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Manual

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SCHEDULED MAINTENANCE INSTRUCTION DEVELOPMENT PROCESSES MANUAL

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1. Purpose

This Transport Publication (TP) provides acceptable procedures and guidelines for developing scheduled maintenance instructions as part of a process for showing compliance with the Instructions for Continued Airworthiness requirements of aircraft being type certified in Canada or intended to be type certified in Canada. The scheduled maintenance instructions will be developed in accordance with either a Maintenance Review Board (MRB) process, a Maintenance Type Board (MTB) process or a manufacturer's internal process. The scheduled maintenance instructions will be published as either a Maintenance Review Board Report (MRBR) or as manufacturers' recommendations and, as such, will be included within an aircraft's Instructions for Continued Airworthiness (ICA).

2. Compliance

While this document provides guidance and is not part of the regulations, it is included by reference as part of the CAR Standard 625 at Appendix E. Applicants who utilize this document to develop scheduled maintenance instructions are advised, that wording of a mandatory nature such as "will" and "shall", where found within this document, are to be complied with.

3. Effective Date

This TP is effective when published.

4. Related Regulations

Refer to the following publications for additional regulatory information:

Canadian Aviation Regulations (CAR) 511.31, 511.34, 516, 605.86, 706.07,

CAR Standards 625.86(5) & Appendixes C, D, E, and

Airworthiness Manual paragraphs 522.1529, 523.1529, 525.571, 525.1309, 525.1529, 527.1529, 529.571, 529.1309, and 529.1529.

5. Headquarters Contact

The responsible officer indicated below, may be contacted for information regarding this TP:

Superintendent, Aircraft Evaluation Group, AARPG
Aircraft Maintenance & Manufacturing Branch

Email: aarpg@tc.gc.ca
Facsimile: (613) 952-3298

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This TP is available on the intranet and internet at the following addresses:

Intranet: <http://info.tc.gc.ca/aviation/mainten/aarpg>
Internet: <http://www.tc.gc.ca/aviation/mainten/aarpg>

6. Correspondence

Correspondence concerning the development of scheduled maintenance instructions or the convening of an MRB/MTB or the participation in a MRB/MTB process, should be addressed to the attention of the:

Superintendent, Aircraft Evaluation Group, AARPG
Maintenance & Manufacturing Branch
Transport Canada
Tower C, Place de Ville, 2nd Floor,
330 Sparks St., Ottawa, Ontario,
Canada, K1A 0N8

Email: aarpg@tc.gc.ca
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7. Related Reading Material

Evaluation Criteria for Reliability-Centered Maintenance (RCM) Processes, Surface Vehicle/Aerospace Standard, JA1011, issued August of 1999. This document may be obtained from Society of Automotive Engineers (SAE) International. To contact SAE, phone (724) 776-4970, fax (724) 776-0790, or visit their web-site at <http://www.sae.org>.

Airline/Manufacturer Maintenance/Inspection Requirements Development Document, Maintenance Steering Group (MSG)-3. This document may be obtained from the Air Transport Association of America (ATA) at 1-800-497-3326, ext 950, or by contacting ATA on the web at <http://www.air-transport.org>.

Maintenance Review Board Procedures, AC121-22A, Federal Aviation Administration issued March 07, 1997. This document is available at the FAA web site, <http://www.faa.gov/avr/air/acs/achome.htm>.

JAA Administrative & Guidance Material, Section Two: Maintenance, Part Two: Procedures, **Chapter 16: Procedures for Maintenance Review Boards**.

Certification Maintenance Requirements, AC25-19, Federal Aviation Administration issued March 07, 1997. This document is available at the FAA web site, <http://www.faa.gov/avr/air/acs/achome.htm>.

Damage Tolerance and Fatigue Evaluation of Structure, AC25.571-1C, Federal Aviation Administration issued March 07, 1997. This document is available at the FAA web site, <http://www.faa.gov/avr/air/acs/achome.htm>.

Reliability Centered Maintenance, Report Number AD-A066-579 by F.S.Nowlan and H.F.Heap (1978). This document may be obtained from the U.S. Department of Commerce, National Technical Information Service, Springfield, VA. Telephone 703-487-4650

Reliability Centered Maintenance Requirements of Naval Aircraft, Weapons Systems and Support Equipment, US Naval MIL-STD-2173(AS) and its successor *Guidelines for the Naval Aviation Reliability Centered Maintenance Process, US Naval Air Systems Command Management Manual 00-25-403*. This document may be obtained from the U.S. Department of Commerce, National Technical Information Service, Springfield, VA. Telephone 703-487-4650

Reliability Centered Maintenance (RCM2), John Moubray. Available from Butterworth-Heinemann, Linacre House, Jordan Hill, Oxford, OX2 8DP, ISBN 0 7506 3358 1.

8. Definitions/ Acronyms

a) Definitions

For the purposes of this document;

“*Air operator*” - means the operator of a transport category aircraft,

“*Approved*” – means accepted by a Contracting State as suitable for a particular purpose.

“*Large aeroplane*” - means an aeroplane with a Maximum Certified Takeoff Weight (MCTOW) of more than 5 700 kg (12,566 pounds).

“*Scheduled Maintenance Instructions*” - means those maintenance actions and inspections performed at set frequencies which are required by the Instructions for Continued Airworthiness.

“*State of Design*” means the State having jurisdiction over the organisation responsible for the type design.

“*State of Manufacture*” - means the State having jurisdiction over the organisation responsible for the final assembly of the aircraft.

“*Maintenance schedule*” - means a schedule required pursuant to CAR 605.86 for the performance of the inspections and other maintenance required by the Regulations,

“*Transport category aircraft*” - means an aeroplane certified pursuant to Chapter 525 of the *Airworthiness Manual* or an equivalent foreign airworthiness standard, or a helicopter certified pursuant to Chapter 529 of the *Airworthiness Manual* or an equivalent foreign airworthiness standard

b) Acronyms

AC	Advisory Circular
AD	Accidental Damage
AEG	Aircraft Evaluation Group
AEP	Age Exploration Program
ATA	Air Transport Association of America
CAR	Canadian Aviation Regulations
CMR	Certification Maintenance Requirement
CPCP	Corrosion Prevention and Control Program
DI	Detailed Inspection
ED	Environmental Deterioration
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FD	Fatigue Damage
GVI	General Visual Inspection
ICAO	International Civil Aviation Organisation
IMRBPB	International Maintenance Review Board Policy Board
IP	Issue Paper
ISC	Industry Steering Committee
JAA	Joint Aviation Authorities
JAR	Joint Airworthiness Requirement
MCTOW	Maximum Certified Takeoff Weight
MFG	Manufacturer

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MR	Manufacturer Recommendations
MRB	Maintenance Review Board
MRBR	Maintenance Review Board Report
MRBPB	Maintenance Review Board Policy Board
MSG-1	Maintenance Steering Group - 1st Task Force
MSG-2	Maintenance Steering Group - 2nd Task Force
MSG-3	Maintenance Steering Group - 3rd Task Force
MSI	Maintenance Significant Item
MTB	Maintenance Type Board
MTBR	Maintenance Type Board Report
NDI	Non-destructive Inspection
PPH	Policy and Procedures Handbook
RCM	Reliability Centred Maintenance
SAE	Society of Automotive Engineers
SDI	Special Detailed Inspection
SIP	Structural Inspection Program
SSI	Structural Significant Item
TCCA	Transport Canada Civil Aviation
WG	Working Group
ZIP	Zonal Inspection Program

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PART A - MAINTENANCE INSTRUCTION DEVELOPMENT

Chapter 1. General

Type certificate applicants who have type certified aircraft in Canada have traditionally developed their scheduled maintenance instructions in accordance with either a Maintenance Review Board process (MRB), a Maintenance Type Board process (MTB) or their own internal analytical processes.

Both the MRB and the MTB analytical processes utilise the ATA MSG-3 logic as the basis for their development of initial scheduled maintenance instructions. This analytical logic is developed from the Reliability-Centred Maintenance (RCM) analytical process published by F. Stanley Nowlan and Howard F. Heap of United Airlines in 1978. Type certificate applicants for aircraft other than the transport category have traditionally utilised internally developed processes that are quite varied in approach and which may or may not have followed reliability centred maintenance principles.

Within the industry at large, the principles of reliability centred maintenance have been adapted to many different maintenance instruction development processes. The proliferation of these processes generated concerns that some maintenance instructions purported to be developed in accordance with reliability-centred maintenance principles were not in fact RCM. As a result, the Society of Automotive Engineers, published in August of 1999 the SAE Standard JA1011. It allows organisations developing maintenance instructions to assess their analytical processes and to determine if they meet the criteria to be labelled as reliability centred maintenance.

Transport Canada has assessed MSG-3 using the SAE Standard and considers that maintenance programs derived from MSG-3 conform to reliability-centred maintenance. With certain exceptions, MSG-3 has maintained the criteria necessary to be considered an analytical methodology centred on realizing the inherent safety and reliability levels of aircraft. Where MSG-3 was not shown as fully compliant with the JA 1011 standard, the International Maintenance Review Board Policy Board will be used as the medium to ensure that future amendments to the analytical logic will mitigate those issues.

Chapter 2. MSG-3, an Analytical Methodology to realize Reliability Centred Maintenance (RCM)

The process of developing initial scheduled maintenance instructions for transport category aircraft has evolved from one in which each air operator proposed its own unique program, to one in which the regulatory authority, the manufacturer and the operator work together to develop the initial scheduled maintenance instructions for new aircraft, and evolve changes to those instructions after the aircraft enters service. Early experience in the development of scheduled maintenance instructions had revealed that a program of effective maintenance tasks could be developed through the use of logical analysis and decision-making processes. Scheduled maintenance instructions developed in accordance with the above mentioned processes were predicated on the use of reliability centred maintenance during both the initial task development phase and then during the period of task performance with the operators.

In 1960 a task force consisting of representatives from the FAA and airlines of the United States was formed to investigate the capabilities of scheduled maintenance. The work of this group led to the establishment of a FAA/Industry Reliability Program and the subsequent development of a propulsion system reliability program. The airline members of that task force were then authorized to develop and implement their own reliability programs in those areas of maintenance for which they were most interested. This led to two discoveries concerning effective scheduled maintenance. The first was that scheduled overhaul has little effect on the overall reliability of a complex item unless the item has a dominant failure mode. The second was, that there are many items for which there is no effective form of scheduled maintenance.

In 1965, a rudimentary decision-diagram technique was developed to provide for a logical and applicable approach when designing preventive maintenance programs for aircraft. In June of 1967 T.D. Matteson and F.S.Nowlan, at an Aircraft Design and Operations Meeting of the American Institute of Aeronautics and Astronautics, presented a paper on the use of this technique. This technique was eventually embodied in a document published by ATA under the title 'Handbook: Maintenance Evaluation and Program Development' in July 1968. This handbook became known as MSG-1 and was

PART A - MAINTENANCE INSTRUCTION DEVELOPMENT

used by the FAA and an industry Maintenance Steering Group for the initial Boeing B-747 maintenance schedule. This was the first attempt to apply reliability centred maintenance concepts. MSG-1 was further developed and published by ATA in 1970 as the Airline/Manufacturer Maintenance Program Planning Document, (MSG-2).

In 1978, F. Stanley Nowlan and Howard F. Heap of United Airlines published a document 'Reliability Centred Maintenance' (RCM). In it they documented a detailed rationale and analytical logic, which required a fundamental shift in the "then current" maintenance instruction development approach (MSG-2). The new reliability centred maintenance analytical logic was a top down, consequence driven, task oriented process. It required an age exploration program for all tasks where reliable historical information was not available, and it required independent auditing of all analysis performed. In 1980, ATA published the Airline/Manufacturer Maintenance Program Planning Document, (MSG-3)¹. This was a major change from the conceptual approach of the MSG-2 document then in use. The Nowlan and Heap report served as the basis for MSG-3. Since 1980, MSG-3 has been revised five times. The chronological history of MSG-3 development is as follows,

- a) MSG-3. In 1980, the Nowlan and Heap report together with the combined efforts of the regulatory authorities, the air operators, the manufacturers and ATA generated a new decision logic and analysis procedure. This analytical process implicitly incorporated the principles of reliability centred maintenance to justify task development but stopped short of fully implementing reliability centred maintenance criteria to audit and substantiate the initial tasks being defined.
- b) MSG-3R1. In 1987, the airline industry decided that the benefits of the experience gained from using MSG-3 should be used to improve the document for future applications. This document revised the "Inspection" definitions and removed "Operating Crew Monitoring" tasks, as well as limiting what was then considered to be "Normal Duties" for flight crew.
- c) MSG-3R2. In 1993, Revision 2 was incorporated. It included; a requirement for a Corrosion Prevention and Control Program (CPCP), more revised inspection definitions, new procedures to ensure tasks and intervals reflected an aircraft's type certificated operating capabilities and tasks, to ensure compliance with Type Certification requirements.
- d) MSG-3 R2001.1 In 2001 MSG was revised. The revision again changed inspection definitions, e.g.: it limited the distance and added the use of a mirror to the "General Visual Inspection", incorporated new guidance on operating crew "normal duties" when determining if a functional failure is evident, expanded wording on hidden functions of safety/emergency equipment, and incorporated "enhanced zonal analysis". It also incorporated analysis for Lightning and High Intensity Radiated Fields (L/HIRF), and added new terms to the glossary to bring the document into closer alignment with reliability centred maintenance criteria.
- e) MSG-3 R2002.1 In 2002, MSG was revised. It emphasized the importance of recording any and all assumptions made during analysis, added a procedure for Fault-Tolerant analysis, added an explanation on the use of the MMEL when answering system analysis level 1, question 4, clarified the definition of General Visual Inspection (GVI), and added a glossary.
- f) MSG-3 R2003.1 In 2003, MSG was again amended to clarify processes with respect to fault tolerant systems.

Chapter 3. International Maintenance Review Board Policy Board (IMRBPB)

The IMRBPB concentrates on the harmonisation and standardisation of MRB policy, procedures, and analytical logic used for maintenance instruction development. The IMRBPB ensures that the analytical logic used during the development of air transport scheduled maintenance instructions is, and remains, acceptable to the member regulatory authorities as a common standard for the development of MRBRs.

The IMRBPB was established to increase transparency with respect to the development of scheduled maintenance instructions and to provide a venue for the further development of standardized policies, procedures and guidance material for personnel participating on the various Maintenance Review Boards (MRBs) around the world.

The IMRBPB meets independently from industry in order to; discuss differing regulatory issues, to seek common standards for maintenance program development, and to establish procedures for the co-ordination and joint approval or

¹ RCM II, John Moubray

PART A - MAINTENANCE INSTRUCTION DEVELOPMENT

acceptance of MRBRs developed for international use. Issues to be discussed by the IMRBPB may be generated by the regulatory authorities, industry, or the industry's respective representatives. When generated by industry or industry representatives the issues are submitted to the respective regulatory authority for inclusion at the next scheduled meeting. The regulatory authorities only first discuss the issues, with separate time allocated for a joint meeting with industry. Decisions are then distributed to affected parties and become policy when implemented by the respective authorities.

a) IMRBPB Charter

The IMRBPB is envisioned as a system for the continuing development of policies, procedures, and guidance for the use of personnel operating under the purview of various Maintenance Review Boards (MRBs). In addition to promoting harmonization with other regulatory authorities, the IMRBPB would advocate the standardization of MRB policy and procedures. The IMRBPB would also provide a structured forum for discussions leading to the development of national and international policy regarding all MRB activities.

The present agreement between the Federal Aviation Administration (FAA), the Joint Aviation Authorities (JAA), and Transport Canada Civil Aviation (TCCA) is built upon a joint meeting held in Glasgow, Scotland, in November 1994.

b) Terms of Reference:

- i) The IMRBPB will, as a minimum, meet once a year for three days – (two days allocated to the Regulatory Authorities and the third day in joint session with Industry). Industry representation should be limited to appropriate representatives dealing with the issues being discussed. The meeting venue will normally rotate between the USA, Europe and Canada.
- ii) Membership will include FAA, JAA and TCCA but is open to any Regulatory Authority prepared to actively participate.
- iii) Chairmanship will rotate depending upon the location of the meeting, therefore, the chairman will make the necessary arrangements, invitations, agenda, and meeting minutes.
- iv) The IMRBPB shall ensure that any domestic MRB policy issue which has an impact on international harmonisation is first considered whenever possible by the IMRBPB before implementation.
- v) The FAA, JAA, and TCCA shall exchange a list of those MRB harmonisation issues each would like discussed at the first scheduled meeting and at subsequent meetings. A status listing of MRB policy items will be developed and maintained for record purposes.
- vi) The IMRBPB will only discuss issues related to the MRB/MSG process. All issues will be based upon the latest revision of FAA Advisory Circular AC 121-22 and JAA Administration and Guidance Material (AGM) / Maintenance Procedure Chapter 16 and TCCA Transport Publication (TP) 13850².
- vii) Each regulatory authority will be responsible for disseminating and distributing harmonized policy information in a timely manner.
- viii) FAA, JAA, and TCCA and other active Regulatory Authorities shall ask their respective Industry representatives how they will identify and collectively propose prospective MRB Issues for regulatory consideration.
- ix) All Industry proposed agenda items are to be submitted to the respective authority 60 days prior to the scheduled meeting for inclusion at that meeting, and will be submitted in issue paper format.
- x) Revisions to Terms of Reference shall be proposed if required as a new issue to be discussed at a subsequent meeting.

² The referenced AMA is now replaced by this TP document and will need to be inserted at the next IMRBPB.

PART A - MAINTENANCE INSTRUCTION DEVELOPMENT

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PART B - THE MAINTENANCE REVIEW BOARD (MRB) PROCESS

Chapter 1. General

The "MRB process" is broadly defined as all of the activities necessary to produce and maintain a Maintenance Review Board Report (MRBR). The process involves three separate and major objectives:

- The first is to ensure that scheduled maintenance instructions (tasks and intervals) which are developed for a subject aircraft, adhere to the continuing airworthiness and environmental requirements³ of the Canadian Aviation Regulations (CARs) and the Standards and Recommended Practices (SARPs) as published by the International Civil Aviation Organisation (ICAO).
- The second is to ensure that the tasks are realistic and capable of being performed.
- The third is to ensure that the developed scheduled maintenance instructions may be performed with a minimum of maintenance expense.

For domestic MRB activities, the Aircraft Evaluation Division will convene a Maintenance Review Board. The board members are all regulatory representatives. Their role is to monitor and facilitate the MRB process in order to bring about approval of the MRBR. During the development of the tasks and intervals by the Working Groups and the Steering Committee, TCCA representatives act as advisors at Working Group (WG) and Industry Steering Committee (ISC) meetings. Their presence is intended to mitigate factors, which could conflict with the MRB process, and subsequently preclude the approval of the MRBR.

On completion of the analysis, a document, in the format as described in Chapter 6 of this part, containing the proposed maintenance / inspection tasks and intervals, is submitted to the Maintenance Review Board. The Board reviews the proposal, which becomes the MRBR when approved by the MRB Chairperson.

Air Operators of an aircraft type for which an MRBR has been produced, are to include the requirements of the MRBR, and revisions thereto, into their maintenance programs, in accordance with nationally established procedures. Air Operators, who have developed specific qualifications and maintenance expertise with an aircraft type, may request their local regulatory authority to approve adjustments to their maintenance program intervals for that aircraft type.

For foreign MRB activities, TCCA representatives may attend WG and ISC meetings to provide advisory input and identify any special conditions affecting the MRBR for foreign manufactured aircraft operated in Canada.

The time allotments for delivery and return of the various documents mentioned in this TP document are intended as a general guide. These allotments have been included as an approximation of the time needed by the various groups to process the material.

Chapter 2. MRB Process

MRBRs are developed as a joint exercise involving the air operator, the type certificate applicant and TCCA, as well as other participating regulatory authorities. The MRB process basically consists of a number of specialist working groups who use an analytical logic plan to develop and propose maintenance / inspection tasks for a specific aircraft type. The proposed tasks are presented to an Industry Steering committee (ISC) who, after considering the working group proposals, prepare a proposal for the MRBR. The proposed MRBR is then reviewed by the MRB and then approved by the MRB Chairperson. It is then published as the MRBR.

³ Environmental requirements are included to ensure that maintenance instructions necessary to meet type certification requirements including continued compliance with ICAO Annex 16 and CAR 516 are addressed. (see ICAO Annex 16, Volume 2, Appendix 6, Page 54 which states certification criteria for manufacturers)

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Chapter 3. MRB Process Applicability

The MRB process is applicable for transport category aircraft greater than nine passengers, or for aeroplanes greater than 15,000 KGs⁴, or for helicopters greater than 9,000 KGs.

a) Where Canada is the State of Design

Where Transport Canada Civil Aviation (TCCA) is the primary type certification authority, the applicant who is seeking a type certificate for a new or a derivative aircraft will normally request the Aircraft Evaluation Division to convene a Maintenance Review Board.

b) Where Canada is not the State of Design

A foreign applicant who is seeking, or who is intending to seek, a Canadian type certificate for a new or a derivative aircraft, should inquire as to the TCCA Aircraft Evaluation Division's intention to participate in their MRB process.

c) Analytical Logic to be used for Scheduled Maintenance Task Development

The most current version of the MSG-3 logic, which has been accepted at the IMRBPB, is the analytical logic to be used when initiating a new MRB⁵ process.

Note: Although MRBRs were once produced by combining tasks developed in accordance with different versions of an analytical logic, this method has proved to be impractical and is no longer acceptable.

If the applicant chooses to utilize logic other than MSG-3, the applicant must demonstrate that their alternative means of compliance will result in an equivalent level of safety⁶. In such cases the scheduled maintenance instructions should be developed in accordance with an analytical logic that is based on reliability centred maintenance principles that meet the criteria of the SAE JA1011 Standard. Should the evaluation identify areas of non-compliance with the SAE JA1011 Standard, the applicant should develop processes that would mitigate the areas of non-compliance prior to utilising the analytical logic. The completed evaluation should be approved by the most senior manager of the applicant who is responsible for the development of the scheduled maintenance instructions and a copy of the completed evaluation, including any processes developed to mitigate non-compliances must be provided to TCCA.

Chapter 4. MRB Process Audits

a) Audit of the Completed Analytical Process⁷

All holders of aircraft type certificates for which an MRBR has been developed shall maintain records of the analysis performed, in a manner such that Transport Canada may conduct an audit of the complete initial analytical process, and any subsequent analytical processes, that may lead to an amendment of the initial MRBR.

⁴ This weight category is selected to agree with the FAA value, it is noted that the JAA metric value is 13,000 kgs. In addition neither the FAA nor JAA require MRBs for helicopters in the range 5,700 kgs to 13,000 kgs. This is optional.

⁵ Provides compliance with IMRBPB IP 051

⁶ Provides compliance with IMRBPB IP 053

⁷ Appendix A, P350, RCM-Nowlan&Heap

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b) **Validation of the Associated Maintenance Procedures⁸**

The type certificate applicant must develop internal instructions and guidelines to enable the validation of all maintenance procedures written to support MRBR tasks and then the applicant must validate those maintenance procedures. The objective of the validation is to ensure that the procedure can be performed and that the procedure meets the intent of the MRBR task.

Where and when requested by Transport Canada, the type certificate applicant must make available a completed aircraft and the necessary qualified maintenance personnel to demonstrate to TCCA that any particular maintenance procedure can be adequately performed and that the procedure meets the intent of the MRB task.

Chapter 5. MRB Report (MRBR)

a) **General**

The MRBR contains the scheduled maintenance instructions required for a transport category aircraft when the aircraft is type certified. MRBRs are “living” documents, which must be reviewed and amended periodically to ensure that they reflect the current “lessons learned” from aircraft operational experience. In this manner the continuing airworthiness of an aircraft fleet is ensured and only those tasks that are applicable and effective are performed.

b) **MRBR Format and Content**

The MRBR format and content requirements are located in Appendix 1 to this document.

c) **MRBR Review and Approval**

When the proposed MRBR is complete the ISC Chairperson will forward it to the type certificate applicant’s representative(s), and may invite the type certificate applicant to discuss the proposal. The type certificate applicant will then present the proposed MRBR to TCCA for approval. Normally, the TCCA approval process will be completed within ninety days. Approval by other regulatory authorities will occur concurrently with that of TCCA. The type certificate applicant is responsible for publishing and distributing the initial and revised MRBRs as well as any supporting documents.

The type certificate holder publishes the MRBR as a separate document. It is a means of complying in part with the maintenance instruction requirements of Appendix H to Chapter 525, and 529 of the *Airworthiness Manual* and for developing the Instructions for Continued Airworthiness, as required by 525.1529 and 529.1529.

The MRBR must be approved by Transport Canada prior to becoming available for use by Canadian operators, as must all subsequent amendments.

d) **Differences Registered By Other Regulatory Authorities**

There may be a need to identify foreign national regulatory differences that are not compatible, acceptable, or applicable to all regulatory authorities. When this condition exists, an appendix to the MRBR may be used to list these differences, with each appendix being approved by the respective regulatory authority.

e) **Non-Approval of Proposed MRB Reports or MRBR Revisions**

The MRB Chairperson shall notify the type certificate applicant in writing of the non-approval of the MRBR or of any subsequent revision. The letter shall include the specific reason(s) for the non-approval. The type certificate applicant will notify the ISC Chairperson in writing of such action.

⁸ Chap11.6 (p328-329) RCM-Nowlan&Heap

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

f) **Publication of the MRBR**

When an MRBR has been approved, the type certificate holder publishes it. The MRBR belongs to the type certificate holder but is approved by an MRB Chairperson (TCCA). Consequently no changes may be made to it without TCCA permission.

g) **MRBR Annual Review**

The MRBR is intended to be an up-to-date document and, as a consequence, the manufacturer, the ISC Chairperson, and the MRB Chairperson should conduct a joint review, at least annually, to determine the need for revisions. Results of these reviews are documented by the MRB Chairperson for inclusion in the MRB historical file.

i) Proposed Changes.

If needed, the manufacturer and the MRB will convene and evaluate any proposed changes. Proposed changes are submitted with supporting data to the MRB Chairperson. Approval or non-approval of the proposed changes shall be processed in the same manner as outlined for the initial MRBR approval/non-approval.

ii) Multiple Approvals.

If more than one regulatory authority has approved an MRBR, then proposed changes will be evaluated by those approving authorities (as per letter of confirmation) before approval by TCCA. Published revisions to the MRBR may then be reviewed by local regulatory authorities for possible changes to their air operators' maintenance programs.

h) **The "Living MRB" Concept**

Prior to approval of the MRBR, the type certificate applicant must develop an auditable system⁹ for the continuing analysis of all tasks included within the MRBR, or show that the intent of the following is being met by the end users of the MRBR. As part of the continuing analysis system, the manufacturer must address the following,

- i) A system for acquiring from operators reports related to adequacy of tasks, failures, failure frequencies and the consequence of the failures,
- ii) An age-exploration system for the continual evaluation of age-condition information for the substantiation of current task intervals, the adjustment of task intervals and the identification of new tasks,
- iii) A system for controlling the addition of new scheduled tasks to ensure that they meet RCM criteria before they are accepted,
- iv) A system for the periodic evaluation of all tasks in the program, to eliminate those which are no longer needed¹⁰; and
- v) A system for evaluating unanticipated problems and determining the appropriate action.

Chapter 6. Process Flow Charts

Process flow charts describing the scheduled maintenance task development process and its relationship to the production of Instructions for Continued Airworthiness (ICAs) by the type certificate applicant are located in Appendix 3 to this document.

⁹ ref Appendix A, Sect A4, P367, RCM Nowlan&Heap

¹⁰ Chap11.6 (p328-329) RCM-Nowlan&Heap

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

Chapter 7. Responsibilities - Industry

a) Type Certificate Applicant

The type certificate applicant is required to:

- i) Present a proposed Policy and Procedures Handbook (PPH) to the ISC, which follows the general guidelines of this Transport Publication.
- ii) If an accepted version of MSG-3 is not being used as the analytical logic, perform an assessment of the selected analytical logic using the SAE JA1011 Standard and submit a report of that assessment to the MRB Chairperson.
- iii) Ensure that the individual ISC and WG members, and each representative of the applicant involved in preparing the analytical analysis for review by the working groups, meet the experience and training requisites of this document or show equivalency, and provide this information upon request to the MRB Chairperson.
- iv) Provide aircraft familiarisation training for all members of the MRB, ISC, and WGs.
- v) Provide the ISC with an initial list of Maintenance Significant Items (MSIs) and Structural Significant Items (SSIs), with sufficient data to support the selection criteria for each item.
- vi) Provide industry WGs with sufficient technical data to support the analysis of MSIs and SSIs in a timely and adequate fashion.
- vii) Provide the ISC and appropriate WGs in a timely manner (90 days) with information concerning certification issues and resolutions regarding proposed tasks originating from the certification process, such as Airworthiness Limitation Items (ALIs) or Certification Maintenance Requirements (CMRs).
- viii) Ensure that the manufacturer's ICAs contain information including the procedures necessary to perform all tasks listed in the MRBR.
- ix) Participate in ISC and WG activities.
- x) Submit the MRBR proposal to the MRB Chairperson at least ninety days prior to scheduled TCCA approval.

b) Industry Steering Committee (ISC)

The Type Certificate applicant is responsible for the setting up of an ISC. The ISC membership should be comprised of representatives from airframe, engine, propeller, and appliance manufacturers as well as the intended air operators/purchasers and Approved Maintenance Organizations (AMOs). The ISC is to develop and establish policy with regard to procedural matters for the development of the proposed MRBR, direct the activities of the working groups (WGs) and prepare the MRBR proposal.

It is also the function and responsibility of the ISC, under the direction of the ISC Chairperson, to perform the following:

- i) Develop and approve the Policy and Procedures Handbook (PPH) and forward it to the MRB Chairperson for review and acceptance. The MRB Chairperson will direct any resultant comments to the type certificate applicant. (Guidance to be used during development can be found in Appendix 2). The PPH must be approved by the ISC and formally accepted by the MRB Chairperson before WG meetings begin.
- ii) Determine the number and type of WGs that will be necessary organise them and appoint an industry representative as chairperson for each WG.
- iii) Provide the MRB Chairperson, with a list of the WGs, and the names of ISC and WG members, their affiliation, and any changes as they occur.

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

- iv) Arrange for necessary technical and analytical logic training (at the revision standard being used) for all ISC and WG Members and Regulatory Authority Advisors.
- v) Invite the MRB Chairperson and selected MRB Members to ISC meetings.
- vi) Invite other regulatory authorities to ISC meetings, with co-ordination of the MRB Chairperson.
- vii) Attend MRB meetings when requested by the MRB Chairperson.
- viii) Review all working group analyses and presentations.
- ix) Identify analysis to be re-visited by WGs and add justification to ISC minutes.
- x) Provide supporting technical data/analysis for the proposed MRBR.
- xi) Document and present the proposed MRBR to the type certificate applicant.
- xii) Review and provide comments on proposed revisions to the MRBR.

c) Working Groups (WGs)

WGs should be composed of representatives of the manufacturers, the air operators, and maintenance organisations. A Working Group's responsibilities include the following functions:

- i) Develop initial minimum scheduled maintenance / inspection requirements for new or derivative aircraft, using the latest acceptable revision of the analytical process.
- ii) Establish sampling requirements as part of an age-exploration system¹¹ when the analysis determines that such sampling is applicable and effective to substantiate, the adjustment of task intervals and the identification of new tasks.

d) Sampling Inspections (In support of Age Exploration and MRBR Evolution)

For aircraft and engines where a manufacturer/air operator conducts discretionary or required sampling/analytical inspections in support of age exploration and MRBR evolution, the following procedures apply:

- i) The manufacturer/air operator shall notify TCCA in a timely manner, of the time and place of the inspection, in order to permit regulatory authority participation. Where regulatory authority attendance is not possible, the manufacturer/air operator must provide to the regulatory authority a copy of the inspection report including supporting documentation and any associated analysis, which was conducted to justify the conclusions of the report.
- ii) Subsequent to completion of any requisite sampling inspections of a complete product or module, further regulatory authority participation will be determined on a case-by-case basis.

NOTE: The TCCA office responsible for co-ordinating regulatory authority attendance at opportunity and required inspections will be the Superintendent, Aircraft Evaluation Group, Aircraft Maintenance and Manufacturing Branch, Ottawa.

e) Experience and Training Requisites

- i) ISC / WG Air Operator / Purchaser/ AMO Representatives must meet the following levels of:
Experience

¹¹ IMRBPB IP 002

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

- Valid aircraft maintenance engineer (technician) license which meets ICAO Annex 1 criteria or equivalent, practical experience and theoretical training in the disciplines associated with maintenance programmes and their development, or
- Practical maintenance experience on an equivalent aircraft type or on systems to that being analysed, or
- Practical experience as an Aircraft Maintenance Inspector or Quality Assurance experience.

Training

- Training in the analytical logic process that is to be utilised.

ii) ISC / WG Manufacturer Representatives must meet the following levels of:

Experience

- Have relevant maintenance engineering experience on an equivalent aircraft type, system or component

Training

- Training in the analytical logic process that is to be utilised.

Chapter 8. Responsibilities - Regulatory Authorities

When the type certificate applicant formally notifies the TCCA Superintendent, Aircraft Evaluation Groupe (AEG) of the intention to develop an MRB proposal, the AEG Superintendent will assign a qualified person as MRB Chairperson to manage the MRB for TCCA. TCCA will establish an MRB as described in this chapter. MRB members are to be selected by the MRB Chairperson with the concurrence of the AEG Superintendent.

a) Maintenance Review Board

The MRB supports, by active participation, the development of an industry proposal or report containing scheduled maintenance/inspection requirements for the initial issue or revision of a Maintenance Review Board Report (MRBR). The MRBR will be developed for aircraft types certified in the transport category only. The MRB will be comprised of qualified Civil Aviation Safety Inspectors from the Aircraft Maintenance & Manufacturing Branch who will act as members to the Board and as advisors to the Industry WGs and ISC.

b) MRB Chairperson

It is the responsibility of the MRB Chairperson, to perform the following functions:

- i) Determine the number and type of TCCA personnel that are necessary, and then organise them into a Maintenance Review Board.
- ii) Provide the ISC Chairperson with the names of TCCA MRB personnel, their affiliations, assignments, and changes as they occur.
- iii) Invite other authorities, in co-ordination with the Superintendent, AEG and the type certificate applicant, to participate in the MRB process, and to co-ordinate the activities of other regulatory authorities through their representatives.
- iv) Obtain confirmation between TCCA and each participating regulatory authority, and inform the ISC Chairperson of participating regulatory authorities.
- v) Establish and maintain a file of all MRB proceedings for the MRB historical file.
- vi) Establish the extent of regulatory authority participation and assignment of WG advisors.
- vii) Brief other regulatory authorities regarding MRB policy and procedures before and during the MRB process.

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

- viii) Formally accept the PPH, following a review by participating regulatory authorities, within 30 days of receipt.
- ix) Co-ordinate all MRB activities and associated matters with the ISC Chairperson.
- x) Ensure that the type certificate applicant provides the necessary technical and analytical logic training to MRB members / WG advisors.
- xi) Attend ISC meetings.
- xii) Ensure that the appropriate regulatory authority is in attendance at all WG meetings.
- xiii) Offer advice to the ISC and the WG's.
- xiv) Review reports from previous ISC meetings (if applicable) and from the WG members.
- xv) Discuss potential problem areas and controversy with other regulatory authority management.
- xvi) Approve the MRBR, and revisions thereto.

c) MRB Members

MRB members are expected to meet or have the equivalent experience and training as required by this Chapter. In addition the MRB members are expected to perform the following functions:

- i) Attend WG meetings as Advisors and provide guidance to the WG members.
- ii) Review WG meeting minutes and provide progress reports to the MRB Chairperson before the next scheduled ISC meeting. This review will contain an assessment of WG activities, including a notification of any controversy for potential problem areas.
- iii) Attend ISC meetings, as invited by the MRB Chairperson in co-ordination with the ISC Chairperson.
- iv) Attend MRB meetings.

d) Other Regulatory Authorities

Representatives of other regulatory authorities normally will perform the following functions:

- i) Participate in the MRB and/or WG activities, as provided by the letter of confirmation between the regulatory authority and TCCA.
- ii) Attend ISC meetings by invitation from the ISC Chairperson and concurrence of the MRB Chairperson.
- iii) Notify the ISC Chairperson, via the MRB Chairperson, of any national regulatory differences before compiling the MRBR proposal.
- iv) Acknowledge approval of the MRBR in the manner outlined in the letter of confirmation, and in the PPH.
- v) Review WG meeting minutes and provide, to the MRB Chairperson, an assessment or notification of any controversial or potential problem areas before the next scheduled ISC meeting.

NOTE 1: If multiple regulatory authority participation is required, it should be conducted through the use of common standards and joint authority representation.

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

NOTE 2: When the role of the host authority is limited due to the lack of personnel or other reasons, the MRB Chairperson may seek more involvement of other regulatory authorities as MRB members/WG advisors.

NOTE 3: Generic terms or terminology should be used when dealing with various regulatory operating rule requirements (for example, "Regulations or other national regulatory requirements").

e) Experience and Training Requisites

i) MRB Members must meet the following levels of:

Experience

- Valid aircraft maintenance engineer (technician) license which meets ICAO Annex 1 criteria or practical experience and theoretical training that is equivalent, or
- Practical training and experience on an equivalent aircraft type or system, or
- Practical experience as an Aircraft Maintenance Inspector or Quality Assurance experience.

Training

- Formal training in the principles of Reliability -Centered Maintenance, and
- Formal training in the analytical logic process that is to be utilised for maintenance instruction development.

Chapter 9. Policy and Procedures Handbook (PPH)

a) PPH Format and Content

The recommended PPH format and content requirements are located in Appendix 2 of this document.

b) PPH Review and Approval

The PPH, when approved by the ISC, is to be forwarded to the MRB for their review and formal acceptance by the MRB Chairperson. Comments arising from the review process will be directed by the MRB Chairperson to the type certificate applicant for action prior to formal acceptance being made. The PPH must be formally accepted prior to commencement of Working Group meetings.

c) PPH Publication

When the PPH has been approved and accepted the applicant publishes it. It is to be used by all of the participants in the MRB process as the standard to which the MRB process will be conducted for a particular aircraft model.

d) PPH Revisions

Revisions to the PPH are to follow the same review and approval route as for the initial development of the PPH.

PART B - MAINTENANCE REVIEW BOARD (MRB) PROCESS

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PART C - MAINTENANCE TYPE BOARDS (MTB) PROCESS

Chapter 1. General

The MTB process was developed to permit type certificate applicants to develop maintenance instructions when air operators are not available to participate in the process. An MTB process is conducted in much the same manner as the MRB process with the exception of no operator participation. In the past, when MTBs have been convened, the maintenance instructions were developed using ATA MSG analytical logic. The maintenance instructions were then published as manufacturers recommendations.

Chapter 2. MTB Process Applicability

The MTB process is applicable for transport category aircraft type certified with nine or less passengers, or for restricted category aircraft greater than 5,700 Kgs.

a) Where Canada is the State of Design

Where TCCA is the primary type certification authority, the applicant who is seeking a type certificate for a new or a derivative aircraft for which this section is applicable may develop their scheduled maintenance instructions in accordance with a Maintenance Type Board process or request the Aircraft Evaluation Division to convene a Maintenance Review Board (see Part B).

b) Where Canada is not the State of Design

A foreign applicant who is seeking, or intending to seek, a Canadian type certificate for a new or a derivative aircraft for which this Part is applicable, should contact the TCCA Aircraft Evaluation Division to discuss the process under which the scheduled maintenance instructions have been or will be developed, and how acceptance of that process may be made by TCCA.

c) Analytical Logic to be used for Scheduled Maintenance Task Development

The most current version of the MSG-3 logic, which has been accepted at the IMRBPB, is the analytical logic to be used when initiating a new MTB.

Note: Although MRBRs were once produced by combining tasks developed in accordance with different versions of an analytical logic, this method has proved to be impractical and is not acceptable for use with MTBs.

If the applicant chooses to utilize logic other than MSG-3, the applicant must demonstrate that their alternative means of compliance will result in an equivalent level of safety¹². In such cases the scheduled maintenance instructions should be developed in accordance with an analytical logic that is based on reliability centered maintenance principles that meet the criteria of the SAE JA1011 Standard. Should the evaluation identify areas of non-compliance with the SAE JA1011 Standard, the applicant should develop processes that would mitigate the areas of non-compliance prior to utilising the analytical logic. The completed evaluation should be approved by the most senior manager of the applicant who is responsible for the development of the maintenance instructions, and a copy of the completed evaluation, including any processes developed to mitigate non-compliances, must be provided to TCCA.

¹² Provides compliance with IMRBPB IP 053

Chapter 3. MTB Process Audits

a) **Audit of the Completed Analytical Process**

All holders of aircraft type certificates for which an MTB Report (MTBR) has been developed shall maintain records of the analysis performed in a manner such that Transport Canada may conduct an audit of the complete initial analytical process, and any subsequent analytical processes, that have led to an amendment of the initial MTB Report.

b) **Validation of the Associated Maintenance Procedures¹³**

The type certificate applicant must develop internal instructions and guidelines to enable the validation of all maintenance procedures written to support MTBR tasks and then the applicant must validate those maintenance procedures. The objective of the validation is to ensure that the procedure can be performed and that the procedure meets the intent of the MTBR task.

Where and when requested by Transport Canada, the type certificate applicant must make available a completed aircraft and the necessary qualified maintenance personnel to demonstrate to TCCA that any particular maintenance procedure can be adequately performed and that the procedure meets the intent of the MTB task.

Chapter 4. MTB Report (MTBR)

a) **General**

The MTBR contains the scheduled maintenance instructions necessary for a transport category aircraft when the aircraft is type certified. MTBRs are “living” documents, which must be reviewed and amended periodically to ensure that they reflect the current “lessons learned” from aircraft operational experience. In this manner the continuing airworthiness of an aircraft fleet is ensured and only those tasks that are applicable and effective are performed

b) **MTBR Review and Approval**

The type certificate applicant is responsible for developing a proposed MTBR and presenting it to TCCA for approval. The MTBR format and content criteria should be aligned with the criteria used for the MRBR as found in Appendix 1. Once approved, the type certificate holder publishes the MTBR as part of the aircraft’s Instructions for Continued Airworthiness. It is a means of complying in part with the maintenance instruction requirements of Appendix H to Chapter 525, and 529 of the *Airworthiness Manual* and for developing the Instructions for Continued Airworthiness, as required by 525.1529 and 529.1529.

The MTBR must be approved by TCCA prior to becoming available for use by Canadian operators, as must all subsequent changes.

c) **Non-Approval of Proposed MTB Reports or MTBR Revisions**

The MTB Chairperson shall notify the type certificate applicant in writing, of the non-approval of the MTBR or of any subsequent revision. The letter shall include the specific reason(s) for the non-approval.

d) **Publication of the MTBR**

When an MTBR has been produced, the type certificate holder will publish it as part of the Instructions for Continued Airworthiness (ICAs) for the aircraft.

¹³ Chap11.6 (p328-329) RCM-Nowlan&Heap

PART C - MAINTENANCE TYPE BOARDS (MTB) PROCESS

e) **MTBR Annual Review**

The MTBR is intended to be an up-to-date document and, as a consequence the manufacturer and the MTB Chairperson must conduct a joint review, at least annually, to determine the need for revisions. Results of these reviews are to be documented by the MTB Chairperson for inclusion in the MTB historical file.

The manufacturer and the MTB will convene and evaluate proposed changes to the MTBR. Proposed changes are submitted, with supporting data, to the MTB Chairperson. Approval or non-approval of the proposed changes shall be processed in the same manner as outlined for the initial MTBR approval/non-approval.

f) **The “Living MTB” Concept**

Prior to approval of the MTBR, the type certificate applicant must develop an auditable system¹⁴ for the continuing analysis of all tasks included within the MTBR, or show that the intent of the following is being met by the end users of the MRBR. As part of the continuing analysis system the manufacturer must provide the following;

- i) A system for acquiring from operators reports related to adequacy of tasks, failures, failure frequencies and the consequence of the failures;
- ii) An age-exploration system for the continuous evaluation of age-condition information for the substantiation of current task intervals, the adjustment of task intervals, and the identification of new tasks;
- iii) A system for controlling the addition of new scheduled tasks to ensure that they meet RCM criteria before they are accepted;
- iv) A system for the periodic evaluation of all tasks in the program to eliminate those which are no longer needed;
- v) A system for evaluating unanticipated problems and determining the appropriate action.

g) **Sampling Inspections (In support of Age Exploration and MTBR Evolution)**

For aircraft and engines where a manufacturer conducts discretionary or required sampling/analytical inspections in support of age exploration and MTBR evolution, the following procedures apply:

- i) The manufacturer/air operator shall notify TCCA in a timely manner, of the time and place of the inspection, in order to permit regulatory authority participation. Where regulatory authority attendance is not possible, the manufacturer/air operator must provide to the regulatory authority a copy of the inspection report including supporting documentation and any associated analysis, which was conducted to justify the conclusions of the report.
- ii) Subsequent to completion of any requisite sampling inspections of a complete product or module further regulatory authority participation will be determined on a case-by-case basis.

NOTE: The TCCA office responsible for co-ordinating regulatory authority attendance at opportunity and required inspections will be the Superintendent, Aircraft Evaluation Group, Aircraft Maintenance and Manufacturing Branch, Ottawa.

Chapter 5. Policy and Procedures Handbook (PPH)

The type certificate applicant must develop an internal policy and procedures document or handbook for the purpose of managing the MTB process. It is recommended that the format and content of the PPH outline, presented in appendix 2

¹⁴ ref Appendix A, Sect A4, P367, RCM Nowlan&Heap

PART C - MAINTENANCE TYPE BOARDS (MTB) PROCESS

of this document, be adopted for the MTB process. A copy of the PPH must be presented to the MTB Chairperson for TCCA review and acceptance prior to beginning any task development work. The PPH is to be utilised by all participants in the MTB process as the standard to which the MTB process will be conducted.

Chapter 6. Process Flow Charts

A process flow chart describing the MTB scheduled maintenance task development process and its relationship to the production of Instructions for Continued Airworthiness (ICAs) would be similar to that of the MRB located in Appendix 3, Chart 3 of this document.

Chapter 7. Manufacturer Representatives

Representatives of the applicant who are engaged in performing the analytical analysis for an MTB process must meet the following criteria,

a) Experience

- Have relevant maintenance engineering experience on an equivalent aircraft type, system or component.

b) Training

- Have undergone training in the analytical logic process that is to be utilised.

Chapter 8. Responsibilities - Regulatory Authorities

When the type certificate applicant formally notifies the TCCA Superintendent, Aircraft Evaluation Group (AEG) of the intention to develop an MTB proposal, the AEG Superintendent will assign a qualified person as MTB Chairperson to establish and manage the MTB. MTB members / WG advisors are to be selected by the MTB Chairperson with the concurrence of the AEG Superintendent.

a) MTB Chairperson

It is the responsibility of the MTB Chairperson, to perform the following functions:

- Determine the number and type of TCCA personnel that are necessary, and then organise them into a Maintenance Type Board.
- Provide the applicant with the names of TCCA MTB personnel, their affiliations, assignments, and changes as they occur.
- Establish and maintain a file of all MTB proceedings for the MTB historical file.
- Establish the extent of regulatory authority participation and assignment of WG advisors.
- Ensure that the type certificate applicant provides the necessary technical and analytical logic training to MTB members / WG advisors.
- Attend Steering Committee (SC) meetings.
- Offer advice to the SC and the WG's.
- Review reports from previous SC meetings (if applicable) and from the WG members.
- Approve the MTBR, and revisions thereto.

b) MTB Members

MTB members are expected to meet or have the equivalent experience and training as required by this Chapter. In addition the MTB members are expected to perform the following functions:

- Attend WG meetings and provide guidance to the WG members.

PART C - MAINTENANCE TYPE BOARDS (MTB) PROCESS

- ii) Review WG meeting minutes and provide progress reports to the MTB Chairperson before the next scheduled SC meeting. This review will contain an assessment of WG activities, including a notification of any controversy or potential problem areas.
 - iii) Attend SC meetings, as invited by the MTB Chairperson, in co-ordination with the applicant.
 - iv) Attend MTB meetings.
- c) **Experience and Training Requisites**
- i) MTB Members must meet the following levels of:
 - Experience
 - Valid aircraft maintenance engineer (technician) license which meets ICAO Annex 1 criteria or practical experience and theoretical training that is equivalent, or
 - Practical training and experience on an equivalent aircraft type or systems, or
 - Practical experience as an Aircraft Maintenance Inspector or Quality Assurance experience.
 - Training
 - Formal training in the principles of Reliability Centered Maintenance, and
 - Formal training in the analytical logic process that is to be utilised for maintenance instruction development,

PART C - MAINTENANCE TYPE BOARDS (MTB) PROCESS

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PART D - MANUFACTURER'S RECOMMENDATION (MR) PROCESS

Chapter 1. General

Applicants seeking, or intending to seek, Canadian type certification of aeroplanes which are less than 5,700 KGs (12,500 Lbs) or helicopters that are to be type certified in the normal category (less than 2,720 KGs (6,000 LBs)) will develop their scheduled maintenance instructions in accordance with the applicants own internal processes. The internal processes must, however, include a maintenance instruction development process, which meets the criteria as identified below.

Chapter 2. MR Process Applicability

a) Where Canada is the State of Design

Where TCCA is the primary type certification authority, the applicant who is seeking a type certificate for a new or a derivative aircraft for which this section is applicable must develop their scheduled maintenance instructions in accordance with an analytical logic that is acceptable to and auditable by TCCA.

b) Where Canada is not the State of Design

Where TCCA is not the primary type certification authority, the applicant to whom this part is applicable must contact the TCCA Aircraft Evaluation Division to discuss the process under which the maintenance instructions have been developed and how acceptance of that process may be made by TCCA.

Chapter 3. MR Process Audits

a) Audit of the Completed Analytical Process

All aircraft type certificate holders shall maintain records of the analysis performed to develop their scheduled maintenance instructions. The records shall be kept in such a manner that TCCA may readily conduct an audit of the initial analytical process and any subsequent analytical processes that may lead to an amendment of the initial scheduled maintenance instructions.

b) Validation of the Associated Maintenance Procedures

The type certificate applicant must develop internal instructions and guidelines to enable the validation of all maintenance procedures written to support scheduled maintenance tasks and then the applicant must validate those maintenance procedures. The objective of the validation is to ensure that the procedure can be performed and that the procedure meets the intent of the scheduled maintenance instruction.

Where and when requested by TCCA, the type certificate applicant must make available a completed aircraft and the necessary qualified maintenance personnel to demonstrate to TCCA that any particular maintenance procedure can be adequately performed and that the procedure meets the intent of the scheduled maintenance task.

Chapter 4. Scheduled Maintenance Instructions

a) Scheduled Maintenance Instruction Review and Approval

The ICAs, as published by the type certificate holder, must contain a statement from the most senior manager responsible for the scheduled maintenance instruction development, which states that the scheduled maintenance instructions and their associated procedures have been reviewed and approved for use by operators, and identify any limitations applicable when implementing the instructions.

b) Scheduled Maintenance Instruction Publication

The type certificate holder publishes the scheduled maintenance instructions as part of the aircraft's "Instructions for Continued Airworthiness". It is the responsibility of the type certificate holder to issue amendments to the Instructions for Continued Airworthiness as required. An aircraft operator may make no changes to the scheduled maintenance instructions.

c) Scheduled Maintenance Instruction Development as a "Living Process"

Prior to TCCA's acceptance of the scheduled maintenance instructions as part of the aircraft's type certification process, the type certificate applicant must develop an auditable system for the continuing analysis of all tasks

PART D - MANUFACTURERS RECOMMENDATIONS

included within the maintenance instructions. As part of the continuing analysis system, the type certificate applicant must address the following,

- i) A system for acquiring from operators reports related to adequacy of tasks, failures, failure frequencies and the consequence of the failures;
- ii) An age-exploration system for the continuous evaluation of age-condition information, for the substantiation of current task intervals and for the adjustment of task intervals;
- iii) A system for controlling the addition of new scheduled tasks, to ensure that they meet RCM criteria before they are accepted;
- iv) A system for the periodic evaluation of all tasks in the program to eliminate those which are no longer needed;
- v) A system for evaluating unanticipated problems and determining the appropriate action.

PART E - APPENDIX 1 - RECOMMENDED MRBR FORMAT AND CONTENT

Appendix 1 - Recommended MRBR Format and Content

Each MRBR should be entitled "Maintenance Review Board Report (MRBR), Manufacturer Name, Aircraft Model #," and at a minimum, should contain the following, as appropriate:

- d) A Revision Log.**
- e) A List of Effective Pages (including the revision status and corresponding dates).**
- f) A Title Page (containing the title of the MRBR and the report number, if any).**
- g) A Table of Contents.**
- h) An Approval Page (containing the following statements):**

"This report outlines the initial minimum scheduled maintenance/inspection requirements to be used in the development of an approved continuous airworthiness maintenance program for the airframe, engines, systems, and components of the (aircraft make, model, and series)."

"The requirements in the report have been developed using (insert the name of the analytical decision logic utilised) decision logic, or an alternative procedure as agreed upon by TC, ISC, WG, etc."

"Transport Canada (TC) hereby approves the use of this report by TC-certified air operators of the (aircraft make, model, and series)."

Signed: _____ Date: _____

(Title of approving official)

(Insert page(s) for other regulatory authority approval, if applicable)

- i) An ISC/MRB Personnel Listing (including ISC/MRB personnel, their organisational affiliation, and the capacity in which they serve).**

- j) The MRBR Preamble (The following information should be included in the Preamble of each MRBR):**

"This report outlines the initial minimum scheduled maintenance/inspection requirements to be used in the development of an approved continuous airworthiness maintenance program for the airframe, engines, systems, and components of (aircraft make, model, and series). These MRB requirements are a basis from which each air operator develops its own continuous airworthiness maintenance program."

"The responsible TCCA inspector shall ascertain that all of the applicable scheduled maintenance/inspection requirements in this report are included in the air operator's initial continuous airworthiness maintenance program."

- k) Acronyms**

All acronyms used in the MRBR should be defined. A listing of acronyms that should be contained in the MRBR are provided in this Appendix.

- l) Definitions**

Definitions of technical terms should be included in the MRBR. The use of industry accepted definitions, such as those found in the analytical logic being used and in the World Airlines Technical Operations Glossary should be used whenever possible.

- m) Applicability**

The MRBR must identify the specific aircraft make, model, and series, and the standard options. New options will be added to the MRBR summary sheets.

- n) Tasks and Frequencies**

All tasks and their frequencies shall be identified in the MRBR.

PART E - APPENDIX 1 - RECOMMENDED MRBR FORMAT AND CONTENT

Further guidance may also be provided in the MRBR regarding the means to adjust the scheduled inspection/maintenance intervals currently provided for in the MRBR. This guidance will be unique to the aircraft.

Escalation guidance should take into consideration the content of like checks and their repetitive intervals. A series or sequence of specified checks must be completed, and the results found satisfactory, before escalation of that type of check. Procedures should be included here for the air operator to advise the manufacturer and for the manufacturer to advise the regulatory authority of any instances in which unscheduled maintenance is carried out prior to an inspection interval being reached or of situations where inspections are being conducted prior to their MRB task intervals being reached.

A description of the types of checks, and their intervals, should be included in this section of the MRBR.

o) Maintenance Program Rules

The following rules should be contained in the MRBR:

If there is an escalation procedure contained in the MRBR, the following rule applies: "The individual check intervals listed in this report may be escalated following the completion of the required series or sequence of checks and the satisfactory review of check results and approval by the appropriate regulatory authority, or in accordance with (IAW) the air operator's approved reliability program."

Individual task intervals may be escalated based on satisfactory substantiation by the air operator, and review and approval by its appropriate regulatory authority, or IAW the air operator's approved reliability program.

Service Bulletins may be referenced by number in this report for clarifying the procedural aspects of this program; however, they shall not be used for escalation purposes.

Task interval parameters expressed in the MRBR may be converted to an individual air operator's desired units, provided this conversion does not result in the air operator exceeding the initial requirements of the MRBR.

The use of non-destructive inspection (NDI) methods, such as X-ray, ultrasonic, eddy current and radio isotope, which are approved by the manufacturer, can provide an alternative to the methods prescribed in this report. Each air operator should notify its regulatory authority of the use of an acceptable alternative method.

Within this report, the terms "check" and "inspection" are not intended to imply a level of skill required to accomplish a task.

Life-limited parts must be retired IAW the limits established in the engine or aircraft Type Certificate Data Sheets (TCDS) or the Airworthiness Limitations section of the engine or aircraft manufacturer's Instructions for Continued Airworthiness.

After the accumulation of industry service experience, the ISC or MRB Chairpersons may request changes to the requirements of this MRBR.

p) System/Powerplant program rules

The following are recommended contents of the System Program Rules section of the MRBR:

" Specify the analytical logic used, and its revision status, to develop a scheduled maintenance program. With the exception of life-limited parts, this process does not normally include detailed off-wing shop maintenance procedures. Off-wing detailed procedures are controlled by individual air operators and are IAW the manufacturer's Instructions for Continued Airworthiness required by the Regulations.

Maintenance Significant Items (MSIs)

Insert the list of MSIs. .

All MSIs identified by the manufacturer have been subjected to the analytical logic process. This process has resulted in the identification of maintenance tasks that are contained in this report. Those MSIs for which a task was not generated during the analysis are identified as follows:

(Insert: MSI listing for which no tasks were identified.)

q) Structural Program Rules

Structural inspection programs (SIPs) are developed by the aircraft manufacturer to meet the inspection requirements for damage tolerance. The types of damage considered during program development are environmental deterioration (ED) (corrosion, stress corrosion), accidental damage (AD), and fatigue damage (FD). Some forms of ED are age related; therefore, inspections for this type of deterioration are controlled by

calendar intervals. These calendar inspections, plus the requirements for detecting other types of ED, and accidental and fatigue damage (FD), are contained in the SIP. The following are recommended contents of the structural program rules section of the MRBR:

"All aircraft in an air operator's or group of air operator's fleets shall be subject to the provisions of this report. These requirements include external and internal inspections, structural sampling and age-exploration programs, Corrosion Prevention and Control Programs, and additional supplemental structural inspections that may be required for fatigue-related items. A reliability program shall not be used to escalate the inspection interval, or delete the task, on any structural inspection item listed in the Airworthiness Limitations section. Initial check intervals for the SIP are expressed in calendar time, flight cycles, or flight hours. No repeat inspection intervals shall be escalated until at least one aircraft in an air operator's fleet has been inspected within the initially defined intervals listed in the MRBR.

Structural inspection limitations listed in the aircraft manufacturer's Airworthiness Limitations section will be referenced in the MRBR by document number."

(Insert SSI sheets.)

r) Zonal Program Rules

The Zonal Inspection Program (ZIP) provides consolidation of a number of general visual inspection (GVI) tasks for each zone. A zonal inspection may include GVI tasks derived from MSIs and SSIs. An MSI/SSI task that is in the ZIP must be cross-referenced, in the supporting documentation, as a zonal item; likewise, the zonal item must be cross referenced as an MSI/SSI task to ensure content and accountability. No Safety Route (5 or 8) tasks are to be candidates for zonal programs. The following are recommended contents of the Zonal Program Rules section of the MRBR:

The ZIP contains a series of GVI tasks. Detailed inspections (DIs) and special detailed inspections (SDIs) are not to be contained in the ZIP. Zonal inspection requirements apply only to zones.

Access to zones should be easily accomplished and should not require the use of special tools. Normally, the inspection aids to be used are a flashlight and/or inspection mirror. The entire visible contents of the zone must be inspected for obvious damage, security of installation, and general condition, including corrosion and leaks.

The following zones do not contain system installations but receive adequate surveillance from other maintenance or structural inspections tasks. Accordingly, these zones are not specified in the inspection requirements presented in the ZIP.

(Insert listing of the zones not specified in the ZIP.)

(Insert zonal inspection sheets.)

s) Appendixes.

- Aircraft zones.
- National regulatory differences, as mandated by other regulatory authorities. (Each shall be accepted by the respective authority.)
- Acronyms.
- Definitions.
- Other, as applicable.

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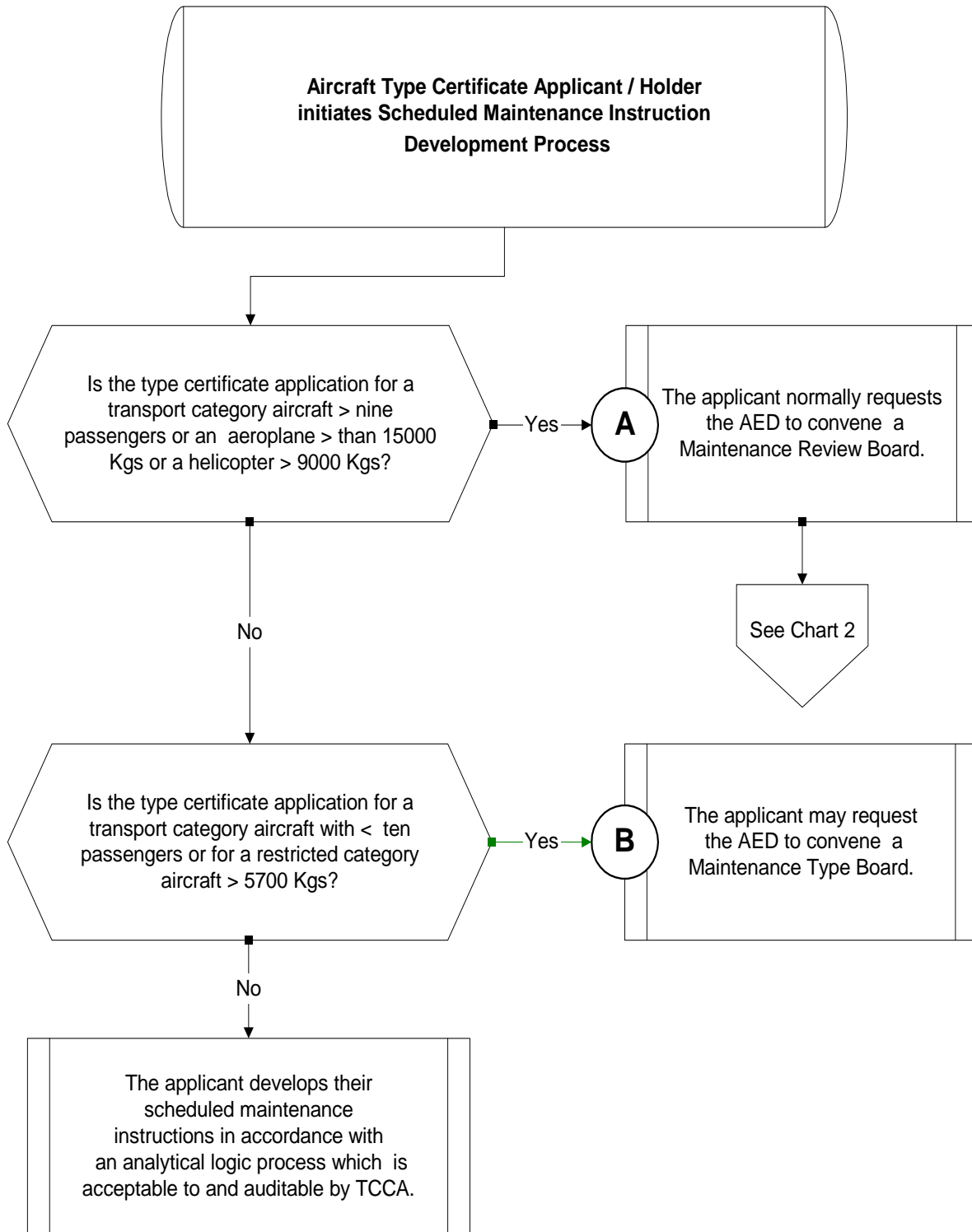
Appendix 2 - Recommended PPH Format and Content

This appendix contains guidance to be used by the aircraft manufacturer, the ISC, and MRB Chairpersons during the development and review of the PPH. The following is an outline of items that should be included in the PPH:

- A. Introduction (identify MSG Baseline)
- B. Table of Contents
- C. Revision Control
- D. Organisational Outline (including the number and type of WGs) and Duties and Responsibilities of Personnel
 - 1. ISC
 - 2. Manufacturer(s)
 - 3. WG Members
 - 4. MRB Members and Advisors
 - 5. Other Regulatory Authority Participants
- E. Technical and Maintenance Development Training (for ISC and WG Members and MRB Advisors)
- F. Program Timetables/Meeting Schedules
- G. Proposed Check Interval Parameters, if any, (for analysis and planning purposes)
- H. Analysis/Procedures to be utilised
- I. Forms (that identify questions, actions, and transfers that may occur during WG activities)
- J. Documentation of Meetings and General Administrative Procedures (The PPH should state that all formal meetings will be documented and that the minutes will be distributed by either the ISC Chairperson or a designee.)
- K. Acronyms
- L. Definitions
- M. Appendixes
- N. Analytical Logic Document
- O. Other, as applicable

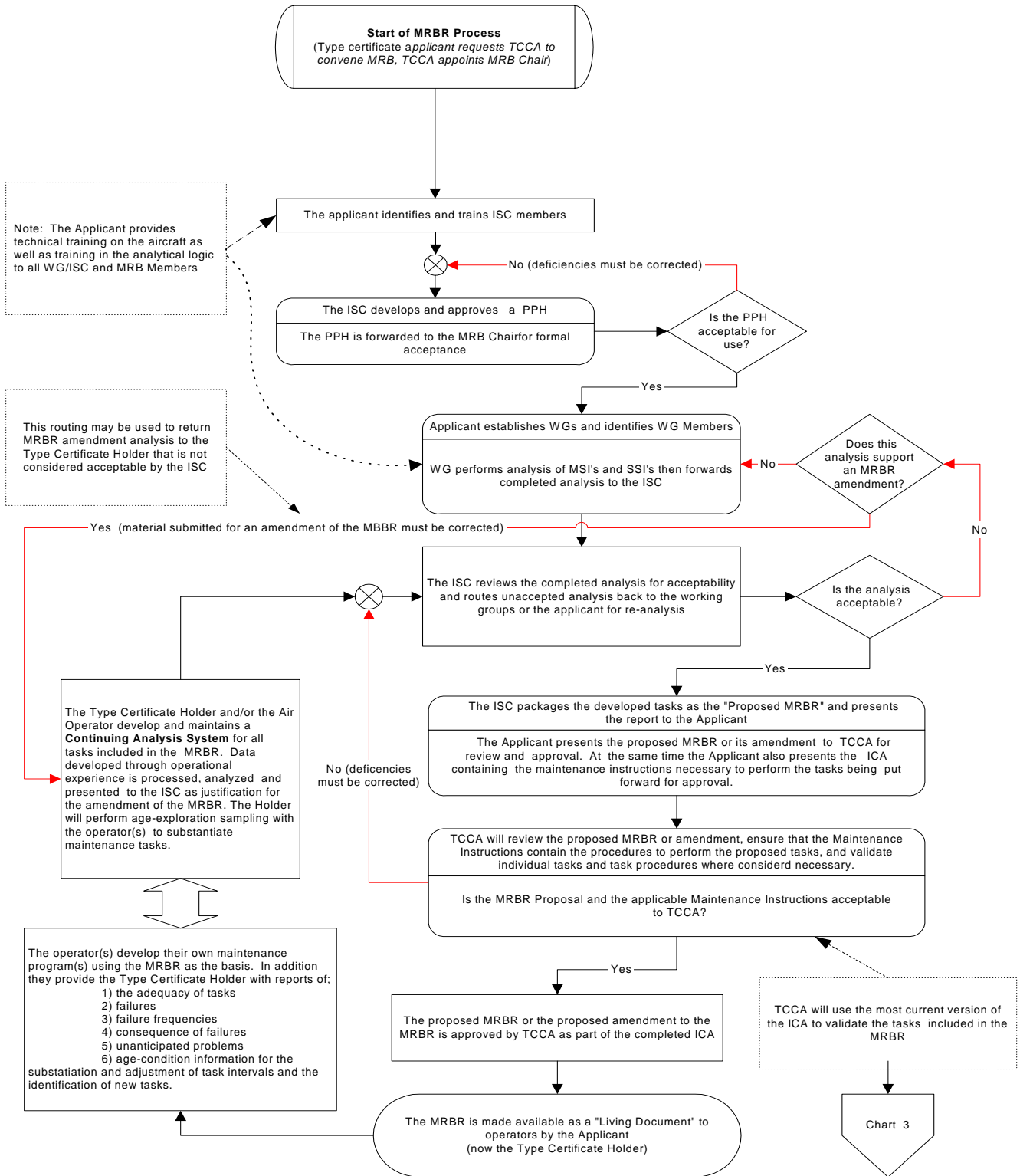
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APPENDIX 3 - CHART 1 - MAINTENANCE PROGRAM DEVELOPMENT PROCESSES

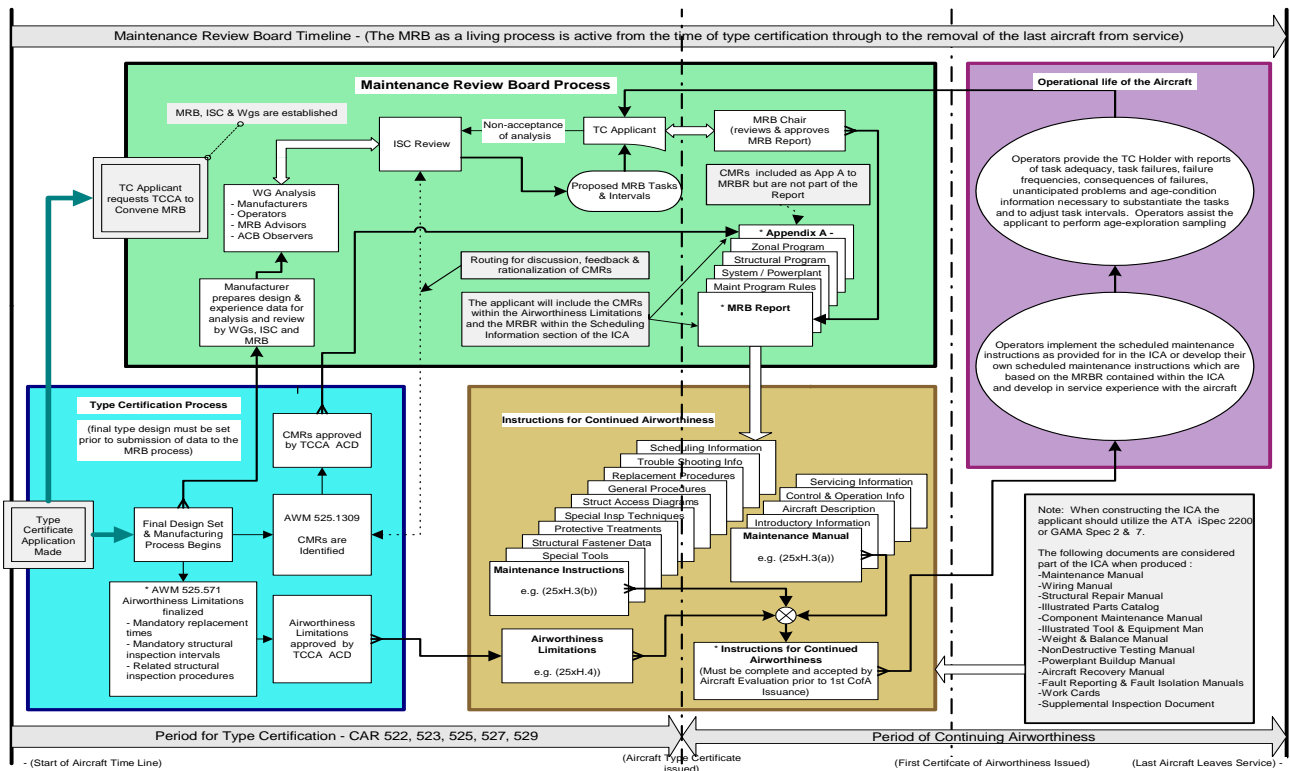


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APPENDIX 3 - CHART 2 - MRBR DEVELOPMENT



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Appendix 3 - Chart 3 Scheduled Maintenance Task Development and Instructions for Continued Airworthiness Process.

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