

A photograph of an Airbus A350-900 aircraft on a tarmac. The aircraft is white with a blue tail fin featuring the Airbus logo and the text 'A350'. The registration number 'F-YVMB' is visible on the fuselage. The aircraft is reflected in a large puddle in the foreground. In the background, another Airbus A350 is visible, along with airport buildings and a clear sky with scattered clouds. The sun is low in the sky, creating a bright reflection on the water.

Malfunction Clustering

Support of the Manufacturer

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Annex I (Definitions) to Regulation (EU) No 965/2012

‘Equivalency of malfunctions’ (malfunction clustering) means all the malfunctions that put a significant demand on a proficient crew regardless whether they are used or not in the EBT modules.

ORO.FC.231 (f) EQUIVALENCY OF MALFUNCTIONS

EQUIVALENCY OF MALFUNCTIONS

- 1) Each flight crew member shall receive assessment and training in the management of aircraft system malfunctions.
- 2) Aircraft system malfunctions that place a significant demand on a proficient crew shall be organised by reference to the following characteristics:
 - i. immediacy;
 - ii. complexity;
 - iii. degradation of aircraft control;
 - iv. loss of instrumentation; and
 - v. management of consequences.
- 3) Crew shall be exposed to at least one malfunction for each characteristic at the frequency determined by the table of assessment and training topics.
- 4) Demonstrated proficiency in the management of one malfunction is considered equivalent to demonstrated proficiency in the management of other malfunctions with the same characteristics.

AMC1 ORO.FC.231 (f)**Evidence-based training****EQUIVALENCY OF MALFUNCTIONS — PROCESS**

- a) The equivalency of malfunctions process should be undertaken by subject matter experts (SMEs) who hold or have held a type rating on the aeroplane type.
- b) Steps of the equivalency of malfunctions:
- Step 1: Look (review) at all aircraft system malfunctions provided by the OEM. For example, FCOM, or AFM for other manufacturers is normally not an exhaustive list of malfunctions.
- Step 2: Determine and retain in a list only malfunctions that place a significant demand on a proficient crew, in isolation from an environmental or operational context.
- Step 3: For each retained malfunction, determine the applicable characteristic or characteristics.
- Step 4: Develop the EBT FSTD programme to incorporate malfunctions at the frequency specified in the table of assessment and training topics.
- c) Malfunctions included in the equivalency of malfunctions but not included in the EBT FSTD programme require review and appropriate procedural knowledge training, conducted in suitable alternative environment (classroom, flight procedure training device, computer-based training, etc.).

GM1 ORO.FC.231 (f)**Evidence-based training****EQUIVALENCY OF MALFUNCTIONS — SIGNIFICANT DEMAND ON A PROFICIENT CREW**

- a) A procedure for a malfunction (e.g. non-normal, abnormal, emergency) may be considered to place significant demand on a proficient crew member if it results in one or more of the following:
- 1) time criticality;
 - 2) multiple paths within the procedures (e.g. decision trees);
 - 3) multiple inoperative or degraded systems;
 - 4) a high potential for undetected errors (e.g. removal of flight protections); and
 - 5) significant increases of workload (e.g. removal of automation).
- b) When a malfunction is placing a significant demand on a proficient crew, it means it has one or more of the characteristics (see more in GM2.ORO.FC.231(f)).

GM2 ORO.FC.231 (f)**Evidence-based training****EQUIVALENCY OF MALFUNCTIONS — MALFUNCTION CHARACTERISTICS**

The following may be considered suitable definitions for each of the characteristics:

- a) 'Immediacy': System malfunctions requiring immediate and urgent crew intervention or decision (e.g. malfunctions with memory items)
- b) 'Complexity': System malfunctions requiring recovery procedures with multiple options to analyse and/or multiple decision paths to apply
- c) 'Degradation of aircraft control': System malfunctions resulting in significant degradation of flight controls in combination with abnormal handling characteristics
- d) 'Loss of instrumentation': System malfunctions that require monitoring and management of the flight path using degraded or alternative displays
- e) 'Management of consequences': System malfunctions affecting significantly the flight crew standard task sharing and/or the workload management and/or the decision-making process during an extensive period

Note:

Equivalency of malfunctions may be undertaken in consultation with the aircraft OEM. The objective of the OEM consultation is to review the operator analysis regarding the OEM operational certification (e.g. OSD) documents and to the general OEM operation and training policy.

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Airbus encourages Operators and Approved Training Organizations (ATOs) to apply the CBTA concept and to develop their own courses adapted to their specificities and their pilot population.

To support the development of such courses, Airbus as Original Equipment Manufacturer (OEM), describes in the Flight Crew Training Standard (FCTS) manual its vision of pilot training and shares with Operators and ATOs its practical experience in the design of type ratings and recurrent training programs.

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APPENDIX 2

MMEC TABLE

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Manufacturer Malfunctions

&

EBT Characteristics

(MMEC)

Table

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MMEC TABLE

A320/FCOM/PROCEDURES/ABNORMAL and EMERGENCY PROCEDURES		EBT Characteristics				
		I	L	D	M	C
AIR	AIR ENG 1+2 BLEED FAULT	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED FAULT (LEFT LEAK and RIGHT LEAK)	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED FAULT (LEFT LEAK)	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED FAULT (RIGHT LEAK)	Y	N	N	Y	N
AIR	AIR ENG 1+2 BLEED LO TEMP	Y	N	N	Y	N
AIR	AIR FWD(AFT) CRG VENT FAULT (if installed)	N	N	N	N	N
AIR	AIR L(R) WING LEAK	N	N	N	N	N
AIR	AIR L(R) WING LEAK DET FAULT	N	N	N	N	N
AIR	AIR PACK 1(2) FAULT	N	N	N	N	N
AIR	AIR PACK 1(2) OFF	N	N	N	N	N
AIR	AIR PACK 1(2) OVHT	N	N	N	N	N
AIR	AIR PACK 1(2) REGUL FAULT	N	N	N	N	N
AIR	AIR PACK 1+2 FAULT	N	N	N	Y	N
AIR	AIR X BLEED FAULT	N	N	N	Y	N
APU	APU AUTO (EMER) SHUT DOWN	N	N	N	N	N
APU	APU FIRE DET FAULT	N	N	N	N	N
APU	APU FIRE LOOP A(B) FAULT	N	N	N	N	N
APU FIRE	APU FIRE	Y	N	N	Y	N
AUTO FLT	AUTO FLT A/THR LIMITED	N	N	N	N	N
AUTO FLT	AUTO FLT A/THR OFF	N	N	N	Y	N
AUTO FLT	AUTO FLT AP OFF	Y	N	N	Y	N
AUTO FLT	AUTO FLT FAC 1(2) FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT FAC 1+2 FAULT	Y	N	Y	Y	Y
AUTO FLT	AUTO FLT FCU 1(2) FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT FCU 1+2 FAULT	N	Y	N	Y	N
AUTO FLT	AUTO FLT REAC W/S DET FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT RUD TRIM 1(2) FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT RUD TRIM SYS	N	N	N	Y	N
AUTO FLT	AUTO FLT RUD TRV LIM 1(2)	N	N	N	N	N
AUTO FLT	AUTO FLT RUD TRV LIM SYS	N	N	N	N	N
AUTO FLT	AUTO FLT TCAS MODE FAULT	N	N	N	N	N
AUTO FLT	AUTO FLT YAW DAMPER 1(2)	N	N	N	N	N
AUTO FLT	AUTO FLT YAW DAMPER SYS	N	N	Y	Y	Y
AVIONICS SMOKE	AVIONICS SMOKE	Y	Y	Y	Y	Y
BLEED	BLEED MONIT SYS 1(2) FAULT	N	N	N	N	N

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