DeltaWing Simulations

ATR 72-600

FLIGHT CREW OPERATING MANUAL

X-Plane 12 add-on · product version 1.0.2_1r1

REVISION	ISSUE DATE
07	10 NOV 2026

FOR FLIGHT SIMULATION USE ONLY.
This manual describes the DeltaWing Simulations ATR 72-600 add-on for X-Plane 12. It is not an ATR publication and must never be used for the operation of a real aircraft.

Copyright © 2021-2026 DeltaWing Simulations. All rights reserved.
DeltaWing Simulations is not affiliated with, endorsed by, or sponsored by ATR or any of the airlines or companies whose liveries are included for free with this product. All aircraft names, airline names, logos and trademarks belong to their respective owners and are used for identification purposes only. Navigraph services require a separate subscription. For simulation use only.

PAGE

INTENTIONALLY

LEFT BLANK

TOC TABLE OF CONTENTS

GEN. GENERAL INFORMATION

GEN.1 ABOUT THIS MANUAL 19
GEN.2 INSTALLATION AND SET-UP 23
GEN.3 ABBREVIATIONS 27

LIM. LIMITATIONS

LIM.1 GENERAL LIMITATIONS 31
LIM.2 WEIGHT AND LOADING 33
LIM.3 SPEEDS 37
LIM.4 OPERATIONAL PARAMETERS 45
LIM.5 SYSTEMS 49

PRO. PROCEDURES

PRO.NOP NORMAL OPERATIONS

PRO.NOP.NOR1 NORMAL PROCEDURES (1/6) 63
PRO.NOP.NOR2 NORMAL PROCEDURES (2/6) 73
PRO.NOP.NOR3 NORMAL PROCEDURES (3/6) 81
PRO.NOP.NOR4 NORMAL PROCEDURES (4/6) 89
PRO.NOP.NOR5 NORMAL PROCEDURES (5/6) 97
PRO.NOP.NOR6 NORMAL PROCEDURES (6/6) 103
PRO.NOP.ANOR1 ADDITIONAL NORMAL PROCEDURES (1/3) 113
PRO.NOP.ANOR2 ADDITIONAL NORMAL PROCEDURES (2/3) 127
PRO.NOP.ANOR3 ADDITIONAL NORMAL PROCEDURES (3/3) 149
PRO.NOP.NSU1 NORMAL SYSTEM USE (1/2) 159
PRO.NOP.NSU2 NORMAL SYSTEM USE (2/2) 175

PRO.NNO EMERGENCY AND ABNORMAL PROCEDURES

PRO.NNO.INTRO INTRODUCTION 189
PRO.NNO.E24 ELECTRICAL POWER 191
PRO.NNO.E26 FIRE PROTECTION 193
PRO.NNO.E27 FLIGHT CONTROLS 199
PRO.NNO.E70 POWER PLANT 201
PRO.NNO.E99 MISCELLANEOUS 211
PRO.NNO.A21 AIR CONDITIONING AND PRESSURIZATION 219
PRO.NNO.A22 AUTO FLIGHT 225
PRO.NNO.A23 COMMUNICATIONS 229
PRO.NNO.A24 ELECTRICAL POWER 231
PRO.NNO.A27 FLIGHT CONTROLS 241
PRO.NNO.A28 FUEL 247
PRO.NNO.A29 HYDRAULIC POWER 251
PRO.NNO.A30 ICE AND RAIN PROTECTION 255
PRO.NNO.A31 INDICATING AND RECORDING 261
PRO.NNO.A32 LANDING GEAR 271
PRO.NNO.A34 NAVIGATION 275
PRO.NNO.A36 PNEUMATIC 287
PRO.NNO.A70 POWER PLANT 289

cont'd... ►►►

cont'd... ►►►

PRO.NNO.A99 MISCELLANEOUS 301
PRO.NNO.ASU ADDITIONAL SYSTEM USE 303
PRO.NNO.ABS1 ABNORMAL SITUATIONS (1/2) 313
PRO.NNO.ABS2 ABNORMAL SITUATIONS (2/2) 325

DSC. DESCRIPTION

DSC.21 AIR CONDITIONING
DSC.21.1 GENERAL 331
DSC.21.2 AIR CONDITIONING 333
DSC.21.3 PRESSURIZATION 343

DSC.22 AUTO FLIGHT
DSC.22.1 GENERAL 349
DSC.22.2 CONTROLS 351
DSC.22.3 AUTOPILOT, YAW DAMPER AND FLIGHT DIRECTOR 355
DSC.22.4 AP / FD MODES 359
DSC.22.5 ALERTS AND MESSAGES 365

DSC.24 ELECTRICAL POWER
DSC.24.1 GENERAL 371
DSC.24.2 DC POWER 375
DSC.24.3 AC POWER 381
DSC.24.4 CONTROLS AND INDICATIONS 383
DSC.24.5 CIRCUIT BREAKERS 389

DSC.29 HYDRAULIC POWER
DSC.29.1 GENERAL 391
DSC.29.2 CONTROLS 395
DSC.29.3 ELECTRICAL SUPPLY 399
DSC.29.4 SYSTEM MONITORING 401

DSC.30 ICE AND RAIN PROTECTION
DSC.30.1 GENERAL 403
DSC.30.2 ANTI ICING ADVISORY SYSTEM 405
DSC.30.3 ENGINE AND WING PROTECTION 409
DSC.30.4 PROPELLER ANTI ICING 415
DSC.30.5 WINDOW HEAT 419
DSC.30.6 PROBE HEAT 423
DSC.30.7 RAIN PROTECTION 425
DSC.30.8 AIRCRAFT PERFORMANCE MONITORING (APM) 427

DSC.31 INDICATING AND RECORDING SYSTEMS
DSC.31.4 CONTROL AND DISPLAY SYSTEM 433
DSC.31.5 INDICATION ON PFD 445
DSC.31.6 INDICATION ON MFD 455
DSC.31.7 INDICATION ON EWD 467
DSC.31.8 INDICATION ON IESI 471
DSC.31.9 CDS REVERSION 475
DSC.31.10 CLOCKS 477
DSC.31.12 FWS 479

DSC.36 PNEUMATIC
DSC.36.1 DESCRIPTION 487

cont'd... ►►►

cont'd... ►►►

DSC.36.2 CONTROLS 491
DSC.36.3 ELECTRICAL SUPPLY 493
DSC.36.4 SYSTEM MONITORING 495
DSC.36.5 LATERAL MAINTENANCE PANEL 497
DSC.36.6 SCHEMATIC 499

DSC.70 POWER PLANT
DSC.70.1 GENERAL 501
DSC.70.2 SYSTEMS DESCRIPTION 503
DSC.70.3 SYSTEMS OPERATING 507
DSC.70.4 CONTROLS AND INDICATORS 513
DSC.70.8 SYSTEM MONITORING 521

FMS. FMS PILOT'S GUIDE
FMS.00 TYPICAL FLIGHT SET-UP 523
FMS.01 FMS AND MCDU 531

FMS.02 FMS FUNCTIONS
FMS.02.1 INITIALIZATION 539
FMS.02.2 FLIGHT PLAN 547
FMS.02.3 PERFORMANCE AND VNAV 561
FMS.02.4 PROGRESS, DATA AND MESSAGES 567
FMS.02.5 RADIO MANAGEMENT (RMS) 577

SIM. SIMULATION FEATURES
SIM.1 GENERAL 583
SIM.2 FLIGHT PLANNING AND NAVIGATION DATA 593
SIM.3 LOADING AND PERFORMANCE 611
SIM.4 AIRCRAFT, GROUND AND TRAINING 619
SIM.5 SETTINGS 645
SIM.6 MOUSE, KEYBOARD AND HARDWARE 661
SIM.7 MENU, POP-UPS, SOUND AND LIVERIES 679

PAGE

INTENTIONALLY

LEFT BLANK

LESM LIST OF EFFECTIVE SECTIONS

CODE	TITLE	PAGES	REV DATE
GEN.1	GENERAL INFORMATION - ABOUT THIS MANUAL	4	10 NOV 2026
GEN.2	GENERAL INFORMATION - INSTALLATION AND SET-UP	4	05 NOV 2026
GEN.3	GENERAL INFORMATION - ABBREVIATIONS	4	28 OCT 2026
LIM.1	LIMITATIONS - GENERAL LIMITATIONS	2	28 OCT 2026
LIM.2	LIMITATIONS - WEIGHT AND LOADING	4	28 OCT 2026
LIM.3	LIMITATIONS - SPEEDS	8	28 OCT 2026
LIM.4	LIMITATIONS - OPERATIONAL PARAMETERS	4	28 OCT 2026
LIM.5	LIMITATIONS - SYSTEMS	14	28 OCT 2026
PRO.NOP.NOR1	NORMAL OPERATIONS - NORMAL PROCEDURES (1/6)	10	30 OCT 2026
PRO.NOP.NOR2	NORMAL OPERATIONS - NORMAL PROCEDURES (2/6)	8	28 OCT 2026
PRO.NOP.NOR3	NORMAL OPERATIONS - NORMAL PROCEDURES (3/6)	8	28 OCT 2026
PRO.NOP.NOR4	NORMAL OPERATIONS - NORMAL PROCEDURES (4/6)	8	28 OCT 2026
PRO.NOP.NOR5	NORMAL OPERATIONS - NORMAL PROCEDURES (5/6)	6	28 OCT 2026
PRO.NOP.NOR6	NORMAL OPERATIONS - NORMAL PROCEDURES (6/6)	10	30 OCT 2026
PRO.NOP.ANOR1	NORMAL OPERATIONS - ADDITIONAL NORMAL PROCEDURES (1/3)	14	06 NOV 2026
PRO.NOP.ANOR2	NORMAL OPERATIONS - ADDITIONAL NORMAL PROCEDURES (2/3)	22	06 NOV 2026
PRO.NOP.ANOR3	NORMAL OPERATIONS - ADDITIONAL NORMAL PROCEDURES (3/3)	10	06 NOV 2026
PRO.NOP.NSU1	NORMAL OPERATIONS - NORMAL SYSTEM USE (1/2)	16	06 NOV 2026
PRO.NOP.NSU2	NORMAL OPERATIONS - NORMAL SYSTEM USE (2/2)	14	06 NOV 2026
PRO.NNO.INTRO	EMERGENCY AND ABNORMAL PROCEDURES - INTRODUCTION	2	06 NOV 2026
PRO.NNO.E24	EMERGENCY PROCEDURES - ELECTRICAL POWER	2	06 NOV 2026
PRO.NNO.E26	EMERGENCY PROCEDURES - FIRE PROTECTION	6	06 NOV 2026
PRO.NNO.E27	EMERGENCY PROCEDURES - FLIGHT CONTROLS	2	06 NOV 2026
PRO.NNO.E70	EMERGENCY PROCEDURES - POWER PLANT	10	06 NOV 2026
PRO.NNO.E99	EMERGENCY PROCEDURES - MISCELLANEOUS	8	06 NOV 2026
PRO.NNO.A21	ABNORMAL PROCEDURES - AIR CONDITIONING AND PRESSURIZATION	6	06 NOV 2026
PRO.NNO.A22	ABNORMAL PROCEDURES - AUTO FLIGHT	4	06 NOV 2026
PRO.NNO.A23	ABNORMAL PROCEDURES - COMMUNICATIONS	2	06 NOV 2026
PRO.NNO.A24	ABNORMAL PROCEDURES - ELECTRICAL POWER	10	06 NOV 2026
PRO.NNO.A27	ABNORMAL PROCEDURES - FLIGHT CONTROLS	6	06 NOV 2026
PRO.NNO.A28	ABNORMAL PROCEDURES - FUEL	4	06 NOV 2026
PRO.NNO.A29	ABNORMAL PROCEDURES - HYDRAULIC POWER	4	06 NOV 2026
PRO.NNO.A30	ABNORMAL PROCEDURES - ICE AND RAIN PROTECTION	6	06 NOV 2026
PRO.NNO.A31	ABNORMAL PROCEDURES - INDICATING AND RECORDING	10	06 NOV 2026
PRO.NNO.A32	ABNORMAL PROCEDURES - LANDING GEAR	4	06 NOV 2026
PRO.NNO.A34	ABNORMAL PROCEDURES - NAVIGATION	12	06 NOV 2026
PRO.NNO.A36	ABNORMAL PROCEDURES - PNEUMATIC	2	06 NOV 2026
PRO.NNO.A70	ABNORMAL PROCEDURES - POWER PLANT	12	06 NOV 2026
PRO.NNO.A99	ABNORMAL PROCEDURES - MISCELLANEOUS	2	06 NOV 2026
PRO.NNO.ASU	ADDITIONAL SYSTEM USE - ADDITIONAL SYSTEM USE	10	06 NOV 2026
PRO.NNO.ABS1	ABNORMAL SITUATIONS - ABNORMAL SITUATIONS (1/2)	12	06 NOV 2026

cont'd... ►►►

cont'd... ►►►

CODE	TITLE	PAGES	REV DATE
PRO.NNO.ABS2	ABNORMAL SITUATIONS - ABNORMAL SITUATIONS (2/2)	6	06 NOV 2026
DSC.21.1	AIR CONDITIONING - GENERAL	2	10 NOV 2026
DSC.21.2	AIR CONDITIONING - AIR CONDITIONING	10	10 NOV 2026
DSC.21.3	AIR CONDITIONING - PRESSURIZATION	6	10 NOV 2026
DSC.22.1	AUTO FLIGHT - GENERAL	2	05 NOV 2026
DSC.22.2	AUTO FLIGHT - CONTROLS	4	05 NOV 2026
DSC.22.3	AUTO FLIGHT - AUTOPILOT, YAW DAMPER AND FLIGHT DIRECTOR	4	05 NOV 2026
DSC.22.4	AUTO FLIGHT - AP / FD MODES	6	05 NOV 2026
DSC.22.5	AUTO FLIGHT - ALERTS AND MESSAGES	6	05 NOV 2026
DSC.24.1	ELECTRICAL POWER - GENERAL	4	05 NOV 2026
DSC.24.2	ELECTRICAL POWER - DC POWER	6	05 NOV 2026
DSC.24.3	ELECTRICAL POWER - AC POWER	2	05 NOV 2026
DSC.24.4	ELECTRICAL POWER - CONTROLS AND INDICATIONS	6	05 NOV 2026
DSC.24.5	ELECTRICAL POWER - CIRCUIT BREAKERS	2	05 NOV 2026
DSC.29.1	HYDRAULIC POWER - GENERAL	4	05 NOV 2026
DSC.29.2	HYDRAULIC POWER - CONTROLS	4	05 NOV 2026
DSC.29.3	HYDRAULIC POWER - ELECTRICAL SUPPLY	2	05 NOV 2026
DSC.29.4	HYDRAULIC POWER - SYSTEM MONITORING	2	05 NOV 2026
DSC.30.1	ICE AND RAIN PROTECTION - GENERAL	2	10 NOV 2026
DSC.30.2	ICE AND RAIN PROTECTION - ANTI ICING ADVISORY SYSTEM	4	10 NOV 2026
DSC.30.3	ICE AND RAIN PROTECTION - ENGINE AND WING PROTECTION	6	10 NOV 2026
DSC.30.4	ICE AND RAIN PROTECTION - PROPELLER ANTI ICING	4	10 NOV 2026
DSC.30.5	ICE AND RAIN PROTECTION - WINDOW HEAT	4	10 NOV 2026
DSC.30.6	ICE AND RAIN PROTECTION - PROBE HEAT	2	10 NOV 2026
DSC.30.7	ICE AND RAIN PROTECTION - RAIN PROTECTION	2	10 NOV 2026
DSC.30.8	ICE AND RAIN PROTECTION - AIRCRAFT PERFORMANCE MONITORING (APM)	6	10 NOV 2026
DSC.31.4	INDICATING AND RECORDING SYSTEMS - CONTROL AND DISPLAY SYSTEM	12	05 NOV 2026
DSC.31.5	INDICATING AND RECORDING SYSTEMS - INDICATION ON PFD	10	10 NOV 2026
DSC.31.6	INDICATING AND RECORDING SYSTEMS - INDICATION ON MFD	12	10 NOV 2026
DSC.31.7	INDICATING AND RECORDING SYSTEMS - INDICATION ON EWD	4	02 NOV 2026
DSC.31.8	INDICATING AND RECORDING SYSTEMS - INDICATION ON IESI	4	28 OCT 2026
DSC.31.9	INDICATING AND RECORDING SYSTEMS - CDS REVERSION	2	28 OCT 2026
DSC.31.10	INDICATING AND RECORDING SYSTEMS - CLOCKS	2	28 OCT 2026
DSC.31.12	INDICATING AND RECORDING SYSTEMS - FWS	8	28 OCT 2026
DSC.36.1	PNEUMATIC - DESCRIPTION	4	10 NOV 2026
DSC.36.2	PNEUMATIC - CONTROLS	2	10 NOV 2026
DSC.36.3	PNEUMATIC - ELECTRICAL SUPPLY	2	10 NOV 2026
DSC.36.4	PNEUMATIC - SYSTEM MONITORING	2	10 NOV 2026
DSC.36.5	PNEUMATIC - LATERAL MAINTENANCE PANEL	2	10 NOV 2026
DSC.36.6	PNEUMATIC - SCHEMATIC	2	10 NOV 2026
DSC.70.1	POWER PLANT - GENERAL	2	05 NOV 2026
DSC.70.2	POWER PLANT - SYSTEMS DESCRIPTION	4	05 NOV 2026
DSC.70.3	POWER PLANT - SYSTEMS OPERATING	6	05 NOV 2026

cont'd... ►►►

cont'd... ►►►

CODE	TITLE	PAGES	REV DATE
DSC.70.4	POWER PLANT - CONTROLS AND INDICATORS	8	05 NOV 2026
DSC.70.8	POWER PLANT - SYSTEM MONITORING	2	05 NOV 2026
FMS.00	QUICK ACCESS - TYPICAL FLIGHT SET-UP	8	28 OCT 2026
FMS.01	GENERAL DESCRIPTION - FMS AND MCDU	8	05 NOV 2026
FMS.02.1	FMS FUNCTIONS - INITIALIZATION	8	28 OCT 2026
FMS.02.2	FMS FUNCTIONS - FLIGHT PLAN	14	02 NOV 2026
FMS.02.3	FMS FUNCTIONS - PERFORMANCE AND VNAV	6	02 NOV 2026
FMS.02.4	FMS FUNCTIONS - PROGRESS, DATA AND MESSAGES	10	02 NOV 2026
FMS.02.5	FMS FUNCTIONS - RADIO MANAGEMENT (RMS)	6	28 OCT 2026
SIM.1	ELECTRONIC FLIGHT BAG - GENERAL	10	10 NOV 2026
SIM.2	ELECTRONIC FLIGHT BAG - FLIGHT PLANNING AND NAVIGATION DATA	18	02 NOV 2026
SIM.3	ELECTRONIC FLIGHT BAG - LOADING AND PERFORMANCE	8	10 NOV 2026
SIM.4	ELECTRONIC FLIGHT BAG - AIRCRAFT, GROUND AND TRAINING	26	10 NOV 2026
SIM.5	ELECTRONIC FLIGHT BAG - SETTINGS	16	10 NOV 2026
SIM.6	HARDWARE AND CONTROLS - MOUSE, KEYBOARD AND HARDWARE	18	10 NOV 2026
SIM.7	COCKPIT AIDS AND DISPLAYS - MENU, POP-UPS, SOUND AND LIVERIES	16	10 NOV 2026

PAGE

INTENTIONALLY

LEFT BLANK

RR RECORD OF REVISIONS

Revision 07 · Issue date: 10 NOV 2026

Data Module	Reason for Update
FCOM.GEN GENERAL INFORMATION	
GEN.1.2 Structure of the Manual ALL	- Content of this revision: DSC.21, DSC.30 and DSC.36 added
FCOM.DSC DESCRIPTION	
DSC.21.1 GENERAL ALL	- New section
DSC.21.2 AIR CONDITIONING ALL	- New section
DSC.21.3 PRESSURIZATION ALL	- New section
DSC.30.1 GENERAL ALL	- New section
DSC.30.2 ANTI ICING ADVISORY SYSTEM ALL	- New section
DSC.30.3 ENGINE AND WING PROTECTION ALL	- New section
DSC.30.4 PROPELLER ANTI ICING ALL	- New section
DSC.30.5 WINDOW HEAT ALL	- New section
DSC.30.6 PROBE HEAT ALL	- New section
DSC.30.7 RAIN PROTECTION ALL	- New section
DSC.30.8 AIRCRAFT PERFORMANCE MONITORING (APM) ALL	- New section
DSC.31.12.8 Check Lists ALL	- Chained check lists are displayed automatically when the window is free - Descent and final approach detection values
DSC.36.1 DESCRIPTION ALL	- New section
DSC.36.2 CONTROLS ALL	- New section
DSC.36.3 ELECTRICAL SUPPLY ALL	- New section
DSC.36.4 SYSTEM MONITORING ALL	- New section
DSC.36.5 LATERAL MAINTENANCE PANEL ALL	- New section

cont'd... ►►►

cont'd... ►►►

Data Module	Reason for Update
DSC.36.6 SCHEMATIC ALL	- New section
FCOM.SIM SIMULATION FEATURES	
SIM.2.5 NAV DATA SIM	- NAV DATA: SHOW AT STARTUP re-enables the advisory
SIM.3.2 PERFORMANCE SIM	- LANDING: TRANSFERRED state on the ground and in flight
SIM.4.7 SAVE / LOAD SIM	- Renamed SAVE / LOAD; a LOAD button on every saved state - Build a state at a stand - BUILD A STATE page: four sections, summary bar, name, LOAD NOW - Ground equipment: KEEP / NONE on save; GPU and cables, CHOCKS, RBF, CONES, doors and shades on build - A saved state keeps the doors and the ground equipment
SIM.5.5 QUADRANT HUD SIM	- Quadrant HUD: RESET POSITION confirms
SIM.5.9 AIRCRAFT STATE SIM	- The whole aircraft is restored after a normal exit on the ground - Transponder settings and ND overlay selections
SIM.7.7 Messages and Prompts SIM	- Ground state restored without a pause

Revision 06 · Issue date: 10 NOV 2026

Data Module	Reason for Update
FCOM.DSC DESCRIPTION	
DSC.31.5.7 Navigation Area ALL	- Mini ND ROSE: terrain on the forward half
DSC.31.6.2 Navigation Display ALL	- ROSE: terrain on the forward half - OFFSET path display
FCOM.SIM SIMULATION FEATURES	
SIM.1.1 Description SIM	- EFB pop-up in VR
SIM.3.1 WEIGHT & BALANCE SIM	- TRIP / RESERVE from the SimBrief OFP - TAKEOFF WT; gross weight against the maximum ramp weight
SIM.4.6 AIRCRAFT LOG SIM	- Registration: the livery is repainted with it - FLEET: the registration of every included livery - A saved state loaded closes the block
SIM.4.7 SAVE / LOAD SIM	- SAVED STATES application - Build a state for a runway
SIM.5.8 COCKPIT SIM	- THROTTLE MANIPULATOR - DISPLAY POP-UPS - MCP / EFCP POP-UP and POSITION
SIM.6.3 HARDWARE (Levers and Knobs) SIM	- A hardware lever already at the cockpit lever position takes over at once
SIM.7.1 Aircraft Menu SIM	- Show FGCP, Show MCP / EFCP

cont'd... ►►►

cont'd... ►►►

Data Module	Reason for Update
SIM.7.5 Pop-up Displays SIM	- FGCP and MCP / EFCP pop-ups - Bezel controls - Pop-ups in VR
SIM.7.7 Messages and Prompts SIM	- Livery registration: the livery is repainted in the sim
SIM.7.9 Liveries SIM	- Liveries from other painters - dwsim_spec.json

Revision 05 · Issue date: 09 NOV 2026

Data Module	Reason for Update
FCOM.GEN GENERAL INFORMATION	
GEN.1.2 Structure of the Manual ALL	- Content of this revision: DSC.22, DSC.24, DSC.29 and DSC.70 added
GEN.2.4 X-Plane Settings SIM	- X-Plane electrical failures can fail the aircraft
FCOM.DSC DESCRIPTION	
DSC.22.1 GENERAL ALL	- New section
DSC.22.2 CONTROLS ALL	- New section
DSC.22.3 AUTOPILOT, YAW DAMPER AND FLIGHT DIRECTOR ALL	- New section
DSC.22.4 AP / FD MODES ALL	- New section
DSC.22.5 ALERTS AND MESSAGES ALL	- New section
DSC.24.1 GENERAL ALL	- New section
DSC.24.2 DC POWER ALL	- New section
DSC.24.3 AC POWER ALL	- New section
DSC.24.4 CONTROLS AND INDICATIONS ALL	- New section
DSC.24.5 CIRCUIT BREAKERS ALL	- New section
DSC.29.1 GENERAL ALL	- New section
DSC.29.2 CONTROLS ALL	- New section
DSC.29.3 ELECTRICAL SUPPLY ALL	- New section

cont'd... ►►►

cont'd... ►►►

Data Module	Reason for Update
DSC.29.4 SYSTEM MONITORING ALL	- New section
DSC.31.4.11 Electrical Supply ALL	- DC ESS BUS sections
DSC.70.1 GENERAL ALL	- New section
DSC.70.2 SYSTEMS DESCRIPTION ALL	- New section
DSC.70.3 SYSTEMS OPERATING ALL	- New section
DSC.70.4 CONTROLS AND INDICATORS ALL	- New section
DSC.70.8 SYSTEM MONITORING ALL	- New section
FCOM.FMS FMS PILOT'S GUIDE	
FMS.01.5 Messages ALL	- TOO STEEP PATH AHEAD message
FCOM.SIM SIMULATION FEATURES	
SIM.3.1 WEIGHT & BALANCE SIM	- Warnings when the aircraft does not carry the planned load
SIM.4.1 GROUND & CONFIG SIM	- Aircraft states reset the electrical protections and service the batteries - Load editable while boarding
SIM.4.5 FAILURES SIM	- New electrical failures - FOLLOW X-PLANE FAILURES
SIM.4.6 AIRCRAFT LOG SIM	- AIRCRAFT LOG application
SIM.5.9 AIRCRAFT STATE SIM	- PER-LIVERY AIRFRAME
SIM.5.13 HARDWARE SIM	- RUN SETUP WIZARD
SIM.6.3 HARDWARE (Levers and Knobs) SIM	- KNOBS: selector and encoder learned from the hardware, automatic fast turn - BUILDER tab
SIM.6.4 Joystick Buttons and Keyboard SIM	- Electrical values for external hardware
SIM.6.6 Hardware Setup Wizard SIM	- Hardware setup wizard
SIM.7.7 Messages and Prompts SIM	- Airframe loaded - Livery registration - Hardware setup

Revision 04 · Issue date: 02 NOV 2026

Data Module	Reason for Update
FCOM.DSC DESCRIPTION	

cont'd... ►►►

cont'd... ►►►

Data Module	Reason for Update
DSC.31.5.4 Airspeed Area ALL	- V2 bug removed when PWR MGT leaves TO after lift-off
DSC.31.5.7 Navigation Area ALL	- TAS and wind dashed below 30 kt TAS or with the ADC invalid - TO/FROM pointer direction
DSC.31.6.2 Navigation Display ALL	- TAS and wind dashed below 30 kt TAS or with the ADC invalid
DSC.31.6.5 PERF Page ALL	- V2 bug and T/O TRIM objective removal
DSC.31.7.2 Flight Controls, Trims, Brake Message and Test Status ALL	- T/O pitch trim objective removed when PWR MGT leaves TO after lift-off
FCOM.FMS FMS PILOT'S GUIDE	
FMS.01.1 Overview ALL	- UNDO prompt label
FMS.02.2.4 ARRIVAL Page ALL	- VIA list filtered by the STAR - LP approaches: APP arms L-LOC only - NOT ALLOWED with LNAV engaged
FMS.02.2.8 HOLD Page ALL	- Hold at present position named PPOS, NOT ALLOWED - NEXT EXIT predictions
FMS.02.2.12 DIRECT TO ALL	- UNDO of a DIRECT TO a missed approach waypoint
FMS.02.3.7 Predictions ALL	- Predictions computed with the true airspeed - Holding patterns included
FMS.02.4.2 PROG 2/3 Page ALL	- Wind dashed below 30 kt TAS
FCOM.SIM SIMULATION FEATURES	
SIM.1.2 Home Page SIM	- WEATHER application added
SIM.1.3 Status Bar and Dock SIM	- Frame rate in the status bar - Dock clicks with a VR controller - Lists scrolled by dragging the list
SIM.2.2 SIMBRIEF SIM	- FULL OFP and MAPS tabs
SIM.2.3 NAVIGRAPH SIM	- Any chart can be starred - PINNED filter
SIM.2.4 DOCUMENTS SIM	- FMS / MCDU User's Manual added to the library
SIM.2.6 WEATHER SIM	- New topic
SIM.4.1 GROUND & CONFIG SIM	- Wheel chocks fitted and removed one by one - Pack intake covers - Boarding and deplaning no longer change the fuel
SIM.5.2 DISPLAY SIM	- FPS IN STATUS BAR

cont'd... ►►►

cont'd... ►►►

Data Module	Reason for Update
SIM.6.1 Mouse Operation SIM	- VR: lists scrolled by dragging, click tolerance
SIM.6.3 HARDWARE (Levers and Knobs) SIM	- PARKING BRAKE hardware axis
SIM.6.4 Joystick Buttons and Keyboard SIM	- Hardware AVIONICS switches have no effect

Revision 03 · Issue date: 30 OCT 2026

Data Module	Reason for Update
FCOM.PRO PROCEDURES	
NOR.5.1 Initial Interior Checks ALL	- Remove-before-flight items removed one by one
NOR.29.5 Cockpit Door Security System Check ALL	- Cockpit door manual locking bolts
FCOM.SIM SIMULATION FEATURES	
SIM.1.3 Status Bar and Dock SIM	- Text cursor in the entry fields of the EFB keyboard
SIM.2.1 FPLN SIM	- Text cursor in the route and entry fields
SIM.4.1 GROUND & CONFIG SIM	- Remove-before-flight items removed one by one, on the aircraft or by command
SIM.5.8 COCKPIT SIM	- FORCE FEEDBACK YOKE
SIM.5.9 AIRCRAFT STATE SIM	- Saved aircraft state includes the radio frequencies, NAV courses and transponder code

Revision 02 · Issue date: 29 OCT 2026

Data Module	Reason for Update
FCOM.SIM SIMULATION FEATURES	
SIM.1.3 Status Bar and Dock SIM	- On-screen keyboard
SIM.3 LOADING AND PERFORMANCE ALL	- On-screen keyboard for loadsheet values and declared runway length
SIM.4.4 NOTES SIM	- VR controller use of the yoke papers
SIM.5 SETTINGS ALL	- Sections SIM.5.9 to SIM.5.14 renumbered
SIM.5.2 DISPLAY SIM	- YOKE MANIPULATOR, THROTTLE MANIPULATOR and EFGCP HELPER moved to COCKPIT
SIM.5.7 REALISM SIM	- COCKPIT DOORS AUTO CLOSE and the CABIN STILL RENDERED advisory
SIM.5.8 COCKPIT SIM	- New COCKPIT page

cont'd... ►►►

cont'd... ►►►

Data Module	Reason for Update
SIM.5.12 SIMBRIEF SIM	- On-screen keyboard for the SimBrief pilot ID
SIM.6.1 Mouse Operation SIM	- VR controller use of the EFB and the yoke papers
SIM.7.2 EFGCP Helper SIM	- EFGCP HELPER setting moved to SETTINGS, COCKPIT

Revision 01 · Issue date: 28 OCT 2026

Data Module	Reason for Update
ALL	First issue: GEN, LIM, normal procedures (PRO.NOP.NOR), indicating and recording systems (DSC.31), FMS pilot's guide, simulation features (SIM). Companion to the Quick Start Guide.

Note

The product changelog (manuals/Changelog.txt) lists every software change. This record lists changes to the manual only.

PAGE

INTENTIONALLY

LEFT BLANK

GEN.1 ABOUT THIS MANUAL

GEN.1.1 Purpose

Ident.: GEN.1.1 — 10 NOV 2026 — ALL

This Flight Crew Operating Manual (FCOM) describes the DeltaWing Simulations ATR 72-600 for X-Plane 12: its limitations, its normal procedures, and how each simulated system works, together with the features that exist only in the simulation (the EFB, hardware set-up, settings).

It is a companion to the **ATR 72-600 Series Quick Start Guide**, which remains the quickest introduction to the package and contains a complete example flight.

WARNING

This manual is written for flight simulation only. It is not an ATR publication, it is not approved by any authority, and it must never be used to operate a real aircraft.

GEN.1.2 Structure of the Manual

Ident.: GEN.1.2 — 10 NOV 2026 — ALL

The manual is divided into parts. Each part is divided into chapters, and each chapter into sections. Page numbers restart at the beginning of every section.

PART	TITLE	CONTENT
PLP	Preliminary pages	Table of contents, list of effective sections, record of revisions
GEN	General information	This chapter, installation, conventions, abbreviations
LIM	Limitations	Operating limits of the aircraft
PRO	Procedures	Normal procedures, normal system use, abnormal and emergency procedures
PER	Performance	Operating data used by the crew
DSC	Description	System descriptions, organised by ATA chapter
FMS	FMS pilot's guide	Use of the FMS through the MCDU
SIM	Simulation features	EFB, hardware, settings and other features specific to the simulation

Content of this revision

The manual is issued in stages. This revision contains:

PART	IN THIS REVISION	IN LATER REVISIONS
GEN	Complete	—
LIM	Complete (LIM.1 to LIM.5)	—
PRO	Normal procedures (PRO.NOP.NOR), including the daily and each-flight tests	Normal system use, additional normal procedures, abnormal and emergency procedures
PER	—	Operating data
DSC	Air conditioning (DSC.21), auto flight (DSC.22), electrical power (DSC.24), hydraulic power (DSC.29), ice and rain protection (DSC.30), indicating and recording systems (DSC.31: displays, control panels, IESI, clocks, flight warning system), pneumatic (DSC.36), power plant (DSC.70)	All other system chapters (flight controls, fuel, landing gear, navigation, …)

cont'd... ►►►

cont'd... ►►►

PART	IN THIS REVISION	IN LATER REVISIONS
FMS	Complete	—
SIM	Complete	—

Until the abnormal and emergency procedures are issued here, the procedure for each alert is shown in the procedure window of the EWD (see DSC.31.12). The record of revisions in the preliminary pages lists what each revision adds.

GEN.1.3 Page Layout

Ident.: GEN.1.3 — 10 NOV 2026
ALL

Every page carries a header box:

- left: DeltaWing Simulations logo, aircraft type and manual name,
- centre: the part, chapter and section the page belongs to,
- right: the section code (for example `DSC.31.5`) and the page number inside that section.

A section that continues on the next page shows **cont'd... ►►►** at the bottom of the page and at the top of the next one. A section always ends on an even page. When necessary, the last page reads PAGE INTENTIONALLY LEFT BLANK.

Each topic starts with a grey bar. The bar shows the topic identifier, the date of its last revision (in blue) and its applicability.

GEN.1.4 Applicability

Ident.: GEN.1.4 — 10 NOV 2026
ALL

The applicability field of each topic tells you how the simulation covers it:

TAG	MEANING
ALL	Applies to the aircraft and is simulated as described.
SIMULATOR ONLY	Exists only in the simulation (EFB, settings, hardware set-up). There is no equivalent on the real aircraft.

GEN.1.5 Conventions

Ident.: GEN.1.5 — 10 NOV 2026
ALL

Procedure lines

Procedure items are written as an item, a dotted line and an action:

► PARKING BRAKE ..... SET

Additional explanation of the item is shown in a grey box under the item.

► CL 1+2 ..... FTR

■ If an item applies only in a given condition

► CONDITIONAL ITEM ..... ACTION

Boxes

Note

A note gives information that helps understand or apply a procedure.

cont'd... ►►►

cont'd... ►►►

CAUTION

A caution warns of a procedure or practice that can damage equipment if not followed.

WARNING

A warning warns of a procedure or practice that can cause injury or loss of life if not followed. In the simulation, it marks what would cause a crash or a failure.

AFM DATA

A limitation box gives an operating limit, as published for the aircraft.

SIMULATOR NOTE

A simulator note explains where the simulation differs from the aircraft, or how to do something with a mouse, keyboard or hardware that a crew would do by hand.

Annunciators and display texts

Light legends on panels are printed in their colour on a black background, for example **FAULT**, **OFF**, **ON** or **ARM**. Texts shown on the displays are printed in their display colour, for example **ENG 1 FIRE** or **DC BUS 1**.

Controls

Controls are numbered on the figures, and each number is described in the same order:

(1) Example pushbutton

ON	(pb pressed in) The system operates.
OFF	(pb released) The system is off. The OFF light comes on white.
FAULT	Comes on amber, and the master caution flashes, when a fault is detected.

GEN.1.6 Revisions and Feedback

Ident.: GEN.1.6 — 10 NOV 2026

SIMULATOR ONLY

The revision number and date of the manual are shown at the bottom of every page and on the cover. The record of revisions in the preliminary pages lists what changed.

Report errors in this manual, or differences between the manual and the simulation, on the X-Plane.org forums ATR Series support area.

GEN.1.7 Trademarks and Third-Party Services

Ident.: GEN.1.7 — 10 NOV 2026

SIMULATOR ONLY

DeltaWing Simulations is not affiliated with, endorsed by, or sponsored by ATR or any of the airlines or companies whose liveries are included for free with this product. All aircraft names, airline names, logos and trademarks belong to their respective owners and are used for identification purposes only. Navigraph services require a separate subscription. For simulation use only.

PAGE

INTENTIONALLY

LEFT BLANK

GEN.2 INSTALLATION AND SET-UP

GEN.2.1 Installation

Ident.: GEN.2.1 — 05 NOV 2026

SIMULATOR ONLY

The package is delivered as a single archive.

1. Unzip the archive.
2. Move the resulting aircraft folder into the `X-Plane 12/Aircraft` folder. A sub-folder of your choice (for example `Aircraft/My Aircraft`) can be used.
3. Start X-Plane and load the ATR 72-600 from the Flight Configuration screen.

Note

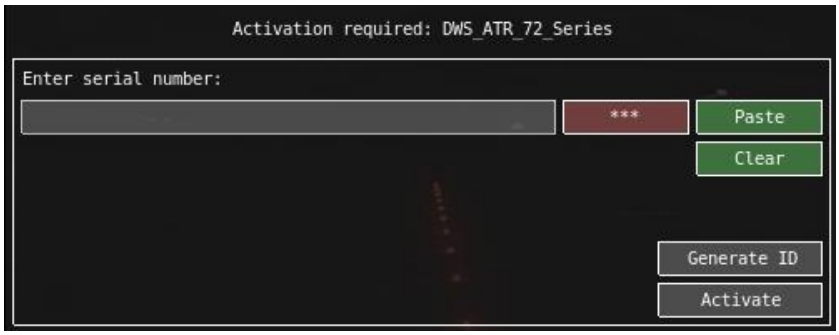
The aircraft folder can be renamed or moved inside `Aircraft`, but its content must not be reorganised. Liveries go in the `liveries` folder of the aircraft (see SIM.7).

GEN.2.2 Activation

Ident.: GEN.2.2 — 05 NOV 2026

SIMULATOR ONLY

The first time the aircraft is loaded, the activation window opens.



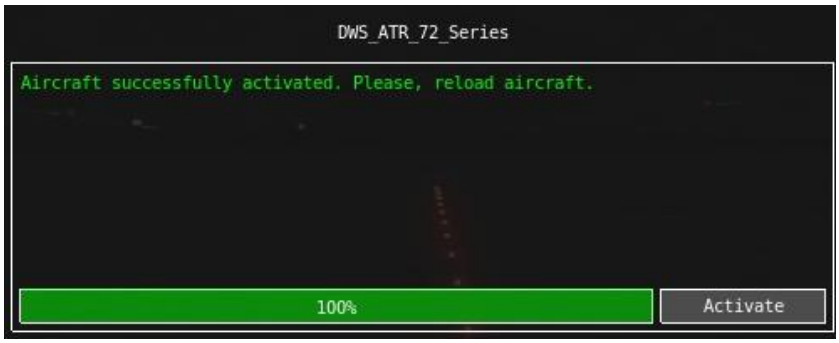
Activation window

Enter serial number	Type the serial number received at purchase, or copy it and use **Paste**.
Paste	Pastes the serial number from the clipboard.
Clear	Clears the field.
Activate	Sends the serial number for activation.

When activation succeeds, the window shows a green confirmation message and a 100 % progress bar.

cont'd... ►►►

cont'd... ►►►



Successful activation

CAUTION

Restart X-Plane after activation. The aircraft does not operate correctly until X-Plane has been restarted.

GEN.2.3 Updates

Ident.: GEN.2.3 — 05 NOV 2026

SIMULATOR ONLY

The package supports the **SkunkCrafts Updater**. Once the updater is installed and the aircraft folder is registered with it, updates are downloaded and applied by the updater. Instructions are published on the X-Plane.org forums, in the SkunkCrafts Updater support area.

When a newer version is available, the EFB DASHBOARD shows an amber **UPDATE AVAILABLE** banner with the version number (see SIM.1.4).

GEN.2.4 X-Plane Settings

Ident.: GEN.2.4 — 05 NOV 2026

SIMULATOR ONLY

Failures

The aircraft has its own failure system, driven from the EFB FAILURES app (see SIM.4.5). Before the first flight, clear any failure X-Plane may have left:

► X-PLANE MENU AIRCRAFT ..... FAILURES
► FIX ALL SYSTEMS ..... PRESS

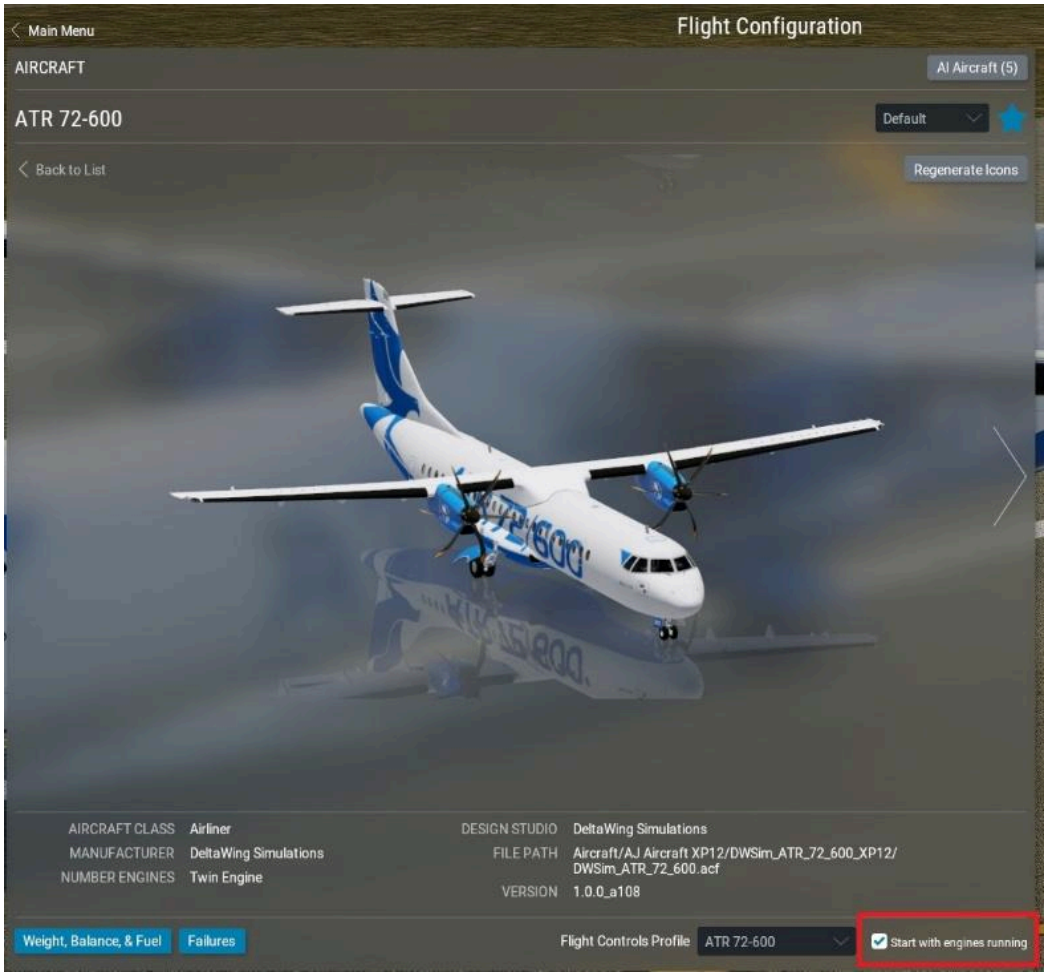
X-Plane's random failures setting is linked to the aircraft: when it is selected, the aircraft's own random failures run, at X-Plane's mean time between failures for each failure item. The link is one way: the EFB never changes X-Plane's setting. For flights without random failures, leave it not selected and the EFB RANDOM switch OFF.

X-Plane's own electrical failures (generators, batteries, inverters, buses) can also fail the aircraft: set FOLLOW X-PLANE FAILURES ON in the EFB FAILURES app, RANDOM tab (default OFF).

cont'd... ►►►

cont'd... ►►►

Start configuration



X-Plane Flight Configuration screen, Start with engines running box (red frame)

► START WITH ENGINES RUNNING ..... SELECT

Select **Start with engines running** in the X-Plane Flight Configuration screen. To start cold and dark, or at the gate for a turnaround, select the state in the EFB after loading: GROUND app, AIRCRAFT STATE (see SIM.4.1). The aircraft can also restore the state in which it was left at the last exit (EFB SETTINGS, AIRCRAFT STATE, see SIM.5.9).

Note

After a crash, or after any unexpected behaviour, reload the aircraft. A restart of X-Plane is the safest way to make sure that every system is reset.

Field of view

A larger field of view shows more of the cockpit at once but distorts the image. A field of view of **65° to 70°** is recommended.

Other aircraft

The number of AI aircraft has a large effect on frame rate. It is set in the Flight Configuration screen, **AI Aircraft** button. Removing all other aircraft (press the X next to each) gives the best frame rate: X-Plane then calculates the physics of one

cont'd... ►►►

cont'd... ►►►

aircraft only, which helps most on slower processors.

GEN.2.5 Navigation Data

Ident.: GEN.2.5 — 05 NOV 2026

SIMULATOR ONLY

The FMS uses the X-Plane default navigation data. This is adequate for most flights. A Navigraph navigation data subscription can be used instead: install the Navigraph data for X-Plane 12, then build the aircraft database in the EFB NAV DATA app.

The EFB NAV DATA app shows the AIRAC cycle in use, its validity and its source, and builds the pre-built database that makes the FMS ready faster at every start (see SIM.2.5).

Note

Navigraph charts and the moving map in the EFB need a Navigraph account with a charts subscription (see SIM.2.3). They do not depend on the navigation data source.

GEN.2.6 Support

Ident.: GEN.2.6 — 05 NOV 2026

SIMULATOR ONLY

Support for the ATR 72-600 is given on the **X-Plane.org forums**, ATR Series support area. Report problems there with:

- the product version (EFB SETTINGS, version line at the bottom, or the ABOUT page),
- a description of what was done and what happened,
- the X-Plane `Log.txt` file.

GEN.3 ABBREVIATIONS

GEN.3.1 Abbreviations Used in this Manual

Ident.: GEN.3.1 — 28 OCT 2026
ALL

ABBREV.	MEANING
AC	Alternating Current
ACW	Alternating Current Wild Frequency
ADC	Air Data Computer
ADU	Advisory Display Unit
AFCS	Automatic Flight Control System
AFM	Aircraft Flight Manual
AHRS	Attitude and Heading Reference System
ALT	Altitude
AP	Autopilot
APP	Approach
ATC	Air Traffic Control
ATPCS	Automatic Take-off Power Control System
BTC	Bus Tie Contactor
C/L	Check List
CAPT	Captain
CCAS	Centralized Crew Alerting System
CDS	Cockpit Display System
CG	Centre of Gravity
CL	Condition Lever
CLB	Climb
CRZ	Cruise
DC	Direct Current
DH	Decision Height
DTO	Direct To
DU	Display Unit
ECL	Electronic Check List
EEC	Electronic Engine Control
EFB	Electronic Flight Bag
EFCP	EFIS Control Panel
EFIS	Electronic Flight Instrument System
ELT	Emergency Locator Transmitter
EWD	Engine and Warning Display
EXT PWR	External Power

cont'd... ►►►

cont'd... ►►►

ABBREV.	MEANING
F/O	First Officer
FCOM	Flight Crew Operating Manual
FD	Flight Director
FGCP	Flight Guidance Control Panel
FI	Flight Idle
FMA	Flight Mode Annunciator
FMS	Flight Management System
FPLN	Flight Plan
FTR	Feather
FWS	Flight Warning System
GI	Ground Idle
GPU	Ground Power Unit
GPWS	Ground Proximity Warning System
HDG	Heading
HP	High Pressure
IAS	Indicated Air Speed
IESI	Integrated Electronic Standby Instrument
ILS	Instrument Landing System
ITT	Inter-Turbine Temperature
LDG	Landing
LP	Low Pressure
LSK	Line Select Key
MC / MW	Master Caution / Master Warning
MCDU	Multipurpose Control and Display Unit
MCP	Multi Function Control Panel
MCT	Maximum Continuous Thrust (power)
MFC	Multi Function Computer
MFD	Multi-Function Display
NAV	Navigation
ND	Navigation Display
NH	High-pressure spool speed
NL	Low-pressure spool speed
NP	Propeller speed
OAT	Outside Air Temperature
OEI	One Engine Inoperative
pb	Pushbutton
PEC	Propeller Electronic Control
PF / PM	Pilot Flying / Pilot Monitoring
PFD	Primary Flight Display

cont'd... ►►►

cont'd... ►►►

ABBREV.	MEANING
PL	Power Lever
RTO	Reserve Take-Off (power)
SAT	Static Air Temperature
SD	System Display (MFD page)
SOP	Standard Operating Procedures
T/O	Take-Off
TAT	Total Air Temperature
TAWS	Terrain Awareness and Warning System
TCAS	Traffic Collision Avoidance System
TLU	Travel Limitation Unit
TQ	Torque
VCP	Virtual Control Panel
VMO	Maximum Operating Speed
VNAV	Vertical Navigation
VS	Vertical Speed
WOW	Weight On Wheels
WXR	Weather Radar
XPDR	Transponder
YD	Yaw Damper
ZFW	Zero Fuel Weight

PAGE

INTENTIONALLY

LEFT BLANK

LIM.1 GENERAL LIMITATIONS

LIM.1.1 Introduction

Ident.: LIM.1.1 — 28 OCT 2026
ALL

This part gives the operating limits of the ATR 72-600. Limits that come from the Airplane Flight Manual are shown in **AFM DATA** boxes. The other limits are operational: they are set to make the operation of the aircraft easier and safer.

CAUTION

Unless stated otherwise, all speeds are indicated airspeeds and all altitudes are pressure altitudes.

LIM.1.2 Kinds of Operation

Ident.: LIM.1.2 — 28 OCT 2026
ALL

AFM DATA

The aircraft is certified in the transport category, by day and by night, for:

- VFR and IFR flight,
- flight in icing conditions,
- taxi with reverse thrust, on one or both engines.

This applies only when the equipment and instruments required by the airworthiness and operating rules are installed and operative.

LIM.1.3 Minimum Flight Crew

Ident.: LIM.1.3 — 28 OCT 2026
ALL

AFM DATA

Two pilots.

LIM.1.4 Performance Configuration

Ident.: LIM.1.4 — 28 OCT 2026
ALL

The aircraft configurations used for the certified performance are given in the PERFORMANCE part.

LIM.1.5 Maximum Operating Altitude

Ident.: LIM.1.5 — 28 OCT 2026
ALL

AFM DATA

LIMIT	VALUE
Maximum operating altitude	**25 000 ft**

cont'd... ►►►

cont'd... ►►►

LIM.1.6 Manoeuvring Limit Load Factors

Ident.: LIM.1.6 — 28 OCT 2026
ALL

AFM DATA

CONFIGURATION	LOAD FACTOR
Gear and flaps retracted	**+2.5 g / −1 g**
Gear and/or flaps extended	**+2 g / 0 g**

LIM.1.7 Dispatch

Ident.: LIM.1.7 — 28 OCT 2026
ALL

For dispatch with failed or missing equipment, the MMEL / CDL applies.

LIM.1.8 Maximum Number of Passenger Seats

Ident.: LIM.1.8 — 28 OCT 2026
ALL

AFM DATA

74 passenger seats, as limited by the emergency exit configuration.

LIM.2.1 WEIGHT

LIM.2.1.1 Structural Limitations

Ident.: LIM.2.1.1 — 28 OCT 2026
ALL

AFM DATA

WEIGHT	kg
Maximum ramp weight	**23 170**
Maximum takeoff weight (MTOW)	**23 000**
Maximum landing weight (MLW)	**22 350**
Maximum zero fuel weight (MZFW)	**21 000**
Minimum takeoff weight	**13 500**
Minimum flight weight (MFW)	**13 000**

LIM.2.1.2 Performance Limitations

Ident.: LIM.2.1.2 — 28 OCT 2026
ALL

AFM DATA

The maximum takeoff and landing weights can be further reduced by performance requirements (see PERFORMANCE):

- climb gradients (first and second segment, final takeoff, en route, approach climb and landing climb),
- runway length available for takeoff and landing,
- tyre limit speed,
- brake energy (for takeoff, observe the BRK TEMP alert),
- obstacle clearance at takeoff and en route,
- en route and landing weight.

LIM.2.2 CERTIFIED CENTER OF GRAVITY ENVELOPE

LIM.2.2.1 Certified Center of Gravity Envelope

Ident.: LIM.2.2.1 — 28 OCT 2026
ALL

CG limits are given in percent of the Mean Aerodynamic Chord (MAC), with the landing gear extended.

REFERENCE	VALUE
MAC length	2.303 m
Station 0	2.362 m forward of the fuselage nose
Station 0 to MAC leading edge	13.604 m

cont'd... ►►►

cont'd... ►►►

AFM DATA

The certified envelope is made of an outer **flight limit** and an inner **takeoff and landing limit**. The corner points below are read from the certified envelope chart.

WEIGHT (kg)	FLIGHT LIMIT FWD	T/O AND LDG LIMIT FWD	T/O AND LDG LIMIT AFT	FLIGHT LIMIT AFT
23 000 (MTOW)	18.25 %	20.85 %	37 %	39 %
22 350 (MLW)	≈ 17.4 %	≈ 20.1 %	37 %	39 %
21 000 (MZFW)	≈ 15.4 %	≈ 18.6 %	37 %	39 %
18 000	10 %	14 %	37 %	39 %
13 500 (min T/O)	10 %	14 %	37 %	39 %
13 000 (MFW)	10 %	—	—	39 %

- Between 18 000 kg and 23 000 kg the forward limits are straight lines on the index chart, from 10 % to 18.25 % MAC (flight) and from 14 % to 20.85 % MAC (takeoff and landing).
- Below 18 000 kg the forward limits are constant: 10 % MAC (flight) and 14 % MAC (takeoff and landing).
- The aft limits are constant over the whole weight range: 37 % MAC (takeoff and landing) and 39 % MAC (flight).
- The takeoff and landing zone is closed at the top by MTOW and at the bottom by the minimum takeoff weight. Inside it, the landing zone ends at MLW and the zero fuel zone at MZFW.

WARNING

The certified CG envelope is not an operational envelope. An operational CG envelope must be defined and used: see the weight and balance manual.

Note

Only 18.25 % and 20.85 % are printed on the certified chart. The other values were read from its % MAC grid; values marked ≈ are interpolated (±0.5 % MAC).

LIM.2.3 LOADING - UNLOADING

LIM.2.3.1 Loading Instructions

Ident.: LIM.2.3.1 — 28 OCT 2026
ALL

AFM DATA

Load the aircraft in accordance with the loading instructions of the weight and balance manual.

LIM.2.4 PASSENGERS BOARDING - DISEMBARKING

LIM.2.4.1 Tail Prop

Ident.: LIM.2.4.1 — 28 OCT 2026
ALL

AFM DATA

Install the tail prop before passengers board or disembark.

cont'd... ►►►

cont'd... ►►►

An aircraft that is out of balance can tip onto its tail on the ground. Tip-up occurs with the CG at **54 % MAC** (no wind, level surface).

Toppling must be considered when more than **7 persons** (conservative figure, no wind, level surface) move near the rear of an empty aircraft.

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

PAGE

INTENTIONALLY

LEFT BLANK

LIM.3.1 AIRSPEEDS

LIM.3.1.1 Maximum Operating Speed VMO / MMO

Ident.: LIM.3.1.1 — 28 OCT 2026
ALL

Never exceed this limit intentionally, in any phase of flight.

SPEED	VALUE
VMO	**250 kt**
MMO	**0.55**

For the overspeed aural alert, see DSC.31.12.3.

LIM.3.1.2 Maximum Design Manoeuvring Speed VA

Ident.: LIM.3.1.2 — 28 OCT 2026
ALL

Limit full deflection of the roll and yaw controls, and manoeuvres close to the stall angle of attack, to speeds below VA.

SPEED	VALUE
VA	**175 kt**

CAUTION

Fast, large and alternating control inputs, in particular combined with large pitch, roll or yaw changes (for example large sideslip), can damage the structure at any speed, even below VA.

CAUTION

With the elevators uncoupled, never apply opposite inputs on the two control columns. This can damage the structure at any speed, even below VA.

LIM.3.1.3 Maximum Flaps Extended Speeds VFE

Ident.: LIM.3.1.3 — 28 OCT 2026
ALL

FLAPS	VFE
15	**185 kt**
30	**150 kt**

LIM.3.1.4 Maximum Landing Gear Extended and Operating Speeds VLE / VLO

Ident.: LIM.3.1.4 — 28 OCT 2026
ALL

SPEED	VALUE
VLE	**185 kt**
VLO, gear extension	**170 kt**
VLO, gear retraction	**160 kt**

cont'd... ►►►

cont'd... ►►►

LIM.3.2 STALL SPEEDS

LIM.3.2.1 Stall Speeds

Ident.: LIM.3.2.1 — 28 OCT 2026
ALL

AFM DATA

Reference stall speed VSR (CAS) versus weight. Values are read from the certified chart, which is linear between the weights shown.

WEIGHT (kg)	FLAPS 0 / GEAR UP	FLAPS 15 / GEAR UP	FLAPS 30 / GEAR DOWN
12 000	86.5 kt	74 kt	67.5 kt
13 000	89.5 kt	77 kt	70 kt
14 000	93 kt	79.5 kt	72.5 kt
15 000	96.5 kt	82.5 kt	75 kt
16 000	99.5 kt	85 kt	77.5 kt
17 000	102.5 kt	88 kt	80 kt
18 000	105.5 kt	90.5 kt	82 kt
19 000	108.5 kt	93 kt	84.5 kt
20 000	111.5 kt	95.5 kt	86.5 kt
21 000	114 kt	98 kt	89 kt
22 000	117 kt	100 kt	91 kt
23 000	119 kt	102 kt	93 kt

LIM.3.3 MINIMUM CONTROL SPEEDS

LIM.3.3.1 V1 Limited by VMCG (Flaps 15)

Ident.: LIM.3.3.1 — 28 OCT 2026
ALL

AFM DATA

V1 must not be less than the VMCG-limited value. It depends on outside air temperature and pressure altitude, and on BOOST. The certified charts cover pressure altitudes from −1 000 ft to 8 500 ft and OAT from about −45 °C up to the environmental limit.

CONDITION	BOOST OFF	BOOST ON
Highest value (−1 000 ft, coldest OAT)	≈ 98 kt CAS	≈ 98 kt CAS
Lowest value (8 500 ft, about +38 °C)	≈ 72 kt CAS	≈ 73 kt CAS

The limit decreases as OAT and altitude increase.

Note

Values above are read from the certified charts and show only the range. The FMS computes takeoff speeds that respect this limit.

cont'd... ►►►

cont'd... ►►►

LIM.3.3.2 VMCA (Flaps 15)

Ident.: LIM.3.3.2 — 28 OCT 2026
ALL

AFM DATA

VMCA depends on outside air temperature, airport pressure altitude and BOOST. The certified charts cover pressure altitudes from −1 000 ft to 8 500 ft.

CONDITION	BOOST OFF	BOOST ON
Highest value (−1 000 ft, coldest OAT)	≈ 102 kt CAS	≈ 102 kt CAS
Lowest value (8 500 ft, about +38 °C)	≈ 83 kt CAS	≈ 84 kt CAS

The charts include a CAS to IAS conversion for VMCA.

LIM.3.3.3 Landing VMCL

Ident.: LIM.3.3.3 — 28 OCT 2026
ALL

AFM DATA

FLAPS	VMCL
15	**98 kt CAS**
30	**98 kt CAS**

LIM.3.4 OPERATING SPEEDS

LIM.3.4.1 General

Ident.: LIM.3.4.1 — 28 OCT 2026
ALL

The crew flies operating speeds, not limit speeds. Operating speeds are built from the limit speeds plus margins (multiplying coefficients), so that the aircraft stays clear of the edges of the flight envelope. Some of them also serve navigation and performance optimisation.

LIM.3.4.2 MAN / AUTO Speed Philosophy

Ident.: LIM.3.4.2 — 28 OCT 2026
ALL

The avionics offer two selectable speeds:

- **AUTO** speed (magenta bug on the PFD speed scale): the managed speed computed by the FMS. It depends on flap lever position, power management setting, normal or icing conditions and number of engines operating. It is limited between Vmin OPS (operational minimum) and Vmax.
- **MAN** speed (cyan bug on the PFD speed scale): the speed selected by the pilot.

cont'd... ►►►

cont'd... ►►►

LIM.3.4.3 Operating Speed Definitions

Ident.: LIM.3.4.3 — 28 OCT 2026
ALL

AFM DATA

SPEED	DEFINITION
V1	Highest speed at which the crew can decide to reject the takeoff and still stop within the runway limits.
VR	Speed at which rotation is started, so as to reach V2 at 35 ft.
VLOF	Speed at which lift becomes greater than weight (lift-off).
V2	Takeoff safety speed, reached at 35 ft with one engine failed. It gives at least the minimum second segment climb gradient (2.4 %).
Vmin OPS	Minimum flight speed for the current flight conditions and configuration.
VmLB	Minimum manoeuvre speed, low bank (15° max), for each flap setting (VmLB0, VmLB15 …) and flight phase.
VmHB	Minimum manoeuvre speed, high bank (27° max), for each flap setting (VmHB0, VmHB15 …) and flight phase.
VFTO	Final takeoff speed, final segment, one engine inoperative. It gives at least the minimum climb gradient (1.2 %).
VREF	Final approach reference speed, used to determine the certified landing distance.
VAPP	Final approach speed flown, VREF plus corrections (wind, gust, failure).
VGA	Go-around speed.
VFGA	Final go-around speed: best climb gradient speed after the go-around acceleration altitude. Highest of VFTO and drift-down speed.

LIM.3.4.4 Limit Speed Definitions

Ident.: LIM.3.4.4 — 28 OCT 2026
ALL

SPEED	DEFINITION
VS	Conventional stall speed: the lift collapses and the load factor is already below 1. VS = 0.94 × VS1g.
VS1g	Stall speed at maximum lift coefficient, just before lift starts to decrease, with the load factor still equal to 1.
VSR	Reference 1 g stall speed for a given configuration, function of weight (see LIM.3.2.1).
VMO / MMO	Maximum operating speed / Mach (see LIM.3.1.1).
VA	Maximum design manoeuvring speed (see LIM.3.1.2).
VMCG	Minimum control speed on the ground: lowest speed at which a sudden failure of the critical engine can be controlled with the primary flight controls only, the other engine at RTO power.
VMCA	Minimum control speed in flight: lowest speed at which the aircraft can be controlled with 5° of bank after failure of the critical engine, the other engine at RTO power, takeoff flaps, gear up.
VMCL	Minimum control speed in landing configuration: lowest speed at which the aircraft can be controlled with 5° of bank after failure of the critical engine, the other engine at GA power, landing flaps, gear down, with the roll capability required by regulations (see LIM.3.3.3).
VFE	Maximum speed for each flap setting (see LIM.3.1.3).
VLE	Maximum speed with the landing gear extended (see LIM.3.1.4).
VLO	Maximum speed for gear extension or retraction (see LIM.3.1.4).

cont'd... ►►►

cont'd... ►►►

LIM.3.5 MINIMUM MANOEUVRE SPEEDS (VmHB - VmLB)

LIM.3.5.1 Introduction

Ident.: LIM.3.5.1 — 28 OCT 2026
ALL

AFM DATA

The minimum manoeuvre speeds keep a sufficient margin above the stall. They depend on:

- normal or icing conditions,
- weight,
- configuration,
- type of manoeuvre (high or low bank).

Each one is a minimum ratio to the stall speed VSR (see LIM.3.2.1), or V2 where applicable.

LIM.3.5.2 Normal Conditions

Ident.: LIM.3.5.2 — 28 OCT 2026
ALL

AFM DATA

FLAPS	VmHB	VmLB
0	1.23 VSR, and not less than VMCL during approach	1.18 VSR
15	1.23 VSR, and not less than VMCL during approach	V2
30	1.23 VSR, and not less than VMCL during approach	Not used

LIM.3.5.3 Icing Conditions

Ident.: LIM.3.5.3 — 28 OCT 2026
ALL

Increase the minimum manoeuvre speeds, and fly the icing values, as soon as ice accretion:

- is possible (flight in atmospheric icing conditions), or
- exists (ice building up, or residual ice).

FLAPS	VmHB	VmLB
0	1.46 VSR	1.40 VSR
15	1.35 VSR	1.22 VSR — takeoff, second segment 1.27 VSR — final takeoff 1.30 VSR — en route 1.24 VSR — go-around
30	1.32 VSR	Not used

CAUTION

For obstacle clearance with an engine failed and ice accretion observed, the en route configuration is FLAPS 15 at no less than 1.30 VSR.

cont'd... ►►►

cont'd... ►►►

Note

The QRH operating data give the minimum manoeuvre and operating speeds directly for all weights. VSR and VMCL values: see LIM.3.2 and LIM.3.3.

LIM.3.5.4 Recommended Conservative Manoeuvring Speeds

Ident.: LIM.3.5.4 — 28 OCT 2026
ALL

When performance does not require the use of the minimum manoeuvre speeds, the following speeds may be flown. They cover all weights, high bank manoeuvres, in normal and icing conditions.

FLAPS	SPEED
0	**180 kt**
15	**150 kt**
30	**135 kt**

LIM.3.6 TAKEOFF SPEEDS

LIM.3.6.1 V1 - VR - V2

Ident.: LIM.3.6.1 — 28 OCT 2026
ALL

- When the takeoff is not performance limited, the non-limiting (NL) V1 / VR / V2 are read in the QRH for a conservative takeoff weight. The FMS also computes them.
- Otherwise, V1 / VR / V2 come from the method used to determine the limiting takeoff weight (FCOM performance charts or performance software), and the crew inserts them manually on the MCDU TAKEOFF PERF page.

Note

If the actual takeoff weight is below the regulatory (limiting) takeoff weight, use the V1 / VR / V2 given by the method that determined the limitation. Single-point performance software gives V1 / VR / V2 and VmLB for non-limiting and limiting runway conditions.

The FMS shows the takeoff speeds on the PFD speed scale.

LIM.3.6.2 VFTO

Ident.: LIM.3.6.2 — 28 OCT 2026
ALL

VFTO is read in the QRH: VmLB0 in normal conditions, VmLB15 in icing conditions.

LIM.3.7 CRUISE SPEEDS

LIM.3.7.1 Minimum Speeds

Ident.: LIM.3.7.1 — 28 OCT 2026
ALL

PHASE	NORMAL CONDITIONS	ICING CONDITIONS
Minimum manoeuvre speed in flight	VmLB0	VmLB0 (icing value)
Minimum speed in drift-down	VmLB0	VmLB15 (icing value)

cont'd... ►►►

cont'd... ►►►

The drift-down speed gives the best altitude versus distance in climb and the best lift-to-drag ratio in descent. Minimum en route and drift-down speeds are read in the QRH.

LIM.3.7.2 Recommended Cruise Speed

Ident.: LIM.3.7.2 — 28 OCT 2026
ALL

The recommended cruise speed is read in the QRH, for the flight level, weight and ISA deviation.

LIM.3.8 LANDING SPEEDS

LIM.3.8.1 Landing Speed

Ident.: LIM.3.8.1 — 28 OCT 2026
ALL

SPEED	RULE
VREF	Highest of VmHB30 and VMCL
VAPP	VREF + correction
Correction	Highest of the wind factor and the failure correction
Wind factor	Highest of 1/3 of the headwind component and the reported gust increment, **15 kt maximum**

The wind factor gives an extra margin against turbulence and windshear. The zero-wind approach speed is read in the QRH for the actual landing weight.

Examples (not for operational use)

RWY	WIND	COMPONENTS	WIND FACTOR
24	310/24G30 kt	Headwind 8 kt, crosswind 23 kt, gust 6 kt	Highest of 3 and 6 = **6 kt**
24	350/10G21 kt	Tailwind 3 kt, crosswind 9 kt, gust 11 kt	**11 kt**

LIM.3.9 GO-AROUND SPEED (VGA)

LIM.3.9.1 Go-Around Speed

Ident.: LIM.3.9.1 — 28 OCT 2026
ALL

CONDITIONS	VGA
Normal	Highest of 1.23 VSR (FLAPS 15) and 1.1 VMCA
Icing	Highest of 1.24 VSR (FLAPS 15) and 1.1 VMCA

VGA is read in the QRH for the actual landing weight.

LIM.3.10 MINIMUM SPEED FOR FLAPS RETRACTION

LIM.3.10.1 Minimum Speed for Flaps Retraction

Ident.: LIM.3.10.1 — 28 OCT 2026
ALL

The minimum speed for retracting the flaps is the VmLB of the next (retracted) flap setting. Example: VmLB0 is the minimum speed to retract from 15 to 0.

PAGE

INTENTIONALLY

LEFT BLANK

LIM.4.1 ENVIRONMENTAL

LIM.4.1.1 Environmental Envelope

Ident.: LIM.4.1.1 — 28 OCT 2026
ALL

AFM DATA

The certified envelope is described below by its limits.

OPERATION	PRESSURE ALTITUDE	MINIMUM OAT	MAXIMUM OAT
Flight	−1 000 ft to 25 000 ft	−54 °C	ISA +35 °C, and not above +50 °C
Takeoff and landing	−1 000 ft to 8 500 ft	−35 °C	ISA +35 °C, and not above +50 °C

KEY POINTS OF THE HOT LIMIT	OAT
−1 000 ft to sea level	+50 °C
8 500 ft (top of takeoff and landing envelope)	about +33 °C
25 000 ft	0 °C

Note

For fuel temperature limits, see LIM.5.70.4.

LIM.4.2 WIND LIMITATION

LIM.4.2.1 Tailwind

Ident.: LIM.4.2.1 — 28 OCT 2026
ALL

AFM DATA

TAKEOFF AND LANDING	LIMIT
Maximum tailwind	**15 kt**

Note

A tailwind above 10 kt is within the certified capability of the aircraft. Where the national authority requires a specific operational approval for tailwinds above 10 kt, this limit does not replace it.

cont'd... ►►►

cont'd... ►►►

LIM.4.2.2 Crosswind

Ident.: LIM.4.2.2 — 28 OCT 2026 — ALL

AFM DATA

Maximum demonstrated crosswind, dry runway:

PHASE	CROSSWIND
Takeoff	**35 kt**
Landing FLAPS 30	**35 kt**

Maximum recommended crosswind on a runway that is not dry, for takeoff and landing:

RUNWAY SURFACE	REPORTED DEPTH	RWYCC / BRAKING ACTION	MAX CROSSWIND
Frost, wet	—	5 – GOOD	**28 kt**
Standing water, slush, dry snow, wet snow	3 mm (1/8 in) or less	5 – GOOD	**28 kt**
Specially prepared winter runway	—	4 – GOOD TO MEDIUM	**22 kt**
Compacted snow, OAT −15 °C or below	—	4 – GOOD TO MEDIUM	**22 kt**
Slippery wet	—	3 – MEDIUM	**16 kt**
Compacted snow, OAT above −15 °C	—	3 – MEDIUM	**16 kt**
Dry snow	more than 3 mm, up to 50 mm (2 in)	3 – MEDIUM	**16 kt**
Dry snow on top of compacted snow	50 mm (2 in) or less	3 – MEDIUM	**16 kt**
Wet snow	more than 3 mm, up to 20 mm (3/4 in)	3 – MEDIUM	**16 kt**
Wet snow on top of compacted snow	20 mm (3/4 in) or less	3 – MEDIUM	**16 kt**
Standing water, slush	more than 3 mm, up to 12.7 mm (1/2 in)	2 – MEDIUM TO POOR	**16 kt**
Ice	—	1 – POOR	**10 kt**

For crosswind technique, see the procedures for operation in wind conditions.

LIM.4.3 RUNWAY

LIM.4.3.1 Runway Slope

Ident.: LIM.4.3.1 — 28 OCT 2026 — ALL

AFM DATA

PARAMETER	LIMIT
Maximum mean runway slope	**±2 %**

Runways with a slope beyond 2 % require a specific approval and procedure.

cont'd... ►►►

cont'd... ►►►

LIM.4.4 ICING CONDITIONS

LIM.4.4.1 Ground Icing Conditions

Ident.: LIM.4.4.1 — 28 OCT 2026
ALL

AFM DATA

Ground icing conditions exist when both:

- the OAT on the ground is **5 °C or below**, and
- snow, standing water or slush is present on ramps, taxiways or runways.

For the associated procedures, see the procedures for atmospheric icing conditions. For contaminated runway penalties, see PERFORMANCE.

LIM.4.4.2 Atmospheric Icing Conditions

Ident.: LIM.4.4.2 — 28 OCT 2026
ALL

AFM DATA

Atmospheric icing conditions exist when there is visible moisture of any kind (cloud, fog, mist, rain, snow, sleet, ice crystals) and:

- on the ground and for takeoff, the OAT is **5 °C or below**, or
- in flight, the TAT is **7 °C or below**.

Do not take off with frost, snow or ice adhering to the wings, tail, control surfaces, engine air inlets or propellers.

Some systems must be operative for flight in icing conditions: see LIM.5.30.

cont'd... ►►►

cont'd... ►►►

LIM.4.4.3 Severe Icing Conditions

Ident.: LIM.4.4.3 — 28 OCT 2026
ALL

AFM DATA

WARNING

Severe icing can come from conditions outside those the aircraft is certified for. Freezing rain, freezing drizzle, or mixed conditions (supercooled liquid water with ice crystals) can build ice on protected surfaces beyond what the ice protection can remove, or form ice behind the protected surfaces. This ice may not shed, and can seriously degrade performance and handling.

Weather that can lead to severe icing in flight:

- visible rain with the static air temperature (SAT) close to 0 °C,
- droplets that splash or splatter on impact, with SAT close to 0 °C.

Severe icing beyond the certified conditions is recognised by any of:

- ice covering all or most of the unheated part of either side window,
- target speed cannot be reached or maintained,
- secondary cues:
  - o water splashing and streaming on the windshield,
  - o unusually large ice build-up on airframe areas that do not normally collect ice,
  - o ice on the wing lower surface, aft of the protected area,
  - o ice on the propeller spinner further aft than normal.

If any of these is observed, ask ATC for priority handling to change route or altitude and leave the icing conditions, and apply the emergency procedure for severe icing.

The autopilot can hide the tactile cues of degraded handling. Do not use the autopilot when:

- severe icing as defined above exists, or
- unusual lateral trim is needed while in icing conditions, or
- autopilot trim warnings appear while in icing conditions.

LIM.5.21 AIR CONDITIONING

LIM.5.21.1 Pressurization

Ident.: LIM.5.21.1 — 28 OCT 2026
ALL

AFM DATA

PARAMETER	LIMIT
Maximum differential pressure	**6.35 psi**
Maximum negative differential pressure	**−0.5 psi**
Maximum differential pressure for landing	**0.35 psi**
Maximum differential pressure for OVBD VALVE FULL OPEN selection	**1 psi**
Maximum altitude with one bleed off	**20 000 ft**

Takeoff with HIGH FLOW selected is prohibited.

LIM.5.22 AUTO FLIGHT

LIM.5.22.1 Automatic Flight Control System

Ident.: LIM.5.22.1 — 28 OCT 2026
ALL

AFM DATA

PARAMETER	LIMIT
Minimum height for AP engagement after takeoff	**100 ft**
AP bank authority, high bank / low bank	**27° / 15°**
Minimum height for AP or FD, except takeoff and approach	**1 000 ft**
Minimum height for AP or FD, VS or IAS mode in approach	**160 ft**
Minimum height for AP or FD, CAT I APP mode	**160 ft**

Single source configuration (one ADC failed and/or one AHRS failed, and/or both DC generators lost):

- do not use the AP and/or the YD below **1 000 ft AGL** or below **160 kt IAS**.

Do not use the AP when the stall warning is inoperative.

NAV mode for a VOR approach, with AP or FD, is only permitted when a collocated DME is available and DME HOLD is not selected.

Climbing in VS mode is prohibited.

For CAT II operations, see the CAT 2 approach procedure.

LIM.5.23 COMMUNICATIONS

LIM.5.23.1 ACARS

Ident.: LIM.5.23.1 — 28 OCT 2026
ALL

cont'd... ►►►

cont'd... ►►►

ACARS is approved as a non-essential system for departure clearance (DCL) and digital ATIS (D-ATIS) messages, which must be checked with approved operational procedures. This is not an operational approval. Terminal weather (TWIP) and oceanic clearance (OCL) functions are not certified and must not be used to manage the flight.

LIM.5.24 ELECTRICAL POWER

LIM.5.24.1 Electrical System

Ident.: LIM.5.24.1 — 28 OCT 2026
ALL

SOURCE	MAXIMUM LOAD	TIME LIMIT
DC GEN	400 A	none
DC GEN	600 A	2 min
DC GEN	800 A	8 s
INV	500 VA	none
INV	575 VA	30 min
INV	750 VA	5 s
ACW GEN	20 kVA	none
ACW GEN	30 kVA	5 min
ACW GEN	40 kVA	5 s
TRU	60 A	none
TRU	90 A	5 min

AFM DATA

With a single DC generator operating, in flight, if the OAT is above ISA +25: limit the flight level to **FL 200**.

LIM.5.26 FIRE PROTECTION

LIM.5.26.1 PED in Cockpit

Ident.: LIM.5.26.1 — 28 OCT 2026
ALL

A portable electronic device must never be key-locked in its cradle.

LIM.5.27 FLIGHT CONTROLS

LIM.5.27.1 Flaps

Ident.: LIM.5.27.1 — 28 OCT 2026
ALL

AFM DATA

In icing conditions, holding with flaps extended is prohibited, except in single engine operation.

cont'd... ►►►

cont'd... ►►►

LIM.5.29 HYDRAULIC POWER

LIM.5.29.1 Hydraulic Fluids

Ident.: LIM.5.29.1 — 28 OCT 2026
ALL

AFM DATA

Use only hydraulic fluids meeting specification NSA 307110. Approved fluids are listed in the AMM (20-31-30).

LIM.5.29.2 Hydraulic Pumps

Ident.: LIM.5.29.2 — 28 OCT 2026
ALL

DATA	ACW PUMP	DC AUX PUMP
Nominal flow	7.9 l/min (2.1 US gal/min) at 197 bar (2 850 psi)	2.6 l/min (0.7 US gal/min) at 197 bar (2 850 psi)
Nominal pressure at zero flow	206.9 bar (3 000 psi)	206.9 bar (3 000 psi)
Electric motor speed	6 700 to 9 700 RPM	10 300 RPM

LIM.5.30 ICE AND RAIN PROTECTION

LIM.5.30.1 Icing Conditions

Ident.: LIM.5.30.1 — 28 OCT 2026
ALL

AFM DATA

- All icing detection lights must be operative before a night flight.
- The ice detector must be operative.

LIM.5.30.2 Maximum Wipers Operating Speed

Ident.: LIM.5.30.2 — 28 OCT 2026
ALL

SPEED	VALUE
VWO	**160 kt**

LIM.5.31 INDICATING AND RECORDING SYSTEMS

LIM.5.31.1 Instrument Marking

Ident.: LIM.5.31.1 — 28 OCT 2026
ALL

AFM DATA

MARKING	MEANING
Red arc or red radial line	Minimum and maximum limits
Amber arc	Caution range

cont'd... ►►►

cont'd... ►►►

MARKING	MEANING
Green arc	Normal range

LIM.5.32 LANDING GEAR

LIM.5.32.1 Landing Gear

Ident.: LIM.5.32.1 — 28 OCT 2026
ALL

AFM DATA

- Except in an emergency, do not pivot (sharp turn) on a landing gear with its wheels fully braked.
- If the ground speed has exceeded **165 kt**, all tyres must be replaced.
- Towbarless towing is prohibited unless it is done to the applicable operational requirements, with a towbarless tractor designed and operated so that it cannot damage the nose wheel steering, or that gives a clear warning if damage may have occurred. ATR lists the accepted tractors in a service letter.

SIMULATOR NOTE

Exceeding the 165 kt tyre limit with a gear leg on the ground flags the tyres for replacement, and a sustained exceedance bursts the tyre. New tyres are fitted from the EFB.

LIM.5.33 LIGHTS

LIM.5.33.1 Cabin Lighting

Ident.: LIM.5.33.1 — 28 OCT 2026
ALL

AFM DATA

Before each flight, operate the general cabin lighting for at least **15 min**.

LIM.5.34 NAVIGATION

LIM.5.34.1 FMS - General

Ident.: LIM.5.34.1 — 28 OCT 2026
ALL

AFM DATA

The Thales FMS 220, with two Topstar T200NG LPV GPS receivers:

- meets ETSO/TSO C146c class Delta 4 and ETSO/TSO C145c class Beta 3,
- is installed in compliance with AC 20-138C for the navigation specifications listed in LIM.5.34.4.

cont'd... ►►►

cont'd... ►►►

LIM.5.34.2 FMS - Approvals and Limitations

Ident.: LIM.5.34.2 — 28 OCT 2026
ALL

AFM DATA

The FMS has been shown to meet:

- primary means of navigation in oceanic and remote areas (FAA Notice 8400.12B, AMC 20-12),
- RNAV 5 (AMC 20-4),
- RNAV 1 and RNAV 2 (TGL 10, AC 90-100A),
- Basic RNP 1 (AC 90-105),
- RNP APCH 0.3 / 1 NM (AMC 20-27, AC 90-105, AC 20-138C).

The operator needs the approval of its national authority for these operations.

- The system is approved for RNAV en route (continental) and RNAV terminal area operations, with AP/FD, FD only or raw data.
- The navigation database must come from a supplier with an EASA Type 2 LOA (or equivalent, ED-76 / DO-200A), and must be current. The crew checks before flight that the FMS database is up to date.
- The system is also approved as a supplemental means for conventional en route, SID / STAR and conventional non-precision approaches (NDB, VOR/DME …), provided the conventional equipment needed for the approach at destination and alternates is installed and operative. For a non-precision approach not published as RNAV (GNSS), display the raw data to monitor the FMS guidance. ILS, LOC, LDA and SDF approaches are excluded.
- When GNSS is needed for RNAV 10, RNAV 5 (without DME), RNAV 1 / 2 or approach, GPS integrity (RAIM or FDE) availability must be predicted during flight preparation.

FMS PREDICTIONS

Deviation of distance, time and fuel predictions:

PHASE	DEVIATION
Climb	Below 10 % between ISA −20 °C and ISA +20 °C, decreasing to zero during the climb. Outside this range, can be above 10 %, decreasing to zero during the climb.
Cruise	Below 5 % in the whole environmental envelope
Descent	Below 5 % in the whole environmental envelope

cont'd... ►►►

cont'd... ►►►

LIM.5.34.3 RNAV Approach Limitations

Ident.: LIM.5.34.3 — 28 OCT 2026

ALL

AFM DATA

RNAV operations capability. Before terminal area RNAV operations, check capability against the Minimum Equipment List.

LNAV. RNAV approaches to LNAV minima are approved with one or two GPS receivers, provided:

- the published LNAV minimum is used (never the LNAV/VNAV minimum),
- the procedure is referenced to WGS 84,
- before the approach, at least one FMS and one GPS receiver are operating, and no RNAV approach limitation message is shown in the FWS status,
- APPR is shown green on the PFDs (HSI) for the final approach; the aircraft must be established on the final leg at least 2 NM before the FAF,
- such approaches are recommended only when an LNAV procedure is available at the destination or alternate,
- with two GPS receivers, no crew action is needed if one is lost; with one GPS receiver, the approach must be discontinued if it is lost, unless visual references are sufficient all the way to landing,
- the VNAV function is advisory only: cross-check VDEV permanently against the primary altimeters,
- temperature compensation may be used.

LNAV/VNAV: not applicable.

LPV: not applicable.

cont'd... ►►►

cont'd... ►►►

LIM.5.34.4 PBN Capabilities

Ident.: LIM.5.34.4 — 28 OCT 2026
ALL

AFM DATA

PBN capability of the RNAV system: RNAV 10, RNAV 5, RNAV 2, RNAV 1, RNP 4, RNP 2, RNP 1 and RNP APCH (LNAV).

Minimum equipment to enter each type of airspace or to fly each operation:

SPECIFICATION	RNAV SYSTEM (FMS + MCDU)	POSITION SENSORS	ALSO REQUIRED
RNP 1	1	1 GNSS	NAV SOURCE selection, 1 CDI, 1 PFD, 1 ND
RNAV 1 / RNAV 2	1	1 DME (DME/DME) and/or 1 GNSS	NAV SOURCE selection, 1 CDI, 1 PFD, 1 ND
RNP 2 oceanic / remote	2 (DU2 and DU4 functional)	2 GNSS with FDE and RAIM	1 PFD, 1 ND
RNP 2 continental	1	1 GNSS with FDE and RAIM	1 PFD, 1 ND
RNP 4	2 (DU2 and DU4 functional)	2 GNSS with FDE (outside navaid coverage)	NAV SOURCE selection, 1 PFD, 1 ND
RNAV 5	1	1 VOR and 1 DME (VOR/DME, DME/DME) and/or 1 GNSS	NAV SOURCE selection, 1 PFD, 1 ND
RNAV 10	2 (DU2 and DU4 functional)	2 GNSS with FDE (outside navaid coverage)	NAV SOURCE selection, 1 PFD, 1 ND
RNP APCH (LNAV)	1	1 GNSS	NAV SOURCE selection, FGCP, 1 CDI, 1 ND, 1 PFD, 1 ICP, 1 AHRS, 1 ADC

A single RNAV system means one FMS with a current, valid database (DU2 or DU4 functional) and one MCDU controlling it.

LIM.5.34.5 PBN Operation

Ident.: LIM.5.34.5 — 28 OCT 2026
ALL

AFM DATA

For all the PBN operations above:

- when the missed approach is based on conventional navaids (NDB, VOR, DME), the related aircraft equipment must be installed and serviceable, and the ground navaids operational,
- before an RNP 2 operation, the crew enters an RNP of 2 NM manually in the FMS, and clears it at the end of the operation to restore the automatic RNP value,
- the FMS 220 can fly RF legs.

Note

All RNAV operations above need a working FDE or RAIM function. All RNP operations also need the on-board performance monitoring and alerting.

cont'd... ►►►

cont'd... ►►►

LIM.5.34.6 TAWS

Ident.: LIM.5.34.6 — 28 OCT 2026
ALL

AFM DATA

1. Do not navigate with the terrain display. It is a situational awareness tool only, without the integrity or accuracy needed for terrain or obstacle avoidance decisions.
2. To avoid nuisance alerts, inhibit the TAWS predictive functions (TERR pb) when landing at an airport that is not in the TAWS airport database, or that is known to cause spurious terrain alerts.
3. Set the current local QNH on the crew altimeters for correct terrain alerting.
4. QFE operation with TAWS is prohibited.
5. Mode 5 alerts are inhibited when the ILS 2 glideslope signal is inoperative.

LIM.5.34.7 ATC Transponder

Ident.: LIM.5.34.7 — 28 OCT 2026
ALL

AFM DATA

The transponder replies in Modes A, C and S and broadcasts ADS-B Out (version 2 extended squitter). It meets CS-ACNS subpart D (elementary and enhanced surveillance, ADS-B) and 14 CFR 91.227 equipment requirements, and is compliant for ADS-B RAD airspace.

LIM.5.34.8 TCAS

Ident.: LIM.5.34.8 — 28 OCT 2026
ALL

AFM DATA

1. TCAS is approved in VMC and IMC.
2. Never start an avoidance manoeuvre from the traffic display or a traffic advisory (TA) alone. They only help to find the traffic visually.
3. When a resolution advisory (RA) occurs, the pilot flying follows the RA display and aural immediately, unless this would endanger the aircraft.
4. Fly the RA with the autopilot disconnected, and only as much as needed to comply. Return to the ATC clearance as soon as CLEAR OF CONFLICT is announced.
5. Before flying a climb or increase climb RA, select the appropriate power setting on the PWR MGT selector and, if needed, adjust CL 1+2.
6. A climb or increase climb RA in landing configuration or during a go-around is flown as a normal go-around, with power increase and configuration changes.
7. TCAS cannot inhibit RAs in every case where it would be appropriate. It may then command a manoeuvre that reduces the stall margin or triggers the stall warning, for example with bank angle, outside the weight / altitude / temperature combinations of LIM.5.34.9, with landing configuration kept during a climb RA on approach, with an engine out, or with abnormal configurations (gear not retracted, stick pusher / shaker failed). The stall warning always has priority over a climb RA.

The crew may deviate from the ATC clearance as far as needed to comply with an RA. Manoeuvres based only on the traffic display are prohibited.

cont'd... ►►►

cont'd... ►►►

CAUTION

After a non-crossing RA, adjust the vertical speed accurately to the RA, so as not to cancel the coordinated manoeuvre of the intruder.

WARNING

When the stall warning comes on, give priority to increasing airspeed, even if this means deviating from the RA.

Note

TCAS supplements the crew. With ATC, the crew keeps the primary responsibility for avoiding mid-air collisions.

LIM.5.34.9 Climb RA Flight Envelope

Ident.: LIM.5.34.9 — 28 OCT 2026

ALL

AFM DATA

Envelope in which a climb RA can be flown without stick shaker / pusher activation:

FLIGHT REGIME	WEIGHT / ALT / TEMP	POWER	FLAPS	GEAR	INITIAL SPEED	MIN SPEED
Takeoff	FAR/JAR 25 climb limit	Takeoff	15	Up	V2 + 20	1.13 VSR
Approach	FAR/JAR 25 climb limit	From level flight power, spin up to go-around power during the manoeuvre	15	Up	1.51 VSR	1.13 VSR
Landing, go-around at RA	FAR/JAR 25 climb limit	From 3° glide slope power, spin up to go-around power during the manoeuvre	30 to 15	Down to up	VAPP + 10	1.13 VSR
En route	Critical weight / altitude giving 1.3 g to buffet onset	Level flight power increased to MCT	0	Up	Long range cruise	Higher of 1.13 VSR (if defined) and buffet onset

Temperature up to ISA +27 °C. Wings level. Altitude range: en route 0 to 25 000 ft, takeoff 0 to 6 000 ft, approach and landing 0 to 7 000 ft.

RA INHIBITION

CONFIGURATION	NON ICING: CLIMB	NON ICING: INCREASE CLIMB	ICING: CLIMB	ICING: INCREASE CLIMB
FLAPS 0, below 20 000 ft	Authorized	Authorized	Authorized	Inhibited
FLAPS 0, above 20 000 ft	Authorized	Authorized	Inhibited	Inhibited
FLAPS 15 takeoff	Authorized	Inhibited	Authorized	Inhibited
FLAPS 15 approach	Authorized	Authorized	Authorized	Inhibited
FLAPS 30	Authorized	Inhibited	Inhibited	Inhibited

cont'd... ►►►

cont'd... ►►►

LIM.5.35 OXYGEN

LIM.5.35.1 Minimum Bottle Pressure

Ident.: LIM.5.35.1 — 28 OCT 2026
ALL

The crew oxygen minimum bottle pressure is read from a chart, as a function of the reference temperature, the crew composition and the flight time required after a decompression.

REFERENCE TEMPERATURE	
On ground	Highest of cabin temperature and OAT
In flight	Cabin temperature

The chart covers a cabin depressurisation at mid-flight, an emergency descent from 25 000 ft to 13 000 ft in less than 4 min, then flight below 13 000 ft. It assumes 25 % passenger oxygen consumption, and includes unusable quantity, normal leakage and reference temperature errors. With smoke, the system protects the flight crew for 15 min.

Example (illustration only, not for operational use)

CONDITIONS	CREW	FLIGHT TIME AFTER DECOMPRESSION
20 °C, bottle at 1 500 psi	2 pilots	**119 min**
20 °C, bottle at 1 500 psi	2 pilots + 1 observer	**77 min**

Note

The minimum oxygen quantity is set by the national operating regulations.

LIM.5.52 DOORS

LIM.5.52.1 Cargo Door Operation

Ident.: LIM.5.52.1 — 28 OCT 2026
ALL

AFM DATA

Do not operate the cargo door with a crosswind component above **45 kt**.

LIM.5.52.2 Cockpit Door Security System

Ident.: LIM.5.52.2 — 28 OCT 2026
ALL

AFM DATA

Check the cockpit door closed and locked before taxi.

LIM.5.70 POWER PLANT

LIM.5.70.1 Engine Parameters

Ident.: LIM.5.70.1 — 28 OCT 2026
ALL

AFM DATA

cont'd... ►►►

cont'd... ►►►

PW127M operating limits, with no unscheduled maintenance action required. Beyond these limits, refer to the maintenance manual.

POWER SETTING	TIME LIMIT	TQ (%)	ITT (°C)	NH (%)	NL (%)	NP (%)	OIL PRESS (PSI)	OIL TEMP (°C) b
RESERVE TAKEOFF	10 min f	100 a	800	103.2	104.2	101	55 to 65	0 to 125
NORMAL TAKEOFF	5 min	90 a	e	101.9	101.4	101	55 to 65	0 to 125
MAXIMUM CONTINUOUS	none g	90.9 a	800	103.2	104.2	101	55 to 65	0 to 125
GROUND IDLE				66 min			40 min d	−40 to 125
HOTEL MODE			715				55 to 65	125
TRANSIENT h	20 s	120	840	106.4	106.8	106 c	40 to 100	
TRANSIENT h	5 s					120		
OTHER						106 c		
OTHER	20 min							140
STARTING	5 s		950					−54 min

a. Value at 100 % NP.
b. Keep the oil temperature above 45 °C to protect the engine air inlet against ice build-up. ENG 1(2) OIL TEMP LO appears on the EWD when an engine runs with oil below 45 °C.
c. The flight may be continued provided TQ stays at or below 75.2 % in CLB and 73.13 % in CRZ.
d. Only up to 75 % NH.
e. Depends on OAT: see LIM.5.70.2.
f. Beyond 5 min, only with one engine inoperative.
g. MCT is the maximum power certified for continuous use. Use it only for in-flight emergencies.
h. A transient is a change of engine parameters caused by PLA or CLA movement or by an altitude change.

Note

Flight with an engine running and its propeller feathered is not permitted.

LIM.5.70.2 ITT Limit at Normal Takeoff Rating

Ident.: LIM.5.70.2 — 28 OCT 2026
ALL

AFM DATA

OAT	ITT LIMIT
−35 °C	**740 °C**
from −35 °C to +15 °C	linear, 740 °C to 765 °C (0.5 °C per °C)
+15 °C to +50 °C	**765 °C**

cont'd... ►►►

cont'd... ►►►

LIM.5.70.3 Overtorque, Overtemperature

Ident.: LIM.5.70.3 — 28 OCT 2026
ALL

Overtorque

TQ	MAXIMUM TIME WITHOUT MAINTENANCE ACTION
100 % to 106.3 %	5 min (10 min with one engine inoperative)
106.3 % to 120 %	20 s
above 120 %	not permitted

Beyond these times or above 120 %, an unscheduled maintenance action is required.

Note

Up to 106.3 % TQ there is no time limit when NP is below 94 %.

ITT during start

ITT	MAXIMUM TIME
800 °C or below	no limit
800 °C to 840 °C	20 s
840 °C to 950 °C	5 s
above 950 °C	not permitted

Above this profile, report to maintenance.

ITT with engine running

ITT	MAXIMUM TIME
800 °C or below	no limit
800 °C to 840 °C	20 s
above 840 °C	not permitted

Above this profile, report to maintenance.

SIMULATOR NOTE

The start ITT profile is monitored. A start that goes beyond it sets a maintenance flag for that engine, shown on the EFB (SYSTEMS, ENGINES). Engine performance is not affected.

LIM.5.70.4 Oil

Ident.: LIM.5.70.4 — 28 OCT 2026
ALL

AFM DATA

Use oil to specification SAE AS5780 and/or MIL-23699 type II.

cont'd... ►►►

cont'd... ►►►

LIM.5.70.5 Starter

Ident.: LIM.5.70.5 — 28 OCT 2026
ALL

AFM DATA

Three consecutive starter uses, with a maximum total starter running time of **1 min 30 s**. Then wait **4 min** before the next use.

Note

*The starter runs whenever the ENG START pb is ON, whatever the CRANK or START selection on the ENG START rotary selector. Do not run the starter-generator for more than **60 s** continuously.*

LIM.5.70.6 Fuel System

Ident.: LIM.5.70.6 — 28 OCT 2026
ALL

Anti-icing additives

ADDITIVE	MAXIMUM CONCENTRATION (% VOLUME)
DIEGME (MIL-DTL-85470, ASTM D4171 type III, DEF STAN 68-252, AL-41, DCSEA 745/A)	**0.15**
Russian fluid I (GOST 8313)	**0.3**
Russian fluid IM (50/50 fluid I and methanol, TU6-10-1458)	**0.3**

AFM DATA

PARAMETER	LIMIT
Maximum refuelling pressure	**3.5 bar (50 psi)**
Usable fuel, each tank	**2 500 kg**
Maximum fuel unbalance	**730 kg**

Fuel left in the tanks when the gauges read zero is not usable in flight.

Each electric pump can feed one engine in the whole flight envelope. One electric pump and its jet pump can feed both engines in the whole flight envelope.

Approved fuels: Jet A, Jet A1, JP5, RT, TS1. JP4 and Jet B are prohibited.

FUEL TEMPERATURE	JET A, JET A1, RT, TS1	JP5
Minimum, for flight preparation (relight)	**−34 °C**	**−26 °C**
Maximum	**57 °C**	**57 °C**

A fuel temperature above 57 °C is acceptable before engine start and for 2 min after engine start.

cont'd... ►►►

cont'd... ►►►

LIM.5.70.7 Propellers

Ident.: LIM.5.70.7 — 28 OCT 2026

ALL

AFM DATA

Two Hamilton Sundstrand 568F-1 propellers.

On the ground:

- avoid static operation between **41.6 %** and **62.5 % NP**,
- do not feather above **66.6 % TQ**,
- do engine run-ups into the wind.

On the ground or in flight: after a propeller overspeed or overtorque, refer to the propeller maintenance manual.

In flight: the IDLE GATE prevents the power levers from being moved below FLIGHT IDLE. Never try to override it. Power levers below FLIGHT IDLE in flight can cause loss of control, or a propeller overspeed with loss of engine power.

NOR.1 INTRODUCTION

NOR.1.1 Introduction

Ident.: NOR.1.1 — 30 OCT 2026 — ALL

This chapter gives the sequence of actions for a normal flight, from the first entry into a cold aircraft to leaving it at the end of the day. It covers the preflight preparation (cockpit and external checks, system tests), each phase of flight, and the additional actions for flight in icing conditions.

The procedures assume that every system works normally and that the automatic functions are used. They are flown from memory, panel by panel, and then confirmed with the normal checklist (C/L) shown on the EWD.

The tests that the preparation refers to (fire protection, ATPCS, trims, fuel pumps and so on) are grouped at the end of the chapter, in NORMAL PROCEDURES (6/6).

Single-pilot adaptation

The aircraft is operated by two pilots, and the procedures share every action between the Captain (CAPT) and the First Officer (F/O), or between the Pilot Flying (PF) and the Pilot Monitoring (PM). In the simulator you are both.

In this chapter the actions of both crew members are merged into **one flow**, in the order that one pilot sitting in the left seat can do them without going back. Call-outs that one pilot would make to the other ("POSITIVE CLIMB", "GEAR UP") are kept as checks: say them to yourself, look at the indication, then act.

Items that only exist between people — cabin crew reports, ground crew hand signals, load sheet signatures — are given in one line or left out. Briefings are kept: reviewing the departure or the approach before you fly it is what makes the procedure work.

Electronic checklist (ECL)

The normal checklists are displayed on the EWD, as on the aircraft. Each one comes up by itself when its condition is met (for example FINAL COCKPIT PREPARATION when the aircraft is powered by the GPU or by ENG 2 in hotel mode, TAXI when the parking brake is released). A checklist can always be called manually from NORMAL CHECK LISTS in the EWD procedure menu.

NOR.2 FLIGHT PREPARATION

NOR.2.1 Flight Preparation

Ident.: NOR.2.1 — 06 NOV 2026 — ALL

Before going to the aircraft, prepare the flight:

1. **Technical status.** Check the aircraft status and any failures carried over that affect the flight. The flight crew must verify the technical status of the aircraft in respect to the airworthiness acceptability of the malfunctions reported, and their influence on the flight plan. The flight crew should use all the documents established by the operator that are necessary, including the Minimum Equipment List (MEL) and Operational Engineering Bulletins (OEB).
2. **Weather.** Obtain the weather for departure, en route (winds, temperatures, icing, convective activity) and for destination and alternates. The weather briefing should include:
   - Actual and expected weather conditions for takeoff and climb out, including runway conditions
   - En route significant weather: winds, temperatures, icing forecast, and dangerous phenomena (cumulonimbus, thunderstorm, turbulences, volcanic …)

cont'd... ►►►

cont'd... ►►►

- Terminal forecasts for destination and alternate airports
- Actual weather for destination and alternates for short range flights, and recent past weather if available
- Survey of the meteorological conditions at airports along the planned route.

3. **NOTAMs and facilities.** Check that the navigation aids and approaches you plan to use are available, including GNSS. Study the latest relevant NOTAMs and check that all required facilities at departure, destination and alternate airports are operational and fulfil the appropriate requirements, including GPS NOTAMs.
4. **Flight plan and performance.** Check the route, levels and times. Compute the load figures and the limiting takeoff and landing weights, and the single-engine performance (takeoff and go-around climb gradients, net flight path, landing distance). Decide the fuel to carry.
   - Check the operational flight plan in respect to routing, altitudes and flight time.
   - Check the estimated load figures and calculate the maximum permitted takeoff and landing weights.
   - Check the aircraft performance for the whole flight, especially in case of failure, including single engine climb gradient (takeoff, go-around), single engine flight path and gross ceiling (classic rules and/or down hill rule), pressurization loss, and landing distance.
   - The Captain decides the amount of fuel necessary for a safe conduct of the flight, taking into consideration possible economic fuel transportation.
   - The Captain checks the ATC flight plan and ensures it is filed based on the prescribed procedures.

SIMULATOR NOTE

- The EFB **SIMBRIEF** page imports your SimBrief flight plan. From there **LOAD ROUTE** → **FMS** loads the route, and **SET / LOAD FUEL & WEIGHTS** fills the EFB **WEIGHT & BALANCE** page.
- The **WEIGHT & BALANCE** page sets passengers, cargo and fuel and loads them into the aircraft. Its CG (%MAC) is the T/O CG entered on the MCDU WEIGHT page, from which the FMS computes the T/O trim.
- The **PERFORMANCE** page computes takeoff and landing speeds; **TRANSFER** sends them to the MCDU.
- The **NAVIGRAPH** page shows charts if you have a Navigraph subscription.
- The MEL, the technical log and the ATC flight plan filing are not simulated.

NOR.3 PILOT ACTIONS SEQUENCE

NOR.3.1 Pilot Actions Sequence

Ident.: NOR.3.1 — 30 OCT 2026
ALL

The preparation depends on whether a ground power unit (GPU) is available. Without a GPU, ENG 2 is started in hotel mode (propeller held by the propeller brake) to supply the aircraft.

ORDER	GPU AVAILABLE	NO GPU AVAILABLE
1	External initial inspection (NOR.4)	External initial inspection (NOR.4)
2	Initial cockpit preparation – step 1, GPU energizing (NOR.5.1, NOR.5.2)	Initial cockpit preparation – step 1, battery stays OFF (NOR.5.1, NOR.5.3)
3	External inspection (NOR.6)	Cockpit preparation – step 2, ENG 2 start in hotel mode (NOR.7.1, NOR.11)
4	Cockpit preparation – step 2 (NOR.7)	External inspection (NOR.6)
5	Panel scan, external inspection closure (NOR.8, NOR.9.1)	Panel scan, external inspection closure (NOR.8, NOR.9.2)
6	Final cockpit preparation – step 3 (NOR.10), hotel mode start up if wanted (NOR.11)	Final cockpit preparation – step 3 (NOR.10)

cont'd... ►►►

cont'd... ►►►

ORDER	GPU AVAILABLE	NO GPU AVAILABLE
7	Before propeller rotation (NOR.12)	Before propeller rotation (NOR.12)

The flight then continues the same way for every case: before taxi, taxi, before takeoff, takeoff, after takeoff, climb and cruise, descent, approach, before landing, landing (or go-around), after landing, parking, and leaving the aircraft.

On a short transit, the cockpit preparations are replaced by the minimum checks of NOR.7.5.

SIMULATOR NOTE

The EFB **GROUND** page has three aircraft-state presets (tap twice to confirm): **COLD & DARK**, **TURNAROUND** (battery on, GPU called, engines off) and **READY TO TAXI** (engines running, CL in AUTO, gust lock off). Use them to start at the point of the sequence you want to fly.

NOR.4 EXTERNAL INITIAL INSPECTION

NOR.4.1 External Initial Inspection

Ident.: NOR.4.1 — 06 NOV 2026 — ALL

A short look at the aircraft before the first entry into the cockpit.

► PARKING BRAKE ACCU PRESSURE ..... CHECK 1 600 psi MIN

With less than 1 600 psi the parking brake alone cannot hold the aircraft on the apron: chocks are needed.

► FLAPS / AILERONS / ELEVATORS ..... MEMORIZE POSITION

You will compare these positions with the FLAPS lever and GUST LOCK lever in the cockpit.
Crosscheck positions with expected FLAPS lever and GUST LOCK control positions before initial cockpit preparation.

SIMULATOR NOTE

The brake accumulator pressure is read on the BRAKE ACCU HYD indicator on the CAPT lateral panel. Chocks are set and removed on the EFB **GROUND** page (**WHEEL CHOCKS**).

NOR.5 INITIAL COCKPIT PREPARATION (STEP 1)

NOR.5.1 Initial Interior Checks

Ident.: NOR.5.1 — 06 NOV 2026 — ALL

Normally done by the F/O on the first flight of the day.

► EMERGENCY EQUIPMENT ..... CHECK

Escape hatch, rope, axe, torches, smoke goggles, gloves, oxygen masks, fire extinguisher, gear emergency extension handle stowed.
Exit hatch closed, handle locked and safe tied, escape rope stowed.
Life jacket stowed.
Axe, flash lights, smoke goggles, protective gloves, observer seat oxygen mask and oxygen masks stowed.
PBE (if installed) stowed.
Portable fire extinguisher safely tied and pressure within green range.
Landing gear emergency extension handle stowed and cover closed.

► GEAR PINS ..... ON BOARD

cont'd... ►►►

cont'd... ►►►

► ALL CIRCUIT BREAKERS ..... CHECK
► CDLS sw ..... OFF
► BRAKE HANDLE ..... PARKING
► PL 1+2 ..... GI
► GUST LOCK lever ..... ON

The gust lock must be correctly engaged: it is one of the conditions for the propeller brake.

► CL 1+2 ..... FUEL S.O.
► FLAPS lever ..... SET

Set the lever to agree with the actual flap position.

► LDG GEAR lever ..... DOWN
► EEC 1+2 ..... PRESSED IN
► CAPT and F/O WIPERS ..... OFF

SIMULATOR NOTE

Gear pins and the other remove-before-flight items (pitot and AOA covers, intake covers, propeller tie-downs) are fitted and removed on the EFB **GROUND** page, **GROUND EQUIPMENT**. **REMOVE ALL RBF** removes the whole set. Each item can also be removed on its own by clicking it on the aircraft (see SIM.4.1).

NOR.5.2 GPU Energizing

Ident.: NOR.5.2 — 06 NOV 2026
ALL

1) Battery power

► BAT ..... ON
► MFC ..... MONITOR AUTOTEST

The MFC 1A and 2A FAULT lights flash first, then MFC 1B and 2B. The test is complete when all MFC FAULT lights are off. With the cargo door panel open, only 1B and 2B flash.

► EMER BUS & ESS BUS ..... CHECK ARROWS ON
► UNDV light ..... CHECK OFF

Check the battery voltage on the CAPT lateral panel (ELEC IND).

► NAV lights ..... ON
► AVIONIC INITIALIZATION ..... CHECK

DU 2 and DU 4 show a green "T", the IESI comes on, MCDU 1 comes on. Adjust the DU brightness. The warning, caution and CRC aurals sound.
At the end of the test the CPL light comes on (CAPT side) and the EWD shows the FINAL COCKPIT PREPARATION checklist.
Check on EWD that ECL database and documentation revision are consistent.
Do not operate any control during the avionics self-test.

2) GPU connection

► EXT PWR ..... CHECK AVAIL LIGHT

The GPU voltage can be read on the CAPT lateral panel.

► EXT PWR pb ..... PRESS

cont'd... ►►►

cont'd... ►►►

Check: DC BTC on line, EMER and MAIN BAT charging, the amber EMER and ESS BUS supply arrows off, UNDV light off.

► IESI ..... CHECK ALIGNMENT

► AVIONIC INITIALIZATION ..... CHECK

DU 1, 3 and 5 show a green "T" and MCDU 2 comes on. Adjust the DU brightness.

SIMULATOR NOTE

Connect the GPU on the EFB **GROUND** page, **GROUND SERVICES**: request the **GPU**, then connect the **DC CABLE**. External power is supplied through the DC cable and the EXT PWR pb on the MAIN ELEC PWR panel. The FULL TURNAROUND sequence on the same page calls the chocks and the GPU and plugs in the DC cable for you.

3) Preparation for the external inspection

► OVERHEAD PANEL ..... SCAN

No white light on, except PROBES HTG and the FUEL PUMP(S).

► HYD AUX PUMP pb (pedestal) ..... PRESS

► HYD X FEED ..... ON THEN OFF

Watch the blue and green pressures rise on the HYD SYST PRESS indicator. Set X FEED off when both systems are fully pressurised.

► BEACON, LOGO, WING lights ..... ON

LAND, STROBE and TAXI/TO lights need the ACW bus and cannot be checked yet.

► EMER EXIT LT sw ..... ARM

To inspect the emergency exit light.

SIMULATOR NOTE

The ECL database version is shown in the FINAL COCKPIT PREPARATION 1/2 checklist (CONFIGURATION DATA). There is no documentation revision to compare it with.

NOR.5.3 No GPU Available

Ident.: NOR.5.3 — 30 OCT 2026 — ALL

To save the battery, leave BAT OFF during the external inspection. The external lights are checked after ENG 2 has been started in hotel mode. Once ENG 2 is running in hotel mode, a pilot must stay in the cockpit.

► HYD AUX PUMP pb (pedestal) ..... PRESS & HOLD

With the MFC not powered, the pump runs only while the pb is held. Hold it as long as needed.

NOR.6 EXTERNAL INSPECTION

NOR.6.1 External Inspection Preparation

Ident.: NOR.6.1 — 06 NOV 2026 — ALL

The external inspection is a visual check that the aircraft, its visible parts and its equipment are fit for flight. It is required before every flight. Check that the flight control surfaces and flaps agree with the positions noted at the initial inspection.

cont'd... ►►►

cont'd... ►►►

The external inspection is normally performed by the Captain and is mandatory before each flight. During the walkaround, control and memorize the FLIGHT CONTROL SURFACES and FLAPS current positions. Check that they are in line with the selected position.

CAUTION

With ENG 2 running in hotel mode, keep clear of the propeller and exhaust danger areas, and adapt the walk-around path to the wind. The right engine, right main gear and right rear fuselage are then checked from a distance.

Each step marked with an asterisk (*) must be done visually from the path in dashed line.

NOR.6.2 External Inspection

Ident.: NOR.6.2 — 06 NOV 2026
ALL

Path in solid line: walkaround without hotel mode. Path in dashed line: adaptation of the walkaround in case of engine 2 running in hotel mode (steps 8*, 11* and 12*).

The walk-around goes clockwise from the left main gear:

AREA	MAIN CHECKS
1 Left main gear and fairing	Doors closed, wheels and tyres, brakes, gear structure and lines, uplock open, safety pin removed, beacon and landing lights, pack ram air inlet clear, TAT probe cover removed
2 Left wing trailing edge	Flaps and position, aileron and tab, static dischargers, exhaust clear
3 Left wing leading edge	Nav and strobe lights, de-icing boots, fuel vent clear, ice detector
4 Left engine	Cowlings latched, air intake clear, de-icing boots, spinner, propeller feathered and free to turn, oil cooling flaps
5 Left forward fuselage	Wing light, emergency exit and light, cargo door closed and latched, oxygen discharge indicator green, AOA probe, ice evidence probe, static ports clear, pitot covers removed
6 Nose	Wipers, radome, nose gear wheels, tyres, structure and doors, taxi and takeoff lights, safety pin removed
7 Right forward fuselage	Pitot cover removed, static ports clear, AOA probe, external power access doors, emergency exit, antennas, wing light
8 Right engine	As left engine (free rotation not checked with hotel mode running)
9–10 Right wing	As left wing
11 Right main gear and fairing	As left gear, refuelling panel door closed
12 Right aft fuselage	Antennas, service door, tail prop and tail skid, outflow valves
13 Tail	Stabilizer, elevators, fin, rudder and tabs, de-icing boots, logo and nav lights, static dischargers
14 Left aft fuselage	Service panel doors closed, cabin door, entry lights

1) Main left landing gear and fairing

► MAINTENANCE DOORS ..... CLOSED
► GEAR DOORS ..... CHECK
► WHEELS & TIRES ..... CHECK STATE
► BRAKE TEMPERATURE SENSORS ..... CHECK
► BRAKE WEAR DETECTORS ..... CHECK
► LANDING GEAR STRUCTURE ..... CHECK

cont'd... ►►►

cont'd... ►►►

- ► HYDRAULIC LINES ..... CHECK
- ► WHEEL WELL ..... CHECK
- ► UPLOCK ..... OPEN
- ► FREE FALL ASSISTER ..... CHECK
- ► SAFETY PIN ..... REMOVED
- ► BEACON lights ..... CHECK
- ► AIR CONDITIONING panel ..... LOCKED
- ► PACK RAM AIR INLET ..... CLOSE & CLEAR
- ► LAND lights ..... CHECK STATE
- ► TAT COVER ..... REMOVED
- ► TAT PROBE ..... CHECK
- ► MAGNETIC FUEL LEVEL ..... IN

2) Left wing trailing edge

- ► FLAPS RAIL SEAL ..... CHECK
- ► FLAPS ..... CHECK STATE
- ► EXHAUST NOZZLE ..... CLEAR
- ► FLAPS POSITION ..... CHECK
- ► AILERON & TAB ..... CHECK
- ► STATIC DISCHARGERS ..... CHECK
- ► HORN ..... CHECK STATE

3) Left wing leading edge

- ► NAV lights ..... CHECK
- ► STROBE lights ..... CHECK STATE
- ► WING DE ICING BOOTS ..... CHECK STATE
- ► FUEL VENT NACA INLET ..... CLEAR
- ► MAGNETIC FUEL LEVEL ..... IN
- ► ICE DETECTOR ..... CHECK

4) Left engine

- ► LEFT COWLING ALL LATCHES ..... CLOSED
- ► OIL COOLING FLAPS ..... CHECK
- ► ENGINE AIR INTAKE ..... CLEAR
- ► ENGINE DE ICING BOOTS ..... CHECK STATE
- ► SPINNER ..... CHECK
- ► PROPELLER ..... CHECK FEATHERED, STATE & FREE ROTATION
- ► RIGHT COWLING ALL LATCHES ..... CLOSED
- ► INNER WING LEADING EDGE & FAIRING ..... CHECK STATE

5) Left forward fuselage

- ► WING lights ..... CHECK
- ► EMERGENCY lights ..... CHECK
- ► EMERGENCY EXIT ..... CLOSED
- ► AVIONICS VENT OVBD VALVE ..... OPEN

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

► CARGO DOOR OPERATING panel DOOR ..... CLOSED
► CARGO DOOR ..... CLOSED & LATCHED
► OXYGEN BOTTLE DISCHARGE indicator ..... GREEN
► ANGLE OF ATTACK PROBE ..... CHECK STATE
► COCKPIT COMMUNICATION HATCH ..... CHECK
► ICE EVIDENCE PROBE ..... CHECK STATE
► STATIC PORTS ..... CLEAR
► PITOTS COVERS ..... REMOVED
► PITOTS PROBES ..... CHECK

6) Nose

► WIPERS ..... CHECK STATE
► RADOME & LATCHES ..... CHECK
► NOSE GEAR WHEELS & TIRES ..... CHECK STATE
► NOSE GEAR STRUCTURE ..... CHECK STATE
► TAXI & TAKEOFF lights ..... CHECK STATE
► WHEEL WELL ..... CHECK
► FREE FALL ASSISTER ..... CHECK
► SAFETY PIN ..... REMOVED
► NOSE WHEEL STEERING ..... CHECK STATE
► HYDRAULIC LINES ..... CHECK STATE
► ALL NOSE GEAR DOORS ..... CHECK STATE

7) Right forward fuselage

► PITOT COVER ..... REMOVED
► PITOT PROBE ..... CHECK
► STATIC PORTS ..... CLEAR
► ANGLE OF ATTACK PROBE ..... CHECK STATE
► EXTERNAL DC & AC ELECTRICAL POWER ACCESS DOORS ..... CHECK
► EMERGENCY EXIT DOOR ..... CLOSED
► EMERGENCY EXIT lights ..... CHECK
► ANTENNAS ..... CHECK
► WING lights ..... CHECK

8) Right engine*

► INNER WING LEADING EDGE & FAIRING ..... CHECK STATE
► LEFT COWLING ALL LATCHES ..... CLOSED
► ENGINE AIR INTAKE ..... CLEAR
► ENGINE DE ICING BOOTS ..... CHECK STATE
► SPINNER ..... CHECK
► PROPELLER ..... CHECK FEATHERED, STATE & FREE ROTATION

Free rotation cannot be checked with engine running in hotel mode.

► RIGHT COWLING ALL LATCHES ..... CLOSED
► OIL COOLING FLAPS ..... CHECK

cont'd... ►►►

cont'd... ►►►

9) Right wing leading edge

- ► WING DE ICING BOOTS ..... CHECK STATE
- ► FUEL VENT NACA INLET ..... CLEAR
- ► MAGNETIC FUEL LEVEL ..... IN
- ► NAV lights ..... CHECK
- ► STROBE lights ..... CHECK STATE

10) Right wing trailing edge

- ► HORN ..... CHECK STATE
- ► STATIC DISCHARGERS ..... CHECK
- ► AILERON & TAB ..... CHECK
- ► FLAPS POSITION ..... CHECK
- ► EXHAUST NOZZLE ..... CLEAR
- ► FLAPS ..... CHECK STATE
- ► FLAPS RAIL SEAL ..... CHECK

11) Main right landing gear and fairing*

- ► MAGNETIC FUEL LEVEL ..... IN
- ► TAT COVER ..... REMOVED
- ► TAT PROBE ..... CHECK
- ► LAND lights ..... CHECK STATE
- ► AIR CONDITIONING GROUND CONNECTION ..... CHECK
- ► PACK RAM AIR INLET ..... CLOSE & CLEAR
- ► AIR CONDITIONING panel ..... LOCKED
- ► REFUELING CONTROL panel ACCESS DOOR ..... CLOSED & LATCHED
- ► GEAR DOORS ..... CHECK
- ► LANDING GEAR STRUCTURE ..... CHECK
- ► HYDRAULIC LINES ..... CHECK
- ► WHEEL WELL ..... CHECK
- ► UPLOCK ..... OPEN
- ► FREE FALL ASSISTER ..... CHECK
- ► SAFETY PIN ..... REMOVED
- ► WHEELS & TIRES ..... CHECK STATE
- ► BRAKE WEAR DETECTORS ..... CHECK
- ► BRAKE TEMPERATURE SENSORS ..... CHECK
- ► REFUELING POINT ACCESS DOOR ..... CHECK

12) Right aft fuselage*

- ► VHF ANTENNAS ..... CHECK
- ► SERVICE DOOR ..... CHECK
- ► TAIL PROP & TAIL SKID ..... CHECK
- ► OUTFLOW VALVES ..... CHECK
- ► EMERGENCY light ..... CHECK

cont'd... ►►►

cont'd... ►►►

13) Tail

► FLIGHT CONTROLS ACCESS DOOR ..... LOCKED
► VOR ANTENNAS ..... CHECK
► STABILIZER DE ICING BOOTS ..... CHECK STATE
► LOGO lights ..... CHECK
► HORNS ..... CHECK STATE
► STABILIZER, ELEVATORS & TABS ..... CHECK
► STATIC DISCHARGERS ..... CHECK
► FIN, RUDDER & TAB ..... CHECK
► TAIL CONE, NAV lights ..... CHECK
► STROBE lights ..... CHECK STATE
► VORTEX GENERATORS ..... CHECK

14) Left aft fuselage

► WATER SERVICE panel ACCESS DOOR ..... CLOSED
► TOILET SERVICE panel ACCESS DOOR ..... CLOSED
► CABIN DOOR ..... CHECK
► ENTRY EMERGENCY lights ..... CHECK

SIMULATOR NOTE

The walk-around itself is optional in the simulator. What matters is the result, which is set on the EFB **GROUND** page:

- **GROUND EQUIPMENT**: all remove-before-flight items removed (the card turns red while any item is still fitted). Propeller tie-downs and intake covers can only be fitted with the engines off and the propeller stopped.
- **DOORS & CONFIG**: doors as required for boarding and servicing; **TAIL PROP** deployed while loading, stowed before engine start.

The flight control positions can be checked from X-Plane's external views.

NOR.7 COCKPIT PREPARATION (STEP 2)

NOR.7.1 Cockpit Preparation (Step 2)

Ident.: NOR.7.1 — 06 NOV 2026
ALL

Step 2 needs DC power. With the GPU connected, go directly to the overhead panel (NOR.7.2). On battery only, ENG 2 must first be started in hotel mode to supply the aircraft. If refuelling or loading of the rear of the aircraft is planned, consider doing it before ENG 2 is started.

■ No GPU available – start ENG 2 in hotel mode

► FUEL PUMP & FUEL X FEED ..... TEST (first part)

See NOR.31.1. The rest of the test is done after the hotel mode start.

► ENG 2 FIRE ..... TEST

See NOR.30.1.

► ENG 2 ..... START IN HOTEL MODE

See NOR.11.1.

► DC GEN 2 FAULT light ..... CHECK OFF

Check DC BTC on line.

► STICK PUSHER/SHAKER ..... TEST

See NOR.29.2.

► ANN LT ..... TEST

All lights come on (LED test).

NOR.7.2 Overhead Panel

Ident.: NOR.7.2 — 06 NOV 2026
ALL

Scan the overhead panel column by column, from bottom to top and from left to right.

► DOME lights ..... AS RQRD
► STBY COMPASS light ..... CHECK & OFF
► STORM lights ..... CHECK & OFF
► CALLS ATTND ..... CHECK

Normal and emergency calls to and from the cabin (there is no cabin crew in the simulator).

► SELCAL light ..... CHECK OFF
► MIN CAB LT ..... OFF
► FUEL PUMP & FUEL X FEED ..... TEST

See NOR.31.1. GPU case: the full test. Hotel mode case: complete the second part now.

► DOORS ..... TEST

See NOR.31.2.

► SPLR lights ..... CHECK OFF
► TLU sw ..... AUTO & GUARDED
► FLT CTL FAULT light ..... CHECK OFF

cont'd... ►►►

cont'd... ►►►

► LDG GEAR overhead lights ..... CHECK

Three green on, all red off.

► MFC ..... CHECK NO LIGHT

► ENG 1 FIRE panel ..... TEST

See NOR.30.1.

► EXTERNAL lights ..... AS RQRD

► PROP BRAKE ..... ENGAGED

PROP BRAKE ON on the overhead panel and PROP BRK on the EWD.

► ENG START selector ..... OFF & START ABORT

► MAIN ELEC PWR panel / ELEC SD ..... CHECK

► CVR ..... TEST

See NOR.30.4.

► SIGNS ..... ON

Check NO DEVICE and SEAT BELTS shown on the MEMO panel.

► EMER EXIT LT ..... ARM

► DISARM light ..... CHECK OFF

► DE/ANTI ICING lights ..... CHECK OFF

The AFR AIR BLEED FAULT light stays on.

► PROBES HTG ..... OFF

On the ground, the probes are not heated before engine start, to protect the ground crew.

► WINDSHIELD HTG pb ..... ON

► AC WILD ELEC PWR panel / ACW-HYD SD ..... CHECK

► HYD PWR panel / ACW-HYD SD ..... CHECK

Overhead: BLUE and GREEN PUMPS LO PR amber lights on, all other lights off.

SD page: blue and green pumps LO PR amber; FLAPS, SPOILERS, PROP BRAKE, N/W STRG amber; EMER BRK ACCU 3 000 psi; NORM BRAKE and LDG GEAR amber.

► EMER LOC XMTR panel ..... AUTO / NO LIGHT

Switch in AUTO, guarded and lock-wired. Leave it there.

► ANN LT ..... AS RQRD

► AIR BLEED and COMPT TEMP panels ..... CHECK

► RECIRC FAN 1+2 ..... ON

► OVBD VALVE ..... AUTO & GUARDED

► OXYGEN panel / CABIN SD ..... CHECK

Oxygen pressure checked, MAIN SUPPLY ON, PAX SUPPLY in AUTO (if fitted), no light on. On the SD page, the crew supply arrow is green.

► COMPT SMK panel ..... TEST

See NOR.31.3.

► ENG 2 FIRE panel ..... TEST

See NOR.30.1. In hotel mode this test was done before ENG 2 start.

cont'd... ►►►

cont'd... ►►►

NOR.7.3 Pedestal and Central Panels

Ident.: NOR.7.3 — 06 NOV 2026
ALL

► ATPCS STATIC TEST ..... PERFORM

See NOR.30.3.

► MIP / PED / OVHD / FLOOD LT ..... AS RQRD
► ACARS / HF (if installed) ..... CHECK
► TRIMS ..... TEST

See NOR.29.3 (first flight of the day) or NOR.30.2.

► IDLE GATE lever ..... CHECK

IDLE GATE FAIL amber light off, amber band on the lever visible.

► EMER AUDIO CANCEL ..... GUARDED
► GUST LOCK lever ..... ON
► FLAPS lever 0
► VCP – COM, SURV, NAV ..... SET / CHECK

NAV page: ND OVLY / TRAFFIC set to ABOVE.
SURV page: active transponder system 1 on odd days and 2 on even days, set to STBY. TCAS in AUTO.
No flag.

► CDLS (if installed) ..... TEST

See NOR.29.5.

► WX RADAR ..... TEST

See NOR.31.4.
Refer also to NSU.34.3.1 Weather Radar.

► MCDU BRT ..... AS RQRD
► STICK PUSHER/SHAKER pb ..... PRESSED IN & GUARDED
► APM ..... TEST

See NOR.29.6.

► PEC 1+2 ..... PRESSED IN / NO LIGHT
► ENG BOOST FUNCTION ..... TEST

See NOR.29.4.

► PWR MGT ..... TO
► IESI ..... NO FLAG
► EWD ..... CHECK

Flight control window: TRIM, TLU LO SPD and FLAPS indications. Engine instruments: TQ, NP, ITT.

► EEC 1+2 ..... PRESSED IN / NO LIGHT
► ATPCS pb ..... PRESSED IN / NO LIGHT
► DITCH (if installed) ..... GUARDED / NO LIGHT
► CAB PRESS MODE SEL ..... PRESSED IN
► CAB PRESS RATE knob ..... NORM

Index on the green mark, red mark hidden.

cont'd... ►►►

cont'd... ►►►

► AUTO PRESS panel ..... TEST & SET

See NOR.31.5. Set the landing elevation of the destination (QNH) or zero (QFE).

► DESCENT RATE ..... NORM
► AUTO PRESS DUMP ..... GUARDED / NO LIGHT
► ANTISKID ..... PRESSED IN / NO FAULT
► LDG GEAR lever ..... DOWN

Three green on, all red off.

NOR.7.4 Lateral Panels

Ident.: NOR.7.4 — 06 NOV 2026
ALL

Left (CAPT) side first, then the right (F/O) side.

Captain lateral panel

► BRAKE ACCU HYD ..... CHECK
► ELEC (ACW BTC OPNG) ..... GUARDED
► STICK PUSHER/SHAKER ..... TEST

See NOR.29.2. On battery only, do the test after the hotel mode start or with the GPU connected.

► WARN selector ..... NORM FLT
► ELEC IND ..... AS RQRD
► N/W STEERING sw ..... ON & GUARDED
► N/W STEERING handle ..... CHECK
► OXYGEN MASK ..... TEST

See NOR.31.6.

► CONSOLE & READING LT ..... AS RQRD
► AUDIO SEL / CAPT SWITCHING ..... NO LIGHT

No light on the ATT/HDG and ADC pbs.

► GPWS sw ..... NORM & GUARDED
► GPWS ..... NO LIGHT
► TERR pb ..... NO LIGHT & GUARDED
► LOUDSPEAKER ..... AS RQRD

Front panels

► CLOCK ..... CHECK
► TAWS ..... TEST

See NOR.31.7.

► PFD (both) ..... CHECK NO FLAG

FMA shown; airspeed, altitude and vertical speed scales without flag; attitude and heading correct.

► MFD ND (both) ..... CHECK NO FLAG

Compare the heading on the ND and the PFD.

► MFD MEMO ..... CHECK

cont'd... ►►►

cont'd... ►►►

First Officer lateral panel

► MAINTENANCE PANEL ..... CHECK
► EXTRACT AIR FLOW ..... GUARDED
► VIDEO SYSTEM (if installed) ..... CHECK
► OXYGEN MASK, AUDIO SEL, F/O SWITCHING ..... CHECK

As on the Captain side.

NOR.7.5 Short Transit

Ident.: NOR.7.5 — 06 NOV 2026
ALL

On a short transit, the cockpit preparations may be replaced by these minimum checks:

These are the minimum AFM checks that the flight crew must complete before each flight. Operators should build their own "Short transit" procedure, provided that it includes the following items.

► ENG 1 FIRE ..... TEST

See NOR.30.1.

► CVR ..... TEST

See NOR.30.4.

► ENG 2 FIRE ..... TEST

See NOR.30.1.

► ATPCS STATIC TEST ..... PERFORM

See NOR.30.3.

► TRIMS ..... TEST

See NOR.30.2.

NOR.8 PANEL SCAN

NOR.8.1 Panel Scan

Ident.: NOR.8.1 — 28 OCT 2026
ALL

The cockpit panels are scanned in a fixed order, so that nothing is missed:

1. **Overhead panel**, in four columns (left, centre-left, centre-right, right), each from the bottom to the top.
2. **Centre**: from the glareshield, down the centre instrument panel to the pedestal.
3. **Captain side**: from the centre panel across the Captain's instruments to the left lateral panel.
4. **First Officer side**: from the centre panel across the First Officer's instruments to the right lateral panel.

NOR.9 EXTERNAL INSPECTION CLOSURE

NOR.9.1 GPU Available

Ident.: NOR.9.1 — 28 OCT 2026
ALL

► BEACON & WING lights ..... OFF
► LOGO lights ..... AS RQRD
► ANN LT ..... TEST

cont'd... ►►►

cont'd... ►►►

All lights come on, except FUEL LO LVL and the engine gauges.

NOR.9.2 No GPU Available

Ident.: NOR.9.2 06 NOV 2026
ALL

► BAT ..... ON
► MFC ..... MONITOR AUTOTEST

MFC 1A and 2A FAULT lights flash, then 1B and 2B. The test is complete when all are off.
When the cargo door panel is open, only the MFC 1B and 2B FAULT lights flash.

► EMER BUS & ESS BUS ..... CHECK ARROWS ON
► UNDV light ..... CHECK OFF

Check the battery voltage on the CAPT lateral panel.

► AVIONIC INITIALIZATION ..... CHECK

As in NOR.5.2: green "T" on DU 2 and 4, IESI and MCDU 1 on, aurals sound, CPL light and FINAL COCKPIT PREPARATION checklist at the end of the test. Do not touch any control during the test.
Check on EWD that ECL database and documentation revision are consistent.

NOR.10 FINAL COCKPIT PREPARATION (STEP 3)

NOR.10.1 Final Cockpit Preparation (Step 3)

Ident.: NOR.10.1 06 NOV 2026
ALL

Aircraft status

► SEAT AND RUDDER PEDALS ..... ADJUST

Seat locked in position. Full rudder travel available in both directions.
Should be performed when rudder is in neutral position.

► BRAKE HANDLE ..... PARKING
► BRAKE ACCU indicator ..... CHECK

HYD SYST PRESS indicator at 3 000 psi.

► ATIS ..... OBTAIN
► FUEL QTY ..... CONFIRM

Fuel on board at least the required minimum. Fuel tanks balanced.

► ENG FU ..... RESET

Engine fuel used resets automatically when the aircraft has been de-energised.

► TANKS BALANCE ..... CHECK
► ALTIMETERS (PFD and IESI) ..... SET & CHECK

CAPT and IESI altimeters, then F/O altimeter.

► VCP MEMO panel ..... SCAN

No label except NO DEVICE and SEAT BELTS.

► LDG ELV ..... SET

cont'd... ►►►

cont'd... ►►►

Landing field elevation for QNH, zero for QFE.

► PROP BRAKE ..... ON

Checked ON on the overhead panel and the EWD.

► PWR MGT ..... TO

FMS and navigation

► FMS PREP ..... PERFORM

In order: WEIGHT, PERF INIT, FPLN INIT, then the PERF pages. See the FMS pilot's guide. Without the final ZFW, enter a provisional value to be able to complete PERF INIT (CRZ ALT) and FPLN INIT.

► FOB / FUEL QTY ..... CROSSCHECK

► FLIGHT PLAN ..... CROSSCHECK

Compare the FMS route with the planned route, on the MCDU and on the ND in PLAN mode.

► ALT SEL ..... SET

Initial cleared altitude.

► VCP ..... SET

COM frequencies, transponder code, navaids or AUTO tuning for the departure.

► BRG 1 & BRG 2 pb ..... AS RQRD

Do not select the bearings with AUTO tuning in use.

Briefing

► T.O DATA CARD ..... FILL 1ST PART

Weather, limiting weight from the performance computation, acceleration altitude, single-engine flight path.

► T.O DATA CARD ..... READ 1ST PART

► DEPARTURE BRIEFING ..... PERFORM

Aircraft status, takeoff performance, weather, NOTAMs, taxi route, departure procedure and clearance.
And any other applicable information.

► FINAL COCKPIT PREP C/L ..... ORDER / PERFORM

SIMULATOR NOTE

- **Route**: the EFB **SIMBRIEF** page loads the SimBrief route into the FMS (**LOAD ROUTE** → **FMS**).
- **Weights**: with EFB **SETTINGS**, REALISM, LOADSHEET TO FMS set to AUTO, the ZFW and FOB of the applied loadsheet are sent to the MCDU WEIGHT page. A new loadsheet clears T/O CG and T/O TRIM: enter the T/O CG shown in the EFB **WEIGHT & BALANCE** header on the WEIGHT page; the FMS then computes the T/O trim. Enter RESERVE by hand (shown on the EFB SIMBRIEF page). With MANUAL, enter ZFW and FOB by hand as well.

PAGE

INTENTIONALLY

LEFT BLANK

NOR.11 HOTEL MODE START UP

NOR.11.1 Hotel Mode Start Up

Ident.: NOR.11.1 — 06 NOV 2026
ALL

In hotel mode, ENG 2 runs with its propeller held stopped by the propeller brake. It supplies electrical power and air conditioning on the ground, like an APU.

Note

With a tailwind of more than 10 kt, a NAC OVHT alarm can occur.

► SERVICE DOOR ..... CLOSED
► FUEL PUMP 2 ..... ON

RUN light on, FEED LO PR light off. If the tanks are unbalanced, or for a long time in hotel mode, use the fuel crossfeed (Fuel Crossfeed).

► WING lights ..... ON
► PROP BRAKE ..... ON

If the PROP BRAKE sw is OFF: press the HYD AUX PUMP pb (pedestal) to get the green READY light, then set PROP BRAKE ON and check PROP BRK on the EWD.

► RIGHT SIDE AREA ..... CHECK CLEAR
► ENG START selector ..... AS RQRD

To find a hidden failure of one ignition system, alternate the systems: START A & B for the first flight of the day, then A or B on the next starts.

► ENG START 2 pb ..... ON
► TIMING ..... START

To monitor the starter limitations.

► NH ..... MONITOR

■ **When NH reaches 10 %**

► CL 2 ..... FTR

With a high OAT or a high residual ITT, the fuel can be opened later: at 10 % NH for a residual ITT below 100 °C, then 1 % NH later for each 10 °C above 100 °C, but never above 20 % NH.

► TIMING ..... START
► ENGINE PARAMETERS ..... MONITOR

Monitor ITT increase, and the ITT is not exceeded.

► LIGHT UP ..... MONITOR WITHIN 10 s

CAUTION

Set the CL to FUEL S.O. if the ITT may exceed its limit.

■ **When NH reaches 45 %**

► ENG START 2 ON light ..... CHECK OFF
► ITT MAX ..... ANNOUNCE

cont'd... ►►►

cont'd... ►►►

Maximum ITT reached during the start within limits.

► START TIME ..... ANNOUNCE

Start time within the starter limits.

■ When the engine is stabilised at idle (NH 66 % ±2 %)

► DC GEN 2 voltage ..... CHECK

On the CAPT lateral panel.

► ENG START selector ..... OFF & START ABORT
► EXT PWR ..... REQ DISCONNECT
► EXT PWR ..... OFF

GPU disconnected.

► DC GEN 2 FAULT light ..... CHECK OFF
► DC BTC ..... CHECK CLOSED
► BLEED 2 FAULT light ..... CHECK OFF
► X VALVE OPEN light ..... CHECK ON
► PACK 1+2 FAULT lights ..... CHECK OFF
► PL 2 ..... ADJUST AS RQRD

PL 2 may be advanced up to the gust lock stop if necessary (high altitude airfield).

SIMULATOR NOTE

- When the ENG START selector leaves OFF & START ABORT, the ENGINE secondary page is shown on the MFDs (unless an MFD is in ND mode).
- Disconnect the GPU on the EFB **GROUND** page after EXT PWR is set OFF. **RELEASE GPU** in the turnaround sequence unplugs the cables and sends the cart away.
- The start limits (ITT, starter time) are in the LIM part of this manual.

NOR.12 BEFORE PROPELLER ROTATION

NOR.12.1 Before Propeller Rotation

Ident.: NOR.12.1 — 06 NOV 2026
ALL

Loading and takeoff data

► LOAD & TRIM SHEET ..... CHECK
► ZFW / CG ..... INSERT

On the MCDU WEIGHT page.

► GW / FOB / CG / PITCH TRIM ..... CHECK

On the PERF page.

► PITCH TRIM ..... SET

■ If the runway is limiting

► V1, VR, V2 ..... INSERT

The FMS speeds only take the weight into account, for a non-limiting runway in normal or icing conditions. When the runway, obstacles or climb gradients limit the takeoff, enter your own values on the MCDU PERF page.

cont'd... ►►►

cont'd... ►►►

► V1, VR, V2 ..... CHECK
► BOOST FUNCTION ..... AS RQRD
► CONFIRM T.O DATA ..... SELECT

Choose normal or icing conditions.

► T.O DATA CONFIRMED ..... CHECK

The blue TO torque index and the magenta TO trim index appear on the EWD. If the TAT and the reported temperature disagree, enter the ground SAT for the TO torque bug computation.

► GW / PITCH TRIM (CAPT) ..... LOADSHEET COMPARE
► T.O DATA CARD ..... FILL 2ND PART

Takeoff weight, speeds and trim setting.

► ALL TRIMS ..... CHECK

Pitch trim at the computed value; rudder and roll trims at neutral.

Boarding and doors

► HARNESS ..... FASTEN & ADJUST

■ **When passengers are on board and cargo is loaded**

► SEAT BELTS ..... ON
► DOORS ..... CLOSED

Doors locked indication checked on the overhead panel.

► START UP CLEARANCE ..... OBTAIN
► BEACON lights ..... ON
► GROUND CLEARANCE ..... OBTAIN

■ **If a pushback is planned**

► NOSE WHEEL STEERING ..... OFF

Agree the pushback with the ground crew before the propellers turn. See Pushback Operations.

► BEFORE PROP ROTATION C/L ..... PERFORM

SIMULATOR NOTE

- Boarding, fuelling and loading are run on the EFB **GROUND** page (**BOARDING**, or the FULL TURNAROUND sequence). The doors and the **TAIL PROP** are set in **DOORS & CONFIG**: stow the tail prop and close all doors before the propellers turn.
- The EFB **PERFORMANCE** page computes the takeoff speeds and **TRANSFER** sends them to the MCDU.
- Pushback: use the X-Plane pushback or any third-party pushback tool; all of them work with this aircraft.
- There is no cabin crew report.

NOR.13 BEFORE TAXI

NOR.13.1 Before Taxi

Ident.: NOR.13.1 — 06 NOV 2026 — ALL

Propeller 2 release

► RIGHT SIDE AREA ..... CHECK CLEAR

cont'd... ►►►

cont'd... ►►►

► HYD AUX PUMP pb ..... PRESS
► XPDR ..... AS RQRD

STBY or ON, as the airport requires.

► PROP BRAKE READY light ..... ON
► PROP BRAKE ..... OFF
► PROP BRK blue light ..... CHECK OFF

UNLOCK flashes then goes off on the overhead panel, PROP BRK goes off on the EWD.

■ When NP 2 is stable at about 15 %

► CL 2 ..... AUTO

TQ indications are not reliable while the CL is in FTR.

► PEC SGL CH ..... CHECK

Comes on for a few seconds, then off.

► LO PITCH ..... CHECK DISPLAYED

■ When NP 2 is stable at about 71 %

► ACW GEN 2 FAULT light ..... CHECK OFF
► ACW BTC ..... CHECK CLOSED

ACW GEN 2 supplies both AC WILD buses.

► HYD SYST PRESS ..... CHECK

3 000 psi on each system (ACW-HYD SD page).

► PROBES HTG ..... ON
► ANTI ICING ..... AS RQRD
► ANTISKID ..... TEST

See Antiskid Test. Press ANTISKID TEST then check on alerting window WHEEL A-SKID TEST CYAN and below FFFF AMBER for a few seconds then NNNN GREEN at the end of the test.

► FLAPS 15

Monitor the extension.

Engine 1 start

► FUEL PUMP 1 ..... ON

RUN light on, FEED LO PR light off.

► ENG 1 ..... START

Same procedure as ENG 2 (NOR.11.1), with ENG START 1 pb.

Note

- *DC GEN 2 FAULT can come on during the ENG 1 cross-start in cold weather. The start continues on the battery with DU 1, 3 and 5 temporarily lost; the EWD and the ENGINE page stay available on DU 2 and DU 4. The DUs come back after the start; then reset DC GEN 2.*

■ When NP 1 is stable at about 15 %

► ENG START selector ..... OFF & START ABORT
► DC GEN 1 FAULT light ..... CHECK OFF

cont'd... ►►►

cont'd... ►►►

► DC BTC ..... CHECK OPEN
► BLEED 1 FAULT light ..... CHECK OFF
► X VALVE OPEN light ..... CHECK OFF

Both engines running and the propeller brake released: the GRD X FEED valve closes automatically.

► CL 1 ..... AUTO
► PEC SGL CH ..... CHECK
► LO PITCH ..... CHECK DISPLAYED

■ When NP 1 is stable at about 71 %

► ACW GEN 1 FAULT light ..... CHECK OFF
► ACW BTC ..... CHECK OPEN

Each ACW generator now supplies its own bus.

► COCKPIT COM HATCH ..... CLOSE
► FWS ..... RCL

No alert should remain.

► OVHD panel lights ..... CHECK OFF

Except AVIONICS VENT EXHAUST MODE, which can stay on for 2 min.

► N/W STEERING ..... ON

If it was set OFF for the pushback.

Both engines running

► RTO TQ ..... CHECK

The RTO target torque is shown in amber on the EWD. See PER for the reserve takeoff torque.

■ If ATC clearance is available

► ATC CLEARANCE ..... OBTAIN
► XPDR ..... SET

Code set; ON or STBY as the airport requires.

► FMS / NAVAIDS ..... CHECK / AMEND

The FMS route and the navaids agree with the clearance. Carefully confirm that ATC clearance match with FMS insertions. Based on departure clearance amend or check as necessary the preset departure.

► ALT SEL ..... CHECK / AMEND
► FGCP ..... SET

NAV source, HDG or NAV, IAS. Coupling (CPL) on the pilot flying side.

► SPD TARGET (ICP) ..... AUTO
► TCAS ..... ABOVE

TCAS ABOVE shown on the PFD.

► BEFORE TAXI C/L ..... PERFORM

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

- Wheel chocks are removed on the EFB **GROUND** page before taxi.
- There is no air bleed GRD X FEED pushbutton: the bleed crossfeed valve (X VALVE) is automatic. On the ground it closes once both engines run with the propeller brake released, and in flight it is always closed.

■ Operation without the propeller brake (no hotel mode)

Close all doors and do the Before Propeller Rotation procedure first. The GPU is highly recommended. Start ENG 1 first, so that the GPU can be disconnected safely on the right side, then ENG 2. See Operations Without Use Of Propeller Brake.

NOR.14 TAXI

NOR.14.1 Taxi

Ident.: NOR.14.1 — 06 NOV 2026
ALL

Ready to taxi

Note

For power back, refer to Powerback Operations.

► TAXI CLEARANCE ..... OBTAIN
► OUTSIDE AREA ..... CHECK CLEAR
► TAXI & T.O lights ..... ON
► BLOCK TIME (CAPT) ..... ANNOUNCE
► BLOCK TIME ..... NOTE
► ELAPSED TIME ..... ON

On the taxiway

► BRAKES ..... CHECK

As soon as the aircraft moves, press the pedals: it must slow down evenly, without pulling to one side.

► BRAKE HANDLE ..... EMER / CHECK

Check the emergency brakes act evenly. Their pressure is lower than with normal braking: the aircraft may not stop at once. Then release.

Note

Taxi at or below GI power. Braking with the PLs at FI may cause a WHEELS BRK HOT alert and wears the brakes.

► INSTRUMENTS ..... CHECK

Compare headings, bearings, PFDs and slip indicators.

■ If the ATC clearance was not obtained before taxi

► ATC CLEARANCE ..... OBTAIN
► XPDR ..... SET
► FMS / NAVAIDS ..... CHECK / AMEND
► ALT SEL ..... CHECK / AMEND

cont'd... ►►►

cont'd... ►►►

► T.O CONFIG TEST ..... PERFORM

T.O CONFIG TEST OK shown in the alerting window.

► FMA (CAPT) ..... READ
► FMA (F/O) ..... CHECK
► T.O BRIEFING ..... PERFORM

Changes since the departure briefing (runway, SID). Review the call-outs and actions for a failure before and after V1. Refer to ABORTED TAKEOFF.

► TAXI C/L ..... PERFORM

NOR.15 BEFORE TAKEOFF

NOR.15.1 Before Takeoff

Ident.: NOR.15.1 — 06 NOV 2026
ALL

► GUST LOCK lever ..... OFF
► FLT CTL ..... CHECK

Rudder pedals, control wheel and control column to full travel in both directions: free movement, correct surface movement, spoiler activation (SPLR lights on the overhead panel).

► XPDR ..... ALT

XPDR 1 or 2 shown green on the PFD.

► WX RADAR ..... AS RQRD

To use the radar on the ground, press STAB 4 times within 3 s.

► DU CONFIGURATION ..... CHECK

PF: MFD = ND / NAV, MCDU = PERF TAKEOFF page. PM: MFD = ND / COM, MCDU = FPLN page.

► TAKEOFF SPEEDS ..... CHECK

V1, VR, V2 agree with the takeoff data. They can change after an annunciator light test, an icing test, a spurious ice detection, or a large TAT change.

Before entering the runway

► LINE UP CLEARANCE ..... OBTAIN
► EXT LT ..... ON

Strobe and landing lights.

► AIR FLOW ..... NORM
► ENG BLEED ..... AS RQRD

OFF only if required by the takeoff performance.

► OVERHEAD PANEL ..... SCAN
► RUDDER CAM ..... CENTER

Rudder pedals neutral and rudder trim at zero (rudder trim index centred on the EWD). The rudder cam (releasable centering unit) re-engages at the trim position each time the rudder trim switches are released, so it must be centred with the pedals neutral before takeoff.

► LATERAL FD BARS ..... CENTER

cont'd... ►►►

cont'd... ►►►

Heading bug on the runway heading; if not, push the HDG knob to synchronise.

► BEFORE T.O C/L ..... PERFORM

NOR.16 TAKEOFF

NOR.16.1 Takeoff

Ident.: NOR.16.1 — 06 NOV 2026
ALL

Cleared and ready for takeoff

► FMA (CAPT) ..... READ
► FMA (F/O) ..... CHECK
► N/W STEERING handle (CAPT) ..... HAND ON
► CONTROL WHEEL (F/O) ..... INTO WIND
► TAKEOFF (CAPT) ..... ANNOUNCE
► BRAKES (CAPT) ..... RELEASE
► PL 1+2 (CAPT) ..... ADVANCE TO THE NOTCH
► PL 1+2 (F/O) ..... CONFIRM IN THE NOTCH

■ If the takeoff is made at RTO

► PL 1+2 (CAPT) ..... ADVANCE TO THE RAMP
► PL 1+2 (F/O) ..... ADJUST
► TO INHIB (F/O) ..... CHECK
► ATPCS ARM light ..... COMES ON

Reject the takeoff if the ATPCS ARM light is not on and steady.

► ATPCS ARM (F/O) ..... ANNOUNCE
► ENGINE PARAMETERS (F/O) ..... MONITOR

The takeoff torque must be reached by 70 kt IAS at the latest, otherwise reject the takeoff. NP 100 % (−0.6 % / +0.8 %). ITT within limits, TQ at expected takeoff value.

► POWER SET (F/O) ..... ANNOUNCE

SIMULATOR NOTE

On the aircraft the CAPT keeps one hand on the steering handle until 70 kt and on the power levers until V1, and the F/O adjusts and monitors the power. Alone, set the power, check it, then take the controls.

At 70 kt

► 70 KNOTS (F/O) ..... ANNOUNCE
► CAPT IAS ..... CROSSCHECK

Both PFDs and the IESI agree.

► N/W STEERING handle (CAPT) ..... RELEASE

Steer with the rudder from now on.

■ If CAPT is PF

► I HAVE CONTROL (CAPT) ..... ANNOUNCE

■ If F/O is PF

► YOU HAVE CONTROL (CAPT) ..... ANNOUNCE
► I HAVE CONTROL (F/O) ..... ANNOUNCE

cont'd... ►►►

cont'd... ►►►

At V1

► V1 (PM) ..... ANNOUNCE
► PL 1+2 (CAPT) ..... RELEASE

From V1 the takeoff is continued; hands off the power levers.

At VR

► ROTATE (PM) ..... ANNOUNCE

When V1 = VR announce V1/ROTATE.

► PITCH (PF) ..... ROTATE SMOOTHLY

Follow the FD bars.

After lift-off

► POSITIVE CLIMB (PM) ..... ANNOUNCE
► GEAR UP (PF) ..... ORDER
► LDG GEAR lever (PM) ..... UP

All gear lights off, including on the overhead panel.

► YAW DAMPER (PM) ..... ENGAGE

Two green arrows on the FMA.

► TAXI & T.O lights (PM) ..... OFF

■ If the takeoff was made at RTO – at 400 ft AGL

► PL 1+2 (PF) ..... RETARD TO THE NOTCH

NOR.17 AFTER TAKEOFF

NOR.17.1 After Takeoff

Ident.: NOR.17.1 — 06 NOV 2026
ALL

Passing the acceleration altitude

► CLIMB PROCEDURE (PF) ..... ORDER
► PL 1+2 (PF) ..... CONFIRM IN THE NOTCH
► PWR MGT (PM) ..... CLB
► NP (PM) ..... CHECK 82 %
► IAS 170 kt (PF) ..... ANNOUNCE
► SPEED BUG (PM) ..... CHECK 170 kt

■ If climbing at a high rate is needed

► IAS (PF) ..... ORDER VALUE
► SPEED BUG (PM) ..... SET
► SPD TGT selector (PM) ..... MAN SEL
► SPD TGT (PM) ..... SET VALUE

■ If the takeoff was made with the bleeds OFF

► ENG BLEED 1+2 ..... ON

cont'd... ►►►

cont'd... ►►►

The PACK 2 VALVE FAULT light comes on for 6 s: the pack is opened with a delay to avoid a pressure bump in the cabin.

Passing the F speed (VmLB0)

► FLAPS 0 (PF) ..... ORDER
► FLAPS (PM) ..... SELECT 0

Check FLAPS 0 indicated. Announce FLAPS 0 when indicated.

Reaching the transition altitude

► ALTIMETERS ..... STD
► ALTIMETERS ..... CROSSCHECK
► AFTER TAKEOFF C/L (PF) ..... ORDER
► AFTER TAKEOFF C/L (PM) ..... PERFORM

SIMULATOR NOTE

Single pilot, engage the autopilot early to keep your hands free for the after takeoff actions — not below 100 ft above the ground.

NOR.18 CLIMB – CRUISE

NOR.18.1 Climb – Cruise

Ident.: NOR.18.1 — 06 NOV 2026
ALL

Climbing through FL 100

► LDG lights ..... OFF
► SEAT BELTS ..... AS RQRD
► PRESSURIZATION ..... MONITOR

ΔP, cabin altitude and cabin rate on the SD page.

Approaching cruise level

► SAT ..... CHECK
► DELTA ISA ..... COMPUTE

At cruise level

► CRUISE PARAMETERS (PM) ..... ANNOUNCE
► SPEED BUG ..... CHECK

The computed reference cruise speed helps to see the drag of ice accretion: the aircraft cruises slower than expected.

► TQ BUGS ..... CHECK

Reaching cruise speed

► PWR MGT ..... CRZ
► CRUISE PARAMETERS ..... MONITOR

TQ, FF, IAS and TAS as expected.

cont'd... ►►►

cont'd... ►►►

During cruise

► SYSTEMS ..... MONITOR PERIODICALLY
► TOP OF DESCENT (PF) ..... COMPUTE
► FUEL (PM) ..... COMPUTE

Remaining fuel and holding time.

► FUEL ..... MONITOR

Fuel remaining, holding time available.

► LDG WEIGHT (PM) ..... COMPUTE
► FMS PREDICTIONS (PM) ..... CHECK

Next waypoint, destination ETA, top of descent, destination RAIM and EFOB (MCDU PROG page).

NOR.19 DESCENT

NOR.19.1 Descent

Ident.: NOR.19.1 — 06 NOV 2026
ALL

Before descent

► ATIS ..... OBTAIN
► FWS ..... RCL

Review the aircraft status.

► LDG DATA CARD (PM) ..... FILL
► LDG DATA CARD (PF) ..... READ
► IESI ..... SET QNH

Crosscheck the QNH by all available means.

► FMS LDG DATA ..... INSERT

Approach wind, QNH and temperature on the MCDU PERF and VNAV pages.

► LDG ELEVATION ..... CHECK
► LDG SPEEDS ..... CHECK

On the PERF page.

► NAVAIDS & FMS ..... SET

Arrival and approach in the FMS, navaids for the approach. See the FMS pilot's guide.

► DH / MDA ..... SET
► TCAS ..... BELOW
► ARRIVAL BRIEFING ..... PERFORM

Destination and alternate weather, MSA, approach procedure, DH or MDA, missed approach and extra fuel.

Approaching top of descent

► DESCENT CLEARANCE ..... OBTAIN
► ASSIGNED ALTITUDE (PF) ..... SELECT
► SPEED BUG (PF) ..... ANNOUNCE
► SPEED BUG (PM) ..... CHECK

cont'd... ►►►

cont'd... ►►►

► DESCENT C/L (PF) ..... ORDER
► DESCENT C/L (PM) ..... PERFORM
► DESCENT (PF) ..... INITIATE
► SD pages ..... CHECK

All systems, engine parameters and pressurization.

► SEAT BELTS ..... ON

Crossing FL 100

► LDG lights ..... ON
► PRESSURIZATION ..... CHECK

NOR.20 APPROACH

NOR.20.1 Approach

Ident.: NOR.20.1 — 06 NOV 2026
ALL

Cleared to an altitude, at the latest at the transition level

► ALTIMETERS ..... SET QNH

Crosscheck the QNH by all available means.

► ALTIMETERS ..... CROSSCHECK
► PRESSURIZATION (PM) ..... MONITOR
► APPROACH C/L (PF) ..... ORDER
► APPROACH C/L (PM) ..... PERFORM

NOR.21 BEFORE LANDING

NOR.21.1 Before Landing

Ident.: NOR.21.1 — 06 NOV 2026
ALL

At the deceleration point

► PL 1+2 ..... RETARD AS RQRD

At the appropriate speed

► FLAPS 15 (PF) ..... ORDER
► FLAPS (PM) 15

Check FLAPS 15 indicated. Announce FLAPS 15 when indicated.

At the appropriate speed

► LDG GEAR DOWN (PF) ..... ORDER
► LDG GEAR (PM) ..... DOWN
► TLU LO SPEED label ..... CHECK DISPLAYED
► PWR MGT ..... TO
► TAXI & T.O lights ..... ON
► LDG GEAR ..... MONITOR

cont'd... ►►►

cont'd... ►►►

Three green: gear down and locked. Announce Gear when locked.

► ICING AOA ..... AS RQRD

ICING AOA must stay ON for a landing in icing conditions. Set it OFF for a normal landing only when the aircraft is clean and out of icing conditions. Refer to ADVERSE WEATHER.

At the appropriate speed

► FLAPS 30 (PF) ..... ORDER
► FLAPS (PM) 30

Check FLAPS 30 indicated. Announce FLAPS 30 when indicated.

► BEFORE LDG C/L (PF) ..... ORDER
► BEFORE LDG C/L (PM) ..... PERFORM

Note

In turbulence, set the CL to 100% OVRD to help hold the approach speed. At low speed and low power, NP can stay below 100 % even with the CL at 100% OVRD.

NOR.22 LANDING

NOR.22.1 Landing

Ident.: NOR.22.1 — 06 NOV 2026
ALL

At DH or MDA + 100 ft

► HUNDRED ABOVE (PM) ..... ANNOUNCE

At DH or MDA

► MINIMUM (PM) ..... ANNOUNCE

■ If the visual references are acquired

► VISUAL REF (PF) ..... ANNOUNCE
► APPROACH (PF) ..... CONTINUE

■ If the visual references are not acquired

► GO-AROUND (PF) ..... ORDER & INITIATE

"Go-around, set power, flaps one notch" – see Go-Around.

► AP (PF) ..... DISCONNECT & ANNOUNCE
► CAVALRY CHARGE (PF) ..... CANCEL

Press the AP disconnect pb a second time.

► YD DISENGAGEMENT (PF) ..... ORDER
► YD (PM) ..... DISENGAGE & ANNOUNCE
► AFCS YD alarm (PM) ..... CLEAR

At 50 ft and 20 ft AAL

► 50 FT AAL (PM) ..... ANNOUNCE

If no automatic call-out.

cont'd... ►►►

cont'd... ►►►

► 20 FT AAL (PM) ..... ANNOUNCE

If no automatic call-out.

► PL 1+2 (PF) ..... FI

► FLARE (PF) ..... PERFORM

On the ground

► BRAKES ..... AS RQRD

Start and strength of braking adapted to the landing conditions, the performance and the brake energy limits.

■ **At nose gear touchdown**

► IDLE GATE (PM) ..... CHECK RETRACTED

Pull it if it does not retract by itself.

► PL 1+2 (PF) ..... GI

Both LO PITCH must be shown before reverse is used.

► LO PITCH (PM) ..... CHECK & ANNOUNCE

ENG	LO PITCH	ANNOUNCE	REVERSE
2 ENG	2	TWO LOW PITCH	NORMAL USE
2 ENG	1	NO REVERSE	NO REVERSE
2 ENG	0	NO REVERSE	NO REVERSE
1 ENG	1	ONE LOW PITCH	USE WITH CARE

► REVERSE (PF) ..... AS RQRD

Reverse is less effective as speed decreases. Bring the PLs back to GI before 40 kt, to avoid ingestion and a pitch disconnect.

Passing 70 kt

► 70 KT (F/O) ..... ANNOUNCE

► I HAVE CONTROL (CAPT) ..... ANNOUNCE

► N/W STEERING handle (CAPT) ..... CONTROL

► CONTROL WHEEL (F/O) ..... INTO WIND

NOR.23 GO-AROUND

NOR.23.1 Go-Around

Ident.: NOR.23.1 — 06 NOV 2026
ALL

► GO-AROUND (PF) ..... ORDER & INITIATE

Announce "Go-around, set power, flaps one notch".

Then, at the same time:

► GA pb on the PLs (PF) ..... PRESS

► PL 1+2 (PF) ..... ADVANCE TO THE RAMP

► PITCH (PF) ..... ROTATE TO GA PITCH

Follow the FD bars and accelerate to the go-around speed.

cont'd... ►►►

cont'd... ►►►

► FLAPS (PM) ..... RETRACT ONE NOTCH

CAUTION

Adjust the go-around torque to avoid an overtorque.

► PL 1+2 (PM) ..... CHECK

GA torque and NP 100 %.

► FLAPS (PM) ..... ANNOUNCE POSITION

► FMA (PF) ..... CHECK

Go-around mode engaged.

► FMA (PM) ..... CHECK

Go-around mode engaged. Keep the NAV source used for the approach.

► CAVALRY CHARGE (PF) ..... CANCEL

Positive climb

► POSITIVE CLIMB (PM) ..... ANNOUNCE

► GEAR UP (PF) ..... ORDER

► LDG GEAR lever (PM) ..... UP

► YAW DAMPER (PM) ..... CONFIRM ENGAGED

Green arrows on.

► TAXI & T.O lights (PM) ..... OFF

► LDG GEAR (PM) ..... MONITOR RETRACTION

Check retraction sequence.

► FGCP (PM) ..... SET

Lateral: LNAV engaged, if not press HDG. Vertical: press IAS.

► FMA (PF) ..... CHECK

► FMA (PM) ..... CHECK

When the workload allows, adjust the NAV source and the lateral mode (HDG or NAV) as required. Vertical setting: IAS.

Passing the acceleration altitude

Apply the after takeoff procedure (NOR.17.1).

NOR.24 AFTER LANDING

NOR.24.1 After Landing

Ident.: NOR.24.1 — 06 NOV 2026
ALL

Runway vacated

Note

Taxi at GI power. Braking with the PLs at FI may cause a WHEELS BRK HOT alert and wears the brakes.

► LAND & STROBE lights ..... OFF
► FLAPS 0
► GUST LOCK lever ..... ON

Pull the control column back to lock the ailerons and elevator.

► FLIGHT CONTROLS ..... CHECK LOCKED
► XPDR ..... AS RQRD
► ALL TRIMS ..... RESET
► WX RADAR ..... STBY
► FGCP ..... STBY
► DE/ANTI ICING ..... OFF
► PROBES HTG ..... OFF
► AFTER LDG C/L ..... PERFORM

■ If last flight of the day

► ATPCS DYNAMIC TEST ..... PERFORM

See NOR.29.1. Not while taxiing. The test may instead be done before the next flight, if the 10 min delay between tests, or between the test and takeoff, is respected.

After 2 min below FI – ENG 1 shutdown

Note

Single-engine taxi is not recommended on a contaminated taxiway or apron.

► CL 1 ..... FTR

Leave it at least 30 s in feather, to avoid a feathering pump cycle.

► TIMING ..... START
► ACW BTC ..... CHECK CLOSED
► HYD SYST PRESS ..... MONITOR

On the HYD SD page, to detect a loss of brake pressure.

■ After 30 s

► FEATHERING ..... ANNOUNCE
► CL 1 ..... FUEL S.O.

cont'd... ►►►

cont'd... ►►►

Move the CL briskly: an ENG 1 OUT alert can appear if it is moved slowly from FTR to FUEL S.O. It goes off once the CL is at FUEL S.O.

► DC BTC ..... CHECK CLOSED

Note

Without the propeller brake (no hotel mode at the stand), shut down ENG 2 instead of ENG 1 after landing: the GPU and refuelling connections are on the right side.

NOR.25 PARKING

NOR.25.1 Parking

Ident.: NOR.25.1 — 28 OCT 2026
ALL

Before the last turn into the parking position

► HYD SYST PRESS ..... CHECK

Aircraft stopped at the parking position

► BRAKE HANDLE ..... PARKING
► SEAT BELTS ..... OFF
► XPDR ..... STBY
► TAXI & T.O lights ..... OFF

With a marshaller in sight, switch it off after the HYD SYST PRESS check so as not to dazzle the marshaller.

► CL 2 ..... FTR
► NP ..... CHECK BELOW 15 %
► PROP BRK READY light ..... CHECK ON
► PROP BRAKE ..... ON

UNLOCK comes on, then off.

► PROP BRK blue light ..... CHECK ON
► PROP 2 ..... CHECK STOPPED

Both propellers stopped

► BEACON lights ..... OFF
► CABIN ΔP ..... CHECK

Open the cockpit communication hatch. The cabin ΔP must be below 0.15 psi before the doors are opened.

► PAX DOOR ..... OPEN
► TAIL PROP ..... DEPLOY
► PARKING C/L ..... PERFORM

■ If external power is available

► EXT PWR ..... CHECK AVAIL LIGHT
► EXT PWR pb ..... PRESS

The voltage can be read on the CAPT lateral panel.

► CL 2 ..... FUEL S.O.

cont'd... ►►►

cont'd... ►►►

ENG 2 must have been in feather for at least 30 s. Move the CL briskly to avoid a spurious ENG 2 OUT alert.

► WING lights ..... OFF

Unloading completed

► CDLS ..... OFF

SIMULATOR NOTE

On the EFB **GROUND** page: set the chocks, call the GPU and plug in the DC cable, open the doors and deploy the **TAIL PROP**. The FULL TURNAROUND sequence does these in order (chocks and GPU, doors, deplaning, fuelling and boarding, closing up, GPU release).

NOR.26 LEAVING THE AIRCRAFT

NOR.26.1 Leaving the Aircraft

Ident.: NOR.26.1 — 06 NOV 2026
ALL

► OXYGEN MAIN SUPPLY ..... OFF
► WINDSHIELD HTG pb ..... OFF
► EMER EXIT LT ..... DISARM
► LOGO lights ..... OFF
► WX RADAR ..... OFF

■ If the GPU is available

► FUEL PUMPS 1+2 ..... OFF (at NH = 0 %)
► EXT PWR ..... OFF
► BAT ..... OFF

■ If the GPU is not available (ENG 2 in hotel mode)

► FUEL PUMP 1 ..... OFF (at NH = 0 %)
► CL 2 ..... FUEL S.O.
► WING lights ..... OFF
► FUEL PUMP 2 ..... OFF
► BAT ..... OFF

► BRAKE HANDLE ..... AS RQRD

In cold weather, see the cold weather procedures before leaving the parking brake set: At Parking - Before Leaving the Aircraft.

► LEAVING AIRCRAFT C/L ..... PERFORM

SIMULATOR NOTE

The EFB **GROUND** page **COLD & DARK** preset sets the whole aircraft to the secured state in one step. Fit the remove-before-flight items (**FIT ALL RBF**) if you want the aircraft to look parked for the night.

cont'd... ►►►

cont'd... ►►►

NOR.27 PROCEDURE FOR ICING CONDITIONS

NOR.27.1 Procedure for Icing Conditions

Ident.: NOR.27.1 — 06 NOV 2026
ALL

In icing conditions, keeping the airspeed is the first priority.

► IAS ..... AT OR ABOVE ICING BUG

Keep at least VmLB0 ICING.

► ANTI ICING systems ..... ON

The ICING AOA light also comes on: the stall warning and stick pusher now trigger at lower angles of attack.

► ICE ACCRETION ..... MONITOR

■ When ice accretion is seen or detected

► DE ICING systems ..... ON
► IAS (FLAPS 0) ..... ICING BUG + 10 kt MIN
► IAS & V/S ..... MONITOR

A loss of performance from ice shows as a lower V/S in climb and a lower IAS in cruise. See CLIMB and, for the cruise in icing conditions, PER.

Note

The severe icing indications are given in Severe Icing Conditions.

■ If any sign of severe icing

► SEVERE ICING procedure (E99.08) ..... APPLY

Keep the aircraft performance above the limits given for severe icing detection. These limits are not targets: if the performance degrades toward them, apply the SEVERE ICING emergency procedure.

■ When leaving icing conditions

► ANTI ICING & DE ICING ..... OFF AS RQRD

They may be kept on, for example when you expect to enter icing conditions again.

■ When the aircraft is visually clear of ice

The aircraft is clear of ice when the ice evidence probe (IEP) is clear.

► ICING AOA pb ..... OFF

The stall protection thresholds return to the normal values.

► NORMAL SPEEDS ..... USE

NOR.28 CRUISE SPEED LOW

NOR.28.1 Alert

Ident.: NOR.28.1 — 06 NOV 2026
ALL

CONDITION	VISUAL	AURAL
In cruise, abnormal drag increase: the speed drops more than 10 kt below the expected	CRZ SPD LO on the	–

cont'd... ►►►

cont'd... ►►►

CONDITION	VISUAL	AURAL
cruise speed	FMA	

The thresholds of the Aircraft Performance Monitoring (APM) messages are given in In Flight Icing Conditions, APM.

NOR.28.2 Cruise Speed Low

Ident.: NOR.28.2 — 28 OCT 2026
ALL

► ICING CONDITIONS ..... MONITOR
► SPEED ..... MONITOR

NOR.28.3 Additional Information

Ident.: NOR.28.3 — 06 NOV 2026
ALL

The message tells you in cruise that the speed is decreasing because of an abnormal drag increase, typically ice accretion.

SIMULATOR NOTE

How the simulated APM sets CRZ SPD LO is described in the simulator note of the APM paragraph in In Flight Icing Conditions.

PAGE

INTENTIONALLY

LEFT BLANK

NOR.29 MANDATORY DAILY CHECKS

NOR.29.1 ATPCS Dynamic Test

Ident.: NOR.29.1 — 06 NOV 2026
ALL

Done with the engines running, after the last flight of the day (or before the first one).

CAUTION

Do not do this test while taxiing: the ACW power, and with it both main hydraulic pumps, is lost for a moment during the test.

Note

To protect the feathering pumps, wait 10 min between this test and takeoff, and between two ATPCS tests (static or dynamic).

Initial setting

► PL 1+2 ..... GI
► CL 1+2 ..... AUTO
► ATPCS pb ..... NO LIGHT
► PWR MGT ..... TO

Engine 1

► ATPCS TEST selector ..... HOLD ON LEFT ARM
  ► ATPCS ARM light ..... CHECK ON
  ► TQ ..... INCREASES
  ► NP & NH ..... DECREASE
► ATPCS TEST selector ..... HOLD ON ENG 1
  ► ENG 2 ..... UPTRIM

TQ 2 unchanged, NP 2 and NH 2 increase slightly.

  ► TQ 1 ..... DECREASES BELOW 18 %

■ After 2.15 s

  ► ATPCS ARM light ..... CHECK OFF
  ► ENG 1 ..... AUTO FEATHER

NP 1 decreases below 20 %. ENG 1 OUT and NO REV shown on the EWD.

► ATPCS TEST selector ..... RELEASE TO NEUTRAL
  ► ENG 1 ..... UNFEATHERS

Engine 2

■ When ENG 1+2 are back to normal idle values

► ATPCS TEST selector ..... HOLD ON RIGHT ARM
  ► ATPCS ARM light ..... CHECK ON
  ► TQ ..... INCREASES
  ► NP & NH ..... DECREASE

cont'd... ►►►

cont'd... ►►►

► ATPCS TEST selector ..... HOLD ON ENG 2
► ENG 1 ..... UPTRIM

TQ 1 unchanged, NP 1 and NH 1 increase slightly.

► TQ 2 ..... DECREASES BELOW 18 %

■ **After 2.15 s**

► ATPCS ARM light ..... CHECK OFF
► ENG 2 ..... AUTO FEATHER

NP 2 decreases below 20 %. ENG 2 OUT and NO REV shown on the EWD.

► ATPCS TEST selector ..... RELEASE TO NEUTRAL
► ENG 2 ..... UNFEATHERS

NOR.29.2 Stick Pusher-Shaker Test

Ident.: NOR.29.2 — 30 OCT 2026
ALL

► GUST LOCK ..... RELEASE

If the propeller brake is still engaged, the PROP BRK warning comes on (red PROP BRK on the EWD, MW flashing, CRC). Keep the PLs below FI to avoid an overtorque.

► CONTROL COLUMN ..... NOSE DOWN
► WARN selector ..... STICK PUSHER

On the CAPT lateral (maintenance) panel.

► TEST pb ..... PRESS & HOLD
► CRICKET ..... SOUNDS
► STICK SHAKER ..... OPERATES

■ **After 10 s**

► CHAN 1 & CHAN 2 lights ..... CHECK ON
► STICK PUSHER on both FMA ..... CHECK DISPLAYED
► STICK PUSHER ..... OPERATES
► TEST pb ..... RELEASE
► WARN selector ..... NORM FLT
► GUST LOCK ..... ENGAGE
► CONTROL COLUMN ..... LOCKED NOSE UP

NOR.29.3 Trims

Ident.: NOR.29.3 — 30 OCT 2026
ALL

► PITCH, ROLL & YAW TRIMS ..... CHECK

Press both halves of each trim switch together: the trim runs over its full travel in both directions. Then press each half alone for a few seconds: the trim must not move.

► TRIM INDICATORS ..... CHECK
► WHOOLER (pitch trim) ..... SOUNDS
► STBY PITCH TRIM ..... CHECK
► TRIM INDICATOR ..... CHECK
► WHOOLER ..... SOUNDS

cont'd... ►►►

cont'd... ►►►

► STBY PITCH TRIM sw ..... GUARDED & OFF
► TRIMS ..... RESET FOR TAKEOFF
► TRIM INDICATORS ..... CHECK

NOR.29.4 ENG Boost Function Test

Ident.: NOR.29.4 — 30 OCT 2026
ALL

Can be done with one or both engines running, or with both engines shut down.

► PL 1+2 ..... GI
► EEC 1+2 ..... PRESSED IN / NO LIGHT
► ENG BOOST pb ..... PRESS

■ **After 5 s**

► ON light ..... CHECK ON
► FAULT light ..... CHECK OFF
► ENG BOOST pb ..... RELEASE
► ON and FAULT lights ..... CHECK OFF

NOR.29.5 Cockpit Door Security System Check

Ident.: NOR.29.5 — 06 NOV 2026
ALL

► COCKPIT DOOR ..... CLOSED
► FAULT light ..... COMES ON
► CDLS sw ..... ON
► FAULT light ..... GOES OFF

Emergency request

► EMER pb (DOOR CALL panel, cargo side) ..... PRESS
► OPEN light (DOOR CALL panel) ..... FLASHES
► BUZZER (cockpit) ..... SOUNDS
► OPEN light (COCKPIT DOOR panel) ..... FLASHES

Denied access

► TOGGLE sw ..... DENY
► BUZZER ..... SILENCED
► OPEN light ..... OFF
► COCKPIT DOOR ..... CHECK LOCKED
► OPEN light (DOOR CALL panel) ..... OFF
► DENIED light (DOOR CALL panel) ..... COMES ON

Note

After the denied access test, the EMER and CALL functions are not available for 3 min.

Authorised access

► EMER pb (DOOR CALL panel) ..... PRESS
► TOGGLE sw ..... OPEN

cont'd... ►►►

cont'd... ►►►

► OPEN light ..... COMES ON
► BUZZER ..... SILENCED
► COCKPIT DOOR ..... CHECK UNLOCKED
► MANUAL LOCKING BOLT ..... CHECK

SIMULATOR NOTE

The upper and lower manual locking bolts are clicked to throw or stow them. A thrown bolt holds the door shut from both sides, also without electrical power. A bolt throws only with both door leaves closed. Commands: `DWSim/ATR_Series/commands/misc/cockpit/doors/locker/up/toggle` and `.../locker/down/toggle`.

NOR.29.6 APM

Ident.: NOR.29.6 — 30 OCT 2026
ALL

► APM TEST pb ..... PRESS & HOLD

On both FMA: CRZ SPD LO and DGD PERF shown, INCREASE SPEED flashing.
The APM FAULT local light comes on, MC flashes, SC sounds.
In the EWD alert window, INCREASE SPEED, DEGRADED PERF, APM FAULT and FDAU flash (and DATA RECORDER if the RCDR pb is ON). If FDAU does not flash, the system is still operative.

► APM TEST pb ..... RELEASE
► ALL ALERTS ..... GO OFF

NOR.30 EACH FLIGHT CHECKS

NOR.30.1 Engine Fire Protection

Ident.: NOR.30.1 — 06 NOV 2026
ALL

► FIRE HANDLE ..... IN / LATCHED / LOCK WIRED
► ALL lights ..... OFF
► ENG 1(2) SQUIB TEST pb ..... PRESS & HOLD
► AGENT 1+2 SQUIB lights ..... COME ON
► ENG 1(2) SQUIB TEST pb ..... RELEASE
► AGENT 1+2 SQUIB lights ..... GO OFF
► ENG TEST sw 1(2) ..... HOLD ON FAULT
► LOOP A & B lights ..... COME ON
► MC / SC ..... ON / SOUNDS
► LOOP on FWS ..... FLASHING
► ENG TEST sw 1(2) ..... RELEASE
► ALL lights ..... OFF
► ENG TEST sw 1(2) ..... HOLD ON FIRE
► FIRE HANDLE red light ..... COMES ON
► MW / CRC ..... ON / SOUNDS
► ENG 1(2) FIRE on EWD & FWS ..... DISPLAYED
► MW ..... PRESS

To silence the CRC and turn off the MW.

cont'd... ►►►

cont'd... ►►►

■ **If the engine is shut down**

► CL 1(2) ..... OUT OF FUEL S.O.

The red FUEL SO light in the CL comes on.

► CL 1(2) ..... FUEL S.O.

The red FUEL SO light goes off.

■ **If ENG 2 is running in hotel mode**

► CL 2 FUEL SO red light ..... CHECK ON

► ENG TEST sw 1(2) ..... RELEASE

► ALL lights ..... OFF

NOR.30.2 Trims

Ident.: NOR.30.2 — 30 OCT 2026
ALL

► PITCH, ROLL & YAW TRIMS ..... CHECK

Press both halves of each trim switch together and check the trim runs in both directions.

► TRIM INDICATORS ..... CHECK

► WHOOLER (pitch trim) ..... SOUNDS

► TRIMS ..... RESET FOR TAKEOFF

► STBY PITCH TRIM sw ..... GUARDED & OFF

► TRIM INDICATORS ..... CHECK

NOR.30.3 ATPCS Static Test

Ident.: NOR.30.3 — 06 NOV 2026
ALL

Note

- *Wait 10 min between this test and takeoff, and between two ATPCS tests (static or dynamic), to protect the feathering pumps.*
- *On a short transit, the static test can be done with ENG 2 in hotel mode, provided the PLs are at GI and the right side is clear.*

► ATPCS selector ..... LEFT ARM

► ARM light ..... COMES ON

► TQ ..... ABOVE 60 %

► ATPCS selector ..... ENG 1

► ENG 2 ..... UPTRIM

► TQ 1 ..... 0 %

■ **After 2.15 s**

► ARM light ..... GOES OFF

► ENG 1 ..... AUTO FEATHER

► MW / CRC ..... ON / SOUNDS

► ENG 1 OUT on EWD ..... DISPLAYED

► ATPCS selector ..... NEUTRAL

► ALL INDICATIONS ..... BACK TO INITIAL

cont'd... ►►►

cont'd... ►►►

► ATPCS selector ..... RIGHT ARM
► ARM light ..... COMES ON
► TQ ..... ABOVE 60 %
► ATPCS selector ..... ENG 2
► ENG 1 ..... UPTRIM
► TQ 2 ..... 0 %

■ **After 2.15 s**

► ARM light ..... GOES OFF
► ENG 2 ..... AUTO FEATHER
► MW / CRC ..... ON / SOUNDS
► ENG 2 OUT on EWD ..... DISPLAYED
► ATPCS selector ..... NEUTRAL
► ALL INDICATIONS ..... BACK TO INITIAL

SIMULATOR NOTE

Lift the guard of the ATPCS test selector before turning it, and close it after the test.

NOR.30.4 CVR-DFDR

Ident.: NOR.30.4 — 06 NOV 2026
ALL

■ **With external power**

► RCDR GND CTL pb ..... PRESS

The ON light comes on.

► CVR TEST pb ..... PRESS & HOLD

The test indication comes on after a few seconds.

► CVR POINTER ..... IN THE GREEN ARC

After around 3 s.

► RESET pb ..... PRESS

Stops the CVR and DFDR; the RCDR GND CTL ON light goes off.

■ **With ENG 2 in hotel mode**

► CVR TEST pb ..... PRESS & HOLD

The test indication comes on after a few seconds.

► CVR POINTER ..... IN THE GREEN ARC

After around 3 s.

SIMULATOR NOTE

The CVR must be energised (automatically, or through RCDR GND CTL). The green test indication comes on after the TEST pb has been held for 5 s (instead of a pointer in the green arc after around 3 s).

cont'd... ►►►

cont'd... ►►►

NOR.31 ADDITIONAL DAILY CHECKS

NOR.31.1 Fuel Pump and X Feed Tests

Ident.: NOR.31.1 — 06 NOV 2026 — ALL

► FUEL PUMP 1+2 ..... OFF
  ► FEED LO PR ENG 1+2 ..... COME ON
► FUEL PUMP 2 ..... ON
  ► RUN light / FEED LO PR 2 ..... ON / OFF

Note

For a hotel mode start without GPU, stop here; the rest of the test is done after ENG 2 has started.

► FUEL PUMP 2 ..... OFF
  ► RUN light ..... OFF
► FUEL X FEED ..... PRESS
  ► X FEED valve ..... IN LINE
  ► FUEL X FEED (MEMO panel) ..... SHOWN
  ► FEED LO PR ENG 1+2 ..... COME ON

It can take a few minutes for the FEED LO PR lights to come on again.

► FUEL X FEED ..... RELEASE
  ► X FEED valve ..... CROSS LINE
  ► FUEL X FEED (MEMO panel) ..... GOES OFF
► FUEL PUMP 1 ..... ON
  ► RUN light / FEED LO PR 1 ..... ON / OFF
► FUEL PUMP 1 ..... OFF
  ► RUN light ..... OFF
► FUEL X FEED ..... PRESS
  ► X FEED valve ..... IN LINE
  ► FUEL X FEED (MEMO panel) ..... SHOWN
  ► FEED LO PR ENG 1+2 ..... COME ON

It can take a few minutes for the FEED LO PR lights to come on again.

► FUEL PUMP 2 ..... ON
  ► RUN light ..... ON
  ► FEED LO PR ENG 1+2 ..... GO OFF
► FUEL X FEED ..... RELEASE
  ► X FEED valve ..... CROSS LINE
  ► FUEL X FEED (MEMO panel) ..... GOES OFF
► FUEL PUMP 2 ..... OFF
  ► RUN light ..... OFF

SIMULATOR NOTE

The fuel quantity indication needs the pumps running for a few minutes to read correctly; you may leave them ON after the test for that reason.

cont'd... ►►►

cont'd... ►►►

NOR.31.2 Doors Test

Ident.: NOR.31.2 — 30 OCT 2026
ALL

► DOORS SW TEST pb ..... PRESS & HOLD
► CAB OK / SVCE OK ..... COME ON

Only when the associated doors are open: the test simulates the door being closed.

► DOORS SW TEST pb ..... RELEASE

NOR.31.3 COMPT SMK

Ident.: NOR.31.3 — 06 NOV 2026
ALL

► COMPT SMK TEST pb ..... PRESS & HOLD
► EXHAUST MODE FAULT light ..... COMES ON
► SMK alerts on FWS ..... SHOWN

AFT SMK, FWD SMK and ELEC SMK; on the SD page LAV SMK, AFT COMPT SMK, FWD SMK and ELEC SMK.

► MW / MC / CRC ..... ON / ON / SOUNDS
► COMPT SMK TEST pb ..... RELEASE
► MW ..... PRESS

Silences the CRC and turns off the MW.

► AVIONICS VENT EXHAUST MODE ..... RESET

Press the pb out and in: the extract fan restarts, the MC and the FAULT light go off. With external power, the MECH call sounds during the reset.

► ALL lights and SMK alerts ..... OFF

ELEC SMK, FWD SMK, AFT SMK, AFT COMPT SMK and LAV SMK go off the FWS.

NOR.31.4 Radar

Ident.: NOR.31.4 — 06 NOV 2026
ALL

► WX RADAR selector ..... TST

See Weather Radar.

► MFD ND ..... MONITOR

Range 100 NM is selected automatically. Green, yellow and red arcs are shown, and a mostly green arc between 85 and 95 NM. The selected mode (STBY, TEST, WX, GMAP) is shown at the bottom right of the ND.

► WX RADAR selector ..... STBY

NOR.31.5 AUTO PRESS

Ident.: NOR.31.5 — 30 OCT 2026
ALL

► AUTO PRESS TEST pb ..... PRESS & HOLD
► LDG ELEVATION display ..... CYCLES

Between −8 800 and 18 800.

► MC / SC ..... ON / SOUNDS

cont'd... ►►►

cont'd... ►►►

► AIR AUTO PRESS (alerting window) ..... ON THEN OFF
► AUTO PRESS TEST pb ..... RELEASE
► CAB PRESS MODE SEL ..... LIGHT ON THEN OFF

NOR.31.6 Oxygen Mask

Ident.: NOR.31.6 — 06 NOV 2026
ALL

The test checks the oxygen flow with the mask left in its stowage box.

Note

Do not remove the mask from its stowage position.

► OXYGEN MAIN SUPPLY ..... CHECK ON
► AUDIO CONTROL PANEL selector ..... INT
► PRESS TO TEST AND RESET pb ..... PRESS AND HOLD

The oxygen flow is heard.

► BLINKER ..... CHECK

The blinker momentarily turns yellow, then goes black. It stays yellow if there is a leak. The oxygen flow is heard through the loudspeakers each time the blinker turns yellow.

► LOUDSPEAKERS ..... OXYGEN FLOW SOUNDS
► RED RELEASE CLIPS ..... SQUEEZE

The red release clips are on each side of the oxygen mask.

► OXYGEN MASK HARNESS ..... INFLATES
► BLINKER ..... CHECK

The blinker momentarily turns yellow, then goes black. It stays yellow if there is a leak. The oxygen flow is heard through the loudspeakers each time the blinker turns yellow.

► LOUDSPEAKERS ..... OXYGEN FLOW SOUNDS
► RED RELEASE CLIPS ..... RELEASE
► EMERGENCY knob ..... PRESS & HOLD
► BLINKER ..... CHECK

The blinker is yellow as long as the knob is pressed. It stays yellow if there is a leak. The oxygen flow is heard through the loudspeakers each time the blinker turns yellow.

► LOUDSPEAKERS ..... OXYGEN FLOW SOUNDS
► EMERGENCY knob ..... RELEASE
► PRESS TO TEST AND RESET pb ..... RELEASE

The flow stops.

CAUTION

When the test is completed, make sure that the oxygen mask control panel stays as follows:

- OXYGEN LO PR light: OFF
- N/100% rocker lever: 100%

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

Only the PRESS TO TEST AND RESET pb is modelled: holding it plays the oxygen flow. The mask has no blinker, and the red release clips, harness, EMERGENCY knob and N/100% lever cannot be operated.

NOR.31.7 TAWS

Ident.: NOR.31.7 — 30 OCT 2026
ALL

► PULL UP / GPWS pb ..... PRESS

"Terrain awareness test start" is heard.

► PULL UP & GPWS FAULT lights ..... ON, THEN OFF
► TERR TEST (bottom right of ND) ..... SHOWN
► COLOUR-CODED SQUARE on ND ..... SHOWN

■ **After 12 s**

"Terrain awareness test complete" is heard; TERR TEST and the coloured square go off the ND.

NOR.31.8 Antiskid Test

Ident.: NOR.31.8 — 30 OCT 2026
ALL

► ANTISKID TEST pb ..... PRESS
► WHEELS A-SKID (alerting window) ..... COMES ON
► MC / SC ..... ON / SOUNDS
► FFFF amber (EWD) ..... SHOWN

After a few seconds NNNN green replaces it.

► WHEELS A-SKID ..... GOES OFF

ANOR.1 FLIGHT CHARACTERISTICS

ANOR.1.1 Takeoff and Landing Runs

Ident.: ANOR.1.1 — 06 NOV 2026 — ALL

1) Control column

Correct flight crew coordination is required in order to hold the control column all the times. This action prevents excessive elevator or aileron deflections due to wind and/or reversed air flow from propellers.

a) Takeoff run. The control column is initially held:

- In pitch: fully nose down, then slowly relaxed as speed increases
- In roll: neutral or deflected toward the wind in case of crosswind component, as appropriate to maintain wings mainly level.

Note

To prevent directional control effect, avoid excessive aileron deflections.

b) Landing run or aborted takeoff. For landing or aborted takeoff, control column holding must be transferred to the First Officer while the Captain takes the nosewheel steering.

If reverse is used, at low speeds and with high power, the reversed air flow may shake violently the flight controls, particularly with no crosswind. The control column must be held very firmly. Below 30 kt, the GUST LOCK can be engaged.

2) Nosewheel steering

For takeoff, use of nosewheel steering guidance is only recommended for the very first section of the takeoff run. Rudder becomes very rapidly efficient when airspeed increases (~40 kt). ATR aircraft have a natural tendency to go straight.

Action on the nosewheel steering handwheel should be smooth and progressive, particularly as ground speed increases.

3) Rudder

Rudder must not be cycled during takeoff, particularly the first section where nosewheel is used: combination of unnecessary rudder cycling (with an increasingly efficient rudder) and nosewheel control would then cause uncomfortable oscillations.

4) Rolling takeoff technique

In order not to increase the takeoff distances, power must be set quickly after the last phase of the line up turn and/or the brake release.

See also Takeoff.

ANOR.1.2 Approach

Ident.: ANOR.1.2 — 06 NOV 2026 — ALL

The deceleration capability of ATR aircraft provides operational advantage during approach. It enables better integration in large airports.

Approach speed can be initiated to 240 kt if no ATC restriction.

Initial approach speed can be maintained on a typical 3° glide slope down to the following height above runway:

cont'd... ►►►

cont'd... ►►►

NP	DECELERATION HEIGHT
82 %	(IAS x 10) ft

It is the flight crew responsibility:

- Not to exceed speed limitations (VLO, VFE...)
- To keep sufficient safety margin to respect stabilization criteria.

Note

If deceleration rate on approach appears insufficient, it is possible to increase it by increasing NP on 100 % OVRD, but that will result in an increased interior noise.

ANOR.1.3 Landing

Ident.: ANOR.1.3 — 06 NOV 2026
ALL

In order to minimize landing distance variations, the following procedure is recommended:

- Maintain standard final approach slope (3°) and final VAPP until 20 ft callout.
- At «20 ft» callout by PM, reduce to FI and flare visually as required.

Note

20 ft leaves ample time for flare control from a standard 3° final slope.

During flare, the airspeed decreases, resulting in a touchdown speed 5 to 10 kt below the stabilized approach speed.

As soon as main landing gear is on ground

- Use brakes as required
- Control nose wheel impact
- Both PL: GI
- Both LO PITCH labels: check ON green

CAUTION

If a thrust dissymmetry occurs or if one **NO REV** red reverse video label appears on EWD, the use of any reverser is prohibited. In this case, the propeller pitch change mechanism is probably locked at a positive blade angle, resulting in a positive thrust for any PL position.

- Use reverse as required
- Below 70 kt, CAPT takes NWS control, F/O holds control column fully forward.

Note

1. *MAX reverse is usable down to full stop if required. However, to minimize flight control shaking due to reverse operation at high powers, it is helpful to slowly release PL back to GI when reaching low ground speeds (below 40 kt estimated).*
2. *MAX braking is usable without restriction down to full stop, regardless of the runway conditions, provided that ANTISKID is operative.*
3. *The tail bumper (with damping capabilities) effectively protects the tail in case of excessive attitude (resulting from prolonged/floating flares) provided that the rate of sink at touchdown does not exceed 5 ft/s.*
4. *In case of a significant bounce, a rejected landing should be considered (bounced landing procedure).*

cont'd... ►►►

cont'd... ►►►

See also Landing.

ANOR.1.4 Stall

Ident.: ANOR.1.4 — 06 NOV 2026

ALL

1) Stall warning and identification system

In most situations, when approaching stall, the aircraft does not exhibit any noticeable change in handling qualities and flight controls efficiency and aircraft stability remains good. In addition, there is no significant aerodynamic buffet.

This is the reason why both stall warning (audio "cricket" and stick shaker) and stall alert / identification (stick pusher) are devices installed in order to produce artificial feedback to the flight crew based on angle of attack measurement (refer to the stall warning system in the description section).

2) Approach to stall

Approach to stall is the flight condition bordered by the stall warning activation and aerodynamic stall.

Therefore, as per the stall warning system design, it corresponds to the activation of the stick shaker and audio cricket alarm when the angle of attack exceeds a predefined threshold.

Activation thresholds are adapted to icing conditions when the **ICING AOA** light is ON.

3) Aerodynamic stall

By definition a stall is an aerodynamic loss of lift caused by exceeding the critical angle of attack.

On ATR aircraft, if the angle of attack is still increased after stall warning activation, the stick pusher will be triggered, preventing an aerodynamic stall of the aircraft.

This situation is clearly identified to the flight crew as the control column is suddenly pushed forward. This must be considered by the flight crew as aircraft stall and is an **emergency situation**.

a) Stall recognition. As explained above, one of the important indications is the activation of the stick pusher, although other cues should draw the attention of the flight crew:

- Unusual or abnormal roll response
- Inability to maintain altitude
- Buffeting

b) Factors that may lead to approach to stall and to stall event. It is not possible to list all the factors that could lead to aircraft stall condition, but here are some typical examples:

- Decaying airspeed
- Inappropriate thrust settings
- High G loading
- High bank angle
- Inappropriate aircraft configuration (flaps)
- Ice contamination or failure to select ANTI/DE ICING SYSTEM
- Misuse of automation (V/S mode for climb for example)
- Loss of situational awareness.

Note

An aircraft stall can occur at any attitude and airspeed.

4) Approach to stall and stall recovery

The flight crew must take immediate action when:

cont'd... ►►►

cont'd... ►►►

- any indication of an approach to stall is observed,
- stall warning or stall alert activates,
- or any stall cues are observed,

by performing a stall recovery procedure.

a) Recovery procedure

- Fly the aircraft first
  - Reduce angle of attack
    - If activated, follow the stick pusher
    - Nose down pitch control until stick shaker stops
    - Nose down pitch trim as needed
  - Increase power as needed
  - If FLAPS 0°, select FLAPS 15°, otherwise maintain flaps configuration
  - Bank: wings level

If the stick pusher activates, it shall not be compensated by the flight crew as it helps in lowering the angle of attack and recovery of the aircraft control. Although the flight crew should react quickly, there is no need for large and abrupt control inputs. During a stall recovery, maximum power is not systematically needed. The power has to be adapted.

For propeller driven aircraft, power application energizes the air flow around the wing, assisting in stall recovery. Reduction in pitch attitude is the priority because it permits to rapidly regain control of the aircraft. This action can result in a loss of altitude, but moreover, it is the fastest and safest way to recover the situation. The use of rudder shall be avoided because it will generate sideslip and still increase the angle of attack.

b) Additional information in icing conditions. Also refer to the Procedure for Icing Conditions.

Even with airframe de-icing used according to procedure, the leading edges cannot be entirely cleared of ice accretion due to the existence of unprotected portions on the wings leading edges as well as continued accretion between two consecutive boots cycles.

- The flight controls performance remains good, however the force required to maneuver in roll (and to reduce pitch angle) may be increased
- Above the reduced angle of attack threshold for stall warning:
  - An aerodynamic buffeting may occur, whose strength will increase with increasing ice accumulation and increasing angle of attack.
  - Stability may be affected in roll, however the stick pusher threshold was designed to prevent an increase of the angle of attack that could generate a risk of wing rocking.

Airframe vibrations or buffeting is an indication of stall and the flight crew should react accordingly. An inadvertent roll motion shall be considered as an indication of stall.

WARNING

APPROACH TO STALL EXERCISES WITH STICK PUSHER INHIBITED OR FAILED ARE PROHIBITED.

ANOR.2 DATA CARD PROCESSING

ANOR.2.1 Takeoff

Ident.: ANOR.2.1 — 06 NOV 2026
ALL

The takeoff data card (ATR TAKEOFF) holds the following fields:

cont'd... ►►►

cont'd... ►►►

Block	Fields
Flight	FLIGHT N°, FROM, TO, DATE
Weights	ATIS, W LIM, TOW
Power and speeds	OBJ TQ, RTO TQ, V1, VR, V2
Minimum manoeuvre speeds	VmLB 0° norm, VmLB 15° icing, VmLB 0° icing, ICING (box)
Trim	CG% TRIM
Single engine	ACC (acceleration altitude), N-1 (one engine out flight path sketch)

The CG% TRIM scale on the card reads:

CG %	14	19	23	28	32	37
TRIM	2.5	2	1.5	1	0.5	0

ANOR.2.2 Landing

Ident.: ANOR.2.2 — 06 NOV 2026
ALL

The landing data card (ATR LANDING) holds the following fields:

Block	Fields
Airports	DESTINATION, ELEVATION, ALTERNATE, ELEVATION
Weights	ATIS, W LIM, LW
Landing	FLAPS, VREF, VAPP, 1.1 VMCA
Minimum manoeuvre speeds	VmLB 0° norm, VmLB 15° icing, VmLB 0° icing, ICING (box)
Go-around	GA TQ, GA, VGA, ACC

ANOR.3 POWERBACK AND PUSHBACK OPERATIONS

ANOR.3.1 Pushback Operations

Ident.: ANOR.3.1 — 06 NOV 2026
ALL

Foreword

Pushback with ground team and servicing (2 steps procedure):

- NAC OVHT and ENG FIRE can be triggered during push back in hotel mode with a tailwind greater than 10 kt, including aircraft direction changes throughout the procedure
- If the tailwind is above this limit, the push back has to be done with the propeller(s) running and unfeathered, in respect with ground safety rules and airport local rules
- Nosewheel steering must be switched OFF. Wait for disconnection of the tow bar by the ground staff before setting the steering ON
- Ground staff and flight crew must remain connected, using conventional signs and/or headphones, all along the push back procedure
- Each flight crew member must keep his feet on the floor.

CAUTION

NEVER USE BRAKES during pushback to avoid tail strike and/or strain on towing system.

cont'd... ►►►

cont'd... ►►►

Step 1 – Before pushback (before propeller rotation)

Ready for pushback:

► PUSHBACK CLEARANCE (F/O) ..... OBTAIN
► NOSEWHEEL STEERING (CAPT) ..... OFF
► TOW BAR CONNECTION (CAPT) ..... CONFIRM
► BRAKE HANDLE (CAPT) ..... BRK OFF
► FEET (CAPT, F/O) ..... ON THE FLOOR
► BRAKES (CAPT, F/O) ..... DO NOT USE

Avoid tail strike and/or strain on towing system.

► PUSHBACK (CAPT) ..... ORDER TO GROUND STAFF

START UP ENGINE NUMBER 1 AND RELEASE OF PROPELLER NUMBER 2 CAN BE PERFORMED DURING PUSHBACK, BASED ON LOCAL AGREEMENT.

Note

Unfeathering of propellers during pushback can damage nosewheel and/or pushback servicing.

Step 2 – After pushback (before taxi)

Pushback completed:

► BRAKE HANDLE (CAPT) ..... PARKING
► TOW BAR DISCONNECTION (CAPT) ..... CONFIRM
► NOSEWHEEL STEERING (CAPT) ..... ON

SIMULATOR NOTE

There is no ground crew. Use the X-Plane pushback (or a pushback add-on): the aircraft takes the tug's push.

ANOR.3.2 Powerback Operations

Ident.: ANOR.3.2 — 06 NOV 2026
ALL

Foreword

- NAC OVHT and ENG FIRE can be triggered if a prolonged power back is maintained with a tailwind greater than 10 kt, including aircraft direction changes throughout the procedure.
- Ground staff must use safety glasses due to possibility of projection during powerback operation
- Ground staff and flight crew must remain connected, using conventional signs and/or headphones, all along the powerback procedure
- Nosewheel steering remains ON
- To limit forward move, apply slowly reverse just after brake released
- Once the aircraft moves backward, each flight crew member must keep his feet on the floor
- Use ground idle or positive power to decrease speed or stop the aircraft.

CAUTION

- Brakes must not be used until the aircraft has moved forward to avoid tail strike.
- Powerback must be performed at low speed.

cont'd... ►►►

cont'd... ►►►

Powerback procedure (1 step) – both engines running and unfeathered

Ready for powerback:

► POWERBACK CLEARANCE (F/O) ..... OBTAIN
► AREA CLEAR ALL AROUND THE AIRCRAFT (CAPT) ..... CONFIRM
► BRAKE HANDLE (CAPT) ..... BRK OFF
► FEET (CAPT, F/O) ..... ON THE FLOOR

Once the aircraft moves backward, each flight crew member keeps his feet on the floor.

► PL (CAPT) ..... SET SMOOTHLY TO REVERSE

Note

Flight crew can control the aircraft using nosewheel steering. Speed is controlled using PL.

► BRAKES (CAPT, F/O) ..... DO NOT USE

Do not use brakes until the aircraft moves forward to avoid tail strike.

Backward move completed:

► PL (CAPT) ..... SET TO GROUND IDLE

Forward move of the aircraft observed:

► PEDAL BRAKE (CAPT) ..... USE
► BRAKE HANDLE (CAPT) ..... PARKING

ANOR.4 NOISE ABATEMENT PROCEDURES

ANOR.4.1 Noise Abatement Procedures

Ident.: ANOR.4.1 — 06 NOV 2026
ALL

1) On ground. Even if not required for turbopropeller aircraft, ATR recommends the following procedures for noise reduction on the ground:

- Do not use reverse while taxiing
- Minimize the use of reverse at landing.

2) In flight. No particular noise abatement procedures are recommended in flight.

3) Local aerodrome procedures. Refer to published airport manuals.

ANOR.5 WET AND CONTAMINATED RUNWAYS OPERATIONS

ANOR.5.1 Runway Surface Descriptor

Ident.: ANOR.5.1 — 06 NOV 2026
ALL

The runway contaminants significantly affect the takeoff performance. The following table gives the definition of the different runway states.

Runway state	Definition
Compact snow	Snow that has been compacted into a solid mass such that aeroplane tires, at operating pressures and loadings, will run on the surface without significant further compaction or rutting of the surface.

cont'd... ►►►

cont'd... ►►►

Runway state	Definition
Dry snow	Snow from which a snowball cannot readily be made.
Frost	Ice crystals formed from airborne moisture on a surface whose temperature is at or below freezing; frost differs from ice in that the frost crystals grow independently and, therefore, have a more granular texture.
Ice	Water that has frozen or compacted snow that has transitioned into ice, in cold and dry conditions.
Slush	Snow that is so water-saturated that water will drain from it when a handful is picked up or will splatter if stepped on forcefully.
Slippery wet runway	Wet runway where the surface friction characteristics of a significant portion of the runway have been degraded.
Standing water	Water of depth greater than 3 mm.
Wet snow	Snow that contains enough water to be able to make a well-compacted, solid snowball, but water will not squeeze out.

ANOR.5.2 Effect on Performance

Ident.: ANOR.5.2 — 06 NOV 2026
ALL

1) Effect on performance

There is a clear distinction of the effect of contaminants on aircraft performance. Contaminants can be divided into hard and fluid contaminants.

- Hard contaminants are compacted snow, frost and ice. They reduce friction forces.
- Fluid contaminants are water, slush, dry snow and wet snow. They reduce friction forces, and cause precipitation drag and aquaplaning.

2) Reduction of friction forces

The friction forces on a dry runway change with aircraft speed. Flight tests help to establish the direct relationship between the aircraft's friction coefficient μ and the ground speed.

The friction coefficient μ is the ratio of maximum available tire friction force and vertical load acting on a tire.

3) Precipitation drag

Precipitation drag is composed of:

- Movements drag: produced by the movement of the contaminant fluid from the path of the tire
- Spray impingement drag: produced by the spray thrown up by the wheels (mainly those of the nose gear) onto the fuselage.

4) Aquaplaning phenomenon

The presence of water on the runway creates a water film between the tire and the runway. This results in a reduction of the dry area. This phenomenon becomes more critical at higher speeds, where the water cannot be squeezed out from between the tire and the runway.

Aquaplaning (or hydroplaning) is a situation where the tires of the aircraft are, to a large extent, separated from the runway surface by a thin fluid film. Under these conditions, tire traction drops to almost negligible values along with aircraft wheels' braking. Wheel steering for directional control is, therefore, virtually not operative.

cont'd... ►►►

cont'd... ►►►

ANOR.5.3 Aircraft Manufacturer Data

Ident.: ANOR.5.3 — 06 NOV 2026 — ALL

The aircraft manufacturer has to provide applicable data for operations on runways contaminated by one of the above contaminants. ATR provides guidance material for the following runway contaminants and maximum depths in the AFM (contaminated runway advisory material). Takeoff is not recommended when conditions are worse than the ones listed below.

Contaminant	Maximum reported depth mm (inch)
STANDING WATER	12.7 mm (1/2″)
SLUSH	12.7 mm (1/2″)
DRY SNOW or DRY SNOW ON TOP OF COMPACT SNOW	50 mm (2″)
WET SNOW or WET SNOW ON TOP OF COMPACT SNOW	20 mm (3/4″)
COMPACT SNOW	No depth limit
ICE	No depth limit

ANOR.5.4 Takeoff and Landing

Ident.: ANOR.5.4 — 06 NOV 2026 — ALL

Actual landing distances are certified on dry runways for all ATR aircraft, and published (for information) for wet and contaminated runways (landing performance and contaminated runway advisory material).

ANOR.5.5 Takeoff

Ident.: ANOR.5.5 — 06 NOV 2026 — ALL

1) Specificity of the wet runway

On a wet or contaminated runway, the screen height is 15 ft in case of engine failure, i.e. the gross takeoff flight path starts 15 ft above the takeoff surface, although the net takeoff flight path starts at 35 ft in any runway condition. The start of the gross and the net flight path are thus different in case of wet or contaminated runway.

Note

1. *ASD definition on a contaminated runway is the same as on a wet runway. The values of the ASD on contaminated runways are given as advisory material in the AFM. They are basically computed with the use of both reversers. Additional pages are provided to supply data in case of no reverse, and are to be used for flight preparation.*
2. *The TOR, TOD and ASD requirements differ between dry runways on one side, and wet & contaminated on the other side. For instance, the screen height for wet and contaminated runways is decreased to 15 ft when determining the TOR and TOD. Or the use of reverse thrust is permitted if determining the ASD on wet and contaminated runways, although it is forbidden on dry runways. However the takeoff limitations on wet and contaminated runways shall not be less penalizing than the limitations on dry runways.*

ANOR.6 ABORTED TAKEOFF

ANOR.6.1 General

Ident.: ANOR.6.1 — 06 NOV 2026 — ALL

Takeoff can be aborted for several operational or technical reasons. It is not possible to list all of these factors. However, in

cont'd... ►►►

cont'd... ►►►

order to help the captain make his decision, the TO INHIB function inhibits the alerts that are nonessential until gear retraction.

The success of an aborted takeoff depends on the captain making timely decisions, and using the proper techniques.

In particular, the flight crew should keep in mind that the inappropriate techniques and the degraded conditions listed below have a negative impact on the landing distance, and on the result of the aborted takeoff procedure:

- Delay in performing the stopping procedure
- Keeping Flight Idle during deceleration instead of Ground Idle
- Not applying fully nose down control column during deceleration
- Damaged tires
- Worn brakes or higher than normal initial brakes temperature
- Brakes not being fully applied
- A runway friction coefficient lower than assumed in computations
- An error in gross weight calculation.

ANOR.6.2 Decision Making

Ident.: ANOR.6.2 — 06 NOV 2026
ALL

The decision to abort a takeoff and to stop the aircraft should be made by the Captain. Therefore the Captain should keep his/her hand on the thrust levers until the aircraft reaches V1, whether the Captain is the Pilot Flying (PF) or the Pilot Monitoring (PM).

The time available for decision making is limited. To minimize the risk, many alerts considered non-essential are inhibited between TO INHIB engagement and gear retraction. Therefore, any warnings triggered during this period must be considered as significant.

1) Below V1

The Captain should consider discontinuing the takeoff if any of the following conditions occur:

- Master warning / caution
- Unusual noise or vibration
- ATPCS not armed
- Windshear
- Cabin smoke / fire
- Abnormal acceleration
- Tire failure
- Unsafe / unable to fly
- Engine failure / fire
- Takeoff configuration warning
- Bird strike
- Window failure.

Note

The list is not exhaustive.

2) Above V1

Takeoff must be continued, because it may not be possible to stop the aircraft on the remaining runway.

The Captain must make the decision to abort before V1:

cont'd... ►►►

cont'd... ►►►

- If a malfunction occurs and the Captain decision is to continue the takeoff, he/she should announce "WE CONTINUE"
- If the decision is to abort, the Captain announces "STOP". This announcement both confirms the decision to abort the takeoff and transfer of controls to the Captain. It is the only time that hand-over of control is not accompanied by the phrase "MY CONTROLS".

ANOR.6.3 Aborted Takeoff Maneuver

Ident.: ANOR.6.3 — 06 NOV 2026 — ALL

As soon as the decision to abort is made, the Captain announces "STOP", takes over control of the aircraft, and executes an aborted takeoff. During any aborted takeoff, both PLs are retarded down to GI by pulling on the triggers and full braking should be applied if needed. Simultaneously, control column must be pushed forward to maximize controllability. As soon as the LO PITCH light(s) comes on, full reverse(s) can be applied if needed.

Reverse is available even in single engine. At 70 kt, control column is transferred to the first officer and the Captain takes the nose wheel steering control. In case of single reverse operation, roll control must be applied (possibly to full travel) in order to minimize the tendency to bank on the side of the operating engine.

On a wet or slippery runway, or takeoff at or near maximum runway limit weight, an aborted takeoff at or near V1 will require MAXIMUM use of brakes until reaching a full stop and use of reverses until 40 kt.

On a contaminated runway, since the effect of asymmetrical reverse thrust is not predicted with a sufficient accuracy, it is therefore not recommended to use single engine reverse thrust.

In case of fire, if possible, position the aircraft to keep fire away from the fuselage, taking into account wind direction.

ANOR.6.4 Aborted Takeoff Procedure

Ident.: ANOR.6.4 — 06 NOV 2026 — ALL

► STOP (CAPT) ..... ANNOUNCE

Immediately and simultaneously

► PL 1+2 (CAPT) ..... GI

To stop the aircraft and prevent brake overheating, the power levers should be retarded immediately to GI by using the triggers.

► CONTROL COLUMN (CAPT) ..... PUSH

► BRAKES (CAPT) ..... AS RQRD

► LO PITCH (F/O) ..... CHECK & ANNOUNCE

ENG	LO PITCH	ANNOUNCE	REVERSE
2 ENG	2	2 LOW PITCH	NORMAL USE
2 ENG	1	NO REVERSE	NO REVERSE
2 ENG	0	NO REVERSE	NO REVERSE
1 ENG	1	1 LOW PITCH	USE WITH CARE

► REVERSE (CAPT) ..... AS RQRD

Note

The effect of asymmetrical reverse thrust is not predictable with a sufficient accuracy on contaminated runways, it is therefore not recommended to use single engine reverse thrust.

cont'd... ►►►

cont'd... ►►►

Passing 70 kt

► 70 KT (F/O) ..... ANNOUNCE
► I HAVE CONTROL (CAPT) ..... ANNOUNCE
► N/W STEERING (CAPT) ..... CONTROL
► CONTROL WHEEL (F/O) ..... HOLD INTO THE WIND

When aircraft stopped

► ATC (VHF1) (F/O) ..... NOTIFY
► BRAKE HANDLE (CAPT) ..... PARKING
► FWS (F/O) ..... RCL
► SITUATION ASSESSMENT (CAPT) ..... PERFORM

The aircraft should remain stationary while the crew evaluates the situation.

■ **If evacuation is required**

► EMERGENCY EVACUATION (ON GROUND) ..... APPLY

■ **If attempting a new takeoff**

► TAKEOFF ..... PROHIBITED FOR 10 min

After aborted takeoff, aircraft must be stopped for 10 min and the WHEELS BRK HOT message must be monitored as it may take up to 10 min before brakes temperature reaches its maximum at sensor location.

ANOR.6.5 Aborted Takeoff Situation Assessment

Ident.: ANOR.6.5 — 06 NOV 2026
ALL

Following an aborted takeoff:

- The flight crew makes a full assessment of the state of the aircraft, including FWS recall to assess any inhibited alerts
- Aircraft must be stopped for 10 min and the **WHEELS BRK HOT** alert must be monitored as it may take up to 10 min before brakes temperature reaches its maximum at sensor location
- If triggered, the **WHEELS BRK HOT** alert requires the flight crew to return to parking
- After a complete assessment of the state of the aircraft and occupants, if the Captain decision is to reattempt the takeoff, the flight crew should prepare the aircraft for a new departure and apply all checklists starting from the Before Taxi checklist.

ANOR.7 SEVERE TURBULENCE

ANOR.7.1 Severe Turbulence

Ident.: ANOR.7.1 — 06 NOV 2026
ALL

When possible, avoid areas with known or forecasted severe turbulence. If turbulence is not avoidable, aim to keep speed, so as to provide the best protection against the effect of gust on the structural limits, even if maintaining an adequate margin above Vmin OPS.

Consider requesting a lower flight level to increase margin to buffet onset. **Maximum Rough Air Speed (VRA) = 180 kt.**

Sufficient buffet margin exists at optimum altitude.

Severe turbulence is defined as turbulence that causes large, abrupt changes in altitude and/or attitude. It usually causes large variations in airspeed. Occupants are forced violently against their seat belts and loose objects will move around the aircraft.

cont'd... ►►►

cont'd... ►►►

If severe turbulence occurs during a flight, the flight crew must make a logbook entry in order to initiate maintenance action.

Before entering an area of known turbulence, the flight crew and the cabin crew must secure all loose equipment and switch the cabin SIGNS to ON.

Keep the autopilot ON.

If the flight crew flies the aircraft manually:

- Expect large variations in altitude, but do not pursue altitude,
- Maintain attitude, and allow altitude to vary,
- Advise Air Traffic Control.

ANOR.7.2 Wake Turbulence

Ident.: ANOR.7.2 — 06 NOV 2026

ALL

Wake turbulence is the leading cause of aircraft upsets.

1) Vortex generation

The phenomenon that creates wake turbulence results from the forces that lift aircraft. High-pressure air from the lower surface of the wings flows around the wingtips to the lower pressure region above the wings. A pair of counter rotating vortices is thus shed from the wings: the right wing vortex rotates counterclockwise, and the left wing vortex rotates clockwise. The region of rotating air behind the aircraft is where wake turbulence occurs.

2) Vortex strength

The strength of the turbulence is determined predominantly by the weight, wingspan, and speed of the aircraft.

Usually, vortices descend at an initial rate of about 300 to 500 ft/min for about 30 s. The descent rate decreases and eventually approaches zero between 500 and 900 ft below the flight path. Flying at or above the flight path provides the best method for avoidance.

Maintaining a vertical separation of at least 1 000 ft when crossing below the previous aircraft may be considered safe.

3) Induced roll

An encounter with wake turbulence usually results in induced rolling or pitch moments. However, in rare cases an encounter could cause structural damage to the aircraft. In more than one instance, flight crew has described an encounter to be like "hitting a wall".

The dynamic forces of the vortex can exceed the roll or pitch capability of the aircraft to overcome these forces. During test programs, the wake was approached from all directions to evaluate the effect of encounter direction on response. One item was common to all encounters: without a concerted effort by the flight crew to check the wake, the aircraft would be ejected from the wake and an aircraft upset could occur.

PAGE

INTENTIONALLY

LEFT BLANK

ANOR.8 ADVERSE WEATHER

ANOR.8.1 Icing and Cold Weather Conditions

Ident.: ANOR.8.1 — 06 NOV 2026
ALL

This chapter gives guidance for operation in icing and cold weather conditions:

- In flight icing conditions
- Ground icing conditions
- Operation on contaminated runway
- Cold weather operation

The limitations for icing conditions are in LIM.4.4. The normal procedure is the Procedure for Icing Conditions.

ANOR.8.1.1 In Flight Icing Conditions

Ident.: ANOR.8.1.1 — 06 NOV 2026
ALL

Introduction

Icing conditions can be encountered on ground and/or in flight. Aircraft certification requirements (EASA CS25 and 14 CFR part 25, Appendix C) describe the icing conditions that were considered likely to be encountered in commercial aviation, in flight.

On ground, aircraft surfaces can be contaminated by frozen moisture such as frost, snow, ice or slush: see Ground Icing Conditions.

The aircraft can be subject to ice accretion when flying in icing conditions. The ice accretion depends on:

- The air mass characteristics, mainly its liquid water content and the size of the water droplets contained in the air.
- The aircraft configuration, for given external conditions. The way ice builds up on the airframe is mainly related to angle of attack and speed.

It is therefore important to differentiate the icing conditions as defined by the environment and the effect of the ice accretion on the airframe. Flying through the same cloud with the same aircraft but different parameters (weight, speed...) may result in different ice accretion rates and shapes.

The following paragraphs help the flight crew to identify the type of icing environment and its effect on the aircraft, and to apply the procedures accordingly.

Definitions - Atmospheric Icing Conditions

Atmospheric icing conditions exist when:

- OAT on ground and for takeoff is at or below 5 °C
- TAT in flight is at or below 7 °C
- Visible moisture in any form is present (such as clouds, fog, mist, rain, snow, sleet and ice crystals).

The tables below summarize:

- The icing severity categories and definitions as described in the FAA Aeronautical Information Manual (AIM) published on October 12, 2017. It is designed as a standard for pilot / ATC reporting of icing conditions in flight (the first two columns).
- The effect and performance degradation depending on the icing category.

cont'd... ►►►

cont'd... ►►►

ICING CATEGORY	DEFINITION	ICING ACCRETION RATE WITH ANTI AND DE ICING SYSTEM ON
Trace	Ice becomes perceptible. Rate of accumulation slightly greater than sublimation. De icing/anti icing equipment is not utilized unless encountered for an extended period of time (over 1 hour).	Negligible
Light	The rate of accumulation may create a problem if flight is prolonged in this environment (over 1 hour). Occasional use of de icing and anti icing equipment removes/prevents accumulation. It does not present a problem if the de icing/anti icing equipment is used.	Stabilized
Moderate	The rate of accumulation is such that even short encounters become potentially hazardous and use of de icing and anti icing equipment or flight diversion is necessary.	Stabilized
Severe	The rate of accumulation is such that ice protection systems fail to remove the accumulation of ice, or ice accumulates in locations not normally prone to icing, such as areas aft of protected surfaces and any other areas identified by the manufacturer. Immediate exit from the condition is necessary.	Increasing

ICING CATEGORY	EFFECT ON CRUISE SPEED	EFFECT ON RATE OF CLIMB	EFFECT ON HANDLING
Trace, Light, Moderate	IAS is lower than in normal condition but stabilized. The use of anti and de icing systems will be enough to limit the loss of performance. See *Cruise in Icing Conditions* below.	Climb performance is lower than in normal condition but stabilized. The use of anti and de icing systems will be enough to limit the loss of performance. See *Climb in Icing Conditions* below.	Stall occurs at a higher speed and lower angle of attack
Severe	Icing is not contained, IAS is decreasing. **Alerting level:** unable to maintain IAS above ICING BUG +10 kt	Rate of climb rapidly decreasing. **Alerting level:** unable to maintain an average V/S above 100 ft/min at ICING BUG +10 kt	Stall occurs at a higher speed and lower angle of attack. Abnormal vibrations, and/or abnormal roll control

One of the main drawbacks of these categories/definitions is that they can be very subjective. As described earlier, ice accretion depends on several parameters and the severity of icing conditions on an aircraft cannot be directly measured.

Note

Crew experience will influence their perception of icing intensity. So when encountering icing, it is necessary to be as objective as possible, keeping in mind that icing level evaluated as light by a crew may be evaluated as severe by another crew.

A correct assessment of icing conditions is essential in case of severe icing encounter. Alerting levels are defined for severe icing conditions to help the crew to perform an objective assessment (see SEVERE ICING DETECTION for the severe icing indications).

Detection of Ice Accretion

Ice accretion may be detected by the flight crew through:

- Visual cues
- Performance decrement
- Handling cues

cont'd... ►►►

cont'd... ►►►

Visual cues: visual indication of ice accretion is provided by ice build-up on any part of the aircraft. The propeller spinners, the wing leading edges, the windshield, the side windows or the wipers are typical locations where such build-up can be observed.

Moreover, the Ice Evidence Probe (IEP) located on the left side of the fuselage provides a good exposure to ice build-up and may be used as visual identification of ice accretion.

Note

IEP is automatically illuminated when the NAV lights are ON.

Performance decrement: the effects of ice accretion on the aircraft first consist in a drag increase. It can generate either:

- A reduction of the vertical speed (especially in climb), or/and
- A loss of airspeed (especially in cruise).

The drag increase can be very slow and progressive or on the contrary fast and massive. The airspeed and vertical speed should be closely monitored in order to detect ice accretion that may not be visually observed (such as clear ice).

Handling cues: abnormal handling feeling, incorrect trim setting or identification of any abnormal vibrations may be cues of ice accretion.

Anti icing advisory system: the aircraft is equipped with an advisory ice detection system. It may help the flight crew in the detection of ice accretion, but visual cues and performance monitoring remain the primary means of detection.

The ice detector provides reliable information up to TAT = 3 °C. Above this TAT, the ice detector may not detect ice. In consequence, when TAT is above 3 °C and in icing conditions, the monitoring of aircraft performance is even more important.

Certification Framework and Case of Severe Icing

Certification requirements defined in JAR/FAR 25 appendix C consider droplet sizes up to 50 microns in diameter. No aircraft is certified for flight in icing conditions with droplets larger than this diameter.

Severe icing conditions are defined by a situation where the aircraft ice protection systems cannot cope with the effect of ice accretion. Therefore the ice accretion keeps increasing and leads to continuous performance degradation. This is the reason why severe icing conditions must be avoided and, in case of unexpected encounter, immediately escaped.

CAUTION

If freezing rain/or freezing drizzle is observed, ATR recommends:

- To delay take off at departure airport, or
- To delay approach and landing at destination airport, or
- To divert flight to an alternate airport.

In flight, the following weather conditions may be conducive to severe icing conditions:

- Visible rain at temperatures close to 0 °C ambient air temperature (SAT)
- Droplets that splash or splatter on impact at temperatures close to 0 °C ambient air temperature (SAT)

Severe icing may be detected through:

- SEVERE ICING main indications:
  - Ice covering all/substantial parts of unheated side window (visual cue)
  - Unable to maintain IAS above ICING BUG +10 kt
  - Unable to maintain V/S above 100 ft/min AVERAGE at ICING BUG +10 kt
  - Abnormal vibrations
- Supplementary indications:

cont'd... ►►►

cont'd... ►►►

- o Water splashing/streaming on the windshield
- o Unusual extensive ice accreted on the airframe in areas normally observed not to collect ice
- o Accumulation of ice on the lower surface of the wing rear of the protected areas
- o Accumulation of ice on propeller spinner farther rear than normally observed

If the flight crew identifies any of the above indications, the emergency SEVERE ICING procedure must be immediately applied.

It can be difficult for the crew to detect icing conditions degradation to severe icing (e.g. if the ice accretion rate slightly exceeds the aircraft de icing capabilities, the loss of performance will be slow but progressive). In consequence, the aircraft performance must be assessed by close monitoring of the rate of climb and/or the airspeed. Continuous decrease of one of those parameters is an indication of severe icing conditions.

The flight crew should react as soon as they identify a continuous loss of performance and before reaching the performance criteria:

- Unable to maintain IAS above ICING BUG +10 kt, or
- Unable to maintain V/S above 100 ft/min AVERAGE at ICING BUG +10 kt

See *Operational Guidance for Flight in Icing Conditions* below for guidance to escape from severe icing.

Effect of Atmospheric Icing on the Aircraft

Operations in atmospheric icing conditions require special attention since ice accretion on airframe and propellers significantly modifies and/or degrades their aerodynamic characteristics. The main effects of ice accretion can be summarized as follows:

1) Lift

The lift curves are substantially modified compared to the clean aircraft:

- Reduction of lift at a given angle of attack, especially at higher AOA
- Reduction of maximum lift
- Reduction of maximum lift angle of attack.

The aerodynamic degradation of the aircraft depends on the angle of attack: the lower the angle of attack, the lower the percentage of degradation. When flying in icing conditions, the angle of attack should be kept as low as possible.

Note

The angle of attack can be reduced by:

- *increasing the speed, or*
- *descending*

In case of ice accretion, stall occurs at a higher speed and lower angle of attack. Protection against stall is ensured by:

- the lowering of the stall warning thresholds when the ICING AOA green light is ON, which comes as a consequence of switching one or both HORNS ANTI-ICING ON.
- the respect of the minimum manoeuvre/operating speeds defined for icing conditions (LIM.3.5.3).

Note

The lowered stall warning AOA thresholds defined for icing conditions remain active as long as the ICING AOA green light is ON. Once the aircraft is visually verified clear of ice, to recover the normal condition thresholds, the crew shall press the ICING AOA pb, which turns the ICING AOA green light off.

2) Drag

The drag polar is also heavily affected:

cont'd... ►►►

cont'd... ►►►

- Greater drag at given angle of attack
- Greater drag at a given lift
- Best lift to drag ratio at a lower lift coefficient.

3) Impact on aircraft performance

Loss of lift combined with drag increase leads to performance decrement. This loss of performance is seen through the decrease of:

- Vertical speed (especially in climb), and/or
- Speed (especially in cruise).

Note

All performance data given for ICING CONDITIONS were derived from flight test measurements performed with ICE SHAPES representative of the worst icing cases considered by certification combined with losses of propeller efficiency.

Ice Protection System

The ATR is equipped with both anti icing and de icing systems.

- **Anti icing system:** electrical heating is used to prevent ice on:
  - the probes,
  - the windshield and side windows (heating for defogging only, not for ice protection),
  - the flight control horns (ailerons, elevators, rudder),
  - the inner leading edge of the propeller blades (the outer part is de iced by centrifugal force only).
- **De icing system:** the airframe de icing system removes ice from:
  - the critical areas of the airframe (wing and horizontal stabilizer leading edges),
  - the engine air intakes and engine gas paths.

The pneumatic boots are made of dual chambers (chordwise chambers on the airframe) which inflate alternately. The de icing cycle duration has been determined by tests to provide optimized de icing performance according to the outside air temperature.

Residual icing must be considered not only during periods when ice accretion develops but also after icing conditions have been exited.

APM

The Aircraft Performance Monitoring (APM) system monitors the aircraft in-flight performance in order to enhance flight crew awareness of any degradation of performance, particularly in icing conditions.

The APM system compares the aircraft theoretical drag with the current drag and alerts the flight crew if a reduction of aircraft performance occurs. If drag and/or speed decay exceed predefined threshold values, messages or alerts (cautions and/or warnings) are triggered. A permanent background monitoring is performed, as ice accretion is not the single cause of speed decay or drag increase.

- **CRUISE SPEED LOW** message indicates a limited performance degradation (around 10 % of drag increase compared to the theoretical drag in these conditions) with a speed decay of at least 10 kt below the expected cruise speed. This message is available in CRUISE phase only. Procedure: Cruise Speed Low.
- **DEGRADED PERF** alert indicates a significant performance degradation (around 22 % or 28 % of drag increase). In climb, the alert is triggered by an increase of drag that generates a severe reduction of rate of climb. In cruise, the alert is triggered by an increase of drag that generates an IAS decrease (15 kt to 20 kt below the expected cruise speed). In descent, the alert is triggered by an increase of drag. Procedure: DEGRADED PERF.
- **INCREASE SPEED** alert is triggered by a severe performance degradation generating an IAS decrease below ICING BUG +10 kt. The alert indicates that the conditions for DEGRADED PERF are met and that the speed is below ICING

cont'd... ►►►

cont'd... ►►►

BUG +10 kt. Procedure: INCREASE SPEED.

FLIGHT PHASE	DRAG INCREASE (VS THEORETICAL)	IAS	MESSAGE / ALERT
Cruise	+10 % or more	10 kt or more below the theoretical cruise speed	CRUISE SPEED LOW
Cruise	+22 % or more	20 kt or more below the theoretical cruise speed	DEGRADED PERF
Cruise	+28 % or more	15 kt or more below the theoretical cruise speed	DEGRADED PERF
Cruise	+22 % or more	below ICING BUG +10 kt	INCREASE SPEED
Climb or descent	+28 % or more	above ICING BUG +10 kt	DEGRADED PERF
Climb or descent	+28 % or more	below ICING BUG +10 kt	INCREASE SPEED

Aircraft performance monitoring starts after landing gear and flap retraction and continues throughout the flight in clean configuration (flaps 0 and landing gear up) and as long as both engines are operating.

The messages or alerts (cautions and/or warnings) can be triggered if SAT is below 10 °C and one or several of the following conditions are met:

- ICING AOA illuminated
- DE ICING AIRFRAME pb selected ON
- Ice accretion detected (at least one time during the flight).

Note

If an engine is restarted in flight following an engine shut down, the APM can only be recovered when the aircraft is on the ground.

APM monitoring can also be performed out of icing conditions when ice is detected or anti icing is selected ON once during the flight. Ice accretion is not the single cause of drag increase and speed degradation. Other causes can significantly degrade the aircraft performance: mountain waves, wind gradients, altered aircraft aerodynamics (CDL, aircraft skin altered, excessive flight control deflections…).

SIMULATOR NOTE

The sim APM compares the IAS with a reference cruise IAS it captures after 30 s of stable level flight above 10 000 ft: CRZ SPD LO at 10 kt below it, DGD PERF at 15 kt below it, INCREASE SPEED when DGD PERF is met below ICING BUG +10 kt. The climb (rate of climb) branch of DEGRADED PERF is not modelled. The SAT < 10 °C gate is applied with the ice detector currently detecting ice or the airframe de icing ON; ICING AOA alone does not enable it.

Operational Guidance for Flight in Icing Conditions

Flight preparation

When icing conditions are forecast, the impact on flight performance must be assessed during flight preparation. The main effects are:

- The operational ceiling may be reduced (see the climb performance)
- The single engine ceiling is reduced (see the single engine cruise performance)

Recommended maximum icing flight level: the flight level that provides a cruise speed with a 40 kt margin above the ICING BUG (VmLB0 icing). This speed margin gives the crew time to carefully monitor icing conditions, anticipate

cont'd... ►►►

cont'd... ►►►

degradation and define a strategy to avoid it.

Therefore, if icing conditions are forecast on the planned route, it is highly recommended to choose a cruise flight level at or below the recommended maximum icing flight level. The recommended maximum icing flight level is displayed in the QRH (OPSDATA / MAX CRUISE 2 ENGINES tables).

Example for ICING BUG at 169 kt: at ISA + 5 °C and if icing conditions are expected, the maximum cruise level is FL 160, where the cruise speed target is 212 kt, in order to maintain at least a margin of 40 kt between the ICING BUG and the cruise speed target.

Strategy to avoid performance degradation in icing conditions

The aircraft is certified to be safely operated in icing conditions. It is equipped with anti icing and de icing systems that provide protection against icing. However, environmental conditions may exist in which the ice accretion rate exceeds the protection capabilities of the aircraft. In such a case, the airspeed in cruise or the vertical speed in climb cannot be maintained and keeps decreasing.

In order to assess the icing environment in which ATR aircraft fly, data from about 17000 flights worldwide has been analyzed. The information comes from the recorded ice detection signal sent by the advisory ice detection system.

It is assumed by the aeronautical community that icing environmental conditions have a limited vertical extension: by descending several hundred or a few thousand feet, it is generally possible to exit such conditions. The cumulative frequency distribution of the altitude change after which ice detection stops shows that the probability to exit icing conditions by changing the altitude by 3 000 ft is 93 %.

The way to escape icing conditions depends on various factors (such as external conditions, crew experience, weather forecasts, planned route...) but in any case, the following factors should be considered:

- **Aircraft energy:** when aircraft energy is low (IAS below ICING BUG +30 kt or V/S below 300 ft/min), the flight crew must consider a level off or descent.
- **Ice accretion rate:** as soon as ice build-up on the aircraft begins, the flight crew should consider a plan of actions to prevent icing condition degradation.

Note

At the recommended maximum icing flight level, the remaining aircraft energy is not sufficient to climb.

Descending combines three positive effects:

1. it helps increasing speed with an energy transfer from potential energy (altitude) to kinetic energy (airspeed);
2. it immediately reduces the angle of attack and thus reduces the ice accretion;
3. more power is provided by the engines.

Severe icing conditions lead to an aircraft energy reduction associated with a significant ice accretion rate. In consequence, descending is the best way to escape severe icing conditions.

Flight in icing conditions

Due to the impact of ice accretion on aircraft flight characteristics, the minimum speed and bank angle limitation must be adapted to the encountered icing condition level. The following table summarizes the impacts of the icing condition level on the minimum speed (with its associated bank angle limitation) and on the aircraft systems:

ICING CONDITION LEVEL	BANK	MINIMUM IAS	ANTI ICING	DE ICING	ICING AOA LIGHT	FD	AP
Icing conditions	LOW	ICING BUG (VmLB0 icing)	ON	OFF	ON	YES	YES
Icing conditions	HIGH (auto computed)	ICING BUG +10 kt	ON	OFF	ON	YES	YES

cont'd... ►►►

cont'd... ►►►

ICING CONDITION LEVEL	BANK	MINIMUM IAS	ANTI ICING	DE ICING	ICING AOA LIGHT	FD	AP
Ice accretion	HIGH	ICING BUG +10 kt	ON	ON	ON	YES	YES
When leaving icing conditions	HIGH	ICING BUG +10 kt	OFF	OFF	ON	YES	YES
When aircraft is visually verified clear of ice	LOW	WHITE BUG (VmLB0 normal conditions)	OFF	OFF	OFF	YES	YES
When aircraft is visually verified clear of ice	HIGH (auto computed)	WHITE BUG +10 kt (VmHB0 normal conditions)	OFF	OFF	OFF	YES	YES
DEGRADED PERF alert	LOW	ICING BUG +10 kt	ON	ON	ON	YES	NO (a)
DEGRADED PERF alert	HIGH (auto computed)	ICING BUG +30 kt	ON	ON	ON	YES	YES
Severe icing conditions or INCREASE SPEED alert	HIGH (auto computed) (b)	ICING BUG +30 kt	ON	ON	ON	YES (b)	NO

a. YES if accelerating to ICING BUG +30 kt. b. If DEGRADED PERF or INCREASE SPEED APM alerts are triggered. If no APM alerts, accelerate and maintain IAS above ICING BUG +30 kt to use the FD and perform a HIGH BANK turn.

When a severe icing condition is detected, descend immediately, then inform Air Traffic Control. Apply the SEVERE ICING emergency procedure.

Note

When the ice detector detects ice accretion and if the FMS is in normal condition (ICING AOA label off), the FMS automatically switches from NORMAL conditions speeds to ICING conditions speeds (for example, with flaps 0, the VminOPS increases to the ICING bug).

Note

The autopilot may mask handling cues that indicate adverse changes in handling characteristics. So, the use of the autopilot is prohibited when:

- *in severe icing, or*
- *following a DEGRADED PERF alert, it is not possible to accelerate and maintain IAS above ICING BUG +30 kt, or*
- *unusual lateral trim is required while the aircraft is in icing conditions, or*
- *autopilot trim warnings are triggered while the aircraft is in icing conditions.*

Climb in icing conditions

For climb in icing conditions, the AP/FD must be used in IAS mode. IAS mode maintains the aircraft speed by adjusting the pitch, and as a result the rate of climb. Any other vertical mode (pitch hold, V/S) is prohibited in climb in icing conditions.

For the ATR 72, the recommended IAS for the climb is the highest value between:

- 170 kt, or
- ICING BUG in icing conditions, or
- ICING BUG +10 kt as soon as accretion is detected.

ATR recommends anticipating the entry into icing conditions: if the aircraft is not in icing conditions yet but approaches icing conditions (for instance, a cloud layer above and/or TAT progressively decreasing), the target IAS should be increased and the anti icing systems engaged before actually entering icing conditions.

cont'd... ►►►

cont'd... ►►►

The flight crew should monitor the rate of climb to identify any possible loss of performance. At any time above safety altitude, a decrease in performance can lead the flight crew to choose a cruise level below the initial target. Depending on the factors that influence the rate of climb (weight, temperature, turbulence...), it may not be easy for the flight crew to detect a climb performance lower than normal.

The operational ceilings are defined when the rate of climb reaches a threshold of 300 ft/min in NORMAL or ICING conditions. In icing conditions, the recommended maximum icing flight level is consistent with the operational ceiling calculated in flight planning.

Indeed, when the average climb rate reaches 100 ft/min or less, a level off will certainly not be enough to regain airspeed and the severe icing procedure has to be applied.

Cruise in icing conditions

LONG RANGE CRUISE is not permitted in icing conditions.

ATR highly recommends targeting a cruise flight level not above the recommended maximum icing flight level. This flight level ensures an appropriate margin against the minimum icing speed (40 kt).

Any ice accretion will generate an increase in drag and a decrease in airspeed. Whatever the severity of ice accretion, there will still be a loss due to ice on unprotected areas (e.g. radome, wipers, spinners...). In most situations, the use of anti and de icing systems will be enough to limit the loss of performance and it may even be almost transparent.

As soon as a loss of airspeed is identified, the flight crew should monitor that it stabilizes. If the airspeed keeps decreasing, the flight crew should take all necessary actions to maintain airspeed above ICING BUG +10 kt. To regain or maintain airspeed, a first action can be to increase the rotation speed of the propellers by setting the CL to 100 % OVRD. This helps in de icing the blades. If the IAS continues to decrease, the flight crew should define a strategy to escape from the current icing conditions (MSA, escape route...).

In any case, if the airspeed cannot be maintained above ICING BUG +10 kt, the flight crew shall immediately apply the severe icing procedure and initiate a descent.

Example: ATR 72-212A, 21 t, ISA+10, cruising at FL200: the speed target is 192 kt, the ICING BUG is 161 kt. If ice accretion occurs and IAS stabilizes around 180 kt, the flight crew shall consider a scenario in order to escape icing conditions, in addition to a close monitoring of the IAS. In this situation, it is not possible to climb with IAS above ICING BUG +10 kt and a vertical speed above 100 ft/min. Therefore the only course of action would be to descend and wait for the speed to stabilize. If the icing environment does not improve, a further descent would be initiated.

Single engine operation in icing conditions

In icing conditions, final takeoff climb, en route and drift down procedures must be performed with flaps 15.

Consequently, whenever minimum icing speeds are imposed (ICING AOA is ON) and obstacle limitations exist, single engine critical phases (final takeoff climb, en route, drift down procedures) must be performed in FLAPS 15 configuration.

Note

If no obstacle limitations exist, FLAPS 0 may be used for single engine cruise in order to benefit from a higher cruise speed but at a lower cruising altitude.

Flight Procedures in Icing Conditions

The following procedures must be applied according to the level of icing conditions:

- PROCEDURE FOR ICING CONDITIONS (normal procedure)
- CRUISE SPEED LOW (normal procedure)
- DEGRADED PERF (abnormal procedure)
- INCREASE SPEED (abnormal procedure)
- SEVERE ICING (emergency procedure)

cont'd... ►►►

cont'd... ►►►

The application of the PROCEDURE FOR ICING CONDITIONS ensures safe operation in certified icing conditions by providing a sufficient performance margin. In these conditions, the ice accretion rate does not exceed the aircraft's de icing capabilities. The performance will slightly decrease but will stabilize.

However, environmental conditions may exist that are difficult to forecast and may exceed the aircraft's de icing capabilities. Such conditions are referred to as "severe icing conditions" and require the SEVERE ICING procedure (see *Certification Framework and Case of Severe Icing* above).

To help the flight crew to detect aircraft performance degradation, the APM can trigger three levels of alert, each with its procedure:

- CRUISE SPEED LOW (normal procedure)
- DEGRADED PERF (abnormal procedure)
- INCREASE SPEED (abnormal procedure)

ANOR.8.1.2 Ground Icing Conditions

Ident.: ANOR.8.1.2	06 NOV 2026
	ALL

Definitions

Ground icing conditions may be expected when the OAT is at or below 5 °C and contaminants such as snow, standing water or slush are accumulated on ground surfaces (ramps, taxiways or runways). See LIM.4.4.1.

Aircraft critical surfaces can also be contaminated by moisture present in the form of either precipitation (snow, rain, drizzle, fog) or condensation.

Ice or frost may also build up when the aircraft is exposed to any form of moisture:

- After the surfaces were cold-soaked during a previous cruise flight at high altitude, or
- After the aircraft was refueled with cold fuel, or
- After the aircraft was exposed to low overnight air temperatures.

Technical Aspects

Effect of aircraft contamination on ground

When the aircraft encounters ground icing conditions, critical aircraft surfaces and systems may be covered with frozen contaminants that can significantly affect the aerodynamic characteristics. The aircraft performance is certified based upon an uncontaminated or clean structure. Ice, snow or frost accumulations disturb the airflow, affecting lift and drag, and also increase weight.

Premature aerodynamic stall or out of trim on the pitch axis associated with degraded handling qualities can be a direct consequence of a takeoff with a contaminated airframe.

Correct functioning of aircraft systems such as the powerplant (engine and propeller), landing gear doors, braking, air data system, flight control surfaces and actuators can be drastically affected by contamination on ground.

Aircraft critical surfaces

The following parts of the aircraft must be considered as aircraft critical surfaces:

- Wing surfaces including leading edges
- Horizontal stabilizer upper and lower surface
- Vertical stabilizer and rudder
- Fuselage
- Air data probes
- Landing gear and brake
- Static vents

cont'd... ►►►

cont'd... ►►►

- Angle-of-attack sensors
- Control surface cavities
- Engines
- Generally intakes and outlets
- Landing gear doors

Clean aircraft concept

The clean aircraft concept as described in ICAO Doc 9640, Chapter 2, is as follows:

During conditions conducive to aircraft icing on ground, take-off shall not be attempted when ice, snow, slush or frost is present or adhering to the wing, tail, control surfaces, engine air inlets or propellers.

Any deposit of ice, snow or frost on the external surfaces of an aircraft may drastically affect its performance due to reduced aerodynamic lift and increased drag resulting from the disturbed airflow. Furthermore, slush, freezing snow or ice may cause moving parts, such as control surfaces and flap-actuating mechanisms, to jam, thus creating a hazardous situation. These adverse effects on the aerodynamic properties of the airfoil may result in a sudden departure from the commanded flight path and may not be preceded by any cockpit indications or aerodynamic warnings to the pilot.

A large number of variables can influence the formation of ice and frost and the accumulation of snow and slush causing surface roughness on an aircraft. These variables include:

- Ambient temperature
- Aircraft skin temperature
- Precipitation rate and moisture content
- De icing / anti icing fluid temperature
- The fluid/water ratio of the de icing and anti icing fluid
- Relative humidity
- Wind velocity and direction.

They can also affect the de icing capabilities of de icing fluids and the anti icing capabilities of anti icing fluids. As a result, a well-defined time for the protection provided by an anti icing fluid cannot be established.

Numerous techniques for complying with the clean aircraft concept have been developed. The application of adequate de icing, followed by an application of appropriate anti icing fluid, provides the best protection against contamination. A visual or physical check of critical aircraft surfaces, to confirm that the treatment has been effective and the aircraft is in compliance with the clean aircraft concept, must be carried out.

WARNING

TAKEOFF ONLY WITH CLEAN AIRCRAFT.

Guidance for Ground Icing Conditions Operation

SIMULATOR NOTE

The sim does not build frost, snow or ice on the parked airframe, and the EFB ground services have no de icing / anti icing truck. The preflight checks and the de icing technique below are given for procedural practice; the in-flight ice accretion model starts on the climb out.

Flight preparation - performance penalties

See the wet and contaminated runways operations and the contaminated runway performance.

Preflight check

When potential contamination of the aircraft is expected to occur, preventive measures shall be taken to prevent contaminant accumulation on critical surfaces while the aircraft is parked.

cont'd... ►►►

cont'd... ►►►

The aircraft is considered contaminated if one of the following external conditions is present on one or more of the aircraft critical surfaces:

CONTAMINANT	DESCRIPTION
Hoar frost	A rough white deposit of crystalline appearance formed at temperatures below freezing point. It usually occurs on exposed surfaces on a cold and cloudless night. It frequently melts after sunrise; if it does not, an approved de icing fluid should be applied in sufficient quantities to remove the deposit. Generally, hoar frost cannot be cleared by brushing alone. Thin hoar frost is a uniform white deposit of fine crystalline texture, which is thin enough to distinguish surface features underneath, such as paint lines, markings, or lettering.
Rime	A rough white covering of ice deposited from fog at temperature below freezing point. As the fog usually consists of super-cooled water drops, which only solidify on contact with a solid object, rime may form only on the windward side or edges and not on the surfaces. It can generally be removed by brushing, but when surfaces as well as edges are covered it will be necessary to use an approved de icing fluid.
Glaze ice or rain ice	A smooth coating of clear ice formed when the temperature is below freezing point and freezing rain contacts a solid surface. It can only be removed by de icing fluid; hard or sharp tools should not be used to scrape or chip the ice off as this can result in damage to the aircraft.
Dry snow	Normally experienced when temperatures are below freezing; it can be brushed off easily, while wet snow (normally experienced at temperatures above freezing) is more difficult to remove, being sufficiently wet to adhere.
Slush	Water saturated with snow, which spatters when stepping firmly on it. It is encountered at temperatures around 5 °C.
Light freezing rain	A precipitation of liquid water particles which freezes upon impact with exposed objects, in the form of drops of more than 0.5 mm (0.02 inch) which, in contrast to drizzle, are widely separated. Measured intensity of liquid water particles is up to 2.5 mm/h (0.1 in/h) or 25 grams/dm²/hour with a maximum of 2.5 mm (0.1 in) in 6 min.
Freezing drizzle	A fairly uniform precipitation composed exclusively of fine drops (diameter less than 0.5 mm (0.02 in)) very close together, which freezes upon impact with the ground or other objects.

CAUTION

ATR recommends to delay takeoff if freezing rain and/or freezing drizzle is observed.

Preflight check - preliminary procedure

The following path should be followed in order to know whether a deep external inspection needs to be carried out or not:

- Activation of the spoilers is a good clue to assess whether the upper wing surface is contaminated or not: the colour is bright, or on the contrary it is dull and therefore contaminated by frost.
- Pass the hand on the top of the passenger door during the preflight (standing on the last step of the staircase) in order to evaluate a possible frost on the fuselage and especially its type (fresh snow, melted snow, ice, etc.). This position also gives a very good angle of view on the left wing, since the eyes are almost at the height of the upper surface and the top of the wing.

CAUTION

When the cabin is heated on ground, passing the hand on the top of the passenger door is not necessarily adequate to evaluate a possible frost on the fuselage. In case of doubt, a detailed visual inspection has to be carried out.

Preflight check - exterior safety inspection

To ensure that takeoff is performed with a clean aircraft, an external inspection has to be carried out, bearing in mind that a phenomenon such as clear ice cannot be visually detected. Devices such as a platform or ladder are necessary to conduct an effective inspection of elevated surfaces (wing, horizontal stabilizers).

cont'd... ►►►

cont'd... ►►►

Thin hoarfrost on the upper surface of the fuselage might be the evidence of hoarfrost on other aircraft critical surfaces.

Note

Thin hoarfrost is typically a white crystalline deposit which usually develops uniformly on exposed surfaces on cold and cloudless nights; it is so thin that a person can distinguish surface features (lines or markings) beneath it.

Perform the exterior safety inspection:

► FOLLOWING COMPONENTS ..... CHECKED FREE OF FROST, ICE AND SNOW

Aircraft critical surfaces.
Landing gear assemblies (including brakes) and tires, landing gear doors.
Engine inlets, inlet lips, propeller blades and spinners.
Drains, bleeds, probes (pitots, static ports, TAT sensors, angle of attack sensors).
Fuel tank ventilation.
Radome.
Verify that the commercial water supplies are not frozen and have been refilled (these should have been emptied prior to the cold soak).

If one of the elements listed above is found contaminated, the anti-de icing procedure has to be carried out.

In addition, if no contamination is found but precipitation is present or expected prior to takeoff, the anti icing procedure should be considered based on factors such as:

- Outside air temperature
- Aircraft skin temperature
- Tank fuel temperature
- And other factors based on operator experience.

CAUTION

All external surfaces must be clear of snow, frost and ice before takeoff.

Particular case: limited frost accretion on lower wing surfaces due to cold fuel remaining and high ambient humidity.

As stated in the operational requirements, takeoff is prohibited when frost, snow or ice is adhering to the wing, control surfaces or propeller of the aircraft. Frost degrades the airfoil aerodynamic characteristics.

Note

Frost is a light, powdery, crystalline ice which forms on the exposed surfaces of a parked aircraft when the temperature of the exposed surfaces is below freezing (while the free air temperature may be above freezing).

However, takeoff can be conducted only if:

- The frost is limited to the lower surface of the wing only
- The frost is due to cold fuel remaining and high ambient humidity
- Frost thickness is limited to 2 mm
- A visual check of the leading edge, upper surface of the wing, control surfaces and propellers is performed to make certain that those surfaces are totally cleared of ice
- The performance decrement and procedures defined for takeoff in atmospheric icing conditions are applied.

cont'd... ►►►

cont'd... ►►►

Ground de icing and anti icing procedure

De icing, anti icing and holdover time (HOT): the HOT is the estimated time the anti icing fluid will prevent the formation of ice and frost, and the accumulation of snow, on the protected (treated) surfaces of an aeroplane.

External de icing and anti icing will be performed as close as possible to the takeoff time in order not to exceed the holdover time. Type I (low viscosity) or type II/III/IV (high viscosity) fluids are used for these operations. The type II/III/IV fluids are used for their anti icing qualities.

Numerous factors can affect the de icing and anti icing performance and HOTs of fluids. The operator must refer to the published and approved HOT tables applicable to the fluids used for de icing and anti icing.

Aircraft preparation

With both engines shut down (no GPU), external de icing and anti icing can be performed provided that:

- All doors and emergency exits are closed.
- When possible, the aircraft is in upwind orientation.
- Parking brake is engaged and chocks installed.
- Blanking and protective equipment, NACA ports, air conditioning inlets, static ports, Pitot probes and temperature sensors should be installed.

With both engines shut down (with GPU), external de icing and anti icing can be performed provided that:

- All doors and emergency exits are closed.
- When possible, the aircraft is in upwind orientation.
- Parking brake is engaged and chocks installed.
- De icing and anti icing gantry is not used.
- Blanking and protective equipment are not used.
- The manual procedure is applied (with a de icing nozzle from a movable access platform) to avoid any fluid spray in engines, NACA ports, air conditioning inlets, static ports, Pitot probes and temperature sensors.

With hotel mode running, external de icing and anti icing can be performed provided that:

- All doors and emergency exits are closed.
- When possible, the aircraft is in upwind orientation.
- Parking brake is engaged.
- Bleeds are OFF.
- De icing and anti icing gantry is not used.
- Blanking and protective equipment are not used.
- The manual procedure is applied (with a de icing nozzle from a movable access platform) to avoid any fluid spray in engines, NACA ports, air conditioning inlets, static ports, Pitot probes and temperature sensors.

Control surface positions

For de icing and anti icing procedures, maintain the pitch control with the gust lock engaged or manually in neutral position.

In the case of communication between ground and cockpit, the procedures can be enhanced as follows:

- For de icing operation:
  - o With the control column in full back position (horizontal stabilizer in full up position) when fluid is sprayed from underneath the surfaces.
  - o With the control column in full forward position (horizontal stabilizer in full down position) when fluid is sprayed from above the surfaces.
- For anti icing operation:
  - o With the control column in full forward position (horizontal stabilizer in full down position).

cont'd... ►►►

cont'd... ►►►

Set the flaps in takeoff configuration for both de icing and anti icing procedures.

Engine use

During de icing and anti icing procedures, both propellers must be stopped and no propeller blade should be at the 6 o'clock position.

De icing and anti icing must be performed symmetrically. The left side and the right side must receive the same and full treatment, regardless of the status of the aircraft before beginning the procedure. Aerodynamic drag could result if this requirement is not met.

Ground crew precautions (from the de icing diagram):

- 1.5 PSI maximum on fairings / fillets.
- Maximum fluid temperature 60 °C (140 °F) on the propeller blades.
- Avoid direct spraying; spray with the wind direction.
- Do not spray when a blade is at the 6 o'clock position.
- Air intake protection is recommended.
- Special attention to the gap, which must be free of contaminant after de icing / anti icing.

WARNING

ANTI-ICING PROCEDURE CAN ONLY BE PERFORMED ON AN AIRCRAFT PREVIOUSLY CLEARED OF ALL ICING, ICE OR SNOW. FURTHERMORE RESIDUES THAT REMAIN FROM PREVIOUS DEICING AND ANTI-ICING FLUID APPLICATIONS MUST BE REMOVED. IF AN ADDITIONAL TREATMENT IS REQUIRED AFTER PREVIOUS ANTI-ICING, IT IS PROHIBITED TO PERFORM NEW ANTI-ICING WITHOUT WASH OR DEICE THE AIRCRAFT BEFORE.

The selection of the de icing process depends on several parameters. The operator selects the appropriate method (one step or two step procedure, fluid type and mixture) based on its experience and the prevailing weather, using SAE AS6285 or ICAO Doc 9640 recommendations for de icing and anti icing aircraft on the ground and the FAA / TC holdover time tables.

Takeoff procedure after de / anti icing operation

1) Takeoff after use of anti icing fluids type II, III or IV

One of the characteristics of the anti icing fluids type II, III and IV is their high viscosity. During the takeoff roll, as the airflow increases, the fluid is spread through the elevator gap and over the lower surface of the elevator.

As the rotation speed of an ATR is rather low, the fluid may not be entirely blown away and may partially obstruct the elevator gap, changing the airflow around the elevator surfaces. This may result in a significant increase in the control forces necessary to rotate. These increased pitch forces are strictly limited to the rotation phase and disappear after takeoff.

Although not systematic, this phenomenon should be anticipated and discussed during the pre-takeoff briefing each time anti icing procedures are performed. Two takeoff procedures are available depending on crew training: takeoff after use of fluids II or IV, and takeoff after use of fluids III.

2) Tail plane badly de iced

During the inspection, the wings may be clear of ice but not the tail plane. In the event of a lack of de icing, or improper de icing of the tail plane, the handling qualities of the aircraft could be affected.

Experience has shown that with a contaminated tail plane, the aircraft has a tendency to pitch up. This effect is further exacerbated with increasing airspeed. In this situation, the aircraft is "light" to rotate and quite an unusual amount of nose down pitch trim is required during climb out and acceleration. The maximum pitch down trim may be reached, generating a "PITCH MISTRIM" message.

cont'd... ►►►

cont'd... ►►►

In such a case, the airspeed shall be decreased as far as possible to limit the pitch down force required and a landing shall be performed.

3) Fluid residues

Dried fluid residues can appear:

- When surfaces have been treated but the aircraft has not subsequently been flown or not been subject to precipitation. The fluid may then have dried on the surfaces.
- After repetitive application of thickened de icing / anti icing fluids. It may lead to the formation / build-up of a dried residue in aerodynamically quiet areas, such as cavities and gaps.

This residue may re-hydrate if exposed to high humidity conditions, precipitation, washing, etc., and increase to many times its original size / volume. This residue will freeze if exposed to conditions at or below 0 °C. This may cause moving parts such as elevators, ailerons and flap actuating mechanisms to stiffen or jam in flight. Re-hydrated residues may also collect inside control surface structures and cause clogging of drain holes or imbalances of the flight controls.

It is therefore recommended to:

- Inspect the aircraft periodically during the winter period, when Type II, III or IV fluids are used.
- Note the type and location of de icing / anti icing fluid residues.
- Do the two step procedure whenever possible to prevent fluid residue accumulation.

ANOR.8.1.3 Operation on Contaminated Runway

Ident.: ANOR.8.1.3 — 06 NOV 2026
ALL

Contaminated runway conditions

A runway is considered contaminated when more than 25 % of the surface is covered with a contaminant; contaminants are water, slush, snow and ice.

Contaminant affects:

- Braking efficiency
- Aircraft directional control

Contaminant may adhere to the wheel brakes when taxiing on contaminated ramps, taxiways and runways.

During takeoff, there is no projection on the wings or engine nacelles, but contaminant might affect the propellers.

The maximum recommended crosswind on a runway that is not dry is in LIM.4.2.2.

Taxi on contaminated runway

- The standard single engine taxi procedure can still be used provided the friction coefficient remains at or above 0.3 (braking action medium, snowtam code 3) and nose wheel steering is not used with too large deflections.
- For taxiing with very low friction coefficients (icy taxiways, slush), it is recommended to use both engines, limit nosewheel travel and use differential power as necessary.

Note

If the OAT is very low, it is necessary anyway to start up engine 1 early enough to get the necessary oil warm up time.

Brakes heating before takeoff

If the contaminant layer is significant enough to possibly accumulate in the brake area during ground operation, the brake disks can join due to icing during the flight, resulting in possible tire damage at the subsequent landing.

The following special procedure should be applied during taxi, before and as close as possible to takeoff:

cont'd... ►►►

cont'd... ►►►

■ **During 30 s**

► PL ..... SET TQ TO 18 %
► BRAKES ..... APPLY TO KEEP SPEED DOWN TO A "MAN PACE"
► NOSE WHEEL STEERING ..... MINIMIZE USE

This procedure ensures a symmetrical warming up of the brakes.

Takeoff on contaminated runway

Standard takeoff procedures are used with the following additions:

- If the runway is contaminated (ice, snow, slush), use the relevant performance penalties defined in the performance section (contaminated runway, advisory material).
- Use of reverse on contaminated runways has to be limited to very low speeds to avoid contaminant projections at the level of the cockpit windshield, which may reduce visibility to zero (snow, slush).
- In atmospheric icing conditions, refer to the appropriate speeds and performance penalties, and add the following: with very cold OAT, delay the start of the takeoff roll until the oil temperature is at least 45 °C (this is necessary to guarantee the inlet splitter de icing capability).

Takeoff procedure on contaminated runway without atmospheric icing conditions:

■ **Before takeoff**

► PROP ANTI ICING ONLY ..... ON

Only this anti-ice system must be set to ON.

■ **After takeoff**

► LANDING GEAR (if possible) ..... CYCLE
► PROP ANTI ICING ..... AS RQRD

Additional information:

- V2 is not impacted.
- HORNS ANTI ICING must not be selected ON, to avoid the ICING AOA switching ON.
- When the anti icing procedure using type II/IV fluids is performed, see *Takeoff procedure after de / anti icing operation* in Ground Icing Conditions.
- Landing gear cycling after takeoff with a significant layer of contaminant on the runway (slush, snow) is highly recommended to avoid brakes freezing, especially if the brakes heating before takeoff procedure (see *Taxi on contaminated runway*) has not been followed for any reason.

Before landing

Before landing, the brake disks can be seized by slush or snow if:

- At the departure airport:
  - o the aircraft was exposed to snow precipitation, or
  - o taxiing has been performed on slush contaminated taxiways, or
  - o takeoff has been performed on a slush contaminated runway
- The temperature remains below freezing during climb, cruise and descent until touch down.

To prevent tire damage at touch down, the following procedure must be applied on final approach:

■ **When landing gears are down**

► ANTISKID ..... OFF
► PEDALS BRAKES ..... PRESS AT LEAST 5 TIMES
► ANTISKID ..... ON

cont'd... ►►►

cont'd... ►►►

Landing

Reverse may be used during the landing roll. Apply the related performance restrictions.

During taxi, use of reverse on contaminated runways / taxiways / ramps has to be limited to avoid contaminant projections at the level of the cockpit windshield, which may reduce visibility (snow, slush).

SIMULATOR NOTE

The sim does not model contaminant freezing in the brake disks, so the brake heating, gear cycling and antiskid-off brake pumping procedures have no effect in the sim; fly them for practice.

ANOR.8.1.4 Cold Weather Operation

Ident.: ANOR.8.1.4 — 06 NOV 2026

ALL

Cockpit preparation

Perform the normal cockpit preparation with the following procedure modifications:

► AVIONICS VENT OVBD VALVE sw ..... FULL CLOSE

The OVBD VALVE is closed to improve the warm up of the cabin.

■ If engine 2 air intake and both packs inlets are free of snow, frost, and ice

► ENG 2 in hotel mode ..... START

See Hotel Mode Start Up.

Additional information:

1. Starting on the aircraft batteries is possible without special precautions down to −15 °C / 5 °F. For cold soak at significantly lower temperatures, it is recommended to remove the batteries and keep them in heated storage.
2. When starting the engine in cold conditions:
   - Start up time is slightly increased
   - Oil pressure rising time is considerably increased: the ENG 1(2) OIL LO PR red warning may be activated for 60 s
   - After the initial increased rising time, OIL PRESS will be higher than usual (up to 70 psi for several minutes)
   - Propeller unfeathering may not occur normally. If NP does not increase correctly, revert to the FEATHER position until the oil temperature is above 0 °C.
3. PL motion above GI is only permitted when OIL TEMP is at or above 0 °C. This warm up time can take up to 4 min when OAT is −35 °C / −31 °F.
4. During cockpit preparation, both packs should be used to warm up the cabin and cockpit whilst running engine 2 in hotel mode. Using gust lock stop power with HI FLOW selected (together with all doors, particularly cargo, closed) is recommended for warm up with OAT below −15 °C / 5 °F.
5. Below −15 °C / 5 °F, several items of equipment (e.g. fuel flow, pressurization indication, FGCP) may not be working INITIALLY but should automatically recover as the cabin and cockpit warm up and the compartment temperature rises.

SIMULATOR NOTE

With the oil below 0 °C the engine stays at idle power whatever the PL position, so wait for 0 °C before moving the PLs above GI. The cold equipment start-up failures of item 5 are not modelled.

At parking - before leaving the aircraft

Parking brake: when OAT is below −5 °C / 23 °F, particularly in wet conditions, avoid leaving the aircraft with the parking brake engaged and use chocks instead whenever possible.

cont'd... ►►►

cont'd... ►►►

Propeller brake: avoid immobilization of the aircraft with the propeller brake engaged if severe cold soak is expected (temperature ≤ −20 °C for a prolonged time).

Commercial water tank: precautions against freezing of the commercial water supplies must be taken in cold weather operation.

ANOR.8.2 Operations in Wind Conditions

Ident.: ANOR.8.2 — 06 NOV 2026
ALL

1) General

The recommended landing flap configuration is the same as the standard landing flap setting, even with strong crosswind. Large flap extension does not impair the controllability in any manner. Moreover, it minimizes the flare duration and enables a quicker speed decrease down to the taxi speed.

Depending on wind force and direction, check the related chapters for other precautions or special instructions.

2) Crosswind takeoff

Note

Use nosewheel steering up to 70 kt to maintain the runway axis. Above 70 kt, use the rudder pedals to maintain the runway axis.

See the normal procedure Takeoff.

3) Crosswind landing

The maximum demonstrated crosswind value is given in LIM.4.2.2 Crosswind. This value indicates the maximum crosswind for which the ATR aircraft landing capability was demonstrated during flight tests. Consider this value as the maximum recommended crosswind.

Note

In the case of special operations, specific wind limitations may be applied.

The operators may consider establishing operating conditions, based on crew experience or airfield specificities, for which the maximum crosswind would be reduced.

During the approach briefing, the pilot flying shall evaluate his/her own ability to land in the announced crosswind condition and get prepared for a go-around and/or a diversion.

Note

The maximum recommended crosswind applicable in the case of a contaminated runway is also given in LIM.4.2.2.

a) Crabbed approach

It is recommended to perform a crabbed approach with wings levelled and drift correction.

Disconnection of the autopilot and yaw damper should occur at the latest at 500 ft above the airfield in order to have time to establish manual control.

cont'd... ►►►

cont'd... ►►►

Note

VAPP = MAX {VmHB; VMCL} + Wind Factor

Wind Factor = the highest of:

- *1/3 of the headwind component, or*
- *The gust reported.*

The maximum Wind Factor is 15 kt.

Crosswind conditions are often associated with turbulence. In any case, the crew shall strictly adhere to the stabilized approach criteria in force within the applicable operator Standard Operating Procedures. Any deviation shall be called out and corrected. Performing a go-around is an option that shall be considered at any time until a safe landing is ensured.

During final approach, the crew shall pay particular attention to changes in wind direction and strength and maintain a high level of cooperation.

b) Flare and decrab

The pilot flying decrabs the aircraft by coordinating simultaneously:

- Downwind rudder input, in order to align the aircraft nose with the runway axis,
- with into wind aileron input, in order to maintain the runway track.

Note

Wing tip ground clearance gives a roll angle limited to 17°.

This manoeuvre shall be initiated at the latest at 20 ft height.

The power reduction shall be initiated passing 20 ft. The touchdown shall occur with the power levers at Flight Idle.

In coordination with the power reduction, the pilot flying progressively adjusts the aircraft pitch to flare the aircraft, until the upwind main landing gear contacts the runway.

c) Landing roll

During the landing roll, the pilot flying:

- Uses the rudder pedals to keep the airplane on the runway axis; any heading deviation must be corrected smoothly, especially into the wind direction. Aircraft alignment requires less effort on the rudder pedals into the wind direction (upwind) than in the downwind direction (decrab). This behaviour is due to the following factors:
  - o the weathercock effect makes the aircraft turn into the wind direction (upwind direction),
  - o rudder efficiency is greater when turning the aircraft into the wind direction,
  - o without effort on the rudder pedals, the rudder is naturally deflected into the wind direction.
- Holds the control column in nose down position to increase directional efficiency,
- Keeps aileron input into the wind, increasing the deflection proportionally to the speed decrease to keep the wings level (up to maximum deflection if necessary),
- Applies braking to minimize the time of exposure to the crosswind effect.

Note

In case of insufficient aileron input, crosswind gusts could lift the upwind wing, reduce the aircraft ground contact and could make the aircraft turn into the wind (weathercock effect).

cont'd... ►►►

cont'd... ►►►

Note

Asymmetrical braking can also be used to assist lateral control, as rudder efficiency decreases with airspeed.

Below 70 kt, the CM1 controls the airplane alignment with the nose wheel steering, and the CM2 maintains aileron input into the wind and the control column in nose down position until the aircraft comes to a complete stop.

PAGE

INTENTIONALLY

LEFT BLANK

ANOR.9 FLIGHT PATTERNS

ANOR.9.1 Introduction

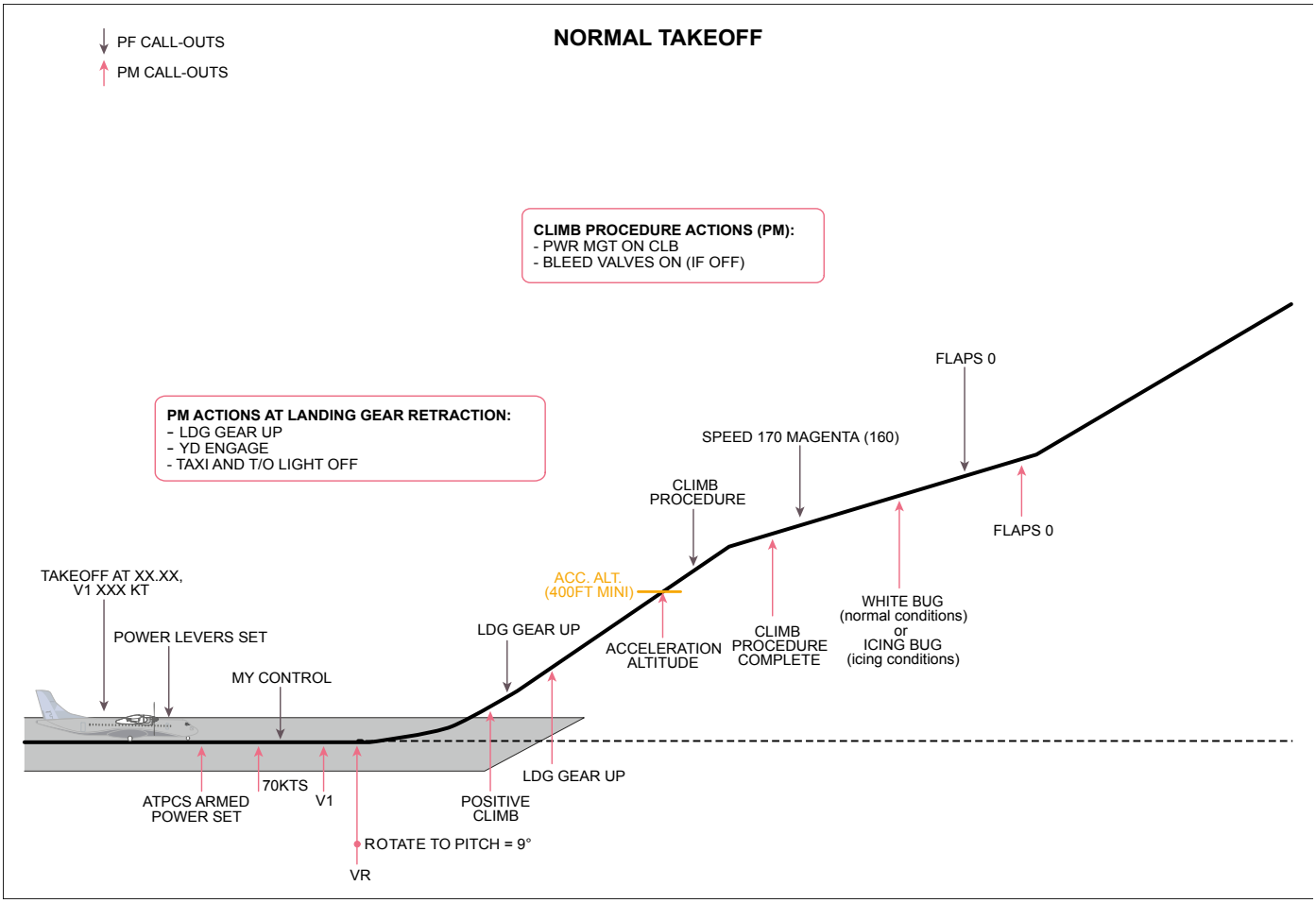
Ident.: ANOR.9.1 — 06 NOV 2026
ALL

Here are some examples to illustrate a possible application of the normal procedures in a typical case, and that they are provided for information only. All boxed items are actions.

Down arrows are PF call-outs, up arrows are PM call-outs.

ANOR.9.2 Normal Takeoff

Ident.: ANOR.9.2 — 06 NOV 2026
ALL



NORMAL TAKEOFF

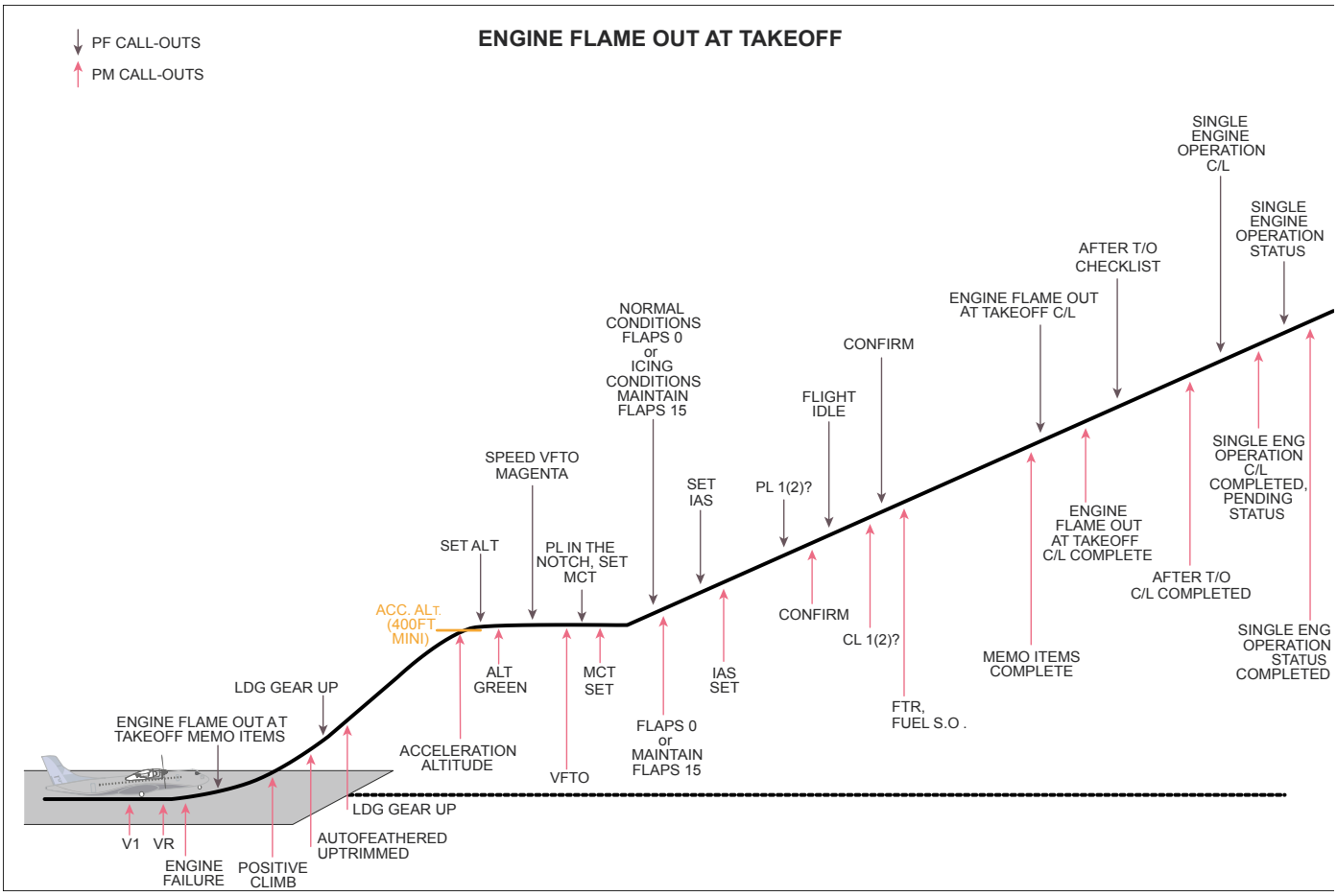
cont'd... ►►►

cont'd... ►►►

ANOR.9.3 Engine Flame Out at Takeoff

Ident.: ANOR.9.3 — 06 NOV 2026

ALL



ENGINE FLAME OUT AT TAKEOFF

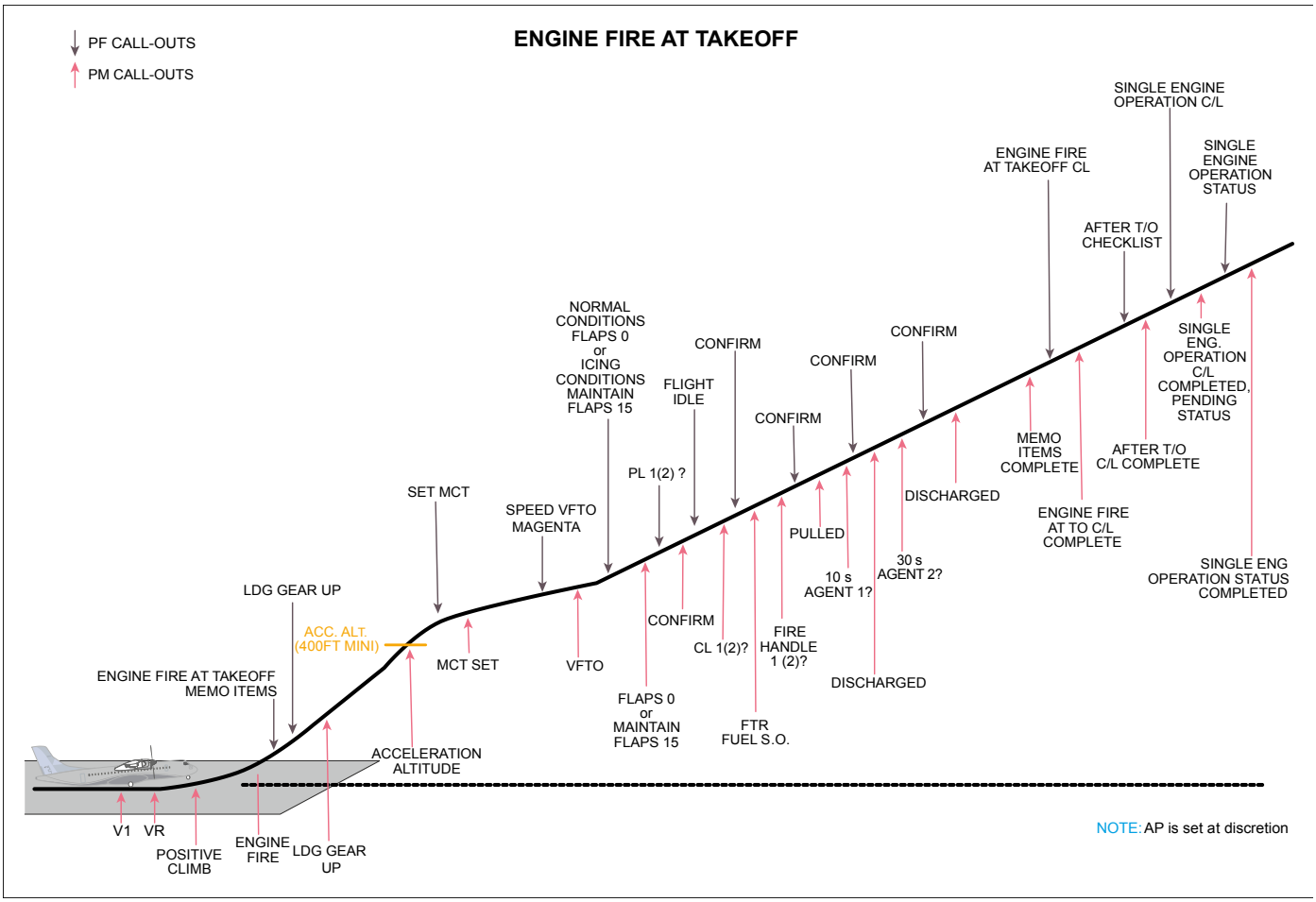
cont'd... ►►►

cont'd... ►►►

ANOR.9.4 Engine Fire at Takeoff

Ident.: ANOR.9.4 — 06 NOV 2026

ALL



ENGINE FIRE AT TAKEOFF

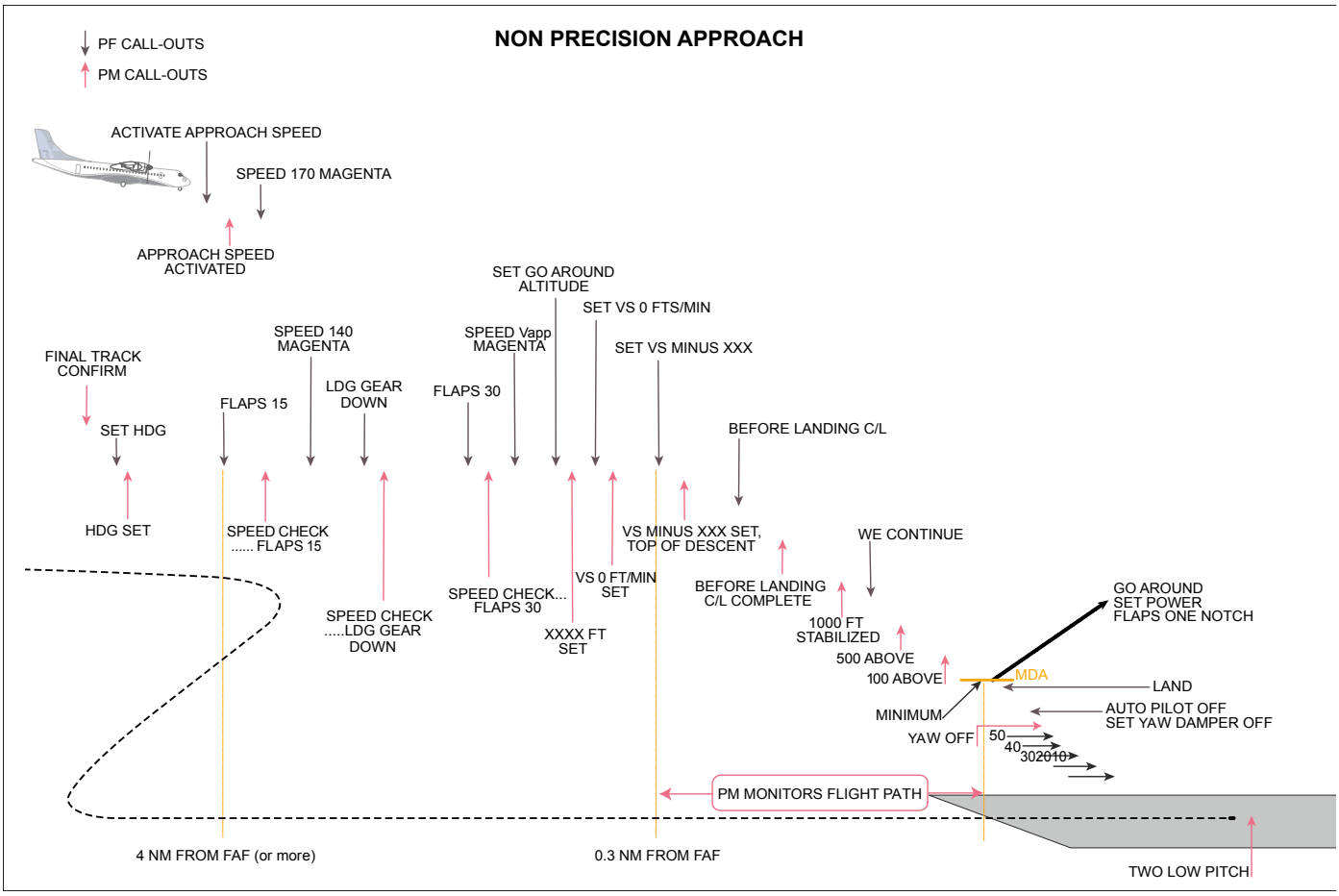
cont'd... ►►►

cont'd... ►►►

ANOR.9.5 Non Precision Approach

Ident.: ANOR.9.5 — 06 NOV 2026

ALL



NON PRECISION APPROACH

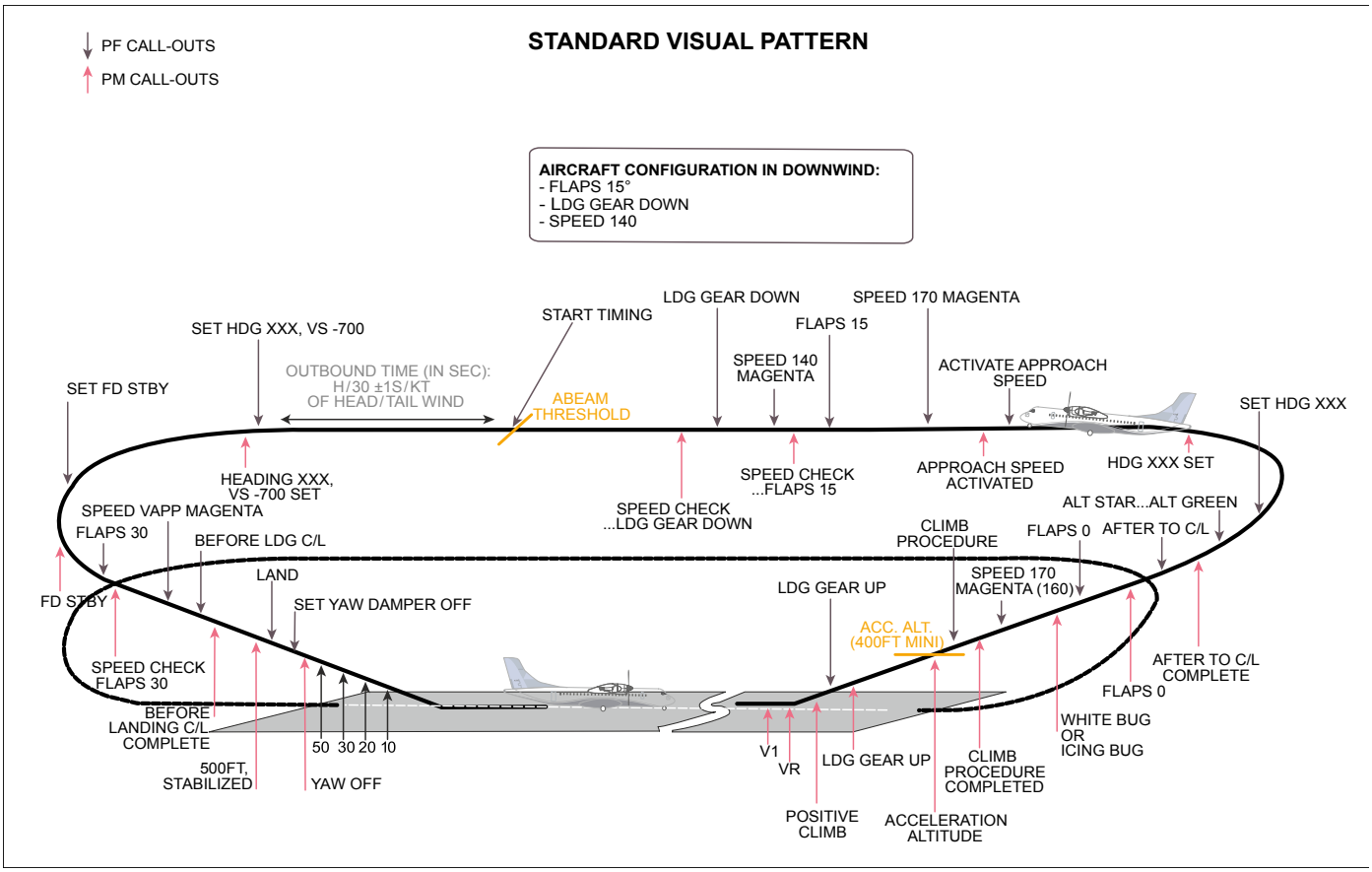
cont'd... ►►►

cont'd... ►►►

ANOR.9.6 Standard Visual Pattern

Ident.: ANOR.9.6 — 06 NOV 2026

ALL



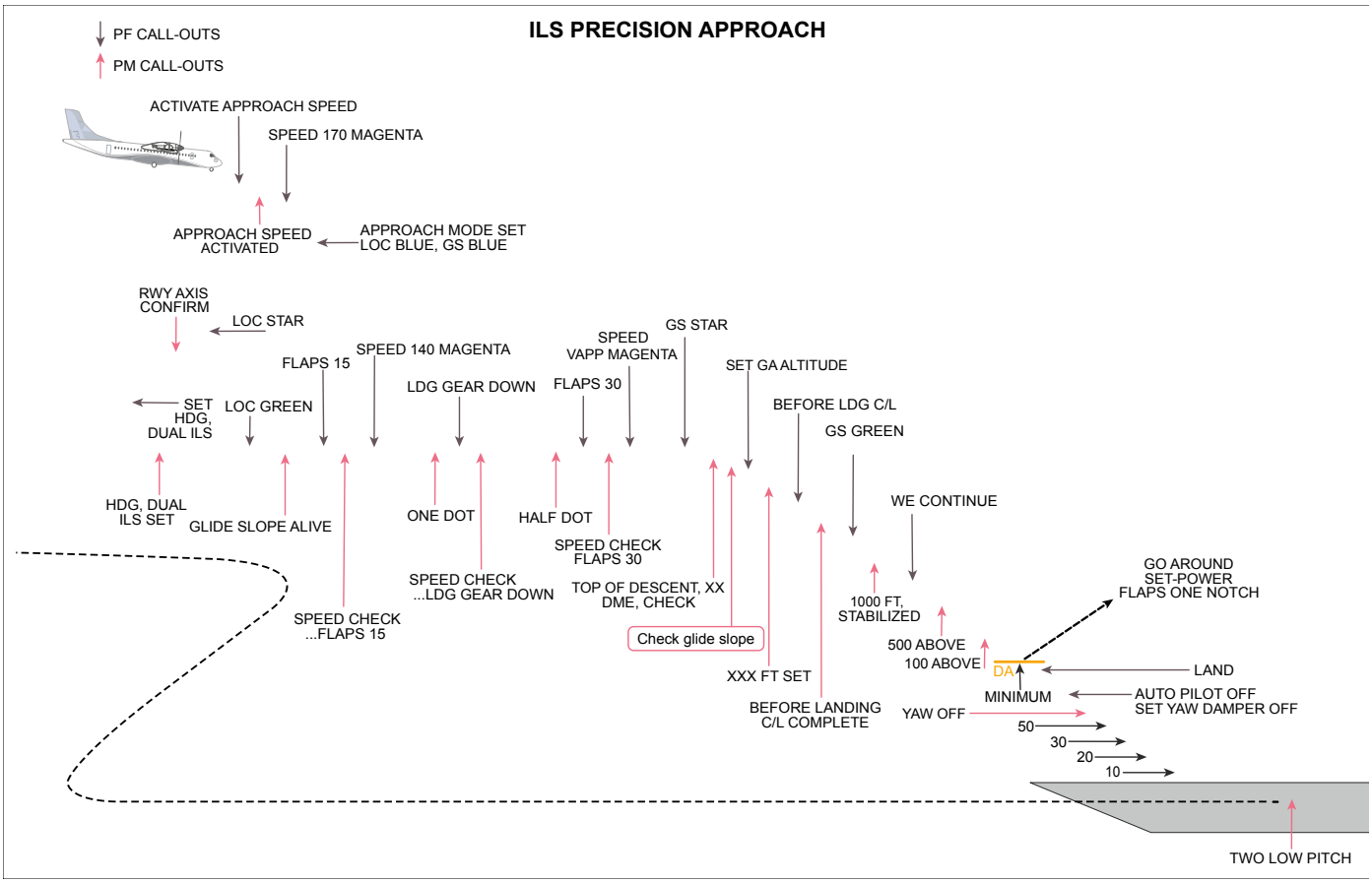
STANDARD VISUAL PATTERN

cont'd... ►►►

cont'd... ►►►

ANOR.9.7 ILS Precision Approach

Ident.: ANOR.9.7 — 06 NOV 2026
ALL



ILS PRECISION APPROACH

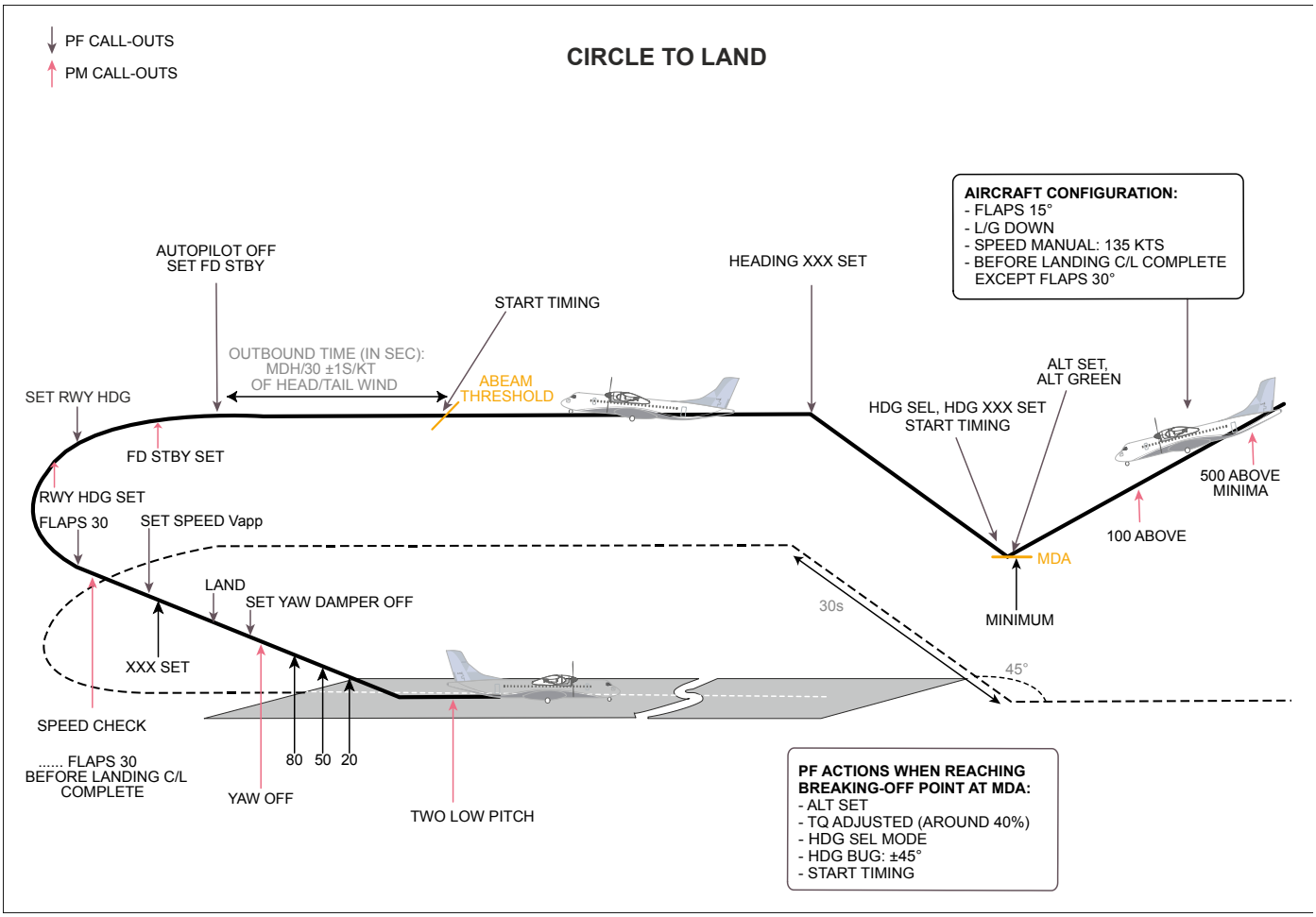
cont'd... ►►►

cont'd... ►►►

ANOR.9.8 Circle to Land

Ident.: ANOR.9.8 — 06 NOV 2026

ALL



CIRCLE TO LAND

cont'd... ►►►

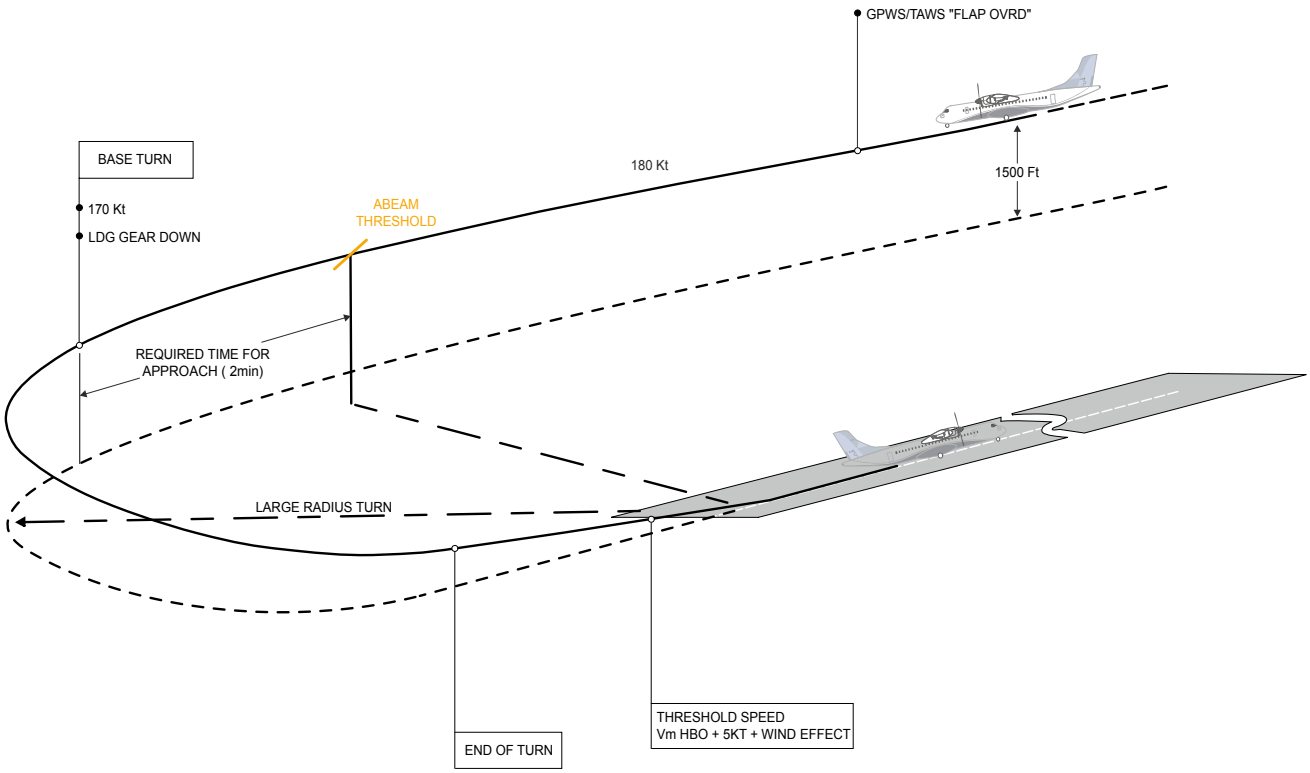
cont'd... ►►►

ANOR.9.9 No Flaps Landing

Ident.: ANOR.9.9 — 06 NOV 2026

ALL

NO FLAPS LANDING



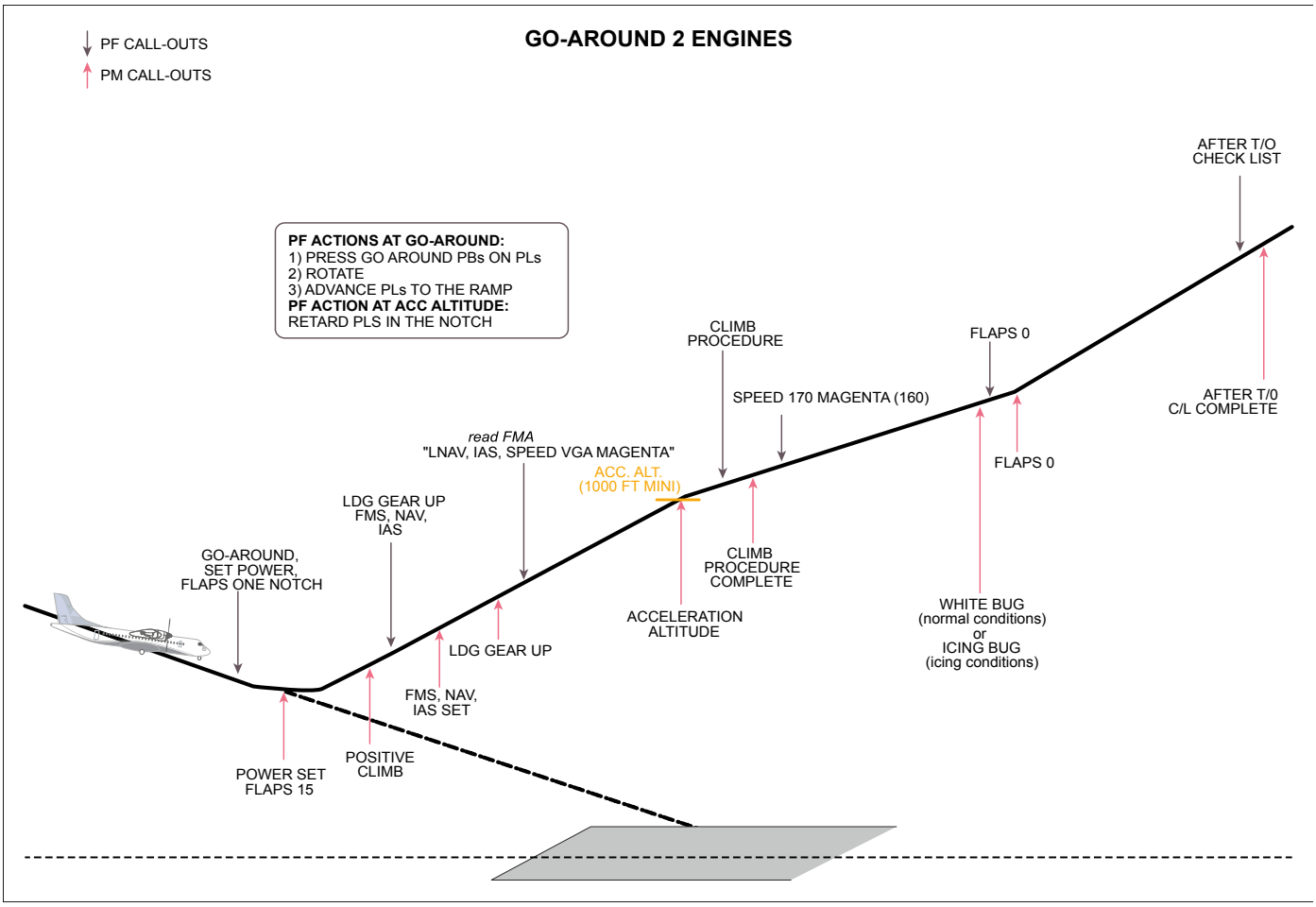
NO FLAPS LANDING

cont'd... ►►►

cont'd... ►►►

ANOR.9.10 Go-Around 2 Engines

Ident.: ANOR.9.10 06 NOV 2026
ALL



GO-AROUND 2 ENGINES

ANOR.10 OPERATIONS WITHOUT USE OF PROPELLER BRAKE

ANOR.10.1 Operations Without Use Of Propeller Brake

Ident.: ANOR.10.1 06 NOV 2026
ALL

Without the use of propeller brake, Hotel Mode is not available.

CAUTION

Vehicles and ground crew must remain clear of aircraft danger areas when aircraft engines are running.

As GPU and refueling connections are on the right aircraft side, ATR recommends the flight crew to perform the following steps:

1) Before engine start. All doors must be closed. Flight crews must perform the Before Propeller Rotation procedure.

cont'd... ►►►

cont'd... ►►►

2) Engine start. Use of GPU is highly recommended. Start Engine 1 before Engine 2 (in order to safely disconnect the GPU).

3) After landing. Shut down Engine 2.

4) At parking. In case of Short Transit, use of GPU is highly recommended.

See Hotel Mode Start Up for the normal sequence with the propeller brake.

NSU.21 AIR CONDITIONING

NSU.21.1 OVBD Valve Operation on Ground

Ident.: NSU.21.1 — 06 NOV 2026
ALL

When the OVBD VALVE CTL sw is set to AUTO, the extract fan runs continuously and the OVBD valve is:

- open as long as engine 1 is not running (oil low PRESS signal), or
- closed as soon as engine 1 is running.

After boarding, with the door closed and engine 1 not running (OVBD valve open), if the OVBD VALVE CTL sw remains in AUTO the extract fan suction creates a very noticeable pressurization change. This is more pronounced with a GPU than in hotel mode, because there is no inlet air flow.

To avoid it, when the cockpit preparation is performed and in any case before closing the passenger door, the cockpit communication hatch must be opened. It is closed after engine 1 start.

Note

Before closing, the temperature selectors can be set to FULL COLD to limit the packs air flow and therefore avoid a pressure shock.

NSU.21.2 Air Conditioning

Ident.: NSU.21.2 — 06 NOV 2026
ALL

When operating from airfields with high OAT, it is essential to cool down the cabin before boarding the passengers. This is best done with a ground conditioning unit, but can also be done with Hotel Mode. In that case the following instructions apply:

- As soon as OAT exceeds 22 °C and the aircraft has remained exposed to direct sun, pre-conditioning becomes necessary for passenger comfort, before boarding.
- The recirculation fans can be turned off until the Before Taxi checklist.
- Allow a reasonable period of time for pre-conditioning, and use up to MAXIMUM POWER AVAILABLE ON R/H ENGINE (GUST LOCK STOP) together with HI flow selection.

Note

1. *HI flow is very effective when the R/H PL is advanced beyond GI.*
2. *Correct orientation of the aircraft on the parking area (wind blowing from 10 o'clock ideally) during Hotel Mode pre-conditioning gives better efficiency and enables pre-conditioning to continue during AFT CARGO loading (hot air from the RH engine exhaust blown away from the service door).*

If, for any reason, it has not been possible to bring the cabin temperature down to comfortable values before boarding:

- Operate the packs during taxi with HI FLOW selected.
- Switch FLOW selection to NORM before takeoff, but keep the bleeds on, unless performance limited.
- As soon as CLB POWER is selected after takeoff, select HI flow and keep HI flow until a comfortable cabin temperature is obtained.
- During cruise, monitor the cabin temperature when operating in NORM flow. If the cabin temperature increases again above comfortable values, use HI flow as necessary.

cont'd... ►►►

cont'd... ►►►

Note

Takeoff with HIGH FLOW mode selected is prohibited.

NSU.21.3 TEMP Control

Ident.: NSU.21.3 — 06 NOV 2026
ALL

Temperature control is normally done in AUTO mode, which has all the protections needed to avoid damage to the pack turbines due to freezing.

In case of duct overheating, manual mode is recommended. As manual mode has no protection against freezing:

- Do not use the temperature selector in manual mode unless the auto mode is not operative.
- To avoid pack freezing in manual mode, monitor the duct temperature and keep it positive.

If temperature control in AUTO mode is not acceptable, the flight crew can use manual mode. AUTO mode is then considered inoperative.

NSU.21.4 Air Pressurization

Ident.: NSU.21.4 — 06 NOV 2026
ALL

AUTO mode operation

The pressure control is fully automatic: the flight crew only sets the LANDING ELEVATION.

To avoid pressure transients:

When switching from AUTO to MAN operation

► MAN RATE knob ..... MAN
► MODE SEL pb (CAB PRESS panel) ..... MAN
► MAN RATE knob ..... SET CABIN RATE AS RQRD

When switching from MAN to AUTO operation

► MODE SEL pb (CAB PRESS panel) ..... DISENGAGE MAN
► MAN RATE knob ..... TURN SMOOTHLY TO NORM

Takeoff

Before takeoff, both bleed valves are selected ON or OFF in accordance with the engine operating instructions. The regulation starts after takeoff when the bleed valves are selected ON.

If a failure occurs after takeoff and the flight crew decides to return to the same airport before reaching 3 500 ft above the departure airfield elevation, the system has memorized the takeoff altitude and no flight crew action is required.

In-flight control

The controller computes a theoretical cabin altitude from:

- the selected landing elevation,
- the memorized takeoff elevation,
- the cabin pressure,
- the aircraft altitude,

and adjusts the cabin rate of climb so that the cabin altitude matches this computed altitude or the landing elevation, whichever is higher.

The extreme values of cabin rate of change are:

cont'd... ►►►

cont'd... ►►►

Phase	Cabin rate
Cabin climb (1) up to ZA = 20 000 ft	+550 ft/min
Cabin climb above ZA = 20 000 ft	+620 ft/min
Cabin normal descent	−400 ft/min
Cabin rapid descent (DESCENT RATE pb selected FAST)	−500 ft/min

(1) The cabin rate after takeoff can be around +1 200 ft/min to +1 300 ft/min, followed by −500 ft/min (transition of the outflow valve position during a few seconds just after takeoff). The airport altitude is then held until 3 500 ft AGL to cover the air turn-back. Above 3 500 ft AGL the cabin rate stabilizes around +550 ft/min, the extreme value for cabin climb up to ZA = 20 000 ft.

See Pressurization for the abnormal procedures.

NSU.21.5 Depressurization

Ident.: NSU.21.5 — 06 NOV 2026 — ALL

Before landing, to avoid a cabin pressure shock at touchdown, the cabin altitude is automatically held at the selected landing elevation minus 300 ft.

After touchdown (landing gear shock absorber compressed), the controller receives a depressurization signal. The cabin is depressurized at +550 ft/min up to the full opening of the outflow valves.

NSU.22 AUTO FLIGHT

NSU.22.1.1 General

Ident.: NSU.22.1.1 — 06 NOV 2026 — ALL

The aircraft is fitted with a digital AUTOPILOT / FLIGHT DIRECTOR with advanced control laws. The system is described in Auto Flight.

Systematic use of the AP/FD is highly recommended in order to:

- increase the accuracy of guidance and tracking in all weather conditions, from early climb-out after takeoff down to landing minima,
- provide increased passenger comfort through SMOOTH AND REPEATABLE altitude and heading changes in all atmospheric conditions,
- reduce flight crew workload and increase safety.

NSU.22.2.1 Main Rules of Use

Ident.: NSU.22.2.1 — 06 NOV 2026 — ALL

Engagement and modes

- AP and YD cannot be engaged on the ground: any attempt results in the message "YD INHIB" on the FMA.
- The FD is available on the ground as soon as the DC normal buses are powered, but the FD bars are displayed only if:
  - one upper mode is selected (green indication on the FMA), and
  - the FD ON/OFF pb on the FGCP is ON.

cont'd... ►►►

cont'd... ►►►

Note

- *The FD ON/OFF pbs, one on the left side and one on the right side, act only on the FD DISPLAYS (FD bars). The left pb selects / deselects the left side only, the right pb the right side only.*
- *The STBY pb on the FGCP deactivates all active and armed upper modes.*
- *If the autopilot is ON, the basic mode with the associated bars is displayed.*

- The references to be flown may be coupled to the left or the right side with the CPL pb. A change of CPL side while coupled to VOR, LOC or LNAV reverts to the basic mode.
- Modes are engaged (green on the FMA) or armed (cyan on the FMA) with the applicable pb on the FGCP. The FMA must be monitored for the current state of the AP/YD modes. A second push on the pb of a mode already engaged (or armed) disengages (or disarms) it and reverts to the basic mode: the lateral mode reverts to "Heading Hold", the vertical mode to "Pitch Hold".
- ALT SEL mode is armed automatically as soon as the flight path is directed towards the altitude set on the PFD via the FGCP. All altitude clearances given by ATC must systematically be set on the PFD via the FGCP, to ensure an automatic level-off when the AP is engaged (or when the FD is followed in manual flight).

Note

After ALT mode has engaged, the aircraft stays in level flight on the new barometric setting.

If the flight crew changes the ALT SEL knob position during ALT capture (ALT), the AP/FD reverts to a vertical basic mode.*

- When HDG changes are made, the maximum bank angle is selected automatically. Below 1 000 ft, or with IAS < VmHB, the AFCS can command at most 15°. Otherwise it can command 27°. This enables AFCS manoeuvring in all conditions, including the early climb after takeoff or go-around, where the speed can be down to Vmin OPS (VmLB).

Note

The Yaw AUTO Trim function enables the AFCS to control the aircraft after an engine failure throughout the airspeed domain.

Modes are described in Vertical Modes and Lateral Modes.

AFCS 3-axes trim management

The AFCS monitors the trim on the roll axis and prompts the pilot to trim manually if necessary:

- The AFCS generates a roll trim request with:
  - an amber **RETRIM ROLL L(R) WING DN** message on the FMA,
  - a cyan arrow above the cyan roll trim symbol on the EWD, showing the required trim direction (the opposite trim command is inhibited).
- With no roll trim request from the AFCS:
  - manual roll trim commands are inhibited,
  - the roll trim symbol on the EWD turns white.

The AFCS monitors and controls the trim on the pitch and yaw axes (autotrim functions):

- the pitch and yaw trim symbols on the EWD turn green,
- a manual pitch trim command (normal or standby) disconnects the AFCS,
- manual yaw trim commands are inhibited.

cont'd... ►►►

cont'd... ►►►

Autopilot / YD disconnect

The autopilot can be disconnected by:

- the quick disconnect pbs on each control wheel,
- the normal or STBY pitch trims,
- AP on the FGCP,
- YD on the FGCP,
- GA on the power levers,
- a flight crew input on the left or right rudder pedals over 300 N (66 lb),
- a flight crew input on the control column (push or pull on the pitch axis) over 100 N (22 lb).

The Yaw Damper, and consequently the AP, can be disconnected by:

- YD on the FGCP,
- a flight crew input on the left or right rudder pedals over 300 N (66 lb),
- touchdown at landing.

CAUTION

Overriding the autopilot on the roll axis does not disconnect the AP.

The QUICK DISCONNECT pb is recommended for all normal AP disengagements, as it leaves the YD engaged. A second push on the QUICK DISCONNECT pb also cancels both the audio and visual AUTOPILOT OFF warnings.

Pressing the TCS pb gives temporary manual control of the aircraft without disconnecting the AP.

Note

AP/YD functions are monitored on three axes. When a monitored failure is detected, the AP/YD disengages and a failure message is displayed on the FMA (AP/YD invalid or AP invalid). Re-engagement is possible only once the failure message has disappeared.

See Autopilot Disengagement and FMA Messages.

NSU.22.3.1 Task Sharing

Ident.: NSU.22.3.1 — 06 NOV 2026 — ALL

- With the AP engaged, the PF selects the references and modes.
- With the FD only (AP not engaged), the PF calls for the references and modes, set by the PM.

SIMULATOR NOTE

Alone in the cockpit you are PF and PM: set the references yourself, but keep the habit of announcing every mode change you read on the FMA.

NSU.22.3.2 Before Takeoff

Ident.: NSU.22.3.2 — 06 NOV 2026 — ALL

- Both FD ON.
- First cleared altitude set on the PFD.
- HDG bug checked on the runway heading.
- NAV mode can be armed if a SID is available in the FMS.
- IAS mode selected with AUTO mode (the FMS automatically commands V2 + 5).

cont'd... ►►►

cont'd... ►►►

NSU.22.3.3 Takeoff

Ident.: NSU.22.3.3 — 06 NOV 2026 — ALL

- With HDG SEL mode active, the lateral FD bar stays centred on the runway heading.
- With IAS mode active, the vertical FD bar shows the recommended rotation value (θ ≃ 8°).
- 5 s after lift-off, the AP may be engaged. It then synchronizes on the FD command.
- Turns may be initiated as required with the HDG SEL knob.
- At the acceleration altitude, setting PWR MGT to CLB increases the speed bug automatically to the climb speed if in SPEED AUTO mode (in SPEED MAN mode, the speed bug must be set manually).

NSU.22.3.4 Climb

Ident.: NSU.22.3.4 — 06 NOV 2026 — ALL

Climb is flown in IAS mode. For operational reasons, the flight crew can use pitch mode with specific attention.

CAUTION

Climb in VS mode is prohibited.

Note

1. *If the flight crew engages ALT* mode, IAS decreases significantly. The flight crew can re-engage IAS mode to avoid this IAS decrease.*
2. *Low speed protection is active with FLAPS 0 or 15. If the stall alert triggers, the AP disengages automatically.*

NSU.22.3.5 Level Off

Ident.: NSU.22.3.5 — 06 NOV 2026 — ALL

- Level-off is automatic when reaching the selected altitude.
- Power must be adjusted to the new condition.

NSU.22.3.6 Resume Climb or Descent

Ident.: NSU.22.3.6 — 06 NOV 2026 — ALL

- First set the new cleared altitude on the PFD.
- For descent, engage IAS or VS mode.
- For climb, preferably engage IAS mode.
- In both cases, adjust the power as necessary.

NSU.22.3.7 Navigation

Ident.: NSU.22.3.7 — 06 NOV 2026 — ALL

HDG and NAV modes for a VOR approach are used as required (see Lateral Modes).

The accuracy of VOR guidance is significantly better when a DME is associated with the VOR. Accuracy decreases if NAV VOR is engaged in DME HOLD mode.

cont'd... ►►►

cont'd... ►►►

NSU.22.3.8 ILS Approach Mode

Ident.: NSU.22.3.8 — 06 NOV 2026
ALL

Before approach (assuming vectors to the final axis)

- Select the V/ILS source (on the FGCP) on the coupled (CPL) side.
- Set the approach course on the HSI with the CRS selector and tune the ILS frequency.
- Use HDG SEL mode to intercept the LOC as appropriate.
- Arm both LOC and GS by pressing the APP pb on the FGCP.

Note

- *LOC beam capture must have started (LOC* green on the FMA) before GS capture.*
- *LOC beam capture may give one initial overshoot when the capture conditions are severe (intercept heading = RWY HDG ± 90°, high IAS, short distance to the ILS transmitter). Provided the distance is at least 5 NM at the standard instrument capture speed of 180 kt, this initial overshoot is followed by an asymptotic capture without further oscillation, even with a 90° intercept angle.*
- *When available, the enhanced LOC capture mode improves LOC capture and limits the overshoot. Enhanced ILS LOC capture is available up to a 170° interception angle.*

When LOC beam capture has started (LOC* green on the FMA)

- Set the runway heading with the HDG bug.
- Closely monitor the G/S deviations.
- Regularly cross-check the aircraft position against the Final Approach Point altitude and distance (from the approach chart).

Note

The flight crew should be prepared to take over control in case of a spurious G/S, a pitch movement or any flight path deviation.*

When GLIDE beam capture has started (G/S* green on the FMA)

- Check the glide slope capture (altitude versus distance on the approach chart).
- Set the go-around altitude.

In case of spurious G/S*

► AP ..... OFF
► FD ..... STBY
► FLIGHT PATH ..... ADJUST

■ **When back on the appropriate flight path**

► FGCP ..... SET
► AP ..... AS RQRD

NSU.22.3.9 Non Precision Approach

Ident.: NSU.22.3.9 — 06 NOV 2026
ALL

Use of the autopilot is recommended with:

- VS mode for the descent (VS pb on the FGCP),
- LNAV mode for a GNSS approach (NAV pb on the FGCP),

cont'd... ►►►

cont'd... ►►►

- LNAV mode for a VOR approach (NAV pb on the FGCP),
- LOC mode for a LOC approach (NAV pb on the FGCP),
- LNAV mode for an NDB approach (NAV pb on the FGCP).

NSU.22.3.10 Go-Around

Ident.: NSU.22.3.10 — 06 NOV 2026 — ALL

When reaching the decision height, or the missed approach point after level-off at MDA, a go-around must be initiated if the required visual references are not established. Follow the Go-Around procedure.

Note

GO-AROUND mode gives (as an FD mode only):

- *on the pitch axis, a target attitude compatible with single engine performance,*
- *on the roll axis, a steering command to hold the heading followed at GA engagement, or the FMS flight plan if LNAV was previously engaged.*

As soon as the climb is firmly established and IAS > VminOPS, the use of HDG SEL / IAS mode + Speed AUTO mode is recommended.

NSU.23 COMMUNICATIONS

NSU.23.2.1 ACP Operation

Ident.: NSU.23.2.1 — 06 NOV 2026 — ALL

To communicate, the flight crew selects the desired transmission key on the audio control panel and adjusts the volume control knob.

Transmission can be made:

- with the hand microphone with its integrated switch,
- with the boomset mike or the oxygen mask mike, using:
  - o the PTT selector on the control wheel, or
  - o the RAD/INT selector on the audio control panel, or
  - o the switch on the nose wheel steering handle (CAPT only).

Note

A switch on the oxygen mask box, when in the released position (oxygen mask out), automatically transfers transmissions from the boomset mike to the oxygen mask mike. Transmission with the hand microphone remains available whatever the transfer switch position. Radio reception is not affected by the transfer switch position.

NSU.23.2.2 Interphone System

Ident.: NSU.23.2.2 — 06 NOV 2026 — ALL

To interconnect all stations

Ground crew stations + cockpit + cabin crew:

- press the INT transmission key on the audio control panel,
- use the PTT pb.

cont'd... ►►►

cont'd... ►►►

Cockpit crew interphone

Using the boomset or the oxygen mask:

- set the RAD/INT selector (audio control panel) to INT, without using the PTT pb, or
- set the PTT selector (control wheels) forward, whatever the RAD/INT selector position.

Note

When using the oxygen mask, it is recommended to set the RAD/INT selector (audio control panel) to the neutral position and to use the control wheel PTT selector forward, to avoid permanent breathing noise.

To call the cabin crew from the cockpit

Press the ATTND pb (overhead panel) for a normal call, or press the ATTND pb three times in succession for an emergency call.

A single chime (three for an EMER call) sounds in the cabin and the flight deck green light comes on on the cabin crew panels. As soon as the cabin crew selects CALL, the flight deck green light goes off.

To call the cockpit from a cabin crew station

Press the CALL pb (beside the cabin crew panel) for a normal call or the EMER pb for an emergency call. The associated ATTND light comes on on the overhead panel and the MFC generates a door bell. Pressing the RESET pb cancels both the visual and the aural calls.

To call the ground crew from the cockpit

Press the MECH pb (overhead panel). A horn sounds in the nose gear bay.

To call the cockpit from the ground crew

On a ground crew call, the MECH pb comes on blue on the overhead panel and the MFC generates a door bell. Pressing the RESET pb cancels both the visual and the aural calls.

NSU.23.3.1 CVR Preservation

Ident.: NSU.23.3.1 — 06 NOV 2026
ALL

Preservation of the SSCVR recording after an occurrence (incident or accident):

► ERASE pb ..... DO NOT PRESS

The ERASE pb erases the recording quickly when the landing gear shock absorbers are compressed and the parking brake is set (press for 2 s for a complete erasure).

► C/B 3RK CVR ..... PULL

NSU.24 ELECTRICAL POWER

NSU.24.1 Use of a Weak DC GPU

Ident.: NSU.24.1 — 06 NOV 2026
ALL

The DC GPU specification requires the ground unit to provide a steady current of 300 to 400 A under 28 V, to ensure correct operation of all electrical services before start-up. For engine start, the GPU must provide an ADDITIONAL STARTER CURRENT of 1 000 A while keeping more than 12 V.

Experience shows that many "28 V DC" GPUs have a much lower power capability.

cont'd... ►►►

cont'd... ►►►

Ground operation without engines running

If an under-rated DC GPU must be used, the following procedure is recommended:

► DC GPU ..... SELECT ON

Check the DC EXT PWR voltage on the maintenance panel: with a weak GPU, the voltage is significantly below 28 V.

Initiate LOAD SHEDDING of the following equipment as needed, to recover as much voltage as possible:

► PACKS VALVES (BOTH) ..... SELECT OFF

Load saving: 1 × 2 = 2 A

► FUEL PUMPS (BOTH) ..... SELECT OFF

Load saving: 10 × 2 = 20 A

► RECIRC FANS (BOTH) ..... SELECT OFF

Load saving: 28.5 × 2 = 57 A

► CABIN CEILING ..... SELECT OFF

On the Flight Attendant Panel, press "−" until the four indicators are off. Load saving: 27 A

CAUTION

If the DC EXT PWR voltage on the maintenance panel is below 26 V despite the full load shedding, the GPU MUST BE CONSIDERED AS COMPLETELY UNUSABLE.

■ If the DC EXT PWR voltage on the maintenance panel is above 26 V

The DC GPU may be used to keep the aircraft batteries charged while using all other ground services normally (cargo door, refuelling, cabin lighting, etc.).

■ Before start-up of the first engine

► DC GPU ..... SELECT OFF

Start the first engine on the aircraft batteries, after the applicable normal checklist.

SIMULATOR NOTE

A weak DC GPU can be injected from the EFB failure pages (Failures). The simulated weak GPU is of the unusable class: after the full load shedding the DC EXT PWR voltage stays below 26 V.

See DC External Power and Load Shedding and Protections.

NSU.24.2 Load Survey with Weak Battery

Ident.: NSU.24.2 — 06 NOV 2026 — ALL

- The battery is considered in a good state of charge when the voltage is at or above 25 V.
- A battery may become weak, especially after a stop where no external DC power is available and hotel mode is not used, if:
  - o refuelling is done with the battery switched ON,
  - o the cargo door is operated several times,
  - o the cargo door operating panel stays open too long,
  - o the minimum cabin light is used too much.

To preserve battery power, minimize such actions.

cont'd... ►►►

cont'd... ►►►

Immediately after starting engine 2 with a weak battery, the 600 A DC GEN load 2 min limitation may be exceeded because of the charge current, which alone may reach 300 A. The automatic protection then engages, which may result in:

- DC SVCE and UTLY BUS shedding,
- DC BTC opening (and loss of DC BUS 1),
- DC GEN 2 isolation (and loss of DC BUS 2).

To avoid this succession of disconnections, the following is recommended after engine 2 start:

- Monitor the DC GEN 2 load on the LH maintenance panel.
- As required to stay within limits (in practice, to keep the DC GEN 2 load below 450 A), switch off as appropriate:
  - DC SVCE and UTLY BUS (including both RECIRC fans control): ≈ 120 A,
  - LH FUEL PUMP: 10 A,
  - both RECIRC fans: ≈ 50 A.
- The off-loaded equipment may be switched ON again as the charging current decreases and the DC GEN load reduces.

NSU.24.3 Use of External DC Electrical System

Ident.: NSU.24.3 — 06 NOV 2026 — ALL

The external DC unit must be able to provide a steady current of 300 A plus an additional starter current of 1 000 A while keeping above 12 V (16 000 W instantaneous power).

If not possible, see Use of a Weak DC GPU.

NSU.25 EQUIPMENT AND FURNISHINGS

NSU.25.1.1 Boomset-Micro Function Recovery on Oxygen Mask

Ident.: NSU.25.1.1 — 06 NOV 2026 — ALL

■ If the oxygen mask is out of its container

► OXYGEN MASK CONTAINER DOORS ..... CLOSE
► TEST pb (in front of the container) ..... PUSH
► TEST pb ..... RELEASE

The yellow cross disappears. The boomset / micro function is recovered.

Note

To use the oxygen mask and recover the mask micro, open the oxygen mask container doors.

SIMULATOR NOTE

The simulated mask has no flow indicator, so there is no yellow cross to check.

NSU.27 FLIGHT CONTROLS

NSU.27.1.1 General

Ident.: NSU.27.1.1 — 06 NOV 2026 — ALL

The aircraft has conventional mechanical primary flight controls on all three axes.

cont'd... ►►►

cont'd... ►►►

CAUTION

After an engine rotor burst, one or several primary control cables can be damaged. In this case, if sufficient authority cannot be obtained with the normal controls, the AP should be engaged immediately to control the initial disturbance as well as the subsequent return and landing.

Once the AP is engaged, keep in mind that a stall warning disconnects it. The lateral trims are still available and must be used as much as required to coordinate the flight.

NSU.27.2.1 Pitch

Ident.: NSU.27.2.1 — 06 NOV 2026
ALL

In flight, aggressive or large elevator inputs should be avoided. Such inputs may lead to high loads and result in structural damage.

CAUTION

The aircraft must be controlled from one control column only. Dual inputs in opposite directions may result in a pitch disconnect.

Both elevators are connected through a pitch uncoupling device, to leave sufficient controllability in case of a mechanical jam of one control surface. Activation of this device:

- requires heavy forces (520 N / 114 lb) on the control columns, which minimizes the risk of an untimely disconnection,
- is shown to the flight crew by the red warning **PITCH DISC**,
- lets the flight continue safely after activation,
- once activated, can only be reset by maintenance.

If the pitch disconnect occurred on the ground or during the landing phase, the PITCH RECONNECTION ON GROUND procedure can be applied. Otherwise maintenance action is required.

CAUTION

1. WHEN PITCH DISCONNECT takes place WITHOUT REAL JAMMING, speed must be limited to 180 kt and bank angle to 30° until flaps extension, to avoid overstressing the stabilizer.
2. The TWO sticks must be held once the aircraft has landed.
3. When the elevators are uncoupled, dual opposite inputs from the left and right control columns are strictly forbidden, as they may result in structural damage to the horizontal stabilizer.

See PITCH DISCONNECT.

NSU.27.3.1 Roll

Ident.: NSU.27.3.1 — 06 NOV 2026
ALL

Aileron spring tabs

The flight controls are connected to the ailerons through the spring tabs. Holding the controls at neutral on the ground therefore does not prevent the ailerons from oscillating in a strong tailwind (> 30 kt). In strong wind conditions it is recommended:

- to disengage the gust lock only when necessary before takeoff,
- after landing, to engage the gust lock before a turn that would expose the aircraft to a tailwind component.

If the aileron lock is not available, it is easier to hold the ailerons fully deflected.

cont'd... ►►►

cont'd... ►►►

Aileron trim

Aileron force trimming is obtained by shifting the zero position of the left aileron spring tab. The AILERON TRIM indicator therefore shows only the differential loading of the spring tab, not the aileron position.

NSU.27.4.1 Yaw

Ident.: NSU.27.4.1 — 06 NOV 2026 — ALL

The rudder has several particular features.

Releasable centering unit (threshold cam)

The threshold cam automatically synchronizes to the actual rudder pedal position each time the rudder trim switch is operated. Before takeoff, the rudder trim must therefore be set to zero with the rudder pedals in the neutral position.

Rudder surface damper

A rudder surface damper protects the rudder assembly against wind gusts on the ground, by preventing excessive deflection speeds of the rudder surface.

When taxiing in strong winds, very large rudder forces would be needed to control the rudder surface. This is not necessary: the rudder should be left "floating" in the wind, as the damper effectively prevents any structural damage.

Rudder trim

Rudder force trimming is obtained by shifting the zero position of the spring tab. The RUDDER TRIM INDICATIONS therefore show only the differential loading of the spring tab, AND NOT THE RUDDER POSITION.

Note

As speed increases, a rudder trim deviation as large as 3 dots to the right may be seen while the rudder surface stays substantially at neutral.

At each speed change, the flight crew must trim as appropriate to avoid sideslip: an extended uncoordinated flight can drain the fuel feeder compartment and cause an engine flameout even with sufficient fuel on board.

Yaw damper

The yaw damper function is provided by the YAW CHANNEL of the AP and should always be engaged in flight for passenger comfort.

The yaw damper also provides a sideslip cancellation function: it keeps the sideslip indication centred. To reduce the sustained rudder effort automatically, the AFCS provides a Yaw AUTO Trim function, engaged as soon as the yaw damper is engaged.

To leave the rudder axis free for flight crew inputs (engine failure) without disconnecting the YAW DAMPER on the FGCP, a force sensor is fitted: any flight crew force above 300 N / 66 lb on the rudder disengages the YD.

See Yaw Damper.

TLU

The TLU limits the pedal travel, to prevent any damaging rudder travel at high speed.

NSU.27.4.2 Recommendations for Use

Ident.: NSU.27.4.2 — 06 NOV 2026 — ALL

To avoid exceeding the structural loads on the rudder and the vertical stabilizer, the following recommendations must be observed.

cont'd... ►►►

cont'd... ►►►

The rudder is designed to control the aircraft in the following circumstances

1. In normal operations, for directional control:
   - o during the takeoff roll, on the ground, especially in crosswind,
   - o during the landing flare with crosswind, for the decrab manoeuvre,
   - o during the landing roll, on the ground,
   - o as deemed necessary, for turn coordination to prevent excessive sideslip.
2. To compensate thrust asymmetry: full rudder authority can be used to compensate for the yawing moment of asymmetric thrust.
3. In some other abnormal situations:
   - o runaway rudder trim: the rudder pedals may be used to return the rudder to neutral,
   - o aileron jam: the rudder may be used to control the roll smoothly,
   - o landing gear unsafe indication (gear not downlocked): when a main landing gear is not downlocked, the rudder may be used to establish a sideslip in an attempt to downlock the gear by aerodynamic side forces,
   - o landing with the landing gear not downlocked: the rudder can be used for directional control on the ground.

In all these normal or abnormal circumstances, correct rudder manoeuvres do not affect the structural integrity of the aircraft.

The rudder should not be used

- to induce roll, except in the previous case (aileron jam), or
- to compensate roll induced by any type of turbulence.

Whatever the airborne flight condition, aggressive, full or nearly full opposite rudder inputs must not be applied. Such inputs can result in loads higher than the limit loads, or possibly the ultimate loads, and can result in structural damage or failure.

Note

Rudder reversals must never be part of airline policy, including so-called "aircraft defensive manoeuvres" to disable or incapacitate hijackers.

For dutch roll, the yaw damper action (if selected) or the Releasable Centering Unit (RCU) is sufficient to stop dutch roll oscillations correctly. The rudder should not be used to complement the yaw damper action.

NSU.27.5.1 Extreme Turbulences

Ident.: NSU.27.5.1 — 06 NOV 2026 — ALL

In extreme turbulence, a temporary difference between the two alpha probes may result in a repeated local "Pusher Fault" alert, with the **FLT CTL PUSHER** caution on the EWD and the master caution chime and light.

Note

In case of a "Pusher Fault" alert in extreme turbulence, apply the STICK PUSHER-SHAKER FAULT procedure.

NSU.28 FUEL

NSU.28.1.1 Fuel Crossfeed

Ident.: NSU.28.1.1 — 06 NOV 2026 — ALL

FUEL CROSSFEED enables one or both engines to be fed from either side tank, particularly for fuel balancing.

cont'd... ►►►

cont'd... ►►►

Procedure: see the "Normal fuel condition" part of FUEL UNBALANCED.

Note

Each electrical pump can supply one engine throughout the flight envelope. One electrical pump and its associated jet pump can supply both engines throughout the flight envelope.

When X FEED is selected "in line", both electrical pumps are forced to run (both RUN lights come on green) as long as the associated PUMP pb is selected ON.

CAUTION

When the X FEED procedure is applied, fuel can transfer from the wing tank on the pump running side to the other wing tank (pump OFF). This transfer is particularly noticeable at low power settings (X FEED in Hotel mode is the worst case).

NSU.28.2.1 Fuel Quantity Indications

Ident.: NSU.28.2.1 — 06 NOV 2026
ALL

In flight

Accurate readings require the aircraft level, without sideslip, and with a pitch attitude close to zero.

On ground

Accurate readings should be taken with the aircraft static (not taxiing) and the fuel pumps running for more than 4 min. Apply this each time a before / after flight comparison of the readings against the fuel used is intended.

Comments

- Fuel quantity indications are affected by excessive longitudinal and lateral attitudes and accelerations.
- Fuel quantity indications are affected by the fuel level in the feed tank. With the pumps running, the feed tanks are filled within a few minutes. This is the normal flight case.

NSU.28.3.1 Refueling

Ident.: NSU.28.3.1 — 06 NOV 2026
ALL

- During automatic refueling, both tanks receive fuel simultaneously.
- With the tanks filled to the maximum nominal total fuel capacity, there is enough space in each tank for a 2 % thermal expansion of the fuel without spillage through the vent system.
- The vent tank in each wing has a volume of 100 l (26 US gal).
- If necessary during refueling, close the related REFUEL VALVE to isolate the associated tank.
- Approximate refueling time at nominal pressure is 18 min.
- As a tank becomes full, the high level sensors stop the fuel flow and the tank HIGH LEVEL light comes on.

Note

Refueling when the right engine is running in Hotel mode is prohibited.

SIMULATOR NOTE

The refueling panel (5004 VU) is not modelled. Fuel is loaded from the EFB (Weight & Balance and Ground & Config); while the fuel truck is connected the MFD CABIN page shows REFUELING.

cont'd... ►►►

cont'd... ►►►

NSU.28.3.4 Use of Manual Magnetic Indicators

Ident.: NSU.28.3.4 — 06 NOV 2026
ALL

Each tank has two manual magnetic indicators (MMI): one in the inner part of the wing (between the engine and the fuselage) and one in the outer part of the wing.

Aircraft configuration

- The fuel electric pumps must be OFF for at least 5 min.
- Pitch attitude must be between −3° and +1°.
- Roll attitude must be between −2° and +2°.

Note

The bank angle is positive when the related wing is up, negative when it is down.

Determination of the fuel level in the tank

- Read the outer MMI value.
  - o If the outer MMI value is between 1 cm and 19 cm: record it, then read the inner MMI value.
    - ▪ If the inner MMI value is between 1 cm and 29 cm: record it, and use the chart with the outer and inner MMI values to determine the fuel level in the tank.
    - ▪ If the inner MMI value is less than 1 cm or more than 29 cm: read and record the aircraft roll attitude, and use the chart with the outer MMI and roll attitude values.
  - o If the outer MMI value is less than 1 cm or more than 19 cm: read and record the aircraft roll attitude, read and record the inner MMI value, and use the chart with the inner MMI and roll attitude values.

The precision of this procedure is ± 200 l.

SIMULATOR NOTE

The manual magnetic indicators are not modelled; use the fuel quantity indications.

NSU.28.3.5 Conversion Quantity-Weight

Ident.: NSU.28.3.5 — 06 NOV 2026
ALL

Example:

Fuel quantity	Density	Weight
1 650 l	0.77 kg/l	1 271 kg

NSU.31 INDICATING AND RECORDING SYSTEMS

NSU.31.1.1 DU

Ident.: NSU.31.1.1 — 06 NOV 2026

ALL

The instrument panel has five Display Units (DU), DU 1 to DU 5 from left to right. They can show the Primary Flight Display (PFD), the Multi Function Display (MFD) or the Engine and Warning Display (EWD) format. In MFD format, different pages can be selected depending on the flight phase, such as the Navigation Display (ND), the System Display (SD), PERF or other options.

In normal operation:

- DU 1 (5) is the CAPT (F/O) PFD,
- DU 3 on the central panel is the EWD,
- DU 2 (4) is normally the CAPT (F/O) MFD.

A DISPLAY pb on the CAPT (F/O) SWITCHING lateral console cycles the three formats on DU 2 (4). If DU 2 (4) fails, this pb switches the DU 1 (5) format.

In most formats, the lower part of the MFD is the VCP. On the VCP, the VHF page should be selected by default, as it is the most frequently used page.

See Display Units and Manual Reconfiguration.

NSU.31.1.2 DU Display Start

Ident.: NSU.31.1.2 — 06 NOV 2026

ALL

The DUs power up automatically when the avionics are powered. If necessary, the PWR sw can be used to power each DU down / up.

The DU start sequence depends on how long the DU was off:

- After a long DU power cut (more than 5 s), the DU performs self-tests. It is normally operative in less than:
  - 45 s on the ground,
  - 10 s in flight.
- After a short DU power cut (less than 5 s), the DU is normally operative after a few seconds, without self-test.

During the DU start the display shows:

Display	Meaning
BLACK SCREEN	The DU is OFF or in transition between two modes.
Green letter "T"	The DU performs its self-tests during the start process.
OPERATION page	The power-on process is complete and the unit operates normally.

The power light is on when the DU is powered.

NSU.31.2 Electronic Flight Bag

Ident.: NSU.31.2 — 06 NOV 2026

SIMULATOR ONLY

The aircraft EFB, its weight and balance and its takeoff and landing performance functions are described in EFB - General and EFB - Loading and Performance.

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

Use the same crew technique as with any performance software: compute the weight and balance and the takeoff and landing data on the EFB, enter ZFW / CG in the FMS and cross-check V1 / VR / V2 before propeller rotation, and recompute if the departure runway changes during taxi. Use only the full runway length for landing calculations.

NSU.32 LANDING GEAR

NSU.32.1 Runway Status

Ident.: NSU.32.1 — 06 NOV 2026
ALL

Braking efficiency depends on the runway status. Seven runway statuses are considered in the takeoff and landing performance:

- Dry,
- Wet up to 3 mm depth,
- Slush or water between 3 mm and 6.3 mm depth,
- Slush or water between 6.3 mm and 12.7 mm depth,
- Slush or water between 3 mm and 12.7 mm depth,
- Compact snow,
- Ice.

NSU.32.2 Normal Taxi

Ident.: NSU.32.2 — 06 NOV 2026
ALL

CAUTION

If the blue hydraulic circuit is pressurized, switch off the Nose Wheel Steering (NWS) for towing by a ground vehicle.

The aircraft can easily taxi forward or backward on one engine without limitation. Ground Idle (GI) power on one engine is enough to taxi out and in. Single engine taxi reduces the taxi fuel consumption on large airports.

Single engine taxi-out is at the operator's discretion, in accordance with the operation specifics and the local authority requirements. Single engine taxi-out is not recommended:

- on a contaminated taxiway, or
- with LVP in force and / or at night.

Anticipate the second engine start to guarantee the minimum oil temperature of 45 °C for takeoff. Anticipate that the EXHAUST MODE **FAULT** light comes on for 120 s when the start sequence is initiated.

Note

Average oil warm-up rate: 6 °C/min (can be higher in cold weather operation).

CAUTION

The second engine start should be performed when the flight crew workload is low, to allow efficient monitoring of the start sequence.

To reduce the use of the brakes during taxi, apply a small amount of reverse to decelerate as necessary.

The turn radius with NWS is sufficient and does not require any differential braking on the inner wheels.

cont'd... ►►►

cont'd... ►►►

CAUTION

Brake pivot turns (sharp turns) are prohibited, except in emergency.

NSU.32.3 Emergency Braking

Ident.: NSU.32.3 06 NOV 2026
ALL

Emergency braking is made operationally easier by the parking brake lever, which has an "EMER BRAKE" notch. With the parking brake lever in this notch, the regulator provides a limited pressure which:

- enables EMER BRAKING for an aborted takeoff at MAX V1, or at touchdown for landings after the GREEN pressure has been completely lost,
- provides a repeatable, smooth deceleration while minimizing the risk of burst tires.

CAUTION

Use of the EMER BRAKE beyond the EMER BRAKE notch above 60 kt must be avoided, to prevent wheel lock-up and damage to the wheels and tires.

Below 60 kt, a SMALL further travel (~ 1 cm) is available without risk of damage when maximum stopping performance is required.

A deflated tire is not easily noticed from the cockpit: NO TAKEOFF should be started after the EMER BRAKE has been used at speeds above a maximum taxiing speed of 20 kt, without a prior visual inspection of the main landing gear tires.

NSU.32.4 Delayed Braking

Ident.: NSU.32.4 06 NOV 2026
ALL

The landing brake energy limitation must be checked for any flight before dispatch, and at any time in flight in case of flaps failure. To mitigate a brake energy limitation, the delayed braking procedure can be applied when the runway length permits.

Delayed braking

Maximum braking is applied at a fixed speed depending on the flaps configuration:

FLAPS	DELAYED BRAKING SPEED
30	80 kt IAS
15	90 kt IAS
0	100 kt IAS

Note

For delayed braking, the approach speed has no effect on the landing brake energy.

Use of reverse is not recommended for delayed braking with one engine inoperative.

For a reduced flaps landing, reassess the landing distance with the following table:

FLAPS	LDG DIST FLAPS 30 MULTIPLY BY
0	2.2
15	2

cont'd... ►►►

cont'd... ►►►

Calculation example

Landing at 22 t, dry runway, elevation 7 000 ft, ISA +20 °C. The tables used are for illustration only, not for operations.

Step	Source	Result
Brake energy limit, FLAPS 30, normal braking	QRH PER.6.2 Landing Brake Energy, FLAPS 30	21.6 t
Brake energy limit, FLAPS 30, delayed braking at 80 kt IAS	QRH PER.6.2, FLAPS 30	31 t: the delayed braking procedure must be used
ALD, FLAPS 30, dry, delayed braking, 22 t	QRH PER.6.1 Actual Landing Distance, FLAPS 30	1 120 m
Elevation correction (dry or wet: +3 % per 1 000 ft; contaminated: +5 % per 1 000 ft)	7 000 ft	1 120 × 1.21 = 1 355 m
Brake energy limit, FLAPS 15 (in-flight failure), delayed braking at 90 kt IAS	QRH PER.6.2, FLAPS 15	29.4 t
ALD, FLAPS 15, delayed braking	Reduced Flaps Landing: × 2	1 355 × 2 = 2 710 m
Brake energy limit, FLAPS 0 (in-flight failure), delayed braking at 100 kt IAS	QRH PER.6.2, FLAPS 0	25.5 t
ALD, FLAPS 0, delayed braking	Reduced Flaps Landing: × 2.2	1 355 × 2.2 = 2 981 m

CAUTION

Delayed braking is prohibited for the following dispatch cases:

- one wheel brake deactivated (AFM - Dispatch with One Wheel Brake Deactivated or Removed),
- flaps retracted (AFM - Dispatch with Flaps Retracted),
- ferry flight with pitch elevators disconnected (AFM - Flight with Pitch Elevators Disconnected),
- antiskid inoperative (AFM - Dispatch with Antiskid System Inoperative).

Methodology

The Maximum Weight Limited by Braking Energy tables are computed for normal and delayed braking, depending on the flaps setting and the landing case.

Determine the Maximum Weight Limited by Braking Energy for normal braking. If it is limiting and the runway length permits, consider delayed braking. To check the effect of delayed braking on the landing distance, use the Actual Landing Distance - Sea Level tables.

SIMULATOR NOTE

The EFB landing performance (Performance) gives the landing distances for the simulated aircraft.

NSU.34 NAVIGATION

NSU.34.1.1 TCAS General

Ident.: NSU.34.1.1 — 06 NOV 2026
ALL

TCAS is an airborne Traffic alert and Collision Avoidance System. It interrogates the ATC transponders of nearby aircraft and generates the appropriate aural and visual advisories to the flight crew, to provide adequate separation.

Air-to-air communication for coordinating manoeuvres between TCAS-equipped aircraft is provided by the mode S ATC transponder.

cont'd... ►►►

cont'd... ►►►

Note

1. *TCAS can only generate resolution advisories for intruders with an operative mode S or mode C transponder (valid intruder altitude information).*
2. *Traffic advisories can only be generated for intruders with an operative mode S, C or A transponder (TCAS gives no indication of aircraft without an operative transponder).*

CAUTION

The TCAS equipment is a supplement to the flight crew who, with the aid of Air Traffic Control, has the primary responsibility for avoiding mid-air collisions.

NSU.34.1.2 TCAS Ground Operation

Ident.: NSU.34.1.2 — 06 NOV 2026
ALL

Unless otherwise instructed by ATC:

► MCP ..... PRESS SURV
► VCP XPDR tab ..... SELECT
► XPDR mode ..... ALT
► XPDR 1 ..... CHECK SELECTED
► MCP ..... PRESS SURV
► VCP TCAS tab ..... SELECT
► TCAS mode ..... AUTO

On the PFD TCAS status indication, green ***TCAS ABOVE*** *is displayed. On the PFD transponder status indication, green* ***XPDR1(2) ALT*** *is displayed.*

See Virtual Control Panel.

NSU.34.1.3 TCAS Flight Procedures

Ident.: NSU.34.1.3 — 06 NOV 2026
ALL

TRAFFIC - TRAFFIC

Procedure initiated by a TCAS Traffic Advisory (TA).

► Decide task sharing and announce ..... "TCAS, I (you) have the controls"

PF

► Be minded for manoeuvre. Follow the traffic evolution on the TCAS indicator.

PM

► Recall the minimum safety altitude.

If a Resolution Advisory (RA) occurs

Note

Some RAs only advise to monitor the vertical speed (preventive RA). Others advise to manoeuvre the aircraft. The following procedures then apply, depending on the sense of the Resolution Advisory asking to manoeuvre.

cont'd... ►►►

cont'd... ►►►

DESCEND

► Confirm ..... "We descend"

PF

► AP ..... DISCONNECT

► Descend at a rate in the green (fly to) band on the PFD vertical speed scale.

► Ask for any configuration changes.

PM

► ATC ..... ADVISE

► IAS ..... MONITOR

Compared to the VLE, VFE, VMO pointer.

► AIRCRAFT ALTITUDE ..... MONITOR

Compared to the minimum safety altitude.

CLIMB

► Confirm ..... "We climb"

PF

► AP ..... DISCONNECT

► Apply roughly the bugged power.

► Climb at a rate in the green (fly to) band on the PFD vertical speed scale.

► Ask for any configuration changes.

PM

► PWR MGT selector ..... SELECT CORRECT RATING

MCT en route, or TO in other phases, e.g. takeoff, approach and landing.

► CL 1+2 ..... AS RQRD

► PL 1+2 ..... ADJUST

Follow the TQ objectives.

► ATC ..... ADVISE

► IAS ..... MONITOR

Compared to VS.

Note

When a climb or increase climb RA occurs with the aircraft in the landing configuration or in the go-around phase, a normal go-around procedure should be followed, including the appropriate power increase and configuration changes.

CLEAR OF CONFLICT

After the separation has become adequate (range increasing):

► Return promptly to the last assigned ATC clearance.

SIMULATOR NOTE

Alone, fly the PF column and run the PM items as soon as the aircraft follows the green band.

cont'd... ►►►

cont'd... ►►►

NSU.34.2.1 AHRS

Ident.: NSU.34.2.1 — 06 NOV 2026 — ALL

The AHRS alignment sequence starts as soon as the battery is switched ON. It nominally takes 1 min, DURING WHICH THE AIRCRAFT MUST NOT BE MOVED (on ground).

The AHRS are not affected by the electrical transients associated with engine start.

Note

- *During AHRS alignment, the alert **AHRS NOT ALIGN** is displayed by the FWS, and **AHRS DEGRADED** on the corresponding PFD.*
- *Nearby buildings during taxi may cause magnetic disturbances that result in a flux valve discrepancy and generate ALT DISAGREE, IAS DISAGREE, ATT DISAGREE and HDG DISAGREE alerts. In this case, an AHRS reset is not recommended: the alerts should disappear at the holding point.*

ON GROUND ONLY, if needed, an AHRS reset can be performed by cycling all the related C/Bs OFF-ON.

CAUTION

An AHRS C/B reset in flight is not recommended: the in-flight realignment requires 1 min and 30 s of very stable flight (which may be impossible in turbulence), and pulling the wrong C/B could result in a complete AHRS failure, unrecoverable for the rest of the flight.

CAUTION

The flight crew must be aware of possible induced attitude and heading errors in continuous turns, particularly at high latitudes. Racetrack holding patterns are therefore to be flown rather than circles.

NSU.34.3.1 Weather Radar

Ident.: NSU.34.3.1 — 06 NOV 2026 — ALL

When the aircraft is airborne, the weather radar transmits in any mode other than STBY or OFF.

The weather radar has a forced standby (FSBY) function, driven by the WEIGHT ON WHEELS switch, that forces the radar into standby automatically. On the ground, the weather radar transmissions are therefore normally inhibited, even with TEST mode selected.

During the whole weather radar test, make sure that:

- on panel 702VU, the WEIGHT ON WHEELS sw is in the NORM position,
- the aircraft is not on jacks,
- on panel 8VU, on the weather radar control box, the STAB pb is not pressed.

NSU.34.4.1 GPS Procedures

Ident.: NSU.34.4.1 — 06 NOV 2026 — ALL

In case of a DGR alarm display, the flight crew must cross-check the aircraft position with conventional means, or revert to an alternative means of navigation.

cont'd... ►►►

cont'd... ►►►

NSU.34.5.1 ADS-B Out

Ident.: NSU.34.5.1 — 06 NOV 2026 — ALL

In all cases, the flight crew should comply with the surveillance provisions, schedules and procedures published in the Aeronautical Information Publications (AIP) of the appropriate authorities.

The ADS-B out function enables ground surveillance at airports equipped with an ADS-B in surveillance application. At such airports, the XPDR should be set ON (enabling the ADS-B broadcast) when the aircraft moves on the surface.

Direct controller-pilot VHF voice communications should be available at all times.

The XPDR is connected to two GNSS units that provide position and velocity data. If one GNSS fails, the XPDR switches automatically to the other source. If both GNSS sources are lost, the amber **ADS-B** caution comes up on the EWD. The flight crew should then inform the Air Navigation Service Provider (ANSP), as appropriate, using any published contingency procedures.

If the Air Traffic Controller requests to stop transmitting ADS-B OUT surveillance data ("STOP ADS-B TRANSMISSION", "STOP ADS-B TRANSMISSION ONLY" or "STOP ADS-B ALTITUDE TRANSMISSION"), do not switch off the transponder or the altitude reporting, so that ACAS operation and ATC radar surveillance are maintained. The flight crew should advise ATC that they are unable to comply ("UNABLE"); the controller should consider alternative solutions. For the alternate procedure, refer to the AIP or equivalent operator documentation.

Note

Independent operation of ADS-B Out and of the SSR transponder is not possible: setting the XPDR OFF also disables the TCAS.

See ADS-B OUT FAULT.

NSU.52 DOORS

NSU.52.1.1 Cockpit Door Operation

Ident.: NSU.52.1.1 — 06 NOV 2026 — ALL

This procedure should be applied if the local authorities require the cockpit door to remain closed throughout the flight.

Before pushback or engine start

► COCKPIT DOOR LOCKING SYSTEM sw ..... ON
► COCKPIT DOOR CLOSED ..... CHECK

With the cockpit door sw at CLOSE, the cockpit door is closed and locked.

After engine start

■ If routine access is requested from the cabin

The buzzer sounds in the cockpit for at least 2 s. Before unlocking the door, the flight crew should identify the person requesting entry.

■ If entry is not authorized by the flight crew

► COCKPIT DOOR sw ..... DENY

Emergency access, the buzzer and the Door Call panel are inhibited for 3 min.

■ If entry is authorized by the flight crew

► COCKPIT DOOR sw ..... OPEN

cont'd... ►►►

cont'd... ►►►

The flight crew should pull the switch and hold it in the OPEN position until the cabin crew opens the door.

Note

If the flight crew takes no action after a routine cabin request, the cabin crew can open the door with the emergency access procedure.

■ If the emergency access is initiated from the cabin

The buzzer sounds continuously in the cockpit for 30 s, and the OPEN light flashes on the central pedestal COCKPIT DOOR panel. If the flight crew takes no action, the door unlocks after 30 s.

■ If entry is not authorized by the flight crew

► COCKPIT DOOR sw ..... DENY

Emergency access, the buzzer and the Door Call panel are inhibited for 3 min. When the situation in the cockpit permits, the flight crew should identify the person requesting entry before unlocking the door.

■ If entry is authorized by the flight crew

► COCKPIT DOOR sw ..... OPEN

The flight crew should pull the switch and hold it in the OPEN position until the cabin crew opens the door.

Before leaving the aircraft

► COCKPIT DOOR LOCKING SYSTEM sw ..... OFF
► FAULT LIGHT on Door Control panel ..... CHECK

NSU.52.1.2 Cockpit Door Daily Check

Ident.: NSU.52.1.2 — 06 NOV 2026
ALL

► COCKPIT DOOR LOCKING SYSTEM sw ..... ON

In the cargo compartment, on the Door Call panel:

► EMER pb ..... PUSH

Check that the OPEN light flashes.

In the cockpit: check the buzzer, and check that the OPEN light flashes.

■ If correct

In the cockpit:

► COCKPIT DOOR sw ..... DENY

Check that the buzzer stops and the OPEN light goes off. In the cargo compartment, on the Door Call panel, check that the OPEN light goes off and the DENIED light comes on.

■ If correct

► COCKPIT DOOR sw ..... OPEN
► COCKPIT DOOR LOCKING SYSTEM sw ..... OFF
► MANUAL LOCK BOLT(S) ..... FUNCTIONAL CHECK

See also Cockpit Door Security System Check.

cont'd... ►►►

cont'd... ►►►

NSU.52.1.3 Opening the Cockpit Door from Cabin

Ident.: NSU.52.1.3 — 06 NOV 2026 — ALL

► CABIN CREW ROUTINE ACCESS ..... REQUEST on the DOOR CALL PANEL
► CABIN CREW ..... PRESS CALL
► CABIN CREW ..... STAND IN COCKPIT DOOR AXIS

The cabin crew should stand in the axis of the cockpit door. A buzzer sounds in the cockpit.

■ If entry is not authorized by the flight crew

The flight crew denies the entry request with the COCKPIT DOOR sw. The Door Call panel red light comes on steady: the door is locked. The emergency access, the buzzer and the Door Call panel are inhibited for 3 min.

■ If entry is authorized by the flight crew

The flight crew unlocks the door with the COCKPIT DOOR sw. The Door Call panel green light comes on steady: the door is unlocked.

► CABIN CREW ..... PULL the DOOR RIGHT PANEL to OPEN
► CABIN CREW ..... UNLOCK the LEFT PANEL and PULL to OPEN

The door left panel is unlocked with the handle on the cockpit side of the left panel.

■ If there is no reaction from the flight crew

► CABIN CREW SECOND ACCESS ..... REQUEST on the DOOR CALL PANEL

Repeat the above procedure.

■ If there is no reaction from the flight crew after a second request

► CABIN CREW ..... CALL THE COCKPIT

To establish contact with the flight crew and request access to the cockpit.

■ If there is no reaction from the flight crew after a cabin crew interphone call

► CABIN CREW ..... PRESS THE EMERGENCY

Rotate the protective plate and press the EMER pb. A buzzer sounds continuously in the cockpit for 30 s and the green light flashes on the Door Call panel. After 30 s the green light comes on steady, the buzzer stops and the cabin crew can pull the door right panel to open. The door is unlocked for 10 s.

► CABIN CREW ..... PULL the DOOR RIGHT PANEL to OPEN
► CABIN CREW ..... UNLOCK the LEFT PANEL and PULL to OPEN

NSU.52.2.1 Cargo Door

Ident.: NSU.52.2.1 — 06 NOV 2026 — ALL

To open the cargo door

1. Push the flap to grasp the handle of the upper lever.
2. Press the handle and pull the upper lever fully down.
3. Pull the lower lever fully down.
4. Open the flap for access to the cargo door control panel (green light comes on).
5. Press the selector to OPEN until the door is completely open.
6. Make sure the selector returns to the neutral position.
7. Lock the folding strut.

cont'd... ►►►

cont'd... ►►►

To close the cargo door

1. Unlock the folding strut.
2. Open the flap for access to the cargo door control panel.
3. Press the selector to CLOSE until the door is completely closed.
4. Fold the lower lever back in its recess.
5. Press the handle of the upper lever and fold it back in its recess.
6. Make sure the blue light is ON (door locked in the closed position), the selector has returned to neutral and the green light is OFF.

All the lights of the operating panel can be tested by pressing them.

As long as the cargo door is not closed with all hooks engaged, the **CARGO UNLK** light is on on the cockpit overhead panel.

Manual operation

If the electrical actuator fails, the cargo door can be opened or closed with a hand crank inserted in a shaft drive of the actuator.

NSU.70 POWER PLANT

NSU.70.1 Start Up

Ident.: NSU.70.1 — 06 NOV 2026 — ALL

Before initiating the start sequence, the EEC **FAULT** light must be OFF. If EEC FAULT is ON, try a reset. If unsuccessful, deselect the EEC.

During an engine start or relight, monitor:

- a correct NH increase when the sequence starts,
- starter disconnection at 45 % NH,
- the maximum ITT: during a battery start, one or two ITT peaks not exceeding 800 °C can usually be observed. ITT peaks are lower with a suitable GPU.

The **ENG OIL LO PR** FWS alarm is time-delayed by 30 s, to avoid an untimely ENG OIL LO PR during the engine start. For cold weather behaviour, see the adverse weather procedures.

Note

This alert is inhibited when the affected CL is in FUEL S.O.

See Engine Start.

NSU.70.2 Use of Bleed Valves for Takeoff

Ident.: NSU.70.2 — 06 NOV 2026 — ALL

The bleed valve closes automatically after an engine failure at takeoff. The closing signal is given by the MFCs when the uptrim is triggered; the BLEED **FAULT** light also comes on for the operative engine. The engine bleed valves can routinely be selected ON (NORM FLOW) for takeoff. A performance decrement must however be considered for the ground phase.

Note

Takeoff with HIGH FLOW mode selected is prohibited.

cont'd... ►►►

cont'd... ►►►

See ATPCS.

NSU.70.3 Power Set Up Procedure for Takeoff and Go-Around

Ident.: NSU.70.3 — 06 NOV 2026
ALL

Takeoff

Engine control normally uses the temperature, altitude and speed data from the selected ADC, but reverts to its own sensors in case of a detected failure or a significant offset.

TAT / SAT information is valid only when the engine (propeller unfeathered) on the side of the selected ADC is running.

RTO torques must be computed with altitude and temperature information independent from the aircraft sources, and compared with the values shown by the torque bugs.

Takeoff power is routinely obtained by setting the power levers and the condition levers in the notches. The CLs should routinely stay in the notches. NP is automatically set at 100 % provided the PWR MGT selector is on TO and the PLA is sufficient.

Go-around

The PF moves the throttles across the notch up to the ramp (beginning of the amber sector).

WARNING

OVERRIDING THE RAMP THRESHOLD UP TO THE ABSOLUTE FULL TRAVEL WILL ENABLE 1.15 X RTO TQ (EEC ON). THIS SHOULD BE USED ONLY IN CASE OF EMERGENCY.

See Power Levers.

NSU.70.4 Unfeathering after an Engine Restart in Flight

Ident.: NSU.70.4 — 06 NOV 2026
ALL

Unfeathering the propeller causes a limited lateral disturbance. See ENGINE RESTART IN FLIGHT.

NSU.70.5 Engine Parameters Fluctuation

Ident.: NSU.70.5 — 06 NOV 2026
ALL

The variation tolerances of the engine parameters are given below. They apply only in stabilized flight phases.

PARAMETERS	TQ	NH	ITT	NP
FLUCTUATION AMPLITUDE	±2 %	±0.25 %	±5 °C	±2.5 %

An NH fluctuation amplitude of ±0.25 % means a maximum amplitude of 0.5 % between the minimum and maximum NH values read by the crew.

If the engine parameters fluctuate beyond the tolerances, it can help to deselect the corresponding EEC (OFF) before shutting the engine down. If this solves the problem, the flight can be continued accordingly.

NSU.70.6 Man Ignition

Ident.: NSU.70.6 — 06 NOV 2026
ALL

When one or both EECs have been deselected, MAN ignition is required when the aircraft enters heavy precipitation or severe turbulence, when ice accretion develops, or when using a contaminated runway for takeoff or landing.

cont'd... ►►►

cont'd... ►►►

NSU.70.7 Adapted Flight Idle

Ident.: NSU.70.7 — 06 NOV 2026
ALL

A low flight idle rating gives a significant increase in aerodynamic drag, which benefits the descent performance (approach and landing). On the other hand, this increased drag affects the lift at high angle of attack.

To meet both requirements, the adapted flight idle provides two power settings. The flight crew selects the FI position; the EEC sets the power level (high or low) according to information from the MFC. This information is associated with a limit angle of attack equal to α stall warning −4°. If the high flight idle is lost, the aircraft behaviour at the stall is unchanged and the decrease in lift is negligible and covered by the regulatory margins.

NSU.70.8 Propeller Brake Use

Ident.: NSU.70.8 — 06 NOV 2026
ALL

The propeller brake must be used only when the **READY** light on the propeller brake control panel is ON.

Braking sequence (ENG 2 running)

► RH CL ..... FTR OR FUEL S.O.
► GUST LOCK ..... ON
► BLUE HYD PRESS ..... CHECK ABOVE 2900 PSI
► PROP BRAKE SW ..... ON

Note

The DC AUX pump runs automatically as soon as:

- *the blue hydraulic pressure is below 1 500 psi, and*
- *the gear is down, and*
- *one engine is running,*

and stops 15 s after the end of the PROP braking sequence (PROP BRK lights ON).

Releasing sequence (ENG 2 in Hotel Mode)

► HYD AUX PUMP ..... PULSE
► PROP BRAKE SW ..... OFF

Note

A pulse on the AUX HYD PUMP pb starts the auxiliary hydraulic pump for 30 s. Selecting the propeller brake sw OFF within this 30 s keeps the DC AUX PUMP running beyond the 30 s, because when the brake is completely released the DC pump stays supplied for 15 s.

See Propeller Brake and Hotel Mode.

NSU.70.9 Reverse Phases

Ident.: NSU.70.9 — 06 NOV 2026
ALL

NP is the parameter to monitor during the reverse phases (NP is the only regulated parameter in these phases).

cont'd... ►►►

cont'd... ►►►

NSU.70.10 Operations Out of the Notch

Ident.: NSU.70.10 — 06 NOV 2026
ALL

The engines are trimmed to compensate for the built-in differences between the left and right engines and their controls. The trimming is done at two Power Lever (PL) positions: Flight Idle (FI) and in the notch. It gives a similar torque on both sides at those PL positions.

When the flight crew retards the PLs out of the notch during descent and approach, the trim efficiency is reduced and may no longer correct the left / right difference. This may give a difference of up to 8 % between the left and right TQ in stabilized conditions.

Such a difference is acceptable. If required, the flight crew can compensate it by adjusting the PLs manually.

NSU.70.11 Boost Operation

Ident.: NSU.70.11 — 06 NOV 2026
ALL

In normal operation, the flight crew selects the appropriate rating with the ENG BOOST pb:

- pressed in for BOOST (PW127M rating, default engine power),
- released out to derate the engine power (PW127F rating).

Once the power levers reach FI, the rating selection is latched. A change of the pb position is not effective until the power levers are retarded below FI.

This inhibition is cancelled after an engine failure: after an engine failure in any flight phase, the crew can change the engine rating for single engine operation. The new selection is then latched until the power levers are retarded below FI.

See ENG BOOST FUNCTION FAULT.

NNO.1 INTRODUCTION

NNO.1.1 General

Ident.: NNO.1.1 — 06 NOV 2026 — ALL

This chapter gives the emergency and the abnormal procedures, grouped by system (ATA chapter): first the emergency procedures, then the abnormal procedures. A procedure is identified by its FCOM code (E for emergency, A for abnormal) and its title, which is usually the alert shown on the EWD.

The procedures are the ones the electronic checklist (ECL) presents on the EWD, item for item.

NNO.1.2 How to Read a Procedure

Ident.: NNO.1.2 — 06 NOV 2026 — ALL

► ITEM ..... ACTION

► ITEM ..... ACTION

■ **Condition**

► ITEM ..... ACTION

● **Sub-condition**

► ITEM ..... ACTION

NOTE: a note or a caution about the items around it.

MARK	MEANING
Items in a box	Memory items: done from memory, before the procedure is read
► ITEM ..... ACTION	An action: set the control or check the indication as stated
■ / ●	A condition: do the indented items below it only when it applies
Text with a bar on the left	A note or a caution
Grey band	Explanation of the item above it

Electronic checklist (ECL)

On the EWD the active procedure comes up by itself with its alert. Any procedure of this chapter can also be called from the EWD procedure menu.

PAGE

INTENTIONALLY

LEFT BLANK

E24 ELECTRICAL POWER

E24.01 DC GEN 1+2 FAULT

Ident.: E24.01 06 NOV 2026
ALL

► PF ..... CAPT
► DC GEN 1 ..... RESET
► DC GEN 2 ..... RESET

■ **IF NO GENERATOR RECOVERED**

► HYD GREEN PUMP ..... OFF
► TRU ..... ON

TRU ON recover the EMER, ESS and STBY busses from ACW generator(s).

● **If no TRU arrow light**

► MAX IMC FLIGHT TIME ..... 30 min
► TRU ..... OFF
► LAND ASAP

► BAT sw ..... OVRD
► AVIONICS VENT EXHAUST MODE ..... OVBD
► F/O ATT/HDG ..... SYS 1
► F/O ADC ..... SYS 1

● **If stall warning inoperative**

► AP USE ..... PROHIBITED

● **If IAS <160 kt and/or below 1 000 ft AGL**

► AP and/or YD USE ..... PROHIBITED

● **If none of the conditions quoted above exists**

► AP and/or YD CAN BE REENGAGED
► COM / SURV / NAV ..... USE MCDU 1
► XPDR ..... SET XPDR 1
► ATC (VHF 1) ..... NOTIFY

Only VHF 1 is available.

► MIN CAB LT ..... OFF
► RECIRC FANS 1+2 ..... OFF
► TLU sw ..... LO SPD

TLU AUTO mode is lost, use MAN MODE.

MAN MODE acts on TLU standby actuator which remains powered.

● **When TLU LO SPEED label appears**

► TLU sw ..... AUTO

When TLU sw is set to AUTO position, TLU standby actuator electrical power is off.

● **If IAS above 180 kt**

► LARGE RUDDER INPUT ..... AVOID

cont'd... ►►►

cont'd... ►►►

► STICK PUSHER-SHAKER FAULT procedure ..... APPLY

Both stick pusher and/or stick shaker are lost without FAULT alarm.

► SIDE WINDOWS pb ..... OFF

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

► BUS EQUIPMENT LIST ..... CHECK

Refer to PRO.NNO.ABN.24.4.1.1 Air (PROCEDURES-NNO-ABN-24-ELECTRICAL-POWER-4-LOST EQUIPMENT LIST-1- STBY BUSSES AND BAT ONLY LOST EQUIPMENT LISTS)

► PFD IAS ..... PERIODICALLY COMPARE WITH IESI

► HDG & TK ..... PERIODICALLY X CHECK WITH STBY COMPASS

• For approach

► PAX INSTRUCTIONS ..... USE PA

Cabin signs are not supplied in emergency.

► HYD X FEED ..... ON

To recover green hydraulic system

• At touchdown

► IDLE GATE lever ..... PULL

■ IF DC GEN 1 RECOVERED

► DC GEN 1 FAULT procedure ..... APPLY

■ IF DC GEN 2 RECOVERED

► DC GEN 2 FAULT procedure ..... APPLY

E26 FIRE PROTECTION

E26.01 SMOKE OR FUMES

Ident.: E26.01 06 NOV 2026
ALL

■ **If smoke/fumes in the cockpit**
- ► CREW OXY MASKS ..... DON
- ► CREW OXY MASK MODE ..... 100 % or EMERGENCY
- ► GOGGLES ..... DON
- ► CREW COMMUNICATIONS ..... ESTABLISH
- ► RECIRC FANS 1+2 ..... OFF
- ► AP ..... ON
- ► LAND ASAP

► CABIN CREW COMMUNICATIONS ..... ESTABLISH

CAUTION: ELEC SMK warning may be triggered by an air conditioning smoke source.

► SMOKE / FUMES SOURCE ..... IDENTIFY

■ **IF ELECTRICAL SMOKE/FUMES IDENTIFIED (see ELECTRICAL SMOKE)**

■ **IF AIR CONDITIONING SMOKE/FUMES IDENTIFIED**

■ **IF FWD SMK ON OR SMOKE/FUMES IN FWD ZONE (see FWD SMOKE)**

■ **IF AFT SMK ON OR SMOKE/FUMES IN AFT ZONE (see AFT SMOKE)**

■ **IF PED OVERHEATING (see PED OVERHEATING)**

■ **IF SMOKE/FUMES SOURCE NOT IDENTIFIED (see ELECTRICAL SMOKE)**

E26.02 ELECTRICAL SMOKE

Ident.: E26.02 06 NOV 2026
ALL

- ► CREW OXY MASKS ..... DON / 100%
- ► GOGGLES ..... SET
- ► CREW COMMUNICATIONS ..... ESTABLISH
- ► RECIRC FAN 1+2 ..... OFF
- ► AP ..... ON

► SMOKE SOURCE ..... IDENTIFY

ELEC SMK MAY BE ACTIVATED BY AN AIR CONDITIONING SMOKE SOURCE

■ **IF SMOKE SOURCE NOT IDENTIFIED OR ELEC SMOKE SUSPECTED**
- ► LAND ASAP
- ► AVIONICS VENT EXHAUST MODE ..... OVBD
- ► AIR FLOW ..... HIGH
- ► DC SVCE & UTLY BUS ..... OFF
- ► DC BTC ..... ISOL
- ► ICING CONDITIONS ..... LEAVE AND AVOID
- ► ACW GEN 1 + 2 ..... OFF

cont'd... ►►►

cont'd... ►►►

► SUSPECTED EQUIPMENT ..... OFF

• If smoke source not identified

► ACW GEN 1+2 LOSS procedure ..... APPLY

• If smoke source identified

► OPERATING EQUIPMENT ..... RESTORE

NOTE : RESTORE ACW GEN, DC BTC AND/OR DC SVCE & UTLY BUS IF APPROPRIATE

► AFFECTED EQUIPMENT FAULT PROCEDURES ..... APPLY

• When ΔP below 1 psi

► OVBD VALVE ..... FULL OPEN

► AVIONICS VENT EXHAUST MODE ..... NORM

■ IF SMOKE GENERATED BY AIR CONDITIONING

► LAND ASAP

► PACK 1 ..... OFF

► MAX FL ..... 200 / MEA

• If smoke persists

► PACK 1 ..... ON

► PACK 2 ..... OFF

► ENG PARAMETERS ..... CAREFULLY MONITOR

• If ENG 1(2) OVER LIM on EWD, or total loss of NL indication, or engine abnormality clearly identified

► PL (affected ENG) ..... FI

► CL (affected ENG) ..... FTR THEN FUEL S.O.

► PACK (operative ENG) ..... CHECK ON

► SINGLE ENG OPERATION procedure ..... APPLY

E26.03 AIR COND SMOKE

Ident.: E26.03 — 06 NOV 2026
ALL

► LAND ASAP

► CREW OXY MASKS ..... DON / 100%
► GOGGLES ..... SET
► CREW COMMUNICATIONS ..... ESTABLISH
► RECIRC FAN 1+2 ..... OFF
► AP ..... ON

► SMOKE SOURCE ..... IDENTIFY

► PACK 1 ..... OFF

CAUTION : Air conditioning smoke may trigger an ELEC SMK warning. Do not apply ELECTRICAL SMOKE procedure in this case.

■ If smoke persists

► PACK 1 ..... ON

► PACK 2 ..... OFF

► ENG PARAMETERS ..... CAREFULLY MONITOR

cont'd... ►►►

cont'd... ►►►

■ **If ENG 1 OVER LIM amber message on EWD**

■ **- OR -**

■ **Total loss of NL indication**

■ **- OR -**

■ **Engine abnormality clearly identified (NH, NL, ITT indications, noise, surge...)**

CAUTION : Identify the engine that shows signs of abnormal operation in order to avoid shutting down the safe engine.

► PL 1 ..... FI
► CL 1 ..... FTR THEN FUEL S.O.
► PACK (operative ENG) ..... CHECK ON
► SINGLE ENG OPERATION procedure ..... APPLY
► MAX FL 200/MEA

E26.03 AIR COND SMOKE

Ident.: E26.03 — 06 NOV 2026
ALL

► LAND ASAP

► CREW OXY MASKS ..... DON / 100%
► GOGGLES ..... SET
► CREW COMMUNICATIONS ..... ESTABLISH
► RECIRC FAN 1+2 ..... OFF
► AP ..... ON

► SMOKE SOURCE ..... IDENTIFY
► PACK 1 ..... OFF

CAUTION : Air conditioning smoke may trigger an ELEC SMK warning. Do not apply ELECTRICAL SMOKE procedure in this case.

■ **If smoke persists**

► PACK 1 ..... ON
► PACK 2 ..... OFF
► ENG PARAMETERS ..... CAREFULLY MONITOR

■ **If ENG 2 OVER LIM amber message on EWD**

■ **- OR -**

■ **Total loss of NL indication**

■ **- OR -**

■ **Engine abnormality clearly identified (NH, NL, ITT indications, noise, surge...)**

CAUTION : Identify the engine that shows signs of abnormal operation in order to avoid shutting down the safe engine.

► PL 2 ..... FI
► CL 2 ..... FTR THEN FUEL S.O.
► PACK (operative ENG) ..... CHECK ON
► SINGLE ENG OPERATION procedure ..... APPLY
► MAX FL 200/MEA

cont'd... ►►►

cont'd... ►►►

E26.04 FWD SMOKE

Ident.: E26.04 — 06 NOV 2026
ALL

► LAND ASAP

► CREW OXY MASKS ..... DON / 100%
► GOGGLES ..... SET
► CREW COMMUNICATIONS ..... ESTABLISH
► RECIRC FAN 1+2 ..... OFF
► AP ..... ON

► SMOKE SOURCE ..... IDENTIFY
► CABIN CREW (PA) ..... ADVISE FOR ACTION
► AVIONICS VENT EXHAUST MODE ..... OVBD
► AIR FLOW ..... HIGH
► EXTRACT AIR FLOW lever ..... CLOSED

■ **When ΔP below 1 psi**

► OVBD VALVE ..... FULL OPEN
► AVIONICS VENT EXHAUST MODE ..... NORM

NOTE : OTHER SMOKE DETECTION ALARMS MAY BE TRIGGERED DURING SMOKE EVACUATION PROCESS. DISREGARD THEM.

E26.06 AFT SMOKE

Ident.: E26.06 — 06 NOV 2026
ALL

► LAND ASAP

► CREW OXY MASKS ..... DON / 100%
► GOGGLES ..... SET
► CREW COMMUNICATIONS ..... ESTABLISH
► RECIRC FAN 1+2 ..... OFF
► AP ..... ON

► SMOKE SOURCE ..... IDENTIFY
► CABIN CREW (PA) ..... ADVISE FOR ACTION
► AIR FLOW ..... HIGH

NOTE : OTHER SMOKE DETECTION ALARMS MAY BE TRIGGERED DURING SMOKE EVACUATION PROCESS. DISREGARD THEM.

E26.07 PED OVERHEATING

Ident.: E26.07 — 06 NOV 2026
ALL

► PF ..... NOT AFFECTED SIDE
► PM ..... MOVE TO OBSERVER AREA

■ **If smoke or fumes**

► CREW OXY MASKS ..... DON
► CREW OXY MASK MODE ..... 100% or EMERGENCY

cont'd... ►►►

cont'd... ►►►

► GOGGLES ..... DON
► CREW COMMUNICATIONS ..... ESTABLISH
► AP ..... ON
► CABIN CREW ..... ADVISE FOR ACTION

► GLOVES ..... DON

CAUTION : Do not move a burning device.

■ If fire

► EXTINGUISHER ..... DISCHARGE
► PED ..... TRANSFER TO FWD CARGO

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

PAGE

INTENTIONALLY

LEFT BLANK

E27 FLIGHT CONTROLS

E27.01 PITCH CONTROL JAM AT TAKEOFF OR LANDING

Ident.: E27.01 06 NOV 2026
ALL

- ► CONTROL COLUMNS ..... UNCOUPLE
- ► FREE CONTROL COLUMN ..... IDENTIFY
- ► PF ..... FREE CONTROL COLUMN SIDE
- ► PITCH DISCONNECT procedure ..... APPLY
- ► MAX IAS: 180 kt

PAGE

INTENTIONALLY

LEFT BLANK

E70 POWER PLANT

E70.01 ENG 1 FIRE AT TO - ICING COND

Ident.: E70.01 06 NOV 2026
ALL

NOTE: Captain may decide to shut down affected engine before reaching acceleration altitude, but not before 400 ft AGL

■ **WHEN AIRBORNE**
- ► LDG GEAR ..... UP

■ **AT ACCELERATION ALTITUDE**
- ► PWR MGT ..... MCT

■ **AT VFTO**
- ► FLAPS: MAINTAIN 15°
- ► PL 1 ..... FI
- ► CL 1 ..... FTR THEN FUEL S.O
- ► FIRE HANDLE 1 ..... PULL

• **If fire persists after 10 s**
- ► AGENT 1 ENG 1 ..... DISCH

• **If fire persists 30 s after AGENT 1 DISCH**
- ► AGENT 2 ENG 1 ..... DISCH

► LAND ASAP
► BLEED ENG 2 ..... OFF (if necessary)
► ATC ..... NOTIFY
► SINGLE ENG OPERATION procedure ..... APPLY
► ENG 1: DO NOT RESTART

E70.01 ENG 2 FIRE AT TO - ICING COND

Ident.: E70.01 06 NOV 2026
ALL

NOTE: Captain may decide to shut down affected engine before reaching acceleration altitude, but not before 400 ft AGL

■ **WHEN AIRBORNE**
- ► LDG GEAR ..... UP

■ **AT ACCELERATION ALTITUDE**
- ► PWR MGT ..... MCT

■ **AT VFTO**
- ► FLAPS: MAINTAIN 15°
- ► PL 2 ..... FI
- ► CL 2 ..... FTR THEN FUEL S.O
- ► FIRE HANDLE 2 ..... PULL

cont'd... ►►►

cont'd... ►►►

- **If fire persists after 10 s**
  - ► AGENT 1 ENG 2 ..... DISCH
- **If fire persists 30 s after AGENT 1 DISCH**
  - ► AGENT 2 ENG 2 ..... DISCH

► LAND ASAP
► BLEED ENG 1 ..... OFF (if necessary)
► ATC ..... NOTIFY
► SINGLE ENG OPERATION procedure ..... APPLY
► ENG 2: DO NOT RESTART

E70.01 ENG 1 FIRE AT TO - NORM COND

Ident.: E70.01 06 NOV 2026
ALL

NOTE: Captain may decide to shut down affected engine before reaching acceleration altitude, but not before 400 ft AGL

■ **WHEN AIRBORNE**
► LDG GEAR ..... UP

■ **AT ACCELERATION ALTITUDE**
► PWR MGT ..... MCT

■ **AT VFTO**
► FLAPS 0
► PL 1 ..... FI
► CL 1 ..... FTR THEN FUEL S.O
► FIRE HANDLE 1 ..... PULL

- **If fire persists after 10 s**
  - ► AGENT 1 ENG 1 ..... DISCH
- **If fire persists 30 s after AGENT 1 DISCH**
  - ► AGENT 2 ENG 1 ..... DISCH

► LAND ASAP
► BLEED ENG 2 ..... OFF (if necessary)
► ATC ..... NOTIFY
► SINGLE ENG OPERATION procedure ..... APPLY
► ENG 1: DO NOT RESTART

E70.01 ENG 2 FIRE AT TO - NORM COND

Ident.: E70.01 06 NOV 2026
ALL

NOTE: Captain may decide to shut down affected engine before reaching acceleration altitude, but not before 400 ft AGL

■ **WHEN AIRBORNE**
► LDG GEAR ..... UP

cont'd... ►►►

cont'd... ►►►

■ **AT ACCELERATION ALTITUDE**

► PWR MGT ..... MCT

■ **AT VFTO**

► FLAPS 0

► PL 2 ..... FI

► CL 2 ..... FTR THEN FUEL S.O

► FIRE HANDLE 2 ..... PULL

● **If fire persists after 10 s**

► AGENT 1 ENG 2 ..... DISCH

● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 2 ..... DISCH

► LAND ASAP

► BLEED ENG 1 ..... OFF (if necessary)

► ATC ..... NOTIFY

► SINGLE ENG OPERATION procedure ..... APPLY

► ENG 2: DO NOT RESTART

E70.02 ENG 1 SEVERE MECH DAMAGE IN FLT

Ident.: E70.02 — 06 NOV 2026
ALL

► PL 1 ..... FI

► CL 1 ..... FTR THEN FUEL S.O

► FIRE HANDLE 1 ..... PULL

■ **If fire persists after 10 s**

► AGENT 1 ENG 1 ..... DISCH

● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 1 ..... DISCH

► LAND ASAP

► ATC ..... NOTIFY

► SINGLE ENG OPERATION procedure ..... APPLY

► ENG 1: DO NOT RESTART

E70.02 ENG 2 SEVERE MECH DAMAGE IN FLT

Ident.: E70.02 — 06 NOV 2026
ALL

► PL 2 ..... FI

► CL 2 ..... FTR THEN FUEL S.O

► FIRE HANDLE 2 ..... PULL

■ **If fire persists after 10 s**

► AGENT 1 ENG 2 ..... DISCH

● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 2 ..... DISCH

cont'd... ►►►

cont'd... ►►►

► LAND ASAP
► ATC ..... NOTIFY
► SINGLE ENG OPERATION procedure ..... APPLY
► ENG 2: DO NOT RESTART

E70.02 ENG 1 FIRE IN FLIGHT

Ident.: E70.02 06 NOV 2026
ALL

► PL 1 ..... FI
► CL 1 ..... FTR THEN FUEL S.O
► FIRE HANDLE 1 ..... PULL

■ **If fire persists after 10 s**
► AGENT 1 ENG 1 ..... DISCH
● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 1 ..... DISCH
► LAND ASAP
► ATC ..... NOTIFY
► SINGLE ENG OPERATION procedure ..... APPLY
► ENG 1: DO NOT RESTART

E70.02 ENG 2 FIRE IN FLIGHT

Ident.: E70.02 06 NOV 2026
ALL

► PL 2 ..... FI
► CL 2 ..... FTR THEN FUEL S.O
► FIRE HANDLE 2 ..... PULL

■ **If fire persists after 10 s**
► AGENT 1 ENG 2 ..... DISCH
● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 2 ..... DISCH
► LAND ASAP
► ATC ..... NOTIFY
► SINGLE ENG OPERATION procedure ..... APPLY
► ENG 2: DO NOT RESTART

E70.03 ENG 1 SEVERE MECH DAMAGE ON GND

Ident.: E70.03 06 NOV 2026
ALL

► AIRCRAFT ..... STOP
► BRAKE HANDLE ..... PARKING
► CL 1+2 ..... FTR THEN FUEL S.O
► FIRE HANDLE 1 ..... PULL

cont'd... ►►►

cont'd... ►►►

■ **If fire persists**

► AGENT 1 ENG 1 ..... DISCH

● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 1 ..... DISCH

► ATC (VHF 1) ..... NOTIFY

■ **IF EMER EVACUATION REQUIRED (see EMERGENCY EVACUATION (ON GROUND))**

E70.03 ENG 2 SEVERE MECH DAMAGE ON GND

Ident.: E70.03 — 06 NOV 2026
ALL

► AIRCRAFT ..... STOP
► BRAKE HANDLE ..... PARKING
► CL 1+2 ..... FTR THEN FUEL S.O
► FIRE HANDLE 2 ..... PULL

■ **If fire persists**

► AGENT 1 ENG 2 ..... DISCH

● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 2 ..... DISCH

► ATC (VHF 1) ..... NOTIFY

■ **IF EMER EVACUATION REQUIRED (see EMERGENCY EVACUATION (ON GROUND))**

E70.03 ENG 1 FIRE ON GROUND

Ident.: E70.03 — 06 NOV 2026
ALL

► AIRCRAFT ..... STOP
► BRAKE HANDLE ..... PARKING
► CL 1+2 ..... FTR THEN FUEL S.O
► FIRE HANDLE 1 ..... PULL

■ **If fire persists**

► AGENT 1 ENG 1 ..... DISCH

● **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 1 ..... DISCH

► ATC (VHF 1) ..... NOTIFY

■ **IF EMER EVACUATION REQUIRED (see EMERGENCY EVACUATION (ON GROUND))**

E70.03 ENG 2 FIRE ON GROUND

Ident.: E70.03 — 06 NOV 2026
ALL

► AIRCRAFT ..... STOP
► BRAKE HANDLE ..... PARKING
► CL 1+2 ..... FTR THEN FUEL S.O
► FIRE HANDLE 2 ..... PULL

cont'd... ►►►

cont'd... ►►►

■ **If fire persists**

► AGENT 1 ENG 2 ..... DISCH

• **If fire persists 30 s after AGENT 1 DISCH**

► AGENT 2 ENG 2 ..... DISCH

► ATC (VHF 1) ..... NOTIFY

■ **IF EMER EVACUATION REQUIRED (see EMERGENCY EVACUATION (ON GROUND))**

E70.04 ENG 1 FLAME OUT AT TO - ICING COND

Ident.: E70.04 — 06 NOV 2026
ALL

► AUTOFEATHER ..... CHECK

► UPTRIM ..... CHECK

■ **If no UPTRIM**

► PL 1 + 2 ..... ADVANCE TO THE RAMP

■ **WHEN AIRBORNE**

► LDG GEAR ..... UP

• **If NO BLEED 1 FAULT**

► BLEED 1 ..... OFF

■ **AT ACCELERATION ALTITUDE**

► ALT MODE ..... SET

■ **AT VFTO**

► PL 1 + 2 ..... IN THE NOTCH

► PWR MGT ..... MCT

► FLAPS ..... MAINTAIN 15°

► SPD TGT ..... CHECK VFTO ICING FLAPS 15°

► IAS MODE ..... SET

► PL 1 ..... FI

► CL 1 ..... FTR THEN FUEL S.O

► BLEED ENG 2 ..... OFF (if necessary)

► ATC ..... NOTIFY

■ **If damage**

► FIRE HANDLE 1 ..... PULL

► SINGLE ENG OPERATION procedure ..... APPLY

■ **If no damage**

NOTE: Engine relight may be performed at flight crew discretion.

► ENG RESTART IN FLIGHT procedure ..... APPLY

• **If no restart**

► SINGLE ENG OPERATION procedure ..... APPLY

cont'd... ►►►

cont'd... ►►►

E70.04 ENG 2 FLAME OUT AT TO - ICING COND

Ident.: E70.04 — 06 NOV 2026
ALL

► AUTOFEATHER ..... CHECK
► UPTRIM ..... CHECK

■ **If no UPTRIM**

► PL 1 + 2 ..... ADVANCE TO THE RAMP

■ **WHEN AIRBORNE**

► LDG GEAR ..... UP

● **If NO BLEED 2 FAULT**

► BLEED 2 ..... OFF

■ **AT ACCELERATION ALTITUDE**

► ALT MODE ..... SET

■ **AT VFTO**

► PL 1 + 2 ..... IN THE NOTCH
► PWR MGT ..... MCT
► FLAPS ..... MAINTAIN 15°
► SPD TGT ..... CHECK VFTO ICING FLAPS 15°
► IAS MODE ..... SET

► PL 2 ..... FI
► CL 2 ..... FTR THEN FUEL S.O
► BLEED ENG 1 ..... OFF (if necessary)
► ATC ..... NOTIFY

■ **If damage**

► FIRE HANDLE 2 ..... PULL
► SINGLE ENG OPERATION procedure ..... APPLY

■ **If no damage**

NOTE: Engine relight may be performed at flight crew discretion.

► ENG RESTART IN FLIGHT procedure ..... APPLY

● **If no restart**

► SINGLE ENG OPERATION procedure ..... APPLY

E70.04 ENG 1 FLAME OUT AT TO - NORM COND

Ident.: E70.04 — 06 NOV 2026
ALL

► AUTOFEATHER ..... CHECK
► UPTRIM ..... CHECK

■ **If no UPTRIM**

► PL 1 + 2 ..... ADVANCE TO THE RAMP

■ **WHEN AIRBORNE**

► LDG GEAR ..... UP

cont'd... ►►►

cont'd... ►►►

● **If NO BLEED 1 FAULT**

► BLEED 1 ..... OFF

■ **AT ACCELERATION ALTITUDE**

► ALT MODE ..... SET

■ **AT VFTO**

► PL 1 + 2 ..... IN THE NOTCH
► PWR MGT ..... MCT
► FLAPS ..... 0°
► SPD TGT ..... CHECK VFTO
► IAS MODE ..... SET

► PL 1 ..... FI
► CL 1 ..... FTR THEN FUEL S.O
► BLEED ENG 2 ..... OFF (if necessary)
► ATC ..... NOTIFY

■ **If damage**

► FIRE HANDLE 1 ..... PULL
► SINGLE ENG OPERATION procedure ..... APPLY

■ **If no damage**

NOTE: Engine relight may be performed at flight crew discretion.

► ENG RESTART IN FLIGHT procedure ..... APPLY

● **If no restart**

► SINGLE ENG OPERATION procedure ..... APPLY

E70.04 ENG 2 FLAME OUT AT TO - NORM COND

Ident.: E70.04 — 06 NOV 2026
ALL

► AUTOFEATHER ..... CHECK
► UPTRIM ..... CHECK

■ **If no UPTRIM**

► PL 1 + 2 ..... ADVANCE TO THE RAMP

■ **WHEN AIRBORNE**

► LDG GEAR ..... UP

● **If NO BLEED 2 FAULT**

► BLEED 2 ..... OFF

■ **AT ACCELERATION ALTITUDE**

► ALT MODE ..... SET

■ **AT VFTO**

► PL 1 + 2 ..... IN THE NOTCH
► PWR MGT ..... MCT
► FLAPS ..... 0°
► SPD TGT ..... CHECK VFTO
► IAS MODE ..... SET

cont'd... ►►►

cont'd... ►►►

► PL 2 ..... FI
► CL 2 ..... FTR THEN FUEL S.O
► BLEED ENG 1 ..... OFF (if necessary)
► ATC ..... NOTIFY

■ **If damage**

► FIRE HANDLE 2 ..... PULL
► SINGLE ENG OPERATION procedure ..... APPLY

■ **If no damage**

NOTE: Engine relight may be performed at flight crew discretion.

► ENG RESTART IN FLIGHT procedure ..... APPLY

● **If no restart**

► SINGLE ENG OPERATION procedure ..... APPLY

E70.05 ENG 1+2 FLAME OUT

Ident.: E70.05 — 06 NOV 2026
ALL

► PF ..... CAPT
► PL 1 + 2 ..... FI

■ **IF NH DROPS BELOW 30 %**

► CL 1 + 2 ..... FTR THEN FUEL S.O
► OPTIMUM SPEED ..... VmHB

NOTE: In order to determine VmHB Refer to PER.8.1 VmHB

► FUEL SUPPLY ..... CHECK
► ATC (VHF1) ..... NOTIFY
► ENGINE RESTART ENVELOPE ..... CHECK
► ENG START selector ..... START A & B

● **RELIGHT SEQUENCE ON ENG 2 THEN ENG 1**

► ENG START pb ..... ON

● **When NH above 10 %**

► CL ..... FTR
► ENG RELIGHT: MONITOR
► CL ..... AS RQRD
► PL ..... AS RQRD

● **If no restart**

► CL ..... FTR THEN FUEL S.O

● **If NO engine recovered**

► ENG START selector ..... OFF & START ABORT
► FUEL PUMPS 1 + 2 ..... OFF

CAUTION: Do not select avionics vent exhaust mode to OVBD.

► FORCED LANDING procedure ..... APPLY
► DITCHING procedure ..... APPLY

cont'd... ►►►

cont'd... ►►►

■ **IF AT LEAST ONE ENGINE RECOVERED**

► SYSTEMS (affected) ..... RESTORE

► APM ..... OFF

► SINGLE ENG OPERATION procedure ..... APPLY

E99 MISCELLANEOUS

E99.01 BOMB ON BOARD

Ident.: E99.01 — 06 NOV 2026
ALL

► ATC ..... NOTIFY
► LANDING ELEVATION ..... SET CAB ALT
► ALT SEL ..... DESCENT TO CABIN ALTITUDE
► LOAD FACTORS: AVOID
► BOMB: HANDLE CAREFULLY AND AVOID SHOCKS

PLACE BOMB NEAR SERVICE DOOR PREFERABLY IN A BAG ATTACHED TO THE DOOR HANDLE SURROUND IT WITH DAMPING MATERIAL

► CABIN CREW OXYGEN AND FIRE EXTINGUISHER ..... MOVE FORWARD
► PAX ..... MOVE FORWARD/CRASH POSITION

■ **When Z aircraft = Z cabin**

► APPROACH CONFIGURATION ..... FLAPS 15
► LDG GEAR ..... DOWN
► CAB PRESS DUMP ..... ON
► SERVICE DOOR ..... UNLOCK
► LAND ASAP

E99.02 COCKPIT DOOR SECURITY SYSTEM

Ident.: E99.02 — 06 NOV 2026
ALL

■ **If electrical power lost**

► MANUAL LOCK BOLT ..... CLOSE POSITION

WHEN THE DOOR IS LOCKED WITH THE MANUAL BOLT, THE EMERGENCY ACCESS TO THE COCKPIT IS NOT AVAILABLE

IT IS RECOMMENDED THAT AT LEAST TWO CREW MEMBERS REMAIN IN THE COCKPIT DURING THAT TIME

■ **If cockpit door is jammed in closed position and need to exit the cockpit**

► THIRD OCCUPANT SEAT (if any) ..... FOLD UP
► TWO HORIZONTAL LATCHES ON THE LEFT PANEL DOOR ..... CHECK OPEN
► COCKPIT DOOR LOCKING SYSTEM sw ..... OFF
► DOORS ..... PUSH

● **If cockpit door still jammed in closed position**

► ELECTRICAL PLUG ON TOP LEFT OF THE LEFT DOOR ..... DISCONNECT
► FOUR RED SAFETY PINS FROM THE DOORS ..... REMOVE
► VERTICAL DOOR HANDLE ..... OPEN
► DOORS ..... PUSH & REMOVE

cont'd... ►►►

cont'd... ►►►

E99.03 DITCHING

Ident.: E99.03 — 06 NOV 2026
ALL

● Preparation

► ATC (VHF1 or HF) ..... NOTIFY

If both engines lost, use VHF1.

► XPDR 1 7700
► CABIN CREW (PA) ..... NOTIFY
► CABIN AND COCKPIT ..... PREPARE

Notify cabin crew of nature of the emergency and state intentions.

Specify the remaining time before ditching.

Loose equipment secured.

Survival equipment prepared.

Belts and shoulder harnesses locked.

► GPWS ..... OFF
► TERR ..... OFF

Avoids nuisance warnings.

► SIGNS ..... ON
► EMER EXIT LT ..... ON
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE
► EMER LOC XMTR ..... MAN

● For approach

► CAB PRESS MODE SEL ..... MAN
► CAB PRESS DUMP ..... ON

The amber FAULT light of the Cabin Pressure Mode selector comes on.

NOTE: DUMP leads to a rapid depressurization.

► PACKS 1+2 ..... OFF
► LDG GEAR: KEEP UP
► CAB PRESS DITCH ..... ON
► RAM AIR ..... OFF

● If no engine operates

► HYD AUX PUMP pb pedestal ..... PRESS

● Within 10 s

► FLAPS (if available) 30
► OVBD VALVE ..... FULL CLOSE
► ENG START selector ..... OFF & START ABORT
► CABIN REPORT ..... OBTAIN

■ Just before ditching

NOTE: In case of night ditching, both engines shut down is performed at captain's discretion as no landing lights available with propellers feathered.

cont'd... ►►►

cont'd... ►►►

► BRACE FOR IMPACT ..... ORDER
► FLARE ..... INITIATE
► OPTIMAL PITCH ATTITUDE ..... 9°
► CL 1+2 ..... FTR THEN FUEL S.O
► FIRE HANDLES 1+2 ..... PULL
► FUEL PUMPS 1+2 ..... OFF

■ **For evacuation**

● **If one of the aft door is under the water line**

► DOOR: DO NOT OPEN
► EVACUATION (PA) ..... INITIATE

During an emergency evacuation, PA should be used to communicate with the cabin crew.

► ATC (VHF1) ..... NOTIFY

Notify ATC the nature of the emergency encountered and state intentions. In the event ATC cannot be contacted, select code 7700 or transmit the distress message on one of the following frequencies (VHF) 121.5 MHz or (HF) 8 364 KHz. Only VHF1 is available on battery.

● **Before leaving aircraft**

► EMER LOC XMTR ..... CHECK EMITTING
► BAT ..... OFF

Battery is kept ON until leaving the aircraft to ensure cabin communication on PA

E99.04 EMERGENCY DESCENT

Ident.: E99.04 — 06 NOV 2026
ALL

► CREW OXY MASKS ..... AS RQRD
► CREW COMMUNICATIONS ..... AS RQRD
► GOGGLES ..... AS RQRD
► DESCENT ..... INITIATE
► PL 1+2 ..... FI
► CL 1+2 ..... 100% OVRD

► OXYGEN PAX SUPPLY ..... AS RQRD
► IAS: VMO/MMO (or less if structural damage is suspected)
► SIGNS ..... ON
► ATC ..... NOTIFY
► MINIMUM SAFE ALTITUDE ..... CHECK

E99.05 EMERGENCY EVACUATION (ON GROUND)

Ident.: E99.05 — 06 NOV 2026
ALL

► AIRCRAFT ..... STOP
► BRAKE HANDLE ..... PARKING
► ATC (VHF1) ..... NOTIFY

Only VHF 1 available on battery.

► CAB PRESS DUMP ..... ON

cont'd... ►►►

cont'd... ►►►

► MIN CAB LT ..... ON

Lateral lighting strip lights.

► CABIN CREW (PA) ..... NOTIFY
► CL 1+2 ..... FTR THEN FUEL S.O
► FIRE HANDLES 1+2 ..... PULL
► AGENTS ..... DISCH AS RQRD

Both agents can be discharged on the same engine OR one agent per engine (e.g. ENG 1 AGENT 1 & ENG 2 AGENT 1)

► ENG START selector ..... OFF & START ABORT
► FUEL PUMPS 1+2 ..... OFF
► EMER EXIT LT ..... ON
► EVACUATION (PA) ..... INITIATE

During an emergency evacuation on ground, PA should be used to communicate with cabin crew.

■ Before leaving aircraft

► BAT ..... OFF

Battery is kept ON until leaving the aircraft to ensure cabin communication on PA.

E99.06 FORCED LANDING

Ident.: E99.06 — 06 NOV 2026
ALL

■ Preparation

► ATC (VHF1 or HF) ..... NOTIFY

If both engines lost, use VHF1.

► XPDR 1 7700
► CABIN CREW (PA) ..... NOTIFY
► CABIN AND COCKPIT ..... PREPARE

Notify cabin crew of nature of the emergency and state intentions.

Specify the remaining time before landing.

Loose equipment secured.

Survival equipment prepared.

Belts and shoulder harnesses locked.

► GPWS ..... OFF
► TERR ..... OFF

Avoids nuisance warnings.

► SIGNS ..... ON
► EMER EXIT LT ..... ON
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE
► EMER LOC XMTR ..... MAN

■ For approach and landing

► CAB PRESS MODE SEL ..... MAN

cont'd... ►►►

cont'd... ►►►

► CAB PRESS DUMP ..... ON

NOTE: DUMP leads to a rapid depressurization.

► LDG GEAR ..... DOWN AS RQRD

● If no engine operates

► HYD AUX PUMP pb pedestal ..... PRESS

● Within 10 s

► FLAPS (if available) 30

► ENG START selector ..... OFF & START ABORT

► CABIN REPORT ..... OBTAIN

■ Just before landing

► BRACE FOR IMPACT ..... ORDER

NOTE: In case of night forced landing,both engines shut down is performed at captain's discretion as no landing lights available with propellers feathered.

► CL 1+2 ..... FTR THEN FUEL S.O

► FIRE HANDLES 1+2 ..... PULL

► FUEL PUMPS 1+2 ..... OFF

● When aircraft has stopped

► BRAKE HANDLE (if available) ..... PARKING

► CABIN CREW (PA) ..... NOTIFY

► AGENTS ..... DISCH

Both agents can be discharged on the same engine or one agent per engine (e.g. ENG 1 AGENT 1 & ENG 2 AGENT 1

► EVACUATION (PA) ..... INITIATE

During an emergency evacuation on the ground, PA should be used to communicate with the cabin crew.

► ATC (VHF1) ..... NOTIFY

Notify ATC the nature of the emergency encountered and state intentions. In the event ATC cannot be contacted, select code 7700 or transmit the distress message on one of the following frequencies (VHF) 121.5 MHz or (HF) 8 364 KHz. Only VHF1 is available on battery.

● Before leaving aircraft

► EMER LOC XMTR ..... CHECK EMITTING

► BAT ..... OFF

Battery is kept ON until leaving the aircraft to ensure cabin communication on PA

E99.08 SEVERE ICING

Ident.: E99.08 — 06 NOV 2026

ALL

► IAS: ICING BUG + 30 kt (or ICING BUG IF FLAPS 15 EXTENDED)

► PWR MGT ..... MCT

► PL 1+2 ..... ADJUST

► CL 1+2 ..... 100 % OVRD

► DESCENT ..... INITIATE

► MINIMUM SAFE ALTITUDE AND RECOMMENDED MAXIMUM ICING FLIGHT LEVEL ..... CHECK

cont'd... ►►►

cont'd... ►►►

CAUTION: Firmly hold control column and wheel to avoid non-expected aircraft movements at AP disengagement

► AP ..... DISENGAGE

■ If not able to accelerate and maintain IAS above ICING BUG + 30 kt with flaps

- OR -

■ If not able to accelerate and maintain IAS above ICING BUG with flaps 15

► MAX BANK ANGLE: 15 °

► SEVERE ICING CONDITION ..... ESCAPE

► ATC ..... NOTIFY

■ If abnormal aircraft roll behavior

► STALL procedure ..... APPLY

■ As long as aircraft is not clear of ice

► FLAPS: DO NOT RETRACT

► TCAS ..... TA ONLY

• For landing

► APPROACH CONFIGURATION ..... FLAPS 15

HIGH BANK TURNS CAN BE PERFORMED

► REDUCED FLAPS LANDING procedure ..... APPLY

NOTE: Refer to PRO.NNO.ABN.30.6.ICE.2.A30.17 SEVERE ICING DETECTION for

► IAS: ICING BUG + 30 kt (or ICING BUG IF FLAPS 15 EXTENDED)

► PWR MGT ..... MCT

► PL 1+2 ..... ADJUST

► CL 1+2 ..... 100 % OVRD

► DESCENT ..... INITIATE

► MINIMUM SAFE ALTITUDE AND RECOMMENDED MAXIMUM ICING FLIGHT LEVEL ..... CHECK

CAUTION: Firmly hold control column and wheel to avoid non-expected aircraft movements at AP disengagement

► AP ..... DISENGAGE

• If not able to accelerate and maintain IAS above ICING BUG + 30 kt with flaps

- OR -

• If not able to accelerate and maintain IAS above ICING BUG with flaps 15

► MAX BANK ANGLE: 15 °

► SEVERE ICING CONDITION ..... ESCAPE

► ATC ..... NOTIFY

• If abnormal aircraft roll behavior

► STALL procedure ..... APPLY

• As long as aircraft is not clear of ice

► FLAPS: DO NOT RETRACT

► TCAS ..... TA ONLY

• For landing

► APPROACH CONFIGURATION ..... FLAPS 15

HIGH BANK TURNS CAN BE PERFORMED

cont'd... ►►►

cont'd... ►►►

► REDUCED FLAPS LANDING procedure ..... APPLY

NOTE: Refer to PRO.NNO.ABN.30.6.ICE.2.A30.17 SEVERE ICING DETECTION for information on severe icing indications. ICING PROCEDURES ICE 6

E99.09 STALL

Ident.: E99.09 — 06 NOV 2026
ALL

► CONTROL COLUMN ..... PUSH
► ENG PWR ..... INCREASE
■ **If FLAPS 0**
► FLAPS ..... EXTEND TO 15
► BANK ..... WINGS LEVEL

► STICK PUSHER ACTIVATION: NO OPPOSITE ACTION
► RUDDER: USE WITH CARE
► ATC ..... NOTIFY

■ **When out of stall**
► FLIGHT PATH ..... RECOVER SMOOTHLY
► FLAPS: DO NOT RETRACT

E99.10 UNRELIABLE AIRSPEED INDICATION

Ident.: E99.10 — 06 NOV 2026
ALL

CAUTION: Unreliable airspeed indication procedure has to be applied only when the three airspeed sources (both ADC and IESI) indications differ.

► AP/YD ..... OFF
► FD ..... STBY
► PITCH: MAINTAIN
► TQ: MAINTAIN
• **If at takeoff or GA below 1 500 ft**
► PITCH ..... 8 ° IMMEDIATELY
► ICING CONDITIONS ..... ESCAPE
► VOLCANIC ASHES CONDITIONS ..... ESCAPE

► AP and/or YD USE: PROHIBITED
► PROBES HTG ..... CHECK ON
► DE/ANTI ICING ..... CHECK ON
► APM ..... OFF

STALL ALARM STILL RELIABLE

► GPS SPEED INFORMATION (IF AVAILABLE) ..... USE
► TCAS ..... TA ONLY

• **Takeoff phase, at or above acceleration altitude**
► ALTITUDE: MAINTAIN AT LEAST 30 s
► FLAPS 0

cont'd... ►►►

cont'd... ►►►

► PITCH ..... 8 °

LAND AT NEAREST SUITABLE AIRPORT

● Climb

► TLU sw ..... LO SPD
► PWR MGT ..... CLB
► PL 1+2 ..... NOTCH
► PITCH ..... ADJUST FOLLOWING TABLE

Altitude (ft)

5 000 10 000 15 000 20 000 Normal conditions pitch 7 ° 5 ° 4 ° 3 ° Icing conditions pitch 6 ° 4 ° 3 ° 2 °

● Cruise

► ALTITUDE: MAINTAIN
► TLU sw ..... HI SPD

NOTE: Average pitch around 0 ° at cruise speed.

► PWR MGT ..... CRZ
► PL 1+2 ..... NOTCH

● Descent

► TLU sw ..... HI SPD
► PITCH: MAINTAIN AT -2.5 °
► PL 1+2 ..... ADJUST TO 30 % TQ

● Initial Approach

CAUTION: Perform transition from clean to LDG configuration in level flight. Refer to ALTIMETER. If possible, maintain level flight for 30 s between each configuration update.

► TLU sw ..... LO SPD
► TQ ..... ADJUST FOLLOWING TABLE
► FLAPS 15
► LDG GEAR ..... DOWN
► PWR MGT ..... TO
► FLAPS 30

■ Final Approach

► PL 1+2 ..... ADJUST 35 % TQ
► Before Landing procedure (1) ..... APPLY

NOTE: Set an average pitch of -5 ° for a 3 ° slope approach.

A21 AIR CONDITIONING AND PRESSURIZATION

A21.01 DUCT 1 OVHT

Ident.: A21.01 — 06 NOV 2026
ALL

► TEMP SEL 1 ..... MAN

OVHT alert light remains as long as overtemperature is detected in the duct. It is not inhibited in MAN mode.

► COMPT TEMP selector 1 ..... COLD

If alert disappears, COMPT TEMP manual control is required.

► DUCT TEMPERATURE ..... MONITOR

NOTE : Make sure DUCT temperature remains positive to avoid possible pack turbine damage.

■ **If alert persists**

► PACK VALVE 1 ..... OFF

If alert does not disappear, the temperature control valve is jammed open. Pack valve has to be closed.

► MAX FL 200/MEA

● **At high altitude**

► LARGE RAPID POWER CHANGES ..... AVOID

A21.01 DUCT 2 OVHT

Ident.: A21.01 — 06 NOV 2026
ALL

► TEMP SEL 2 ..... MAN

OVHT alert light remains as long as overtemperature is detected in the duct. It is not inhibited in MAN mode.

► COMPT TEMP selector 2 ..... COLD

If alert disappears, COMPT TEMP manual control is required.

► DUCT TEMPERATURE ..... MONITOR

NOTE : Make sure DUCT temperature remains positive to avoid possible pack turbine damage.

■ **If alert persists**

► PACK VALVE 2 ..... OFF

If alert does not disappear, the temperature control valve is jammed open. Pack valve has to be closed.

► MAX FL 200/MEA

● **At high altitude**

► LARGE RAPID POWER CHANGES ..... AVOID

A21.04 PACK 1 FAULT

Ident.: A21.04 — 06 NOV 2026
ALL

► PACK 1 ..... OFF

► RECIRC FAN 1 ..... OFF

■ **At high altitude**

► LARGE RAPID POWER CHANGE ..... AVOID

cont'd... ►►►

cont'd... ►►►

It may generate engine surges.

► MAX FL 200/MEA

A21.04 PACK 2 FAULT

Ident.: A21.04 — 06 NOV 2026
ALL

► PACK 2 ..... OFF
► RECIRC FAN 2 ..... OFF

■ At high altitude

► LARGE RAPID POWER CHANGE ..... AVOID

It may generate engine surges.

► MAX FL 200/MEA

A21.05 PACK 1+2 FAULT

Ident.: A21.05 — 06 NOV 2026
ALL

No air enters in the cabin. Leaks will increase cabin altitude.

■ When ΔP < 1 psi

► OVBD VALVE ..... FULL OPEN
► MAN CAB ALT knob ..... 9 O'CLOCK
► CAB PRESS MODE SEL ..... MAN
► MAN CAB ALT knob ..... MAX INCREASE
► RECIRC FAN 1 ..... OFF
► RECIRC FAN 2 ..... OFF
► RAM AIR ..... ON

● If FLT Compt/Cabin temperature is too cold

► RAM AIR ..... OFF

Air supplied by the RAM AIR is not heated. When outside air is cold, the air supplied by the RAM AIR reduces FLT Compt/cabin temperature.

► MAX FLIGHT TIME WITH RAM AIR OFF OR FAULT ..... 80 min

This flight time value is established to limit CO2 concentration to 3% in the cabin.

► MAX FL 100/MEA

A21.06 RECIRC FAN 1 FAULT

Ident.: A21.06 — 06 NOV 2026
ALL

► RECIRC FAN 1 ..... OFF

A21.06 RECIRC FAN 2 FAULT

Ident.: A21.06 — 06 NOV 2026
ALL

► RECIRC FAN 2 ..... OFF

cont'd... ►►►

cont'd... ►►►

A21.08 AVIONICS VENT EXHAUST MODE FAULT

Ident.: A21.08 — 06 NOV 2026
ALL

► EXHAUST MODE ..... OVBD

OVBD position controls partially open the OBVD valve and stops the extract fan. Ventilation air discharges overboard instead of being directed to the underfloor valve. ΔP between cabin and outside air ensures ventilation.

A21.09 OVBD VALVE FAULT

Ident.: A21.09 — 06 NOV 2026
ALL

■ If ΔP > 1 psi

► OVBD VALVE ..... DO NOT SELECT FULL OPEN POSITION

■ If engine 1 running, in flight or on ground

► OVBD VALVE ..... FULL CLOSE

Overrides OVBD position.

■ If engine 1 not running, on ground

► OVBD VALVE ..... FULL OPEN

Overrides OVBD position.

A21.10 AUTO PRESS FAULT

Ident.: A21.10 — 06 NOV 2026
ALL

■ If OUTFLOW NORM amber light is off

► MAN CAB ALT knob ..... 9 O'CLOCK
► CAB PRESS MODE SEL ..... MAN
► MAN CAB ALT knob ..... AS RQRD TO ADJUST TARGET CAB ALT

TARGET CAB ALT — FL 140 : 2 500 ft · FL 170 : 3 300 ft · FL 200 : 4 200 ft · FL 220 : 5 200 ft · FL 240 : 6 200 ft · FL 250 : 6 700 ft

LANDING ELEVATION VALUE DISREGARD

■ Before descent

■ If CAB ALT above landing elevation

► MAN CAB ALT knob ..... DECREASE
► CAB ALT RATE ..... ADJUST 400 ft/min DN

■ If CAB ALT below landing elevation

► MAN CAB ALT knob ..... INCREASE
► CAB ALT RATE ..... ADJUST 1 000 ft/min UP MAX

■ When CAB ALT = landing elevation

► MAN CAB ALT knob ..... 9 O'CLOCK & MONITOR

■ After landing

► MAN CAB ALT knob ..... MAX INCREASE

■ If OUTFLOW NORM amber light is on

CAB PRESS MANUAL MODE IS LOST

cont'd... ►►►

cont'd... ►►►

► MAX FL 100/MEA
► CAB ALT ..... MONITOR
► CAB ΔP ..... MONITOR

Expect EXCESS CAB ALT, EXCESS CAB ΔP or NEGATIVE CAB ΔP alert

■ **Below FL100 or when ΔP > 6 PSI**

► PACK 1 + 2 ..... OFF

■ **When ΔP < 1 PSI**

► OVBD VALVE ..... FULL OPEN
► RECIRC FAN 1 ..... OFF
► RECIRC FAN 2 ..... OFF
► RAM AIR ..... ON

■ **If FLT Compt/Cabin temperature is too cold**

► RAM AIR ..... OFF

Air supplied by the RAM AIR is not heated. When outside air is cold, the air supplied by the RAM AIR reduces FLT Compt/cabin temperature.

► MAX FLIGHT TIME WITH RAM AIR OFF OR FAULT ..... 80 min

■ **At parking**

► CABIN ΔP ..... CHECK

A21.11 CABIN ALTITUDE

Ident.: A21.11 — 06 NOV 2026
ALL

► CABIN ALTITUDE ..... MONITOR

A21.12 CABIN DELTA P

Ident.: A21.12 — 06 NOV 2026
ALL

► CABIN ΔP ..... MONITOR

A21.13 EXCESS CAB ALT

Ident.: A21.13 — 06 NOV 2026
ALL

► CAB PRESS indicator ..... CHECK

■ **If rapid decompression**

► EMERGENCY DESCENT procedure ..... APPLY

■ **If cabin altitude > 10 000 ft confirmed**

► MAN CAB ALT knob ..... 9 O'CLOCK
► CAB PRESS MODE SEL ..... MAN
► MAN CAB ALT knob ..... DECREASE

■ **If EXCESS CAB ALT persists**

► CREW OXY MASKS ..... DON
► CREW COMMUNICATIONS ..... ESTABLISH
► OXYGEN PAX SUPPLY ..... AS RQRD
► OXYGEN PRESSURE ..... CHECK

cont'd... ►►►

cont'd... ►►►

► DESCENT ..... INITIATE AS RQRD
► MAX FL 100/MEA

A21.14 EXCESS CAB DELTA P

Ident.: A21.14 — 06 NOV 2026
ALL

► MAN CAB ALT knob ..... 9 O'CLOCK
► CAB PRESS MODE SEL ..... MAN
► MAN CAB ALT knob ..... MAX INCREASE

■ If EXCESS CAB DELTA P persists

► DESCENT ..... INITIATE
► MAX FL 100/MEA

NOTE : Closing of the pack valves may trigger EXCESS CAB ALT alert

► PACK 1+2 ..... OFF

■ When ΔP < 1 PSI

► OVBD VALVE ..... FULL OPEN
► RECIRC FAN 1 ..... OFF
► RECIRC FAN 2 ..... OFF
► RAM AIR ..... ON

■ If FLT COMPT / CABIN temperature is too cold

► RAM AIR ..... OFF

Air supplied by the RAM AIR is not heated. When outside air is cold, the air supplied by the RAM AIR reduces FLT Compt/cabin temperature.

► MAX FLIGHT TIME WITH RAM AIR OFF OR FAULT ..... 80 min

This flight time value is established to limit CO2 concentration to 3% in the cabin.

A21.15 NEGATIVE CABIN DELTA P

Ident.: A21.15 — 06 NOV 2026
ALL

► MAN CAB ALT knob ..... 9 O'CLOCK
► CAB PRESS MODE SEL ..... MAN
► MAN CAB ALT knob ..... MAX DECREASE
► AIRCRAFT RATE OF DESCENT ..... ADJUST

A21.16 OUTFLOW NORM FAULT

Ident.: A21.16 — 06 NOV 2026
ALL

No crew action required

A21.17 OUTFLOW BACKUP FAULT

Ident.: A21.17 — 06 NOV 2026
ALL

No crew action required

PAGE

INTENTIONALLY

LEFT BLANK

A22 AUTO FLIGHT

A22.01 ABNORMAL FLIGHT CHARACTERISTICS IN ROLL

Ident.: A22.01 — 06 NOV 2026
ALL

► CONTROL COLUMN & WHEEL ..... HOLD FIRMLY
► AP ..... DISENGAGE
► AIL TRIM ..... ADJUST

■ **When aileron trim adjusted**

A22.03 AILERON MISTRIM

Ident.: A22.03 — 06 NOV 2026
ALL

► CONTROL COLUMN & WHEEL ..... HOLD FIRMLY
► AP ..... DISENGAGE
► AIL TRIM ..... ADJUST

■ **When aileron trim adjusted**

A22.04 AP PITCH TRIM FAIL

Ident.: A22.04 — 06 NOV 2026
ALL

► CONTROL COLUMN & WHEEL ..... HOLD FIRMLY
► AP ..... DISENGAGE
► PITCH TRIM ..... ADJUST

■ **When pitch trim adjusted**

A22.06 ENHANCED BC CAPTURE DEGRADED POSITION

Ident.: A22.06 — 06 NOV 2026
ALL

EXPECT OVERSHOOT.

ENHANCED CAPTURE UNSERVICEABLE.

A22.07 ENHANCED BC CAPTURE INCORRECT COURSE

Ident.: A22.07 — 06 NOV 2026
ALL

► COURSE (ON COUPLED SIDE) ..... ADJUST

A22.08 ENHANCED LOC CAPTURE DEGRADED POSITION

Ident.: A22.08 — 06 NOV 2026
ALL

EXPECT OVERSHOOT.

ENHANCED CAPTURE UNSERVICEABLE.

cont'd... ►►►

cont'd... ►►►

A22.09 ENHANCED LOC CAPTURE INCORRECT COURSE

Ident.: A22.09 — 06 NOV 2026
ALL

► COURSE (ON COUPLED SIDE) ..... ADJUST

A22.10 EXCESSIVE LATERAL TRIM REQUIRED

Ident.: A22.10 — 06 NOV 2026
ALL

► CONTROL COLUMN & WHEEL ..... HOLD FIRMLY
► AP ..... DISENGAGE
► AIL TRIM ..... ADJUST

■ **When aileron trim adjusted**

A22.11 FGCP LOSS

Ident.: A22.11 — 06 NOV 2026
ALL

► PF CM1
► AP ..... DISENGAGE

■ **If FGCP LOSS during approach**

► GO AROUND ..... PERFORM

CAUTION: ALTITUDE ALERT AND FD BARS ARE LOST

NOTE: For RNAV trajectory follow track on ND.

■ **In short final**

► YD ..... DISENGAGE WITH RUDDER PEDALS

NOTE: 1) Use IESI for ILS and VOR approaches 2) If NAV SOURCE was FM before failure only, RNAV approaches are available in RAW DATA 3)

A22.12 FGCP SINGLE CHANNEL

Ident.: A22.12 — 06 NOV 2026
ALL

NO FLIGHT CREW ACTION REQUIRED.

NOTE: ILS CAT 2 is prohibited.

A22.13 PITCH MISTRIM

Ident.: A22.13 — 06 NOV 2026
ALL

► CONTROL COLUMN & WHEEL ..... HOLD FIRMLY
► AP ..... DISENGAGE
► PITCH TRIM ..... ADJUST

■ **When pitch trim adjusted**

AP CAN BE REENGAGED

cont'd... ►►►

cont'd... ►►►

A22.14 RUDDER MISTRIM

Ident.: A22.14 — 06 NOV 2026
ALL

► RUDDER PEDALS ..... BLOCK WITH FEET
► CONTROL COLUMN & WHEEL ..... HOLD FIRMLY
► YD ..... DISENGAGE
► RUDDER TRIM ..... ADJUST

■ **When rudder trim adjusted**

A22.15 YAW AUTOTRIM FAILURE

Ident.: A22.15 — 06 NOV 2026
ALL

■ **When RETRIM message on FMA**

► RUDDER PEDALS ..... BLOCK WITH FEET
► CONTROL COLUMN AND WHEEL ..... HOLD FIRMLY
► YD ..... DISENGAGE
► RUDDER TRIM ..... ADJUST

■ **When rudder trim adjusted**

A22.16 YAW DAMPER SINGLE SOURCE

Ident.: A22.16 — 06 NOV 2026
ALL

► AP ..... DISENGAGE
► YD ..... DISENGAGE

CAUTION: USE OF YD IS PROHIBITED IN SINGLE SOURCE FOR IAS BELOW 160 kt.

PAGE

INTENTIONALLY

LEFT BLANK

A23 COMMUNICATIONS

A23.01 ADS-B OUT FAULT

Ident.: A23.01 — 06 NOV 2026
ALL

► XPDR ..... CHANGE ACTIVE XPDR

■ If ADS-B OUT fault persists

► ATC ..... NOTIFY

A23.02 AUDIO SEL 1(2) FAULT

Ident.: A23.02 — 06 NOV 2026
ALL

► AUDIO SEL (affected) ..... ALTN

NOTE: If the CAPT (F/O) station is affected, the CAPT (F/O) station is directly connected to VHF 1(2).

A23.03 RMS 1+2 FAULT

Ident.: A23.03 — 06 NOV 2026
ALL

► VHF 1-VOR/ILS 1 TUNING ..... USE IESI

NOTE: Last tuned freq saved : VHF 2, VOR 2, DME 1 + 2, ADF 1 + 2

► ILS CAT2: PROHIBITED

A23.04 VHF 1+2 LOSS

Ident.: A23.04 — 06 NOV 2026
ALL

► ATC 7600

A23.06 XPDR FAULT

Ident.: A23.06 — 06 NOV 2026
ALL

► XPDR ..... CHANGE ACTIVE XPDR

A23.07 VHF EMITTING

Ident.: A23.07 — 06 NOV 2026
ALL

NOTE: VHF EMITTING alert may be triggered following a transmission. Any Push To Talk (PTT) transmission selector or switch (control handwheel, hand-mic, RAD on ACP/steering) is jammed or stuck in the transmission position TX.

► AFFECTED PTT ..... IDENTIFY

► AFFECTED PTT ..... TRY TO RELEASE

Tone sounds and FAIL is displayed on CAPT/F/O VCP/MCDU as long as PTT is jammed or stuck.

■ If PTT release is successful

► AFFECTED PTT ..... DO NOT USE

Tone stops and FAIL is no longer displayed on CAPT(F/O) VCP/MCDU.

► ANY OTHER OPERATIVE PTT ..... PRESS ONCE TO RESTORE

cont'd... ►►►

cont'd... ►►►

Press PTT to restore VHF 1(2) transmission TX and VHF EMITTING alert is no more displayed on EWD.

■ If PTT release is not successful

► ALL PTT (affected side) ..... DO NOT USE

► INT TRANSMISSION KEY (affected side) ..... SMOOTHLY PUSH UNTIL VHF IS DESELECTED

Tone stops and FAIL is no longer displayed on CAPT(F/O) VCP/MCDU.

► VHF 1(2) ACP TRANSMISSION KEY (operative side) ..... SELECT

► PTT (operative side) ..... PRESS ONCE TO RESTORE

Press PTT to restore VHF 1(2) transmission TX and VHF EMITTING alert is no more displayed on EWD.

Additional Information

A23.08 HF EMITTING

Ident.: A23.08 — 06 NOV 2026
ALL

NOTE: HF EMITTING alert may be triggered following a transmission. Any Push To Talk (PTT) transmission selector or switch (control handwheel, hand-mic, RAD on ACP/ steering) is jammed or stuck in the transmission position TX.

► AFFECTED PTT ..... IDENTIFY

► AFFECTED PTT ..... TRY TO RELEASE

■ If PTT release is successful

► AFFECTED PTT ..... DO NOT USE

■ If PTT release is not successful

► ALL PTT (affected side) ..... DO NOT USE

► INT TRANSMISSION KEY (affected side) ..... SMOOTHLY PUSH UNTIL HF IS DESELECTED

► HF 1(2) ACP TRANSMISSION KEY (operative side) ..... SELECT

A24 ELECTRICAL POWER

A24.01 AC BUS 1 OFF

Ident.: A24.01 — 06 NOV 2026
ALL

■ **If AC BUS 1 OFF persists after 10 s**

► DC BTC ..... RESET

● **If AC BUS 1 OFF persists**

► AC BUS 1 LOST EQUIPMENT LIST ..... CHECK

A24.02 AC BUS 2 OFF

Ident.: A24.02 — 06 NOV 2026
ALL

■ **If AC BUS 2 OFF persists after 10 s**

► DC BTC ..... RESET

● **If AC BUS 2 OFF persists**

► CABIN TEMP SEL ..... MAN
► AC BUS 2 LOST EQUIPMENT LIST ..... CHECK

A24.04 26 V AC STBY BUS FAULT

Ident.: A24.04 — 06 NOV 2026
ALL

► APM ..... OFF
► TLU sw ..... HI or LO SPD based on IAS
► SPD TGT ..... MAN SEL

CAUTION: VminOPS is lost Flaps extension is not possible Flaps retraction : 0 ° ONLY possible

■ **For Approach**

► REDUCED FLAPS LANDING procedure ..... APPLY

CAUTION: If flaps already in landing position : In case of GO Around, climb performance is degraded due to flaps in landing position, until flaps retraction to 0 °

A24.05 115 V AC STBY BUS FAULT

Ident.: A24.05 — 06 NOV 2026
ALL

NO CREW ACTION REQUIRED

A24.06 ACW BUS 1 OFF

Ident.: A24.06 — 06 NOV 2026
ALL

► ICING CONDITIONS ..... LEAVE AND AVOID
► ICE ACCRETION ..... VISUALLY MONITOR
► ACW GEN 1 ..... OFF
► CAPT SWITCHING ADC ..... SYS 2
► FMA ..... CHECK & CONFIRM

cont'd... ►►►

cont'd... ►►►

■ **If stall warning inoperative**

► AP USE ..... PROHIBITED

■ **If IAS < 160 kt and/or below 1 000 ft AGL**

► AP and/or YD USE ..... PROHIBITED

■ **If none of the conditions quoted above exists**

AP and/or YD CAN BE REENGAGED

► IAS & ALT ..... PERIODICALLY COMPARE WITH IESI

BARO SETTING SELECTION ONLY AVAILABLE ON OPERATIVE SIDE

► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

■ **If single engine operation**

► LARGE RAPID POWER CHANGE ..... AVOID

► HYD X FEED pb ..... ON

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► ANTI ICING HORNS 1(2) FAULT procedure ..... APPLY

► ACW BUS 1 LOST EQUIPMENT LIST ..... CHECK

► AFFECTED EQUIPMENT FAULT PROCEDURE ..... APPLY

■ **If IAS disagree**

► UNRELIABLE AIRSPEED INDICATION procedure ..... APPLY

■ **After touchdown**

► TAXI ..... ON ENG 1+2

A24.07 ACW BUS 2 OFF

Ident.: A24.07 — 06 NOV 2026
ALL

► ICING CONDITIONS ..... LEAVE AND AVOID

► ICE ACCRETION ..... VISUALLY MONITOR

► ACW GEN 2 ..... OFF

► F/O SWITCHING ADC ..... SYS 1

► FMA ..... CHECK & CONFIRM

■ **If stall warning inoperative**

► AP USE ..... PROHIBITED

■ **If IAS < 160 kt and/or below 1 000 ft AGL**

► AP and/or YD USE ..... PROHIBITED

■ **If none of the conditions quoted above exists**

AP and/or YD CAN BE REENGAGED

► IAS & ALT ..... PERIODICALLY COMPARE WITH IESI

BARO SETTING SELECTION ONLY AVAILABLE ON OPERATIVE SIDE

■ **If single engine operation**

► LARGE RAPID POWER CHANGE ..... AVOID

► HYD X FEED pb ..... ON

cont'd... ►►►

cont'd... ►►►

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► ANTI ICING HORNS 1(2) FAULT procedure ..... APPLY
► ACW BUS 2 LOST EQUIPMENT LIST ..... CHECK
► AFFECTED EQUIPMENT FAULT PROCEDURES ..... APPLY

■ **If IAS disagree**

► UNRELIABLE AIRSPEED INDICATION procedure ..... APPLY

■ **After touchdown**

► TAXI ..... ON ENG 1+2

A24.08 ACW GEN 1 FAULT

Ident.: A24.08 — 06 NOV 2026
ALL

► ACW GEN 1 ..... OFF
► ICING CONDITIONS: LEAVE AND AVOID

■ **If ACW GEN 2 FAULT**

● **After touchdown**

► TAXI: ON ENG 1+2

A24.08 ACW GEN 2 FAULT

Ident.: A24.08 — 06 NOV 2026
ALL

► ACW GEN 2 ..... OFF
► ICING CONDITIONS: LEAVE AND AVOID

■ **If ACW GEN 2 FAULT**

● **After touchdown**

► TAXI: ON ENG 1+2

A24.09 ACW GEN 1+2 LOSS

Ident.: A24.09 — 06 NOV 2026
ALL

► ICING CONDITIONS ..... LEAVE AND AVOID
► ICE ACCRETION ..... VISUALLY MONITOR
► IESI ALT & IAS ..... USE AS REFERENCE
► IAS & ALT ..... PERIODICALLY COMPARE WITH IESI
► ACW GEN 1 + 2 ..... OFF
► HYD X FEED ..... CHECK OFF
► ACW GEN 1+2 LOSS LOST EQUIPMENT LIST ..... CHECK
► AFFECTED EQUIPMENT FAULT procedure ..... APPLY
► HYD BLUE PUMP ..... OFF
► HYD GREEN PUMP ..... OFF

■ **Before landing**

LDG GEAR NORMAL OPERATION LOST

► LDG GEAR lever ..... DOWN

cont'd... ►►►

cont'd... ►►►

► BLUE PRESSURE ..... CHECK
► FLAPS 15 ..... AS RQRD
► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY
► FLAPS 30 ..... AS RQRD

NORMAL BRAKE OPERATION LOST.

NOTE: "TLU LO SPEED" label on EWD is not visible, check that no TLU FAULT alert is displayed on EWD or local alert on overhead panel.

■ **After touchdown**

► REVERSE ..... AS RQRD
► BRAKE HANDLE ..... EMER/AS RQRD
► TAXI ..... ON ENG 1+2

► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.5

A24.10 BAT DISCHARGE IN FLIGHT

Ident.: A24.10 — 06 NOV 2026
ALL

► ENG START selector ..... OFF & START ABORT

■ **If one ACW GEN lost**

► HYD BLUE PUMP ..... OFF
► HYD X FEED ..... ON

► TRU ..... ON

■ **If battery discharge stops**

► NORMAL OPERATIONS: RESUME

MAINTENANCE ACTION REQUIRED.

■ **If at least one battery is still discharging**

► TRU ..... OFF
► HYD X FEED ..... OFF AS RQRD
► HYD BLUE PUMP ..... ON AS RQRD
► LAND ASAP

A24.11 DC BUS 1 OFF

Ident.: A24.11 — 06 NOV 2026
ALL

► DC GEN 1 ..... OFF
► DC SVCE/UTLY BUS pb: MAINTAIN ON

To keep DC UTLY BUS 2 on line.

► CAPT IAS & ALT: PERIODICALLY COMPARE WITH F/O
► DC BUS 1 LOST EQUIPMENT LIST ..... CHECK
► AFFECTED EQUIPMENT FAULT procedure ..... APPLY

NOTE: Stick pusher is lost.

■ **At touchdown**

► IDLE GATE lever ..... PULL

cont'd... ►►►

cont'd... ►►►

A24.12 DC BUS 2 OFF

Ident.: A24.12 — 06 NOV 2026
ALL

► DC GEN 2 ..... OFF
► PF ..... CAPT
► ADC 1(2) FAILURE procedure ..... APPLY
► ICP ..... USE
► VHF ..... SELECT SYS 1
► ATC ..... SELECT SYS 1
► VOR-ILS ..... SELECT SYS 1
► TLU FAULT procedure ..... APPLY
► PAX INSTRUCTIONS ..... USE PA
► DC SVCE/UTLY BUS pb: MAINTAIN ON
► DC BUS 2 LOST EQUIPMENT LIST ..... CHECK
► AFFECTED EQUIPMENT FAULT procedures ..... APPLY
► CDLS (if installed) MANUAL BOLT(S) ..... MOVE TO CLOSE POSITION

NOTE: When the door is locked with the manual bolt(s), the emergency access to the cockpit is not available. It is recommended that at least two crew members remain in the cockpit during that time.

■ **For approach**

► ILS CAT 2: PROHIBITED

■ **After touchdown**

► TAXI: ON ENG 1+2

■ **At parking**

► GPU (if available) ..... CONNECT
► CL 1 ..... FUEL S.O

A24.13 DC EMER BUS OFF

Ident.: A24.13 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► HYD BLUE PUMP ..... OFF
► HYD X FEED ..... ON
► TRU ..... ON

● **If DC EMER BUS recovered**

CAUTION: Do not restore HYD BLUE PUMP

► TRU: MAINTAIN ON

MAINTENANCE ACTION REQUIRED.

● **If DC EMER BUS not recovered**

► TRU ..... OFF
► VHF 2 / XPDR 2 ..... USE
► F/O SWITCHING ADC ..... SYS 1
► FMA ..... CHECK & CONFIRM
► IAS & ALT: PERIODICALLY COMPARE WITH IESI

cont'd... ►►►

cont'd... ►►►

BARO SETTING SELECTION ONLY AVAILABLE ON CM 1 SIDE

► DESCENT ..... INITIATE
► MAX FL: 100 or MINIMUM SAFE ALTITUDE
► STBY PITCH TRIM ..... USE AS RQRD
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE
► FLIGHT TIME: MINIMIZE

ENGINE FIRE DETECTION LOST TLU CONTROL IS LOST

- **If TLU is in LO speed position**
  ► MAX IAS: 180 kt
- **If acceleration above 180 kt is necessary**
  ► LARGE RUDDER INPUT: AVOID
  ► DC EMER BUS LOST EQUIPMENT LIST ..... CHECK
  ► AFFECTED EQUIPMENT FAULT PROCEDURES ..... APPLY
- **If in icing conditions**
  ► ICE ACCRETION: VISUALLY MONITOR
  ► DE ICING AIRFRAME FAULT procedure ..... APPLY

  NOTE: The landing performance penalties of the DE ICING AIRFRAME FAULT procedure are integrated in this procedure.

  ► DE ICING MODE SEL FAULT procedure ..... APPLY
  ► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
  ► ANTI ICING HORNS 1(2) FAULT procedure ..... APPLY
  ► ILS CAT 2: PROHIBITED
- **For approach**
  ► N/W STEERING ..... OFF
  ► ANTISKID ..... OFF
- **If TLU is in LO speed position**
- **If landing performance penalties of the DE ICING AIRFRAME FAULT**

procedure must be applied

► IAS ..... NOT LESS THAN Vmin OPS + 15 kt
► LDG DIST Refer to LANDING DISTANCES ..... MULTIPLY BY 1.75

- **Other cases**
  ► LDG DIST Refer to LANDING DISTANCES ..... MULTIPLY BY 1.4
- **If TLU is in HI speed position**
  ► MAX CROSSWIND: 15 kt (Dry runway/TLU HI SPD)
  ► RUDDER LATERAL CONTROL: LIMITED
- **If landing performance penalties of the DE ICING AIRFRAME FAULT**

procedure must be applied

► IAS ..... NOT LESS THAN Vmin OPS + 15 kt
► LDG DIST Refer to LANDING DISTANCES ..... MULTIPLY BY 1.75

- **Other cases**
  ► IAS ..... NOT LESS THAN Vmin OPS + 10 kt

cont'd... ►►►

cont'd... ►►►

► LDG DIST Refer to LANDING DISTANCES ..... MULTIPLY BY 1.61

■ At touchdown

► REVERSE ..... AS RQRD
► NORMAL BRAKE ..... USE WITH CARE
► BRAKE HANDLE ..... EMER/AS RQRD

■ After touchdown

► TAXI: ON ENG 1+2

A24.14 DC ESS BUS OFF

Ident.: A24.14 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► HYD GREEN PUMP ..... OFF
► HYD X FEED ..... ON
► TRU ..... ON

■ If DC ESS BUS recovered

► TRU: MAINTAIN ON

MAINTENANCE ACTION REQUIRED

■ If DC ESS BUS not recovered

► TRU ..... OFF
► PF ..... F/O
► DESCENT ..... INITIATE
► MAX FL: 100 or MINIMUM SAFE ALTITUDE
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY
► PERF PAGE ..... SELECT TAT 2
► CAPT IAS & ALT: PERIODICALLY COMPARE WITH F/O
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE
► DC ESS BUS OFF LOST EQUIPMENT LIST ..... CHECK
► AFFECTED EQUIPMENT FAULT PROCEDURES ..... APPLY

NOTE: 1) Cockpit Door Control panel FAULT light is inoperative. 2) When the door is locked with the manual bolt, the emergency access to the cockpit is not available. It is recommended that at least two crewmembers remain in the cockpit during that time.

► COCKPIT DOOR MANUAL BOLT(S) ..... MOVE TO CLOSE POSITION

• Before landing

► ANTISKID ..... OFF
► ANTISKID FAULT procedure ..... APPLY

• After touchdown

► TAXI: ON ENG 1+2

A24.15 DC GEN 1 FAULT

Ident.: A24.15 — 06 NOV 2026
ALL

► DC GEN 1 ..... OFF

cont'd... ►►►

cont'd... ►►►

■ **If OAT > ISA +25**

► MAX FL: 200

■ **After landing**

► TAXI: ON ENG 1+2

■ **At parking**

● **If DC GEN 2 FAULT**

► GPU (if available) ..... CONNECT

► CL 1 ..... FUEL S.O

A24.15 DC GEN 2 FAULT

Ident.: A24.15 — 06 NOV 2026

ALL

► DC GEN 2 ..... OFF

■ **If OAT > ISA +25**

► MAX FL: 200

■ **After landing**

► TAXI: ON ENG 1+2

■ **At parking**

● **If DC GEN 2 FAULT**

► GPU (if available) ..... CONNECT

► CL 1 ..... FUEL S.O

A24.16 DC STBY BUS FAILURE

Ident.: A24.16 — 06 NOV 2026

ALL

■ **Only when EMER BAT CHG amber FAULT light is off**

► EMER BAT CHG ..... RESET

■ **If DC STBY BUS failure persists**

► HYD BLUE PUMP ..... OFF

► TRU ..... ON

● **If DC STBY BUS recovered**

► HYD X FEED ..... ON

► HYD BLUE PUMP: KEEP OFF

► TRU: MAINTAIN ON

● **If DC STBY BUS failure still persists**

► TRU ..... OFF

► HYD BLUE PUMP ..... ON

● **When IAS < 185 kt**

► TLU FAULT procedure ..... APPLY

► AVNX IOM 12 + IOM 13 LOSS procedure ..... APPLY

► Refer to STBY BUSSES AND BAT ONLY LOST EQUIPMENT LISTS ..... CHECK

► AFFECTED EQUIPMENTS FAULT PROCEDURES ..... APPLY

cont'd... ►►►

cont'd... ►►►

- **Before landing**
  - ► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY
  - ► REDUCED FLAPS LANDING procedure ..... APPLY

A24.17 DC STBY BUS UND-V

Ident.: A24.17 — 06 NOV 2026 — ALL

■ If DC GEN 1+2 operate

■ If one ACW GEN lost

► HYD BLUE PUMP ..... OFF
► HYD X FEED ..... ON
► TRU ..... ON

■ If STBY BUS UND/V disappears

► TRU ..... KEEP ON

MAINTENANCE ACTION REQUIRED

■ If STBY BUS UND/V persists

► TRU ..... OFF
► HYD X FEED ..... OFF AS RQRD
► HYD BLUE PUMP ..... ON AS RQRD
► DC STBY BUS FAILURE procedure ..... APPLY

■ If DC GEN 1+2 FAULT and TRU not available

■ For approach only

► DC STBY BUS ..... SELECT OVRD

A24.18 DC SVCE-UTLY BUS SHED

Ident.: A24.18 — 06 NOV 2026 — ALL

► DC SVCE/UTLY BUS ..... AS RQRD

■ If DC SVCE/UTLY BUS is set to OFF position

► DC SVCE/UTLY BUS SHED LOST EQUIPMENT LIST ..... CHECK

A24.19 EMER(MAIN) BAT CHG FAULT

Ident.: A24.19 — 06 NOV 2026 — ALL

► BAT CHG (affected) ..... OFF

A24.20 EMER+MAIN BAT CHG LOSS

Ident.: A24.20 — 06 NOV 2026 — ALL

► MFC MODULES (one at a time) ..... RESET

■ If EMER + MAIN BAT recovered

MAINTENANCE ACTION REQUIRED.

cont'd... ►►►

cont'd... ►►►

■ **If EMER + MAIN BAT CHG LOSS persists**

● **If no BAT arrow**

MAINTENANCE ACTION REQUIRED.

● **If BOTH BAT arrows turned on**

● **If one ACW GEN lost**

► HYD BLUE PUMP ..... OFF

► HYD X FEED ..... ON

► TRU ..... ON

● **If TRU ON**

► FLIGHT TIME: MINIMIZE (without battery charge)

● **If TRU failure**

► LAND ASAP

A24.21 INV 1(2) FAULT

Ident.: A24.21 — 06 NOV 2026

ALL

MAINTENANCE ACTION REQUIRED.

After 10 s following INV FAULT, the AC BTC is automatically closed causing affected AC BUS and AC STBY BUS to be supplied from the remaining inverter.

A24.22 X START FAIL

Ident.: A24.22 — 06 NOV 2026

ALL

► NORMAL ENG START: CONTINUE

A27 FLIGHT CONTROLS

A27.01 FLAPS ASYM

Ident.: A27.01 — 06 NOV 2026
ALL

► FLAPS CONTROL lever ..... NEAR FLAPS PRESENT POSITION

■ **For approach**

► REDUCED FLAPS LANDING procedure ..... APPLY

A27.02 FLAPS JAM

Ident.: A27.02 — 06 NOV 2026
ALL

► FLAPS CONTROL lever ..... NEAR FLAPS PRESENT POSITION

■ **For approach**

► REDUCED FLAPS LANDING procedure ..... APPLY

A27.04 FLAPS UNLK

Ident.: A27.04 — 06 NOV 2026
ALL

■ **Before V1**

► TAKEOFF ..... ABORT

■ **After V1**

VR & V2 SPEED BUGS AUTOMATICALLY INCREASED

■ **If FLAPS UNLK during approach**

► GO-AROUND ..... PERFORM

► VGA ..... NOT LESS THAN Vmin OPS

■ **When possible**

► FLAPS 0

■ **For approach**

► REDUCED FLAPS LANDING procedure ..... APPLY

A27.05 REDUCED FLAPS LANDING

Ident.: A27.05 — 06 NOV 2026
ALL

► GPWS ..... FLAP OVRD

FLAPS LDG DIST FLAPS 30 MULTIPLY BY APP/LDG SPD 2.2 VmHB0 + wind effect + 5 kt 15 VmHB15 + wind effect

■ **If severe icing procedure applied & aircraft not clear of ice**

FLAPS LDG DIST FLAPS 30 MULTIPLY BY APP/LDG SPD 15 2.12 VmHB15 ICING + wind effect +5 kt

cont'd... ►►►

cont'd... ►►►

NOTE: Refer to Landing Brake Energy to determine maximum landing weight limited by braking energy for normal or delayed braking. WHEELS BRK HOT alert may be triggered and wheel fuse plug melting may occur. Refer to Landing Distance to determine LDG DIST FLAPS 30. Use for calculation LDG DIST FLAPS 30 delayed braking if landing performed with delayed braking technique. Then apply LDG DIST FLAPS 30 multiplication factor. Refer to Reduced Flaps Landing Configuration VAPP to determine APP/LDG SPD.

NOTE: If delayed braking technique is used, braking is performed at: 90 kt for FLAPS 15 landing 100 kt for FLAPS 0 landing.

■ **During flare**

► PITCH ATTITUDE: DO NOT EXCEED 6 °

● **For FLAPS 0 landing**

● **At 10 ft**

► ENG POWER ..... SLOWLY REDUCE

► STEEP SLOPE APPROACH (≥4.5 °): PROHIBITED

► ILS CAT 2: PROHIBITED

A27.06 PITCH CONTROL JAM IN FLIGHT

Ident.: A27.06 — 06 NOV 2026
ALL

■ **If IAS > 180 kt**

► IAS ..... REDUCE

NOTE: Apply normal effort on control column Use pitch trim to reduce effort on control column Reduce PL if flight conditions permit it. Pitch trim reversal can occur after pitch control jam, use caution when acting on pitch trim

■ **When IAS reduction is no longer possible or when IAS< 180 kt**

► CONTROL COLUMNS EFFORT ..... REDUCE USING PITCH TRIM

► CONTROL COLUMNS ..... UNCOUPLE

► FREE CONTROL COLUMN ..... IDENTIFY

► PF ..... FREE CONTROL COLUMN SIDE

► PITCH DISCONNECT procedure ..... APPLY

A27.07 PITCH DISCONNECT

Ident.: A27.07 — 06 NOV 2026
ALL

► FREE CONTROL COLUMN(S) ..... IDENTIFY

► PF ..... FREE CONTROL COLUMN SIDE

CAUTION : WHEN ELEVATORS ARE UNCOUPLED, DUAL OPPOSITE INPUTS FROM LEFT AND RIGHT CONTROL COLUMNS ARE STRICTLY FORBIDDEN AS IT MAY RESULT IN STRUCTURAL DAMAGE TO THE HORIZONTAL STABILIZER.

► ICING CONDITIONS ..... LEAVE AND AVOID

PITCH CONTROL EFFICIENCY REDUCED

► MIN IAS ..... NOT LESS THAN Vmin OPS +10 kt

■ **If one elevator is stuck to full down position**

► MAX IAS ..... 154 kt

► FLAPS ..... EXTEND IF NECESSARY

cont'd... ►►►

cont'd... ►►►

■ **If elevator jamming occurs at takeoff**

► MAX IAS ..... 161 kt
► FLAPS ..... MAINTAIN IF NECESSARY

■ **If other cases**

► MAX IAS ..... 180 kt

■ **If left elevators is jammed**

STICK PUSHER MUST BE CONSIDERED INOPERATIVE.

■ **If right elevator is jammed**

AP CANNOT BE REENGAGED.

■ **For approach**

► STEEP SLOPE APPROACH (>=4.5 °) ..... PROHIBITED
► LAND AT AIRPORT WITH MINIMUM CROSSWIND
► ILS CAT 2 ..... PROHIBITED
► IAS ..... NOT LESS THAN Vmin OPS +10 kt
► SPD TGT ..... MAN SEL
► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15

■ **During flare**

► PL 1+2 ..... REDUCE SMOOTHLY

■ **At parking**

● **If pitch disconnect occurred in flight**

MAINTENANCE ACTION REQUIRED

● **If pitch disconnect occurred on ground**

► PITCH RECONNECTION ON GROUND procedure ..... APPLY
► MAX IAS ..... 180 kt
► MAX BANK ANGLE ..... 30 ° UNTIL FLAPS EXTENSION

A27.08 PITCH RECONNECT

Ident.: A27.08 — 06 NOV 2026
ALL

No crew action Maintenance action required

A27.09 PITCH RECONNECTION ON GROUND

Ident.: A27.09 — 06 NOV 2026
ALL

CAUTION: Do not use the PITCH RECONNECTION ON GROUND procedure after pitch disconnection in flight.

► GUST LOCK ..... ON
► BOTH COLUMNS ..... CHECK LOCKED
► ELEV CLUTCH pb ..... PRESS AND HOLD

■ **When PITCH DISCONNECT turns off on EWD**

► ELEV CLUTCH pb ..... RELEASE
► PITCH RECONNECT ON EWD ..... CHECK TURNED OFF
► GUST LOCK ..... OFF
► BOTH COLUMNS ..... CHECK COUPLED

cont'd... ►►►

cont'd... ►►►

A27.10 PITCH TRIM ASYM

Ident.: A27.10 — 06 NOV 2026
ALL

► AP DISENGAGEMENT ..... CONFIRM MANUALLY
► PITCH TRIM INOPERATIVE procedure ..... APPLY
► NORMAL & STBY PITCH TRIMS ..... DO NOT USE
► ILS CAT 2 ..... PROHIBITED

A27.12 PITCH TRIM INOPERATIVE

Ident.: A27.12 — 06 NOV 2026
ALL

► CURRENT CONFIGURATION & SPEED: MAINTAIN AS LONG AS POSSIBLE

■ **For approach**

► STEEP SLOPE APPROACH (≥4.5 °): PROHIBITED
► FLAPS ..... EXTEND AT VFE FOR EACH CONFIGURATION
► IAS ..... NOT LESS THAN Vmin OPS +10 kt
► SPD TGT ..... MAN SEL
► VAPP (Refer to OPSDATA) ..... INCREASE BY 10 kt
► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15
► ILS CAT 2: PROHIBITED

A27.13 STICK PUSHER-SHAKER FAULT

Ident.: A27.13 — 06 NOV 2026
ALL

► STICK PUSHER / SHAKER pb ..... OFF
► TCAS ..... TA ONLY
► IAS ..... NOT LESS THAN Vmin OPS + 10 kt
► SPD TGT ..... MAN SEL

■ **Below 1 000 ft AGL**

► AP USE: PROHIBITED

■ **For approach**

► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15

A27.14 AIL LOCK LIT

Ident.: A27.14 — 06 NOV 2026
ALL

■ **Before takeoff**

► RETURN TO PARKING

■ **After landing**

► TAXI WITH CARE (WIND EFFECT)

● **At parking**

► AILERON LOCK: USE ALTERNATE SYSTEM

cont'd... ►►►

cont'd... ►►►

A27.15 AILERON JAM

Ident.: A27.15 — 06 NOV 2026
ALL

► HYD BLUE PUMP ..... OFF
► HYD AUX PUMP ..... OFF
► LAND AT AIRPORT WITH MINIMUM CROSSWIND

■ **For approach**

► STEEP SLOPE APPROACH (≥ 4.5 °): PROHIBITED
► HYD BLUE PUMP ..... ON
► HYD AUX PUMP ..... ON
► VAPP (Refer to OPSDATA) ..... NOT LESS THAN VREF + 10 kt
► SPD TGT ..... MAN SEL IF NECESSARY
► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15
► ILS CAT 2: PROHIBITED

CAUTION: Do not extend flaps in turn.

■ **When in landing configuration**

► HYD BLUE PUMP ..... OFF
► HYD AUX PUMP ..... OFF

■ **Immediately after touchdown**

► HYD BLUE PUMP ..... ON
► HYD AUX PUMP ..... ON

► MAX BANK ANGLE: 25 °

A27.16 SPOILER JAM

Ident.: A27.16 — 06 NOV 2026
ALL

► HYD BLUE PUMP ..... OFF
► HYD AUX PUMP ..... OFF
► LAND AT AIRPORT WITH MINIMUM CROSSWIND

■ **For approach**

► MAX CROSSWIND: 20 kt (DRY RUNWAY)
► STEEP SLOPE APPROACH (≥ 4.5 °): PROHIBITED
► HYD BLUE PUMP ..... ON
► HYD AUX PUMP ..... ON
► VAPP (Refer to OPSDATA) ..... NOT LESS THAN VREF + 10 kt
► SPD TGT ..... MAN SEL IF NECESSARY
► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15
► ILS CAT 2: PROHIBITED

CAUTION: Do not extend flaps in turn.

■ **When in landing configuration**

► HYD BLUE PUMP ..... OFF
► HYD AUX PUMP ..... OFF

cont'd... ►►►

cont'd... ►►►

■ **Immediately after touchdown**

► HYD BLUE PUMP ..... ON

► HYD AUX PUMP ..... ON

► MAX BANK ANGLE: 25 °

A27.17 DUTCH ROLL TENDENCY-RUDDER RELEASABLE CENTERING UNIT FAIL

Ident.: A27.17 — 06 NOV 2026

ALL

■ **If YD is available**

► YD ..... ENGAGE

■ **If YD is not available**

► RUDDER PEDALS: BLOCK MOVEMENT

A27.18 RUDDER JAM

Ident.: A27.18 — 06 NOV 2026

ALL

► DIFFERENTIAL POWER ..... USE TO MINIMIZE SIDESLIP

■ **For approach**

► STEEP SLOPE APPROACH (≥ 4.5 °): PROHIBITED

► ILS CAT 2: PROHIBITED

► LAND AT AIRPORT WITH MINIMUM CROSSWIND

► FLAPS 30

■ **At touchdown before power reduction below FI**

► NOSE ..... DOWN

A27.19 TLU FAULT

Ident.: A27.19 — 06 NOV 2026

ALL

■ **In flight**

► TLU sw ..... HI or LO SPD based on IAS

NOTE: Set TLU to HI SPEED above 185 kt Set TLU to LO SPEED below 185 kt

● **If TLU sw in HI SPD position and TLU FAULT persists after 40 s**

► MAX IAS: 180 kt

► LARGE RUDDER INPUT ..... AVOID

■ **Before approach, when IAS < 185 kt**

► TLU sw ..... LO SPD

● **If TLU LO SPEED labels remains off after 40 s**

● **For Approach**

► IAS ..... NOT LESS THAN Vmin OPS + 10 kt

► SPD TGT ..... MAN SEL

► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15

► MAX CROSSWIND: 15 kt (Dry runway/TLU HI SPD)

► RUDDER LATERAL CONTROL: LIMITED

A28 FUEL

A28.01 FUEL 1 ABNORMAL TEMP

Ident.: A28.01 — 06 NOV 2026
ALL

■ **If FUEL TEMP > 50 °C**

● **On ground**

► OIL TEMP: MONITOR

► ENG PARAMETERS: MONITOR

NOTE: Setting the PL of the affected engine to GUST LOCK stop can reduce the fuel temperature (by increasing the fuel flow).

● **If FUEL TEMP > 57 °C**

NOTE: A temperature above 57 °C can be acceptable before engine start and during a transient period of 2 min after engine start.

► RETURN TO PARKING

► PL 1 ..... GI

► CL 1 ..... FTR THEN FUEL S.O

● **In flight**

► LARGE RAPID POWER CHANGE: AVOID

► OIL TEMP: MONITOR

► ENG PARAMETERS: MONITOR

NOTE: Report to maintenance if fuel temperature exceeded 57 °C

■ **If FUEL TEMP < 0 °C**

A28.01 FUEL 2 ABNORMAL TEMP

Ident.: A28.01 — 06 NOV 2026
ALL

■ **If FUEL TEMP > 50 °C**

● **On ground**

► OIL TEMP: MONITOR

► ENG PARAMETERS: MONITOR

NOTE: Setting the PL of the affected engine to GUST LOCK stop can reduce the fuel temperature (by increasing the fuel flow).

● **If FUEL TEMP > 57 °C**

NOTE: A temperature above 57 °C can be acceptable before engine start and during a transient period of 2 min after engine start.

► RETURN TO PARKING

► PL 2 ..... GI

► CL 2 ..... FTR THEN FUEL S.O

● **In flight**

► LARGE RAPID POWER CHANGE: AVOID

► OIL TEMP: MONITOR

cont'd... ►►►

cont'd... ►►►

► ENG PARAMETERS: MONITOR

NOTE: Report to maintenance if fuel temperature exceeded 57 °C

■ If FUEL TEMP < 0 °C

A28.02 FUEL CLOG

Ident.: A28.02 — 06 NOV 2026
ALL

■ If FUEL CLOG 1+2 lights come on:

► ENG (1+2) PARAMETERS: MONITOR

• If abnormal engine parameters

► LAND ASAP

MAINTENANCE ACTION REQUIRED

NOTE: Fuel contamination may be suspected.

■ If only FUEL CLOG 1(2) light comes on

► ENG (affected) PARAMETERS: MONITOR

A28.03 FUEL FEED LO PR

Ident.: A28.03 — 06 NOV 2026
ALL

► FUEL PUMP (affected side) ..... CONFIRM ON

► ENG (affected) PARAMETERS: MONITOR

■ If engine runs down

- OR -

■ If fuel quantity decreases significantly

► LAND ASAP

CAUTION: X feed valve keep closed

► PL (affected ENG) ..... FI

► CL (affected ENG) ..... FTR THEN FUEL S.O

► FUEL PUMP (affected side) ..... OFF

► FIRE HANDLE (affected ENG) ..... PULL

► SINGLE ENG OPERATION procedure ..... APPLY

A28.04 FUEL LEAK DETECTION

Ident.: A28.04 — 06 NOV 2026
ALL

■ If fuel leak suspected:

► FUEL LEAK procedure ..... APPLY

A28.05 FUEL LEAK

Ident.: A28.05 — 06 NOV 2026
ALL

■ If leak confirmed

► LAND ASAP

cont'd... ►►►

cont'd... ►►►

- **If leak from engine (excessive fuel flow or feed spray from engine)**
  - ► PL (affected ENG) ..... FI
  - ► CL (affected ENG) ..... FTR THEN FUEL S.O
  - ► FUEL PUMP (affected side) ..... OFF
  - ► FIRE HANDLE (affected ENG) ..... PULL
- **If excessive fuel flow was identified before engine shutdown**

FUEL X FEED VALVE CAN BE OPENED.

- **In all other cases**
  - ► FUEL X FEED: KEEP CLOSED
  - ► SINGLE ENG OPERATION procedure ..... APPLY
- **If leak not located**
  - ► FUEL X FEED: KEEP CLOSED
- **Before landing**
  - ► ATC ..... NOTIFY

A28.06 FUEL LO LVL

Ident.: A28.06 — 06 NOV 2026
ALL

► EXCESSIVE PITCH AND ROLL ATTITUDES: AVOID
► SIDESLIP: AVOID

■ **If FUEL LO LVL on both tanks**
  - ► LAND ASAP

■ **If FUEL LO LVL on one tank only**

- **If leak suspected**
  - ► FUEL LEAK procedure ..... APPLY
- **If no leak suspected**
- **If Fuel Quantity Indication < 160 kg (352 lb)**
  - ► FUEL X FEED ..... ON
- **If Fuel Quantity Indication ≥ 160 kg (352 lb)**
  - ► FUEL COMSUMPTION: MONITOR
  - ► FUEL X FEED: KEEP CLOSED
  - ► UNUSABLE FUEL IN AFFECTED TANK: 130 kg (287 lb)

A28.07 FUEL MISMATCH

Ident.: A28.07 — 06 NOV 2026
ALL

■ **If leak suspected**
  - ► FUEL LEAK procedure ..... APPLY

■ **If normal fuel condition**
  - ► FOB ..... UPDATE IN CRZ PITCH RANGE

cont'd... ►►►

cont'd... ►►►

A28.08 FUEL UNBALANCED

Ident.: A28.08 06 NOV 2026
ALL

■ If FUEL LEAK suspected

► FUEL LEAK procedure ..... APPLY

■ If normal fuel condition

● If LEFT TANK QTY > RIGHT TANK QTY

► FUEL X FEED ..... IN LINE
► FUEL PUMP LEFT ..... CHECK ON
► FUEL PUMP RIGHT ..... OFF

● When fuel balanced

► FUEL PUMP RIGHT ..... ON
► FUEL X FEED ..... X LINE

● If LEFT TANK QTY < RIGHT TANK QTY

► FUEL X FEED ..... IN LINE
► FUEL PUMP RIGHT ..... CHECK ON
► FUEL PUMP LEFT ..... OFF

● When fuel balanced

► FUEL PUMP LEFT ..... ON
► FUEL X FEED ..... X LINE

A29 HYDRAULIC POWER

A29.01 HYD BLUE (GREEN) LO LVL

Ident.: A29.01 — 06 NOV 2026
ALL

■ If blue hydraulic system affected

► HYD X FEED ..... CHECK OFF
► HYD BLUE PUMP ..... OFF
► HYD AUX PUMP ..... OFF
► HYD BLUE SYS LOST EQUIPMENT LIST ..... CHECK

• For approach

► REDUCED FLAPS LANDING procedure ..... APPLY

• At landing

N/W STEERING LOST

► DIFFERENTIAL BRAKING: USE
► TAXI: ON ENG 1+2

■ If green hydraulic system affected

► HYD X FEED ..... CHECK OFF
► HYD GREEN PUMP ..... OFF
► LDG DIST (Refer to QRH - PER.7.1 - Landing Distance) ..... MULTIPLY BY 1.5
► HYD GREEN SYS LOST EQUIPMENT LIST ..... CHECK

• Before landing

NORMAL BRAKING LOST

NOTE: "TLU LO SPEED" label on EWD is not visible, check that no TLU FAULT alert is displayed on EWD or local alert on overhead panel.

► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

• After touchdown

► REVERSE ..... AS RQRD
► BRAKE HANDLE ..... EMER/AS RQRD
► TAXI: ON ENG 1+2

A29.02 HYD BLUE (GREEN) LO PR

Ident.: A29.02 — 06 NOV 2026
ALL

► HYD (affected) PUMP ..... OFF
► HYD X FEED ..... ON
► TAXI: ON ENG 1+2

A29.03 HYD BLUE (GREEN) OVHT

Ident.: A29.03 — 06 NOV 2026
ALL

► HYD (affected) PUMP ..... OFF
► HYD X FEED ..... ON

cont'd... ►►►

cont'd... ►►►

► TAXI: ON ENG 1+2

A29.04 HYD BLUE AND GREEN PUMPS LOSS

Ident.: A29.04 — 06 NOV 2026
ALL

► HYD BLUE PUMP ..... OFF
► HYD GREEN PUMP ..... OFF
► HYD X FEED ..... CHECK OFF
► HYD BLUE SYS LOST EQUIPMENT LIST ..... CHECK
► HYD GREEN SYS LOST EQUIPMENT LIST ..... CHECK

■ Before landing

NORMAL BRAKING LOST

NOTE: "TLU LO SPEED" label on EWD is not visible, check that no TLU FAULT alert is displayed on EWD or local alert on overhead panel.

► LDG GEAR lever ..... DOWN
► HYD BLUE PRESSURE ..... CHECK
► FLAPS 15 ..... AS RQRD
► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

LDG GEAR CANNOT BE RETRACTED

► FLAPS 30 ..... AS RQRD

■ After touchdown

► REVERSE ..... AS RQRD
► BRAKE HANDLE ..... EMER/AS RQRD
► TAXI ..... ON ENG 1+2

► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.5

A29.05 HYD BLUE AND GREEN SYS LOSS

Ident.: A29.05 — 06 NOV 2026
ALL

► HYD BLUE PUMP ..... OFF
► HYD GREEN PUMP ..... OFF
► HYD AUX PUMP ..... OFF
► HYD GREEN SYS LOST EQUIPMENT LIST ..... CHECK
► HYD BLUE SYS LOST EQUIPMENT LIST ..... CHECK

■ For approach

► GPWS ..... FLAP OVRD
► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

LDG GEAR CANNOT BE RETRACTED

► VAPP (Refer to OPSDATA) ..... VmHB0 + 5 kt + WIND EFFECT
► LDG DIST (Refer to Landing Distance) ..... MULTIPLY LDG DIST FLAPS 30 BY 2.9

■ Before landing

NORMAL BRAKING LOST

cont'd... ►►►

cont'd... ►►►

NOTE: "TLU LO SPEED" label on EWD is not visible, check that no TLU FAULT alert is displayed on EWD or local alert on overhead panel.

■ **During flare**

► PITCH ATTITUDE ..... DO NOT EXCEED 6 °

● **For FLAPS 0 landing**

● **At 10 ft**

► ENG POWER ..... SLOWLY REDUCE

■ **After touchdown**

► REVERSE ..... AS RQRD

► BRAKE HANDLE ..... EMER/AS RQRD

► TAXI ..... ON ENG 1+2

A29.06 HYD AUX LO PR

Ident.: A29.06 — 06 NOV 2026
ALL

► HYD AUX PUMP ..... OFF

A29.07 HYD AUX OVHT

Ident.: A29.07 — 06 NOV 2026
ALL

► HYD AUX PUMP ..... OFF

PAGE

INTENTIONALLY

LEFT BLANK

A30 ICE AND RAIN PROTECTION

A30.01 ANTI ICING HORNS 1 FAULT

Ident.: A30.01 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ANTI ICING HORNS 1 ..... OFF

■ **If icing conditions**

● **Every 5 min**

► FLIGHT CONTROLS ..... CHECK FREE

A30.01 ANTI ICING HORNS 2 FAULT

Ident.: A30.01 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ANTI ICING HORNS 2 ..... OFF

■ **If icing conditions**

● **Every 5 min**

► FLIGHT CONTROLS ..... CHECK FREE

A30.02 ANTI ICING PROP 1 FAULT

Ident.: A30.02 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ANTI ICING PROP 1 ..... OFF

■ **If propeller unbalance becomes excessive due to ice**

● **For 5 min**

► CL 1+2 ..... 100 % OVRD

A30.02 ANTI ICING PROP 2 FAULT

Ident.: A30.02 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ANTI ICING PROP 2 ..... OFF

■ **If propeller unbalance becomes excessive due to ice**

● **For 5 min**

► CL 1+2 ..... 100 % OVRD

A30.05 AFR AIR BLEED FAULT

Ident.: A30.05 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► AFR AIR BLEED ..... OFF

cont'd... ►►►

cont'd... ►►►

■ **If DE ICING ENG FAULT light comes on after 6 s**

► DE ICING ENG (affected side) ..... OFF
► AFR AIR BLEED ..... ON
► AFR AIR BLEED FAULT light ..... CHECK OFF

■ **If DE ICING ENG FAULT light stays OFF on both sides**

► DE ICING AIRFRAME FAULT procedure ..... APPLY

A30.06 DE-ANTI ICING MODE SEL AUTO FAULT

Ident.: A30.06 — 06 NOV 2026
ALL

► DE-ANTI ICING MODE SEL AUTO ..... MAN

■ **If SAT < -10 °C**

► ANTI ICING MODE SEL SAT < -10 C° ..... ON

■ **If SAT < -20 °C**

► ANTI ICING MODE SEL SAT < -10 C° ..... ON
► DE ICING SAT < -20 C° ..... SLOW

A30.07 DE ICING AIRFRAME FAULT

Ident.: A30.07 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► DE ICING AIRFRAME ..... OFF

■ **As long as aircraft is not clear of ice**

- OR -

■ **If in icing conditions**

► IAS (Refer to QRH - PER.3 - OPSDATA) ..... NOT LESS THAN icing bug + 15 kt
► VAPP (Refer to QRH - PER.3 - OPSDATA) ..... NOT LESS THAN VREF + 15 kt
► SPD TGT ..... MAN SEL
► LDG DIST (Refer to QRH - PER.7.1 - Landing Distance) ..... MULTIPLY BY 1.25
► STEEP SLOPE APPROACH (≥ 4.5 °): PROHIBITED

A30.08 DE ICING MODE SEL FAULT

Ident.: A30.08 — 06 NOV 2026
ALL

► DE ICING MODE SEL ..... OVRD
► DE ICING: MONITOR

■ **If ENG 1(2) FLAME OUT in flight**

► DE ICING MODE SEL ..... RELEASE PB

A30.09 DE ICING ENG 1 FAULT

Ident.: A30.09 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ENG 1 PARAMETERS: MONITOR
► DE ICING ENG 1 ..... OFF

cont'd... ►►►

cont'd... ►►►

A30.09 DE ICING ENG 2 FAULT

Ident.: A30.09 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ENG 2 PARAMETERS: MONITOR
► DE ICING ENG 2 ..... OFF

A30.10 ICE DETECT FAULT

Ident.: A30.10 — 06 NOV 2026
ALL

► ICE ACCRETION: VISUALLY MONITOR

A30.11 PROBES HTG FAILURE

Ident.: A30.11 — 06 NOV 2026
ALL

■ **If one CAPT/FO ALPHA PROBE HTG comes on**
► STICK PUSHER / SHAKER: MONITOR
■ **If both CAPT/FO ALPHA PROBE HTG come on**
► STICK PUSHER-SHAKER FAULT procedure ..... APPLY
■ **If any CAPT/FO PITOT/STAT/TAT PROBE HTG comes on**
► ADC 1(2) FAILURE procedure ..... APPLY
► ILS CAT 2: PROHIBITED
■ **If any STBY PITOT/STAT PROBE HTG comes on**
► IESI IAS and ALT indications ..... DISREGARD

A30.12 SIDE WINDOW HTG FAULT

Ident.: A30.12 — 06 NOV 2026
ALL

► SIDE WINDOW pb ..... OFF

A30.13 WINDSHIELD HTG FAULT

Ident.: A30.13 — 06 NOV 2026
ALL

► WINDSHIELD HTG pb (affected side) ..... OFF

A30.14 APM FAULT

Ident.: A30.14 — 06 NOV 2026
ALL

► APM ..... OFF
► ICING CONDITIONS: MONITOR
► SPEED: MONITOR

A30.15 DEGRADED PERF

Ident.: A30.15 — 06 NOV 2026
ALL

► IAS: MAINTAIN ABOVE ICING BUG +10 kt

cont'd... ►►►

cont'd... ►►►

► IAS & V/S: MONITOR
► FLIGHT PATH: AMEND

NOTE: It is recommended to accelerate above icing bug + 30 kt. Refer to OPSDATA to determine recommended maximum icing flight level.

• If in icing condition

► ANTI ICING systems ..... CHECK ON
► DE ICING systems ..... CHECK ON

• If not able to accelerate and maintain IAS above icing bug +30 kt

► AP ..... OFF

NOTE: Refer to PRO.NNO.ABN.30.6.ICE.2.A30.17 SEVERE ICING DETECTION for severe icing indications information.

• If any severe icing indication

► SEVERE ICING procedure ..... APPLY

• As long as DGD PERF is displayed

► TCAS ..... TA ONLY
► ICING CONDITIONS: MONITOR

► IAS: MAINTAIN ABOVE ICING BUG +10 kt
► IAS & V/S: MONITOR
► FLIGHT PATH: AMEND

NOTE: It is recommended to accelerate above icing bug + 30 kt. Refer to OPSDATA to determine recommended maximum icing flight level.

■ If in icing condition

► ANTI ICING systems ..... CHECK ON
► DE ICING systems ..... CHECK ON

• If not able to accelerate and maintain IAS above icing bug +30 kt

► AP ..... OFF

NOTE: Refer to PRO.NNO.ABN.30.6.ICE.2.A30.17 SEVERE ICING DETECTION for severe icing indications information.

• If any severe icing indication

► SEVERE ICING procedure ..... APPLY

■ As long as DGD PERF is displayed

► TCAS ..... TA ONLY
► ICING CONDITIONS: MONITOR

A30.16 INCREASE SPEED

Ident.: A30.16 — 06 NOV 2026
ALL

► IAS: ICING BUG +30 kt
► SEVERE ICING procedure ..... APPLY
► IAS: ICING BUG +30 kt

► SEVERE ICING procedure ..... APPLY

ICING PROCEDURES ICE 4

cont'd... ►►►

cont'd... ►►►

A30.17 SEVERE ICING DETECTION

Ident.: A30.17 06 NOV 2026
ALL

■ **If any severe icing indication :**

► SEVERE ICING procedure ..... APPLY

Supplementary indications:

Water splashing/streaming on the windshield Unusual extensive ice accreted on the airframe in areas not normally observed to collect ice Accumulation of ice on the lower surface of the wing aft of the protected areas Accumulation of ice on propeller spinner farther aft than normally observed Weather conditions that can result in severe in-flight icing:

Visible rain at temperatures close to 0 °C (SAT)

Droplets that splash or splatter on impact at temperature close to 0 °C (SAT).

■ **If any severe icing indication :**

► SEVERE ICING procedure ..... APPLY

Supplementary indications:

Water splashing/streaming on the windshield Unusual extensive ice accreted on the airframe in areas not normally observed to collect ice Accumulation of ice on the lower surface of the wing aft of the protected areas Accumulation of ice on propeller spinner farther aft than normally observed Weather conditions that can result in severe in-flight icing:

Visible rain at temperatures close to 0 °C (SAT)

Droplets that splash or splatter on impact at temperature close to 0 °C (SAT).

Cruise Speed Low Cruise Speed Low

PAGE

INTENTIONALLY

LEFT BLANK

A31 INDICATING AND RECORDING

A31.01 MFC 1A FAULT

Ident.: A31.01 — 06 NOV 2026
ALL

► MFC 1A ..... RESET

■ **If MFC 1A FAULT persists**

► MFC 1A ..... OFF

● **Before takeoff**

► RETURN TO PARKING

► MFC 1A LOST EQUIPMENT LIST ..... CHECK

A31.02 MFC 1B FAULT

Ident.: A31.02 — 06 NOV 2026
ALL

► MFC 1B ..... RESET

■ **If MFC 1B FAULT persists**

► MFC 1B ..... OFF

● **Before takeoff**

► RETURN TO PARKING

► OVBD VALVE ..... FULL OPEN

To improve racks cooling as WOW signal is lost.

● **After takeoff**

► LDG GEAR: KEEP DOWN 1 MINUTE EXCEPT IN CASE OF EMERGENCY

Keep down for cooling as hot brakes indication lost.

● **In flight**

► OVBD VALVE ..... FULL CLOSE

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

● **After landing**

► OVBD VALVE ..... FULL OPEN

Relieves the ΔP as outflow valves do not fully open.

● **At parking**

CAUTION: Carefully monitor ΔP before door opening.

► PACK 1+2 ..... OFF

► COCKPIT COM HATCH ..... OPEN

► MFC 1B LOST EQUIPMENT LIST ..... CHECK

A31.03 MFC 2A FAULT

Ident.: A31.03 — 06 NOV 2026
ALL

► MFC 2A ..... RESET

cont'd... ►►►

cont'd... ►►►

■ **If MFC 2A FAULT persists**

► MFC 2A ..... OFF

● **Before takeoff**

► RETURN TO PARKING

► OVBD VALVE ..... FULL OPEN

● **In flight**

► IDLE GATE: MONITOR

► AVIONICS VENT EXHAUST MODE ..... OVBD

● **At touchdown**

► IDLE GATE: MONITOR

● **After landing**

► OVBD VALVE ..... FULL OPEN

► MFC 2A LOST EQUIPMENT LIST ..... CHECK

A31.04 MFC 2B FAULT

Ident.: A31.04 — 06 NOV 2026
ALL

► MFC 2B ..... RESET

■ **If MFC 2B FAULT persists**

► MFC 2B ..... OFF

● **Before takeoff**

► RETURN TO PARKING

► OVBD VALVE ..... FULL OPEN

To improve racks cooling as WOW signal is lost.

● **After takeoff**

► LDG GEAR: KEEP DOWN 1 MINUTE EXCEPT IN CASE OF EMERGENCY

Keep down for cooling as hot brakes indication lost.

► IEP: MONITOR

● **In flight**

► OVBD VALVE ..... FULL CLOSE

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

● **After landing**

► OVBD VALVE ..... FULL OPEN

Relieves the ΔP as outflow valves do not fully open.

● **At parking**

CAUTION: Carefully monitor ΔP before door opening.

► PACK 1+2 ..... OFF

► COCKPIT COM HATCH ..... OPEN

► MFC 2B LOST EQUIPMENT LIST ..... CHECK

cont'd... ►►►

cont'd... ►►►

A31.05 MFC 1A+1B FAULT

Ident.: A31.05 — 06 NOV 2026
ALL

► MFC 1A ..... RESET

• After MFC 1A RESET

► MFC 1B ..... RESET

• If one MFC module recovered

► MFC (affected module) procedure ..... APPLY

• If MFC 1A + 1B FAULT persists

► MFC 1A + 1B ..... OFF

• Before takeoff

► RETURN TO PARKING

► PACK 1 ..... OFF

PACK 1 is lost without FAULT indication.

► OVBD VALVE ..... FULL OPEN

To improve racks cooling as WOW signal is lost.

• In flight

► ICING CONDITIONS: LEAVE AND AVOID

► ANTI ICING PROP 1 ..... OFF

ANTI ICING PROP 1 FAULT indication lost.

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► DE-ANTI ICING MODE SEL AUTO ..... MAN

• If SAT < -10 °C

► ANTI ICING MODE SEL SAT < -10 °C ..... ON

► DE ICING MODE SEL ..... OVRD AS RQRD

► PACK 1 ..... OFF

PACK 1 is lost without FAULT indication.

► ENG BLEED 1 ..... OFF

ENG BLEED 1 is lost without FAULT indication.

► OVBD VALVE ..... FULL CLOSE

► ENG BLEED 1(2) FAULT procedure ..... APPLY

► GPWS ..... OFF

Loss of radio altimeter information.

■ Before landing

► ATPCS ..... OFF

Autofeather on engine 1 lost. Check go-around performances with ATPCS OFF.

► VAPP (Refer to OPSDATA) ..... NOT LESS THAN VmHB +10 kt

► SPD TGT ..... MAN SEL

► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15

cont'd... ►►►

cont'd... ►►►

■ **After landing**

► OVBD VALVE ..... FULL OPEN

Relieves the ΔP as outflow valves do not fully open.

■ **At parking**

CAUTION: Carefully monitor ΔP before door opening.

► PACK 2 ..... OFF

► COCKPIT COM HATCH ..... OPEN

► MFC 1A + 1B LOST EQUIPMENT LIST ..... CHECK

A31.06 MFC 1A+2A FAULT

Ident.: A31.06 — 06 NOV 2026
ALL

► MFC 1A ..... RESET

■ **After MFC 1A RESET**

► MFC 2A ..... RESET

■ **If one MFC module recovered**

► MFC (affected module) procedure ..... APPLY

■ **If MFC 1A + 2A FAULT persists**

► MFC 1A + 2A ..... OFF

● **Before takeoff**

► RETURN TO PARKING

► OVBD VALVE ..... FULL OPEN

● **In flight**

► AVIONICS VENT EXHAUST MODE ..... OVBD

► TLU sw ..... HI or LO SPD based on IAS

► GPWS ..... OFF

● **If airframe deicing is ON**

► BOOTS INFLATION: MONITOR

AIRFRAME FAULT AMBER ALERT IS LOST.

● **Below 1 000 ft AGL**

► AP USE: PROHIBITED

● **Before landing**

► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

LDG GEAR CANNOT BE RETRACTED

● **At touchdown**

► IDLE GATE: MONITOR

● **After landing**

► OVBD VALVE ..... FULL OPEN

► MFC 1A + 2A LOST EQUIPMENT LIST ..... CHECK

cont'd... ►►►

cont'd... ►►►

A31.07 MFC 1A+2B FAULT

Ident.: A31.07 06 NOV 2026
ALL

► MFC 1A ..... RESET

• After MFC 1A RESET

► MFC 2B ..... RESET

• If one MFC module recovered

► MFC (affected module) procedure ..... APPLY

• If MFC 1A + 2B FAULT persists

► MFC 1A + 2B ..... OFF

• Before takeoff

► RETURN TO PARKING

► OVBD VALVE ..... FULL OPEN

• In flight

► OVBD VALVE ..... FULL CLOSE

► HYD BLUE PUMP ..... OFF

► HYD X FEED ..... ON

HYD BLUE pressure recovery. FLAPS control remains lost.

► DE-ANTI ICING MODE SEL AUTO ..... MAN

• If SAT < -10 °C

► ANTI ICING MODE SEL SAT < -10 °C ..... ON

► DE ICING MODE SEL ..... OVRD AS RQRD

Recover all pneumatic deicers operations.

• Before landing

FLAPS CONTROL LOST

► REDUCED FLAPS LANDING procedure ..... APPLY

► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

LDG GEAR CANNOT BE RETRACTED

► ILS CAT 2: PROHIBITED

• After landing

► OVBD VALVE ..... FULL OPEN

Relieves the ΔP as outflow valves do not fully open.

• At parking

CAUTION: Carefully monitor ΔP before door opening.

► PACK 1+2 ..... OFF

► COCKPIT COM HATCH ..... OPEN

► MFC 1A + 2B LOST EQUIPMENT LIST ..... CHECK

cont'd... ►►►

cont'd... ►►►

A31.08 MFC 1B+2A FAULT

Ident.: A31.08 — 06 NOV 2026
ALL

► MFC 1B ..... RESET

■ After MFC 1B RESET

► MFC 2A ..... RESET

■ If one MFC module recovered

► MFC (affected module) procedure ..... APPLY

■ If MFC 1B + 2A FAULT persists

► MFC 1B + 2A ..... OFF

• Before takeoff

► RETURN TO PARKING

► OVBD VALVE ..... FULL OPEN

• In flight

► AVIONICS VENT EXHAUST MODE ..... OVBD

► DE-ANTI ICING MODE SEL AUTO ..... MAN

• If SAT < -10 °C

► ANTI ICING MODE SEL SAT < -10 °C ..... ON

► DE ICING MODE SEL ..... OVRD AS RQRD

Recover all pneumatic deicers operations.

• Before landing

FLAPS CONTROL LOST

► REDUCED FLAPS LANDING procedure ..... APPLY

► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

LDG GEAR CANNOT BE RETRACTED

► ILS CAT 2: PROHIBITED

• At touchdown

► IDLE GATE: MONITOR

• After landing

► OVBD VALVE ..... FULL OPEN

To improve racks cooling as WOW signal is lost. Relieves the ΔP as outflow valves do not fully open.

• At parking

CAUTION: Carefully monitor ΔP before door opening.

► PACK 1+2 ..... OFF

► COCKPIT COM HATCH ..... OPEN

► MFC 1B + 2A LOST EQUIPMENT LIST ..... CHECK

A31.09 MFC 1B+2B FAULT

Ident.: A31.09 — 06 NOV 2026
ALL

► MFC 1B ..... RESET

cont'd... ►►►

cont'd... ►►►

- **After MFC 1B RESET**
  - ► MFC 2B ..... RESET
- **If one MFC module recovered**
  - ► MFC (affected module) procedure ..... APPLY
- **If MFC 1B + 2B FAULT persists**
  - ► MFC 1B + 2B ..... OFF
- **Before takeoff**
  - ► RETURN TO PARKING
  - ► OVBD VALVE ..... FULL OPEN
- **In flight**
  - ► OVERHEAD panel: MONITOR

  FWS degraded: MC, MW, and most centralized alerts lost.
  - ► IEP: MONITOR
  - ► OVBD VALVE ..... FULL CLOSE
  - ► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY
- **Before landing**

NOTE: ATPCS operates, only ARM light inhibited.
  - ► N/W STEERING ..... OFF
  - ► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

  LDG GEAR CANNOT BE RETRACTED.
- **After touchdown**

Touchdown protection lost.
  - ► IDLE GATE lever ..... PULL

  Auto functioning lost.
  - ► DIFFERENTIAL BRAKING ..... USE
- **After landing**
  - ► OVBD VALVE ..... FULL OPEN

  To improve racks cooling as WOW signal is lost. Relieves the ΔP as outflow valves do not fully open.
  - ► ANTI ICING HORNS ..... RELEASE
  - ► PROBE HTG ..... OFF

■ **At parking**

CAUTION: Carefully monitor ΔP before door opening.
  - ► PACK 1+2 ..... OFF
  - ► COCKPIT COM HATCH ..... OPEN

  NOTE: External power cannot be used.

► MFC 1B + 2B LOST EQUIPMENT LIST ..... CHECK

A31.10 MFC 2A+2B FAULT

Ident.: A31.10 — 06 NOV 2026
ALL

► MFC 2A ..... RESET

cont'd... ►►►

cont'd... ►►►

- **After MFC 2A RESET**
  - ► MFC 2B ..... RESET
- **If one MFC module recovered**
  - ► MFC (affected module) procedure ..... APPLY
- **If MFC 2A + 2B FAULT persists**
  - ► MFC 2A + 2B ..... OFF
- **Before takeoff**
  - ► RETURN TO PARKING
  - ► ENG BLEED 2 ..... OFF

    ENG BLEED 2 FAULT indication lost.
  - ► PACK 2 ..... OFF

    PACK 2 FAULT indication lost.
  - ► OVBD VALVE ..... FULL OPEN
- **In flight**
  - ► ICING CONDITIONS: LEAVE AND AVOID
  - ► IEP: MONITOR
  - ► AVIONICS VENT EXHAUST MODE ..... OVBD
  - ► ANTI ICING PROP 2 ..... OFF

    ANTI ICING PROP 2 FAULT indication lost.
  - ► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
  - ► DE-ANTI ICING MODE SEL AUTO ..... MAN
- **If SAT < -10 °C**
  - ► ANTI ICING MODE SEL SAT < -10 °C ..... ON
  - ► DE ICING MODE SEL ..... OVRD AS RQRD
  - ► PACK 2 ..... OFF

    PACK 2 FAULT indication lost.
  - ► ENG BLEED 2 ..... OFF

    ENG BLEED 2 FAULT indication lost.
  - ► ENG BLEED 1(2) FAULT procedure ..... APPLY
- **■ Before landing**
  - ► ATPCS ..... OFF

    Autofeather on engine 2 lost. Check go-around performances with ATPCS OFF.
  - ► VAPP (Refer to OPSDATA) ..... NOT LESS THAN VmHB +10 kt
  - ► SPD TGT ..... MAN SEL
  - ► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15
- **■ At touchdown**
  - ► IDLE GATE: MONITOR
- **■ After landing**
  - ► OVBD VALVE ..... FULL OPEN

    Relieves the ΔP as outflow valves do not fully open.

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

■ **At parking**

CAUTION: Carefully monitor ΔP before door opening.

► PACK 1 ..... OFF
► COCKPIT COM HATCH ..... OPEN
► MFC 2A + 2B LOST EQUIPMENT LIST ..... CHECK

A31.12 FWS 1+2 LOSS

Ident.: A31.12 — 06 NOV 2026
ALL

■ **If Master Caution or Master Warning**

► LOCAL ALERTS: MONITOR

■ **If FPLN NOT available on ND**

► AVNX SWITCH 1+2 LOSS procedure ..... APPLY

■ **If FPLN available on ND**

● **If TRIM indication not available on EWD**

► AVNX CPM 1+2 LOSS procedure ..... APPLY

● **If TRIM indication available on EWD**

► CABIN PRESS: MONITOR
► ENG PARAMETERS: MONITOR
► FWS 1+2 LOST EQUIPMENT LIST ..... CHECK

PAGE

INTENTIONALLY

LEFT BLANK

A32 LANDING GEAR

A32.01 ANTISKID FAULT

Ident.: A32.01 — 06 NOV 2026
ALL

► ANTISKID ..... OFF

■ At touchdown

► REVERSE ..... AS RQRD
► NORMAL BRAKE ..... USE WITH CARE
► BRAKE HANDLE ..... EMER/AS RQRD

► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.4

A32.02 BRK TEMP HOT

Ident.: A32.02 — 06 NOV 2026
ALL

■ On ground

► PL ..... CHECK ON GI

NOTE: Taxi at low speed, use reverse if necessary.

► RETURN TO PARKING
► BRAKES ..... USE WITH CARE

● At parking

► GROUND CREW ..... ADVISE
► WHEEL CHOCKS ..... USE
► BRAKE HANDLE ..... BRK OFF

■ In flight

● If flight conditions permit

► MAX IAS: VLO
► LDG GEAR ..... DOWN
► LDG GEAR: DO NOT RETRACT UNTIL WHEELS BRK HOT OFF

A32.03 LDG GEAR GRAVITY EXTENSION

Ident.: A32.03 — 06 NOV 2026
ALL

► LDG GEAR lever ..... DOWN

CAUTION: Do not twist handle when operating. Pull above the top of the pedestal and maintain until green lights are on. The expected landing gear extension duration is between 10 s and 20 s.

► EMER EXTENSION HANDLE: PULL & MAINTAIN UP
► TCAS ..... TA ONLY

LDG GEAR CANNOT BE RETRACTED

■ If abnormal LDG GEAR indication

► LANDING WITH ABNORMAL LDG GEAR procedure ..... APPLY

cont'd... ►►►

cont'd... ►►►

A32.04 LDG GEAR RETRACTION NOT POSSIBLE

Ident.: A32.04 — 06 NOV 2026
ALL

► ICING CONDITION: LEAVE AND AVOID
► LDG GEAR lever ..... DOWN
► FWS ..... RCL
► TCAS ..... TA ONLY
► IDLE GATE: MONITOR
► MAX IAS: VLE

A32.05 LDG GEAR UNSAFE INDICATION

Ident.: A32.05 — 06 NOV 2026
ALL

■ If LDG GEAR selected DOWN

■ If GREEN light OFF on one panel only

► UNSAFE INDICATION ..... DISREGARD

■ If GREEN light OFF on both panels

► LDG GEAR GRAVITY EXTENSION procedure ..... APPLY

■ If LDG GEAR selected UP

■ If RED light ON on one panel only

► UNSAFE INDICATION ..... DISREGARD

■ If RED or/and GREEN light(s) ON on both panels

► ICING CONDITIONS ..... LEAVE AND AVOID
► IAS MAX ..... 160 kt
► LDG GEAR lever ..... DOWN
► TCAS ..... TA ONLY

A32.06 LANDING WITH ABNORMAL LDG GEAR

Ident.: A32.06 — 06 NOV 2026
ALL

■ Preparation

► CABIN CREW (PA) ..... NOTIFY
► ATC ..... NOTIFY
► XPDR ..... AS RQRD
► SIGNS ..... ON
► GPWS ..... OFF
► CABIN AND COCKPIT ..... PREPARE
► FUEL WEIGHT ..... IF POSSIBLE, REDUCE

• If abnormal nose LDG GEAR

► CG LOCATION (if possible) ..... AFT

• If abnormal main LDG GEAR

► FUEL UNBALANCE (if possible) ..... ESTABLISH

NOTE: Reduce fuel on side with failed LDG GEAR, and do not exceed fuel unbalance limit 730 kg (1 609 lb).

cont'd... ►►►

cont'd... ►►►

■ **Approach**

- ► LDG GEAR lever ..... DOWN
- ► LDG GEAR EMER EXTENSION HANDLE ..... PULL
- ► ENG START selector ..... OFF & START ABORT
- ► CABIN REPORT ..... OBTAIN

■ **Before landing**

- ► ENG BLEEDS 1+2 ..... OFF
- ► BRACE FOR IMPACT ..... ORDER

■ **At touchdown**

- ► PL 1+2 ..... GI
- ► CL 1+2 ..... FTR THEN FUEL S.O

■ **After touchdown**

- ► FIRE HANDLES 1+2 ..... PULL

■ **When aircraft has stopped**

- ► BRAKE HANDLE ..... PARKING
- ► CABIN CREW (PA) ..... NOTIFY
- ► FUEL PUMPS 1+2 ..... OFF
- ► AGENTS ..... DISCH
- ► EVACUATION (PA) ..... INITIATE

■ **Before leaving aircraft**

- ► BAT ..... OFF

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

PAGE

INTENTIONALLY

LEFT BLANK

A34 NAVIGATION

A34.01 ADC 1 FAILURE

Ident.: A34.01 — 06 NOV 2026
ALL

► ADC 1 ..... ALTERNATE SYS
► FMA ..... CHECK & CONFIRM

■ If stall warning inoperative
► AP USE ..... PROHIBITED

■ If IAS <160 kt and/or below 1 000 ft AGL
► AP and/or YD USE ..... PROHIBITED

■ If none of the conditions quoted above exists

AP and/or YD CAN BE REENGAGED

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY
► IAS & ALT ..... PERIODICALLY COMPARE WITH IESI

BARO SETTING SELECTION ONLY AVAILABLE ON OPERATIVE SIDE

■ If single engine operation
► LARGE RAPID POWER CHANGE ..... AVOID
► ILS CAT 2 ..... PROHIBITED

■ If ADC 1 FAILED
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

A34.01 ADC 2 FAILURE

Ident.: A34.01 — 06 NOV 2026
ALL

► ADC 2 ..... ALTERNATE SYS
► FMA ..... CHECK & CONFIRM

■ If stall warning inoperative
► AP USE ..... PROHIBITED

■ If IAS <160 kt and/or below 1 000 ft AGL
► AP and/or YD USE ..... PROHIBITED

■ If none of the conditions quoted above exists

AP and/or YD CAN BE REENGAGED

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY
► IAS & ALT ..... PERIODICALLY COMPARE WITH IESI

BARO SETTING SELECTION ONLY AVAILABLE ON OPERATIVE SIDE

■ If single engine operation
► LARGE RAPID POWER CHANGE ..... AVOID
► ILS CAT 2 ..... PROHIBITED

■ If ADC 1 FAILED
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

cont'd... ►►►

cont'd... ►►►

A34.02 ADC 1+2 FAILURE

Ident.: A34.02 — 06 NOV 2026
ALL

► PF ..... CAPT
► IESI ..... USE
► CAB PRESS RATE knob ..... 9 O'CLOCK (MAN POSITION)
► CAB PRESS MODE SEL ..... MAN
► TCAS ..... STBY
► ENG PARAMETERS: MONITOR
► GPWS ..... OFF
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY
► TLU sw ..... HI or LO SPD based on IAS

NOTE: Set TLU to HI SPEED above 185 kt. Set TLU to LO SPEED below 185 kt. Disregard TLU FAULT alerts (FWS and local alerts) if 30 s after TLU sw setting, the TLU position indication is in accordance with IAS.

► AUTO PRESS FAULT procedure ..... APPLY

AHRS 1+2 DEGRADED MESSAGE MAY DISPLAY

■ If flight instruments parameters deviate

• During 90 s

► SPEED & LEVEL ..... STABILIZE

A34.04 ALTITUDE DISAGREE

Ident.: A34.04 — 06 NOV 2026
ALL

► BOTH PFD / IESI ALT ..... COMPARE TO IDENTIFY AFFECTED ADC
► ADC (affected side) ..... ALTERNATE SYS
► ADC 1(2) FAILURE procedure ..... APPLY

A34.05 IAS DISAGREE

Ident.: A34.05 — 06 NOV 2026
ALL

► BOTH PFD / IESI IAS ..... COMPARE TO IDENTIFY AFFECTED ADC

■ If affected ADC identified

► ADC (affected side) ..... ALTERNATE SYS
► ADC 1(2) FAILURE procedure ..... APPLY

■ If IAS disagree between both PFD and IESI

► UNRELIABLE AIRSPEED INDICATION procedure ..... APPLY

A34.07 AHRS 1 FAILURE

Ident.: A34.07 — 06 NOV 2026
ALL

► ATT/HDG 1 ..... ALTERNATE SYS
► FMA ..... CHECK & CONFIRM

■ If stall warning inoperative

► AP USE ..... PROHIBITED

cont'd... ►►►

cont'd... ►►►

■ **If IAS below 160 kt and/or below 1 000 ft AGL**

► AP and/or YD USE ..... PROHIBITED

■ **If none of the conditions quoted above exists**

AP and/or YD CAN BE REENGAGED

■ **When wings level**

► PFD ..... PERIODICALLY COMPARE WITH IESI

► HDG & TK ..... PERIODICALLY X CHECK WITH STBY COMPASS

■ **If single engine operation**

► LARGE RAPID POWER CHANGE ..... AVOID

A34.07 AHRS 2 FAILURE

Ident.: A34.07 — 06 NOV 2026

ALL

► ATT/HDG 2 ..... ALTERNATE SYS

► FMA ..... CHECK & CONFIRM

■ **If stall warning inoperative**

► AP USE ..... PROHIBITED

■ **If IAS below 160 kt and/or below 1 000 ft AGL**

► AP and/or YD USE ..... PROHIBITED

■ **If none of the conditions quoted above exists**

AP and/or YD CAN BE REENGAGED

■ **When wings level**

► PFD ..... PERIODICALLY COMPARE WITH IESI

► HDG & TK ..... PERIODICALLY X CHECK WITH STBY COMPASS

■ **If single engine operation**

► LARGE RAPID POWER CHANGE ..... AVOID

A34.08 AHRS 1+2 FAILURE

Ident.: A34.08 — 06 NOV 2026

ALL

► PF ..... CAPT

► IESI ..... USE

► STBY COMPASS ..... USE

► SPEED & LEVEL ..... STABILIZE

► FMS PROG PAGE ..... USE

► VISUAL FLIGHT CONDITIONS: MAINTAIN IF POSSIBLE

► ATC ..... NOTIFY

PFD ATT & HDG LOST

A34.09 AHRS NOT ALIGN

Ident.: A34.09 — 06 NOV 2026

ALL

■ **On ground**

► AIRCRAFT ..... STOP UNTIL ALERT DISAPPEARS

cont'd... ►►►

cont'd... ►►►

■ **In flight**

► AHRS FAULT ..... IDENTIFY

► SPEED & LEVEL ..... STABILIZE DURING 90 s

• **If alert disappears**

AP CAN BE REENGAGED

• **If AHRS NOT ALIGN persists after 3 min**

► AHRS 1(2) FAILURE procedure ..... APPLY

A34.10 ATTITUDE DISAGREE

Ident.: A34.10 — 06 NOV 2026
ALL

► BOTH PFD / IESI ATT ..... COMPARE TO IDENTIFY AFFECTED AHRS

► ATT/HDG (affected side) ..... ALTERNATE SYS

► AHRS 1(2) FAILURE procedure ..... APPLY

A34.12 HEADING DISAGREE

Ident.: A34.12 — 06 NOV 2026
ALL

■ **When wing leveled**

► HDG / TK / STBY COMPASS ..... COMPARE TO IDENTIFY AFFECTED AHRS

► ATT/HDG (affected side) ..... ALTERNATE SYS

► AHRS 1(2) FAILURE procedure ..... APPLY

A34.13 AVNX FWS SGL CH

Ident.: A34.13 — 06 NOV 2026
ALL

NO CREW ACTION REQUIRED

A34.14 AVNX SGL SWITCH

Ident.: A34.14 — 06 NOV 2026
ALL

NO CREW ACTION REQUIRED

A34.15 AVNX SWITCH 1+2 LOSS

Ident.: A34.15 — 06 NOV 2026
ALL

► LAND ASAP

► ENG PARAMETERS: MONITOR

► ICE ACCRETION: MONITOR

► SPEEDS: MONITOR

RMS AVAILABLE ON MCDU and IESI.

► VOR/ILS 1 TUNING ..... USE IESI

► LOST EQUIPMENT LIST ..... CHECK

cont'd... ►►►

cont'd... ►►►

A34.16 AVNX CPM 1 LOSS

Ident.: A34.16 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE
► LOST EQUIPMENT LIST ..... CHECK

A34.17 AVNX CPM 2 LOSS

Ident.: A34.17 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK

A34.18 AVNX CPM 1+2 LOSS

Ident.: A34.18 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► OPERATIONAL SPEEDS (Refer to OPSDATA) ..... USE OPS DATA
► ICE ACCRETION: MONITOR
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► DEICING: MONITOR OVERHEAD PANEL
► CAB PRESS RATE knob ..... 9 O'CLOCK (MAN POSITION)
► CAB PRESS MODE SEL ..... MAN
► DESCENT ..... INITIATE
► CAB PRESS RATE knob ..... 10 O'CLOCK (INCREASE POSITION)
► TLU sw ..... HI or LO SPD based on IAS

NOTE: Set TLU to HI SPEED above 185 kt. Set TLU to LO SPEED below 185 kt. Disregard the FLT CTL FAULT local alert if TLU sw is set in accordance with IAS.

► ENG PARAMETERS: MONITOR
► VOR/ILS 1 ..... USE IESI
► LOST EQUIPMENT LIST ..... CHECK

cont'd... ►►►

cont'd... ►►►

► MAX FL: 100 or MINIMUM SAFE ALTITUDE

A34.19 AVNX CPM 1 + IOM 22 LOSS

Ident.: A34.19 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ICE ACCRETION: MONITOR
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► DEICING: MONITOR OVERHEAD PANEL

► WINGS: MONITOR DUE TO LOSS OF DEICE AIRFRAME FAULT
► TLU sw ..... HI or LO SPD based on IAS

NOTE: Set TLU to HI SPEED above 185 kt. Set TLU to LO SPEED below 185 kt. When IAS is below 185 kt, the FLT CTL FAULT local alert is triggered. Disregard it if TLU sw is set in accordance with IAS.

► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► AUTO PRESS FAULT procedure ..... APPLY

■ **At touchdown**

CAUTION: Do not use ENG 1 REVERSE

A34.20 AVNX CPM 1 + IOM 23 LOSS

Ident.: A34.20 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► TLU sw ..... HI or LO SPD based on IAS

NOTE: Set TLU to HI SPEED above 185 kt. Set TLU to LO SPEED below 185 kt. Disregard TLU FAULT alerts (FWS and local alerts) if 30 s after TLU sw setting, the TLU position indication is in accordance with IAS. VMO AND MMO AURAL WARNINGS LOST

► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

■ **At touchdown**

A34.21 AVNX CPM 2 + IOM 12 LOSS

Ident.: A34.21 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP

cont'd... ►►►

cont'd... ►►►

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

■ **When IAS < 185 kt**

► TLU FAULT procedure ..... APPLY

► ENG PARAMETERS: MONITOR

► LOST EQUIPMENT LIST ..... CHECK

► HYD GREEN PRESS: MONITOR OVHD PANEL

► FLAPS SETTING: VISUALLY MONITOR

► AUTO PRESS FAULT procedure ..... APPLY

■ **At touchdown**

A34.22 AVNX CPM 2 + IOM 13 LOSS

Ident.: A34.22 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID

► ICE ACCRETION: MONITOR

► LAND ASAP

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► TLU sw ..... HI or LO SPD based on IAS

NOTE: Set TLU to HI SPEED above 185 kt. Set TLU to LO SPEED below 185 kt. Disregard TLU FAULT alerts (FWS and local alerts) if TLU sw is set in accordance with IAS. VMO AND MMO AURAL WARNINGS LOST

► ENG PARAMETERS: MONITOR

► LOST EQUIPMENT LIST ..... CHECK

► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

■ **At touchdown**

A34.23 AVNX IOM 12 LOSS

Ident.: A34.23 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► ENG PARAMETERS: MONITOR

► LOST EQUIPMENT LIST ..... CHECK

A34.24 AVNX IOM 13 LOSS

Ident.: A34.24 — 06 NOV 2026
ALL

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

► TLU sw ..... HI or LO SPD based on IAS

cont'd... ►►►

cont'd... ►►►

► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

A34.25 AVNX IOM 22 LOSS

Ident.: A34.25 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK

A34.26 AVNX IOM 23 LOSS

Ident.: A34.26 — 06 NOV 2026
ALL

► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **When IAS < 185 kt**

► TLU FAULT procedure ..... APPLY

► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK

A34.27 AVNX IOM 12 + IOM 13 LOSS

Ident.: A34.27 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

A34.28 AVNX IOM 12 + IOM 22 LOSS

Ident.: A34.28 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► ENG PARAMETERS: MONITOR

cont'd... ►►►

cont'd... ►►►

► LOST EQUIPMENT LIST ..... CHECK

■ **At touchdown**

CAUTION: Do not use ENG 2 REVERSE

A34.29 AVNX IOM 12 + IOM 23 LOSS

Ident.: A34.29 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

A34.30 AVNX IOM 13 + IOM 22 LOSS

Ident.: A34.30 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► ICE DETECT: MONITOR IEP
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► DEICING: MONITOR OVERHEAD PANEL

► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

A34.31 AVNX IOM 13 + IOM 23 LOSS

Ident.: A34.31 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY

► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK
► LANDING ELEVATION ..... SET PRESSURE ALTITUDE

cont'd... ►►►

cont'd... ►►►

■ **At touchdown**

CAUTION: Do not use ENG 2 REVERSE

A34.32 AVNX IOM 22 + IOM 23 LOSS

Ident.: A34.32 — 06 NOV 2026
ALL

► ICING CONDITIONS: LEAVE AND AVOID
► LAND ASAP
► DE-ANTI ICING MODE SEL AUTO FAULT procedure ..... APPLY

■ **If icing conditions**

► ANTI ICING PROP 1(2) FAULT procedure ..... APPLY
► TLU sw ..... HI or LO SPD based on IAS
► ENG PARAMETERS: MONITOR
► LOST EQUIPMENT LIST ..... CHECK

A34.33 DU DISCREPANCY

Ident.: A34.33 — 06 NOV 2026
ALL

DU FORMAT SHOWS CORRUPTED PARAMETERS

► EACH DU ..... RESET

■ **If DU DISCREPANCY between PFD and IESI**

► AFFECTED DU ..... OFF

■ **If DU DISCREPANCY disappears**

► NORMAL OPERATIONS: RESUME

A34.34 DU TEMP HI

Ident.: A34.34 — 06 NOV 2026
ALL

► MFC 2A ..... RESET

A34.35 SEVERAL DUS TEMP HI

Ident.: A34.35 — 06 NOV 2026
ALL

► MFC 2A ..... RESET

■ **If alert persists after 15 min**

► OVBD VALVE ..... AUTO
► AVIONICS VENT EXHAUST MODE ..... OVBD

MAINTENANCE ACTION REQUIRED

■ **In case of one DU loss**

► LAND ASAP

NOTE: SEVERAL DU CAN BE LOST

cont'd... ►►►

cont'd... ►►►

A34.36 FMS 1(2) FAILURE

Ident.: A34.36 — 06 NOV 2026
ALL

■ **If FMS 1 fail**

● **If CAPT NAV SOURCE is FM 1**

► NAV SOURCE CAPT ..... FM 2
► FGCP/FMA ..... SET & CONFIRM

● **If CAPT NAV SOURCE is V/ILS**

NO CREW ACTION REQUIRED

● **If Go-around**

► NAV SOURCE CAPT ..... SELECT FM 2 OR V/ILS

■ **If FMS 2 fail**

● **If F/O NAV SOURCE is FM 2**

► NAV SOURCE F/O ..... FM 1
► FGCP/FMA ..... SET & CONFIRM

● **If F/O NAV SOURCE is V/ILS**

NO CREW ACTION REQUIRED

● **If Go-around**

► NAV SOURCE F/O ..... SELECT FM 1 OR V/ILS

A34.37 FMS 1+2 FAILURE

Ident.: A34.37 — 06 NOV 2026
ALL

■ **If failure during RNP APPROACH**

► GO-AROUND ..... PERFORM

FPLN NOT AVAILABLE

► AIRCRAFT ROUTE & POSITION: MONITOR WITH NAVAIDS
► RNP APPROACH: PROHIBITED

A34.38 GPS 1(2) FAILURE

Ident.: A34.38 — 06 NOV 2026
ALL

NO CREW ACTION REQUIRED

A34.40 GPS INTEGRITY

Ident.: A34.40 — 06 NOV 2026
ALL

■ **If failure during RNP APPROACH**

► GO-AROUND ..... PERFORM
► NAV SOURCES ..... AS RQRD
► VCP VOR/ILS 1+2 ..... AS RQRD

NOTE: Use AUTO when NAV SOURCE is FM. AUTO selection on VOR/ILS VCP improves BCP.

cont'd... ►►►

cont'd... ►►►

■ **If UNABLE RNP is triggered**

► AIRCRAFT ROUTE & POSITION: MONITOR WITH NAVAIDS

► ATC ..... NOTIFY

► RNP APPROACH: PROHIBITED

A34.42 GPS TOTAL LOSS

Ident.: A34.42 — 06 NOV 2026
ALL

■ **If failure during RNP APPROACH**

► GO-AROUND ..... PERFORM

► NAV SOURCES ..... AS RQRD

► VCP VOR/ILS 1+2 ..... AS RQRD

NOTE: Use AUTO when NAV SOURCE is FM. AUTO selection on VCP VOR/ILS improves BCP.

■ **If UNABLE RNP is triggered**

► AIRCRAFT ROUTE & POSITION: MONITOR WITH NAVAIDS

► ATC ..... NOTIFY

► RNP APPROACH: PROHIBITED

A34.48 LOSS OF RADIO ALTIMETER INFORMATION

Ident.: A34.48 — 06 NOV 2026
ALL

► GPWS ..... OFF

► TCAS ..... STBY

NOTE: When reducing PL, LDG GEAR NOT DOWN undue warning can be generated. This alarm can be canceled by using EMER AUDIO CANCEL.

■ **For Approach**

► SPD TGT ..... MAN SEL

► ILS CAT 2: PROHIBITED

A34.50 TERRAIN DEGRADED

Ident.: A34.50 — 06 NOV 2026
ALL

► TERR GUARDED pb ..... OFF

■ **If TERR DEGRADED disappears**

► TERR GUARDED pb ..... ON

A34.51 UNABLE RNP

Ident.: A34.51 — 06 NOV 2026
ALL

■ **If failure during RNP APPROACH**

► GO-AROUND ..... PERFORM

► AIRCRAFT ROUTE & POSITION: MONITOR WITH NAVAIDS

► ATC ..... NOTIFY

► RNP APPROACH: PROHIBITED

A36 PNEUMATIC

A36.01 AIR BLEED X VALVE OPEN

Ident.: A36.01 — 06 NOV 2026
ALL

■ In flight

NO CREW ACTION REQUIRED EXPECT ONE ENG BLEED FAULT

A36.02 BLEED LEAK 1(2)

Ident.: A36.02 — 06 NOV 2026
ALL

► PACK (affected side) ..... OFF

PACK FAULT light is inhibited as soon as ENG BLEED is selected OFF. Select the PACK affected side to OFF to confirm pack valve closure.

► ENG BLEED (affected side) ..... OFF

■ On ground

► RETURN TO PARKING

■ In flight

► MAX FL: 200/MEA

● At high altitude

► LARGE RAPID POWER CHANGE: AVOID

It may generate engine surges.

CAUTION: Do not restore ENG BLEED in flight.

A36.03 BLEED 1(2) OVHT

Ident.: A36.03 — 06 NOV 2026
ALL

► PACK (affected side) ..... OFF

PACK FAULT light is inhibited as soon as ENG BLEED is selected OFF. Select the PACK affected side to OFF position to confirm pack valve closure.

► ENG BLEED (affected side) ..... OFF

► MAX FL: 200/MEA

■ At high altitude

► LARGE RAPID POWER CHANGE: AVOID

May generate engine surges.

Additional Information

A36.04 ENG BLEED 1(2) FAULT

Ident.: A36.04 — 06 NOV 2026
ALL

► PACK (affected side) ..... OFF

cont'd... ►►►

cont'd... ►►►

PACK FAULT light is inhibited as soon as ENG BLEED is selected OFF. Selecting PACK affected side to OFF confirm pack valve closure.

► ENG BLEED (affected side) ..... OFF

► MAX FL: 200/MEA

■ At high altitude

► LARGE RAPID POWER CHANGE: AVOID

May generate engine surges.

■ If PACK 1 and PACK 2 lost

► PACK 1+2 FAULT procedure ..... APPLY

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

A70 POWER PLANT

A70.03 EEC FAULT

Ident.: A70.03 — 06 NOV 2026
ALL

► ATPCS ..... OFF

CAUTION: Do not reset EEC Flashing

■ When flight conditions permit

► PL (affected ENG) ..... RETARD IN GREEN SECTOR
► EEC (affected ENG) ..... RESET

● If EEC recovered

► ATPCS ..... ON
► PL (affected ENG) ..... RESTORE POWER

● If EEC fault persists

► EEC (affected ENG) ..... OFF
► PL (affected ENG) ..... MOVE WITH CARE

CAUTION: Adjust affected ENG TQ to other ENG TQ until the end of the flight to avoid overtorque.

► PL (affected ENG) ..... RESTORE POWER

● In the following cases : icing conditions, engine(s) flame out,

emergency descent, severe turbulence, heavy rain

► MAN IGN ..... ON

● In final approach

► CL 1 + 2 ..... 100 % OVRD
► VAPP ..... NOT LESS THAN VREF +10 kt
► SPD TGT ..... MAN SEL
► LDG DIST (Refer to Landing Distance) ..... MULTIPLY BY 1.15

● If engine failure during go-around

► PL: DO NOT REDUCE BELOW 45 ° BEFORE FEATHERING

● After landing

► TAXI: ENG (affected) FEATHERED
► ACW BTC ..... CHECK CLOSED

■ IF EEC 1+2 FAULT

A70.05 PEC 1 FAULT

Ident.: A70.05 — 06 NOV 2026
ALL

■ If in short final approach (below 400 ft RA)

► GO-AROUND ..... PERFORM

■ Above 400 ft or when flight conditions permit

► CL 1 ..... 100 % OVRD
► PEC 1 ..... RESET

cont'd... ►►►

cont'd... ►►►

- **If PEC recovered**
  - ► CL 1 ..... AUTO
- **If PEC fault persists**
  - ► PEC 1 ..... OFF
  - ► PL 1 ..... MOVE WITH CARE
- **For landing**
  - ► CL 1+2 ..... 100 % OVRD
  - ► PL: KEEP AT OR ABOVE FI UNTIL NOSE WHEEL ON GROUND
  - ► REVERSE 1: DO NOT USE
- **After landing**
  - ► TAXI: ON ENG 1+2
  - ► ACW BTC ..... CHECK CLOSED

A70.05 PEC 2 FAULT

Ident.: A70.05 — 06 NOV 2026
ALL

■ **If in short final approach (below 400 ft RA)**
- ► GO-AROUND ..... PERFORM

■ **Above 400 ft or when flight conditions permit**
- ► CL 2 ..... 100 % OVRD
- ► PEC 2 ..... RESET

- **If PEC recovered**
  - ► CL 2 ..... AUTO
- **If PEC fault persists**
  - ► PEC 2 ..... OFF
  - ► PL 2 ..... MOVE WITH CARE
- **For landing**
  - ► CL 1+2 ..... 100 % OVRD
  - ► PL: KEEP AT OR ABOVE FI UNTIL NOSE WHEEL ON GROUND
  - ► REVERSE 2: DO NOT USE
- **After landing**
  - ► TAXI: ON ENG 1+2
  - ► ACW BTC ..... CHECK CLOSED

A70.06 PEC 1 SGL CH

Ident.: A70.06 — 06 NOV 2026
ALL

■ **In flight**
- ► PEC 1: DO NOT RESET

■ **For landing**
- ► PEC 1 FAULT ..... ANTICIPATE

cont'd... ►►►

cont'd... ►►►

A70.06 PEC 2 SGL CH

Ident.: A70.06 — 06 NOV 2026
ALL

■ **In flight**

► PEC 2: DO NOT RESET

■ **For landing**

► PEC 2 FAULT ..... ANTICIPATE

A70.07 ENG 1(2) FLAME OUT IN FLIGHT

Ident.: A70.07 — 06 NOV 2026
ALL

► PL (affected ENG) ..... FI

■ **If NH drops below 30 % (no immediate relight)**

► CL (affected ENG) ..... FTR THEN FUEL S.O

■ **If damage suspected**

► FIRE HANDLE (affected ENG) ..... PULL

FIRE handle pulled as precautionary measure.

► LAND ASAP

► SINGLE ENG OPERATION procedure ..... APPLY

■ **If no damage suspected**

► ENG RESTART IN FLIGHT procedure ..... APPLY

● **If not successful**

► LAND ASAP

► SINGLE ENG OPERATION procedure ..... APPLY

A70.08 ENG 1(2) FLAME OUT ON GROUND

Ident.: A70.08 — 06 NOV 2026
ALL

► PL 1+ 2 ..... GI
► AIRCRAFT ..... STOP
► BRAKE HANDLE ..... PARKING
► CL (affected ENG) ..... FTR THEN FUEL S.O
► FIRE HANDLE (affected ENG) ..... PULL
► FUEL PUMP (affected ENG) ..... OFF
► RETURN TO PARKING

A70.09 ENGINE RESTART IN FLIGHT

Ident.: A70.09 — 06 NOV 2026
ALL

► ENGINE RESTART ENVELOPE ..... CHECK

CAUTION: Single engine IAS (VFTO or drift down) may be below the minimum engine restart airspeed.

► FUEL SUPPLY ..... CHECK
► CL ..... FUEL S.O

cont'd... ►►►

cont'd... ►►►

► PL ..... FI

• If propeller is feathered after ATPCS sequence

CAUTION: Before attempting restart the PWR MGT must be out of TO position

► PWR MGT ..... MCT

To cancel propeller feathering signal sent by ATPCS sequence.

► ENG START selector ..... START A & B

► ENG START pb ..... ON

During restart phase, cabin altitude will increase with high cabin altitude variation rate due to Bleed and Pack valves closing at restart phase.

AP/YD MAY DISCONNECT DURING START

■ When NH at or above 10 %

► CL ..... FTR

► ENG RELIGHT: MONITOR

• If engine fails to restart within 10 s

► CL ..... FUEL S.O

► ENG START selector ..... OFF & START ABORT

NOTE: Wait at least 30 s before attempting a new RESTART. Refer to LIM.5.70.1.4 Overtemperature Limit for Starting

• If no restart

► LAND ASAP

► SINGLE ENG OPERATION procedure ..... APPLY

• If engine recovered

► CL ..... AUTO

► PL ..... ADJUST TO OTHER ENG

► ENG START selector ..... OFF & START ABORT

► SYSTEMS AFFECTED ..... RESTORE

Power Management.

► APM ..... OFF

A70.10 ENGINE STALL

Ident.: A70.10 — 06 NOV 2026
ALL

► PL (affected ENG) ..... FI

► ENG PARAMETERS: MONITOR

■ If abnormal engine parameters

► CL (affected ENG) ..... FTR THEN FUEL S.O

► LAND ASAP

► SINGLE ENG OPERATION procedure ..... APPLY

■ If normal engine parameters

► DE/ANTI ICING ENG ..... ON

► PL (affected ENG) ..... SLOWLY ADVANCE

cont'd... ►►►

cont'd... ►►►

- **If stall reoccurs**
  - ► PL (affected ENG) ..... RETARD AND OPERATE BELOW STALL THRESHOLD
- **If stall does not reoccur**
  - ► ENGINE OPERATION: RESUME

A70.11 LO PITCH IN FLIGHT

Ident.: A70.11 — 06 NOV 2026
ALL

► PL (affected ENG) ..... FI
► CL (affected ENG) ..... FTR THEN FUEL S.O

► LAND ASAP
► SINGLE ENG OPERATION procedure ..... APPLY

A70.12 SINGLE ENGINE OPERATION

Ident.: A70.12 — 06 NOV 2026
ALL

► PWR MGT ..... MCT
► BOOST FUNCTION ..... AS RQRD
► LAND ASAP
► FUEL PUMP (affected ENG) ..... OFF
► DC GEN (affected side) ..... OFF
► ACW GEN (affected side) ..... OFF
► PACK (affected side) ..... OFF
► ENG BLEED (affected side) ..... OFF
► APM ..... OFF
► TCAS ..... TA ONLY

NOTE: Refer to Single Engine Gross Ceiling to determine single engine gross ceiling.

■ **If icing conditions**

► FLAPS 15

TO IMPROVE DRIFT DOWN PERFORMANCES & SINGLE ENGINE CEILING.

If no obstacle limitations exist, FLAPS 0 may be used for single engine cruise in order to take advantage of a higher cruise speed but at a lower cruise altitude.

Anti-icing PROP and de-icing ENG systems are lost on affected engine. Alerts are triggered in the cockpit.

► FUEL BALANCE: MONITOR

MAXIMUM RECOMMENDED FUEL UNBALANCE IS 200 kg (440 lb).

■ **When FUEL X FEED is required**

► FUEL PUMP (affected ENG) ..... ON
► FUEL X FEED ..... ON
► FUEL PUMP (operating ENG) ..... OFF

■ **For approach**

NOTE: Refer to STEEP SLOPE APPROACH to check steep slope approach limitation applicable to your aircraft.

► ENG BLEED (operating side) ..... OFF

cont'd... ►►►

cont'd... ►►►

► CL (operating ENG) ..... 100 % OVRD
► VAPP ..... NOT LESS THAN VGA

• If affected engine NP above 10 %

► VAPP ..... NOT LESS THAN VREF + 10 kt

A70.13 ABNORM ENG PARAMETERS IN FLIGHT

Ident.: A70.13 — 06 NOV 2026
ALL

■ If Intermittent fluctuations or unrealistic steady indication

► ATPCS ..... OFF

• When flight conditions permit

► PL (affected ENG) ..... FI
► EEC (affected ENG) ..... OFF

• If normal engine operations recovered

► EEC 1(2) FAULT procedure ..... APPLY

• If abnormal fluctuations or indications persist

-OR-

• If TQ = 0 % and NP < 77 %

► PL (affected ENG) ..... FI
► CL (affected ENG) ..... FUEL S.O
► LAND ASAP
► SINGLE ENG OPERATION procedure ..... APPLY

■ If "HBV" indication on display

► PL (affected ENG) ..... MOVE WITH CARE

A70.14 ENG 1(2) OIL LO PR

Ident.: A70.14 — 06 NOV 2026
ALL

► PL (affected ENG) ..... FI

■ On ENG SD page, if ENG OIL PRESS in red range and LO PR label

► CL (affected ENG) ..... FTR

• After 10 s

• If ENG OIL PRESS no longer in red range

► CL (affected ENG) ..... AUTO
► ENGINE NORMAL OPERATIONS: RESUME

MAINTENANCE ACTION REQUIRED

• If ENG OIL PRESS still in red range

► CL (affected ENG) ..... FUEL S.O
► LAND ASAP
► SINGLE ENG OPERATION procedure ..... APPLY

■ On ENG SD page, if ENG OIL PRESS in red range and no LO PR label

► CL (affected ENG) ..... FTR

cont'd... ►►►

cont'd... ►►►

- **After 10 s**
- **If ENG OIL PRESS no longer in red range**
  - ► CL (affected ENG) ..... AUTO
  - ► ENGINE NORMAL OPERATIONS: RESUME

  MAINTENANCE ACTION REQUIRED
- **If ENG OIL PRESS still in red range**
  - ► CL (affected ENG) ..... FUEL S.O
- **If LO PR label appears within 30 s after fuel shut off**
  - ► ENG RESTART IN FLIGHT procedure ..... APPLY
- **If LO PR label still missing 30 s after fuel shut off**
  - ► LAND ASAP
  - ► SINGLE ENG OPERATION procedure ..... APPLY

■ **On ENG SD page, if ENG OIL PRESS in normal range and LO PR label**

- ► ALERT: DISREGARD

MAINTENANCE ACTION REQUIRED

- ► OIL PRESS LOCAL ALERT: MONITOR

A70.15 ENG 1(2) OIL TEMP BELOW 45 °C

Ident.: A70.15 — 06 NOV 2026
ALL

■ **If icing conditions are expected or present**

- ► ENG POWER (if possible) ..... INCREASE

■ **If no icing conditions**

NO CREW ACTION REQUIRED

A70.16 ENG 1 OIL TEMP HIGH

Ident.: A70.16 — 06 NOV 2026
ALL

■ **If OIL TEMP between 125 °C and 140 °C**

- ► OIL TEMP AND PRESS: MONITOR

- **If OIL TEMP increases after PL reduction**
  - ► PL ..... ADVANCE
- **If OIL TEMP increase occurs in steady state conditions**
  - ► PL ..... RETARD

■ **If OIL TEMP between 125 °C and 140 °C more than 20 min**

- ► PL 1 ..... RETARD TO SET MINIMUM POSSIBLE POWER

CAUTION: Minimize flight time in these engine abnormal operating conditions.

■ **If OIL TEMP above 140 °C**

- ► PL 1 ..... FI
- ► CL 1 ..... FTR THEN FUEL S.O
- ► LAND ASAP
- ► SINGLE ENG OPERATION procedure ..... APPLY

cont'd... ►►►

cont'd... ►►►

A70.16 ENG 2 OIL TEMP HIGH

Ident.: A70.16 — 06 NOV 2026
ALL

■ If OIL TEMP between 125 °C and 140 °C

► OIL TEMP AND PRESS: MONITOR

● If OIL TEMP increases after PL reduction

► PL ..... ADVANCE

● If OIL TEMP increase occurs in steady state conditions

► PL ..... RETARD

■ If OIL TEMP between 125 °C and 140 °C more than 20 min

► PL 2 ..... RETARD TO SET MINIMUM POSSIBLE POWER

CAUTION: Minimize flight time in these engine abnormal operating conditions.

■ If OIL TEMP above 140 °C

► PL 2 ..... FI
► CL 2 ..... FTR THEN FUEL S.O
► LAND ASAP
► SINGLE ENG OPERATION procedure ..... APPLY

A70.17 ENG 1 OVER LIMIT

Ident.: A70.17 — 06 NOV 2026
ALL

► PL 1 ..... RETARD TO RESTORE NORMAL VALUES

■ If TQ, NH and/or ITT still over limit & conditions permit ENG shutdown

► PL 1 ..... FI
► CL 1 ..... FTR THEN FUEL S.O
► LAND ASAP
► SINGLE ENG OPERATION procedure ..... APPLY

■ If all TQ, NH and ITT below limit

► BLEED VALVE 1 ..... OFF/AS RQRD

■ If TQ, NH and/or ITT still over limit & conditions do not permit ENG shutdown

► LAND ASAP
► BLEED VALVE 1 ..... OFF AS RQRD
► ENG POWER 1 ..... USE MINIMUM TO SUSTAIN SAFE FLIGHT

A70.17 ENG 2 OVER LIMIT

Ident.: A70.17 — 06 NOV 2026
ALL

► PL 2 ..... RETARD TO RESTORE NORMAL VALUES

■ If TQ, NH and/or ITT still over limit & conditions permit ENG shutdown

► PL 2 ..... FI
► CL 2 ..... FTR THEN FUEL S.O
► LAND ASAP
► SINGLE ENG OPERATION procedure ..... APPLY

cont'd... ►►►

cont'd... ►►►

■ **If all TQ, NH and ITT below limit**

► BLEED VALVE 2 ..... OFF/AS RQRD

■ **If TQ, NH and/or ITT still over limit & conditions do not permit ENG shutdown**

► LAND ASAP

► BLEED VALVE 2 ..... OFF AS RQRD

► ENG POWER 2 ..... USE MINIMUM TO SUSTAIN SAFE FLIGHT

A70.18 ENG NAC OVHT

Ident.: A70.18 — 06 NOV 2026
ALL

■ **During hotel mode operation**

► PL 2 ..... GI

► CL 2 ..... FTR THEN FUEL S.O.

■ **During taxi**

► AIRCRAFT ..... STOP

► PL 2 ..... SLIGHTLY INCREASE POWER

● **If NAC OVHT persists within 30 s**

► BRAKE HANDLE ..... PARKING

► PL 2 ..... GI

► CL 2 ..... FTR THEN FUEL S.O.

► FUEL PUMP 2 ..... OFF

► RETURN TO PARKING

A70.19 PROP 1 OVER LIMIT

Ident.: A70.19 — 06 NOV 2026
ALL

► PL 1 ..... RETARD TO SET NP BELOW 106 %

► PEC pb 1 ..... RESET

► PL 1 ..... AS RQRD

MAINTENANCE ACTION REQUIRED

■ **If NP decreases below 106 %**

► NORMAL OPERATIONS: RESUME

NOTE: 106 % permitted to complete a flight without overshooting 73 % TQ in CRZ and 75 % in CLB.

■ **If NP remains above 106 % and conditions permit**

► PL 1 ..... FI

► CL 1 ..... FTR THEN FUEL S.O

► LAND ASAP

► SINGLE ENG OPERATION procedure ..... APPLY

A70.19 PROP 2 OVER LIMIT

Ident.: A70.19 — 06 NOV 2026
ALL

► PL 2 ..... RETARD TO SET NP BELOW 106 %

► PEC pb 2 ..... RESET

cont'd... ►►►

cont'd... ►►►

► PL 2 ..... AS RQRD

MAINTENANCE ACTION REQUIRED

■ **If NP decreases below 106 %**

► NORMAL OPERATIONS: RESUME

NOTE: 106 % permitted to complete a flight without overshooting 73 % TQ in CRZ and 75 % in CLB.

■ **If NP remains above 106 % and conditions permit**

► PL 2 ..... FI

► CL 2 ..... FTR THEN FUEL S.O

► LAND ASAP

► SINGLE ENG OPERATION procedure ..... APPLY

A70.20 UNEXPECTED 100 % NP ON ONE OR TWO ENGINES

Ident.: A70.20 — 06 NOV 2026
ALL

► CL 1 + 2 ..... 100 % OVRD

A70.21 ABNORMAL PROP BRK

Ident.: A70.21 — 06 NOV 2026
ALL

■ **On ground**

● **If propeller rotation and FWS PROP BRK alert**

- OR -

● **If UNLK light and FWS PROP BRK alert**

► CL 2 ..... FUEL S.O

● **If FWS PROP BRK alert only**

● **If GUST LOCK ON**

► CL 2 ..... FUEL S.O

● **If DC and AC GPU are not available**

► ENG 1 ..... START

► CL 1 ..... AUTO

● **When READY light comes on**

► PROP BRK ..... OFF

► UNLK LIGHT ..... CHECK TURNED OFF

► C/B ENG IND PROP BRK / PWR SUPPLY ..... PULL

● **If GUST LOCK OFF**

► GUST LOCK ..... ON

● **Based on operational situation**

► PROP BRK ..... OFF

► ALL PROP BRK LIGHTS ..... CHECK TURNED OFF

■ **In flight**

► NORMAL OPERATIONS: CONTINUE

► ENG 2 PARAMETERS: MONITOR

cont'd... ►►►

cont'd... ►►►

● **After landing**

► CL 2 ..... FUEL S.O

MAINTENANCE ACTION REQUIRED

A70.22 ABNORMAL PARAMETERS DURING START

Ident.: A70.22 — 06 NOV 2026
ALL

■ **If ITT tends to exceed 900 °C, or no ITT, or no NH**

► CL (affected ENG) ..... FUEL S.O

► ENG START selector ..... OFF & START ABORT

■ **IF EXCESSIVE ITT DURING START**

■ **IF NO ITT DURING START**

■ **IF NO NH DURING START**

A70.26 START 1(2) FAULT

Ident.: A70.26 — 06 NOV 2026
ALL

► ENG START selector ..... OFF & START ABORT

■ **If START ON light is off above 45 % NH**

► START: CONTINUE

A70.29 ENG BOOST FUNCTION FAULT

Ident.: A70.29 — 06 NOV 2026
ALL

■ **On ground**

► PL 1 + 2 ..... GI

● **If ON light comes on**

► BOOST FUNCTION ..... CONFIRM TO LIGHT ON

CONSIDER RATING WITH ON LIGHT FOR PERFORMANCE COMPUTATION

● **If ON light remains turned off**

► BOOST FUNCTION ..... OFF

CONSIDER BASIC RATING FOR PERFORMANCE COMPUTATION

■ **In flight**

● **If ON light comes on**

► BOOST FUNCTION ..... CONFIRM TO LIGHT ON

CONSIDER RATING WITH ON LIGHT FOR PERFORMANCE COMPUTATION

● **If ON light remains turned off**

► BOOST FUNCTION ..... OFF

A70.30 FIRE LOOP FAULT

Ident.: A70.30 — 06 NOV 2026
ALL

► LOOP (affected side) ..... OFF

cont'd... ►►►

cont'd... ►►►

A70.31 IDLE GATE FAIL

Ident.: A70.31 06 NOV 2026
ALL

■ In flight

► IDLE GATE lever ..... PUSH

■ At touchdown

► IDLE GATE lever ..... PULL

A99 MISCELLANEOUS

A99.01 COCKPIT DOOR CONTROL PANEL FAULT

Ident.: A99.01 — 06 NOV 2026
ALL

► COCKPIT DOOR MANUAL LOCK BOLT(S) ..... MOVE TO CLOSE POSITION

NOTE: When the door is locked with the manual bolt, the emergency access to the cockpit is not available. It is recommended that at least two crewmembers remain in the cockpit during that

A99.02 DOORS UNLK IN FLIGHT

Ident.: A99.02 — 06 NOV 2026
ALL

■ If FWD COMPT UNLK light comes on

NO CREW ACTION REQUIRED

■ If any other DOOR UNLK light comes on

► SIGNS ..... ON
► DOOR (affected) ..... VISUALLY CHECK

● If unlocked confirmed

- OR -

● Visual check not possible

► CAB PRESS SOURCE SEL ..... MAN
► CAB PRESS LANDING ELEV ..... 9 000 ft
► MAX FL: 100 OR MEA

As the doors (except FWD COMPT) open outward, when one is not locked, the ΔP must be reduced by aircraft descent and landing elevation selection.

A99.03 OXYGEN LO PR

Ident.: A99.03 — 06 NOV 2026
ALL

► OXY MAIN SUPPLY ..... OFF

■ After 2 seconds

► OXY MAIN SUPPLY ..... ON

■ If oxygen LO PR light persists

► OXY MAIN SUPPLY ..... OFF
► OXYGEN PORTABLE UNIT ..... USE AS RQRD

A99.04 SMK DET FANS FAULT

Ident.: A99.04 — 06 NOV 2026
ALL

► FAN (affected) ..... ALTN

■ If AFT COMPT/LAV DET FANS still FAULT

SMOKE DETECTION FANS are lost

cont'd... ►►►

cont'd... ►►►

■ **If DATA RECORDER FAULT**

► 115 V AC STBY BUS FAULT ..... CONSIDER

A99.05 COCKPIT WINDOW CRACKED

Ident.: A99.05 — 06 NOV 2026
ALL

► WINDOW HEAT (affected) ..... OFF
► CAB PRESS SOURCE SEL ..... MAN
► CAB PRESS LANDING ELEV ..... 9 000 ft
► HARNESS ..... CHECK FASTENED & ADJUSTED

CAUTION: Be prepared to don oxygen mask in case of cockpit window burst.

► MAX FL: 100 OR MEA

A99.06 VOLCANIC ASH ENCOUNTER

Ident.: A99.06 — 06 NOV 2026
ALL

► 180 ° TURN ..... INITIATE
► DESCENT (if possible) ..... INITIATE
► ATC ..... NOTIFY

■ **If conditions permit**

► PL 1+2 ..... RETARD
► IAS (Refer to OPSDATA) ..... VmHB
► CREW OXY MASKS ..... ON / 100 %
► CABIN CREW ..... NOTIFY
► PASSENGER OXYGEN ..... AS RQRD
► AIR FLOW ..... HIGH
► ENG PARAMETERS: MONITOR

NOTE: In extreme case, it could be necessary to consider precautionary engine shut down and engine restart in flight. If both engines flame out, refer to BOTH ENGINE FLAME OUT procedure.

► AIRSPEED INDICATORS: MONITOR

VOLCANIC ASH COULD CLOG THE PITOT PROBES.

■ **If engine flame out**

► ENG 1(2) FLAME OUT IN FLIGHT procedure ..... APPLY

■ **If airspeed unreliable or lost**

► AIRCRAFT ATTITUDE ..... ADJUST
► PL 1+2 ..... ADJUST
► UNRELIABLE AIRSPEED INDICATION procedure ..... APPLY

ASU.24 ELECTRICAL POWER

ASU.24.01 Loss of DC SVCE Bus

Ident.: ASU.24.01 — 06 NOV 2026
ALL

The DC SVCE BUS is normally powered:

- Either directly by DC GPU, or
- Through DC BUS 1.

It may be shed:

- By the flight crew setting the DC SVCE/UTLY BUS pb to OFF on the overhead panel
- By the cabin attendant setting the DC SVCE pb to OFF on the cabin attendant panel. No specific SHED information is provided to the flight crew
- Automatically when a load shed condition controlled by the BPCU is present.

1) Possible cause of DC SVCE BUS loss

Faulty relays.

2) Corrective actions

Make sure the cabin attendant DC SVCE pb is not on SHED position.

► DC BTC pb ..... RESET
► DC SVCE/UTLY BUS pb ..... RESET

SIMULATOR NOTE

The cabin attendant pb is the GND SVCE DC key on the cabin attendant panel (FAP).

ASU.24.02 Loss of DC EMER BUS

Ident.: ASU.24.02 — 06 NOV 2026
ALL

The DC EMER BUS is normally powered:

- Either directly by DC BUS 1, or
- By the TRU (if installed), or
- By the EMER battery.

1) Possible cause of DC EMER BUS loss

C/B 12PD - DC EMER & STBY BUS ON HEBB/DC EMER BUS tripped.

2) Corrective actions

On 130 VU lateral panel:

► C/B 12PD - DC EMER & STBY BUS ON HEBB/DC EMER BUS (tripped) ..... PUSH

cont'd... ►►►

cont'd... ►►►

Note

- *Only one reengagement per flight is allowed.*
- *Flight crew may reengage a tripped circuit breaker only if he/she judges it is necessary for a safe continuation of the flight.*
- *This C/B is identified with a green cap as necessary for a safe continuation of the flight.*

SIMULATOR NOTE

On the 130 VU C/B panel this C/B is at grid position AC10.

ASU.31 INDICATING AND RECORDING SYSTEMS

ASU.31.1.01 DU Degraded Operation

Ident.: ASU.31.1.01 — 06 NOV 2026
ALL

In case of DU failure, the consequence depends on the DU position, and an automatic reversion logic is implemented so as to immediately guarantee the safety of the flight. The highest priority is given to PFD, and then to EWD.

Then the flight crew remains free to choose the configuration via two means:

- The DISPLAY pushbuttons
- The EFIS control panel.

Except if required by a failure procedure, the captain decides who is PF and PM based on failure assessment and airline policy.

DU 2 or 4 failure induces the loss of the hosted FMS and RMS functions. There is no operational impact as the remaining FMS and RMS take over.

The different failure cases and the ATR recommended policy are listed in the following table.

DU failed	DU automatic display	PF	Configuration (DU 1 / 2 / 3 / 4 / 5)	Recommendations
1	PFD is displayed on DU 2.	CAPT	– / PFD / EWD / MFD / PFD	F/O keeps a normal configuration with two DUs (PFD and MFD).
2	The automatic reversion has no effect. FMS 1 and RMS 1 are lost.	CAPT	PFD / – / EWD / MFD / PFD	F/O keeps a normal configuration with two DUs (PFD and MFD).
3	The automatic reversion depends on the coupling side selected on the FGCP: there is no change on the PF side, but the EWD is displayed on the PM MFD instead. In case EWD is not displayed on any DU and a warning or caution occurs, an automatic reversion of EWD applies on the PM side.	CAPT or F/O	PFD / MFD / – / EWD / PFD, or PFD / EWD / – / MFD / PFD	Both pilots can display EWD on DU 2 or 4 using the DISPLAY pushbuttons. PF keeps a normal configuration with two DUs (PFD and MFD). EWD remains readable by PF even sideways.
4 (symmetrical to DU 2 failure)	The automatic reversion has no effect. FMS 2 and RMS 2 are lost.	F/O	PFD / MFD / EWD / – / PFD	CAPT keeps a normal configuration with two DUs (PFD and MFD).

cont'd... ►►►

cont'd... ►►►

DU failed	DU automatic display	PF	Configuration (DU 1 / 2 / 3 / 4 / 5)	Recommendations
5 (symmetrical to DU 1 failure)	PFD is displayed on DU 4.	F/O	PFD / MFD / EWD / PFD / –	CAPT keeps a normal configuration with two DUs (PFD and MFD).

ASU.31.1.02 Dispatch with One DU Inoperative

Ident.: ASU.31.1.02 06 NOV 2026

ALL

Based on MMEL, one DU among DU 1, DU 3 and DU 5 can be inoperative for dispatch, but DU 2 and 4 must be operative as they are hosting FMS and RMS functions. However all DU have the same P/N and are interchangeable.

In case of a second DU failure, several cases must be considered, and for each case, several solutions are possible.

The following ATR recommendations aim to provide:

- PF with the optimal displays to fly and navigate
- PM with the displays to communicate and monitor systems.

Dispatch with DU 1 inoperative

PF is CAPT with PFD on DU 2, and F/O keeps a normal configuration with two DUs (PFD and MFD).

DU failed	DU automatic display	PF	Configuration (DU 1 / 2 / 3 / 4 / 5)	Recommendations
2	The automatic reversion has no effect. FMS 1 and RMS 1 are lost.	F/O	– / – / EWD / MFD / PFD	CAPT tunes COM and NAV via MCDU, and can still monitor navigation and systems sideways on DU 4.
3	PFD remains on DU 2. EWD is displayed on DU 4 (PM side).	CAPT	– / PFD / – / MFD-EWD / PFD	DU 4: MFD (cruise) - EWD (approach). PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.
4	The automatic reversion has no effect. FMS 2 and RMS 2 are lost.	CAPT	– / PFD / EWD / – / PFD	PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.
5	PFD is displayed on DU 4.	CAPT	– / PFD / EWD / PFD / –	PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.

CAUTION

A full flexibility is offered for display selection on DU 2 and DU 4 via both DISPLAY pushbuttons (and/or EFIS control panel), and in case of DU 1 and DU 5 failure, the flight crew must avoid any configuration without PFD.

Dispatch with DU 3 inoperative

PF can be CAPT as well as F/O. Both pilots can display EWD on DU 2 or 4, using the DISPLAY pushbuttons. In case EWD is not displayed on any DU and a warning or caution occurs, an automatic reversion of EWD applies on the PM side (the system takes the information of PF/PM side via the FGCP coupling selection).

ATR recommends to keep EWD displayed on the PF side most of the time, and the PM keeps a normal configuration with two DUs (PFD and MFD). EWD remains easily readable by the PM even sideways.

cont'd... ►►►

cont'd... ►►►

DU failed	DU automatic display	PF	Configuration (DU 1 / 2 / 3 / 4 / 5)	Recommendations
1	PFD is displayed on DU 2. EWD is displayed on DU 4.	CAPT	– / PFD / – / MFD-EWD / PFD	DU 4: MFD (cruise) - EWD (approach).
2	EWD is displayed on DU 4. FMS 1 and RMS 1 are lost.	CAPT	PFD / – / – / MFD-EWD / PFD	DU 4: MFD (cruise) - EWD (approach).
4	EWD is displayed on DU 2. FMS 2 and RMS 2 are lost.	F/O	PFD / MFD-EWD / – / – / PFD	DU 2: MFD (cruise) - EWD (approach).
5	PFD is displayed on DU 4. EWD is displayed on DU 2.	F/O	PFD / MFD-EWD / – / PFD / –	DU 2: MFD (cruise) - EWD (approach).

Dispatch with DU 5 inoperative

PF is F/O with PFD on DU 4, and CAPT keeps a normal configuration with two DUs (PFD and MFD).

DU failed	DU automatic display	PF	Configuration (DU 1 / 2 / 3 / 4 / 5)	Recommendations
1	PFD is displayed on DU 2.	F/O	– / PFD / EWD / PFD / –	PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.
2	The automatic reversion has no effect. FMS 1 and RMS 1 are lost.	F/O	PFD / – / EWD / PFD / –	PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.
3	PFD remains on DU 4. EWD is displayed on DU 2 (PM side).	F/O	PFD / MFD-EWD / – / PFD / –	DU 2: MFD (cruise) - EWD (approach). PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.
4	The automatic reversion has no effect. FMS 2 and RMS 2 are lost.	PF must switch to CAPT	PFD / MFD / EWD / – / –	PM tunes COM and NAV via MCDU, and can occasionally switch to MFD format in VMC cruise.

CAUTION

A full flexibility is offered for display selection on DU 2 and DU 4 via both DISPLAY pushbuttons and/or EFIS control panel. In the case of DU 1 and DU 5 failure, the flight crew must avoid any configuration without PFD.

ASU.31.1.03 Dual DC GEN Loss

Ident.: ASU.31.1.03 — 06 NOV 2026
ALL

In the case of dual DC GEN loss, only DU 2 and DU 4 remain operative. As AHRS 2 and ADC 2 are lost:

- PFD is displayed on DU 2
- EWD is displayed on DU 4.

In case EWD is not displayed on any DU and a warning or caution occurs, an automatic reversion of EWD applies on the PM side.

PF: CAPT. Configuration: DU 2 PFD, DU 4 PFD / EWD / MFD (DU 1, 3 and 5 off).

CAPT:

- Always keeps PFD on DU 2
- Monitors navigation on MINI ND.

F/O:

cont'd... ►►►

cont'd... ►►►

- Must switch AHRS and ADC to SYS 1 to recover a normal PFD format on DU 4
- Uses mainly DU 4 in PFD format
- Can temporarily switch to EWD and MFD
- Tunes VHF 1 via VCP on MFD or MCDU 1.

IESI:

- Used for attitudes, IAS and altitude monitoring
- Can be used to tune VHF 1 and V/ILS 1. VOR, LOC and GLIDE deviations can also be displayed.

CAUTION

A full flexibility is offered for display selection on DU 2 and DU 4 via both DISPLAY pushbuttons and/or EFIS control panel. The flight crew must avoid any configuration without PFD.

ASU.32 LANDING GEAR

ASU.32.1.01 Taxi with Nosewheel Steering Off

Ident.: ASU.32.1.01 — 06 NOV 2026 — ALL

Taxi with nosewheel steering OFF (or without blue HYD pressure):

- Single engine taxi is no more possible
- Taxiing remains very easy with both engines operating and EEC ON. Directional control is achieved primarily with differential power on engines, possibly augmented by use of differential braking
- Avoid sharp turns: turn radius without nosewheel steering should be limited to about half turn radius with nosewheel steering.

ASU.32.1.03 Taxi with EEC Off

Ident.: ASU.32.1.03 — 06 NOV 2026 — ALL

1) One EEC OFF

For taxi and prolonged ground operations near idle, feather the affected engine to avoid prolonged use within prohibited NP range.

Keep operative EEC selected ON for taxi.

2) Both EEC OFF

With both EEC OFF, the NP is not high enough to supply an ACW GEN and thus to supply HYD PUMPS. The flight crew has to use the EMER Brake in order to stop the aircraft.

CAUTION

Do not push both PLs above GI to avoid hot brakes.

Note

Nosewheel Steering and STBY braking remain available in all cases through DC AUX PUMP.

cont'd... ►►►

cont'd... ►►►

ASU.32.1.04 Taxi with Hot Brakes

Ident.: ASU.32.1.04 — 06 NOV 2026
ALL

If the **WHEELS BRK HOT** alert is displayed on the EWD during taxi:

► PL ..... GI POSITION
► BRAKES ..... USE WITH PRECAUTION

Prefer the use of reverse to slow down.

ASU.32.2.1 Parking with Hot Brakes

Ident.: ASU.32.2.1 — 06 NOV 2026
ALL

If the **WHEELS BRK HOT** alert is displayed on the EWD, the flight crew should avoid the use of the parking brake, except for operational constraints. The use of the parking brake with high brakes temperature can lead to brakes jamming.

If required, walking to a tire must be done from the front or the rear but never from the side of the wheel.

ASU.34 NAVIGATION

ASU.34.1 GPS

Ident.: ASU.34.1 — 06 NOV 2026
ALL

1) Dual GPS

- For RNAV (GNSS) non-precision approach, if the GPS INTEG message is displayed, or if EPE increases significantly (different messages can be triggered on MCDU), perform a go-around unless suitable visual reference is available
- If navigation capability is lost or degraded, resulting in the loss of the required navigation performance, flight crew must inform ATC and revert to alternate navigation means.

2) Single GPS

- For RNAV (GNSS) non-precision approach, if GPS INTEG or UNABLE RNP messages are displayed, perform a go-around unless suitable visual reference is available
- If navigation capability is lost or degraded, resulting in the loss of the required navigation performance, flight crew must inform ATC and revert to alternate navigation means.

ASU.34.2 FMS

Ident.: ASU.34.2 — 06 NOV 2026
ALL

In case of navigation capability degradation resulting in the loss of the required navigation performance, flight crew must revert to alternate ways of navigation and inform ATC.

The following amber alert messages can be displayed on the ND: **UNABLE RNP**, **GPS INTEG**, or **NAV DR**.

The following amber messages can be displayed on the MCDU: **RNP**, **POS**, **HIL** or **GPS**.

If any of the above mentioned alerts is triggered during the approach, a go-around must be initiated unless visual references are acquired and can be maintained.

In case of navigation equipment failure, the following amber alert messages are displayed on the EWD, the master caution light flashes amber and a single chime sounds: **UNABLE RNP**, **GPS INTEG**, **GPS 1**, **GPS 2**, **GPS LOSS**.

cont'd... ►►►

cont'd... ►►►

ASU.34.3 TCAS

Ident.: ASU.34.3 — 06 NOV 2026 — ALL

Use of TCAS in non normal operation.

The TCAS selector must be turned **TA ONLY** in the following cases:

- Engine out operations
- Stick pusher/shaker failure
- Flight with landing gear down
- Severe Icing
- Unreliable Airspeed Indication
- Degraded Perf.

The TCAS selector must be turned **STBY** in the following cases:

- ATC request
- ADC 1+2 failure.

ASU.34.4 ADS-B

Ident.: ASU.34.4 — 06 NOV 2026 — ALL

An amber **ADS-B** caution message can be displayed on the EWD in case of:

- XPDR failure, or
- Loss of both GNSS sources (in this case, the **GPS LOSS** caution message is also displayed on the EWD).

If the **ADS-B** caution message is displayed on the EWD, the flight crew should switch to the opposite XPDR.

If the **ADS-B** caution message is still displayed after the XPDR switching, the flight crew should inform the Air Navigation Service Provider (ANSP), as appropriate, using any published contingency procedures.

ASU.52 DOORS

ASU.52.1.1 Emergency Evacuation – Ditching

Ident.: ASU.52.1.1 — 06 NOV 2026 — ALL

Exit	Use after ditching	Operation
A – Emergency exits (forward, left and right)	Available in all cases	PULL, THROW EMERGENCY EXIT OUT (see forced landing)
B – Service door (rear right)	Right wing above water line	1. ROTATE 2. PUSH UP TO THE LATCHED POSITION
C – Passenger / crew door (rear left)	Left wing above water line	LIFT HANDLE, PUSH DOOR

Note

Be sure that safety pin is removed.

cont'd... ►►►

cont'd... ►►►

ASU.52.1.2 Emergency Evacuation – Forced Landing

Ident.: ASU.52.1.2 — 06 NOV 2026 — ALL

All three exit types (A emergency exits, B service door, C passenger / crew door) are shown usable after a forced landing.

Exit	Operation
A – Emergency exit	PULL, THROW EMERGENCY EXIT OUT
B – Service door	1. ROTATE 2. PUSH UP TO THE LATCHED POSITION
C – Passenger / crew door	LIFT HANDLE, PUSH DOOR

Note

Be sure that safety pin is removed.

See Emergency Evacuation (On Ground).

ASU.52.1.3 Emergency Exit Hatch

Ident.: ASU.52.1.3 — 06 NOV 2026 — ALL

The emergency exit hatch is on the roof of the crew compartment. The hatch provides an emergency exit for the flight crew.

To open the hatch:

1. Grab the assist handle in order to secure the hatch
2. Unlock the hatch with the hatch operating handle
3. Pull the hatch, it will fall inside the flight crew compartment
4. Clear the hatch away from the escape route
5. Remove the escape rope stowage cover
6. Throw the escape rope outside

SIMULATOR NOTE

Cabin evacuation itself is not simulated.

ASU.70 POWER PLANT

ASU.70.02 EEC Fault versus Engine Flame Out in Flight

Ident.: ASU.70.02 — 06 NOV 2026 — ALL

Difference between an EEC fault condition and an engine flame out in flight:

	ENGINE FLAME OUT [1]	EEC FAULT
POWER EVOLUTION	Immediate power loss	Moderate variation (either way)
EEC FAULT LIGHT	Not lighted	Immediately comes on
NH	Rapidly below 74 %	Always above 74 %
ITT	Rapidly below 350 °C	Always above 350 °C
POWER LEVER	Totally inefficient	Generally inefficient
ASSOCIATED DC GEN LT	DC GEN Fault comes on rapidly	Normal

cont'd... ►►►

cont'd... ►►►

	ENGINE FLAME OUT [1]	EEC FAULT
BLEED/PACK	FAULT comes on rapidly	Normal

[1] If automatic relight unsuccessful.

ASU.70.03 Engine Operation with EEC Off

Ident.: ASU.70.03 06 NOV 2026
ALL

- EEC deactivation can result in an important power variation at constant throttle position. Power recovery requires throttle readjustment
- Maintaining target torque can necessitate positions out of the notch since constant throttle position feature is lost. Some throttle readjustments are necessary during climb. Engine response can be more sluggish when increasing power and a temporary throttle overtravel can be necessary to obtain a fast power response.
- If EEC is selected from OFF to ON, an important power variation can result. That is why the throttle has to be reduced below 52° before such an action
- Landing with both EEC OFF results in a significant propeller speed decrease as the airspeed decreases. Consequently ACW power can be lost at the end of the landing run. Be ready to use nose wheel steering and emergency braking as required. Engine response during taxi is slower
- Reverse power is reduced. Moreover, in case of acceleration stop, a one second stop must be observed at FI before setting PLs below.

See also Taxi with EEC Off.

ASU.70.04 Boost Failure

Ident.: ASU.70.04 06 NOV 2026
ALL

Derating input to the EECs is automatically canceled (i.e. BOOST selected) if:

- ERIU built in test equipment (BITE) is triggered due to unit internal failure
- Rating selection feedback is different between EECs.

Discrepancy between the position of the ENG BOOST cockpit selection and the rating selection feedback from any EEC turns on the amber FAULT on the pb switch and triggers the following warning sequence:

- Lighting of the CAUTION light
- Single chime
- FWS activated, **ENG BOOST** alert displayed on EWD
- BOOST pb **FAULT** light comes on.

PAGE

INTENTIONALLY

LEFT BLANK

ABS.1 BOUNCED LANDING

ABS.1.1 Bounced Landing

Ident.: ABS.1.1 06 NOV 2026
ALL

General

A bounced landing usually results from a high energy approach. In-service experience shows that most bounced landings result from the following factors:

- Excessive airspeed during approach
- Engine power at touchdown
- Late flare initiation
- Incorrect flare technique.

Some environmental factors can also contribute to a bounced landing, such as:

- Windshear
- Thermal activity.

To prevent a bounced landing, the flight crew must pay attention to two parameters:

- Approach speed
- Stabilized approach.

Refer to the final approach speeds in the performance data.

Bounced landing – recovered landing

In the case of significant bounce at touchdown, the following rejected landing technique must be applied:

► Pitch ..... Landing attitude
► PL ..... Close to the ramp to initiate a rejected LDG
► Landing Gear ..... Landing configuration
► Flaps ..... Landing configuration

Be ready for a possible second touchdown, soft enough to prevent damage to the aircraft:

► Pitch ..... Landing attitude
► Power ..... Increased

When steady positive climb is established, follow normal go-around procedures (NOR.23.1).

Note

When a rejected landing is initiated, the flight crew must complete the procedure. One of the basic task sharing principles is that only one pilot is Pilot Flying (PF) at a time. But if the PM disagrees with the PF procedure performance, or if deemed necessary for a requested corrective action, he/she has to:

- *Clearly announce “I have control”*
- *Take the controls and ensure the PF role.*

cont'd... ►►►

cont'd... ►►►

ABS.2 GPWS – TAWS WARNING

ABS.2.1 GPWS - TAWS Warning

Ident.: ABS.2.1 — 06 NOV 2026

ALL

Note

When flying under daylight VMC conditions, should a warning threshold be deliberately exceeded or encountered due to known specific terrain at certain locations, the warning can be regarded as cautionary and the approach can be continued.

A go-around shall be initiated in case the warning cause cannot be identified immediately.

Reactive mode

"SINK RATE"

Adjust pitch attitude and power to silence the warning.

"TERRAIN - TERRAIN" - "PULL UP"

■ If in landing configuration

► GO AROUND ..... PERFORM

Advance PLs to the Wall if necessary.

■ If not in landing configuration

► AP ..... OFF

► CLIMB ..... INITIATE WITH CURRENT IAS

► MAX POWER ..... APPLY AS RQRD

Advance PLs to the Ramp, or to the Wall if necessary.

► PWR MGT ..... MCT

► AIRCRAFT CONFIGURATION ..... MAINTAIN

► IAS ..... ADJUST TO VminOPS

When workload permits, retract landing gear if extended.

■ When flight path is safe and TAWS warning stops

► Resume normal flight

"DON'T SINK"

Adjust pitch attitude and power to maintain level or climbing flight.

"TOO LOW GEAR" - "TOO LOW FLAPS"

Correct the configuration or alter the flight path.

"TOO LOW TERRAIN" (in approach)

Correct the configuration or alter the flight path.

"GLIDE SLOPE"

Establish the aircraft on the glide slope.

"BANK ANGLE"

Adjust roll attitude to correct the bank angle (the aural warning will stop).

cont'd... ►►►

cont'd... ►►►

Predictive mode

"TERRAIN AHEAD" - "TOO LOW TERRAIN" - "OBSTACLE AHEAD"

Verify the aircraft flight path and correct it if required. If in doubt, perform a maximum climb until the caution alert stops.

"TERRAIN AHEAD, PULL UP" - "OBSTACLE AHEAD, PULL UP"

■ **If in landing configuration**

► GO AROUND ..... PERFORM

Advance PLs to the Wall if necessary.

■ **If not in landing configuration**

► AP ..... OFF
► CLIMB ..... INITIATE WITH CURRENT IAS
► MAX POWER ..... APPLY AS RQRD

Advance PLs to the Ramp, or to the Wall if necessary.

► PWR MGT ..... MCT
► AIRCRAFT CONFIGURATION ..... MAINTAIN
► IAS ..... ADJUST TO VminOPS

When workload permits, retract landing gear if extended.

■ **When flight path is safe and TAWS warning stops**

► Resume normal flight

"AVOID TERRAIN" - "AVOID OBSTACLE"

■ **If in landing configuration**

► GO AROUND ..... PERFORM

Advance PLs to the Wall if necessary.

■ **If not in landing configuration**

► AP ..... OFF
► CLIMB ..... INITIATE WITH CURRENT IAS
► MAX POWER ..... APPLY AS RQRD

Advance PLs to the Ramp, or to the Wall if necessary.

► PWR MGT ..... MCT
► AIRCRAFT CONFIGURATION ..... MAINTAIN
► IAS ..... ADJUST TO VminOPS

When workload permits, retract landing gear if extended.

► TURN ..... INITIATE

Use any available information to initiate the turn in the direction that provides the best separation from terrain.

■ **When flight path is safe and TAWS warning stops**

► Resume normal flight

cont'd... ►►►

cont'd... ►►►

ABS.3 RECOMMENDATIONS IN CASE OF OVERWEIGHT LANDING

ABS.3.1 Recommendations in case of Overweight Landing

Ident.: ABS.3.1 — 06 NOV 2026
ALL

The landing technique is not changed (refer to the flight characteristics at landing in the abnormal operations).

ALD tables are computed up to the maximum takeoff weight.

Check the landing performance with an overweight computation. It may be computed by the operator's engineering team.

Following an overweight landing, **MAINTENANCE ACTION** is required.

ABS.4 RECOMMENDATIONS AFTER BIRD STRIKE

ABS.4.1 Introduction

Ident.: ABS.4.1 — 06 NOV 2026
ALL

If the flight crew has observed or suspects a collision with a bird, or if bird remains are found during the walkaround, it must be reported to the maintenance team. A qualified technician must perform a specific inspection in accordance with the “Detailed Visual Inspection after Bird Strike” Maintenance Procedure (MP).

If no qualified personnel is available on site, the captain must perform the visual inspection during the preflight check as per ABS.4.2 Guidance for Visual Inspection and ABS.4.3 Preflight Check – External Inspection Procedure.

SIMULATOR NOTE

Bird strikes are not simulated. ABS.4 is kept for the crew technique of the walkaround.

ABS.4.2 Guidance for Visual Inspection

Ident.: ABS.4.2 — 06 NOV 2026
ALL

After a bird strike, if the captain observes one of the following malfunctions/findings, then maintenance action is required:

- Any bird remains in openings and engine intake
- Any bird remnant that cannot be cleaned in such a way that the area cannot be inspected
- Any damage such as flaking paint, spalling and/or cracks, dents, perforation, damaged/missing fasteners, displacement, delamination, disbonding, fastener holes elongation or tear-out, hydraulic line leakage, de-icing boots damage, or missing structure parts
- Any technical/system malfunction
- Any smell through the bleed system and/or engine vibrations, any damage on the engine parts (broken compressor blades, propeller damage) or any signs of blood or feather on the engine compressor/impeller
- Any doubt about operations/operability of the aircraft after completion of the visual inspection.

If the captain finds none of these items during the visual inspection, and no findings require a maintenance action, operations are authorized for a maximum of 3 flights.

Note

A “Detailed Visual Inspection after Bird Strike” maintenance procedure must be performed by a qualified mechanic no later than 3 flights.

cont'd... ►►►

cont'd... ►►►

ABS.4.3 Preflight Check – External Inspection Procedure

Ident.: ABS.4.3 — 06 NOV 2026
ALL

Before visual walkaround inspection

► FLAPS ..... SET POSITION

Set flaps in a configuration similar to the one when the bird strike occurred or was suspected.

► PROP BRAKE ..... SET/CHECK OFF

Set the propeller brake to OFF when a bird strike occurred or is suspected on the engine. It enables the propeller and blades of the engine to be checked.

Visual walkaround inspection

► DAMAGE(S) & FINDING(S) ..... IDENTIFY & INSPECT

Identify and inspect potential damage(s) due to collision(s) with bird(s). For guidance for assessment, refer to ABS.4.2 Guidance for Visual Inspection.

Note

The visual walkaround inspection is in accordance with the external inspection related to structural items only (NOR.6.2).

After visual walkaround inspection

► FLAPS ..... 0°

Set flaps in clean configuration.

■ **In the case of finding(s) or damage(s)**

► MAINTENANCE ..... REQUEST

Contact Maintenance Control Center (MCC) for assistance.

■ **In the case of no finding(s)/damage(s)**

► NORMAL OPERATIONS ..... APPLY

"Detailed Visual Inspection after Bird Strike" maintenance procedure must be performed by a qualified mechanic no later than 3 flights.

ABS.5 RECOMMENDATIONS AFTER CREW INCAPACITATION

ABS.5.1 Recommendations after Crew Incapacitation

Ident.: ABS.5.1 — 06 NOV 2026
ALL

SIMULATOR NOTE

The simulator does not model a second crew member or crew incapacitation. ABS.5 is kept as crew technique for reference.

Description

Crewmember incapacitation is defined as any condition that:

- Affects the health of a crewmember during the flight phase

cont'd... ►►►

cont'd... ►►►

- Decreases his/her skill for the assigned tasks.

Incapacitation is a real air safety hazard that occurs more frequently than many of the other emergencies, and is the subject of routine training. Incapacitation can occur in many forms, varying from obvious sudden death to subtle, partial loss of function. It occurs in all age groups and during all phases of flight, and may not be preceded by any warning.

Detection

The critical operational problem is early recognition of the incapacitation. The keys for immediate recognition of incapacitation are:

- Routine monitoring and cross-checking of flight instruments, particularly during critical phases of flight, such as takeoff, climb out, descent, approach, landing and go-around
- A crewmember does not respond appropriately to two verbal communications, or does not respond to a verbal communication associated with a significant deviation from a standard flight profile.

Other symptoms of the beginning of an active incapacitation are:

- Incoherent speech, or
- Strange behavior, or
- Irregular breathing, or
- Pale fixed facial expression, or
- Jerky motions that are either delayed or too rapid.

Note

If a crewmember feels sick, he/she must inform the other crewmember and transfer the flying task.

Procedure

The recovery from any detected incapacitation of a crewmember must follow the following sequence.

a) Flight

The remaining pilot must ensure the control and return the aircraft to a safe flight path. He/She has to call “MY CONTROL” and use the autopilot and headset.

b) Incapacitation

The remaining pilot must ensure that the incapacitated pilot cannot interfere with the aircraft control. He/She must call a cabin crew member to lock the sick pilot in his/her flight crew seat. If the cockpit door is locked, the assisting cabin crew will apply the relevant procedure to unlock the system, and provide first aid.

c) Organization and communication

Remaining pilot:

► AP ..... ON
► Coupling ..... On remaining pilot
► Resume to a safe flight path
► Headset ..... ON
► Flight attendant ..... Call
► Message “MAYDAY” ..... to ATC
► Situation ..... Assessment
► Decision
► Report decision ..... to ATC

cont'd... ►►►

cont'd... ►►►

The remaining pilot must land as soon as possible at a suitable airport, taking into account the incapacitated pilot's state of health, airport equipment (prefer an airport with an ILS approach), weather and runway conditions, the remaining pilot's knowledge of the airport (...), and request medical assistance:

“MAYDAY, MAYDAY, MAYDAY, (CALL SIGN) EXPERIENCING CREW INCAPACITATION, REQUEST MEDICAL ASSISTANCE ON LANDING”

The remaining pilot must:

- Perform PF and PM tasks
- Verify and call loudly all actions
- Perform all checklists loudly.

ABS.6 VOLCANIC ASH ENCOUNTER

ABS.6.1 Volcanic Ash Description

Ident.: ABS.6.1 — 06 NOV 2026 — ALL

Volcanic ash is, essentially, extremely fine particles of glass shards and pulverized rock, the composition of which reflects the composition of the magma inside the volcano.

It is composed predominantly of siliceous materials (> 50 %) that are both very hard and very abrasive. The melting point of glassy silicates is around 1 100 °C, which is close to the operating temperature of the engine at cruise thrust.

The ash is accompanied by gaseous solutions of sulphur dioxide (sulfuric acid) and chlorine (hydrochloric acid).

SIMULATOR NOTE

Volcanic ash is not simulated. The VOLCANIC ASH ENCOUNTER procedure is available in the ECL.

ABS.6.2 Avoidance

Ident.: ABS.6.2 — 06 NOV 2026 — ALL

Flight operations in volcanic ash are extremely hazardous and must be avoided. Flights in areas of known volcanic activity must be avoided.

When a flight is planned into an area with known potential for volcanic activity:

- All NOTAMs and air traffic advisories have to be checked for the current status of volcanic activity
- The planned route has to avoid significantly the area of volcanic activity
- If possible, stay upwind of volcanic ash.

The first two or three days following an explosive eruption are especially critical, because high hazardous concentrations of gas could be encountered at cruise levels some considerable distance from the volcano. Beyond three days, it is assumed that if the ash is still visible by eye or from satellite data, it is still a hazard to aircraft.

ABS.6.3 Detection

Ident.: ABS.6.3 — 06 NOV 2026 — ALL

A volcanic ash cloud does not produce “returns” or “echoes” on the airborne weather radar. Volcanic ash may be difficult to detect visually, especially at night or in instrument meteorological conditions.

However, the following have been reported by flight crews:

- Acrid odor, similar to electrical smell, burned dust or sulfur

cont'd... ►►►

cont'd... ►►►

- Smoke or dust appearing in the cabin and cockpit, leaving a coating on cabin and cockpit surfaces
- Multiple engine malfunctions, such as stall, ITT increase, flameout
- Airspeed fluctuating irregularly
- At night, static electric discharges (St. Elmo's fire) visible around the cockpit windshields
- At night, landing lights cast sharp, distinct shadows on the volcanic ash clouds, as opposed to the normally fuzzy, indistinct shadows cast on water / ice clouds.

ABS.6.4 Effects on Power Plant

Ident.: ABS.6.4 — 06 NOV 2026
ALL

The melting point of volcanic ash is close to the operating temperature of the engine at cruise power. This can cause serious damage in the hot section of the engine that may result in engine thrust loss and possible flameout.

The flight crew is therefore asked to reduce engine power settings to flight idle when possible, to lower the engine operating temperature below the melting point of volcanic ash.

Volcanic ash, being abrasive, also damages engine components, causing loss of engine thrust. The erosion also results in a decrease in the engine stall margin. Although this abrasion effect takes longer than the melting of volcanic ash to shut down the engine, the abrasion damage is permanent and irreversible. Reduction of engine thrust to idle slows the rate of erosion of the compressor blades but cannot eliminate it entirely while the engine is still ingesting air contaminated by volcanic ash.

Propeller blades may also be degraded by erosion, inducing a loss of traction efficiency.

Oil cooler efficiency may also be decreased, either due to excessive erosion of the cooler or due to blockage of the air intake by ash.

ABS.6.5 Effects on the Airframe and Equipment

Ident.: ABS.6.5 — 06 NOV 2026
ALL

Volcanic ash abrades cockpit windows, airframe, and flight surfaces. Any parts protruding from the airframe, such as antennas, probes and ice detectors, can be damaged and made inoperable.

- The abrasion of the cockpit windows reduces the flight crew forward visibility. This can cause serious problems during the landing phase
- The abrasion damage of the wing or horizontal stabilizer leading edges can either prevent the correct operation of the de-icing boots or even detach parts of the boots, with a subsequent drag increase
- The abrasion damage of the landing lights can significantly reduce landing light effectiveness
- Damage to the antennas can cause a complete loss of HF communications and a degradation of VHF communications
- Damage to the various sensors can seriously degrade the information available to the flight crew through the instruments
- The pitot probes can be blocked by volcanic ash, resulting in unreliable airspeed indications or complete loss of airspeed indication in the cockpit.

Volcanic ash can obstruct probes and penetrate into the air conditioning and equipment cooling systems. It can contaminate electrical and avionic units, fuel, the hydraulic system and the smoke detection system.

Volcanic ash columns are highly charged electrically. The static charge on the aircraft creates a "cocoon" effect, which may cause a temporary degradation, or even complete loss, of VHF or HF communication with ground stations.

cont'd... ►►►

cont'd... ►►►

ABS.7 WINDSHEAR

ABS.7.1 Description

Ident.: ABS.7.1 — 06 NOV 2026
ALL

Windshear is a notable change in wind direction and/or speed over a short distance.

In a microburst, the air moves downwards until it hits ground level and then spreads outward in all directions.

Windshear can be encountered in the vicinity of thunderstorms, in rain showers (even without thunderstorms), during a frontal passage, or at airports situated near large areas of water (sea breeze fronts).

Severe windshear encountered above 1 000 ft, whilst unpleasant, can generally be negotiated safely. However, if it is encountered below 500 ft on takeoff or approach/landing, it is potentially dangerous. As far as possible this phenomenon must be avoided. If a slow moving airplane passes through windshear, the winds can cause it to lose control and plunge toward the ground.

ABS.7.2 Detection

Ident.: ABS.7.2 — 06 NOV 2026
ALL

The following are indications that the aircraft is encountering windshear conditions.

On ground

- Unusual lack of speed acceleration during the rolling phase
- Unusual time to reach V1/VR.

In flight

Unacceptable flight path deviations, recognized as uncontrolled changes from normal steady state flight conditions below 1 000 ft AGL:

- Indicated airspeed variations in excess of 15 kt
- Groundspeed variations (decreasing headwind or increasing tailwind, or a shift from headwind to tailwind)
- Vertical-speed excursions of 500 ft/min or more
- Pitch attitude excursions of 5° or more
- Glide slope deviation of one dot or more
- Heading variations of 10° or more
- Unusual power lever activity or unusual power lever position for a significant period of time
- Or, a combination of all these effects.

ABS.7.3 Protection

Ident.: ABS.7.3 — 06 NOV 2026
ALL

Effective protection against windshear is performed by:

- Forecasting, recognizing, and avoiding windshear
- Correctly reacting to windshear encountered during the takeoff, initial climb, approach and landing.

cont'd... ►►►

cont'd... ►►►

ABS.7.4 Windshear Situation

Ident.: ABS.7.4 — 06 NOV 2026
ALL

Takeoff

If windshear is foreseen or reported, delay the takeoff.

If a risk of windshear is expected:

- Calculate V1, VR and V2 for the maximum limiting takeoff weight for the day
- Carefully monitor the airspeed and airspeed change during the takeoff roll to detect any evidence of windshear
- When clear of obstacles, use maximum acceleration and clean up the aircraft
- Climb at the normal climb speed.

If windshear occurs before V1:

- The takeoff must be rejected if unacceptable airspeed variations occur (not exceeding the target V1).

If windshear is experienced after V1:

- Apply the windshear procedure at takeoff (ABS.7.4.1).

A microburst reduces airspeed and lift at normal attitude, which results in a pitch down tendency to regain airspeed. The flight path must be controlled with pitch attitude. 10° pitch attitude is the best compromise, ensuring a climbing slope while respecting an acceptable high value of AOA.

Approach

If windshear is foreseen or reported, delay the approach.

If windshear occurs:

- Apply the windshear procedure during approach (ABS.7.4.2).

Takeoff and approach

If significant windshear is encountered, it must be reported to Air Traffic Control immediately and an Air Safety Report must be completed after the flight.

ABS.7.4.1 Windshear Procedure at Takeoff

Ident.: ABS.7.4.1 — 06 NOV 2026
ALL

PF	PM
PITCH ..... **INCREASE TO 10°** Stick Shaker may be triggered. In case of Stick Shaker activation, reduce pitch to stay at the limit of Stick Shaker activation.	
Disregard FD indication.	
MAX POWER ..... **APPLY AS RQRD** Advance PLs to the Ramp, or to the Wall if necessary.	**POWER SETTING** ..... **X CHECK**
● Until out of windshear conditions	
LDG GEAR: KEEP CONFIGURATION Leaving the gear down until the climb is established will enable absorbing some energy impact, should a microburst exceed the aircraft capability to climb.	**VERTICAL SPEED** ..... **MONITOR**
FLAPS: KEEP CONFIGURATION	**ALTITUDE** ..... **MONITOR**

cont'd... ►►►

cont'd... ►►►

PF	PM
RATE OF CLIMB ..... **COMPARE ALTIMETER AND VSI**	**RATE OF CLIMB** ..... **X CHECK**
● When positive rate of climb on both instruments	
LDG GEAR ..... **RETRACT**	
NORMAL CLIMB PROFILE ..... **RETURN**	

ABS.7.4.2 Windshear Procedure during Approach

Ident.: ABS.7.4.2 — 06 NOV 2026

ALL

PF	PM
PITCH ..... **INCREASE TO 10°** Stick Shaker may be triggered. In case of Stick Shaker activation, reduce pitch to stay at the limit of Stick Shaker activation.	
Disregard FD indication.	
MAX POWER ..... **APPLY AS RQRD** Advance PLs to the Ramp, or to the Wall if necessary.	**POWER SETTING** ..... **X CHECK**
● Until out of windshear conditions	
LDG GEAR: KEEP EXTENDED Leaving the gear down until the climb is established will enable absorbing some energy impact, should a microburst exceed the aircraft capability to climb.	**VERTICAL SPEED** ..... **MONITOR**
FLAPS: KEEP CONFIGURATION	**ALTITUDE** ..... **MONITOR**
RATE OF CLIMB ..... **COMPARE ALTIMETER AND VSI**	**RATE OF CLIMB** ..... **X CHECK**
● When positive rate of climb on both instruments	
NORMAL GO AROUND PROCEDURE ..... **APPLY**	

PAGE

INTENTIONALLY

LEFT BLANK

ABS.8 FLYING WITH ONE ENGINE INOPERATIVE

ABS.8.1.1 General

Ident.: ABS.8.1.1 — 06 NOV 2026
ALL

Engine flameout requires precise identification and appropriate actions from the flight crew during all phases of flight.

Note

- *For the difference between an engine control computer failure and an engine flameout in flight, refer to ASU.70.02.*
- *The arming conditions of the ATPCS depend on the PWR MGT setting, the PLs position and the TQ values (DSC.70.4.1).*

ABS.8.1.2 Causes

Ident.: ABS.8.1.2 — 06 NOV 2026
ALL

Engine flameout can occur due to internal or external causes.

Internal causes

- Engine internal defects. The engine shutdown may result from the failure or from a flight crew action (abnormal parameter).
- Fuel mismanagement or starvation.

External causes

- Heavy rain, ice ingestion, severe turbulence, bird strike.

The use of the AUTO RELIGHT function may avoid the engine flameout.

ABS.8.1.3 Engine Restart in Flight

Ident.: ABS.8.1.3 — 06 NOV 2026
ALL

The flight crew must clearly assess whether the flamed out engine is damaged or not. A damaged or suspected damaged engine must not be restarted.

The relight procedure is the ENGINE RESTART IN FLIGHT procedure.

ABS.8.1.4 Landing with One Engine Inoperative

Ident.: ABS.8.1.4 — 06 NOV 2026
ALL

During a crosswind landing, particularly when the wind comes from the side of the failed engine, it is crucial to ensure that the trim is correctly centered.

Neglecting this adjustment significantly increases the risk of a lateral runway excursion.

Proper yaw trim adjustment is essential to maintain aircraft control during the landing roll in challenging wind conditions.

cont'd... ►►►

cont'd... ►►►

ABS.8.2.1 General

Ident.: ABS.8.2.1 — 06 NOV 2026
ALL

General

A windmilling propeller generates a dissymmetry effect that is particularly perceivable at high power settings of the operative engine. This effect is amplified at low airspeed.

As long as the failed engine is not identified, the flight crew should use both PLs.

Alerting

The engine flameout can be detected by observing a rapid decrease of TQ, ITT, or NH.

When NH drops below 60 %, an engine flameout alert is triggered on the EWD with the associated MW and CRC.

ABS.8.2.2 Engine Flameout during Taxi

Ident.: ABS.8.2.2 — 06 NOV 2026
ALL

Detection

Engine flameout on ground is detected by engine parameter observation and external noise modification. The engine thrust response may also lead the flight crew to detect the flameout.

Procedure

Apply the procedure ENG 1(2) FLAME OUT ON GROUND.

Guidance

The flight crew (particularly the PM) must remain vigilant in monitoring the engine parameters, particularly in adverse weather.

ABS.8.2.3 Engine Flameout before V1

Ident.: ABS.8.2.3 — 06 NOV 2026
ALL

Detection

Engine flameout during the takeoff roll may be detected by a strong engine power dissymmetry. The resulting yaw may be significant, leading to a rapid displacement from the runway centerline.

ATPCS is operative.

Procedure

Abort the takeoff (aborted takeoff procedure).

If required, apply the procedure ENG 1(2) FIRE OR SEVERE MECHANICAL DAMAGE ON GROUND.

Guidance

Reverse is operative even on a single engine until full stop.

To improve deceleration and maintain directional control on the runway, consider immediately reducing both PLs to reduce the power asymmetry caused by the failed engine.

cont'd... ►►►

cont'd... ►►►

ABS.8.2.4 Engine Flameout between V1 and Acceleration Altitude

Ident.: ABS.8.2.4 — 06 NOV 2026
ALL

Detection

Engine flameout during the takeoff roll may be detected by a strong engine power dissymmetry.

ATPCS is operative.

Procedure

Apply the procedure ENG 1(2) FLAME OUT AT TAKEOFF.

Guidance

Takeoff must be continued.

On ground

- Use the rudder pedals for directional control.

When airborne

- Aircraft trajectory control can be managed with around 2° of bank angle toward the operating engine. Excessive sideslip has a negative effect on climb performance.
- Both rudder and aileron forces can be completely trimmed out, even at the minimum scheduled V2.
- After both rudder and aileron are trimmed out, the autopilot should be engaged.
- If the flameout occurs above V2, it is recommended to maintain the reached speed without exceeding V2 + 10 kt. In any case, the minimum speed must be equal to V2.

ABS.8.2.5 Engine Flameout during Climb

Ident.: ABS.8.2.5 — 06 NOV 2026
ALL

Detection

Engine flameout in climb may be detected by a strong engine power dissymmetry.

ATPCS is not operative.

The dissymmetry caused by a windmilling propeller significantly decreases the aircraft climb performance.

Procedure

Apply the procedure ENG 1(2) FLAME OUT IN FLIGHT.

Guidance

Aircraft trajectory control can be managed with around 2° of bank angle toward the operating engine. It is highly recommended to decrease the rudder deflection to achieve better climb performance.

As IAS mode is used in climb, the FD bar order is adjusted to maintain the targeted speed.

ABS.8.2.6 Engine Flameout in Cruise

Ident.: ABS.8.2.6 — 06 NOV 2026
ALL

Detection

Engine flameout in cruise may be detected by engine parameter observation and external noise modification.

ATPCS is not operative.

cont'd... ►►►

cont'd... ►►►

The effect of the engine flameout on handling qualities may not be easily perceivable.

Procedure

Apply the procedure ENG 1(2) FLAME OUT IN FLIGHT.

Guidance

Above the single engine ceiling:

- If no obstacle, standard rule using 200 kt IAS.
- If obstacle, perform the drift down procedure.

In icing conditions, the Flaps 15 setting improves the drift down performance and the single engine ceiling.

ABS.8.2.7 Engine Flameout in Descent

Ident.: ABS.8.2.7 — 06 NOV 2026
ALL

Detection

Engine flameout in descent may be detected by engine parameter observation and external noise modification. The effect of the engine flameout on handling qualities may not be easily perceivable.

Procedure

Apply the procedure ENG 1(2) FLAME OUT IN FLIGHT.

Guidance

Similar to the guidance for cruise (ABS.8.2.6).

ABS.8.2.8 Engine Flameout in Approach

Ident.: ABS.8.2.8 — 06 NOV 2026
ALL

Detection

Engine flameout in approach is detected by engine parameter observation and external noise modification.

ATPCS may not be armed at the moment of the engine flameout (depending on the PL position and PWR MGT position when the engine flameout occurs).

The effect of the engine flameout on handling depends on the PL position: the more the PLs are advanced, the more the asymmetry effects will be present.

Procedure

Apply the procedure ENG 1(2) FLAME OUT IN FLIGHT.

Note

Due to time constraints, it may not be possible to fully complete the procedure. In this case, at least the memory items must be applied.

Guidance

The flight crew should consider the following points:

- Go-around or landing at the Captain’s decision.
- ATPCS may not be armed at the moment of the engine flameout.

cont'd... ►►►

cont'd... ►►►

- Smoothly advance both PLs up to the notch to maintain the targeted speed. Smooth PL movements help the AP functioning and limit the pilot workload. Use automation (AP) as much as possible.
- Without ATPCS, the propeller of the failed engine remains windmilling, which results in:
  - o Speed decrease until propeller feathering.
  - o Reduced controllability, particularly if the PLs are advanced to the ramp.
- The failed engine is feathered by application of the ENG 1(2) FLAME OUT IN FLIGHT memory items.

If a go-around is considered:

- Go-around power (PL to the RAMP) must be applied.
- VGA and failed engine shutdown (PL on FI and CL on FUEL S.O position) provide the best aircraft behavior and performance during the go-around.
- Excessive sideslip has a negative effect on climb performance.
- After go-around initiation, apply the ENG 1(2) FLAME OUT AT TAKEOFF procedure.

ABS.8.2.9 Engine Flameout during Go-Around

Ident.: ABS.8.2.9 — 06 NOV 2026
ALL

Detection

Engine flameout may be detected by a strong engine thrust asymmetry.

ATPCS is operative without UPTRIM.

Procedure

Apply the procedure ENG 1(2) FLAME OUT AT TAKEOFF.

Guidance

After both rudder and aileron are trimmed out, the autopilot should be engaged.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.21.1 GENERAL

DSC.21.1.1 General

Ident.: DSC.21.1.1 — 10 NOV 2026
ALL

The aircraft uses external air to supply:

- the air conditioning and the ventilation systems,
- the pressurization system (see DSC.21.3),
- the deicing system (see DSC.30.3).

Air inlets location:

- engines air intakes,
- main landing gear fairings,
- low pressure ground unit through a connector.

The air intended for air conditioning and pressurization is pressurized by the engines compressors and delivered through the bleed valves (see DSC.36.2).

It is conditioned by the packs, distributed to the pressurized zones, then discharged overboard through two outflow valves. A part of this air is recirculated.

Electric and electronic equipment and the forward cargo compartment are ventilated by cabin ambient air, which is then recirculated or discharged outside the aircraft.

The MFC provides the system monitoring and failures information to the flight crew.

DSC.21.1.2 Schematics

Ident.: DSC.21.1.2 — 10 NOV 2026
ALL

The general air conditioning schematic shows, for each side (LH ENG and RH ENG):

- the ENG AIR INTAKE and the engine COMPRESSORS (LP and HP ports), with the HP VALVE and the BLEED VALVE,
- downstream of the bleed valve, the DE ICE VALVE and the ISOL. VALVE, which supply the deicing system,
- the PACK VALVE, which supplies the PACK through the TURBO FAN SHUT OFF VALVE, the HOT BY PASS VALVE and the TEMP. CONTROL VALVE,
- in the LANDING GEAR FAIRING, the RAM AIR inlet and the GROUND AIR inlet with the GROUND COOLING FAN; the pack air is discharged through the EXHAUST.

The two bleed ducts are connected through the X VALVE. The pack outlets supply the MIXING CHAMBER, with a RECIRC. FAN on each side. The GROUND CONNECTION supplies the mixing chamber from a ground unit. Air is distributed to the flight compartment and to the cabin, and discharged overboard through the two OUTFLOW VALVES.

For the pack details, refer to DSC.21.2.5.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.21.2 AIR CONDITIONING

DSC.21.2.1 Description

Ident.: DSC.21.2.1 — 10 NOV 2026
ALL

Air production

The air conditioning system is equipped with two packs, which regulate air flow and temperature as required. The packs cool, remove moisture and pressurize the bleed air.

The two packs are installed in the main landing gear fairings and operate automatically and independently. The left pack supplies the cabin and the cockpit with conditioned air; the right pack mainly supplies the cabin.

If one pack is inoperative, the other one supplies both compartments through the mixing chamber.

Hot bleed air from the engines is admitted through the pack valves. The pack valve is pneumatically operated and electrically controlled. It is spring-loaded closed. When it is electrically energized, the valve is ready to open, provided there is sufficient air pressure.

This butterfly valve has two functions:

- pack shutoff,
- flow control: two levels are available, normal or high flow.

In high outside temperature conditions, selecting high flow increases the pack entrance pressure, resulting in a high flow pack output.

Air is cooled:

- by two ground turbo fans, through turbo shutoff valves, when:
  - IAS ≤ 150 kt and the landing gear has been retracted for less than 10 min, or
  - IAS ≤ 150 kt and the landing gear is extended;
- by ram air when IAS > 150 kt.

Note

In case of ENG OIL LOW PRESS, the turbo fan starts on the opposite side and runs as long as IAS ≤ 150 kt, regardless of the landing gear position.

Note

An incorrect position of a turbo fan shutoff valve leads to the closure of the associated pack valve.

Air distribution

Conditioned air is blown into the cabin by outlet ramps under the overhead bins. It is then evacuated through guides along the cabin side walls at floor level. A part of it is recirculated by the fans; the other part is evacuated overboard through the outflow valves.

The toilet is ventilated by differential pressure through a vent line.

Aircraft ventilation

The flight deck, the forward cargo compartment and the electric and electronic equipment are ventilated by a flow of ambient air, which is:

- recirculated (underfloor) to the pressurized compartment, or

cont'd... ►►►

cont'd... ►►►

- ducted overboard.

The selection is made by the overboard (OVBD) valve, which controls the underfloor (U/F) valve:

- OVBD full closed → U/F open,
- OVBD partially or full open → U/F closed.

OVBD NORMAL MODE Automatic selection.

OVBD MANUAL MODE To be used in case of AUTO MODE failure or, on ground, to accelerate cabin heating (full closed position).

Air is extracted by a fan, which can operate at different speeds depending on the flight deck temperature: the rotation speed is minimum below 20 °C (68 °F), maximum above 52 °C (126 °F), and varies linearly between these values.

The fan is automatically cut off when there is smoke detection in the aft cargo compartment or in the lavatory module.

Only when OVBD VALVE AUTO MODE is selected, the EXHAUST MODE pb may be used to control the OVBD valve in a partially open position. This action is required in case of fan failure, in order to create a cabin differential pressure that generates some cooling air flow.

In case of smoke in the forward cargo compartment, the flight deck air extraction duct can be closed with a lever on the right side maintenance panel, in order to avoid contaminated air suction to the flight deck (see DSC.21.2.2).

The avionics ventilation schematic shows the EXTRACT FAN drawing air from the flight compartment (FLT CMPT) and from the ELECTRIC AND ELECTRONIC RACKS VENTILATION through the EXTRACT AIR FLOW VALVE, past the TEMP SENSOR and the SMOKE DETECTOR. The fan discharges the air either overboard through the OVBD VALVE (to the outflow valves zone), or under the floor through the U/F VENTILATION VALVE. The LAVATORY SMOKE DETECTOR and the AFT CARGO SMOKE DETECTOR are also shown.

Temperature control

The system is designed to regulate and limit the temperature of the air discharged from the packs, which is supplied to the different zones:

- FLT COMPT, by the left pack,
- CABIN, by the right pack and the excess air from the left pack.

The pack temperature control valves adapt the amount of hot air mixed with the cool air in order to establish the required temperature.

In automatic mode, each pack discharge temperature is controlled by an electronic temperature controller, which computes the position of the temperature control valve taking into account:

- the duct temperature,
- the COMPT TEMP knob,
- the associated compartment temperature,
- the aircraft skin temperature.

In manual mode, each pack temperature control valve is controlled directly by the COMPT TEMP knob and limited by the pneumatic temperature sensor.

Overheat protection

The pack valve closes automatically when the air downstream of the pack compressor overheats: T > 204 °C (399 °F).

When the duct temperature downstream of the mixing chamber increases over T = 88 °C (191 °F), the limiter closes the temperature control valve progressively, by a pneumatic action, in order to reduce the hot air flow.

An OVHT caution is provided to the flight crew when T duct > 92 °C (198 °F), but the pack valve does not close.

cont'd... ►►►

cont'd... ►►►

DSC.21.2.2 Controls

Ident.: DSC.21.2.2 — 10 NOV 2026
ALL

COMPT TEMP panel

The COMPT TEMP panel is on the overhead panel. It has the PACK VALVE pbs (1), the FLOW pb (2), the COMPT TEMP knobs (3), the TEMP SEL pbs (4), the RECIRC FAN pbs (5), the COMPT indicator (6), the DUCT indicator (7), the COMPT SEL switch (8) and the GRD X FEED pb (9).

(1) PACK VALVE pb

ON — Pb pressed in. The associated PACK VALVE is open if electrical supply and air pressure are available.

OFF — Pb released. The associated PACK VALVE is closed. The OFF light comes on white. **AIR PACK** caution is displayed on the EWD when one of the pack valves is commanded OFF. **AIR PACK 1+2** caution is displayed on the EWD when both pack valves are commanded OFF.

FAULT — Comes on amber, and the caution message **AIR PACK** from the FWS is displayed on the EWD, associated with a Master Caution and a Single Chime, when the PACK VALVE position disagrees with the selected position, or in case of overheat downstream of the pack compressor (T > 204 °C / 399 °F). In the latter case, the valve is latched closed automatically.

Note

A 6 s delay is provided on the right pack valve for passenger comfort.

(2) FLOW pb

NORM — Pb released. Both pack valves are controlled automatically to give 22 psi regulated pressure.

HIGH — Pb pressed in. Both pack valves are controlled to give 30 psi regulated pressure, which increases the flow accordingly. HIGH light comes on cyan.

(3) COMPT TEMP knobs

The temperature of the related compartment is controlled depending on the temperature control mode selected:

- Automatic mode: the temperature of the compartment is controlled automatically according to the position of the knob.
- Manual mode: the knob directly controls the position of the temperature control valve.

(4) TEMP SEL pb

Selects the temperature control mode of operation.

AUTO — Pb pressed in. Automatic mode is selected. The electronic temperature controller controls the valve position.

MAN — Pb released. Manual mode is selected. The COMPT TEMP knob directly controls the position of the valve. The pneumatic temperature limiter limits the MAX duct temperature below T = 88 °C / 191 °F. The MAN light comes on cyan.

OVHT — Comes on amber, and the caution message **AIR DUCT 1(2) OVHT** from the FWS is displayed on the EWD, associated with a Master Caution and a Single Chime, when an overtemperature is detected in the duct (T > 92 °C / 198 °F). It is not inhibited in MAN mode.

(5) RECIRC FAN pb

Selects the operation of the respective recirculation fan.

cont'd... ►►►

cont'd... ►►►

ON	Pb pressed in. The fan runs. Recirculation of a part of the cabin air, to supplement the conditioned air supply, is provided. The fan rotation speed varies linearly from 12 700 RPM to 15 600 RPM, depending on the temperature control valve position. If the temperature measured at cabin floor level is lower than 13 °C (55 °F), high speed is automatically selected.
OFF	Pb released. The fan stops. All the air is supplied by the packs, without recirculation. The OFF light comes on white. **AIR RECIR FAN 1(2)** caution is displayed on the EWD.
FAULT	Comes on amber, and the caution message **AIR RECIR FAN 1(2)** from the FWS is displayed on the EWD, associated with a Master Caution and a Single Chime, in case of: the rotation speed of the fan becomes too low (< 11 400 RPM), or the fan electrical motor overheats.

(6) COMPT indicator

The air temperature in the selected compartment is indicated in °C.

(7) DUCT indicator

For the selected compartment, the temperature of the conditioned air before it leaves the duct is indicated in °C. The duct temperature is automatically limited to MAX 88 °C / 191 °F in AUTO or MAN mode.

(8) COMPT SEL switch

Selects the zone, FLT COMPT or CABIN, for which the temperature reading (COMPT and DUCT) is desired.

(9) GRD X FEED

Refer to the crossfeed description (see DSC.36.2).

AVIONICS VENT panel

The AVIONICS VENT panel is on the overhead panel. It has the OVBD VALVE selector switch (1), the EXHAUST MODE pb (2) and the OVBD VALVE FAULT caution light (3). A placard reads: CAUTION DO NOT SEL FULL OPEN IF ΔP > 1 PSI.

(1) OVBD VALVE selector switch

AUTO	Automatic operation of the overboard valve. The safety guard in the auto position prevents a valve opening control when the cabin/exterior ΔP is greater than 1 psi.
FULL OPEN	Cyan full open indicator on the SD Cabin page. Serves to fully open the overboard valve when the cabin/exterior ΔP is equal to or lower than 1 psi.
FULL CLOSE	Cyan full close indicator on the SD Cabin page. Overboard valve closing control.

(2) EXHAUST MODE pb

The pb has two steady positions.

PUSHED	Normal configuration. The extraction fan is electrically supplied. On ground, engine 1 not running (OIL LOW PRESS): OVBD valve full open (green full open indicator on the SD Cabin page), U/F valve closed. In flight, or on ground with engine 1 running: OVBD valve full closed (green full closed indicator on the SD Cabin page), U/F valve open.

cont'd... ►►►

cont'd... ►►►

OVBD Released, OVBD legend on. The extraction fan power supply is shut off. In flight (normal configuration): the overboard ventilation valve opens to an intermediate position (green intermediate position on the SD Cabin page), the U/F valve closes, and the following alarms are activated: Master Caution, Single Chime, FW caution message **AIR VENT EXH** on the EWD, **EXHAUST OVBD** status on the SD Cabin page. On ground: the U/F valve closes, the mechanic call system is activated if the power supply is through a ground power unit, and the following alarms are activated: Master Caution and Single Chime (if the condition levers are in a position other than FTR or FUEL S.O.), FW caution message **AIR VENT EXH** on the EWD, **EXHAUST OVBD** status on the SD Cabin page.

Note

1. *Aircraft on ground and external power available: if the EXHAUST MODE pb is set to the OVBD position, the extract fan is OFF. A ground mechanic call is then generated to alert the flight crew that the avionics are not ventilated.*
2. *When the start sequence is initiated, the extract fan stops for 120 s to avoid pressure shocks. The exhaust mode fault comes on; however, the ground mechanic call is not generated.*

FAULT The FAULT legend comes on when the EXHAUST MODE pb is pushed and the following failures appear: the rotation speed of the air extraction fan is null or insufficient (fan failure or power supply loss), or excessive internal temperature (fan failure, or simultaneous closing of the overboard vent valve and the underfloor vent valve). At the same time, the following alarms appear: Master Caution and Single Chime (if the condition levers are in a position other than FTR or FUEL S.O.), **EXHAUST FAULT** status and amber extraction fan indicator on the SD Cabin page. The FAULT legend is off when the EXHAUST MODE pb is released (OVBD legend on).

When a SMK TEST is performed, the FAULT light comes on to indicate that the extract fan is stopped. To restart it, the AVIONICS VENT EXHAUST MODE pb must be reset manually.

(3) OVBD VALVE FAULT caution light

FAULT Comes on amber when the position of the overboard valve does not correspond to the control position. The related warnings appear simultaneously: Master Caution, Single Chime, FW caution message **AIR OVBD** on the EWD, **OVBD VALVE** amber status on the SD Cabin page.

Flight deck ventilation isolation

The EXTRACT AIR FLOW lever (OPEN / CLOSED) is on the right side maintenance panel. A placard reads: CAUTION: CLOSE ONLY IN CASE OF FWD COMPT SMOKE.

CAUTION

Close only in case of FWD COMPT smoke.

It enables, in case of smoke in the forward cargo compartment, the isolation of the flight deck ventilation, which prevents smoke from entering the flight compartment.

Display on SD Cabin page

The SD Cabin page of the MFD shows the following air conditioning indications:

- (1) PACK VALVE: the status of each pack valve. When high flow is selected on the COMPT TEMP panel, **AIR HIGH FLOW** is shown in cyan.
- (2) RECIRCULATION FAN and CABIN AIR DISTRIBUTION: the recirculation fan status, with the faulty elements highlighted.
- (3) CABIN AIR DISTRIBUTION DUCT: depending on the pack valve status and the recirculation fan status, a visual indication of the cabin air supply.

cont'd... ►►►

cont'd... ►►►

- (4) and (5) VENTILATION: the extraction fan and the overboard valve.
- (6) and (7) TEMPERATURE MANAGEMENT and CABIN TEMPERATURE: the temperature control mode of each zone (the left hand indication for the flight compartment, the right hand indication for the cabin) and the cabin temperature.

ITEM	DISPLAY	DESCRIPTION
1	Green PACK box, green duct	PACK VALVE ON. Appears when the BLEED pb and the PACK pb are ON and the associated BLEED SOV is open and the associated engine is running (no OIL LOW PRESS + NH > 60 %), or the CVB is open (on ground when the PACK is fed by the opposite BLEED).
1	White box, **PACK OFF**	PACK VALVE OFF. Appears when the PACK pb is OFF.
1	Amber PACK box	PACK FAULT. Appears when the MFC detects a fault in the associated PACK with the PACK pb ON.
1	Green box, **PACK STBY**	PACK Stand-by. All other conditions (see below).
1	Amber crossed PACK box	PACK invalid (see below).
2	Green circle	Recirculation fan ON.
2	White circle	Recirculation fan OFF.
2	Amber circle	Recirculation fan FAULT.
2	**RECIRC**	Recirculation fan 1 or 2 OFF.
2	**RECIRC**	Recirculation fan 1 or 2 FAULT.
3	Green ducts on both sides	Both pack valves ON or both recirculation fans ON.
3	Green duct, left side only	Right pack valve and recirculation fan 2 OFF or in fault.
3	Green duct, right side only	Left pack valve and recirculation fan 1 OFF or in fault.
3	White ducts	Pack valves and recirculation fans fault or OFF on both sides.
4	Green fan symbol	Extraction fan ON.
4	**EXHAUST OVBD**, white fan circle	EXHAUST MODE pb released.
4	**EXHAUST FAULT**, amber fan circle	Extraction fan fault.
5	Green valve bar, open	Automatic mode, OVBD valve full open.
5	Green valve bar, intermediate	Automatic mode, OVBD valve in intermediate position.
5	Green valve bar, closed	Automatic mode, OVBD valve full closed.
5	**FULL OPEN**	Manual mode, OVBD valve full open.
5	**FULL CLOSE**	Manual mode, OVBD valve full closed.
5	**OVBD VALVE**, amber valve bar	OVBD valve fault, shown at the valve position (open or closed).
6	**AUTO**	Automatic temperature control.

cont'd... ►►►

cont'd... ►►►

ITEM	DISPLAY	DESCRIPTION
6	MAN	Manual temperature control.
6	OVHT	Duct overheat alert.
7	21 °C	Valid sensor measurement.
7	- - °C	Invalid measurement.
8	AIR HIGH FLOW	High flow selected.

The PACK Stand-by (PACK STBY) appears following the CAC internal logic. The most common configurations where the pack valve comes to STANDBY are:

1. Aircraft in flight: PACK pb ON, BLEED pb OFF, no BLEED FAULT, no PACK FAULT.
2. Aircraft on ground: PACK pb ON, BLEED pb ON, no BLEED FAULT (no leak, no overheat, no overpressure), engine OFF, CLA not in the FUEL S.O. position.

The PACK invalid indication appears as soon as the information used by the NAS is received as INVALID. The most common configurations where the pack valve comes to INVALID are:

1. Loss of communication between the NAS and the MFC (no input data available for the NAS logic).
2. The MFC declares the information INVALID due to an internal problem.

DSC.21.2.3 Electrical Supply

Ident.: DSC.21.2.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
LH side		
Pack valve	DC ESS BUS (on lateral panel SYS1/PACK VALVE)	NIL
Recirculation fan	DC UTLY BUS 1 (on lateral panel PWR SUPPLY CTL)	NIL
Pack and recirculation fan alert	DC ESS BUS (on lateral panel SYS1/PACK and RECIRC FAN CAUTION)	NIL
FLT COMPT automatic temperature control	DC ESS BUS (on lateral panel FLT COMPT/TEMP CTL/AUTO)	NIL
FLT COMPT manual temperature control	DC ESS BUS (on lateral panel FLT COMPT/TEMP CTL/MAN)	NIL
RH side		
Pack valve	DC ESS BUS (on lateral panel SYS2/PACK VALVE)	NIL
Recirculation fan	DC UTLY BUS 2 (on lateral panel PWR SUPPLY CTL)	NIL
Pack and recirculation fan alert	DC ESS BUS (on lateral panel SYS2/PACK and RECIRC FAN CAUTION)	NIL
Automatic temperature control	DC ESS BUS (on lateral panel CABIN/TEMP CTL/AUTO)	NIL
Manual temperature control	DC ESS BUS (on lateral panel CABIN/TEMP CTL/MAN)	NIL
Common		
Compartment and duct temperature indicator	DC BUS 1 (on lateral panel COMPT and DUCT TEMP IND)	NIL
TURBO FAN SHUT OFF VALVE 1 CTL	DC BUS 1 (on lateral panel SYS1/TURBO FAN)	NIL
TURBO FAN SHUT OFF VALVE 2 CTL	DC BUS 2 (on lateral panel SYS2/TURBO FAN)	NIL

cont'd... ►►►

cont'd... ►►►

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
OVBD valve, U/F valve	DC EMER BUS (on lateral panel VALVES)	NIL
Extract fan control relay	DC ESS BUS (on lateral panel CTL)	NIL
EXTRACT FAN contactor	DC BUS 2 (on lateral panel EXTRACT FAN)	NIL
EXTRACT FAN contactor	DC BUS 1 (on lateral panel EXTRACT FAN)	NIL

DSC.21.2.4 System Monitoring

Ident.: DSC.21.2.4 — 10 NOV 2026
ALL

AVIONICS VENT EXHAUST MODE FAULT

CONDITION	VISUAL	AURAL
Underspeed or overheat of extract fan (T > 90 °C / 194 °F)	MC light flashing amber. **AIR VENT EXH** amber message on EWD. **EXHAUST FAULT** amber message on Cabin SD page. EXHAUST MODE FAULT amber light on overhead panel.	SC

OVBD VALVE FAULT

CONDITION	VISUAL	AURAL
OVBD valve position not corresponding with aircraft condition	MC light flashing amber. **AIR OVBD** amber message on EWD. **OVBD VALVE** amber message on Cabin SD page. FAULT amber light on overhead panel.	SC

DUCT 1(2) OVHT

CONDITION	VISUAL	AURAL
Overheat in the duct (T duct > 92 °C / 198 °F)	MC light flashing amber. **AIR DUCT 1(2) OVHT** amber message on EWD. TEMP **OVHT** amber message on Cabin SD page. Associated TEMP SEL OVHT amber light on overhead panel.	SC

RECIRC FAN 1(2) FAULT

CONDITION	VISUAL	AURAL
Recirculation fan underspeed or fan electrical motor overheat	MC light flashing amber. **AIR RECIR FAN 1(2)** amber message on EWD. Associated RECIRC FAN FAULT amber light on overhead panel. Associated **RECIRC** amber message on Cabin SD page.	SC

PACK 1(2) VALVE FAULT

CONDITION	VISUAL	AURAL
Pack valve position disagrees with commanded, or overheat downstream of the compressor (T > 204 °C / 399 °F)	MC light flashing amber. **AIR PACK** amber message on EWD. PACK FAULT amber message on Cabin SD page. Associated PACK VALVE FAULT amber light on overhead panel.	SC

PACK 1+2 VALVES FAULT

CONDITION	VISUAL	AURAL
Pack valve position disagrees with commanded, or overheat downstream of the compressor (T > 204 °C / 399 °F)	MC light flashing amber. **AIR PACK 1+2** amber message on EWD. Both PACK FAULT amber messages on Cabin SD page. Both PACK VALVE FAULT amber lights on the overhead panel.	SC

cont'd... ►►►

cont'd... ►►►

DSC.21.2.5 Schematics

Ident.: DSC.21.2.5 — 10 NOV 2026

ALL

Air conditioning

- The LH ENGINE BLEED AIR supplies the LH PACK through its PACK VALVE; the RH ENGINE BLEED AIR supplies the RH PACK through its PACK VALVE. The two bleed lines are connected by the GRD X BLEED valve.
- Each pack has a GROUND TURBO FAN and a TEMP CONTROL VALVE controlled by its ELECTRONIC TEMPERATURE CONTROL, which receives the TEMPERATURE SENSORS of its zone.
- The packs supply the MIXING CHAMBER, which also receives the GROUND UNIT CONNECTION and the air of the two RECIRCULATION FANS.
- The left pack supplies the FLT COMPT and the cabin; the right pack supplies the CABIN. The air is discharged through the two OUTFLOW VALVES.

Pack

STAGE	ELEMENT
Inlet	BLEED AIR through the PACK VALVE (controlled by the PACK VALVE pb; FAULT on DISAGREE or T > 204 °C) and the FLOW pb (HIGH).
Cooling air	RAM AIR INLET, or GROUND INLET with the GROUND COOLING FAN through the TURBO FAN SHUT OFF VALVE, across the HEAT EXCHANGERS, then to EXHAUST.
Air cycle machine	COMPRESSOR, HEAT EXCHANGERS, CONDENSER, WATER EXTRACTOR, TURBINE. The HOT BY-PASS VALVE and the TIC VALVE are installed around the cooling stages.
Temperature control	The TEMP. CONTROL VALVE mixes hot air into the cold air. It is controlled by the ELECTRONIC TEMPERATURE CONT. in AUTO, or by the COMPT TEMP knob in MAN, and limited at T > 88 °C.
Outlet	MIXING CHAMBER, with the RECIRC. FAN. The TEMP SEL OVHT light comes on at T > 92 °C.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.21.3 PRESSURIZATION

DSC.21.3.1 Description

Ident.: DSC.21.3.1 — 10 NOV 2026
ALL

General

The cabin pressure is controlled by an electropneumatic valve and a pneumatic valve. These valves are on the lower fuselage skin in the rear underfloor zone and are operated by either of two control subsystems:

- A digital electropneumatic sub-system: AUTO-mode
- A pneumatic sub-system: MAN-mode.

An overpressure relief valve and a negative pressure relief valve are fitted on both outflow valves as safety devices.

The controls related to the Cabin Pressure Control System (CPCS) are on the right side of the flight deck central instrument panel.

Indicating is provided through SD cabin page, on the upper part of MFD.

When the system is operating in the AUTO-mode, the pneumatic outflow valve is slaved to the electropneumatic valve. Their opening will be the same.

In case of controller failure:

- The positive differential pressure is limited to 6.35 psi by a manometric capsule.
- The negative differential pressure is limited to -0.5 psi by a non return valve.

Note

The MAN RATE knob must be selected to NORM position in order not to disturb the automatic regulation.

AUTO mode

The digital controller is on the cabin pressure control system (CPCS) panel. It consists of an electronic box with a front panel and three plug-in modules as follows:

- One module contains the electrical supply circuit, the power output circuit and subsidiary circuits
- One module holds all the input circuits (including the pressure sensor) and the output circuits
- The remaining module contains the central processor unit.

With the AUTO-mode operating, the outflow valves are driven by the controller according to the information received with respect to:

- Aircraft altitude obtained from Air Data Computer (ADC) via the CAC
- Landing elevation, pre-selected by the ELV SET trigger switch
- Takeoff elevation, memorised by the controller
- Pressure cabin altitude, obtained from a pressure transducer inside the digital controller.

The digital controller is supplied by DC BUS 1. It also receives the FLT / GND signal from the landing gear proximity switches, the AIRCRAFT DOOR CLOSED signal, and the altitude data from ADC 1 through CAC 1 and from ADC 2 through CAC 2.

DUMP function

A DUMP function is available to send a fully open electrical signal to the electropneumatic outflow valve.

DUMP function is available as long as pressurization system is in AUTO mode.

cont'd... ►►►

cont'd... ►►►

CAUTION

The DUMP pb is guarded. No other safety device protects DUMP function from inadvertent use.

MANUAL mode

The electropneumatic outflow valve is maintained closed and the pneumatic outflow valve controls the cabin outlet air flow. Its control servo pressure is function of the manual controller demand. The control knob is used to select any cabin rate of change from -1 500 ft/min to +2 500 ft/min.

Ditching mode

Two electrical motors (one for each outflow valves) maintain both outflow valves in closed position.

Ditching mode is available in both automatic and manual mode.

Ambient Pressure Sensor

It is composed of three modules that enable acquisition, process and transmission of cabin pressure data to the CAC.

Both signals (pressure and pressure variation) are designed to provide an output between 0.5 V and 4.5 V, which enable failure detections out of this range.

Signals from APS are sent to the CAC and processed to display as three indicators on the SD Cabin page:

Cabin altitude (ft)	Determine the equivalent altitude associated the cabin pressure.
VS (ft/min)	Determine the equivalent altitude change associated to the pressure variation.
ΔP (psi)	Determine the pressure difference between the outside (provided by other pressure sensor) and the inside of aircraft.

DSC.21.3.2 Controls

Ident.: DSC.21.3.2 — 10 NOV 2026
ALL

CABIN PRESS indications

(1) CABIN PRESS IND

The SD Cabin page gives the following information:

- Cabin altitude, obtained from Ambient Pressure Sensor (APS) via the CAC
- Rate of change of cabin altitude
- Differential pressure between cabin pressure and outside static pressure.

After conversion, data received from APS are sent by the CAC to both MFD to be displayed.

(2) SD CABIN page

Differential pressure indicator (1)

In the event of an excessive differential pressure, the CAC sends a warning signal to both MFCs and the alerting display is activated.

DISPLAY	DESCRIPTION
Green needle, green value (e.g. 3.00)	ΔP NOMINAL DISPLAY
Amber needle, amber boxed value (e.g. - 0.25)	ΔP PRE-ALERTING DISPLAY
Red needle, white value on red background (e.g. 7.00)	ΔP ALERTING DISPLAY
No needle, -.-- value	INVALID ΔP

cont'd... ►►►

cont'd... ►►►

Cabin rate indicator (2)

Cabin rate of climb or descent are indicated on SD Cabin page.

Invalid rate are also indicated and can be due to sensors failure or missing connectivity.

An invalid speed can be due to sensors failure (out of range measurement) or a missing connection.

DISPLAY	DESCRIPTION
Green needle, green value (e.g. 500 UP)	RATE OF CLIMB
Green needle, green value (e.g. 1000 DN)	RATE OF DESCENT
No needle	INVALID RATE

Cabin altitude indicator (3)

Cabin and target altitude are displayed.

An invalid display can be due to sensors failure (out of range measurement) or a missing connection.

DISPLAY	DESCRIPTION
AUTO PRESS, CAB ALT green value	AUTOMATIC PRESSURE CONTROL NOMINAL DISPLAY
AUTO PRESS, CAB ALT white value	AUTOMATIC PRESSURE CONTROL FAULT
MAN ALT, CAB ALT green value, TARGET magenta value	MANUAL PRESSURE CONTROL NOMINAL DISPLAY
MAN ALT, CAB ALT green value, TARGET no value	MANUAL PRESSURE CONTROL INVALID TARGET
MAN ALT, CAB ALT no value, TARGET magenta value	INVALID CAB ALT
MAN ALT, CAB ALT amber value	CAB ALT PREVENTING DISPLAY
MAN ALT, CAB ALT white value on red background	CAB ALT ALERTING DISPLAY

(3) EWD

High Altitude Airport Operation

HI ALT mode activates automatically before takeoff and landing from airports with an altitude above 8 500 ft.

In HI ALT mode, cabin altitude monitoring thresholds are raised to take into account the airport elevation. When HI ALT mode is active, green HI ALT memo appears on the EWD.

SIMULATOR NOTE

HI ALT mode is not available. The cabin altitude monitoring thresholds stay at 9 500 ft and 10 000 ft at every airport, and the EXCESS CAB ALT alert is inhibited on ground and during 2 min after takeoff.

AUTO PRESS panel

The AUTO PRESS panel has the LANDING ELEVATION indicator (1), the ELV SET trigger switch (2), the DESCENT RATE pb (3), the TEST pb (4) and the DUMP guarded pb (5).

(1) LANDING ELEVATION indicator

Displays in ft the landing elevation setting. The two last digits always display 0. All digits turn off in case of automatic system failure, manual mode or DUMP mode.

(2) ELV SET trigger switch

Enables selection of the elevation of the planned destination airport in 100 ft increments. The landing altitude ranges between -1 500 ft and 10 000 ft.

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

A single click on the ELV SET switch changes the landing elevation by 100 ft. Hold the switch up or down to change it continuously.

(3) DESCENT RATE pb

Is operated to enable a fast cabin descent.

NORM — (pb released) The max cabin vertical speed in descent is -400 ft/min.

FAST — (pb pressed in) The max cabin vertical speed in descent is -500 ft/min. The FAST LIGHT comes on cyan.

(4) TEST pb

When pressed, the system is electrically tested. If the system is ready to use, the LANDING ELEVATION indicator displays alternately 18800 and -8800. FAULT light comes on amber on CAB PRESS MODE SEL pb.

In flight, this test is inhibited.

(5) DUMP guarded pb

DUMP guarded pb enables selection of the dump function when in AUTO mode.

NORMAL — (pb released) The digital controller operates normally.

ON — (pb pressed in) The digital controller is out of circuit and an electrical opening signal is sent to the electropneumatic outflow valve. Both outflow valves fully open. The ON light comes on white.

Note

When the DUMP guarded pb is pressed while in AUTO mode, the FAULT light of the MAN PRESS CONTROL panel comes on amber.

MAN PRESS panel

The CAB PRESS panel has the MODE SEL pb (1), the MAN RATE knob (2) and the DITCH guarded pb (3).

(1) MODE SEL pb

Selects the pressure control mode:

AUTO — (pb pressed in) The digital controller is in operation.

MAN — (pb released) The digital controller is out of operation, digits turn off and the manual controller regulates the pressure. The MAN light comes on white. **AIR AUTO PRESS** caution is displayed on EWD.

FAULT — The light comes on amber to indicate a digital controller failure, **AIR AUTO PRESS** caution is displayed on EWD.

Note

The FAULT light comes on amber when in AUTO mode, the DUMP guarded pb is pressed in.

(2) MAN RATE knob

In manual mode, the control knob is used to select any cabin rate of change from -1 500 ft/min to +2 500 ft/min.

NORM — This position must be used when in AUTO mode.

cont'd... ►►►

cont'd... ►►►

(3) DITCH guarded pb

Selects the ditch mode.

ON (pb pressed in) Both outflow valves are forced to closed position regardless of the pressure control mode. The ON light comes on white.

DSC.21.3.3 Electrical Supply

Ident.: DSC.21.3.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
Digital controller	DC BUS 1 (on lateral panel AUTO PRESS)	NIL
Ambient Pressure Sensor	DC EMER BUS (on lateral panel APS)	NIL
DITCH	DC EMER BUS (on lateral panel DITCH)	NIL

DSC.21.3.4 System Monitoring

Ident.: DSC.21.3.4 — 10 NOV 2026
ALL

AUTO PRESS FAULT

CONDITION	VISUAL	AURAL
Digital controller failure	MC light flashing amber. **AIR AUTO PRESS** amber message on EWD. FAULT amber light on CAB PRESS MOD SEL pb. **AUTO PRESS** amber message on Cabin SD page.	SC

EXCESS CAB DELTA P

CONDITION	VISUAL	AURAL
Differential pressure > 6.6 psi	MW light flashing red. **EXCESS CAB ΔP** red message on EWD. The ΔP value is displayed white on red background on Cabin SD page. DIFF PRESS local indicator exceeds 6.6 psi on the cabin SD page.	CRC

EXCESS CAB ALT

CONDITION	VISUAL	AURAL
Cabin altitude > 10 000 ft (15 000 ft in High Altitude mode)	MW light flashing red. **EXCESS CAB ALT** red message on EWD. Red reverse video ALT flashing on Air Cabin SD page.	CRC

CABIN ALTITUDE

CONDITION	VISUAL	AURAL
9 500 ft < Cabin altitude < 10 000 ft - OR - 14 000 ft < Cabin altitude < 15 000 ft (in High Altitude mode)	MC light flashing amber. **CAB ALT** amber message on EWD.	SC

CABIN DELTA P

CONDITION	VISUAL	AURAL
6.25 psi < Cabin ΔP < 6.6 psi - OR - -0.5 psi < Cabin ΔP < -0.2 psi	MC light flashing amber. **CAB ΔP** amber message on EWD.	SC

cont'd... ►►►

cont'd... ►►►

NEGATIVE CABIN DELTA P

CONDITION	VISUAL	AURAL
CAB ΔP < -0.5 psi	MW light flashing red. **NEGATIVE CAB ΔP** red message on EWD.	CRC

DITCH mode

CONDITION	VISUAL	AURAL
Both outflow valves selected in DITCH position.	MC light flashing amber. **AIR DITCH** amber message on EWD. ON white light on DITCH pb.	SC

DSC.21.3.5 Schematics

Ident.: DSC.21.3.5 — 10 NOV 2026

ALL

Pressurization control schematic

- ENGINE 1 and ENGINE 2 supply the AIR JET PUMP, which provides the VACUUM to the outflow valves.
- The AUTO PRESS panel (DUMP, DESCENT RATE, TEST, LANDING ELEVATION, ELV SET) sends a REFERENCE SIGNAL to the TORQUE MOTOR of the ELECTROPNEUMATIC OUTFLOW VALVE.
- The PNEUMATIC OUTFLOW VALVE is controlled through a PNEUMATIC RELAY. In AUTO mode the relay slaves it to the electropneumatic outflow valve. In MAN mode the REFERENCE PRESSURE set by the MAN CAB ALT knob (INCREASE / DECREASE / NORM) on the CAB PRESS panel controls it.
- Each outflow valve has a NEGATIVE PRESSURE RELIEF device and an OVERPRESSURE RELIEF device. Both are connected to the OUTSIDE STATIC PRESSURE.
- The electropneumatic outflow valve has an AIR FILTER on its pressurized area side.
- Each outflow valve has an ELECTRICAL MOTOR, connected to the CAB PRESS panel (DITCH pb).
- Both outflow valves are on the boundary between the PRESSURIZED AREA and the NON PRESSURIZED AREA.

DSC.22.1 GENERAL

DSC.22.1.1 Description

Ident.: DSC.22.1.1 — 05 NOV 2026
ALL

The Automatic Flight Control System (AFCS) gives:

- the autopilot (AP), with automatic pitch trim and rudder autotrim,
- the yaw damper (YD), with turn coordination,
- the flight director (FD),
- the altitude alert,
- the flight path angle and speed protections.

The crew controls the AFCS with:

- the Flight Guidance and Control Panel (FGCP), on the glare shield,
- the two Index Control Panels (ICP), for the speed target,
- the AP DISC pb and the TCS pb on each control wheel,
- the GA pb on each power lever,
- the pitch trim switches (normal and STBY), which disengage the AP.

The AFCS shows its status on the Flight Mode Annunciator (FMA) at the top of each PFD (see DSC.31.5) and on the green arrows of the FGCP. Failures that need a crew action are also shown on the EWD (see DSC.22.5).

The AFCS computes its commands from both AHRS, both ADC, the radio altimeter, the NAV 1 and NAV 2 receivers and the FMS. Three servo actuators (pitch, roll, yaw) move the flight controls. The pitch and yaw trim are driven through the trim boxes.

SIMULATOR NOTE

The two AFCS computers (CAC 1 commands, CAC 2 monitors) are simulated as one computation: one set of control laws drives the three servos, and the monitoring is done in the same logic. The FGCP AP pb engages the AP on channel 1 (FGCP CHAN 1) when it is supplied, otherwise on channel 2 (FGCP CHAN 2).

DSC.22.1.2 Architecture

Ident.: DSC.22.1.2 — 05 NOV 2026
ALL

FUNCTION	WHAT IT DOES	DATA USED
AP	Flies the active FD modes. With no upper mode, holds the basic modes (attitude, heading or bank).	Both AHRS and both ADC (monitored), coupled-side navigation
YD	Damps the dutch roll, coordinates the turns, trims the rudder.	Both AHRS and both ADC (monitored)
FD	Shows the pitch and roll commands of the active modes on both PFD.	Coupled-side AHRS, ADC and navigation source
Altitude alert	Warns when the aircraft approaches or leaves the selected altitude.	Baro altitude, ALT SEL
Protections	Keep the flight path and the speed inside safe limits when the AP is engaged.	IAS, VmHB, Vmin OPS, VMO

The AP flies every mode except GA, which is an FD-only mode (see DSC.22.4.5).

When the AP is engaged, it engages the YD at the same time. The YD can be engaged alone.

cont'd... ►►►

cont'd... ►►►

DSC.22.1.3 AFCS Coupling

Ident.: DSC.22.1.3 — 05 NOV 2026
ALL

The CPL pb on the FGCP selects the side (CAPT or F/O) that the AFCS uses for the FD and the navigation data: the NAV SOURCE selector, the course, the deviations and the receiver of that side. At power-up the CAPT side is coupled. The coupled side is shown by the green arrow beside the CPL pb and by the coupling arrow on the FMA.

A change of coupled side cancels the armed and active navigation modes (LNAV, VOR, LOC, BC, GS). The FD reverts to the basic modes and the amber CHECK NAV SRC message comes on (see DSC.22.5.2).

The AP and YD monitor both AHRS and both ADC. If the coupled-side AHRS or ADC fails, or the two sides disagree, the AP and YD disengage. To engage them again, select the operative source on the switching panel (single AHRS or single ADC configuration). The FMA then shows FD SINGLE SRC.

Dual coupling (ILS)

Dual coupling engages automatically when all these conditions are met:

- LOC and GS are in track (not capture) in APP mode,
- both NAV receivers are tuned to the same ILS frequency and are supplied,
- both CRS knobs show the same course,
- the radio altitude is below 1 200 ft.

Both CPL arrows come on and DUAL is shown on the FMA. The CPL pb has no effect while DUAL is active. When APP is cancelled, or one condition is lost, the AFCS returns to the side that was coupled before.

DSC.22.1.4 Electrical Supply

Ident.: DSC.22.1.4 — 05 NOV 2026
ALL

EQUIPMENT	DC SUPPLY	C/B
Roll servo	DC STBY BUS	ROLL SERVO
Pitch servo	DC STBY BUS	PITCH SERVO
Yaw servo	DC STBY BUS	YAW SERVO
FGCP channel 1 / AP channel 1	DC EMER BUS	FGCP CHAN 1 / IOM-AP1
FGCP channel 2 / AP channel 2	DC ESS BUS	FGCP CHAN 2 / IOM-AP2

There is no AC supply.

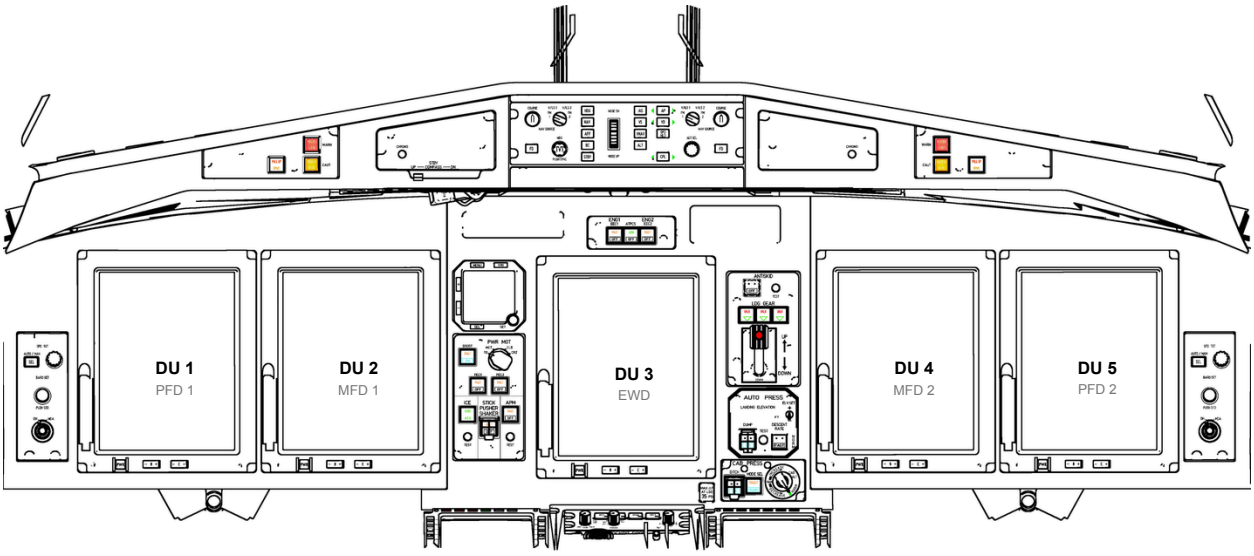
LOSS OF	EFFECT
One FGCP channel	FGCP SGL CH caution on the EWD.
Both FGCP channels	FGCP LOSS caution on the EWD. The FGCP controls have no effect, the FD bars and the altitude alert are lost, and a GA mode active for 0.9 s or more is cancelled.
FGCP CHAN 1 or FGCP CHAN 2	An AP engaged on that channel continues on the other channel. With both channels lost, an engaged AP and YD stay engaged, but cannot be engaged again once disengaged.
A servo	That servo gives no output. The loss of the pitch or roll servo disengages the AP, the loss of the yaw servo the YD.
The AP+YD function of the avionics	AP and YD disengage and cannot be engaged.
The FD function of the avionics (both FD)	AFCS FAIL: the FMA mode zones are blank and the AP cannot be engaged.

DSC.22.2 CONTROLS

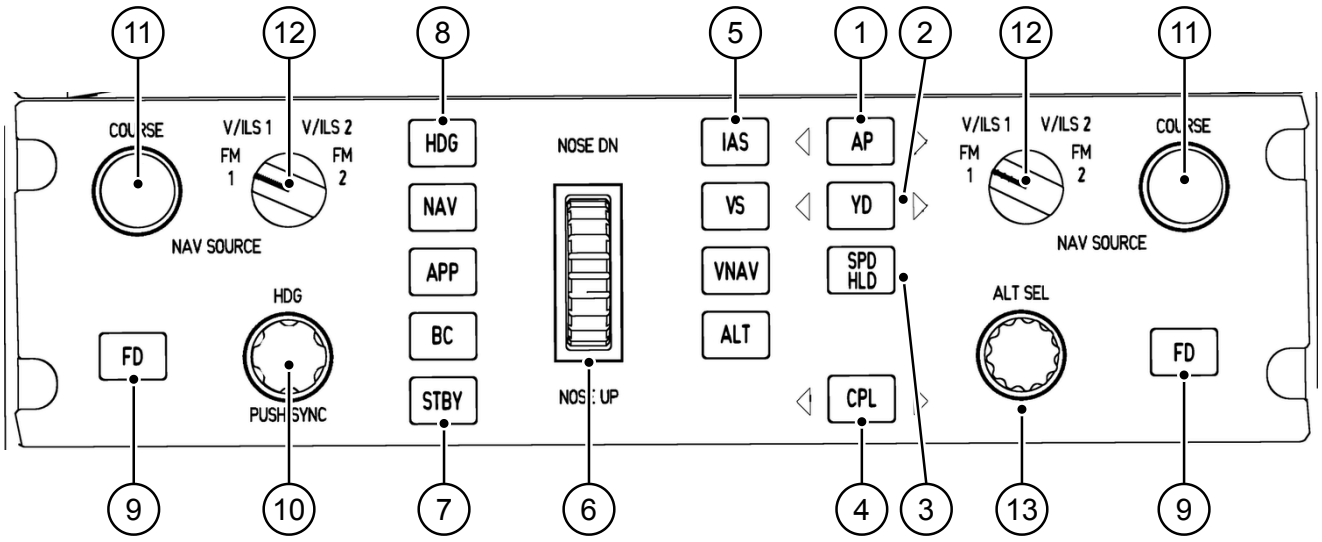
DSC.22.2.1 Flight Guidance and Control Panel

Ident.: DSC.22.2.1 — 05 NOV 2026
ALL

The FGCP is in the centre of the glare shield. It carries the AP, YD and FD pushbuttons, the mode pushbuttons, the HDG, CRS and ALT SEL knobs, the pitch wheel and the two NAV SOURCE selectors.



Glare shield and main instrument panel, FGCP in the centre of the glare shield



Flight Guidance and Control Panel

A mode pushbutton pressed once selects (or arms) its mode. Pressed again, it cancels the mode, and the axis returns to its basic mode. When both FGCP channels are lost, the FGCP controls have no effect.

cont'd... ►►►

cont'd... ►►►

① AP pb

PRESS — The AP and the YD engage together. The green arrows of the AP pb and of the YD pb come on. If an engagement condition is not met, the AP does not engage and AP INHIBIT is shown on the FMA (see DSC.22.3.1).

PRESS AGAIN — The AP disengages. The YD stays engaged. AP DISENG is shown on the FMA and the cavalry charge sounds.

② YD pb

PRESS — The YD engages. The green arrows of the YD pb come on. On the ground the YD does not engage and YD INHIBIT is shown on the FMA.

PRESS AGAIN — The YD disengages, and the AP too if it is engaged. With the AP engaged: AP/YD DISENG on the FMA and cavalry charge. With the YD only: YD DISENG on the FMA, no aural.

③ SPD HLD pb

The speed hold function is not installed. A press shows SPD HLD INHIBIT on the FMA, yellow, for 7 s.

④ CPL pb

Each press changes the coupled side (CAPT or F/O), shown by the green arrow on the side of the pb and by the FMA arrow. The navigation modes armed or active are cancelled (see DSC.22.1.3). No effect while DUAL coupling is active.

⑤ Vertical mode pbs

IAS, VS, ALT and VNAV select the vertical modes (see DSC.22.4.3). A second press on the pb of the active mode returns to PITCH HOLD.

⑥ Pitch wheel

ACTIVE VERTICAL MODE	ONE CLICK
VS	Changes the VS target by 100 ft/min. Range -6 000 to +6 000 ft/min.
PITCH HOLD	Changes the pitch target by 0.5°, between -11° and +15°.
Any other mode	No effect.

The NOSE DN direction is inhibited when the IAS is above Vmax or when the high speed protection is active. The NOSE UP direction is inhibited when the IAS is below Vmin OPS or when the low speed protection is active.

⑦ STBY pb

Cancels all the armed and active FD modes (lateral and vertical). The AFCS returns to the basic modes: PITCH HOLD at the current pitch (limited to -11° / +15°), and WING LVL, HDG HOLD or ROLL HOLD depending on the bank. After STBY, ALT SEL does not arm again until the AP is engaged or an FD mode is selected. No effect if the AP and both FD are off.

⑧ Lateral mode pbs

HDG, NAV, APP and BC select the lateral modes (see DSC.22.4.4). APP also arms the vertical approach mode (see DSC.22.4.5). A second press on the pb of the armed or active mode returns to the basic lateral mode. A second press on APP cancels both axes.

⑨ FD pb (CAPT and F/O)

PRESS — The own-side FD is on. If both FD were off and the AP is off, the basic modes are set so that the bars have something to fly.

cont'd... ►►►

cont'd... ►►►

PRESS AGAIN	The own-side FD is off.

The FD bars are shown when an upper mode is active, or in basic modes only when the AP is engaged (see DSC.22.3.4).

(10) HDG knob

TURN	Sets the selected heading (heading bug), shown on both PFD and ND.
PUSH	Sets the heading bug to the current magnetic heading.

(11) CRS knobs (CAPT and F/O)

Each knob sets the course of the own-side HSI / ND when the NAV SOURCE is V/ILS. The AFCS uses the course of the coupled side. With an FM source the course is computed by the FMS.

(12) NAV SOURCE selectors (CAPT and F/O)

Each selector sets the navigation source of the own-side PFD and ND: FM 1, V/ILS 1, V/ILS 2 or FM 2. The coupled-side selector decides what the NAV pb arms (LNAV with FM, VOR or LOC with V/ILS). A source change on the coupled side cancels the navigation modes and shows CHECK NAV SRC.

(13) ALT SEL knob

Sets the selected altitude, in 100 ft steps from 0 to 25 000 ft. It is shown above the PFD altitude scale. A change during the altitude capture (ALT*) cancels the capture: ALT OFF on the FMA and reversion to PITCH HOLD.

DSC.22.2.2 Control Wheel

Ident.: DSC.22.2 — 05 NOV 2026
ALL

AP DISC pb

FIRST PRESS	Disengages the AP. The YD stays engaged. AP DISENG and cavalry charge.
SECOND PRESS	Silences the cavalry charge and clears the AP DISENG, AP/YD DISENG or YD DISENG message. After an automatic disengagement by the monitoring, this press also starts the monitoring recovery (see DSC.22.3.2).

Pitch trim switches

Normal pitch trim (control wheel) or STBY pitch trim (pedestal): any operation disengages the AP.

TCS pb

TCS (Touch Control Steering) lets the crew fly the aircraft by hand without disengaging the AP. It acts only when the AP is engaged.

HELD	The AP stops moving the controls and the crew has full manual control. The control column does not disengage the AP while TCS is held, but the pedals and the pitch trim still do. TCS is shown on the FMA.
RELEASED	The AP takes the aircraft back from its new attitude, as shown in the table below.

AT TCS RELEASE	AP REFERENCE
Pitch 25° or more (nose up or down)	The AP disengages.
PITCH HOLD	New pitch attitude, limited to -11° / +15°.
VS (or VNAV VS)	New VS target = current VS.
ALT, IAS, GS and other modes	Mode and target kept.

cont'd... ►►►

cont'd... ►►►

AT TCS RELEASE	AP REFERENCE
Basic lateral mode, bank below 6°	WING LVL, then HDG HOLD.
Basic lateral mode, bank 6° to 35°	ROLL HOLD on the current bank.
Basic lateral mode, bank above 35°	The aircraft returns to 35°, and ROLL HOLD holds 35°.
Upper lateral mode	Mode kept.

DSC.22.2.3 Go-Around pbs

Ident.: DSC.22.2.3 — 05 NOV 2026
ALL

There is one GA pb on the outboard side of each power lever. A press:

- disengages the AP (AP DISENG, cavalry charge),
- cancels all FD modes armed and active, except LNAV if it was engaged,
- engages GA in vertical, and HDG HOLD on the current heading in lateral (LNAV stays if it was engaged),
- sets the CAPT FD on if both FD were off.

The missed approach of the FMS flight plan is activated by the FMS (see FMS.02.2).

DSC.22.2.4 Speed Target (ICP)

Ident.: DSC.22.2.4 — 05 NOV 2026
ALL

The SPD TGT part of each ICP sets the IAS target used by the IAS and VNAV IAS modes.

MAN	(power-up default) The target is set with the SPD TGT knob, between 100 and 250 kt. Cyan bug.
AUTO	The target comes from the FMS. Magenta bug. The knob has no effect.

Pressing the AUTO/MAN pb from AUTO to MAN sets the manual target to the current IAS. From MAN to AUTO, if the FMS speed target is not valid, the mode stays MAN and SPD AUTO INOP is shown (yellow, 7 s).

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

DSC.22.3 AUTOPILOT, YAW DAMPER AND FLIGHT DIRECTOR

DSC.22.3.1 Autopilot Engagement

Ident.: DSC.22.3.1 — 05 NOV 2026
ALL

The AP engages when the AP pb is pressed and all the conditions below are met. Otherwise the AP does not engage and AP INHIBIT is shown on the FMA (yellow, steady, 7 s).

CONDITION	VALUE
Aircraft	In flight, 100 ft AGL or more
IAS	60 kt or more
Bank	50° or less
Pitch	25° or less (nose up or down)
AHRS and ADC monitoring	No failure, no disagreement (or single source selected)
PITCH TRIM ASYM	Not detected since the last clearance
FD function	At least one FD channel available (no AFCS FAIL)
Pitch control	Right pitch line not jammed

At engagement:

- the YD engages too, if it was not already engaged,
- an upper mode already active on the FD is kept, and the AP flies toward it smoothly from the current attitude,
- a GA mode is cancelled and replaced by PITCH HOLD,
- an axis with no mode receives its basic mode: PITCH HOLD in vertical, WING LVL, HDG HOLD or ROLL HOLD in lateral (see DSC.22.4.2),
- ALT SEL can arm again if it was inhibited by the STBY pb,
- the pitch autotrim and the rudder autotrim start.

DSC.22.3.2 Autopilot Disengagement

Ident.: DSC.22.3.2 — 07 NOV 2026
ALL

Manual disengagement

ACTION	AP	YD	FMA MESSAGE	AURAL
AP pb on the FGCP	OFF	Stays	AP DISENG	Cavalry charge
AP DISC pb on a control wheel	OFF	Stays	AP DISENG	Cavalry charge
GA pb	OFF	Stays	AP DISENG	Cavalry charge
Pitch trim, normal or STBY	OFF	Stays	AP DISENG	Cavalry charge
Force on the control column (not with TCS held)	OFF	Stays	AP DISENG	Cavalry charge
YD pb on the FGCP	OFF	OFF	AP/YD DISENG YD DISENG if the AP was off	Cavalry charge (none with YD only)

cont'd... ►►►

cont'd... ►►►

ACTION	AP	YD	FMA MESSAGE	AURAL
Force on the pedals	OFF	OFF	AP/YD DISENG YD DISENG if the AP was off	Cavalry charge (none with YD only)

Automatic disengagement

The AP disengages automatically when:

- the IAS goes below 60 kt, the bank goes above 50° or the pitch goes above 25°,
- the stall warning (or the stick shaker) is active for 0.5 s. All FD modes are then cancelled,
- PITCH TRIM ASYM is detected. The AP cannot be engaged again while the asymmetry is present,
- an AHRS or ADC of the coupled side fails, or the two AHRS or the two ADC disagree (the YD disengages too),
- the AP+YD function of the avionics is lost (the YD disengages too),
- the pitch or roll servo loses its supply,
- the pitch servo load reaches the AP effort limit (10 daN), for example with a pitch control jam. PITCH MISTRIM is shown first,
- in an approach mode, the radio altitude goes below the AP minimum height: 160 ft in LOC, GS or V-FP (CAT 1), 80 ft once CAT 2 has been shown, and 80 ft in BC.

The YD alone disengages when the yaw servo loses its supply.

The loss of one or both FGCP channels does not disengage the AP or the YD. With both channels lost (FGCP LOSS), an engaged AP or YD stays engaged until the crew disengages it (AP DISC pb, or pedal force for the YD), and neither can be engaged again.

The messages and the aural are the same as for a manual disengagement.

Disengagement warnings

FMA MESSAGE	COLOUR	AURAL	RESET
AP DISENG	White on red, flashing	Cavalry charge, continuous	AP DISC pb (second press), or AP engaged again
AP/YD DISENG	White on red, flashing	Cavalry charge, continuous	AP DISC pb (second press), or AP / YD engaged again
YD DISENG	Black on amber, flashing	None	AP DISC pb, or YD engaged again

Monitoring recovery

After a disengagement by the AHRS or ADC monitoring, the second press on the AP DISC pb clears the disengagement message. The FMA then shows ATT INVALID or ADC INVALID for 7 s, to name the failed reference. The AP and YD can then be engaged again. If the failure is still present, the AP and YD do not engage (AP INHIBIT or YD INHIBIT).

SIMULATOR NOTE

The 100 N column force and the 300 N pedal force of the aircraft are replaced by a deflection threshold of the X-Plane pitch and yaw axes, because X-Plane gives no force data. With EFB SETTINGS > COCKPIT > FORCE FEEDBACK YOKE ON, the column position never disengages the AP; the other devices do.

cont'd... ►►►

cont'd... ►►►

DSC.22.3.3 Yaw Damper

Ident.: DSC.22.3.3 — 05 NOV 2026
ALL

The YD damps the yaw oscillations, coordinates the turns and trims the rudder. It uses the AFCS computation and the yaw servo.

The YD engages with the YD pb, or with the AP pb. It does not engage:

- on the ground (YD INHIBIT, yellow, 7 s),
- with an AHRS or ADC monitoring failure present (YD INHIBIT).

The YD disengages:

- with the YD pb (and the AP with it),
- with a force on the pedals,
- on loss of the yaw servo supply,
- on an AHRS or ADC monitoring failure, or on loss of the AP+YD avionics function.

With one AHRS or one ADC in single source and the IAS below 160 kt in flight with the YD engaged, the YD DEGRADED caution comes on the EWD.

SIMULATOR NOTE

When a flight is loaded in the air, the YD is set engaged without message or aural as soon as the yaw servo is supplied.

DSC.22.3.4 Flight Director

Ident.: DSC.22.3.4 — 05 NOV 2026
ALL

The FD shows on each PFD the pitch and roll commands that fly the active modes. The commands are satisfied when the aircraft symbol is kept on the bars. With the AP engaged, the AP flies the same commands.

Each FD pb sets the own-side bars on or off. The bars are shown:

- when an upper mode is active on either axis, or
- in basic modes (PITCH HOLD, HDG HOLD, WING LVL, ROLL HOLD), only when the AP is engaged.

If no vertical mode is active, the vertical command reverts to PITCH HOLD. If no lateral mode is active, the lateral command reverts to HDG HOLD, WING LVL or ROLL HOLD.

The FD modes are cancelled:

- by a second press on the mode pb,
- by the STBY pb (all modes),
- by the GA pb (all modes except LNAV),
- by a new mode on the same axis (it replaces the previous one),
- when the stall warning makes the AP disengage, or when the stall warning comes on in GA.

The FD bars and the FMA mode zones are lost with both FGCP channels (FGCP LOSS) or with both FD channels (AFCS FAIL). With one FD channel lost, FD SINGLE CH is shown on the FMA.

For the FD bars and the FMA symbols on the PFD, see DSC.31.5.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.22.4 AP / FD MODES

DSC.22.4.1 General

Ident.: DSC.22.4.1 — 05 NOV 2026
ALL

The modes are grouped as follows.

GROUP	MODES
Basic, vertical	PITCH HOLD
Basic, lateral	WING LVL, HDG HOLD, ROLL HOLD
Upper, vertical	ALT SEL (ALT*), ALT, VS, IAS, VNAV IAS, VNAV ALT, VNAV VS, VNAV PATH, PROT LEVEL
Upper, lateral	HDG SEL, LNAV, VOR, LOC (NAV pb), BC
Common	APP (LOC + GS, L-LOC + L-GS, or V-FP), GA

Some modes are first **armed** (cyan on the FMA), then **captured** (green, with a star) and then **held** or **tracked** (green). A mode that becomes active is boxed for 7 s. For the FMA layout and colours, see DSC.31.5.

- Only one lateral mode can be armed at a time. In vertical, one primary mode can be armed with ALT SEL as a second armed mode (for example ALT SEL / GS).
- If two vertical modes are armed, the first one whose capture conditions are met becomes active. The other stays armed.
- A mode that becomes active replaces the active mode of the same axis.

Bank angle limit

In all lateral modes the AFCS selects the bank limit automatically:

BANK LIMIT	SELECTED WHEN	FMA
LO BANK, 15°	IAS below VmHB, or RA below 1 000 ft	Green LO
HI BANK, 27°	IAS above VmHB + 5 kt and RA above 1 100 ft	Nothing

Between the two thresholds the previous limit is kept. The limit is also shown by two green ticks on the PFD roll scale.

DSC.22.4.2 Basic Modes

Ident.: DSC.22.4.2 — 05 NOV 2026
ALL

The basic modes are engaged by the AP pb when no FD mode is active, by the FD pb when both FD were off, by the STBY pb, and after a reversion. They are shown on the FMA only with the AP engaged or with an upper mode active on the other axis.

PITCH HOLD

Holds the pitch attitude present at engagement. A pitch above +15° or below -11° is brought back to the limit. The pitch wheel (0.5° per click) or the TCS pb changes the reference, within the same limits.

Lateral basic modes

BANK AT ENGAGEMENT	MODE
Below 3° for 10 s or more	HDG HOLD on the current heading (not on the heading bug)

cont'd... ►►►

cont'd... ►►►

BANK AT ENGAGEMENT	MODE
Below 6°	WING LVL. The wings are levelled, then HDG HOLD engages when the bank stays below 3° for 10 s.
6° or more	ROLL HOLD on the current bank, limited to the bank limit (15° or 27°)

The TCS pb changes the bank reference (see DSC.22.2.2). Above 50° of bank the AP disengages.

DSC.22.4.3 Vertical Modes

Ident.: DSC.22.4.3 — 05 NOV 2026
ALL

Altitude select (ALT SEL, ALT*)

ALT SEL arms automatically (cyan) when the aircraft flies toward the selected altitude in PITCH HOLD, VS, IAS, VNAV IAS, VNAV VS or VNAV PATH, and is more than 50 ft from it. It does not arm on the ground. After a STBY pb press it stays disarmed until the AP is engaged or an FD vertical mode is selected.

Near the selected altitude, ALT* (capture, green boxed) replaces the previous vertical mode. The capture starts at a distance that grows with the vertical speed, so that the level-off is smooth. At the selected altitude ALT* becomes ALT (hold).

During ALT*, a change of the selected altitude cancels the capture: ALT OFF (amber, 7 s) and reversion to PITCH HOLD. A GS capture has priority over ALT SEL, ALT* and ALT.

Altitude hold (ALT)

The ALT pb engages ALT on the altitude at the press and cancels the active vertical mode and any armed VNAV mode. The aircraft is levelled smoothly. The lateral mode is kept. In ALT, GS and the other vertical modes can be armed. The pitch wheel has no effect.

Vertical speed (VS)

The VS pb engages VS on the current vertical speed, rounded to 100 ft/min (or on a VS target already set). The target is shown in cyan on the PFD VS scale. The pitch wheel changes the target in 100 ft/min steps, between -6 000 and +6 000 ft/min, without leaving the mode. TCS released resynchronises the target to the current VS. ALT SEL arms if the VS is toward the selected altitude.

Indicated airspeed (IAS)

The IAS pb engages IAS on the ICP speed target (MAN: cyan, AUTO: magenta), or on the current IAS if no target has been set. The pitch is moved to keep the target; the SPD TGT knob changes it without leaving the mode. ALT SEL arms if the selected altitude is more than 50 ft away. The pitch wheel has no effect.

VNAV

The VNAV pb engages the FMS vertical guidance. For the FMS vertical profile, see FMS.02.3.

The press is refused when:

- LNAV is not engaged (on the ground, LNAV armed is enough): SELECT LNAV, yellow, 7 s,
- the selected altitude is below the aircraft in a climb phase, above it in a descent phase, or ALT* is in progress: CHECK ALT SEL, yellow, 7 s.

AIRCRAFT VS. FMS ALTITUDE	MODE ENGAGED
Below (climb)	VNAV IAS: holds the speed target (FMS speed in AUTO, ICP speed in MAN). On the ground VNAV IAS is armed and engages at lift-off.

cont'd... ►►►

cont'd... ►►►

AIRCRAFT VS. FMS ALTITUDE	MODE ENGAGED
Above (descent), more than 5 min before the top of descent	VNAV VS at -1 500 ft/min, ALT SEL armed
Above (descent), within 5 min of the top of descent	VNAV PATH: follows the FMS descent path, ALT SEL armed
At the FMS altitude	VNAV ALT armed

In VNAV IAS the level-off altitude follows the FMS: the next altitude constraint, the FMS level-off or the selected altitude, whichever comes first. If the crew sets a new selected altitude in the climb, the aircraft levels at the new value. VNAV ALT* (capture) and VNAV ALT (hold) level the aircraft at that altitude.

After a level-off on an FMS altitude constraint, VNAV continues automatically once the constraint waypoint is passed (VNAV IAS to climb, VNAV VS to descend). After a level-off on the selected altitude, press the VNAV pb again to continue.

VNAV reversions

EVENT	RESULT	MESSAGE / AURAL
LNAV is no longer active or armed: HDG, VOR, LOC or BC selected, NAV pb pressed off, CPL or NAV SOURCE change, FMS LNAV lost (discontinuity, end of flight plan)	All VNAV modes and V-FP, armed or active, are cancelled. The vertical axis reverts to PITCH HOLD.	None (PITCH HOLD boxed)
The selected altitude is set on the wrong side: below the aircraft in VNAV IAS, above it in VNAV VS or VNAV PATH	Reversion to PITCH HOLD	VNAV OFF (amber, 7 s), triple click

DSC.22.4.4 Lateral Modes

Ident.: DSC.22.4.4 — 05 NOV 2026
ALL

Heading select (HDG SEL)

The HDG pb engages HDG SEL on the heading bug and cancels the active and armed lateral modes (including LNAV). The aircraft turns to the selected heading. A heading selected before HDG SEL is engaged gives a turn the shortest way. When the bug is turned with the AP engaged in HDG SEL, the aircraft turns in the direction the bug was turned, also beyond 180°.

LNAV

With an FM source on the coupled side, the NAV pb arms LNAV (cyan). HDG SEL or HDG HOLD can be used to reach the flight plan. LNAV becomes active (green boxed) when the FMS takes the guidance on the active leg. It then flies the FMS lateral path and its transitions.

LNAV is cancelled when:

- HDG, APP or BC is pressed, or NAV is pressed again,
- the coupled-side NAV SOURCE is set to V/ILS, or the coupled side is changed (CHECK NAV SRC),
- the FMS stops the guidance (flight plan discontinuity, last waypoint). The lateral axis reverts to HDG HOLD on the current heading.

The loss of LNAV cancels VNAV (see DSC.22.4.3).

VOR

With a V/ILS source on the coupled side and a VOR frequency tuned, the NAV pb arms VOR (cyan). Set the course with the coupled-side CRS knob. VOR* (capture) engages when the signal is valid and the deviation is less than 2 dots. VOR

cont'd... ►►►

cont'd... ►►►

(track) follows.

LOC (NAV pb)

With a V/ILS source and an ILS frequency tuned, the NAV pb arms LOC, lateral only (GS does not arm). The sequence is LOC (cyan), LOC* (capture), LOC (track). A press on APP then arms GS and the approach continues as in APP mode.

Back course (BC)

The BC pb arms BC (cyan) with a V/ILS source and an ILS frequency tuned on the coupled side. Set the course to the published inbound track. BC* (capture) and BC (track) follow, as for the front course. GS does not arm. If the source or the frequency is wrong, BC does not arm and CHECK NAV SRC (yellow, 7 s) is shown.

Enhanced LOC / BC capture

The LOC and BC captures anticipate the beam more when the enhanced capture is available, and less when only the basic capture is available (expect an overshoot). The enhanced capture is available when:

- the FMS estimated position error is below 0.1 NM within 10 NM of the localizer (0.3 NM within 25 NM),
- the interception angle is 170° or less,
- the coupled-side course agrees with the FMS database course.

An EPE or course failure raises the ENHANCED LOC* or ENHANCED BC* caution on the EWD (see DSC.22.5.3).

DSC.22.4.5 Common Modes

Ident.: DSC.22.4.5 — 05 NOV 2026
ALL

ILS approach (APP)

The APP pb arms LOC and GS (cyan) when the coupled side has a V/ILS source and an ILS frequency tuned (the beam need not be received yet). With an FM source, no ILS tuned, or a FROM indication, APP does not arm and CHECK NAV SRC (yellow, 7 s) is shown.

- During LOC arm, HDG SEL or HDG HOLD steers the aircraft. Any vertical mode can be used during GS arm.
- LOC* engages when the deviation (with anticipation) is less than 2 dots. From LOC*, the FMA shows the approach capability: CAT 2 when both receivers are tuned to the same ILS, both courses agree and both receivers are supplied, otherwise CAT 1.
- GS can only be captured after the LOC. GS* engages when the glide deviation is less than 1 dot and the deviation predicted 5 s ahead is less than 0.3 dot. GS* replaces any vertical mode and ALT SEL is disarmed.
- LOC and GS track follow. Dual coupling engages below 1 200 ft RA (see DSC.22.1.3).
- If a CAT 2 condition is lost during the approach: CAT 2 INVALID (amber, 7 s) and triple click.
- With CAT 2 shown, below 300 ft RA: LOC deviation above 1.5 dots, or GS deviation above 1 dot (between 300 and 100 ft RA), for 7 s gives EXCESS DEV on the FMA.

The altitude alert is inhibited in GS, L-GS and V-FP.

LPV / LP approach (L-LOC, L-GS)

With an LPV approach in the active flight plan, APP arms L-LOC and L-GS (L-LOC only for an LP approach). Guidance comes from the FMS (GPS / SBAS), not from the ILS receivers. The press is refused with SELECT VTF (no vector-to-final and LNAV not engaged) or APP INVALID (LPV capability lost). With LNAV engaged, L-LOC engages 2 NM before the FAF. The FMA shows LPV or LP in the approach capability zone.

FMS approach (V-FP)

With a non-precision (LNAV / VNAV) approach in the active flight plan, the APP pb arms V-FP (cyan). The press is refused with:

cont'd... ►►►

cont'd... ►►►

- APP INHIB (yellow, 7 s) if no FAF is ahead in the flight plan or the FMS flight phase is not cruise, descent or approach,
- SELECT LNAV if LNAV is not engaged or armed.

V-FP does not need VNAV: APP alone is enough. V-FP becomes active 2 NM before the FAF, with LNAV engaged, if the aircraft is within 150 ft of the FMS vertical path. It then follows the FMS final path and ignores the selected altitude (ALT SEL is disarmed). Off the path, V-FP stays armed.

Go-around (GA)

GA is an FD mode only. The GA pb disengages the AP and engages GA in vertical with HDG HOLD (or LNAV if engaged) in lateral (see DSC.22.2.3). The FD commands a fixed climb flight path of +7°.

GA is cancelled when:

- another vertical mode is selected,
- the AP is engaged (PITCH HOLD replaces GA),
- the STBY pb is pressed,
- both FGCP channels are lost while GA has been active for 0.9 s or more,
- the stall warning comes on (PITCH HOLD replaces GA).

DSC.22.4.6 Protections

Ident.: DSC.22.4.6 — 05 NOV 2026
ALL

Flight path angle protection

The protection stops the climb from ending when the IAS target changes a lot (flap retraction) or in a downdraft. It is available:

- in IAS mode, during the first 180 s after lift-off,
- in VNAV IAS mode,
- in GA mode, during 180 s after a go-around started below 500 ft RA (or with the RA failed).

When the flight path angle reaches +0.5° and keeping the IAS target would reduce it further, the AFCS holds +0.5°. If the protection stays active for 20 s with the IAS below VmHB, PITCH HOLD replaces the active vertical mode (boxed) and a triple click sounds.

High speed protection

Available with the AP engaged, flaps 0 or 15, descending, in VNAV PATH, VNAV VS, VS, ALT* or PITCH HOLD.

CONFIGURATION	TARGET	REDUCE SPD AND TRIPLE CLICK AFTER
Flaps 0	Vmax - 2.5 kt (Vmax 250 kt)	6 s
Flaps 15	Vmax - 5 kt (Vmax 185 kt)	3 s

The AFCS reduces the descent rate, down to level flight if needed, to keep the target. If the AP disengages while the protection is active in VS, ALT*, VNAV PATH or VNAV VS, the vertical mode is cancelled and REDUCE SPD stays 7 s. PITCH HOLD replaces it. If the lateral mode is a basic mode, both FD are set off.

Low speed protection

Available with the AP engaged, flaps 0 or 15, climbing, in ALT*, VNAV ALT*, VS or PITCH HOLD. When the IAS reaches Vmin OPS, the AFCS reduces the climb to keep Vmin OPS. After 3 s, MONITOR SPD is shown. When the vertical speed reaches zero, PROT LEVEL replaces the vertical mode and holds level flight: MONITOR SPD flashes for 7 s and a triple click sounds. PROT LEVEL is cancelled by STBY, by a new vertical mode, or by the capture of an armed mode. It remains as an FD mode if the AP disengages.

cont'd... ►►►

cont'd... ►►►

If the AP disengages with MONITOR SPD shown before PROT LEVEL, in VS or ALT*, the vertical mode is cancelled and MONITOR SPD stays at least 7 s. The FD behaves as for REDUCE SPD.

Complementary low speed alert

In flight above 80 ft, without PROT LEVEL, SPEED SPEED flashes on the FMA with a triple click when the IAS goes below Vmin OPS - 5 kt (flaps 0 or 15) or Vmin OPS - 3 kt (flaps 30). It goes when the IAS is above Vmin OPS. With PROT LEVEL engaged, the alert comes below Vmin OPS + 1 kt and goes above Vmin OPS + 10 kt.

DSC.22.4.7 Altitude Alert

Ident.: DSC.22.4.7 — 05 NOV 2026
ALL

The altitude alert warns the crew when the aircraft approaches or leaves the selected altitude.

ZONE	ALERT
Between 250 ft and 1 000 ft from the selected altitude	The selected altitude readout on the PFD is framed in flashing amber.
Entering this zone, from either side	C chord

A new selected altitude cancels the alert until the value has been stable for 1 s. The alert is inhibited in GS, L-GS and V-FP, and lost with both FGCP channels.

DSC.22.5 ALERTS AND MESSAGES

DSC.22.5.1 General

Ident.: DSC.22.5.1 — 05 NOV 2026
ALL

The AFCS alerts the crew in three ways:

- messages on the FMA message lines of both PFD (this section and DSC.31.5),
- cautions on the EWD with the amber MASTER CAUTION and a single chime (see DSC.31.7),
- specific aurals: cavalry charge, triple click and C chord (see DSC.31.12).

Display styles used in the tables:

STYLE	MEANING
Flashing	Reverse video, flashing until reset
RV 7 s, steady	Reverse video flashing for 7 s, then steady until the condition clears
RV 7 s	Reverse video flashing for 7 s, then removed
Flash 7 s	Text flashing for 7 s, then removed
Steady 7 s	Text steady for 7 s, then removed
Steady	Text steady while the condition exists

DSC.22.5.2 FMA Messages

Ident.: DSC.22.5.2 — 07 NOV 2026
ALL

Engagement and disengagement

Each message is shown as the PFD draws it. A message with a 7 s reverse video phase is shown in both phases: reverse video above, steady below.

MESSAGE	COLOUR / STYLE	AURAL	CAUSE
AP DISENG	White on red, flashing	Cavalry charge	AP disengaged, manually or automatically (see DSC.22.3.2). Reset by the AP DISC pb.
AP/YD DISENG	White on red, flashing	Cavalry charge	AP and YD disengaged together. Reset by the AP DISC pb.
YD DISENG	Amber reverse video, flashing	None	YD disengaged with the AP off. Reset by the AP DISC pb.
AP INHIBIT	Yellow, steady 7 s	None	AP pb pressed while an engagement condition is not met.
YD INHIBIT	Yellow, steady 7 s	None	YD pb pressed on the ground, or with an AHRS / ADC monitoring failure.
SPD HLD INHIBIT	Yellow, steady 7 s	None	SPD HLD pb pressed (function not installed).
FD SINGLE CH FD SINGLE CH	Amber, RV 7 s, steady	None	One FD channel lost.
FD SINGLE SRC	Amber, steady	None	Single AHRS and/or single ADC selected on the switching panel.
TCS	Green, in the AP status zone	None	TCS pb held with the AP engaged.

cont'd... ►►►

cont'd... ►►►

Navigation and modes

MESSAGE	COLOUR / STYLE	AURAL	CAUSE
CHECK NAV SRC	Yellow, flash 7 s	None	APP, BC or NAV pressed with a wrong source on the coupled side: FM source, no ILS tuned, or FROM indication.
CHECK NAV SRC CHECK NAV SRC	Amber, RV 7 s, steady	None	An armed or active navigation mode was cancelled by a NAV SOURCE change, a CPL change, or a loss of the navigation signal. Cleared by another FD mode pb or the STBY pb.
ATT INVALID	Yellow, flash 7 s	None	AHRS failure or disagreement (shown after the AP/YD DISENG reset).
ADC INVALID	Yellow, flash 7 s	None	ADC failure or disagreement (shown after the AP/YD DISENG reset).
HDG INVALID	Yellow, flash 7 s	None	Heading disagreement or failure. The AP is not disengaged.
NAV INVALID	Yellow, flash 7 s	None	Navigation receiver failure or loss after the beam was received.
FD MODE CHG FD MODE CHG	Amber, RV 7 s, steady	None	An AHRS failure cancelled the FD modes, or APP was not armed 2 NM before the FAF on an LPV approach. Cleared by an AHRS source change, another FD mode or STBY.
ALT OFF	Amber, RV 7 s	None	ALT SEL changed during ALT*: reversion to PITCH HOLD.
VNAV OFF	Amber, flash 7 s	Triple click	Selected altitude set on the wrong side of the aircraft in a VNAV climb or descent: reversion to PITCH HOLD.
SELECT LNAV	Yellow, flash 7 s	None	VNAV or V-FP selected without LNAV engaged.
CHECK ALT SEL	Yellow, flash 7 s	None	VNAV selected with the selected altitude on the wrong side, or during ALT*.
APP INHIB	Yellow, flash 7 s	None	V-FP selected with no FAF ahead, or in a wrong flight phase.
APP INVALID	Yellow, flash 7 s	None	LPV selected while the LPV capability is lost.
SELECT VTF	Yellow, flash 7 s	None	LPV selected with no vector-to-final and LNAV not engaged.
SPD AUTO INOP	Yellow, flash 7 s	None	AUTO/MAN pb pressed to AUTO with no valid FMS speed target.
SPD AUTO INOP	Amber, RV 7 s	None	FMS speed target lost in AUTO: the speed target reverts to MAN.
CHECK T/O SPEED CHECK T/O SPEED	Amber, RV 7 s, steady	None	Icing selection on the VCP does not agree with the icing conditions.
STEEP APP	Green, steady	None	Steep approach selected.
AFCS TEST	Amber, flashing	None	AFCS maintenance test in progress.

Approach

MESSAGE	COLOUR / STYLE	AURAL	CAUSE
CAT1 CAT2	Green	None	Approach capability, from LOC* (see DSC.22.4.5).
LPV LP	Green	None	LPV or LP approach, from L-LOC.
DUAL	Green	None	Dual coupling active.
CAT2 INVALID	Amber, RV 7 s	Triple click	A CAT 2 condition was lost during the approach.

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

MESSAGE	COLOUR / STYLE	AURAL	CAUSE
EXCESS DEV EXCESS DEV	White on red, RV 7 s, then amber steady	None	Excessive LOC or GS deviation below 300 ft RA with CAT 2 shown.

Speed and trim

MESSAGE	COLOUR / STYLE	AURAL	CAUSE
REDUCE SPD REDUCE SPD	Amber, RV 7 s, steady	Triple click	High speed protection active (see DSC.22.4.6).
MONITOR SPD MONITOR SPD	Amber, RV 7 s, steady	Triple click at PROT LEVEL	Low speed protection active, or PROT LEVEL engaged.
SPEED SPEED	Amber reverse video, flashing	Triple click	IAS far below Vmin OPS (complementary low speed alert).
RETRIM ROLL L WING DN RETRIM ROLL L WING DN RETRIM ROLL R WING DN RETRIM ROLL R WING DN	Amber, RV 7 s, steady	None	Roll servo at its first load threshold: trim the roll.
RETRIM A/C NOSE L RETRIM A/C NOSE L RETRIM A/C NOSE R RETRIM A/C NOSE R	Amber, RV 7 s, steady	None	Yaw servo at its first load threshold: trim the rudder.
PITCH MISTRIM PITCH MISTRIM	Amber, RV 7 s, steady	Single chime	Pitch servo load above the threshold. Also on the EWD.
AILERON MISTRIM AILERON MISTRIM	Amber, RV 7 s, steady	Single chime	Roll servo at its second load threshold. Also on the EWD.
RUDDER MISTRIM RUDDER MISTRIM	Amber, RV 7 s, steady	Single chime	Yaw servo at its second load threshold. Also on the EWD.
AP PITCH TRIM FAIL AP PITCH TRIM FAIL	Amber, RV 7 s, steady	Single chime	The AFCS cannot drive the pitch trim with the AP engaged. Also on the EWD.
YAW AUTO TRIM FAIL YAW AUTO TRIM FAIL	Amber, RV 7 s, steady	Single chime	The AFCS cannot drive the yaw trim. Also on the EWD.

When a MISTRIM or TRIM FAIL message is shown, disengage the AP and fly the aircraft manually, holding the control forces.

A pitch servo load that reaches the AP effort limit (10 daN) disengages the AP (see DSC.22.3.2).

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

SIMULATOR NOTE

The servo loads are not measured. They are computed as the force at the control (column, wheel or pedals) from the control surface position away from its trimmed position and the airspeed. The thresholds are design values:

MESSAGE	LOAD	HELD FOR
RETRIM ROLL L / R WING DN	2.2 daN	4 s
AILERON MISTRIM	8 daN	4 s
PITCH MISTRIM	7 daN	3 s
RETRIM A/C NOSE L / R	8.9 daN	4 s
RUDDER MISTRIM	11 daN	4 s
AP disengagement (pitch effort limit)	10 daN	2 s

The roll servo load used for RETRIM ROLL and AILERON MISTRIM is the load the AP keeps holding: it is averaged over about 10 s and only while the wings are steady and level (bank below 5°), so turns do not raise them. A standing roll load shows in wings-level flight.

The yaw servo load is limited by the YD authority: below about 185 kt RUDDER MISTRIM cannot be reached, and a yaw mistrim then shows as RETRIM ROLL or AILERON MISTRIM.

DSC.22.5.3 EWD Cautions

Ident.: DSC.22.5.3 — 05 NOV 2026
ALL

All these cautions come with the amber MASTER CAUTION flashing and a single chime.

EWD MESSAGE	CONDITION
PITCH MISTRIM	Pitch servo load above the AP trim threshold. The pitch trim pointer on the EWD becomes amber.
AILERON MISTRIM	Roll servo at its second load threshold (wrong roll trim, or excessive yaw trim).
RUDDER MISTRIM	Yaw servo at its second load threshold. The rudder trim pointer becomes amber.
AP PITCH TRIM	Failure of the AFCS pitch autotrim.
YAW AUTOTRIM	Failure of the AFCS yaw autotrim (yaw trim servo not healthy).
FGCP SGL CH	One FGCP channel lost.
FGCP LOSS	Both FGCP channels lost. FD bars and altitude alert lost. An engaged AP / YD stays engaged; neither can be engaged again.
YD DEGRADED	YD engaged in flight with an AHRS or an ADC in single source and IAS below 160 kt.
ENHANCED LOC*	Enhanced LOC capture not available: EPE not sufficient, or coupled-side course different from the FMS database course.
ENHANCED BC*	Same conditions in BC mode.

DSC.22.5.4 Aurals

Ident.: DSC.22.5.4 — 05 NOV 2026
ALL

AURAL	CAUSE
Cavalry charge (continuous)	AP disengagement (with or without the YD). Stops with the AP DISC pb, or when the AP is engaged again.

cont'd... ►►►

cont'd... ►►►

AURAL	CAUSE
Triple click	CAT2 INVALID, REDUCE SPD, MONITOR SPD at PROT LEVEL, SPEED SPEED, VNAV OFF, reversion to PITCH HOLD by the flight path angle protection
C chord	Altitude alert: entering the zone 250 ft to 1 000 ft from the selected altitude
Single chime	AFCS cautions on the EWD

FGCP power-up test

At each power-up of the FGCP, after the flight controls built-in test has passed, the AP, YD and CPL arrows flash in sequence. When the CPL arrows go off after their first flash, the C chord sounds, followed by one cavalry charge. These aurals are part of the test and do not mean an AP disengagement.

SIMULATOR NOTE

When a flight is loaded with the aircraft already powered or with the engines running, the power-up test is skipped.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.24.1 GENERAL

DSC.24.1.1 Sources

Ident.: DSC.24.1.1 — 05 NOV 2026
ALL

Electrical power comes from:

- two batteries: the MAIN BAT and the EMER BAT,
- two DC starter / generators (DC GEN 1 and 2), driven by the engine accessory gearboxes,
- two AC wild frequency generators (ACW GEN 1 and 2), driven by the propeller reduction gearboxes,
- two ground power units, one DC and one AC, each with its own receptacle.

Two static inverters (INV 1 and 2), supplied by the DC network, give constant frequency AC power (115 V and 26 V, 400 Hz). A Transformer Rectifier Unit (TRU) lets the ACW network supply the essential part of the DC network.

SOURCE	RATING
MAIN BAT	24 V Ni-Cd, 43 Ah. Engine starting and emergency supply
EMER BAT	24 V Ni-Cd, 17 Ah. Emergency network, and protection of critical equipment against transients during engine starts
DC GEN 1, 2	12 kW (400 A), 28 V network
ACW GEN 1, 2	20 kVA, 115 / 200 V three phase, 341 to 488 Hz (70 to 100 % NP)
INV 1, 2	500 VA, 115 V and 26 V single phase, 400 Hz
TRU	Supplied by ACW BUS 2, delivers 28 V DC

DSC.24.1.2 Architecture

Ident.: DSC.24.1.2 — 05 NOV 2026
ALL

The network has a left side and a right side. In normal operation each side runs on its own generator. Bus Tie Contactors (BTC) connect the two sides automatically when a source is lost or when ground power is used.

The DC network has eleven buses:

BUS	NORMAL SUPPLY
DC BUS 1	DC GEN 1
DC BUS 2	DC GEN 2
HOT EMER BAT BUS	DC BUS 1 through the EMER BAT charge contactor, else the EMER BAT
HOT MAIN BAT BUS	DC BUS 2 through the MAIN BAT charge contactor, else the MAIN BAT
DC EMER BUS	HOT EMER BAT BUS
DC ESS BUS (SECT 1, SECT 2)	HOT MAIN BAT BUS
DC STBY BUS	Same source as the DC EMER BUS or as the DC ESS BUS (changeover)
UTLY BUS 1, UTLY BUS 2	Associated main DC BUS
DC SVCE BUS	DC BUS 1, or the DC GPU
GND HDLG BUS	DC SVCE BUS, or the HOT MAIN BAT BUS (ground only)

The AC networks are:

cont'd... ►►►

cont'd... ►►►

BUS	NORMAL SUPPLY
AC BUS 1 (115 V and 26 V)	INV 1
AC BUS 2 (115 V and 26 V)	INV 2
AC STBY BUS (115 V and 26 V)	INV 1, else INV 2
ACW BUS 1	ACW GEN 1
ACW BUS 2	ACW GEN 2
ACW SVCE BUS	ACW BUS 1, or the AC GPU

The DC part is described in DSC.24.2, the AC parts in DSC.24.3, the controls and indications in DSC.24.4 and the circuit breakers in DSC.24.5.

DSC.24.1.3 Schematic

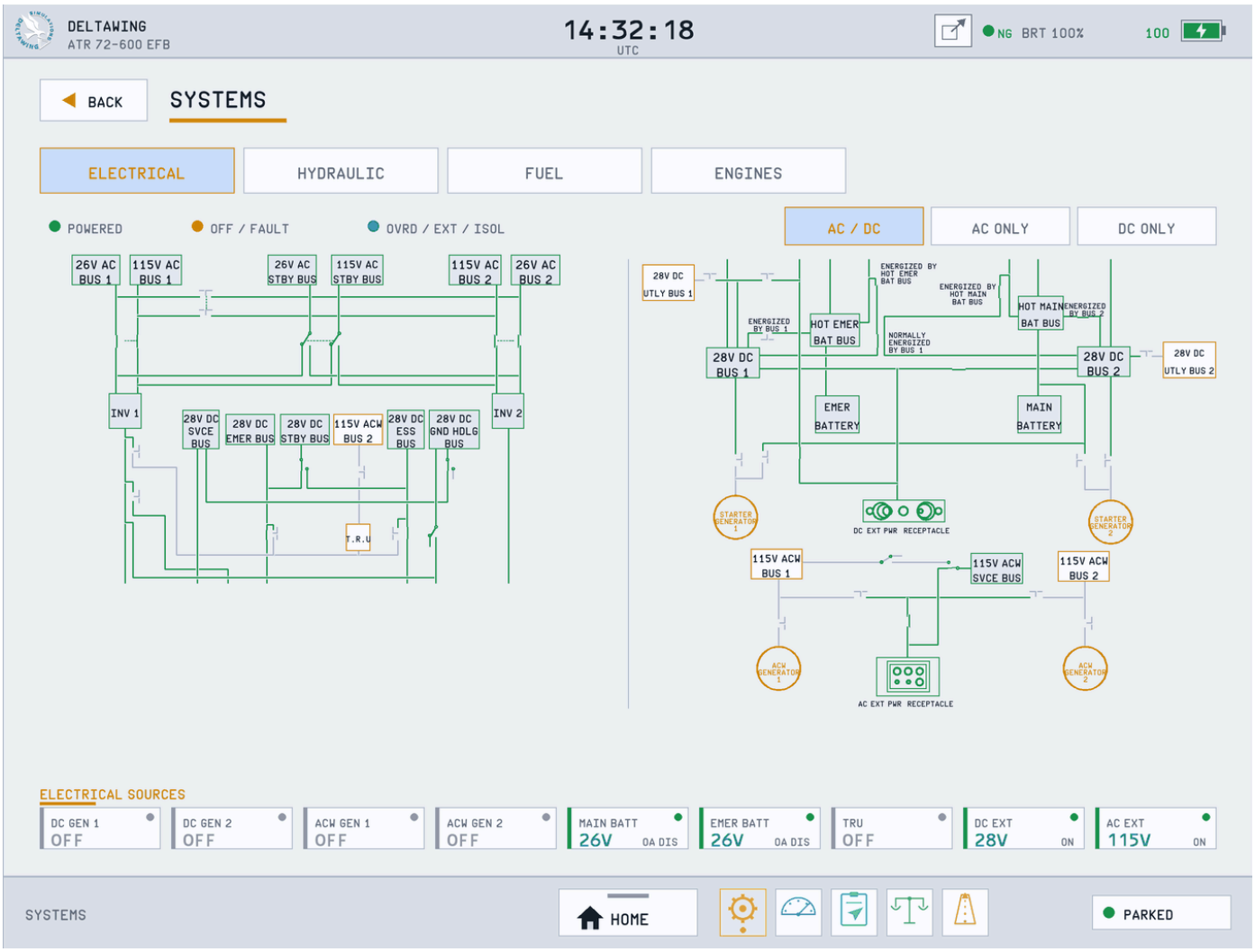
Ident.: DSC.24.1.3 — 05 NOV 2026

SIMULATOR ONLY

The EFB **SYSTEMS** app, ELECTRICAL tab, shows the live single-line schematic of the whole network. Powered conductors are green, sources that are off or failed are amber, and override, external power or isolated states are blue. The AC / DC, AC ONLY and DC ONLY keys filter the drawing. The ELECTRICAL SOURCES row at the bottom gives the state and voltage of each source.

cont'd... ►►►

cont'd... ►►►



EFB SYSTEMS, ELECTRICAL tab: on the ground with the DC and AC GPUs on line, engines stopped

PAGE

INTENTIONALLY

LEFT BLANK

DSC.24.2 DC POWER

DSC.24.2.1 Batteries

Ident.: DSC.24.2.1 — 05 NOV 2026
ALL

Each battery is permanently connected to its HOT BAT BUS:

- the MAIN BAT to the HOT MAIN BAT BUS. It is used for engine starting and as the emergency source of the DC ESS BUS, the DC STBY BUS and INV 1,
- the EMER BAT (17 Ah) to the HOT EMER BAT BUS. It is the emergency source of the DC EMER BUS. During engine starts it carries the emergency network, so that critical equipment does not see the starter voltage drop.

The BAT toggle switch connects the batteries to the emergency network (see DSC.24.4). With the BAT sw OFF, the HOT BAT BUSES stay supplied.

Each battery is charged from one main DC BUS only, through its Battery Charge Contactor (BCC):

- MAIN BAT: from DC BUS 2, through the MAIN BAT CHG contactor,
- EMER BAT: from DC BUS 1, through the EMER BAT CHG contactor.

The MFC controls the two BCCs and monitors the batteries (see DSC.24.2.6).

The battery voltage falls with the state of charge and with the discharge current. The batteries are modelled with their capacity, internal resistance and temperature.

DSC.24.2.2 DC Starter / Generators

Ident.: DSC.24.2.2 — 05 NOV 2026
ALL

Each engine accessory gearbox drives one DC starter / generator. Its Generator Control Unit (GCU) controls the generator contactor (GC) and the start contactor.

Starter mode

When the crew starts an engine, the starter / generator becomes a starter. It is supplied by:

- the MAIN BAT, or
- the DC GPU, when DC EXT PWR is ON, or
- the MAIN BAT and the generator of the running engine, on the ground only (cross start).

The starter drives the engine up to 45 % NH. Then the start sequence ends and the starter drops out. Refer to DSC.70 for the start sequence.

Cross start: during a start on the MAIN BAT, on the ground, the generator of the running engine assists the starter from 10 % NH. Its current reaches the starting side through the BTC, so the BTC must be able to close (BTC pb not on ISOL). If the running generator does not come on line between 10 % and 45 % NH, the X START FAIL light comes on and the EWD shows ENG X START.

Generator mode

When the start sequence is complete and NH is at least 61.5 %, the starter / generator works as a generator. With its DC GEN pb ON and DC EXT PWR not in use, the GC closes and the generator supplies its own DC BUS. The generator goes off line when the engine runs down below 45 % NH.

The GCU protects the generator against:

- overvoltage and undervoltage,
- reverse current,

cont'd... ►►►

cont'd... ►►►

- differential fault current (DC BUS short circuit),
- overload (see DSC.24.2.6).

A protection trip opens the GC and lights the DC GEN pb FAULT legend. The trip is latched: to reset it, select the DC GEN pb OFF, then ON. If the fault is still present, the GCU trips again.

DSC.24.2.3 DC External Power

Ident.: DSC.24.2.3 — 05 NOV 2026
ALL

The DC GPU connects to the DC receptacle on the lower right side of the forward fuselage. When it is connected, the EXT PWR pb AVAIL legend comes on and EXT DC AVAIL is shown on the MFD AC/DC page.

With the EXT PWR pb ON, the DC GPU has priority over the generators:

- it supplies DC BUS 1, and DC BUS 2 through the BTC, which closes automatically,
- the GCs stay open while the generators run, so the DC GEN pb FAULT legends are on.

With the BTC pb on ISOL, the DC GPU cannot reach DC BUS 2, which stays on DC GEN 2 if it is on line.

The DC GPU also supplies the DC SVCE BUS directly, when the cabin attendant panel GND SVCE BUS DC key is ON. This needs neither the EXT PWR pb nor the batteries.

SIMULATOR NOTE

The GPU is connected and removed on the EFB **GROUND** page. One GPU cart has two cables, one DC and one AC: connect either one or both.

DSC.24.2.4 Distribution

Ident.: DSC.24.2.4 — 05 NOV 2026
ALL

DC BUS 1 and DC BUS 2

DC BUS 1 is supplied by DC GEN 1 and DC BUS 2 by DC GEN 2, with the BTC open. When one generator is lost, the BTC closes and the remaining generator supplies both buses. When both are lost, the BTC opens and both main DC BUSES are lost.

HOT BAT BUSES

The HOT EMER BAT BUS is supplied by DC BUS 1 and the HOT MAIN BAT BUS by DC BUS 2, each through its BCC. When the BCC is open, or the main DC BUS is lost, the HOT BAT BUS is supplied by its battery.

The BCCs open for every engine start, so both HOT BAT BUSES run on their batteries during the start.

DC EMER BUS, DC ESS BUS and DC STBY BUS

In normal operation the DC EMER BUS takes the HOT EMER BAT BUS and the DC ESS BUS takes the HOT MAIN BAT BUS, both through the BAT sw.

Each bus takes the first available source in this order:

BUS	1st	2nd	3rd	4th
DC EMER BUS	TRU (TRU pb ON and TRU on line)	HOT EMER BAT BUS (BAT sw ON)	DC BUS 1 (transfer)	DC BUS 2 (transfer)
DC ESS BUS	TRU (TRU pb ON and TRU on line)	HOT MAIN BAT BUS (BAT sw ON)	DC BUS 1 (transfer)	DC BUS 2 (transfer)

cont'd... ►►►

cont'd... ►►►

The bus transfers to DC BUS 1, or to DC BUS 2 if DC BUS 1 is not powered (main bus transfer contactor), only when its battery is in thermal runaway or when its HOT BAT BUS is not supplied.

With the BAT sw OFF, the DC ESS BUS is isolated from the HOT MAIN BAT BUS and the DC EMER BUS from the HOT EMER BAT BUS. There is no transfer: unless the TRU supplies them, the DC ESS BUS, the DC EMER BUS and the DC STBY BUS are not supplied, even with the generators or the GPU on line.

If a feeder C/B between the HOT BAT BUS and the DC EMER BUS (or DC ESS BUS) is open, the bus is lost. It does not transfer to DC BUS 1 or 2.

The DC STBY BUS has a changeover. It takes the same source as:

- the DC EMER BUS, when a main DC BUS is powered, when the ENG START rotary selector is out of OFF & START ABORT, or when the OVRD UND/V pb is pressed,
- the DC ESS BUS, in the other cases (batteries only).

DC ESS BUS sections

The DC ESS BUS has two sections, SECT 1 and SECT 2. On the HOT MAIN BAT BUS each section has its own feeder C/B, so one section can be lost alone. On the TRU or on a main DC BUS both sections are supplied together. The loss of one section gives no alert.

UTLY BUS 1 and 2

Each UTLY BUS is supplied by its own main DC BUS only, through a utility bus contactor. The cockpit DC SVCE/UTLY BUS pb must be ON. The BPCU sheds the UTLY BUSES automatically (see DSC.24.2.6).

DC SVCE BUS

The DC SVCE BUS supplies cabin servicing loads in flight and on the ground. It is supplied by:

- DC BUS 1, when both the cockpit DC SVCE/UTLY BUS pb and the cabin attendant panel GND SVCE BUS DC key are ON,
- the DC GPU, when it is connected and the cabin attendant key is ON (the cockpit pb has no effect).

GND HDLG BUS

The GND HDLG BUS supplies ground servicing loads. It is always lost in flight. On the ground it is supplied:

- from the DC SVCE BUS, when a GPU is connected, or when the BAT sw is ON and a DC generator is on line,
- otherwise from the HOT MAIN BAT BUS, through the GND HDLG BUS ON BAT XF relay, when the cargo door operating panel or the entry door is open.

SIMULATOR NOTE

The refuelling panel microswitch is not modelled: an open refuelling panel does not supply the GND HDLG BUS from the HOT MAIN BAT BUS.

DSC.24.2.5 DC Supply Configurations

Ident.: DSC.24.2.5 — 05 NOV 2026 — ALL

CONFIGURATION	DC BUS 1 / DC BUS 2	DC EMER BUS	DC ESS BUS	DC STBY BUS	INV 1
DC GPU, EXT PWR ON	GPU / GPU through BTC	HOT EMER BAT BUS (DC BUS 1)	HOT MAIN BAT BUS (DC BUS 2)	As DC EMER	DC BUS 1
Both DC GEN on line	GEN 1 / GEN 2, BTC open	HOT EMER BAT BUS (DC BUS 1)	HOT MAIN BAT BUS (DC BUS 2)	As DC EMER	DC BUS 1

cont'd... ►►►

cont'd... ►►►

CONFIGURATION	DC BUS 1 / DC BUS 2	DC EMER BUS	DC ESS BUS	DC STBY BUS	INV 1
One DC GEN on line	Remaining GEN, BTC closed	HOT EMER BAT BUS (DC BUS 1)	HOT MAIN BAT BUS (DC BUS 2)	As DC EMER	DC BUS 1
Both DC GEN lost, TRU OFF	Lost	EMER BAT	MAIN BAT	As DC ESS (MAIN BAT)	MAIN BAT
Both DC GEN lost, OVRD pressed	Lost	EMER BAT	MAIN BAT	As DC EMER (EMER BAT)	As DC EMER (EMER BAT)
TRU ON and on line	Unchanged	TRU	TRU	TRU	TRU
Engine start	Unchanged	EMER BAT (BCC open)	MAIN BAT (BCC open)	As DC EMER	Unchanged

INV 2 is supplied by DC BUS 2 only. When DC BUS 1 is lost and DC BUS 2 is powered, INV 1 is not supplied: AC BUS 1 then takes INV 2 through the AC bus tie (see DSC.24.3).

DSC.24.2.6 Load Shedding and Protections

Ident.: DSC.24.2.6 — 05 NOV 2026
ALL

Automatic load shedding

When both DC generators are lost and the DC GPU does not supply the network, the BPCU sheds UTLY BUS 1 and 2 after 1 s. When only the batteries remain, it also sheds the DC SVCE BUS (DC BUS 1 path). The buses come back when a generator is on line again.

Source overload

Each DC generator is monitored against its time-at-load limits. When a generator stays overloaded, the BPCU acts in steps:

1. it sheds the UTLY BUS (and the DC SVCE BUS, when it is on DC BUS 1) supplied by that generator. The SHED legend comes on,
2. it locks the BTC open,
3. the GCU isolates the generator: the DC GEN pb FAULT legend comes on.

The shed is reset with the DC SVCE/UTLY BUS pb OFF, then NORM. The BTC lock-out and the generator isolation are reset by cycling the DC GEN pb.

The inverters and the TRU are monitored in the same way. An overloaded inverter shows INV FAULT. An overloaded TRU stops supplying.

DC BUS short circuit

The GCU differential protection trips the generator of the shorted bus. The BTC stays open, so the bus is not tied to the healthy side, and the DC GPU cannot supply it either. The buses downstream follow the transfer rules above.

Battery charge contactors

With the MAIN (EMER) BAT CHG pb ON, the MFC keeps the BCC closed. It opens it when:

- the battery is in thermal runaway,
- its own main DC BUS (DC BUS 2 for MAIN, DC BUS 1 for EMER) is lost or below 25 V. It closes again when the bus is back above 26 V for 2 s,
- the ENG START rotary selector is on CRANK or on a START position. Both BCCs open, and close again when the selector is back on OFF & START ABORT,

cont'd... ►►►

cont'd... ►►►

- the BAT sw is on OVRD.

These are normal protective openings: they do not light CHG FAULT.

Battery thermal runaway

The MFC monitors the battery temperature. At 60 °C it declares an incipient thermal runaway (latched):

- the BCC opens, the CHG pb FAULT legend comes on and the EWD shows ELEC BAT CHG,
- the HOT BAT BUS of that battery stays on its battery,
- the bus it supplied (DC ESS BUS for the MAIN BAT, DC EMER BUS for the EMER BAT) transfers to DC BUS 1, or to DC BUS 2.

The detection resets when the CHG pb is OFF and the battery is below 50 °C. The detection needs the MFC charge control function.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.24.3 AC POWER

DSC.24.3.1 AC Wild Frequency Generation

Ident.: DSC.24.3.1 — 05 NOV 2026
ALL

Each propeller reduction gearbox drives one brushless three phase ACW generator, rated 20 kVA. The frequency follows the propeller speed: 341 Hz at 70 % NP, 488 Hz at 100 % NP.

The generator comes on line when NP is above 66 % and goes off line below 64 %. With the propeller brake engaged (hotel mode) NP is zero, so ACW GEN 2 is not available.

Each ACW generator has its own GCU. It protects against:

- underfrequency (underspeed): the GC opens and the generator comes back automatically when NP is high enough again,
- overfrequency, overvoltage and undervoltage: the trip is latched. Select the ACW GEN pb OFF, then ON, to reset it,
- overload: a sustained load above 20 kVA trips the generator (latched).

DSC.24.3.2 AC Wild Frequency Distribution

Ident.: DSC.24.3.2 — 05 NOV 2026
ALL

The ACW network has three buses: ACW BUS 1, ACW BUS 2 and the ACW SVCE BUS.

ACW BUS 1 is supplied by ACW GEN 1 and ACW BUS 2 by ACW GEN 2. The two buses are joined by two bus tie contactors in series, BTC 1 and BTC 2. The AC GPU connects between them.

With the ACW BTC pb on NORM, the BPCU controls BTC 1 and 2 together:

- both generators on line: the BTCs are open, each side runs alone,
- one generator on line: the BTCs close and the remaining generator supplies both buses,
- AC EXT PWR ON: the BTCs close and the AC GPU supplies both buses. It has priority over the generators, whose GCs stay open.

With the ACW BTC pb on ISOL, both BTCs stay open.

ACW SVCE BUS

The cabin attendant panel GND SVCE BUS ACW key controls the ACW SVCE BUS. With the key ON, the bus is supplied:

- from ACW BUS 1 (contactor GXC), when ACW BUS 1 is powered,
- from the AC GPU (contactor EXC), when ACW BUS 1 is not powered and the AC GPU is connected. The AC EXT PWR pb does not need to be ON.

The ACW SVCE BUS is shed automatically when one ACW generator is off line and no AC GPU is connected, and when ACW GEN 1 is overloaded. The key then shows SHED.

TRU

The TRU converts ACW BUS 2 power into 28 V DC. It is connected only when the crew selects the TRU pb ON. It is on line when ACW BUS 2 is powered with a usable frequency. Then it supplies the DC EMER BUS, the DC ESS BUS, the DC STBY BUS and INV 1, whatever the DC generators do (see DSC.24.2).

cont'd... ►►►

cont'd... ►►►

DSC.24.3.3 AC External Power

Ident.: DSC.24.3.3 — 05 NOV 2026
ALL

The AC GPU connects to the AC receptacle on the lower right side of the forward fuselage. When it is connected, the ACW EXT PWR pb AVAIL legend comes on and EXT AC AVAIL is shown on the MFD ACW/HYD page. Selected ON, it supplies both ACW BUSES through BTC 1 and 2.

The AC GPU is wild frequency power only. It does not supply the inverters or the AC STBY BUS.

Receptacle panels

The DC and AC receptacle panels each have two white lights. They are supplied by the ground power itself and work on a dead aircraft.

LIGHT	COMES ON WHEN
AC CNCTD	The AC GPU is connected
AC PWR NOT USED	The AC GPU is connected and the ACW SVCE BUS does not use it
DC CNCTD	The DC GPU is connected
DC PWR NOT USED	The DC GPU is connected and the DC SVCE BUS does not use it

DSC.24.3.4 AC Constant Frequency

Ident.: DSC.24.3.4 — 05 NOV 2026
ALL

Two static inverters give 115 V and 26 V single phase AC at 400 Hz. Each inverter is rated 500 VA.

Inverter supply

- INV 1 takes the TRU when it is on line, else DC BUS 1. When both main DC BUSES are lost, it takes the HOT MAIN BAT BUS, or the DC EMER BUS source when the OVRD UND/V pb is pressed.
- INV 2 takes DC BUS 2 only.

An inverter needs at least 18 V at its input. Below 18 V for 0.5 s its output is lost, and it comes back at 19.5 V.

AC buses

BUS	SUPPLY
AC BUS 1 (115 V / 26 V)	INV 1, when a main DC BUS is powered. Else INV 2 through the AC BTR
AC BUS 2 (115 V / 26 V)	INV 2. Else INV 1 through the AC BTR
AC STBY BUS (115 V / 26 V)	INV 1. Else INV 2, at once

On batteries only, AC BUS 1 and AC BUS 2 are lost. The AC STBY BUS stays on INV 1.

AC bus tie relay (AC BTR)

When one inverter is lost and the other runs, the AC BTR closes after 10 s and the dead AC BUS is supplied by the other inverter. During these 10 s the AC BUS OFF light is on. The AC BTR stays open when:

- the BTC pb is on ISOL (the same guarded pb as the DC bus tie),
- the OVRD UND/V pb is pressed.

DSC.24.4 CONTROLS AND INDICATIONS

DSC.24.4.1 MAIN ELEC PWR Panel

Ident.: DSC.24.4.1 — 05 NOV 2026
ALL

The MAIN ELEC PWR panel is on the overhead panel. It controls the DC network, the batteries, the TRU and the inverters.

DC GEN 1 (2) pb

ON — pb pressed in. The generator is energized. Its GC closes when the generator runs and DC EXT PWR is not in use.

OFF — pb released. The generator is de-energized and its GC is open. A latched GCU trip is reset.

FAULT — The pb is pressed in and the GC is open: GCU protection trip, engine not running, or DC EXT PWR ON. The FWS shows ELEC DC GEN. The legend stays off during the start sequence. The BTC closes and the other source supplies the bus.

BTC pb (guarded)

NORM — pb released. The BPCU controls the DC BTC. The flow bar comes on when the BTC is closed: one generator on line, or DC EXT PWR ON.

ISOL — pb pressed in. The DC BTC is open. The AC BTR is also locked open.

EXT PWR pb

AVAIL — The DC GPU is connected.

ON — pb pressed in with the DC GPU connected. The GPU supplies the DC network.

DC SVCE/UTLY BUS pb

NORM — pb pressed in. UTLY BUS 1 and 2 and the DC SVCE BUS (on DC BUS 1) are connected, unless they are shed.

OFF — pb released. UTLY BUS 1 and 2 and the DC SVCE BUS are disconnected from the main DC BUSES. An overload shed is reset.

SHED — The pb is on NORM and at least one UTLY BUS is not supplied. The FWS shows ELEC DC SHED.

X START FAIL light

X START FAIL — On the ground, during a start on the MAIN BAT, the generator of the running engine does not come on line to assist the starter between 10 % and 45 % NH. The FWS shows ENG X START.

DC BUS 1 (2) OFF lights

DC BUS OFF — The associated main DC BUS is not supplied. The FWS shows ELEC DC BUS 1 (2).

EMER BAT CHG and MAIN BAT CHG pbs

ON — pb pressed in. The MFC controls the BCC (see DSC.24.2.6).

cont'd... ►►►

cont'd... ►►►

OFF	pb released. The BCC is open and the battery is not charged.
FAULT	A main DC BUS is powered and the BCC is open for an abnormal reason: battery thermal runaway, or charge contactor failure. The FWS shows ELEC BAT CHG (ELEC CHG LOSS for both).

TRU pb

NORM	pb released. The TRU is not connected.
ON	pb pressed in. The TRU is connected to ACW BUS 2. The ON light comes on.
Arrow	Comes on when the supply of the DC EMER BUS, DC STBY BUS, INV 1 and DC ESS BUS from the TRU is effective.

Emergency supply indicator

The two arrows above the DC AMP indicator show that a battery supplies the emergency network.

Right arrow	Comes on amber when the DC ESS BUS or INV 1 is supplied by the MAIN BAT.
Left arrow	Comes on amber when the DC EMER BUS or INV 1 is supplied by the EMER BAT.

The arrows stay off while the HOT BAT BUS is supplied by the network, even if it supplies the emergency buses.

OVRD UND/V pb (guarded)

NORM	pb released. On batteries only, the DC STBY BUS and INV 1 are supplied from the same source as the DC ESS BUS (MAIN BAT).
OVRD	pb pressed in. On batteries only, the DC STBY BUS and INV 1 are supplied from the same source as the DC EMER BUS (EMER BAT). The AC BTR is locked open.
UNDV	The DC STBY BUS voltage is below 19.5 V. The FWS shows ELEC STBY UNDV. Pressing OVRD can recover the bus.

BAT toggle switch

OFF	The DC ESS BUS, the DC STBY BUS and INV 1 are isolated from the HOT MAIN BAT BUS. The DC EMER BUS is isolated from the HOT EMER BAT BUS. The HOT BAT BUSES stay supplied. Unless the TRU pb is ON, the DC ESS BUS, the DC EMER BUS and the DC STBY BUS are not supplied, even with the generators or the GPU on line.
ON	The batteries are connected to the emergency network. On batteries only: DC ESS BUS, DC STBY BUS and INV 1 on the MAIN BAT, DC EMER BUS on the EMER BAT. With a generator or the DC GPU: DC ESS BUS on the HOT MAIN BAT BUS, DC EMER BUS and DC STBY BUS on the HOT EMER BAT BUS.
OVRD	Guarded position. Both BCCs open, so the DC EMER BUS and the DC ESS BUS are supplied by their own batteries.

DC AMP indicator and BAT SEL switch

DC AMP	Charge (CH) or discharge (DCH) current of the selected battery. Scale in A × 100, from 0 to 2 on each side.
BAT SEL	Selects the battery read by the DC AMP indicator: EMER or MAIN.

cont'd... ►►►

cont'd... ►►►

AC BUS 1 (2) lights

BUS OFF The associated AC BUS (115 V) is not supplied. The FWS shows ELEC AC BUS 1 (2). After an inverter loss the light goes off when the AC BTR closes (10 s).

INV FAULT The inverter has no output: inverter failure or loss of its input supply. The FWS shows ELEC INV 1 (2).

The DC BUS OFF, INV FAULT, UNDV, CHG FAULT, arrows and GEN FAULT legends need the MFC. Each light is also supplied through its own indication C/B.

DSC.24.4.2 AC WILD ELEC PWR Panel

Ident.: DSC.24.4.2 05 NOV 2026
ALL

ACW GEN 1 (2) pb

ON pb pressed in. The generator is energized. Its GC closes when the propeller turns fast enough and AC EXT PWR is not in use.

OFF pb released. The generator is de-energized. A latched GCU trip is reset.

FAULT The pb is pressed in and the generator does not supply its bus: GCU trip, propeller below 66 % NP, or AC EXT PWR ON. The FWS shows ELEC ACW GEN 1 (2).

ACW BUS 1 (2) OFF lights

ACW BUS OFF The associated ACW BUS is not supplied. The FWS shows ELEC ACW BUS 1 (2).

BTC pb (guarded)

NORM pb released. The BPCU controls BTC 1 and 2. The flow bar comes on when they are closed: one ACW generator on line, or AC EXT PWR ON.

ISOL pb pressed in. BTC 1 and 2 are open.

EXT PWR pb

AVAIL The AC GPU is connected.

ON pb pressed in with the AC GPU connected. The GPU supplies both ACW BUSES.

DSC.24.4.3 Other Controls

Ident.: DSC.24.4.3 05 NOV 2026
ALL

Cabin attendant panel

The GND SERVICE BUS DC and ACW keys are on the ARMONIA flight attendant panel.

ON Green. The key is selected and a source is available. The DC (ACW) SVCE BUS is supplied.

SHED Amber. A source is available and the key is released, or the key is selected and the bus is shed.

ACW BTC OPNG selector

On the LH maintenance panel (101VU), under a guard. It opens one ACW bus tie contactor:

BTC 1 OPEN BTC 1 is held open. ACW BUS 1 is cut from the AC GPU and from ACW GEN 2.

cont'd... ►►►

cont'd... ►►►

NORM FLT Normal position.

BTC 2 OPEN BTC 2 is held open. ACW BUS 2 is cut from the AC GPU and from ACW GEN 1.

DSC.24.4.4 ELEC IND Panel

Ident.: DSC.24.4.4 — 05 NOV 2026
ALL

The ELEC IND panel is on the CAPT lateral console (101VU). A rotary selector connects the indicators to a measuring point. The DC indicators are a DC voltmeter and a DC ammeter. The AC indicators show AC LOAD, AC voltage and frequency. Each indicator has a bargraph and a digital readout.

SELECTOR	DC INDICATORS (V, A)	AC INDICATORS (LOAD, V, HZ)
OFF	Blank	Blank
EXT PWR	DC GPU	AC GPU
GEN 1, GEN 2	DC GEN	ACW GEN
INV 1, INV 2	Blank	Inverter voltage and frequency
BAT MAIN, BAT EMER	Battery voltage and current	Blank

A reading shows only when the source is on line. Each measuring point is supplied through its own indication C/B. AC LOAD is the load of the source as a fraction of its rating: 1.0 is 100 %.

Normal readings:

- battery without load: 25 to 28 V; under load: 23 to 28 V,
- DC GEN current: below 300 A,
- AC LOAD: below 0.5,
- inverter: 115 V ± 4 V, 400 Hz ± 5 Hz.

The panel is supplied by the HOT MAIN BAT BUS. After five minutes without a selector movement it goes to standby and the indicators are blank. Turn the selector to wake it up.

SIMULATOR NOTE

On INV 1 and INV 2 the AC LOAD indicator stays blank.

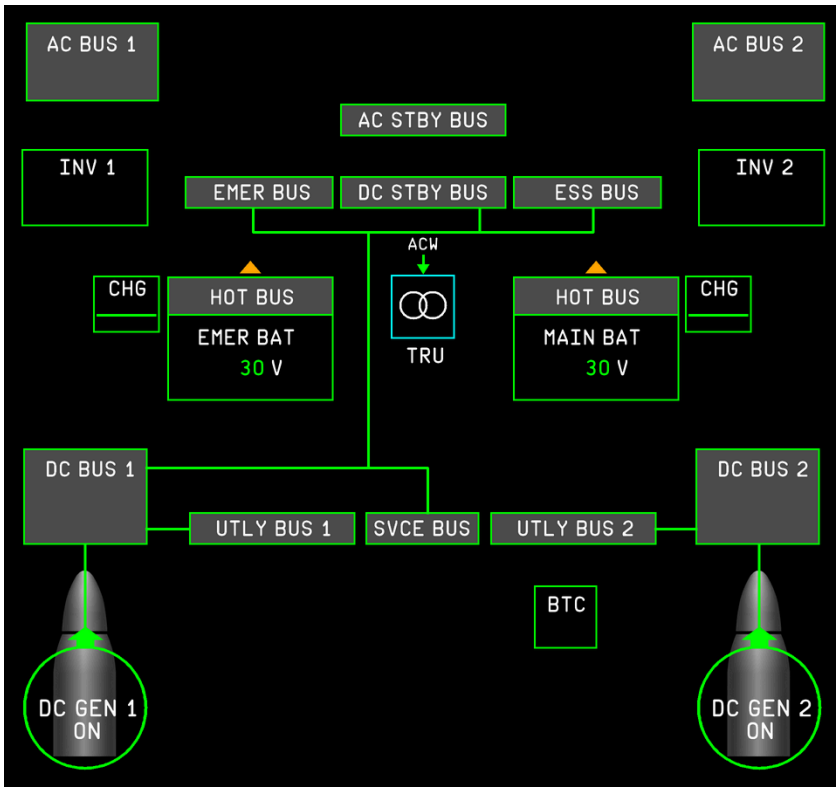
DSC.24.4.5 MFD AC/DC Page

Ident.: DSC.24.4.5 — 05 NOV 2026
ALL

The AC/DC system page shows the DC network, the batteries, the inverters and the AC buses.

cont'd... ►►►

cont'd... ►►►



MFD AC/DC page: both DC generators on line

ITEM	INDICATION
DC GEN 1, 2	ON (green), OFF (white) or FAULT (amber), as the DC GEN pb. Green feed arrow when the GC is closed
EXT DC	Not shown when the DC GPU is not connected. AVAIL (green box), AVAIL and ON, or ON alone (GPU selected but not available)
BTC	Green box in NORM, cyan box and ISOL in ISOL. A green line joins the DC BUSES when the BTC connects them
DC BUS 1, 2	Green when supplied, amber OFF when not supplied
UTLY BUS 1, 2, SVCE BUS	Green when supplied. White OFF with the DC SVCE/UTLY BUS pb OFF. Amber FAULT when not supplied with the pb on NORM. Amber SHED message when a UTLY BUS is shed
TRU	Border and symbol colours give the TRU pb and ACW BUS 2 state: grey (pb released, ACW BUS 2 off), white (pb released, TRU not available), amber border (pb released, TRU available), cyan border (pb ON) with a green symbol when the TRU supplies, amber when it cannot
EMER BUS, DC STBY BUS, ESS BUS	Green box when the voltage is valid and above 18 V, amber otherwise. DC STBY BUS: OVRD with the OVRD UND/V pb pressed, amber UNDV below 19.5 V
HOT BUS (EMER BAT, MAIN BAT)	Green when the HOT BAT BUS is valid, cyan with the BAT sw on OVRD (BAT OVRD shown), amber when not valid
Battery voltage	Battery voltage in V. Dashes when the measurement is not valid
CHG	OFF (white, CHG pb released), CHG with the contactor closed, a green line when the battery charges, amber FAULT when the BCC is lost
Battery arrow	Amber arrow above the battery when it supplies the emergency network (same logic as the overhead arrows)

cont'd... ►►►

cont'd... ►►►

ITEM	INDICATION
INV 1, 2	Amber FAULT when the inverter has no output
AC BUS 1, 2, AC STBY BUS	Green when supplied, amber OFF when not supplied

Green lines show the current paths. The AC STBY BUS line comes from INV 1, or from INV 2 when INV 1 is lost.

The ACW generators, the ACW BUSES, the ACW BTC, EXT AC and the TRU input are shown on the ACW/HYD page.

DSC.24.4.6 EWD Alerts

Ident.: DSC.24.4.6 — 05 NOV 2026
ALL

All ELEC alerts are cautions (MC light flashing amber, single chime) except ELEC DC GEN 1+2.

EWD MESSAGE	CONDITION
ELEC DC GEN 1+2	Both DC generators tripped. MW light, CRC
ELEC DC GEN	One DC GEN pb pressed in with its GC open
ELEC DC BUS 1 (2)	DC BUS 1 (2) not supplied
ELEC DC EMER	DC EMER BUS not supplied
ELEC DC ESS	DC ESS BUS not supplied
ELEC DC SBY BUS	DC STBY BUS at or below 19.5 V (not supplied included). Shown with ELEC STBY UNDV below 19.5 V
ELEC STBY UNDV	DC STBY BUS below 19.5 V. OVRD UND/V amber light on
ELEC DC SHED	DC SVCE/UTLY BUS pb SHED legend on
ELEC BAT DISCH	In flight, with a main DC BUS powered, a battery is not charged. Inhibited on the ground and with the BAT sw on OVRD
ELEC BAT CHG	Incipient battery thermal runaway, or one charge contactor lost
ELEC CHG LOSS	Both charge contactors lost
ELEC INV 1 (2)	Inverter has no output
ELEC AC BUS 1 (2)	AC BUS 1 (2) not supplied
ELEC AC STBY	AC STBY BUS not supplied
ELEC ACW GEN 1 (2)	ACW GEN pb pressed in, generator not supplying its bus
ELEC ACW BUS 1 (2)	ACW BUS 1 (2) not supplied
ELEC ACW 1+2	Both ACW BUSES not supplied

A grouped alert replaces its single alerts:

- ELEC DC GEN 1+2 replaces ELEC DC GEN, ELEC AC BUS 1 and 2, ELEC INV 2 and ELEC DC SHED,
- ELEC ACW 1+2 replaces the ELEC ACW BUS and ELEC ACW GEN alerts,
- ELEC CHG LOSS replaces ELEC BAT CHG.

When the alert comes only from generators that are stopped or selected OFF (engines not running), it is shown without a procedure.

DSC.24.5 CIRCUIT BREAKERS

DSC.24.5.1 General

Ident.: DSC.24.5.1 — 05 NOV 2026
ALL

Each consumer is protected by a circuit breaker (C/B) on the bus that supplies it. A C/B is identified by its line letter and column number on its panel (for example AB8). The bus of each C/B follows the distribution equipment lists of the aircraft documentation.

A C/B label that ends with GND SPLY does not make it a ground-only supply. The bus that the C/B is on decides when it is supplied.

The main bus feeders are also protected by C/Bs. When a feeder C/B is open:

- the bus it feeds is not supplied from that source,
- the DC EMER BUS and the DC ESS BUS are lost when their HOT BAT BUS feeder is open. They do not transfer to another source,
- on the HOT MAIN BAT BUS, the DC ESS BUS SECT 1 and SECT 2 have separate feeders.

DSC.24.5.2 Operation

Ident.: DSC.24.5.2 — 05 NOV 2026
ALL

Pushed in	The consumer is supplied when its bus is supplied.
Pulled or tripped	The consumer and its lights are not supplied.

A C/B trips on overcurrent. The trip time gets shorter as the current rises. A tripped C/B stays out until it is pushed in. If the cause is still present, it trips again.

SIMULATOR NOTE

- The C/Bs can be pulled and pushed in on the cockpit C/B panels.
- The ground state presets, such as COLD & DARK, push every C/B in and clear the trips.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.29.1 GENERAL

DSC.29.1.1 General

Ident.: DSC.29.1.1 — 05 NOV 2026
ALL

The aircraft has two independent hydraulic systems: BLUE and GREEN. Each system has its own pump, its own accumulator and its own compartment in a common tank. The nominal system pressure is 3 000 psi.

A crossfeed valve (X FEED) can connect the two systems when one pump is lost.

The hydraulic controls are on the HYD PWR panel of the overhead panel. A ground switch for the auxiliary pump is on the center pedestal. The indications are on the ACW / HYD page of the MFD.

DSC.29.1.2 Power Generation

Ident.: DSC.29.1.2 — 05 NOV 2026
ALL

Tank

The common tank is not pressurized. A diaphragm divides it into two equal compartments, one per system.

ITEM	VALUE
Total fluid volume	9.6 l
Normal filling level	9.35 l
Minimum filling level	8.5 l
LO LVL alert, per compartment	below 2.5 l

A low level in one compartment gives the HYD BLUE (GREEN) LO LVL alert and closes the X FEED valve (see DSC.29.1.4). When a compartment is empty, its pumps deliver no flow.

Main pumps

Each system has one electrical pump driven by ACW power:

- the BLUE pump is supplied by the ACW BUS 1,
- the GREEN pump is supplied by the ACW BUS 2.

The main pumps run only when the ACW network is supplied, i.e. with the engines running (ACW GEN) or with ACW external power. With the engines stopped and no ACW external power, the main pumps cannot run.

Each pump feeds its system through a non-return valve. The LO PR indication of a pump senses the pump delivery pressure, not the system pressure. A pump that does not run shows LO PR even if the system is pressurized by another source (auxiliary pump or X FEED).

Auxiliary pump

The BLUE system also has a DC auxiliary pump. It supplies the BLUE users if the BLUE ACW pump fails, and it pressurizes the BLUE system on ground when the main pumps cannot run, for example for the propeller brake before engine start.

The auxiliary pump runs in two modes.

Automatic mode

With the AUX PUMP pb pressed in (AUTO), the pump runs when all these conditions are met:

- the BLUE ACW pump delivery pressure is below 1 500 psi,

cont'd... ►►►

cont'd... ►►►

- the propeller brake is released,
- the landing gear handle is selected DOWN,
- at least one engine is running.

In automatic mode the pump is supplied by the DC BUS 2.

For the propeller brake condition, the auxiliary pump keeps running while the propeller brake locks. It stops 15 s after the PROP BRK is locked, and the automatic mode stays inhibited until the propeller brake is completely released.

Manual mode

The HYD AUX PUMP ground switch on the pedestal starts the pump manually. It does not depend on the AUX PUMP pb.

- With the BAT toggle sw ON and the aircraft supplied (GEN or EXT PWR), one press runs the pump for 30 s.
- With the BAT toggle sw OFF, the pump runs only as long as the switch is held.

In manual mode the pump is supplied by the HOT MAIN BAT BUS. It can run even with the BAT toggle sw OFF.

If the propeller brake is selected OFF during the 30 s, the pump keeps running until 15 s after the propeller brake is completely released.

CAUTION

The ground switch works with the BAT toggle sw OFF. Long use discharges the main battery.

SIMULATOR NOTE

The 30 s timer is an MFC function. When MFC 2B is not powered (BAT OFF), the switch works only while held.

Accumulators

Each system has an accumulator behind a non-return valve. The accumulator charges whenever its system pressure is higher than its own, and keeps its charge when the system pressure decreases. The gas pre-charge is 1 000 psi. On a cold aircraft the accumulators are found at 3 000 psi.

- The BLUE accumulator supplies the emergency and parking brakes. Its pressure is shown on the MFD (EMER BRK ACCU) and on the BRAKE ACCU HYD indicator of the left lateral maintenance panel.
- The GREEN accumulator backs up the normal brakes.

The emergency / parking brake accumulator gives at least six brake applications. Each application of the EMER or PARKING position uses some of its fluid. A held parking brake uses no fluid. Below 1 600 psi, emergency braking is not available.

SIMULATOR NOTE

- The BLUE system has one accumulator only: the same accumulator absorbs pump pressure surges and supplies the emergency and parking brakes.
- Pressurizing the systems with a ground hydraulic power unit is not simulated.

DSC.29.1.3 Supplied Systems

Ident.: DSC.29.1.3 — 05 NOV 2026
ALL

BLUE SYSTEM	GREEN SYSTEM
Flaps extension / retraction	Landing gear extension / retraction
Spoilers	Normal brakes
Nose wheel steering	

cont'd... ►►►

cont'd... ►►►

BLUE SYSTEM	GREEN SYSTEM
RH propeller brake	
Emergency and parking brakes (through the brake accumulator)	

A user is available when its system pressure is above 1 500 psi. Below this value, its legend on the MFD turns amber. The actuators move more slowly when the system pressure is low.

Each user takes fluid only while its actuator moves. A held actuator (gear down and locked, parking brake set, propeller brake locked) takes no flow.

Propeller brake

The RH propeller brake is on the BLUE system. It needs more than 1 500 psi to operate. On ground, with the engines stopped, the BLUE system is pressurized by the auxiliary pump (ground switch) for the propeller brake operation (see DSC.29.1.2).

DSC.29.1.4 Crossfeed

Ident.: DSC.29.1.4 — 05 NOV 2026
ALL

If one main pump fails, the flight crew can open the X FEED valve. The remaining pump then supplies the users of both systems. With the valve open, both systems have the same pressure.

The X FEED valve has no automatic opening. It opens only when the crew presses the X FEED pb.

Note

After a LO LVL alert on either system, the X FEED valve:

- *stays closed, if it was closed,*
- *closes automatically, if it was open.*

It cannot be opened again while the LO LVL alert is present.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.29.2 CONTROLS

DSC.29.2.1 HYD PWR Panel

Ident.: DSC.29.2.1 — 05 NOV 2026
ALL

The HYD PWR panel is on the overhead panel. From left to right it has the BLUE PUMP pb (1), the AUX PUMP pb (2), the X FEED pb (3) and the GREEN PUMP pb (1). The OVHT lights (4) and LO LVL lights (5) are part of the pump pbs.

In the normal configuration the BLUE PUMP, GREEN PUMP and AUX PUMP pbs are pressed in and the X FEED pb is released. All lights are off.

(1) BLUE PUMP and GREEN PUMP pbs

Control the ACW main pump of the associated system.

Pressed in	The pump runs when its ACW bus and its control supply are available.
OFF	pb released. The pump is stopped and the OFF light comes on white.
LO PR	Comes on amber when the pb is pressed in and the pump delivery pressure is below 1 500 psi. The FWS shows HYD BLUE (GREEN) LO PR on the EWD with MC light and SC.

The LO PR light also comes on when the pump is selected but not running, for example with its engine stopped and no ACW power.

(2) AUX PUMP pb

Controls the automatic mode of the DC auxiliary pump.

Pressed in (AUTO)	The auxiliary pump runs as soon as the automatic conditions are met (see DSC.29.1.2).
OFF	pb released. The automatic mode is deselected and the OFF light comes on white. The pedestal ground switch still works.
LO PR	Comes on amber when the auxiliary pump runs and its outlet pressure is below 1 500 psi. The FWS shows HYD AUX LO PR on the EWD with MC light and SC.

SIMULATOR NOTE

The AUX LO PR indication is ignored during the first 3 s of each auxiliary pump run, while the pump brings the circuit up.

(3) X FEED pb

Controls the crossfeed valve.

Released	The X FEED valve is closed. The two systems are separated.
ON	pb pressed in. The X FEED valve is open and connects the two systems. The ON light comes on.

When a LO LVL alert is present, the X FEED valve closes and the pb cannot open it (see DSC.29.1.4).

(4) OVHT lights

OVHT	BLUE (GREEN) PUMP pb: comes on amber when the system fluid temperature is above 121 °C. The FWS shows HYD BLUE (GREEN) OVHT. AUX PUMP pb: comes on amber on an auxiliary pump overheat. The FWS shows HYD AUX OVHT.

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

- The BLUE and GREEN overheat is computed from one fluid temperature per system, heated by the running pumps and cooled to ambient. It is not a separate pump housing drain line sensor.
- The auxiliary pump has no temperature model. Its OVHT comes on only with the AUX pump overheat failure (EFB FAILURES).

⑤ LO LVL lights

LO LVL Comes on amber when the fluid quantity in the associated tank compartment is below 2.5 l. The FWS shows HYD BLUE (GREEN) LO LVL. The X FEED valve closes automatically.

Light supply

The lights of each pb need their own supply (see DSC.29.3). When that supply is lost, the lights of the pb stay off.

SIMULATOR NOTE

The X FEED valve follows the pb even when the X FEED supply (DC STBY BUS) is lost. Only the ON light goes off.

DSC.29.2.2 Hydraulic Auxiliary Pump Switch

Ident.: DSC.29.2.2 — 05 NOV 2026
ALL

The HYD AUX PUMP switch (GND CTL ONLY) is on the center pedestal. It is a momentary pushbutton.

PRESS Starts the auxiliary pump in manual mode. With the BAT toggle sw ON and the aircraft supplied, the pump runs for 30 s. Otherwise it runs while the switch is held.

The switch works with the BAT toggle sw OFF. It is for ground use only.

Note

Do not run the auxiliary pump before the hydraulic pressure check.

SIMULATOR NOTE

- Each new press restarts the 30 s run.
- The switch is not inhibited in flight. Use it on ground only.

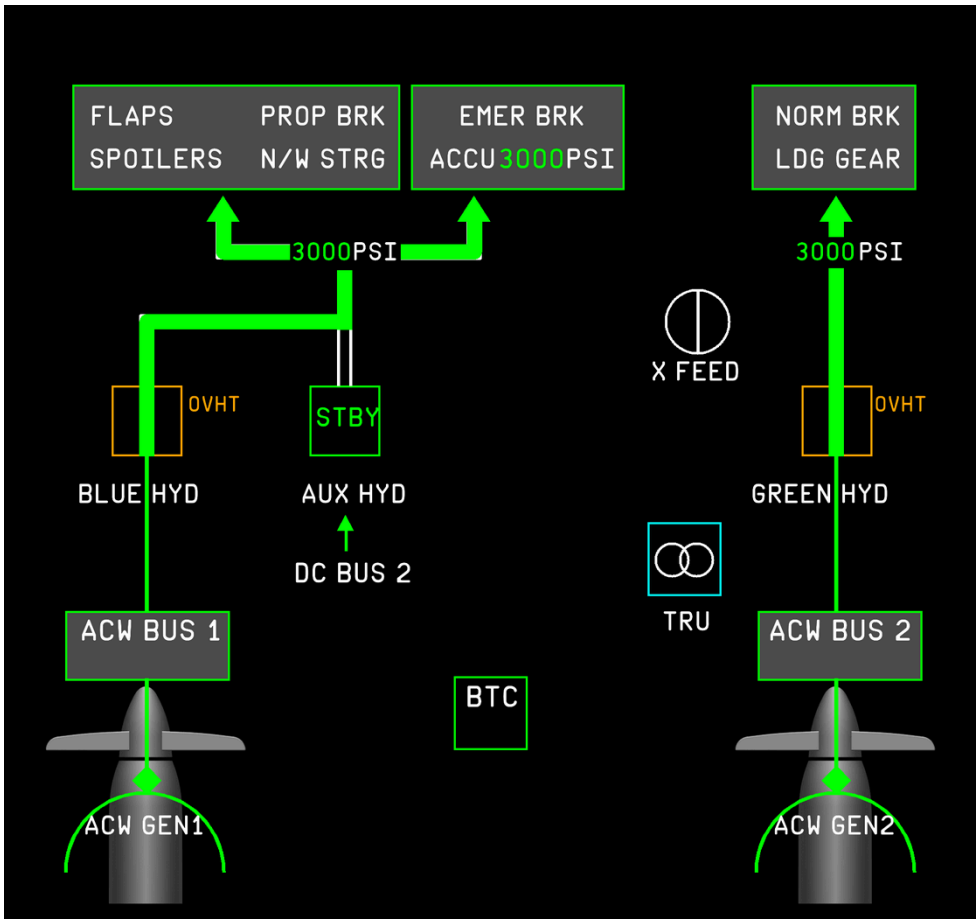
DSC.29.2.3 MFD Indications

Ident.: DSC.29.2.3 — 05 NOV 2026
ALL

The hydraulic indications are on the ACW / HYD page of the MFD. The same page shows the ACW network (see DSC.24).

cont'd... ►►►

cont'd... ►►►



MFD ACW / HYD page, both engines running, X FEED closed, auxiliary pump in STBY

System pressure

3000 PSI, green	System pressure above 1 500 psi.
1100 PSI, amber	System pressure 1 500 psi or below.

The pressure is shown in steps of 100 psi.

Main pumps

Green line through the pump	Pump pb pressed in, normal pump pressure.
OFF	Pump pb released. The pump symbol is white.
LO PR	Pump pb pressed in, low pump delivery pressure. The pump symbol is amber.
OVHT	Next to the pump. Fluid temperature above 121 °C.
LO LVL	Next to the pump. Tank compartment quantity below 2.5 l.

Auxiliary pump

Green line through the pump	Pump running in automatic mode, normal pressure.
Cyan pump symbol	Pump running in manual mode (pedestal switch).

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

STBY	AUX PUMP pb pressed in, pump not running.
STBY, grey	AUX PUMP pb pressed in, no electrical supply for the pump: DC BUS 2 off and HOT MAIN BAT BUS below 18 V.
OFF	AUX PUMP pb released.
LO PR	Pump running, low outlet pressure.

The supply label under the auxiliary pump shows:

DC BUS 2	Normal supply.
MAIN BAT	Emergency supply (DC BUS 2 off, main battery above 18 V).

X FEED

White circle with a bar	X FEED valve closed.
Cyan symbol, flow path across	X FEED valve open.
Green symbol and white INHIB	X FEED inhibited after a LO LVL alert.

Users

The users are listed in two boxes above the systems: FLAPS, SPOILERS, PROP BRK, N/W STRG on the BLUE side, NORM BRK, LDG GEAR on the GREEN side.

White text	Normal operation.
Amber text	Associated system pressure 1 500 psi or below.

N/W STRG is also amber when the N/W STEERING switch is OFF.

Emergency brake accumulator

EMER BRK, ACCU … PSI	Accumulator pressure above 1 600 psi: labels white, value green, in steps of 100 psi.
EMER BRK, **ACCU 1400 PSI**	Accumulator pressure 1 600 psi or below. Emergency braking is not available.
ACCU ---- PSI	Invalid accumulator pressure.

DSC.29.2.4 Brake Accumulator Indicator

Ident.: DSC.29.2.4 — 16 NOV 2026
ALL

The BRAKE ACCU HYD indicator is on the left lateral maintenance panel. It shows the emergency / parking brake accumulator pressure in green, in thousands of psi, with two digits (3.0 = 3 000 psi). It is for use when the MFD is not available, for example with the batteries OFF before towing.

Switch ON	Spring-loaded to OFF. Moved to ON and released, it returns to OFF and the value is displayed for 2 min.
Blinking value	Accumulator pressure below 1 700 psi or above 3 100 psi.

SIMULATOR NOTE

The out-of-range value blinks, as described in DSC.32. It does not blank.

DSC.29.3 ELECTRICAL SUPPLY

DSC.29.3.1 Electrical Supply

Ident.: DSC.29.3.1 05 NOV 2026
ALL

EQUIPMENT	DC SUPPLY (C/B)	AC SUPPLY (C/B)
BLUE pump power	–	ACW BUS 1 (BLUE HYD PUMP PWR SPLY)
BLUE pump control	DC EMER BUS (BLUE PUMP CTL)	–
BLUE system alert and lights	DC EMER BUS (CAUTION BLUE SYS)	–
GREEN pump power	–	ACW BUS 2 (GREEN HYD PUMP PWR SPLY)
GREEN pump control	DC ESS BUS (GREEN PUMP CTL)	–
GREEN system alert and lights	DC EMER BUS (CAUTION GREEN SYS)	–
Auxiliary pump power, normal	DC BUS 2 (AUX HYD PUMP NORM PWR SPLY)	–
Auxiliary pump power, ground	HOT MAIN BAT BUS (AUX HYD PUMP GND PWR SPLY)	–
Auxiliary pump control and lights, normal	DC BUS 2 (AUX PUMP CTL & IND NORM)	–
Auxiliary pump control and lights, ground	HOT MAIN BAT BUS (AUX PUMP CTL & IND GND)	–
X FEED valve	DC STBY BUS (X FEED)	–
BRAKE ACCU HYD indicator	DC STBY BUS	–

Pump supply logic

- A main pump runs when its pb is pressed in and both its power C/B and its control C/B are supplied.
- In automatic mode, the auxiliary pump uses the normal supply: both normal C/Bs on the DC BUS 2.
- In manual mode (pedestal switch), the auxiliary pump uses the ground supply: both ground C/Bs on the HOT MAIN BAT BUS. If the ground supply is lost, it uses the normal supply.
- The lights of the AUX PUMP pb are supplied by the normal C/B. They are supplied by the ground C/B only during a manual run.

SIMULATOR NOTE

- The BRAKE ACCU HYD indicator has no C/B of its own. It is supplied when the DC STBY BUS is supplied.
- Pulling a pump C/B stops the pump, as a loss of its bus does.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.29.4 SYSTEM MONITORING

DSC.29.4.1 Hydraulic Alerts

Ident.: DSC.29.4.1 — 05 NOV 2026
ALL

All the hydraulic alerts are amber cautions. Each one comes with the MC light flashing amber and a single chime (SC).

ALERT (EWD)	CONDITION	OTHER INDICATIONS
HYD BLUE (GREEN) LO LVL	Tank compartment quantity below 2.5 l	LO LVL on the MFD, LO LVL light on the pump pb. X FEED valve closed.
HYD BLUE (GREEN) LO PR	Pump pb pressed in and pump delivery pressure below 1 500 psi	LO PR on the MFD, LO PR light on the pump pb
HYD BLUE (GREEN) OVHT	System fluid temperature above 121 °C	OVHT on the MFD, OVHT light on the pump pb
HYD AUX LO PR	Auxiliary pump running, outlet pressure below 1 500 psi	LO PR on the MFD, LO PR light on the AUX PUMP pb
HYD AUX OVHT	Auxiliary pump overheat	OVHT light on the AUX PUMP pb
HYD PUMPS LOSS	Both main pump pbs pressed in and both pumps LO PR	Both LO PR lights
HYD SYS LOSS	Both systems below 1 500 psi and both compartments LO LVL	Both LO PR and LO LVL indications

Pumps loss and systems loss

HYD PUMPS LOSS means that both main pumps are lost but the fluid is still in the tank. The BLUE system can be recovered by the auxiliary pump when the landing gear is selected DOWN. The procedure is shown on the EWD.

HYD SYS LOSS means that both systems have lost their fluid. Neither the auxiliary pump nor the X FEED valve can recover them.

A pump that the crew selects OFF is not counted as lost for HYD PUMPS LOSS.

Alerts without procedure

Some alerts are expected consequences of a normal state. They are shown on the EWD without their procedure:

- HYD BLUE (GREEN) LO PR when the pump is selected but not running because its engine is stopped,
- HYD PUMPS LOSS when both engines are stopped.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.30.1 GENERAL

DSC.30.1.1 Description

Ident.: DSC.30.1.1 — 10 NOV 2026 — ALL

The ice and rain protection systems permit aircraft operation in various environmental conditions, in particular, in icing situations.

An ice detector, connected to the FWS, monitors ice accretion. In addition, an icing evidence probe is installed to indicate visually an ice accretion (see DSC.30.2.1).

In parallel, an Aircraft Performance Monitoring (APM) system triggers some alerts when the performances are degraded due to ice accretion on the airframe (see DSC.30.8.1).

Aircraft ice protection is provided by:

- A pneumatic system operating on areas of the airframe:
  - outer, center, and inner wing leading edges,
  - horizontal tailplane leading edges,
  - engine air intakes and gas paths.
- Electrical heating of:
  - propeller blades,
  - windshields,
  - probes,
  - flight control horns.

For the pneumatic system, the engines supply bleed air through the LH and RH deice valves (also called Pressure Regulator and Shutoff Valves, PRSOV) regardless of the engine bleed valves position.

For electrical heating, the power is supplied primarily by AC wild current.

Windshield wipers enable rain removal from the front windshields.

Note

Refer to IN FLIGHT ICING CONDITIONS for icing conditions definitions.

DSC.30.1.2 Schematics

Ident.: DSC.30.1.2 — 10 NOV 2026 — ALL

The general schematic shows the protected areas and the detection means:

FUNCTION	AREAS / EQUIPMENT
Ice detection	ICE DETECTOR, ICING EVIDENCE PROBE
Pneumatic system	Outer and center wing leading edges, inner wing leading edges, horizontal tailplane leading edge, engine air intakes, gas path
Electrical heating	Windshields, probes (including the TAT probes), propellers, horns

PAGE

INTENTIONALLY

LEFT BLANK

DSC.30.2 ANTI ICING ADVISORY SYSTEM

DSC.30.2.1 Description

Ident.: DSC.30.2.1 — 10 NOV 2026
ALL

General

An Anti-ice Advisory System (AAS) is installed. The AAS system includes:

- an ice detector,
- an Icing Evidence Probe (IEP),
- the ICING AOA (green) light on the central panel,
- the ICING (amber) label on the FMA,
- some labels on the memo panel display.

This system is designed to alert the flight crew on the correct procedures to be applied when flying in icing conditions (refer to Flight Procedures In Icing Conditions):

- the IEP and the ice detector are advisory means of ice accretion detection,
- the ICING AOA light indicates that the stall warning and the stick shaker use icing condition thresholds,
- the IEP is used to visually verify that the aircraft is clear of ice in flight.

Ice detector

The ice detector, under the left wing, alerts the flight crew as soon as and as long as ice accretion is sensed by the probe.

When the ice detector detects ice accretion:

- the alert is generated by the amber **ICING** message on the FMA,
- if the FMS is in normal condition (ICING AOA label off), the FMS automatically switches from NORMAL conditions speeds to ICING conditions speeds (for example, with Flaps 0, the Vmin OPS increases to the ICING bug).

The system is self tested constantly. Any failure generates the **A-ICING DETECT** caution with a single chime (see DSC.30.2.4).

Detection of ice accretion and the associated alert are performed under the following cycle:

STEP	EVENT
1	Beginning of ice accretion on the probe.
2	Ice on the probe reaches 0.5 mm (0.02 in): the ICING light comes on and the probe heating begins.
3	The probe is heated for 7 s, then a new detection cycle begins. While ice accretion continues, the cycle repeats and the ICING light stays on.
4	End of ice accretion: the ICING light goes off 60 s after the last detection.

CAUTION

The ice detector indicates that ice accretion is building up on the aircraft. Therefore, the amber icing light turning off must be regarded as an end of ice accretion and not as an absence of ice on the aircraft. Therefore, a visual check of the IEP must be performed to ensure the aircraft is cleared of ice after having encountered ice accretion conditions.

Ice accretion on the aircraft under certain circumstances may sublimate. If the ice accretion rate is low, the balance accretion / sublimation may tend to be low or NIL. Under those circumstances, the ice detector may not detect ice accretion (sublimation is much faster on the ice detector than on the airframe).

cont'd... ►►►

cont'd... ►►►

Freezing rain is a precipitation composed of large super cooled water droplets which may be transformed into clear ice when impacting the skin of the aircraft in negative temperature condition. However, if the SAT is slightly negative, these large droplets may not freeze immediately when impacting: clear ice builds up behind the leading edge. The ice detector may become inefficient.

The ice detector is not designed to detect ice accretion on ground. During taxi, rainy conditions without being in icing conditions can trigger a spurious ice detection:

- This spurious ice detection alert may modify the FMS T/O speeds (NL or manually inserted) without crew alerting (T/O DATA can remain confirmed).

Note

- *FMS T/O speeds are not modified when ICING CONDITIONS are ticked on the VCP or speeds manually inserted in accordance with icing conditions takeoff performance.*
- *A spurious ice detection alert may disappear by modifying the airflow dynamics surrounding the ice detector probe (for example, change in wind direction or slight increase of power below FI with parking brake engaged as close as possible to takeoff).*
- *After the last spurious ice detection, the alert remains active for 60 s.*

SIMULATOR NOTE

The ice detector senses ice only in flight. There is no spurious ice detection on ground, and an ICE test on ground does not change the FMS takeoff speeds.

Icing evidence probe

The Icing Evidence Probe (IEP) is under the left side cockpit window and visible by both flight crew. It enables the flight crew to visually monitor the beginning of ice accretion, before ice builds up in other parts of the aircraft airframe.

After ice accretion, the IEP is used to visually verify that the aircraft is clear of ice.

An integrated light is provided to help ice accretion monitoring at night. It comes on with the NAV light sw.

DSC.30.2.2 Controls

Ident.: DSC.30.2.2 — 10 NOV 2026
ALL

Ice detector panel

The ice detector panel is on the center panel, on the left of the STICK PUSHER pb. It has the ICING AOA pb (1) and the ICE TEST pb (2). The ICING indicator (3) is on the FMA of each PFD. The right part of the panel holds the APM pb and the APM TEST pb (see DSC.30.8.2).

(1) ICING AOA pb

ICING AOA — Comes on green as soon as one horns ANTI ICING pb is selected ON, to remind the flight crew that the stall alarm threshold is lower in icing conditions. The **ICING AOA** green label is displayed on the FMA.

The ICING AOA pb can only be turned off manually by pressing it, provided that both horns ANTI ICING pbs are selected OFF. In this case, the stall alarm threshold recovers the values defined for flight in normal conditions.

ICING AOA is set to OFF only when the aircraft is clear of ice.

(2) ICE TEST pb

The push to test pb is used to check the ice detector correct operation. Press and hold the test pb for 3 s:

- the **ICING** amber label is displayed flashing on the FMA (with associated warning) if the system works correctly,

cont'd... ►►►

cont'd... ►►►

- the **A-ICING DETECT** alert is displayed with the associated procedure on the EWD. The master caution light and the single chime are activated.

CAUTION

When takeoff speeds (V1, VR and V2) are manually set:

- An ice test performed on ground can trigger a reversion of manual takeoff speeds to non-limiting runway takeoff speeds.
- When it happens, it is necessary to re-enter and validate takeoff speeds.

(3) ICING indicator on the FMA

ICING steady — Comes on amber when ice accretion is detected, provided that both horns ANTI ICING and airframe DE ICING are selected ON.

ICING flashing — Flashes amber when ice accretion is detected and horns ANTI ICING and/or airframe DE ICING are not selected ON.

De icing indicator

The ANTI ICING and DE ICING memo is displayed on the MFD, in the memo panel at the bottom left of the display. Its messages are:

ANTI ICING	DE ICING
1 HORN 2	1 ENG 2
1 PROP 2	AIRFRAME
SIDE WINDOWS	

ANTI ICING message

When an anti-ice system is selected ON and is not failed, a **cyan** specific message is displayed, corresponding to the involved anti-ice system.

If the selected system is failed, an **amber** message is displayed.

DE ICING message

When a deicing system is selected ON and is not failed, a **cyan** specific message is displayed, corresponding to the involved deicing system (AIRFRAME, ENG 1, or ENG 2).

For AIRFRAME:

- the **AIRFRAME** cyan message is displayed steady when the airframe deicing system is selected ON,
- the AIRFRAME message flashes when the airframe deicing system is still selected ON 5 min after the last ice accretion detection,
- the **AIRFRAME** message is displayed steady amber in case of deicing system failure.

The flight crew must disregard the AIRFRAME blue message flashing on the memo panel and keep the DE ICING and ANTI ICING systems ON until leaving the icing conditions.

DSC.30.2.3 Electrical Supply

Ident.: DSC.30.2.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ICE detector	–	ACW BUS 2 (on lateral panel, C/B ICE DET PWR SPLY)

cont'd... ►►►

cont'd... ►►►

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ICING AOA light	DC EMER BUS (on lateral panel, C/B DE ICING-AAS / C/B BOOTS A AND B IND)	–

DSC.30.2.4 System Monitoring

Ident.: DSC.30.2.4 — 10 NOV 2026
ALL

ICE DETECT FAULT alert

CONDITION	VISUAL	AURAL
Ice detector failure	MC light flashing amber **A-ICING DETECT** amber message on EWD	SC

DSC.30.3 ENGINE AND WING PROTECTION

DSC.30.3.1 Description

Ident.: DSC.30.3.1 — 10 NOV 2026
ALL

General

The operating principle is to sequentially inflate the boots in order to remove ice.

The deice valves control the delivery pressure to 20.3 psi.

7 distribution valves control air supply to the boots:

- Valve (1) to LH engine air intake and separation chamber
- Valve (2) to RH engine air intake and separation chamber
- Valve (3) to LH outer wing leading edge
- Valve (4) to LH center wing leading edge and LH internal wing leading edge
- Valve (5) to RH outer wing leading edge
- Valve (6) to RH center wing leading edge and RH internal wing leading edge
- Valve (7) to horizontal tailplane leading edge.

Each of these distribution valves has one input and two outputs A and B, each controlled by the MFC. For more details, refer to the schematics (see DSC.30.3.5).

Two types of boots are used:

- Transversal (chordwise) boots for the leading edges and the gas paths. Boots A and boots B alternate along the chord.
- Annular boots for the engine intakes.

When deflated, the boots are held to the structure thanks to a venturi supplied by bleed air.

Note

The system is designed to remain operative with one engine inoperative through a common air manifold, except icing protection of the inoperative engine which is lost.

CAUTION

With this type of boots, there is no need to wait for ice accretion on airframe before selecting it ON. This system MUST be selected ON as soon as and as long as ice accretion develops on airframe.

Time sequence diagram

A selection of the AIRFRAME pb or of one ENG pb initiates a deicing cycle. One sequence serves the engines and the airframe. Each output inflates for 5 s.

Normal mode

TIME CYCLE	INFLATED BOOTS
0 to 5 s	Engines air intakes and separation chamber: BOOTS A ENG 1 and BOOTS A ENG 2
5 s to 10 s	Engines air intakes and separation chamber: BOOTS B ENG 1 and BOOTS B ENG 2
10 s to 15 s	Wings, outer boots (1 and 2): BOOTS A
15 s to 20 s	Wings, outer boots (1 and 2): BOOTS B
20 s to 25 s	Wings, inner boots: BOOTS A

cont'd... ►►►

cont'd... ►►►

TIME CYCLE	INFLATED BOOTS
25 s to 30 s	Wings, inner boots: BOOTS B
30 s to 35 s	Horizontal stabilizer: BOOTS A
35 s to 40 s	Horizontal stabilizer: BOOTS B

Beginning of the following sequence at:

- FAST MODE (SAT > -20 °C): 60 s
- SLOW MODE (SAT < -20 °C): 180 s

OVRD mode

TIME CYCLE	INFLATED BOOTS
0 to 5 s	Engine 1 air intakes and separation chamber: BOOTS A ENG 1
5 s to 10 s	Engine 1 air intakes and separation chamber: BOOTS B ENG 1
10 s to 15 s	Wings, outer boots (1 and 2): L BOOTS A and R BOOTS B
15 s to 20 s	Wings, outer boots (1 and 2): R BOOTS A and L BOOTS B
20 s to 25 s	Wings, inner boots: L BOOTS A and R BOOTS B
25 s to 30 s	Wings, inner boots: R BOOTS A and L BOOTS B
30 s to 35 s	Engine 2 air intakes and separation chamber: BOOTS A ENG 2
35 s to 40 s	Engine 2 air intakes and separation chamber: BOOTS B ENG 2. Horizontal stabilizer: BOOTS A
40 s to 45 s	Horizontal stabilizer: BOOTS B

Beginning of the following sequence at 60 s (FAST MODE).

Note

When DE ICING OVRD mode is selected, boots inflate according to a separate timer and MFC is totally bypassed.

DSC.30.3.2 Controls

Ident.: DSC.30.3.2 — 10 NOV 2026
ALL

Engine-Wing De Icing panel

The DE ICING panel is on the overhead panel. It has the AFR AIR BLEED pb (1), the AIRFRAME pb (2), the ENG 1 and ENG 2 pbs (3), the DE ICING SAT < -20 °C pb (4), the DE ICING MODE SEL guarded pb (5) and the DE-ANTI ICING MODE SEL AUTO pb (6).

(1) AFR AIR BLEED pb

Controls both deice and isolation valves.

Pb pressed in	Normal operation. Both DEICE and ISOLATION VALVES are open.
OFF	Pb released. OFF light comes on white. Both DEICE and isolation valves are closed. However, engine deicing can be used (engine DE ICING selected ON will open deice valve). But airframe deicing is not available.
FAULT	The light comes on amber and the FWS is activated when air pressure downstream of the deice valves stays below 14 psi, or air temperature upstream of the deice valves exceeds 230 °C. A-ICING BLEED alert is displayed with associated procedure on EWD. Master Caution light and Single Chime are activated. The alert is inhibited when pb is released.

cont'd... ►►►

cont'd... ►►►

(2) AIRFRAME pb

Controls the outputs A and B of both wings and stabilizers distribution valves.

ON	Pb pressed in. Signal is sent to the MFC in order to initiate a deicing cycle depending on DE ICING SAT < -20 °C pb. ON light comes on blue.
Pb released	Normal operation. Associated boots stay deflated.
FAULT	The light comes on amber and the FWS is activated when inflation sequencing of airframe boots A and B is not correct: associated distribution valve output has been controlled open but no downstream pressure has been detected, or associated distribution valve output has been controlled closed but a downstream pressure is detected. A-ICING FRAME alert is displayed with associated procedure on EWD. Master Caution light and Single Chime are activated. "AIRFRAME" amber label is displayed on the memo panel display of MFD.

When AIRFRAME deicing is ON, "AIRFRAME" cyan label is displayed on the memo panel display, under DE ICING. The AIRFRAME label flashes when the airframe deicing is still selected ON 5 min after the last ice accretion detection (see DSC.30.2.2).

(3) ENGINE pbs

Control deice valves, as well as the outputs A and B of respective engine distribution valves.

ON	Pb pressed in. Deice valve is controlled open even if AFR AIR BLEED pb is not selected ON, and a signal is sent to the MFC in order to initiate a deicing cycle depending on DE ICING SAT < -20 °C pb. ON light comes on blue. ENG cyan label is displayed on the memo panel display of MFD.
Pb released	Associated boots stay deflated. Also controls associated deice valve in closed position, after AFR AIR BLEED pb FAULT and ENG FAULT.
FAULT	The light comes on amber and the FWS is activated when associated distribution valve output has been controlled open but no downstream pressure has been detected, or associated distribution valve output has been controlled closed but a downstream pressure is detected, or AFR AIR BLEED pb selected OFF and air temperature upstream of the deice valve exceeds 230 °C, or inflation sequencing of engine boots A or B is not correct. A-ICING ENG alert is displayed with associated procedure on EWD. Master Caution light and Single Chime are activated. ENG amber label is displayed on the temporary selections window of MFD.

When at least one ENGINE deicing is ON, "ENG" cyan label is displayed on the memo panel display, under DE ICING, as 1 ENG 2.

(4) DE ICING SAT < -20 °C pb

To be used when SAT < -20 °C. Controls the selection of wings/engines boots inflation cycles when MAN is selected on MODE SEL AUTO pb.

FAST	Pb released. Timing cycle = 60 s.
SLOW	Pb pressed in. Timing cycle = 180 s. SLOW light comes on blue.

(5) DE ICING MODE SEL guarded pushbutton

Controls the emergency deicing operation. The control panel enables control of all double valves (ENG and AIRFRAME).

NORM	Pb released. Normal operation.
OVRD	Pb pressed in. The emergency deicing activation is selected (timing cycle = 60 s), the light comes on blue and all deicing lights turn off. This position is used when the associated FAULT light comes on.

cont'd... ►►►

cont'd... ►►►

FAULT The light comes on amber when both MFC modules associated with air intake boots control fail. A-ICING SEL alert is displayed with associated procedure on EWD. Master Caution light and Single Chime are activated.

(6) DE-ANTI ICING MODE SEL AUTO pb

Pb released — Normal operation (automatic operating mode). The DE ICING MODE SEL pb is inoperative. The cycle selection is provided by ADC data computation through CAC and MFC.

FAULT Comes on amber and the FWS is activated when MFC (1B or 2B) and/or ADC, or CPM, or IOM failure occurs. The DE ICING MODE SEL pb is inoperative. In this case the FAST mode is automatically activated.

MAN The flight crew must select the appropriate timing cycle depending on SAT using ANTI ICING MODE SEL SAT < -10 °C (see DSC.30.4) and DE ICING SAT < -20 °C pb. MAN comes on blue.

The temperature data come from the left temperature sensor through ADC 1 and the right temperature sensor through ADC 2. They are processed by CAC 1 and CAC 2 and sent to MFC 1A, 1B, 2A and 2B through the MFC ARINC bus.

SIMULATOR NOTE

The A-ICING AUTO alert and the MODE SEL AUTO FAULT light come on for an MFC 1B or 2B, CPM or IOM failure only. An ADC failure, or outputs not in accordance, do not trigger them.

Horns Anti Icing panel

(1) ANTI ICING HORNS pushbuttons

Control activation of following units:

- RUD & L ELEV: Rudder and left elevator horns anti-ice
- AIL & R ELEV: Ailerons and right elevator horns anti-ice.

ON Pb pressed in. Associated anti-ice units are activated. ON light comes on cyan. HORN cyan label is displayed on the memo panel display of MFD. As soon as a HORN is selected ON, ICING AOA light is displayed on the Ice Detector panel (see DSC.30.2).

OFF — Pb released. Associated anti-ice units are deactivated.

FAULT The light comes on amber and the FWS is activated when electrical power is lost on one of the associated units. HORN amber label is displayed on the memo panel display of MFD.

Note

As soon as at least one of the ANTI ICING HORNS pb is selected ON, stall alert threshold is reduced (see DSC.31.12). Horns heating are inhibited on ground.

On the MFD memo panel, under ANTI ICING, the horns are shown as 1 HORN 2.

DSC.30.3.3 Electrical Supply

Ident.: DSC.30.3.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
Deice valves	DC BUS 2 (on lateral panel C/B SO and REG VALVE 1 and 2)	NIL
Isolation valves	DC ESS BUS (on lateral panel C/B ISOL VALVE 1 and 2)	NIL

cont'd... ►►►

cont'd... ►►►

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
Distribution valves (Boots A + ENG 1)	DC EMER BUS (on lateral panel C/B ENG 1 and C/B AFR-BOOTS A SPLY)	NIL
Distribution valves (Boots B + ENG 2)	DC BUS 2 (on lateral panel C/B ENG 2 and C/B AFR-BOOTS B NORM SPLY) and DC EMER BUS (BACK UP) (on lateral panel C/B ENG 2 and C/B AFR-BOOTS B EMER SPLY)	NIL
Controls and alerts	DC EMER (on lateral panel C/B CTL and C/B CAUTION)	NIL
Left elevator and rudder horns anti-ice	NIL	115 VAC wild BUS 1 (on lateral panel C/B L ELEV RUD)
Left elevator and rudder horns anti-ice control	DC EMER BUS (on lateral panel C/B L ELEV and C/B RUD)	NIL
Right elevator and ailerons horns anti-ice	NIL	115 VAC wild BUS 2 (on lateral panel C/B R ELEV R AIL L AIL)
Right elevator and ailerons horns anti-ice control	DC EMER BUS (on lateral panel C/B R ELEV and C/B AIL)	NIL

DSC.30.3.4 System Monitoring

Ident.: DSC.30.3.4 — 10 NOV 2026
ALL

ANTI ICING HORNS 1(2) FAULT

CONDITION	VISUAL	AURAL
Power loss on a horn anti ice unit.	MC light flashing amber. **A-ICING HORNS 1(2)** amber message on EWD. **HORN 1(2)** amber message on Memo Panel. Associated FAULT amber light on overhead panel.	SC

AIRFRAME AIR BLEED FAULT (DE ICING)

CONDITION	VISUAL	AURAL
Low pressure in deicing common air manifold (P < 14 psi) - OR - Overtemperature (T > 230 °C) upstream pressure regulating valve	MC light flashing amber. **A-ICING BLEED** amber message on EWD. AFR AIR BLEED FAULT amber light on overhead panel.	SC

DE ICING AIRFRAME FAULT

CONDITION	VISUAL	AURAL
Distribution valve output controlled open but no downstream pressure detected - OR - Distribution valve output controlled closed but downstream pressure detected	MC light flashing amber. **A-ICING FRAME** amber message on EWD. **AIRFRAME** amber message on Memo Panel. AIRFRAME FAULT amber light on overhead panel.	SC

DE ICING MODE SEL FAULT

CONDITION	VISUAL	AURAL
Incorrect deicing cycles schedule	MC light flashing amber. **A-ICING SEL** amber message on EWD. **AIRFRAME** amber message on Memo Panel. **ENG 1** amber message on Memo Panel. **ENG 2** amber message on Memo Panel. DE ICING MODE SEL FAULT amber light on overhead panel.	SC

cont'd... ►►►

cont'd... ►►►

DE-ANTI ICING MODE SEL AUTO FAULT

CONDITION	VISUAL	AURAL
MFC 1B or 2B and/or ADC failure - OR - Outputs not in accordance	MC light flashing amber. **A-ICING AUTO** amber message on EWD. DE-ANTI ICING MODE SEL AUTO FAULT amber light on overhead panel.	SC

DE ICING ENG 1(2) FAULT

CONDITION	VISUAL	AURAL
Distribution valve output controlled open but no downstream pressure detected - OR - Distribution valve output controlled closed but downstream pressure detected - OR - AFR AIRBLEED pb selected OFF and air temperature upstream of the de icing valve exceeds 230 °C - OR - Inflation sequencing of engine boots A or B is not correct	MC light flashing amber. **A-ICING ENG 1(2)** amber message on EWD. **ENG 1(2)** amber message on Memo Panel. Associated FAULT amber light on overhead panel.	SC

SIMULATOR NOTE

The air temperature upstream of the deice valves is not monitored. A-ICING BLEED and A-ICING ENG 1(2) come on for the pressure conditions only, not for an overtemperature above 230 °C.

DSC.30.3.5 Schematics

Ident.: DSC.30.3.5 — 10 NOV 2026
ALL

General

- Each engine supplies BLEED AIR HP to its DE ICE VALVE. An OVER HEAT THERMAL SWITCH is installed upstream of each deice valve.
- Downstream of each deice valve, the air goes to the dual distributor valve of the associated engine air intake (boots A and B, with pressure switches), and to the common air manifold through a SHUT OFF VALVE (isolation valve).
- A PRESSURE SWITCH monitors the common air manifold.
- The common air manifold supplies, through DUAL DISTRIBUTOR VALVES with pressure switches, the outboard wing boots (EXTERNAL 1, EXTERNAL 2 and MEDIAN, A and B), the INNER DE ICER (A and B) of each wing and the HORIZONTAL STABILIZER boots (A and B).
- Water drains (WD) are installed on the lines.

The CONTROL PANEL and the COMPUTER control the distribution valves. Computer module 1 controls the ENG 1 boots A and B and the airframe boots A. Computer module 2 controls the ENG 2 boots A and B and the airframe boots B.

Engine nacelle protection system

The engine nacelle boots are:

- the air intake boots (upper and lower),
- the upper boots,
- the radiator upper duct boots.

DSC.30.4 PROPELLER ANTI ICING

DSC.30.4.1 Description

Ident.: DSC.30.4.1 — 10 NOV 2026
ALL

General

Propeller anti-ice is performed by resistors installed near the surface of the inboard sections of the blade leading edges.

On each propeller, the heating elements are electrically connected in three blades (every other blade).

The system is supplied with 115 V ACW.

Two modes are available:

- **AUTO**: MODE SEL AUTO pb released. Automatic operating mode.
- **MAN**: MODE SEL AUTO pb pressed in. The MODE SEL pb is operative and is selected depending on the temperature:
  - NORMAL: to be used when SAT is between -10 °C (14 °F) and 0 °C (32 °F),
  - ON: to be used when SAT is between -30 °C (-22 °F) and -10 °C (14 °F).

When selected on, the propeller anti-ice system starts to heat the blades only when NP is sensed above 63 %.

Note

Below -30 °C (-22 °F) icing problems should not be present (no supercooled water).

Time sequence

The blade groups are supplied one after the other. Each propeller is heated half of the time, and the two propellers are never heated together.

NORMAL OPERATION (MODE SEL pb OUT)	ON (MODE SEL pb IN)	BLADES SUPPLIED
0 to 10 s	0 to 20 s	Propeller 1, blades 1-3-5
10 s to 20 s	20 s to 40 s	Propeller 1, blades 2-4-6
20 s to 30 s	40 s to 60 s	Propeller 2, blades 1-3-5
30 s to 40 s	60 s to 80 s	Propeller 2, blades 2-4-6
40 s to 50 s	80 s ...	Propeller 1, blades 1-3-5
50 s ...		...

SIMULATOR NOTE

The ice on a propeller is removed as if all its blades were heated together, for as long as the propeller is heated. The blade sequence and the MODE SEL selection act on the electrical load only.

DSC.30.4.2 Controls

Ident.: DSC.30.4.2 — 10 NOV 2026
ALL

Propeller Anti Icing Panel

The PROP pbs and the MODE SEL pb are in the ANTI ICING part of the ANTI ICING / DE ICING panel (24VU) on the overhead panel. The MODE SEL AUTO pb is on the same panel.

cont'd... ►►►

cont'd... ►►►

(1) PROP pb

Controls the respective propeller heating elements.

ON — pb pressed in. The heating units are supplied. The ON light comes on cyan. PROP cyan label is displayed on the memo panel display of the MFD.

Pb released — The heating elements are not supplied.

FAULT — The light comes on amber to indicate that at least one blade is not electrically supplied. A-ICING PROP alert is displayed with associated procedure on the EWD. Master Caution light and Single Chime are activated.

(2) MODE SEL pb (to be used when SAT < -10 °C)

Controls the duration of the propeller anti-ice cycles when MAN is selected on the MODE SEL AUTO pb.

Pb released — LOW POWER cycle is selected.

ON — pb pressed in. HIGH POWER cycle is selected. The ON light comes on cyan.

Note

- *Low Power (pb OUT): temperature greater than -10 °C (14 °F).*
- *High Power (pb IN): temperature between -10 °C (14 °F) and -30 °C (-22 °F).*
- *Below -30 °C (-22 °F) icing problems should not be present (no supercooled water).*

(3) MODE SEL AUTO pb

Pb released — Normal operation (automatic operating mode). The ANTI ICING MODE SEL pb is inoperative. The cycle selection is provided by ADC 1, MFC 1B, ADC 2 and MFC 2B.

FAULT — Comes on amber and the FWS is activated when an MFC (1B or 2B) and/or ADC failure occurs. The ANTI ICING MODE SEL pb is inoperative. In this case the HIGH POWER cycle is automatically activated.

MAN — pb pressed in. The ANTI ICING MODE SEL pb is operative and enables the flight crew to select the appropriate timing cycle depending on SAT. MAN comes on blue.

The MODE SEL AUTO pb also controls the de-icing cycle selection (see DSC.30.3).

Memo Panel Display

The ANTI ICING part of the memo panel on the MFD shows **1 PROP 2**:

1 PROP 2 — The associated PROP pb is selected ON.

1 PROP 2 — The associated PROP pb FAULT light is on.

DSC.30.4.3 Electrical Supply

Ident.: DSC.30.4.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
Propeller 1 ANTI ICING PWR	NIL	ACW BUS 1 (on lateral panel, C/B PROP 1 ANTI ICING PWR SPLY)
Propeller 2 ANTI ICING PWR	NIL	ACW BUS 2 (on lateral panel, C/B PROP 2 ANTI ICING PWR SPLY)
PROP ANTI ICING CTL and IND	DC EMER BUS (on lateral panel, C/B PROP CTL and C/B IND)	NIL

cont'd... ►►►

cont'd... ►►►

Note

Propeller anti icing is inhibited when NP is below 63 %.

DSC.30.4.4 System Monitoring

Ident.: DSC.30.4.4 — 10 NOV 2026
ALL

ANTI ICING PROP 1(2) FAULT Alert

CONDITION	VISUAL	AURAL
One or more blade anti icing inoperative	MC light flashing amber **A-ICING PROP 1(2)** amber message on EWD PROP 1(2) amber message on memo panel Associated FAULT amber light on overhead panel	SC

DSC.30.4.5 Lateral Maintenance Panel

Ident.: DSC.30.4.5 — 10 NOV 2026
ALL

Propeller Anti-Icing Test Pushbutton

The guarded PROP A/ICING test pb (PUSH ONLY PROP RUNNING) is on the RH lateral maintenance panel. It is used to check the propeller anti-ice system functioning. It must only be operated on ground, with the propellers above 63 % NP.

Test procedure:

- Aircraft on ground, propellers above 63 % NP.
- Mode select (overhead panel): NORM.
- Push the test button.
- The system performs a short anti-ice cycle.

SIMULATOR NOTE

The guard and the test pb move, but the test does not start an anti-ice cycle.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.30.5 WINDOW HEAT

DSC.30.5.1 Description

Ident.: DSC.30.5.1 — 10 NOV 2026
ALL

The cockpit windows are electrically heated:

- the front windshields for ice protection and defogging,
- the side windows for defogging only.

The front windshields are protected against ice formation by an electrically heated transparent film incorporated between two plies of glass. It is supplied with 200 V ACW, and the temperature is controlled by an electronic controller which keeps the outer windshield temperature over 2 °C (35 °F). The inner surface remains above 21 °C (70 °F) to prevent mist formation.

The side windows are protected by an electrically heated system consisting of small wires embedded between two plies of glass. It is supplied with 28 V DC and keeps the inner temperature over 21 °C (70 °F).

DSC.30.5.2 Controls

Ident.: DSC.30.5.2 — 10 NOV 2026
ALL

The WINDSHIELD HTG pbs are on the overhead panel. The SIDE WINDOWS pb is in the ANTI ICING part of the ANTI ICING / DE ICING panel (24VU).

(1) WINDSHIELD HTG L or R pb

Controls activation of the window heat systems.

Pb pressed in	Power is supplied to the associated window heat system.
OFF	pb released. The window heat system is deactivated. The OFF light comes on white.
FAULT	The light comes on amber and the FWS is activated when there is a power loss. The light also comes on during the MFC test.

(2) SIDE WINDOWS pb

Controls activation of the side window heat systems.

ON	pb pressed in. Power is supplied to both side window heat systems. The ON light comes on blue. SIDE WINDOW cyan label is displayed on the temporary selections window of the MFD.
Pb released	The side window heat systems are deactivated.
FAULT	The light comes on amber and the FWS is activated when there is a power loss. SIDE WINDOW amber label is displayed on the temporary selections window of the MFD.

Memo Panel Display

The ANTI ICING part of the memo panel on the MFD shows **SIDE WINDOWS**:

SIDE WINDOWS	SIDE WINDOWS pb selected ON.
SIDE WINDOWS	SIDE WINDOWS pb FAULT light on.

cont'd... ►►►

cont'd... ►►►

DSC.30.5.3 Electrical Supply

Ident.: DSC.30.5.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
LH		
Front windshield supply	NIL	ACW BUS 1 (on lateral panel, C/B L FRONT WINDOW HTG)
Front windshield control	NIL	ACW BUS 1 (on lateral panel, C/B FRONT CTL and C/B CAUTION)
Front windshield alert	DC BUS 2 (on lateral panel, C/B WDSHLD IND L)	NIL
Side window supply and control	DC BUS 1 (on lateral panel, C/B SIDE WDO L CTL)	NIL
RH		
Front windshield supply	NIL	ACW BUS 2 (on lateral panel, C/B R FRONT WINDOW HTG)
Front windshield control	NIL	ACW BUS 2 (on lateral panel, C/B FRONT CTL and C/B CAUTION)
Front windshield alert	DC BUS 1 (on lateral panel, C/B WDSHLD IND R)	NIL
Side window supply and control	DC BUS 2 (on lateral panel, C/B SIDE WDO R CTL)	NIL
Side windows		
Side windows alert	DC ESS BUS (on lateral panel, side window C/B CAUTION)	NIL

DSC.30.5.4 System Monitoring

Ident.: DSC.30.5.4 — 10 NOV 2026
ALL

SIDE WINDOW HTG FAULT Alert

CONDITION	VISUAL	AURAL
Loss of side window heating	MC light flashing amber **A-ICING WINDOWS** amber message on EWD SIDE WINDOWS amber message on memo panel SIDE WINDOWS FAULT amber light on overhead panel	SC

WINDSHIELD HTG FAULT Alert

CONDITION	VISUAL	AURAL
Loss of windshield heating	MC light flashing amber **A-ICING L(R) WSHLD** amber message on EWD Associated WINDSHIELD HTG FAULT amber light on overhead panel	SC

cont'd... ►►►

cont'd... ►►►

DSC.30.5.5 Lateral Maintenance Panel

Ident.: DSC.30.5.5 — 10 NOV 2026
ALL

Windshield Heat Test Pushbutton

The WSHLD HTG test pb is on the RH lateral maintenance panel. It is used to check the windshield heat controller functioning.

Test procedure:

- Press and hold the test button for 3 s.
- The BITE executes a programmed check of the controllers, ending with de-energization of both overheat power relays.

The MFC magnetic indicator comes on, on the RH maintenance panel, when a failure has been detected during the windshield heating cycle.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.30.6 PROBE HEAT

DSC.30.6.1 Description

Ident.: DSC.30.6.1 — 10 NOV 2026
ALL

To prevent icing on the air data sensors, electrical heating is provided for:

- CAPT, F/O, STBY pitot tubes,
- CAPT, F/O, STBY left and right static ports,
- CAPT, F/O alpha (angle of attack) probes,
- CAPT, F/O TAT probes.

The probes are heated both on ground and in flight, except the TAT sensors heating, which is inhibited on ground.

SIMULATOR NOTE

Only the CAPT and F/O pitot tubes and alpha probes ice up when they are not heated. The STBY pitot, the static ports and the TAT probes do not ice up: their heating acts on the lights, the alerts and the electrical load only.

DSC.30.6.2 Controls

Ident.: DSC.30.6.2 — 10 NOV 2026
ALL

Probe Heat Panel

The PROBES HTG panel is on the overhead panel. It has one pb per circuit (CAPT, STBY, F/O) and the associated amber lights.

PITOT (1) Comes on amber and the FWS is activated if the associated pitot is not heated, in flight or on ground.

ALPHA **TAT** (2) Come on amber and the FWS is activated when the respective probe is not heated.

STAT (3) Comes on amber and the FWS is activated when the respective probe is not heated. In flight, the static ports are not monitored by the FWS.

(4) CAPT, STBY, F/O pbs

Control the activation of probe heating of their respective circuits.

Pb pressed in — Probe heating is activated.

OFF — pb released. Probe heating is deactivated. The OFF light comes on white. The respective probe heat lights come on amber.

CAUTION

Even if the probes are not heated, the F/O probe lights (PITOT, ALPHA, STAT and TAT) remain OFF in case of:

- DC BUS 1 OFF, and
- DC BUS 2 OFF, and
- ACW BUS 1 OFF, and
- ACW BUS 2 OFF.

cont'd... ►►►

cont'd... ►►►

DSC.30.6.3 Electrical Supply

Ident.: DSC.30.6.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
CAPT		
Pitot tubes	NIL	ACW BUS 1 (on lateral panel, C/B PITOT)
Alpha probe	NIL	ACW BUS 1 (on lateral panel, C/B ALPHA)
Static ports	DC BUS 1 (on lateral panel)	NIL
Alerts	DC ESS BUS (on lateral panel, C/B CAUTION)	NIL
TAT probe	NIL	ACW BUS 1 (on lateral panel, C/B CPT TAT)
F/O		
Pitot tubes	NIL	ACW BUS 2 (on lateral panel, C/B PITOT)
Alpha probe	NIL	ACW BUS 2 (on lateral panel, C/B ALPHA)
Static ports	DC BUS 2 (on lateral panel)	NIL
Alerts	DC BUS 2 (on lateral panel, C/B CAUTION)	NIL
TAT probe	NIL	ACW BUS 2 (on lateral panel, C/B F/O TAT)
STBY		
Pitot tube	NIL	ACW BUS 1 and 115 VAC STBY BUS (back up) (on lateral panel, C/B STBY PITOT NORM SPLY and C/B EMER SPLY)
Static ports	DC BUS 1 (on lateral panel, C/B LEFT, RIGHT)	NIL
Alerts	DC ESS BUS (on lateral panel, C/B CAUTION)	NIL

DSC.30.6.4 System Monitoring

Ident.: DSC.30.6.4 — 10 NOV 2026
ALL

PROBES HTG FAILURE Alert

CONDITION	VISUAL	AURAL
Power loss on a probe anti-ice unit	MC light flashing amber **A-ICING ALPHA** / **A-ICING ALPHAs** amber message on EWD **A-ICING PIT CPT(F/O)(SBY)** amber message on EWD **A-ICING TAT CPT(F/O)** amber message on EWD Associated ALPHA, TAT or PITOT amber lights on overhead panel	SC

DSC.30.7 RAIN PROTECTION

DSC.30.7.1 Description

Ident.: DSC.30.7.1 — 10 NOV 2026
ALL

Rain removal from the front windshields is provided by two wipers. Each wiper is driven by a two-speed electric motor. They are controlled by two WIPER selectors on the overhead panel: one for the captain and one for the F/O.

The maximum speed to operate the wipers is 160 kt.

DSC.30.7.2 Controls

Ident.: DSC.30.7.2 — 10 NOV 2026
ALL

WIPER rotary selector

There is one selector for each side: CAPT WIPER and F/O WIPER. Each selector controls the windshield wiper on the associated side.

FAST	The wiper operates at 130 cycles/min.
SLOW	The wiper operates at 80 cycles/min.
OFF	Wiper operation stops at the end-of-travel (parking) position.

SIMULATOR NOTE

The wipers run slower than the real aircraft: one cycle (out and back) takes 2 s in SLOW and 1 s in FAST.

DSC.30.7.3 Electrical Supply

Ident.: DSC.30.7.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
Captain wiper	DC ESS BUS (on lateral panel, C/B CAPT)	NIL
F/O wiper	DC BUS 2 (on lateral panel, C/B F/O)	NIL

PAGE

INTENTIONALLY

LEFT BLANK

DSC.30.8 AIRCRAFT PERFORMANCE MONITORING (APM)

DSC.30.8.1 Description

Ident.: DSC.30.8.1 — 10 NOV 2026
ALL

General

The Aircraft Performance Monitoring (APM) system monitors aircraft in-flight performance in order to enhance flight crew awareness about any degradation of performance and especially in icing conditions. The APM system is hosted by the MPC.

The APM system compares the aircraft theoretical drag with the current drag and alerts the flight crew if a reduction of aircraft performance occurs. If drag and/or speed decay exceed predefined threshold values, the corresponding messages or alerts (cautions and/or warnings) are triggered.

A permanent background monitoring is performed as ice accretion is not the single cause of speed decay or drag increase. Other causes can significantly degrade the aircraft performance: mountain waves / wind gradients, aircraft aerodynamic altered (CDL or aircraft skin altered, excessive flight controls deflections …).

APM principle

The APM compares the in-flight drag computed with measured parameters available in the FDAU with the aircraft theoretical drag.

Parameters are smoothed to avoid noise and errors, therefore alarms may trigger up to 60 s after the performance degradation.

The APM also conducts monitoring of the current IAS compared to:

- the theoretical cruise IAS with engines running at CRZ power,
- the ICING BUG (VmLB0 ICING) + 10 kt.

Depending on drag computation and speed monitoring, different messages or alerts (cautions and/or warnings) are provided to the crew.

The APM inputs include:

- pressure altitude,
- SAT,
- IAS,
- engine torque,
- propeller rotation speed,
- landing gear and flaps sensor inputs,
- aircraft weight taken from FMS entry and fuel flow,
- longitudinal acceleration (for takeoff weight computation if not set in the FMS),
- altitude hold mode.

APM conditions for monitoring and triggering

Aircraft performance monitoring starts after landing gear and flap retraction and continues during the flight in clean configuration (flaps 0 and landing gear up) and as long as both engines are operating.

The messages or alerts (cautions and/or warnings) can be triggered if the SAT is below 10 °C and one or several of the following conditions are met:

- ICING AOA illuminated,

cont'd... ►►►

cont'd... ►►►

- DE ICING AIRFRAME pb selected ON,
- ice accretion detected (at least once during the flight).

APM flight phases determination

The messages or alerts (cautions and/or warnings) triggering conditions depend on the flight phase. Therefore, the APM must determine the current flight phase: CRUISE, DESCENT, or CLIMB. The different flight phases are:

- CRUISE: ALT mode engaged or vertical speed below ± 200 ft/min for more than 2 min.
- CLIMB / DESCENT: out of cruise conditions.

APM triggering thresholds

Depending on the flight phase, if drag and speed degradation exceed predefined threshold values, messages and/or alerts are triggered. They are organized on three levels of alerting depending on aircraft performance degradation:

- The **CRUISE SPEED LOW** message indicates a limited performance degradation (around 10 % of drag increase compared to the theoretical drag in the same conditions) with a speed decay at least 10 kt below the expected cruise speed. This message is available in CRUISE phase only.
- The **DEGRADED PERF** alert indicates a significant performance degradation (around 22 % or 28 % of drag increase):
  - in climb, the alert is triggered by an increase of drag that generates a severe reduction of rate of climb,
  - in cruise, the alert is triggered by an increase of drag that generates an IAS decrease (15 kt to 20 kt below the expected cruise speed),
  - in descent, the alert is triggered by an increase of drag.
- The **INCREASE SPEED** alert is triggered by a severe performance degradation generating an IAS decrease below ICING BUG + 10 kt. The alert indicates that the conditions for DEGRADED PERF are met and that the speed is below ICING BUG + 10 kt.

All messages or alerts (cautions and/or warnings) are triggered after a confirmation time of 60 s. However, they can be immediately triggered based on drag gradients to alert the crew when high rates of drag degradation are calculated.

The CRUISE SPEED LOW message and the DEGRADED PERF alert turn off when the triggering conditions are no more met.

Examples:

- In the case of a CRUISE SPEED LOW, considering that the aircraft begins the descent, the CRUISE SPEED LOW message will disappear as soon as the flight phase is no more CRUISE, even if the degradation of drag remains above 10 %.
- In the case of a DEGRADED PERF triggering in CRUISE, considering that the aircraft begins the descent and accelerates above ICING BUG + 30 kt, the DEGRADED PERF message will remain as long as the degradation of drag remains above 22 %.

Triggering thresholds and associated messages summary:

FLIGHT PHASE	DRAG INCREASE	IAS	MESSAGE / ALERT
Cruise	+ 10 %	10 kt below the theoretical cruise IAS	CRUISE SPEED LOW
Cruise	+ 22 %	15 kt to 20 kt below the theoretical cruise IAS	DEGRADED PERF
Climb or descent	+ 28 %	–	DEGRADED PERF
All	DEGRADED PERF conditions met	below ICING BUG + 10 kt	INCREASE SPEED

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

The APM has no drag computation. It monitors the speed decay only:

- In stable level flight above 10 000 ft (vertical speed below ± 200 ft/min for 30 s), it stores the current IAS as the expected cruise speed.
- **CRZ SPD LO** comes on 10 kt below this speed and **DGD PERF** 15 kt below it. INCREASE SPEED needs DGD PERF and an IAS below ICING BUG + 10 kt.
- There is no 60 s confirmation time: the messages come on and go off at once.
- DEGRADED PERF has no climb (rate of climb) and no descent branch.
- The APM FAULT comes on only during the APM TEST. There is no APM internal failure.

DSC.30.8.2 Controls

Ident.: DSC.30.8.2 — 10 NOV 2026
ALL

APM indications

The APM messages are displayed on the FMA of each PFD.

CRZ SPD LO amber message

CRZ SPD LO This attention getter is generated only in Cruise mode, to inform the flight crew that the aircraft speed is 10 kt below the theoretical maximum cruise speed and that there is a small drag increase. No aural alert.

DGD PERF amber message

DGD PERF This caution is generated in the case of a significant performance degradation that could be due to severe icing conditions.

Visual and aural alerts are:

- MC light flashing amber,
- **DGD PERF** amber message on the FMA,
- **DEGRADED PERF** amber message on the EWD,
- single chime aural alert.

INCREASE SPEED flashing amber message

INCREASE SPEED This caution is generated in the case of a severe performance degradation, when the aircraft speed is below ICING BUG + 10 kt.

Visual and aural alerts are:

- MC light flashing amber,
- **INCREASE SPEED** flashing amber message on the FMA,
- **INCREASE SPEED** amber message on the EWD,
- single chime aural alert.

APM control panel

The APM pb (2) and the APM TEST pb (1) are on the right part of the ice detector panel, on the center panel (see DSC.30.2.2).

cont'd... ►►►

cont'd... ►►►

(1) APM TEST pb

The APM TEST pb is used to test the APM function. The flight crew must perform this test daily, to determine whether the APM components are operational or not.

(2) APM pb

The APM pb controls the activation of the APM. If the FAULT light comes on, the APM must be selected OFF.

OFF APM function in OFF position (comes on white).

FAULT Comes on amber in case of APM FAULT (the APM FAULT alert is triggered by the FWS). The APM FAULT is inhibited on ground. The APM FAULT is triggered by the MPC in case of internal failure or invalid aircraft parameters.

DSC.30.8.3 Electrical Supply

Ident.: DSC.30.8.3 — 10 NOV 2026
ALL

EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
MPC	DC ESS BUS	–
CAC 1, CPM 1 and IOM-S 1	DC EMER BUS (upper panel CAC / CPM 1 / IOM-S 1)	–
CAC 2, CPM 2 and IOM-S 2	DC ESS BUS (upper panel CAC / CPM 2 / IOM-S 2) DC STBY BUS (upper panel CAC / CPM 2 / IOM-S 2)	–
APM FAULT	DC ESS BUS	–

DSC.30.8.4 System Monitoring

Ident.: DSC.30.8.4 — 10 NOV 2026
ALL

ALERT	CONDITION	VISUAL	AURAL
APM FAULT	APM failure - OR - Invalid aircraft parameters	MC light flashing amber **APM FAULT** amber message on EWD APM pb **FAULT** amber light on the center panel	SC
DEGRADED PERF	In level flight: drag abnormally high AND IAS significant decrease compared to max cruise speed - OR - In climb: drag abnormally high resulting in a loss of rate of climb - OR - In descent: drag abnormally high	MC light flashing amber **DEGRADED PERF** amber message on EWD **DGD PERF** amber message on FMA	SC
INCREASE SPEED	In level flight: drag abnormally high AND IAS below ICING BUG + 10 kt - OR - In climb: drag abnormally high resulting in a loss of rate of climb AND IAS below ICING BUG + 10 kt - OR - In descent: drag abnormally high AND IAS below ICING BUG + 10 kt	MC light flashing amber **INCREASE SPEED** amber message on EWD **INCREASE SPEED** amber message flashing on FMA	SC

cont'd... ►►►

cont'd... ►►►

DSC.30.8.5 Schematics

Ident.: DSC.30.8.5 — 10 NOV 2026
ALL

The APM function is hosted by the MPC:

ELEMENT	DESCRIPTION
Inputs to the MPC	FMS 1/2, ADC 1/2, EEC 1/2, FCU 1/2 (ARINC 429, analog and discrete)
Panel	APM pb (FAULT / OFF) and APM TEST (PTT) pb
MPC outputs	Broadcast on ARINC 429 to CAC 1/2: APM FAULT, CSL (CRUISE SPEED LOW), DP (DEGRADED PERF), IS (INCREASE SPEED), APM OFF
Displays	EWD: APM FAULT, DEGRADED PERF, INCREASE SPEED. PFD (FMA): CRZ SPD LO, DGD PERF, INCREASE SPEED

PAGE

INTENTIONALLY

LEFT BLANK

DSC.31.4 CONTROL AND DISPLAY SYSTEM

DSC.31.4.1 General

Ident.: DSC.31.4.1 — 05 NOV 2026
ALL

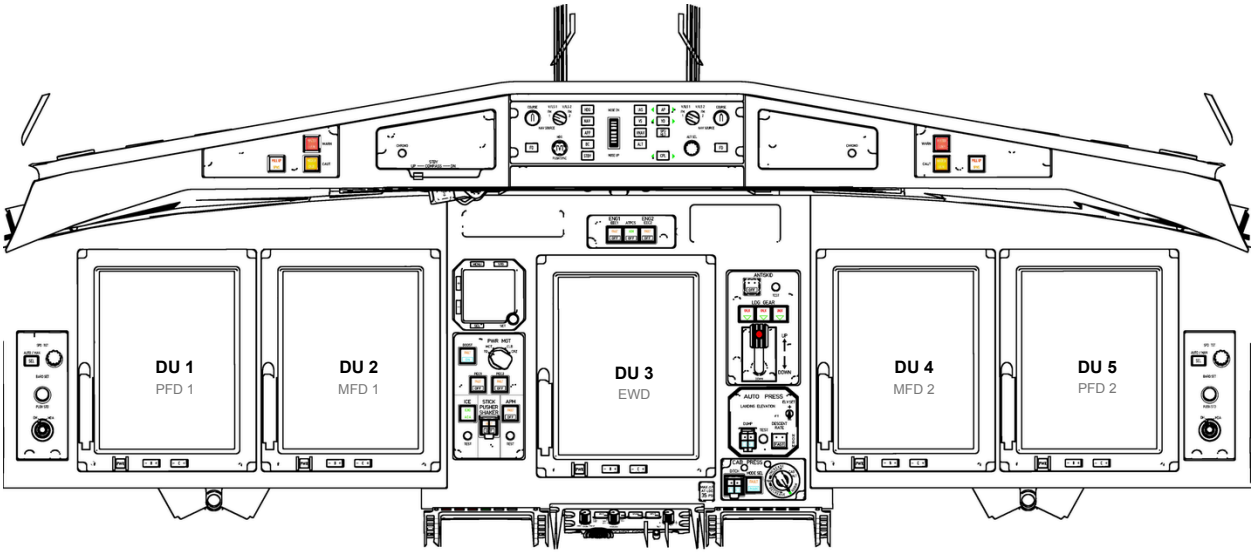
The Control and Display System (CDS) is the crew interface to the avionics. It presents flight, navigation, engine and system data, and the alerts and procedures generated by the Flight Warning System (FWS).

The CDS is made of:

- five identical Display Units (DU 1 to DU 5) on the main instrument panel,
- two EFIS Control Panels (EFCP) and two Multipurpose Control Panels (MCP) on the centre pedestal,
- two Index Control Panels (ICP), one on each side of the main panel,
- two MCDUs on the centre pedestal (described in the FMS part),
- two switching panels (CAPT and F/O SWITCHING), on the side parts of the main panel.

The information is grouped into three **formats**. Each format is divided into windows.

FORMAT	CONTENT	REFERENCE
PFD (Primary Flight Display)	Flight and auto flight data, short-term navigation	see DSC.31.5
MFD (Multi-Function Display)	Navigation display, system pages, performance data, radio and surveillance control	see DSC.31.6
EWD (Engine and Warning Display)	Primary engine parameters, flight controls and trims, alerts and procedures	see DSC.31.7



Glare shield and main instrument panel

DSC.31.4.2 Cockpit Layout and Terminology

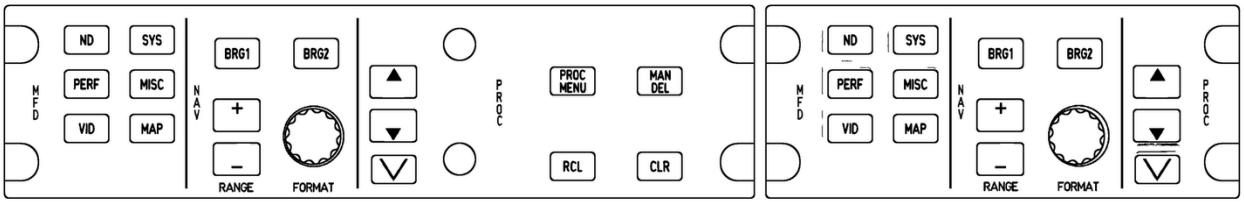
Ident.: DSC.31.4.2 — 05 NOV 2026
ALL

The panels that control the displays are named as follows. Use these names when you read the procedures.

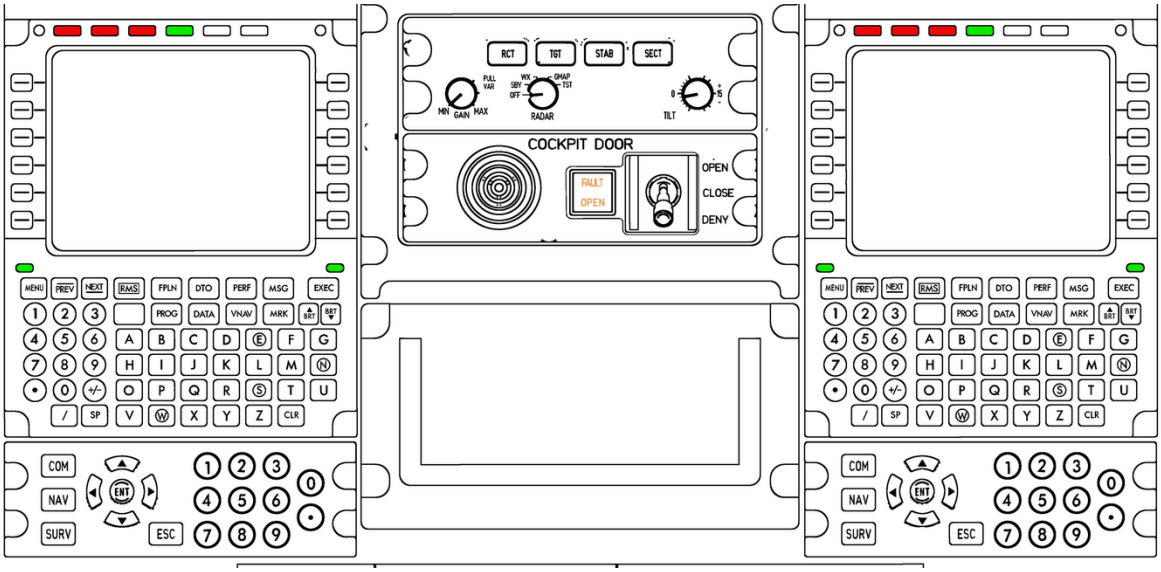
cont'd... ►►►

cont'd... ►►►

PANEL	LOCATION	FUNCTION
FGCP (Flight Guidance Control Panel)	Glare shield, centre	AFCS modes and targets, NAV SOURCE, course
ICP (Index Control Panel)	Main panel, outboard of each PFD	Speed target, baro setting, DH / MDA
EFCP-L / EFCP-R (EFIS Control Panel)	Centre pedestal, forward	MFD page selection, ND range, format and bearings, alert and procedure management
MCP (Multipurpose Control Panel)	Centre pedestal, below each MCDU	Control of the Virtual Control Panel (VCP) on the own-side MFD
MCDU	Centre pedestal	FMS, radio management (see the FMS part)
CAPT / F/O SWITCHING	Main panel, each side	ATT/HDG and ADC source, DISPLAY reversion
WRCP (Weather Radar Control Panel)	Centre pedestal, between the MCDUs	Weather radar (see DSC.31.4.9)
GA pushbuttons	Power lever handles	Go-around mode



EFCP-L (left) and EFCP-R (right) on the centre pedestal



MCDUs, MCPs and WRCP on the centre pedestal

DSC.31.4.3 Display Units

Ident.: DSC.31.4.3 — 05 NOV 2026
ALL

The five DUs are identical and interchangeable. In normal configuration they show:

cont'd... ►►►

cont'd... ►►►

DU	POSITION	NORMAL FORMAT
DU 1	Captain, outboard	PFD 1
DU 2	Captain, inboard	MFD 1
DU 3	Centre	EWD
DU 4	F/O, inboard	MFD 2
DU 5	F/O, outboard	PFD 2



Display unit numbering



Formats in normal configuration

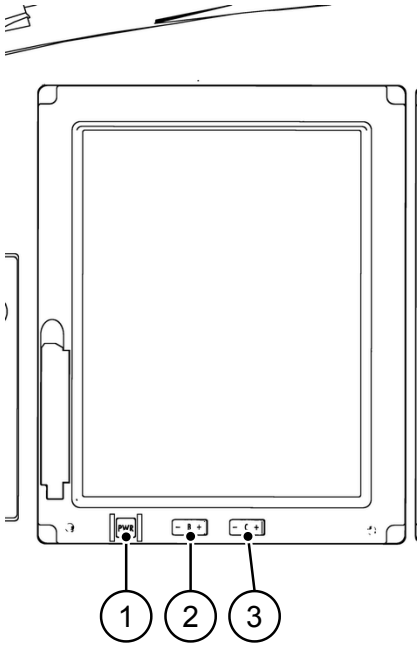
At power-up, MFD 1 shows the ND (ARC) and MFD 2 shows the ENGINE system page, so PFD 2 shows the mini ND in place of its HSI. Any DU can show any format after a reversion (see DSC.31.9).

Display unit controls

Each DU has a row of controls along its bottom edge.

cont'd... ►►►

cont'd... ►►►



Display unit controls

① PWR pb

ON	(pb pressed in) The DU is powered when its bus is supplied.
OFF	(pb released) The DU is off and dark.

② B (brightness) - / +

- / +	Decreases / increases the display brightness.

③ C (contrast) - / +

- / +	Decreases / increases the display contrast. On a TAWS terrain alert, contrast is reset automatically to 80 % (see DSC.31.5).

SIMULATOR NOTE

The DU ON/OFF light is not modelled: the switch works, but the lamp in the 3D cockpit does not change. The automatic dimming from the luminance sensors and the data card slots are not simulated.

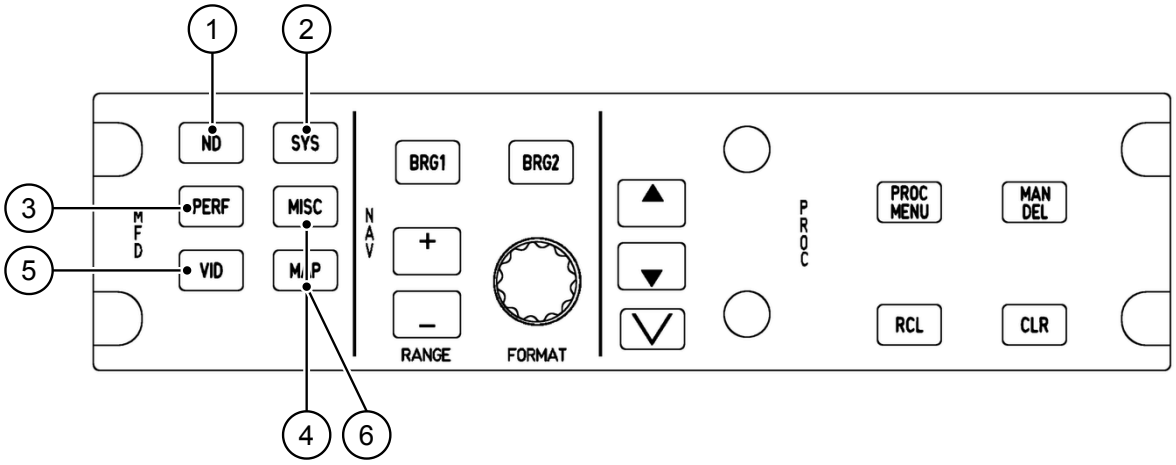
DSC.31.4.4 EFCP - MFD Control

Ident.: DSC.31.4.4 — 05 NOV 2026
ALL

The two EFCPs are on the centre pedestal. EFCP-L acts on the Captain MFD (DU 2) and PFD (DU 1), EFCP-R on the F/O MFD (DU 4) and PFD (DU 5). Each EFCP has three groups of keys: MFD control, NAV control and WD (warning display) control.

cont'd... ►►►

cont'd... ►►►



EFCP-L, MFD control

The MFD control group selects the page shown in the upper window of the own-side MFD.

(1) ND pb

PRESS — Displays the ND. The ND comes back in the format last used by the mini ND (ARC or ROSE). The PFD navigation area returns to the HSI.

(2) SYS pb

PRESS — Displays a system page. Successive presses cycle through the four system pages: ACW/HYD, ENGINE, CABIN, AC/DC, then ACW/HYD again. The first press from any other page always shows ACW/HYD.

(3) PERF pb

PRESS — Displays the MFD PERF page in the upper window and the VCP TO DATA page in the lower window. A further press, while PERF is displayed, alternates the VCP between TO DATA and ENG OAT. When PERF is left, the VCP returns to the page shown before PERF.

(4) MISC pb

PRESS — Provision. No effect.

(5) VID pb

PRESS — Provision. No effect.

(6) MAP pb

PRESS — Displays the airport moving map (MAP) in the upper window. A second press returns to the ND in ARC.

SIMULATOR NOTE

MISC and VID are provisions. The MAP pb opens an airport moving map with stands, parking positions and taxiways, which exists only in the simulation: see DSC.31.6 for its use.

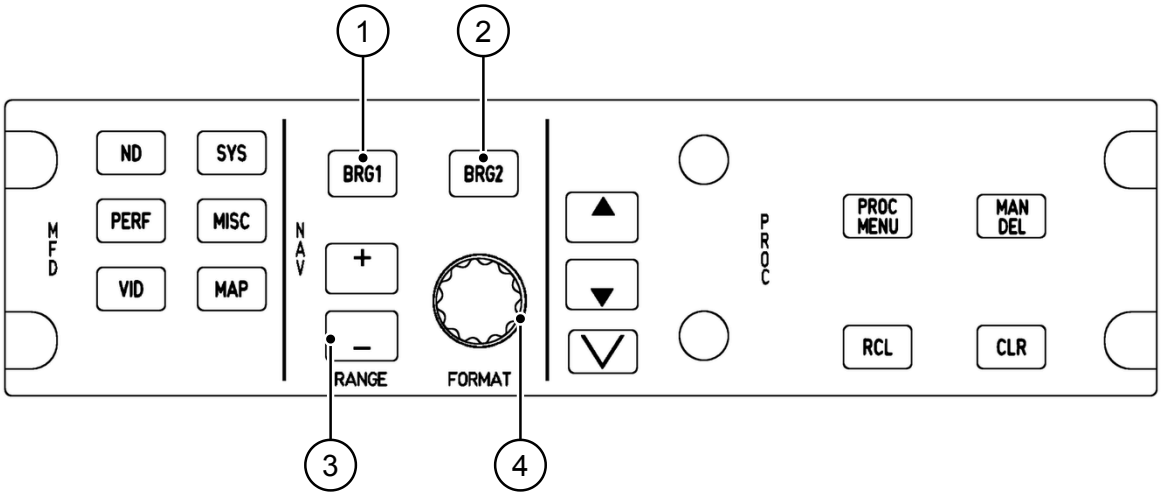
cont'd... ►►►

cont'd... ►►►

DSC.31.4.5 EFCP - NAV Control

Ident.: DSC.31.4.5 — 05 NOV 2026
ALL

The NAV control group acts on the ND on the own-side MFD and on the navigation area of the own-side PFD.



EFCP-L, NAV control

(1) BRG1 pb

PRESS — Selects the source of bearing pointer 1 (circle). Successive presses cycle VOR 1, ADF 1, no pointer. At power-up no pointer is selected.

(2) BRG2 pb

PRESS — Same as BRG1 for bearing pointer 2 (open diamond): VOR 2, ADF 2, no pointer.

(3) RANGE + / - pb

+ / - — Increases / decreases the ND range. The same range applies to the mini ND on the own-side PFD. Available ranges: 5, 10, 20, 40, 80 and 160 NM. A manual range change cancels an automatic (AUTO) range set by TAWS.

(4) FORMAT rotary knob

ND displayed — Selects the ND format: ARC, ROSE or PLAN.

ND not displayed — Selects the format of the mini ND on the PFD: ARC or ROSE only.

The format also changes automatically:

- on a TAWS terrain alert: ND and mini ND in ARC, 10 NM range, terrain display selected,
- on a TCAS traffic advisory: ND in ROSE (range unchanged); mini ND in ROSE, 10 NM range,
- when an ND in PLAN is replaced by another page: the mini ND is shown in ROSE.

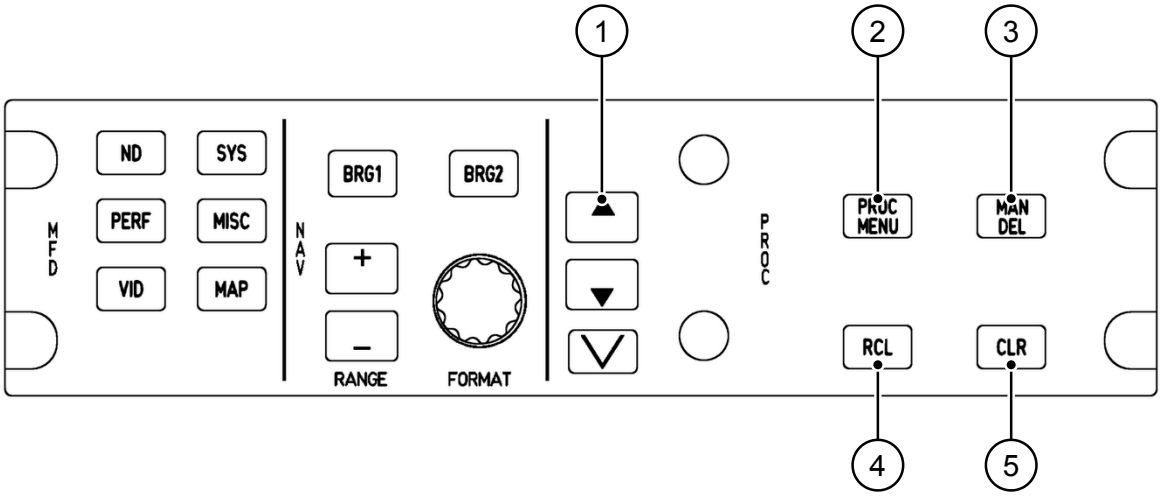
cont'd... ►►►

cont'd... ►►►

DSC.31.4.6 EFCP - WD Control

Ident.: DSC.31.4.6 — 05 NOV 2026
ALL

The WD control keys manage the alerts and procedures shown in the lower part of the EWD. The PROC MENU, MAN DEL, RCL and CLR keys are on EFCP-L only and are used by both pilots. Each EFCP has its own set of procedure control keys (up, down, validate).



EFCP-L, WD control

(1) Procedure control pbs (up / down / validate)

UP / DOWN	Moves the cyan selection box one line up / down in the procedure window.
V (validate)	Validates the boxed item: acknowledges an action, opens a boxed procedure or status, selects a choice.

(2) PROC MENU pb

PRESS	Displays the procedure menu (PENDING list and LIST sub-menus) in the procedure window.

(3) MAN DEL pb

PRESS	Deletes a procedure inserted manually.
PRESS > 3 s	Clears the displayed procedure or check list (or the boxed one in the menu) until the next RCL press.

(4) RCL pb

1st PRESS	Displays the alert messages previously cleared and still active. Cancels the take-off alert inhibition. Opens the procedure menu.
2nd PRESS	Scrolls the alert list if it overflows the alert window.

(5) CLR pb

PRESS	Clears the displayed caution message and its procedure. A warning cannot be cleared.

For the use of these keys, see DSC.31.12.

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

The procedure keys act 0.1 s after the key moves.

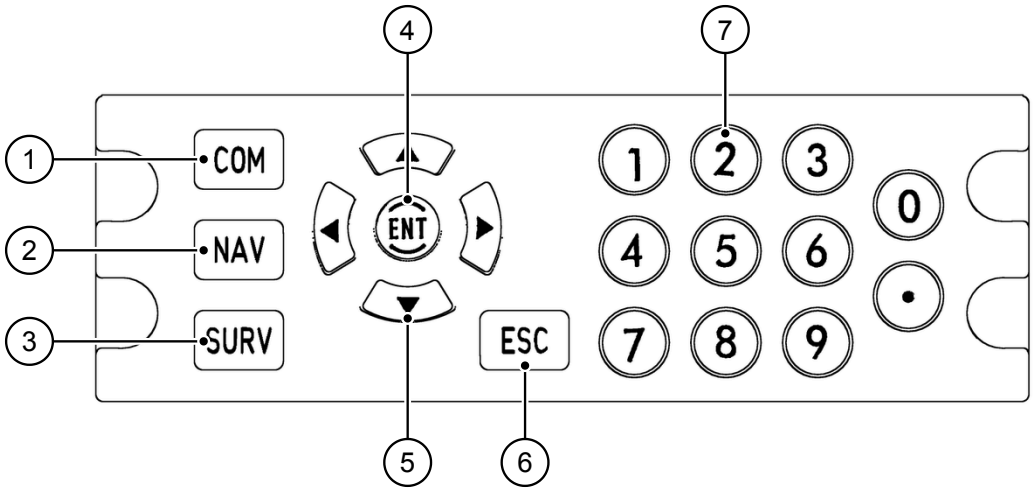
DSC.31.4.7 MCP

Ident.: DSC.31.4.7

05 NOV 2026

ALL

Each MCP controls the Virtual Control Panel (VCP) shown in the lower right part of the own-side MFD. The two MCPs are independent: the CAPT MCP drives the VCP on MFD 1, the F/O MCP the VCP on MFD 2.



Multipurpose Control Panel

(1) COM pb

PRESS — Displays the VHF page (VHF 1 and VHF 2) on the VCP.

(2) NAV pb

PRESS — Displays a NAV page. Successive presses cycle through the three NAV pages: VOR/ILS, ADF, ND OVLY.

(3) SURV pb

PRESS — Displays a surveillance page. Successive presses alternate XPDR and TCAS.

(4) ENT pb

PRESS — Validates the selected field or entry. On a page tab, opens the page.

(5) Multi-directional pad

ARROWS — Moves the cursor between fields. LEFT from the leftmost field moves the cursor onto the page tabs; UP / DOWN then walk the tabs.

(6) ESC pb

PRESS — Leaves the current entry without change.

cont'd... ►►►

cont'd... ►►►

(7) Numeric keyboard

0 - 9, .	Enters a frequency, a code or a value. The keyed value goes directly into the field under the cursor and is confirmed with ENT.

The VCP pages are described in DSC.31.6.

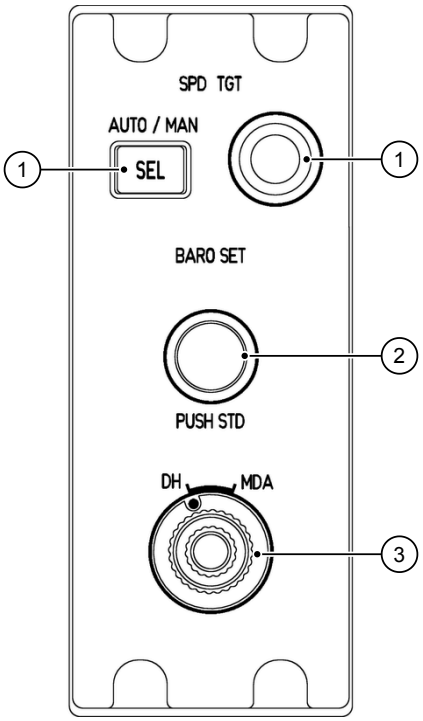
SIMULATOR NOTE

When the MFD shows the MAP page, the CAPT MCP (CAPT side) or F/O MCP (F/O side) arrows, ENT and ESC drive the MAP soft keys instead of the VCP. See DSC.31.6.

DSC.31.4.8 ICP

Ident.: DSC.31.4.8 — 05 NOV 2026
ALL

Each ICP is connected to its own-side PFD. The CAPT and F/O settings are independent.



Index Control Panel (CAPT side)

(1) SPD TGT knob and AUTO/MAN SEL pb

AUTO	The speed target is computed by the FMS. The speed bug and target readout on the PFD are magenta.
MAN	The speed target is set with the knob. The bug and readout are cyan.

(2) BARO SET knob

ROTATE	Sets the baro reference shown on the PFD.
PUSH STD	Selects standard pressure (STD).

cont'd... ►►►

cont'd... ►►►

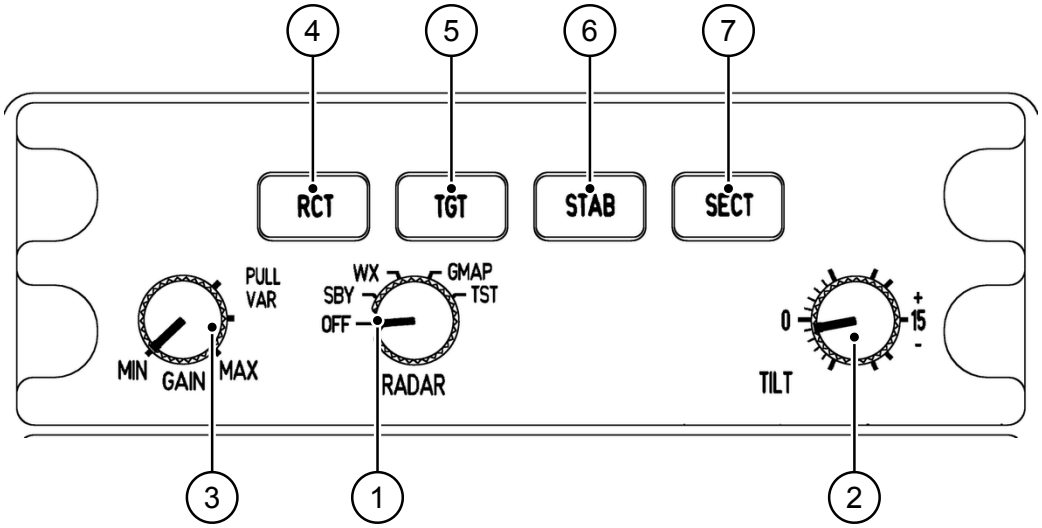
③ DH / MDA knob

OUTER	Selects DH (radio altitude) or MDA (baro altitude).
INNER	Sets the value: DH 0 to 990 ft, MDA 0 to 19 990 ft.

DSC.31.4.9 Weather Radar Control Panel

Ident.: DSC.31.4.9 — 05 NOV 2026
ALL

The WRCP controls the weather radar, whose image is shown on the ND (and mini ND) when WX is selected on the VCP ND OVLY page.



Weather Radar Control Panel

① RADAR mode selector

OFF	Radar off. **WX OFF** on the ND when WX is selected.
SBY	Standby: antenna stopped, transmitter off. **WX STBY**.
WX	Weather detection, five levels (black, green, yellow, red, magenta). **WX TX**.
GMAP	Ground mapping, four levels (black, cyan, yellow, magenta). **WX GMAP**.
TST	Test pattern. **WX TEST**, or **WX FAIL** if a fault is detected.

After the radar is switched on, **WX WAIT** is shown for about 90 s while the transmitter warms up. On the ground the radar is held in standby; pressing STAB four times within 3 s restores the selected mode.

② TILT knob

ROTATE	Sets the antenna tilt from 15° down to 15° up. The tilt is shown on the ND as T followed by the angle.

③ GAIN knob

PUSHED	Calibrated gain. The rotary function is inhibited. The knob can be pushed in at any position.
PULLED	Variable gain, set by rotating the knob. **G-VAR** is shown on the ND.

cont'd... ►►►

cont'd... ►►►

④ RCT pb

PRESS — Rain attenuation compensation (REACT) on / off. **WX RCT** replaces **WX TX**. Areas behind heavy precipitation, where no further compensation is possible, are shown in cyan.

⑤ TGT pb

PRESS — Target alert on / off (WX mode only). **TGT** on the ND; it turns **TGT** when a strong return is detected ahead, beyond the selected range.

⑥ STAB pb

PRESS — Antenna pitch and roll stabilisation on / off.

⑦ SECT pb

PRESS — Alternates the scan between 120° (normal) and 60° (sector, faster update).

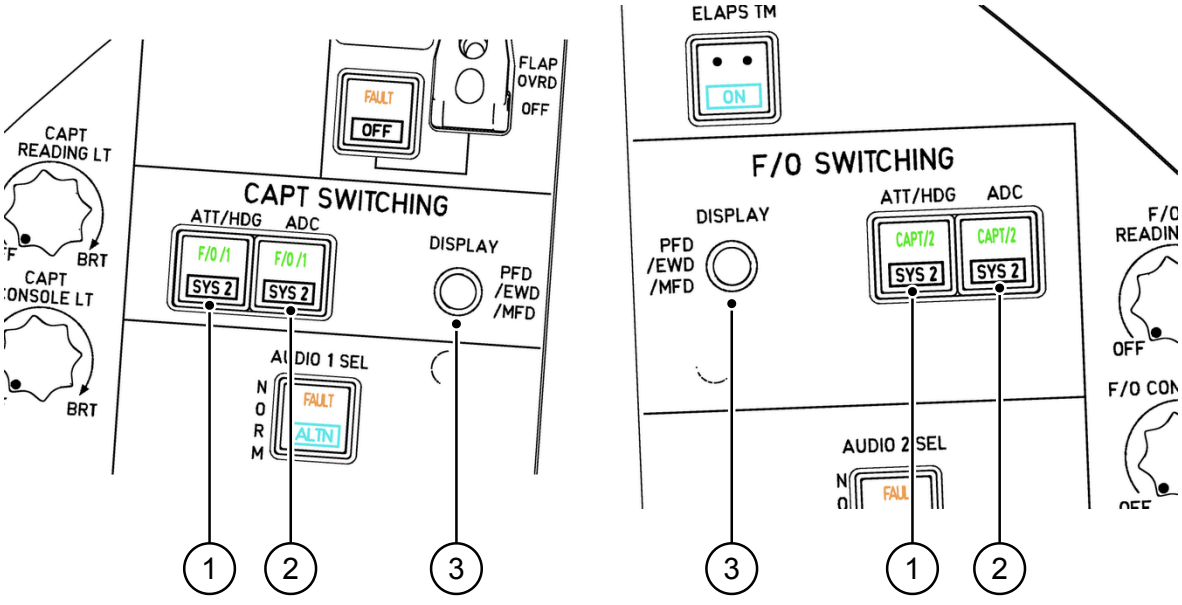
SIMULATOR NOTE

- The radar image is computed from the X-Plane weather.

DSC.31.4.10 Switching Panels

Ident.: DSC.31.4.10 — 05 NOV 2026
ALL

There is one SWITCHING panel on each side of the main panel (CAPT and F/O).



CAPT SWITCHING (left) and F/O SWITCHING (right) panels

① ATT/HDG pb

NORM — (pb released) The own-side AHRS feeds the own-side PFD and MFD.

cont'd... ►►►

cont'd... ►►►

PRESSED IN — The opposite-side AHRS is used. A yellow AHRS 2 (CAPT side) or AHRS 1 (F/O side) flag is shown on the PFD. **SYS 2** (CAPT side) or **SYS 1** (F/O side) comes on in the pb. On the other side's ATT/HDG pb, **CAPT/2** or **F/O/1** comes on.

(2) ADC pb

NORM — (pb released) The own-side ADC feeds the own-side displays.

PRESSED IN — The opposite-side ADC is used. A yellow ADC 2 (CAPT side) or ADC 1 (F/O side) flag is shown on the PFD. **SYS 2** (CAPT side) or **SYS 1** (F/O side) comes on in the pb. On the other side's ADC pb, **CAPT/2** or **F/O/1** comes on.

(3) DISPLAY PFD/EWD/MFD pb

PRESS — Cycles the format on the own-side inboard DU (DU 2 or DU 4) through PFD, EWD and MFD. If that DU is inoperative, the outboard DU (DU 1 or DU 5) takes the command. See DSC.31.9.

DSC.31.4.11 Electrical Supply

Ident.: DSC.31.4.11 — 05 NOV 2026
ALL

EQUIPMENT	DC SUPPLY	BACK-UP SUPPLY
DU 1	DC BUS 1	-
DU 2	DC EMER BUS	HOT MAIN BAT BUS
DU 3	DC BUS 1	-
DU 4	DC ESS BUS SECT 1	HOT EMER BAT BUS
DU 5	DC BUS 2	-
EFCP-L	DC EMER BUS	-
EFCP-R	DC ESS BUS SECT 2	-
MCP 1	DC EMER BUS	-
MCP 2	DC ESS BUS SECT 1	-

No AC supply is used. The back-up supply keeps DU 2 and DU 4 powered when their normal bus is lost after they were on. The DC ESS BUS has two sections: the loss of one section cuts only the equipment it supplies.

SIMULATOR NOTE

Each supply is protected by its circuit breaker. Pulling a breaker removes the supply.

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

DSC.31.5 INDICATION ON PFD

DSC.31.5.1 General

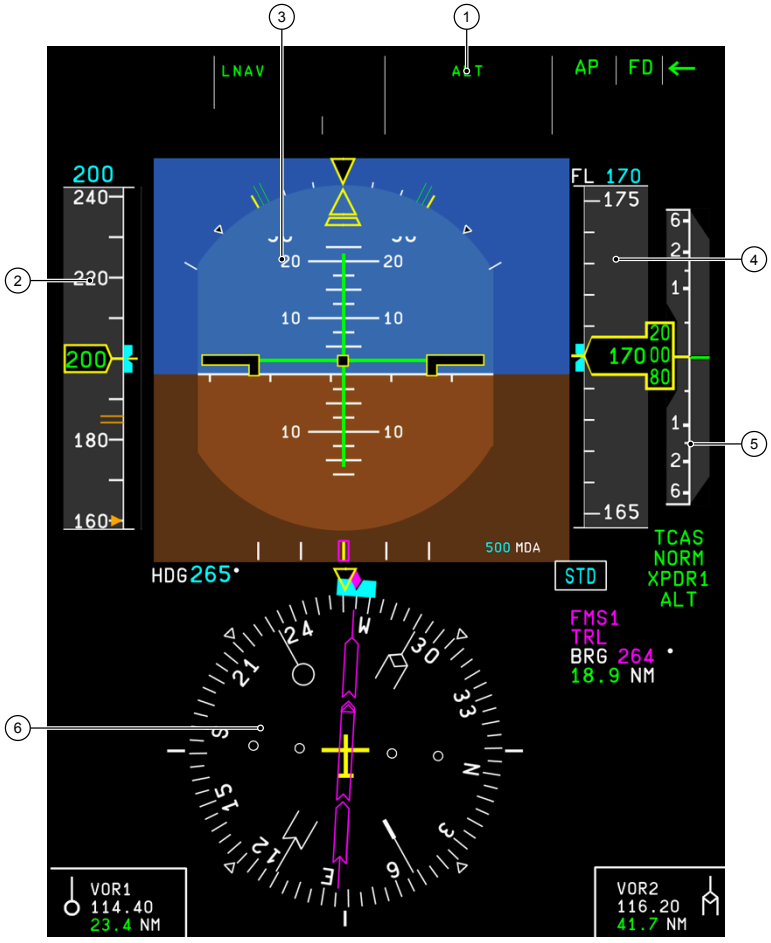
Ident.: DSC.31.5.1 — 10 NOV 2026
ALL

The PFD gives the flight data needed in the short term. In normal configuration PFD 1 is on DU 1 and PFD 2 on DU 5. After a manual or automatic reversion, a PFD can be shown on DU 2 (CAPT) or DU 4 (F/O).

The PFD is divided into six areas:

1. Flight Mode Annunciator (FMA), at the top,
2. airspeed, on the left,
3. Attitude Display Indicator (ADI), in the centre,
4. altitude, right of the ADI,
5. vertical speed, at the far right,
6. navigation area, in the lower half: HSI or mini ND.

The PFD is controlled by the FGCP, the own-side ICP and the own-side EFCP. Each PFD uses the own-side AHRS and ADC unless the ATT/HDG or ADC pb on the switching panel selects the other side.



PFD in cruise, HSI in the navigation area

cont'd... ►►►

cont'd... ►►►

DSC.31.5.2 Flight Mode Annunciator

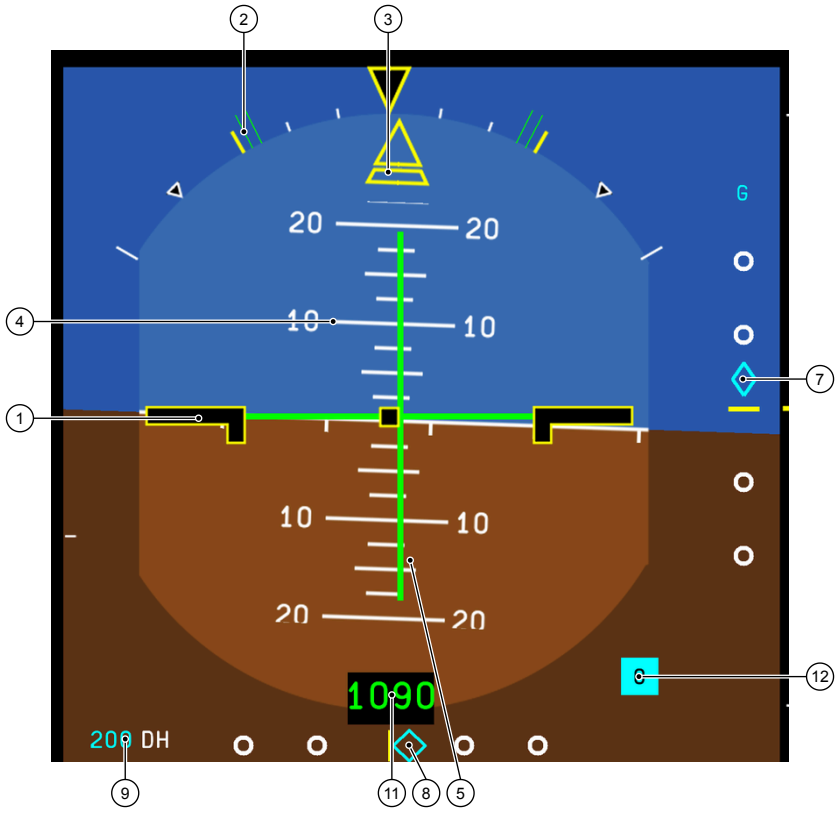
Ident.: DSC.31.5.2 — 10 NOV 2026
ALL

The FMA shows, from left to right, the icing status, the lateral modes, the vertical modes and the AFCS engagement status (AP, YD, FD, coupling arrow, approach category). Armed modes are cyan, engaged modes green; a new mode is boxed for a few seconds. AFCS messages are shown on the lines below.

The green arrow at the top right of the FMA is the **coupling arrow**. It points to the side whose navigation source and FD the AFCS uses (selected with the CPL pb on the FGCP).

DSC.31.5.3 Attitude Display Indicator

Ident.: DSC.31.5.3 — 10 NOV 2026
ALL



ADI on an ILS approach: LOC and GS, DH 200 ft, outer marker

(1) Aircraft symbol

Fixed symbol, black outlined in yellow. Pitch and roll are read between this symbol and the moving horizon.

(2) Roll scale and roll index

Fixed white marks at 10, 20, 30, 45 and 60°. The yellow triangle shows the bank angle. Two green ticks show the bank limit selected on the FGCP (15° LO BANK, 27° HI BANK).

(3) Slip / skid index

Yellow trapezoid below the roll index. It moves with lateral acceleration.

cont'd... ►►►

cont'd... ►►►

(4) Horizon and pitch scale

Sky blue, ground brown. The white pitch scale has marks every 2.5° up to 20°, then at 25, 30, 50 and 80°. At very high pitch a part of sky or ground always stays in view. Beyond 25° of pitch, large red chevrons point toward the horizon.

(5) Flight director bars

Green. The horizontal bar gives the vertical command, the vertical bar the lateral command. Fly the aircraft symbol onto the bars. The bars are shown only when the own-side FD is on.

(6) Selected heading index

Cyan line on the horizon at the selected heading. It is shown only when the FD bars are not shown.

(7) Vertical deviation

On the right side of the ADI, two dots each side of a yellow reference line.

V/ILS source	Glide slope. Cyan diamond, and a cyan **G** at the top right of the ADI.
FMS source	Vertical deviation from the FMS path. Magenta open rectangle, and a magenta **V**. Full scale is 500 ft.

When the deviation is off scale, only part of the symbol is shown.

(8) Lateral deviation

At the bottom of the ADI, two dots each side of a yellow reference line.

V/ILS source	Localizer. Cyan diamond.
FMS source	Cross-track deviation. Magenta open rectangle. Full scale is the RNP in use (1 NM in terminal area, 0.3 NM in approach), at most 5 NM.

On excessive deviation (CAT II monitoring) the dots flash amber. If the signal is invalid, the scale is crossed in red.

(9) DH

Selected DH, cyan value and white **DH**, bottom left of the ADI. When the aircraft descends through the DH, an amber box with **DH** is shown above the RA readout and the RA digits turn amber.

(10) MDA

Selected MDA, cyan value and white **MDA**, bottom right of the ADI. When the baro altitude is at or below the MDA, the altitude readout turns amber.

Only the minimum selected on the ICP (DH or MDA) is shown and monitored.

(11) Radio altitude

Green digits in the centre box below the ADI, from 0 to 2 500 ft. Amber dashes if the RA is invalid.

(12) Marker beacons

Bottom right of the ADI: **O** on cyan (outer), **M** on yellow (middle), **I** on white (inner). There is one marker receiver.

ADI flags

FLAG	COLOUR	MEANING
AHRS 1 / AHRS 2	Yellow, top left of the ADI	The other side AHRS is used (ATT/HDG pb, or one AHRS failed)
ADC 1 / ADC 2	Yellow, top left of the ADI	The other side ADC is used (ADC pb, or one ADC failed)
CHECK ATT	Amber, flashes 9 s then steady	Pitch or roll disagree between AHRS 1 and 2

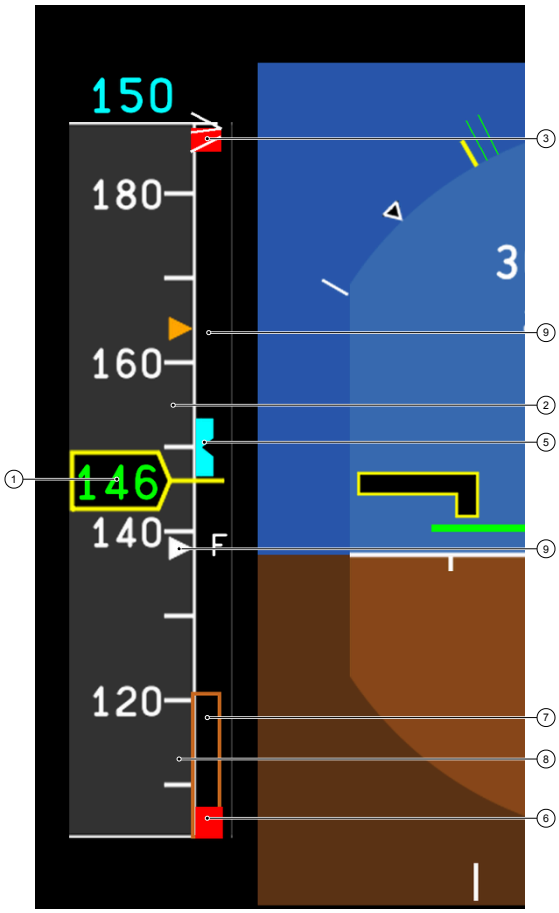
cont'd... ►►►

cont'd... ►►►

FLAG	COLOUR	MEANING
ATT FAIL	Red, ADI black with a white outline	Both AHRS lost

DSC.31.5.4 Airspeed Area

Ident.: DSC.31.5.4 — 02 NOV 2026
ALL



Airspeed area in the initial climb, flaps 15

The airspeed tape is a grey vertical scale, 10 kt marks and labels every 20 kt, from 30 to 450 kt. About ±42 kt around the current speed are in view. A yellow line marks the current speed.

(1) Airspeed readout

In knots, in the centre of the tape. Shown above 30 kt.

(2) Airspeed trend

Yellow arrow from the reference line to the speed expected in 10 s at the present acceleration.

(3) Maximum speed band

Red band with white oblique dashes from VMAX to the top of the scale. VMAX is VMO, VFE or VLE according to the configuration.

cont'd... ►►►

cont'd... ►►►

④ VFE NEXT

Two amber lines: maximum speed for the next flap lever position. Not shown after take-off until the flaps are first retracted to 0.

⑤ Speed target bug and readout

M-shaped bug on the tape and target value above the tape.

Cyan	Target set manually on the ICP (MAN).
Magenta	Target computed by the FMS (AUTO).

⑥ Shaker speed (VMIN)

Red band from VMIN to the bottom of the scale: speed below which the stick shaker is activated.

⑦ Minimum operational speed (Mini VOPS)

Empty amber band from Mini VOPS down to the bottom of the scale or to the VMIN band.

⑧ Take-off speeds

Shown once the take-off data are confirmed on the VCP (see DSC.31.6).

V1	Cyan line with a cyan **1**. When V1 is off the tape, its value is shown in cyan at the top or bottom of the tape.
VR	Cyan line with a cyan **R**.
V2	Cyan triangle with a cyan **V2**.

V1 and VR are removed at lift-off. V2 is removed when the PWR MGT selector leaves TO after lift-off (normally CLB at the acceleration altitude). A new confirmation of the take-off data shows them again.

⑨ Minimum manoeuvre speed bugs

VmLB	White triangle: VmLB0 with the flap lever at 0; with an **F**, the flap retraction speed with the flap lever at 15. Not shown in icing conditions or with the lever beyond 15.
VmLB icing	Amber triangle (with an **F** at flap lever 15 in icing conditions). Also shown in normal conditions, for information.
VmHB15	Line with **F**: white in normal conditions, amber in icing conditions. Shown when the flaps are beyond 15°.
VmHB landing	Green triangle. Minimum speed in landing configuration.

Airspeed flag

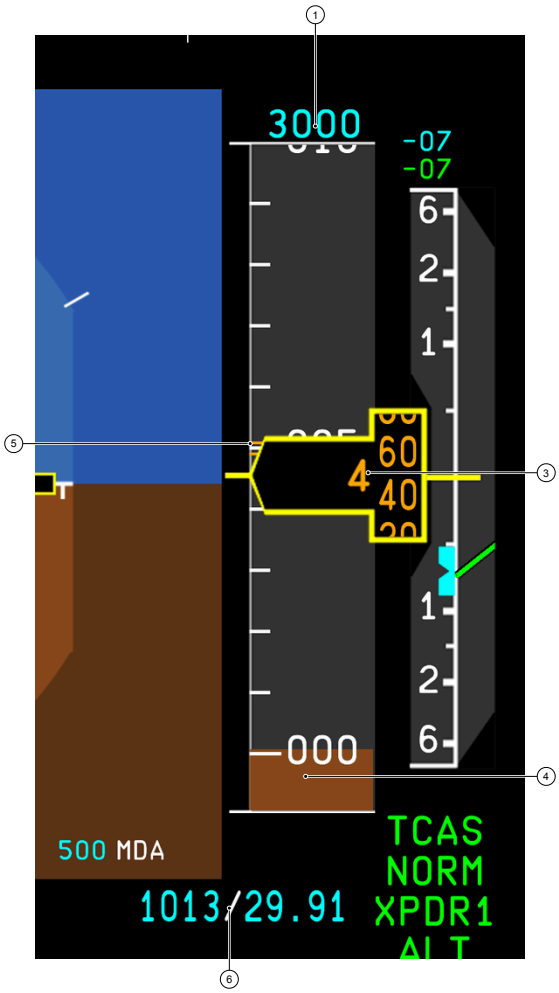
CHECK IAS: the airspeeds of ADC 1 and ADC 2 disagree.

cont'd... ►►►

cont'd... ►►►

DSC.31.5.5 Altitude Area

Ident.: DSC.31.5.5 — 10 NOV 2026
ALL



Altitude area on a non-precision approach below the MDA

The altitude tape is a grey vertical scale, 100 ft marks and labels every 500 ft, from -1 000 ft to above 25 000 ft. A yellow line marks the current altitude.

(1) Selected altitude

Above the tape.

Cyan	Altitude selected on the FGCP. In feet (digits only) or as a flight level (FL + 3 digits).
Magenta	Next altitude constraint from the FMS, when VNAV is available.

(2) Altitude bug

Cyan M-shaped bug	Selected altitude.
Magenta filled triangle	Next FMS altitude constraint.

cont'd... ►►►

cont'd... ►►►

③ Altitude readout

Drum counter with 20 ft steps, in a "T" shaped window. Negative altitudes show a white **NEG** in place of the thousands. The readout turns amber at or below the MDA.

④ Landing elevation band

Brown zone at the bottom of the tape. Its top is the FMS landing elevation: departure airport at departure, destination airport or runway at arrival.

⑤ MDA marks

Two amber lines on the tape at the selected MDA.

⑥ Baro setting

Below the tape, cyan: hPa on the right, inHg on the left, separated by a white "/". STD is shown in cyan in a white box when standard is selected. Amber dashes if invalid.

The baro setting flashes when:

- QNH is still set above the transition altitude in climb,
- STD is still set below the transition level in descent, or below 2 500 ft RA,
- the CAPT and F/O settings differ for more than 5 s.

The transition altitude and level come from the MCDU TAKEOFF and APPROACH pages.

⑦ Metric altitude

When metric units are selected on the MCDU, the readout becomes a rectangle and the altitude in metres is shown above it. The selected altitude is then shown in cyan with a white **M**.

Altitude flags

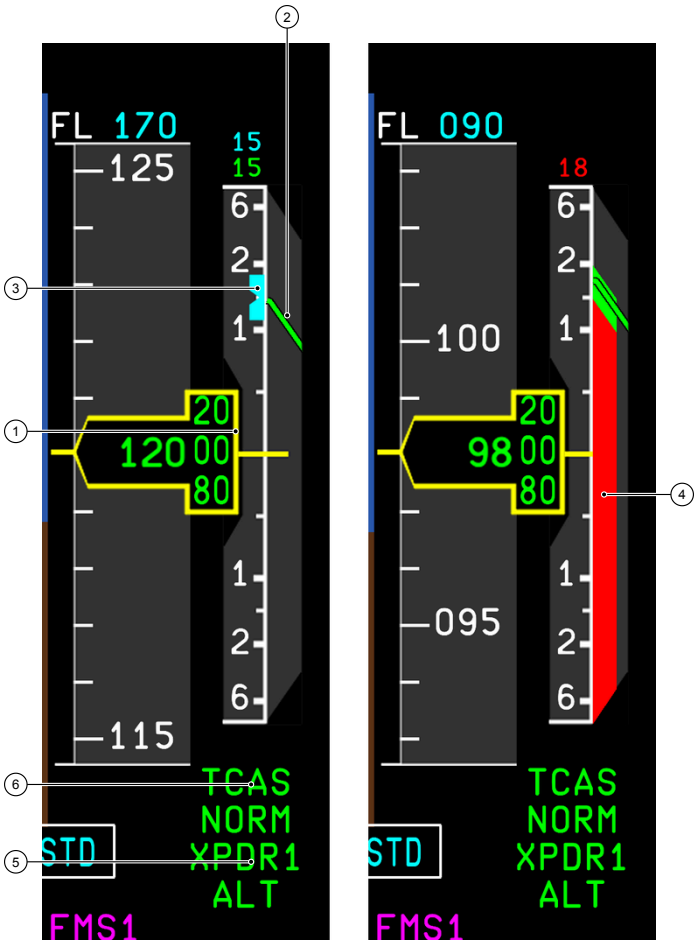
FLAG	COLOUR	MEANING
CHECK ALT	Amber	Altitudes of ADC 1 and ADC 2 disagree
ALT FAIL	Red, vertical, tape surrounded by three white lines	Baro altitude invalid

cont'd... ►►►

cont'd... ►►►

DSC.31.5.6 Vertical Speed Area

Ident.: DSC.31.5.6 — 10 NOV 2026
ALL



Vertical speed area: climb in VS mode (left), corrective TCAS RA (right)

(1) VS scale

White outline, marks labelled 1, 2 and 6 for 1 000, 2 000 and 6 000 ft/min. A yellow line marks zero.

(2) VS pointer and readout

Green pointer and green readout in hundreds of ft/min. The pointer turns red when it is in a TCAS red band. The readout is red while a resolution advisory is active.

(3) VS target

Cyan M-shaped bug and cyan readout above the scale, in hundreds of ft/min, when a VS target is selected.

(4) TCAS resolution advisory

Red bands show the vertical speeds to avoid. A green band shows the vertical speed range to fly during a corrective advisory.

(5) Transponder status

Two lines below the VS scale.

cont'd... ►►►

cont'd... ►►►

LINE 1	LINE 2	COLOUR	STATUS
XPDR1 (2)	FAIL	Amber / amber	Transponder failed
XPDR1 (2)	STBY	White / white	Standby
XPDR1 (2)	ALT OFF	Green / white	Altitude reporting off
XPDR1 (2)	ALT	Green / green	Altitude reporting on

(6) TCAS status

Two lines above the transponder status: TCAS and its state (for example **NORM**, ABOVE, BELOW, TA ONLY, **FAIL**, TEST).

VS flag

VS FAIL, vertical, the scale surrounded by three white lines: vertical speed invalid.

DSC.31.5.7 Navigation Area

Ident.: DSC.31.5.7 — 10 NOV 2026
ALL

The navigation area shows either the HSI or the mini ND.



PFD navigation area with HSI, NAV source FMS 1

HSI

(1) Compass rose	White, rotating. Yellow aircraft symbol and heading index at the top.
(2) Selected heading	Cyan bug on the rose. Readout HDG + cyan value at the top left of the rose.
(3) Course pointer and deviation bar	Cyan with a V/ILS source, magenta with the FMS. Four white dots. TO / FROM triangle: it points toward the course arrowhead for TO, toward the tail for FROM.
(4) Bearing pointers	Pointer 1 (circle) and pointer 2 (open diamond), white for a VOR, green for an ADF. Selected with BRG1 / BRG2 on the EFCP.
(5) Top right	Navigation source (cyan VOR1 / ILS1, magenta FMS1), frequency or TO waypoint, CRS (V/ILS) or BRG to the TO waypoint (FMS), distance. A cyan **H** shows DME hold.
(6) Bottom left / right	VOR or ADF information of bearing pointers 1 and 2.

cont'd... ►►►

cont'd... ►►►

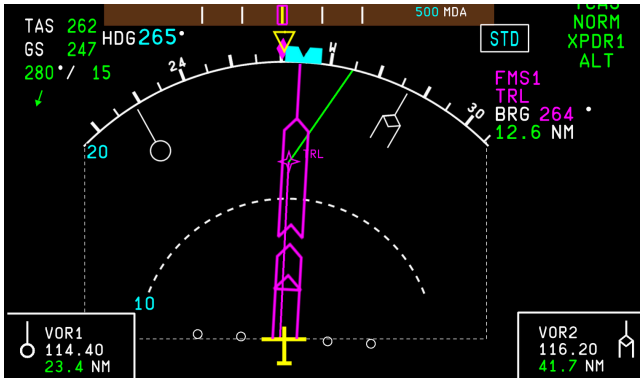
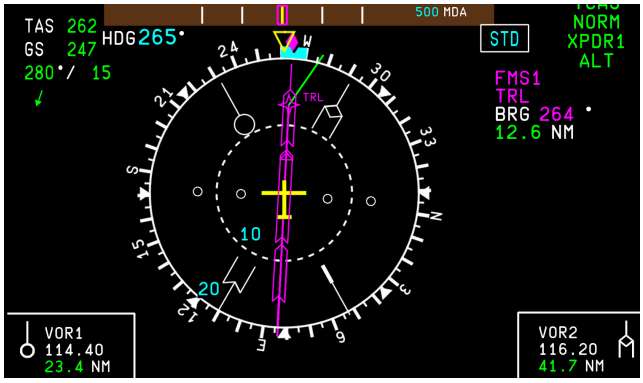
Left of the rose	FMS messages, green: TERM or APPR (RNP area), MSG (message on the MCDU), OFST (offset active).
TAS, GS, wind	Green, below the airspeed area, with the wind direction / speed and arrow. Shown only when the own-side MFD does not show an ND page (the ND shows them). TAS comes from the own-side ADC (ADC 1 CAPT, ADC 2 F/O). TAS and wind are dashed when that ADC is invalid or the TAS is below 30 kt.

Mini ND

When the own-side MFD shows a page other than the ND, the HSI is replaced by a mini ND. Its range is the ND range; its format is set with the FORMAT knob (ARC or ROSE only). It shows the flight plan, navaids, terrain or weather radar image and traffic, as on the ND. In ROSE, terrain is shown on the forward half of the rose.

ND ON THE MFD	MINI ND ON THE PFD
ARC, replaced by another page	ARC
ROSE or PLAN, replaced by another page	ROSE
ND displayed again	HSI. The ND keeps the mini ND format.

On a TCAS traffic advisory, the mini ND goes to ROSE, 10 NM. On a TAWS terrain alert it goes to ARC, 10 NM, with terrain selected, and the DU contrast is set to 80 %.

Mini ND ARC	Mini ND ROSE
	

When the navigation source is on the opposite side (VOR or FMS of the other side), the source label is yellow.

Heading flags

FLAG	COLOUR	MEANING
CHECK HDG	Amber	Headings of AHRS 1 and AHRS 2 disagree
HDG FAIL	Red	Heading lost

DSC.31.5.8 Electrical Supply

Ident.: DSC.31.5.8 — 10 NOV 2026
ALL

The PFD is supplied with the DU on which it is shown (see DSC.31.4).

DSC.31.6 INDICATION ON MFD

DSC.31.6.1 Description

Ident.: DSC.31.6.1 — 10 NOV 2026
ALL

The MFD is shown on the inboard DUs (DU 2 CAPT, DU 4 F/O) in normal configuration. It gives the medium-term navigation picture, the system synoptics, the performance data and the radio and surveillance selections.

The MFD is divided into these areas:

1. the **upper window**, which shows one page at a time: ND, SYS, PERF or MAP,
2. the **memo panel**, lower left: status of some system selections,
3. the **Virtual Control Panel (VCP)**, lower right: radio, surveillance, ND overlay and take-off data pages, controlled with the MCP,
4. with an ND page, the bearing pointer sources, in two boxes between the upper window and the VCP (left and right),
5. with an ND page, the TCAS mode and the NAVAID / AIRPORT overlay status, between the two boxes.



MFD areas: ND ARC, memo panel, VCP ND OVLY page

The upper window page is selected with the MFD keys of the own-side EFCP (see DSC.31.4).

cont'd... ►►►

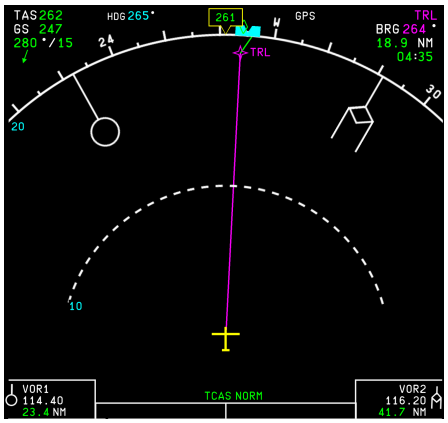
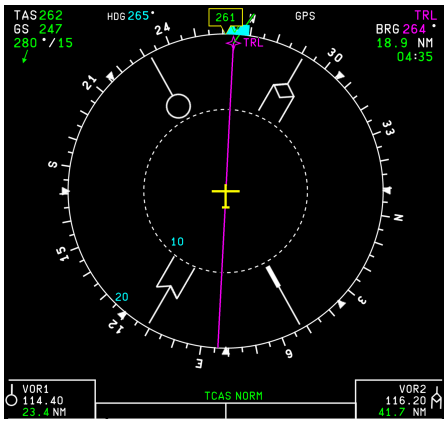
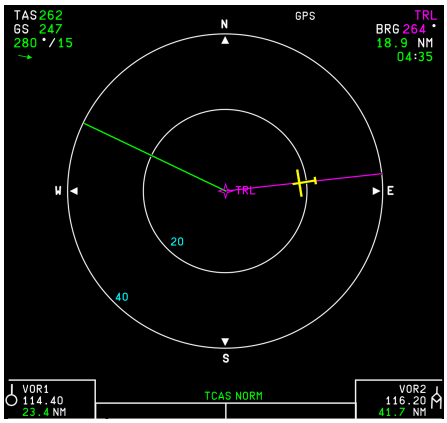
cont'd... ►►►

DSC.31.6.2 Navigation Display

Ident.: DSC.31.6.2 — 10 NOV 2026
ALL

The ND is shown in one of three formats, selected with the EFCP FORMAT knob:

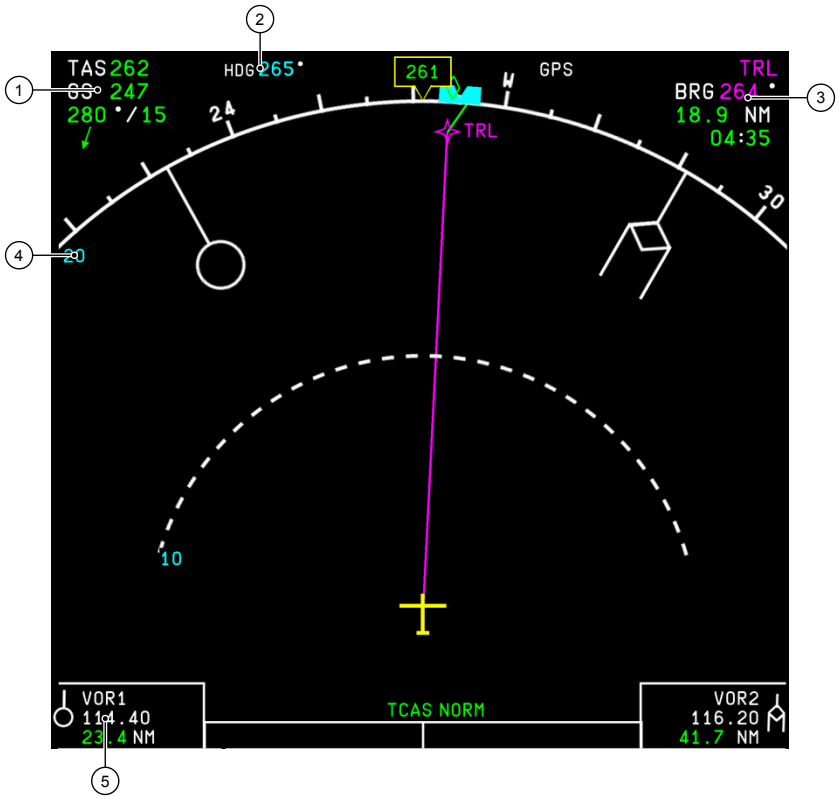
ARC	90° forward sector, aircraft symbol at the bottom. Used for normal navigation. Terrain and weather radar are shown.
ROSE	Full compass rose, aircraft symbol in the centre. Weather radar is shown on the whole rose, terrain on its forward half.
PLAN	North-up map centred on a flight plan waypoint. For flight plan review.

ARC	ROSE	PLAN
		

cont'd... ►►►

cont'd... ►►►

General indications



ND ARC, 20 NM, cruise on the DDM - TRL leg

(1) Top left	TAS, GS and wind (direction ° / speed and a green arrow), green. TAS comes from the own-side ADC (ADC 1 CAPT, ADC 2 F/O). TAS and wind are dashed when that ADC is invalid or the TAS is below 30 kt.
(2) Top centre	HDG + cyan selected heading. Heading index and track diamond (green) on the compass.
(3) Top right	TO waypoint (magenta ident), bearing, distance and estimated time en route (mm:ss). When no TO waypoint is available, the present position (latitude / longitude) is shown instead.
(4) Range	Cyan digits on the range ring. After an automatic TAWS range change: white digits and **AUTO**.
(5) Bottom corners	Source, frequency or ident and distance of bearing pointers 1 and 2. VOR white, ADF green.
Bottom right	Weather radar or TAWS status lines.

Navigation messages

Two-line messages left of the TO waypoint block, highest priority on top:

MESSAGE	COLOUR	MEANING
NAV / DR	Amber	FMS in dead reckoning
GPS / INTEG	Amber	GPS integrity not sufficient
UNABLE / RNP	Amber	Required navigation performance not met
FMS1 / FMS2	Amber	Opposite FMS used
NAV / DME, VOR/DME, VOR/VOR	White	Radio position mode
GPS	White	GPS position mode

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

Flight plan

ELEMENT	COLOUR
Active leg and TO waypoint	Magenta
Active leg with an OFFSET: the offset path (parallel to the leg)	Magenta (the leg itself turns green)
FROM waypoint, next legs and waypoints	Green
Missed approach, not yet active	Cyan
Temporary flight plan (TMPY)	Yellow
Altitude constraint value, below the waypoint ident	Green
Legs already flown	Not shown
Secondary flight plan (SEC)	Not shown

With an OFFSET, only the active leg of the offset path is shown; the waypoints stay where they are. Guided legs are continuous lines, non-guided transitions are dashed. Pseudo waypoints (TOD, level-off points) are shown as small circles with their label.

Symbols

SYMBOL	MEANING
Four-point star	Waypoint
Circle with four ticks	Airport
Hexagon	VOR
Hexagon with three lobes	VOR/DME
Double circle	NDB
Circle	Pseudo waypoint

Navaids and airports near the aircraft are added when NAVAID and AIRPORT are selected on the VCP ND OVLY page. Symbols from the pilot database are drawn in reverse video.

Overlays

- **Traffic**: TCAS intruders, according to the TRAFFIC selection on the ND OVLY page.
- **Terrain**: TAWS terrain image when TERR is selected. On a TAWS alert, the ND goes to ARC, 10 NM, terrain selected.
- **Weather**: weather radar image when WX is selected (see DSC.31.4).

Failures

HDG FAIL: heading lost. **FPLN NOT AVAILABLE**: no flight plan data.

On a TCAS traffic advisory the ND changes to ROSE. The range is kept.

DSC.31.6.3 MAP Page

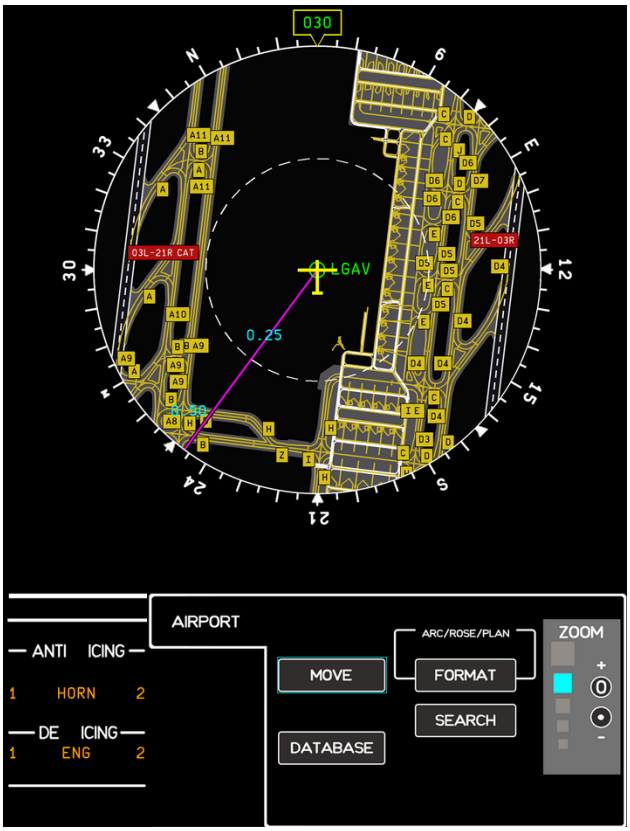
Ident.: DSC.31.6.3 — 10 NOV 2026

SIMULATOR ONLY

The MAP page exists only in the simulation. Press MAP on the EFCP to show an airport moving map of the departure, destination or nearest airport, with runways, taxiways, stands and parking positions. Press MAP again to return to the ND.

cont'd... ►►►

cont'd... ►►►



MAP page at LGAV with its soft-key menu

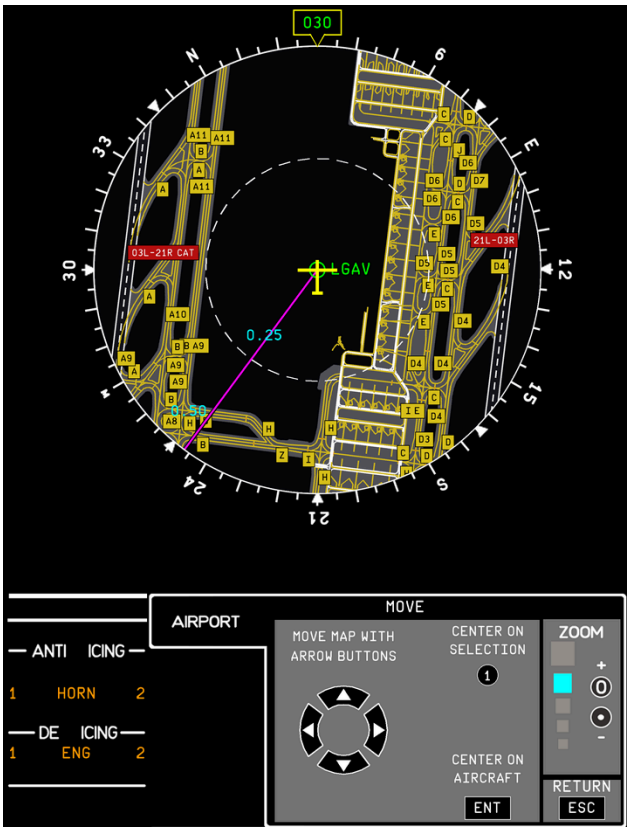
When MAP is shown, the VCP area becomes the MAP menu, driven by the own-side MCP:

MOVE	Pans the map with the MCP arrows. ENT centres on the selected stand or parking, ESC returns. Key 1 centres on the selection.
FORMAT	Frames the map as ARC, ROSE or PLAN.
SEARCH	Selects a stand or parking (keys 7, 8, 9 choose the family and clear the selection).
DATABASE	Shows the validity of the navigation databases and the airport database in use.
ZOOM	MCP keys 0 and "." (or EFCP RANGE +/-).

The airport shown (departure, destination or nearest) is cycled with the MAP airport command. The own-ship symbol is shown only when the FMS position is GPS; otherwise MAP POSITION NOT AVAILABLE is shown.

cont'd... ►►►

cont'd... ►►►



MAP page in MOVE mode

DSC.31.6.4 System Pages

Ident.: DSC.31.6.4 — 10 NOV 2026
ALL

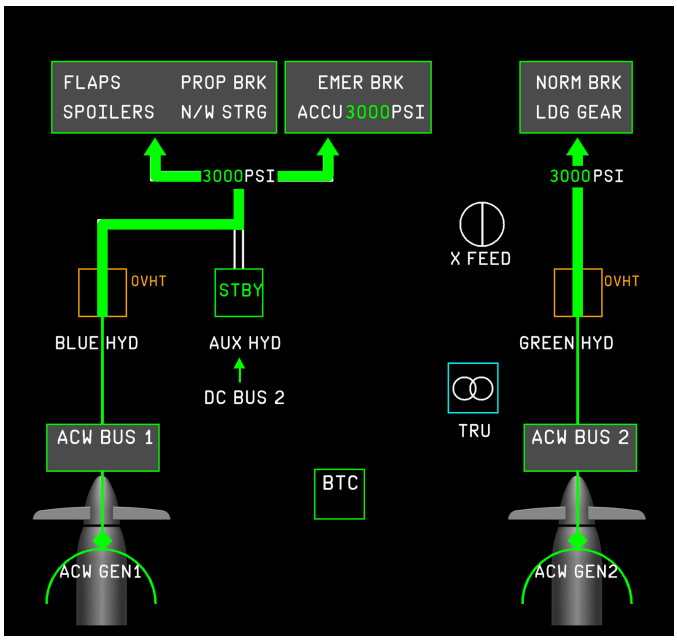
Press SYS on the EFCP to show a system page. Each further press shows the next page: ACW/HYD, ENGINE, CABIN, AC/DC.

PAGE	CONTENT
ACW/HYD	AC wild generators and buses, hydraulic pumps, pressures, consumers, X FEED
ENGINE	Oil pressure and temperature, NH, NL, ITT, fuel flow, fuel temperature, fuel quantity per tank, LP valves, crossfeed, pumps
CABIN	Packs, bleeds, duct and cabin temperatures, recirculation, oxygen supply, doors, cabin pressure (ΔP, cabin altitude, cabin rate)
AC/DC	DC generators, buses, batteries, TRU, inverters, AC buses, external power

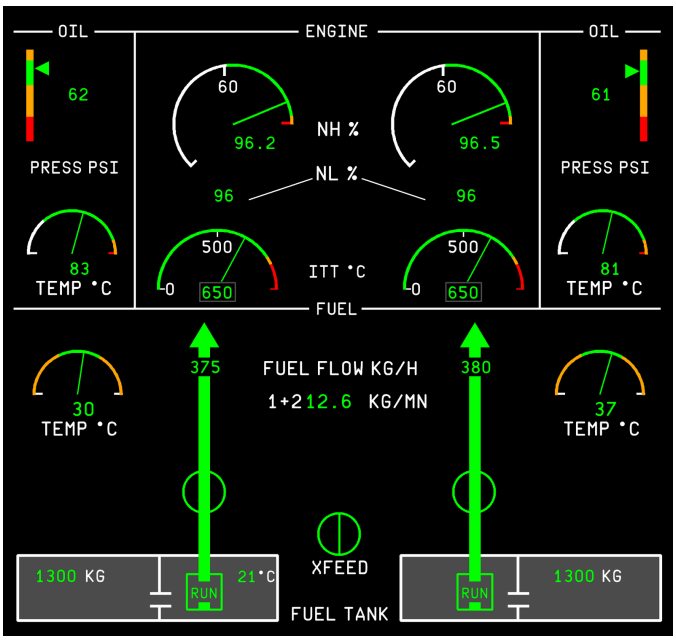
cont'd... ►►►

cont'd... ►►►

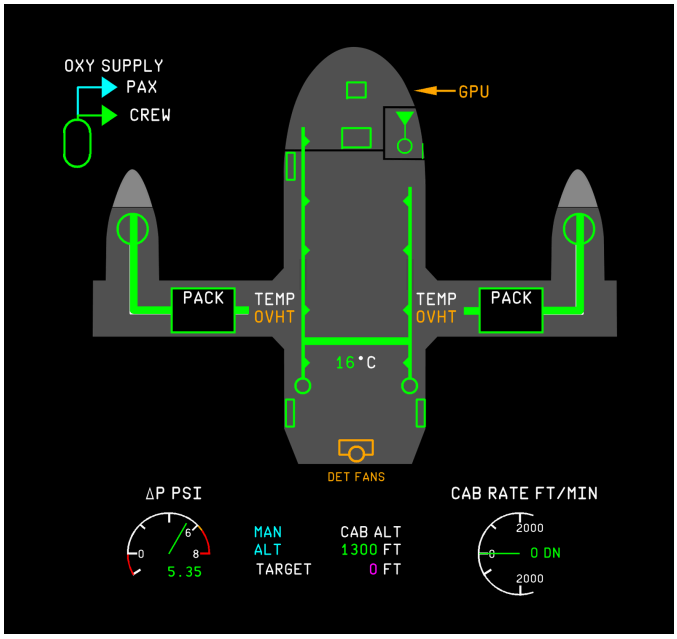
ACW/HYD



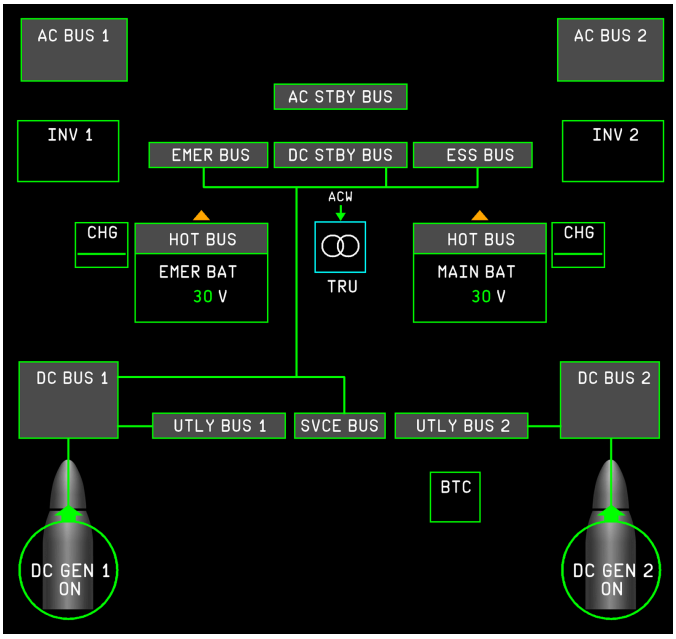
ENGINE



CABIN



AC/DC



The colours follow the cockpit philosophy: green for normal operation, cyan for a transient or selected state, white for a system selected off, amber for a failure, red for a warning condition. A value that is not valid is replaced by amber dashes, or its symbol is crossed.

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

When the ENG START rotary selector leaves OFF, both MFDs show the ENGINE page. During a procedure, the FWS calls the related system page: see DSC.31.9.

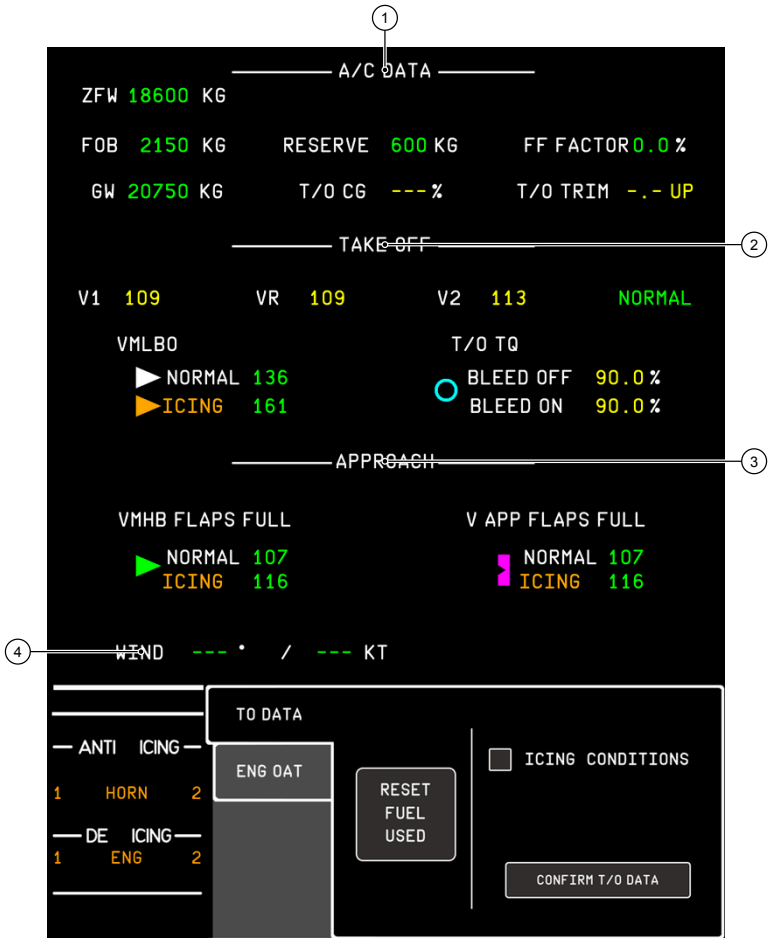
SIMULATOR NOTE

- After an MFC failure, the lost indications are crossed on the CABIN page only. On the AC/DC and ACW/HYD pages they keep their last state.
- The ENGINE page keeps an ITT dial beside the counter.
- The CABIN page shows **REFUELING** while the fuel truck of the EFB **GROUND** page is in position.

DSC.31.6.5 PERF Page

Ident.: DSC.31.6.5 — 02 NOV 2026
ALL

Press PERF on the EFCP to show the MFD PERF page with the VCP TO DATA page. The page shows the FMS performance data; it cannot be changed from the MFD.



MFD PERF page and VCP TO DATA page, before the take-off data are confirmed

(1) A/C DATA — ZFW, FOB, GW, RESERVE, FF FACTOR, T/O CG and T/O TRIM. Set on the MCDU INIT and WEIGHT pages.

(2) TAKE OFF — V1, VR, V2 and their condition: **NORMAL**, **ICING** or MANUAL (white). VmLB0 normal and icing. T/O TQ with bleed off and bleed on.

cont'd... ►►►

cont'd... ►►►

(3) APPROACH VmHB and VAPP flaps full, normal and icing.

(4) WIND Ground wind at destination, from the MCDU PERF APPROACH page.

The take-off values (V1, VR, V2, T/O CG, T/O TRIM, T/O TQ) are yellow until the take-off data are confirmed on the VCP, then green. Then:

- the V1, VR and V2 bugs and the VmLB0 bugs appear on the PFD speed tape,
- the T/O TQ bugs (cyan circles) appear on the EWD torque dials,
- the T/O TRIM objective (magenta bug) appears on the EWD pitch trim scale.

The V2 bug is removed when the PWR MGT selector leaves TO after lift-off. The T/O TRIM objective is removed when the landing gear is selected UP.

Missing values are amber dashes.

DSC.31.6.6 Memo Panel

Ident.: DSC.31.6.6 10 NOV 2026
ALL

The memo panel shows the state of systems that have no dedicated indication elsewhere.

FUEL XFEED	Crossfeed open. Cyan, amber on failure.
ANTI ICING	HORN, PROP 1 and 2, SIDE WINDOWS: each shown when selected.
DE ICING	ENG 1 and 2, AIRFRAME: each shown when selected.
NO DEVICE / SEAT BELT	Passenger signs on.
CHR	Chronometer, when started (see DSC.31.10).

An item selected and working is cyan. It turns amber when the related system is failed.

DSC.31.6.7 Virtual Control Panel

Ident.: DSC.31.6.7 10 NOV 2026
ALL

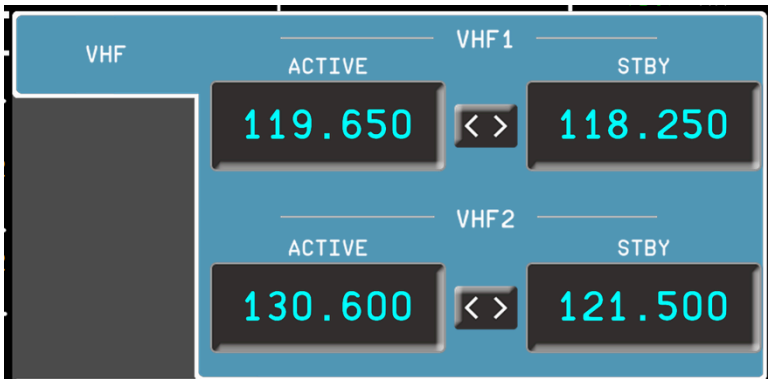
The VCP is the lower right window of the MFD. It is controlled with the own-side MCP (see DSC.31.4). The page tabs are on the left of the window; the active tab is highlighted.

COM page

Press COM. VHF 1 and VHF 2 active and standby frequencies, with a swap key between them. Key the frequency into the field under the cursor and confirm with ENT.

cont'd... ►►►

cont'd... ►►►

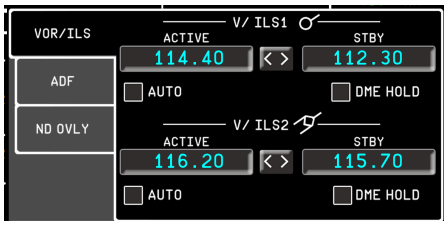
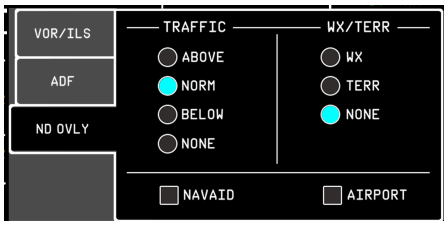


VCP VHF page

NAV pages

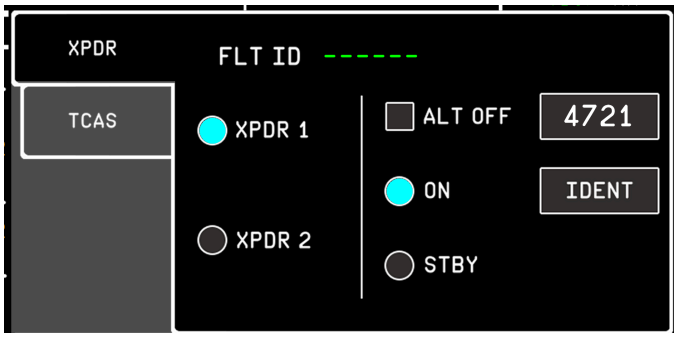
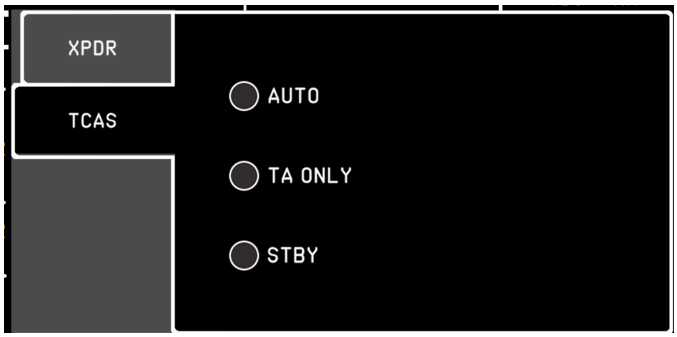
Press NAV repeatedly to cycle the three NAV pages.

VOR/ILS	V/ILS 1 and V/ILS 2 active and standby frequencies, AUTO (FMS auto-tuning) and DME HOLD boxes. DME hold shows a cyan **H** on the PFD and ND.
ADF	ADF 1 and ADF 2 active and standby frequencies, ADF mode and TONE selection.
ND OVLY	ND overlays. TRAFFIC: ABOVE, NORM, BELOW or NONE. WX/TERR: WX, TERR or NONE (only one at a time). NAVAID and AIRPORT boxes.

VOR/ILS	ADF	ND OVLY
		

SURV pages

Press SURV to alternate the XPDR page (transponder code and mode) and the TCAS page.

XPDR	TCAS
	

cont'd... ►►►

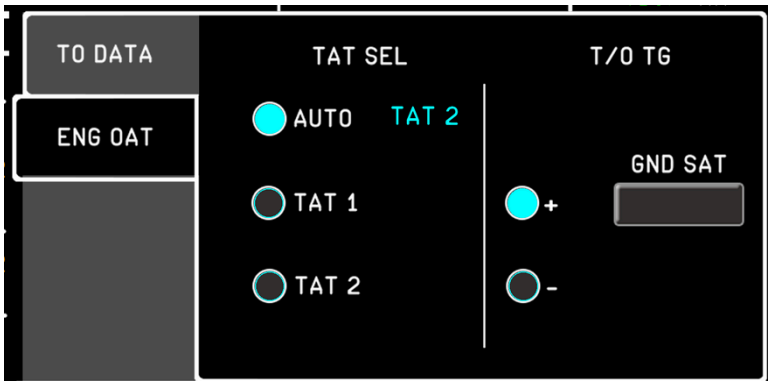
cont'd... ►►►

PERF pages

Shown with the PERF key on the EFCP. A further PERF press alternates the two pages.

TO DATA	RESET FUEL USED: resets the fuel used counters. ICING CONDITIONS: computes the take-off data for icing conditions. CONFIRM T/O DATA: confirms the take-off data; the label becomes T/O DATA CONFIRMED and the bugs appear on the PFD and EWD. A new confirmation is needed after any change of the performance data.
ENG OAT	TAT SEL: AUTO, TAT 1 or TAT 2. With AUTO, the source is ADC 2 on even days and ADC 1 on odd days. GND SAT: ground temperature for the T/O TQ computation, when it differs from the measured value.

When both FMS are in dual mode, an action on the TO DATA page applies to both sides. In flight the TO DATA selections are dimmed and inactive.



VCP ENG OAT page

SIMULATOR NOTE

The HF pages are not available: the simulated aircraft has no HF radio. The COM key shows the VHF page only.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.31.7 INDICATION ON EWD

DSC.31.7.1 General

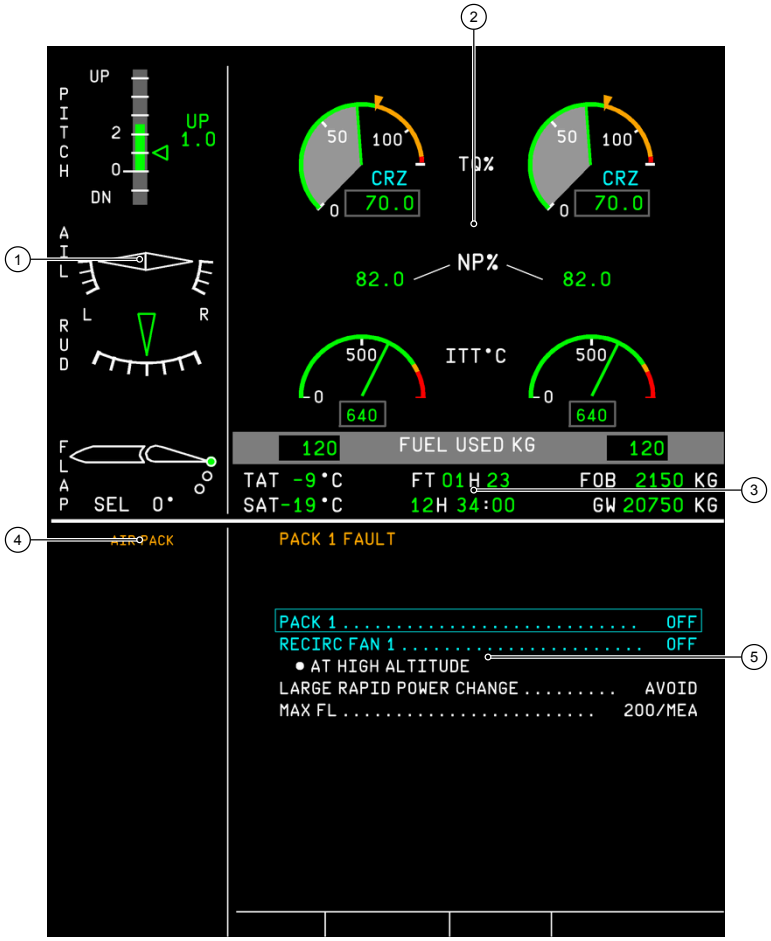
Ident.: DSC.31.7.1 — 02 NOV 2026
ALL

The Engine and Warning Display (EWD) is shown on DU 3 in normal configuration. After a DU 3 failure or a manual reversion it can be shown on DU 2 or DU 4 (see DSC.31.9).

The EWD is divided into five areas:

1. flight controls, trims, brake message and test status (left strip),
2. primary engine window (top),
3. permanent data window (middle),
4. alert window (bottom left),
5. procedure window (bottom right).

The crew controls the alert and procedure windows with the WD keys of the EFCPs (see DSC.31.4).



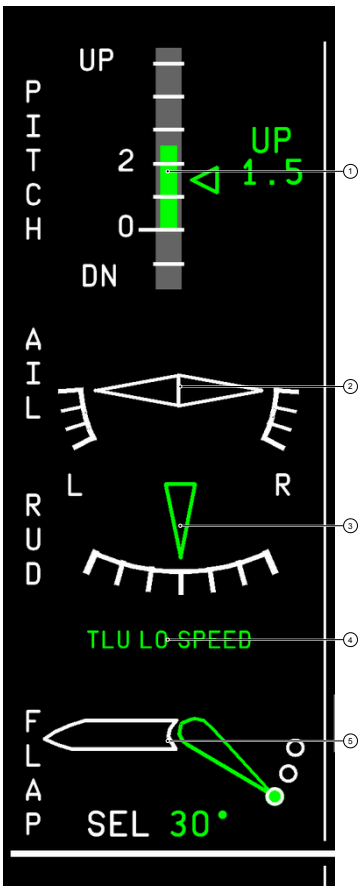
EWD in cruise with the AIR PACK caution and its procedure

cont'd... ►►►

cont'd... ►►►

DSC.31.7.2 Flight Controls, Trims, Brake Message and Test Status

Ident.: DSC.31.7.2 — 02 NOV 2026
ALL



Trims, flaps and messages strip on final approach, flaps 30

(1) Pitch trim indication

Vertical scale marked UP / DN, with a pointer and its value in degrees. A green band marks the take-off range.

Cyan	Manual trim.
Green	Autopilot engaged.
Amber	PITCH TRIM ASYM, PITCH MISTRIM, AP PITCH TRIM FAIL, or pointer outside the green band in take-off configuration.

The magenta bug is the take-off trim objective from the FMS. It is shown once the take-off data are confirmed on the VCP, and removed when the landing gear is selected UP after lift-off.

(2) Aileron (roll) trim indication

Lateral scale L / R.

White	Autopilot engaged.
Cyan	Autopilot not engaged, or RETRIM ROLL requested. A cyan arrow then shows the direction to trim.

cont'd... ►►►

cont'd... ►►►

Amber	AILERON MISTRIM with the autopilot engaged.

③ Rudder (yaw) trim indication

Lateral scale L / R in trim units (three dots each side).

Cyan	Normal.
Green	Yaw auto trim active.
Amber	Yaw mistrim, or YAW AUTOTRIM FAIL with the YD engaged.

A cyan arrow shows the direction to trim when RETRIM is requested.

④ Messages

TLU LO SPEED	The TLU is in low speed (full rudder authority) position.
PRKG BRK ON	Parking brake set.
TO CONFIG TEST OK	The take-off configuration test is passed.

⑤ Flaps indication

Flap position on a scale with marks at 0, 15 and 30°, and the selected position (SEL) below it. A bullet shows the flap lever command: cyan while the flaps move, green when they have reached it.

White	Flaps at 0.
Cyan	Flaps moving.
Green	Flaps at the selected position.
Amber	FLAPS ASYM, FLAPS JAM or command failure. Crossed when the position is not valid.
Red	Flaps unlocked.

DSC.31.7.3 Primary Engine Window

Ident.: DSC.31.7.3 — 02 NOV 2026
ALL

For each engine:

TQ %	Torque dial and digital readout. The PWR MGT rating (TO, MCT, CLB, CRZ) is shown below each dial with the torque limit for that rating. Cyan circle: take-off torque bug, shown once the take-off data are confirmed, and removed 2 s after touchdown with the power levers at GI. The dial is white while NP is 25 % or less. The readout is green in a grey box (green sector), amber in an amber box (amber sector), white on red above the amber limit, and dashes when invalid. It is replaced by HBV in an amber box when the EEC cannot control the handling bleed valve, and by LAB when a wrong EEC is installed.
NP %	Propeller speed, digital readout.
ITT °C	Turbine temperature dial and digital readout.

Messages around the dials:

AUTO FTR	Auto feather armed, per engine.
UPTRIM	ATPCS uptrim active, per engine.

cont'd... ►►►

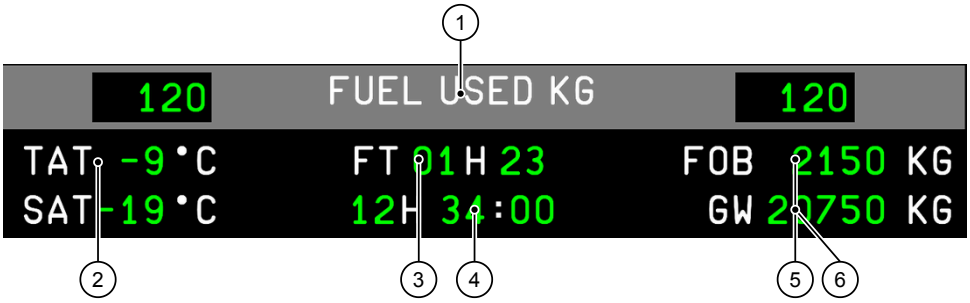
cont'd... ►►►

SGL CH	Engine control on single channel.
LO PITCH	Propeller blade angle below the low pitch stop.
PROP BRK	Propeller brake state.
FIRE / LOOP	Engine fire warning and fire detection loop status.
NAC OVHT	Nacelle overheat.

The engine limits behind the colour bands are given in LIM.5.

DSC.31.7.4 Permanent Data Window

Ident.: DSC.31.7.4 — 02 NOV 2026
ALL



Permanent data window

(1) FUEL USED	Fuel used by each engine since the last reset (VCP TO DATA page), from the fuel flow meters. 1 kg resolution.
(2) TAT / SAT	Total and static air temperature, from the ADC selected on the VCP ENG OAT page.
(3) FT	Flight time, hours and minutes. Counts automatically in flight.
(4) UTC	Hours, minutes and seconds. From the GPS, otherwise from the internal clock.
(5) FOB	Fuel on board, from the FMS. Initialised on the MCDU, then updated with the fuel used.
(6) GW	Gross weight, from the FMS. Dashes until the ZFW is entered.

Units (kg or lb) follow the MCDU units setting. An invalid value is replaced by amber dashes.

DSC.31.7.5 Alert and Procedure Windows

Ident.: DSC.31.7.5 — 02 NOV 2026
ALL

The lower part of the EWD belongs to the FWS:

- the **alert window**, on the left, lists the active warnings (red) and cautions (amber), warnings first,
- the **procedure window**, on the right, shows the procedure or check list associated with an alert, or one called by the crew, or the procedure menu,
- a status line at the bottom of the procedure window shows FWS information, such as **TO INHIB**.

How alerts, procedures and check lists are managed is described in DSC.31.12.

DSC.31.8 INDICATION ON IESI

DSC.31.8.1 Description

Ident.: DSC.31.8.1 — 28 OCT 2026
ALL

The Integrated Electronic Standby Instrument (IESI) is on the centre panel. It is independent of the CDS and has its own attitude sensors and air data. It shows:

- attitude,
- airspeed,
- altitude and baro setting,
- VHF 1 frequency,
- VOR / ILS 1 frequency and deviations, when the NAV mode is selected.

For standby heading, use the standby compass.



IESI screen in cruise, NAV mode with VOR 1

Display

Aircraft symbol	Fixed, black outlined in yellow.
Roll scale and index	White scale with marks at 10, 20, 30, 45 and 60°. Black index outlined in yellow, with the slip / skid trapezoid below it.
Pitch scale	White, marks every 2.5° up to 20°. Beyond 25° red chevrons show the way back to the horizon.
Airspeed	White moving tape on the left, readout in a "T" shaped window.
Altitude	White moving tape on the right, readout in a rectangular window.
Baro setting	Cyan, below the altitude tape: the selected setting or STD.
Radios	VHF 1 frequency at the top. VOR1 or ILS1 and the frequency when the NAV mode is on.

cont'd... ►►►

cont'd... ►►►

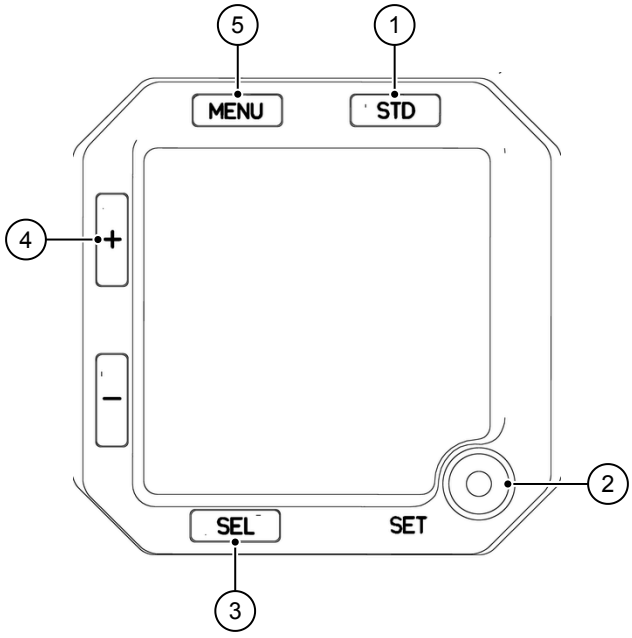
ILS mode	Localizer scale at the bottom and glide slope scale on the right. The magenta indexes appear when the signals are valid.
VOR mode	Deviation scale at the bottom with a cyan index. Bottom left: cyan TO (up triangle) or FROM (down triangle) and the IESI course.

The IESI course is its own. It is not the course set on the FGCP and it does not reach the PFDs. The IESI shares only the NAV 1 receiver.

At power-up, the IESI first shows its identification page for about 10 s (part and serial numbers, installed options, functional time, IESI CHECK : OK). It then aligns its attitude. During the alignment, the attitude area is blank and ALIGNING is shown in a box with the remaining time. Speed and altitude are available.

DSC.31.8.2 Controls

Ident.: DSC.31.8.2 — 28 OCT 2026
ALL



IESI controls

① STD pb

PRESS	Sets the baro setting to standard (1013 hPa / 29.92 inHg).

② SET knob

ROTATE	Scrolls the menu. Outside the menu, changes the selected field: baro setting or course (VOR mode).

③ SEL pb

PRESS	Validates the menu selection. In NAV mode, moves the cursor between the fields on the screen (VHF COM, VHF NAV, baro, course).

④ + / - pbs

PRESS	Increases / decreases the screen brightness.

cont'd... ►►►

cont'd... ►►►

(5) MENU pb

PRESS — Opens the menu: BARO UNIT (hPa or inHg, hPa by default), VOR MODE or ILS MODE (on / off, according to the NAV 1 frequency), TUNING MODE, MAINTENANCE.

SIMULATOR NOTE

- The STD pb acts on a single press (no 0.2 s hold), and a second press returns to the baro setting.
- The VHF COM and VHF NAV fields can be selected but not tuned from the IESI.

DSC.31.8.3 Flags

Ident.: DSC.31.8.3 — 28 OCT 2026
ALL

FLAG	MEANING
ATT, red reverse video	Attitude lost
IAS, red reverse video	Airspeed lost
ALT, red reverse video	Altitude lost
VOR, ILS, LOC, G/S, red reverse video	Mode selected, no valid signal
ATT : RST, cyan	Aircraft moved during the alignment
FAIL, amber box	Invalid signal or tuning off
OUT OF ORDER, white	IESI unserviceable

SIMULATOR NOTE

The IESI flags are not simulated. When a NAV signal is invalid the deviation index is removed, but no flag is shown.

DSC.31.8.4 Electrical Supply

Ident.: DSC.31.8.4 — 28 OCT 2026
ALL

The IESI is supplied by the DC ESS BUS. If the DC ESS BUS voltage is lost, it is supplied by the HOT EMER BAT BUS.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.31.9 CDS REVERSION

DSC.31.9.1 General

Ident.: DSC.31.9.1 — 28 OCT 2026
ALL

The CDS changes the format shown on each DU automatically after a DU failure or a power loss, and manually with the DISPLAY pbs. The aim is to keep the PFDs first, then the EWD, in view.

DSC.31.9.2 Configurations

Ident.: DSC.31.9.2 — 28 OCT 2026
ALL

CONDITION	DU 1	DU 2	DU 3	DU 4	DU 5
Normal (GPU or engines)	PFD	MFD (ND)	EWD	MFD (ENGINE page)	PFD (mini ND)
Batteries only, on ground	Off	EWD	Off	MFD (ENGINE page)	Off
DC GEN 1 and 2 lost, in flight	Off	PFD	Off	EWD	Off

On batteries only, DU 1, DU 3 and DU 5 are not supplied. DU 2 and DU 4 are supplied by the DC EMER and DC ESS buses.

DSC.31.9.3 Automatic Reconfiguration

Ident.: DSC.31.9.3 — 28 OCT 2026
ALL

After a DU failure, an MFD is replaced by the lost PFD or EWD. The PFD has priority over the EWD.

1. DU 1 failed: DU 2 shows PFD 1. DU 5 failed: DU 4 shows PFD 2.
2. DU 3 failed: the EWD is shown on the MFD of the pilot monitoring (the side not coupled to the AFCS). If that DU is failed or shows a PFD, the EWD goes to the other MFD. The EWD never replaces a PFD.
3. DU 1, DU 3 and DU 5 failed: DU 2 and DU 4 show the PFDs; the EWD is lost.
4. A DU 2 or DU 4 failure alone causes no reconfiguration.

EWD recall. If the EWD is not shown on any working DU (for example after a manual reversion) and a new warning or caution occurs, the FWS recalls the EWD to the pilot monitoring side.

Engine start. When the ENG START rotary selector leaves OFF, both MFDs show the ENGINE page.

System page call. While a procedure or a check list is shown in the EWD procedure window, the FWS displays the related system page (ENGINE, HYDRAULIC, AC/DC or CABIN) on the MFDs. On the ground both MFDs are used, the ND included, except an ND showing a TAWS pop-up. In flight, an MFD showing the ND is not switched; only an MFD already on a system page changes. When the call ends, the MFD stays on the page called. A page selected by the crew during a call takes priority: that MFD is no longer moved by the procedure.

AFDX loss. When both AFDX switches are lost, the DU configuration is frozen: there is no automatic reconfiguration, and manual reversion stays available on DU 2 and DU 4. The EWD shows **AFDX / FWS NOT AVAIL**.

Fatal DU failure. A large amber **F** is shown on the failed DU.

DSC.31.9.4 Manual Reconfiguration

Ident.: DSC.31.9.4 — 28 OCT 2026
ALL

Press the DISPLAY PFD/EWD/MFD pb on the CAPT or F/O SWITCHING panel. Each press shows the next format on the own-side inboard DU (DU 2 or DU 4), in the order PFD, EWD, MFD, starting from the format displayed. If the inboard DU

cont'd... ►►►

cont'd... ►►►

is inoperative (failed, unpowered or switched off), the outboard DU (DU 1 or DU 5) takes the command.

A manual selection overrides the automatic configuration. A new automatic reconfiguration (new failure, EWD recall, engine start call) replaces the manual selection.

The MFD keys of the EFCP call the MFD pages directly.

DSC.31.10 CLOCKS

DSC.31.10.1 Description

Ident.: DSC.31.10.1 — 28 OCT 2026 — ALL

Time is available on the displays:

- **UTC** on the EWD permanent data window, hours, minutes and seconds. It comes from the GPS, otherwise from the internal clock. Amber dashes when no time source is valid.
- **Flight time (FT)** on the EWD permanent data window, hours and minutes.
- **Chronometer (CHR)** on the memo panel of each MFD, minutes and seconds, from 00:00 to 59:59.

SIMULATOR NOTE

The stand-alone electronic clock (UTC / date / local time, ET, CHR and TST functions) is not fitted.

DSC.31.10.2 Controls

Ident.: DSC.31.10.2 — 28 OCT 2026 — ALL

There is one CHRONO pb on each side of the glare shield (CAPT and F/O). Each one controls the chronometer on its own-side MFD.

(1) CHRONO pb

1st PRESS	CHR appears on the memo panel and counts up from 00:00.
2nd PRESS	The chronometer stops; the value stays displayed.
3rd PRESS	The chronometer is removed from the memo panel.

SIMULATOR NOTE

The chronometer runs on the simulator clock: it stops when the simulation is paused.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.31.12 FWS

DSC.31.12.1 Description

Ident.: DSC.31.12.1 — 28 OCT 2026
ALL

The Flight Warning System (FWS) helps the crew manage normal and abnormal configurations. It:

- draws the crew's attention to an alert with lights and aural signals,
- identifies the failed system with an alert message,
- displays the associated procedure, and the check lists in each flight phase,
- checks the take-off configuration,
- inhibits some alerts during take-off,
- shows the remaining limitations and actions as a status.

The FWS uses the lower part of the EWD: the alert window on the left, the procedure window on the right, and a status line at the bottom of the procedure window. It is controlled with the WD keys of the EFCPs, the MASTER WARNING and MASTER CAUTION lights, the TO CONFIG TEST pb and the EMER AUDIO CANCEL switch.

Basic principles

- **Lights out**: in normal operation no light is on, except green or cyan lights for transient states.
- **Alert sequence**: detection (aural and MW or MC light), identification (message in the alert window), isolation (local light on the system panel, system page).

Local alert lights on the panels are driven by the systems themselves. The FWS cannot inhibit or clear them: they go off only when the system is back to normal.

DSC.31.12.2 Alert Levels and Colours

Ident.: DSC.31.12.2 — 28 OCT 2026
ALL

LEVEL	TYPE	ATTENTION GETTERS	MESSAGE
3	Warning: emergency, immediate action	MW light flashing red, continuous repetitive chime (CRC) or a specific aural	Red
2	Caution: abnormal, action without delay	MC light flashing amber, single chime (SC)	Amber
1	Advisory: loss of redundancy, monitoring	None	Amber
0	Information	None	No message (green, cyan or white indication on the system display)

COLOUR	MEANING
Red	Configuration or failure requiring immediate action
Amber	Configuration or failure not requiring immediate action
Green	Normal operation
Cyan	Normal transient configuration, control position
White	System selected off

cont'd... ►►►

cont'd... ►►►

DSC.31.12.3 Aurals

Ident.: DSC.31.12.3 — 06 NOV 2026
ALL

Two kinds of aural signals are used:

- **non-specific**: CRC with a warning, SC with a caution, always with a message in the alert window,
- **specific**: without MW / MC light or message. Stall (cricket), overspeed VMO / VFE / VLE (clacker), AP disconnect (cavalry charge), trim in motion (whooler), altitude alert (C-chord), calls (door bell), AP capability downgrade and speed protections (triple click).

When several aurals are triggered together, the order of priority is:

1. cricket (stall),
2. clacker (overspeed),
3. CRC for engine fire, dual DC loss, propeller brake failure, flaps unlocked, pitch disconnect, excess cabin altitude, excess cabin ΔP, negative cabin ΔP,
4. whooler (trim in motion),
5. CRC for smoke, oil low pressure, landing gear not down,
6. cavalry charge (AP disconnect),
7. triple click,
8. C-chord (altitude alert),
9. single chime (cautions),
10. door bell (calls).

Overspeed alert

If the aircraft is in overspeed conditions (VMO, VFE, VLE), a specific aural alert is generated. The alert persists until return into the following flight envelope:

ALERTS	VFE − 5 kt	VLE − 5 kt	VMO
FLAPS 0		180 kt	250 kt
FLAPS 15	180 kt		
FLAPS 30	145 kt		

DSC.31.12.4 Controls

Ident.: DSC.31.12.4 — 28 OCT 2026
ALL

(1) MASTER WARNING light

FLASHING RED — A warning is active. Its red message and procedure are on the EWD.

PRESS — The light goes off and the associated aural stops.

(2) MASTER CAUTION light

FLASHING AMBER — A caution is active. Its amber message and procedure are on the EWD.

PRESS — The light goes off.

There is one MW and one MC light in front of each pilot.

cont'd... ►►►

cont'd... ►►►

③ TO CONFIG TEST pb

PRESS — Simulates the power levers at take-off power (except for the parking brake check) and checks the take-off configuration. Also performs a recall, which rearms the aurals cancelled with EMER AUDIO CANCEL.

EWD MESSAGE	CONDITION
CONFIG FLT CTL	TLU not in LO SPD, or AIL LOCK disagree, or pitch trim out of the green band, or flaps not in take-off position
CONFIG PWR MGT	PWR MGT selector not on TO
TO CONFIG TEST OK	Configuration correct. Shown in the flight controls area.

The same check is made when the power levers are advanced to take-off power with the parking brake released. With the parking brake set and the power levers at take-off, the CONFIG warning and PRKG BRK ON are triggered.

④ EMER AUDIO CANCEL switch

Guarded switch. Cancels an undue continuous aural of the system that triggered it; aurals of other systems are not affected.

The cancelled aural is rearmed:

- at the next aircraft power-up or MFC reset,
- when RCL is pressed,
- when the TO CONFIG TEST pb is pressed.

The aurals of the landing gear (landing configuration), stall warning, pitch trim whooler and AP disconnect cannot be cancelled: they come back as soon as their condition reappears.

⑤ EFCP WD keys

PROC MENU, MAN DEL, RCL, CLR and the procedure control keys. See DSC.31.4.

DSC.31.12.5 Take-off Inhibition

Ident.: DSC.31.12.5 — 28 OCT 2026
ALL

During take-off, some alerts are inhibited (no message, no light, no aural). TO INHIB is shown on the EWD while the inhibition is active.

- **Starts**: when the power levers reach the notch at take-off.
- **Ends**: when the main landing gear retracts, or when the crew presses RCL.

While it is active, all OIL and SMOKE warnings and most cautions are inhibited. The cautions that stay active are those that affect the take-off itself (for example SINGLE ENG OPERATION, ENG OVER LIMIT, FLAPS, pitch trim and mistrim alerts, TLU FAULT, ATTITUDE / IAS / ALTITUDE / HEADING DISAGREE). When the inhibition ends, any alert still present is displayed.

DSC.31.12.6 Alert Window

Ident.: DSC.31.12.6 — 28 OCT 2026
ALL

- Warnings are listed at the top, cautions below, each sorted by priority.
- A new caution with the same title prefix as an uncleared one does not trigger a new chime.
- A warning cannot be cleared. A caution is cleared with CLR, and can be recalled with RCL while its condition is still present.

cont'd... ►►►

cont'd... ►►►

- When the list is longer than the window, an amber arrowhead at the bottom shows that more alerts are hidden. Press RCL to scroll.
- When a failure disappears, its local light, its message and its attention getters go off.

Before the descent, press RCL: the messages of the failures still present, or of systems with a white light still on, are displayed again. If no failure occurred, no message is shown.

DSC.31.12.7 Procedure Window

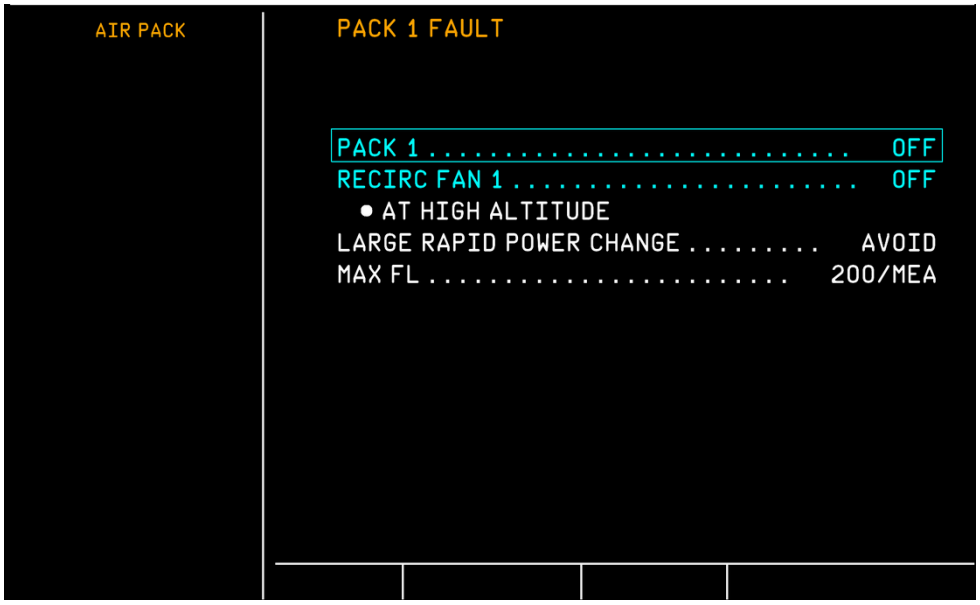
Ident.: DSC.31.12.7 — 28 OCT 2026
ALL

Window states

The procedure window shows one of:

- nothing (blank), when no procedure or check list is active,
- a procedure or check list, on one or several pages,
- PENDING PROCEDURE, when an active procedure was cleared before completion,
- the procedure menu (PROC MENU),
- **FWS NOT AVAIL**, on a black page, when the FWS is lost.

Colours in a procedure



Alert window (left) and procedure window (right): AIR PACK caution, PACK 1 FAULT procedure, first item boxed

COLOUR	USE
Cyan	Action to perform, choice to make
Amber	Abnormal procedure title, recommendation, status title
Red	Emergency procedure title, strong recommendation
White	Subtitle, note, normal procedure title, validated item

Working through a procedure

A procedure starts with its title (line 1) and, when a sub-procedure is active, a subtitle (line 2). It contains the actions to do now, the deferred actions for later flight phases, and the limitations.

cont'd... ►►►

cont'd... ►►►

1. Move the cyan box with the up / down keys.
2. Press V to acknowledge the boxed item. A mandatory item turns from cyan to white.
3. When the procedure offers choices, box the choice and press V. PREVIOUS CHOICE (line 3) returns to the choice list. A choice can be selected only after all items above it are acknowledged.
4. When all items are acknowledged, PROCEDURE COMPLETED is shown. Acknowledge it with V.

After PROCEDURE COMPLETED is acknowledged:

- nothing pending: the window turns blank,
- something pending (procedure, check list or status): the PROC MENU opens.

When the procedure leaves a status, the status replaces it. It contains the deferred actions, the limitations and the inoperative equipment. Status titles are shown in brackets in the PENDING list.

Pages: when a procedure or a status is longer than one page, the page number is shown (white for procedures, amber for statuses).

Procedure menu

Press PROC MENU (or RCL) to open it.

- **PENDING**: titles of all active procedures, check lists and statuses. Select one to open it again; it starts from the beginning (validated items are not kept).
- **LIST**: NORMAL, ABNORMAL and EMERGENCY sub-menus. Any procedure or check list can be called. A procedure called this way shows **MAN** at the end of its PENDING line once one of its items is acknowledged.
- **NO ACTIVE PROCEDURE** is shown when nothing is pending.

Clearing and deleting

CLR	Removes the displayed procedure, check list or status from the window. PENDING PROCEDURE then reminds the crew.
MAN DEL > 3 s	Clears the displayed (or boxed) procedure or check list until the next RCL. It comes back if its condition is still present. A manually inserted status can be deleted; automatic statuses cannot.
MAN DEL	Deletes a manually inserted procedure.

Several alerts

Each procedure has the level of its alert. A warning procedure takes the window over a caution procedure or a check list; the displaced one is stored in the PENDING list. A new caution procedure does not replace an open PROC MENU: it is added to the PENDING list.

DSC.31.12.8 Check Lists

Ident.: DSC.31.12.8 — 10 NOV 2026
ALL

The normal check lists are triggered by the aircraft state.

CHECK LIST	TRIGGER
FINAL COCKPIT PREPARATION	Aircraft powered by GPU or in HOTEL mode
BEFORE PROPELLER ROTATION	FINAL COCKPIT PREPARATION completed
BEFORE TAXI	One engine running, its CL in AUTO or above, doors closed
TAXI	Parking brake released, after BEFORE TAXI
BEFORE TAKEOFF	Both engines running and TO CONFIG TEST pressed, after TAXI
AFTER TAKEOFF	Aircraft airborne

cont'd... ►►►

cont'd... ►►►

CHECK LIST	TRIGGER
DESCENT	Descent detected
APPROACH	10 s after DESCENT is completed
BEFORE LANDING	Final approach detected
AFTER LANDING	Touchdown and speed below 40 kt
PARKING	Parking brake set after landing
LEAVING AIRCRAFT	PARKING completed

A check list that follows another one (BEFORE PROPELLER ROTATION, APPROACH, LEAVING AIRCRAFT) is triggered when the previous one is completed. Like any newly triggered check list, it is displayed automatically when the procedure window is free; when another procedure or the PROC MENU is displayed, it is added to the PENDING list.

A check list is completed only when every item is acknowledged. Items skipped with the down key keep the check list open: V on the last item moves the box back to the first item not acknowledged.

After take-off with both engines running, AFTER TAKEOFF is shown directly for two engines. With one engine out, the crew chooses between the normal and icing versions.

If a trigger is lost (for example the parking brake signal), the check list is not shown automatically: select it in PROC MENU, LIST, NORMAL.

Icing procedures

- Icing detected, or DE ICING AIRFRAME selected ON: ICE ACCRETION is activated.
- ICING AOA active and ANTI ICING HORNS deselected: LEAVING ICING CONDITIONS is activated.

SIMULATOR NOTE

The FCOM gives no values for the descent and final approach detection. The simulation uses:

- DESCENT: after the climb or the cruise, a descent at more than 300 ft/min for 5 s.
- BEFORE LANDING: in the descent, a descent at more than 300 ft/min with the landing gear down or the flaps extended, for 5 s.

A level-off during the descent or the approach keeps the phase; only a climb leaves it.

DSC.31.12.9 Operation with MFC or FWS Failure

Ident.: DSC.31.12.9 — 28 OCT 2026
ALL

MFC 1B and 2B failed

- MC lights on steady, **MFC** on the EWD, MFC 1B and 2B FAULT lights on the overhead panel.
- Level 2 alerts and the CONFIG, ENG OIL and PROP BRK warnings are not processed: monitor the local lights on the overhead panel.
- Other warnings are still shown on the EWD, without MW and CRC.

FWS lost

When both flight warning applications are lost (or both core processing modules, or both AFDX switches), **FWS NOT AVAIL** is shown on a black procedure window. No alert message is displayed. Monitor the panels: local lights still work. For failures detected by the MFC, the MW / MC lights and chimes still operate.

One flight warning application lost: **FWS SGL CH**, with MC and SC.

cont'd... ►►►

cont'd... ►►►

DSC.31.12.10 Lateral Maintenance Panel

Ident.: DSC.31.12.10 — 28 OCT 2026
ALL

The WARN section of the left maintenance panel tests, on the ground, warnings that cannot be tested from their own system.

(1) WARN selector

Selects the test: SMK, EXCESS CAB ALT, PITCH DISCONNECT, LDG GEAR NOT DOWN, EXCESS CAB ΔP, VMO, STICK PUSHER / SHAKER tests. Return it to NORM FLT before flight.

(2) PTT pb

PRESS — Starts the selected test. **MAINT PNL** is shown on the EWD while a test is in progress.

DSC.31.12.11 Electrical Supply

Ident.: DSC.31.12.11 — 28 OCT 2026
ALL

EQUIPMENT	PRIMARY SUPPLY	ALTERNATE SUPPLY
FWS side 1	DC BUS 1	DC EMER BUS
FWS side 2	DC BUS 2	DC EMER BUS

PAGE

INTENTIONALLY

LEFT BLANK

DSC.36.1 DESCRIPTION

DSC.36.1.1 General

Ident.: DSC.36.1.1 — 10 NOV 2026
ALL

The pneumatic system includes all the systems designed to supply bleed air to the various aircraft systems, zones, or engines, with associated control, monitoring, and indicating components.

The pneumatic system supplies pressurized air to air conditioning, pressurization, and ice protection system.

Compressed air is bled from the engine compressors at the LP or HP stages.

Protection against overheat and leak around the hot air ducts is provided as well as wing leading edge ventilation.

DSC.36.1.2 Air Bleed

Ident.: DSC.36.1.2 — 10 NOV 2026
ALL

Air conditioning and pressurization

The system is designed to:

- Select the compressor stage from which air is bled, depending on the pressure and/or temperature existing at these stages
- Regulate air pressure in order to avoid excessive pressures.

Air is usually bled from the low compressor stage (LP). At low engine speed if pressure from LP is not sufficient, air source is automatically switched to the high compressor stage HP (This may occur on ground and during descent at FI).

Bleed air from HP compressors is transferred via a pneumatically operated electrically controlled HP butterfly valve.

When the HP valve is not energized the valve remains closed, air is directly bled from the LP stage through LP bleed check valves.

When the HP valve is energized the valve opens, the HP bleed air enters into the LP pneumatic duct and closes the check valve. Air is bled only from HP compressors stage, without any recirculation into the engine.

Wing and engine deicing

Air is bled from the HP. Bleed air is transferred via electrically controlled pressure regulating valve (see DSC.30.3.1).

DSC.36.1.3 Isolation

Ident.: DSC.36.1.3 — 10 NOV 2026
ALL

The bleed air shutoff valve is downstream of the LP and HP duct. The valve is a butterfly bleed valve pneumatically operated and electrically controlled. The valve is spring-loaded closed.

When the solenoid is energized the valve is ready to open provided sufficient air pressure. When the solenoid is not energized, the valve is locked in the closed position.

The bleed air shutoff valve automatically closes in the following cases:

- Bleed duct OVHT, or
- Bleed duct LEAK, or
- Actuation of associated ENG FIRE handle, or
- Engine failure at T.O (UPTRIM signal), or
- PROPELLER BRAKE selected ON (only for left bleed valve).

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

Note

During a starting sequence, the opening of the bleed air shutoff valve is inhibited.

DSC.36.1.4 Crossfeed

Ident.: DSC.36.1.4 — 10 NOV 2026
ALL

The crossfeed valve (X VALVE), on the crossfeed duct, enables to connect LH and RH air bleed systems.

In flight, the crossfeed valve is always closed.

On ground, the valve is closed except when:

- Both engines are running and the propeller brake is engaged, or
- One engine is running, or
- One engine bleed is off.

The crossfeed valve is electrically controlled and pneumatically actuated. It is spring-loaded closed. When its solenoid is electrically energized, the valve opens provided that sufficient bleed pressure is available.

DSC.36.1.5 Wing Leading Edge Ventilation

Ident.: DSC.36.1.5 — 10 NOV 2026
ALL

The wing leading edge ventilation is on the top engine nacelle fairing, between the fuselage and the engine nacelle. The purpose of this ventilation system is to maintain low temperature inside the wing leading edge zones. Ventilation is provided in flight using dynamic air pressure through a ram air intake scoop. No cockpit monitoring or control is provided.

DSC.36.1.6 Leak Detection System

Ident.: DSC.36.1.6 — 10 NOV 2026
ALL

The bleed air leak detection system provides a continuous monitoring of bleed duct leak to protect the structure and components near the hot bleed air ducts.

The system is installed in the following areas:

- Wing leading edge and wing to fuselage fairing
- Upper and lower fuselage floor
- Air conditioning pack area.

The air leak detection system includes two single loop detection assemblies (one for each LH and RH air duct systems), a control unit and indicating system. Each loop has 6 sensing elements, connected to a multi zone control unit, which gives electrical signals to the indicating system.

When the temperature at the sensing element exceeds 153 °C (307 °F) the associated LEAK light, on the overhead panel comes on. After 1 s delay, the associated pack valve, HP valve and BLEED valve (and GRD X FEED valve if the left loop is affected) are automatically latched closed.

Note

There is a difference in philosophy between LEAK and OVHT.

In the case of OVHT, the associated bleed system will be recovered after a cooling time.

In the case of LEAK, the flight crew must consider the associated bleed system as inoperative for the rest of the flight.

cont'd... ►►►

cont'd... ►►►

DSC.36.1.7 Overheat Control System

Ident.: DSC.36.1.7 — 10 NOV 2026
ALL

The overheat control system includes two thermal resistances switches, for each LH and RH bleed systems. The switches are installed downstream of the bleed air shutoff valve and are segregated for redundancy.

If bleed air temperature exceeds 274 °C (525 °F):

- The associated bleed air shutoff valve and HP bleed valves are commanded closed
- The OVHT light on the overhead panel comes on.

In the case of OVHT, the associated bleed system will be recovered after a cooling time.

They operate at 274 °C (525 °F) and are controlled by the MFC.

DSC.36.1.8 Overpressure Control System

Ident.: DSC.36.1.8 — 10 NOV 2026
ALL

The pressure switch is on the bleed air duct, upstream the bleed air shutoff valve. If air bleed pressure > 80 psi, overpressure switch provides a signal to the MFC which closes the bleed air shutoff valve.

The FAULT light on the corresponding air bleed pushbutton comes on.

DSC.36.1.9 HP Bleed Air Thermal Protection

Ident.: DSC.36.1.9 — 10 NOV 2026
ALL

The HP bleed air thermal protection monitors over-temperature of the HP bleed air supply. If this thermal sensor detects temperature > 270 °C on HP port, the HP bleed valve is closed. Then the MFC BITE LOADED indicator (on maintenance panel) comes on amber (see DSC.36.5.1).

SIMULATOR NOTE

The HP port temperature is not monitored. The HP bleed valve does not close for an HP port overtemperature, and the BITE LOADED indicator does not come on for this case.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.36.2 CONTROLS

DSC.36.2.1 AIR BLEED Panel

Ident.: DSC.36.2.1 — 10 NOV 2026
ALL

The AIR BLEED panel is on the overhead panel. It has the ENG 1 BLEED and ENG 2 BLEED pbs (1), the OVHT lights (2), the LEAK lights (3) and the GRD X FEED X VALVE OPEN light (4). The PACK VALVE pbs on the same panel are described in see DSC.21.2.2.

(1) ENG BLEED pb

Controls the associated HP valve and BLEED valve.

ON	Pb pressed in. Associated HP and bleed valves solenoids are energized. The valves will open when sufficient pressure is available.
OFF	Pb released. Associated HP and bleed valves are closed. OFF light comes on white. Caution **AIR BLEED 1(2)** appears on EWD.
FAULT	If the bleed valve position disagrees with the selected position (case of OVHT, Overpressure, or LEAK), the amber light comes on. Then a specific caution message from the FWS appears on EWD associated with a caution and a single chime.

(2) OVHT light

If either of the respective bleed duct dual overheat switch measures T > 274 °C (525 °F), the amber light comes on. Then the caution message OVHT from the FWS appears on EWD associated with a caution light and a single chime.

(3) LEAK light

If respective bleed leak detection system signal an alert (T loop > 153 °C / 307 °F), the amber light comes on. Then the caution message LEAK from the FWS appears on EWD associated with a caution light and a single chime.

(4) X VALVE OPEN light

If the GRD X FEED valve is open, the amber light comes on. This occurs on ground if the air is bled from right engine running in hotel mode (propeller brake switched on), or during taxiing with one engine running.

DSC.36.2.2 Cabin SD Page

Ident.: DSC.36.2.2 — 10 NOV 2026
ALL

The bleed indications are on the CABIN page of the SD: the ENGINE BLEED symbol (1), the BLEED CROSSFEED pipe (2), the BLEED CROSSFEED valve (3), OVHT (4) and LEAK (5). The other indications of the page are described in see DSC.21.2.

(1) ENGINE BLEED symbol

Green	ON status, FULLY status, FULL OPERATIVE, NO FAULT reported.
White	OFF status, NO FAULT reported.
Amber	The engine bleed is reported faulty either because a fault directly impacts the system or another fault is detected and impacts the engine bleed air system (duct bleed leak, engine off, etc.).

cont'd... ►►►

cont'd... ►►►

(2) BLEED CROSSFEED pipe

Green	Air is flowing in the pipe.
Grey	No air is flowing inside the pipe but the bleed crossfeed valve operation is reported faulty.
Not shown	No air flows inside the pipe and the bleed crossfeed valve operates properly.

(3) BLEED CROSSFEED valve

Green	The bleed crossfeed valve operates properly and is fully open (the valve open position corresponds to the valve command).
Amber	The valve reported position does not correspond to the valve command (see DSC.36.4.4).
Not shown	The valve operates properly and is fully closed as required.

(4) OVHT

OVHT amber displayed besides the affected engine bleed (see DSC.36.4.2).

(5) LEAK

LEAK amber displayed besides the engine bleed on the relevant side (see DSC.36.4.3).

DSC.36.3 ELECTRICAL SUPPLY

DSC.36.3.1 Electrical Supply

Ident.: DSC.36.3.1 — 10 NOV 2026
ALL

SYSTEM	EQUIPMENT	DC BUS SUPPLY (C/B)	AC BUS SUPPLY (C/B)
ENG 1	HP valve	DC BUS 1 (on lateral panel C/B HP NORM)	NIL
ENG 1	Bleed valve	DC ESS BUS (on lateral panel C/B BLEED)	NIL
ENG 1	Fault and OVHT alert light	DC ESS BUS (on lateral panel C/B CAUTION)	NIL
ENG 2	HP valve	DC BUS 2 (on lateral panel C/B HP NORM)	NIL
ENG 2	Bleed valve	DC ESS BUS (on lateral panel C/B BLEED)	NIL
ENG 2	Fault and OVHT alert light	DC ESS BUS (on lateral panel C/B CAUTION)	NIL
CROSSFEED	Crossfeed valve and associated OPEN light	DC BUS 1 (on lateral panel C/B X FEED)	NIL
LEAK	Bleed leak detection system	NIL	115 VAC BUS 1 (on lateral panel C/B BLEED LEAK DET)
LEAK	LEAK lights	DC BUS 1 (on lateral panel C/B CAUTION)	NIL

PAGE

INTENTIONALLY

LEFT BLANK

DSC.36.4 SYSTEM MONITORING

DSC.36.4.1 ENG BLEED 1(2) FAULT

Ident.: DSC.36.4.1 — 10 NOV 2026
ALL

CONDITION	VISUAL	AURAL
Bleed valve position disagree with commanded	MC light flashing amber. **AIR BLEED 1(2)** amber message on EWD. **BLEED FAULT** amber message on Cabin SD page. Associated ENG BLEED FAULT amber light on overhead panel. Associated PACK VALVE FAULT amber light on overhead panel.	SC

DSC.36.4.2 BLEED 1(2) OVHT

Ident.: DSC.36.4.2 — 10 NOV 2026
ALL

CONDITION	VISUAL	AURAL
Overheat in bleed duct: T duct > 274 °C / 525 °F	MC light flashing amber. **AIR BLEED1(2) OVHT** amber message on EWD. Associated **BLEED FAULT** amber message, **PACK FAULT** amber message or **OVHT** amber message on Cabin SD page. Associated TEMP SEL OVHT amber light on overhead panel. Associated ENG BLEED FAULT amber light on overhead panel. Associated PACK VALVE FAULT amber light on overhead panel.	SC

DSC.36.4.3 BLEED 1(2) LEAK

Ident.: DSC.36.4.3 — 10 NOV 2026
ALL

CONDITION	VISUAL	AURAL
Bleed air leak loop > 153 °C / 307 °F	MC light flashing amber. **AIR BLEED1(2) LEAK** amber message on EWD. Associated **BLEED FAULT** amber message, **PACK FAULT** amber message or **LEAK** amber message on Cabin SD page. Associated LEAK amber light on overhead panel. Associated ENG BLEED FAULT amber light on overhead panel. Associated PACK VALVE FAULT amber light on overhead panel.	SC

DSC.36.4.4 AIR BLEED X VALVE OPEN

Ident.: DSC.36.4.4 — 10 NOV 2026
ALL

CONDITION	VISUAL	AURAL
X valve open while it should be closed	MC light flashing amber. **AIR X VALVE** amber message on EWD. **X VALVE** amber message on Cabin SD page. X VALVE OPEN amber light on overhead panel.	SC

PAGE

INTENTIONALLY

LEFT BLANK

DSC.36.5 LATERAL MAINTENANCE PANEL

DSC.36.5.1 RH Maintenance Panel

Ident.: DSC.36.5.1 — 10 NOV 2026
ALL

The RH maintenance panel has the MFC BITE LOADED magnetic indicator (1) and the AIR BL LEAK TEST push to test button (2).

(1) BITE LOADED magnetic indicator

Reports that the maintenance system recorded a failure - "LH or RH HP valve position disagrees with the closed selected position". This happens if the HP bleed air thermal sensor detects a temperature above 270 °C.

(2) AIR BL LEAK TEST push to test button

Used to check the functioning of both ambient overheat detection circuits along bleed air ducts. Both bleed leak detection loops are tested simultaneously.

When pressed, both LEAK lights come on on overhead panel and both LEAK messages appear on the Cabin SD page (test is successful).

PAGE

INTENTIONALLY

LEFT BLANK

DSC.36.6 SCHEMATIC

DSC.36.6.1 Schematic

Ident.: DSC.36.6.1 — 10 NOV 2026
ALL

Each engine side has the same layout:

- The engine supplies air from its LP and HP compressor ports. The LP port goes through a check valve. The HP port goes through the HP VALVE. An HP port thermal sensor (T > 270 °C) closes the HP valve.
- The LP and HP ducts join upstream of the BLEED VALVE. An OVER PRESSURE SWITCH (80 PSI) is on the duct upstream of the bleed valve.
- A dual overheat switch (T > 274 °C) is on the duct downstream of the bleed valve. It drives the OVHT light.
- Downstream of the bleed valve, the duct supplies the associated PACK (PACK 1 or PACK 2).
- The ENG 1(2) BLEED pb (FAULT / OFF) and the ENG 1(2) FIRE handle control the bleed and HP valves. On the left side, the PROP BRK SELECTOR (OFF / ON) also controls the bleed valve.
- The ENG/WING DE ICING supply is taken from the HP port, upstream of the HP valve (see DSC.30.3.1).

The X VALVE on the crossfeed duct connects the left and right ducts, downstream of the bleed valves. It drives the X VALVE OPEN light.

The LEFT LEAK DETECTION LOOP and the RIGHT LEAK DETECTION LOOP (T LOOP) run along the ducts of each side. They drive the LEAK lights.

PAGE

INTENTIONALLY

LEFT BLANK

DSC.70.1 GENERAL

DSC.70.1.1 General

Ident.: DSC.70.1.1 — 05 NOV 2026
ALL

Each wing carries one Pratt & Whitney Canada **PW127M** turbopropeller engine. The engine is certified for a maximum take-off rating of 2750 SHP. In normal operation the take-off rating is lower, 2475 SHP. If one engine fails during the take-off, the other engine automatically goes up to the 2750 SHP reserve take-off rating (RTO): this is the uptrim function of the ATPCS (see DSC.70.4.1).

The crew sets the power with two levers per engine, the power lever (PL) and the condition lever (CL). For a given flight phase, a fixed position of both levers gives a fixed power: the rating for that phase is chosen on the PWR MGT selector, and the engine control computes and holds the corresponding torque.

The engine is a free turbine engine:

- a two-spool gas generator (low pressure and high pressure spools) produces the gas power,
- a two-stage free power turbine takes this power and drives the propeller through a concentric shaft and a reduction gear box (RGB),
- the propeller pitch is controlled electronically.

PROPELLER	HAMILTON SUNDSTRAND 568F-1
Blades	6
Diameter	3.93 m
Rotation	Clockwise, seen from the rear
100 % NP	1200 RPM
Weight	180 kg

Ratings

RATING	POWER (SHP)	MAX TQ AT THE NOTCH	NP
RTO (reserve take-off, uptrim, go-around at the ramp)	2750	100 %	100 %
TO (normal take-off)	2475	90 %	100 %
MCT (maximum continuous)	2500	90.9 %	100 %
CLB (maximum climb)	2192	97.2 %	82 %
CRZ (maximum cruise)	2132	94.5 %	82 %

These torques are the mechanical limits. Below them the EEC also respects a thermodynamic (flat rating) limit that depends on the outside air temperature, the altitude and the bleed configuration: see DSC.70.3.2. The engine limitations are given in LIM.5.70.

DSC.70.1.2 Accessories and Control Units

Ident.: DSC.70.1.2 — 05 NOV 2026
ALL

The engine accessories are on two gear boxes.

cont'd... ►►►

cont'd... ►►►

GEAR BOX	DRIVEN BY	ACCESSORIES
Accessory gear box (top of the engine)	HP spool	DC starter-generator, HP fuel pump, oil pumps
Reduction gear box (RGB)	Power turbine	ACW generator, Propeller Valve Module (PVM), HP feather pump and overspeed governor, electric auxiliary feather pump, Fuel Cooled Oil Cooler (FCOC), propeller brake (ENG 2 only)

The power plant is controlled by the following units:

UNIT	LOCATION	FUNCTION
EEC (Engine Electronic Control)	Nacelle	Computes and holds the engine power through the HMU stepper motor; minimum propeller speed on the ground; uptrim on ATPCS signal; handling bleed valve
HMU (Hydro Mechanical Unit)	Engine	Meters the fuel, protects against NH overspeed, shuts the HP fuel off, supplies the motive flow of the tank jet pump
PEC (Propeller Electronic Control)	Nacelle	Dual channel control of the blade angle through the PVM
PVM (Propeller Valve Module)	RGB	Pitch change oil metering, feathering, low pitch protection
PIU (Propeller Interface Unit)	Electronic rack	Interface between the cockpit and the PEC: propeller speed selection, PEC fault logic
AFU (Auto Feathering Unit)	Nacelle	Conditions the torque signal for the TQ pointer and for the ATPCS logic
MFC (Multi Function Computer)	Electronic rack	ATPCS arming, uptrim and autofeather logic, idle gate, alerts

The interfaces between the cockpit controls and these units are shown below.

COCKPIT CONTROL	ACTS ON	RESULT
Power lever	EEC, HMU	Engine power (TQ), and blade angle below FI
PWR MGT selector	EEC, PIU / PEC	Rating (max TQ) and propeller speed
Condition lever	PVM, HMU	Maximum NP, feathering, HP fuel shut-off
Bleed valves	EEC	Power correction for the bleed air taken

DSC.70.2 SYSTEMS DESCRIPTION

DSC.70.2.1 Engine

Ident.: DSC.70.2.1 — 05 NOV 2026
ALL

Air enters through an S-shaped intake below the spinner. The curved duct separates heavy particles from the engine air and also feeds a secondary flow to the oil cooler.

The gas generator has two centrifugal compressors in series:

- the **LP compressor**, driven by the LP axial turbine (uncooled),
- the **HP compressor**, driven by the HP axial turbine (cooled vanes and blades).

Diffuser pipes and cross-over ducts carry the air from the first stage to the second. The combustion chamber is annular, of the reverse-flow type, with 14 fuel nozzles.

Downstream of the gas generator, the two stages of the free **power turbine** drive the propeller through a coupling shaft and the two-stage RGB. The RGB is offset from the engine centre line.

PARAMETER	MEANING
NH	HP spool speed (%)
NL	LP spool speed (%)
NP	Propeller speed (%, 100 % = 1200 RPM)
TQ	Torque measured on the RGB (%)
ITT	Inter-turbine temperature (°C)
FF	Fuel flow (kg/h)

DSC.70.2.2 Fuel System (Engine)

Ident.: DSC.70.2.2 — 05 NOV 2026
ALL

The aircraft fuel system (tanks, pumps, LP valves and crossfeed) feeds each engine. On the engine, the fuel goes through:

1. a **fuel heater**, with a filter that can be bypassed. Engine oil heats the fuel; the outlet temperature is thermostatically controlled and is shown on the ENGINE system page,
2. the **HP pump**, with its own filter. When this filter starts to clog, **CLOG** appears on the ENGINE page and the ENG FUEL CLOG caution comes on. Further clogging opens a bypass,
3. the **HMU**, which meters the fuel to the engine and returns the excess to the pump inlet. The HMU also sends the motive flow that drives the jet pump of the tank,
4. the **fuel flowmeter** (FF indication),
5. the **FCOC**, where the fuel cools the engine oil,
6. the **flow divider** and the fuel nozzles.

The HP fuel shut-off valve in the HMU is controlled by the condition lever (FUEL S.O. position) and by the ENG FIRE handle.

SIMULATOR NOTE

- The filters clog only when the corresponding failure is set on the EFB FAILURES page. CLOG appears at 30 % blockage.

cont'd... ►►►

cont'd... ►►►

DSC.70.2.3 Lubrication System

Ident.: DSC.70.2.3 — 05 NOV 2026
ALL

One oil system lubricates the gas generator and the RGB, and supplies the propeller pitch change mechanism.

- **Tank**: 14.4 l, with a filler cap and a sight glass for the quantity check.
- **Pressure system**: a gear pump on the accessory gear box sends the oil through the air/oil cooler in the nacelle and a pressure filter. The cooler and the filter both have a bypass. The RGB oil is also cooled in the fuel heater and in the FCOC. A regulating valve controls the pressure, and a low temperature valve protects against pressure surges on a cold start.
- **Sensing**: a pressure transducer (OIL PRESS indication), a low pressure switch (LO PR flag and ENG OIL PRESS warning) and a temperature sensor (OIL TEMP indication).
- **Scavenge**: by gear pumps for the N° 6 and 7 bearings and the RGB; the other cavities drain by gravity or air pressure.

Oil to specification MIL-L-23699 is used (see LIM.5.70.4).

The flaps of the air/oil cooler are automatic: closed with the oil below 71 °C and fully open above 81 °C.

During a start, the oil pressure starts to rise at about 40 % NH. A cold engine warms its oil at about 1 °C every 2 s during the start, and then about 1 °C per second once it is stabilised, until the oil reaches its normal temperature.

Oil pressure loss can be set as a failure on the EFB FAILURES page.

DSC.70.2.4 Ignition System

Ident.: DSC.70.2.4 — 05 NOV 2026
ALL

Each engine has two high energy ignition exciters, A and B, supplied by the DC ESS BUS, and two igniters (one per exciter). When ignition starts, the exciters spark at a high rate for 25 s, then at 1 spark per second.

Ignition is commanded in three ways:

MODE	ARMED WHEN	ENDS WHEN
Start	A start sequence is running and the CL is out of FUEL S.O.	NH reaches 45 %
Automatic relight (EEC)	The engine runs and NH drops below 60 %	NH goes above 65 %
Manual	MAN IGN pb ON	MAN IGN pb released

The automatic relight is inhibited when:

- NH is below 30 %, or
- the EEC is deselected or failed, or
- the CL is at FTR or FUEL S.O., or
- the engine is the failed engine of an ATPCS sequence.

When the EEC is lost, the crew can use the MAN IGN pb: both exciters of both engines are then energized continuously.

The EWD shows **IGN** under the ITT dial when ignition is commanded by the automatic relight logic or by the MAN IGN pb. It is not shown for the start ignition.

SIMULATOR NOTE

The selection of exciter A, B or A + B on the ENG START rotary selector has no effect: both exciters always fire together. Losing both ignition circuit breakers prevents a start.

cont'd... ►►►

cont'd... ►►►

DSC.70.2.5 Propeller

Ident.: DSC.70.2.5 — 05 NOV 2026
ALL

General

The power turbine drives the propeller through the RGB. The blade angle (β) is changed hydraulically, by engine oil, under the control of the PVM. The PVM is commanded by the PEC.

The propeller control uses the PL, the CL and the PWR MGT selector. It is protected against low blade angle in flight, overspeed and loss of pitch change oil pressure.

Propeller Valve Module (PVM)

The PVM, on the RGB, gives:

- the basic speed setting and the governing in flight,
- the blade angle schedule below FI (beta range) and reverse,
- feathering (normal, through the electro-hydraulic valve, and back-up, through the feather solenoid),
- the low pitch protection,
- with the overspeed governor, the overspeed protection.

The blade angle reference can range from −14° (full reverse) to 78.5° (feather). A transducer in the PVM measures the PLA.

PEC

The PEC is a dual channel computer. It controls the blade angle in closed loop and detects and isolates its own faults. If the active channel fails, the other channel takes over (SGL CH on the EWD). The PEC computes the propeller speed from the NP sensors and from altitude and airspeed data sent by the EEC.

The PEC also synchronises the phase of the two propellers.

PIU

One PIU per PEC, in the electronic rack, handles the propeller speed selection, the PEC fault logic and the propeller anti-icing interface.

Feathering

The propeller feathers when:

- the CL is set to FTR or FUEL S.O.,
- the ATPCS autofeather fires (see DSC.70.4.1),
- the ENG FIRE handle is pulled.

While the engine turns, the HP pump on the RGB supplies the pitch change oil, also when the propeller windmills. When the propeller is nearly stopped, only the electric feathering pump can move the blades. Each new feather command starts this pump. It runs for 30 s at most and then cannot run again for 10 min. In flight, the autofeather of one propeller is inhibited when the other propeller is already feathered. With no oil pressure at all, the counterweights slowly move the blades toward feather.

SIMULATOR NOTE

- Synchrophasing is not modelled as a separate function. Both propellers are governed to the same NP, so they sound in phase. A beat is heard only when the two NPs really differ.

cont'd... ►►►

cont'd... ►►►

DSC.70.2.6 Propeller Brake

Ident.: DSC.70.2.6 — 05 NOV 2026
ALL

ENG 2 has a propeller brake on a countershaft of its RGB. It stops the propeller and the power turbine, so that ENG 2 can run on the ground as an auxiliary power unit: this is **Hotel mode** (see DSC.70.3.4). The gas generator then drives the DC generator and supplies bleed air to both packs.

Engagement logic

The READY light comes on green when all of these conditions are met:

- aircraft on ground,
- gust lock engaged,
- ENG 2 CL at FTR or FUEL S.O.,
- blue hydraulic pressure above 2100 psi,
- ENG 2 FIRE handle not pulled.

The brake engages only if READY is on when the PROP BRAKE switch is set to ON. Losing one of the conditions afterwards does not release the brake. Setting the switch to OFF always releases it.

The brake stops the propeller and locks in about 6 s, and releases in about 3 s. Between the two end positions the red UNLK light is on. When fully locked, the blue PROP BRK light comes on and **PROP BRK** appears on the EWD.

If the gust lock is released while the brake is engaged, the PROP BRK red warning comes on (see DSC.70.8).

SIMULATOR NOTE

The overhead READY light does not stay on for 15 s after a braking or a releasing sequence: it follows the conditions above.

DSC.70.3 SYSTEMS OPERATING

DSC.70.3.1 General

Ident.: DSC.70.3.1 — 05 NOV 2026
ALL

The engine control parameter is the **torque**:

TQ = P / NP (engine power divided by propeller speed)

For the rating set on the PWR MGT selector, the EEC computes the maximum torque for the current flight conditions and shows it as the automatic torque bug on the EWD (see DSC.31.7).

The EEC moves a stepper motor in the HMU. The HMU meters the fuel and so sets NH, and therefore the power. The power demand comes from:

- the power lever angle (PLA),
- the PWR MGT selector position,
- the bleed valve positions,
- the flight conditions (outside air temperature, altitude, airspeed).

The PVM, commanded by the PEC, then sets the blade angle. The division of work is:

FUNCTION	CONTROLLED BY	FROM
Engine power, minimum NP on ground	EEC → HMU	PL, PWR MGT, bleeds
NH (fuel metering), NH overspeed	HMU	EEC, PL
Blade angle: governing, beta range, reverse	PEC → PVM	PL, PWR MGT
Maximum NP, feathering	PVM	CL
Engine shutdown (HP fuel shut-off)	HMU	CL, FIRE handle

DSC.70.3.2 Engine Governing

Ident.: DSC.70.3.2 — 05 NOV 2026
ALL

HMU laws

The HMU schedules NH as a function of PLA with two laws:

LAW	USED WHEN	FUNCTION
Top law	EEC ON	Upper limit only: protects against NH overspeed (105 % NH). The EEC works below it.
Base law	EEC OFF or failed	NH follows the PL directly. Minimum 73.5 % NH on the ground, 74 % NH in flight.

EEC (top law)

With the EEC ON, the PL sets a **power**, not an NH. At a fixed PLA the EEC keeps the power, and so the torque at a given NP, constant whatever the outside conditions. When the power at a given rating would exceed its limit, the EEC reduces it to hold the maximum torque allowed for that rating. This limit is mechanical (the torques in DSC.70.1.1) on a cold day and thermodynamic on a hot day or at altitude.

At low power the torque control gradually hands over to an NH schedule, which is fully in use at FI. The NH schedule is also used in Hotel mode.

The EEC also:

- keeps a minimum propeller speed on the ground at low power (fuel governing, see DSC.70.3.3),

cont'd... ►►►

cont'd... ►►►

- uptrims the remaining engine to RTO when the ATPCS detects an engine failure at take-off,
- schedules the handling bleed valve (HBV) for correct LP compressor operation,
- limits ITT: when ITT reaches the limit of the selected rating, the EEC trims NH down slightly until ITT is back within the limit.

PL positions

PL POSITION	POWER DELIVERED
NOTCH (PLA position 1)	Maximum rated power of the PWR MGT selection: TO 2475, MCT 2500, CLB 2192, CRZ 2132 SHP
RAMP (PLA position 2)	RTO / go-around power (2750 SHP, 100 % TQ, 100 % NP), whatever the PWR MGT position
Beyond the ramp, to the forward stop	Emergency only: up to 15 % more power than RTO (115 % TQ at 100 % NP)

Between FI and the notch the power follows the PL. In CLB and CRZ, the torque at the notch must match the TQ bug. With PWR MGT on TO and the ATPCS armed, the bug shows the RTO torque, and the engines run at the normal take-off torque below it.

SIMULATOR NOTE

Beyond the ramp the torque available rises linearly up to 115 % at the forward stop.

BOOST

The BOOST function raises the thermal limit of the engine in TO and MCT. The mechanical limits do not change, and CLB and CRZ are not affected. So BOOST gives more power only when the engine is thermally limited (hot day, high airfield).

SIMULATOR NOTE

The BOOST pb always latches, but the function is applied only on the ground or in flight after an engine failure. Once applied, it stays applied through the take-off until the pb is released. A press in normal flight lights the pb but gives no extra power.

EEC failure

When the EEC fails with the PL forward of 52°:

- the EEC FAULT light **flashes** amber,
- the fuel flow is frozen, so NH stays at its value at the failure (fail fix). The PL has no effect until it is retarded below 52°,
- do **not** deselect the EEC while FAULT flashes.

When the PL is brought back below 52° (or NH reaches the overspeed protection), the FAULT light becomes **steady**, the engine reverts to the HMU base law and the PL is effective again. NH then moves to the base law value for that PLA, so a step in power can be felt.

When the EEC fails with the PL already below 52°, or when the crew deselects the EEC, the engine goes straight to the base law.

In base law (reversion mode):

- the torque is no longer regulated: a change in outside conditions needs a PL adjustment,
- the fuel governing on the ground is lost,
- the torque indications are not affected.

cont'd... ►►►

cont'd... ►►►

DSC.70.3.3 Propeller Speed Governing

Ident.: DSC.70.3.3 05 NOV 2026
ALL

Blade angle governing

This is the normal mode in flight, with the EEC ON or OFF. The PEC adjusts the blade angle to keep NP at the selected value. The PL sets the power, and so the torque at that NP.

With the CL at AUTO, the propeller speed comes from the PWR MGT selector:

PWR MGT	NP
TO, MCT	100 %
CLB, CRZ	82 %

In approach, the last CLB / CRZ speed (82 %) is kept even when PWR MGT is set back to TO. NP goes to 100 % only when the PL is advanced past 62° (go-around), or 16 s after landing.

With the CL at 100 OVRD, NP is 100 % whatever the PWR MGT position.

Fuel governing

On the ground at low power and low speed, the blade angle is set by the PL (beta range) and cannot govern NP. The EEC then adds fuel to keep a minimum propeller speed of 70.8 % NP, with the CL at AUTO.

Fuel governing is cancelled when the EEC is OFF and when the propeller is feathered.

Transition mode

Between fuel governing and blade angle governing, on the ground or in flight at low power and low speed, NP varies between 70.8 % and the selected NP.

Beta range and reverse

Below FI the PL sets the blade angle directly:

- from FI down to GI the blades go to ground fine pitch,
- below GI (reverse sector) the blades go to negative angles for reverse thrust,
- the **LO PITCH** flag on the EWD shows that the blade angle is below 8°.

On the ground at GI the propeller produces only a small forward thrust: on a level surface, two engines at GI make the aircraft creep forward very slowly. The reverse thrust and the ground idle drag follow the propeller thrust data of the FCOM.

PEC failure

If one PEC channel fails, the other takes over: **SGL CH** on the EWD.

If both channels are lost (PEC FAULT), or the PEC pb is OFF, the blade angle is governed hydromechanically: NP is limited by the overspeed governor to 102 % when the power is sufficient.

SIMULATOR NOTE

The ground taxi thrust at GI is a design value, set so that two engines at GI creep forward at about 0.5 kt.

cont'd... ►►►

cont'd... ►►►

DSC.70.3.4 Hotel Mode

Ident.: DSC.70.3.4 — 05 NOV 2026
ALL

Hotel mode is available on ENG 2 only, on the ground. The gas generator runs with the propeller held by the propeller brake, to supply air conditioning and DC power without the propeller turning.

- The CL must be at FTR before the propeller brake is engaged, and must stay there. With the CL at FTR the EEC fuel governing is cancelled, so the PL controls NH (and the generator power) directly.
- The gust lock lever limits the PL travel, so the engine cannot be over-torqued with the propeller braked. Hotel mode cannot be selected without the gust lock.
- Hotel mode works with the EEC ON or OFF.

At idle in Hotel mode, NH is about 70 to 71 %. NP, NL and torque are zero.

The ITT limit is lower in Hotel mode: 715 °C, shown by the red point H on the ITT dial (see DSC.70.4.5).

For the engagement conditions of the brake, see DSC.70.2.6.

SIMULATOR NOTE

- ENG 2 can be started in Hotel mode (propeller braked). Blue hydraulic pressure is not needed to start, only to engage the brake.
- An engine started with its propeller tie-down in place (EFB GROUND page) runs like in Hotel mode. Advancing its PL beyond the Hotel mode limit fails the engine after 5 s.
- An engine started with its intake or exhaust cover in place gets no light-off: the start hangs.

DSC.70.3.5 Engine Start

Ident.: DSC.70.3.5 — 05 NOV 2026
ALL

The engine is started by its DC starter-generator. The start is controlled from the ENG START panel (see DSC.70.4.6) and the CL.

Conditions

A START pb press starts a sequence only when:

- the ENG START rotary selector is on START A, START B or START A & B,
- the DC ESS BUS is powered (battery or ground power),
- the START control and ignition circuit breakers are in,
- for ENG 2 with the PROP BRAKE switch ON: the gust lock is engaged. If it is not, the start is blocked and the START 2 FAULT light comes on.

Sequence, as simulated

STEP	NH	WHAT HAPPENS
START pb pressed	0 %	ON light on. The starter turns the HP spool at a steady rate. The ENGINE system page shows **START**.
Fuel opening	10 %	The crew moves the CL from FUEL S.O. to FTR. The fuel reaches the burners about 1 s later. Ignition is on.
Light-off	shortly after the fuel opening	ITT rises quickly: about 440 °C at 30 % NH, 630 °C at 40 % NH.
	50 to 65 %	ITT peaks at about 690 °C, then starts to decrease.
Starter cut-out	45 %	Starter and ignition stop. ON light off.

cont'd... ►►►

cont'd... ►►►

STEP	NH	WHAT HAPPENS
Acceleration	45 to 69 %	NH continues at the same rate up to a peak of about 69 %.
Idle	66 ± 2 %	NH settles at about 67 %. ITT drops toward idle.

The time from the START pb press to the 45 % NH cut-out depends on the oil temperature at the start:

OIL TEMPERATURE AT START	TIME TO 45 % NH
60 °C or above (warm engine)	about 16 s
20 °C or below (cold engine)	about 30 s
In between	interpolated

Hot engine

With a residual ITT above 100 °C, delay the fuel opening by 1 % NH for each 10 °C above 100 °C, but not beyond 20 % NH. If the fuel is opened earlier than that, the light-off ITT peak is higher by the residual temperature not covered by the delay.

Cross start

With the main battery supplying the start and the other engine running with its DC GEN on line, the start is a cross start. On the ground, from 10 % NH, the operating DC GEN assists the battery through the DC bus tie. If the operating DC GEN does not supply the start bus between 10 % and 45 % NH, the **X START FAIL** light comes on (overhead panel and ENGINE system page) and the ENG X START caution is triggered. With ground power connected, the ground power supplies the starter.

Aborted and failed starts

EVENT	RESULT
ENG START selector set to OFF & START ABORT before the 45 % cut-out	The start stops: starter and ignition off, the engine runs down.
CL left at FUEL S.O., no fuel at the engine (both fuel PUMP pbs OFF) or no ignition	No light-off. The starter alone cannot reach 45 % NH: NH stays near 40 %. ENG START ITT comes on 20 s after the CL was moved out of FUEL S.O.
Flame lost after the cut-out	Nothing drives the spool: the engine runs down.
Starter still engaged above 45 % NH	START FAULT light and ENG START caution.
NH still below 20 % 10 s after the START pb press	ENG START NO NH caution.

Observe the starter limits (see LIM.5.70.5) before a new start.

After the start

- The oil pressure starts to rise at about 40 % NH. The ENG OIL PRESS warning is inhibited until the oil pressure has had 30 s to build up (see DSC.70.8).
- When the CL leaves FTR for AUTO, the propeller unfeathers. **SGL CH** shows for about 3 s while the PEC tests itself. **LO PITCH** appears when NP passes 30 %.

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

SIMULATOR NOTE

- With the ENG START rotary selector on CRANK, the START pb dry cranks the engine: the starter turns it, the ignition stays off and no fuel is lit, even with the CL out of FUEL S.O. NH stays near 40 %. The crank goes on until the rotary selector is set to OFF & START ABORT; the spools then run down. An engine still running down after an aborted start can be cranked.
- The start ITT is compared with the start profile of LIM.5.70.3. A start beyond the profile sets a maintenance flag for that engine on the EFB (SYSTEMS, ENGINES). Engine performance is not affected.
- The starter sound stops when a start is aborted.

DSC.70.4 CONTROLS AND INDICATORS

DSC.70.4.1 ATPCS

Ident.: DSC.70.4.1 — 16 NOV 2026
ALL

General

The Automatic Take-off Power Control System (ATPCS) protects the take-off against an engine failure. If an engine fails, the ATPCS:

- **uptrims** the remaining engine from TO to RTO power (2750 SHP, 100 % TQ),
- **autofeathers** the propeller of the failed engine.

Because of the uptrim, the normal take-off is flown at about 10 % less power than the engine is certified for, which saves engine and propeller life with no loss in engine-out performance. Uptrim and autofeather together are only available for the take-off.

Components

On each engine:

- the **AFU** conditions the torque signal for the TQ pointer and sends it to the MFC,
- the **MFC** contains the arming, uptrim and autofeather logic. It commands the feather solenoid and the feathering pump of the failed engine, and the uptrim of the opposite EEC,
- the **EEC** raises the power from TO to RTO on the uptrim signal,
- the **feather solenoid** on the PVM and the **feathering electric pump** on the RGB feather the propeller.

In the cockpit: the ATPCS pb, a switch in each PL quadrant at 49°, and the ATPCS test selector on the pedestal.

Arming

CONDITION	ON GROUND	IN FLIGHT
PWR MGT selector	TO	TO
ATPCS pb	ON	ON
Both PL	above 49°	above 49°
Both TQ	above 46 %	above 46 %
Functions armed	**Uptrim and autofeather**	**Autofeather only**

The ARM light on the ENG panel comes on green when the system is armed.

Uptrim armed on the ground stays available through the take-off, after lift-off, until the PWR MGT selector leaves TO. In flight (for example at a go-around with PWR MGT on TO), only autofeather can be armed.

Trigger and sequence

The trigger is **one torque below 18 %**.

TIME	ARMED ON GROUND	ARMED IN FLIGHT
Trigger	Uptrim of the remaining engine. Its bleed valve closes. **UP TRIM** on the EWD.	—
Trigger + 2.15 s	Autofeather of the failed engine: feather solenoid and feathering pump. ARM light off. **AUTO FTR** on the EWD.	Autofeather of the failed engine. ARM light off.

cont'd... ►►►

cont'd... ►►►

During the first 2.15 s nothing happens on the failed engine. This allows an accelerate-stop with reverse on both engines: retarding a PL below 49° within the 2.15 s cancels the sequence before the autofeather.

Once the autofeather has fired, the autofeather of the other engine is inhibited.

After the trigger, the sequence is cancelled only by:

- the PWR MGT selector out of TO, or
- the ATPCS pb set to OFF, or
- both PLs retarded below 49°.

Disarming

Before a trigger, the ATPCS disarms (ARM light off) when:

- the PWR MGT selector leaves TO, or
- the ATPCS pb is set to OFF, or
- at least one PL is retarded below 49°, or
- both torques are below 46 %.

In a normal flight, the ATPCS disarms after take-off when PWR MGT is moved from TO to MCT or CLB.

ATPCS test

The ENG TEST panel on the pedestal (cover removed) has a five-position selector, spring-loaded to neutral: ENG 1, ARM, neutral, ARM, ENG 2. The test injects a torque signal into the AFU, and the real ATPCS logic then runs.

Each engine has two torque probes: one feeds the AFU, which drives the TQ needle (analog pointer); the other feeds the EEC, which drives the digital TQ counter. The test signal therefore moves the TQ needle only; the digital counter keeps the measured torque.

POSITION	EFFECT
ARM	Both AFU torque signals are raised above the arming value: the ATPCS arms and the ARM light comes on.
ENG 1 (2)	The tested engine's torque signal drops to 0. After about 2.4 s the uptrim of the other engine triggers, then 2.15 s later the tested engine autofeathers and the ARM light goes off.

The test is **dynamic** with both engines running and the propeller brake released (the engines react: NP and NH change slightly, the propeller actually feathers), and **static** otherwise, including in Hotel mode. Releasing the selector to neutral ends the test.

SIMULATOR NOTE

- The static test follows the test card of the earlier aircraft serials: at the end of the static test, the tested engine autofeathers (**AUTO FTR**, ENG OUT on the EWD).
- The size of the NP and NH changes in the dynamic test and the 2.4 s signal delay are design values.
- ATPCS failures (torque signal loss, channel fault) can be set on the EFB FAILURES page.
- By default the 3D selector clicks from position to position and stays there. With SETTINGS, REALISM, ATPCS TEST SELECTOR = HOLD it is spring-loaded as on the aircraft: hold one side for ARM, keep holding about 1 s for ENG 1 (2), release to return to neutral (see SIM.5.7).

DSC.70.4.2 Power Levers

Ident.: DSC.70.4.2 — 05 NOV 2026
ALL

The PLs are linked to the HMU and the PVM. They control the power from the maximum rated torque down to the maximum reverse.

cont'd... ►►►

cont'd... ►►►

CAUTION

After an engine failure, the PL of that engine still controls the blade angle, and so the propeller drag, as long as the propeller is not feathered.

The PL travel, in PLA degrees, is:

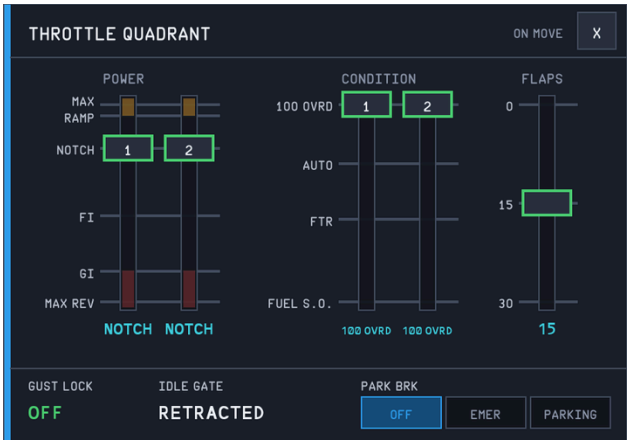
PLA	POSITION	REMARKS
0°	MAX REVERSE	Rear stop
0° to 13°	Reverse sector	Spring-loaded: the PL must be held against a force and returns to GI when released
13°	GI (ground idle)	Reached by lifting the triggers past the FI gate
13° to 31°	Beta range	Blade angle set by the PL (ground fine pitch)
31°	FI (flight idle)	Idle gate stop in flight; gust lock stop on the ground
49°	ATPCS PL switch	Above 49°: one of the ATPCS arming conditions
52°	EEC reversion	Below 52°: the fail fix ends after an EEC failure
62°	100 % NP switch	With PWR MGT on TO, above 62° the propeller goes to 100 % NP (go-around in approach)
65° to 67°	NOTCH	Maximum rated power of the PWR MGT selection
74.5°	RAMP	RTO / go-around power
85°	Forward stop	Beyond the ramp: emergency power

For take-off, both PLs are pushed from GI to the notch. At landing, the PLs are retarded to FI; once the idle gate has retracted on touchdown, the triggers are lifted to bring the PLs to GI and, if necessary, into reverse.

With the gust lock engaged on the ground, the PL cannot be pushed beyond FI.

SIMULATOR NOTE

The PLs move with an X-Plane throttle axis, with the mouse, or with the commands of the throttle quadrant. The reverse sector, the triggers and the detents are described in the SIM part, and the THROTTLE QUADRANT window shows the lever positions.



THROTTLE QUADRANT window

cont'd... ►►►

cont'd... ►►►

DSC.70.4.3 Idle Gate

Ident.: DSC.70.4.3 — 16 NOV 2026
ALL

At take-off, when all landing gear shock absorbers are extended, a gate stops the PLs at FI. At landing, as soon as one shock absorber is compressed, the gate retracts and the PLs can go to GI and reverse.

(1) IDLE GATE FAIL light

AMBER — The gate has not engaged in flight or has not retracted on landing (state disagrees with the automatic demand for more than 2 s). The IDLE GATE caution comes on.

(2) IDLE GATE lever

Manual override when the automatic logic fails.

PUSH — In flight: engages the gate.

PULL — On the ground: retracts the gate. An amber band shows.

SIMULATOR NOTE

The 2 s delay before IDLE GATE FAIL is a design value. The automatic logic failure can be set on the EFB FAILURES page.

The lever has three positions: pushed, ground and pulled. The automatic logic moves it between pushed (in flight) and ground (on the ground). PULL takes it to the pulled position from either. The lever stays pulled through touchdown and goes back to the ground position when the PLs are brought out of reverse to just above GI.

DSC.70.4.4 Condition Levers

Ident.: DSC.70.4.4 — 05 NOV 2026
ALL

The CLs control the feathering, the HP fuel shut-off and the propeller speed.

CL POSITION	ANGLE	FUNCTION
FUEL S.O.	0°	HP fuel shut off: the engine stops. The propeller stays feathered.
FTR	25°42'	Propeller feathered
AUTO	42°	NP selected by the PWR MGT selector (100 % in TO / MCT, 82 % in CLB / CRZ)
100 OVRD	55° to 60°	NP 100 %

A trigger on the side of the lever must be lifted to move the CL:

- from AUTO to FTR, and back,
- from FTR to FUEL S.O., and back.

A red light in the CL knob comes on when a fire is detected on that engine, unless the CL is at FUEL S.O.

Between FTR and AUTO the NP governing is cancelled: this is a transit area only.

cont'd... ►►►

cont'd... ►►►

DSC.70.4.5 Indicators

Ident.: DSC.70.4.5 — 05 NOV 2026
ALL

Primary engine indications (EWD)

The EWD shows TQ, NP and ITT for each engine, with the PWR MGT rating and the engine messages. These are described in DSC.31.7. Notes for the power plant:

ITEM	INDICATION
TQ pointer	White while NP is 25 % or less. Above that: green from 0 to the TQ bug, amber from the bug to 120 %, red above 120 % (the pointer stops at 120 %). The pointer comes from the AFU, the digital readout from the EEC.
TQ bug	Maximum torque of the selected rating. The amber triangle, shown when NP is above 25 %, marks the reserve take-off torque (10 % above the take-off objective); it is magenta when go-around is selected. The cyan circle and number are the take-off torque objective. They show with PWR MGT on TO once the take-off data are confirmed, engines running or not, and go 2 s after touchdown with the power levers at GI.
UP TRIM	Green reverse video: uptrim active on this engine.
AUTO FTR	Green reverse video: autofeather active on this engine.
LO PITCH	Green reverse video: blade angle below 8° on the ground (normal). Amber reverse video: low pitch in an abnormal case (in flight).
NO REV	Red reverse video, in place of LO PITCH: the blade angle stays at 8° or more with the PL below 27° (1 s confirmation; inhibited for 30 s after unfeathering).
SGL CH	Amber: one PEC channel lost, or PEC self-test when the propeller unfeathers at start.
PROP BRK	Cyan: propeller brake engaged on ENG 2.
IGN	Cyan: ignition commanded by the auto relight logic or the MAN IGN pb.

ITT sectors

SECTOR	LIMIT
Green	From 0 °C to the amber sector
Amber	Up to 800 °C (MCT, CLB, CRZ, RTO); up to the take-off limit, 740 to 765 °C with OAT, in TO; up to 715 °C in Hotel mode
Red point H	715 °C, Hotel mode limit
Red	From 840 °C, or from 715 °C in Hotel mode
Red line S	950 °C, limit during the start

The limits themselves are in LIM.5.70.

SIMULATOR NOTE

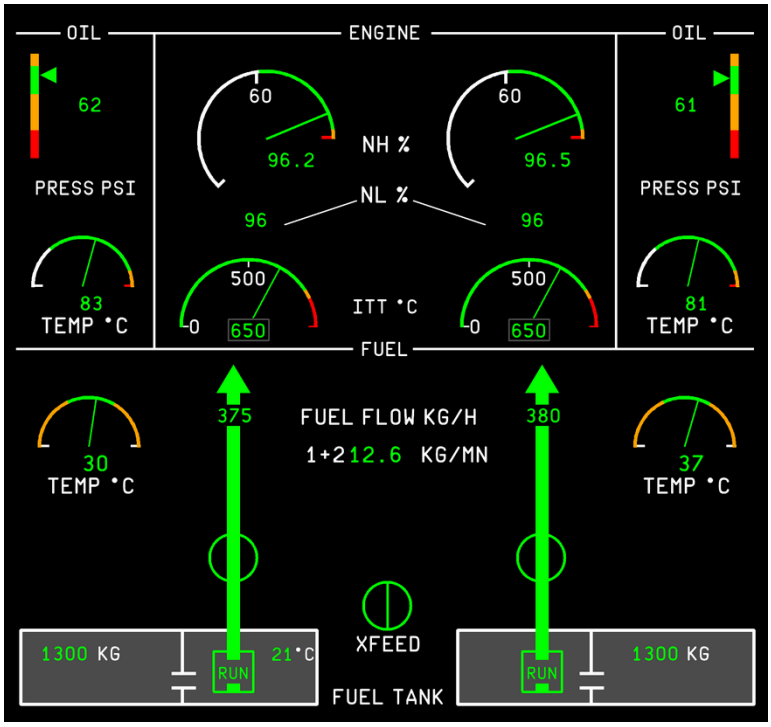
- The Hotel mode marks (red point H, 715 °C sectors) appear only once ENG 2 is running with the propeller braked, not during its start.
- The red line S is shown only during the start.

cont'd... ►►►

cont'd... ►►►

Secondary engine indications (ENGINE system page)

The ENGINE system page on the MFD (SYS pb, see DSC.31.6) gives the secondary engine parameters and the fuel feed. Both MFDs show it automatically when the ENG START rotary selector leaves OFF & START ABORT.



ENGINE system page

AREA	CONTENT
OIL (each side)	Oil pressure (psi) and oil temperature (°C), pointer and readout. Red **LO PR** box when the oil pressure is low.
ENGINE (centre)	NH % dial and readout, NL % readout, ITT °C readout (with a small dial).
START label	**START** (green reverse video) during a start, until the starter cut-out. Amber reverse video when a start fault is detected (start hung for more than 40 s).
X START FAIL	Amber, between the START labels: the cross start has failed with the opposite DC GEN on line.
NAC OVHT	Red, on the right side: ENG 2 nacelle overheat on the ground.
FUEL	Fuel flow per engine (kg/h), total fuel flow (kg/min), fuel temperature, **CLOG**, tanks, pumps, LP valves and crossfeed.

DSC.70.4.6 Control Panels

Ident.: DSC.70.4.6 — 05 NOV 2026
ALL

ENG panel (center panel)

① EEC 1 (2) pb

ON (pb pressed in) The EEC controls the engine power through the HMU stepper motor.

cont'd... ►►►

cont'd... ►►►

OFF	(pb released) The HMU controls NH from the PL only (base law). The OFF light comes on white.
FAULT flashing	EEC failure with the fuel flow frozen (fail fix). **Do not deselect the EEC.** Retard the PL below 52° first: FAULT then becomes steady.
FAULT steady	EEC failure, the engine is on the HMU base law.

(2) ATPCS pb

ON	(pb pressed in) On the ground, uptrim and autofeather can be armed. In flight, only autofeather can be armed.
OFF	(pb released) Uptrim and autofeather are deselected. The OFF light comes on white.
ARM	Green when the arming conditions are met (see DSC.70.4.1).

ENG START panel (overhead panel)

(1) ENG START rotary selector

OFF & START ABORT	Ignition off. The start sequence is disarmed, or stopped if one is running.
CRANK	Dry cranking, without ignition.
START A / START B / START A & B	Start sequence selected. Ignition comes on when the CL opens the HP fuel valve. Starter and ignition stop at 45 % NH.

(2) START 1 (2) pb

ON	(momentary press) Starts the start sequence of that engine if the rotary selector is on a START position, or the cranking sequence if it is on CRANK. The ON light comes on and goes off automatically at 45 % NH.
FAULT	Amber, with the ENG START caution, when: - the starter stays engaged above 45 % NH, or - on ENG 2, the PROP BRAKE switch is ON and the gust lock is not engaged. The light goes off when the rotary selector is set to OFF & START ABORT.

(3) MAN IGN pb (guarded)

ON	Both exciters of both engines are energized continuously. The ON light comes on blue.

For use after an EEC loss in conditions where a flame-out is possible: icing, heavy rain, severe turbulence, emergency descent, after a flame-out.

SIMULATOR NOTE

- On CRANK, the crank goes on until the rotary selector is set to OFF & START ABORT. Observe the starter limits of LIM.5.70.5: 60 s of continuous running at most.
- START A, START B and START A & B work the same: both exciters fire.
- The START pb lights are supplied by the DC ESS BUS and go dark when their circuit breakers are out.

PROP BRAKE panel (overhead panel)

(1) PROP BRAKE switch

ON	Engages the ENG 2 propeller brake, if READY is on (see DSC.70.2.6).

cont'd... ►►►

cont'd... ►►►

OFF — Releases the brake.

(2) READY light

GREEN — The engagement conditions are met.

(3) PROP BRK light

BLUE — The propeller brake is fully locked.

UNLK light

RED — The brake is neither fully locked nor fully released. If this lasts more than 15 s, the PROP BRK warning comes on.

PWR MGT panel (pedestal)

(1) PWR MGT selector

TO / MCT / CLB / CRZ — Selects the rating for both engines (maximum torque, and NP with the CL at AUTO). The selection is shown in cyan under each TQ dial.

(2) PEC 1 (2) FAULT pb

FAULT — Amber, with the ENG 1 (2) PEC caution: both PEC channels are lost.

OFF — (pb released) The PEC is deactivated. NP is governed hydromechanically, up to 102 % when the power is sufficient.

(3) BOOST pb

ON — (pressed in) BOOST function selected (see DSC.70.3.2).

FAULT — Amber, with the ENG BOOST caution: the rating feedback from an EEC does not agree with the pb position.

X START FAIL light (main electrical panel)

AMBER — The cross start has failed although the opposite DC GEN is on line (see DSC.70.3.5).

DSC.70.8 SYSTEM MONITORING

DSC.70.8.1 Warnings

Ident.: DSC.70.8.1 — 05 NOV 2026
ALL

Red warnings come with the flashing MASTER WARNING light and the continuous repetitive chime (CRC). The procedures are in the PRO part and on the EWD.

EWD MESSAGE	CAUSE, AS SIMULATED	OTHER INDICATIONS
ENG 1 (2) FIRE	Fire detected on the engine (on ground, at take-off or in flight)	FIRE 1 (2) flashing on the EWD, red light in the FIRE handle and in the CL
ENG 1 (2) OUT	An engine that had reached 60 % NH with its CL forward of FUEL S.O. drops below 60 % NH (flame-out, severe damage, fuel starvation). Cleared by the CL at FUEL S.O.	
ENG 1+2 OUT	Both engines failed, in flight	
ENG 1 (2) OIL PRESS	Oil pressure below 40 psi with the CL out of FUEL S.O. On a running, stabilised engine: at once. Otherwise (start, shutdown) only if the low pressure lasts 30 s.	Red LO PR box on the ENGINE page
PROP BRK	Propeller brake engaged with the gust lock released, or PROP BRAKE switch ON (OFF) and the brake not fully locked (released) after 15 s	UNLK red light on the overhead panel
NAC OVHT	ENG 2 nacelle overheat detected on the ground	NAC OVHT on the ENGINE page

DSC.70.8.2 Cautions

Ident.: DSC.70.8.2 — 05 NOV 2026
ALL

Amber cautions come with the flashing MASTER CAUTION light and a single chime (SC).

EWD MESSAGE	CAUSE, AS SIMULATED	OTHER INDICATIONS
ENG START	Starter still engaged above 45 % NH, or ENG 2 start attempted with PROP BRAKE ON and the gust lock not engaged	START FAULT light
ENG START ITT	During the start, ITT above 950 °C, above 840 °C for more than 5 s, or above 800 °C for more than 20 s; or no light-off 20 s after the CL was moved out of FUEL S.O.	
ENG START NO NH	NH still below 20 % 10 s after the START pb press	
ENG X START	On the ground, the operating DC GEN does not supply the start bus between 10 % and 45 % NH of the second engine	X START FAIL lights
ENG EEC	Failure of one EEC	EEC FAULT light (flashing or steady)
ENG EEC 1+2	Failure of both EECs	Both EEC FAULT lights
ENG 1 (2) OVER LIM	TQ above 120 %, NH above 106.4 %, NL above 106.78 %, or ITT above the limit of the rating: at once above the red sector, after 20 s otherwise. Not during the start.	Parameter in the red sector

cont'd... ►►►

cont'd... ►►►

EWD MESSAGE	CAUSE, AS SIMULATED	OTHER INDICATIONS
ENG 1 (2) PROP LIM	NP above 106 %	
ENG PROP NP	NP at 97 % or more while 82 % is expected (PEC or PIU failure)	
ENG 1 (2) PEC SG CH	One PEC channel lost	SGL CH on the EWD
ENG 1 (2) PEC	Both PEC channels lost	PEC FAULT light
ENG 1 (2) LO PITCH	Blade angle below 8° in flight	Amber LO PITCH on the EWD
ENG 1 (2) OIL TEMP L	Oil below 45 °C with the engine running and the PL above 30°, or oil below 0 °C on the ground	
ENG 1 (2) OIL TEMP H	Oil temperature above 125 °C	
ENG 1 (2) OIL OVHT	Oil temperature above 140 °C	
ENG FUEL CLOG	HP pump filter clogging on one engine (both engines: higher priority caution)	CLOG on the ENGINE page
SINGLE ENGINE	In flight, only one engine running, whatever stopped the other (failure or crew shutdown)	
ENG BOOST	Rating feedback from an EEC disagrees with the BOOST pb	BOOST FAULT light
IDLE GATE	Idle gate not in the position the automatic logic demands for more than 2 s	IDLE GATE FAIL light

SIMULATOR NOTE

- ENG 1 (2) OUT is computed from NH, so it also comes on for a stop the engine model does not call a failure, such as a fuel starvation or a FIRE handle pulled with the CL forward.
- Most of these conditions can be created from the EFB FAILURES page (engine, ATPCS, PEC, EEC, oil, fuel and idle gate failures).

DSC.70.8.3 Electrical Supply

Ident.: DSC.70.8.3 — 05 NOV 2026
ALL

The main power plant consumers and their circuit breakers, as simulated:

FUNCTION	C/B	EFFECT OF LOSS
ENG 1 START CTL & IND	A27	ENG 1 cannot be started, START 1 lights dark
ENG 2 START CTL & IND	A24	ENG 2 cannot be started, START 2 lights dark
IGN SPARK PLUG A / B	A26 / A25	Both lost: no start possible
PROP BRK PWR SUPPLY CTL & IND	N14 / N15	PROP BRK, UNLK and READY lights dark
Feathering pumps	AE8 / AF8 (hot main battery bus)	No electric feathering with the propeller stopped

For the bus supplying each circuit breaker, see the electrical system description (DSC.24).

FMS.00 QUICK ACCESS

FMS.00.1 Foreword

Ident.: FMS.00.1 — 28 OCT 2026
ALL

This chapter gives the FMS tasks of a normal flight in the order the crew does them, from the final cockpit preparation to the approach. It is a short procedure: the pages used are described in FMS.01 and FMS.02.1 to FMS.02.5.

The example is a flight from Portland (KPDX) to Redmond (KRDM):

ITEM	VALUE
Flight ID	DWS001
Departure	KPDX runway 28R, SID WHAMY5
En route	WHAMY, then CUPRI (added by the crew)
Arrival	KRDM, approach ILS23 (ILS runway 23)
Cruise altitude	13 000 ft
Alternate	KPDX at FL140

The recommended order of entries is **WEIGHT** → **PERF INIT** → **FPLN INIT**, then the departure and arrival procedures, then the revisions.

Note

FMS predictions are only as good as the entries. Enter the weights and the cruise altitude before the flight plan, so the predictions are right as soon as the plan is executed.

SIMULATOR NOTE

The MCDU keys can be clicked in the 3D cockpit, or typed on the computer keyboard: click the MCDU scratchpad to give it the keyboard, then type. BACKSPACE is a short CLR press, DELETE clears the whole scratchpad, ESC gives the keyboard back to X-Plane.

FMS.00.2 FMS Pre-Initialization

Ident.: FMS.00.2 — 28 OCT 2026
ALL

The MCDU shows the FMS power-up page when the FMS has finished its self-test after electrical power-up. If the MCDU MENU is shown instead, select the FMS.

► MENU key ..... PRESS
► <FMS 1 (MCDU 1) or <FMS 2 (MCDU 2) ..... SELECT

The FMS power-up page (THALES AVIONICS FMS 220) is displayed.

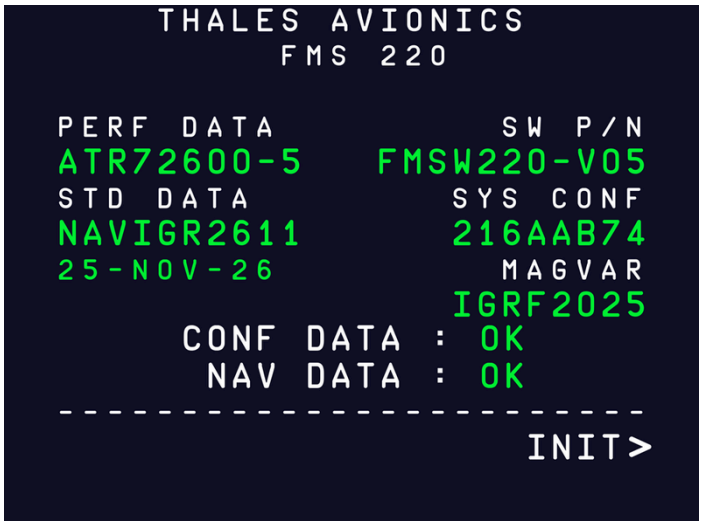
► PERF DATA ..... CHECK ATR72600
► STD DATA ..... CHECK cycle and expiry date

The expiry date is green when the database is current and amber when it has expired.

► CONF DATA / NAV DATA ..... CHECK OK
► INIT> (6R) ..... PRESS

cont'd... ►►►

cont'd... ►►►



FMS power-up page — check the data, then INIT>

FMS.00.3 FMS Initialization

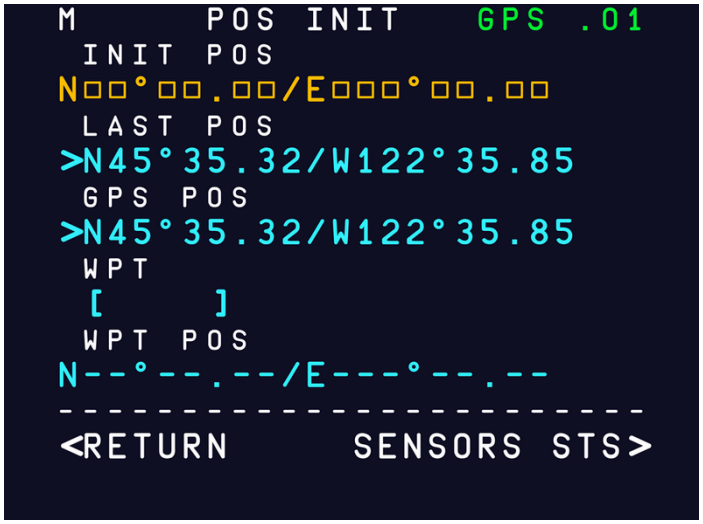
Ident.: FMS.00.3 — 28 OCT 2026
ALL

The INIT page is the hub of the initialization. DATE and UTC come from the GPS (green) and need no entry.

► INIT page ..... CHECK DATE / UTC
► <POS INIT (4L) ..... PRESS
► GPS POS ..... CHECK valid

No entry is needed. The FMS positions itself continuously from the GPS and the radio navaids. A manual position initialization overrides the automatic positioning and is only needed when the INI alert asks for it.

► SENSORS STS> (6R) ..... CHECK GPS1 mode NAV
► <RETURN ..... PRESS twice, back to INIT



POS INIT page — GPS position available

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

cont'd... ►►►

FMS.00.4 Performance Initialization

Ident.: FMS.00.4 — 28 OCT 2026
ALL

WEIGHT page

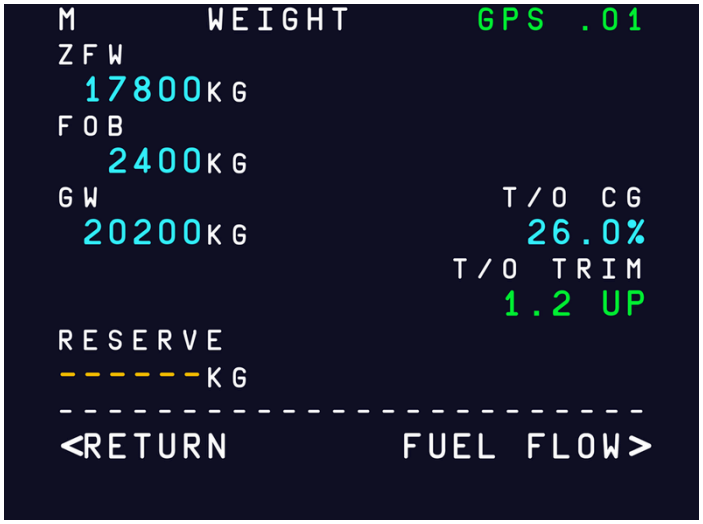
► WEIGHT> (4R) ..... PRESS
► ZFW (1L) ..... ENTER
► FOB (2L) ..... ENTER (or CHECK the value sent by the EFB)

GW is computed (ZFW + FOB).

► T/O CG (3R) ..... ENTER

T/O TRIM is computed from the T/O CG.

► RESERVE (5L) ..... ENTER as required
► <RETURN ..... PRESS



WEIGHT page completed

SIMULATOR NOTE

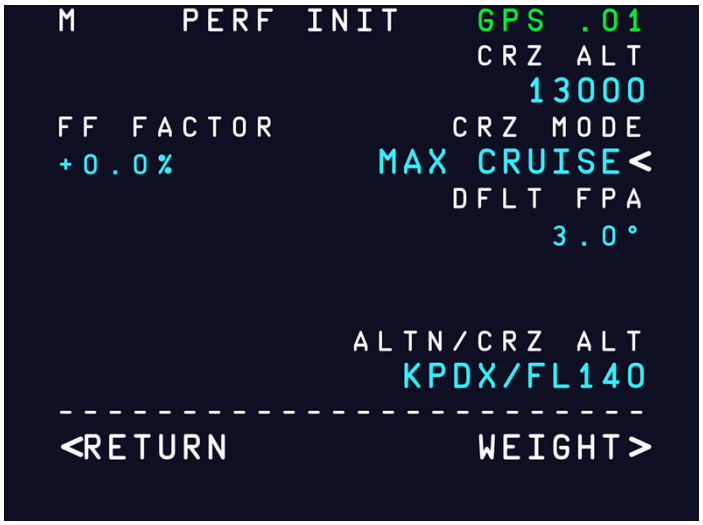
With EFB **SETTINGS ▸ REALISM ▸ LOADSHEET TO FMS** set to AUTO (default), the EFB WEIGHT & BALANCE page (SET FUEL & WEIGHT, or a SimBrief load) sends ZFW and FOB to the WEIGHT page. The same push clears T/O CG and T/O TRIM, because the previous CG is no longer valid: enter the new T/O CG from the EFB loadsheet. RESERVE is never sent by the EFB. With MANUAL, nothing is sent and the crew enters every value.

PERF INIT page

► PERF INIT> (5R) ..... PRESS
► CRZ ALT (1R) ..... ENTER 13000
► ALTN/CRZ ALT (5R) ..... ENTER KPDX/FL140
► FF FACTOR, CRZ MODE, DFLT FPA ..... CHECK
► <RETURN ..... PRESS

cont'd... ►►►

cont'd... ►►►



PERF INIT page completed

FMS.00.5 FPLN Initialization

Ident.: FMS.00.5 — 28 OCT 2026
ALL

► <FPLN INIT (6L) ..... PRESS
► <ROUTE (1L) ..... PRESS
► FLT ID (1R) ..... ENTER DWS001
► FROM/TO (2L) ..... ENTER KPDX/KRDM

The route found for this city pair is shown in yellow, with FPLN< in reverse video at 6R. The EXEC light comes on.

► EXEC key ..... PRESS

The active FPLN page is displayed: KPDX, a FPLN DISCONTINUITY and KRDM (magenta: the TO waypoint).



ROUTE SEL — FLT ID and FROM/TO entered, the direct route in yellow

cont'd... ►►►

cont'd... ►►►

FMS.00.6 Departure and Arrival Procedures

Ident.: FMS.00.6 — 28 OCT 2026
ALL

Departure

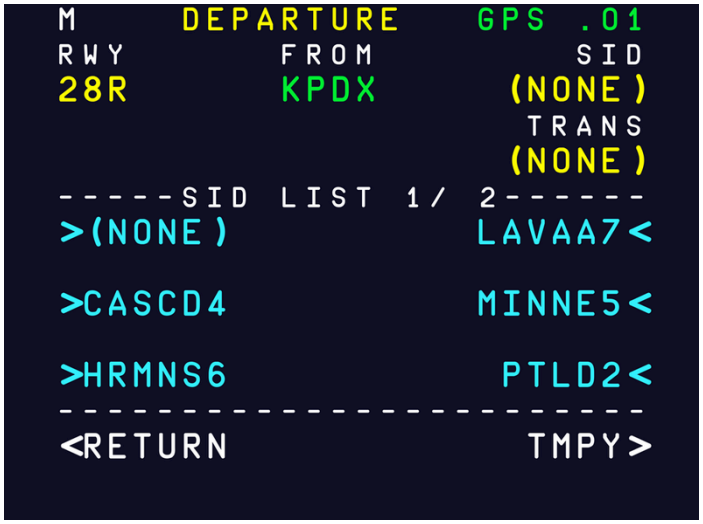
► Left LSK beside KPDX ..... PRESS

The DEPARTURE page is displayed with the runway list.

► RWY ..... SELECT 28R
► SID ..... SELECT WHAMY5
► TRANS ..... SELECT if required
► TMPY> (6R) ..... PRESS

The temporary flight plan (TMPY, yellow) is displayed. Check it with NEXT / PREV.

► EXEC key ..... PRESS



DEPARTURE page — SID list after the runway pick

Arrival

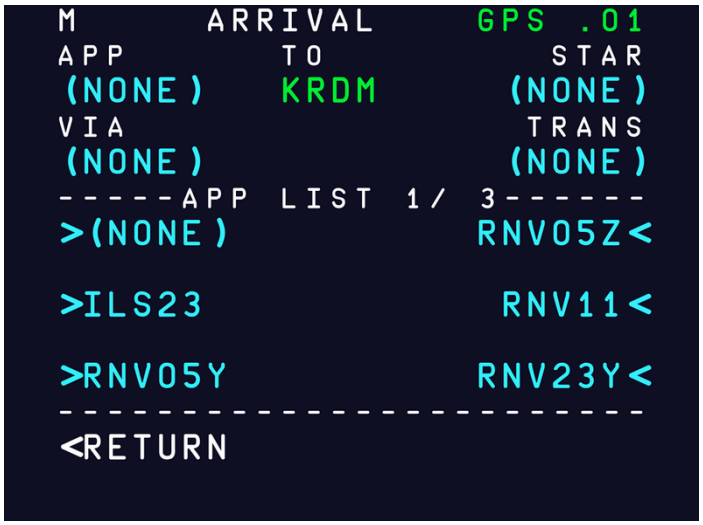
► NEXT key ..... PRESS until KRDM is shown
► Left LSK beside KRDM ..... PRESS

The ARRIVAL page is displayed with the approach list.

► APP ..... SELECT ILS23
► STAR / VIA / TRANS ..... SELECT as required
► TMPY> (6R) ..... PRESS, check the TMPY
► EXEC key ..... PRESS

cont'd... ►►►

cont'd... ►►►



ARRIVAL page — approach list

FMS.00.7 FPLN Revision at Departure

Ident.: FMS.00.7 — 28 OCT 2026
ALL

Adding a waypoint (CUPRI after WHAMY)

► Left LSK beside WHAMY ..... PRESS

The LTRL REV page of WHAMY is displayed.

► Scratchpad ..... TYPE CUPRI
► NEXT WPT (2R) ..... PRESS

More than one CUPRI exists: the DATA LIST page shows each with its position and ICAO region.

► CUPRI (K1, N44/W121) ..... SELECT
► EXEC key ..... PRESS
► <RETURN ..... PRESS



LTRL REV at WHAMY — CUPRI typed, ready for NEXT WPT (2R)

cont'd... ►►►

cont'd... ►►►

Clearing a discontinuity

► CLR key ..... PRESS (scratchpad shows CLEAR ?)
► Left LSK beside ---FPLN DISCONTINUITY--- ..... PRESS

The TMPY is created.

► EXEC key ..... PRESS
► FPLN pages ..... CHECK no discontinuity left, with NEXT / PREV

Checking the route on the ND

► ND ..... SELECT PLAN mode
► NEXT / PREV keys ..... PRESS on the FPLN page

The ND PLAN display centres on each waypoint in turn, north up.

FMS.00.8 Before Propeller Rotation

Ident.: FMS.00.8 — 28 OCT 2026
ALL

► PERF key ..... PRESS

On the ground the TAKE OFF page is displayed first.

► DEPT RWY / RWY LNG/AXIS ..... CHECK
► V1, VR, V2 ..... CHECK

These are speeds for a non-limiting runway, computed from the weight. Enter the speeds of the take-off performance computation when they differ.

► PERF key ..... PRESS twice
► APPROACH page ..... ENTER destination QNH (4L) when known
► PROG key ..... PRESS, check DEST ETA / EFOB on PROG 1/3
► VNAV key ..... PRESS, check CRZ ALT on VNAV 1/2

CAUTION

Do not press >ACTIVATE on the APPROACH page on the ground: it is refused (NOT ALLOWED). The approach speed phase activates automatically in flight.

FMS.00.9 In Flight

Ident.: FMS.00.9 — 28 OCT 2026
ALL

► FPLN / PROG pages ..... MONITOR

The active leg and the TO waypoint are magenta. The last waypoint passed (FROM) is the top line of FPLN page 1.

► DTO key ..... AS REQUIRED for a direct

See FMS.02.2.12.

■ Descent preparation

► APPROACH page ..... CHECK DEST RWY, QNH, VAPP, FLAPS LDG
► VNAV 2/2 ..... CHECK destination QNH, TRANS ALT
► TEMP COMP ..... SET ON when the destination is cold (ISA alert)
► VNAV 1/2 ..... MONITOR TOD, TGT VS, VDEV

PAGE

INTENTIONALLY

LEFT BLANK

FMS.01 GENERAL DESCRIPTION

FMS.01.1 Overview

Ident.: FMS.01.1 — 02 NOV 2026
ALL

The aircraft has two Thales FMS220 flight management systems. The FMS:

- computes the aircraft position from the GPS and the radio navaids (multi-sensor),
- manages the flight plans (active, temporary and secondary),
- gives lateral and vertical navigation data, and guidance to the AFCS through LNAV and VNAV,
- tunes the VOR / ILS and DME automatically,
- computes performance and predictions (speeds, fuel, time, top of climb and descent).

The crew talks to the FMS through the two MCDUs. FMS data are also shown on the ND, the PFD and the EWD.

Dual FMS

FMS 1 is normally selected on MCDU 1 and FMS 2 on MCDU 2. In normal operation the two FMS work together (dual mode): an entry made on one side is sent to the other through the cross talk. PROG 3/3 shows the position difference between the two FMS. If one FMS is lost, the other continues alone and the CTK alert is shown.

Navigation database

SIMULATOR NOTE

The standard database is built from the X-Plane navigation data. When Navigraph data is installed in `Custom Data`, it is used first and the default X-Plane data fills the gaps. The cycle and expiry date are shown on the power-up page and on NAV DATA. Pilot data (waypoints, navaids, airports, routes) and company routes are stored with the aircraft and kept between sessions when saved (DATA MENU SAVE<).

Flight plans

PLAN	USE	COLOUR ON MCDU
FPLN	Active flight plan, used for navigation and guidance	Active leg and TO waypoint **magenta**, other legs **green**, missed approach not yet active **cyan**
TMPY	Temporary copy of FPLN, created by any revision. EXEC makes it the FPLN	**yellow** (active leg stays magenta)
SEC	Secondary flight plan, not flown. Can be activated or swapped with FPLN	**white**

Any FPLN revision is made through the TMPY. The crew checks it, then presses EXEC (or >CLR TMPY to discard it). During one minute after an EXEC, >UNDO on the FPLN page restores the previous plan. The SEC has no temporary plan: SEC revisions apply directly.

The FPLN is reset automatically a few seconds after landing (end of flight cycle).

cont'd... ►►►

cont'd... ►►►

FMS.01.2 MCDU

Ident.: FMS.01.2 — 05 NOV 2026
ALL



MCDU — MCDU MENU page and keyboard

(1) Screen

The screen has 14 lines of 24 characters:

- **Title line**: heading reference (M magnetic, T true) on the left, page title and page number (n/m) in the centre, navigation mode and EPE on the right (for example `GPS .01`). When an FMS alert is pending, its three-letter code is shown in amber reverse video beside the M/T letter.
- **Six pairs of lines**: a small label line and a large data line. Each data line is beside one left and one right line select key.
- **Scratchpad** (bottom line): entries typed on the keyboard, and messages.

(2) Line select keys (LSK)

Six keys on each side, named 1L to 6L and 1R to 6R from top to bottom. An LSK:

- inserts the scratchpad content into the field beside it,
- performs the action of a prompt,
- on a flight plan page, opens the revision page of the waypoint beside it.

Prompt symbols:

cont'd... ►►►

cont'd... ►►►

<XXX or XXX> (arrow pointing outwards) Displays another page.

>XXX or XXX< (arrow pointing inwards) Performs the action or changes a selection.

(3) FMS page keys

FPLN	Flight plan pages. A second press (when FPLN is shown) displays the SEC FPLN, a third press returns to FPLN.
DTO	DIRECT TO list. A second press displays DTO ABEAM.
PERF	The PERF page of the flight phase (TAKE OFF on ground, CRUISE in climb and cruise, APPROACH in descent and go-around). Each further press steps TAKE OFF → CRUISE → APPROACH.
MSG	MESSAGE page (FMS alerts).
PROG	PROG 1/3. Further presses display PROG 2/3 and PROG 3/3.
DATA	DATA MENU. A second press displays the DATA LIST of the standard and pilot databases.
VNAV	VNAV 1/2. A second press displays VNAV 2/2.
MRK	Marks the present position as a MKnnn pilot waypoint and displays the MARK page.
RMS	COMMUNICATION page of the radio management system (VHF, XPDR, TCAS, NAV, ADF). See FMS.02.5.
MENU	MCDU MENU page: selection of FMS 1, FMS 2, RMS 1 or RMS 2.
PREV / NEXT	Previous / next page of a multi-page display, in a loop. On the FPLN page with the ND in PLAN mode, they also move the ND centre from waypoint to waypoint.

(4) Keyboard

Letters, digits, ., /, SP (space) and +/−. The +/− key types − on its first press, then changes the sign at each press.

(5) CLR key

Short press	Deletes the last character of the scratchpad. With an empty scratchpad, shows CLEAR ?: pressing an LSK then clears the field beside it (if allowed). With a message shown, removes the message and restores the entry.
Held (1 s)	Clears the whole scratchpad line.

(6) EXEC key and light

The green light above EXEC comes on when a command waits for confirmation (a TMPY, a FPLN or SEC initialization, a protected command). Pressing EXEC executes it. With the light off, EXEC has no effect.

(7) Annunciators

FAIL	(amber) MCDU major failure. The screen is blank.
MSG	(amber) An FMS alert is pending on the MSG page.
POS	(amber) Positioning error.
OFST	(green) A lateral offset is active.
MENU	(green) A system not displayed on the MCDU requests attention.

cont'd... ►►►

cont'd... ►►►

⑧ BRT keys

Adjust the brightness of the screen and of the annunciators.

SIMULATOR NOTE

- Click the keys in the cockpit, or use the MCDU pop-up. Click the scratchpad to type with the computer keyboard (BACKSPACE = CLR, DELETE = held CLR, ESC ends keyboard capture).
- The MCDU failures (MCDU 1, MCDU 2) are in the EFB FAILURES app.

FMS.01.3 Data Entry

Ident.: FMS.01.3 — 05 NOV 2026
ALL

1. Type the value in the scratchpad.
2. Press the LSK beside the field.
3. The value goes into the field and the scratchpad clears. If the entry is refused, a message replaces it; CLR restores the entry so it can be corrected.

Field conventions:

- □□□□□ amber boxes: mandatory entry.
- [ ] cyan brackets or dashes: optional entry.
- Cyan data can be modified by the crew. Green data are computed by the FMS and cannot be changed.
- Several values in one field are separated by `/`. A value can be left out by starting with `/` (for example `/FL140` changes the second value only).
- Altitude: `13000` or `FL130` / `130`. Position: `N4512.3W12234.5` (short forms and trailing hemisphere accepted).
- CLEAR ? + LSK on a crew entry restores the default value. A field with no default cannot be cleared (NOT ALLOWED).

FMS.01.4 Symbology

Ident.: FMS.01.4 — 05 NOV 2026
ALL

ATTRIBUTE	MEANING
Small font	Labels, units, FMS-computed or default values
Large font	Values entered by the crew; main data
Reverse video	Protected prompt waiting for EXEC, alert code in the title, scratchpad messages
Underline	Time prediction of a waypoint with a time constraint (RTA); temperature-compensated altitude

COLOUR	MEANING
AMBER	Mandatory field, alerts, constraint predicted missed, EFOB below reserve, icing data
CYAN	Data the crew can modify, inactive selection, missed approach not yet active
GREEN	FMS-computed data, FROM waypoint, active selection, constraint predicted met
MAGENTA	Active leg and TO waypoint, FMS targets
YELLOW	Temporary flight plan and temporary data, before EXEC
WHITE	Titles, labels, prompts, SEC flight plan, separators, ignored constraint

On the flight plan pages:

- ∆ after an ident: overfly waypoint.
- " between two waypoints: the procedure named above still applies.

cont'd... ►►►

cont'd... ►►►

- C / H before a course: course or heading leg. T after it: true reference.
- Altitude constraint suffix A at or above, B at or below, none = at. A small C in front: value corrected by the temperature compensation.

FMS.01.5 Messages

Ident.: FMS.01.5 — 05 NOV 2026
ALL

Scratchpad messages

Shown in reverse video in the scratchpad. CLR removes them, except ERASING DATA and XFER DATA IN PROGRESS, which lock the keyboard until the action ends.

MESSAGE	MEANING
FORMAT ERROR	Entry format is wrong
RANGE ERROR	Entry out of range
NOT ALLOWED	Command or entry forbidden here
NO ACTION DEFINED	The LSK has no function on this line
NOT IN DATABASE	Ident not found
CLEAR ?	CLR pressed with an empty scratchpad; next LSK clears its field
PRESS EXEC TO CONFIRM	A protected command waits for EXEC
FPLN WILL BE DELETED	EXEC will erase the flight plan
TMPY EXIST	SEC activation / copy / swap refused while a TMPY exists
FPLN FULL / SEC FULL / MEMORY FULL	Plan or database is full
IDENT ALREADY USED	The ident already exists in the pilot database
OFFSET CANCELLED / OFFSET DELAYED	Offset removed, or moved to the next leg
VERTICAL PROFILE ERROR / ADJUST DESCENT	Vertical profile cannot be computed / a level point lies after the TOD
TOO STEEP PATH AHEAD	In descent or approach with VNAV engaged: the next altitude constraint cannot be made (250 ft tolerance), even with a 5.5° path
RTA MISSED / DELETE OTHER RTA ?	Time constraint cannot be met / only one RTA allowed
END OF COUNTDOWN TIMER	The TIMERS countdown has reached zero

FMS alerts (MSG page)

An alert lights the MSG annunciator and shows its code in the MCDU title line. Press MSG to read it. See FMS.02.4.9.

CODE	ALERT
AIM	GPS PRAIM NOT VALID AT FAF OR MAP / NO GPS RAIM
AIR	AIR DATA FAILURE — INSERT BACKUP PARAMETERS
ALN	IRS ALIGNMENT IN PROGRESS
APP	APPROACH NOT ENABLE — CHECK POS EPE OR GPS HIL / CHECK TKE OR XTK
CFG	CONF DATA DISCREPANCY
CMD / CTK	CROSS TALK COMMAND REJECT / CROSS TALK FAILURE

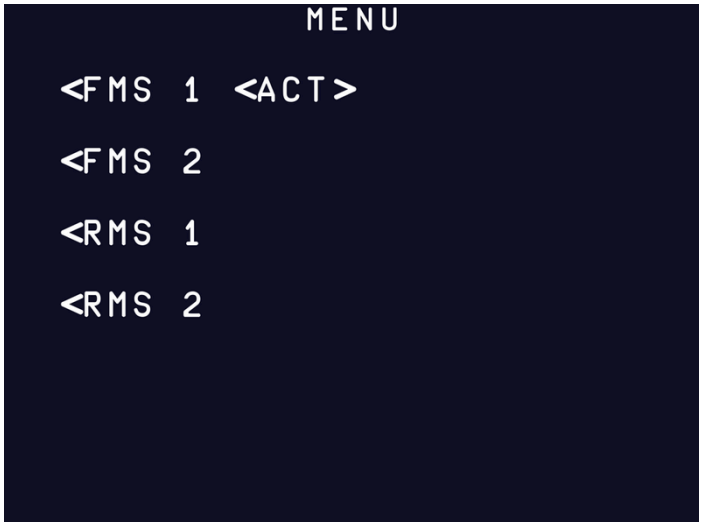
cont'd... ►►►

cont'd... ►►►

CODE	ALERT
DTA	NAV DATA MODIFIED — SAVE DATA
FAL	DESTINATION FUEL LESS THAN RESERVE / NRP ALERT
FFF	FUEL FLOW FAILURE — INSERT BACKUP PARAMETERS
FMS	FMS BITE FAILURE
FPL	FPLN DISCONTINUITY OR END OF ROUTE
GPS	GPS FAILURE — CHECK GPS STATUS
HDG	HEADING INPUT NOT VALID — INSERT NAV HEADING
HIL	GPS HORIZONTAL INTEGRITY ALERT
INI	CHECK INITIAL POSITION AND INIT SENSORS
ISA	TEMP COMPENSATION RECOMMENDED
POS	POSITION DISCREPANCY / SELECTED POS NOT VALID / BCP POSITION UPDATING IN 30S
R/N	RADIO NAV EPE > RNP OR INVALID / RADIO NAV AUTOTUNING FAILURE
RNP	NAVIGATION ACCURACY DEGRADED
TMR	END OF COUNTDOWN TIMER
VAR	INSERTED/COMPUTED VAR DISCREPANCY
WGT	SEC FPLN ACTIVATED — CHECK WEIGHT

FMS.01.6 MCDU MENU and Power-Up Page

Ident.: FMS.01.6 — 05 NOV 2026
ALL



MCDU MENU page — FMS 1 active

MCDU MENU

Displayed with the MENU key, or automatically when the selected FMS does not answer.

<FMS 1 (1L) Connects the MCDU to FMS 1.

<FMS 2 (2L) Connects the MCDU to FMS 2.

<RMS 1 (3L) / <RMS 2 (4L) Connects the MCDU to the radio management system.

cont'd... ►►►

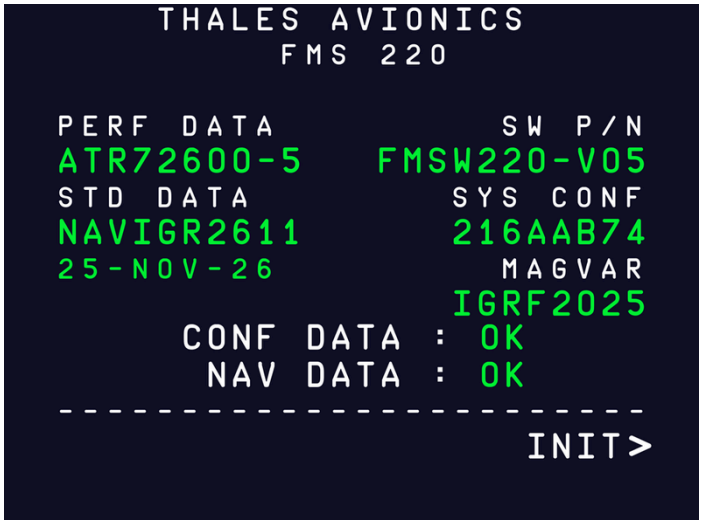
cont'd... ►►►

Status tag	Beside each system: <ACT> for the system shown on the MCDU, <OFF> for a lost FMS (its DU failed or not powered), <REQ> for a system requesting attention (MENU light), blank otherwise.

SIMULATOR NOTE

The ACMS entry of the aircraft MCDU MENU is not simulated and is not shown.

Power-up page (THALES AVIONICS FMS 220)



FMS power-up page

Displayed automatically after the FMS has started following a power-up. It stays until the crew presses INIT>.

PERF DATA	Aircraft performance file (ATR72600).
STD DATA	Standard database cycle and its expiry date.
SW P/N / SYS CONF / MAGVAR	Software, configuration and magnetic variation model identification.
CONF DATA / NAV DATA	Result of the integrity test: TEST (in progress, keys inactive), OK (green, INIT> available at 6R) or FAIL (amber, FMS BITE> at 6L).
INIT> (6R)	Displays the INIT page.

PAGE

INTENTIONALLY

LEFT BLANK

FMS.02.1 INITIALIZATION

FMS.02.1.1 Initialization Sequence

Ident.: FMS.02.1.1 — 28 OCT 2026 — ALL

The FMS initialization is made on the ground, from the INIT page, in this order:

1. INIT page: check date and time.
2. POS INIT: check the position (normally automatic).
3. WEIGHT: ZFW, FOB, T/O CG, RESERVE.
4. PERF INIT: cruise altitude, cruise mode, alternate.
5. FPLN INIT: flight plan (route, departure, arrival).

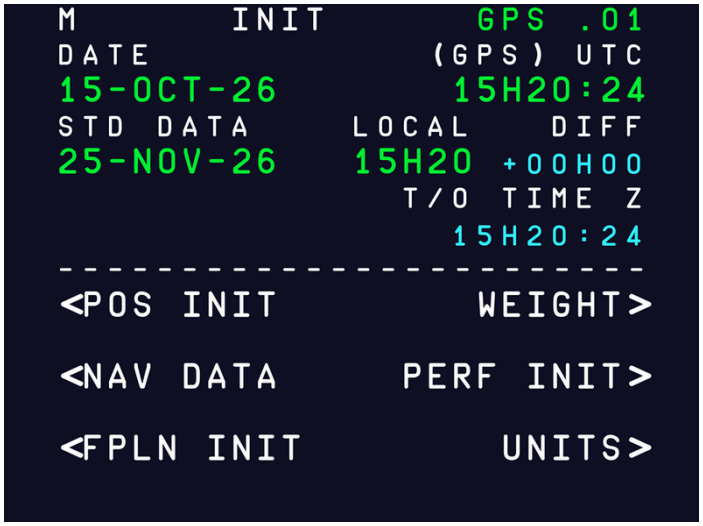
The INIT page is reached by INIT> on the power-up page, or by <INIT on the DATA MENU.

Note

After landing (end of flight cycle) the FMS clears the flight plan and the flight-related entries (weights, T/O CG, V-speeds). They must be entered again for the next flight.

FMS.02.1.2 INIT Page

Ident.: FMS.02.1.2 — 28 OCT 2026 — ALL



INIT page

DATE (1L) / UTC (1R) — Date and UTC. With (GPS) above UTC, they come from the GPS (green) and cannot be changed. With (FMS), they come from the FMS clock (cyan) and can be overwritten: date `DDMMMYY` (for example `16SEP26`), time `HHMMSS`.

STD DATA (2L) — Expiry date of the standard database. Amber when expired or no database.

LOCAL / DIFF (2R) — Local time (green) and difference to UTC (cyan). Enter the difference as `-0400` or `+0530` (max 14 h). CLR resets it to +00H00.

T/O TIME L/Z (3R) — Scheduled take-off time, local (L, when DIFF is set) or UTC (Z). Shown on the ground only.

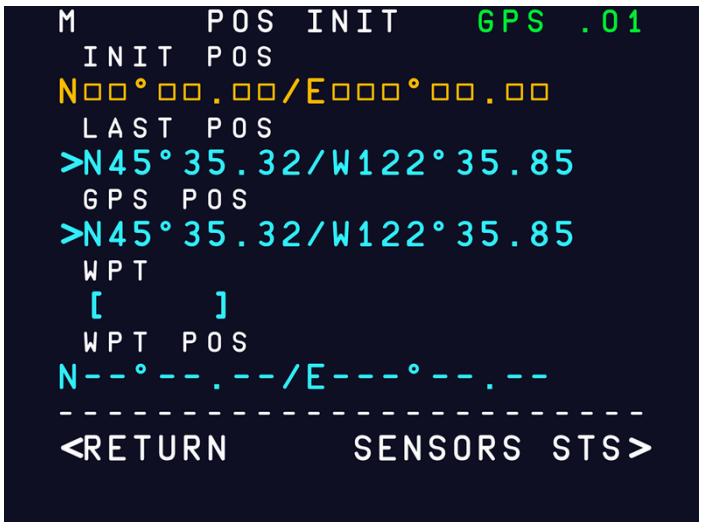
cont'd... ►►►

cont'd... ►►►

<POS INIT (4L)	Displays POS INIT.
<NAV DATA (5L)	Displays NAV DATA.
<FPLN INIT (6L)	Displays FPLN INIT.
WEIGHT> (4R)	Displays WEIGHT.
PERF INIT> (5R)	Displays PERF INIT.
UNITS> (6R)	Displays UNITS.

FMS.02.1.3 POS INIT Page

Ident.: FMS.02.1.3 — 28 OCT 2026
ALL



POS INIT page

The FMS computes its position continuously (Best Computed Position, BCP) by mixing the GPS and radio navaid positions. No crew action is needed in normal operation. A manual initialization overrides the automatic positioning; use it only when the INI alert (CHECK INITIAL POSITION AND INIT SENSORS) is shown, which happens on the ground when no valid GPS position is available.

All actions on this page are possible on the ground only.

INIT POS (1L)	Position used to initialize. Amber boxes until filled. A position can be typed, or copied with one of the prompts below.
> LAST POS (2L)	Copies the last stored position into INIT POS.
> GPS POS (3L)	Copies the GPS position into INIT POS. Shown only with a valid GPS position (EPE below 0.1 NM).
WPT (4L)	Enter an ident to copy its database position. With an empty scratchpad, opens the DATA LIST.
WPT POS (5L)	Position of the WPT. Pressing copies it into INIT POS.
<RETURN (6L)	Back to INIT.
SENSORS INIT< (6R)	Shown when INIT POS is filled. Initializes the BCP and the sensors on INIT POS.
SENSORS STS> (6R)	Shown otherwise. Displays the SENSOR STS page (GPS mode).

cont'd... ►►►

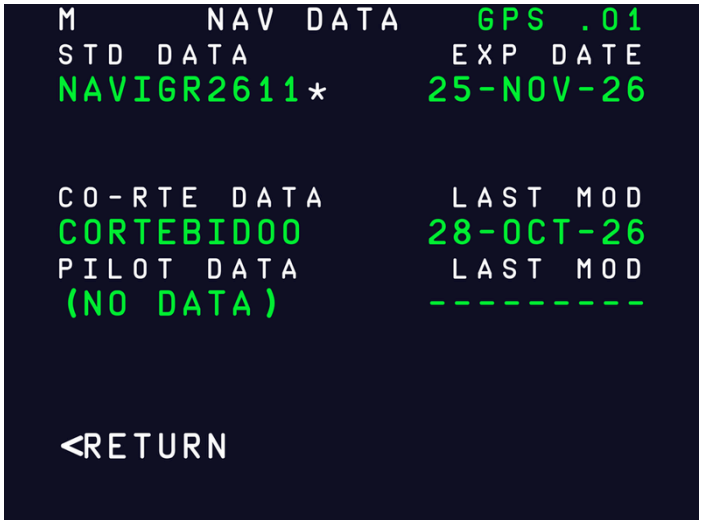
cont'd... ►►►

SIMULATOR NOTE

The EFB READY TO TAXI preset does the position initialization for the crew (GPS POS, then SENSORS INIT).

FMS.02.1.4 NAV DATA Page

Ident.: FMS.02.1.4 — 28 OCT 2026
ALL



NAV DATA page

Read-only page (also reached from DATA MENU).

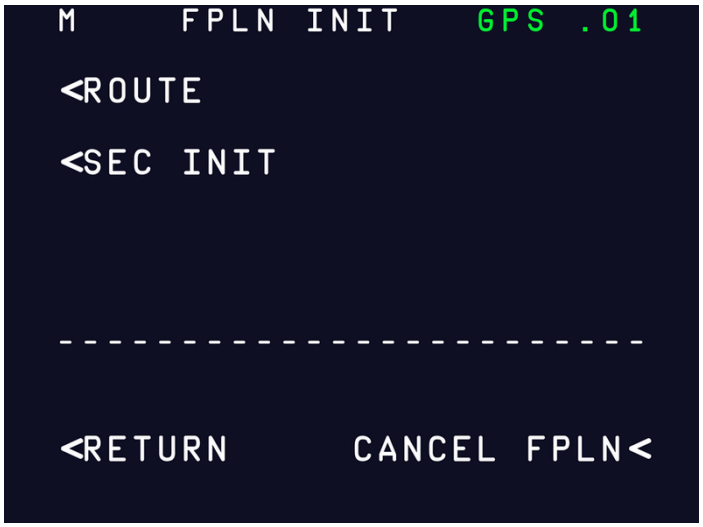
STD DATA / EXP DATE	Standard database identifier (> and * mark the active one) and its expiry date.
CO-RTE DATA / LAST MOD	Company route database and its last modification.
PILOT DATA / LAST MOD	Pilot database and its last modification.
<RETURN (6L)	Back to the previous page.

cont'd... ►►►

cont'd... ►►►

FMS.02.1.5 FPLN INIT Page

Ident.: FMS.02.1.5 — 28 OCT 2026
ALL



FPLN INIT page

Reached from INIT <FPLN INIT, or from <NEW FPLN on the FPLN page.

<ROUTE (1L) Displays ROUTE SEL to initialize the FPLN.

<SEC INIT (2L) Displays SEC INIT (secondary flight plan, see FMS.02.2.13).

<RETURN (6L) Back to the previous page.

CANCEL FPLN< (6R) First press arms the deletion of the active flight plan (prompt in reverse video, scratchpad FPLN WILL BE DELETED). EXEC deletes it. A second press disarms. NOT ALLOWED when there is no flight plan.

FMS.02.1.6 ROUTE SEL Page

Ident.: FMS.02.1.6 — 28 OCT 2026
ALL



ROUTE SEL — route found for KPDX/KRDM

cont'd... ►►►

cont'd... ►►►

The ROUTE SEL page initializes a flight plan from a stored route or from a city pair.

IDENT (1L)	Enter the ident of a company or pilot route. With an empty scratchpad, displays the company route list. NOT IN DATABASE if unknown.
FROM/TO (2L)	Enter `XXXX/YYYY` (departure / destination ICAO). The FMS searches the pilot and company routes for this pair (and the reverse); the direct route (departure and destination only) is always offered last. When several routes are found, `n/m` follows IDENT: use NEXT / PREV to choose.
FLT ID (1R)	Flight identification, up to 8 letters or digits. Can be entered only when 6R is FPLN<.
REVERSE< (2R)	Reverses the route. Not shown when the route has a SID or STAR.
Route area (lines 3 to 5)	Waypoints of the selected route, airways and procedures in reverse video. `----->` / `<-----` scroll a long route.
<RETURN (6L)	Back to FPLN INIT.
FPLN< / SEC< / TMPY< (6R)	Target of the initialization; each press changes it. EXEC loads the route into this target: FPLN becomes active at once, TMPY is created for review, SEC is built as the secondary plan.

The route is shown in yellow and the EXEC light comes on as soon as a route is selected.

Note

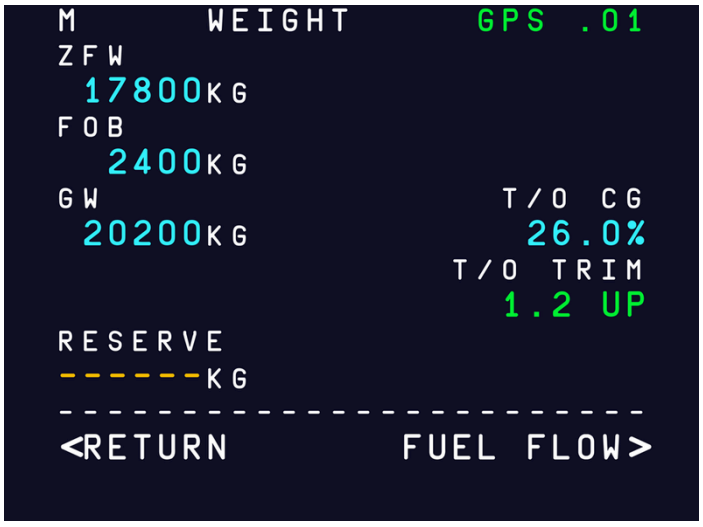
The direct route gives a plan with only the two airports and a FPLN DISCONTINUITY between them. Complete it with the departure, the arrival and the en-route waypoints (see FMS.02.2).

SIMULATOR NOTE

A SimBrief flight plan can be loaded into the FMS from the EFB. See the SIM part of this manual.

FMS.02.1.7 WEIGHT Page

Ident.: FMS.02.1.7 — 28 OCT 2026 — ALL



WEIGHT page

ZFW (1L)	Zero fuel weight. Range 12 000 to 21 000 kg. Amber dashes until entered.

cont'd... ►►►

cont'd... ►►►

FOB (2L)	Fuel on board. Range 0 to 5 100 kg. Amber dashes until entered: the FMS does not take the fuel quantity of the aircraft. Without FOB, EFOB and the other fuel predictions are dashed.
GW (3L)	Gross weight = ZFW + FOB. It can also be entered (12 000 to 25 000 kg): ZFW is then recomputed. Any two of ZFW, FOB and GW give the third. ZFW, FOB and GW are cyan, entered or computed.
T/O CG (3R)	Take-off centre of gravity, 14 to 37 % MAC. Amber dashes until entered.
T/O TRIM (4R)	Pitch trim setting for take-off, computed from the T/O CG (units UP). Also shown on the EWD.
RESERVE (5L)	Fuel reserve (amber dashes until entered, or the value kept from the last flight). When not entered, the FMS uses its own fuel policy. EFOB below the reserve is amber on the FPLN pages and gives the FAL alert.
<RETURN (6L)	Back to INIT.
FUEL FLOW> (6R)	Displays the FUEL FLOW page.

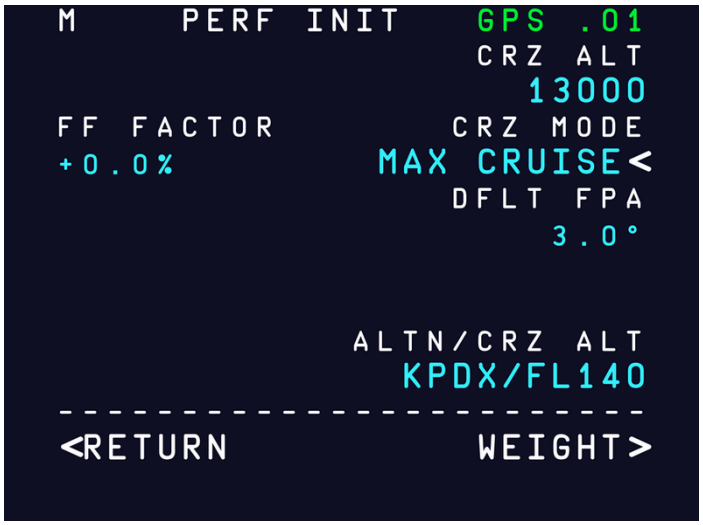
Any entry that changes the weight cancels V-speeds the crew entered on the TAKE OFF page. Weights are in kilograms.

SIMULATOR NOTE

See FMS.00.4 for the EFB loadsheet transfer (ZFW and FOB only).

FMS.02.1.8 PERF INIT Page

Ident.: FMS.02.1.8 — 28 OCT 2026 — ALL



PERF INIT page

CRZ ALT (1R)	Cruise altitude used for the predictions. Enter `13000`, `FL130` or `130`. Range: the FGCP ALT SEL up to the computed ceiling + 5 000 ft (RANGE ERROR outside). Same field as on CRUISE and VNAV 1/2.
FF FACTOR (2L)	Fuel flow correction in %, for example `+2.5`. Default +0.0 %. CLR restores the default.
CRZ MODE (2R)	Cruise speed law. Press to change between MAX CRUISE (default) and LONG RANGE. A number entered here sets a fixed cruise IAS (manual mode). CLR restores MAX CRUISE.
DFLT FPA (3R)	Default descent flight path angle, 1.0° to 9.9°. Default 3.0°.

cont'd... ►►►

cont'd... ►►►

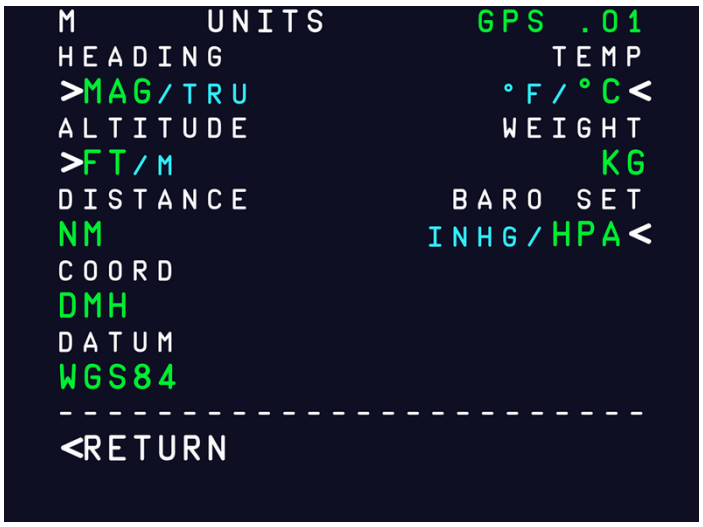
ALTN/CRZ ALT (5R) Alternate airport and its cruise level. Enter `KPDX/FL140`, `KPDX` or `/FL140`. Defaults: the departure airport and FL100. With an empty scratchpad, the DATA LIST of airports is shown.

<RETURN (6L) Back to the previous page.

WEIGHT> (6R) Displays WEIGHT.

FMS.02.1.9 UNITS Page

Ident.: FMS.02.1.9 — 28 OCT 2026 — ALL



UNITS page

The active unit is green large, the other cyan small. Only units with a prompt can be changed; each press changes to the other unit. The defaults are restored at each FMS power-up.

HEADING (1L) MAG / TRU. Reference of all courses and bearings on the MCDU (M or T in the title line).

ALTITUDE (2L) FT / M.

DISTANCE / COORD / DATUM NM, DMH (degrees, minutes, hundredths), WGS84. Not changeable.

TEMP (1R) °F / °C.

WEIGHT KG. Not changeable.

BARO SET (3R) INHG / HPA. Unit of the QNH entries.

<RETURN (6L) Back to the previous page.

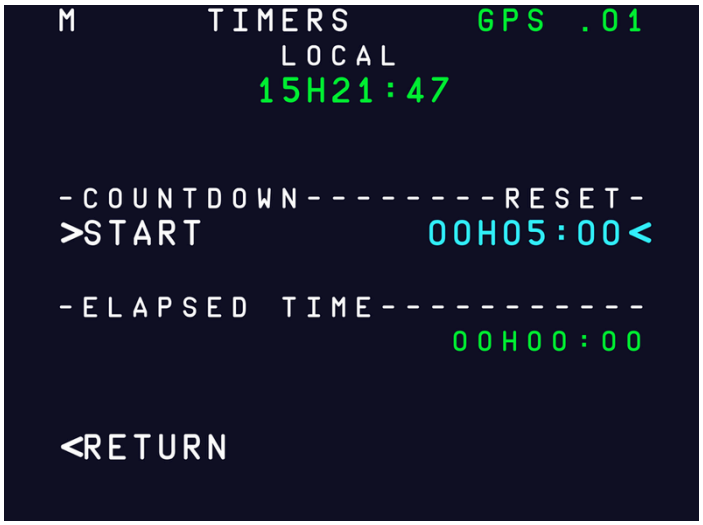
FMS.02.1.10 TIMERS Page

Ident.: FMS.02.1.10 — 28 OCT 2026 — ALL

Reached from the DATA MENU (<TIMERS).

cont'd... ►►►

cont'd... ►►►



TIMERS page — countdown set to 5 min

LOCAL	Local time (green, UTC + DIFF).
COUNTDOWN (3R)	Countdown time (cyan, HHhMM:SS). Enter the time as `M.SS` (`2.50` = 2 min 50 s) or `M` (`5` = 5 min). With an empty scratchpad, RESET restores the time set. CLR sets 00H00:00.
>START / >PAUSE (3L)	Starts or stops the countdown. Shown once a time is set.
ELAPSED TIME (4R)	Elapsed time (green), started and stopped with the ELAPS TM pushbutton. RESET (or CLR) sets it to 00H00:00; while it runs, the reset shows 00H00:00 in yellow and needs EXEC.
<RETURN (6L)	Back to DATA MENU.

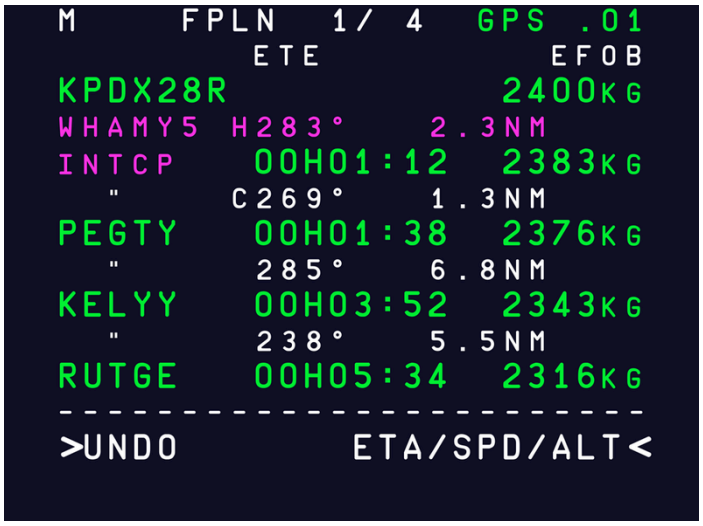
At zero the countdown stops, END OF COUNTDOWN TIMER is shown in both scratchpads and the TMR alert is raised.

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

FMS.02.2 FLIGHT PLAN

FMS.02.2.1 FPLN Page

Ident.: FMS.02.2.1 — 02 NOV 2026 — ALL



Active FPLN page 1/5, ETE/EFOB format (on the ground)

Displayed with the FPLN key. Five waypoints per page; NEXT / PREV show the other pages. The title reads FPLN (active), TMPY (temporary, yellow) or SEC FPLN.

Waypoint lines

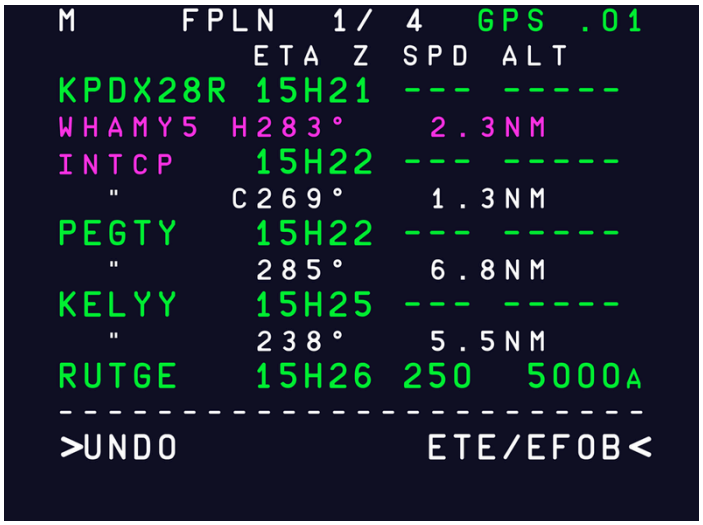
- **FROM** (top line of page 1): the last waypoint passed — on the ground the departure airport or runway. Its data are values measured when it was passed, in green. Legs flown before it are not shown.
- **TO** (magenta): the waypoint the aircraft is flying to. The active leg is between FROM and TO.
- Next waypoints in green; missed approach waypoints in cyan until the missed approach is activated.
- Between two waypoints, in white: the procedure name (or `"` for the same procedure), the leg course (`C` course, `H` heading, `T` true) and the leg distance.
- `---FPLN DISCONTINUITY---`: the plan is not continuous at this point. The FPL alert is raised when the aircraft reaches it.
- `----CLR TO EXIT NEXT----`: a holding pattern (see FMS.02.2.8).
- `------END OF FPLN------`: after the last waypoint.

Display formats (6R)

ETE/EFOB (default)	Estimated time en route and estimated fuel on board at each waypoint. EFOB amber below the RESERVE.
ETA/SPD/ALT	Estimated time of arrival, speed and altitude constraints (dashes when none). Constraint colours: green predicted met, amber predicted missed, white ignored. `A` at or above, `B` at or below. ETA underlined when an RTA is defined.

cont'd... ►►►

cont'd... ►►►



FPLN page 1/5, ETA/SPD/ALT format (6R pressed)

LSK use on the FPLN page

Left LSK, departure airport or runway	DEPARTURE page (on the ground).
Left LSK, destination or landing runway	ARRIVAL page.
Left LSK, other waypoint	LTRL REV page of the waypoint. In flight, the left LSK of the FROM opens the LTRL REV at present position (PPOS).
Right LSK, waypoint	VERT REV page (the FROM waypoint gives the WIND page).
Ident in scratchpad + left LSK	Inserts the waypoint before the selected one, followed by a discontinuity (see FMS.02.2.5).
/ in scratchpad + left LSK	Inserts a discontinuity before the selected waypoint.
CLEAR ? + left LSK	Deletes the waypoint, the discontinuity or the hold.
<NEW FPLN (6L)	Displays FPLN INIT.
>UNDO (6L)	During 60 s after an EXEC: restores the plan as it was before.
>CLR TMPY (6L)	With a TMPY: discards it.

Note

The FROM and the TO (when coupled to the autopilot) cannot be revised by an insertion. Right fields (ETE, EFOB, constraints) are not cleared here: use the VERT REV page.

SIMULATOR NOTE

With the ND in PLAN mode, NEXT and PREV on the FPLN page move the ND centre from waypoint to waypoint, so the whole route can be checked north up.

cont'd... ►►►

cont'd... ►►►

FMS.02.2.2 Temporary Flight Plan and EXEC

Ident.: FMS.02.2.2 — 02 NOV 2026
ALL



TMPY flight plan after the departure pick

Any revision of the active plan (departure, arrival, waypoint insertion or deletion, hold, offset, constraint, DIRECT TO) first creates a temporary flight plan:

1. The FMS copies the FPLN into the TMPY. The TMPY pages and the TMPY on the ND are yellow; the active leg stays magenta.
2. More revisions can be made on the TMPY.
3. EXEC makes the TMPY the active FPLN. >CLR TMPY (6L) discards it.

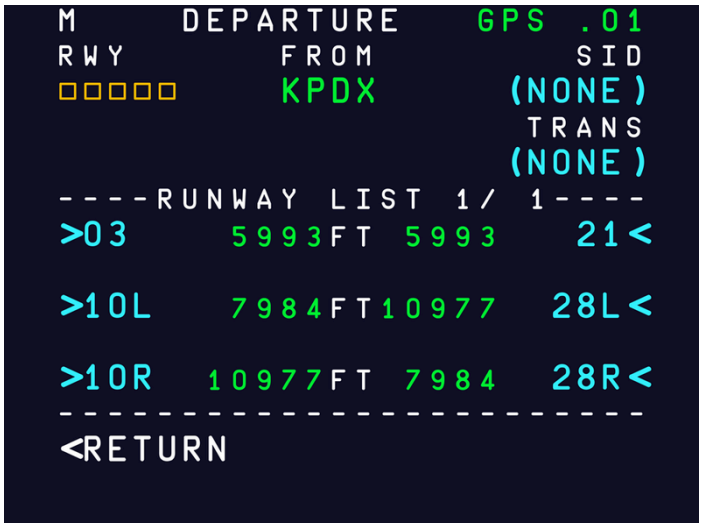
The FMS keeps sequencing the TMPY while the aircraft flies. A SEC activation, copy or swap is refused (TMPY EXIST) while a TMPY exists.

cont'd... ►►►

cont'd... ►►►

FMS.02.2.3 DEPARTURE Page

Ident.: FMS.02.2.3 — 02 NOV 2026
ALL



DEPARTURE page, runway list

Reached by the left LSK of the departure airport on the FPLN page (on the ground), or by <DEPARTURE on the LTRL REV page of a departure waypoint.

RWY (1L)	Selected runway. Amber boxes until selected. Press to show the runway list again.
FROM	Departure airport.
SID (1R)	Selected SID. Press to show the SID list.
TRANS (2R)	Selected SID transition. Press to show the transition list.
List (lines 3 to 5)	RUNWAY LIST, then SID LIST, then TRANS LIST, in cyan. Each item has its own LSK (`>ITEM` left, `ITEM<` right). Runways show their length. The first item of the SID and TRANS lists is `(NONE)`.
<RETURN (6L)	Back to the FPLN page.
TMPY> (6R)	Displays the TMPY to check it.

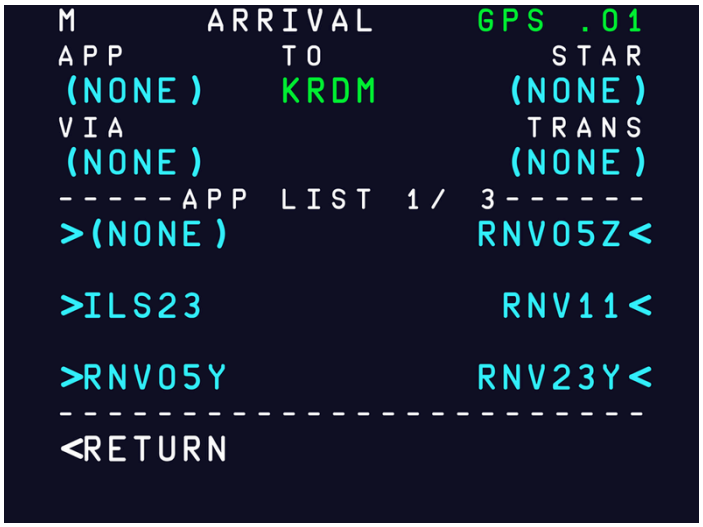
The order is runway, then SID, then transition: each pick shows the next list and resets the fields after it. Each pick revises the TMPY (title and fields yellow). EXEC activates it and displays the first FPLN page.

cont'd... ►►►

cont'd... ►►►

FMS.02.2.4 ARRIVAL Page

Ident.: FMS.02.2.4 — 02 NOV 2026
ALL



ARRIVAL page, approach list

Reached by the left LSK of the destination (or the landing runway) on the FPLN page.

APP (1L)	Approach. Press to show the APP LIST.
TO	Destination airport.
VIA (2L)	Approach transition (via). The recommended navaid and its frequency are shown beside it. For an RNP AR approach, `RNP AR` is shown there instead, in yellow reverse video. For an LPV or LP approach flown as LPV or LP, `LPV` or `LP` is shown, in cyan reverse video.
STAR (1R)	Standard arrival.
TRANS (2R)	STAR transition.
List (lines 3 to 5)	APP, STAR, VIA and TRANS lists, in cyan, `(NONE)` first. The STAR list shows the STARs for the approach runway. Once a STAR is selected, the VIA list shows only the approach transitions that start where the STAR ends. If none does, only `(NONE)` is listed. With no STAR, every approach transition is listed.
TYPE (4L)	LPV or LP approach that also has LNAV minima, once no list is shown: `>LPV/LNAV` (or `>LP/LNAV`), the type in force in large green characters, the other in small cyan. Press to change it. LPV or LP is the default, and selecting another approach brings it back. With LP, the APP pushbutton arms L-LOC only. With LNAV, the approach is flown like an RNAV approach: the APP pushbutton arms V-FP, not L-LOC and L-GS. Changing TYPE while L-LOC and L-GS are armed disarms them (FD MODE CHG and LPV INVALID). Changing the approach or its TYPE disarms V-FP.
<RETURN (6L) / TMPY> (6R)	As on the DEPARTURE page.

The order is approach, STAR, via, transition. EXEC activates the TMPY even if not all fields are filled. The STAR is always placed before the approach in the plan.

With LNAV engaged, a new APP, STAR, VIA, TRANS or TYPE is refused (NOT ALLOWED) while the destination is the TO waypoint, or while the STAR or the approach is being flown (missed approach excepted). Disengage LNAV first.

cont'd... ►►►

cont'd... ►►►

Note

Linking the arrival to the en-route part may leave a FPLN DISCONTINUITY. Check all FPLN pages and clear it if the route is continuous (FMS.02.2.6).

FMS.02.2.5 Adding a Waypoint

Ident.: FMS.02.2.5 — 02 NOV 2026
ALL

Method 1 — NEXT WPT on the LTRL REV page

1. Left LSK beside the waypoint after which the new one goes.
2. Type the ident, press NEXT WPT (2R).
3. If the ident exists more than once, the DATA LIST page shows each candidate with its position, ICAO region and type: select the right one.
4. The TMPY is created: EXEC.

The new waypoint is joined to the next one of the plan.

Method 2 — direct insertion on the FPLN page

Type the ident and press the left LSK of a waypoint: the new waypoint is inserted **before** it, with a discontinuity between them. On a discontinuity line, the waypoint fills the discontinuity.

Accepted entries

ENTRY	EXAMPLE	RESULT
Ident	`CUPRI`	Database waypoint, navaid or airport
Place/bearing/distance	`PDX/090/12`	Point at a bearing and distance from a place
Place/bearing/place/bearing	`PDX/090/UBG/180`	Intersection of two radials
Latitude/longitude	`N4512.3W12234.5`	Point at this position
LAT or LON crossing	`/N4500.0`	Point where the route crosses this latitude (or longitude)
Along-track offset	`/12.3` or `/-12.3`	Point on the route at this distance after (before) the waypoint

Points created by the FMS are named automatically (for example `PDX-01`). An unknown ident opens the NEW DATA page to create it in the pilot database.

FMS.02.2.6 Deleting a Waypoint or a Discontinuity

Ident.: FMS.02.2.6 — 02 NOV 2026
ALL

1. CLR key with an empty scratchpad: CLEAR ? is shown.
2. Left LSK beside the waypoint, the discontinuity or the hold.
3. EXEC.

A deleted waypoint is replaced by a discontinuity. Deleting a discontinuity joins the waypoints before and after it.

cont'd... ►►►

cont'd... ►►►

FMS.02.2.7 LTRL REV Page

Ident.: FMS.02.2.7 — 02 NOV 2026
ALL



LTRL REV page of an en-route waypoint

The position of the revised waypoint is shown above its ident (1L).

Waypoint of the plan

Ident (1L)	Displays the database page of the waypoint.
OVERFLY YES/NO (2L)	Makes the waypoint an overfly point (△ on the FPLN), through the TMPY.
<HOLDING (3L)	Displays the HOLD page for a hold at this waypoint.
<DEPARTURE / <ARRIVAL (5L)	On a waypoint of a departure or arrival procedure: the procedure page.
NEXT WPT (2R)	Inserts a waypoint after this one (FMS.02.2.5).
NEW DEST (3R)	Enters a new destination after this waypoint. The plan after the waypoint is replaced by the new destination.
AIRWAY (4R)	Enter an airway from this waypoint; the AIRWAY page asks for the exit point. With an empty scratchpad, the list of airways through the waypoint is shown.
<RETURN (6L)	Back to the FPLN page.
NEW FPLN> (6R)	Displays FPLN INIT.

Present position (PPOS, left LSK of the FROM in flight)

<HOLDING (3L)	Hold at the present position.
OFFSET	Lateral offset: L or R and the distance (for example R5), up to 20 NM. L0, R0 or CLR cancels it. Staged in the TMPY; EXEC activates it and the OFST annunciator comes on.
CHECK POS TO (3R) / BRG / DIST	Enter an ident: its bearing and distance from the aircraft are shown and kept up to date. Not available on a moving waypoint.

cont'd... ►►►

cont'd... ►►►

FMS.02.2.8 HOLD Page

Ident.: FMS.02.2.8 — 02 NOV 2026
ALL

Reached by <HOLDING on the LTRL REV page. The title is HOLDING AT, in yellow while the hold is not yet in the flight plan.



HOLD page at CUPRI, default values

Fix (1L)	Holding fix (green).
INBND CRS (2L)	Inbound course.
TURN (3L)	Turn direction, RIGHT or LEFT. Press to change.
TIME/DIST (2R)	Leg time in minutes and leg distance. Enter `1.5` for a time or `/4` for a distance: the other is computed with the IAS. Default 1 min.
IAS (3R)	Holding speed. Default: the FMS target speed, limited to 170 kt or the next speed constraint. Range: minimum operating speed to 250 kt.
NEXT EXIT	Predicted time and fuel at the next exit of the hold: one pattern after the fix, or for the hold being flown the next pass over the fix.
<RETURN (6L)	Back to LTRL REV.
TMPY> (6R)	Puts the hold in the TMPY and displays it for review.

Default values are small, crew entries large. CLR on an entry restores the default. EXEC inserts the hold in the active plan and displays the FPLN page. A hold at present position is named `PPOS`. A hold that cannot be inserted (for example at a leg termination with no fixed position) is refused with NOT ALLOWED.

The hold is shown on the FPLN page as the hold fix, the hold leg (`HOLD`, course and distance) and the fix again (predictions at the next exit), followed by `----CLR TO EXIT NEXT----`. The waypoints after the hold are predicted from its next exit.

cont'd... ►►►

cont'd... ►►►



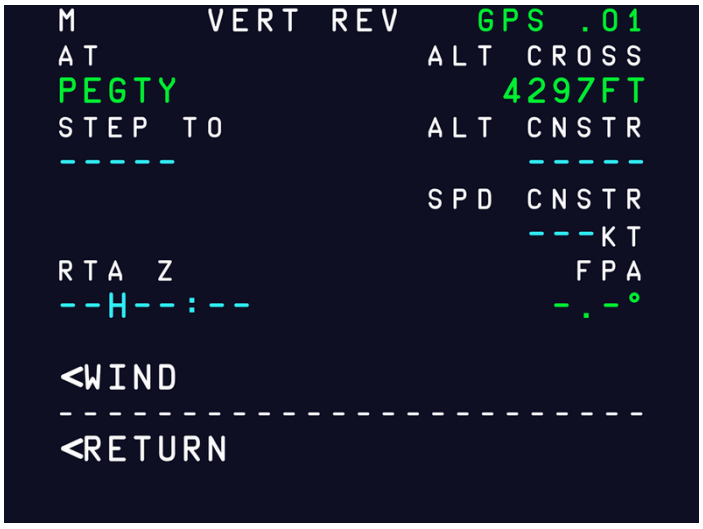
Hold at CUPRI in the TMPY

To leave the hold: CLEAR ? + left LSK beside this line, then EXEC: the aircraft leaves the hold at the next pass over the fix.

FMS.02.2.9 VERT REV Page

Ident.: FMS.02.2.9 — 02 NOV 2026
ALL

Reached by the right LSK beside a waypoint on the FPLN page.



VERT REV page of PEGTY

AT (1L)	Revised waypoint. Press for its database page.
ALT CROSS (1R)	Predicted altitude at the waypoint (read only).
STEP TO (2L) / STEP MODE (3L)	Altitude step from this waypoint, and its mode.
ALT CNSTR (2R)	Altitude constraint: `5000` (at), `5000A` (at or above), `5000B` (at or below), or a flight level.
SPD CNSTR (3R)	Speed constraint (IAS).

cont'd... ►►►

cont'd... ►►►

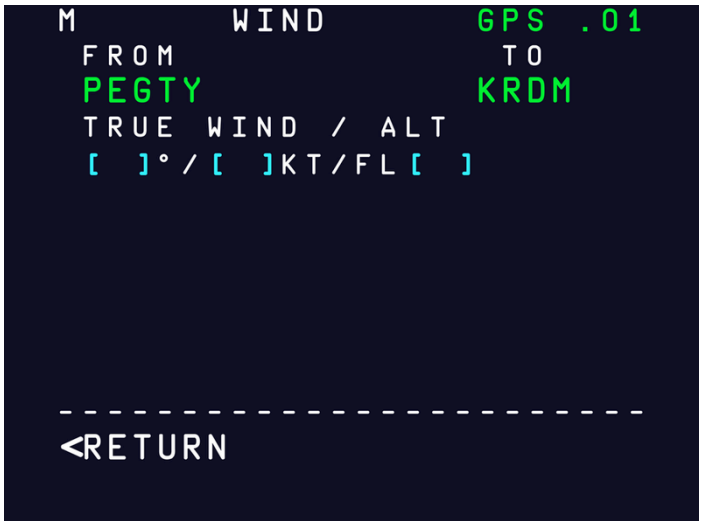
RTA (4L) / ETA	Required time of arrival at the waypoint, and the predicted time. Only one RTA in the plan (DELETE OTHER RTA ?). Amber when RTA MISSED.
FPA (4R)	Flight path angle of the leg ending at the waypoint.
<WIND (5L)	Displays the WIND page.
VERT DTO> (5R)	Vertical direct to the waypoint (steepest angle accepted 5.5°). Shown only when possible.
<RETURN (6L) / TMPY> (6R)	Back to FPLN / display the TMPY.

All crew fields turn yellow when they revise a TMPY. EXEC activates the revision.

FMS.02.2.10 WIND Page

Ident.: FMS.02.2.10 — 02 NOV 2026
ALL

Reached by <WIND on the VERT REV page, or the right LSK of the FROM.



WIND page, no wind entered

FROM / TO	Waypoint where the profile is defined, and the next waypoint with its own profile (or the destination).
TRUE WIND / ALT (2L to 5L)	Up to four groups `direction/speed/altitude`, for example `270/45/FL120`. Groups are sorted by altitude.
<RETURN (6L) / TMPY> (6R)	Back / display the TMPY.

A profile entered at a waypoint is large; a profile carried from a previous waypoint is small. The FMS uses the wind profile for its predictions.

FMS.02.2.11 Airways

Ident.: FMS.02.2.11 — 02 NOV 2026
ALL

AIRWAY page	Reached from AIRWAY on the LTRL REV page. Enter the airway and its exit point (TO); several airways can be chained. An exit point already in the flight plan is joined and the waypoints between are deleted; otherwise a FPLN DISCONTINUITY follows the exit point. TMPY> shows the result; EXEC activates it.

cont'd... ►►►

cont'd... ►►►

AIRWAY LIST page Airways through the waypoint, filtered HIGH< / LOW<.

FMS.02.2.12 DIRECT TO

Ident.: FMS.02.2.12 — 07 NOV 2026
ALL



DIRECT TO list, FPLN waypoints

DIRECT TO list (DTO key)

IDENT (1L)	Type any waypoint, navaid or airport and press 1L. Amber boxes.
ABEAM> / AIRPORTS> / FPLN WPTS> (1R)	Changes the list: FPLN waypoints, then DTO ABEAM, then nearest airports.
List (2L to 6L)	FPLN WPT: the waypoints of the plan from the TO, with bearing and distance from the aircraft. AIRPORTS: the 20 nearest airports within 240 NM, with their longest runway.

Selecting a waypoint (list or IDENT) displays the DIRECT TO page. A missed approach waypoint selected in the list activates the missed approach when the DIRECT TO is executed (its legs turn green, the flight phase becomes CRUISE); entered in IDENT, it does not. >UNDO on the FPLN page, then EXEC, de-activates the missed approach again and restores the flight phase.

cont'd... ►►►

cont'd... ►►►

DIRECT TO page



DIRECT TO page — CUPRI selected from the list

IDENT (1L)	Target of the direct (yellow). BRG/DIST and LAT/LONG are shown on the right.
INBND CRS (2L)	Optional inbound course to the target.
INTCP DIST (3L)	Distance before the target where the inbound course is intercepted. Only with an INBND CRS.
ALT CNSTR (4L)	Optional altitude constraint at the target.
TMPY> (6R)	Displays the TMPY.

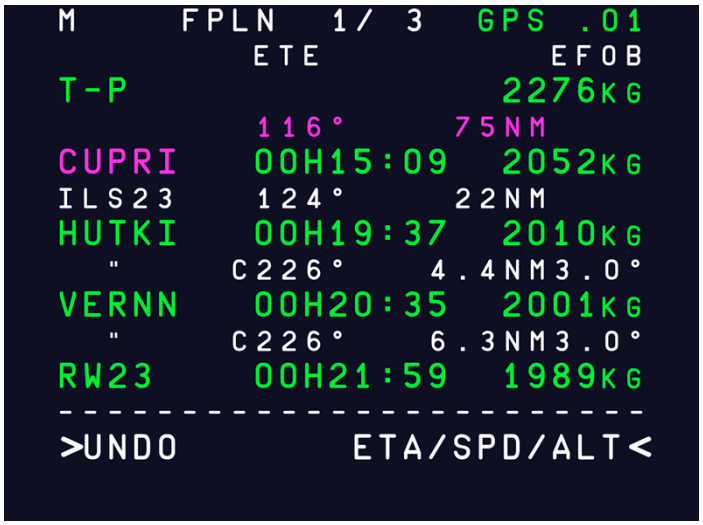
The direct is built in the TMPY at once and rebuilt at each change. EXEC activates it and displays the FPLN page. The FROM becomes `T-P` (turning point).

With an INBND CRS alone, the FMS builds a 30 NM straight leg on the inbound course, ending at the target. The aircraft is then no longer on the flight plan: EXEC disengages LNAV (HDG HOLD). Fly the aircraft towards the inbound leg (HDG SEL) and arm LNAV again to capture it.

With an INBND CRS and an INTCP DIST, the intercept is part of the direct and LNAV stays engaged.

cont'd... ►►►

cont'd... ►►►



FPLN after the DIRECT TO CUPRI

A direct to a waypoint of the plan keeps the plan after it. A direct to a point that is not in the plan inserts it before the rest of the plan, with a discontinuity.

DTO ABEAM (DTO key pressed twice)

Selecting a waypoint of the plan builds a direct to it and creates abeam points: the waypoints skipped are projected onto the new track. The abeam points cannot be revised.

SIMULATOR NOTE

The VTF (vector to final) function of the DIRECT TO page is not simulated.

FMS.02.2.13 Secondary Flight Plan

Ident.: FMS.02.2.13 — 02 NOV 2026
ALL

The SEC FPLN is a second flight plan that is not flown (for example the return route or the route to the alternate). It is shown in white and not on the ND. The FPLN key pressed on the FPLN page displays the SEC FPLN. Revisions of the SEC apply directly, without TMPY.

SEC INIT page

Reached from FPLN INIT <SEC INIT, or <NEW FPLN on the SEC FPLN page.

<ROUTE (1L)	ROUTE SEL with the SEC< target: initializes the SEC from a route or a city pair.
>COPY FPLN (2L)	Copies the active plan into the SEC. Arms (prompt in reverse video, PRESS EXEC TO CONFIRM); EXEC confirms.
ACTIVATE< (1R)	The SEC becomes the active FPLN. Confirmed with EXEC on the SEC FPLN page. The WGT alert reminds the crew to check the weights.
SWAP FPLN< (2R)	Exchanges the SEC and the active FPLN. Confirmed with EXEC.
SEC PERF> (5R)	SEC PERF page: CRZ ALT, CRZ MODE, MEANWIND, QNH, TRANS ALT, GND WIND, and ZFW / FOB when the SEC is not a copy of the FPLN. The SEC predictions use them.
<RETURN (6L)	Back.

cont'd... ►►►

cont'd... ►►►

CANCEL SEC< (6R) Deletes the SEC after EXEC.

COPY, ACTIVATE and SWAP are refused while a TMPY exists (TMPY EXIST).

FMS.02.3 PERFORMANCE AND VNAV

FMS.02.3.1 PERF Pages

Ident.: FMS.02.3.1 — 02 NOV 2026
ALL

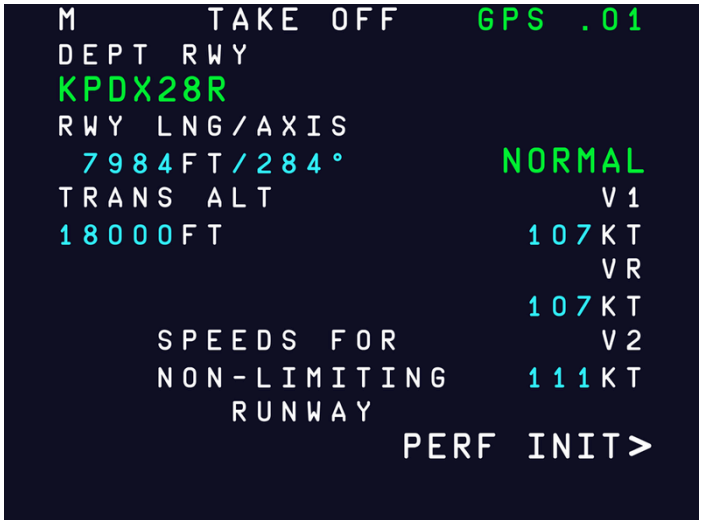
The PERF key displays the PERF page of the present flight phase:

FLIGHT PHASE	PAGE
Ground, take-off	TAKE OFF
Climb, cruise	CRUISE
Descent, approach, go-around	APPROACH

Each further press of PERF (or NEXT / PREV) steps TAKE OFF → CRUISE → APPROACH. Each page has PERF INIT> at 6R.

FMS.02.3.2 TAKE OFF Page

Ident.: FMS.02.3.2 — 02 NOV 2026
ALL



TAKE OFF page

DEPT RWY (1L)	Departure airport and runway of the flight plan.
RWY LNG/AXIS (2L)	Runway length and axis from the database (small). Can be entered (large).
TRANS ALT (3L)	Transition altitude of the departure airport.
Status (2R)	NORMAL — speeds computed for a non-icing take-off. ICING — speeds computed for icing conditions. MANUAL — at least one speed entered by the crew.
V1 (3R) / VR (4R) / V2 (5R)	Take-off speeds. Computed speeds small cyan; crew speeds large cyan; amber boxes when missing.
PERF INIT> (6R)	Displays PERF INIT.

The computed speeds are for a non-limiting runway (SPEEDS FOR NON-LIMITING RUNWAY). They need the weights of the WEIGHT page.

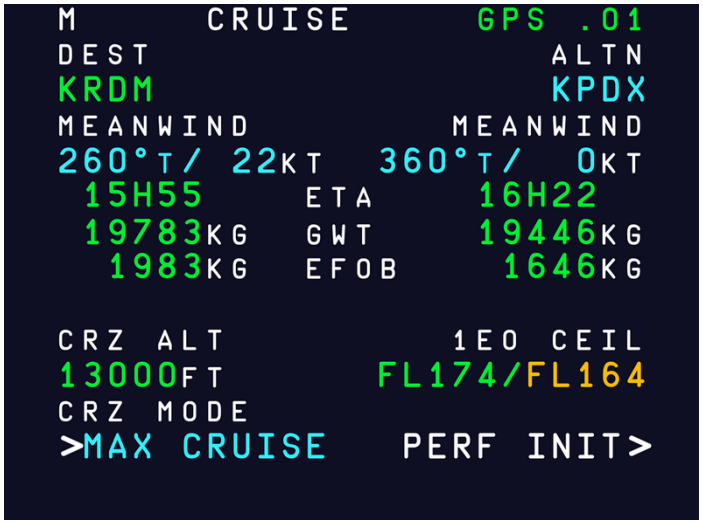
cont'd... ►►►

cont'd... ►►►

On the first manual entry, the two other computed speeds are deleted: enter all three. Any later weight entry deletes the crew speeds.

FMS.02.3.3 CRUISE Page

Ident.: FMS.02.3.3 — 02 NOV 2026
ALL



CRUISE page in cruise

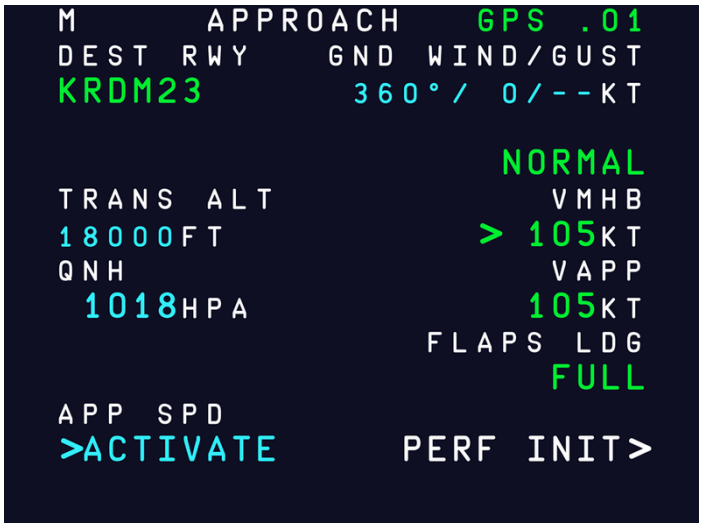
DEST (1L)	Destination (green).
ALTN (1R)	Alternate (cyan). Can be changed.
MEANWIND (2L / 2R)	Mean wind for the trip to the destination (left) and to the alternate (right), true direction and speed: `270/25`. Up to 155 kt.
ETA / GWT / EFOB	Predicted arrival time, gross weight and fuel at the destination (left) and the alternate (right). EFOB amber below the reserve.
CRZ ALT (5L)	Cruise altitude (same field as PERF INIT and VNAV 1/2).
1EO CEIL (5R)	One-engine-out ceilings: normal conditions (green) / icing conditions (amber). 1EO CEIL BST with the engine BOOST on.
CRZ MODE (6L)	LONG RANGE or MAX CRUISE: press to change. Enter a speed to fly a fixed cruise IAS.
PERF INIT> (6R)	Displays PERF INIT.

cont'd... ►►►

cont'd... ►►►

FMS.02.3.4 APPROACH Page

Ident.: FMS.02.3.4 — 02 NOV 2026
ALL



APPROACH page with destination QNH

DEST RWY (1L)	Destination and landing runway.
GND WIND/GUST (1R)	Surface wind at the destination: `direction/speed/gust`. Each value can be entered alone (`250`, `/15`, `//25`). CLR restores 360°/0/--KT. Used for the approach speed.
Status (2R)	NORMAL or **ICING**.
TRANS ALT (3L)	Transition altitude at the destination. Same field as VNAV 2/2.
QNH (4L)	Destination QNH, in the UNITS BARO SET unit. Amber boxes until entered. Same field as VNAV 2/2. Cannot be entered in descent below the transition level.
VMHB (3R)	Minimum maneuvering speed, high bank.
VAPP (4R)	Approach speed.
FLAPS LDG (5R)	The standard landing flap setting expected for landing: FULL. It does not follow the flap lever.
APP SPD >ACTIVATE (6L)	Activates the approach phase of the managed speed. ACT is shown beside APP SPD when active, and the prompt becomes >DESELECT. Not allowed on the ground or in go-around.
PERF INIT> (6R)	Displays PERF INIT.

Note

The approach phase of the managed speed is normally activated automatically. Use >ACTIVATE only when the approach speed is needed earlier.

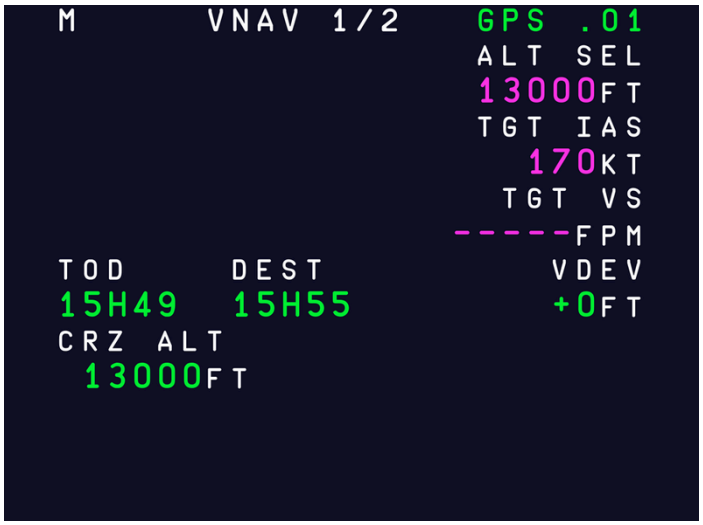
FMS.02.3.5 VNAV 1/2 Page

Ident.: FMS.02.3.5 — 02 NOV 2026
ALL

Displayed with the VNAV key.

cont'd... ►►►

cont'd... ►►►



VNAV 1/2 page at the cruise level

Next level point (1L)	Next level interception (for example ↑13000 for the top of climb) and its ETA.
STEP points (2L, 3L)	Waypoints with an altitude STEP, their level interception and ETA.
TOD / DEST (4L)	ETA at the top of descent and at the destination.
CRZ ALT (5L)	Cruise altitude. Can be entered here.
ALT SEL (1R)	Altitude selected on the FGCP (magenta).
TGT IAS (2R)	FMS target speed (magenta). With an RTA in the flight plan, the IAS that meets it in cruise and descent.
TGT VS (3R)	FMS target vertical speed (magenta). Computed after the TOD, and in cruise when the aircraft is more than 300 ft from CRZ ALT. Dashes otherwise.
VDEV (4R)	Vertical deviation from the FMS path: positive above the path, negative below.

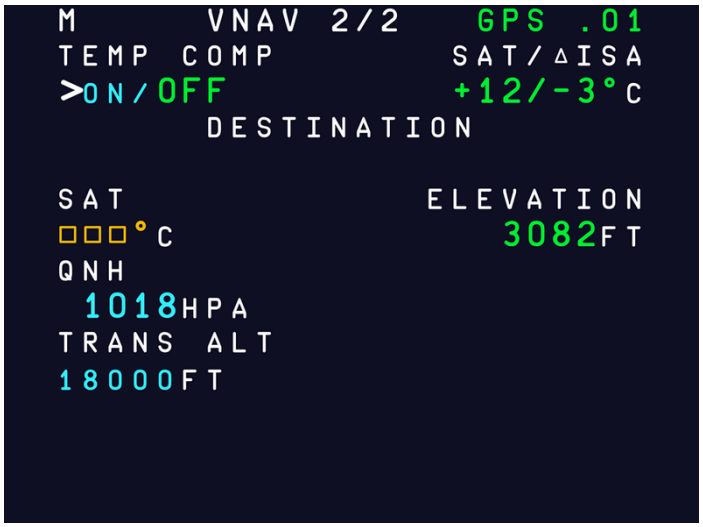
FMS predictions are computed up to the maximum ceiling of the day. Above it, the predictions are dashed.

cont'd... ►►►

cont'd... ►►►

FMS.02.3.6 VNAV 2/2 Page

Ident.: FMS.02.3.6 — 02 NOV 2026
ALL



VNAV 2/2 page

Displayed with VNAV pressed twice, or NEXT from VNAV 1/2.

TEMP COMP (1L)	ON / OFF. With ON, the altitude constraints of the approach and missed approach are corrected for the destination temperature. Corrected values show a small c and are underlined on the FPLN.
SAT/ΔISA (1R)	Present static air temperature and ISA deviation.
SAT (3L)	Destination temperature (crew entry). Needed for TEMP COMP.
ELEVATION (3R)	Destination elevation (database).
QNH (4L)	Destination QNH (shared with APPROACH).
TRANS ALT (5L)	Destination transition altitude (shared with APPROACH).
BARO / COMP ALT (6L)	Shown once the destination SAT is entered. Altitude calculator: enter a barometric altitude (for example the MDA); the compensated altitude is shown in green with a c.

The ISA alert (TEMP COMPENSATION RECOMMENDED) is raised when the destination is much colder than ISA.

FMS.02.3.7 Predictions

Ident.: FMS.02.3.7 — 02 NOV 2026
ALL

The FMS computes, along the FPLN, the TMPY and the SEC:

- the take-off speeds (non-limiting runway) and the approach speeds,
- the managed speed of each flight phase, in normal or icing conditions,
- the time (ETA, ETE), the fuel (EFOB) and the distance to each waypoint and to the destination,
- the top of climb and top of descent,
- the respect of the altitude, speed and time constraints,
- the one-engine-out ceilings.

cont'd... ►►►

cont'd... ►►►

The predictions are updated at each crew change and, in flight, every 10 s and at each waypoint sequencing. They use the weights, the CRZ ALT and CRZ MODE, the winds (MEANWIND and the WIND pages) and the FF FACTOR. Times come from the true airspeed at the predicted altitude and the wind. A holding pattern counts as one pattern, up to its next exit.

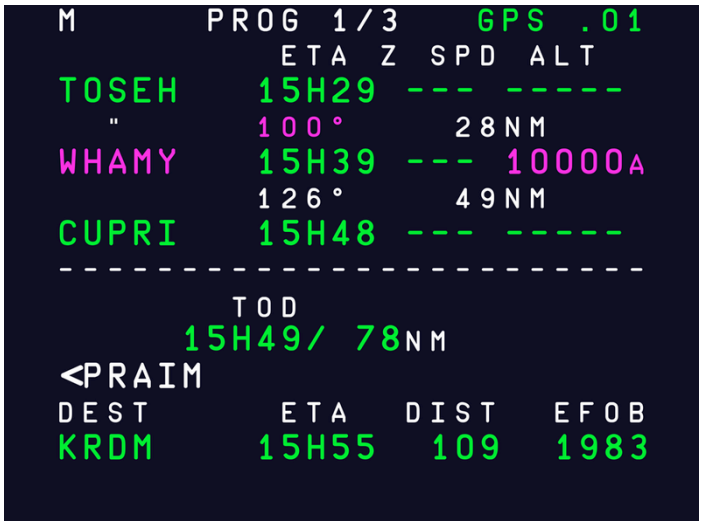
CAUTION

Without the weights (WEIGHT page) the FMS cannot compute the take-off speeds and the fuel predictions.

FMS.02.4 PROGRESS, DATA AND MESSAGES

FMS.02.4.1 PROG 1/3 Page

Ident.: FMS.02.4.1 — 02 NOV 2026
ALL



PROG 1/3 page in cruise, TOD next

Displayed with the PROG key. PROG pressed again (or NEXT) displays PROG 2/3, then PROG 3/3.

FROM / TO / NEXT (lines 1 to 3) The first three lines of the FPLN in ETA/SPD/ALT format. The TO is magenta.

Next vertical point — Next level interception, TOC or TOD (for example TOD), with its ETA and distance.

<PRAIM (5L) — Displays the PRAIM page (FMS.02.4.4).

DEST (6L) — Destination with its ETA, distance and EFOB. EFOB amber below the reserve.

cont'd... ►►►

cont'd... ►►►

FMS.02.4.2 PROG 2/3 Page

Ident.: FMS.02.4.2

02 NOV 2026

ALL



PROG 2/3 page in flight

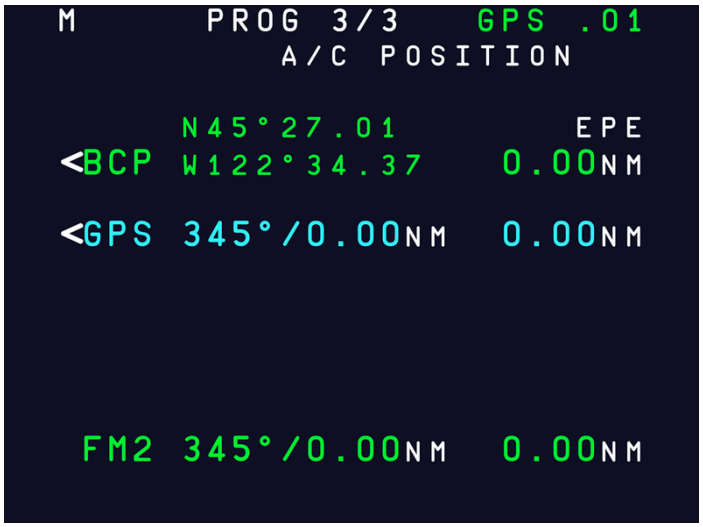
TO / DTK	TO waypoint (magenta) and desired track.
BRG / DIST	Bearing and direct distance from the aircraft to the TO waypoint.
TK / GS	Present track and ground speed.
DRIFT / XTK	Drift angle and cross-track error (L or R) from the active leg.
RNP (6L) / ANP	Required and actual navigation performance. The RNP default is computed by the FMS (small); the crew can enter a value (large). CLR restores the default.
WIND	Present wind. Dashed below 30 kt true airspeed (for example on the ground), unless a wind is entered on the BCP NAV page.
TTG	Time to go to the TO waypoint. Dashed below 8 kt ground speed.
FOB	Fuel on board.
TGT/IAS	FMS target speed (magenta) and present IAS.
TKE	Track angle error.
OFFSET	Present lateral offset (0.0 NM without offset).

cont'd... ►►►

cont'd... ►►►

FMS.02.4.3 PROG 3/3 Page

Ident.: FMS.02.4.3 02 NOV 2026
ALL



PROG 3/3 page

A/C POSITION page.

Selected mode	Position of the selected navigation mode (green) and its EPE (estimated position error).
<BCP (2L)	Best Computed Position mode (GPS and radio navaids mixed). Displays the BCP NAV page.
<GPS (3L)	GPS mode. Displays the GPS NAV page.
Stand-by mode	Bearing / distance from the FMS position to the position of the other mode, and its EPE (cyan).
FM2 (FM1)	Bearing / distance to the position of the opposite FMS, and its EPE. Dashed without cross talk.

On the BCP NAV and GPS NAV pages, SELECT< selects that navigation mode. The selected mode and its EPE are shown in the title line of every page (for example `GPS .01`). GPS NAV gives access to PRAIM>.

FMS.02.4.4 PRAIM

Ident.: FMS.02.4.4 02 NOV 2026
ALL

The predictive RAIM checks whether the GPS integrity (HIL) will be good enough at the destination, at a chosen waypoint, and along the flight plan. Satellites known to be out of service can be deselected. On the ground, <PRAIM opens PRAIM 2/2; in flight, PRAIM 1/2.

PRAIM 1/2	Predicted HIL at DEST and at a WPT (default: the alternate) at the ETA and at ETA ±5, ±10 and ±15 min. WPT (1R) and its ETA (2R) can be entered. HIL above 0.3 NM is amber.
PRAIM 2/2	Prediction along a flight plan: >ACT/SEC (1L) selects the plan, T/O TIME (1R, on the ground), criterion (2L), >START PREDICTION (3L, confirmed with EXEC; progress in %, >CANCEL PREDICTION while running), result OK or <RESULT FAIL (4L) for the details.
DESELECTED SATELLITES (5L / 5R)	Number of deselected satellites; enter a satellite number at 5R to deselect it.

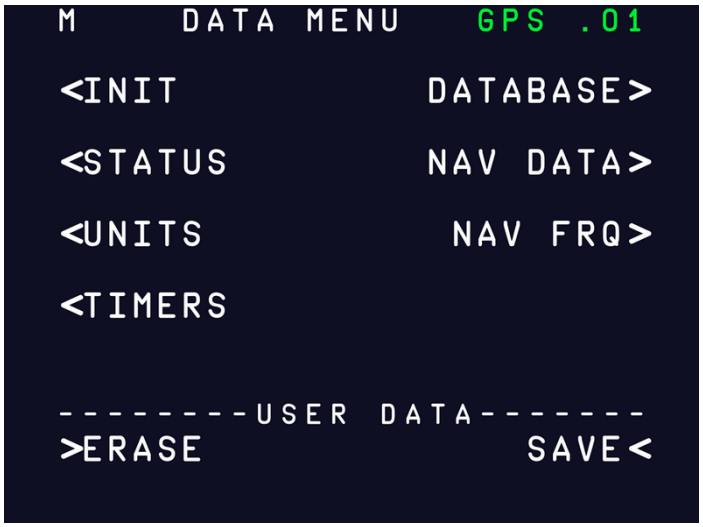
When the GPS integrity is predicted not available at the FAF or the MAP, the AIM alert is raised.

cont'd... ►►►

cont'd... ►►►

FMS.02.4.5 DATA MENU Page

Ident.: FMS.02.4.5 — 02 NOV 2026
ALL



DATA MENU page

Displayed with the DATA key.

<INIT (1L)	INIT page.
<STATUS (2L)	STATUS page (FMS.02.4.6).
<UNITS (3L)	UNITS page.
<TIMERS (4L)	TIMERS page.
DATABASE> (1R)	DATABASE page (FMS.02.4.7).
NAV DATA> (2R)	NAV DATA page.
NAV FRQ> (3R)	NAV FRQ page (FMS.02.4.8).
>ERASE (6L)	Erases the user data (pilot database, flight plans). First press arms the prompt (reverse video, PRESS EXEC TO CONFIRM); EXEC erases (ERASING DATA). A second press disarms.
SAVE< (6R)	Saves the user data (pilot database, MARK waypoints, company routes, SEC). One press, no confirmation (XFER DATA IN PROGRESS). Amber when unsaved changes exist (DTA alert).

SIMULATOR NOTE

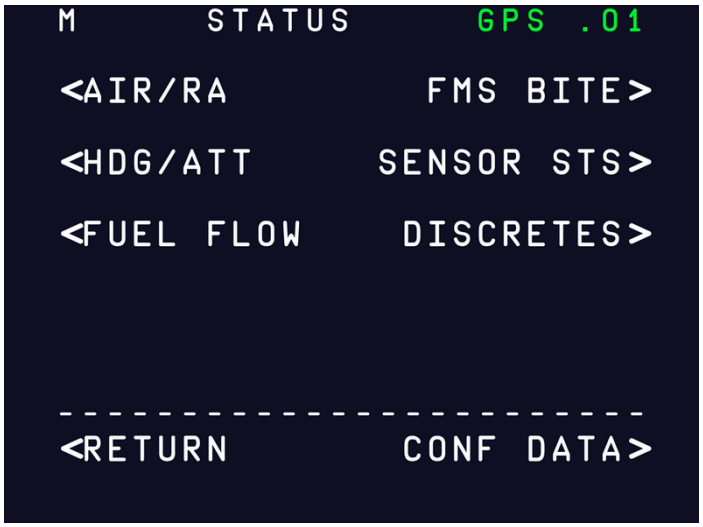
Saved user data are kept with the aircraft and loaded at the next session. MARK waypoints that were not saved are lost at the next FMS power-up.

cont'd... ►►►

cont'd... ►►►

FMS.02.4.6 STATUS Pages

Ident.: FMS.02.4.6 — 02 NOV 2026
ALL



STATUS page

Status of the systems that feed the FMS. Mainly for maintenance.

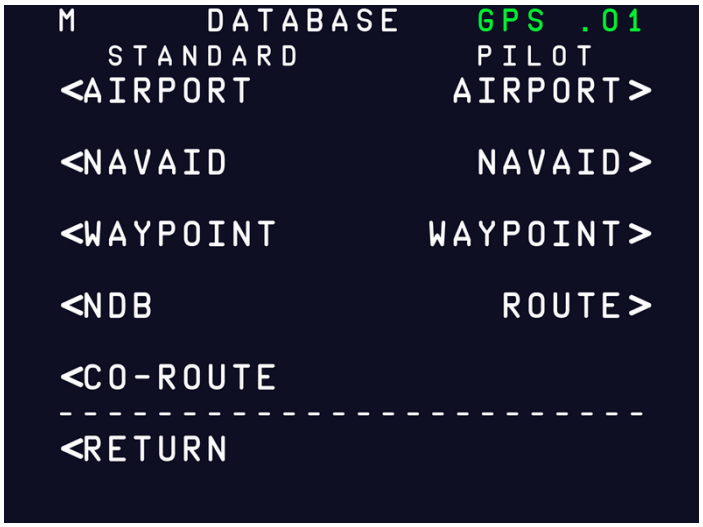
<AIR/RA (1L)	Air data of the ADC used (IAS, TAS, VZ, ZP, ZC, SAT, TAT) and radio height. When the air data fail (AIR alert), backup values can be entered here.
<HDG/ATT (2L)	Roll, pitch and heading of both AHRS; magnetic variation (VAR), heading reference and true heading. NAV HDG (5R) can be entered only when the heading is lost (HDG alert).
<FUEL FLOW (3L)	Fuel flow of each engine and total consumption (per hour and per NM). A backup fuel flow can be entered when the fuel flow fails (FFF alert).
FMS BITE> (1R)	Built-in test results; MCDU TEST<.
SENSOR STS> (2R)	GPS sensor status and mode (NAV, ACQ…).
DISCRETES> (3R)	Discrete inputs: weight on wheels, gear, flaps, battery and generators.
CONF DATA> (6R)	Configuration, performance and magnetic variation files with their CRC.
<RETURN (6L)	Back to DATA MENU.

cont'd... ►►►

cont'd... ►►►

FMS.02.4.7 Databases

Ident.: FMS.02.4.7 — 02 NOV 2026
ALL



DATABASE page

The DATABASE page (DATA MENU DATABASE>) gives access to the three navigation databases.

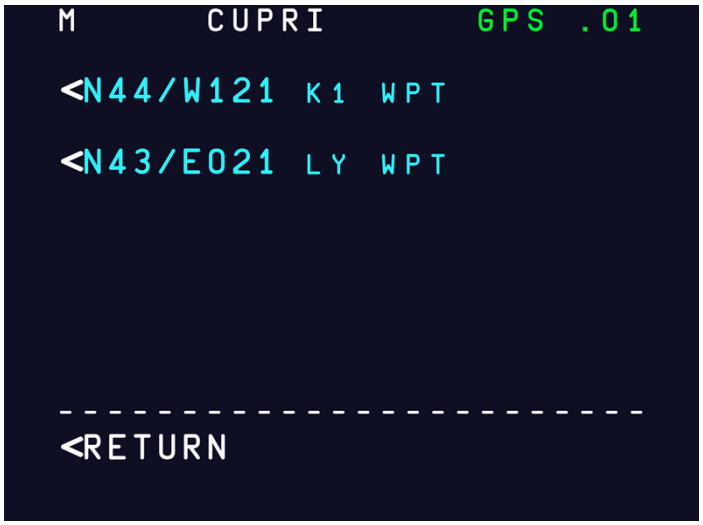
Standard database (left column)

<AIRPORT (1L)	STD APT: ident, position, elevation, magnetic variation, longest runway and name.
<NAVAID (2L)	STD NAVAID: ident, frequency or channel, type, figure of merit, position, elevation, declination and name.
<WAYPOINT (3L)	STD WPT: ident, type and position.
<NDB (4L)	STD NDB: ident, frequency, type and position.
<CO-ROUTE (5L)	List of the company routes. A route can be selected and loaded (ROUTE SEL, then EXEC).

On each STD page, enter the ident at 1L. When the ident exists more than once, the DATA LIST page shows every match with its position, ICAO region and type: select one.

cont'd... ►►►

cont'd... ►►►



DATA LIST — several waypoints with the same ident

Pilot database (right column)

AIRPORT> / NAVAID> / WAYPOINT> / ROUTE> PILOT DATA pages: list of the pilot records of each type. NEW> creates a record.

A pilot waypoint can be defined by a position, by place/bearing/distance or by two place/bearings. A pilot route is built like a flight plan (departure, en route, arrival) and can be loaded with ROUTE SELECT>. Pilot data that are not saved (SAVE< on DATA MENU) raise the DTA alert. To delete a record: CLEAR ? + its LSK, then EXEC.

Note

An ident already in the pilot database cannot be used again (IDENT ALREADY USED).

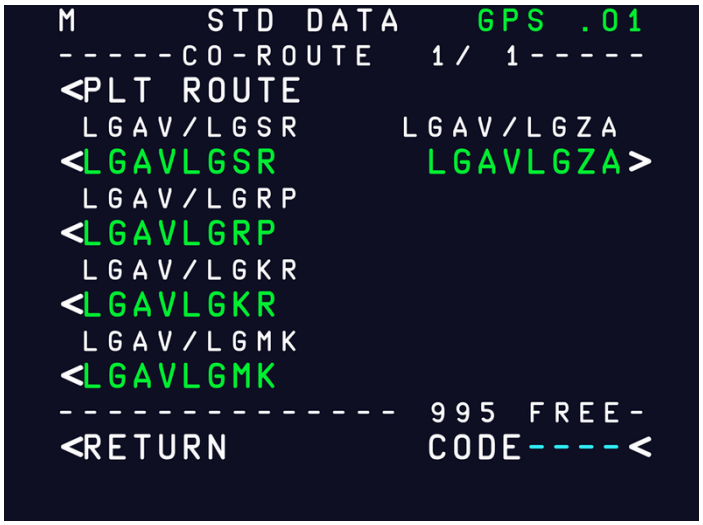
Company routes

Company routes are stored routes for the city pairs flown. They are offered by ROUTE SEL (IDENT or FROM/TO) and listed on the CO-ROUTE page. New company routes are created with NEW> on the CO-ROUTE page and edited like pilot routes.

cont'd... ►►►

FOR FLIGHT SIMULATION USE ONLY - NOT FOR REAL-WORLD OPERATIONS

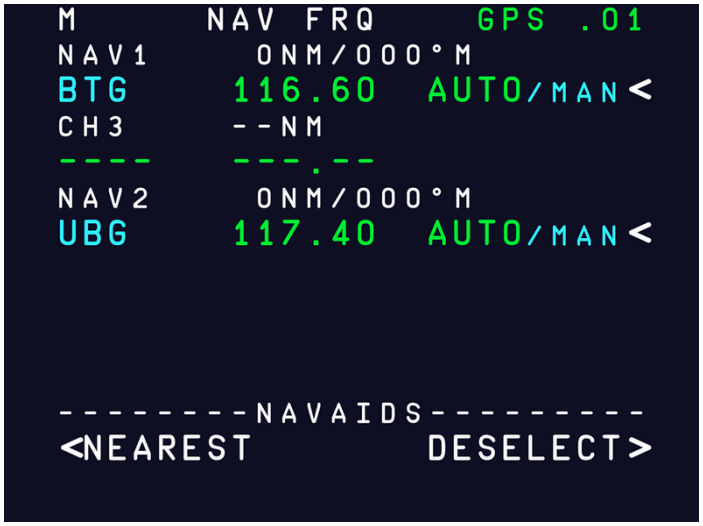
cont'd... ►►►



CO-ROUTE page with the factory company routes

FMS.02.4.8 NAV FRQ Page

Ident.: FMS.02.4.8 02 NOV 2026
ALL



NAV FRQ page

The FMS tunes the VOR / DME automatically to the best navaids for its radio position. The NAV FRQ page shows the three navaids used:

NAV1 (1L line) / NAV2 (3L line)	Ident, frequency, distance and bearing of the navaid on NAV 1 / NAV 2. AUTO/MAN< (1R / 3R): with AUTO, the FMS tunes the receiver; with MAN, the crew tunes it (RMS or VCP).
CH3	Navaid on the third DME channel, always tuned by the FMS (distance only).
<NEAREST (6L)	NEAREST page: the nearest VHF and NDB navaids (VHF NAV> / NDB NAV>).
DESELECT> (6R)	Up to ten navaids the FMS must not use (for example a navaid out of service). ALREADY DESELECTED if entered twice.

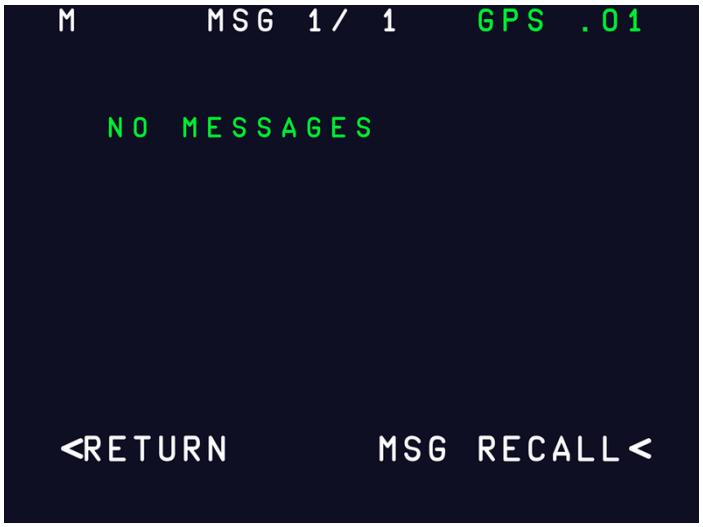
The R/N alert is raised when the radio position is not accurate enough or when the autotuning fails.

cont'd... ►►►

cont'd... ►►►

FMS.02.4.9 MESSAGE Page

Ident.: FMS.02.4.9 — 02 NOV 2026
ALL



MESSAGE page with no alert

Displayed with the MSG key. Up to two alerts per page, by priority; NEXT / PREV show the others. The list is frozen while the page is displayed. The title line shows the code of the highest-priority alert.

>CLEAR (2L / 4L)	Removes the alert on this MCDU only (cleared, or masked until the cause changes). Not shown for alerts that cannot be removed.
Action prompt (2R / 4R)	CHECK>, INSERT>, UPDATE>, SAVE>…: displays the page where the crew can act on the alert.
MSG RECALL< (6R)	Shows again the alerts that were masked.
<RETURN (6L)	Back.

With no alert, NO MESSAGES is shown. The alerts are listed in FMS.01.5.

FMS.02.4.10 MARK Page

Ident.: FMS.02.4.10 — 02 NOV 2026
ALL

The MRK key stores the present FMS position as a pilot waypoint named MKnnn and displays the MARK page:

MKnnn AT time	Name and time of the mark (UTC, or local when DIFF is set).
Position	Frozen position (green).
UPD AT / BRG / DIST (2L)	To update the FMS position: enter the ident of the point actually overflown at the mark time, or an ident/bearing/distance.
LAT/LONG (3L)	Or enter the position of that point.
UPDATE POSITION?	Shown with the position difference (ΔPOS) once a point is entered, with PRESS EXEC TO CONFIRM. EXEC shifts the FMS position by this difference.
<RETURN (6L)	Back.

cont'd... ►►►

cont'd... ►►►

MARK waypoints can be used like any pilot waypoint (DIRECT TO, FPLN). They are kept only if saved (SAVE< on DATA MENU).

FMS.02.5 RADIO MANAGEMENT (RMS)

FMS.02.5.1 General

Ident.: FMS.02.5.1 — 07 NOV 2026
ALL

The RMS key (or <RMS 1 / <RMS 2 on the MCDU MENU) connects the MCDU to the radio management system. The RMS pages set the VHF COM, the transponder, the TCAS and the radio navigation receivers. <RMS 1 connects the MCDU to the side 1 radios (NAV 1), <RMS 2 to the side 2 radios (NAV 2). The RMS key connects MCDU 1 to RMS 1 and MCDU 2 to RMS 2 until another RMS is selected on the MCDU MENU.

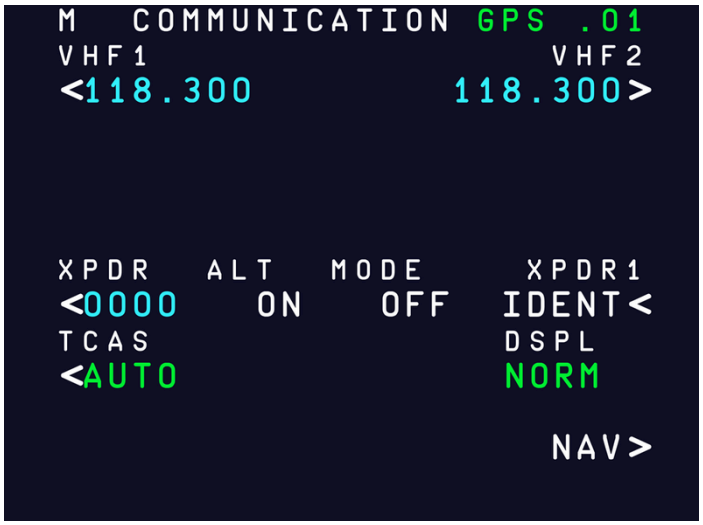
On all RMS pages, a two-state field shows the active state in green large and the other in cyan small; pressing its LSK changes it.

Note

While the RMS is displayed, the FMS annunciators (EXEC, MSG, POS, OFST) keep their last state.

FMS.02.5.2 COMMUNICATION Page

Ident.: FMS.02.5.2 — 28 OCT 2026
ALL



COMMUNICATION page

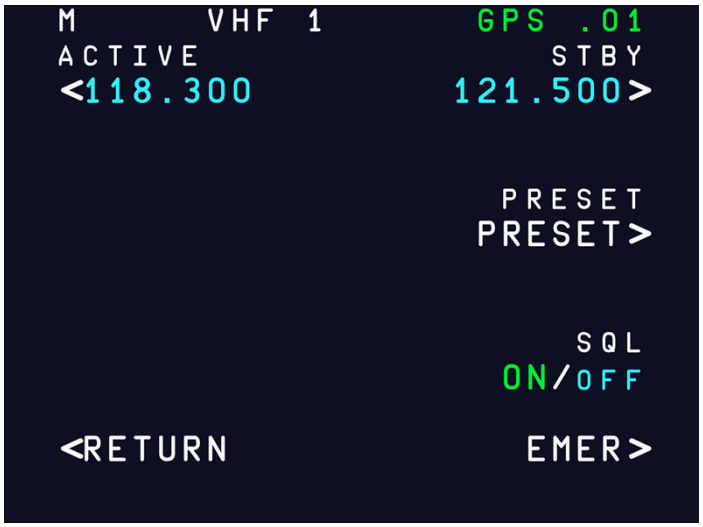
VHF1 (1L) / VHF2 (1R)	Active frequency. A frequency in the scratchpad + LSK tunes it directly. With an empty scratchpad, the LSK displays the VHF 1 / VHF 2 page.
XPDR (4L)	Transponder code. A 4-digit code + LSK sets it. With an empty scratchpad, displays the XPDR page. ALT and MODE show the altitude reporting and the transponder mode.
XPDR1 IDENT< (4R)	Sends the IDENT of the transponder in use.
TCAS (5L)	TCAS mode (AUTO, TA ONLY, STBY) and display (DSPL). Displays the TCAS page.
NAV> (6R)	Displays the NAV page.

cont'd... ►►►

cont'd... ►►►

FMS.02.5.3 VHF 1 / VHF 2 Pages

Ident.: FMS.02.5.3 — 28 OCT 2026
ALL



VHF 1 page

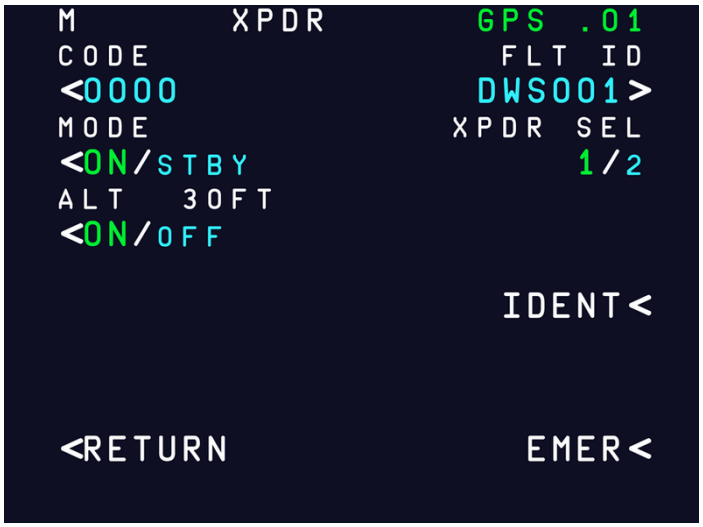
ACTIVE (1L)	Active frequency. Enter a frequency in MHz.
STBY (1R)	Standby frequency.
PRESET> (3R)	VHF PRESET page: ten channels CH1 to CH10. A frequency + LSK stores it in the channel; an empty scratchpad + LSK makes the channel frequency active; CLEAR ? + LSK empties the channel.
SQL (5R)	Squelch ON / OFF.
EMER> (6R)	Tunes 121.500 MHz as active frequency.
<RETURN (6L)	Back to COMMUNICATION.

cont'd... ►►►

cont'd... ►►►

FMS.02.5.4 XPDR Page

Ident.: FMS.02.5.4 — 28 OCT 2026
ALL



XPDR page

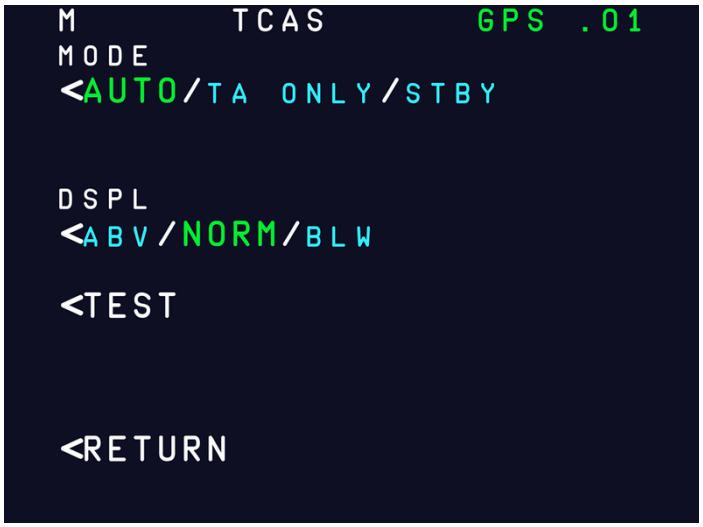
CODE (1L)	Transponder code (4 digits, 0 to 7).
FLT ID (1R)	Flight identification sent by the transponder.
MODE (2L)	ON / STBY.
XPDR SEL (2R)	Transponder in use, 1 / 2.
ALT (3L)	Altitude reporting ON / OFF. The present altitude is shown in the label.
IDENT< (4R)	Sends the IDENT.
EMER< (6R)	Arms code 7700 (PRESS EXEC TO CONFIRM). EXEC sets it.
<RETURN (6L)	Back to COMMUNICATION.

cont'd... ►►►

cont'd... ►►►

FMS.02.5.5 TCAS Page

Ident.: FMS.02.5.5 — 28 OCT 2026
ALL

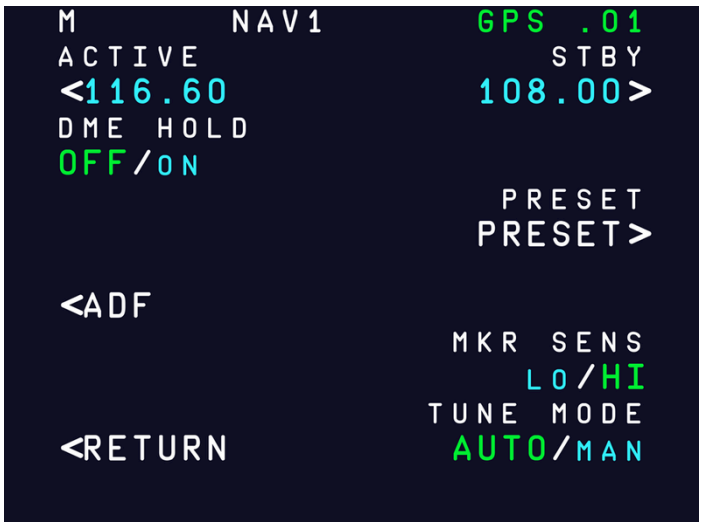


TCAS page

MODE (1L)	AUTO / TA ONLY / STBY. Each press selects the next mode.
DSPL (3L)	Display band ABV / NORM / BLW.
<TEST (4L)	Starts the TCAS self-test.
<RETURN (6L)	Back to COMMUNICATION.

FMS.02.5.6 NAV and ADF Pages

Ident.: FMS.02.5.6 — 07 NOV 2026
ALL



NAV1 page

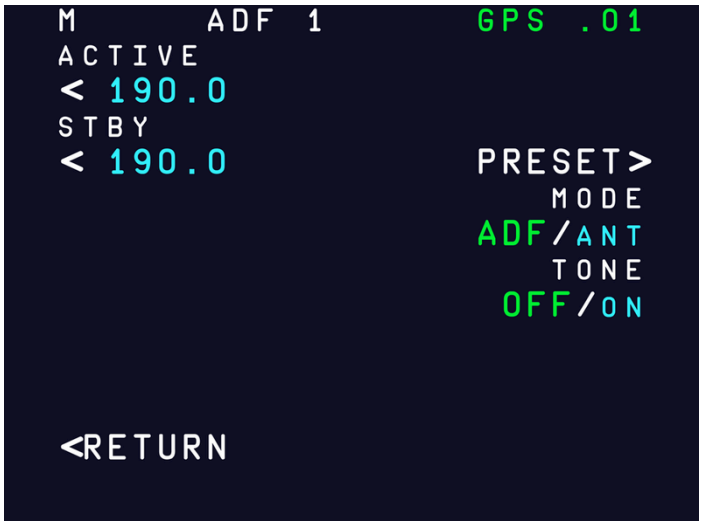
cont'd... ►►►

cont'd... ►►►

NAV page (NAV> on COMMUNICATION)

ACTIVE (1L) / STBY (1R)	VOR / ILS active and standby frequencies.
DME HOLD (2L)	OFF / ON. With ON, the DME stays on the present frequency when the VOR / ILS frequency changes.
PRESET> (3R)	NAV PRESET page: ten channels CH1 to CH10 (108.00 to 117.95 MHz). A frequency + LSK stores it in the channel; an empty scratchpad + LSK makes the channel frequency the STBY frequency; CLR + LSK empties the channel.
<ADF (4L)	Displays the ADF page.
MKR SENS (5R)	Marker sensitivity LO / HI.
TUNE MODE (6R)	AUTO / MAN. With AUTO, the FMS tunes the VOR / ILS (see NAV FRQ, FMS.02.4.8).
<RETURN (6L)	Back to COMMUNICATION.

ADF page



ADF 1 page

ACTIVE (1L) / STBY (2L)	ADF active and standby frequencies.
PRESET> (2R)	ADF PRESET page: ten channels CH1 to CH10 (190.0 to 1799.5 kHz), used as the NAV PRESET page.
MODE (3R)	ADF / ANT.
TONE (4R)	OFF / ON (identification tone).
<RETURN (6L)	Back to the NAV page.

The aircraft has one ADF.

PAGE

INTENTIONALLY

LEFT BLANK

SIM.1 EFB - GENERAL

SIM.1.1 Description

Ident.: SIM.1.1 — 10 NOV 2026

SIMULATOR ONLY

The Electronic Flight Bag (EFB) is a tablet available on the CAPT and F/O sides. It gathers the simulation tools: flight planning, loading, performance, charts, documents, airport weather, navigation database, hardware set-up, ground handling, systems synoptics, cabin panel, yoke notes, failures and settings.

The EFB is shown:

- on the tablet in the 3D cockpit,
- in an X-Plane pop-up window, which can be moved, resized, or moved out of the X-Plane window to a second monitor.

The figures of this chapter show the EFB during the preparation of a flight from Portland (KPDX) to Redmond (KRDM), parked at the gate on ground power.

SIMULATOR NOTE

To open the pop-up, click the pop-out icon in the status bar ((4) below), or select **Show EFB** in the aircraft menu of X-Plane (command `DWSim/Screens/Popup/EFB`). In the pop-up, the same icon closes it.
`DWSim/Screens/Popup/CloseAll` closes every pop-up. In VR, the EFB pop-up opens as a VR window (see SIM.7.5).

SIM.1.2 Home Page

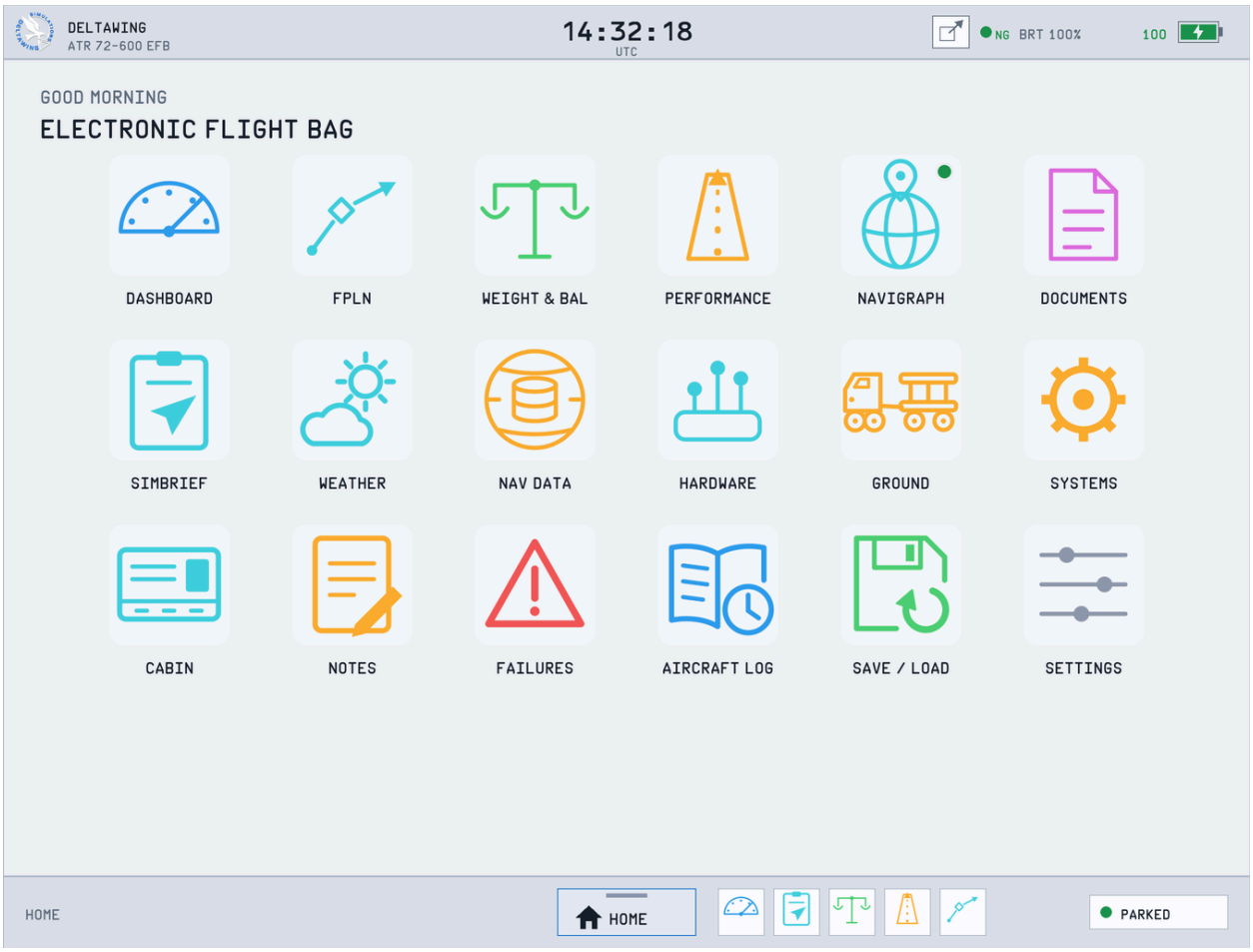
Ident.: SIM.1.2 — 02 NOV 2026

SIMULATOR ONLY

The HOME page shows a greeting (GOOD MORNING, GOOD AFTERNOON or GOOD EVENING, from the local time at the aircraft), the title ELECTRONIC FLIGHT BAG, and the application icons. Click an icon to open the application: it opens with a zoom from its icon.

cont'd... ►►►

cont'd... ►►►



EFB HOME page

ICON	PAGE TITLE	USE	REFERENCE
DASHBOARD	DASHBOARD	Flight summary	SIM.1.4
FPLN	FPLN	View, type, build and store routes	SIM.2.1
WEIGHT & BAL	WEIGHT & BALANCE	Payload, fuel and CG	SIM.3.1
PERFORMANCE	PERFORMANCE	Take-off and landing speeds, RTOW	SIM.3.2
NAVIGRAPH	NAVIGRAPH	Moving map and charts	SIM.2.3
DOCUMENTS	DOCUMENTS	Document viewer	SIM.2.4
SIMBRIEF	SIMBRIEF	Import of the SimBrief flight plan	SIM.2.2
WEATHER	WEATHER	METAR, TAF and simulated weather of an airport	SIM.2.6
NAV DATA	NAV DATA	Navigation and airport databases	SIM.2.5
HARDWARE	HARDWARE	Hardware levers and selector / encoder knobs	SIM.6.3
GROUND	GROUND & CONFIG	Doors, ground services, ground equipment, boarding, aircraft state	SIM.4.1
SYSTEMS	SYSTEMS	Electrical, hydraulic, fuel and engine synoptics	SIM.4.2
CABIN	CABIN PANEL (FAP)	Remote cabin panel	SIM.4.3
NOTES	YOKE NOTES	Paper notes on the control columns	SIM.4.4

cont'd... ►►►

cont'd... ►►►

ICON	PAGE TITLE	USE	REFERENCE
FAILURES	FAILURES	Failure training	SIM.4.5
SETTINGS	SETTINGS	EFB, aircraft and application settings	SIM.5

The NAVIGRAPH icon carries a dot: green when the EFB is signed in to Navigraph with a charts subscription, amber otherwise.

SIM.1.3 Status Bar and Dock

Ident.: SIM.1.3 — 02 NOV 2026
SIMULATOR ONLY

The status bar is at the top of every page, the dock at the bottom.



Status bar and dock

cont'd... ►►►

cont'd... ►►►

① Product

DeltaWing logo and product name, ATR 72-600 EFB.

② Clock

Time, with the suffix UTC or LCL, as selected in SETTINGS, TIME & CLOCK. In 12H format the suffix is AM or PM.

③ Navigraph status

NG green	Signed in.
NG cyan	Sign-in in progress.
NG amber	Session saved, not connected.

No indication when no Navigraph session exists.

④ Pop-out icon

Opens the EFB as a pop-up window, or closes the pop-up.

⑤ Brightness

Display brightness, in %.

⑥ Battery

Tablet battery indication.

Frame rate

With SETTINGS, DISPLAY, FPS IN STATUS BAR set to SHOW, the status bar also shows the frame rate of X-Plane (n FPS), to the left of the pop-out icon:

Green	30 FPS and above.
Amber	20 to 29 FPS.
Red	Below 20 FPS.

The indication is off by default (see SIM.5.2).

⑦ Application name

Name of the current application (HOME on the HOME page).

⑧ HOME

Shows the HOME page and clears the BACK history.

⑨ Recent applications

Icons of the most recently opened applications, the most recent first (as many as fit: five in landscape). Click an icon to go directly to that application. A dot marks the current application.

⑩ Flight phase

PARKED, TAXI, TAKEOFF, CLIMB, CRUISE or DESCENT, from the ground speed and the vertical speed.

Page header

Each application page has a **BACK** button and the page title.

cont'd... ►►►

cont'd... ►►►

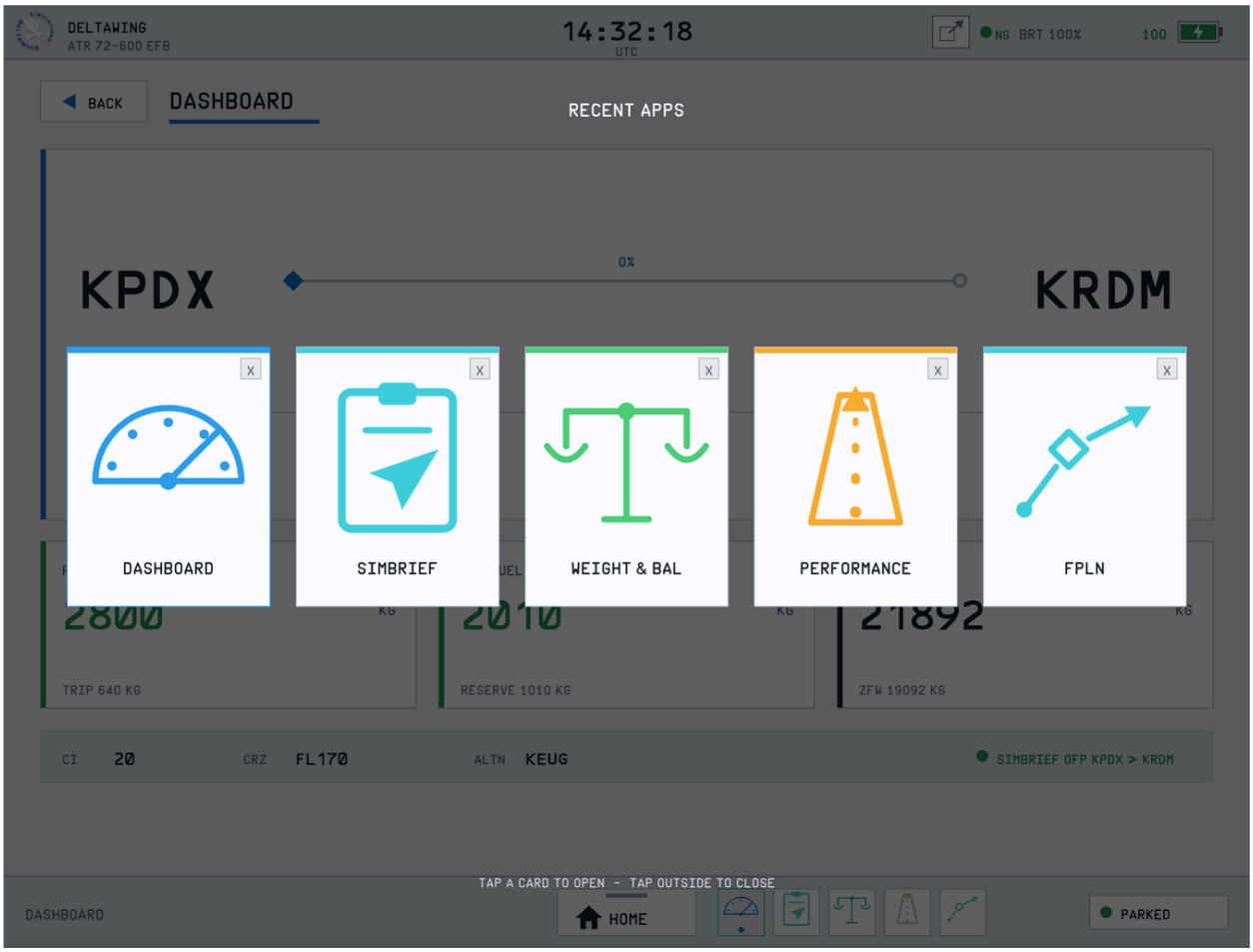
BACK	Returns to the previous page (up to 16 pages back). With no previous page, BACK shows the HOME page. In a sub-page (SETTINGS page, T/O RUNWAY, DETENTS), BACK returns to the main page of the application.

Gestures

The dock is also a gesture surface (drag with the mouse, left button held):

- swipe up: HOME page,
- long swipe up: RECENT APPS switcher,
- swipe left / right: next / previous recent application.

A press on the dock that moves less than a swipe is a click: it operates the HOME button or the recent application under it. In VR, a small movement of the controller between the press and the release of the trigger therefore does not cancel the click.



RECENT APPS switcher

In the RECENT APPS switcher, click a card to open the application, click X on a card to remove it from the list, click outside the cards to close the switcher.

Scrolling lists

Every list or page that scrolls (CHARTS, the MAP chart list, FPLN, the route builder lists, SETTINGS, FAILURES, GROUND, HARDWARE, the DOCUMENTS chapter list, WEATHER) can be scrolled by dragging the list itself, with the

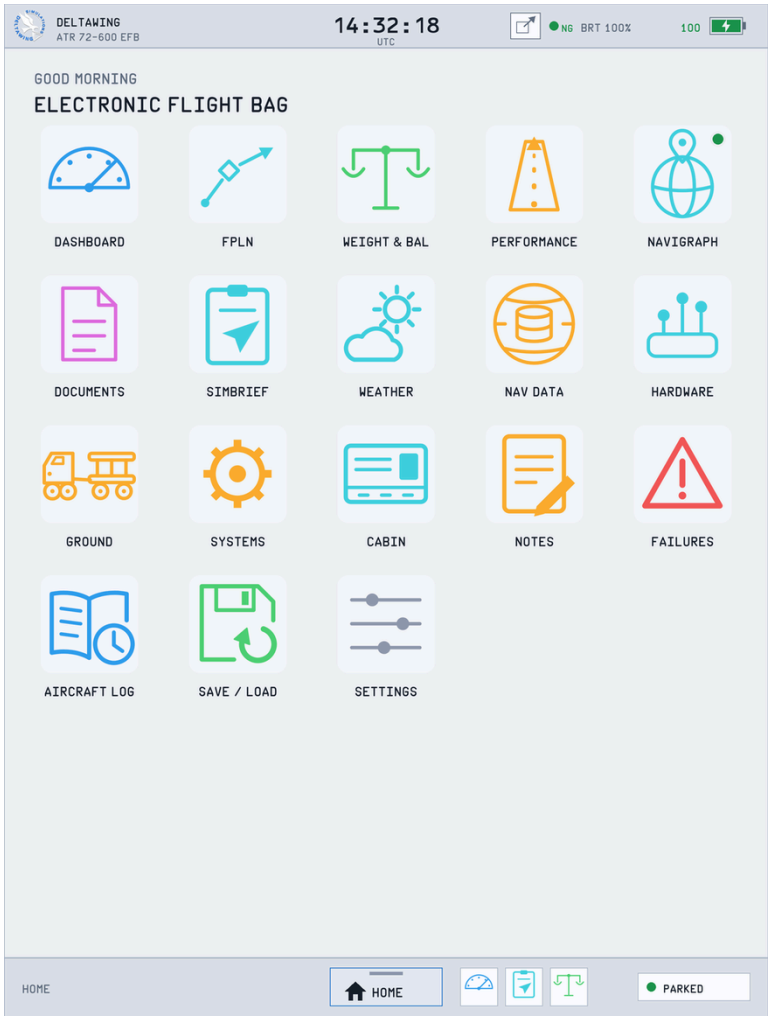
cont'd... ►►►

cont'd... ►►►

mouse (left button held) or with the VR controller (trigger held). There is no need to aim at the scroll bar. A press that does not move selects the item under it when the button or the trigger is released. The mouse wheel and the arrow buttons also scroll the lists.

Orientation and screen lock

The EFB operates in landscape or portrait orientation. The pages rearrange for the orientation. The screen can also be locked: it fades to black, the applications keep running, and clicks are ignored.



HOME page, portrait orientation

SIMULATOR NOTE

Commands: `DWSim/ATR_Series/commands/efb/rotateToggle`, `.../rotatePortrait`, `.../rotateLandscape` and `.../lockToggle`. The rotation takes 0.5 s. The lock is also the side button of the tablet in the 3D cockpit. In portrait, the pop-up window has its own portrait layout.

Keyboard

A text field of the EFB (route, ICAO code, loadsheet value, note) accepts the computer keyboard after a click on it. The status bar then shows KEYBOARD CAPTURED · ESC. ESC, or a click on that indication, releases the keyboard.

cont'd... ►►►

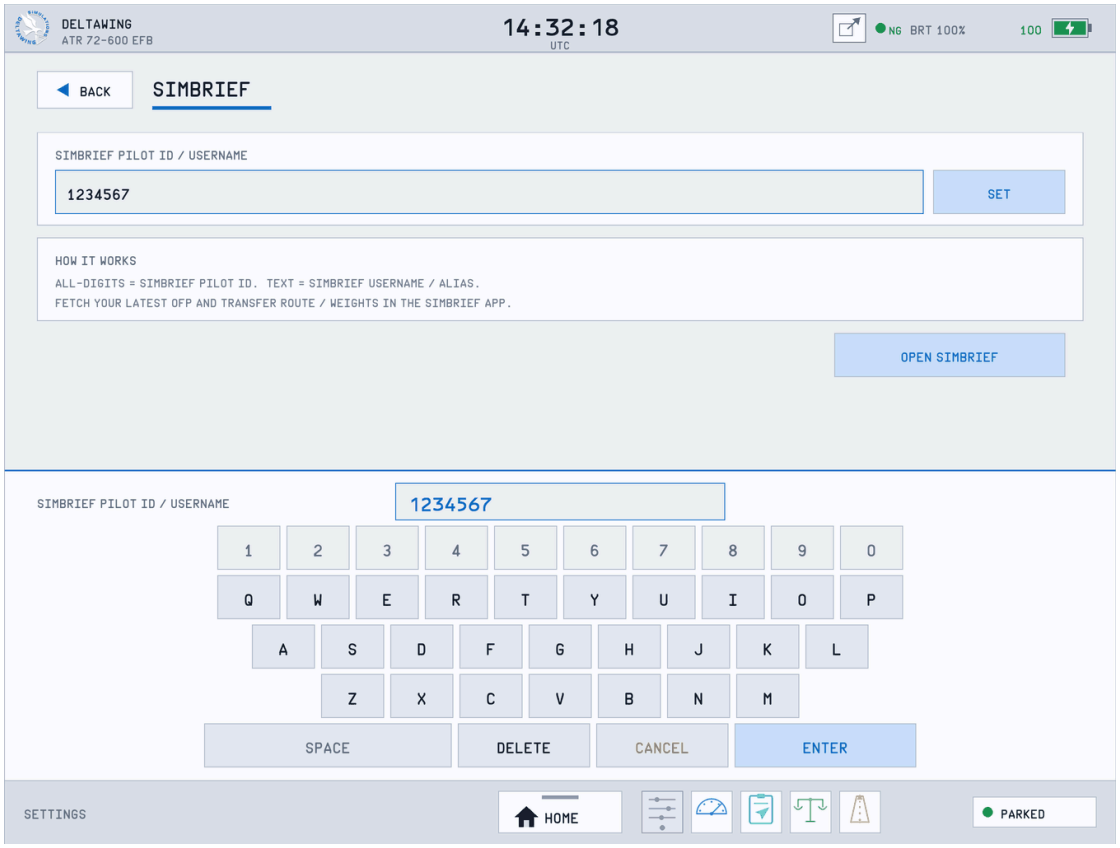
cont'd... ►►►

The route and the entry fields of the FPLN application have a text cursor. Typing inserts at the cursor, and BACKSPACE (DELETE on the EFB keyboard) removes the character before it. The DELETE key of the computer keyboard removes the character after it. To move the cursor:

- click the text: the cursor goes to the nearest character,
- use the left and right arrow keys of the FPLN keyboard (hold to repeat),
- use the LEFT and RIGHT arrow keys, HOME and END of the computer keyboard.

A long route scrolls sideways so that the cursor stays in view.

A field with no keys on its page (loadsheet value, declared runway length, SimBrief pilot ID) also opens an on-screen keyboard at the bottom of the screen, with the entry shown above the keys. ENTER sets the entry and CANCEL closes the keyboard without a change. The computer keyboard types into the same entry. In VR, this on-screen keyboard is the way to type, as X-Plane does not show its VR keyboard for aircraft screens.



On-screen keyboard, SIMBRIEF PILOT ID field

SIM.1.4 DASHBOARD

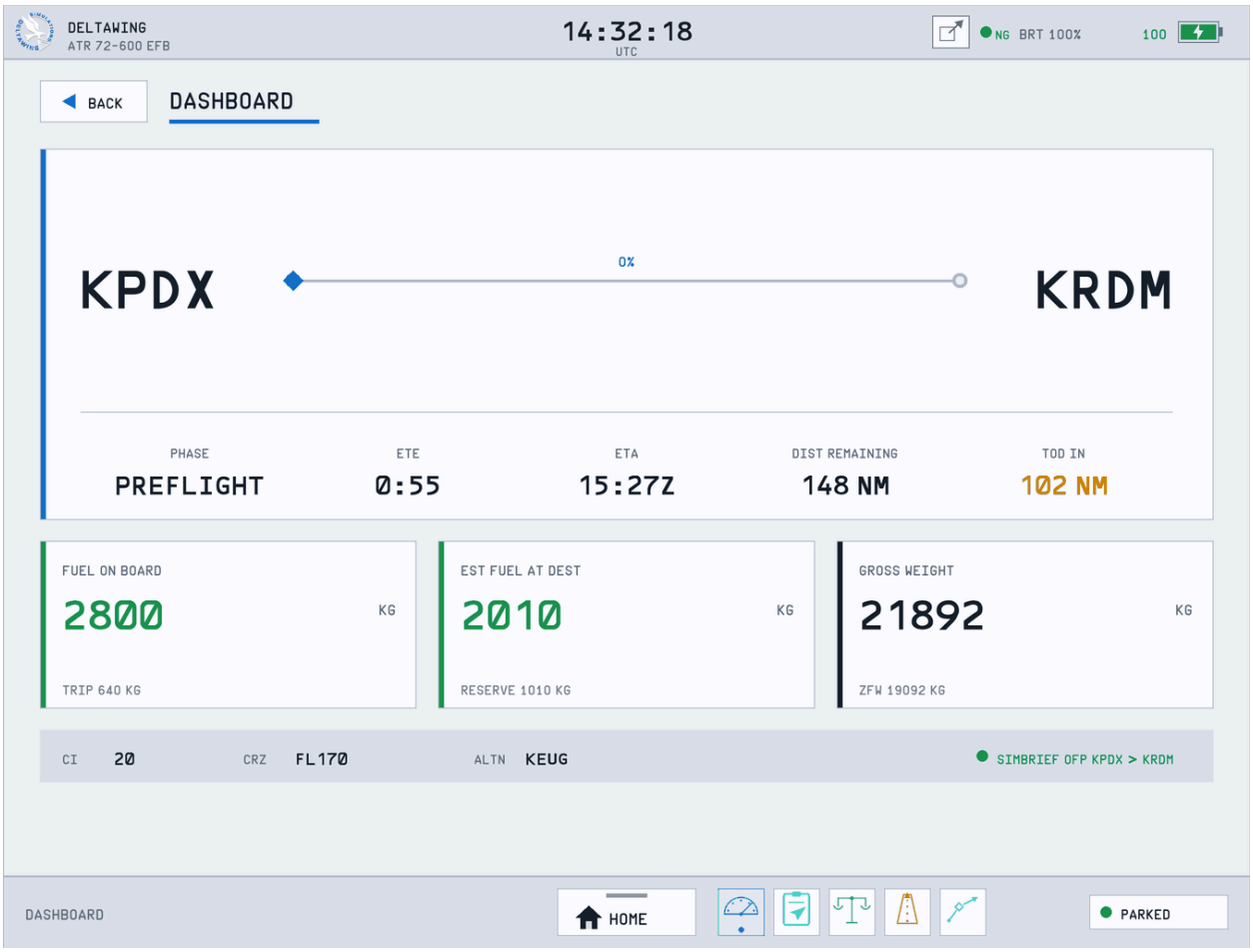
Ident.: SIM.1.4 — 30 OCT 2026

SIMULATOR ONLY

The DASHBOARD summarises the current flight.

cont'd... ►►►

cont'd... ►►►



DASHBOARD

Flight plan

With an active flight plan (entered on the MCDU, or loaded from FPLN or SIMBRIEF), the DASHBOARD shows the origin and destination, a progress bar with the percentage flown, and the predictions:

PHASE	Flight phase of the FMS.
ETE	Estimated time en route.
ETA	Estimated time of arrival at destination (UTC, suffix Z).
DIST REMAINING	Distance to destination along the route.
TOD IN	Distance to the top of descent (amber), until the descent starts.

With no active flight plan, it shows NO ACTIVE FLIGHT PLAN and ENTER A ROUTE ON THE MCDU OR LOAD ONE IN FPLN.

Summary cards

FUEL ON BOARD	Fuel on board, with the trip fuel below.
EST FUEL AT DEST	Estimated fuel at destination, with the reserve below (final reserve, contingency and alternate fuel, or the reserve entered on the MCDU). Amber when below the reserve.

cont'd... ►►►

cont'd... ►►►

GROSS WEIGHT Gross weight, with the ZFW below.

The bottom line shows the cost index (CI), cruise level (CRZ) and alternate (ALTN), as the MCDU shows them.

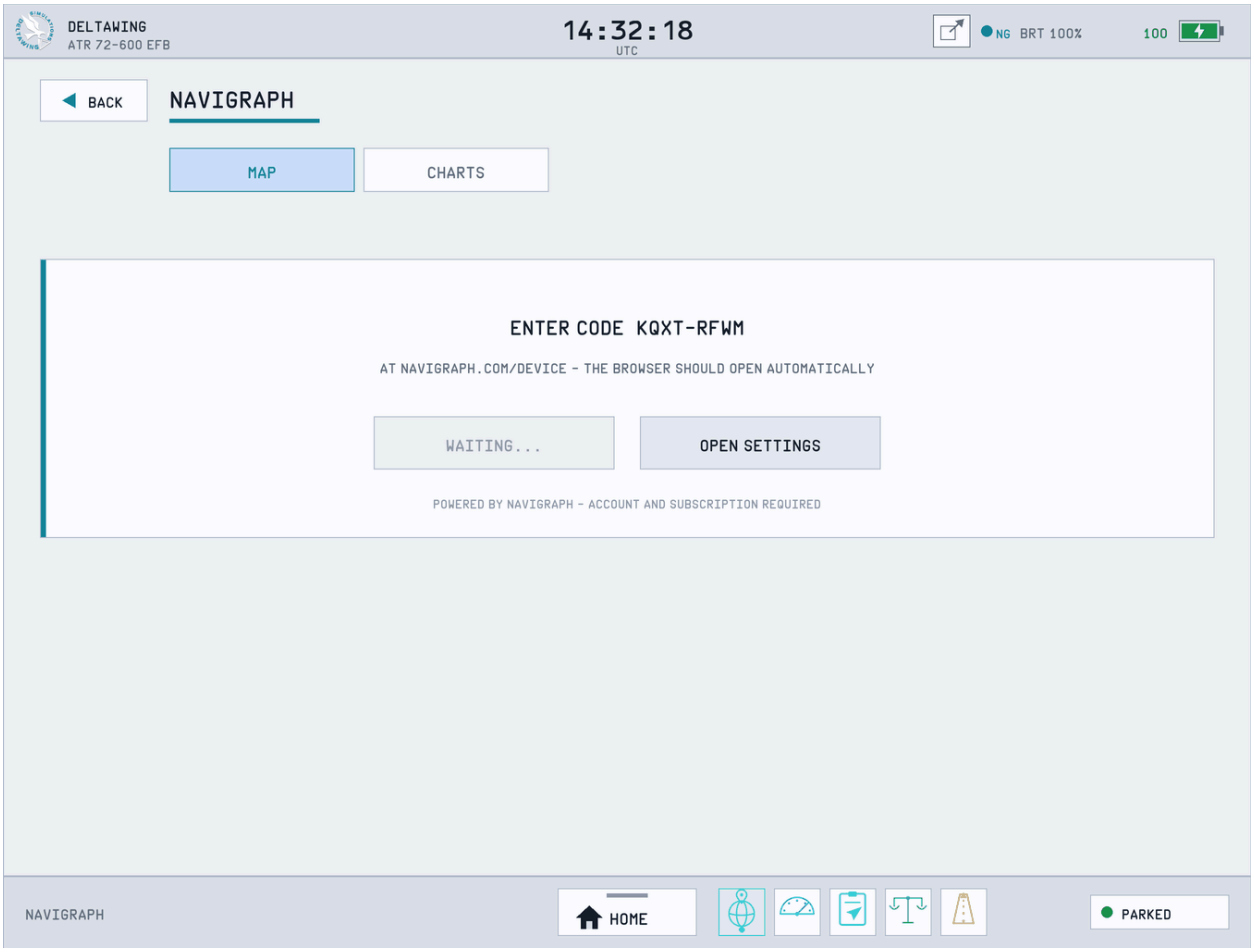
When an update of the package is available, an amber **UPDATE AVAILABLE** banner shows the new version.

SIM.1.5 Navigraph Sign-In

Ident.: SIM.1.5 30 OCT 2026

SIMULATOR ONLY

The NAVIGRAPH map and charts need a Navigraph account with an active charts subscription. Until the EFB is signed in, the NAVIGRAPH application shows the reason and two buttons.



NAVIGRAPH sign-in, code displayed

CONNECT NAVIGRAPH Starts the sign-in. The EFB shows ENTER CODE with a short code, and a web browser opens at the Navigraph device page (NAVIGRAPH.COM/DEVICE). Sign in and approve the code in the browser. WAITING… shows until the sign-in is complete. With a saved session, CONNECT resumes it without a code.

OPEN SETTINGS Opens SETTINGS (see SIM.5.10).

cont'd... ►►►

cont'd... ►►►

MESSAGE	MEANING
NOT SIGNED IN	No Navigraph session.
SESSION SAVED — NOT CONNECTED	A session is saved. CONNECT resumes it.
CONNECTING TO NAVIGRAPH…	Sign-in in progress.
NAVIGRAPH LOGIN ERROR	The sign-in failed. The reason is shown in plain words below, and written to the log.
NO ACTIVE NAVIGRAPH SUBSCRIPTION	Signed in, but the account has no charts subscription.
NAVIGRAPH LIBRARY FAILED TO LOAD	The Navigraph library could not start. CONNECT retries.

When the sign-in is complete, the session is saved. It can be restored automatically at each start (SETTINGS, NAVIGRAPH, AUTO-CONNECT ON LOAD).

SIM.2 EFB - FLIGHT PLANNING AND NAVIGATION DATA

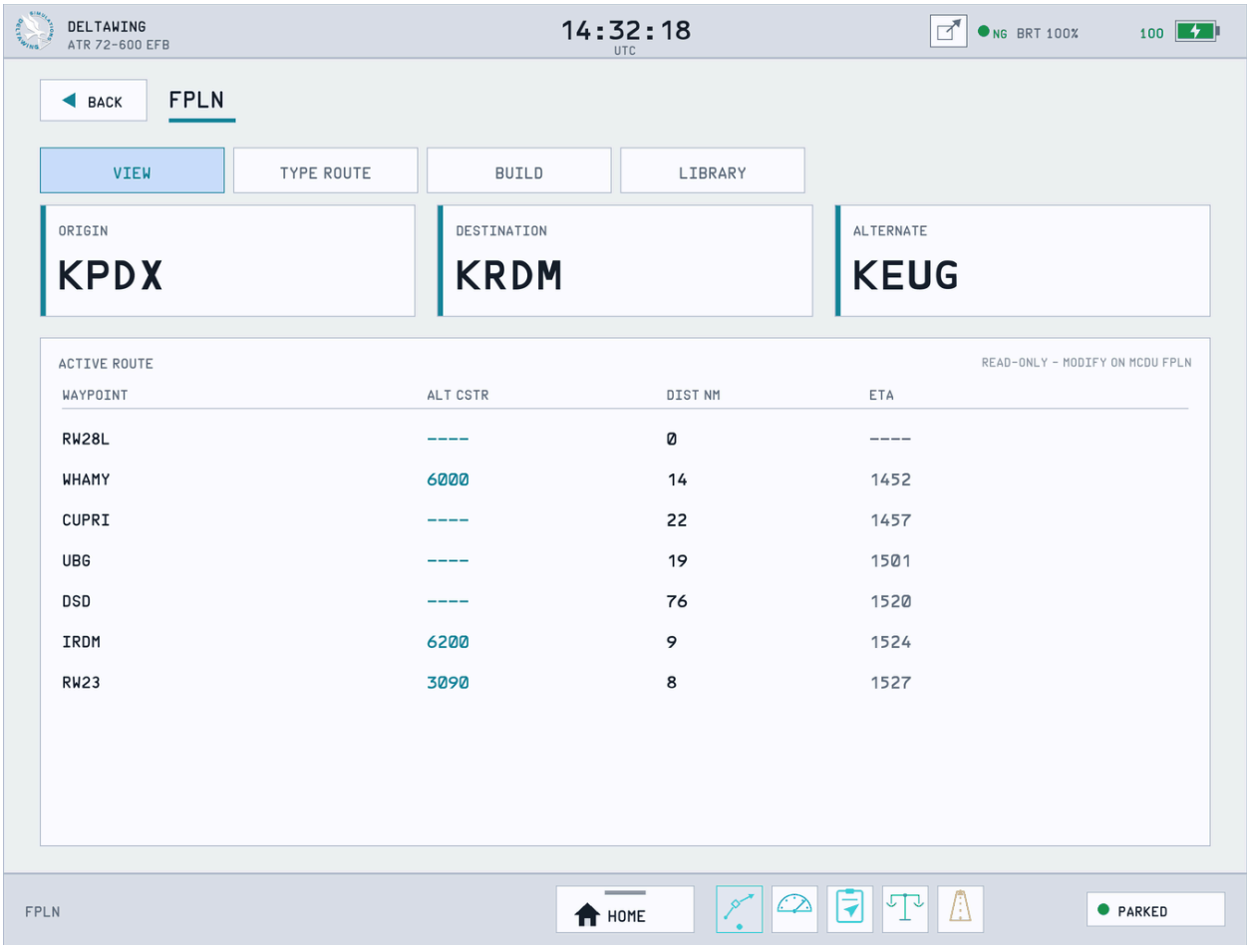
SIM.2.1 FPLN

Ident.: SIM.2.1 — 30 OCT 2026

SIMULATOR ONLY

The FPLN application shows the active flight plan, and creates flight plans for the FMS from a typed route, from a selection of procedures, or from a library of company routes. It has four tabs: **VIEW**, **TYPE ROUTE**, **BUILD** and **LIBRARY**.

VIEW tab



FPLN, VIEW tab

VIEW shows the active flight plan of the FMS. It is read only (READ-ONLY — MODIFY ON MCDU FPLN).

ORIGIN / DESTINATION / ALTERNATE — Airports of the active flight plan.

ACTIVE ROUTE — List of waypoints with their altitude constraint (ALT CSTR), distance from the previous waypoint (DIST NM) and ETA. Discontinuities show as --- DISCONTINUITY ---. The list scrolls with the mouse wheel, by drag, or with the arrow buttons.

With no active flight plan, the tab shows NO ACTIVE FPLN.

cont'd... ►►►

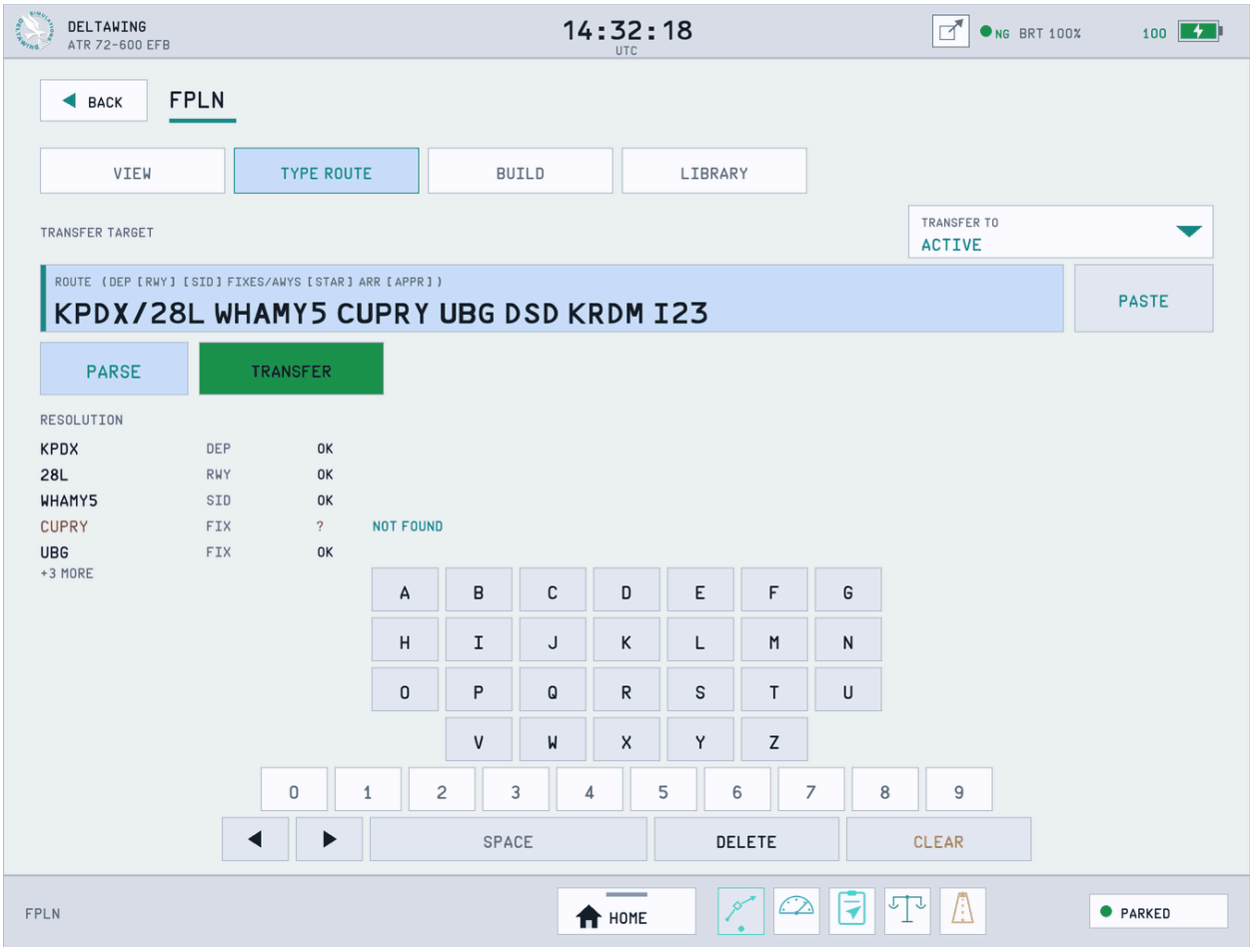
cont'd... ►►►

Transfer target

TYPE ROUTE and BUILD send the flight plan to the FMS. The **TRANSFER TO** selector defines where it goes:

TMPY	The route is built as a temporary flight plan (EXEC ON MCDU).
ACTIVE	The route becomes the active flight plan immediately (LIVE IMMEDIATELY, default).
SECONDARY	The route is built as the secondary flight plan (ACTIVATE< ON MCDU).

TYPE ROUTE tab



FPLN, TYPE ROUTE tab, one fix not found

TYPE ROUTE accepts a route written as a single line, typed with the EFB keyboard or the computer keyboard, or pasted. To correct an item inside the route, move the text cursor to it (see SIM.1.3).

The format is:

```
DEP[/RWY] [SID] FIXES/AIRWAYS [STAR] ARR[/RWY] [APPR]
```

DEP	Departure airport (ICAO). The runway can be added as DEP/RWY or as a separate item.
SID	Standard instrument departure (optional).
FIXES/AIRWAYS	Waypoints and airways. An airway is expanded between the fixes before and after it. An airport inside the route is used as a waypoint.

cont'd... ►►►

cont'd... ►►►

STAR	Standard terminal arrival route (optional).
ARR	Arrival airport (ICAO), optionally with the runway (ARR/RWY).
APPR	Approach (optional), for example I28R, ILS28R, ILS RWY28R, RNAV Y RWY 28R, or a runway alone.
PASTE	Replaces the route field with the clipboard content.
PARSE	Decodes the route. The RESOLUTION list shows each item, its type (DEP, RWY, SID, FIX, AWY, STAR, ARR, APPR) and OK. An item that is not recognised is red with ?, and a note gives the reason (NOT FOUND, NEAREST IS n NM AWAY, AIRPORT NOT IN DB, NOT AT <airport>). Up to five items are listed, then +n MORE.
TRANSFER	Sends the route to the transfer target. Available when the departure and arrival airports (and the approach, if one is typed) are recognised. The result shows next to the button (TRANSFERRED or TRANSFER FAILED).
Keyboard	Letters, numbers, SPACE, DELETE and CLEAR.

Note

When a fix name exists more than once, the EFB uses the one nearest to the previous fix. A fix too far from the route is reported as not found. An item that is not found leaves a discontinuity in the flight plan.

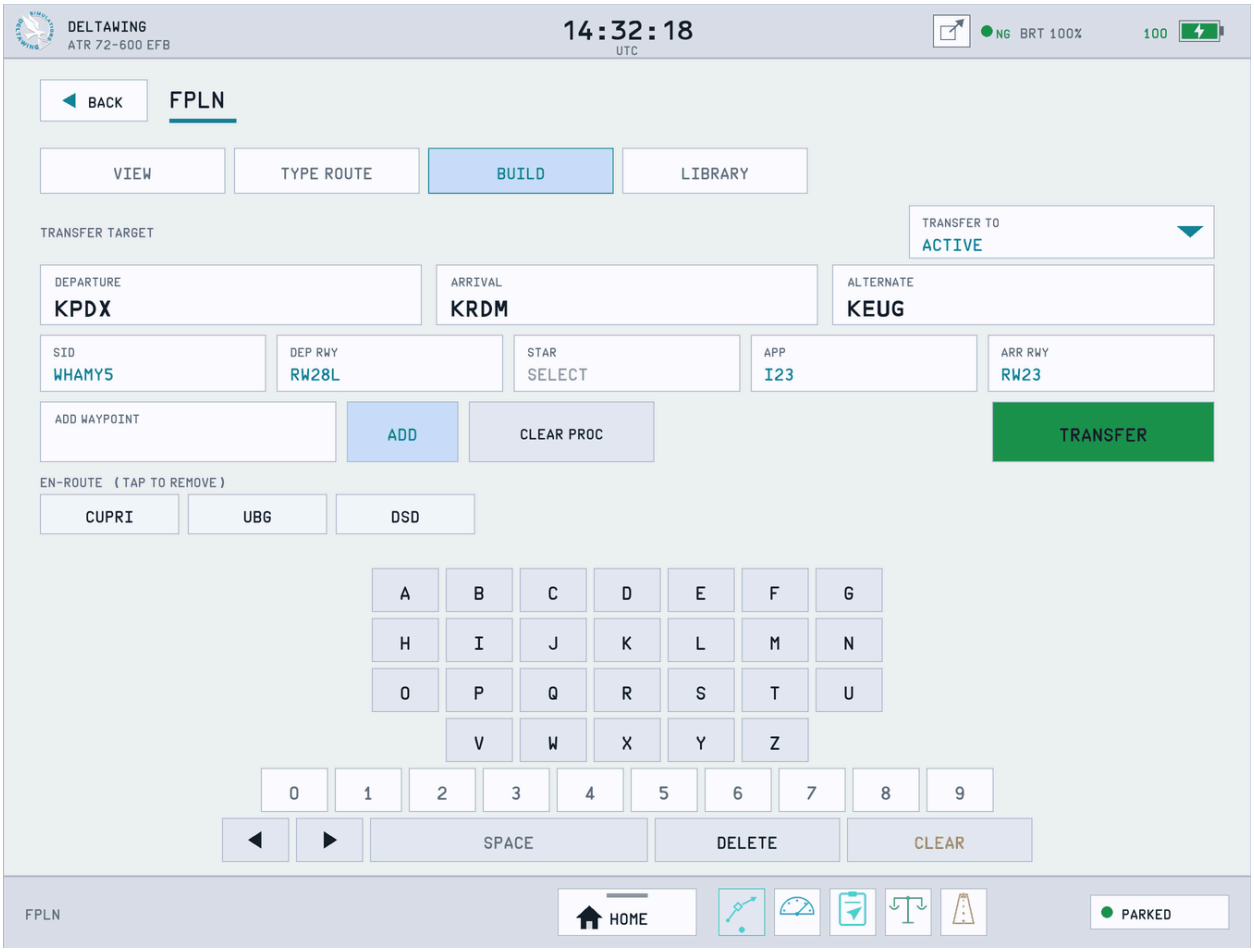
Note

A route from the EFB loads an approach only when one is named in the route. Otherwise the flight plan ends with a discontinuity before the destination, and the crew selects the arrival on the MCDU.

cont'd... ►►►

cont'd... ►►►

BUILD tab



FPLN, BUILD tab

BUILD creates a flight plan item by item.

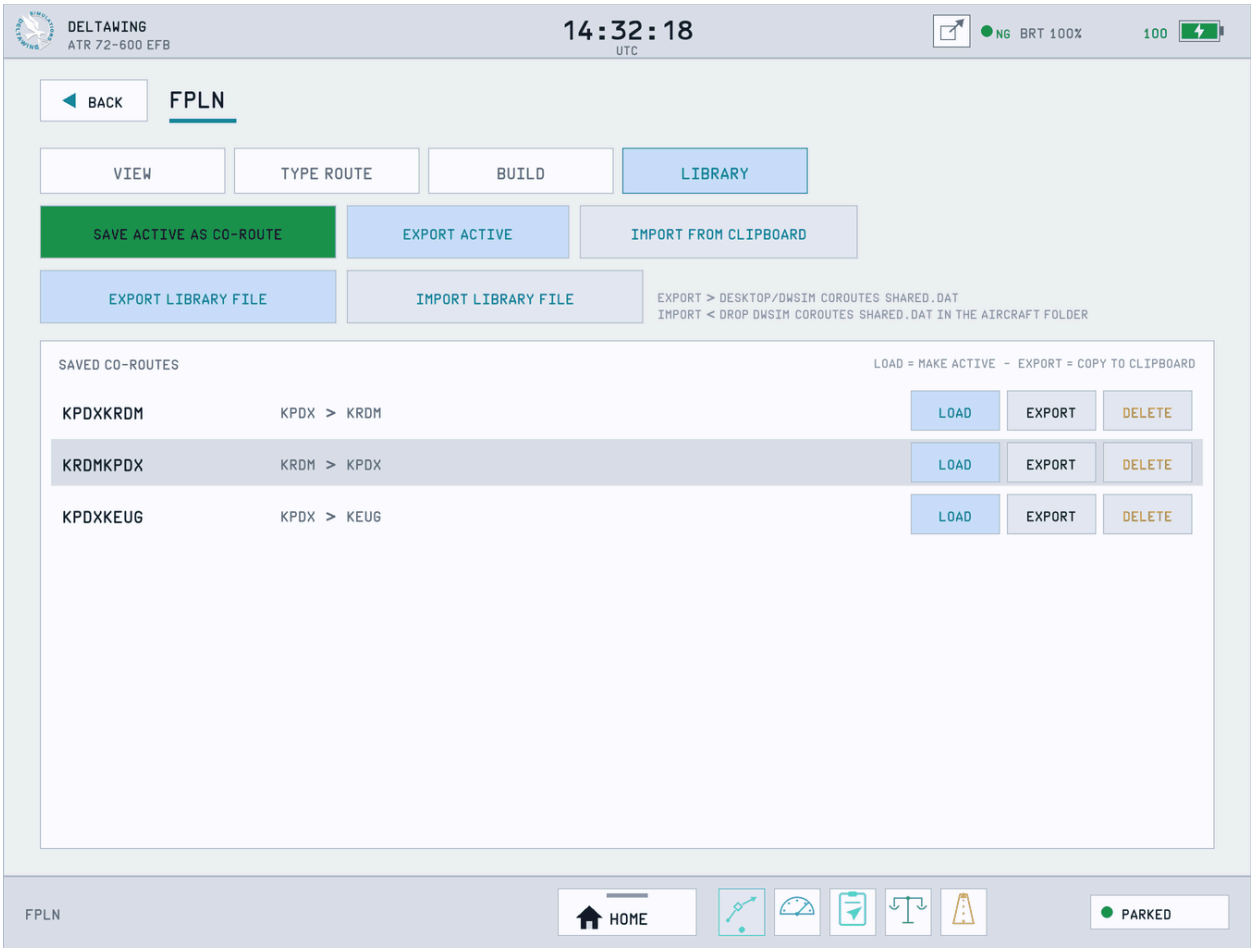
DEPARTURE / ARRIVAL / ALTERNATE	Airports (ICAO). TAB or ENTER on the computer keyboard moves to the next field.
SID / DEP RWY	Departure procedure and runway, selected from a list.
STAR / APP / ARR RWY	Arrival procedure, approach and runway, selected from a list.
ADD WAYPOINT	Type a waypoint and press ADD to add it to the en-route part. The waypoints added show as chips (EN-ROUTE): click a chip to remove it.
CLEAR PROC	Clears the procedures selected.
TRANSFER	Sends the flight plan to the transfer target.

The lists show the procedures of the departure and arrival airports. Enter the airports first: until then the page shows ENTER DEPARTURE FIRST or ENTER ARRIVAL FIRST.

cont'd... ►►►

cont'd... ►►►

LIBRARY tab



FPLN, LIBRARY tab

LIBRARY stores company routes (CO-ROUTES), the same routes as the MCDU ROUTE SELECT page.

SAVE ACTIVE AS CO-ROUTE	Saves the active flight plan in the library, named after its airports.
EXPORT ACTIVE	Copies the active route, as a route string, to the clipboard.
IMPORT FROM CLIPBOARD	Reads a route string from the clipboard and loads it as the active flight plan.
EXPORT LIBRARY FILE	Writes the whole library to `DWSim_CoRoutes_Shared.dat` on the desktop.
IMPORT LIBRARY FILE	Reads `DWSim_CoRoutes_Shared.dat` placed in the aircraft folder and adds its routes (routes already in the library are skipped).

The SAVED CO-ROUTES list has three buttons on each route:

LOAD	Makes the route the active flight plan.
EXPORT	Copies the route string to the clipboard.
DELETE	Removes the route from the library.

cont'd... ►►►

cont'd... ►►►

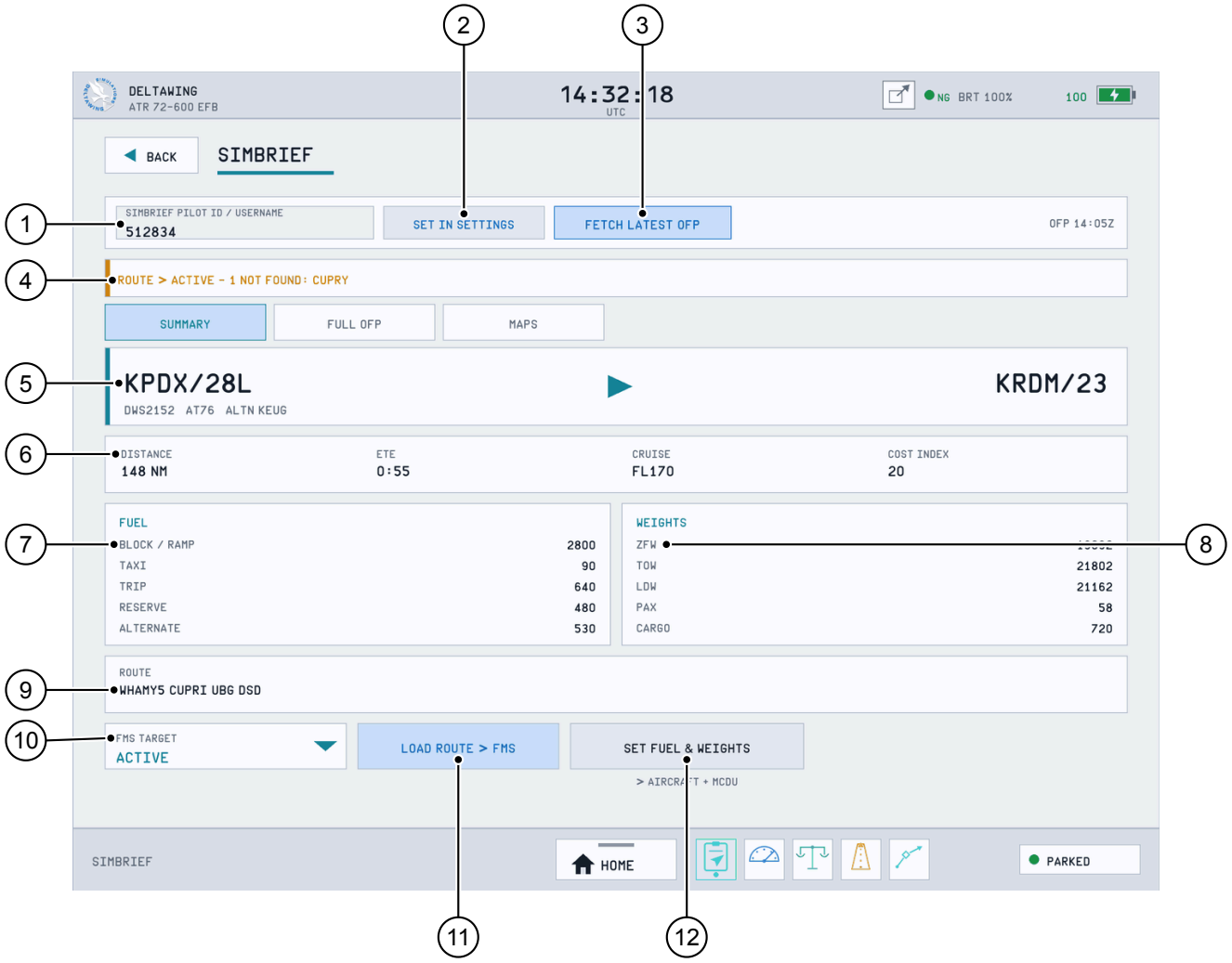
SIM.2.2 SIMBRIEF

Ident.: SIM.2.2 — 02 NOV 2026

SIMULATOR ONLY

The SIMBRIEF application imports the latest flight plan (OFP) created on the SimBrief web site. The SimBrief pilot ID or user name must first be entered in SETTINGS, SIMBRIEF (see SIM.5.12).

Once an OFP is loaded, three tabs show it: **SUMMARY** (the figure below, and the items (5) to (12)), **FULL OFP** and **MAPS**. A tab is grey when the OFP has no such content (THIS OFP HAS NO PRINTED PLAN).



SIMBRIEF, SUMMARY tab, route loaded with one waypoint not found

(1) SIMBRIEF PILOT ID / USERNAME

The pilot ID or user name in use, or NOT SET — TAP SET IN SETTINGS.

(2) SET IN SETTINGS

Opens SETTINGS, SIMBRIEF.

cont'd... ►►►

cont'd... ►►►

(3) FETCH LATEST OFP

Downloads the latest OFP of the pilot. FETCHING… shows during the download, then the time of the OFP (OFP hh:mmZ) at the right.

(4) Message line

Result of the last action: green when complete, amber with a warning. After LOAD ROUTE → FMS, any route waypoint that cannot be found is named in amber (n NOT FOUND: …), and the flight plan has a discontinuity at that point. A download error shows in red (ERROR — reason).

(5) Route header

Origin and destination with the planned runways, callsign, aircraft type and alternate.

(6) DISTANCE, ETE, CRUISE, COST INDEX

From the OFP.

(7) FUEL

BLOCK / RAMP, TAXI, TRIP, RESERVE and ALTERNATE fuel of the OFP.

(8) WEIGHTS

ZFW, TOW, LDW, PAX and CARGO of the OFP.

(9) ROUTE

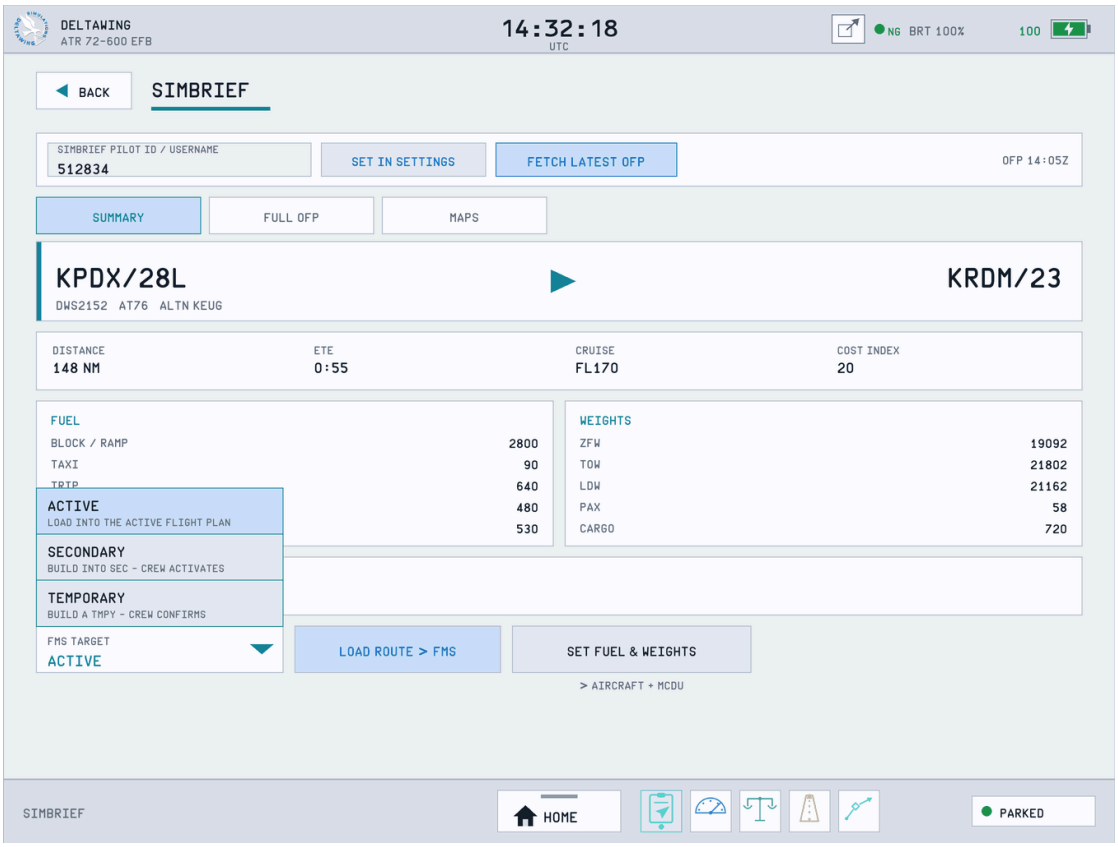
Route string of the OFP.

(10) FMS TARGET

Where LOAD ROUTE → FMS puts the route. Click to open the list:

cont'd... ►►►

cont'd... ►►►



SIMBRIEF, FMS TARGET list open

ACTIVE	Load into the active flight plan (default).
SECONDARY	Build into the secondary flight plan. The crew activates it.
TEMPORARY	Build a temporary flight plan. The crew confirms it.

(11) LOAD ROUTE → FMS

Loads the OFP route into the FMS target, with the departure runway and the cruise altitude of the OFP. The cruise altitude shows on PERF INIT as a crew entry (CRZ ALT, large cyan); CLR returns it to the FMS default. If the SID of the OFP is not available from that runway, the SID is kept on its own runway and the message says so (SID NOT AVAIL RWY nn).

(12) SET FUEL & WEIGHTS

Loads the OFP block fuel, passengers (spread over the three cabin zones) and cargo (as bags, split between the holds) into WEIGHT & BALANCE, and sets them. On the ground only.

SET FUEL & WEIGHTS	(SETTINGS, REALISM, LOADSHEET TO FMS = AUTO) The load goes to the aircraft and to the MCDU WEIGHT page (> AIRCRAFT + MCDU).
LOAD FUEL & WEIGHTS	(LOADSHEET TO FMS = MANUAL) The load goes to the aircraft only (> AIRCRAFT ONLY). The FUEL and WEIGHTS cards then add a LOADED column (what was loaded) and an MCDU column: ENTER (amber) until the crew enters ZFW and FOB on the MCDU, then the entry (green when it agrees with the load, amber otherwise).

cont'd... ►►►

cont'd... ►►►

With INSTANT CHANGE off in WEIGHT & BALANCE, the load is only staged (STAGED ON W&B - PRESS SET THERE), and the aircraft is boarded and fuelled from the GROUND page.

CAUTION

SET FUEL & WEIGHTS / LOAD FUEL & WEIGHTS overwrites the values previously entered in WEIGHT & BALANCE.

FULL OFP tab

FULL OFP shows the whole SimBrief OFP as it is printed, in a fixed-width font so that its columns line up: fuel, flight log with MORA, times and fuel at each waypoint, alternates, take-off and landing data, airport weather (METAR and TAF) and NOTAMs.

SECTIONS	Opens the list of the parts of the OFP. Click a part to go to it. The name of the part shown is next to the button.
A- / A+	Smaller / larger text. The largest size keeps all the columns of the OFP on the screen.
TOP	Returns to the start of the OFP.
Scrolling	Drag the text, use the arrow buttons at the right (hold to repeat), or the mouse wheel.
Map line	A map of the OFP shows as a line (MAP - TAP TO OPEN IN THE MAPS TAB). Click it to open that map in the MAPS tab.

MAPS tab

MAPS shows the maps of the OFP: route, significant weather, wind and vertical profile, as SimBrief provides them. Click the name of a map to show it. The map is downloaded when it is first shown (DOWNLOADING MAP…). If the download fails, TRY AGAIN retries.

Drag	Moves the map.
+ / - or mouse wheel	Zoom in / out.
FIT	Fits the whole map in the window.

Route typed by the crew

When SETTINGS, REALISM, SIMBRIEF ROUTE TO FMS is MANUAL, the EFB does not load the route. The ROUTE card reads ROUTE - TYPE ON THE MCDU (FPLN), and LOAD ROUTE → FMS is replaced by a check of the FMS flight plan against the OFP: FMS ROUTE MATCHES OFP, or the number of OFP waypoints found in the FMS and the missing ones.

SIM.2.3 NAVIGRAPH

Ident.: SIM.2.3 — 02 NOV 2026

SIMULATOR ONLY

The NAVIGRAPH application shows the Navigraph moving map and charts. It needs a Navigraph account with a charts subscription (see SIM.1.5). It has two tabs: **MAP** and **CHARTS**. Every map and chart carries the Navigraph user name and NOT FOR REAL NAVIGATION.

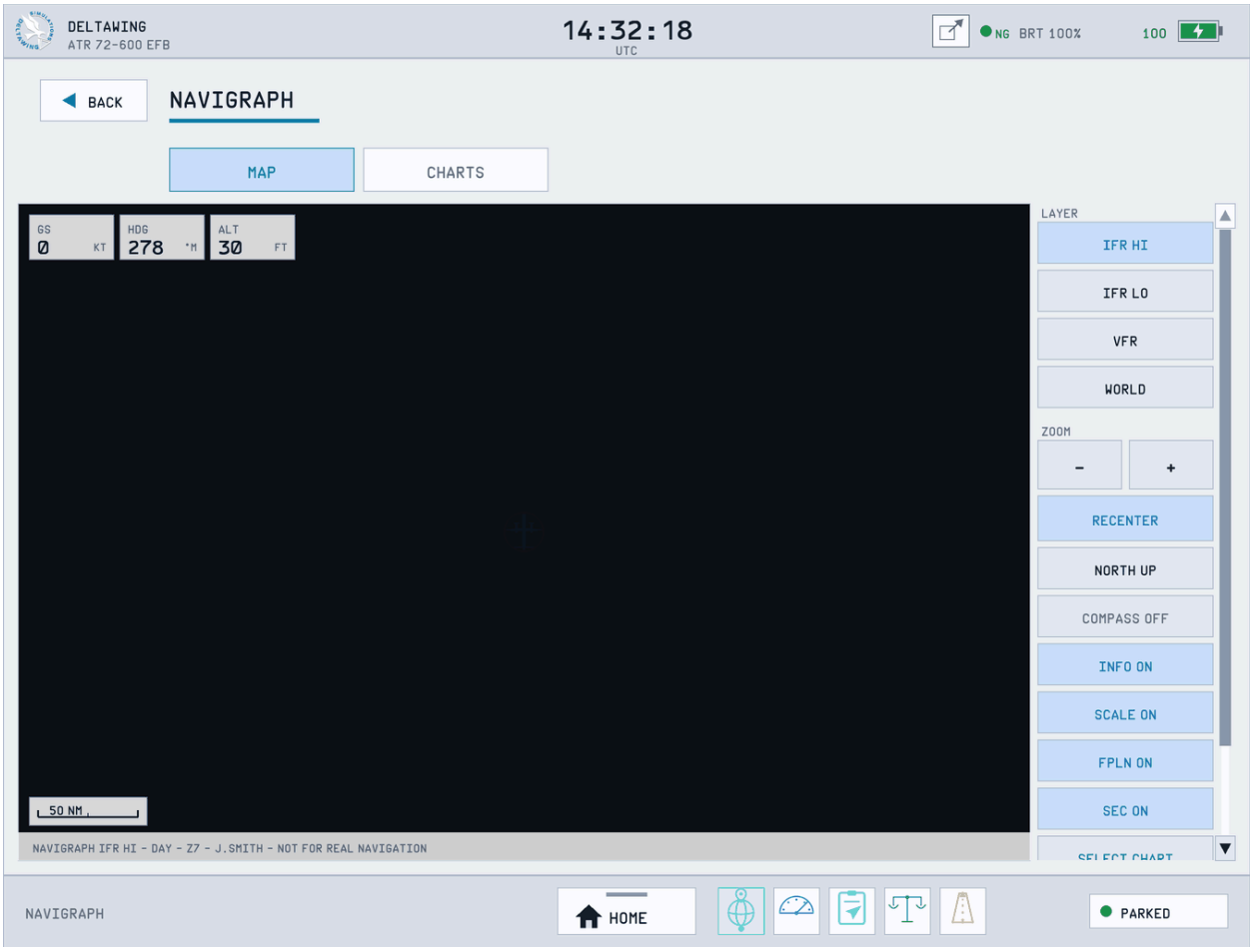
Note

In the figures below, the map tiles and the chart image are not shown.

cont'd... ►►►

cont'd... ►►►

MAP tab



NAVIGRAPH, MAP tab

The map shows the aircraft position, with ground speed, heading and altitude in the INFO block. The controls are in the right column, which scrolls:

LAYER	Map type: IFR HI, IFR LO, VFR or WORLD.
ZOOM	Zoom out (-) and in (+).
RECENTER	Centres the map on the aircraft. After the map is dragged, PANNED — TAP RECENTER is shown.
NORTH UP / HDG UP	Map orientation.
COMPASS	Compass rose ON or OFF.
INFO	GS, HDG and ALT block ON or OFF.
SCALE	Scale bar ON or OFF.
FPLN	Active flight plan ON or OFF.
SEC	Secondary flight plan ON or OFF.
SELECT CHART	Opens the MAP CHARTS list (see below). CLOSE CHARTS closes it.

cont'd... ►►►

cont'd... ►►►

CHART — Chart overlay ON or OFF.

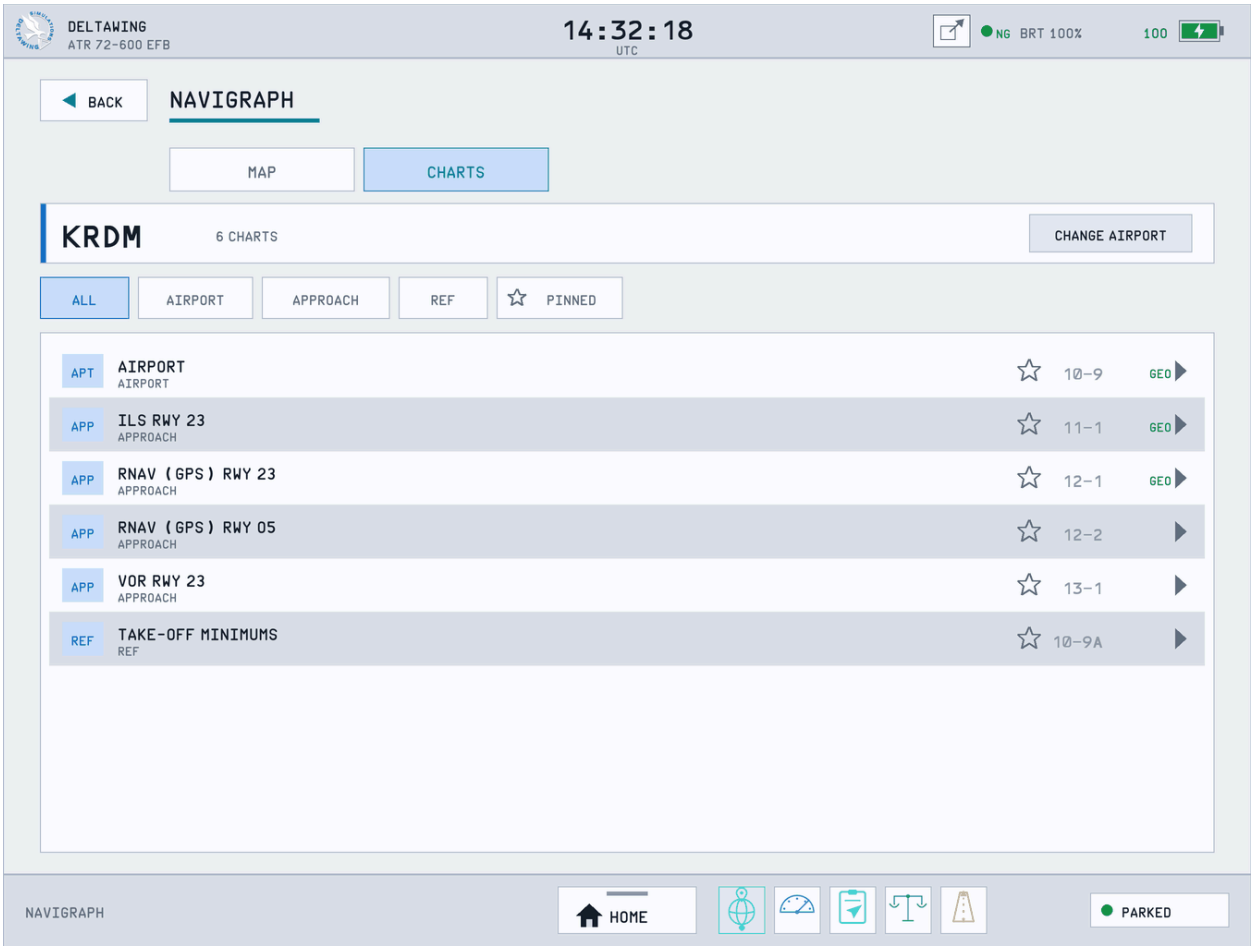
DAY / NIGHT — Map colours. OVERRIDE shows when the colours are forced and do not follow the EFB display mode.

SELECT CHART opens the MAP CHARTS list. It contains only geo-referenced charts, in two lists: THIS FLIGHT (charts of the flight plan airports) and FAVOURITES (the starred charts that can be laid over the map; see CHARTS tab below). Click a chart to overlay it on the map at its geographic position. All the map controls stay available with a chart overlaid.

CHARTS tab

Select the airport:

- QUICK OPEN: ORIG, DEST, ALTN (from the flight plan) or the recent airports,
- AIRPORT ICAO: type the ICAO code with the keypad (or the computer keyboard) and press OPEN.



NAVIGRAPH, CHARTS tab, chart list of an airport

The chart list shows the number of charts of the airport. The chart lists are kept on disk; those of the flight plan airports are loaded in the background on the ground.

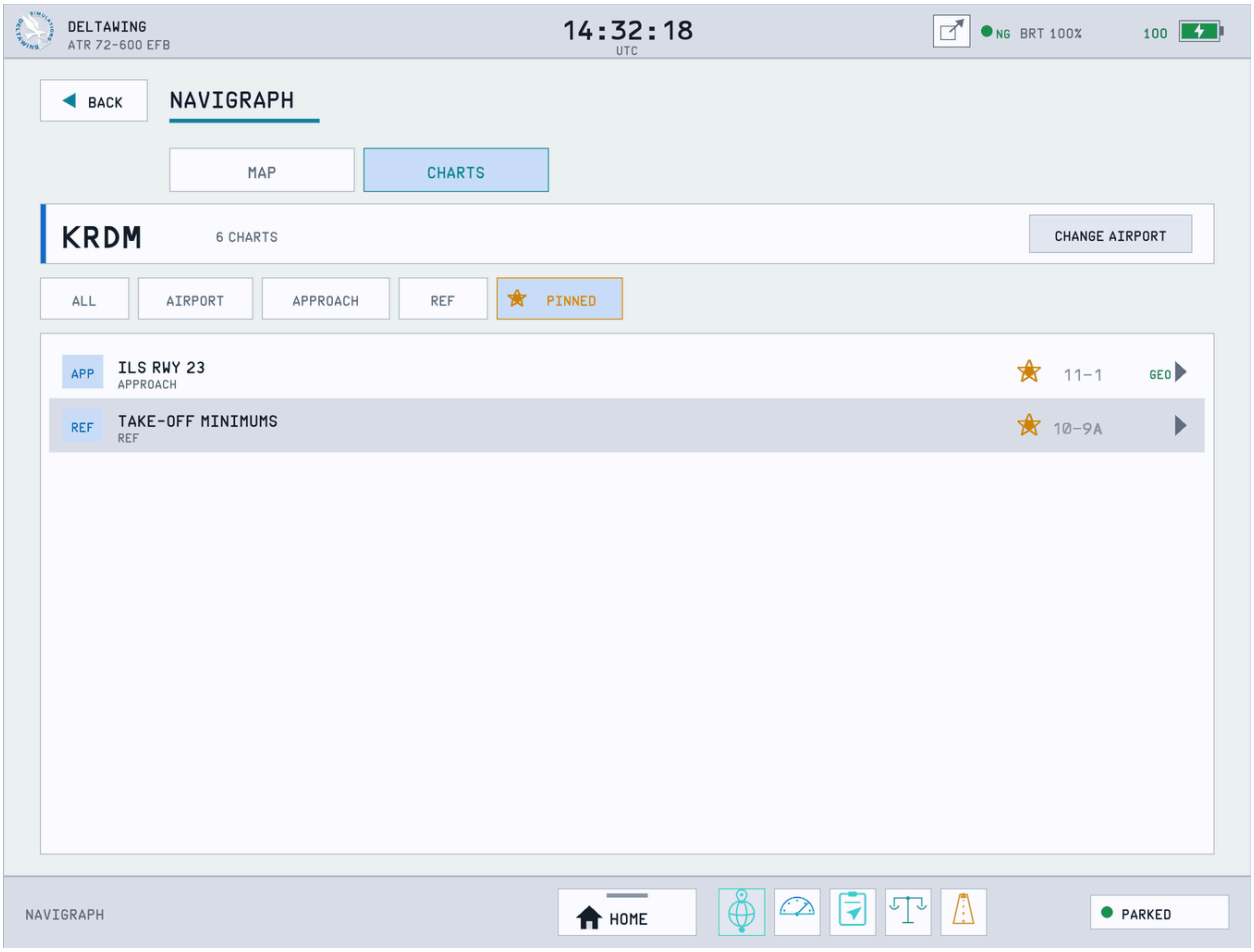
CHANGE AIRPORT — Returns to the airport selection.

Filters — ALL, AIRPORT, SID, STAR, APPROACH and REF. Only the categories that contain charts are shown.

cont'd... ►►►

cont'd... ►►►

★ PINNED	The starred charts of the airport. NO PINNED CHARTS - TAP THE STAR ON A CHART TO PIN IT shows when there are none.
GEO	Green tag on a geo-referenced chart. The aircraft position is shown on these charts.
★	Stars (pins) the chart, or removes the star. Any chart can be starred. The star is amber on a starred chart.



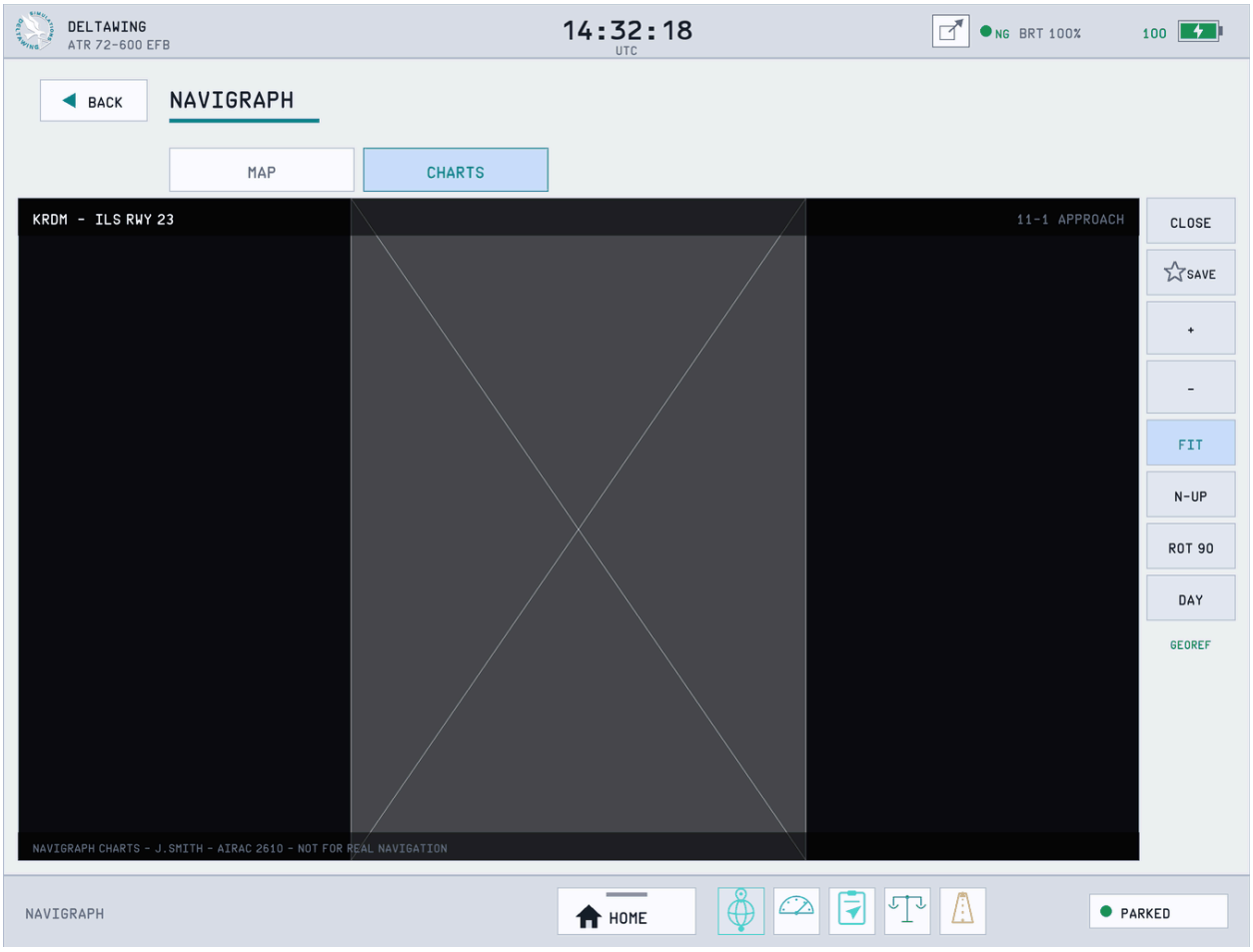
NAVIGRAPH, CHARTS tab, PINNED filter

The starred charts are kept from one session to the next. They appear in the PINNED list of their airport, and the geo-referenced ones also in the FAVOURITES list of the MAP tab.

cont'd... ►►►

cont'd... ►►►

Chart viewer



NAVIGRAPH, chart open

CLOSE	Closes the chart and returns to the list.
SAVE / SAVED	Stars the chart, as ★ in the list. SAVED: the chart is starred; a click removes the star.
+ / -	Zoom in and out.
FIT	Fits the whole chart in the window.
N-UP / HDG UP	Chart orientation, north up or heading up.
ROT 90	Rotates the chart by 90°.
DAY / NIGHT	Chart colours. Each click changes AUTO → DAY → NIGHT. OVERRIDE shows when the colours are forced.
GEOREF	Shown when the chart is geo-referenced.

The chart ident and category are shown at the top of the chart. If a chart does not load, CHART FAILED and a RETRY button are shown.

cont'd... ►►►

cont'd... ►►►

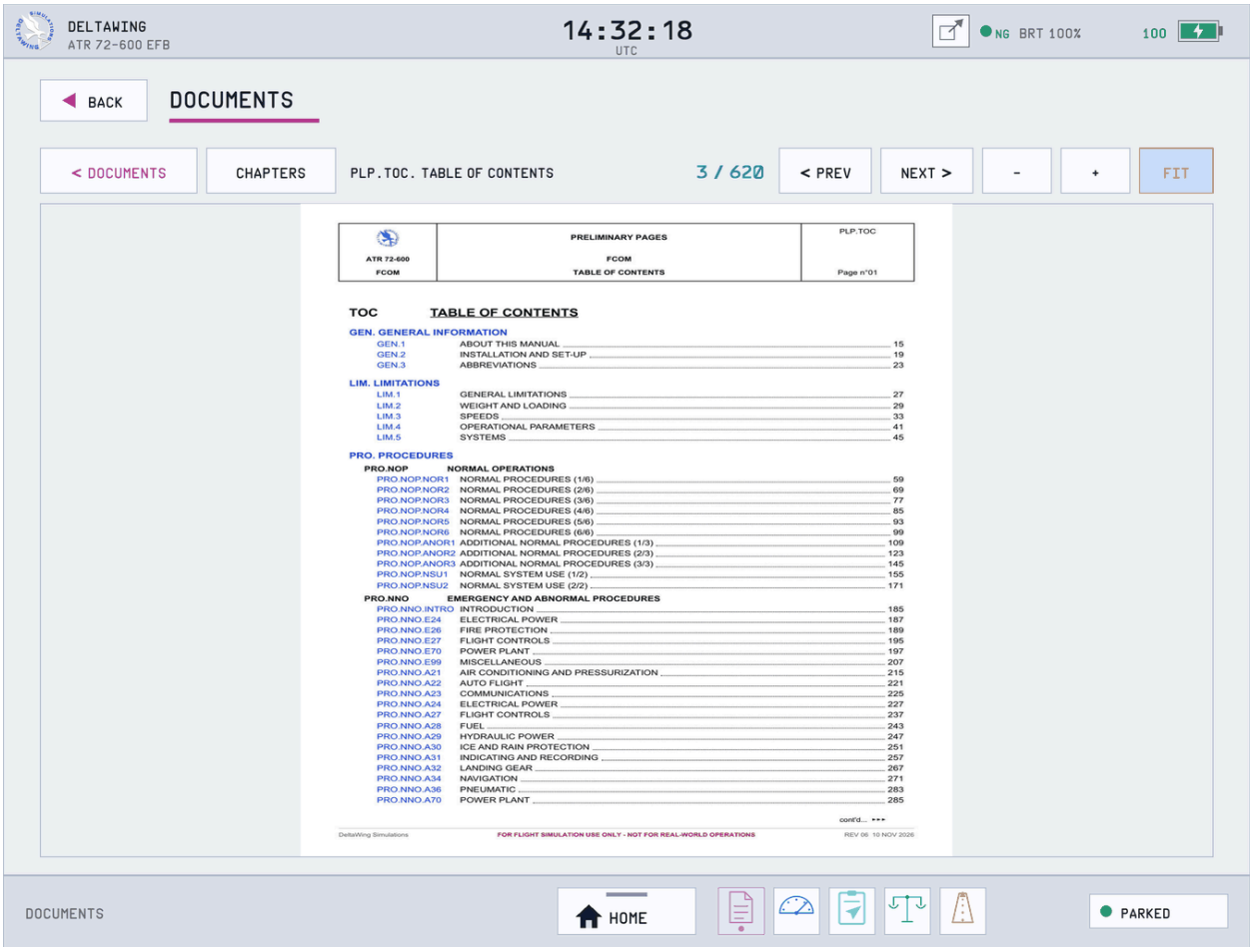
SIM.2.4 DOCUMENTS

Ident.: SIM.2.4 — 02 NOV 2026

SIMULATOR ONLY

DOCUMENTS shows documents in the EFB. The library contains three documents by DeltaWing Simulations: the **QSG - QUICK START GUIDE**, this manual, the **FCOM - FLIGHT CREW OPERATING MANUAL**, and the **FMS - FMS / MCDU USER'S MANUAL**. Each document of the list shows its number of pages and chapters, or PDF PRESENT - PAGES NOT RENDERED, or NOT FOUND.

Click a document to open it.



DOCUMENTS, page viewer showing this manual's table of contents

< DOCUMENTS	Returns to the list.
CHAPTERS	Opens the chapter list of the document. Click a chapter to go to its first page. Drag the list to scroll it.
< PREV / NEXT >	Previous / next page. The page counter shows the current page and the number of pages.
- / +	Zoom out / in.
FIT	Fits the whole page in the window.

cont'd... ►►►

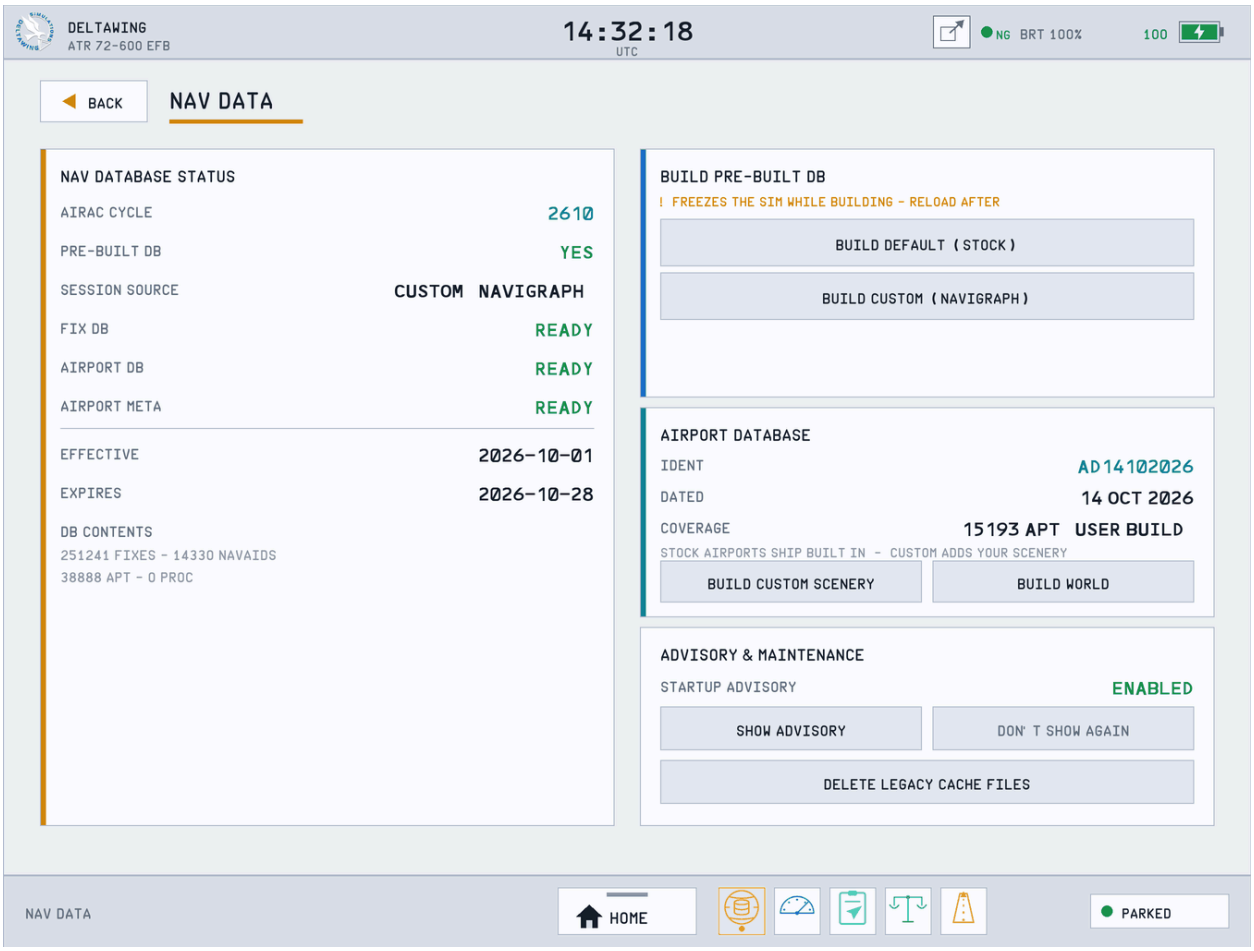
cont'd... ►►►

SIM.2.5 NAV DATA

Ident.: SIM.2.5 — 30 OCT 2026

SIMULATOR ONLY

NAV DATA shows the status of the navigation database of the FMS, builds the pre-built database, and builds the airport database of the MFD map. A pre-built database is ready at once each time X-Plane starts, and the FMS does not have to read the navigation data files at every start.



NAV DATA

NAV DATABASE STATUS

AIRAC CYCLE	AIRAC cycle in use.
PRE-BUILT DB	YES or NO. OUTDATED - REBUILD (amber), with the DB SCHEMA line, when the pre-built database was made with an older database format.
SESSION SOURCE	CUSTOM (NAVIGRAPH) or DEFAULT (STOCK) X-Plane navigation data.
FIX DB / AIRPORT DB / AIRPORT META	READY or LOADING.
EFFECTIVE / EXPIRES	Validity of the cycle. EXPIRES is red when the cycle has expired.
DB CONTENTS	Number of fixes, navaids, airports and procedures of the pre-built database.

cont'd... ►►►

cont'd... ►►►

When there is no pre-built database, PRE-BUILT MANIFEST reads NONE, and the page may show RECOMMEND BUILDING A PRE-BUILT DB.

BUILD PRE-BUILT DB

BUILD DEFAULT (STOCK) Builds the database from the X-Plane default navigation data.

BUILD CUSTOM (NAVIGRAPH) Builds the database from the Navigraph navigation data installed in X-Plane.

Each button must be clicked twice (TAP AGAIN TO CONFIRM). When the build is complete, reload the aircraft.

CAUTION

The simulator is frozen during the build. Do not build the database in flight.

AIRPORT DATABASE

The airport database feeds the airport map of the MFD. The database supplied with the aircraft holds the X-Plane default airports. The card shows its IDENT, the date (DATED) and the COVERAGE: number of airports, and USER BUILD or DWSIM.

BUILD CUSTOM SCENERY Adds the airports of the installed custom scenery packages to the database supplied with the aircraft. The build takes a few seconds.

BUILD WORLD Rebuilds the whole airport database from the custom scenery packages and the X-Plane default airports. The build takes a few minutes and runs without stutters.

Each button must be clicked twice (TAP AGAIN TO CONFIRM). The build runs in the background, on any EFB page; the card shows its progress, and CANCEL BUILD stops it. A new build replaces the previous user build. PACK FORMAT SUPERSEDED — REBUILD TO RESTORE shows when the user build is in an older format.

ADVISORY & MAINTENANCE

STARTUP ADVISORY ENABLED or SUPPRESSED: the navigation data advisory window shown when X-Plane loads. The advisory points to NAV DATA to build the pre-built database.

SHOW ADVISORY Shows the advisory window now.

DON'T SHOW AGAIN Suppresses the advisory at the next starts. While it is suppressed the button reads SHOW AT STARTUP: tap it to have the advisory again.

DELETE LEGACY CACHE FILES Deletes the cache files of earlier versions.

SIM.2.6 WEATHER

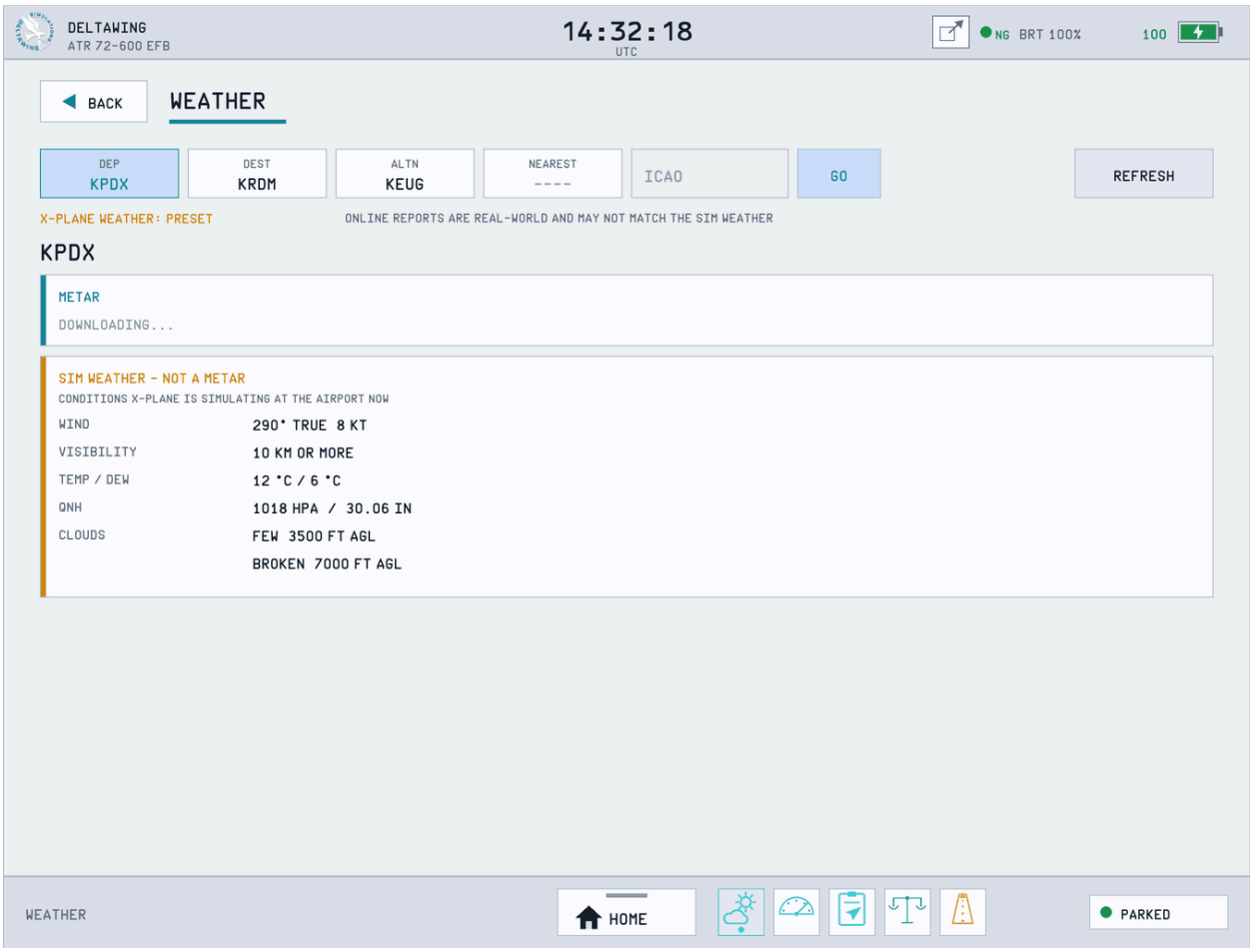
Ident.: SIM.2.6 02 NOV 2026

SIMULATOR ONLY

WEATHER shows the METAR, the TAF and the simulated weather of one airport at a time.

cont'd... ►►►

cont'd... ►►►



WEATHER, X-Plane in preset weather, online reports downloading

Airport selection

DEP / DEST / ALTN	Airports of the active flight plan of the FMS, or of the SimBrief OFP when the FMS has no flight plan. ---- when there is none.
NEAREST	Nearest airport to the aircraft.
ICAO / GO	Click the field, type an ICAO code (on-screen keyboard or computer keyboard), then GO or ENTER.
REFRESH	Downloads the reports again (at most once a minute).

When the page is first opened, it shows the departure airport. The selected airport is in cyan.

X-PLANE WEATHER

The line under the airport selection shows the weather mode of X-Plane: REAL WEATHER (green), or PRESET, CONTROL PAD or PLUGIN (amber). In the amber modes, ONLINE REPORTS ARE REAL-WORLD AND MAY NOT MATCH THE SIM WEATHER is added.

Reports

METAR - X-PLANE	With X-Plane in REAL WEATHER mode: the METAR that X-Plane downloaded and is flying.

cont'd... ►►►

cont'd... ►►►

METAR - ONLINE (REAL WORLD)	In the other modes: the real-world METAR from the NOAA / National Weather Service Aviation Weather Center (aviationweather.gov), with the time since the download.
TAF - ONLINE (REAL WORLD)	The real-world TAF, always from aviationweather.gov: X-Plane has no TAF.
SIM WEATHER - NOT A METAR	In the modes other than REAL WEATHER: the conditions X-Plane is simulating at the airport: wind (true direction), visibility, temperature and dew point, QNH (hPa and in), cloud layers (FEW, SCATTERED, BROKEN, OVERCAST, with their base above the airport) and precipitation.

The online reports are shown unaltered, under their source line, and a card below them gives the source and the disclaimer. A long line is only wrapped to fit the page. They are downloaded again after 10 minutes. DOWNLOADING… shows during the download, NO METAR FOR / NO TAF FOR when the airport has none, and ONLINE WEATHER UNAVAILABLE (reason) when the download fails. The page scrolls (drag, or the mouse wheel).

Note

The online METAR and TAF are real-world reports. They match the weather of the simulator only when X-Plane is in REAL WEATHER mode. DeltaWing Simulations is not affiliated with or endorsed by NOAA or the NWS. For flight simulation only - not an official briefing.

SIM.3 EFB - LOADING AND PERFORMANCE

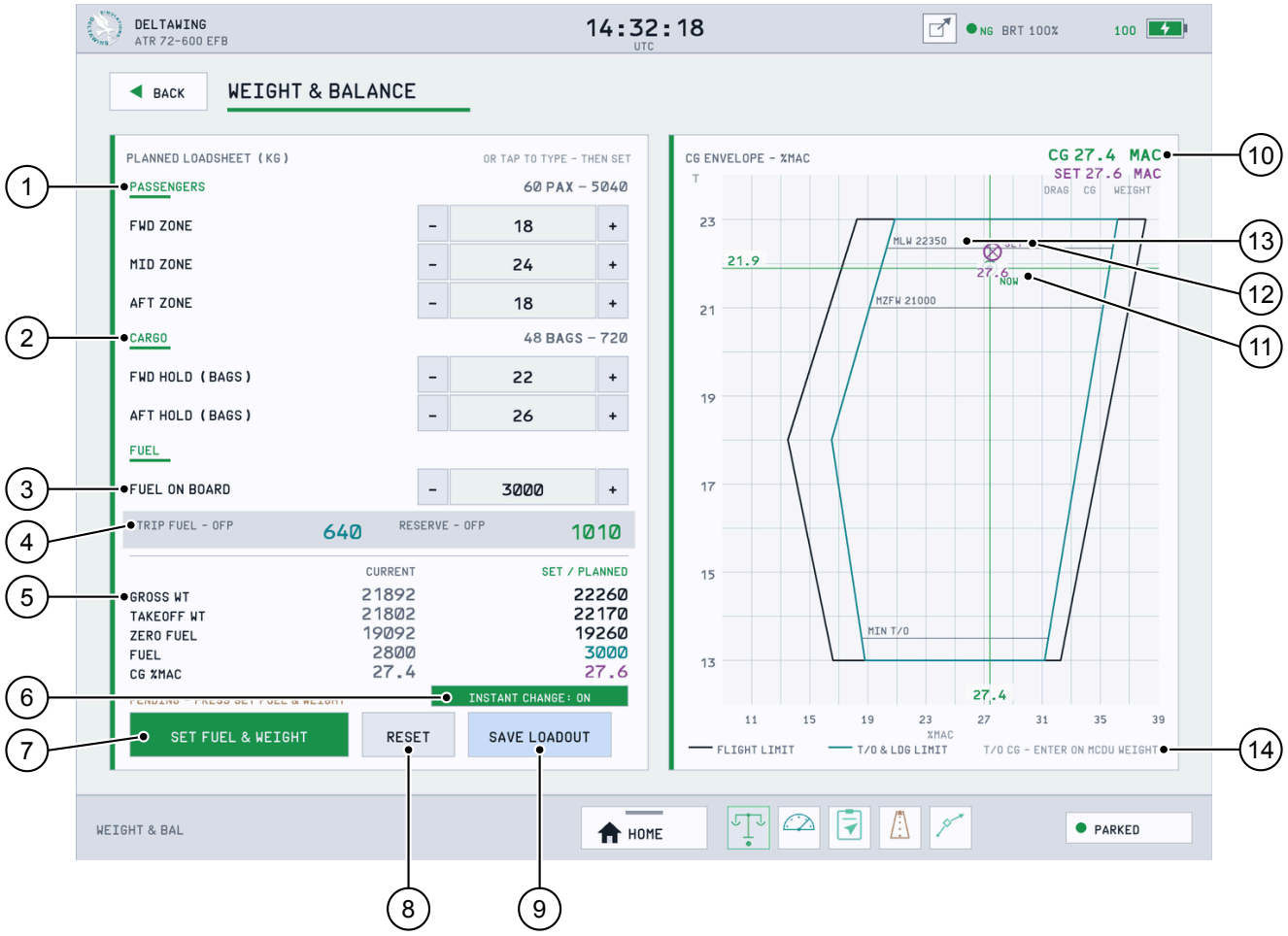
SIM.3.1 WEIGHT & BALANCE

Ident.: SIM.3.1 — 10 NOV 2026

SIMULATOR ONLY

WEIGHT & BALANCE sets the passengers, cargo and fuel, shows the resulting weights and centre of gravity, and loads them into the aircraft. The loadsheet is in KG or LB, as selected in SETTINGS, UNITS.

The changes are staged: they reach the aircraft only when they are set. The figure shows two passengers and 200 kg of fuel staged on top of the load in the aircraft.



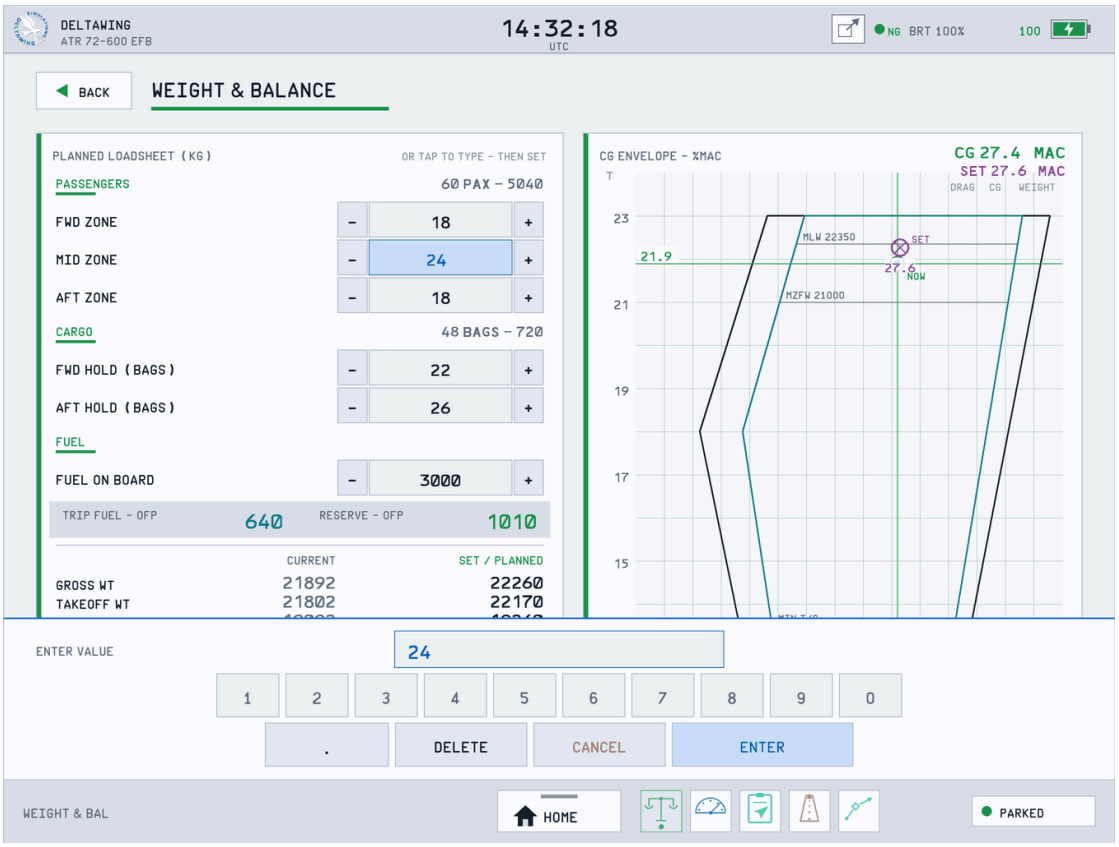
WEIGHT & BALANCE, changes staged

(1) PASSENGERS

FWD ZONE, MID ZONE and AFT ZONE: number of passengers in each cabin zone (25, 26 and 25 seats). The total number of passengers and their weight are shown above. Each value is changed with the - and + buttons, or by clicking the value and typing it on the computer keyboard or the on-screen keyboard (± OR TAP TO TYPE · THEN SET).

cont'd... ►►►

cont'd... ►►►



On-screen keyboard, MID ZONE value being typed

② CARGO

FWD HOLD (BAGS) and AFT HOLD (BAGS): number of bags in each hold. The total number of bags and their weight are shown above.

③ FUEL ON BOARD

Fuel to load, split evenly between the two tanks.

④ TRIP FUEL / RESERVE

With a SimBrief OFP (TRIP FUEL · OFP) When the loaded OFP is for this flight (same destination as the active flight plan, or no flight plan loaded): the OFP trip fuel, and as RESERVE its contingency, alternate and final reserve fuel. When the FMS trip prediction differs clearly from the OFP, it is shown below the label (FMS …, amber).

Without an OFP From the active flight plan: the FMS trip prediction, and as RESERVE the final reserve, contingency and alternate fuel of the FMS, or the RESERVE entered on the MCDU WEIGHT page (RESERVE · MCDU).

No flight plan TRIP / RESERVE — LOAD ACTIVE FPLN.

The RESERVE value is amber when the fuel on board does not cover the taxi fuel (OFP), the trip fuel and the reserve.

⑤ Comparison

GROSS WT, TAKEOFF WT, ZERO FUEL, FUEL and CG %MAC in two columns: CURRENT (the weights the aircraft actually has now, updated as fuel burns) and SET / PLANNED (the loadsheet). GROSS WT is the weight at the ramp, taxi

cont'd... ►►►

cont'd... ►►►

fuel included: it is red above the maximum ramp weight. TAKEOFF WT is the gross weight less the taxi fuel of the SimBrief OFP (no taxi fuel without an OFP): it is red above the MTOW. ZERO FUEL is red above the MZFW.

The status line below reads APPLIED · NO PENDING CHANGES, APPLIED · SAVED LOADOUT WILL AUTO-LOAD, or PENDING - PRESS SET FUEL & WEIGHT (amber).

The status line warns (amber) when the aircraft does not carry the planned load:

MCDU ZFW … VS AIRCRAFT …	The ZFW on the MCDU WEIGHT page differs from the aircraft's ZFW.
BOARDING / REFUELLING NOT COMPLETE - SEE GROUND	A boarding or refuelling started on the GROUND page is still in progress.
PLANNED LOAD NOT APPLIED - AIRCRAFT AT CURRENT	In flight: the loadsheet was changed but never set, the aircraft flies with the CURRENT load.

From the engine start, the same warning shows at the top right of every EFB page: W&B: MCDU ZFW DIFFERS FROM AIRCRAFT, W&B: BOARDING NOT COMPLETE or W&B: PLANNED LOAD NOT APPLIED.

(6) INSTANT CHANGE

ON	The load changes at once when it is set.
OFF	The loadsheet becomes a target, and passengers, bags and fuel are loaded through the GROUND page (BOARDING TO TARGETS — SEE GROUND PAGE). The main button then reads SET TARGETS & BOARD or LOAD TARGETS & BOARD.

(7) SET FUEL & WEIGHT

SET FUEL & WEIGHT	(SETTINGS, REALISM, LOADSHEET TO FMS = AUTO) Loads the loadsheet into the aircraft and into the MCDU WEIGHT page (ZFW and FOB).
LOAD FUEL & WEIGHT	(LOADSHEET TO FMS = MANUAL) Loads the loadsheet into the aircraft only. The crew enters ZFW and FOB on the MCDU. The page shows MCDU: ENTER ZFW … + FOB …, then MCDU ZFW + FOB MATCH LOADSHEET when the MCDU entries agree (or which entry differs).

(8) RESET

Discards the staged changes. Shown only when there are changes.

(9) SAVE LOADOUT

Saves the loadsheet. It is loaded automatically the next time the aircraft is loaded (SAVED — AUTO-LOADS ON NEXT LOAD).

(10) CG readout

Current CG of the aircraft (CG nn.n %MAC), and the CG of the loadsheet (SET nn.n %MAC, magenta) while changes are staged. The current CG is green inside the T/O & LDG LIMIT envelope, amber outside it but inside the FLIGHT LIMIT, red outside both. CG OUTSIDE T/O & LDG LIMIT or CG OUTSIDE FLIGHT LIMIT then shows in the diagram.

(11) NOW

Crosshair at the current weight and CG of the aircraft, with the values on the axes.

(12) SET

Marker (magenta) at the weight and CG of the loadsheet, while changes are staged.

cont'd... ►►►

cont'd... ►►►

(13) Envelopes and lines

FLIGHT LIMIT and T/O & LDG LIMIT envelopes, MLW 22350, MZFW 21000 and MIN T/O lines.

(14) T/O CG

CG entered on the MCDU WEIGHT page. T/O CG — ENTER ON MCDU WEIGHT shows when there is no entry.

Drag in the diagram

Click or drag in the diagram (DRAG ↔ CG ↕ WEIGHT) to choose a new CG (horizontal) and gross weight (vertical). The EFB redistributes the passengers and bags, and adjusts the fuel and payload, to reach that point. The result is staged as the SET marker: press the main button to load it. Dragging is possible on the ground only.

Note

The loadsheet can be set on the ground only. In flight the page shows AIRBORNE — LOCKED.

Note

The CG %MAC is entered as T/O CG on the MCDU WEIGHT page, where the take-off pitch trim setting is computed from it.

SIM.3.2 PERFORMANCE

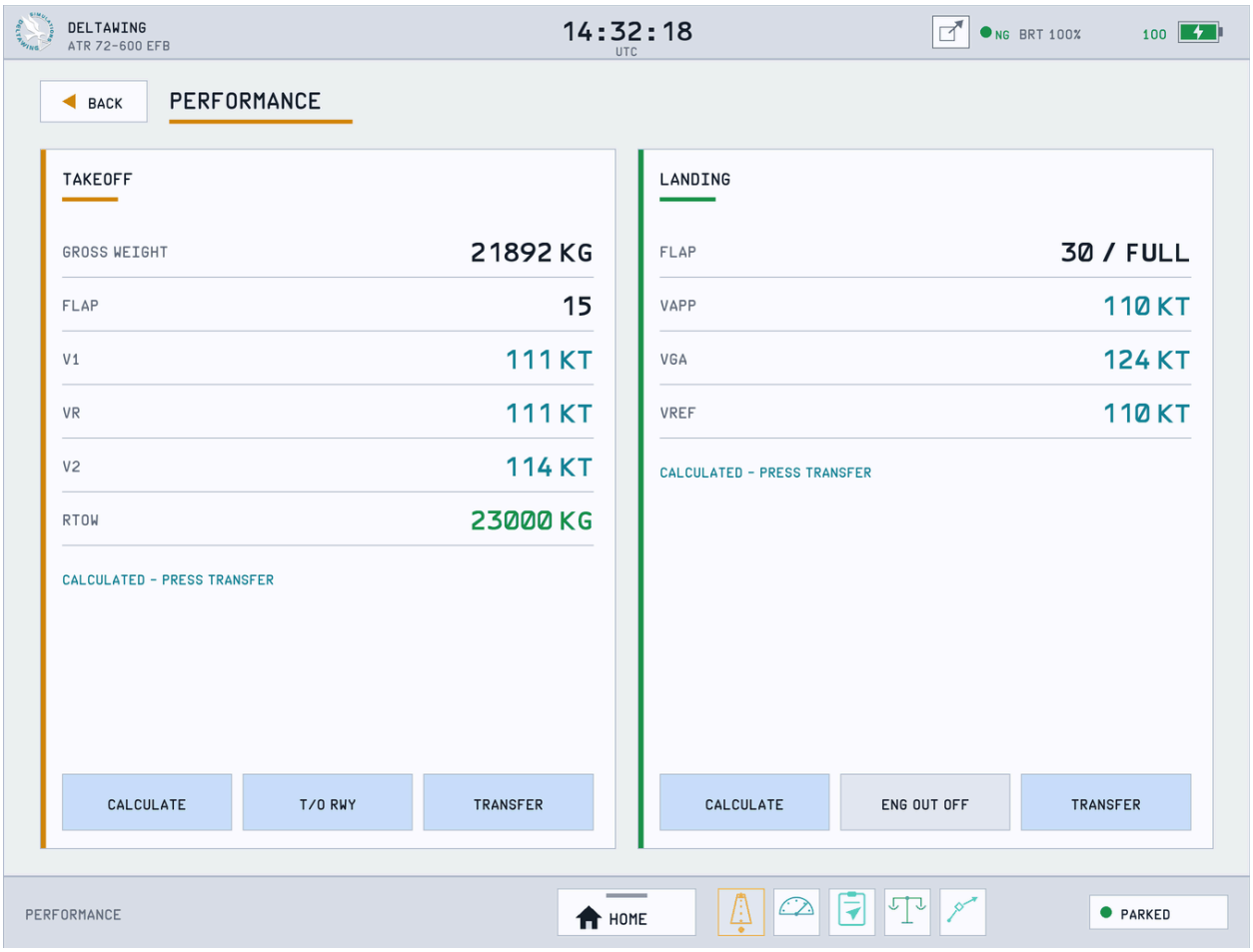
Ident.: SIM.3.2 — 29 OCT 2026

SIMULATOR ONLY

PERFORMANCE computes the take-off and landing speeds and the regulatory take-off weight, and transfers them to the FMS and the PFD speed bugs.

cont'd... ►►►

cont'd... ►►►



PERFORMANCE after CALCULATE

TAKEOFF

GROSS WEIGHT	Weight used: the weight set in WEIGHT & BALANCE.
FLAP	Take-off flap setting (15).
V1 / VR / V2	Take-off speeds, after CALCULATE (cyan), or after TRANSFER (green).
RTOW	Regulatory take-off weight for the runway and conditions of the T/O RUNWAY page. Amber when the planned TOW exceeds it.
CALCULATE	Computes the speeds for the current weight.
T/O RWY	Opens the T/O RUNWAY page.
TRANSFER	Sends the weight and the V-speeds to the FMS and sets the PFD speed bugs. Speeds entered by hand on the MCDU TAKEOFF page are replaced. The button then reads TRANSFERRED.

The status line shows PRESS CALCULATE, then CALCULATED — PRESS TRANSFER, then TRANSFERRED · PFD BUGS ACTIVE.

The take-off speeds and the RTOW come from the same take-off tables as the FMS and the PFD bugs.

cont'd... ►►►

cont'd... ►►►

LANDING

FLAP	Landing flap setting (30 / FULL).
VAPP	Approach speed (VREF plus the wind correction entered on the MCDU APPROACH page).
VGA	Go-around speed.
VREF	Reference landing speed.
CALCULATE	Computes the landing speeds.
ENG OUT ON / OFF	Landing with one engine out (see below).
TRANSFER	Sends the weight to the FMS. The button then reads TRANSFERRED, until a new CALCULATE. In flight it also activates the approach speed phase, as APP SPD on the MCDU APPROACH page; the button then reads APP SPD ACTIVE.

The status line shows PRESS CALCULATE, then CALCULATED — PRESS TRANSFER, then TRANSFERRED · APP SPD ACTIVATES IN FLIGHT on the ground (the approach speed phase cannot be active on the ground), or TRANSFERRED · APP SPD ACTIVE in flight. Without a transfer in flight, the approach speed phase still comes by itself at the localizer capture, at gear down or when the FMS enters the approach phase.

One engine out

ENG OUT comes ON by itself in flight when one engine is shut down, flamed out or feathered and the other one runs. It can also be selected by hand; a change of the engine state cancels the manual selection. With ENG OUT ON, the VAPP line reads VAPP (1 ENG), and VAPP is not less than VGA, nor less than VREF + 10 kt when the affected propeller turns above 10 % NP. The status line (amber) then reads:

- 1 ENG: VAPP INCREASED FROM nnn · LDG DIST X1.15 · SET SPD TGT, or
- 1 ENG: VAPP NOT INCREASED · SET SPD TGT TO VAPP.

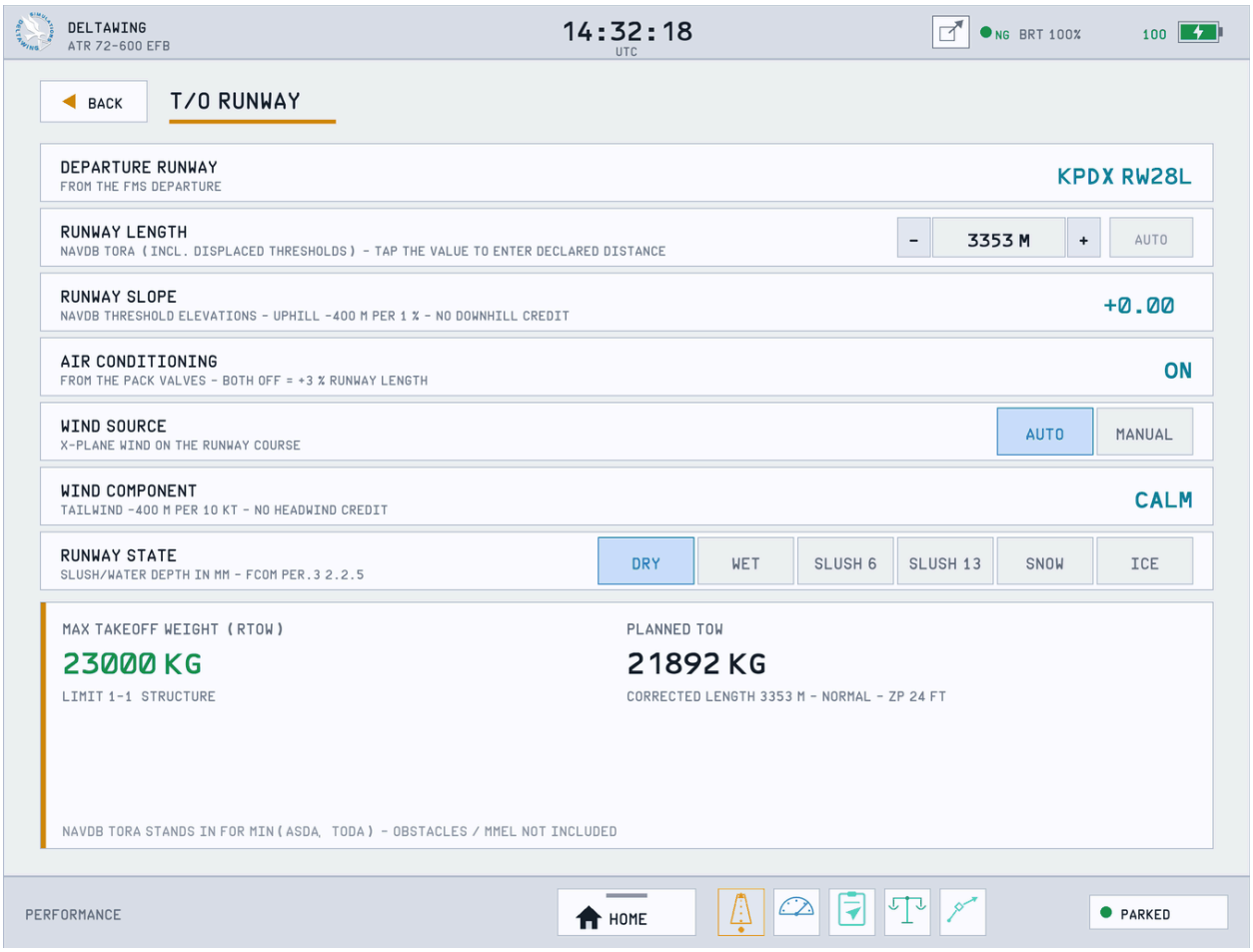
The FMS VAPP and the PFD VAPP bug are not changed: the crew sets the speed target.

T/O RUNWAY page

The T/O RUNWAY page defines the runway and conditions used for the RTOW. BACK returns to PERFORMANCE.

cont'd... ►►►

cont'd... ►►►



T/O RUNWAY

DEPARTURE RUNWAY	Departure runway, FROM THE FMS DEPARTURE. SELECT A DEPARTURE RUNWAY IN THE FMS (amber) when none is selected.
RUNWAY LENGTH	Take-off run available from the navigation database (including displaced thresholds). Click the value and type it (computer keyboard or on-screen keyboard), or use - and +, to enter a declared distance; AUTO returns to the database length.
RUNWAY SLOPE	From the threshold elevations of the database. Uphill slope reduces the runway length by 400 m per 1 %; no credit is taken for a downhill slope.
AIR CONDITIONING	ON or OFF, from the pack valves. Both packs off: + 3 % runway length.
WIND SOURCE	AUTO (X-Plane wind on the runway course) or MANUAL (component entered, for example from the ATIS).
WIND COMPONENT	HEAD, TAIL or CALM. A tailwind reduces the runway length by 400 m per 10 kt; no credit is taken for a headwind.
RUNWAY STATE	DRY, WET, SLUSH 6, SLUSH 13, SNOW or ICE (slush or water depth in mm).
MAX TAKEOFF WEIGHT (RTOW)	Result, with the limitation code and the limiting factor: STRUCTURE, 2ND SEGMENT, RUNWAY, OBSTACLE, TIRE SPEED, BRAKE ENERGY, RUNWAY 2 ENG or FINAL T/O. The line below shows the corrected runway length, the conditions and the pressure altitude (ZP).

cont'd... ►►►

cont'd... ►►►

PLANNED TOW	Planned take-off weight, for comparison with the RTOW. PLANNED TOW EXCEEDS RTOW (amber) when above it.

Note

The take-off run available stands in for the lower of ASDA and TODA. Obstacles and MMEL items are not taken into account. RUNWAY SHORTER THAN THE FCOM CHARTS — RTOW NOT COVERED shows when the corrected length is below the charts.

SIM.4 EFB - AIRCRAFT, GROUND AND TRAINING

SIM.4.1 GROUND & CONFIG

Ident.: SIM.4.1 — 05 NOV 2026

SIMULATOR ONLY

GROUND & CONFIG (GROUND icon) controls the doors, the ground services, the tyres, the ground equipment, the boarding and the aircraft state. The figure shows a turnaround: GPU with both cables connected, chocks in, fuel truck in position, catering truck on its way, cones set, and the pitot / AOA covers and the engine covers still fitted.



GROUND & CONFIG

(1) DOORS & CONFIG

PASSENGER (AIRSTAIR)	Passenger door with airstair: OPEN / CLOSE.
CARGO	Cargo door: OPEN / CLOSE. Reads LOCKED when closed.
CATERING	Service door: OPEN / CLOSE.
TAIL PROP	Tail prop stand: DEPLOY / STOW (on the ground only).
EMERGENCY EXITS	Overwing hatches: L and R.

cont'd... ►►►

cont'd... ►►►

A bar shows the movement of each door. The doors cannot be opened while the cabin is pressurised (PRESSURISED) or in flight (IN FLIGHT).

(2) GROUND SERVICES

Each vehicle has a REQUEST / DISMISS button and shows its state: IDLE, ENROUTE (with the time to arrival), DOCKING, IN POSITION, DEPARTING.

GPU — DC / AC	Ground power unit. In position, it reads which cable is connected (NO CABLE, DC, AC, DC + AC).
WHEEL CHOCKS	The chocks of the two main wheels hold the aircraft (they are X-Plane's wheel chocks). They are shown in position while either chock is fitted, and the aircraft is free to move once both are removed. Not fitted while the aircraft moves.
FUEL TRUCK	Needed for refuelling. Comes only with the engines stopped. While it is in position, the MFD CABIN page shows REFUELING.
CATERING TRUCK	Catering service.
DC CABLE — 28V	CONNECT / UNPLUG the DC cable of the GPU (DC external power: CONNECTED · DC AVAIL). WAITING FOR GPU until the GPU is in position. The receptacle door opens before the cable is plugged.
AC CABLE — 115V	CONNECT / UNPLUG the AC cable of the GPU (AC wild external power: CONNECTED · AC AVAIL).

The GPU itself powers nothing: only a connected cable supplies the aircraft. A dismissed GPU unplugs its cables before it drives away. The GPU and the cones are left on the ramp, and removed, when the aircraft starts to move.

(3) REAL-TIME / INSTANT

Timing of the ground handling: REAL-TIME (vehicle drive-in times, boarding and fuel at the boarding RATE), or INSTANT (every action completes at once).

(4) TYRES & TAIL BUMPER

Condition of the NOSE, LH MAIN and RH MAIN tyres (OK or BURST) and of the TAIL SKID shoe (OK or WORN), the highest ground speed reached (MAX GS, LIMIT 165 kt), and a maintenance line: NO TYRE MAINTENANCE DUE, REPLACE ALL TYRES (with the cause), INSPECT MLG TYRES — EMER BRAKE USED ABOVE 20 KT, or TAIL STRIKE xn with the deflection.

REPLACE TYRES	Replaces the tyres.
INSPECTED OK	Clears the inspection request after an emergency brake application.
REPLACE SHOE	Replaces the tail bumper shoe after a tail strike.

The buttons operate with the aircraft stopped on the ground (otherwise STOP ON GROUND TO SERVICE), and must be clicked twice (CONFIRM).

(5) BOARDING

BOARDING loads the targets set in WEIGHT & BALANCE (INSTANT CHANGE OFF). Loading is gated (GATED — LOADS WHEN VEHICLES IN PLACE): each item waits until its door or vehicle is ready.

PASSENGERS	Progress of boarding, on board / planned. WAITING: PAX DOOR until the passenger door is open.
CARGO (BAGS)	Progress of bag loading. WAITING: CARGO DOOR until the cargo door is open.
FUEL	Progress of refuelling. LOAD FUEL / STOP FUEL. WAITING: FUEL TRUCK until the fuel truck is in position.
RATE	Boarding time, 10 s to 600 s in 15 s steps (INSTANT with INSTANT timing).

cont'd... ►►►

cont'd... ►►►

BOARD	Starts boarding. Reads STOP while boarding.
DEPLANE	Starts deplaning.
W&B	Opens WEIGHT & BALANCE.

Boarding and deplaning move only the passengers and the cargo. The fuel changes only while the fuel truck refuels, starting from the fuel left in the tanks. Boarding and refuelling continue while another EFB page is shown. WEIGHT & BALANCE stays editable while boarding or refuelling runs, or waits for a door or the fuel truck. Boarding continues to the targets it started with: a load changed meanwhile shows as PENDING until it is set.

(6) FULL TURNAROUND

Runs a full turnaround automatically, in seven steps: CALL SERVICES (chocks, GPU with DC cable, catering, cones), OPEN DOORS, DEPLANE, FUEL + BOARD, CLOSE UP, RELEASE GPU (cables unplugged, cones cleared), LOADSHEET TO FMS. Click twice (CONFIRM FULL TURNAROUND). The step in progress is shown (TURNAROUND n/7), with a STOP button. Each step waits until the previous one is complete.

(7) GROUND EQUIPMENT

Remove-before-flight (RBF) items and ramp equipment. Each RBF row shows how many of its items are fitted (n/N FITTED): red while one or more is fitted, green when none is. While items are being fitted or removed, the row shows FITTING or REMOVING with the time left. HELD: ENGINES RUNNING or HELD: PROP TURNING shows when the engines or the propellers prevent the operation.

PITOT / AOA COVERS	FIT / REMOVE. Three pitot covers and six AOA covers (9 items).
ENGINE INTAKE COVERS	FIT / REMOVE. Intake and exhaust covers of both engines, and the left and right pack intake covers, low on each side of the fuselage ahead of the wing (6 items).
PROP TIE-DOWNS	FIT / REMOVE (2 items).
LANDING GEAR PINS	FIT / REMOVE (3 items).
SAFETY CONES	SET / CLEAR.
FIT ALL RBF / REMOVE ALL RBF	Fits or removes all the remove-before-flight items.

The header shows the number of RBF items fitted (n REMOVE-BEFORE-FLIGHT ITEMS FITTED, red), or NO RBF ITEMS FITTED.

Each item can also be removed on its own: click it on the aircraft during the walk-around, or use its command. An item only affects its own side: a left pitot cover blocks ADC 1 only, a right engine cover engine 2 only. The pack intake covers have no effect on the systems.

cont'd... ►►►

cont'd... ►►►

SIMULATOR NOTE

Commands: `DWSim/ATR_Series/commands/ground/equipment/<group>/<item>/toggle` (fits or removes that one item), with the groups `probeCovers` (two pitot covers on the left, one on the right, and three AOA covers on each side: `leftPitot`, `leftPitot2`, `rightPitot`, `leftAoa`, `leftAoa2`, `leftAoa3`, `rightAoa`, `rightAoa2`, `rightAoa3`), `engineCovers` (`leftIntake`, `leftExhaust`, `rightIntake`, `rightExhaust`, `leftPack`, `rightPack`), `propTiedown` (`left`, `right`) and `gearPins` (`nose`, `leftMain`, `rightMain`). `.../ground/equipment/gearPins/toggle` removes the three gear pins. `.../ground/equipment/rbf/fitAll` and `.../rbf/removeAll` fit or remove the whole set. After each of these commands, a small window shows for a few seconds how many items of the group are still on, and how many RBF items in all (or ALL RBF ITEMS REMOVED).

The cones are set or cleared as a whole set with `.../ground/equipment/cones/toggle`, `.../cones/set` and `.../cones/clear`.

The wheel chocks: `DWSim/ATR_Series/commands/ground/services/chocks/left/toggle` and `.../chocks/right/toggle` fit or remove one main wheel chock; `.../ground/services/chocks/set`, `.../chocks/clear` and `.../chocks/toggle` fit, remove or toggle both. The chocks cannot be fitted while the aircraft is moving.

CAUTION

Remove all the remove-before-flight items before flight.

⑧ AIRCRAFT STATE

Sets the whole aircraft to a predefined state. Click twice to confirm.

READY TO TAXI	Batteries on, engines running, CL in AUTO, gust lock off, audio control panel INT/RAD selectors at INT.
TURNAROUND	Batteries on, GPU called, engines off.
COLD & DARK	Aircraft secured, everything off, audio control panel INT/RAD selectors at NEUTRAL.

TURNAROUND and COLD & DARK also end the flight cycle of the FMS.

All three states reset the circuit breakers and the tripped electrical protections. READY TO TAXI and TURNAROUND also service the batteries: both are fully charged, and an active weak battery failure is removed. COLD & DARK leaves the batteries as they are.

SIM.4.2 SYSTEMS

Ident.: SIM.4.2 — 30 OCT 2026

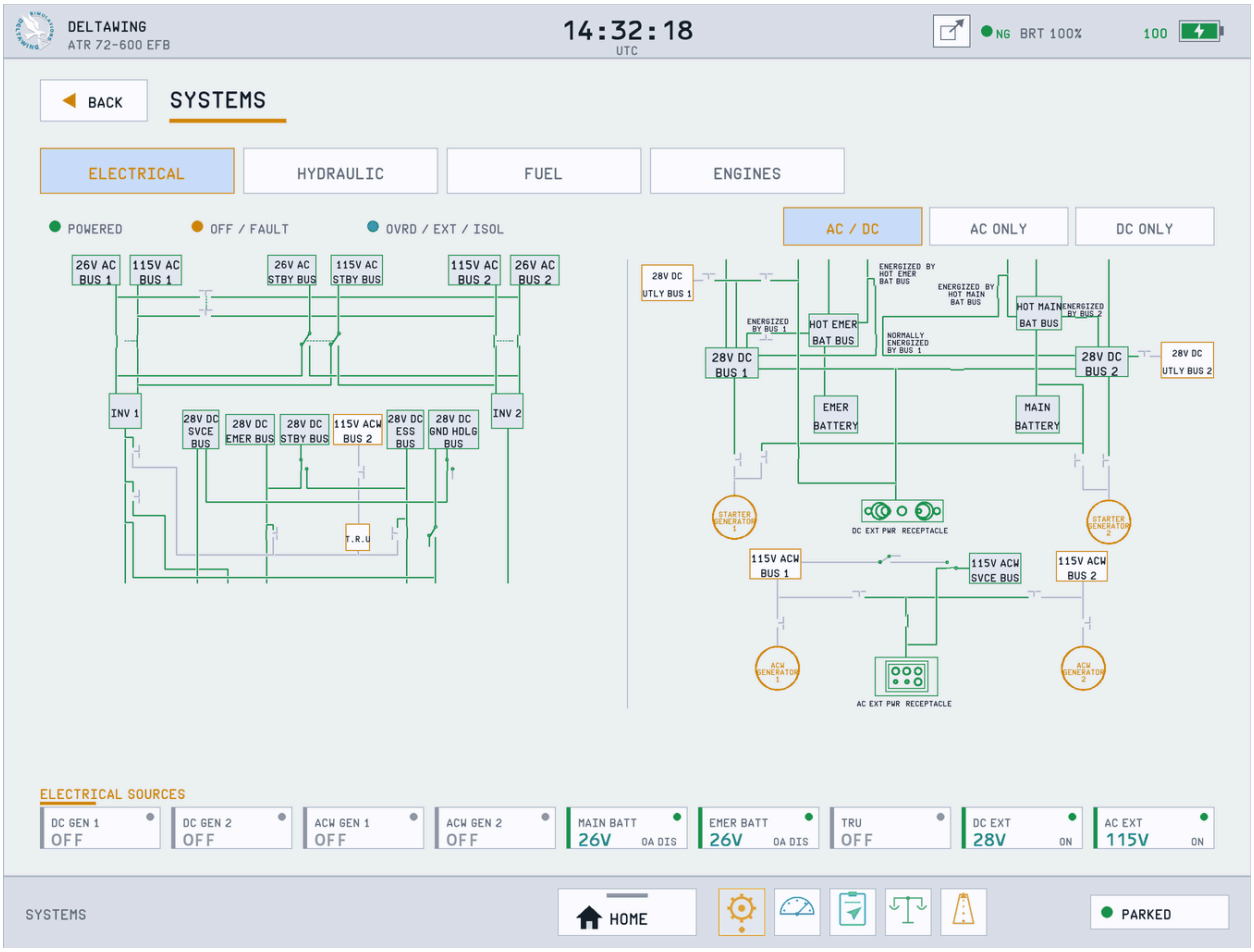
SIMULATOR ONLY

SYSTEMS shows synoptics of the aircraft systems, with their live values. It has four tabs: **ELECTRICAL**, **HYDRAULIC**, **FUEL** and **ENGINES**. It is a monitor only: the systems are operated from the cockpit panels. The figures show the aircraft on ground power, engines stopped.

cont'd... ►►►

cont'd... ►►►

ELECTRICAL



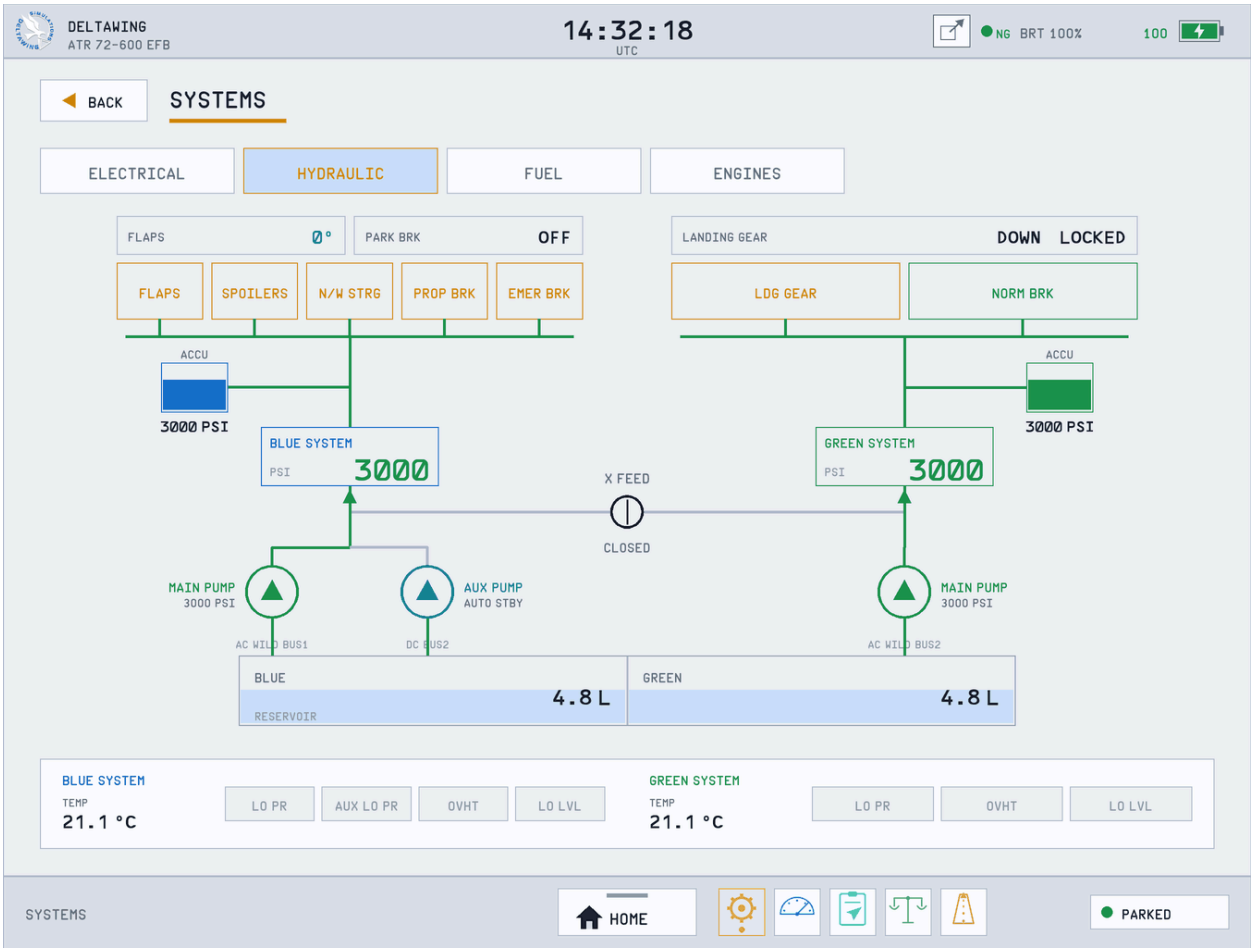
SYSTEMS, ELECTRICAL tab

The electrical schematic shows the buses, sources and contactors. The selector at the top right shows **AC / DC** (complete schematic), **AC ONLY** or **DC ONLY**. Colours: green POWERED, amber OFF / FAULT, cyan OVRD / EXT / ISOL. The ELECTRICAL SOURCES line at the bottom shows each source (DC GEN 1 and 2, ACW GEN 1 and 2, MAIN BATT, EMER BATT, TRU, DC EXT, AC EXT) with its voltage or OFF.

cont'd... ►►►

cont'd... ►►►

HYDRAULIC



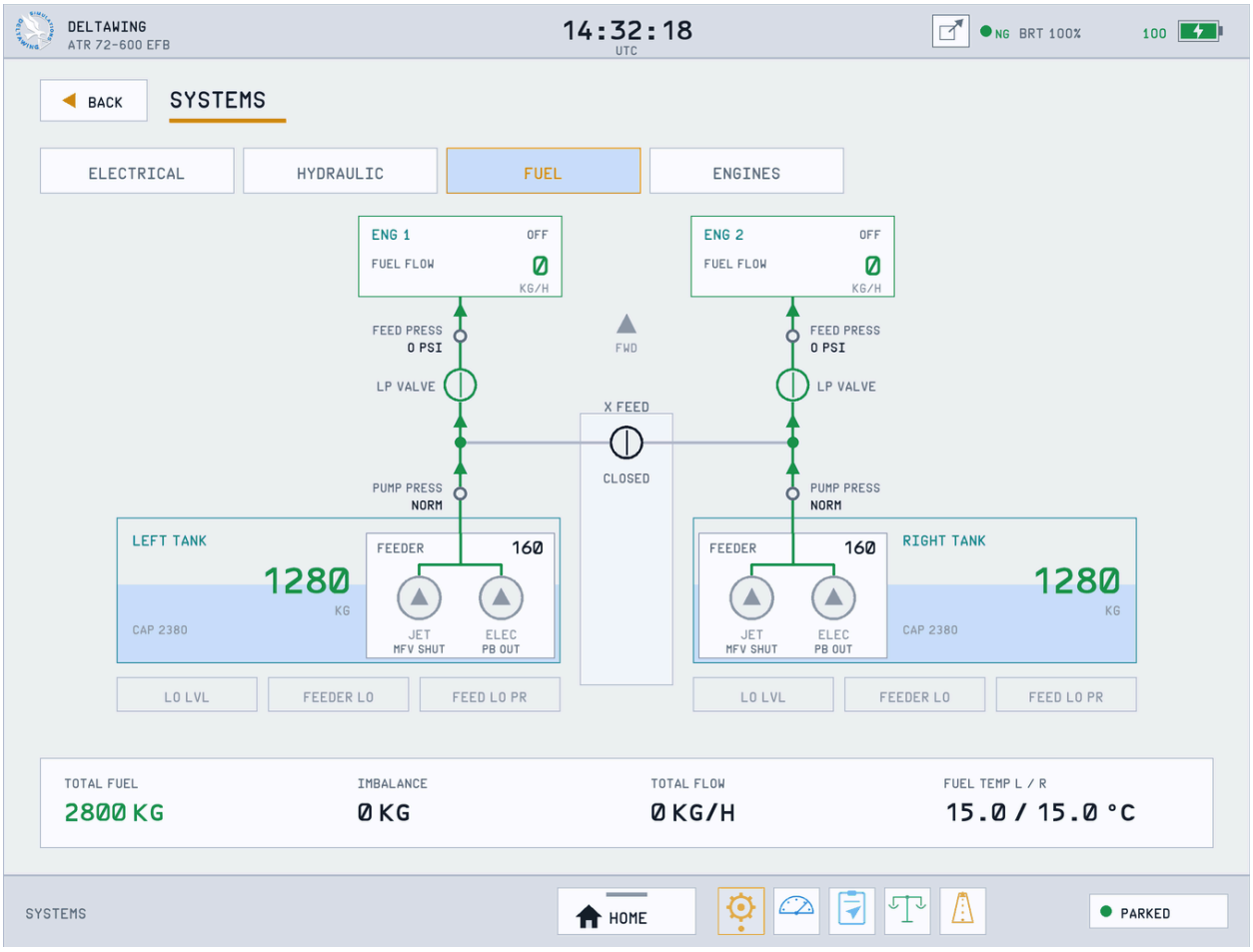
SYSTEMS, HYDRAULIC tab

The hydraulic synoptic shows the BLUE and GREEN systems: pressure, main pumps and the auxiliary pump (with their supply bus), accumulators, reservoir contents, X FEED valve, and the users of each system (flaps, spoilers, nose wheel steering, propeller brake, emergency brake, landing gear, normal brake). The top line shows the flap position, the parking brake and the landing gear position. The bottom line shows the temperature of each system and its alerts (LO PR, AUX LO PR, OVHT, LO LVL).

cont'd... ►►►

cont'd... ►►►

FUEL



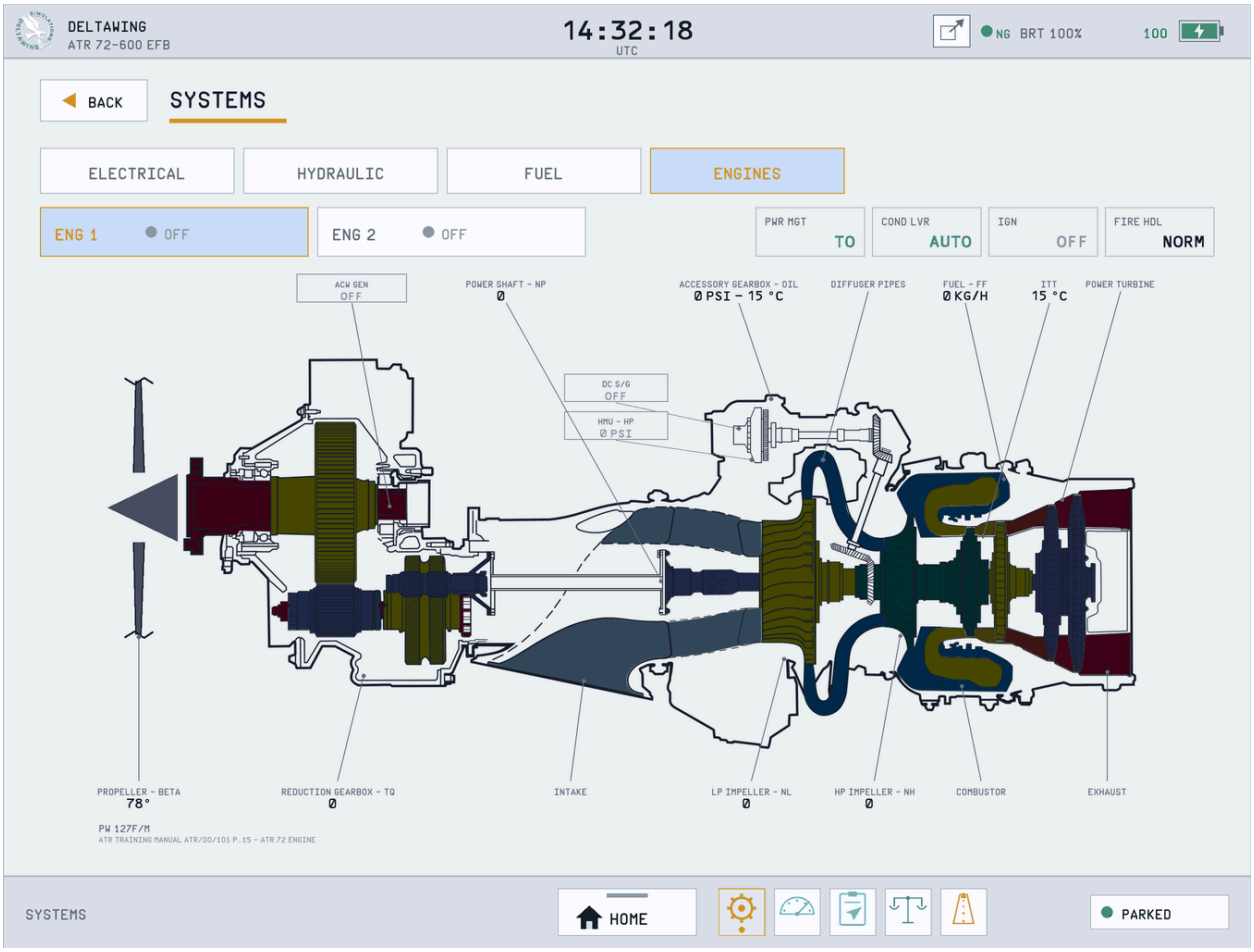
SYSTEMS, FUEL tab

The fuel synoptic shows the LEFT TANK and RIGHT TANK with their FEEDER and pumps (JET, ELEC), the pump pressure, the LP valves, the X FEED valve, the feed pressure and the fuel flow of each engine, and the alerts of each side (LO LVL, FEEDER LO, FEED LO PR). The bottom line shows TOTAL FUEL, IMBALANCE, TOTAL FLOW and FUEL TEMP L / R.

cont'd... ►►►

cont'd... ►►►

ENGINES



SYSTEMS, ENGINES tab

Select ENG 1 or ENG 2 (each tab shows the engine state). A cut-away view of the PW127M shows its sections with live values: propeller (blade angle), reduction gearbox (TQ), power shaft (NP), intake, LP and HP impellers (NL, NH), diffuser pipes, combustor, power turbine, ITT, fuel flow, accessory gearbox (oil pressure and temperature), the DC starter-generator and the ACW generator. The turning parts are coloured while they turn. Chips show the PWR MGT selector, the condition lever, the ignition, the fire handle and, for ENG 2, the HOTEL mode.

After a hot start, the page shows HOT START — REPORT TO MAINTENANCE with the cause and the peak ITT. Press **INSPECTED** to clear the indication after the inspection. Otherwise the line shows the peak ITT of the last start.

SIM.4.3 CABIN

Ident.: SIM.4.3 — 07 NOV 2026
SIMULATOR ONLY

CABIN has two tabs at the top: PANEL (FAP) and INTERIOR.

PANEL (FAP)

PANEL (FAP) shows the cabin flight attendant panel, CABIN PANEL (FAP). The screen is a live copy of the FAP installed in the aft galley: a click on the EFB has the same effect as a touch on the cabin panel. The header shows FAP POWERED or FAP NOT POWERED.

cont'd... ►►►

cont'd... ►►►



CABIN PANEL (FAP), CABIN LIGHTING page

The FAP shows:

- at the top, the SERVICE BUS keys (DC and ACW: SHED or ON) and the cabin plan,
- at the right, the seat belt and no device signs, the lavatory (VACANT or OCCUPIED) and the screen brightness (- / +),
- in the centre, the page selected with the tab bar at the bottom: home, WELCOME, CABIN LIGHTING (galley, entrance, lavatory, cargo, reading lights, PSU ambient light, cabin lateral and ceiling levels), temperature, audio (announcements and music), SETTINGS and MAINTENANCE.

SIMULATOR NOTE

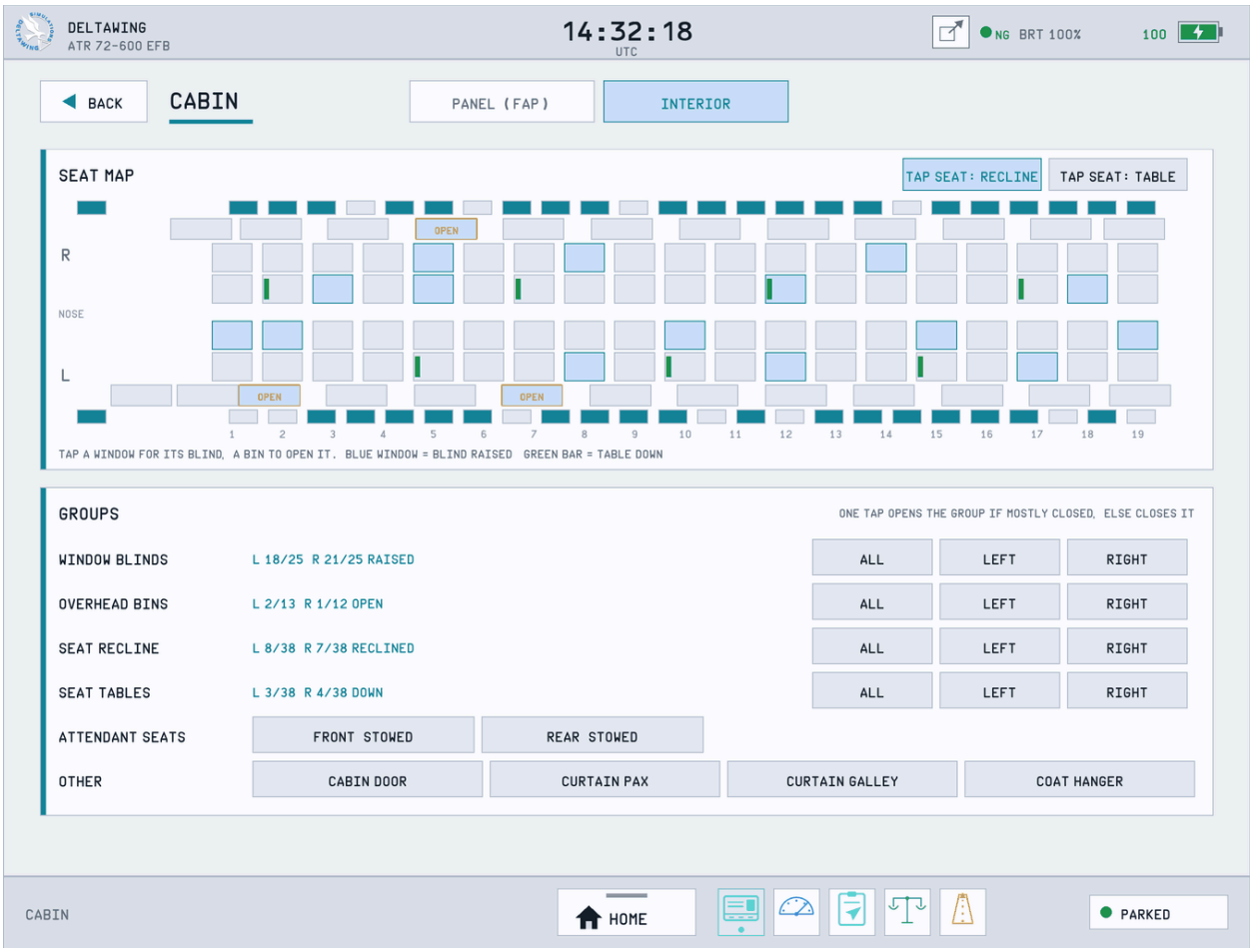
On the aircraft, the FAP is only in the cabin.

INTERIOR

INTERIOR moves the passenger cabin's window blinds, overhead bins, seats and other cabin items. Each change has the same effect as a click on the item in the cabin.

cont'd... ►►►

cont'd... ►►►



CABIN, INTERIOR tab

SEAT MAP shows the cabin from above, nose on the left: the right side of the aircraft is at the top. Each row number is under its row (19 rows of 4 seats).

- Tap a window to raise or lower its blind. A blue window has its blind raised.
- Tap an overhead bin to open or close it. An open bin shows OPEN.
- Tap a seat to recline it (TAP SEAT: RECLINE) or to deploy the table on the seat back in front of it (TAP SEAT: TABLE). A reclined seat is blue, a deployed table is shown as a green bar.

GROUPS moves all the WINDOW BLINDS, OVERHEAD BINS, SEAT RECLINE or SEAT TABLES at once, or those of the LEFT or RIGHT side only. Each line shows how many are raised, open, reclined or down on each side. One tap opens the group if most of it is closed, otherwise closes it. ATTENDANT SEATS (FRONT and REAR) and OTHER (CABIN DOOR, CURTAIN PAX, CURTAIN GALLEY and COAT HANGER) are toggled one at a time.

The cabin items are saved with the aircraft state.

SIM.4.4 NOTES

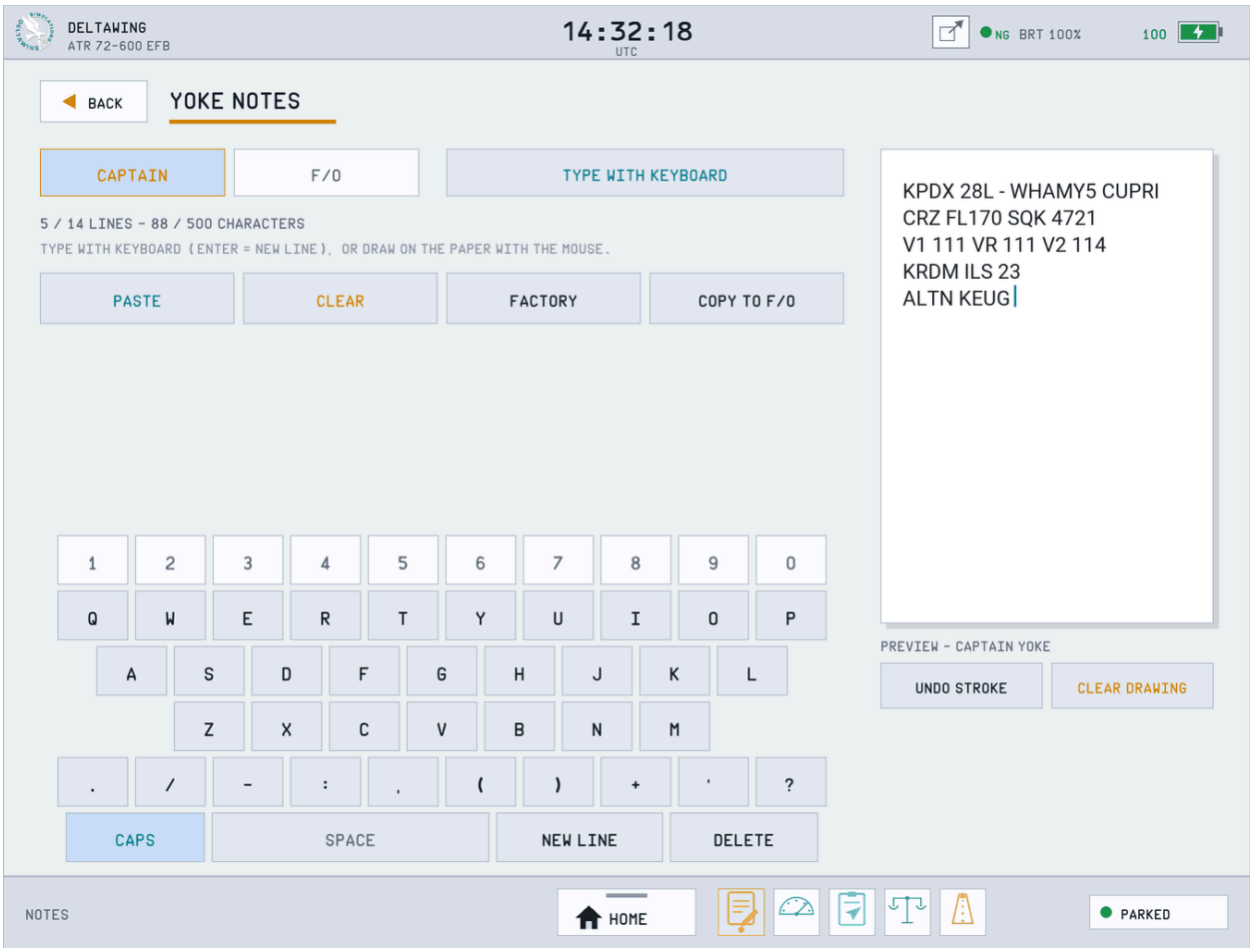
Ident.: SIM.4.4 — 29 OCT 2026

SIMULATOR ONLY

NOTES (page YOKE NOTES) edits the paper note clipped on each control column.

cont'd... ►►►

cont'd... ►►►



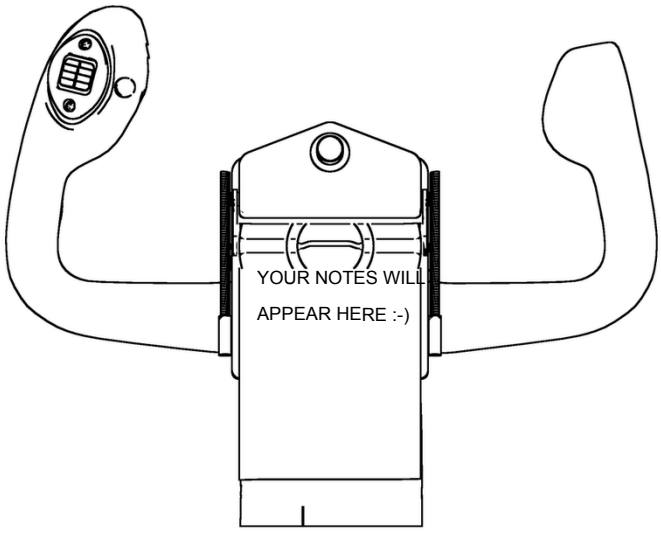
YOKE NOTES

CAPTAIN / F/O	Selects the note to edit. The preview at the right is the paper of that yoke, with the same line breaks.
TYPE WITH KEYBOARD	Types with the computer keyboard (ENTER = new line). It reads KEYBOARD: ON — STOP while the keyboard is captured.
PASTE	Replaces the note with the clipboard.
CLEAR	Clears the note and the drawing.
FACTORY	Restores the default note and clears the drawing.
COPY TO F/O / COPY TO CAPT	Copies the note and the drawing to the other yoke.
UNDO STROKE / CLEAR DRAWING	The paper can also be drawn on with the mouse, or in VR with the controller trigger held (on the preview, or on the paper in the cockpit). These buttons remove the last stroke or the whole drawing.

The on-screen keyboard has numbers, letters, punctuation, CAPS, SPACE, NEW LINE and DELETE. The number of lines and characters used is shown above the buttons (up to 16 lines and 500 characters).

cont'd... ►►►

cont'd... ►►►



Note on the CAPT control column

SIMULATOR NOTE

The papers can be shown or hidden from the aircraft menu of X-Plane, DWSim Show/Hide (see SIM.7.1). The notes are saved.

SIM.4.5 FAILURES

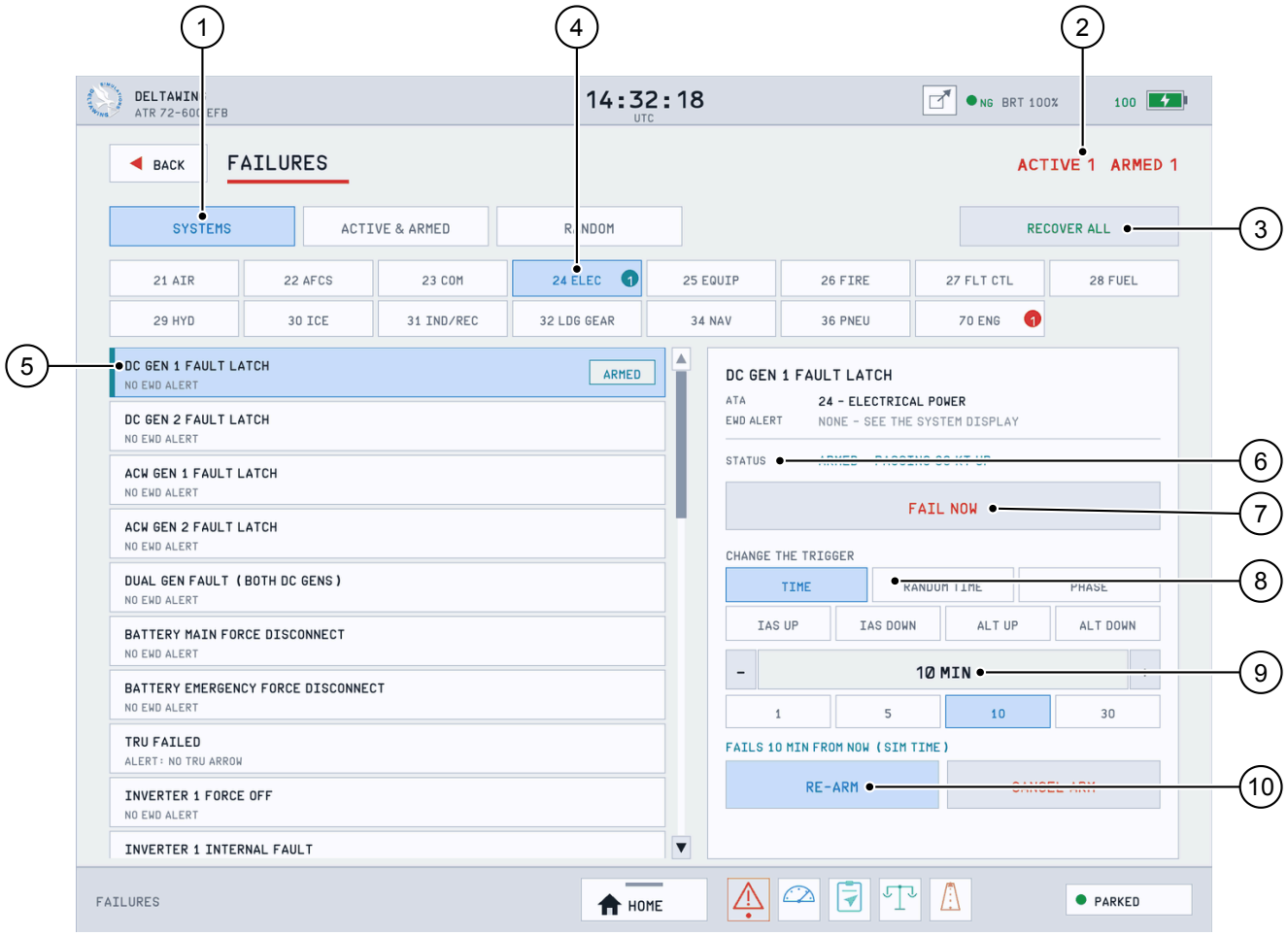
Ident.: SIM.4.5 — 05 NOV 2026

SIMULATOR ONLY

FAILURES triggers failures for training, as an instructor would in a simulator. It has three tabs: **SYSTEMS**, **ACTIVE & ARMED** and **RANDOM**. The figure shows the DC GEN 1 fault armed to fail when the airspeed passes 80 kt, and the ENG 1 WRONG EEC INSTALLED failure active.

cont'd... ►►►

cont'd... ►►►



FAILURES, SYSTEMS tab

① Tabs

SYSTEMS, ACTIVE & ARMED and RANDOM.

② Counters

Number of failures ACTIVE and ARMED. Each action is confirmed for a few seconds on this line.

③ RECOVER ALL

Removes all the failures and cancels all the armed failures. Click twice (TAP AGAIN TO CONFIRM).

④ Systems

Failures are grouped by ATA chapter: 21 AIR, 22 AFCS, 23 COM, 24 ELEC, 25 EQUIP, 26 FIRE, 27 FLT CTL, 28 FUEL, 29 HYD, 30 ICE, 31 IND/REC, 32 LDG GEAR, 34 NAV, 36 PNEU and 70 ENG. A badge shows the number of failures active (red) or armed (cyan) in the chapter.

The 24 ELEC chapter includes, among others:

FAILURE	EWD ALERT	EFFECT
DC BUS 1 / 2 short circuit	ELEC DC BUS 1 / 2	The bus is isolated, its DC GEN faults and the DC BTC stays open. After RECOVER, the DC GEN pb must be cycled to bring the generator back.

cont'd... ►►►

cont'd... ►►►

FAILURE	EWD ALERT	EFFECT
DC BTC failed open	ELEC DC BUS (on GEN loss)	No effect until a DC GEN is lost: the bus of the failed generator is then not supplied.
DC GEN 1 / 2 regulation high (over voltage)	ELEC DC GEN	The generator over voltage protection trips: DC GEN FAULT, the DC BTC closes.
MAIN / EMER BAT weak (low charge)	—	Battery voltage below 25 V on the CAPT lateral panel. After the engine start, the recharge current loads the DC GEN. RECOVER recharges the battery.
DC GPU weak	—	GPU voltage well below 28 V on the CAPT lateral panel, unusable once below 26 V.
TRU contactor failed open	ELEC DC EMER BUS	With the TRU ON, the DC EMER BUS and the DC STBY BUS are lost. TRU OFF supplies the DC EMER BUS again from the HOT EMER BAT BUS.

The weak battery and weak GPU failures are pre-flight states: they are never picked at random.

(5) Failure list

Failures of the chapter selected, with the EWD alert that each one triggers (ALERT: …, or NO EWD ALERT). An ACTIVE or ARMED tag marks the failures in use. Click a failure to select it.

(6) Detail

ATA chapter, EWD ALERT (or NONE - SEE THE SYSTEM DISPLAY) and STATUS: NORMAL, ACTIVE, or ARMED with its trigger.

(7) FAIL NOW / RECOVER

FAIL NOW triggers the failure at once. RECOVER removes an active failure.

(8) Trigger

Arms the failure to occur later, on one of these triggers:

TIME	After a time, 1 to 600 MIN (sim time). Presets 1, 5, 10, 30.
RANDOM TIME	At a random time in a window, for example 5-30 MIN. Presets 0-10, 5-30, 10-60, 30-120.
PHASE	Once in CLIMB, CRUISE, DESCENT or APPROACH, after 5 s in that phase.
IAS UP / IAS DOWN	When accelerating / decelerating through an airspeed (20 to 300 KT).
ALT UP / ALT DOWN	When climbing / descending through an altitude (500 to 25000 FT).

The line below the value says when the failure will occur (for example FAILS 10 MIN FROM NOW (SIM TIME)). An airspeed or altitude trigger fires only when the value is crossed and held about one second.

(9) Value

Trigger value: - / + or a preset.

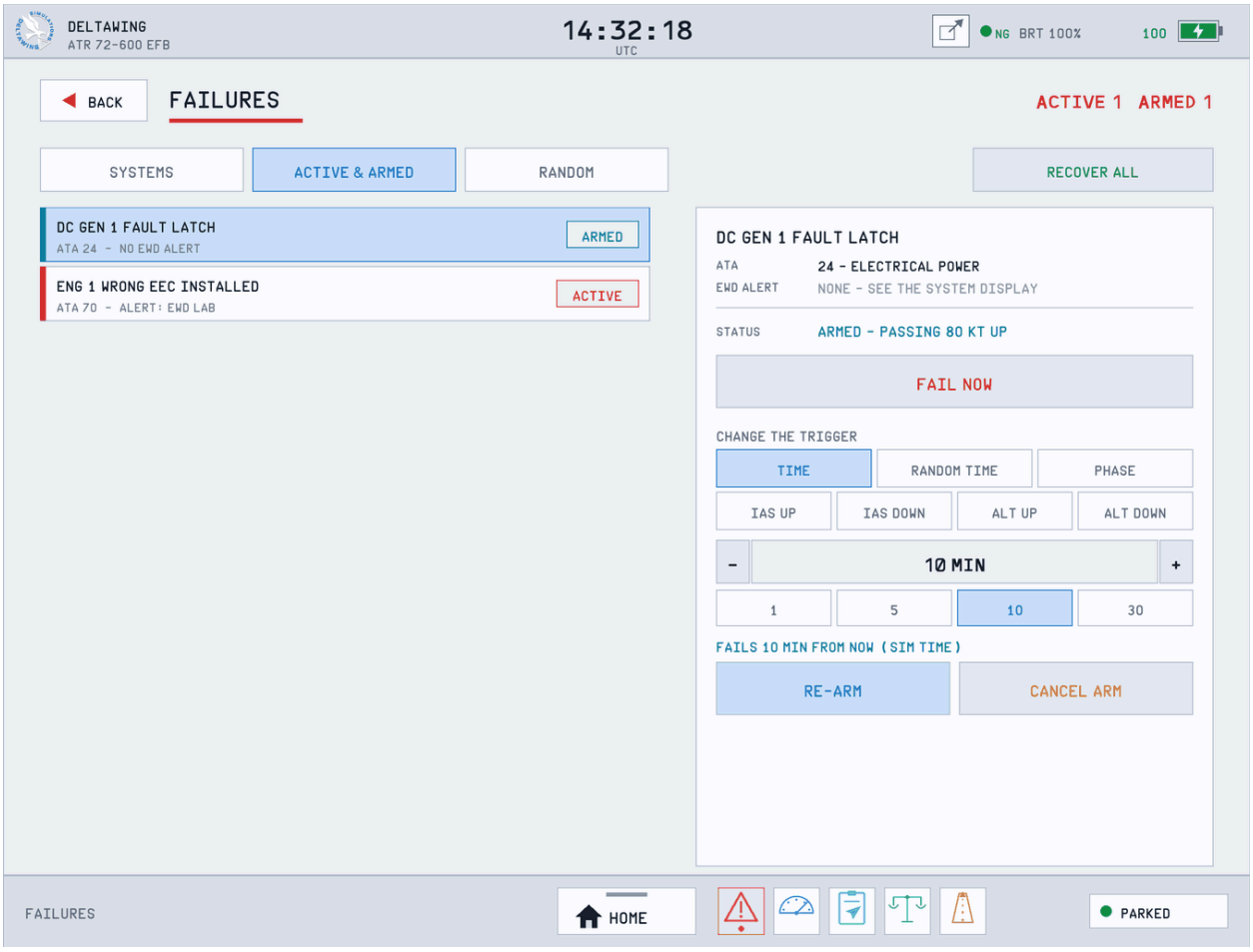
(10) ARM / RE-ARM / CANCEL ARM

ARM arms the failure. On an armed failure, RE-ARM changes the trigger and CANCEL ARM disarms it.

cont'd... ►►►

cont'd... ►►►

ACTIVE & ARMED tab



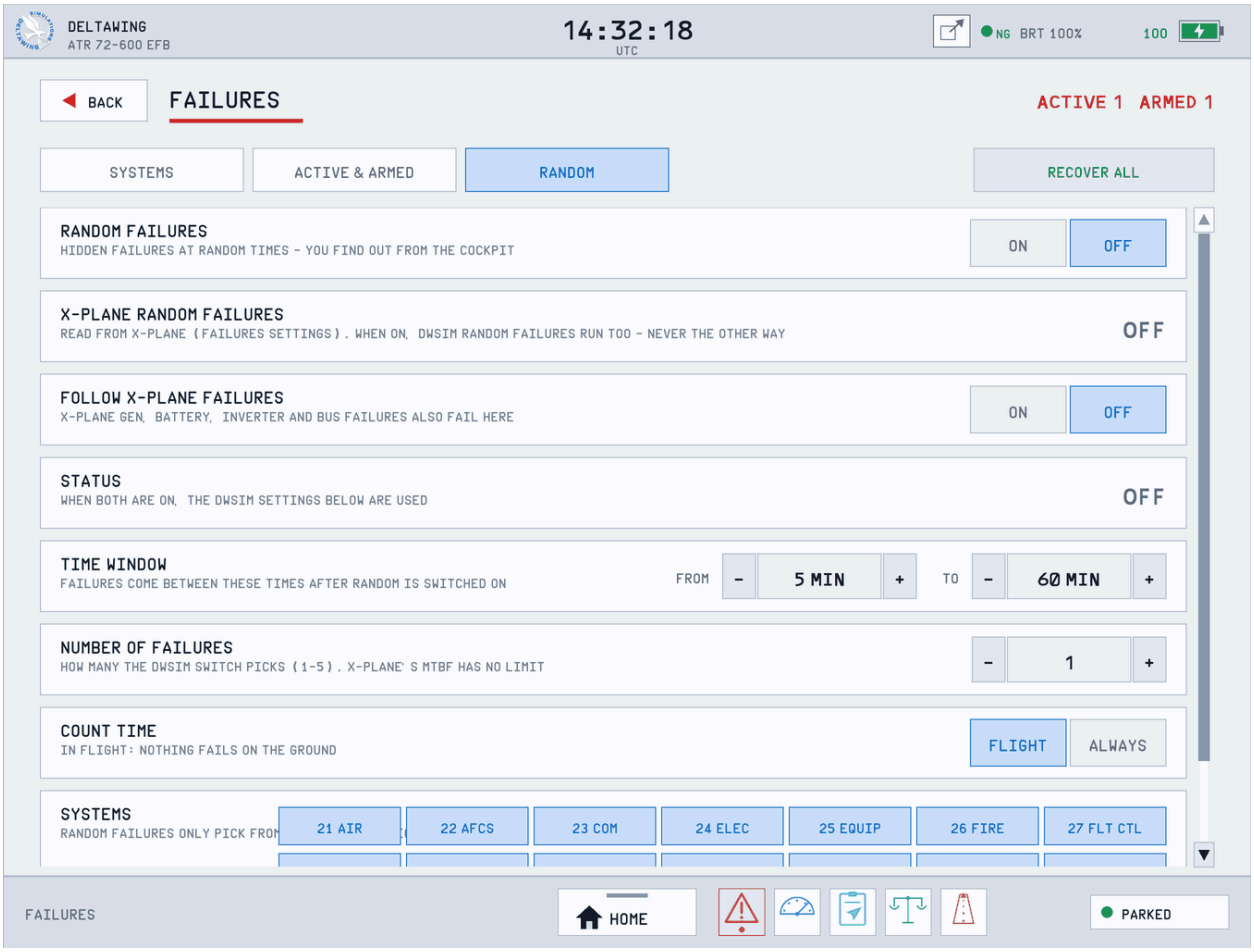
FAILURES, ACTIVE & ARMED tab

Lists the failures that are active and the failures that are armed, with the same detail panel.

cont'd... ►►►

cont'd... ►►►

RANDOM tab



FAILURES, RANDOM tab

Random failures are hidden: the crew finds them from the cockpit.

RANDOM FAILURES	ON / OFF (default OFF).
X-PLANE RANDOM FAILURES	The X-Plane random failure setting (X-Plane failure settings), shown only. When it is ON, the random failures of the aircraft also run, at X-Plane's mean time between failures for each failure of the selected systems. The EFB never changes the X-Plane setting.
FOLLOW X-PLANE FAILURES	ON / OFF (default OFF). ON: an X-Plane electrical failure (X-Plane failure settings) also fails the matching aircraft failure. The number of failures received this way is shown (n ACTIVE). See the table below.
STATUS	OFF, RUNNING (own settings), or RUNNING - X-PLANE MTBF. When both are on, the EFB settings below are used.
TIME WINDOW	Window, after RANDOM FAILURES is switched on, in which the failures occur: FROM and TO, in minutes (default 5 to 60 MIN).
NUMBER OF FAILURES	1 to 5 (default 1).
COUNT TIME	FLIGHT (nothing fails on the ground, default) or ALWAYS.

cont'd... ►►►

cont'd... ►►►

SYSTEMS ATA chapters from which the random failures are taken.

The ENG 1 / ENG 2 WRONG EEC INSTALLED failures (amber LAB in the EWD torque readout) are never picked at random.

With FOLLOW X-PLANE FAILURES ON, these X-Plane failures fail the aircraft:

X-PLANE FAILURE	AIRCRAFT FAILURE
Generator 1 / 2	DC GEN 1 / 2 fault
Generator 1 / 2 voltage low / high	DC GEN 1 / 2 regulation low / high
Battery 1 / 2	MAIN / EMER battery force disconnect
Battery 1 / 2 voltage low	MAIN / EMER BAT weak (on the ground only)
Inverter 1 / 2	Inverter 1 / 2 internal fault
Electrical system bus 1 / 2	DC BUS 1 / 2 short circuit

The link is one way, and only follows the moment X-Plane fails an item: a failure already set in X-Plane when the aircraft loads, or when the option is set ON, does not fail the aircraft. When X-Plane repairs the item, the aircraft failure is recovered, unless it was failed from the EFB. A failure recovered on the EFB while X-Plane still shows it failed stays recovered. The link does nothing in a replay or while the simulation is paused. The ACW generators are failed from the EFB only.

SIMULATOR NOTE

The random settings are saved. Active and armed failures are not: every load starts without failures. Commands: `dwsim/failures/fail/<id>`, `dwsim/failures/recover/<id>`, `dwsim/failures/recover_all` and `dwsim/failures/random_toggle`.

Note

Learn to fly the aircraft without failures first. Failures are best practised once the normal procedures are well known.

SIM.4.6 AIRCRAFT LOG

Ident.: SIM.4.6 10 NOV 2026

SIMULATOR ONLY

AIRCRAFT LOG keeps the life of the aircraft: hours, cycles, engine counters and a logbook of each flight. Each livery is its own aircraft (its own airframe): the hours, the logbook and the cockpit state of one livery are not those of another.

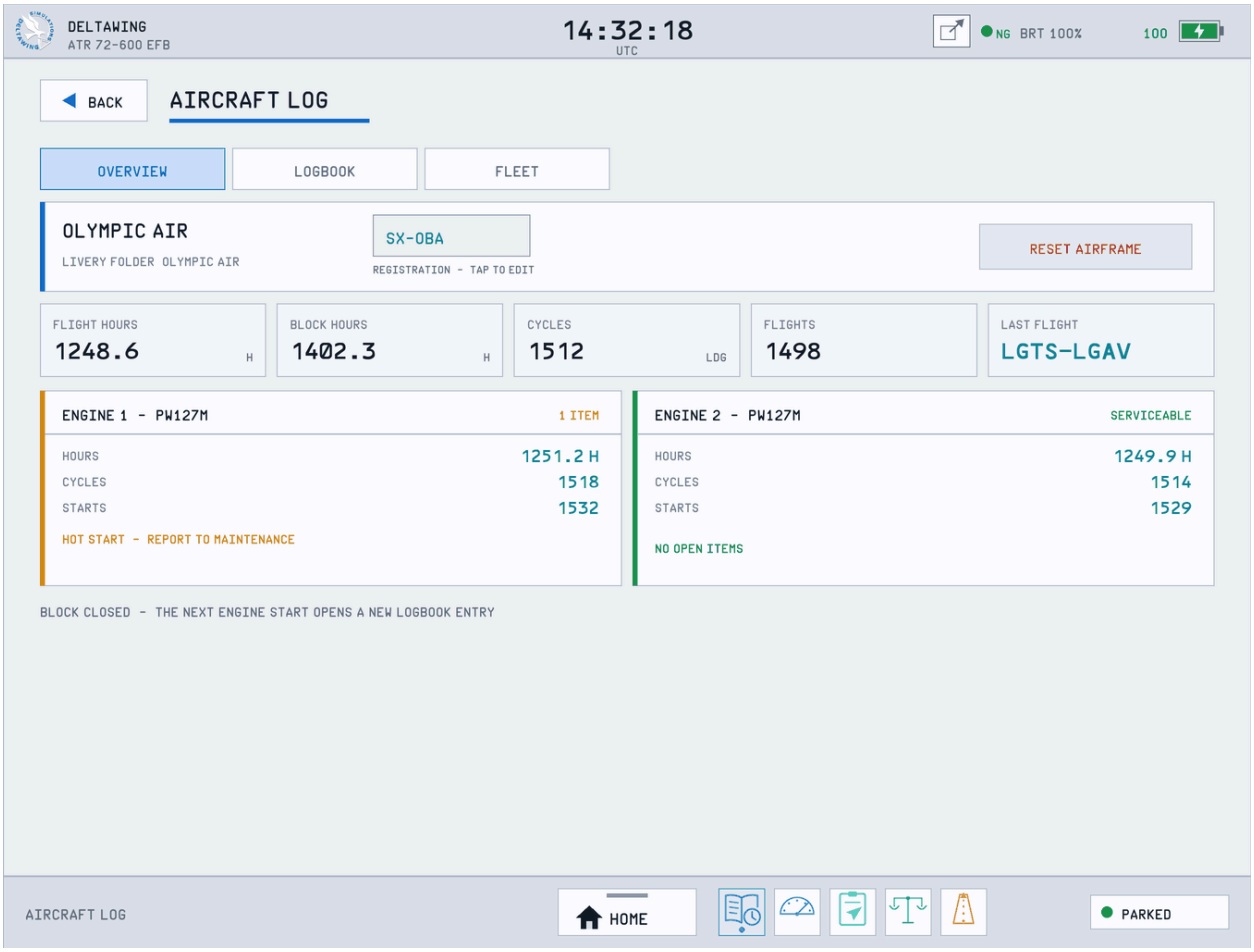
AIRCRAFT LOG needs PER-LIVERY AIRFRAME set to ON (EFB SETTINGS, AIRCRAFT STATE, see SIM.5.9). With it OFF, the page shows PER-LIVERY AIRFRAME IS OFF and nothing is counted.

The page has three tabs: OVERVIEW, LOGBOOK and FLEET.

cont'd... ►►►

cont'd... ►►►

OVERVIEW



AIRCRAFT LOG, OVERVIEW

The top card gives the livery (DEFAULT LIVERY for the default paint) and its folder name.

REGISTRATION — Tap to type the registration of this aircraft (up to 10 letters, digits and hyphens), ENTER to accept. X-Plane's tail number is set to it, so ATC and other add-ons see it. When the registration differs from the one painted on the livery, a prompt offers to repaint the livery with it, or to switch to a livery already painted with it (SIM.7.7).

RESET AIRFRAME — Sets the hours, cycles, flights and engine counters to zero and starts a new logbook with an AIRFRAME RESET entry. The registration is kept. Only on the ground with both engines stopped. Tap once: the button shows TAP AGAIN TO RESET; tap again to confirm.

The tiles show the FLIGHT HOURS, BLOCK HOURS, CYCLES, FLIGHTS and the LAST FLIGHT (departure - arrival).

Each engine card gives the HOURS, CYCLES and STARTS of that engine, and its open items:

OPEN ITEM	MEANING
HOT START - REPORT TO MAINTENANCE	A hot start was recorded (see SIM.4.2 ENGINES to clear it).
OVERTORQUE - LOGBOOK ENTRY OVERTORQUE - REFER TO MAINTENANCE	An overtorque was recorded.
PROPELLER DESTROYED	The propeller struck the ground.

cont'd... ►►►

cont'd... ►►►

With no open item the card shows SERVICEABLE and NO OPEN ITEMS.

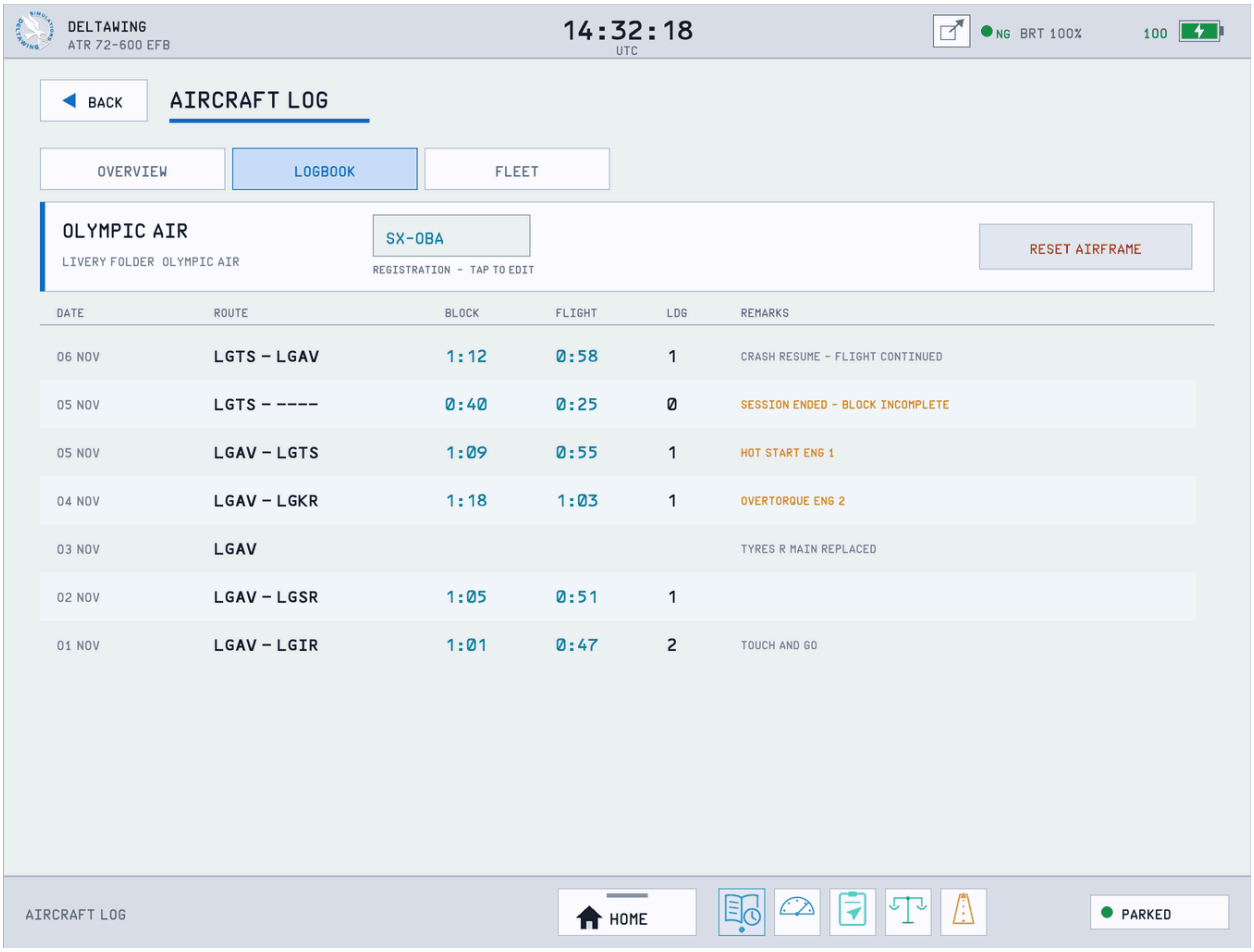
The line below gives BLOCK OPEN while a flight is being counted, or BLOCK CLOSED - THE NEXT ENGINE START OPENS A NEW LOGBOOK ENTRY.

How the aircraft counts

COUNTER	FROM	TO
Block time	The first engine running	Both engines stopped on the ground (5 s)
Flight time	Lift-off	Touchdown
Landing (cycle)	A touchdown after at least 30 s in the air, touch-and-go included	
Engine hours	The engine running	The engine stopped
Engine start	Each time the engine reaches RUNNING	

Each landing is one cycle of the airframe and of each engine running. The time counts in simulator time: nothing is counted while the simulator is paused or during a replay, and a time acceleration counts as the time flown.

LOGBOOK



AIRCRAFT LOG, LOGBOOK

One line for each block, the newest first: DATE, ROUTE, BLOCK and FLIGHT time (hours:minutes), landings (LDG) and REMARKS. The route is the FMS origin and destination, or the nearest airport when the FMS has none. The tablet held

cont'd... ►►►

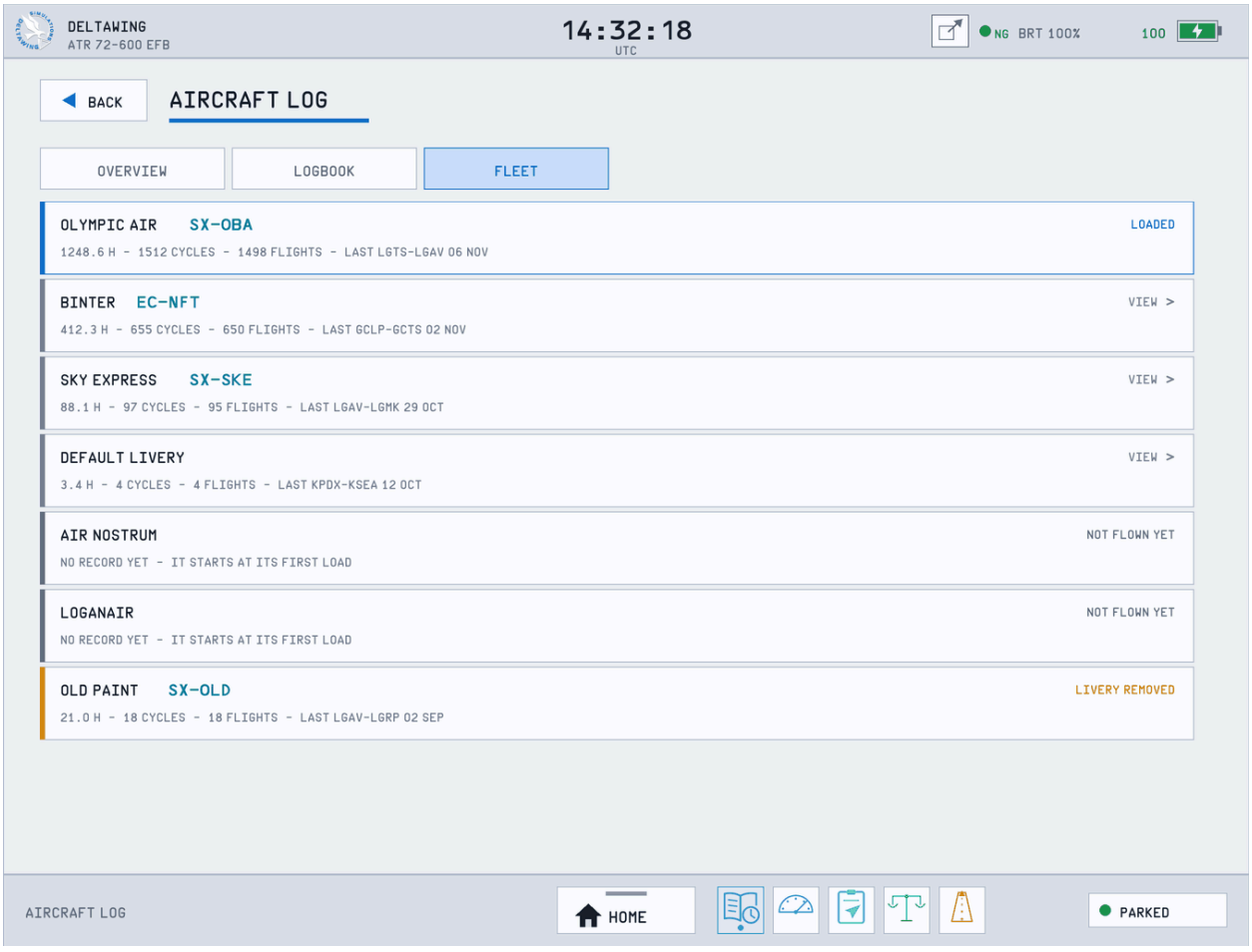
cont'd... ►►►

upright (portrait) shows no REMARKS column.

The REMARKS list the events of the block: HOT START, OVERTORQUE and PROP STRIKE (ENG 1 or 2), TYRE BURST (NOSE, L MAIN or R MAIN) and the tail strikes. An event on the ground between two flights, such as a tyre replaced or an airframe reset, gets a line of its own with only the date and the airport.

When a session ends in the air (a crash of X-Plane, or a quit in flight) the block stays open. If the flight is resumed at the next load (SIM.7.7), the block continues (CRASH RESUME - FLIGHT CONTINUED). Otherwise it is closed as SESSION ENDED - BLOCK INCOMPLETE, with the time counted until then.

FLEET



AIRCRAFT LOG, FLEET

Every livery installed and every airframe saved, with its registration, hours, cycles, flights and last flight. The right side gives:

LOADED	The livery flying now (blue frame).
VIEW >	Another livery already flown. Tap it to see its OVERVIEW and LOGBOOK, read only (VIEWING - NOT LOADED - READ ONLY). BACK TO CURRENT returns to the livery loaded.
NOT FLOWN YET	An installed livery with no record yet. Its record starts at its first load.
LIVERY REMOVED	A saved airframe whose livery is no longer installed.

cont'd... ►►►

cont'd... ►►►

To fly another airframe, select its livery in X-Plane. A livery changed with the aircraft loaded gets its own hours and logbook at once; its cockpit state is used from its next load.

DELETE LIVERY — On a livery made by a repaint (SIM.7.7) that is not loaded. Tap it, then TAP AGAIN TO DELETE: the livery folder and its airframe (hours, logbook, cockpit state) are deleted. The livery it was painted from is not changed. X-Plane lists the deleted livery in its livery menu until the aircraft is loaded again.

DELETE LOGBOOK — On a LIVERY REMOVED airframe. Tap it, then TAP AGAIN TO DELETE: the saved airframe is deleted.

The loaded livery, the default paint and liveries not made by a repaint cannot be deleted from the EFB. To delete one of those, load another livery and delete its folder in `liveries`.

Note

The airframes are saved in the `data/output/DWSim_Data/Airframes` folder of the aircraft plugin, one folder for each livery. An update of the aircraft does not change them.

SIM.4.7 SAVE / LOAD

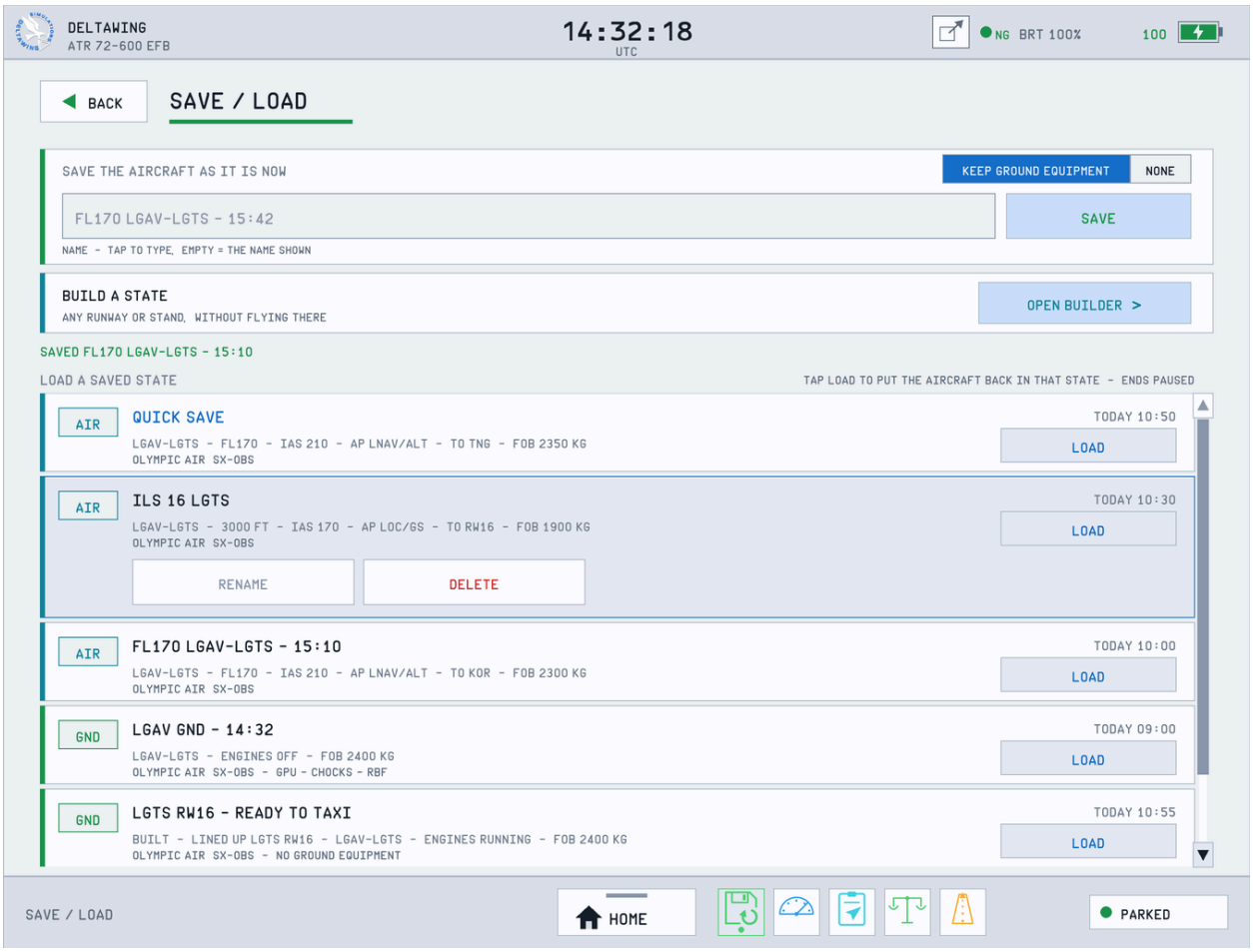
Ident.: SIM.4.7 — 10 NOV 2026

SIMULATOR ONLY

SAVE / LOAD (the saved states) keeps the whole aircraft at a moment you choose, at the gate, at the holding point, in a hold or on the approach, and puts it back later, in the same session or another day. A state holds the position, speed and attitude, the configuration and power levers, the engines, the fuel and load, the cockpit panel, both FMS with the active leg and the secondary flight plan, the AFCS modes and targets, the check lists, the failures, the ice and the temperatures, the doors, hatches and receptacle covers, the ground equipment (GPU and its cables, chocks, the vehicles, the remove-before-flight items, the tail stand and the cones, as fitted at the save, a fit or removal in progress included), and the X-Plane date and time.

cont'd... ►►►

cont'd... ►►►



SAVE / LOAD

Save

Type a name in the field, or leave it empty to take the name shown: the nearest airport on the ground (for example `LGAV GND - 14:32`), the level and route in flight (`FL170 LGAV-LGTS - 15:10`). **SAVE** (or ENTER on the keyboard) writes the state. The line below the card confirms it.

KEEP GROUND EQUIPMENT / NONE (top of the card) applies to the next save. KEEP: the ground equipment is saved as it is (GPU and its cables, chocks, vehicles, remove-before-flight items, cones). Every save keeps the doors and the window blinds, each blind at its exact position. NONE: the state loads with no ground equipment. To save another choice, set it in the GROUND application before you save.

Up to 20 states, plus one QUICK SAVE. When the 20 are in use, the SAVE button shows LIST FULL: select a state and use **REPLACE WITH NOW**, or delete one.

The list

Below the save card, LOAD A SAVED STATE lists the states: the QUICK SAVE first, then the newest first. Each line gives GND or AIR, the name, a summary (route, level, IAS, AP modes, next waypoint, fuel on board, or ENGINES RUNNING / OFF on the ground), the livery and registration followed, on the ground, by the ground equipment of the state (for example GPU - CHOCKS - RBF, or NO GROUND EQUIPMENT), and the date.

One list serves every livery. A state saved on another livery shows SAVED ON <LIVERY> in amber: it loads onto the livery you are flying.

cont'd... ►►►

cont'd... ►►►

Every line has its own **LOAD** button, on the right under the date: tap it twice (the first tap shows TAP AGAIN TO LOAD) to put the aircraft in the saved state.

Tap a line to select it for the other actions:

RENAME	Opens the keyboard for a new name.
DELETE	Tap twice. Removes the state.
REPLACE WITH NOW	Only when the list is full. Tap twice. Saves the aircraft as it is now in place of this state.

Load

The load runs the same steps as the flight resume (SIM.7.7): the aircraft is held in place while the engines, the panel and the systems, the flight plan and the autopilot are set, and the line below the card gives the step in progress. At the end the sim is **paused**: check the autopilot modes, the power and the trim, then unpause.

The ground equipment is put back as it was at the save, after the aircraft is moved. A state built for a runway (Build a state, below) takes the ground equipment of its phase instead.

The X-Plane date and time are set to those of the save. The engine and brake temperatures are those of the save; they do not cool down for the time the state was kept.

On the AIRCRAFT LOG (SIM.4.6), a load closes the block in progress as STATE LOADED - BLOCK INCOMPLETE and adds the event STATE LOADED with the name. A state loaded in the air or with an engine running opens a new block. The hours, cycles and engine starts are never set back by a load, and the engine start and move of the load are not counted.

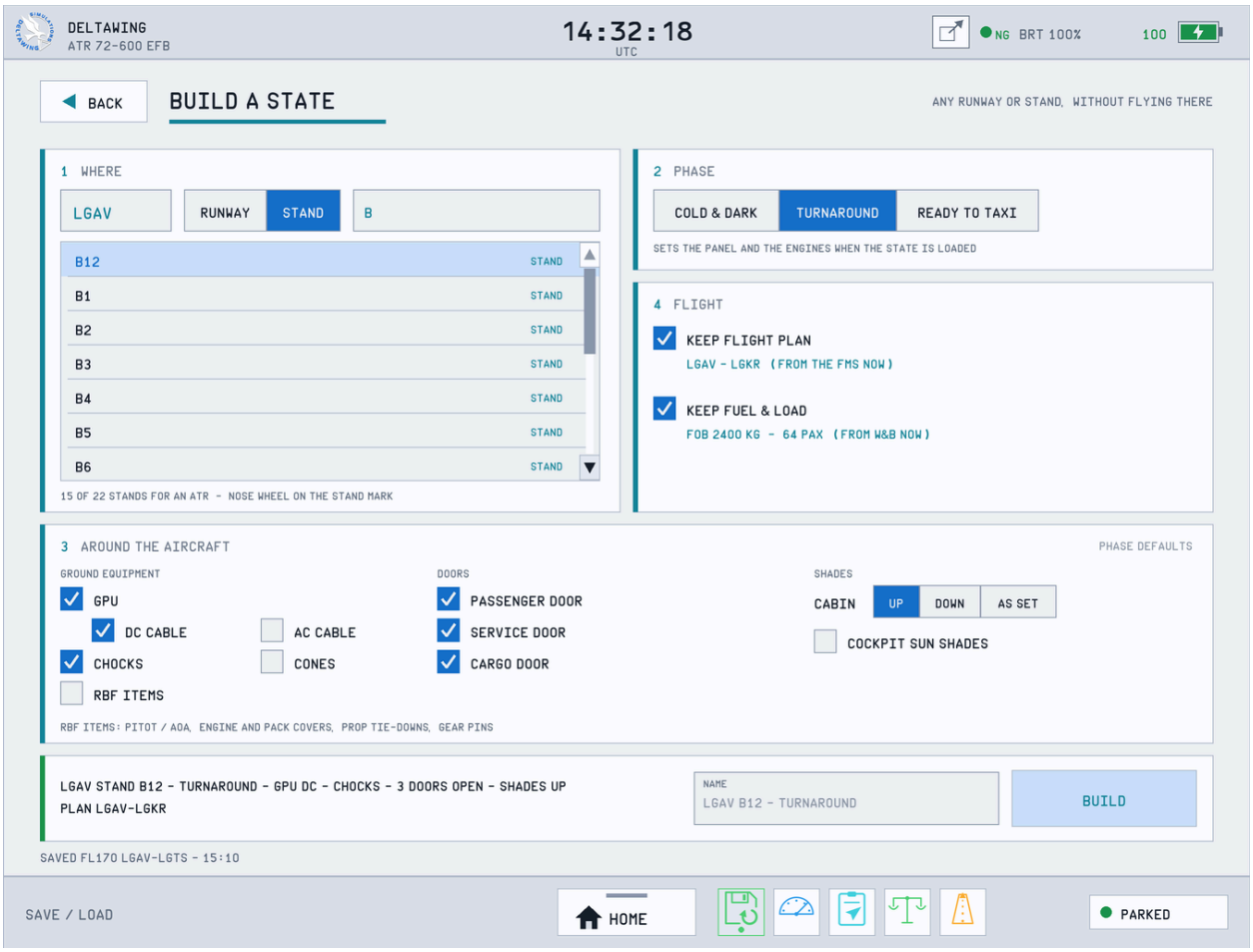
A state that cannot be read (damaged, or written by another version of the aircraft) is not loaded, and the line below the card says so. When a waypoint of the saved flight plan is no longer in the navigation database (a new AIRAC cycle), the flight plan is not loaded at all and the line ends with FLIGHT PLAN NOT LOADED (NAV DATA CHANGED); the rest of the state is loaded.

Build a state

A state can be made for a runway or a stand the aircraft has never been to. **OPEN BUILDER >** on the BUILD A STATE card opens the builder page; **BACK** returns to SAVE / LOAD. The page has four sections and a summary bar. A pill (one part highlighted) means one choice of several; a box with a tick means on or off.

cont'd... ►►►

cont'd... ►►►



BUILD A STATE at a stand

1 WHERE

AIRPORT — Tap and type the ICAO code.

RUNWAY / STAND — RUNWAY lists the runways of the airport, from the navigation database: the aircraft is lined up at the start of the runway (behind a displaced threshold), on the runway axis. STAND lists the stands of the airport that an ATR 72 can use, from the X-Plane airport data (the scenery installed, add-on airports included; hangars and stands for other aircraft sizes are left out): type part of the name in the field beside it to filter the list, then tap a stand. The aircraft is placed with its nose wheel on the stand mark, on the stand heading. The chosen stand is shown first.

2 PHASE

COLD & DARK, TURNAROUND or READY TO TAXI: the same states as the GROUND & CONFIG page (SIM.4.1), set when the state is loaded.

3 AROUND THE AIRCRAFT

GROUND EQUIPMENT — GPU, with DC CABLE and AC CABLE under it when it is ticked (a cable is plugged in with its receptacle cover open), CHOCKS, CONES and RBF ITEMS (the whole set: pitot and AOA covers, engine and pack intake covers, propeller tie-downs and gear pins).

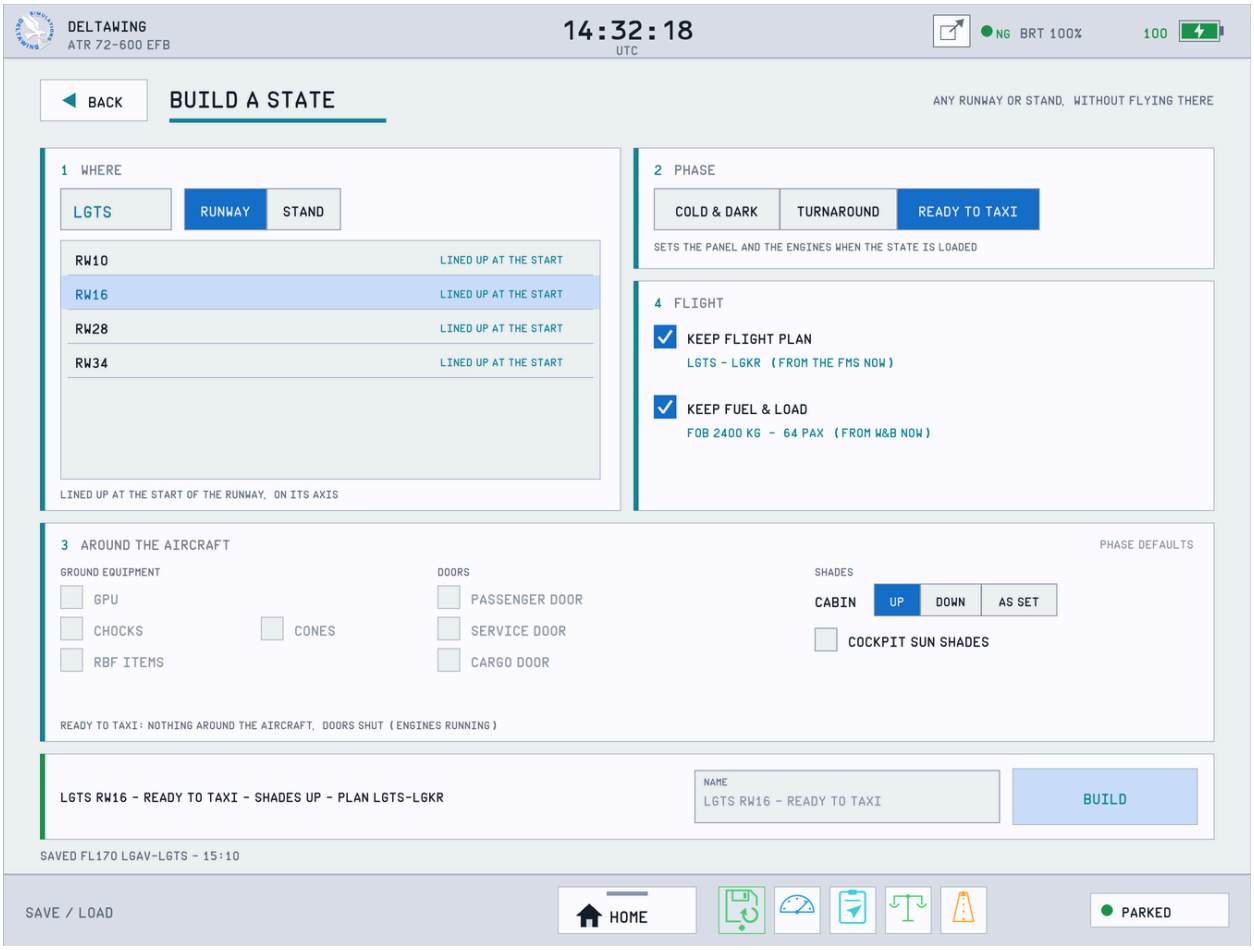
cont'd... ►►►

cont'd... ►►►

DOORS — PASSENGER DOOR (opens with its handrails), SERVICE DOOR, CARGO DOOR (opens with its control panel; unticked means locked).

SHADES — CABIN: UP, DOWN or AS SET. AS SET keeps every cabin window blind at the exact position it has in the cabin when BUILD is pressed; set them first in the cabin or in the CABIN application. COCKPIT SUN SHADES: ticked = out.

Each phase ticks its usual choice: COLD & DARK chocks, cones and RBF items, doors shut, cabin shades down; TURNAROUND GPU with the DC cable, chocks, the three doors open, cabin shades up; READY TO TAXI nothing around the aircraft and the doors shut (the engines run; these boxes are not available). A box changed by hand keeps its value when another phase is chosen, and shows CHANGED where it differs from the phase's choice. **PHASE DEFAULTS** clears the changes.



BUILD A STATE on a runway, READY TO TAXI

4 FLIGHT

KEEP FLIGHT PLAN — Ticked: the state carries the flight plan in the FMS now (prepare it first in the FPLN application, from SimBrief or on the MCDU); the route shows below it. When the flight plan departs from another airport than the one chosen, it says so in amber; the state can still be built.

KEEP FUEL & LOAD — Ticked: the state carries the fuel and load of WEIGHT & BALANCE now; the fuel on board and the passengers show below it.

cont'd... ►►►

cont'd... ►►►

Summary bar

The bar repeats in one line what will be built (for example LGAV STAND B12 - TURNAROUND - GPU DC - CHOCKS - 3 DOORS OPEN - SHADES UP - PLAN LGAV-LGTS).

NAME — Tap to type a name; empty takes the name shown (the airport, runway or stand and the phase, for example `LGAV B12 - TURNAROUND`).

BUILD — Writes the state. It joins the list with BUILT - LINED UP <AIRPORT> <RUNWAY> or BUILT - AT <AIRPORT> STAND <STAND>. The button then reads **LOAD NOW**: it loads the new state at once and returns to SAVE / LOAD. Any change on the page turns it back into BUILD.

The line under the bar says what is missing (TYPE AN AIRPORT, PICK A STAND …) or the result of the build.

A built state keeps the X-Plane date and time of the moment it is loaded. At the load the aircraft is put on the ground with the terrain found there, and the choices of section 3 are applied after the phase.

Note

The builder needs the height of the aircraft on its gear, measured once with the aircraft parked on the ground. If it was never measured (the aircraft has only been loaded in the air), BUILD says PARK THE AIRCRAFT ON THE GROUND ONCE FIRST.

Holding points cannot be chosen yet.

Quick save

Two commands, for the keyboard or hardware: `DWSim/ATR_Series/commands/state/quick_save` writes the QUICK SAVE (it replaces the previous one), `DWSim/ATR_Series/commands/state/quick_load` loads it.

Note

The weather comes from X-Plane at the time of the load and may differ from the weather of the save. The states are kept in the `data/output/DWSim_Data/Saves` folder of the aircraft plugin. An update of the aircraft does not change them; a state written by an older version may no longer load.

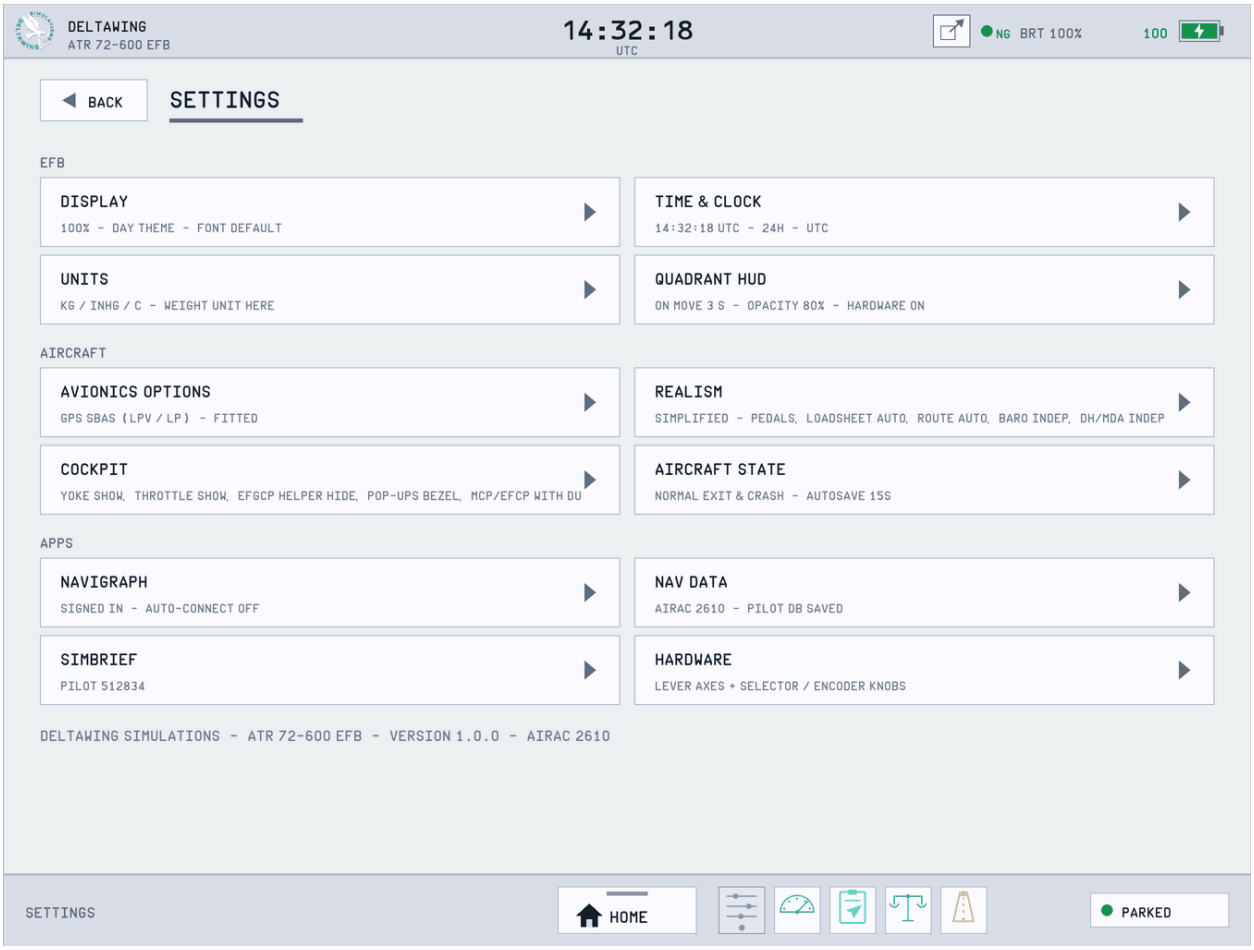
SIM.5 EFB - SETTINGS

SIM.5.1 General

Ident.: SIM.5.1 — 30 OCT 2026

SIMULATOR ONLY

SETTINGS holds the settings of the EFB, of the aircraft and of the EFB applications. The settings are kept from one session to the next.



SETTINGS

The pages are in three groups. Each card shows a summary of the current settings; click it to open the page. BACK returns to the list.

GROUP	PAGES
EFB	DISPLAY, TIME & CLOCK, UNITS, QUADRANT HUD
AIRCRAFT	AVIONICS OPTIONS, REALISM, COCKPIT, AIRCRAFT STATE
APPS	NAVIGRAPH, NAV DATA, SIMBRIEF, HARDWARE

The line at the bottom of the list shows the product, the version and the AIRAC cycle. Click it to open the ABOUT page.

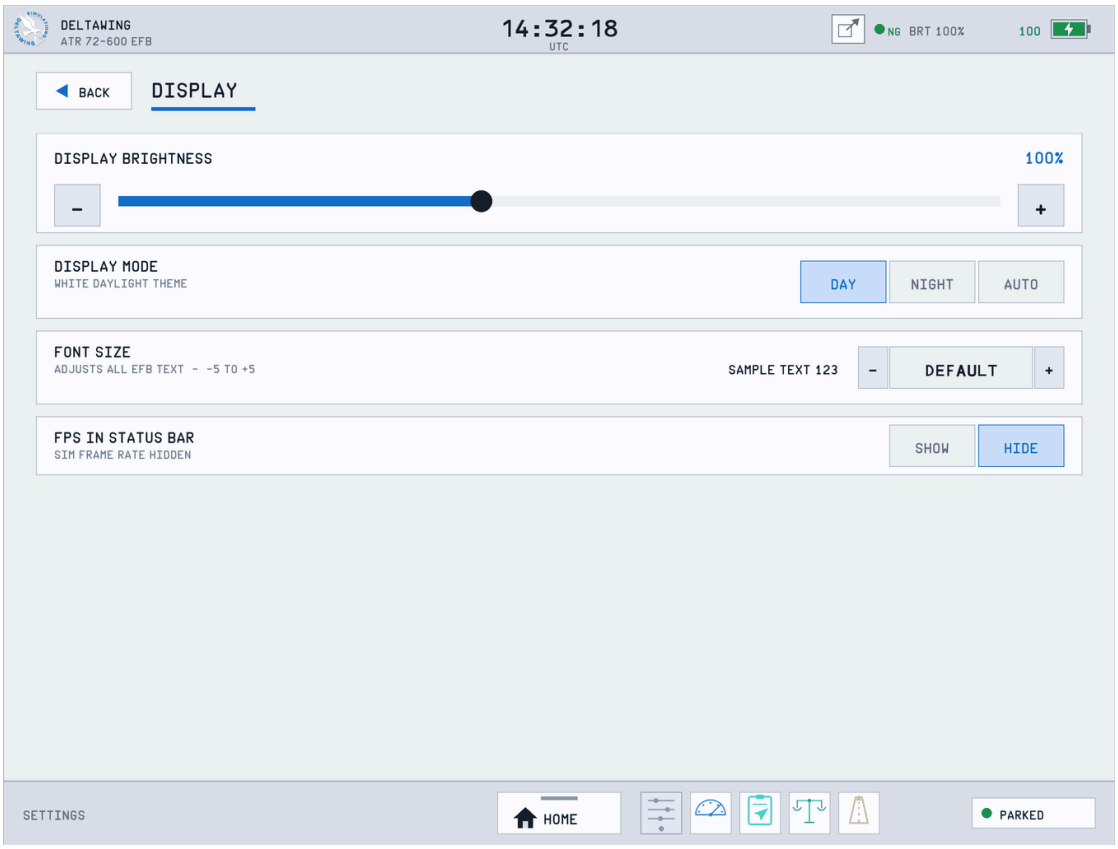
cont'd... ►►►

cont'd... ►►►

SIM.5.2 DISPLAY

Ident.: SIM.5.2 — 02 NOV 2026

SIMULATOR ONLY



SETTINGS, DISPLAY

DISPLAY BRIGHTNESS — 30 % to 200 % (default 100 %), with - / + or by dragging the bar. Above 100 %, the tablet screen in the 3D cockpit is brighter than normal.

DISPLAY MODE — DAY (white theme), NIGHT (dark theme) or AUTO (default DAY). AUTO follows the sun at the aircraft: NIGHT when the sun is more than 2° below the horizon, DAY again when it rises above it.

FONT SIZE — -5 to +5 (default DEFAULT). Changes the size of all the EFB texts. A sample text shows the result.

FPS IN STATUS BAR — SHOW / HIDE (default HIDE). SHOW: the status bar shows the frame rate of X-Plane, in green at 30 FPS and above, amber from 20 FPS, red below (see SIM.1.3). The DISPLAY card of the SETTINGS list then reads FPS SHOWN.

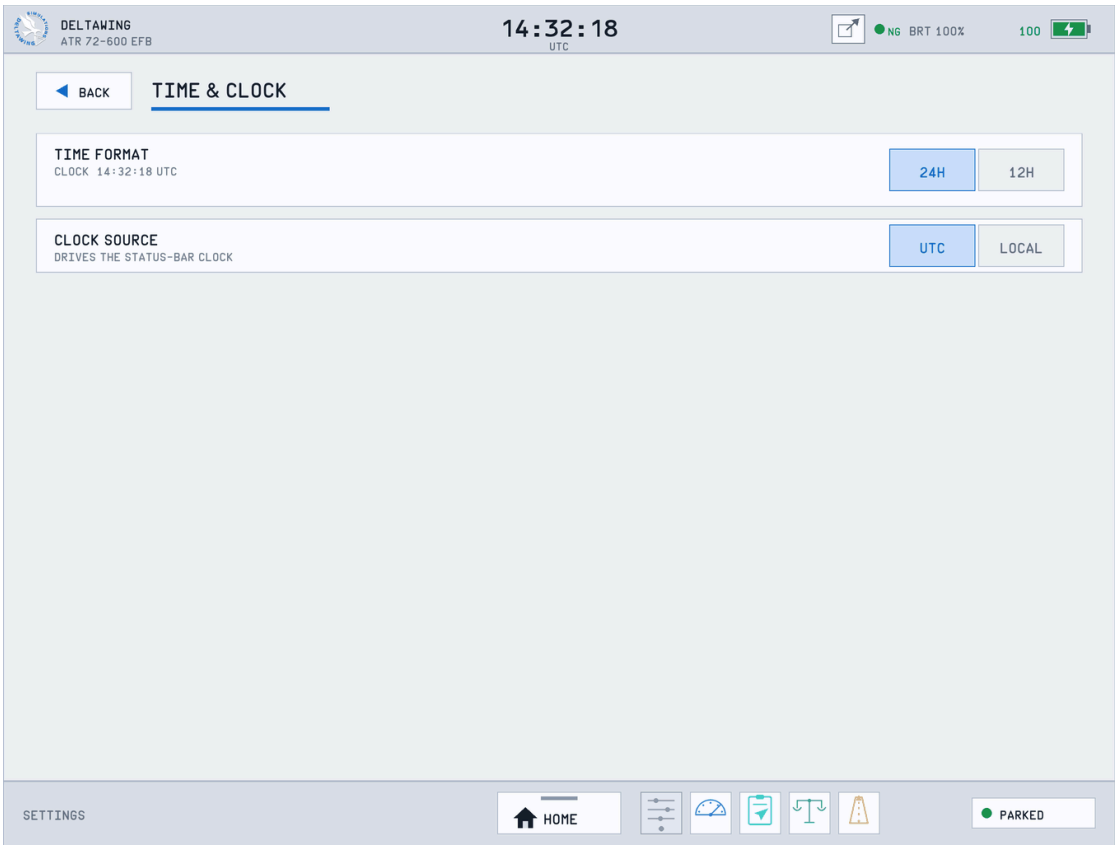
cont'd... ►►►

cont'd... ►►►

SIM.5.3 TIME & CLOCK

Ident.: SIM.5.3 — 30 OCT 2026

SIMULATOR ONLY



SETTINGS, TIME & CLOCK

TIME FORMAT 24H or 12H (default 24H).

CLOCK SOURCE UTC or LOCAL (default UTC). Time shown in the EFB status bar.

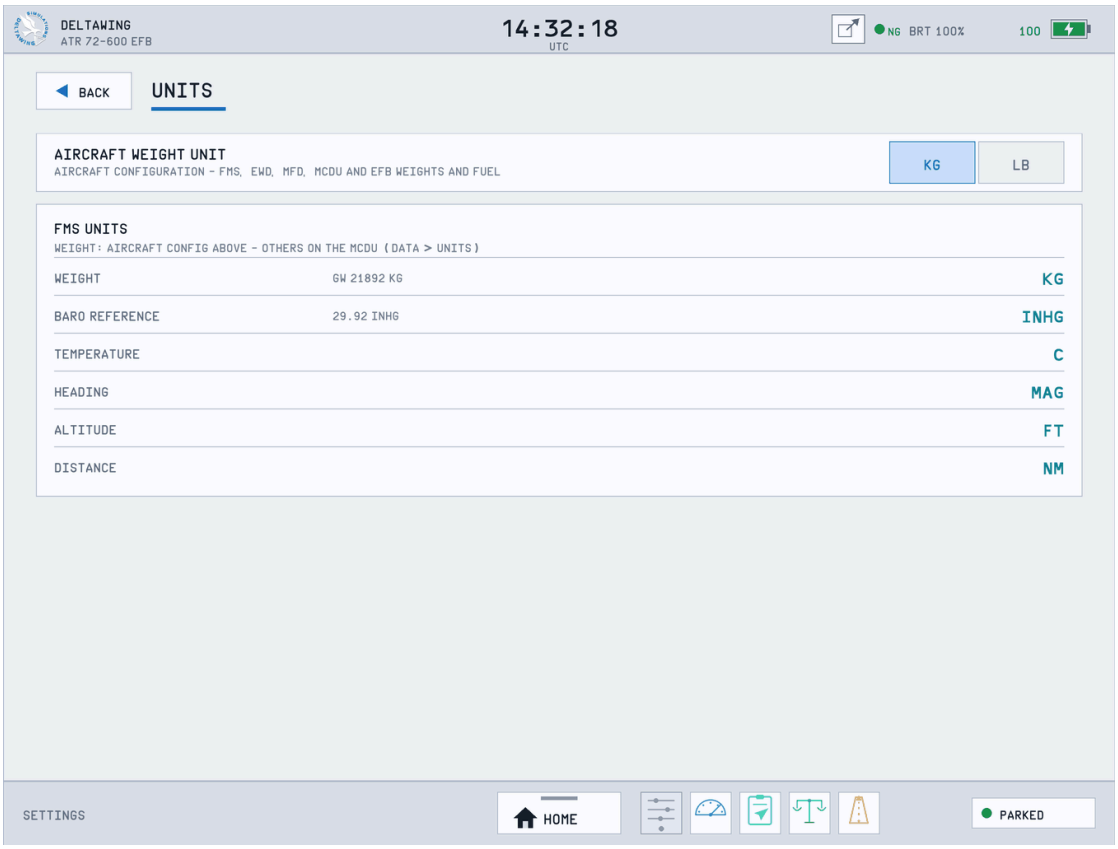
cont'd... ►►►

cont'd... ►►►

SIM.5.4 UNITS

Ident.: SIM.5.4 — 30 OCT 2026

SIMULATOR ONLY



SETTINGS, UNITS

AIRCRAFT WEIGHT UNIT KG or LB (default KG). Weight unit of the FMS, EWD, MFD, MCDU and EFB.

FMS UNITS WEIGHT, BARO REFERENCE, TEMPERATURE, HEADING, ALTITUDE and DISTANCE units of the FMS, with an example. Shown here only: change them on the MCDU (DATA, UNITS page). The EFB follows them.

SIM.5.5 QUADRANT HUD

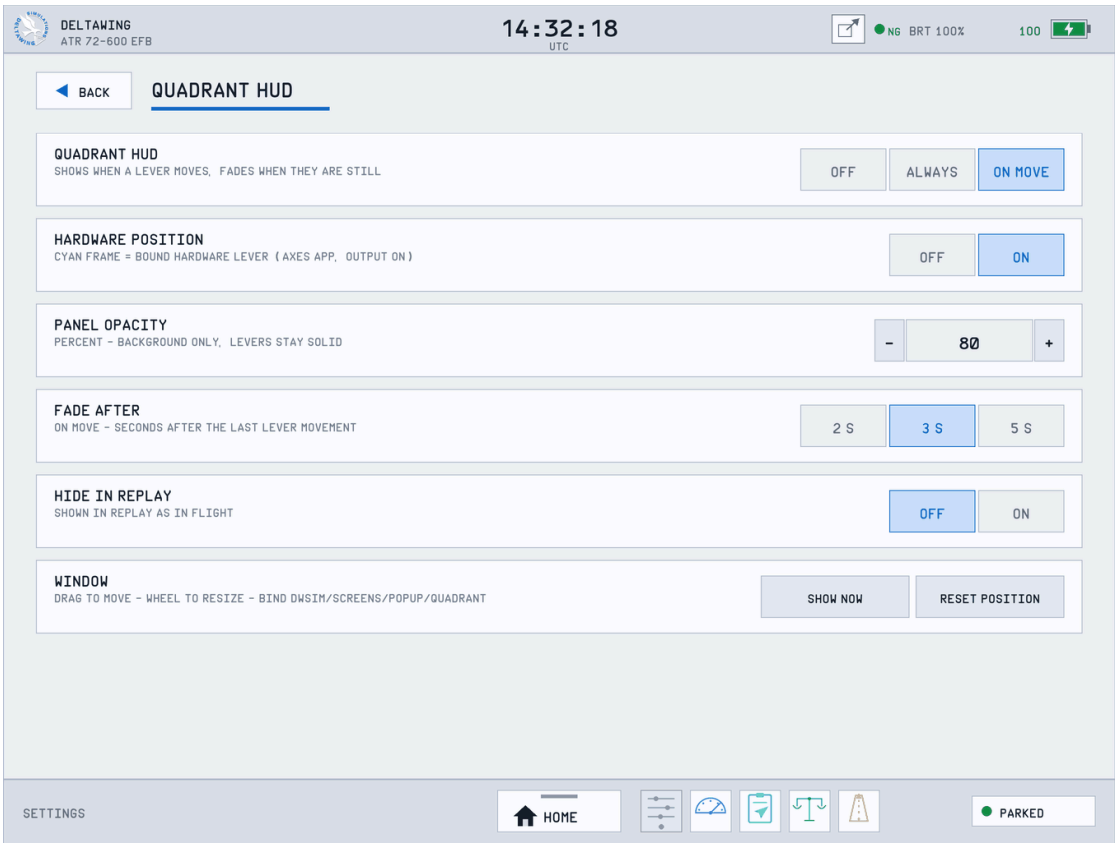
Ident.: SIM.5.5 — 30 OCT 2026

SIMULATOR ONLY

Settings of the throttle quadrant window (see SIM.7.6).

cont'd... ►►►

cont'd... ►►►



SETTINGS, QUADRANT HUD

QUADRANT HUD	OFF, ALWAYS or ON MOVE (default ON MOVE). ON MOVE: the window shows when a lever moves, and fades when the levers stop. ALWAYS: the window stays, X closes it until it is opened again. OFF: the command still opens it.
HARDWARE POSITION	OFF / ON (default ON). A cyan frame shows the position of each hardware lever bound in the HARDWARE application (axis output ON).
PANEL OPACITY	40 % to 100 %, in steps of 10 (default 80). Opacity of the window background. The levers stay solid.
FADE AFTER	2 S, 3 S or 5 S (default 3 S). ON MOVE: time after the last lever movement before the window fades.
HIDE IN REPLAY	OFF / ON (default OFF). ON: the window is hidden while an X-Plane replay plays, even when pinned open.
WINDOW	SHOW NOW / HIDE NOW shows or hides the window. RESET POSITION returns it to its default position at the bottom right of the screen; the button reads POSITION RESET for a moment.

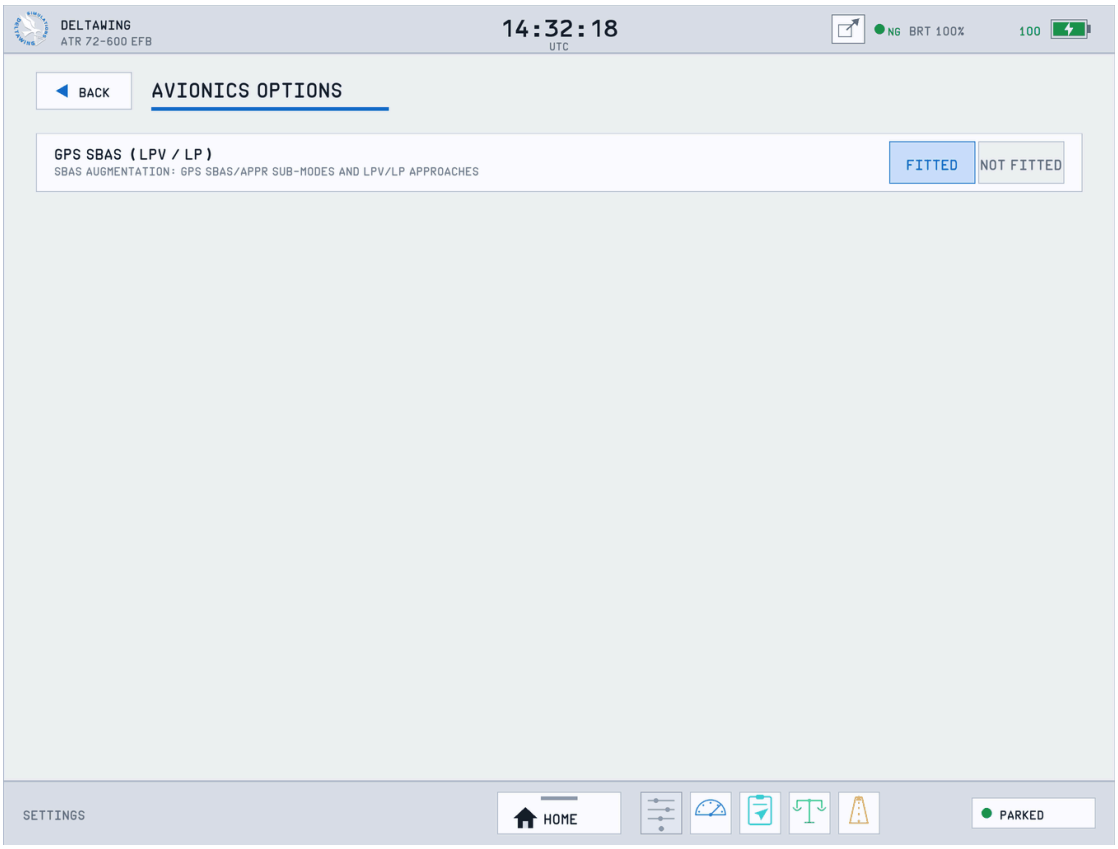
cont'd... ►►►

cont'd... ►►►

SIM.5.6 AVIONICS OPTIONS

Ident.: SIM.5.6 — 30 OCT 2026

SIMULATOR ONLY



SETTINGS, AVIONICS OPTIONS

GPS SBAS (LPV / LP) FITTED or NOT FITTED (default FITTED). With SBAS fitted, the GPS uses SBAS augmentation (GPS SBAS / APPR sub-modes) and LPV / LP approaches are available.

SIM.5.7 REALISM

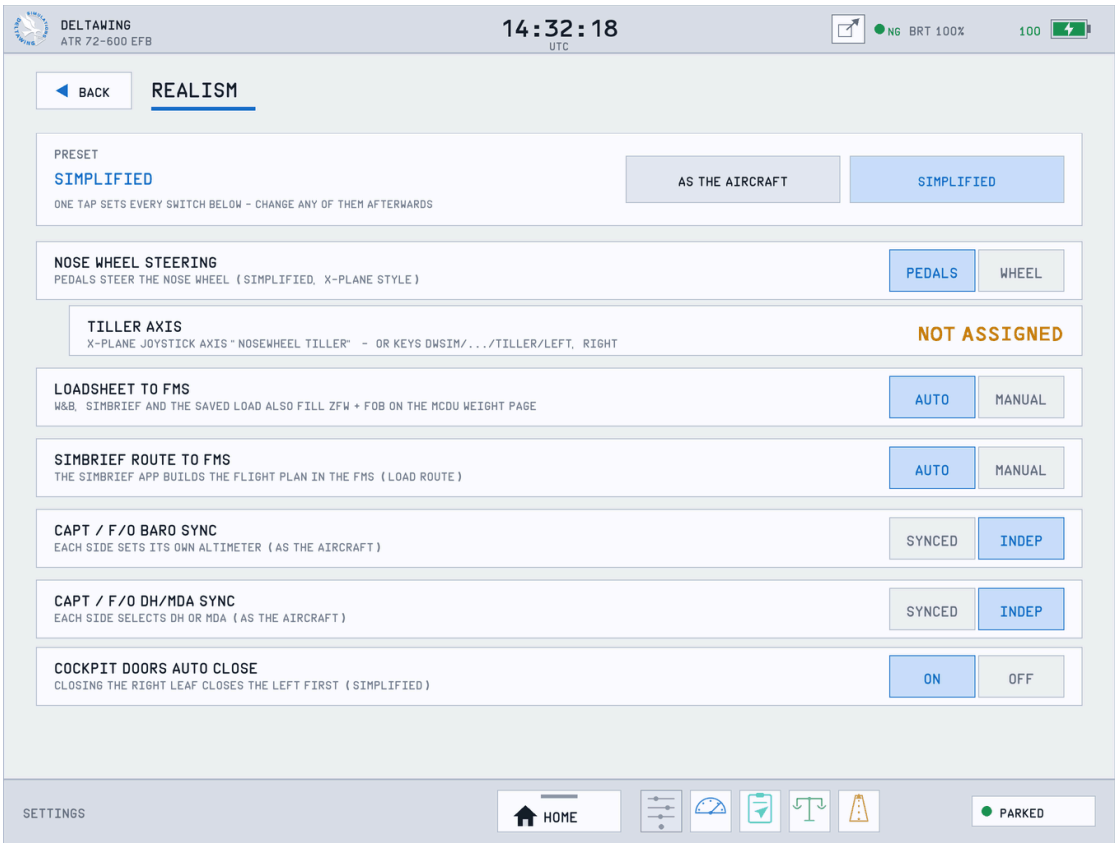
Ident.: SIM.5.7 — 16 NOV 2026

SIMULATOR ONLY

REALISM selects how the aircraft is operated: as the real aircraft, or with simplifications for desktop simulation.

cont'd... ►►►

cont'd... ►►►



SETTINGS, REALISM

PRESET	Shows AS THE AIRCRAFT, SIMPLIFIED or CUSTOM (amber). AS THE AIRCRAFT sets all the switches below to the aircraft setting. SIMPLIFIED sets NOSE WHEEL STEERING to PEDALS, the two FMS transfers to AUTO, COCKPIT DOORS AUTO CLOSE to ON and ATPCS TEST SELECTOR to CLICK, and does not change the two syncs. Any switch can then be changed one by one.
NOSE WHEEL STEERING	PEDALS or WHEEL (default PEDALS). PEDALS: the rudder pedals steer the nose wheel (simplified). WHEEL: only the steering hand wheel (tiller) steers the nose wheel, 60° each way; the pedals move the rudder. TILLER AXIS shows DETECTED when a joystick axis is assigned to the X-Plane nosewheel tiller function, or the tiller left / right keys are used, otherwise NOT ASSIGNED.
LOADSHEET TO FMS	AUTO or MANUAL (default AUTO). AUTO: WEIGHT & BALANCE, SIMBRIEF and the saved loadout also fill ZFW and FOB on the MCDU WEIGHT page. MANUAL: the crew enters them.
SIMBRIEF ROUTE TO FMS	AUTO or MANUAL (default AUTO). AUTO: the SIMBRIEF application builds the flight plan in the FMS (LOAD ROUTE). MANUAL: the crew types the route on the MCDU, and the SIMBRIEF application checks it.
CAPT / F/O BARO SYNC	SYNCED or INDEP (default INDEP). SYNCED: the two altimeter setting knobs are linked.
CAPT / F/O DH/MDA SYNC	SYNCED or INDEP (default INDEP). SYNCED: the two DH/MDA selectors are linked.

cont'd... ►►►

cont'd... ►►►

COCKPIT DOORS AUTO CLOSE — ON or OFF (default ON). The right leaf of the cockpit door closes last. ON: closing the right leaf closes the left leaf first, then the right. OFF: as the aircraft, close the left leaf first; if the right leaf is closed first, the left leaf stays slightly open against it. The cabin is then still drawn from the cockpit (reduced frame rate), and a CABIN STILL RENDERED advisory explains how to close the doors.

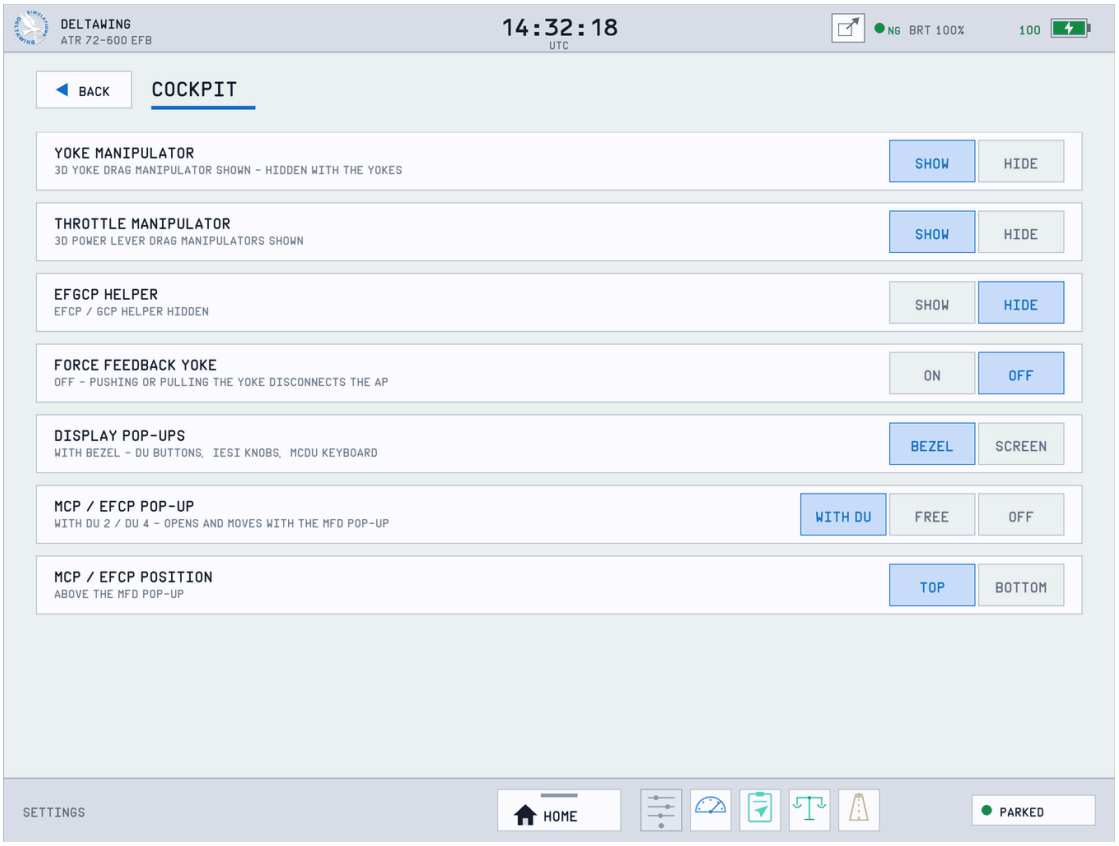
ATPCS TEST SELECTOR — CLICK or HOLD (default CLICK). CLICK: the 3D selector moves one position per click and stays there; turn it back to neutral to end the test. HOLD: as the aircraft, spring-loaded to neutral: press and hold one side for ARM, keep holding about 1 s for ENG 1 (2), release to return to neutral.

SIM.5.8 COCKPIT

Ident.: SIM.5.8 — 10 NOV 2026

SIMULATOR ONLY

COCKPIT groups the aids used to operate the 3D cockpit. They do not exist on the aircraft.



SETTINGS, COCKPIT

YOKE MANIPULATOR — SHOW / HIDE (default SHOW). Mouse manipulator used to move the yoke in the 3D cockpit (VR). It is hidden with the yokes.

THROTTLE MANIPULATOR — SHOW / HIDE (default SHOW). Mouse manipulators used to drag the power levers in the 3D cockpit.

THROTTLE MANIPULATOR — SHOW / HIDE (default SHOW). Mouse manipulators used to move the power levers in the 3D cockpit (VR).

cont'd... ►►►

cont'd... ►►►

EFGCP HELPER	SHOW / HIDE (default HIDE). Shows the EFCP / GCP helper panel above the CAPT displays (see SIM.7.2).
FORCE FEEDBACK YOKE	ON / OFF (default OFF). Set ON with a force feedback yoke that follows the autopilot. OFF: pushing or pulling the yoke disconnects the AP. ON: the yoke position does not disconnect the AP. Disconnect it with the AP disconnect pb on the control wheel, the AP pb, the pitch trim, the pedals or a GA pb.
DISPLAY POP-UPS	BEZEL / SCREEN (default BEZEL). BEZEL: the DU, IESI and MCDU pop-ups show the display with its bezel: DU buttons, IESI knobs, MCDU keyboard. SCREEN: the display alone, without bezel or keys. Open pop-ups change at once (see SIM.7.5).
MCP / EFCP POP-UP	WITH DU / FREE / OFF (default WITH DU). The MCP / EFCP pop-up of each side (see SIM.7.5). WITH DU: it opens, closes and moves with the MFD pop-up of its side (DU 2 CAPT, DU 4 F/O). FREE: a pop-up of its own, opened from the aircraft menu or its command. OFF: never shown.
MCP / EFCP POSITION	TOP / BOTTOM (default TOP). WITH DU only: the MCP / EFCP is above or below the MFD pop-up.

SIM.5.9 AIRCRAFT STATE

Ident.: SIM.5.9 — 13 NOV 2026

SIMULATOR ONLY

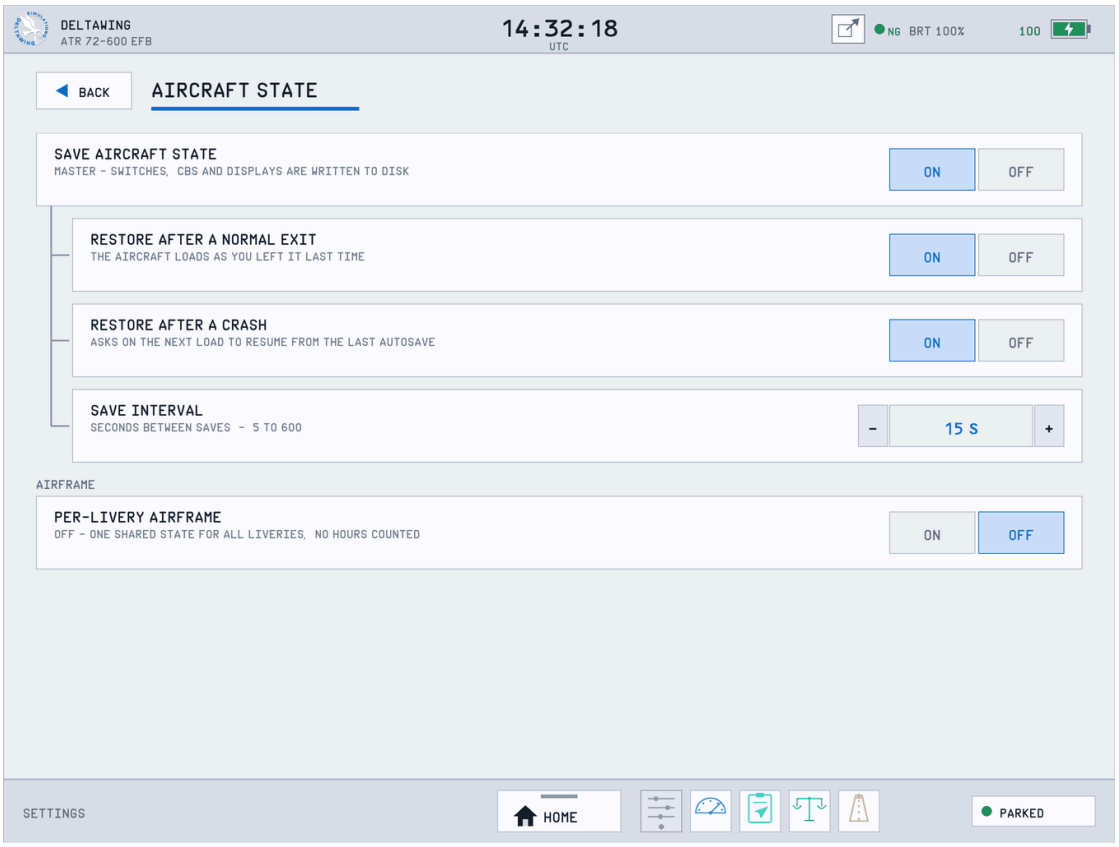
AIRCRAFT STATE saves the whole aircraft and restores it at the next load, as it was left: switches, circuit breakers, displays, both FMS with their flight plans, the autopilot settings and minimums, the check lists, the flaps, trims and parking brake, the fuel and load, the failures, the hydraulic quantities, the pressurisation and the ice, the doors and the ground equipment, and the cockpit and cabin items (sun visors, shades, vents, seats, galley).

After a normal exit on the ground, the aircraft goes back to the exact place where it was left when X-Plane loads it at the same airport (within about 3 km); at another airport it stays where X-Plane put it, and everything else is restored. The X-Plane date and time are those of the new session. The engines, brakes and hydraulic fluid have cooled for the time the aircraft was not used. The sim is not paused at the end.

The radios are saved with it: on both RMPs, the COM, NAV and ADF frequencies (active and standby), the NAV course, the transponder code, ON / STBY and ALT RPT, the TCAS mode and the traffic display; on both VCPs, the ND overlay selections. As on the aircraft, the radios keep their frequencies through a power cut. The NAV tuning mode is not saved: it starts in its power-up mode.

cont'd... ►►►

cont'd... ►►►



SETTINGS, AIRCRAFT STATE

SAVE AIRCRAFT STATE	ON / OFF (default ON). Master switch. OFF: the aircraft loads cold and dark; a saved state is kept.
RESTORE AFTER A NORMAL EXIT	ON / OFF (default ON). The aircraft loads as it was left at the last exit. When the last exit was made in flight, a prompt asks first (see SIM.7.7).
RESTORE AFTER A CRASH	ON / OFF (default ON). After a crash or a hang of X-Plane, a prompt offers to resume from the last automatic save (see SIM.7.7).
SAVE INTERVAL	Time between automatic saves, 5 to 600 s (default 15 S). Used with RESTORE AFTER A CRASH.
PER-LIVERY AIRFRAME	ON / OFF (default OFF). Needs SAVE AIRCRAFT STATE ON. ON: each livery is its own aircraft, with its own cockpit state, hours, cycles and logbook (see SIM.4.6). The line below gives the livery loaded, its registration, hours and cycles; tap it to open the AIRCRAFT LOG. OFF: one state for all the liveries, and no hours are counted.

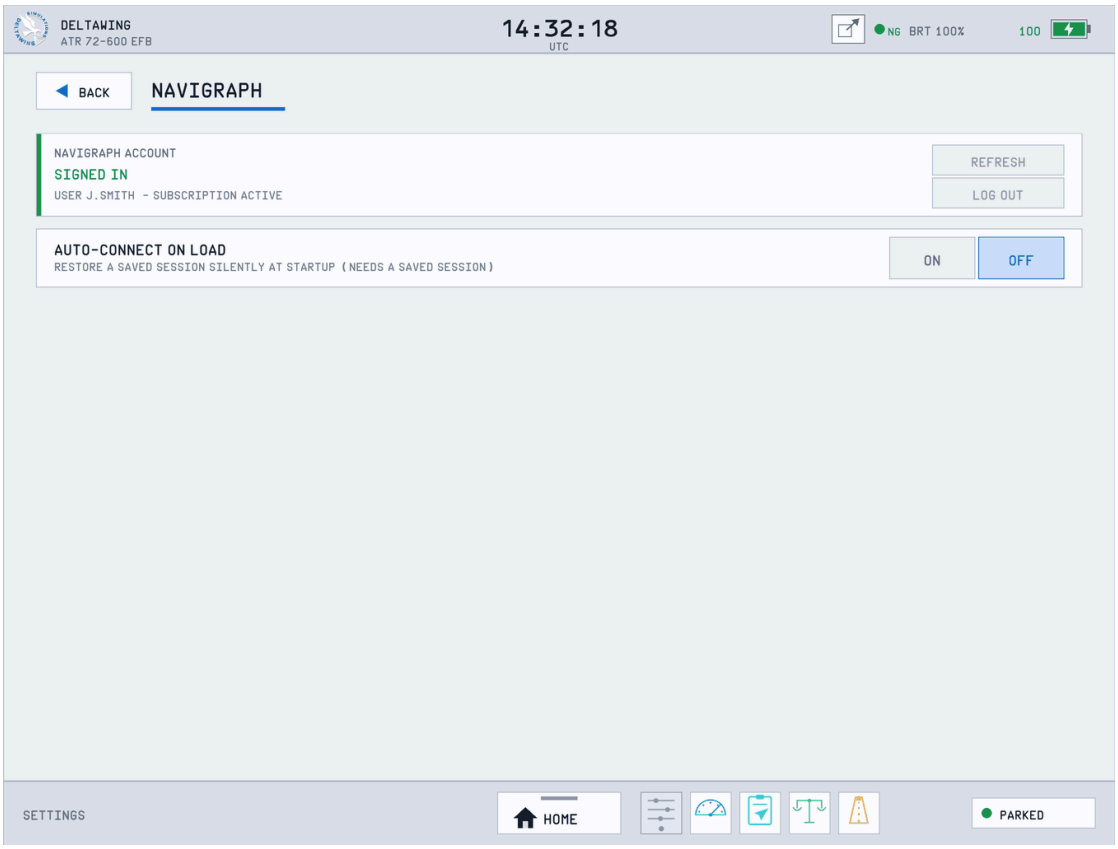
cont'd... ►►►

cont'd... ►►►

SIM.5.10 NAVIGRAPH

Ident.: SIM.5.10 — 30 OCT 2026

SIMULATOR ONLY



SETTINGS, NAVIGRAPH

NAVIGRAPH ACCOUNT — Shows the account status (for example SIGNED IN, the user and the subscription). LOGIN / CONNECT signs in (see SIM.1.5), REFRESH updates the status, LOG OUT signs out.

AUTO-CONNECT ON LOAD — ON / OFF (default OFF). Restores the saved Navigraph session silently when the aircraft loads.

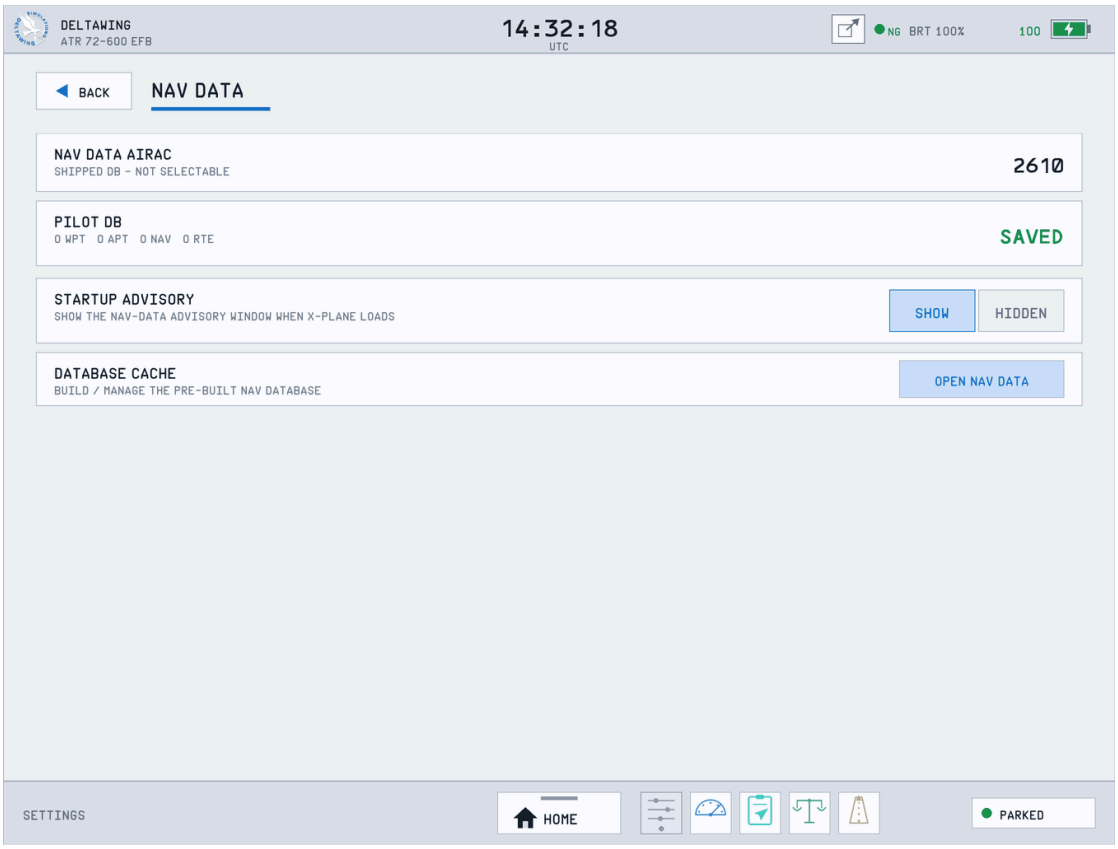
cont'd... ►►►

cont'd... ►►►

SIM.5.11 NAV DATA

Ident.: SIM.5.11 — 30 OCT 2026

SIMULATOR ONLY



SETTINGS, NAV DATA

NAV DATA AIRAC	AIRAC cycle of the navigation data in use. Not selectable.
PILOT DB	SAVED or NOT SAVED: pilot-stored waypoints, airports, navaids and routes, with their numbers.
STARTUP ADVISORY	SHOW / HIDDEN: navigation data advisory window when X-Plane loads.
DATABASE CACHE	OPEN NAV DATA opens the NAV DATA application (see SIM.2.5).

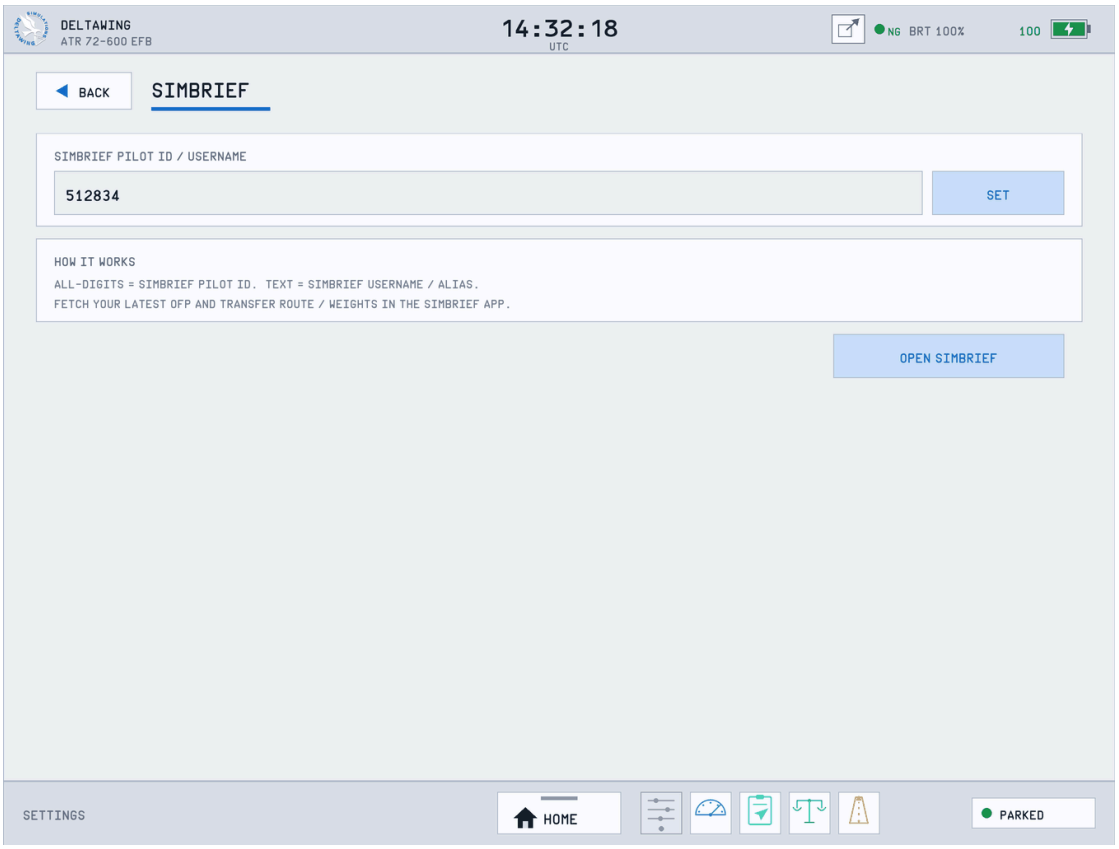
cont'd... ►►►

cont'd... ►►►

SIM.5.12 SIMBRIEF

Ident.: SIM.5.12 — 29 OCT 2026

SIMULATOR ONLY



SETTINGS, SIMBRIEF

SIMBRIEF PILOT ID / USERNAME — Click the field, type the SimBrief pilot ID or user name on the on-screen keyboard or the computer keyboard, then press ENTER or SET. An entry of digits only is taken as the pilot ID, any other entry as the user name.

OPEN SIMBRIEF — Opens the SIMBRIEF application.

SIM.5.13 HARDWARE

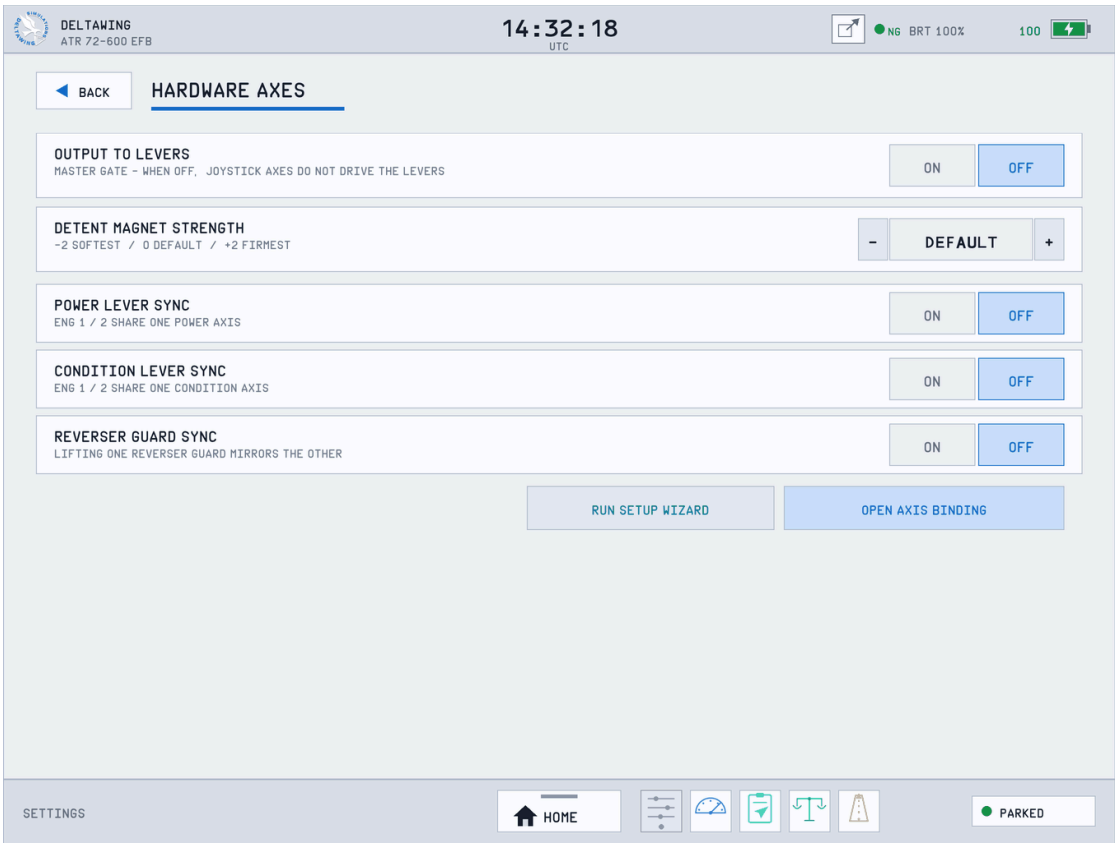
Ident.: SIM.5.13 — 09 NOV 2026

SIMULATOR ONLY

The HARDWARE card opens the HARDWARE AXES page. Its settings are the same as at the top of the HARDWARE application, LEVERS tab (see SIM.6.3). The knob settings are in the HARDWARE application, KNOBS tab.

cont'd... ►►►

cont'd... ►►►



SETTINGS, HARDWARE AXES

OUTPUT TO LEVERS	ON / OFF. Master switch: when OFF, the joystick axes do not drive the levers.
DETENT MAGNET STRENGTH	-2 (softest) to +2 (firmest), 0 = DEFAULT.
POWER LEVER SYNC	ON / OFF. ON: PL 1 and 2 share one power axis.
CONDITION LEVER SYNC	ON / OFF. ON: CL 1 and 2 share one condition axis.
REVERSER GUARD SYNC	ON / OFF. ON: lifting one reverser guard lifts the other.
OPEN AXIS BINDING	Opens the HARDWARE application.
RUN SETUP WIZARD	Opens the hardware setup wizard (see SIM.6.6).

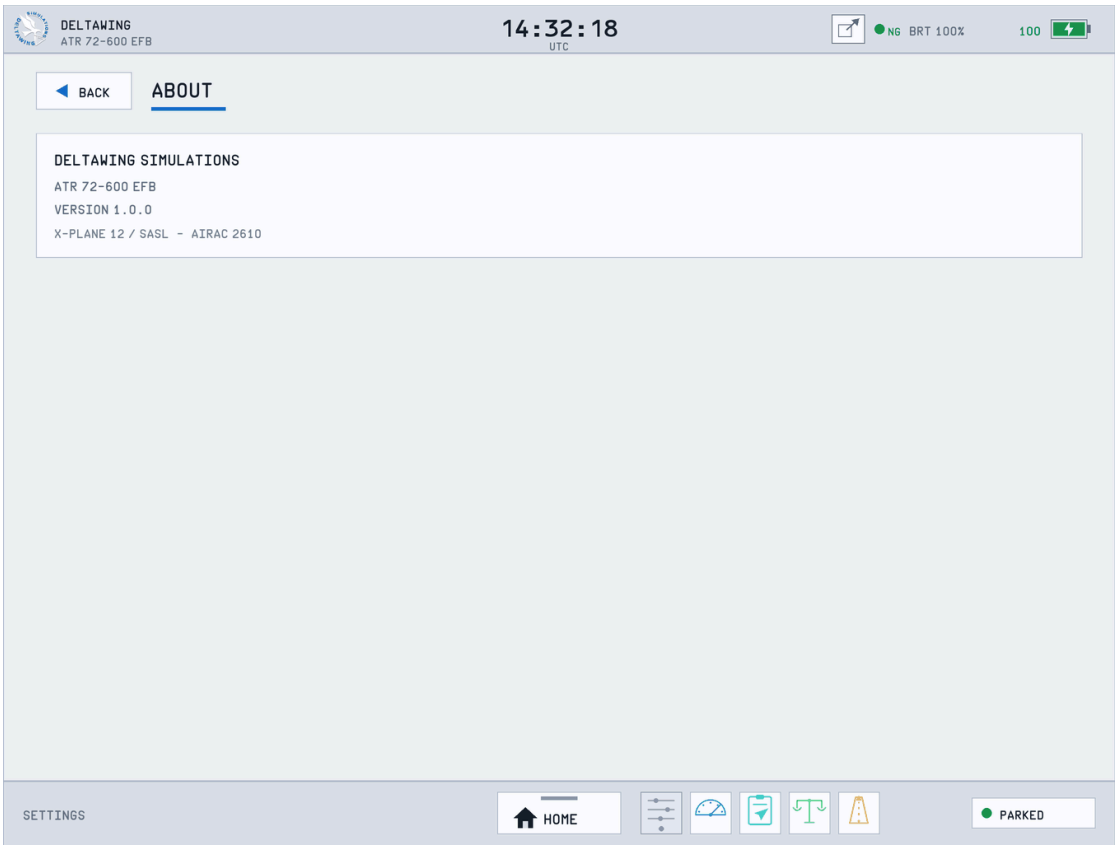
cont'd... ►►►

cont'd... ►►►

SIM.5.14 ABOUT

Ident.: SIM.5.14 — 30 OCT 2026

SIMULATOR ONLY



SETTINGS, ABOUT

ABOUT shows the product (DELTAWING SIMULATIONS, ATR 72-600 EFB), the VERSION, the simulator platform and the AIRAC cycle.

PAGE

INTENTIONALLY

LEFT BLANK

SIM.6 HARDWARE AND CONTROLS

SIM.6.1 Mouse Operation

Ident.: SIM.6.1 — 02 NOV 2026

SIMULATOR ONLY

Knobs

The FGCP knobs, and the other rotary knobs, turn fast with the mouse wheel and in single steps with a left click.

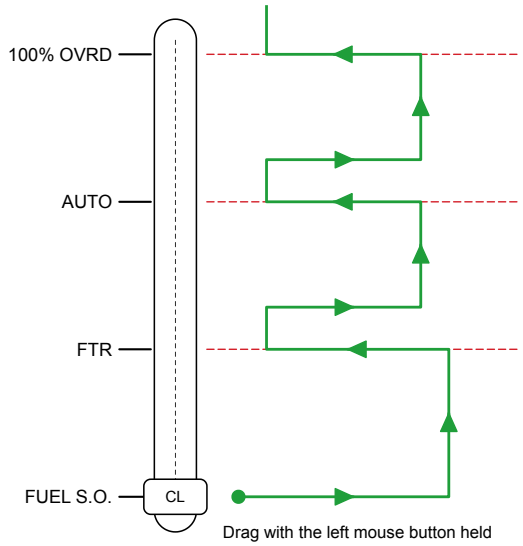
Switches

Two-position and three-position switches move up when the area above the switch is clicked, and down when the area below it is clicked. The mouse wheel also moves them.

Condition levers

The condition levers (CL) snap to their four positions: FUEL S.O. (fuel shut-off), FTR (feather), AUTO and 100% OVRD (maximum override). The lever movement is animated.

To move a CL, drag it with the left mouse button held, following the path shown below (the gates between the positions). While the lever is dragged up or down, it snaps to the next position.



Condition lever drag path (green arrows)

Click regions

X-Plane can show the click regions of the cockpit and the descriptions of the instruments. Select these options in the X-Plane **View** menu.

Look around

A right-button drag over a cockpit display moves the view, as elsewhere in the cockpit.

VR

The EFB and the yoke papers work with the VR controller as with the mouse. Hold the trigger to drag: the EFB map and charts pan, lists scroll (drag the list itself, see SIM.1.3), and drawings follow the controller on the NOTES page and on the

cont'd... ►►►

cont'd... ►►►

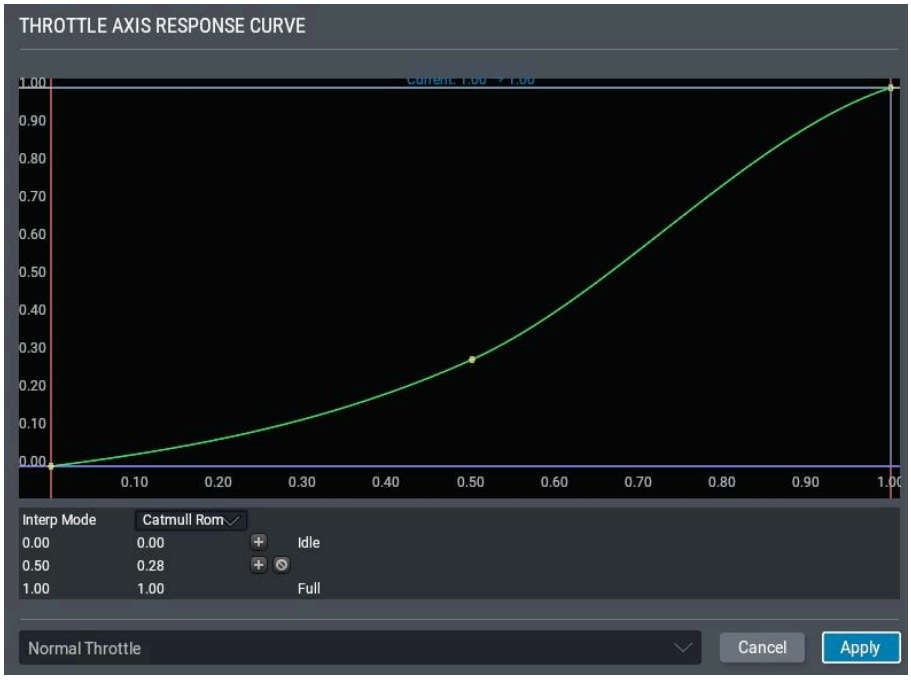
paper in the cockpit. A press that does not move is a click, even if the controller moves slightly before the trigger is released. Text and values are typed on the EFB on-screen keyboard (see SIM.1.3).

SIM.6.2 Power Levers and Reversers with X-Plane Axes

Ident.: SIM.6.2 — 29 OCT 2026
SIMULATOR ONLY

The power levers can be driven by the X-Plane throttle axis. To use the reverse range on the same axis as the forward range:

► X-PLANE SETTINGS ..... JOYSTICK
► THROTTLE AXIS TYPE OF ACTION ..... NORMAL THROTTLE
► RESPONSE CURVE ..... CATMULL ROM OR LINEAR, AS PREFERRED



X-Plane throttle axis response curve, Normal Throttle

Note

The HARDWARE application of the EFB gives a more complete binding of the power levers, condition levers and flap lever, with detents and reverser gates (see SIM.6.3).

SIM.6.3 HARDWARE (Levers and Knobs)

Ident.: SIM.6.3 — 10 NOV 2026
SIMULATOR ONLY

The HARDWARE application binds hardware to the cockpit controls. It has three tabs:

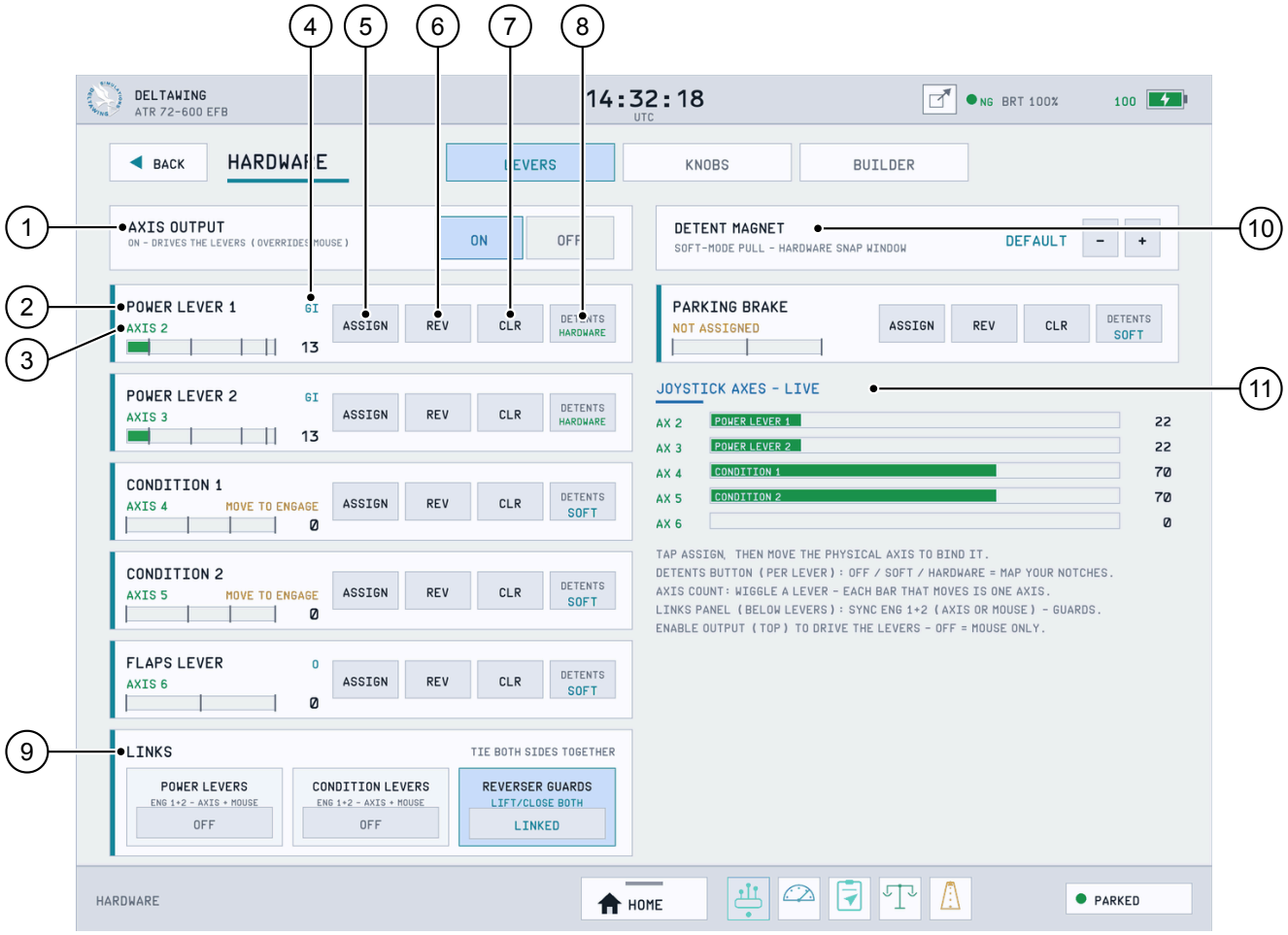
- **LEVERS**: hardware levers bound to the power levers, condition levers, flap lever and EMER / PARKING BRAKE handle,
- **KNOBS**: one selector knob and one encoder (as on many throttle quadrants) driving the cockpit knobs,
- **BUILDER**: one command for each position of the cockpit switches and selectors, for home cockpits.

cont'd... ►►►

cont'd... ►►►

LEVERS tab

A bound axis moves the lever in the 3D cockpit, and the systems react exactly as if the lever had been moved with the mouse. Detents can be simulated, or mapped on the physical notches of the hardware.



HARDWARE, LEVERS tab

① AXIS OUTPUT

ON	The bound axes drive the levers, and override the mouse.
OFF	The bindings are kept, but do not drive the levers (mouse only).

② Lever

Six levers can be bound: POWER LEVER 1, POWER LEVER 2, CONDITION 1, CONDITION 2, FLAPS LEVER and PARKING BRAKE (in the right column). A bar shows the lever position, with its value (PLA degrees for the power levers).

PARKING BRAKE drives the EMER / PARKING BRAKE handle. The axis travel is split into three positions, OFF, EMER and PARKING, whatever the detent mode: the handle always goes to one of them, with the same braking as when it is moved in the cockpit. If the handle is moved another way (click in the cockpit, command, aircraft state), the axis lets go of it until the hardware lever is moved again.

cont'd... ►►►

cont'd... ►►►

③ Axis

The axis bound (AXIS n, and REVERSED if the axis is inverted), NOT ASSIGNED, or SYNCED → the lead lever when the pair is linked.

④ Status

The current detent (GI, FI, NTCH, …), MOVE TO ENGAGE (amber), REVERSER ARMED (cyan, guard lifted) or IN REVERSE (green).

⑤ ASSIGN

Starts the detection: MOVE THE AXIS YOU WANT…. Move the hardware lever: the axis that moves is bound. The button reads CANCEL during the detection.

⑥ REV

Inverts the axis.

⑦ CLR

Removes the binding.

⑧ DETENTS

Shows the detent mode of the lever (OFF, SOFT, HARDWARE) and opens its DETENTS page.

⑨ LINKS

POWER LEVERS	LINKED: PL 1 and 2 move together (axis and mouse). One axis then drives both levers.
CONDITION LEVERS	LINKED: CL 1 and 2 move together.
REVERSER GUARDS	LINKED: lifting or closing one reverser guard does the same on the other.

⑩ DETENT MAGNET

SOFTEST, SOFT, DEFAULT, FIRM or FIRMEST: pull of the detents in SOFT mode, and width of the snap window in HARDWARE mode.

⑪ JOYSTICK AXES — LIVE

A bar for each joystick axis that moves (AX n), with its value. The bar of a bound axis shows the name of the lever. To identify the axes of a device, move each hardware lever: each bar that moves is one axis. A short description of the set-up follows.

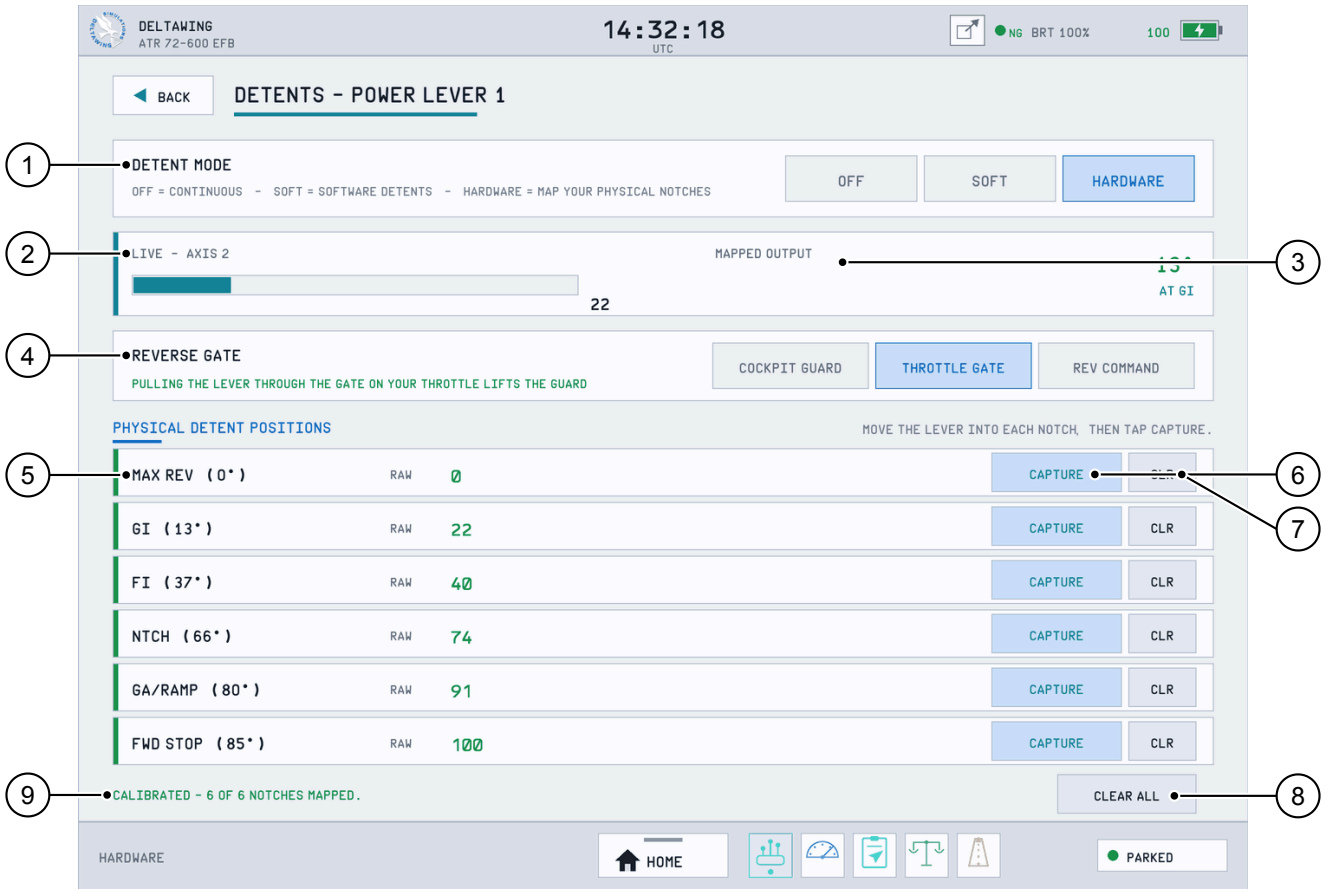
Note

When the aircraft is loaded, or when AXIS OUTPUT is set to ON, the cockpit levers stay where the start state put them, and each bound lever shows MOVE TO ENGAGE. Move the hardware lever: the cockpit lever then follows it. A hardware lever that already sits where the cockpit lever is takes over at once, without a move. This prevents the cockpit levers from jumping to the hardware positions. A condition lever or the flap lever moved by other means (mouse, aircraft state) also waits for the hardware to move.

cont'd... ►►►

cont'd... ►►►

DETENTS page



HARDWARE, DETENTS page of POWER LEVER 1

① DETENT MODE

OFF	The lever follows the axis (continuous).
SOFT	Software detents: the lever is pulled towards a detent when it is near it, and follows the axis between the detents.
HARDWARE	The lever snaps to the detent positions captured on the hardware notches.

② LIVE

Live value of the axis.

③ MAPPED OUTPUT

Lever position sent to the cockpit (degrees), and the detent it is AT.

④ REVERSE GATE

Power levers only. How the lever enters the reverse range (below GI):

COCKPIT GUARD	The reverser guard in the cockpit must be lifted first (mouse, or a hardware button bound to the reverser guard hold command). With the guard down, the axis stops at GI.

cont'd... ►►►

cont'd... ►►►

THROTTLE GATE — For a throttle with its own reverse gate or lift latch: pulling the lever through the gate on the hardware lifts the cockpit guard and enters reverse. Needs HARDWARE mode with the GI notch captured; until then the cockpit guard applies (amber caption).

REV COMMAND — For a throttle with no reverse travel and a reverser button or key. The whole travel is GI to MAX. On the ground, with the throttle at idle, any reverser command (thrust reverse hold or toggle, reverser guard commands) turns the same travel into reverse, from GI to MAX REVERSE. Reverse ends only when the command is released or toggled off and the throttle is back at idle, so releasing the button with the throttle up never jumps the lever to forward thrust. The reverse travel has no detents: HARDWARE detents apply to forward thrust only.

With the power levers linked, POWER LEVER 2 takes the REV COMMAND setting of POWER LEVER 1 (SYNCED TO POWER LEVER 1).

(5) PHYSICAL DETENT POSITIONS

For HARDWARE mode, one row per detent, in lever order, with its angle and the RAW axis value captured (or NOT CAPTURED):

LEVER	DETENTS
POWER LEVER 1, 2	MAX REV (0°), GI (13°), FI (37°), NTCH (66°), GA/RAMP (80°), FWD STOP (85°)
CONDITION 1, 2	SO (FUEL S.O.), FTR, AUTO, 100% (OVRD)
FLAPS LEVER	0, 15, 30
PARKING BRAKE	OFF, EMER, PARKING

Capturing MAX REV maps the reverse travel of the hardware onto the full reverse range.

(6) CAPTURE

Put the hardware lever in the notch and press CAPTURE.

(7) CLR

Clears that position.

(8) CLEAR ALL

Clears all the positions.

(9) Calibration status

Number of notches mapped. At least two must be captured.

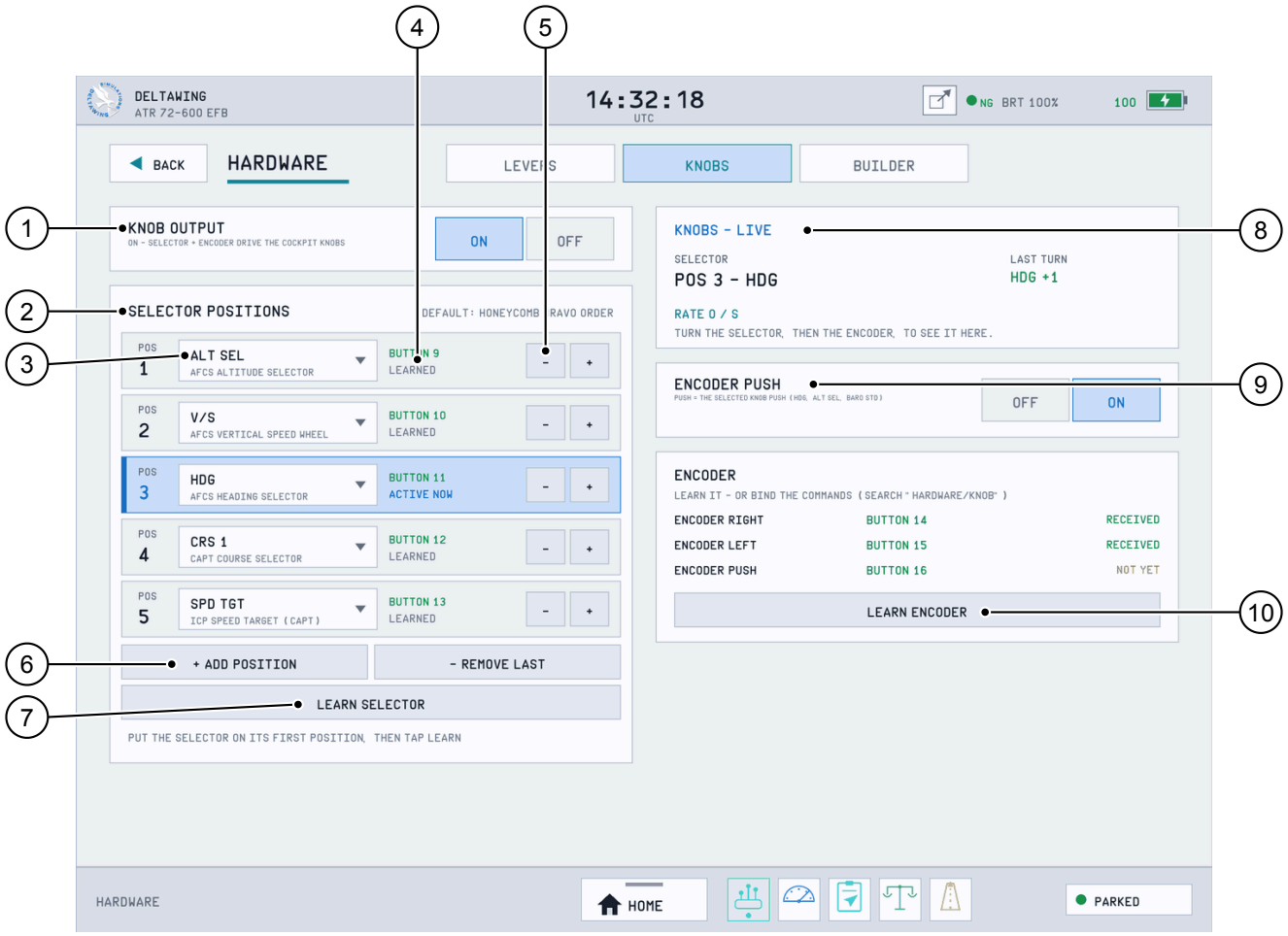
KNOBS tab

Many quadrants have one selector knob (ALT, VS, HDG, CRS, IAS …) and one left / right encoder: the selector decides what the encoder turns. The KNOBS tab maps each selector position to a cockpit knob. The encoder then turns that knob exactly as the mouse does (the 3D knob turns, its click plays, the system rules apply).

The selector and the encoder are learned from the hardware itself: no X-Plane binding is needed.

cont'd... ►►►

cont'd... ►►►



HARDWARE, KNOBS tab

① KNOB OUTPUT

ON	The selector and the encoder drive the cockpit knobs.
OFF	The knob commands do nothing.

② SELECTOR POSITIONS

One row per selector position (POS 1 to POS 8). The default is the order of the Honeycomb Bravo selector: ALT SEL, V/S, HDG, CRS 1, SPD TGT. The position selected now is highlighted (ACTIVE NOW).

③ Function

Click to choose the cockpit knob of the position:

FUNCTION	COCKPIT KNOB
HDG	AFCS heading selector
ALT SEL	AFCS altitude selector
V/S	AFCS vertical speed wheel
SPD TGT	ICP speed target (CAPT)
CRS 1 / CRS 2	CAPT / F/O course selector

cont'd... ►►►

cont'd... ►►►

FUNCTION	COCKPIT KNOB
NAV SRC 1 / NAV SRC 2	CAPT / F/O V/ILS navigation source knob
BARO 1 / BARO 2	CAPT / F/O baro setting
MINS 1 / MINS 2	CAPT / F/O DH / MDA value
ND RANGE 1 / ND RANGE 2	CAPT / F/O EFCP range - / +
- UNUSED	No function

(4) Selector button

The joystick button learned for the position: BUTTON n (green) with LEARNED, HELD or ACTIVE NOW, or NOT LEARNED (amber).

(5) - / +

Turns the knob of the position by one detent, to test the mapping.

(6) + ADD POSITION / - REMOVE LAST

Adds a selector position (up to 8) or removes the last one.

(7) LEARN SELECTOR

Learns the button of each selector position in one sweep:

► SELECTOR ..... FIRST POSITION
► LEARN SELECTOR ..... PRESS
► SELECTOR ..... ONE STEP AT A TIME TO THE LAST POSITION

Each step shows CAPTURED on its row, and the next row reads TURN ONE STEP.

► DONE ..... PRESS

CANCEL keeps the buttons learned before. The selector must hold a button down in each position. The position is then read at all times: a selector that rests on a position when the aircraft loads works at once.

(8) KNOBS - LIVE

The selector position read last, the LAST TURN (function, direction and step) and the encoder RATE. FAST TURN (AUTOMATIC) is shown when the encoder turns fast: from 8 detents per second, the faster the encoder turns, the bigger each step. The fast turn applies to the value knobs only (HDG, ALT SEL, V/S, SPD TGT, CRS, BARO, MINS), never to the NAV SRC and ND RANGE selectors.

(9) ENCODER PUSH

ON (default) / OFF. ON: the push of the encoder pushes the selected knob (HDG, ALT SEL, BARO STD).

(10) ENCODER

The buttons of the encoder (ENCODER RIGHT, ENCODER LEFT, ENCODER PUSH), learned with LEARN ENCODER:

► LEARN ENCODER ..... PRESS
► ENCODER ..... ONE STEP RIGHT
► ENCODER ..... ONE STEP LEFT
► ENCODER ..... PUSH

SKIP PUSH if the encoder has no push.

A learned function shows BUTTON n (green), a function not learned shows INC, DEC or PUSH. The status at the right reads RECEIVED once the function has been used in the session, NOT YET before. For panels that only send commands,

cont'd... ►►►

cont'd... ►►►

bind them in X-Plane (Settings, Joystick, buttons, search "hardware/knob"):

SELECTOR POSITION N `DWSim/ATR_Series/hardware/knob/select1` to `select8`, one per selector position.

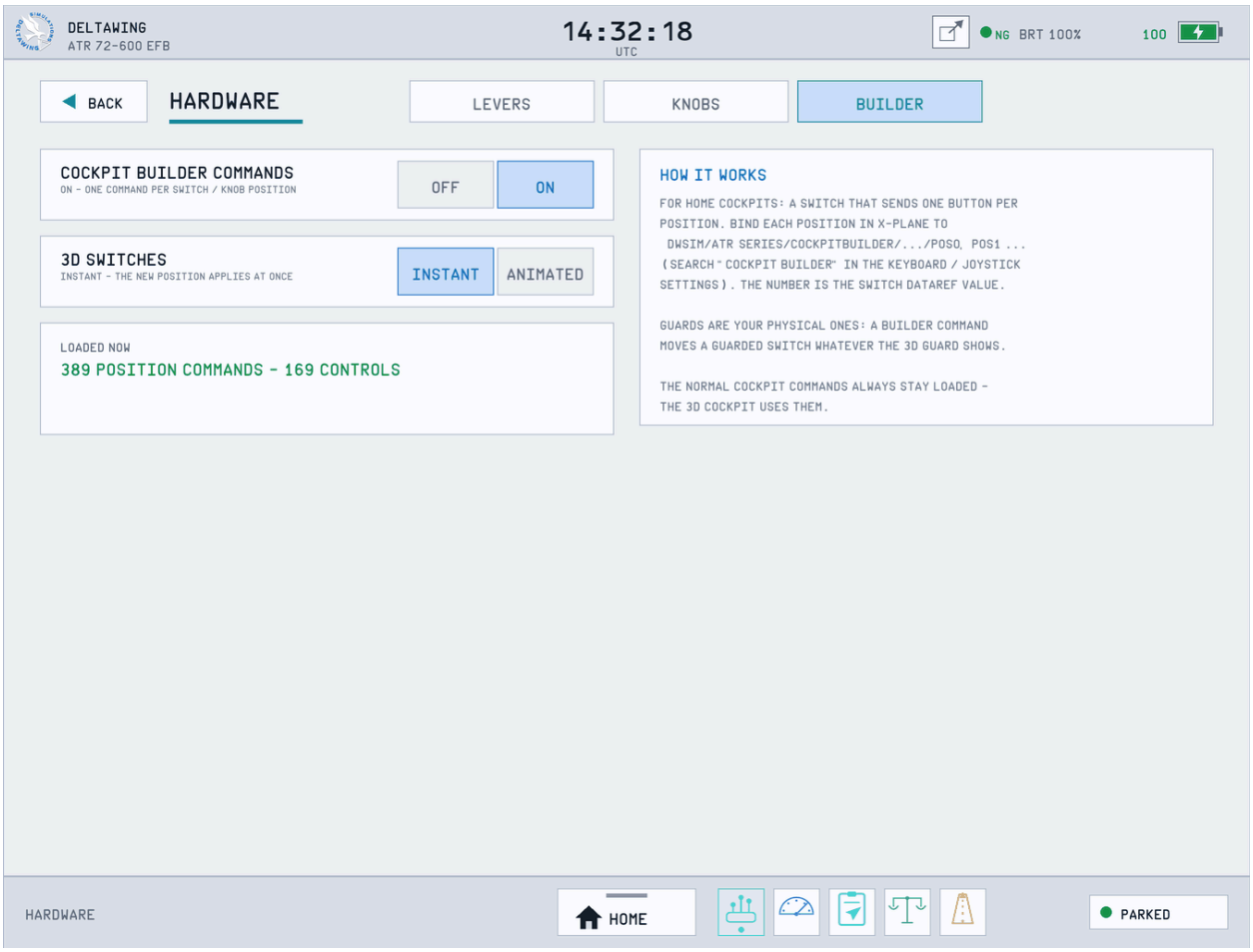
ENCODER RIGHT `DWSim/ATR_Series/hardware/knob/inc`.

ENCODER LEFT `DWSim/ATR_Series/hardware/knob/dec`.

ENCODER PUSH `DWSim/ATR_Series/hardware/knob/push`.

Once a function is learned, its command is ignored, so a binding left in place does not count the steps twice.

BUILDER tab



HARDWARE, BUILDER tab

The cockpit commands are relative (toggle, up / down, left / right). A home-cockpit switch that sends one button per position needs one command for each position. With the BUILDER tab ON, the aircraft creates these commands for the latching and detented cockpit controls:

`DWSim/ATR_Series/cockpitBuilder/<control>/pos<N>`

N is the value of the control's dataref (`DWSim/ATR_Series/datarefs/<control>`) in that position. Example, BAT switch: `.../overhead/mainElecPwr/battSwitch/pos0` OFF, `pos1` ON, `pos2` OVRD. Search "cockpit builder" in the X-Plane keyboard or joystick settings to see the list.

cont'd... ►►►

cont'd... ►►►

COCKPIT BUILDER COMMANDS	OFF (default) / ON. Applies at the next aircraft load: X-Plane cannot remove a command once it exists. LOADED NOW shows the commands in use (NONE, or the number of position commands and controls), and RELOAD THE AIRCRAFT TO APPLY until the aircraft is reloaded.
3D SWITCHES	INSTANT (default): the new position applies at once and the 3D switch does not travel. ANIMATED: the 3D switch moves as with the mouse. Applies at once.

A position command moves the control one detent at a time with its normal command, so its click, its system effects and its rules are the same as with the mouse. Bind each position to a button that is held while the switch is in that position. A spring-loaded switch (fire TEST, ACP INT / RAD, cockpit door) stays in the position for as long as the command is held, then springs back.

CAUTION

The guards of a home cockpit are physical. A builder command moves a guarded switch whatever the 3D guard shows. The 3D guard does not move, and the mouse and the normal cockpit commands still respect it.

Not included: momentary pushbuttons (their normal command is already press = in, release = out), continuous knobs, and the levers. The normal cockpit commands always stay loaded: the 3D cockpit uses them.

SIMULATOR NOTE

X-Plane cannot assign its axes to custom aircraft functions, nor make a binding depend on a switch. The LEVERS tab reads the raw joystick axes, and the KNOBS tab routes the encoder to the selected knob. Calibrate the axes in the X-Plane joystick settings: the EFB uses the X-Plane calibration. The lever settings are also on the SETTINGS, HARDWARE page (see SIM.5.13). The knob settings are saved in `DWSim_HardwareKnobs.dat`, the BUILDER settings in `DWSim_CockpitBuilder.dat`.

SIM.6.4 Joystick Buttons and Keyboard

Ident.: SIM.6.4 — 05 NOV 2026

SIMULATOR ONLY

Many aircraft functions are X-Plane commands, which can be assigned to joystick buttons or to keyboard keys:

- buttons: X-Plane **Settings**, **Joystick**, select the button, then the command,
- keys: X-Plane **Settings**, **Keyboard**, select the command, then the key.

The aircraft commands are under **DWSim** in the command list (for example `DWSim/ATR_Series/commands/...` and `DWSim/Screens/Popup/...`).

Electrical values for external hardware

Voltages, currents and loads of the electrical system are available to external hardware and instruments, as read-only datarefs under `DWSim/ATR_Series/datarefs/elec/`. They are updated about 30 times per second (sim time) and hold 0 when the source is off.

DATAREF	UNIT	VALUE
`bus/dc1V`, `bus/dc2V`, `bus/essV`, `bus/emerV`, `bus/stbyV`	V	DC BUS 1, DC BUS 2, DC ESS BUS, DC EMER BUS, DC STBY BUS voltage
`bus/hotMainV`, `bus/hotEmerV`	V	HOT MAIN BAT BUS, HOT EMER BAT BUS voltage
`gen/dc1A`, `gen/dc2A`	A	DC GEN 1 / 2 current (+ supplying, − reverse current)

cont'd... ►►►

cont'd... ►►►

DATAREF	UNIT	VALUE
gen/dc1V, gen/dc2V	V	DC GEN 1 / 2 voltage (0 when off line)
gen/acw1Load, gen/acw2Load	ratio	ACW GEN 1 / 2 load (1.0 = 100 %)
tru/A, tru/V	A, V	TRU output current and voltage
ext/dcA, ext/dcV	A, V	DC GPU current and voltage
bat/mainA, bat/emerA	A	MAIN / EMER battery current (+ discharge, − charge)
bat/mainV, bat/emerV	V	MAIN / EMER battery voltage
bat/mainSoc, bat/emerSoc	0 to 1	MAIN / EMER battery state of charge
bat/mainTempC, bat/emerTempC	°C	MAIN / EMER battery temperature
env/dcGen1, env/dcGen2, env/acwGen1, env/acwGen2, env/inv1, env/inv2, env/tru	ratio	Time-at-load use of the load limits (see LIM.5.24); 1 = protection operates
cb/trippedCount	integer	Number of tripped circuit breakers

Avionics switches of yokes and switch panels

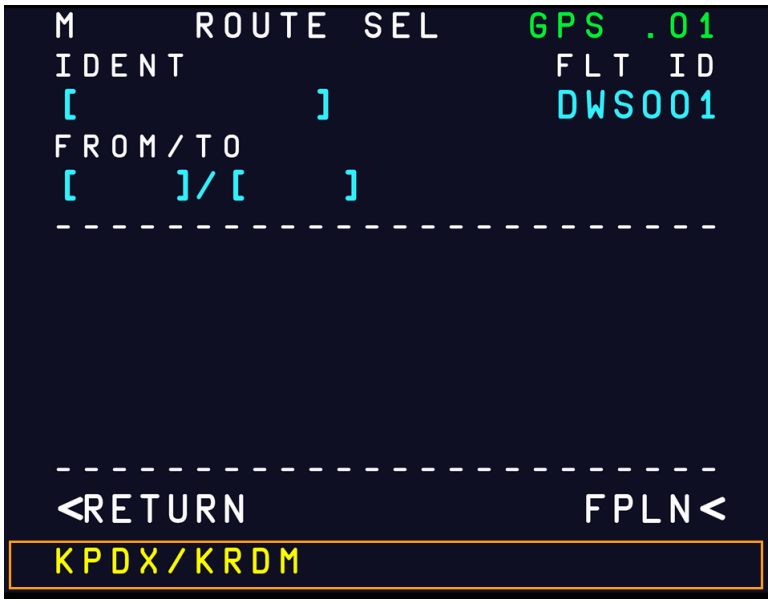
The ATR has no avionics master switch: the radios and navigation receivers are powered through their circuit breakers only. The AVIONICS switches of a yoke, throttle quadrant or switch panel (for example a Honeycomb Bravo) therefore have no effect, in any position.

SIM.6.5 Keyboard Typing in the MCDU

Ident.: SIM.6.5 — 29 OCT 2026

SIMULATOR ONLY

The MCDU scratchpad accepts the computer keyboard, on the MCDU in the 3D cockpit and on the MCDU pop-up.



MCDU, keyboard typing active (amber frame on the scratchpad row)

► MCDU SCRATCHPAD AREA ..... CLICK

An amber frame shows around the scratchpad: the keyboard types into this MCDU. The frame is a simulator indication, not part of the MCDU display.

cont'd... ►►►

cont'd... ►►►

► TYPE ..... AS REQUIRED

A to Z, 0 to 9	Letter and number keys.
. and /	Period and slash keys.
SPACE	SP key.
+ or -	+/- key.
BACKSPACE	CLR key (clears one character).
DELETE	CLR key held (clears the whole scratchpad).

The keyboard is released by a new click on the scratchpad, by the ESC key, or after 30 seconds without a key press.

CAUTION

While the keyboard types into the MCDU (or into an EFB field), the X-Plane keyboard commands do not operate.

SIM.6.6 Hardware Setup Wizard

Ident.: SIM.6.6 — 09 NOV 2026

SIMULATOR ONLY

The hardware setup wizard is a window that takes you through your joysticks, levers and knobs one step at a time, and checks X-Plane's own bindings for anything that works against the aircraft. It uses the same bindings as the HARDWARE application (see SIM.6.3): what is set in one shows in the other. Nothing is changed in X-Plane unless you ask for it.

When it opens

The aircraft checks your hardware 8 seconds after it loads, on the ground, once no other start-up window is showing. It never opens when the aircraft loads in flight, and it is not offered if X-Plane has no joystick settings.

FIRST START	The first time the aircraft loads, the wizard opens on its welcome page.
HARDWARE CHANGED	A device was added since the last setup, or a device that carried a lever binding is no longer connected. Only the steps for the changed devices are asked again.
CONFLICT CHECK	A new X-Plane binding conflicts with the aircraft. The wizard opens on the conflict check only (AT LOAD).

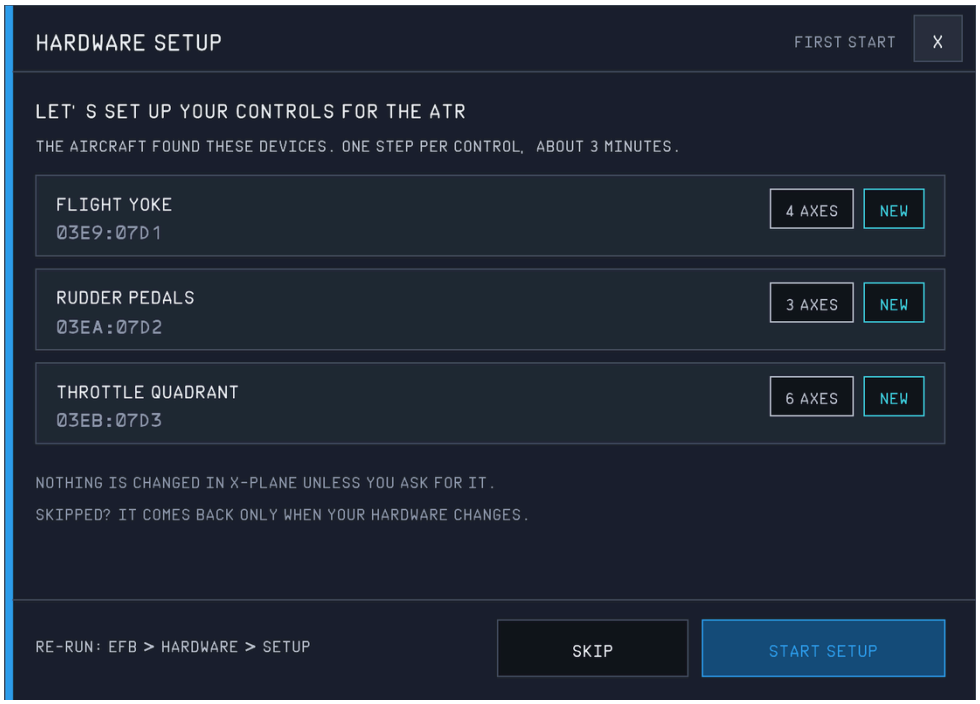
A device connected to another USB port keeps its bindings: they move with it without a question. A device with no lever binding can be unplugged without opening the wizard.

To run the wizard again at any time: EFB, SETTINGS, HARDWARE card, **RUN SETUP WIZARD** (see SIM.5.13).

cont'd... ►►►

cont'd... ►►►

Welcome



Hardware setup wizard, welcome page at the first start

The page lists the devices the aircraft found, with their USB ID and number of axes.

START SETUP — Starts the six steps.

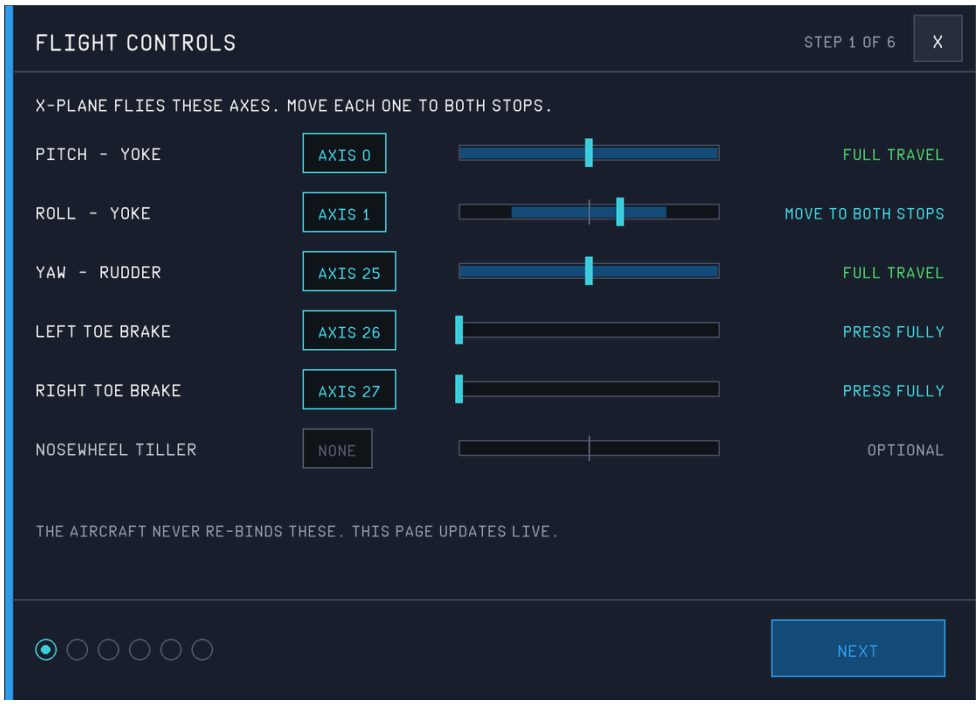
SKIP — Closes the wizard. It comes back only when your hardware changes.

The **X** closes the wizard at any step. What was set up until then is kept.

cont'd... ►►►

cont'd... ►►►

Step 1 - FLIGHT CONTROLS



Step 1, FLIGHT CONTROLS

The yoke, the rudder, the toe brakes and the nosewheel tiller are X-Plane axes: the aircraft reads them, but never binds them. The page shows the axis X-Plane gives each function, with its live position. Move each control to both stops.

FULL TRAVEL	The control went from one stop to the other.
MOVE TO BOTH STOPS / PRESS FULLY	The control has an axis but has not yet been moved through its full travel.
NOT ASSIGNED	(amber) X-Plane has no axis for this function. The page gives where to assign it in the X-Plane settings.
ON A BUTTON	The toe brakes are on a button in X-Plane.
OPTIONAL	The nosewheel tiller can be left without an axis.

Step 2 - POWER LEVERS

Move the hardware lever you want for POWER LEVER 1, then the one for POWER LEVER 2. While the wizard listens, the first axis that moves is taken. Axes already used by another lever, and X-Plane's flight-control axes, are ignored, so a yoke moved by mistake is not taken.

A lever that X-Plane already has on an axis (THROTTLE 1 or 2, or one THROTTLE axis) is taken from that axis without having to move it (FOUND IN X-PLANE). X-Plane's own use of that axis is then listed in step 6, to be removed.

ONE HARDWARE LEVER DRIVES BOTH ENGINES	Links the two power levers on one axis.
AGAIN	Learns the lever again.
INVERT / NORMAL	Reverses the direction of the axis.
NO LEVER	The lever stays on the mouse.

cont'd... ►►►

cont'd... ►►►

Step 3 - REVERSE

How your throttle goes into reverse:

BELOW IDLE	The hardware lever pulls past a gate or a hard stop (THROTTLE GATE). Put the lever in each gate and click CAPTURE for each detent.
A BUTTON	The lever stops at idle; a button gives reverse (REV COMMAND). At idle, hold the reverse button: the same travel then gives reverse. The page shows whether a button is bound to thrust reverse in X-Plane.
NOT ON MY HARDWARE	Lift the reverser guard on the cockpit lever with the mouse, or bind a button to the guard, then pull below idle (COCKPIT GUARD).

The three choices are the REVERSE GATE settings of the HARDWARE application (see SIM.6.3).

Step 4 - CONDITION LEVERS + FLAPS

- **CONDITION LEVER 1** and **2**: as for the power levers. CONDITION LEVER 2 can have its own lever or follow CL 1. A PROP or MIXTURE axis of X-Plane is taken without moving it.
- **FLAPS**: a lever (it snaps to 0, 15 and 30; the X-Plane flaps up / down buttons still work), or **I USE BUTTONS** for the X-Plane flaps buttons only.
- **PARKING BRAKE**: optional, a lever for the EMER / PARKING BRAKE handle (OFF, EMER, PARKING).

Step 5 - SELECTOR + ENCODER

Optional, for panels with one mode selector and one turn knob (see the KNOBS tab, SIM.6.3).

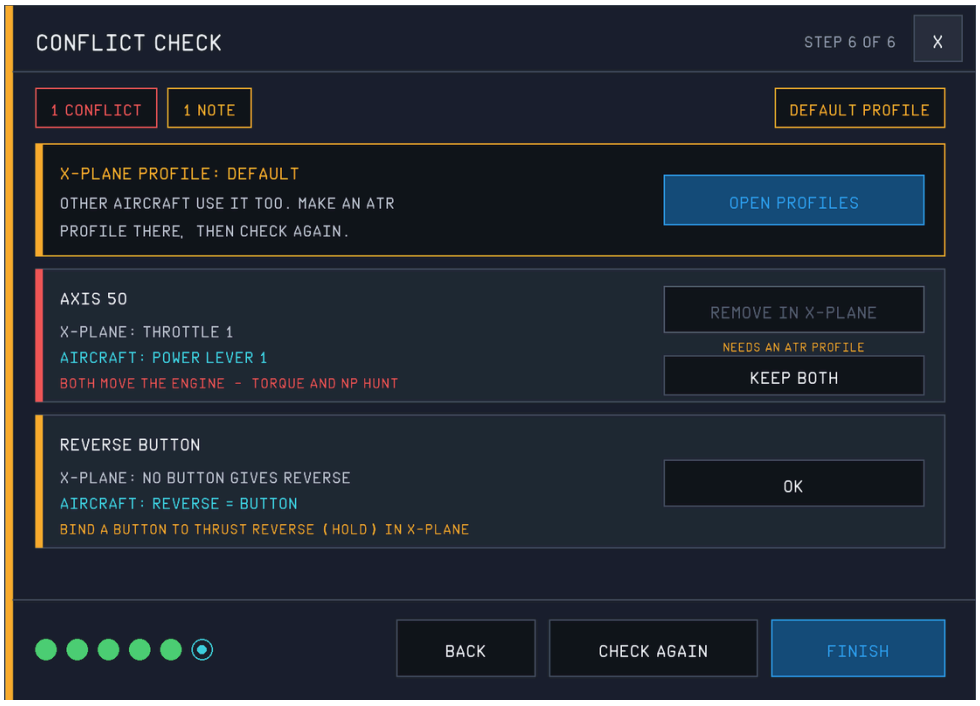
- **SELECTOR**: click LEARN, then turn the selector one detent at a time; DONE after the last position.
- **ENCODER**: click LEARN, then turn one step right, one step left, then push (SKIP PUSH if the knob has no push).

NO SUCH PANEL goes to the next step.

cont'd... ►►►

cont'd... ►►►

Step 6 - CONFLICT CHECK



Step 6, CONFLICT CHECK on the default X-Plane profile

The wizard reads X-Plane's control settings and lists what fights the aircraft:

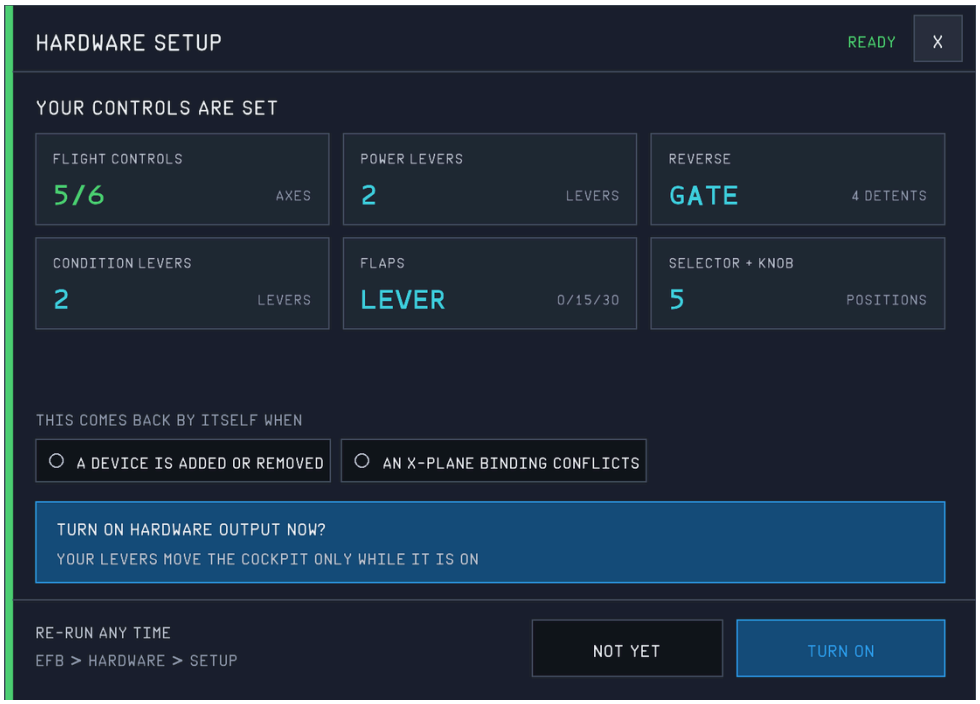
Axis (red)	An axis bound to an aircraft lever also has an X-Plane function. On a power or condition lever, both move the engine and torque and NP hunt.
Button (red)	A button learned for the selector or the encoder also has an X-Plane command: one press does both. Clear the button in the X-Plane settings.
REVERSE BUTTON (amber)	Reverse is set to A BUTTON, but no X-Plane button gives reverse.
REMOVE IN X-PLANE	Removes X-Plane's function from that axis. Available only when the ATR flies its own X-Plane control profile.
KEEP BOTH / OK	Leaves the binding as it is. A kept conflict is not shown again.
CHECK AGAIN	Reads the X-Plane settings again.

The chip at the top right gives the X-Plane control profile the ATR flies with: ATR PROFILE, SHARED PROFILE (other aircraft use it too) or DEFAULT PROFILE. The wizard changes X-Plane bindings only in a profile of the ATR alone, so that other aircraft are not affected. On a shared or default profile, **OPEN PROFILES** opens X-Plane's profile window: make a profile for the ATR there, then click CHECK AGAIN.

cont'd... ►►►

cont'd... ►►►

READY



Hardware setup wizard, READY

The last page sums up the setup: flight-control axes found, power and condition levers, reverse, flaps and selector positions, and the number of X-Plane bindings removed or kept. If levers are bound but the axis output of the HARDWARE application is off, the wizard asks **TURN ON HARDWARE OUTPUT NOW?**: your levers move the cockpit only while it is on (AXIS OUTPUT, SIM.6.3).

HARDWARE CHANGED

The page lists each device as NEW, NOT CONNECTED (with the levers it carried) or NO CHANGE, and the steps to redo. The conflict check is always one of them.

SET UP CHANGES Runs only the steps to redo.

KEEP OLD SETUP Keeps the bindings as they are and closes the wizard.

PAGE

INTENTIONALLY

LEFT BLANK

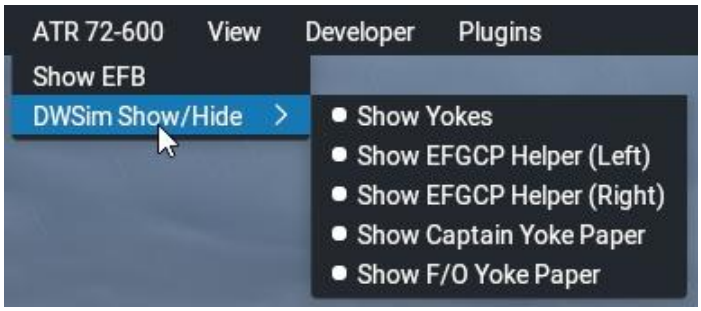
SIM.7 COCKPIT AIDS, DISPLAYS, SOUND AND LIVERIES

SIM.7.1 Aircraft Menu

Ident.: SIM.7.1 — 10 NOV 2026

SIMULATOR ONLY

The aircraft adds its own items to the X-Plane menu bar, under the aircraft name.



Aircraft menu, DWSim Show/Hide sub-menu

Show EFB	Opens or closes the EFB pop-up.
Show FGCP	Opens or closes the FGCP pop-up (see SIM.7.5).
Show MCP / EFCP (Captain), (F/O)	Opens or closes the MCP / EFCP pop-up of that side.
DWSim Show/Hide	Sub-menu with the items below.

- Show Yokes: shows or hides the control columns.
- Show EFGCP Helper (Left): shows or hides the CAPT EFGCP helper (see SIM.7.2).
- Show EFGCP Helper (Right): F/O EFGCP helper.
- Show Captain Yoke Paper: shows or hides the paper note on the CAPT control column.
- Show F/O Yoke Paper: shows or hides the paper note on the F/O control column.

Each item is also an X-Plane command (for example `DWSim/ATR_Series/commands/efgcp/helper/left/toggle`), which can be assigned to a key or a button.

Note

In this version, the F/O EFGCP helper has no 3D panel: Show EFGCP Helper (Right) has no visible effect.

SIM.7.2 EFGCP Helper

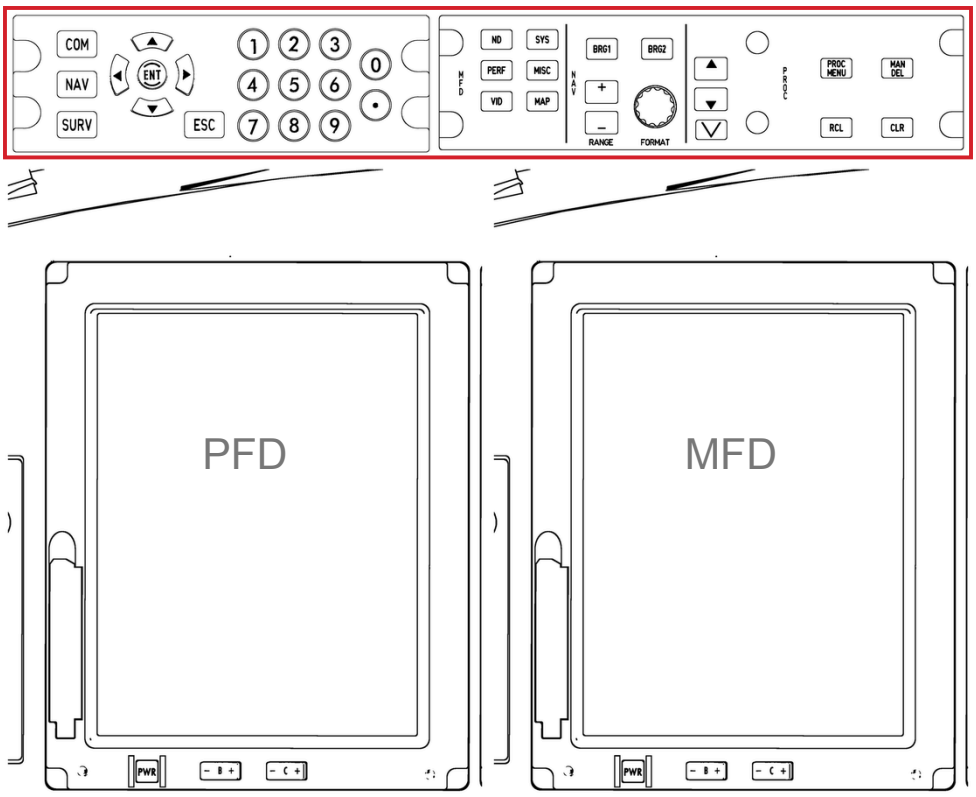
Ident.: SIM.7.2 — 10 NOV 2026

SIMULATOR ONLY

Some of the panels that control the PFD and MFD are far from the display units and are hard to reach in the simulator. The EFGCP helper is an additional panel, placed above the CAPT PFD and MFD, that repeats these controls. With the helper shown, the PFD and MFD settings can be changed without changing the view.

cont'd... ►►►

cont'd... ►►►



EFGCP helper (red frame) above the CAPT PFD and MFD

The helper is shown or hidden from the aircraft menu (Show EFGCP Helper (Left)) or from the EFB (SETTINGS, COCKPIT, EFGCP HELPER). It is hidden by default.

SIMULATOR NOTE

The EFGCP helper does not exist on the aircraft.

SIM.7.3 Yokes and Yoke Papers

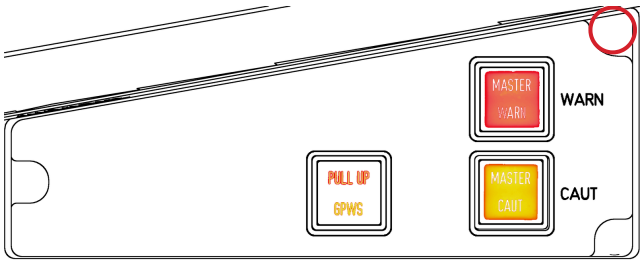
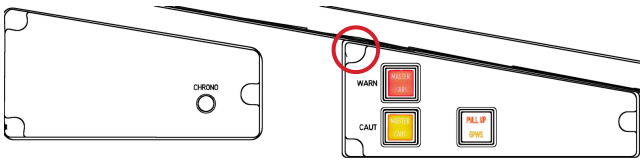
Ident.: SIM.7.3 — 10 NOV 2026

SIMULATOR ONLY

The control columns can be hidden, to give a clear view of the lower panels. Click the screw circled in red on the glareshield panel next to the WARN and CAUT lights, on either side, to hide or show the yokes. The aircraft menu item Show Yokes does the same.

cont'd... ►►►

cont'd... ►►►

CAPT side	F/O side
 Glareshield click spot, CAPT side	 Glareshield click spot, F/O side

A paper note is clipped on each control column. Its text is written in the EFB NOTES application (see SIM.4.4). The papers are hidden with the yokes, and can be hidden on their own from the aircraft menu.

SIM.7.4 Cockpit Aids

Ident.: SIM.7.4 — 10 NOV 2026

SIMULATOR ONLY

Headset

The headsets in the cockpit have click spots. A click on a headset puts it on: the cockpit sounds are reduced, as heard through a headset. A new click takes it off. The command `DWSim/ATR_Series/commands/audio/headsetToggle` does the same.

Window shades

The left and right cockpit window shades are animated. Lower or raise them as required.

Separate CAPT and F/O displays

The CAPT and F/O displays are independent: the display formats and ranges are selected separately on each side, as on the aircraft.

Checklists

The aircraft has its own electronic checklist on the displays. The Xchecklist plugin (X-Plane.org forums, Utilities) can also be used with a checklist file for the aircraft.

The command `DWSim/ATR_Series/commands/ecl/resetChecklists` sets all completed check lists of the electronic checklist back to not done, for the next flight (turnaround). The check list in progress is not changed.

SIM.7.5 Pop-up Displays

Ident.: SIM.7.5 — 10 NOV 2026

SIMULATOR ONLY

Every display and the EFB can be shown in an X-Plane pop-up window:

- EFB: click the pop-out icon of the EFB status bar (see SIM.1.1), or use the aircraft menu, Show EFB,
- display: left click the display in the cockpit.

cont'd... ►►►

cont'd... ►►►



PFD pop-up opened by a click on the display

In the pop-up window:

- drag anywhere in the window to move it,
- drag an edge or a corner to resize it,
- use the X-Plane pop-out control to move the window out of the X-Plane window, for example to a second monitor.

The DU, IESI and MCDU pop-ups show the display with its bezel, and the bezel controls work as in the cockpit: DU buttons, IESI knobs and keys, MCDU keyboard. Set SETTINGS, COCKPIT, DISPLAY POP-UPS to SCREEN to show the display alone (see SIM.5.8).

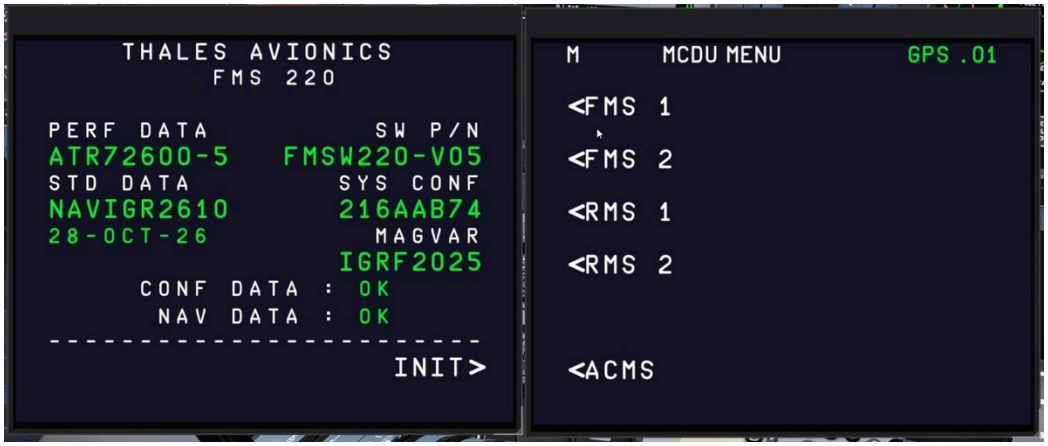
Close the pop-up with the X-Plane close control of the window, or with a new click on the display in the cockpit. The command `DWSim/Screens/Popup/CloseAll` closes all the pop-ups.

cont'd... ►►►

cont'd... ►►►



PFD and MFD pop-ups



MCDU pop-ups

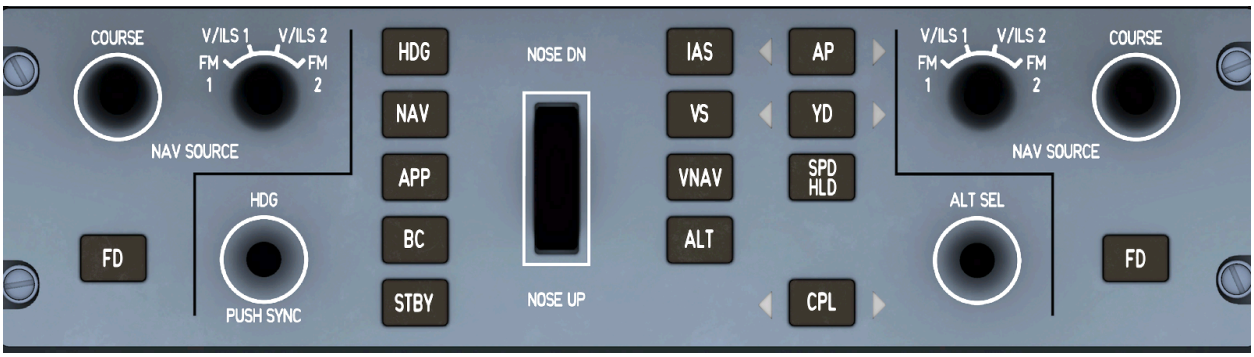
The MCDU pop-up includes the MCDU keys. The keyboard can be used to type in the scratchpad (see SIM.6.5).

Panel pop-ups

The FGCP and the MCP / EFCP of each side can also be shown in a pop-up. The panel is drawn from the 3D cockpit, and a click on a pushbutton or a knob does the same as in the cockpit. A pushbutton shows when it is pressed. A knob turns left with a click on its left half and right with a click on its right half, or with the mouse wheel. The AP, YD and CPL arrows of the FGCP light as in the cockpit.

cont'd... ►►►

cont'd... ►►►



FGCP pop-up

FGCP — A pop-up of its own: aircraft menu, Show FGCP, or command `DWSim/Screens/Popup/FGCP`.

MCP / EFCP — One per side, with the MCP keys (COM, NAV, SURV, arrows, ENT, digits, ESC) on the left and the EFCP keys (MFD, NAV, PROC) on the right. By default it is attached to the MFD pop-up of its side (DU 2 CAPT, DU 4 F/O), with the same width, above it (or below it, see SIM.5.8). It then opens and closes with the MFD pop-up, and dragging its frame moves both. Closed on its own, it stays closed until the MFD pop-up is opened again. Set to FREE, it is a pop-up of its own (aircraft menu, Show MCP / EFCP, or command `DWSim/Screens/Popup/EFCP_L` or `EFCP_R`).



MCP / EFCP pop-up, CAPT side

Drag the bottom right corner of a panel pop-up to resize it. The panel pop-ups are not available in VR.

Pop-ups in VR

In VR, the DU, IESI, MCDU, AUTO PRESS, FAP and EFB pop-ups open as VR windows, with the same bezel and controls. X-Plane moves and sizes the VR windows. A pop-up open when VR starts becomes a VR window, and goes back to a normal pop-up when VR ends (a popped-out window is not changed).

cont'd... ►►►

cont'd... ►►►



Several display pop-ups arranged over the cockpit

cont'd... ►►►

cont'd... ►►►



EWD and lower display pop-ups

SIMULATOR NOTE

Each pop-up has an X-Plane command, which can be assigned to a key or a button: `DWSim/Screens/Popup/` followed by DU1 to DU5, IESI, MCDU1, MCDU2, AUTOPRESS, FAP, EFB, QUADRANT, FGCP, EFCP_L or EFCP_R.

SIM.7.6 Throttle Quadrant Window

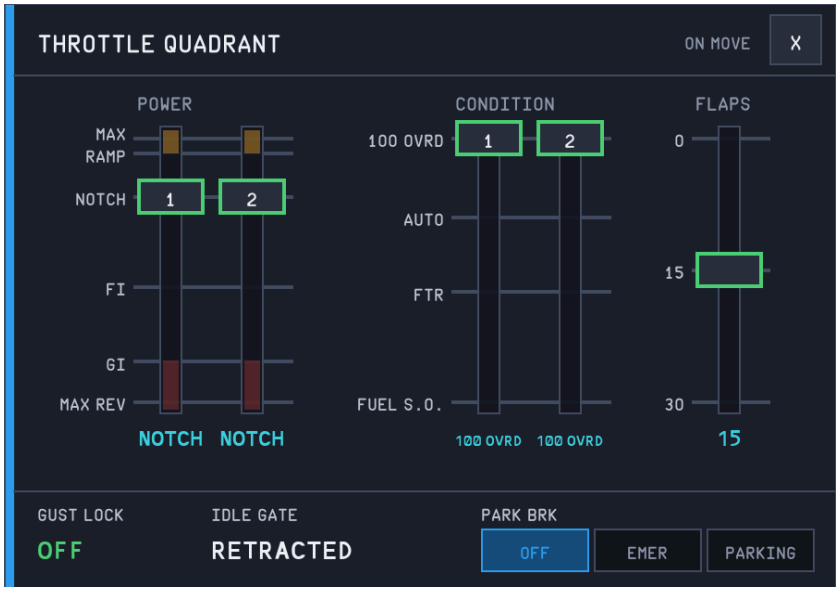
Ident.: SIM.7.6 — 10 NOV 2026

SIMULATOR ONLY

The THROTTLE QUADRANT window shows the position of the levers of the pedestal, which are often out of view from the normal cockpit view.

cont'd... ►►►

cont'd... ►►►



THROTTLE QUADRANT window, take-off setting (PL at the NOTCH, CL 100 OVRD, flaps 15)

POWER	PL 1 and 2, with the positions MAX REV, GI, FI, NOTCH, RAMP and MAX. The reverse range is red with the reverser guard down, and green with the guard lifted.
CONDITION	CL 1 and 2, with the positions FUEL S.O., FTR, AUTO and 100 OVRD (as the window labels them).
FLAPS	Flap lever, 0, 15 and 30.
GUST LOCK	ENGAGED or OFF.
IDLE GATE	ENGAGED or RETRACTED.
PARK BRK	OFF, EMER or PARKING.

When HARDWARE POSITION is ON, a cyan frame on each lever shows the position of the hardware lever bound in the HARDWARE application (LEVERS tab). If a hardware lever is not engaged yet, the window shows NOT PICKED UP - MOVE THE HARDWARE LEVER.

Display

The display mode is selected in the EFB (SETTINGS, QUADRANT HUD, see SIM.5.5):

ON MOVE	The window shows when a lever is moved (mouse, command or hardware), then fades after a few seconds (FADE AFTER). It stays while the mouse is over it.
ALWAYS	The window stays. X closes it until it is opened again.
OFF	The window shows only on command.

The command `DWSim/Screens/Popup/QUADRANT` opens the window, in any mode, until it is closed, or closes it.

SIMULATOR NOTE

Drag the window to move it. Use the mouse wheel over the window to resize it. The position and size are saved. RESET POSITION (SETTINGS, QUADRANT HUD) returns it to the bottom right of the screen.

cont'd... ►►►

cont'd... ►►►

SIM.7.7 Messages and Prompts

Ident.: SIM.7.7 — 10 NOV 2026

SIMULATOR ONLY

The aircraft opens a small window when it needs a decision from you, or has something to tell you that the cockpit cannot show. The windows have the look of the EFB and of the throttle quadrant window. The bar on the left edge gives the meaning: blue for information, amber for a warning, green when done or clear, red while items are still on. The **X** at the top right closes the window; a press anywhere else that is not on a button moves it. The figures below are drawn by the windows themselves.

Resume flight

Shown about 3 s after the aircraft loads, in the first flight of the X-Plane session, when the last saved state was written in flight, or the last session ended in a crash:

LAST SESSION	SETTING THAT ENABLES THE PROMPT	CAPTION
Closed normally while airborne	RESTORE AFTER A NORMAL EXIT ON	LAST SESSION CLOSED IN FLIGHT
Crashed or hung (airborne or on the ground)	RESTORE AFTER A CRASH ON	LAST SESSION ENDED UNEXPECTEDLY (amber)

A state saved on the ground after a normal exit is not offered: it is restored without a prompt and without a pause, the aircraft held while the systems settle (see SIM.5.9).

After a normal exit in flight	After a crash
	

The window shows the saved flight: departure and arrival with the progress along the flight plan (next waypoint, legs flown, distance to go, or NO FLIGHT PLAN), IAS, ALTITUDE, HEADING, VERTICAL SPEED, FUEL ON BOARD and AUTOPILOT (AP or OFF, with the lateral and vertical modes), then AIRBORNE or ON GROUND, the time of the save and the X-Plane time (UTC).

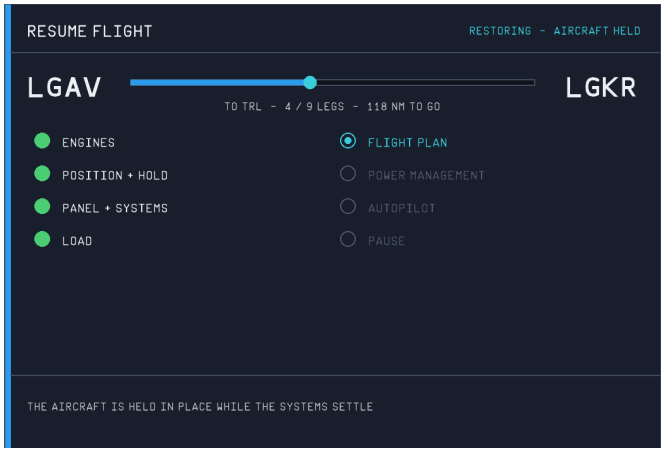
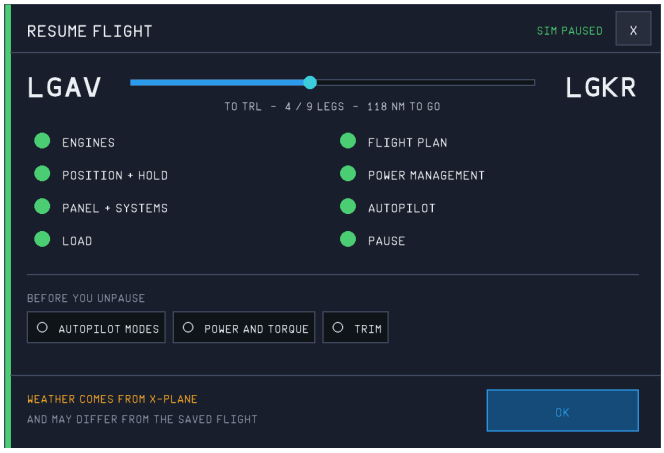
RESUME — Puts the aircraft back in the saved state, systems and flight together, from the last automatic save.

START FRESH — Keeps the aircraft as X-Plane loaded it. The automatic save starts again and replaces the saved state. The **X** has the same effect.

cont'd... ►►►

cont'd... ►►►

During the restore (caption RESTORING - AIRCRAFT HELD) the aircraft is held in place while the systems settle, and the window ticks off the steps: ENGINES, POSITION + HOLD, PANEL + SYSTEMS, LOAD, FLIGHT PLAN, POWER MANAGEMENT, AUTOPILOT and PAUSE. When it is complete (caption SIM PAUSED) the sim is paused, and the window lists what to check BEFORE YOU UNPAUSE: the AUTOPILOT MODES (the COCKPIT, on the ground), the POWER AND TORQUE and the TRIM. Close it with **OK** and unpause when ready.

Restore in progress	Restore complete
	

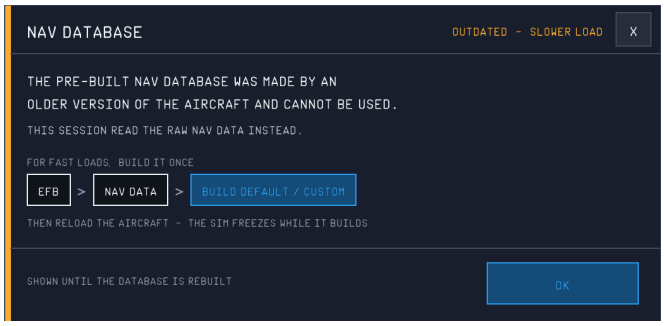
Note

The weather comes from X-Plane at the time of the restore and may differ from the weather of the saved flight.

Nav database

Shown at load when Navigraph data is installed but the FMS had to read the raw navigation data, because no matching pre-built database was found (caption SLOWER LOAD). The window gives the way to build the database once: EFB > NAV DATA > BUILD CUSTOM, then reload the aircraft. The sim freezes while the database builds.

When the installed pre-built database was made by an older version of the aircraft, it cannot be used (caption OUTDATED - SLOWER LOAD). The way is then EFB > NAV DATA > BUILD DEFAULT or BUILD CUSTOM. This message is shown at every load until the database is built again.

No matching database	Outdated database
	

OK — Closes the window for this session. It comes back at the next load if the condition is still there.

cont'd... ►►►

cont'd... ►►►

DO NOT SHOW AGAIN — Closes the window and never shows the SLOWER LOAD message again. Not offered with an outdated database.

Cockpit door

Shown when the cockpit door leaves were closed in the wrong order: the right leaf shut first, so the left leaf rests ajar on it. The cabin is then still drawn behind the cockpit, which costs frame rate (caption CABIN STILL RENDERED - FRAME RATE). To fix: open the right leaf, close the left leaf, then close the right leaf, or set EFB > SETTINGS > REALISM > COCKPIT DOORS AUTO CLOSE to ON.

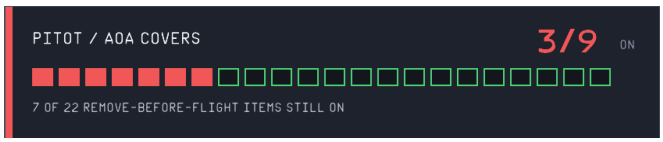
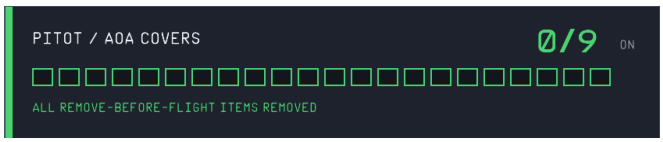


Cockpit door: cabin still rendered

OK — Closes the window. It is shown again the next time the doors are closed in the wrong order.

Remove-before-flight counter

A short banner, shown for 3 s each time a remove-before-flight item is fitted or removed (one item, a group, FIT ALL RBF or REMOVE ALL RBF, see SIM.4), so that the walk-around can be done without the EFB.

Items still fitted	All items removed
	

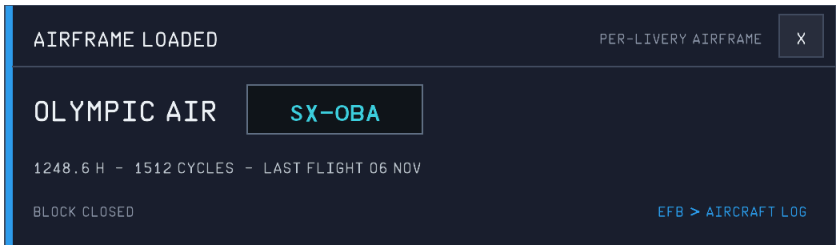
The top line gives the group just changed (REMOVE-BEFORE-FLIGHT ITEMS for FIT ALL / REMOVE ALL) and the count of its items still on: red while one is on, green when none is. The row of squares shows each item of the whole kit, filled red while fitted. The bottom line gives n OF N REMOVE-BEFORE-FLIGHT ITEMS STILL ON, or ALL REMOVE-BEFORE-FLIGHT ITEMS REMOVED (green). HELD: and the reason, in amber, means that the item cannot move yet (for example GPU NOT IN POSITION).

Airframe loaded

With PER-LIVERY AIRFRAME ON (SIM.5.9), a notice shows which aircraft is flying, once at each load and when the livery is changed with the aircraft loaded. It closes after 8 s.

cont'd... ►►►

cont'd... ►►►



It gives the livery, the registration (NO REG when none is set), the flight hours, the cycles and the date of the last flight (NEW AIRFRAME when there is none), BLOCK OPEN - COUNTING or BLOCK CLOSED, and a reminder of EFB > AIRCRAFT LOG (SIM.4.6).

Livery registration

When the registration typed on the AIRCRAFT LOG is not the one painted on the livery, a prompt (LIVERY REGISTRATION - DOES NOT MATCH) shows both registrations and asks whether the livery should show the new one. It is shown when the livery can be repainted (all the included liveries, and liveries from other painters as given in SIM.7.9), or when a copy of the livery painted with that registration is already installed:

- YES: a copy of the livery with the new registration is painted, in the folder `<livery> <REGISTRATION>` (PAINTING ... ON ..., about 30 s; the sim keeps running). The registration is changed on the fuselage, the fin, the gear doors, the registration plates, the cockpit plate and the airworthiness placard, wherever the livery carries it; the painter's own letters are kept where the old and the new registrations share them. The aircraft then switches to the new livery (X-Plane steps through its liveries, a few seconds) and this aircraft's hours and logbook move with it. When the copy is already installed, the aircraft switches to it straight away.
- If the painted livery is already an aircraft of its own (two aircraft cannot share a registration), the prompt says ALREADY AN AIRFRAME and gives its hours and cycles. SWITCH NOW flies that aircraft instead; this one gives the registration back. CANCEL keeps this livery.
- NO, or the **X**: the livery is kept, and the prompt does not ask again for this registration.

NEW LIVERY NOT LISTED

When X-Plane does not list the new livery yet, the prompt says RELOAD THE AIRCRAFT, THEN PICK THE LIVERY. Reload the aircraft and select the new livery in the Flight Configuration screen.

Hardware setup

At the first start, when your hardware changes, or when an X-Plane binding conflicts with the aircraft, the hardware setup wizard opens (see SIM.6.6).

SIM.7.8 Sound

Ident.: SIM.7.8 — 10 NOV 2026

SIMULATOR ONLY

The sounds of the aircraft are made with FMOD. They include the engines and propellers, the systems, the cockpit controls and the aural alerts.

SIM.7.9 Liveries

Ident.: SIM.7.9 — 10 NOV 2026

SIMULATOR ONLY

Liveries are in the `liveries` folder of the aircraft, and are selected in the X-Plane Flight Configuration screen.

cont'd... ►►►

cont'd... ►►►

FREE LIVERIES

All liveries are FREE. *They are included with the aircraft at no extra cost. DeltaWing Simulations is not affiliated with, endorsed by, or sponsored by any of the airlines whose liveries are included (see GEN.1.7).*

The package includes the following liveries:

LIVERIES	
Air Nostrum	Maldivian
BahamasAir	Olympic Air
Binter	Satena
Clic	Silver Airways
Loganair	Sky Express

More liveries are planned.

Liveries from other painters

A livery from another painter is its own aircraft like any other (SIM.4.6). To have its registration repainted when another one is typed on the AIRCRAFT LOG (SIM.7.7), the livery folder needs:

dwsim_registration.txt — One line: the registration painted on the livery, for example `SX-ABC`. Without it, the aircraft does not know what is painted and never asks.

dwsim_spec.json — Optional: where the registration is painted (see below).

With `dwsim_registration.txt` only, the aircraft finds by itself, once, the registration plates, the cockpit plate, the airworthiness placard and the gear doors (same place on every livery). Each is kept only when the ink there has the shape of the registration and matches it letter for letter in width and spacing; anything else is left alone. The rear fuselage and the fin are repainted only from a `dwsim_spec.json`.

Every livery included with the aircraft has both files; use them as examples.

dwsim_spec.json

A JSON file next to `dwsim_registration.txt`. It lists the places that differ from the included set; the plates, cockpit plate, placard and gear doors are included by default and are changed or removed by name.

```
{
  "registration": "SX-ABC",
  "font": { "sheet": "Arial Bold" },
  "items": [
    { "name": "rear fuselage, side 1", "texture": "fuselage_2+3",
      "window": [3800, 1860, 4560, 2040], "ink": "auto", "dash": "auto",
      "font": { "sheet": "Arial Rounded Bold" }, "stroke_px": 1 },
    { "name": "rear fuselage, side 2 (upside down)", "texture": "fuselage_2+3",
      "window": [3800, 790, 4560, 960], "rotate": 180, "ink": "auto", "dash": "auto" },
    { "name": "nose gear door", "text": "after_dash" },
    { "name": "nose gear door (rotated)", "skip": true }
  ]
}
```

KEY	
`registration`	The registration painted on the livery.

cont'd... ►►►

cont'd... ►►►

KEY	
`font`	Default letter sheet: Arial, Arial Bold, Arial Narrow Bold, Arial Rounded Bold, Avenir Next Bold, Avenir Next Medium, DIN Alternate Bold, DIN Condensed Bold, Futura Bold, Futura Medium, Helvetica, Helvetica Bold, Tahoma Bold, Verdana Bold.
`name`	The place. Included places: `registration plate 1`, `registration plate 2`, `cockpit registration plate`, `airworthiness placard registration`, `nose gear door`, `nose gear door (rotated)`. Any other name adds a place.
`texture`	DDS file in `objects/textures` (DXT1 or DXT5). `fuselage_2+3` is the rear fuselage across the joint of `fuselage_2.dds` and `fuselage_3.dds`, as one strip: x up to 4062 is `fuselage_2`, beyond is `fuselage_3`.
`window`	Box around the painted text, in texture pixels: left, top, right, bottom. Keep some paint around the letters and nothing else painted inside.
`ink`	`paint` (dark letters, default), `light` (light letters on a dark plate), `auto` (any ink on any paint), `decal` (letters on a transparent decal layer).
`thr`	Ink threshold (0-255), when the default does not separate the letters from the paint.
`text`	What is painted from the registration: `full` (default), `after_dash` (SX-ABC: ABC), `last2`, `last3`, `digits` (N702SV: 702), `nodash` (HK-5399: HK5399).
`old`	The painted text when it is not exactly the rule's (a space, a different letter).
`rotate`	`180` for text painted upside down on the texture.
`stroke_px`	Letters bolder (+) or thinner (-) than the sheet, in pixels.
`dash`	`auto` (the painter's dash is measured) or [width, height] as fractions of the letter height.
`erase`	`flat`: the old letters are covered with the background colour (plain bars).
`color`	[r, g, b] of the letters, when the measured colour is not right.
`skip`	`true`: the place is left alone.

CHECKING A SPEC

Type another registration on the AIRCRAFT LOG and answer YES: the new livery `<livery> <REGISTRATION>` shows the result, and the X-Plane `Log.txt` gives, for each place, the text found, the letter sheet, and the width and spacing fitted ([LiveryReg] lines). A place whose text is not found is reported and left alone.

PAGE

INTENTIONALLY

LEFT BLANK