



Issue Paper (IP)

IP Number: 211

Initial Date: (DD/MMM/YYYY): 12/May/2023

Revision / Date: (DD/MMM/YYYY): Rev. 0 / 12/May/2023

Effective Date: 11/Jul/2023

Retroactivity: N

Title:	Level 3 Analysis – AHM Effectiveness Determination
Submitter:	MPIG

Applies To:	
MSG-3 Vol 1	X
MSG-3 Vol 2	
IMPS	

Issue:

Following the selection of an AHM Hybrid in a Level 3 analysis, it may be possible that the result provides no evident benefit compared to the classic task.

The logic flow needs to be updated to create the possibility of not selecting an AHM Alternative/Hybrid if such selection would not lead to an effective outcome.

Problem:

An AHM Hybrid is selected when multiple failure causes lead to the creation of a Classic Task but the AHM capabilities of the aircraft are only capable of providing detection of some of the failure causes and not all. The purpose of an AHM Hybrid selection is to pair AHM with a scheduled maintenance task that is less burdensome than the original classic task (e.g. different interval, reduced scope, etc.).

The current Level 3 logic requires that if Question 2-3-9.A (Is the AHM use effective?) is answered yes, an AHM Alternative or Hybrid will be selected and published within the MRBR. However, there may be situations where it would not be desirable to publish an AHM Hybrid because it would be less effective than the current Classic Task.

An example of a less effective AHM Hybrid is as follows:

- An Operational Check of a system that was derived from three unique failure causes.
- AHM capability is available for two of the failure causes but not the third.
- Of the three failure causes, the one without AHM has the worst reliability and was the driving factor leading to the current interval of the Operational Check.
- A new procedure that checks only the third failure cause is not feasible, given that only the current Operational Check procedure is available to detect it.
- In this situation, when doing a Level 3 analysis for the failure causes with AHM capability, question 2-3-9-A will be answered Yes, necessitating the selection of an AHM Hybrid. However, as the scope and interval of the Classic Task cannot be modified, the only change would be the addition of AHM.



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The effectiveness question is asked too early in the logic to have enough information to make that determination. It should be moved so that the effectiveness of the AHM is conditioned upon which type of AHM (Alternative or Hybrid) is being evaluated.

Recommendation (including Implementation):

Update logic flow to move AHM effectiveness determination to follow AHM Alternative/Hybrid path selection. Each path will have its own effectiveness question necessitating the inclusion of an additional box in the logic. Existing logic boxes will need to be renumbered to accommodate the shift in logic flow.

Box 2-3-9.BA: (as applicable to all three steps) DOES AHM FULLY SATISFY THE INTENT OF THE CLASSIC TASK?

AHM must address all failure causes covered by the classic task.

NOTE: In assessing the question consideration should include AHM capability beyond those associated with failure cause (e.g. functional failure). The way AHM mitigates the failure cause does not necessarily have to be the same as the classic task, for example a failure cause covered by a classic qualitative visual check (failure finding task) may be fully covered by quantitative AHM monitoring (potential failure finding).

Box 2-3-9.AB: (as applicable to all three steps) IS ~~THE AN~~ AHM ~~USE~~ ALTERNATIVE EFFECTIVE?

The same criteria as in Level 2 are used in determining the effectiveness of AHM.

The AHM must be as effective as, or more effective than the classic task(s) selected in Level 2 analysis according to the FEC. In assessing the AHM effectiveness, the following criteria must be satisfied by AHM, as applicable, for:

- FEC 8: it reduces the risk of failure to assure safe operations
- FEC 6&9: it reduces the risk of failure to an acceptable level
- FEC 7&9: the cost of AHM is less than the cost of potentially recurring failure

Box 2-3-9.C: (as applicable to all three steps) IS AN AHM HYBRID EFFECTIVE?

The same criteria as in Level 2 are used in determining the effectiveness of AHM.

The AHM must be as effective as, or more effective than the classic task(s) selected in Level 2 analysis according to the FEC. In assessing the AHM effectiveness, the following criteria must be satisfied by AHM, as applicable, for:



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- FEC 8: it reduces the risk of failure to assure safe operations
- FEC 6&9: it reduces the risk of failure to an acceptable level
- FEC 7&9: the cost of AHM is less than the cost of potentially recurring failure

The AHM Hybrid effectiveness should also evaluate the original Classic Task against the modified Classic Task with AHM. AHM Hybrids may be considered not effective if the Classic Task cannot be sufficiently modified with the introduction of AHM.

Box 2-3-9.D: (as applicable to all three steps) SELECT THE AHM ALTERNATIVE

This outcome is a fully equivalent AHM alternative to the classic task. The AHM Alternative is published within the MRBR.

Box 2-3-9.E: (as applicable to all three steps) SELECT AHM HYBRID

This is a classic task supplemented by AHM which may change scope, interval or procedure. In this case the AHM does not fully satisfy the intent of the classic task – not all failure causes are covered by AHM.

Examples of combination could be (but are not limited to):

- AHM paired with modified classic task at different interval (e.g. for partial – not all failure causes)
- Classic task scheduled by parameters from AHM (e.g. for delta P – a restore task converted to FC at a reduced interval)
- AHM data applied for scheduled checks (e.g. for Air Cycle Machine – temp records of operational environments allow for a different interval for ACM maintenance)
- AHM may provide usage parameter to aid in task interval definition

The AHM Hybrid is published within the MRBR.

Box 2-3-9.4: SUMMARIZE THE AHM AS SELECTED IN BOXES 2.3.9 **E** & **D** AND SUBMIT TO ISC FOR APPROVAL AND INCLUSION IN THE MRBR PROPOSAL.

This means that all results produced by the Level 3 analysis, following the logic of boxes **E** and **D** per any of the three steps (i.e. Step 1 to 3), should be processed as detailed in the PPH.



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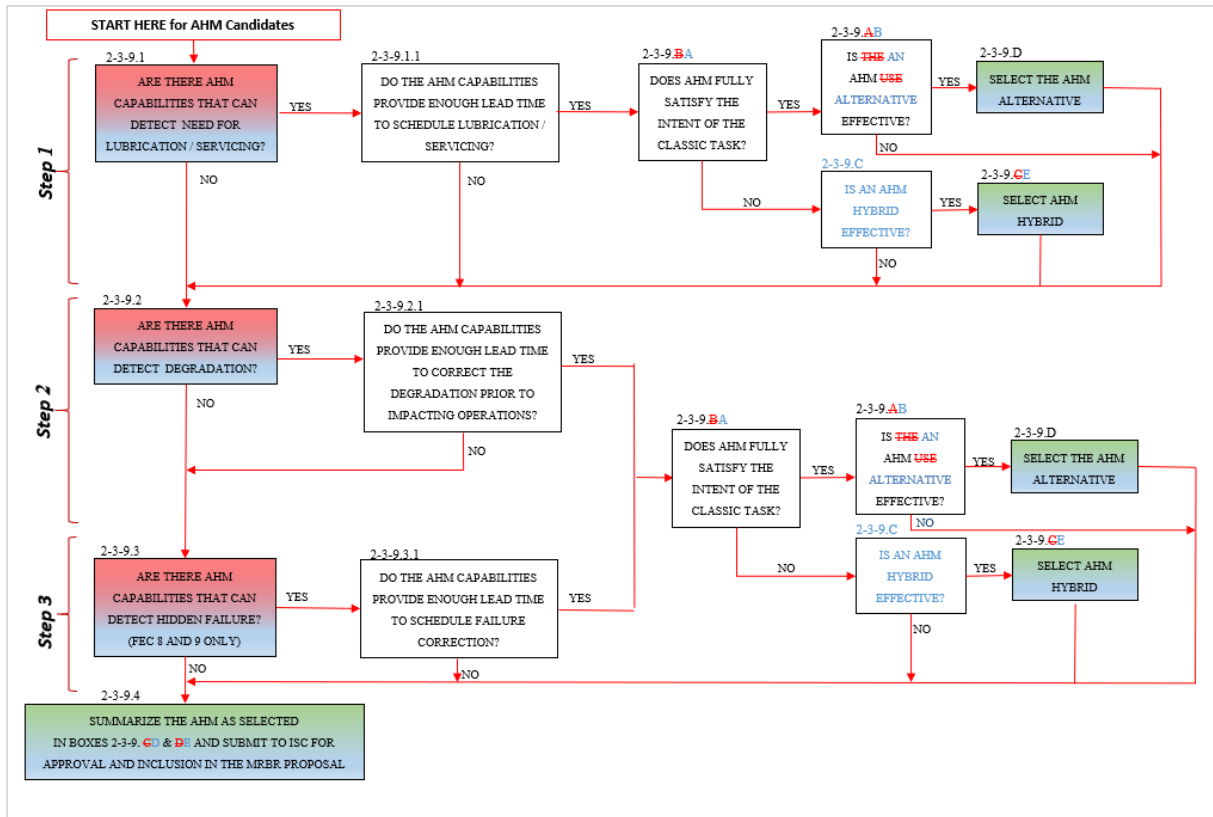
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IMRBPB Position:	
Date:	12 May 2023
Position:	Agreed, closed in 2023 meeting as IP 211
Recommendation for Implementation:	As per effective date

Status of the Issue Paper:	<input checked="" type="checkbox"/>	Active
	<input type="checkbox"/>	Incorporated in MSG-3 / IMPS (with details)
	<input type="checkbox"/>	Archived