ATA MSG-3

Operator/Manufacturer Scheduled Maintenance Volume 1 - Fixed Wing Aircraft

Revision 2022.1

MSG-3

Airlines for America
We Connect the World

Airlines for America
1275 Pennsylvania Avenue, NW - Suite 1300
Washington, DC 20004-1707
USA

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Acceptance Letter

International Maintenance Review Board Policy Board (IMRBPB)

International MRB Policy Board

ENDORSEMENTS:

19 April 2023

Mr. Kevin Berger

Director, Technical Operations
Airlines for America

1275 Pennsylvania Ave NW
Washington, DC 20004

Dear Mr. Berger,

The International Maintenance Review Board Policy Board (IMRBPB) has reviewed the changes proposed to the Air Transport Association (ATA) Maintenance Steering Group – 3 (MSG-3) Report "Operator/Manufacturer Scheduled Maintenance Development", Volumes 1 and 2, Revision 2022.1.

The ten signatory agencies of the IMRBPB hereby accept ATA MSG-3 2022.1, Volume 1 and 2, for use as a guidance document in the development of future Maintenance Review Board Reports (or equivalent reports) within our respective regulatory structures.

Sincerely,

William A. Heliker

William A. Heliker, Chairperson, IMRBPB

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Dale R Hawkins for
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Rebecca S Hoover

Rebecca HOOVER — Date

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Federal Aviation Administration (FAA)

18 April 2023

Jeffrey PHIPPS — Date

Chief, Operational Airworthiness (AARTM)

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Transport Canada, Civil Aviation (TCCA)

24/02/2023

Raffaele IOVINELLA — Date

Aircraft Maintenance Section Manager

Maintenance and Production Department / Flight Standards Directorate

European Union Aviation Safety Agency (EASA)

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Jimmy LEUNG — Date

Senior Airworthiness Officer

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Hong Kong Civil Aviation Department (HKCAD)

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28 March 2023

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2023/3/29

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Senior Manager Air Operators and CAMO

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General Civil Aviation Authority (GCAA)

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- Revision 2022.1 (December 2022)
- Revision 2018.1 (December 2018)
- Revision 2015.1 (September 2015)
- Revision 2013.1 (October 2013)
- Revision 2011.1 (September 2011)
- Revision 2009.1 (December 2009)
- Revision 2007.1 (April 2007)
- Revision 2005.1 (March, 2005)
- Revision 2003.1 (March, 2003)
- Revision 2002.1 (March, 2002)
- Revision 2001.1 (February, 2001)
- Revision 2000.1 (March 2000, reformatted into an electronic document)
- Revision 2 (September 12, 1993)
- Revision 1 (March 31, 1988)
- Original Issue (September 30, 1980)

Revision 2022.1 (Revised December 2022)

Location	Description of Change
All	See the Preface section for a complete description.

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Preface

Airline and manufacturer experience in developing scheduled maintenance for new aircraft has shown that more efficient programs can be developed through the use of logical decision processes.

In July, 1968, representatives of various airlines developed Handbook MSG-1, "Maintenance Evaluation and Program Development," which included decision logic and inter-airline/manufacturer procedures for developing scheduled maintenance for the new Boeing 747 aircraft.

Subsequently, it was decided that experience gained on this project should be applied to update the decision logic and to delete certain 747 detailed procedural information so that a universal document could be made applicable for later new type aircraft. This was done and resulted in the document, entitled, "Airline/ Manufacturer Maintenance Program Planning Document," MSG-2. MSG-2 decision logic was used to develop scheduled maintenance for the aircraft of the 1970's.

In 1979, a decade after the publication of MSG-2, experience and events indicated that an update of MSG procedures was both timely and opportune in order for the document to be used to develop maintenance for new aircraft, systems or powerplants.

An ATA Task Force reviewed MSG-2 and identified various areas that were likely candidates for improvement. Some of these areas were the rigor of the decision logic, the clarity of the distinction between economics and safety, and the adequacy of treatment of hidden functional failures. Additionally

A. The development of new generation aircraft provided a focus, as well as motivation, for an evolutionary advancement in the development of the MSG concept.

B. New regulations which had an effect on maintenance programs had been adopted and therefore needed to be reflected in MSG procedures. Among those were new damage tolerance rules for structures and the Supplemental Structural Inspection program for high time aircraft.

C. The high price of fuel and the increasing cost of materials created trade-off evaluations which had great influences on maintenance program development. As a result, maintenance programs required careful analysis to ensure that only those tasks were selected which provided genuine retention of the inherent designed level of safety and reliability or provided economic benefit.

MSG-3, Original Revision

Against this background, ATA airlines decided that a revision to existing MSG-2 procedures was both timely and appropriate. The active participation and combined efforts of the FAA, CAA/UK, AEA, U.S. and European aircraft and engine manufacturers, U.S. and foreign airlines, and the U.S. Navy generated the document, MSG-3. As a result there were a number of differences between MSG-2 and MSG-3, which appeared both in the organization/presentation of the material and in the detailed procedural content. However, MSG-3 did not constitute a fundamental departure from the previous version but was built upon the existing framework of MSG-2 which had been validated by ten years of reliable aircraft operation using maintenance based thereon.

The following reflects some of the major improvements and enhancements generated by MSG-3 as compared to MSG-2.

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1. Systems/Powerplant Treatment:

   MSG-3 adjusted the decision logic flow paths to provide a more rational procedure for task definition and a more straightforward and linear progression through the decision logic.

   MSG-3 logic took a "from the top down" or consequence of failure approach. At the outset, the functional failure was assessed for consequence of failure and was assigned one of two basic categories:

   A. SAFETY
   B. ECONOMIC

   Further classification determined sub-categories based on whether the failure was evident to or hidden from the operating crew. (For structures, category designation was "significant" or "other" structure, and all functional failures were considered safety consequence items).

   With the consequence category established for systems/powerplants, only those task selection questions pertinent to the category needed to be asked. This eliminated unnecessary assessments and expedited the analysis. A definite applicability and effectiveness criteria was developed to provide more rigorous selection of tasks. In addition, this approach helped to eliminate items from the analytical procedure whose failures had no significant consequence.

   Task selection questions were arranged in a sequence such that the most preferred, most easily accomplished task, was considered first. In the absence of a positive indication concerning the applicability and effectiveness of a task, the next task in sequence was considered, down to and including possible redesign.

2. Structures Treatment:

   Structures logic evolved into a form which more directly assessed the possibility of structural deterioration processes. Considerations of fatigue, corrosion, accidental damage, age exploration and others, were incorporated into the logic diagram and were routinely considered.

3. MSG-3 recognized the new damage tolerance rules and the supplemental inspection programs, and provided a method by which their intent could be adapted to the **Maintenance Review Board (MRB)** process instead of relying on type data certificate restraints. Concepts such as multiple failures, effect of failure on adjacent structure, crack growth from detectable to critical length, and threshold exploration for potential failure, were covered in the decision logic of the procedural material.

4. The MSG-3 logic was task-oriented and not maintenance process oriented (MSG-2). This eliminated the confusion associated with the various interpretations of **Condition Monitoring (CM)**, **On-Condition (OC)**, **Hardtime (HT)** and the difficulties encountered when attempting to determine what maintenance was being accomplished on an item that carried one of the process labels.

   By using the task-oriented concept, one would be able to view the MRB document and see the initial scheduled maintenance reflected for a given item (e.g., an item might show a lubrication task at the "A" frequency, and inspection/functional check at the "C" frequency and a restoration task at the "D" frequency).

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5. Servicing/Lubrication was included as part of the logic diagram to ensure that this important category of task was considered each time an item was analyzed.
6. The selection of maintenance tasks, as output from the decision logic, was enhanced by a clearer and more specific delineation of the task possibilities contained in the logic.
7. The logic provided a distinct separation between tasks applicable to either hidden or evident functional failures; therefore, treatment of hidden functional failures was more thorough than that of MSG-2.
8. The effect of concurrent or multiple failure was considered. Sequential failure concepts were used as part of the hidden functional failure assessment (Systems/Powerplant), and multiple failure was considered in structural evaluation (Structures).
9. There was a clear separation between tasks that were economically desirable and those that were required for safe operation.
10. The structures decision logic no longer contained a specific numerical rating system. The responsibility for developing rating systems was assigned to the appropriate manufacturer with approval of the Industry Steering Committee.

MSG-3, Revision 1

In 1987, after using MSG-3 procedures on a number of new aircraft and powerplants in the first half of the 1980's, it was decided that the benefits of the experience so gained should be used to improve the document for future application; thus, Revision 1 was undertaken.

This revised document includes changes developed by American and European airframe manufacturers, American and European airworthiness authorities, supplemented and agreed to by the Air Transport Association of America and other airline representatives.

The major improvements and enhancements reflected in items one through nine above were basically unchanged and remain applicable to this revised document.

The following are some of the more noteworthy revisions that have been incorporated:

1. Table of Contents and a List of Effective Pages: ADDED.
2. Clarification that MSG-3 is used to develop an "initial scheduled maintenance program."
3. The task - "Operating Crew Monitoring": DELETED.
4. Section addressing "Threshold Sample": REVISED.
5. Section addressing "Program Development Administration": DELETED.
6. “Top-down approach" - explanation of process: ADDED.
7. "Visual Check" added to "Operational Check" task.
8. System/Powerplant and Structures logic diagrams: REVISED.
9. Task selection criteria table: ADDED.

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10. Inspections:

    Detailed Inspection - REVISED.

    Directed Inspection - DELETED.

    External Surveillance Inspection - DELETED.

    General Visual Inspection - REVISED.

    Internal Surveillance Inspection - DELETED.

    Special Detailed Inspection - UNCHANGED.

    Walk Around Check Inspection - DELETED.

11. Clarification of hidden functional failure: "one additional failure."
12. Inspection/Functional Check task question revised.
13. Reference to a "User's Guide" for procedures related to administration and forms added.
14. Reference to "off-aircraft" deleted.
15. Operating Crew Normal Duties - "Normal Duties" revised to delete pre-flight and post-flight check list; added "on a daily basis" for frequency of usage with respect to normal crew duties.
16. Added that procedures for handling composite of other new materials may have to be developed.
17. Reference to specific U.S. Federal Air Regulations: DELETED.
18. Definition of "Operating": REVISED.
19. Defined logic for failures which may affect dispatch capability or involve the use of abnormal or emergency procedures. Failure-effect Category 6 is now identified as "Operational - Evident".
20. Noted that each MSI and SSI should be recorded for tracking purposes whether or not a task was derived therefrom.

MSG-3, Revision 2

In 1993, MSG-3 Revision 2 was incorporated. The most significant changes introduced were:

21. To adapt MSG-3 logic procedures to assure development of tasks/intervals associated with the aircraft's certificated operating capabilities.
22. To provide guidelines which ensure that a consistent approach be taken with respect to tasks/intervals required to maintain compliance with Type Certification requirements.
23. To provide guidelines on the development of Corrosion Prevention and Control Programs.
24. To introduce procedures to determine the appropriate scheduled maintenance requirements for composite structure.

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25. To revise inspection task definitions.

MSG-3 [Section 2-4] and its respective logic diagrams have been revised to add an evaluation process to insure the **Corrosion Prevention and Control Program (CPCP)** is considered in the evaluation of each **Structural Significant Item (SSI)** and every zone.

Damage Sources [Heading 2-4-3.1] now includes a discussion of non-metallic materials (composites).

Procedures [Heading 2-4-4.1] has been revised to add Procedure and Decision blocks for the CPCP evaluation and edited to produce a more ordered flow of the Procedure and Decision block numbers.

The Glossary - [Appendix A] Inspection Level Definitions have been revised to apply to Systems, Powerplants and Structures, and definitions related to CPCP have been added.

It is suggested, in order to fully comprehend the MSG-3 concept, that the entire MSG-3 document be reviewed and considered prior to accepting or modifying its approaches to maintenance development. A User's Guide or Policies and Procedures Handbook may be adopted with guidance and approval of the Industry Steering Committee.

MSG-3, Revision 2001

In 2001, MSG-3 Revision 2001 was incorporated. The most significant changes introduced were:

1. Added distance requirement and use of a mirror to definition of General Visual Inspection (GVI).
2. Deleted "visual" from definition of Detailed Inspection, and substituted the term "used" for the word "necessary."
3. Corrected terminology throughout the document to change the product of MSG-3 from a "maintenance program" to simply "maintenance."
4. Guidance was added to [Heading 2-3-5.1]. to cover acceptable assumptions as to the flight crew "normal duties" in determining whether or not a functional failure is evident.
5. Expanded the wording on hidden functions of safety/emergency systems or equipment [Heading 2-3-5.3].
6. Deletion of the requirement to forward FEC 6 items without task to the ISC/MRB for review...
7. Significantly expanded the wording on "Interval Determination" [Subject 2-3-8].
8. Rewrote [Section 2-5] to incorporate enhanced zonal analysis.
9. Added a section [Section 2-6] on analysis for Lightning/High Intensity Radiated Field (L/HIRF).
10. Added many more terms to the Glossary.

MSG-3, Revision 2002

In 2002, MSG-3 Revision 2002 was incorporated. The most significant changes introduced were:

1. Added wording emphasizing the importance of recording any and all assumptions made during analysis.

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2. Added wording emphasizing the importance of fully considering all available Vendor Recommendations during MWG discussions.
3. Rewrote the MSI Selection Process to expand and clarify.
4. Added a new [Subject 2-3-2], "Analysis Procedure" in order to separate its paragraphs from the MSI Selection Process.
5. Procedure added for Fault-Tolerant Systems Analysis.
6. Explanation provided for use of MMEL in answering Systems Analysis Level 1 Question 4.
7. General Visual Inspection (GVI) definition was clarified.
8. Structural Maintenance Task Development expanded to address analysis of non-metallic structures.
9. Glossary additions - "Fault" and "Redundant Functional Elements."

MSG-3, Revision 2003

In 2003, MSG-3 Revision 2003 was incorporated. The most significant changes introduced were:

1. Added 3-letter task abbreviations to the 2-letter task abbreviations of [Heading 2-1-2.2]
2. Rewrote the procedural [Subject 2-3-4]. for "Fault-Tolerant Systems" as per FAA request.
3. Added a definition for "Fault-Tolerant System" to the Appendix A, Glossary.
4. Divided existing definition in Appendix A, Glossary, for "Safety/Emergency Systems or Equipment" into bullet points to clarify.

MSG-3, Revision 2005

The changes introduced in 2005 were:

1. Added a NOTE in the MSI Selection [Subject 2-3-1]. Step 2 to identify design features that may result in development of ignition sources in the fuel tank system.
2. Corrected [Heading 2-3-5.1] referencing the Airplane Flight Manual (AFM).
3. In [Heading 2-4-1.1], rewrote the paragraph differentiating Structural Significant Items (SSI) and Principal Structural Elements (PSE).
4. Corrected wording relating to Fatigue Damage (FD) detection in non-metals; [Subject 2-4-2].
5. Corrected a typo in the first box in [Figure 2-4-4.6].
6. Enhanced the Zonal Analysis Procedure, [Subject 2-5-1], paragraphs "e" and "f," added paragraph "l," enhanced both [Figure 2-5-1.1] and [Figure 2-5-1.2] to incorporate the most current recommendations from the FAA's Aging Transport Systems Rulemaking Advisory Committee (ATSRAC) on aging wiring.
7. Added a definition for "Electrical Wiring Interconnection System (EWIS)" to the Appendix A, Glossary.

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MSG-3, Revision 2007

The changes introduced in 2007 were:

1. Expanded text to better define/consider structural wear damage. Changes were made to the note under step 1 of the MSI Selection procedure [Section 2-3-1.1], Aircraft Structure Defined [Section 2-4-1.], and Scheduled Structural Maintenance [Section 2-4-2.].
2. Expanded text and added a flowchart to better explain the CMR versus MRB task and interval determination procedure. Changes were made to Certification Maintenance Requirements (CMRs) [Section 2-3-8.6.].
3. Expanded text and revised two flowcharts to clarify the Fatigue Damage (FD) logic. Changes were made to Scheduled Structural Maintenance Development Procedure [Section 2-4-4.1.] and [Figure 2-4-4.1.] and [Figure 2-4-4.6.].
4. Major rewrite of Lightning/High Intensity Radiated Field (L/HIRF) Analysis [Section 2-6.], and added L/HIRF Protection Systems, L/HIRF Protection Components, and L/HIRF Characteristics to Glossary [Appendix A].

MSG-3, Revision 2009.1

The changes introduced in 2009 were:

1. Addition of Structural Health Monitoring (SHM) and Scheduled Structural Health Monitoring (S-SHM) definitions to the Glossary [Appendix A].
2. Added SHM and S-SHM concepts and revised Fatigue Damage (FD) analysis in:

   [Section 2-1-2] Scheduled Maintenance Content

   [Section 2-4-2] Scheduled Structural Maintenance

   [Section 2-4-4] Scheduled Structural Maintenance Development

   [Figure 2-4-4.6] Fatigue Damage Analysis Logic Diagram

   [Section 2-4-5] Rating Systems for Structural Significant Items
3. Added a definition of Wear Damage to the Glossary [Appendix A]
4. Added discussion of wear [Section 2-4-2]
5. Clarified in [Section 1-2] and [Section 2-3-3] that the analysis process accounts for all the aircraft's certificated operating capabilities.
6. Added note to clarify the need to consider all elements of assemblies defined as SSIs [Section 2-4-1]
7. Added note [Section 2.3.7] to require GVI's developed from Category 5 or Category 8 logic be retained as System/Powerplant tasks and not to become covered by zonal inspections; requirement also referenced in [Section 2.5.1]
8. Revised handling of hidden functions of safety/emergency systems or equipment to allow credit for

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redundancies within these systems or equipment in order to develop an FEC 9 task [Section 2-3-5]

MSG-3, Revision 2011.1

The changes introduced in 2011 were:

1. Clarified status of system parts that meet SSI definition [Section 2-3-1] (IP 96)
2. Clarified status of structure that meet MSI definition [Section 2-3-1] (IP 96)
3. Clarify analysis of ED/AD due to system failure effects [Section 2-3-2] (IP 96)
4. Updated the definition of Fault Tolerant system [Section 2-3-4, Appendix A] (IP 112)
5. Clarified that normal flight crew duties are described in the "approved section" of the AFM [Section 2-3-5]
6. Clarified analysis of structural degradation of MSI [Section 2-3-7] (IP 96)
7. Deleted current wording that incorrectly suggests that the requirement for the aircraft manufacturer to work with the LRU manufacturer constitutes an alternative to application of MSG-3 in cases of LRU internal L/HIRF protection. [Section 2-6] (IP 113)
8. Updated the L/HIRF Protection Analysis Process and Flowchart to remove duplications and address misunderstandings. [Section 2-6-1] (IP 114)

MSG-3, Revision 2013.1

The changes introduced in this revision are:

1. Clarified the treatment of fluid spill and the corresponding structure consequences [2-4-3] [2-4-5] [Appendix A Glossary] (IP 97)
2. Updated the definition of Corrosion Level 1. [Appendix A Glossary] (IP 119)
3. Added a note to Second Level Task Development to prevent transfer of safety (FEC8) Visual Check to zonal [2-3-7.2] (IP 121)
4. Updated the definitions for "General Visual (GVI)", "Detailed (DET)", and "Special Detailed (SDI)" Inspections [2-3-7.4] [Appendix A Glossary] (IP 122)
5. Clarified handling of emergency and back-up equipment whose failure is evident. [2-3-5.2] (IP 124)
6. Designated this document as MSG-3 Volume 1 (Fixed Wing Aircraft) based on creation of new MSG-3 Volume 2 for Rotorcraft (IP 125)
7. Added a new definition to the Glossary for "Vendor Recommendations (VR) to highlight that they may be contained in TSOs" [Appendix A Glossary] (IP 126)
8. Clarified requirements for Certification Maintenance Requirements (CMRs) and changed the term "System Safety Assessment (SSA)" to "Safety Analyses (SA)" [0] (IP 128)
9. Revised the L/HIRF logic diagram and supporting text [2-6]. Added new definition to the glossary for "Lightning/HIRF Significant Item" [Appendix A Glossary] (IP 129)

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10. Updated the structural analysis logic in MSG3 to clarify the intent of the Zonal transfer of structural maintenance requirements [2-4-4.1] (IP 130)

11. Updated the text relating to redesign for Failure Effect Category 8 [2-3-6.4] (IP 131)

12. Clarified that FEC8 consideration for safety/emergency systems or equipment is limited to the safety/emergency functions only [2-3-5.3]. Added new definition in the Glossary for "Safety/Emergency Function" [Appendix A Glossary] (IP 132)

13. Updated the Zonal Analysis Procedure to reflect AC 25-27A and clarify the relationship between the "Standard" and "Enhanced" zonal analysis processes [2-5]. Modified the Glossary definition of "Electrical Wiring Interconnection System (EWIS)" and added new definition for "Enhanced Zonal Analysis Procedure (EZAP)" [Appendix A Glossary] (IP 133)

14. Updated the Zonal Analysis Procedure to clarify when zonal analysis should be conducted at multiple levels of access [2-5] (IP 135)

MSG-3, Revision 2015.1

The changes introduced in 2015 are:

1. Updated the definition of Corrosion Level 1 in accordance with the recommendation from the Airworthiness Assurance Working Group [Appendix A Glossary] (IP 119 Rev 2_210415).

2. Removed statement in the Zonal Analysis Procedure regarding Zonal Transfer Guidance of GVI's determined by L/HIRF Analysis [2-5-1] (IP 137).

3. Deleted the Glossary term for L/HIRF Protection Systems as that term is no longer used in MSG-3 [Appendix A Glossary] (IP 138).

4. Clarified that surface protection ratings should evolve over time [2-4-5] (IP 139).

5. Provided guidance to help in answering question 3 of level 1 Systems analysis for protective functions, in particular which combination of failures should be considered [2-3-5.3] (IP 140).

6. Provided additional guidance on handling of safe life items that might be affected by corrosion and subsequent premature failure [2-4-2.5],[2-4-2.6], [2-4-4.1] (IP 141).

7. Updated logic diagram titles for consistency [Figure_2-2.1], [Figure_2-4-4.1], [Figure_2-5-1.1], [Figure_2-6-1.3] (IP 142).

8. Clarified the distinction between Visual Check and Operational Check [2-3-7.2], [2-3-7.8], [Appendix A Glossary] (IP 143).

9. Provided clarification of the policy permitting consolidation of tasks [2-3-7.7], [2-3-7.9], [Appendix A Glossary] (IP 144).

10. Removed references to FAA 14 CFR §25.571 to allow recognition of the equivalent requirement in other regulatory systems [2-4-1.1] (IP 149).

11. Provided clarification that the MRB Report should contain tasks only arising from the MSG-3 logic process [1-1] (IP 150).

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12. Revised the Glossary definition of "Lightning/HIRF Significant Item" to clarify which L/HIRF structural components should be addressed as LHSIs [Appendix A Glossary] (IP 151).

13. Provided clarification on which Effectiveness criteria should be considered for each Failure Effect Category. Also provided guidance on what is meant by "cost-effective" and "multiple failure" [2-3-6.3], [2-3-6.5], [2-3-7.1], [2-3-7.2], [2-3-7.3], [2-3-7.4], [2-3-7.5], [2-3-7.6], [2-3-7.8], [Appendix A Glossary] (IP 152).

14. Clarified the meaning of "unacceptable degradation" for L/HIRF protection [2-6-1.3], [Appendix A Glossary] (IP 155).

MSG-3, Revision 2018.1

The changes introduced in 2018 are:

1. Updated document acceptance (letter) page to replace the EASA, FAA and TCCA acceptance letters with one International Maintenance Review Board Policy Board (IMRBPB) letter.

2. Provided guidance on need to identify power-down assumptions when considering faults found during tests performed automatically at power up [2-3-5], [2-3-6] (IP156)

3. Clarified L/HIRF analysis methodology with wording to ensure attention is given to assessment of L/HIRF protection provided to all systems and structural components required to maintain the inherent safety of the aircraft [2-6], [2-6-1.3] (IP157)

4. Removed references to non-scheduled and non-routine maintenance to eliminate confusion with MSG-3 Objective [1-1], [2-1-2.2], [2-1-2.3] (IP158)

5. Clarified that sampling programs are not to be used to select initial tasks intervals larger than those that can be substantiated with available data [2-3-8.7] (IP162)

6. Clarified the structural analysis for landing gears including the need to add CPCP identifiers on tasks looking for corrosion irrespective of the Section in which they are placed [1-3-2], [2-4-2.5] (IP164)

7. Added statement that scheduled maintenance development shall not be unduly influenced by National Requirements [2-1-2.3] (IP169)

8. Updated Structure logic to introduce significant changes. Fatigue Damage on PSE structure no longer part of MSG-3 logic. MSG-3 FD assessment limited to accessibility and feasibility evaluation in cases where stress office recommend a task for non-PSE structure [2-4], [2-4-1, 2, 3, 4], [Figures 2-4-4-1, 2, 3, 4, 5, 6] (IP171)

9. Added the need for the identification and recording of information to support task selection and to provide traceability of task requirements [2-1-2.3] (IP176)

10. Clarified that in both Systems and Structure logic application, a Special Detailed Inspection may be selected to detect wear damage within specified limits using a measuring tool [2-3-7], [2-4-2] (IP179)

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11. Added a statement to require that traceability is recorded of individual tasks that are subsequently consolidated [2-3-7-9] (IP182)

12. Added text to drive a harmonised approach to assessment of pressurised cylinder failures and the consideration of the effectiveness of hydrostatic tests for the satisfaction of MSG-3 logic [2-3-4] (IP185)

MSG-3, Revision 2022.1

The changes introduced in 2022 are:

1. Added a method to integrate AHM capability within the MSG-3 process by introducing new language and new decision tree logic (Systems/Powerplant Analysis Level 3) (IP180)

2. Updated the definition of “Operating” to align it to ICAO definition of “Operation of an aircraft” (IP 186)

3. Clarified that “Operators” and not only “Airlines” are involved to develop scheduled maintenance (IP 188)

4. Clarified that tasks selected through EZAP to reduce the likelihood of accumulation of combustible materials is only for zone containing EWIS (IP 189)

5. Clarified that Failure Causes should describe specifically why and how a function fails (IP 190)

6. Provided guidance on need to consider in the SSI selection any structure that, if failed or detached in flight could, through secondary damage, compromise continued safe flight and landing (IP 192)

7. Provided guidance on the need to provide detailed information about how much deterioration of an LHSI / L/HIRF protection component is acceptable and how it can be detected (IP 193)

8. Clarified that “Sampling” is not only applicable to “Systems/Powerplant” (IP 194)

9. Removed duplicated information from paragraph [2-3-7] (IP 195)

10. Adjusted the Zonal procedure scope to adequately address “Other Structure” (IP 196)

11. Clarified that the references to and use of Aircraft Health Monitoring (AHM) requires the certification of associated on-aircraft system features (IP 197)

12. Added the definition of the "Intent” of an MSI Classic Task (IP 200)

13. Provided guidance on the management of AFM Assumptions (IP 201)

14. Added supplementary factors to be considered in the definition of the CPCP task (IP 202)

15. Removed the references to the CCMR/CMCC process from paragraph [2-3-8] (IP 204)

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Chapter 1. General

1-1. Objective

It is the objective of this document to present a means for developing the scheduled maintenance tasks and intervals which will be acceptable to the regulatory authorities, the operators, and the manufacturers. The scheduled maintenance task and interval details will be developed by coordination with specialists from the operators, manufacturers, and the Regulatory Authority of the country of manufacture. Specifically, this document outlines the general organization and decision processes for determining scheduled maintenance requirements initially projected for the life of the aircraft and/or powerplant.

Initial scheduled maintenance tasks and intervals are specified in **Maintenance Review Board (MRB)** Reports. MSG-3 is intended to facilitate the development of initial scheduled maintenance.

This document addresses the development of scheduled maintenance using the MSG-3 analysis procedure. The MRB Report should only contain tasks arising from the MSG-3 logic process. National requirements not derived from MSG-3 logic are not part of the MRB Report. Other non-MSG-3 tasks may be submitted to the Industry Steering Committee for consideration for inclusion in the MRB Report only when justification can be provided.

1-2. Scope

For the purpose of developing an MRB Report, MSG-3 is to be used to determine initial scheduled maintenance requirements.

The analysis process allows scheduled tasks and intervals required to support all certificated operating capabilities of the aircraft (including specific operations such as Extended Twin OPerationS / ExTended OPerationS (ETOPS), Reduced Vertical Separation Minima (RVSM), Category (Cat) III to be identified.

1-3. Organization

The organization to carry out the scheduled maintenance development for a specific type aircraft shall be staffed by representatives of the operators purchasing the equipment, the prime manufacturers of the airframe and powerplant, and the Regulatory Authority.

1-3-1. Industry Steering Committee

The management of the scheduled maintenance development activities shall be accomplished by an **Industry Steering Committee** composed of members from a representative number of operators and representatives of the prime airframe and engine manufacturers. It shall be the responsibility of this committee to establish policy, decide on AHM consideration, set initial goals for scheduled maintenance check intervals, direct the activities of working groups or other working activity, carry out liaison with the manufacturer and other operators, prepare the final recommendations and represent the operators in contacts with the Regulatory Authority. The ISC should see that the MSG-3 process identifies 100% accountability for all **Maintenance Significant Items (MSI's)** and **Structural Significant Items (SSI's)**, whether or not a task has been derived from the analysis.

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The ISC should advise Maintenance Working Groups (MWG) to fully consider available Vendor Recommendations (VR) and accept them only if they are applicable and effective according to MSG-3 criteria.

1-3-2. Working Groups

One or more Working Groups, consisting of specialist representatives from the participating operators, the prime manufacturer, and the Regulatory Authority, may be constituted. The Industry Steering Committee, alternatively, may arrange some other means for obtaining the detailed technical information necessary to develop recommendations for scheduled maintenance in each area. Irrespective of the organization of the working activity, written technical data must be provided that supports its recommendations to the Industry Steering Committee. After approval by the Industry Steering Committee, these analyses and recommendations shall be consolidated into a final report for presentation to the Regulatory Authority.

NOTE: If separate Working Groups are constituted, means of cooperation need to be established to assess items that fall into both SSI and MSI definitions (landing gear, doors, etc.) If similar tasks are developed in the separate working groups, coordination between the working groups must occur to avoid task duplication (e.g., a reference to the other working group's task can be inserted in the analysis). However, when assessing the duplication of tasks, the intent of the tasks should be carefully considered in order to ensure that the expected degradations will be detected in a timely manner and that the monitoring and reporting of in-service issues is properly addressed.

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Chapter 2. Development of Scheduled Maintenance

2-1. General

It is necessary to develop scheduled maintenance for each new type of aircraft prior to its introduction into service.

2-1-1. Purpose

The primary purpose of this document is to develop a proposal to assist the Regulatory Authority in establishing initial scheduled maintenance tasks and intervals for new types of aircraft and/or powerplant. The intent is to maintain the inherent safety and reliability levels of the aircraft. These tasks and intervals become the basis for the first issue of each operator's maintenance requirements to govern its initial maintenance policy. Initial adjustments may be necessary to address operational and/or environmental conditions unique to the operator. As operating experience is accumulated, additional adjustments may be made by the operator to maintain efficient scheduled maintenance.

2-1-2. Approach

It is desirable, therefore, to define in some detail

a) The objectives of efficient scheduled maintenance.

b) The content of efficient scheduled maintenance.

c) The method by which efficient scheduled maintenance can be developed.

1. Scheduled Maintenance Objectives

The objectives of efficient aircraft scheduled maintenance are

a) To ensure realization of the inherent safety and reliability levels of the aircraft.

b) To restore safety and reliability to their inherent levels when deterioration has occurred.

c) To obtain the information necessary for design improvement of those items whose inherent reliability proves inadequate.

d) To accomplish these goals at a minimum total cost, including maintenance costs and the costs of resulting failures.

These objectives recognize that scheduled maintenance, as such, cannot correct deficiencies in the inherent safety and reliability levels of the aircraft. The scheduled maintenance can only prevent deterioration of such inherent levels. If the inherent levels are found to be unsatisfactory, design modification is necessary to obtain improvement.

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2. Scheduled Maintenance Content

The content of the scheduled maintenance itself consists of two parts with the objective to identify failures and to prevent deterioration of the inherent safety and reliability levels of the aircraft:

a) A group of scheduled tasks to be accomplished at specified intervals. The tasks in scheduled maintenance may include:

(1) Lubrication/Servicing (LU/SV or LUB/SVC)

(2) Operational/Visual Check (OP/VC or OPC/VCK)

(3) Inspection/Functional Check (IN*/FC or */FNC)

* General Visual Inspection (GV or GVI)

* Detailed Inspection (DI or DET)

* Special Detailed Inspection (SI or SDI)

* Scheduled Structural Health Monitoring (S-SHM)

(4) Restoration (RS or RST)

(5) Discard (DS or DIS)

and

b) A group of alternative procedures and/or actions and/or tasks, as related to above (1) to (5), which make use of AHM capability.

An efficient program is one which schedules only those tasks necessary to meet the stated objectives. It does not schedule additional tasks which will increase maintenance costs without a corresponding increase in reliability protection.

3. Method for Scheduled Maintenance Development

This document describes the method for developing the scheduled maintenance.

Scheduled maintenance will be developed via use of a guided logic approach and will result in a task-oriented program. The logic's flow of analysis is failure-effect oriented.

The development shall not be unduly influenced by National Requirements.

As part of the Scheduled maintenance development procedures, maintenance requirements will only be selected if they meet the applicability and effectiveness criteria as defined in this document. The ISC will define the information to be presented to the working group to support their task selection decision and to provide traceability of task requirements in the development of the supporting ICA. This information (e.g. task purpose, accesses, tools/GSE, main steps of the procedure, estimated elapsed time/labor hour, pass/fail criteria ...) will be recorded in the MSG-3 analysis or referenced supporting documentation for tracking purposes.

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Items that, after analysis, have no scheduled task specified, may be monitored by an operator's reliability program and/or optionally make use of AHM.

Sampling may be established for items defined in any MSG-3 Analysis Procedures when novel technology is used, or items which the expected degradation is not fully experienced by the equipment manufacturer for the application operational environment. In order to select applicable and effective Sampling, its selection needs to be supported by the manufacturers and ISC participants.

Sampling is an examination of a specific number of items at defined intervals in order to validate that there are no unexpected degradation characteristics. Sampling programs should not be used as a means to select initial task intervals larger than those that can be substantiated with available data (such as in service and/or design data). Non-sampled items may continue in service until sampling results highlight the need for adjustment.

Assumptions made during the analysis, that can result in a change to the analysis, are to be recorded.

- Assumptions applying to the program as a whole, and not only to an individual MSG-3 analysis, are to be documented in the appropriate "Policy and Procedures Handbook" or "User's Guide." As a minimum, this applies to statements concerning anticipated average annual utilization, the environments to be considered, and the operating capabilities to which the aircraft/powerplant is certificated.
- If an analysis is (partially or as a whole) based on design solutions not completely frozen, this should be recorded in the analysis.

2-2. Divisions of MSG-3 Document

The working portions of MSG-3 are contained in the next four (4) sections. Systems/Powerplant, including components and APU's, are considered in [Section 2-3]. Aircraft Structures is considered in [Section 2-4], Zonal Inspections in [Section 2-5] and L/HIRF is considered in [Section 2-6]. Each section contains its own explanatory material and decision logic diagram (as appropriate); therefore, it may be used independently of other MSG-3 sections.

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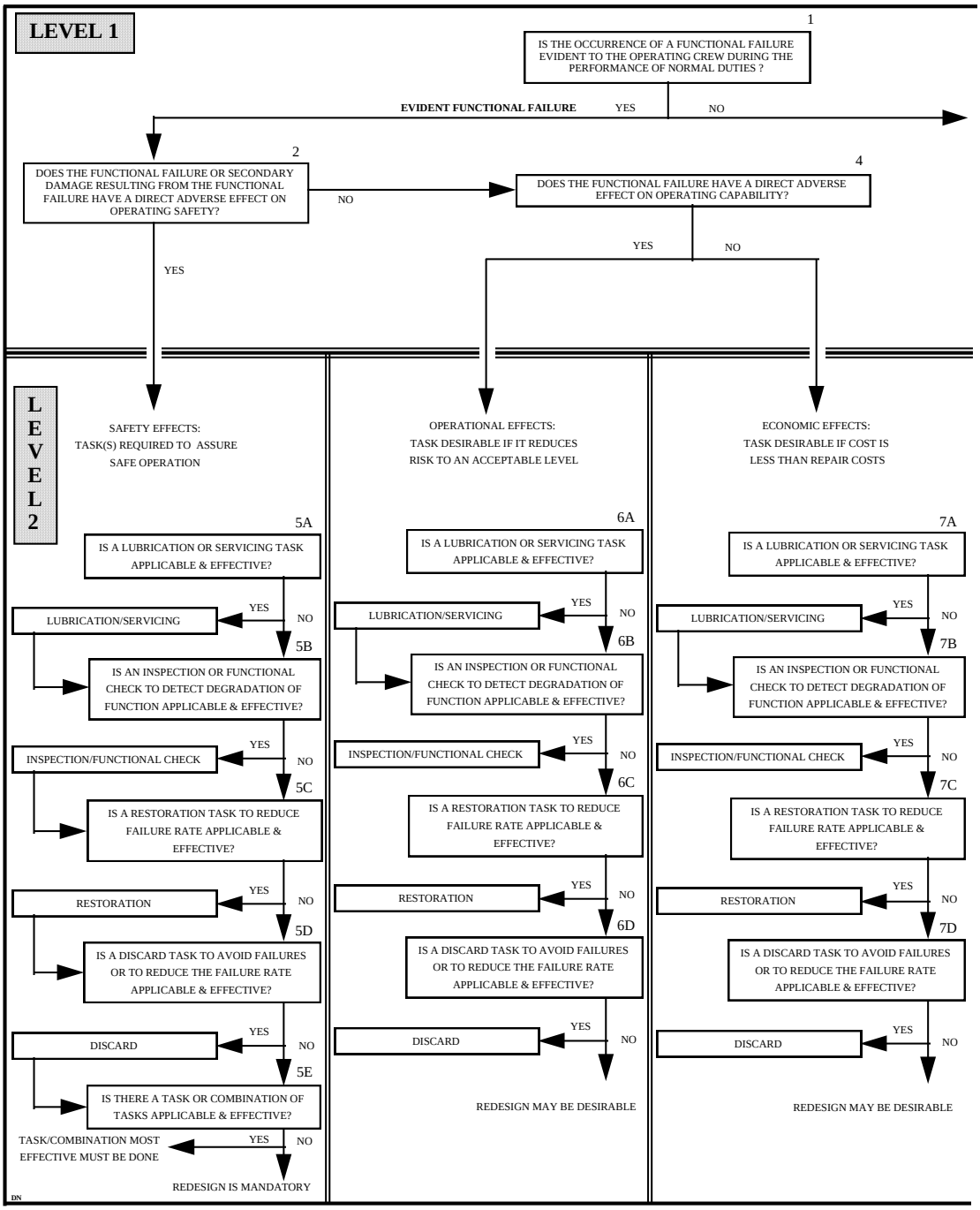
Figure 2-2.1. **Systems/Powerplant MSG-3 Logic Diagram (Part 1 of 2)**



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