber triangle on the DOOR/OXYGEN SD indicates which sliding window is not locked in the closed position.*

DOOR FWD(AFT)(BULK) CARGO NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The cargo door is not closed and is not locked.

Indications:

Audio



Master Light

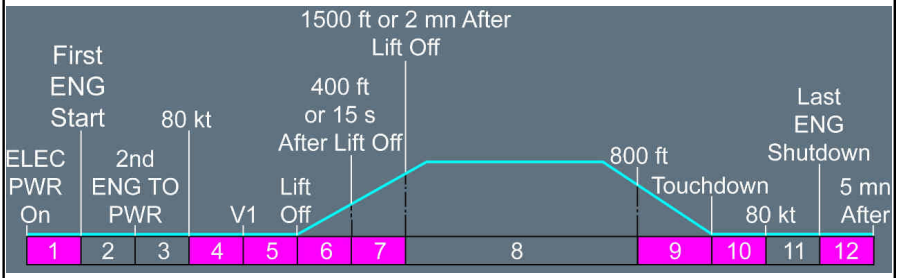


SD page



DOOR/OXY SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR AFT(BULK)(FWD) CARGO NOT CLOSED* .

Continued on the following page

DOOR FWD(AFT)(BULK) CARGO NOT CLOSED (Cont'd)

■ **Only in flight phases 2 or 3, and if pressurization is not available:**
PACK 1+2 & CAB PRESS NOT AVAIL

■ **In flight:**

L2 No flight crew action is required, as long as cabin pressure is normal.

L1 ● **IF ABNORM CAB V/S :**

MAX FL: 100/MEA
CABIN CREW.....ADVISE
ATC.....NOTIFY
DESCENT TO FL 100/MEA..... INITIATE
FLT PLANNING.....REVIEW

Continued on the following page

DOOR FWD(AFT)(BULK) CARGO NOT CLOSED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

STATUS

INOP SYS

ALL PHASES

CAB PRESS SYS (Only in flight phases 2 or 3, and if pressurization is not available)
PACK 1+2 (Only in flight phases 2 or 3, and if pressurization is not available)

DOOR L(R) MAIN AVNCS NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The avionics bay access door is not closed.

Indications:

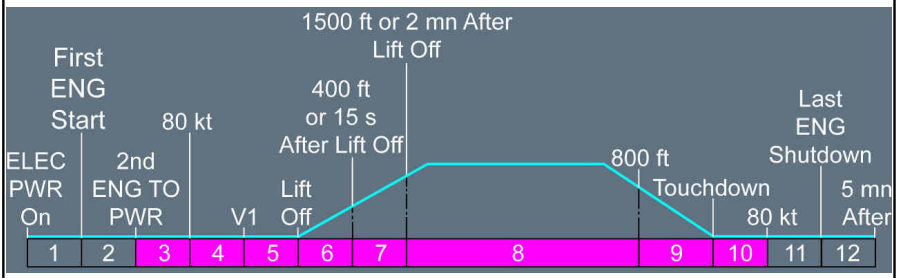
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR AFT(L MAIN)(R MAIN)(UPPER) AVNCS NOT CLOSED* .

Crew awareness.

L2 The main avionics doors are not accessible from the cabin. Therefore, it is not useful to advise the cabin crew.

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) ACTUATOR FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The opening/closing actuator is failed.

Indications:

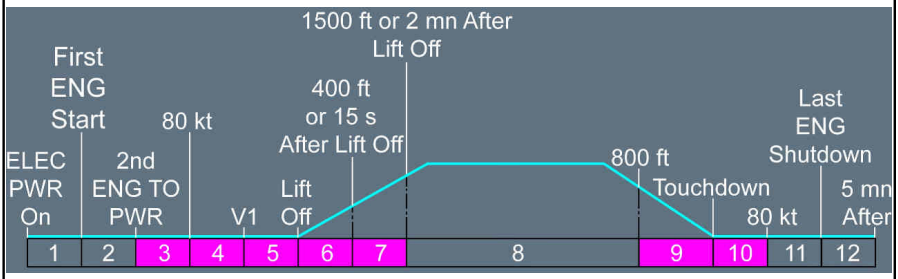
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN(UPPER) 1(2)(3)(4)(5) L(R) ACTUATOR FAULT*.

CABIN CREW.....ADVISE

L2 *Advise the cabin crew that a door is inoperative for evacuation, and that the evacuation procedure has to be changed.*

Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) ACTUATOR FAULT (Cont'd)

STATUS

INOP SYS

APPR & LDG

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) FLIGHT LOCK FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight lock actuator is failed, or detected in the wrong position.

Indications:

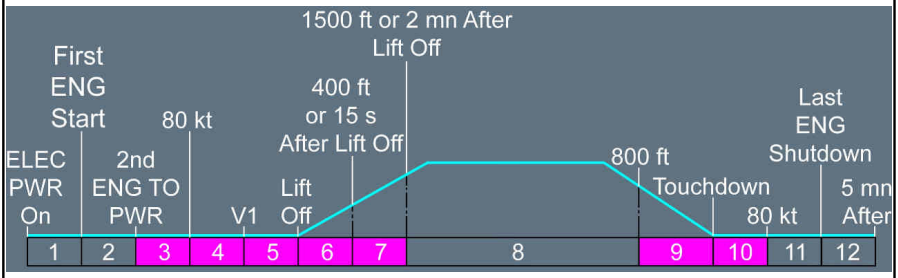
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) FLIGHT LOCK FAULT (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN(UPPER) 1(2)(3)(4)(5) L(R) FLIGHT LOCK FAULT* .

- **If the flight lock actuator is failed and locked:**
  FLIGHT LOCK ENGAGED

L2 The emergency exit is not usable for evacuation.

L1 CABIN CREW..... ADVISE

L2 *Advise the cabin crew that the flight lock actuator is inoperative, and that the appropriate procedure must be applied.*

L1 - **On ground, and if the flight lock actuator is failed and unlocked:**
  FLIGHT LOCK NOT AVAIL

STATUS

INOP SYS

ALL PHASES	APPR & LDG
MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) FLT LOCK (If FLIGHT LOCK NOT AVAIL)	DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) (If FLIGHT LOCK ENGAGED)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER1(2)(3)L(R) LATCH MONITORING FAULT

Applicable to: ALL

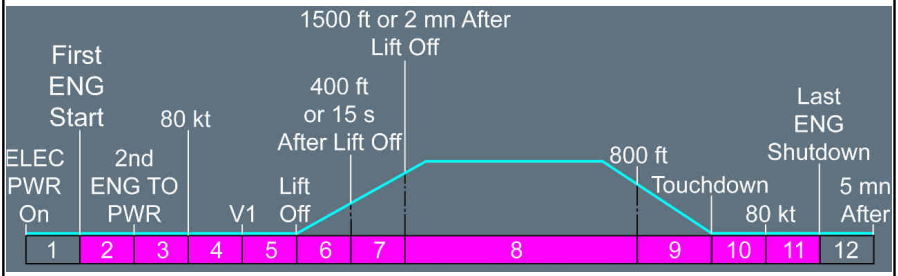
ANNUNCIATIONS

Triggering Conditions:

L2 The LDC can no longer perform the internal monitoring.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN(UPPER) 1(2)(3)(4)(5) L(R) LATCH MONITORING FAULT* .

Crew awareness.

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) NOT CLOSED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The door is not closed and is not locked.

Indications:

Audio



Master Light



SD page



DOOR/OXY SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN(UPPER) 1(2)(3)(4)(5) L(R) NOT CLOSED* .

Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) NOT CLOSED (Cont'd)

■ **Only in flight phases 2 or 3, and if pressurization is not available:**
PACK 1+2 & CAB PRESS NOT AVAIL

■ **In flight:**

L2 No flight crew action is required, as long as cabin pressure is normal.

L1 ● **IF ABNORM CAB V/S :**

MAX FL : 100/MEA
CABIN CREW.....ADVISE
ATC.....NOTIFY
DESCENT TO FL 100/MEA..... INITIATE
FLT PLANNING.....REVIEW

Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) NOT CLOSED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

STATUS

INOP SYS

ALL PHASES

CAB PRESS SYS (Only in flight phase 2 or 3, and if pressurization is not available)
PACK 1+2 (Only in flight phase 2 or 3, and if pressurization is not available)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) POS DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Local Door Controller (LDC) is failed, or two other faults are detected on the door.

Note: *When the LDC is failed:*
- *The monitoring of the door is not available*
- *The door is detected as not closed and not locked*
- *The flight lock actuator is no longer engaged.*

Indications:

Audio



Master Light

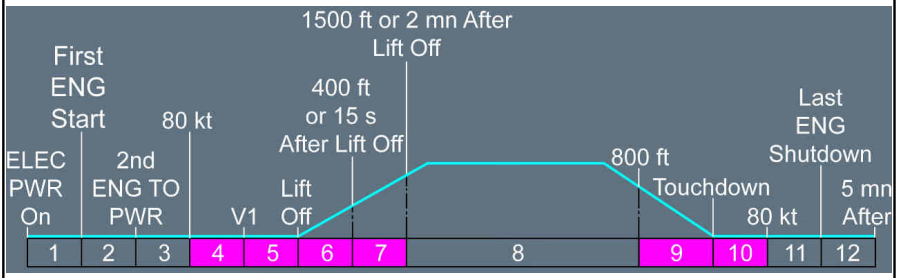


SD page



DOOR/OXY SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN(UPPER) 1(2)(3)(4)(5) L(R) POS DET FAULT* .

Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) POS DET FAULT (Cont'd)

■ **Only in flight phases 1, 2 or 3 and if pressurization is not available:**
PACK 1+2 & CAB PRESS NOT AVAIL

■ **In flight:**

L2 No flight crew action is required, as long as cabin pressure is normal.

L1 ● **IF ABNORM CAB V/S :**

MAX FL : 100/MEA
CABIN CREW.....ADVISE
ATC.....NOTIFY
DESCENT TO FL 100/MEA..... INITIATE
FLT PLANNING.....REVIEW

Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) POS DET FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- In flight, and if the cabin V/S is not normal:
  MAX FL : 100/MEA

STATUS

INOP SYS

ALL PHASES

CAB PRESS SYS (Only in flight phases 1, 2 or 3, and if pressurization is not available)
PACK 1+2 (Only in flight phases 1, 2 or 3, and if pressurization is not available)

APPR & LDG

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R)

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) SLIDE FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- The emergency escape slide is not ready or is failed, or
- The protection against inadvertent slide inflation is lost.
  In this case, there is neither audio nor visual alert (no master caution, no DOOR/OXYGEN SD page).

Indications:

Audio



Master Light

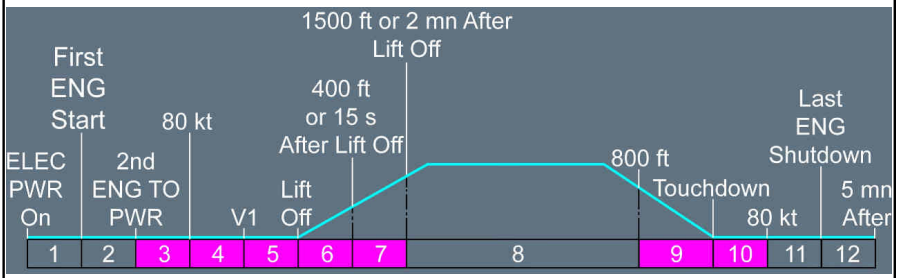


SD page



DOOR/OXY SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN(UPPER) 1(2)(3)(4)(5) R SLIDE FAULT* .

Continued on the following page

DOOR MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) SLIDE FAULT (Cont'd)

■ **Only in flight phases 1 or 12, and if the protection against inadvertent slide inflation is lost:**
PROTECTION LOST

■ **In all other cases:**
CABIN CREW..... ADVISE

L2 *Advise the cabin crew, when any slide is inoperative for evacuation.*

STATUS

INOP SYS

APPR & LDG

MAIN 1(2)(3)(4)(5)L(R) / UPPER 1(2)(3)L(R) SLIDE (If the emergency escape slide is not ready or is failed)

DOOR MAIN 1L(R) SLIDE LENGTHENING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The sensors that detect the sill height variation are failed.
The slide extension is not available.

Indications:

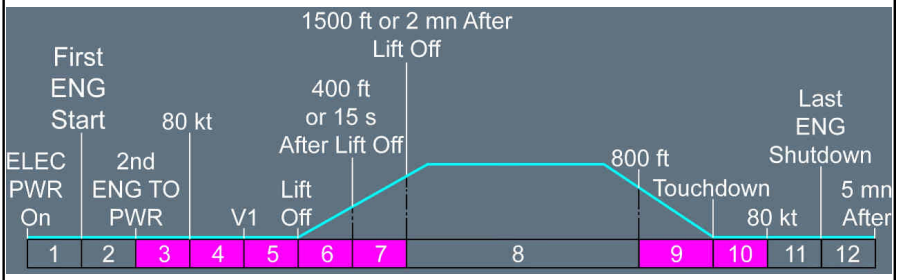
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR MAIN 1L(R) SLIDE LENGTHENING FAULT* .

CABIN CREW.....ADVISE

L2 *Advise the cabin crew that the slide extension in M1L(R) is inoperative.*

Continued on the following page

DOOR MAIN 1L(R) SLIDE LENGTHENING FAULT (Cont'd)

STATUS

INOP SYS

	APPR & LDG
	MAIN 1L(R) SLIDE LENGTH

DOOR POS DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Doors and Slides Management System (DSMS) is failed, and:

- Three channels are inoperative, or
  If three channels are inoperative, this alert inhibits the other DOORS alerts.

  Note: *The DSMS is failed due to the loss of all channels, therefore the monitoring of the door is not available:*
  - *The door is detected as not closed and locked, and*
  - *The flight lock actuator is no longer engaged.*

- All local door controllers of the same aircraft side are inoperative, or
- Two channels are inoperative.

Indications:

Audio



Master Light



SD page



If two channels inoperative, no display of DOOR/OXY SD Page.

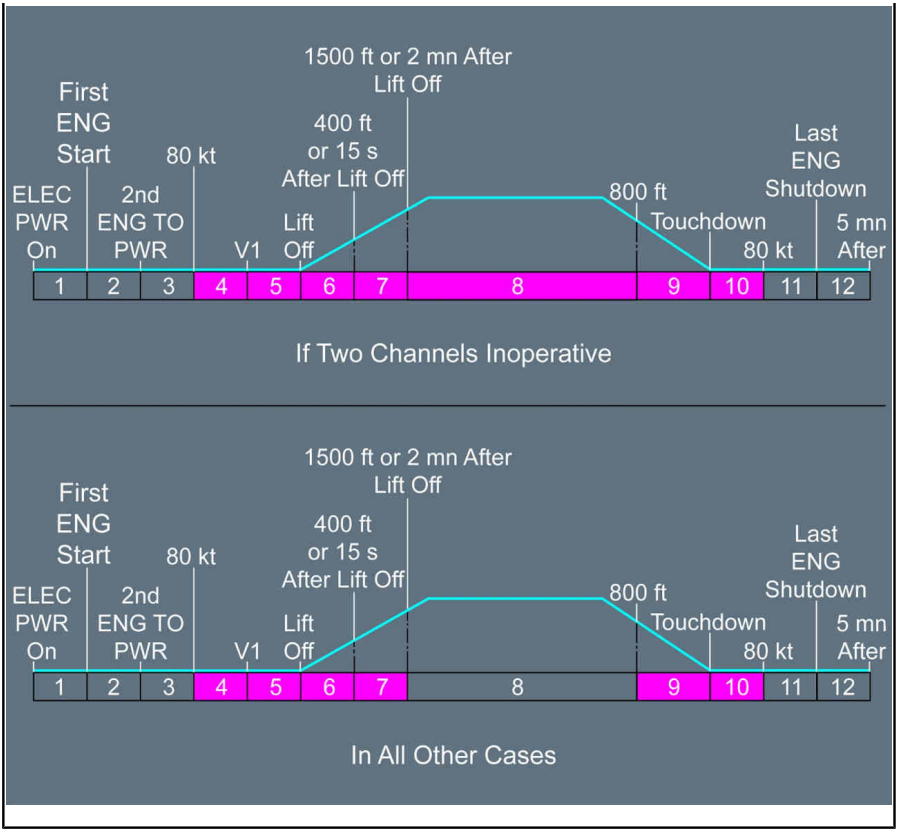


In all other cases, DOOR/OXY SD Page

Flight Phase Inhibition:

Continued on the following page

DOOR POS DET FAULT (Cont'd)



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR POS DET FAULT* .

Continued on the following page

DOOR POS DET FAULT (Cont'd)

- **Only in flight phases 1, 2 or 3, and if pressurization is not available:**
  PACK 1+2 & CAB PRESS NOT AVAIL

- **On ground, and if three channels are inoperative:**

  - **BEFORE OPENING ANY CABIN DOOR :**
    RESIDUAL DIFF PRESS.....CHECK

    L2 *The cabin differential pressure is indicated on the CRUISE page, and on the CAB PRESS SD page.*
    Before opening any cabin door, the cabin differential pressure indication must be 0 PSI on the SD page.

    L3 *The maximum cabin differential pressure allowed before opening any cabin door is 0.036 PSI, corresponding to 0 PSI on the SD page.*

    L1 CABIN CREW.....ADVISE

    L2 *The flight crew must advise the cabin crew when the cabin differential pressure equals 0 PSI.*

L1 - **In flight, and if three channels or if all LDCs of the same side are inoperative:**

  - **IF ABNORM CAB V/S :**
    MAX FL : 100/MEA
    CABIN CREW.....ADVISE
    ATC.....NOTIFY
    DESCENT TO FL 100/MEA..... INITIATE
    FLT PLANNING.....REVIEW

Continued on the following page

DOOR POS DET FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If three channels are inoperative, or if all LDCs of the same side are inoperative
  and
  in flight
  and
  if the cabin V/S is not normal:
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- If three channels are inoperative, or if all LDCs of the same side are inoperative
  and
  in flight
  and
  if the cabin V/S is not normal:
  MAX FL : 100/MEA

STATUS

INOP SYS

ALL PHASES

CAB PRESS SYS (In flight phases 1, 2 or 3, and if pressurization is not available)
PACK 1+2 (In flight phases 1, 2 or 3, and if pressurization is not available)
DOOR POS DET (If three channels are inoperative)

APPR AND LDG

L(R) DOORS pos det (If all LDCs of the same side are inoperative)

DOOR RESIDUAL DIFF PRESS DET FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Autonomous Standby Power Supply Unit (ASPSU) is failed.

Note: The ASPSU is failed, therefore the detection and indication of cabin differential pressure are not available.

Indications:

Audio



Master Light

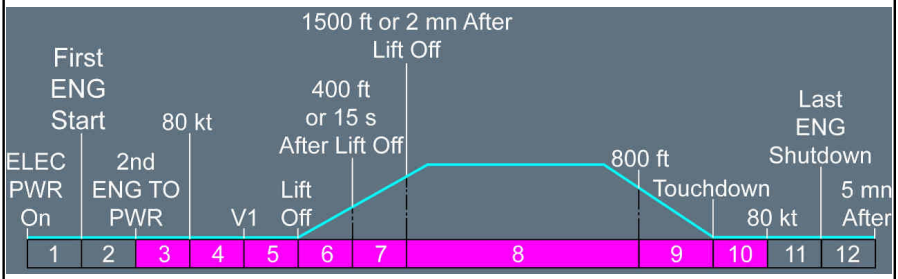


SD page



CAB PRESS SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-52-25 DOOR RESIDUAL DIFF PRESS DET FAULT .*

Continued on the following page

DOOR RESIDUAL DIFF PRESS DET FAULT (Cont'd)

● **BEFORE OPENING ANY CABIN DOOR :**

RESIDUAL DIFF PRESS..... CHECK

L2 *The cabin differential pressure is indicated on the CRUISE SD page, and on the CAB PRESS SD page.*
Before opening any cabin door, the cabin differential pressure indication must be 0 PSIon the SD page.

L3 *The maximum cabin differential pressure allowed before opening any cabin door is 0.036 PSI, corresponding to 0 PSI on the SD page.*

L1 CABIN CREW..... ADVISE

L2 *Advise the cabin crew, when the cabin differential pressure equals 0 PSI.*

STATUS

INOP SYS

ALL PHASES
DOOR RES PRESS DET

Intentionally left blank

Cockpit Windows

DOOR CKPT SLIDING WINDOW NOT CLOSED

Applicable to: ALL

DOOR CKPT SLIDING WINDOW NOT CLOSED (*Refer to procedure*)

MISC CKPT WINDOW CRACKED

Applicable to: ALL

MISC CKPT WINDOW CRACKED (*Refer to procedure*)

MISC CKPT WINDOW ELEC ARCING

Applicable to: ALL

MISC CKPT WINDOW ELEC ARCING (*Refer to procedure*)

Intentionally left blank

Engines

ENG 1(2)(3)(4) CTL SYS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A failure preventing the FADEC for satisfactorily controlling the engine has occurred

L3
- HP compressor exit pressure sensor failure (P30)
- N1, N2 sensor failure
- Fuel regulation (HMU) failure
- Fuel cutback following overthrust detection.

Indications:

L2

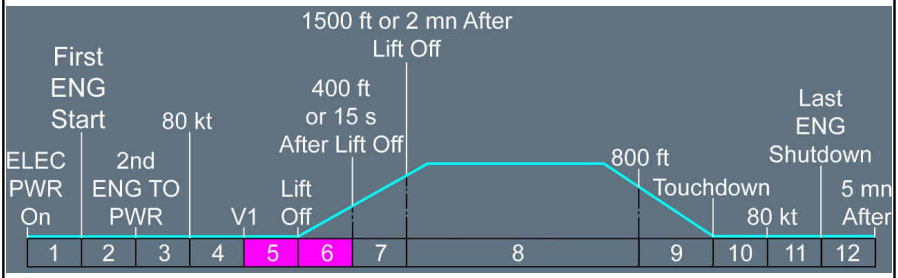
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) CTL SYS FAULT*.

Continued on the following page

ENG 1(2)(3)(4) CTL SYS FAULT (Cont'd)

- **In flight:**
  - **If engine control is degraded:**

L3 Engine control can be degraded due to:
- Pressure sensor failure at the HP compressor outlet, or
- Temperature sensor failure at the HP compressor inlet, or
- Internal engine bleed valve failure, or
- VSV failure, or
- FMV failure, or
- N1, or N2 sensor failure.

L1 NO RAPID THR CHANGES

L2 *The surge engine protection is degraded. The flight crew should avoid rapid thrust changes.*

L1 ENG 1(2)(3)(4) SLOW RESPONSE

  - **In the case of pressure sensor leakage at the HP compressor outlet, or internal engine bleed valve failure:**
    ENG 2(3) REVERSER: DO NOT USE
    - **If inner engines are affected:**
      LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

L1
  - **In the case of fuel reduction following overthrust protection activation, or pressure sensor leakage at the HP compressor outlet, or internal engine bleed valve failure:**
    THR LEVER 1(2)(3)(4)..... IDLE
  - **In the case of fuel reduction following overthrust protection activation:**
    ENG 1(2)(3)(4) MASTER ..... OFF

- **On ground:**
  THR LEVER 1(2)(3)(4)..... IDLE
  ENG 1(2)(3)(4) MASTER ..... OFF

Continued on the following page

ENG 1(2)(3)(4) CTL SYS FAULT (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If engine control degraded:
  NO RAPID THR CHANGES

APPR

- In the case of pressure sensor leakage at the HP compressor outlet, or internal engine bleed valve failure:
  ENG 2(3) REVERSER: DO NOT USE

LIMITATIONS ON PFD

ALL PHASES

- If engine control degraded:
  NO RAPID THR CHANGES

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) A/THR (If engine control degraded)

APPR

ENG 2(3) REVERSER (If engine 2(3) forced at idle)
BTV

INFO

- In the case of engine forced at idle:
  ENG 1(2)(3)(4) IDLE ONLY
- In the case of engine control degraded:
  ENG 1(2)(3)(4) SLOW RESPONSE

ENG 1(2)(3)(4) CTL VLV FAULT

Applicable to: ALL

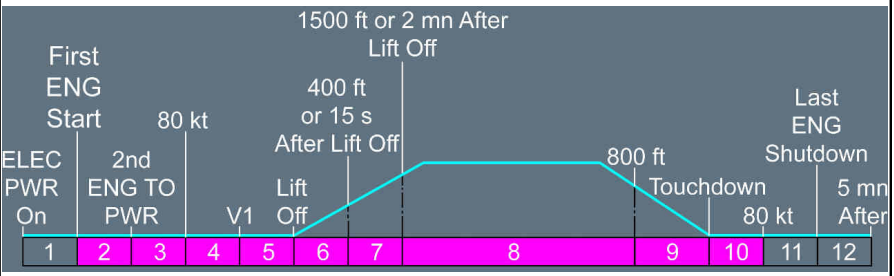
ANNUNCIATIONS

Triggering Conditions:

L2 One control valve of the applicable engine is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) CTL VLV FAULT* .

- **Depending on the failure case, one of the following will appear:**

  COOL VLV NOT OPEN

  HP TURB VLV NOT OPEN

  COMP DISCHARGE VLV NOT OPEN

ENG 1(2)(3)(4) EGT OVER LIMIT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The EGT is:

- Above the red line (i.e. 1 002 °C)
  - During takeoff and go-around, or
  - When the thrust reversers are selected, or
  - When the α-floor protection is active.
- Above the EGT limit (i.e. amber line at 970 °C) when the thrust lever is at or below MCT.

Indications:

Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) EGT OVER LIMIT (Cont'd)

THR LEVER 1(2)(3)(4).....REDUCE BELOW EGT LIMIT

L2 *Normal operation may be resumed to next landing.*

L1 ● **IF OVER LIMIT PERSISTS**

ENG 1(2)(3)(4) MASTER.....OFF

L2 *If conditions do not permit engine shut down, land asap using the minimum thrust required to sustain safe flight.*

L1

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

ENG 1(2)(3)(4) SHUT DOWN apply *Refer to procedure* .

ENG 1(2)(3)(4) FADEC FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FADEC of the ENG 1(2)(3)(4) cannot communicate via the avionic networks.

Indications:

Audio



Master Light

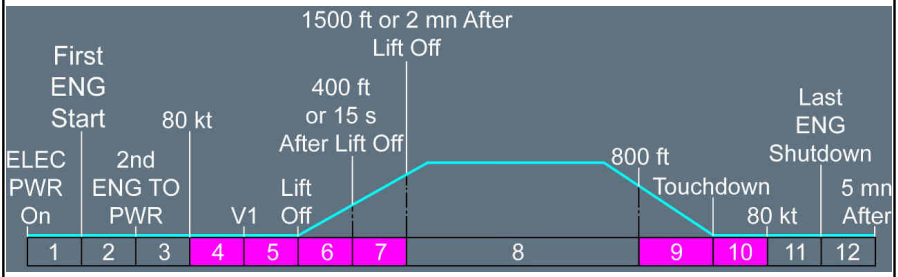


SD page



ENGINE SD Page

Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) FADEC FAULT (Cont'd)

L2 When the FADEC of the ENG 1(2)(3)(4) is failed, the FADEC cannot communicate via the avionic networks.
The FADEC can still provide engine control, and transmits to the EWD the primary engine parameters, N1 , current THR , maximum THR , thrust lever position, and EGT . The ENG 1(2)(3)(4) parameters on the ENG SD page are lost.
L3 The FADEC provides these parameters via Input/Output Modules that interface the FADEC and the avionic networks via conventional buses.
L2 If the ENG 1(2)(3)(4) oil pressure, LP compressor speed (N1), or HP compressor speed (N2) is abnormal, the ECAM can still trigger the associated ECAM alerts.
L3 The FADEC communicates with the FWS via conventional buses.
L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FADEC FAULT* .

● **If A/THR engaged :**
THR LEVER 1(2)(3)(4)..... MAN ADJUST

L2 *When the A/THR is used, adjust THR LEVER 1(2)(3)(4) in order to set the thrust (or N1) target to an average value, corresponding to the flight conditions. Continuous adjustment is not necessary.*

L1 ENG 1(2)(3)(4) PARAMETERS.....MONITOR

L2 *The essential ENG 1(2)(3)(4) parameters are still displayed on the EWD . Monitor these parameters in a standard way.*
The EGT is still normally displayed. However, the ENG 1(2)(3)(4) EGT OVER LIMIT ECAM will not trigger in the case of EGT exceedance. Therefore, the flight crew must closely monitor the EGT parameter of the ENG 1(2)(3)(4).

L1 ● **IF ABNORMAL :**
THR LEVER 1(2)(3)(4).....IDLE
ENG 1(2)(3)(4) MASTER.....OFF

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

Continued on the following page

ENG 1(2)(3)(4) FADEC FAULT (Cont'd)

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) A/THR (If A/THR engaged)

ENG 1(2)(3)(4) FADEC IDENT FAULT

Applicable to: ALL

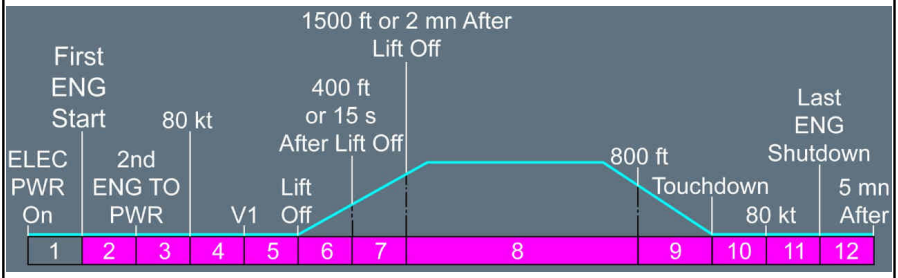
ANNUNCIATIONS

Triggering Conditions:

L2 The FADEC cannot identify the engine configuration.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FADEC IDENT FAULT*.

Crew awareness.

ENG 1(2)(3)(4) FADEC SYS FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A FADEC failure affects the control of the engine.

Indications:

Audio



Master Light

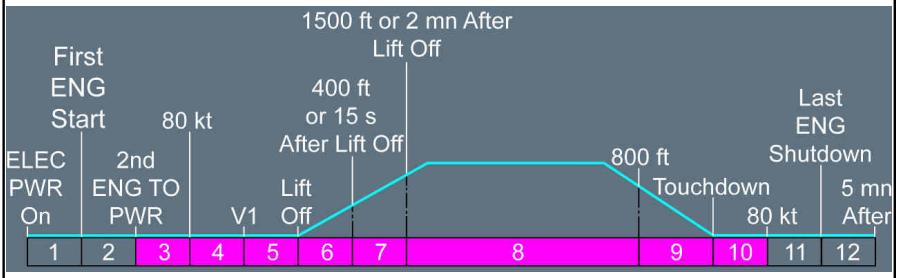


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FADEC SYS FAULT* .

Crew awareness.

ENG 1(2)(3)(4) FADEC TEMP HI

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FADEC temperature is too high.

Indications:

Audio



Master Light

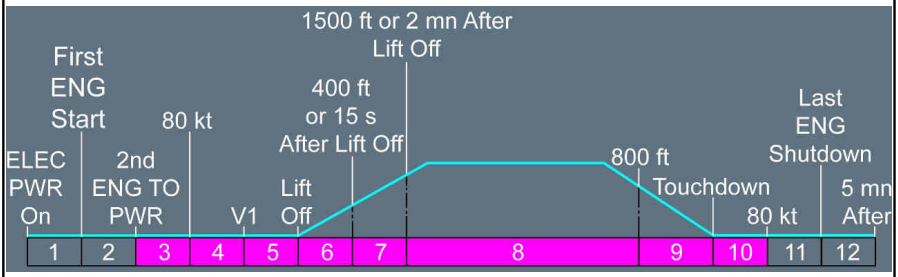


SD page



ENG SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FADEC TEMP HI .*

Crew awareness.

ENG 1(2)(3)(4) FAIL

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FWS detects that the engine is not running when N2 is below 61 %.
In the case of FADEC overheat or overthrust protection activation, the FADEC indicates the reason of the failure.
In all other cases, in flight, the FADEC automatically attempts an engine restart.

Indications:

Audio



Master Light

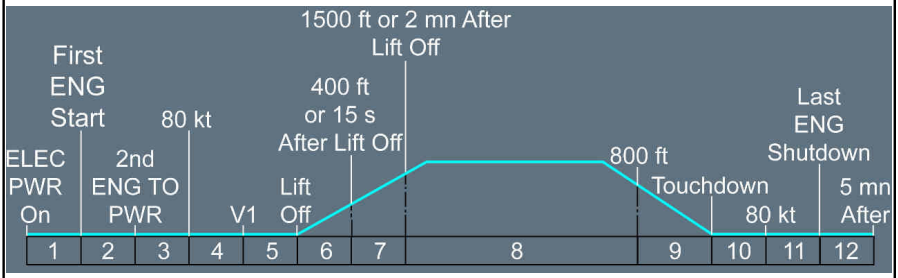


SD page



ENGINE SD Page

Flight Phase Inhibition:



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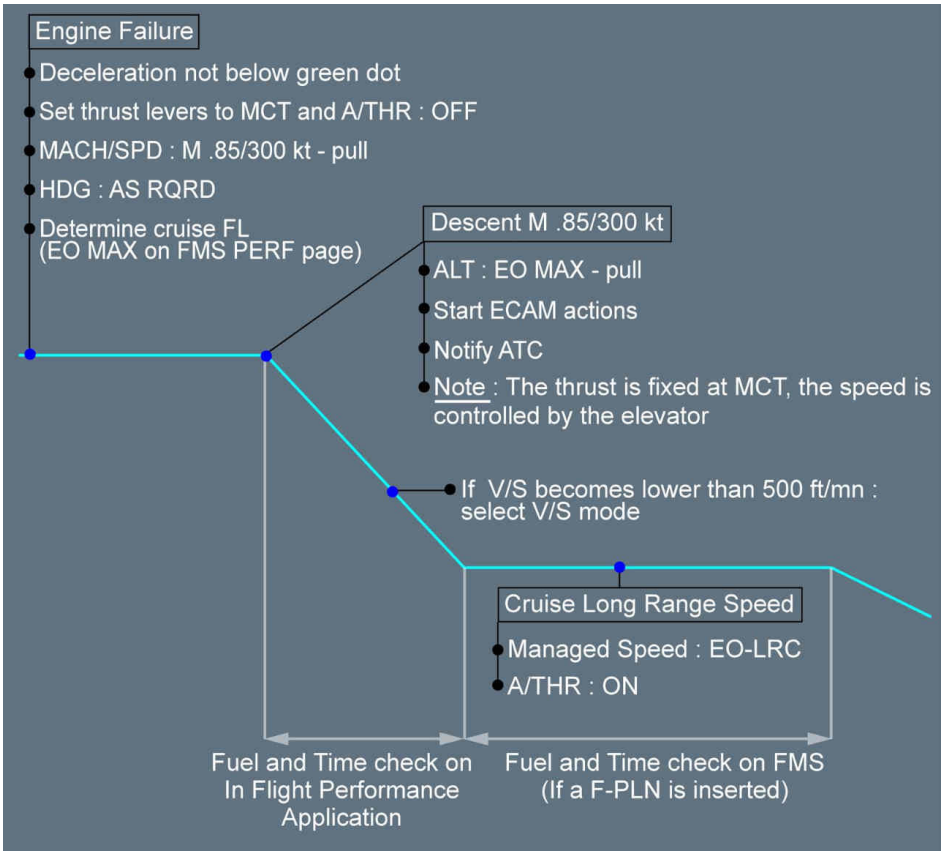
ENG 1(2)(3)(4) FAIL (Cont'd)

ENGINE FAILURE DURING CRUISE

In cruise, the flight crew may apply either:

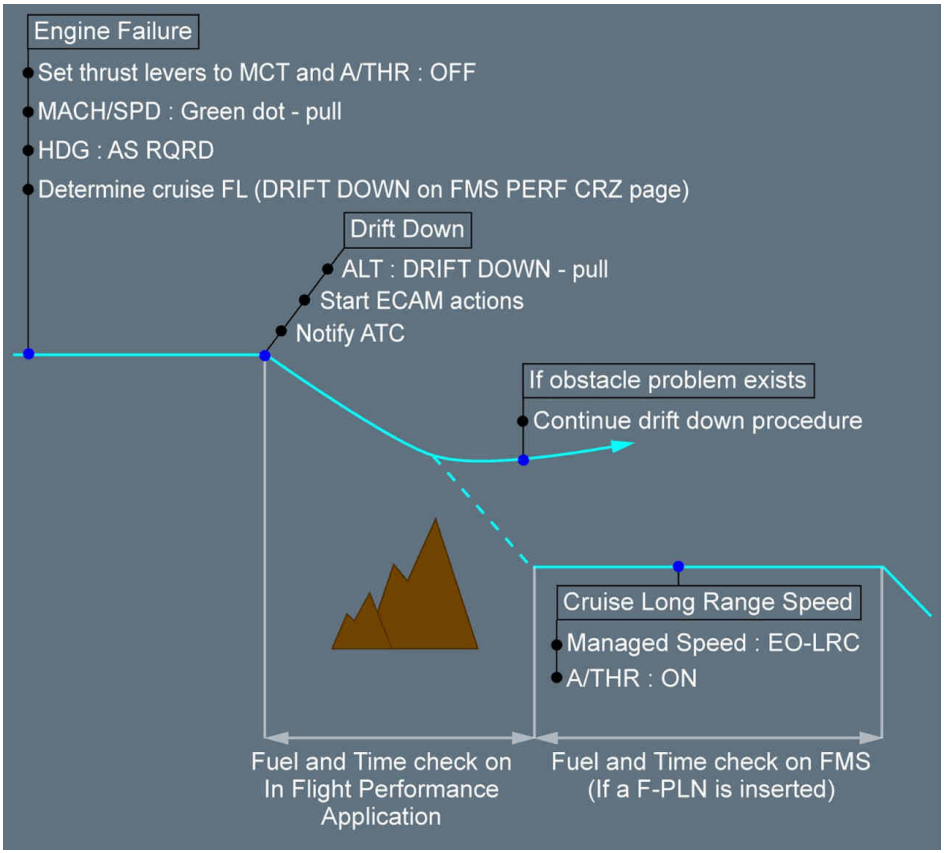
- The standard strategy:



- Or, the obstacle strategy:

Continued on the following page

ENG 1(2)(3)(4) FAIL (Cont'd)



Unless the obstacle strategy has been established before dispatch (considering mountainous areas), the standard strategy must be used.
For training-oriented information on engine failure during cruise, *Refer to FCTM/AO-70 Engine Fail* .
For performance oriented information on standard and obstacle strategy, *Refer to PER-IFT-OEI-GEN Diversion Strategy* .

Continued on the following page

ENG 1(2)(3)(4) FAIL (Cont'd)

■ **If L/G is down in the takeoff and initial climb phases:**
L/G.....UP

■ **In the case of a FADEC OVHT :**

L2 The FADEC automatically shuts down the engine.

L1 THR LEVER (AFFECTED ENGINE)..... IDLE
ENG (AFFECTED ENGINE) MASTER.....OFF

L2 *On ground after 15 min , the FADEC is no longer supplied. Therefore, the THR LEVER .. IDLE line appears again as "not-completed", even if the thrust lever is set to idle.*

L1

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

■ **In the case of THRUST CTL LOST :**

L2 Depending on the aircraft altitude and speed, the FADEC automatically shuts down the affected engine.

For more information, *Refer to DSC-70-20-20-10 Overthrust* .

L1 THR LEVER (AFFECTED ENGINE)..... IDLE
ENG (AFFECTED) MASTER.....OFF

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

■ **In flight and the FADEC does not identify the failure:**
AUTO RELIGHT IN PROGRESS

L2 *Depending on the engine parameters and flight conditions, the FADEC chooses between a starter assisted or a windmilling engine start to relight the engine.*
For more information, Refer to DSC-70-80-30-20 Starter Assisted or Windmilling Start .

L1 THR LEVER (AFFECTED ENGINE)..... IDLE

● **IF NO ENG RELIGHT AFTER 30S:**
ENG (AFFECTED) MASTER.....OFF

Continued on the following page

ENG 1(2)(3)(4) FAIL (Cont'd)

● **IF ENG 1(2)(3)(4) DAMAGED:**

ENG (AFFECTED) FIRE P/B.....PUSH

L2 *If the flight crew pushes the ENG FIRE pb , the FADEC may be no longer supplied. Therefore, the THR LEVER ...IDLE line may appear again as "not-completed", even if the thrust lever is set to idle.*

L1 ● **If engine 1 failed:**

APU BLEED.....OFF

L2 *When engine 1 is failed and ENG 1 FIRE pb is pushed, the left crossbleed valve and the pack flow valve of the engine 1 close. As a consequence, the APU bleed cannot supply the packs.*

L1 APU BLEED : DO NOT USE

AGENT 1 AFTER 10S..... DISCH

L2 *AFTER 10S countdown only appears in flight.*

L1 EMER OUTR TK XFR..... ON

L2 *The emergency outer tank transfer enables to transfer the outer tank fuel into feed tanks 1 and 4 even if the galleries are damaged due to an engine burst.*

L1 ● **IF ENG 1(2)(3)(4) NOT DAMAGED:**

■ **If less than three engines failed:**

ENG (AFFECTED) RELIGHT PROC.....CONSIDER

ENG 1(2)(3)(4) RELIGHT Refer to procedure apply.

■ **If more than two engines failed:**

ENG (AFFECTED) RELIGHT PROC..... APPLY

ENG 1(2)(3)(4) RELIGHT Refer to procedure apply.

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

L2 In flight, if high engine vibrations occur and continue after the engine shutdown, reduce airspeed and descend to a safe altitude.

Attempt to define and use appropriate airspeed and altitude for minimum vibrations.

Continued on the following page

ENG 1(2)(3)(4) FAIL (Cont'd)

L1 ■ **On ground and the FADEC does not identify the failure:**

THR LEVER (AFFECTED ENGINE)..... IDLE
ENG (AFFECTED) MASTER.....OFF

L2 *On ground after 15 min , the FADEC is no longer supplied. Therefore, the THR LEVER .. IDLE line appears again as "not-completed", even if the thrust lever is set to idle.*

L1 ● **IF ENG 1(2)(3)(4) DAMAGED:**

ENG (AFFECTED) FIRE P/B.....PUSH

L2 *If the flight crew pushes the ENG FIRE pb , the FADEC is no longer supplied. Therefore, the THR LEVER ...IDLE line appear again as "not-completed", even if the thrust lever is set to idle.*

L1 ● **If engine 1 failed:**

APU BLEED.....OFF

L2 *When engine 1 is failed and ENG 1 FIRE pb is pushed, the left crossbleed valve and the pack flow valve of the engine 1 close. As a consequence, the APU bleed cannot supply the packs.*

L1 APU BLEED : DO NOT USE

AGENT 1..... DISCH
EMER OUTR TK XFR..... ON

L2 *The emergency outer tank transfer enables to transfer the outer tank fuel into feed tanks 1 and 4 even if the galleries are damaged due to an engine burst.*

L1 ● **IF ENG 1(2)(3)(4) NOT DAMAGED:**

ENG (AFFECTED) RELIGHT PROC..... CONSIDER

ENG 1(2)(3)(4) RELIGHT Refer to procedure apply.

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

Continued on the following page

ENG 1(2)(3)(4) FAIL (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If ENG 1 FIRE pb is pressed:
  APU BLEED DO NOT USE

STATUS

INOP SYS

APPR & LDG

ENG 2(3) REVERSER (If ENG 2(3) failed)

ENG 1(2)(3)(4) FUEL FILTER CLOGGED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The fuel filter is clogged.

L3 The pressure drop across the fuel filter is higher than 35 PSI. When the pressure drop is higher than 60 PSI, the bypass valve opens and the ENG FUEL SYS CONTAMINATION alert is triggered.

Indications:

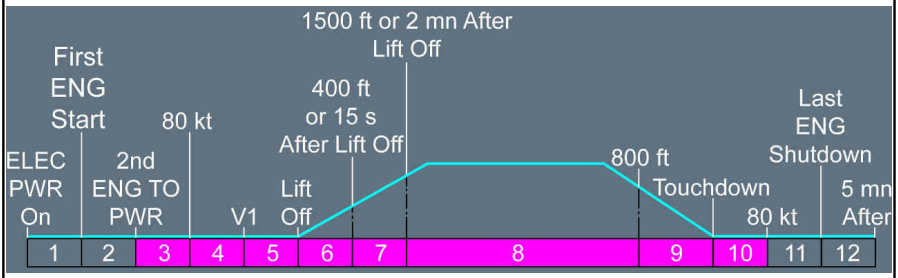
L2

SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FUEL FILTER CLOGGED* .

Crew awareness.

ENG 1(2)(3)(4) FUEL FILTER MONITORING FAULT

Applicable to: ALL

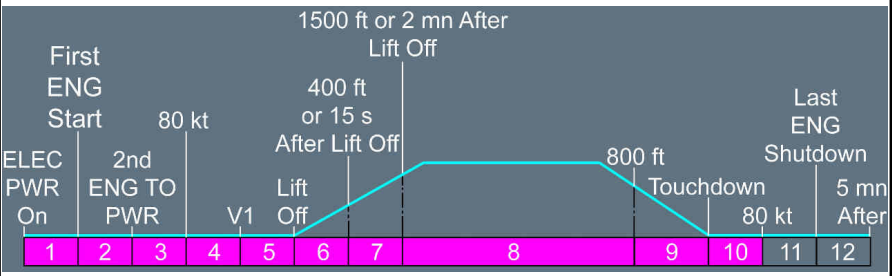
ANNUNCIATIONS

Triggering Conditions:

L2 The fuel filter is no longer monitored.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FUEL FILTER MONITORING FAULT* .

Crew awareness.

ENG 1(2)(3)(4) FUEL LEAK

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Detection of an abnormal fuel flow or fuel used on an engine.

L3 The detection is based on the following:
- comparison of the engine fuel flow and the average fuel flow of the three others. This will detects massive fuel leak after the fuel metering valve.
- comparison of the engine fuel used during 5 min and the average fuel used of the three others. This will detect unusual overconsumption.

L2 This is an indication of an internal engine fuel leak between the fuel flow transmitter and the combustion chamber.

Indications:

Audio



Master Light

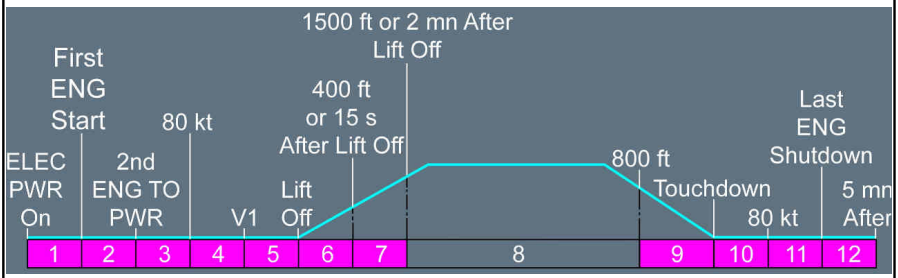


SD page



ENGINE SD Page

Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) FUEL LEAK (Cont'd)

ENG FUEL PARAMETERS..... CHECK

L2 *Confirm the fuel leak using other cockpit indications such as fuel quantity and fuel imbalance.*

L1 ● **IF FUEL LEAK**

THR LEVER 1(2)(3)(4).....IDLE

ENG 1(2)(3)(4) MASTER.....OFF

L2 *The MASTER LEVER OFF will close both high and low pressure shutoff valves, thus preventing fuel tanks from feeding the leak.*

L1

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

ENG 1(2)(3)(4) FUEL STRAINER CLOGGED

Applicable to: ALL

ANNUNCIATIONS

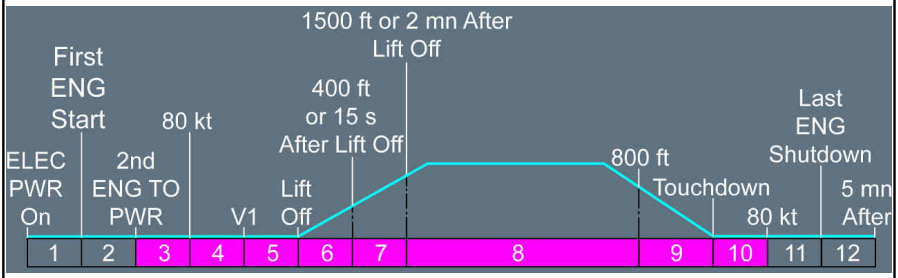
Triggering Conditions:

L2 The fuel strainer is clogged.

L3 The pressure drop across the fuel strainer is higher than 12 PSI.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions: *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FUEL STRAINER CLOGGED* .

Crew awareness.

ENG 1(2)(3)(4) FUEL SYS CONTAMINATION

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 - The bypass valve of the fuel filter is open, or
L3 The bypass valve of the fuel filter opens when the pressure drop across the fuel filter is higher then 60 PSI.
L2 - The bypass valve of the fuel strainer is open and the fuel filter is clogged.
L3 The bypass valve of the fuel strainer opens when the pressure drop across the fuel strainer is higher then 14 PSI.

Indications:

L2

Audio



Master Light

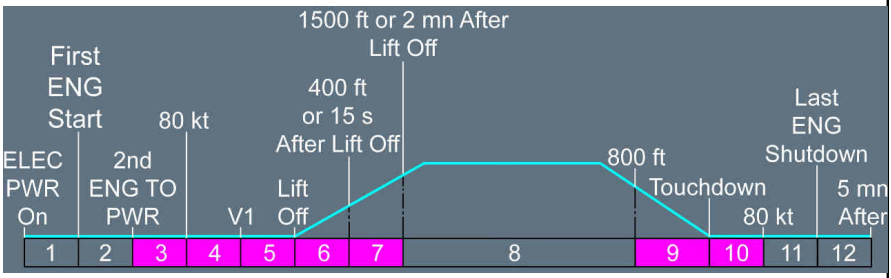


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) FUEL SYS CONTAMINATION* .

Crew awareness.

ENG 1(2)(3)(4) HP FUEL VLV FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The high pressure fuel valve is failed either in the close or in the open position.

Indications:

Audio



Master Light

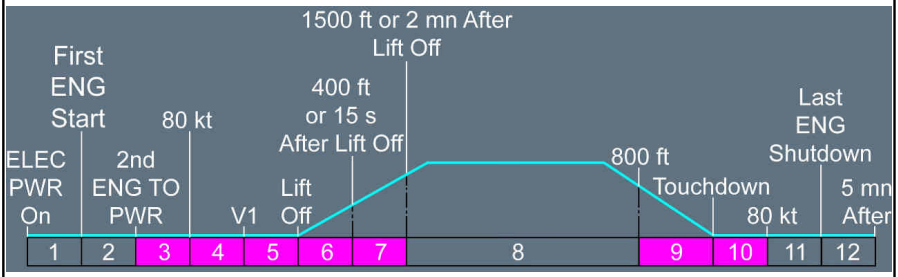


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) HP FUEL VLV FAULT* .

Continued on the following page

ENG 1(2)(3)(4) HP FUEL VLV FAULT (Cont'd)

■ **During engine start :**

HP FUEL VALVE NOT OPEN

● **In the case of manual engine start :**

ENG 1(2)(3)(4) MAN START..... OFF

ENG 1(2)(3)(4) MASTER ..... OFF

■ **During engine shutdown :**

HP FUEL VALVE NOT CLOSED

● **In the case of manual engine start :**

ENG 1(2)(3)(4) MAN START..... OFF

ENG 1(2)(3)(4) MASTER ..... OFF

L2 *The engine will shutdown by closure of the LP fuel valve.*

L1 ● **On ground :**

ENG 1(2)(3)(4) FIRE P/B..... PUSH

L2 *This ensures LP valve closure.*

ENG 1(2)(3)(4) IGN A(B) FAULT

Applicable to: ALL

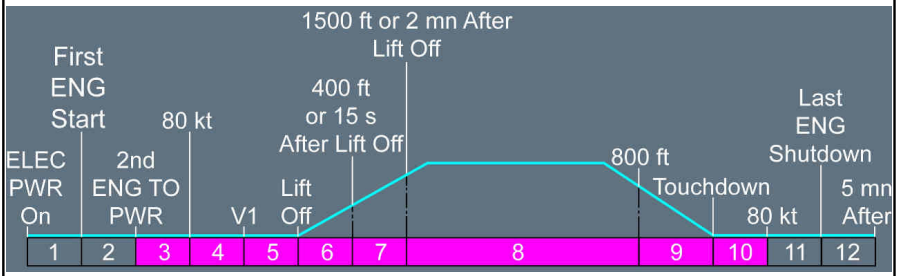
ANNUNCIATIONS

Triggering Conditions:

L2 Either ignitor A or B is failed.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) IGN A FAULT* or *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) IGN B FAULT* .

Crew awareness

MORE INFO

REDUND LOSS

ENG 1(2)(3)(4) IGN A(B)

ENG 1(2)(3)(4) IGN A+B FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This caution is triggered when both ignitors are failed.

Indications:

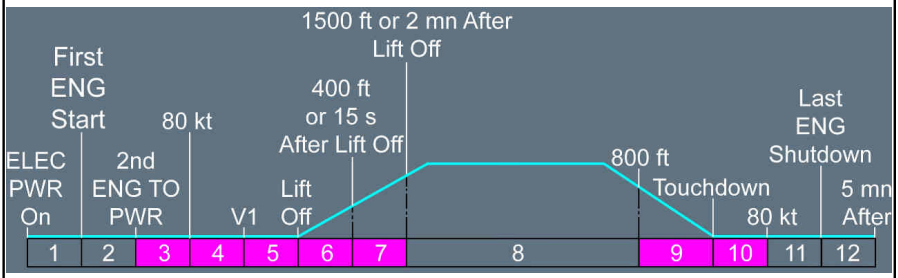
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) IGN A +B FAULT* .

Crew awareness.

STATUS

INOP SYS

ALL PHASES
ENG 1(2)(3)(4) IGNITION

ENG 1(2)(3)(4) LP SHAFT PROT LOST - ALERT

Applicable to: ALL

Crew awareness.

ENG 1(2)(3)(4) MINOR FAULT

Applicable to: ALL

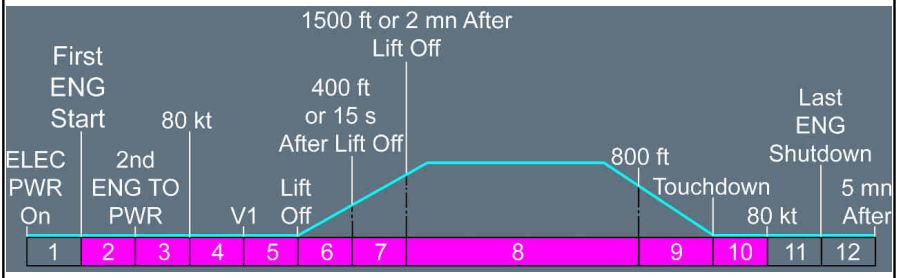
ANNUNCIATIONS

Triggering Conditions:

L2 Some internal engine sensors or one FADEC channel are failed.
It is triggered after flight if only one engine is affected.
It is triggered at aircraft power-up if more than two engines are affected.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) MINOR FAULT*.

Crew awareness

ENG 1(2)(3)(4) N1/N2 OVER LIMIT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One of the following engine parameter is above red limit:
-N1 above 96.1 %
- N2 above 97.8 %

Indications:

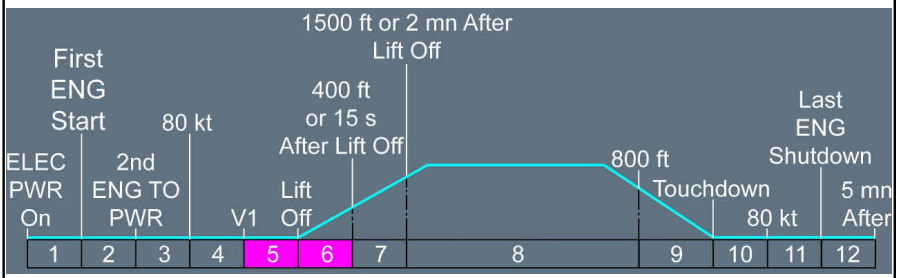
Audio



Master Light



Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) N1/N2 OVER LIMIT (Cont'd)

THR LEVER 1(2)(3)(4).....REDUCE BELOW N1 LIMIT

● **IF OVER LIMIT PERSISTS :**

ENG 1(2)(3)(4) MASTER.....OFF

L2 *If conditions do not permit engine shutdown, land as soon as possible using the minimum thrust required to sustain safe flight.*

L1

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

ENG 1(2)(3)(4) OIL CHIP DETECTED

Applicable to: ALL

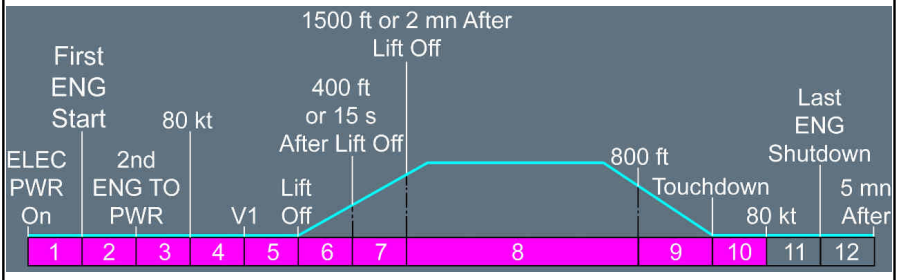
ANNUNCIATIONS

Triggering Conditions:

L2 Metallic particles are detected in the engine oil system.

Indications:

Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) OIL CHIP DETECTED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL CHIP DETECTED* .

Crew awareness.

ENG 1(2)(3)(4) OIL FILTER CLOGGED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The oil filter in the feed line or in the return line is clogged.
The oil filter in the feed line has no bypass. Therefore, further clogging can cause a reduction in the oil pressure, and ultimately an ENG OIL PRESS LO ECAM alert may trigger.

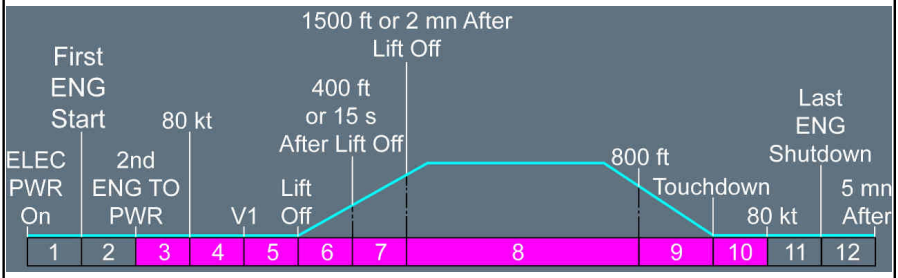
Indications:

SD page



ENGINE SD Page

Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) OIL FILTER CLOGGED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL FILTER CLOGGED* .

Crew awareness.

ENG 1(2)(3)(4) OIL FILTER MONITORING FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The engine oil filter monitoring system is failed.

Indications:

Audio



Master Light

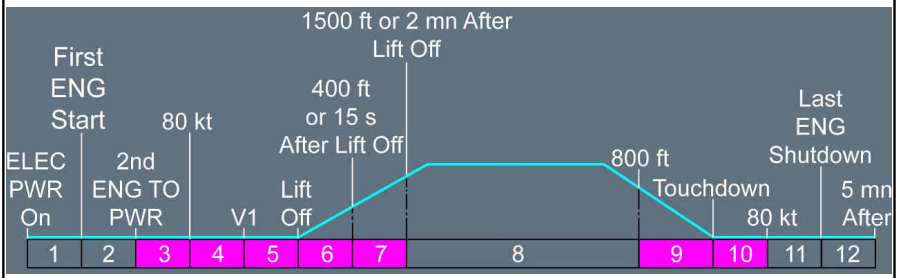


SD page



ENG SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL FILTER MONITORING FAULT* .

Continued on the following page

ENG 1(2)(3)(4) OIL FILTER MONITORING FAULT (Cont'd)

Crew awareness.

ENG 1(2)(3)(4) OIL PRESS LO (RED ALERT)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This warning is displayed when the oil pressure drops below 25 PSI.
This value is the minimum level required to operate the engine without risk of damage.

Indications:

Audio



Master Light

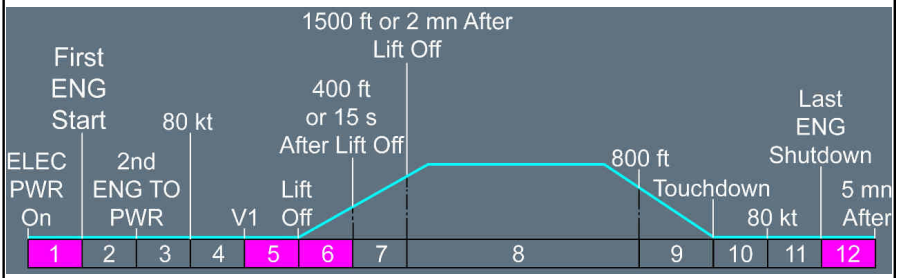


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL PRESS LO* .

Continued on the following page

ENG 1(2)(3)(4) OIL PRESS LO (RED ALERT) (Cont'd)

THR LEVER 1(2)(3)(4)..... IDLE
ENG 1(2)(3)(4) MASTER LEVER..... OFF

ENG 1(2)(3)(4) SHUT DOWN apply, *Refer to procedure* .

ENG 1(2)(3)(4) OIL SYS CONTAMINATION

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The oil filter in the return line is clogged and the bypass valve is open. The opening of the bypass valve may result in oil system contamination.

Indications:

Audio



Master Light

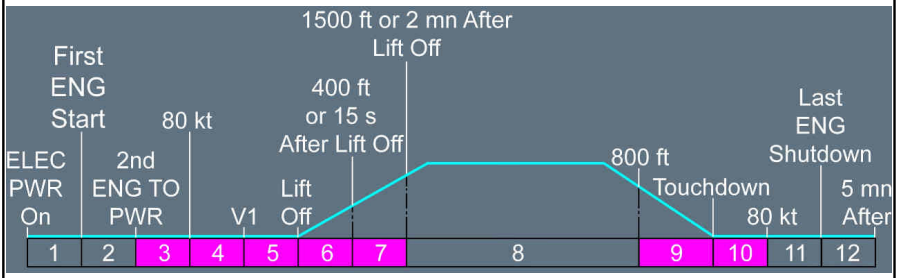


SD page



ENG SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL SYS CONTAMINATION* .

Continued on the following page

ENG 1(2)(3)(4) OIL SYS CONTAMINATION (Cont'd)

Crew awareness.

ENG 1(2)(3)(4) OIL TEMP HI

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The oil temperature is above 196 °C.

Indications:

Audio



Master Light

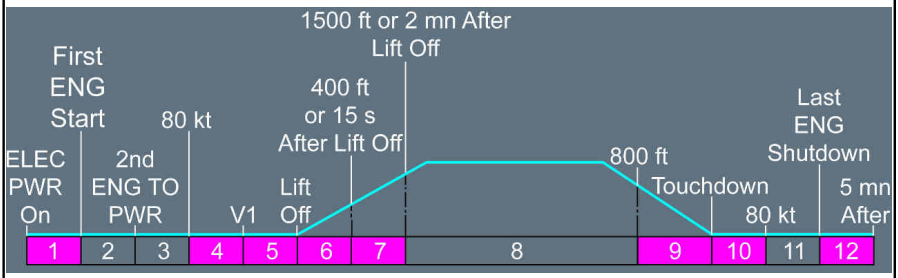


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL TEMP HI .*

Continued on the following page

ENG 1(2)(3)(4) OIL TEMP HI (Cont'd)

THR LEVER 1(2)(3)(4)..... REDUCE BELOW OIL TEMP LIMIT

L2 *Gradually reduce thrust on the affected engine, to decrease the oil temperature below limit.*

L1 ● **IF HI TEMP PERSISTS**

ENG 1(2)(3)(4) MASTER.....OFF

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

ENG 1(2)(3)(4) OIL TEMP LO

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 On ground, the engine oil temperature is less than 50 °C:
- 30 s after the engine is running, or
- After the flight crew presses T.O CONFIG pb, or
- After the flight crew sets the takeoff power.

Indications:

Audio



Master Light

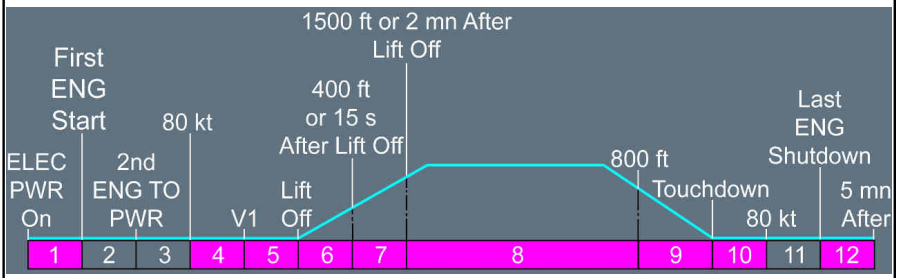


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OIL TEMP LO* .

THR LEVER 1(2)(3)(4)..... IDLE
DELAY T.O FOR WARM UP

ENG 1(2)(3)(4) OVERTHRUST PROT LOST

Applicable to: ALL

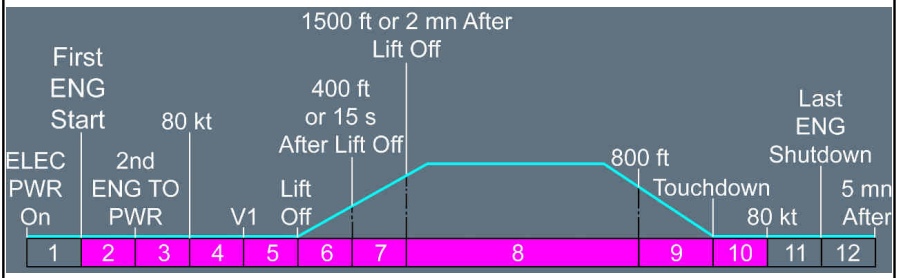
ANNUNCIATIONS

Triggering Conditions:

L2 The overthrust protection is lost.
For more information on the overthrust protection *Refer to DSC-70-20-20-10 General* .
It is displayed after flight if only one engine is affected.
It is displayed at aircraft power-up if more than two engines are affected.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) OVERTHRUST PROT LOST* .

Crew awareness.

ENG 1(2)(3)(4) SENSOR FAULT

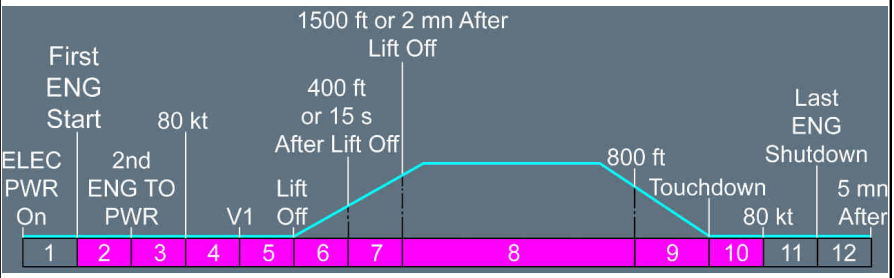
Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Engine total pressure probe or total temperature probe or static temperature probe is failed.
If more than one probe is failed the caution is displayed before engine start.
Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) SENSOR FAULT* .

Crew awareness.

ENG 1(2)(3)(4) SHUT DOWN

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This caution is displayed following an engine shutdown when either the ENG MASTER lever is set to the OFF position or the ENG FIRE pb is pushed.

Indications:

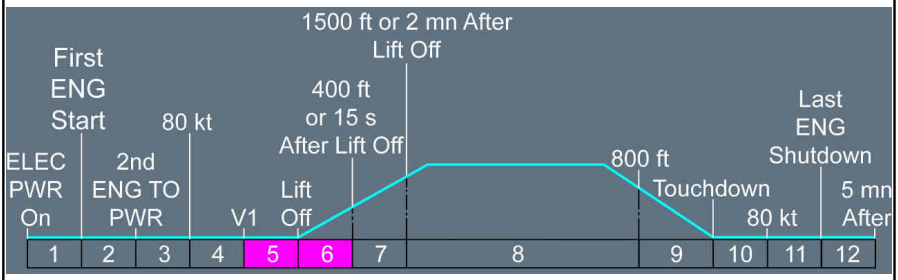
Audio



Master Light



Flight Phase Inhibition:



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ENG 1(2)(3)(4) SHUT DOWN (Cont'd)

TCAS MODE.....TA ONLY

- **During takeoff :**
  L/G LEVER.....UP

- **IF NO FUEL LEAK and FOB between 121 300 lb and 209 400 lb :**
  ALL CROSSFEEDS.....ON

L2 *This action anticipates any further crossfeed valves failure that could happen when the crossfeed valves are needed to use fuel from the feed tank from the failed engine.*
When there is no fuel leak and the FOB is between 121 300 lb and 209 400 lb , the fuel required to reach an airport may not be sufficient if the feed tank form the failed engine is not usable and is not immediately detected.

L1 - **In the case of an abnormal bleed configuration:**
  ABNORM BLEED CONFIG procedure..... APPLY
  Refer to AIR ABNORMAL BLEED CONFIGURATION .

- **IF MAX THR RQRD :**
  AIR FLOW.....LO
  FWD CARGO TEMP REGUL.....OFF

- **If inner engine affected:**
  LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

L1

SECONDARY FAILURES

* ELEC
* BLEED

L2 *Note: Depending on the aircraft weight and configuration, the minimum speed secured by the angle of attack protection (i.e. $V\alpha_{max}$) may lead to significant sideslip excursions, due to the decreased rudder efficiency at very low speed. This sideslip would be detrimental to the easiness of control of the lateral trajectory and to the climbing performance. Therefore, in the case of TAWS or windshear alert with external engine asymmetric power, the flight crew should not fly below the VLS when applying the appropriate procedure.*

Continued on the following page

ENG 1(2)(3)(4) SHUT DOWN (Cont'd)

L12

STATUS

INOP SYS

ALL PHASES

GEN 1(2)(3)(4)
G ENG 1(2) PMP A+B (If ENG 1(2) affected)
Y ENG 3(4) PMP A+B (If ENG 3(4) affected)
ENG 1(2)(3)(4) BLEED

Note: *Some additional inoperative systems may appear in the case of abnormal bleed configuration.*

APPR

BTV (If ENG 2(3) affected)
ENG 2(3) REVERSER (If ENG 2(3) affected)
CAT 3 DUAL (If APU off)

INFO

- If APU off:
  CAT 3 SINGLE ONLY
  Only three different generators supply the AC busbars. Therefore, CAT 3 DUAL is lost. The flight crew can recover CAT 3 DUAL by starting the APU. Therefore, the APU generator directly supplies the AC 1(2)(3)(4) busbar.

ENG 1(2)(3)(4) STALL

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The FADEC detects an engine stall.
A stall may be indicated by varying degrees of abnormal engine noises, accompanied by :
— flame from the engine exhaust (and possibly from engine inlet in severe cases),
— fluctuating performance parameters,
— sluggish or no thrust lever response,
— high EGT, and/or a rapid EGT rise when thrust lever is advanced.
Engine stalls must be reported for maintenance action.
ENG STALL alert is inhibited during the takeoff phase from V1 to 400 ft unless two or more engines are affected.
Indications:

Audio



Master Light

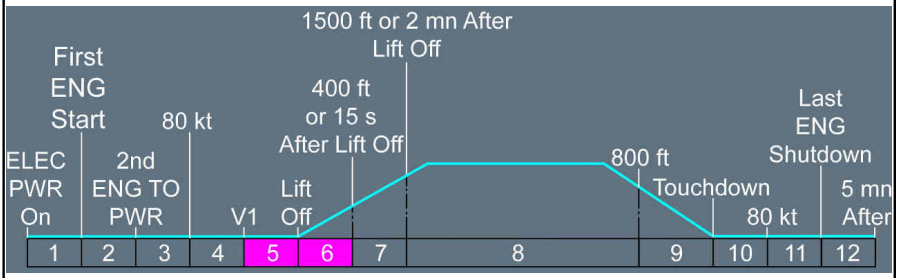


SD page



ENGINE SD Page

Flight Phase Inhibition:



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ENG 1(2)(3)(4) STALL (Cont'd)

THR LEVER 1(2)(3)(4)..... IDLE
ENG 1(2)(3)(4) PARAMETERS..... CHECK

● **IF ABNORMAL**

ENG 1(2)(3)(4) MASTER..... OFF
ENG 1(2)(3)(4) RELIGHT PROC..... CONSIDER

L2 *ENG 1(2)(3)(4) RELIGHT apply, Refer to procedure .*
Engine relight is at flight crew discretion.
If engine is relighted and engine parameters are normal, consider to switch on wing anti-ice and nacelle anti-ice of the affected engine. This will increase the stall margin, with a trade—off on EGT increase.
If stall does not reoccur, continue normal engine operation.

L1 ● **If relight unsuccessful**

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

ENG 1(2)(3)(4) START FAULT

Applicable to: ALL

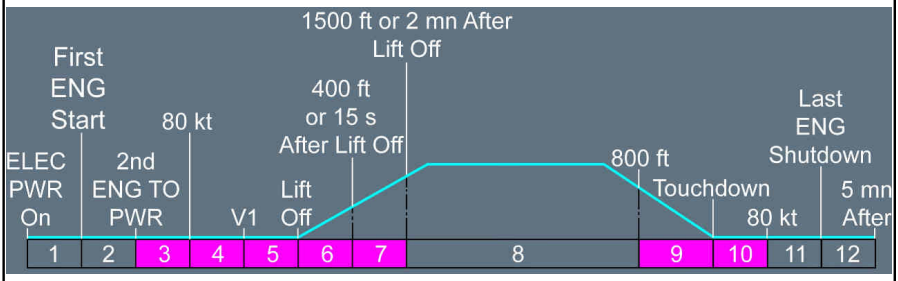
ANNUNCIATIONS

Triggering Conditions:

L2 The engine start was not successful due to:
- A too low starter air pressure,
- No starter air pressure,
- A too low N1,
- A too low N2,
- A hung start,
- EGT overlimit,
- No light up,
- Engine stall,
- Exceeded starter time, or
- Thrust levers not at idle.

Indications:

Flight Phase Inhibition:



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ENG 1(2)(3)(4) START FAULT (Cont'd)

- **Depending on the failure case, one of the following will appear:**

  LOW STARTER AIR PRESSURE
  NO STARTER AIR PRESSURE
  LOW N1
  LOW N2
  HUNG START
  EGT OVERLIMIT
  NO LIGHT UP
  ENG STALL
  STARTER TIME EXCEEDED
  THR LEVERS NOT AT IDLE

- **In the case of NO STARTER AIR PRESSURE:**

  XBLEED..... OPEN
  APU BLEED.....ON

- **In flight:**

  MIN SPEED FOR WINDML RELIGHT : 260 KT
  WINDMILL START INITIATED
  ENG PARAMETERS.....MONITOR

  - **IF ABNORMAL :**

    ENG 1(2)(3)(4) MAN START..... OFF
    ENG 1(2)(3)(4) MASTER..... OFF

- **IF NOT SUCCESSFUL :**

  ENG 1(2)(3)(4) MAN START.....OFF
  ENG 1(2)(3)(4) MASTER.....OFF

- **In the case of LOW N1 (Only on ground):**

  THR LEVER 1(2)(3)(4).....IDLE
  CRANK IN PROGRESS
  ENG 1(2)(3)(4) MASTER LEVER.....OFF

  - **Only in manual start**

    ENG START SEL..... CRANK

L2 *To clear fuel vapors, it is necessary to dry crank the engine for 30 seconds.*

Continued on the following page

ENG 1(2)(3)(4) START FAULT (Cont'd)

L1 ● **AFTER 30s :**
ENG START SEL..... NORM
ENG 1(2)(3)(4) MAN START.....OFF

L2 *Note: The flight crew must decide whether to decide a new start or report the no start condition for further maintenance action.*

L1 ● **in the case of EGT OVERLIMIT, NO LIGHT UP or ENG STALL:**

● **In flight :**
ENG 1(2)(3)(4) MASTER LEVER..... OFF

L2 *To clear fuel vapors, wait 30 s before a new start attempt .*

L1 ● **On ground during an autostart :**

NEW START IN PROGRESS

L2 If the engine fails to start, fuel and igniter are turned off. The engine is then motored to clear fuel vapors. After sufficient time, a new engine start is attempted.

L1 ● **If restart is not successful :**
ENG 1(2)(3)(4) MASTER LEVER.....OFF

L2 *The HP fuel valve and starter air valve automatically close. Both igniters go off.*

L1 ● **On ground during a manual start :**
ENG 1(2)(3)(4) MASTER LEVER..... OFF
ENG START SEL..... CRANK

L2 *To clear fuel vapors, it is necessary to dry crank the engine for 30 seconds.*

L1 ● **AFTER 30s :**
ENG START SEL..... NORM
ENG 1(2)(3)(4) MAN START.....OFF

L2 *Note: The flight crew must decide whether to decide a new start or report the no start condition for further maintenance action.*

L1 ● **In the case of STARTER TIME EXCEEDED:**

● **During a manual start :**
ENG 1(2)(3)(4) MAN START..... OFF

ENG 1(2)(3)(4) MASTER LEVER.....OFF

Continued on the following page

ENG 1(2)(3)(4) START FAULT (Cont'd)

● **In the case of THR LEVERS NOT AT IDLE:**

ALL THR LEVERS .....IDLE

SECONDARY FAILURES

*BLEED

ENG 1(2)(3)(4) START VLV FAULT (NOT CLOSED)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The engine start air valve is failed open.

Indications:

Audio



Master Light

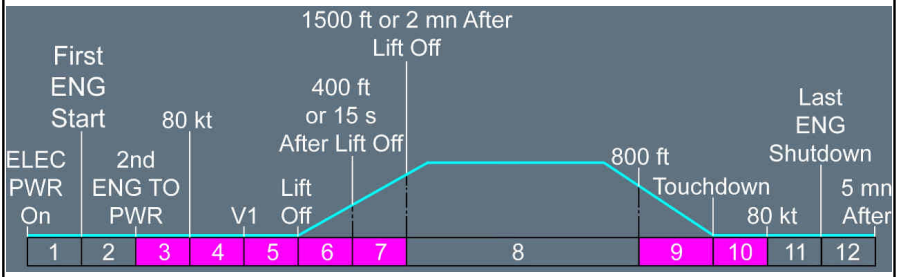


SD page



ENGINE SD Page

Flight Phase Inhibition:



Continued on the following page

ENG 1(2)(3)(4) START VLV FAULT (NOT CLOSED) (Cont'd)

L2 The procedure remove all bleed sources supplying the faulty starter air valve.
On ground the engine is shutdown and manual starter air valve operation may be consider.
For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) START VLV FAULT [START VLV NOT CLOSED]* .

Continued on the following page

ENG 1(2)(3)(4) START VLV FAULT (NOT CLOSED) (Cont'd)

START VLV NOT CLOSED

- **In flight :**
  ENG 1(2)(3)(4) BLEED.....OFF
- **If engine 1 affected :**
  APU BLEED.....OFF

L2 *The X-BLEED cannot isolate the APU bleed from the engine 1 bleed.*

L1 X BLEED..... CLOSE

- **During manual start :**
  ENG 1(2)(3)(4) MAN START.....OFF
- **On ground :**
  ENG 1(2)(3)(4) MASTER.....OFF

L2 *Consider application of "START VALVE MANUAL OPERATION" Refer to procedure .*

L1 ● **if engine 1 or 4 affected :**
WING A-ICE.....OFF

L2 *This will prevent asymmetric ice accretion.*

L1 AVOID ICING CONDs

- **IF L(if engine 1 or 2 is affected) or R(if engine 3 or 4 is affected) XBLEED STILL OPEN AFTER 15 S :**

L2 This condition covers a departure under MEL with L(R) XBLEED valve failed open.

L1 ● **If engine 2 affected :**
APU BLEED..... OFF

L2 *If the L X-BLEED valve does not close it cannot isolate the APU bleed from the engine 2 bleed.*

L1 ENG 2(1)(4)(3) BLEED.....OFF
PACK 1(2).....OFF
WING A-ICE.....OFF

L2 *This will prevent asymmetric ice accretion.*

L1 AVOID ICING CONDs

Continued on the following page

ENG 1(2)(3)(4) START VLV FAULT (NOT CLOSED) (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If engine 1 or 4 affected :
  AVOID ICING CONDs

LIMITATIONS ON PFD

ALL PHASES

- If engine 1 or 4 affected :
  AVOID ICING CONDs

DEFERRED PROC

FOR APPROACH

- **If engine 1 or 4 affected :**
  - **IF SEVERE ICE ACCRETION :**
    FOR LDG : FLAP LVR 3

STATUS

INOP SYS

ALL PHASES

ENG 1(2)(3)(4) BLEED
APU BLEED (If engine 1 affected)
WING A-ICE (If engine 1 or 4 affected)

ENG 1(2)(3)(4) START VLV FAULT (NOT OPEN)

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The starter air valve cannot open.
The valve is stuck closed or their is no bleed air available for engine start.

Indications:

Audio



Master Light

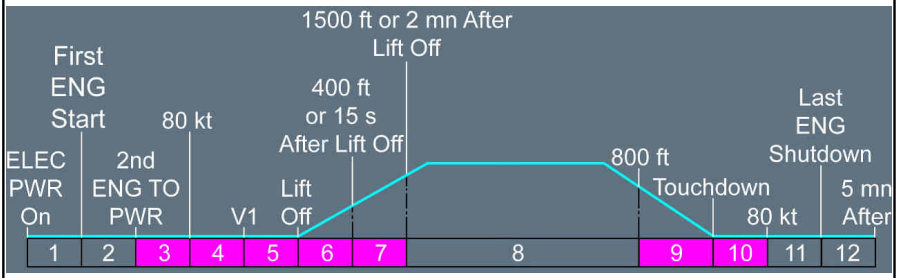


SD page



ENGINE SD Page

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) START VLV FAULT* .

Continued on the following page

ENG 1(2)(3)(4) START VLV FAULT (NOT OPEN) (Cont'd)

■ **If the valve is mechanically stuck closed :**

VLV STUCK CLOSED

● **On ground**

● **During manual start :**

ENG 1(2)(3)(4) MAN START.....OFF

ENG 1(2)(3)(4) MASTER..... OFF

L2 Consider application of “START VALVE MANUAL OPERATION” , *Refer to procedure* .

L1 ■ **If air pressure is not sufficient to open the starter valve :**

NO STARTER AIr PRESSURE
X BLEED.....OPEN
APU BLEED.....ON

● **IF NOT SUCCESSFUL (on ground only) :**

● **During manual start :**

ENG 1(2)(3)(4) MAN START.....OFF

ENG 1(2)(3)(4) MASTER..... OFF

● **In flight**

L2 In flight, the FADEC will attempt a windmill start even if the aircraft's speed is below the minimum speed for windmilling. As a consequence the flight crew must closely monitor engine parameters during engine restart.

L1 MIN SPEED FOR WINDML RELIGHT: 260 KT
WINDMILL START INITIATED
ENG PARAMETERS..... MONITOR WITH CARE

● **IF ABNORMAL :**

● **During manual start :**

ENG 1(2)(3)(4) MAN START.....OFF

ENG 1(2)(3)(4) MASTER..... OFF

SECONDARY FAILURES

* BLEED

ENG 1(2)(3)(4) THR LEVER ABOVE IDLE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2
- One thrust lever is above idle and at least one thrust reverser lever is in reverse detent, or
- One thrust lever is above idle and at least one thrust lever on the other engines is at idle, or
  This condition covers the inadvertent selection of an engine thrust lever above idle during thrust reversers de-selection.
- The auto-idle protection is active.
  For more information on the auto-idle protection, *Refer to DSC-70-70-70-20 Auto-Idle Protection* .

In addition, a dual RETARD callout triggers.

Indications:

Master Light



Flight Phase Inhibition:



THR LEVER 1(2)(3)(4)..... IDLE

ENG 1(2)(3)(4) THR LEVER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Tthe FADEC has lost the throttle lever position.
It may be an indication of a rotor burst from an other engine.

Indications:

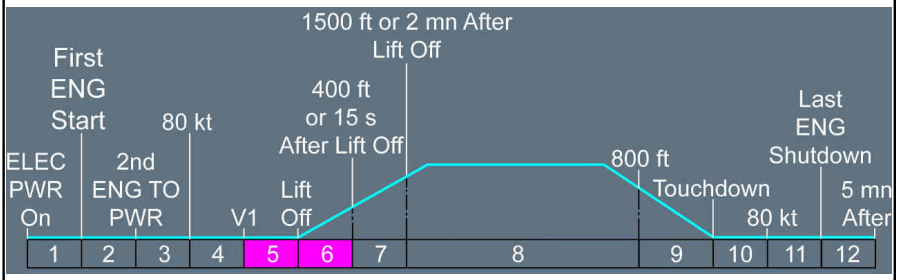
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) THR LEVER FAULT* .

Continued on the following page

ENG 1(2)(3)(4) THR LEVER FAULT (Cont'd)

■ **On ground:**
ENG 1(2)(3)(4) IDLE ONLY
THR LEVER 1(2)(3)(4).....IDLE

L2 *The affected engine is automatically set to idle.*

L1 ■ **In flight:**
ENG 1(2)(3)(4) CLB ONLY
THR LEVER 1(2)(3)(4).....CLB

L2 *The affected engine power is automatically limited.*

L1 ● **If THR LEVER 2 (3) is affected:**
LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

STATUS

INOP SYS

ALL PHASES	**APPR**
ENG 1(2)(3)(4) THR LEVER	ENG 2(3) REVERSER (If engine 2 (3) affected) BTV (If engine 2 (3) affected)

INFO

- On ground:
  ENG 1(2)(3)(4) IDLE ONLY
- In flight:
  ENG 1(2)(3)(4) CLB ONLY

ENG 1(2)(3)(4) THRUST LOSS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 A loss of thrust is detected following an erroneous but valid calculation of the THR parameter (*Refer to DSC-70-20-40-20 Engine Power Setting*).

L3 The FADEC detects a loss of thrust if the maximum THR of the affected engine is 10 % lower than at least two other engines maximum THR .
A wrong calculation of the maximum THR may lead to a wrong but valid calculation of the actual THR .

Indications:

L2

Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) THRUST LOSS* .

THR LEVER 1(2)(3)(4)..... IDLE
ENG 1(2)(3)(4) MASTER ..... OFF

ENG 1(2)(3)(4) TIME LIMITED ITEM

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Engine time limited failures are expired. For more information, *Refer to DSC-31-40-10 Time Limited Failure* .

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 1(2)(3)(4) TIME LIMITED ITEM* .

Crew awareness.

ENG 2(3) REVERSER CTL FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One thrust reverser control system is failed.
The affected thrust reverser is inoperative.
Indications:

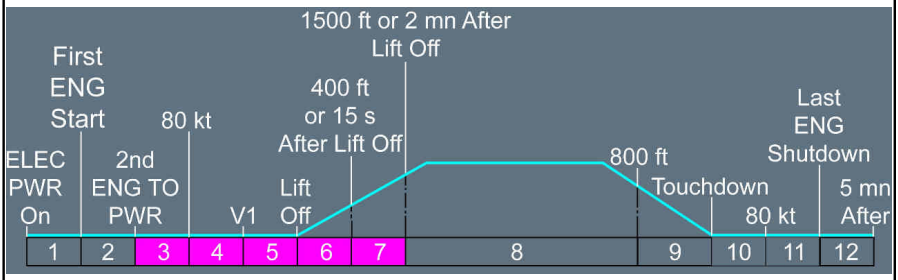
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER CTL FAULT* .

- **Before takeoff:**

  T.O PERF..... CHECK

  LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

Continued on the following page

ENG 2(3) REVERSER CTL FAULT (Cont'd)

STATUS

INOP SYS

APPR

ENG 2(3) REVERSER
BTV

ENG 2(3) REVERSER ENERGIZED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 On ground, the thrust reverser is energized without thrust reverser deployment order.
In flight, the thrust reverser is energized and the tertiary lock is failed not locked. For more information on the tertiary lock, *Refer to DSC-70-70-70-20 Three Lines of Defense* .

Indications:

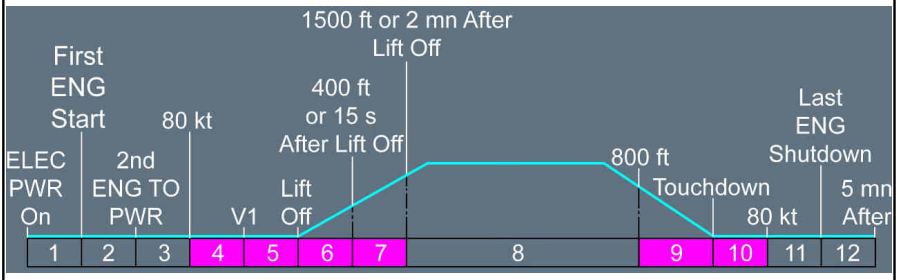
Audio



Master Light



Flight Phase Inhibition:



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ENG 2(3) REVERSER ENERGIZED (Cont'd)

For associated MEL dispatch conditions, refer to MEL *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER ENERGIZED* .

THR LEVER 2(3).....IDLE

ENG 2(3) REVERSER FAULT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One thrust reverser is failed.

Indications:

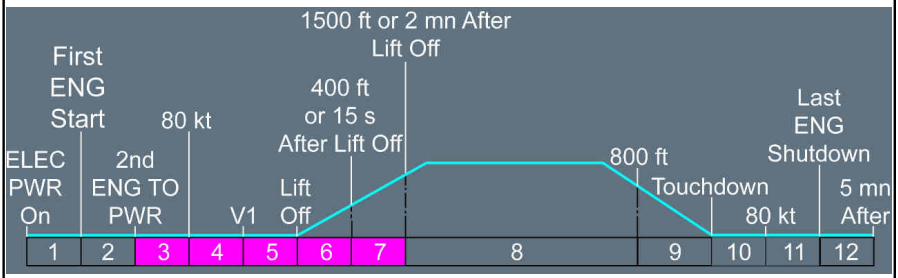
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER FAULT* .

Continued on the following page

ENG 2(3) REVERSER FAULT (Cont'd)

● **On ground:**
T.O PERF..... CHECK

LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

STATUS

INOP SYS

APPR

ENG 2(3) REVERSER
BTV

ENG 2(3) REVERSER INHIBITED

Applicable to: ALL

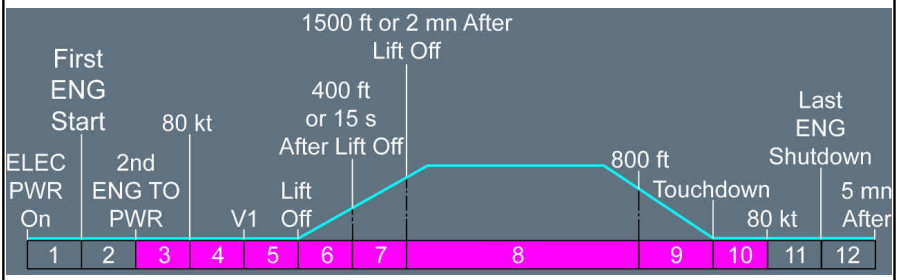
ANNUNCIATIONS

Triggering Conditions:

L2 One thrust reverser has been electrically and mechanically inhibited by maintenance action.

Indications:

Flight Phase Inhibition:



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ENG 2(3) REVERSER INHIBITED (Cont'd)

L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER INHIBITED* .

- **Before takeoff:**

  T.O PERF..... CHECK

  LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

STATUS

INOP SYS

	APPR
	ENG 2(3) REVERSER
	BTV

ENG 2(3) REVERSER LOCKED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One thrust reverser is failed locked.
Primary left, right or tertiary locking system is failed locked,

Indications:

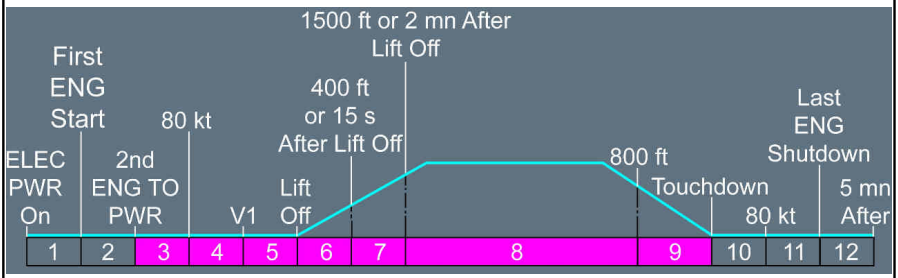
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER LOCKED* .

- **Before takeoff:**
  T.O PERF.....CHECK

LDG DIST IMPACT ON WET/CONTAM RWY ONLY

L2 *Landing distance computation on dry runways does not take into account the impact of the reversers.*

Continued on the following page

ENG 2(3) REVERSER LOCKED (Cont'd)

STATUS

INOP SYS

APPR

ENG 2(3) REVERSER
BTV

ENG 2(3) REVERSER MINOR FAULT

Applicable to: ALL

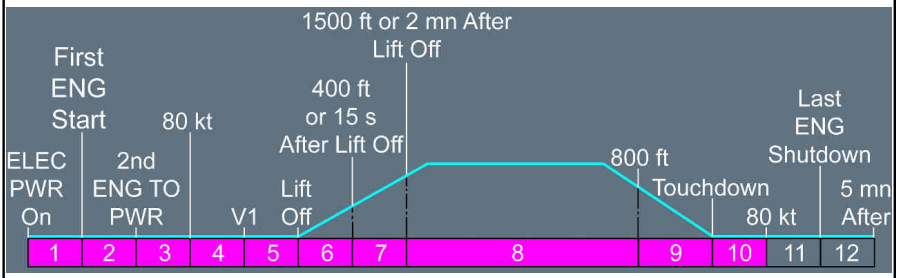
ANNUNCIATIONS

Triggering Conditions:

L2 Displayed, after landing, when the FADEC detects a failure that does not impair thrust reversers operation.

Indications:

Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER MINOR FAULT* .

Crew awareness.

ENG 2(3) REVERSER UNLOCKED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 One thrust reverser is not fully locked while not commanded deployed by the flight crew.
L3 Two lines of defense out of three command a reverse deployment.
This caution is not inhibited even if the affected thrust reverser has been inhibited.

Indications:

L2

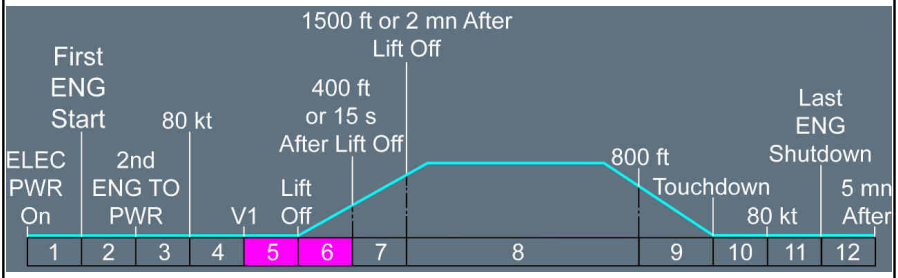
Audio



Master Light



Flight Phase Inhibition:



For associated MEL dispatch conditions, refer to MEL *Refer to MEL/ME-ECAM-70-80-26 ENG 2(3) REVERSER UNLOCKED* .

Continued on the following page

ENG 2(3) REVERSER UNLOCKED (Cont'd)

ENG 2(3) IDLE ONLY

■ **On ground**

THR LEVER 2(3)..... IDLE

L2 *Select thrust lever at idle, even if idle is automatically selected by the FADEC .*

L1 ENG 2(3) MASTER.....OFF

■ **In flight**

THR LEVER 2(3)..... IDLE

L2 *Select thrust lever at idle, even if idle is automatically selected by the FADEC .*

L1 ● **IF BUFFET**

ENG 2(3) MASTER.....OFF

L2 *The warning alone without buffet or vibration may be a false warning.*

L1

ASSOCIATED PROCEDURES

ENG 1(2)(3)(4) SHUTDOWN
Refer to procedure

STATUS

INFO

ENG 2(3) IDLE ONLY

ENG ALL ENG FLAME OUT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This warning is triggered when all engines are failed.

Indications:

Audio



Master Light

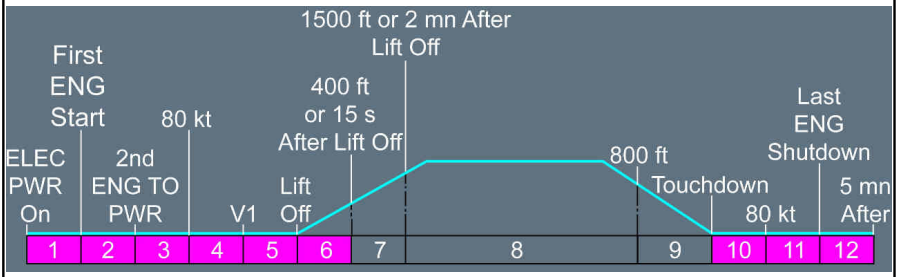


SD page



ENGINE SD Page

Flight Phase Inhibition:



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ENG ALL ENG FLAME OUT (Cont'd)

This alert inhibits the ELEC EMER CONFIG alert.

The procedure is divided into two parts:
- Fuel remaining,
  Immediate actions then successive engine starts are attempted without and with APU bleed when available.
  If engine restarts are unsuccessful, forced landing or ditching procedure
- No fuel remaining,
  Immediate actions then forced landing or ditching procedure.

L2 **COMMUNICATIONS REMAINING WHEN THE AIRCRAFT IS ON BATTERIES ONLY.**

When the APU is not running and the RAT does not deliver electrical power due to low speed (approximately below 120 kt), the following communication means remain available:
- VHF 1
- RMP 1
- Audio controls on RMP 2 (Although RMP 2 display is black)
- ATC communication on both sides, and frequencies tuning on RMP 1 only
- All communications on both sides (PA, CAB and INT) whatever the devices.

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

Impacted by TDU: 00020793 ENG ALL ENG FLAME OUT - Alert

LAND ASAP

RAT MAN ON.....PRESS
ALL THR LEVERS.....IDLE
FUEL QTY.....CHECK

● **IF FUEL REMAINS:**

ENG START SEL.....IGN START
OPTIMUM RELIGHT SPEED : 260 KT

L2 *At 260 kt, with all engines stopped, it takes about 18 min to descend from FL 400 to the ground. The distance is about 100 nm.*

L1 USE VHF1

L2 *Only VHF 1 is always supplied. Notify air traffic control of the nature of the emergency, and state intentions. If there is no contact with air traffic control, transmit a distress message on VHF frequency 121.5 MHz.*
As the display of RMP 2 is not available, use RMP 1 to tune VHF 1 (or HF 1).
Communications can be done on the both sides.
XPDR and TCAS are available on SYS 1 only.

L1 GLIDING DIST (NO WIND) : 2.5 NM/1000 FT
SPEED BRAKES AVAIL

L2 *Speed brakes remain actuated and may be extended to increase descent rate, if needed.*

L1 LDG STRATEGY.....DETERMINE

L2 *Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.*

L1 ● **IF NO ENG RELIGHT AFTER 30 S:**

ALL ENG MASTERS.....OFF 30S THEN ON

L2 *This allows ventilation of the combustion chamber.*
Unassisted start attempts can be repeated until successful, or until APU BLEED is available.

L1 ENGs RELIGHT.....TRY REGULARLY
CREW OXY MASKS (FL>100).....USE

L2 *Cabin altitude increases due to the lack of engine bleed. The EXCESS CAB ALT alert can trigger. Depending on the situation, to gain gliding distance, the flight crew may disregard*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

L1 CABIN & CKPT.....PREPARE

L2
- *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked.*

L1
● **WHEN BELOW FL 200:**
APU.....START

● **WHEN APU AVAIL:**
ALL ENG MASTERS.....OFF
WING A-ICE.....OFF
APU BLEED.....ON
OPTIMUM SPEED : GREEN DOT

L2 *Green dot speed is the optimum speed for gliding, i.e. descent angle is minimum.*

L1
● **WHEN BELOW FL 200:**

● **AFTER 30 S:**
ENG MASTER (2 AT A TIME).....ON

L2 *Only two engines must be started at a time. The other non-running engine masters must be selected OFF.*

L1 CABIN CREW.....ADVISE
COMMERCIAL 1+2.....OFF
RAM AIR.....ON

L2 *Switch ON the RAM AIR to ensure a complete depressurization and to provide fresh air to the cabin.*
Emergency RAM AIR inlets open when the differential pressure goes below 1 PSI.

L1 BARO REF (IF AVAIL).....SET

● **IF FORCED LDG ANTICIPATED:**
DES SLOPE (LDG CONF/NO WIND): 1.5 NM/1000 FT (650 FT/NM)

● **FOR APPROACH & LANDING:**
MIN RAT SPEED : 140 KT
[MFD SURV] GPWS.....OFF
FLAP LEVER 3 (EXTN 4 MIN).....SELECT

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

FOR L/G GRVTY : MAX SPEED 220 KT
L/G GRVTY (EXTN 2 MIN)..... DOWN

- **WHEN L/G LOCKED DOWN:**
  L/G LEVER..... DOWN

APPROACH SPEED : VLS
N/W STEER NOT USABLE
USE DIFF BRAKING..... AS RQRD
GND SPLRs ..... ARM

- **AT 2000 FT AGL:**
  CABIN CREW..... ADVISE

- **AT 500 FT AGL:**
  BRACE FOR IMPACT..... ORDER

- **AT TOUCHDOWN:**
  ALL ENG MASTERS ..... OFF
  APU MASTER SW..... OFF

- **WHEN AIRCRAFT STOPPED:**
  PARK BRK..... ON
  ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions. Only VHF1 is available on batteries.*

L1 CABIN CREW..... ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

L1 ALL FIRE P/Bs (ENG & APU)..... PUSH
ALL AGENTS (ENG & APU)..... DISCH
EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND..... ON
ALL 4 BATs ..... OFF

L2 *Only PA announcement and CAB communication via the handset are available.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L1 ● **IF DITCHING ANTICIPATED:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS.....OFF
FLAP LEVER 3 (EXTN 4 MIN).....SELECT
L/G LEVER.....CHECK UP
APPROACH SPD : VLS UNTIL FLARE
FOR FLARE: OPT PITCH ATT 8° & MIN V/S

● **AT 2000 FT AGL:**

CABIN CREW.....ADVISE
DITCHING P/B.....ON

L2 *In the case of strong crosswind, ditch face to the wind. In the absence of strong crosswind, prefer ditching parallel to the swell.*

L1 ● **AT 500 FT AGL:**

BRACE FOR IMPACT.....ORDER
START FLARE AT 50 FT

● **JUST BEFORE DITCHING:**

ALL ENG MASTER LEVERS.....OFF
APU MASTER SW.....OFF

● **AFTER DITCHING:**

ATC.....NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions. Only VHF 1 is available on batteries.*

L1 CABIN CREW.....ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

L1 ALL FIRE P/Bs (ENG & APU).....PUSH
ALL AGENTS (ENG & APU).....DISCH
EVAC (PA).....ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND.....ON
ELT.....CHECK EMITTING
ALL 4 BATs.....OFF

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L2 *Only PA announcement and CAB communication are available via the handset.*

L1 ● **IF NO FUEL:**

OPTIMUM SPEED : GREEN DOT

L2 *At 260 kt, with all engines stopped, it takes about 18 min to descend from FL 400 to the ground. The distance is about 100 nm.*

L1 USE VHF1

L2 *Only VHF 1 is always supplied. Notify air traffic control of the nature of the emergency, and state intentions. If there is no contact with air traffic control, transmit a distress message on VHF frequency 121.5 MHz.*
As the display of RMP 2 is not available, use RMP 1 to tune VHF 1 (or HF 1).
Communications can be done on both sides.
XPDR and TCAS are available on SYS 1 only.

L1 GLIDING DIST (NO WIND) : 2.7 NM/1000 FT

SPEED BRAKES AVAIL

L2 *Speed brakes remain actuated and may be extended to increase descent rate if needed.*

L1 LDG STRATEGY..... DETERMINE

L2 *Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.*

L1 CREW OXY MASKS (FL>100)..... USE

L2 *Cabin altitude increases due to the lack of engine bleed. The EXCESS CAB ALT alert can trigger. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.*

L1 CABIN & CKPT..... PREPARE

L2 *- Loose equipment secured*
- Survival equipment prepared
- Belts and shoulder harnesses locked.

L1 RAM AIR..... ON

L2 *Switch ON the RAM AIR to ensure a complete depressurization and to provide fresh air to the cabin.*
Emergency RAM AIR inlets open when the differential pressure goes below 1 PSI.

L1 BARO REF (IF AVAIL)..... SET

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

- **IF FORCED LDG ANTICIPATED:**

DES SLOPE (LDG CONF/NO WIND): 1.5 NM/1000 FT (650 FT/NM)

- **FOR APPROACH & LDG:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS.....OFF
FLAP LEVER 3 (EXTN 4 MIN).....SELECT
FOR L/G GRVTY EXTN : MAX SPD 220 KT
L/G GRVTY (EXTN 2 MIN).....DOWN

- **WHEN L/G LOCKED DOWN:**

L/G LEVER.....DOWN

APPROACH SPEED : VLS
N/W STEER NOT USABLE
USE DIFF BRAKING.....AS RQRD
GND SPLRs.....ARM

- **AT 2000 FT AGL:**

CABIN CREW.....ADVISE

- **AT 500 FT AGL:**

BRACE FOR IMPACT.....ORDER

- **AT TOUCHDOWN:**

ALL ENG MASTERS.....OFF
APU MASTER SW.....OFF

- **WHEN AIRCRAFT STOPPED:**

PARK BRK.....ON
ATC.....NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*
Only VHF 1 is available on batteries.

L1 CABIN CREW.....ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

L1 ALL FIRE P/Bs (ENG & APU).....PUSH
ALL AGENTS (ENG & APU).....DISCH
EVAC (PA).....ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L1 EVAC COMMAND ..... ON
ALL 4 BATs ..... OFF

L2 *Only PA announcement and CAB communication are available via the handset.*

L1 ● **IF DITCHING ANTICIPATED:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS ..... OFF
FLAP LEVER 3 (EXTN 4 MIN) ..... SELECT
L/G LEVER ..... CHECK UP

APPROACH SPEED : VLS UNTIL FLARE

FOR FLARE : OPT PITCH ATT 8° & MIN V/S

● **AT 2000 FT AGL:**

CABIN CREW ..... ADVISE
DITCHING P/B ..... ON

L2 In the case of strong crosswind, ditch face to the wind. In the absence of strong crosswind, prefer ditching parallel to the swell.

L1 ● **AT 500 FT AGL:**

BRACE FOR IMPACT ..... ORDER

START FLARE AT 50 FT

● **JUST BEFORE DITCHING:**

ALL ENG MASTERS ..... OFF
APU MASTER SW ..... OFF

● **AFTER DITCHING:**

ATC ..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*
Only VHF 1 is available on batteries.

L1 CABIN CREW ..... ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

L1 ALL FIRE P/Bs (ENG & APU) ..... PUSH
ALL AGENTS (ENG & APU) ..... DISCH
EVAC (PA) ..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L1 EVAC COMMAND ..... ON
ELT ..... CHECK EMITTING
ALL 4 BATs ..... OFF
L2 *Only PA announcement and CAB communication are available via the handset.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

Impacted DU: 00008075 ENG ALL ENG FLAME OUT - Alert

LAND ASAP

RAT MAN ON.....PRESS
ALL THR LEVERS..... IDLE
FUEL QTY.....CHECK

● **IF FUEL REMAINS:**
ENG START SEL.....IGN START
OPTIMUM RELIGHT SPEED : 260 KT

L2 *At 260 kt, with all engines stopped, it takes about 18 min to descend from FL 400 to the ground. The distance is about 100 nm.*

L1 USE VHF1

L2 *Only VHF 1 is always supplied. Notify air traffic control of the nature of the emergency, and state intentions. If there is no contact with air traffic control, transmit a distress message on VHF frequency 121.5 MHz.*
As the display of RMP 2 is not available, use RMP 1 to tune VHF 1 (or HF 1).
Communications can be done on the both sides.
XPDR and TCAS are available on SYS 1 only.

L1 GLIDING DIST (NO WIND) : 2.5 NM/1000 FT
SPEED BRAKES AVAIL

L2 *Speed brakes remain actuated and may be extended to increase descent rate, if needed.*

L1 LDG STRATEGY..... DETERMINE

L2 *Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.*

L1 ● **IF NO ENG RELIGHT AFTER 30 S:**
ALL ENG MASTERS..... OFF 30S THEN ON

L2 *This allows ventilation of the combustion chamber.*
Unassisted start attempts can be repeated until successful, or until APU BLEED is available.

L1 ENGs RELIGHT..... TRY REGULARLY
CREW OXY MASKS (FL>100).....USE

L2 *Cabin altitude increases due to the lack of engine bleed: The EXCESS CAB ALT alert can trigger. Depending on the situation, to gain gliding distance, the flight crew may disregard*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.

L1 CABIN & CKPT..... PREPARE

L2
- *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked.*

L1 ● **WHEN BELOW FL 200:**
APU..... START

● **IF APU START FAILED:**
TRY A NEW APU START AT LOWER FL

L2 *The APU start should be successful below FL 150.*

L1 ● **WHEN APU AVAIL:**
ALL ENG MASTERS.....OFF
WING A-ICE.....OFF
APU BLEED.....ON
OPTIMUM SPEED : GREEN DOT

L2 *Green dot speed is the optimum speed for gliding, i.e. descent angle is minimum.*

L1 ● **WHEN BELOW FL 200:**

● **AFTER 30 S:**
ENG MASTER (2 AT A TIME)..... ON

L2 *Only two engines must be started at a time. The other non-running engine masters must be selected OFF.*

L1 CABIN CREW.....ADVISE
COMMERCIAL 1+2..... OFF
RAM AIR.....ON

L2 *Switch ON the RAM AIR to ensure a complete depressurization and to provide fresh air to the cabin.*
Emergency RAM AIR inlets open when the differential pressure goes below 1 PSI.

L1 BARO REF (IF AVAIL)..... SET

● **IF FORCED LDG ANTICIPATED:**
DES SLOPE (LDG CONF/NO WIND): 1.5 NM/1000 FT (650 FT/NM)

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

● **FOR APPROACH & LANDING:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS.....OFF
FLAP LEVER 3 (EXTN 4 MIN).....SELECT
FOR L/G GRVTY : MAX SPEED 220 KT
L/G GRVTY (EXTN 2 MIN)..... DOWN

● **WHEN L/G LOCKED DOWN:**
L/G LEVER..... DOWN

APPROACH SPEED : VLS
N/W STEER NOT USABLE
USE DIFF BRAKING.....AS RQRD
GND SPLRs ..... ARM

● **AT 2000 FT AGL:**
CABIN CREW..... ADVISE

● **AT 500 FT AGL:**
BRACE FOR IMPACT.....ORDER

● **AT TOUCHDOWN:**
ALL ENG MASTERS ..... OFF
APU MASTER SW.....OFF

● **WHEN AIRCRAFT STOPPED:**
PARK BRK.....ON
ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions. Only VHF1 is available on batteries.*

L1 CABIN CREW.....ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

L1 ALL FIRE P/Bs (ENG & APU).....PUSH
ALL AGENTS (ENG & APU).....DISCH
EVAC (PA).....ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND..... ON

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

ALL 4 BATs ..... OFF

L2 *Only PA announcement and CAB communication via the handset are available.*

L1 ● **IF DITCHING ANTICIPATED:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS..... OFF
FLAP LEVER 3 (EXTN 4 MIN)..... SELECT
L/G LEVER..... CHECK UP

APPROACH SPD : VLS UNTIL FLARE

FOR FLARE: OPT PITCH ATT 8° & MIN V/S

● **AT 2000 FT AGL:**

CABIN CREW..... ADVISE
DITCHING P/B..... ON

L2 In the case of strong crosswind, ditch face to the wind. In the absence of strong crosswind, prefer ditching parallel to the swell.

L1 ● **AT 500 FT AGL:**

BRACE FOR IMPACT..... ORDER

START FLARE AT 50 FT

● **JUST BEFORE DITCHING:**

ALL ENG MASTER LEVERS..... OFF
APU MASTER SW..... OFF

● **AFTER DITCHING:**

ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions. Only VHF 1 is available on batteries.*

L1 CABIN CREW..... ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

L1 ALL FIRE P/Bs (ENG & APU)..... PUSH
ALL AGENTS (ENG & APU)..... DISCH
EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L1 EVAC COMMAND.....ON
ELT.....CHECK EMITTING
ALL 4 BATs .....OFF

L2 *Only PA announcement and CAB communication are available via the handset.*

L1 ● **IF NO FUEL:**
OPTIMUM SPEED : GREEN DOT

L2 *At 250 kt, with all engines stopped, it takes about 18 min to descend from FL 400 to the ground. The distance is about 100 nm.*

L1 USE VHF1

L2 *Only VHF 1 is always supplied. Notify air traffic control of the nature of the emergency, and state intentions. If there is no contact with air traffic control, transmit a distress message on VHF frequency 121.5 MHz.*
As the display of RMP 2 is not available, use RMP 1 to tune VHF 1 (or HF 1).
Communications can be done on both sides.
XPDR and TCAS are available on SYS 1 only.

L1 GLIDING DIST (NO WIND) : 2.7 NM/1000 FT
SPEED BRAKES AVAIL

L2 *Speed brakes remain actuated and may be extended to increase descent rate if needed.*

L1 LDG STRATEGY..... DETERMINE

L2 *Determine whether a runway can be reached, or the most appropriate place for a forced landing/ditching.*

L1 CREW OXY MASKS (FL>100)..... USE

L2 *Cabin altitude increases due to the lack of engine bleed: The EXCESS CAB ALT alert can trigger. Depending on the situation, to gain gliding distance, the flight crew may disregard the ECAM emergency descent requirement, because passengers will be provided with oxygen for a sufficient period of time.*

L1 CABIN & CKPT.....PREPARE

L2 - *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked.*

L1 RAM AIR.....ON

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L2 *Switch ON the RAM AIR to ensure a complete depressurization and to provide fresh air to the cabin.*
Emergency RAM AIR inlets open when the differential pressure goes below 1 PSI.

L1 BARO REF (IF AVAIL)..... SET

● **IF FORCED LDG ANTICIPATED:**

DES SLOPE (LDG CONF/NO WIND): 1.5 NM/1000 FT (650 FT/NM)

● **FOR APPROACH & LDG:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS.....OFF
FLAP LEVER 3 (EXTN 4 MIN).....SELECT

FOR L/G GRVTY EXTN : MAX SPD 220 KT
L/G GRVTY (EXTN 2 MIN)..... DOWN

● **WHEN L/G LOCKED DOWN:**
L/G LEVER.....DOWN

APPROACH SPEED : VLS
N/W STEER NOT USABLE
USE DIFF BRAKING.....AS RQRD
GND SPLRs .....ARM

● **AT 2000 FT AGL:**
CABIN CREW..... ADVISE

● **AT 500 FT AGL:**
BRACE FOR IMPACT.....ORDER

● **AT TOUCHDOWN:**
ALL ENG MASTERS.....OFF
APU MASTER SW.....OFF

● **WHEN AIRCRAFT STOPPED:**
PARK BRK.....ON
ATC.....NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*
Only VHF 1 is available on batteries.

L1 CABIN CREW..... ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L1 ALL FIRE P/Bs (ENG & APU)..... PUSH
ALL AGENTS (ENG & APU)..... DISCH
EVAC (PA)..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND..... ON
ALL 4 BATs ..... OFF

L2 *Only PA announcement and CAB communication are available via the handset.*

L1 ● **IF DITCHING ANTICIPATED:**

MIN RAT SPEED : 140 KT
[MFD SURV] GPWS..... OFF
FLAP LEVER 3 (EXTN 4 MIN)..... SELECT
L/G LEVER..... CHECK UP

APPROACH SPEED : VLS UNTIL FLARE

FOR FLARE : OPT PITCH ATT 8° & MIN V/S

● **AT 2000 FT AGL:**
CABIN CREW..... ADVISE
DITCHING P/B..... ON

L2 In the case of strong crosswind, ditch face to the wind. In the absence of strong crosswind, prefer ditching parallel to the swell.

L1 ● **AT 500 FT AGL:**
BRACE FOR IMPACT..... ORDER

START FLARE AT 50 FT

● **JUST BEFORE DITCHING:**
ALL ENG MASTERS ..... OFF
APU MASTER SW..... OFF

● **AFTER DITCHING:**
ATC..... NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*
Only VHF 1 is available on batteries.

L1 CABIN CREW..... ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation is required.*

Continued on the following page

ENG ALL ENG FLAME OUT (Cont'd)

L1 ALL FIRE P/Bs (ENG & APU).....PUSH
ALL AGENTS (ENG & APU).....DISCH
EVAC (PA).....ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND.....ON
ELT.....CHECK EMITTING
ALL 4 BATs .....OFF

L2 *Only PA announcement and CAB communication are available via the handset.*

ENG HI VIBRATIONS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the ENG menu.

Indications:

SD page



ENGINE SD Page

Continued on the following page

ENG HI VIBRATIONS (Cont'd)

The ECAM vibration advisory (N1, N2 greater than 5 units) is mainly a guideline for the flight crew to more closely monitor engine parameters.
The ECAM vibration advisory does not necessarily require any engine shutdown.

Note:
- *High engine vibrations may be associated with cockpit and cabin smoke, and/or the smell of burning. This may only be due to the contact of the compressor blade tip with associated abradable seals.*
- *High N1 vibrations are generally associated with airframe vibrations. High N2 vibrations can occur without airframe vibrations.*

Check engine parameters and especially EGT. Crosscheck with other engines.

● **IF ICING CONDs:**

L2 An increase of N1 vibration in icing conditions, with or without engine anti-ice, may be due to fan blades and/or spinner icing.

L1 A/THR.....OFF
ALL ENGs (ONE BY ONE)..... IDLE THEN INCREASE

L2 *To shed ice, it may be necessary to perform several engine run-ups for approximately 6 min. During each engine run-up, increase thrust up to an appropriate setting for the flight phase. After each engine run-up, vibrations should decrease indicating the progress of the ice shedding.*
When the ice is shed, vibrations should return to normal and the flight crew can resume normal engine operation.

L1 ● **IF ABOVE VIB ADV:**
THRUST (AFFECTED ENG) .....REDUCE

L2 *If flight conditions permit, reduce THR to maintain vibration level below the advisory threshold.*

L1 ● **IF VIB STILL ABOVE VIB ADVI:**
ENG (AFFECTD) MASTER OFF..... CONSIDER

L2 *If the vibrations do not decrease, there may be other problems on the engine. Apply appropriate procedure.*

ENG RELIGHT IN FLIGHT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the ENG menu.

Indications:

SD page



ENGINE SD Page

The procedure is divided into two parts, depending on the number of failed engines:

- If the start attempt applies to only one engine: The procedure enables to attempt either a windmilling start, or a starter-assisted engine relight with the bleed of the other engines
- If the start attempt applies to multiple engines: Similarly to the previous case, the procedure enables to attempt either a windmilling start, or a starter-assisted engine relight with the bleed of the other engines, but in addition the procedure covers engine relight using APU bleed, if available.

Continued on the following page

ENG RELIGHT IN FLIGHT (Cont'd)

- **FOR RELIGHT (SINGLE ENGINE):**

MAX GUARANTEED ALTITUDE : 30000 FT

MIN SPEED FOR WINDML RELIGHT : 260 KT

THR LEVER (AFFECTED)..... IDLE
ENG (AFFECTED) MASTER.....OFF
XBLEED..... OPEN
WING A-ICE.....OFF
FEED TK (AFFECTED ENG) MAIN PMP.....OFF

L2 *The standby pump of the feed tank starts when the flight crew switches off the associated main pump.*
If the engine failure was due to an undetected gravity feeding (e.g. main feed tank pump failed but not detected), the engine relights when the standby pump is running because the standby pump feeds again the engine with fuel.

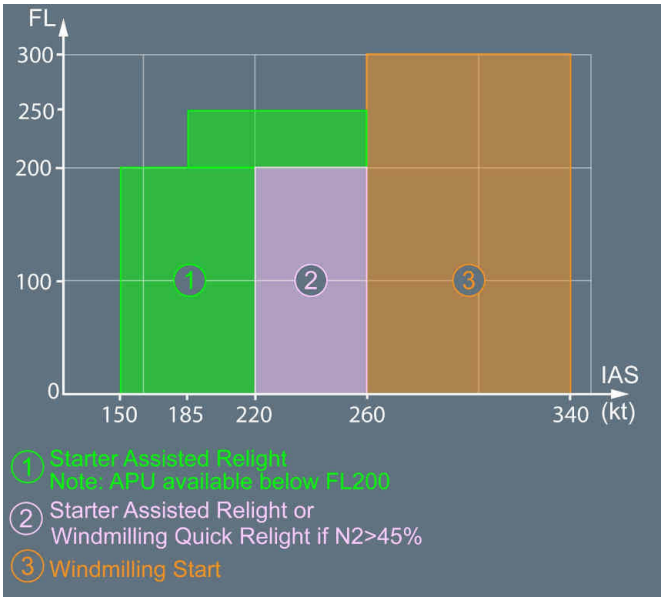
L1 ENG START SEL.....IGN START

L2 - *The FADEC selects a starter assisted start (i.e. start valves automatically open), when N2 is below 11 %*
An airspeed at or above 260 kt ensures a windmilling start.

Continued on the following page

ENG RELIGHT IN FLIGHT (Cont'd)

In Flight Relight Envelope



- *In flight, automatic start abort does not operate. The flight crew must perform the start sequence and initiate corrective actions, if necessary.*
  For more information on engine start abort, Refer to DSC-70-80-30-20 Start Abort during Automatic Start .

L1 ENG (AFFECTED) MASTER..... ON

L2 *Engine must relight within 30 s after fuel flow increases.*

L1 MAX EGT : 865 °C
ENG RELIGHT..... MONITOR (FF, EGT, N2)

● **WHEN IDLE REACHED (ENG AVAIL) :**
ENG START SEL..... NORM
TCAS MODE..... TA/RA

L2 *If the flight crew applied the ENG SHUT DOWN procedure (Refer to procedure), the TCAS mode is TA ONLY.*

L1 X BLEED..... AUTO

Continued on the following page

ENG RELIGHT IN FLIGHT (Cont'd)

A-ICE.....AS RQRD

- **FOR RELIGHT (MULTIPLE ENGINES):**

THR LEVER (AFFECTED)..... IDLE
ENG START SEL.....IGN START
MAX GUARANTEED ALTITUDE : 28000 FT
MIN SPEED FOR WINDML RELIGHT : 250 KT
XBLEED..... OPEN
WING A-ICE.....OFF
ENG (AFFECTED) MASTERS..... OFF 30S THEN ON

L2 *This allows ventilation of the combustion chamber.*
Unassisted start attempts can be repeated until successful, or until APU BLEED is available.

L1 ENG s RELIGHT ..... TRY REGULARLY
WHEN BELOW FL 200 : APU.....CONSIDER

- **WHEN BELOW FL 200:**

APU.....START

- **WHEN APU AVAIL:**

RECOMMENDED SPEED : GREEN DOT

L2 *Green dot speed is the optimum speed for gliding, i.e. descent angle is minimum.*

L1 APU BLEED.....ON
ENG (AFFCTD) MASTERS (2 AT A TIME).....OFF 30S THEN ON

L2 *Only two engines must be started at a time. The other non-running engine masters must be set to OFF.*

L1 ENG s RELIGHT .....
.....TRY REGULARLY
ENG RELIGHT..... MONITOR (FF, EGT, N2)

- **IF NO FURTHER ENG RELIGHT ATTEMPT:**

ENG (INOP) MASTER..... OFF
XBLEED.....AUTO
A-ICE.....AS RQRD

- **IF NO ENG OUT:**

TCAS MODE.....TA/RA

ENG REVERSER SELECTED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Any thrust reverser is selected in flight.
Thrust reverser system protection prohibit in-flight deployment. For more information on thrust reverser system protection, *Refer to DSC-70-70-70-20 Three Lines of Defense* .

Indications:

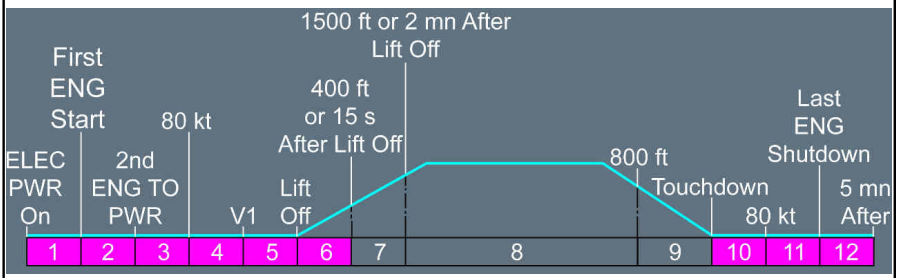
Audio



Master Light



Flight Phase Inhibition:



THR LEVER 2(3)(2+3).....FWD THR

ENG T.O THRUST DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 All FADECs do not have the same takeoff mode, derate, flex or TOGA.

Indications:

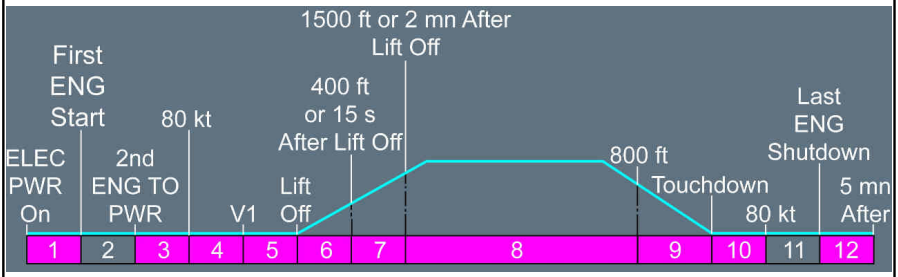
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG T.O THRUST DISAGREE* .

Crew awareness

ENG TAIL PIPE FIRE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the ENG menu.

Indications:

SD page



ENGINE SD Page

Continued on the following page

ENG TAIL PIPE FIRE (Cont'd)

ENG (AFFECTED) MASTER ..... OFF

L2 *Note: Do not press the engine fire pushbutton, since this would cut off the FADEC power supply, which would prevent motoring sequence*

L1 ● **If at least one engine is running**
X BLEED..... OPEN

● **If no engine is running**
APU..... START
APU BLEED..... ON

L2 If APU BLEED is not available, and the other engine is shut down, connect external pneumatic power (if readily available).

L1 ● **WHEN N2 BELOW 10% :**
ENG START SEL..... CRANK
ENG (AFFECTED) MAN START..... ON

● **WHEN FIRE STOPPED :**
ENG (AFFECTED) MAN START..... OFF
ENG START SEL..... NORM
XBLEED..... AUTO

L2 Maintenance action is due.

Internal engine fire may be encountered during engine start or engine shutdown. It may be seen by the ground crew, or the EGT may fail to decrease after the MASTER LEVER is turned off.

CAUTION	External fire agents can cause severe corrosive damage and should, therefore, only be considered after having applied the following ECAM procedure.

ENG THR LEVERS NOT SET

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 Displayed during takeoff when either:
— one throttle lever is set between CL and FLEX MCT,
or
— in case of disagreement between the thrust lever position and the takeoff thrust mode selected by the FADECs.

Indications:

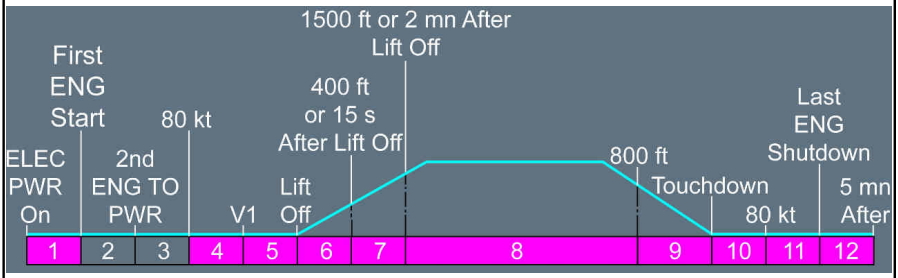
Audio



Master Light



Flight Phase Inhibition:



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ENG THR LEVERS NOT SET (Cont'd)

- **If TOGA selected on FMS and thrust levers are at or below FLX/MCT**
  ALL THR LEVERS.....TOGA
- **If derate or flex takeoff selected on FMS and thrust levers are below FLX/MCT**
  THR LEVERS.....MCT/FLEX
- **If derated takeoff selected on FMS and thrust levers at TOGA**
  THR LEVERS.....MCT/FLEX

L2 *TOGA thrust rating is not allowed when a derate takeoff is performed.*

ENG THRUST LOCKED

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The thrust is frozen on one or more engines after a failure or an involuntary A/THR disconnection. This alert is recalled every 5 s, until the thrust levers are moved.

Indications:

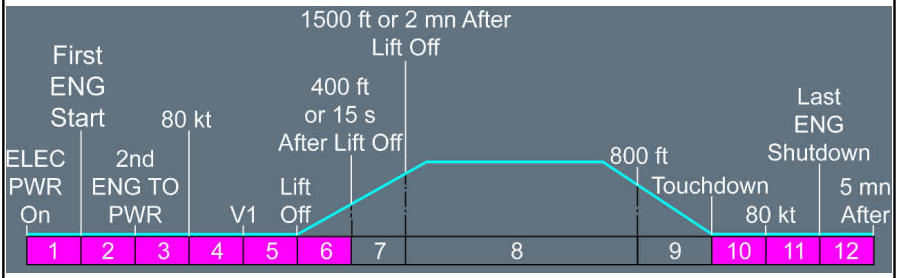
Audio



Master Light



Flight Phase Inhibition:



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ENG THRUST LOCKED (Cont'd)

ALL THR LEVERS.....MOVE

ENG TWO ENGS OUT ON SAME SIDE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This caution is triggered when two engines are failed on the same side.

Indications:

Audio



Master Light

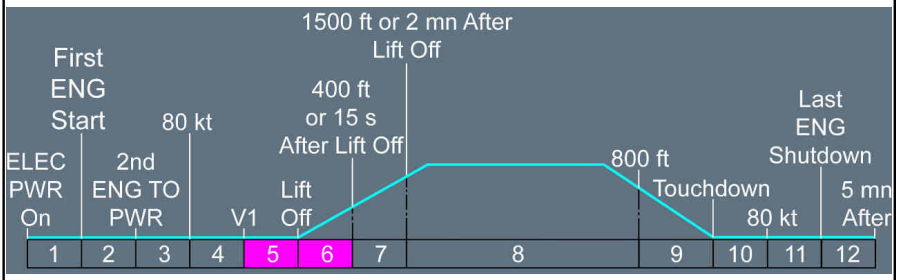


SD page



ENGINE SD Page

Flight Phase Inhibition:



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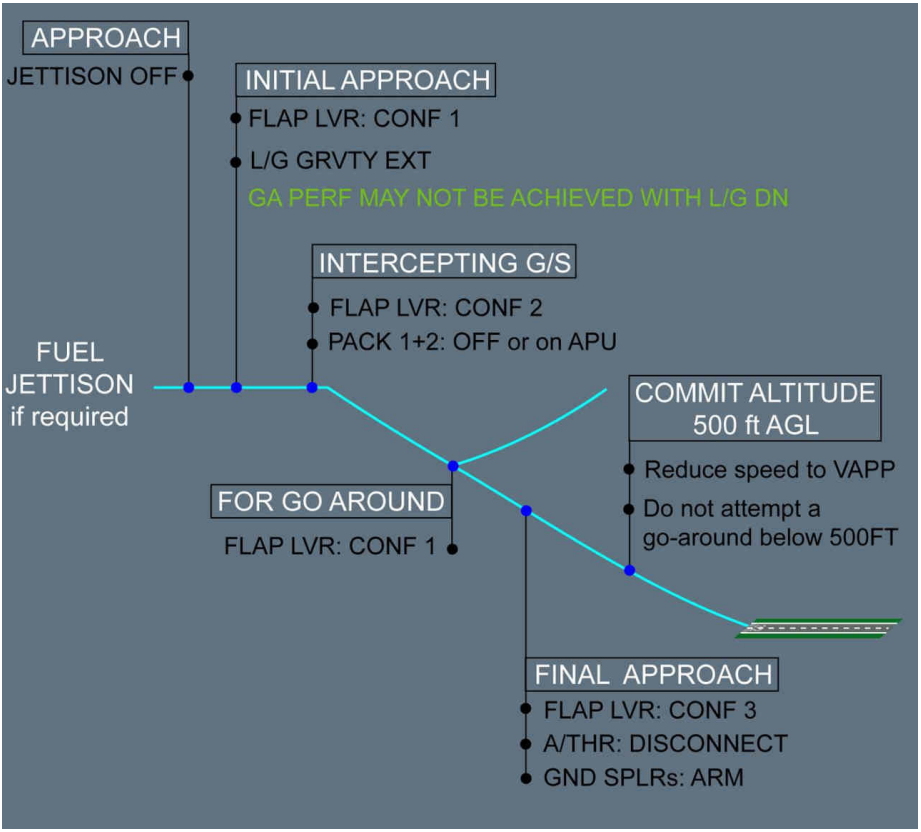
ENG TWO ENGS OUT ON SAME SIDE (Cont'd)

Two Engines Out on Same Side



L2 For training-oriented information, *Refer to FCTM/AO-20-10-4 Two Engine Inoperative Landing.*

Continued on the following page

ENG TWO ENGS OUT ON SAME SIDE (Cont'd)

LAND ANSA

- **Depending on the failed engines:**
  PACK 1(2).....OFF

LDG PERF AFFECTED

- **If ENG 1+2 failed:**

  FOR TAXI : STEER ENDURANCE LIMITED

L2 *The normal Nose Wheel Steering (NWS) is lost. ALTN NWS is available.*
The ALTN NWS is designed to be used until the runway is cleared (i.e. to land and to exit the runway). Therefore, the flight crew should anticipate a tug to tow the aircraft back to the gate.

The flight crew should avoid a prolonged use of the ALTN NWS because it would result in:
- *An ALTN NWS overheat and the associated ECAM alert followed by*
- *A disconnection of the NWS.*

In alternate nose wheel steering:
- *The maximum steering rate is limited to 10 °/s (instead of 15 °/s for normal NWS)*
- *Damping of the CAPT and the F/O tillers is increased to prevent the flight crew from commanding excessive steering rates.*

L1

SECONDARY FAILURES

* ELEC

* F/CTL

* BLEED

* HYD

Continued on the following page

ENG TWO ENGS OUT ON SAME SIDE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

LAND ANSA

APPR & LDG

FOR LDG : FLAP LVR 3

- If ENG 1+2 failed:
  SLATS SLOW
  FLAPS SLOW
  L/G GRVTY EXTN ONLY
  LDG PERF AFFECTED
- If ENG 1+2 failed:
  STEER ENDUR LIMITED

LIMITATIONS ON PFD

ALL PHASES

LAND ANSA

L12

DEFERRED PROC

ALL PHASES

● **IF GW DECREASE RQRD:**
JETTISON ARM.....ON
JETTISON ACTIVE.....ON

FOR APPROACH

● **IF JETTISON ACTIVE:**
JETTISON ACTIVE.....OFF
JETTISON ARM.....OFF

LDG PERF COMPUTATION..... CONFIRM
DISREGARD NORM APPR & C/Ls
LONG APPROACH..... PLAN
FLAPS SLOW

Continued on the following page

ENG TWO ENGS OUT ON SAME SIDE (Cont'd)

Due to the failure of one hydraulic system, only the remaining hydraulic system is available to move the flaps. As a result, the flaps operate at half-speed.

- **If ENG 1+2 are lost:**

  SLATS SLOW

  Due to the failure of the green hydraulic system, only the electric motor is available to move the slats. As a result, the slats operate at half-speed.

BARO REF.....SET
MINIMA..... SET
CABIN CREW.....ADVISE
SIGNS.....ON

- **INITIAL APPROACH:**

  FLAP LVR.....CONF 1
  GA PERF MAY NOT BE ACHIEVED WITH L/G DN

- **FOR L/G EXTN:**

  FOR L/G GRVTY EXTN : MAX SPD 220 KT
  L/G LEVER.....UP
  L/G GRVTY (EXTN MAX 2 MIN).....DOWN

  - **WHEN L/G LOCKED DOWN OR AFTER 120S:**

    L/G LEVER.....DOWN

- **INTERCEPTING G/S:**

  FLAP LVR.....CONF 2
  PACK 1+2..... OFF OR ON APU

  When engine 1 is failed and ENG 1 FIRE pb is pushed, the left crossbleed valve and the pack flow valve of the engine 1 close. As a consequence, the APU bleed cannot supply the packs.

  FOR GO AROUND : FLAP LVR 1

- **FINAL APPROACH:**

  FLAP LVR.....CONF 3
  A/THR..... DISCONNECT
  GND SPLRs .....ARM

- **AT COMMIT ALTITUDE (500 FT AGL):**

  REDUCE SPEED TO VAPP

Continued on the following page

ENG TWO ENGS OUT ON SAME SIDE (Cont'd)

The VLS displayed on the PFD takes into account the VMCL-2 whereas VAPP does not take it into consideration. Therefore, the VAPP may be below the VLS, and flight crew may have to decrease the speed below the VLS.

DO NOT ATTEMPT GO AROUND

VAPP is below VMCL-2.

L12

STATUS

INOP SYS

ALL PHASES

PART SPLRs
PART L/G RETRACTION
GEN 1+2 (If ENG 1+2 failed)
GEN 3+4 (If ENG 3+4 failed)
G(Y) HYD SYS (Depending on the failed engines)
ENG 1(2)(3)(4) BLEED (Depending on the failed engines)
PACK 1(2) (Depending on the failed engines)

APPR & LDG

FLAP SYS 1 (If ENG 1+2 failed)
SLAT SYS 2 (If ENG 1+2 failed)
FLAP SYS 2 (If ENG 3+4 failed)
BTV
NORM N/W STEER (If ENG 1+2 failed)
B/W STEER (If ENG 3+4 failed)
ENG 2(3) REVERSER (If ENG 2(3) failed)
CAT 2
GLS AUTOLAND

INFO

- If ENG 3+4 failed:
  TAXI WITH CARE
  The body wheel steering is lost.

When the body wheel steering is inoperative:
- *The body landing gear aft wheels remain centered and locked*
- *Wheel skid and turn radius are increased.*

As a consequence, do not perform brake pivot turn. On wet or contaminated runways, minimize the tiller angle.

ENG TWO ENGS OUT ON OPPOSITE SIDE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 This caution is triggered when two engines are failed on opposite side.

Indications:

Audio



Master Light

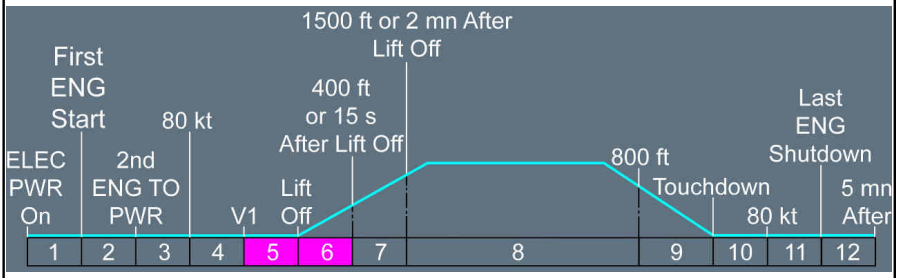


SD page



ENGINE SD Page

Flight Phase Inhibition:



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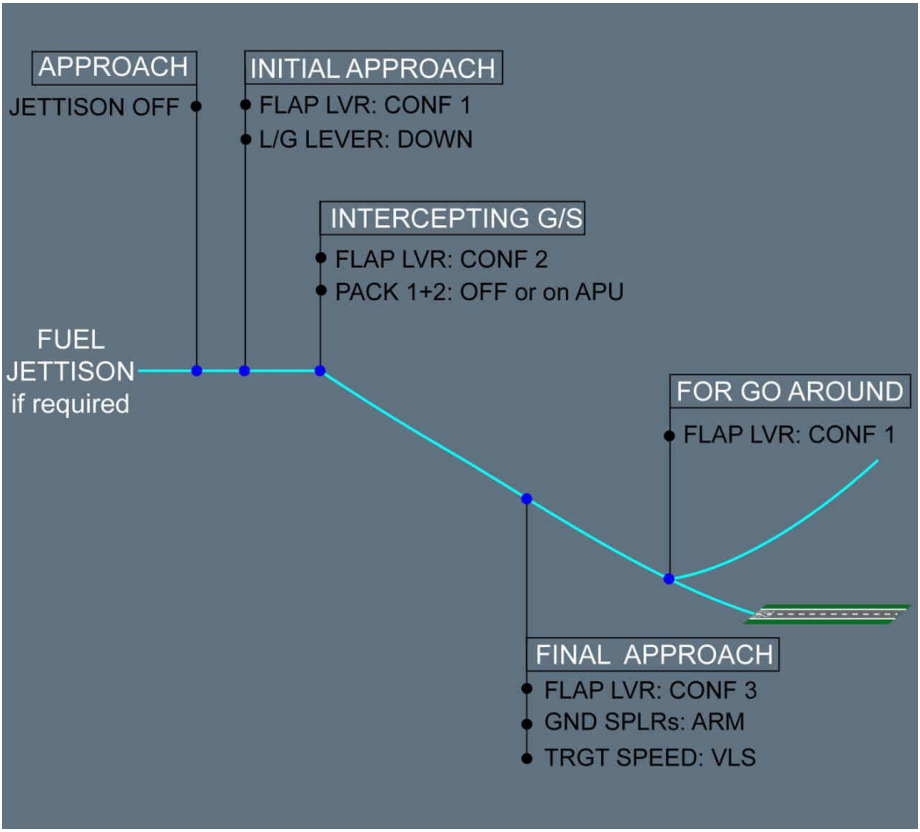
ENG TWO ENGS OUT ON OPPOSITE SIDE (Cont'd)

Two Engines Out on Opposite Side



L2 For training-oriented information, *Refer to FCTM/AO-20-10-4 Two Engine Inoperative Landing.*

Continued on the following page

ENG TWO ENGS OUT ON OPPOSITE SIDE (Cont'd)

LAND ANSA

- **Depending on the failed engines:**
  PACK 1(2).....OFF

LDG PERF AFFECTED

SECONDARY FAILURES

* ELEC

* F/CTL

* BLEED

Continued on the following page

ENG TWO ENGS OUT ON OPPOSITE SIDE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES	APPR & LDG
LAND ANSA	FOR LDG : FLAP LVR 3 LDG PERF AFFECTED

LIMITATIONS ON PFD

ALL PHASES
LAND ANSA

L12

DEFERRED PROC

ALL PHASES

- **IF GW DECREASE RQRD:**
  JETTISON ARM.....ON
  JETTISON ACTIVE.....ON

APPR & LDG

- **IF JETTISON ACTIVE:**
  JETTISON ACTIVE.....OFF
  JETTISON ARM.....OFF

LDG PERF COMPUTATION..... CONFIRM
DISREGARD NORM APPR & C/Ls
LONG APPROACH..... PLAN
BARO REF.....SET
MINIMA..... SET
CABIN CREW.....ADVISE
SIGNS.....ON

- **INITIAL APPROACH:**
  FLAP LVR.....CONF 1
  L/G LEVER..... DOWN

Continued on the following page

ENG TWO ENGS OUT ON OPPOSITE SIDE (Cont'd)

- **INTERCEPTING G/S:**

  FLAP LVR.....CONF 2
  PACK 1+2.....OFF OR ON APU

  When engine 1 is failed and ENG 1 FIRE pb is pushed, the left crossbleed valve and the pack flow valve of the engine 1 close. As a consequence, the APU bleed cannot supply the packs.

- **FINAL APPROACH:**

  FLAP LVR.....CONF 3
  GND SPLRs .....ARM
  FOR GO AROUND : FLAP LEVER 1

STATUS

INOP SYS

ALL PHASES

GEN 1+4(1+3)(2+3)(2+4) (Depending on the failed engines)
G ENG 1(2) PMP A+B (Depending on the failed engines)
Y ENG 3(4) PMP A+B (Depending on the failed engines)
ENG 1(2)(3)(4) BLEED (Depending on the failed engines)
PACK 1(2) (Depending on the failed engines)

APPR & LDG

BTV
ENG 2(3)(2+3) REVERSER (Depending on the failed engines)
CAT 3

INFO

CAT 2 ONLY

ENG TYPE DISAGREE

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The engine thrust ratings are not similar on all engines.

Indications:

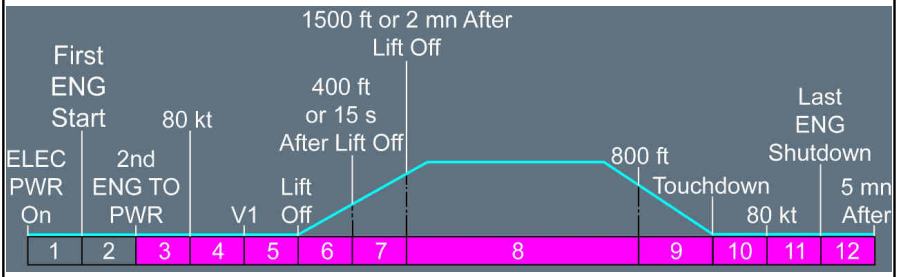
Audio



Master Light



Flight Phase Inhibition:



L2 For associated MEL dispatch conditions, *Refer to MEL/ME-ECAM-70-80-26 ENG TYPE DISAGREE* .

Crew awareness.

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Miscellaneous

MISC BOMB ON BOARD

Applicable to: ALL

INTRODUCTION

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the MISCELLANEOUS menu.

L1 IF POSSIBLE, LAND AND EVACUATE THE AIRCRAFT IMMEDIATELY.
If it is not possible to land and evacuate the aircraft within 30 minutes, apply the following procedure.

BACKGROUND

To avoid the activation of an altitude-sensitive bomb, the cabin altitude should not exceed the value at which the bomb has been discovered.
To reduce the effects of the explosion, the aircraft should fly as long as possible with approximately 1 PSI differential pressure, to help the blast go outwards. 1 PSI differential pressure corresponds to a 2500 feet difference between the aircraft and the cabin altitude. These conditions are achieved by using the manual pressure control.

PROCEDURE

The following procedures applies to cockpit, for cabin related procedures, *Refer to CCOM/14-90 Bomb On Board*.

The procedure assumes that it is initiated during climb or cruise :
- First, maintain the cabin altitude,
- While maintaining the cabin altitude, descend the aircraft to the cabin altitude +2 500 ftand maintain delta P at 1 PSI,
- During further steps of descent, maintain delta P at 1 PSI,
- For landing, reduce the differential pressure to zero, until the final approach.

If flight conditions are different, the crew should adapt the procedure, bearing in mind the above-mentioned principles (background paragraph).

Continued on the following page

MISC BOMB ON BOARD (Cont'd)

CKPT / CABIN COM..... ESTABLISH

- **IF LDG+EVAC POSSIBLE WITHIN 30 MIN:**

  ATC / COMPANY..... NOTIFY
  EVAC.....PREPARE

- **IF NO IMMEDIATE LANDING:**

  ATC / COMPANY..... NOTIFY
  ACFT (IF CLIMBING).....LEVEL OFF
  TRGT SPEED : PREFER LO IAS

L2 *Select the most appropriate speed, taking into account the time to destination, the fuel consumption and the fact that low speed could reduce the consequences of possible structural damage, if the bomb explodes*

L1 CABIN ALT MODE.....MAN

L2 *The purpose is to immediately prevent the cabin altitude from increasing, in order to avoid the activation of an altitude-sensitive bomb.*
The system automatically maintain the current cabin altitude.

L1 DESCENT TO CABIN ALT + 2500 FT / MEA

L2 *Descending to 2 500 ftabove the cabin altitude gives a cabin differential pressure of approximately 1 PSI, which helps to ensure that the blast goes outwards, if the bomb explodes.*

L1 - **WHEN ACFT ALT = CAB ALT + 2500 FT:**

  GALLEY.....OFF
  PAX SYS.....OFF

- **IF FUEL PERMITS:**

  Keep in mind that when flying at cabin altitude +2500ft, fuel consumption in CONF 1, with landing gear down, will be about 2.1 times that consumed in clean configuration.

  The detonation could damage the landing systems. Therefore, if fuel permits, configure the aircraft for landing as soon as possible.

  FLAPS..... AT LEAST CONF 1

L2 *For landing, use normal landing configuration.*

L1 L/G LEVER.....DOWN

DURING FURTHER DESCENT :
MAINTAIN MAX DIFF PRESS 1 PSI

Continued on the following page

MISC BOMB ON BOARD (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- IF NO IMMEDIATE LANDING
  MAX DIFF PR : 1 PSI

L12

DEFERRED PROC

APPR

- **IF NO IMMEDIATE LANDING**
  CABIN ALT MODE.....AUTO
  This allow the pressurization system to automatically control the cabin altitude to the landing elevation during final approach.
  EVAC.....PREPARE
  Avoid exits and exiting on the same side as the bomb, and near the bomb.

L12

STATUS

INFO

- If flaps and landing gear are extended:
  FUEL CONSUMPT INCRSD : FMS PRED DISREGARD
  If the landing gear is extended, fuel consumption is increased by 55 %.
  If the aircraft is in configuration 1+F, the fuel consumption is increased by 25 %.
  If the aircraft is in configuration full, the fuel consumption is increased by 70 %.

MISC CKPT WINDOW CRACKED

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the MISCELLANEOUS menu.

Continued on the following page

MISC CKPT WINDOW CRACKED (Cont'd)

L2 When a windshield or a lateral window is cracked, the flight crew must determine which layer is cracked (*Refer to DSC-56-10 Cockpit Windshields and Windows*).

L1 ■ **IF EXTERNAL LAYER CRACKED :**

(CRACKS ON EXT SIDE OF HEAT BARS)
STRUCTURE NOT AFFECTED
NO LIMITATION

L2 When the cracks are on the exterior side of the heat bars: Only the external layer is cracked. This layer is not a structural layer: The structure is not affected. The flight can be continued.

Windshield or window arcing is not likely to occur.

L1 ■ **IF INTERNAL LAYER CRACKED :**

(CRACKS ON CKPT SIDE OF HEAT BARS)
OR NO DIAGNOSIS POSSIBLE

L2 When the cracks are on the cockpit side of the heat bars: One structural layer is broken. The windshield, or window, is still able to withstand maximum differential pressure. However, because the flight crew is not able to accurately determine how many layers are cracked, the flight crew must reduce differential pressure to 5 PSI.

If the flight crew cannot determine which layer is cracked (external, or internal), the flight crew must reduce differential pressure to 5 PSI.

L1 MAX FL : 230/MEA

L2 *Reducing the flight level to FL 230 will enable the flight crew to obtain a differential pressure of 5 PSI. This reduction will also help to avoid excessive cabin altitude, and the triggering of the CAB PRESS EXCESS CAB ALT alert.*

L1 CABIN ALT MODE.....MAN
CABIN ALT TRGT.....AS RQRD

L2 Set the cabin altitude target, in accordance with the following table, to maintain a differential pressure of 5 PSI:

L1

ACFT FL	CABIN ALT TRGT
100	LDG ELEVN
150	3000
200	6000
230	8000

Continued on the following page

MISC CKPT WINDOW CRACKED (Cont'd)

L2 To avoid windshield or window arcing, turn off the heating:

L1 ■ **IF L WINDOW/WINDSHLD AFFECTED :**
AICU 1.....PULL

L2 The AICU 1 reset button is on the left reset panel of the overhead panel.

L1 This action will trigger the A-ICE CTL SYS FAULT .

■ **IF R WINDOW/WINDSHLD AFFECTED :**
AICU 2.....PULL

L2 The AICU 2 reset button is on the right reset panel of the overhead panel.

L1 This action will trigger the A-ICE CTL SYS FAULT .

ASSOCIATED PROCEDURES

A-ICE CTL SYS FAULT
Refer to procedure

Note: If the flight crew does not have enough visibility for approach due to windswhield(window) damage, they should consider automatic landing. If automatic landing is not available, consider opening the sliding window on the PF 's side, after cabin depressurization.

To manually depressurize the cabin:
- *Set the CABIN ALT MODE pb-sw to MAN*
- *Set the CABIN ALT TRGT selector to an altitude slightly above the current aircraft altitude*
- *Avoid high descend rate*
- *Open the sliding window on the PF 's side if the cabin ΔP equals 0 PSI .*

If the aircraft altitude is more than 10 000 ft , the flight crew should don the oxygen mask before cabin depressurization.
Due to increased noise level when the sliding window is open, the flight crew should pay particular attention to visual alerts.

Continued on the following page

MISC CKPT WINDOW CRACKED (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If internal layer cracked, or no diagnosis possible:
  MAX FL : 230/MEA

LIMITATIONS ON PFD

ALL PHASES

- If internal layer cracked, or no diagnosis possible:
  MAX FL : 230/MEA

DEFERRED PROC

ALL PHASES

- **If internal layer cracked, or no diagnosis possible:**
  - **AT TOP OF DESCENT :**
    CABIN ALT MODE..... AUTO

STATUS

INOP SYS

ALL PHASES

WING A-ICE (If both AICU reset buttons pulled)
L WINDSHIELD HEATG (If AICU 1 pulled)
L SLIDG WINDOW HEATG (If AICU 1 pulled)
L FIXED WINDOW HEATG (If AICU 1 pulled)
R WINDSHIELD HEATG (If AICU 2 pulled)
R SLIDG WINDOW HEATG (If AICU 2 pulled)
R FIXED WINDOW HEATG (If AICU 2 pulled)

Continued on the following page

MISC CKPT WINDOW CRACKED (Cont'd)

INFO

ACFT FL	CABIN ALT TRGT
100	LDG ELEVN
150	3000
200	6000
230	8000

MISC CKPT WINDOW ELEC ARCING

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the MISCELLANEOUS menu.

L2 Turn off the heating when:
- Electrical arcing appears on a windshield or a window, or
- Burning smell or smoke identified as coming from the bottom left corner of the CAPT windshield, or the bottom right corner of the F/O windshield. The ECAM could also trigger the A-ICE L(R) WINDSHIELD HEATG FAULT alert associated with the same side of the windshield.

L1 ■ **IF L WINDOW/WINDSHIELD AFFECTED :**
AICU 1.....PULL

L2 The AICU 1 reset button is on the left reset panel of the overhead panel.

L1 ■ **IF R WINDOW/WINDSHIELD AFFECTED :**
AICU 2.....PULL

L2 The AICU 2 reset button is on the right reset panel of the overhead panel.

L1 This action will trigger the A-ICE CTL SYS FAULT alert.

ASSOCIATED PROCEDURES

A-ICE CTL SYS FAULT
Refer to procedure

Continued on the following page

MISC CKPT WINDOW ELEC ARCING (Cont'd)

STATUS

INOP SYS

ALL PHASES

WING A-ICE (If both AICU reset buttons pulled)
L WINDSHIELD HEATG (If AICU 1 pulled)
L SLIDG WINDOW HEATG (If AICU 1 pulled)
L FIXED WINDOW HEATG (If AICU 1 pulled)
R WINDSHIELD HEATG (If AICU 2 pulled)
R SLIDG WINDOW HEATG (If AICU 2 pulled)
R FIXED WINDOW HEATG (If AICU 2 pulled)

MISC DITCHING

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the DITCHING procedure.

L1 The direction of ditching depends mainly on wind direction and sea state and these factors may be considered as follows:

1. Wind direction:
   This may be determined by observation of the waves, which move and break downwind. Spray from wave tops is also a reliable indicator.
2. Wind speed:

   The following guidelines can be used to evaluate wind speed:
   - A few white crests: 8 kt-17 kt
   - Many white crests: 17 kt-26 kt
   - Streaks of foam along water: 23 kt-35 kt
   - Spray from waves: 35 kt-43 kt.
3. Sea state:
   This is best determined from a height of 500 ft to 1 000 ft. At lower height, the direction of the swell may be less obvious than the direction of the waves, even though the waves are much smaller.
   When there is no swell, align into the wind.
   In the presence of swell, and provided that drift does not exceed 10 °, ditch parallel to the swell and as nearly into the wind as possible. If drift exceeds 10 °, ditch into wind. The presence of drift on touchdown is not dangerous, but every effort should be made to minimize roll.
   Touchdown with approximately 8 ° of pitch and minimum vertical speed.

Continued on the following page

MISC DITCHING (Cont'd)

ATC..... NOTIFY & SQUAWK 7700
CABIN & COCKPIT.....PREPARE

L2 *Notify the cabin crew of the nature of the emergency and state intentions.*
Specify the available time.

- *Loose equipment secured*
- *Survival equipment prepared*
- *Belts and shoulder harnesses locked*

L1 JETTISON ARM.....ON
JETTISON ACTIVE.....ON
[MFD SURV] GPWS .....OFF
[MFD SURV] TERR SYS.....OFF

L2 *Switching the GPWS and TERR SYS OFF avoids nuisance warnings.*

L1 SIGNS.....ON
EMER EXIT LT..... ON
COMMERCIAL 1+2.....OFF
DISREGARD NORM C/Ls

L2 *Approach and landing normal checklists are included in the procedure.*

L1 ● **AT TOP OF DESCENT:**
CABIN ALT MODE.....MAN
CABIN ALT TRGT.....ZERO

● **FOR APPROACH & LANDING:**
FOR DITCHING : KEEP L/G UP
BARO REF (IF AVAIL)..... SET

● **If jettison is on-going:**
JETTISON ACTIVE.....OFF

TRIM TK FEED.....ISOL
SLATS / FLAPS.....MAX AVAIL
TRGT SPEED : VLS UNTIL FLARE
FOR FLARE : OPT PICTH ATT 8° & MIN V/S

● **AT 2000 FT AGL:**
ALL BLEEDS (ENG & APU).....OFF
CABIN CREW..... ALERT FOR DITCHING

Continued on the following page

MISC DITCHING (Cont'd)

DITCHING P/B.....ON

- **AT 500 FT AGL:**

  BRACE FOR IMPACT..... ORDER

  START FLARE AT 50 FT

- **JUST BEFORE DITCHNG:**

  ALL ENG MASTERS..... OFF

  APU MASTER SW.....OFF

- **AFTER DITCHING**

  ALL FIRE P/Bs (ENG & APU).....PUSH

  ALL AGENTS (ENG & APU).....DISCH

  ATC..... NOTIFY

L2 *Only VHF 1 is available on batteries.*

L1 EVAC (PA).....ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND..... ON

ELT.....CHECK EMITTING

ALL 4 BATS.....OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

MISC EMER DESCENT

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the EMER DESCENT procedure.

Continued on the following page

MISC EMER DESCENT (Cont'd)

CREW OXY MASKS..... ON
SIGNS..... ON
EMER DESCENT..... INITIATE

Descend with the autopilot engaged:
- *Turn the ALT knob and pull*
- *Turn the HDG/TRK knob and pull*
- *Adjust the speed/Mach target.*

● **If A/THR is neither armed or active:**

ALL THR LEVERS..... IDLE

L2 *If A/THR is armed or active, check A/THR is at IDLE on the EWD.*

L1 SPEED BRAKE LEVER..... FULL

● **IF STRUCTURAL DAMAGE SUSPECTED:**

MANEUVER WITH CARE

SPEED : MAX / APPROPRIATE

CAUTION	*Descend at the maximum appropriate speed.* *If structural damage is suspected, use the flight controls with care and reduce speed as appropriate.*

The flight crew may extend the landing gear below 21 000 ft. They must reduce the speed to VLO.

ATC..... NOTIFY

If not in contact with ATC, select transponder code A 7700, or transmit a distress message on one of the following frequencies:
- *VHF: 121.5 MHz*
- *HF: 2 182 kHz, or 8 364 kHz.*

MAX FL : 100/MEA

● **IF CAB ALT ABOVE 14000 FT:**

PAX OXY MASKS MAN ON..... PRESS

If the cabin altitude is above 13 800 ft, the passenger oxygen masks will automatically drop. If the automatic drop did not operate, pressing the PAX OXY MASK MAN ON pb will release the passenger masks. In addition, contact the cabin crew to confirm that passenger masks are released.

Continued on the following page

MISC EMER DESCENT (Cont'd)

Notify the cabin crew when the aircraft reaches a safe flight level, and when the use of oxygen masks is no more necessary.

- **WHEN DESCENT ESTABLISHED:**

CREW OXY MASKS DILUTION..... N

To save oxygen, set the N/100% selector to N.
With the N/100% selector set to 100 %, oxygen quantity may be insufficient to cover the entire emergency descent profile.
Ensure that crew communication is established with oxygen masks. Avoid the continuous use of the interphone to minimize interference with the breathing noise in the oxygen mask.

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

- If STRUCTURAL DAMAGE SUSPECTED:
  MANEUVER WITH CARE
  MAX FL : 100/MEA

LIMITATIONS ON PFD

ALL PHASES

- If STRUCTURAL DAMAGE SUSPECTED:
  MANEUVER WITH CARE
  MAX FL : 100/MEA

MISC EMER EVAC

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the EMER EVAC procedure.

L1 Apply this procedure when considering an emergency evacuation.
Carefully analyze the situation before deciding to evacuate passengers.
However, do not waste valuable time.

- **WHEN ACFT STOPPED:**

PARK BRK.....ON
ATC.....NOTIFY

L2 *Notify ATC of the nature of the emergency, and state intentions.*

L1 CABIN CREW.....ALERT

L2 *Make a short and precise announcement to warn that an emergency evacuation may be required.*

L1 PACK 1+2.....OFF
ALL ENG MASTERS.....OFF

L2 *Associated LP and HP valves close.*

L1 ALL FIRE P/BS (ENG & APU).....PUSH
ALL AGENTS (ENG & APU).....AS RQRD

L2 *The use of agents is required if the ENG FIRE or APU FIRE alert is displayed.*

L1 - **IF EVAC RQRD:**

EVAC (PA).....ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND.....ON
ALL 4 BATS.....OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

L1 - **IF EVAC NOT RQRD:**

CABIN CREW.....ADVISE

MISC FORCED LANDING

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the FORCED LANDING procedure.

L1 This procedure applies when engines are running.

If engines are not running, apply the ECAM ENG ALL ENG FLAME OUT procedure, which includes the forced landing procedure when the engines are not running.

L2 **COMMUNICATIONS REMAINING WHEN THE AIRCRAFT IS ON BATTERIES ONLY .**

- VHF 1
- RMP 1
- Audio controls on RMP 2 (Although RMP 2 display is black)
- ATC communication on both sides, and frequencies tuning on RMP 1 only
- All communications on both sides (PA, CAB and INT) whatever the devices.

Continued on the following page

MISC FORCED LANDING (Cont'd)

ATC..... NOTIFY & SQUAWK 7700

L2 *Notify ATC of the nature of emergency encountered and state intentions.*

If not in contact with ATC, select transponder code A 7700, or transmit a distress message on one of the following frequencies :
- *VHF: 121.5 MHZ*
- *HF: 2182 KHZ, or 8364 KHZ*

L1 CABIN & CKPT..... PREPARE

L2 *Notify the cabin crew of the nature of the emergency and state intentions. Specify the available time.*
Loose equipment secured.
Survival equipment prepared.
Belts and shoulder harnesses locked.

L1 JETTISON ARM..... ON
JETTISON ACTIVE..... ON
[MFD SURV] GPWS SYS..... OFF
[MFD SURV] TERR SYS..... OFF

L2 *This avoids nuisance warnings.*

L1 SIGNS..... ON
EMER EXIT LT..... ON
COMMERCIAL 1+2..... OFF
DISREGARD NORM C/L

L2 *Approach and landing checklists are included in the procedure.*

L1 ● **AT TOP OF DESCENT:**
CABIN ALT MODE..... MAN
CABIN ALT TRGT..... LDG ELEVN

L2 *If not known, select an approximate value.*

L1 ● **FOR APPROACH & LANDING:**
BARO REF (IF AVAIL)..... SET
RAM AIR..... ON

L2 *Switch ON the RAM AIR to ensure complete depressurization on the ground.*

L1 JETTISON ACTIVE..... OFF
TRIM TK FEED..... ISOL
L/G LEVER..... DOWN

Continued on the following page

MISC FORCED LANDING (Cont'd)

SLATS / FLAPS ..... MAX AVAIL
A/THR ..... AS RQRD
GND SPLRs ..... ARM

- **AT 2000 FT AGL:**
  CABIN CREW ..... ADVISE FOR LANDING
- **AT 500 FT AGL:**
  BRACE FOR IMPACT ..... ORDER
- **AT TOUCHDOWN:**
  ALL ENG MASTERS ..... OFF
  APU MASTER SW ..... OFF
- **WHEN ACFT STOPPED**
  PARK BRK ..... ON
  ALL FIRE P/Bs (ENG & APU) ..... PUSH
  ALL AGENTS (ENG & APU) ..... DISCH
  ATC ..... NOTIFY

L2 *Only VHF 1 is available on batteries.*

L1
- **IF EVAC RQRD**
  EVAC (PA) ..... ANNOUNCE

L2 *Make a short and precise announcement to order the emergency evacuation.*

L1 EVAC COMMAND ..... ON
ALL 4 BATs ..... OFF

L2 *Only PA announcement and CAB communication are available, via the handset.*

MISC OVERWEIGHT LDG

Applicable to: ALL

L2 The flight crew can display this procedure by pressing the ECP ABN PROC pb, then selecting the MISCELLANEOUS menu.

Continued on the following page

MISC OVERWEIGHT LDG (Cont'd)

Automatic landing is certified up to the Maximum Landing Weight (MLW). Autoland flight tests have, however, been successful up to the Maximum Takeoff Weight (MTOW).
Depending on the situation (e.g emergency or other) and provided that the runway is approved for automatic landing, the flight crew can decide to perform an autoland up to the maximum takeoff weight.

JETTISON PROC..... CONSIDER

It is always possible to return immediately to land, at the departure runway, whatever the aircraft weight, provided that max reverse is used on at least one reverser.
On the other hand, the aircraft weight may be limiting, in case of an overweight landing on a diversion airport (depending on the airport altitude and OAT). In that case, either consider jettison to decrease the aircraft weight below the limiting weight , or choose another diversion.
It is not possible to jettison fuel from the feed tanks.

LDG DIST AFFECTED

Use the ECAM flap settings, if required, for abnormal operations.

In all other cases :
- *FULL is preferred for optimized landing performance, or*
- *If the aircraft weight is above one of the limiting weights, consider jettison and / or use FLAP 3 for landing.*
  In all cases, if the landing configuration is different from CONF FULL, use FLAP 1 for go-around.

Continued on the following page

MISC OVERWEIGHT LDG (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

	APPR & LDG
	LDG DIST AFFECTED

L12

DEFERRED PROC

FOR APPROACH

PACK 1 + 2..... OFF OR ON APU BLEED

Selecting PACKS OFF (or supplied from APU) increases the maximum thrust available from the engines, in the case of a go-around.

IF LDG CONF 3 : USE CONF 1 FOR GO AROUND
TRGT SPEED AT RUNWAY THRESHOLD : VLS

This speed target is applicable in manual landing and autoland.
Reduce the speed to reach VLS at the runway threshold.
Touch down as smoothly as possible to reduce the V/S.
The maximum touch down V/S should not exceed 360 ft/min.
The main landing gears must touch down as symmetrically as possible.

LDG DIST COMPUTATION.....CONFIRM

FOR LANDING

USE MAX REVERSE ASAP
APPLY BRAKES AS NECESSARY

The flight crew may apply maximum braking after the nosewheel touchdown. But, if landing distance permits, they should delay or reduce the braking, to take full advantage of the available runway length.
If maximum braking is not necessary, it is recommended to use the BTV function, if available (i.e. there is no BTV failure, or no other failure that affects the landing performance), in order to optimize the braking.

MISC SEVERE TURBULENCE IN CRUISE

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the MISCELLANEOUS menu.

SIGNS.....ON

- **If no more restrictive speed limitation**

  MAX TURB SPEED : 300 / .85

L2 *This speed range:*
- *Protects the aircraft structure from wind gusts*
- *Maintains a buffet margin, especially during vertical wind gusts.*

L1 MIN TURB SPEED : GREEN DOT
ADJUST SPEED AS NECESSARY FOR COMFORT
AP : KEEP ON
CABIN & CKPT (LOOSE EQPT)..... SECURE

L2 *The flight and cabin crewmembers must secure all loose equipment.*

L1 SPEED BRAKES..... AS RQRD

L2 *Be prepared to use the speedbrakes, if necessary.*

L1
- **IF THRUST VARIATIONS BECOME EXCESSIVE:**

  A/THR..... DISCONNECT

L2 *Do not attempt to maintain Mach or airspeed.*

Continued on the following page

MISC SEVERE TURBULENCE IN CRUISE (Cont'd)

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

TURB SPEED:
MAX SPEED : 300 / .85
MIN SPEED : GREEN DOT

LIMITATIONS ON PFD

ALL PHASES

TURB SPEED:
MAX SPEED : 300 / .85
MIN SPEED : GREEN DOT

MISC VOLCANIC ASH ENCOUNTER

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb, then by selecting the MISCELLANEOUS menu.

Continued on the following page

MISC VOLCANIC ASH ENCOUNTER (Cont'd)

180° TURN.....INITIATE

L2 *The performance of a 180 ° turn will usually enable the aircraft to exit the volcanic ash clouds as quickly as possible, because volcanic ash clouds can extend for hundreds of nautical miles.*

L1 ATC.....NOTIFY

A/THR..... OFF

L2 *This action prevents thrust variations due to the use of autothrust.*

L1 THRUST (IF CONDS PERMIT)..... REDUCE

L2 *A decrease in thrust helps to maintain the engine stall margin by reducing the amount of volcanic ash ingestion and limiting the EGT . It also limits the accumulation of molten ash on the turbine vanes.*
Do not climb, because this increases the EGT .

L1 CREW OXY MASKS..... ON / 100% / EMER

CABIN CREW.....ADVISE

PAX OXY MASK MAN ON.....AS RQRD

L2 *Oxygen masks may be necessary depending on the cabin contamination.*

L1 ENG A-ICE.....ON

WING A-ICE.....ON

AIR FLOW.....HI

L2 *Maximum air bleed provides the engines with an additional stall margin.*

L1 *Note: If a CARGO VENTILATION system is installed, the flight crew should turn off the CARGO ISOL VALVES pb-sw to prevent the ECAM from triggering a cargo smoke warning.*

APU.....AS RQRD

L2 *It may be necessary to turn on the APU for a starter–assisted engine relight.*

L1 ENG PARAMETERS..... MONITOR

L2 *Carefully monitor the EGT to prevent the engines from exceeding EGT limits.*

Note: To prevent the engines from exceeding EGT limits, it may become necessary to perform a precautionary engine shutdown. In this case:
- *Restart the engines, when the aircraft is no longer flying in a volcanic ash cloud*
- *The engines may accelerate very slowly. This is not an indication of a start failure*
- *Due to the fact that the compressor and turbine blades may have been eroded, avoid sudden thrust changes. Fuel flow and the EGT may increase.*

L1 AIR SPEED.....MONITOR

Continued on the following page

MISC VOLCANIC ASH ENCOUNTER (Cont'd)

L2 *Volcanic ash may cause a blockage in the pitot probes. If speed indication is lost, or becomes unreliable, Refer to NAV ALL AIR DATA DISAGREE and apply the procedure.*

Note: Electrostatic conditions may cause communication problems.

L1 *Note: If the flight crew does not have enough visibility for approach due to windshield (window) damage, they should consider automatic landing. If automatic landing is not available, consider opening the sliding window on the PF 's side, after cabin depressurization.*

To manually depressurize the cabin:

- *Set the CABIN ALT MODE pb-sw to MAN*
- *Set the CABIN ALT TRGT selector to an altitude slightly above the current aircraft altitude*
- *Avoid high descend rate*
- *Open the sliding window on the PF 's side if the cabin ΔP equals 0 PSI .*

If the aircraft altitude is more than 10 000 ft , the flight crew should don the oxygen mask before cabin depressurization.
Due to increased noise level when the sliding window is open, the flight crew should pay particular attention to visual alerts.

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Introduction

INTRODUCTION

Applicable to: ALL

OVERVIEW

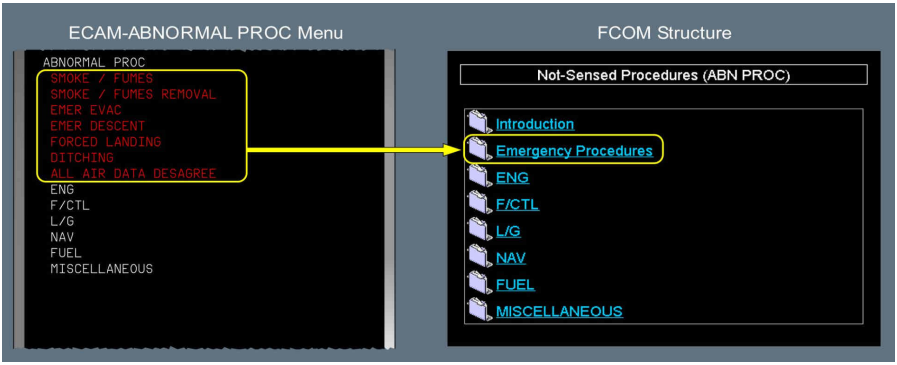
Not-sensed procedures are abnormal and emergency procedures that appear on the ECAM , and that the flight crew manually activates. Not-sensed procedure also refers to as not-sensed ABN PROC . For more information, *Refer to DSC-31-40-10-00001135 Sensed and Not-Sensed Procedures* .

When the flight crew performs not-sensed ABN PROC , the flight crew uses the “READ” and “DO” principle (oral reading). For more information, *Refer to PRO-ABN-00 Operational Recommendations* .

PRESENTATION OF THE NOT-SENSED ABN PROC IN THE FCOM

Not-sensed procedures (ABN PROC) in the FCOM enable the flight crew to consult all the not-sensed ABN PROC , that appear on ECAM . They appear in the FCOM in the same way as on the ECAM . However, for the sole purpose of the FCOM consultation, all the emergency procedures that appear on the first part of the ECAM ABN PROC menu, are grouped in a single subchapter "Emergency Procedures" in the FCOM as illustrated below.

Not-Sensed ABN Procedure Presentation



Not-sensed procedures (ABN PROC) section only provides links to the Abnormal and Emergency Procedures section in order to enable the flight crew to quickly access the description of the not-sensed ABN PROC .

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Emergency Procedures

EMERGENCY PROCEDURES

Applicable to: ALL

FIRE SMOKE/FUMES (*Refer to procedure*)

MISC EMER EVAC (*Refer to procedure*)

MISC EMER DESCENT (*Refer to procedure*)

MISC FORCED LANDING (*Refer to PRO-ABN-ECAM-10-80-30 MISC FORCED LANDING*)

MISC DITCHING (*Refer to procedure*)

NAV UNRELIABLE AIRSPEED INDICATION (*Refer to procedure*)

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ENG

ENG

Applicable to: ALL

ENG TAIL PIPE FIRE (*Refer to procedure*)

ENG RELIGHT IN FLT (*Refer to procedure*)

ENG HI VIBRATIONS (*Refer to procedure*)

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F/CTL

F/CTL

Applicable to: ALL

F/CTL LDG WITH FLAPS LEVER JAMMED (*Refer to procedure*)

F/CTL LDG WITH NO SLATS NO FLAPS (*Refer to procedure*)

F/CTL RUDDER PEDAL JAMMED (*Refer to procedure*)

F/CTL RUDDER TRIM RUNAWAY (*Refer to procedure*)

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L/G

L/G

Applicable to: ALL

L/G LDG WITH ABNORM NOSE L/G (*Refer to Procedure*)

L/G LDG WITH 2 ABNORM L/Gs ON SAME SIDE (*Refer to Procedure*)

L/G LDG WITH 1 ABNORM WING OR BODY L/G (*Refer to procedure*)

L/G LDG WITH 2 ABNORM BODY L/G (*Refer to Procedure*)

L/G LDG WITH 2 ABNORM WING L/G (*Refer to Procedure*)

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NAV

NAV

Applicable to: ALL

NAV IR ALIGNMT IN ATT MODE (*Refer to procedure*)

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FUEL

FUEL

Applicable to: ALL

FUEL JETTISON (*Refer to procedure*)

FUEL LEAK (*Refer to procedure*)

FUEL MAN BALANCING PROCEDURE (*Refer to procedure*)

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MISCELLANEOUS

MISCELLANEOUS

Applicable to: ALL

MISC VOLCANIC ASH ENCOUNTER (*Refer to procedure*)

MISC OVERWEIGHT LDG (*Refer to procedure*)

MISC CKPT WINDOW CRACKED (*Refer to procedure*)

MISC CKPT WINDOW ELEC ARCING (*Refer to procedure*)

MISC BOMB ON BOARD (*Refer to procedure*)

MISC SEVERE TURBULENCE IN CRUISE (*Refer to procedure)*

MISC OIS FAULT (*Refer to procedure*)

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ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF

Applicable to: ALL

L2 The following procedure applies, in the case of an engine failure:

- On ground, after V1:
  Continue the takeoff.
- During the initial climb-out.

Continued on the following page

ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

L2 For additional training-oriented information, *Refer to FCTM/AO-20-10-3 Aircraft Handling.*

L1 **AFTER V1**

TAKEOFF.....CONTINUE
DIRECTIONAL CONTROL.....USE RUDDER

L2 *Use rudder as usual, to stay on the runway centerline.*

L1 **AT VR**

ROTATION.....PERFORM

L2 *At VR, initiate the rotation towards a pitch attitude of 10 °.*
After liftoff, follow the SRS pitch command bar.

L1 MIN SPEED.....V2

L2 *If an engine failure occurs on ground, the SRS takes the engine failure into account, and targets V2 speed (instead of V2+10 kt with all engines operating).*
If an engine failure occurs after liftoff, the SRS takes the engine failure into account, and targets the speed at which the failure occurred (limited between V2 and V2+15 kt).

L1 **BEFORE THRUST REDUCTION ALTITUDE**

CAUTION	TOGA is permitted for only 10 min.

L2 Perform the following procedure to ensure that the directional control is correctly managed, when the aircraft is in climb.

L1 ● **When in positive climb:**
LDG GEAR.....UP
BETA TARGET.....CENTER

L2 *Shortly after liftoff, the PFD displays the beta target indication. Adjust the rudder position to center the beta target.*

L1 THRUST..... AS APPROPRIATE

L2 - *On FLEX takeoff, TOGA application may restore thrust margins.*
- *On derated takeoff, do not use TOGA thrust, if the speed is below F in CONF 2 and 3.*

L1 ● **When convenient:**
RUDDER TRIM.....SET

Continued on the following page

ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

AT 400 FT MINI

ECAM PROCEDURE.....APPLY

AT EO ACCELERATION ALTITUDE

L2 Perform the following procedure to ensure that the aircraft correctly accelerates toward climb speed.

L1 ALTITUDE.....HOLD

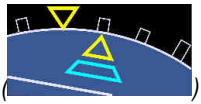
- **At F speed:**

L2 *Note: For takeoffs in CONF 1+F, the PFD does not display the F speed.*

L1 FLAPS 1.....SELECT | PNF

- **At S speed:**

FLAPS ZERO.....SELECT | PNF
SIDESLIP.....CENTER

L2 *In clean configuration, the beta target indication on the PFD (*  *) reverts to the sideslip indication (*  *). Center the sideslip indication as usual.*

L1 **AT GREEN DOT SPEED**

THRUST LEVERS.....MCT
SPEED.....MAINTAIN GREEN DOT
ALTITUDE.....CLIMB to cleared altitude

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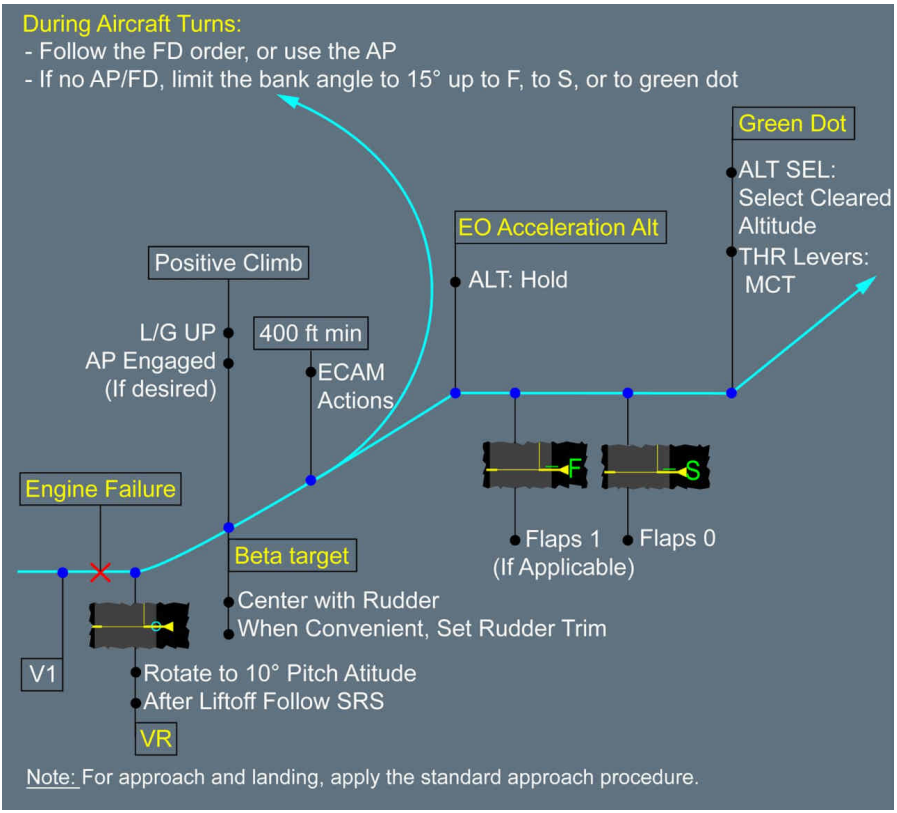
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF PATTERN

Takeoff Pattern



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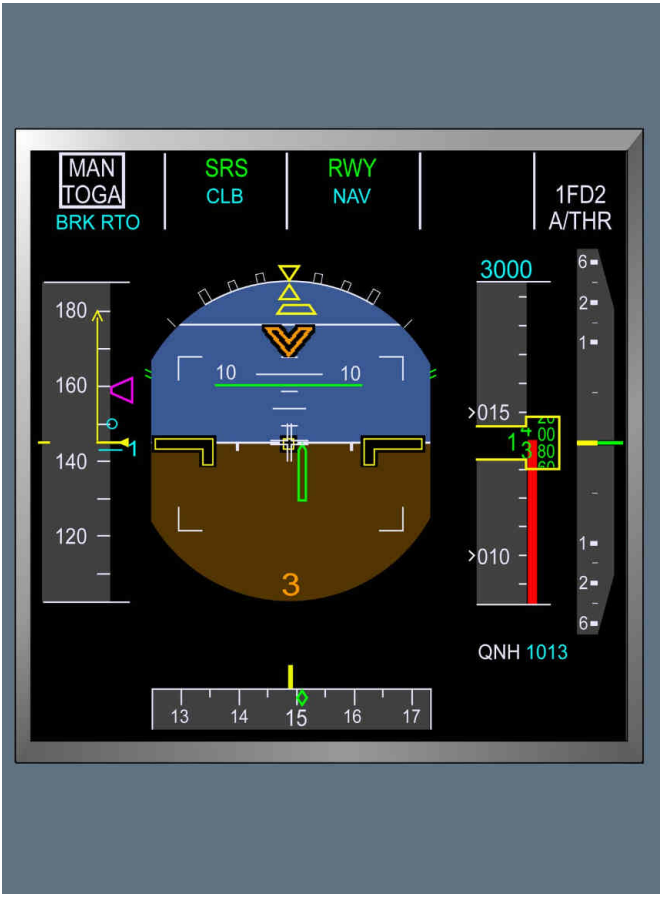
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

L2 AT ENGINE FAILURE

Engine Failure



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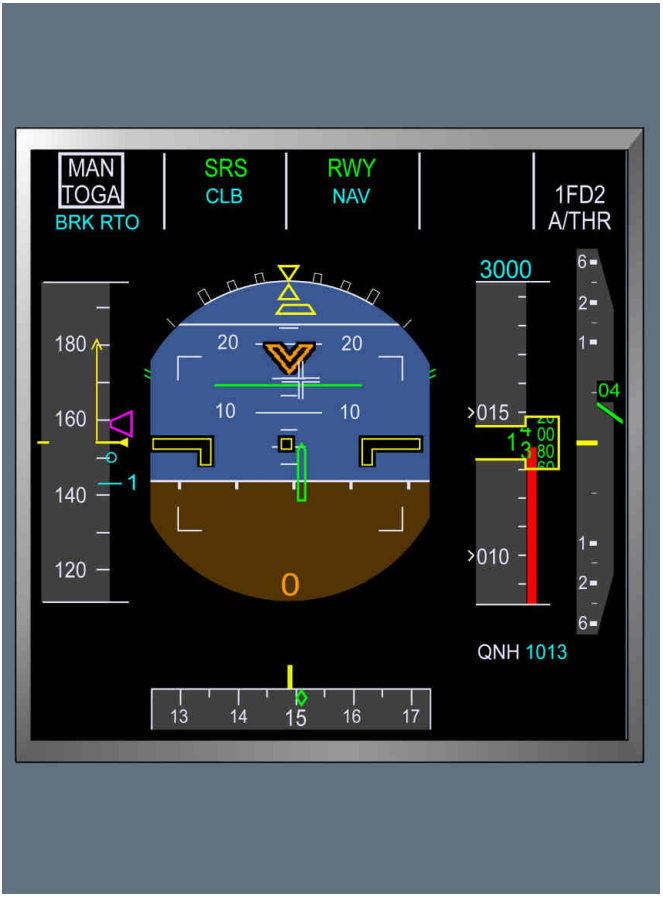
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

AT VR

At VR



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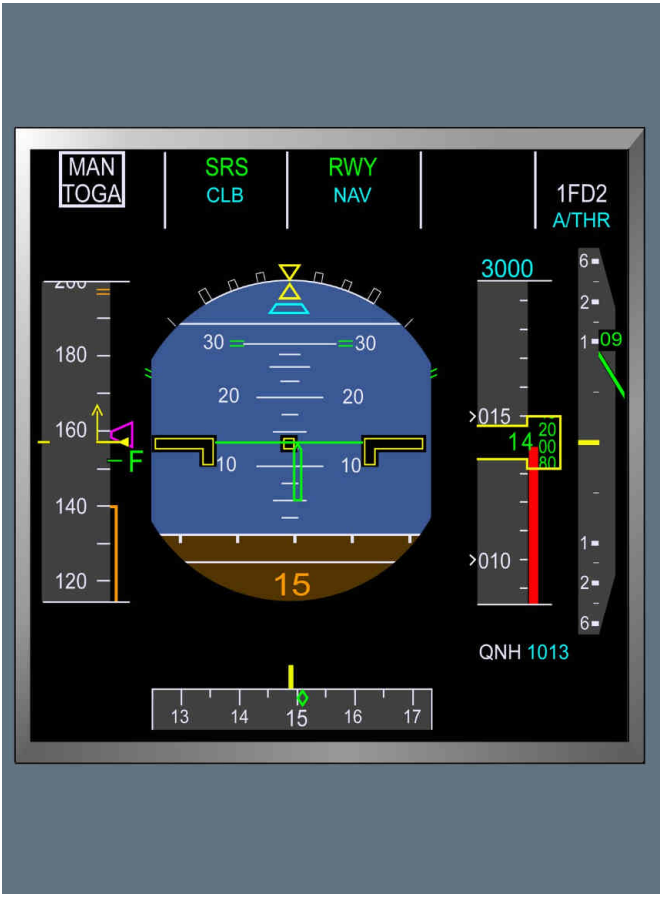
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

BETA TARGET

Beta Target Centered



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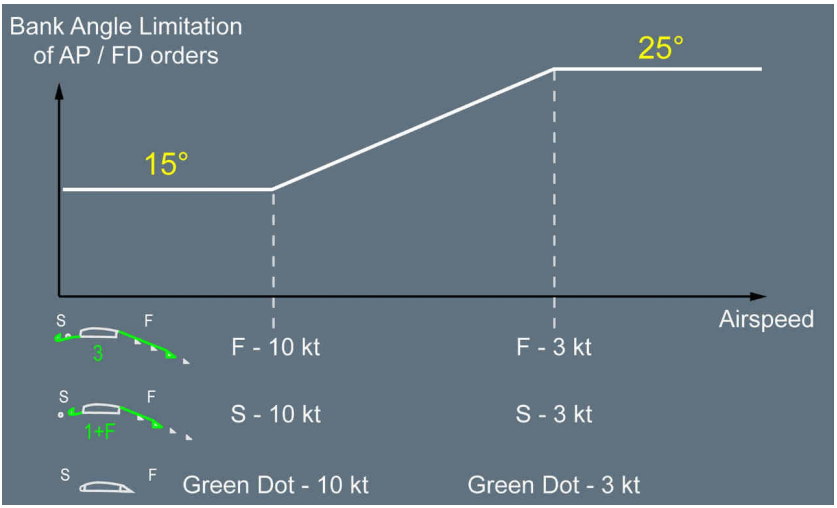
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

DURING AIRCRAFT TURNS

- **In the case of an engine failure, FD and AP orders are limited as follows:**

Bank Angle Limitation of AP and FD Orders



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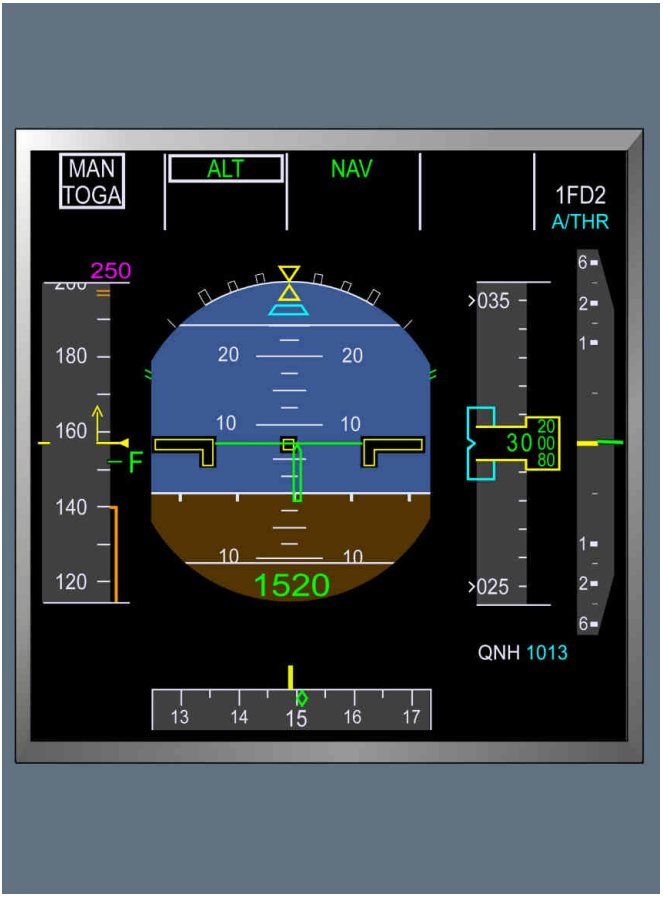
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

AT ENGINE OUT (EO) ACCELERATION ALTITUDE

At Engine Out Acceleration Altitude



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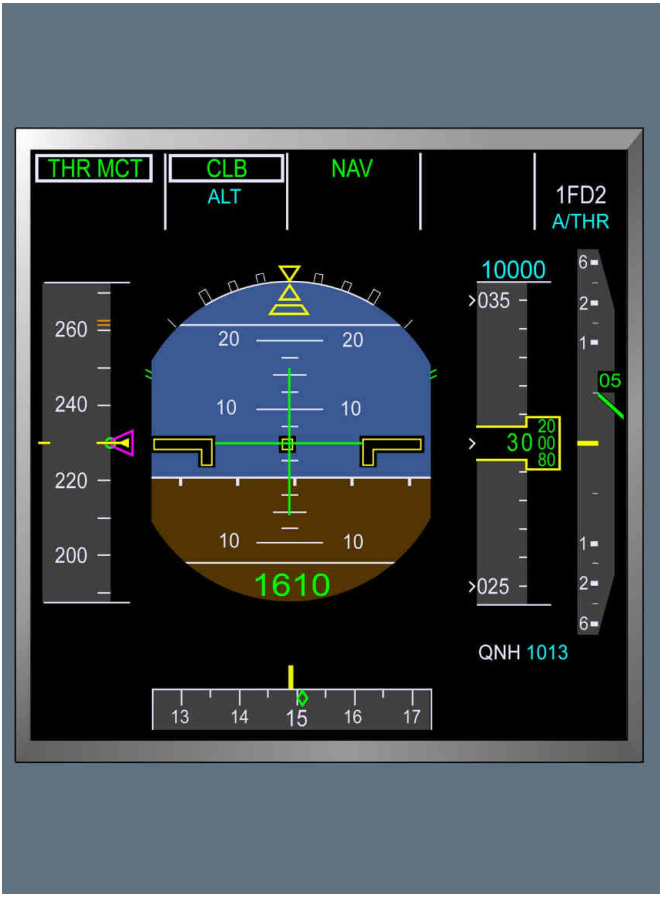
ENGINE FAILURE AFTER V1 - CONTINUED TAKEOFF (Cont'd)

AFTER GREEN DOT

After Green Dot



REJECTED TAKEOFF

Applicable to: ALL

The following procedure applies in the case of a rejected takeoff.

L2 For additional training-oriented information, *Refer to FCTM/AO-20-10-1 Factors Affecting RTO*.

For callouts associated with the rejected takeoff procedure, *Refer to FCTM/AO-90 Abnormal and Emergency Callouts*.

For cockpit/cabin communication information, *Refer to FCTM/AO-15 Cockpit/Cabin Communication*.

Continued on the following page

REJECTED TAKEOFF (Cont'd)

PROCEDURE

L12

CAPT	F/O
"STOP"..... ANNOUNCE	
Simultaneously:	
THRUST LEVERS..... IDLE	
REVERSE THRUST..... MAX AVAIL	REVERSES..... CHECK/ANNOUNCE (1)
	DECELERATION..... CHECK/ANNOUNCE (2)
	ANY AUDIO.....CANCEL
AIRCRAFT STOPPED:	
Consider positioning the aircraft to keep any possible fire away from the fuselage.	
REVERSERS..... STOWED	ATC.....NOTIFY
PARKING BRAKE..... ON	EMER EVAC Procedure (QRH)..... LOCATE
CABIN CREW.....ALERT	
ECAM ACTIONS.....ORDER	ECAM ACTIONS.....PERFORM
The aircraft should remain stationary while the flight crew evaluates the situation.	
EVACUATION PHASE:	
•If required:	ATC.....NOTIFY
EMER EVAC Procedure.....APPLY	*The flight crew should notify the ATC of their intention, and the required assistance.*
For more information on the EMER EVAC procedure, Refer to PRO-ABN-ECAM-10-80-10 EMER EVAC .	
Except if the emergency evacuation procedure is within the ECAM procedure of the failure, the flight crew should apply the not-sensed emergency evacuation procedure on the ECAM or the QRH procedure, as appropriate.	

(1) Full reverse may be used until the aircraft is fully stopped. But, if there is enough runway at the end of the deceleration, the flight crew should reduce the reverse thrust when passing 70 kt .

(2)

- *If the brake response does not seem appropriate for the runway condition, the flight crew should apply and maintain full manual braking.*
  If the flight crew has any doubt, they must take over manually.
  Before clearing the runway, the flight crew must ensure that an evacuation is not necessary and that it is safe.
- *If the autobrake is inoperative, the Captain simultaneously reduces the thrust and applies maximum pressure on both pedals. The aircraft stops in the minimum distance, only if the flight crew maintains the brake pedals fully pressed until the aircraft stops.*
- *If the normal braking is inoperative, the flight crew should immediately apply the LOSS OF BRAKING procedure (Refer to PRO-ABN-NECA-32-130 LOSS OF BRAKING).*
- *After a rejected takeoff, if the aircraft stops using autobrake RTO, before taxiing, the flight crew must disarm the ground spoilers in order to release the brakes.*
- *If the takeoff is rejected before 72 kt , the ground spoilers do not extend, and the auto-brake is not active.*

STALL RECOVERY

Applicable to: ALL

As soon as any stall indication (could be aural warning, buffet, etc.) is recognized, apply the immediate actions:

NOSE DOWN PITCH CONTROL..... APPLY

This will reduce angle of attack.

Note: In the case of lack of pitch down authority, reducing thrust may be necessary.

BANK..... WINGS LEVEL

- **When out of stall (no longer stall indications):**

THRUST.....INCREASE SMOOTHLY AS NEEDED

Note: In the case of one engine inoperative, progressively compensate the thrust asymmetry with rudder.

SPEEDBRAKES.....CHECK RETRACTED

FLIGHT PATH..... RECOVER SMOOTHLY

- **If in clean configuration and below 20 000 ft:**

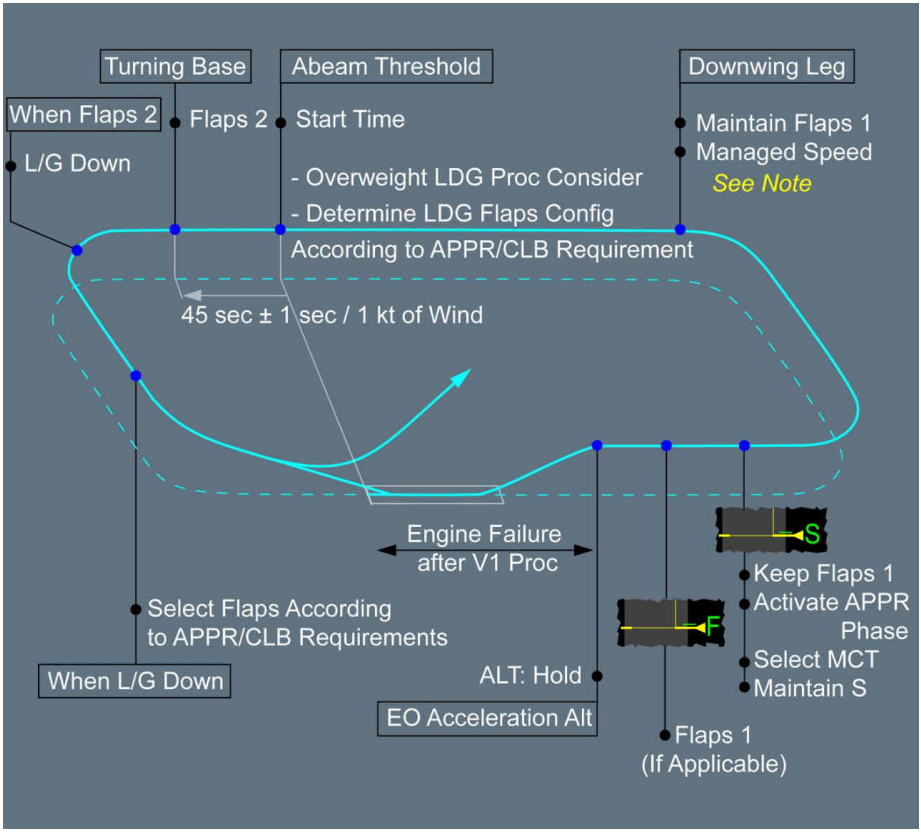
FLAP 1..... SELECT

Note: If a risk of ground contact exists, once clearly out of stall (no longer stall indications), establish smoothly a positive climb gradient.

VMC LANDING FOLLOWING ENGINE FAILURE AT TAKEOFF

Applicable to: ALL

VMC Landing After Engine Failure at Takeoff



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VMC LANDING FOLLOWING ENGINE FAILURE AT TAKEOFF (Cont'd)

Note: *This pattern takes into account the use of managed speed (including minimum ground speed function).*

If managed speed is not used, manually select the following speeds:
- *F, after Flaps 2 selection*
- *VAPP, after landing flaps selection.*

If the flight plan is not updated with the new runway, use the selected speed.

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FLIGHT CREWMEMBER INCAPACITATION

Applicable to: ALL

If a flight crewmember is incapacitated, the other flight crewmember(s) in the cockpit, must request assistance from the cabin crew as soon as possible. The flight crewmember(s) that is(are) not incapacitated can use the PA system to call the cabin crew by announcing, for example: “Attention, Purser to the cockpit please”.

The Purser, or another cabin crewmember, must immediately go to the cockpit, and perform the following actions:

- Tighten, and manually lock the shoulder harness of the incapacitated flight crewmember
- Adjust the incapacitated flight crewmember’s seat to the most backward and reclined position.

The removal of the incapacitated flight crewmember from the cockpit seat requires the assistance of two people, in order to ensure that during this course of this action, no pushbuttons, switches and/or controls in the cockpit are inadvertently operated.
If it is not possible to remove the incapacitated flight crewmember from their seat, one cabin crewmember must remain in the cockpit, in order observe and take care of this incapacitated flight crewmember.

In coordination with the Purser, the flight crewmember(s) that is(are) not incapacitated, must try to find, and request assistance from, any passenger that has:

- Medical qualifications, and is able to provide medical assistance
- A commercial pilot typerating, and is able to perform the duties of the incapacitated flight crewmember.

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AUTOLAND

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The aircraft is in autoland below 200 ft RA, and one of the following occurs:

- The last AP disengages

L3 The AUTOLAND light stops flashing, when:

- The flight crew engages the go-around, or
- The altitude goes above 200 ft RA, or
- The flight crew cancels the AUTO FLT AP OFF alert (if the alert was triggered).

L2 *Note: If the flight crew quickly presses on the sidestick pushbutton two times, the AUTOLAND light appears furtively.*

- Above 100 ft RA, during a CAT 2 or CAT 3 ILS approach, or during a GLS CAT 1 approach with Autoland:
  - The glide signal of the ILS transmitter fails, or
  - The glide signal of the GLS transmitter fails, or
  - The glide deviation is excessive.

  L3 The glide deviation becomes excessive, when the glide deviation is one gradation away from the center of the scale.

  L2 The AUTOLAND light stops flashing, when:
  - LAND disengages, or
  - The flight crew disengages the AP(s) by pressing the sidestick pushbutton two times.
- Above 15 ft RA, during a CAT 2 or CAT 3 ILS approach, or during a GLS CAT1 approach with Autoland:
  - The LOC signal of the ILS transmitter fails, or
  - The LOC signal of the GLS transmitter fails, or
  - The LOC deviation is excessive.

  L3 The LOC deviation becomes excessive, when the LOC deviation is one quarter gradation away from the center of the scale.

  L2 The AUTOLAND light stops flashing, when:
  - LAND or FLARE disengages, or
  - The flight crew disengages the AP(s) by pressing the sidestick pushbutton two times.
- One radio altimeter is failed, and the values provided by the two remaining radio altimeters differ by more than 15 ft

Continued on the following page

AUTOLAND (Cont'd)

The AUTOLAND light stops flashing, when:
- LAND, FLARE or ROLL OUT disengages, or
- The flight crew disengages the AP(s) by pressing the sidestick pushbutton two times.

- A long flare is detected.

L3 A long flare is detected, when FLARE is engaged for 13 s.

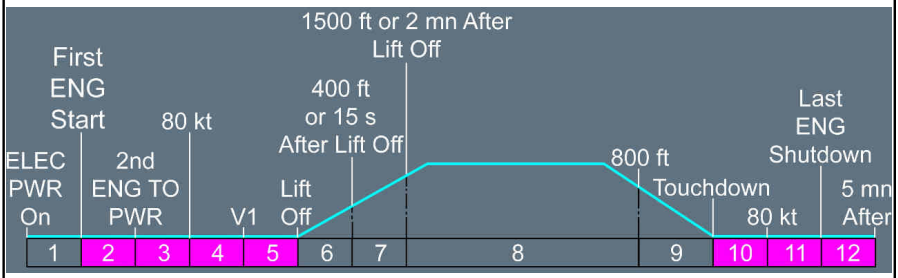
L2 The AUTOLAND light stops flashing, when:
- The flight crew engages the go-around, or
- The flight crew disengages the AP(s) by pressing the sidestick pushbutton two times.

Indications:

Local light



Flight Phase Inhibition:



GO-AROUND.....PERFORM

In some cases, if visual references are sufficient, a manual landing can be performed.

FIRE SMOKE / FUMES REMOVAL

Applicable to: ALL

L2 The flight crew can display this procedure by first pressing the ECP ABN PROC pb.
Apply the SMOKE / FUMES REMOVAL paper procedure, if smoke / fumes become the greatest threat while applying the SMOKE / FUMES paper procedure.

The procedure is divided in three parts:
- Cockpit affected,
- Cockpit not affected and upper deck affected,
- Cockpit not affected and main deck affected.

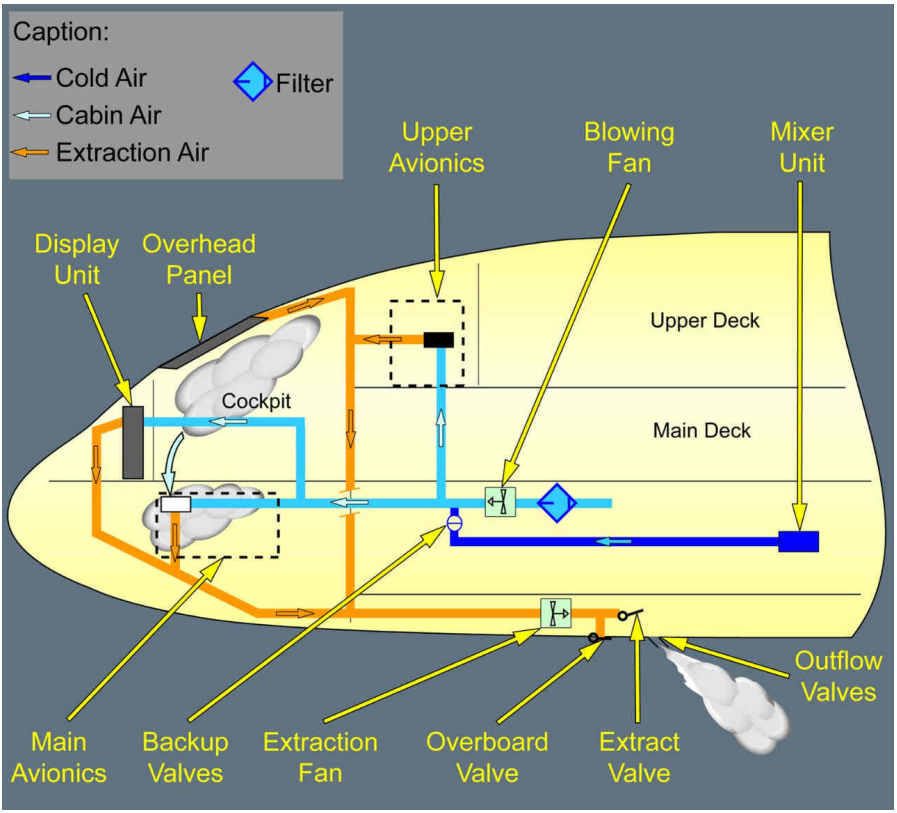
COCKPIT AFFECTED

The smoke is initially evacuated from the cockpit via the forward outflow valve using the avionics ventilation extraction fan.

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

Air Flow for Cockpit Smoke Removal



Descent is initiated to FL 100 or Minimum En-route Altitude.

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

At FL 100 the RAM AIR is open to supply fresh air to the cabin following packs closure.
If smoke continues, PM cockpit window is opened.

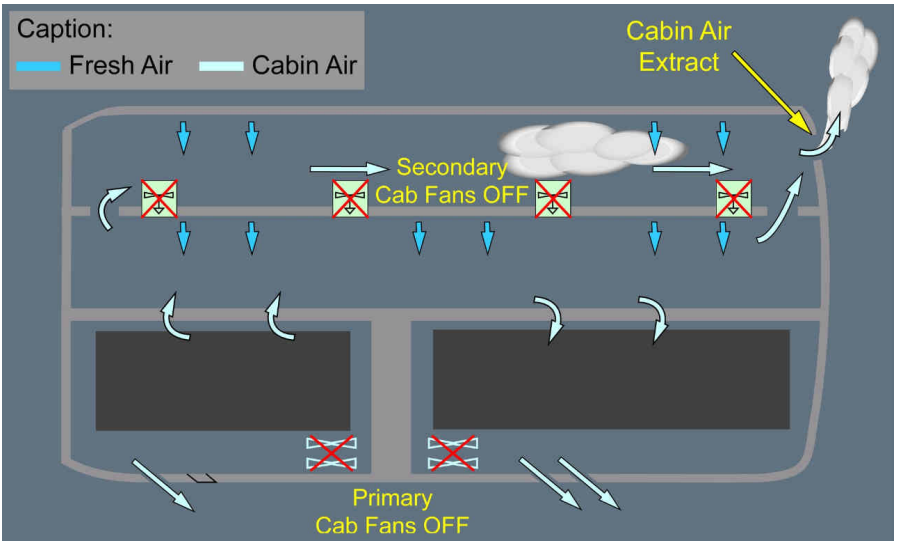
COCKPIT NOT AFFECTED AND UPPER DECK AFFECTED

The smoke is evacuated from the upper deck via the CABIN AIR EXTRACT valve located at the rear of the upper deck.
CABIN ALT MODE and CABIN V/S must be AUTO in order to ensure the automatic closure of one forward outflow valve. This shall ensure that main deck is not contaminated with air from the upper deck.

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

Air Flow for Upper Deck Smoke Removal



COCKPIT NOT AFFECTED AND MAIN DECK AFFECTED

Smoke is evacuated from the main deck via the outflow valves.

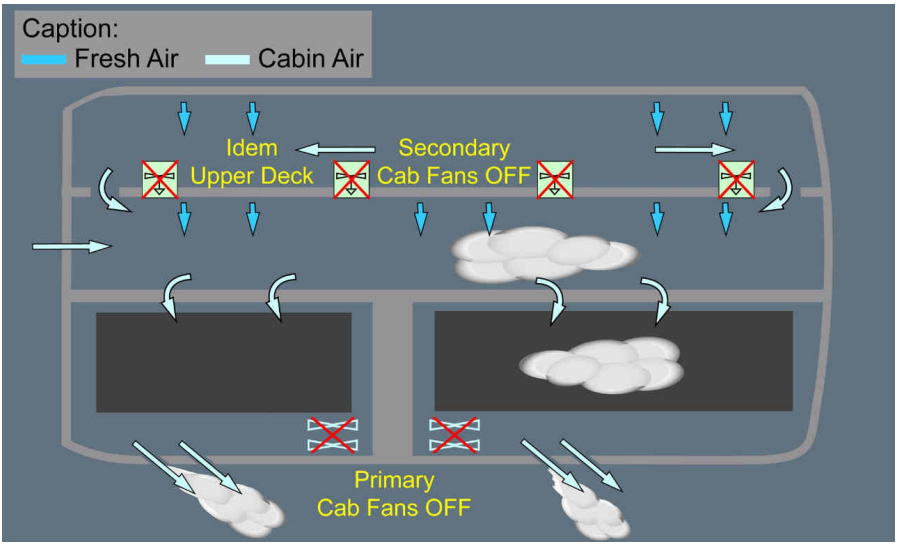
Avionics ventilation is evacuated using the overboard valve (VENT AVNCS EXTRACT OVRD), this will decrease the amount of air extracted from the cockpit and thus build up an

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

overpressure in the cockpit. This shall prevent smoke entering the cockpit from the main deck.

Air Flow for Main Deck Smoke Removal



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FIRE SMOKE / FUMES REMOVAL (Cont'd)

EMER EXIT LT ..... ON
AIR FLOW.....HI

L2 *This will provide maximum airflow from the packs. Do not shut down the air conditioning packs, and do not reduce ventilation in an attempt to smother the fire.*

Do not deploy oxygen masks, if fire is suspected in the cabin.

L1 ATC.....NOTIFY FOR DESCENT
DESCENT (FL 100 or MEA OR minimum obstacle clearance altitude).....INITIATE

- **If cockpit affected :**

  ALL CARGO ISOL VALVES.....OFF
  CABIN ALT MODE.....MAN
  CABIN ALT TRGT..... 10000 FT/MEA
  CABIN V/S MODE..... MAN
  CABIN V/S TRGT..... 1000 FT/MIN

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

L2 *Descent is initiated to FL 100, or the MEA, or the minimum obstacle clearance altitude, while the cabin altitude is increased to 10 000 ft or the MEA.*

The increase in cabin altitude also reduces, at least temporarily, the smoke concentration.

Cabin depressurization starts, when descent is initiated.

Passenger oxygen, as required by regulations

L1 SMOKE/FUMES/QRH PROC.....CONTINUE

L2 *While descending, continue applying the appropriate steps of the SMOKE/FUMES paper procedure depending on the suspected smoke source. When reaching FL 100/MEA continue the SMOKE REMOVAL procedure.*

L1 ● **At FL 100/MEA :**

PACK 1+2..... OFF

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

L2 *Packs must be switch off to allow cockpit window opening.*

L1 RAM AIR.....ON

L2 *At FL 100, or MEA, it is possible to open the RAM AIR valve, when Delta P is 1 PSI psi or below.*
RAM AIR does not assist smoke removal, but allows to supply cabin with fresh air when both packs are OFF.

L1 ● **If smoke continues :**

L2 During descent, the SMOKE / FUMES procedure has been applied, if smoke generation has stopped it may not be necessary anymore to open the cockpit window.

L1 MAX SPEED : 230 KT
CKPT DOOR OR DOOR FLAP.....OPEN
HEADSETS.....ON

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

CKPT WINDOW (PM).....OPEN | PNF

- **When window is open :**

  PACKS (NOT AFFECTED).....ON

  VISUAL WARNING (noisy cockpit).....
  .....MONITOR

L2 *Due to the increased noise level, pay particular attention to visual warnings.*

L1 SMOKE/FUMES/QRH PROC.....
.....CONTINUE

L2 *Continue applying the appropriate steps of the SMOKE / FUMES paper procedure depending on the suspected smoke source.*

L1 - **If cockpit not affected and only UPPER deck affected :**

  CABIN ALT MODE.....AUTO

  CABIN V/S MODE..... AUTO

  CABIN AIR EXTRACT.....OVRD

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

L2 *The CABIN AIR EXTRACT opens, one forward outflow valve closes and the other outflow valves open.*

This ensures that main deck is not contaminated with air from the upper deck.

L1 SMOKE/FUMES/QRH PROC.....CONTINUE

L2 *Continue applying the appropriate steps of the SMOKE / FUMES paper procedure depending on the suspected smoke source.*

L1 ● **If cockpit not affected and only MAIN deck affected :**

VENT AVNCS EXTRACT.....OVRD

L2 *This pressurizes the cockpit, and prevents contaminated air from the main deck to enter the cockpit.*

L1 ALL CARGO ISOL VALVES.....OFF

SMOKE/FUMES/QRH PROC.....CONTINUE

Continued on the following page

FIRE SMOKE / FUMES REMOVAL (Cont'd)

L2 *Continue applying the appropriate steps of the SMOKE / FUMES paper procedure depending on the suspected smoke source.*

FIRE SMOKE/FUMES

Applicable to: ALL

L2 This procedure is a paper procedure of the Quick Reference Handbook (QRH).

It includes all the steps of the following ECAM procedures:
- SMOKE L(R) UPPER AVNCS SMOKE
- SMOKE L(R) MAIN AVNCS SMOKE
- SMOKE AFT AVNCS SMOKE
- FIRE SMOKE/FUMES not-sensed procedure.

Apply this paper procedure when :
- The flight(cabin) crew suspects that smoke is coming from the avionics, and/or the air conditioning, and/or the cabin equipment, or
- Requested by one of the ECAM AVNCS SMOKE procedures, or
- There is a smell of smoke/fumes :
  - If the smell is similar to that of orange peels, suspect a toxic leak of rain repellent fluid
  - If the smell is similar to that of pine needles, suspect a non-toxic leak.

If any other ECAM SMOKE alert triggers, e.g. CARGO SMOKE, the flight crew must first apply the ECAM procedure and then consider applying this paper procedure.
These ECAM SMOKE alerts may be caused by another source, that the flight crew, the cabin crew or an avionics smoke detector should usually detect first.

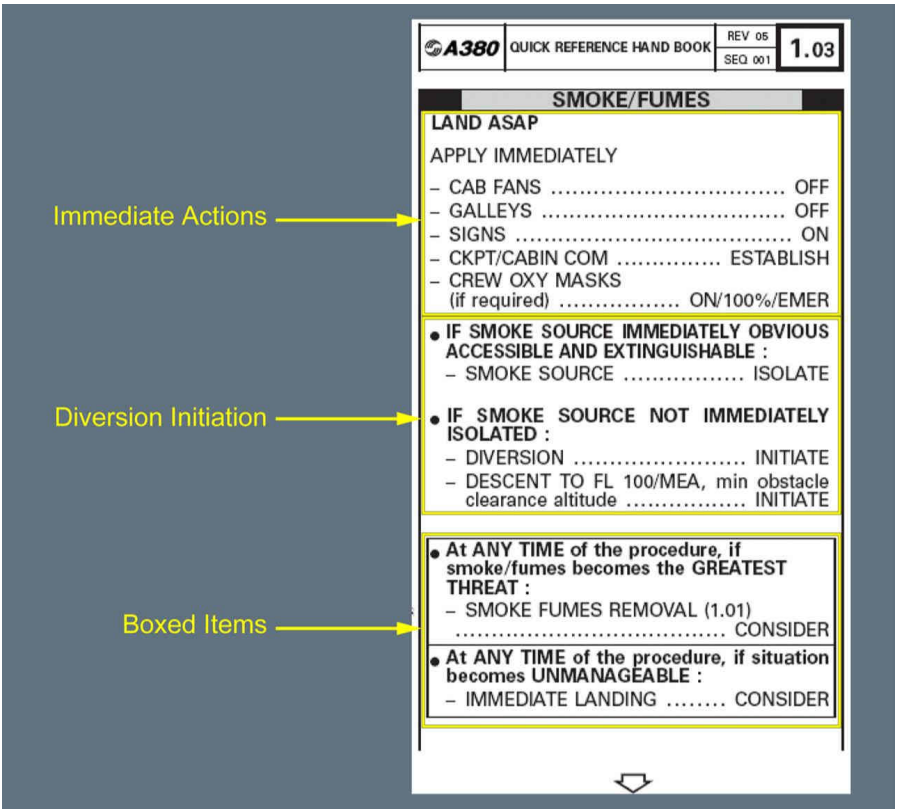
PROCEDURE LAYOUT

The first page of the QRH procedure contains the following main steps:

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

Procedure Layout



IMMEDIATE ACTIONS

The procedure lines above the boxed items indicate the immediate actions that the flight crew must perform, if smoke is detected (with or without ECAM activation, and regardless of the smoke source). These immediate actions correspond to the most common steps to apply in smoke cases.

The not-sensed ECAM FIRE SMOKE/FUMES procedure, and the ECAM AVNCS SMOKE procedures include the immediate actions and refer to the QRH procedure for further actions, if any.

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

DIVERSION INITIATION

In parallel, the flight crew must also be prepared to immediately perform a diversion. However, this diversion may be avoided if the smoke source is obvious, accessible and extinguishable or confirmed isolated (after completion of the immediate actions).

BOXED ITEMS

The boxed items indicate the actions that the flight crew must consider, if at any time during the remainder of the procedure but always after the initial steps :
- Smoke/fumes become the greatest threat and smoke/fumes removal is required, and/or
- The situation becomes critical and can no longer be controlled.

PROCEDURE LAYOUT (CON'T)

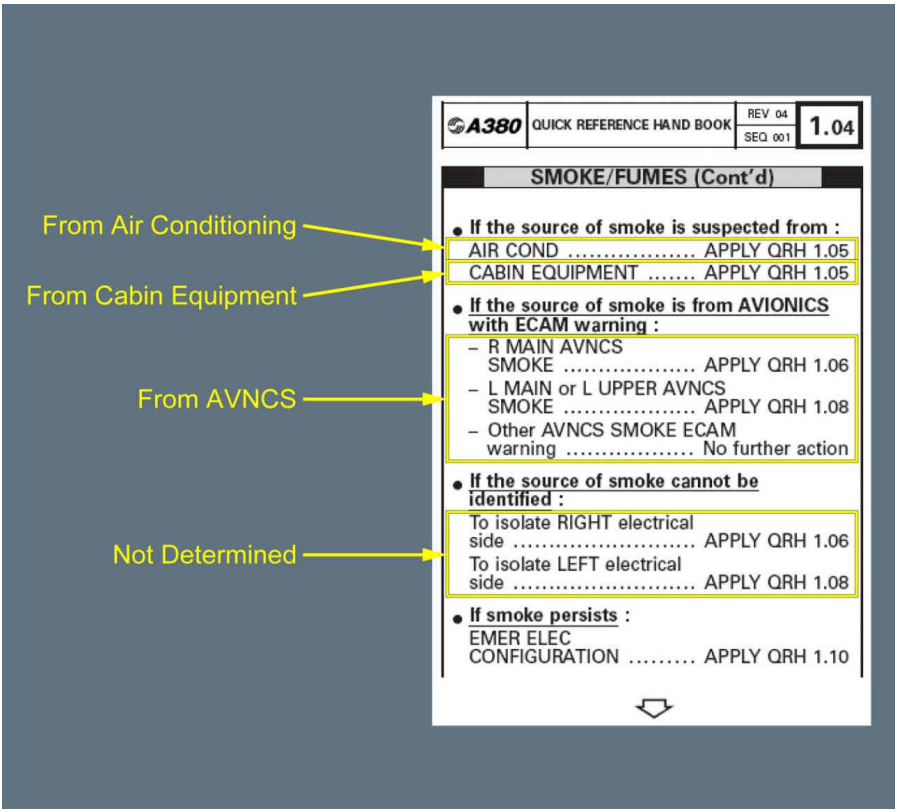
The procedure lines below the boxed items indicate the actions that the flight crew must perform, as soon as they suspect a source of smoke.

The actions will depend on whether the smoke is coming from:
- Air conditioning, or
- Cabin equipment, or
- Avionics, or
- Smoke source cannot be determined and still continues.

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

Procedure Layout (Con't)



SMOKE FROM AIR CONDITIONING

The possible origins of air conditioning smoke are:

- Air supply to the cabin:
  - From engines bleed (oil or hydraulic vapor), or truck exhaust sucked by the aircraft, or
  - From APU bleed (oil vapor), or
  - From external power which is prone to trigger false alerts on ground (contaminated air supply).

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

- Re-circulation fans, which propagate contaminated air in all the pressurized areas.

The entire airplane is fed with the smoke and many smoke detection may be triggered. They obviously do not appear simultaneously and are displayed in a completely erratic manner, one after each other and several minutes may separate each alert provided to the crew.
When identified, the only way to overcome the smoke generation is to switch off the affected bleed system.

SMOKE FROM CABIN EQUIPMENT

All enclosed cabin areas (crew rest, lavatories, ...) have dedicated smoke detectors and associated ECAM alerts.
Smoke from cabin equipment which is not automatically detected mainly concerns galleys, seats or IFE equipment. In that case , the alert comes from the cabin crew together with possible smells.
The cabin crew takes initial actions and reports to the cockpit crew.
Since GALLEYS are already switched off during immediate actions , the flight crew first sets the PAX SYS pb to OFF, this will shed IFE center, and the seat power supply.
If smoke continues, the flight crew sets COMMERCIAL 1+2 pb-sw to OFF, this will shed all aircraft commercial loads.

SMOKE FROM AVIONICS

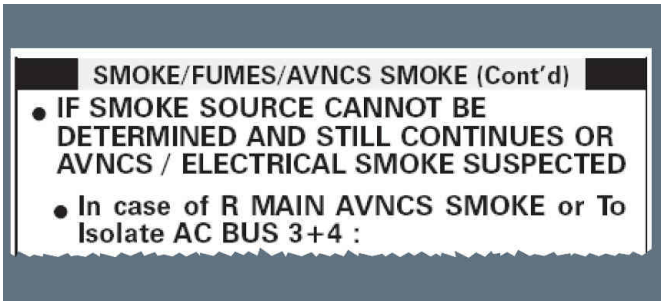
Each avionics bay has a smoke detection system, Main and Upper avionics are divided into Left and Right Main and Upper avionics with dedicated smoke detection system. For information on avionics smoke detection system, *Refer to DSC-26-50-10-10 Avionics Bays Smoke Detection* .

- SMOKE R MAIN AVNCS SMOKE
  In the case of SMOKE alert, the flight crew must apply the following part of the paper procedure:

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

Isolation of AC3 and AC4 busbars

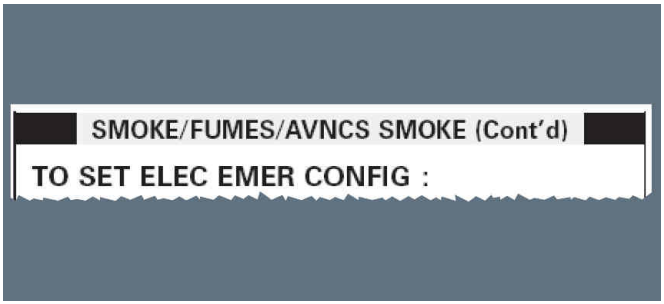


Right Main avionics equipment are mainly supplied by right electrical side (AC3, AC4 or DC2 busbars), therefore in the case of SMOKE R MAIN AVNCS SMOKE alert, AC3 and AC4 must be isolated and BUS TIE pb-sw set to OFF. This will shed AC3, AC4 and DC2 busbars.

However, some equipment in the Right Main avionics are supplied by the left electrical side (AC1, AC2 or DC1 busbars). If smoke continues following AC3, AC4 and DC2 shedding, AC1 and AC2 must be isolated. With BUS TIE pb-sw set to OFF, this will shed AC1, AC2 and DC1 busbars.

Finally smoke continuation may be an indication that affected equipment is supplied by both left electrical side (AC1, AC2, or DC1 busbars) and right electrical side (AC3, AC4, or DC2 busbars). The flight crew must set the emergency electrical configuration.

Emergency Electrical Configuration

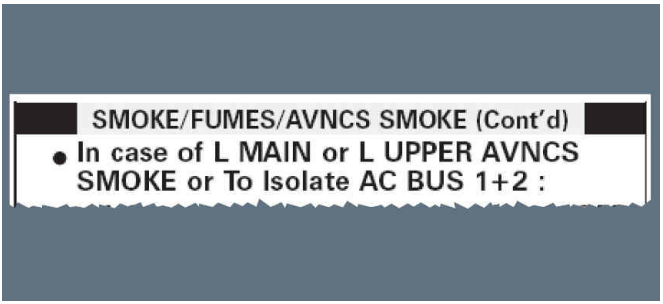


- SMOKE L MAIN AVNCS SMOKE
  Same situation as for Right Main avionics, however the flight crew begins to shed left electrical side (AC1, AC2, or DC1 busbars).

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

Isolation of AC1 and AC2 busbars



Then, if unsuccessful, the flight crew sheds the right electrical side (AC3, AC4 or DC2 busbars). Finally, if unsuccessful, they must set the emergency electrical configuration.

- SMOKE L UPPER AVNCS SMOKE
  Even if most of the equipment located in this bay are supplied by AC ESS busbar, some remain supplied by normal busbars.
  Therefore, the same procedures as for Left Main avionics must be applied.
- SMOKE R UPPER AVNCS SMOKE
  All equipments located in this bay are supplied by AC ESS busbar, therefore only immediate actions and diversion must be applied.

SMOKE SOURCE CANNOT BE DETERMINED

If the smoke source cannot be determined, the flight crew applies the same part of the paper procedure as for avionics smoke.
The flight crew must isolate AC3 and AC4 busbars and set BUS TIE pb-sw to OFF. This will shed AC3, AC4 and DC2 busbars.
Then, if unsuccessful, the flight crew must isolate AC1 and AC2 busbars and set BUS TIE pb-sw to OFF. This will shed AC1, AC2 and DC1 busbars.
Finally, if unsuccessful, set emergency electrical configuration.

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

LAND ASAP

APPLY IMMEDIATELY

CAB FANS.....OFF

L2 *To avoid smoke propagation.*

L1 GALLEY.....OFF

L2 *This sheds the highest AC commercial load and a probable smoke source.*

L1 SIGNS.....ON

CKPT/CABIN COM..... ESTABLISH

L2 *Communication must be established with the cabin crew in order to follow up on the smoke origin and dissipation.*

L1 CREW OXY MASKS (if required)....ON/100%/EMER

L2 *Ensure crew communication is established. Avoid continuous use of the interphone to minimize interference from the oxygen mask breathing noise. Turn the emergency knob to remove condensation or smoke from the mask.*

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L1

- **IF SMOKE SOURCE IMMEDIATELY OBVIOUS ACCESSIBLE AND EXTINGUISHABLE :**
  SMOKE SOURCE.....ISOLATE
- **IF SMOKE SOURCE NOT IMMEDIATELY ISOLATED :**
  DIVERSION.....INITIATE
  DESCENT TO FL 100/MEA, MIN OBSTACLE CLEARANCE ALTITUDE.....INITIATE

L12

•At ANY TIME of the procedure, if smoke/fumes becomes the GREATEST THREAT :
SMOKE FUMES REMOVAL..... CONSIDER

•At ANY TIME of the procedure, if situation becomes UNMANAGEABLE :
IMMEDIATE LANDING..... CONSIDER
Captain should consider an overweight landing, a tailwind landing, a ditching, a forced landing or a forced off-airport landing.

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L2

Guidelines to determine smoke source :

- If smoke initially comes out of the cockpit's ventilation outlets, or if smoke is detected in the cabin, the crew may suspect an AIR COND SMOKE. In addition, very shortly thereafter, several SMOKE warnings (cargo, lavatory, avionics) will be triggered. The displayed ECAM procedures must therefore be applied,
- After an ENG or APU failure, smoke may come from the faulty item via the bleed system and be perceptible in the cockpit and/or cabin. In that case, it will be re-circulated throughout the aircraft, until it completely disappears from the air conditioning system.
- If only the AVIONICS SMOKE warning is triggered, the crew may suspect avionics smoke,
- If smoke is detected, while an equipment is declared faulty, the crew may suspect that smoke is coming from this equipment

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L1

- **If the source of smoke is suspected from :**

  AIR COND..... See AIR COND SMOKE

  CABIN EQUIPMENT..... See CABIN EQUIPMENT SMOKE

- **If the source of smoke is from AVIONICS with ECAM warning :**

  R MAIN AVNCS SMOKE..... See R MAIN AVNCS SMOKE

  L MAIN or L UPPER AVNCS SMOKE..... See L MAIN or L UPPER AVNCS SMOKE

  Other AVNCS SMOKE ECAM warning..... No further action

- **If the source of smoke cannot be identified :**

  To isolate RIGHT electrical side..... See To Isolate AC BUS 3+4

  To isolate LEFT electrical side..... See To Isolate AC BUS 1+2

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

- **If smoke persists:**

  EMER ELEC CONFIGURATION.....
  ..... See To Set EMER CONFIG

- **IF AIR COND SMOKE SUSPECTED :**

  APU BLEED.....OFF
  VENT AVNCS EXTRACT..... AUTO
  PACK 1.....OFF

L2 *The ECAM alert AIR PACK 1 OFF is triggered.*

L1 - **If smoke continues :**

  PACK 1.....ON
  PACK 2..... OFF

L2 *The ECAM alert AIR PACK 2 OFF is triggered.*

L1 - **If smoke persists :**

  PACK 2.....ON

L2 *If the flight crew suspects that the smoke does not come from Pack 2, normal pack configuration can be restored.*

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L1 SMOKE/FUMES REMOVAL.....CONSIDER

● **IF CABIN EQUIPMENT SMOKE SUSPECTED :**

PAX SYS..... OFF

● **If smoke continues :**

EMER EXIT LT.....ON

L2 *To recover minimum cabin lighting when the COMMERCIAL 1+2 are switched OFF.*

L1 COMMERCIAL 1+2.....OFF

SMOKE DISSIPATION.....CHECK

FAULTY EQPT.....SEARCH/ISOLATE

L2 *Cabin lights, reading lights, passenger system, and galleys have dedicated control or C/B in the cabin or cockpit.*

L1 ● **If smoke persists or when faulty equipment confirmed isolated :**

PAX SYS.....ON

COMMERCIAL 1+2..... NORM

SMOKE/FUMES REMOVAL.....CONSIDER

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

- **IF SMOKE SOURCE CANNOT BE DETERMINED AND STILL CONTINUES OR AVNCS/ELECTRICAL SMOKE SUSPECTED :**
  - **In case of R MAIN AVNCS SMOKE or To ISOLATE AC BUS 3+4 :**

L2

Right electrical side (AC3, AC4 or DC2 busbars) supplies most of the avionics equipment located in the Right Main avionics bay. Therefore in case of SMOKE R MAIN AVNCS SMOKE alert, the flight crew must shed first AC3, AC4 and DC2 busbars.

However, some equipment in the Right Main avionics are supplied by the left electrical side (AC1, AC2 or DC1 busbars). If smoke continues following AC3, AC4 and DC2 shedding, AC1 and AC2 must be isolated. With BUS TIE pb-sw set to OFF, this will shed AC1, AC2 and DC1 busbars.

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

Finally smoke continuation may be an indication that affected equipment is supplied by both left electrical side (AC1, AC2, or DC1 busbars) and right electrical side (AC3, AC4, or DC2 busbars). The flight crew must set the emergency electrical configuration.

L1 VHF 1.....USE
XPDR/TCAS.....SYS 1

- **If any GEN inoperative:**

  Inoperative GEN.....KEEP OFF

  L2 *If an engine generator is inoperative, the flight crew should keep it off for the rest of the procedure.*

  L1 RAT MAN ON..... PRESS
  RAT AVAIL..... CHECK

GEN 1+2.....CHECK ON
AC ESS FEED.....CHECK NORM
APU GEN A+B.....OFF
AIR DATA.....F/O ON 3

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

ATT HDG.....F/O ON 3
BUS TIE.....OFF

L2 *The ECAM alert ELEC BUS TIE OFF is triggered.*
When the BUS TIE is set to OFF left and right electrical side are fully segregated.

L1 RH cockpit lights are lost when GEN 3+4 OFF

GEN 3+4.....OFF

L2 *The ECAM alerts ELEC GEN 3(4) OFF are triggered. When GEN 3+4 are set to off, the ECAM alert ELEC AC 3 + AC 4 + DC 2 BUS FAULT is triggered.*

L1 SMOKE DISSIPATION.....CHECK

- **If smoke continues :**

  GEN 3+4.....ON
  ATT HDG.....KEEP F/O ON 3
  AFTER 1 MIN : AIR DATA.....NORM
  NSS MASTER SW.....OFF

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L2 *All the electrical power to the NSS is cut off. The OIS is not available. The laptops are supplied on batteries and still running. Laptops can be removed from their stowage and used directly on the sliding table.*

L1 AC ESS FEED..... ALTN

L2 *The AC 4 busbar supplies the AC ESS busbar.*

L1 AP sidestick locking device and LH Cockpit lights are lost when GEN 1+2 OFF

GEN 1+2..... OFF

L2 *The ECAM alerts ELEC GEN 1(2) OFF are triggered. When GEN 1+2 are set to off, the ECAM alert ELEC AC 1+ AC 2+ DC 1 BUS FAULT is triggered.*

L1 SMOKE DISSIPATION..... CHECK

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

- **If smoke persists :**

  GEN 1+2..... ON
  AC ESS FEED.....NORM
  BUS TIE.....AUTO
  EMER ELEC.....CONSIDER
  SMOKE/FUMES REMOVAL.....
  .....CONSIDER

- **If smoke stops :**

  ECAM ACTIONS..... PERFORM

- **In case of L MAIN OR L UPPER AVNCS SMOKE or To isolate AC BUS 1+2 :**

  NSS MASTER SW.....OFF

L2 *All the electrical power to the NSS is cut off. The OIS is not available. The laptops are supplied on batteries and still running. Laptops can be removed from their stowage and used directly on the sliding table.*

L1 VHF1.....USE
XPDR/TCAS.....SYS 1

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

● If any GEN inoperative:

Inoperative GEN.....KEEP OFF

L2 *If an engine generator is inoperative, the flight crew should keep it off for the rest of the procedure.*

L1 RAT MAN ON..... PRESS
RAT AVAIL..... CHECK

GEN 3+4.....CHECK ON
AC ESS FEED.....ALTN

L2 *The AC 4 busbar supplies the AC ESS busbar.*

L1 APU GEN A+B.....OFF
BUS TIE.....OFF

L2 *The ECAM alert ELEC BUS TIE OFF is triggered.*

L1 AP sidestick locking device and LH Cockpit lights are lost when GEN 1+2 OFF

GEN 1+2.....OFF

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L2 *The ECAM alerts ELEC GEN 1(2) OFF are triggered. When GEN 1+2 are set to off, the ECAM alert ELEC AC 1+ AC 2+ DC 1 BUS FAULT is triggered.*

L1 SMOKE DISSIPATION..... CHECK

- **If smoke continues :**

  GEN 1+2..... ON
  AC ESS FEED..... NORM
  AIR DATA..... F/O ON 3
  ATT HDG..... F/O ON 3

  When GEN 3+4 OFF, RH cockpit lights are lost and F/CTL laws may revert to ALTN LAW with loss of AP, FD, and A/THR

  GEN 3+4..... OFF
  SMOKE DISSIPATION..... CHECK

  - **If smoke persists :**

    GEN 3+4..... ON
    BUS TIE..... AUTO
    ATT HDG..... KEEP F/O ON 3

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

AFTER 1 MIN : AIR DATA.....NORM
EMER ELEC.....CONSIDER
SMOKE/FUMES REMOVAL.....
.....CONSIDER

- **If smoke stops :**
  ECAM ACTIONS..... PERFORM

- **TO SET ELEC EMER CONFIG :**
  CABIN CREW.....ADVISE
  VHF1.....USE
  XPDR / TCAS.....SYS1
  WXR / TAWS.....SYS1
  RAT MAN ON.....PRESS

  AP and A/THR are lost when all GENs OFF.

- **WHEN RAT AVAIL :**
  GEN 1+4.....OFF

L2 *The ECAM cautions ELEC GEN 1(4) OFF are triggered.*

L1 GEN 2+3.....OFF

Continued on the following page

FIRE SMOKE/FUMES (Cont'd)

L2 *The ECAM cautions ELEC GEN 2(3) OFF are triggered.*

L1 ELEC EMER CONFIG

Apply ELEC EMER CONFIG ECAM procedure EXCEPT the items "GENs OFF THEN ON" and "APU CONSIDER", if displayed.

Intentionally left blank

LOSS OF BRAKING

Applicable to: ALL

This emergency procedure is not displayed on the ECAM , and should be performed by memory if the braking system does not automatically reconfigure after a significant failure.

- **If no braking :**

	REV.....MAX	PF
L2	*If needed, the flight crew may keep maximum reverse thrust until full aircraft stop.*	
L1	BRAKE PEDALS.....RELEASE	
L2	*When the flight crew sets the A-SKID to OFF, the control of the braking system is transferred from the BCS to the EBCU , and the emergency braking mode is activated. Consequently the CAPT should release the brake pedals before the F/O selects the A-SKID off. This action avoids brutal braking application.* *For information on the emergency braking mode, Refer to DSC-32-10-30-30-40 Emergency Braking .*	
L1	A-SKID.....ORDER	PF
L2	*The CAPT orders the F/O to select the A-SKID OFF.*	
L1	A-SKID.....OFF	PNF
	BRAKE PEDALS.....PRESS	PF
L2	*The pressure on the brakes is automatically limited.*	

L1 - **If still no braking :**

	PARK BRK.....ON	PF
L2	*The ultimate braking mode is activated. If the ground spoilers are not extended, the parking brake only is activated.* *For information on the ultimate braking mode, Refer to DSC-32-10-30-30-50 Ultimate Braking .* *For information on the parking brake, Refer to DSC-32-10-30-30-60 Parking Brake .*	

RUNWAY OVERRUN WARNING

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Runway Overrun Warning (ROW) function detects that the aircraft is in position to overrun the runway.
These alerts are triggered between 500 ft RA and the start of braking or when the flight crew selects the reversers.

The function displaysone of the following message on the PFD:
- IF WET : RWY TOO SHORT
- RWY TOO SHORT

Associated to the RWY TOO SHORT message, an aural warning is triggered below 200 ft RA.
Indications:

Audio	SD page
Runway Too Short	

PFD

Continued on the following page

RUNWAY OVERRUN WARNING (Cont'd)

L2 The runway overrun warning is approved based on landing performance on dry or wet runway with no failure affecting landing distances.

L3 In the case of a failure that affects landing distance, unless ROW/ROP is declared inoperative, the runway overrun protection remains available. However ROW does not take into account the impact of the failure on the landing distance. Therefore, if the runway overrun warning activates during the final approach, the flight crew must apply the associated procedure.

L2 When the flight crew lands on a contaminated runway with an autobrake mode selected, the runway overrun warning remains active but does not prevent runway excursion in such conditions. Nevertheless, if the alerts are triggered during the approach on a contaminated runway, the flight crew must apply the associated procedure.

L1 ● **If IF WET : RWY TOO SHORT message is displayed on the PFD:**

- **If the runway is not dry :**

  GO-AROUND..... PERFORM

- **If the runway is dry :**

  CONTINUE

● **If RWY TOO SHORT message is displayed on the PFD with the associated aural warning:**

GO-AROUND.....PERFORM

RWY OVERRUN PROTECTION

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Runway Overrun Protection (ROP) alert is triggered and protections activate when the ROP function detects a runway overrun situation.
The ROP alert may be triggered from the activation of the autobrake or when the flight crew selects the reversers, until the full stop of the aircraft.

Indications:

Audio
MAX REVERSE

SD page



PFD

Continued on the following page

RWY OVERRUN PROTECTION (Cont'd)

L2 The runway overrun protection is approved based on braking performance on dry and wet runway with no failure impacting the braking performance.
On contaminated runway, the runway overrun protection does not prevent runway overrun. Nevertheless the runway overrun protection remains armed. If the runway overrun protection activates, the flight must follow the associated procedure.
When the flight warning system triggers an alert that impacts the landing performance, the flight warning system declares ROP as inoperative system because ROP does not take into account the impact of the triggered alert on the landing distance. Nevertheless, the runway overrun protection remains armed. If the runway overrun protection activates during the rollout, the flight crew must apply the associated procedure.

Associated to the activation of this alert:
- The autobrake automatically applies maximum braking,
- The message MAX REVERSE is displayed on PFD
- The aural warning MAX REVERSE is continuously repeated as long as the flight crew does not select full reversers and ROP is active
- The stop bar turns to red pulsing on OANS as long as it remains beyond the end of the runway. The braking distance indication turns to red
- At 80 kt, if the ROP is still active while reversers are selected at MAX, the aural warning KEEP MAX REVERSE is triggered one time.

L1	MAX REVERSE.....SELECT/KEEP	PF

Intentionally left blank

UNRELIABLE AIR SPEED INDICATION - ABOVE FL 250 - ALERT

Applicable to: ALL

Impacted DU: NONE

● **If the safe conduct of the flight is impacted:**

MEMORY ITEMS:

AP	DISCONNECT
A/THR	DISCONNECT
FD	DISCONNECT
PITCH/THRUST	5°/CLB
SPEED BRAKES	Check retracted
Level off for troubleshooting	

RISK OF UNDUE OVERSPEED WARNING

L2 *The overspeed warning is not inhibited, if the flight control computers reject the ADRs.*

L1 ● **To level off for troubleshooting:**

AP..... DISCONNECT
A/THR..... DISCONNECT
FD..... DISCONNECT

PITCH (°) / THRUST (% THR) FOR LEVEL FLIGHT

		550 t	450 t	350 t
FL	**Speed**	**Pitch (°) / Thrust (% THR)**		
FL 250-FL 290	300 kt	2.5 / 68	2 / 58	1.5 / 48
FL 300-FL 330		2.5 / 78	2 / 68	1.5 / 58
FL 340-FL 370	M 0.85	2.5 / 88	2 / 78	1.5 / 68
Above FL 370		-	2 / 88	1.5 / 78

CAUTION	If the failure is due to radome destruction, the drag will increase and therefore THR must be increased by 5%. The fuel consumption will increase by about 10%.

AIR DATA (ADRs/STBY INSTR)..... XCHECK

L2 *Crosscheck all speeds and altitudes indications.*

Alternate sources may be used to evaluate the air data:
- *GPS altitude*
- *GPS and IRS Ground Speeds, taking into account altitude and wind effect.*

Continued on the following page

UNRELIABLE AIR SPEED INDICATION - ABOVE FL 250 - ALERT (Cont'd)

L1 ■ **If at least one air data is reliable:**

RELIABLE AIR DATA..... USE

AT LEAST ONE ADR : KEEP ON

L2 *Maintain at least one ADR to ON, in order to prevent the display of the backup scales (i.e. BUSS and GPS altitude) in the case of the three ADRs failure with ISIS reliable because the ISIS data are more accurate than the backup scales data.*

L1 UNRELIABLE ADRs P/Bs..... OFF

L2 *Set unreliable ADRs to OFF, in order to prevent the fight controls operation with erroneous air data sources.*
In the case of the three ADRs failure with the ISIS reliable, the flight crew must switch off only two ADRs.

L1 ECAM ACTIONS..... PERFORM

L2 *Return to the ECAM to complete the ECAM actions (i.e. Perform the actions of the abnormal alert displayed following the ADRs switching off).*

L1 ■ **If no air data is reliable:**

ONE ADR: KEEP ON

L2 Maintain one ADR to ON, in order to prevent the display of the backup scales (i.e. BUSS and GPS altitude) on the PFD.

L1 TWO ADRs P/Bs..... OFF

L2 *Set two ADRs to OFF, in order to avoid flying normal law with erroneous air data parameters coming from ADRs.*

L3 *When the flight controls use the air data parameters coming from one ADR, there is a reversion to Alternate 2 or direct law accordingly to the remaining erroneous air data (i.e. the remaining ADR to ON and the ISIS).*

L1 ● **At Top of Descent**

Set the thrust to IDLE

FL	Pitch(°) / Thrust (%THR)
Above FL 330	-0.5 / IDLE
FL 330-FL 250	0 / IDLE

● **When below FL 250, if air data still unreliable:**

ADRs 1+2+3 P/Bs..... OFF

Note: The NAV ADR 1+2+3 FAULT alert will trigger. Complete QRH actions before performing ECAM actions.

Continued on the following page

UNRELIABLE AIR SPEED INDICATION - ABOVE FL 250 - ALERT (Cont'd)

L2 *Set all ADRs to OFF, in order to replace the PFD's normal speed scale and altitude indication by the backup scales (i.e. BUSS and GPS altitude).*

L1 SPEED.....FLY THE GREEN

L2 *Fly within the green area of the speed scale to ensure safe flight.*
For slats/flaps retraction, it is better to fly at the top of the green area of the speed scale.
Before extending the slats/flaps, it is better to fly at the bottom of the speed scale green area, and to be in straight flight.

L1 CABIN ALT MODE..... MAN
CABIN ALT TRGT.....LDG ELEVN

SPD BRK : DO NOT USE

L2 *The BUSS is tuned for the aerodynamic model with the speed brake retracted. The flight crew must not extend the speed brake because it would affect the relation between Angle of Attack and airspeed, therefore making the BUSS unreliable.*

L1 FOR NAV : USE STBY INSTRUMENTS

FMS F-PLN & PRED NOT AVAILABLE

AVOID ICING CONDs
ECAM ACTIONS.....PERFORM

L2 *Return to the ECAM to complete the ECAM actions (i.e. Perform the actions of the NAV ADR 1+2+3 FAULT alert)*

Intentionally left blank

SURV GLIDE SLOPE, GLIDE SLOPE ALERT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS (in the SURV system) detects when the aircraft descends below the glide slope by more than 1.3 dots, during an ILS approach.

Indications:

Audio



CAUTION	During night or IMC conditions, apply the procedure immediately. Do not delay reaction for analysis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered to be a caution. Take positive corrective action until the alert ceases, or until a safe trajectory is ensured.

Stabilize the aircraft on the glide slope.

- **If flight crew intentionally flies below the glide slope (i.e. a Non-Precision Approach):**

  G/S MODE.....OFF

L2 *The flight crew turns off the G/S MODE button on:*
- *The SURV/CONTROLS page of the MFD, or*
- *The SURV panel.*

SURV GO AROUND, WINDSHEAR AHEAD

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Predictive Windshear System (in the SURV system) detects windshear (predictive windshear) during the approach phase.

Indications:

Audio

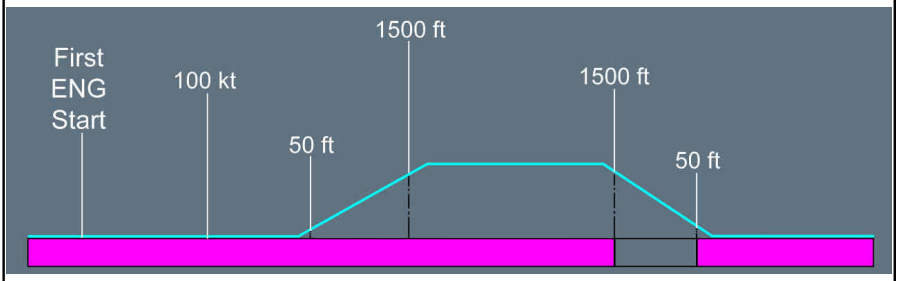


SD page



PFD

Flight Phase Inhibition:



Continued on the following page

SURV GO AROUND, WINDSHEAR AHEAD (Cont'd)

Apply the following procedure at landing, if the PWS triggers:
- The W/S AHEAD warning on the PFDs
- The associated GO AROUND, WINDSHEAR AHEAD aural alert
- The location of windshear on the ND.

● **At landing:**

L2 *Note: If the flight crew verifies and confirms that there is no risk of windshear, they may disregard the alert, provided that:*
- *There are no other signs of possible windshear conditions*
- *The reactive windshear function is operative.*

There are reported cases that specific environments (e.g. obstacles) cause the spurious triggering of predictive windshear alerts, during either takeoff or landing. However, the flight crew must always rely on all reactive windshear (i.e. WINDSHEAR) alerts.

L1 GO AROUND.....PERFORM

L2 *It is permitted to change the slats/flaps configuration, provided that the aircraft does not enter a windshear.*

L1 L/G UP.....SELECT

SRS ORDERS.....FOLLOW

L2 *If necessary, the flight crew may apply full backstick.*

Note:
- *If the autopilot is engaged, it will disengage, when the angle-of-attack goes above alpha prot.*
- *If the FD is not available, select an initial pitch attitude of 12.5 °. Then, if necessary, increase the pitch attitude, in order to minimize the decrease in altitude.*

SURV MONITOR RADAR DISPLAY

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Predictive Windshear System (in the SURV system) detects windshear (predictive windshear) during the approach phase.

Indications:

Audio

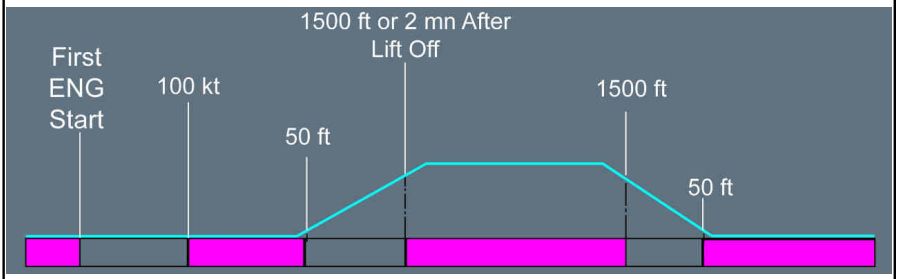


SD page



PFD

Flight Phase Inhibition:



Apply the precautionary steps, as indicated in the SUSPECTED WINDSHEAR procedure (*Refer to procedure*), if the PWS triggers:

- The W/S AHEAD caution on the PFD s
- The associated MONITOR RADAR DISPLAY aural alert
- The location of windshear on the ND .

SURV PULL UP ALERTS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS (in the SURV system) detects:
- An excessive rate of descent at low altitude (PULL UP alert), or
- A terrain collision threat ahead of the aircraft (TERRAIN AHEAD, PULL UP alert), or
- An obstacle collision threat ahead of the aircraft (OBSTACLE AHEAD, PULL UP alert).

For more information on the aural alerts, *Refer to DSC-34-20-20-20 Aural Alerts* .

Indications:

SD page



PFD

Continued on the following page

SURV PULL UP ALERTS (Cont'd)

CAUTION	During night or IMC conditions, apply the procedure immediately. Do not delay reaction for analysis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered to be a caution. Take positive corrective action until the alert ceases, or until a safe trajectory is ensured.

- **If the TAWS triggers one of the PULL UP alerts, apply the following procedure:**

AP.....DISENGAGE
PITCH.....PULL UP

Pull up to full backstick and maintain in that position.

THRUST LEVERS.....TOGA
SPEED BRAKE LEVER.....CHECK RETRACTED
BANK.....WINGS LEVEL or ADJUST

L2 *Aircraft achieve the best climb performance when the wings are as level as possible. If the "TERRAIN AHEAD, PULL UP" alert or the "OBSTACLE AHEAD, PULL UP" alert is triggered, the flight crew can initiate a turning maneuver while climbing, provided that turning is the safest action.*

L1 - **If the flight path is safe, and the GPWS warning stops:**

PITCH.....REDUCE
SPEED.....ACCELERATE

- **If the speed is above VLS, and the vertical speed is positive:**

FLAPS ZERO.....AS RQRD

SURV RESOLUTION ADVISORY ALERTS

Applicable to: ALL

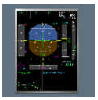
ANNUNCIATIONS

Triggering Conditions:

L2 The TCAS (in the SURV system) detects a Resolution Advisory (RA).
For more information on the aural alerts, *Refer to DSC-34-20-40-20 Aural Alerts* .

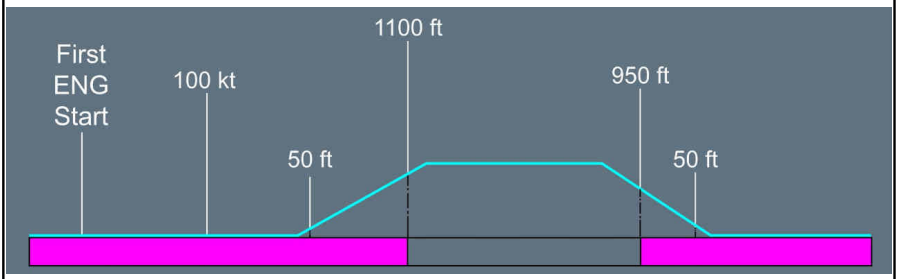
Indications:

SD page



PFD

Flight Phase Inhibition:



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SURV RESOLUTION ADVISORY ALERTS (Cont'd)

L2 There are two types of Resolution Advisories (RA):

- Preventive RA s
  A preventive RA is announced by the "MONITOR VERTICAL SPEED" aural alert. For more information on the aural alerts, *Refer to 34 / SURV / TCAS / Controls and Indicators / Aural Alerts* .
- Corrective RA s.

  A corrective RA is announced by one of the following aural alerts:
  - "CLIMB, CLIMB"
  - "CLIMB, CROSSING CLIMB, CLIMB, CROSSING CLIMB"
  - "CLIMB, CLIMB NOW, CLIMB, CLIMB NOW"
  - "INCREASE CLIMB, INCREASE CLIMB"
  - "DESCEND, DESCEND"
  - "DESCEND, CROSSING DESCEND, DESCEND, CROSSING DESCEND"
  - "INCREASE DESCENT, INCREASE DESCENT"
  - "DESCEND, DESCEND NOW, DESCEND, DESCEND NOW"
  - "MAINTAIN VERTICAL SPEED, MAINTAIN"
  - "MAINTAIN VERTICAL SPEED, CROSSING MAINTAIN"
  - "ADJUST VERTICAL SPEED, ADJUST".

  For more information on the aural alerts, *Refer to 34 / SURV / TCAS / Controls and Indicators / Aural Alerts* .

If the AP / FD TCAS mode is available, the AP / FD TCAS mode engages. For more information on the AP / FD TCAS mode availability, *Refer to DSC-22-FG-70-110-10 AP/FD TCAS Mode Availability* .
When the AP / FD TCAS mode engages, the flight crew must apply the AP / FD TCAS procedure: *Refer to AP/FD TCAS Procedure* .
If the AP / FD TCAS mode does not engage, the flight crew must apply the basic TCAS procedure: *Refer to Basic TCAS Procedure* .

Continued on the following page

SURV RESOLUTION ADVISORY ALERTS (Cont'd)

AP / FD TCAS PROCEDURE

L2 The flight crew applies this procedure, when a Resolution Advisory (RA) is triggered, and the AP / FD TCAS mode engages. The AP / FD TCAS mode follows the RA orders.
For more information on the AP / FD TCAS mode engagement following a RA , *Refer to DSC-22-FG-70-110-40-GNRA Introduction* .

L1 Always follow the RA orders, even if this results in crossing the intruders altitude, because these orders ensure the best altitude separation.

CAUTION	Be aware that the intruder may have a TCAS , and may maneuver in response to a coordinated RA order. Therefore, not following an RA order could compromise safe separation.

- **If the PF uses the Head-Up Display (HUD):**

Revert to PFD .

L2 *The HUD does not display the green and red areas of the vertical speed scale.*

L1 - **If the AP is off:**

FD ORDERS ..... FOLLOW

The AP can be engaged.

VERTICAL SPEED..... MONITOR

L2 *If a preventive RA was triggered: Check that the vertical speed remains out of the red area of the vertical speed scale.*
If a corrective RA was triggered: Check that the vertical speed gets out of the red area, and remains in the green area of the vertical speed scale.

L1

CAUTION	*If for any reason during an RA , the aircraft vertical speed does not reach the green area of the vertical speed scale. the Pilot Flying (PF) should disconnect the AP , and override the FD orders, in order to lead the aircraft vertical speed out of the red area of the vertical speed scale.* *If necessary, the PF must use the full speed range between* $V\alpha_{max}$ *and VMAX .*

- **If any "CLIMB" aural alert sounds during the final approach:**

AP / FD TCAS ORDERS .....
..... MONITOR/FOLLOW
GO-AROUND..... CONSIDER

Continued on the following page

SURV RESOLUTION ADVISORY ALERTS (Cont'd)

L2 *If the flight crew performs a go-around, the AP / FD TCAS mode disengages, and the SRS GA mode engages. The AP / FD does no longer follow the RA orders. The flight crew must follow the vertical speed indications on the vertical speed scale. The flight crew must then apply the basic TCAS procedure: Refer to PRO-ABN-NECA-34-20-570 TCAS Procedure .*

L1 Respect stall, GPWS , or windshear warning.
ATC..... NOTIFY

- **When "CLEAR OF CONFLICT" aural alert sounds:**

L2 The AP / FD TCAS mode disengages. For more information, *Refer to DSC-22-FG-70-110-40-GNCOC Introduction .*

L1 AP / FD .....MONITOR/FOLLOW
ATC.....NOTIFY
LATERAL AND VERTICAL GUIDANCE..... ADJUST

L2 *The flight crew should engage an appropriate vertical mode, or adjust the vertical speed target, in accordance with the latest ATC clearance.*

L1 SPEED.....ADJUST

L2 *The flight crew should adjust the speed target, and revert to managed speed, as appropriate.*

Continued on the following page

SURV RESOLUTION ADVISORY ALERTS (Cont'd)

BASIC TCAS PROCEDURE

The flight crew must apply the basic TCAS procedure, if a corrective RA is triggered, and the AP/FD TCAS does not engage.

- **If the PF uses the Head-Up Display (HUD):**

Revert to PFD.

L2 *The HUD does not display the green and red areas of the vertical speed scale.*

L1 Always follow RA orders, even if this results in crossing the intruders altitude, because these orders ensure the best altitude separation.

CAUTION	Be aware that the intruder may have a TCAS, and may maneuver in response to a coordinated RA order. Therefore, not following an RA order could compromise safe separation.

AP (if engaged)..... OFF
FDs..... OFF
Respond promptly and smoothly.
VERTICAL SPEED..... ADJUST or MAINTAIN

L2 *Adjust or maintain vertical speed as required, depending on the green area, and/or to avoid the red area of the vertical speed scale.*

Note: Avoid excessive maneuvers while attempting to maintain the vertical speed just outside the red area of the scale, and within the green area. If necessary, use the full speed range between $V\alpha_{max}$ and V_{max}.

L1 Respect stall, GPWS, or windshear warnings.
ATC..... NOTIFY

- **When the "CLEAR OF CONFLICT" aural alert sounds:**

ATC..... NOTIFY
LATERAL AND VERTICAL GUIDANCE..... ADJUST

L2 *Adjust the lateral and vertical guidance to resume normal navigation, in accordance with ATC clearance.*

L1 AP/FD..... AS RQRD

L2 *If necessary, reengage the AP/FD.*

Continued on the following page

SURV RESOLUTION ADVISORY ALERTS (Cont'd)

L1 ● **If any "CLIMB" aural alert sounds during the final approach:**

GO-AROUND.....PERFORM

SURV SINK RATE, SINK RATE - DON'T SINK, DON'T SINK ALERTS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS (in the SURV system) detects:
- A high rate of descent at low altitude (SINK RATE, SINK RATE alert), or
- A rate of descent during the initial climb after takeoff, or during a go-around (DON'T SINK, DON'T SINK alert).

For more information on the aural alerts, *Refer to DSC-34-20-20-20 Aural Alerts* .

Indications:

SD page



PFD

CAUTION	During night or IMC conditions, apply the procedure immediately. Do not delay reaction for analysis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered to be a caution. Take positive corrective action until the alert ceases, or until a safe trajectory is ensured.

PITCH ATTITUDE.....ADJUST
THRUST.....ADJUST

SURV TERRAIN AHEAD, TERRAIN AHEAD- OBSTACLE AHEAD, OBSTACLE AHEAD ALERTS

Applicable to: ALL

ANNUNCIATIONS

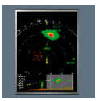
Triggering Conditions:

L2 The TAWS (in the SURV system) detects:
- A terrain collision threat ahead of the aircraft (TERRAIN AHEAD, TERRAIN AHEAD alert), or
- An obstacle collision threat ahead of the aircraft (OBSTACLE AHEAD, OBSTACLE AHEAD alert).

For more information on the aural alerts, *Refer to DSC-34-20-20-20 Aural Alerts* .

Indications:

SD page



ND

CAUTION	During night or IMC conditions, apply the procedure immediately. Do not delay reaction for analysis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered to be a caution. Take positive corrective action until the alert ceases, or until a safe trajectory is ensured.

FLIGHT PATH.....ADJUST
DESCENT.....STOP
CLIMB and/or TURN.....AS RQRD

L2 *Climb and/or turn as required, based on the analysis of information from all available instruments.*

SURV TERRAIN TERRAIN - TOO LOW TERRAIN ALERTS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS (in the SURV system) detects when:

- The aircraft approaches the terrain (TERRAIN, TERRAIN alert), or
- The aircraft approaches terrain with the landing gear up and the flaps not extended for landing, at speed above 200 kt (TOO LOW TERRAIN alert), or
- The aircraft approaches the terrain with the landing gear down and the flaps not extended for landing, at a speed above 180 kt (TOO LOW TERRAIN alert), or
- The aircraft descends towards terrain during takeoff and climb, with the landing gear up, or if the flaps are not in landing configuration (TOO LOW TERRAIN alert).

For more information on the aural alerts, *Refer to DSC-34-20-20-20 Aural Alerts* .

Indications:

SD page



PFD

CAUTION	During night or IMC conditions, apply the procedure immediately. Do not delay reaction for analysis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered to be a caution. Take positive corrective action until the alert ceases, or until a safe trajectory is ensured.

FLIGHT PATH.....ADJUST
GO-AROUND.....AS RQRD

SURV TOO LOW GEAR - TOO LOW FLAPS ALERTS

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TAWS (in the SURV system) detects when:
- The aircraft approaches the terrain with the landing gear up (TOO LOW GEAR alert), or
- The aircraft approaches the terrain with the landing gear down, the flaps not in landing configuration, at a speed below 180 kt (TOO LOW FLAPS alert).

For more information on the aural alerts, *Refer to DSC-34-20-20-20 Aural Alerts* .

Indications:

SD page



PFD

CAUTION	During night or IMC conditions, apply the procedure immediately. Do not delay reaction for analysis. During daylight VMC conditions, with terrain and obstacles clearly in sight, the alert may be considered to be a caution. Take positive corrective action until the alert ceases, or until a safe trajectory is ensured.

GO-AROUND procedure.....PERFORM

SURV TRAFFIC ADVISORY ALERT

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The TCAS (in the SURV system) detects a Traffic Advisory (TA).

Indications:

Audio



L2 If the AP / FD TCAS mode is available, the AP / FD TCAS mode arms. For more information, *Refer to DSC-22-FG-70-110-40-GNTA Introduction* .

L1 TCAS mode ..... CHECK ARMED (blue)

L2 *When the AP / FD TCAS mode arms, the flight crew must be prepared to apply the AP / FD TCAS procedure in the case of a Resolution Advisory.*
If the AP / FD TCAS mode does not arm, the flight crew must be prepared to apply the basic TCAS procedure in the case of a Resolution Advisory.

L1 ● **If the A/THR is off:**

A/THR ..... ON

L2 *The flight crew should set the A/THR ON to avoid the triggering of the AUTO FLT A/THR LIMITED alert at the A/THR activation, in the case of a Resolution Advisory.*

L1 Do not perform a maneuver based on a TA alone.

SURV WINDSHEAR AHEAD, WINDSHEAR AHEAD

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The Predictive Windshear System (in the SURV system) detects windshear (predictive windshear) during the takeoff phase.

Indications:

Audio

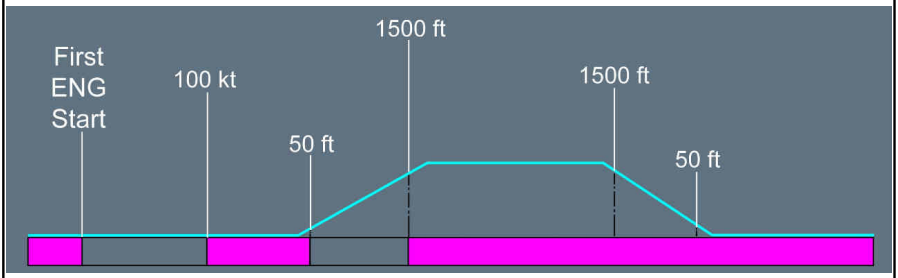


SD page



PFD

Flight Phase Inhibition:



Continued on the following page

SURV WINDSHEAR AHEAD, WINDSHEAR AHEAD (Cont'd)

Apply the following procedure on ground, before and during takeoff, if the PWS triggers:
- The W/S AHEAD warning on the PFDs
- The associated WINDSHEAR AHEAD, WINDSHEAR AHEAD aural alert
- The location of windshear on the ND.

■ On ground:

L2 Note: *If the flight crew verifies and confirms that there is no risk of windshear, they may disregard the alert, provided that:*
- *There are no other signs of possible windshear conditions*
- *The reactive windshear function is operative.*

There are reported cases that specific environments (e.g. obstacles) cause the spurious triggering of predictive windshear alerts, during either takeoff or landing. However, the flight crew must always rely on all reactive windshear (i.e. WINDSHEAR) alerts.

L1 ■ **Before takeoff:**

TAKEOFF..... DELAY

L2 *Delay takeoff, until weather conditions improve.*

L1 MOST SUITABLE RUNWAY..... SELECT

L2 *When selecting the most suitable runway, take into account the location of predicted windshear.*

L1 ■ **During the takeoff run:**

TAKEOFF..... REJECT

L2 *Predictive windshear alerts are inhibited above 100 kt, and until the aircraft reaches 50 ft.*

L1 ■ **When airborne, at initial climb:**

THR LEVERS..... TOGA

L2 It is permitted to change the slats/flaps configuration, provided that the aircraft does not enter a windshear.

L1 SRS ORDERS..... FOLLOW

L2 Note: *If the autopilot is engaged, it will disengage, when the angle-of-attack goes above alpha prot.*

SURV WINDSHEAR, WINDSHEAR, WINDSHEAR

Applicable to: ALL

ANNUNCIATIONS

Triggering Conditions:

L2 The PRIMs detect windshear (reactive windshear).

Indications:

Audio

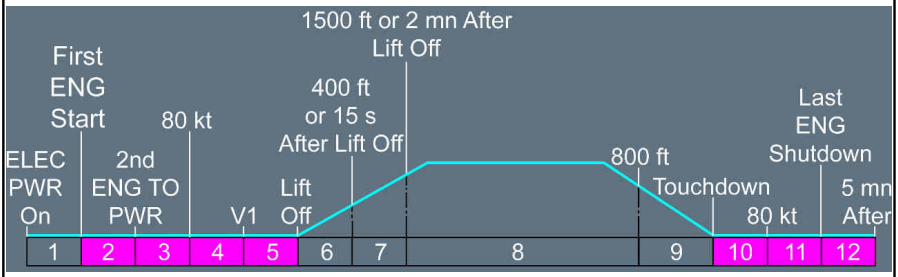


SD page



PFD

Flight Phase Inhibition:



Both PFDs display the WINDSHEAR warning, during the takeoff and landing phases. This warning is associated with a WINDSHEAR, WINDSHEAR, WINDSHEAR aural alert.

Continued on the following page

SURV WINDSHEAR, WINDSHEAR, WINDSHEAR (Cont'd)

If windshear is detected, either by the systems, or by the flight crew, apply the following recovery techniques:

■ **On ground, at takeoff:**

L2 During the takeoff roll, WINDSHEAR, WINDSHEAR, WINDSHEAR alert is inhibited. Windshear recognition is based on the flight crew observation.

L1 ● **Before V1:**

If there are significant variations in airspeed, and in airspeed trend below the indicated V1, reject the takeoff.

L2 *If windshear occurs during the takeoff roll, the aircraft may reach V1 later (or sooner) than expected. The flight crew should ensure that there is sufficient runway remaining to stop the aircraft, if necessary.*

L1 ● **After V1:**

THR LEVERS.....TOGA
REACHING VR.....ROTATE NORMALLY
SRS ORDERS..... FOLLOW

■ **When airborne, during initial climb, or at landing:**

THR LEVERS AT TOGA..... SET OR CONFIRM
AP (if engaged).....KEEP ENGAGED
SRS ORDERS.....FOLLOW

L2 *If necessary, the flight crew may apply full backstick.*

Note: - *If the autopilot is engaged, it will disengage, when the angle-of-attack goes above alpha prot.*
- *If the FD is not available, select an initial pitch attitude of 12.5 ° . Then, if necessary, increase the pitch attitude, in order to minimize the decrease in altitude.*

L1 DO NOT CHANGE CONFIGURATION (SLATS/FLAPS, GEAR) UNTIL OUT OF WINDSHEAR.

CAREFULLY MONITOR FLIGHT PATH AND SPEED.

RECOVER SMOOTHLY TO CLIMB, WHEN OUT OF WINDSHEAR.

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SMOKE/FIRE PROCEDURE

Applicable to: ALL

L2 If smoke is detected in the Flight Crew Rest Compartment (FCRC):
- A single low chime sounds for 30 s
  After the single low chime, a repetitive triple chime sounds every 30 s.
- The smoke location message comes on and the red indicator light flashes on the Attendant Indication Panel (AIP)
- The FCRC lighting comes on at 100 % intensity.
- In the cockpit, the SMOKE FLT REST SMOKE alert is triggered.

L1 COMMUNICATION WITH THE FLIGHT CREW IN THE COCKPIT..... MAINTAIN
Search for smoke and fire in the FCRC.

L2 *Look at the bunks, closets, and stowage compartments.*

L1 ● **If there is no smoke or fire in the FCRC:**
SMOKE RESET pb ..... PRESS

L2 *By pressing the SMOKE RESET pb on the FAP or on the Additional Attendant Panel (AAP), it:*
- *Stops the chimes in the cabin*
- *Removes the visual alerts on the respective Area Call Panels (ACP) and AIPs.*

Note: The smoke indicator and the SMOKE RESET pb on the FAP smoke page remain displayed until the smoke has dissipated.

L1 ● **If there is smoke or fire in the FCRC:**
BASIC FIRE-FIGHTING PROCEDURE..... APPLY

L2 *Take the nearest appropriate fire extinguisher.*
Consider the use of a Protective Breathing Equipment (PBE).

L1 DEDICATED CREWMEMBER.....
..... MONITOR FCRC FOR THE REMAINDER OF THE FLIGHT

DEPRESSURIZATION

Applicable to: ALL

L2 If a depressurization occurs:

- A continuous high chime sounds
- The oxygen masks automatically drop down from the oxygen container, when the cabin altitude is more than 14 000 ft.

L1 OXYGEN MASKS..... ON
SEAT BELT..... FASTEN
CREW REST OCCUPANTS.....STAY INSIDE

L2 *Stay inside until the aircraft reaches a safe flight level.*

LATERAL ASYMMETRY MONITORING

Applicable to: ALL

Like all other aircraft, the A380 may have a small lateral asymmetry in flight.
In cruise, when the autopilot is engaged, the flight control laws compensate this possible lateral asymmetry via rudder and aileron deflection, while optimizing fuel burn and ensuring passenger comfort.

The autopilot achieves this optimized compensation by:
- Setting a small sideslip and bank angle up to a comfort limit

  Note: *The effect on drag of a small sideslip and bank angle is lower than the effect on drag that the rudder and aileron deflection would have if the autopilot targeted zero sideslip and zero bank angle.*

- The use of ailerons to keep the roll at the comfort limit.

Therefore, in cruise, the flight crew may observe a small sideslip, bank angle, and aileron deflection due to the compensation of a lateral asymmetry.

Note: *At high latitudes, even if perfectly symmetric, the aircraft may have an additional bank angle of ± 0.2 ° , due to the Coriolis acceleration. If the aircraft has a small lateral asymmetry in flight, the Coriolis effect partially compensates or amplifies the bank angle.*

The flight crew can use the following guidelines in order to define whether an observed asymmetry is excessive or not. Based on this monitoring and if appropriate, the flight crew should report the lateral asymmetry in the logbook.

FLIGHT CONDITIONS

In order to have a reliable asymmetry monitoring, the aircraft should be in the following conditions:
- There is no turbulence
- The aircraft flies straight and level at the cruise Mach (not higher than M 0.86) and close to the optimum flight level
- The autopilot is engaged and the lateral guidance mode is NAV
- The engine thrust is symmetrical

- The ECAM did not trigger any alert associated with the fuel system
- On the FUEL SD page:
  - There are no amber-underlined fuel quantities, and
  - The fuel imbalance in the wing tanks is not greater than:
    - 1 t between a feed tank and its opposite feed tank
    - 1.4 t between both inner tanks
    - 1.4 t between both mid tanks
    - 0.2 t between both outer tanks.

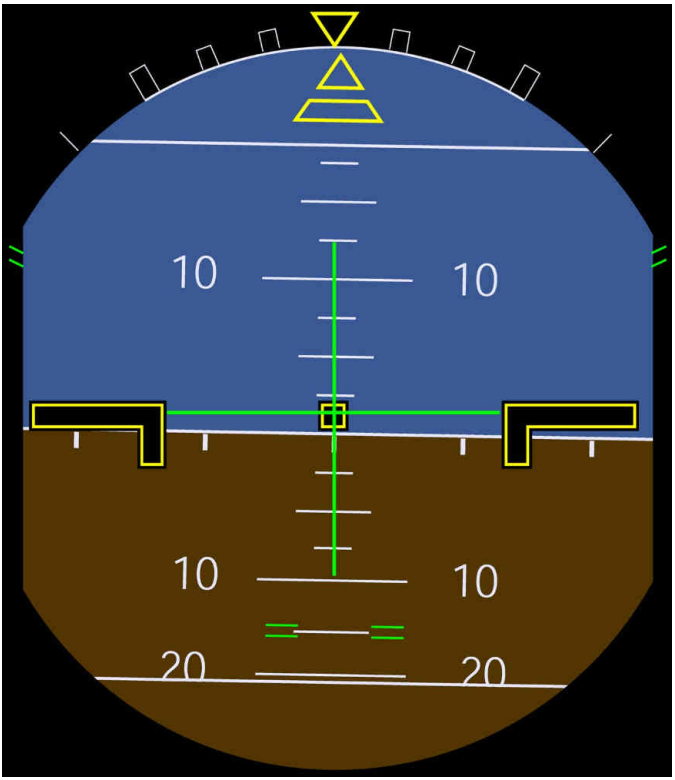
Note: *If the fuel imbalance is greater for at least one pair of tanks, the monitoring is not reliable. In this case, it is recommended to perform the monitoring later during the flight, when the fuel is better balanced.*

If the aircraft is in the above-listed conditions, the flight crew checks the bank angle on the PFD , and the aileron deflection on the F/CTL SD page:

BANK ANGLE ON PFD

Normal operations of the aircraft in stable horizontal flight may lead to a stabilized (left or right) bank angle of 0.7 ° , as illustrated below:

Bank Angle on PFD



If the stabilized bank angle (left or right) is higher than the bank angle on the illustration (0.7 °), the flight crew should:

- Press the ACMS TRIGGER pb , on the center pedestal

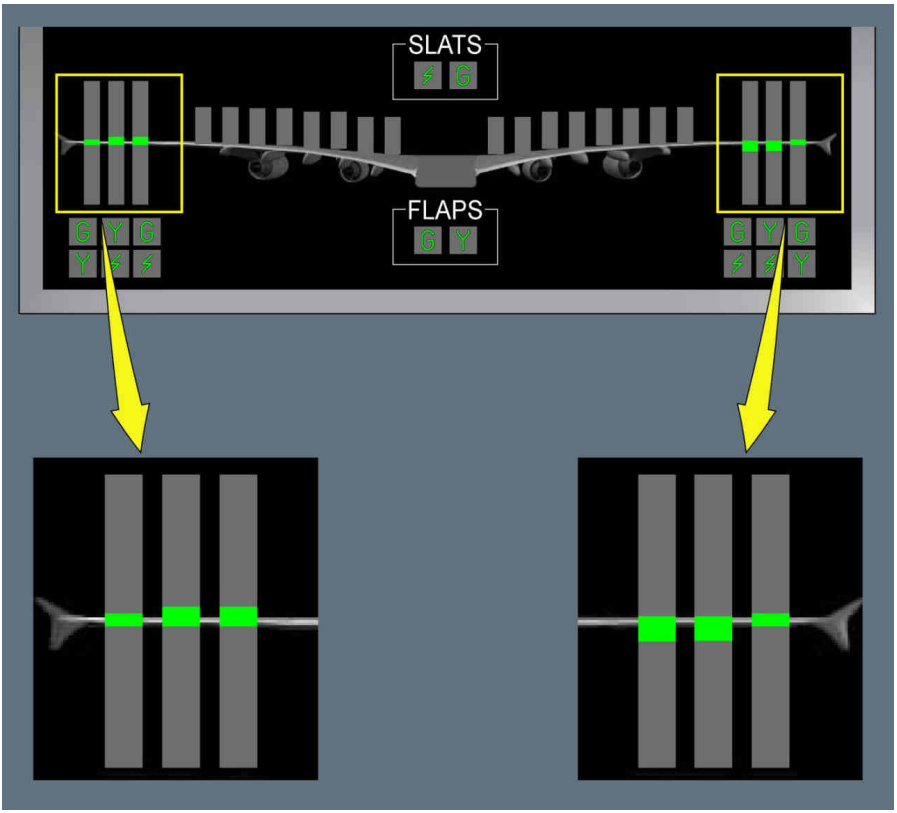
  Note: *The flight crew can disregard the reports that are automatically printed.*

  For more information, *Refer to ACMS TRIGGER pb* .
- Report the event in the logbook.

AILERON DEFLECTION ON THE F/CTL SD PAGE

Normal operations of the aircraft in stable horizontal flight may lead to a stabilized aileron deflection, as illustrated below:

Aileron Deflection on F/CTL SD Page



If the stabilized aileron deflection on the F/CTL SD page exceeds the deflection that is indicated on the illustration here above, the flight crew should:

- Press the ACMS TRIGGER pb , on the center pedestal

  Note: *The flight crew can disregard the reports that are automatically printed.*

  For more information, *Refer to ACMS TRIGGER pb*
- Report the event in the logbook.

REFUEL WITH ONE ENGINE RUNNING

Applicable to: ALL

Refuel with one engine running should only be performed when there is no available external power unit, and when the APU is inoperative.
If only one engine is running, the electrical power does not supply some of the transfer pumps. Therefore the automatic ground transfer is not available, and if necessary, the flight crew should apply the manual transfer when the refuel is completed.

Use the left-hand side fuel coupling that is opposite of the running engine.
ALL PASSENGERS.....DISEMBARK
AIRPORT AUTHORIZATION..... OBTAIN
The airport fire protection services should be near the aircraft during the entire refueling procedure.
Consider positioning the aircraft downwind, and at a location where the ground slope is negligible.
PARK BRK..... ON
Check the park brake pressure on the BRK PRESSURE indications.
ENG 3.....GROUND IDLE
L2 *Engine 3 enables the electrical supply of more avionics equipments and to pressurize the parking brake.*
L1 GEN 3 CONNECTED.....CHECK
Place the fuel truck under the extremity of the left wing.
The fuel truck pressure should not exceed 50 PSI.

If the refuel operations are in progress:
- Do not start engines 1, 4, 2
- Do not shut down engine 3.

AUTOMATIC or MANUAL REFUEL PROCEDURE.....APPLY
The refuel system must be fully operative.

OPERATIONS MONITORING DURING THE ENTIRE REFUEL PROCEDURE

FUEL TRUCK SHUTOFF VALVE.....MONITOR
Ensure that the fueling company controls permanently the emergency fuel shutoff devices.
One flight crewmember must be in the cockpit to monitor the systems and the running engine.
One qualified ground crewmember must be near the REFUEL panel to operate the controls switches, if the refuel is performed from the REFUEL panel. If the refuel is performed from the cockpit, the flight crew sets to ON the REFUEL pb-sw on the overhead panel to activate the refuel operations.

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DEFINITION OF ICING CONDITIONS

Applicable to: ALL

Icing conditions exist when OAT on the ground and for takeoff, or TAT in flight is 10 °C or below and visible moisture in any form is present (such as clouds, fog with visibility of one nautical mile or less, rain, snow, sleet or ice crystals).

Note: Ice crystals can be encountered near convective weather.

Icing conditions also exist when the OAT on the ground and for takeoff is 10 °C or below when operating on ramps, taxiways, or runways where surface snow, ice, standing water or slush may be ingested by the engines or freeze on engines, nacelles or engine sensor probes.

OPERATIONS IN ICING CONDITIONS

Applicable to: ALL

FLIGHT IN ICING CONDITIONS

ENGINE ANTI-ICE

Engine anti-ice must be ON during all ground and flight operations, when icing conditions exist or are anticipated, except during climb and cruise when the SAT is below –40 °C .
Engine anti-ice must be ON before and during a descent in icing conditions, even if the SAT is below –40 °C .

WING ANTI-ICE

The flight crew may use wing anti-ice either to prevent the ice accretion, or to remove an ice accumulation from the wing leading edge.
The flight crew should turn wing anti-ice ON whenever there is an indication that the airframe is icing up. The indication may be an accumulation of ice on the visual ice indicator (between the cockpit windshields), or when the A-ICE SEVERE ICE DETECTED caution triggers.

CAUTION	1. The flight crew should avoid extended flight in icing conditions with the slats extended. 2. If there is evidence of significant ice accretion and to take into account ice formation on non heated structure, the minimum speed should be: - Green Dot in clean configuration - VLS in CONF 1, 2, 3 and FULL 3. If there is evidence of ice accretion on de-iced parts of the airframe (WING ANTI ICE inoperative (*Refer to PRO-ABN-ECAM-10-30-110 A-ICE L(R) WING VLV CLOSED* , *Refer to PRO-ABN-ECAM-10-30-100 A-ICE L(R) WING VLV PRESS LO*)), the minimum speed should be: - Green Dot in clean configuration - VLS in CONF 1, 2, and 3 (Landing configuration is CONF 3)

GROUND OPERATIONS IN ICING CONDITIONS

- For ground operations on contaminated runways: *Refer to Fluid Contaminated Runways*
- For aircraft preparation and/or securing the aircraft in cold weather: *Refer to Cold Weather Procedures*
- For engine operations on ground: *Refer to Standard Operating Procedures*

THRUST APPLICATION ON BRAKES

Applicable to: ALL

The braking system is not designed to hold the aircraft in a stationary position when a high thrust level is applied on at least one engine.

The thrust level from which the aircraft starts to move (with parking brake set to ON or with manual braking applied) depends on several factors such as:

- Ground surface conditions
- Environment
- The aircraft weight
- Etc ...

During ground procedures that require a thrust increase with braking, the flight crew must ensure that the aircraft remains stationary, and one flight crew must keep his/her hands on the thrust levers to be ready to immediately retard the thrust levers to IDLE if the aircraft starts to move.

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TAWS

Applicable to: ALL

During cockpit preparation, the flight crew must set all TAWS settings to ON, by selecting DEFAULT SETTINGS on the SURV/CONTROLS page of the MFD.

The flight crew must maintain the default settings during all phases of flight, except in the following conditions:

- If airport data is missing from the TAWS database, and if the aircraft is within 15 nm from that airport, or

L2 When airport or terrain data is not yet included in the database, the TCF envelope cannot be defined. The TAWS function uses the lowest map resolution, due to the fact that no airport is detected. Therefore, the TAWS may trigger early and unexpected TAD alerts.

L1 - For specific approach procedures that have been identified as potentially producing erroneous terrain alerts.

● **In this case, apply the following procedure:**

TERR SYS button.....OFF

L2 *Set the TERR SYS button to OFF on the SURV/CONTROLS page of the MFD.*
The Terrain Awareness and Display (TAD) and Terrain Clearance Floor (TCF) modes are inhibited.

TCAS

Applicable to: ALL

The Traffic Collision Avoidance System (TCAS) triggers the following aural and visual alerts:

- Traffic Advisory (TA)
  A TA indicates a possible collision threat.
- Resolution Advisory (RA).
  A RA indicates that there is a high threat of collision.

For more information on the TCAS , *Refer to DSC/34/TCAS* .

OPERATION RECOMMENDATIONS

In order to avoid RA s triggering, the flight crew should limit the vertical speed during the last 2 000 ft of a climb or a descent.

L2 *The flight crew should limit the vertical speed to 1 500 ft/min during the last 2 000 ft of a climb or a descent, particularly when the other aircraft converges in altitude and attempts to level off 1 000 ft above or below the altitude target.*

L1 The flight crew should manually select TA ONLY mode, if:
- There is an engine failure
- The aircraft is dispatched with the landing gear down
- Operators have identified specific airports or procedures, for which RA s that are not appropriate may be triggered: For example, parallel runways that are next to each other, converging runways, or low terrain along the final approach.

For more information on the procedures, in the case of TCAS alert:
- *Refer to PRO/ABN/34-Surveillance/Traffic Advisory Alert*
- *Refer to PRO/ABN/34-Surveillance/Resoluation Advisory Alert* .

For additional training-oriented information, *Refer to FCTM/SI-60-GTECH General* .

ADS-B

Applicable to: ALL

AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)

In some cases, the ATC ground stations can receive non valid data from the ADS-B function. Therefore, the air traffic controller may ask the flight crew to stop the transmission of the ADS-B data (e.g. the air traffic controller requests "STOP ADS-B TRANSMISSION" or "STOP ADS-B ALTITUDE TRANSMISSION").
The flight crew cannot switch off the ADS-B automatic data transmission independently of the XPDR. An operative XPDR is mandatory to maintain correct TCAS operations.
The flight crew must refer to local Aeronautical Information Publication (AIP) to apply alternate procedure when the air traffic controller requests to stop ADS-B transmission.

APU START ON BATTERIES

Applicable to: ALL

The flight crew must apply this procedure when the APU is started on ground using the batteries.

C/B 2WF, C/B 2WC, C/B 4WF, C/B 2WD1, C/B 2WD4 [Emergency Supply Center in upper avionics bay].....CHECK PUSHED

L2 *When only the batteries supply the electrical network, the power supply of the APU SQUIB cannot be verified during the fire test. As a result, the flight crew must ensure that the circuit breakers (C/B) that protect the power supply of the APU fire detection and extinguishing systems are correctly engaged.*

The circuit breakers (C/B) are located on the Emergency Supply Center:
- *Right door: Position of the C/Bs is: C/B 2WF (2060), C/B 2WC (2169), C/B 4WF (2160)*
- *Left door: Position of the C/Bs is: C/B 2WD1 (0349), C/B 2WD4 (0344).*

L1 DISPLAY SD ON MFD: PRESS 3 TIMES THE DU RECONF pb

L2 *When only the batteries supply the electrical network, only the MFD display on the CAPT side and the EWD display are available. Therefore, the flight crew must press the DU RECONF pb (3 times) on the CAPT side, to display the SD page on the MFD display .*

L1 APU SD page..... SELECT

L2 *When only the batteries supply the electrical network, to select the APU SD page, the flight crew must press and maintain the ALL pb on the ECP until the APU SD page appears.*

L1 APU MASTER SW pb-sw .....ON
APU START pb .....ON

L2 *Note: If the APU start failed, Refer to APU Start Limitation.*

L1 ● **When the APU is AVAIL**
Fire TEST pb ..... PRESS

L2 *When the aircraft is supplied by batteries, the APU SQUIB light is not powered. In this case, if the TEST pb is pressed, the APU SQUIB will not come on. Therefore, when the APU is available, the flight crew must perform the fire test to verify the availability of the fire extinguishing system.*

L1 SOP..... RESUME

L2 *After APU start, resume normal SOP, Refer to PRO-NOR-SOP-40-GOIS OIS Preparation_OIS Start .*

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MANUAL ENGINE START

Applicable to: ALL

OVERVIEW

The flight crew normally uses automatic starting to start an engine.

However, a manual starting can enable to start an engine when an automatic start is aborted due to:

- Degraded bleed performance due to hot conditions, or at high-altitude airfields, or
- An engine with a reduced EGT margin in hot conditions or at high-altitude airfields, or
- Low performance of the external pneumatic power units.

The flight crew must closely monitor the manual start sequence due to the FADEC authority that is reduced compared with an automatic engine start.
For more information on engine starting in manual mode, *Refer to DSC-70-80-30-30 Manual Starting* .
For additional training-oriented information, *Refer to FCTM/NO-80 Manual Engine Start* .

PROCEDURE

THR LEVERS ..... IDLE

CAUTION	*The engines start regardless of the thrust lever position. If the thrust levers are not set to IDLE, the thrust rapidly increases to the corresponding thrust lever position, causing a hazardous situation.*

ENG START selector ..... NORM THEN IGN START

The ENG SD page appears, and all pack valves close.

Note: After 30 s , if the ENG MAN START pb-sw is not set to ON, the pack valves open again.

ENG MAN START pb-sw .....ON

Do not set the ENG MAN START pb-sw to ON before the EGT value appears on the ENG SD page.

- **On the ENG SD page:**
  START VALVE.....CHECK IN-LINE
  OIL PRESSURE INCREASE.....CHECK
  N2 INCREASE .....CHECK

- **When N2 is at or above 20 % for 20 s :**
  ENG MASTER lever .....ON
  CHRONO..... START
  The F/O starts timing in order to monitor the light-up delay.

- **On the ENG SD page:**
  IGNITERS A AND B INDICATIONS..... CHECK
  FF INCREASE ..... CHECK
  - **20 s maximum after ENG MASTER lever is set to ON:**
    N1 AND EGT INCREASE ..... CHECK

- **When N2 is at, or above 59 % :**
  - **On the ENG SD page:**
    IGNITER INDICATION.....CHECK OFF
    START VALVE.....CHECK CROSS LINE
    MAIN AND SECONDARY ENGINE PARAMETERS.....CHECK NORMAL

ENG MAN START pb-sw ..... OFF
ENG START selector .....NORM

ENGINE START WITH GROUND PNEUMATIC POWER

Applicable to: ALL

BEFORE CONNECTING GROUND PNEUMATIC POWER

PACKS 1 & 2.....OFF

L2 *Packs are set to off to prevent any possible contamination of the packs by the ground pneumatic power.*

L1 BEFORE ENGINE START

APU BLEED pb-sw ..... OFF

L2 *The APU BLEED pb-sw is set to off to prevent multiple bleed sources that may result in adverse effect on the bleed system.*

L1 ALL ENG BLEED pb-sw ..... OFF

L2 *Simultaneous use of the external pneumatic power and the engine bleed is prohibited to prevent any adverse effect on the bleed system.*

L1 EXT PNEUMATIC PWR.....CONNECT

L2 *Two ground pneumatic units may be used in parallel, if the pressure/flow relation is expected to be marginal.*

L1 BLEED PRESS > 25 PSI.....CHECK

L2 *The recommended starter air supply pressure is 25 PSI, when the start valve is open.*

L1 WHEN CLEARED TO START

ENGINE 1 OR 2..... START

Use the normal engine start procedure.

L2 *For any operational reason, any engine can be started first.*

L1 **FOR OTHER ENGINES START**

If the external electrical power supplies the aircraft (e.g. the engines are started with the ground pneumatic power because the APU is inoperative), start a second engine before disconnecting the external electrical power.

L2 This ensures that the full aircraft network is supplied.

L1 ■ **If ground pneumatic power is used to start the other engines:**

ENGINE (ONE BY ONE).....START

Use the normal engine start procedure.

L2 *Start the engines one by one, if ground pneumatic units air supply pressure is not sufficient.*

L1 EXT PNEUMATIC PWR.....DISCONNECT

■ **If the CROSSBLEED ENGINE START procedure is used to start the other engines:**

EXT PNEUMATIC PWR.....DISCONNECT

L2 *The simultaneous use of the external pneumatic power and the engine bleed is prohibited.*

L1 ENG (AVAIL) BLEED.....ON
XBLEED.....AUTO
SECOND ENGINE.....START

It is recommended to start the engine on the same side. With one engine at idle, the starter air supply pressure shall be between 28 to 30 PSI, which is sufficient to start another engine. Therefore, it is not necessary to increase the thrust of the supplying engine. The flight crew can keep the thrust lever of the running engine at idle detent.

● **When two engines are avail:**

ENG (AVAIL) BLEED.....ON
OTHER ENGINES.....START

The flight crew can keep the thrust lever of the running engines at idle detent. The bleed air pressure is sufficient to start the two remaining engines at the same time.

AFTER ALL ENGINES START

ALL ENG BLEEDS.....ON
PACKS 1 & 2.....ON

CROSSBLEED ENGINE START

Applicable to: ALL

CAUTION	The simultaneous use of engine bleed supply and external pneumatic power supply is prohibited.

EXT PNEUMATIC PWR.....DISCONNECT

BEFORE START

ALL ENG BLEEDS.....ON
X BLEED.....AUTO

WHEN CLEARED TO START

SECOND ENG.....START

It is recommended to start the engine on the same side. With one engine at idle, the starter air supply pressure shall be between 28 to 30 PSI, which is sufficient to start another engine. Therefore it is not necessary to increase thrust of the supplying engine. The thrust lever of the running engine can be kept at the idle detent.

- **When two engines are avail:**
  OTHER ENG_S .....START

  The thrust lever of the running engines can be kept at the idle detent. The bleed air pressure is sufficient to start the two remaining engines at the same time.

- **When all engines are started:**
  PACK 1+2.....ON

START VALVE MANUAL OPERATION

Applicable to: ALL

Advise ground crew to prepare for manual start valve operation.

WARNING	Before starting an engine with manual operation of the start valve, the adjacent engine must be shutdown to ensure the security of the ground crew. The access to the start valve of the affected engine may be in the danger area of the adjacent running engine.

RMP CAB .....SELECT

The flight crew can also use the cockpit handset to establish communication with ground crew on the engine.

COM WITH GND PERSONNEL.....ESTABLISH

- **When ground crew is ready:**
  ENG START selector .....IGN START
  ENG (AFFECTED) MASTER sw .....ON
  START VALVE.....REQUEST OPEN

  The ground crew must maintain the valve in the OPEN position until the engine is started. If not, the start valve closes.

- **When N2 is at 58%:**
  START VALVE.....REQUEST CLOSE
  Resume normal procedure.

ENGINE START WITH ELECTRICAL EXTERNAL POWER

Applicable to: ALL

Start two engines before disconnecting the external electrical power.

L2 *This ensures that the full aircraft network is supplied.*

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GROUND ICE SHEDDING PROCEDURE IN CASE OF FREEZING FOG

Applicable to: ALL

OVERVIEW

When taxiing in freezing fog conditions, if temperature is less than +3 °C (37 °F), ice may accumulate on the engines fans.
The ice accretion depends on the total taxi time during which the engines are running on ground, at or around idle (e.g. during taxi) in freezing fog conditions.
The total taxi time is the cumulative time of the taxi-in time of the previous flight and the taxi-out time of the next flight, provided the freezing fog or icing conditions persisted between taxi-in and taxi-out.
In order to shed the ice, the flight crew must apply the following procedure at least every 30 min of total taxi time.

TAXI-IN

Because it is necessary to determine the remaining taxi-out time that is allowed for the next flight, the flight crew must record in the logbook the taxi-in time in freezing fog conditions.

TAXI-OUT

It is recommended to estimate with the ATC the duration of the taxi-out time in order to assess the total taxi time (i.e. taxi-in + taxi-out).
The flight crew must take into account the taxi-in time in freezing fog conditions only if the ground crew did not inspect engine icing and/or did not manually deice the engine in accordance with AMM .
If the ground crew inspected engine icing and/or manually deiced the engine in accordance with the AMM , the flight crew can consider the total taxi time of 30 min as available for the taxi-out time.
Additionally, the flight crew must assess if the ground surface and the environment permit the application of the procedure, specifically with regards to:

- Slippery runway surfaces
- Jet blast, *Refer to PRO-NOR-SOP-80 Ground Run Up - Danger Areas*
- Snow and ice ingestion on the edge of the taxiway
- Airport noise restrictions

● **If the total taxi time is expected to be less than 30 min :**

● **Apply the following ice shedding procedure, if ground surface and environment permit, within 5 min prior takeoff or when lined up, just prior takeoff:**
ATC..... NOTIFY
PARK BRK or brake with pedals .....
..... ON

THRUST LEVERS..... 60 % N1 momentarily

Accelerate the engines momentarily for a short run-up to 60 % N1.
Apply the thrust on two symmetric engines at a time (i.e. 1 and 4, 2 and 3).

CAUTION	*Pay particular attention to the aircraft movement during this procedure. If during thrust increase, the aircraft starts to move, immediately retard the thrust levers to IDLE.*

If the aircraft moves, apply the thrust on only one engine at a time.

- **If the total taxi time is expected to be more than 30 min :**
  - **Apply the following ice shedding procedure, if ground surface and environment permit, at least every 30 min of total taxi time:**

ATC..... NOTIFY
PARK BRK or brake with pedals ..... ON
THRUST LEVERS..... 60 % N1 momentarily

Accelerate the engines momentarily for a short run-up to 60 % N1.
Apply the thrust on two symmetric engines at a time (i.e. 1 and 4, 2 and 3).

CAUTION	*Pay particular attention to the aircraft movement during this procedure. If during thrust increase, the aircraft starts to move, immediately retard the thrust levers to IDLE.*

If the aircraft moves, apply the thrust on only one engine at a time.

  - **When lined up, just before takeoff:**

ATC..... NOTIFY
PARK BRK or brake with pedals ..... ON
THRUST LEVERS..... 60 % N1 momentarily

Accelerate the engines momentarily for a short run-up to 60 % N1.
Apply the thrust on two symmetric engines at a time (i.e. 1 and 4, 2 and 3).

CAUTION	*Pay particular attention to the aircraft movement during this procedure. If during thrust increase, the aircraft starts to move, immediately retard the thrust levers to IDLE.*

If the aircraft moves, apply the thrust on only one engine at a time.

- **If the preceding ice shedding procedure cannot be applied within 30 min of total taxi time (e.g. ground surface and environment does not permit):**

  Request that ground crew inspects engine icing and if necessary manually deices the engine in accordance with the AMM .

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Overview

OVERVIEW

Applicable to: ALL

For flight operations in icing conditions, *Refer to PRO-SUP-30-A Operations in Icing Conditions* .
For ground operations on contaminated runways, *Refer to PRO-SPO-FCR Taxi* .
For ground operations in freezing fog, *Refer to PRO-SUP-70-20 Ground Ice Shedding Procedure In Case Of Freezing Fog* .
For altitude correction in low temperature conditions during approach, *Refer to PER-OPD-ATR Altitude Temperature Correction For Low Altitude Use* .
In cold weather conditions, the flight crew must use the cold weather procedures for the preparation, and ground operation of the aircraft.
Depending on the deicing equipment available at the airport (fin partially deiced), the flight crew must use a specific flight preparation procedure (*Refer to PRO-SUP-91-10-10 Fin partially deiced*).
When the cold weather procedures are performed, the flight crew can continue to operate the aircraft according to the standard operating procedures.

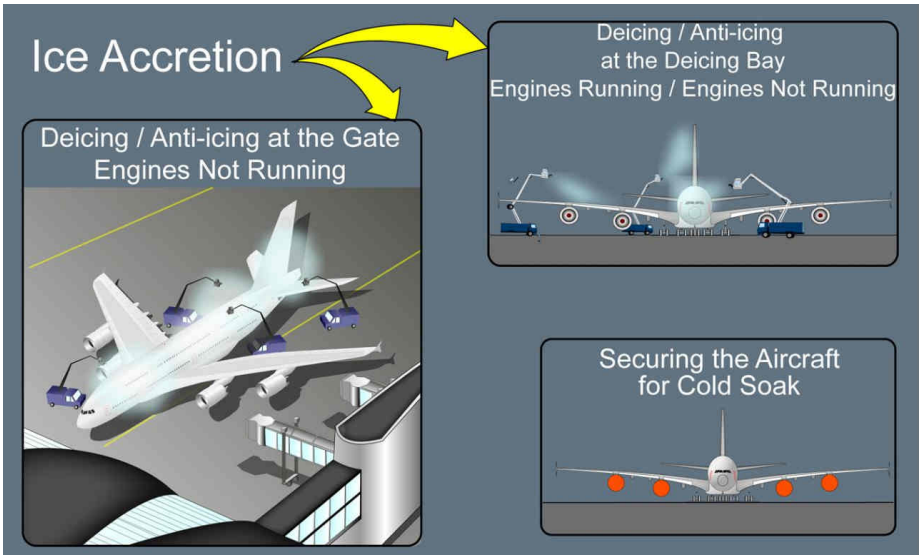
Ice accretion can occur, when:
- The air temperature is below, or near 0 °C , with precipitation, or condensation
- The aircraft is exposed to moisture, and the aircraft has been:
  - Cold soaked during a flight at high altitude, or
  - Refueled with cold fuel, or
  - Exposed to low overnight temperatures.

In one of these situations, and depending on the airport, the flight crew must:
- Deice/anti-ice the aircraft at the gate, with no engine running, or
- Taxi to the deicing bay for deicing/anti-icing with engines running, or
- Taxi to the deicing bay for deicing/anti-icing with engines not running.

Note: - *In cold weather conditions, the crewmembers should maintain the doors closed as often as possible, in order to avoid disturbance of the temperature regulation in the cockpit and in the cabin areas near the doors.*
- *The safety exterior inspection, the preliminary cockpit preparation, the exterior inspection, and the cockpit preparation procedures for cold weather, are the same for the deicing/anti-icing at the gate, and for the deicing/anti-icing at the deicing bay.*

After the flight, the aircraft must be secured for cold soak.

Cold Weather Conditions



Deicing/Anti-icing at the Gate - Engines Not Running

SAFETY EXTERIOR INSPECTION

Applicable to: ALL

SAFETY EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the safety exterior inspection SOP, Refer to associated procedure .

- **In addition, apply the following procedure:**

  APU AIR INTAKE..... CLEAR OF ICE AND SNOW

  The APU air intake is visible behind the horizontal stabilizer, on the RH side of the aircraft.

  PACK RAM AIR INLET AND PACK RAM AIR OUTLETS.....
  .....CLEAR OF ICE AND SNOW

  OUTFLOW VALVE..... CLEAR OF ICE AND SNOW

When the APU air intake, the pack ram air inlet and outlets, and the outflow valve are not clear of ice and snow, request for deicing, as necessary.

PRELIMINARY COCKPIT PREPARATION

Applicable to: ALL

PRELIMINARY COCKPIT PREPARATION SOP..... PERFORM

For the detailed description of the cockpit preparation SOP, Refer to associated procedure .

- **In addition, apply the following procedure:**

  PROBE/WINDOW HEAT P/B..... ON

  When no engine is started, window heating operates when the PROBE/WINDOW HEAT pb-sw is set to ON.

EXTERIOR INSPECTION

Applicable to: ALL

EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the exterior inspection SOP, Refer to associated procedure .

- **During exterior inspection, apply the following procedure:**

  SURFACES..... CLEAR OF FROST, ICE, AND SNOW

  The following surfaces must be cleared of frost, ice, and snow:
  - *Leading edges and upper surfaces of the wings*
  - *Vertical and horizontal stabilizers*

- *All control surfaces*
- *Slats and flaps.*

Thin hoarfrost is acceptable on the upper surface of the fuselage. On the lower side of the wing tank area, a layer of frost thinner than 3 mm (0.12 in) does not penalize aircraft performance during takeoff.

Note: Thin hoarfrost is a white crystalline deposit that develops uniformly on the exposed aircraft surfaces during cold and cloudless nights. Below the hoarfrost layer, it is possible to distinguish the surface features (e.g. lines or markings).

EQUIPMENT..... CLEAR OF FROST, ICE, AND SNOW

The following equipment must be cleared of frost, ice, and snow:
- *Landing gear equipment: Lever locks, tires, and landing gear doors*
- *Engine inlets, inlet lips, fans (check that the fans can rotate), spinners, fan exhaust ducts, reverser equipment*
- *Drains, bleeds, probes, (pitots, static ports, TAT sensors, angle-of-attack sensors)*
- *Fuel tank ventilation*
- *Radome*
- *Commercial water supply must not be frozen, and must have been refilled. Before cold soak, the water supplies must be emptied.*
- *Air/hydraulic heat exchanger inlet.*

COCKPIT PREPARATION

Applicable to: ALL

COCKPIT PREPARATION SOP.....PERFORM

For a detailed description of the cockpit preparation SOP, Refer to associated procedure .

DEICING/ANTI-ICING AT THE GATE

Applicable to: ALL

The captain must decide whether or not to deice/anti-ice the aircraft, and to repeat the operation, as necessary.
The flight crew must ensure that the ground personnel use deicing/anti-icing fluids, in accordance with the applicable Operator's requirements, and with the Aircraft Maintenance Manual instructions.

CAUTION	- Check that the HP or LP ground connectors do not supply external air to the aircraft - If anti-icing must be performed after deicing, the ground personnel must deice the surfaces with a hot fluid mixture before applying a new layer of anti-icing fluid - Avoid indiscriminate use of deicing/anti-icing fluid, or its ingestion by the engine or the APU - Do not move slats or flaps, or flight control surfaces if they are not free of ice - The aircraft must be deiced/anti-iced symmetrically: Both sides of the aircraft must be deiced/anti-iced completely.

Note: *When possible, do not disconnect the external power units until the aircraft is thoroughly deiced. If the external power units have to be disconnected in order to move the aircraft, reconnect the external power units before turning the APU off.*

● **BEFORE FLUID SPRAYING:**

WINDOWS & DOORS..... CLOSE
GEAR PINS and COVERS.....REMOVE
COMMUNICATION WITH GROUND PERSONNEL..... ESTABLISH
PARK BRK.....ON
APU BLEED..... OFF

● **If at least two external power units electrically supply the aircraft:**

APU MASTER SW..... OFF

L2 *If the external power units are not available, the flight crew can maintain the APU on in order to electrically supply the aircraft.*

L1 DITCHING pb ..... ON

L2 *Setting the DITCHING pb to ON closes the following:*

L3
- *The outflow valves*
- *The overboard valve*
- *Both pack valves*
- *All the cargo isolation valves*
- *The pack ram air inlet and outlets*
- *The two emergency RAM air inlets.*

L1 *This prevents the deicing fluid from entering the aircraft.*
All cabin fans stop.
The avionics ventilation remains available, when the avionics ventilation blowing fans are operative.

MAXIMUM 30 MIN WITH DITCHING P/B ON

On ground, with passengers on board, it is not recommended to exceed 30 min without air conditioning, because passenger comfort may be affected.

- **When the aircraft is ready for spraying:**

  FLUID SPRAYING.....REQUEST

- **AFTER FLUID SPRAYING:**

DITCHING pb .....OFF
OUTFLOW VALVES.....CHECK OPEN

To avoid any unexpected pressurization, check on the CAB PRESS SD page that the four outflow valves are open.

APU.....AS RQRD

- **At least 1 min after APU start or fluid spraying:**

  APU BLEED.....AS RQRD

  Note: *If the fuselage was sprayed, there is a risk of fluid ingestion by the APU air intake resulting in odors or smoke alerts. Therefore, the flight crew should consider a takeoff with APU bleed off.*

EXT PWR.....AS RQRD
GROUND EQUIPMENT.....REMOVE
PROBE/WINDOW HEAT pb .....AUTO
DEICING/ANTI-ICING REPORT.....RECEIVED

The information from the ground personnel who performed the deicing/anti-icing, and the post-application check must include:

- *The type of fluid used*
- *The ratio of fluid to water (e.g. 75/25)*
- *The time of the holdover beginning*
- *The result of the post-application check: "Aircraft critical parts are clean".*

BEFORE PUSHBACK OR START

Applicable to: ALL

BEFORE PUSHBACK OR START SOP.....PERFORM

For the detailed description of the before pushback or start SOP, Refer to associated procedure .

Deicing/Anti-icing at the Deicing Bay - Engines Running

SAFETY EXTERIOR INSPECTION

Applicable to: ALL

SAFETY EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the safety exterior inspection SOP, Refer to associated procedure .

- **In addition, apply the following procedure:**

  APU AIR INTAKE..... CLEAR OF ICE AND SNOW

  The APU air intake is visible behind the horizontal stabilizer, on the RH side of the aircraft.

  PACK RAM AIR INLET AND PACK RAM AIR OUTLETS.....CLEAR OF ICE AND SNOW

  OUTFLOW VALVE..... CLEAR OF ICE AND SNOW

When the APU air intake, the pack ram air inlet and outlets, and the outflow valve are not clear of ice and snow, request for deicing, as necessary.

PRELIMINARY COCKPIT PREPARATION

Applicable to: ALL

PRELIMINARY COCKPIT PREPARATION SOP..... PERFORM

For the detailed description of the cockpit preparation SOP, Refer to associated procedure .

- **In addition, apply the following procedure:**

  PROBE/WINDOW HEAT P/B..... ON

  When no engine is started, window heating operates when the PROBE/WINDOW HEAT pb-sw is set to ON.

EXTERIOR INSPECTION

Applicable to: ALL

EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the exterior inspection SOP, Refer to associated procedure .

- **During exterior inspection, apply the following procedure:**

  SURFACES..... CLEAR OF FROST, ICE, AND SNOW

  The following surfaces must be cleared of frost, ice, and snow:
  - *Leading edges and upper surfaces of the wings*
  - *Vertical and horizontal stabilizers*
  - *All control surfaces*
  - *Slats and flaps.*

Thin hoarfrost is acceptable on the upper surface of the fuselage. On the lower side of the wing tank area, a layer of frost thinner than 3 mm (0.12 in) does not penalize aircraft performance during takeoff.

Note: *Thin hoarfrost is a white crystalline deposit that develops uniformly on the exposed aircraft surfaces during cold and cloudless nights. Below the hoarfrost layer, it is possible to distinguish the surface features (e.g. lines or markings).*

EQUIPMENT..... CLEAR OF FROST, ICE, AND SNOW

The following equipment must be cleared of frost, ice, and snow:

- *Landing gear equipment: Lever locks, tires, and landing gear doors*
- *Engine inlets, inlet lips, fans (check that the fans can rotate), spinners, fan exhaust ducts, reverser equipment*
- *Drains, bleeds, probes, (pitots, static ports, TAT sensors, angle-of-attack sensors)*
- *Fuel tank ventilation*
- *Radome*
- *Commercial water supply must not be frozen, and must have been refilled. Before cold soak, the water supplies must be emptied.*
- *Air/hydraulic heat exchanger inlet.*

COCKPIT PREPARATION

Applicable to: ALL

COCKPIT PREPARATION SOP.....PERFORM

For a detailed description of the cockpit preparation SOP, Refer to associated procedure .

BEFORE PUSHBACK OR START

Applicable to: ALL

BEFORE PUSHBACK OR START SOP..... PERFORM

For a detailed description of the before pushback or start SOP, Refer to associated procedure .

ENGINE START

Applicable to: ALL

ENGINE START.....PERFORM

For a detailed description of the engine start SOP, Refer to associated procedure .

AFTER START

Applicable to: ALL

AFTER START SOP..... RESUME

For a detailed description of the after start SOP, Refer to associated procedure .

- **The flight crew should perform the after start SOP, except the following:**

PROBE/WINDOW HEAT pb ..... AUTO

L2 *When at least one engine is started, window heating operates under automatic control.*

L1 RUDDER TRIM : DO NOT MOVE

L2 *The flight controls can only be moved, when the aircraft is thoroughly deiced.*

L1 FLAPS LEVER : DO NOT MOVE

L2 *The flight controls can only be moved, when the aircraft is thoroughly deiced.*

L1 FLIGHT CONTROL SURFACES : DO NOT MOVE

L2 *The flight crew must not perform the flight controls check until the aircraft is thoroughly deiced.*

L1 NORM C/Ls : DELAY UNTIL ACFT DEICED

L2 *Delay the AFTER START checklist until the aircraft is thoroughly deiced.*

TAXI TO DEICING BAY

Applicable to: ALL

ANTISKID INHIBITED BELOW 4 KT

PAX..... NOTIFY

DEICING/ANTI-ICING AT THE DEICING BAY

Applicable to: ALL

The captain must decide whether or not to deice/anti-ice the aircraft, and to repeat the operation, as necessary.

The flight crew must ensure that the ground personnel use deicing/anti-icing fluids, in accordance with the applicable Operator's requirements, and with the Aircraft Maintenance Manual instructions.

CAUTION	- Check that the HP or LP ground connectors do not supply external air to the aircraft - If anti-icing must be performed after deicing, the ground personnel must deice the surfaces with a hot fluid mixture before applying a new layer of anti-icing fluid - Avoid indiscriminate use of deicing/anti-icing fluid, or its ingestion by the engine or the APU - Do not move slats or flaps, or flight control surfaces if they are not free of ice - The aircraft must be deiced/anti-iced symmetrically: Both sides of the aircraft must be deiced/anti-iced completely.

● **BEFORE FLUID SPRAYING:**

COMMUNICATION WITH GROUND PERSONNEL..... ESTABLISH
PARK BRK..... ON
APU BLEED..... OFF
DITCHING pb ..... ON

L2 *Setting the DITCHING pb to ON closes the following:*
L3
- *The outflow valves*
- *The overboard valve*
- *Both pack valves*
- *All the cargo isolation valves*
- *The pack ram air inlet and outlets*
- *The two emergency RAM air inlets.*

L1 *This prevents the deicing fluid from entering the aircraft.*
All cabin fans stop.
The avionics ventilation remains available, when the avionics ventilation blowing fans are operative.

MAXIMUM 30 MIN WITH DITCHING P/B ON

On ground, with passengers on board, it is not recommended to exceed 30 min without air conditioning, because passenger comfort may be affected.

● **When the aircraft is ready for spraying:**

FLUID SPRAYING.....REQUEST

● **AFTER FLUID SPRAYING:**

DITCHING pb .....OFF
OUTFLOW VALVES.....CHECK OPEN

To avoid any unexpected pressurization, check on the CAB PRESS SD page that the four outflow valves are open.

● **At least 1 min after APU start or fluid spraying:**

APU BLEED.....AS RQRD

Note: *If the fuselage was sprayed, there is a risk of fluid ingestion by the APU air intake resulting in odors or smoke alerts. Therefore, the flight crew should consider a takeoff with APU bleed off.*

GROUND EQUIPMENT.....REMOVE

After deicing is completed, request the ground personnel to confirm that the aircraft is clear from any ground equipment

DEICING/ANTI-ICING REPORT.....RECEIVED

The information from the ground personnel who performed the deicing/anti-icing, and the post-application check must include:

- *The type of fluid used*
- *The ratio of fluid to water (e.g. 75/25)*
- *The time of the holdover beginning*
- *The result of the post-application check: "Aircraft critical parts are clean".*

GND SPLRS.....ARM
RUDDER TRIM.....NEUTRAL
FLAPS.....SET

If there is slush on the taxiway, delay FLAPS setting then flight controls checks until reaching the holding point before takeoff. The flight crew should perform the flight controls in the flaps configuration for takeoff.

FLIGHT CONTROLS.....CHECK

In freezing precipitation, perform the appropriate checks to evaluate aircraft icing. The decision on whether to take off, or to deice again the aircraft, depends on the amount of ice that has built up on the critical surfaces since the last deicing. Make an inspection from the inside and outside the aircraft before the holdover time expires, or just before takeoff.

AFTER START CHECKLIST.....COMPLETE

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Deicing/Anti-icing at the Deicing Bay - Engines Not Running

SAFETY EXTERIOR INSPECTION

Applicable to: ALL

SAFETY EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the safety exterior inspection SOP, Refer to associated procedure .

- **In addition, apply the following procedure:**

  APU AIR INTAKE..... CLEAR OF ICE AND SNOW

  The APU air intake is visible behind the horizontal stabilizer, on the RH side of the aircraft.

  PACK RAM AIR INLET AND PACK RAM AIR OUTLETS.....
  .....CLEAR OF ICE AND SNOW

  OUTFLOW VALVE..... CLEAR OF ICE AND SNOW

When the APU air intake, the pack ram air inlet and outlets, and the outflow valve are not clear of ice and snow, request for deicing, as necessary.

PRELIMINARY COCKPIT PREPARATION

Applicable to: ALL

PRELIMINARY COCKPIT PREPARATION SOP..... PERFORM

For the detailed description of the cockpit preparation SOP, Refer to associated procedure .

- **In addition, apply the following procedure:**

  PROBE/WINDOW HEAT P/B.....ON

  When no engine is started, window heating operates when the PROBE/WINDOW HEAT pb-sw is set to ON.

EXTERIOR INSPECTION

Applicable to: ALL

EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the exterior inspection SOP, Refer to associated procedure .

- **During exterior inspection, apply the following procedure:**

  SURFACES..... CLEAR OF FROST, ICE, AND SNOW

  The following surfaces must be cleared of frost, ice, and snow:
  - *Leading edges and upper surfaces of the wings*
  - *Vertical and horizontal stabilizers*

- *All control surfaces*
- *Slats and flaps.*

Thin hoarfrost is acceptable on the upper surface of the fuselage. On the lower side of the wing tank area, a layer of frost thinner than 3 mm (0.12 in) does not penalize aircraft performance during takeoff.

Note: Thin hoarfrost is a white crystalline deposit that develops uniformly on the exposed aircraft surfaces during cold and cloudless nights. Below the hoarfrost layer, it is possible to distinguish the surface features (e.g. lines or markings).

EQUIPMENT..... CLEAR OF FROST, ICE, AND SNOW

The following equipment must be cleared of frost, ice, and snow:
- *Landing gear equipment: Lever locks, tires, and landing gear doors*
- *Engine inlets, inlet lips, fans (check that the fans can rotate), spinners, fan exhaust ducts, reverser equipment*
- *Drains, bleeds, probes, (pitots, static ports, TAT sensors, angle-of-attack sensors)*
- *Fuel tank ventilation*
- *Radome*
- *Commercial water supply must not be frozen, and must have been refilled. Before cold soak, the water supplies must be emptied.*
- *Air/hydraulic heat exchanger inlet.*

COCKPIT PREPARATION

Applicable to: ALL

COCKPIT PREPARATION SOP.....PERFORM

For a detailed description of the cockpit preparation SOP, Refer to associated procedure .

BEFORE PUSHBACK OR START

Applicable to: ALL

BEFORE PUSHBACK OR START SOP..... PERFORM

For a detailed description of the before pushback or start SOP, Refer to associated procedure .

ENGINE START

Applicable to: ALL

ENGINE START.....PERFORM

For a detailed description of the engine start SOP, Refer to associated procedure .

AFTER START

Applicable to: ALL

AFTER START SOP..... RESUME

For a detailed description of the after start SOP, Refer to associated procedure .

- **The flight crew should perform the after start SOP, except the following:**

PROBE/WINDOW HEAT pb ..... AUTO

L2 *When at least one engine is started, window heating operates under automatic control.*

L1 RUDDER TRIM : DO NOT MOVE

L2 *The flight controls can only be moved, when the aircraft is thoroughly deiced.*

L1 FLAPS LEVER : DO NOT MOVE

L2 *The flight controls can only be moved, when the aircraft is thoroughly deiced.*

L1 FLIGHT CONTROL SURFACES : DO NOT MOVE

L2 *The flight crew must not perform the flight controls check until the aircraft is thoroughly deiced.*

L1 NORM C/Ls : DELAY

L2 *Delay the AFTER START checklist until the flight crew starts the engines again after the aircraft is thoroughly deiced.*

TAXI TO DEICING BAY

Applicable to: ALL

ANTISKID INHIBITED BELOW 4 KT

PAX..... NOTIFY

DEICING/ANTI-ICING AT THE DEICING BAY

Applicable to: ALL

The captain must decide whether or not to deice/anti-ice the aircraft, and to repeat the operation, as necessary.

The flight crew must ensure that the ground personnel use deicing/anti-icing fluids, in accordance with the applicable Operator's requirements, and with the Aircraft Maintenance Manual instructions.

CAUTION	- Check that the HP or LP ground connectors do not supply external air to the aircraft - If anti-icing must be performed after deicing, the ground personnel must deice the surfaces with a hot fluid mixture before applying a new layer of anti-icing fluid - Avoid indiscriminate use of deicing/anti-icing fluid, or its ingestion by the engine or the APU - Do not move slats or flaps, or flight control surfaces if they are not free of ice - The aircraft must be deiced/anti-iced symmetrically: Both sides of the aircraft must be deiced/anti-iced completely.

● **BEFORE FLUID SPRAYING:**

COMMUNICATION WITH GROUND PERSONNEL..... ESTABLISH
PARK BRK..... ON
APU..... START
APU..... CONFIRM AVAIL
APU BLEED..... OFF
ENG 1, 2, 3, 4..... SHUTDOWN
DITCHING pb ..... ON

L2 *Setting the DITCHING pb to ON closes the following:*
L3
- *The outflow valves*
- *The overboard valve*
- *Both pack valves*
- *All the cargo isolation valves*
- *The pack ram air inlet and outlets*
- *The two emergency RAM air inlets.*

L1 *This prevents the deicing fluid from entering the aircraft.*
All cabin fans stop.
The avionics ventilation remains available, when the avionics ventilation blowing fans are operative.

MAXIMUM 30 MIN WITH DITCHING P/B ON

On ground, with passengers on board, it is not recommended to exceed 30 min without air conditioning, because passenger comfort may be affected.

● **When the aircraft is ready for spraying:**

FLUID SPRAYING..... REQUEST

● **AFTER FLUID SPRAYING:**

DITCHING pb ..... OFF

OUTFLOW VALVES.....CHECK OPEN

To avoid any unexpected pressurization, check on the CAB PRESS SD page that the four outflow valves are open.

- **At least 1 min after APU start or fluid spraying:**
  APU BLEED..... ON

  Note: *If the fuselage was sprayed, there is a risk of fluid ingestion by the APU air intake resulting in odors or smoke alerts. Therefore, the flight crew should consider a takeoff with APU bleed off.*

GROUND EQUIPMENT.....REMOVE

After deicing is completed, request the ground personnel to confirm that the aircraft is clear from any ground equipment

DEICING/ANTI-ICING REPORT.....RECEIVED

The information from the ground personnel who performed the deicing/anti-icing, and the post-application check must include:

- *The type of fluid used*
- *The ratio of fluid to water (e.g. 75/25)*
- *The time of the holdover beginning*
- *The result of the post-application check: "Aircraft critical parts are clean".*

BEFORE PUSHBACK OR START - BEFORE START CLEARANCE

Applicable to: ALL

BEFORE PUSHBACK OR START SOP..... PERFORM

For the detailed description of the before pushback or start SOP, Refer to associated procedure .

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Securing the Aircraft for Cold Soak

SECURING THE AIRCRAFT FOR COLD SOAK

Applicable to: ALL

- **After switching off all bleeds, and before switching off the AC power:**
  DITCHING pb ..... ON

L2 *Setting the DITCHING pb to ON closes the following:*

L3
- *The outflow valves*
- *The overboard valve*
- *Both pack valves*
- *All the cargo isolation valves*
- *The pack ram air inlet and outlets*
- *The two emergency RAM air inlets.*

L2 *This protects the aircraft from the cold outside temperatures.*

L1
- **When the chocks are in place:**
  PARKING BRAKE..... OFF

L2 *When the OAT is below -30 °C, hydraulic fluid may spill, if the parking brakes are pressurized.*

L1
- **After switching off the batteries:**
  DITCHING pb .....OFF

L2 *All the applicable valves will open at the next power up.*

L1 PROTECTIVE COVERS.....INSTALL

L2 *Install protective covers and plugs to protect the aircraft wheels and the engines from snow and ice.*

L1 WATER SYSTEM DRAINING (MAINTENANCE).....REQUEST

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Ground Operations

GROUND OPERATIONS AT AIRPORTS COVERED WITH VOLCANIC ASH, SAND, OR DUST

Applicable to: ALL

Volcanic ash has very abrasive particles that can significantly damage aircraft parts and degrade the operation of aircraft systems.
If possible, Operators should avoid airports that are covered with volcanic ash.
If it is not possible to avoid these airports, Operators must apply the following procedures.
If Operators operate on airports covered with sand or dust, they can apply most of the following ground operations procedures in order to avoid contamination of the aircraft systems, based on their experience and on the amount of deposit.

PRELIMINARY COCKPIT PREPARATION

Applicable to: ALL

PRELIMINARY COCKPIT PREPARATION SOP..... PERFORM

For a detailed description of the preliminary cockpit preparation SOP, Refer to associated procedure .

- **In addition, apply the following procedures:**

APU..... DO NOT USE

L2 *Request ground power for air conditioning and electricity. If ground power is not available, the APU should be used to start the engines, but should not be used for anything else.*

L1 WINDSHIELD WIPERS.....DO NOT USE

L2 *Do not use windshield wipers to remove volcanic ash or any particles.*

L1 **PRELIMINARY PERFORMANCE DETERMINATION**

BRAKING PERFORMANCE.....CONSIDER PENALTY

L2 *A layer of volcanic ash on the runway may degrade braking performance. The performance penalties for takeoff on runways with:*
- *Dry volcanic ash, are similar to the performance penalties for takeoff on wet runways*
- *Wet volcanic ash, are similar to the performance penalties for takeoff on runways covered with slush.*

L1 Consider a takeoff with the packs set to OFF, in order to avoid contamination of the air conditioning system.

EXTERIOR INSPECTION

Applicable to: ALL

EXTERIOR INSPECTION SOP.....PERFORM

For a detailed description of the exterior inspection SOP, Refer to associated procedure .

- **During the exterior inspection, carefully check the following:**

SURFACES AND EQUIPMENT.....CHECK FREE OF DEPOSITS

The ground crew must remove volcanic ash, sand or dust from lubricated surfaces, and must remove all deposits that could:
- *Penetrate seals*
- *Enter the engine gas path, air conditioning system, air data probes, access doors and panels, and other openings on the aircraft.*

ENGINE/APU INLETS.....CHECK FREE OF DEPOSITS

L2 *Inspect the inlets, and make sure that the ground crew removes all deposits. The ground crew should also remove the deposits from the area that is within 25 ft of the engine inlets.*

BEFORE PUSHBACK OR START

Applicable to: ALL

BEFORE PUSHBACK or START SOP.....PERFORM

For a detailed description of the before pushback or start SOP, Refer to associated procedure .

- **In addition, pay attention to the following:**

BRAKING PERFORMANCE.....CONSIDER PENALTY

L2 *A layer of volcanic ash on the runway may degrade braking performance. The performance penalties for takeoff on runways with:*
- *Dry volcanic ash, are similar to the performance penalties for takeoff on wet runways*
- *Wet volcanic ash, are similar to the performance penalties for takeoff on runways covered with slush.*

L1 Consider a takeoff with the packs set to OFF, in order to avoid contamination of the air conditioning system.

ENGINE START

Applicable to: ALL

Use external pneumatic power to start the engines, if available.

For a detailed description of the manual engine start, *Refer to associated procedure* .

ALL ENGINES.....CRANK

Before engine start, ventilate all engines for 2 min by dry-cranking at the maximum motoring speed to remove any deposit from the booster area.

TAXI

Applicable to: ALL

TAXI SOP.....PERFORM

For a detailed description of the taxi SOP, Refer to associated procedure .

- **After brake release, apply the following procedure:**

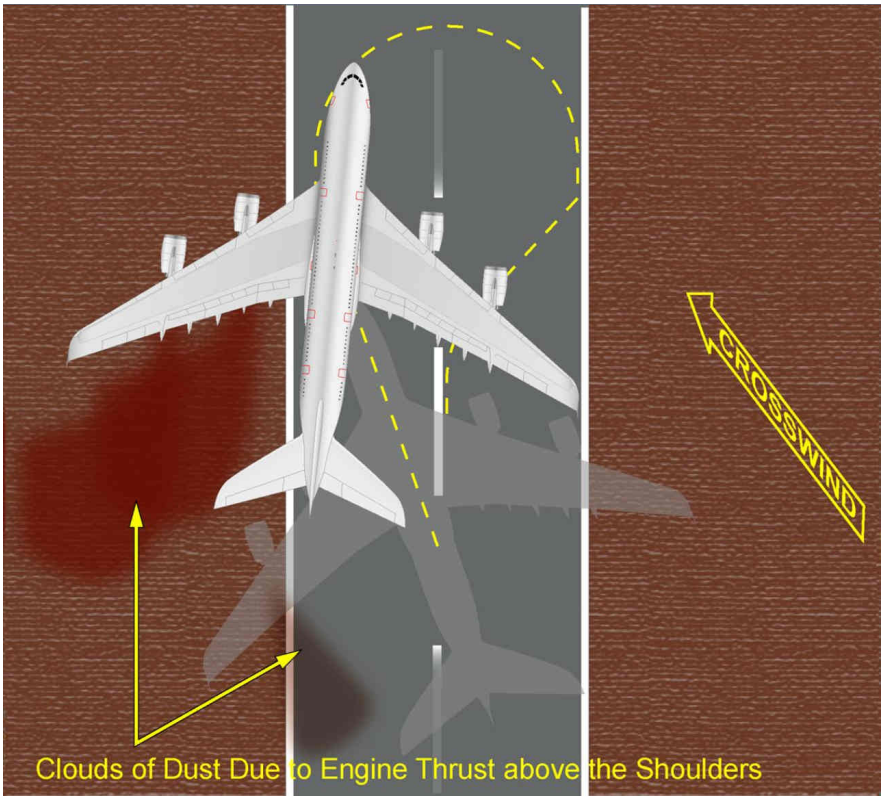
THRUST LEVERS.....MOVE FWD SMOOTHLY then SET TO IDLE

L2 *Smoothly move the thrust levers forward to the minimum required position, in order to begin moving the aircraft.*
Avoid sharp and high-speed turns.
Perform an all-engine taxi to minimize the thrust on each engine.

L1 ENGINE BLEED.....OFF

L2 *Keep the engine bleed valves closed during taxi, particularly in volcanic ash conditions.*

L1 In the case of crosswind when performing a 180 ° turn on the runway, start to turn with the nose downwind in order to prevent ash, sand, or dust ingestion.



TAKEOFF

Applicable to: ALL

Before starting the takeoff roll, wait for volcanic ash, sand, and dust to settle on the runway.
If possible, perform a rolling takeoff.
TAKEOFF SOP..... PERFORM

For a detailed description of the thrust application for takeoff, Refer to associated procedure .

Consider a takeoff with the packs set to OFF, in order to avoid contamination of the air conditioning system.

LANDING

Applicable to: ALL

L2 *Note: Volcanic ash deposits on the windshield and/or on the landing lights may significantly reduce the flight crew's visibility during approach and landing. Therefore, consider performing a diversion to an airport where AUTOLAND is possible.*

L1 LANDING SOP.....PERFORM

For a detailed description of the landing SOP, Refer to associated procedure .

- **In addition, pay attention to the following:**

REVERSERS.....AS RQRD

L2 *If maximum reverse thrust is necessary, apply reverse thrust at Main Landing Gear (MLG) touchdown. Limit the use of thrust reversers as much as possible, because the reverse air flow can stir the volcanic ash, sand, or dust, and reduce visibility.*

L1 BRAKING PERFORMANCE.....CONSIDER PENALTY

L2 *A layer of volcanic ash on the runway may degrade braking performance. The performance penalties for landing on runways with:*

- *Dry volcanic ash, are similar to the performance penalties for landing on wet runways*
- *Wet volcanic ash, are similar to the performance penalties for landing on runways covered with slush.*

SECURING THE AIRCRAFT

Applicable to: ALL

- **After turning off all bleeds and before turning off AC power, apply the following procedure:**

DITCHING pb .....ON

L2 *When set to ON, the following will close, in order to protect the aircraft from volcanic ash, sand, or dust ingestion:*

L3
- *The outflow valves*
- *The overboard valve*
- *Both pack valves*
- *All cargo isolation valves*
- *The pack ram air inlets and outlets*
- *Both emergency ram air inlets.*

L1 ● **After turning off the batteries, apply the following procedures:**

DITCHING pb .....OFF

L2 *When set to OFF, all the applicable valves will open, at the next power-up.*

L1 PROTECTIVE COVERS.....INSTALL

L2 *Install protective covers and plugs to protect the aircraft from volcanic ash, sand, or dust.*

Flight Operations

MISC VOLCANIC ASH ENCOUNTER

Applicable to: ALL

Volcanic ash has very abrasive particles that can significantly damage aircraft parts and degrade the operation of aircraft systems.
Avoid flight in active volcanic areas.
If a volcanic eruption is reported, change the flight route, in order to avoid the area because volcanic dust can spread over several hundred miles. When possible, stay on the upwind side of the volcano, at a distance of atleast 20 nm.

The following may be indications that the aircraft is flying in a volcanic ash cloud:
- Dust in the cockpit
- An acrid odor, similar to electrical smoke
- St Elmo's fire (i.e. a bright white and blue glow appears on the wings)
- Bright white or orange sparks in the engine inlets
- Sharp and distinct beams from the landing lights
- Multiple engine malfunctions (e.g. increased EGT, decreased power, stall, or flameout)
- Airspeed fluctuations
- Reduced visibility.

Continued on the following page

MISC VOLCANIC ASH ENCOUNTER (Cont'd)

180° TURN.....INITIATE

L2 *The performance of a 180 ° turn will usually enable the aircraft to exit the volcanic ash clouds as quickly as possible, because volcanic ash clouds can extend for hundreds of nautical miles.*

L1 ATC.....NOTIFY
A/THR..... OFF

L2 *This action prevents thrust variations due to the use of autothrust.*

L1 THRUST (IF CONDS PERMIT)..... REDUCE

L2 *A decrease in thrust helps to maintain the engine stall margin by reducing the amount of volcanic ash ingestion and limiting the EGT . It also limits the accumulation of molten ash on the turbine vanes.*
Do not climb, because this increases the EGT .

L1 CREW OXY MASKS..... ON / 100% / EMER
CABIN CREW.....ADVISE
PAX OXY MASK MAN ON.....AS RQRD

L2 *Oxygen masks may be necessary depending on the cabin contamination.*

L1 A-ICE AUTO MODE.....OFF
ENG A-ICE.....ON
WING A-ICE.....ON
AIR FLOW.....HI

L2 *Maximum air bleed provides the engines with an additional stall margin.*

L1 *Note: If a CARGO VENTILATION system is installed, the flight crew should turn off the CARGO ISOL VALVES pb-sw to prevent the ECAM from triggering a cargo smoke warning.*

APU.....AS RQRD

L2 *It may be necessary to turn on the APU for a starter–assisted engine relight.*

L1 ENG PARAMETERS..... MONITOR

L2 *Carefully monitor the EGT to prevent the engines from exceeding EGT limits.*

Note: To prevent the engines from exceeding EGT limits, it may become necessary to perform a precautionary engine shutdown. In this case:
- *Restart the engines, when the aircraft is no longer flying in a volcanic ash cloud*
- *The engines may accelerate very slowly. This is not an indication of a start failure*
- *Due to the fact that the compressor and turbine blades may have been eroded, avoid sudden thrust changes. Fuel flow and the EGT may increase.*

Continued on the following page

MISC VOLCANIC ASH ENCOUNTER (Cont'd)

L1 AIR SPEED.....MONITOR

L2 *Volcanic ash may cause a blockage in the pitot probes. If speed indication is lost, or becomes unreliable, Refer to NAV ALL AIR DATA DISAGREE and apply the procedure.*

Note: Electrostatic conditions may cause communication problems.

L1 *Note: If the flight crew does not have enough visibility for approach due to windshield (window) damage, they should consider automatic landing. If automatic landing is not available, consider opening the sliding window on the PF 's side, after cabin depressurization.*

To manually depressurize the cabin:

- *Set the CABIN ALT MODE pb-sw to MAN*
- *Set the CABIN ALT TRGT selector to an altitude slightly above the current aircraft altitude*
- *Avoid high descend rate*
- *Open the sliding window on the PF 's side if the cabin ΔP equals 0 PSI .*

If the aircraft altitude is more than 10 000 ft , the flight crew should don the oxygen mask before cabin depressurization.
Due to increased noise level when the sliding window is open, the flight crew should pay particular attention to visual alerts.

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WEATHER RADAR

Applicable to: ALL

The weather radar is a good tool for the detection of adverse weather. This section provides recommendations on the use of the weather radar, based on a general knowledge of the radar capabilities.
For more information about the WXR , *Refer to DSC-34-20-30-10 Overview* .

The flight crew should monitor the weather, by selecting long and also short ND ranges, in order to determine the best trajectory to avoid areas of adverse weather.

- **In order to avoid thunderstorms, apply the following procedure:**
  PM EFIS CP..... ND RANGE 160 nm
  PF EFIS CP..... ND RANGE 80 nm

  To avoid a large thunderstorm, make decisions when the aircraft is at least 40 nm away from the thunderstorm.

Avoid red and magenta areas, by at least:
- 20 nm , if the aircraft is above FL 230
- 5 nm to 10 nm , if the aircraft is below FL 230 .

Note: Closely spaced, or thin lines, between color gradations usually indicate severe turbulence.

Avoid single magenta areas of turbulence that are not associated with heavy precipitation, by at least 5 nm .
Avoid penetrating a cell or clearing its top by less than 5 000 ft , because turbulence may occur at the top of the clouds.
If the top of the cell is at or above 25 000 ft , avoid overflying the cell, because turbulence may be stronger than expected.
Avoid flying under a thunderstorm, because of possible windshears, microbursts, severe turbulence, or hail.
If any doubt, prefer lateral deviation, instead of vertical deviation.

- **To better analyze the weather situation, apply the following procedure:**
  WXR MANUAL MODE..... AS RQRD

L2 *The flight crew can use the manual modes temporarily, in order to monitor thunderstorm development and to obtain the best cell echo.*

L1 WXR AUTO MODE..... SELECT

L2 *When the flight crew has completed the analysis, select the AUTO mode of the weather radar.*

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OVERVIEW

Applicable to: ALL

To display this procedure, press the ECP ABN PROC pb, then select the MISCELLANEOUS menu.

Severe turbulence causes large and abrupt changes in altitude and/or attitude, usually causes large variations in airspeed, pushes passengers and crewmembers against their seat belts, and causes loose objects to move around the aircraft.

Therefore, the flight crew should avoid areas of severe turbulence by flying the aircraft above, or around, these areas. If the flight crew cannot avoid these areas, they should expect large altitude variations, and should:

- Maintain aircraft speed in the range indicated in the following procedure
- Maintain attitude and allow altitude variations, if the flight crew manually flies the aircraft.

At the end of a flight with severe turbulence, the flight crew must make a logbook entry, in order to notify maintenance personnel that maintenance action is required.

Note: The operational recommendations for severe and extreme turbulence are identical.

MISC SEVERE TURBULENCE IN CRUISE

Applicable to: ALL

SIGNS.....ON

- **If no more restrictive speed limitation**

  MAX TURB SPEED : 300 / .85

L2 *This speed range:*
- *Protects the aircraft structure from wind gusts*
- *Maintains a buffet margin, especially during vertical wind gusts.*

L1 MIN TURB SPEED : GREEN DOT
ADJUST SPEED AS NECESSARY FOR COMFORT
AP : KEEP ON
CABIN & CKPT (LOOSE EQPT)..... SECURE

L2 *The flight and cabin crewmembers must secure all loose equipment.*

L1 SPEED BRAKES..... AS RQRD

L2 *Be prepared to use the speedbrakes, if necessary.*

L1 ● **IF EXCESSIVE THRUST VARIATIONS:**

A/THR..... DISCONNECT

L2 *Do not attempt to maintain Mach or airspeed.*

LIMITATIONS

LIMITATIONS ON ECAM

ALL PHASES

TURB SPEED:
MAX SPEED: 300 / .85
MIN SPEED: GREEN DOT

LIMITATIONS ON PFD

ALL PHASES

TURB SPEED:
MAX SPEED: 300 KT / .85
MIN SPEED: GREEN DOT

SEVERE TURBULENCE DURING APPROACH

Applicable to: ALL

In high-lift configurations, operational speeds provide sufficient stall and overspeed margins when the aircraft is flying in turbulent conditions.

A/THR..... RECOMMENDED

L2 *During the approach phase, autothrust is recommended in managed speed.*

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OVERVIEW

Applicable to: ALL

L2 For additional training-oriented information, *Refer to FCTM/SI-10-10-2 General* .

L1 To reduce the risk of a windshear encounter, the flight crew can suspect windshear by checking meteorological reports and listening to ATC reports.
In addition, there are two aircraft systems that can detect a windshear, and increase flight crew's awareness of windshear.

If windshear is detected, the Predictive Windshear System (PWS) and the PRIM s may trigger the following alerts:

- The PWS triggers predictive windshear alerts:
  - Both PFD s display the W/S AHEAD caution, or the W/S AHEAD warning
  - These alerts are associated with aural alerts
  - The ND s display the windshear location.

  For more information, *Refer to SURV / WXR / PWS* .
- The PRIM s trigger a reactive windshear warning:
  - Both PFD s display the WINDSHEAR warning, during the takeoff and landing phases
  - This warning is associated with an aural alert.

  For more information, *Refer to FLIGHT ENVELOPE / Reactive Windshear* .

SUSPECTED WINDSHEAR

Applicable to: ALL

BEFORE TAKEOFF

Delay takeoff, until weather conditions are better.

L2 *Confirm if the weather conditions are safe for takeoff by:*
- *Observation and experience*
- *Checking weather conditions.*

L1 MOST SUITABLE RUNWAY.....SELECT

L2 *Take into account the location of suspected windshear, when selecting the most suitable runway.*

L1 ● **Before starting the takeoff run:**
WEATHER RADAR.....CHECK

L2 *Press the EFIS CP WX pb to check the weather radar and the PWS display on the ND, and to ensure that there are no suspected problem areas on the flight path.*

L1 TOGA THRUST.....SELECT

L2 *Do not use reduced takeoff thrust (i.e. derate or FLEX).*

L1 SPEED and SPEED TREND.....MONITOR

L2 *During the takeoff run, carefully monitor airspeed and the airspeed trend, for early indications of windshear.*

Continued on the following page

SUSPECTED WINDSHEAR (Cont'd)

DURING APPROACH

Delay landing, until weather conditions are better, or divert to another airport.

L2 *Confirm if the weather conditions are safe for landing by:*
- *Observation and experience*
- *Checking weather conditions.*

L1 WEATHER RADAR.....CHECK

L2 *Press the EFIS CP WX pb: To check the weather radar and the PWS display on the ND, and to ensure that there are no suspected problem areas on the flight path.*

L1 MOST SUITABLE RUNWAY.....SELECT

L2 *Take into account the location of suspected windshear, when selecting the most suitable runway approach aid.*

L1 FLAPS 3 .....SELECT
MANAGED SPEED.....USE

L2 *Use managed speed during the approach phase.*
When in managed speed, the ground speed mini function provides additional speed in strong wind conditions.

L1 Both FDs.....CHECK ENGAGED

L2 *Make sure that both FDs are engaged in ILS approach modes, FPA or V/S modes.*

L1 AUTOPILOT.....ENGAGE

L2 *Engage the autopilot to ensure a more accurate approach, and to rapidly correct any deviation from the beam, when the ILS is available.*

L1 ● **If downburst is expected:**
VAPP.....INCREASE

L2 *Increase the VAPP, that appears on the MFD, up to a maximum of VLS + 15 kt.*

PREDICTIVE WINDSHEAR

Applicable to: ALL

WINDSHEAR AHEAD

Apply the precautionary steps, as indicated in the SUSPECTED WINDSHEAR procedure (*Refer to procedure*), if the PWS triggers:

- The W/S AHEAD caution on the PFD s
- The associated MONITOR RADAR DISPLAY aural alert
- The location of windshear on the ND .

Continued on the following page

PREDICTIVE WINDSHEAR (Cont'd)

WINDSHEAR AHEAD ALERT

Apply the following procedure on ground, before and during takeoff, if the PWS triggers:
- The W/S AHEAD warning on the PFDs
- The associated WINDSHEAR AHEAD, WINDSHEAR AHEAD aural alert
- The location of windshear on the ND.

■ **On ground:**

L2 *Note: If the flight crew verifies and confirms that there is no risk of windshear, they may disregard the alert, provided that:*
- *There are no other signs of possible windshear conditions*
- *The reactive windshear function is operative.*

There are reported cases that specific environments (e.g. obstacles) cause the spurious triggering of predictive windshear alerts, during either takeoff or landing. However, the flight crew must always rely on all reactive windshear (i.e. WINDSHEAR) alerts.

L1 ■ **Before takeoff:**

TAKEOFF.....DELAY

L2 *Delay takeoff, until weather conditions improve.*

L1 MOST SUITABLE RUNWAY.....SELECT

L2 *When selecting the most suitable runway, take into account the location of predicted windshear.*

L1 ■ **During the takeoff run:**

TAKEOFF.....REJECT

L2 *Predictive windshear alerts are inhibited above 100 kt, and until the aircraft reaches 50 ft.*

L1 ■ **When airborne, at initial climb:**

THR LEVERS.....TOGA

L2 It is permitted to change the slats/flaps configuration, provided that the aircraft does not enter a windshear.

L1 SRS ORDERS..... FOLLOW

L2 *Note: If the autopilot is engaged, it will disengage, when the angle-of-attack goes above alpha prot.*

Continued on the following page

PREDICTIVE WINDSHEAR (Cont'd)

L1 Apply the following procedure at landing, if the PWS triggers:
- The W/S AHEAD warning on the PFDs
- The associated GO AROUND, WINDSHEAR AHEAD aural alert
- The location of windshear on the ND.

● **At landing:**

L2 *Note: If the flight crew verifies and confirms that there is no risk of windshear, they may disregard the alert, provided that:*
- *There are no other signs of possible windshear conditions*
- *The reactive windshear function is operative.*

There are reported cases that specific environments (e.g. obstacles) cause the spurious triggering of predictive windshear alerts, during either takeoff or landing. However, the flight crew must always rely on all reactive windshear (i.e. WINDSHEAR) alerts.

L1 GO AROUND..... PERFORM

L2 *It is permitted to change the slats/flaps configuration, provided that the aircraft does not enter a windshear.*

L1 L/G UP..... SELECT
SRS ORDERS..... FOLLOW

L2 *If necessary, the flight crew may apply full backstick.*

Note:
- *If the autopilot is engaged, it will disengage, when the angle-of-attack goes above alpha prot.*
- *If the FD is not available, select an initial pitch attitude of 12.5 °. Then, if necessary, increase the pitch attitude, in order to minimize the decrease in altitude.*

REACTIVE WINDSHEAR

Applicable to: ALL

If windshear is detected, either by the systems, or by the flight crew, apply the following recovery techniques:

■ **On ground, at takeoff:**

L2 During the takeoff roll, WINDSHEAR, WINDSHEAR, WINDSHEAR alert is inhibited. Windshear recognition is based on the flight crew observation.

L1 ● **Before V1:**

If there are significant variations in airspeed, and in airspeed trend below the indicated V1, reject the takeoff.

L2 *If windshear occurs during the takeoff roll, the aircraft may reach V1 later (or sooner) than expected. The flight crew should ensure that there is sufficient runway remaining to stop the aircraft, if necessary.*

L1 ● **After V1:**

THR LEVERS.....TOGA
REACHING VR.....ROTATE NORMALLY
SRS ORDERS..... FOLLOW

■ **When airborne, during initial climb, or at landing:**

THR LEVERS AT TOGA..... SET OR CONFIRM
AP (if engaged).....KEEP ENGAGED
SRS ORDERS.....FOLLOW

L2 *If necessary, the flight crew may apply full backstick.*

Note: - *If the autopilot is engaged, it will disengage, when the angle-of-attack goes above alpha prot.*
- *If the FD is not available, select an initial pitch attitude of 12.5 ° . Then, if necessary, increase the pitch attitude, in order to minimize the decrease in altitude.*

L1 DO NOT CHANGE CONFIGURATION (SLATS/FLAPS, GEAR) UNTIL OUT OF WINDSHEAR.

CAREFULLY MONITOR FLIGHT PATH AND SPEED.

RECOVER SMOOTHLY TO CLIMB, WHEN OUT OF WINDSHEAR.

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TAXI WITH DEFLATED TIRES

Applicable to: ALL

In some situations, after a rejected takeoff or after a landing, the flight crew may need to taxi the aircraft with deflated tires.

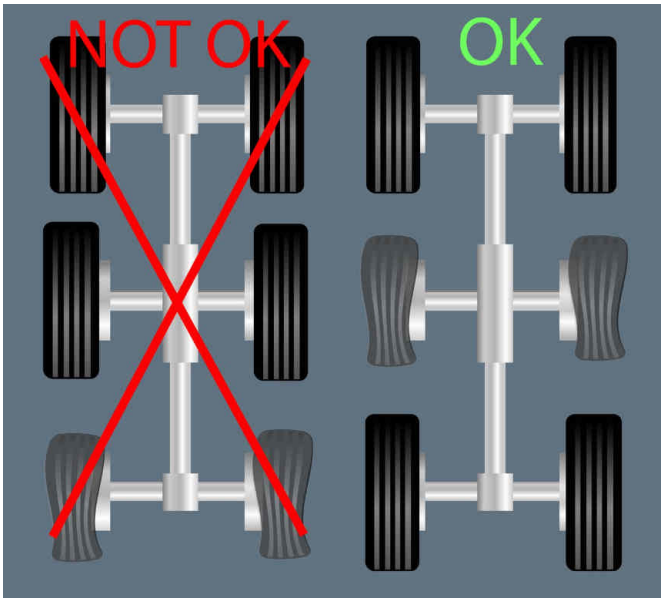
LIMITATIONS

The following limitations apply in order to be able to taxi with deflated tires:

- Maximum taxi speed: 3 kt
- Maximum nosewheel steering angle: 30 °
- Up to 9 tires can be deflated with the following maximum of deflated tires per landing gear:
  - One deflated tire on the nose landing gear, or/and
  - Two deflated tires per body landing gear provided they are not on the same axle, or/and
  - Two deflated tires per wing landing gear provided they are not on the same axle.

  Exceptions:
  - For runway vacating only: The two deflated tires on the body or wing landing gear can be on the same axle
  - For taxi: The two deflated tires can be located on the center axle of the body landing gear.

Deflated Tires Distribution Allowed for Taxi



OPERATIONAL RECOMMENDATIONS

The flight crew uses the WHEEL SD page to know the condition of each tire.

RUNWAY VACATING

Due to airport operational constraints, the flight crew can decide to vacate the runway with deflated tires or tire burst. Nevertheless, the deflated tires distribution must be in accordance with the above limitations.

TAXI

In the case of deflated tires, the flight crew can taxi the aircraft to the gate in accordance with the above limitations.
If the number or the distribution of deflated tires is not in accordance with the above limitations, the appropriate wheels must be replaced to recover an aircraft configuration allowed for taxi.
In the case of suspected tire burst, the flight crew must ask for an aircraft inspection before taxi.
If the ground crew assesses that a tire spread can damage the landing gear, the ground crew must replace the affected wheels before taxi.

GENERAL

Applicable to: ALL

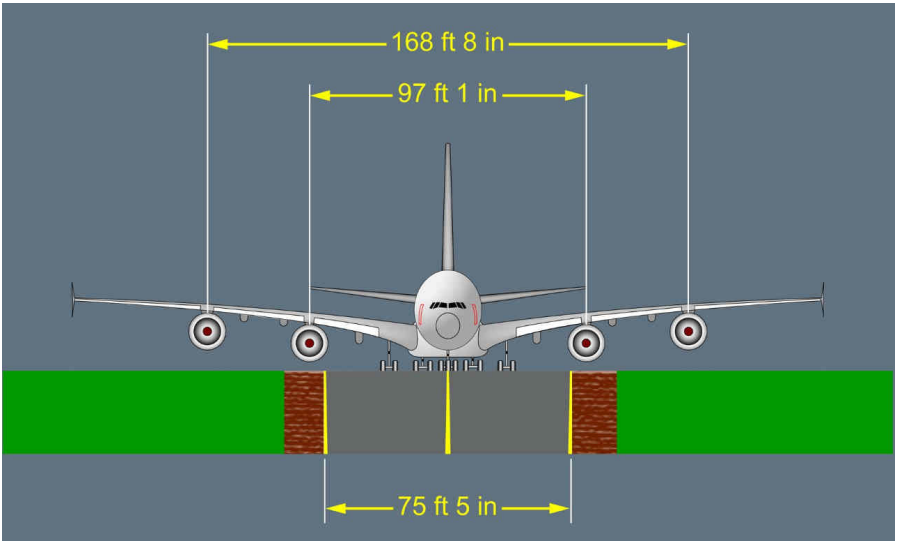
TAXIWAY CONFIGURATION

The A380 can taxi on 75 ft 5 in wide taxiways.

L2 Some states allow the A380 to taxi on taxiways narrower than 75 ft 5 in.

L1 The A380 engines extend beyond the paved area of 75 ft 5 in wide taxiways, as shown below.

A380 on 75 ft 5 in Wide Taxiway



KIND OF TAXIWAY SHOULDER

Depending on the width of the taxiway shoulders, the A380 engines may be either above:

- Stabilized surface: I.e. grass without loose gravel or asphalt
- Non-stabilized surface: I.e. natural soil, sand, grass with loose gravels, snow.

RECOMMENDATIONS

Applicable to: ALL

GENERAL RECOMMENDATIONS

At low weight (e.g. landing weight), idle thrust on the four engines is sufficient to move the aircraft. If additional thrust is needed, e.g. in the case of slope, it is recommended to apply the additional thrust only on two out of the four engines.

L2 This recommendation provides a smooth acceleration which increases passenger comfort.

L1 **OPERATIONAL RECOMMENDATIONS**

ON TAXIWAY PLUS PAVED SHOULDERS MORE THAN 180 FT WIDE

The flight crew may use any of the engines if additional thrust is needed (uphill taxiway for example).

ON TAXIWAYS PLUS PAVED SHOULDERS LESS THAN 180 FT WIDE BUT MORE THAN 120 FT WIDE

- **If the surface beyond the paved area is free of loose objects at least until 180 ft wide (i.e. good grass, treated grass) :**
  The flight crew may use any of the engines if additional thrust is needed (uphill taxiway for example).
- **If the surface beyond the paved area contain loose objects (i.e. loose gravels or stones) :**
  The flight crew should prefer the use of the inner engines if additional thrust is needed (uphill taxiway for example).
  L2 Applying additional thrust on the outer engines may cause foreign object contamination of the taxiway pavement behind the aircraft, due to the jet blast of the engines.

L1 **ON TAXIWAY PLUS PAVED SHOULDERS LESS THAN 120 FT WIDE OR ON CONTAMINATED TAXIWAYS**

On taxiways plus paved shoulders less than 120 ft wide or if the taxiway pavement is contaminated, both the inner and the outer engines are above non-stabilized surface. In this configuration, the flight crew should prefer the use of the outer engines, if additional thrust is needed (uphill taxiway for example).

L2 The flight crew should maintain the inner engines at idle thrust in order to prevent the engines from ingesting foreign objects. The outer engines are high enough to prevent the risk of ingesting foreign objects at taxi thrust. However, the flight crew should apply any additional thrust on the outer engines, as smoothly as possible. The smooth application thrust limits the risk of foreign object contamination of the taxiway pavement behind the aircraft due to jet blast of the engines.

GENERAL

Applicable to: ALL

GENERAL ASPECTS

The flight crew must consider the two-engine taxi procedure in engine symmetrical configuration (engines 2+3 or 1+4).
Unless in some operational conditions (e.g. uphill slopes, high gross weight, tight turns), flight crew may consider to taxi only on two engines.
When taxiing on only two engines, the thrust per engine is higher than during a standard four-engine taxi. Therefore jet blast and the risk of Foreign Object Damage (FOD) by engine ingestion are higher.

L2 The use of either outer or inner engines for taxiing has no impact on hydraulic or electrical systems.

L1 TAXI ON ENGINES 2+3 OR 1+4 CONFIGURATION

RULES:

If the inner engines are above non stabilized surface (sand, loose gravels, snow), the flight crew should taxi on the outer engines (1+4).

L2 The inner engine air intakes are about 3 ft 5 in high above the ground at MTOW. The risks of FOD under the inner engines is significant in the case of non stabilized surface below the inner engines. For information, the outer engine air intakes are about 6 ft 3 in above the ground. For the outer engines and for usual taxi thrust, the risk of FOD by engine ingestion is remote.

L1 If a tight turn is expected during the taxi phase, the flight crew should consider the use of the outer engines (1+4), in order to take benefit of a greater momentum.

AT DEPARTURE

Applicable to: ALL

The flight crew should use the following procedures to taxi out, if company policy and regulations permit.
The SOP flow can be performed with only two symmetrical engine running.

TAXI ON OUTER ENGINES ONLY

ENGINE 1 and 4.....START
AFTER START SOP.....PERFORM

For a detailed description of the after start SOP , Refer to PRO-NOR-SOP-90-90 After start_ENG START selector .

AFTER START C/L.....DELAY

Delay the AFTER START checklist until all engines are started.

L2 Note: *The flight crew can perform the flight control check with only two symmetrical engines running.*

L1 TAXI SOP.....PERFORM

For a detailed description of the taxi SOP , Refer to PRO-NOR-SOP-100-100 Taxi_ CLEARANCE

ENGINE 2 and 3.....START

CAUTION	Start engines 2 and 3 at least 5 minutes before takeoff.

L2 Note: *5 min engine warm-up are necessary before applying high thrust.*

L1 AFTER START C/L.....PERFORM
BEFORE TAKEOFF SOP.....PERFORM

For a detailed description of the before takeoff SOP , Refer to PRO-NOR-SOP-110-110 Before takeoff_TAKEOFF OR LINE UP CLEARANCE .

TAXI ON INNER ENGINES ONLY

ENGINE 2 and 3.....START
AFTER START SOP.....PERFORM

For a detailed description of the after start SOP , Refer to PRO-NOR-SOP-90-90 After start_ENG START selector .

AFTER START C/L.....DELAY

Delay the AFTER START checklist until all engines are started.

L2 Note: *The flight crew can perform the flight control check with only two symmetrical engines running.*

L1 TAXI SOP.....PERFORM

For a detailed description of the taxi SOP , Refer to PRO-NOR-SOP-100-100 Taxi_ CLEARANCE

ENGINE 1 and 4.....START

CAUTION	Start engines 1 and 4 at least 5 minutes before takeoff.

L2 Note: *5 min engine warm-up are necessary before applying high thrust.*

L1 AFTER START C/L.....PERFORM
BEFORE TAKEOFF SOP.....PERFORM

For a detailed description of the before takeoff SOP , Refer to PRO-NOR-SOP-110-110 Before takeoff_TAKEOFF OR LINE UP CLEARANCE .

AT ARRIVAL

Applicable to: ALL

TAXI ON OUTER ENGINE ONLY

The flight crew should use the following procedure for taxi in:

CAUTION	Wait 3 min before shutting down the engines.

L2 *Note: For the inner engines, the use of reversers is considered as engine high thrust operation. 3 minutes are necessary for engine cooling before the flight crew shuts down the engines.*

L1 ENGINES 2 and 3.....SHUT DOWN

TAXI ON INNER ENGINE ONLY

The flight crew should use the following procedure for taxi in:

CAUTION	Wait 3 min before shuting down the engines.

L2 *Note: For the outer engines, the approach phase is considered as engine high thrust operation due to the possible thrust increase above idle during the approach. The outer engines are considered at low thrust only when the aircraft is on the ground. 3 minutes are necessary for engine cooling before the flight crew shuts down the engines.*

L1 ENGINES 1 and 4.....SHUT DOWN

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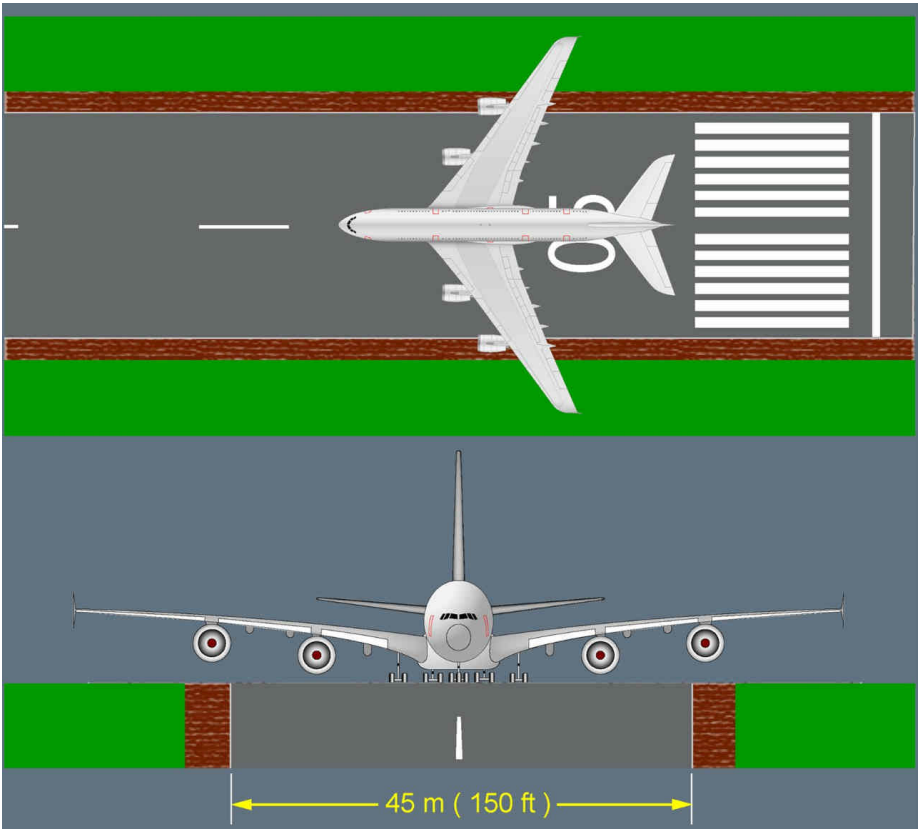
OPERATIONS ON RUNWAY + SHOULDERS LESS THAN 58 M (190 FT) WIDE

Applicable to: ALL

The minimum runway width for A380 takeoff and landing is 45 m (150 ft).
On a 45 m (150 ft) wide runway, the outer engines may be above non-stabilized surface depending on the width of the runway stabilized shoulders.
The following supplementary procedure only applies when the overall width of the runway plus stabilized shoulders is between 45 m (150 ft) and 58 m (190 ft).
The stabilized shoulders may be in asphalt or in grass (i.e. without loose gravels).
The natural soil beyond the stabilized surface of the runway may be non-stabilized (i.e. sand, loose gravels, snow).



This procedure limits the risk of contamination of the runway pavement behind the aircraft due to jet blast.

The standard operating procedures (*Refer to PRO-NOR-SOP-120-120 Takeoff_GENERAL*) remain applicable for operations on runway plus shoulders less than 58 m (190 ft) wide. In addition, apply the following procedure :

THRUST SETTING

TAKEOFF..... ANNOUNCE | PF
THR.....25% | PF

L2 *Apply 25% THR on all four engines with brakes on. However, the flight crew can release the brakes to perform a rolling takeoff.*

L1

- **If the crosswind is at, or below 23 kt , and there is no tailwind:**

  BRAKES.....RELEASE | PF
  THRUST LEVERS ON INNER ENGINES ONLY.....FLX or TOGA | PF

- **If the crosswind is above 23 kt , and/or in the case of tailwind:**

  BRAKES.....RELEASE | PF
  THRUST LEVERS ON INNER ENGINES ONLY..... 50% | PF

  - **At 20 kt ground speed:**

    THRUST LEVERS ON INNER ENGINES ONLY..... FLX or TOGA | PF

- **AT 40 kt :**

  THRUST LEVERS ON OUTER ENGINES.....FLX or TOGA | PF

DIRECTIONAL CONTROL..... USE RUDDER | PF
CHRONO.....START | PM
PFD/ND..... SCAN | PM
TAKEOFF THRUST..... CHECK | PM

L2 *Check that the current THR of each engine reached the THR rating limit value, before the aircraft reaches 80 kt .*

L1 Continue the takeoff procedure, as usual.

The application of the takeoff thrust setting procedure on a runway plus shoulders less than 58 m (190 ft) wide , has an impact on the takeoff distance. For more information on performance impact, *Refer to PER-TOF-TOC-RWY Operations on Runway + Shoulders less than 58 m Wide* .
The flight crew should check that the runway plus shoulders state is correctly defined in the takeoff performance application.

BRAKE COOLING TIME

Applicable to: ALL

CONTEXT

Based on the flight test campaign and on the brakes temperature observed on in service aircraft, a table is provided to estimate the brake cooling time.

This table enables the flight crew to predict the brake cooling time, taking into account:
- The current brake temperature displayed on the WHEEL SD page.
- The outside temperature displayed on the permanent data of the SD page (SAT).

SCOPE

The flight crew uses the brake cooling time table to estimate a minimum turnaround time based on the brake temperature.
At the gate, when the aircraft is stopped for at least for 15 min, the flight crew reads the maximum brake temperature displayed on the WHEEL SD page.

L2 For a better estimation of the turn around time, the flight crew should wait 15 min. Between the stop of the aircraft at the gate and 15 min later, the energy absorbed by the brakes during the taxi phase continues to impact the brake temperature behavior (I.e. increases the brake temperature or slows down the brake cooling).

L1 ESTIMATED BRAKE COOLING TIME TABLE IN MIN.

Current Hottest Brake Temp		300 °C	350 °C	400 °C	450 °C	500 °C	550 °C	600 °C	650 °C	700 °C
Temp. Target	SAT									
300 °C	-54 °C	0	16	29	42	53	63	72	81	89
	15 °C	0	19	35	50	63	74	85	94	103
	55 °C	0	22	40	56	70	83	94	104	114
250 °C	-54 °C	18	33	47	59	71	81	90	99	107
	15 °C	23	42	58	72	85	97	107	117	126
	55 °C	27	49	67	83	97	110	121	131	141
200 °C	-54 °C	39	55	68	81	92	102	111	120	128
	15 °C	51	70	86	101	113	125	135	145	154
	55 °C	62	84	102	118	132	144	156	166	176
150 °C	-54 °C	65	80	94	106	118	128	137	146	154
	15 °C	88	107	123	138	150	162	173	182	191
	55 °C	111	133	152	168	182	194	206	216	225

The flight crew enters the table with the current brake temperature at the top of the table. Function of the SAT, and the brake temperature target at the end of the cooling, the flight crew reads the estimated brake cooling time at the intersection of the line and the column.

L2 *Note:* *Example:*

- *SAT= 15 °C*
- *Current maximum brake temperature red on the WHEEL SD page= 550 °C*

The flight crew estimates the brake cooling time for a target brake temperature of 200 °C.

They read the value at the intersection of:

- *The 550 °C actual temperature column*
- *The line associated with 200 °C temperature target and a 15 °C SAT.*

125 min is the estimated time corresponding to the brake cooling time for the condition of the day.

L1 For intermediate values, the flight crew interpolates linearly.
The brake cooling time does not take into account the effect of the wind.
To increase the precision of the estimated brake cooling time, the flight crew can use the table several times during the brake cooling, taking the hottest brake temperature as a reference.

OVERVIEW

Applicable to: ALL

The Precision Runway Monitor (PRM) system enables simultaneous close parallel ILS approaches. The air traffic controllers use the PRM system to monitor the aircraft position. If necessary, the ATC orders a break out, turn and climb or descent.

To perform PRM operations:
- The air traffic controllers and the flight crews must fulfil specific training requirements
- The ATC and the aircraft equipment must fulfil specific requirements.

BREAK OUT TURN AND CLIMB PROCEDURE

Applicable to: ALL

Simultaneously:

AP..... OFF | PF
BREAK OUT LEFT(RIGHT), HDG___, ALT___..... ANNOUNCE | PF
THR LEVERS.....TOGA, and back to CL | PF

L2 *The SRS GA and the GA TRK modes engage. The THR CLB mode engages.*
The speed is managed. The speed target is the aircraft speed at SRS GA engagement.
The FMS GO-AROUND phase becomes active. Thus, the FMS reinserts the approach.

L1 TURN LEFT(RIGHT) AND CLIMB

L2 *As the situation is urgent, the flight crew should temporarily not follow the FD orders.*

L1 HDG___.....TURN AND PULL | PM

L2 *The GA TRK mode disengages, and the HDG mode engages.*

L1 ALT___..... TURN AND PULL | PM

L2 *The SRS GA mode disengages, and the OP CLB mode engages. The speed target becomes the FMS speed target of the CLIMB phase.*

L1 SPEED..... ADJUST | PM

L2 *For the initial break out procedure, adjust the speed (e.g. 160 kt), in order to avoid an important acceleration, and an increase of workload.*

L1 ● **When established on the break out path:**
AP.....ENGAGE | PM

L2 *Before engaging the AP, ensure that the FD bar orders approximately correspond to the aircraft current path.*

L1 SPEED.....SELECT AS RQRD | PF
FLAPS.....AS RQRD | PM
GEAR.....AS RQRD | PM

TCAS MODE SEL..... TA/RA AS RQRD | PM

BREAK OUT TURN AND DESCENT PROCEDURE

Applicable to: ALL

Simultaneously:

AP..... OFF | PF

TURN LEFT(RIGHT) AND MAINTAIN RATE OF DESCENT

BREAK OUT LEFT(RIGHT), HDG___, ALT___..... ANNOUNCE | PF

L2 *As the situation is urgent, the flight crew should temporarily not follow the FD orders.*

L1 HDG___.....TURN AND PULL | PM

L2 *The HDG mode engages. The vertical mode reverts to the V/S mode. The vertical speed target is the aircraft vertical speed at V/S engagement.*

L1 ALT___..... TURN AND PULL | PM

L2 *This action defines an altitude target. The OP DES mode and the THR IDLE mode engage. The speed target does not change.*

L1 V/S.....MONITOR | PM

CAUTION	*Depending on the speed target, the vertical speed may become excessive. If the rate of descent exceeds 1 000 ft/min, engage the V/S mode and limit the rate of descent to 1 000 ft/min.*

- **When established on the break out path:**

AP.....ENGAGE | PM

L2 *Before engaging the AP, ensure that the FD bar orders approximately correspond to the aircraft current path.*

L1

- **When cleared by ATC:**

ALT___..... TURN | PF

L2 *Select an altitude target for go-around, in accordance with the ATC clearance.*

L1 THR LEVERS..... TOGA, and back to CL | PF

L2 *The SRS GA and the GA TRK modes engage. The THR CLB mode engages.*
The speed is managed. The speed target is the aircraft speed at SRS GA engagement.
The FMS GO-AROUND phase becomes active.

L1 HDG___.....PULL | PF

L2 *The GA TRK mode disengages, and the HDG mode engages. The SRS GA mode remains engaged, until ALT* engagement.*

L1 SPEED.....SELECT AS RQRD | PF

FLAPS.....AS RQRD | PM

GEAR.....AS RQRD	PM
TCAS MODE SEL..... TA/RA AS RQRD	PM

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RULES FOR COMPUTER RESET

Applicable to: ALL

Some systems that operate abnormally, or that are detected failed by the ECAM , can be recovered by a computer reset.
The flight crew can perform a computer reset by using the cockpit controls (e.g. pushbuttons), or the reset buttons.

The flight crew must only attempt a computer reset when:
- It is requested by the ECAM procedure, or
- The flight crew detects or suspects a system failure and the associated computer reset is authorized by one of the listed procedures (*Refer to List of Computer Reset Procedures*)

The reset procedures give the conditions to perform a reset and also describes the precautions to take and the effects of the reset.

Unless indicated differently in the reset procedure, to perform a system reset:
- Set the normal control to OFF, or pull the reset button
- Wait three seconds if a normal cockpit control is used, or one second if a reset button was pulled
- Set the normal control to ON, or push the reset button.

The number of computer reset attempt is not limited.

WARNING	Several resets must not be performed at the same time, unless indicated in the applicable reset procedure.

Note: *In flight, before taking any action on the reset buttons, the PF and PM must:*
- *Consider and fully understand the consequences of taking action*
- *Crosscheck and verify that the reset button corresponds to the affected system.*

LIST OF COMPUTER RESET PROCEDURES

Applicable to: ALL

AESU 1(2) Reset (*Refer to reset procedure*)

AICU 1(2) Reset (*Refer to reset procedure*)

ARPT NAV Reset (*Refer to reset procedure*)

ATC Reset (*Refer to reset procedure*)

AVS 1(2) Reset (*Refer to reset procedure*)

BCSC 1(2) Reset (*Refer to reset procedure*)

CDLS Reset (*Refer to reset procedure*)

CIDS 1(2)(3) Reset (*Refer to reset procedure*)

CPCS 1(2) Reset (*Refer to reset procedure*)

ENG 1(2)(3)(4) EIPM 1(2) Reset (*Refer to reset procedure*)

FCU Reset (*Refer to reset procedure*)

FLAPS 1(2) Reset (*Refer to reset procedure*)

FMC A(B)(C) Reset (*Refer to reset procedure*)

FWS 1(2) Reset (*Refer to reset procedure*)

HUD Reset (*Refer to reset proccedure*)

NSS FLT OPS Reset (*Refer to reset procedure*)

PACK 1(2) CTL Reset (*Refer to reset procedure*)

SCS 1(2) Reset (*Refer to reset procedure*)

SDF 1(2)(3) Reset (*Refer to reset procedure*)

SLATS 1(2) Reset (*Refer to reset procedure*)

TCS 1(2) Reset (*Refer to reset procedure*)

TR 1(2) (ESS) Reset (*Refer to reset procedure*)

VCS 1(2) Reset (*Refer to reset procedure*)

PACK 1(2) CTL RESET

Applicable to: ALL

PACK 1 CTL Reset Button Location



PACK 2 CTL Reset Button Location



Before resetting one pack controller, ensure that the associated pack is off.
Do not reset both pack controllers at the same time.

TEMPERATURE CONTROL SYSTEM (TCS) 1(2) RESET

Applicable to: ALL

TCS 1(2) Reset Button Location



Do not reset both Temperature Control Systems at the same time.

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AVIONICS VENTILATION SYSTEM (AVS) 1(2) RESET

Applicable to: ALL

AVS 1 Reset Button Location



AVS 2 Reset Button Location



Reset both Avionics Ventilation Systems at the same time.

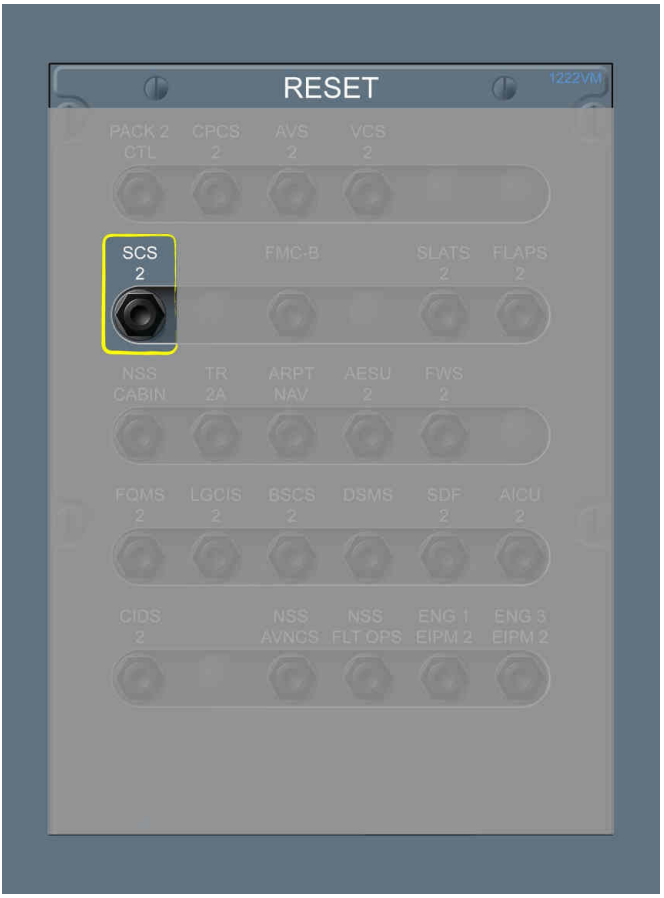
SUPPLEMENTAL COOLING SYSTEM (SCS) 1(2) RESET

Applicable to: ALL

SCS 1 Reset Button Location



SCS 2 Reset Button Location



The cabin crew will inform the flight crew, when a reset of the Supplemental Cooling System (SCS) should be performed.

COOLG PB SW.....OFF
SCS 1 and SCS 2 RESETs..... PULL

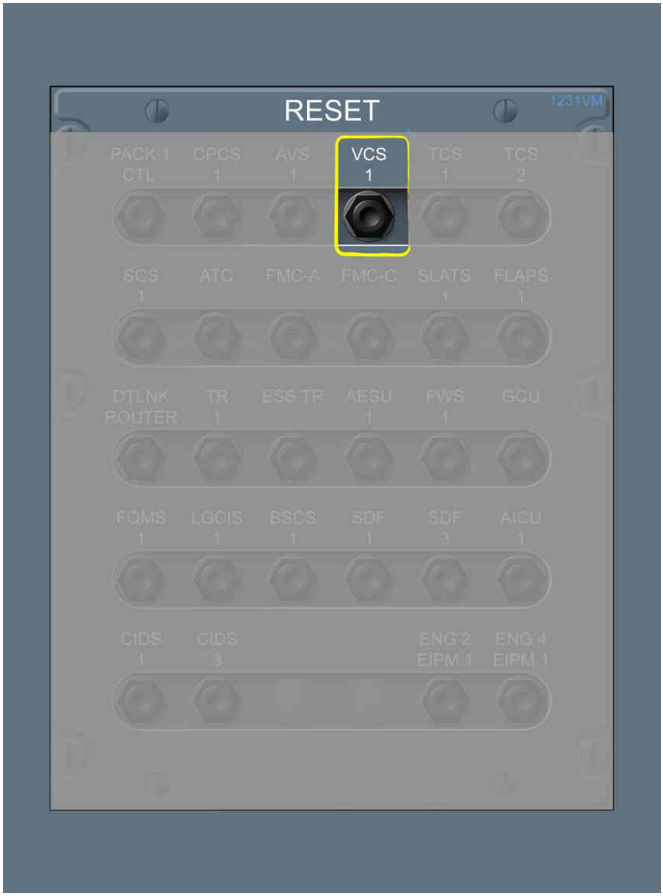
- **After 5 s:**
  SCS 1 and SCS 2 RESETs.....PUSH
- **After 2 s:**
  COOLG PB SW.....AUTO

Note: *If the reset of the SCS is not successful, this indicates that the failure is latched for the remainder of the flight. Any other reset attempts will have no effect.*

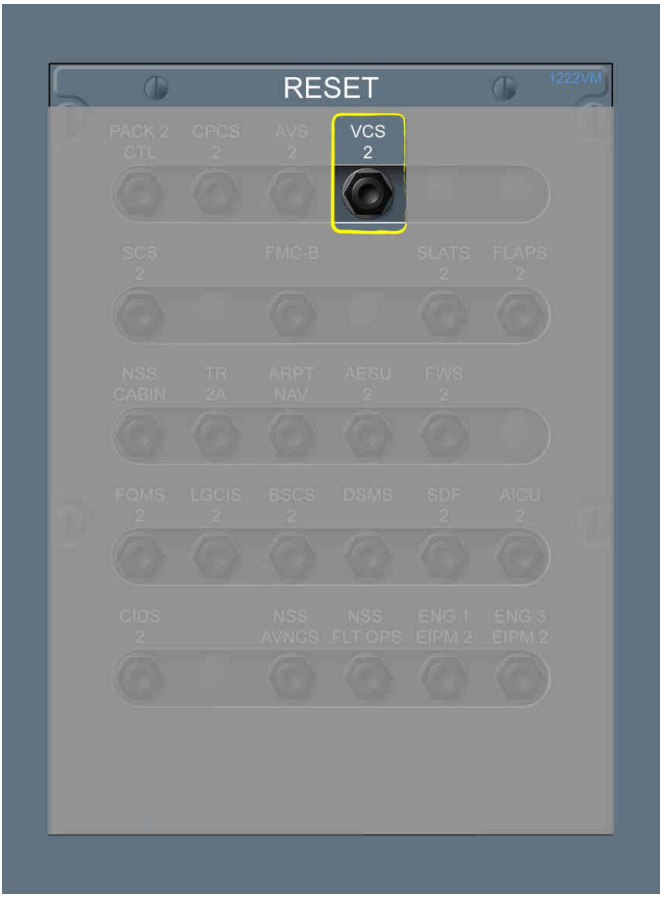
VENTILATION CONTROL SYSTEM (VCS) 1(2) RESET

Applicable to: ALL

VCS 1 Reset Button Location



VCS 2 Reset Button Location



In the case of a smoke warning in the lower Cabin Crew Rest Compartment (CCRC), the ventilation of this compartment automatically stops. In flight, in the case of an erroneous smoke warning, the flight crew can perform a reset of the Ventilation Control System (VCS) to recover the ventilation in the CCRC.

CAUTION	Do not reset the VCS in the case of smoke warning affecting a cargo compartment, or if the cabin crew cannot visually confirm the absence of smoke or smoke source in the CCRC

VCS 1 RESET..... PULL

- **After 5 s:**

VCS 1 RESET.....PUSH

VCS 2 RESET..... PULL

- **After 5 s:**

VCS 2 RESET.....PUSH

Note: *In flight, the flight crew should not reset both Ventilation Control Systems (VCS) at the same time, to avoid the loss of the In-Flight Entertainment, and a reduced airflow in the cabin during the reset.*

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CABIN PRESSURE CONTROL SYSTEM (CPCS) 1(2) RESET

Applicable to: ALL

CPCS 1 Reset Button Location



CPCS 2 Reset Button Location



It is possible to perform a reset of the CPCS 1(2) reset buttons, when the automatic mode of the Cabin Pressure Control System does not operate normally (e.g. outflow valve oscillations associated with high cabin rates).

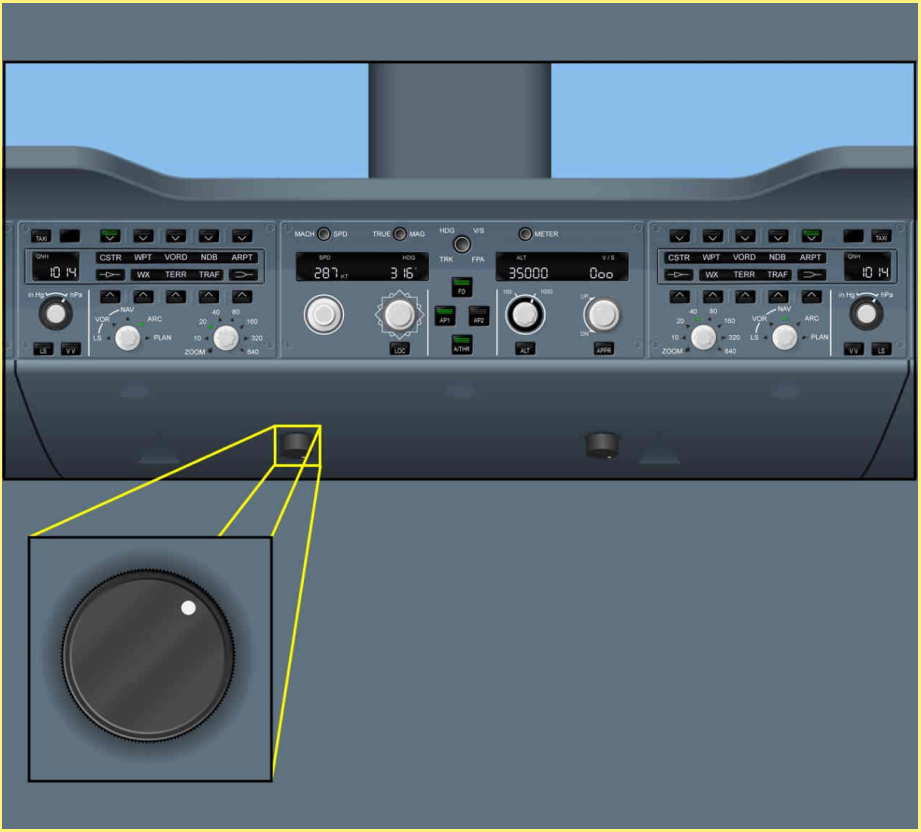
CPCS 1 then CPCS 2 RESETs..... PULL

- **After 1 s:**
  CPCS 2 then CPCS 1 RESETs.....PUSH

FLIGHT CONTROL UNIT (FCU) RESET

Applicable to: ALL
Impacted DU: 00019430 Flight Control Unit (FCU) Reset

Left FCU Brightness Knob Location



It is possible to perform the following reset procedure, in the case of FCU failure.
In flight, do not perform a FCU reset, if the AFS CP only fails.

LEFT FCU BRIGHTNESS KNOB.....TURN OFF 3 s then ON

This action switches off, then on both EFIS CPs and the AFS CP.

FCU TARGETS AND SELECTIONS..... CHECK

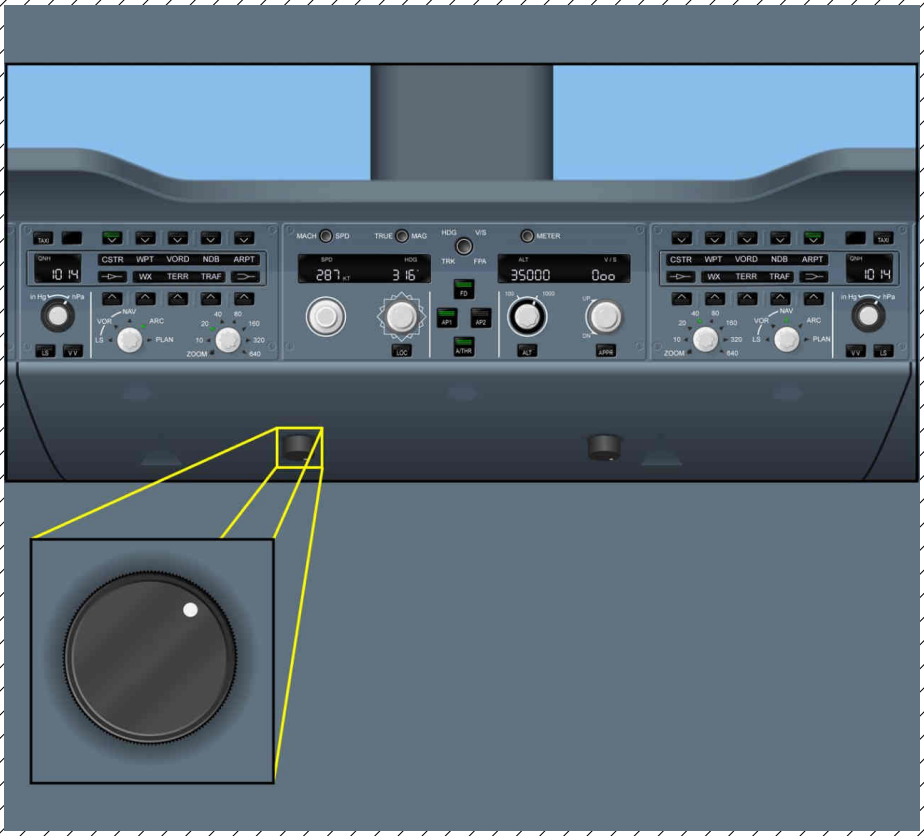
Check targets, and selections on the AFS CP and both EFIS CPs.

When on ground, with engines stopped, the barometric references (values and QNH/STD selection) on both EFIS CPs may be erroneous: In such a case, set the appropriate barometric references on both EFIS CPs.

FLIGHT CONTROL UNIT (FCU) RESET

Applicable to: ALL
Impacted by TDU: 00019639 Flight Control Unit (FCU) Reset

Left FCU Brightness Knob Location



It is possible to perform the following reset procedure, in the case of FCU failure.
In flight, do not perform a FCU reset, if the AFS CP only fails.

LEFT FCU BRIGHTNESS KNOB.....TURN OFF 3 s then ON

This action switches off, then on both EFIS CPs and the AFS CP.

FCU TARGETS AND SELECTIONS.....CHECK

Check targets, and selections on the AFS CP and both EFIS CPs.

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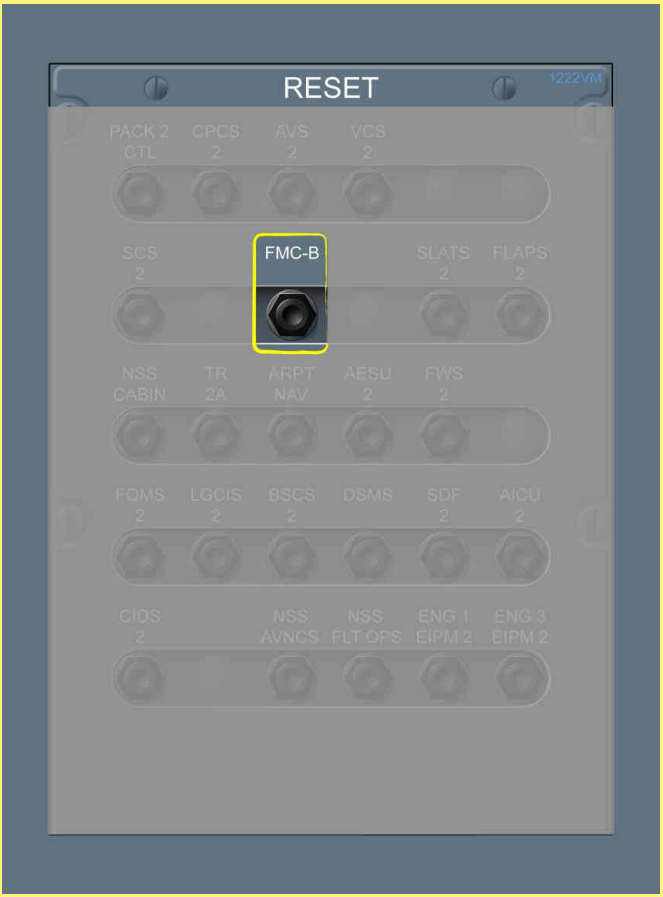
FLIGHT MANAGEMENT COMPUTER FMC A(B)(C) RESET

Applicable to: ALL
Impacted DU: 00019415 Flight Management Computer FMC A(B)(C) Reset

FMC A(C) Reset Button Location



FMC B Reset Button Location



It is possible to perform a FMC A(B)(C) reset in the case of:
- A malfunction of the FMC (with or without the associated FMC A(B)(C) FAULT alert on the ECAM), or
- The three FMC s are not in the normal operation configuration.

Refer to Manual FMC Reset

● **In the case of a malfunction of an FMC :**
AFFECTED FMC RESET..... PULL

- **After 2 s :**
  AFFECTED FMC RESET..... PUSH

- **If the three FMC s are not in the normal operation configuration:**
  ONE FMC RESET IN ABNORMAL CONFIGURATION..... PULL

- **After 10 s :**
  AFFECTED FMC RESET..... PUSH

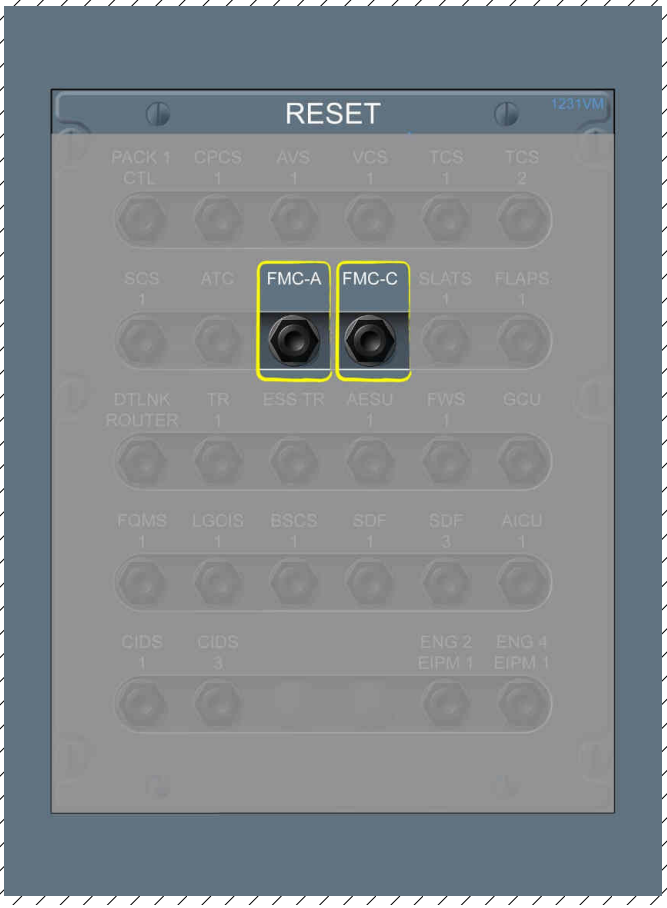
L2 *Note:* *After the FMS reset, the STATUS page may display CAT 2 as Inoperative System, with no associated alert. This may happen if the initial departure runway had no ILS . In this case only, to clear the CAT 2 INOP SYS message, the flight crew should perform the following actions:*

- *Select the POSITION / NAVAIDS page of the MFD*
- *Enter a valid ILS ident (e.g. ILS at destination)*
- *Check that the CAT 2 INOP SYS disappears on the STATUS page*
- *Clear the ILS ident on the POSITION / NAVAIDS page of the MFD .*

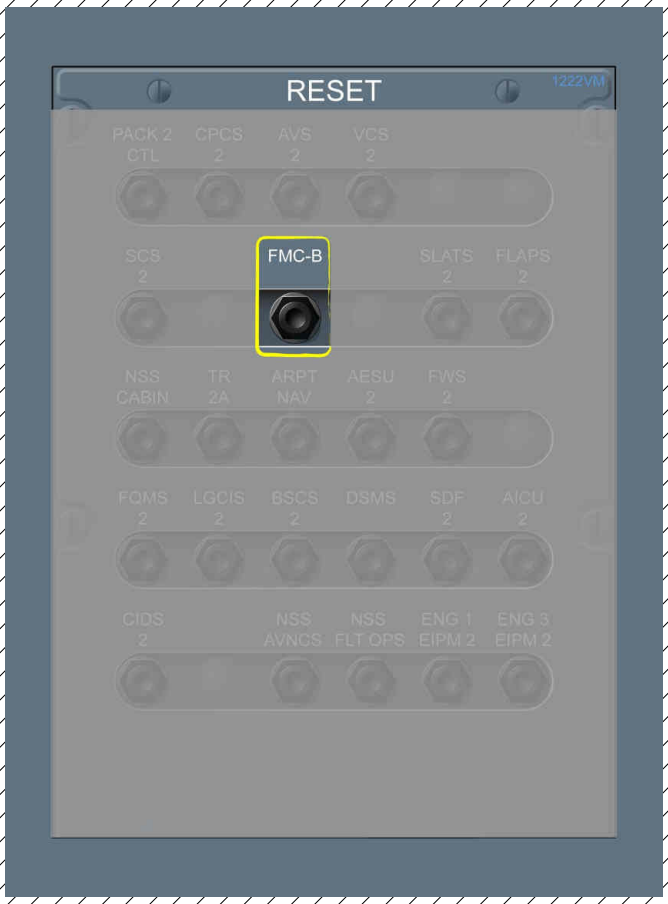
FLIGHT MANAGEMENT COMPUTER (FMC) A(B)(C)

Applicable to: ALL
Impacted by TDU: 00023890 Flight Management Computer FMC A(B)(C) Reset

FMC A(C) Reset Button Location



FMC B Reset Button Location



It is possible to perform a FMC A(B)(C) reset in the case of:
- A malfunction of the FMC (with or without the associated FMC A(B)(C) FAULT alert on the ECAM), or
- The three FMC s are not in the normal operation configuration.

Refer to Manual FMC Reset

● **In the case of a malfunction of an FMC :**
AFFECTED FMC RESET ..... PULL

- **After 2 s :**

  AFFECTED FMC RESET.....PUSH

- **If the three FMC s are not in the normal operation configuration:**

  ONE FMC RESET IN ABNORMAL CONFIGURATION.....PULL

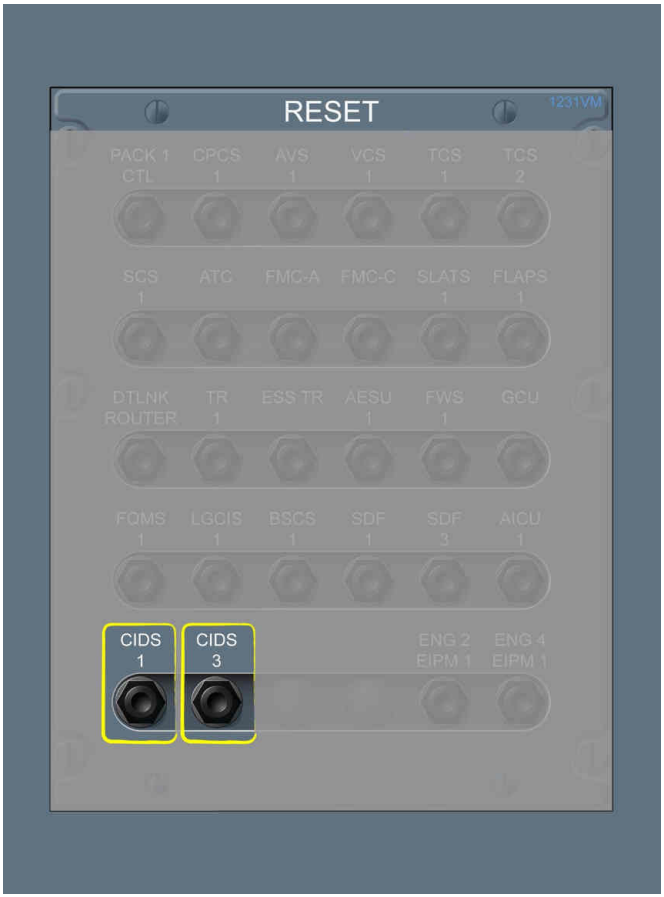
- **After 10 s :**

  AFFECTED FMC RESET.....PUSH

CABIN INTERCOMMUNICATION DATA SYSTEM (CIDS) 1(2)(3) RESET

Applicable to: ALL

CIDS 1(3) Reset Buttons Location



CIDS 2 Reset Buttons Location



The cabin crew informs the flight crew, when a reset of the CIDS should be performed.

- **When on ground, and no passengers on board:**
  - **If the cabin crew requests a CIDS reset:**

    Be aware that the CIDS reset will result in the loss of PA and interphone for 3 min.

    CIDS 3 RESET.....PULL

    - **After 5 s:**

      CIDS 2 RESET.....PULL

- **After 5 s:**
  CIDS 1 RESET.....PULL
  - **After 5 s:**
    CIDS 1, 2 AND 3 RESET.....PUSH AT THE SAME TIME

    This action leads to:
    - *Full bright cabin illumination*
    - *Loss of basic CIDS functions (e.g. PA, interphone) for 3 min*
    - *The FAPs and mini-FAPs are not available for 5 min.*

    The ECAM will trigger the CAB COM CIDS 1+2+3 FAULT alert.

    Disregard this alert.
    CABIN CREW.....ADVISE
    Inform the cabin crew that the cabin systems should be recovered in 5 min.

- **When on ground, with passengers on board, or when in flight:**
  - **If the cabin crew requests a CIDS reset:**
    CIDS 1 RESET.....PULL
    CABIN CREW.....ADVISE
    Inform the cabin crew that the cabin systems should be recovered in 1 min.
    - **After 1 min, if the cabin crew informs that the pull action on the CIDS 1 reset button is successful:**
      CIDS 1 RESET.....KEEP PULLED
    - **If the cabin crew informs that the pull action on the CIDS 1 reset button is not successful:**
      CIDS 1 RESET.....PUSH
      CIDS 1 restarts.

      If CIDS 1 succeeds to become the active computer, the following occurs:
      - *CIDS 1 takes into account default settings*
        These default settings lead to full bright cabin illumination.
      - *The basic CIDS functions (e.g. PA, interphone) are lost for 30 s*
      - *The FAPs and mini-FAPs are not available for 5 min.*

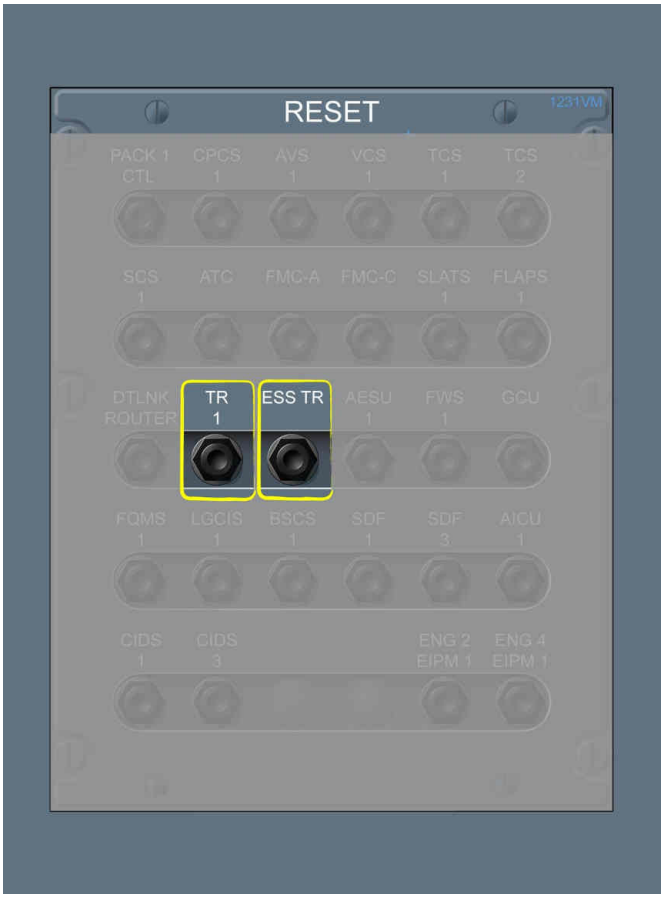
      If the push action is successful, the cabin systems are recovered after 5 min.
      CABIN CREW.....ADVISE
      Inform the cabin crew that the cabin systems should be recovered in 5 min.
      - **After 5 min, if the cabin crew informs that the push action on the CIDS 1 reset button is not successful:**
        Repeat the same actions on the CIDS 2 reset button.

After 5 min, if the cabin crew informs the flight crew that the push action on the CIDS 2 reset button is not successful, the flight crew should check that CIDS 1 and CIDS 2 reset buttons are pushed. Then, repeat the same actions on the CIDS 3 reset button.

TRANSFORMER RECTIFIER (TR) 1(2) (ESS) RESET

Applicable to: ALL

TR 1 and ESS TR Reset Button Location



TR 2 Reset Button Location



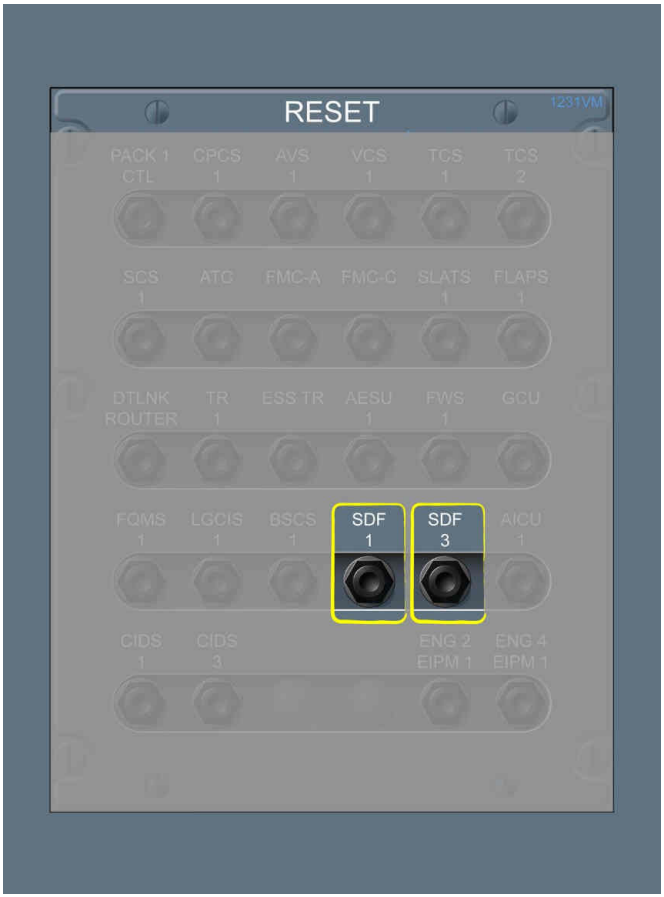
It is possible to perform a TR 1, TR 2, or ESS TR reset, on ground only.

Note: *Pull the TR 1(2)(ESS) reset button less than 5 s, to avoid latching the ELEC TR 1(2A)(ESS) FAULT alert.*

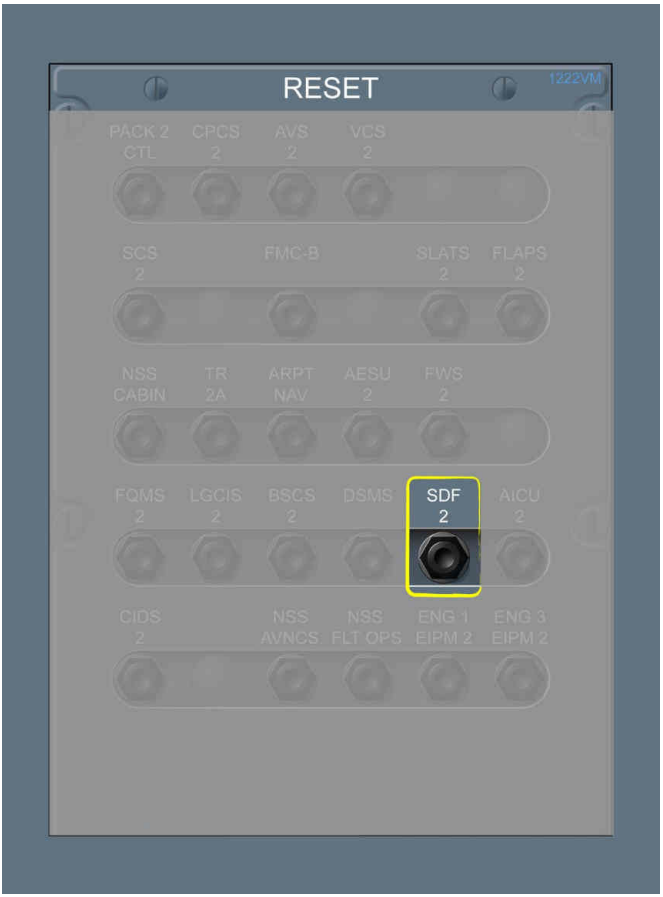
SMOKE DETECTION FUNCTION (SDF) 1(2)(3) RESET

Applicable to: ALL

SDF 1 and SDF 3 Reset Button Location



SDF 2 Reset Button Location



The flight crew can perform a reset of the SDF only if at least two of the following smoke detection fault alerts are triggered:

- SMOKE AFT AVNCS DET FAULT
- SMOKE L(R) MAIN(UPPER) AVNCS DET FAULT
- SMOKE IFE BAY DET FAULT
- SMOKE FWD(AFT/BULK) DET FAULT
- SMOKE AFT LWR CAB REST DET FAULT
- SMOKE UPPER 1R SOCIAL AREA DET FAULT

For the following smoke detection fault alerts, the flight crew can perform a CIDS reset (*Refer to PRO-SUP-24-23 Cabin Intercommunication Data System (CIDS) 1(2)(3) Reset*) instead of a SDF reset:

- SMOKE MAIN(UPPER) DECK LAVATORY DET FAULT
- SMOKE MAIN(UPPER) XX CWS DET FAULT

Note: Depending on the failure, the active CIDS computer can be CIDS 1, 2 or 3. When the flight crew pulls the SDF reset button associated with the active CIDS computer, the active CIDS computer changes. This can lead to disturbance in the cabin during few minutes (For more information on CIDS computer reset procedure, Refer to PRO-SUP-24-23 Cabin Intercommunication Data System (CIDS) 1(2)(3) Reset)

SDF 3 RESET..... PULL then PUSH after 4 s

- **After 20 s :**
  SDF 2 RESET..... PULL then PUSH after 4 s
- **After 20 s**
  SDF 1 RESET..... PULL then PUSH after 4 s

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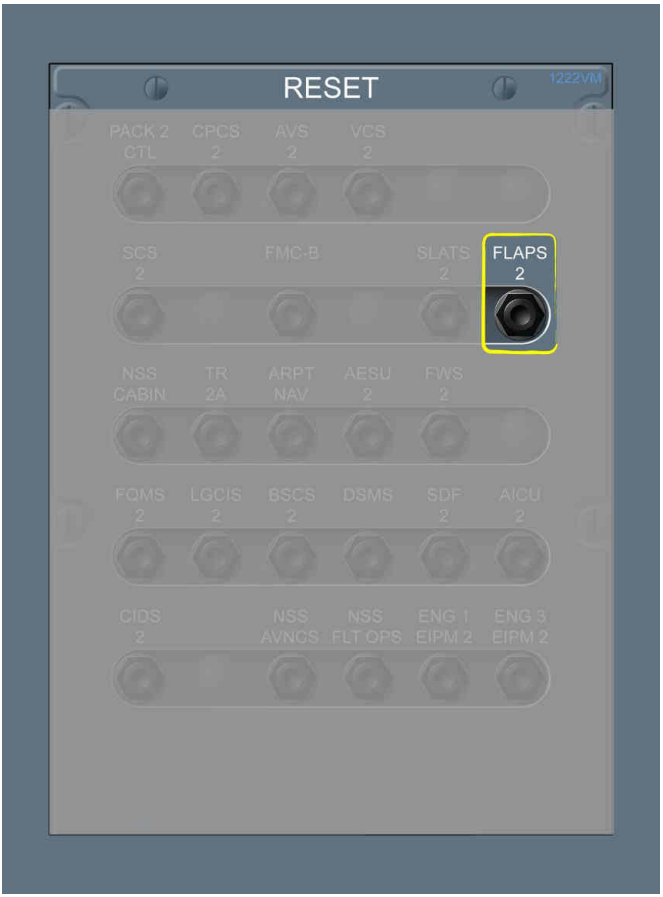
FLAPS 1(2) RESET

Applicable to: ALL

FLAPS 1 Reset Button Location



FLAPS 2 Reset Button Location



Do not perform any reset of the flaps control unit during flaps movement, and do not reset both flaps control units at the same time.

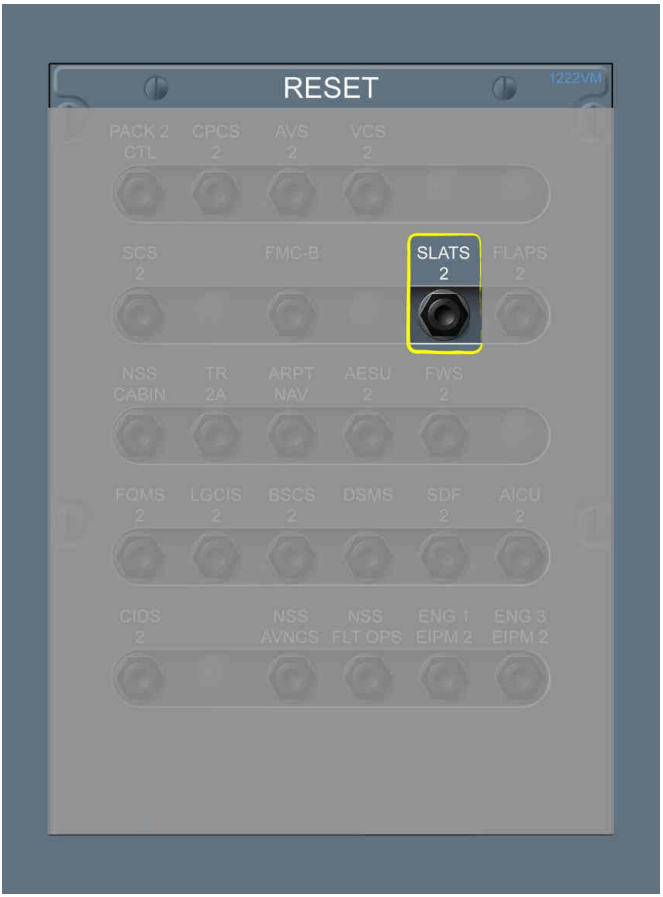
SLATS 1(2) RESET

Applicable to: ALL

SLATS 1 Reset Button Location



SLATS 2 Reset Button Location



Do not perform any reset of slats control unit reset during slats movement, and do not reset both slats control units at the same time.

ANTI ICE CONTROL UNIT (AICU) 1(2) RESET

Applicable to: ALL

AICU 1 Reset Button Location



AICU 2 Reset Button Location



AICU 1 then AICU 2 RESETs.....PULL

- **After 10 s:**
  AICU 1 and AICU 2 RESETs..... PUSH

Wait 30 s before using the wing and/or engine anti-ice.

FLIGHT CONTROL UNIT (FCU) RESET

Applicable to: ALL

Refer to FCU reset procedure .

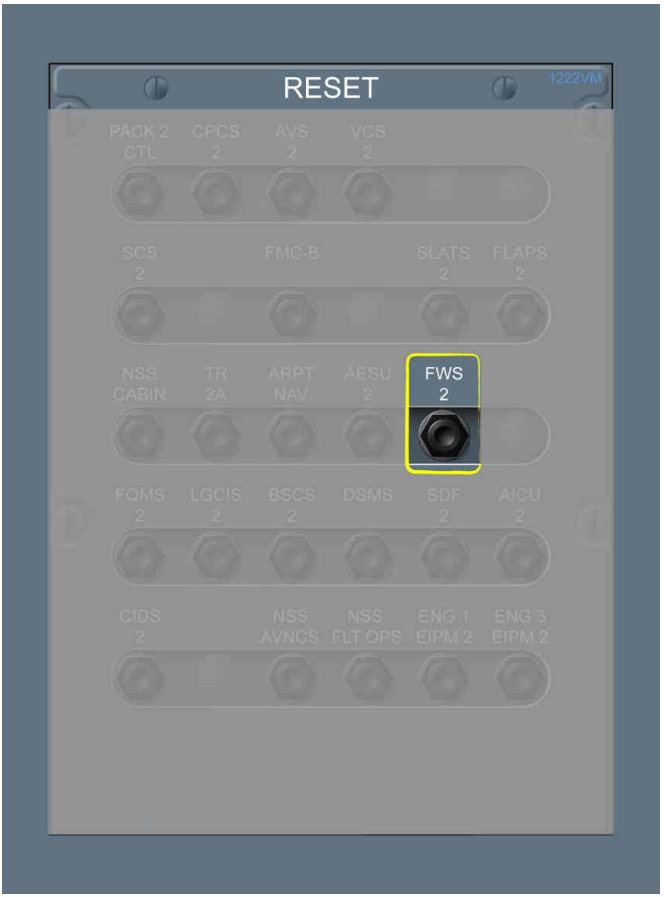
FLIGHT WARNING SYSTEM (FWS) 1(2) RESET

Applicable to: ALL

FWS 1 Reset Button Location



FWS 2 Reset Button Location



On ground, it is possible to perform the following reset procedure, when there is a malfunction of FWS 1 and/or FWS 2.
In flight, it is possible to perform the following reset procedure, only when there is a malfunction on both FWS 1 and FWS 2.

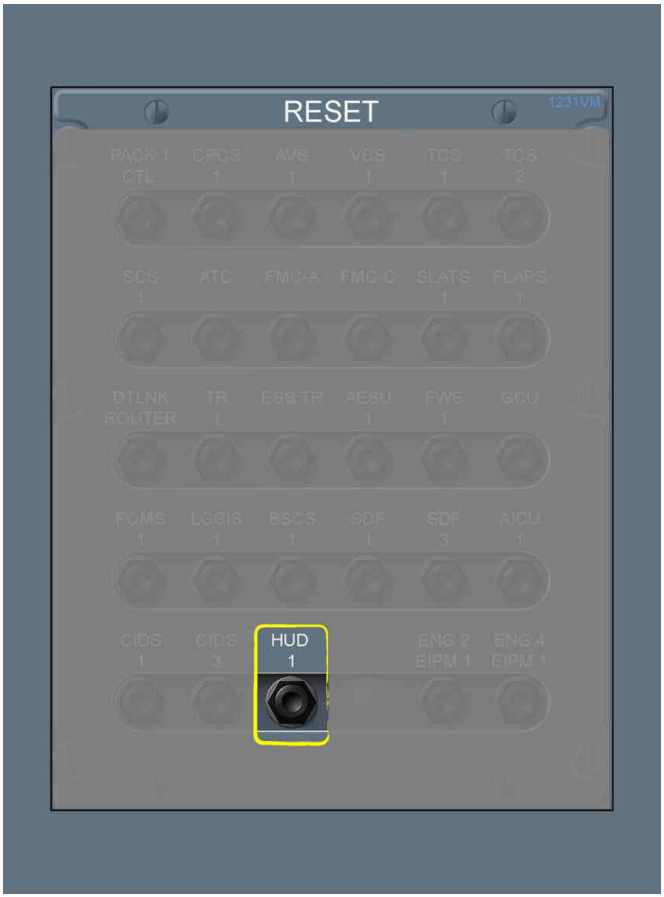
FWS 1 and FWS 2 RESETs .....PULL

- **When the CDS FWS 1+2 FAULT alert triggers:**
  FWS 2 RESET then FWS 1 RESET..... PUSH

HEAD-UP DISPLAY (HUD) RESET

Applicable to: ALL

HUD 1 Reset Button Location



In the case of HUD failure, wait for automatic HUD recovery during maximum 2 min.
It is possible to perform a HUD reset, if the HUD automatic reset is not successful.

HUD 1 RESET..... PULL

● **After 5 s:**

HUD 1 RESET..... PUSH

The HUD may display SELF TEST IN PROGRESS - MAX XX SEC for a few seconds before the HUD is recovered.

■ **If the HUD reset is successful:**

HUD USE.....AS RQRD

■ **If the HUD reset is not successful:**

Continue using the PFD and the ND.

HUD..... STOW

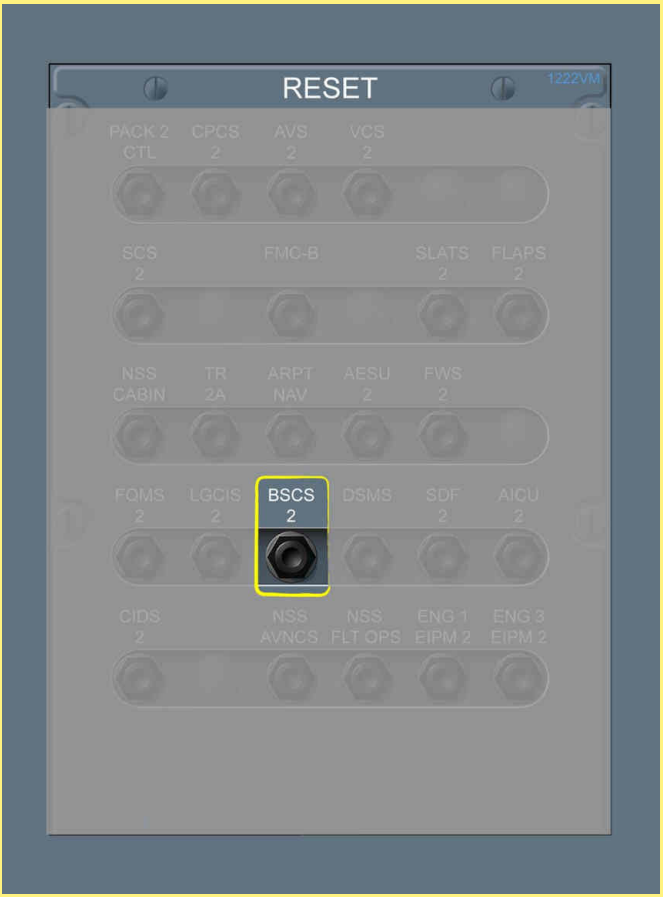
BRAKE AND STEERING CONTROL SYSTEM (BSCS) 1(2) RESET

Applicable to: ALL
Impacted DU: NONE

BSCS 1 Reset Button Location



BSCS 2 Reset Button Location



ECAM ALERTS.....RECALL

Check any BRAKES or STEER alert (s) other than STEER B/W STEER NOT LOCKED.

- **If other BRAKES or STEER alerts are displayed:**

  The BSCS reset is not allowed

● **If no other BRAKES or STEER alert is displayed (STEER B/W STEER NOT LOCKED only):**

TAXI OR TOW THE A/C IN STRAIGHT LINE OVER 165 FT

L2 *Taxi or tow the aircraft in straight line over about 165 ft reduces Body Landing Gear stress and facilitates the locking of the BWS.*

L1 PARKING BRAKE.....ON
BSCS 1 RESET.....PULL
BSCS 1 RESET.....PUSH

● **When BSCS 1 reset:**
BSCS 2 RESET.....PULL
BSCS 2 RESET.....PUSH

PARKING BRAKE.....OFF

● **IF NOT SUCCESSFUL**
PARKING BRAKE.....ON
BSCS 2 RESET.....PULL
BSCS 2 RESET.....PUSH

● **When BSCS 2 reset:**
BSCS 1 RESET.....PULL
BSCS 1 RESET.....PUSH

PARKING BRAKE.....OFF

Note:
1. *If the BSCS 1 and BSCS 2 are reset simultaneously, the aircraft looses all steering capability and the braking degrades to EMERGENCY mode.*
2. *The BSCS will attempt to re-lock the BWS when the BSCS 1 and BSCS 2 are reset and the parking brake set to OFF.*
3. *If the STEER B/W STEER NOT LOCKED alert appears again after the release of the parking brake, dispatch is not allowed.*

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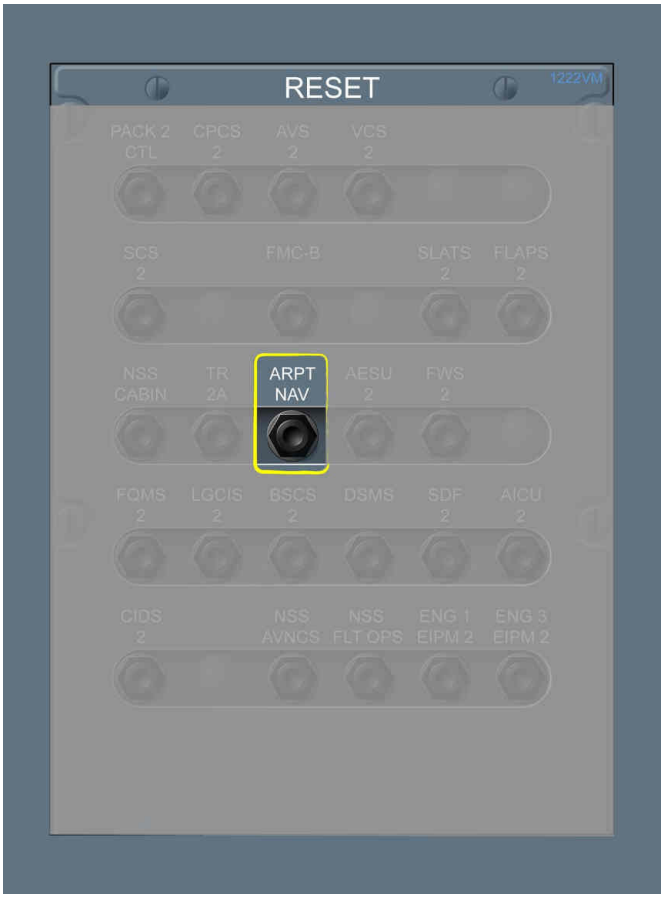
AIRPORT NAVIGATION (ARPT NAV) RESET

Applicable to: ALL

ARPT NAV Reset Button Location



ARPT NAV RESET.....PULL

- **After 10 s:**
  ARPT NAV RESET.....PUSH

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AIRCRAFT ENVIRONMENTAL SURVEILANCE UNIT (AESU) 1(2) RESET

Applicable to: ALL

AESU 1 Reset Button Location



AESU 2 Reset Button Location



It is possible to perform a reset of the AESU 1(2), when the surveillance system does not operate normally.

AESU 1 and AESU 2 RESETS.....PULL

- **When the SURV SYS 1+2 FAULT alert triggers:**
  AESU 1 then AESU 2 RESET.....PUSH

AIR TRAFFIC CONTROL (ATC) RESET

Applicable to: ALL

ATC Reset Button Location



It is possible to perform an ATC reset, when:

- MAILBOX NOT AVAIL is displayed on the lower part of the SD , or
- ATC COM PAGE NOT AVAIL is displayed on the CAPT and/or F/O MFD (s).

Note: *Inform by voice the ATC center that ADS will be set to OFF and that ATC will be reset (for appropriate phraseology, refer to regional procedures).*

ADS.....OFF

L2 *When possible, set the ADS OFF on the CONNECT/CONNECTION STATUS page (Refer to DSC-46-10-20-30-20 CONNECTION STATUS Page).*

Setting the ADS OFF :
- *Closes all current ADS connections*
- *Sends a disconnect message to all the connected ATC centers.*

L1 ATC RESET.....PULL

L2 *The alert COM ATC DATALINK FAULT may appear during the reset.*

L1 ● **After 1 s :**
ATC RESET..... PUSH

L2 *Following an ATC reset:*
- *All current CPDLC and ADS connections are lost*
- *Mailbox messages are lost*
- *All the messages stored in the MSG RECORD/LIST page are kept (Refer to DSC-46-10-20-30-80 MSG RECORD/LIST Page).*

L1 *Note: If the flight crew directly resets the ATC without setting the ADS OFF , no ADS disconnect message will be sent to the connected ATC centers. Therefore, ADS connections may not be properly closed and the ATC centers may have difficulties to establish again ADS connection with the aircraft after the notification.*

ATC CENTER.....NOTIFY

L2 *Notify the ATC center on the CONNECT/NOTIFICATION page (Refer to DSC-46-10-20-30-10 NOTIFICATION Page).*
The ATC center will establish again ADS and CPDLC connections.

NETWORK SERVER SYSTEM (NSS) FLIGHT OPERATIONS (FLT OPS) RESET

Applicable to: ALL

NSS FLT OPS Reset Button Location



It is possible to perform an NSS FLT OPS reset, when CAPT and F/O OITs do not display the FLT OPS side, and when CAPT and F/O laptops are operative.

CAPT & F/O LAPTOPS.....OFF

L2 *To turn off the laptops, slide the laptops ON/OFF sw to the right for no more than 2 s.*

L1 BOTH OIT BRIGHTNESS KNOB.....OFF

NSS FLT OPS RESET.....PULL

- **After 5 s:**

  NSS FLT OPS RESET.....PUSH

BOTH OIT BRIGHTNESS KNOB.....ON

- **After one minute:**

  CAPT & F/O LAPTOPS.....ON

L2 *To turn on the laptops, slide the laptops ON/OFF sw to the right for no more than 2 s.*

L1 L12

Note: The laptop takes approximately 5 min to restart.

COCKPIT DOOR LOCKING SYSTEM (CDLS) RESET

Applicable to: ALL

It is possible to perform a CDLS reset when at least one STRIKE light on the CKPT DOOR CONT overhead panel is amber.

CKPT DOOR CONT Panel



COCKPIT DOOR..... OPEN
CKPT DOOR SW..... UNLOCK 10 s

Maintain the CKPT DOOR sw in the UNLOCK position for 10 s to reset and to attempt to recover the CDLS:

- *If the STRIKE light goes off, the system has resumed normal operation*
- *If the light remains on, the CDLS is failed.*

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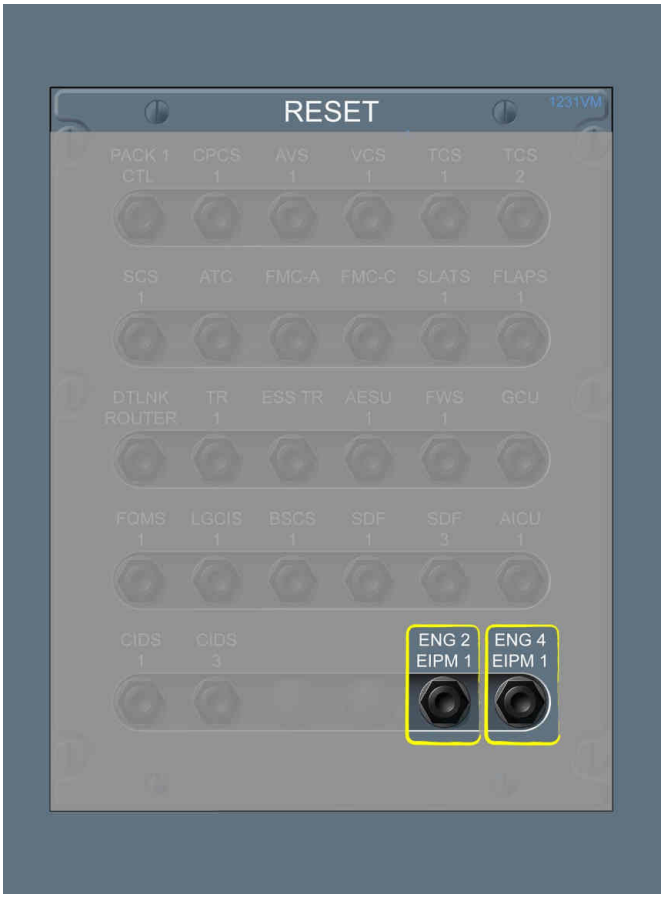
ENG 1(2)(3)(4) ENGINE INTERFACE POWER MANAGEMENT (EIPM) 1(2) RESET

Applicable to: ALL

ENG 2(4) EIPM 1 Reset Button Location



ENG 1(3) EIPM 2 Reset



It is possible to perform a reset of the applicable engine EIPM, when the parameters of the associated engine on the ENG SD page are replaced by amber crosses.

PROCEDURES

SPECIAL OPERATIONS

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PRO-SPO-PLP PRELIMINARY PAGES

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OVERVIEW

Applicable to: ALL

Operations on fluid contaminated runways require the application of special procedures. These procedures are applicable to the following phases of flight:

- Taxi
- Takeoff
- Landing
- After Landing.

For the associated performance limitations to be applied during these phases of flight, refer to the AFM.

TAXI

Applicable to: ALL

TAXI SOP.....PERFORM

For a detailed description of the Taxi SOP, Refer to the associated procedure .

● **In addition, apply the following procedures:**

When taxiing on slippery surfaces, maintain the aircraft far behind the aircraft in front.

THRUST LEVERS..... AS RQRD

L2 *Avoid high thrust settings.*

L1 TAXI SPEED..... LOW

L2
- *Remember that the antiskid is inhibited at very low speeds.*
- *For turns with large nosewheel steering angles (minimum radius):*
  - *Noise and vibrations may be due to wheel skid*
  - *Maintain the speed as low as possible (max 5 kt), to prevent wheel skid and/or an increase in turn radius*
  - *If necessary, use the outer engine and differential braking. Maintain the other engines at idle*
  - *Do not apply symmetrical thrust to prevent wheel skid and/or an increase in turn radius.*
- *If the body wheel steering is inoperative:*
  - *Do not perform brake pivot turns to prevent wheel skid and/or an increase in turn radius*
  - *On slippery or contaminated runways, minimize the tiller angle.*

L1 ● **Icing conditions with rain, slush, or snow may contaminate the runways and taxiways:**

SLATS/FLAPS.....RETRACTED

L2 *Maintain the slats/flaps retracted, until the aircraft reaches the holding point on the takeoff runway, in order to prevent contamination of the slats/flaps mechanism.*

L1 BEFORE TAKEOFF CHECKLIST.....KEEP ON HOLD

L2 *Stop the BEFORE TAKEOFF checklist before the FLAPS T.O setting. After slats/flaps extension, continue and complete the BEFORE TAKEOFF checklist.*

TAKEOFF

Applicable to: ALL

TAKEOFF SOP.....PERFORM

For a detailed description of the Takeoff SOP, Refer to the associated procedure .

- **In addition, apply the following procedure:**

THRUST LEVER.....TOGA

LANDING

Applicable to: ALL

LANDING SOP.....PERFORM

For a detailed description of the Landing SOP, Refer to the associated procedure .

- **In addition, apply the following procedures:**
  - **If the antiskid is inoperative:**

LANDING.....AVOID

AUTO BRK.....SET TO 3

L2 *If the autobrake is inoperative, use the brake pedals to stop the aircraft.*

L1 FLARE.....INITIATE

Perform a firm touchdown after a brief flare.

  - **As soon as the aircraft touches down, apply the following procedures:**

DEROTATION.....INITIATE

L2 *Before lowering the nosewheel on the runway, select maximum reverse thrust to ensure that maximum reverse thrust is applied as soon as possible.*

L1 REV (if available).....MAX

L2 *If necessary, use maximum reverse thrust until the aircraft is fully stopped.*

Note: In snowing conditions, and if the flight crew does not reduce the reversers, visibility may be reduced by snow blowing at low speeds.

L1 AUTO BRK.....MONITOR

L2 *Monitor the autobrake. If necessary, use the brake pedals to stop the aircraft.*

L1 **AT TAXI SPEED**

AT TAXI SPEED SOP..... PERFORM

For a detailed description of the At Taxi Speed SOP, Refer to the associated procedure .

● **In addition, apply the following procedure:**

TAXI SPEED..... LOW

L2 - *Remember that the antiskid is inhibited at very low speeds.*
- *For turns with large nosewheel steering angles (minimum radius):*
  - *Noise and vibrations may be due to wheel skid*
  - *Maintain the speed as low as possible (max 5 kt), to prevent wheel skid and/or an increase in turn radius*
  - *If necessary, use the outer engine and differential braking. Maintain the other engines at idle*
  - *Do not apply symmetrical thrust to prevent wheel skid and/or an increase in turn radius.*
- *If the body wheel steering is inoperative:*
  - *Do not perform brake pivot turns to prevent wheel skid and/or an increase in turn radius*
  - *On slippery or contaminated runways, minimize the tiller angle.*

AFTER LANDING

Applicable to: ALL

AFTER LANDING SOP..... PERFORM

For a detailed description of the After Landing SOP, Refer to the associated procedure .

● **In addition, apply the following procedures:**

FLAPS.....DO NOT RETRACT

L2 *Flaps retraction may damage the structure.*

L1 ● **After engine shutdown, pay attention to the following items:**

EXTERIOR INSPECTION.....PERFORM

L2 *The slats/flaps mechanism must be free of contamination.*

L1 ● **When the slats/flaps mechanism are free of contamination, apply the following procedure:**

GREEN AND YELLOW ELEC PUMP.....ON

FLAPS.....RETRACT

L2 *Monitor slats/flaps retraction on the ECAM page.*

L1 GREEN AND YELLOW ELEC PUMP.....OFF

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OVERVIEW

Applicable to: ALL

Flight without cabin pressurization can result of:

- Dispatch under MEL (e.g. both packs inoperative)
- Departure following a structural damage
- Decompression in flight.

The flight crew will decide the flight level, and airspeed depending on:

- The cause of the depressurization
- The distance to fly
- The topographic conditions
- The meteorological conditions, and
- The passengers on board the aircraft.

OXYGEN REQUIREMENTS

Applicable to: ALL

FOR CREW MEMBERS

To obtain the requirements in oxygen for crew members, refer to FAR 121.329 and/or JAR-OPS 1.770, or any other applicable operational regulation.
For more information on oxygen limitations for crew members, *Refer to LIM-35 Minimum Flight Crew Oxygen Pressure* .

FOR PASSENGERS

For oxygen limitations for passengers, *Refer to LIM-35 Minimum Cabin Oxygen Pressure* .

FAILURE OCCURING IN FLIGHT

Applicable to: ALL

In the case of an aircraft decompression in flight, the CAB PRESS EXCESS CAB ALT alert will trigger on the EWD (for more information on this alert, *Refer to PRO-ABN-ECAM-10-21-30-110 CAB PRESS EXCESS CAB ALT*).

FAILURE PRESENT AT DISPATCH

Applicable to: ALL

OPERATIONAL RECOMMENDATIONS

RECOMMENDED ALTITUDE : FL 100 or MSA

If the altitude of the aircraft cabin reaches 13 800 ft , the cabin oxygen masks will automatically drop.

The flight crew must decide the aircraft altitude, depending on:
- *The Minimum Safe Altitude (MSA)*
- *Oxygen requirements*
- *Turbulence, that can be uncomfortable for passengers*
- *Possible low Outside Air temperature (OAT), that can be uncomfortable for passengers, when the aircraft is ventilated by RAM air only.*

AIRSPEED REDUCTION.....CONSIDER

Consider reducing airspeed, to minimize the impact of turbulence on passengers. Use slats and flaps, as necessary.

BEFORE TAKEOFF AND FOR THE WHOLE FLIGHT

- **If both packs are inoperative, or if there is a door failure:**
  PACK 1.....OFF
  PACK 2.....OFF
  RAM AIR..... ON

- **If there is a structural damage:**
  PACK 1..... ON
  PACK 2..... ON
  CAB ALT MODE..... MAN
  CAB ALT TRGT..... CRUISE ACFT ALT

DURING TAKEOFF AND CLIMB

RATE OF CLIMB : LIMIT TO ABOUT 500 ft/min

L2 *This limits the pressure change felt by the passengers, and/or the crew.*

Note: The CAB PRESS EXCESS CAB ALT alert can be triggered by the ECAM during climb. Consider the use of the ECAM CLR key to clear this alert.

L1 AT TOP OF DESCENT

RATE OF DESCENT : LIMIT TO ABOUT 500 ft/min EXCEPT DURING FINAL APPROACH

- **If there is a structural damage:**

  CAB ALT TRGT..... CRUISE ACFT ALT

  The cabin altitude target must be maintained at the cruise aircraft altitude: This ensures that the outflow valves remain open and the cabin differential pressure remains at 0 during descent.

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OVERVIEW

Applicable to: ALL

This procedure applies to ferry the aircraft with the landing gear down.
For procedure limitations, and information applicable in the case of in-flight failure of the landing gear retraction, *Refer to PRO-ABN-ECAM-10-32-70 L/G RETRACTION FAULT* .
A ferry flight with the landing gear down is permitted with the gear doors closed.

LIMITATIONS

Applicable to: ALL

- Maximum altitude: 35 000 ft
- VMO/MMO: 245 kt / M 0.62
- Do not fly into expected icing conditions
- Ditching with landing gear down has not been demonstrated
- The flight crew must disregard FMS fuel predictions and other predictions (altitude, speed). Time predictions are valid only when in cruise
- The flight crew must not use:
  - Managed speed (except in approach)
  - The AP/FD CLB and DES modes

PROCEDURE

Applicable to: ALL

PREFLIGHT

VMO/MMO..... 245 kt/M 0.62
VMO-MMO sw .....CHECK ON "L/G DOWN" POSITION

The VMO-MMO switch is located in the avionics compartment.
The flight crew can check the VMO-MMO sw position in the technical logbook. Before flight with gear down, the maintenance personnel must prepare the aircraft and fill in the technical logbook.

FINAL TAKEOFF

VLS+12kt.....MAINTAIN

L2 *This speed is determined in relation with the following constraints:*
- *The speed must guarantee the best climb gradient for takeoff, therefore the minimum speed*
- *The speed must guarantee sufficient manoeuvrability, therefore sufficient aircraft speed*
- *The speed must be easy to manage*

PERFORMANCE

Applicable to: ALL

OVERVIEW

The drag increase due to the landing gear down position affects takeoff, en-route and go-around performance, and also fuel consumption.
The flight must be planned in accordance with this modified performance capability.

TAKEOFF

CONF 1+F is the recommended takeoff configuration.

Note: *Avoid tailwind conditions.*

The T.O. PERF application takes into account the second segment and the final takeoff climb gradient penalty, when the flight crew selects the option LANDING GEAR POSITION EXTENDED in the ACFT STATUS panel/MEL items.
During final takeoff, the flight crew must maintain VLS + 12 kt.

EN ROUTE CONDITION

For the planned takeoff weight, in the case of an engine(s) failure(s), the aircraft is able to clear terrain along the route by :
- 1 000 ft, if the aircraft needs to climb or is in the climb phase, or
- 2 000 ft, if the aircraft is in the descent phase

The conditions must be checked with the PEP AFM module calculation. If en-route conditions cannot be respected, the takeoff weight should be reduced.

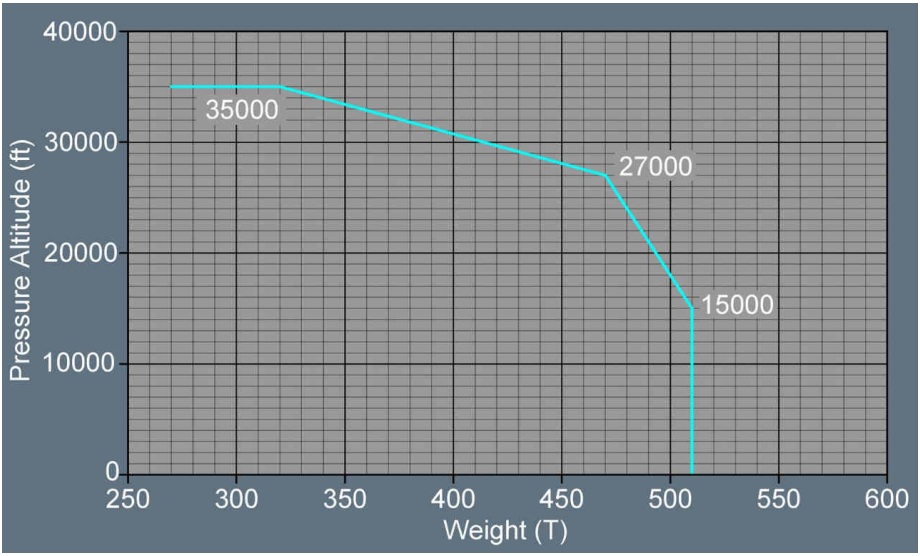
GO-AROUND PERFORMANCE

The LDG PERF application takes into account the go-around gradient penalty, when the flight crew selects the option LANDING GEAR POSITION EXTENDED in the ACFT STATUS panel/MEL items.

FLIGHT PLANNING

MAXIMUM ALTITUDE

The aircraft must remain below the following profile to ensure that at any moment of the flight, VLS is 20 kt below the maximum speed (limited by thrust or VMO/MMO):



CLIMB

Apply maximum climb thrust on all engines.
Climb Speed..... 235KT / 0.59M

CRUISE/DESCENT

Recommended cruise/descent speed.....235KT/ 0.59M
The ceiling with one or two engine inoperative may be a limiting factor, and the choice of the route should reflect this concern.

ENGINE FAILURE

The flight crew can determine the drift down ceiling with engine(s) inoperative by using the IN-FLT PERF application.
Drift down thrust (thrust lever)..... Maximum Continuous (MCT)
Drift down speed.....VLS + 12kt

HOLDING

CLEAN configuration at green dot speed is recommended for holding.
The flight crew can determine the fuel consumption by using the IN-FLT PERF application, HLD thumbnail.

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HIGH ALTITUDE AIRPORT OPERATION

Applicable to: ALL

TAKEOFF FROM AIRPORT AT, OR ABOVE 9 000 FT OF PRESSURE ALTITUDE

BEFORE TAKEOFF

Spurious triggering of CAB PRESS EXCESS CAB ALT alert may occur at aircraft power up. Cancel the alert.

ONE OXYGEN MASK.....DON / N SELECTION

At least one pilot must use the oxygen mask from takeoff, and until cruise.

L2 *During that period, the triggering threshold of CAB PRESS EXCESS CAB ALT alert changes from 9 550 ft to takeoff elevation + 1 000 ft .*

L1 *The use of the mask increases the oxygen consumption. The minimum flight crew oxygen pressure must be increased: Refer to Limitations / Fixed Oxygen System for Cockpit .*

AT TOP OF CLIMB

LDG ELEVN..... CHECK

Check that the LDG ELEVN appears on the CRUISE page.

OXYGEN MASK.....REMOVE / 100% SELECTION / STOW

Remove the oxygen mask, set the N/100% selector on 100%, and stow the mask.

L2 *For more information on mask stowing, Refer to DSC-35-20-30 How to Stow the Mask .*

L1 LANDING ON AIRPORT AT, OR ABOVE 9 000 FT OF PRESSURE ALTITUDE

CRUISE

- **If CAB ALT unduly increases above 8 000 ft :**

  CABIN ALT MODE.....MAN
  CABIN ALT TRGT..... 8 000 ft

  In the case of a step descent, or a turbulence, the pressurization system may consider that the aircraft is in descent.

L3 The pressurization descent phase occurs, when the aircraft rate of descent is greater than 150 ft/min .

L1 The pressurization system will then control the pressure to the landing field elevation.

- **Just after top of descent :**

  CABIN ALT MODE..... AUTO

AT TOP OF DESCENT

LDG ELEVN..... CHECK

Check that the LDG ELEVN appears on the CRUISE page.

When the aircraft is descending, the pressurization system controls the pressure to the landing field elevation.

L3 *The landing field elevation comes from the FMS .*

L1 ONE OXYGEN MASS.....DON / N SELECTION

At least one pilot must use the oxygen mask continuously until landing.

L2 *During that period, the triggering threshold of CAB PRESS EXCESS CAB ALT alert changes from 9 550 ft to the landing field elevation + 1 000 ft .*

L1 *The use of the mask increases the oxygen consumption. The minimum flight crew oxygen pressure must be increased: Refer to Limitations / Fixed Oxygen System for Cockpit .*

FLIGHT OVER MOUNTAINOUS AREA

Applicable to: ALL

INTRODUCTION

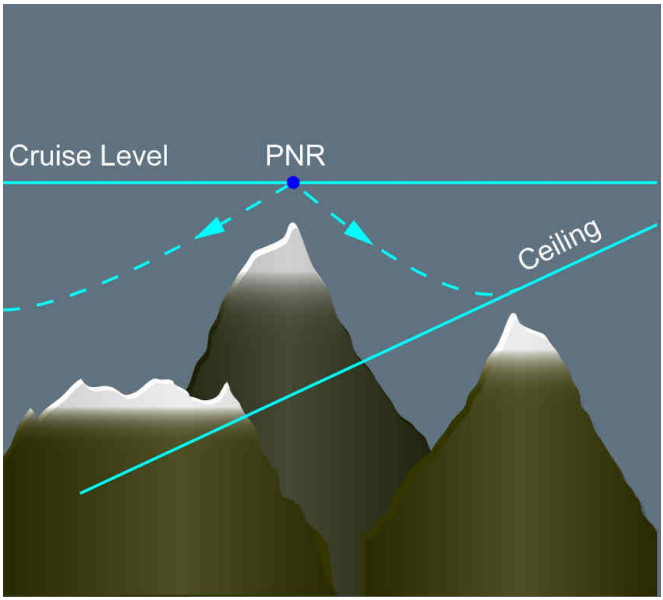
The Operator must take into account two failures for en-route obstacle clearance over mountainous area:

- Engine failure that forces a descent to a lower cruise level
- Depressurization that requires a descent to FL 100 before no more oxygen from the passenger oxygen system is available.

ENGINE FAILURE

If the standard strategy does not enable the aircraft to clear obstacles, the flight crew must apply a drift down procedure. If an engine failure occurs at any point on the route, the net flight path must clear the obstacles on the drift down part by 2 000 ft , and on the climb part by 1 000 ft .
For procedures to be applied in the different strategies, *Refer to Performance/Diversion Strategy* .
If the aircraft cannot clear the en-route obstacles, a point of no-return (PNR) must be determined.

Engine Failure



If an engine failure occurs after the PNR , the aircraft must drift down on course. If the failure occurs before the PNR , the aircraft must turn back.

DEPRESSURIZATION

In the case of depressurization, the passengers receive oxygen through individual oxygen masks. The flight crew has to perform an emergency descent, in accordance with a profile. This profile depends on the fixed oxygen system for the cabin: *Refer to Limitations/Fixed Oxygen System for Cabin* .

CONCLUSION

A detailed study of each route over mountainous area must show that the net flight path with one engine out, and that the performance of the fixed oxygen system for cabin enable the aircraft to clear the obstacles by 1 000 ft in climb, and by 2 000 ft in cruise or descent.
If the aircraft in these circumstances cannot clear the obstacles on the route, the Operator must determine a PNR , and must establish diversion procedures.

GENERAL

Applicable to: ALL

Operators that intend to perform a three-engine ferry flight should obtain an operational approval from the appropriate authority.

The operator must refer to:
- The Aircraft Flight Manual (AFM) that provides the limitations to perform a three-engine ferry flight, *Refer to AFM/APP-3EFF-GEN General*
- The Minimum Equipment List (MEL) that provides the conditions to perform a three-engine ferry flight, *Refer to MEL/SPE-OPS-3EFF-PRE Preamble* .

The flight crew must be qualified and trained on the three-engine ferry flight operations.

TECHNICAL CONDITION OF THE AIRCRAFT

Applicable to: ALL

RESET BUTTON

In accordance with the Aircraft Maintenance Manual (AMM) procedure, the Engine Interface Power Management (EIPM) reset button in relation to the inoperative engine must be pulled on the reset panel:

- If engine 1 is inoperative: ENG 1 EIPM 2...CHECK PULLED
- If engine 2 is inoperative: ENG 2 EIPM 1...CHECK PULLED
- If engine 3 is inoperative: ENG 3 EIPM 2...CHECK PULLED
- If engine 4 is inoperative: ENG 4 EIPM 1...CHECK PULLED.

When the EIPM reset button of the inoperative engine is pulled, the associated FADEC is permanently powered and the anti-ice fault light is on.

C/B ECAM PAGE

In accordance with the AMM procedure, the circuit breakers of the ignitors of the inoperative engine must be tripped on the C/B ECAM page:
- IGNITOR B ENG 1(2)(3)(4)...CHECK TRIPPED
- IGNITOR ENG 1(2)(3)(4) ESS...CHECK TRIPPED.

MEL

The flight crew must check that all inoperative systems are not required as fully operative for dispatch.
All the systems that are required for dispatch are listed in the MEL . *Refer to MEL/SPE-OPS-3EFF-LIM-PROC-AC-SYS-LIM Aircraft Systems Limitations* .

PERFORMANCE APPLICATION

The flight crew can use the T.O PERF application to compute the takeoff performance, by selecting the "1 engine out ferry flight" item in the MEL items subpanel of the ACFT STATUS panel.
Before the flight, the flight crew should ensure that the "1 engine out ferry flight" item is activated in the performance application by the performance application administrator.
If the "1 engine out ferry flight" item is not available in the performance application, a specific takeoff chart must be computed for each runway from which a three-engine ferry flight is performed and according to the inoperative engine.

ENGINES

All four engines with complete cowlings must be installed. Any engine may be inoperative.

Prior to the ferry flight, the inoperative engine should be conditioned in accordance with the AMM procedure, in one of the following configurations:
- Windmilling: Fan rotor and core engine freely rotating in the airflow, or
- Core blank: Fan blades removed and core engine blanked by maintenance equipment.

It is the airline responsibility to choose the engine configuration according to the engine damage (e.g. rotating parts, vanes, abradable seals).

THRUST REVERSERS

If the inoperative engine is an inner engine, the associated thrust reverser must be inhibited in accordance with the AMM procedure.

FUEL USED

If the FU indication of the inoperative engine does not indicate zero, the maintenance crew must reset it to zero according to the AMM procedure.

OPERATING LIMITATIONS

Applicable to: ALL

GENERAL

The following gives only the additional restrictions applicable to three-engine ferry flight. Where not explicitly mentioned, the basic limitations remain valid throughout the three-engine ferry flight.

FLIGHT DURATION

FERRY FLIGHT WITH CORE BLANK

No limitation on flight duration.

FERRY FLIGHT IN WINDMILLING

The duration of the ferry flight only depends on the flight time performed after the engine failure during the previous flight.

Note: The duration of the ferry flight does not depend on the status of the engine lubrication system.

The total flight time (with engine failed during the previous flight plus the ferry flight) must not exceed 25 h .

CG LIMITATION

The maximum aft CG at takeoff is limited to 40 % .
After the refuel, if the CG is out of the takeoff limit, the flight crew can start an automatic ground transfer. For more information, *Refer to DSC-28-50-20 AUTOMATIC GROUND TRANSFER* .

TAKEOFF CONFIGURATION

For maximum performance at takeoff, the engines shall not supply bleed air. The packs must be switched off or supplied by APU .
Slats/flaps configuration for takeoff is CONF 1 + F only.

WEATHER CONDITIONS

ICING

Icing conditions must be avoided because the associated engine anti-ice system is not available on the inoperative engine.

RUNWAY CONDITION

Takeoff is only authorized on dry or wet runway.
Takeoff is not authorized on contaminated runway.

CROSSWIND

The maximum crosswind allowed for takeoff is 10 kt .

LANDING GEAR

Dispatch for a flight with the landing gear down is not authorized.

POWER PLANT

Only TOGA takeoff thrust is authorized.
Flexible or derated takeoff thrust is not authorized.

NORMAL OPERATING PROCEDURES

Applicable to: ALL

GENERAL

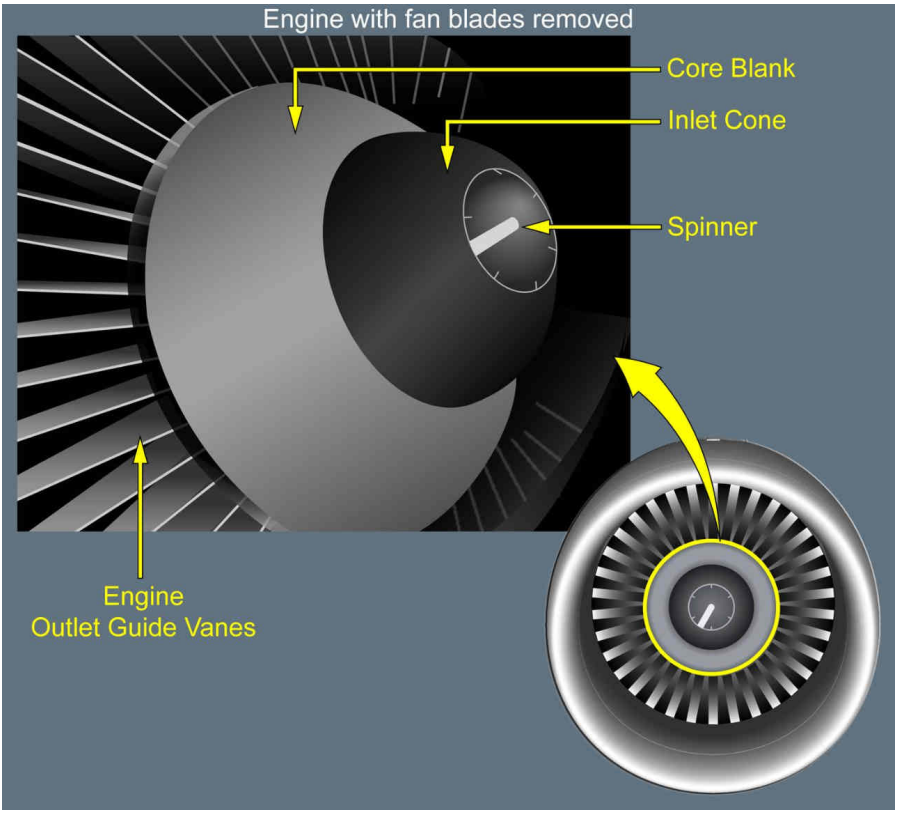
The standard operating procedures remain applicable for a three-engine ferry flight unless here after modified.

EXTERIOR WALKAROUND

No particular check is required regarding the inoperative engine (i.e. windmilling and core blank configurations). The flight crew should apply the standard exterior walkaround procedure.

L2 If the inoperative engine is in core blank configuration, the maintenance crew installs the following equipment, in accordance with the AMM procedure:

CORE BLANK CONFIGURATION



L1 COCKPIT PREPARATION

AIR

AIR FLOW selector ..... LO

ELEC

GEN 1(2)(3)(4) ..... OFF

The generator associated with the inoperative engine must be switched off throughout the ferry flight.

The complete AC and DC electrical networks remain supplied. No specific shedding of commercial loads is required.

Note: Associated to the inoperative engine, the ECAM alert ELEC GEN 1(2)(3)(4) OFF triggers 1 min after 1 500 ft AGL .
The flight crew should clear the ECAM and remove the STATUS page.

FUEL

ALL FUEL PUMPS..... ON

As for normal operation all the fuel pumps are selected ON, including the fuel pumps of the inoperative engine.

ALL FUEL CROSSFEEDS.....ON then OFF

Check on the FUEL SD page that crossfeed valves correctly open then close.

FUEL USED OF THE FAILED ENGINE.....CHECK ZERO

If the Fuel Used indication of the failed engine does not indicate zero, the maintenance crew must reset it to zero according to the AMM procedure.

HYD

ENG 1(2)(3)(4) PMP A..... OFF
ENG 1(2)(3)(4) PMP B..... OFF

The engine driven pumps A and B of the inoperative engine must be set to OFF.

Note: When the inoperative engine is in windmilling, do not push the ENG FIRE pb since that may cause hydraulic pump damage.

CARGO AIR COND

ALL ISOL VALVES pb-sw .....OFF

MFD SURV

TCAS pb ..... TA ONLY

MFD FMS INITIALIZATION

On ground, the FMS fuel predictions are different from the predictions of the Computerized Flight Plan (CFP): The CFP fuel predictions are based on one engine inoperative while the FMS does not detect that one engine is inoperative on ground when the engines are not running. As a result, on ground, the FMS fuel predictions consider all engines operative and normal operating speeds. After takeoff, the FMS automatically detects that one engine is inoperative, and computes the FMS fuel predictions accordingly.
For more information on FMS predictions with one engine inoperative, *Refer to DSC-22-FMS-10-60 General* .

The FMS detects the inoperative engine during the takeoff phase. Therefore, the THRUST RED altitude and the ACCEL altitude of the T.O panel of the FMS ACTIVE/PERF page have no effect on the aircraft guidance.
After liftoff, in IMC , fly a "standard" engine inoperative procedure, e.g. level acceleration at the recommended altitude or 1 000 ft AGL , if obstacles permit. In VMC , a slow acceleration toward climb speed can be performed reaching the normal acceleration altitude.

Note: *The EO ACCEL altitude of the T.O panel of the FMS ACTIVE/PERF page is only a reminder.*

For more information on the procedure to apply with one engine out during the initial climb-out, *Refer to PRO-ABN-NECA-10-GENGF Engine Failure after V1 - Proc* .

ENG

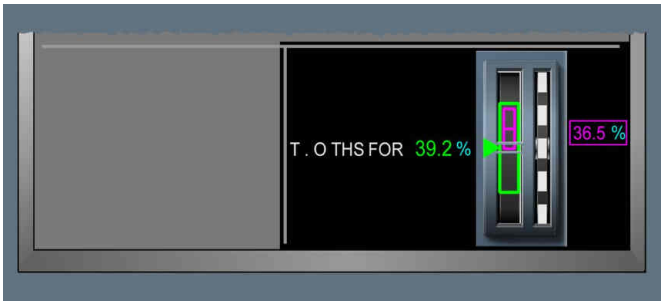
If the inoperative engine is an INNER engine:
- ENG 2(3) REVERSER INHIBITED ECAM alert triggers at power up
  The flight crew should clear the ECAM and remove the STATUS page.
- ENG 2(3) REVERSER CTL FAULT ECAM alert triggers at 1 500 ft AGL .
  The flight crew should clear the ECAM and remove the STATUS page.

AFTER ENGINE START

Position the pitch trim more nose down, i.e. at the lower end of the magenta band that is displayed on the PFD .

L2 Setting the pitch trim at the lower end of the magenta band improves the directional efficiency during the takeoff run.

Pitch Trim Setting



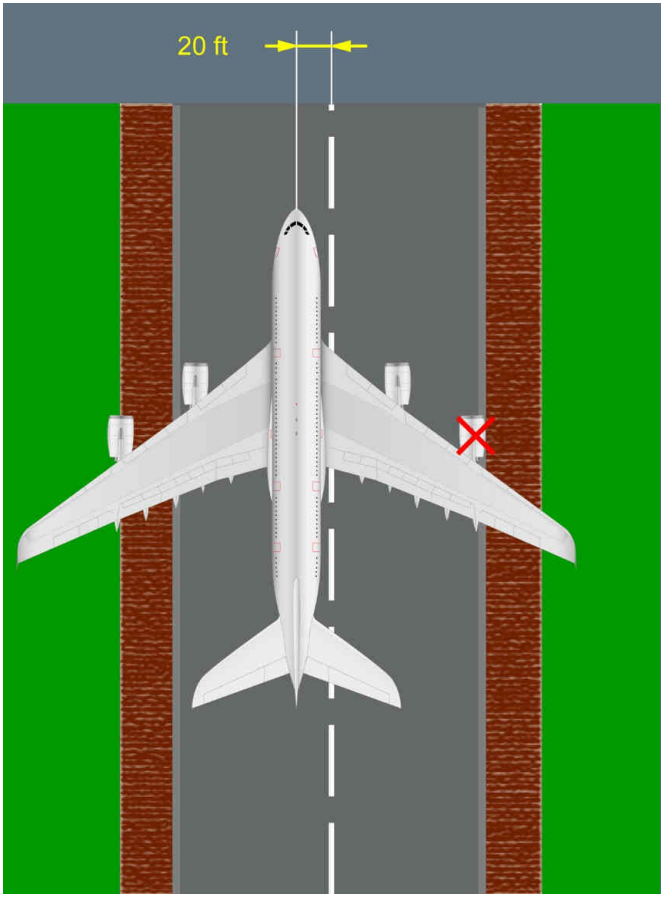
L1 BEFORE TAKEOFF

PACKS 1+2.....OFF or SUPPLIED BY APU BLEED

TAKEOFF PROCEDURE

Align the aircraft with a 20 ft offset toward the side where two engines are operative.

Aircraft Alignment on runway



Specific takeoff thrust setting procedures have been defined for the two following cases:

- **Takeoff procedure with an INNER engine inoperative :**

  Prior to brake release: Apply 25 % THR on the operative engines.

  After brake release: Apply TOGA on the two outer engines.

From 60 kt : Progressively accelerate the operative inner engine to reach:
- CL at 100 kt ,
- TOGA at 120 kt .

Note: - *Do not rush to set the power on the operative inner engine*
- *At takeoff thrust application, the ECAM alerts ENG 2(3) SHUT DOWN and *ELEC and *BLEED secondary failures trigger.*
The flight crew should clear the ECAM and remove the STATUS page.

At VR , progressively rotate toward a pitch attitude of 10 ° .

After liftoff, center the beta target.

For more information on procedure to apply with one engine out during the initial climb-out, *Refer to PRO-ABN-NECA-10-GENGF Engine Failure after V1 - Proc* .

■ **Takeoff procedure with an OUTER engine inoperative :**

Prior to brake release: Apply 25 % THR on the inner engines and 20 % THR on the operative outer engine.

After brake release: Apply TOGA on the two inner engines.

From 60 kt : Progressively accelerate the operative outer engine to reach:
- 50 % THR at 100 kt ,
- CL at 120 kt ,
- TOGA at 140 kt .

Note: - *Do not rush to set the power on the operative outer engine*
- *At takeoff thrust application, the ECAM alerts ENG 1(4) SHUT DOWN and *ELEC and *BLEED secondary failures trigger.*
The flight crew should clear the ECAM and remove the STATUS page.

At VR , initiate the rotation toward a pitch attitude of 10 ° .

After liftoff, center the beta target.

For more information on procedure to apply with one engine out during the initial climb-out, *Refer to PRO-ABN-NECA-10-GENGF Engine Failure after V1 - Proc* .

AFTER TAKEOFF, WHEN IN CLEAN CONFIGURATION

● **If the APU is used to supply the air conditioning during takeoff:**
APU BLEED pb-sw ..... OFF
APU MASTER sw ..... OFF

● **If the takeoff is performed with both packs OFF:**
PACKS 1 + 2 ..... ON

IN FLIGHT

During the main fuel transfers from the transfer tanks to the feed tanks, the FQMS automatically balances the fuel.
When inner and mid tanks are empty, the FQMS can no longer balance the fuel. Subsequently, due to the inoperative engine, this may lead to a fuel imbalance and the ECAM alert FUEL WINGS NOT BALANCED may trigger. Apply the associated ECAM procedure.
For more information, *Refer to PRO-ABN-ECAM-10-28-390 FUEL WINGS NOT BALANCED* .

L2 *Note: The ECAM alert FUEL WINGS NOT BALANCED triggers as soon as there is an imbalance of more than 6 600 lb between two symmetric feed tanks.*

L1 When the fuel balancing is completed, the ECAM alert FUEL WINGS BALANCED triggers. Apply the associated ECAM procedure.
For more information, *Refer to PRO-ABN-ECAM-10-28-400 FUEL WINGS BALANCED*

L2 *Note: The ECAM alert FUEL WINGS BALANCED triggers as soon as there is an imbalance of less than 1 100 lb between two symmetric feed tanks.*

L1 Taking into account that the fuel consumption is approximately 6 600 lb/h per engine, the ECAM alert FUEL WINGS NOT BALANCED may trigger every hour. Apply the associated ECAM procedure.

ABNORMAL OPERATING PROCEDURES

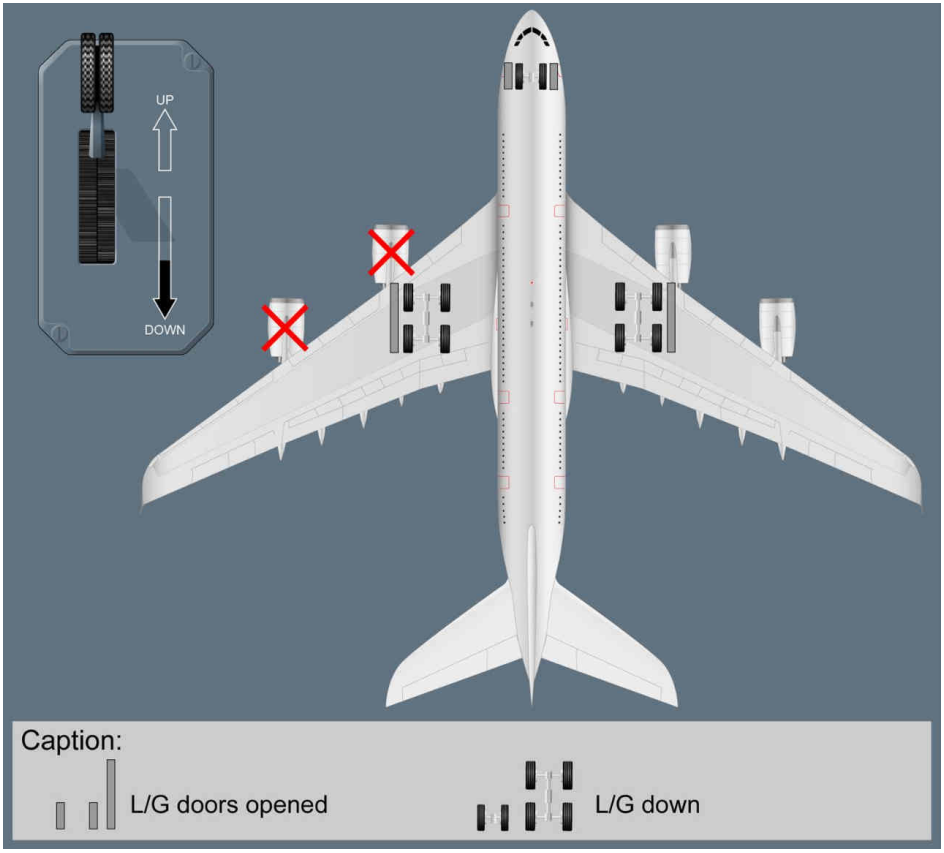
Applicable to: ALL

The abnormal and emergency operating procedures remain applicable for three-engine ferry flight, *Refer to Abnormal and Emergency Procedures* .

In the case of dispatch with one inoperative engine, if the remaining engine on the same wing fails during takeoff one hydraulic system is lost.
With one hydraulic system inoperative, depending on the hydraulic system failure, some landing gears do not retract and some landing gear doors remain open, when the flight crew set the L/G lever to the UP.
However , the flight crew must set to UP the L/G lever in order to reduce the drag.

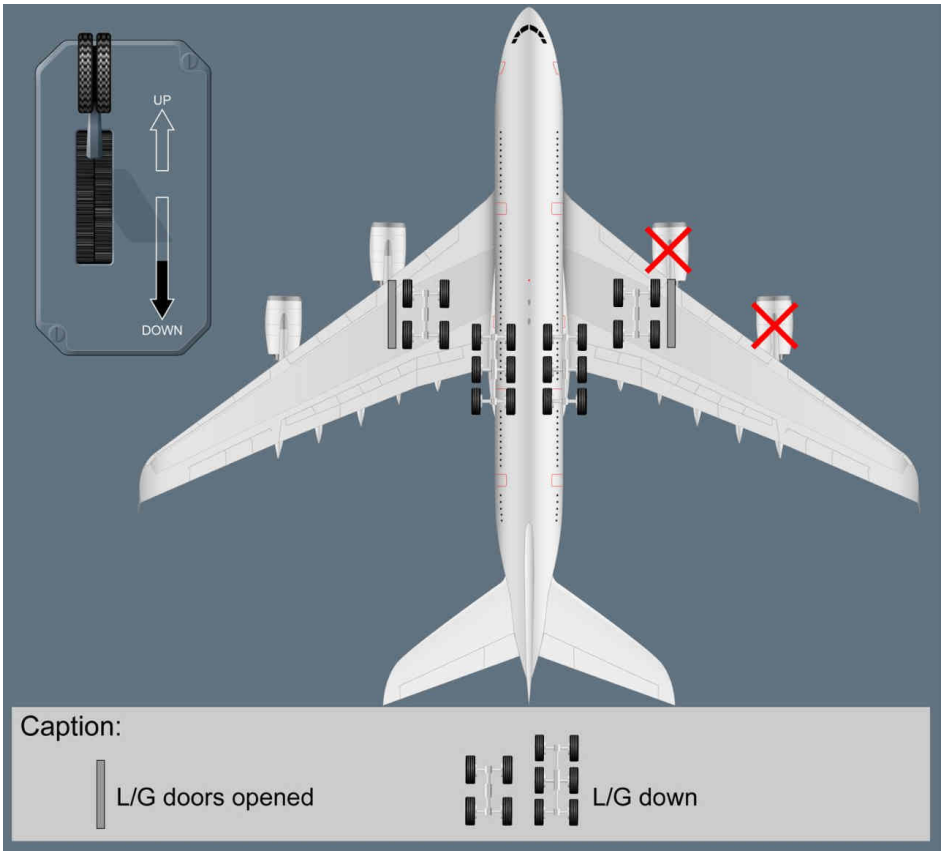
L2 - Landing gear position when L/G is retracted after the loss of engines 1 and 2:

Two Engine Inoperative Same Side (Engines 1 and 2)



- Landing gear position when L/G is retracted after the loss of engines 3 and 4:

Two Engine Inoperative Same Side (Engines 3 and 4)



L1 Use VLS + 5 kt as final takeoff speed.

L2 *VLS + 5 kt corresponds to the Green Dot speed with two engines inoperative same side, some landing gears not retracted, and some landing gear doors open.*

L1 For landing: Use normal landing gear extension.

PERFORMANCE

Applicable to: ALL

REQUIREMENTS

The regulatory requirements that are usually applicable are replaced by the following requirements, for the three-engine ferry flight.

TAKEOFF

For takeoff distance and takeoff run determination, no additional engine failure is taken into account. The required TOD and TOR are equal to 1.15 of the distance covered from the brake release to a point at which the aircraft is at 35 ft . Credit for clearway cannot be taken into account.

The VSTOP is the maximum speed to which the aircraft can accelerate with all operative engines operating, and then stop within the available accelerate-stop distance.

VR must be above 1.03 VMCA -2.
V2 must be above 1.07 VMCA -2.

Note: - *If after VSTOP a second engine fails, the criterion " 35 ft above the takeoff surface at V2 speed" may not be satisfied.*
- *The performance application calculates a VSTOP instead of a V1 . However, the performance application still displays VSTOP as V1 .*

Differentiation between inoperative inner and outer engine is taken into account in the AFM , but inoperative outer engine leads to the most adverse performance.
No differentiation between the ferry flight in windmilling and with core blank is considered in the AFM , the performance is the same.

There is no requirement concerning the first segment.

The following takeoff flight path requirements are based on the failure of a second engine during the takeoff phase. All performance data are based on dispatch with one RH engine inoperative and failure of the adjacent (RH) engine that corresponds to the critical case in terms of drag. This scenario results in non-retraction of wing and body gears.

- Second segment requirement: A minimum gradient of 1.5 % at 400 ft height is required
- Final takeoff requirement: A minimum gradient of 1.2 % is required.

The net takeoff flight path is the gross flight path reduced by a gradient of 0.5 % .

EN ROUTE

The en route flight path is considered with two engines inoperative on the same wing and gear up.

The net gradient is the gross gradient decreased by 1 % .

APPROACH AND LANDING

There is no requirement concerning the approach climb.
For landing climb, a minimum climb gradient of 2 % is required with all three operative engines, landing configuration, gear down, thrust available 8 s after initiation of throttle movement from idle to TOGA detent, and a speed not less than 1.23 Vs1g and VMCL .
The landing distance calculation does not basically account for the two engines inoperative case. In the case of second engine failure in flight, refer to displayed ECAM procedure for associated system loss (loss of spoilers if the engine on the same wing fails and/or thrust reversers) for landing performance computation.

For additional information:
- *Refer to PRO-ABN-ECAM-10-70-272 ENG TWO ENGs OUT ON SAME SIDE*
- *Refer to PRO-ABN-ECAM-10-70-273 ENG TWO ENGs OUT ON OPPOSITE SIDE* .

PERFORMANCE DATA

FUEL PLANNING

Fuel consumption is the same with the inoperative engine in windmilling or in core blank configuration.

The recommended speeds are:
- For climb:
  - 250 kt below FL 100 if ATC speed limitations are applicable
  - 300 kt above FL 100
  - M 0.80 above the cross-over altitude.
- For cruise: M 0.80
- For descent:
  - M 0.80
  - 300 kt
  - 250 kt

TAKEOFF

It is not authorized to take off with tailwind.
The flight crew can use the TO PERF application to compute the takeoff performance, by selecting the "3 engine ferry flight" MEL item in the takeoff performance application of the OIS .

Note: *Before the flight, ensure that the "3 engine ferry flight" MEL item has been activated in the performance application by the performance application administrator.*
For all runways intended to be operated for "3 engine ferry flight", the performance application administrator should define a runway plus shoulders width of at least 58 m in the airport database to ensure that the flight crew can perform the performance takeoff computation.

If the "3 engine ferry flight" MEL item is not available in the performance application, a specific takeoff chart must be computed for each runway from which a three engine ferry flight is performed and according to the inoperative engine.

EN ROUTE

The flight crew can use the IN-FLT PERF application to compute high speed performance in the case of three engine ferry flight . All the functions and modules of the IN-FLT PERF application are available.
In the case of second engine failure, the DES module of the IN-FLT PERF application provides the drift down ceiling.

APPROACH AND LANDING

The landing climb performance is never limiting:
- For airports elevation up to 8 000 ft and ISA + 25 °C in CONF FULL
- For airports elevation up to 8 000 ft ISA + 30 °C in CONF 3.

For higher airport elevations or higher delta ISA , the corresponding maximum limiting weight must be determined using the performance programs.

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OVERVIEW

Applicable to: ALL

The Reduced Vertical Separation Minimum (RVSM) airspace is any airspace or route between FL 290 and FL 410 (inclusive), where aircraft are vertically separated by 1 000 ft, instead of 2 000 ft.

RVSM REQUIREMENTS

Applicable to: ALL

A380 aircraft systems are designed to comply with the design criteria of the JAA Temporary Guidance Leaflet No. 6 (JAA TGL 6 - EASA Regulations), and the FAA Guidance Material for RVSM operations No. 91–RVSM.
The AFM provides the statement of RVSM capability.

OPERATIONAL APPROVAL

In addition to the RVSM capability statement provided in the AFM, Operators must obtain operational approval from their national airworthiness authorities, in order to operate within the RVSM airspace.
The above-mentioned EASA and FAA documents also indicate the requirements for obtaining operational approval.

REQUIRED EQUIPMENT AND FUNCTIONS

The RVSM regulation requires that the following equipment or functions be operative:

- Two ADR s
- One transponder
  For associated MEL dispatch conditions, *Refer to MEL/MI-34-71 Transponder* .
- One autopilot function

  For associated MEL dispatch conditions:
  - *Refer to MEL/MI-22-10 Autopilot*
  - *Refer to MEL/MI-22-10 Sidestick AP Locking Device* .
  - *Refer to MEL/MI-22-10 Rudder Pedals AP Locking Device* .
- Two PFD s
- One AFS CP channel or AFS CP backup (for the altitude target selection and the OP CLB or OP DES mode engagement)
- One FWS (for the altitude alert function).

MAXIMUM DIFFERENCES BETWEEN ALTITUDE INDICATIONS

		Comparison of Altitude Indications (ft)		
Flight Level	Speed or Mach Number	ADR 1 and ADR 2 (on the PFD)	ADR 3 and ADR 1(2) (on the PFD)	ISIS and ADR 1(2)(3)
Ground Check	-	20	20	30
FL 50	250 kt	55	60	120
FL 100	250 kt	60	70	140
FL 200	320 kt	120	125	220
FL 300	M 0.85	150	150	320
FL 410	M 0.85	150	150	360

RVSM PROCEDURE

Applicable to: ALL

For flights in RVSM airspace, the flight crew must apply the standard or abnormal and emergency procedures, in addition to the following RVSM procedures:

FLIGHT PREPARATION

The flight crew must take into account the conditions that may affect operations in RVSM airspace, including:

RVSM APPROVAL.....CHECK

L2 *Verify that the airframe is approved for RVSM operations.*

L1 WEATHER.....CHECK

L2 *Review the weather forecasted for the flight route. If severe turbulence is expected, this may affect the ability to maintain aircraft altitude.*

L1 REQUIRED EQUIPMENT FOR RVSM.....CHECK

L2 *Check that all the required equipment is operative (MEL).*
The flight crew should review the maintenance logs and forms, in order to ensure that the equipment required for RVSM is satisfactory.

L1 ALTITUDES.....CHECK

L2 *Check that the difference between each altitude indication (in the QNH reference) and the airport elevation is less than 75 ft .*
On ground, check that at least two of the main altitude indications are within the specified tolerance. For more information, Refer to Maximum Differences Between Altitude Indications .

IN FLIGHT

BEFORE ENTERING RVSM AIRSPACE

REQUIRED EQUIPMENT FOR RVSM.....OPERATIVE

L2 *If any of the required equipment fails before the aircraft enters RVSM airspace, the flight crew must request new clearance, to avoid this airspace.*

L1 ALTITUDES.....CHECK

L2 *Check that the difference between two of the main altitude indications (in the standard baro setting) is less than the specified tolerance. For more information, Refer to Maximum Differences between altitude indications.*

L1 ● **If only two ADRs are operative:**
ALTITUDES ON PFD and STBY ALTITUDE.....RECORD

L2 *This information may be useful, in the case of subsequent PFD altitude discrepancy or altimeter failure.*

L1 **IN RVSM AIRSPACE**

AP.....KEEP ENGAGED

L2 *Ensure that autopilot is engaged for cruise, and for flight level changes.*

L1 AP GUIDANCE.....MONITOR

L2 *During flight level transitions, do not exceed or go below the assigned flight level by more than 150 ft .*

L1 ● **Approximately every hour:**
ALTITUDES.....CHECK

L2 *Check that the difference between two of the main altitude indications is less than the specified tolerance. For more information, Refer to Maximum Differences Between Altitude Indications.*
Regular checks of the flight deck instruments should be sufficient.
Use the transponder and the autopilot, that are associated with any ADR that is within the tolerance. AP 1 and XPDR 1 use ADIRS 1, AP 2 and XPDR 2 use ADIRS 2.

AT THE END OF THE FLIGHT

ANY MALFUNCTIONS or DEVIATIONS.....REPORT

L2 *Report any malfunction of the systems that enable the aircraft to maintain altitude, including:*
- *Any malfunction or loss of required equipment*
- *Any deviation involving the functions that enable the aircraft to maintain altitude.*

ABNORMAL AND EMERGENCY PROCEDURES

ATC..... NOTIFY

When the aircraft is in RVSM airspace, the flight crew must notify the ATC of the following situations, because they may affect the aircraft's ability to maintain the flight level:

- *The failure of both autopilots*
- *The loss of altimeter system redundancy (i.e. only one altitude information remaining)*
- *An excessive discrepancy in altitude indications, and no way to identify the valid indication*
- *The failure of any other equipment, that affects the aircraft's ability to maintain the flight level*
- *The encounter of greater than moderate turbulence.*

If the flight crew cannot notify the ATC, or obtain ATC clearance, before deviating from the assigned flight level, they should follow the established contingency procedure and obtain ATC clearance as soon as possible.

L2 *Note: Appendix 4 of the JAA TGL 6 (EASA Regulations), and Appendix 5 of the FAA 91-RVSM (FAA Regulations), provide detailed Operator guidelines,, on the content and development of contingency procedures.*

OVERVIEW

Applicable to: ALL

Regulations require a system for aircraft navigation, in order to fly within a specific airspace, sometimes referred to as Required Navigation Performance (RNP) airspace.

The navigation system must comply with:
- The RNAV functionality criteria
- The flight guidance criteria
- The navigation position accuracy and integrity criteria.

When referring to RNP–X, X is the navigation accuracy value expressed in nautical miles (nm). The aircraft position error must be below the X value during 95 % of the flight time.

An RNP value is associated with:
- An airspace, or
- A route, or
- A SID, or
- A STAR, or
- An RNAV approach, or
- A RNAV missed approach procedure.

Several navigation systems may be necessary, depending on the RNP value and on the airspace environment (ground radio NAVAID).
It may also be necessary for Operators to obtain operational approval from the airline's airworthiness authority.
The AFM provides the statement of RNP capability.

NAVIGATION SYSTEM CAPABILITY

Applicable to: ALL

The aircraft navigation systems meet the certification requirements of the FAA AC 20–130A and TSO C 129A in class C1 (for a navigation system with multiple sensor inputs, including GPS). The navigation systems also comply with the airworthiness requirements of the following regulations:

- JAA Temporary Guidance Leaflet (TGL) 2 for B-RNAV (5 nm accuracy)
- JAA TGL 10 for P-RNAV (1 nm accuracy)
- FAA Advisory Circular (AC) 90–100 for US RNAV SID and STAR
  - RNAV-2 (2 nm accuracy)
  - RNAV-1 (1 nm accuracy)
- FAA Order 8400.12A, applicable to RNP–10 operations in oceanic and remote areas: Eligibility is based on paragraph 12.0, 12.b (1) or 12.b (5)

- FAA Order 8400.33, applicable to RNP–4 operations in oceanic and remote areas
- EUROCAE ED75A/DO236A, apart from vertical performance.

RNP CAPABILITY

Applicable to: ALL

To comply with a specific RNP procedure, the FMS estimated position accuracy, also called the Estimated Position Uncertainty (EPU), must be lower than the RNP value associated with the procedure. This depends on the selected mode for FMS navigation (GPS , DME /DME, VOR /DME or IRS).
The FMS POSITION/MONITOR page of the MFD displays the RNP and the EPU , and provides the HIGH/LOW accuracy indication. For more information, *Refer to FMS/Navigation Accuracy* .

The RNP on the FMS POSITION/MONITOR page can be:
- A default value, or
- A coded value that is in the navigation database, or
- A value that is manually entered by the flight crew.

When flying in RNP airspace, the FMS provides the navigation accuracy level (HIGH or LOW) on the FMS POSITION/MONITOR page:
- When HIGH appears, the EPU is less than, or equal to the RNP
- When LOW appears, the EPU is more than the RNP , and:
  - The flight crew must crosscheck the navigation with raw data, if available
  - The flight crew must inform the ATC , if the result of the crosscheck is negative, or if the raw data is not available,

When the aircraft exits RNP airspace, the flight crew must clear the manually-entered RNP .

B-RNAV AIRSPACE, RNAV-5, OR EQUIVALENT

Applicable to: ALL

In European B-RNAV airspace, radio NAVAID coverage is considered to support RNAV–5 accuracy.

Before entering a B-RNAV airspace, the minimum required equipment is:
- One RNAV system, that includes:
  - One FMS
  - One MFD
  - The relevant KCCU

    Note: *To comply with the minimum equipment requirements, it is sufficient for the KCCU to have either an operational Cursor Control Device (CCD), or an operational keyboard.*
  - One VOR for FMS navigation update
    For associated MEL dispatch condition, *Refer to MEL/MI-34-50 VOR* .
  - One DME for FMS navigation update
    For associated MEL dispatch condition, *Refer to MEL/MI-34-50 DME* .
  - One IRS
- Flight plan data on both ND s.

In other equivalent airspaces, other RNP accuracy values such as RNAV-2 are possible.
GPS may be required, depending on what radio NAVAID coverage is available.
For associated MEL dispatch condition, *Refer to MEL/DEL-34-ME1 GPS* .

B-RNAV, RNAV-5, OR EQUIVALENT PROCEDURE

● **If GPS PRIMARY is not available:**

FMS POSITION.....CROSSCHECK

L2 *Periodically crosscheck the FMS position, using NAVAID raw data.*

L1 RNP..... CHECK/ENTER

L2 *The flight crew can manually enter the RNP value, or the equivalent radial (e.g. the radial equivalent to 5 nm XTK accuracy is 6.1 nm) on the FMS POSITION/MONITOR page of the MFD.*

When the aircraft exits RNP airspace, or enters the terminal area, the flight crew should:
- *Revert to the default required accuracy value, or*
- *Enter the appropriate value on the FMS POSITION/MONITOR page.*

L1 ● **If any of the following messages appear on the MFD or ECAM:**

- MFD: NAV ACCUR DOWNGRADED
- MFD: FMS1 / FMS2 POSITION DISAGREE
- MFD: CHECK IRS 1(2)(3) / FMS POSITION
- ECAM: NAV FM / GPS POS DISAGREE
- ECAM: NAV FM / IR POS DISAGREE

NAVIGATION ACCURACY.....CHECK

L2 *Check navigation accuracy using NAVAID raw data, or the FMS POSITION/GPS page of the MFD.*

L1 ■ **If RNP capability is lost, or if both FMS are failed:**

ATC.....NOTIFY

NAVIGATION.....USE CONVENTIONAL METHOD

■ **If only one FMS position is correct:**

NAVIGATION..... RESUME

L2 *Resume navigation using the FMS that provides the correct position.*

In inertial navigation, systems maintain B-RNAV capability (5 nm accuracy) for 2 h regardless of the estimated accuracy value that appears on the MFD.

RNP-10 OR RNP-4 IN OCEANIC OR REMOTE AREAS

Applicable to: ALL

In RNP-10/RNP-4 airspace, the aircraft can fly a long time outside the radio NAVAID coverage.

Before entering RNP-10/RNP-4 airspace, the minimum required equipment is:

- Two RNAV systems, that include:
  - Two FMS

    For associated MEL dispatch conditions:
    ■ *Refer to MEL/MI-22-70 Flight Management Computer*
    ■ *Refer to MEL/MI-22-70 FMS Selector* .
  - Two MFD s
  - Two KCCU s

    Note: To comply with the minimum equipment requirements, it is sufficient for each KCCU to have either an operational Cursor Control Device (CCD), or an operational keyboard.
  - For RNP-10, one GPS , if required due to the duration of flight time outside radio NAVAID coverage
    For associated MEL dispatch conditions, *Refer to MEL/MI-34-50 GPS* .
    For RNP-4, one GPS is required.
  - Two IRS.
- Flight plan data on both ND s.

For more information, also refer to Regional Supplementary Procedures of ICAO Doc 7030 for specific requirements in a particular airspace.

RNP-10/RNP-4 PROCEDURE

RNP..... CHECK/ENTER

L2 *The flight crew can manually enter RNP 10 nm, or the equivalent radial (e.g. the radial equivalent to 10 nm XTK accuracy is 12.2 nm) on the FMS POSITION/MONITOR page of the MFD.*
For RNP-4, the flight crew must manually enter 4.9 nm (i.e. the radial equivalent to 4 nm XTK accuracy).

When the aircraft exits RNP airspace, or enters the terminal area, the flight crew must:
- *Revert to the default required accuracy value, or*
- *Enter the appropriate value on the FMS POSITION/MONITOR page of the MFD.*

L1 ● **If any of the following messages appear on the MFD or ECAM:**

- MFD: FMS1 / FMS2 POSITION DISAGREE
- MFD: CHECK IRS 1(2)(3) / FMS POSITION
- ECAM: NAV FM / GPS POS DISAGREE
- ECAM: NAV FM / IR POS DISAGREE

NAVIGATION .....CHECK

L2 *Check navigation accuracy on the FMS POSITION/MONITOR, FMS POSITION/IRS, and FMS MONITOR/GPS pages of the MFD.*

L1 AP.....USE

L2 *Use the AP that has the valid navigation system (previously checked).*
If the flight crew cannot identify the valid system, they should inform the ATC and obtain NAVAID raw data confirmation as soon as possible.

In inertial navigation, systems maintain RNP−10 capability for 5.7 h, since the last radio update (according to the FAA Notice 8400.12A), regardless of the estimated accuracy value that appears on the MFD.
For RNP-4 with GPS PRIMARY LOST, the RNP-4 capability is maintained until NAV ACCUR DOWNGRADED appears.

L1 ● **If RNP capability is lost, or if both FMS are failed:**
ATC.....NOTIFY

P-RNAV, RNAV-1, OR RNAV-2 TERMINAL PROCEDURES

Applicable to: ALL

In European terminal procedures that require P-RNAV capability, radio NAVAID coverage is considered to support the required accuracy. In all other cases, the terminal procedure may require GPS equipment (refer to the published approach chart).

The minimum equipment that is required, before flying a P-RNAV, or RNAV-1, or RNAV-2 procedure is:

- One RNAV system, that includes:
  - One FMS

    Note: *However, some published approach charts may require two RNAV systems.*

    For associated MEL dispatch conditions if two RNAV systems are required:
    - *Refer to MEL/MI-22-70 Flight Management Computer*
    - *Refer to MEL/MI-22-70 FMS Selector .*

  - One MFD
  - The relevant KCCU

    Note: *To comply with the minimum equipment requirements, it is sufficient that the KCCU has either an operational Cursor Control Device (CCD), or an operational keyboard.*

  - One GPS receiver, or one VOR and one DME (for the navigation update)

    Note: *GPS equipment may be required for some terminal procedures.*

    For associated MEL dispatch conditions:
    - *Refer to MEL/DEL-34-ME1 GPS* , or
    - *Refer to MEL/MI-34-50 VOR* , or
    - *Refer to MEL/MI-34-50 DME* .
  - Two IRS
  - One FD engaged in the NAV mode.
    For associated MEL dispatch conditions, *Refer to MEL/MI-22-10 Flight Director* .

  For the terminal procedures with legs below the Minimum Safety Altitude (MSA), or with legs that may not have sufficient radar coverage, two RNAV systems may be required by the published procedure chart.
- Flight plan data on both ND s.

P-RNAV, RNAV-1, OR RNAV-2 PROCEDURE

The FMS navigation database provides the terminal procedure (RNAV SID, RNAV STAR, RNAV TRANSITION, ...) of the flight plan. The flight crew must check the terminal procedure by comparing the published approach charts with the waypoint sequences, tracks, distances, and altitude or speed constraints (on the F-PLN page).
The flight crew must not modify the procedure that is provided by the navigation database, unless required by the ATC (DIR TO, radar vectoring, insertion of waypoints from the navigation database).

■ **If GPS is required for the P-RNAV, RNAV-1, or RNAV-2 procedure:**

GPS PRIMARY..... CHECK AVAILABLE

L2 *Before beginning the procedure, verify that GPS PRIMARY is available: GPS PRIMARY must appear on the FMS POSITION/MONITOR page of the MFD.*

L1 ■ **If GPS PRIMARY is not available:**

ATC..... NOTIFY

L2 *Request another procedure that does not require GPS.*

L1 ■ **If GPS PRIMARY is lost in flight:**

ATC..... NOTIFY

L2 *Follow ATC instructions.*

L1 ■ **If GPS is not required for the P-RNAV, RNAV-1, or RNAV-2 procedure:**

GPS PRIMARY ..... CHECK AVAILABLE

L2 *Before beginning the procedure, check if GPS PRIMARY is available: GPS PRIMARY must appear on the FMS POSITION/MONITOR page of the MFD.*

L1 ● **If GPS PRIMARY i s not available:**

FM POSITION..... CROSSCHECK

L2 *Before beginning the procedure, crosscheck the FMS position using NAVAID raw data.*

L1 RNP FOR APPROACH..... CHECK/ENTER

L2 *Check and enter the RNP value in the RNP entry field, of the FMS POSITION/MONITOR page of the MFD.*

When completing the terminal procedure, the flight crew must:
- *Revert to the default required accuracy, or*
- *Enter the appropriate value on the FMS POSITION/MONITOR page.*

L1 HIGH ACCURACY..... CHECK

■ **If the following messages appear on the MFD or ECAM, or if both FMS are failed:**

- NAV ACCUR DOWNGRADED on both NDs

L2 *Note: If only one ND displays the NAV ACCUR DOWNGRADED message, the flight crew may continue navigation using the other FMS.*

L1
- MFD: FMS1 / FMS2 POSITIONS DISAGREE
- ECAM: NAV FM / GPS POS DISAGREE

ATC.....NOTIFY

L2 *Inform the ATC of the RNP capability loss, and follow ATC instructions.*

BASIC RNP 0.3 APPROACH

Applicable to: ALL

The navigation systems comply with the ED75/DO-236 requirements for RNP 0.3 in approach. These requirements support basic RNP 0.3 approaches designed under ICAO PANS OPS or TERPS "standard" criteria (not RNPAR or SAAAR).

Before flying an RNP 0.3 procedure, the minimum required equipment is:

- One RNAV system, that includes:
  - One FMS

    Note: *However, some published approach charts may require two RNAV systems.*

    For associated MEL dispatch conditions if two RNAV systems are required:
    - *Refer to MEL/MI-22-70 Flight Management Computer*
    - *Refer to MEL/MI-22-70 FMS Selector .*

  - One MFD
  - The relevant KCCU

    Note: *To comply with the minimum equipment requirements, it is sufficient for the KCCU to have either an operational Cursor Control Device (CCD), or an operational keyboard.*

  - One GPS receiver
    For associated MEL dispatch conditions, *Refer to MEL/DEL-34-ME1 GPS .*
  - One IRS
  - One FD engaged in the NAV mode.
    For associated MEL dispatch conditions, *Refer to MEL/MI-22-10 Flight Director .*

  Two RNAV systems may be required by the published approach chart.
- One FLS , if the flight crew intends to use the FLS function
- Flight plan data on both ND s.

BASIC RNP 0.3 APPROACH PROCEDURE

Refer to PRO-NOR-SOP-190-10-GINT Introduction .

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LIMITATIONS

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LIM-PLP PRELIMINARY PAGES

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LIM-32 Landing Gear

LIM-35 Oxygen

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LIM-45 Onboard Maintenance System

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LIM-49 Auxiliary Power Unit

LIM-70 Engines

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M(1)	Localization	DU Title	DU identification	DU date
	LIM-22-30	**Approach Capability**	00021981.0001001	01 APR 09
	Criteria: DD **Applicable to: ALL** *Impacted DU: 00018781 Approach Capability*			
	Reason for issue: *In the case of loss of electrical segregation of the AC or DC busbars, the display of CAT3 SINGLE or CAT3 DUAL is not frozen below 200 ft RA.* *A future standard of FCDC will correct this deviation.*			
	LIM-32-30	**BTV**	00024053.0007001	06 JUN 11
	Criteria: T73183, T78703 **Applicable to: ALL** *Impacted DU: 00021915 BTV*			
	Reason for issue: *Following in service BTV disconnection during VOR or GPS approaches on 13R or 13L runway in JFK, the use of BTV is prohibited on those runways.*			
	LIM-49-20	**Operational Envelope**	00018905.0002001	05 MAR 09
	Criteria: T68621, DD **Applicable to: ALL** *Impacted DU: 00004292 Operational Envelope*			
	Reason for issue: *The APU start may not be successful on ground and in flight at very low temperatures.* *This limitation will be corrected by a future standard of the APU.*			

(1) Evolution code : N=New, R=Revised, E=Effectivity

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LIMITATIONS

GENERAL LIMITATIONS

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LIM-10-PLP PRELIMINARY PAGES

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Minimum flight crew....B
Flight maneuvering load acceleration limits....C
Aircraft Geometry Limits ....D

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Localization Title	Toc Index	ID	Reason
LIM-10 Aircraft Geometry Limits	D	1	**04 Nov 2011 : Modification of content of the element 20300424.9001001**
LIM-10 Aircraft Geometry Limits	D	2	**04 Nov 2011 : Modification of content of the element 20300424.9001001**

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KIND OF OPERATIONS

Applicable to: ALL

The airplane is certified in the public transport category (passengers and freight) for day and night operations, when the appropriate equipment and instruments required by the airworthiness and operating regulations are approved, installed, and in an operable condition. The airplane is certified in the following conditions:

- VFR and IFR
- Extended overwater flight
- Flight in icing conditions
- Maximum number of passenger seats: 853.

MINIMUM FLIGHT CREW

Applicable to: ALL

The minimum flight crew consists of 2 pilots.

FLIGHT MANEUVERING LOAD ACCELERATION LIMITS

Applicable to: ALL

Clean configuration.....-1 g to +2.5 g
Other configurations..... 0 g to +2 g

AIRCRAFT GEOMETRY LIMITS

Applicable to: ALL

1
2 **TAIL STRIKE PITCH ATTITUDE**

Landing Gear	Pitch Attitude
COMPRESSED	11.5°
EXTENDED	13.5°

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LIMITATIONS

WEIGHT AND CENTER OF GRAVITY LIMITS

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LIM-11-PLP PRELIMINARY PAGES

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Center of Gravity Limits....A
Weight limitations....B

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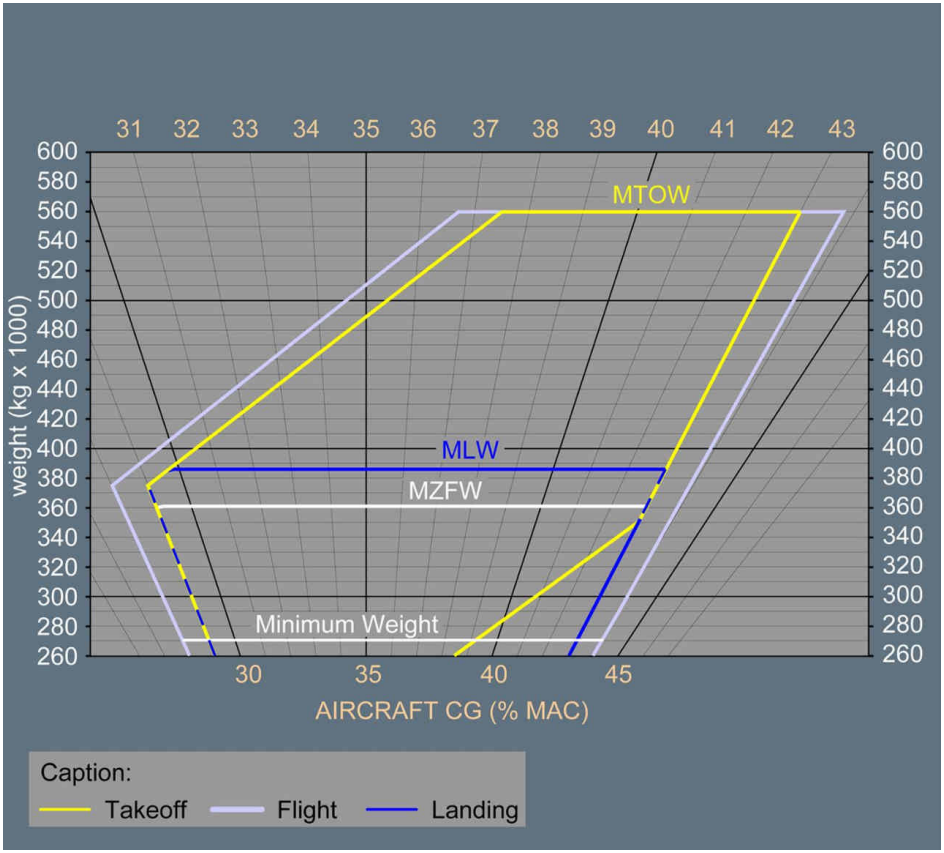
CENTER OF GRAVITY LIMITS

Applicable to: ALL

Center of Gravity Limits



WEIGHT LIMITATIONS

Applicable to: ALL

Maximum taxi weight..... 1 238 998 lb
Maximum Takeoff Weight (MTOW)..... 1 234 588 lb
Maximum Landing Weight (MLW)..... 850 984 lb
Maximum Zero Fuel Weight (MZFW)..... 795 868 lb

Note: *MTOW, MLW, and MZFW vary with the center of gravity.*

Minimum weight..... 595 247 lb
In exceptional conditions (in-flight turnback or diversion), an immediate landing at a weight above maximum landing weight is permitted, provided that the flight crew follows the overweight landing procedure.

LIMITATIONS

ENVIRONMENTAL ENVELOPE AND AIRPORT OPERATIONS

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LIM-12-PLP PRELIMINARY PAGES

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Environmental envelope..... A
Airport Operations..... B

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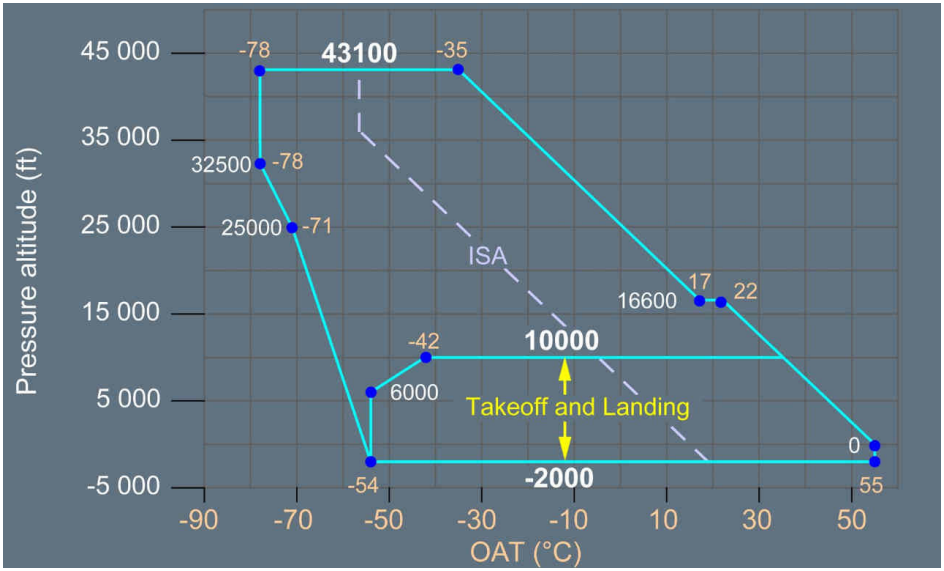
ENVIRONMENTAL ENVELOPE

Applicable to: ALL

Environmental Envelope



Minimum TAT ..... -54 °C
Maximum operating altitude with slats and/or flaps extended..... 20 000 ft
Maximum altitude at which the landing gear may be extended..... 21 000 ft

AIRPORT OPERATIONS

Applicable to: ALL

Runway slope (mean)..... ± 2 %
Minimum runway width..... 148 ft

WIND FOR TAKEOFF AND LANDING

Maximum certified crosswind at takeoff (gust included)..... 30 kt

L2 *The maximum certified crosswind values are imposed by engines.*
For information, maximum demonstrated crosswind at takeoff: 39 kt gusting 51 kt .
For more information on the maximum crosswind recommended on contaminated runways, Refer to PER-TOF-CTA-CWD Crosswind .

L1 Maximum certified crosswind at landing (gust included)..... 30 kt

L2 *The maximum certified crosswind values are imposed by engines.*
For information, maximum demonstrated crosswind at landing: 42 kt gusting 56 kt .
For more information on the maximum crosswind recommended on contaminated runways, Refer to PER-LND-CTA-CWD Crosswind .

L1 Maximum tailwind..... 10 kt

WIND FOR PASSENGER/CARGO DOOR OPERATION

Maximum wind for passenger door operation..... 40 kt

Maximum wind is 50 kt , if the aircraft nose is oriented into the wind.

Maximum wind for cargo door operation..... 40 kt

Maximum wind is 50 kt , if the aircraft nose is oriented into the wind, or if the door is on the leeward side.

The passenger and cargo doors must be closed before the wind reaches 60 kt .

LIMITATIONS

SPEED LIMITATIONS

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Maximum Flaps/Slats Speeds C
Minimum Control Speeds ..... D
Maximum Speeds with the Landing Gear Extended ..... E
Maximum Tire Speed ..... F
Cockpit Window Maximum speed ..... G
Windshield wipers maximum speed ..... H

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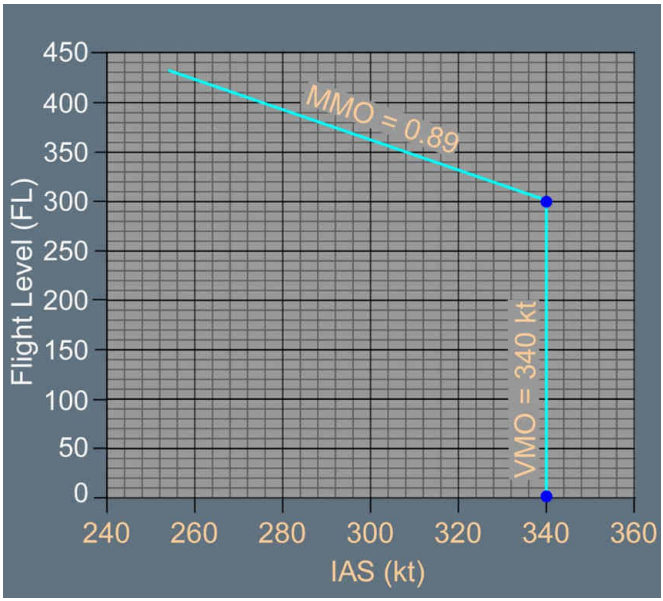
MAXIMUM OPERATING SPEED VMO/MMO

Applicable to: ALL

VMO ..... 340 kt
MMO 0.89

VMO/MMO



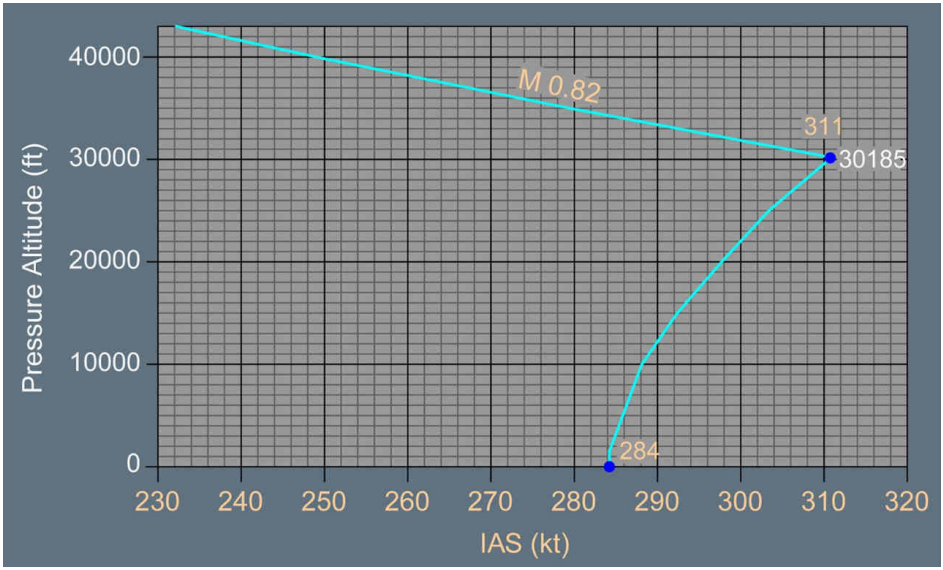
The maximum operating limit speed VMO/MMO may not be deliberately exceeded in any regime of flight.

MAXIMUM DESIGN MANEUVERING SPEED V_A

Applicable to: ALL

Note: *Applies in alternate or direct flight control laws only.*

V_A



If alternate or direct law is active, full ailerons and rudder application should be confined to speeds below V_A.

If alternate or direct law is active, maneuvers involving angle of attack near stall should be confined to speeds below V_A.

CAUTION	Rapid and large alternating control inputs, especially in combination with large changes in pitch, roll or yaw (e.g. large sideslip angles) may result in structural failures at any speed, even below V_A.

MAXIMUM FLAPS/SLATS SPEEDS

Applicable to: ALL

MAXIMUM FLAPS/SLATS SPEEDS

FLAPS Lever Position	Slats	Flaps	Configuration on ECAM	Max Speed	Flight Phase
0	0 °	0 °		VMO/MMO	CRUISE
1	20 °	0 °	1	263 kt	HOLDING
	20 °	8 °	1+F	222 kt (1)	TAKEOFF / APPROACH
2	20 °	17 °	2	220 kt	TAKEOFF / APPROACH
3	23 °	26 °	3	196 kt	TAKEOFF / APPROACH / LANDING
FULL	23 °	33 °	FULL	182 kt	LANDING

(1) *In conf 1+F, when the aircraft reaches a speed of 212 kt, the Auto Retraction System (ARS) automatically retracts the flaps to conf 1.*

MINIMUM CONTROL SPEEDS

Applicable to: ALL

VMCL ..... 120 kt
VMCL-2 ..... 145 kt

MAXIMUM SPEEDS WITH THE LANDING GEAR EXTENDED

Applicable to: ALL

Maximum speed with the landing gear extended (VLE)..... 250 kt / M 0.55
Maximum speed with the landing gear operating (VLO)..... 250 kt / M 0.55
Maximum speed for landing gear gravity extension (VLE/VLO)..... 220 kt/M 0.48

MAXIMUM TIRE SPEED

Applicable to: ALL

Maximum ground speed..... 204 kt.

COCKPIT WINDOW MAXIMUM SPEED

Applicable to: ALL

Maximum opening speed..... 250 kt

L2 *Note:* *Opening the cockpit window is not possible with the packs ON.*

L1 Maximum closing speed..... 160 kt

WINDSHIELD WIPERS MAXIMUM SPEED

Applicable to: ALL

Maximum speed..... 250 kt

LIMITATIONS

21 - AIR CONDITIONING

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Air-Conditioning with LP Ground Carts.....B

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RAM AIR INLETS

Applicable to: ALL

The RAM air inlets only open, when the differential pressure is below 1 psi.

AIR-CONDITIONING WITH LP GROUND CARTS

Applicable to: ALL

- Do not use conditioned air from the packs and from the LP ground carts at the same time.
- The airflow from the LP ground carts must not exceed 2*1.6 kg/sec.

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LIMITATIONS

21 - PRESSURIZATION

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Cabin Pressure..... A

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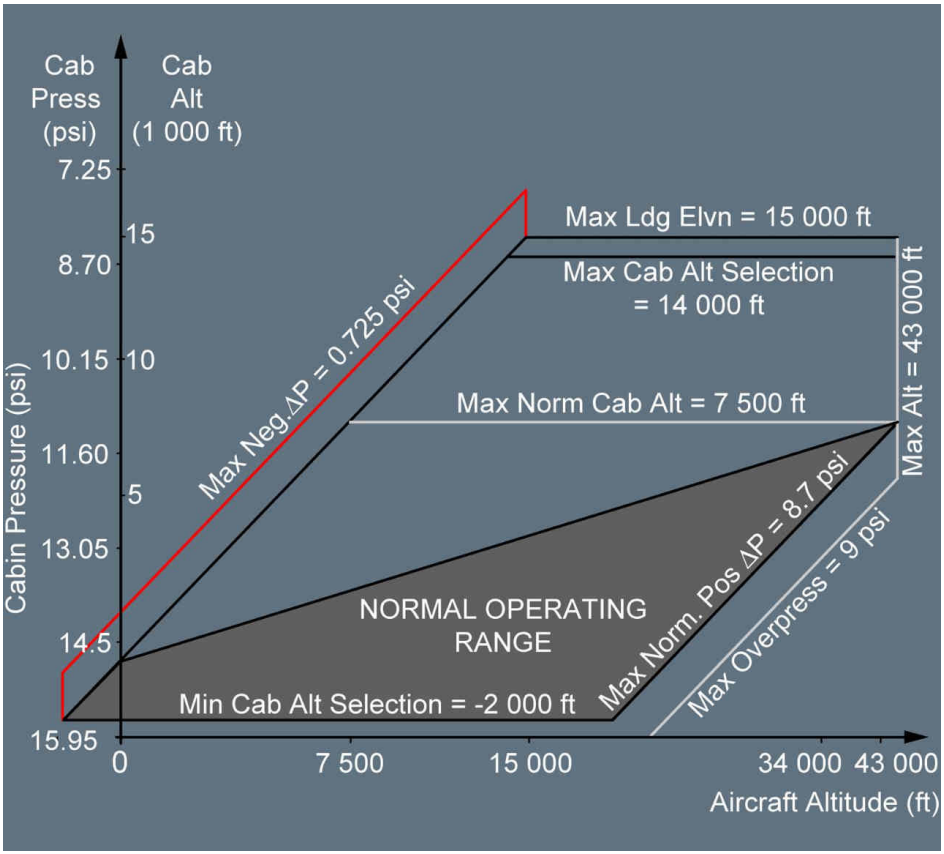
CABIN PRESSURE

Applicable to: ALL

Maximum positive differential pressure..... 9 psi
Maximum negative differential pressure.....- 0.725 psi

Cabin Pressure



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LIMITATIONS

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Localization Title	Toc Index	ID	Reason
LIM-22-30 Ground/Runway Equipment Required for Precision Instrument Approaches	F	1	**04 Nov 2011 : Modification of content of the element 20300428.9001001**
			07 Nov 2011 : Modification of content of the element 20300428.9001001
LIM-22-30 Ground/Runway Equipment Required for Precision Instrument Approaches	F	2	**04 Nov 2011 : Modification of content of the element 20300428.9001001**
			07 Nov 2011 : Modification of content of the element 20300428.9001001

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GENERAL

Applicable to: ALL

AUTOPILOT

Minimum height for use of autopilot:

- At takeoff ..... 100 ft AGL, and at least 5 s after liftoff

L2 *An internal PRIM logic prevents the autopilot from engaging during 5 s after liftoff.*

L1
- Straight-in non-precision approach..... 200 ft AGL
- Circling approach..... 200 ft AGL
- ILS approach with CAT 1 displayed on FMA ..... 160 ft AGL
- After manual go-around..... 100 ft AGL
- All other phases..... 500 ft AGL

The use of AP or FD in OP DES or DES is not permitted, if the AFS CP selected altitude is set below MDA/MDH, or 500 ft AGL, whichever is the highest.

AUTOTHRUST

All AP/FD modes may be used with or without autothrust, except if specified.
Autothrust may be used with, or without AP/FD, in selected or managed speed/Mach.

FLIGHT MANAGEMENT

The FMS lateral and vertical navigation is approved for after takeoff, en route and terminal area operations and for instrument approach procedures and missed approach procedures.
The FMS lateral navigation (NAV mode) has been certified for instrument approach procedures except ILS, GLS, MLS, IGS, LOC, LOC-BC, LDA, and SDF.
The FLS (FMS Landing System) has been certified for instrument approach procedures except ILS, GLS, MLS, IGS, LDA, and SDF, using FMS navigation alone or FMS navigation associated with LOC, or ILS (GS out), or LOC-BC.
Approval of the FMS is based on the assumption that the navigation database has been validated for intended use. The airworthiness approval does not account for database accuracy or compatibility.
Obstacle clearance and adherence to airspace constraints remains a flight crew responsibility.
Fuel, time predictions/performance information is provided for advisory purpose only.
For instrument procedures not coded in the WGS 84 coordinate system, the GPS must be deselected, unless the shift between the local coordinate system and the WGS 84 is found acceptable for the intended operation.

Note: *1. The assessment of this shift can be done:*

- *in flight, monitoring the NAVAID raw data in non RNAV procedures,*
- *on ground performing a GPS survey of the procedure waypoints.*

2. RNAV (GPS) and RNP RNAV approach procedures require WGS 84 coordinates and GPS PRIMARY.

AIRWORTHINESS STANDARD COMPLIANCE

The FMS has been demonstrated to comply with applicable airworthiness requirements, including FAA AC 20–130A, for a navigation system integrating multiple navigation sensors, when operating with IRS, updated by radio or GPS.

The FMS also complies with the airworthiness part of:

- EASA AMC 20-4 (or JAA TGL 2 REV 1) for Basic RNAV
- JAA TGL 10 for Precision RNAV (compliance with paragraph 8.2 has not been demonstrated)
- FAA Advisory circular 20–129 for baro VNAV
- FAA Advisory circular 90–100 for terminal and en route RNAV operations
- FAA Order 8400.33 for RNP 4 in oceanic and remote area
- FAA Order 8400.12A for RNP 10 in oceanic and remote area
  RNP 10 oceanic/remote area operations are approved:
  - with GPS PRIMARY
  - without GPS PRIMARY (GPS deselected or inoperative), provided time limitations in IRS only navigation, acceptable to the operational authorities, are established.
- MASPS ED75A/DO236A, apart from vertical performance.

Note: *Compliance with the applicable airworthiness requirements does not constitute an operational approval.*

NAVIGATION PERFORMANCE

- **With GPS PRIMARY:**
  The FMS is certified in accordance with the lateral performance requirements of MASPS ED-75A/DO-236A for RNP operations.
  The RNP accuracy has been demonstrated to be:

	With AP ON - In NAV (all phases) - in F-LOC (approach phase)	With AP OFF and FD ON - In NAV (all phases) - In F-LOC (approach phase)	With AP OFF and FD OFF
En route	1 nm	1 nm	1.1 nm
Terminal area	0.5 nm	0.51 nm	0.51 nm
In approach	0.3 nm	0.3 nm	0.5 nm with F-LOC deviation. Not authorized without F-LOC deviation.

- **Without GPS primary:**
  The FMS is certified in accordance with the accuracy requirements and assumptions of MASPS ED-75A/DO-236A for RNP operations, provided the appropriate RNP value is checked or entered on the MFD and HIGH accuracy is displayed.
  Without GPS PRIMARY (GPS deselected or inoperative) the navigation accuracy is a function of ground radio navaid infrastructure or elapse time since last radio update.

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USE OF NAV MODE, AND FLS FUNCTION

Applicable to: ALL

USE OF NAV MODE

The NAV mode may be used (with V/S or FPA):

- In terminal area, when:
  - GPS PRIMARY is available, or
  - HIGH accuracy is displayed, and the appropriate RNP is checked, or entered on the MFD, or
  - Navaid raw data is monitored.
- In final approach:
  - For VOR, VOR/DME, or RNAV (including GPS) approach
  - But not for ILS, GLS, IGS, LOC, LOC B/C, LDA and SDF approaches.

USE OF FLS FUNCTION

The FLS function may be used:

- For an RNAV (including GPS) approach, when F-APP is displayed on FMA
- For VOR, or VOR/DME approach, when F-APP or F-APP + RAW capability is displayed on FMA
- For ILS G/S out, LOC only, or LOC B/C approach in association with LOC or LOC B/C modes, when FAPP or F-APP + RAW capability is displayed on FMA.

REQUIRED CONDITIONS FOR F-APP, F-APP + RAW, OR RAW ONLY CAPABILITY

Applicable to: ALL

The following table presents the FLS capability, as monitored by the FG , in accordance with required conditions:

L12

Required Conditions	FLS Capability		
	RAW ONLY	F-APP + RAW	F-APP
FMC	1	1	1
Navigation Accuracy (1)	No requirement	ACCURACY HIGH within one FMS	GPS PRIMARY within one FMS
FLS function (within MMR)	1	1	1
GPS receiver	0	0	1
Air Data Source	1 ADR	1 ADR	- 2 ADR s, or - 1 ADR , and 1 ISIS
IRS	1	1	2

(1) *If the NAV FM / GPS POS DISAGREE alert triggers, the FLS capability becomes RAW ONLY . For more information on the NAV FM / GPS POS DISAGREE , Refer to procedure .*

The Captain (First Officer) FMA displays the FLS capability, when the flight crew presses the Captain (First Officer) LS pb , and:

- The required conditions for F-APP , F-APP + RAW , or RAW ONLY capability are met
- An NPA has been selected on the FMS ARRIVAL page

L2 In addition, the NO FLS FOR THIS APPR message has not appeared on the MFD .

L1 - The FMS flight phase is descent or approach.

If the FLS capability downgrades, a triple click aural warning sounds.

MAXIMUM WIND CONDITIONS FOR AUTOMATIC APPROACH, LANDING, AND ROLL-OUT

Applicable to: ALL

The following limitations apply to automatic approach, or automatic landing and automatic roll-out of: GLS CAT I, ILS CAT II or ILS CAT III.

Maximum headwind..... 38 kt
Maximum tail wind..... 10 kt
Maximum cross wind..... 30 kt(CAT II/III 15 kt)

Note: Wind limitation is based on the surface wind reported by the tower. If the ND indicates a current wind speed that exceeds the above-noted autoland limitations, but the tower reports a surface wind speed within the limitations, then the flight crew can perform an automatic landing. If the tower reports a surface wind speed beyond the limitations, the flight crew can only perform a CAT I automatic approach without autoland.

AUTOMATIC APPROACH, LANDING, AND ROLL-OUT

Applicable to: ALL

GLS CATEGORY I

Minimum decision height..... 200 ft AGL

GLS CAT I WITHOUT AUTOLAND

At least one autopilot must be engaged in approach mode, and CAT 1 must be displayed on the FMA.
If the flight crew performs an automatic approach without autoland, the autopilot must be disengaged no later than 160 ft AGL.

GLS CAT I WITH AUTOLAND

At least one autopilot must be engaged in approach mode, and AUTO LAND must be displayed on the FMA.

ILS CATEGORY II

Minimum decision height..... 100 ft AGL
At least one autopilot must be engaged in approach mode, and CAT 2, CAT 3 SINGLE or CAT 3 DUAL must be displayed on the FMA.
If the flight crew performs an automatic approach without autoland, the autopilot must be disengaged no later than 80 ft AGL.

ILS CATEGORY III FAIL-PASSIVE

Minimum decision height..... 50 ft AGL
Alert Height (no DH)..... 100 ft AGL

If DH is not published for CAT III approach and the aircraft is fail passive automatic landing system, set Radio Altimeter Bug at 50ft RA as a CAT IIIa
At least one autopilot must be engaged in approach mode, and CAT 3 SINGLE or CAT 3 DUAL must be displayed on FMA.

ILS CATEGORY III FAIL-OPERATIONAL

The A/THR must be used in selected or managed speed.
Alert height..... 100 ft AGL
Minimum Runway Visual Range..... 75 m

CAT III WITH DH

Both APs must be engaged in approach mode and CAT 3 DUAL must be displayed on FMA.

CAT III WITHOUT DH

Both APs must be engaged in approach mode and CAT 3 DUAL must be displayed on FMA.

ENGINE OUT

ONE ENGINE INOPERATIVE

GLS CAT I autoland, ILS CAT II autoland, and ILS CAT III autoland are approved in CONF 3, and CONF FULL.

TWO ENGINES INOPERATIVE ON THE OPPOSITE SIDE

GLS CAT I autoland, and ILS CAT II autoland are approved in CONF 3.

AUTOMATIC LANDING

Applicable to: ALL

GLS CATEGORY I AUTOMATIC LANDING

GLS CAT I autoland is approved in CONF 3 and CONF FULL.

Automatic landing has been demonstrated:
- With GLS ground stations compliant with ICAO annex 10 amendment 76 and 77.
- With a GLS glideslope angle inside a range of -2.5 ° and -3.5 °
- For airport altitude between -1 000 ft and 9 200 ft
- For weights between 305 t , and maximum landing weight
- At approach speed equal to VLS + wind correction, with a minimum wind correction of 5 kt, and a maximum wind correction of 15 kt.

The performance of ROLL OUT mode has been demonstrated on dry and wet runways. But the performance on snow covered, or icy runway has not been demonstrated.

Note: Depending on the situation (e.g. emergency or other) and provided that the runway is approved for automatic landing, the flight crew can decide to perform an autoland up to the maximum takeoff weight.

ILS CATEGORY II OR ILS CATEGORY III AUTOMATIC LANDING

CAT II and CAT III autoland is approved in CONF 3 and CONF FULL.

Automatic landing has been demonstrated:
- On CAT II and CAT III ILS beam with an ILS glideslope angle inside a range of -2.5 ° and -3.5 °
- For airport altitude between -1 000 ft and 9 200 ft
- For weights between 672 410 lb , and maximum landing weight
- At approach speed equal to VLS + wind correction, with a minimum wind correction of 5 kt, and a maximum wind correction of 15 kt.

The performance of ROLL OUT mode has been demonstrated on dry and wet runways. But the performance on snow covered, or icy runway has not been demonstrated.

Automatic landing system performance has been demonstrated on CAT II and CAT III ILS beams. However, automatic landing in CAT I, or better weather conditions is possible on CAT I ground installation, or on CAT II/III ground installations when ILS-sensitive areas are not protected, if the following precautions are taken:
- The airline has checked that the ILS beam quality, and the effect of the terrain profile before the runway have no adverse effect on autopilot guidance. In particular, the effect of terrain discontinuities within 984 ft before the runway threshold must be evaluated.
- The flight crew is aware that LOC or G/S beam fluctuations, independent of the aircraft system, may occur. The PF is prepared to immediately disconnect the autopilot, and to take the appropriate action, should unsatisfactory guidance occur.
- At least CAT 2 capability is displayed on the FMA and CAT II/III procedures are used.
- Visual references are obtained, at a DH appropriate for the CAT I approach being flown, or a go-around is performed.

Note: Depending on the situation (e.g. emergency or other) and provided that the runway is approved for automatic landing, the flight crew can decide to perform an autoland up to the maximum takeoff weight.

APPROACH CAPABILITY

Applicable to: ALL
Impacted by TDU: 00021981 Approach Capability

The FG computes its own approach capability: CAT1, CAT2, CAT3 SINGLE, or CAT3 DUAL, and displays the approach capability on the FMA. Each capability depends on the availability of

aircraft systems and functions. When the approach capability downgrades, a triple click aural warning sounds.

FAIL-OPERATIONAL AUTOMATIC LANDING SYSTEM

An automatic landing system is fail-operational if, in the event of a failure below alert height, the remaining part of the automatic system allows the aircraft to complete the approach, flare, and landing. A CAT3 DUAL system is a fail-operational automatic landing system.

Note: In the event of a failure, the automatic landing system operates as a fail-passive system.

FAIL-PASSIVE AUTOMATIC LANDING SYSTEM

An automatic landing system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition, or deviation of flight path or attitude, but the landing is not completed automatically. A CAT3 SINGLE system is a fail-passive automatic landing system.

Note: With a fail-passive automatic landing system, the flight crew controls of the aircraft after a failure.

ALERT HEIGHT

The alert height is the height above the runway, above which a CAT3 autoland would be discontinued, and a missed approach executed, if a failure occurred in either the airplane systems, or the relevant ground equipments. Below the alert height, if such a failure occurs, the flare, touchdown and roll-out may be accomplished using the remaining automatic system.

Note: Below 200 ft RA, the FG freezes the CAT3 capability. Therefore, a failure occurring below 200 ft RA does not change the capability of the system.

APPROACH CAPABILITY

Applicable to: ALL
Impacted DU: 00018781 Approach Capability

The FG computes its own approach capability: CAT1, CAT2, CAT3 SINGLE, or CAT3 DUAL, and displays the approach capability on the FMA. Each capability depends on the availability of aircraft systems and functions. When the approach capability downgrades, a triple click aural warning sounds.

FAIL-OPERATIONAL AUTOMATIC LANDING SYSTEM

An automatic landing system is fail-operational if, in the event of a failure below alert height, the remaining part of the automatic system allows the aircraft to complete the approach, flare, and landing. A CAT3 DUAL system is a fail-operational automatic landing system.

Note: In the event of a failure, the automatic landing system operates as a fail-passive system.

FAIL-PASSIVE AUTOMATIC LANDING SYSTEM

An automatic landing system is fail-passive if, in the event of a failure, there is no significant out-of-trim condition, or deviation of flight path or attitude, but the landing is not completed automatically. A CAT3 SINGLE system is a fail-passive automatic landing system.

Note: With a fail-passive automatic landing system, the flight crew controls of the aircraft after a failure.

ALERT HEIGHT

The alert height is the height above the runway, above which a CAT3 autoland would be discontinued, and a missed approach executed, if a failure occurred in either the airplane systems, or the relevant ground equipments. Below the alert height, if such a failure occurs, the flare, touchdown and roll-out may be accomplished using the remaining automatic system.

Note: Below 200 ft RA, the FG freezes the CAT3 capability, except:
- *If the AC busbars are not supplied by 4 different generators, or*
- *If each DC busbar is not supplied by its assigned TR.*

Therefore, except for these cases, a failure occurring below 200 ft RA does not change the capability of the system displayed on the FMA.

GROUND/RUNWAY EQUIPMENT REQUIRED FOR PRECISION INSTRUMENT APPROACHES

Applicable to: ALL

1
2

Component	CAT I (1)	CAT II	CAT III
LOCALIZER/GLIDESLOPE	Yes	Yes	Yes
Outer Marker	Yes (7)	Yes (7)	Yes (7)
Middle Marker	No (2)	No (2)	No
Inner Marker	No	Yes (7)	Yes (7)
Approach Light System (ALS)	Yes (3)	Yes (3)	Yes (3)
Sequenced Flashing Lights (SFL; also part of RAIL, ALSF, etc.)	Yes (4)	Yes (6)	No
High Intensity Runway Lights	Yes	Yes	Yes

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Component	CAT I (1)	CAT II	CAT III
Touchdown Zone Lights (TDZ)	Yes (5)	Yes (6)	Yes
Runway Centerline Lights (CL)	Yes (5)	Yes (6)	Yes

(1) CAT I ILS approaches may be flown with equipment outages (e.g. CL out) if the approach chart gives specific minima to be used with such outages.

(2) For countries that impose higher minima for MM OUT condition, refer to Airway Manual

(3) CAT I ILS approaches in visibilities of 1,200M (4,000 ft) RVR or 3/4 mile (or better) however, do not require ALS. All CAT II approaches and CAT III approaches require "standard" ALS (e.g. ALSF-1, ALSF-2) or equivalent international system. (e.g. HIALS)

(4) CAT I ILS approaches in visibilities of RVR 1,200M (4,000 ft) or 3/4 mile (or better) however, do not require SFL.

(5) If TDZ and/or CL inoperative, refer to FOM chapter 4 Weather(CAT I Minima by Lighting Facilities).

(6) CATII approach operation can be authorized at the airports with reduced lighting facilities those have been approved by Ops Specs. Refer to the Terminal Chapter (Green Page) of the Airway Manual for approved runways (e.g. ANC 07L).

(7) A marker is considered out of service only when none of the authorized substitutes is available. These include the following and, except for ASR and PAR, are shown on the approach chart.

Authorized Substitute	Outer Marker	Middle Marker	Inner Marker
COMPASS LOCATOR 1)	Yes	Yes	No
NDB, VOR, DME fix, Minimum GSIA Fix or ASR Radar Fix 2)	Yes	No	No
PAR Radar Fix 2)	Yes	Yes	No
Radio Altimeter	No	No	Yes 3)

1) If locators are used for both the outer and middle marker, dual ADF or single ADF with a dual tuning head is required.
2) Where available and if requested by the flight crew
3) Where applicable : e.g., at some CAT II installations radio altimeter is not authorized to identify decision height, and this is specified on the approach chart. (e.g. "RA NA")

REQUIRED EQUIPMENT FOR CAT II, OR CAT III OPERATION

Applicable to: ALL

In order to perform a CAT II or CAT III operation, the flight crew must check that the aircraft has the appropriate capability. The FG monitors one part of the required equipment (See Required Equipment Monitored by the FG), and computes the approach capability. The other part of the required equipment is not monitored by the FG : See Required Equipment not Monitored by the FG .

Any approach capability downgrade, computed by the FG , is announced by:
- A triple click aural warning
- The display of the inoperative capability on the SD STATUS page.

The loss of a required equipment, monitored by the FG , is announced by an assigned alert (e.g. F/CTL FCDC 1 FAULT), or by the AUTO FLT APPROACH CAPABILITY DOWNGRADED alert (*Refer to procedure*).

The occurrence of a failure or a warning in approach may modify the approach procedure. For more information, *Refer to Failures or warnings during a CAT II or CAT III approach* .

REQUIRED EQUIPMENT MONITORED BY THE FG

The following table presents the equipment, as monitored by the FG , required to perform CAT II, or CAT III approach, and landing:

L123

Required Equipment Monitored by FG	Precision Approach Capability		
	CAT2	CAT3 SINGLE	CAT3 DUAL
AP	1 AP engaged	1 AP engaged	2 AP s engaged
A/THR	Not required	Active	Active
PRIM	1	1	- PRIM 1 and PRIM 2, or - PRIM 1 and PRIM 3.
SEC	1	1	1
Flight control vertical accelerometer, used for the computation of pitch normal law *(1)*	3	3	4
Flight control gyrometer, used by flight controls *(1)*	5	5	6
Slat Control Unit	1	1	2
Flap Control Unit	1	1	2
Rudder trim	Available	Available	Available
Normal law	Available	Available	Available
Hydraulic circuit	1	1	2
AFS CP , or CAPT AFS CP backup, or F/O AFS CP backup	1	1	1
PFD display *(1)*	2	2	2
FWS , including the audio function	1	1	2
FCDC	1	1	2
Normal or alternate braking	Not required	Not required	Available
Antiskid	Not required	Not required	Available
Nosewheel Steering *(2)*	Not required	Not required	Available
LGERS	1	1	1
Ground spoilers	Available	Available	Available
Radio Altimeter	1	2	2

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Required Equipment Monitored by FG	Precision Approach Capability		
	CAT2	CAT3 SINGLE	CAT3 DUAL
ILS receiver (3)	2	2	2
ADR	2	2	3
IRS in NAV mode (1) (4)	2	2	3
Angle of Attack (1)	2	2	3
Sideslip angle (1)	2	2	3
Engine	1 on the right side, and 1 on the left side	3	- 4, or - 3, with the APU running, and one APU generator is connected to the electrical network. (5)
AC busbar	(6)	(6)	6
Supply of AC busbars	(6)	(6)	4 different generators supply the AC busbars
Supply of DC busbars	(6)	(6)	Each DC busbar is supplied by its assigned TR

(1) The PRIM s monitor this equipment, and may trigger the AUTO FLT APPROACH CAPABILITY DOWNGRADED alert. For more information, Refer to Procedure .

(2) In CAT3 DUAL , the nosewheel steering must be able to receive AP guidance orders.

If the communication between the nosewheel steering and the FG is failed:
- *CAT3 DUAL is lost*
- *The AUTO FLT ROLL OUT FAULT alert triggers.*

(3) In addition, the tuning of both ILS receivers must be consistent.
If the tuning of both ILS receivers is not consistent, the NAV LS TUNING DISAGREE alert triggers.

(4) CAT3 DUAL will not be available, if the flight crew has set the ATT HDG selector out of NORM.

(5) If one engine fails, only three generators supply the AC busbars, and so CAT3 DUAL is lost. However, if the flight crew starts the APU , CAT3 DUAL is recovered.

(6) In accordance with the failure, and the associated equipment loss, capability downgrade may occur.

The FMA s display the precision approach capability:
- In accordance with the minimum required equipment, and
- When all of the following conditions are met:
  - An ILS approach has been selected on the FMS ARRIVAL page
  - The North reference is MAG
  - The LOC and G/S modes are armed, or engaged.

L2 CAT3 SINGLE , or CAT3 DUAL is memorized at 200 ft RA , and remains displayed as long as:
- At least one AP is engaged, and
- LAND , FLARE , or ROLL OUT is engaged.

L1 **REQUIRED EQUIPMENT NOT MONITORED BY THE FG**

The following table presents the equipment, not monitored by the FG , required to perform CAT II or CAT III approach, and landing:

Required Equipment Not Monitored by FG	Precision Approach Capability		
	CAT2	CAT3 SINGLE	CAT3 DUAL
AP pb , or CAPT sidestick pushbutton, or F/O sidestick pushbutton	2	2	2
Autoland light	1	1	1
AP OFF alert	Available	Available	Available
DH Indication	1 for F/O	1 for F/O	1 for F/O
Attitude indicationon PFD	2	2	2
Attitude indication on standby instrument	1	1	1
Windshield wiper	1 for CAPT	1 for CAPT	1 for CAPT
Windshield heating	1 for CAPT	1 for CAPT	1 for CAPT

To perform an automatic roll-out in CAT2 , or CAT3 SINGLE , the antiskid, the nosewheel steering, and the normal or alternate braking must be available.

REQUIRED EQUIPMENT FOR GLS CAT I AUTOMATIC APPROACH AND AUTOMATIC LANDING

Applicable to: ALL

In order to perform a GLS CAT I automatic approach and automatic landing, the flight crew must check that the aircraft has the appropriate capability. The FG monitors a part of the required equipment (See Required Equipment Monitored by the FG), and computes the approach capability. The other part of the required equipment is not monitored by the FG : See Required Equipment not Monitored by the FG .

Any approach capability downgrade, computed by the FG , is announced by:
- A triple click aural warning
- The display of the inoperative capability on the STATUS SD page.

The loss of a required equipment, monitored by the FG , is announced by an assigned alert (e.g. F/CTL FCDC 1+2 FAULT), or by the AUTO FLT APPROACH CAPABILITY DOWNGRADED alert (*Refer to procedure*).

REQUIRED EQUIPMENT MONITORED BY THE FG

The following table presents the equipment, as monitored by the FG , required to perform a GLS CAT I automatic approach and automatic landing:

L123

Required Equipment Monitored by FG	Precision Approach Capability GLS AUTO LAND
AP	1 AP engaged
A/THR	Not required
PRIM	1
SEC	1
Flight control vertical accelerometer, used for the computation of pitch normal law (1)	3
Flight control gyrometer, used by flight controls (1)	5
Slat Control Unit	1
Flap Control Unit	1
Rudder trim	Available
Normal law	Available
Hydraulic circuit	1
AFS CP , or CAPT AFS CP backup, or F/O AFS CP backup	1
PFD display (1)	2
FWS , including the audio function	1
FCDC	1
LGERS	1
Ground spoilers	Available
Radio Altimeter	1
GLS receiver (2)	2
ADR	2
IRS in NAV mode (1)	2
Angle of Attack (1)	2
Sideslip angle (1)	2
Engine	1 on the right side, and 1 on the left side
AC busbar	(3)

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Required Equipment Monitored by FG	Precision Approach Capability GLS AUTO LAND
Supply of AC busbars	(3)
Supply of DC busbars	(3)

(1) *The PRIM s monitor this equipment, and may trigger the AUTO FLT APPROACH CAPABILITY DOWNGRADED alert. For more information, Refer to Procedure .*

(2) *In addition, the tuning of both GLS receivers must be consistent.*
If the tuning of both GLS receivers is not consistent, the NAV LS TUNING DISAGREE alert triggers.

(3) *In accordance with the failure, and the associated equipment loss, capability downgrade may occur.*

The FMA s display the GLS capability:
- In accordance with the minimum required equipment, and
- When all of the following conditions are met:
  - A GLS approach is selected on the FMS ARRIVAL page
  - The North reference is MAG
  - The LOC and G/S modes are armed, or engaged.

REQUIRED EQUIPMENT NOT MONITORED BY THE FG

The following table presents the equipment, not monitored by the FG , required to perform a GLS CAT I automatic approach, and automatic landing:

Required Equipment Not Monitored by FG	Precision Approach Capability GLS AUTO LAND
Normal or alternate braking	(1)
Antiskid	(1)
Nosewheel steering	(1)
AP pb , or CAPT sidestick pushbutton, or F/O sidestick pushbutton	2
Autoland light	1
AP OFF alert	Available
DH Indication	1 for PM
Attitude indication on PFD	2
Attitude indication on standby instrument	1
Windshield wiper	1 for PF
Windshield heating	1 for PF

(1) *To perform an automatic roll-out in GLS CAT I, the antiskid, the nosewheel steering, and the normal or alternate braking must be available.*

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LIMITATIONS

COMMUNICATION

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LIM-23-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

HF Communication..... A

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HF COMMUNICATION

Applicable to: ALL

During refuelling, HF communication should not be used.

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LIMITATIONS

ELECTRICAL

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LIM-24-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

Electrical Outlets.....A
Portable Electronic Devices.....B

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ELECTRICAL OUTLETS

Applicable to: ALL

Do not use the electrical outlets during takeoff and landing.

PORTABLE ELECTRONIC DEVICES

Applicable to: ALL

The portable electronic devices carried by passengers, must be switched off from the In Seat Power Supply System (ISPSS) during takeoff and landing.

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LIMITATIONS

FUEL

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LIM-28-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

Certified fuel....A
Maximum allowed wing fuel imbalance....B
Fuel Temperature....C

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CERTIFIED FUEL

Applicable to: ALL

The fuel system has been certified for the following fuels:

- JET A
- JET A1
- JP5
- JP8
- RT
- TS-1
- N°3 Jet Fuel (RP-3).

MAXIMUM ALLOWED WING FUEL IMBALANCE

Applicable to: ALL

Maximum Allowed Wing Imbalance at Takeoff, in Flight , and Landing	
Feed tanks 1 / Feed tanks 4	6 613 lb
Feed tank 2 / Feed tank 3	6 613 lb
Left inner tank / Right inner tank	6 613 lb
Left mid tank / Right mid tank	5 511 lb
Left outer tank / Right outer tank	2 645 lb

Note: In exceptional conditions (i.e. fuel system failures) the above-mentioned maximum fuel imbalance values may be exceeded without significantly affecting the aircraft handling qualities. The aircraft remains fully controllable in all phases of the flight.

FUEL TEMPERATURE

Applicable to: ALL

MINIMUM FUEL TEMPERATURE

The minimum fuel temperature is the actual freezing point of the fuel used for the flight.
If the actual freezing point of the fuel used for the flight is unknown, use the following fuel specification freezing point.

JET A	JET A1	JP5	JP8	RT	TS-1	RP-3
-40 °C	-47 °C	-46 °C	-47 °C	-50 °C	-50 °C	-47 °C

MAXIMUM FUEL TEMPERATURE

The maximum fuel temperature is +53 °C.

FUEL MIXABILITY

The various types of fuel can be mixed in all proportions.

The freezing point of a fuel mixture varies, based on non-linear laws. Therefore, the only reliable way to obtain an accurate freezing point of a mixture of fuels is to measure the freeze point.

If this is not possible, the freezing point of the mixture in one tank should be:

- The highest freezing point, if the fuel type with the lowest quantity is more than 10 % of the mixture, or
- The freezing point of the fuel type with the highest quantity, if the fuel type with the lowest quantity is less than 10 % of the mixture.

For example, assuming that the aircraft has a mixture of fuel type JET A and fuel type JP8, and that the freezing points are in accordance with the specifications:

- If there is less than 10 % of fuel type JET A, the freezing point of the mixture can be considered as that of fuel type JP8: -47 °C (i.e. the fuel type with the highest quantity)
- If there is more than 10 % of fuel type JET A, the freezing point of the mixture can be considered as that of fuel type JET A: -40 °C (i.e. the highest freezing point).

LIMITATIONS

INDICATING/RECORDING

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LIM-31-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

HUD.....A

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HUD

Applicable to: ALL

The use of the Head-Up Display (HUD) is approved for all phases of flight with the following limitations:

MANUAL APPROACH

The flight crew may use the HUD for visual, or instrument CAT I approaches, provided that the selected slope is between -2 ° and -4 °.

AUTOMATIC APPROACH, LANDING AND ROLL OUT

The flight crew may use the HUD to monitor automatic approach, landing and roll out.

Note: Following automatic approach and landing, the HUD is approved as a reversionary means for roll out in the event of untimely autopilot disconnection or failure of a system affecting the automatic roll out.

SYNTHETIC RUNWAY

The flight crew must not use the synthetic runway for runway identification.

Note:
- *The HUD displays a synthetic runway during the approach phase, if the heading of the aircraft is ±80 ° of the runway QFU, in order to help the flight crew locate the runway*
- *During a precision approach, the synthetic runway and the LOC axis on the HUD may not overlay the real runway*
- *In Non-Precision Approaches (NPA), the synthetic runway course may be different from the real runway course by a few degrees.*

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LIMITATIONS

LANDING GEAR

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LIM-32-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

LIM-32-30 Braking System

ROW - ROP....A
BTV....B
BTV....C
Braking System....D

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ROW - ROP

Applicable to: ALL

Runway Overrun Warning - Runway Overrun Protection are approved:
- For dry and wet runway only
- With thrust reverser available
- Without any alert that impacts landing performance.

Note: *In the case of alert that impacts landing performance, ROW-ROP alerts are available. The ROW-ROP alerts are based on landing performance that does not take into account the performance penalties linked to the alert that impact the landing performance.*

BTV

Applicable to: ALL
Impacted DU: 00021915 BTV

CAUTION	BTV must be used only on dry and wet runway. The use of BTV is prohibited on contaminated runway. The use of BTV is prohibited on the runways 13 R or 13 L associated with the approach VOR or GPS 13R or 13 L "CANARSIE" at JFK airport.

Note: *Precision on runway condition:*
- *Any runway declared damp must be considered wet*
- *Any wet runway including a PFC or grooved surface must be considered wet*
- *Any wet runway declared as slippery when wet must be considered contaminated.*

BTV can be used every time at landing, independently of wind condition, visibility, aircraft configuration (e.g. weight, CG, landing configuration), manual landing, automatic landing.
The flight crew should not use BTV if the airport destination is not available in the airport navigation database.

BTV

Applicable to: ALL
Impacted by TDU: 00024053 BTV

CAUTION	BTV must be used only on dry and wet runway. The use of BTV is prohibited on contaminated runway.

Note: *Precision on runway condition:*
- *Any runway declared damp must be considered wet*
- *Any wet runway including a PFC or grooved surface must be considered wet*
- *Any wet runway declared as slippery when wet must be considered contaminated.*

BTV can be used every time at landing, independently of wind condition, visibility, aircraft configuration (e.g. weight, CG, landing configuration), manual landing, automatic landing.
The flight crew should not use BTV if the airport destination is not available in the airport navigation database.
BTV cannot be used in the case of ECAM alert that impact the landing performance.

BRAKING SYSTEM

Applicable to: ALL

Maximum brake temperature for takeoff..... 300 °C
The braking system is not designed to hold the aircraft in a stationary position when a high thrust level is applied on at least one engine. During ground procedures that require a thrust increase with braking, the flight crew must ensure that the aircraft remains stationary.

LIMITATIONS

OXYGEN

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LIM-35-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

Minimum Flight Crew Oxygen Pressure.....A
Minimum Cabin Oxygen Pressure.....B

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MINIMUM FLIGHT CREW OXYGEN PRESSURE

Applicable to: ALL

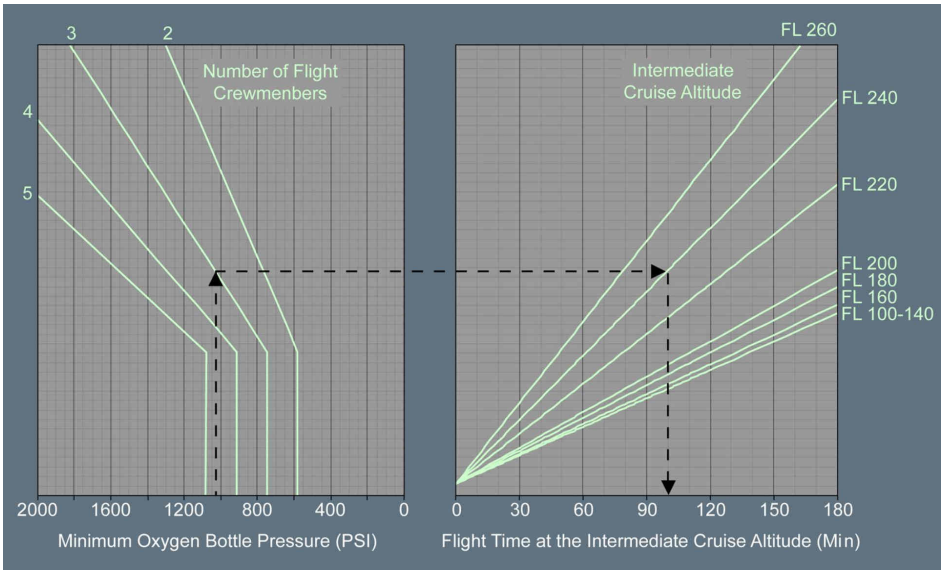
The minimum oxygen bottle pressure, indicated on the graph, takes into account all of the following:

1.	The preflight checks for all flight crewmembers.	
2.	Only one flight crewmember is in the cockpit, and uses the oxygen mask at 8 000 ft of cabin altitude for 15 min , with the N/100% selector set to N. This can occur two times.	
3.	The most demanding case among the two following: *(1)*	Protection after loss of cabin pressure for all flight crewmembers, with the N/100% selector set to N, to fly: - 1 min at FL 430 - Descent from FL 430 to an intermediate cruise altitude at 5 500 ft/min The intermediate cruise altitude is read on the following graph. - Flight time at the intermediate cruise altitude The flight time is read on the graph. - Descent from the intermediate cruise altitude to FL 100 at 5 500 ft/min .
		Protection against toxic gases and smoke for all flight crewmembers with the N/100% selector set to 100%, at 8 000 ft of cabin altitude for 15 min .
4.	One flight crewmember uses the oxygen mask when the aircraft: - Takes off from an airport at, or above 9 200 ft , or - Lands on an airport at, or above 9 200 ft . For information on the use of the mask during high altitude airport operation, *Refer to PRO-SPO-HAO High Altitude Airport Operation* .	
5.	Normal system leakage.	
6.	Not usable quantity.	

(1) *In accordance with FAR 121.333, the fixed oxygen for the cockpit must provide enough oxygen to protect all flight crewmembers, with the N/100% selector set to N, after loss of cabin pressure, to fly:*
- *A descent from FL 430 to FL 100 , with a constant descent rate, for 10 min*
- *A step at FL 100 for 110 min .*

However, this profile is less demanding than the two cases.

Minimum Oxygen Bottle Pressure



Note: 1. *The values of the oxygen bottle pressure refers to the oxygen bottle pressure displayed on the DOOR SD page.*
2. *The above conditions are based on the use of a sealed mask on a non-bearded face. They may be affected when the masks are used by bearded flight crewmembers.*
3. *It is recommended to fly at, or close to the profile when the altitude is above FL 250 . If the aircraft flies below the profile, and above FL 250 , the oxygen consumption will be higher than flying the profile.*

FLIGHT ABOVE FL 410

For FAA -certified aircraft, and in accordance with FAR 121.333, if flight above FL 410 is expected:

- Before departure, the flight crew must increase the minimum oxygen bottle pressure. The amount of the increase is based on the amount of time that the aircraft will be above FL 410 . For calculation purposes, the minimum oxygen bottle pressure must be increased by 73 PSI per hour.
- When the aircraft goes above FL 410 , one flight crewmember must don the oxygen mask, and set the N/100% selector to N.

MINIMUM CABIN OXYGEN PRESSURE

Applicable to: ALL

MINIMUM OXYGEN BOTTLE PRESSURE

In the case of depressurization, the fixed oxygen system for the cabin provides oxygen to the cabin (passengers and cabin crew), and to the crew rest compartments via individual oxygen masks.

The fixed oxygen system has the capacity to provide the necessary amount of oxygen:

- To the number of masks to be used by the cabin occupants
  The cabin occupants include the passengers, and the cabin crew.
- To fly on, or below one of the three following profiles:
  - See Descent from FL 430 to FL 150 in 10 min, or
  - See Emergency descent , or
  - See Emergency descent with a step flight level.
- When the oxygen bottle pressure, indicated on the DOOR SD, is above the minimum bottle pressure, indicated on one of the following table, or graph.

DESCENT FROM FL 430 TO FL 150 IN 10 MIN

Note: This profile is required by JAR OPS 1.770.

The following table indicates the minimum oxygen pressure necessary to provide oxygen:

- To the number of cabin masks in use
- During a descent from FL 430 to FL 150 in 10 min, with a constant descent rate.

Number of Cabin Masks in Use	100	200	300	400	500	600	700	800
Minimum Oxygen Bottle Pressure PSI	407	706	999	1290	1579	More than 1 850 PSI is necessary.		

EMERGENCY DESCENT

The following table indicates the minimum oxygen pressure necessary to provide oxygen:

- To the number of cabin masks in use
- For the following profile:
  - 1 min at FL 430
  - An emergency descent from FL 430 to FL 100, with a descent rate of 5 500 ft/min.
- In the case of depressurization.

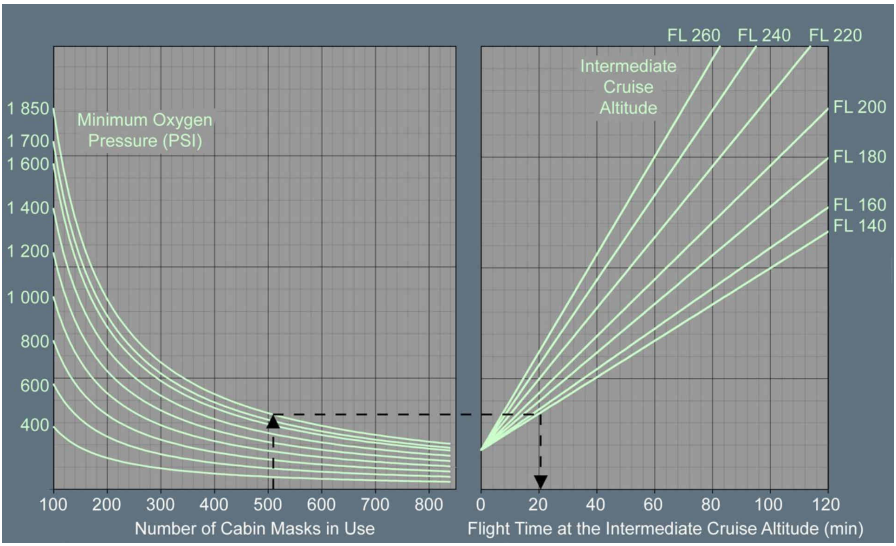
Number of Cabin Masks in Use	100	200	300	400	500	600	700	800
Minimum Oxygen Bottle Pressure PSI	286	469	649	827	1003	1178	1352	1526

EMERGENCY DESCENT WITH A STEP FLIGHT LEVEL

The following graph indicates the minimum oxygen bottle pressure necessary to provide oxygen:

- To the number of cabin masks in use
- For the following profile:
  - 1 min at FL 430
  - Descent from FL 430 to an intermediate cruise altitude at 5 500 ft/min
    The intermediate cruise altitude is read on the graph.
  - Flight time at the intermediate cruise altitude
    The flight time is read on the graph.
  - Descent from the intermediate cruise altitude to FL 100 at 5 500 ft/min.
- In the case of depressurization.

Minimum Oxygen Bottle Pressure for Emergency Descent with a Step Flight Level



LIMITATIONS

BLEED AIR

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LIM-36-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

Air Conditioning with HP Ground Air Supply..... A

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AIR CONDITIONING WITH HP GROUND AIR SUPPLY

Applicable to: ALL

- Do not use HP ground air supply, when APU supplies bleed air.

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LIMITATIONS

ONBOARD MAINTENANCE SYSTEM

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LIM-45-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

Onboard Maintenance Terminal..... A

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ONBOARD MAINTENANCE TERMINAL

Applicable to: ALL

The in-flight use of the Onboard Maintenance Terminal (OMT) DVD reader and writer has not been demonstrated.

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LIMITATIONS

INFORMATION SYSTEMS

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LIM-46-PLP PRELIMINARY PAGES

TABLE OF CONTENTS

OIS - Onboard Information System....A
PEA - Performance Applications....B
PrinterS....C

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OIS - ONBOARD INFORMATION SYSTEM

Applicable to: ALL

FLT OPS SIDE

FLT OPS STS PAGE

- The FLT OPS STS page does not display the navigation charts validity after the flight crew member has started the laptop
- When the connection of a laptop to the network is lost then recovered, the synchronization of the FLT OPS STS page is partially lost between the CAPT and the F/O laptop
- The OIS version may not appear on the FLT OPS STS page.

For more information, *Refer to DSC-46-20-10-30 FLT OPS STS Page* .

LOAD BOX/EXPORT BOX

- The flight crew must not use two USB devices at the same time on the same laptop
- If the flight crew plugs a USB device when the LOAD BOX is already open, the list of data to load is not automatically refreshed.

For more information, *Refer to DSC-46-20-10-30 LOAD BOX / EXPORT BOX* .

OPS LIBRARY

- The OPS LIBRARY may take several minutes to start, when the flight crew starts the application for the first time.
  When the application starts, "NOT AVAILABLE" may be temporarily displayed on the OIT .
- When the flight crew opens a manual or performs an ECAM search, the first documentary unit that the flight crew has selected may not appear, *Refer to DSC-46-20-50-10 How to Start the OPS LIBRARY* and *Refer to DSC-46-20-50-10 How to Use ECAM Search* .
- There is no indication to the flight crew when the push/receive function of MEL / CDL items from the elogbook application to the FLT OPS side is lost, *Refer to DSC-46-20-50-10 How to use The Logbook Status* .

FLT FOLDER

- The flight crew must close the FLT FOLDER application before exiting the session
- The performance applications are not available after the FLT FOLDER closure
- When the flight crew starts the export process, if the SATCOM is the only communication means available, the export process may be blocked, because the data file size is bigger than the size permitted by the SATCOM, *Refer to DSC-46-20-50-30-40 Send the EFF to the Ground via Wireless* .

NSS AVNCS SIDE

ELOGBOOK

- The flight crew must not use the technical logbook application during a synchronization process, *Refer to DSC-46-20-50-40 How to Accept the Aircraft* and *Refer to DSC-46-20-50-40 How to Close the Flight* .

AIRLINE OPERATIONAL CONTROL (AOC)

- On the FLT OPS side, when an AOC notification is selected on the Captain's (F/O 's) OIT , the corresponding notification is not deleted on the other OIT . The notification must be manually deleted
- A customized notification is pushed to the FLT OPS side and appears on one OIT when the flight crewmember selects the FLT OPS side, only if this OIT s display the NSS AVNCS side when the notification occurs
- The COMPANY COM application may temporarily freeze after navigation through the application. If the freeze persists, the flight crew should restart the laptop.

PEA - PERFORMANCE APPLICATIONS

Applicable to: ALL

TAKEOFF

INOPERATIVE FLEX AND DERATED TAKEOFF MODE

In the case of a MEL item that forbids the use of FLEX or Derated Takeoff thrust, the FLEX and the Derate Level THRUST options are still available in T.O PERF, even though it is forbidden by the associated MEL procedure.
Workaround: Select the TOGA THRUST option.

For more information about this limitation:
- *Refer to PER-TOF-TOC-ACS-THR Inoperative FLEX and Derated Takeoff Mode*
- *Refer to PER-TOF-TOC-ACM-THR Inoperative FLEX and Derated Takeoff Mode*
- *Refer to PER-TOF-TOC-AFS-MEL Inoperative FLEX and Derated Takeoff Mode* .

MULTIPLE RESULTS

The TOGA result line is sometimes overlapped by the FLEX result line.
Workaround: Move the cursor over the first line of the result table and select it.
For more information about this limitation, *Refer to PER-TOF-TOR-MRS FLEX Takeoff* .

ENG. A-ICE VALVE POSITION

Calculation may fail when the MEL item "Eng. A-Ice valve position: Stuck open" is selected.

Workaround:
- Deselect the MEL item "Eng. A-Ice valve position: Stuck open"
- Select "Engine & Wing" in the A-ICE drop down list of the CONDITIONS panel.

This procedure provides the correct results.
For more information about this limitation, *Refer to PER-TOF-TOC-AFS-MEL Eng. A-Ice Valve Position* .

TAKEOFF WEIGHT

TOW in Tons

For some calculation sequences with at least two computations, when the flight crew enters the TOW in Tons, T.O PERF may use a lower TOW value.
Workaround: Enter the TOW value directly in Kilograms.

For more information about this limitation:
- *Refer to PER-TOF-TOC-ACS Takeoff Weight*
- *Refer to PER-TOF-TOC-ACM Takeoff Weight* .

Different rounding between LOADSHEET and T.O PERF

When the flight crew has run a LOADSHEET computation and then switches to T.O PERF, the TOW value is retrieved from the LOADSHEET results. There is a different rounding between LOADSHEET and T.O PERF: the TOW may be different by 100 kg . The TOW in T.O PERF is rounded up to the next 100 kg .

For more information about this limitation:
- *Refer to PER-TOF-TOC-ACS Takeoff Weight*
- *Refer to PER-TOF-TOC-ACM Takeoff Weight* .

Switch between T.O PERF and LOADSHEET while a T.O PERF computation is running

When the flight crew switches between T.O PERF and LOADSHEET while a T.O PERF computation is running, the T.O PERF RESULTS panel may display results for a weight different from the one displayed on the CONDITIONS and RESULTS panels.
Workaround: Do not switch from T.O PERF to LOADSHEET while a T.O PERF calculation is running.

For more information about this limitation:
- *Refer to PER-TOF-TOC-ACS Takeoff Weight*
- *Refer to PER-TOF-TOC-ACM Takeoff Weight* .

CDL

When a CDL item is selected, the number of missing items is hidden in the ACFT STS box.
Workaround: Use the scroll bar to display the hidden information.

For more information about this limitation, *Refer to PER-TOF-TOC-AFS CDL* .

SYNCHRONIZATION WITH LOGBOOK

If the Logbook status is lost in the FLT OPS domain, T.O PERF may synchronize with an old Logbook status.
For more information about this limitation, *Refer to PER-TOF-TOC-AFS Synchronization with Logbook* .

FULL RUNWAY MODIFICATION: T.O SHIFT

In MODIFY RWY - Full Mode, the T.O SHIFT value is hidden on the AIRPORT panel, but there is no impact on the computation. T.O PERF uses the relevant T.O SHIFT value and displays this value on the RESULTS panel.

For more information about this limitation:
- *Refer to PER-TOF-TOC-RWY SINGLE RWY COMPUTATION Panel - Length-CWY-SWY*
- *Refer to PER-TOF-TOC-RWY SINGLE RWY COMPUTATION Panel - TORA-TODA-ASDA* .

REDUCED RUNWAY MODIFICATION

Entry Angle

In MODIFY RWY - Reduced Mode, the ENTRY ANGLE value is not correctly displayed on the AIRPORT panel, but there is no impact on the calculation. The T.O PERF application uses the relevant entry angle value.

In MODIFY RWY - Reduced Mode, the following equivalences apply:
- 0 on the AIRPORT panel corresponds to 0 °
- 1 on the AIRPORT panel corresponds to 90 °
- 2 on the AIRPORT panel corresponds to 180 °
- 3 on the AIRPORT panel corresponds to 180 ° pad
- 4 on the AIRPORT panel corresponds to an entry angle value customized by the airline.

For more information about this limitation:
- *Refer to PER-TOF-TOC-RWY SINGLE RWY COMPUTATION Panel - Length-CWY-SWY*
- *Refer to PER-TOF-TOC-RWY SINGLE RWY COMPUTATION Panel - TORA-TODA-ASDA* .

Additional Obstacle

When the flight crew adds one obstacle from RWY end by using the ADD 1 OBSTACLE function, the label “Distance: 0(m) from RWY start” appears on the VIEW OBST subpanel. There is no impact on the computation. T.O PERF uses the relevant obstacle longitudinal distance from RWY start.
For more information about this limitation, *Refer to PER-TOF-TOC-RWY-CRR VIEW OBST* .

MULTIPLE RUNWAY COMPUTATION (LENGTH-CWY-SWY)

The label "TORA" is displayed instead of the label "LENGTH" on the MULTIPLE RWY COMPUTATION panel.
For more information about this limitation, *Refer to PER-TOF-TOC-RWY MULTIPLE RWY COMPUTATION Panel - Length-CWY-SWY* .

LANDING

ECAM ALERTS AND AUTOLAND

The selection of an ECAM alerts item plus the LDG TECHNIQUE Autoland is not possible even if the associated ECAM alert enables the use of Autoland system. The following error message appears: "Computation using autoland with ECAM Alert is not possible".
However, for these failure cases, the distance computed for Manual Landing is consistent with the average landing distance achieved with Autoland.
Consequently, the flight crew can set the LDG TECHNIQUE field to Manual.

For more information about this limitation:
- *Refer to PER-LND-LCF-AFS ECAM Alerts*
- *Refer to PER-LND-LFF-IOI Conditions* .

SYNCHRONIZATION WITH ECAM - MEL DISPATCH

In the case of a dispatch with a MEL item resulting from an ECAM alert affecting landing performance during the previous flight, the list of the ECAM Alert items is still on the STATUS MORE page of the SD . The list of the ECAM Alert items of the previous flight is sent to LDG PERF.

Workaround:
- If there is no additional ECAM alert during the current flight: Manually deselect the list of the ECAM Alert items in LDG PERF
- If there are additional ECAM alerts during the current flight: Deselect the list of the ECAM Alert items in LDG PERF that are linked to the MEL dispatch.

For more information about this limitation:
- *Refer to PER-LND-LCF-AFS ECAM Alerts*
- *Refer to PER-LND-LCF-AFS Synchronization with ECAM* .

RLD AUTOLAND

LDG PERF does not automatically check that the RLD for automatic landing is higher than or equal to the RLD in manual mode.

Workaround:
- Run two calculations with LDG PERF: one with the Manual landing technique and one with the Autoland landing technique
- Retain for automatic landing the greatest of the following values:
  - RLD calculated using the Autoland landing technique
  - RLD calculated using the Manual landing technique

For more information about this limitation, *Refer to PER-LND-LRD-DSR Landing Distances* .

LANDING WEIGHT

When the flight crew switches between LDG PERF and LOADSHEET while a LDG PERF computation is running, the LDG PERF RESULTS panel may display results for a weight different from the one displayed in the CONDITIONS panel.
Workaround: Do not switch from LDG PERF to LOADSHEET while a LDG PERF calculation is running.

For more information about this limitation:
- *Refer to PER-LND-LCD-ACC Landing Weight*
- *Refer to PER-LND-LCF-ACC Landing Weight* .

CDL

Missing Items

When a CDL item is selected, the number of missing items is hidden in the ACFT STS box.
Workaround: Use the scroll bar to display the hidden information.

For more information about this limitation:
- *Refer to PER-LND-LCD-AFS CDL*
- *Refer to PER-LND-LCF-AFS CDL* .

ΔVref Speed Increment in VAPP when no ECAM Alert Selected

If no ECAM alert item is selected and if the flight crew selects a CDL item that has an impact on the VAPP , the associated increment in VAPP (ΔVref) is not displayed on the RESULTS panel. However, the landing computation is correct.
If no ECAM alert item is selected and if the flight crew selects a CDL item that has no impact on the VAPP , an additional result ΔVref appears on the RESULTS panel. This label should not be displayed. However, the landing computation is correct.
For more information about this limitation, *Refer to PER-LND-LCF-AFS CDL* .

IN-FLIGHT

CLB, CRZ, DES, HLD AND PLAN MODULES

MEL Items

MEL items are not implemented.
For more information about this limitation, *Refer to PER-IFT-ACS MEL* .

CDL Items

Ticked CDL items from the AFM are not transferred to IN-FLT PERF.
Workaround: Select directly the CDL items in IN-FLT PERF.
For more information about this limitation, *Refer to PER-IFT-ACS CDL* .

CDL Negligible Items

If the flight crew selects only CDL negligible items, the IN-FLT PERF computation fails.
For more information about this limitation, *Refer to PER-IFT-ACS CDL* .

DES MODULE - ALL ENGINES FLAMES OUT

The All Engines Flames Out Descent computation fails.
Refer to PER-IFT-DES-DSD Engines Operative .

CRZ AND PLAN MODULE

NSC Items - Mach Speed Input

When the flight crew uses a Mach number speed input, the IN-FLT PERF computation fails for the following NSC items:
- L/G EXTENDED
- DISPATCH WITH GEAR DOWN
- L/G DOORS OPEN.

Workaround: Use a CAS entry (the CAS vs. Mach conversion is computed by the ATMO module).

For more information about this limitation:
- *Refer to PER-IFT-ACS-NSC L/G*
- *Refer to PER-IFT-ACS-NSC L/G DOORS* .

Turbulence Speed - Cruise Altitude Below the Crossover Altitude

When the flight crew enters a cruise altitude below the Crossover Altitude, the IN-FLT PERF Turbulence Speed computation fails.
Workaround: Run a Selected Speeds computation when the altitude is below the Crossover Altitude.
For more information about this limitation, *Refer to PER-IFT-CRZ-TBS Turbulence Speed* .

PLAN MODULE - ECAM ALERTS - FUEL PENALTY FACTOR

The PLAN module does not display any fuel penalty linked to the selected ECAM Alerts item.

The flight crew should apply the following calculation sequence to assess the average fuel penalty along the remaining distance:

1. The computation is first made at current conditions without ECAM Alerts item
2. On the RESULTS panel, the flight crew notes down the Trip Fuel (F1)
3. The flight crew restarts the computation with the adequate ECAM Alerts item
4. On the RESULTS panel, the flight crew notes down the new Trip Fuel (F2)
5. The flight crew manually calculates the fuel penalty factor:
   Fuel Penalty Factor (%) = 100 x (F2 – F1) / F1.

For more information about this limitation, *Refer to PER-IFT-IFF Impact on Results* .

LOADSHEET

MANUAL FUEL DISTRIBUTION

In the case of a manual fuel distribution, the sum of all tanks (distribution section FOB) must be exactly identical to the total FOB (loading section FOB): there is no tolerance.
For more information about this limitation, *Refer to PER-LOD-LAI-FUL Fuel Distribution Section* .

MAXIMUM FOB

LOADSHEET computations fail when the flight crew enters the maximum FOB for the aircraft.
Workaround: Reduce the FOB by 150 kg .
For more information about this limitation, *Refer to PER-LOD-LAI-FUL Fuel Loading Section* .

MEL - FUEL DISTRIBUTION

If the flight crew selects a MEL item with an impact on Fuel Distribution, the associated non standard fuel distribution is not computed.
Workaround: Use the Manual Distribution function with the fuel quantities read on the ECAM .
For more information about this limitation, *Refer to PER-LOD-ACS MEL* .

OPERATING DATA - NSC AND CDL

Do not perform ATMO calculation with Non Standard Configurations (NSC) items or CDL items.

ATMO module calculations:
- Do not take into account NSC
- Fail when the flight crew selects a CDL item.

For more information about this limitation:

- *Refer to PER-OPD-AMISC ATMO Module Interface (Speed conversions)*
- *Refer to PER-OPD-AMITA ATMO Module Interface (True altitude for high altitude use)*
- *Refer to PER-OPD-AMILA ATMO Module Interface (Low altitude temperature corrections)* .

PRINTERS

Applicable to: ALL

The reference information is the information that appears on the different display units and OIT. In the case of a discrepancy between the printed and displayed information, the flight crew should use the displayed information for flight and fuel planning, ATC communication, etc.

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LIMITATIONS

AUXILIARY POWER UNIT

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LIM-49-PLP PRELIMINARY PAGES

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LIM-49-10 Auxiliary Power Unit

APU Limitations General ..... A

LIM-49-20 Operational Envelope

Operational Envelope ..... A
Operational Envelope ..... B

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APU LIMITATIONS GENERAL

Applicable to: ALL

APU START

In the case of an aborted APU start, the flight crew must wait 60 s before a new start attempt.

L2 This 60 s period is due to the ECB inhibition logic after an aborted APU start.

L1 After three consecutive APU start attempts, the flight crew must wait 60 min before a new start attempt.

L2 This 60 min period is to allow the APU starter to cool down.

ROTOR SPEED

Maximum N1 speed..... 106 %
Maximum N2 speed..... 102 %

EGT

Maximum indicated EGT ..... 900 °C
Maximum EGT for APU start..... 700 °C on ground, 800 °C in flight
Maximum EGT for APU running..... 900 °C during 30 s, or 935 °C during 0.5 s

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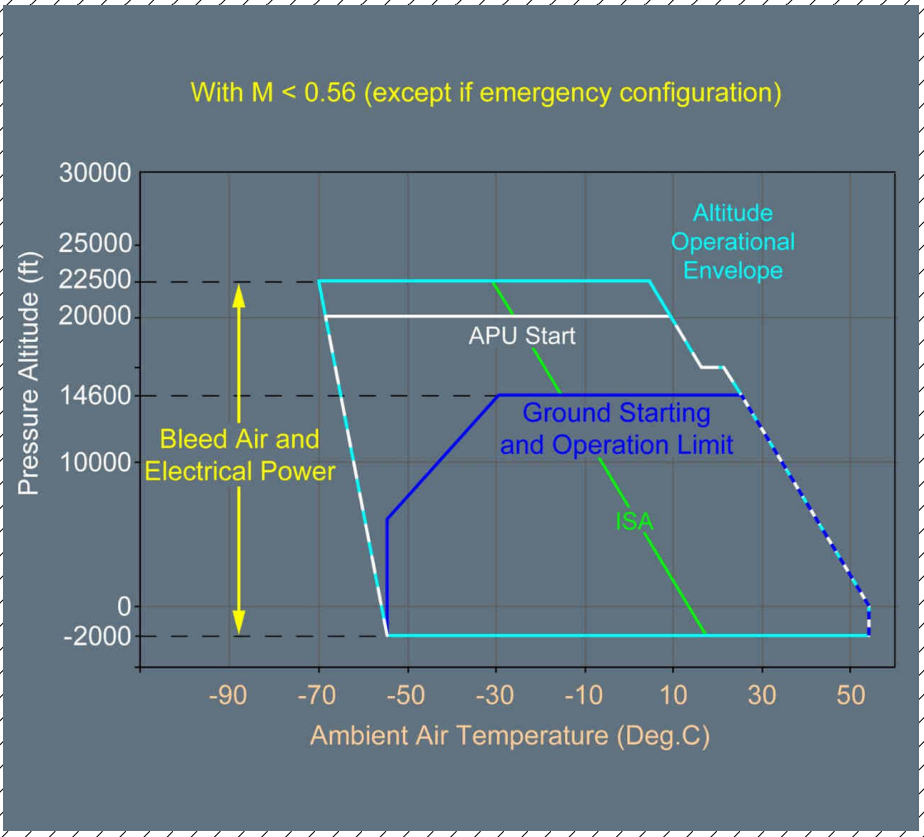
OPERATIONAL ENVELOPE

Applicable to: ALL
Impacted by TDU: 00018905 Operational Envelope

OPERATIONAL ENVELOPE

In the case of an all engine flame out, the APU can operate at any aircraft speed.
Otherwise, the APU can operate, when the aircraft speed is below M 0.56.

APU Operational Envelope



APU GENERATORS

L2 L1 On ground, each APU generator can supply up to 120 KVA.
On ground, both APU generators can operate.

In flight, up to 22 500 ft, only one APU generator can operate.

APU BLEED AIR SUPPLY

APU bleed air can be supplied up to 22 500 ft, provided the aircraft airspeed is below M 0.56.
Use of APU bleed air for wing anti-ice is not permitted.

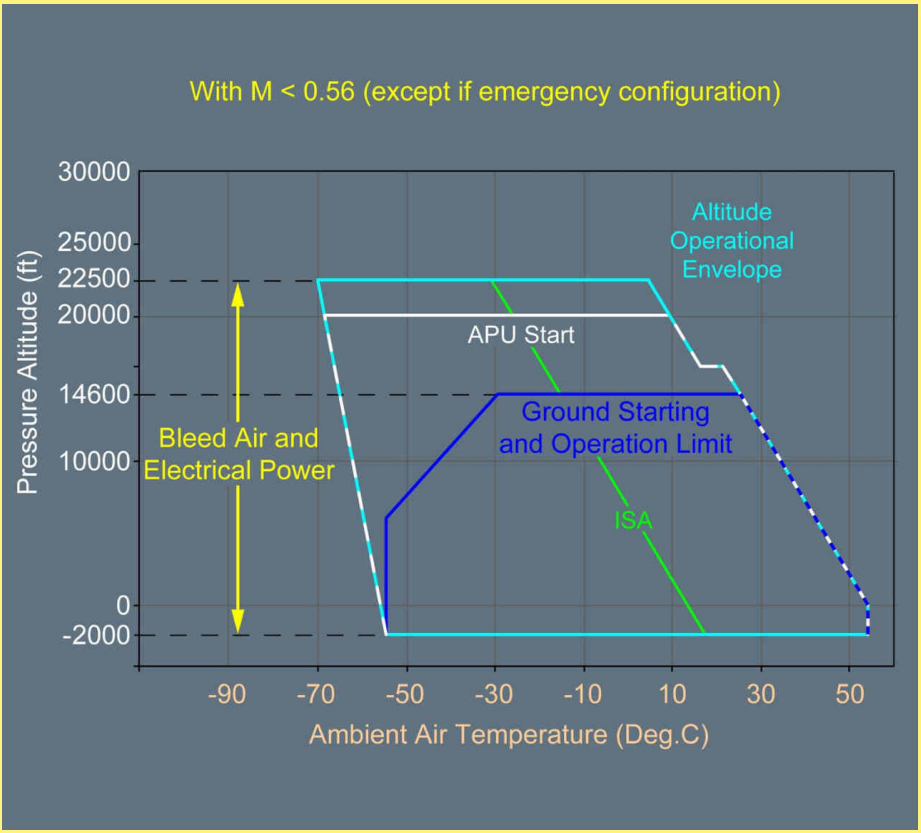
OPERATIONAL ENVELOPE

Applicable to: ALL
Impacted DU: 00004292 Operational Envelope

OPERATIONAL ENVELOPE

In the case of an all engine flame out, the APU can operate at any aircraft speed.
Otherwise, the APU can operate, when the aircraft speed is below M 0.56.
In addition, the APU start may not be successful below -30 °C (on ground and in flight).

APU Operational Envelope



APU GENERATORS

L2 On ground, each APU generator can supply up to 120 KVA.

L1 On ground, both APU generators can operate.

In flight, up to 22 500 ft, only one APU generator can operate.

APU BLEED AIR SUPPLY

APU bleed air can be supplied up to 22 500 ft, provided the aircraft airspeed is below M 0.56.

Use of APU bleed air for wing anti-ice is not permitted.

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LIMITATIONS

ENGINES

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LIM-70-PLP PRELIMINARY PAGES

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Shaft Speeds..... C
Starter..... D
Reverse Thrust..... E
Reduced Thrust Takeoff..... F

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THRUST SETTING/EGT LIMITS

Applicable to: ALL

Operating Condition		Time Limit	EGT Limit
Takeoff and Go-around	All engines operative	5 min	1 002 °C
	One engine inoperative	10 min	
Maximum Continuous Thrust (MCT)		Not limited	970 °C
Starting	On ground		745 °C
	In flight		865 °C

OIL

Applicable to: ALL

Maximum continuous temperature..... 177 °C during 5 s or 163 °C during 20 min
Minimum starting temperature..... –40 °C
Minimum temperature prior to takeoff..... 50 °C
Minimum oil quantity..... *Refer to PRO-NOR-SOP-50-E Before Walkaround_ECAM PAGES*
Minimum oil Pressure..... 25 PSI

SHAFT SPEEDS

Applicable to: ALL

N1 max..... 111 %
N2 max..... 118.7 %

STARTER

Applicable to: ALL

Three periods of 5 min continuous starter use are possible.

L2 The FADEC monitors the starter-on time. When the starter-on time exceeds 5 min continuous operation, the ENG x START FAULT STARTER TIME EXCEEDED ECAM alert triggers. The starter-on time resets when the flight crew sets to off the ENG MASTER lever.

L3 The starter-on time begins when the flight crew sets to on the ENG MASTER lever and stops when the starter disengages, i.e. when N2 is 58.4 %.

L1 After a long period of use, a starter cool down period is required, approximately 2 min cool down for each minute of starter time.

When the starter accumulates 15 min of use, the starter must cool down for 30 min before a new engine start is attempted.

If the N2 is above 25 %, no running engagement of the starter is possible.

Note: *High tailwinds (i.e. higher than 25 kt) may have an adverse effect on start. It may be necessary to reposition the airplane into the wind.*

REVERSE THRUST

Applicable to: ALL

- Selection of the reverse thrust is prohibited in flight
- Backing the aircraft with reverse thrust is not permitted
- Maximum reverse should not be used below 70 kt (or when the indication starts to fluctuate). Idle reverse is allowed down to aircraft stop.

REDUCED THRUST TAKEOFF

Applicable to: ALL

Takeoff at reduced thrust is allowed only if the airplane meets all performance requirements at the takeoff weight, with the operating engines at the thrust available for the flex temperature.
Takeoff at reduced thrust is allowed with any inoperative item affecting the performance only if the associated performance shortfall has been applied to meet the above requirements.

Note: *Allowed inoperative items may be identified through DISPATCH WITH INOPERATIVE ITEM chapter of the AFM or the MMEL*

Takeoff at reduced thrust is not allowed on contaminated runways.

The flex temperature must not be:
- Higher than ISA + 60 °C
- Lower than the flat rating temperature or actual OAT.

Takeoff at reduced thrust is not allowed unless the operator establishes a means to verify the availability of takeoff thrust to ensure that the engine deterioration does not exceed authorized limits.

PERFORMANCE

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PER-PLP PRELIMINARY PAGES

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PER-OPS Operating Speeds

PER-OPD Operating Data

PER-LOD Load Control

PER-THR Thrust Ratings

PER-TOF Takeoff

PER-IFT In-Flight

PER-LND Landing

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M(1)	Localization	DU Title	DU identification	DU date
	PER-TOF-TOC-ACS	**Takeoff Weight**	00021444.0007001	10 MAR 11
	Criteria: T71998, T76643, T77489, T81152, DD **Applicable to: ALL** *Impacted DU: 00006199 Takeoff Weight*			
	Reason for issue: *Description of the limitations linked to the introduction of NSS / OIS PEIS 2B+ (MOD 70908 / MP T81152).*			
	PER-TOF-TOC-ACM	**Takeoff Weight**	00021445.0007001	10 MAR 11
	Criteria: T71998, T76643, T77489, T81152, DD **Applicable to: ALL** *Impacted DU: 00008698 Takeoff Weight*			
	Reason for issue: *Description of the limitations linked to the introduction of NSS / OIS PEIS 2B+ (MOD 70908 / MP T81152).*			
	PER-LND-LCD-ACC	**Landing Weight**	00021446.0004001	10 MAR 11
	Criteria: T76643, T77489, T81152, DD **Applicable to: ALL** *Impacted DU: 00011596 Landing Weight*			
	Reason for issue: *Description of the limitations linked to the introduction of NSS / OIS PEIS 2B (MOD 68240 / MP T77489).*			
	PER-LND-LCF-ACC	**Landing Weight**	00021447.0004001	10 MAR 11
	Criteria: T76643, T77489, T81152, DD **Applicable to: ALL** *Impacted DU: 00011674 Landing Weight*			
	Reason for issue: *Description of the limitations linked to the introduction of NSS / OIS PEIS 2B (MOD 68240 / MP T77489).*			

(1) Evolution code : N=New, R=Revised, E=Effectivity

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PERFORMANCE

OPERATING SPEEDS

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GREEN DOT..... C
VLS CONF 0..... D

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OPERATING SPEEDS DURING APPROACH

Applicable to: ALL

OPERATING SPEEDS DURING APPROACH (KT)					
Weight (1 000 lb)	S	F2		F3	
		29 % CG	43 % CG	29 % CG	43 % CG
600	153	143	140	130	130
700	165	154	151	137	134
800	176	165	161	146	143
900	187	175	171	155	151
1000	197	184	181	163	160
1100	207	191	189	171	167
1200	215	191	191	177	175

Note: For CG between 29 % and 43 %, determine Operating Speeds by linear interpolation.

VLS DURING APPROACH

Applicable to: ALL

CONF 1 / CONF 1+F

VLS DURING APPROACH (KT)				
Weight (1 000 lb)	CONF 1		CONF 1+F	
	29 % CG	43 % CG	29 % CG	43 % CG
600	133	130	127	123
700	144	141	137	133
800	154	150	146	143
900	163	159	155	151
1000	173	168	164	159
1100	181	177	172	167
1200	190	185	179	175

Note: For CG between 29 % and 43 %, determine VLS by linear interpolation.

CONF 2 / CONF 3 / CONF FULL

VLS DURING APPROACH (KT)						
Weight (1 000 lb)	CONF 2		CONF 3		CONF FULL	
	29 % CG	43 % CG	29 % CG	43 % CG	29 % CG	43 % CG
600	122	120	120	120	120	120
700	132	128	128	124	125	121
800	141	137	137	133	133	130
900	149	146	145	141	141	138
1000	158	153	153	149	149	145
1100	165	161	160	156	157	152
1200	173	168	168	163	164	159

Note: For CG between 29 % and 43 %, determine VLS by linear interpolation.

GREEN DOT

Applicable to: ALL

GREEN DOT (KT)				
Weight (1 000 lb)	**Below FL 100**	**FL 200**	**FL 300**	**FL 400**
600	167	168	196	210
700	180	185	213	226
800	194	202	228	240
900	207	222	244	252
1000	217	238	257	252
1100	228	255	272	
1200	238	266	282	

VLS CONF 0

Applicable to: ALL

FL 0 / FL 100 / FL 150 / FL 200/ FL 250 / FL 300

VLS CONF 0 (KT)						
Weight (1 000 lb)	**FL 0**	**FL 100**	**FL 150**	**FL 200**	**FL 250**	**FL 300**
600	155	155	155	156	160	165
700	168	168	168	171	178	180
800	179	179	181	187	191	195
900	190	191	195	201	205	210
1000	200	203	210	213	218	225
1100	210	216	222	226	231	239
1200	219	229	233	238	244	254

FL 320 / FL 340 / FL 360 / FL 400 / FL 430

VLS CONF 0 (KT)						
Weight (1 000 lb)	**FL 320**	**FL 340**	**FL 360**	**FL 380**	**FL 400**	**FL 430**
600	166	168	169	171	174	178
700	182	184	186	189	192	198
800	197	200	203	207	211	211
900	213	216	220	224	224	227
1000	228	233	236	236	236	
1100	244	247	247	247	250	
1200	258	258	257	262		

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PERFORMANCE

OPERATING DATA

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ATMO Module Interface (True altitude for high altitude use) ..... A

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ATMO Module Interface (Low altitude temperature corrections) ..... A

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PER-OPD-CDTTA Conditions (True altitude for high altitude use)

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PER-OPD-SDSC Specific Data (Speed conversions)

SPECIFIC DATA Panel ..... A
Computation Type ..... B
Speed Type C
Indicated Altitude ..... D
Airport Elevation ..... E

PER-OPD-SDTA Specific Data (True altitude for high altitude use)

SPECIFIC DATA Panel ..... A
Computation Type ..... B
Altitude Type C
Indicated Altitude ..... D
Airport Elevation ..... E

PER-OPD-SDLA Specific Data (Low altitude temperature corrections)

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Altitude Type C
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Airport Elevation ..... E
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PER-OPD-ATR Atmosphere Results

Conversions ..... A
ISA Information ..... B
Low Altitude Temperature Corrections C

IN-FLT PERF APPLICATION - ATMO MODULE

Applicable to: ALL

The IN-FLT PERF application is made of 6 modules (CLB, CRZ, DES, HLD, PLAN and ATMO).

The ATMO module provides the flight crew with a means to convert speeds and to consult ISA tables for:

- Given meteorological conditions
- A given standard aircraft configuration.

The main results of this module are:

- Speed conversions
- True altitude for high altitude use
- Low altitude temperature corrections
- ISA information.

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ATMO MODULE INTERFACE (SPEED CONVERSIONS)

Applicable to: ALL

IN-FLT PERF ATMO Module Interface



CONDITIONS

The flight crew can define the current outside conditions.
For more information about the CONDITIONS panel, *Refer to PER-OPD-CDTSC CONDITIONS Panel* .

SPECIFIC DATA

The flight crew can define the specific data needed for the computation of the operating data.
For more information about the SPECIFIC DATA panel, *Refer to PER-OPD-SDSC SPECIFIC DATA Panel* .

AIRCRAFT STATUS

Do not perform ATMO calculation with NSC items or CDL items.

ATMO module calculations:
- Do not take into account Non Standard Configurations (NSC)
- Fail when the flight crew selects a CDL item.

RESULTS

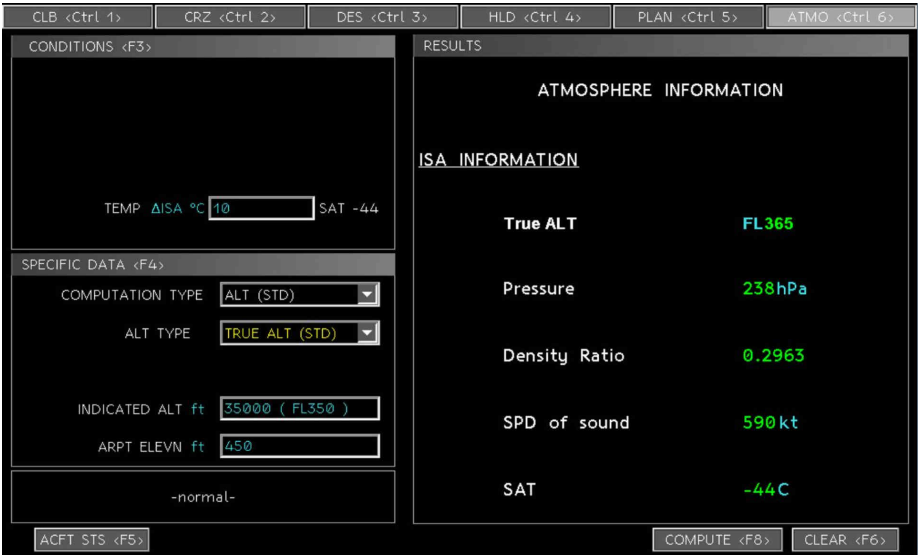
The RESULTS panel displays:

- Conversions
  For more information about the Conversions, *Refer to Atmosphere Results - Conversions*
- ISA Information.
  For more information about the ISA Information, *Refer to Atmosphere Results - ISA Information*

ATMO MODULE INTERFACE (TRUE ALTITUDE FOR HIGH ALTITUDE USE)

Applicable to: ALL

IN-FLT PERF ATMO Module Interface



CONDITIONS

The flight crew can define the current outside conditions.
For more information about the CONDITIONS panel, *Refer to PER-OPD-CDTTA CONDITIONS Panel* .

SPECIFIC DATA

The flight crew can define the specific data needed for the computation of the operating data.
For more information about the SPECIFIC DATA panel, *Refer to PER-OPD-SDTA SPECIFIC DATA Panel* .

AIRCRAFT STATUS

Do not perform ATMO calculation with NSC items or CDL items.

ATMO module calculations:
- Do not take into account Non Standard Configurations (NSC)
- Fail when the flight crew selects a CDL item.

RESULTS

The RESULTS panel displays ISA Information.
For more information about the ISA Information, refer to *Refer to Atmosphere Results - ISA Information* .

ATMO MODULE INTERFACE (LOW ALTITUDE TEMPERATURE CORRECTIONS)

Applicable to: ALL

IN-FLT PERF ATMO Module Interface



CONDITIONS

No outside conditions are necessary to compute the low altitude temperature corrections.

SPECIFIC DATA

The flight crew can define the specific data needed for the computation of the operating data. For more information about the SPECIFIC DATA panel, *Refer to PER-OPD-SDLA SPECIFIC DATA Panel* .

AIRCRAFT STATUS

Do not perform ATMO calculation with NSC items or CDL items.

ATMO module calculations:
- Do not take into account Non Standard Configurations (NSC)
- Fail when the flight crew selects a CDL item.

RESULTS

The RESULTS panel displays the low altitude temperature corrections.

For more information about the low altitude temperature corrections, refer to *Refer to Atmosphere Results - Low Altitude Temperature Corrections* .

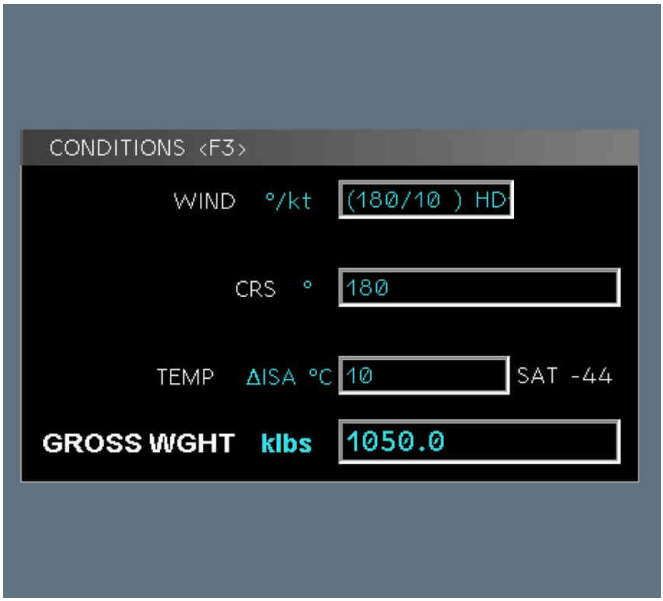
CONDITIONS PANEL

Applicable to: ALL

The CONDITIONS panel provides the following information:

- Wind
- Course
- Temperature (Δ ISA)
- Gross weight.

CONDITIONS Panel



WIND

Applicable to: ALL

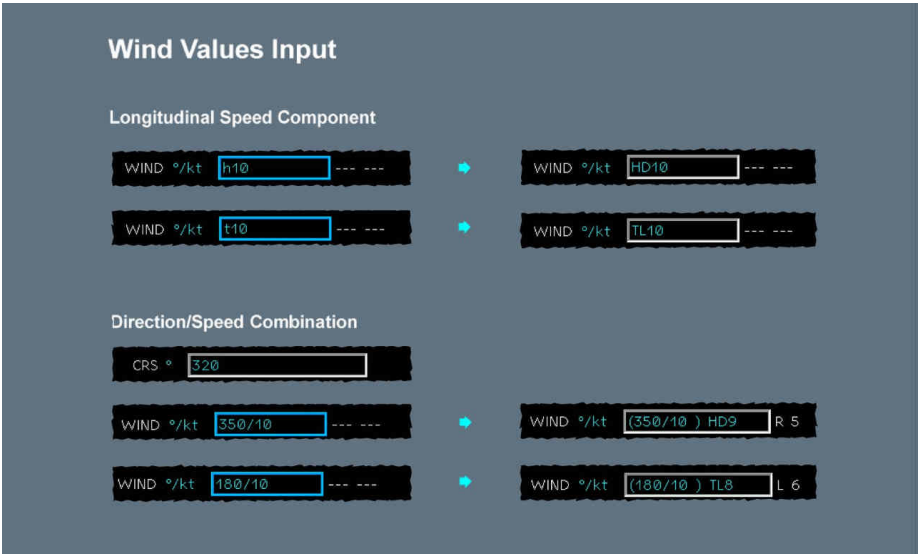
GENERAL

The wind affects the Ground Speed (GS). A tailwind will induce an increase in GS.

ATMO

There are two ways of defining wind values:
- Longitudinal Speed Component
- Direction/Speed Combination.

Wind Values Input



LONGITUDINAL SPEED COMPONENT

It is possible to directly enter a longitudinal wind component.
The flight crew can use the codes “H” for a headwind and “T” for a tailwind.
The flight crew can also use the codes “HD” for a headwind and “TL” for a tailwind.

DIRECTION/SPEED COMBINATION

The flight crew can enter the combination of a direction and a speed.
The entry is projected along the course and perpendicular to the course.
The longitudinal projection follows the same display rules as the speed entry.

Crosswind is displayed as:
- R, if it comes from the right, or
- L, if it comes from the left.

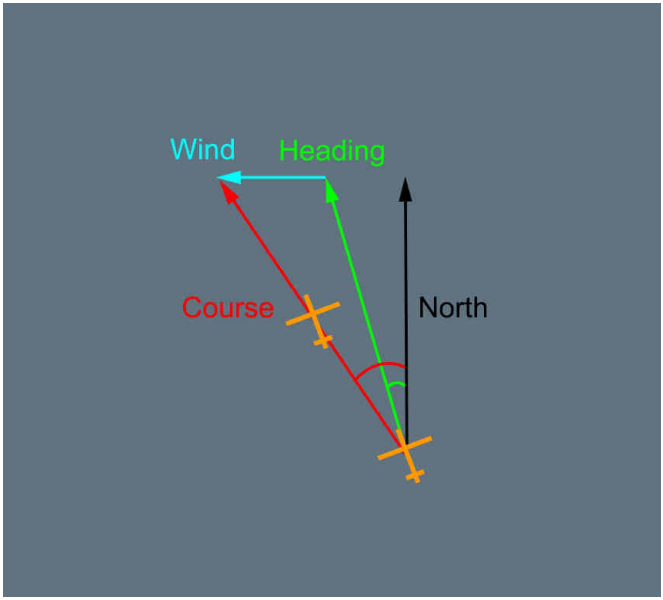
COURSE

Applicable to: ALL

GENERAL

The course defines the axis on which the wind is projected.

Course Definition



ATMO

The CRS field is only displayed if a wind has been entered in a combination of a direction and a speed.

L2 For more information about the wind, *Refer to PER-OPD-CDTSC Wind* .

TEMPERATURE

Applicable to: ALL

GENERAL

An increase in temperature (SAT or ΔISA) leads to:

- A higher True Air Speed (TAS) for the same Calibrated Air Speed (CAS) or Mach

L2 At fixed CAS, TAS is inversely proportional to air density, which decreases with temperature.
At fixed Mach, TAS increases with temperature.

L1 - A higher Ground Speed (GS)

- A higher true altitude at fixed indicated altitude
- A lower density ratio

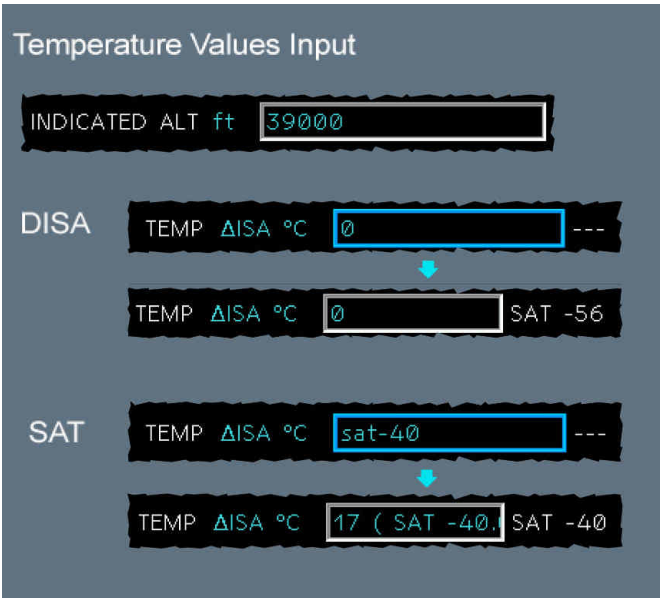
L2 The air density decreases with temperature.

L1 - A higher speed of sound

- A higher Total Air Temperature (TAT).

ATMO

Temperature Values Input



The TEMP field corresponds to a deviation from ISA law (ΔISA).

The flight crew can enter a temperature as:
- A ΔISA, or
- A Static Air Temperature (SAT) at current pressure altitude, which is automatically converted into a ΔISA.

GROSS WEIGHT

Applicable to: ALL

GENERAL

At a fixed pressure altitude, any decrease in weight, due to fuel burn off for example, leads to lower ECON and LRC Mach.

ATMO

The flight crew enters the current aircraft weight.
This gross weight (GROSS WGHT field) must be between the Operating Empty Weight (OEW) and the Maximum Design Takeoff Weight (MTOW).

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CONDITIONS PANEL

Applicable to: ALL

CONDITIONS Panel



GENERAL

An increase in temperature (SAT or ΔISA) leads to:

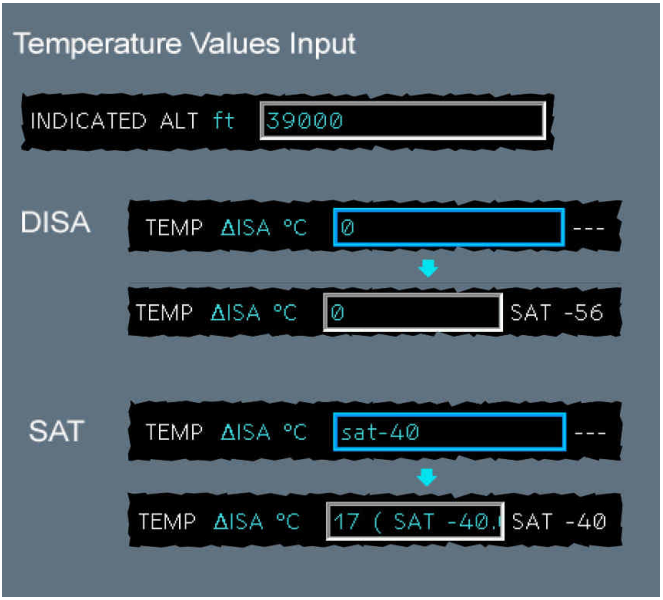
- A higher true altitude at fixed indicated altitude
- A lower density ratio

L2 The air density decreases with temperature.

L1 - A higher speed of sound.

ATMO

Temperature Values Input



The TEMP field corresponds to a deviation from ISA law (ΔISA).

The flight crew can enter a temperature as:
- A ΔISA, or
- A Static Air Temperature (SAT) at current pressure altitude, which is automatically converted into a ΔISA.

SPECIFIC DATA PANEL

Applicable to: ALL

The SPECIFIC DATA panel includes the following information:

- Computation type
- Speed type
- Indicated altitude
- Airport elevation.

SPECIFIC DATA Panel



COMPUTATION TYPE

Applicable to: ALL

The flight crew uses the COMPUTATION TYPE drop-down list to select one of the following computation types:

- SPEED, to compute speed conversions and ISA Information
- ALT (STD), to compute true altitude for high altitude use or low altitude temperature corrections.

SPEED TYPE

Applicable to: ALL

The flight crew uses the SPD TYPE drop-down list to select one of the following speed types:
- Mach
- IAS
- ECON speed based on CI value
- LRC speed.

INDICATED ALTITUDE

Applicable to: ALL

GENERAL

A higher pressure altitude results in:
- A lower pressure
- A lower density ratio

L2 The air density decreases with altitude.

L1 - A lower speed of sound

L2 The speed of sound decreases when temperature decreases.

L1 - A lower SAT below the tropopause and a constant SAT above the tropopause
- A lower TAT at constant Mach.

TRUE AIR SPEED

At fixed CAS, TAS increases with altitude.

At fixed Mach, TAS is proportional to SAT, which:
- Decreases with altitude below the tropopause
- Remains constant above the tropopause.

ECON AND LRC MACH

ECON and LRC Mach increase with pressure altitude.

ATMO

The flight crew enters the pressure altitude.

AIRPORT ELEVATION

Applicable to: ALL

GENERAL

The elevation of the intended airport impacts the true altitude if there is deviation from ISA law.
For a positive ΔISA, a higher elevation of the intended airport results in a lower true altitude.
For a negative ΔISA, a higher elevation of the intended airport results in a higher true altitude.

ATMO

The flight crew enters the elevation of the intended airport.
For high altitude use, the flight crew may enter 0.

Intentionally left blank

SPECIFIC DATA PANEL

Applicable to: ALL

The SPECIFIC DATA panel includes the following information:

- Computation type
- Altitude type
- Indicated altitude
- Airport elevation.

SPECIFIC DATA Panel



COMPUTATION TYPE

Applicable to: ALL

The flight crew uses the COMPUTATION TYPE drop-down list to select one of the following computation types:

- SPEED, to compute speed conversions and ISA Information
- ALT (STD), to compute true altitude for high altitude use or low altitude temperature corrections.

ALTITUDE TYPE

Applicable to: ALL

The flight crew uses the ALT TYPE drop-down list to select one of the following altitude types:
- TRUE ALT (STD), to compute true altitude for high altitude use
- LO ALT TEMP CORR, to compute low altitude temperature corrections.

INDICATED ALTITUDE

Applicable to: ALL

GENERAL

A higher pressure altitude results in:
- A lower pressure
- A lower density ratio

L2 The air density decreases with altitude.

L1 - A lower speed of sound

L2 The speed of sound decreases when temperature decreases.

L1 - A lower SAT below the tropopause and a constant SAT above the tropopause.

ATMO

The flight crew enters the pressure altitude.

AIRPORT ELEVATION

Applicable to: ALL

GENERAL

The elevation of the intended airport impacts the true altitude if there is deviation from ISA law.
For a positive ΔISA, a higher elevation of the intended airport results in a lower true altitude.
For a negative ΔISA, a higher elevation of the intended airport results in a higher true altitude.

ATMO

The flight crew enters the elevation of the intended airport.
For high altitude use, the flight crew may enter 0.

SPECIFIC DATA PANEL

Applicable to: ALL

The SPECIFIC DATA panel includes the following information:

- Computation type
- Altitude type
- Height above airport elevation
- Airport elevation
- Airport temperature.

SPECIFIC DATA Panel



COMPUTATION TYPE

Applicable to: ALL

The flight crew uses the COMPUTATION TYPE drop-down list to select one of the following computation types:

- SPEED, to compute speed conversions and ISA Information
- ALT (STD), to compute true altitude for high altitude use or low altitude temperature corrections.

ALTITUDE TYPE

Applicable to: ALL

The flight crew uses the ALT TYPE drop-down list to select one of the following altitude types:
- TRUE ALT (STD), to compute true altitude for high altitude use
- LO ALT TEMP CORR, to compute low altitude temperature corrections.

HEIGHT ABOVE AIRPORT LEVEL

Applicable to: ALL

GENERAL

The Height Above the Airport Level (HGT AAL) is a minimum promulgated height above the elevation of the altimeter setting.
At the same airport temperature, the higher the HGT AAL, the higher the altitude correction to add to the minimum promulgated height.

ATMO

The flight crew enters the HGT AAL.

AIRPORT ELEVATION

Applicable to: ALL

GENERAL

A higher airport elevation results in a slightly lower altitude correction.

ATMO

The flight crew enters the elevation of the intended airport.

AIRPORT TEMPERATURE

Applicable to: ALL

GENERAL

A decrease in temperature leads to a higher altitude correction.

ATMO

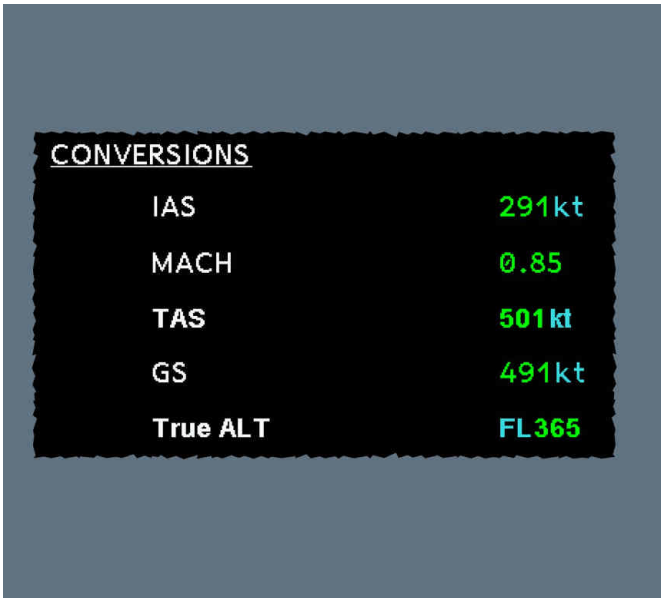
The flight crew enters the Outside Air Temperature (OAT) at the intended airport.

CONVERSIONS

Applicable to: ALL

The CONVERSIONS subpanel provides the essential information for the conversion of typical operating speeds and altitudes.

CONVERSIONS Subpanel



IAS

This value is the instantaneous Indicated Air Speed (IAS) for current conditions.

MACH

This value is the instantaneous Mach number for current conditions.

TAS

This value is the instantaneous True Air Speed (TAS) for current conditions.

GS

This value is the instantaneous Ground Speed (GS) for current conditions.

TRUE ALT

This value is the true altitude of the airplane for current conditions.

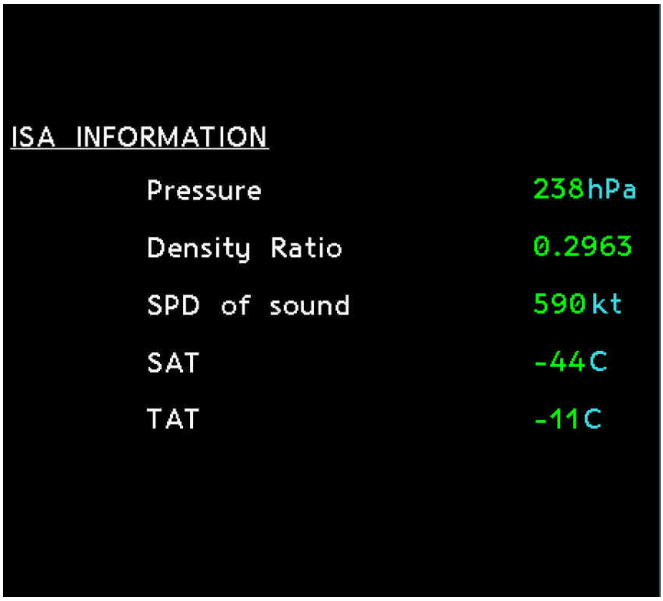
ISA INFORMATION

Applicable to: ALL

SPEED COMPUTATION TYPE

The ISA INFORMATION subpanel provides the essential information on atmospheric data.

ISA INFORMATION Subpanel



PRESSURE

This value is the standard pressure for current conditions.

DENSITY RATIO

This value is the standard density ratio for current conditions.

SPD OF SOUND

This value is the speed of sound for current conditions.

SAT

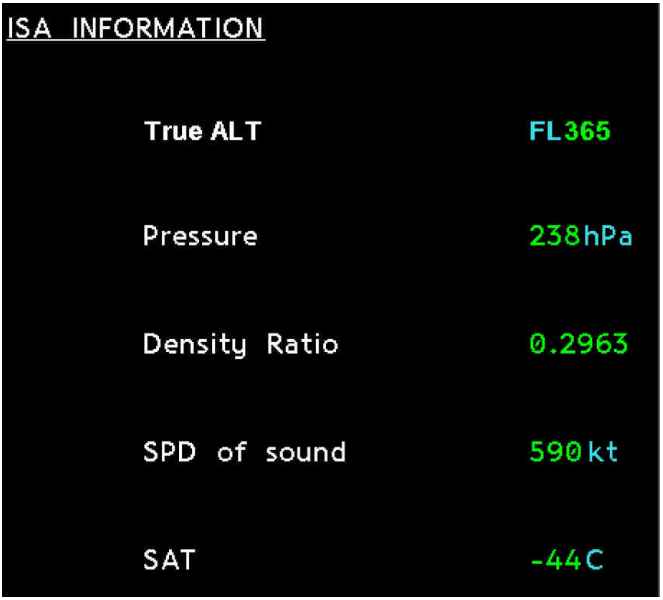
This value is the Static Air Temperature (SAT) for current conditions.

TAT

This value is the Total Air Temperature (TAT) for current conditions.

TRUE ALT

ISA INFORMATION Subpanel



TRUE ALT

This value is the true altitude of the airplane for current conditions.

PRESSURE

This value is the standard pressure for current conditions.

DENSITY RATIO

This value is the standard density ratio for current conditions.

SPD OF SOUND

This value is the speed of sound for current conditions.

SAT

This value is the Static Air Temperature (SAT) for current conditions.

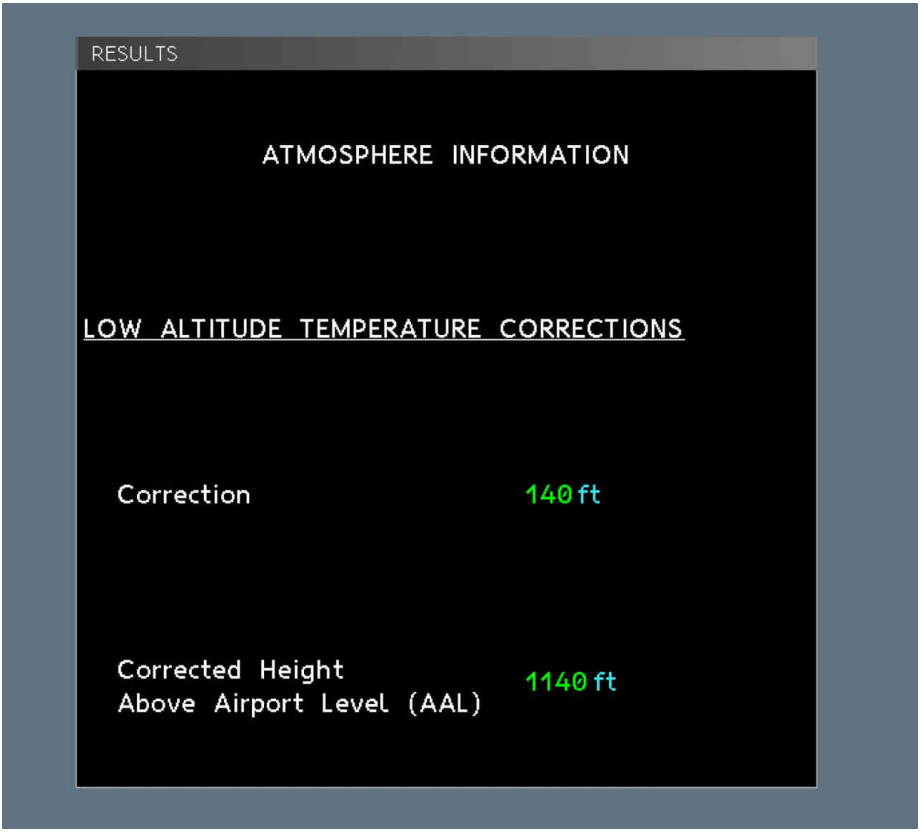
LOW ALTITUDE TEMPERATURE CORRECTIONS

Applicable to: ALL

The RESULTS panel provides:

- Correction: The altitude correction to add to the minimum promulgated height. This altitude correction for low altitude use is the consequence of the low airport temperature
- Corrected Height Above Airport Level (AAL): The minimum promulgated height + Correction.

RESULTS Panel



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PERFORMANCE

LOAD CONTROL

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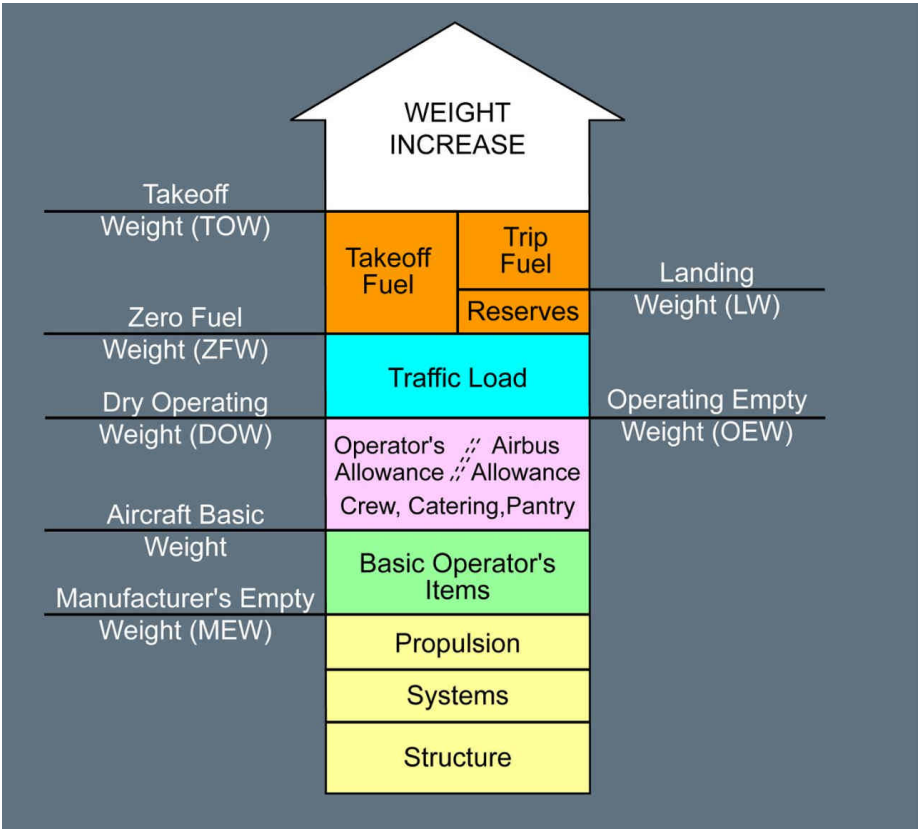
WEIGHTS

Applicable to: ALL

Weights



MANUFACTURER'S EMPTY WEIGHT (MEW)

Manufacturer's Empty Weight (MEW) refers to the weight of the aircraft structure, power plant, furnishings, systems and other items of equipment that are considered as part of the manufacturer's aircraft. MEW includes fluids contained in closed systems (e.g. hydraulic fluid).

AIRCRAFT BASIC WEIGHT

Aircraft basic weight refers to the MEW plus basic Operator items, that are on board the aircraft for every flight. Basic Operator items include unusable fuel, engine oil, emergency equipment, toilet chemicals and fluids, galley structure, seats and documentation, etc.

OPERATING EMPTY WEIGHT (OEW)

Operating Empty Weight (OEW) refers to the basic weight of the aircraft, plus any items specific to the flight (e.g. catering, water, cabin crew, miscellaneous), also referred to as variable Operator items. Airbus defines a standard weight for these variable Operator items. The OEW is published in the aircraft Wheighing Report. The OEW is not used as an operational weight.

DRY OPERATING WEIGHT (DOW)

The Dry Operating Weight (DOW) refers to the basic weight of the aircraft, plus any items specific to the flight (e.g. catering, water, cabin crew, miscellaneous), also referred to as variable Operator items. The Operator defines the actual weight of these variable Operator items for each flight. This weight is the starting weight of the load and trim sheet for a specific flight.

T.O FUEL

Takeoff fuel weight is the weight of the fuel on board the aircraft at takeoff. T.O fuel weight refers to the weight of the Fuel On Board (FOB) at the gate, minus taxi fuel

OPERATING WEIGHT

Operating weight is the weight obtained by adding the DOW and the T.O fuel weight. Ground personnel use the operating weight in the load message, in order to determine the underload.

TOTAL TRAFFIC LOAD

Total traffic load is the weight of the payload including cargo loads, passengers and baggage of passengers.

TRIP FUEL

Trip fuel weight is the weight of the fuel necessary to fly from departure to destination, without fuel reserves. Trip fuel is equal to T.O fuel minus the fuel reserves.

ZERO FUEL WEIGHT (ZFW)

Zero Fuel Weight (ZFW) is the weight obtained by adding the DOW and the total traffic load weight. The flight crew must check that the ZFW is below MZFW and above the minimum weight (the lowest weight displayed in the CG diagram). The MZFW depends on the CG.

The MZFW may be reduced, depending on:
- Loading

- MEL items.

TAKEOFF WEIGHT (TOW)

Takeoff Weight (TOW) is the total weight of the aircraft at takeoff, it is obtained by adding the ZFW and the T.O fuel weight. The flight crew must check that the TOW is below MTOW.

The MTOW may be reduced, depending on:
- Takeoff performance
- MEL items.

LANDING WEIGHT (LW)

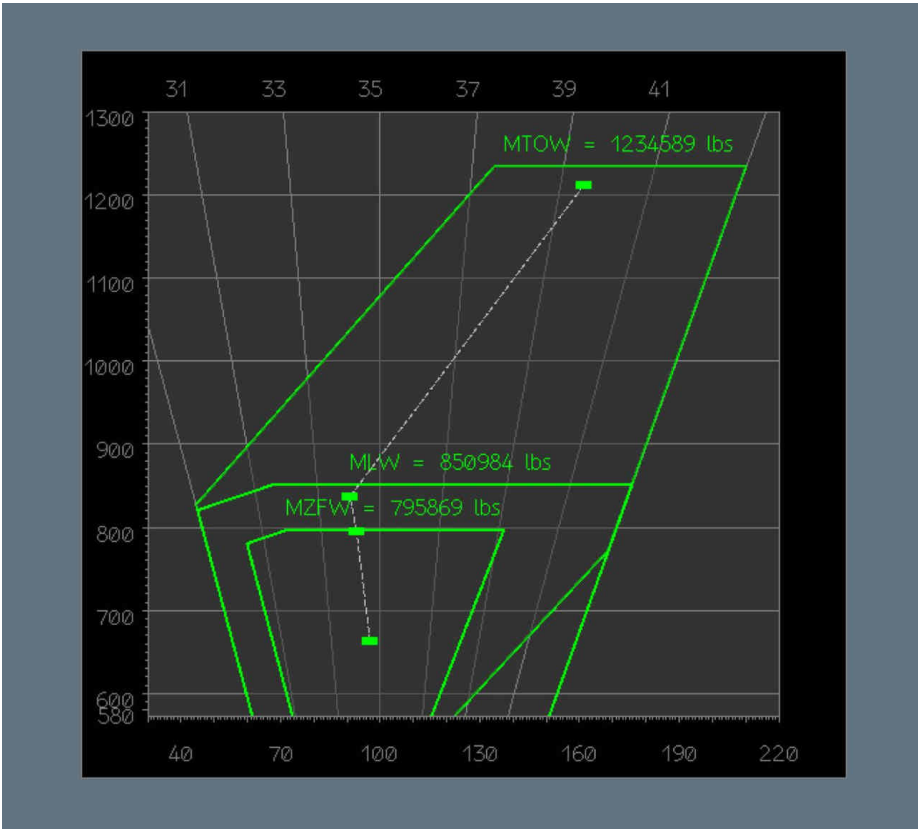
Landing Weight (LW) is the total weight of the aircraft at landing. It is equal to the TOW minus trip fuel. The flight crew must check that the LW is below MLW. The MLW depends on the CG.

The MLW may be reduced, depending on:
- Loading
- Landing performance
- MEL items.

CGS

Applicable to: ALL

CG Diagram



For each flight, the flight crew must check that the ZFW/CG, TOW/CG, and LW/CG do not exceed the corresponding operational CG envelopes.

LOADSHEET APPLICATION

Applicable to: ALL

The loadsheet application computes aircraft weights and corresponding CG positions before dispatch.

Two modes of data entry are available:
- Detailed: Requires all aircraft loading entries (variable Operator items, payload, fuel), and is used as an electronic load and trim sheet
- Reduced: Uses ZFW/CG (computed by the ground) and fuel data to compute TOW/CG and LW/CG.

LOADSHEET APPLICATION PARAMETERS (REDUCED MODE)

Applicable to: ALL

In reduced mode, the flight crew must enter the following parameters:
- Aircraft configuration, by selecting the appropriate configuration code
- MTOW/MLW, in the case of a weight restriction due to MEL items
- ZFW/CG, in order to define aircraft loading
- Fuel On Board (FOB)
- Trip Fuel
- Taxi Fuel, if necessary
- Fuel Density, if necessary.

In reduced mode, the flight crew can enter the following parameters:
- LMC, in order to define the final ZFW/CG with additional passengers and cargo, either:
  - As a total weight (total), or
  - In detail (distributed).
- Trim tank quantity (in trim adjustment mode)
- Fuel weight per tank (in manual distribution mode).

LOADSHEET APPLICATION PARAMETERS (DETAILED MODE)

Applicable to: ALL

In detailed mode, the flight crew must enter the following parameters:

- Aircraft configuration, by selecting the configuration code and defining the variable Operator items. These items define the DOW/CG by adding crew, catering and the additional items to the predefined aircraft basic weight
- MTOW/MLW, in the case of a weight restriction due to MEL items
- Payload (passengers and cargo) and its distribution, in order to define the ZFW/CG by adding payload and DOW
- Fuel On Board (FOB)
- Trip Fuel
- Taxi Fuel, if necessary
- Fuel Density, if necessary.

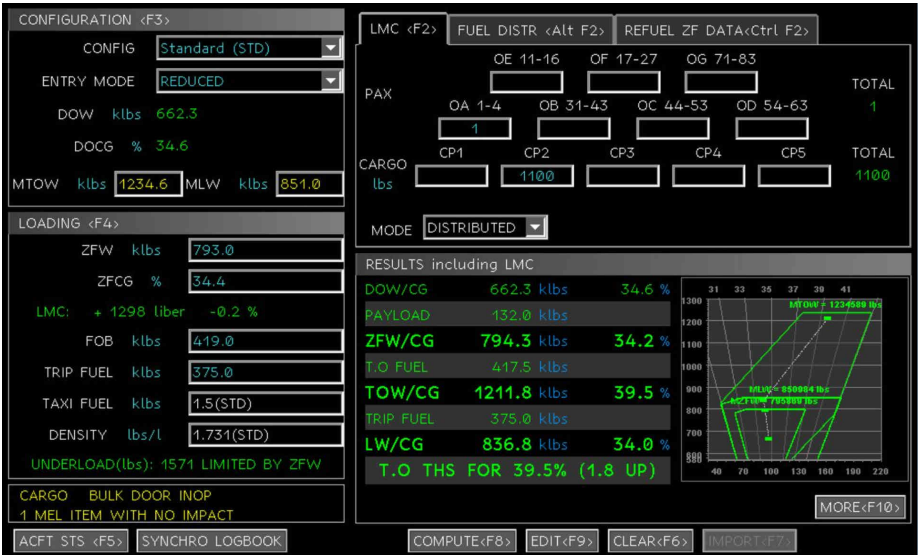
In detailed mode, the flight crew can enter the following parameters:

- Trim tank quantity (in trim adjustment mode)
- Fuel weight per tank (in manual distribution mode).

LOADSHEET APPLICATION INTERFACE (REDUCED MODE)

Applicable to: ALL

Loadsheet Application Interface



CONFIGURATION

The CONFIGURATION panel displays the configuration code, the entry mode, the DOW / DOCG , and the MTOW / MLW for the flight.

For more information about the CONFIGURATION panel,

- *Refer to PER-LOD-LAI-ACRO Aircraft Configuration Panel (Reduced Mode Only) - "Direct DOW/CG in Reduced Mode" Disabled* , or
- *Refer to PER-LOD-LAI-ACRO Aircraft Configuration Panel (Reduced Mode Only) - "Direct DOW/CG in Reduced Mode" Enabled* , or
- *Refer to PER-LOD-LAI-ACRD Aircraft Configuration Panel (Reduced Mode plus Detailed Mode) - "Direct DOW/CG in Detailed Mode" Disabled* , or
- *Refer to PER-LOD-LAI-ACRD Aircraft Configuration Panel (Reduced Mode plus Detailed Mode) - "Direct DOW/CG in Detailed Mode" Enabled* .

LOADING

The LOADING panel displays the loading of the aircraft entered by the flight crew:

ZFW / CG

The flight crew must enter the ZFW and ZFCG .

FUEL

The flight crew must enter the following fuel quantities:
- Fuel On Board (FOB)
- Trip fuel
- Taxi fuel, if necessary
- Fuel density, if necessary.

For more information about the fuel, *Refer to Fuel - Loading Section* .

DISTRIBUTION

These panels display the payload and fuel distribution information:

LMC

The flight crew can enter the Last Minute Changes (LMC).
For more information about the LMC , *Refer to PER-LOD-LAI-PRM Last Minute Changes (LMC)* .

FUEL DISTRIBUTION

After computation, this subpanel displays the predicted fuel distribution.
The flight crew can enter the detailed fuel distribution between tanks.
For more information about the fuel distribution, *Refer to Fuel - Distribution Section* .

REFUEL ZF DATA

The flight crew selects the ZFW / CG values to be used to compute the predicted fuel distribution according to the CG targeting logic.
For more information about the refuel ZF data, *Refer to PER-LOD-LAI-FUL REFUEL ZF DATA Panel* .

AIRCRAFT STATUS

The flight crew can select MEL items impacting loading capabilities.
For more information about the aircraft status, *Refer to PER-LOD-ACS AIRCRAFT STATUS Panel* .

SYNCHRO LOGBOOK

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.
For more information about the SYNCHRO LOGBOOK function, *Refer to PER-LOD-ACS Synchronization with Logbook* .

RESULTS

The RESULTS panel displays the results of the weight and balance computation.
For more information about the results of the computation, *Refer to PER-LOD-LAO RESULTS Panel* .

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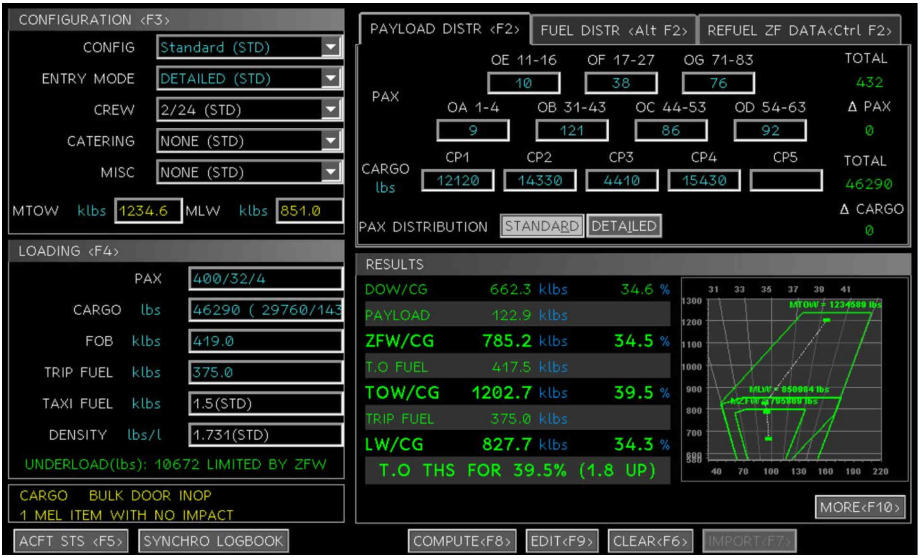
LOADSHEET APPLICATION INTERFACE (DETAILED MODE)

Applicable to: ALL

Loadsheet Application Interface



CONFIGURATION

The CONFIGURATION panel displays the aircraft configuration.
The flight crew can enter, if necessary, the crew composition, the catering and the additional loaded items part of the DOW / CG definition. The flight crew can also enter directly the DOW / DOCG .

For more information about the CONFIGURATION panel,

- *Refer to PER-LOD-LAI-ACDO Aircraft Configuration Panel (Detailed Mode Only)* , or
- *Refer to PER-LOD-LAI-ACRD Aircraft Configuration Panel (Reduced Mode plus Detailed Mode) - "Direct DOW/CG in Detailed Mode" Disabled* , or
- *Refer to PER-LOD-LAI-ACRD Aircraft Configuration Panel (Reduced Mode plus Detailed Mode) - "Direct DOW/CG in Detailed Mode" Enabled* .

LOADING

The LOADING panel displays the loading of the aircraft entered by the flight crew:

PAYLOAD

The flight crew must enter the pax and cargo.
For more information about the payload, *Refer to Payload - Loading Section* .

FUEL

The flight crew must enter the following fuel quantities:
- Fuel On Board (FOB)
- Trip fuel
- Taxi fuel, if necessary
- Fuel density, if necessary.

For more information about the fuel, *Refer to Fuel - Loading Section* .

DISTRIBUTION

These panels display the payload and fuel distribution information:

PAYLOAD DISTRIBUTION

The flight crew enters the payload distribution.
For more information about the payload distribution, *Refer to Payload - Distribution Section* .

FUEL DISTRIBUTION

This subpanel displays the fuel distribution.
The flight crew can enter the detailed fuel distribution between tanks.
For more information about the fuel distribution, *Refer to Fuel - Distribution Section* .

REFUEL ZF DATA

The flight crew can select the ZFW / CG values used to compute the fuel distribution according to the CG targeting logic.
For more information about the refuel ZF data, *Refer to PER-LOD-LAI-FUL REFUEL ZF DATA Panel* .

AIRCRAFT STATUS

The flight crew can select MEL items impacting loading capabilities.
For more information about the aircraft status, *Refer to PER-LOD-ACS AIRCRAFT STATUS Panel* .

SYNCHRO LOGBOOK

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RESULTS

The RESULTS panel displays the results of the weight and balance computation.
For more information about the results of the computation, *Refer to PER-LOD-LAO RESULTS Panel* .

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AIRCRAFT CONFIGURATION PANEL (REDUCED MODE ONLY) - "DIRECT DOW/CG IN REDUCED MODE" DISABLED

Applicable to: ALL

The CONFIGURATION panel includes the following information:

- Configuration
- DOW
- DOCG
- MTOW
- MLW.

Aircraft Configuration Panel



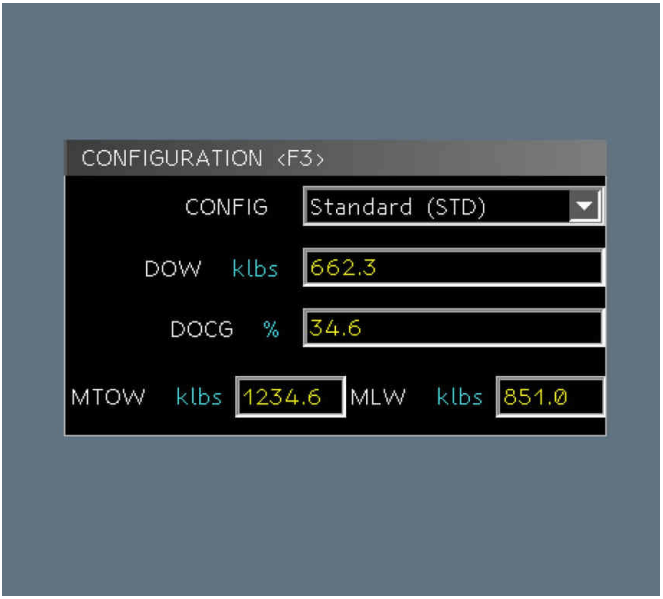
AIRCRAFT CONFIGURATION PANEL (REDUCED MODE ONLY) - "DIRECT DOW/CG IN REDUCED MODE" ENABLED

Applicable to: ALL

The CONFIGURATION panel includes the following information:

- Configuration
- DOW
- DOCG
- MTOW
- MLW.

Aircraft Configuration Panel



CONFIGURATION

Applicable to: ALL

The CONFIG drop down list enables the flight crew to select the applicable configuration. The following parameters will automatically be updated accordingly:

- Basic Weight
- Passenger average weight
- Aircraft CG limits
- User interface.

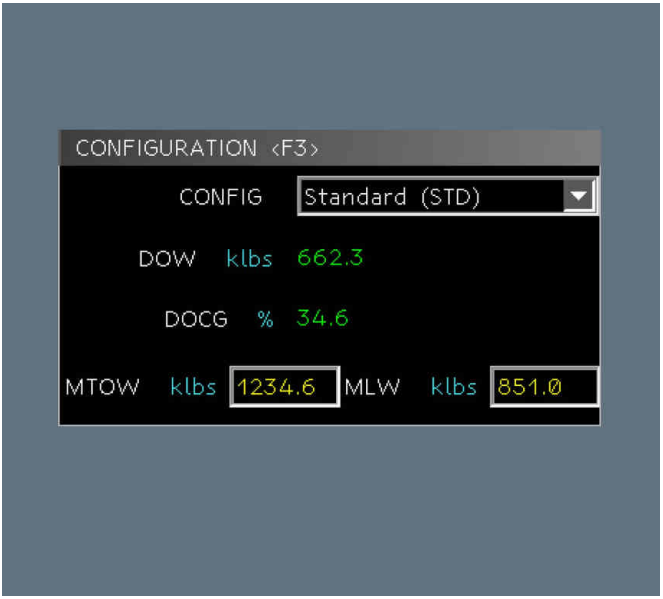
If more than one configuration is defined, the flight crew must select the configuration that is applicable to the current flight.

DOW/DOCG - "DIRECT DOW/CG IN REDUCED MODE" DISABLED

Applicable to: ALL

The DOW and DOCG fields display the default Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG). The flight crew cannot modify the default DOW and DOCG. The values appear in green.

CONFIGURATION Panel



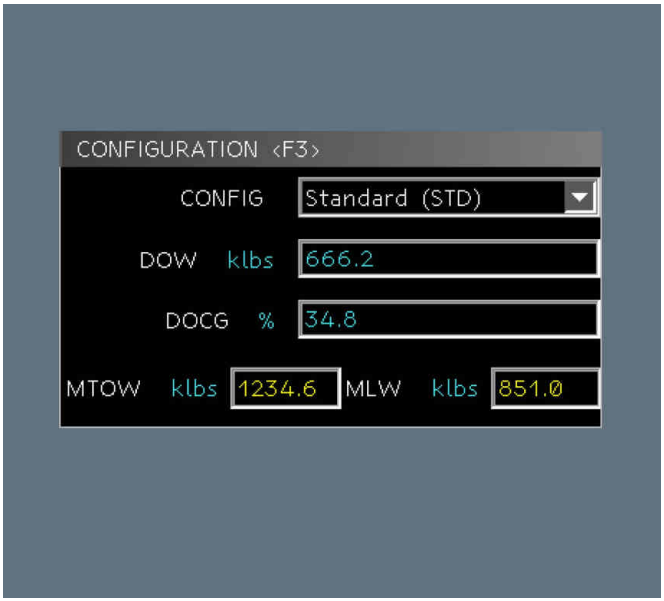
Note: After the computation, the DOW and DOCG values also appear on the RESULTS panel.

DOW/DOCG - "DIRECT DOW/CG IN REDUCED MODE" ENABLED

Applicable to: ALL

The flight crew directly enters the Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG). The DOW and DOCG values appear in cyan.

CONFIGURATION Panel



Note: *After the computation, the DOW and DOCG values also appear on the RESULTS panel.*

MTOW

Applicable to: ALL

The MTOW field displays the weight that limits the loading. The MTOW is the minimum of:
- Maximum structural takeoff weight
- Maximum weight selected for the flight, in the case of multiple weight variants
- Maximum performance limited takeoff weight (MTOW(perf))
- MEL/CDL limited weight.

The flight crew can update the MTOW, but the weight cannot be above the Maximum Structural Takeoff Weight (MSTOW).

COMMUNICATION FROM T.O PERF TO LOADSHEET

When the MTOW value is displayed in yellow, it means that this value is retrieved from T.O PERF and corresponds to the MTOW(perf).

MLW

Applicable to: ALL

The MLW field displays the weight that limits the loading. The MLW is the minimum of:
- Maximum structural landing weight
- Maximum weight selected for the flight, in the case of multiple weight variants
- Maximum performance limited landing weight (MLW(perf))
- MEL/CDL limited weight.

The flight crew can update the MLW, but the weight cannot be above the Maximum Structural Landing Weight (MSLW).

COMMUNICATION FROM LDG PERF TO LOADSHEET

When the MLW value is displayed in yellow, it means that this value is retrieved from LDG PERF and corresponds to the MLW(perf).

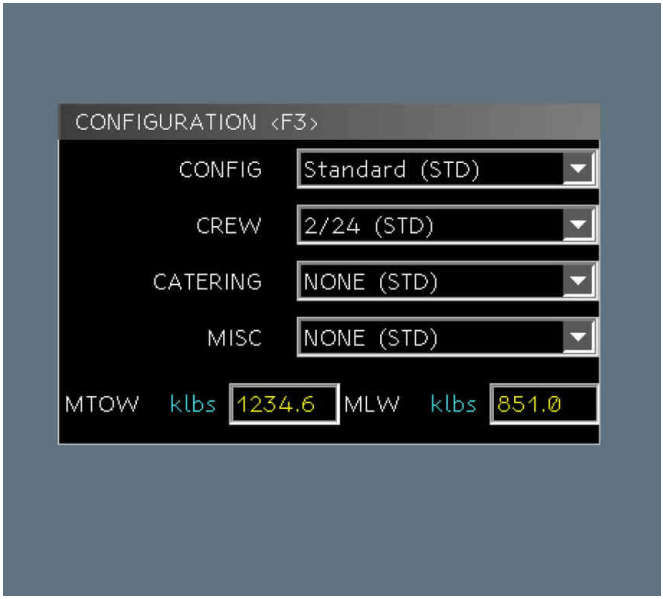
AIRCRAFT CONFIGURATION PANEL (DETAILED MODE ONLY)

Applicable to: ALL

The CONFIGURATION panel includes the following information:

- Configuration
- Crew (flight and cabin crew)
- Catering
- Miscellaneous Items
- MTOW
- MLW.

Aircraft Configuration Panel



CONFIGURATION

Applicable to: ALL

The CONFIG drop down list enables the flight crew to select the applicable configuration. The following parameters will automatically be updated accordingly:

- Basic Weight
- Passenger average weight
- Aircraft CG limits
- User interface.

If more than one configuration is defined, the flight crew must select the configuration that is applicable to the current flight.

CREW

Applicable to: ALL

The flight crew can select the applicable crew composition (flight crew and cabin crew). The crew composition weight is added to the aircraft basic weight contributing to DOW/CG calculation.

Note: *If CREW input is not available, a basic crew configuration is considered and the appropriate weight is included in the aircraft basic weight.*

CATERING

Applicable to: ALL

The flight crew can select the code corresponding to the catering currently loaded in the aircraft, or directly enter the catering weight per galley section. The catering weight is added to the aircraft basic weight contributing to DOW/CG definition.

MISCELLANEOUS ITEMS

Applicable to: ALL

Miscellaneous Items



If available, the flight crew can add the weight of any additional item (in addition to crew or catering) that needs to be taken into account in the DOW/CG calculation. The flight crew can select these items from a predefined list, or manually enter the weight and position of the item (e.g. H-arm). In this section, the flight crew can define up to 5 MISC items.

DOW/DOCG

Applicable to: ALL

The Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG) are computed by adding the predefined basic weight of the aircraft to the flight crew input for flight and cabin crew, catering and miscellaneous items.
The DOW and DOCG values appear on the RESULTS panel.

MTOW

Applicable to: ALL

The MTOW field displays the weight that limits the loading. The MTOW is the minimum of:
- Maximum structural takeoff weight
- Maximum weight selected for the flight, in the case of multiple weight variants
- Maximum performance limited takeoff weight (MTOW(perf))
- MEL/CDL limited weight.

The flight crew can update the MTOW, but the weight cannot be above the Maximum Structural Takeoff Weight (MSTOW).

COMMUNICATION FROM T.O PERF TO LOADSHEET

When the MTOW value is displayed in yellow, it means that this value is retrieved from T.O PERF and corresponds to the MTOW(perf).

MLW

Applicable to: ALL

The MLW field displays the weight that limits the loading. The MLW is the minimum of:
- Maximum structural landing weight
- Maximum weight selected for the flight, in the case of multiple weight variants
- Maximum performance limited landing weight (MLW(perfo))
- MEL/CDL limited weight.

The flight crew can update the MLW, but the weight cannot be above the Maximum Structural Landing Weight (MSLW).

COMMUNICATION FROM LDG PERF TO LOADSHEET

When the MLW value is displayed in yellow, it means that this value is retrieved from LDG PERF and corresponds to the MLW(perf).

AIRCRAFT CONFIGURATION PANEL (REDUCED MODE PLUS DETAILED MODE) - "DIRECT DOW/CG IN DETAILED MODE" DISABLED

Applicable to: ALL

REDUCED ENTRY MODE

The CONFIGURATION panel includes the following information:
- Configuration
- Entry Mode
- DOW
- DOCG
- MTOW
- MLW.

Aircraft Configuration Panel - REDUCED Entry Mode

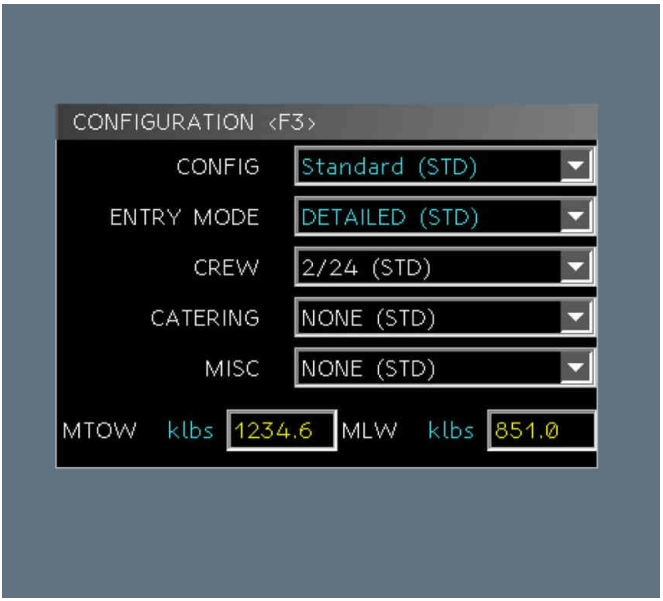


DETAILED (STD) ENTRY MODE

The CONFIGURATION panel includes the following information:
- Configuration
- Entry Mode
- Crew (flight and cabin crew)

- Catering
- Miscellaneous Items
- MTOW
- MLW.

Aircraft Configuration Panel - DETAILED (STD) Entry Mode



AIRCRAFT CONFIGURATION PANEL (REDUCED MODE PLUS DETAILED MODE) - "DIRECT DOW/CG IN DETAILED MODE" ENABLED

Applicable to: ALL

REDUCED ENTRY MODE

The CONFIGURATION panel includes the following information:
- Configuration
- Entry Mode
- DOW
- DOCG
- MTOW
- MLW.

Aircraft Configuration Panel - REDUCED Entry Mode

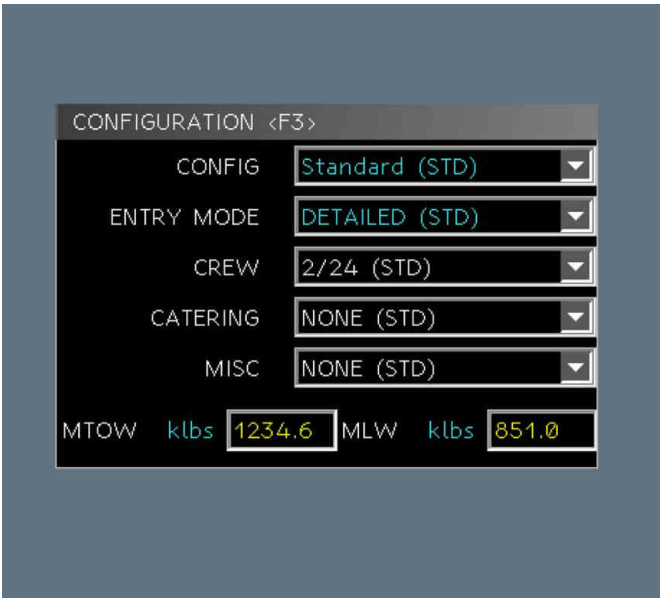


DETAILED (STD) ENTRY MODE

The CONFIGURATION panel includes the following information:
- Configuration
- Entry Mode
- Crew (flight and cabin crew)

- Catering
- Miscellaneous Items
- MTOW
- MLW.

Aircraft Configuration Panel - DETAILED (STD) Entry Mode

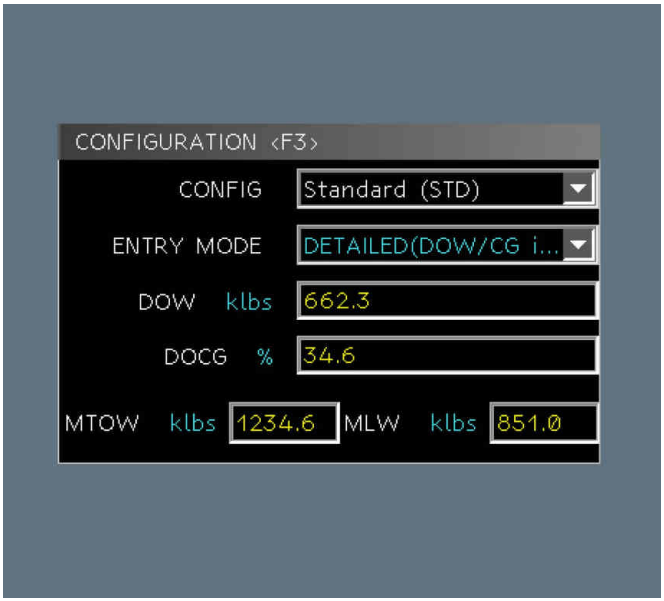


DETAILED (DOW/CG INPUT) ENTRY MODE

The CONFIGURATION panel includes the following information:

- Configuration
- Entry Mode
- DOW
- DOCG
- MTOW
- MLW.

Aircraft Configuration Panel - DETAILED (DOW/CG input) Entry Mode



CONFIGURATION

Applicable to: ALL

The CONFIG drop down list enables the flight crew to select the applicable configuration. The following parameters will automatically be updated accordingly:

- Basic Weight
- Passenger average weight
- Aircraft CG limits
- User interface.

If more than one configuration is defined, the flight crew must select the configuration that is applicable to the current flight.

ENTRY MODE

Applicable to: ALL

The flight crew can change from detailed to reduced mode, and vice versa.
When the flight crew changes the application from detailed mode to reduced mode, all data entered in the loadsheet that is related to payload and variable Operator items, is used to determine the ZFW/CG that will be displayed. However, when the flight crew changes back to detailed mode, data related to payload and variable Operator items is lost.

CREW

Applicable to: ALL

The flight crew can select the applicable crew composition (flight crew and cabin crew). The crew composition weight is added to the aircraft basic weight contributing to DOW/CG calculation.

Note: *If CREW input is not available, a basic crew configuration is considered and the appropriate weight is included in the aircraft basic weight.*

CATERING

Applicable to: ALL

The flight crew can select the code corresponding to the catering currently loaded in the aircraft, or directly enter the catering weight per galley section. The catering weight is added to the aircraft basic weight contributing to DOW/CG definition.

MISCELLANEOUS ITEMS

Applicable to: ALL

Miscellaneous Items



If available, the flight crew can add the weight of any additional item (in addition to crew or catering) that needs to be taken into account in the DOW/CG calculation. The flight crew can select these items from a predefined list, or manually enter the weight and position of the item (e.g. H-arm). In this section, the flight crew can define up to 5 MISC items.

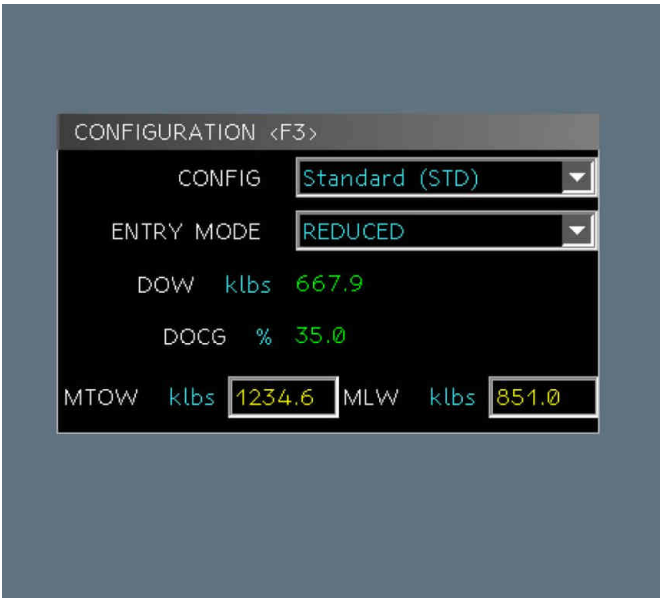
DOW/DOCG - "DIRECT DOW/CG IN DETAILED MODE" DISABLED

Applicable to: ALL

REDUCED ENTRY MODE

The DOW and DOCG fields display the default Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG).

CONFIGURATION Panel - REDUCED Entry Mode

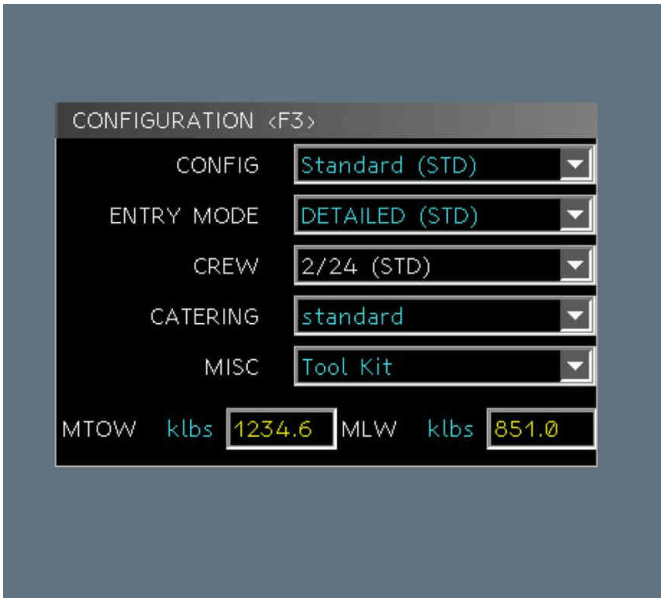


Note: *After the computation, the DOW and DOCG values also appear on the RESULTS panel.*

DETAILED (STD) ENTRY MODE

The Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG) are computed by adding the predefined basic weight of the aircraft to the flight crew input for flight and cabin crew, catering and miscellaneous items.
The flight crew enters the crew composition, the catering and the additional loaded items part of the DOW/CG definition.

CONFIGURATION Panel - DETAILED (STD) Entry Mode



In order to obtain the DOW and DOCG values, the flight crew can:

- Start the computation, or
  After the computation, the DOW and DOCG values also appear on the RESULTS panel.
- Switch to the REDUCED entry mode. The DOW and DOCG values are automatically calculated using the data previously entered in the DETAILED (STD) Entry Mode. The values appear on the CONFIGURATION panel.

DOW/DOCG - "DIRECT DOW/CG IN DETAILED MODE" ENABLED

Applicable to: ALL

REDUCED ENTRY MODE

The DOW and DOCG fields display the default Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG).

CONFIGURATION Panel - REDUCED Entry Mode

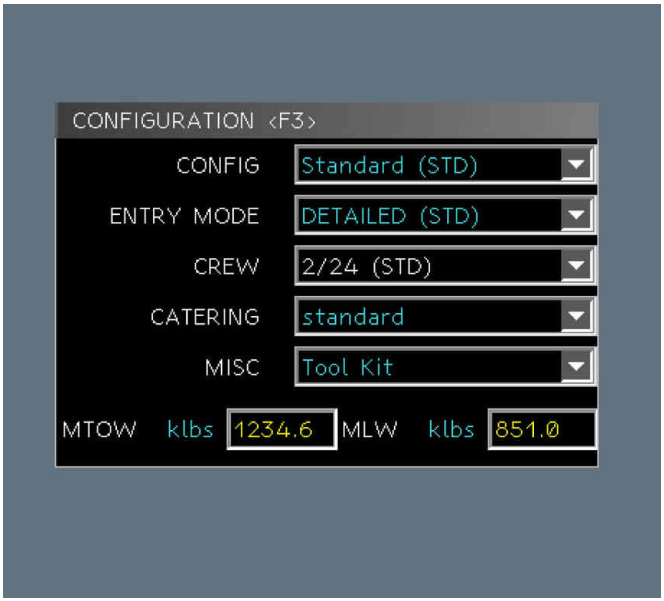


Note: *After the computation, the DOW and DOCG values also appear on the RESULTS panel.*

DETAILED (STD) ENTRY MODE

The Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG) are computed by adding the predefined basic weight of the aircraft to the flight crew input for flight and cabin crew, catering and miscellaneous items.
The flight crew enters the crew composition, the catering and the additional loaded items part of the DOW/CG definition.

CONFIGURATION Panel - DETAILED (STD) Entry Mode



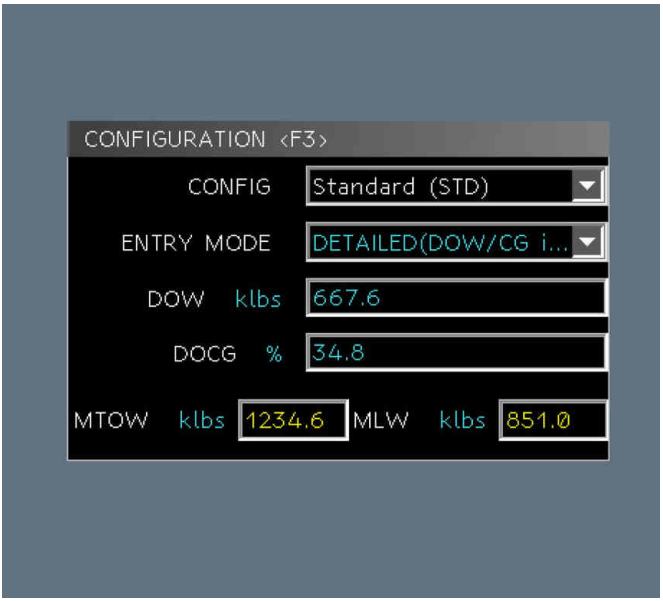
In order to obtain the DOW and DOCG values, the flight crew can:

- Start the computation, or
  After the computation, the DOW and DOCG values also appear on the RESULTS panel.
- Switch to the REDUCED entry mode. The DOW and DOCG values are automatically calculated using the data previously entered in the DETAILED (STD) Entry Mode. The values appear on the CONFIGURATION panel.

DETAILED (DOW/CG INPUT) ENTRY MODE

The flight crew directly enters the Dry Operating Weight (DOW) and the Dry Operating Center of Gravity (DOCG), without setting the crew code, the catering or miscellaneous items. In this case, the values appear in cyan.

CONFIGURATION Panel - DETAILED(DOW/CG input) Entry Mode



MTOW

Applicable to: ALL

The MTOW field displays the weight that limits the loading. The MTOW is the minimum of:
- Maximum structural takeoff weight
- Maximum weight selected for the flight, in the case of multiple weight variants
- Maximum performance limited takeoff weight (MTOW(perf))
- MEL/CDL limited weight.

The flight crew can update the MTOW, but the weight cannot be above the Maximum Structural Takeoff Weight (MSTOW).

COMMUNICATION FROM T.O PERF TO LOADSHEET

When the MTOW value is displayed in yellow, it means that this value is retrieved from T.O PERF and corresponds to the MTOW(perf).

MLW

Applicable to: ALL

The MLW field displays the weight that limits the loading. The MLW is the minimum of:

- Maximum structural landing weight
- Maximum weight selected for the flight, in the case of multiple weight variants
- Maximum performance limited landing weight (MLW(perfo))
- MEL/CDL limited weight.

The flight crew can update the MLW, but the weight cannot be above the Maximum Structural Landing Weight (MSLW).

COMMUNICATION FROM LDG PERF TO LOADSHEET

When the MLW value is displayed in yellow, it means that this value is retrieved from LDG PERF and corresponds to the MLW(perf).

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PAYLOAD DATA (REDUCED MODE)

Applicable to: ALL

Payload Data



ZFW/CG

The flight crew must enter the ZFW and ZFCG .

LMC

The flight crew can enter the LMC .
For more information about the LMC , *Refer to PER-LOD-LAI-PRM Last Minute Changes (LMC)* .

LAST MINUTE CHANGES (LMC)

Applicable to: ALL

In the case of Last Minute Changes (LMC), the flight crew can enter the increment or decrement in passenger number or cargo weight, in the LMC panel.

The flight crew can enter LMC either:

- In the corresponding cabin section or cargo compartment. In this case, all the weights and corresponding CGs (ZFCG, TOCG, LDCG) are automatically updated

L2 LMC weight limited in this case by underload and operational CG envelopes.

L1 - Or, as a total LMC. In this case, only the weights are automatically updated.

L2 LMC weight limited in this case by underload and maximum LMC tolerance.

L1 *Note: A maximum value for LMC in the passenger or cargo section is predefined in the loadsheet application, as per Operator's policy.*

PAYLOAD DATA (DETAILED MODE)

Applicable to: ALL

Payload Data



LOADING SECTION

The flight crew must enter the payload loading including:
- Pax
- Cargo.

For more information about the loading, *Refer to PER-LOD-LAI-PDM Payload Loading Section* .

DISTRIBUTION SECTION

The flight crew can enter the payload distribution for:
- Passengers
- Cargo.

For more information about the distribution, *Refer to PER-LOD-LAI-PDM Payload Distribution Section* .

PAYLOAD LOADING SECTION

Applicable to: ALL

PASSENGER

The flight crew must enter the number of passengers by passenger type (e.g.: Adult/Child/Infant). For each passenger type, a corresponding weight is defined as per Operator's policy (e.g. Adults: 185 lb / Children: 77 lb / Infants: 22 lb).

Note: Some passengers (e.g. infants) can be defined as not occupying a seat. Passengers that do not occupy a seat are disregarded for the passenger count, when checking that capacity in the cabin is not exceeded.

CARGO

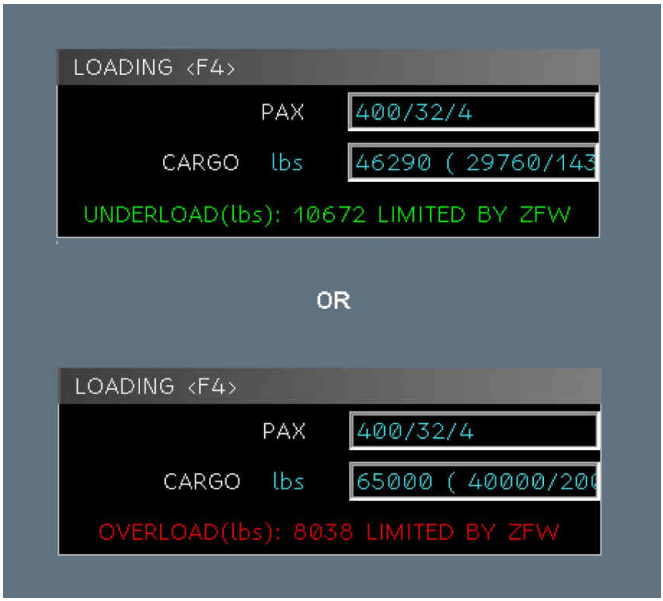
The flight crew must enter the cargo weight by cargo type (e.g.: Cargo/Baggage/Mail).

Note: It may be possible to set the amount of some cargo type(s) (e.g. baggage) by number of pieces. For each cargo type, the corresponding weight of the item is predefined.

UNDERLOAD / OVERLOAD

When the flight crew enters information in the loading panel, the corresponding underload is computed and displayed in green on the loading panel. The name of the aircraft maximum weight limiting the underload is also displayed (MZFW, MLW, MTOW). If the underload is negative, it is displayed as overload in red.

LOADING Panel



PAYLOAD DISTRIBUTION SECTION

Applicable to: ALL

PASSENGER

The flight crew can distribute passengers in the cabin sections, or can enter a total number of passengers.

Input can be made:
- By type of passenger, as defined in the LOADING panel PAX field. In this case each corresponding passenger weight is taken into account.
- By total number of passengers. In this case an average weight per passenger is computed in the LOADING panel, depending on the number of passenger in each passenger type group.

Note: *If both entries are available, the flight crew can change from one input to another via a toggle button.*

The TOTAL field displays the passengers already loaded in the distribution section.
The ΔPAX field contains the difference between the number of passengers entered in the loading section, and passengers that are already distributed (in TOTAL field).

Note: *If the number of loaded passengers in the distribution section exceeds the number of passengers entered in the loading section, the ΔPAX indication appears in red and the number of extra passenger(s) is indicated.*

CARGO

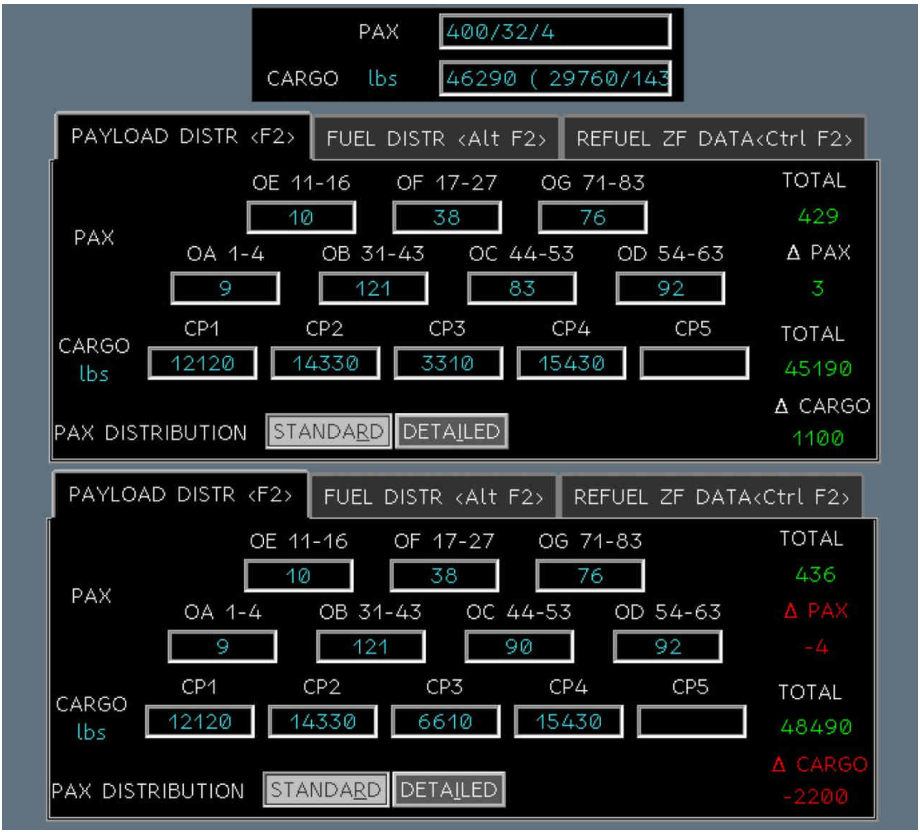
The flight crew must distribute the total weight of cargo between the cargo compartments defined for the aircraft. The flight crew can enter input per cargo compartment, either by cargo type, as defined in the LOADING panel, or by total cargo weight.

Note: *The flight crew may use both input types simultaneously, as required.*

The TOTAL field displays the cargo weight that is already loaded in the distribution section.
The ΔCARGO field contains the difference between the cargo weight entered in the loading section, and the cargo that is already distributed (in TOTAL field).

Note: *If the loaded cargo weight in the distribution section exceeds the cargo weight entered in the loading section, the ΔCARGO indication appears in red and the extra weight is indicated.*

Payload Distribution



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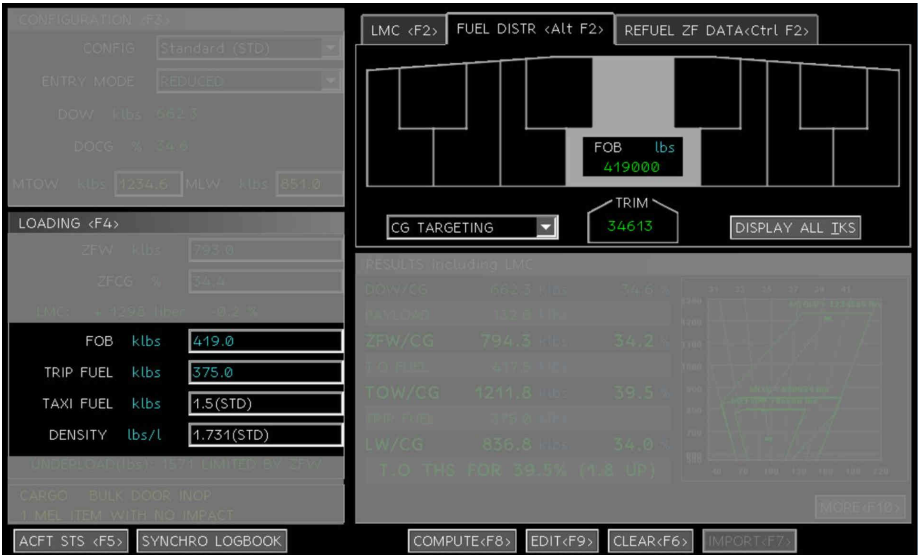
FUEL DATA

Applicable to: ALL

Fuel Data



LOADING SECTION

The flight crew must enter the following fuel quantities:

- Fuel On Board (FOB)
- Trip fuel
- Taxi fuel, if necessary
- Fuel density, if necessary.

For more information about the fuel, *Refer to PER-LOD-LAI-FUL Fuel Loading Section* .

FUEL DISTRIBUTION SECTION

The flight crew can access the predicted fuel distribution or enter the fuel distribution.
For more information about the fuel distribution, *Refer to PER-LOD-LAI-FUL Fuel Distribution Section* .

REFUEL ZF DATA

The flight crew can access and modify the ZFW / CG used by the loadsheet application for fuel distribution computation.

For more information about the refuel ZF data, *Refer to PER-LOD-LAI-FUL REFUEL ZF DATA Panel* .

FUEL LOADING SECTION

Applicable to: ALL

FOB

The flight crew can enter the Fuel On Board (FOB) for Gross Weight (GW) computation. The FOB is equal to the Ramp Fuel.
The FOB corresponds either to the Preselected Fuel Quantity (PFQ) or to the actual FOB that appears on the FUEL SD page. The FOB is also used with taxi fuel to estimate the fuel distribution per tank at takeoff, and the TOCG.

Note: *Loadsheet computations fail when the flight crew enters the maximum FOB for the aircraft.*
Workaround: Reduce the FOB by 350 lb.

TRIP FUEL

The flight crew can enter the estimated trip fuel for LW computation. Trip fuel is also used to estimate the fuel distribution per tank at landing, and the LDCG.

TAXI FUEL

If the taxi fuel field is available, the flight crew can enter the estimated taxi fuel. The application subtracts taxi fuel from the entered FOB in order to compute the TOW.
If the flight crew is not able to modify the taxi fuel, a standard value is used.

FUEL DENSITY

If the fuel density field is available, the flight crew can enter the fuel density. The fuel density is used to compute fuel distribution per tank.
If the flight crew is not able to modify the fuel density, a standard value is used.

FUEL DISTRIBUTION SECTION

Applicable to: ALL

The loadsheet application enables the flight crew to determine the effect of the fuel distribution, per tank, on the aircraft's CG .
Fuel distribution is either a result of computation, or a flight crew input that is displayed on the ECAM .

The FUEL DISTR panel enables the flight crew to:

- Either visualize predicted fuel distribution after refuelling in accordance with the Fuel Quantity and Management System (FQMS) CG targeting logic

L2 For more information about the FQMS CG targeting logic, *Refer to Aircraft Systems - CG Targeting* .

L1 , or

- Set a fuel distribution as per ECAM FUEL PAGE information, in order to recompute the corresponding TOW / CG .

The flight crew can select the requested visualization mode, using the ALL TANKS/TRIM TK ONLY button on the FUEL DISTR panel. By default, only FOB and trim tank fuel quantity are visible.

The flight crew can select between three types of computation, using the drop-down list on the FUEL DISTR panel:

- CG TARGETING: No input from the flight crew is required

L2 For more information about CG targeting, *Refer to PER-LOD-FDC-CGT CG Targeting* .

L1 <u>Note:</u> *If the flight crew performs a CG TARGETING computation, the fuel tank fields are set to the predicted fuel quantity. As a result, when the flight crew changes the drop-down list to TRIM ADJUSTMENT or MANUAL DISTR, all fields are predefined.*

- TRIM ADJUSTMENT: The flight crew is requested to set the trim tank fuel quantity as per ECAM FUEL PAGE information

L2 For more information about trim adjustment, *Refer to PER-LOD-FDC Trim Tank Adjustment* .

L1 <u>Note:</u> *In TRIM ADJUSTMENT mode, if trim tank fuel quantity is modified, the other fuel tank fields are emptied, because the wing fuel distribution needs to be recomputed.*

- MANUAL DISTR: The flight crew is requested to set tank fuel quantities as per ECAM FUEL PAGE information. When the flight crew modifies the fuel tank quantities, the distribution section FOB is automatically recomputed. Loading and distribution sections FOB values can differ within a tolerance, as per Operator policy.

L2 For more information about manual distribution, *Refer to All tank fuel quantities manual input* .

L1 *Note: In the case of a manual fuel distribution, the sum of all tanks (distribution section FOB) must be exactly identical to the total FOB (loading section FOB): there is no tolerance.*

REFUEL ZF DATA PANEL

Applicable to: ALL

REFUEL ZF DATA panel enables to define ZFW and ZFCG values to be used for the computation of the predicted fuel distribution after refuelling as per FQMS CG targeting logic.

L2 For more information about the FQMS CG targeting logic, *Refer to Aircraft Systems - CG Targeting* .

L1 The flight crew can set ZFW / CG :

- To the default refuel values, using the FQMS DEFAULT button on the REFUEL ZF DATA panel. These values correspond to the values used by the FQMS in order to determine the aircraft fuel distribution in the case no ZFW / CG data has been inserted in the system before refuelling was started

L2 For more information about the default ZFW / CG values, *Refer to Aircraft Systems - CG Targeting* .

L1 - To predefined values, using the NEW SET OF DATA button. The flight crew manually enters these values, which should correspond to the values entered into the FQMS before refuelling was started
- To the values computed in the application from the loading entries, using the LOADSHEET button.

The values that the flight crew selects will have an impact on the fuel distribution per tank computation in CG TARGETING mode.

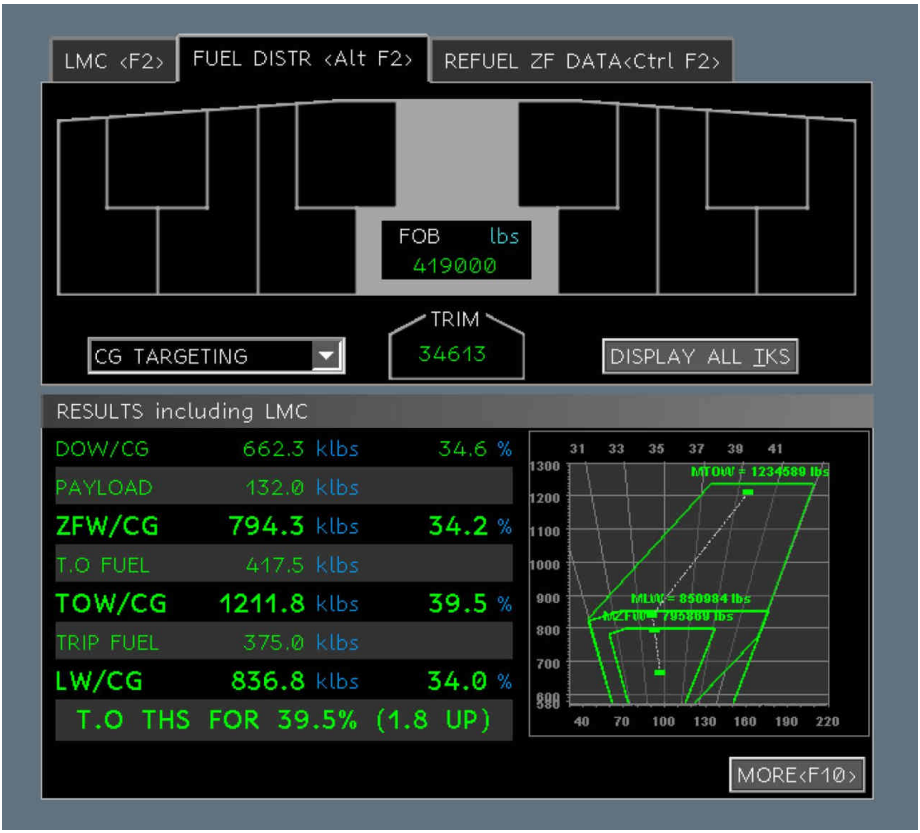
RESULTS PANEL

Applicable to: ALL

The flight crew can access, via the RESULTS panel:

- Basic loading results
- Fuel distribution
- Detailed results and Automatic Ground Transfer (AGT) information, using the MORE button on the RESULTS panel.

RESULTS Panel

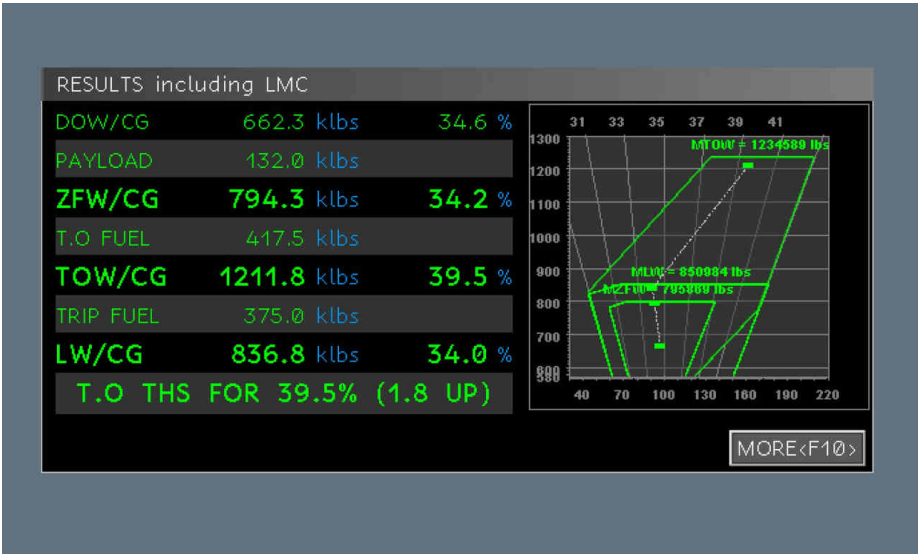


BASIC RESULTS

Applicable to: ALL

After a computation, the following results are displayed on the RESULTS panel:

Basic Results



DOW/CG

- In DETAILED (STD) mode, the DOW / CG values are computed by adding the predefined basic weight of the aircraft to the flight crew input for the flight and cabin crew, the catering and the miscellaneous items
- In DETAILED(DOW/CG input) mode, the DOW / CG values are equal to the values entered by the flight crew in the DOW and DOCG fields of the CONFIGURATION panel.
- In REDUCED mode, the DOW / CG values are equal to:
  - The default DOW and DOCG values, or
  - The values entered by the flight crew in the DOW and DOCG fields of the CONFIGURATION panel, if the DOW and DOCG fields are enabled as per Operator policy.

PAYLOAD

- In DETAILED mode, payload is computed as the sum of passengers and cargo weights
- In REDUCED mode, payload is the difference between ZFW and DOW .

ZFW/CG

If the ZFW / CG is not within the corresponding limits, the ZFW / CG values appear in red and the flight crew cannot access the LTS EDITION panel.

T.O FUEL

T.O FUEL value corresponds to FOB decreased by taxi fuel weight.

TOW/CG

If the TOW / CG is not within the corresponding limits, the TOW / CG values appear in red and the flight crew cannot access the LTS EDITION panel. The flight crew must perform an AGT to move the CG back in the limits, if possible. The flight crew can use the MORE panel to have more information about the quantity of fuel to transfer to move the CG back in the limits or to move the CG back on the refueling target.

L2 For more information about AGT , *Refer to Aircraft Systems - Automatic Ground Transfer* .

L1 **COMMUNICATION FROM LOADSHEET TO T.O PERF**

When the flight crew changes from LOADSHEET to T.O PERF, LOADSHEET transfers the calculated TOW value to T.O PERF. T.O PERF displays this value in yellow in the CONDITIONS panel.

TRIP FUEL

Trip fuel is the weight of fuel predicted to be burned during the trip, without taking into account the reserve fuel.

LW/CG

If the LW / CG is not within the corresponding limits, the LW / CG values appear in red and the flight crew cannot access the LTS EDITION panel.

COMMUNICATION FROM LOADSHEET TO LDG PERF

When the flight crew changes from LOADSHEET to LDG PERF, LOADSHEET transfers the calculated LW value to LDG PERF. LDG PERF displays this value in yellow in the CONDITIONS panel.

T.O THS FOR

The T.O THS FOR value is the takeoff trim setting that depends on the TOW / CG .

CG POSITIONS GRAPHICAL PRESENTATION

The CG diagram indicates all CG points DOW / CG , ZFW / CG , LW / CG , TOW / CG and also the corresponding CG limits (ZF , LDG , T.O).

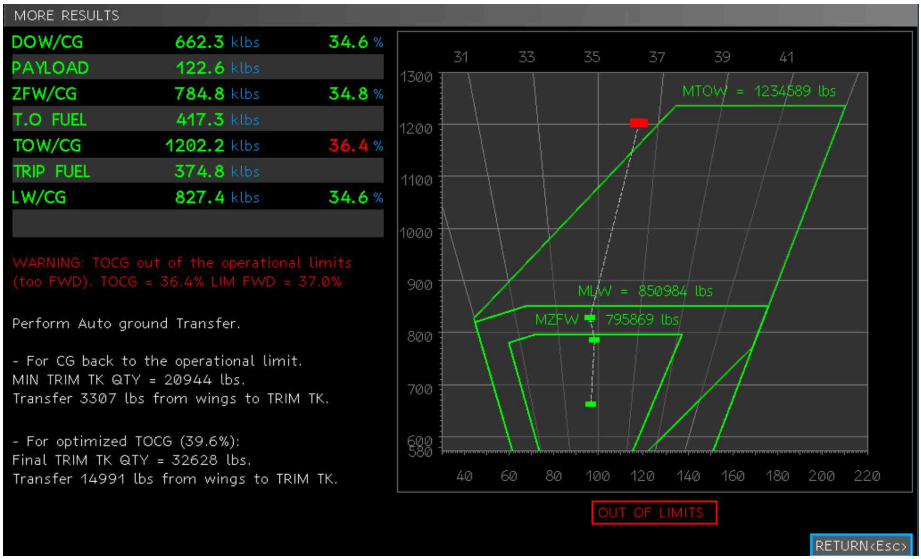
MORE PANEL & AGT INFORMATION

Applicable to: ALL

The flight crew can access the MORE panel by pressing the MORE button on the RESULTS panel.
The MORE panel includes the primary outputs, as well as a larger version of the CG diagram.
If TOCG is not within operational limits, a warning appears on the MORE panel, indicating the value of the calculated TOCG, and the value of the limit TOCG corresponding to TOW.

The following information on AGT appears on the MORE panel:
- The amount of fuel to be transferred to move the CG back in the limits
- The amount of fuel to be transferred to move the CG back on the refuelling target.

MORE Panel & AGT Information



FUEL DISTRIBUTION

Applicable to: ALL

The FUEL DISTR panel enables the flight crew to access the fuel distribution per tank, in accordance with the FQMS logic.

L2 For more information about the FQMS CG targeting logic and fuel distribution, *Refer to Aircraft Systems - CG Targeting* .

L1 The flight crew can access two different types of results, depending on the computation mode selected by the flight crew:

- CG TARGETING: The FUEL DISTR panel displays the predicted fuel quantity in the trim tank after a CG targeting process. The ALL TANKS button enables to display the predicted fuel distribution in the other tanks

L2 For more information about CG targeting, *Refer to PER-LOD-FDC-CGT CG Targeting* .

L1 - TRIM ADJUSTMENT: If the flight crew selects ALL TANKS, the FUEL DISTR panel displays the predicted fuel distribution in the wing tanks, corresponding to the standard refuelling logic, taking into account the flight crew trim tank fuel quantity input.

L2 For more information about trim adjustment, *Refer to PER-LOD-FDC Trim Tank Adjustment* .

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REPORT PANEL (REDUCED MODE)

Applicable to: ALL

Report Panel



ADDITIONAL INPUT

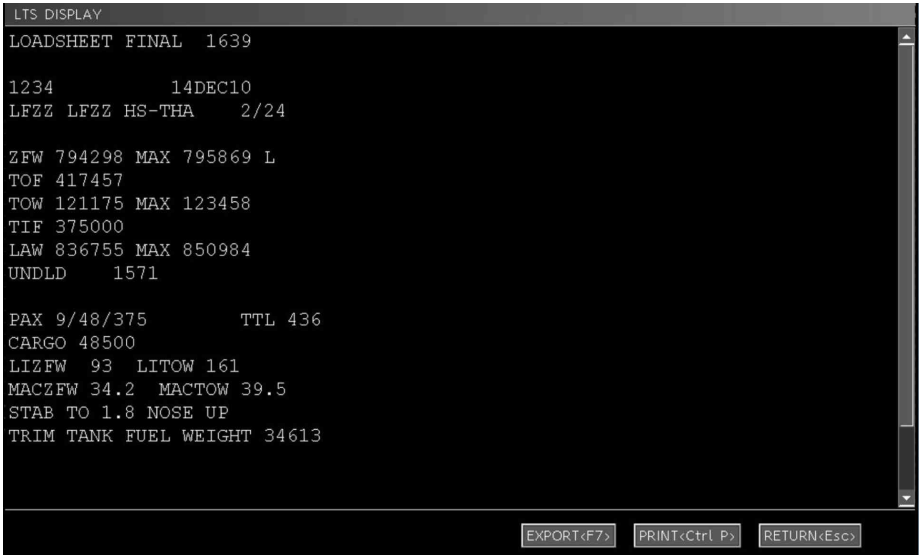
The flight crew enters additional input requested to appear on the loadsheet, and additional information entered by the Captain in the CAPT INFO NOTES frame (limited to 5 lines of text).

REDUCED LOADSHEET

The flight crew can generate a reduced loadsheet, corresponding to the AHM518 IATA format (ACARS Loadsheet).
A status has to be set for the generated loadsheet: PRELIM or FINAL.

LTS DISPLAY

LTS DISPLAY



When the loadsheet is generated, the flight crew can:

- Send the loadsheet to the ground,
- Print the loadsheet, in order to sign it manually, if necessary.

Note: After any of these actions, the loadsheet is also stored in the Electronic Flight Folder (EFF), if installed.

REPORT PANEL (DETAILED MODE)

Applicable to: ALL

Report Panel



ADDITIONAL INPUT

The flight crew enters additional input requested to appear on the loadsheet, and additional information entered by the Captain in the CAPT INFO NOTES frame (limited to 5 lines of text).

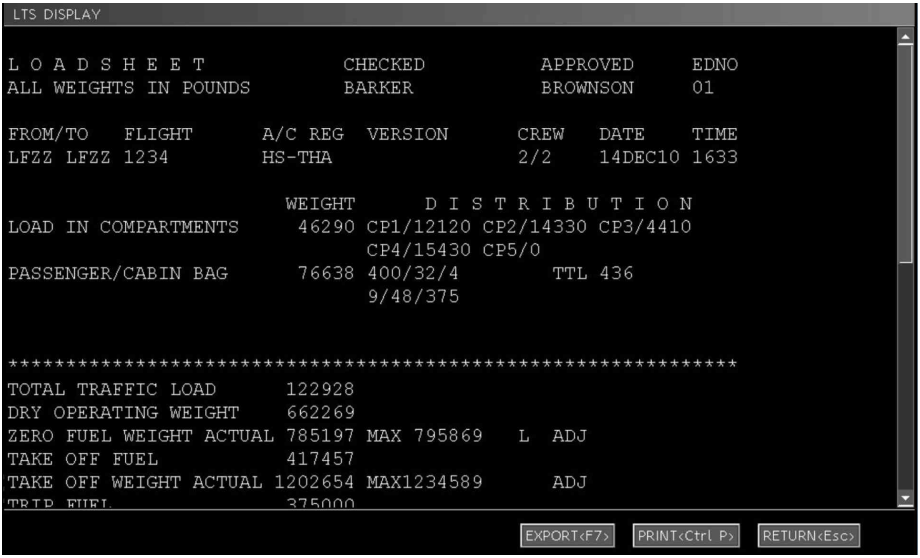
DETAILED OR REDUCED LOADSHEET

The flight crew can generate:

- A detailed loadsheet, corresponding to the AHM517 IATA format, or
  The flight crew must set an edition number in the ED N° drop-down list, if several loadsheets are generated consecutively, in order to follow-up the last version.
- A reduced loadsheet, corresponding to the AHM518 IATA format (ACARS Loadsheet).
  A status has to be set for the generated loadsheet: PRELIM or FINAL.

LTS DISPLAY

LTS DISPLAY



When the loadsheet is generated, the flight crew can:

- Send the loadsheet to the ground,
- Print the loadsheet, in order to sign it manually, if necessary.

Note: After any of these actions, the loadsheet is also stored in the Electronic Flight Folder (EFF), if installed.

CG TARGETING

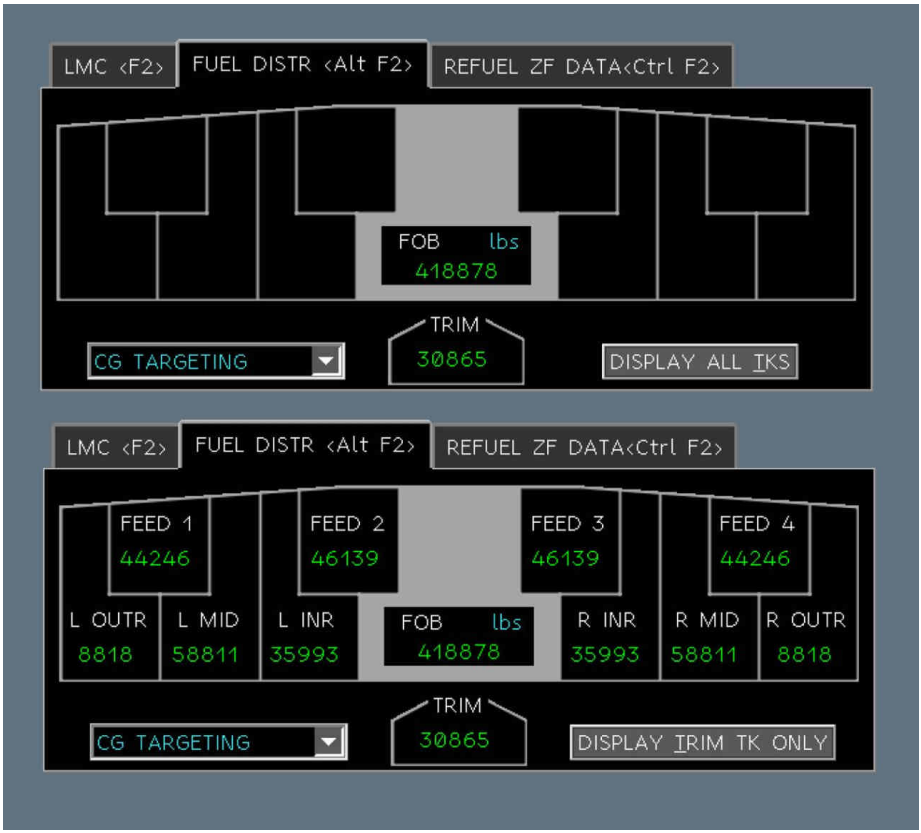
Applicable to: ALL

The CG targeting computation reflects the FQMS logic, and therefore requires the following three entries:

- Fuel On Board (FOB)
- ZFW, used during the refuelling process
- ZFCG, used during the refuelling process.

The flight crew enters these data via the LOADING panel and the REFUEL ZF DATA panel.
The output is then TOW/CG and either the corresponding fuel quantity in the trim tank or the fuel distribution in all tanks, depending on the level of detail requested by the flight crew.

CG Targeting



TRIM TANK ADJUSTMENT

Applicable to: ALL

The trim tank adjustment computation is based on the knowledge of the total FOB and the trim tank fuel quantity value. The trim tank adjustment computation is used to compute TOW/CG if the ZFW/CG used for refuel is not available, or if there is a discrepancy between the ECAM GW/CG and the computed TOW/CG.

The flight crew must enter the fuel loading data and the actual trim tank fuel quantity displayed on the ECAM FUEL page.

Trim Tank Adjustment

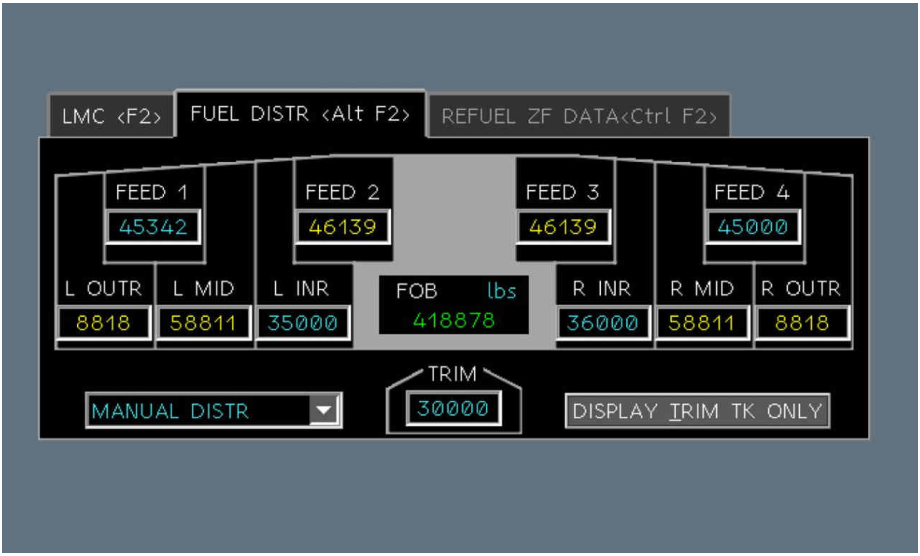


ALL TANK FUEL QUANTITIES MANUAL INPUT

Applicable to: ALL

The all tank fuel quantities manual input computation is based on the knowledge of all tank fuel quantity values. The all tank fuel quantities manual input is used to compute TOW/CG if fuel distribution is not standard. LW/CG is also computed from the additional input trip fuel.

Manual Distribution



AIRCRAFT STATUS PANEL

Applicable to: ALL

The current aircraft status must be considered during flight preparation.

The reminder area of the AIRCRAFT STATUS panel lists:
- MEL items impacting loading capabilities
- The number of MEL items without loading capabilities impact (if any).

If the aircraft is dispatched without any deferred items, "NORMAL" appears in the reminder area of the AIRCRAFT STATUS panel.

Reminder area of the AIRCRAFT STATUS Panel



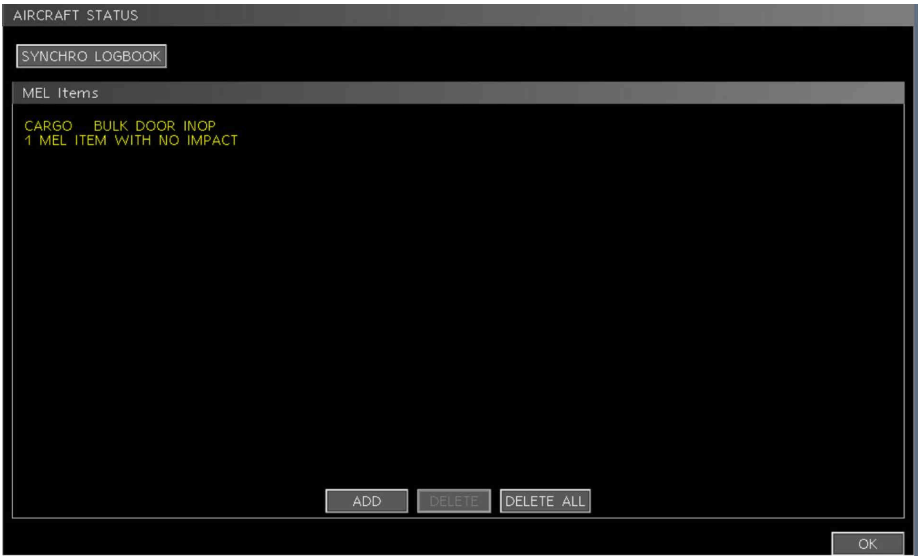
SYNCHRO LOGBOOK

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.
For more information about the SYNCHRO LOGBOOK function, *Refer to PER-LOD-ACS Synchronization with Logbook* .

AIRCRAFT STATUS

By clicking on the ACFT STS button, the flight crew opens the AIRCRAFT STATUS panel.
The AIRCRAFT STATUS panel has one subpanel: MEL Items.
Moreover, the flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.

AIRCRAFT STATUS Panel



MEL

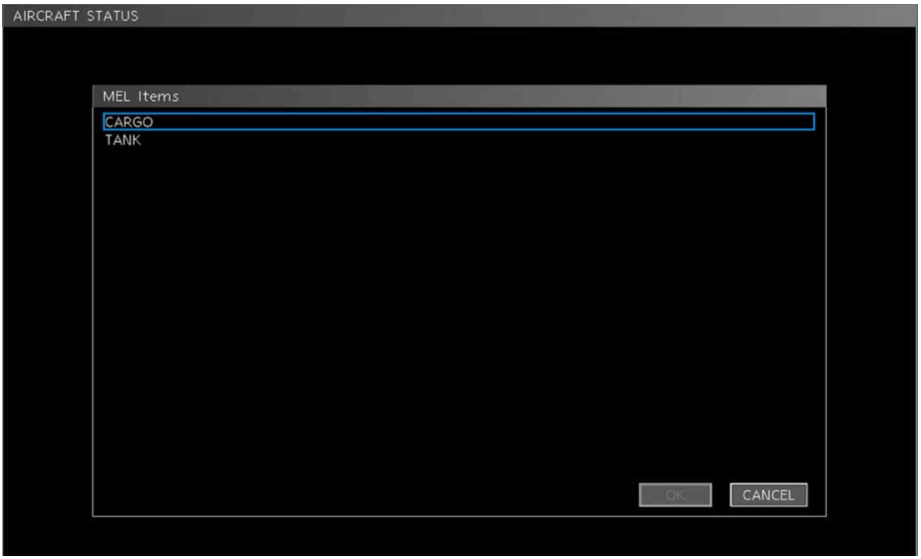
Applicable to: ALL

The MEL items subpanel displays the inoperative systems selected by the flight crew using:
- The OPS LIBRARY / MEL manual, via the selection of a MEL item, or
  In this case, the inoperative systems are displayed in yellow on Loadsheet Application.
- The Loadsheet Application MEL panel.
  In this case, the MEL items are displayed in cyan on Loadsheet Application.

By clicking on the ADD button of the MEL items subpanel, the flight crew opens the MEL items panel. The MEL items panel displays the list of MEL items that may impact loading capabilities.

These MEL items may have an impact on:
- Fuel
- Characteristics
- Weights
- Envelopes
- DOW
- Cabin
- Compartment.

MEL Items Panel



The flight crew selects a MEL item by first selecting the applicable system, and then the corresponding MEL item.
Items selected from the lists on the MEL items panel appear in the MEL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

Note: *If the flight crew selects a MEL item with an impact on Fuel Distribution, the associated non standard fuel distribution is not computed.*
Workaround: The flight crew shall use the Manual Distribution function with fuel quantities read on the ECAM.

COMMUNICATION BETWEEN MEL MANUAL AND LOADSHEET APPLICATION

When the aircraft is dispatched with MEL items and if these MEL items are selected via the OPS LIBRAY / MEL manual:

- The associated MEL items impacting loading capabilities are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in Loadsheet Application
- The number of MEL items without loading performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in Loadsheet Application.

SYNCHRONIZATION WITH LOGBOOK

Applicable to: ALL

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button. This action synchronizes the aircraft status of the whole FLT OPS domain with the current deferred items of the eLogbook
If the flight crew had previously selected additional MEL items in Loadsheet Application (displayed in cyan in the AIRCRAFT STATUS panel) and then uses the SYNCHRO LOGBOOK function, these manually entered items are lost.

Note: *When the flight crew uses the SYNCHRO LOGBOOK function in Loadsheet Application, the whole FLT OPS domain is also synchronized with the eLogbook.*

PERFORMANCE

THRUST RATINGS

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N1 To Fly....A

MAXIMUM TAKEOFF

Applicable to: ALL

The “Maximum Takeoff” thrust rating is the maximum thrust certified for takeoff and is normally limited to 5 min .
This time is extended to 10 min for engine out contingency, as authorized by the approved AFM .

The FADEC commands the “Maximum Takeoff” thrust rating:

- For a thrust lever on the TOGA detent
- Up to the throttle reduction.

L2 In fact, once throttle reduction achieved, if the PF moves back the thrust lever to TOGA , the corresponding thrust rating is the “Maximum Go Around” one.
For more information about the “Maximum Go Around” thrust rating, *Refer to PER-THR-NRM-MGA Maximum Go Around* .

POWER MANAGEMENT TABLE

Applicable to: ALL

MAXIMUM TAKEOFF

GP7270 - TAKEOFF THR (%)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
-60.0	97.8	97.6	97.4	97.2	97.0	96.7	97.7	98.1	98.1
-10.0	97.8	97.6	97.4	97.2	97.0	96.7	97.7	98.1	98.1
-5.0	97.8	97.6	97.4	97.2	97.0	96.7	97.7	98.1	98.1
0.0	97.8	97.6	97.4	97.2	97.0	96.7	97.7	98.1	97.4
5.0	97.8	97.6	97.4	97.2	97.0	96.7	97.7	96.8	*96.9*
10.0	97.8	97.6	97.4	97.2	97.0	96.7	96.6	*96.6*	*97.0*
15.0	97.8	97.6	97.4	97.2	97.0	*96.6*	*96.2*	*95.9*	*95.4*
20.0	97.8	97.6	97.4	97.2	*97.0*	*96.4*	*96.2*	*95.9*	*95.4*
25.0	97.8	97.6	97.4	*97.2*	*97.0*	*96.3*	*96.0*	*95.8*	*95.2*
30.0	97.8	97.6	*97.3*	*97.1*	*96.9*	*96.2*	*96.0*	*95.7*	
35.0	*97.8*	*97.6*	*97.4*	*97.1*	*96.9*	*96.2*	*96.0*		
40.0	*97.7*	*97.5*	*97.3*	*97.0*	*96.8*				
45.0	*97.8*	*97.4*	*97.2*	*97.0*					
50.0	*97.7*	*97.6*	*97.3*						
55.0	*97.7*								
60.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**OAT < CORNER POINT**	**OAT > CORNER POINT**
AIR CONDITIONING OFF	THR = 100.0	
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

DERATED TAKEOFF

Applicable to: ALL

The “Derated Takeoff” thrust rating is a reduced maximum thrust certified for takeoff.
For detailed information about the “Derated Takeoff” thrust rating, *Refer to PER-TOF-THR-DRT Definition of Derated Takeoff* .

The FADEC commands the “Derated Takeoff” thrust rating:

- For a thrust lever on the FLX / MCT detent, with a derate level entered into the MFD - PERF - TO page
- Up to a throttle reduction or a TOGA recovery.

L2 In fact, after the throttle reduction or the TOGA recovery, if the PF moves back the thrust lever to FLX / MCT , the corresponding thrust rating is the “Maximum Continuous” one.
For more information about the “Maximum Continuous” thrust rating, *Refer to PER-THR-NRM-MCT Maximum Continuous* .

POWER MANAGEMENT TABLE (D04)

Applicable to: ALL

DERATED TAKEOFF - D04

GP7270 - D04 DERATED TO THR (%)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
-60.0	94.3	94.2	94.0	94.0	93.8	93.5	94.5	95.4	95.7
-10.0	94.3	94.2	94.0	94.0	93.8	93.5	94.5	95.4	95.7
-5.0	94.3	94.2	94.0	94.0	93.8	93.5	94.5	95.4	95.7
0.0	94.3	94.2	94.0	94.0	93.8	93.5	94.5	95.4	94.8
5.0	94.3	94.2	94.0	94.0	93.8	93.5	94.5	93.9	*94.3*
10.0	94.3	94.2	94.0	94.0	93.8	93.5	93.4	*93.5*	*93.9*
15.0	94.3	94.2	94.0	94.0	93.8	*93.4*	*93.1*	*92.8*	*92.3*
20.0	94.3	94.2	94.0	94.0	*93.8*	*93.2*	*92.9*	*92.7*	*92.1*
25.0	94.3	94.2	94.0	*93.9*	*93.7*	*93.0*	*92.7*	*92.5*	*91.9*
30.0	94.3	94.2	*94.0*	*93.8*	*93.6*	*92.9*	*92.7*	*92.4*	
35.0	*94.3*	*94.2*	*94.0*	*93.7*	*93.5*	*92.8*	*92.6*		
40.0	*94.3*	*94.0*	*93.8*	*93.6*	*93.3*				
45.0	*94.4*	*94.1*	*93.9*	*93.6*					
50.0	*94.2*	*94.1*	*93.9*						
55.0	*94.1*								
60.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**OAT < CORNER POINT**	**OAT > CORNER POINT**
AIR CONDITIONING OFF	+2.2	+2.7
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

POWER MANAGEMENT TABLE (D08)

Applicable to: ALL

DERATED TAKEOFF - D08

GP7270 - D08 DERATED TO THR (%)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
-60.0	90.9	90.9	90.8	90.6	90.6	90.3	91.3	92.3	93.0
-10.0	90.9	90.9	90.8	90.6	90.6	90.3	91.3	92.3	93.0
-5.0	90.9	90.9	90.8	90.6	90.6	90.3	91.3	92.3	93.0
0.0	90.9	90.9	90.8	90.6	90.6	90.3	91.3	92.3	92.0
5.0	90.9	90.9	90.8	90.6	90.6	90.3	91.3	90.7	*91.1*
10.0	90.9	90.9	90.8	90.6	90.6	90.3	90.3	*90.3*	*90.7*
15.0	90.9	90.9	90.8	90.6	90.6	*90.2*	*89.9*	*89.6*	*89.1*
20.0	90.9	90.9	90.8	90.6	*90.5*	*90.0*	*89.7*	*89.4*	*88.9*
25.0	90.9	90.9	90.8	*90.6*	*90.4*	*89.8*	*89.5*	*89.3*	*88.7*
30.0	90.9	90.9	*90.7*	*90.5*	*90.2*	*89.6*	*89.3*	*89.1*	
35.0	*90.9*	*90.8*	*90.5*	*90.3*	*90.1*	*89.5*	*89.2*		
40.0	*90.9*	*90.7*	*90.5*	*90.2*	*90.0*				
45.0	*90.9*	*90.7*	*90.5*	*90.2*					
50.0	*90.7*	*90.6*	*90.4*						
55.0	*90.6*								
60.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING OFF	+2.2	+2.7
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

POWER MANAGEMENT TABLE (D12)

Applicable to: ALL

DERATED TAKEOFF - D12

GP7270 - D12 DERATED TO THR (%)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
-60.0	87.7	87.6	87.5	87.5	87.4	87.2	88.2	89.2	89.9
-10.0	87.7	87.6	87.5	87.5	87.4	87.2	88.2	89.2	89.9
-5.0	87.7	87.6	87.5	87.5	87.4	87.2	88.2	89.2	89.9
0.0	87.7	87.6	87.5	87.5	87.4	87.2	88.2	89.2	88.9
5.0	87.7	87.6	87.5	87.5	87.4	87.2	88.2	87.7	*88.1*
10.0	87.7	87.6	87.5	87.5	87.4	87.2	87.2	*87.2*	*87.6*
15.0	87.7	87.6	87.5	87.5	87.4	*87.1*	*86.7*	*86.4*	*85.9*
20.0	87.7	87.6	87.5	87.5	*87.4*	*86.8*	*86.6*	*86.3*	*85.8*
25.0	87.7	87.6	87.5	*87.4*	*87.3*	*86.6*	*86.3*	*86.1*	*85.5*
30.0	87.7	87.6	*87.4*	*87.2*	*87.0*	*86.3*	*86.1*	*85.9*	
35.0	*87.7*	*87.6*	*87.3*	*87.1*	*86.9*	*86.3*	*86.0*		
40.0	*87.6*	*87.4*	*87.2*	*87.0*	*86.8*				
45.0	*87.5*	*87.3*	*87.1*	*86.9*					
50.0	*87.3*	*87.3*	*87.0*						
55.0	*87.2*								
60.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING OFF	+2.2	+2.7
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

POWER MANAGEMENT TABLE (D16)

Applicable to: ALL

DERATED TAKEOFF - D16

GP7270 - D16 DERATED TO THR (%)

AIR CONDITIONING ON — MACH=.000

OAT	PRESSURE ALTITUDE (FT)								
(C)	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	84.2	84.2	84.0	84.1	84.1	83.9	84.9	85.9	86.7
-10.0	84.2	84.2	84.0	84.1	84.1	83.9	84.9	85.9	86.7
-5.0	84.2	84.2	84.0	84.1	84.1	83.9	84.9	85.9	86.7
0.0	84.2	84.2	84.0	84.1	84.1	83.9	84.9	85.9	85.7
5.0	84.2	84.2	84.0	84.1	84.1	83.9	84.9	84.4	*84.8*
10.0	84.2	84.2	84.0	84.1	84.1	83.9	83.8	*83.9*	*84.3*
15.0	84.2	84.2	84.0	84.1	84.1	*83.7*	*83.4*	*83.2*	*82.7*
20.0	84.2	84.2	84.0	84.1	*84.0*	*83.5*	*83.2*	*82.9*	*82.4*
25.0	84.2	84.2	84.0	*83.9*	*83.9*	*83.1*	*82.9*	*82.6*	*82.2*
30.0	84.2	84.2	*84.0*	*83.8*	*83.6*	*83.0*	*82.8*	*82.5*	
35.0	*84.1*	*84.1*	*83.9*	*83.7*	*83.5*	*82.9*	*82.6*		
40.0	*84.0*	*83.9*	*83.7*	*83.5*	*83.3*				
45.0	*84.0*	*83.8*	*83.6*	*83.4*					
50.0	*83.7*	*83.7*	*83.5*						
55.0	*83.5*								
60.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING OFF	+2.2	+2.7
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

POWER MANAGEMENT TABLE (D20)

Applicable to: ALL

DERATED TAKEOFF - D20

GP7270 - D20 DERATED TO THR (%)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
-60.0	80.5	80.6	80.5	80.5	80.5	80.4	81.4	82.3	83.1
-10.0	80.5	80.6	80.5	80.5	80.5	80.4	81.4	82.3	83.1
-5.0	80.5	80.6	80.5	80.5	80.5	80.4	81.4	82.3	83.1
0.0	80.5	80.6	80.5	80.5	80.5	80.4	81.4	82.3	82.2
5.0	80.5	80.6	80.5	80.5	80.5	80.4	81.4	80.9	*81.3*
10.0	80.5	80.6	80.5	80.5	80.5	80.4	80.4	*80.4*	*80.8*
15.0	80.5	80.6	80.5	80.5	80.5	*80.3*	*79.9*	*79.6*	*79.1*
20.0	80.5	80.6	80.5	80.5	*80.4*	*79.9*	*79.6*	*79.3*	*78.9*
25.0	80.5	80.6	80.5	*80.4*	*80.3*	*79.7*	*79.4*	*79.2*	*78.7*
30.0	80.5	80.6	*80.4*	*80.2*	*80.0*	*79.4*	*79.2*	*79.0*	
35.0	*80.4*	*80.4*	*80.2*	*80.0*	*79.8*	*79.2*	*79.0*		
40.0	*80.3*	*80.2*	*80.0*	*79.8*	*79.6*				
45.0	*80.2*	*80.1*	*79.9*	*79.7*					
50.0	*79.9*	*79.9*	*79.7*						
55.0	*79.6*								
60.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING OFF	+2.2	+2.7
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

POWER MANAGEMENT TABLE (D24)

Applicable to: ALL

DERATED TAKEOFF - D24

GP7270 - D24 DERATED TO THR (%)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
-60.0	76.8	77.0	77.0	77.0	77.0	76.8	77.8	78.8	79.6
-10.0	76.8	77.0	77.0	77.0	77.0	76.8	77.8	78.8	79.6
-5.0	76.8	77.0	77.0	77.0	77.0	76.8	77.8	78.8	79.6
0.0	76.8	77.0	77.0	77.0	77.0	76.8	77.8	78.8	78.7
5.0	76.8	77.0	77.0	77.0	77.0	76.8	77.8	77.4	*77.9*
10.0	76.8	77.0	77.0	77.0	77.0	76.8	76.9	*76.9*	*77.3*
15.0	76.8	77.0	77.0	77.0	77.0	*76.7*	*76.4*	*76.1*	*75.7*
20.0	76.8	77.0	77.0	77.0	*76.9*	*76.4*	*76.2*	*75.9*	*75.5*
25.0	76.8	77.0	77.0	*76.9*	*76.8*	*76.2*	*75.9*	*75.6*	*75.2*
30.0	76.8	77.0	*76.8*	*76.6*	*76.4*	*75.8*	*75.6*	*75.4*	
35.0	*76.8*	*76.8*	*76.6*	*76.4*	*76.2*	*75.6*	*75.4*		
40.0	*76.6*	*76.6*	*76.4*	*76.2*	*76.0*				
45.0	*76.4*	*76.4*	*76.2*	*76.0*					
50.0	*76.0*	*76.2*	*76.0*						
55.0	*75.8*								
60.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING OFF	+2.2	+2.7
NACELLE ANTI ICE ON	0.0	-1.7
NACELLE AND WING ANTI ICE ON	0.0	-1.7

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FLEXIBLE TAKEOFF

Applicable to: ALL

The “Flexible Takeoff” thrust rating is a reduced takeoff thrust as compared to the maximum permissible one.

The related THR is calculated as a function of the flexible temperature (TFLEX) entered in the MFD .

TFLEX is a function of the aircraft weight and environmental conditions.

It guarantees that the regular performance requirements are met.

L2 For detailed information about FLEX Takeoff, *Refer to PER-TOF-THR-FLX Definition of FLEX Takeoff* .

L1 The FADEC commands the “Flexible Takeoff” thrust rating:

- For a thrust lever on the FLX / MCT detent, with a TFLEX entered into the MFD - PERF - TO page
- Up to the throttle reduction or a TOGA recovery.

L2 In fact, after the throttle reduction or the TOGA recovery, if the PF moves back the thrust lever to FLX / MCT , the corresponding thrust rating is the “Maximum Continuous” one.

For more information about the “Maximum Continuous” thrust rating, *Refer to PER-THR-NRM-MCT Maximum Continuous* .

POWER MANAGEMENT TABLE (TFLEX 10)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 10 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 10.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0								94.8	92.0
-10.0								94.8	92.0
-5.0								94.8	92.0
0.0								94.8	92.0
5.0								94.8	*93.0*
10.0									
12.0									
14.0									
16.0									
18.0									
20.0									
22.0									
24.0									
26.0									
28.0									
30.0									
32.0									
34.0									
36.0									
38.0									
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 10.0 (C)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 15)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 15 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 15.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0						96.0	94.3	90.9	88.2
-10.0						96.0	94.3	90.9	88.2
-5.0						96.0	94.3	90.9	88.2
0.0						96.0	94.3	90.9	88.2
5.0						96.0	94.3	90.9	*89.2*
10.0						96.0	94.3	*92.5*	*92.0*
12.0						96.0	*95.1*	*93.8*	*93.3*
14.0						96.0	*95.9*	*95.2*	*94.6*
16.0									
18.0									
20.0									
22.0									
24.0									
26.0									
28.0									
30.0									
32.0									
34.0									
36.0									
38.0									
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

Continued on the following page

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 15.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 20)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 20 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 20.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0					95.5	93.1	91.3	87.2	85.1
-10.0					95.5	93.1	91.3	87.2	85.1
-5.0					95.5	93.1	91.3	87.2	85.1
0.0					95.5	93.1	91.3	87.2	85.1
5.0					95.5	93.1	91.3	87.2	*86.0*
10.0					95.5	93.1	91.3	*88.8*	*88.7*
12.0					95.5	93.1	*92.1*	*90.0*	*90.0*
14.0					95.5	93.1	*92.8*	*91.3*	*91.3*
16.0					95.5	*94.3*	*93.7*	*92.8*	*92.7*
18.0					95.5	*95.2*	*94.9*	*94.3*	*94.1*
20.0									
22.0									
24.0									
26.0									
28.0									
30.0									
32.0									
34.0									
36.0									
38.0									
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 20.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 25)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 25 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 25.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0				95.3	93.5	88.8	86.8	84.2	81.9
-10.0				95.3	93.5	88.8	86.8	84.2	81.9
-5.0				95.3	93.5	88.8	86.8	84.2	81.9
0.0				95.3	93.5	88.8	86.8	84.2	81.9
5.0				95.3	93.5	88.8	86.8	84.2	*82.8*
10.0				95.3	93.5	88.8	86.8	*85.8*	*85.4*
12.0				95.3	93.5	88.8	*87.6*	*86.9*	*86.6*
14.0				95.3	93.5	88.8	*88.3*	*88.2*	*87.9*
16.0				95.3	93.5	*90.0*	*89.2*	*89.6*	*89.3*
18.0				95.3	93.5	*90.8*	*90.4*	*91.1*	*90.6*
20.0				95.3	*94.9*	*92.0*	*91.5*	*92.7*	*91.8*
22.0				95.3	*95.2*	*93.6*	*93.4*	*94.0*	*93.0*
24.0				*96.8*	*96.1*	*95.3*	*95.2*	*95.2*	*94.5*
26.0									
28.0									
30.0									
32.0									
34.0									
36.0									
38.0									
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 25.0 (C)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 30)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 30 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 30.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0		97.6	94.3	92.1	88.4	84.3	83.2	80.9	77.4
-10.0		97.6	94.3	92.1	88.4	84.3	83.2	80.9	77.4
-5.0		97.6	94.3	92.1	88.4	84.3	83.2	80.9	77.4
0.0		97.6	94.3	92.1	88.4	84.3	83.2	80.9	77.4
5.0		97.6	94.3	92.1	88.4	84.3	83.2	80.9	*78.3*
10.0		97.6	94.3	92.1	88.4	84.3	83.2	*82.3*	*80.7*
12.0		97.6	94.3	92.1	88.4	84.3	*83.9*	*83.5*	*81.8*
14.0		97.6	94.3	92.1	88.4	84.3	*84.6*	*84.7*	*83.0*
16.0		97.6	94.3	92.1	88.4	*85.4*	*85.4*	*86.1*	*84.4*
18.0		97.6	94.3	92.1	88.4	*86.2*	*86.5*	*87.5*	*85.6*
20.0		97.6	94.3	92.1	*89.8*	*87.3*	*87.6*	*89.0*	*86.7*
22.0		97.6	94.3	92.1	*90.0*	*88.8*	*89.4*	*90.3*	*87.9*
24.0		97.6	94.3	*93.5*	*90.8*	*90.5*	*91.2*	*91.4*	*89.2*
26.0		97.6	94.3	*94.2*	*92.6*	*92.4*	*92.8*	*92.6*	*90.7*
28.0		97.6	*95.9*	*95.3*	*94.1*	*94.4*	*94.3*	*94.1*	
30.0									
32.0									
34.0									
36.0									
38.0									
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 30.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 35)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 35 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 35.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	97.0	94.0	90.8	87.3	84.0	80.9	79.8	76.1	72.0
-10.0	97.0	94.0	90.8	87.3	84.0	80.9	79.8	76.1	72.0
-5.0	97.0	94.0	90.8	87.3	84.0	80.9	79.8	76.1	72.0
0.0	97.0	94.0	90.8	87.3	84.0	80.9	79.8	76.1	72.0
5.0	97.0	94.0	90.8	87.3	84.0	80.9	79.8	76.1	*72.9*
10.0	97.0	94.0	90.8	87.3	84.0	80.9	79.8	*77.5*	*75.1*
12.0	97.0	94.0	90.8	87.3	84.0	80.9	*80.5*	*78.5*	*76.2*
14.0	97.0	94.0	90.8	87.3	84.0	80.9	*81.1*	*79.7*	*77.3*
16.0	97.0	94.0	90.8	87.3	84.0	*81.9*	*81.9*	*81.0*	*78.5*
18.0	97.0	94.0	90.8	87.3	84.0	*82.7*	*83.0*	*82.3*	*79.7*
20.0	97.0	94.0	90.8	87.3	*85.4*	*83.8*	*84.1*	*83.7*	*80.8*
22.0	97.0	94.0	90.8	87.3	*85.6*	*85.2*	*85.8*	*84.9*	*81.8*
24.0	97.0	94.0	90.8	*88.7*	*86.4*	*86.8*	*87.4*	*86.0*	*83.1*
26.0	97.0	94.0	90.8	*89.3*	*88.1*	*88.7*	*89.0*	*87.1*	*84.4*
28.0	97.0	94.0	*92.4*	*90.4*	*89.5*	*90.6*	*90.5*	*88.5*	
30.0	97.0	94.0	*93.7*	*92.1*	*92.1*	*92.3*	*92.0*	*90.1*	
32.0	97.0	*95.5*	*95.2*	*93.5*	*94.4*	*93.9*	*93.6*		
34.0	*97.0*	*96.9*	*96.9*	*96.0*	*96.1*	*95.5*	*95.2*		
36.0									
38.0									
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 35.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 40)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 40 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 40.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	93.7	90.7	86.8	84.0	80.8	77.3	74.8	71.1	67.1
-10.0	93.7	90.7	86.8	84.0	80.8	77.3	74.8	71.1	67.1
-5.0	93.7	90.7	86.8	84.0	80.8	77.3	74.8	71.1	67.1
0.0	93.7	90.7	86.8	84.0	80.8	77.3	74.8	71.1	67.1
5.0	93.7	90.7	86.8	84.0	80.8	77.3	74.8	71.1	*67.9*
10.0	93.7	90.7	86.8	84.0	80.8	77.3	74.8	*72.4*	*70.0*
12.0	93.7	90.7	86.8	84.0	80.8	77.3	*75.4*	*73.4*	*71.0*
14.0	93.7	90.7	86.8	84.0	80.8	77.3	*76.0*	*74.5*	*72.0*
16.0	93.7	90.7	86.8	84.0	80.8	*78.3*	*76.8*	*75.7*	*73.2*
18.0	93.7	90.7	86.8	84.0	80.8	*79.1*	*77.8*	*76.9*	*74.3*
20.0	93.7	90.7	86.8	84.0	*82.0*	*80.1*	*78.8*	*78.2*	*75.3*
22.0	93.7	90.7	86.8	84.0	*82.3*	*81.5*	*80.4*	*79.4*	*76.2*
24.0	93.7	90.7	86.8	*85.3*	*83.0*	*83.0*	*82.0*	*80.4*	*77.4*
26.0	93.7	90.7	86.8	*85.9*	*84.6*	*84.8*	*83.4*	*81.4*	*78.7*
28.0	93.7	90.7	*88.3*	*86.9*	*86.0*	*86.6*	*84.8*	*82.7*	
30.0	93.7	90.7	*89.7*	*88.6*	*88.5*	*88.3*	*86.2*	*84.2*	
32.0	93.7	*92.1*	*91.1*	*89.9*	*90.7*	*89.8*	*87.7*		
34.0	*93.8*	*93.5*	*92.7*	*92.3*	*92.4*	*91.3*	*89.2*		
36.0	*95.2*	*94.8*	*93.6*	*94.2*	*93.9*	*92.8*			
38.0	*96.4*	*96.1*	*95.6*	*95.6*	*95.4*	*94.3*			
40.0									
42.0									
44.0									
46.0									
48.0									

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 40.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 45)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 45 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 45.0 (C)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	90.2	86.8	83.7	80.9	77.2	72.9	70.1	66.4	62.4
-10.0	90.2	86.8	83.7	80.9	77.2	72.9	70.1	66.4	62.4
-5.0	90.2	86.8	83.7	80.9	77.2	72.9	70.1	66.4	62.4
0.0	90.2	86.8	83.7	80.9	77.2	72.9	70.1	66.4	62.4
5.0	90.2	86.8	83.7	80.9	77.2	72.9	70.1	66.4	*63.1*
10.0	90.2	86.8	83.7	80.9	77.2	72.9	70.1	*67.6*	*65.1*
12.0	90.2	86.8	83.7	80.9	77.2	72.9	*70.7*	*68.5*	*66.0*
14.0	90.2	86.8	83.7	80.9	77.2	72.9	*71.3*	*69.5*	*66.9*
16.0	90.2	86.8	83.7	80.9	77.2	*73.9*	*72.0*	*70.7*	*68.0*
18.0	90.2	86.8	83.7	80.9	77.2	*74.6*	*72.9*	*71.8*	*69.1*
20.0	90.2	86.8	83.7	80.9	*78.4*	*75.5*	*73.9*	*73.0*	*69.9*
22.0	90.2	86.8	83.7	80.9	*78.7*	*76.8*	*75.4*	*74.1*	*70.8*
24.0	90.2	86.8	83.7	*82.2*	*79.3*	*78.3*	*76.8*	*75.0*	*72.0*
26.0	90.2	86.8	83.7	*82.7*	*80.9*	*79.9*	*78.2*	*76.0*	*73.1*
28.0	90.2	86.8	*85.2*	*83.7*	*82.2*	*81.7*	*79.5*	*77.2*	
30.0	90.2	86.8	*86.4*	*85.3*	*84.6*	*83.3*	*80.9*	*78.6*	
32.0	90.2	*88.2*	*87.8*	*86.6*	*86.7*	*84.7*	*82.2*		
34.0	*90.3*	*89.5*	*89.3*	*88.9*	*88.3*	*86.1*	*83.6*		
36.0	*91.7*	*90.8*	*90.3*	*90.7*	*89.8*	*87.5*			
38.0	*92.8*	*92.0*	*92.2*	*92.1*	*91.2*	*88.9*			
40.0	*94.1*	*93.4*	*93.8*	*93.5*	*92.5*				
42.0	*95.4*	*94.9*	*95.2*	*94.9*	*93.9*				
44.0	*96.9*	*96.6*	*96.5*	*96.3*					
46.0									
48.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 45.0 (C)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 50)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 50 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 50.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	86.3	83.6	80.7	77.0	72.8	68.7	65.5	61.9	
-10.0	86.3	83.6	80.7	77.0	72.8	68.7	65.5	61.9	
-5.0	86.3	83.6	80.7	77.0	72.8	68.7	65.5	61.9	
0.0	86.3	83.6	80.7	77.0	72.8	68.7	65.5	61.9	
5.0	86.3	83.6	80.7	77.0	72.8	68.7	65.5	61.9	
10.0	86.3	83.6	80.7	77.0	72.8	68.7	65.5	*63.0*	
12.0	86.3	83.6	80.7	77.0	72.8	68.7	*66.2*	*63.9*	
14.0	86.3	83.6	80.7	77.0	72.8	68.7	*66.7*	*64.8*	
16.0	86.3	83.6	80.7	77.0	72.8	*69.6*	*67.3*	*65.9*	
18.0	86.3	83.6	80.7	77.0	72.8	*70.3*	*68.2*	*67.0*	
20.0	86.3	83.6	80.7	77.0	*74.0*	*71.1*	*69.1*	*68.1*	
22.0	86.3	83.6	80.7	77.0	*74.2*	*72.4*	*70.5*	*69.1*	
24.0	86.3	83.6	80.7	*78.2*	*74.8*	*73.7*	*71.9*	*69.9*	
26.0	86.3	83.6	80.7	*78.8*	*76.3*	*75.3*	*73.1*	*70.8*	
28.0	86.3	83.6	*82.1*	*79.7*	*77.6*	*76.9*	*74.3*	*72.0*	
30.0	86.3	83.6	*83.3*	*81.2*	*79.8*	*78.4*	*75.6*	*73.2*	
32.0	86.3	*85.0*	*84.6*	*82.4*	*81.8*	*79.7*	*76.9*		
34.0	*86.3*	*86.2*	*86.1*	*84.6*	*83.3*	*81.1*	*78.2*		
36.0	*87.6*	*87.4*	*87.0*	*86.3*	*84.7*	*82.4*			
38.0	*88.8*	*88.6*	*88.9*	*87.7*	*86.0*	*83.7*			
40.0	*89.9*	*90.0*	*90.4*	*89.0*	*87.3*				
42.0	*91.2*	*91.4*	*91.7*	*90.3*	*88.6*				
44.0	*92.7*	*93.0*	*93.1*	*91.7*					
46.0	*94.4*	*94.6*	*94.4*	*93.0*					
48.0	*96.1*	*96.1*	*95.9*						

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 50.0 (C)									
AIR CONDITIONING ON									MACH=.000
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0									
52.0									
54.0									
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 55)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 55 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 55.0 (C)									
AIR CONDITIONING ON							MACH=.000		
OAT	PRESSURE ALTITUDE (FT)								
(C)	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	83.1	80.6	76.4	72.5	68.5	64.6	61.3		
-10.0	83.1	80.6	76.4	72.5	68.5	64.6	61.3		
-5.0	83.1	80.6	76.4	72.5	68.5	64.6	61.3		
0.0	83.1	80.6	76.4	72.5	68.5	64.6	61.3		
5.0	83.1	80.6	76.4	72.5	68.5	64.6	61.3		
10.0	83.1	80.6	76.4	72.5	68.5	64.6	61.3		
12.0	83.1	80.6	76.4	72.5	68.5	64.6	*61.8*		
14.0	83.1	80.6	76.4	72.5	68.5	64.6	*62.3*		
16.0	83.1	80.6	76.4	72.5	68.5	*65.5*	*62.9*		
18.0	83.1	80.6	76.4	72.5	68.5	*66.1*	*63.7*		
20.0	83.1	80.6	76.4	72.5	*69.6*	*66.9*	*64.5*		
22.0	83.1	80.6	76.4	72.5	*69.8*	*68.1*	*65.9*		
24.0	83.1	80.6	76.4	*73.6*	*70.4*	*69.4*	*67.1*		
26.0	83.1	80.6	76.4	*74.1*	*71.8*	*70.8*	*68.3*		
28.0	83.1	80.6	*77.8*	*75.0*	*73.0*	*72.4*	*69.5*		
30.0	83.1	80.6	*78.9*	*76.4*	*75.2*	*73.8*	*70.7*		
32.0	83.1	*81.9*	*80.2*	*77.6*	*77.0*	*75.0*	*71.9*		
34.0	*83.1*	*83.0*	*81.6*	*79.6*	*78.4*	*76.3*	*73.1*		
36.0	*84.4*	*84.2*	*82.4*	*81.3*	*79.7*	*77.5*			
38.0	*85.5*	*85.4*	*84.2*	*82.5*	*81.0*	*78.8*			
40.0	*86.6*	*86.7*	*85.6*	*83.7*	*82.2*				
42.0	*87.8*	*88.1*	*86.9*	*85.0*	*83.4*				
44.0	*89.2*	*89.6*	*88.1*	*86.3*					
46.0	*90.8*	*91.1*	*89.4*	*87.6*					
48.0	*92.5*	*92.6*	*90.8*						
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 55.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0	*94.1*	*94.0*	*92.2*						
52.0	*95.5*	*95.4*							
54.0	*97.0*	*96.8*							
56.0									
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 60)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 60 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 60.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	79.8	76.0	72.0	68.2	64.5				
-10.0	79.8	76.0	72.0	68.2	64.5				
-5.0	79.8	76.0	72.0	68.2	64.5				
0.0	79.8	76.0	72.0	68.2	64.5				
5.0	79.8	76.0	72.0	68.2	64.5				
10.0	79.8	76.0	72.0	68.2	64.5				
12.0	79.8	76.0	72.0	68.2	64.5				
14.0	79.8	76.0	72.0	68.2	64.5				
16.0	79.8	76.0	72.0	68.2	64.5				
18.0	79.8	76.0	72.0	68.2	64.5				
20.0	79.8	76.0	72.0	68.2	*65.5*				
22.0	79.8	76.0	72.0	68.2	*65.7*				
24.0	79.8	76.0	72.0	*69.2*	*66.3*				
26.0	79.8	76.0	72.0	*69.7*	*67.6*				
28.0	79.8	76.0	*73.2*	*70.5*	*68.7*				
30.0	79.8	76.0	*74.3*	*71.9*	*70.7*				
32.0	79.8	*77.2*	*75.5*	*72.9*	*72.4*				
34.0	*79.8*	*78.3*	*76.8*	*74.9*	*73.8*				
36.0	*81.0*	*79.4*	*77.6*	*76.4*	*75.0*				
38.0	*82.1*	*80.5*	*79.3*	*77.6*	*76.2*				
40.0	*83.2*	*81.7*	*80.7*	*78.8*	*77.3*				
42.0	*84.3*	*83.1*	*81.8*	*79.9*	*78.4*				
44.0	*85.7*	*84.5*	*83.0*	*81.1*					
46.0	*87.2*	*86.0*	*84.2*	*82.3*					
48.0	*88.9*	*87.3*	*85.5*						

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 60.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0	*90.4*	*88.7*	*86.8*						
52.0	*91.7*	*90.0*							
54.0	*93.1*	*91.3*							
56.0	*94.5*								
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 65)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 65 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 65.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	75.3	71.7	67.8	64.0					
-10.0	75.3	71.7	67.8	64.0					
-5.0	75.3	71.7	67.8	64.0					
0.0	75.3	71.7	67.8	64.0					
5.0	75.3	71.7	67.8	64.0					
10.0	75.3	71.7	67.8	64.0					
12.0	75.3	71.7	67.8	64.0					
14.0	75.3	71.7	67.8	64.0					
16.0	75.3	71.7	67.8	64.0					
18.0	75.3	71.7	67.8	64.0					
20.0	75.3	71.7	67.8	64.0					
22.0	75.3	71.7	67.8	64.0					
24.0	75.3	71.7	67.8	*65.0*					
26.0	75.3	71.7	67.8	*65.5*					
28.0	75.3	71.7	*68.9*	*66.3*					
30.0	75.3	71.7	*70.0*	*67.5*					
32.0	75.3	*72.8*	*71.1*	*68.5*					
34.0	*75.3*	*73.9*	*72.3*	*70.4*					
36.0	*76.5*	*74.9*	*73.1*	*71.8*					
38.0	*77.5*	*75.9*	*74.6*	*72.9*					
40.0	*78.5*	*77.1*	*75.9*	*74.0*					
42.0	*79.6*	*78.3*	*77.0*	*75.1*					
44.0	*80.9*	*79.7*	*78.1*	*76.2*					
46.0	*82.4*	*81.1*	*79.3*	*77.4*					
48.0	*83.9*	*82.3*	*80.5*						

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 65.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0	*85.3*	*83.6*	*81.7*						
52.0	*86.6*	*84.8*							
54.0	*87.9*	*86.1*							
56.0	*89.2*								
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 70)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 70 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 70.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	71.0	67.5	63.7						
-10.0	71.0	67.5	63.7						
-5.0	71.0	67.5	63.7						
0.0	71.0	67.5	63.7						
5.0	71.0	67.5	63.7						
10.0	71.0	67.5	63.7						
12.0	71.0	67.5	63.7						
14.0	71.0	67.5	63.7						
16.0	71.0	67.5	63.7						
18.0	71.0	67.5	63.7						
20.0	71.0	67.5	63.7						
22.0	71.0	67.5	63.7						
24.0	71.0	67.5	63.7						
26.0	71.0	67.5	63.7						
28.0	71.0	67.5	*64.8*						
30.0	71.0	67.5	*65.7*						
32.0	71.0	*68.5*	*66.8*						
34.0	*71.0*	*69.6*	*67.9*						
36.0	*72.1*	*70.5*	*68.7*						
38.0	*73.0*	*71.5*	*70.1*						
40.0	*74.0*	*72.6*	*71.3*						
42.0	*75.1*	*73.8*	*72.4*						
44.0	*76.3*	*75.0*	*73.4*						
46.0	*77.6*	*76.3*	*74.5*						
48.0	*79.1*	*77.5*	*75.6*						

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 70.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0	*80.4*	*78.7*	*76.8*						
52.0	*81.6*	*79.9*							
54.0	*82.9*	*81.1*							
56.0	*84.1*								
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

POWER MANAGEMENT TABLE (TFLEX 75)

Applicable to: ALL

FLEXIBLE TAKEOFF - TFLEX = 75 °C

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 75.0 (C)

AIR CONDITIONING ON — MACH=.000

OAT (C)	PRESSURE ALTITUDE (FT)								
	-2000.	0.	2000.	4000.	6000.	8000.	10000.	12000.	14000.
-60.0	66.8	63.4							
-10.0	66.8	63.4							
-5.0	66.8	63.4							
0.0	66.8	63.4							
5.0	66.8	63.4							
10.0	66.8	63.4							
12.0	66.8	63.4							
14.0	66.8	63.4							
16.0	66.8	63.4							
18.0	66.8	63.4							
20.0	66.8	63.4							
22.0	66.8	63.4							
24.0	66.8	63.4							
26.0	66.8	63.4							
28.0	66.8	63.4							
30.0	66.8	63.4							
32.0	66.8	*64.4*							
34.0	*66.8*	*65.4*							
36.0	*67.9*	*66.3*							
38.0	*68.8*	*67.2*							
40.0	*69.7*	*68.2*							
42.0	*70.7*	*69.3*							
44.0	*71.8*	*70.5*							
46.0	*73.1*	*71.7*							
48.0	*74.4*	*72.9*							

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	NEANT
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

Continued on the following page

Continued from the previous page

GP7270 - FLEX TAKEOFF THR (%) - TFLEX = 75.0 (C)									
AIR CONDITIONING ON					MACH=.000				
OAT	PRESSURE ALTITUDE (FT)								
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**
50.0	*75.7*	*74.0*							
52.0	*76.8*	*75.1*							
54.0	*78.0*	*76.2*							
56.0	*79.1*								
OAT < CORNER POINT					*OAT > CORNER POINT*				

THR CORRECTIONS FOR AIR BLEED	**NEANT**
AIR CONDITIONING OFF	2.7
NACELLE ANTI ICE ON	-1.7
NACELLE AND WING ANTI ICE ON	-1.7

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MAXIMUM GO AROUND

Applicable to: ALL

The "Maximum Go Around" thrust rating is the maximum permissible thrust during go-around.

The FADEC commands the "Maximum Go Around" thrust rating:
- For a thrust lever on the TOGA detent
- After the throttle reduction
- Below 14 500 ft.

POWER MANAGEMENT TABLE

Applicable to: ALL

MAXIMUM GO AROUND

GP7270 - GO AROUND THR (%)										
AIR CONDITIONING ON										MACH=.250
TAT	PRESSURE ALTITUDE (FT)									
(C)	**-2000.**	**0.**	**2000.**	**4000.**	**6000.**	**8000.**	**10000.**	**12000.**	**14000.**	**16000.**
-60.0	98.2	98.2	97.9	97.9	97.8	97.5	97.5	98.2	98.3	99.0
-5.0	98.2	98.2	97.9	97.9	97.8	97.5	97.5	98.2	98.3	99.0
0.0	98.2	98.2	97.9	97.9	97.8	97.5	97.5	98.2	98.3	98.9
5.0	98.2	98.2	97.9	97.9	97.8	97.5	97.5	98.1	97.9	*98.4*
10.0	98.2	98.2	97.9	97.9	97.8	97.5	97.5	*97.7*	*97.4*	*97.2*
15.0	98.2	98.2	97.9	97.9	97.8	97.5	*97.4*	*97.3*	*96.9*	*96.4*
20.0	98.2	98.2	97.9	97.9	97.8	*97.5*	*97.3*	*97.0*	*96.6*	*96.1*
25.0	98.2	98.2	97.9	97.9	*97.7*	*97.2*	*97.0*	*96.8*	*96.4*	*95.8*
30.0	98.2	98.0	*97.9*	*97.7*	*97.6*	*97.0*	*96.8*	*96.6*	*96.1*	
35.0	98.2	*98.0*	*97.8*	*97.6*	*97.4*	*96.9*	*96.7*	*96.5*		
40.0	*98.2*	*98.0*	*97.8*	*97.6*	*97.4*	*96.8*				
45.0	*98.2*	*98.0*	*97.8*	*97.6*	*97.4*					
50.0	*98.3*	*98.1*	*97.9*	*97.7*						
55.0	*98.2*	*98.1*	*97.9*							
60.0	*98.2*									
OAT < CORNER POINT					*OAT > CORNER POINT*					

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING OFF	THR = 100.0	
NACELLE ANTI ICE ON	0.0	-1.9
NACELLE AND WING ANTI ICE ON	0.0	-3.2

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MAXIMUM CONTINUOUS

Applicable to: ALL

The “Maximum Continuous” thrust rating is the maximum thrust certified for continuous use. This rating should be used, at the flight crew discretion, only when required to ensure safe flight (engine failure).

The FADEC commands the “Maximum Continuous” thrust rating:

- After a throttle reduction or a TOGA recovery
- For a thrust lever on the FLX/MCT detent.

POWER MANAGEMENT TABLE (230KT)

Applicable to: ALL

MAXIMUM CONTINUOUS - IAS = 230 KT

GP7270 - MAXIMUM CONTINUOUS THR (%)												
AIR CONDITIONING LOW											VC=230KT	
TAT	PRESSURE ALTITUDE (FT)											
(C)	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	98.3	98.0	98.1	97.0	98.2	98.4	98.5	96.4	98.7	98.5	98.3	97.8
-25.0	98.3	98.0	98.1	97.0	98.2	98.4	98.5	96.4	98.7	98.5	98.3	97.8
-20.0	98.3	98.0	98.1	97.0	98.2	98.4	98.5	96.4	98.7	*98.5*	*98.3*	97.8
-15.0	98.3	98.0	98.1	97.0	98.2	98.4	98.5	96.4	*98.7*	*98.5*	*98.3*	*98.0*
-10.0	98.3	98.0	98.1	97.0	98.2	98.4	98.5	*96.4*	*98.6*	*98.5*	*98.3*	*98.0*
-5.0	98.3	98.0	98.1	97.0	98.2	98.4	*98.5*	*96.8*	*98.5*	*98.1*	*97.7*	*97.4*
0.0	98.3	98.0	98.1	97.0	98.2	98.4	*98.3*	*98.3*	*98.1*	*97.9*	*97.5*	*97.0*
5.0	98.3	98.0	98.1	97.0	98.2	*98.6*	*98.4*	*98.1*	*98.3*	*97.8*	*97.3*	*96.9*
10.0	98.3	98.0	98.1	97.0	*96.8*	*97.8*	*97.7*	*97.7*	*97.9*	*97.4*	*97.0*	*96.1*
15.0	98.3	98.0	98.1	*95.9*	*96.0*	*97.3*	*97.3*	*97.2*				*95.5*
20.0	98.3	98.0	*98.1*	*93.8*	*95.8*	*97.0*	*97.0*	*96.9*				
25.0	98.3	98.0	*93.6*	*94.5*	*95.3*	*96.9*	*96.9*					
30.0	98.3	*95.2*	*93.9*	*94.6*	*95.1*	*96.8*						
35.0	*98.2*	*94.0*	*95.0*	*94.6*	*95.1*							
40.0	*96.9*	*94.8*	*95.1*	*94.6*								
45.0	*93.3*	*93.5*	*94.4*									
50.0	*92.1*	*92.2*	*93.2*									
55.0	*90.2*	*90.9*										
60.0	*89.5*											
OAT < CORNER POINT							*OAT > CORNER POINT*					

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
OTHER ECS CONFIGURATION DOWN TO	-1.2	-1.2
NACELLE ANTI ICE ON	0.0	-3.1
NACELLE AND WING ANTI ICE ON	0.0	-5.8

POWER MANAGEMENT TABLE (260KT)

Applicable to: ALL

MAXIMUM CONTINUOUS - IAS = 260 KT

GP7270 - MAXIMUM CONTINUOUS THR (%)

AIR CONDITIONING LOW — VC=260KT

TAT (C)	PRESSURE ALTITUDE (FT)											
	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	98.3	98.2	97.8	98.2	98.4	98.4	98.5	98.3	98.7	98.4	98.2	97.9
-25.0	98.3	98.2	97.8	98.2	98.4	98.4	98.5	98.3	98.7	98.4	98.2	97.9
-20.0	98.3	98.2	97.8	98.2	98.4	98.4	98.5	98.3	98.7	98.4	98.2	97.9
-15.0	98.3	98.2	97.8	98.2	98.4	98.4	98.5	98.3	98.7	*98.5*	98.2	97.9
-10.0	98.3	98.2	97.8	98.2	98.4	98.4	98.5	98.3	*98.7*	*98.5*	*98.2*	97.9
-5.0	98.3	98.2	97.8	98.2	98.4	98.4	98.5	*98.5*	*98.6*	*98.4*	*98.0*	*97.6*
0.0	98.3	98.2	97.8	98.2	98.4	98.4	*98.2*	*98.1*	*98.1*	*97.8*	*97.5*	*97.1*
5.0	98.3	98.2	97.8	98.2	98.4	*98.5*	*98.3*	*98.2*	*98.1*	*97.7*	*97.2*	*96.9*
10.0	98.3	98.2	97.8	98.2	*98.3*	*98.0*	*97.9*	*97.8*	*97.8*	*97.5*	*97.1*	*96.7*
15.0	98.3	98.2	97.8	98.2	*98.3*	*97.5*	*97.6*	*97.6*	*97.6*	*97.1*	*96.3*	*95.8*
20.0	98.3	98.2	97.8	*97.6*	*98.0*	*97.0*	*96.9*	*96.9*	*96.9*			*95.3*
25.0	98.3	98.2	*95.7*	*97.4*	*97.9*	*96.9*	*96.8*					*95.1*
30.0	98.3	*97.4*	*93.8*	*97.5*	*97.9*	*96.8*						
35.0	98.3	*93.9*	*96.1*	*97.4*	*97.8*	*96.7*						
40.0	*97.8*	*94.9*	*95.8*	*97.4*	*97.7*							
45.0	*93.4*	*94.2*	*94.3*	*97.3*								
50.0	*92.7*	*92.5*	*92.8*									
55.0	*91.0*	*90.8*										
60.0	*89.6*	*89.4*										

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
OTHER ECS CONFIGURATION DOWN TO	-1.2	-1.2
NACELLE ANTI ICE ON	0.0	-3.1
NACELLE AND WING ANTI ICE ON	0.0	-5.8

POWER MANAGEMENT TABLE (290KT/M.84)

Applicable to: ALL

MAXIMUM CONTINUOUS - 290 KT/M 0.84

GP7270 - MAXIMUM CONTINUOUS THR (%)

AIR CONDITIONING LOW — 290/.84

TAT (C)	PRESSURE ALTITUDE (FT)											
	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	98.3	98.6	98.4	98.2	98.0
-25.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	98.3	98.6	98.4	98.2	98.0
-20.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	98.3	98.6	98.4	98.2	98.0
-15.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	98.3	98.6	98.4	98.2	98.0
-10.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	98.3	98.6	*98.4*	*98.2*	*97.9*
-5.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	98.3	*98.6*	*98.3*	*98.0*	*97.4*
0.0	98.3	98.3	98.2	98.1	98.4	98.3	98.1	*98.1*	*98.1*	*97.8*	*97.5*	*97.1*
5.0	98.3	98.3	98.2	98.1	98.4	98.3	*98.2*	*98.1*	*98.0*	*97.5*	*97.2*	*96.9*
10.0	98.3	98.3	98.2	98.1	98.4	*97.9*	*97.9*	*97.8*	*97.9*	*97.6*	*97.1*	*96.2*
15.0	98.3	98.3	98.2	98.1	*98.3*	*97.6*	*97.6*	*97.5*	*97.6*	*96.9*	*96.3*	*95.6*
20.0	98.3	98.3	98.2	*98.1*	*98.0*	*97.0*	*96.9*	*96.8*	*97.1*	*96.5*		
25.0	98.3	98.3	98.2	*98.1*	*97.9*	*96.9*	*96.8*	*96.7*	*96.7*			
30.0	98.3	98.3	*98.2*	*98.0*	*97.8*	*96.7*	*96.7*	*96.6*				
35.0	98.3	*97.1*	*98.1*	*97.9*	*97.7*	*96.6*						
40.0	*97.7*	*95.9*	*98.1*	*97.9*	*97.7*							
45.0	*94.6*	*96.1*	*98.0*	*97.9*								
50.0	*92.4*	*94.8*	*98.1*	*97.9*								
55.0	*91.0*	*93.8*	*98.1*									
60.0	*89.6*	*93.0*										

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
OTHER ECS CONFIGURATION DOWN TO	-1.2	-1.2
NACELLE ANTI ICE ON	0.0	-3.1
NACELLE AND WING ANTI ICE ON	0.0	-5.8

POWER MANAGEMENT TABLE (320KT/M.84)

Applicable to: ALL

MAXIMUM CONTINUOUS - 320 KT/M 0.84

GP7270 - MAXIMUM CONTINUOUS THR (%)

AIR CONDITIONING LOW — 320/.84

TAT (C)	PRESSURE ALTITUDE (FT)											
	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	98.4	98.4	98.2	98.0
-25.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	98.4	98.4	98.2	98.0
-20.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	98.4	98.4	98.2	98.0
-15.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	98.4	98.4	98.2	98.0
-10.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	98.4	*98.4*	*98.2*	*97.9*
-5.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	98.4	*98.3*	*98.0*	*97.4*
0.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	98.0	*98.1*	*97.8*	*97.5*	*97.1*
5.0	98.5	98.3	98.2	98.1	98.4	97.8	98.1	*97.9*	*97.9*	*97.5*	*97.2*	*96.9*
10.0	98.5	98.3	98.2	98.1	98.4	97.8	*97.8*	*97.9*	*97.8*	*97.6*	*97.1*	*96.2*
15.0	98.5	98.3	98.2	98.1	98.4	*97.7*	*97.6*	*97.5*	*97.7*	*96.9*	*96.3*	*95.6*
20.0	98.5	98.3	98.2	98.1	*97.9*	*97.1*	*97.0*	*96.9*	*97.1*	*96.5*		
25.0	98.5	98.3	98.2	*98.0*	*97.9*	*96.8*	*96.7*	*96.7*	*96.8*			
30.0	98.5	98.3	*98.2*	*98.0*	*97.8*	*96.7*	*96.6*	*96.6*	*96.6*			
35.0	98.5	*98.3*	*98.1*	*97.9*	*97.7*	*96.6*	*96.6*	*96.5*				
40.0	98.5	*98.2*	*98.0*	*97.8*	*97.6*	*96.5*						
45.0	*98.2*	*98.2*	*98.0*	*97.8*	*97.6*							
50.0	*96.8*	*98.3*	*98.1*	*97.9*								
55.0	*96.7*	*98.3*	*98.1*									
60.0	*96.2*	*98.2*										

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
OTHER ECS CONFIGURATION DOWN TO	-1.2	-1.2
NACELLE ANTI ICE ON	0.0	-3.3
NACELLE AND WING ANTI ICE ON	0.0	-6.7

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MAXIMUM CLIMB

Applicable to: ALL

The “Maximum Climb” thrust rating is the maximum thrust approved for normal climb.
The FADEC commands this rating when the thrust lever is on the CL detent and no derated level entered in the MFD - PERF - CLB page.

POWER MANAGEMENT TABLE

Applicable to: ALL

MAXIMUM CLIMB - 250 KT/320 KT/M 0.84

GP7270 - MAXIMUM CLIMB THR (%)

AIR CONDITIONING NORM												250/320/.84
TAT	PRESSURE ALTITUDE (FT)											
(C)	**-1000.**	**3000.**	**7000.**	**11000.**	**15000.**	**19000.**	**23000.**	**27000.**	**31000.**	**35000.**	**39000.**	**43000.**
-60.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	98.5	98.5	98.3	98.1
-25.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	98.5	98.5	98.3	98.1
-20.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	98.5	98.5	98.3	98.1
-15.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	98.5	98.5	98.3	98.1
-10.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	98.5	*98.5*	*98.3*	*98.1*
-5.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	98.5	*98.4*	*98.1*	*97.6*
0.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	98.2	*98.2*	*97.9*	*97.6*	*97.2*
5.0	98.4	98.2	98.1	98.1	98.0	97.2	98.2	*98.1*	*98.0*	*97.7*	*97.3*	*97.1*
10.0	98.4	98.2	98.1	98.1	98.0	97.2	*97.9*	*98.0*	*98.0*	*97.7*	*97.3*	*96.5*
15.0	98.4	98.2	98.1	98.1	98.0	*97.5*	*97.7*	*97.6*	*97.9*	*97.1*	*96.5*	*95.9*
20.0	98.4	98.2	98.1	98.1	*97.8*	*97.3*	*97.2*	*97.1*	*97.3*	*96.7*		
25.0	98.4	98.2	*95.1*	*98.0*	*98.0*	*97.0*	*96.9*	*96.9*	*96.9*			
30.0	98.4	*96.7*	*94.0*	*98.0*	*97.9*	*96.9*	*96.8*	*96.8*	*96.8*			
35.0	98.4	*94.0*	*95.9*	*98.0*	*97.8*	*96.8*	*96.8*	*96.7*				
40.0	*97.6*	*95.3*	*95.7*	*97.9*	*97.7*	*96.6*						
45.0	*93.1*	*94.3*	*94.4*	*97.9*	*97.7*							
50.0	*92.6*	*92.7*	*93.1*	*98.0*								
55.0	*90.7*	*91.1*										
60.0	*89.6*											
OAT < CORNER POINT							*OAT > CORNER POINT*					

THR CORRECTIONS FOR AIR BLEED	**OAT < CORNER POINT**	**OAT > CORNER POINT**
AIR CONDITIONING LOW	+0.4	+0.4
NACELLE ANTI ICE ON	0.0	-3.3
NACELLE AND WING ANTI ICE ON	0.0	-6.7

DERATED CLIMB

Applicable to: ALL

The Derated Climb thrust rating is a reduced maximum thrust that the flight crew can select for the climb.
The FADEC manages the Derated Climb thrust rating when the thrust lever is set to the CL detent and a derated level is entered in the FMS - PERF - CLB page.

The Derated Climb thrust rating has the following economical advantages:
- Increased engine life
- Improved engine reliability
- Reduced direct maintenance costs.

There are three Derated Climb thrust ratings:
- Derated Climb 1 (DCL1)
- Derated Climb 2 (DCL2)
- Derated Climb 3 (DCL3).

The Derated Climb thrust rating progressively increases to the Maximum Climb (MCL) thrust rating (washout). The use of a Derated Climb thrust rating consequently does not affect the climb ceiling or the climb rate at the end of the climb.
The climb ratings, the associated thrust ratings and the indicative altitudes at which the washout begins (ISA conditions) are as follows.

CLB Thrust	Maximum Thrust Reduction from MCL Thrust	Progressive Washout to MCL Thrust from
MCL	0 %	N/A
DCL1	8 %	29 000 ft
DCL2	16 %	25 000 ft
DCL3	24 %	21 000 ft

The higher the temperature, the lower the washout altitude.
The economical advantages increase for high Derated Climb thrust ratings. The reduced direct maintenance costs usually compensate for the slight increase in the fuel consumed and the time necessary to climb.

The use of an appropriate Derated Climb thrust rating is recommended:
- When the aircraft is light, or
- In cool atmosphere, or
- When there are no obstacles or operational constraints to clear along the flight path.

DERATED CLIMB LEVEL DETERMINATION

Applicable to: ALL

GENERAL

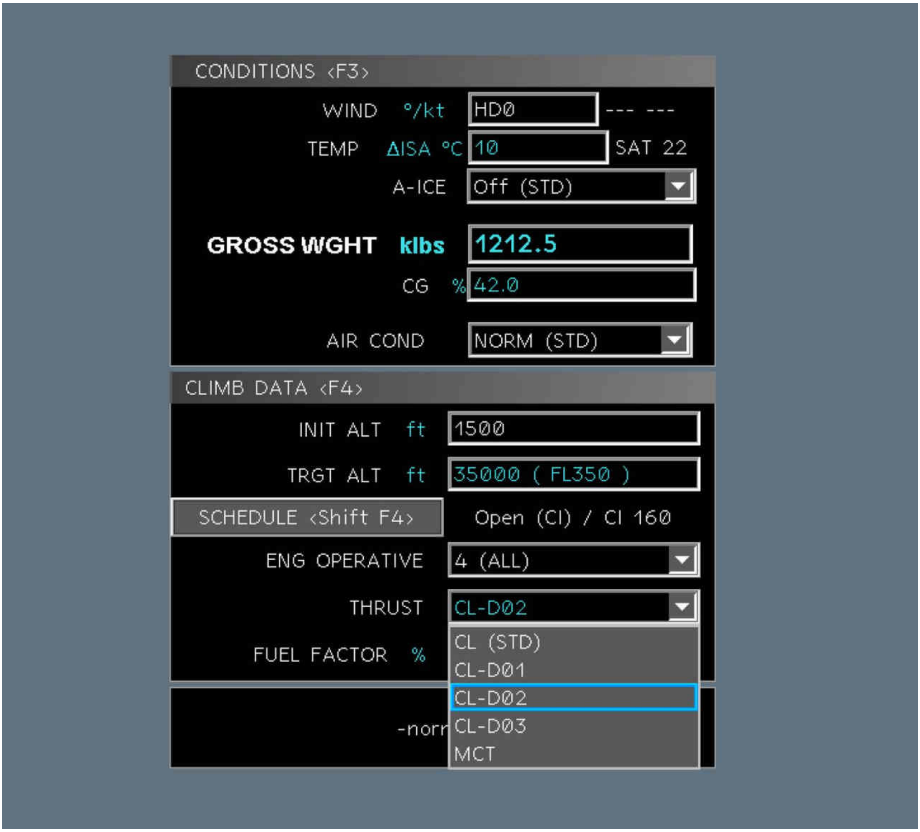
The flight crew selects the appropriate Derated Climb level before takeoff.
When possible, DCL3 is recommended. However, the operational constraints may require higher thrust levels, and it may not be possible to achieve these constraints with DCL3. In this case, the flight crew may select DCL2, DCL1, or even keep MCL.
Below is an example that illustrates a method to determine the appropriate Derated Climb level, when there is an altitude constraint at a specific ground distance from the runway (e.g. ATC requirement).
This method consists in successively checking if DCL3, DCL2, or DCL1, is appropriate for the clearance of the constraint. The MCL thrust rating should be used only when required.

EXAMPLE

The flight crew may use the IN-FLT PERF CLB module to determine the appropriate Derated Climb level.
For more information about the CLB module, *Refer to PER-IFT-CLB-CMI CLB Module Interface* .

ASSUMPTIONS

Assumptions



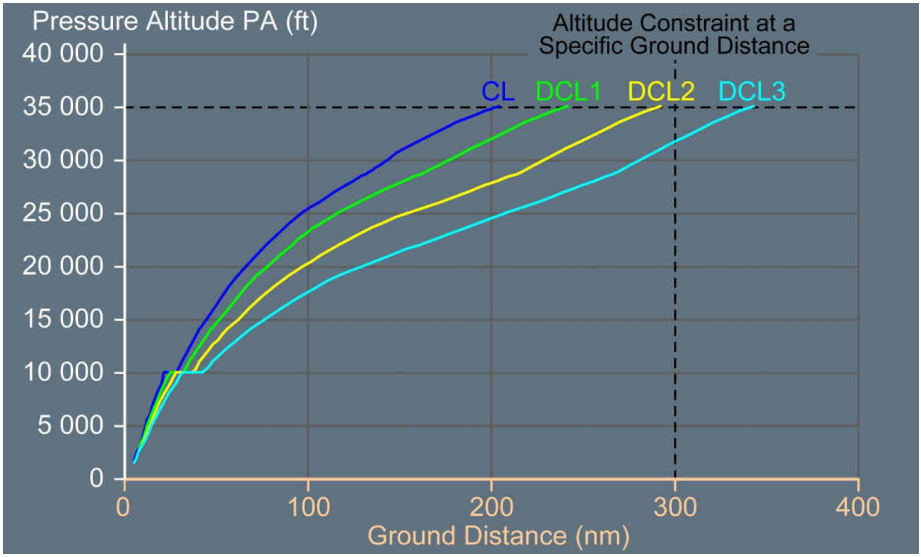
The example is based on the following assumptions:
- MTOW : 1 215 700 lb
- Airflow: NORM
- Anti-Ice: OFF

- Center of gravity: 42 %RC
- Climb speed profile: 250 kt up to an altitude of 10 000 ft - Open (CI) with CI = 210
- ISA conditions: ISA +10
- Altitude constraint: 35 000 ft at a ground distance of 300 nm from the runway
- Takeoff allowances from brake release to +1 500 ft :
  - Time: 3 min
  - Fuel: 3 200 lb
  - Distance: 5 nm .

  Note: *Consider these takeoff allowances as an example only.*

DERATED CLIMB LEVEL DETERMINATION

Derated Climb Level Determination



- IN-FLT PERF CLB computation with DCL3
  As illustrated above, the ground distance required to climb to 35 000 ft with DCL3 is more than the ground distance available to climb to the altitude constraint. This ground distance is the sum of the takeoff allowance distance plus the ground distance from 1 500 ft to 35 000 ft resulting from the IN-FLT PERF CLB computation with DCL3.
  The altitude constraint is not cleared. Therefore, the flight crew cannot select DCL3.
- IN-FLT PERF CLB computation with DCL2

As illustrated above, the ground distance required to climb to 35 000 ft with DCL2 is less than 250 nm . This ground distance is the sum of the takeoff allowance distance plus the ground distance from 1 500 ft to 35 000 ft resulting from the IN-FLT PERF CLB computation with DCL2.

The altitude constraint is cleared. Therefore, the flight crew can select DCL2.

L12

Note: *The flight crew can clear the DCL thrust rating at any time during the climb if required.*

To clear the DCL thrust rating, the flight crew can:

- *Select NONE in the DERATED CLB drop down list of the FMS - PERF - CLB page, or*
  For more information about the DERATED CLB drop down list of the FMS - PERF - CLB page, Refer to DSC-22-FMS-20-30-22FMS502BC PERF page .
- *Change the thrust lever position out of the CL detent and then set the thrust lever position back to the CL detent.*

POWER MANAGEMENT TABLE (DCL1)

Applicable to: ALL

DERATED CLIMB 1 - 250 KT/320 KT/M 0.84

GP7270 - DERATED CLIMB 1 THR (%)

AIR CONDITIONING NORM — 250/320/.84

TAT (C)	PRESSURE ALTITUDE (FT)											
	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	94.9	98.5	98.3	98.1
-25.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	94.9	98.5	98.3	98.1
-20.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	94.9	98.5	98.3	98.1
-15.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	94.9	98.5	98.3	98.1
-10.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	94.9	*98.5*	*98.3*	*98.1*
-5.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	94.9	*98.4*	*98.1*	*97.6*
0.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	90.6	*95.7*	*97.9*	*97.6*	*97.2*
5.0	91.2	90.5	90.5	89.4	89.0	89.1	90.5	*90.2*	*97.5*	*97.7*	*97.3*	*97.1*
10.0	91.2	90.5	90.5	89.4	89.0	89.1	*89.6*	*89.1*	*98.0*	*97.7*	*97.3*	*96.5*
15.0	91.2	90.5	90.5	89.4	89.0	*88.4*	*87.8*	*89.8*	*97.9*	*97.1*	*96.5*	*95.9*
20.0	91.2	90.5	90.5	89.4	*88.6*	*87.3*	*86.3*	*92.9*	*97.3*	*96.7*		
25.0	91.2	90.5	*87.5*	*89.2*	*88.5*	*86.8*	*85.9*	*96.9*	*96.9*			
30.0	91.2	*89.1*	*86.2*	*89.0*	*88.0*	*86.3*	*87.9*	*96.8*	*96.8*			
35.0	91.2	*86.5*	*87.9*	*88.8*	*87.7*	*85.9*	*96.8*	*96.7*				
40.0	*90.5*	*87.9*	*87.8*	*88.6*	*87.6*	*87.2*						
45.0	*86.3*	*87.1*	*86.8*	*88.9*	*87.9*							
50.0	*85.7*	*85.4*	*85.4*	*89.0*								
55.0	*83.7*	*83.7*										
60.0	*82.6*											

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING LOW	+0.4	+0.4
NACELLE ANTI ICE ON	0.0	-3.3
NACELLE AND WING ANTI ICE ON	0.0	-6.7

POWER MANAGEMENT TABLE (DCL2)

Applicable to: ALL

DERATED CLIMB 2 - 250 KT/320 KT/M 0.84

GP7270 - DERATED CLIMB 2 THR (%)												
AIR CONDITIONING NORM											250/320/.84	
TAT	PRESSURE ALTITUDE (FT)											
(C)	**-1000.**	**3000.**	**7000.**	**11000.**	**15000.**	**19000.**	**23000.**	**27000.**	**31000.**	**35000.**	**39000.**	**43000.**
-60.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	94.9	98.5	98.3	98.1
-25.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	94.9	98.5	98.3	98.1
-20.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	94.9	98.5	98.3	98.1
-15.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	94.9	98.5	98.3	98.1
-10.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	94.9	*98.5*	*98.3*	*98.1*
-5.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	94.9	*98.4*	*98.1*	*97.6*
0.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	86.3	*95.7*	*97.9*	*97.6*	*97.2*
5.0	84.5	83.3	82.9	81.0	80.2	79.9	81.0	*87.1*	*97.5*	*97.7*	*97.3*	*97.1*
10.0	84.5	83.3	82.9	81.0	80.2	79.9	*79.7*	*88.5*	*98.0*	*97.7*	*97.3*	*96.5*
15.0	84.5	83.3	82.9	81.0	80.2	*79.1*	*77.8*	*89.8*	*97.9*	*97.1*	*96.5*	*95.9*
20.0	84.5	83.3	82.9	81.0	*79.7*	*77.7*	*79.3*	*92.9*	*97.3*	*96.7*		
25.0	84.5	83.3	*80.2*	*80.8*	*79.3*	*77.0*	*82.7*	*96.9*	*96.9*			
30.0	84.5	*82.1*	*79.1*	*80.5*	*78.9*	*76.6*	*87.9*	*96.8*	*96.8*			
35.0	84.5	*79.9*	*80.7*	*80.5*	*78.8*	*79.1*	*96.8*	*96.7*				
40.0	*83.8*	*81.1*	*80.6*	*80.6*	*78.9*	*87.2*						
45.0	*79.8*	*80.2*	*79.5*	*80.7*	*80.5*							
50.0	*79.1*	*78.5*	*78.1*	*80.5*								
55.0	*77.2*	*76.8*										
60.0	*76.0*											
OAT < CORNER POINT							*OAT > CORNER POINT*					

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING LOW	+0.4	+0.4
NACELLE ANTI ICE ON	0.0	-3.3
NACELLE AND WING ANTI ICE ON	0.0	-6.7

POWER MANAGEMENT TABLE (DCL3)

Applicable to: ALL

DERATED CLIMB 3 - 250 KT/320 KT/M 0.84

GP7270 - DERATED CLIMB 3 THR (%)

AIR CONDITIONING NORM — 250/320/.84

TAT (C)	PRESSURE ALTITUDE (FT)											
	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	94.9	98.5	98.3	98.1
-25.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	94.9	98.5	98.3	98.1
-20.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	94.9	98.5	98.3	98.1
-15.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	94.9	98.5	98.3	98.1
-10.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	94.9	*98.5*	*98.3*	*98.1*
-5.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	94.9	*98.4*	*98.1*	*97.6*
0.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	86.3	*95.7*	*97.9*	*97.6*	*97.2*
5.0	78.0	77.0	76.1	73.5	71.9	71.1	76.2	*87.1*	*97.5*	*97.7*	*97.3*	*97.1*
10.0	78.0	77.0	76.1	73.5	71.9	71.1	*76.8*	*88.5*	*98.0*	*97.7*	*97.3*	*96.5*
15.0	78.0	77.0	76.1	73.5	71.9	*70.2*	*77.6*	*89.8*	*97.9*	*97.1*	*96.5*	*95.9*
20.0	78.0	77.0	76.1	73.5	*71.4*	*69.0*	*79.3*	*92.9*	*97.3*	*96.7*		
25.0	78.0	77.0	*73.6*	*73.3*	*71.3*	*71.2*	*82.7*	*96.9*	*96.9*			
30.0	78.0	*75.8*	*72.7*	*73.2*	*71.1*	*74.3*	*87.9*	*96.8*	*96.8*			
35.0	78.0	*73.6*	*74.0*	*73.1*	*70.9*	*79.1*	*96.8*	*96.7*				
40.0	*77.4*	*74.6*	*73.8*	*72.9*	*73.1*	*87.2*						
45.0	*73.6*	*73.7*	*72.7*	*72.9*	*80.5*							
50.0	*72.9*	*72.0*	*71.3*	*73.6*								
55.0	*71.0*	*70.2*										
60.0	*70.0*											

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING LOW	+0.4	+0.4
NACELLE ANTI ICE ON	0.0	-3.3
NACELLE AND WING ANTI ICE ON	0.0	-6.7

MAXIMUM CRUISE

Applicable to: ALL

The “Maximum Cruise” thrust rating is the maximum thrust approved for normal cruise.
There is no thrust lever position corresponding to this thrust rating.
It is not displayed to the flight crew, and the THR limit which is displayed in cruise is the maximum climb THR (taking into account the air bleed effect).
The FG AFS uses the maximum cruise TPR to compute the aircraft maximum speed.

With A/THR disconnected, in cruise AEO , the flight crew should limit THR to the maximum cruise THR that is equal to the THR value displayed on the IN-FLT PERF application:

- For a CRZ calculation, and
- With CL (A/THR) as THRUST.

For more information about THR in the IN-FLT PERF application, *Refer to PER-IFT-CRZ-CRR-CRF THR* .

POWER MANAGEMENT TABLE

Applicable to: ALL

MAXIMUM CRUISE

GP7270 - MAXIMUM CRUISE THR (%)

AIR CONDITIONING NORM — 250/320/.84

TAT (C)	PRESSURE ALTITUDE (FT)											
	-1000.	3000.	7000.	11000.	15000.	19000.	23000.	27000.	31000.	35000.	39000.	43000.
-60.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	92.3	93.9	93.7	93.5
-25.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	92.3	93.9	93.7	93.5
-20.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	92.3	93.9	93.7	93.5
-15.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	92.3	93.9	93.7	93.5
-10.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	92.3	*93.6*	*93.0*	*92.8*
-5.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	92.3	*92.7*	*92.0*	*91.4*
0.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	92.4	*91.8*	*91.5*	*91.2*	*91.0*
5.0	91.7	91.5	91.8	91.4	91.7	91.8	92.7	*92.2*	*91.5*	*91.1*	*90.3*	*89.7*
10.0	91.7	91.5	91.8	91.4	91.7	91.8	*92.1*	*91.4*	*90.6*	*89.9*	*88.6*	*87.6*
15.0	91.7	91.5	91.8	91.4	91.7	*91.2*	*90.7*	*89.6*	*89.0*	*87.8*	*86.9*	*86.3*
20.0	91.7	91.5	91.8	91.4	*91.4*	*90.1*	*89.3*	*88.3*	*87.6*	*86.7*		
25.0	91.7	91.5	*88.7*	*91.3*	*91.3*	*89.7*	*88.8*	*87.8*	*86.9*			
30.0	91.7	*90.0*	*87.5*	*91.1*	*91.0*	*89.3*	*88.5*	*87.6*	*86.6*			
35.0	91.7	*87.4*	*89.2*	*90.9*	*90.6*	*88.9*	*88.1*	*87.3*				
40.0	*91.0*	*88.8*	*89.1*	*90.7*	*90.5*	*88.7*						
45.0	*86.8*	*88.0*	*88.0*	*91.0*	*90.7*							
50.0	*86.2*	*86.3*	*86.6*	*91.1*								
55.0	*84.3*	*84.6*										
60.0	*83.2*											

OAT < CORNER POINT — *OAT > CORNER POINT*

THR CORRECTIONS FOR AIR BLEED	OAT < CORNER POINT	OAT > CORNER POINT
AIR CONDITIONING LOW	+0.4	+0.4
NACELLE ANTI ICE ON	0.0	-3.4
NACELLE AND WING ANTI ICE ON	0.0	-6.0

N1 TO FLY

Applicable to: ALL

The following table gives the N1 to be set in cruise to maintain M 0.85.

M.85	FLIGHT LEVEL							
WEIGHT (KLB)	290	310	330	350	370	390	410	431
620	87.3	87.1	87.1	87.1	87.6	88.7	90.0	91.6
660	87.6	87.6	87.6	87.7	88.2	89.4	90.9	92.7
700	88.0	88.0	88.1	88.2	88.9	90.2	91.9	93.9
740	88.5	88.5	88.6	88.8	89.6	91.1	92.9	95.2
780	88.9	88.9	89.1	89.4	90.3	92.0	94.0	96.7
820	89.3	89.4	89.6	90.0	91.1	92.9	95.1	98.8
860	87.7	89.9	90.2	90.7	91.9	93.9	96.5	101.0
900	90.2	90.4	90.8	91.5	92.8	95.0	98.3	
940	90.6	90.9	91.4	92.2	93.7	96.2	100.3	
980	91.1	91.5	92.2	93.1	94.7	97.7		
1020	91.6	92.1	92.8	93.9	95.8	99.7		
1060	92.2	92.8	93.6	94.8	97.1	101.8		
1100	92.8	93.5	94.4	95.8	98.9			
1140	93.4	94.2	95.3	96.9	100.6			
1180	94.1	94.9	96.2	98.3				
1220	94.7	95.7	97.2	100.0				
1260	95.4	96.6	98.2	101.7				N1 (%)

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PERFORMANCE

TAKEOFF

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TAKEOFF PERFORMANCE OPTIMIZATION

Applicable to: ALL

GENERAL

Takeoff performance optimization is the process which aims at obtaining:
- The maximum performance limited takeoff weight (MTOW(perf))
- The maximum takeoff thrust reduction for the current weight.

Takeoff performance is optimized for each runway, the associated obstacles, flap setting and prevailing conditions (temperature, wind and QNH).

T.O PERF

The takeoff performance optimization process is made with the takeoff performance application (T.O PERF).

This application determines:
- MTOW(perf)
- The optimum thrust option.

T.O PERF provides the takeoff performance information to the flight crew that is necessary for an optimized takeoff.

The flight crew uses T.O PERF:
- During flight preparation: To determine the maximum takeoff weight limited by performance (e.g. runway, takeoff climb segments, obstacles)
- During OIS preparation, then before start clearance, and during taxi in the case of runway change: To obtain applicable takeoff data.

TAKEOFF PERFORMANCE PARAMETERS

Applicable to: ALL

The takeoff performance optimization process:
- Takes into account the parameters that affect takeoff performance
- Optimizes the parameters for which there is a possible range of values or settings.

The takeoff performance parameters are:
- The characteristics of the runway

L2
- Declared lengths (TORA , TODA , ASDA)
- Elevation
- Slope
- Obstacles.

For more information about the characteristics of the runway, *Refer to PER-TOF-TOC-RWY Airport Panel* .

L1 - The outside conditions

L2
- Temperature
- Wind
- QNH
- Anti-ice
- Runway state.

For more information about the outside conditions, *Refer to PER-TOF-TOC-OCD Outside Conditions Subpanel* .

L1 - The aircraft configuration

L2
- Aerodynamic configuration
- Air conditioning
- The derate level (in the case of a VMCG limitation).

For more information about the aircraft configuration, *Refer to Aircraft Configuration - Single Results* , or
For more information about the aircraft configuration, *Refer to Aircraft Configuration - Multiple Results* .

L1 - The aircraft status

L2
- MEL ,
- CDL .

For more information about the aircraft status, *Refer to PER-TOF-TOC-AFS AIRCRAFT STATUS Panel* .

L1 - The takeoff speeds.

L2
- V1
- V2.

L1 The following parameters can be optimized:
- Aerodynamic configuration
- Air conditioning
- Derate level (in the case of a VMCG limitation)
- Takeoff speeds.

SPEED OPTIMIZATION

Applicable to: ALL

Among the takeoff performance parameters that can be optimized, the takeoff speeds optimization has the largest potential for gain of takeoff weight.

The takeoff performance optimization process calculates the takeoff speeds (V1 and V2) that produce:

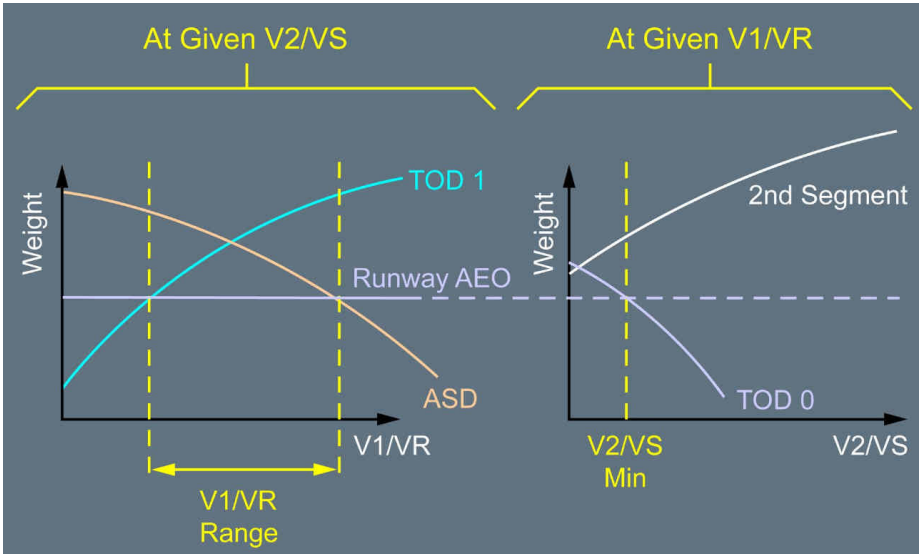
- MTOW(perf), or
- The maximum takeoff temperature for the current weight (in the case of a FLEX Takeoff).

This is done by calculating the performance limitations due to regulatory requirements versus speed.

L2 EXAMPLE

The graph below provides an example of a takeoff speed computation:

Weight vs. Speed



TOD 0	Takeoff Distance All Engines Operative (AEO)
TOD 1	Takeoff Distance One Engine Inoperative (OEI)

The takeoff performance of a four-engine aircraft usually results from the all-engine runway limitation (Runway AEO). In this example, Runway AEO corresponds to TOD 0.
The graph on the right indicates that the optimum V2/VS is the minimum value of the V2/VS range.

Due to the Runway AEO limitation, the takeoff weight that can be achieved is the same for a range of V1/VR:

- At the minimum of the V1/VR range (V1 min), the takeoff weight is limited by both the Takeoff Distance (TOD) and the Runway AEO
- Along the V1/VR range, the takeoff weight is only limited by the Runway AEO
- At the maximum of V1/VR range (V1 max), the takeoff weight is limited by both the Accelerate-Stop Distance (ASD) and the Runway AEO.

In addition, optimum V1 may be affected by the obstacles.

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T.O PERF INITIALIZATION

Applicable to: ALL

FLT OPS STS

The Flight Operations Status (FLT OPS STS) page defines the aircraft context (aircraft registration, MSN) and the flight context (flight number, city pair).

The aircraft and flight contexts aim at:
- Securing the communication between the FLT OPS applications
- Preventing the use of incorrect inputs coming from another flight.

This common reference page enables the other FLT OPS applications to synchronize with the aircraft and flight data entered in the FLT OPS STS page.
For more information about the FLT OPS STS page, *Refer to DSC-46-20-10-30 FLT OPS STS Page* .

PREREQUISITE TO START T.O PERF

FLIGHT OPERATION STATUS

To enable the launch of T.O PERF, the following mandatory parameters must be filled in the FLT OPS STS page:
- The aircraft registration (ACFT REGISTRATION)
- The manufacturer serial number (MSN)
- The flight number (FLT NBR)
- The departure airport (FROM).

If one of the previous parameters is not defined, T.O PERF cannot be launched.

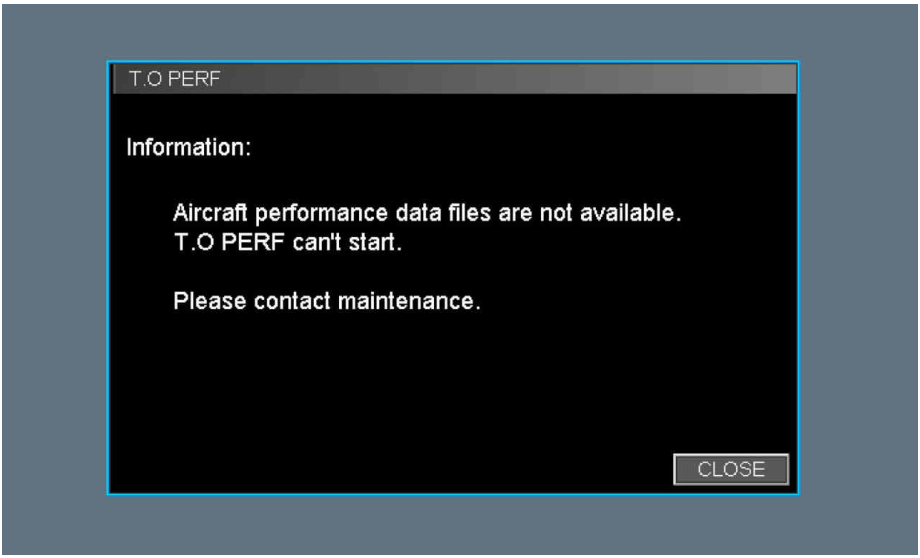
Note: If no destination airport (TO) is defined in the FLT OPS STS page, T.O PERF can still be launched.

When the flight crew launches T.O PERF, the departure airport (FROM) of the FLT OPS STS page is retrieved in T.O PERF and displayed in yellow in the AIRPORT field of the SINGLE RWY COMPUTATION panel.

PERFORMANCE DATABASES

When the flight crew starts T.O PERF without the relevant performance databases, the following error message appears and T.O PERF cannot start:

Error at T.O PERF Start



The flight crew needs to contact the ground.

CHANGE OF AIRPORT IN T.O PERF

Applicable to: ALL

When the flight crew directly changes the departure airport in T.O PERF, this is considered as a next flight simulation.
As a consequence, the FLT OPS STS page parameters do not change.

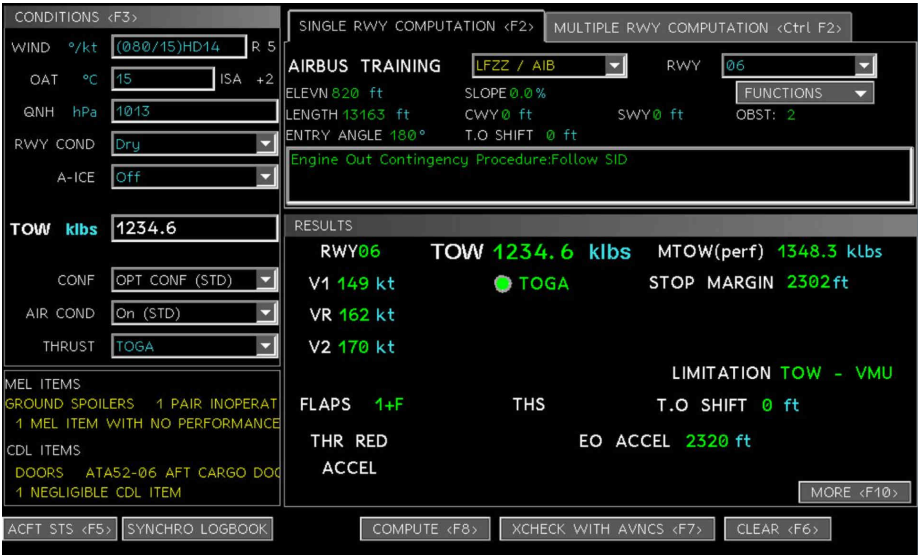
T.O PERF becomes in standalone mode (it is not anymore in the same context as other applications):

- All input data of T.O PERF are reset to default values
- TOW is defaulted to MSTOW
- Previous T.O PERF results are deleted
- MEL / CDL items still remain
- Data from LOADSHEET and OPS LIBRARY are not available anymore (communication capability with LOADSHEET or OPS LIBRARY is lost).

T.O PERF INTERFACE

Applicable to: ALL

T.O PERF Interface



SINGLE RWY COMPUTATION / MULTIPLE RWY COMPUTATION

The flight crew can:
- Select one, or more, runway(s)
- View the runway characteristics
- Modify the selected runway(s).

For more information about airports and runways, *Refer to PER-TOF-TOC-RWY Airport Panel* .

CONDITIONS

This panel displays the current outside conditions and the aircraft configuration:

OUTSIDE CONDITIONS

The flight crew enters the outside conditions.
For more information about the outside conditions, *Refer to PER-TOF-TOC-OCD Outside Conditions Subpanel* .

AIRCRAFT CONFIGURATION

The flight crew selects the aircraft configuration.

For more information about the aircraft configuration:
- *Refer to Aircraft Configuration - Single Results* , or
- *Refer to Aircraft Configuration - Multiple Results* .

AIRCRAFT STATUS

The flight crew can select:
- Inoperative systems impacting takeoff performance
- CDL items impacting takeoff performance.

For more information about the aircraft status, *Refer to PER-TOF-TOC-AFS AIRCRAFT STATUS Panel* .

SYNCHRO LOGBOOK

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.
For more information about the SYNCHRO LOGBOOK function, *Refer to PER-TOF-TOC-AFS Synchronization with Logbook* .

RESULTS

The layout of the RESULTS panel may be different, depending on the Operator policy.

For more information about the optimization results:
- *Refer to Single Results - Single Runway Computation* , or
- *Refer to Single Results - Multiple Runway Computation* , or
- *Refer to Multiple Results - Single Runway Computation* , or
- *Refer to Multiple Results - Multiple Runway Computation - One Step* , or
- *Refer to Multiple Results - Multiple Runway Computation - Two Steps* .

XCHECK WITH AVNCS

The flight crew can crosscheck the FMS takeoff performance entries with the OIS takeoff performance results.

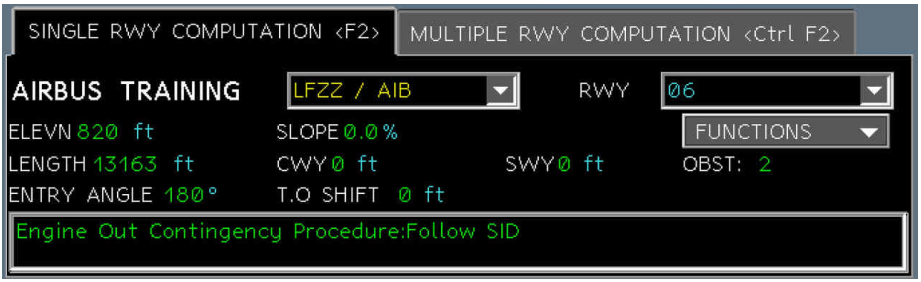
For more information about the XCHECK WITH AVNCS function:
- *Refer to XCHECK WITH AVNCS - Single Results* , or
- *Refer to XCHECK WITH AVNCS - Multiple Results* .

AIRPORT PANEL

Applicable to: ALL

The flight crew uses the airport panel to select the airport and runway(s).

Airport Panel



SINGLE RWY COMPUTATION

For more information about the SINGLE RWY COMPUTATION panel:

- *Refer to SINGLE RWY COMPUTATION Panel - Length-Clearway-Stopway* , or
- *Refer to SINGLE RWY COMPUTATION Panel - TORA-TODA-ASDA* .

MULTIPLE RWY COMPUTATION

For more information about the MULTIPLE RWY COMPUTATION panel:

- *Refer to MULTIPLE RWY COMPUTATION Panel - Length-Clearway-Stopway* , or
- *Refer to MULTIPLE RWY COMPUTATION Panel - TORA-TODA-ASDA* .

FUNCTIONS

For more information about the runway modification FUNCTIONS:

- *Refer to FUNCTIONS - Reduced Mode* .

SINGLE RWY COMPUTATION PANEL - LENGTH-CWY-SWY

Applicable to: ALL

GENERAL

A takeoff performance calculation takes into account the following runway characteristics:

- Declared lengths

L2 For more information about declared lengths, *Refer to PER-TOF-TOC-RWY-DEL Declared Lengths* .

L1 - Elevation

L2 For more information about elevation, *Refer to PER-TOF-TOC-RWY Elevation* .

L1 - Slope

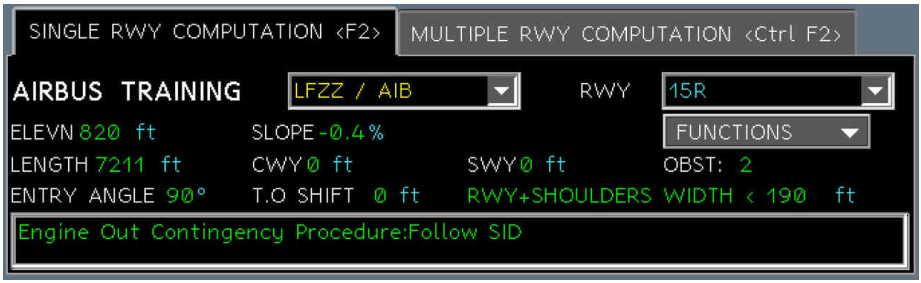
L2 For more information about slope, *Refer to PER-TOF-TOC-RWY Slope* .

L1 - Obstacles.

L2 For more information about obstacles, *Refer to PER-TOF-TOC-RWY Obstacles* .

L1 **T.O PERF**

SINGLE RWY COMPUTATION Panel



The flight crew uses the SINGLE RWY COMPUTATION panel to select the runway.

AIRPORT SELECTION

The AIRPORT drop-down list provides a list of available airports. This list is sorted by airport codes.

RUNWAY SELECTION

When the flight crew has selected an airport, the RWY drop-down list provides a choice of runways applicable to that airport.

RUNWAY CHARACTERISTICS

Runway characteristics are:

- Runway ID

- Elevation
- Slope
- Length
- Length of clearway (CWY)
- Length of stopway (SWY)
- Number of obstacles

L2 For more information about obstacles, *Refer to VIEW OBST - Reduced Mode* .

L1 - Runway entry angle:

L2
- 0 ° for a straight entry, or
- 90 ° for a 90 ° taxiway entry to the runway, or
- 180 ° for a turnaround on the runway.

L1 - Takeoff shift

L2 For more information about takeoff shift, *Refer to MODIFY RWY - Reduced Mode* .

L1 - Runway plus shoulders width less than 58 m (if applicable)
For more information about runway plus shoulders width, *Refer to PER-TOF-TOC-RWY Operations on Runway + Shoulders less than 58 m Wide* .

- Runway comment (if applicable).
The runway comment panel usually displays the takeoff procedure.

L2 For more information about the runway comment, *Refer to PER-TOF-TOC-RWY Runway Comment* .

SINGLE RWY COMPUTATION PANEL - TORA-TODA-ASDA

Applicable to: ALL

GENERAL

A takeoff performance calculation takes into account the following runway characteristics:

- Declared lengths

L2 For more information about declared lengths, *Refer to PER-TOF-TOC-RWY-DEL Declared Lengths* .

L1 - Elevation

L2 For more information about elevation, *Refer to PER-TOF-TOC-RWY Elevation* .

L1 - Slope

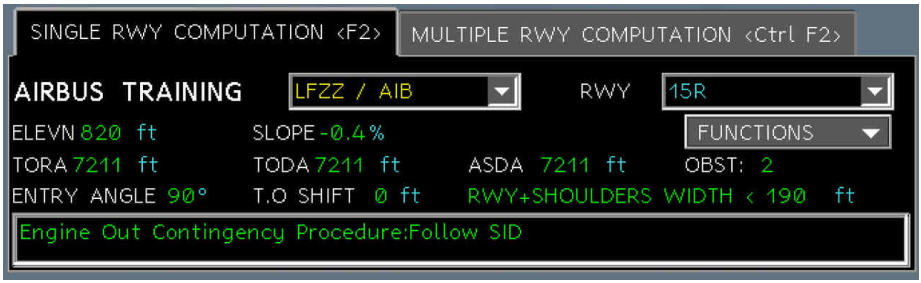
L2 For more information about slope, *Refer to PER-TOF-TOC-RWY Slope* .

L1 - Obstacles.

L2 For more information about obstacles, *Refer to PER-TOF-TOC-RWY Obstacles* .

L1 **T.O PERF**

SINGLE RWY COMPUTATION Panel



The flight crew uses the SINGLE RWY COMPUTATION panel to select the runway.

AIRPORT SELECTION

The AIRPORT drop-down list provides a list of available airports. This list is sorted by airport codes.

RUNWAY SELECTION

When the flight crew has selected an airport, the RWY drop-down list provides a choice of runways applicable to that airport.

RUNWAY CHARACTERISTICS

Runway characteristics are:

- Runway ID

- Elevation
- Slope
- Takeoff Run Available (TORA)
- Takeoff Distance Available (TODA)
- Accelerate-Stop Distance Available (ASDA)
- Number of obstacles

L2 For more information about obstacles, *Refer to VIEW OBST - Reduced Mode* .

L1 - Runway entry angle:

L2
- 0 ° for a straight entry, or
- 90 ° for a 90 ° taxiway entry to the runway, or
- 180 ° for a turnaround on the runway.

L1 - Takeoff shift

L2 For more information about takeoff shift, *Refer to MODIFY RWY - Reduced Mode* .

L1 - Runway plus shoulders width less than 58 m (if applicable)
For more information about runway plus shoulders width, *Refer to PER-TOF-TOC-RWY Operations on Runway + Shoulders less than 58 m Wide* .

- Runway comment (if applicable).
The runway comment panel usually displays the takeoff procedure.

L2 For more information about the runway comment, *Refer to PER-TOF-TOC-RWY Runway Comment* .

DECLARED LENGTHS

Applicable to: ALL

TAKEOFF RUN AVAILABLE (TORA)

The Takeoff Run Available (TORA) is either:
- The length of runway declared available and suitable by the appropriate Authority, or
- The distance from an intermediate taxi crossing intersection to the end of the runway.

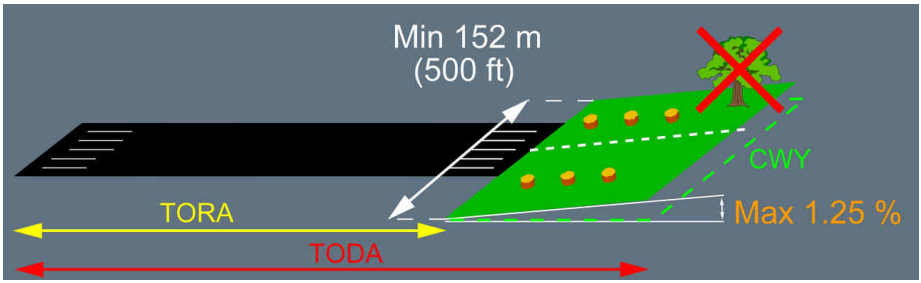
TAKEOFF DISTANCE AVAILABLE (TODA)

The Takeoff Distance Available (TODA) is equal to the length of TORA, plus the length of any associated clearway (CWY).

L2 A clearway is an area that is beyond the end of TORA, and:
- Uses the same extended centerline as the runway
- Does not exceed an upward slope of 1.25 %
- Is at least 500 ft wide
- Does not have any protruding terrain or obstacles, except threshold lights (if their height above the surface is less than 2.16 ft).

A clearway need not have bearing strength and may be land or water.

Clearway



L1 ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)

The Accelerate-Stop Distance Available (ASDA) is equal to the length of TORA, plus the length of any associated stopway (SWY).

L2 A stopway is an area that is beyond the end of TORA, and is:
- At least as wide as the runway, and has the same extended centerline
- Able to support the aircraft during an aborted takeoff
- Designated by airport authorities for decelerating an aircraft, in the case of an aborted takeoff.

LINEUP DISTANCES

For takeoff performance computations, TODA and ASDA must be reduced by the lineup distance corrections, in the case of:

- A 90 ° taxiway entry to the runway

90 Degree Runway Entry			
NLG steering angle	Maximum effective steering angle	Minimum lineup distance correction	
		TODA	ASDA
70 °	69.5 °	74.6 ft	172.5 ft

- A 180 ° turnaround on the runway.

180 Degree Turnaround				
Minimum lineup distance correction		Required minimum runway width	Nominal lineup distance on a 200 ft runway width	
TODA	ASDA		TODA	ASDA
121.9 ft	219.8 ft	222 ft	162.8 ft	260.6 ft

ELEVATION

Applicable to: ALL

Airport elevation has an impact on pressure altitude.

For more information about the effect of pressure altitude on takeoff performance, *Refer to PER-TOF-TOC-OCD QNH* .

SLOPE

Applicable to: ALL

Takeoff is authorized on runways that have an average slope between -2 % and +2 % .

L2 Upward slopes have dual effects on performance:

- Acceleration distances increase, but
- Deceleration distances decrease.

As a result, it is not possible to make a general statement on the overall effect of runway slopes on MTOW(perf).

OBSTACLES

Applicable to: ALL

Obstacles along the takeoff flight path within a departure sector must be cleared by the intended takeoff flight path with a regulatory margin.

L2 A departure sector, also called takeoff funnel, represents an area surrounding the takeoff flight path, within which all obstacles must be cleared, assuming they are all projected on the intended track.

OPERATIONS ON RUNWAY + SHOULDERS LESS THAN 190 FT WIDE

Applicable to: ALL

GENERAL

A specific takeoff procedure has to be applied when the sum of the runway width plus hard shoulders is less than 190 ft . This specific takeoff procedure induces a penalty on the takeoff performance.

For more information about this specific takeoff procedure, *Refer to Operations on Runway + Shoulders less than 190 ft Wide* .

T.O PERF

When the Airport panel displays the following message: "RWY+SHOULDERS WIDTH < 190 ft", T.O PERF automatically takes into account the takeoff performance penalty induced by the specific takeoff procedure "Operations on Runway + Shoulders less than 190 ft Wide".

L2 The progressive thrust setting has an impact on takeoff performance.

L1 *Note:* *The message "RWY+SHOULDERS WIDTH < 190 ft" displayed on the Airport panel is not sufficient to directly apply the specific takeoff procedure. The flight crew must check with the Airport Authorities whether the runway plus shoulder width is really less than 190 ft or not.*

L2 If there is no value in the field "Shoulder" in the airport data, the message "RWY+SHOULDERS WIDTH < 190 ft" may be displayed in the Airport panel because T.O PERF assumes that no value in the field "Shoulder" means that the shoulder width is equal to 0.

RUNWAY COMMENT

Applicable to: ALL

The runway comment panel displays additional data on the selected runway as per Operator policy. The runway comment panel usually displays the engine out contingency takeoff procedure.

CREATE RWY - REDUCED MODE

Applicable to: ALL

FUNCTIONS

The FUNCTIONS drop down list enables the flight crew to:

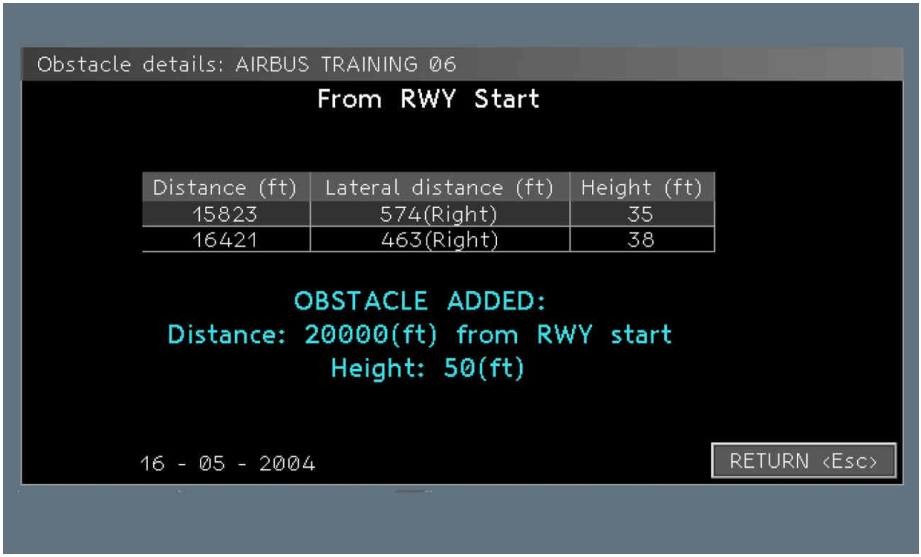
- VIEW OBST: To display information about the obstacles associated to the selected runway
- MODIFY RWY: To modify an existing runway.

VIEW OBST

The flight crew uses the VIEW OBST subpanel to display information about the obstacles associated to the selected runway.

L2 The flight crew can access this subpanel by selecting VIEW OBST in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

Obstacle Details Subpanel



L1 **HEADER**

The header identifies the selected runway.

OBSTACLE DETAILS

The VIEW OBST subpanel contains information about the obstacle(s) applicable to the selected runway.

The following data is displayed:
- Distance from the runway entry point (start of runway area or intermediate taxi crossing intersection)
- Obstacle lateral distance from the runway centerline
- Obstacle height.

The date associated to the obstacles information appears at the bottom of the Obstacle details panel.

ADDITIONAL OBSTACLE

When the flight crew adds an obstacle via the ADD 1 OBSTACLE function, the obstacle appears at the bottom of the panel.

L2 The flight crew can access this function by selecting MODIFY RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.
For more information about the ADD 1 OBSTACLE function, *Refer to PER-TOF-TOC-RWY-CRR MODIFY RWY* .

MODIFY RWY

The flight crew uses the MODIFY RWY subpanel to modify the characteristics of the selected runway by either decreasing the runway length, or by adding an obstacle.

L2 The flight crew can access this subpanel by selecting MODIFY RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

MODIFY RWY Subpanel



L1 RUNWAY LENGTH REDUCTION

The flight crew can enter the runway length reduction from either end.

The runway length (LENGTH) displayed on the SINGLE RWY COMPUTATION panel is reduced according to the entered value.

The Takeoff Shift (T.O SHIFT) displayed on the SINGLE RWY COMPUTATION panel is increased according to the entered value, if the runway length has been decreased from the runway entry point (RWY START).

L2 The takeoff shift is a reduction of the takeoff distances (TORA , TODA , ASDA) due to a shifted entry of the aircraft on the runway.

L1 The SINGLE RWY COMPUTATION panel displays the label “length modified” to indicate that the flight crew has modified the runway length.

If the flight crew reduces the runway length from the RWY end, the length of the CWY and SWY are automatically set to 0.

ADD 1 OBSTACLE

One more obstacle can be added for the selected runway.
The flight crew can enter the obstacle longitudinal distance from either end.
Then, the flight crew enters the obstacle height.
The SINGLE RWY COMPUTATION panel displays the label “OBSTACLE ADDED” to indicate that the flight crew has added an obstacle.
This added obstacle is displayed on the VIEW OBST subpanel.

L2 For more information about the VIEW OBST subpanel, *Refer to PER-TOF-TOC-RWY-CRR VIEW OBST* .

L1 RWY+SHOULDERS WIDTH < 190 FT

The flight crew can activate or deactivate the option "RWY+SHOULDERS WIDTH < 190 ft".

L2 For more information about this option, *Refer to PER-TOF-TOC-RWY Operations on Runway + Shoulders less than 58 m Wide* .

L1 ENTRY ANGLE

The flight crew can modify the runway entry angle via the Entry Angle drop-down list.
The runway entry angle (ENTRY ANGLE) displayed on the SINGLE RWY COMPUTATION panel is updated according to the selected value.
The SINGLE RWY COMPUTATION panel displays the label “ENTRY ANGLE MODIFIED” to indicate that the flight crew has modified the runway entry angle.

MULTIPLE RWY COMPUTATION PANEL - LENGTH-CWY-SWY

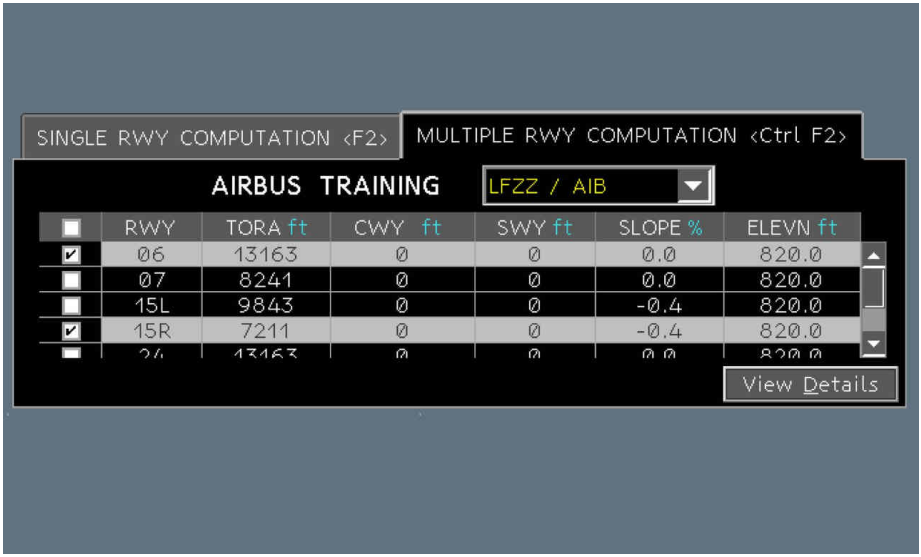
Applicable to: ALL

The flight crew uses the MULTIPLE RWY COMPUTATION panel to select several runways for which optimization will be performed in the current conditions.

The flight crew may use this feature during OIS preparation to anticipate a possible runway change.

L2 This function increases calculation time.

MULTIPLE RWY COMPUTATION Panel



L1 *Note: The label "TORA" is displayed instead of the label "LENGTH" on the MULTIPLE RWY COMPUTATION panel.*

AIRPORT SELECTION

The AIRPORT drop-down list provides a list of the available airports.

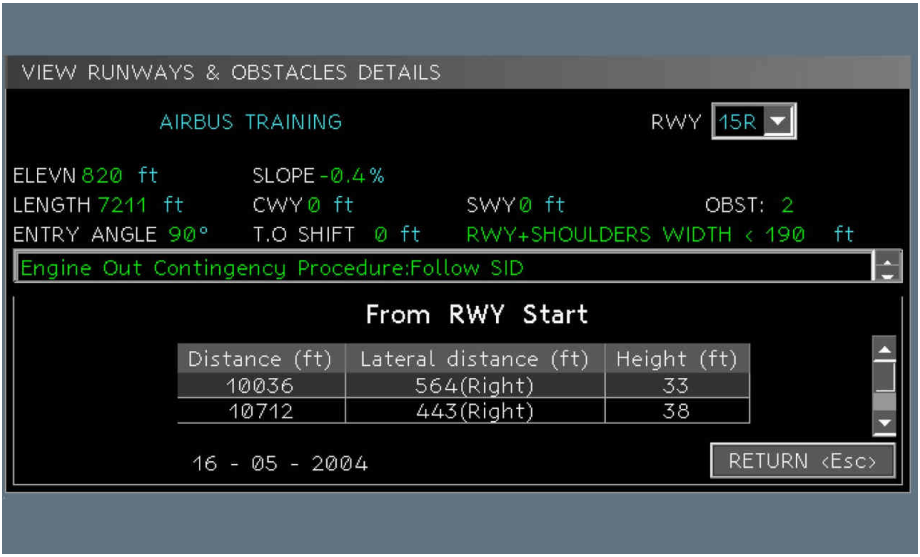
RUNWAY TABLE

The flight crew uses the runway table to select the runways on which the computation will be performed.

VIEW DETAILS

When the flight crew selects one or multiple runways in the table, the flight crew can click on the View Details button to open the VIEW RUNWAYS & OBSTACLES DETAILS panel. This panel displays information associated to the selected runway(s).
The flight crew then uses the RWY drop down list to access the information for each selected runway.

VIEW RUNWAYS & OBSTACLES DETAILS Panel



MULTIPLE RWY COMPUTATION PANEL - TORA-TODA-ASDA

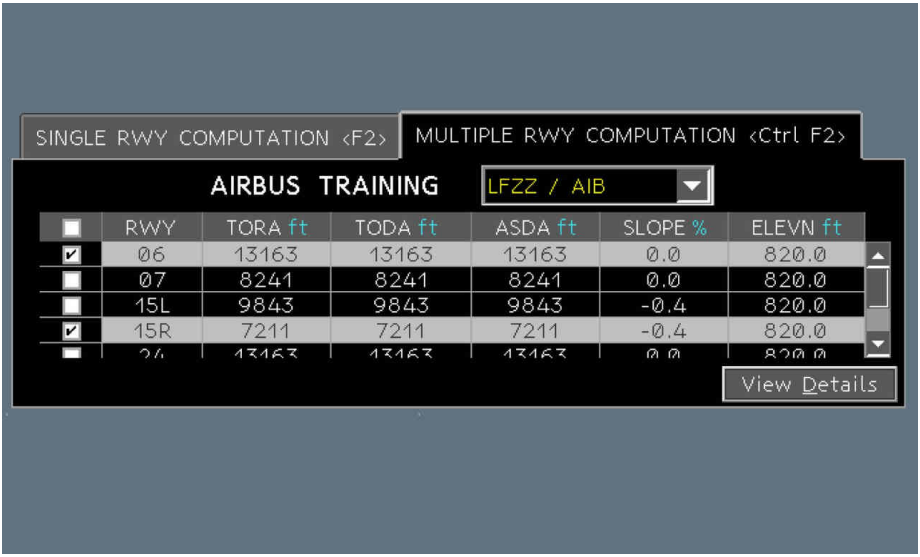
Applicable to: ALL

The flight crew uses the MULTIPLE RWY COMPUTATION panel to select several runways for which optimization will be performed in the current conditions.

The flight crew may use this feature during OIS preparation to anticipate a possible runway change.

L2 This function increases calculation time.

MULTIPLE RWY COMPUTATION Panel



L1 AIRPORT SELECTION

The AIRPORT drop-down list provides a list of the available airports.

RUNWAY TABLE

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VIEW DETAILS

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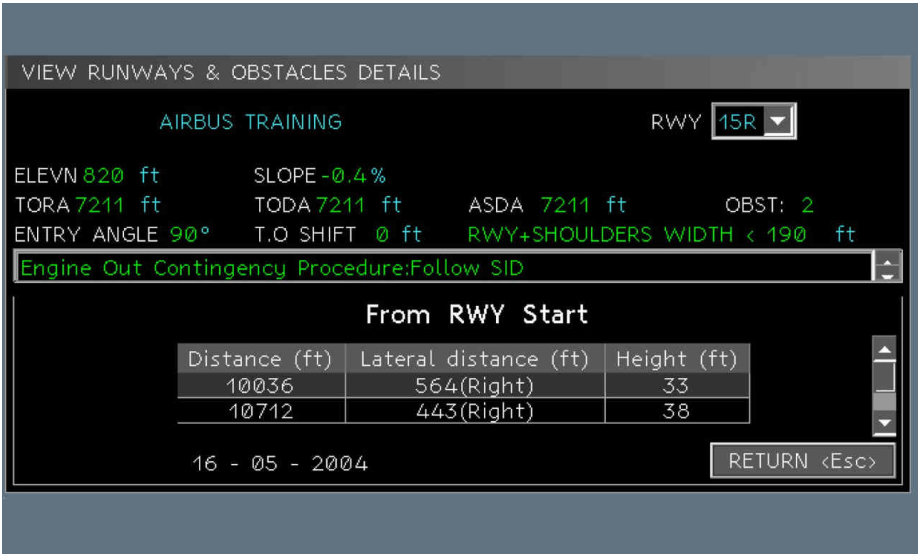
The flight crew then uses the RWY drop down list to access the information for each selected runway.

VIEW RUNWAYS & OBSTACLES DETAILS Panel



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OUTSIDE CONDITIONS SUBPANEL

Applicable to: ALL

The Outside Conditions subpanel provides the following information:

- Wind
- Temperature (OAT)
- QNH
- Runway conditions
- Anti-ice.

Outside Conditions Subpanel



WIND

Applicable to: ALL

GENERAL

L2 The longitudinal wind component affects the aircraft ground speed, and therefore the ground distance necessary to accelerate to liftoff speed (VLOF).

L1 The takeoff distance decreases in the case of headwind, and increases in the case of tailwind.

L2 As per regulation, the computation is based on 150 % of the entered tailwind, and 50 % of the entered headwind.

L1 The crosswind component does not affect the calculation of the takeoff distance. However, a maximum crosswind component is demonstrated.
For more information about crosswind limitation, *Refer to PER-TOF-CTA-CWD Crosswind* .
In addition, the flight crew must apply a specific thrust application procedure in the case of a crosswind above 23 kt and/or tailwind. This specific thrust application procedure increases the takeoff distance.
For more information about the specific thrust application procedure, *Refer to Standard Operating Procedures - Takeoff Thrust Setting* .

T.O PERF

There are two ways to define wind values:
- Longitudinal Speed Component
- Direction/Speed (or Direction/Speed/Gust) Combination.

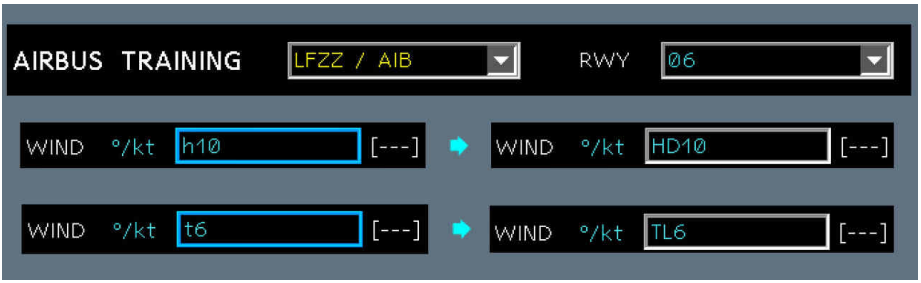
The Direction/Speed (or Direction/Speed/Gust) Combination is required in the case of a MULTIPLE RUNWAY COMPUTATION.

Note: *Displayed wind values are rounded mathematically instead of conservatively, but there is no impact on the computation, which uses exact values.*

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED (OR DIRECTION/SPEED/GUST) COMBINATION

This wind input mode is compulsory when computations are made on multiple runways.

The flight crew can enter:
- The wind direction and the wind speed, or
- The wind direction, the wind speed, and the gust, if this option is enabled.

Direction/Speed Combination

The speed entry is projected along the runway axis and perpendicular to the runway axis. The longitudinal projection follows the same display rules as the longitudinal speed component entry mode.

T.O PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



Direction/Speed/Gust Combination

This entry mode is possible if a maximum crosswind limit is defined as gust included for one RWY COND at least.

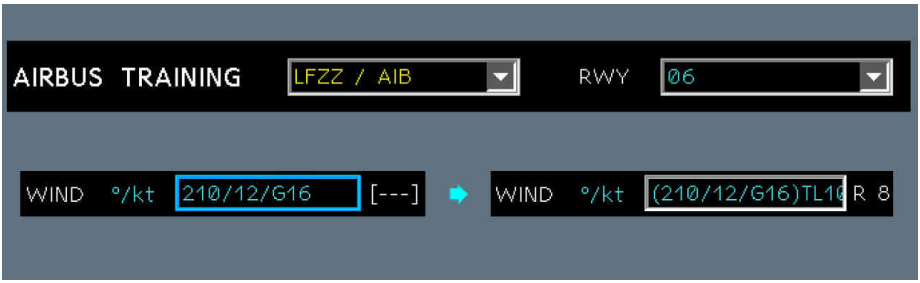
In this case, the flight crew can enter the value of the gust with the prefix G followed by the gust value (e.g. G16).
The speed entry (gust respectively) is projected along the runway axis and perpendicular to the runway axis.
The longitudinal projection follows the same display rules as the longitudinal speed component entry mode.

T.O PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

If the flight crew enters the gust, T.O PERF displays the perpendicular projection of the gust as the crosswind.

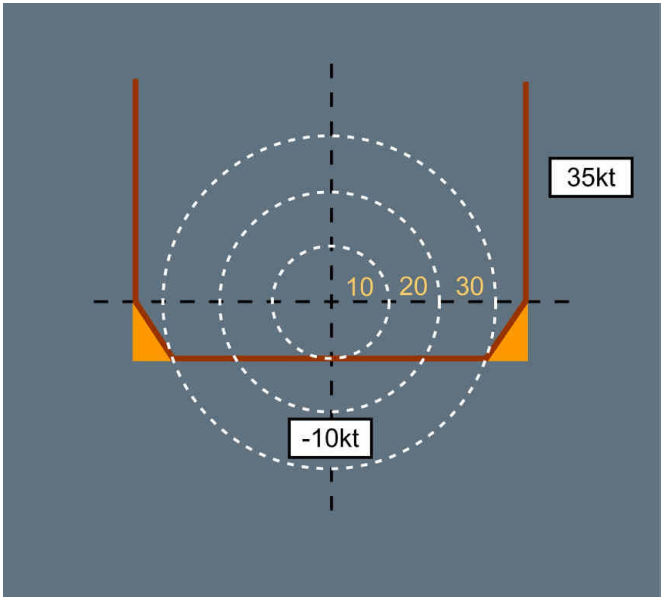
T.O PERF uses:
- The gust perpendicular component for the check of the maximum crosswind limitation if this one is defined as gust included for the selected RWY COND
- The steady wind perpendicular component for the check of the maximum crosswind limitation if this one is not defined as gust included for the selected RWY COND.

Wind Values Input - Direction/Speed/Gust Combination



COMBINATION OF CROSSWIND AND TAILWIND

Crosswind / Tailwind Envelope



When the flight crew enters a specific combination of crosswind and tailwind included in the orange area of the illustration above, T.O PERF displays the following error message: "Risk of engine pumping with this combination of Crosswind and Tailwind. Takeoff not allowed on QFU: ***".

Engine pumping means engine stall.

The flight crew cannot run the computation.

OUTSIDE AIR TEMPERATURE

Applicable to: ALL

GENERAL

Temperature has an effect on speed and on thrust.

TEMPERATURE EFFECT ON SPEED

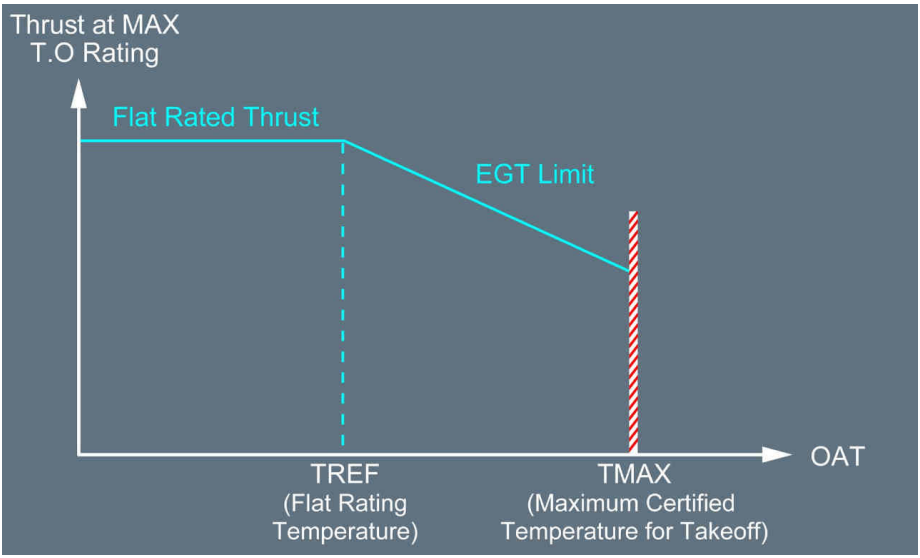
L2 When the Outside Air Temperature (OAT) increases, the air density ρ decreases.

L1 When the OAT increases, a higher true airspeed is required in order to maintain the same lift.
At high temperatures, the takeoff distances are longer.

TEMPERATURE EFFECT ON THRUST

L2 At specific altitudes, takeoff thrust will vary as follows, depending on the OAT :

Thrust vs. Temperature



The thrust provided by the engines at takeoff rating (TOGA) versus OAT is constant up to the Flat Rating Temperature (TREF).
When OAT goes above the TREF , available thrust decreases to avoid exceeding the Exhaust Gas Temperature (EGT), until the OAT reaches the Maximum Certified Temperature For Takeoff (TMAX).

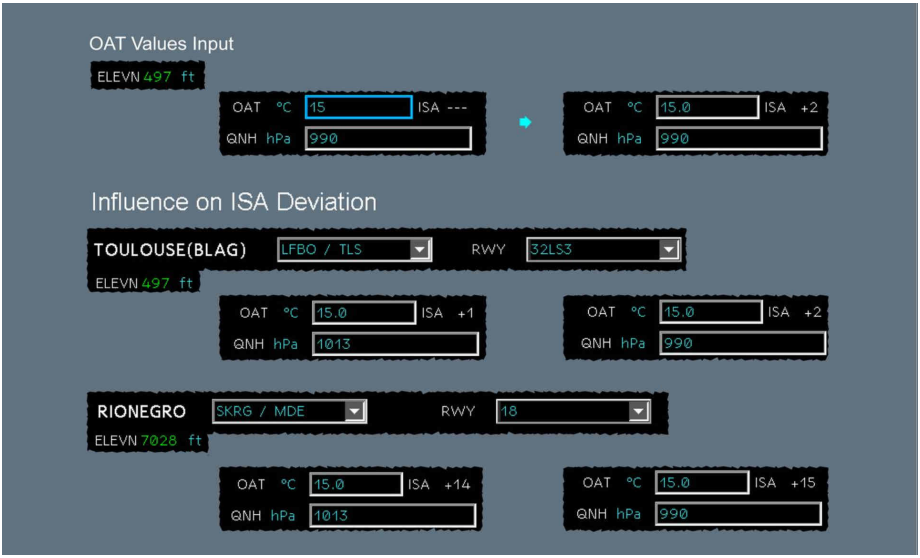
L1 Thrust varies depending on the OAT .

Therefore, at high temperatures, the takeoff distance increases and the takeoff climb gradient decreases.

L2 The Power Management tables provide the value of the thrust parameter, depending on the OAT and altitude.

L1 **T.O PERF**

OAT Input



OAT VALUE INPUT

Any deviation from the International Standard Atmosphere (ISA) is automatically computed and displayed next to the OAT field.

INFLUENCES ON ISA DEVIATION

The deviation from ISA is influenced by:
- The airport elevation
- The QNH value.

L2 For more information about the QNH , *Refer to PER-TOF-TOC-OCD QNH* .

QNH

Applicable to: ALL

GENERAL

The QNH is the pressure at the Mean Sea Level (MSL).

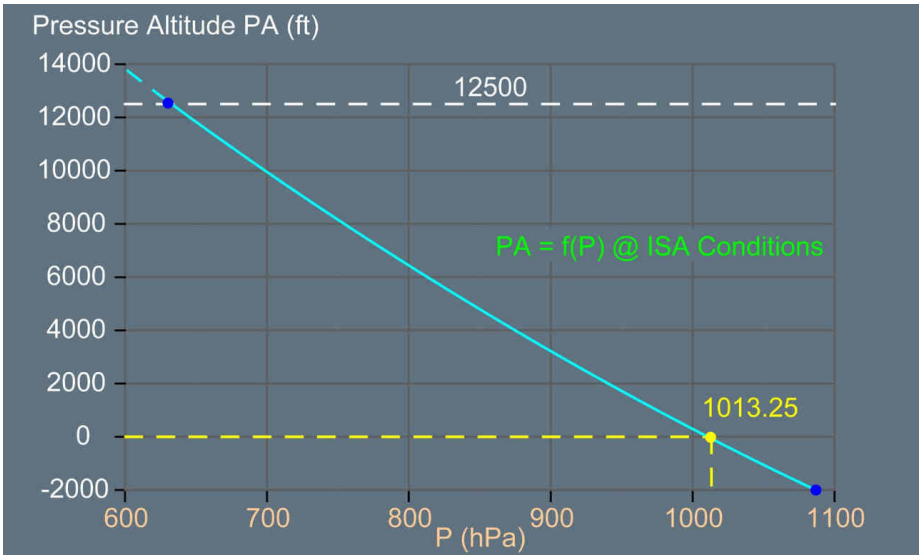
L2 The QNH is calculated from:
- The airport atmospheric pressure
- The airport elevation
  The airport elevation is the geometric altitude of the airport.
- The standard pressure law from ISA atmosphere.

At the airport level, with the QNH setting, in ISA conditions, the altimeter indicates the airport elevation.

L1 The airport Pressure Altitude (PA) depends on the QNH and the airport elevation.

L2 The PA is a barometric measurement converted into an altitude via the ISA law.

PA Function of Pressure (P)



L1 The QNH affects the aircraft takeoff speed and engine thrust.

QNH EFFECT ON TAKEOFF SPEED

When the QNH decreases at a given airport elevation:
- The PA increases
- The air density ρ decreases
- A higher TAS is required for takeoff in order to maintain the same lift
- The takeoff distance is longer.

QNH EFFECT ON ENGINE THRUST

When the QNH decreases at a given airport elevation:
- The PA increases
- The available engine thrust decreases
- The takeoff distance increases
- The takeoff climb gradients decrease.

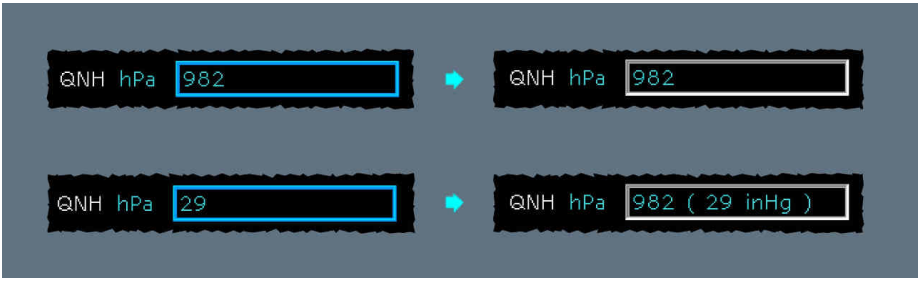
T.O PERF

The QNH is the input parameter that determines the pressure altitude, taking into account the airport elevation.

The flight crew can enter a QNH using the following units:
- Hecto Pascal (hPa)
- Inch of Mercury (inHg).

T.O PERF automatically detects the QNH format. For example, when the flight crew enters 29 for the QNH, T.O PERF automatically converts the value into the appropriate one for hPa unit.

QNH Input



L2 The airport elevation affects the QNH range.

RUNWAY CONDITIONS

Applicable to: ALL

GENERAL

The runway surface condition affects the takeoff performance and must be taken into account for MTOW(PERF) calculation.
For more information about the runway conditions, *Refer to Runway Contamination* .

T.O PERF

The flight crew selects one of the following settings from the RWY COND drop-down list depending on the runway surface condition.

DRY

The flight crew selects “Dry” for dry and damp runways.

WET

The flight crew selects “Wet” for runways covered with:
- Less than 0.12 in of Water, or
- Equivalent contaminants in terms of performance:
  - Less than 0.12 in of Slush, or
  - Less than 0.16 in of Wet Snow, or
  - Less than 0.59 in of Dry Snow.

For more information about equivalences, *Refer to PER-TOF-CTA Equivalences for Performance* .

WATER 1/4" (6.3 MM)

The flight crew selects ”Water 1/4” (6.3 mm)” between 0.12 in and 0.25 in of Standing Water.

WATER 1/2" (12.7 MM)

The flight crew selects ”Water 1/2” (12.7 mm)” between 0.25 in and 0.50 in of Standing Water.

L2 For takeoff performance assessment, in the case of Fluid Contaminant (Water, Slush), the contaminant depth has a dual effect on performance. The contaminant drag has a negative effect on the acceleration part, but a favorable effect on the deceleration segment. So, the takeoff performance for the higher contaminant depth is not systematically conservative versus the lower depth one.
When the flight crew performs a takeoff performance computation with a runway condition of ”Water 1/2” (12.7 mm)”, T.O PERF automatically performs a second computation with a runway condition of ”Water 1/4” (6.3 mm)” and chooses the more penalizing results (lower MTOW(PERF)).

L1 **SLUSH 1/4" (6.3 MM)**

The flight crew selects “Slush 1/4" (6.3 mm)” for runways covered with:
- Between 0.12 in and 0.25 in of Slush, or
- Equivalent contaminants in terms of performance:
  - Between 0.16 in and 0.50 in of Wet Snow, or
  - Between 0.59 in and 2.00 in of Dry Snow.

For more information about equivalences, *Refer to PER-TOF-CTA Equivalences for Performance* .

SLUSH 1/2" (12.7 MM)

The flight crew selects “Slush 1/2" (12.7 mm)” for runways covered with:
- Between 0.25 in and 0.50 in of Slush, or
- Equivalent contaminants in terms of performance:
  - Between 0.50 in and 1.00 in of Wet Snow, or
  - Between 2.00 in and 4.00 in of Dry Snow.

For more information about equivalences, *Refer to PER-TOF-CTA Equivalences for Performance* .

L2 For takeoff performance assessment, in the case of Fluid Contaminant (Water, Slush), the contaminant depth has a dual effect on performance. The contaminant drag has a negative effect on the acceleration part, but a favorable effect on the deceleration segment. So, the takeoff performance for the higher contaminant depth is not systematically conservative versus the lower depth one.
When the flight crew performs a takeoff performance computation with a runway condition of ”Slush 1/2” (12.7 mm)”, T.O PERF automatically performs a second computation with a runway condition of ”Slush 1/4” (6.3 mm)” and chooses the more penalizing results (lower MTOW(PERF)).

L1 **COMPACTED SNOW**

The flight crew selects “Compacted snow” for runways covered with Compacted Snow.

ANTI-ICE

Applicable to: ALL

GENERAL

The engine bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

L1 The air conditioning and the anti-ice (wing, engine) systems affect the takeoff performance. The engine bleeds reduce the available engine power. As a result, the takeoff distance increases and the takeoff climb gradient decreases.
The FADEC compensates to a large extent the thrust loss due to “Engine only” anti-ice.

T.O PERF

The flight crew selects one of the following setting from the A-ICE drop-down list:
- Off
- Engine only
- Engine & Wing.

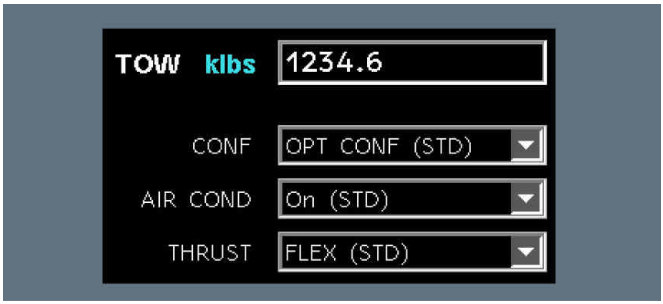
AIRCRAFT CONFIGURATION SUBPANEL

Applicable to: ALL

The Aircraft Configuration subpanel provides the following information:

- Takeoff Weight (TOW)
- Aerodynamic configuration
- Airflow
- Thrust option.

Aircraft Configuration Subpanel



TAKEOFF WEIGHT

Applicable to: ALL
Impacted by TDU: 00021444 Takeoff Weight

GENERAL

The actual takeoff weight must not exceed:
- The certified Maximum Takeoff Weight (MTOW), and
- MTOW(perf).

L2 For more information about MTOW(perf), *Refer to PER-TOF-TOR-SRS Takeoff Weights*.

L1 T.O PERF

The flight crew enters the desired TOW value.
The flight crew can use the shortcut "*" to insert the MTOW .
It is possible to enter a weight that is higher than the certified MTOW . The results will be displayed for the entered weight, regardless of the MTOW .

COMMUNICATION FROM LOADSHEET TO T.O PERF

When the flight crew has launched a LOADSHEET computation and then switches to T.O PERF, the TOW value is retrieved from the LOADSHEET results and is displayed in yellow in the CONDITIONS panel of T.O PERF.

TAKEOFF WEIGHT

Applicable to: ALL
Impacted DU: 00006199 Takeoff Weight

GENERAL

The actual takeoff weight must not exceed:
- The certified Maximum Takeoff Weight (MTOW), and
- MTOW(perf).

L2 For more information about MTOW(perf), *Refer to PER-TOF-TOR-SRS Takeoff Weights .*

L1 T.O PERF

The flight crew enters the desired TOW value.
The flight crew can use the shortcut "*" to insert the MTOW .
It is possible to enter a weight that is higher than the certified MTOW . The results will be displayed for the entered weight, regardless of the MTOW .

CAUTION	For some calculation sequences with at least two computations, when the flight crew enters the TOW in klbs, T.O PERF may use a lower TOW value. Workaround: Enter the TOW value directly in lb.

COMMUNICATION FROM LOADSHEET TO T.O PERF

When the flight crew has run a LOADSHEET computation and then switches to T.O PERF, the TOW value is retrieved from the LOADSHEET results and is displayed in yellow in the CONDITIONS panel of T.O PERF.

L2 *Note: There is a different rounding between LOADSHEET and T.O PERF: the TOW may be different by 100 lb . The TOW in T.O PERF is rounded up to the next 100 lb .*

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

The certified takeoff configurations are:
- CONF 1+F
- CONF 2
- CONF 3.

L2 For more information about takeoff configurations, *Refer to DSC-27-20-20 Configuration* .

L1 The selection of an aerodynamic configuration affects all takeoff performance limitations. The effects are multiple and complex.

L2 A higher flap setting will increase lift at a given speed, but will also increase drag. Therefore, a higher flap setting will improve takeoff performance, but will also degrade climb performance. As a result, it is recommended to use the following settings, in accordance with the applicable outside conditions:

OUTSIDE CONDITIONS	FLAP SETTING	OBJECTIVE
Well-paved runway (dry or wet)	Use the flap setting that provides the optimum performance. If takeoff weight is not limited by performance, consider using a higher flap setting.	To extend engine life and save maintenance costs, and improve aft fuselage clearance.
High altitude takeoff	Use CONF 2 or CONF 3.	To improve comfort.
Badly-paved runway, or accelerate stop limited runway	Use CONF 2 or CONF 3.	To improve comfort, and stopping distance.

L1 T.O PERF

Two types of calculation relating to aerodynamic configurations are available in T.O PERF:
- For a given flap setting (CONF 1+F ; CONF 2 ; CONF 3)
- OPT CONF.

When OPT CONF is selected, the optimum aerodynamic configuration for maximum weight (or maximum flexible temperature) is determined in the RESULTS panel.

AIRFLOW

Applicable to: ALL

GENERAL

The engine bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

L1 The air conditioning and the anti-ice (wing, engine) systems affect the takeoff performance. The engine bleeds reduce the available engine power. As a result, the takeoff distance increases and the takeoff climb gradient decreases.

T.O PERF

The flight crew selects one of the following setting from the AIR COND drop-down list:
- On
- Off.

THRUST OPTION

Applicable to: ALL

GENERAL

Various thrust options are certified for takeoff.

In specific conditions, an optimum thrust can be found to achieve:
- The maximum performance limited takeoff weight
- The maximum thrust reduction to save engine life.

The use of a specific option depends on the outside conditions.

L2 For more information about thrust options:
- *Refer to TOGA*
- *Refer to FLEX Takeoff*
- *Refer to Derated Takeoff* .

L1 T.O PERF

T.O PERF provides four types of THRUST options:
- TOGA
- FLEX
- Derate level (D04, D08, D12, D16, D20, D24)
- OPTIMUM DERATE, for a takeoff at optimum thrust.

AIRCRAFT CONFIGURATION SUBPANEL

Applicable to: ALL

The Aircraft Configuration subpanel provides the following information:

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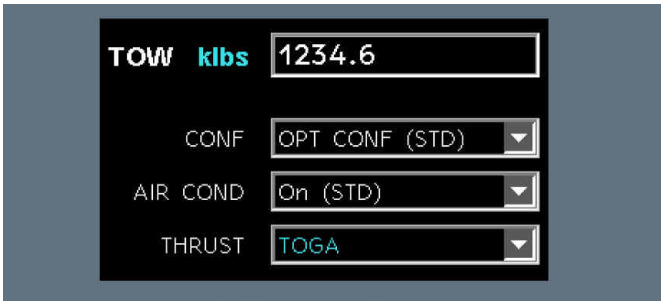

TAKEOFF WEIGHT

Applicable to: ALL
Impacted by TDU: 00021445 Takeoff Weight

GENERAL

The actual takeoff weight must not exceed:
- The certified Maximum Takeoff Weight (MTOW), and
- MTOW(perf).

L2 For more information about MTOW(perf), *Refer to PER-TOF-TOR-MRS Takeoff Weights*.

L1 T.O PERF

The flight crew enters the desired TOW value.
The flight crew can use the shortcut "*" to insert the MTOW .
It is possible to enter a weight that is higher than the certified MTOW . The results will be displayed for the entered weight, regardless of the MTOW .

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TAKEOFF WEIGHT

Applicable to: ALL
Impacted DU: 00008698 Takeoff Weight

GENERAL

The actual takeoff weight must not exceed:
- The certified Maximum Takeoff Weight (MTOW), and
- MTOW(perf).

L2 For more information about MTOW(perf), *Refer to PER-TOF-TOR-MRS Takeoff Weights* .

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The flight crew enters the desired TOW value.
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OUTSIDE CONDITIONS	FLAP SETTING	OBJECTIVE
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Applicable to: ALL

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- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

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T.O PERF

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THRUST OPTION

Applicable to: ALL

GENERAL

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In specific conditions, an optimum thrust can be found to achieve:
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- The maximum thrust reduction to save engine life.

The use of a specific option depends on the outside conditions.

L2 For more information about thrust options:
- *Refer to TOGA*
- *Refer to FLEX Takeoff*
- *Refer to Derated Takeoff* .

L1 T.O PERF

T.O PERF provides three types of THRUST options:
- TOGA
- Derate level (D04, D08, D12, D16, D20, D24)
- OPTIMUM DERATE, for a takeoff at optimum thrust.

AIRCRAFT STATUS PANEL

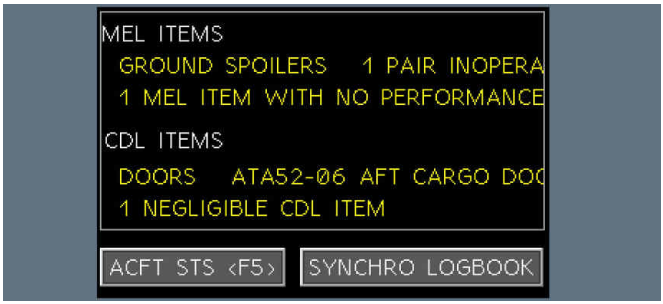
Applicable to: ALL

The current aircraft status must be considered during flight preparation.

The reminder area of the AIRCRAFT STATUS panel lists:
- Inoperative systems impacting takeoff performance
- The number of MEL items without takeoff performance impact (if any)
- CDL items impacting takeoff performance
- The number of negligible CDL items (if any).

If the aircraft is dispatched without any deferred items, "NO PERFORMANCE IMPACT" appears in the reminder area of the AIRCRAFT STATUS panel.

Reminder area of the AIRCRAFT STATUS Panel



SYNCHRO LOGBOOK

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.
For more information about the SYNCHRO LOGBOOK function, *Refer to PER-TOF-TOC-AFS Synchronization with Logbook* .

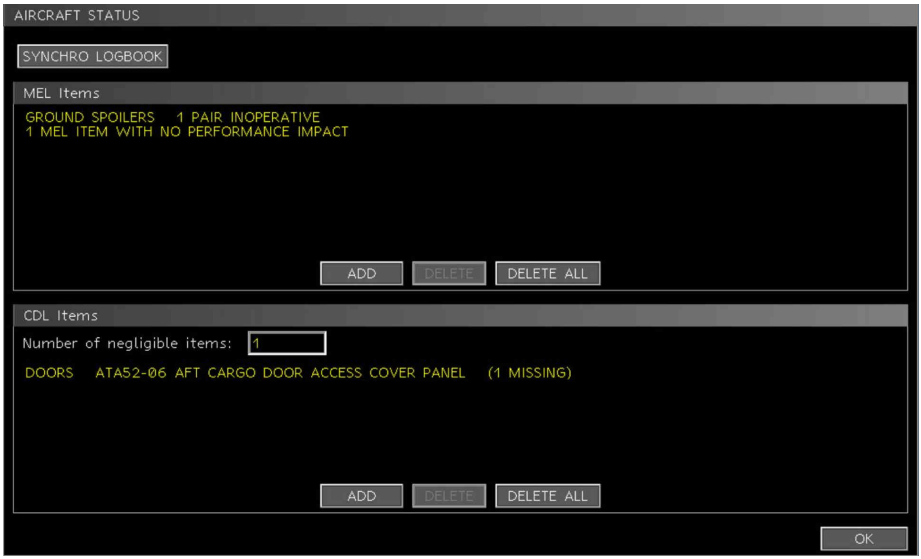
AIRCRAFT STATUS

By clicking on the ACFT STS button, the flight crew opens the AIRCRAFT STATUS panel.

The AIRCRAFT STATUS panel is divided in two subpanels:
- MEL items
- CDL items.

Moreover, the flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.

AIRCRAFT STATUS Panel



MEL

Applicable to: ALL

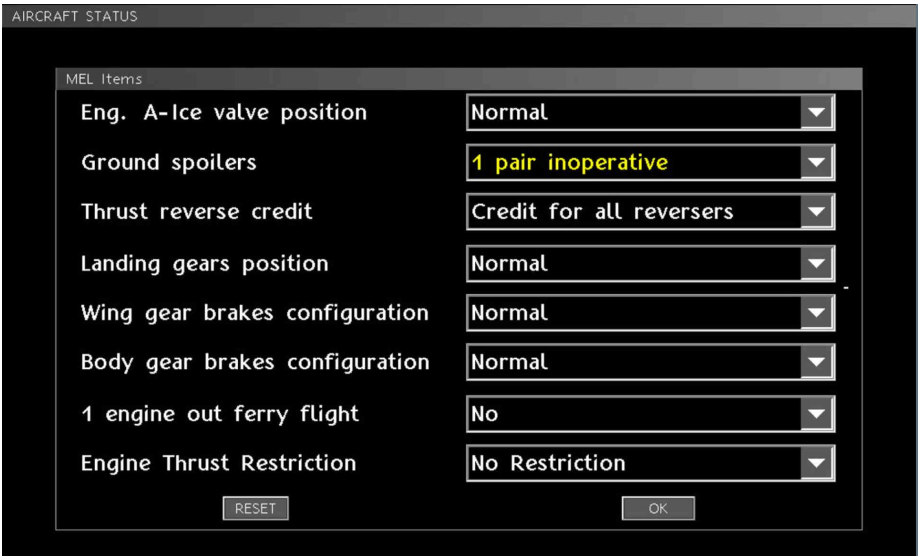
The MEL items subpanel displays the inoperative systems selected by the flight crew using:

- The OPS LIBRARY / MEL manual, via the selection of a MEL item, or
  In this case, the inoperative systems are displayed in yellow on T.O PERF.
- The T.O PERF MEL panel.
  In this case, the inoperative systems are displayed in cyan on T.O PERF.

MEL ITEM SELECTION

To open the MEL items panel, the flight crew uses the ADD button of the MEL items subpanel.
The MEL items panel displays the list of systems that could be inoperative and that involve takeoff performance penalties.
The flight crew selects inoperative items by selecting the appropriate status for each item in the drop-down lists.
The inoperative systems associated to the MEL item are described in the (o) procedure of the MEL item.

MEL Items Panel



The selected item appears in the MEL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

MEL ITEMS COMBINATION

The flight crew must check that the MEL items combination is permitted for dispatch in the "MEL Items" section of the MEL manual.
T.O PERF does not ensure that the selected combination of inoperative systems is permitted for dispatch.

COMMUNICATION BETWEEN MEL MANUAL AND T.O PERF

When the aircraft is dispatched with MEL items and if these MEL items are selected via the OPS LIBRARY / MEL manual:

- The associated inoperative systems that affect the takeoff performance are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in T.O PERF
- The number of MEL items without takeoff performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in T.O PERF.

Some MEL items induce a restriction on the use of the derated or flexible takeoff thrust.
If such a MEL item is selected via the OPS LIBRARY / MEL manual, T.O PERF automatically applies the associated thrust restriction.

LIMITATION

If the flight crew directly selects the inoperative system "1 engine out ferry flight" in the AIRCRAFT STATUS panel of T.O PERF, T.O PERF does not automatically applies the thrust restriction associated to this inoperative system.
Workaround: The flight crew must manually select the correct engine thrust in the THRUST drop down list of the CONDITIONS panel.

ENG. A-ICE VALVE POSITION

Calculation may fail when the MEL item "Eng. A-Ice valve position: Stuck open" is selected.

In the case of calculation failure when the MEL item "Eng. A-Ice valve position: Stuck open" is selected, the flight crew must:

- Deselect the MEL item "Eng. A-Ice valve position: Stuck open"
- Select "Engine & Wing" in the A-ICE drop down list of the CONDITIONS panel.

This workaround calculates correctly and yields the correct results.

CDL

Applicable to: ALL

The CDL items subpanel displays the missing structural parts selected by the flight crew using:

- The OPS LIBRARY / CDL manual, via the selection of a CDL item, or
  In this case, the CDL items are displayed in yellow on T.O PERF.
- The T.O PERF CDL panel.
  In this case, the CDL items are displayed in cyan on T.O PERF.

The CDL items subpanel also displays the number of negligible items.

NUMBER OF NEGLIGIBLE ITEMS

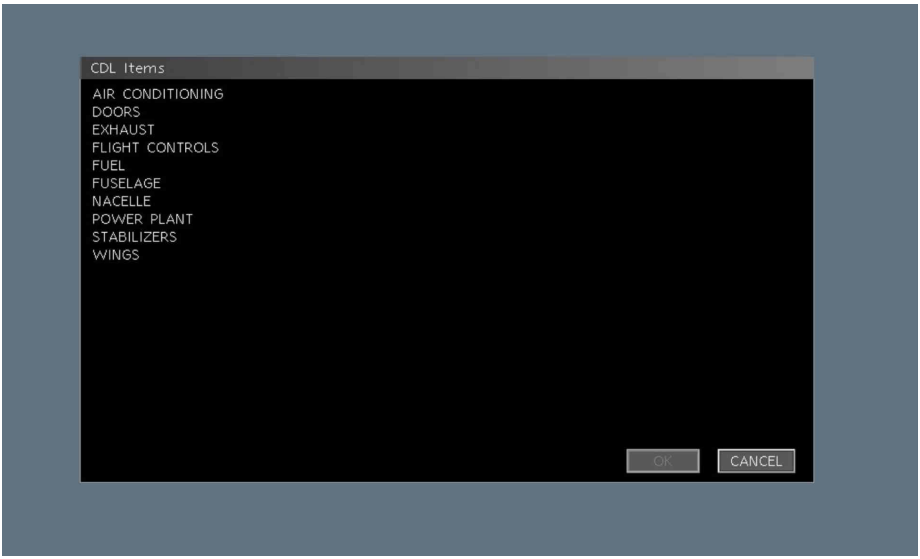
The flight crew enters the number of different structural parts simultaneously missing that have a negligible impact on the performance.

L2 If the number of negligible items is less or equal to three, then no penalty applies. If the number of negligible items is greater or equal to four, then a drag increase for each item is applied.
For more information about the negligible CDL items, *Refer to AFM/MCDL-GEN-PERF Performance penalties published in the Airplane Flight Manual MCDL chapter*.

L1 CDL ITEM SELECTION

To open the CDL items panel, the flight crew uses the ADD button of the CDL items subpanel. The CDL items panel displays the list of structural parts that could be missing and that involve takeoff performance penalties.

CDL items Panel



To add a CDL item, the flight crew selects:
- The appropriate system group
- The corresponding CDL item
- The number of items missing

The selected item appears in the CDL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

Note: *When the flight crew selects a CDL item, the number of missing items is hidden in the ACFT STS box. The flight crew must use the scroll bar to display the hidden information.*

CDL ITEMS COMBINATION

The flight crew must check that the CDL items combination is permitted for dispatch in the Aircraft Flight Manual (AFM).
T.O PERF does not ensure that the selected configuration is permitted for dispatch.

COMMUNICATION BETWEEN CDL MANUAL AND T.O PERF

When the aircraft is dispatched with CDL items and if these CDL items are selected via the OPS LIBRARY / CDL manual:

- The CDL items that affect the takeoff performance are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in T.O PERF. Their associated number of missing parts is also displayed.
- The number of CDL items without takeoff performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in T.O PERF. These CDL items are called "negligible items".

When the flight crew uses the OPS LIBRARY / CDL manual to select a specific CDL item that affects the takeoff performance and then starts T.O PERF, the takeoff performance module may consider this CDL item as a negligible item if the CDL To T.O PERF communication file does not include this CDL item.
In this case, the flight crew must manually apply the weight reduction described in the OPS LIBRARY / CDL manual to the MTOW(PERF) calculated by T.O PERF.

SYNCHRONIZATION WITH LOGBOOK

Applicable to: ALL

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button. This action synchronizes the aircraft status of the whole FLT OPS domain with the current deferred items of the eLogbook
If the flight crew had previously selected additional MEL and CDL items in T.O PERF (displayed in cyan in the AIRCRAFT STATUS panel) and then uses the SYNCHRO LOGBOOK function, these manually entered items are lost.

Note: *1. When the flight crew uses the SYNCHRO LOGBOOK function in T.O PERF, the whole FLT OPS domain is also synchronized with the eLogbook*
2. If the Logbook status is lost in the FLT OPS domain, T.O PERF may synchronize with an old Logbook status.

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RESULTS DATA

Applicable to: ALL

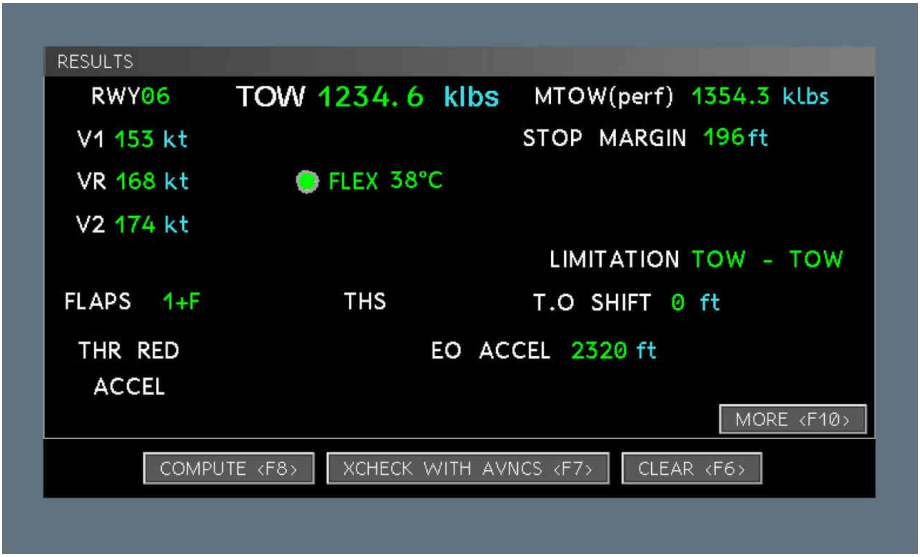
GENERAL

A takeoff performance calculation computes the following results:

- The takeoff weights
- The takeoff speeds
- The power
- The stop margin
- The aerodynamic configuration
- The limitation codes
- The engine-out acceleration altitude.

T.O PERF

RESULTS Panel



TAKEOFF WEIGHTS

Applicable to: ALL

GENERAL

The Maximum Takeoff Weight Limited by the Performance (MTOW(PERF)) is the maximum aircraft weight which complies with all the regulatory requirements for takeoff performance in given environmental conditions.
The MTOW(PERF) value may exceed the certified MTOW value. However, the real takeoff weight must not exceed MTOW .

L2 For a relevant value of MTOW , *Refer to FCOM Limitations* .

L1 T.O PERF

The RESULTS panel displays the following two weights:
- TOW, the input weight of the calculation
- MTOW(perf).

COMMUNICATION FROM T.O PERF TO LOADSHEET

When the flight crew completes a T.O PERF computation and then changes from T.O PERF to LOADSHEET, T.O PERF transfers the calculated MTOW(PERF) value to LOADSHEET if the MTOW(PERF) value is lower than or equal to the certified MTOW value. If the MTOW(PERF) value is transferred, LOADSHEET displays this value in yellow in the MTOW field of the CONDITIONS panel.

TAKEOFF SPEEDS

Applicable to: ALL

GENERAL

For a specific runway and in defined conditions, the takeoff performance optimization process determines the optimum takeoff speeds, in order to maximize the takeoff weight and Flexible Temperature (TFLEX), by taking into account the regulatory requirements.

L2 DECISION SPEED - V1

The decision speed is referred to as V1.
V1 is the maximum speed at which the flight crew can reject the takeoff in the case of engine failure, in such a way that the aircraft is still able to stop within the runway limits.

The takeoff optimization computation considers that:
- The engine failure occurs 1 second before V1
- The decision to abort takeoff occurs at V1.

V1 must be at least equal to the minimum control speed on ground (VMCG) plus 1 second acceleration on the remaining engines.
Depending on takeoff performance limitations, the V1 that results from the speed optimization can either be a single value or a range of values.
For more information about speed optimization, *Refer to PER-TOF-GEN Speed Optimization* .

In the case of a V1 range, the Operator can use one of the following three options:
- V1 min:
  - Is the lowest permitted decision speed
  - Provides the best stop margin
    For more information about stop margin, *Refer to PER-TOF-TOR-SRS Stop Margin* .
  - But increases the go-distance time between V1 and VR.
- V1 max:
  - Is the highest permitted takeoff decision speed
  - Reduces the go-distance time between V1 and VR
  - But provides the lowest stop margin.
- V1 mean:
  - Is a compromise between V1 min and V1 max.

ROTATION SPEED - VR

VR is the speed at which the flight crew must initiate the rotation.

VR may not be less than:
- V1
- 105 % of the minimum control speed in the air (VMCA)
- The speed that allows reaching V2 before reaching a height of 35 ft above the runway.

In addition the liftoff speed (VLOF), that results from VR, must:
- Be lower than the maximum tire speed (VTIRE)
- Exceed the minimum unstick speed (VMU) OEI by 4 % and AEO by 8 % .

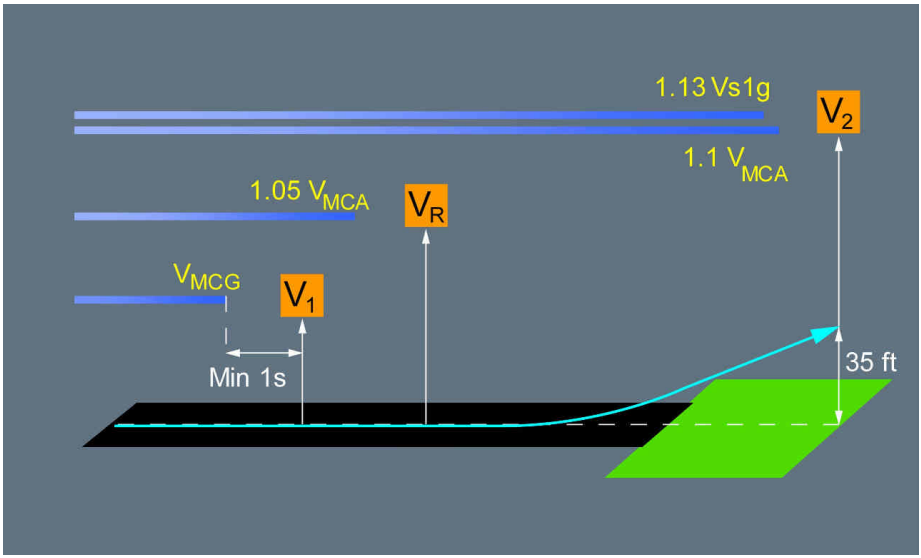
MINIMUM TAKEOFF CLIMB SPEED - V2

If one engine fails, the aircraft must reach the minimum takeoff climb speed at a height of 35 ft above the runway. This minimum takeoff climb speed is referred to as V2.

V2 must exceed:
- The minimum control speed in the air (VMCA) by a minimum of 10 %
- The 1g stall speed (VS1G) by a minimum of 13 % .

L1 **SPEED SUMMARY**

Takeoff Speeds Summary



T.O PERF

T.O PERF displays the following takeoff speeds on the RESULTS panel:
- V1, the decision speed
- VR, the rotation speed
- V2, the minimum takeoff climb speed.

In the case of a V1 range resulting from the speed optimization process, the following two display modes are available:

SINGLE V1

Single V1



Only one V1 value is displayed and can correspond to:
- V1 min, or
- V1 max, or
- V1 mean.

V1 RANGE

V1 Range



The V1 value may be selected within the [V1 min ; V1 max] range via arrow keys.

THRUST

Applicable to: ALL

Depending on the THRUST option that the flight crew has selected on the CONDITIONS panel, the thrust label displayed on the RESULTS panel may be:

- The selected THRUST option, if TOGA or a derate level (D04, D08, etc.) was selected
- An optimum derate level, if OPTIMUM DERATE was selected
- An adapted thrust to the actual takeoff weight, if FLEX was selected.

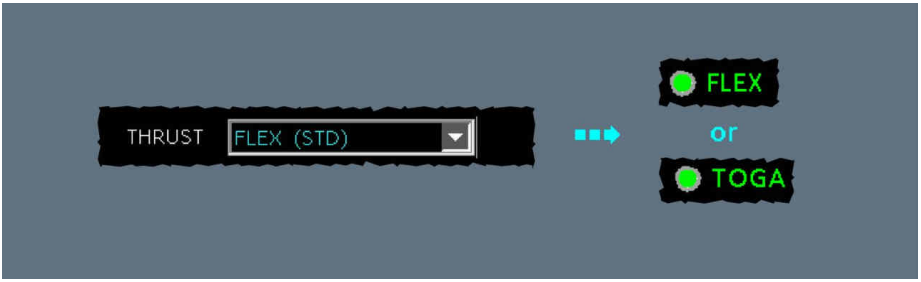
THRUST Option



FLEX TAKEOFF

Applicable to: ALL

FLEX THRUST Option



WHEN FLEX TAKEOFF IS POSSIBLE

The Flexible Temperature (TFLEX) is displayed if all the following conditions are met:

- FLEX is selected as the THRUST option
- FLEX Takeoff is permitted for the current runway conditions
- TOW is lower than MTOW(perf)
- There is TFLEX above TREF for TOW.

L2 For more information, *Refer to PER-TOF-THR-FLX TFLEX Possible Range* .

L1 WHEN FLEX TAKEOFF IS NOT POSSIBLE

TOGA thrust is displayed.

OPTIMUM DERATE

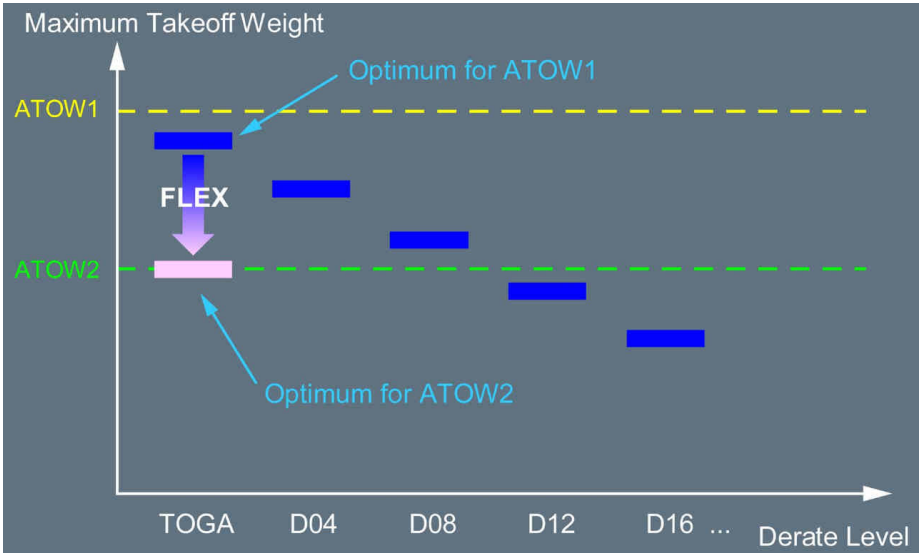
Applicable to: ALL

CAUTION	The use of derate levels lower than the one leading to the highest possible maximum performance limited takeoff weight is not permitted.

Note: *A lower derate level is a derate level that results in a higher thrust reduction.*

WITHOUT VMC LIMITATION

Optimum Derate Without VMC Limitation



ATOW1 CASE

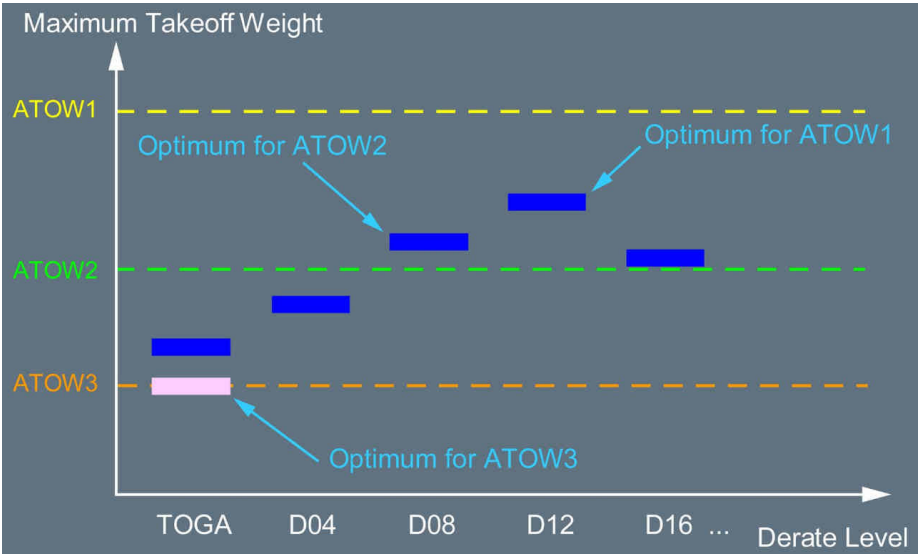
TOGA is displayed as the optimum derate level, even if it is not possible to takeoff (MTOW(perf) lower than ATOW1).

ATOW2 CASE

TOGA is the optimum derate level.
If FLEX Takeoff is permitted, TFLEX is displayed.

WITH VMC LIMITATION

Optimum Derate With VMC Limitation



ATOW1 CASE

D12 is displayed as the optimum derate level, even if it is not possible to takeoff (MTOW(perf) lower than ATOW1).

ATOW2 CASE

D08 is displayed as the optimum derate level, even if it is allowed to takeoff with D12.
However, it is not permitted to takeoff using D16 in this example, even if it is theoretically possible to takeoff with this derate level.

ATOW3 CASE

TOGA is the optimum derate level.
If FLEX Takeoff is permitted, TFLEX is displayed.
However, it is allowed to takeoff with D04, D08 and D12 in this example.
It is still not permitted to takeoff using D16 in this example, even if it is theoretically possible to takeoff with this derate level.

STOP MARGIN

Applicable to: ALL

GENERAL

The stop margin is the difference between the Accelerate-Stop Distance (ASD) and the available runway length including the Stopway (SWY).

T.O PERF

The display of the stop margin depends on the V1 option:

STP MRG

STP MRG



Only one stop margin is displayed, if the V1 type is:
- A V1 min setting, or
- A V1 max setting.

STP MRG V1 MIN & STP MRG V1 MAX

STP MRG V1 Min & STP MRG V1 Max



Two stop margins are displayed, if the V1 type is:

- A V1 mean setting, or
- A range of V1 setting.

STP MRG V1 Min corresponds to the maximum stop margin (i.e. the stop margin calculated for the lowest permitted V1).
STP MRG V1 Max corresponds to the minimum stop margin (i.e. the stop margin calculated for the highest permitted V1).
In the case of a V1 mean setting, the stop margin V1 mean is closer to STP MRG V1 Max than STP MARG V1 Min.

TAKEOFF LIMITATION CODES

Applicable to: ALL

GENERAL

Several regulatory requirements limit takeoff performance. They are called takeoff limitations.

T.O PERF

The requirements that limit performance in specific cases are identified in the computation results via limitation codes.

Usually, MTOW(perf) is obtained at the intersection of two limitation curves. For this reason, the limitation codes are always indicated by two codes.

The two codes are identical if MTOW(perf) is only limited by one limitation.

The following table indicates the various codes that can appear:

TOW	Maximum computation weight, or maximum structural weight
RWY0	All-engine Takeoff Distance (TOD0)
	or All-engine Takeoff Run (TOR0)
	or All-engine Accelerate-Stop Distance (ASD0)
RWY1	One-engine Inoperative Takeoff Distance (TOD1)
	or One-engine Inoperative Takeoff Run (TOR1)
	or One-engine Inoperative Accelerate-Stop Distance (ASD1)
VMCG	V1 limited by Certified Minimum Control Speed on Ground
TIRE	Vlof limited by Maximum Tire Speed
BRK	V1 limited by Maximum Brake Energy
VMCA	V2 limited by certified Minimum Control Speed in the Air
1SEG	First Segment Climb Gradient
2SEG	Second Segment Climb Gradient
3SEG	Acceleration (third) Segment
FTO	Final Takeoff Climb Gradient
OBS	Obstacle Clearance
VMU	Minimum Unstick Speed

Customized codes may differ from the above listed.

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

For more information about aerodynamic configuration, *Refer to Aerodynamic Configuration (Input)* .

If the takeoff performance for two aerodynamic configurations is identical, the highest flap setting is recommended.

L2 The highest flap setting corresponds to the configuration that provides the lowest takeoff speeds and, therefore, improves safety during a rejected takeoff (RTO).

L1 T.O PERF

The FLAPS field on the RESULTS panel displays the selected or optimized configuration.

The optimization process keeps the configuration that provides the maximum performance limited takeoff weight (or the maximum TFLEX).

If the weight is the same for several configurations, the configuration that provides the lowest takeoff speeds is selected.

TAKEOFF SHIFT

Applicable to: ALL

GENERAL

The takeoff shift is a reduction of the takeoff distances (TORA, TODA, ASDA) due to a shifted entry of the aircraft on the runway.

T.O PERF

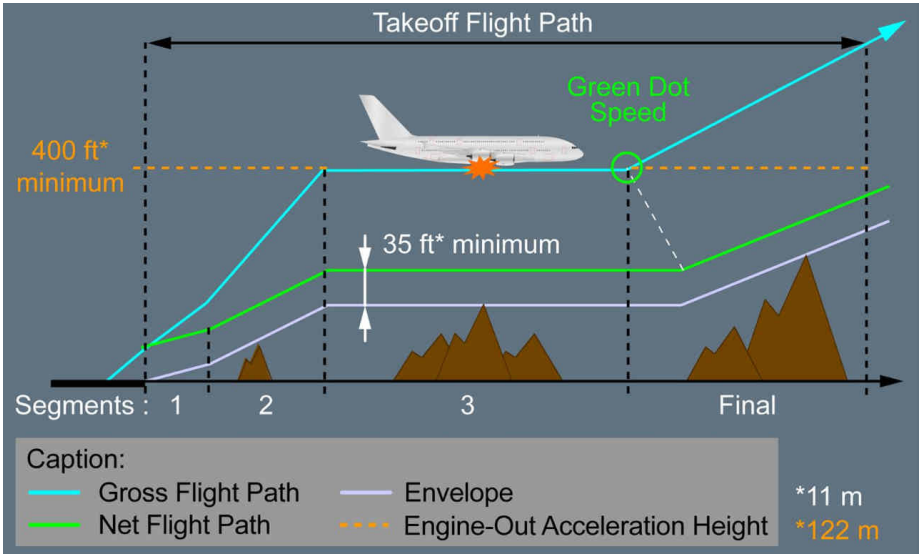
The RESULTS panel displays the takeoff shift (T.O SHIFT) of the SINGLE RWY COMPUTATION panel.

ENGINE-OUT ACCELERATION ALTITUDE

Applicable to: ALL

L2 GENERAL

Engine-Out Acceleration Height



The certified minimum acceleration height is 400 ft above the takeoff surface.
The gross minimum acceleration height ensures that the obstacles are cleared by the net takeoff flight path with the regulatory margin.
The maximum acceleration height ensures that acceleration to Green Dot speed and cleanup can be achieved within the maximum permitted 10 min of TOGA.

L1 T.O PERF

The EO ACCEL field on the RESULTS panel displays the computed engine-out acceleration altitude value.

Note: *This value is a pressure altitude.*

MORE PANEL

Applicable to: ALL

The MORE panel displays the following information:

- The results of the T.O PERF computation, identical to the results displayed on the RESULTS panel
- The thrust reverser status for the T.O PERF computation:
  - For dry and wet runway conditions, the thrust reverser status is: NO REVERSE THRUST CREDIT
  - For contaminated runways, the thrust reverser status is defined as per Operator policy.
- Additional results data that the Operator can customize.

MORE Panel



XCHECK WITH AVIONICS

Applicable to: ALL

The XCHECK WITH AVNCS function enables the flight crew to crosscheck the FMS takeoff performance entries with the OIS takeoff performance results.

L2 For more information about the XCHECK WITH AVNCS procedure, *Refer to PRO-NOR-SOP-60-B FMS INITIALIZATION_FMS DATA CROSSCHECK* .

L1 The following takeoff performance data are crosschecked:

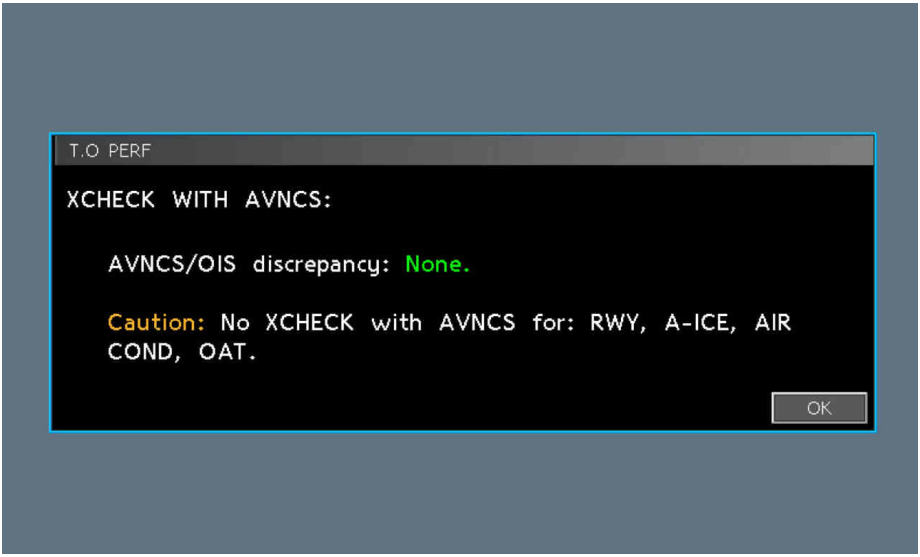
- Takeoff Speeds: V1, VR, V2
- Aerodynamic configuration (FLAPS)
- Takeoff weight (TOW)
- Flexible Temperature (TFLEX)
- QNH .

When the flight crew uses the XCHECK WITH AVNCS function, the crosscheck is performed with:

- The takeoff speeds, the aerodynamic configuration, the TOW , and thrust displayed on the RESULTS panel
- The QNH entered in the CONDITIONS panel.

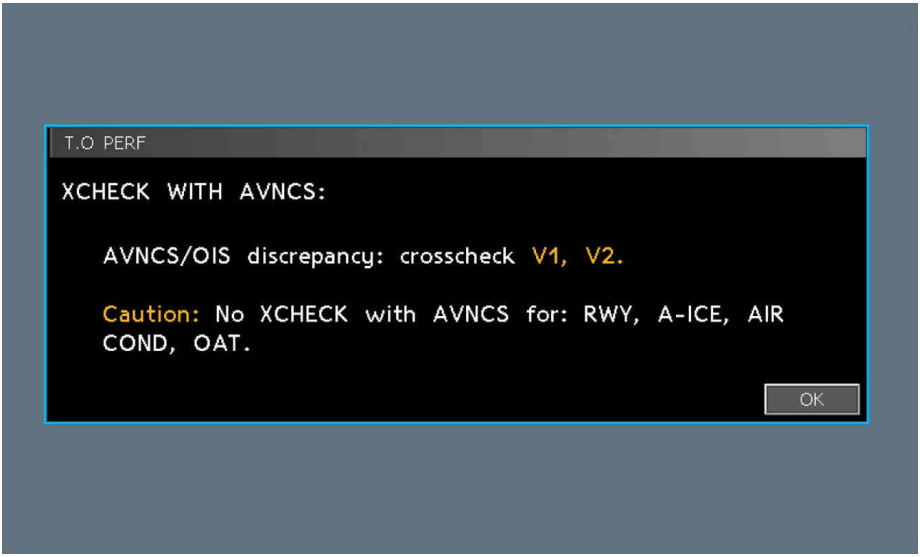
If there is no discrepancy between the FMS takeoff performance entries and the OIS takeoff performance results, T.O PERF displays the following popup message.

AVNCS/OIS: no Discrepancy



If there is one or more discrepancies between the FMS takeoff performance entries and the OIS takeoff performance results, T.O PERF displays the following popup message. The discrepancy parameters are displayed in amber (e.g. V1 and V2 in the following example).

AVNCS/OIS: Discrepancies



Note: *There is no crosscheck for the following parameters: RWY, A-Ice, AIR COND, OAT.*

XCHECK WITH AVNCS ASSUMPTIONS

TOW

The XCHECK WITH AVNCS function is active if and only if the calculated MTOW(perf) is equal to or above than the TOW value.
The XCHECK WITH AVNCS function compares the TOW value with the Gross Weight (GW) coming from the ECAM and displayed on the permanent data of the System Display (SD). Consequently, the TOW crosscheck does not make sense if it is performed before the end of the refueling.
The TOW crosscheck is successful if GW is included in the following weight range: 0.99*TOW ≤ GW ≤ 1.0035*TOW.

TAKEOFF SPEEDS

The VR/V2 crosscheck is successful if:
- The VR value inserted in the FMS T.O page is equal to the VR value calculated in T.O PERF
- The V2 value inserted in the FMS T.O page is equal to the V2 value calculated in T.O PERF.

Single V1

Single V1



The V1 crosscheck is successful if the V1 value inserted in the FMS T.O page is equal to the V1 value calculated in T.O PERF.

V1 Range

V1 Range



The V1 crosscheck is successful if the V1 value inserted in the FMS T.O page is selected within the [V1 min ; V1 max] range calculated in T.O PERF.

FLAPS

The FLAPS crosscheck is successful if the FLAPS selection on the FMS T.O page corresponds to the one selected or computed in T.O PERF.

QNH

The XCHECK WITH AVNCS function checks the QNH if and only if the barometric reference of the CM1 is QNH.
The QNH crosscheck is successful if the QNH displayed on the EFIS Control Panel of the CM1 (named CM1_QNH) is included in the following QNH range compared to the entered QNH in T.O PERF (named OIS_QNH): OIS_QNH - 0.99 hPa ≤ CM1_QNH ≤ OIS_QNH + 0.99 hPa.

XCHECK WITH AVNCS ASSUMPTIONS

THRUST

The Thrust crosscheck of the XCHECK WITH AVNCS function compares the Thrust selection of the FMS T.O page with the selected or calculated thrust in T.O PERF.
The Thrust crosscheck rules are expressed in the following matrix table:

XCHECK WITH AVNCS popup message		Thrust in FMS T.O page		
		TOGA	FLEX	DERATED
Thrust in T.O PERF results	TOGA	Caution: No XCHECK with AVNCS for: THRUST	AVNCS/OIS discrepancy: crosscheck THRUST	Caution: No XCHECK with AVNCS for: THRUST
	FLEX	AVNCS/OIS discrepancy: crosscheck THRUST	*Flexible Temperature comparison*	AVNCS/OIS discrepancy: crosscheck THRUST
	DERATED	Caution: No XCHECK with AVNCS for: THRUST	AVNCS/OIS discrepancy: crosscheck THRUST	Caution: No XCHECK with AVNCS for: THRUST

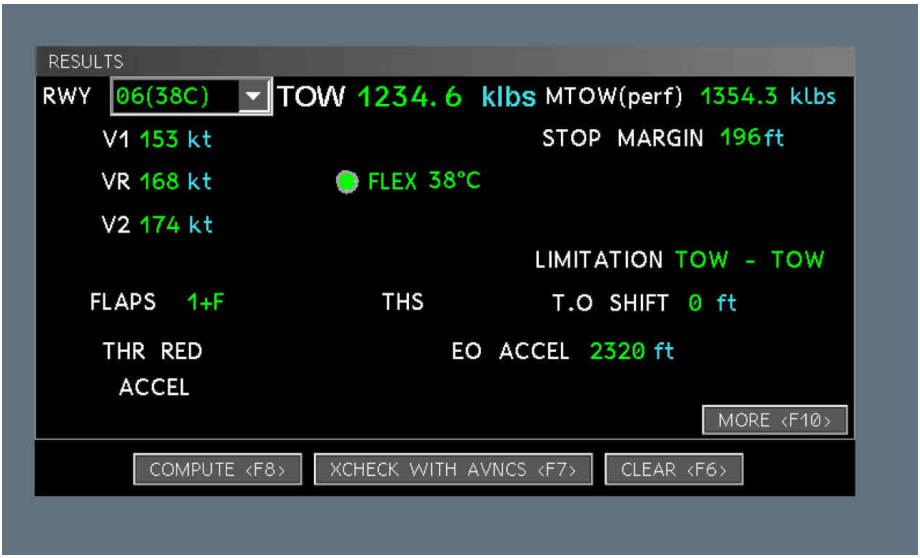
The FMS_FLEX vs. T.O PERF_FLEX check requires a flexible temperature comparison before displaying a XCHECK WITH AVNCS message.
In this case, the Thrust crosscheck of the XCHECK WITH AVNCS function compares the FLEX temperature value inserted in the FMS T.O page with the Flexible Temperature (TFLEX) value computed by T.O PERF.
This crosscheck is successful if the inserted FLEX temperature is included in the following temperature range: TFLEX - 5 °C ≤ FLEX ≤ TFLEX.
Otherwise, the XCHECK WITH AVNCS popup message displays "AVNCS/OIS discrepancy: crosscheck THRUST".

COMPUTATION RESULTS

Applicable to: ALL

The flight crew can access the results for each runway via the RWY drop-down list.

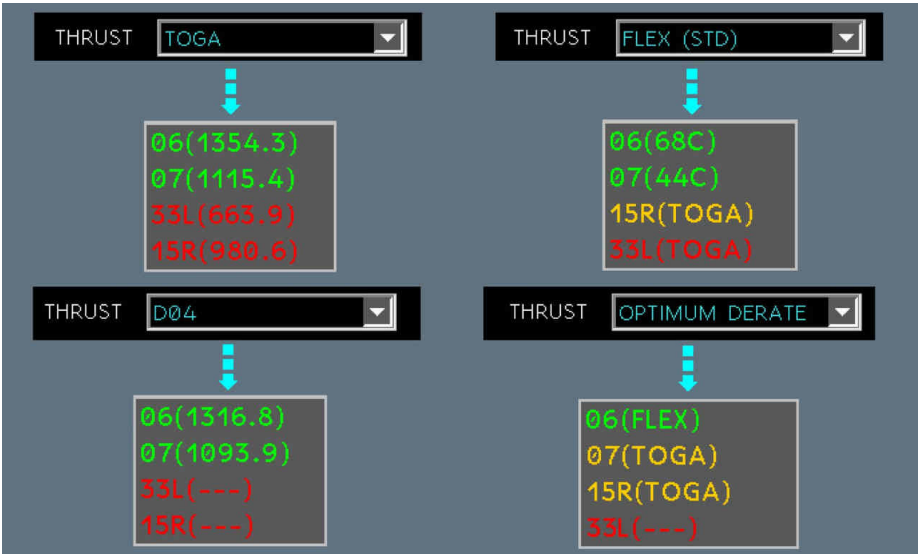
Single RESULTS Panel - MULTIPLE RWY COMPUTATION



MULTIPLE RWY COMPUTATION

Applicable to: ALL

Runway Selection



TOGA

For each runway, the maximum performance limited takeoff weight is displayed between brackets after the Runway ID.
The list is sorted by weight from the highest to the lowest and is color-coded.

GREEN

When MTOW(perf) is above, or equal to, TOW.

RED

When MTOW(perf) is below TOW.

DERATE

For each runway, the maximum performance limited takeoff weight is displayed between brackets after the Runway ID.
The list is sorted by weight from the highest to the lowest and is color-coded.

GREEN

When MTOW(perf) is above, or equal to, TOW.

RED

When MTOW(perf) is below TOW.

FLEX

For each runway, TFLEX (or TOGA when FLEX Takeoff is not permitted) is displayed between brackets after the Runway ID.
The list is sorted by temperature, then by weight (both in decreasing order). Moreover, it is color-coded.

GREEN

Indicates that the results correspond to a FLEX Takeoff.

AMBER

Indicates that the results correspond to a takeoff at TOGA, when MTOW(perf) is above, or equal to, TOW.

RED

Indicates that the results correspond to a takeoff at TOGA, when MTOW(perf) is below TOW.

OPTIMUM DERATE

For each runway, FLEX (or TOGA, or the derate level) is displayed between brackets after the Runway ID.
The list is sorted by temperature, then by weight (both in decreasing order). Moreover, it is color-coded.

GREEN

Indicates that the results correspond to FLEX Takeoff.

AMBER

Indicates that the results correspond to a takeoff at TOGA (or derate level), when MTOW(perf) is above, or equal to, TOW.

RED

Indicates that the results correspond to a takeoff at TOGA (or derate level), when MTOW(perf) is below TOW.

Intentionally left blank

RESULTS DATA

Applicable to: ALL

GENERAL

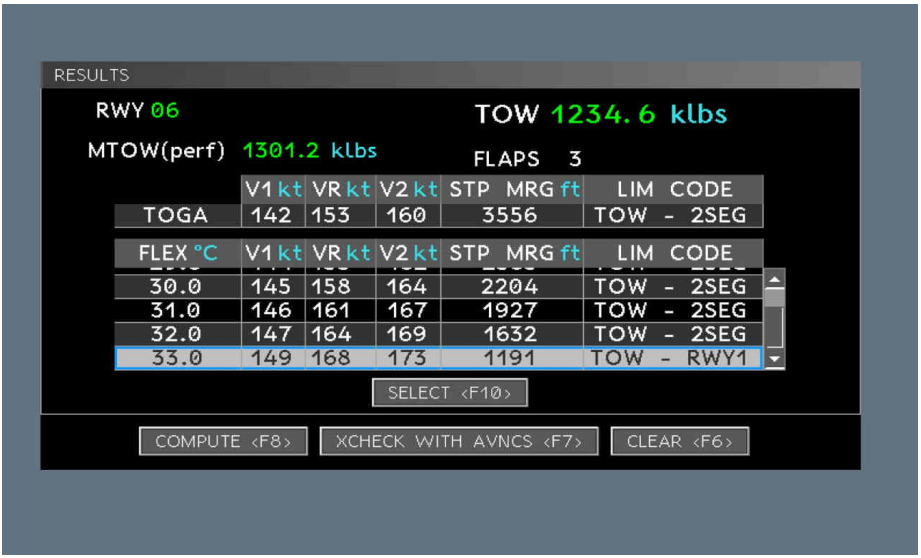
A takeoff performance calculation computes the following results:

- The takeoff weights
- The takeoff speeds
- The power
- The stop margin
- The aerodynamic configuration
- The limitation codes
- The engine-out acceleration altitude.

T.O PERF

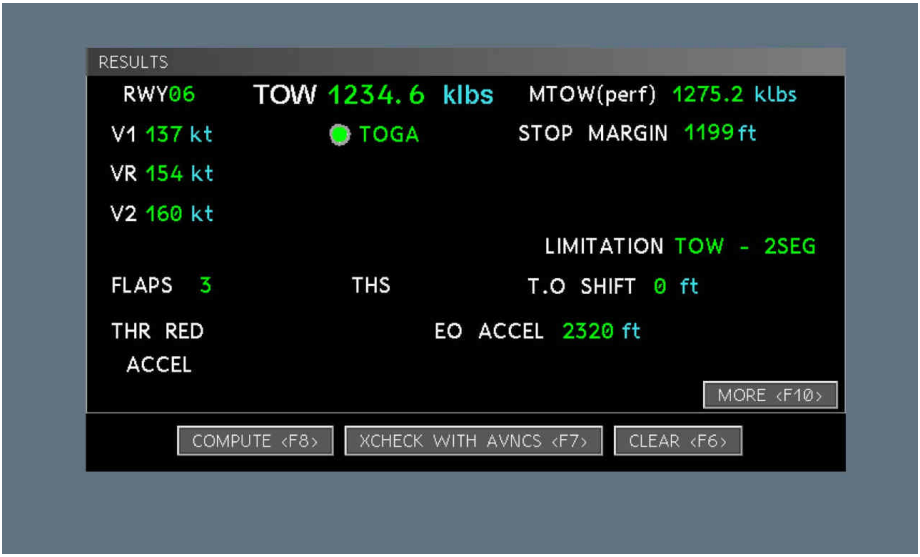
WHEN FLEX TAKEOFF IS POSSIBLE

RESULTS Panel



WHEN FLEX TAKEOFF IS NOT POSSIBLE

RESULTS Panel



TAKEOFF WEIGHTS

Applicable to: ALL

GENERAL

The Maximum Takeoff Weight Limited by the Performance (MTOW(PERF)) is the maximum aircraft weight which complies with all the regulatory requirements for takeoff performance in given environmental conditions.
The MTOW(PERF) value may exceed the certified MTOW value. However, the real takeoff weight must not exceed MTOW .

L2 For a relevant value of MTOW , *Refer to FCOM Limitations* .

L1 T.O PERF

The RESULTS panel displays the following two weights:
- TOW, the input weight of the calculation
- MTOW(perf).

COMMUNICATION FROM T.O PERF TO LOADSHEET

When the flight crew completes a T.O PERF computation and then changes from T.O PERF to LOADSHEET, T.O PERF transfers the calculated MTOW(PERF) value to LOADSHEET if the MTOW(PERF) value is lower than or equal to the certified MTOW value. If the MTOW(PERF) value is transferred, LOADSHEET displays this value in yellow in the MTOW field of the CONDITIONS panel.

TAKEOFF SPEEDS

Applicable to: ALL

GENERAL

For a specific runway and in defined conditions, the takeoff performance optimization process determines the optimum takeoff speeds, in order to maximize the takeoff weight and Flexible Temperature (TFLEX), by taking into account the regulatory requirements.

L2 **DECISION SPEED - V1**

The decision speed is referred to as V1.

The takeoff optimization computation considers that:
- The engine failure occurs 1 second before V1
- The decision to abort takeoff occurs at V1.

V1 must be at least equal to the minimum control speed on ground (VMCG) plus 1 second acceleration on the remaining engines.
Depending on takeoff performance limitations, the V1 that results from the speed optimization can either be a single value or a range of values.
For more information about speed optimization, *Refer to PER-TOF-GEN Speed Optimization* .

In the case of a V1 range, the Operator can use one of the following three options:
- V1 min:
  - Is the lowest permitted decision speed
  - Provides the best stop margin
    For more information about stop margin, *Refer to PER-TOF-TOR-MRS Stop Margin* .
  - But increases the go-distance time between V1 and VR.
- V1 max:
  - Is the highest permitted takeoff decision speed
  - Reduces the go-distance time between V1 and VR
  - But provides the lowest stop margin.
- V1 mean:
  - Is a compromise between V1 min and V1 max.

ROTATION SPEED - VR

VR is the speed at which the flight crew must initiate the rotation.

VR may not be less than:
- V1

- 105 % of the minimum control speed in the air (VMCA)
- The speed that allows reaching V2 before reaching a height of 35 ft above the runway.

In addition the liftoff speed (VLOF), that results from VR, must:
- Be lower than the maximum tire speed (VTIRE)
- Exceed the minimum unstick speed (VMU) OEI by 4 % and AEO by 8 % .

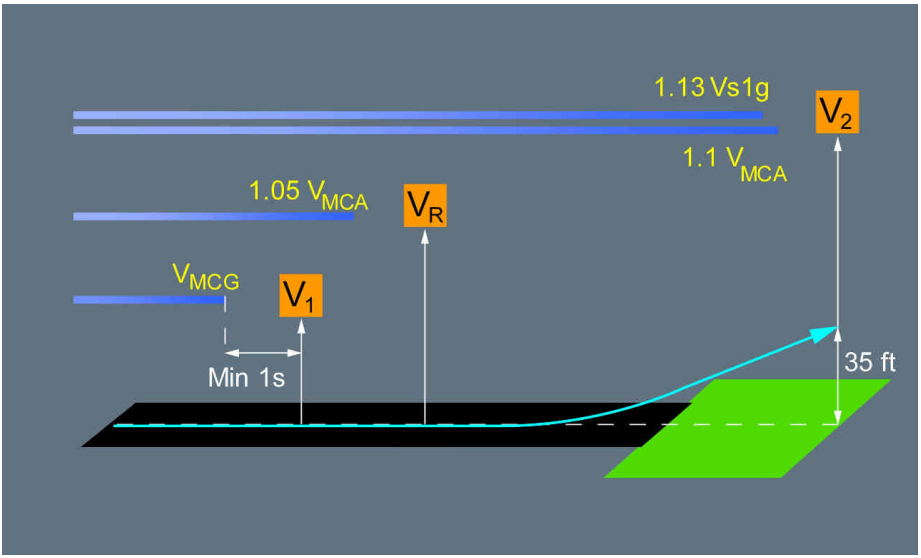
MINIMUM TAKEOFF CLIMB SPEED - V2

If one engine fails, the aircraft must reach the minimum takeoff climb speed at a height of 35 ft above the runway. This minimum takeoff climb speed is referred to as V2.

V2 must exceed:
- The minimum control speed in the air (VMCA) by a minimum of 10 %
- The 1g stall speed (VS1G) by a minimum of 13 % .

L1 **SPEED SUMMARY**

Takeoff Speeds Summary



T.O PERF

T.O PERF displays the following takeoff speeds on the RESULTS panel:
- V1, the decision speed
- VR, the rotation speed

- V2, the minimum takeoff climb speed.

In the case of a V1 range resulting from the speed optimization process, the following display modes are available.

WHEN FLEX TAKEOFF IS POSSIBLE

Single V1

Single V1



Only one V1 value is displayed and can correspond to:
- V1 min, or
- V1 max, or
- V1 mean.

V1 range

V1 Range



The following two values are displayed:
- V1 min
- V1 max.

WHEN FLEX TAKEOFF IS NOT POSSIBLE

Single V1

Single V1



Only one V1 value is displayed and can correspond to:
- V1 min, or
- V1 max, or
- V1 mean.

V1 range

V1 Range



The V1 value may be selected within the [V1 min ; V1 max] range via arrow keys.

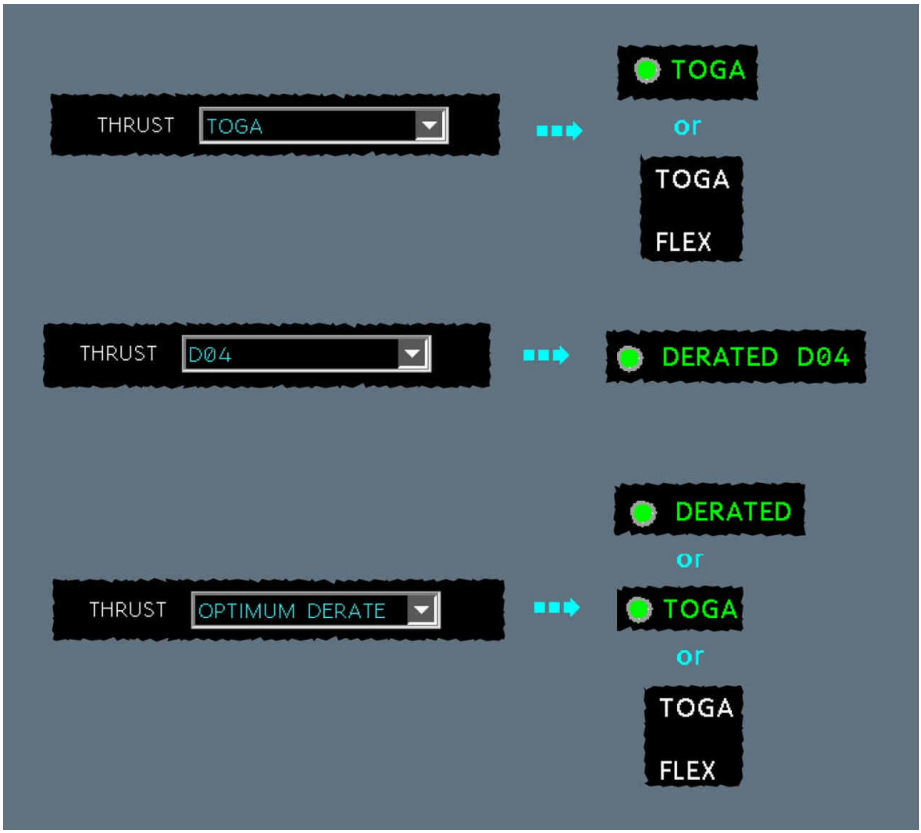
THRUST

Applicable to: ALL

Depending on the THRUST option that the flight crew has selected on the CONDITIONS panel, the thrust label displayed on the RESULTS panel may be:

- The selected THRUST option, if a derate level (D04, D08, etc.) was selected
- An optimum derate level, if OPTIMUM DERATE was selected
- An adapted thrust to the actual takeoff weight (FLEX or TOGA), if TOGA was selected.

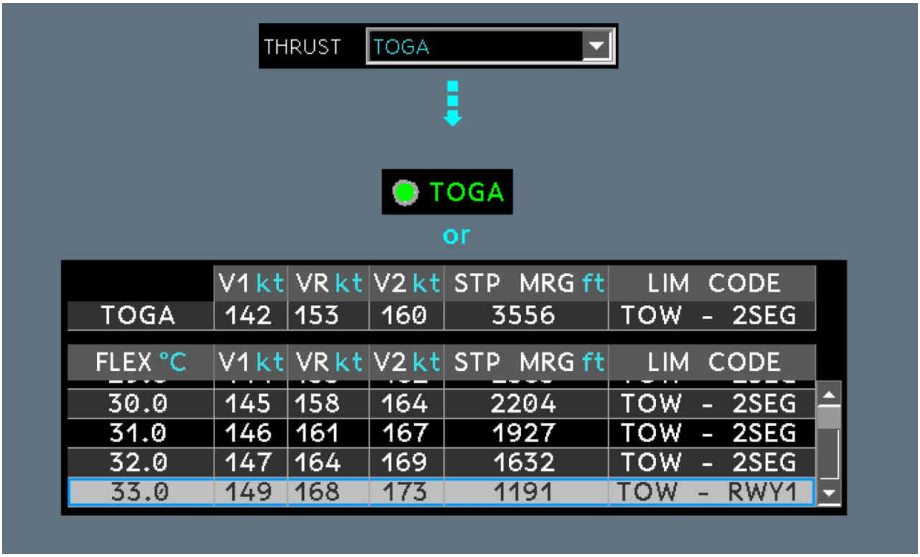
THRUST Option



FLEX TAKEOFF

Applicable to: ALL

TOGA THRUST Option



WHEN FLEX TAKEOFF IS POSSIBLE

Two tables are displayed if all the following conditions are met:

- TOGA is selected as the THRUST option
- FLEX Takeoff is permitted for the current runway conditions
- TOW is lower than MTOW(perf)
- There is TFLEX above TREF for TOW.

L2 For more information, *Refer to PER-TOF-THR-FLX TFLEX Possible Range* .

L1 **TOGA TABLE**

The TOGA table displays the associated takeoff data.

Note: *The TOGA result line is sometimes overlapped by the FLEX result line.*
Workaround: Move the cursor over the first line of the result table and select it.

FLEX TABLE

For each permitted TFLEX , the FLEX table displays its associated takeoff data.

WHEN FLEX TAKEOFF IS NOT POSSIBLE

TOGA thrust is displayed.

OPTIMUM DERATE

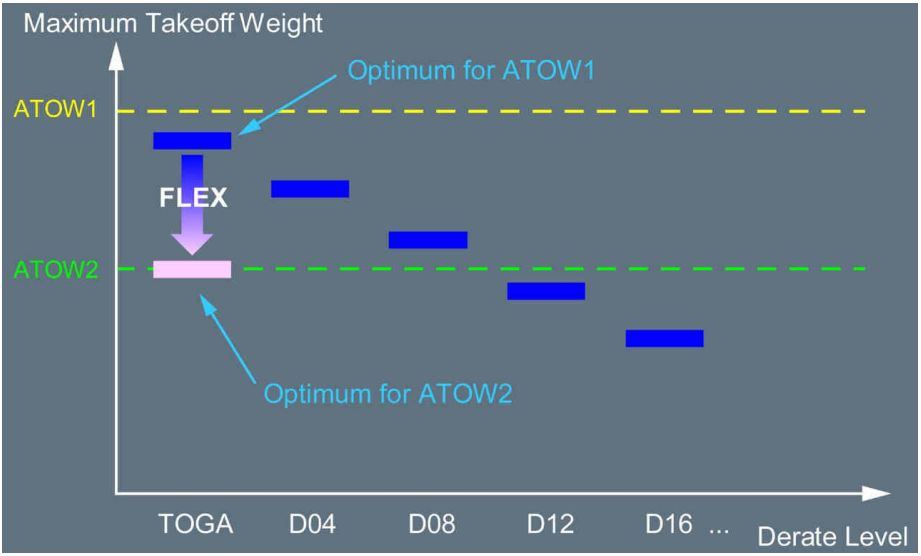
Applicable to: ALL

CAUTION	The use of derate levels lower than the one leading to the highest possible maximum performance limited takeoff weight is not permitted.

Note: *A lower derate level is a derate level that results in a higher thrust reduction.*

WITHOUT VMC LIMITATION

Optimum Derate Without VMC Limitation



ATOW1 CASE

TOGA is displayed as the optimum derate level, even if it is not possible to takeoff (MTOW(perf) lower than ATOW1).

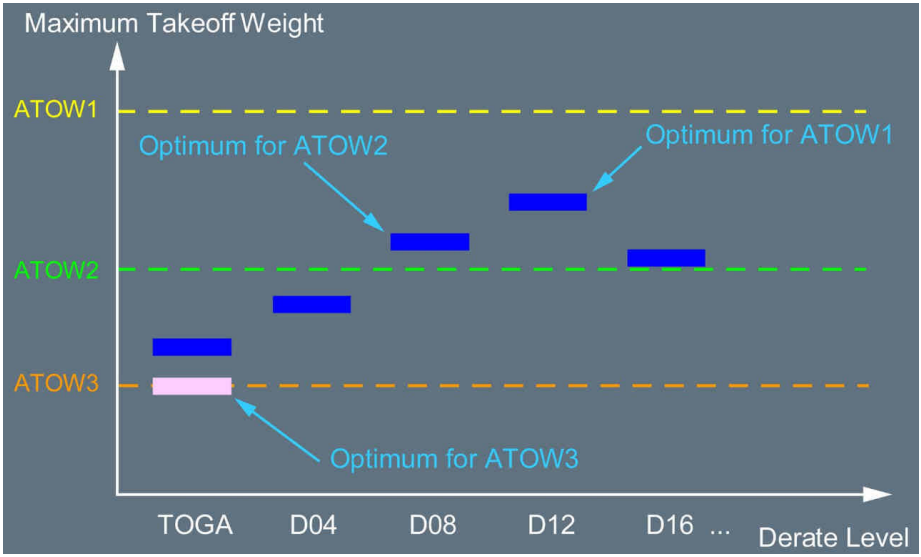
ATOW2 CASE

TOGA is the optimum derate level.

If FLEX Takeoff is permitted, the following two tables are displayed:
- The TOGA table displays the actual OAT and associated takeoff data
- The FLEX table displays for each permitted TFLEX the associated takeoff data.

WITH VMC LIMITATION

Optimum Derate With VMC Limitation



ATOW1 CASE

D12 is displayed as the optimum derate level, even if it is not possible to takeoff (MTOW(perf) lower than ATOW1).

ATOW2 CASE

D08 is displayed as the optimum derate level, even if it is allowed to takeoff with D12. However, it is not permitted to takeoff using D16 in this example, even if it is theoretically possible to takeoff with this derate level.

ATOW3 CASE

TOGA is the optimum derate level.

If FLEX Takeoff is permitted, the following two tables are displayed:
- The TOGA table displays the actual OAT and associated takeoff data
- The FLEX table displays for each permitted TFLEX the associated takeoff data.

However, it is allowed to takeoff with D04, D08 and D12 in this example.

It is still not permitted to takeoff using D16 in this example, even if it is theoretically possible to takeoff with this derate level.

STOP MARGIN

Applicable to: ALL

GENERAL

The stop margin is the difference between the Accelerate-Stop Distance (ASD) and the available runway length including the Stopway (SWY).

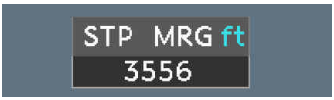
T.O PERF

The display of the stop margin depends on the V1 option:

WHEN FLEX TAKEOFF IS POSSIBLE

One Stop Margin

STP MRG



Only one stop margin is displayed, if V1 type is:
- A V1 min setting, or
- A V1 max setting.

Two Stop Margins

STP MRG



Two stop margins are displayed, if V1 type is:
- A V1 mean setting, or
- A range of V1 setting.

The first value corresponds to the maximum stop margin (i.e. the stop margin calculated for the lowest permitted V1).
The second value corresponds to the minimum stop margin (i.e. the stop margin calculated for the highest permitted V1).

WHEN FLEX TAKEOFF IS NOT POSSIBLE

STP MRG

STP MRG



Only one stop margin is displayed, if the V1 type is:
- A V1 min setting, or
- A V1 max setting.

STP MRG V1 Min & STP MRG V1 Max

STP MRG V1 Min & STP MRG V1 Max



Two stop margins are displayed, if the V1 type is:
- A V1 mean setting, or
- A range of V1 setting.

STP MRG V1 Min corresponds to the maximum stop margin (i.e. the stop margin calculated for the lowest permitted V1).
STP MRG V1 Max corresponds to the minimum stop margin (i.e. the stop margin calculated for the highest permitted V1).

TAKEOFF LIMITATION CODES

Applicable to: ALL

GENERAL

Several regulatory requirements limit takeoff performance. They are called takeoff limitations.

T.O PERF

The requirements that limit performance in specific cases are identified in the computation results via limitation codes.
Usually, MTOW(perf) is obtained at the intersection of two limitation curves. For this reason, the limitation codes are always indicated by two codes.
The two codes are identical if MTOW(perf) is only limited by one limitation.
The following table indicates the various codes that can appear:

TOW	Maximum computation weight, or maximum structural weight
RWY0	All-engine Takeoff Distance (TOD0)
	or All-engine Takeoff Run (TOR0)
	or All-engine Accelerate-Stop Distance (ASD0)
RWY1	One-engine Inoperative Takeoff Distance (TOD1)
	or One-engine Inoperative Takeoff Run (TOR1)
	or One-engine Inoperative Accelerate-Stop Distance (ASD1)
VMCG	V1 limited by Certified Minimum Control Speed on Ground
TIRE	Vlof limited by Maximum Tire Speed
BRK	V1 limited by Maximum Brake Energy
VMCA	V2 limited by certified Minimum Control Speed in the Air
1SEG	First Segment Climb Gradient
2SEG	Second Segment Climb Gradient
3SEG	Acceleration (third) Segment
FTO	Final Takeoff Climb Gradient
OBS	Obstacle Clearance
VMU	Minimum Unstick Speed

Customized codes may differ from the above listed.

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

For more information about aerodynamic configuration, *Refer to Aerodynamic Configuration (Input)* .

If the takeoff performance for two aerodynamic configurations is identical, the highest flap setting is recommended.

L2 The highest flap setting corresponds to the configuration that provides the lowest takeoff speeds and, therefore, improves safety during a rejected takeoff (RTO).

L1 T.O PERF

The FLAPS field on the RESULTS panel displays the selected or optimized configuration.

The optimization process keeps the configuration that provides the maximum performance limited takeoff weight (or the maximum TFLEX).

If the weight is the same for several configurations, the configuration that provides the lowest takeoff speeds is selected.

TAKEOFF SHIFT

Applicable to: ALL

GENERAL

The takeoff shift is a reduction of the takeoff distances (TORA, TODA, ASDA) due to a shifted entry of the aircraft on the runway.

T.O PERF

WHEN FLEX TAKEOFF IS POSSIBLE

If the runway length has been modified, the flight crew can access the takeoff shift via the selection of a TFLEX (or the OAT for TOGA) in the RESULTS tables.

WHEN FLEX TAKEOFF IS NOT POSSIBLE

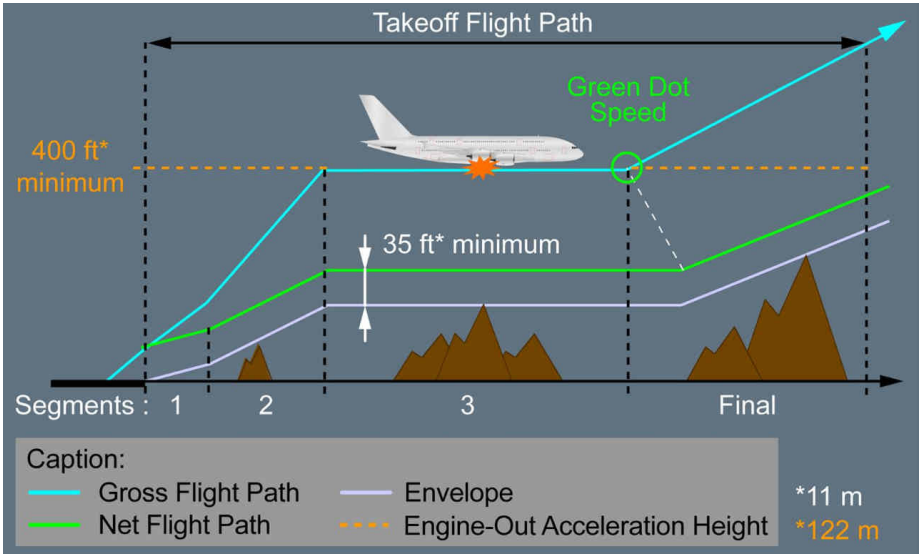
The RESULTS panel displays the takeoff shift (T.O SHIFT) of the SINGLE RWY COMPUTATION panel.

ENGINE-OUT ACCELERATION ALTITUDE

Applicable to: ALL

L2 GENERAL

Engine-Out Acceleration Height



The certified minimum acceleration height is 400 ft above the takeoff surface.
The gross minimum acceleration height ensures that the obstacles are cleared by the net takeoff flight path with the regulatory margin.
The maximum acceleration height ensures that acceleration to Green Dot speed and cleanup can be achieved within the maximum permitted 10 min of TOGA.

L1 T.O PERF

WHEN FLEX TAKEOFF IS POSSIBLE

The flight crew can access the computed engine-out acceleration altitude value via the selection of a TFLEX (or the OAT for TOGA) in the RESULTS tables.

WHEN FLEX TAKEOFF IS NOT POSSIBLE

The EO ACCEL field on the RESULTS panel displays the computed engine-out acceleration altitude value.

Note: *This value is a pressure altitude.*

MORE PANEL

Applicable to: ALL

The MORE panel displays the following information:

- The results of the T.O PERF computation, identical to the results displayed on the RESULTS panel
- The thrust reverser status for the T.O PERF computation:
  - For dry and wet runway conditions, the thrust reverser status is: NO REVERSE THRUST CREDIT
  - For contaminated runways, the thrust reverser status is defined as per Operator policy.
- Additional results data that the Operator can customize.

MORE Panel



XCHECK WITH AVIONICS

Applicable to: ALL

The XCHECK WITH AVNCS function enables the flight crew to crosscheck the FMS takeoff performance entries with the OIS takeoff performance results.

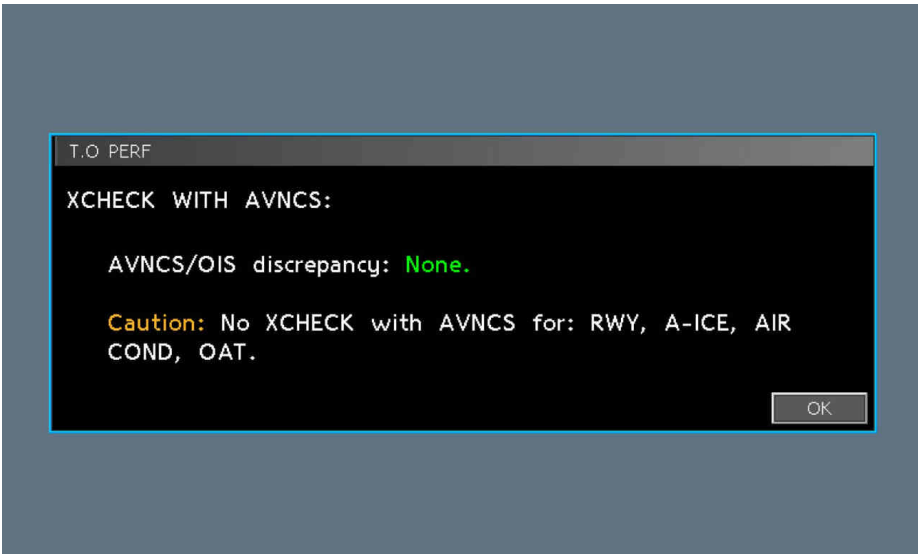
L2 For more information about the XCHECK WITH AVNCS procedure, *Refer to PRO-NOR-SOP-60-B FMS INITIALIZATION_FMS DATA CROSSCHECK* .

L1 The following takeoff performance data are crosschecked:

- Takeoff Speeds: V1, VR, V2
- Aerodynamic configuration (FLAPS)
- Takeoff weight (TOW)
- Flexible Temperature (TFLEX)
- QNH .

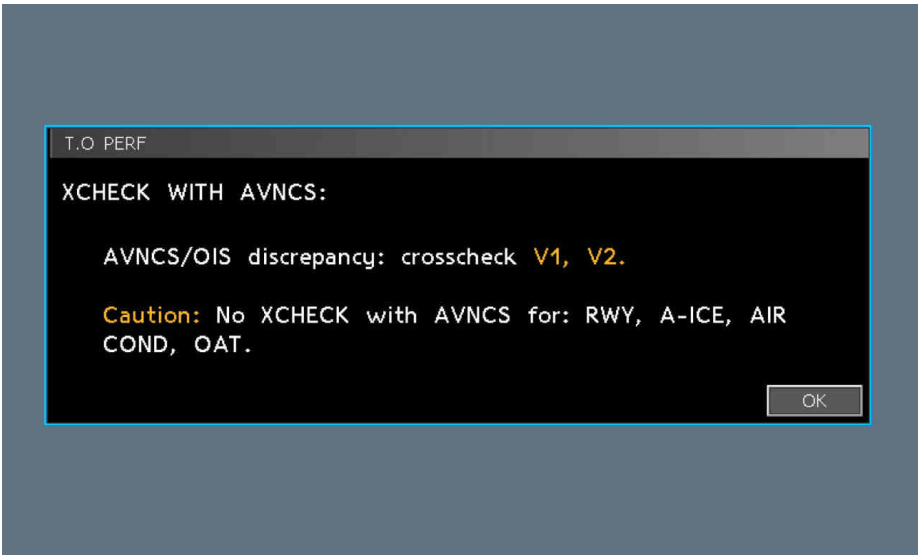
If there is no discrepancy between the FMS takeoff performance entries and the OIS takeoff performance results, T.O PERF displays the following popup message.

AVNCS/OIS: no Discrepancy



If there is one or more discrepancies between the FMS takeoff performance entries and the OIS takeoff performance results, T.O PERF displays the following popup message. The discrepancy parameters are displayed in amber (e.g. V1 and V2 in the following example).

AVNCS/OIS: Discrepancies



Note: *There is no crosscheck for the following parameters: RWY, A-Ice, AIR COND, OAT.*

WHEN FLEX TAKEOFF IS POSSIBLE

When the flight crew has performed a T.O PERF computation, and if a FLEX takeoff is possible, two tables are displayed on the RESULTS panel:

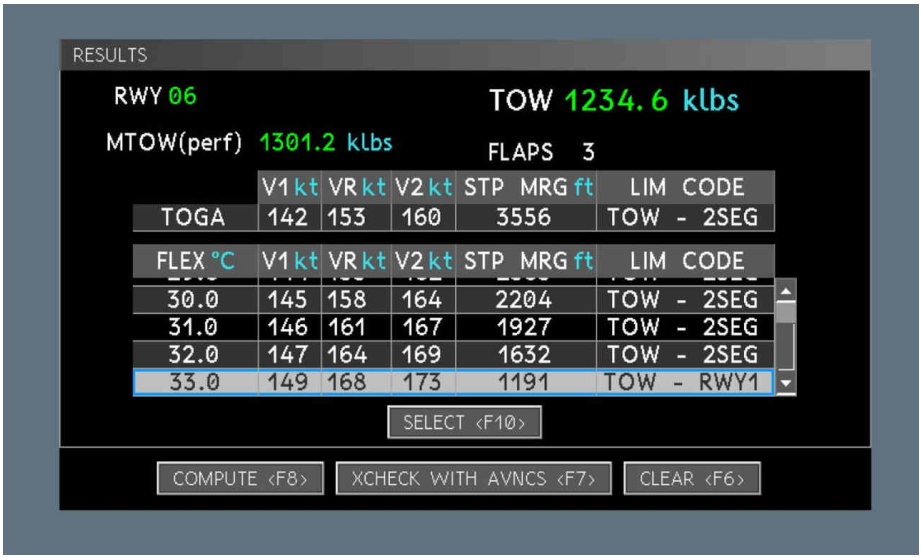
- A table showing performance results at TOGA thrust
- A table showing performance results for different possible TFLEX.

When the flight crew uses the XCHECK WITH AVNCS function, the crosscheck is performed with:

- The aerodynamic configuration and the TOW displayed on the RESULTS panel
- The QNH entered in the CONDITIONS panel
- The thrust and associated takeoff speeds of the selected line in the tables.

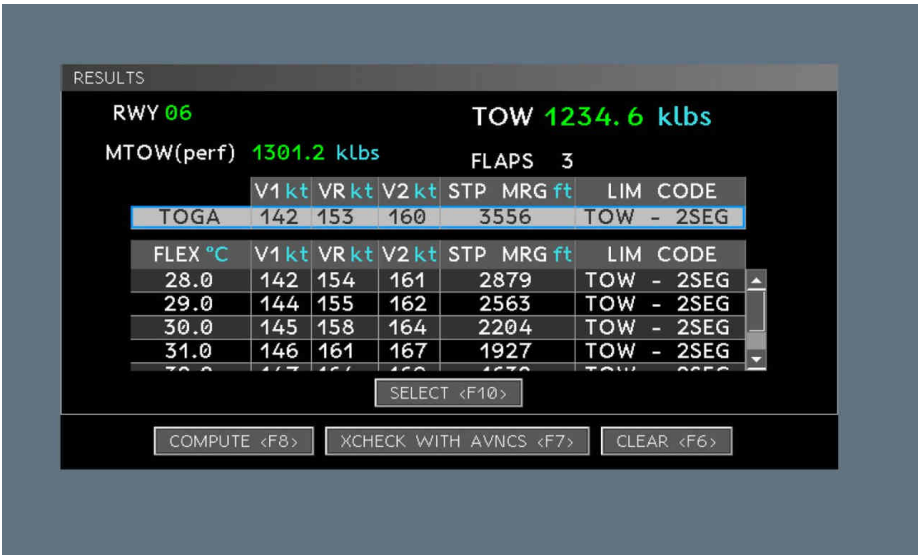
In the following example, if the flight crew uses the XCHECK WITH AVNCS function, the crosscheck will be performed with the "33.0" TFLEX line.

TFLEX Line Selected



In the following example, if the flight crew uses the XCHECK WITH AVNCS function, the crosscheck will be performed with the TOGA line.

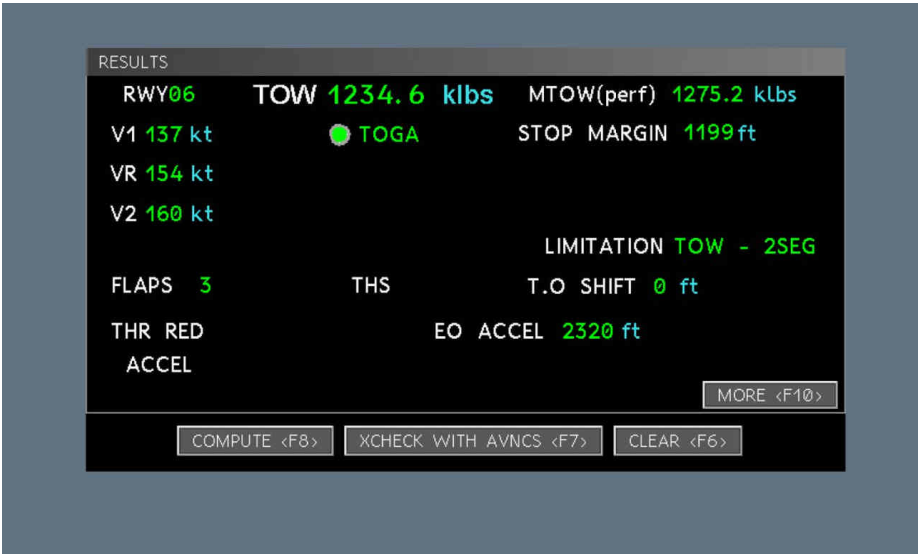
TOGA Line Selected



WHEN FLEX TAKEOFF IS NOT POSSIBLE

When the flight crew has performed a T.O PERF computation, if a FLEX takeoff is not possible, T.O PERF displays the results with the following layout.

RESULTS Panel



When the flight crew uses the XCHECK WITH AVNCS function, the crosscheck is performed with:

- The takeoff speeds, the aerodynamic configuration, the TOW, and TOGA (or Derate level) displayed on the RESULTS panel
- The QNH entered in the CONDITIONS panel.

XCHECK WITH AVNCS ASSUMPTIONS

TOW

The XCHECK WITH AVNCS function is active if and only if the calculated MTOW(perf) is equal to or above than the TOW value.
The XCHECK WITH AVNCS function compares the TOW value with the Gross Weight (GW) coming from the ECAM and displayed on the permanent data of the System Display (SD). Consequently, the TOW crosscheck does not make sense if it is performed before the end of the refueling.
The TOW crosscheck is successful if GW is included in the following weight range: 0.99*TOW ≤ GW ≤ 1.0035*TOW.

TAKEOFF SPEEDS

The VR/V2 crosscheck is successful if:
- The VR value inserted in the FMS T.O page is equal to the VR value calculated in T.O PERF
- The V2 value inserted in the FMS T.O page is equal to the V2 value calculated in T.O PERF.

When FLEX Takeoff is Possible

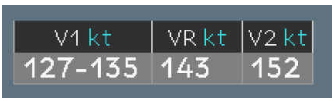
Single V1

Single V1



V1 Range

V1 Range



When FLEX Takeoff is not possible

Single V1

Single V1



V1 Range

V1 Range



FLAPS

The FLAPS crosscheck is successful if the FLAPS selection on the FMS T.O page corresponds to the one selected or computed in T.O PERF.

QNH

The XCHECK WITH AVNCS function checks the QNH if and only if the barometric reference of the CM1 is QNH.
The QNH crosscheck is successful if the QNH displayed on the EFIS Control Panel of the CM1 (named CM1_QNH) is included in the following QNH range compared to the entered QNH in T.O PERF (named OIS_QNH): OIS_QNH - 0.99 hPa ≤ CM1_QNH ≤ OIS_QNH + 0.99 hPa.

XCHECK WITH AVNCS ASSUMPTIONS

THRUST

The Thrust crosscheck of the XCHECK WITH AVNCS function compares the Thrust selection of the FMS T.O page with the selected or calculated thrust in T.O PERF.
The Thrust crosscheck rules are expressed in the following matrix table:

XCHECK WITH AVNCS popup message		Thrust in FMS T.O page		
		TOGA	FLEX	DERATED
Thrust in T.O PERF results	TOGA	Caution: No XCHECK with AVNCS for: THRUST	AVNCS/OIS discrepancy: crosscheck THRUST	Caution: No XCHECK with AVNCS for: THRUST
	FLEX	AVNCS/OIS discrepancy: crosscheck THRUST	*Flexible Temperature comparison*	AVNCS/OIS discrepancy: crosscheck THRUST
	DERATED	Caution: No XCHECK with AVNCS for: THRUST	AVNCS/OIS discrepancy: crosscheck THRUST	Caution: No XCHECK with AVNCS for: THRUST

The FMS_FLEX vs. T.O PERF_FLEX check requires a flexible temperature comparison before displaying a XCHECK WITH AVNCS message.
In this case, the Thrust crosscheck of the XCHECK WITH AVNCS function compares the FLEX temperature value inserted in the FMS T.O page with the Flexible Temperature (TFLEX) value computed by T.O PERF.
This crosscheck is successful if the inserted FLEX temperature is included in the following temperature range: TFLEX - 5 °C ≤ FLEX ≤ TFLEX.
Otherwise, the XCHECK WITH AVNCS popup message displays "AVNCS/OIS discrepancy: crosscheck THRUST".

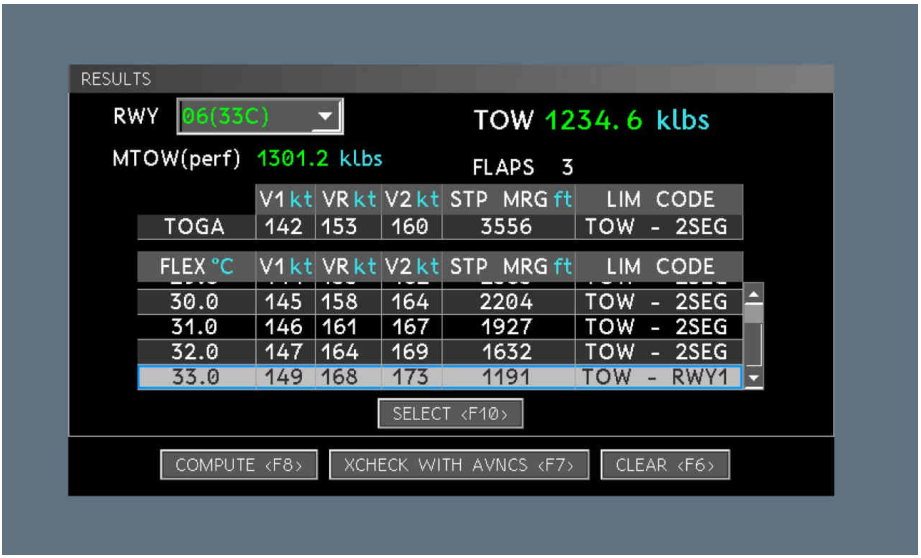
Intentionally left blank

COMPUTATION RESULTS

Applicable to: ALL

The flight crew can access the results for each runway via the RWY drop-down list.

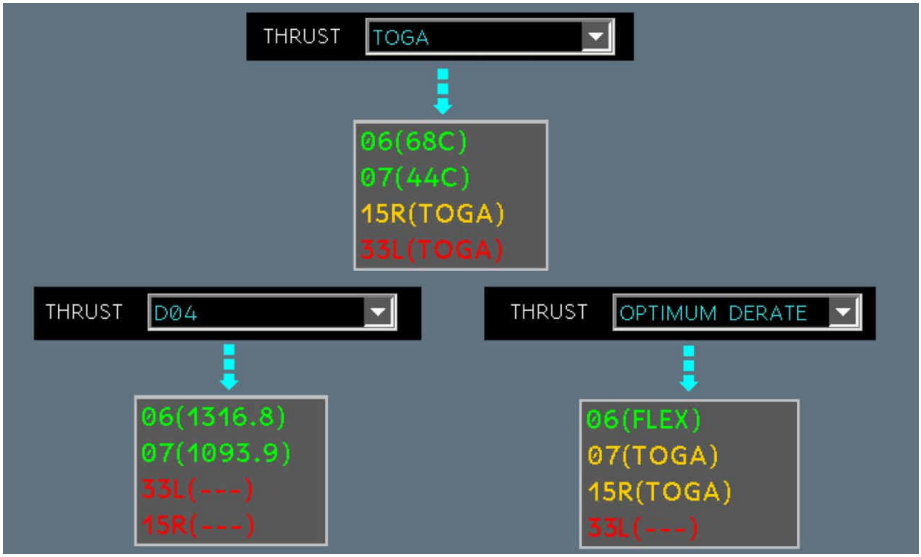
Multiple RESULTS Panel - MULTIPLE RWY COMPUTATION - One Step



MULTIPLE RWY COMPUTATION

Applicable to: ALL

Runway Selection



TOGA

For each runway, TFLEX (or TOGA when FLEX Takeoff is not permitted) is displayed between brackets after the Runway ID.
The list is sorted by temperature, then by weight (both in decreasing order). Moreover, it is color-coded.

GREEN

Indicates that the results correspond to a FLEX Takeoff.

AMBER

Indicates that the results correspond to a takeoff at TOGA, when MTOW(perf) is above, or equal to, TOW.

RED

Indicates that the results correspond to a takeoff at TOGA, when MTOW(perf) is below TOW.

DERATE

For each runway, the maximum performance limited takeoff weight is displayed between brackets after the Runway ID.
The list is sorted by weight from the highest to the lowest and is color-coded.

GREEN

When MTOW(perf) is above, or equal to, TOW.

RED

When MTOW(perf) is below TOW.

OPTIMUM DERATE

For each runway, FLEX (or TOGA, or the derate level) is displayed between brackets after the Runway ID.
The list is sorted by temperature, then by weight (both in decreasing order). Moreover, it is color-coded.

GREEN

Indicates that the results correspond to FLEX Takeoff.

AMBER

Indicates that the results correspond to a takeoff at TOGA (or derate level), when MTOW(perf) is above, or equal to, TOW.

RED

Indicates that the results correspond to a takeoff at TOGA (or derate level), when MTOW(perf) is below TOW.

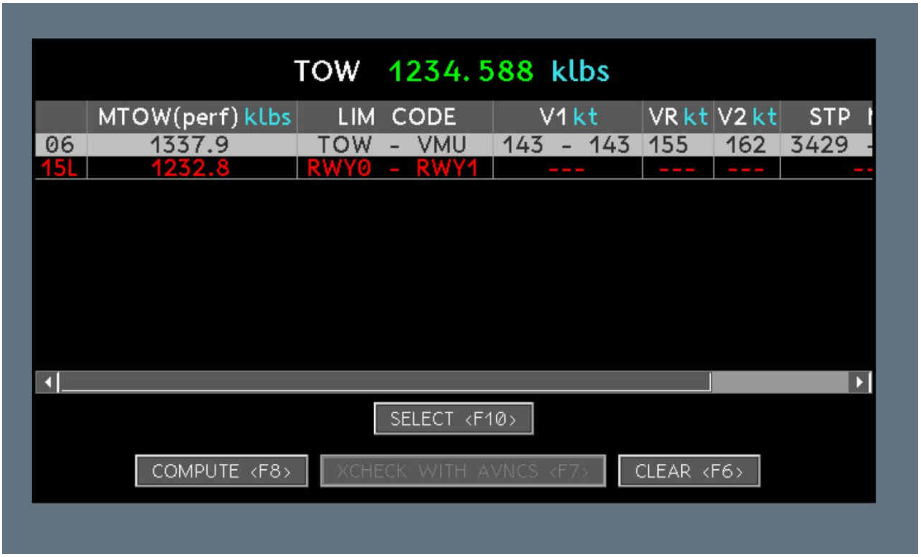
Intentionally left blank

COMPUTATION RESULTS - FIRST STEP

Applicable to: ALL

For each runway selecte within the MULTIPLE RWY COMPUTATION panel, the first step calculation displays the results at TOGA (or Derate level).

Multiple RESULTS Panel - MULTIPLE RWY COMPUTATION - First Step



When the aircraft cannot take off at the actual takeoff weight for a given runway (MTOW(perf) below the TOW value entered by the flight crew), the red labels "- - -" are displayed instead of the output values, and it is not possible to perform the second step calculation.

XCHECK WITH AVIONICS

The XCHECK WITH AVNCS function enables the flight crew to crosscheck the FMS takeoff performance entries with the OIS takeoff performance results.

L2 For more information about the XCHECK WITH AVNCS procedure, *Refer to PRO-NOR-SOP-60-B FMS INITIALIZATION_FMS DATA CROSSCHECK* .

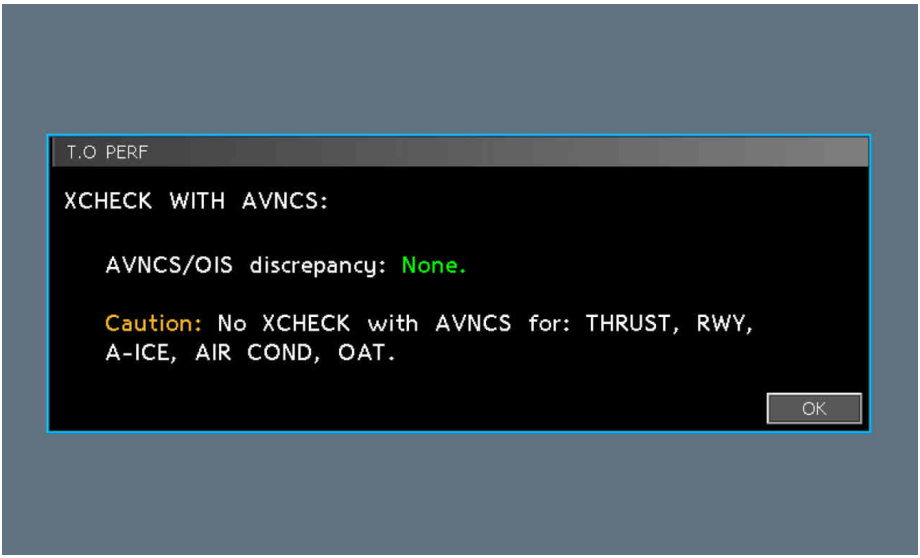
L1 When the flight crew uses the XCHECK WITH AVNCS function, the crosscheck is performed with the takeoff performance data of the line that the flight crew has selected in the table displayed on the RESULTS panel.

The following takeoff performance data are crosschecked:

- Takeoff Speeds: V1, VR, V2
- Aerodynamic configuration (FLAPS)
- Takeoff weight (TOW)
- Flexible Temperature (TFLEX)
- QNH .

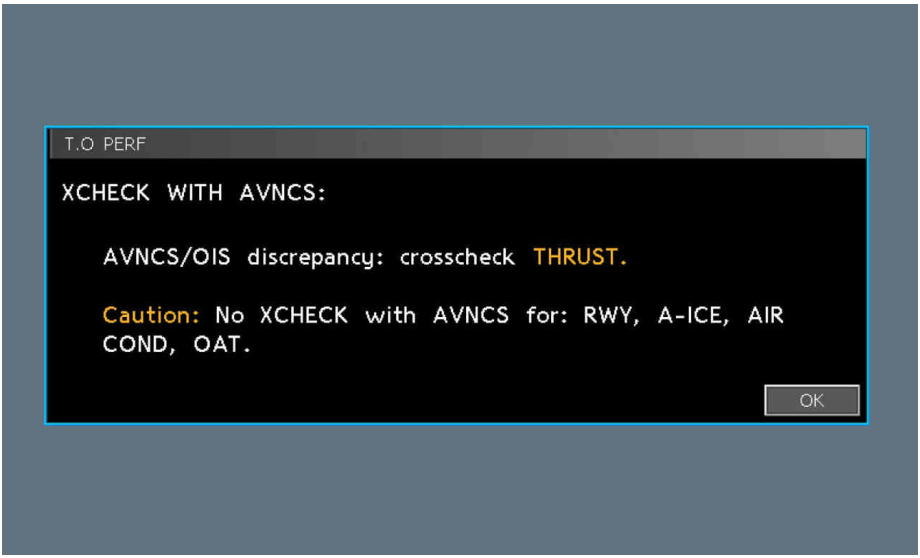
If there is no discrepancy between the FMS takeoff performance entries and the OIS takeoff performance results, T.O PERF displays the following popup message.

AVNCS/OIS: no Discrepancy



If there is one or more discrepancies between the FMS takeoff performance entries and the OIS takeoff performance results, T.O PERF displays the following popup message. The discrepancy parameters are displayed in amber (e.g. THRUST in the following example).

AVNCS/OIS: Discrepancies



Note: There is no crosscheck for the following parameters: RWY, A-Ice, AIR COND, OAT.

GREY LINE SELECTED ON THE RESULTS TABLE

When the flight crew uses the XCHECK WITH AVNCS function, the crosscheck is performed with:

- The TOW displayed on the RESULTS panel
- The QNH entered in the CONDITIONS panel
- TOGA (or Derate level) and associated takeoff speeds of the selected line in the tables.

In the following example, if the flight crew uses the XCHECK WITH AVNCS function, the crosscheck will be performed with the 06 RWY ID line.

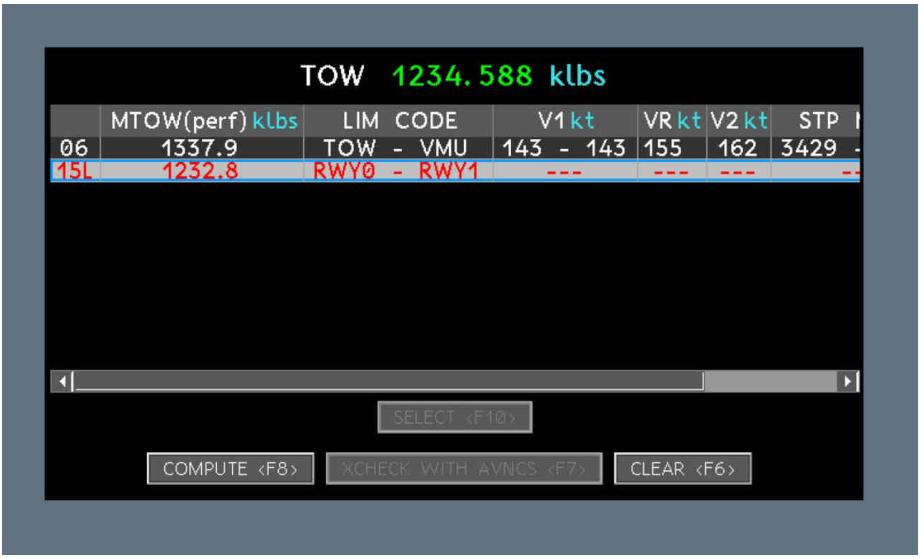
Grey Line Selected



RED LINE SELECTED ON THE RESULTS TABLE

The aircraft cannot take off at the actual takeoff weight for the selected runway
Therefore, the XCHECK WITH AVNCS button is disabled: The crosscheck function is inactive.

Red Line Selected



SPECIFIC XCHECK WITH AVNCS RULE ON THRUST

L2 For more information about the XCHECK WITH AVNCS assumptions, *Refer to PER-TOF-TOR-MRS-XAVN XCHECK with Avionics Assumptions* .

L1 The Thrust crosscheck of the XCHECK WITH AVNCS function compares the Thrust selection of the FMS T.O page with the selected or calculated thrust in T.O PERF.
At this first step of the calculation process, T.O PERF displays the results at TOGA (or Derate level).
The Thrust crosscheck rules are expressed in the following matrix table:

XCHECK WITH AVNCS popup message		Thrust in FMS T.O page		
		TOGA	FLEX	DERATED
Thrust in T.O PERF results	TOGA	Caution: No XCHECK with AVNCS for: THRUST	AVNCS/OIS discrepancy: crosscheck THRUST	Caution: No XCHECK with AVNCS for: THRUST
	DERATED	Caution: No XCHECK with AVNCS for: THRUST	AVNCS/OIS discrepancy: crosscheck THRUST	Caution: No XCHECK with AVNCS for: THRUST

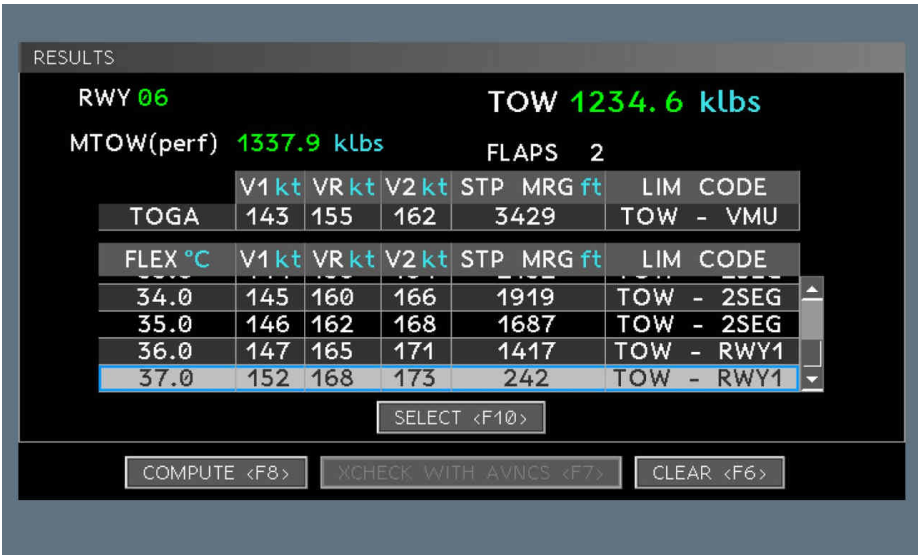
If the thrust selected in the FMS T.O page is TOGA or DERATED, then no crosscheck is performed with the thrust value computed by the OIS . The XCHECK WITH AVNCS popup message displays " Caution: No XCHECK with AVNCS for: THRUST".
If a FLEX temperature value is inserted in the FMS T.O page, then the XCHECK WITH AVNCS popup message displays "AVNCS/OIS discrepancy: crosscheck THRUST ".

COMPUTATION RESULTS - SECOND STEP

Applicable to: ALL

As soon as the flight crew has selected a runway via the SELECT button on the first step RESULTS panel, a computation is launched to obtain a results table of takeoff data.

Multiple RESULTS Panel - MULTIPLE RWY COMPUTATION - Second Step



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DEFINITION OF TOGA THRUST

Applicable to: ALL

TOGA is the maximum thrust certified for takeoff.
When all engines are operative, the TOGA thrust rating must not be used for more than 5 minutes.
In the case of one engine out, the TOGA thrust rating may be used for up to 10 minutes.

The flight crew must use TOGA thrust for takeoff, if at least one of the following conditions applies:
- Maximum power is required
- Performance reasons
- FLEX Takeoff not permitted.

RECOMMENDATIONS

Applicable to: ALL

When windshear is expected along takeoff path, the use of TOGA thrust is recommended.
This maintains acceleration capability.

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DEFINITION OF FLEX TAKEOFF

Applicable to: ALL

When the actual takeoff weight is lower than the maximum performance limited takeoff weight, the aircraft may comply with the regulatory requirements with a reduced thrust, called Flexible Takeoff Thrust.

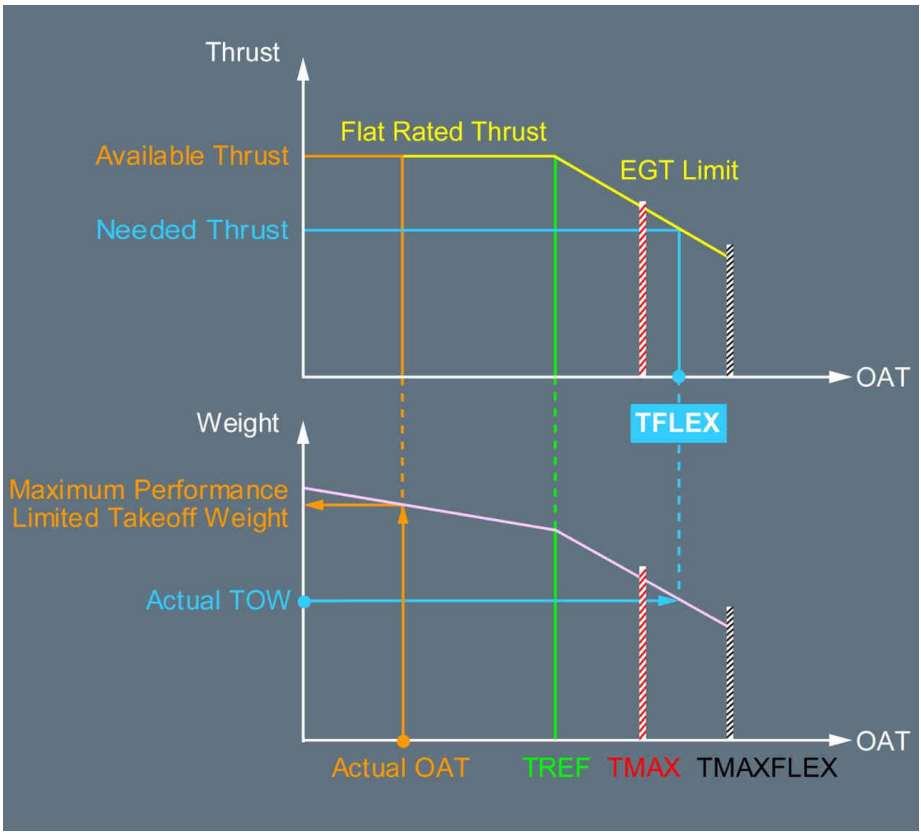
This takeoff operation is called FLEX Takeoff.

PRINCIPLE

Applicable to: ALL

The FLEX Takeoff principle is based on the change in maximum available takeoff thrust with OAT. The maximum performance limited takeoff weight depends on the maximum available takeoff thrust, therefore it is possible to determine a temperature at which the actual takeoff weight would be limited by performance.
This temperature is referred to as TFLEX (Flexible Temperature).

FLEX Takeoff Principle



ADVANTAGES

Applicable to: ALL

The use of FLEX Takeoff extends engine life and reliability, as well as reduces maintenance and operating costs.
The effect is particularly significant with the first degrees of TFLEX.

REQUIREMENTS

Applicable to: ALL

FLEX Takeoff is not permitted on contaminated runways.
For more information about contaminated runways, *Refer to Runway Contamination* .

L2 Operators should check the maximum thrust (TOGA) by:

- Performing full-rated takeoffs at regular intervals, in order to detect a reduced EGT margin, or
- Maintaining an adequate engine monitoring program, in order to follow-up on the engine parameters.

RECOMMENDATIONS

Applicable to: ALL

The highest TFLEX extends engine life and save maintenance costs. However, if a high TFLEX is reduced by a few degrees only, the engines are not significantly affected.
The highest TFLEX will usually be obtained at the lowest flap setting. However, a higher flap setting provides a lower decision speed (V1) and more comfort.
To extend engine life and to save maintenance costs, the use of flap setting that provides the highest TFLEX is recommended. However, when the difference (in terms of TFLEX) between 2 configurations is low, the highest of both takeoff configurations is preferable.

TFLEX POSSIBLE RANGE

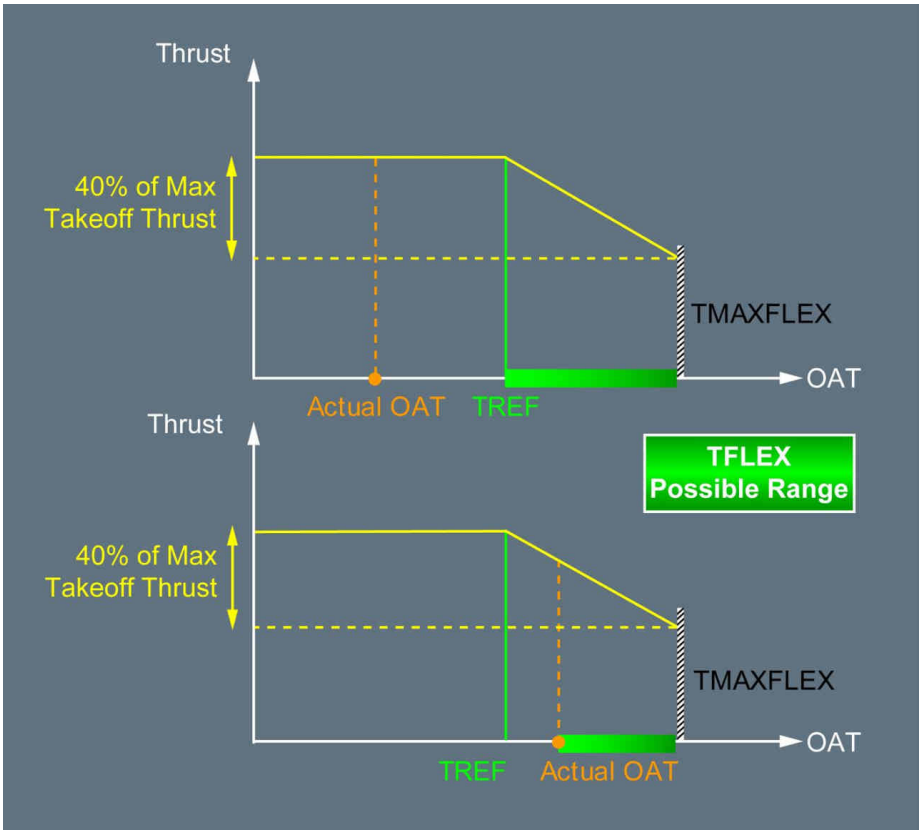
Applicable to: ALL

TFLEX cannot be:

- Higher than TMAXFLEX, equal to ISA + 60 (75 °C at sea level). The takeoff thrust cannot be reduced by more than 40 % from the full rated takeoff thrust.
- Lower than the Flat Rating Temperature (TREF), equal to ISA + 15 (30 °C at sea level).
- Lower than the actual OAT.

T.O PERF automatically takes into account the conditions listed above.

TFLEX Possible Range

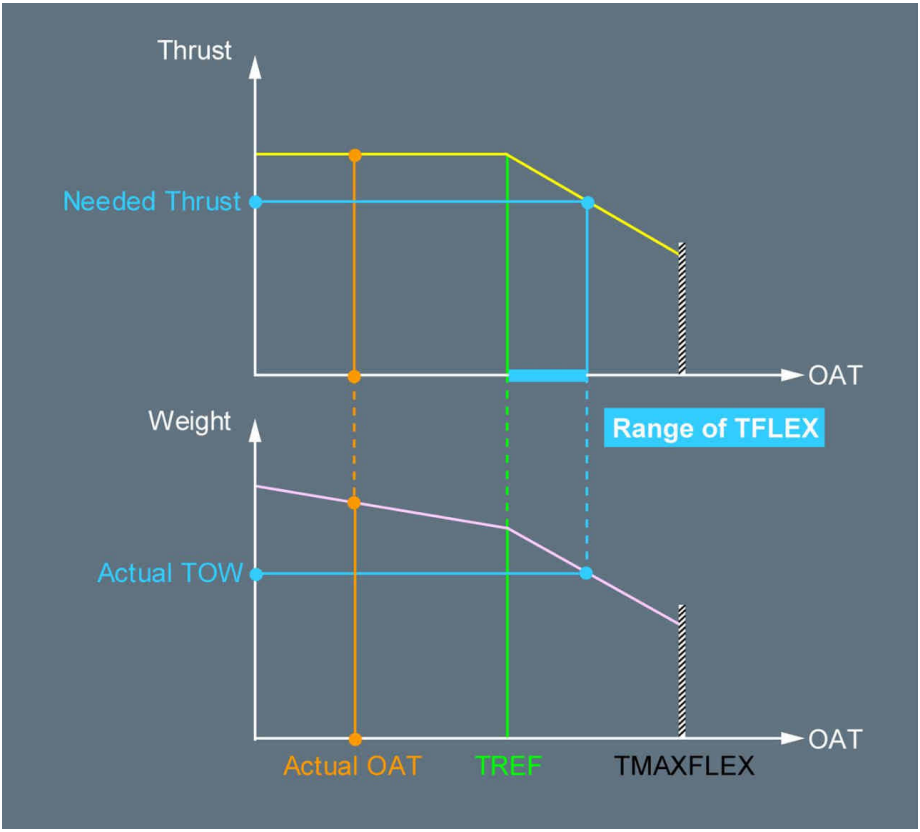


RANGE OF TFLEX

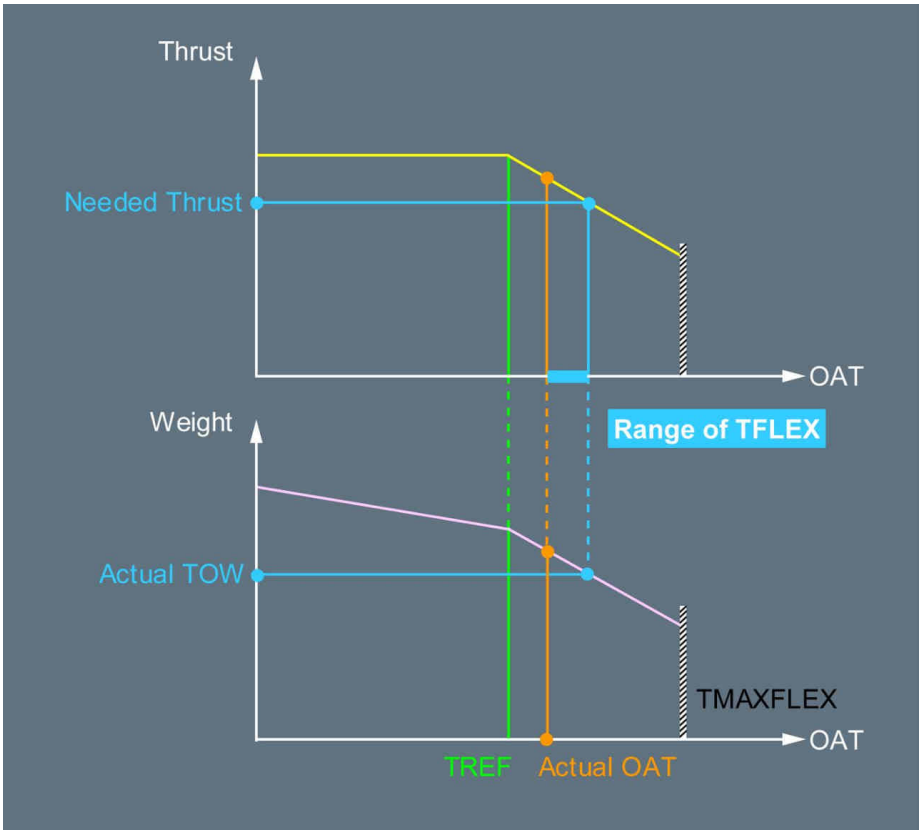
Applicable to: ALL

When a FLEX takeoff is permitted, the optimization provides results for a range of TFLEX. Therefore, it is possible to use a temperature that is lower than the maximum possible TFLEX calculated, in order to increase the performance margin.
This usually results in lower takeoff speeds (V1/VR/V2).

Range of TFLEX - Case 1



Range of TFLEX - Case 2

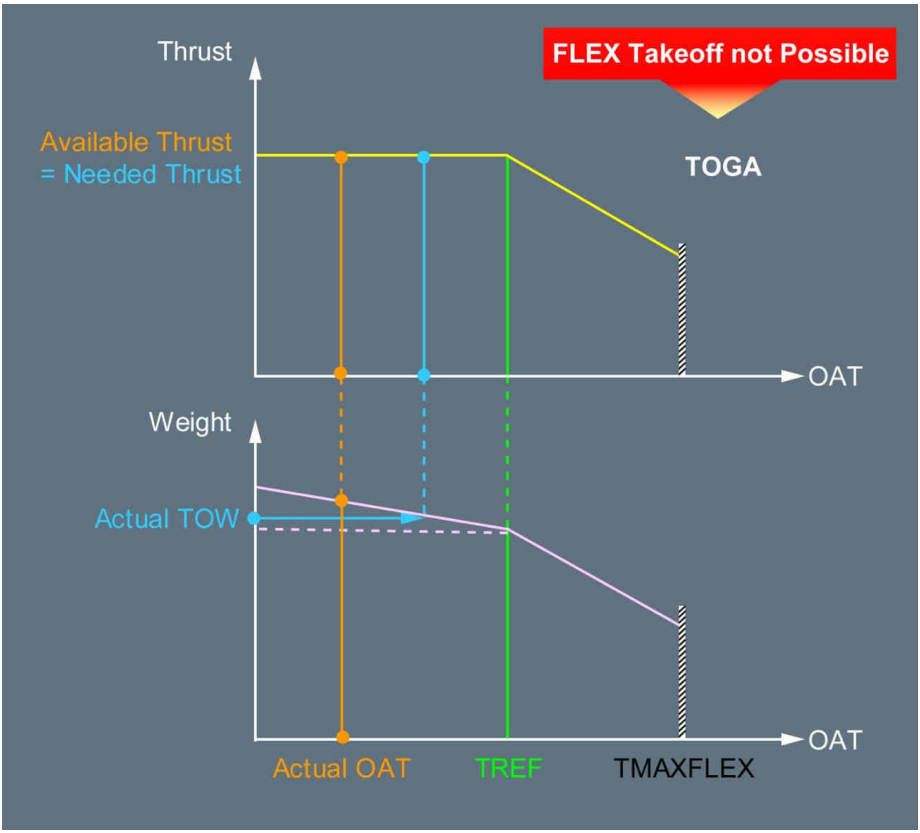


TFLEX LOWER THAN TREF

Applicable to: ALL

In some cases, even if the actual takeoff weight is lower than the maximum performance limited takeoff weight, it is not permitted to perform a FLEX Takeoff, because TFLEX is lower than TREF .
For more information about the TFLEX possible range, *Refer to PER-TOF-THR-FLX TFLEX Possible Range* .
In the above-mentioned cases, it is mandatory to use TOGA thrust. Takeoff speeds are optimized accordingly.
T.O PERF only displays a TOGA thrust result.

TFLEX lower than TREF



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DEFINITION OF DERATED TAKEOFF

Applicable to: ALL

A Derated Takeoff is defined as the takeoff operation at a thrust setting lower than TOGA, for which the AFM provides a set of takeoff limitations and performance data.
The AFM provides the THR values that correspond to each certified derated takeoff thrust setting. These THR values are considered as normal takeoff limits.

There are six derate levels:
- D04 corresponds to approximately a 4 % decrease in the maximum takeoff thrust
- D08 corresponds to approximately a 8 % decrease in the maximum takeoff thrust
- D12 corresponds to approximately a 12 % decrease in the maximum takeoff thrust
- D16 corresponds to approximately a 16 % decrease in the maximum takeoff thrust
- D20 corresponds to approximately a 20 % decrease in the maximum takeoff thrust
- D24 corresponds to approximately a 24 % decrease in the maximum takeoff thrust.

ADVANTAGE - IMPROVEMENT OF TAKEOFF PERFORMANCE

Applicable to: ALL

The advantage of a Derated Takeoff is to benefit from the increase in takeoff performance when the takeoff weight is limited by VMCG, due to the decrease in VMCG that is associated with the lower rating.

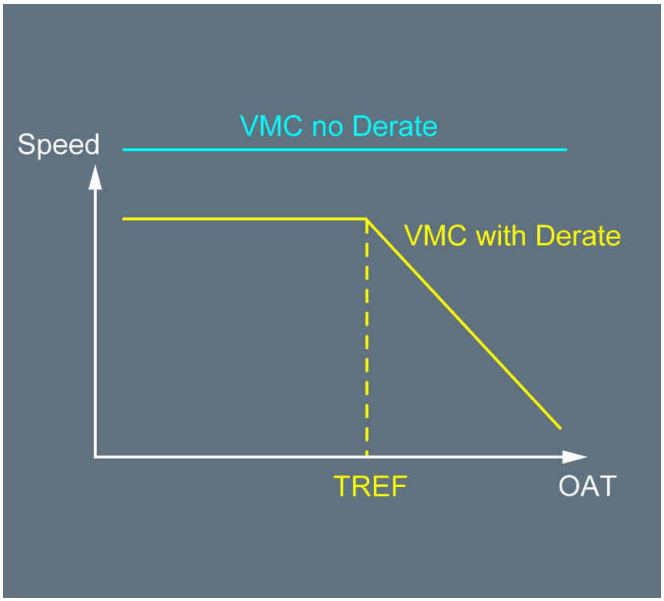
VMC DECREASE

Applicable to: ALL

L2 In the case of Derated Takeoff, the minimum control speeds (VMCG and VMCA) are decreased because:

- The derated thrust is lower than the maximum takeoff thrust
- The effect of temperature on maximum available thrust is taken into account, which is not the case for a FLEX Takeoff, since TOGA thrust may not be recovered during a Derated Takeoff.

VMC Decrease with Derate



VMCG LIMITING

VMCG only has an impact on the accelerate-stop distance, that includes an acceleration and a deceleration phase.
The decrease in VMCG allows to use lower V1 values in the speed optimization, which shortens both the acceleration and the deceleration distances, therefore largely compensating for the thrust loss.
If takeoff performance is limited by the VMCG limited weight, an overall improvement can be achieved by derating.

VMCA LIMITING

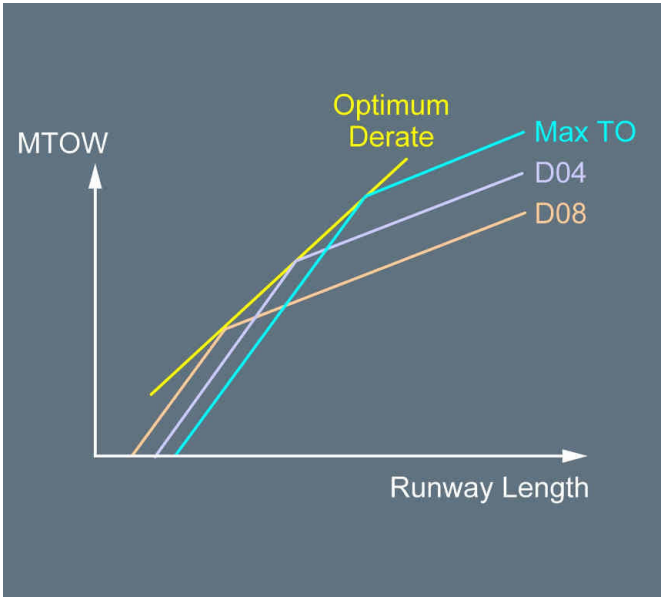
The penalizing effect on climb gradient of the decrease in thrust outweighs the advantage of a lower VMCA.
Therefore, Derated Takeoff would not improve the takeoff weight if VMCA limited.

OPTIMUM DERATE

Applicable to: ALL

When MTOW(perf) is VMCG limited, an optimum derate can be determined, as illustrated below:

MTOW(perf) vs. Runway Length



REQUIREMENTS

Applicable to: ALL

It is not permitted to combine a Derated Takeoff and a FLEX Takeoff.

L2 The flight crew selects the derate level on the MFD PERF TO page. This prevents the simultaneous selection of both a derate level and a TFLEX .

L1 When a Derated Takeoff is performed, the selection of full takeoff thrust by setting thrust levers to TOGA is not permitted below the speeds specified in the “Engine Failure After V1 - Continued Takeoff” Operating Technique, with the only exception of the Recovery Technique at Takeoff after penetrating unforecast windshear.

L2 For more information on the specified speeds, *Refer to PRO-ABN-NECA-10-GENGF Engine Failure after V1 - Proc* .

L1 Derated Takeoff is permitted on dry, wet and contaminated runways.

Derated Takeoff procedures do not permit the selection of TOGA in an emergency. Therefore FLEX Takeoff is expected to provide the best performance margin in most cases, with Derated Takeoff only to be used on limiting runways.

CAUTION	The use of derate levels lower than the one leading to the highest possible maximum performance limited takeoff weight is not permitted.

Note: *A lower derate level is a derate level that results in a higher thrust reduction.*

DEFINITIONS

Applicable to: ALL

Takeoff performance is impacted by runway contamination.

CONTAMINANTS

Contaminants can be classified into Fluid and Hard Contaminants:

FLUID CONTAMINANTS

WATER	Wet	Depth of water less or equal to 0.12 in.
	Standing Water	Due to heavy rainfall, and/or insufficient runway drainage. Deeper than 0.12 in.
SLUSH	Water saturated with snow that spatters when stepping firmly on it. Slush occurs at an approximate temperature of 5 °C, and an approximate density of 0.85 kg/l (7.1 lb/US Gal).	
WET SNOW	If compacted by hand, the snow will stick together, and usually forms a snowball. Its density is approximately 0.4 kg/l (3.35 lb/US Gal).	
DRY SNOW	Can be blown if loose, or if compacted by hand, will fall apart again upon release. Its density is approximately 0.2 kg/l (1.7 lb/US Gal).	

HARD CONTAMINANTS

COMPACTED SNOW	Snow that has been compressed (the usual friction coefficient is 0.2).
ICE	In icy conditions, the friction coefficient is 0.05 or below.

STATE OF RUNWAY

The contaminant characteristics (type, depth, appearance) determine the state of the runway.

DRY	A runway is dry when its surface is not: - Damp - Wet - Contaminated.
DAMP	A runway is damp: - When its surface is not dry - But when the water on it does not give it a shiny appearance.
WET	A runway is considered as wet: - When its surface has a shiny appearance - Due to a thin layer of Fluid Contaminant - With no substantial risk of hydroplaning. For Water, this layer may not exceed 0.12 in depth.
CONTAMINATED	A runway is contaminated when more than 25 % of its surface is covered with: - A layer of Fluid Contaminant that is not considered as thin

Continued on the following page

Continued from the previous page

	- A Hard Contaminant.

EFFECT ON PERFORMANCE

Applicable to: ALL

Contaminants are classified by their effect on aircraft performance.

FLUID CONTAMINANTS

Fluid Contaminants reduce friction forces, and cause:
- Precipitation drag
- Hydroplaning.

PRECIPITATION DRAG

L2 Precipitation drag includes:
- Displacement drag, that is produced by the displacement of the contaminant fluid from the path of the tire
- Spray impingement drag, that is produced by the spray thrown up by the wheels (mainly those of the Nose Landing Gear (NLG)) onto the fuselage.

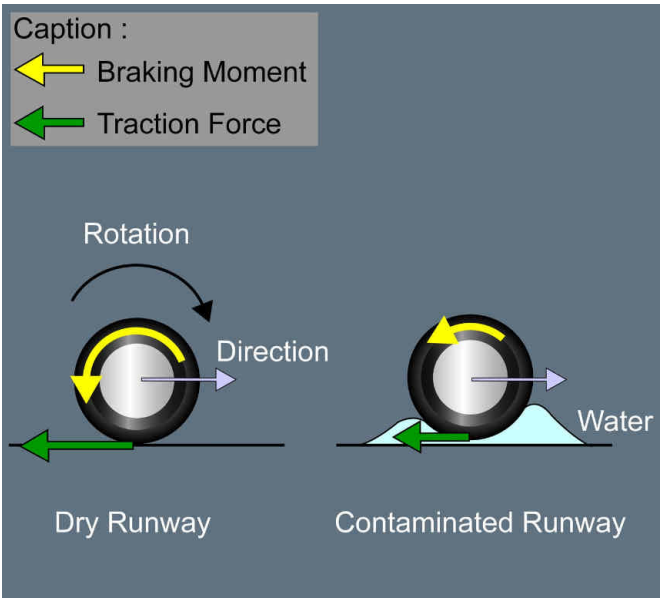
L1 Precipitation drag:
- Improves the deceleration rate, this has a positive effect in the case of a rejected takeoff
- Reduces the acceleration rate, this has a negative effect during takeoff.

The detrimental effect on the acceleration rate during takeoff requires that the depth of a Fluid Contaminant be no more than a maximum value (depending on the type of contaminant).

HYDROPLANING

L2 If there is water on the runway, a water film is created between the tire and the runway, that causes a reduction in the dry contact surface area between the tire and the runway.
This phenomenon becomes more critical at high speeds, when the rolling tire cannot evacuate the water fast enough.
Hydroplaning is a situation where the tires of the aircraft are, to a large extent, separated from the runway surface while floating on a thin film of fluid.
During hydroplaning, tire traction decreases to almost negligible values, thus rendering wheel braking and steering virtually ineffective.

Hydroplaning Phenomenon



Hydroplaning speed depends on tire pressure, and on the specific gravity of the contaminant (i.e. how dense the contaminant is).

L1 The hydroplaning speed is a threshold above which friction forces are severely reduced. Performance calculations on contaminated runways take into account the penalizing effect of hydroplaning.

HARD CONTAMINANTS

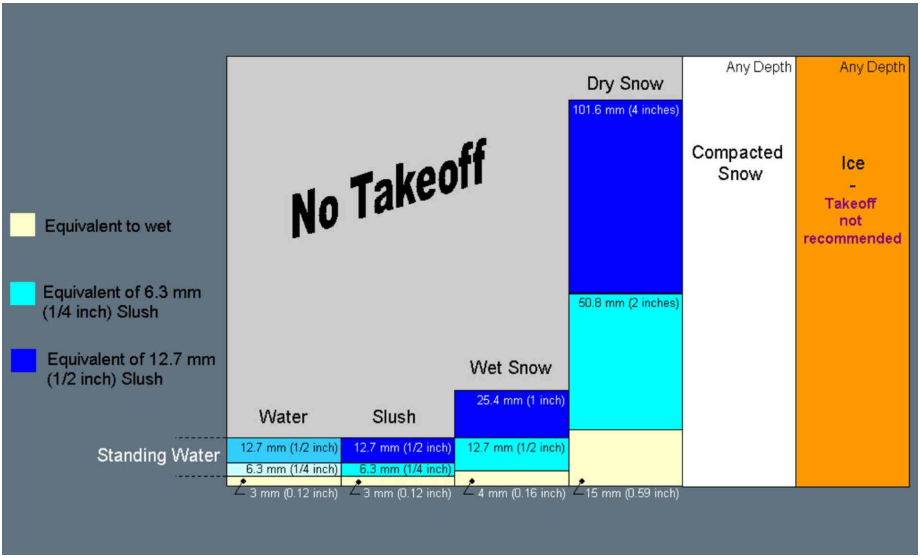
Hard Contaminants only reduce friction forces.

L2 The tires roll on top of a flat layer of Hard Contaminant. Therefore, only the friction coefficient (effective μ) is reduced, the depth of contaminant has no influence on takeoff performance.

EQUIVALENCES FOR PERFORMANCE

Applicable to: ALL

Runway Conditions



Takeoff performance is established only for some well-identified certified runway conditions. Within limits, it is possible to take into account other runway condition that may be encountered in operation, by using one of the identified states that has an equivalent impact on performance.

WET RUNWAY

In terms of performance, a Fluid Contamination is equivalent to wet, up to a maximum depth of:

- 3 mm (0.12 in) Water,
- 3 mm (0.12 in) Slush,
- 4 mm (0.16 in) Wet Snow,
- 15 mm (0.59 in) Dry Snow.

For more information on wet runway, *Refer to PER-TOF-CTA Definitions* .

CONTAMINATED RUNWAY

In terms of performance, an equivalence between Dry and Wet Snow and the certified contaminated runway conditions is defined.

EQUIVALENTS OF 6.3 MM (1/4 IN) SLUSH

- 12.7 mm (1/2 in) Wet Snow is equivalent to 6.3 mm (1/4 in) Slush,
- 50.8 mm (2 in) Dry Snow is equivalent to 6.3 mm (1/4 in) Slush.

EQUIVALENTS OF 12.7 MM (1/2 IN) SLUSH

- 25.4 mm (1 in) Wet Snow is equivalent to 12.7 mm (1/2 in) Slush,
- 101.6 mm (4 in) Dry Snow is equivalent to 12.7 mm (1/2 in) Slush.

For more information on contaminated runway, *Refer to PER-TOF-CTA Definitions* .

EFFECTIVE AND REPORTED FRICTION COEFFICIENTS

Applicable to: ALL

Airport authorities publish runway contamination data in a document called “SNOWTAM”, that includes:

- The type of contaminant
- The average depth for each third of total runway length
- The reported friction coefficient, or braking action.

The reported Friction coefficient (μ) is measured by friction-measurement vehicles, usually at comparatively low speed. However, the friction forces that are applicable to an aircraft (interaction tire/runway) depend on its weight, tire wear, tire pressure, anti-skid system efficiency and ground speed.
No universal correlation has been identified between the figures obtained from these measurement vehicles (reported μ), and the actual braking performance of an aircraft (effective μ).
In the case of runway contamination, the performance data is calculated for several well-identified types and depths of contaminant, and not as a function of the aircraft’s effective μ, except if the operator experience has permitted to establish such a correlation.

COMPUTATION ASSUMPTIONS

Applicable to: ALL

In the case of runway contamination, takeoff performance calculations are based on the following assumptions:

- The contaminant covers the entire length of the runway in a layer that has a uniform depth and density
- The friction coefficient is based on studies, and verified by tests
- The screen height at the end of the takeoff segment is 15 ft, instead of 35 ft.

In addition, for contaminated runways only:

- Drag increases, due to rolling resistance of the wheels
- Drag increases, due to the spray from the Nose Landing Gear (NLG) on the airframe and on the main gears
- Reverse thrust is used for deceleration
- Maximum thrust available is used for takeoff.

RESTRICTIONS

Applicable to: ALL

The following restrictions apply for operations on contaminated runways:

- FLEX takeoff is not permitted
- It is not recommended to take off from a runway that is covered with more than 25.4 mm (1 in) of Wet Snow or 101.6 mm (4 in) of Dry Snow.

CAUTION	Takeoff on icy runway is not recommended.

CROSSWIND

Applicable to: ALL

REPORTED BRAKING ACTION AND RUNWAY CONDITION ENTRY

It is not recommended to take off with a crosswind component higher than the one that appears in the table below:

Reported Braking Action	Reported Runway Friction Coefficient	Maximum Crosswind (kt)	Equivalent Runway Condition(2)
Good	≥ 0.4	35 kt (1)	1
Good/Medium	0.39 to 0.36	27 kt	1
Medium	0.35 to 0.3	20 kt	2/3
Medium/Poor	0.29 to 0.26	20 kt	2/3
Poor	≤ 0.25	15 kt	3/4
Unreliable		5 kt	4/5

(1) This is the maximum crosswind for dry and wet runway gust included.

(2) Equivalent runway condition (only valid in determining the maximum crosswind):

1. *Dry, damp or Wet runway covered with Water.*
2. *Runway covered with Slush.*
3. *Runway covered with Dry Snow.*
4. *Runway covered with Standing Water, with risk of hydroplaning or Wet Snow.*
5. *Icy runway or high risk of hydroplaning.*

The crosswind limitation:

- Depends on the reported braking action that the control tower provides,
- Ensures sufficient directional control during the low speed phase of takeoff roll.

RUNWAY CONDITION ENTRY

It is not recommended to take off with a crosswind component higher than the one that appears in the table below:

Runway Condition(2)	Maximum Crosswind (kt)
1	35 kt (1)
1	27 kt
2/3	20 kt
2/3	20 kt
3/4	15 kt
4/5	5 kt

(1) This is the maximum crosswind for dry and wet runway gust included.

(2) Runway condition (only valid in determining the maximum crosswind):

1. Dry, damp or Wet runway covered with Water.
2. Runway covered with Slush.
3. Runway covered with Dry Snow.
4. Runway covered with Standing Water, with risk of hydroplaning or Wet Snow.
5. Icy runway or high risk of hydroplaning.

The crosswind limitation:

- Depends on the reported braking action that the control tower provides,
- Ensures sufficient directional control during the low speed phase of takeoff roll.

REPORTED BRAKING ACTION ENTRY

It is not recommended to take off with a crosswind component higher than the one that appears in the table below:

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Poor	≤ 0.25	15 kt
Unreliable		5 kt

(1) This is the maximum crosswind for dry and wet runway gust included.

The crosswind limitation:

- Depends on the reported braking action that the control tower provides,
- Ensures sufficient directional control during the low speed phase of takeoff roll.

SPRAY INGESTION

Applicable to: ALL

During the takeoff roll and in the case of runway contamination, there is a small possibility that the engines may ingest spray of contaminant from the Nose Landing Gear (NLG) tires.
This spray of contaminant does not jeopardize the operation of the engines. The risk of ingestion does not depend on the depth of the fluid on the runway.

PERFORMANCE

IN-FLIGHT

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PER-IFT-CLB-SSP Selected Speeds - AEO
General ..... A
Speed Profile ..... B

PER-IFT-CLB-BRT Best Rate - AEO
General ..... A

PER-IFT-CLB-BAN Best Angle - AEO
General ..... A

PER-IFT-CLB-TBL Turbulence - AEO
General ..... A
Speed Profile ..... B

PER-IFT-CLB-CBR Climb Results
REC MAX Altitude ..... A
Climb Ceiling ..... B
Basic RESULTS Panel C
TABLE RESULTS Subpanel ..... D
GRAPH RESULTS Subpanel ..... E

PER-IFT-CRZ Cruise

PER-IFT-CRZ-GEN General
IN-FLT PERF Application - CRZ Module ..... A

PER-IFT-CRZ-CMI CRZ Module Interface
CRZ Module Interface ..... A

PER-IFT-CRZ-CDT Conditions
CONDITIONS Panel ..... A
Wind ..... B
Heading C
Temperature ..... D
Anti-Ice ..... E
Gross Weight ..... F
CG ..... G
Airflow ..... H

PER-IFT-CRZ-CRD Cruise Data
CRUISE DATA Panel ..... A
Altitude Profile ..... B
Speed Type C
Engines operative ..... D
Thrust ..... E
Fuel Factor ..... F
Buffet Margin ..... G

PER-IFT-CRZ-ECI ECON (CI) - AEO
General ..... A
Cost Index ..... B
ECON Mach C
Cost Index Long Range ..... D

PER-IFT-CRZ-FSP Fixed Speed - AEO
General ..... A
Speed ..... B

PER-IFT-CRZ-LRC LRC Speed - AEO
General....A
Long Range Cruise Speed....B
PER-IFT-CRZ-GDS Green Dot Speed - AEO
General....A
PER-IFT-CRZ-TBS Turbulence Speed - AEO
General....A
Turbulence Speed....B
PER-IFT-CRZ-MSP Maximum Speed - AEO
General....A
PER-IFT-CRZ-CRR Cruise Results
PER-IFT-CRZ-CRR-CRF Fuel
Fuel Flow....A
Specific Range....B
Distance Consumption....C
THR....D
PER-IFT-CRZ-CRR-CRA Altitude
REC MAX Altitude....A
EO MAX Altitude....B
MAX ALT....C
MAX CRZ ALT....D
Buffet Ceiling....E
Optimum Altitude....F
Step Climb....G
Specific Range Equivalence....H
PER-IFT-CRZ-CRR-CRS Speed
Mach....A
Calibrated Air Speed....B
True Air Speed....C
N1....D
PER-IFT-CRZ-CRR-CRD Detailed Results
TABLE RESULTS Subpanel....A
GRAPH RESULTS Subpanel....B

PER-IFT-DES Descent
PER-IFT-DES-GEN General
IN-FLT PERF Application - DES Module....A

PER-IFT-DES-DMI DES Module Interface
DES Module Interface ..... A

PER-IFT-DES-CDT Conditions
CONDITIONS Panel ..... A
Wind ..... B
Heading C
Temperature ..... D
Anti-Ice ..... E
Gross Weight ..... F
CG ..... G
Airflow ..... H

PER-IFT-DES-DSD Descent Data
DESCENT DATA Panel ..... A
Descent Type Preset ..... B
Initial Altitude C
Target Altitude ..... D
Descent Schedule ..... E
Engines Operative ..... F
Thrust ..... G
Fuel Factor ..... H

PER-IFT-DES-ECI ECON (CI) - AEO
General ..... A
Cost Index ..... B
Speed Profile C
Economic Descent Schedule ..... D

PER-IFT-DES-STD STANDARD - AEO
Fixed Speed ..... A
Turbulence Speed ..... B

PER-IFT-DES-GVS GIVEN V/S - AEO
General ..... A
Speed Profile ..... B

PER-IFT-DES-EMG EMERGENCY - AEO
General ..... A
Speed Profile ..... B

PER-IFT-DES-DSR Descent Results
Basic RESULTS Panel....A
TABLE RESULTS Subpanel....B
GRAPH RESULTS Subpanel....C

PER-IFT-HLD Holding

PER-IFT-HLD-GEN General
IN-FLT PERF Application - HLD Module....A

PER-IFT-HLD-HMI HLD Module Interface
HLD Module Interface....A

PER-IFT-HLD-CDT Conditions
CONDITIONS Panel....A
Wind....B
Heading....C
Temperature....D
Anti-Ice....E
Gross Weight....F
CG....G
Airflow....H

PER-IFT-HLD-HLD Holding Data
HOLDING DATA Panel....A
Altitude....B
Holding Type....C
Holding Strategy....D
Engines Operative....E
Thrust....F
Fuel Factor....G

PER-IFT-HLD-HLS Holding Speeds
CAS....A
CAS Min Drag....B
GD Speed....C
S Speed....D
Max End Speed....E

PER-IFT-HLD-HDR Holding Results
Distance ..... A
Fuel ..... B
Fuel Flow C
Average CAS Speed ..... D
THR ..... E
Final Weight ..... F
Maximum Holding Time ..... G

PER-IFT-OEI One Engine Inoperative

PER-IFT-OEI-GEN General
General ..... A
Diversion Strategy ..... B

PER-IFT-OEI-SVI Severe Icing
Severe Icing ..... A

PER-IFT-OEI-OBS OBSTACLE Strategy

PER-IFT-OEI-OBS-BLW EO Below EO MAX Altitude
Below EO MAX Altitude ..... A
Drift Up - Green Dot Speed ..... B

PER-IFT-OEI-OBS-ABV EO Above EO MAX Altitude
Above EO MAX Altitude ..... A
Drift Down - Green Dot ..... B
Drift Down - Fixed Speed C

PER-IFT-OEI-STD STANDARD Strategy

PER-IFT-OEI-STD-BLW EO Below EO MAX Altitude
EO Below EO MAX Altitude ..... A
Climb to EO MAX Altitude ..... B

PER-IFT-OEI-STD-ABV EO Above EO MAX Altitude
EO Above EO MAX Altitude ..... A
Descent to EO MAX Altitude ..... B
Cruise to Diversion Airport C

PER-IFT-OEI-STD-ICZ PLAN - In Cruise
General ..... A
ECON (CI) ..... B
LRC Speed C

PER-IFT-OEI-HLD Holding
GD Speed ..... A

PER-IFT-OEI-ALT PLAN - Alternate
LRC - Optimum Altitude ..... A
LRC - Input Altitude ..... B

PER-IFT-TEI Two Engines Inoperative

PER-IFT-TEI-GEN General
General ..... A

PER-IFT-TEI-SVI Severe Icing
Severe Icing ..... A

PER-IFT-TEI-STD STANDARD Strategy
General ..... A
Descent to Level Off ..... B
Cruise to Diversion Airport C
In Cruise - LRC Speed ..... D

PER-IFT-TEI-HLD Holding
GD Speed ..... A

PER-IFT-ACS Aircraft Status
AIRCRAFT STATUS Panel ..... A
NON STD CONF ..... B
MEL C
CDL ..... D

PER-IFT-IFF In-Flight Failures (ECAM Alerts)
General ..... A
Impact on Input ..... B
Impact on Results C

IN-FLT PERF APPLICATION - PLAN MODULE

Applicable to: ALL

GENERAL

OPERATIONAL FLIGHT PLAN

Before each flight, an operational flight plan - usually a Computerized Flight Plan (CFP) - has to be calculated with:

- The actual aircraft weights
- The updated performance of the aircraft
- The operating limitations
- The ATC cleared route
- The weather forecast on:
  - The route
  - The airports involved.

Apart from other pertinent information, it provides the required amount of fuel needed to perform a safe flight along the planned route, including any necessary fuel reserves.

FUEL POLICY

Adequate fuel quantity (named Block Fuel) to cover the requirements of trip, contingency, alternate, reserve and taxi must be loaded prior to departure.
At any time during a flight, the remaining Fuel On Board (FOB) must be enough to deal with the planned operation and the possible deviations.

FUEL QUANTITY CHECKS

The FOB must be periodically checked in flight. This will help the flight crew to detect possible fuel consumption higher than anticipated or a fuel leak.

PLAN

The IN-FLT PERF application is made of 6 modules (CLB, CRZ, DES, HLD, PLAN and ATMO).

The PLAN module provides the flight crew with a means to obtain fuel, time and air distance over a given ground distance for:

- Average meteorological conditions
- A given aircraft configuration including non standard ones (engines out, landing gear down)
- Various speed schedules
- Various flight planning functions (FLIGHT PLAN, IN CRUISE, ALTERNATE).

The main results of this module are:

- The fuel consumed

- The time elapsed
- The air distance covered.

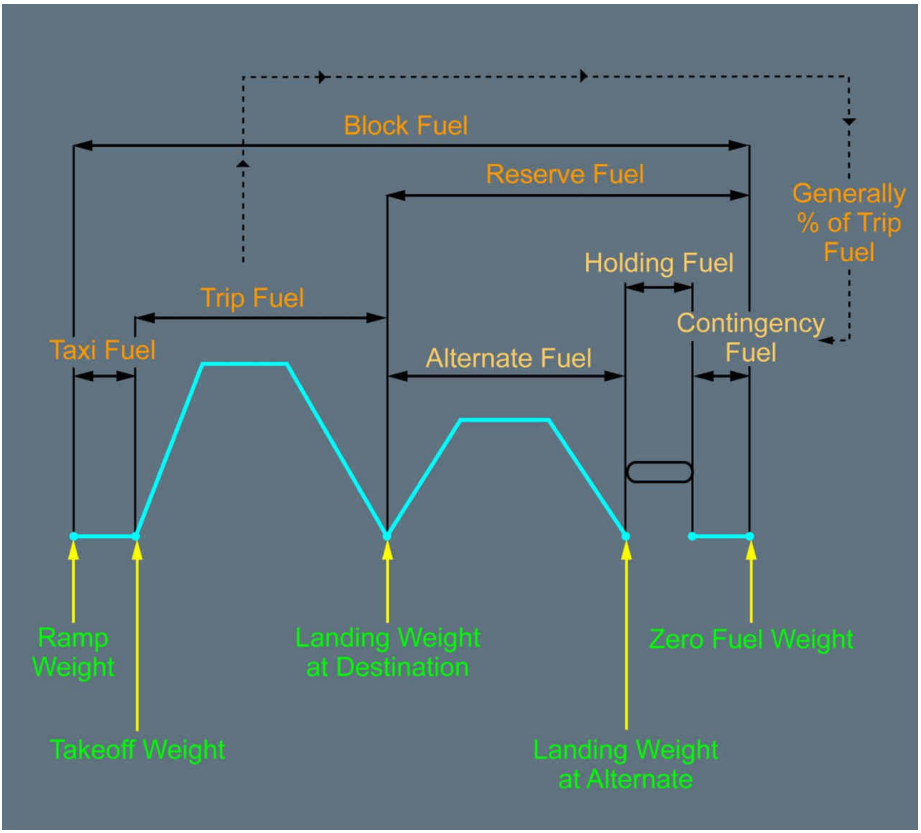
CAUTION	The Operator must not use the IN-FLT PERF PLAN module as an operational flight plan tool.

STANDARD FLIGHT PLANNING

Applicable to: ALL

The following graph illustrates the different fuel quantities for a standard flight planning.

Standard Flight Planning



BLOCK FUEL

Applicable to: ALL

GENERAL

The total fuel quantity (Block Fuel) required to fly a given sector is the sum of the following quantities:

- Taxi Fuel

L2 For more information about Taxi Fuel, *Refer to PER-IFT-FPL-MRF Taxi Fuel* .

L1 - Trip Fuel

L2 For more information about Trip Fuel, *Refer to PER-IFT-FPL-MRF Trip Fuel* .

L1 - Reserve Fuel.

L2 For more information about Reserve Fuel, *Refer to PER-IFT-FPL-MRF-RSF Reserve Fuel* .

L1 PLAN

The PLAN module does not directly provide Block Fuel.

TAXI FUEL

Applicable to: ALL

GENERAL

Taxi Fuel is the quantity of fuel expected to be used prior to takeoff (including engine start, taxi and APU consumption).

Taxi Fuel is usually a fixed quantity calculated for:

- An average taxi duration
- An average fuel consumption.

Taxi Fuel is 1 170 lb for an average taxi duration of 12 min, assuming a fuel consumption of 97 lb/min.

Note: *Maximum ramp weight may not be exceeded with Taxi Fuel on board.*

PLAN

The FLIGHT PLAN function of the PLAN module uses a fixed quantity for Taxi Fuel, depending on the Operator policy.
This value appears in the second line of the TABLE RESULTS subpanel (TAKE OFF PHASE).

TRIP FUEL

Applicable to: ALL

GENERAL

Trip Fuel is the fuel required from brake release at the departure airport to the landing touchdown at the destination airport.

Trip Fuel takes into account the necessary fuel for:
- Takeoff from the departure airport
- Climb to cruise level
- Cruise, including any step climb
- Descent
- Approach and landing at the destination airport.
  Fuel calculation is based on a consumption of 240 lb/min.
  Average quantity for 6 min IFR → 1 440 lb.

PLAN

The flight crew may use the FLIGHT PLAN function to compute Trip Fuel, according to the selected speed schedule.

RESERVE FUEL

Applicable to: ALL

RESERVE FUEL

Reserve Fuel includes the following quantities:
- Contingency Fuel ("En Route" reserve fuel)

L2 For more information about Contingency Fuel, *Refer to PER-IFT-FPL-MRF-RSF Contingency Fuel* .

L1 - Alternate Fuel

L2 For more information about Alternate Fuel, *Refer to PER-IFT-FPL-MRF-RSF Alternate Fuel* .

L1 - Holding Fuel.

L2 For more information about Holding Fuel, *Refer to PER-IFT-FPL-MRF-RSF Holding Fuel* .

CONTINGENCY FUEL

GENERAL

Contingency Fuel ("En Route" reserve fuel) depends on the Operator policy following to a national Authority approval.
Contingency Fuel is generally based on a percentage of Trip Fuel.

PLAN

The PLAN module does not compute Contingency Fuel.
If Contingency Fuel is a percentage of Trip Fuel, the flight crew may determine this value from the calculation of Trip Fuel via the FLIGHT PLAN function.

ALTERNATE FUEL

GENERAL

Alternate Fuel is the fuel required to fly from the destination airport to the alternate airport.

Alternate Fuel takes into account the necessary fuel for:
- Missed approach at the destination airport (go-around)
  Go-around allowance → 2 650 lb
- Climb from missed approach altitude
- Cruise
- Descent
- Approach and landing at the alternate airport.
  Average quantity for 4 min VFR → 970 lb.

PLAN

The flight crew may use the ALTERNATE function to compute Alternate Fuel, according to the selected speed schedule.

HOLDING FUEL

GENERAL

Holding Fuel is the minimum fuel required to fly for 30 min at 1 500 ft above the alternate airport, at holding speed in ISA conditions.
Holding Fuel is calculated with the landing weight at the alternate airport.
A conservative quantity corresponding to 30 min holding at 1 500 ft above the alternate airport in ISA conditions, at green dot speed + 25 kt in the clean configuration is 10 600 lb.

PLAN

The flight crew may calculate Holding Fuel using the FUEL computation type of the HLD module with 30 min as holding time.

APU FUEL

Applicable to: ALL

During ground operations, the APU fuel consumption is about:
- 1 135 lb/h Packs ON and APU GEN ON, or
- 1 035 lb/h APU GEN ON.

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PLAN MODULE INTERFACE

Applicable to: ALL

IN-FLT PERF PLAN Module Interface



CONDITIONS

The flight crew can define the average outside conditions and the aircraft configuration.
For more information about the CONDITIONS panel, *Refer to PER-IFT-FPL-CDT CONDITIONS Panel* .

FLIGHT DATA

The flight crew can define the data of the flight.
For more information about the FLIGHT DATA panel, *Refer to PER-IFT-FPL-FLD FLIGHT DATA Panel* .

AIRCRAFT STATUS

The flight crew can select CDL items and non standard configuration items.
For more information about the AIRCRAFT STATUS panel, *Refer to PER-IFT-ACS AIRCRAFT STATUS Panel* .

RESULTS

The RESULTS panel displays the essential information for the flight.

For more information about the RESULTS panel, refer to PLAN Results.

CONDITIONS PANEL

Applicable to: ALL

The CONDITIONS panel includes the following information:

- Average wind
- Temperature (Δ ISA)
- Anti-ice
- Initial weight
- Average CG
- Airflow.

CONDITIONS Panel



AVERAGE WIND

Applicable to: ALL

GENERAL

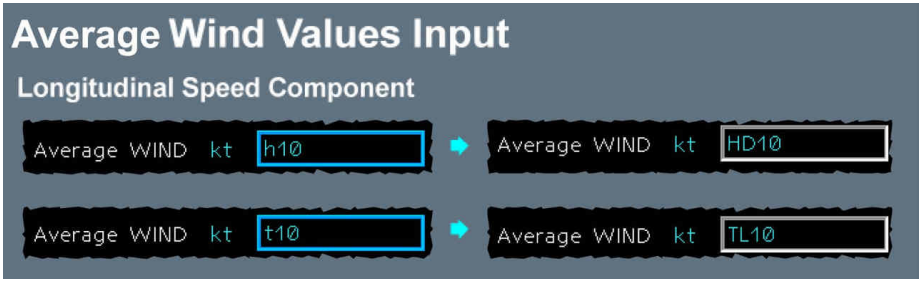
The wind affects the air distance, and therefore:
- The time to cover a given ground distance
- The fuel to cover a given ground distance.

A tailwind, as average wind, will induce:
- A decrease in the fuel consumed
- A decrease in the time elapsed
- A decrease in the air distance covered.

On the contrary, a headwind, as average wind, will induce:
- An increase in the fuel consumed
- An increase in the time elapsed
- An increase in the air distance covered.

PLAN

Average Wind Values Input



The flight crew directly enters a longitudinal average wind value for the flight.
The flight crew can use the codes “H” for a headwind and “T” for a tailwind.
The flight crew can also use the codes “HD” for a headwind and “TL” for a tailwind.

TEMPERATURE

Applicable to: ALL

GENERAL

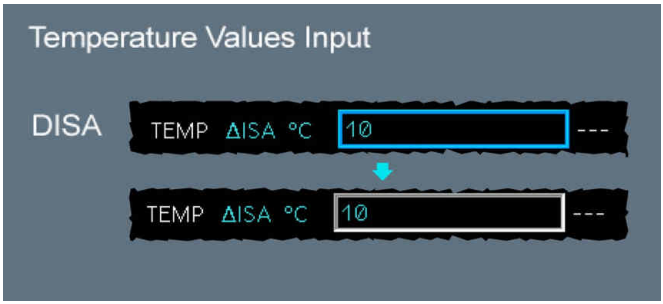
An increase in temperature leads to:

- An increase in the fuel consumed to cover a given ground distance
- A decrease in the time elapsed to cover a given ground distance.

L2 At given Mach, the True Air Speed (TAS) increases with temperature.

L1 PLAN

Temperature Values Input



The TEMP field corresponds to a deviation from ISA law (ΔISA).
The flight crew enters a temperature as a ΔISA.

ANTI-ICE

Applicable to: ALL

GENERAL

In the case of ENG and/or WING anti-ice:
- Fuel increases to cover a given ground distance
- Time increases to cover a given ground distance (only for a LRC speed cruise phase).

L2 The LRC Mach decreases, and so the True Air Speed (TAS).

L1 IN-FLT PERF

IN-FLT PERF has four anti-ice options:
- Off
- Engine
- Total
- Severe Icing.

The flight crew may use the Severe Icing option to assess the impact of ice accretion on fuel consumption and ceilings.

INITIAL WEIGHT

Applicable to: ALL

GENERAL

Any increase in the initial weight leads to:
- An increase in the fuel consumed to cover a given ground distance
- A slight increase in the time elapsed at fixed Mach to cover a given ground distance.

L2 The climb (if performed) and descent time increase with weight.

L1 PLAN

The initial weight must be between the Operating Empty Weight (OEW) and the Maximum Design Takeoff Weight (MTOW).

IN CRUISE

The flight crew enters the actual aircraft weight.

FLIGHT

The flight crew enters the aircraft weight at engine start.

ALTERNATE

The flight crew enters the aircraft weight at go-around.

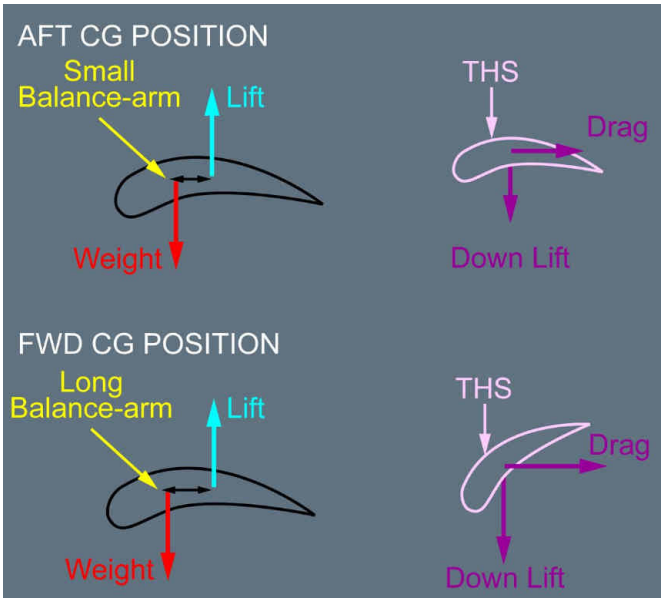
AVERAGE CG

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position impacts the forces applied on the aircraft. As a result, it impacts aircraft performance.

CG Position



L2 In order to keep the aircraft level, the Trimmable Horizontal Stabilizer (THS) creates a downward force that counters the pitch down moment due to the distance between the center of lift and the center of gravity. The larger this lever arm, the higher the down lift that must be generated by the THS, and the higher the drag.

L1 PLAN

The flight crew enters an average value of the CG for the flight.
This CG is expressed in % of the Mean Aerodynamic Chord (MAC).

AIRFLOW

Applicable to: ALL

GENERAL

In the case of an increase in airflow:
- Fuel increases to cover a given ground distance
- Time increases to cover a given ground distance (only for a LRC speed cruise phase).

L2 The LRC Mach decreases, and so the True Air Speed (TAS).

L1 IN-FLT PERF

IN-FLT PERF has five airflow options:
- OFF
- LO
- MAN
- NORM
- HI.

IMPACT OF FWD CARGO COOLING

When FWD cargo cooling is active, the airflow automatically increases, and so the engine bleed.
The IN-FLT PERF airflow settings reflect the engine bleed with FWD cargo cooling OFF.
The flight crew applies the following equivalences to obtain an engine bleed that considers the effect of FWD cargo cooling:

ENG OPERATIVE	AIR FLOW Selector	FWD Cargo Cooling	Select IN-FLT PERF setting
4	LO	ON	MAN
	MAN		HI
	NORM		HI
	HI		HI
3	LO	ON	MAN
	MAN		MAN
	NORM		NORM
	HI		HI
2	LO	ON	LO
	MAN		MAN
	NORM		NORM
	HI		HI

FLIGHT DATA PANEL

Applicable to: ALL

The FLIGHT DATA panel includes the following information:

- Computation type
- Distance
- Altitude rule
- Speed type
- Engines operative
- Fuel factor.

FLIGHT DATA Panel



COMPUTATION TYPE

Applicable to: ALL

The flight crew uses the COMPUTATION TYPE drop-down list to define the desired flight planning type, whether he wishes to obtain performance for a complete flight, or over the remaining distance.

For more information about the flight planning types:
- *Refer to In Cruise*
- *Refer to Flight Plan*
- *Refer to Alternate* .

DISTANCE

Applicable to: ALL

IN CRUISE

The flight crew enters the remaining ground distance to:
- The destination airport, or
- A diversion airport, or
- The alternate airport.

FLIGHT PLAN

The flight crew enters the ground distance from the departure airport to the destination airport or a potential diversion airport.

ALTERNATE

The flight crew enters the ground distance from the destination airport to the alternate airport.

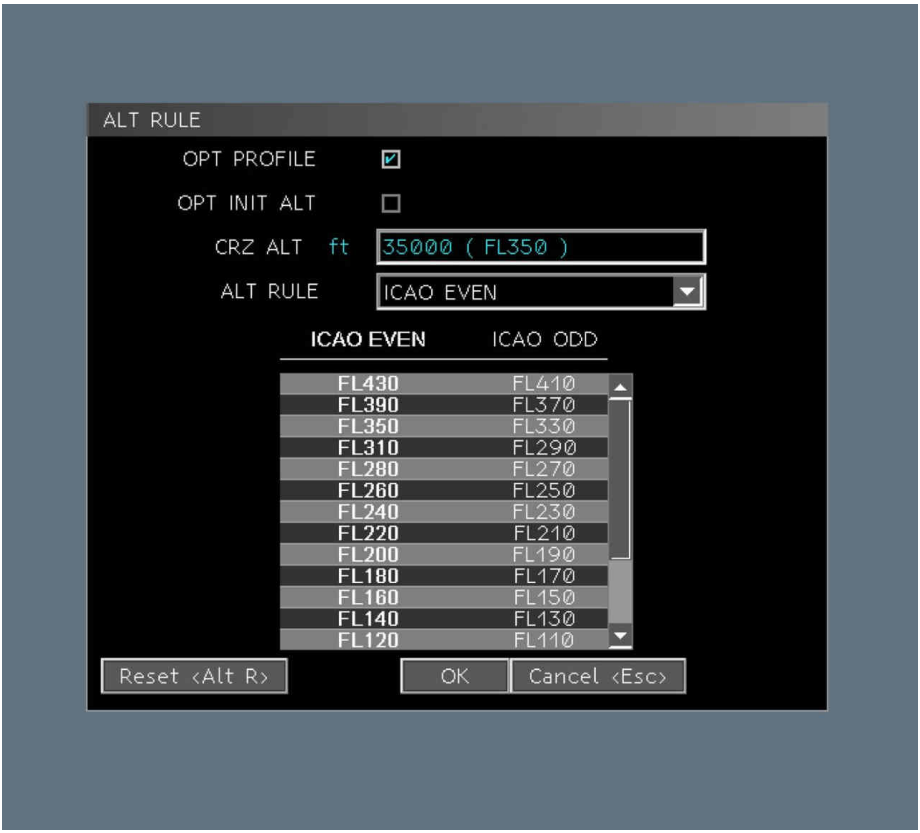
ALTITUDE RULE

Applicable to: ALL

The ALT RULE subpanel includes the following information:

- OPT PROFILE option
- OPT INIT ALT option
- Cruise altitude
- Altitude rule.

ALT PROFILE Subanel



CRUISE ALTITUDE

GENERAL

The best way to optimize fuel is to fly as close as possible to the optimum altitude, following to a given altitude rule.

PLAN

IN CRUISE

The flight crew may compute:
- At constant cruise altitude, or
- By optimizing the cruise profile, with optimum step climbs, using the OPT PROFILE option.

FLIGHT PLAN

The flight crew may compute:
- With an initial fixed cruise altitude
  - At constant cruise altitude, or
  - By optimizing the cruise profile, with optimum step climbs, using the OPT PROFILE option.

L2 If the initial fixed cruise altitude is below the optimum altitude, the optimization of the cruise profile leads to an initial cruise altitude equal to the optimum altitude.

L1 - With the initial optimum cruise altitude, using the OPT INIT ALT option
  - At constant cruise altitude, or
  - By optimizing the cruise profile, with optimum step climbs, using the OPT PROFILE option.

ALTERNATE

The flight crew may compute:
- With an initial fixed cruise altitude
- With the initial optimum cruise altitude, using the OPT INIT ALT option.

ALTITUDE RULES

GENERAL

The altitude rule defines which flight levels may be used in a given region, depending on the aircraft heading.

IN-FLT PERF

IN-FLT PERF provides the following altitude rules:
- ICAO EVEN
- ICAO ODD
- RVSM EVEN
- RVSM ODD
- CHINA EVEN (metric)
- CHINA ODD (metric)
- RUSSIA EVEN (metric)
- RUSSIA ODD (metric).

The field defaults to the first applicable altitude rule identified from the above list, depending on the selected pressure altitude.

SPEED TYPE

Applicable to: ALL

The flight crew uses the SPD TYPE drop-down list to define his speed schedule.

For more information about the speed types:
- *Refer to In Cruise*
- *Refer to Flight Plan*
- *Refer to Alternate* .

ENGINES OPERATIVE

Applicable to: ALL

GENERAL

The number of engines operative determines the thrust available to perform each flight phase and therefore largely impacts the flight planning.

PLAN

The flight crew selects the number of engines operative:

- 4 (ALL), or
- 3, or
- 2.

FUEL FACTOR

Applicable to: ALL

GENERAL

The performance factor for FMS predictions (FMS PERF FACTOR) is the sum of the Basic FMS PERF FACTOR and the Monitored Fuel Factor.

BASIC FMS PERF FACTOR

The Basic FMS PERF FACTOR correction is applied when the aircraft FMS database does not exactly fit to the aircraft model. It is published for each FMS Performance Data Base (PDB).
It results in FMS predictions consistent with the level reflected by the uncorrected IN-FLT PERF application, also called the book level.

MONITORED FUEL FACTOR

The actual airframe drag and engine performance deviate from the nominal model due to the aircraft's aging process.
The Monitored Fuel Factor is used to correct the performance book level to the actual performance level in order to permit realistic fuel predictions.
The Monitored Fuel Factor is defined as a percentage increase or decrease of the nominal Specific Range (SR) value.

IN-FLT PERF

The IN-FLT PERF fuel factor corresponds to the sum of:
- The Monitored Fuel Factor, and
- A positive performance prediction adjustment (if enabled, and at flight crew discretion).

L2 This allows the flight crew to adjust performance predictions to a drag increase due to non-quantified aerodynamic sources.

L1 When no such performance adjustment is required, the IN-FLT PERF fuel factor may thus differ from the FMS one by the Basic FMS PERF FACTOR.

Intentionally left blank

General

GENERAL

Applicable to: ALL

GENERAL

In flight, the flight crew must periodically check that the Fuel On Board (FOB) is enough to complete the planned operation.

PLAN

The flight crew may use the IN CRUISE function:

- During cruise, to assess:
  - The Estimated Fuel On Board (EFOB) at the destination airport
  - The EFOB at a potential diversion airport.
- During alternate cruise, to assess the EFOB at the alternate airport
- During diversion, to assess the EFOB at a diversion airport.

The IN CRUISE function does not directly provide an EFOB but a cumulated fuel burnt over a given straight distance.
The flight crew has to substract the cumulated fuel burnt from the actual FOB, to assess the EFOB at the corresponding airport.

The cruise phase of an IN CRUISE calculation is either:

- An optimum profile (with optimum step climbs) from a fixed cruise altitude, or
- A cruise at constant altitude.

Intentionally left blank

ECON (CI) - AEO

OPTIMUM PROFILE

Applicable to: ALL

An IN CRUISE ECON (CI) planning with optimum cruise profile is divided into several flight phases:

- An ECON (CI) cruise phase at initial altitude
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial cruise altitude, if this flight level becomes optimum (in terms of cost function) compared to the initial cruise altitude

L2 The step climb is performed at the first ECON cruise Mach of the next cruise phase.

L1 - A potential ECON (CI) cruise phase at the new cruise altitude

- Other potential step climbs and ECON (CI) cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, last cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

CONSTANT ALTITUDE

Applicable to: ALL

An IN CRUISE ECON (CI) planning at constant altitude is divided into three main flight phases:

- An ECON (CI) cruise phase at constant altitude
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

Intentionally left blank

Fixed Speed - AEO

OPTIMUM PROFILE

Applicable to: ALL

An IN CRUISE Fixed Speed planning with optimum cruise profile is divided into several flight phases:

- A cruise phase at initial altitude and constant input Mach or CAS
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the initial cruise altitude

L2 The step climb is performed at the Mach or CAS of the standard climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and constant input Mach or CAS

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE

Applicable to: ALL

An IN CRUISE Fixed Speed planning at constant altitude is divided into three main flight phases:

- A cruise phase at constant altitude and constant input Mach or CAS
- A descent at standard descent speed profile
- A standard approach and landing.

Intentionally left blank

LRC Speed - AEO

OPTIMUM PROFILE

Applicable to: ALL

An IN CRUISE LRC Speed planning with optimum cruise profile is divided into several flight phases:

- A cruise phase at initial altitude and LRC speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the initial cruise altitude

L2 The step climb is performed at the Mach or CAS of the standard climb speed profile.

L1 - A potential cruise phase the at new cruise altitude and LRC speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE

Applicable to: ALL

An IN CRUISE LRC Speed planning at constant altitude is divided into three main flight phases:

- A cruise phase at constant altitude and LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

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Green Dot Speed - AEO

OPTIMUM PROFILE

Applicable to: ALL

An IN CRUISE Green Dot Speed planning with optimum cruise profile is divided into several flight phases:

- A cruise phase at initial altitude and green dot speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the initial cruise altitude

L2 The step climb is performed at green dot speed.

L1 - A potential cruise phase at the new cruise altitude and green dot speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE

Applicable to: ALL

An IN CRUISE Green Dot Speed planning at constant altitude is divided into three main flight phases:

- A cruise phase at constant altitude and at green dot speed
- A descent at standard descent speed profile
- A standard approach and landing.

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Turbulence Speed - AEO

OPTIMUM PROFILE

Applicable to: ALL

An IN CRUISE Turbulence Speed planning with optimum cruise profile is divided into several flight phases:

- A cruise phase at initial altitude and turbulence speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the initial cruise altitude

L2 The step climb is performed at the Mach or CAS of the turbulence climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and turbulence speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at turbulence descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE

Applicable to: ALL

An IN CRUISE Turbulence Speed planning at constant altitude is divided into three main flight phases:

- A cruise phase at constant altitude and turbulence speed
- A descent at turbulence descent speed profile
- A standard approach and landing.

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General

GENERAL

Applicable to: ALL

GENERAL

Before any flight, the flight crew shall check that the Fuel On Board (FOB) at departure is enough, so that the Estimated Fuel On Board (EFOB) at destination is not less than the minimum recommended fuel quantities.
The FOB at departure shall not be less than the Block Fuel.

L2 For more information about the Block Fuel, *Refer to Flight Planning - Fuel* .

L1 PLAN

The flight crew may use the FLIGHT PLAN function to assess:
- The EFOB at the destination airport
- The EFOB at a potential diversion airport.

The FLIGHT PLAN function does not directly provide an EFOB but a cumulated fuel burnt over a given straight distance.
The flight crew has to substract the cumulated fuel burnt from the FOB at the departure airport, to assess the EFOB at the corresponding airport.

The initial cruise altitude of a FLIGHT PLAN calculation is either:
- The optimum altitude, or
- An input altitude.

The cruise phase of a FLIGHT PLAN calculation is either:
- An optimum profile (with optimum step climbs), or
- A cruise at constant altitude.

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ECON (CI) - AEO

OPTIMUM PROFILE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN ECON (CI) planning with optimum cruise profile from the initial optimum altitude is divided into several flight phases:

- A standard taxi and takeoff
- An OPEN (CI) climb, with the following climb law:
  - 250 kt from 1 500 ft to 10 000 ft
  - ECON climb CAS, which is a function of CI, predicted gross weight at T/C, first cruise altitude
  - ECON climb Mach, which is the ECON cruise Mach at T/C.
- An ECON (CI) cruise phase at the initial optimum altitude
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial optimum altitude, if this flight level becomes optimum (in terms of cost function) compared to the initial optimum altitude

L2 The step climb is performed at the first ECON cruise Mach of the next cruise phase.

L1 - A potential ECON (CI) cruise phase at the new cruise altitude

- Other potential step climbs and ECON (CI) cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, last cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

OPTIMUM PROFILE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN ECON (CI) planning with optimum cruise profile from an initial input cruise altitude is divided into several flight phases:

- A standard taxi and takeoff
- An OPEN (CI) climb, with the following climb law:
  - 250 kt from 1 500 ft to 10 000 ft
  - ECON climb CAS, which is a function of CI, predicted gross weight at T/C, first cruise altitude
  - ECON climb Mach, which is the ECON cruise Mach at T/C.
- An ECON (CI) cruise phase at the input cruise altitude
- A potential step climb up to the first flight level (of the chosen altitude rule) above the input cruise altitude, if this flight level becomes optimum (in terms of cost function) compared to the input cruise altitude

L2 The step climb is performed at the first ECON cruise Mach of the next cruise phase.

L1 - A potential ECON (CI) cruise phase at the new cruise altitude

- Other potential step climbs and ECON (CI) cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, last cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN ECON (CI) planning at constant cruise altitude from the initial optimum altitude is divided into five flight phases:

- A standard taxi and takeoff
- An OPEN (CI) climb, with the following climb law:
  - 250 kt from 1 500 ft to 10 000 ft
  - ECON climb CAS, which is a function of CI, predicted gross weight at T/C, cruise altitude
  - ECON climb Mach, which is the ECON cruise Mach at T/C.
- An ECON (CI) cruise phase at the initial optimum altitude
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN ECON (CI) planning at constant cruise altitude from an initial input cruise altitude is divided into five flight phases:

- A standard taxi and takeoff
- An OPEN (CI) climb, with the following climb law:
  - 250 kt from 1 500 ft to 10 000 ft
  - ECON climb CAS, which is a function of CI, predicted gross weight at T/C, input cruise altitude
  - ECON climb Mach, which is the ECON cruise Mach at T/C.
- An ECON (CI) cruise phase at the input cruise altitude
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, input cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

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Fixed Speed - AEO

OPTIMUM PROFILE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Fixed Speed planning with optimum cruise profile from the initial optimum altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and constant input Mach or CAS
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial optimum altitude, if this flight level becomes optimum (in terms of SR) compared to the initial optimum altitude

L2 The step climb is performed at the Mach or CAS of the standard climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and constant input Mach or CAS

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

OPTIMUM PROFILE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Fixed Speed planning with optimum cruise profile from an initial input cruise altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and constant input Mach or CAS
- A potential step climb up to the first flight level (of the chosen altitude rule) above the input cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the input cruise altitude

L2 The step climb is performed at the Mach or CAS of the standard climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and constant input Mach or CAS

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Fixed Speed planning with constant cruise altitude from the initial optimum altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and constant input Mach or CAS
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Fixed Speed planning with constant cruise altitude from an input cruise altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and constant input Mach or CAS
- A descent at standard descent speed profile
- A standard approach and landing.

LRC Speed - AEO

OPTIMUM PROFILE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN LRC Speed planning with optimum cruise profile from the initial optimum altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and LRC speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial optimum altitude, if this flight level becomes optimum (in terms of SR) compared to the initial optimum altitude

L2 The step climb is performed at the Mach or CAS of the standard climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and LRC speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

OPTIMUM PROFILE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN LRC Speed planning with optimum cruise profile from an initial input cruise altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and LRC speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the input cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the input cruise altitude

L2 The step climb is performed at the Mach or CAS of the standard climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and LRC speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN LRC Speed planning with constant cruise altitude from the initial optimum altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN LRC Speed planning with constant cruise altitude from an input cruise altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

Green Dot Speed - AEO

OPTIMUM PROFILE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Green Dot Speed planning with optimum cruise profile from the initial optimum altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at green dot speed
- A cruise phase at the initial optimum altitude and green dot speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial optimum altitude, if this flight level becomes optimum (in terms of SR) compared to the initial optimum altitude

L2 The step climb is performed at green dot speed.

L1 - A potential cruise phase at the new cruise altitude and green dot speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

OPTIMUM PROFILE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Green Dot Speed planning with optimum cruise profile from an initial input cruise altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at green dot speed
- A cruise phase at the input cruise altitude and green dot speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the input cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the input cruise altitude

L2 The step climb is performed at green dot speed.

L1 - A potential cruise phase at the new cruise altitude and green dot speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Green Dot Speed planning with constant cruise altitude from the initial optimum altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at green dot speed
- A cruise phase at the initial optimum altitude and green dot speed
- A descent at standard descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Green Dot Speed planning with constant cruise altitude from an initial input cruise altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at green dot speed
- A cruise phase at the input cruise altitude and green dot speed
- A descent at standard descent speed profile
- A standard approach and landing.

Turbulence Speed - AEO

OPTIMUM PROFILE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Turbulence Speed planning with optimum cruise profile from the initial optimum altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at turbulence climb speed profile
- A cruise phase at the initial optimum altitude and turbulence speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the initial optimum altitude, if this flight level becomes optimum (in terms of SR) compared to the initial optimum altitude

L2 The step climb is performed at the Mach or CAS of the turbulence climb speed profile.

L1 - A potential cruise phase at new cruise altitude and turbulence speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at turbulence descent speed profile
- A standard approach and landing.

OPTIMUM PROFILE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Turbulence Speed planning with optimum cruise profile from an initial input cruise altitude is divided into several flight phases:

- A standard taxi and takeoff
- A climb at turbulence climb speed profile
- A cruise phase at the input cruise altitude and turbulence speed
- A potential step climb up to the first flight level (of the chosen altitude rule) above the input cruise altitude, if this flight level becomes optimum (in terms of SR) compared to the input cruise altitude

L2 The step climb is performed at the Mach or CAS of the turbulence climb speed profile.

L1 - A potential cruise phase at the new cruise altitude and turbulence speed

- Other potential step climbs and cruise phases, when above flight levels (of the chosen altitude rule) become better than the current one
- A descent at turbulence descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL OPTIMUM ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Turbulence Speed planning with constant cruise altitude from the initial optimum altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at turbulence climb speed profile
- A cruise phase at the initial optimum altitude and turbulence speed
- A descent at turbulence descent speed profile
- A standard approach and landing.

CONSTANT ALTITUDE FROM INITIAL INPUT ALTITUDE

Applicable to: ALL

A FLIGHT PLAN Turbulence Speed planning with constant cruise altitude from an input cruise altitude is divided into five flight phases:

- A standard taxi and takeoff
- A climb at turbulence climb speed profile
- A cruise phase at the input cruise altitude and turbulence speed
- A descent at turbulence descent speed profile
- A standard approach and landing.

General

GENERAL

Applicable to: ALL

GENERAL

The Fuel On Board (FOB) at departure shall not be less than the Block Fuel.
Alternate Fuel is a part of the Block Fuel.

L2 For more information about the Alternate Fuel, *Refer to PER-IFT-FPL-MRF-RSF Alternate Fuel* .

L1 PLAN

The flight crew may use the ALTERNATE function to estimate Alternate Fuel.

The cruise altitude of an ALTERNATE calculation is either:

- The initial optimum altitude, or
- An input altitude.

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ECON (CI) - AEO

OPTIMUM ALTITUDE

Applicable to: ALL

An ALTERNATE ECON (CI) planning at initial optimum altitude is divided into five flight phases:

- A standard missed approach (go-around)
- An OPEN (CI) climb, with the following climb law:
  - 250 kt from 1 500 ft to 10 000 ft
  - ECON climb CAS, which is a function of CI, predicted gross weight at T/C, cruise altitude
  - ECON climb Mach, which is the ECON cruise Mach at T/C.
- An ECON (CI) cruise phase at the initial optimum altitude
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

INPUT ALTITUDE

Applicable to: ALL

An ALTERNATE ECON (CI) planning at input cruise altitude is divided into five flight phases:

- A standard missed approach
- An OPEN (CI) climb, with the following climb law:
  - 250 kt from 1 500 ft to 10 000 ft
  - ECON climb CAS, which is a function of CI, predicted gross weight at T/C, input cruise altitude
  - ECON climb Mach, which is the ECON cruise Mach at T/C.
- An ECON (CI) cruise phase at the input cruise altitude
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of CI, gross weight at T/D, input cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

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Fixed Speed - AEO

OPTIMUM ALTITUDE

Applicable to: ALL

An ALTERNATE Fixed Speed planning at initial optimum altitude is divided into five flight phases:
- A standard missed approach (go-around)
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and constant input Mach or CAS
- A descent at standard descent speed profile
- A standard approach and landing.

INPUT ALTITUDE

Applicable to: ALL

An ALTERNATE Fixed Speed planning at input cruise altitude is divided into five flight phases:
- A standard missed approach (go-around)
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and constant input Mach or CAS
- A descent at standard descent speed profile
- A standard approach and landing.

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LRC Speed - AEO

OPTIMUM ALTITUDE

Applicable to: ALL

An ALTERNATE LRC Speed planning at initial optimum altitude is divided into five flight phases:
- A standard missed approach (go-around)
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

INPUT ALTITUDE

Applicable to: ALL

An ALTERNATE LRC Speed planning at input cruise altitude is divided into five flight phases:
- A standard missed approach (go-around)
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

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Green Dot Speed - AEO

OPTIMUM ALTITUDE

Applicable to: ALL

An ALTERNATE Green Dot Speed planning at initial optimum altitude is divided into five flight phases:

- A standard missed approach (go-around)
- A climb at green dot speed
- A cruise phase at the initial optimum altitude and green dot speed
- A descent at standard descent speed profile
- A standard approach and landing.

INPUT ALTITUDE

Applicable to: ALL

An ALTERNATE Green Dot Speed planning at input cruise altitude is divided into five flight phases:

- A standard missed approach (go-around)
- A climb at green dot speed
- A cruise phase at the input cruise altitude and green dot speed
- A descent at standard descent speed profile
- A standard approach and landing.

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Turbulence Speed - AEO

OPTIMUM ALTITUDE

Applicable to: ALL

An ALTERNATE Turbulence Speed planning at initial optimum altitude is divided into five flight phases:

- A standard missed approach (go-around)
- A climb at turbulence climb speed profile
- A cruise phase at the initial optimum altitude and turbulence speed
- A descent at turbulence descent speed profile
- A standard approach and landing.

INPUT ALTITUDE

Applicable to: ALL

An ALTERNATE Turbulence Speed planning at input cruise altitude is divided into five flight phases:

- A standard missed approach (go-around)
- A climb at turbulence climb speed profile
- A cruise phase at the input cruise altitude and turbulence speed
- A descent at turbulence descent speed profile
- A standard approach and landing.

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BASIC RESULTS PANEL

Applicable to: ALL

The basic RESULTS panel provides the essential information for the flight planning.

IN CRUISE

Basic RESULTS Panel



TRIP FUEL is the fuel burnt from the start of the IN CRUISE calculation to:
- The destination airport, or
- A diversion airport, or
- The alternate airport (if the start of calculation is during the alternate cruise phase).

TIME is the time elapsed from the start of the IN CRUISE calculation to:
- The destination airport, or
- A diversion airport, or
- The alternate airport (if the start of calculation is during the alternate cruise phase).

AIR DIST is the air distance covered from the start of the IN CRUISE calculation to:
- The destination airport, or
- A diversion airport, or
- The alternate airport (if the start of calculation is during the alternate cruise phase).

FLIGHT PLAN

Basic RESULTS Panel



taxi+trip FUEL is the fuel burnt from the departure airport to the destination airport.
TIME is the time elapsed from the departure airport to the destination airport.
AIR DIST is the air distance covered from the departure airport to the destination airport.

ALTERNATE

Basic RESULTS Panel



ALT FUEL is the fuel burnt from the destination airport to the alternate airport.
TIME is the time elapsed from the destination airport to the alternate airport.
AIR DIST is the air distance covered from the destination airport to the alternate airport.

TABLE RESULTS SUBPANEL

Applicable to: ALL

The TABLE RESULTS subpanel provides the detailed information for the flight planning.
The parameters are given for each flight phase of the flight planning. The parameters actually displayed depend on the Operator customization.

PHASE

This column displays the phase of the flight planning.

ACCDST

This column displays the actual cumulated ground distance covered from the first phase of the flight planning to the end of the considered one.

ACCTIME

This column displays the actual cumulated time elapsed from the first phase of the flight planning to the end of the considered one.

ACCFUEL

This column displays the actual cumulated fuel burnt from the first phase of the flight planning to the end of the considered one.

ALT

This column displays the pressure altitude at the top of the flight phase.

ACCNAM

This column displays the actual cumulated air distance covered from the first phase of the flight planning to the end of the considered one.

TRKDST

This column displays the ground distance covered during each phase of the flight planning.

SEGTIME

This column displays the time elapsed during each phase of the flight planning.

SEGFUEL

This column displays the fuel burnt during each phase of the flight planning.

TRKNAM

This column displays the air distance covered during each phase of the flight planning.

GRAPH RESULTS SUBPANEL

Applicable to: ALL

The flight crew can plot flight parameters versus each other using the GRAPH RESULTS subpanel. The possible parameters depend on the Operator customization of the TABLE RESULTS. Specific values can be read from the graph using the cross-hairs.

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IN-FLT PERF APPLICATION - CLB MODULE

Applicable to: ALL

GENERAL

The climb phase starts at the end of takeoff and ends at the initial cruise level.

CLB

The IN-FLT PERF application is made of 6 modules (CLB, CRZ, DES, HLD, PLAN and ATMO).

The CLB module provides the flight crew with a means to obtain climb performance data for:
- Given meteorological conditions
- A given aircraft configuration including non standard ones (engines out, landing gear down)
- Various speed schedules.

The main results of this module are:
- Fuel, time, and distance to the Top of Climb (T/C)
- Climb ceiling.

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CLB MODULE INTERFACE

Applicable to: ALL

IN-FLT PERF CLB Module Interface



CONDITIONS

The flight crew can define the current outside conditions and the aircraft configuration.
For more information about the CONDITIONS panel, *Refer to PER-IFT-CLB-CDT CONDITIONS Panel* .

CLIMB DATA

The flight crew can define the data of the climb phase.
For more information about the CLIMB DATA panel, *Refer to PER-IFT-CLB-CBD CLIMB DATA Panel* .

AIRCRAFT STATUS

The flight crew can select CDL items and non standard configuration items.
For more information about the AIRCRAFT STATUS panel, *Refer to PER-IFT-ACS AIRCRAFT STATUS Panel* .

RESULTS

The RESULTS panel displays the essential information for the climb phase.

For more information about the RESULTS panel, refer to Climb Results.

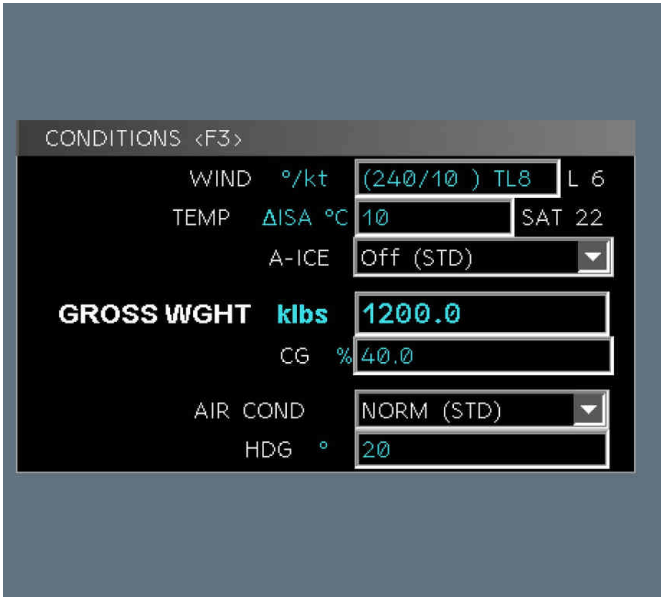
CONDITIONS PANEL

Applicable to: ALL

The CONDITIONS panel provides the following information:

- Wind
- Heading
- Temperature (Δ ISA)
- Anti-ice
- Gross weight
- CG
- Airflow.

CONDITIONS Panel



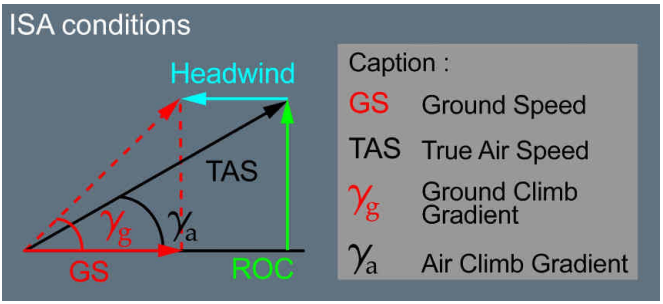
WIND

Applicable to: ALL

GENERAL

A constant wind component has no influence on the Rate of Climb (ROC), but affects the climb angle.

Headwind Effect on Climb Flight Path



L2 A headwind component increases the flight path angle and decreases the ground distance to the Top of Climb (T/C).
The air climb gradient remains unchanged, whatever the wind component. So, the fuel and the time necessary to climb form the initial altitude to the T/C stay the same.

L3 This is not applicable to a climb at Cost Index (CI), as the ECON climb Mach slightly depends on the wind.

L1 A longitudinal headwind component decreases the ground distance to reach the target pressure altitude.
Crosswind does not affect climb performance and is provided for information only.
A large and sudden increase in the tailwind with increasing altitude can significantly affect the climb capability.

CLB

There are two ways to define wind values:
- Longitudinal Speed Component
- Direction/Speed Combination.

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED COMBINATION

The flight crew enters the wind direction and the wind speed.
The entry is projected along the heading and perpendicular to the heading.
The longitudinal projection follows the same display rules as the speed entry.

IN-FLT PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



HEADING

Applicable to: ALL

GENERAL

The heading defines the axis on which the wind is projected.

CLB

The IN-FLT PERF heading and wind direction have to be both entered in either magnetic or true north.

The HDG field is only displayed if a wind has been entered in a combination of a direction and a speed.

L2 For more information about the wind, *Refer to Climb - Wind* .

TEMPERATURE

Applicable to: ALL

GENERAL

When temperature (SAT or ΔISA) increases, air density decreases, therefore:

- Climb gradient decreases

L2 Climb gradient mostly depends on excess thrust, which decreases with temperature.

L3 In climb, excess thrust is the difference between maximum available thrust in climb rating and drag.

Due to air density reduction, climb thrust and drag decrease. But, since the drag force decreases at a lower rate than the available thrust, the difference between thrust and drag decreases.

L1 - True Air Speed (TAS) increases

L2 At fixed Calibrated Air Speed (CAS), TAS is inversely proportional to air density, which decreases with temperature.

At fixed Mach, TAS increases with temperature.

L1 - Rate of Climb (ROC) decreases

L3 ROC is a function of climb gradient (GRDT), TAS and ΔISA.

ROC can be expressed as ROC = TAS × sin (GRDT) × f(ΔISA).

The function f(ΔISA) is equal to 1 in ISA conditions, and decreases with ΔISA.

The increment in TAS is offset by the decrement due to f(ΔISA) and GRDT.

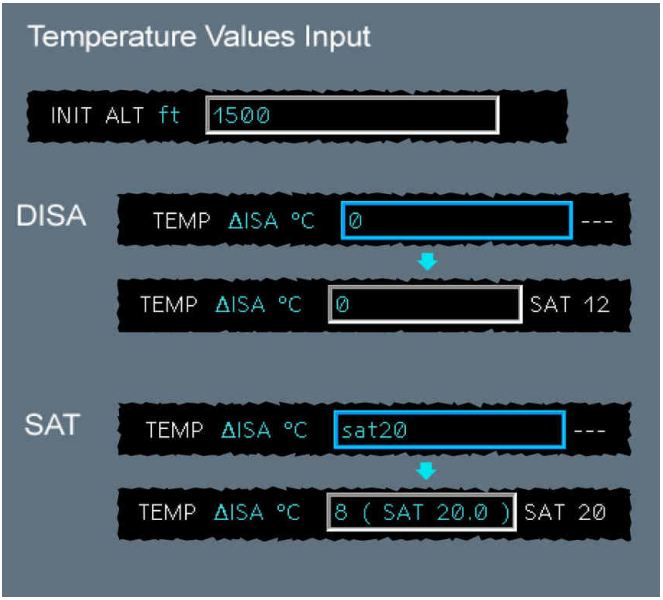
L1 - Fuel, time and distance to reach the target pressure altitude increase

- Climb ceiling is lower.

L2 As the ROC decreases at given pressure altitude, it reaches its minimum value at a lower pressure altitude.

L1 **CLB**

Temperature Values Input



The TEMP field corresponds to a deviation from ISA law (ΔISA).

The flight crew can enter a temperature as:
- A ΔISA, or
- A Static Air Temperature (SAT) at initial pressure altitude, which is automatically converted into a ΔISA.

ANTI-ICE

Applicable to: ALL

GENERAL

Anti-ice increases engine bleed and reduces available thrust.

In the case of ENG and/or WING anti-ice:

- Climb gradient and ROC decrease

L2 Climb gradient and ROC depend on thrust. Climb thrust decreases.

L1 - Fuel, time and distance to reach the target pressure altitude increase
- Climb ceiling is lower.

L2 As the ROC decreases at given pressure altitude, it reaches its minimum value at a lower pressure altitude.

L1 IN-FLT PERF

IN-FLT PERF has four anti-ice options:

- Off
- Engine
- Total
- Severe Icing.

  The flight crew may use the Severe Icing option to assess the impact of ice accretion on fuel consumption and ceilings.

GROSS WEIGHT

Applicable to: ALL

GENERAL

An increase in weight leads to:

- A decrease in climb gradient and Rate Of Climb (ROC)

L3 If TAS were constant with altitude at given CAS or Mach, climb gradient (GRDT) and ROC would be inversely proportional to the weight.

$$\sin(\mathrm{GRDT}) = \frac{(\mathrm{Thrust} - \mathrm{Drag})}{\mathrm{Weight}} - \frac{1}{g} \times \frac{d}{dt}(TAS)$$

L1 - An increase in fuel, time and distance to reach the target pressure altitude
- A lower climb ceiling.

L2 As the ROC decreases at given pressure altitude, it reaches its minimum value at a lower pressure altitude.

L1 CLB

The flight crew enters the current aircraft weight at start of climb calculation.
This gross weight (GROSS WGHT field) must be between the Operating Empty Weight (OEW) and the Maximum Design Takeoff Weight (MTOW).

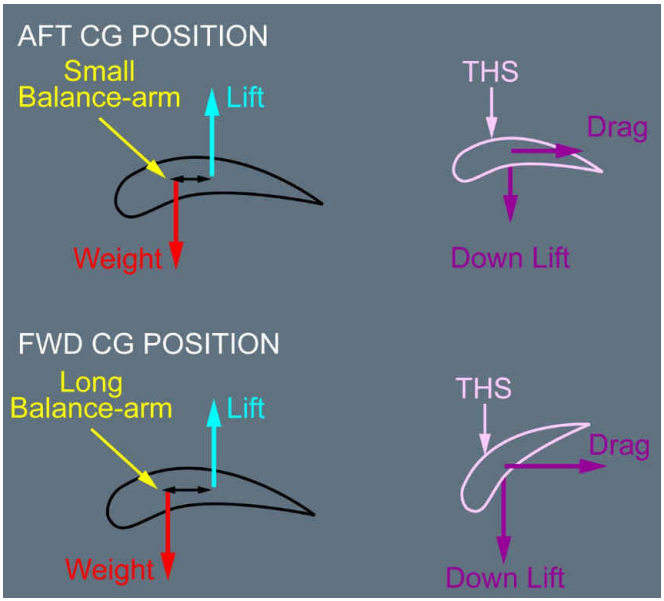
CG

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position impacts the forces applied on the aircraft. As a result, it impacts aircraft performance.

CG Position



L2 In order to keep the aircraft level, the Trimmable Horizontal Stabilizer (THS) creates a downward force that counters the pitch down moment due to the distance between the center of lift and the center of gravity. The larger this lever arm, the higher the down lift that must be generated by the THS, and the higher the drag.

L1 **IN-FLT PERF**

The CG field is expressed in % of the Mean Aerodynamic Chord (MAC).

AIRFLOW

Applicable to: ALL

GENERAL

High airflow increases engine bleed and reduces available thrust.

With increased engine bleed:

- Climb gradient and ROC decrease

L2 Climb gradient and ROC depend on thrust. Climb thrust decreases.

L1 - Fuel, time and distance to reach the target pressure altitude increase

- Climb ceiling is lower.

L2 As the ROC decreases at given pressure altitude, it reaches its minimum value at a lower pressure altitude.

L1 IN-FLT PERF

IN-FLT PERF has five airflow options:

- OFF
- LO
- MAN
- NORM
- HI.

IMPACT OF FWD CARGO COOLING

When FWD cargo cooling is active, the airflow automatically increases, and so the engine bleed. The IN-FLT PERF airflow settings reflect the engine bleed with FWD cargo cooling OFF.
The flight crew applies the following equivalences to obtain an engine bleed that considers the effect of FWD cargo cooling:

ENG OPERATIVE	AIR FLOW Selector	FWD Cargo Cooling	Select IN-FLT PERF setting
4	LO	ON	MAN
	MAN		HI
	NORM		HI
	HI		HI
3	LO	ON	MAN
	MAN		MAN
	NORM		NORM
	HI		HI
2	LO	ON	LO
	MAN		MAN
	NORM		NORM
	HI		HI

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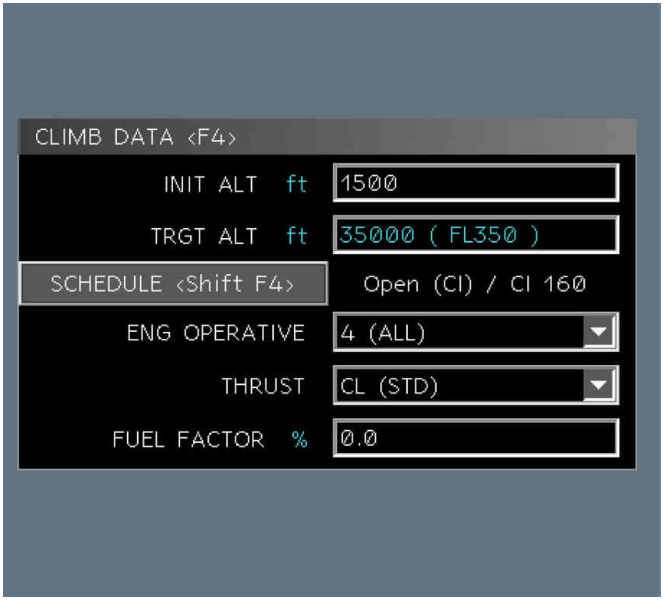
CLIMB DATA PANEL

Applicable to: ALL

The CLIMB DATA panel provides the following information:

- Initial altitude
- Target altitude
- Climb speed schedule (climb selection, specific information on the climb speed schedule, minimum rate of climb, buffet margin).
- Number of engines operative
- Thrust lever position
- Fuel factor.

CLIMB DATA Panel



INITIAL ALTITUDE

Applicable to: ALL

The initial altitude is the pressure altitude at which the computation of an initial climb or step climb begins.

TARGET ALTITUDE

Applicable to: ALL

The target altitude is the pressure altitude at which the computation should stop.
If the target altitude is above the climb ceiling in the conditions defined, the computation will end at the climb ceiling.

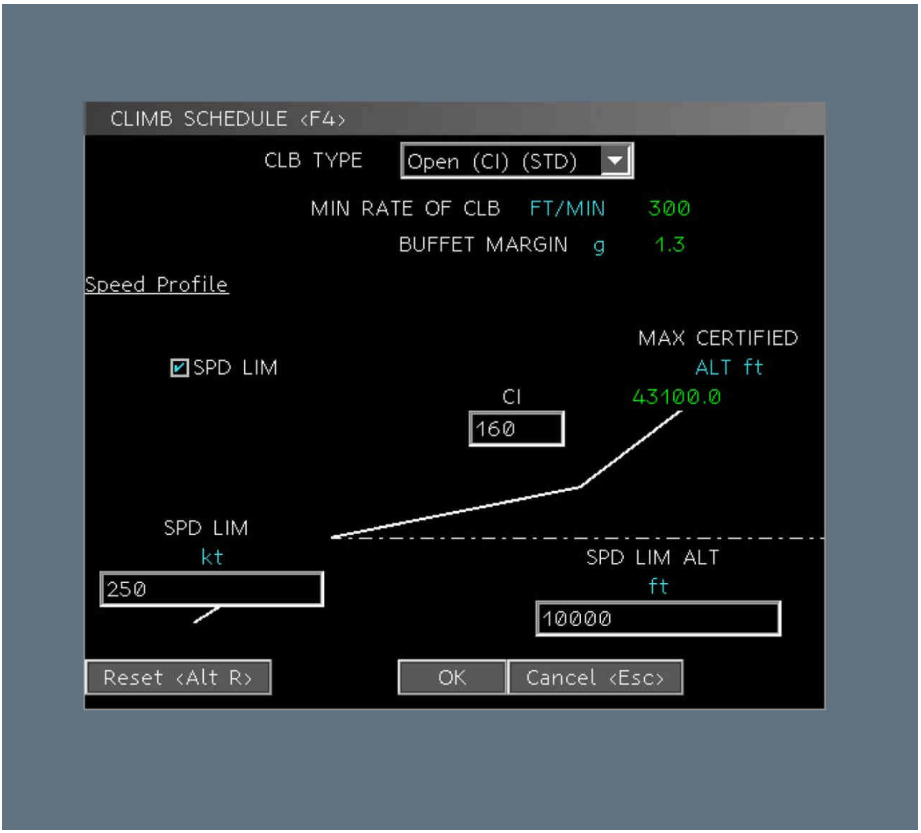
CLIMB SCHEDULE

Applicable to: ALL

The CLIMB SCHEDULE subpanel includes the following information:

- Climb selection
- Specific information on the climb speed schedule
- Minimum rate of climb
- Buffet margin.

CLIMB SCHEDULE Subpanel



CLIMB TYPE

The flight crew uses the CLB TYPE drop-down list to define the climb type.

The following climb types are available:

- Open (CI)

L2 For more information about the Open (CI) climb type, *Refer to PER-IFT-CLB-OCI General* .

L1 - Selected speeds

L2 For more information about the Selected speeds climb type, *Refer to PER-IFT-CLB-SSP General* .

L1 - Best rate

L2 For more information about the Best rate climb type, *Refer to PER-IFT-CLB-BRT General* .

L1 - Best angle

L2 For more information about the Best angle climb type, *Refer to PER-IFT-CLB-BAN General* .

L1 - Turbulence .

L2 For more information about the Turbulence climb type, *Refer to PER-IFT-CLB-TBL General* .

BUFFET MARGIN

GENERAL

Aircraft maneuverability is limited by the load factor at which buffet onset begins.
To ensure a sufficient aircraft maneuverability, a buffet margin in level flight is maintained. It is expressed as a factor of g.

L2 The load factor is defined as the ratio between lift and weight.

L1 This load factor limit is called buffet margin.

CLB

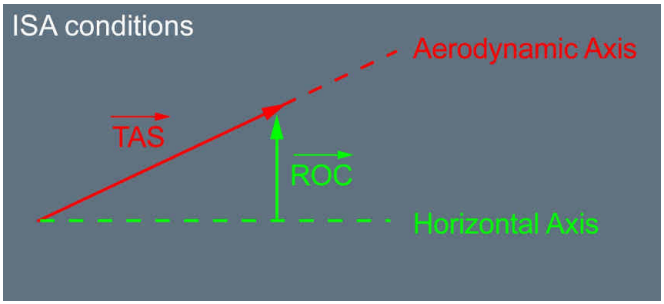
The buffet margin is generally fixed to 1.3 for all engine operations.
For the Turbulence climb type, the buffet margin is generally increased to 1.4.
The buffet margin is used to determine the buffet ceiling.

MINIMUM RATE OF CLIMB

GENERAL

In ISA conditions, the Rate Of Climb (ROC) represents the vertical component of the aircraft's speed (i.e. the vertical speed).

ROC definition



CLB

Theoretically, a climb could continue until the ROC is equal to zero. But the final part of the climb would amount to a drift up that considerably increases climb time, distance and fuel.
To prevent this, the climb is usually stopped when a minimum residual climb capability is reached, the minimum ROC.
The minimum ROC is generally fixed to 300 ft/min in normal conditions.
The target altitude may be not reachable if the residual climb capability at that level is less than the minimum ROC.

ENGINES OPERATIVE

Applicable to: ALL

GENERAL

The number of engines operative determines the thrust available to perform the climb and therefore largely impacts the climb performance and the climb strategy (e.g. climb at green dot speed after an engine failure).

CLB

The flight crew selects the number of engines operative:
- 4 (ALL), or
- 3, or
- 2.

A climb on less than 2 engines is not considered.

THRUST

Applicable to: ALL

GENERAL

The thrust available to perform the climb depends on the selected climb rating.
The standard climb rating is “Maximum Climb Thrust”, which is delivered when the thrust lever is in the CL detent.
Three "Derated Climb Thrust" levels are available (DCL1, DCL2, DCL3).
For more information about derated climb, *Refer to PER-THR-NRM-DCL Derated Climb* and *Refer to PER-THR-NRM-DCL-DCL Derated Climb Level Determination* .
In the case of an engine failure, the rating “Maximum Continuous Thrust” is mandatory.

CLB

The flight crew selects the thrust rating:
- CL (AEO), or
- CL-D01 (AEO), or
- CL-D02 (AEO), or
- CL-D03 (AEO), or
- MCT (OEI).

FUEL FACTOR

Applicable to: ALL

GENERAL

The performance factor for FMS predictions (FMS PERF FACTOR) is the sum of the Basic FMS PERF FACTOR and the Monitored Fuel Factor.

BASIC FMS PERF FACTOR

The Basic FMS PERF FACTOR correction is applied when the aircraft FMS database does not exactly fit to the aircraft model. It is published for each FMS Performance Data Base (PDB).
It results in FMS predictions consistent with the level reflected by the uncorrected IN-FLT PERF application, also called the book level.

MONITORED FUEL FACTOR

The actual airframe drag and engine performance deviate from the nominal model due to the aircraft's aging process.
The Monitored Fuel Factor is used to correct the performance book level to the actual performance level in order to permit realistic fuel predictions.
The Monitored Fuel Factor is defined as a percentage increase or decrease of the nominal Specific Range (SR) value.

IN-FLT PERF

The IN-FLT PERF fuel factor corresponds to the sum of:
- The Monitored Fuel Factor, and
- A positive performance prediction adjustment (if enabled, and at flight crew discretion).

L2 This allows the flight crew to adjust performance predictions to a drag increase due to non-quantified aerodynamic sources.

L1 When no such performance adjustment is required, the IN-FLT PERF fuel factor may thus differ from the FMS one by the Basic FMS PERF FACTOR.

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GENERAL

Applicable to: ALL

The Open (CI) climb type enables the flight crew to emulate several MFD CLB page performance predictions:

- Recommended Maximum (REC MAX) altitude
- ECON speed and Mach
- Distance to targeted altitude
- Time to targeted altitude.

Furthermore, the Open (CI) climb type provides some additional performance information, like gradient (GRDT) and vertical speed (ROC) along the flight path.

L2 This is flown in managed speed/Mach target.

L3 The Open (CI) climb type combines the use of the FMS managed speed/Mach targets with the physical model of the aircraft, whereas the FMS predictions use a simplified model of the aircraft.

COST INDEX

Applicable to: ALL

The Cost Index (CI) is defined as the ratio between Cost of Time per time unit (CT) and Cost of Fuel per mass unit (CF).

The CI value is expressed in hundreds of pounds per hour (100 lb/h).

The purpose of the CI concept is to reduce Direct Operating Costs (DOC).

L2 DOCs are made up of:

- Fixed costs
- Time-related costs, which can be expressed as CT × (trip time)
- Cost of fuel, which can be expressed as CF × (trip fuel).

SPEED PROFILE

Applicable to: ALL

GENERAL

A climb in managed speed/Mach target is generally operated using a speed profile divided into two main phases:

- An optional climb speed limit phase

L2 The climb speed limit is a speed constraint to be respected, up to a specified altitude.

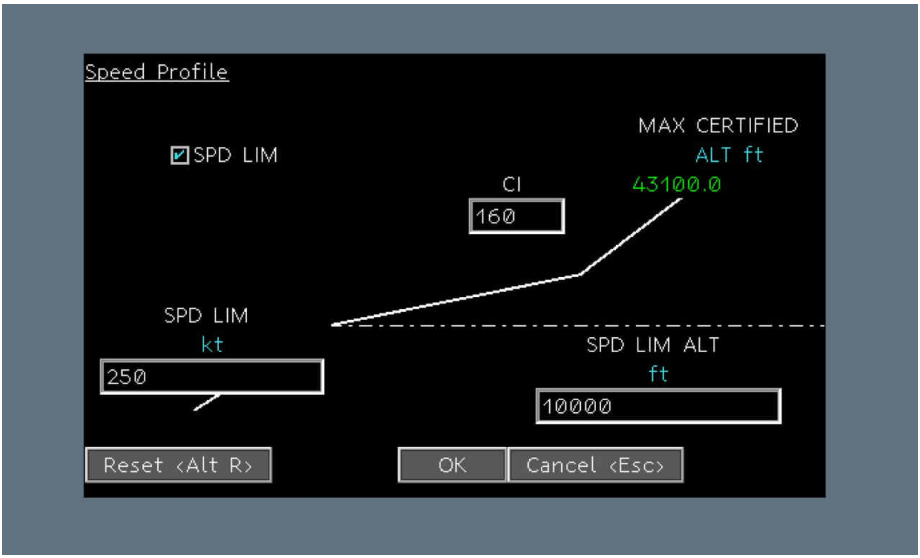
L1 - An economic climb schedule (ECON IAS / ECON Mach law).

L2 For more information about the economic climb schedule, *Refer to PER-IFT-CLB-OCI Economic Climb Schedule* .

L1 CLB

WITH A SPEED LIMIT

Speed Profile Subpanel - With a Speed Limit



The flight crew enters:

- The CI value used to manage the flight
- The climb speed limit CAS (SPD LIM)
- The climb speed limit altitude (SPD LIM ALT).

WITHOUT A SPEED LIMIT

Speed Profile Subpanel - Without a Speed Limit



The flight crew enters the CI value used to manage the flight.

ECONOMIC CLIMB SCHEDULE

Applicable to: ALL

An economic climb schedule is a predetermined IAS /Mach climb speed law depending on CI .
The ECON climb Mach is identical to the first ECON cruise Mach.

L2 The IAS phase is flown at ECON IAS function of:

- CI
- Top Of Climb (T/C) altitude
- Predicted weight at T/C .

The Mach phase is flown at ECON Mach function of:

- CI
- T/C altitude
- Predicted weight at T/C altitude
- Temperature
- Wind.

For more information about the ECON Mach, *Refer to Cruise - ECON Mach* .

GENERAL

Applicable to: ALL

The flight crew may use the Selected speeds climb type to calculate climb performance for a climb in selected speed/Mach target with a given fixed speed schedule.

SPEED PROFILE

Applicable to: ALL

GENERAL

A climb in selected speed/Mach target is generally operated using a speed profile divided into three phases (SPD LIM/SPD/MACH).
The standard climb speed profile is 250 kt/320 kt/M 0.84 with a speed constraint up to FL 100.

BELOW THE CLIMB SPEED LIMIT ALTITUDE

This climb phase is operated at constant IAS (SPD LIM).
The speed is limited by ATC and according to airspace rules.

ABOVE THE CLIMB SPEED LIMIT ALTITUDE

This climb phase is operated at a higher IAS (SPD), which is maintained up to the crossover altitude.

L2 The crossover altitude is the pressure altitude at which SPD and MACH are equal to the same TAS.
At constant IAS, TAS increases with pressure altitude.
This acceleration progressively reduces climb capability.

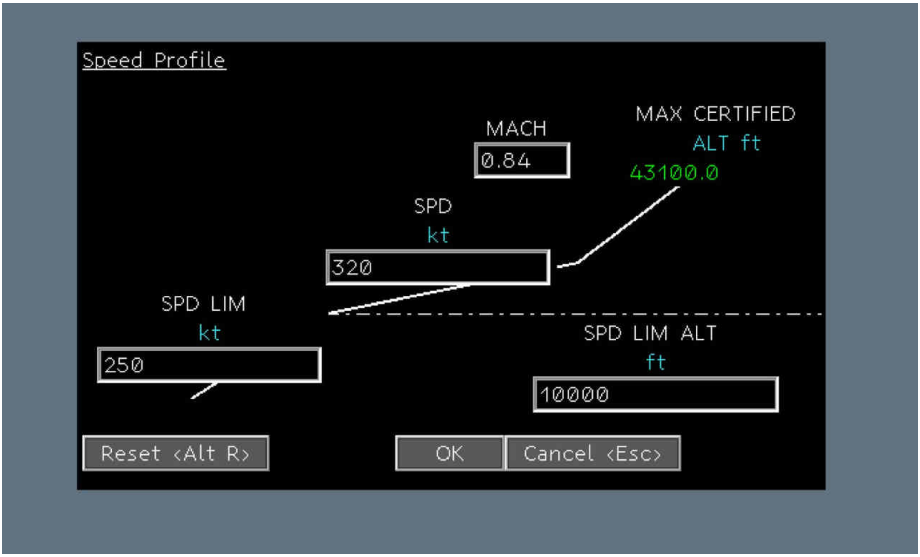
L1 ABOVE THE CROSSOVER ALTITUDE

This climb phase is operated at constant Mach (MACH) to improve the climb ceiling.

L2 At constant Mach, TAS decreases with pressure altitude.
This deceleration restores some climb capability.

L1 **CLB**

Speed Profile Subpanel



The flight crew enters:

- The climb speed limit CAS (SPD LIM)
- The climb speed limit altitude (SPD LIM ALT)
- The climb speed CAS (SPD)
- The climb speed Mach (MACH).

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GENERAL

Applicable to: ALL

The flight crew may use the Best rate climb type to calculate climb performance with the aim of reaching the targeted altitude in the shortest time.
This may be flown in selected speed/Mach target by manually setting the best rate speed on the AFS CP, computed by the IN-FLT PERF Best rate climb type.

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GENERAL

Applicable to: ALL

The flight crew may use the Best angle climb type to calculate climb performance with the aim of reaching the targeted altitude in the shortest distance.

This is flown in selected speed/Mach target by manually setting the green dot speed on the AFS CP computed by:

- The FMC based on aircraft weight, and indicated on the PFD and the MFD PERF CLB page (MAX ANGLE function), or
- The IN-FLT PERF Best angle climb type.

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GENERAL

Applicable to: ALL

The flight crew may use the Turbulence climb type to calculate climb performance for a climb in selected speed/Mach target operated through turbulence areas.

L2 Turbulence speeds are recommended when the aircraft flies in a turbulent atmosphere. They increase the margin to buffet onset, which is more likely to occur due to Angle Of Attack (AOA) variations induced by disturbances in these meteorological conditions.

L1 This is flown in selected speed/Mach target by manually setting the MAX TURB fixed IAS/Mach law on the AFS CP, computed by the FMC and indicated on the MFD PERF CLB page (MAX TURB function).

This may also be flown in selected speed/Mach target by manually setting the turbulence climb speed profile on the AFS CP, given by the IN-FLT PERF Turbulence climb type.

SPEED PROFILE

Applicable to: ALL

The recommended turbulence penetration airspeed (VRA/MRA) is between green dot and 300 kt/M 0.85.

The MAX TURB function indicated on the MFD PERF CLB page displays the maximal speed/Mach not to exceed according to this recommendation.

The IN-FLT PERF Turbulence climb type philosophy is different. It enables to make a computation from the Operator's turbulence climb speed profile.

The optimum turbulence climb speed profile in terms of margin towards buffet onset is 260 kt/300 kt/M 0.85 with a speed constraint up to FL 100.

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REC MAX ALTITUDE

Applicable to: ALL

GENERAL

The FMS Recommended Maximum (REC MAX) altitude is a precomputed value, function of the aircraft gross weight and DISA, displayed on all the PERF pages as long as all engines are operative.

L2 REC MAX altitude respects the following criteria:
- It can be flown with a speed higher than green dot speed and lower than Maximum Operating Speed/Mach (VMO/MMO)
- It can be reached with a minimum rate of climb of 300 ft/min at “Maximum Climb Thrust” rating
- It can be flown in level flight without acceleration with a rating less than “Maximum Cruise Thrust”
- It can be reached before buffeting with a margin of 0.3 g
- It is less than the maximum certified altitude.

L1 CLB

REC MAX altitude is only computed for the Open (CI) climb type.
For all engines operative, it corresponds to the REC MAX altitude displayed on the MFD.

CLIMB CEILING

Applicable to: ALL

GENERAL

The climb ceiling is the pressure altitude at which the calculated Rate of Climb (ROC) is equal to the minimum ROC .

L2 For more information about the minimum ROC , *Refer to PER-IFT-CLB-CBD-CSH Minimum Rate of Climb* .

L1 CLB

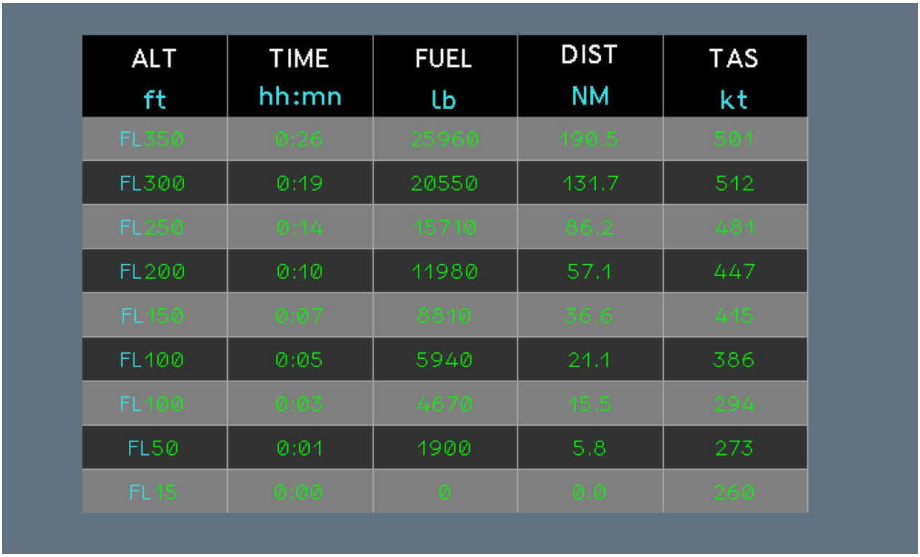
The climb ceiling is calculated for the following climb types:
- Selected speeds
- Best rate
- Best angle
- Turbulence .

BASIC RESULTS PANEL

Applicable to: ALL

The basic RESULTS panel provides the essential information for the climb via a typical climb table.

Basic RESULTS Table



ALT ft	TIME hh:mn	FUEL lb	DIST NM	TAS kt
FL350	0:26	25960	190.5	501
FL300	0:19	20550	131.7	512
FL250	0:14	15710	86.2	481
FL200	0:10	11980	57.1	447
FL150	0:07	8810	36.6	415
FL100	0:05	5940	21.1	386
FL100	0:03	4670	15.5	294
FL50	0:01	1900	5.8	273
FL15	0:00	0	0.0	260

ALT

This column displays the altitude from the initial pressure altitude to the target pressure altitude (or the final pressure altitude limited by the minimum Rate of Climb (ROC) value) with a step of 5 000 ft.

TIME

This column displays the time elapsed from the initial pressure altitude to each intermediate pressure altitude.

FUEL

This column displays the fuel burnt from the initial pressure altitude to each intermediate pressure altitude.

DIST

This column displays the ground distance covered from the initial pressure altitude to each intermediate pressure altitude.

TAS

This column displays the instantaneous True Air Speed (TAS) at each intermediate pressure altitude.

TABLE RESULTS SUBPANEL

Applicable to: ALL

The TABLE RESULTS subpanel provides the detailed information for the climb. The parameters displayed depend on the Operator customization.
In addition to the basic table, the detailed table may include:

ALTG

This column displays the geometric altitude corresponding to each intermediate pressure altitude.

WGHT

This column displays the aircraft weight at each intermediate pressure altitude.

CAS

This column displays the instantaneous Calibrated Air Speed (CAS) at each intermediate pressure altitude.

MACH

This column displays the instantaneous Mach number at each intermediate pressure altitude.

THR

This column displays the instantaneous THR at each intermediate pressure altitude.
L2 The THR value indicates the thrust used. It is shown as a % of the available thrust.

Assuming that the thrust achieved in windmilling is close to zero, the available thrust is the ratio of the actual thrust calculated from engine parameters to:
- The thrust achieved with TO thrust rating and bleeds OFF for Takeoff and Taxi
- The thrust achieved with GA thrust rating and bleeds OFF for all other flight phases (Climb, Cruise, Descent, Holding).

L1 **GRDT**

This column displays the instantaneous climb gradient at each intermediate pressure altitude.
L2 The climb gradient represents the angle between the horizontal axis and the aerodynamic axis defined by the speed direction.

L1 **RATE**

This column displays the instantaneous Rate Of Climb (ROC) at each intermediate pressure altitude.
L2 In ISA conditions, ROC represents the vertical component of the speed.
In ISA conditions, ROC = TAS x sin (GRDT) ~ TAS x GRDT.

L1 WITH TAKEOFF

The flight crew can use the "With Takeoff" tick box to take into account the time allowance and the distance allowance for the takeoff phase of the climb:

- When the "With Takeoff" tick box is unticked, IN-FLT PERF computes the time and the distance results from the INIT ALT entered by the flight crew in the CLIMB DATA panel
- When the "With Takeoff" tick box is ticked, IN-FLT PERF computes the time and the distance results from the takeoff point of the aircraft.

For more information about the "With Takeoff" tick box, *Refer to PER-IFT-CLB-CBR GRAPH RESULTS Subpanel* .

GRAPH RESULTS SUBPANEL

Applicable to: ALL

The flight crew can plot climb parameters versus each other using the GRAPH RESULTS subpanel. The possible parameters depend on the Operator customization of the TABLE RESULTS.
Specific values can be read from the graph using the cross-hairs.
The flight crew can use the "With Takeoff" tick box to take into account the time allowance and the distance allowance for the takeoff phase of the climb. When the "With Takeoff" tick box is ticked, the origin of the graph is moved to take into account the new initial conditions.

GRADIENT

When ALT is plotted against DIST, three fixed gradients are displayed:
- 3 %
- 5 %
- 7.5 %.

These fixed gradients are also displayed when GRDT is plotted against any parameter.

WITHOUT TAKEOFF

When the "With Takeoff" tick box is unticked:
- The origin of the aircraft trajectory (cyan curve) is:
  - DIST = 0
  - ALT = INIT ALT entered by the flight crew in the CLIMB DATA panel.
- The origin of the gradient graph (yellow curve) is:
  - DIST = 0
  - ALT = 35 ft.

WITH TAKEOFF

When the "With Takeoff" tick box is ticked:
- The origin of the aircraft trajectory (cyan curve) is:
  - DIST = Takeoff distance allowance
  - ALT = INIT ALT entered by the flight crew in the CLIMB DATA panel.
- The origin of the gradient graph (yellow curve) is:
  - DIST = 1/3 of the takeoff distance allowance
  - ALT = 35 ft.

RATE OF CLIMB

When ALT is plotted against TIME, three fixed ROCs are displayed:
- 1 000 ft/min
- 1 500 ft/min
- 2 000 ft/min.

These ROCs are also displayed when RATE is plotted against any parameter.

WITHOUT TAKEOFF

When the "With Takeoff" tick box is unticked:
- The origin of the aircraft trajectory (cyan curve) is:
  - TIME = 0
  - ALT = INIT ALT entered by the flight crew in the CLIMB DATA panel.
- The origin of the gradient graph (yellow curve) is:
  - TIME = 0
  - ALT = 35 ft.

WITH TAKEOFF

When the "With Takeoff" tick box is ticked:
- The origin of the aircraft trajectory (cyan curve) is:
  - TIME = Takeoff time allowance
  - ALT = INIT ALT entered by the flight crew in the CLIMB DATA panel.
- The origin of the gradient graph (yellow curve) is:
  - TIME = 2/3 of the takeoff time allowance
  - ALT = 35 ft.

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IN-FLT PERF APPLICATION - CRZ MODULE

Applicable to: ALL

GENERAL

The cruise phase starts at the Top of Climb (T/C) and ends at the Top of Descent (T/D).

CRZ

The IN-FLT PERF application is made of 6 modules (CLB, CRZ, DES, HLD, PLAN and ATMO).

The CRZ module enables the flight crew to obtain current and predicted cruise performance data for:

- Given meteorological conditions
- A given aircraft configuration including non standard ones (engines out, landing gear down)
- Given speed or cost index.

The main results of this module are:

- Fuel results: the Fuel Flow (FF), the Specific Range (SR), the THR
- Altitude results: the maximum altitude, the optimum altitude, the specific range equivalence
- Speed results: the Mach, the Calibrated Air Speed (CAS), the True Air Speed (TAS), the N1.

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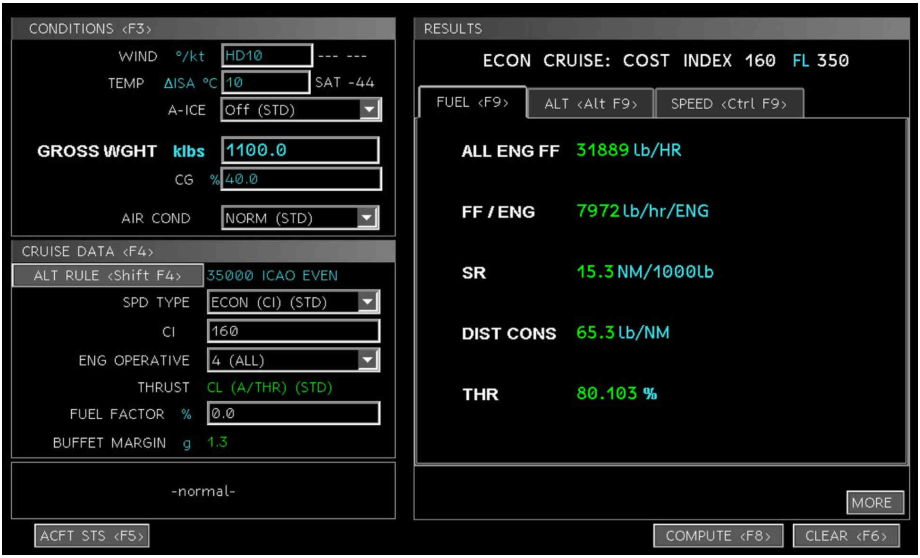
CRZ MODULE INTERFACE

Applicable to: ALL

IN-FLT PERF CRZ Module Interface



CONDITIONS

The flight crew can define the current outside conditions and the aircraft configuration.
For more information about the CONDITIONS panel, *Refer to PER-IFT-CRZ-CDT CONDITIONS Panel* .

CRUISE DATA

The flight crew can define the data of the cruise phase.
For more information about the CRUISE DATA panel, *Refer to PER-IFT-CRZ-CRD CRUISE DATA Panel* .

AIRCRAFT STATUS

The flight crew can select CDL items and non standard configuration items.
For more information about the AIRCRAFT STATUS panel, *Refer to PER-IFT-ACS AIRCRAFT STATUS Panel* .

RESULTS

The RESULTS panel displays the essential information for the cruise phase:

- Fuel
- Altitude
- Speed.

For more information about the RESULTS panel, refer to Cruise Results.

CONDITIONS PANEL

Applicable to: ALL

The CONDITIONS panel provides the following information:

- Wind
- Heading
- Temperature (Δ ISA)
- Anti-ice
- Gross weight
- CG
- Airflow.

CONDITIONS Panel



WIND

Applicable to: ALL

GENERAL

The wind affects:
- The Ground Speed (GS)
- The Specific Range (SR)
- The ECON and LRC Mach.

A tailwind will induce:
- An increase in SR
- A decrease in ECON and LRC Mach.

On the contrary, a headwind will induce:
- A decrease in SR
- An increase in ECON and LRC Mach.

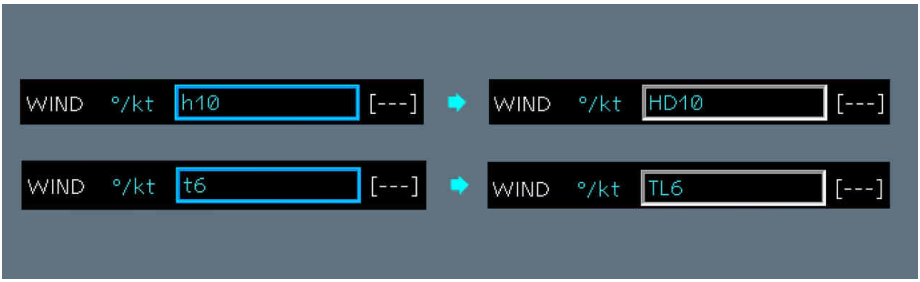
CRZ

There are two ways to define wind values:
- Longitudinal Speed Component
- Direction/Speed Combination.

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED COMBINATION

The flight crew enters the wind direction and the wind speed.
The entry is projected along the heading and perpendicular to the heading.

The longitudinal projection follows the same display rules as the speed entry.

IN-FLT PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



HEADING

Applicable to: ALL

GENERAL

The heading defines the axis on which the wind is projected.

CRZ

The IN-FLT PERF heading and wind direction have to be both entered in either magnetic or true north.
The HDG field is only displayed if a wind has been entered in a combination of a direction and a speed.

L2 For more information about the wind, *Refer to Cruise - Wind* .

TEMPERATURE

Applicable to: ALL

GENERAL

An increase in temperature (SAT or ΔISA) leads to:

- A higher true altitude at fixed indicated altitude
- A higher True Air Speed (TAS) for the same Calibrated Air Speed (CAS) or Mach

L2 At fixed CAS, TAS is inversely proportional to air density, which decreases with temperature. At fixed Mach, TAS increases with temperature.

L1 - A higher required net thrust to fly this TAS.

L2 The net thrust is the difference between the gross thrust and the capturing drag. It is the thrust necessary to maintain the level flight.

L1 Thus, when temperature increases:

- Fuel Flow (FF) increases
- Specific Range (SR) decreases

L2 The increase in Ground Speed (GS) does not offset the increment in FF.

L1 - THR increases

L2 The maximum available thrust decreases with temperature, and the required net thrust increases.

L1 - The Maximum Cruise Altitude (MAX CRZ ALT) decreases

L2 The applicable thrust limit is reached at a lower altitude.

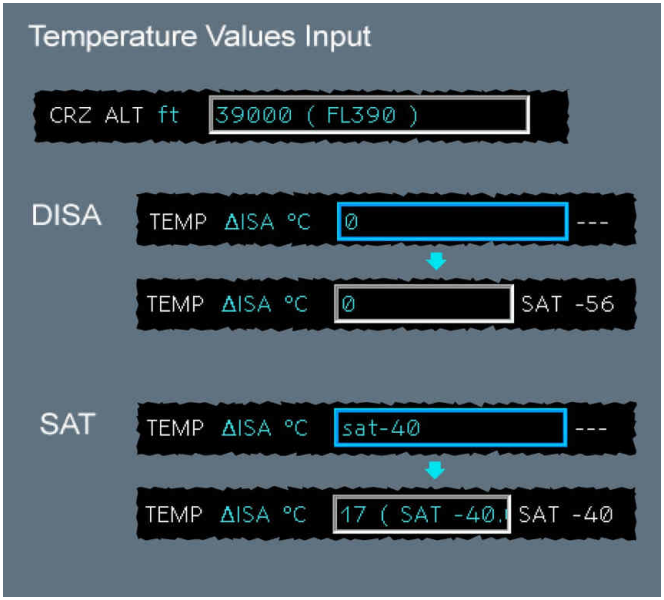
L1 - The Optimum Altitude (OPT ALT) stays roughly the same

L2 OPT ALT is the result of a comparison of SR at different altitudes. These SR values vary with temperature in the same way at all altitudes.

L1 - ECON and LRC Mach decrease.

CRZ

Temperature Values Input



The TEMP field corresponds to a deviation from ISA law (ΔISA).

The flight crew can enter a temperature as:

- A ΔISA, or
- A Static Air Temperature (SAT) at cruise altitude, which is automatically converted into a ΔISA.

ANTI-ICE

Applicable to: ALL

GENERAL

In cruise, anti-ice increases engine bleed.

L2 The net thrust (which is the thrust necessary to maintain the level flight) stays the same. But, the increased bleed flow leads to an increased Fuel Flow (FF) to generate this thrust.

L1 Thus, in the case of ENG and/or WING anti-ice:

- FF increases
- Specific Range (SR) decreases
- THR increases
- The Maximum Cruise Altitude (MAX CRZ ALT) decreases

L2 The applicable thrust limit is reached at a lower altitude.

L1 - The Optimum Altitude (OPT ALT) stays roughly the same

L2 OPT ALT is the result of a comparison of SR at different altitudes. These SR values vary with anti-ice in the same way at all altitudes.

L1 - LRC Mach slightly decreases
- ECON Mach remains the same.

L2 The FMS model does not consider bleed variations.

L1 IN-FLT PERF

IN-FLT PERF has four anti-ice options:

- Off
- Engine
- Total
- Severe Icing.

  The flight crew may use the Severe Icing option to assess the impact of ice accretion on fuel consumption and ceilings.

GROSS WEIGHT

Applicable to: ALL

GENERAL

L2 When the weight increases, the lift must be increased to maintain the altitude. As a result, the drag increases. So, the net thrust must be increased at fixed CAS or Mach.

L1 At a fixed pressure altitude, any decrease in weight, due to fuel burn off for example, leads to:
- A lower Fuel Flow (FF)
- A higher Specific Range (SR).

L2 The SR is inversely proportional to FF.

L1 - A lower THR

L2 The required net thrust decreases.

L1 - A higher Maximum Cruise Altitude (MAX CRZ ALT)
- A higher Optimum Altitude (OPT ALT)
- A lower ECON and LRC Mach.

CRZ

The flight crew enters the current aircraft weight at start of cruise calculation.
This gross weight (GROSS WGHT field) must be between the Operating Empty Weight (OEW) and the Maximum Design Takeoff Weight (MTOW).

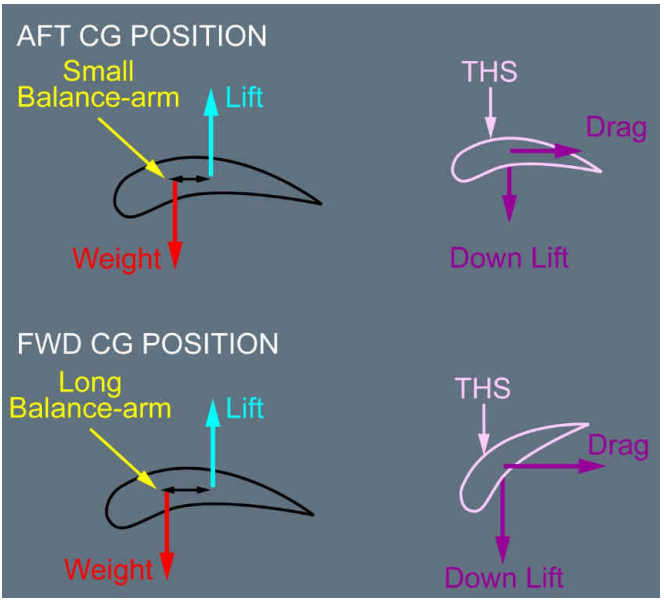
CG

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position impacts the forces applied on the aircraft. As a result, it impacts aircraft performance.

CG Position



L2 In order to keep the aircraft level, the Trimmable Horizontal Stabilizer (THS) creates a downward force that counters the pitch down moment due to the distance between the center of lift and the center of gravity. The larger this lever arm, the higher the down lift that must be generated by the THS, and the higher the drag.

L1 **IN-FLT PERF**

The CG field is expressed in % of the Mean Aerodynamic Chord (MAC).

AIRFLOW

Applicable to: ALL

GENERAL

In cruise, high airflow increases engine bleed.

L2 The net thrust (which is the thrust necessary to maintain the level flight) stays the same. But, the increased bleed flow leads to an increased Fuel Flow (FF) to generate this thrust.

L1 Thus, in the case of an increase in airflow:

- FF increases
- Specific Range (SR) decreases
- THR increases
- The Maximum Cruise Altitude (MAX CRZ ALT) decreases

L2 The applicable thrust limit is reached at a lower altitude.

L1 - The Optimum Altitude (OPT ALT) stays roughly the same

L2 OPT ALT is the result of a comparison of SR at different altitudes. These SR values vary with airflow in the same way at all altitudes.

L1 - LRC Mach decreases
- ECON Mach remains the same.

L2 The FMS model does not consider bleed variations.

L1 IN-FLT PERF

IN-FLT PERF has five airflow options:

- OFF
- LO
- MAN
- NORM
- HI.

IMPACT OF FWD CARGO COOLING

When FWD cargo cooling is active, the airflow automatically increases, and so the engine bleed.
The IN-FLT PERF airflow settings reflect the engine bleed with FWD cargo cooling OFF.
The flight crew applies the following equivalences to obtain an engine bleed that considers the effect of FWD cargo cooling:

ENG OPERATIVE	AIR FLOW Selector	FWD Cargo Cooling	Select IN-FLT PERF setting
4	LO	ON	MAN
	MAN		HI
	NORM		HI
	HI		HI
3	LO	ON	MAN
	MAN		MAN
	NORM		NORM
	HI		HI
2	LO	ON	LO
	MAN		MAN
	NORM		NORM
	HI		HI

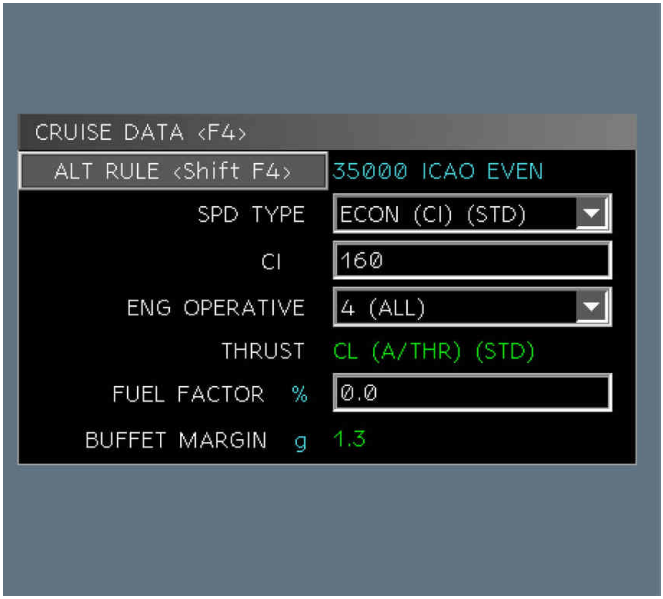
CRUISE DATA PANEL

Applicable to: ALL

The CRUISE DATA panel provides the following information:

- Altitude profile (cruise altitude, altitude rule)
- Speed type
- Engines operative
- Thrust lever position
- Fuel factor
- Buffet margin.

CRUISE DATA Panel



ALTITUDE PROFILE

Applicable to: ALL

The ALT RULE subpanel provides the following information:

- Cruise altitude
- Altitude rule.

ALT RULE Subpanel



CRUISE ALTITUDE - GENERAL

THRUST AND FUEL FLOW

In level flight, the thrust is inversely proportional to the lift-to-drag ratio.
At fixed Mach, the lift-to-drag ratio increases with altitude up to the optimum altitude. Above this optimum altitude, it decreases.

Altitude below the optimum altitude

A higher pressure altitude results in:
- A lower net thrust
  The net thrust is the thrust necessary to maintain the level flight.
- A lower Fuel Flow (FF).

Altitude above the optimum altitude

A higher pressure altitude results in:
- A higher net thrust
- A higher FF.

THR

Altitude below the optimum altitude

Below the optimum altitude, the maximum available thrust decreases with pressure altitude at a higher rate than the decrease in required net thrust.
So, THR increases.

Altitude above the optimum altitude

Above the optimum altitude, the maximum available thrust decreases with pressure altitude, and the required net thrust increases.
So, THR increases.

TRUE AIR SPEED

At fixed Mach, the True Air Speed (TAS) is proportional to SAT, which:
- Decreases with altitude below the tropopause
- Remains constant above the tropopause.

Altitude below the tropopause

A higher pressure altitude results in:
- A lower TAS.

Altitude above the tropopause

A higher pressure altitude results in:
- No change in TAS.

SPECIFIC RANGE

The main influence on the Specific Range (SR) is the Lift to Drag ratio. At the optimum altitude defined as the pressure altitude for which SR is maximum, the Lift to Drag ratio is maximum as well.

Altitude below the optimum altitude

A higher pressure altitude results in:
- A higher SR.

Altitude above the optimum altitude

A higher pressure altitude results in:
- A lower SR.

ECON AND LRC MACH

ECON and LRC Mach increase with pressure altitude.

CRUISE ALTITUDE - CRZ

The flight crew enters the current pressure altitude.

ALTITUDE RULES

GENERAL

The altitude rule defines which flight levels may be used in a given region, depending on the aircraft heading.

IN-FLT PERF

IN-FLT PERF provides the following altitude rules:

- ICAO EVEN
- ICAO ODD
- RVSM EVEN
- RVSM ODD
- CHINA 180°-359° (metric)
- CHINA 360°-179° (metric)
- RUSSIA 180°-359° (metric)
- RUSSIA 360°-179° (metric).

The field defaults to the first applicable altitude rule identified from the above list, depending on the selected pressure altitude.

SPEED TYPE

Applicable to: ALL

The flight crew uses the SPD TYPE drop-down list to define the cruise type.

The following cruise types are available:

- ECON (CI)

L2 For more information about the ECON (CI) cruise type, *Refer to PER-IFT-CRZ-ECI General* .

L1 - Fixed Speed

L2 For more information about the Fixed Speed cruise type, *Refer to PER-IFT-CRZ-FSP General* .

L1 - LRC Speed

L2 For more information about the LRC Speed cruise type, *Refer to PER-IFT-CRZ-LRC General* .

L1 - Green Dot Speed

L2 For more information about the Green Dot Speed cruise type, *Refer to PER-IFT-CRZ-GDS General* .

L1 - Turbulence Speed

L2 For more information about the Turbulence Speed cruise type, *Refer to PER-IFT-CRZ-TBS General* .

L1 - Maximum Speed

L2 For more information about the Maximum Speed cruise type, *Refer to PER-IFT-CRZ-MSP General* .

ENGINES OPERATIVE

Applicable to: ALL

GENERAL

The number of engines operative determines the thrust available to perform the cruise and therefore largely impacts the cruise performance and the type of cruise (e.g. cruise at LRC speed after an engine failure).

CRZ

The flight crew selects the number of engines operative:

- 4 (ALL), or
- 3, or
- 2.

THRUST

Applicable to: ALL

GENERAL

The thrust available to perform the cruise depends on the selected cruise rating.
The standard cruise thrust limit is the “Maximum Cruise Thrust” which is delivered when the thrust lever is in the CL detent.
However, in the case of an engine failure, the thrust rating “Maximum Continuous Thrust” is mandatory.

L2 For more information, refer to Thrust Ratings.

L1 CRZ

The thrust rating is automatically selected, depending on the number of engines operative:
- CL (A/THR), if AEO
- MCT (A/THR), if OEI or TEI.

FUEL FACTOR

Applicable to: ALL

GENERAL

The performance factor for FMS predictions (FMS PERF FACTOR) is the sum of the Basic FMS PERF FACTOR and the Monitored Fuel Factor.

BASIC FMS PERF FACTOR

The Basic FMS PERF FACTOR correction is applied when the aircraft FMS database does not exactly fit to the aircraft model. It is published for each FMS Performance Data Base (PDB).
It results in FMS predictions consistent with the level reflected by the uncorrected IN-FLT PERF application, also called the book level.

MONITORED FUEL FACTOR

The actual airframe drag and engine performance deviate from the nominal model due to the aircraft's aging process.
The Monitored Fuel Factor is used to correct the performance book level to the actual performance level in order to permit realistic fuel predictions.
The Monitored Fuel Factor is defined as a percentage increase or decrease of the nominal Specific Range (SR) value.

IN-FLT PERF

The IN-FLT PERF fuel factor corresponds to the sum of:
- The Monitored Fuel Factor, and
- A positive performance prediction adjustment (if enabled, and at flight crew discretion).

L2 This allows the flight crew to adjust performance predictions to a drag increase due to non-quantified aerodynamic sources.

L1 When no such performance adjustment is required, the IN-FLT PERF fuel factor may thus differ from the FMS one by the Basic FMS PERF FACTOR.

BUFFET MARGIN

Applicable to: ALL

GENERAL

Aircraft maneuverability is limited by the load factor at which buffet onset begins.
To ensure a sufficient aircraft maneuverability, a buffet margin in level flight is maintained. It is expressed as a factor of g.

L2 The load factor is defined as the ratio between lift and weight.

L1 This load factor limit is called buffet margin.

CRZ

The buffet margin is generally fixed to 1.3 for all engine operations.
For the Turbulence cruise type, the buffet margin is generally increased to 1.4.
The buffet margin is used to determine the buffet ceiling.

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GENERAL

Applicable to: ALL

The ECON (CI) cruise type enables the flight crew to emulate several MFD CRZ page performance predictions:

- Recommended Maximum (REC MAX) altitude
- Optimum Altitude (OPT ALT)
- ECON Mach.

Moreover, the ECON (CI) cruise type provides current and predicted performance information.

L2 This is flown in managed speed/Mach target.

L3 The ECON (CI) cruise type combines the use of the FMS managed speed/Mach targets with the physical model of the aircraft, whereas the FMS predictions use a simplified model of the aircraft.

COST INDEX

Applicable to: ALL

The Cost Index (CI) is defined as the ratio between Cost of Time per time unit (CT) and Cost of Fuel per mass unit (CF).
The CI value is expressed in hundreds of pounds per hour (100 lb/h).
The purpose of the CI concept is to reduce Direct Operating Costs (DOC).

L2 DOCs are made up of:

- Fixed costs
- Time-related costs, which can be expressed as CT × (trip time)
- Cost of fuel, which can be expressed as CF × (trip fuel).

ECON MACH

Applicable to: ALL

For a given CI, ECON Mach is defined as the Mach for which DOCs are minimum.

The ECON Mach is a function of:

- CI

L2 The ECON Mach increases when CI increases.

L1 - Cruise altitude

- Weight

L2 The ECON Mach increases when weight increases.

L1 - Temperature

L2 The ECON Mach decreases when temperature increases.

L1 - Wind.

L2 The ECON Mach increases when headwind increases.

The extreme ECON Mach values are:

- CI = 0, minimum fuel mode, if fuel is expensive
  ECON Mach = Mach of Maximum Range
- CI = 999, minimum time mode, if time is much more important than the cost of fuel
  ECON Mach = (MMO – 0.015) or (VMO – 10 kt).
  The use of CI = 999 induces a disproportionate increase in fuel consumption to permit flight at maximum managed speed.

COST INDEX LONG RANGE

Applicable to: ALL

The Cost Index Long Range (CI_{LRC}) is defined as the CI value which approximates the Long Range Cruise (LRC) speed with all engines operative.

L2 CI_{LRC} is determined in such a way that, for a cruise altitude equal to the FMS OPT ALT ± 10 000 ft, the SR at CI_{LRC} allows ± 1% variation around the SR at LRC speed with all engines operative.

L1 CI_{LRC} = 210.

GENERAL

Applicable to: ALL

The flight crew may use the Fixed Speed cruise type to obtain current and predicted cruise performance data for a cruise in selected speed/Mach target and at fixed Mach or a fixed Calibrated Air Speed (CAS).

SPEED

Applicable to: ALL

The speed is either a Mach or a CAS.
The standard cruise Mach is M 0.85.

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GENERAL

Applicable to: ALL

The flight crew may use the LRC Speed cruise type to obtain current and predicted cruise performance data for a cruise at Long Range Cruise (LRC) speed.

This is flown in selected speed/Mach target by manually setting the LRC speed on the AFS CP, computed by:

- The FMC based on aircraft weight, and indicated on the MFD PERF CRZ page (LRC function), or
- The IN-FLT PERF LRC Speed cruise type.

LONG RANGE CRUISE SPEED

Applicable to: ALL

The Long Range Cruise (LRC) speed is defined as the Mach for which the Specific Range (SR) is equal to 99 % of the maximum SR.

L2 The purpose of LRC speed is to achieve a significant increase in cruise speed versus the Mach of maximum range for a relatively moderate cost in terms of fuel.

L1 The LRC Mach depends on:

- Cruise altitude

L2 The LRC Mach increases when pressure altitude increases.

L1 - Weight

L2 The LRC Mach increases when weight increases.

L1 - Temperature

L2 The LRC Mach decreases when temperature increases.

L1 - Wind

L2 The LRC Mach increases when headwind increases.

L1 - Airflow and anti-ice.

L2 The LRC Mach slightly decreases when bleeds increases.

L1 The standard cruise Mach (M 0.85) corresponds to the LRC Mach at optimum altitude, ISA conditions, without wind, airflow NORM and anti-ice OFF, for a wide range of weights.

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GENERAL

Applicable to: ALL

The flight crew may use the Green Dot Speed cruise type to obtain current and predicted cruise performance data for a cruise at green dot speed.

This is flown in selected speed/Mach target by manually setting the green dot speed on the AFS CP computed by:

- The FMC based on aircraft weight, and indicated on the PFD, or
- The IN-FLT PERF Green Dot Speed cruise type.

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GENERAL

Applicable to: ALL

The flight crew may use the Turbulence Speed cruise type to obtain current and predicted cruise performance data for a cruise operated through turbulence areas.

L2 Turbulence speeds are recommended when the aircraft flies in a turbulent atmosphere. They increase the margin to buffet onset, which is more likely to occur due to Angle Of Attack (AOA) variations induced by disturbances in these meteorological conditions.

L1 This is flown in selected speed/Mach target by manually setting the VRA or MRA on the AFS CP, computed by the FMC and indicated on the MFD PERF CRZ page (MAX TURB function).
This may also be flown in selected speed/Mach target by manually setting the VRA or MRA on the AFS CP, given by the IN-FLT PERF Turbulence Speed cruise type.

TURBULENCE SPEED

Applicable to: ALL

The recommended turbulence penetration airspeed (VRA/MRA) is between green dot and 300 kt/M 0.85.
The MAX TURB function indicated on the MFD PERF CRZ page displays the maximal speed/Mach not to exceed according to this recommendation.
The IN-FLT PERF Turbulence Speed cruise type philosophy is different. It enables to make a computation from the Operator's turbulence speed.
The optimum turbulence speed in terms of margin towards buffet onset is M 0.85.

Note: When the flight crew enters a cruise altitude below the Crossover Altitude, the IN-FLT PERF Turbulence Speed computation fails.

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GENERAL

Applicable to: ALL

The flight crew may use the Maximum Speed cruise type to obtain current cruise performance data for a cruise at maximum True Air Speed (TAS), in order to manage a medical emergency or a delay.

The maximum speed is either:
- The Maximum Operating Mach (MMO), or
- The Maximum Operating Speed (VMO), or
- The speed limited by the available thrust.

This is flown in selected speed/Mach target by manually setting the maximum speed on the AFS CP, computed by the IN-FLT PERF Maximum Speed cruise type.

The philosophy of the Maximum Speed cruise type is:
- To present performance data calculated at current altitude and maximum speed
- To compare these data versus optimum altitude ones.

L2 The optimum altitude at maximum speed is defined as the altitude for which TAS is maximum.

L1 It is recommended to prefer flying at CI=999, in order to increase the fuel efficiency with a limited speed penalty and avoid speed excursions.

Intentionally left blank

Fuel

FUEL FLOW

Applicable to: ALL

GENERAL

The Fuel Flow (FF) is defined as the fuel consumption per time unit.

CRZ

The FUEL subpanel displays:
- ALL ENG FF: The total FF in current conditions
- FF / ENG: The FF per engine in current conditions.

The flight crew may crosscheck the IN-FLT PERF FFs with:
- The ECAM SD ENGINE page for FF / ENG
- The ECAM SD FUEL page for ALL ENG FF
- The ECAM SD CRUISE page for FF / ENG.

SPECIFIC RANGE

Applicable to: ALL

GENERAL

The Specific Range (SR) is the distance covered per fuel mass unit burnt.
SR is defined as the ratio between the Ground Speed (GS) and FF.

CRZ

The FUEL subpanel displays the SR in current conditions.

DISTANCE CONSUMPTION

Applicable to: ALL

GENERAL

The distance consumption is the fuel consumption per distance unit.
This is defined as the ratio between FF and the Ground Speed (GS).

CRZ

The FUEL subpanel displays the distance consumption in current conditions.

THR

Applicable to: ALL

GENERAL

The THR value indicates the thrust used. It is shown as a % of the available thrust.

Assuming that the thrust achieved in windmilling is close to zero, the available thrust is the ratio of the actual thrust calculated from engine parameters to:

- The thrust achieved with TO thrust rating and bleeds OFF for Takeoff and Taxi
- The thrust achieved with GA thrust rating and bleeds OFF for all other flight phases (Climb, Cruise, Descent, Holding).

CRZ

The FUEL subpanel shows the THR in current conditions.
The flight crew may crosscheck the IN-FLT PERF THR with the ECAM EWD ENGINE page one.

Altitude

REC MAX ALTITUDE

Applicable to: ALL

GENERAL

The FMS Recommended Maximum (REC MAX) altitude is a precomputed value, function of the aircraft gross weight and DISA , displayed on all the PERF pages as long as all engines are operative.

L2 REC MAX altitude respects the following criteria:

- It can be flown with a speed higher than green dot speed and lower than Maximum Operating Speed/Mach (VMO / MMO)
- It can be reached with a minimum rate of climb of 300 ft/min at “Maximum Climb Thrust” rating
- It can be flown in level flight without acceleration with a rating less than “Maximum Cruise Thrust”
- It can be reached before buffeting with a margin of 0.3 g
- It is less than the maximum certified altitude.

L1 **CRZ**

REC MAX ALT



REC MAX altitude is only computed for the ECON (CI) cruise type.
For all engines operative, it corresponds to the REC MAX altitude displayed on the MFD , provided that TROPO is defaulted to 36 090 ft on the FMS - INIT page.
For more information about the FMS tropopause, *Refer to DSC-22-FMS-20-30-22FMS5020M INIT page* .

EO MAX ALTITUDE

Applicable to: ALL

GENERAL

The FMS long range cruise Engine Out Maximum (EO MAX) altitude is a precomputed value, function of the aircraft gross weight and DISA, displayed on all the PERF pages if at least one engine is inoperative.

L2 EO MAX altitude respects the following criteria:

- It can be flown with long range cruise speed
- It can be held in level flight with:
  - The operating engine(s) at “Maximum Continuous Thrust” rating
  - The external failed engine in windmilling
  - Anti-ice OFF
- It can be reached before buffeting with a margin of 0.3 g
- It is less than the maximum certified altitude.

L1 **CRZ**

EO MAX altitude is only computed for the ECON (CI) cruise type.
For OEI or TEI, it corresponds to the EO MAX altitude displayed on the MFD.

MAX ALT

Applicable to: ALL

MAXIMUM ALT



The Maximum Altitude (MAX ALT) definition depends on the cruise type.

FIXED SPEED, TURBULENCE SPEED

MAX ALT is defined as the minimum of:
- The Maximum Cruise Altitude (MAX CRZ ALT)
- The buffet ceiling.

When the flight crew selects a Non Standard Configuration (NSC) item with an associated maximum altitude, MAX ALT computed and displayed by IN-FLT PERF is limited by the maximum altitude of the NSC item.

LRC SPEED, GREEN DOT SPEED

MAX ALT is equal to MAX CRZ ALT.
When the flight crew selects a Non Standard Configuration (NSC) item with an associated maximum altitude, MAX ALT computed and displayed by IN-FLT PERF is limited by the maximum altitude of the NSC item.

MAX CRZ ALT

Applicable to: ALL

GENERAL

The Maximum Cruise Altitude (MAX CRZ ALT) is defined as the maximum altitude which can be flown in level flight without acceleration at the applicable thrust rating.
It must be less than the Maximum Certified Altitude.

CRZ

MAX CRZ ALT is calculated for the following cruise types:

- Fixed Speed
- LRC Speed
- Green Dot Speed
- Turbulence Speed.

BUFFET CEILING

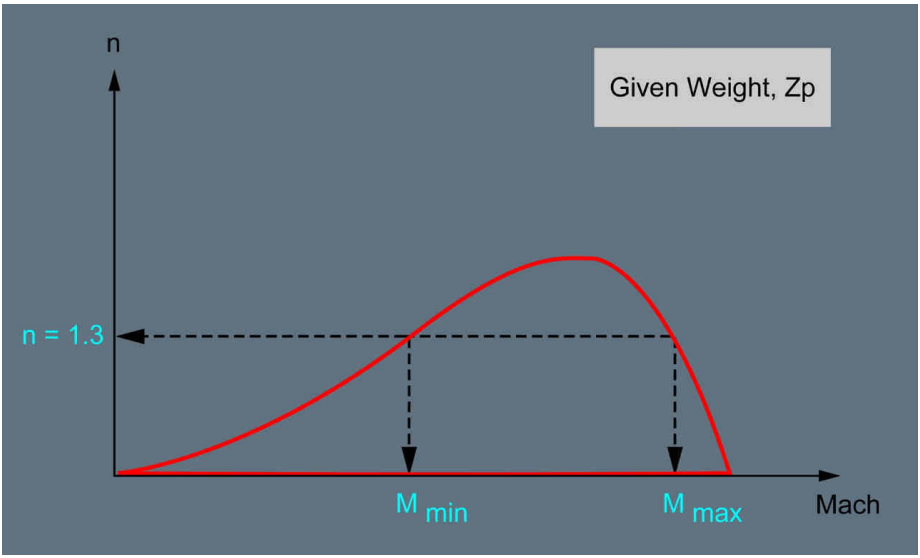
Applicable to: ALL

GENERAL

The buffet ceiling depends on the buffet margin value (generally fixed to 1.3).

L2 The variation of the load factor versus Mach is as follows:

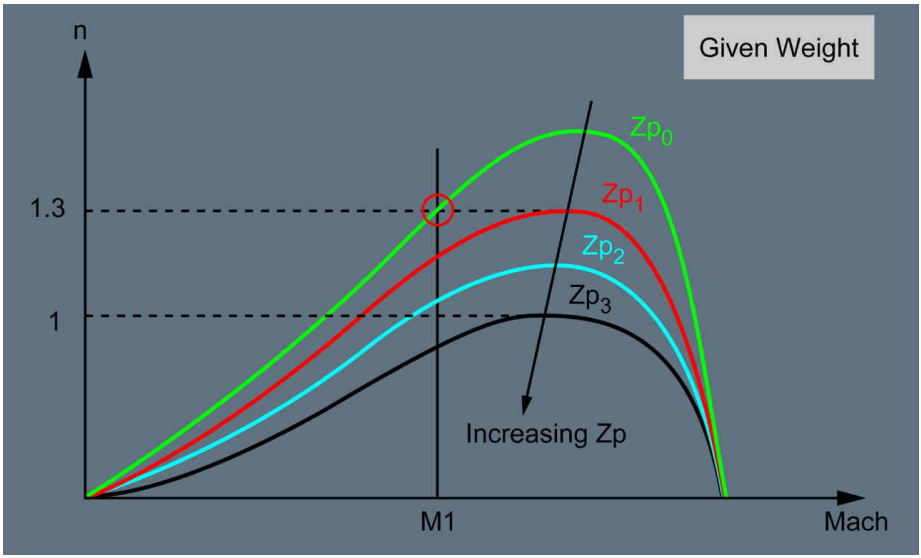
Load Factor versus Mach



For given weight and pressure altitude, if the Mach is included in the lift area (between M_{min} and M_{max}), the aircraft can bear a load factor up to 1.3 without buffeting (i.e. a 40 ° turn).

The variation of the lift area versus pressure altitude is as follows:

Lift Area versus Pressure Altitude



So, for a Mach M1 and a load factor of 1.3 g, the pressure altitude Zp_0 is the buffet ceiling. Indeed, M1 is one of both limits of the lift area at Zp_0.

L1 At given weight, the buffet ceiling is defined as the pressure altitude for which, at the desired load factor, the considered Mach is one of both limits of the lift area.

CRZ

The buffet ceiling is determined for Fixed Speed and Turbulence Speed cruise types.
For the ECON (CI) cruise type, the 1.3 g buffet ceiling is one of the criteria that REC MAX altitude must respect.

OPTIMUM ALTITUDE

Applicable to: ALL

OPTIMUM ALT



The optimum altitude definition depends on the cruise type.

ECON (CI)

The optimum altitude (OPT) displayed on the FMS-PERF page and the optimum altitude (OPTIMUM ALT) determined by the OIS IN-FLT PERF Cruise computation for a given Cost Index (CI) are the result of a minimum cost analysis. To determine these optimum altitudes, both the FMS and IN-FLT PERF calculate the value of the Cost Function (CF) based on the CI at 500 ft increment altitudes (these altitudes are called trial altitudes). The altitude that provides the lowest value for the CF is displayed as OPT on the FMS-PERF page and as OPTIMUM ALT on the OIS IN-FLT PERF.

These optimum altitude computations take into account a large number of parameters. The FMS and the OIS consider some of these parameters in a different manner. Therefore, OPT on the FMS and OPTIMUM ALT on the OIS may differ.

L2 The main contributor to any difference between OPT on the FMS and OPTIMUM ALT on the OIS is the wind.

L3 On the FMS, the flight crew can enter (or upload via ACARS) a vertical wind profile for each waypoint along the route. This vertical wind profile includes up to 5 altitudes. On the OIS IN-FLT PERF, the flight crew only enters the local wind at the current altitude for the computation.

L2 The relevance of the FMS altitude optimization mainly depends on the accuracy of the entered wind profile. The simplified wind model used in the OIS IN-FLT PERF computation may result in a less accurate altitude optimization than the FMS one.

To a lesser extent, the other contributors to any difference between OPT on the FMS and OPTIMUM ALT on the OIS are:

- The weight

L3 The FMS includes a prediction of gross weight reduction due to the fuel consumed during the climb to the trial altitude, while the OIS IN-FLT PERF makes a comparison at the entered weight

L2 - The performance model

L3 The FMS uses a simplified performance model (FMS performance database), due to the real time computation constraints, while the OIS IN-FLT PERF uses the best available first principle model of the aircraft (IFP model). The linearization and the smoothing of the data in the FMS model may lead to differences with the first principle model

L2 - The FMS top of descent

L3 The FMS avoids climbs shortly before the top of descent

L2 - The FMS smooth display update.

L3 The FMS updates the optimum altitude value if the CF of the new optimum altitude is better by at least 0.02 KG/NM than the CF of the previous optimum altitude.

L2 For the temperature assumption on the optimum altitude computation, the FMS extrapolates the current ΔISA to the trial altitude in the same way as the OIS. Therefore, if the flight crew enters the current ΔISA into the OIS IN-FLT PERF, the temperature assumptions for both the FMS and OIS are the same.

L1 **FIXED SPEED, LRC SPEED, GREEN DOT SPEED, TURBULENCE SPEED**

The optimum altitude is the altitude for which the Specific Range (SR) is maximum.
When the flight crew selects a Non Standard Configuration (NSC) item with an associated maximum altitude, the optimum altitude computed and displayed by IN-FLT PERF is limited by the maximum altitude of the NSC item.

MAXIMUM SPEED

The optimum altitude is the altitude for which the TAS is maximum.
When the flight crew selects a Non Standard Configuration (NSC) item with an associated maximum altitude, the optimum altitude computed and displayed by IN-FLT PERF is limited by the maximum altitude of the NSC item.

STEP CLIMB

Applicable to: ALL

GENERAL

An ideal cruise would follow the optimum altitude in a continuous climb. But ATC requires level flight cruise.
To maintain an optimum profile, step climbs between two flight levels are required as soon as the upper flight level is better than the current one.

CRZ

The weight displayed on the ALT subpanel is the one at which the next step climb should be initiated.
Even if the current pressure altitude does not respect the selected altitude rule, the step climb is calculated for the next higher flight level in accordance with the selected altitude rule.

L2 The criterion used to determine the weight (at which the next step climb should be initiated) depends on the cruise type:

- Cost function for ECON (CI)
- SR for Fixed Speed, LRC Speed, Green Dot Speed, Turbulence Speed.

SPECIFIC RANGE EQUIVALENCE

Applicable to: ALL

GENERAL

The wind speed may vary with altitude.
the cost function and the SR depend on the ground speed and thus on wind. The wind speed profile may thus shift the optimum altitude from the level of the optimum altitude in a theoretical calm atmosphere to a different level in an atmosphere with a wind variation.

CRZ

ECON (CI)

The SPECIFIC RANGE EQUIVALENCE table displays the minimum required wind difference at four flight levels (one above and three below the current cruise altitude) so as to the cost function at these flight levels is at least equal to the cost function at the current cruise altitude.
Any strong tail wind component would make one of these altitudes more advantageous than the current one.

FIXED SPEED, LRC SPEED, GREEN DOT SPEED, TURBULENCE SPEED

The SPECIFIC RANGE EQUIVALENCE table displays the minimum required wind difference at four flight levels (one above and three below the current cruise altitude) so as to the SR at these flight levels is at least equal to the SR at the current cruise altitude.
Any strong tail wind component would make one of these altitudes more advantageous than the current one.

Speed

MACH

Applicable to: ALL

GENERAL

The Mach number is defined as the ratio between TAS and the speed of sound.

CRZ

The SPEED subpanel displays the Mach number for current conditions.

ECON (CI)

The Mach displayed corresponds to the ECON Mach for current conditions.

LRC SPEED

The Mach displayed corresponds to the LRC Mach (or the Mach limited by the available thrust) for current conditions.

CALIBRATED AIR SPEED

Applicable to: ALL

GENERAL

The Calibrated Air Speed (CAS) is the speed resulting from the difference between the measured pressures (total and static).
A correction is made on the CAS to obtain the Indicated Air Speed (IAS). This correction takes into account the measurement errors on pressures, which affect CAS.

CRZ

The SPEED subpanel displays the CAS for current conditions.

Note: In normal CRZ conditions, there is a very little difference between CAS and IAS.

TRUE AIR SPEED

Applicable to: ALL

GENERAL

An aircraft in flight moves in an air mass, which is itself in motion compared to the earth. The True Air Speed (TAS) represents the aircraft speed in the airflow.

L2 TAS may be obtained from CAS, using the air density and a compressibility correction.

L1 **CRZ**

The SPEED subpanel displays the TAS for current conditions.
The flight crew may crosscheck the IN-FLT PERF TAS and GS with the ND ones.

N1

Applicable to: ALL

GENERAL

N1 is the rotation speed of the low pressure rotor. It is expressed as a percentage of the maximum rotation speed of the low pressure rotor. The FADEC uses the N1 parameter for engine control and monitoring. The N1 appears on the EWD .

L2 For more information about the N1, *Refer to DSC-70-15-10 Engine Description - LP* .

L1 **CRZ**

IN-FLT PERF displays the N1 to fly the aircraft in the current conditions of the cruise.

Detailed Results

TABLE RESULTS SUBPANEL

Applicable to: ALL

The TABLE RESULTS subpanel provides the detailed information for the cruise. The parameters displayed depend on the Operator customization.
The parameters are calculated for several cruise points by decreasing the current weight of the aircraft.

WGHT

This column displays the weights for which all the parameters are calculated.

FF

This column displays the instantaneous All Engine Fuel Flow (ALL ENG FF) for each intermediate weight.

L2 For more information about the ALL ENG FF, *Refer to PER-IFT-CRZ-CRR-CRF Fuel Flow* .

L1 CAS

This column displays the instantaneous Calibrated Air Speed (CAS) for each intermediate weight.

L2 For more information about the CAS , *Refer to PER-IFT-CRZ-CRR-CRS Calibrated Air Speed* .

L1 MACH

This column displays the instantaneous Mach number for each intermediate weight.

L2 For more information about the Mach number, *Refer to PER-IFT-CRZ-CRR-CRS Mach* .

L1 TAS

This column displays the instantaneous True Air Speed (TAS) for each intermediate weight.

L2 For more information about the TAS , *Refer to PER-IFT-CRZ-CRR-CRS True Air Speed* .

L1 THR

This column displays the instantaneous THR for each intermediate weight.

L2 For more information about the THR , *Refer to PER-IFT-CRZ-CRR-CRF THR* .

L1 SR

This column displays the instantaneous Specific Range (SR) for each intermediate weight.

L2 For more information about the SR , *Refer to PER-IFT-CRZ-CRR-CRF Specific Range* .

L1 AOA

This column displays the instantaneous Angle Of Attack (AOA) for each intermediate weight.

L2 AOA represents the angle between the aerodynamic chord and the aerodynamic axis defined by the speed direction.

L1 **N1**

This column displays the instantaneous N1 for each intermediate weight.

L2 For more information about the N1 , *Refer to PER-IFT-CRZ-CRR-CRS N1* .

GRAPH RESULTS SUBPANEL

Applicable to: ALL

The flight crew can plot cruise parameters versus weight using the GRAPH RESULTS subpanel. The possible parameters depend on the Operator customization of the TABLE RESULTS.

ADDITIONAL INFORMATION

When ALT is selected as the ordinate parameter, the following information is displayed on the graph:

- The cruise profile
- The optimum altitude
- The limit altitudes:
  - The maximum certified altitude
  - The maximum cruise altitude, except for ECON (CI)
  - The buffet ceiling, for Fixed Speed and Turbulence Speed
  - The REC MAX altitude for ECON (CI).
- The airspace levels of the selected altitude rule.

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IN-FLT PERF APPLICATION - DES MODULE

Applicable to: ALL

GENERAL

The descent phase starts at the Top of Descent (T/D) and ends at landing or level off.

DES

The IN-FLT PERF application is made of 6 modules (CLB, CRZ, DES, HLD, PLAN and ATMO).

The DES module provides the flight crew with a means to obtain descent performance data for:
- Given meteorological conditions
- A given aircraft configuration including non standard ones (engines out, landing gear down)
- Various speed schedules.

The main results of this module are:
- Fuel, time, and distance to landing or level off
- Level off.

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DES MODULE INTERFACE

Applicable to: ALL

IN-FLT PERF DES Module Interface



CONDITIONS

The flight crew can define the current outside conditions and the aircraft configuration.
For more information about the CONDITIONS panel, *Refer to PER-IFT-DES-CDT CONDITIONS Panel* .

DESCENT DATA

The flight crew can define the data of the descent phase.
For more information about the DESCENT DATA panel, *Refer to PER-IFT-DES-DSD DESCENT DATA Panel* .

AIRCRAFT STATUS

The flight crew can select CDL items and non standard configuration items.
For more information about the AIRCRAFT STATUS panel, *Refer to PER-IFT-ACS AIRCRAFT STATUS Panel* .

RESULTS

The RESULTS panel displays the essential information for the descent phase.

For more information about the RESULTS panel, Refer to Descent Results.

CONDITIONS PANEL

Applicable to: ALL

The CONDITIONS panel provides the following information:

- Wind
- Heading
- Temperature (Δ ISA)
- Anti-ice
- Gross weight
- CG
- Airflow.

CONDITIONS Panel



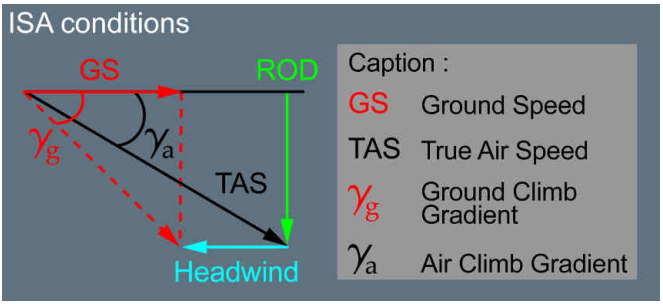
WIND

Applicable to: ALL

GENERAL

A constant wind component has no influence on the Rate of Descent (ROD), but impacts the descent angle.

Headwind Effect on Descent Flight Path



L2 A headwind component increases the flight path angle and decreases the ground distance from the Top of Descent (T/D).
The air climb gradient remains unchanged, whatever the wind component. So, the fuel and the time necessary to descent from the T/D to the final level stay the same.

L3 This is not applicable to a descent at Cost Index (CI), as the ECON descent Mach slightly depends on the wind.

L1 A longitudinal headwind component decreases the ground distance to reach the target pressure altitude.
Crosswind does not affect descent performance and is provided for information only.

DES

There are two ways to define wind values:
- Longitudinal Speed Component
- Direction/Speed Combination.

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED COMBINATION

The flight crew enters the wind direction and the wind speed.
The entry is projected along the heading and perpendicular to the heading.
The longitudinal projection follows the same display rules as the speed entry.

IN-FLT PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



HEADING

Applicable to: ALL

GENERAL

The heading defines the axis on which the wind is projected.

DES

The IN-FLT PERF heading and wind direction have to be both entered in either magnetic or true north.

The HDG field is only displayed if a wind has been entered in a combination of a direction and a speed.

L2 For more information about the wind, *Refer to Descent - Wind* .

TEMPERATURE

Applicable to: ALL

GENERAL

When temperature (SAT or ΔISA) increases, air density decreases, therefore:

- Descent gradient remains constant

L2 Assuming the "Idle" thrust rating, descent gradient mostly depends on the lift to drag ratio, which is independent from the temperature.

L1 - True Air Speed (TAS) increases

L2 At fixed Calibrated Air Speed (CAS), TAS is inversely proportional to air density, which decreases with temperature.
At fixed Mach, TAS increases with temperature.

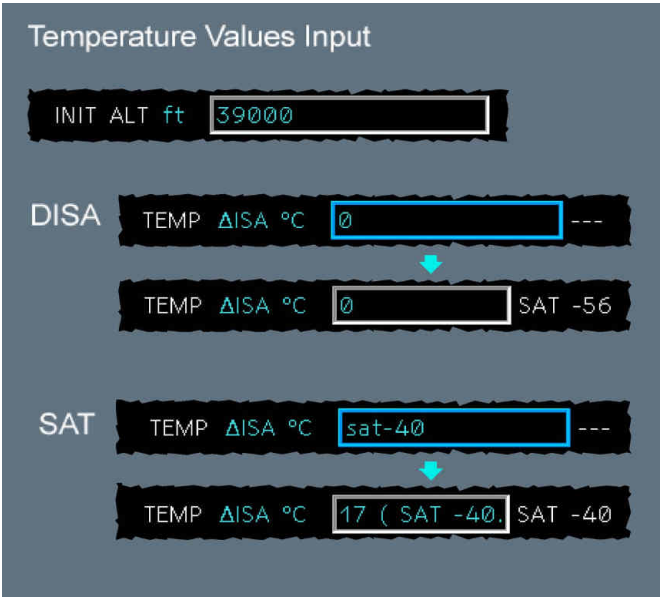
L1 - Rate of Descent (ROD) decreases

L3 ROD is a function of descent gradient (GRDT), TAS and ΔISA.
ROD can be expressed as ROD = TAS × sin (GRDT) × f(ΔISA).
The function f(ΔISA) is equal to 1 in ISA conditions, and decreases with ΔISA.
The increment in TAS is offset by the decrement due to f(ΔISA).

L1 - Fuel, time and distance to reach the target pressure altitude increase.

DES

Temperature Values Input



The TEMP field corresponds to a deviation from ISA law (ΔISA).

The flight crew member can enter a temperature as:
- A ΔISA, or
- A Static Air Temperature (SAT) at initial pressure altitude, which is automatically converted into a ΔISA.

ANTI-ICE

Applicable to: ALL

GENERAL

Anti-ice increases engine bleed. The FADEC offsets the increase in engine bleed by increasing the actual thrust calculated from internal engine parameters. The increment in net thrust is appreciable as the engine is more efficient compared without anti-ice.

Thus, in the case of ENG and/or WING anti-ice:

- Descent gradient decreases

L2 Descent gradient depends on excess thrust, which is negative in descent. With anti-ice, excess thrust increases but is still negative. Therefore it decreases in absolute value.

L3 In descent, excess thrust is the difference between net thrust and drag, which is negative as thrust rating is close to zero.

L1
- Rate of Descent (ROD) decreases
- Fuel, time and distance to reach the target pressure altitude increase.

IN-FLT PERF

IN-FLT PERF has four anti-ice options:

- Off
- Engine
- Total
- Severe Icing.

  The flight crew may use the Severe Icing option to assess the impact of ice accretion on fuel consumption and ceilings.

GROSS WEIGHT

Applicable to: ALL

GENERAL

An increase in weight leads to:

- A decrease in the descent gradient and Rate Of Descent (ROD)

L3 If TAS were constant with altitude at given CAS or Mach, descent gradient (GRDT) and ROD would be inversely proportional to the weight.

$$\sin\left(\text{GRDT}\right) = \frac{\left(\text{Thrust - Drag}\right)}{\text{Weight}} - \frac{1}{g} \times \frac{d}{dt}\left(\text{TAS}\right)$$

L1 - An increase in fuel, time and distance to reach the target pressure altitude.

DES

The flight crew enters the current aircraft weight at start of descent calculation.
This gross weight (GROSS WGHT field) must be between the Operating Empty Weight (OEW) and the Maximum Design Takeoff Weight (MTOW).

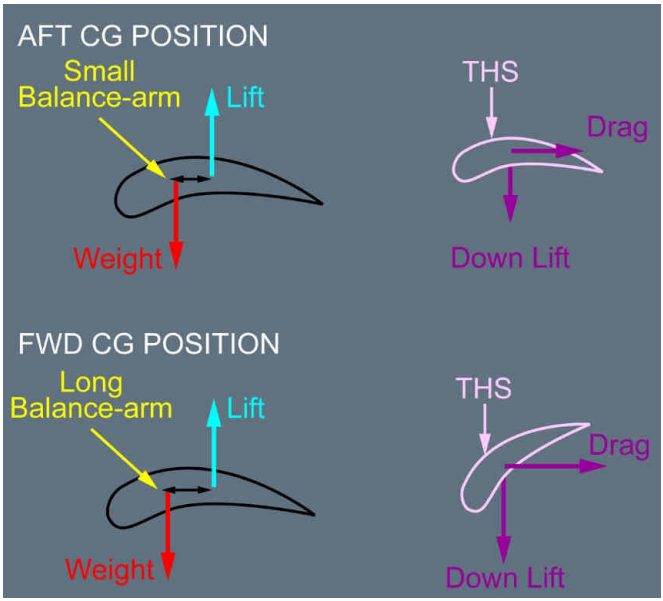
CG

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position impacts the forces applied on the aircraft. As a result, it impacts aircraft performance.

CG Position



L2 In order to keep the aircraft level, the Trimmable Horizontal Stabilizer (THS) creates a downward force that counters the pitch down moment due to the distance between the center of lift and the center of gravity. The larger this lever arm, the higher the down lift that must be generated by the THS, and the higher the drag.

L1 IN-FLT PERF

The CG field is expressed in % of the Mean Aerodynamic Chord (MAC).

AIRFLOW

Applicable to: ALL

GENERAL

High airflow increases engine bleed. The FADEC offsets the increase in engine bleed by increasing the actual thrust calculated from internal engine parameters. But, the increment in net thrust is not really appreciable as the engine is not more really efficient than without airflow.

Thus, in the case of an increase in airflow:

- Descent gradient slightly decreases

L2 Descent gradient depends on excess thrust, which is negative in descent. With airflow, excess thrust slightly increases but is still negative. Therefore it slightly decreases in absolute value.

L3 In descent, excess thrust is the difference between net thrust and drag, which is negative as thrust rating is close to zero.

L1
- Rate of Descent (ROD) slightly decreases
- Fuel increases
- But time and distance to reach the target pressure altitude are not very impacted

L3 The slight decrement in descent gradient and ROD tends to increase time and distance. On the contrary, the overconsumption tends to decrease time and distance by decreasing the aircraft's weight.

L1 IN-FLT PERF

IN-FLT PERF has five airflow options:

- OFF
- LO
- MAN
- NORM
- HI.

IMPACT OF FWD CARGO COOLING

When FWD cargo cooling is active, the airflow automatically increases, and so the engine bleed. The IN-FLT PERF airflow settings reflect the engine bleed with FWD cargo cooling OFF.
The flight crew applies the following equivalences to obtain an engine bleed that considers the effect of FWD cargo cooling:

ENG OPERATIVE	AIR FLOW Selector	FWD Cargo Cooling	Select IN-FLT PERF setting
4	LO	ON	MAN
	MAN		HI
	NORM		HI
	HI		HI
3	LO	ON	MAN
	MAN		MAN
	NORM		NORM
	HI		HI
2	LO	ON	LO
	MAN		MAN
	NORM		NORM
	HI		HI

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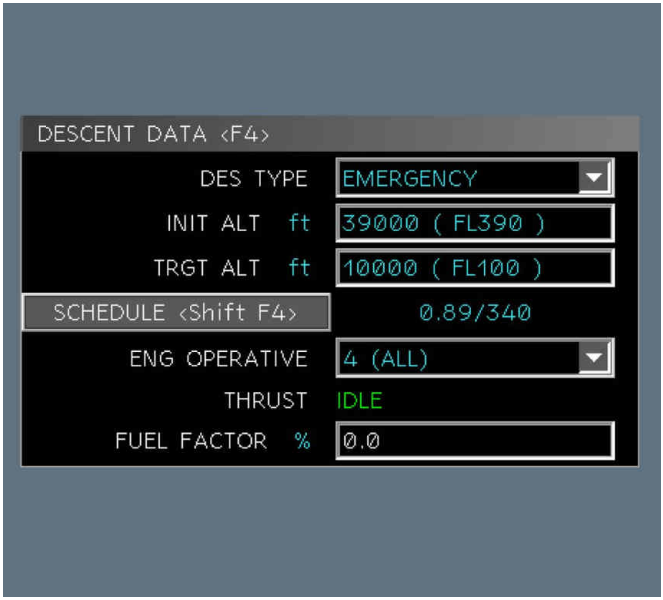
DESCENT DATA PANEL

Applicable to: ALL

The DESCENT DATA panel provides the following information:

- Descent type preset
- Initial altitude
- Target altitude (except for the OBSTACLE descent type preset)
- Descent schedule (speed type, speed brakes, specific information on the descent speed schedule)
- Engines operative
- Thrust lever position
- Fuel factor.

DESCENT DATA Panel



DESCENT TYPE PRESET

Applicable to: ALL

The flight crew uses the DES TYPE PRESET drop-down list to define the descent type.

The following descent types are available:

- ECON (CI)
- STANDARD
- GIVEN V/S
- EMERGENCY

In OEI , two additional descent types are available:

- OBSTACLE

L2 For more information about the OBSTACLE descent type, *Refer to PER-IFT-OEI-OBS-ABV Drift Down - Green Dot* .

L1 - EO-STD

L2 For more information about the EO-STD descent type, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

INITIAL ALTITUDE

Applicable to: ALL

The initial altitude is the pressure altitude at which the computation of a descent begins.

TARGET ALTITUDE

Applicable to: ALL

The target altitude is the pressure altitude at which the computation should stop.
The TRGT ALT field is not displayed for the OBSTACLE descent type.

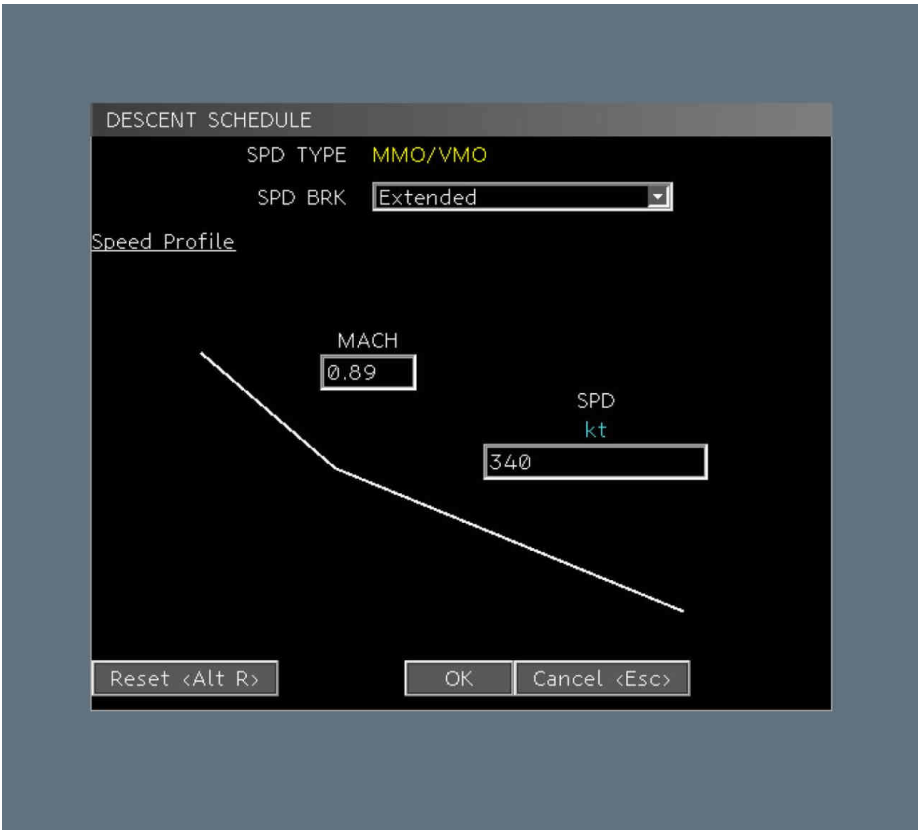
DESCENT SCHEDULE

Applicable to: ALL

The DESCENT SCHEDULE subpanel provides the following information:

- The speed type
- The speed brakes
- The speed profile.

DESCENT SCHEDULE Subpanel



SPEED TYPE

The flight crew uses the SPD TYPE drop-down list to define the speed profile type according to the selected descent type.

If the flight crew has selected ECON (CI) as descent type, the speed type is automatically Open (CI) .

L2 For more information about the ECON(CI) Open (CI) descent type, *Refer to PER-IFT-DES-ECI General* .

L1 If the flight crew has selected STANDARD as descent type, the following speed types are available:

- Fixed Speed

L2 For more information about the STANDARD Fixed Speed descent type, *Refer to PER-IFT-DES-STD-FSP General* .

L1 - Turbulence Speed

L2 For more information about the STANDARD Turbulence Speed descent type, *Refer to PER-IFT-DES-STD-TSP General* .

L1 If the flight crew has selected GIVEN V/S as descent type, the speed type is automatically Fixed Speed .

L2 For more information about the GIVEN V/S Fixed Speed descent type, *Refer to PER-IFT-DES-GVS General* .

L1 If the flight crew has selected EMERGENCY as descent type, the speed type is automatically MMO/VMO .

L2 For more information about the EMERGENCY MMO/VMO descent type, *Refer to PER-IFT-DES-EMG General* .

L1 If the flight crew has selected OBSTACLE as descent type, the following speed types are available:

- Green Dot

L2 For more information about the OBSTACLE Green Dot descent type, *Refer to PER-IFT-OEI-OBS-ABV Drift Down - Green Dot* .

L1 - Fixed Speed

L2 For more information about the OBSTACLE Fixed Speed descent type, *Refer to PER-IFT-OEI-OBS-ABV Drift Down - Fixed Speed* .

L1 If the flight crew has selected EO-STD as descent type, the speed type is automatically Mach/CAS - V/S .

L2 For more information about the EO-STD Mach/CAS - V/S descent type, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

SPEED BRAKES

GENERAL

The speed brakes may be used in order to increase the Rate of Descent (ROD).
They are especially used in the case of an emergency descent.

DES

The flight crew uses the SPD BRK drop-down list to select the position of the speed brakes, which are:
- Retracted, or
- Extended.

By default, the speed brakes are “Retracted” except for the IN-FLT PERF EMERGENCY descent type.

ENGINES OPERATIVE

Applicable to: ALL

GENERAL

The number of engines operative does not really impact the descent performance.
But, the number of engines operative directly impacts the type of descent (e.g. drift down after an engine failure in OBSTACLE strategy).

DES

The flight crew selects the number of engines operative:
- 4 (ALL), or
  Except for the OBSTACLE and EO-STD descent types.
- 3, or
- 2, or
  Except for the GIVEN V/S descent type.
- 1, or
  Except for the GIVEN V/S and ECON (CI) descent types.
- 0.
  Only for the OBSTACLE descent type.

Note: The All Engines Flame Out Descent computation fails.

THRUST

Applicable to: ALL

GENERAL

The standard descent thrust rating is “Idle”. This thrust rating is delivered when the thrust lever is in the IDLE detent. However, if the thrust lever is in the CL detent with A/THR engaged, the minimum thrust rating is also "Idle".
However, in the case of an engine failure, the throttle lever is set in the MCT detent. The “Maximum Continuous Thrust” rating is used.

L2 For more information, refer to Thrust Ratings.

L1 DES

The thrust rating depends on the descent type and the number of engines operative.

OBSTACLE

- MCT, whatever the number of engines operative (less than all engines).

ECON (CI)

- CL (A/THR), if AEO
- MCT, if OEI or TEI.

STANDARD

- CL (A/THR), if AEO
- IDLE, whatever the number of engines operative
- MCT, if at least one engine is inoperative.

GIVEN V/S

- CL (A/THR), if AEO
- MCT, if OEI.

EMERGENCY

- IDLE, whatever the number of engines operative.

EO-STD

- MCT, whatever the number of engines operative (less than all engines).

FUEL FACTOR

Applicable to: ALL

GENERAL

The performance factor for FMS predictions (FMS PERF FACTOR) is the sum of the Basic FMS PERF FACTOR and the Monitored Fuel Factor.

BASIC FMS PERF FACTOR

The Basic FMS PERF FACTOR correction is applied when the aircraft FMS database does not exactly fit to the aircraft model. It is published for each FMS Performance Data Base (PDB).
It results in FMS predictions consistent with the level reflected by the uncorrected IN-FLT PERF application, also called the book level.

MONITORED FUEL FACTOR

The actual airframe drag and engine performance deviate from the nominal model due to the aircraft's aging process.
The Monitored Fuel Factor is used to correct the performance book level to the actual performance level in order to permit realistic fuel predictions.
The Monitored Fuel Factor is defined as a percentage increase or decrease of the nominal Specific Range (SR) value.

IN-FLT PERF

The IN-FLT PERF fuel factor corresponds to the sum of:
- The Monitored Fuel Factor, and
- A positive performance prediction adjustment (if enabled, and at flight crew discretion).

L2 This allows the flight crew to adjust performance predictions to a drag increase due to non-quantified aerodynamic sources.

L1 When no such performance adjustment is required, the IN-FLT PERF fuel factor may thus differ from the FMS one by the Basic FMS PERF FACTOR.

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GENERAL

Applicable to: ALL

The ECON (CI) Open (CI) descent type enables the flight crew to emulate several MFD DES page performance predictions:

- ECON Mach and speed
- Distance to targeted altitude
- Time to targeted altitude.

Moreover, the ECON (CI) Open (CI) descent type provides some additional performance information.

L2 This is flown in managed speed/Mach target.

L3 The ECON (CI) Open (CI) descent type combines the use of the FMS managed speed/Mach targets with the physical model of the aircraft, whereas the FMS predictions use a simplified model of the aircraft.

COST INDEX

Applicable to: ALL

The Cost Index (CI) is defined as the ratio between Cost of Time per time unit (CT) and Cost of Fuel per mass unit (CF).
The CI value is expressed in hundreds of pounds per hour (100 lb/h).
The purpose of the CI concept is to reduce Direct Operating Costs (DOC).

L2 DOCs are made up of:

- Fixed costs
- Time-related costs, which can be expressed as CT × (trip time)
- Cost of fuel, which can be expressed as CF × (trip fuel).

SPEED PROFILE

Applicable to: ALL

GENERAL

A descent in managed speed/Mach target is generally operated using a speed profile divided into two main phases:

- An economic descent schedule (ECON Mach/ ECON IAS law)

L2 For more information about the economic descent schedule, *Refer to PER-IFT-DES-ECI Economic Descent Schedule* .

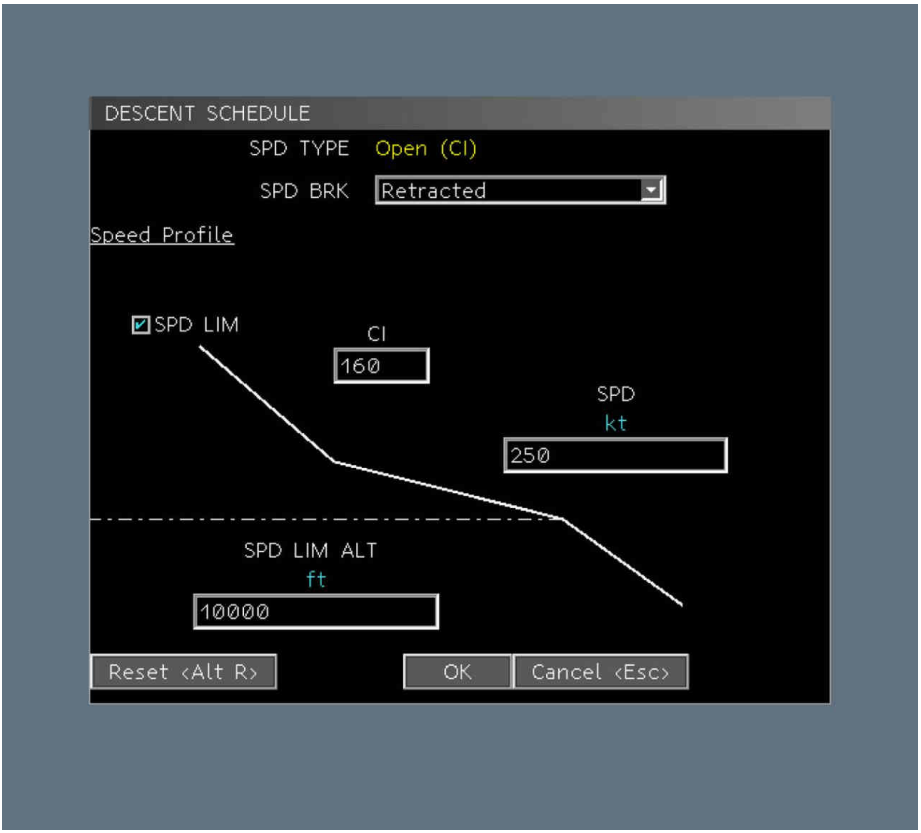
L1 - An possible descent speed limit phase.

L2 The descent speed limit is a speed constraint to be respected, at and below a specified altitude.

L1 DES

WITH A SPEED LIMIT

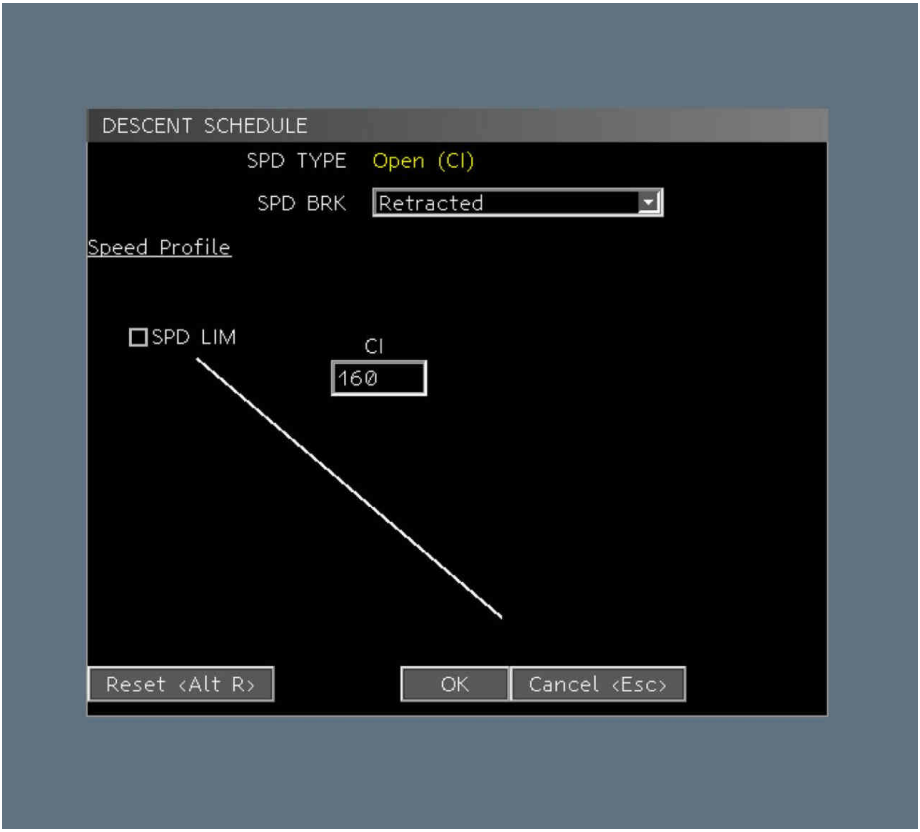
Speed Profile Subpanel - With a Speed Limit



The flight crew enters:
- The CI value used to manage the flight
- A descent speed limit CAS (SPD LIM)
- A descent speed limit altitude (SPD LIM ALT).

WITHOUT A SPEED LIMIT

Speed Profile Subpanel - Without a Speed Limit



The flight crew enters the CI value used to manage the flight.

ECONOMIC DESCENT SCHEDULE

Applicable to: ALL

An economic descent schedule is a predetermined Mach/ IAS descent speed law depending on CI .

L2 The Mach phase is flown at ECON Mach function of:

- CI
- Top of Descent (T/D) altitude
- Predicted weight at T/D altitude
- Temperature
- Wind.

For more information about the ECON Mach, *Refer to Cruise - ECON Mach* .

The IAS phase is flown at ECON IAS function of:

- CI
- T/D altitude
- Predicted weight at T/D .

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FIXED SPEED

Applicable to: ALL

The flight crew may use the STANDARD Fixed Speed descent type to calculate descent performance for a descent in selected speed/Mach target with a given fixed speed schedule. Usually, the speed schedule is the standard descent speed profile.

SPEED PROFILE

GENERAL

A descent in selected speed/Mach target is generally operated using a speed profile divided into three phases (MACH/SPD/SPD LIM).
The standard descent speed profile is M 0.85 /300 kt /250 kt with a speed constraint from FL 100.

Above the Crossover Altitude

This descent phase is operated at constant Mach (MACH).

L2 At constant Mach, TAS increases in descent.

L1 Below the Crossover Altitude

This descent phase is operated at constant IAS (SPD), which is maintained until the descent speed limit altitude.

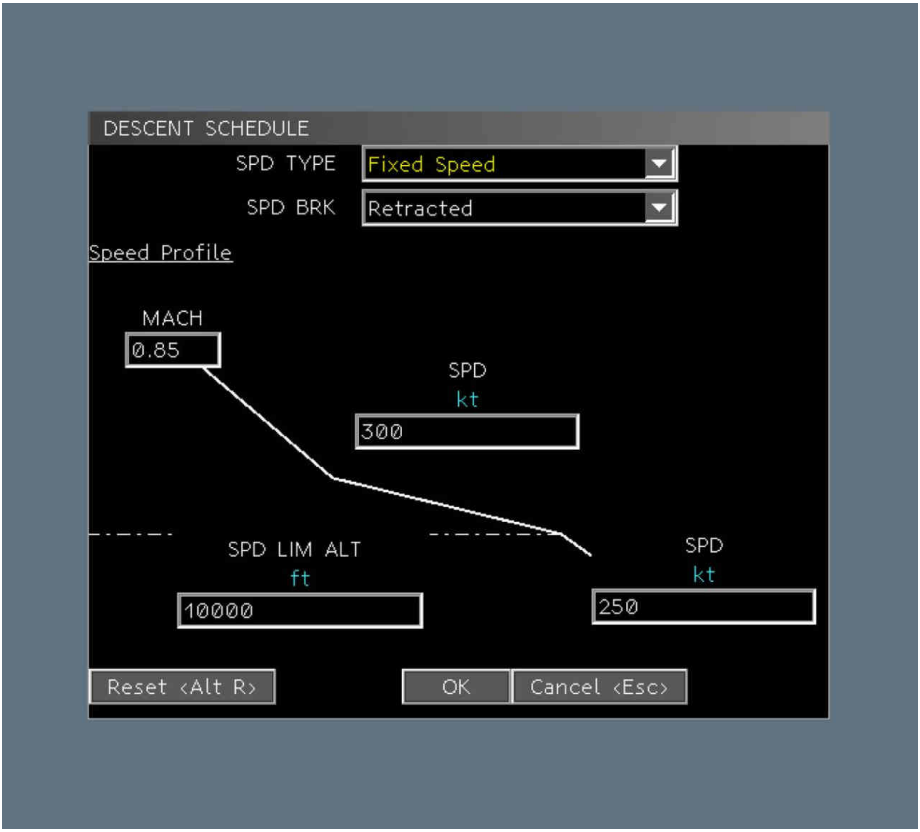
L2 The crossover altitude is the pressure altitude at which SPD and MACH are equal to the same TAS.
At constant IAS, TAS decreases in descent.

L1 Below the Descent Speed Limit Altitude

This descent phase is operated at constant IAS (SPD LIM).
The speed is limited by ATC and according to airspace rules.

DES

Speed Profile Subpanel



The flight crew enters:
- The descent speed Mach (MACH)
- The descent speed CAS (SPD)
- The descent speed limit altitude (SPD LIM ALT)
- The descent speed limit CAS (SPD LIM).

TURBULENCE SPEED

Applicable to: ALL

GENERAL

The flight crew may use the STANDARD Turbulence descent type to calculate descent performance for a descent in selected speed/Mach target operated through turbulence areas.

L2 Turbulence speeds are recommended when the aircraft flies in a turbulent atmosphere. They increase the margin to buffet onset, which is more likely to occur due to Angle Of Attack (AOA) variations induced by disturbances in these meteorological conditions.

L1 This is flown in selected speed/Mach target by manually setting the MAX TURB fixed IAS/Mach law on the AFS CP, computed by the FMC and indicated on the MFD PERF DES page (MAX TURB function).

This may also be flown in selected speed/Mach target by manually setting the turbulence descent speed profile on the AFS CP, given by the IN-FLT PERF Turbulence descent type.

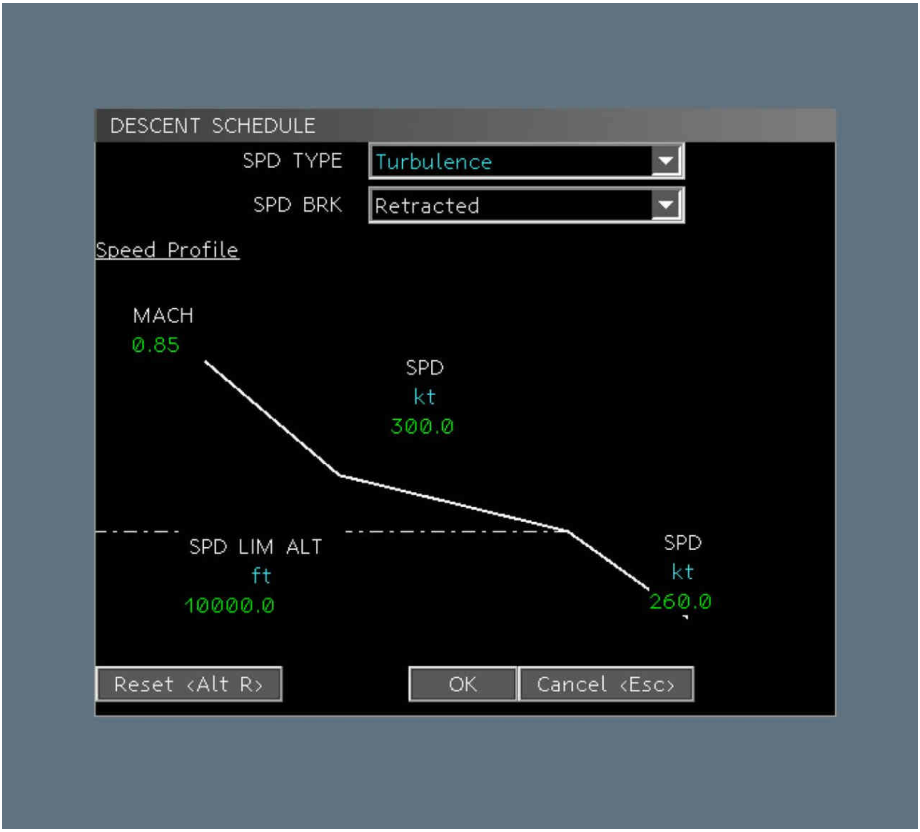
SPEED PROFILE

GENERAL

The recommended turbulence penetration airspeed (VRA/MRA) is between green dot and 300 kt/M 0.85.
The MAX TURB function indicated on the MFD PERF DES page displays the maximal speed/Mach not to exceed according to this recommendation.
The IN-FLT PERF Turbulence descent type philosophy is different. It enables to make a computation from the Operator's turbulence descent speed profile.
The optimum turbulence descent speed profile in terms of margin towards buffet onset is M 0.85/300 kt/260 kt with a speed constraint up to FL 100.

DES

Speed Profile Subpanel



GENERAL

Applicable to: ALL

The flight crew may use the GIVEN V/S Fixed Speed descent type to calculate descent performance for a descent in selected speed/Mach target at fixed Rate of Descent (ROD) with a given fixed speed schedule.

This is flown by engaging the basic vertical mode V/S on the AFS CP.

SPEED PROFILE

Applicable to: ALL

GENERAL

A descent in selected speed/Mach target is generally operated using a speed profile divided into three phases (MACH/SPD/SPD LIM).
The standard descent speed profile is M 0.85 /300 kt /250 kt with a speed constraint from FL 100.

ABOVE THE CROSSOVER ALTITUDE

This descent phase is operated at constant Mach (MACH).

L2 At constant Mach, TAS increases in descent.

L1 BELOW THE CROSSOVER ALTITUDE

This descent phase is operated at constant IAS (SPD), which is maintained until the descent speed limit altitude.

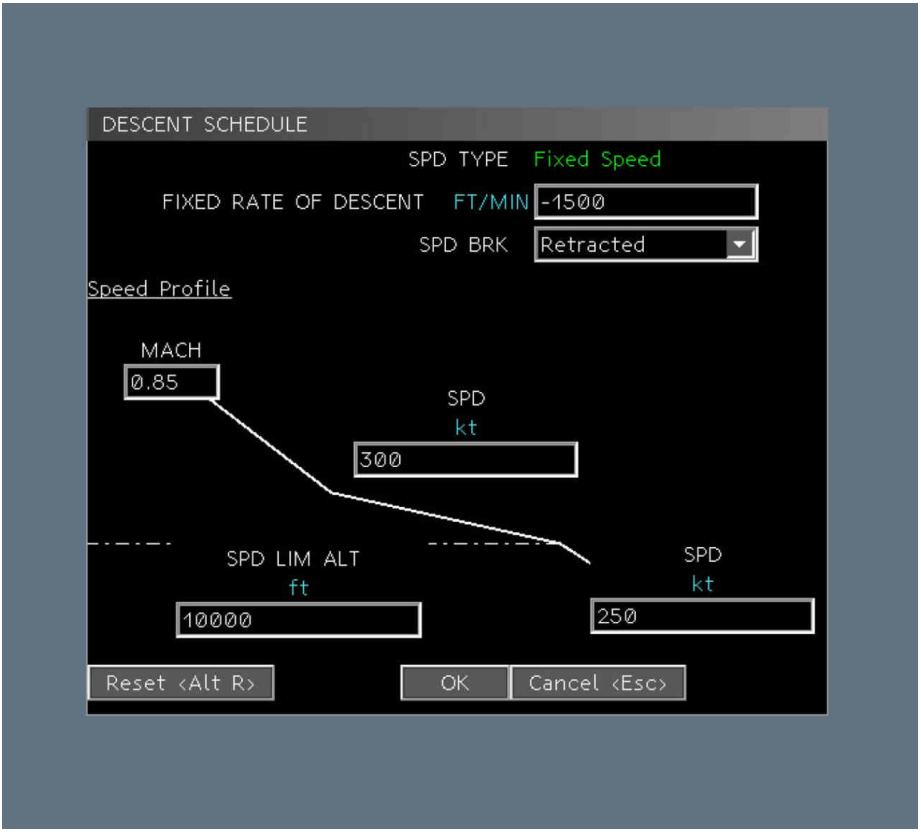
L2 The crossover altitude is the pressure altitude at which SPD and MACH are equal to the same TAS.
At constant IAS, TAS decreases in descent.

L1 BELOW THE DESCENT SPEED LIMIT ALTITUDE

This descent phase is operated at constant IAS (SPD LIM).
The speed is limited by ATC and according to airspace rules.

DES

Speed Profile Subpanel



The flight crew enters:

- The descent speed Mach (MACH)
- The descent speed CAS (SPD)
- The descent speed limit altitude (SPD LIM ALT)
- The descent speed limit CAS (SPD LIM).

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GENERAL

Applicable to: ALL

The flight crew may use the EMERGENCY MMO/VMO descent type to calculate descent performance for an emergency descent (e.g. due to a cabin pressurization failure).

SPEED PROFILE

Applicable to: ALL

The purpose of an emergency descent is to reach a specific FL as quickly as possible, i.e. with the highest Rate of Descent (ROD).

MMO/VMO is the best speed profile as it gives high RODs, which can be increased by extending the speed brakes, if needed.

L2 In fact, ROD increases with TAS.

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BASIC RESULTS PANEL

Applicable to: ALL

The basic RESULTS panel provides the essential information for the descent.

Basic RESULTS Panel



LEVEL OFF

Level off on the RESULTS panel is the pressure altitude at which the calculated Rate of Descent (ROD) is 0.

The level off is only available for the OBSTACLE Green Dot or Fixed Speed descent types.

TIME

Time on the RESULTS panel is the time elapsed from the initial pressure altitude to the target pressure altitude (or the level off for the OBSTACLE Green Dot or Fixed Speed descent types).

DISTANCE

Distance on the RESULTS panel is the distance covered from the initial pressure altitude to the target pressure altitude (or the level off for the OBSTACLE Green Dot or Fixed Speed descent types).

FUEL

FUEL on the RESULTS panel is the estimated fuel used from the initial pressure altitude to the target pressure altitude (or the level off for the OBSTACLE Green Dot or Fixed Speed descent types).

EO LRC CEILING

EO LRC Ceiling on the RESULTS panel is the highest pressure altitude that can be flown in level flight with long range cruise speed and at least one engine inoperative.
The EO LRC Ceiling is only available for the OBSTACLE Green Dot or Fixed Speed descent types and the EO-STD Fixed Speed descent type.

TABLE RESULTS SUBPANEL

Applicable to: ALL

The TABLE RESULTS subpanel provides the detailed information for the descent. The parameters displayed depend on the Operator customization.

ALT

This column displays the altitude from the initial pressure altitude to the target pressure altitude (or the level off pressure altitude) with a step of 5 000 ft.

ALTG

This column displays the geometric altitude corresponding to each intermediate pressure altitude.

TIME

This column displays the time elapsed from the initial pressure altitude to each intermediate pressure altitude.

FUEL

This column displays the fuel burnt from the initial pressure altitude to each intermediate pressure altitude.

DIST

This column displays the distance covered from the initial pressure altitude to each intermediate pressure altitude.

TAS

This column displays the instantaneous True Air Speed (TAS) at each intermediate pressure altitude.

MACH

This column displays the instantaneous Mach number at each intermediate pressure altitude.

CAS

This column displays the instantaneous Calibrated Air Speed (CAS) at each intermediate pressure altitude.

THR

This column displays the instantaneous THR at each intermediate pressure altitude.

L2 The THR value indicates the thrust used. It is shown as a % of the available thrust.

Assuming that the thrust achieved in windmilling is close to zero, the available thrust is the ratio of the actual thrust calculated from engine parameters to:

- The thrust achieved with TO thrust rating and bleeds OFF for Takeoff and Taxi
- The thrust achieved with GA thrust rating and bleeds OFF for all other flight phases (Climb, Cruise, Descent, Holding).

L1 **GRDT**

This column displays the instantaneous descent gradient at each intermediate pressure altitude.

L2 The descent gradient represents the angle between the horizontal axis and the aerodynamic axis defined by the speed direction.

L1 **AOA**

This column displays the instantaneous Angle Of Attack (AOA) at each intermediate pressure altitude.

L2 The angle of attack represents the angle between the aircraft axis and the aerodynamic axis defined by the speed direction.

L1 **RATE**

This column displays the instantaneous Rate Of Descent (ROD) at each intermediate pressure altitude.

L2 In ISA conditions, ROD represents the vertical component of the speed.
In ISA conditions, ROD = TAS × sin (GRDT) ~ TAS × GRDT.

L1 **PITCH**

This column displays the instantaneous pitch angle at each intermediate pressure altitude.

L2 The pitch angle represents the angle between the aircraft axis and the horizontal axis.

GRAPH RESULTS SUBPANEL

Applicable to: ALL

The flight crew can plot descent parameters versus each other using the GRAPH RESULTS subpanel.
The possible parameters depend on the Operator customization of the TABLE RESULTS.
Specific values can be read from the graph using the cross-hairs.

ADDITIONAL INFORMATION

When altitude is selected as the ordinate, the following additional elements are shown in the graph:

- If ECON (CI) or STANDARD is selected, a horizontal line is shown for the altitude value of the “End of repressurization segment”
- If OBSTACLE is selected, a horizontal line is shown for the altitude value of the “Transition Mach/CAS”
- If OBSTACLE or EO-STD is selected, a horizontal line is shown for the altitude value of the "EO LRC Ceiling".

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IN-FLT PERF APPLICATION - HLD MODULE

Applicable to: ALL

GENERAL

The holding phase, when required, starts before the landing phase above the destination or alternate airport.

Holding Fuel is one of the minimum recommended fuel quantities for a standard flight planning.

L2 For more information about the minimum recommended fuel quantities, *Refer to PER-IFT-FPL-MRF-RSF Holding Fuel* .

L1 HLD

The IN-FLT PERF application is made of 6 modules (CLB, CRZ, DES, HLD, PLAN and ATMO).

The HLD module provides the flight crew with a means to obtain holding performance data for:
- Given meteorological conditions
- A given aircraft configuration including non standard ones (engines out, landing gear down)
- Various holding strategies.

Two computation types are available:
- FUEL, to assess holding fuel for a given holding time
- TIME, to assess maximum holding time capability for a given fuel quantity (maximum endurance).

The main results of this module are:
- Holding fuel, holding time
- Average Fuel Flow (FF)
- Average CAS .

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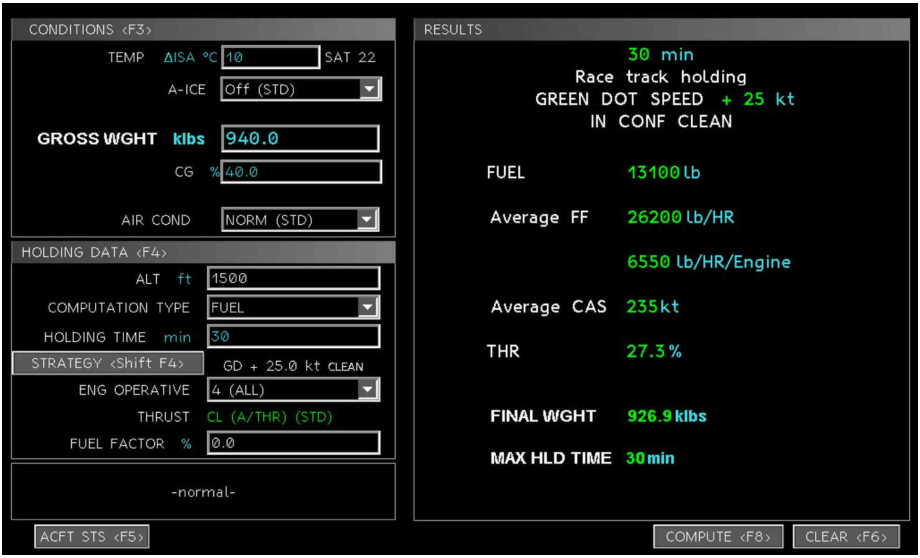
HLD MODULE INTERFACE

Applicable to: ALL

IN-FLT PERF HLD Module Interface



CONDITIONS

The flight crew can define the current outside conditions and the aircraft configuration.
For more information about the CONDITIONS panel, *Refer to PER-IFT-HLD-CDT CONDITIONS Panel* .

HOLDING DATA

The flight crew can define the data of the holding phase.
For more information about the HOLDING DATA panel, *Refer to PER-IFT-HLD-HLD HOLDING DATA Panel* .

AIRCRAFT STATUS

The flight crew can select CDL items and non standard configuration items.
For more information about the AIRCRAFT STATUS panel, *Refer to PER-IFT-ACS AIRCRAFT STATUS Panel* .

RESULTS

The RESULTS panel displays the essential information for the holding phase.

For more information about the RESULTS panel, refer to Holding Results.

CONDITIONS PANEL

Applicable to: ALL

The CONDITIONS panel provides the following information:

- Wind
- Heading
- Temperature (Δ ISA)
- Anti-Ice
- Gross Weight
- CG
- Airflow.

CONDITIONS Panel



WIND

Applicable to: ALL

GENERAL

The influence of wind is only taken into account for a straight line holding pattern.
The wind affects the ground distance.
A tailwind will induce an increase in the ground distance.

HLD

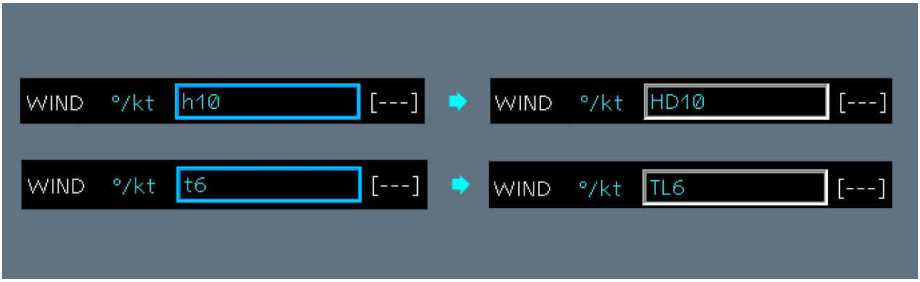
There are two ways to defining wind values:
- Longitudinal Speed Component
- Direction/Speed Combination.

The WIND field is only displayed in the case of a straight line holding pattern.

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED COMBINATION

The flight crew enters the wind direction and the wind speed.
The entry is projected along the heading and perpendicular to the heading.
The longitudinal projection follows the same display rules as the speed entry.

IN-FLT PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



HEADING

Applicable to: ALL

GENERAL

The heading defines the axis on which the wind is projected.

HLD

The IN-FLT PERF heading and wind direction have to be both entered in either magnetic or true north.

The HDG field is only displayed:
- If a wind has been entered in a combination of a direction and a speed
- In the case of a straight line holding pattern.

L2 For more information about the wind, *Refer to Holding - Wind* .

TEMPERATURE

Applicable to: ALL

GENERAL

An increase in temperature (SAT or ΔISA) leads to:

- A higher true altitude at fixed indicated altitude
- A higher True Air Speed (TAS) for the same Calibrated Air Speed (CAS)

L2 At fixed CAS, TAS is inversely proportional to air density, which decreases with temperature.

L1 - A higher required net thrust to fly this TAS.

L2 The net thrust is the difference between the gross thrust and the capturing drag. It is the thrust necessary to maintain the level flight.

L1 FUEL

When temperature increases:

- Fuel Flow (FF) increases
- THR increases

L2 The maximum available thrust decreases with temperature, and the required net thrust increases.

L1 - Distance increases

L2 TAS increases for the same CAS.

L1 - Fuel burnt increases for a given holding time.

TIME

When temperature increases:

- FF increases
- THR increases

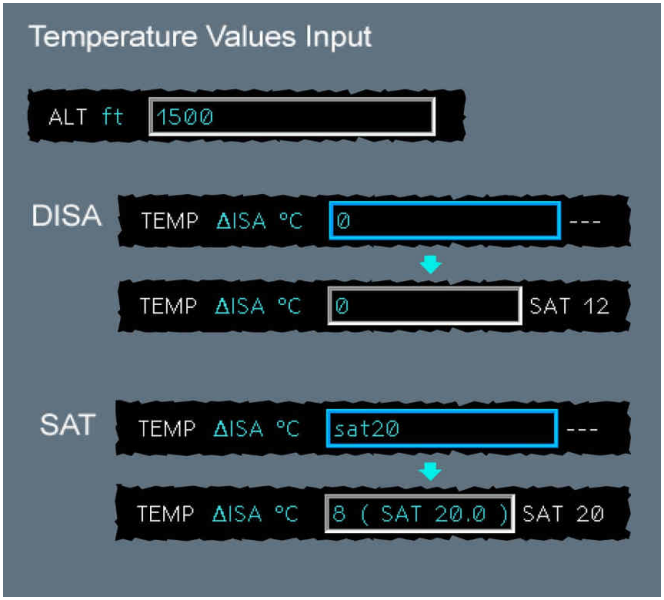
L2 The maximum available thrust decreases with temperature, and the required net thrust increases.

L1 - Maximum holding time decreases for a given fuel quantity
- Distance decreases.

L2 The increment in TAS does not off set the decrease in time.

L1 **HLD**

Temperature Values Input



The TEMP field corresponds to a deviation form ISA law (ΔISA).

The flight crew can enter a temperature as:
- A ΔISA, or
- A Static Air Temperature (SAT) at holding altitude, which is automatically converted into a ΔISA.

ANTI-ICE

Applicable to: ALL

GENERAL

Anti-ice increases engine bleed.

L2 The net thrust (which is the thrust necessary to maintain the level flight) stays the same. But, the increased bleed flow leads to an increased Fuel Flow (FF) to generate this thrust.

L1 **FOR A GIVEN HOLDING TIME**

In the case of ENG and/or WING anti-ice:
- FF increases
- THR increases
- Fuel quantity increases for a given holding time.

FOR A GIVEN HOLDING FUEL

In the case of ENG and/or WING anti-ice:
- FF increases
- THR increases
- Maximum holding time decreases for a given fuel quantity
- Distance decreases.

L2 The time decreases and TAS stays the same.

L1 **IN-FLT PERF**

IN-FLT PERF has four anti-ice options:
- Off
- Engine
- Total
- Severe Icing.

The flight crew may use the Severe Icing option to assess the impact of ice accretion on fuel consumption and ceilings.

GROSS WEIGHT

Applicable to: ALL

GENERAL

L2 When the weight increases, the lift must be increased to maintain the altitude. As a result, the drag increases. So, the net thrust must be increased at fixed CAS or Mach.

L1 **FOR A GIVEN HOLDING TIME**

At a fixed pressure altitude, any decrease in weight, due to fuel burn off for example, leads to:
- A lower Fuel Flow (FF)
- A lower THR

L2 The required net thrust decreases.

L1 - Fuel quantity decreases for a given holding time.

FOR A GIVEN HOLDING FUEL

At a fixed pressure altitude, any decrease in weight, due to fuel burn off for example, leads to:
- A lower FF
- A lower THR

L2 The required net thrust decreases.

L1 - Maximum holding time increases for a given fuel quantity
- Distance increases.

L2 The time increases and TAS stays the same.

L1 **HLD**

The flight crew enters the current aircraft weight at start of holding calculation.
This gross weight (GROSS WGHT field) must be between the Operating Empty Weight (OEW) and the Maximum Design Takeoff Weight (MTOW).

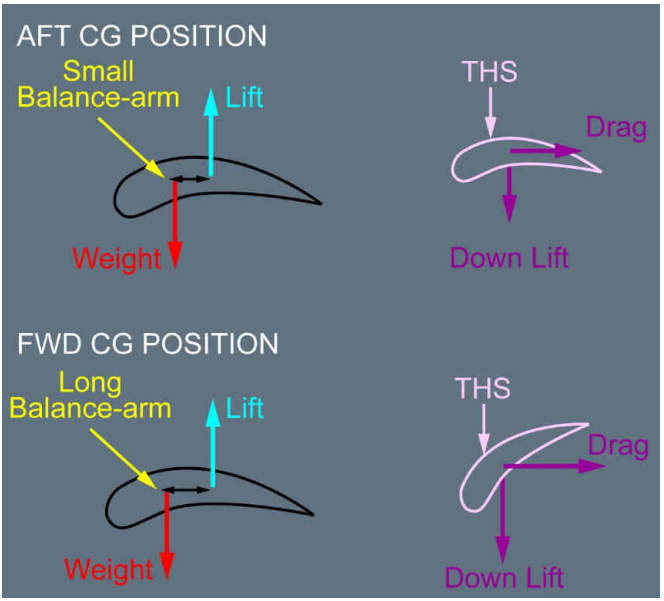
CG

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position impacts the forces applied on the aircraft. As a result, it impacts aircraft performance.

CG Position



L2 In order to keep the aircraft level, the Trimmable Horizontal Stabilizer (THS) creates a downward force that counters the pitch down moment due to the distance between the center of lift and the center of gravity. The larger this lever arm, the higher the down lift that must be generated by the THS, and the higher the drag.

L1 **IN-FLT PERF**

The CG field is expressed in % of the Mean Aerodynamic Chord (MAC).

AIRFLOW

Applicable to: ALL

GENERAL

Airflow increases engine bleed.

L2 The net thrust (which is the thrust necessary to maintain the level flight) stays the same. But, the increased bleed flow leads to an increased Fuel Flow (FF) to generate this thrust.

L1 FOR A GIVEN HOLDING TIME

In the case of an increase in airflow:
- FF increases
- THR increases
- Fuel quantity increases for a given holding time.

FOR A GIVEN HOLDING FUEL

In the case of an increase in airflow:
- FF increases
- THR increases
- Maximum holding time decreases for a given fuel quantity
- Distance decreases.

L2 The time decreases and TAS stays the same.

L1 IN-FLT PERF

IN-FLT PERF has five airflow options:
- OFF
- LO
- MAN
- NORM
- HI.

IMPACT OF FWD CARGO COOLING

When FWD cargo cooling is active, the airflow automatically increases, and so the engine bleed.
The IN-FLT PERF airflow settings reflect the engine bleed with FWD cargo cooling OFF.
The flight crew applies the following equivalences to obtain an engine bleed that considers the effect of FWD cargo cooling:

ENG OPERATIVE	AIR FLOW Selector	FWD Cargo Cooling	Select IN-FLT PERF setting
4	LO	ON	MAN
	MAN		HI
	NORM		HI
	HI		HI
3	LO	ON	MAN
	MAN		MAN
	NORM		NORM
	HI		HI
2	LO	ON	LO
	MAN		MAN
	NORM		NORM
	HI		HI

HOLDING DATA PANEL

Applicable to: ALL

The HOLDING DATA panel describes the following information:

- The Altitude
- The computation type (holding type, holding time, holding fuel)
- The strategy (configuration, speed type, holding pattern)
- The number of engines operative
- The thrust lever position
- The fuel factor.

HOLDING DATA Panel



ALTITUDE

Applicable to: ALL

GENERAL

In level flight at low altitude and at fixed CAS, the net thrust is roughly constant (slight increase with altitude).

L2 The net thrust is the thrust necessary to maintain the level flight.

L1 **FOR A GIVEN HOLDING TIME**

A higher pressure altitude results in:

- A lower Fuel Flow (FF)

L2 At low altitude, the efficiency of the engines is improved when altitude increases.

L1 - A higher THR

L2 The maximum available thrust decreases with altitude and the required net thrust slightly increases.

L1 - Distance increases for a given time

L2 TAS increases for the same CAS.

L1 - Fuel burnt decreases.

FOR A GIVEN HOLDING FUEL

A higher pressure altitude results in:

- A lower FF

L2 At low altitude, the efficiency of the engines is improved when altitude increases.

L1 - A higher THR

L2 The maximum available thrust decreases with altitude and the required net thrust slightly increases.

L1 - Maximum holding time increases for a given fuel quantity

- Distance increases.

L2 The time and TAS increase.

L1 **HLD**

The flight crew enters the holding pressure altitude.

HOLDING TYPE

Applicable to: ALL

The following two computation types are available:

- FUEL, to assess holding fuel for a given holding time
- TIME, to assess maximum holding time capability for a given fuel quantity.

HOLDING STRATEGY

Applicable to: ALL

The HOLDING STRATEGY subpanel describes the following information:

- The configuration (Flaps / Slats)
- The speed type
- The speed increment or speed value (if available)
- The holding pattern.

HOLDING STRATEGY Subpanel



CONFIGURATION

GENERAL

Two aerodynamic configurations are used in operation:
- CLEAN
- 1 when there are limiting obstacles (in terms of holding pattern) around the airport.

HLD

HLD has five options:
- CLEAN
- 1
- 1+F
- 2
- 3
- FULL.

SPEED TYPE

The flight crew uses the SPD TYPE drop-down list to select his holding speed.
The following holding speeds are available:

- CAS

L2 For more information about the CAS type, *Refer to PER-IFT-HLD-HLS CAS* .

L1 - CAS Min Drag

L2 For more information about the CAS Min Drag type, *Refer to PER-IFT-HLD-HLS CAS Min Drag* .

L1 - GD Speed

L2 For more information about the GD Speed type, *Refer to PER-IFT-HLD-HLS GD Speed* .

L1 - S Speed

L2 For more information about the S Speed type, *Refer to PER-IFT-HLD-HLS S Speed* .

L1 - Max End Speed

L2 For more information about the Max End Speed type, *Refer to PER-IFT-HLD-HLS Max End Speed* .

HOLDING PATTERN

The flight crew selects the holding pattern:
- Race track holding, or

L2 A race track pattern is composed of two straight legs plus two 180 degree turns.

L1 - Straight line.

ENGINES OPERATIVE

Applicable to: ALL

GENERAL

The number of engines operative determines the thrust available to perform the holding and therefore impacts holding performance. However, as holding is usually performed at low altitudes and low speeds, the impact is poor.

HLD

The flight crew selects the number of engines operative:
- 4 (ALL), or
- 3, or
- 2.

THRUST

Applicable to: ALL

GENERAL

The thrust available to perform the holding depends on the selected holding rating.
The standard holding rating is called “Maximum Cruise Thrust” which is delivered when the thrust lever is in the CL detent.
However, in the case of an engine failure, the thrust rating “Maximum Continuous Thrust” is mandatory.

L2 For more information, refer to Thrust Ratings.

L1 HLD

The thrust rating is automatically selected, depending on the number of engines operative:
- CL (A/THR), if AEO
- MCT (A/THR), if OEI or TEI.

FUEL FACTOR

Applicable to: ALL

GENERAL

The performance factor for FMS predictions (FMS PERF FACTOR) is the sum of the Basic FMS PERF FACTOR and the Monitored Fuel Factor.

BASIC FMS PERF FACTOR

The Basic FMS PERF FACTOR correction is applied when the aircraft FMS database does not exactly fit to the aircraft model. It is published for each FMS Performance Data Base (PDB).
It results in FMS predictions consistent with the level reflected by the uncorrected IN-FLT PERF application, also called the book level.

MONITORED FUEL FACTOR

The actual airframe drag and engine performance deviate from the nominal model due to the aircraft's aging process.
The Monitored Fuel Factor is used to correct the performance book level to the actual performance level in order to permit realistic fuel predictions.
The Monitored Fuel Factor is defined as a percentage increase or decrease of the nominal Specific Range (SR) value.

IN-FLT PERF

The IN-FLT PERF fuel factor corresponds to the sum of:
- The Monitored Fuel Factor, and
- A positive performance prediction adjustment (if enabled, and at flight crew discretion).

L2 This allows the flight crew to adjust performance predictions to a drag increase due to non-quantified aerodynamic sources.

L1 When no such performance adjustment is required, the IN-FLT PERF fuel factor may thus differ from the FMS one by the Basic FMS PERF FACTOR.

CAS

Applicable to: ALL

The flight crew may use the CAS speed type to calculate holding performance for a holding in selected speed/Mach target, at fixed CAS, and usually with:

- 240 kt for CONF 1
- 210 kt for CONF 2.

CAS MIN DRAG

Applicable to: ALL

The flight crew may use the CAS Min Drag speed type to calculate holding performance for a holding in selected speed/Mach target, at CAS Min Drag, and for CONF CLEAN or 1.

This is flown by manually setting the CAS Min Drag on the AFS CP, computed by the CAS Min Drag speed type.

The CAS Min Drag speed type gives an average value of CAS Min Drag during the holding phase.

GD SPEED

Applicable to: ALL

L2 The maximum holding time (maximum endurance) is a determining factor for a holding. This may be done by minimizing the Fuel Flow (FF). The corresponding speed (maximum endurance speed) is close to green dot speed + 25 kt.

L1 In CONF CLEAN, the standard holding speed is the green dot speed + 25 kt.

The flight crew may use the GD Speed speed type with green dot speed + 25 kt to calculate holding performance for a holding in managed speed/Mach target, at maximum endurance speed, and in CONF CLEAN.

The flight crew may also use the GD Speed speed type to calculate holding performance for a holding in selected speed/Mach target, at green dot speed, and in CONF CLEAN. This is flown by manually setting the green dot speed on the AFS CP, computed by the FMC based on aircraft weight, and indicated on the PFD.

The GD Speed speed type gives an average value of green dot speed during the holding phase.

S SPEED

Applicable to: ALL

L2 Holding patterns at green dot speed may be limiting in CONF CLEAN. In fact, obstacles nearby some airports can bring about significant bank angles during turn phase. As it is not preferable to fly below green dot speed in CONF CLEAN, slats may be extended and holding done in CONF 1 at S Speed.
For more information about S Speed, *Refer to DSC-22-27-10-10 GREEN DOT* .

L1 The flight crew may use the S Speed speed type to calculate holding performance for a holding in selected speed/Mach target, at S Speed, and in CONF 1.
This is flown by manually setting S on the AFS CP , computed by the FMC based on aircraft weight, and indicated on the PFD .
The S Speed speed type gives an average value of S during the holding phase.

MAX END SPEED

Applicable to: ALL

L2 The maximum holding time (maximum endurance) is a determining factor for a holding. This may be done by minimizing the Fuel Flow (FF). The corresponding speed is the maximum endurance speed.

L1 The flight crew may use the Max End Speed speed type to calculate holding performance for a holding in managed speed/Mach target in CONF CLEAN.
In managed speed/Mach target in CONF CLEAN, the holding speed targeted by the FMS is the maximum endurance speed.

DISTANCE

Applicable to: ALL

In the case of a straight line holding, the RESULTS panel shows the ground distance covered:
- For a given holding time, or
- For a given holding fuel quantity.

FUEL

Applicable to: ALL

The RESULTS panel displays the fuel quantity (FUEL) used, which corresponds to:
- The fuel burnt during the given holding time, or
- The holding fuel quantity entered by the flight crew.

FUEL FLOW

Applicable to: ALL

GENERAL

The Fuel Flow (FF) is defined as the fuel consumption per time unit.

HLD

The RESULTS panel shows:
- The average total FF during the holding phase
- The average FF per engine during the holding phase.

AVERAGE CAS SPEED

Applicable to: ALL

The RESULTS panel shows the average CAS speed during the holding phase.

THR

Applicable to: ALL

GENERAL

The THR value indicates the thrust used. It is shown as a % of the available thrust.

Assuming that the thrust achieved in windmilling is close to zero, the available thrust is the ratio of the actual thrust calculated from engine parameters to:

- The thrust achieved with TO thrust rating and bleeds OFF for Takeoff and Taxi
- The thrust achieved with GA thrust rating and bleeds OFF for all other flight phases (Climb, Cruise, Descent, Holding).

HLD

The RESULTS panel shows the average THR during the holding phase.

FINAL WEIGHT

Applicable to: ALL

The RESULTS panel displays the final weight (FINAL WGHT) of the aircraft at the end of the holding phase.

MAXIMUM HOLDING TIME

Applicable to: ALL

The RESULTS panel shows the maximum holding time, which corresponds to:

- The holding time entered by the flight crew, or
- The maximum endurance for a given holding fuel quantity.

GENERAL

Applicable to: ALL

The flight crew may use the performance data calculated with the IN-FLT PERF to conduct and monitor a flight after an engine failure.

DIVERSION STRATEGY

Applicable to: ALL

The diversion strategy (climb, descent and cruise speed schedules) shall be defined before the flight, and described in the Operator's routes specifications, as a function of the prevailing operational factors (e.g. obstacles clearance requirements).
If there are constraining obstacles along the route, the OBSTACLE strategy must be selected.
Otherwise, the STANDARD strategy is recommended.

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SEVERE ICING

Applicable to: ALL

If severe icing conditions are encountered, ice may build up on non heated structure. In these conditions:

- The minimum speed is Green Dot in clean configuration
- The nominal gross OEI Level off is reduced by 5 000 ft.

L2 The nominal gross Level off is calculated at Green Dot speed, engines at MCT, Anti-ice Off. The reduction in altitude takes into account of the effect of activation of Anti-ice Total and ice accretion.

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EO Below EO MAX Altitude

BELOW EO MAX ALTITUDE

Applicable to: ALL

ENGINE FAILURE BELOW EO MAX ALTITUDE

DRIFT UP

As there are constraining obstacles along the route, a drift up at green dot speed is performed to clear the obstacles.

The drift up is operated either:
- In selected speed/Mach target at green dot speed with thrust lever in the MCT detent and A/THR disconnected, or
- In managed speed/Mach target with thrust lever in the MCT detent following to the FMS EO - GDOT function.

For more information about the IN-FLT PERF predictions for the drift up phase, *Refer to PER-IFT-OEI-OBS-BLW Drift Up - Green Dot Speed* .

DESCENT TO EO MAX ALTITUDE

As soon as obstacles are cleared, a standard descent is performed to the new cruise altitude at most equal to EO MAX altitude.
For more information about the IN-FLT PERF predictions for this phase common with the STANDARD strategy, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

CRUISE TO DIVERSION AIRPORT

A cruise is initiated to reach a diversion airport.

The cruise phase is operated either:
- In selected speed/Mach target at LRC speed with A/THR engaged, or
- In managed speed/Mach target.

For more information about the IN-FLT PERF predictions for this phase common with the STANDARD strategy, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

DESCENT TO LANDING

The descent to the diversion airport is operated either:
- In selected speed/Mach target with a given fixed speed schedule (M 0.85 /300 kt /250 kt) and A/THR engaged, or
- In managed speed/Mach target.

DRIFT UP - GREEN DOT SPEED

Applicable to: ALL

The flight crew may use the IN-FLT PERF Best angle climb type to calculate EO climb performance for the drift up phase of the OBSTACLE strategy with EO below EO MAX altitude.

This is flown in selected speed/Mach target by manually setting the green dot speed on the AFS CP computed by:

- The FMC based on aircraft weight, and indicated on the PFD and the MFD PERF CLB page (MAX ANGLE function), or
- The IN-FLT PERF Best angle climb type.

Moreover, this is usually flown in managed speed/Mach target (EO-GDOT function).

EO Above EO MAX Altitude

ABOVE EO MAX ALTITUDE

Applicable to: ALL

EO IN CRUISE OR IN CLIMB

DECELERATION

After the engine failure, a deceleration phase in level flight is initiated to green dot speed.
The thrust lever is set in the MCT detent with A/THR disconnected.

DRIFT DOWN

As there are constraining obstacles along the route, a drift down is performed to clear the obstacles.
The drift down is operated at green dot speed.
The thrust lever is still in the MCT detent with A/THR disconnected.
If there are still constraining obstacles on the route once the level off is reached, the drift down must be maintained so as to fly an ascending cruise profile.
For more information about the IN-FLT PERF predictions for the drift down phase, *Refer to PER-IFT-OEI-OBS-ABV Drift Down - Green Dot* .

DESCENT TO EO MAX ALTITUDE

As soon as obstacles are cleared, a standard descent is performed to the new cruise altitude at most equal to EO MAX altitude.
For more information about the IN-FLT PERF predictions for this phase common with the STANDARD strategy, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

CRUISE TO DIVERSION AIRPORT

A cruise is initiated to reach a diversion airport.

The cruise phase is operated either:
- In selected speed/Mach target at LRC speed with A/THR engaged, or
- In managed speed/Mach target.

For more information about the IN-FLT PERF predictions for this phase common with the STANDARD strategy, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

DESCENT TO LANDING

The descent to the diversion airport is operated either:
- In selected speed/Mach target with a given fixed speed schedule (M 0.85 /300 kt /250 kt) and A/THR engaged, or
- In managed speed/Mach target.

DRIFT DOWN - GREEN DOT

Applicable to: ALL

The flight crew may use the OBSTACLE Green Dot descent type to calculate EO descent performance for the drift down phase of the OBSTACLE strategy with EO above EO MAX altitude (green dot speed and thrust lever in the MCT detent with A/THR disconnected).

This is flown in selected speed/Mach target by manually setting the green dot speed on the AFS CP computed by:

- The FMC based on aircraft weight, and indicated on the PFD, or
- The IN-FLT PERF OBSTACLE Green Dot descent type.

DRIFT DOWN - FIXED SPEED

Applicable to: ALL

The flight crew may use the OBSTACLE Fixed Speed descent type to calculate EO descent performance for a descent in selected speed/Mach target with a given fixed speed schedule, and thrust lever in the MCT detent with A/THR disconnected.
The OBSTACLE Fixed Speed descent type is an alternative to OBSTACLE Green Dot. However, contrary to Green Dot, Fixed Speed does not permit the aircraft to maintain the highest possible level.

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EO Below EO MAX Altitude

EO BELOW EO MAX ALTITUDE

Applicable to: ALL

ENGINE FAILURE BELOW EO MAX ALTITUDE

CLIMB TO EO MAX ALTITUDE

As there are no constraining obstacles along the route, the climb proceeds up to a new cruise altitude, which is at or below the EO MAX altitude.

After the engine failure, the climb is operated either:
- In selected speed/Mach target with thrust lever in the MCT detent and A/THR disconnected, or
- In managed speed/Mach target with thrust lever in the MCT detent following to the FMS EO - GDOT function.

For more information about the IN-FLT PERF predictions for the climb to EO MAX altitude phase, *Refer to PER-IFT-OEI-STD-BLW Climb to EO MAX Altitude* .

CRUISE TO DIVERSION AIRPORT

A cruise is initiated to reach a diversion airport.

The cruise phase is operated either:
- In selected speed/Mach target at LRC speed with A/THR engaged.
- In managed speed/Mach target.

For more information about the IN-FLT PERF predictions for the cruise phase to diversion airport, *Refer to PER-IFT-OEI-STD-ABV Cruise to Diversion Airport* .

DESCENT TO LANDING

The descent to the diversion airport is operated either:
- In selected speed/Mach target with a given fixed speed schedule (M 0.85 /300 kt /250 kt) and A/THR engaged, or
- In managed speed/Mach target.

CLIMB TO EO MAX ALTITUDE

Applicable to: ALL

The flight crew may use the IN-FLT PERF Selected speeds climb type to calculate EO climb performance at a given fixed speed schedule for the climb to EO MAX altitude phase of the STANDARD strategy with EO below EO MAX altitude.

EO Above EO MAX Altitude

EO ABOVE EO MAX ALTITUDE

Applicable to: ALL

EO IN CRUISE OR IN CLIMB ABOVE EO MAX ALTITUDE

DECELERATION

After the engine failure, a deceleration phase in level flight is initiated to a speed not below green dot.
The thrust lever is set in the MCT detent with A/THR disconnected.

DESCENT TO EO MAX ALTITUDE

As there are no constraining obstacle along the route, a standard descent is performed to the new cruise altitude at most equal to EO MAX altitude.
The descent is operated with a given fixed speed schedule (M 0.85 /300 kt). The thrust lever is still in the MCT detent with A/THR disconnected.
If ROD becomes less than 500 ft/min , the flight crew must engage the basic vertical mode V/S on the AFS CP with a ROD value of 500 ft/min . The A/THR is activated.
For more information about the IN-FLT PERF predictions for the descent phase to EO MAX altitude, *Refer to PER-IFT-OEI-STD-ABV Descent to EO MAX Altitude* .

CRUISE TO DIVERSION AIRPORT

A cruise is initiated to reach a diversion airport.

The cruise phase is operated either:
- In selected speed/Mach target at LRC speed with A/THR engaged.
- In managed speed/Mach target.

For more information about the IN-FLT PERF predictions for the cruise phase to diversion airport, *Refer to PER-IFT-OEI-STD-ABV Cruise to Diversion Airport* .

DESCENT TO LANDING

The descent to the diversion airport is operated either:
- In selected speed/Mach target with a given fixed speed schedule (M 0.85 /300 kt /250 kt) and A/THR engaged, or
- In managed speed/Mach target.

DESCENT TO EO MAX ALTITUDE

Applicable to: ALL

The flight crew may use the DES EO-STD Mach/CAS - V/S descent type to calculate EO descent performance for the descent to EO MAX altitude phase of:

- The STANDARD strategy with EO above EO MAX altitude, or
- The OBSTACLE strategy.

This is flown in selected speed/Mach target by manually setting M 0.85 /300 kt on the AFS CP (with thrust lever in the MCT detent and A/THR disconnected).
And when the Rate of Descent (ROD) becomes less than 500 ft/min, this strategy is flown by engaging the basic vertical mode V/S on the AFS CP with a ROD value of 500 ft/min (with thrust lever in the MCT detent and A/THR activated).

CRUISE TO DIVERSION AIRPORT

Applicable to: ALL

The flight crew may use the IN-FLT PERF LRC Speed or ECON (CI) cruise types to calculate EO cruise performance for the cruise phase to diversion airport of:
- The STANDARD strategy, or
- The OBSTACLE strategy.

LRC SPEED

The flight crew may use the IN-FLT PERF LRC Speed cruise type to obtain current and predicted cruise performance data for a cruise to diversion airport at EO LRC speed.
This is flown in selected speed/Mach target by manually setting the EO LRC speed on the AFS CP computed by the IN-FLT PERF LRC Speed cruise type.

L2 Engine Out Long Range Cruise (EO LRC) speed is defined as the Mach for which the Specific Range (SR) is equal to 99 % of the maximum SR with one engine inoperative.

EO LRC Mach depends on:
- Cruise altitude
- Weight
  The EO LRC Mach increases when weight increases.
- Temperature
  The EO LRC Mach decreases when temperature increases.
- Wind
  The EO LRC Mach increases when headwind increases.
- Air flow and anti-ice.

L1 ECON (CI)

If the flight crew selects a number of engines less than 4 and the IN-FLT PERF ECON (CI) cruise type, the application will prompt the flight crew whether he wants to perform a computation with the EO CI_{LRC} or with the current CI value.

The IN-FLT PERF ECON (CI) cruise type enables the flight crew to emulate several MFD CRZ page predictions:
- EO MAX altitude
- ECON Mach.

The flight crew may use the IN-FLT PERF ECON (CI) cruise type to obtain current and predicted cruise performance data for a cruise to diversion airport in managed speed/Mach target following to:
- The FMS EO-LRC function, or
- The FMS EO-ECON function.

EO-LRC

The FMS EO-LRC function (in managed speed/Mach target) ensures a longer range with OEI by optimizing the CI.

This function uses a specific value of CI called Engine Out Cost Index Long Range (EO CI $_{LRC}$).

L2 EO CI $_{LRC}$ is defined as the CI value which approximates the Long Range Cruise (LRC) with one engine inoperative.

EO CI $_{LRC}$ = 65.

L1 EO-ECON

The FMS EO-ECON function (in managed speed/Mach target) can be used if there is a sufficient FOB quantity to reach the diversion airport with the AEO CI.

This function uses the AEO CI value which was entered by the flight crew for the flight.

PLAN - In Cruise

GENERAL

Applicable to: ALL

The PLAN module does not allow the flight crew to compute an EO diversion from the engine failure point.
However, the PLAN module may enable the flight crew to assess the EO diversion fuel and time from the start of the cruise to diversion airport phase.

ECON (CI)

Applicable to: ALL

An IN CRUISE ECON (CI) EO planning is divided into three main flight phases:

- An ECON (CI) cruise phase following:
  - The EO-LRC function (EO CI $_{LRC}$), or
  - The EO-ECON function (current CI).
- An ECON (CI) descent, with the following descent law:
  - ECON descent Mach, which is the ECON cruise Mach at T/D
  - ECON descent CAS, which is a function of on CI, gross weight at T/D, cruise altitude
  - 250 kt from 10 000 ft to 1 500 ft.
- A standard approach and landing.

LRC SPEED

Applicable to: ALL

An IN CRUISE LRC Speed EO planning is divided into three main flight phases:

- A cruise phase at EO LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

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GD SPEED

Applicable to: ALL

In CONF CLEAN, the standard EO holding speed is the green dot +25 kt.
The flight crew may use the GD Speed speed type with green dot speed + 25 kt to calculate holding performance for a holding in managed speed/Mach target, at maximum endurance speed, and in CONF CLEAN.
The GD Speed speed type gives an average value of green dot speed during the holding phase.

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LRC - OPTIMUM ALTITUDE

Applicable to: ALL

An ALTERNATE LRC Speed planning at initial optimum altitude is divided into five flight phases:

- A standard missed approach (go-around)
- A climb at standard climb speed profile
- A cruise phase at the initial optimum altitude and conducted in selected speed/Mach target at EO LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

LRC - INPUT ALTITUDE

Applicable to: ALL

An ALTERNATE LRC Speed planning at input cruise altitude is divided into five flight phases:

- A standard missed approach (go-around)
- A climb at standard climb speed profile
- A cruise phase at the input cruise altitude and conducted in selected speed/Mach target at EO LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

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GENERAL

Applicable to: ALL

The flight crew may use the performance data calculated with the IN-FLT PERF to conduct and monitor a flight after a second engine failure.

Intentionally left blank

SEVERE ICING

Applicable to: ALL

If severe icing conditions are encountered, ice may build up on non heated structure. In these conditions:

- The minimum speed is Green Dot in clean configuration
- The nominal gross TEI Level off is reduced by 5 000 ft.

L2 The nominal gross Level off is calculated at Green Dot speed, engines at MCT, Anti-ice Off. The reduction in altitude takes into account of the effect of activation of Anti-ice Total and ice accretion.

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GENERAL

Applicable to: ALL

DESCENT TO LEVEL OFF

A descent at green dot speed is performed down to the level off. The thrust lever is set in the MCT detent with A/THR disconnected.
For more information about the IN-FLT PERF predictions for the descent phase to level off, *Refer to PER-IFT-TEI-STD Descent to Level Off* .

CRUISE TO DIVERSION AIRPORT

After level off, the altitude is maintained.
A cruise phase is operated in selected speed/Mach target at LRC speed.
For more information about the IN-FLT PERF predictions for the cruise phase to diversion airport, *Refer to PER-IFT-TEI-STD Cruise to Diversion Airport* .

DESCENT TO LANDING

The descent to the diversion airport is operated in selected speed/Mach target with a given fixed speed schedule (300 kt /250 kt) and A/THR engaged.

DESCENT TO LEVEL OFF

Applicable to: ALL

The flight crew may use the OBSTACLE Green Dot descent type to calculate TEO descent performance according to the STANDARD strategy (green dot speed and thrust lever in the MCT detent with A/THR disconnected).

This is flown in selected speed/Mach target by manually setting the green dot speed on the AFS CP computed by:
- The FMC based on aircraft weight, and indicated on the PFD, or
- The IN-FLT PERF OBSTACLE Green Dot descent type.

CRUISE TO DIVERSION AIRPORT

Applicable to: ALL

The flight crew may use the IN-FLT PERF LRC Speed cruise type to obtain current and predicted cruise performance data for a cruise at TEO LRC speed.
This is flown in selected speed/Mach target by manually setting the TEO LRC speed on the AFS CP computed by the IN-FLT PERF LRC Speed cruise type.
TEO LRC speed is defined as the Mach for which the SR is equal to 99 % of the maximum SR with two engines inoperative.

TEO LRC speed depends on:
- Cruise altitude
- Weight

L2 The LRC Mach increases when weight increases.

L1 - Temperature

L2 The LRC Mach decreases when temperature increases.

L1 - Wind

L2 The LRC Mach increases when headwind increases.

L1 - Air flow and Anti-ice.

IN CRUISE - LRC SPEED

Applicable to: ALL

An IN CRUISE LRC Speed TEO planning is divided into three main flight phases:
- A cruise phase at TEO LRC speed
- A descent at standard descent speed profile
- A standard approach and landing.

GD SPEED

Applicable to: ALL

In CONF CLEAN, the standard TEO holding speed is the green dot.
The flight crew may use the GD Speed speed type to calculate holding performance for a holding in selected speed/Mach target, at green dot speed, and in CONF CLEAN.
This is flown by manually setting the green dot speed on the AFS CP, computed by the FMC based on aircraft weight, and indicated on the PFD.
The GD Speed speed type gives an average value of green dot speed during the holding phase.

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AIRCRAFT STATUS PANEL

Applicable to: ALL

The current aircraft status must be considered for the computation.
The reminder area of the AIRCRAFT STATUS panel lists CDL items and Non Standard Configuration (NON STD CONF) items that have an impact on in-flight performance.
If no CDL /NON STD CONF item that affects in-flight performance is selected, "normal" appears in the reminder area of the AIRCRAFT STATUS panel.

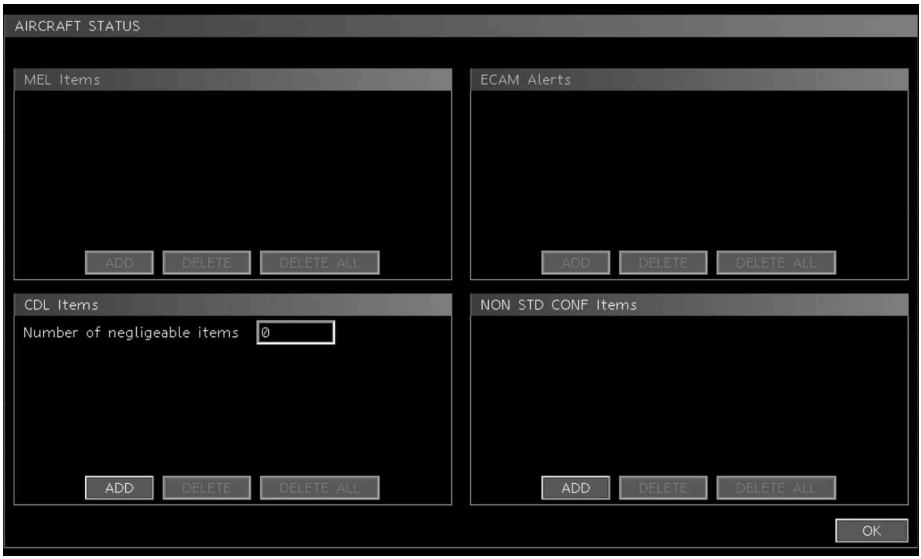
Reminder area of the AIRCRAFT STATUS Panel



By clicking on the ACFT STS button, the flight crew opens the AIRCRAFT STATUS panel.

The AIRCRAFT STATUS panel is divided in four subpanels:
- MEL Items
- CDL Items
- ECAM Alerts
- NON STD CONF Items.

AIRCRAFT STATUS Panel



NON STD CONF

Applicable to: ALL

The NON STD CONF Items subpanel displays the non-standard configurations selected by the flight crew.
To open the NON STD CONF Items panel, the flight crew uses the ADD button of the NON STD CONF Items subpanel . The NON STD CONF Items panel displays the list of non-standard configurations that affect the in-flight computation and that involve in-flight performance penalties (e.g. fuel consumption increase, altitude restriction, speed limitation).

NON STD CONF Items Panel



To add a non-standard configuration item, the flight crew selects the appropriate status for each item in the drop-down lists.
The selected items appears in the NON STD CONF Items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

FLAPS / SLATS

The flight crew defines the aircraft aerodynamic configuration if this one is different from CLEAN.
The FLAPS / SLATS item is not available in the HLD module (standard configuration).

SPD BRK

The flight crew selects EXTENDED if the speed brakes are extended.
The SPD BRK item is disabled in the CLB module.
The SPD BRK item is not available in the DES module (standard configuration).

ENG INOPERATIVE STS

The flight crew selects FAN BLDS REMOVD if the aircraft is dispatched with three engines ferry flight and in core blank configuration.
For more information about the three engines ferry flight speed profile, *Refer to Three Engines Ferry Flight Procedure - Performance Data* .

L/G

The flight crew selects EXTENDED in the case of L/G RETRACTION FAULT.
For more information about the L/G RETRACTION FAULT procedure, *Refer to PRO-ABN-ECAM-10-32-70 L/G RETRACTION FAULT* .
The flight crew select DISPATCH WITH GEAR DOWN if the aircraft is dispatched with landing gear down and the gear doors closed.
For more information about the dispatch with gear down, *Refer to Flight With Gear Down* .

Note: *In the CRZ module and the PLAN module, do not use a Mach number speed input for a computation with L/G EXTENDED or DISPATCH WITH GEAR DOWN.*
Workaround: Enter the speed input directly in CAS .

L/G DOORS

The flight crew selects OPEN in the case of L/G DOORS NOT CLOSED.
For more information about L/G DOORS NOT CLOSED, *Refer to PRO-ABN-ECAM-10-32-80 L/G DOORS NOT CLOSED* .

Note: *In the CRZ module and the PLAN module, do not use a Mach number speed input for a computation with L/G DOORS OPEN.*
Workaround: Enter the speed input directly in CAS .

PRESSURIZATION

The fight crew selects DISPATCH WITHOUT in the case of a flight without cabin pressurization.
For more information about a flight without cabin pressurization, *Refer to Flight Without Cabin Pressurization - Overview* .

MEL

Applicable to: ALL

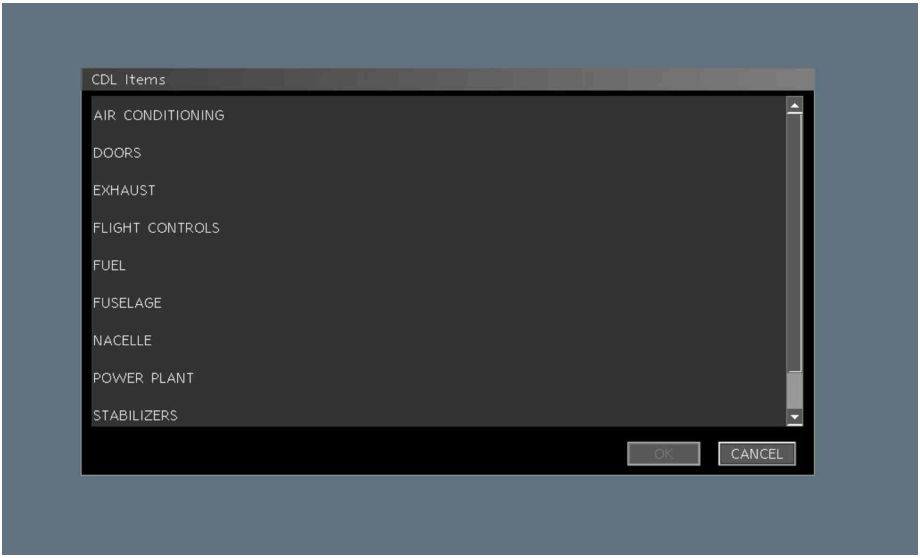
This function is not available yet.

CDL

Applicable to: ALL

The CDL Items subpanel displays the number of negligible items. Depending on this number, penalties will be applied for the in-flight computation.
By clicking on the ADD button of the CDL Items subpanel, the flight crew opens the CDL Items panel.
The CDL Items panel displays the list of structural parts that could be missing. These items involve performance penalties.

CDL Items Panel



The flight crew selects a CDL item by first selecting the applicable system, and then the corresponding failure case. The flight crew must enter the appropriate number of items that are missing.
Items selected from the lists on the CDL Items panel appears in the CDL Items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

IN-FLT PERF does not include the following CDL items affecting high speed performance:
- 27-03 Slat Blade Seal
- 27-05 Aileron End Seal
- 27-14 Droop Nose Blade Seal
- 54-02 Pylon Apron Seal
- 57-06 Seal of FTE lower panel to flap.

For these CDL items, the flight crew must manually:

- Enter the fuel consumption penalty published in the OPS LIBRARY / CDL manual into the FUEL FACTOR field
- Reduce the computed ceilings by the en-route performance altitude penalty available in the OPS LIBRARY / CDL manual
  The flight crew can use the following conversion rate from the published weight penalty to the ceiling penalty: 10 kg corresponds to 1 ft.

Note: *Ticked CDL items from the AFM are not transferred to the IN-FLT PERF application. The flight crew must select directly the CDL items in the IN-FLT PERF application*

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GENERAL

Applicable to: ALL

The FMS predictions do not consider the over consumption resulting from any failure except the engine one.
In the case of a failure leading to an increase in the fuel consumption, the ECAM STATUS page displays "FUEL CONSUMPT INCRSD : FMS PRED DISREGARD".
Therefore, the flight crew can use IN-FLT PERF to assess this over consumption by selecting the corresponding ECAM Alerts item.

IMPACT ON INPUT

Applicable to: ALL

When the flight crew selects an ECAM Alerts item, the CLB, DES and ATMO modules are disabled.

The flight crew can perform CRZ, HLD, and PLAN computations:
- With only one ECAM Alerts item
- With all engine operative
- With the following fixed state of the Non Standard Configuration items:
  - FLAPS / SLATS: CLEAN
  - SPD BRK: RETRACTED
  - 1 ENG OUT FERRY FLIGHT: NO
  - L/G: RETRACTED
  - L/G DOORS: CLOSED

Only the IN CRUISE computation type is enabled for PLAN computation.

IMPACT ON RESULTS

Applicable to: ALL

The selection of an ECAM Alerts item modifies the RESULTS panel.
The label “IN-FLIGHT FAILURE SELECTED” appears in red on the RESULTS panel.
All the results parameters consider the effect of the selected ECAM Alerts item.

CRZ MODULE

FUEL

The FUEL panel displays an additional parameter named PERF FACTOR WITH FAILURE.
If the flight crew selects an ECAM Alerts item, IN-FLT PERF optimizes the associated fuel penalty depending on the flight conditions, contrary to the FCOM envelope fuel penalties that are conservatives.
This associated fuel penalty factor is named Performance Factor With Failure (LPFC).
LPFC is computed using the worse possible state of the failure. Therefore, the flight crew should adjust the LPFC value during the flight, via an appropriate in-flight fuel check.

ALT

The STEP TO field disappears.

MORE PANEL

LPFC is added in the TABLE results and in the GRAPH results.

HLD MODULE

The RESULTS panel displays an additional parameter named Average PERF FACTOR WITH FAILURE.
If the flight crew selects an ECAM Alerts item, IN-FLT PERF optimizes the associated fuel penalty depending on the flight conditions, contrary to the FCOM envelope fuel penalties that are conservatives.
This associated fuel penalty factor is named Performance Factor With Failure (LPFC).
LPFC is computed using the worse possible state of the failure. Therefore, the flight crew should adjust the LPFC value during the flight, via an appropriate in-flight fuel check.
The HLD module displays an average LPFC along the holding phase.

PLAN MODULE

The MORE panel disappears. There are no more TABLE results and GRAPH results.

The PLAN module automatically computes and displays two types of results:
- Fuel, time and air distance at current conditions without In-Flight Failure

- Fuel, time and air distance at current conditions with the selected In-Flight Failure (with the ECAM Alerts item selected by the flight crew)

The RESULTS panel also displays an additional parameter named AVERAGE FUEL PENALTY FACTOR.
If the flight crew selects an ECAM Alerts item, IN-FLT PERF optimizes the associated fuel penalty depending on the flight conditions, contrary to the FCOM envelope fuel penalties that are conservatives.
This associated fuel penalty factor is named Performance Factor With Failure (LPFC).
LPFC is computed using the worse possible state of the failure. Therefore, the flight crew should adjust the LPFC value during the flight, via an appropriate in-flight fuel check.
The PLAN module displays an average LPFC along the trip.

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PERFORMANCE

LANDING

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LANDING PERFORMANCE CALCULATION

Applicable to: ALL

The landing performance calculation determines the Maximum Landing Weight Limited by the Performance (MLW(PERF)).

The landing performance calculation checks that the aircraft can land at destination in compliance with the regulatory requirements.

The landing performance is calculated for each runway, the aircraft settings (flaps, air conditioning and anti-ice selection), the outside conditions (temperature, wind and QNH), and the go-around gradient.

LDG PERF COMPUTATION

Applicable to: ALL

The Landing Performance Application (LDG PERF) provides the performance information to the flight crew for landing.

The flight crew uses LDG PERF:

- In DISPATCH computation type, to determine the MLW(PERF) during the flight preparation
- In IN-FLIGHT computation type, to check during the flight the landing performance in the case of a significant change of the conditions since the dispatch.

L2 The significant change may be a failure occurring during the flight, a change in the weather conditions or a change of the runway in use.

L1 MLW(PERF)

To calculate the MLW(PERF), the flight crew enters the forecasted conditions at destination and may use the certified MLW for Landing Weight (LW) input.

Note: Even if MLW(PERF) is more than the certified MLW , the aircraft must be dispatched with a landing weight below the certified MLW .

When the MLW(PERF) is below the LW value entered by the flight crew, LDG PERF displays the labels "- - -" instead of some output values.

LANDING DATA

To calculate the landing data, the flight crew enters the forecasted conditions and aircraft weight. LW input must be below or equal to MLW(PERF).

OVERWEIGHT LANDING

The overweight landing calculation is only available in In-Flight computation type. In the case of an overweight landing, the flight crew enters a LW above the certified MLW , which must be below the certified MTOW .

L2 For more information about the overweight landing procedure, *Refer to PRO-ABN-ECAM-10-80-50 MISC OVERWEIGHT LDG* .

LDG PERF PARAMETERS

Applicable to: ALL

INPUT PARAMETERS

LDG PERF uses the following landing performance parameters:

- The characteristics of the runway

L2
- Landing Distance Available (LDA)
- Elevation
- Slope.

For more information about the characteristics of the runway, *Refer to PER-LND-LCD-RWY Airport Panel* .

L1 - The outside conditions

L2
- Temperature
- Wind
- Sea level atmospheric pressure (QNH)
- Anti-ice
- Runway state.

For more information about the outside conditions, *Refer to PER-LND-LCD-OCD Outside Conditions Subanel* .

L1 - The aircraft configuration

L2
- Landing Weight (LW)
- Aerodynamic configuration
- Air conditioning
  The flight crew may improve go-around performance by selecting air conditioning OFF.
- Aircraft CG position.
- Approach speed

For more information about the aircraft configuration, *Refer to PER-LND-LCD-ACC Aircraft Configuration Subpanel* .

L1 - The aircraft status.

L2
- Configuration Deviation List (CDL)
- Minimum Equipment List (MEL)
- ABNORMAL & EMERGENCY (ABNEMER) Configuration (for in-flight computation only).

For more information about the aircraft status in dispatch, *Refer to PER-LND-LCD-AFS AIRCRAFT STATUS Panel* .
For more information about the aircraft status in flight, *Refer to PER-LND-LCF-AFS AIRCRAFT STATUS Panel* .

L1 OUTPUT PARAMETERS

LDG PERF provides the following results:

- The approach and go-around speeds and the speed increments

L2
- Go-around speed
- VAPP (for in-flight computation only)
- Vref (for in-flight computation only)
- Vpilot (for in-flight computation only)
- Wind speed increment (for in-flight computation only)
- Failure speed increment (for in-flight computation only).

For more information about these speeds, *Refer to PER-LND-LRF-FSR Landing Speed* .

L1 - The aircraft data

L2
- Flaps
- Go-around gradient
- Landing Weight (LW)
- Maximum Landing Weight Limited by Performance (MLW(PERF)).

For more information about the landing weights, *Refer to PER-LND-LRD-DSR Landing Weights* .

L1 - The limitations

L2 For more information about the landing limitation codes, *Refer to PER-LND-LRD-DSR Landing Limitation Codes* .

L1 - The landing distances.

L2
- Landing Distance (LD)
  For more information about the LD in dispatch, *Refer to PER-LND-LRD-DSR Landing Distances* .
  For more information about the LD in flight, *Refer to PER-LND-LRF-FSR Landing Distances* .
- Stop margin (for in-flight computation only).
  For more information about the Stop margin, *Refer to PER-LND-LRF-FSR Stop Margin* .

LANDING DISTANCE DEFINITIONS

Applicable to: ALL

ACTUAL LANDING DISTANCE

The Actual Landing Distance (ALD) is the distance covered from a point at which the aircraft is 50 ft above the runway threshold to a full stop.

The calculation of the ALD considers that:

- The approach speed is:
  - VLS for manual landing, or
    VLS is equal to 1.23 VS1G of the current flaps setting. L2
  - VLS + 5 kt for CAT II / CAT III automatic landing. L1

  Note: Landing should be calculated at least at VLS + 5 kt when the approach is planned with the use of A/THR.

- The flight crew applies maximum braking at the main gear touchdown
- The antiskid system is operating
- The ground spoilers are operating
- The thrust reversers selection is possible depending on the Operator's policy, except on dry runways.

REQUIRED LANDING DISTANCE

MANUAL LANDING

On a dry runway, the Required Landing Distance (RLD) is the ALD divided by 0.6.
On a wet runway, the RLD is the RLD calculated for the dry runway multiplied by 1.15.

For EU OPS and JAR OPS operators, on a contaminated runway, the RLD is the greater of:

- The RLD calculated on wet runway
- The ALD calculated on the contaminated runway multiplied by 1.15.

AUTOMATIC LANDING

The RLD for an automatic landing is the greater of:

- The ALD calculated in the automatic landing multiplied by 1.15
- The RLD in the manual mode.

CAUTION	LDG PERF does not automatically check that the RLD for automatic landing is higher than or equal to the RLD in manual mode.

DISPATCH REQUIREMENTS

Applicable to: ALL

REQUIREMENT ON THE LANDING DISTANCE

The Landing Distance Available (LDA) at destination must be at least equal to the Required Landing Distance (RLD) for the planned landing weight.
In the case of a dispatch with a MEL or CDL item, the LDA must be at least equal to the RLD calculated with the applicable MEL or CDL item selected.
In all cases, the dispatch requirement is: RLD ≤ LDA.

REQUIREMENT ON THE GO-AROUND PERFORMANCE

In Normal, CAT II, and CAT III conditions, the go-around climb gradient must be at least equal to:
- 2.7 %
- The gradient published in the airport approach chart.

DIVERSION REQUIREMENTS

Applicable to: ALL

In the case of a diversion, the flight crew calculates the landing distance based on the ALD plus Operator's margins, and the go-around climb gradient in the forecasted conditions at the diversion airport. The LDA at the diversion airport must be at least equal to this landing distance. The requirement for the go-around climb gradient for the diversion is defined in the same way as in the dispatch requirement.

IN-FLIGHT FAILURE REQUIREMENTS

Applicable to: ALL

In the case of a failure that occurs during the flight and that affects the landing performance, the resulting landing distance with failure is the ALD with failure plus Operator's margins.
The ALD with failure is equal to the ALD without failure multiplied by the landing distance coefficient associated to the failure.
For more information about the landing performance following failure, *Refer to Landing Performance Following Failure - General* .

OVERWEIGHT LANDING REQUIREMENTS

Applicable to: ALL

In exceptional conditions, for example an in-flight turn-back, or a diversion, the flight crew can land the aircraft at a weight above the certified Maximum Landing Weight (MLW).
In the case of an overweight landing, the flight crew calculates the landing distance based on the ALD plus Operator's margins, and the go-around climb gradient. The LDA must be at least equal to this landing distance. The requirement for the go-around climb gradient for the overweight landing is the same as in the dispatch requirement. For more information about the dispatch requirement, *Refer to PER-LND-GEN Dispatch Requirements* .

L2 As per Overweight Landing Procedure, if a go-around in CONF 3 (landing in CONF FULL) does not comply with the go-around gradient constraint, the flight crew lands in CONF 3 and performs go-around in CONF 1+F.

L3 The go-around in CONF 1+F is permitted because VS1G of the go-around configuration (CONF 1+F) is less than VS1G of the landing configuration (CONF 3) multiplied by 1.1.

L1 The flight crew must apply the abnormal procedure for overweight landing. For more information about the Overweight Landing Procedure, *Refer to PRO-ABN-ECAM-10-80-50 MISC OVERWEIGHT LDG* .

L2 In the case of an overweight landing, LDG PERF uses the recommended application sequence of braking means for the computation. LDG PERF considers that the flight crew applies maximum braking after the nosewheel touchdown.

USE OF THE AUTOBRAKE SYSTEM

Applicable to: ALL

The autobrake system helps the flight crew in the case of:
- Rejected takeoffs
- Landing.

L2 For more information about the autobrake system, *Refer to DSC-32-10-30-20 Autobrake* .

SEVERE ICING

Applicable to: ALL

The OIS does not take into account severe icing conditions.

Therefore, the flight crew must manually decrease the approach climb limiting weight by 7 % if:
- Icing conditions are predicted during the flight
- The Total Air Temperature (TAT) is less than 10 °C
- There is a significant ice accretion on the non-heated structure.

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LDG PERF INITIALIZATION

Applicable to: ALL

FLT OPS STS

The Flight Operations Status (FLT OPS STS) page defines the aircraft context (aircraft registration, MSN) and the flight context (flight number, city pair).

The purpose of the aircraft and flight contexts is to:
- Secure the communication between the FLT OPS applications
- Prevent the use of incorrect inputs coming from another flight.

This common reference page enables the other FLT OPS applications to synchronize with the aircraft and flight data entered in the FLT OPS STS page.
For more information about the FLT OPS STS page, *Refer to DSC-46-20-10-30 FLT OPS STS Page* .

PREREQUISITE TO START LDG PERF

FLIGHT OPERATION STATUS

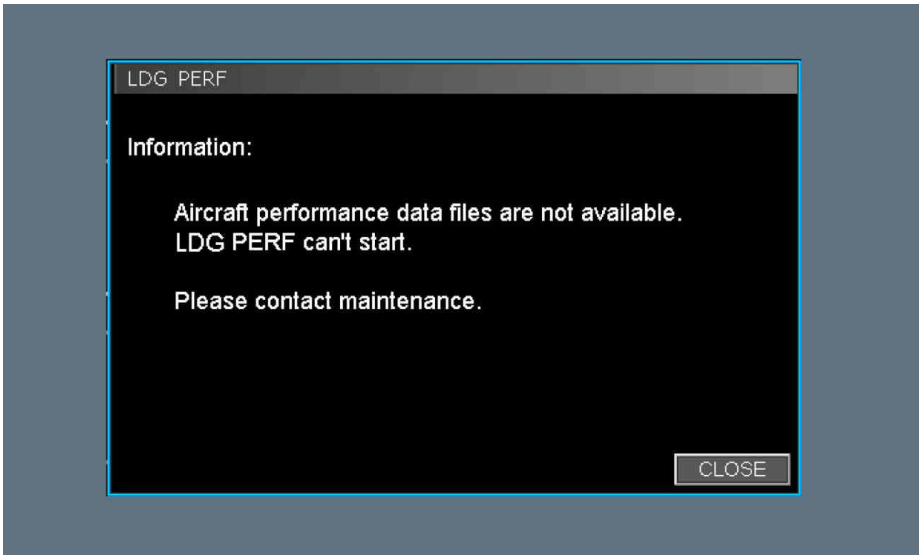
To enable the start of LDG PERF, the following mandatory parameters must be defined in the FLT OPS STS page:
- The aircraft registration (ACFT REGISTRATION)
- The manufacturer serial number (MSN)
- The flight number (FLT NBR)
- The departure airport (FROM)
- The destination airport (TO).

If one of the previous parameters is not defined, the flight crew cannot start LDG PERF.
When the flight crew starts LDG PERF, the destination airport (TO) of the FLT OPS STS page is automatically transferred in LDG PERF and displayed in yellow in the AIRPORT field of the SINGLE RWY COMPUTATION panel.

PERFORMANCE DATABASES

When the flight crew starts LDG PERF without the relevant performance databases, the following error message appears and LDG PERF cannot start:

Error at LDG PERF Start



The flight crew needs to contact the ground.

CHANGE OF AIRPORT IN LDG PERF

Applicable to: ALL

When the flight crew changes the destination airport directly in LDG PERF, this is considered as a landing performance calculation during a diversion.
The flight remains the same so the FLT OPS STS page parameters do not change.

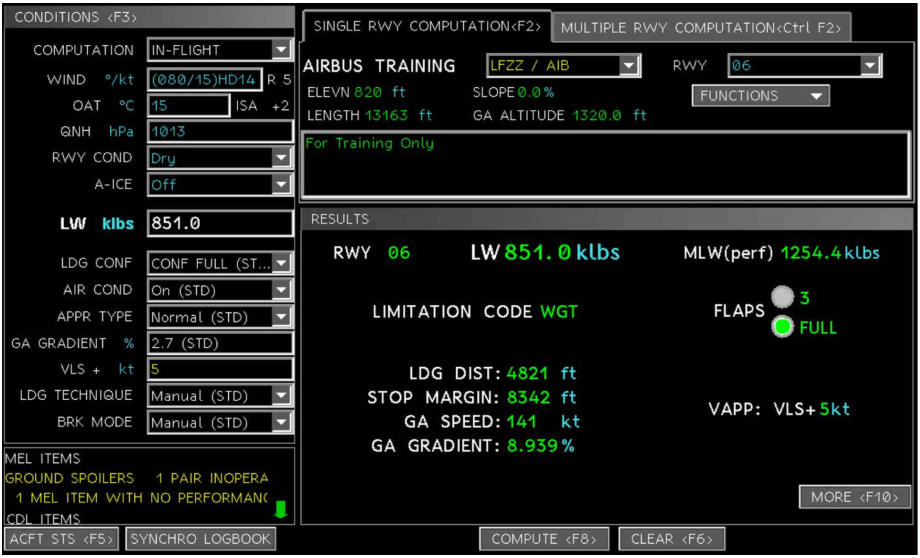
To avoid the use of irrelevant landing data corresponding to the FLT OPS STS airport, the application:

- Resets to default values all input data of LDG PERF
- Defaults the LW to the MSLW
- Deletes previous LDG PERF results
- Keeps MEL, CDL, and ECAM ALERTS selected and valid
- Breaks the connection to LOADSHEET (communication capability with LOADSHEET is lost).

LDG PERF INTERFACE

Applicable to: ALL

LDG PERF Interface



SINGLE RWY COMPUTATION / MULTIPLE RWY COMPUTATION

The flight crew can:
- Select one or more runway(s)
- View the runway characteristics
- Modify the selected runway(s).

For more information about airports and runways:
- *Refer to Dispatch Mode* , or
- *Refer to In Flight Mode* .

CONDITIONS

This panel displays the outside conditions and the desired aircraft configuration:

OUTSIDE CONDITIONS

The flight crew enters the outside conditions.

For more information about the outside conditions:
- *Refer to Dispatch Mode* , or
- *Refer to In Flight Mode* .

AIRCRAFT CONFIGURATION

The flight crew selects the desired aircraft configuration.

For more information about the aircraft configuration:
- *Refer to Dispatch Mode* , or
- *Refer to In Flight Mode* .

AIRCRAFT STATUS

The flight crew can select:
- Inoperative systems that affect the landing performance
- CDL items that affect the landing performance
- ECAM alerts that affect the landing performance.

For more information about the aircraft status:
- *Refer to Dispatch Mode* , or
- *Refer to In Flight Mode* .

RESULTS

The layout of the RESULTS panel depends on the computation mode.

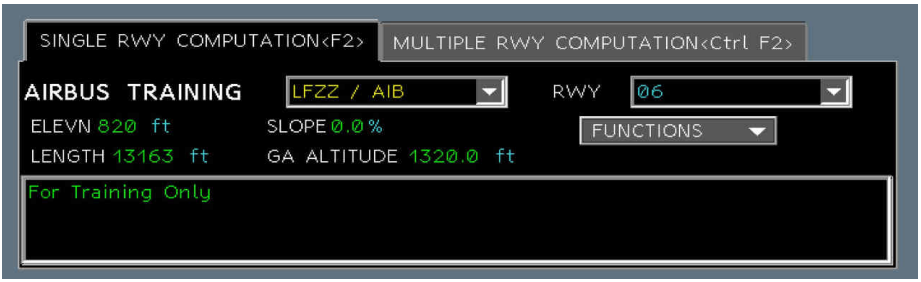
For more information about the landing calculation results:
- *Refer to Dispatch Mode — Single Runway* , or
- *Refer to Dispatch Mode — Multiple Runway* , or
- *Refer to In Flight Mode — Single Runway* , or
- *Refer to In Flight Mode — Multiple Runway* , or
- *Refer to Landing Performance Following Failure* .

AIRPORT PANEL

Applicable to: ALL

The flight crew uses the airport panel to select the airport and runway(s).

Airport Panel



SINGLE RWY COMPUTATION

For more information about the SINGLE RWY COMPUTATION panel, *Refer to PER-LND-LCD-RWY SINGLE RWY COMPUTATION Panel* .

MULTIPLE RWY COMPUTATION

For more information about the MULTIPLE RWY COMPUTATION panel, *Refer to PER-LND-LCD-RWY MULTIPLE RWY COMPUTATION Panel* .

FUNCTIONS

For more information about the runway modification FUNCTIONS:

- *Refer to MODIFY RWY - Reduced Mode* , or
- *Refer to FUNCTIONS - Full Mode* .

SINGLE RWY COMPUTATION PANEL

Applicable to: ALL

GENERAL

A landing performance calculation takes into account the following runway characteristics:

- Landing Distance Available (LDA)

L2 For more information about LDA , *Refer to PER-LND-LCD-RWY LDA* .

L1 - Elevation

L2 For more information about elevation, *Refer to PER-LND-LCD-RWY Elevation* .

L1 - Slope

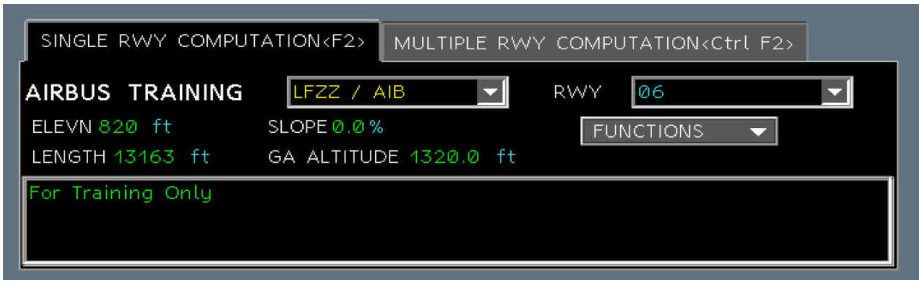
L2 For more information about slope, *Refer to PER-LND-LCD-RWY Slope* .

L1 - Go-around altitude.

L2 For more information about go-around altitude, *Refer to PER-LND-LCD-RWY Go-Around Altitude* .

L1 **LDG PERF**

SINGLE RWY COMPUTATION Panel



The flight crew uses the SINGLE RWY COMPUTATION panel to select the intended runway.

AIRPORT SELECTION

The AIRPORT drop-down list provides a list of available airports. This list is sorted by airport codes.

RUNWAY SELECTION

When the flight crew has selected an airport, the RWY drop-down list provides a choice of runways applicable to that airport.

RUNWAY CHARACTERISTICS

The runway characteristics are:

- Runway ID

- Elevation
- Slope
- Length.

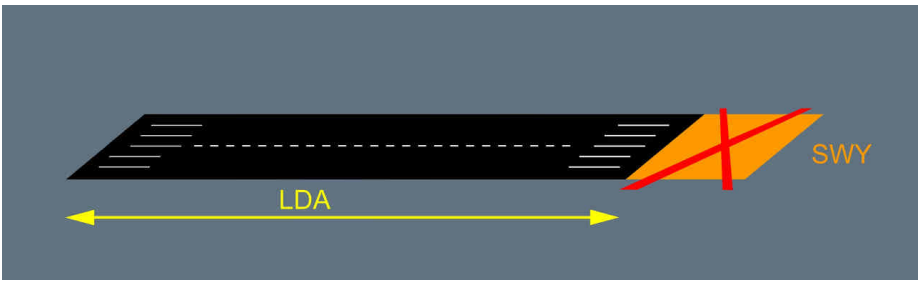
LDA

Applicable to: ALL

The Landing Distance Available (LDA) is the runway length available for landing.

Note: *As per regulation, the stopway is not used for landing calculation.*

Landing Distance and Stopway



ELEVATION

Applicable to: ALL

Runway elevation is the geometric altitude of the runway above mean sea level.

L2 The runway elevation and the QNH are used for pressure altitude determination.

L1 For more information about the effect of pressure altitude on landing performance, *Refer to PER-LND-LCD-OCD QNH* .

SLOPE

Applicable to: ALL

The landing is authorized on runways that have an average slope between -2 % and 2 % .

L2 The upward slope decreases the landing distance.

The downward slope increases the landing distance.

L1 *Note: As per regulation, LDG PERF considers the slope effect only for autoland. For manual landing, the regulatory margin included in the required landing distance covers the slope effect.*

L2 For more information about the Required and the Actual Landing Distance, *Refer to PER-LND-GEN Landing Distance Definitions* .

GO-AROUND ALTITUDE

Applicable to: ALL

The GA ALTITUDE field is optional. The display of GA ALTITUDE is at the Airline's discretion.
GA ALTITUDE is a geometrical altitude. The GA ALTITUDE is specific to the selected airport.

GA ALTITUDE is equal to the sum of:
- A go-around height, which is at the Airline's discretion
- The elevation of the runway threshold.

If GA ALTITUDE does not appear on the Airport panel, LDG PERF computes the go-around gradients at an altitude equal to the runway threshold altitude.
If GA ALTITUDE appears on the Airport panel, LDG PERF computes the go-around gradients at an altitude equal to GA ALTITUDE.
The GA ALTITUDE option enables the flight crew to compute go-around gradients at a more operational go-around height.
The higher the GA ALTITUDE, the lower the go-around gradients.

MODIFY RWY SUBPANEL

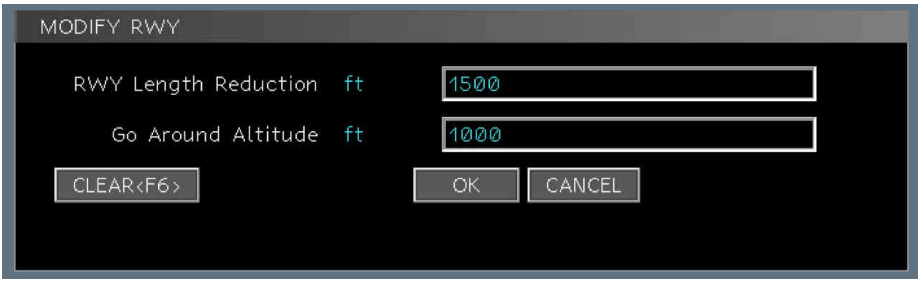
Applicable to: ALL

The flight crew uses the MODIFY RWY subpanel to modify the characteristics of the selected runway by decreasing the runway length or entering the new go-around altitude.

L2 The flight crew can access this subpanel using the MODIFY RWY button of the SINGLE RWY COMPUTATION panel.

For more information about the SINGLE RWY COMPUTATION panel, *Refer to PER-LND-LCD-RWY Airport Panel* .

MODIFY RWY Subpanel



L1 RWY LENGTH REDUCTION

The flight crew can enter the runway length reduction.

The runway length (LENGTH) displayed on the SINGLE RWY COMPUTATION panel is reduced according to the entered value.

The SINGLE RWY COMPUTATION panel displays the label “LENGTH MODIFIED” to indicate that the flight crew has modified the runway length.

GO-AROUND ALTITUDE

The "Go Around Altitude" field is optional and is displayed if this information is available on the SINGLE RWY COMPUTATION panel.

The flight crew can enter a new go-around altitude value.

The go-around altitude (GA ALTITUDE) displayed on the SINGLE RWY COMPUTATION panel is equal to the value entered in the MODIFY RWY Subpanel.

The SINGLE RWY COMPUTATION panel displays the label “GA ALTITUDE MODIFIED” to indicate that the flight crew has modified the go-around altitude.

L2 For more information about the go-around altitude, *Refer to PER-LND-LCD-RWY Go-Around Altitude* .

CREATE RWY - FULL MODE

Applicable to: ALL

FUNCTIONS

The FUNCTIONS drop down list enables the flight crew to:

- MODIFY RWY: To modify the characteristics of an existing runway
- RESTORE RWY: To reset to default values the characteristics of an existing runway after the flight crew has modified it
- CREATE RWY: To create a new runway for an existing airport or for a new airport
- EDIT RWY: To edit the characteristics of the runway that the flight crew has created
- DELETE RWY: To delete a previously created runway.

MODIFY RWY

The flight crew uses the RUNWAY MODIFICATION/CREATION Panel to modify the characteristics of the selected runway.

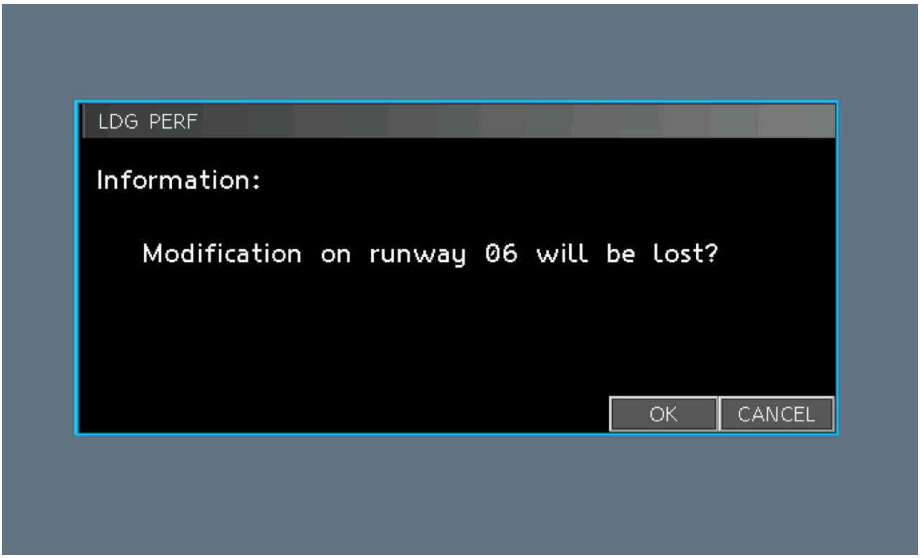
L2 The flight crew can access this panel by selecting MODIFY RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

RUNWAY MODIFICATION/CREATION Panel



L1 The runway characteristics displayed on the SINGLE RWY COMPUTATION panel are updated according to the entered value.
The SINGLE RWY COMPUTATION panel displays the label “MODIFIED” after the runway ID to indicate that the flight crew has modified the characteristics of the runway. Each modified runway characteristic is displayed with the color cyan.
If a runway has already been created or modified for an airport, and if the flight crew selects MODIFY RWY for another runway of the same airport, a dialog box warns the flight crew that the previous created or modified runway will be lost.

Dialog Box



RESTORE RWY

The flight crew can reset to default values the characteristics of an existing runway after it has been modified.

CREATE RWY

The RUNWAY MODIFICATION/CREATION panel enables the flight crew to:
- Create a new runway for an existing airport, or
- Create a new airport with an associated runway.

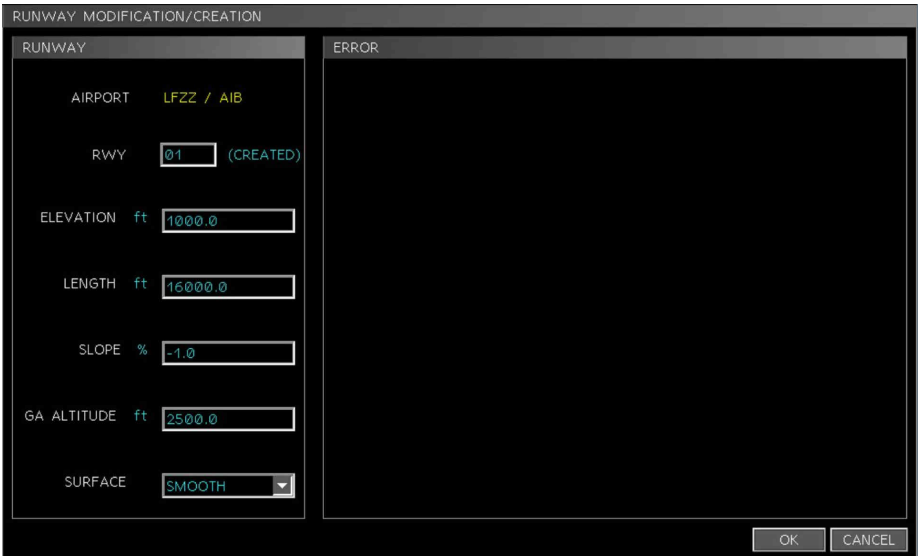
The SINGLE RWY COMPUTATION panel displays the label “CREATED” after the runway ID to indicate that the flight crew has created a new runway.

CREATE A NEW RUNWAY FOR AN EXISTING AIRPORT

To create a new runway for an existing airport, the flight crew:
- First selects an existing airport in the AIRPORT drop down list of the SINGLE RWY COMPUTATION panel, and
- Then selects CREATE RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

LDG PERF displays the following panel:

RUNWAY MODIFICATION/CREATION Panel



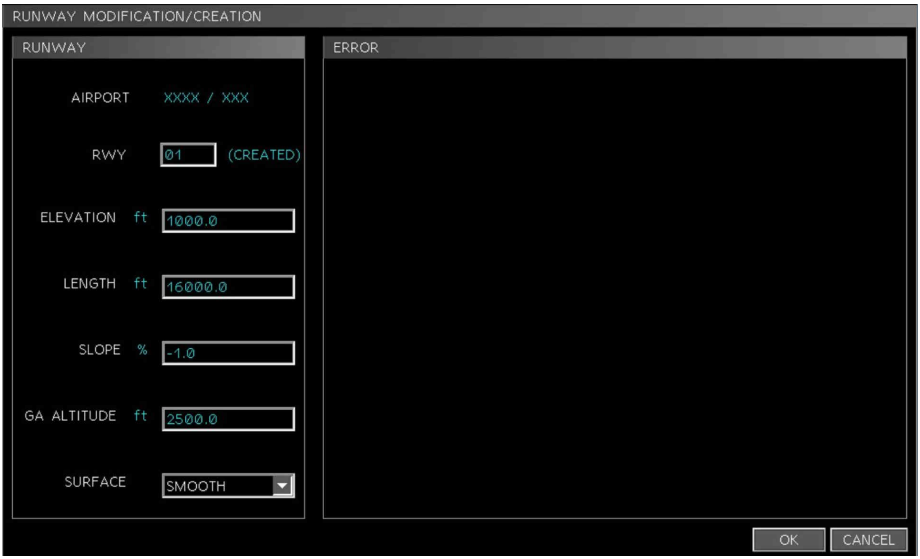
Note: The field SURFACE appears on the RUNWAY MODIFICATION/CREATION panel. This option should not be available as the A380 has not the grooved runway option capability. The selection of the GROOVED/PFC option does not lead to additional landing benefit. Whatever the SURFACE selection, the LDG PERF calculation considers the SMOOTH SURFACE.

CREATE A NEW AIRPORT WITH AN ASSOCIATED RUNWAY

To create a new airport with an associated runway, the flight crew:
- First checks that the AIRPORT drop down list of the SINGLE RWY COMPUTATION panel is empty, and
- Then selects CREATE RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

LDG PERF displays the following panel:

RUNWAY MODIFICATION/CREATION Panel



Note: The field SURFACE appears on the RUNWAY MODIFICATION/CREATION panel. This option should not be available as the A380 has not the grooved runway option capability. The selection of the GROOVED/PFC option does not lead to additional landing benefit. Whatever the SURFACE selection, the LDG PERF calculation considers the SMOOTH SURFACE.

EDIT RWY

When the flight crew has created a new runway, he can then edit the characteristics of this runway.

DELETE RWY

The flight crew can only delete a runway that has been previously created. The flight crew cannot delete the runways already available in the airport database loaded into LDG PERF.
To delete a runway, the flight crew selects DELETE RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

MULTIPLE RWY COMPUTATION PANEL

Applicable to: ALL

The flight crew uses the MULTIPLE RWY COMPUTATION panel to select several runways for which computation will be performed in the current conditions.
L2 This function increases calculation time.

MULTIPLE RWY COMPUTATION Panel



L1 AIRPORT SELECTION

The AIRPORT drop-down list provides a list of the available airports.

RUNWAY TABLE

The flight crew uses the runway table to select the runways on which the computation will be performed.

Intentionally left blank

OUTSIDE CONDITIONS SUBANEL

Applicable to: ALL

The Outside Conditions subpanel provides the following information:

- Wind
- Outside Air Temperature (OAT)
- Pressure at the Mean Sea Level (QNH)
- Runway conditions
- Anti-ice status.

Outside Conditions Subpanel



WIND

Applicable to: ALL

GENERAL

L2 The longitudinal wind component affects the aircraft ground speed, and therefore the landing distances.

L1 The landing distance decreases in the case of headwind, and increases in the case of tailwind.

L2 In the case of headwind, the Approach Speed (VAPP) must additionally be increased to avoid speed loss close to the ground, since wind speed is often reducing as the aircraft descends. As a result, the beneficial headwind effect on the landing distance is compensated for by the increase of the Approach Speed (VAPP).
As per regulation, the computation is based on 150 % of the entered tailwind, and 50 % of the entered headwind.

L1 The crosswind component does not affect the calculation of the landing distance. However, a maximum crosswind component is demonstrated.
For more information about crosswind limitation, *Refer to PER-LND-CTA-CWD Crosswind* .

LDG PERF

There are two ways to define wind values:
- Longitudinal Speed Component
- Direction/Speed (or Direction/Speed/Gust) Combination.

The Direction/Speed (or Direction/Speed/Gust) Combination is required in the case of a MULTIPLE RUNWAY COMPUTATION.

Note: *Displayed wind values are rounded mathematically instead of conservatively, but there is no impact on the computation, which uses exact values.*

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED (OR DIRECTION/SPEED/GUST) COMBINATION

This wind input mode is compulsory when computations are made on multiple runways.

The flight crew can enter:
- The wind direction and the wind speed, or
- The wind direction, the wind speed, and the gust, if this option is enabled.

Direction/Speed Combination

The speed entry is projected along the runway axis and perpendicular to the runway axis. The longitudinal projection follows the same display rules as the longitudinal speed component entry mode.

LDG PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



Direction/Speed/Gust Combination

This entry mode is possible if a maximum crosswind limit is defined as gust included for one RWY COND at least.

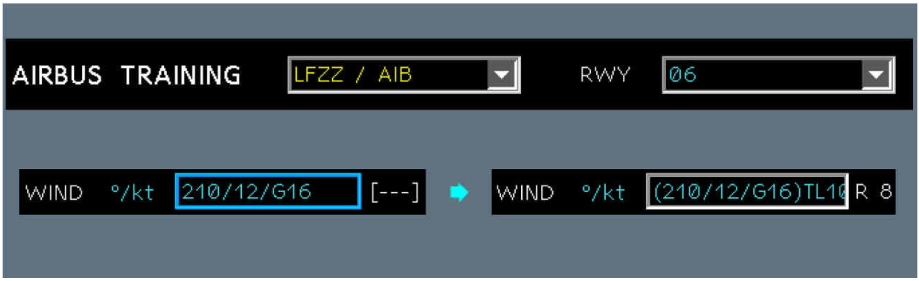
In this case, the flight crew can enter the value of the gust with the prefix G followed by the gust value (e.g. G16).
The speed entry (gust respectively) is projected along the runway axis and perpendicular to the runway axis.
The longitudinal projection follows the same display rules as the longitudinal speed component entry mode.

LDG PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

If the flight crew enters the gust, LDG PERF displays the perpendicular projection of the gust as the crosswind.

LDG PERF uses:
- The gust perpendicular component for the check of the maximum crosswind limitation if this one is defined as gust included for the selected RWY COND
- The steady wind perpendicular component for the check of the maximum crosswind limitation if this one is not defined as gust included for the selected RWY COND.

Wind Values Input - Direction/Speed/Gust Combination



OUTSIDE AIR TEMPERATURE

Applicable to: ALL

GENERAL

The Outside Air Temperature (OAT) affects the go-around performance.

Note: As per regulation, the effect of temperature on landing distance is only taken into account for water contaminated runway or autoland.

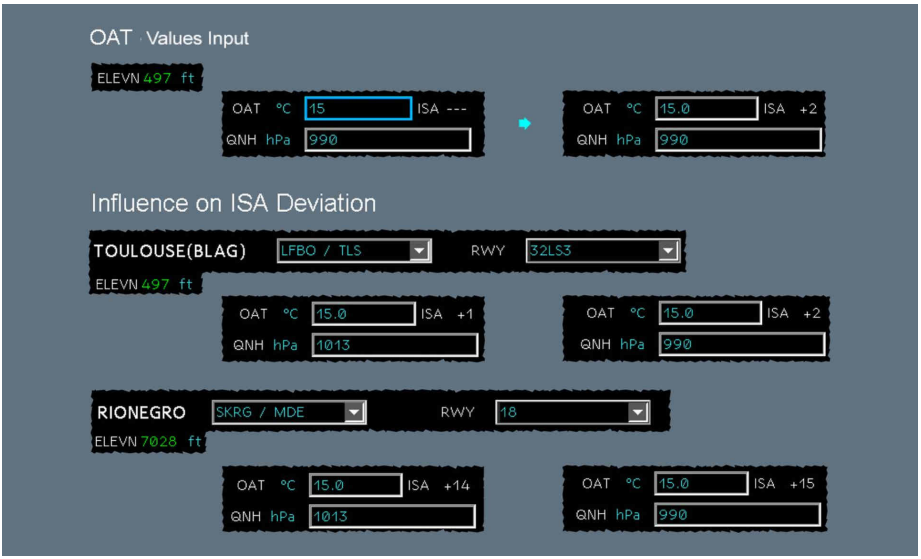
TEMPERATURE EFFECT ON ENGINE THRUST

The thrust provided by the engines at go-around rating (TOGA) versus OAT is constant up to the flat rating temperature (TREF).

When the OAT increases,
- The available engine thrust decreases above TREF
- The go-around climb gradients decrease.

LDG PERF

OAT Input



OAT VALUE INPUT

The OAT is the input parameter that gives the temperature at the arrival airport.

L2 The range of permitted OAT is the certified environmental envelope for landing, which depends on the airport pressure altitude and the runway condition.

L1 The deviation from the International Standard Atmosphere (ISA) is automatically computed and displayed next to the OAT field.

INFLUENCES ON ISA DEVIATION

The deviation from ISA is influenced by:

- The airport elevation
- The QNH value.

L2 For more information about the QNH , *Refer to PER-LND-LCD-OCD QNH* .

QNH

Applicable to: ALL

GENERAL

The QNH is the pressure at the Mean Sea Level (MSL).

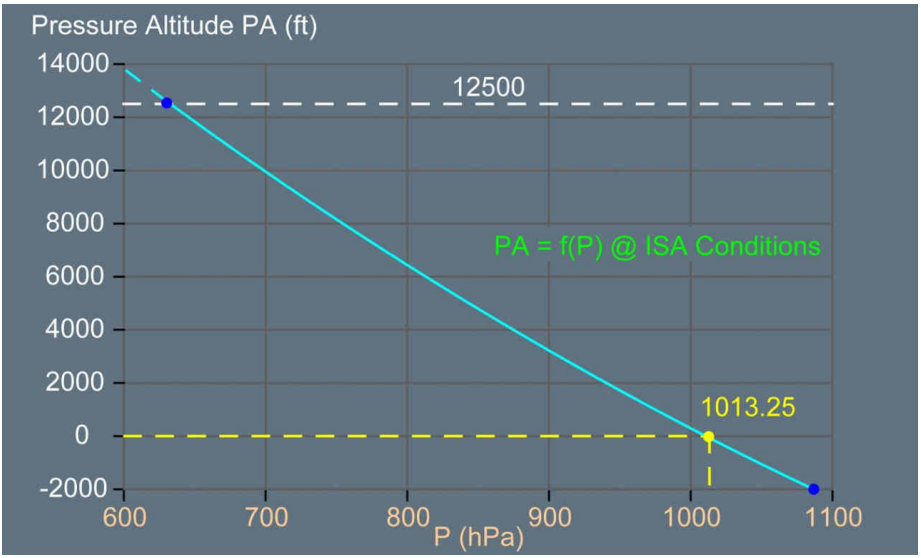
L2 The QNH is calculated from:
- The airport atmospheric pressure
- The airport elevation
  The airport elevation is the geometric altitude of the airport.
- The standard pressure law from ISA atmosphere.

At the airport level, with the QNH setting, in ISA conditions, the altimeter indicates the airport elevation.

L1 The airport Pressure Altitude (PA) depends on the QNH and the airport elevation.

L2 The PA is a barometric measurement converted into an altitude via the ISA law.

PA Function of Pressure (P)



L1 The QNH affects the aircraft landing speed and engine thrust.

QNH EFFECT ON LANDING SPEED

When the QNH decreases at a given airport elevation:
- The PA increases
- The air density ρ decreases
- A higher TAS is required for approach in order to maintain the same lift
- The landing distance is longer.

QNH EFFECT ON ENGINE THRUST

When the QNH decreases at a given airport elevation:
- The PA increases
- The available engine thrust decreases
- The landing distance increases
- The go-around climb gradients decrease.

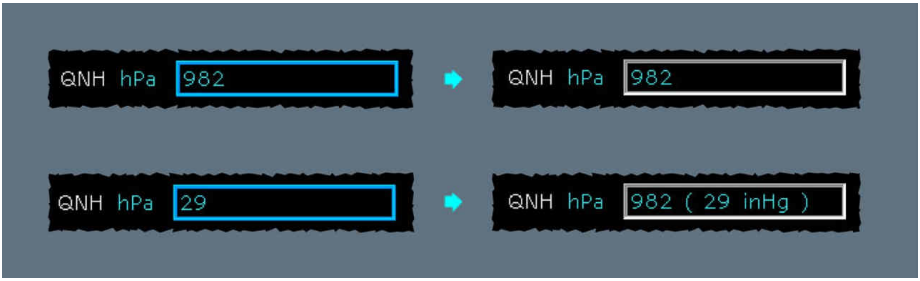
LDG PERF

The QNH is the input parameter that determines the pressure altitude, taking into account the airport elevation.

The flight crew can enter a QNH using the following units:
- Hecto Pascal (hPa)
- Inch of Mercury (inHg).

LDG PERF automatically detects the QNH format. For example, when the flight crew enters 29 for the QNH, LDG PERF automatically converts the value into the appropriate one for hPa unit.

QNH Input



L2 The airport elevation and the go-around altitude affect the QNH range.

RUNWAY CONDITIONS

Applicable to: ALL

GENERAL

The runway surface condition affects the landing performance and must be taken into account for MLW(PERF) calculation.
For more information about the runway conditions, *Refer to Runway Contamination* .

LDG PERF

The flight crew selects one of the following settings from the RWY COND drop-down list depending on the runway surface condition.

DRY

The flight crew selects “Dry” for dry runways.

WET

The flight crew selects “Wet” for runways covered with:
- Less than 0.12 in of Water, or
- Equivalent contaminants in terms of performance:
  - Less than 0.12 in of Slush, or
  - Less than 0.16 in of Wet Snow, or
  - Less than 0.59 in of Dry Snow.

For more information about equivalences, *Refer to PER-LND-CTA Equivalences for Performance* .

WATER 1/4" (6.3 MM)

The flight crew selects ”Water 1/4” (6.3 mm)” between 0.12 in and 0.50 in of Standing Water.
L2 For landing performance assessment, a higher contaminant depth systematically produces shorter landing distances. Airports tend to overestimate contaminant thicknesses in their reporting. This may result in a calculated landing distance shorter than the achievable one. As a consequence, Airbus does not recommend the operational use of the landing distance information corresponding to the "Water 1/2" (12.7 mm)" and "Slush 1/2" (12.7 mm)".

L1 SLUSH 1/4" (6.3 MM)

The flight crew selects “Slush 1/4" (6.3 mm)” for runways covered with:
- Between 0.12 in and 0.50 in of Slush, or
- Equivalent contaminants in terms of performance:
  - Between 0.16 in and 1.00 in of Wet Snow, or

- Between 0.59 in and 4.00 in of Dry Snow.

For more information about equivalences, *Refer to PER-LND-CTA Equivalences for Performance* .

L2 For landing performance assessment, a higher contaminant depth systematically produces shorter landing distances. Airports tend to overestimate contaminant thicknesses in their reporting. This may result in a calculated landing distance shorter than the achievable one. As a consequence, Airbus does not recommend the operational use of the landing distance information corresponding to the "Water 1/2" (12.7 mm)" and "Slush 1/2" (12.7 mm)".

L1 **COMPACTED SNOW**

The flight crew selects “Compacted snow” for runways covered with Compacted Snow.

ICY

The flight crew selects "Icy" for runways covered with ice.

CAUTION	Landing on icy runway is not recommended.

ANTI-ICE

Applicable to: ALL

GENERAL

The engine bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

L1 The air conditioning and the anti-ice (wing, engine) systems affect the landing performance. The engine bleeds reduce the available engine power. As a result, the go-around gradient decreases. The FADEC compensates to a large extent the thrust loss due to “Engine only” anti-ice.

LDG PERF

The flight crew selects one of the following setting from the A-ICE drop-down list:
- Off
- Engine only
- Engine & Wing.

AIRCRAFT CONFIGURATION SUBPANEL

Applicable to: ALL

The Aircraft Configuration subpanel provides the following information:

- Landing weight (LW)
- Aerodynamic configuration
- Airflow
- Approach type
- Go-around gradient
- Approach speed
- Landing technique.

Aircraft Configuration Subpanel



LANDING WEIGHT

Applicable to: ALL
Impacted by TDU: 00021446 Landing Weight

GENERAL

The estimated Landing Weight (LW) at dispatch must not exceed:
- The certified Maximum Landing Weight (MLW)
- The Maximum Landing Weight Limited by the Performance (MLW(PERF)).

L2 For more information about MLW(PERF) , *Refer to PER-LND-LRD-DSR Landing Weights* .

L1 LDG PERF

The flight crew enters the planned LW value.
The flight crew can use the shortcut "*" to insert the MLW .
The LW entered must be less than the certified MLW , defined as per operator policy.
LDG PERF permits the overweight landing computation only for the In-Flight computation type.

COMMUNICATION FROM LOADSHEET TO LDG PERF

When the flight crew completes a LOADSHEET computation and then changes from LOADSHEET to LDG PERF, LOADSHEET transfers the calculated LW value to LDG PERF. LDG PERF displays this value in yellow in the CONDITIONS panel.

LANDING WEIGHT

Applicable to: ALL
Impacted DU: 00011596 Landing Weight

GENERAL

The estimated Landing Weight (LW) at dispatch must not exceed:
- The certified Maximum Landing Weight (MLW)
- The Maximum Landing Weight Limited by the Performance (MLW(PERF)).

L2 For more information about MLW(PERF) , *Refer to PER-LND-LRD-DSR Landing Weights* .

L1 LDG PERF

The flight crew enters the planned LW value.
The flight crew can use the shortcut "*" to insert the MLW .
The LW entered must be less than the certified MLW , defined as per operator policy.
LDG PERF permits the overweight landing computation only for the In-Flight computation type.

COMMUNICATION FROM LOADSHEET TO LDG PERF

When the flight crew completes a LOADSHEET computation and then changes from LOADSHEET to LDG PERF, LOADSHEET transfers the calculated LW value to LDG PERF. LDG PERF displays this value in yellow in the CONDITIONS panel.

Note: When both LOADSHEET and LDG PERF are opened, LDG PERF always takes the landing weight from the LOADSHEET results.
Check the landing weight in LDG PERF before any calculation, particularly in the case of a diversion.

CG POSITION

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position affects the balance of forces applied on the aircraft. As a result, the CG position affects the aircraft performance, particularly the Approach Speed (VAPP) and the go-around speed.

L2 The CG position has a direct effect on the stalling speeds. A forward CG increases the stalling speeds and an aft CG reduces them. Therefore, the CG position affects the VAPP and the go-around speed and thus the entire landing performance.

L1 LDG PERF

The CG field is expressed in % of the Mean Aerodynamic Chord (MAC).
In accordance with aircraft certification, and without failure in flight, the CG is assumed to be at the most forward limit for all computations. The CG field does not appear on the CONDITIONS panel.
In the case of the selection of a failure in flight, the CG field becomes available on the CONDITIONS panel, in order to reduce conservatism on the approach speed in such a degraded situation. The VAPP computation takes into account the value that the flight crew enters in the CG field, but the landing distance computation considers that the CG is at the most forward limit.

L2 For more information about the CG in the case of a failure in flight, *Refer to Landing Performance Following Failure - Impact on Conditions* .

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

The certified landing configurations are:
- CONF 3
- CONF FULL.

CONF FULL is recommended.
The selection of an aerodynamic configuration affects the landing performance.
L2 At a given speed, a higher flap setting increases the lift, but also increases the drag. Therefore, a higher flap setting decreases the landing distance, but also decreases the go-around gradient.

L1 LDG PERF

LDG PERF provides two types of calculation related to the aerodynamic configuration:
- For a given flap setting (CONF 3, CONF FULL)
- AUTO CONF.

When the flight crew selects AUTO CONF, LDG PERF computes the landing performance for:
- Landing in CONF FULL (go-around in CONF 3)
- Landing in CONF 3 (go-around in CONF 2).

If both a go-around in CONF 3 (landing in CONF FULL) and a go-around in CONF 2 (landing in CONF 3) comply with the go-around gradient constraint, then LDG PERF displays the results for: landing in CONF FULL (go-around in CONF 3).
If a go-around in CONF 3 (landing in CONF FULL) does not comply with the go-around gradient constraint, the flight crew lands in CONF 3 and performs go-around in CONF 2. LDG PERF displays the results for: landing in CONF 3 (go-around in CONF 2).

AIRFLOW

Applicable to: ALL

GENERAL

The engine bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

L1 The air conditioning and the anti-ice (wing, engine) systems affect the landing performance. The engine bleeds reduce the available engine power. As a result, the go-around gradient decreases.

LDG PERF

The flight crew selects one of the following setting from the AIR COND drop-down list:
- On
- Off.

APPROACH TYPE

Applicable to: ALL

GENERAL

As the A380 is a four-engined aircraft, the approach type does not affect the minimum go-around gradient (2.7 %).

L2 The CAT II minimum go-around gradient (2.5 %) is lower than the CAT I minimum go-around gradient (2.7 %) for a four-engined aircraft.

L1 The approach type affects the go-around speed for the approach climb calculation:

- For CAT I approach type: The go-around speed is equal to VLS (1.23 VS1G) of the approach configuration
- For CAT II approach type: The go-around speed is equal to the maximum of:
  - VLS of the approach configuration (landing gear retracted)
  - VLS of the landing configuration (landing gear extended) + 5 kt
  - Minimum Control Airspeed for Landing (VMCL) + 5 kt.

As a result, the approach type only affects the approach climb gradient calculation.

LDG PERF

The flight crew selects one of the following approach types:

- Normal, for a CAT I approach
- CAT II, for a CAT II or a CAT III approach.

GO-AROUND GRADIENT

Applicable to: ALL

GENERAL

As per regulation the aircraft must achieve the minimum go-around gradient which is the maximum of:

- 2.7 %
- The value published in the go-around procedure.

L2 For more information about the go-around gradient, *Refer to PER-LND-LRD-DSR Go-Around Gradient* .

L1 LDG PERF

The flight crew can use the shortcut "MIN" to insert the minimum regulatory go-around gradient value.

To compute with a go-around gradient more than the minimum one, the flight crew enters the required gradient in GA GRADIENT.

USER SPEED INCREMENT - VLS+

Applicable to: ALL

GENERAL

The Approach Speed (VAPP) is the speed of the aircraft when crossing the runway threshold.

VAPP is the sum of:

- VLS

L2 VLS is the Lowest Selectable Speed
VLS is equal to 1.23 VS1G

L1 - The wind speed increment

L2 The wind correction is equal to 1/3 of the headwind. The wind correction is limited to 15 kt .
When A/THR is selected, a minimum wind correction of 5 kt is required.

L1 - The CDL speed increment
- An extra value selected at the flight crew discretion.

LDG PERF

The default value of the increment on the approach speed field (VLS+) is equal to the wind speed increment, considering that the A/THR is ON.
The flight crew can increase the default value of the increment on the approach speed.

When the flight crew starts a computation, LDG PERF computes the landing performance with an approach speed equal to the sum of:

- VLS
- The user speed increment
- The CDL speed increment, if the flight crew has selected a CDL item that affects the approach speed.

L2 For more information about the CDL items, *Refer to PER-LND-LCD-AFS CDL* .

LANDING TECHNIQUE

Applicable to: ALL

GENERAL

The autoland systems are designed to help the flight crew for landing in low visibility.

L2 On a dry runway the Actual Landing Distance (ALD) in autoland is the addition of two distances: the airborne phase distance and the ground phase distance.

L1 LDG PERF

The flight crew selects one of the following setting in the LDG TECHNIQUE drop-down list:

- Autoland
- Manual.

When Autoland is selected, the flight crew must enter the glide slope angle.

L2 When the flight crew runs a LDG PERF computation with the LDG TECHNIQUE Autoland, LDG PERF automatically checks that the RLD for automatic landing is more than or equal to the RLD in manual mode:

- If the RLD for automatic landing is more than or equal to the RLD in manual mode, LDG PERF displays the results for a RLD calculated using the Autoland landing technique
- If the RLD for automatic landing is less than the RLD in manual mode, LDG PERF displays the results for a RLD calculated using the Manual landing technique.

AIRCRAFT STATUS PANEL

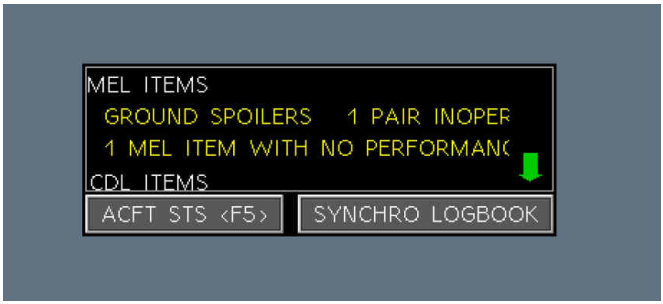
Applicable to: ALL

The current aircraft status must be considered during flight preparation.

The reminder area of the AIRCRAFT STATUS panel lists:
- Inoperative systems impacting landing performance
- The number of MEL items without landing performance impact (if any)
- CDL items impacting landing performance
- The number of negligible CDL items (if any).

If the aircraft is dispatched without any deferred items, "NO PERFORMANCE IMPACT" appears in the reminder area of the AIRCRAFT STATUS panel.

Reminder area of the AIRCRAFT STATUS Panel



SYNCHRO LOGBOOK

The flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.
For more information about the SYNCHRO LOGBOOK function, *Refer to PER-LND-LCD-AFS Synchronization with Logbook* .

AIRCRAFT STATUS

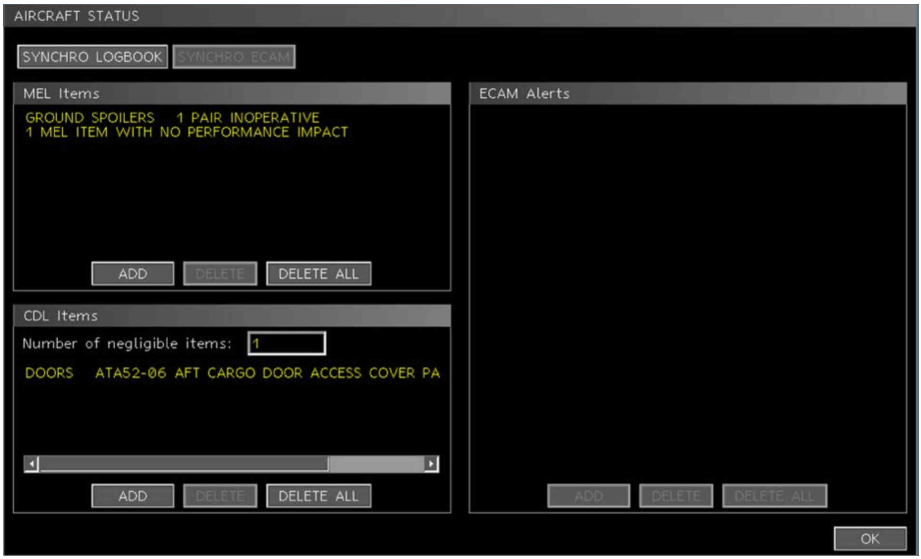
By clicking on the ACFT STS button, the flight crew opens the AIRCRAFT STATUS panel.

The AIRCRAFT STATUS panel is divided in three subpanels:
- MEL items
- CDL items
- ECAM Alerts.
  The ECAM Alerts subpanel is empty and disabled. It does not represent the current status of the ECAM alerts impacting landing performance.

Moreover, the flight crew can recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button.

Note: *The ECAM Alerts part is active only for computations in IN-FLIGHT mode.*

AIRCRAFT STATUS Panel



MEL

Applicable to: ALL

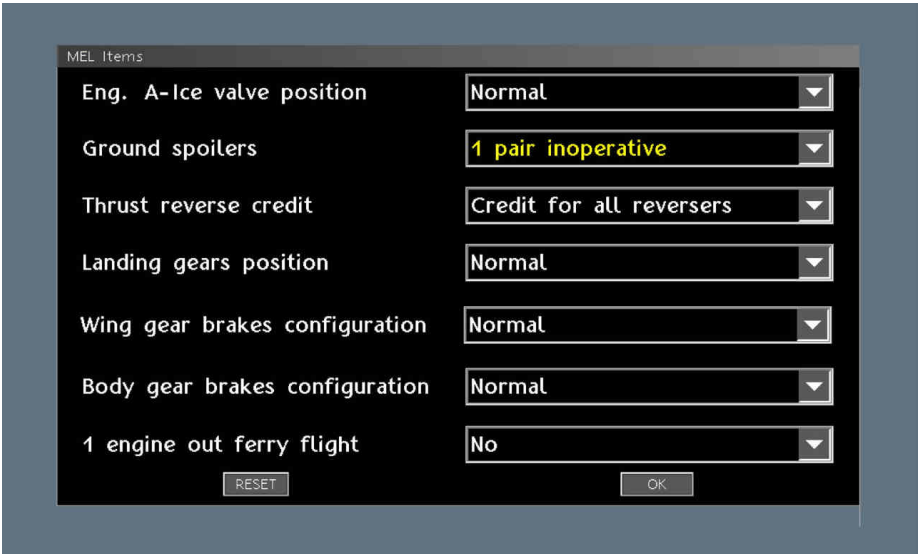
The MEL items subpanel displays the inoperative systems selected by the flight crew using:

- The OPS LIBRARY / MEL manual, via the selection of a MEL item, or
  In this case, the inoperative systems are displayed in yellow on LDG PERF.
- The LDG PERF MEL panel.
  In this case, the inoperative systems are displayed in cyan on LDG PERF.

MEL ITEM SELECTION

To open the MEL items panel, the flight crew uses the ADD button of the MEL items subpanel.
The MEL items panel displays the list of systems that could be inoperative and that involve landing performance penalties.
The flight crew selects inoperative items by selecting the appropriate status for each item in the drop-down lists.
The inoperative system associated to the MEL item is described in the (o) procedure of the MEL item.

MEL Items Panel



The selected item appears in the MEL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

MEL ITEMS COMBINATION

The flight crew must check that the MEL items combination is permitted for dispatch in the "MEL Items" section of the MEL manual.
T.O PERF does not ensure that the selected combination of inoperative systems is permitted for dispatch.

COMMUNICATION BETWEEN MEL MANUAL AND LDG PERF

When the aircraft is dispatched with MEL items and if these MEL items are selected via the OPS LIBRARY / MEL manual:

- The associated inoperative systems that affect the landing performance are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF
- The number of MEL items without landing performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF.

CDL

Applicable to: ALL

The CDL items subpanel displays the missing structural parts selected by the flight crew using:

- The OPS LIBRARY / CDL manual, via the selection of a CDL item, or
  In this case, the CDL items are displayed in yellow on LDG PERF.
- The LDG PERF CDL panel.
  In this case, the CDL items are displayed in cyan on LDG PERF.

The CDL items subpanel also displays the number of negligible items.

NUMBER OF NEGLIGIBLE ITEMS

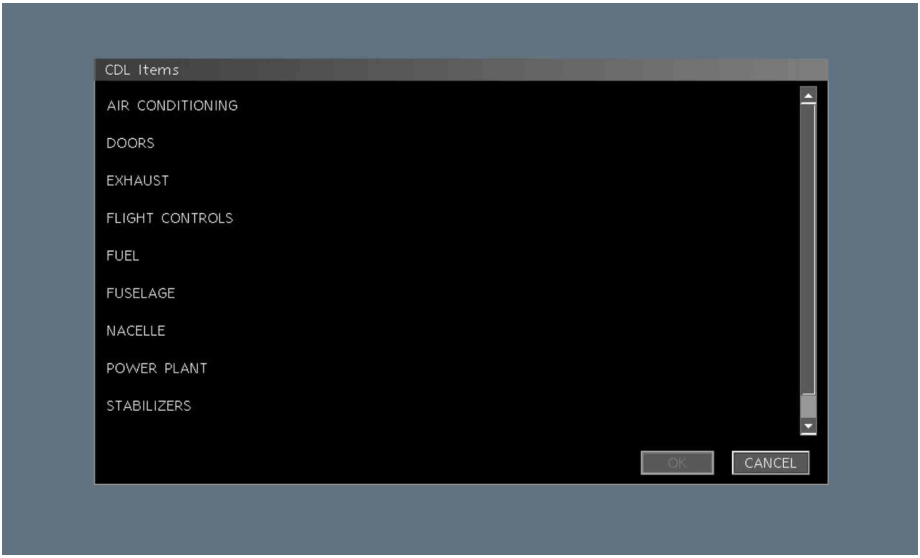
The flight crew enters the number of different structural parts simultaneously missing that have a negligible impact on the performance.

L2 If the number of negligible items is less or equal to three, there is no performance penalty. If the number of negligible items is greater or equal to four, then a drag increase for each item is taken into account for the performance computation.
For more information about the negligible CDL items, *Refer to AFM/MCDL-GEN-PERF Performance penalties published in the Airplane Flight Manual MCDL chapter*.

L1 CDL ITEM SELECTION

To open the CDL items panel, the flight crew uses the ADD button of the CDL items subpanel. The CDL items panel displays the list of structural parts that could be missing and that involve landing performance penalties.

CDL Items Panel



To add a CDL item, the flight crew selects:
- The appropriate system group
- The corresponding CDL item
- The number of items missing

The selected item appears in the CDL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

Note: *When the flight crew selects a CDL item, the number of missing items is hidden in the ACFT STS box. The flight crew must use the scroll bar to display the hidden information.*

CDL ITEMS COMBINATION

The flight crew must check that the CDL items combination is permitted for dispatch in the Aircraft Flight Manual (AFM).
LDG PERF does not ensure that the selected configuration is permitted for dispatch.

COMMUNICATION BETWEEN CDL MANUAL AND LDG PERF

When the aircraft is dispatched with CDL items and if these CDL items are selected via the OPS LIBRARY / CDL manual:

- The CDL items that affect the landing performance are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF. Their associated number of missing parts is also displayed.
- The number of CDL items without landing performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF. These CDL items are called "negligible items".

When the flight crew uses the OPS LIBRARY / CDL manual to select a specific CDL item that affects the landing performance and then starts LDG PERF, the landing performance module may consider this CDL item as a negligible item if the CDL To LDG PERF communication file does not include this CDL item.
In this case, the flight crew must manually apply the weight reduction described in the OPS LIBRARY / CDL manual to the MLW(PERF) calculated by LDG PERF.

SYNCHRONIZATION WITH LOGBOOK

Applicable to: ALL

The flight crew can use the "SYNCHRO LOGBOOK" button to recover the eLogbook status.
This action synchronizes the aircraft status of the whole FLT OPS domain with the current deferred items of the eLogbook
If the flight crew had previously selected additional MEL and CDL items in LDG PERF (displayed in cyan in the AIRCRAFT STATUS panel) and then uses the SYNCHRO LOGBOOK function, these manually entered items are lost.

Note: *1. When the flight crew uses the SYNCHRO LOGBOOK function in LDG PERF, the whole FLT OPS domain is also synchronized with the eLogbook*
2. If the Logbook status is lost in the FLT OPS domain, LDG PERF may synchronize with an old eLogbook status.

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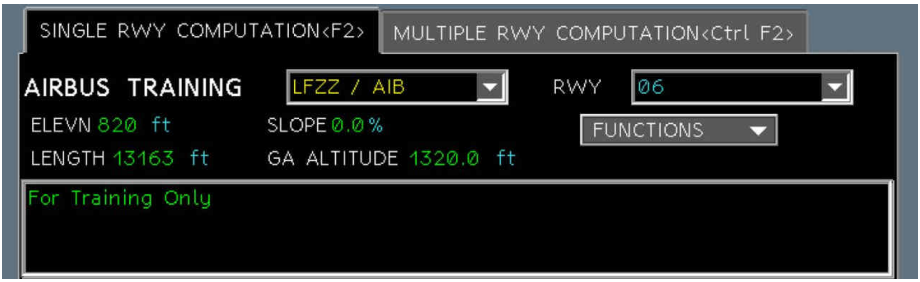
AIRPORT PANEL

Applicable to: ALL

The flight crew uses the airport panel to select the airport and runway(s).

Airport Panel



SINGLE RWY COMPUTATION

For more information about the SINGLE RWY COMPUTATION panel, *Refer to PER-LND-LCF-RWY SINGLE RWY COMPUTATION Panel* .

MULTIPLE RWY COMPUTATION

For more information about the MULTIPLE RWY COMPUTATION panel, *Refer to PER-LND-LCF-RWY MULTIPLE RWY COMPUTATION Panel* .

FUNCTIONS

For more information about the runway modification FUNCTIONS:

- *Refer to MODIFY RWY - Reduced Mode* , or
- *Refer to FUNCTIONS - Full Mode* .

SINGLE RWY COMPUTATION PANEL

Applicable to: ALL

GENERAL

A landing performance calculation takes into account the following runway characteristics:

- Landing Distance Available (LDA)

L2 For more information about LDA , *Refer to PER-LND-LCF-RWY LDA* .

L1 - Elevation

L2 For more information about elevation, *Refer to PER-LND-LCF-RWY Elevation* .

L1 - Slope

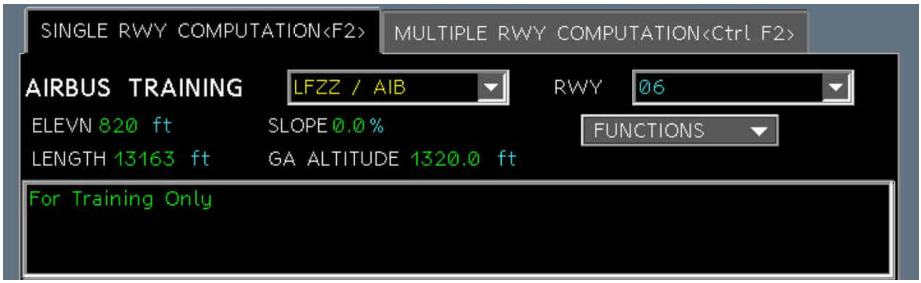
L2 For more information about slope, *Refer to PER-LND-LCF-RWY Slope* .

L1 - Go-around altitude.

L2 For more information about go-around altitude, *Refer to PER-LND-LCF-RWY Go-Around Altitude* .

L1 **LDG PERF**

SINGLE RWY COMPUTATION Panel



The flight crew uses the SINGLE RWY COMPUTATION panel to select the intended runway.

AIRPORT SELECTION

The AIRPORT drop-down list provides a list of available airports. This list is sorted by airport codes.

RUNWAY SELECTION

When the flight crew has selected an airport, the RWY drop-down list provides a choice of runways applicable to that airport.

RUNWAY CHARACTERISTICS

The runway characteristics are:

- Runway ID

- Elevation
- Slope
- Length.

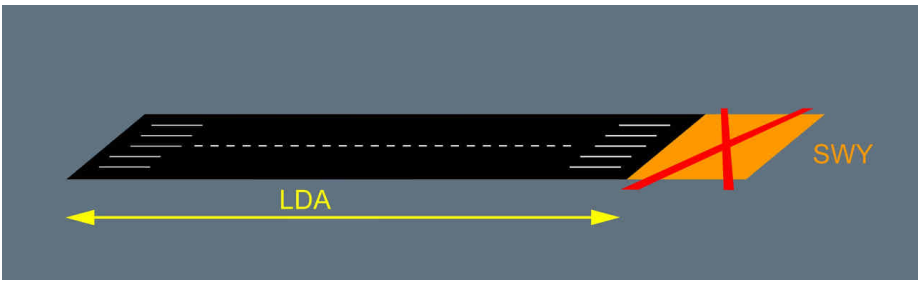
LDA

Applicable to: ALL

The Landing Distance Available (LDA) is the runway length available for landing.

Note: *As per regulation, the stopway is not used for landing calculation.*

Landing Distance and Stopway



ELEVATION

Applicable to: ALL

Runway elevation is the geometric altitude of the runway above mean sea level.

L2 The runway elevation and the QNH are used for pressure altitude determination.

L1 For more information about the effect of pressure altitude on landing performance, *Refer to PER-LND-LCF-OCD QNH* .

SLOPE

Applicable to: ALL

The landing is authorized on runways that have an average slope between -2 % and 2 % .

L2 The upward slope decreases the landing distance.

The downward slope increases the landing distance.

L1 *Note:* *As per regulation, LDG PERF considers the slope effect only for autoland. For manual landing, the regulatory margin included in the required landing distance covers the slope effect.*

L2 For more information about the Required and the Actual Landing Distance, *Refer to PER-LND-GEN Landing Distance Definitions* .

GO-AROUND ALTITUDE

Applicable to: ALL

The GA ALTITUDE field is optional. The display of GA ALTITUDE is at the Airline's discretion.
GA ALTITUDE is a geometrical altitude. The GA ALTITUDE is specific to the selected airport.

GA ALTITUDE is equal to the sum of:
- A go-around height, which is at the Airline's discretion
- The elevation of the runway threshold.

If GA ALTITUDE does not appear on the Airport panel, LDG PERF computes the go-around gradients at an altitude equal to the runway threshold altitude.
If GA ALTITUDE appears on the Airport panel, LDG PERF computes the go-around gradients at an altitude equal to GA ALTITUDE.
The GA ALTITUDE option enables the flight crew to compute go-around gradients at a more operational go-around height.
The higher the GA ALTITUDE, the lower the go-around gradients.

MODIFY RWY SUBPANEL

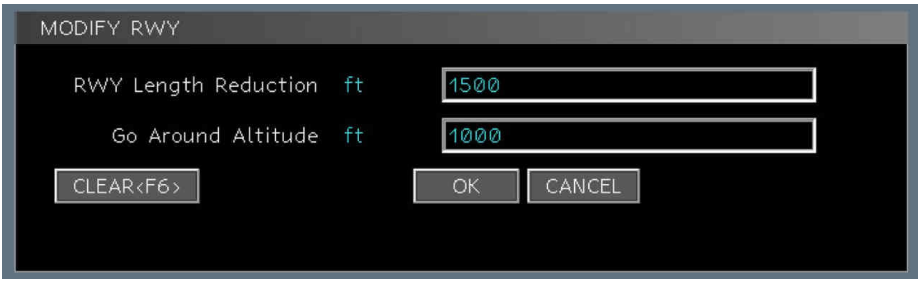
Applicable to: ALL

The flight crew uses the MODIFY RWY subpanel to modify the characteristics of the selected runway by decreasing the runway length or entering the new go-around altitude.

L2 The flight crew can access this subpanel using the MODIFY RWY button of the SINGLE RWY COMPUTATION panel.

For more information about the SINGLE RWY COMPUTATION panel, *Refer to PER-LND-LCD-RWY Airport Panel* .

MODIFY RWY Subpanel



L1 RWY LENGTH REDUCTION

The flight crew can enter the runway length reduction.

The runway length (LENGTH) displayed on the SINGLE RWY COMPUTATION panel is reduced according to the entered value.

The SINGLE RWY COMPUTATION panel displays the label “LENGTH MODIFIED” to indicate that the flight crew has modified the runway length.

GO-AROUND ALTITUDE

The "Go Around Altitude" field is optional and is displayed if this information is available on the SINGLE RWY COMPUTATION panel.

The flight crew can enter a new go-around altitude value.

The go-around altitude (GA ALTITUDE) displayed on the SINGLE RWY COMPUTATION panel is equal to the value entered in the MODIFY RWY Subpanel.

The SINGLE RWY COMPUTATION panel displays the label “GA ALTITUDE MODIFIED” to indicate that the flight crew has modified the go-around altitude.

L2 For more information about the go-around altitude, *Refer to PER-LND-LCF-RWY Go-Around Altitude* .

CREATE RWY - FULL MODE

Applicable to: ALL

FUNCTIONS

The FUNCTIONS drop down list enables the flight crew to:

- MODIFY RWY: To modify the characteristics of an existing runway
- RESTORE RWY: To reset to default values the characteristics of an existing runway after the flight crew has modified it
- CREATE RWY: To create a new runway for an existing airport or for a new airport
- EDIT RWY: To edit the characteristics of the runway that the flight crew has created
- DELETE RWY: To delete a previously created runway.

MODIFY RWY

The flight crew uses the RUNWAY MODIFICATION/CREATION panel to modify the characteristics of the selected runway.

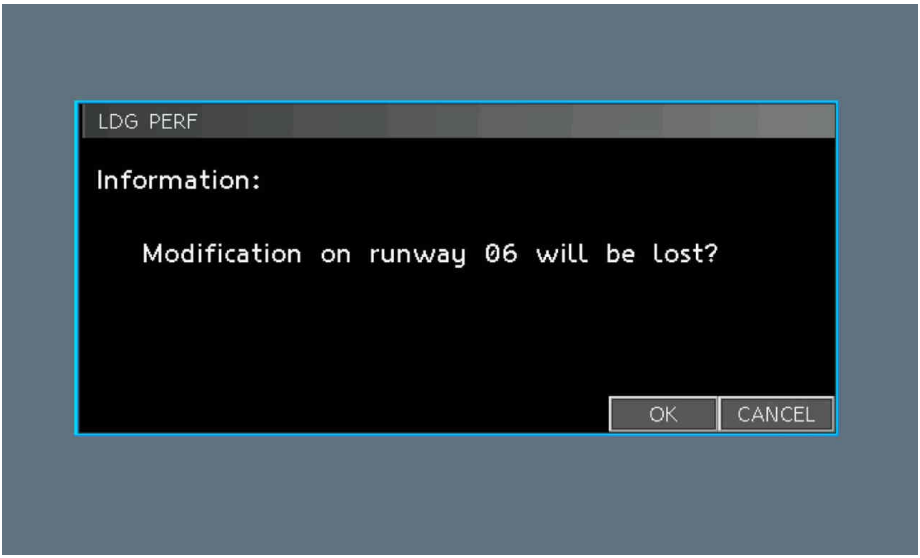
L2 The flight crew can access this panel by selecting MODIFY RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

RUNWAY MODIFICATION/CREATION Panel



L1 The runway characteristics displayed on the SINGLE RWY COMPUTATION panel are updated according to the entered value.
The SINGLE RWY COMPUTATION panel displays the label “MODIFIED” after the runway ID to indicate that the flight crew has modified the characteristics of the runway. Each modified runway characteristic is displayed with the color cyan.
If a runway has already been created or modified for an airport, and if the flight crew selects MODIFY RWY for another runway of the same airport, a dialog box warns the flight crew that the previous created or modified runway will be lost.

Dialog Box



RESTORE RWY

The flight crew can reset to default values the characteristics of an existing runway after it has been modified.

CREATE RWY

The RUNWAY MODIFICATION/CREATION panel enables the flight crew to:
- Create a new runway for an existing airport, or
- Create a new airport with an associated runway.

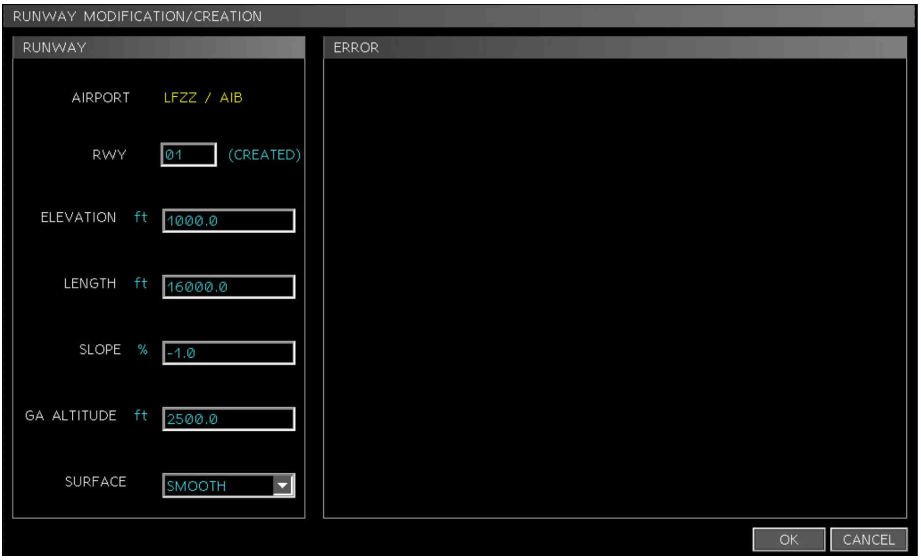
The SINGLE RWY COMPUTATION panel displays the label “CREATED” after the runway ID to indicate that the flight crew has created a new runway.

CREATE A NEW RUNWAY FOR AN EXISTING AIRPORT

To create a new runway for an existing airport, the flight crew:
- First selects an existing airport in the AIRPORT drop down list of the SINGLE RWY COMPUTATION panel, and
- Then selects CREATE RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

LDG PERF displays the following panel:

RUNWAY MODIFICATION/CREATION Panel



Note: The field SURFACE appears on the RUNWAY MODIFICATION/CREATION panel. This option should not be available as the A380 has not the grooved runway option capability. The selection of the GROOVED/PFC option does not lead to additional landing benefit. Whatever the SURFACE selection, the LDG PERF calculation considers the SMOOTH SURFACE.

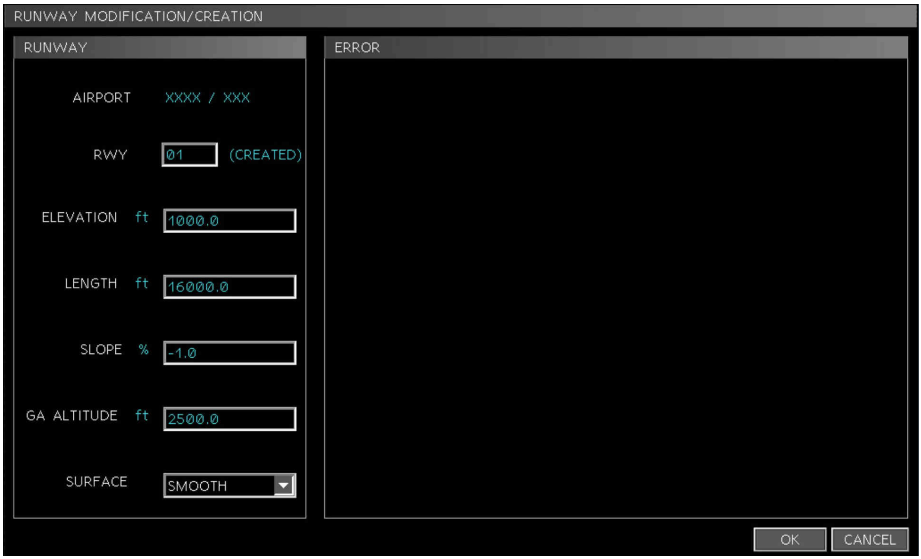
CREATE A NEW AIRPORT WITH AN ASSOCIATED RUNWAY

To create a new airport with an associated runway, the flight crew:

- First checks that the AIRPORT drop down list of the SINGLE RWY COMPUTATION panel is empty, and
- Then selects CREATE RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

LDG PERF displays the following panel:

RUNWAY MODIFICATION/CREATION Panel



Note: The field SURFACE appears on the RUNWAY MODIFICATION/CREATION panel. This option should not be available as the A380 has not the grooved runway option capability. The selection of the GROOVED/PFC option does not lead to additional landing benefit. Whatever the SURFACE selection, the LDG PERF calculation considers the SMOOTH SURFACE.

EDIT RWY

When the flight crew has created a new runway, he can then edit the characteristics of this runway.

DELETE RWY

The flight crew can only delete a runway that has been previously created. The flight crew cannot delete the runways already available in the airport database loaded into LDG PERF.
To delete a runway, the flight crew selects DELETE RWY in the FUNCTIONS drop down list of the SINGLE RWY COMPUTATION panel.

MULTIPLE RWY COMPUTATION PANEL

Applicable to: ALL

The flight crew uses the MULTIPLE RWY COMPUTATION panel to select several runways for which computation will be performed in the current conditions.
L2 This function increases calculation time.

MULTIPLE RWY COMPUTATION Panel



L1 AIRPORT SELECTION

The AIRPORT drop-down list provides a list of the available airports.

RUNWAY TABLE

The flight crew uses the runway table to select the runways on which the computation will be performed.

Intentionally left blank

OUTSIDE CONDITIONS SUBPANEL

Applicable to: ALL

The Outside Conditions subpanel provides the following information:

- Wind
- Outside Air Temperature (OAT)
- Pressure at the Mean Sea Level (QNH)
- Runway conditions
- Anti-ice status.

Outside Conditions Subpanel



WIND

Applicable to: ALL

GENERAL

L2 The longitudinal wind component affects the aircraft ground speed, and therefore the landing distances.

L1 The landing distance decreases in the case of headwind, and increases in the case of tailwind.

L2 In the case of headwind, the Approach Speed (VAPP) must additionally be increased to avoid speed loss close to the ground, since wind speed is often reducing as the aircraft descends. As a result, the beneficial headwind effect on the landing distance is compensated for by the increase of the Approach Speed (VAPP).
As per regulation, the computation is based on 150 % of the entered tailwind, and 50 % of the entered headwind.

L1 The crosswind component does not affect the calculation of the landing distance. However, a maximum crosswind component is demonstrated.
For more information about crosswind limitation, *Refer to PER-LND-CTA-CWD Crosswind* .

LDG PERF

There are two ways to define wind values:
- Longitudinal Speed Component
- Direction/Speed (or Direction/Speed/Gust) Combination.

The Direction/Speed (or Direction/Speed/Gust) Combination is required in the case of a MULTIPLE RUNWAY COMPUTATION.

Note: *Displayed wind values are rounded mathematically instead of conservatively, but there is no impact on the computation, which uses exact values.*

LONGITUDINAL SPEED COMPONENT

The flight crew enters the longitudinal component with:
- H or HD followed by the headwind speed (e.g. H10 or HD5), or
- T or TL followed by the tailwind speed (e.g. T6 or TL8).

Wind Values Input - Longitudinal Speed Component



DIRECTION/SPEED (OR DIRECTION/SPEED/GUST) COMBINATION

This wind input mode is compulsory when computations are made on multiple runways.

The flight crew can enter:
- The wind direction and the wind speed, or
- The wind direction, the wind speed, and the gust, if this option is enabled.

Direction/Speed Combination

The speed entry is projected along the runway axis and perpendicular to the runway axis. The longitudinal projection follows the same display rules as the longitudinal speed component entry mode.

LDG PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

Wind Values Input - Direction/Speed Combination



Direction/Speed/Gust Combination

This entry mode is possible if a maximum crosswind limit is defined as gust included for one RWY COND at least.

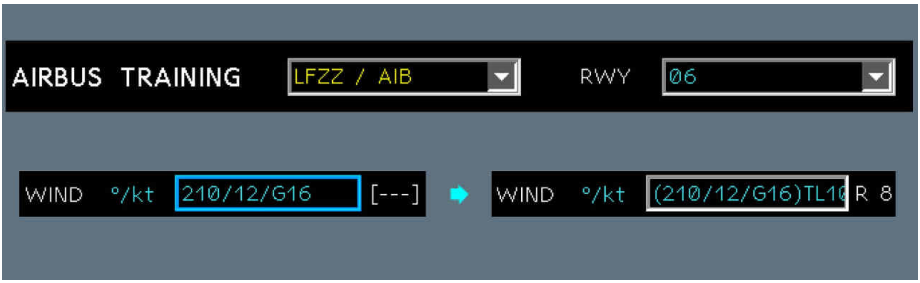
In this case, the flight crew can enter the value of the gust with the prefix G followed by the gust value (e.g. G16).
The speed entry (gust respectively) is projected along the runway axis and perpendicular to the runway axis.
The longitudinal projection follows the same display rules as the longitudinal speed component entry mode.

LDG PERF displays the crosswind as:
- R, if the wind comes from the right, or
- L, if the wind comes from the left.

If the flight crew enters the gust, LDG PERF displays the perpendicular projection of the gust as the crosswind.

LDG PERF uses:
- The gust perpendicular component for the check of the maximum crosswind limitation if this one is defined as gust included for the selected RWY COND
- The steady wind perpendicular component for the check of the maximum crosswind limitation if this one is not defined as gust included for the selected RWY COND.

Wind Values Input - Direction/Speed/Gust Combination



OUTSIDE AIR TEMPERATURE

Applicable to: ALL

GENERAL

The Outside Air Temperature (OAT) affects the go-around performance.

Note: As per regulation, the effect of temperature on landing distance is only taken into account for water contaminated runway or autoland.

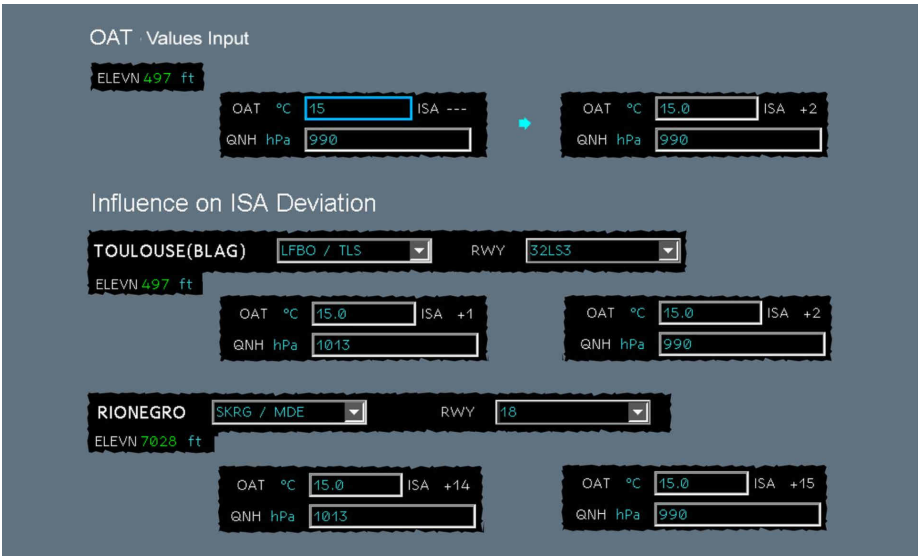
TEMPERATURE EFFECT ON ENGINE THRUST

The thrust provided by the engines at go-around rating (TOGA) versus OAT is constant up to the flat rating temperature (TREF).

When the OAT increases,
- The available engine thrust decreases above TREF
- The go-around climb gradients decrease.

LDG PERF

OAT Input



OAT VALUE INPUT

The OAT is the input parameter that gives the temperature at the arrival airport.

L2 The range of permitted OAT is the certified environmental envelope for landing, which depends on the airport pressure altitude and the runway condition.

L1 The deviation from the International Standard Atmosphere (ISA) is automatically computed and displayed next to the OAT field.

INFLUENCES ON ISA DEVIATION

The deviation from ISA is influenced by:

- The airport elevation
- The QNH value.

L2 For more information about the QNH , *Refer to PER-LND-LCF-OCD QNH* .

QNH

Applicable to: ALL

GENERAL

The QNH is the pressure at the Mean Sea Level (MSL).

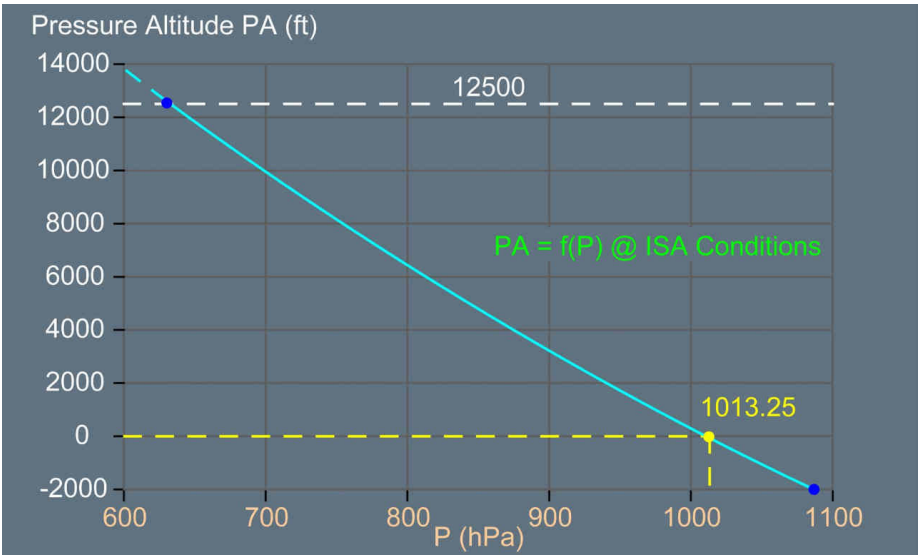
L2 The QNH is calculated from:
- The airport atmospheric pressure
- The airport elevation
  The airport elevation is the geometric altitude of the airport.
- The standard pressure law from ISA atmosphere.

At the airport level, with the QNH setting, in ISA conditions, the altimeter indicates the airport elevation.

L1 The airport Pressure Altitude (PA) depends on the QNH and the airport elevation.

L2 The PA is a barometric measurement converted into an altitude via the ISA law.

PA Function of Pressure (P)



L1 The QNH affects the aircraft landing speed and engine thrust.

QNH EFFECT ON LANDING SPEED

When the QNH decreases at a given airport elevation:
- The PA increases
- The air density ρ decreases
- A higher TAS is required for approach in order to maintain the same lift
- The landing distance is longer.

QNH EFFECT ON ENGINE THRUST

When the QNH decreases at a given airport elevation:
- The PA increases
- The available engine thrust decreases
- The landing distance increases
- The go-around climb gradients decrease.

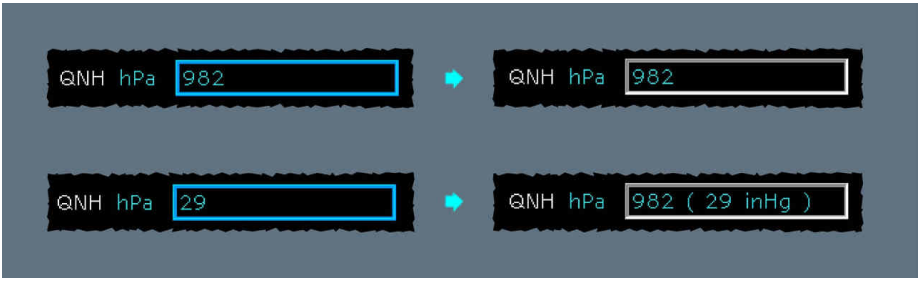
LDG PERF

The QNH is the input parameter that determines the pressure altitude, taking into account the airport elevation.

The flight crew can enter a QNH using the following units:
- Hecto Pascal (hPa)
- Inch of Mercury (inHg).

LDG PERF automatically detects the QNH format. For example, when the flight crew enters 29 for the QNH, LDG PERF automatically converts the value into the appropriate one for hPa unit.

QNH Input



The QNH range is:
- 950 - 1080 for hPa
- 28.06 - 31.89 for inHg.

RUNWAY CONDITIONS

Applicable to: ALL

GENERAL

The runway surface condition affects the landing performance and must be taken into account for MLW(PERF) calculation.
For more information about the runway conditions, *Refer to Runway Contamination* .

LDG PERF

The flight crew selects one of the following settings from the RWY COND drop-down list depending on the runway surface condition.

DRY

The flight crew selects “Dry” for dry runways.

WET

The flight crew selects “Wet” for runways covered with:
- Less than 0.12 in of Water, or
- Equivalent contaminants in terms of performance:
  - Less than 0.12 in of Slush, or
  - Less than 0.16 in of Wet Snow, or
  - Less than 0.59 in of Dry Snow.

For more information about equivalences, *Refer to PER-LND-CTA Equivalences for Performance* .

WATER 1/4" (6.3 MM)

The flight crew selects ”Water 1/4” (6.3 mm)” between 0.12 in and 0.50 in of Standing Water.
L2 For landing performance assessment, a higher contaminant depth systematically produces shorter landing distances. Airports tend to overestimate contaminant thicknesses in their reporting. This may result in a calculated landing distance shorter than the achievable one. As a consequence, Airbus does not recommend the operational use of the landing distance information corresponding to the "Water 1/2" (12.7 mm)" and "Slush 1/2" (12.7 mm)".

L1 SLUSH 1/4" (6.3 MM)

The flight crew selects “Slush 1/4" (6.3 mm)” for runways covered with:
- Between 0.12 in and 0.50 in of Slush, or
- Equivalent contaminants in terms of performance:
  - Between 0.16 in and 1.00 in of Wet Snow, or

- Between 0.59 in and 4.00 in of Dry Snow.

For more information about equivalences, *Refer to PER-LND-CTA Equivalences for Performance* .

L2 For landing performance assessment, a higher contaminant depth systematically produces shorter landing distances. Airports tend to overestimate contaminant thicknesses in their reporting. This may result in a calculated landing distance shorter than the achievable one. As a consequence, Airbus does not recommend the operational use of the landing distance information corresponding to the "Water 1/2" (12.7 mm)" and "Slush 1/2" (12.7 mm)".

L1 **COMPACTED SNOW**

The flight crew selects “Compacted snow” for runways covered with Compacted Snow.

ICY

The flight crew selects "Icy" for runways covered with ice.

CAUTION	Landing on icy runway is not recommended.

ANTI-ICE

Applicable to: ALL

GENERAL

The engine bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

L1 The air conditioning and the anti-ice (wing, engine) systems affect the landing performance. The engine bleeds reduce the available engine power. As a result, the go-around gradient decreases. The FADEC compensates to a large extent the thrust loss due to “Engine only” anti-ice.

LDG PERF

The flight crew selects one of the following setting from the A-ICE drop-down list:
- Off
- Engine only
- Engine & Wing.

AIRCRAFT CONFIGURATION SUBPANEL

Applicable to: ALL

The Aircraft Configuration subpanel provides the following information:

- Landing weight (LW)
- Aerodynamic configuration
- Airflow
- Approach type
- Go-around gradient
- Approach speed
- Landing technique
- Braking mode.

Aircraft Configuration Subpanel



LANDING WEIGHT

Applicable to: ALL
Impacted by TDU: 00021447 Landing Weight

GENERAL

The estimated Landing Weight (LW) in flight must not exceed:

- The certified Maximum Takeoff Weight (MTOW)

L2 The landing calculation at a weight above MLW and below MTOW takes into account overweight conditions.
For more information about overweight procedures, *Refer to PRO-ABN-ECAM-10-80-50 MISC OVERWEIGHT LDG* .

L1
- MLW(PERF) .

L2 For more information about MLW(PERF) , *Refer to PER-LND-LRF-FSR Landing Weights* .

L1 LDG PERF

The flight crew can enter:

- The estimated LW value, or

L2 The LW entered must be less than the certified MTOW , as per operator policy.

L1
- The shortcut "*", to insert the MLW , or
- A weight that is more than the MLW .

The results will be displayed for the weight entered, regardless of the MLW . In this case, the warning message "OVERWEIGHT LANDING" appears at the top of the RESULTS panel.

COMMUNICATION FROM LOADSHEET TO LDG PERF

When the flight crew completes a LOADSHEET computation and then changes from LOADSHEET to LDG PERF, LOADSHEET transfers the calculated LW value to LDG PERF. LDG PERF displays this value in yellow in the CONDITIONS panel.

LANDING WEIGHT

Applicable to: ALL
Impacted DU: 00011674 Landing Weight

GENERAL

The estimated Landing Weight (LW) in flight must not exceed:

- The certified Maximum Takeoff Weight (MTOW)

L2 The landing calculation at a weight above MLW and below MTOW takes into account overweight conditions.
For more information about overweight procedures, *Refer to PRO-ABN-ECAM-10-80-50 MISC OVERWEIGHT LDG* .

L1 - MLW(PERF) .

L2 For more information about MLW(PERF) , *Refer to PER-LND-LRF-FSR Landing Weights* .

L1 LDG PERF

The flight crew can enter:

- The estimated LW value, or

L2 The LW entered must be less than the certified MTOW , as per operator policy.

L1 - The shortcut "*", to insert the MLW , or
- A weight that is more than the MLW .
The results will be displayed for the weight entered, regardless of the MLW . In this case, the warning message "OVERWEIGHT LANDING" appears at the top of the RESULTS panel.

COMMUNICATION FROM LOADSHEET TO LDG PERF

When the flight crew completes a LOADSHEET computation and then changes from LOADSHEET to LDG PERF, LOADSHEET transfers the calculated LW value to LDG PERF. LDG PERF displays this value in yellow in the CONDITIONS panel.

Note: When both LOADSHEET and LDG PERF are opened, LDG PERF always takes the landing weight from the LOADSHEET results.
Check the landing weight in LDG PERF before any calculation, particularly in the case of a diversion.

CG POSITION

Applicable to: ALL

GENERAL

The Center of Gravity (CG) position affects the balance of forces applied on the aircraft. As a result, the CG position affects the aircraft performance, particularly the Approach Speed (VAPP) and the go-around speed.

L2 The CG position has a direct effect on the stalling speeds. A forward CG increases the stalling speeds and an aft CG reduces them. Therefore, the CG position affects the VAPP and the go-around speed and thus the entire landing performance.

L1 LDG PERF

The CG field is expressed in % of the Mean Aerodynamic Chord (MAC).
In accordance with aircraft certification, and without failure in flight, the CG is assumed to be at the most forward limit for all computations. The CG field does not appear on the CONDITIONS panel.
In the case of the selection of a failure in flight, the CG field becomes available on the CONDITIONS panel, in order to reduce conservatism on the approach speed in such a degraded situation. The VAPP computation takes into account the value that the flight crew enters in the CG field, but the landing distance computation considers that the CG is at the most forward limit.

L2 For more information about the CG in the case of a failure in flight, *Refer to Landing Performance Following Failure - Impact on Conditions* .

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

The certified landing configurations are:
- CONF 3
- CONF FULL.

CONF FULL is recommended.
The selection of an aerodynamic configuration affects the landing performance.
L2 At a given speed, a higher flap setting increases the lift, but also increases the drag. Therefore, a higher flap setting decreases the landing distance, but also decreases the go-around gradient.

L1 LDG PERF

LDG PERF provides two types of calculation related to the aerodynamic configuration:
- For a given flap setting (CONF 3, CONF FULL)
- AUTO CONF.

When the flight crew selects AUTO CONF, LDG PERF computes the landing performance for:
- Landing in CONF FULL (go-around in CONF 3)
- Landing in CONF 3 (go-around in CONF 2).

If both a go-around in CONF 3 (landing in CONF FULL) and a go-around in CONF 2 (landing in CONF 3) comply with the go-around gradient constraint, then LDG PERF displays the results for: landing in CONF FULL (go-around in CONF 3).
If a go-around in CONF 3 (landing in CONF FULL) does not comply with the go-around gradient constraint, the flight crew lands in CONF 3 and performs go-around in CONF 2. LDG PERF displays the results for: landing in CONF 3 (go-around in CONF 2).

OVERWEIGHT LANDING

In the case of an overweight landing, when the flight crew selects AUTO CONF, LDG PERF will also compute landing performance in CONF 3 (go-around in CONF 1+F) if a go-around in CONF 2 does not comply with the go-around gradient constraint.

ECAM ALERTS

When an ECAM Alert item is selected, the selection of an aerodynamic configuration in the CONDITIONS panel of LDG PERF is not possible any more. For all ECAM Alerts, the aerodynamic configuration is automatically determined according to the failure.

GO-AROUND CONFIGURATION

Applicable to: ALL

GA CONF on the CONDITIONS panel is the flaps setting to be used for the go-around. GA CONF only appears in the case of an overweight landing.

When the flight crew sets the LDG CONF drop down list to:
- AUTO CONF, GA CONF is automatically set to AUTO CONF. LDG PERF determines the go-around configuration depending on the landing performance calculation
- CONF FULL, GA CONF is automatically set to CONF 3
- CONF 3, the flight crew can select CONF 2 or CONF 1+F for GA CONF.

AIRFLOW

Applicable to: ALL

GENERAL

The engine bleed air system supplies high-pressure air to the following systems:
- Air conditioning and cabin pressurization
- Wing anti-ice and engine anti-ice
- Engine start
- Hydraulic reservoir pressurization
- Pack bay ventilation system.

L2 For more information about the engine bleed air system, *Refer to DSC-36-10-20-10 Engine Bleed Air System* .

L1 The air conditioning and the anti-ice (wing, engine) systems affect the landing performance. The engine bleeds reduce the available engine power. As a result, the go-around gradient decreases.

LDG PERF

The flight crew selects one of the following setting from the AIR COND drop-down list:
- On
- Off.

APPROACH TYPE

Applicable to: ALL

GENERAL

As the A380 is a four-engined aircraft, the approach type does not affect the minimum go-around gradient (2.7 %).

L2 The CAT II minimum go-around gradient (2.5 %) is lower than the CAT I minimum go-around gradient (2.7 %) for a four-engined aircraft.

L1 The approach type affects the go-around speed for the approach climb calculation:

- For CAT I approach type: The go-around speed is equal to VLS (1.23 VS1G) of the approach configuration
- For CAT II approach type: The go-around speed is equal to the maximum of:
  - VLS of the approach configuration (landing gear retracted)
  - VLS of the landing configuration (landing gear extended) + 5 kt
  - Minimum Control Airspeed for Landing (VMCL) + 5 kt.

As a result, the approach type only affects the approach climb gradient calculation.

LDG PERF

The flight crew selects one of the following approach types:

- Normal, for a CAT I approach
- CAT II, for a CAT II or a CAT III approach.

GO-AROUND GRADIENT

Applicable to: ALL

GENERAL

As per regulation the aircraft must achieve the minimum go-around gradient which is the maximum of:

- 2.7 %
- The value published in the go-around procedure.

L2 For more information about the go-around gradient, *Refer to PER-LND-LRF-FSR Go-Around Gradient* .

L1 LDG PERF

The flight crew can use the shortcut "MIN" to insert the minimum regulatory go-around gradient value.

To compute with a go-around gradient more than the minimum one, the flight crew enters the required gradient in GA GRADIENT.

USER SPEED INCREMENT - VLS+ / VPILOT

Applicable to: ALL

GENERAL

The Approach Speed (VAPP) is the speed of the aircraft when crossing the runway threshold.

VAPP is the sum of:

- VLS

L2 VLS is the Lowest Selectable Speed
VLS is equal to 1.23 VS1G

L1 - The wind speed increment

L2 The wind correction is equal to 1/3 of the headwind. The wind correction is limited to 15 kt .
When A/THR is selected, a minimum wind correction of 5 kt is required.

L1 - The CDL speed increment
- The ECAM Alert speed increment
- An extra value selected at the flight crew discretion.

LDG PERF

NO ECAM ALERT ITEM SELECTED - VLS+

The default value of the increment on the approach speed field (VLS+) is equal to the wind speed increment, considering that the A/THR is ON.
The flight crew can increase the default value of the increment on the approach speed.

When the flight crew starts a computation, LDG PERF computes the landing performance with an approach speed equal to the sum of:

- VLS
- The user speed increment
- The CDL speed increment, if the flight crew has selected a CDL item that affects the approach speed.

L2 For more information about the CDL items, *Refer to PER-LND-LCF-AFS CDL* .

L1 ECAM ALERT ITEM SELECTED - VPILOT

VPilot only appears if an ECAM Alert item is ticked in the ECAM ALERTS panel of LDG PERF.
The default value of VPilot is zero. It considers that the A/THR is OFF.
The flight crew can enter an airspeed correction in VPilot to increase the approach speed.

L2 For more information about:

- VPilot determination, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .
- LDG PERF calculation sequence using the VPilot airspeed correction, *Refer to PER-LND-LFF-CMT Calculation Sequence* .

L1 When the flight crew starts a computation, LDG PERF computes the landing performance with an approach speed equal to the sum of:
- VLS
- VPilot
- The wind speed increment

L2 The wind correction is equal to 1/3 of the headwind. The wind correction is limited to 15 kt .

L1
- The CDL speed increment, if the flight crew has selected a CDL item that affects the approach speed
- The ECAM Alert speed increment, in the case of the selection of an ECAM Alert item that affects the approach speed.

LANDING TECHNIQUE

Applicable to: ALL

GENERAL

The autoland systems are designed to help the flight crew for landing in low visibility.

L2 On a dry runway the Actual Landing Distance (ALD) in autoland is the addition of two distances: the airborne phase distance and the ground phase distance.

L1 LDG PERF

The flight crew selects one of the following setting in the LDG TECHNIQUE drop-down list:
- Autoland
- Manual.

When Autoland is selected, the flight crew must enter the glide slope angle.

BRAKING MODE

Applicable to: ALL

GENERAL

To brake the aircraft, the flight crew can use:
- The manual braking via the brake pedals
- The automatic braking via the autobrake system.

L2 For more information about the use of the autobrake system, *Refer to PER-LND-GEN Use of the Autobrake System* .

L1 LDG PERF

The flight crew selects one of the following braking mode:
- Manual
- Lo
- 2
- 3
- Hi.

For Manual braking mode, LDG PERF considers that:
- The flight crew applies the braking at the touchdown of the main landing gear
- The braking is the maximum braking performance limited by the Anti-Skid (A-SKID).

If the flight crew selects an ECAM Alert, then only the Manual braking mode is available for computation.

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AIRCRAFT STATUS PANEL

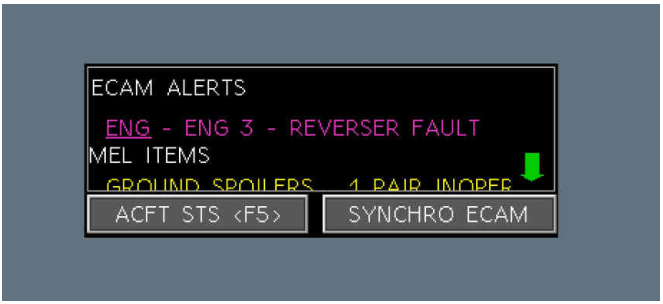
Applicable to: ALL

The current aircraft status must be considered for the computation.

The reminder area of the AIRCRAFT STATUS panel lists:
- ECAM alerts impacting landing performance
- Inoperative systems impacting landing performance
- The number of MEL items without landing performance impact (if any)
- CDL items impacting landing performance
- The number of negligible CDL items (if any).

If no ECAM Alert affects landing performance and if the aircraft is dispatched without any deferred items, "NO PERFORMANCE IMPACT" appears in the reminder area of the AIRCRAFT STATUS panel.

Reminder area of the AIRCRAFT STATUS Panel



SYNCHRO ECAM

The flight crew can retrieve the ECAM alerts affecting landing performance by clicking on the "SYNCHRO ECAM" button.
For more information about the SYNCHRO ECAM function, *Refer to PER-LND-LCF-AFS Synchronization with ECAM* .

AIRCRAFT STATUS

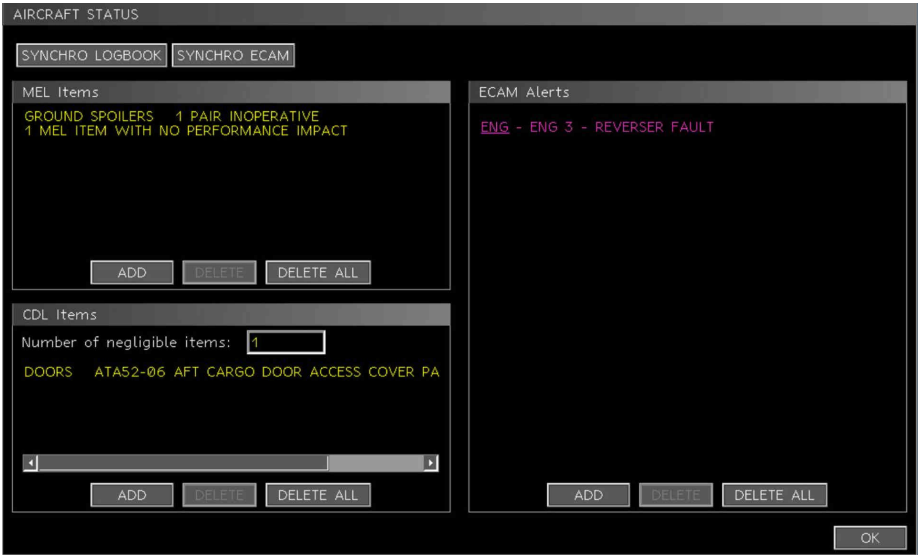
By clicking on the ACFT STS button, the flight crew opens the AIRCRAFT STATUS panel.

The AIRCRAFT STATUS panel is divided in three subpanels:
- MEL items
- CDL items
- ECAM Alerts.

Moreover, the flight crew can:

- Recover the eLogbook status by clicking on the "SYNCHRO LOGBOOK" button
- Retrieve the ECAM alerts affecting landing performance by clicking on the "SYNCHRO ECAM" button.

AIRCRAFT STATUS Panel



MEL

Applicable to: ALL

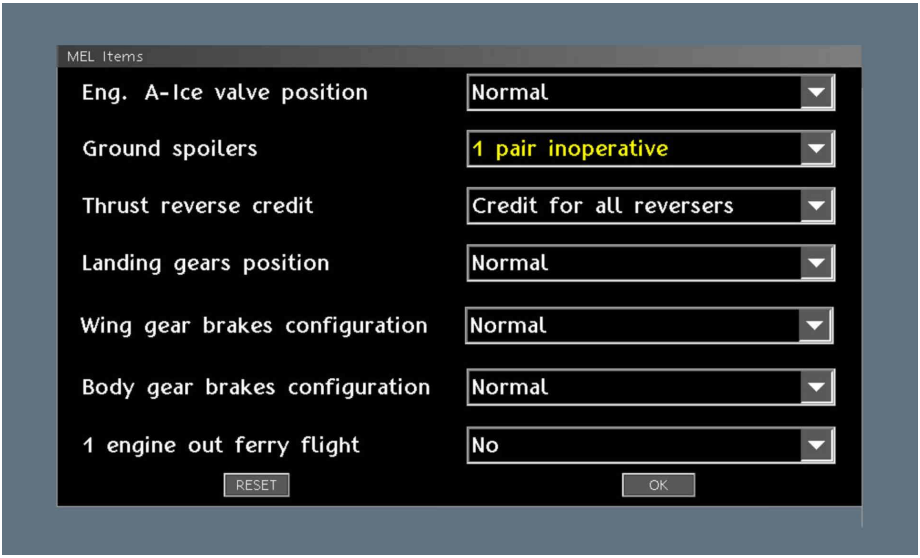
The MEL items subpanel displays the inoperative systems selected by the flight crew using:

- The OPS LIBRARY / MEL manual, via the selection of a MEL item, or
  In this case, the inoperative systems are displayed in yellow on LDG PERF.
- The LDG PERF MEL panel.
  In this case, the inoperative systems are displayed in cyan on LDG PERF.

MEL ITEM SELECTION

To open the MEL items panel, the flight crew uses the ADD button of the MEL items subpanel.
The MEL items panel displays the list of systems that could be inoperative and that involve landing performance penalties.
The flight crew selects inoperative items by selecting the appropriate status for each item in the drop-down lists.
The inoperative system associated to the MEL item is described in the (o) procedure of the MEL item.

MEL Items Panel



The selected item appears in the MEL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

COMMUNICATION BETWEEN MEL MANUAL AND LDG PERF

When the aircraft is dispatched with MEL items and if these MEL items are selected via the OPS LIBRARY / MEL manual:

- The associated inoperative systems that affect the landing performance are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF
- The number of MEL items without landing performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF.

CDL

Applicable to: ALL

The CDL items subpanel displays the missing structural parts selected by the flight crew using:

- The OPS LIBRARY / CDL manual, via the selection of a CDL item, or
  In this case, the CDL items are displayed in yellow on LDG PERF.
- The LDG PERF CDL panel.
  In this case, the CDL items are displayed in cyan on LDG PERF.

The CDL items subpanel also displays the number of negligible items.

NUMBER OF NEGLIGIBLE ITEMS

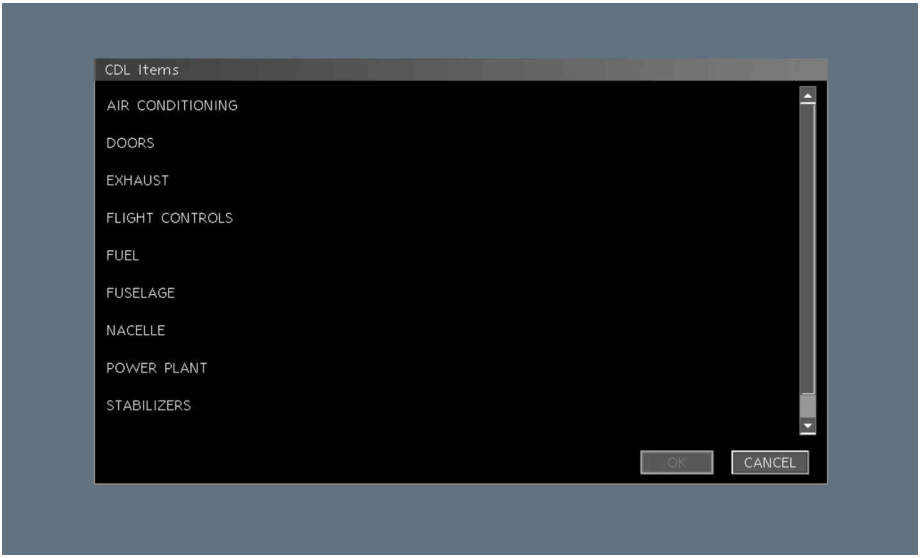
The flight crew enters the number of different structural parts simultaneously missing that have a negligible impact on the performance.

L2 If the number of negligible items is less or equal to three, there is no performance penalty. If the number of negligible items is greater or equal to four, then a drag increase for each item is taken into account for the performance computation.
For more information about the negligible CDL items, *Refer to AFM/MCDL-GEN-PERF Performance penalties published in the Airplane Flight Manual MCDL chapter*.

L1 CDL ITEM SELECTION

To open the CDL items panel, the flight crew uses the ADD button of the CDL items subpanel. The CDL items panel displays the list of structural parts that could be missing and that involve landing performance penalties.

CDL items Panel



To add a CDL item, the flight crew selects:
- The appropriate system group
- The corresponding CDL item
- The number of items missing

The selected item appears in the CDL items subpanel and in the reminder area of the AIRCRAFT STATUS panel.

Note: *When the flight crew selects a CDL item, the number of missing items is hidden in the ACFT STS box. The flight crew must use the scroll bar to display the hidden information.*

COMMUNICATION BETWEEN CDL MANUAL AND LDG PERF

When the aircraft is dispatched with CDL items and if these CDL items are selected via the OPS LIBRARY / CDL manual:
- The CDL items that affect the landing performance are automatically selected and displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF. Their associated number of missing parts is also displayed.
- The number of CDL items without landing performance impact is displayed in yellow on the reminder area of the AIRCRAFT STATUS panel in LDG PERF. These CDL items are called "negligible items".

When the flight crew uses the OPS LIBRARY / CDL manual to select a specific CDL item that affects the landing performance and then starts LDG PERF, the landing performance module may consider this CDL item as a negligible item if the CDL To LDG PERF communication file does not include this CDL item.
In this case, the flight crew must manually apply the weight reduction described in the OPS LIBRARY / CDL manual to the MLW(PERF) calculated by LDG PERF.

IMPACT ON OUTPUT (WHEN NO ECAM ALERT)

The selection of a CDL item modifies the layout of the RESULTS panel if:
- The CDL item has an impact on the VAPP, and
- No ECAM alert item is selected.

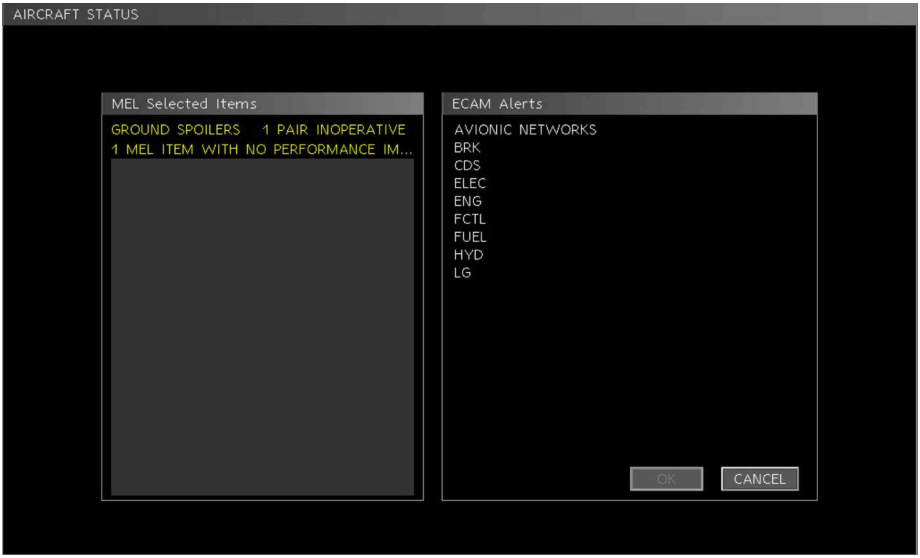
An additional result ΔVCDL appears. ΔVCDL is the speed increment in VAPP due to the selected CDL item(s).

Only the following CDL item induces a speed increment in VAPP:
- POWER PLANT ATA71-15 NACELLE STRAKES
  For more information on this CDL item, *Refer to AFM/MCDL-71-15 Nacelle strake*.
- FLIGHT CONTROLS ATA27-22 FLAP END SEAL.
  For more information on this CDL item, *Refer to AFM/MCDL-27-22 Flap end seal*.

ECAM ALERTS

Applicable to: ALL

ECAM Alerts Panel



SELECTION OF INOPERATIVE ITEMS

The ECAM Alerts panel displays a list of possible inoperative systems that result in an Abnormal or Emergency situation.
This list only includes the ECAM alerts that involve landing performance penalties.
To open the ECAM Alerts panel, the flight crew uses the ADD button of the ECAM Alerts subpanel.

To add an ECAM alert item, the flight crew selects:
- The appropriate system group
- The corresponding ECAM alert item
- The OK button.

The selected item appears in the ECAM Alerts subpanel and in the reminder area of the AIRCRAFT STATUS panel.

Note: *The following error message appears if the flight crew selects the LDG TECHNIQUE Autoland: "Computation using autoland with ECAM Alert is not possible".*
The selection of an ECAM alert item plus the LDG TECHNIQUE Autoland is not possible even if the associated ECAM alert enables the use of the Autoland system.
However, for these failure cases, the distance computed for Manual Landing is consistent with the average landing distance achieved with Autoland.
Therefore, the flight crew can set the LDG TECHNIQUE field to Manual.

COMMUNICATION BETWEEN ECAM AND LDG PERF

The ECAM alert items displayed on the ECAM STATUS MORE page are automatically sent to LDG PERF.
For more information about the synchronization with the ECAM , *Refer to PER-LND-LCF-AFS Synchronization with ECAM* .

Note: *In the case of a dispatch with a MEL item that results from an ECAM alert affecting the landing performance during the previous flight, the list of the ECAM alert items is still on the STATUS MORE page of the SD . The list of the ECAM alert items of the previous flight is sent to LDG PERF.*

Workaround:
- *If there is no additional ECAM alert during the current flight: Manually deselect the list of the ECAM alert items in LDG PERF*
- *If there are additional ECAM alerts during the current flight: Deselect the list of the ECAM alert items in LDG PERF that are associated with the MEL dispatch.*

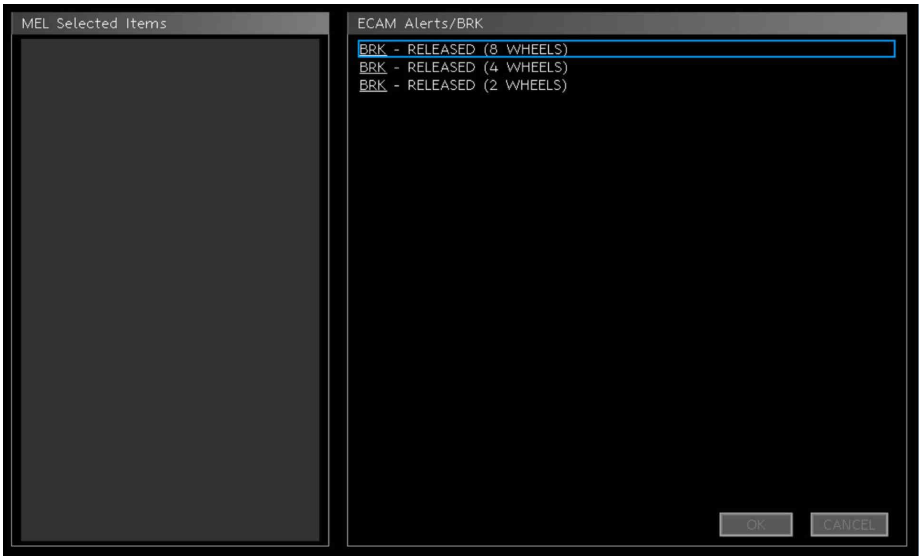
STRICT MATCHING BETWEEN THE ECAM AND LDG PERF

In the case of an automatic or a manual synchronization with the ECAM , and if the ECAM alert displayed on the ECAM STATUS MORE page corresponds to a unique ECAM alert item in LDG PERF, this ECAM alert item directly appears in magenta on the reminder area of the AIRCRAFT STATUS panel, without any flight crew selection.

SEVERAL POSSIBILITIES IN LDG PERF FOR ONE ALERT IN THE ECAM

In the case of an automatic or a manual synchronization with the ECAM , and if the ECAM alert displayed on the ECAM STATUS MORE page may correspond to several possibilities of ECAM alert items in LDG PERF, the flight crew has to manually select the applicable item from a filtered list.
The following type of window is displayed:

ECAM Alerts - Filtered List

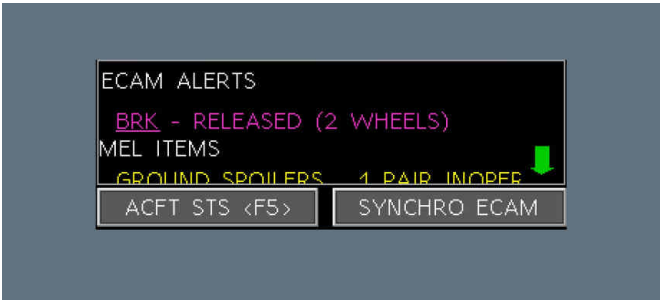


The filtered ECAM alert items correspond to the same ECAM alert on the ECAM STATUS MORE page.

However, the impacts of the filtered ECAM alert items on the landing performance differ by:
- The current or reachable aerodynamic configuration for landing (SLATS LOCKED, SLATS SYS 1+2 FAULT, FLAPS LOCKED, FLAP SYS 1+2 FAULT, G+Y SYST PRESS LO, FLAPS LEVER JAMMED), or
- The number of wheels released (BRAKES RELEASED).

When the flight crew selects the applicable ECAM alert item from the filtered list, this ECAM alert item appears in magenta on the reminder area of the AIRCRAFT STATUS panel.

Reminder area of the AIRCRAFT STATUS panel



IMPACT ON INPUT

The selection of an item in the ECAM Alerts panel modifies the CONDITIONS panel.
For more information about the modifications of the interface, *Refer to PER-LND-LFF-IOI Conditions* .

SYNCHRONIZATION WITH LOGBOOK

Applicable to: ALL

The flight crew can use the "SYNCHRO LOGBOOK" button to recover the eLogbook status.
This action synchronizes the aircraft status of the whole FLT OPS domain with the current deferred items of the eLogbook
If the flight crew had previously selected additional MEL and CDL items in LDG PERF (displayed in cyan in the AIRCRAFT STATUS panel) and then uses the SYNCHRO LOGBOOK function, these manually entered items are lost.

Note:
1. *When the flight crew uses the SYNCHRO LOGBOOK function in LDG PERF, the whole FLT OPS domain is also synchronized with the eLogbook*
2. *If the Logbook status is lost in the FLT OPS domain, LDG PERF may synchronize with an old eLogbook status*
3. *When the flight crew uses the SYNCHRO LOGBOOK function in the IN-FLIGHT Mode of LDG PERF, the ECAM status is also updated.*

SYNCHRONIZATION WITH ECAM

Applicable to: ALL

MANUAL SYNCHRONIZATION WITH THE ECAM: "SYNCHRO ECAM"

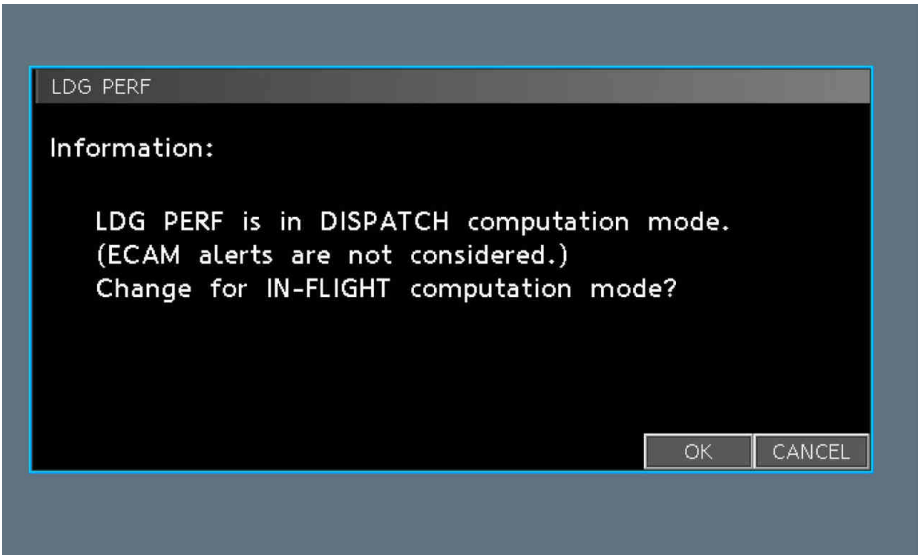
The flight crew can use the "SYNCHRO ECAM" button to get back to LDG PERF the ECAM alerts that affect the landing.
This action synchronizes the aircraft status of LDG PERF with the current ECAM alert items listed on the ECAM STATUS MORE page.
If the flight crew had previously selected additional ECAM alerts in LDG PERF (displayed in cyan on the AIRCRAFT STATUS panel) and then uses the SYNCHRO ECAM function, these manually entered alerts are lost.

AUTOMATIC SYNCHRONIZATION WITH THE ECAM

The synchronization with the ECAM is automatic if the fight crew:
- Opens LDG PERF, or
- Changes from an application of the FLT OPS domain to LDG PERF, or
- Changes from the DISPATCH mode to the IN-FLIGHT mode in LDG PERF.

If an ECAM alert that affects the landing performance occurs while the flight crew is using LDG PERF in DISPATCH mode, LDG PERF displays the following popup message:

ECAM alert: popup message in DISPATCH mode



Note: *In the case of a dispatch with a MEL item that results from an ECAM alert affecting the landing performance during the previous flight, the list of the ECAM alert items is still on the STATUS MORE page of the SD. The list of the ECAM alert items of the previous flight is sent to LDG PERF.*

Workaround:

- *If there is no additional ECAM alert during the current flight: Manually deselect the list of the ECAM alert items in LDG PERF*
- *If there are additional ECAM alerts during the current flight: Deselect the list of the ECAM alert items in LDG PERF that are associated with the MEL dispatch.*

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RESULTS DATA

Applicable to: ALL

GENERAL

A landing performance calculation computes the following results:

- The landing weights

L2 For more information about the landing weights, *Refer to PER-LND-LRD-DSR Landing Weights* .

L1 - The landing distances

L2 For more information about the landing distances, *Refer to PER-LND-LRD-DSR Landing Distances* .

L1 - The landing limitation codes

L2 For more information about the landing limitation codes, *Refer to PER-LND-LRD-DSR Landing Limitation Codes* .

L1 - The aerodynamic configuration

L2 For more information about the aerodynamic configuration, *Refer to PER-LND-LRD-DSR Aerodynamic Configuration* .

L1 - The go-around gradient

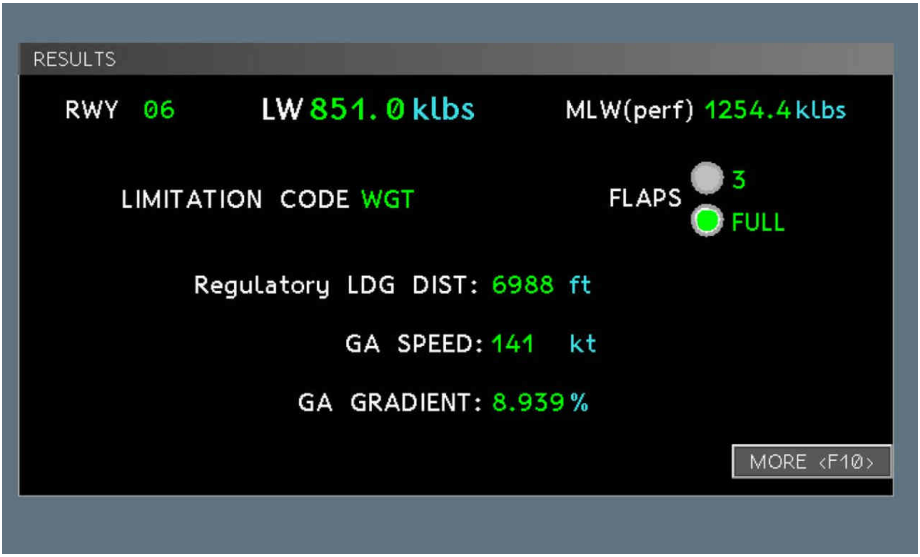
L2 For more information about the go-around gradient, *Refer to PER-LND-LRD-DSR Go-Around Gradient* .

L1 - The go-around speed.

L2 For more information about the go-around speed, *Refer to PER-LND-LRD-DSR Go-Around Speed* .

L1 **LDG PERF**

RESULTS Panel



LANDING WEIGHTS

Applicable to: ALL

GENERAL

The Maximum Landing Weight Limited by the Performance (MLW(PERF)) is the maximum aircraft weight which complies with all the regulatory requirements for landing performance in given environmental conditions.
The MLW(PERF) value may exceed the certified MLW value. The calculation with a LW above the certified MLW (overweight) is possible only in flight.

L2 For an applicable value of MLW , *Refer to FCOM Limitations* .

L1 LDG PERF

The RESULTS panel displays the following two weights:
- LW, the input weight of the calculation
- MLW(perf).

COMMUNICATION FROM LDG PERF TO LOADSHEET

When the flight crew completes a LDG PERF computation and then changes from LDG PERF to LOADSHEET, LDG PERF transfers the calculated MLW(PERF) value to LOADSHEET if the MLW(PERF) value is lower than or equal to the certified MLW value. If the MLW(PERF) value is transferred, LOADSHEET displays this value in yellow in the MLW field of the CONDITIONS panel.

LANDING DISTANCES

Applicable to: ALL

GENERAL

LDA at destination must at least be equal to the RLD for the planned LW and the forecasted conditions.
For more information about landing distances, *Refer to PER-LND-GEN Landing Distance Definitions* .

LDG PERF

Regulatory LDG DIST on the RESULTS panel is the RLD .

L2 When the flight crew runs a LDG PERF computation with the LDG TECHNIQUE Autoland, LDG PERF automatically checks that the RLD for automatic landing is more than or equal to the RLD in manual mode:

- If the RLD for automatic landing is more than or equal to the RLD in manual mode, LDG PERF displays the results for a RLD calculated using the Autoland landing technique
- If the RLD for automatic landing is less than the RLD in manual mode, LDG PERF displays the results for a RLD calculated using the Manual landing technique.

LANDING LIMITATION CODES

Applicable to: ALL

GENERAL

Several regulatory requirements limit landing performance. They are called landing limitations.

LDG PERF

The limitation code identifies the regulatory requirement that limits the MLW(PERF).
If the LW is below the MLW(PERF), the limitation code displays WGT.
The following table describes the meaning of the codes:

WGT	Input Weight
LDA	Landing Distance Available
ACG	Approach Climb Gradient
LCG	Landing Climb Gradient
TIRE	Maximum Tire Speed
BRK	Maximum Brake Energy

Customized codes may differ from the above list.

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

For more information about aerodynamic configuration, *Refer to Aerodynamic Configuration (Input)* .

LDG PERF

FLAPS on the RESULTS panel is the configuration selected by the flight crew or the result of the optimization with the AUTO CONF option.

When the flight crew selects AUTO CONF, LDG PERF computes the landing performance for:
- Landing in CONF FULL (go-around in CONF 3)
- Landing in CONF 3 (go-around in CONF 2).

If both a go-around in CONF 3 (landing in CONF FULL) and a go-around in CONF 2 (landing in CONF 3) comply with the go-around gradient constraint, then LDG PERF displays the results for: landing in CONF FULL (go-around in CONF 3).
If a go-around in CONF 3 (landing in CONF FULL) does not comply with the go-around gradient constraint, the flight crew lands in CONF 3 and performs go-around in CONF 2. LDG PERF displays the results for: landing in CONF 3 (go-around in CONF 2).

GO-AROUND GRADIENT

Applicable to: ALL

GENERAL

As per regulation, the aircraft must achieve a minimum climb gradient in the case of a go-around. The go-around gradient is the minimum of the approach climb gradient and the landing climb gradient.

APPROACH CLIMB

The approach climb is based on the following assumptions:

- One engine is inoperative
- The engine thrust rating on the remaining engines is TOGA
- The landing gear is retracted
- The flaps are in approach configuration (CONF 3, 2 and 1+F are certified)
- The go-around speed is higher than VMCL
- The go-around speed is equal to:
  - For CAT I approach type: VLS (1.23 VS1G) of the approach configuration
  - For CAT II approach type: The maximum of:
    - VLS of the approach configuration (landing gear retracted)
    - VLS of the landing configuration (landing gear extended) + 5 kt
    - Minimum Control Airspeed for Landing (VMCL) + 5 kt .

The minimum approach climb gradient is 2.7 % .

LANDING CLIMB

The landing climb is based on the following assumptions:

- All engines are operative
- The thrust is the thrust available 8 s after initiation of thrust control movement from minimum flight idle to TOGA thrust
- The landing gear is extended
- The flaps are in landing configuration (CONF 3 or FULL)
- The go-around speed is higher than VMCL
- The go-around speed is equal to VLS of the landing configuration.

The minimum approach climb gradient is 3.2 % .

L2 The landing climb regulatory requirement is never limiting for landing performance compared to the approach climb regulatory requirement.

L1 **LDG PERF**

GA GRADIENT on the RESULTS panel is the maximum go-around gradient.

L2 For more information about Go-Around Gradient, *Refer to PER-LND-LCD-ACC Go-Around Gradient* .

GO-AROUND SPEED

Applicable to: ALL

For the A380, there is no optimization of the go-around speed.

For the approach climb gradient calculation, the go-around speed is equal to:

- For CAT I approach type: VLS (1.23 VS1G) of the approach configuration
- For CAT II approach type: The maximum of:
  - VLS of the approach configuration (landing gear retracted)
  - VLS of the landing configuration (landing gear extended) + 5 kt
  - Minimum Control Airspeed for Landing (VMCL) + 5 kt.

For the landing climb gradient calculation, the go-around speed is equal to VLS of the landing configuration.

MORE PANEL

Applicable to: ALL

The MORE panel displays the following information:

- The basic results of the LDG PERF computation, plus the Actual LDG DIST and the RWY Length
- The thrust reverser status for the LDG PERF computation:
  - For dry and wet runway conditions, the thrust reverser status is: NO REVERSE THRUST CREDIT
  - For contaminated runways, the thrust reverser status is defined as per Operator policy.
- Additional results data that the Operator can customize.

MORE Panel

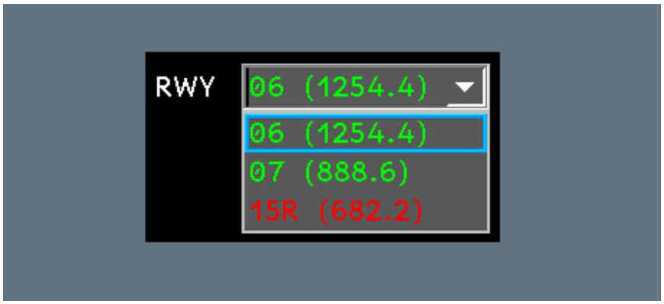


COMPUTATION RESULTS

Applicable to: ALL

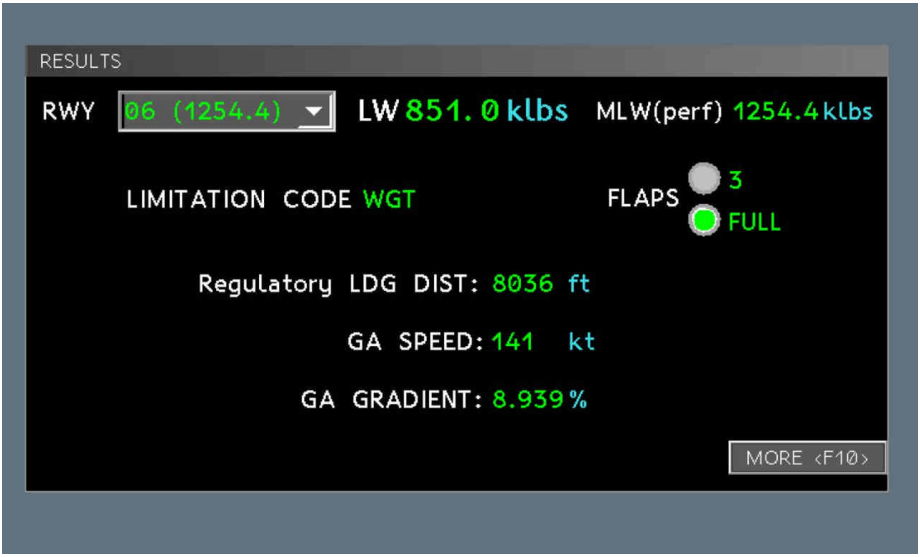
The flight crew uses the RWY drop-down list to access the results for each runway.
For each runway, the MLW(PERF) is displayed between brackets after the Runway ID.

Runway Selection



The list is sorted by weight from the highest to the lowest and is color-coded:
- Green: When the MLW(PERF) is more or equal to the LW
- Red: When the MLW(PERF) is less to the LW .

RESULTS Panel - MULTIPLE RWY COMPUTATION



RESULTS DATA

Applicable to: ALL

GENERAL

A landing performance calculation computes the following results:

- The landing weights

L2 For more information about the landing weights, *Refer to PER-LND-LRF-FSR Landing Weights* .

L1 - The landing distances

L2 For more information about the landing distances, *Refer to PER-LND-LRF-FSR Landing Distances* .

L1 - The stop margin

L2 For more information about the stop margin, *Refer to PER-LND-LRF-FSR Stop Margin* .

L1 - The landing limitation codes

L2 For more information about the landing limitation codes, *Refer to PER-LND-LRF-FSR Landing Limitation Codes* .

L1 - The aerodynamic configuration

L2 For more information about the aerodynamic configuration, *Refer to PER-LND-LRF-FSR Aerodynamic Configuration* .

L1 - The go-around gradient

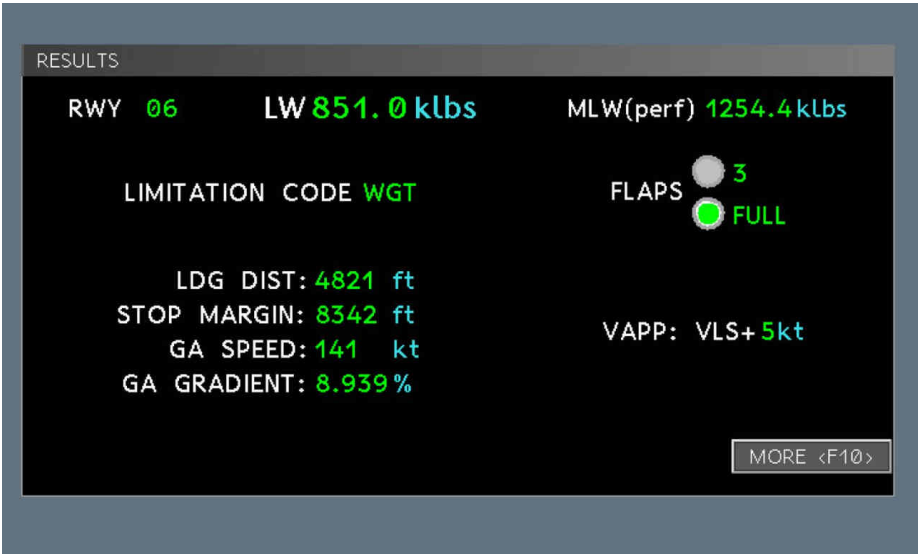
L2 For more information about the go-around gradient, *Refer to PER-LND-LRF-FSR Go-Around Gradient* .

L1 - The go-around speed.

L2 For more information about the go-around speed, *Refer to PER-LND-LRF-FSR Go-Around Speed* .

L1 **LDG PERF**

RESULTS Panel



LANDING WEIGHTS

Applicable to: ALL

GENERAL

The Maximum Landing Weight Limited by the Performance (MLW(PERF)) is the maximum aircraft weight which complies with all the regulatory requirements for landing performance in given environmental conditions.
The MLW(PERF) value may exceed the certified MLW value.

L2 For more information about the overweight landing, *Refer to PER-LND-GEN Overweight Landing Requirements* .
For an applicable value of MLW , *Refer to FCOM Limitations* .

L1 LDG PERF

The RESULTS panel displays the following two weights:
- LW, the input weight of the calculation
- MLW(perf).

In the case of an overweight landing, LDG PERF displays the label OVERWEIGHT LANDING at the top of the RESULTS panel.

COMMUNICATION FROM LDG PERF TO LOADSHEET

When the flight crew completes a LDG PERF computation and then changes from LDG PERF to LOADSHEET, LDG PERF transfers the calculated MLW(PERF) value to LOADSHEET if the MLW(PERF) value is lower than or equal to the certified MLW value. If the MLW(PERF) value is transferred, LOADSHEET displays this value in yellow in the MLW field of the CONDITIONS panel.

LANDING DISTANCES

Applicable to: ALL

GENERAL

LDA at destination must at least be equal to the ALD for the planned LW and the forecasted conditions.
For more information about the landing distances, *Refer to PER-LND-GEN Landing Distance Definitions* .

LDG PERF

LDG DIST on the RESULTS panel is the ALD .

STOP MARGIN

Applicable to: ALL

GENERAL

For in-flight calculation, the stop margin is the difference between the Landing Distance Available (LDA) and the Actual Landing Distance (ALD).
STOP MARGIN = LDA - ALD.

LDG PERF

STOP MARGIN on the RESULTS panel is equal to: RWY LENGTH - LDG DIST.

LANDING LIMITATION CODES

Applicable to: ALL

GENERAL

Several regulatory requirements limit landing performance. They are called landing limitations.

LDG PERF

The limitation code identifies the regulatory requirement that limits the MLW(PERF).
If the LW is below the MLW(PERF), the limitation code displays WGT.
The following table describes the meaning of the codes:

WGT	Input Weight
LDA	Landing Distance Available
ACG	Approach Climb Gradient
LCG	Landing Climb Gradient
TIRE	Maximum Tire Speed
BRK	Maximum Brake Energy

Customized codes may differ from the above list.

AERODYNAMIC CONFIGURATION

Applicable to: ALL

GENERAL

For more information about aerodynamic configuration, *Refer to Aerodynamic Configuration (Input)* .

LDG PERF

FLAPS on the RESULTS panel is the configuration selected by the flight crew or the result of the optimization with the AUTO CONF option.

When the flight crew selects AUTO CONF, LDG PERF computes the landing performance for:
- Landing in CONF FULL (go-around in CONF 3)
- Landing in CONF 3 (go-around in CONF 2).

If both a go-around in CONF 3 (landing in CONF FULL) and a go-around in CONF 2 (landing in CONF 3) comply with the go-around gradient constraint, then LDG PERF displays the results for: landing in CONF FULL (go-around in CONF 3).
If a go-around in CONF 3 (landing in CONF FULL) does not comply with the go-around gradient constraint, the flight crew lands in CONF 3 and performs go-around in CONF 2. LDG PERF displays the results for: landing in CONF 3 (go-around in CONF 2).

OVERWEIGHT LANDING

In the case of an overweight landing, when the flight crew selects AUTO CONF, LDG PERF computes the following scenarios:
1. Landing in CONF FULL, go-around in CONF 3
2. Landing in CONF 3, go-around in CONF 2
3. Landing in CONF 3, go-around in CONF 1+F.

The last scenario (3) is computed only if the first two scenarios failed to give a result. In other words, the last scenario is computed only if a go-around in CONF 2 does not comply with the go-around gradient constraint.
However, as per the FCOM Overweight Landing Procedure: “In all cases, if the landing configuration is different from CONF FULL, use FLAP 1 for go-around”.

L2 For more information about the overweight landing procedure:
- *Refer to FCOM - Overweight Landing Procedure*
- *Refer to FCTM/ FCTM - Overweight Landing Procedure* .

L1 Therefore, in the case of an overweight landing, the flight crew may select AUTO CONF to determine the adequate aerodynamic configuration to use for the overweight landing. If the result of the LDG PERF computation is: landing in CONF 3 and go-around in CONF 2, the flight

crew manually selects CONF 3 for LDG CONF and CONF 1+F for GA CONF. Then the flight crew restarts the computation.

GO-AROUND GRADIENT

Applicable to: ALL

GENERAL

As per regulation, the aircraft must achieve a minimum climb gradient in the case of a go-around. The go-around gradient is the minimum of the approach climb gradient and the landing climb gradient.

APPROACH CLIMB

The approach climb is based on the following assumptions:

- One engine is inoperative
- The engine thrust rating on the remaining engines is TOGA
- The landing gear is retracted
- The flaps are in approach configuration (CONF 3, 2 and 1+F are certified)
- The go-around speed is higher than VMCL
- The go-around speed is equal to:
  - For CAT I approach type: VLS (1.23 VS1G) of the approach configuration
  - For CAT II approach type: The maximum of:
    - VLS of the approach configuration (landing gear retracted)
    - VLS of the landing configuration (landing gear extended) + 5 kt
    - Minimum Control Airspeed for Landing (VMCL) + 5 kt .

The minimum approach climb gradient is 2.7 % .

LANDING CLIMB

The landing climb is based on the following assumptions:

- All engines are operative
- The thrust is the thrust available 8 s after initiation of thrust control movement from minimum flight idle to TOGA thrust
- The landing gear is extended
- The flaps are in landing configuration (CONF 3 or FULL)
- The go-around speed is higher than VMCL
- The go-around speed is equal to VLS of the landing configuration.

The minimum approach climb gradient is 3.2 % .

L2 The landing climb regulatory requirement is never limiting for landing performance compared to the approach climb regulatory requirement.

L1 **LDG PERF**

GA GRADIENT on the RESULTS panel is the maximum go-around gradient.

L2 For more information about Go-Around Gradient, *Refer to PER-LND-LCF-ACC Go-Around Gradient* .

GO-AROUND SPEED

Applicable to: ALL

For the A380, there is no optimization of the go-around speed.

For the approach climb gradient calculation, the go-around speed is equal to:

- For CAT I approach type: VLS (1.23 VS1G) of the approach configuration
- For CAT II approach type: The maximum of:
  - VLS of the approach configuration (landing gear retracted)
  - VLS of the landing configuration (landing gear extended) + 5 kt
  - Minimum Control Airspeed for Landing (VMCL) + 5 kt.

For the landing climb gradient calculation, the go-around speed is equal to VLS of the landing configuration.

LANDING SPEED

Applicable to: ALL

GENERAL

The Approach Speed (VAPP) is the speed of the aircraft 50 ft above the runway.

VAPP is the sum of:

- VLS

L2 VLS is the Lowest Selectable Speed
VLS is equal to 1.23 VS1G

L1 - The wind speed increment

L2 The wind correction is equal to 1/3 of the headwind. The wind correction is limited to 15 kt.
When A/THR is selected, a minimum wind correction of 5 kt is required.

L1 - The CDL speed increment
- The ECAM alert speed increment
- An extra value selected at the flight crew discretion.

LDG PERF

NO ECAM ALERT ITEM SELECTED

VAPP on the RESULTS panel is the sum of:

- VLS
- VLS+, the speed increment entered by the flight crew on the CONDITIONS panel
- ΔVCDL, the speed increment in VAPP due to the selected CDL item(s), if the flight crew has selected a CDL item that affects VAPP.

ECAM ALERT ITEM SELECTED

VAPP on the RESULTS panel is equal to the sum of:

- Vref, which is equal to VLS
- ΔVref, which is detailed on the MORE panel and is equal to the sum of:
  - ΔVfailure, the ECAM alert speed increment, when an ECAM alert item that affects the approach speed is selected
  - ΔVwind, the wind speed increment

L2 The wind correction is equal to 1/3 of the headwind. The wind correction is limited to 15 kt.

L1
  - ΔVpilot, the speed increment entered by the flight crew on the CONDITIONS panel
  - ΔVcdl, the CDL speed increment, if the flight crew has selected a CDL item that affects the approach speed.

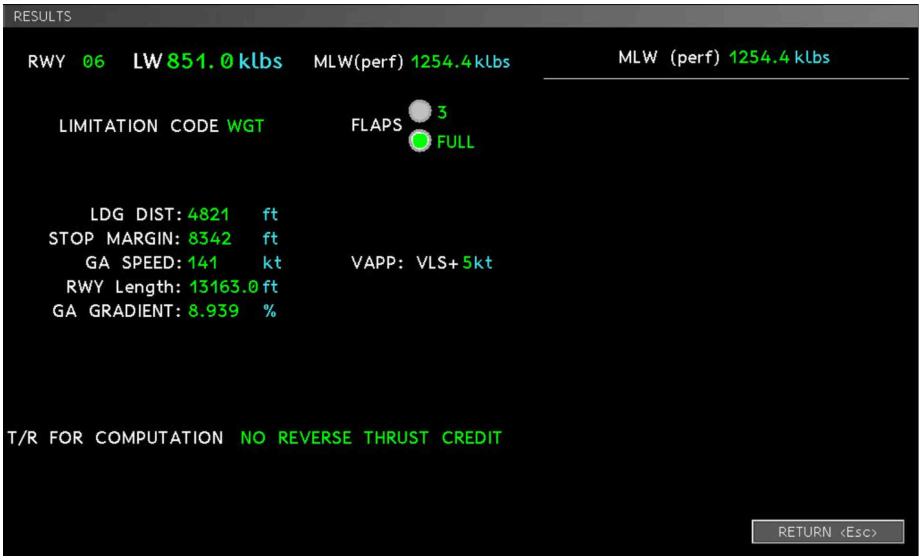
MORE PANEL

Applicable to: ALL

The MORE panel displays the following information:

- The basic results of the LDG PERF computation, plus the RWY Length
- The thrust reverser status for the LDG PERF computation:
  - For dry and wet runway conditions, the thrust reverser status is: NO REVERSE THRUST CREDIT
  - For contaminated runways, the thrust reverser status is defined as per Operator policy.
- Additional results data that the Operator can customize.

MORE Panel

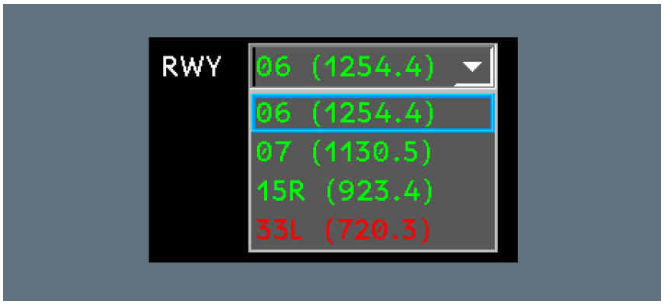


COMPUTATION RESULTS

Applicable to: ALL

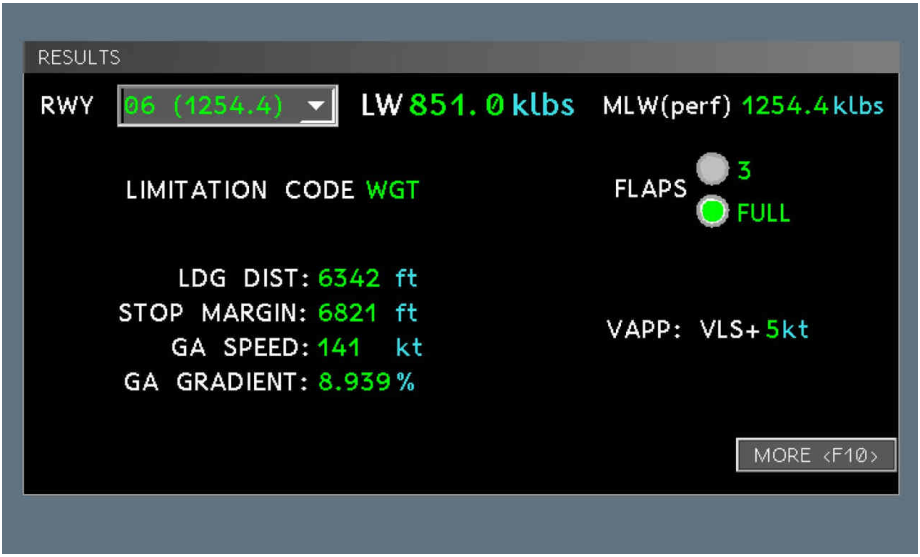
The flight crew uses the RWY drop-down list to access the results for each runway.
For each runway, the MLW(PERF) is displayed between brackets after the Runway ID.

Runway Selection



The list is sorted by weight from the highest to the lowest and is color-coded:
- Green: When the MLW(PERF) is more or equal to the LW
- Red: When the MLW(PERF) is less to the LW .

RESULTS Panel - MULTIPLE RWY COMPUTATION



GENERAL

Applicable to: ALL

LANDING PERFORMANCE ECAM INDICATIONS

After an aircraft system failure that occurs in flight and that affects the landing performance, the flight crew must follow the associated ECAM procedure.
The ECAM displays landing performance indications in the applicable procedure.

L2 For more information about the landing performance ECAM indications, *Refer to DSC-31-40-10 Landing Performance Indications* .

L1 In the case of a landing performance ECAM indication that results in a LDG PERF computation, the flight crew selects the applicable ECAM alert items in the ACFT STATUS panel of LDG PERF - IN-FLIGHT.
The applicable ECAM alert items are listed in the ECAM STATUS MORE page.

LDG PERF COMPUTATION WITH ECAM ALERT

LANDING DISTANCE IMPACT

The runway length for landing is the ALD in CONF FULL without failure multiplied by the landing distance coefficient associated with the applicable ECAM alert item.

On the RESULTS panel of LDG PERF:
- LDG DIST without ECAM is the ALD in CONF FULL without failure
- Failure coefficient is the landing distance coefficient associated with the applicable ECAM alert item
- LDG DIST is equal to LDG DIST without ECAM multiplied by Failure coefficient

VAPP IMPACT

The applicable ECAM alert item may affect the VAPP because of a speed increment due to the system failure (ΔVfailure).
In the case of a ΔVfailure different from 0, the flight crew enters into the FMS - PERF - APPR page the VAPP value computed by LDG PERF - IN-FLIGHT.

L2 For more information about the VAPP value computed by the FMS , *Refer to DSC-22-FMS-20-30-22FMS502BC PERF page - VAPP* .

Intentionally left blank

CONDITIONS

Applicable to: ALL

The selection of an ECAM alert item modifies the CONDITIONS panel.

CONDITIONS Panel



LDG CONF

The LDG CONF field disappears.

L2 The LDG CONF is a result of a computation with an ECAM alert, and not an input.

L1 LDG CG

The LDG CG field appears.
In this field, the flight crew enters the estimated CG at landing.
The CG field enables the flight crew to reduce conservatism on the approach speed in such a degraded situation. The Approach Speed (VAPP) computation takes into account the value that the flight crew enters in the CG field, but the landing distance computation considers that the CG is at the most forward limit.

$\Delta V_{FAILURE} = 0$

For ECAM alerts that do not affect the VAPP , LDG CG enables to calculate the landing distance using the best VLS assessment (as VLS depends on CG).

$\Delta V_{FAILURE} \neq 0$

For ECAM alerts that affect the VAPP , LDG CG enables:

- To calculate the landing distance using the best VLS assessment (as VLS depends on CG)
- To determine the most relevant VAPP at landing.
  LDG PERF is the reference tool for the VAPP determination in the case of ECAM alert(s) that affect the VAPP .

VPILOT

The VPilot field appears instead of VLS+.
VPilot is the speed increment entered by the flight crew in order to increase the approach speed.
To determine VPilot, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

LDG TECHNIQUE

The following error message appears if the flight crew selects the LDG TECHNIQUE Autoland: "Computation using autoland with ECAM Alert is not possible".
The selection of an ECAM alert item plus the LDG TECHNIQUE Autoland is not possible even if the associated ECAM alert does not inhibit the use of the Autoland system.
However, for these failure cases, the distance computed for Manual Landing is consistent with the average landing distance achieved with Autoland.
Therefore, the flight crew can set the LDG TECHNIQUE field to Manual.

BRK MODE

The following error message appears if the flight crew selects an autobrake mode: "Computation using autobrake mode with ECAM Alert is not possible".
The failure coefficients are computed without autobrake (i.e. with maximum pedal braking).
Therefore, the flight crew must set the BRAKE MODE field to Manual.

L2 Autobrake may be used operationally at the flight crew discretion when sufficient performance margins are available.

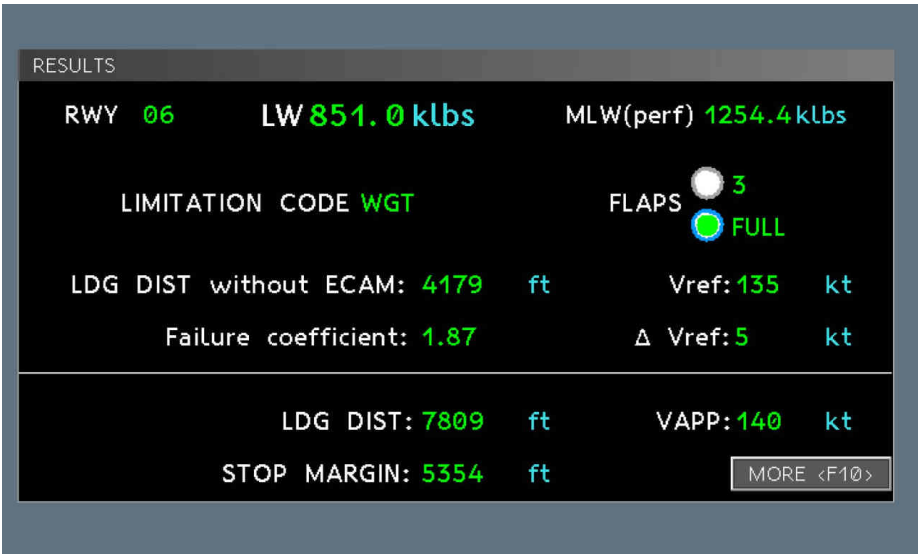
BASIC RESULTS

Applicable to: ALL

The selection of an ECAM alert item modifies the RESULTS panel.
For ECAM alert items that do not require a specific flaps lever position for landing, the landing can be performed in both CONF FULL and CONF 3. The default LDG PERF computation considers CONF FULL. The flight crew can use the buttons FLAPS 3 and FLAPS FULL to access the appropriate landing performance and approach speeds on the RESULTS panel.

FLAPS FULL

RESULTS Panel: FLAPS FULL



LDG DIST WITHOUT ECAM

LDG DIST without ECAM is the distance necessary for the aircraft to land, considering that the aircraft has no failure.

FAILURE COEFFICIENT

Failure coefficient is the coefficient that LDG PERF applies to LDG DIST without ECAM to compute LDG DIST.

VREF

Vref is the VLS of the aircraft calculated with FULL flaps setting.

ΔVREF

ΔVref is the sum of:

- ΔVfailure, the speed increment due to the system failure
  L2 ΔVfailure is calculated by LDG PERF.
- L1 ΔVwind, the speed increment due to the wind correction
  L2 ΔVwind is calculated by LDG PERF.
  For more information about the ΔVwind calculation, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .
- L1 ΔVPilot, equal to the VPilot entered by the flight crew on the CONDITIONS panel
  L2 For more information about how to determine VPilot, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .
- L1 ΔVcdl, the speed increment due to the selected CDL item(s), only if the following CDL items are selected:
  - POWER PLANT ATA71-15 NACELLE STRAKES, and/or
  - FLIGHT CONTROLS ATA27-22 FLAP END SEAL.

LDG DIST

LDG DIST is the distance necessary for the aircraft to land. This distance takes into account the aircraft system failures selected. LDG DIST is equal to LDG DIST without ECAM multiplied by Failure coefficient.

STOP MARGIN

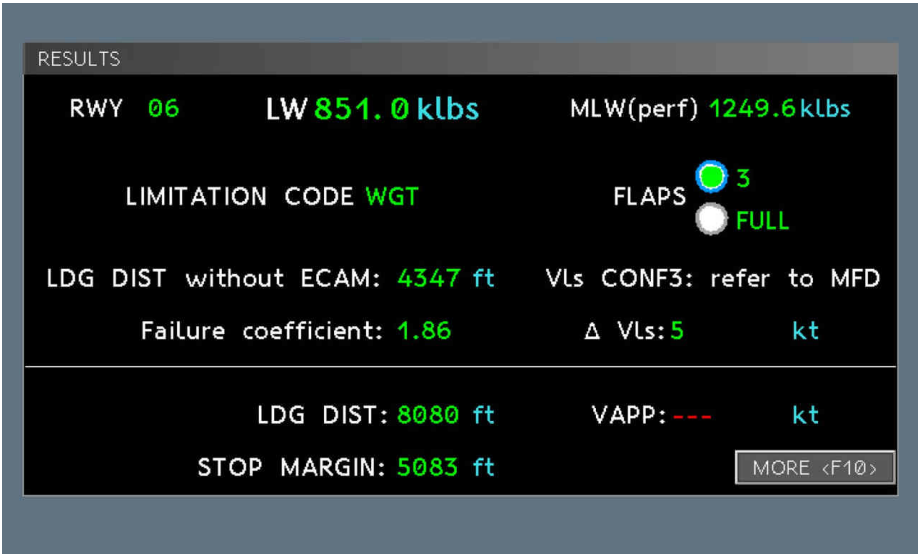
STOP MARGIN is the difference between the LDA and LDG DIST.

VAPP

VAPP is the sum of Vref and ΔVref. To determine VAPP , *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

FLAPS 3

BASIC Results: FLAPS 3



The layout of the RESULTS panel is slightly modified.
Vls CONF 3 replaces VREF and ΔVls replaces ΔVref.

VLS CONF 3

LDG PERF does not calculate Vls CONF 3.
The reference remains the VLS value displayed on the FMS - PERF - APPR page.

ΔVLS

ΔVls is the sum of:

- ΔVfailure, the speed increment due to the system failure

L2 ΔVfailure is calculated by LDG PERF.

- L1 L2 ΔVwind, the speed increment due to the wind correction

ΔVwind is calculated by LDG PERF.
For more information about ΔVwind calculation, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

- L1 L2 ΔVPilot, which is equal to the VPilot entered by the flight crew on the CONDITIONS panel

To determine VPilot, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

L1 - ΔVcdl, which is different from zero only if one or both of the following CDL items are selected:

- POWER PLANT ATA71-15 NACELLE STRAKES
- FLIGHT CONTROLS ATA27-22 FLAP END SEAL.

VAPP

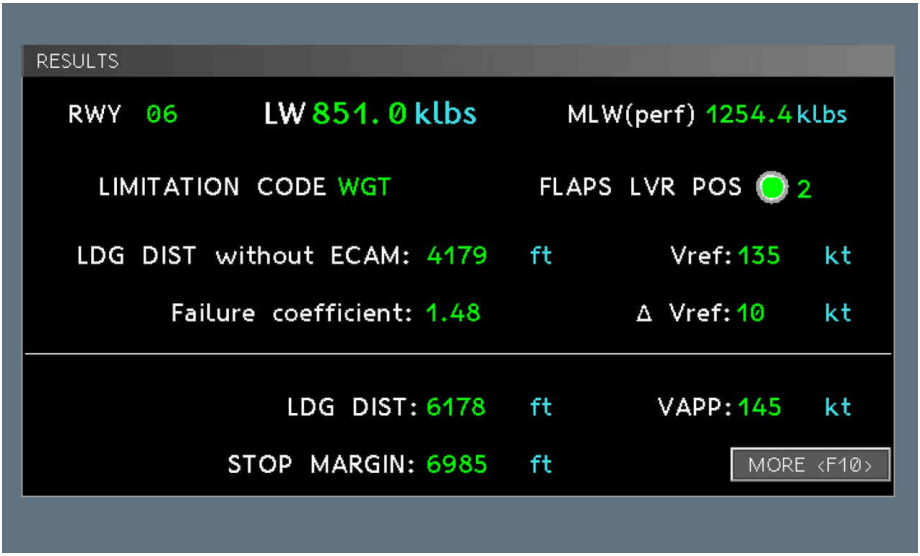
VAPP is the sum of Vls and ΔVls.
As LDG PERF does not calculate Vls CONF 3, LDG PERF does not calculate VAPP.

BASIC RESULTS: SPECIFIC FLAPS LEVER POSITION

Applicable to: ALL

Some ECAM alerts require a specific flaps lever position for the landing.
FLAPS LVR POS on the RESULTS panel is the configuration required by the ECAM alert for the landing.

BASIC Results: Specific Flaps Lever Position

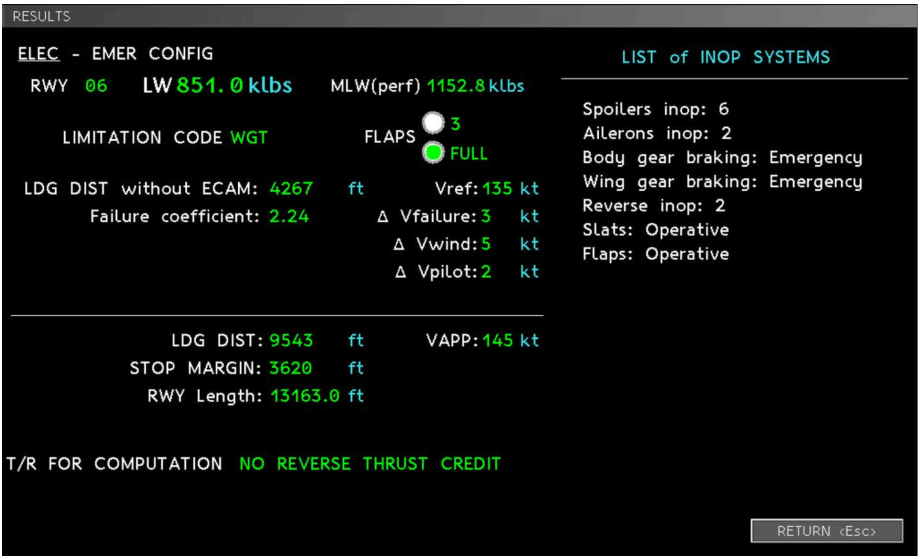


MORE PANEL

Applicable to: ALL

The selection of an ECAM alert item modifies the MORE panel.

MORE Panel



Note: If the flight crew select FLAPS 3, the layout is slightly modified as Vls CONF 3 replaces Vref.

ΔVFAILURE

ΔVfailure is the speed increment due to the failure.
ΔVfailure is calculated by LDG PERF.

ΔVWIND

ΔVwind is the speed increment due to the wind correction.
ΔVwind is calculated by LDG PERF.

L2 For more information about the ΔVwind calculation, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

L1 ΔVPILOT

ΔVPilot is equal to the VPilot entered by the flight crew on the CONDITIONS panel.

L2 For more information about how to determine VPilot, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

L1 **ΔVCDL**

ΔVcdl is displayed only if the following CDL items are selected:
- POWER PLANT ATA71-15 NACELLE STRAKES, and/or
- FLIGHT CONTROLS ATA27-22 FLAP END SEAL.

ΔVcdl is the speed increment due to the selected CDL item(s).

LIST OF INOP SYSTEMS

The LIST of INOP SYSTEMS panel displays the list of the systems that are considered to be inoperative due to the selected ECAM alert(s).

CALCULATION SEQUENCE

Applicable to: ALL

During a flight following failure, the flight crew must verify that the LDA of the expected runway is longer than the actual landing distance with failure at the expected landing weight in forecasted conditions.

If the flight crew has selected one or several ECAM Alerts items, the following calculation sequence is recommended:

1. The computation is first made at current conditions with VPilot = 0
2. In the RESULTS MORE panel, the flight crew checks the value of the increment in VAPP : ΔVfailure and ΔVwind
3. If ΔVfailure > 5 kt OR ΔVwind ≥ 5 kt OR the landing is planned with A/THR disengaged: Minimum VPilot = 0.
   The first calculation is sufficient
4. If ΔVfailure ≤ 5 kt AND ΔVwind < 5 kt AND the landing is planned with A/THR engaged: Minimum VPilot = " 5 kt - ΔVwind".
   The flight crew performs an additional landing calculation with at least the value of Minimum VPilot.

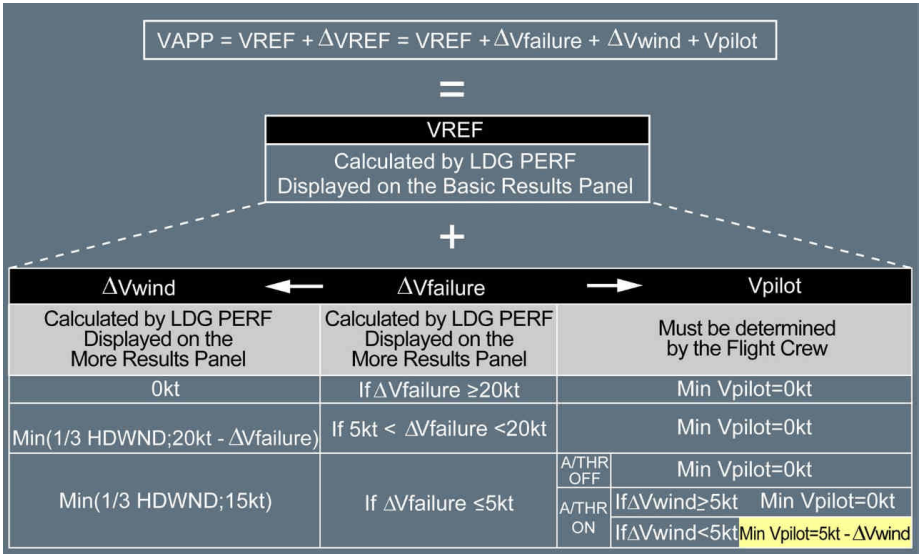
For more information on VPilot determination, *Refer to PER-LND-LFF-CMT VPilot Determination for VAPP Calculation* .

Note: *If ΔVcdl is displayed and different from 0, add ΔVcdl to ΔVfailure and follow the same calculation sequence.*

VPILOT DETERMINATION FOR VAPP CALCULATION

Applicable to: ALL

VPilot Determination for VAPP Calculation



Note: *If ΔVcdl is displayed and different from 0, add ΔVcdl to ΔVfailure and follow the same calculation sequence.*

DEFINITIONS

Applicable to: ALL

Landing performance is impacted by runway contamination.

CONTAMINANTS

Contaminants can be classified into Fluid and Hard Contaminants:

FLUID CONTAMINANTS

WATER	Wet	Depth of water less or equal to 0.12 in.
	Standing Water	Due to heavy rainfall, and/or insufficient runway drainage. Deeper than 0.12 in.
SLUSH	Water saturated with snow that spatters when stepping firmly on it. Slush occurs at an approximate temperature of 5 °C, and an approximate density of 0.85 kg/l (7.1 lb/US Gal).	
WET SNOW	If compacted by hand, the snow will stick together, and usually forms a snowball. Its density is approximately 0.4 kg/l (3.35 lb/US Gal).	
DRY SNOW	Can be blown if loose, or if compacted by hand, will fall apart again upon release. Its density is approximately 0.2 kg/l (1.7 lb/US Gal).	

HARD CONTAMINANTS

COMPACTED SNOW	Snow that has been compressed (the usual friction coefficient is 0.2).
ICE	In icy conditions, the friction coefficient is 0.05 or below.

STATE OF RUNWAY

The contaminant characteristics (type, depth, appearance) determine the state of the runway.

DRY	A runway is dry when its surface is not: - Damp - Wet - Contaminated.
DAMP	A runway is damp: - When its surface is not dry - But when the water on it does not give it a shiny appearance.
WET	A runway is considered as wet: - When its surface has a shiny appearance - Due to a thin layer of Fluid Contaminant - With no substantial risk of hydroplaning. For Water, this layer may not exceed 0.12 in depth.
CONTAMINATED	A runway is contaminated when more than 25 % of its surface is covered with: - A layer of Fluid Contaminant that is not considered as thin

Continued on the following page

Continued from the previous page

	- A Hard Contaminant.

EFFECT ON PERFORMANCE

Applicable to: ALL

Contaminants are classified by their effect on aircraft performance.

FLUID CONTAMINANTS

Fluid Contaminants reduce friction forces, and cause:
- Precipitation drag
- Hydroplaning.

PRECIPITATION DRAG

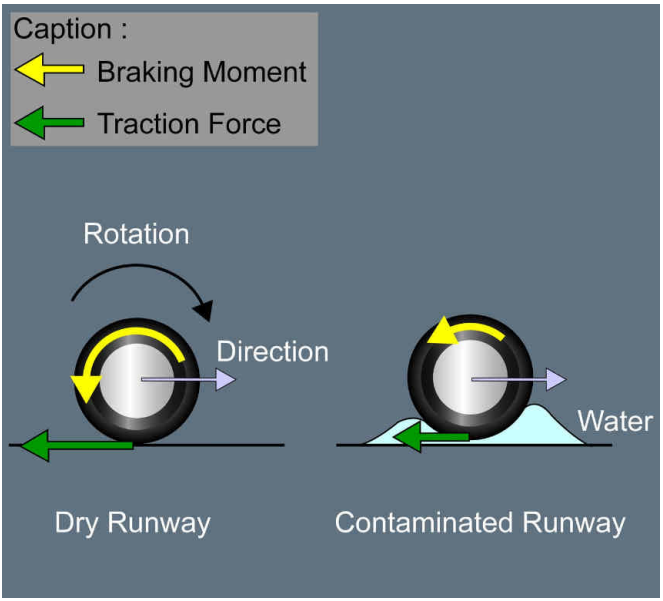
L2 Precipitation drag includes:
- Displacement drag, that is produced by the displacement of the contaminant fluid from the path of the tire
- Spray impingement drag, that is produced by the spray thrown up by the wheels (mainly those of the Nose Landing Gear (NLG)) onto the fuselage.

L1 Precipitation drag improves the deceleration rate and has a beneficial effect on landing performance.

HYDROPLANING

L2 If there is water on the runway, a water film is created between the tire and the runway, that causes a reduction in the dry contact surface area between the tire and the runway.
This phenomenon becomes more critical at high speeds, when the rolling tire cannot evacuate the water fast enough.
Hydroplaning is a situation where the tires of the aircraft are, to a large extent, separated from the runway surface while floating on a thin film of fluid.
During hydroplaning, tire traction decreases to almost negligible values, thus rendering wheel braking and steering virtually ineffective.

Hydroplaning Phenomenon



Hydroplaning speed depends on tire pressure, and on the specific gravity of the contaminant (i.e. how dense the contaminant is).

L1 The hydroplaning speed is a threshold above which friction forces are severely reduced. Performance calculations on contaminated runways take into account the penalizing effect of hydroplaning.

HARD CONTAMINANTS

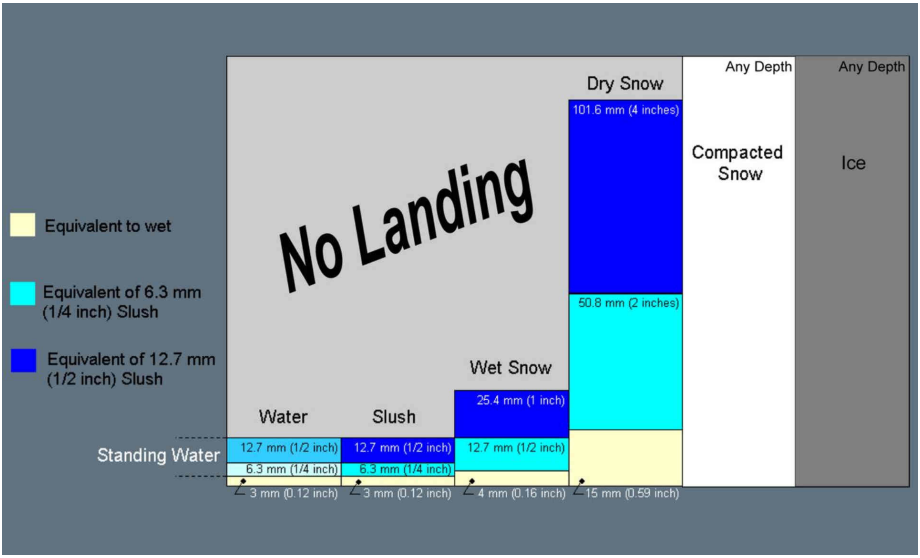
Hard Contaminants only reduce friction forces.

L2 The tires roll on top of a flat layer of Hard Contaminant. Therefore, only the friction coefficient (effective μ) is reduced, the depth of contaminant has no influence on landing performance.

EQUIVALENCES FOR PERFORMANCE

Applicable to: ALL

Runway Conditions



Landing performance is established only for some well-identified certified runway conditions. Within limits, it is possible to take into account other runway condition that may be encountered in operation, by using one of the identified states that has an equivalent impact on performance.

WET RUNWAY

In terms of performance, a Fluid Contamination is equivalent to wet, up to a maximum depth of:

- 3 mm (0.12 in) Water,
- 3 mm (0.12 in) Slush,
- 4 mm (0.16 in) Wet Snow,
- 15 mm (0.59 in) Dry Snow.

For more information on wet runway, *Refer to PER-LND-CTA Definitions* .

CONTAMINATED RUNWAY

In terms of performance, an equivalence between Dry and Wet Snow and the certified contaminated runway conditions is defined.

EQUIVALENTS OF 6.3 MM (1/4 IN) SLUSH

- 12.7 mm (1/2 in) Wet Snow is equivalent to 6.3 mm (1/4 in) Slush,
- 50.8 mm (2 in) Dry Snow is equivalent to 6.3 mm (1/4 in) Slush.

EQUIVALENTS OF 12.7 MM (1/2 IN) SLUSH

- 25.4 mm (1 in) Wet Snow is equivalent to 12.7 mm (1/2 in) Slush,
- 101.6 mm (4 in) Dry Snow is equivalent to 12.7 mm (1/2 in) Slush.

For more information on contaminated runway, *Refer to PER-LND-CTA Definitions* .

EFFECTIVE AND REPORTED FRICTION COEFFICIENTS

Applicable to: ALL

Airport authorities publish runway contamination data in a document called “SNOWTAM”, that includes:

- The type of contaminant
- The average depth for each third of total runway length
- The reported friction coefficient, or braking action.

The reported Friction coefficient (μ) is measured by friction-measurement vehicles, usually at comparatively low speed. However, the friction forces that are applicable to an aircraft (interaction tire/runway) depend on the weight on wheels, tire pressure, anti-skid system efficiency and ground speed.
No universal correlation has been identified between the figures obtained from these measurement vehicles (reported μ), and the actual braking performance of an aircraft (effective μ).
In the case of runway contamination, the performance data is calculated for several well-identified types and depths of contaminant, and not as a function of the aircraft’s effective μ, except if the operator experience has permitted to establish such a correlation.

COMPUTATION ASSUMPTIONS

Applicable to: ALL

In the case of runway contamination, landing performance calculations are based on the following assumptions:

- The contaminant covers the entire length of the runway in a layer that has a uniform depth and density
- The friction coefficient is defined by the applicable regulation.

In addition, for fluid contaminated runways only:

- Drag increases, due to rolling resistance of the wheels
- Drag increases, due to the spray from the Nose Landing Gear (NLG) on the airframe and on the main gears
- Reverse thrust credit may be used for the deceleration phase.

CROSSWIND

Applicable to: ALL

It is not recommended to land with a crosswind component higher than the one that appears in the table below:

Reported Braking Action	Reported Runway Friction Coefficient	Maximum Crosswind (kt)	Equivalent Runway Condition(2)
Good	≥ 0.4	35 kt (1)	1
Good/Medium	0.39 to 0.36	27 kt	1
Medium	0.35 to 0.3	20 kt	2/3
Medium/Poor	0.29 to 0.26	20 kt	2/3
Poor	≤ 0.25	15 kt	3/4
Unreliable		5 kt	4/5

(1) This is the maximum crosswind for dry and wet runway gust included.

(2) Equivalent runway condition (only valid in determining the maximum crosswind):

1. *Dry, damp or Wet runway covered with Water.*
2. *Runway covered with Slush.*
3. *Runway covered with Dry Snow.*
4. *Runway covered with Standing Water, with risk of hydroplaning or Wet Snow.*
5. *Icy runway or high risk of hydroplaning.*

It is not recommended to land with a crosswind component higher than the one that appears in the table below:

Runway Condition(2)	Maximum Crosswind (kt)
1	35 kt (1)
1	27 kt
2/3	20 kt
2/3	20 kt
3/4	15 kt
4/5	5 kt

(1) This is the maximum crosswind for dry and wet runway gust included.

(2) Runway condition (only valid in determining the maximum crosswind):

1. *Dry, damp or Wet runway covered with Water.*
2. *Runway covered with Slush.*
3. *Runway covered with Dry Snow.*
4. *Runway covered with Standing Water, with risk of hydroplaning or Wet Snow.*
5. *Icy runway or high risk of hydroplaning.*

It is not recommended to land with a crosswind component higher than the one that appears in the table below:

Reported Braking Action	Reported Runway Friction Coefficient	Maximum Crosswind (kt)
Good	≥ 0.4	35 kt (1)
Good/Medium	0.39 to 0.36	27 kt
Medium	0.35 to 0.3	20 kt
Medium/Poor	0.29 to 0.26	20 kt
Poor	≤ 0.25	15 kt
Unreliable		5 kt

(1) This is the maximum crosswind for dry and wet runway gust included.

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INTRODUCTION

Applicable to: ALL

DEFINITION

An **Operations Engineering Bulletin (OEB)** is issued to rapidly inform operators of any deviations from initial design objectives that have a significant operational impact. An OEB provides the operators with technical information and temporary operational procedures that address these deviations.

TYPE OF OEB

OEB s can either be red or white, depending on their level of priority.

Red OEB s : Are issued to indicate that non-compliance with the recommended procedures may have a significant impact on the safe operation of the aircraft .

White OEB s : Are issued to indicate that non-compliance with the recommended procedures may have a significant impact on aircraft operation.

Airbus strongly recommends that all Operators rapidly apply the OEB corrective actions as soon as they become available, particularly for red OEB s.

The information in the OEB is recommended by Airbus, but may not be approved by Airworthiness Authorities. However, the procedures of the red OEB s are also issued via Temporary Revisions (TRs) of the Airplane Flight Manual (AFM). If the procedures contained in the red OEB differ from the procedures in the AFM TR, the approved AFM TR remains the reference.

OEB CONTENT AND MANAGEMENT

An OEB :

- Is a part of the Flight Crew Operating Manual (FCOM)
- Is temporary and usually focuses on one operational subject only
- Remains applicable until the appropriate corrective actions are completed
- Is filed in numerical order.

The content of each OEB includes:

- The reason for issue
- Technical explanations of the deviation from the initial design objectives
- The operational impact if the flight crew does not apply the OEB procedure
- The conditions for applying the OEB procedures:
  - Cockpit effect
  - Flight phases
  - Specific event.

- The OEB operational procedure(s) to be applied
- The corrective actions that cancel the OEB , if available when the OEB is issued.

If necessary, there are links to the FCOM sections for which the OEB is applicable, and these sections are usually in the format of Temporary Documentary Unit (TDU).

OEB AND ECAM ABNORMAL & EMERGENCY PROCEDURES

OEB s do not impact the ECAM abnormal/emergency procedures.
The Airbus Temporary Quick Change (ATQC) database is used to urgently make any required updates or changes to an ECAM abnormal and emergency procedures. For more information on the ATQC database, *Refer to DSC-31-40-10-BBB ECAM ARchitecture - FWS* .

REVIEW OF THE OEB

In accordance with the Standard Operating Procedures, and before each flight, the flight crew must review all OEB s that are applicable to their aircraft. (*Refer to PRO-NOR-SOP-40-D OIS Preparation_OPERATIONS ENGINEERING BULLETINS (OEB)*) . If the OEB conditions are applicable, the flight crew must apply the operational procedure(s) that is in the OEB .

DISTRIBUTION

OEB s are distributed to all affected Operators. The Operator shall provide flight crews with the content of the OEB without delay.

OPERATIONS
ENGINEERING BULLETINS

FCU - ERRONEOUS BAROMETRIC REFERENCE AFTER FCU RESET

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FCU - ERRONEOUS BAROMETRIC REFERENCE AFTER FCU RESET

Applicable to: ALL

FCU - ERRONEOUS BAROMETRIC REFERENCE AFTER FCU RESET - APPROVAL

Applicable to: ALL

APPROVAL REFERENCE
APPROVED BY: Head of Flight Operations Support and Services
Approval date: 06 JUN 11
Approval reference: 2011-06-06
Approved by: HO Flight Operations Support and Services

Reason for issue:

This OEB is issued to:

- Inform Operators about the possibility of erroneous barometric reference, following Flight Control Unit (FCU) switched OFF then ON
- Provide operational recommendations in the case the Flight Crew resets the FCU.

Applicable to: All A380 aircraft

Cancelled by: The next PRIM P10 standard

M	Localization	T	DU Title	DU identification	DU date

No bulletin found

Applicable to: ALL

EVENT DESCRIPTION

In the frame of tests on the Flight Control Unit (FCU), Airbus identified the following misbehavior: If the FCU is switched OFF then ON, the barometric reference can erroneously initialize, at FCU power-up, to the default mode and value QNH 1013.

This erroneous barometric reference can appear on:
- One EFIS CP only, or
- Both EFIS CPs simultaneously.

Note: This misbehavior does not affect the barometric reference displayed on the EFIS CP page of the MFD FCU backup. The selection/deselection of the EFIS CP backup page ensures a correct continuity of the barometric reference.

EXPLANATION

The PRIM computers transmit to the FCU the baro-setting data coming from the Air Data Reference (ADR). At FCU power-up, the FCU synchronizes on these PRIM data to initialize. However, due to asynchronous data emission, the FCU can wait for baro-setting data from the PRIM. In this case, a default mode and value are set.
As a result, the barometric reference displayed on the EFIS CP can reset to QNH 1013.

Applicable to: ALL

PROCEDURE

- **In the case of Flight Control Unit (FCU) reset via the FCU brightness knob:**
  Check the barometric reference on both EFIS CPs, and set the appropriate mode and value, if erroneously displayed.

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