

International Maintenance Review Board Policy Board (IMRBPB)
Issue Paper (IP)

Initial Date : 15-FEB-2013

IP Number: IP 132

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Title: Limit FEC8 consideration to the safety/emergency functions of safety/emergency systems or equipment

Submitter: Airbus

Issue: Question 3 in the MSG-3 logic asks:

DOES THE COMBINATION OF A HIDDEN FUNCTIONAL FAILURE AND ONE ADDITIONAL FAILURE OF A SYSTEM RELATED OR BACK-UP FUNCTION HAVE AN ADVERSE EFFECT ON OPERATING SAFETY?

Paragraph 3 of section 2-3-5 provides guidance on answering this question. One paragraph states:

For hidden functions of safety/emergency systems or equipment (see Glossary), the additional failure is the event for which this function of the system or equipment is designed, and in these cases, where the system has no redundancies, a FEC 8 is to be selected. For redundant systems, if the system failure remains hidden after the failure of the first redundancy, a FEC 8 is also to be selected. This applies irrespective of whether the function is required by regulation or is carried as an operator option.

The issue concerns the words:

For hidden functions of safety/emergency systems or equipment... a FEC 8 is to be selected.

Problem:

The above mentioned paragraph obliges MSG-3 authors to follow FEC8 for all hidden functions of systems or equipment required for safety / emergency purposes (either directly in the case of 'emergency equipment' or indirectly in the case of equipment that provides the last means to prevent the adverse effect on safety following a sequence of unrelated failures.

It is proposed that the logic flow should not be required to follow FEC8 simply because the functional failure is hidden. The 'safety/emergency equipment' may have several hidden functions but it is only those that provide the safety / emergency function that need to be considered on FEC8.

It is noted that the Glossary definition of 'Safety/Emergency Systems or Equipment' states that that failure of the function when needed will result in a Failure Condition **that might have an adverse effect on safety.**

A device or system that:

- 1) enhances the evacuation of the aircraft in an emergency or,*
- 2) if it does not function when required, results in a Failure Condition that might have an adverse effect on safety*

From this it may be argued that failures in Safety/Emergency Systems or Equipment' that do **not** result in a Failure Condition that might have an adverse effect on safety need not be assessed under FEC8 (hidden safety) logic

The following examples are provided:

- 1) **Example from Dassault Aviation: MSI 52-20-00 : Emergency exit.**

The main functions of the emergency exit are safety related and FEC8 is forced for all hidden failures that might result in inability to open it. There are however specific draining system

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and water evacuation functions within this exit. The failure of these functions will not impair the exit opening function, these being essentially a means to limit corrosion and thus minimise findings during structural inspections. It should be acceptable that these functional failures are assessed under FEC9.

2) Example from Airbus: MSI 78-37: Thrust Reverser Independent Locking System

A thrust reverser locking system is required to prevent unintended deployments and constitutes a safety system. The loss of some functions within the system would not result in the loss of any of the three locking system. For example, the loss of redundant data to the EEC for monitoring of the third lock would be hidden following failure of one proximity switch. Even if all monitoring is lost the lock function is unaffected. Though the loss of indication of the status of the lock is undesirable it should not need to be addressed on an FEC 8.

3) Example from Embraer: MSI 25-61: Emergency Locator Transmitter System (ELT)

The function of the ELT is to make search and rescue operations easier, facilitating aircraft location. The ELT provides automatic transmission of the standard swept tone and an encoded digital message is sent to a satellite COSPAS-SARSAT in the event of an accident. The emergency locator transmitter sub-subsystem transmits signals through emergency frequencies of 121.5 MHz, 243.0 MHz and 406.025 MHz.

MSG-3 Functions and related FECs (simplified):

1. To transmit emergency signal in the event of a crash
2. To provide position data to ELT if equipped with ELT/NAV interface
3. Provide means to reset and test ELT

While the first function relates to the emergency and needs to be considered under FEC 8, it should be acceptable that the other two functions be considered under FEC 9 since, although they are functions of safety / emergency equipment, their failure will not impact the safety / emergency function.

Recommendation:

Replace Paragraph 3 of section 2-3-5 with the following (changes shown in bold)

For hidden **functional failures** of safety/emergency systems or equipment (see Glossary) **that could prevent the safety/emergency function**, the additional failure is the event for which this function of the system or equipment is designed, and in these cases, where the system has no redundancies, a FEC 8 is to be selected. For redundant systems, if the system failure remains hidden after the failure of the first redundancy, a FEC 8 is also to be selected. This applies irrespective of whether the function is required by regulation or is carried as an operator option.

Add the following definition to the Glossary:

Safety/Emergency function: "The function of the safety/emergency equipment that provides the means to address the safety/emergency related event for which it has been included in the aircraft type design."

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IMRBPB Position:

Date: April 26, 2013

Position: A new recommendation has been developed during the IMRBPB, which has been accepted.

Status of Issue Paper (when closed state the closure date): Closed as IP 132, April 26, 2013.

Recommendation for implementation: Incorporate into MSG-3 Volume I and II at the next revision.

Important Note: The IMRBPB positions are not policy. Positions become policy only when the policy is issued formally by the appropriate National Aviation Authority.