

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

Initial Date: 28/APR/2016

IP Number: IP 156

Revision / Date: Rev 00 / 28/APR/2016

Title: Power-up Built-In Tests (PBITs)

Applies To:	
Vol 1:	X
Vol 2:	
Both:	

Submitter: EASA

Issue: MSG-3 analysis can take credit for “Power-up Built-In Tests” (PBITs) at two different analysis levels (related text is highlighted in yellow):

Analysis Level 1: to select an EVIDENT functional failure

Extract from MSG-3 2015.1 Vol1 and Vol2:

2-3-5. Consequences of Failure (First Level)

The decision logic diagram (Ref. [Figure 2-2.1]) facilitates the identification of the tasks required. There are four first level questions.

1. Evident or Hidden Functional Failure

QUESTION 1: IS THE OCCURRENCE OF A FUNCTIONAL FAILURE EVIDENT TO THE OPERATING CREW DURING THE PERFORMANCE OF NORMAL DUTIES?

This question asks if the operating crew will be aware of the loss (failure) of the function during performance of normal operating duties. Question 1 must be asked for each functional failure of the item being analysed. The intent is to segregate the evident and hidden functional failures. The operating crew consists of qualified flight compartment and cabin attendant personnel who are on duty. Normal duties are those duties associated with the routine operation of the aircraft on a daily basis. If there is uncertainty about the frequency of use of certain systems, and assumptions are to be made, then the assumptions made must be recorded in the analysis for later verification. This applies equally to assumptions made concerning tests that are performed automatically by electronic equipment.

Analysis Level 2: to justify NO TASK SELECTION for a FEC 8 based on the design philosophy (Application of IP 131, FEC 8 with “No Task Selected”)

Extract from MSG-3 2015.1 Vol1 and Vol2:

2-3-6. Failure Effect Categories (First Level)

4. Hidden Function Safety Effects (Category 8)

The **Hidden Function Safety Effect** requires a task(s) to assure the availability necessary to avoid the safety effect of multiple failures. All questions must be asked. If there are no tasks found effective, then redesign is mandatory unless it can be justified in the analysis that no task selection is acceptable based on the design philosophy (e.g. existence of an auto-initiated test). The use of this design philosophy must provide the timely detection for the failure. In addition the function of the

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detection capability must be analysed within the appropriate MSI. The following is the logic progression for functional failures that have Hidden Function Safety Effects.

Problem:

This issue was already discussed and agreed in IP3, however today there is NO EVIDENCE that:

A system is de-powered on a daily basis in order to take credit for **tests that are performed automatically by electronic equipment** at power up of the system, to select an EVIDENT functional failure

or

A system is de-powered frequently enough to provide the timely detection of the failure in order to take credit for **tests that are performed automatically by electronic equipment** at power up of the system, to justify in the analysis that no task selection is acceptable for a FEC 8 based on the design philosophy.

If there is no mandated time to power off/on the system these tests would not run as frequently as assumed.

Recommendation (including Implementation):

No credit should be taken from “Power-up Built-In Tests” (PBITs) unless the assumption to power off/on the system is confirmed.

MSG-3 document to be updated as follows (added NOTES in blue):

2-3-5. Consequences of Failure (First Level)

The decision logic diagram (Ref. [Figure 2-2.1]) facilitates the identification of the tasks required. There are four first level questions.

1. Evident or Hidden Functional Failure

QUESTION 1: IS THE OCCURRENCE OF A FUNCTIONAL FAILURE EVIDENT TO THE OPERATING CREW DURING THE PERFORMANCE OF NORMAL DUTIES?

This question asks if the operating crew will be aware of the loss (failure) of the function during performance of normal operating duties. Question 1 must be asked for each functional failure of the item being analysed. The intent is to segregate the evident and hidden functional failures. The operating crew consists of qualified flight compartment and cabin attendant personnel who are on duty. Normal duties are those duties associated with the routine

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operation of the aircraft on a daily basis. If there is uncertainty about the frequency of use of certain systems, and assumptions are to be made, then the assumptions made must be recorded in the analysis for later verification. This applies equally to assumptions made concerning tests that are performed automatically by electronic equipment.

NOTE: In order to take credit for tests that are performed automatically by electronic equipment at power up of a system, any assumption that this system is de-powered on a daily basis is to be formalised in the MRB Report Program/Operating rules.

2-3-6. Failure Effect Categories (First Level)

4. Hidden Function Safety Effects (Category 8)

The **Hidden Function Safety Effect** requires a task(s) to assure the availability necessary to avoid the safety effect of multiple failures. All questions must be asked. If there are no tasks found effective, then redesign is mandatory unless it can be justified in the analysis that no task selection is acceptable based on the design philosophy (e.g. existence of an auto-initiated test). The use of this design philosophy must provide the timely detection for the failure. In addition the function of the detection capability must be analysed within the appropriate MSI. The following is the logic progression for functional failures that have Hidden Function Safety Effects.

NOTE: In order to take credit for tests that are performed automatically by electronic equipment at power up of a system, the assumption that this system is de-powered frequently enough to provide the timely detection of the failure is to be justified prior to the MRB Report approval, and the assumed maximum period between power-downs shall be formalised in the MRB Report Program/Operating rules.

IMRBPB Position:

Date: 28 April 2016

Position: IMRBPB has agreed to the amended wording, CIP EASA 2016-01 closed as IP 156

Status of Issue Paper (when closed state the closure date): 28 April 2016

Recommendation for implementation: The additional notes to be added to the next revision of MSG-3

Retroactive: Y

Retroactive to MRBRs that have applied IP131 “Acceptance of FEC 8 without tasks”

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