

International Maintenance Review Board Policy Board (IMRBPB)

Issue Paper (IP)

IP Number: CIP IND 2020-06 (VI)

Initial Date: 26/FEB/2020

Revision / Date (DD/MMM/YYYY):

Effective Date (DD/MMM/YYYY):

Retroactivity (Y/N): N

Title:	Amendment to IP180 to clarify system features to be certified by type certification staff
Submitter:	Industry (MPIG based on AHM WG proposal)

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

Issue:

Issue Paper 180, titled “Aircraft Health Monitoring (AHM) integration into MSG-3” proposes a systematic approach to integrate AHM capability within the MSG-3 process by introducing new language and new level of Analysis (Level-3 Analysis/ AHM Candidate Analysis). It provides WGs with the option of defining an AHM alternative process using acquired data instead of a repetitive maintenance task.

IP180 proposes amendments for future incorporation in MSG-3 Vol 1. Initial use of IP180 has revealed that the wording of one sentence needs to be clarified to allow certification staff to better understand their responsibilities within the new methodology.

Problem:

IP 180 § 1.4 proposes the addition of a new paragraph in MSG-3 Vol 1 chapter 2-3. **Aircraft Systems/Powerplant Analysis Procedure** which reads as follows:

“The references to and use of Aircraft Health Monitoring throughout this section requires the certification of associated system features by the type certification staff of the Regulatory Authority. The use of AHM is limited to non-safety tasks provided the tasks are not covering CCMRs.”

Discussion between TCHs, Operators and MRB representatives at program level has identified that the scope of the wording “**certification of associated system features**” in the first sentence of the proposed paragraph is not sufficiently clear. Some parties understood this refers to the certification of on-ground features of the AHM system as well as those carried on the aircraft.

Following discussion in MPIG and feedback from Airbus and Boeing, a simple recommendation is proposed for inclusion in IP180 (and later in MSG-3). Exceptionally, the Airbus and Boeing positions are recorded in this paper to provide more detailed explanation on how a PPH might clarify expectations relating to the certification of the end-to-end AHM solution.

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Airbus:

Airbus suggested a division of end to end AHM approach within two main groups (On-Aircraft and On-Ground) which clarifies the responsibilities for TCHs and Operators. Proposed division consolidates the understanding of data process, software and hardware assurance roles of TCHs and Operators during AHM activities. Amendment was proposed as follows:

“Data/information flow for an end-to-end Aircraft Health Monitoring operation can be defined within two main groups of processes:

- a. On-aircraft** data process group is responsible from the point where data is generated by on-aircraft systems up to its transmission to ground systems. It includes (wholly or partially) the data acquisition from system sensors, data processing, recording, displaying and transmission to ground segments.
- b. On-ground** data process group is the interpretation and utilization of the data on-ground, this being received from on-aircraft transmission. It includes (wholly or partially) data cleaning, adjustment, analytics, integration within algorithm, alerting and improvement in on-ground systems.

TCHs are responsible explicitly for the identification of all necessary components, parameters, resulting data sets and alert criteria which will be used to develop the AHM model. The reliability of identified related system features and security measures for necessary on-aircraft (group a.) data and transmission is subject to approval / validation by the Regulatory Authority.

Related system features and methods used in on-ground section (group b.) are to be approved / validated for their effectiveness and reliability by the operator’s National Aviation Authority. TCH involvement in the AHM development regarding the group b. process is not a requirement.

The use of AHM is limited to non-safety tasks provided the tasks are not covering CCMRs.” *(this is an existing sentence in the IP180)*

Boeing:

Boeing approached the problem with solution similar to Airbus’ proposal. However, new definition investigates the roles and responsibilities in more detailed way. Three sub-sections within the end-to-end AHM process are suggested for sufficient coverage of data domain usage by TCH and Operators. Accordingly to the division, it assigns the

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responsibilities for providing and maintaining the AHM reliability. Amendment was proposed as follows:

“With the advent of digital technologies, data streams emanating from commercial airplanes span across domains involving several stakeholders. This end-to-end process termed as IAHM is the responsibility of each domain holder for integration of AHM data for use in MSG-3 to make airworthiness determinations. Based on the above, the data domain can be broadly classified into three distinct groups.

- 1. On-Aircraft:** The aircraft is equipped with sensors that acquire data periodically from various systems that are processed for on-board display, recording and transmission to ground based equipment as part of the “Type Certificate” of the aircraft. Therefore the TCH is responsible for the integrity of the “On-Aircraft” data which includes data security, sensing and transmission reliability until the time it leaves the aircraft.
- 2. Aircraft to Ground Connectivity:** There are many modes of data transmission from aircraft to ground stations which include but are not limited to Satellite, Cellular and ACARS. Each transmission mode can have a different service provider and it is the responsibility of the stakeholder (airline) to ensure transmission reliability and provide alternate methods of data collection during transmission loss.
- 3. Ground Based Equipment:** Ground based equipment capture streamed data and channel the data through different independent networks until it reaches the airlines network. These independent networks can be third party service providers or controlled by the airline itself. Irrespective of the network, the airline is responsible for data collection, data processing and data visualization using single or multiple software / devices to achieve its end.

As the On-aircraft data domain is certified by the ACO in step 1 above, it is the responsibility of the airline to develop detailed policies and procedures to cover steps 2 and 3 of the IAHM Program and obtain the approval of the local regulatory authority.”

Recommendation (including Implementation):

After review of Airbus and Boeing feedback with MPIG members, it is concluded that while both of the proposals are conceptually in line with each other and adequately address the confusion in the IP 180 §1.4 statement, they are too detailed for inclusion in IP180. Therefore, a simpler wording is necessary which is clear enough to conceptually cover the above proposals and short enough to keep focus on the statement and prevent misunderstandings.

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TCHs may take benefit from the proposals given by Boeing and Airbus when developing more detailed explanations for inclusion in their program specific PPHs.

In conclusion, the following amendment is proposed to the IP 180 §1.4 paragraph which addresses MSG-3 Vol 1 §2-3. Text to be added is **in red**.

“The references to and use of Aircraft Health Monitoring throughout this section requires the certification of associated **on-aircraft** system features by the type certification staff of the Regulatory Authority. The use of AHM is limited to non-safety tasks provided the tasks are not covering CCMRs.”

By introducing this amendment, TCHs will be responsible for demonstrating an appropriate level of reliability of AHM related on-aircraft hardware, software and data sent to ground systems with the Regulatory Authorities (Certifying Authorities).

Conversely, users (Airline / MRO) of AHM on-ground systems will be responsible for demonstrating an appropriate level of reliability of associated on-ground systems to their National Aviation Authority.

IMRBPB Position:	
Date:	
Position:	
Recommendation for Implementation:	

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