



CIVIL AVIATION PUBLICATION

CAP 13

MAINTENANCE PROGRAMMES (COMMERCIAL AIR TRANSPORT)

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MAINTENANCE PROGRAMME (COMMERCIAL AIR TRANSPORT)

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1.1 Introduction

- (a) The San Marino CAA must approve the Maintenance Programme for aircraft being used for commercial air transportation to ensure the continuing airworthiness of the aircraft.
- (b) The term 'Maintenance Programme' is intended to include scheduled maintenance tasks and the associated procedures and standard maintenance practices. The term 'Maintenance Schedule' is intended to embrace the scheduled maintenance tasks alone.
- (c) The aircraft should only be maintained to one approved Maintenance Programme at a given point in time. Where an owner or operator wishes to change from one approved Maintenance Programme to another, a bridging check will need to be performed in order to implement the change.
- (d) The maintenance programme details should be reviewed at least annually. As a minimum, revisions of documents affecting the programme basis need to be considered by the operator for inclusion in the maintenance programme during the annual review. Applicable mandatory requirements should be incorporated into the operator's maintenance programme as soon as possible.
- (e) Revisions to the approved maintenance programme must be approved by the SM CAA prior to incorporation.
- (f) Appendix I provides detailed information on the content of the Maintenance Programme.

1.2 Maintenance Programme Compliance

- (a) The maintenance programme must establish compliance with:
 - (1) Instructions issued by the San Marino CAA.
 - (2) Instructions for continuing airworthiness issued by the holders of the type certificate, restricted type-certificate, supplemental type-certificate, major repair design approval, or any other relevant approval.
 - (3) Additional or alternative instructions proposed by the owner or the continuing airworthiness management organisation.
 - (4) Repetitive maintenance tasks derived from modifications and repairs.
- (b) The Maintenance Programme shall contain details, including frequency, of all maintenance to be carried out, including any specific tasks linked to the type and the specificity of operations.
- (c) An owner or operator's maintenance programme should normally be based upon the maintenance review board (MRB) report where applicable, the maintenance planning document (MPD), the relevant chapters of the maintenance manual or any other maintenance data containing information on scheduling. Furthermore, an owner or operator's maintenance programme should also take into account any maintenance data



containing information on scheduling for components.

- (d) Maintenance programmes for aircraft types subjected to the MRB report process should contain identification cross reference to the MRB report tasks such that it is always possible to relate such tasks to the current approved Maintenance Programme. This does not prevent the Maintenance programme from being developed in the light of service experience to beyond the MRB report recommendations, but will show the relationship to such recommendations.
- (e) Some Maintenance Programmes, not developed from the MRB process, utilise reliability programmes. Such Reliability Programmes should be considered as a part of the maintenance programme.
- (f) Alternate and/or additional instructions proposed by the owner or the operator, may include but are not limited to the following:
- Escalation of the interval for certain tasks based on reliability data or other supporting information. The maintenance programme must contain the corresponding escalation procedures. The San Marino CAA directly approves the escalation of these tasks, except in the case of ALLs (Airworthiness Limitations), which cannot be escalated.
 - More restrictive intervals than those proposed by the TC holders as a result of the reliability data, or because of a more stringent operational environment.
 - Additional tasks at the discretion of the operator.
- (g) The Maintenance Programme shall be subject to annual reviews and amended accordingly when necessary. These reviews will ensure that the Maintenance Programme continues to be valid in light of the operating experience and instructions from the San Marino CAA, whilst taking into account new and/or modified maintenance instructions promulgated by the type certificate and supplementary type certificate holders, and any other organisation that publishes such data.
- (h) The Operator is responsible for ensuring that the Maintenance Programme is appropriate for its age, utilisation, operating environment and configuration. The recommended maintenance by the Type Certificate Holder is normally based on an assumed utilisation and operating environment. Should the anticipated or actual utilisation of the aircraft vary by more than 25% from these assumptions, then the Maintenance Programme should be reviewed and the tasks and frequencies adjusted as necessary. In some cases the Type Certificate Holder has produced specific low utilisation recommendations for the adoption of Operators, which should be used when applicable.
- (i) A Maintenance Programme may indicate that it applies to several aircraft registrations as long as the maintenance programme clearly identifies the effectivity of the tasks and procedures that are not applicable to all of the listed registrations.



1.3 Reliability Programme

- (a) Reliability programmes should be developed for Maintenance Programmes based upon maintenance steering group (MSG) 3 logic, or those that include condition-monitored components, or that do not contain overhaul time periods for all significant system components.
- (b) Reliability Programmes need not be developed for aircraft under 5 700 kg or single engine helicopters that contain overhaul time periods for all significant aircraft system components.
- (c) The purpose of a reliability programme is to ensure that the aircraft maintenance programme tasks are effective and their periodicity is adequate.
- (d) The reliability programme may result in the escalation or deletion of a maintenance task, as well as the de-escalation or addition of a maintenance task.
- (e) A reliability programme provides an appropriate means of monitoring the effectiveness of the Maintenance Programme and should be considered as part of the Maintenance Programme.
- (f) Appendix 2 gives further guidance on Reliability Programmes.

1.4 Additional Maintenance Tasks

- (a) The maintenance review board (MRB) report, the maintenance planning document (MPD), and the relevant chapters of the maintenance manual source documents used as the basis for the Maintenance Programme, do not normally include the required maintenance for such things as seats, safety equipment, galley equipment etc., as these can be specified and sourced from different equipment manufacturers. The aircraft manufacturers recommended maintenance document (e.g. MPD) will frequently say “in accordance with the manufacturer’s requirements” for these items. The information for continuing airworthiness for these items is found in the documents supplied from the Original Equipment Manufacturer (OEM). These must be reviewed and the necessary maintenance tasks included within the Maintenance Programme.
- (b) Modifications to the aircraft, engines, propellers and equipment embodied after manufacture of the aircraft are not normally included in the source documents used as the basis for the Maintenance Programme. The information for continuing airworthiness supplied with these modifications should be reviewed and their requirements included the Maintenance Programme.
- (c) Special Operating Approvals such as RVSM, All Weather Operations (AWOPS), EVS/HUD, EFB etc., frequently require further maintenance and are not normally included in the source documents used as the basis for the Maintenance Programme. Any additional maintenance tasks associated with maintaining these approvals should be reviewed and their details included in the Maintenance Programme.



- (d) The Operator may elect to perform non-mandatory maintenance tasks normally derived from Service Bulletins, Service Letters etc. These additional maintenance tasks should be reviewed and their details included in the Maintenance Programme.

1.5 Inspections of Flight Recorder Systems

In order to ensure the continued serviceability and reliability of the Flight Recorder systems, inspections are required at certain intervals. Refer to CAP 02 for details of the inspection requirements.

1.6 Calibration of the FDR system

In order to ensure the continued serviceability of the FDR system certain aircraft types require the system to be calibrated at certain intervals. Refer to CAP 02 for details of the calibration requirements.

1.7 Permitted Variations to Maintenance Periods

(to be included in the Maintenance Management Exposition as well)

Where the TC/STC holder has not prescribed any variation that may be applied to task periods, the operator may vary the periods prescribed by this programme provided that such variations are within the limits of sub-paragraphs (a) to (d).

Where the TC/STC holder has prescribed variations that may be applied using operator procedures to task intervals in the programme, the operator shall use those tolerances and not those prescribed in sub-paragraphs (a) to (d) below.

Where the TC/STC holder has prescribed tolerances that may be applied to task intervals in the programme, the operator shall use those tolerances and not combine their use with those prescribed in sub-paragraphs (a) to (d) below.

Note: The programme must specify which of the above is being used.

Variations shall be permitted only when the periods prescribed by this programme, or documents in support of this programme, cannot be complied with due to circumstances which could not have been reasonably foreseen by the operator.

The decision to vary any of the prescribed periods shall only be made by the operator. Particulars of every variation shall be entered in the appropriate Log Book(s).

(a) Items Controlled by Flying Hours

- (1) 5000 flying hours or less 10%
- (2) More than 5000 flying hours 500 flying hours

(b) Items Controlled by Calendar Time

- (1) 1 year or less 10% or 1 month, whichever is the lesser



- (2) More than 1 year but not exceeding 3 years; 2 months;
 - (3) More than 3 years; 3 months.
- (c) Items Controlled by Landing/Cycles
- (1) 500 landings/cycles or less 10% or 25 landings/cycles, whichever is the lesser
 - (2) More than 500 landings/cycles 10% or 500 landings/cycles, whichever is the lesser
- (d) Items Controlled by more than one limit for items controlled by more than one limit, e.g. items controlled by flying hours and calendar time or flying hours and landings/cycles, the more restrictive limit shall be applied.

Notes: The variations permitted above do not apply to:

- (1) *Those components for which an ultimate (scrap) or retirement life has been prescribed (e.g. primary structure, components with limited fatigue lives, and high energy rotating parts for which containment is not provided). Details concerning all items of this nature are included in the Type Certificate holder's documents or manuals.*
- (2) *Those tasks included in the Maintenance Programme that have been classified as mandatory by the Type Certificate holder or the San Marino CAA.*
- (3) *Certification Maintenance Requirements (CMR) unless specifically approved by the manufacturer and agreed by the San Marino CAA.*

Any variations to the Maintenance Programme beyond that described above must have the approval of the San Marino CAA.

1.8 Inspection Standards

The maintenance and inspection standards applicable to the maintenance tasks must meet the requirements of the Type Certificate holders recommended standards and practices.

1.9 Systems and Structural Integrity Programmes

Any systems or structural integrity programmes, such as Supplemental Structural Programmes Ageing Structures and Systems, Corrosion Prevention and Control Programme, Fuel Tank Safety, Electrical Wiring Interconnection System (EWIS), published by the Type Certificate holder must be included into the Maintenance Programme.

1.10 Pre – Flight Inspections

- (a) The Operator shall be responsible for the satisfactory accomplishment of the pre-flight inspection. The pilot or another qualified person must carry out this inspection.



- (b) With regard to the pre-flight inspection it is intended to mean all of the actions necessary to ensure that the aircraft is fit to make the intended flight. These should typically include but are not necessarily limited to:
- (1) a walk-around type inspection of the aircraft and its emergency equipment for condition including, in particular, any obvious signs of wear, damage or leakage. In addition, the presence of all required equipment including emergency equipment should be established.
 - (2) An inspection of the aircraft continuing airworthiness record system or the Operator's technical log, as applicable, to ensure that the intended flight is not adversely affected by any outstanding deferred defects, and that no required maintenance action shown in the maintenance statement is overdue or will become due during the flight.
 - (3) A control that consumable fluids, gases etc. uplifted prior to flight, is of the correct specification, free from contamination, and correctly recorded.
 - (4) A control that all doors are securely fastened.
 - (5) A control that control surface and landing gear locks, pitot/static covers, restraint devices and engine/aperture blanks have been removed.
 - (6) A control that all the aircraft's external surfaces and engines are free from ice, snow, sand, dust etc. and an assessment to confirm that, as the result of meteorological conditions and de-icing/anti-icing fluids having been previously applied on it, there are no fluid residues that could endanger flight safety. Alternatively to this pre-flight assessment, when the type of aircraft and nature of operations allow for it, the build-up of residues may be controlled through scheduled maintenance inspections/cleanings identified in the approved maintenance programme.
- (c) Tasks such as oil and hydraulic fluid uplift and tyre inflation may be considered as part of the pre-flight inspection. The related pre-flight inspection instructions should address the procedures to determine where the necessary uplift or inflation results from an abnormal consumption and possibly requires additional maintenance action by the approved maintenance organisation or certifying staff as appropriate.
- (d) For a repetitive pre-flight airworthiness directive which specifically states that the flight crew may carry out such airworthiness directive; the aircraft commander may carry out the pre-flight airworthiness directive on the basis of the flight crew license held, provided that sufficient practical training has been carried out to ensure that such person can accomplish the airworthiness directive to the required standard.
- (e) The operator should publish guidance to maintenance and flight personnel and any other personnel performing pre-flight inspection tasks, defining responsibilities for these actions.



- (f) Pre-flight inspection personnel must have received appropriate training for the relevant pre-flight inspection tasks.



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APPENDIX I

CONTENT OF THE MAINTENANCE PROGRAMME

1	General Requirements
1.1	The maintenance programme should contain the following basic information.
1.2	The type/model and registration number of the aircraft, engines and, where applicable, auxiliary power units and propellers.
1.3	The name and address of the organisation managing the continuing airworthiness organisation.
1.4	A statement signed by the Operator managing the aircraft continuing airworthiness, to the effect that the specified aircraft will be maintained to the programme and that the programme will be reviewed and updated as required.
1.5	MP contents, list of effective pages and their revision status.
1.6	MP Check periods, which reflect the anticipated utilisation of the aircraft. Such utilisation should be stated and include a tolerance of not more than 25%. Where utilisation cannot be anticipated, calendar time limits should also be included.
1.7	SM CAA Permitted Variations to Maintenance Periods.
1.8	Provision to record the date and reference of revisions incorporated in the MP.
1.9	Details of pre-flight maintenance tasks that are accomplished by maintenance staff.
1.10	The tasks and the periods (intervals/frequencies) at which each part of the aircraft, engines, APU's, propellers, components, accessories, equipment, instruments, electrical and radio apparatus, together with the associated systems and installations should be inspected. This should include the type and degree of inspection required.
1.11	The periods, at which components should be checked, cleaned, lubricated, replenished, adjusted and tested.
1.12	If applicable details of ageing aircraft system requirements together with any specified sampling programmes.
1.13	If applicable, details of specific structural maintenance programmes issued by the type certificate holder including but not limited to: <ul style="list-style-type: none"> a. Maintenance of structural integrity by damage tolerance and supplemental structural inspection programmes (SSID). b. Structural maintenance programmes resulting from service bulletins. c. Corrosion prevention and control programme (CPC). d. Design repair assessment criteria. e. Widespread fatigue damage criteria.
1.14	If applicable, details of critical design configuration control limitations (CDCCL), together with appropriate procedures.
1.15	The periods at which overhauls and replacements by new or overhauled components should be made.
1.16	Mandatory life limitations, certification maintenance requirements (CMR's) and AD's identified as to their mandatory status.
1.17	Scheduled maintenance required by STC holders.



1.18	Scheduled maintenance requirements for operational approvals.
1.19	Details of, or cross-reference to, any required reliability programme
1.20	FDR and CVR serviceability checks.
1.21	The MP review to ensure that it reflects current TC holder's maintenance recommendations and mandatory requirements.
1.22	The Operator review of the detailed requirements at least annually for continued validity in the light of operating experience.



APPENDIX 2

RELIABILITY PROGRAMMES

1. RELIABILITY PROGRAMMES

In preparing the programme details, account should be taken of this Appendix. All associated procedures should be clearly defined.

1.1 Objectives

1.1.1 A statement should be included summarising as precisely as possible the prime objectives of the programme. To the minimum it should include the following:

- (a) to recognise the need for corrective action,
- (b) to establish what corrective action is needed and,
- (c) to determine the effectiveness of that action

1.1.2 The extent of the objectives should be directly related to the scope of the programme. Its scope could vary from a component defect monitoring system for a small Operator, to an integrated maintenance management programme for a large Operator.

The manufacturer's maintenance planning documents may give guidance on the objectives and should be consulted in every case.

1.1.3 In case of a MSG-3 based maintenance programme, the reliability programme should provide a monitor that all MSG-3 related tasks from the maintenance programme are effective and their periodicity is adequate.

1.2 Identification of items

The items controlled by the programme should be stated, e.g. by ATA Chapters. Where some items (e.g. aircraft structure, engines, APU) are controlled by separate programmes, the associated procedures (e.g. individual sampling or life development programmes, constructor's structure sampling programmes) should be cross-referenced in the programme.

1.3 Terms and definitions

The significant terms and definitions applicable to the Programme should be clearly identified.

1.4 Information sources and collection.

1.4.1 [Sources of information should be listed and procedures for the transmission of information from the sources, together with the procedure for collecting and receiving it, should be set out in detail in the Maintenance Management Exposition or Maintenance Control Manual if the aircraft is operated under an Article 83bis agreement.]



1.4.2 The type of information to be collected should be related to the objective of the Programme and should be such that it enables both an overall broad based assessment of the information to be made and also allow for assessments to be made as to whether any reaction, both to trends and to individual events, is necessary. The following are examples of the normal prime sources:

- (a) Pilots Reports.
- (b) Technical Logs.
- (c) Aircraft Maintenance Access Terminal / On-board Maintenance System readouts.
- (d) Maintenance Worksheets.
- (e) Workshop Reports.
- (f) Reports on Functional Checks.
- (h) Reports on Special Inspections
- (g) Stores Issues/Reports.
- (i) Air Safety Reports.
- (j) Reports on Technical Delays and Incidents.
- (k) Other sources: EDTOs, RVSM, CAT II/III.

1.4.3 In addition to the normal prime sources of information, due account should be taken of continuing airworthiness and safety information promulgated by TC/STC Holders.

1.5 Display of information.

Collected information may be displayed graphically or in a tabular format or a combination of both. The rules governing any separation or discarding of information prior to incorporation into these formats should be stated. The format should be such that the identification of trends, specific highlights and related events would be readily apparent.

1.5.1 The above display of information should include provisions for “nil returns” to aid the examination of the total information.

1.5.2 Where “standards” or “alert levels” are included in the programme, the display of information should be oriented accordingly.

1.6 Examination, analysis and interpretation of the information.

The method employed for examining, analysing and interpreting the programme information should be explained.



1.6.1 Examination

Methods of examination of information may be varied according to the content and quantity of information of individual programmes. These can range from examination of the initial indication of performance variations to formalised detailed procedures at specific periods, and the methods should be fully described in the programme documentation.

1.6.2 Analysis and Interpretation.

The procedures for analysis and interpretation of information should be such as to enable the performance of the items controlled by the programme to be measured; they should also facilitate recognition, diagnosis and recording of significant problems. The whole process should be such as to enable a critical assessment to be made of the effectiveness of the programme as a total activity. Such a process may involve:

- (a) Comparisons of operational reliability with established or allocated standards (in the initial period these could be obtained from in-service) experience of similar equipment of aircraft types).
- (b) Analysis and interpretation of trends.
- (c) The evaluation of repetitive defects.
- (d) Confidence testing of expected and achieved results.
- (e) Studies of life-bands and survival characteristics.
- (f) Reliability predictions.
- (g) Other methods of assessment.

1.6.3 The range and depth of engineering analysis and interpretation should be related to the particular programme and to the facilities available. The following, at least, should be taken into account:

- (a) Flight defects and reductions in operational reliability.
- (b) Defects occurring on-line and at main base.
- (c) Deterioration observed during routine maintenance.
- (d) Workshop and overhaul facility findings.
- (e) Modification evaluations.
- (f) Sampling programmes.
- (g) The adequacy of maintenance equipment and publications.



- (h) The effectiveness of maintenance procedures.
- (i) Staff training.
- (j) Service bulletins, technical instructions, etc.

1.6.4 Where the Operator relies upon contracted maintenance and/or overhaul facilities as an information input to the programme, the arrangements for availability and continuity of such information should be established and details should be included.

1.7 Corrective Actions

1.7.1 The procedures and time scales both for implementing corrective actions and for monitoring the effects of corrective actions should be fully described. Corrective actions shall correct any reduction in reliability revealed by the programme and could take the form of:

- (a) Changes to maintenance, operational procedures or techniques.
- (b) Maintenance changes involving inspection frequency and content, function checks, overhaul requirements and time limits, which will require amendment of the scheduled maintenance periods or tasks in the approved maintenance programme. This may include escalation or de-escalation of tasks, addition, modification or deletion of tasks.
- (c) Amendments to approved manuals (e.g. maintenance manual, crew manual).
- (d) Initiation of modifications.
- (e) Special inspections of fleet campaigns.
- (f) Spares provisioning.
- (g) Staff training.
- (h) Manpower and equipment planning.

Note: Some of the above corrective actions may need the SM CAA approval before implementation.

1.7.2 The procedures for effecting changes to the maintenance programme should be described, and the associated documentation should include a planned completion date for each corrective action, where applicable.

1.8 Organisational Responsibilities.

The organisational structure and the department responsible for the administration of the programme should be stated. The chains of responsibility for individuals and departments (Engineering, Production, Quality, Operations etc.) in respect of the programme, together with the information and functions of any programme control committees (reliability group), should be defined. Participation of the competent authority should be stated.



[This information should be contained in the Maintenance Management Exposition or Maintenance Control Manual if the aircraft is operated under an Article 83bis agreement.]

1.9 Presentation of information to the SM CAA

The following information should be submitted to the competent authority for approval as part of the reliability programme:

- (a) The format and content of routine reports.
- (b) The time scales for the production of reports together with their distribution.
- (c) The format and content of reports supporting request for increases in periods between maintenance (escalation) and for amendments to the approved maintenance programme. These reports should contain sufficient detailed information to enable the competent authority to make its own evaluation where necessary.

1.10 Evaluation and Review

Each programme should describe the procedures and individual responsibilities in respect of continuous monitoring of the effectiveness of the programme as a whole. The time periods and the procedures for both routine and non-routine reviews of maintenance control should be detailed (progressive, monthly, quarterly, or annual reviews, procedures following reliability “standards” or “alert levels” being exceeded, etc.).

1.10.1 Each Programme should contain procedures for monitoring and, as necessary, revising the reliability “standards” or “alert levels”. The organisational responsibilities for monitoring and revising the “standards” should be specified together with associated time scales.

1.10.2 Although not exclusive, the following list gives guidance on the criteria to be taken into account during the review.

- (a) Utilisation (high/low/seasonal).
- (b) Fleet commonality.
- (c) Alert Level adjustment criteria.
- (d) Adequacy of data.
- (e) Reliability procedure audit.
- (f) Staff training.
- (g) Operational and maintenance procedures.



1.11 Approval of maintenance programme amendment

The SM CAA may authorise the Operator to implement in the maintenance programme changes arising from the reliability programme results prior to their formal approval by the SM CAA when satisfied that;

- (a) the Reliability Programme monitors the content of the Maintenance Programme in a comprehensive manner, and
- (b) the procedures associated with the functioning of the “Reliability Group” provide the assurance that the Operator exercises appropriate control over the internal validation of such changes.

2. POOLING ARRANGEMENTS

2.1 In some cases, in order that sufficient data may be analysed it may be desirable to ‘pool’ data: i.e. collate data from a number of Operators of the same type of aircraft. For the analysis to be valid, the aircraft concerned, mode of operation, and maintenance procedures applied should be substantially the same: variations in utilisation between two Operators may, more than anything, fundamentally corrupt the analysis. Although not exhaustive, the following list gives guidance on the primary factors, which need to be taken into account.

- (a) Certification factors, such as: aircraft TCDS compliance (variant)/modification status, including SB compliance.
- (b) Operational Factors, such as: operational environment/utilisation, e.g. low/high/seasonal, etc./respective fleet size operating rules applicable (e.g. ETOPS/RVSM/All Weather etc.)/operating procedures/MEL and MEL utilisation.
- (c) Maintenance factors, such as: aircraft age, maintenance procedures; maintenance standards applicable; lubrication procedures and programme; MPD revision or escalation applied or maintenance programme applicable.

2.2 Although it may not be necessary for all of the foregoing to be completely common, it is necessary for a substantial amount of commonality to prevail. Decision should be taken by the SM CAA on a case-by-case basis.

2.3 In case of a short-term lease agreement (less than 6 month) more flexibility against the para 2.1 criteria may be granted by the competent authority, so as to allow the owner/operator to operate the aircraft under the same programme during the lease agreement effectivity.

2.4 Changes by the Operator to the above, requires assessment in order that the pooling benefits can be maintained. Where an Operator wishes to pool data in this way, the approval of the SM CAA should be sought prior to any formal agreement being signed between Operators.

2.5 Whereas this paragraph 2.6 is intended to address the pooling of data directly between Operators, it is acceptable that the Operator participates in a reliability programme managed by the aircraft manufacturer, when the SM CAA is satisfied that the manufacturer manages a reliability programme which complies with the intent of this paragraph.