

Maintenance Programmes

CIAC 11-12

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GENERAL

Cayman Islands Aviation Circulars are issued to provide advice, guidance and information on standards, practices and procedures necessary to support Overseas Territory Aviation Requirements. They are not in themselves law but may amplify a provision of the Air Navigation (Overseas Territories) Order or provide practical guidance on meeting a requirement contained in the Overseas Territories Aviation Requirements.

RELATED REQUIREMENTS

This Circular relates to OTAR Part 39 Subpart C.

CHANGE INFORMATION

First Issue.

ENQUIRIES

Enquiries regarding the content of this Circular should be addressed to Manager Airworthiness civil.aviation@caacayman.com

CIAC: 11-12 Maintenance Programmes

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Introduction 1

- 1.1 The objective of this document is to provide guidance for the development and submission to the CAACI, for the approval of an aircraft Maintenance Programme.
- 1.2 It is the responsibility of the CAACI to ensure that aircraft on its register are effectively maintained in an airworthy condition. The CAACI approval of the Maintenance Programme provides a mechanism to record minimum standards of airworthiness that the owner/operator must comply with.
- 1.3 An Approved Maintenance Programme (AMP) will be the source of all scheduled inspections, relevant controls and supporting Consideration should be given to the Maintenance Programme always being active (subject of review and amendment) and often utilised document, which should provide for effective maintenance to be carried out in a logical, concise, clear and controllable manner.
- 1.4 Some of the subject material in this document may not be 'applicable' to the subject aircraft. This can only be confirmed by carrying out a detailed assessment, as it may be possible that the aircraft may be affected by subsections of a larger section. Caution should be exercised before assuming that a subject or a subpart of this guidance is considered 'not applicable'.

2 **Application**

- 2.1 Initial application for approval of a Maintenance Programme should be made to the CAACI by the VP-C Online system at www.vp-conline.com the application Form will require the following information:
 - Operator details (a)
 - Maintenance Programme document reference (b)
 - Base Document reference, MPD, MRB, AMM (c)
 - Bridging Check reference (d)
 - Applicability of Low Utilisation (e)
 - (f) Anticipated Annual Aircraft Utilisation
 - Technical Author contact details (g)
 - Uploaded copy of drafted MP and any associated documentation. (h)
 - Uploaded copy of the completed CIAC 11-12 (i)
- 2.2 On receipt and acceptance of the application, the CAACI will undertake a review and as required be in correspondence with the Technical Author.

3 **Application Liaison**

Throughout the application process, the applicant should readily identify to the CAACI the OTAR Part 39 approved organisation that shall be responsible for the initial and subsequent development and control of the programme; this should include: ensuring that the programme is suitably amended following regular and annual reviews.

MP Presentation 4

- 4.1 The applicant should review this guidance material, complete the application Form at Appendix B and submit it together with a draft maintenance programme, completed compliance document, supporting documentation and include payment of the appropriate application fee.
- 4.2 The Maintenance Programme can be submitted in either hard copy or electronic format.
- 4.3 The aircraft Maintenance Programme should contain a preface developed in line with the guidance template referenced at Appendix A. The objective of the preface is to record the process of controls and explanations of the Maintenance Programme contents.
- 4.4 Where the aircraft Maintenance Programme relies on other published documentation, references should be made to such and where relevant, on agreement, copies of this supporting documentation should be made available to the CAACI.
- 4.5 The responsible person/s or organisation nominated in paragraph 3 should have in place an appropriate subscription service to ensure any revisions made to the Maintenance Planning Document (MPD) or Chapter 5 inspection requirements are received for analysis to establish applicability and effective inspection regime.
- 4.6 The manufacturer's published Standard Maintenance Practices (SMP) is sometimes also known as manufacturers maintenance rules. These rules. which describe the inspection philosophy of the manufacturer, must be included and should become part of the introduction section of the Maintenance Programme. Where the manufacture has not adequately defined an SMP, where appropriate the applicant should provide for acceptable standards derived from typical and relevant data. In such circumstances this material should be made visible to the CAACI.
- 4.7 The MP shall be produced in the English language in a format that is readily understandable to maintenance personnel.

5 **Programme Basis**

- 5.1 The Maintenance Programme should normally be based upon the MRB report, where applicable, the TC holder's maintenance planning document or Chapter 5 of the maintenance manual, (the manufacturer's recommended maintenance programme).
- 5.2 Under OTARs, the aircraft shall be compliant with a specific Type Certification basis. The Technical Author should ensure that the Maintenance Programme development takes account of the actual certification basis as described by the applicable CAACI Type Acceptance Certificate. Issues such as requirements and standards for improvements in airworthiness and Mandatory requirements promulgated by the applicable State of Type Certification should be incorporated in the applicable sections of the Maintenance Programme.
- 5.3 The structure and format of these maintenance recommendations may be re-written by the owner or the nominated approved organisation to better suit the operation and control of the particular maintenance programme.
- 5.4 For a newly type-certificated aircraft where no previously approved maintenance programme exists, it will be necessary for the owner or nominated approved organisation to comprehensively appraise the manufacturer's recommendations (and the MRB report where applicable), together with other airworthiness information, in order to produce a realistic programme for approval.
- 5.5 In such circumstances it is most important to continually monitor the effectiveness of the Maintenance Programme whilst limited operational and inspection-finding data is available.
- 5.6 For existing aircraft types it is permissible for the operator to make comparisons with maintenance programmes previously approved. It should not be assumed that a programme previously approved for another operator or approved organisation would automatically be approved for another.
- 5.7 An evaluation should be made of the aircraft utilisation, landing rate (cycles), equipment fit and, in particular, the experience of the owner or approved organisation when assessing an existing programme.
- 5.8 Where the authority is not satisfied that the proposed Maintenance Programme can be used as is, the authority should request appropriate changes such as additional maintenance tasks or de-escalation of check frequencies as necessary.

6 **Applicability**

- 6.1 It is acceptable to maintain more than one aircraft to the same Maintenance Programme, principles of fleet optimisation, reliability data gathering and balancing scheduled maintenance tasks such as engine life are distinct advantages.
- 6.2 Typically it would be one operator responsible for the Maintenance Programme that would utilise the document to maintain several applicable aircraft in an airworthy condition.
- 6.3 Under OTARs and specifically recognising OTAR Part 39 Continued Airworthiness Management Approval, it is possible for more than one non-commercial air transport operator to have their aircraft maintained to a common Maintenance Programme.
- 6.4 If more than one aircraft of the same type is placed on a programme, a comparison check will be necessary and recorded in a supplemental section produced to identify the differences. Reference to the supplement must be clearly identified in the contents and introduction part of the Maintenance Programme.
- 6.5 It is most important where more than one aircraft is to be maintained to the same Maintenance Programme that the applicant obtains early agreement in principal with the applicable CAACI prior to developing the actual Maintenance Programme.

MP Approval 7

- 7.1 The CAACI will only indicate approval of a Maintenance Programme in writing and with the allocation of a unique reference number. This reference will normally be issued following a review and acceptance of the initial application.
- 7.2 On satisfactory completion of an investigation, the CAACI will provide an approval certificate that may be accompanied by a letter identifying any conditions and limitations.
- 7.3 The CAACI approval reference should be incorporated in the front section of the Maintenance Programme and any correspondence associated with the Maintenance Programme.

8 **MP Amendments**

- 8.1 Amendments shall in all cases be supported by sufficient technical justification that shall be recorded and utilised during the regular and annual review of the Maintenance Programme.
- 8.2 Amendments to the approved maintenance programme may only be approved in accordance with a Maintenance Programme approval procedure or for amendments that are not covered by such a procedure by the CAACI.
- 8.3 Application for amendment approval should be made utilising the VP-C online application system and be supported by sufficient technical justification.
- 8.4 Maintenance Programme Amendment Procedure: The author of the Maintenance Programme may develop a suitable procedure for amendments required of applicable approved technical documents such as Instructions for Continued Airworthiness, manufactures MPD, MRBR amendments, and to address typographical issues, task card technical instructions, cross references and similar issues. In having such a procedure approved by the CAACI (approved by MP raised Issue not amendment) will afford the incorporation of these amendments without having to gain separate CAACI approval. Only the applicable OTAR Part 39 approved organisation in airworthiness management of the subject aircraft, has the privilege to utilise this amendment procedure and shall have compatible procedures in its MCM to ensure sound technical and compliant decisions are made. This procedure is conditional on the CAACI being kept up to date with such amendments by controlled copy amendment procedures. The CAACI reserves the right to reject or require alterations to Operator approved amendments.
- 8.5 Any amendment that escalates inspection frequencies, deletes an inspection task unless due by applicability/configuration, amendments to the inspection methodology such as zonal, block checks, equalised task interval controls and those amendments not covered by definition in an approved MP procedure will require CAACI direct approval.
- 8.6 Controlled Copy Maintenance Programme procedures shall be developed and be administered by the applicable OTAR Part 39 approved organisation ensuring all copy holders are kept up to date with the revision status of the Maintenance Programme. For amendments approved in accordance with section 8.4 above, visibility shall be made to the CAACI by a signed declaration of compliance to the protocols of the Maintenance Programme and applicable requirements of OTARs.

9 Regular and Annual Review

- 9.1 The maintenance programme should be reviewed at least annually. All supporting documents referenced in the Maintenance Programme should be considered during the annual review.
- 9.2 For aircraft subject to reliability analysis, the Maintenance Programme review should be conducted at intervals commensurate with the reliability programme.
- 9.3 In order to meet the requirements of the Air Navigation (Overseas Territories) Order (AN(OT)O) It is the responsibility of the nominated person/organisation identified in 3.1 to ensure that applicable promulgated instructions for continued airworthiness:
 - that are mandatory and non-mandatory; and (a)
 - (b) for incorporated design changes (modifications and repairs); and
 - (c) As required by the CAACI

are evaluated for applicability and suitable Maintenance Programme amendments are developed for approval.

- 9.4 Regular and annual reviews of the maintenance Programme shall as a minimum include the following items:
 - (a) Applicable Mandatory Directives;
 - Where applicable, evaluations of reliability analysis: (b)
 - (c) Operational issues;
 - (d) Maintenance findings;
 - (e) Type Certificate holder's recommendations;
 - If applicable, revisions to the MRB report; (f)
 - (g) Revisions to Chapter 5 Maintenance Manual:
 - (h) Any applicable Supplemental Type Certificate Holders revisions to instruction for continued airworthiness;
 - (i) Aircraft utilisation:
 - Changes to aircraft field of operations; (j)
 - Review of aircraft and equipment life limits; (k)

- (l) Review of CPCP tasks and findings.
- (m) Review of incorporated MP amendments
- 9.5 If the aircraft or its engines are not supported by a manufacturer's Reliability programme, because the aircraft is below a particular weight category, reviews of PIREPS, component removal, TBO, MEL usage, defect worksheets, MORs or ASRs for trends or patterns should be undertaken.
- 9.6 For aircraft operating to a Low Utilisation, the regular and annual review should take account of the periods of Parking/Storage, please refer section 29 of this document.
- 9.7 The person or organisation responsible for maintaining the Maintenance Programme should maintain records of all applicable promulgated continued airworthiness information. Following the review of this information, records should be maintained of technical justification supporting the amendment decisions for both inclusion and non-inclusion to the Maintenance Programme.

10 **Human Performance**

Consideration should be given to human performance within the maintenance programme and specifically to the document format and user defined functions of the Maintenance Programme such as:

- 10.1 Maintenance Planning: data required to effectively produce maintenance inputs including the arrangement of inspections in a manner that avoids conflicts of inspection/maintenance activities typically known as task orientation;
- 10.2 Mandatory Inspection Tasks: ensure that maintenance planning personnel have clear visibility of such tasks preventing any unauthorised escalation:
- 10.3 Required Reporting: tasks associated with reporting such as SSID are readily identified;
- 10.4 Critical Task Controls: visibility of tasks that are critical in nature are planned and allocated in a segregated manner that prevents the possibility of multiple error maintenance;
- 10.5 Maintenance Resource Planning: tasks requiring specialised tooling and or techniques are readily identified with references to required resources.

11 **Pre-Flight Inspections**

- 11.1 The Maintenance Programme should readily identify inspection task requiring a certificate of release to service. Normally Pre-Flight inspection tasks do not require the issue of a Certificate of Release to Service.
- 11.2 Pre-Flight inspection tasks should remain part of the Maintenance Programme in order to control their effectiveness.
- 11.3 Pre-flight inspections often vary between aircraft manufacturers. It is most important when determining the content of a pre-flight inspection the need to issue a Certificate of Release to Service.
- 11.4 A maintenance task requiring a release to service is normally identified by the aircraft manufacture. Where this is not clear or is ambiguous, contact should be made with the CAACI to establish when a particular maintenance task requires a Certificate of Release to service.

12 Migrating aircraft between Maintenance Programmes

- 12.1 When transferring an aircraft between maintenance programmes, the transfer should be carried out in a controlled manner that is also approved by the CAACI.
- 12.2 A 'bridging check' should be determined and form the basis of the technical justification required by CAACI for their approval of the aircraft transfer.
- 12.3 A 'bridging check' does not in itself mean a maintenance package; it is the product of a detail analysis of the transfer aircraft maintenance history in relation to the Maintenance Programme the aircraft is to be placed under. Typically there may be some maintenance activity at the time of transfer; the amount will clearly be influenced by the current maintenance status of the subject aircraft and to the extent the Maintenance Programme has been developed.
- 12.4 The transfer proposal to the CAACI should detail the immediate maintenance activities, the duration of the transition encompassing the scheduled maintenance activities, any variations including escalations to inspection periods.
- 12.5 Consideration should where applicable be given to reliability programmes and any significant changes in operation.
- 12.6 Records of any Corrosion Protection Corrosion Control, SSID programme should form part of the transfer analysis.

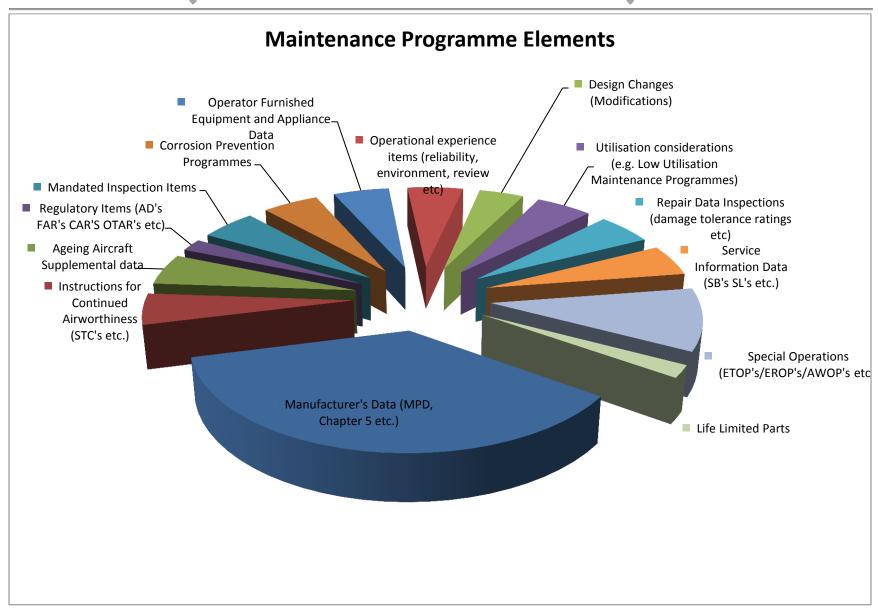
- 12.7 In order to allow an aircraft to change operators in a timely manner it may be necessary to have an aircraft recorded against two maintenance programmes for a limited time. This is allowable, provided the circumstances and controls associated with the duplication and a suitable end date is clearly annotated and agreed by all parties including the CAACI.
- 12.8 Aircraft records should make reference to the approved transfer arrangements quoting the CAACI approval reference.

13 **Maintenance Programme Content**

- 13.1 The Maintenance Programme should be developed from the manufacturer's documents that may be in the form of: chapter 5 of the maintenance manual or derived from an MSG process.
- 13.2 The Template at Appendix 'A' identifies subject material that should be considered in the schedule and preface sections of the Maintenance Programme. Completion of this Appendix should provide for visibility of compliance to the requirements of OTARs.
- 13.3 Any repetitive instructions of continued airworthiness (ICAs) derived from modifications and repairs should also be incorporated into the approved Maintenance Programme.
- 13.4 For aircraft types where Certification Maintenance Review (CMR) tasks are identified as part of the Type Certification process, these tasks should be subject to separate procedures for escalation.
- 14.5 Visibility to mandatory tasks such as Certificate of Maintenance Requirements (CMR) and Failure Effect Categories (FEC) found within the MPG-3 logic flow path should be readily made in the Maintenance Programme order that such requirements are not the subject of unauthorised variations to frequency of inspection.
- 14.6 Task frequency should be clearly identified within the introductory parts of the Maintenance Programme from 'A' Check or 1st Flight of the day to major inspections periods/intervals.
- 14.7 The Maintenance Programme, where possible, should identify aircraft panel charts and aircraft Zones (Zoning).
- Where a Supplemental Type Certificate such as for a cabin interior has 14.8 established the configuration of the aircraft, the appropriate configuration inspection manual should be appropriately referred to for aircraft inspections effected by the configuration changes. These would typically be for gaining access and planning for task orientation.

- 14.9 For aircraft declared as Low Utilisation, the Maintenance Programme should identify the parameters for when an aircraft falls out of active operation into Parking/Storage and readily identifies scheduled maintenance task required to maintain the aircraft in an airworthy or preservation condition as applicable.
- 14.10 As an aid to identifying the content of a maintenance programme, below you will find a chart highlighting a typical structure of technical content, please consider this in reference to the development of your maintenance programme.







14 Inspection Standards

- 14.1 All significant terms and abbreviations used within this Programme/Schedule to define each maintenance task are defined in accordance with the Type Certificate holder's definitions, current OTAR or, in the absence of formal definitions, those quoted in World Airlines Technical Operations Glossary.
- 14.2 The inspection standards applied to individual task inspections must meet the requirements of the Type Certificate holder's recommended standards and practices. In the absence of specific manufacturer's guidance, refer to UK CAA CAP 562 Civil Aircraft Airworthiness Information and Procedures or FAA AC 43-13-1A Aircraft Inspection and Repair or other approved data, as appropriate.
- 14.3 The Maintenance Programme should include a paragraph describing in detail, mandatory items such as duplicate inspections (either at main base or especially when aircraft goes to an off island, Third party maintenance organisation that is unfamiliar with the format of a duplicate inspection philosophy). In addition, consideration should also be given to assessment of 'vital points and critical task inspection'.

15 Permitted Variations to Maintenance Periods

- Periods prescribed by the Maintenance Programme may only be varied with the approval of the CAACI or through a procedure developed in the maintenance programme and approved by the CAACI.
- 15.2 Subject to CAACI approval for inclusion in the Maintenance Programme and unless specifically prohibited by an Airworthiness Directive or manufactures requirement inspection periods may be varied in accordance with the 'Inspection Planning Tolerance Extensions' (shown in Table 1).
- 15.3 It is the responsibility of the Technical Coordinator (TC) or contracted approved Continued Airworthiness Management organisation to ensure that arrangements are effectively established to maintain the aircraft in accordance with the approved Maintenance Programme.
- Notwithstanding paragraph 15.2 and unless specifically prohibited by, an airworthiness directive or a manufacturer's requirement, the inspection periods specified in the maintenance programme may be extended in accordance with the provisions of the Approved Maintenance Programme as follows:

Table 1

PERIOD	MAXIMUM VARIATION		
Items (controlled by flying hours		
5,000 flying hours or less	10%		
More than 5,000 flying hours	500 flying hours		
Items controlled by cale	ndar time		
One year or less	The lesser of 10% or one month		
More than 1 year but less than 3 years	2 months		
More than 3 years	3 Months		
Items controlled by cycl	es or landings		
500 cycles/landings or less	The lesser of 10% or 25 cycles/landings		
More than 500 cycles/landings	The lesser of 10% or 500 cycles/landings		

- 15.5 For items that are controlled by more than one limit i.e. flying hours and calendar time, the more restrictive limit will apply.
- 15.6 The extension granted to Table 1 parameters should be supported by appropriate technical justification. This justification should be established from a detailed review of the aircraft records, maintenance and operational history. It should also establish inspection requirements that cannot be subject to variation as per Table 1.
- 15.7 The period to the next required inspection shall be deemed to begin at the beginning of the extension period. No extension may be taken towards the next required inspection.

16 Task Card

- 16.1 An important feature of Task cards is recognising their role in achieving the required maintenance standard.
- 16.2 Task Cards should be manageable, offer clear sections for correct certification (i.e. sign and stamp). Give clear instructions to maintenance personnel as to the necessary task. This includes ensuring that references to other documents have been previously assessed and if not applicable the task is amended.
- 16.3 Where task cards contain actual maintenance instruction data. arrangements must be made to ensure appropriate document controls.

16.4 Critical task control particular regarding error maintenance can be effectively mitigated when Task Cards are formatted in such a manner that provides production maintenance planners appropriate indicators and data to make provisions for segregation, appropriate resources and task orientation.

17 **Environmental**

- 17.1 Fuel systems are susceptible to microbiological growth in hot humid conditions and increased water content when the aircraft sits on the ground in a hot humid climate. Fuel system water sampling tasks and fuel tank structural inspection may need to take account of the likelihood of microbiological contamination and corrosion.
- 17.2 Consideration should be given to aircraft utilisation and monitoring of aircraft routinely operating in adverse weather conditions (i.e. salt laden atmosphere, high humidity, extreme heat etc). Considerations should include; an increase in restorative maintenance inputs, for example cleaning and lubrication, inspection of protective finishes.
- 17.3 There should be mitigations for the effects of operating aircraft on runways that have been categorised as rough surfaces. Manufacturer's recommendations such as the Short Wavelength Roughness (SWR), service letters and maintenance requirements should be appropriately incorporated in to the Maintenance Programme. Typical mitigations are an increased lubrication frequency of undercarriage components and fittings due to an increase in lubrication migration from bearing surfaces. Where published data is not available, guidance should be sought from the aircraft manufacturer.

18 Corrosion of Aircraft Structures

- 18.1 Corrosion Control programmes require specific controls, procedures and reporting protocols. The Maintenance Programme should furnish the details of the specific requirements including clear visibility to the related inspection tasks in order that production maintenance planning can resource the required tasks appropriately.
- 18.2 Where the manufacturer makes no specific reference to corrosion control programs, this should be taken into account when inspecting structure for condition. The assessment may require adjustment of maintenance program periods. The application of corrosion inhibitors during maintenance may significantly improve the duration of the airframe.

19 **Mandatory Requirements**

- 19.1 The inclusion of repetitive Airworthiness Directives (AD) or Service Bulletins (SB) in the Maintenance Programme should be considered to reduce the use of the 'Out of Phase' task management function.
- 19.2 published Fatique lives and mandatory life limits by the constructor/manufacturer or by the CAACI, should be included in the Maintenance Programme.
- 19.3 Fuel Tank System Safety is now a feature for many aircraft types. Mandatory requirements are now published with compliance times. The rectification actions are complex involving many disciplines. The Maintenance Programme should be amended accordingly ensuring that the appropriate continued airworthiness instructions are referred to.

20 **Design Changes**

- 20.1 An approved modification or repair incorporated to the aircraft may also have "Instructions for Continued Airworthiness'. These should be assessed and included in the Maintenance Programme.
- 20.2 Significant structural changes may have an effect to structural programmes that in some cases may not have been finalised at the time of incorporation. This may be due to a fatigue damage assessment that only effects the fatique lives from a total cycle/hour amount not yet achieved. In such circumstances it is most important to ensure there is a marker in the maintenance programme. This is to ensure that nearer the operation life when the fatigue effects take hold, material required to amend the structural programme is obtained from the Supplemental Type Certificate holder.

21 Special operations

- 21.1 Special operational approvals granted by the CAACI such as ETOPS, RVSM, AWOPS, and MNPS etc. may involve changes to maintenance inspection requirements, frequency or tasks introduced by modification to the aircraft.
- 21.2 In order to satisfy the approval process of the special operation, the inspection tasks supporting the aircraft capability should be referenced.

22 **Equipment Carriage**

- 22.1 The AN(OT)O Schedule 4 and 5 identifies mandatory equipment requirements for types of aircraft and operation. Commensurate with the actual equipment fitted to conform to these requirements, any instructions for continued airworthiness should also be incorporated into the Maintenance Programme.
- 22.2 Any other equipment carried should also have any continued airworthiness instructions incorporated into the Maintenance Programme.
- 22.3 Typically the 'installation modification' of additional equipment should identify any required continued airworthiness inspections. These may be in the form of vendor manuals determined as suitable documents. In the absence of such instructions suitable inspection techniques should be identified per paragraph 14.2.

23 **Safety Equipment**

- 23.1 Where the aircraft is required to carry safety equipment this should be checked for serviceability at regular intervals. The manufacturer should specify overhaul and retirement periods.
- 23.2 The maintenance programme can make provision for fleet sampling of emergency equipment such as slide rafts. When sufficient operating aircraft allow for a fleet sampling programme, CAACI agreement should be established for its introduction in line with information promulgated by the safety equipment manufacture.

CVR/FDR 24

- 24.1 For each installed CVR/FDR, arrangements for data acquisition and verification of recorded data should be established with a recognised playback facility.
- 24.2 The applicable Type acceptance standards should be applied for the development of the periodicity for the testing of and recorded data verification for each installed CVR/FDR.
- 24.3 Records should be maintained for a minimum period of 24 months for all testing undertaken.
- 24.4 Equipment manufacturers and continued airworthiness instructions consistent with the approved installation for a CVR/FDR shall be integrated as scheduled requirements of the Maintenance Programme.

25 **Battery Capacity Check**

Routine capacity check should be carried out in accordance with manufacturer's instructions and periods where specified; or the following periods shall apply:

- Lead acid Battery 3 months (a)
- Ni-Cad Battery 4 months. (b)

Weight and Balance 26

- 26.1 An aircraft weighing schedule should also be included into the Maintenance Programme. Note: Any permanent, non-operational role changes to the aircraft either by modification or repair that either add or reduce weight needs to be assessed, calculated and if necessary the aircraft weight records and the Weight and Balance C of G Schedule will require amendment.
- 26.2 The aircraft should be weighed in accordance with the frequency and manner defined in OTAR 39.81 and should be included within the approved maintenance programme.

27 Low Utilisation Maintenance Programmes

- 27.1 A maintenance-planning document is produced by a manufacturer, which is formatted on an idealised model of an aircraft's "average" annual utilisation based on commercial/marketing criteria, and this model is applied during type certification.
- 27.2 It is acknowledged that the annual utilisation of certain operators is outside the range, which is termed "average" for that aircraft's operation.
- 27.3 As long as the annual utilisation declared by the operator in the front of the maintenance programme is within the definition of the "average" (in other words what the aircraft was designed for) there is no need for a Low Utilisation Maintenance Programme (LUMP).
- 27.4 Where it is determined that the actual aircraft utilisation will be below the Type Certified utilisation, this should be considered as a design change. In such circumstances the Type Certificate holder may have developed a Low Utilisation Maintenance Programme that may be suitable for the specific operation and environment.
- 27.5 An operator proposing a Low Utilisation Maintenance Programme should have consulted the Type Certificate holder for technical support in developing their Maintenance Programme.

- 27.6 It is probable that 'Hard times' and component overhauls may be additional features.
- 27.7 The reliability programme will be less effective due to lack of statistical data and the MEL may need a review due to changes in the systemic reliability of components.
- 27.8 Generally the aircraft is assessed for exposure to risk of failures that is heavily dependent on:
 - (a) Flight Cycle / Flight Hours ratio;
 - (b) Average sector length;
 - Operating environment; (c)
 - (d) Flight Hours vs. Airframe design life;
 - (e) Structures and systems loading;
 - (f) Reliability predictions.

For an aircraft on a LUMP normal assessments of the above may prove inadequate. It is most important that special consideration is given to these in view of the typical compromises and associated causal factors of low utilisation.

- 27.9 Recommended lubrication tasks are based on average utilisation predictions therefore lubrication tasks triggered by Flight Cycles or Flight Hours will be less frequent on aircraft with low utilisation, allowing corrosion growth which could be accelerated in a harsh environment.
- 27.10 The operator must consult the Type Certificate holder who may only provide feedback on world fleet reports; therefore the operator will need to add its own experience from their reliability programme to include their own specific experience.
- 27.11 Low utilisation may lead to accumulation of moisture, reduced distribution of oil/grease and possible chemical breakdown of oil/grease. This could lead to increased internal corrosion of structures, power plants and components.
- 27.12 A LUMP should address the accumulation of moisture in cargo holds, door sills require drains to be regularly exercised, this is even more important in winter conditions. Also the lack of protective oil/grease on exposed surfaces i.e. landing gear oleos will increase corrosion growth.
- 27.13 Seal leakage is a common fault when aircraft sit around in cold conditions for long periods. Some hydraulic fluids especially reclaimed fluids would

break down and separate causing internal leaking of actuators when overheated or left for long periods.

- 27.14 Low distribution rates of oil/grease may lead to an increase in the predicted mechanical wear-out rate and corrosion of control cables and mechanical systems. Corrosion is accelerated in moist ground conditions and slower when the aircraft operating in a dry cold atmosphere.
- 27.15 Fuselage insulation blankets will be prone to moisture accumulation requiring additional inspections as they are likely to accumulate large quantities of water on the ground due to humidity or inclement weather, if the insulation blankets are not sealed they will soak this water up causing corrosion and increase the aircraft weight.
- 27.16 Structural areas may not be opened up and inspected for long periods of time as they normally would for servicing therefore corrosion will progress undetected
- 27.17 When a structural area is opened up there may be a need for the inspections standard to be modified from General Visual to Detailed in order to identify known vulnerable areas.
- 27.18 Low Utilisation may affect electronic component reliability due to relatively long periods of power down. In a low voltage electronic system a small amount of resistance due to corrosion build up possibly due to inactivity could damage a sensitive system.
- 27.19 BITE functionality may be affected invalidating the statistical assumptions with some BITE functions only take place on boot up of an electronic system if this is not happening regularly there may be a dormant failure it also means the systems are not checked and exercised on a regular basis.
- 27.20 Battery reliability may be significantly affected by loading profile changes this includes implanted cells within equipment.
- 27.21 Exposure to corrosion will affect terminals, bond joints and plug breaks therefore terminals and joints such as Engine Fire detection systems, which are particularly susceptible to break down from corrosion, and deposits should be considered.
- 27.22 Avionics systems like work and function far better if worked regularly, if left for long periods of time they are susceptible to spurious interference.
- 27.23 Manometric elements in aircraft instrument systems may require additional maintenance due to moisture ingress and fungi contamination. Most Instruments are ventilated on a regular basis during normal operation and predominately to remain free from contamination; this may not be the norm for a low utilised aircraft.

28 Reliability

- 28.1 A reliability programme should feature in a Maintenance Programme in the following circumstances:
 - The aircraft maintenance programme is based upon MSG-3 logic; (a)
 - (b) The aircraft maintenance programme includes condition monitored components;
 - The aircraft maintenance programme does not contain overhaul (c) time periods for all significant system components;
 - (d) When specified by the manufacturer's maintenance planning document or MRB.
- 28.2 A reliability Programme need not be developed in the following cases:
 - The maintenance programme is based upon the MSG-1 or -2 logic (a) but only contains hard time or on condition items;
 - (b) The aircraft is not above 5700Kgs MTOWA or multi engine helicopter;
 - The aircraft maintenance programme provides overhaul time (c) periods for all significant system components.
 - Note: for the purpose of this paragraph, a significant system is a system the failure of which could hazard aircraft safety.
- 28.3 The CAACI for approval will require access to all data used to prepare the reliability programme as submitted.
- 28.4 The objective of the reliability programme should be included detailing the prime elements of the programme. As a minimum it should include a statement to:
 - (a) substantiate that the existing schedule of inspections are appropriate in maintaining the aircraft in an airworthy condition; and
 - (b) identify corrective action to any issues of reliability; and
 - establish that system reliability conforms to any applicable (c) performance data promulgated by the aircraft manufacturer; and
 - (d) determine the optimum level of scheduled inspections; and

- (e) determine the effectiveness of any amendment to the schedule of inspections.
- 28.5 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 commercial operator. The manufacturer's maintenance planning documents may give guidance on the objectives and should be consulted in every case.
- 28.6 The type of information to be collected for analysis should be related to the objectives 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:
 - (1) Pilots Reports;
 - (2) Technical Log;
 - Aircraft Maintenance Access Terminal / On-board Maintenance (3)System readouts;
 - (4) Maintenance Worksheets:
 - Workshop Reports; (5)
 - Reports on Functional Checks; (6)
 - (7) Reports on Special Inspections;
 - (8)Stores Issues/Reports;
 - (9)Air Safety Reports;
 - (10)Reports on Technical Delays and Incidents;
 - Other sources: ETOPS, RVSM, CAT MIL. (11)
- 28.7 Information and data collection; 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 referred to. These procedures should reside with the organisation responsible for the continued airworthiness management of the aircraft and be reflected in their Maintenance Control Manual.
- 28.8 Reliability programmes are dependent on sufficient data sampling, fleet size is clearly a factor in data gathering. For small fleet sizes of fewer than 6 aircraft of the same type, the following should be considered:

- (1) Complex reliability programmes could be inappropriate for a small fleet. It is recommended that such operator's tailor their reliability programmes to suit the size and complexity of operation.
- (2) One difficulty with a small fleet of aircraft consists in the amount of available data that can be processed: when this amount is too low, the calculation of alert level is very coarse. Therefore "alert levels" should be used carefully.
- (3)An operator of a small fleet of aircraft, when establishing a reliability programme, should consider the following:
- (a) The programme should focus on areas where a sufficient amount of data is likely to be processed.
- (b) When the amount of available data is very limited, then engineering judgement is then a vital element. In the following examples, careful engineering analysis should be exercised before taking decisions.
- A "0" rate in the statistical calculation may possibly simply reveal (c) that enough statistical data is missing, rather that there is no potential problem.
- 28.9 When alert levels are used, a single event may reach the alert level. Engineering judgement is necessary so as to discriminate an isolated incident from an actual need for a corrective action. It is advisable in such circumstances to review other data sources such as other similar operational data to verify decisions made.



MAINTENANCE PROGRAMME TEMPLATE

COMMERCIAL AND NON-COMMERCIAL AIR TRANSPORT

The purpose of this Maintenance Programme Guidance Document is to assist applicants with a view to ensuring that Maintenance Programmes submitted to the CAACI for approval have been developed in a standardised fashion, have visibility of compliance to OTARs and include the elements required to ensure that the subject aircraft can be effectively maintained in an airworthy condition.

The front sections of the maintenance programme and where applicable the schedule sections should be developed in consideration of this guidance document.

It is intended that this document establishes a standardised format, however in developing a Maintenance Programme you will inevitably have to take account of the nature of included material, cater for operator related material and be dependent on other documentation with a consequence that this may alter the formatting from this document. Where the applicant has deviated from this guidance format, completing and maintaining this document in cross reference will assist in establishing continued visibility of compliance to the applicable OTARs.

It is not intended that this document should constrain or prevent the applicant from including required information. In all cases where the applicant has included additional data or other means of compliance, the applicant should submit with the Maintenance Programme an explanatory document detailing any such changes.

The columns titled MCM (maintenance control manual) MP (maintenance programme) References should be entered where appropriate. Where it is determined that the subject is not applicable, is covered by a process in another document, or is dealt with in an alternative way, details of the variance including any cross references should be recorded in the 'Compliance Notes' column.

The column titled Section Interpretation is designed to assist the applicant to develop the text in a particular section/paragraph.

Application Details

OPERATOR

TECHNICAL CO-ORDINATOR

AOC NUMBER *where applicable

CONTRACTED PART 39 ORGANISATION

MCM REFERENCE

MP REFERENCE

TECHNICAL AUTHOR - PERSON TO CONTACT

CIAC: 11-12

				R	eport	
#	OTAR AN(OT)O Reference	MCM Reference	MP Reference	Compliance Notes	Subject	Section Interpretation
1	39.61(a)			Insert developed text here	Approval statement, document reference and revision status	A section for the inclusion of the [CAACI] approval letter and or its reference, the Maintenance Programme reference, revision status at time of original approval.
	Surveyors C	l comments:				
2	39.61(b)			Insert developed text here	Amendment Control	This section should identify the document; and
	Surveyors C	omments:		<u> </u>		
3	39.63(b)(7)			Insert developed text here	Applicability by aircraft designation including engine, propeller, APU and registration	This paragraph should replicate the aircraft listed in an operations manual unless the operator utilises separate maintenance programmes for the operating fleet of aircraft. For each maintenance programme this section should identify the aircraft that are required to be maintained to the inspection requirements of the programme. A policy should be developed to prevent aircraft from being referenced in this section without a CAACI approved plan (transition) for a bridging check
	Surveyors C	omments:	l			

4	39.63(b)(1)	Insert developed text here	Name address of Owner Operator and Maintenance Programme Developer	This paragraph should detail the responsible operator of the aircraft, any applicable Technical Co-ordinator and any contracted continued airworthiness organisation secured for the management of the maintenance programme.
	Surveyors Comments:			
5	39.55	Insert developed text here	Name address of OTAR Part 39 Organisation	For Commercial Air Transport Operations, this section should record the applicable OTAR Part 39 organisation undertaking CAW management of the applicable aircraft.
	Surveyors Comments:			
6	39.61(h)(5)	Insert developed text here	Programme Development	This paragraph should either reference the operators MCM section or detail the operator's policy on the development of the maintenance programme in light of operational and maintenance experiences.
	Surveyors Comments:			

7	39.61(g)		Insert developed text here	Policy on	SUGGESTED OPERATOR'S CERTIFICATION
'	00.01(g)			Continued	STATEMENT
				Airworthiness	In the preparation of this Maintenance Programme to meet
				All Worthiness	The requirements of OTAR Part 39, the recommendations
					made by the airframe constructors and engine and
					equipment manufacturers have been evaluated and, where
					appropriate, have been incorporated. It is accepted that any
					inspection requirements specified by the Director of CAACI
					shall be incorporated. This Maintenance Programme lists the
					tasks and identifies the practices and procedures specified
					by the applicable Type Certificate Holder(s), which form the
					basis for the scheduled maintenance of the aircraft(s). The
					operator undertakes to ensure that these aircraft will
					continue to be maintained in accordance with this
					programme. The data contained in this programme will be
					reviewed for continued validity at least annually in the light of
					operating experience. It is accepted that this programme
					does not prevent the necessity for complying with any new
					or amended OTAR where any new or amended
					requirements may override elements of this programme. It is
					understood that compliance with this programme alone does
					not discharge the operator from ensuring that the
					programme reflects the maintenance needs of the aircraft,
					such that continuing safe operation can be assured. It is
					further understood that the CAACI reserves the right to
					suspend, vary or cancel approval of the Maintenance
					Programme if the CAACI has evidence that the requirements
					of the Maintenance Programme are not being followed or
					that the required standards of airworthiness are not being
					maintained.
					Name
					Position
					Signed
					For and on behalf of operator: Date:
					To and on bondii of opolator.
	Surveyors C	Comments:			

39.61(h)(11)	Insert developed text here	Acronyms		should detail the meaning of any
				sed such as:
			Acronyms	Designation
			A/C	Aircraft
			EASA	European Aviation Safety Agency
			FAA	Federal Aviation Administration
			TCCA	Transport Canada Civil Aviation
				Directorate
			FC	Failure Cause
			FF	Functional Failure
			ISC	Industry Steering Committee
			MP	Maintenance Programme
			MPD	Maintenance Planning Document
			MRB	Maintenance Review Board
			MRBR	Maintenance Review Board Report
			MTBF	Mean Time Between Failure
			MTBUR	Mean Time Between Unscheduled
				Removal
			MSG-3	Maintenance Steering Group 3
			MSG-2	Maintenance Steering Group 2
			MSG-1	Maintenance Steering Group
			MWG	Maintenance Working Group
			PPH	Policy and Procedures Handbook
			WFD	Widespread Fatigue Damage

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			 Modification, Repairs. Fuel Tank Safety Inspection Programmes Wide Spread Fatigue Damage Cabin Hand Book Component Vendor Maintenance Data
Surveyors Comments:			
39.61(c)	Insert developed text here	Inspection Task Development	Definitions of inspection standards, standard practices and procedures identified by the TC holder should be included in this section. Definitions should include Detailed Visual, General Visual and any other defined methodology of inspection specified by the applicable design authority. The Inspection Schedule should clearly identify the nature and level of the specified inspection in line with these definitions.
Surveyors Comments:	·		
39.61 (g)	Insert developed text here	Special Conditions	This section describes the process and policy of developing amendments in response to conditions imposed by the CAACI.
			Surveyors Comments: 39.61 (g) Insert developed text here Special

	Surveyors Comments:			
12	39.61(h)(9)	Insert developed text here	Special Operations	Where an operator holds specific operational approvals that have associated continued airworthiness requirements, the maintenance schedule section should contain the applicable CAW inspection requirements. This paragraph should list the special operations that the maintenance programme supports such as: • AWOPS • MNPS • RVSM • ETOPS • HEMS • DANGEROUS GOODS • OFFSHORE OPERATIONS Where an operator holds an MCM this paragraph may reference any supporting procedures.
13	Surveyors Comments: 39.61(h)(4) Surveyors Comments:	Insert developed text here	Operational Description - Utilisation	This paragraph should outline the general nature of the type of operation including any regular unusual operations, the typical environmental conditions and predicted utilisation. There should be a statement compatible with the manufactures utilisation criteria in respect to variances of actual utilisation be it low or high.
14	39.61(h)(1)	Insert developed text here	Programme Description	This paragraph should identify the methodology of the inspection requirements be it hard time, MSG2 or MSG3.
	Surveyors Comments:			

15	39.61(h)(8)	Insert developed text here	Trend analysis Procedures Reporting	This paragraph should either reference the operators MCM section or detail the procedures for any required reliability trend analysis.
	Surveyors Comments:			
16	39.65(a)	Insert developed text here	Condition Monitoring	This section should detail the nature of the monitoring programme, any reporting requirements and procedures, by cross-reference if applicable.
	Surveyors Comments:			
17	39.61(d)	Insert developed text here	Amendment introduction	This section should identify introduction controls for significant amendments. Amendments that by example alter the inspection methodology, without appropriate controls for their introduction may have an adverse The controls should cater for introduction, transition and bridging of significant amendments whilst taking account of change management processes of an applicable SMS.
	Curvoyora Commentar			
18	Surveyors Comments: 39.61(e)	Insert developed text here	Human Factors Critical Task Control	The document and its instructions for utilisation (production planning) must contain information on any critical inspection tasks including any controls that should have been developed to take account of human factors. It is suggested that this section contains either a list of any significant critical inspection tasks or a reference to those contained in the schedule section in such a manner that enables maintenance production planning to accommodate them in consideration of human factors in maintenance.

19	39.61(h)(2)	Insert developed text here	Special Maintenance Instructions	It is useful to identify any special maintenance instructions particularly where specialised tooling requirements exist, additional access task requirements due modification status, equipment maintenance instructions and special processes including any need for specialised working parties etc. This data should enable the production planning and maintenance provider to resource their facility commensurately for the planned maintenance input.
	Surveyors Comme	nts:		
20	39.57(a)	Insert developed text here	Maintenance Requirements	This section should detail by cross reference to the Inspection Schedule the nature of facilities required to accomplish the identified inspect tasks such as Line Maintenance, Ramp Inspections, Base Maintenance On-Route Maintenance to be conducted by a Person Authorised by the Director.
	Surveyors Comme	nts:		
21	39.61(h)(6)	Insert developed text here	Variation Instructions Policies	This section should detail procedures for varying inspection intervals as defined in Appendix 1. This section should also detail the procedures that ensure mandatory and technical justification required and that of an application for further extensions that require OTAA approval.
	Surveyors Comme	ts:		

22	39.61(h)(3)	Insert developed text here	Inspection	The inspection schedule should identify the method of
			Schedule	interval controls; Flight Hours, Calendar Time, Engine
			Controls	Log Hours, Number of System Operations, Cycles,
				Total Time, Overhaul, Ultimate Lives or any other.
				Each inspection task should clearly identify what type
				of inspection is required by reference to a detailed
				description of the methodology and of any special
				provisions such as the nature of facilities and tooling
				requirements.
				· ·
	Surveyors Comments:			

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	The Inspection Schedule should detail where applicable inspection requirements for:
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24	39.61(f)	Insert developed text here	Special Inspections	The Inspection Schedule should readily identify inspection tasks that are derived from special inspection programmes such as:
	Surveyors Comments:			
25	39.61(9)	Insert developed text here	Special Operations	The schedule section should detail by cross-references or other visible means to readily identify the applicable Continued airworthiness inspection tasks required of Special Operation approvals.
	Surveyors Comments:			
26	39.61(f)	Insert developed text here	Specific Task Controls	Where there are maintenance inspection tasks that are subject of specific control such as; those derived of a mandatory continued airworthiness requirement, certification maintenance requirement etc. This section should identify how these tasks are readily identified.
	Curriovora Commonto			
27	Surveyors Comments: 39.61(h)(7)		Associated	Copies of any associated Forms such as corrosion
			Forms	reporting, inspection task variation and amendment applications.
	Cum rayrana Camana anta-			
	Surveyors Comments:			