

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

Initial Date (DD/MMM/YYYY):24/02/2014

IP Number: 140

Revision / Date (DD/MMM/YYYY):

Applies To:	
Vol 1:	<input type="checkbox"/>
Vol 2:	<input type="checkbox"/>
Both:	X

Title: protective functions (not safety/emergency related)

Submitter: EASA

Issue: Current MSG3 does not provide guidance how to address Question 3 (Systems analysis, First Level) for the protective functions, which are not safety/emergency related.

Problem:

- MSG3 **revision 2**, Paragraph 2.3.4.3, stated a general guidance how to address “protective safety/emergency” items for Systems and Powerplant First Level Analysis – Question 3:

For protective safety/emergency systems or equipment, the additional failure is the event for which the system or equipment is designed.

- MSG3 **revision 2001.1** introduced:

- Revision of above guidance to address safety/emergency functions (text further amended with MSG3 revision 2013.1 - see paragraph 2-3-5.3) – no more reference to “protective function”.

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,....

- Guidance to identify protective functions (see Systems Analysis procedure, Paragraph 2-3-2) :

When listing functions, functional failures, failure effects, and failure causes, care should be taken to identify the functions of all protective devices. These include devices with the following functions:

- a) to draw the attention of the operating crew to abnormal conditions
- b) to shut down equipment in the event of a failure
- c) to eliminate or relieve abnormal conditions which follow a failure
- d) to take over from a function that has failed

Protective function statements should describe the protective function itself, and should also include the words "if" or "in the event of" followed by a brief description of the events or circumstances that would activate or require activation of the protection.

Conclusion: although this aspect was covered/mentioned in MSG3 revision 2, and although MSG3 rev 2001.1 and subsequent recommends care to be taken to identify the protective functions, MSG3 does not provide today guidance how to address these protective functions (First Level Analysis – Question 3), which are not necessarily safety/emergency related.

Recommendation (including Implementation):

Recommend adding one statement in paragraph 2-3-5.3 to help answering question 3 of level 1 analysis for protective functions, in particular which combination of failures should be considered.

Proposed changes are **highlighted in red**.

IP Template Rev 2, dated 22/02/2007

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3. Hidden Functional Failure Safety Effect

QUESTION 3: 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?

This question is asked of each hidden functional failure which has been identified in Question 1.

The question takes into account failures in which the loss of the one hidden function (whose failure is unknown to the operating crew) does not of itself affect safety; however, in combination with an additional functional failure (system related or intended to serve as a back-up) has an adverse effect on operating safety.

For hidden functional failures of protective devices that could prevent the protective function, the additional failure is the event for which this function of the system or equipment is designed.

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.

If a “YES” answer is determined, there is a safety effect and task development must proceed in accordance with [Heading 2-3-6.4].

A “NO” answer indicates that there is a non-safety effect and will be handled in accordance with [Heading 2- 3-6.5].

Example 1:

Function: Provide signal for indication of fuel low level condition on one side

Functional failure: Fails to provide signal for indication of fuel low level condition on one side, at the specified low fuel level

Assuming an hidden functional failure on Question 1, the answer to Question 3 should consider the low level event and could be answered:

In combination with a fuel low level event, the functional failure has no adverse effect on operating safety, because a fuel low level signal will be provided from the other tank. In addition, fuel gauging information is continually provided on the PFD.

Therefore a FEC9 is selected

Example 2:

Function: To prevent complete loss of hydraulic fluid (System #1) in case of hydraulic fluid leak downstream of hydraulic brake line

Functional failure: Fails to prevent complete loss of hydraulic fluid (System #1) in case of hydraulic fluid leak downstream of hydraulic brake line

Assuming an hidden functional failure on Question 1, the answer to Question 3 should consider an hydraulic fluid leakage and could be answered:

In combination with a major hydraulic fluid leakage downstream of hydraulic brake line, the functional failure has no adverse effect on operating safety, because Systems #2 and #3 remain to ensure a safe control of the aircraft and appropriate landing gear operation.

Therefore a FEC9 is selected

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Date:01/MAY/2014

Status of Issue Paper (when closed state the closure date):closed as IP 140 the 01/MAY/2014

Recommendation for implementation: NIL

Retroactive: ~~Y~~/ N

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