KINGDOM OF BAHRAIN
Ministry of Transportation
and Telecommunications

مملكة البحرين
وزارة المواصلات والاتصالات

CIVIL AVIATION PUBLICATION

CAP 25

MAINTENANCE PROGRAMME

INDEX

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Bahrain CAA Publication Revisions Highlight Sheet

☒ CAP: 25 ☐ TPM: __

The following pages have been revised to Revision 01 dated 21 April 2022.

Item	Chapter/Paragraph number	Page(s)	Reason
1.	---	ALL	Reflects current revision status and date.
2.	4.1	7	New paragraph added.
3.	4.9	10	New paragraph added to refer to Appendix 5 of this CAP.
4.	4.15	11	New content on Human Factors added.
5.	5.3	12	Item amended.
6.	6.2	14-16	Added Abbreviations, Terms and Definitions.
7.	Appendix 1	APP 1-20	Added d. in item 1.1.16.
8.	Appendix 5	APP 5-1 to APP 5-4	New appendix on Ageing Aircraft Fleet criteria.

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1. INTRODUCTION

1.1 General

ANTR M.A.302 requires that aircraft are maintained in accordance with an Approved Maintenance Programme. The term “maintenance programme” is intended to include scheduled maintenance tasks, the associated procedures and standard maintenance practices. The term “maintenance schedule” is intended to embrace the scheduled maintenance tasks alone.

Note: In this document the term 'Maintenance Programme is used in line with ANTR M and can mean either a schedule or programme.

1.2 Maintenance Programmes

A Maintenance Programme contains details of what is to be maintained on an aircraft and how often. The details are those as published by the Original Equipment Manufacturer (OEM) who may also be the Type Certificate Holder (TCH) of that product. As the aircraft will consist of an airframe, engine, propeller and other equipment, there will be several sources of basic information. Not only will there be details of 'What and When' but also 'How' the parts are to be maintained; more detail on the types of task that are usually described can be found in Section 3.

In its simplest form a Maintenance Programme is an approved schedule with a host of procedures that are designed to continually review its applicability and effectiveness for the aircraft it is approved for. The two principal procedures required are Management interest and a Reliability Programme.

ANTR M, Appendix 1 to AMC M.A.302 gives a comprehensive list of what should be in a Maintenance Programme and a programme will not be approved unless compliance with that list can be demonstrated. To assist operators with showing compliance, the CAA have produced a Compliance Checklist that should be submitted with any new Programme.

Note: Refer to Appendix 1 for Maintenance Programme Compliance Checklist

2. COMPILATION OF A PROGRAMME

2.1 General

The first place for information is the OEM/TCH documentation that is relevant to the aircraft being operated. As data will be obtained from several manuals, there will be a collection of tasks to be accomplished at varying intervals. These intervals can be based either on flying hours, flight cycles or calendar time and sometimes there are combinations of these. It is quite often inconvenient to take each task as it comes and accomplish it; it is usually expedient to parcel the tasks into packages of work that can be carried out when it is convenient to do so, but at a frequency not exceeding the approval intervals. The generalrule that can be applied for compiling work packages is that tasks can quite often be done earlier than when recommended. They can only be done later with agreement of the CAA and only in exceptional circumstances. So for tasks that have more than one frequency in terms of flying hours and calendar time, then the event that occurs first is normally the governing one.

For Large Transport Aircraft the tasks can be found in Maintenance Planning Documents provided by the TCH, these are described further in Section 3. Smaller aircraft usually have the TCH recommended maintenance in the Maintenance Manual.

The frequency of maintenance tasks is affected by the way the aircraft is to be operated. When the TCH recommendations are first compiled they will have in mind a 'typical' flight profile for the aircraft type; any deviation from this may need an adjustment on the basic recommendations. For example, an aircraft may be designed and its typical operation could be considered to be 'One flying hour to each flight cycle'. Someone may have a version that will fly six hours for every cycle and another may be doing six cycles every hour. It can be seen that in these cases a schedule based solely on flying hours may mean the first aircraft is maintained too often and the other not enough, so, with the help of the TCH, usually a schedule can be developed for any particular type of operation. The area of operation is another important consideration, for example operating over salt water may require special tasks, such as engine compressor washes and other maintenance, to be done on a more frequent basis. Similarly, operation in sandy areas or off rough strips may affect the tasks required.

The age of an aircraft may affect the number and frequency of tasks, particularly if it has ageing structural inspections and significant repairs. Significant parts of the aircraft such as make and type of engines, propellers and/or APU should be detailed as quite often operators have a choice of equipment and adding the same type with a different engine to a common schedule will mean careful identification of tasks applicable to each aircraft. Finally, the modification state of equipment on board has to be considered as it may be unique to the aircraft on any particular schedule.

2.2 Development of a Programme

Once established an owner or operator may wish to change the frequency of some tasks away from where the OEM has set them. This can be done with the aid of an amendment to the Programme, which is submitted to the CAA for their agreement and subsequent approval. Doing tasks less frequently requires suitable justification in order that it may be approved. Proof that safety will not be compromised must be provided. Maintenance Programmes supported by a reliability programme will have an advantage here as they will readily be able to show how often a task has been performed without deterioration of the item/system. Again for those with a reliability programme, ANTR M gives provision for some 'self development' of the Approved Maintenance Programme (AMP) withinparameters and to procedures agreed with the CAA.

2.3 Maintenance Review Boards (MRB)

A Maintenance Review Board (MRP) is formed during the Type Certification process of an aircraft the MTOM of which is greater than 5700 kg. It consists of members of interested National Authorities chaired by the Authority of the State of Design/Manufacture. Reporting to the Board is an Industry Steering Committee (ISC) which is a group containing representatives from various working groups who are looking at various aspects of the aircraft's design from a maintenance perspective. The ISC and the working groups will contain members from Authorities, the OEMs and the Operators. Each working group will consist of specialists in that particular discipline (e.g. structures, powerplant, avionics etc.) from interested Authorities, the Design organisation and Operators, usually those who are already customers and have a vested interest in the meeting outcome.

For a particularly advanced design, if the lead Authority believes that the customers do not have sufficient knowledge to contribute then they may invite specialists from operators that do. Before commencing work the Board will put together a 'Policy and Procedures Handbook', which will describe how the whole review process will work. The final outcomefrom the ISC will be Maintenance Programme Proposals that is approved by the chairman ofthe MRB. If an aircraft type which has been subject to the MRB process is modified by an STC, the systems, powerplant and structure must be reviewed and consideration given to forming an MRB to determine the maintenance requirements.

2.4 Maintenance Steering Group (MSG) Analyses

This is basically a process driven by a set of logic diagrams that are followed by the MRB working groups in order to determine types of and frequency of tasks, depending on component and system failure modes and visibility of those failures to the users.

Note: For more information on MSG analysis contact the Air Transport Association of America on www.airlines.org/home/default.aspx as the owner of this analysis process.

2.5 Maintenance Planning Document (MPD)

All the working groups will detail the tasks they have identified during the MSG 3 analysis procedure in an MRB document. These tasks, along with other tasks (such as Airworthiness Limitations Items (ALIs)) considered applicable by the OEM/TCH are all published in the MPD and hence this is the stock document an operator of a new type needs in order to start compiling his Programme.

3. TYPES OF TASK

3.1 Certification Maintenance Requirements (CMR)

Certification maintenance requirements arise from the aircraft Certification process. CS 25.1309, for example, requires an aircraft System Safety Assessment (SSA) to ensure that failures are categorised on their consequential severity and within defined bounds of probability. A CMR is a task required to reveal hidden or dormant failures and to ensure that a system meets the SSA target (e.g. <1 failure in 109 flights). The failures individually, or in combination with another failure or a sequence of failures, must not compromise the safety of the aircraft, or its occupants.

Major aircraft manufacturers predominantly refer to two types of CMR task:

(a) One Star Certification Maintenance Requirements. (CMR*)

Such tasks and intervals are mandatory and cannot be changed or deleted without the approval of the state of certification Authority.

(b) Two Star Certification Maintenance Requirements. (CMR**)

Changes to task intervals must be supported by an approved procedure and monitoring programme. Tasks may not be changed or deleted without the agreement of the State of Registration.

Note: It is important to read carefully the introduction to the TC Holder's data that is being used for the production of a Maintenance Programme. Some manufacturers will use a different terminology, for example some TCHs have the opposite definitionfor one/two star tasks to other TCHs.

Certification Maintenance Requirements should be clearly identified as such in a Programme submitted to the CAA for approval. Any subsequent applications for approval tovary these tasks must be supported by the TCH. Again, care should be taken in understanding the Manufacturer's certification philosophy as some do allow short-termvariations of these tasks.

3.2 Airworthiness Limitation Items (ALI)

ALI are structural items that the Certification process has defined as critical from a fatigue point of view during the Damage Tolerance assessment. Again, the inspection frequency of such items is Mandatory and they should be treated in the same way as a CMR*. These lives are published in a supplement of the MRB report and may not be found in an MPD.

3.3 Critical Design Configuration Control Limitation (CDCCL)

CDCCLs will be listed in a uniquely referenced section within the ALIs. They are design features that have been identified as being critical to the integrity of the Fuel System and must be maintained in order to ensure that unsafe conditions do not develop throughout the service life of the aircraft and must be retained during modification, repair or maintenance.

3.4 Other Items

There are significant parts of aircraft that also have Mandatory lives that are not determined from the Certification process but arise due to their significance and use. Such items might include the rotating assembly within an engine, transmission parts of helicopters and landing gear parts. Details of these items do not have to be in a Programme but information on how they are controlled should be.

(a) Zonal Inspections

The inspection level for the Zonal tasks in each programme must be clearly defined, since interpretation of the MSG rule may differ between aircraft types and their respective Zonal programmes. The MRB report should provide clearly defined criteria and in most cases this is repeated in the MPD. General visual or surveillance tasks from the MSG analysis may be appropriate for the Zonal Inspection programme. The principal of Zonal inspections is to group tasks within an area together, in order to minimise the number of times an area is disturbed. Systems, installations and structure within a zone will all be inspected for security and general condition.

(b) Lubrication

During the working group phase of the certification process the MSG analysis has lubrication as the first consideration when looking at reducing a risk of failure of a component or system. It is a relatively quick and cost effective method of preventative maintenance.

Lubrication servicing requirements may either be in the ATA chapters of the Programme with the daily and weekly check or in a specific lubrication section defining the intervals determined by the MRB. Rescheduling of the lubrication frequency may be necessary if a check cycle is changed or the operating pattern is changed, so that degradation does not result.

Deterioration may take some time to be evident so the effectiveness of a lubrication programme must be monitored.

(c) **Inspection Levels**

There are no defined standards of Inspection level; different manufacturers will have applied their own standards and these need to be understood and published for the programme user's benefit.

Examples of types of Inspection are:

(1) General Visual Inspection - A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. Typically this level of inspection is made within touching distance unless otherwise specified. A mirror may be necessary in order to see all exposed surfaces and only available lighting, such as daylight or hangar lighting, may be necessary. Stands, ladders or platforms may be required to obtain adequate access.

(2) Detailed Inspection - An intensive examination of a specific item, installation or assembly to detect damage, failure or irregularity. Available lighting may be supplemented with a direct source at an appropriate intensity. Inspection aids such as mirrors and/or magnifiers may be required. Cleaning of areasmay be necessary to carry out inspection.

(3) Special Detailed Inspection - An intensive examination of a specific item, installation, or assembly that may require specialised inspection techniques such as Non-destructive testing or boroscope inspection. In this case intensive cleaning may be required prior to inspection.

(4) Functional Check - A quantative check to determine if one or more functions of an item performs within specified limits.

3.5 Task Frequency

Tasks identified as necessary during the certification programme will have a time interval allocated that is based on the most appropriate parameter to maintain the condition of the item to which the task refers. The three types of frequency are: Flying hours, Flight cycles and Calendar time; sometimes there will be two limits with the operator normally having to comply with whichever comes first in their particular operation.

In cases of structural inspections, the threshold inspection and repeat frequency can vary depending on the type of operation being used. Structural inspections are always based on flight cycle limits as their reliability is directly related to cyclic fatigue.

When reviewing the effectiveness of a Maintenance Programme, or carrying out an annual review of a Programme, it is the frequency of all the tasks that is being considered. Reliability monitoring is the continual monitoring of task frequency; it is permissible to amend these frequencies away from those recommended by the manufacturer by making application to the CAA. As the operation of an aircraft is usually unique to an Operator a conscientious owner/operator will develop their Programme to maximise reliability and minimise costs.

3.6 Engine Tasks

Turbine powered engines, by implication, are more complex than Piston ones and the way their lives and reliability are managed is significantly different, so they will be treated separately below.

(a) **Turbine Engines**

Turbine engine reliability is based on an approved Condition Monitored Maintenance Programme for both on-wing and off-wing tasks. Various certifying authorities provide guidance as to what should be contained in an 'Engine Maintenance Programme' (EMP). An EMP document becomes part of the aircraft Maintenance Programme.

By implication Auxiliary Power Units, being Turbine powered, are treated in a similar manner.

Engine health management is complicated and requires some expert control. Onwing Health monitoring may include regular oil analysis (SOAP), magnetic plug inspections and boroscope inspection. Modules may have separate lives, generallyhot sections being shorter than cold, and Rotating Parts have finite cyclic lives. Removed engines need agreed workscopes and good strip reports all to remain in compliance with the EMP.

(b) **Piston Engines**

Piston engines work on a 'manufacturer's recommended' overhaul life. The CAA views this 'recommended' life as the life. Some aircraft not used for commercial air transport may have the life of their engine extended beyond that recommended by the manufacturer.

4. DEVELOPMENT OF PROGRAMMES

4.1 General

An aircraft must be maintained to an Approved Maintenance Programme. It can only be maintained to one Approved Maintenance Programme at any time. More than one aircraft, however, can be maintained to the same Programme, providing they all bear similarities that are covered entirely by that Programme. The Appendix to AMC M.A.302 provides detailed information on the contents of an approved aircraft maintenance programme. The approved aircraft maintenance programme should reflect applicable mandatory regulatory requirements addressed in documents issued by the TC holder.

Repetitive maintenance tasks derived from modifications and repairs should be incorporated into the approved maintenance programme.

The maintenance organization shall ensure compliance with applicable standards by either establishing an independent quality assurance system to monitor compliance with, and adequacy of, the procedures, or by providing a system of inspection to ensure that all maintenance is properly performed.

4.2 Introductory Details

The introductory part of the Programme must contain details of the aircraft to which it applies. The aircraft maintenance programme should contain a preface which will define the maintenance programme contents, the inspection standards to be applied, permitted variations to task frequencies and where applicable, any procedure to manage the evolution of established check or inspection intervals. CAA requirements should also be included.

Note: Refer to Appendix 4 on required contents of a maintenance programme introductory pages.

There should be a certification statement by the Accountable Manager or postholder that the Maintenance Programme meets the requirements of ANTR Part M, and that any recommendations made by the airframe constructors and engine, APU, propeller and equipment manufacturers have been evaluated and, where appropriate, have been incorporated.

4.3 MRB Report

The 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.

Where an aircraft type has been subjected to the MRB report process, an operator should normally develop the initial operator's aircraft maintenance programme based upon the MRB report. Where an aircraft is maintained in accordance with an aircraft maintenance programme based upon the MRB report process, any associated programme for the continuous surveillance of the reliability, or health monitoring of the aircraft should be considered as part of the aircraft maintenance programme.

Aircraft 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 aircraft maintenance programme. This does not prevent the approved aircraft 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. Some approved aircraft maintenance programmes, not developed from the MRB process, utilise reliability programmes. Such reliability programmes should be considered as a part of the approved maintenance programme.

4.4 Reliability Programmes

4.4.1 General

A reliability programme could be required in the following cases:

(a) the aircraft maintenance programme is based upon MSG-3 logic; or

(b) the aircraft maintenance programme includes condition monitored components; or

(c) the aircraft maintenance programme does not include overhaul time periods for all significant system; or

(d) when specified by the Manufacturer's maintenance planning document or MRB.

4.4.2 Intent of a Reliability Programme

The purpose of a reliability programme is to ensure that the aircraft maintenance programme tasks are effective and their periodicity is adequate. It therefore follows that the actions resulting from the reliability programme may be not only to escalate or delete maintenance tasks, but also to de-escalate or add maintenance tasks, as necessary. A reliability programme provides an appropriate means of monitoring the effectiveness of the maintenance programme.

4.4.3 Details of Reliability Programmes

Reliability programmes are designed to supplement the operator's overall programme for maintaining aircraft in a continuous state of airworthiness. There are a number of maintenance reliability programmes now in operation that use new and improved maintenance management techniques. Although the design and methods of application vary to some degree, the basic goals are the same — to recognize, access and act upon meaningful symptoms of deterioration before malfunction or failure in order to establish and monitor the maintenance control requirements.

Performance standards (alert values, etc.) are established by actuarial study of service experience using statistical methods coupled with application of technical judgement. These standards are used to identify trends or patterns of malfunction or failures experiencedduring programme operation.
Even though reliability programmes vary, they should provide means for measurement, evaluation, and improvement predictions. They should contain the following elements:

(a) an organizational structure;

(b) a data collection system;

(c) a method of data analysis and display;

(d) procedures for establishing performance standards or levels;

(e) procedures for programme revision;

(f) procedures for time control; and

(g) a section containing definitions of significant terms used in the programme.

ANTR M (M.A.302 (d)) requires that any Maintenance Programme based on MSG logic or containing Condition Monitoring tasks should contain a Reliability Programme.

Reliability programmes should be developed for aircraft maintenance programmes based

upon maintenance steering group (MSG) logic or those that include condition monitored components or that do not contain overhaul time periods for all significant system components.

The purpose of a reliability programme is to ensure that the aircraft maintenance programme tasks are effective and their periodicity is adequate. 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. A reliability programme provides an appropriate means of monitoring the effectiveness of the maintenance programme.

There is some guidance in Appendix I to AMC M.A.302 on what constitutes a Reliability Programme. Typically, on a monthly basis an operator will look at Tech log entries, component failures (in particular - cause of failure), delays, Ground or Air safety reports (MORs) and findings from task cards and look for trends or areas of hurt that can be addressed by taking some kind of preventative maintenance action. Operators whose aircraftare not designated as 'Large' by definition may be exempt from this. It has also been found that for fleets of six or fewer aircraft insufficient data is produced to maintain an accurate programme and hence alternative procedures need to be established, whereby events rather than trends are monitored.

4.5 Annual Review

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 owner or operator for inclusion in the maintenance programme during the annual review. Applicable mandatory requirements for compliance with ANTR 21 or an acceptable Part 21 should be incorporated into the operator’s maintenance programme as soon as possible.

4.6 Utilisation

The utilisation of an aircraft is inextricably linked to the effectiveness of a Maintenance Programme. When optimised for a certain utilisation, tasks will lose their effectiveness if the relationship between Flying hours and Cycles varies by a significant amount. The MRB will set task intervals to meet, what they have considered to be a 'typical' flight profile for their product. For example the Boeing 747 might reasonably have been considered to have a profile of about 7 flight hours to one cycle. An operator then chose to use the aircraft on thirty minute sectors. By using the original MRB derived data the operator would suffer failures due to the flight hour tasks not being done soon enough to protect the cyclic dependent parts and systems.

Operators are required to state their expected annual utilisation in the front of the programme. Part of the annual review of effectiveness is to determine that this figureremains within plus or minus 25% of that figure. Significant deviations should be discussed with the TCH to see how tasks may need to be changed.

Quite often manufacturers will produce a 'low utilisation' programme for operators doing very low hours, for example an executive jet operation. This can be a cost effective solution for such an operator.

Finally, Supplemental Structural Inspection Programmes (SSIP) can have differentinspection frequencies dependent on the type of operation. Details of these will be found in the introduction of the SSIP document itself.

4.7 Task Escalation

Following a period in operation it may be noticed that a particular inspection is carried out routinely and no faults are ever detected. Providing data supporting this can be presented to the CAA, it is possible for the task frequency to be reduced, such that the task is carried out less frequently.

Short-term escalation procedures do not apply to the following:

(a) Intervals specified by airworthiness directives.

(b) Life limits specified by Type Certificate data sheets, flight manuals, or manufacturer's publications.

(c) Limitations specified by minimum equipment lists.

(d) Structural sampling periods imposed by maintenance review boards.

Applicants who wish to establish authorisation for short-term increases in maintenance intervals (escalation) other than those which are part of their approved reliability programmes must apply to the CAA with a proposed reference to the applicant's maintenance programme defining those procedures.

4.8 Registrations

Aircraft maintained to any Programme are listed by registration in that document and on a CAA database. If the registration of an aircraft is changed but it remains on the same programme, or new aircraft is added, an amendment will be required to be submitted for CAA approval highlighting the fact.

4.9 Mixed Age/Modification Fleets

For a programme with a number of aircraft of the same type on it, the varying ages and modification standards should be catered for, by highlighting affectivity of tasks that apply. For example, should two aircraft out of the fleet have an STC applied that does not feature on the others, then any task relevant to the STC should be included but clearly denoted in the programme which two aircraft it applies to. It follows that any aircraft being added to a programme is to be assessed by the operator for its modification standard and equipment fit to ensure the programme adequately addresses the needs of the individual aircraft build/change standard. Should any further tasks need to be added then an amendment should be submitted addressing these needs.

The Operator should consider the additional criteria specified under Appendix 5 to this CAP in specific to address the ageing aircraft fleet.

4.10 Adding Aircraft to the Programme

When adding an aircraft to a Programme an amendment must be submitted to the CAA. As stated above the commonality of the aircraft and the Programme must be established, in terms of Modification standard, Equipment fit, Structural life inspections etc.

4.11 Bridging Checks

A Bridging Check is a set of tasks required to transfer an aircraft from one Programme to another. As previously discussed, every Operation is unique and hence an aircraft may have been maintained to same tasks at a different frequency or to different maintenance standards in its previous operation. The Bridging Check is carried out to bring the tasks into line with the new frequencies and standards to ensure standards are met and no task is overrun.

4.12 Changing Programmes

To move an aircraft from one programme to another will involve making an amendment requiring the CAA approval to remove it from one Programme and add it to another, and requires the operator to propose to the CAA a 'B' amendment for each of the affected Programmes. In this case the operator will need to consider the differences between the two Programmes and the need for a 'Bridging Check' to cater for such differences. Where an owner or operator wishes to change from one approved programme to other, a transfer checkor inspection may need to be performed in order to implement the change.

4.13 Permitted Variations to Maintenance Periods

The operator may permit variations to Maintenance Periods only when the periods prescribed by the approved Programme (or documents in support of this Programme) cannotbe complied with due to circumstances, which could not reasonably have been foreseen by the operator. The decision to vary any of the prescribed periods shall be made only by the operator. Particulars of every variation shall be entered in the appropriate Log Book(s).

Note: Refer to Appendix 3 for permitted variations to maintenance periods

4.14 Content of Maintenance Programme Introductory Pages

For standardisation and compliance issues the CAA require that the content of the Maintenance Programme introductory pages cover specific matters. The content may be modified as required but must incorporate the responsibilities of the operator/organisation and the compliance issues

Note: Refer to Appendix 4 for suggested contents of Maintenance Programme introductory pages.

4.15 Human Factors

The design and application of the operator's maintenance programme shall observe Human Factors principles. Guidance on Human Factors principles can be found in ICAO Document 9683 (Human Factors Training Manual).

5. OTHER CONSIDERATIONS

5.1 Task Cards/Work Packaging

Task management will differ from Programme to Programme. For Light Aircraft Maintenance Scheme (LAMS), for aircraft not exceeding 2730 kg MTWA, tasks are grouped by inspection frequency, that is all the 50 hour repeat tasks appear consecutively, followed by the 100 or 150 hour tasks. For a large transport aircraft Programme, the tasks will probably be grouped in ATA order. This means that consecutive tasks in the Programme have different inspection

frequencies. In order to save costs operators will want to have the minimum number of maintenance checks done on their aircraft, so they will select items with the same or close frequency and 'package' them into workpacks to be done together.

The Light Aircraft Maintenance Scheme for aircraft not exceeding 2730 kg MTWA, comes in a format whereby the tasks are laid out in a way that can be used as a set of worksheets. For the compiler of a workpack, the tasks are usually broken down onto separate 'cards' which can be certified individually as the tasks are accomplished. Traditionally a large transport aircraft Programme would contain defined periods of A and B line checks and C and D base checks. Nowadays these tasks are not designated by letter but frequency only, these are termed 'Equalised' Programmes, now the old base tasks can be accomplished alongwith some of the lesser line tasks in order to make more efficient use down time (overnight stops) and manpower. The downside of equalised programmes is the complex packaging of the tasks and the added responsibility on the continuing airworthiness management organisation to ensure repeat inspections are controlled properly.

5.2 Repairs

Since 1980, large transport aircraft have been designed with 'Damage Tolerant' Structures. This means that the designers have calculated with the expected lifetime loads experienced by the aircraft, when significant structural parts will begin to fail from fatigue. In this way they can determine suitable inspection frequencies and techniques to detect fatigue cracks long before the part will fail. During the aircraft life it will suffer from accidental damage, requiring some repair work to the structure. In most cases the repair will return the damaged part to its 'as was' standard, and routine inspections of that piece of structure will continue asbefore. In some cases, Damage Tolerance analysis of the repair will require an interim inspection of it before the regular inspection period falls due. This new inspection requirement is now part of the Maintenance Programme which should be amended toinclude these inspections.

5.3 Special Operations

Issues such as All Weather Operations, Reduced Vertical Separation Minima, EDTO, FDR, CVR, and emergency equipment, etc. are operational issues, not used by everyone. They do, however, have specific maintenance requirements in order to maintain their accuracy. As such, any of these maintenance requirements must be included in the Maintenance Programme.

5.4 Variations

All maintenance must be carried out at, or before, its specified frequency. In some unforeseen circumstances, the task frequency can be extended by an amount approved bythe CAA and detailed in the Programme by the operator of the aircraft. Typically the frequency can be extended by 10%. Should the unforeseen circumstances mean that the aircraft cannot meet its maintenance slot even with such a variation then the operator can approach the CAA with a justifiable request for a further extension. If accepted, the extension will be approved as a one off change.

6. APPROVAL PROCESS

6.1 Initial Application

An application for approval of a Maintenance Programme should be made on form ALD/AIR/F022. In preparing the Maintenance Programme the applicant must list the primary maintenance processes by which it is proposed that the airworthiness of the aircraft will be

preserved on a continuing basis.

The following supporting documentation must accompany the application;

(a) Maintenance Programme;

(b) Signed Statement from Accountable Manager or postholder;

(c) Programme basis (MRB, TCH Planning Document, etc);

(d) Reliability Programme (if applicable);

(e) Maintenance Programme Compliance Checklist (refer Appendix 1); and

(f) Recommendation from applicant's CAMO.

The application should only be submitted after review by both the Quality Manager and SMS Manager.

6.2 Amendment to the Maintenance Programme

Furnishing copies of all amendments to the Approved Maintenance Programme is the responsibility of the operator. Revisions to the approved programme should be submitted to the CAA by the operator, to reflect changes in the Type Certificate holder's recommendations, revisions to the maintenance review board report, mandatory requirements, service experience and maintenance needs of the aircraft or as required by the CAA. Reliability programmes form one important method of updating approved programmes. The operator may only vary the periods prescribed by the programme with the approval of the CAA. The CAA will not approve intervals escalations or tasks modificationsrelated to airworthiness directives (AD), airworthiness limitation (ALI) and certification maintenance requirements (CMR) without an appropriate consultation with the State of Design.

Amendments shall not be incorporated into an Approved Maintenance Programme without the written agreement of the CAA. When an amendment to a maintenance programme is required the postholder should submit one copy of the Programme page(s) which incorporates the amendment, together with two copies of an application form. The appropriate section of the Maintenance Programme Compliance Checklist must also accompany the amendment.

Note: Refer to Appendix 2 - Maintenance Programme Amendment Approval Submission

On completion of the necessary investigation one copy of the application form will be returned to the applicant stamped and signed to indicate approval. One copy will be retained by the CAA for incorporating the amended pages into the "master" Programme.

All Amendments will be allocated consecutive reference numbers, and their incorporation in this Programme must be recorded by making an entry in the appropriate column provided. The Amendment reference must also be recorded against the amendment entry.

For the purpose of this CAP, the following Abbreviations, Terms & Definitions apply:

Aging Aircraft

Airplanes exceeding 24 years in service on December 8, 2003; initial and repetitive inspections and records reviews.

Airplanes exceeding 14 years in service but not 24 years in service on December 8, 2003; initial and repetitive inspections and records reviews.

Airplanes not exceeding 14 years in service on December 8, 2003; initial and repetitive inspections and records reviews.

Corrosion

- Level 1 Corrosion

  (1) Corrosion, occurring between successive corrosion inspection tasks that is local and can be reworked or blended out within the allowable limit; or

  (2) Corrosion damage that is local and exceeds the allowable limit, butcan be attributed to an event not typical of operator's usage of other aircraft in the same fleet (e.g. mercury spill); or

  (3) Operator experience has demonstrated only light corrosion between each successive corrosion inspection task inspection; and, the latest corrosion inspection task results in rework or blend out that exceeds the allowable limit.

- Level 2 Corrosion.

  Level 2 corrosion occurring between any two successive corrosion inspections task that requires a single rework or blend out which exceeds the allowable limit.

  or;

  Corrosion occurring between successive inspections that is widespread and requires a single blend-out approaching allowable rework limits. i.e. it is not light corrosion as provided for in Level 1, definition (3).

  A finding of *Level 2 corrosion* requires repair, reinforcement, or complete or partial replacement of the applicable structure.

- Level 3 Corrosion.

  Level 3 corrosion is corrosion occurring during the first or subsequent accomplishments of a corrosion inspection task that the operator determines to be an urgent airworthiness concern.

- Light Corrosion.

  Light corrosion is corrosion damage so slight that removal and blend-out over multiple repeat intervals (RI) may be accomplished before material loss exceeds the allowable limit.

- Local Corrosion

  Generally, local corrosion is corrosion of a skin or web (wing, fuselage, empennage or strut) that does not exceed one frame, stringer, or stiffener bay. Local corrosion is typically limited to a single frame, chord, stringer or stiffener, or corrosion of more than one frame, chord, stringer or stiffener where no corrosion exists on two adjacent members on each side of the corroded member.

- Widespread Corrosion.

  Widespread corrosion is corrosion of two or more adjacent skin or web bays (a web bay is defined by frame, stringer or stiffener spacing). Or, widespread corrosion is corrosion of two or more adjacent frames, chords, stringers, or stiffeners. Or, widespread corrosion is corrosion of a frame, chord, stringer, or stiffener and an adjacent skin or web bay.

Damage-tolerance (DT) is the attribute of the structure that permits it to retain its required residual strength without detrimental structural deformation for a period of use after the structure has sustained a given level of fatigue, corrosion, and accidental or discrete source damage.

Design Approval Holder (DAH) is the holder of any design approval, including type certificate, supplemental type certificate or repair approval.

Design Service Goal (DSG) is the period of time (in flight cycles/hours) established at design and/or certification during which the principal structure will be reasonably free from significant cracking including widespread fatigue damage.

Fatigue Critical Structure (FCS) is structure that is susceptible to fatigue cracking that could lead to a catastrophic failure of an aircraft. For the purposes of this TPM, FCS refers to the same class of structure that would need to be assessed for compliance with § 25.571(a) at Amendment 25-45, or later. The term FCS may refer to fatigue critical baseline structure, fatigue critical modified structure, or both.

Limit of validity (LOV) is the period of time, expressed in appropriate units (e.g. flight cycles) for which it has been shown that the established inspections and replacement times will be sufficient to allow safe operation and in particular to preclude development of widespread fatigue damage.

Multiple Element Damage (MED) is a source of widespread fatigue damage characterised by the simultaneous presence of fatigue cracks in similar adjacent structural elements.

Multiple Site Damage (MSD) is a source of widespread fatigue damage characterised by the simultaneous presence of fatigue cracks in the same structural element (i.e., fatigue cracks that may coalesce with or without other damage leading

to a loss of required residual strength).

Primary Structure is structure that carries flight, ground, crash or pressurisation loads.

Repair Evaluation Guidelines (REG) provide a process to establish damage-tolerance inspections for repairs that affect Fatigue Critical Structure.

Repair Assessment Programme (RAP) is a programme to incorporate damage tolerance-based inspections for repairs to the fuselage pressure boundary structure (fuselage skin, door skin, and bulkhead webs) into the operator's maintenance and/or inspection programme.

Widespread Fatigue Damage (WFD) in a structure is characterised by the simultaneous presence of cracks at multiple structural details that are of sufficient size and density whereby the structure will no longer meet its damage-tolerance requirement (i.e. to maintain its required residual strength after partial structural failure).

Following list defines the acronyms that are used throughout this CAP

AC	Advisory Circular
AD	Airworthiness Directive
CPCP	Corrosion Prevention and Control Programme
CS	Certification Specification
DAH	Design Approval Holder
FCBS	Fatigue Critical Baseline Structure
FCS	Fatigue Critical Structure
RAP	Repairs Assessment Programme
REG	Repair Evaluation Guidelines
SB	Service Bulletin
SSID	Supplemental Structural Inspection Document
SSIP	Supplemental Structural Inspection Programme
TCH	Type-Certificate Holder
WFD	Widespread Fatigue Damage

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CIVIL AVIATION PUBLICATIONS

APPENDIX 1

MAINTENANCE PROGRAMME COMPLIANCE CHECKLIST

The purpose of the Maintenance Programmes Compliance Checklist is to assist owners / operators with a view to ensuring that Maintenance Programmes submitted to the CAA for approval are standardised and include all items that are required by ANTR M.A.302, AMC M.A. 302 and also other additional CAA required items. This checklist, when completed, should be submitted with the draft maintenance programme. This document includes all the relevant information as detailed in Appendix 1 to the Acceptable Means of Compliance (AMC), the format of which may be modified to suit the operator's preferred method. In all cases the checklist should clearly show either compliance (yes) & location of the compliance in the notes section or not applicable (no) & the reason in the notes section.

The specific tasks and the relevant control procedures shall be included as specified in the Maintenance Programme (MP) or Continuing Airworthiness Management Exposition (CAME) of the operator/Subpart G organisation managing the aircraft. The relevant cross-references shall be specified in the notes column at the appropriate paragraphs and the correct term MP or CAME shall be used. It is not acceptable simply enter the MP or CAME as the cross-reference. The checklist is provided to ensure the minimum required items are contained in the Maintenance Programme. It should be enhanced as necessary to suit the aircraft's needs; operational, utilisation & environmental.

AOC Number (if applicable):	
CAA MP / reference:	
CAME Ref (if applicable):	
Owner / Operators Name:	
Owner / Operators MP / reference	
Amendment Status:	
Details of the previous maintenance programme:	

1. GENERAL REQUIREMENTS				
1.1	Maintenance Programme Basic Information:	Compliance Yes	No	Notes
1.1.1	The type/model/ and registration of the aircraft			
	The type/model of the engines			
	The type/model of the propellers, where applicable			
	The type/model of the auxiliary power units, where applicable			
1.1.2	The name and address of the owner, operator, M.A. (G) organisation managing the aircraft airworthiness			
1.1.3	The programme reference, the date of issue, and issue number			

1.1.4	A signed statement. See Appendix 1 for this document.			
1.1.5	Contents list			
	List of effective pages			
	Revision status of the document			
1.1.6	Check periods for anticipated utilisation; include a utilisation tolerance of not more than 25%. Where utilisation cannot be anticipated, calendar time limits should also be included.			
1.1.7	Procedures for escalation where applicable and acceptable to the BCAA			
1.1.8	Date and reference of approved amendments			
1.1.9	Pre-flight maintenance tasks			
1.1.10	The tasks and the periods (intervals / frequencies) at which inspections should be carried out, including the task effectivity and type and degree of inspection of the:			
	a. Aircraft			
	b. Engine(s)			
	c. APU			
	d. Propeller(s)			
	e. Components			
	f. Accessories			
	g. Equipment			
	h. Instruments			
	i. Electrical and radio apparatus			
1.1.11	The periods at which components should be:			
	a. Checked			
	b. Cleaned			
	c. Lubricated			
	d. Replenished			
	e. Adjusted			
	f. Tested			
1.1.12	Details of ageing aircraft system requirements with any specified sampling programmes (if applicable)			

1.1.13	Details of specific structural maintenance programmes, (if applicable), including but not limited to:			
	a. Damage Tolerance and Supplemental Structural Inspection Programmes (SSID)			
	b. SB review performed by the TC holder			
	c. Corrosion prevention and control			
	d. Repair Assessment			
	e. Widespread Fatigue Damage			
1.1.14	Statement of the limit of validity for the structural programme in 1.1.13 (if applicable)			
1.1.15	The periods at which overhauls should be made			
	The periods at which replacements should be made			
1.1.16	A cross-reference to other documents related to:			
	a. Mandatory life limitations			
	b. Certification Maintenance Requirements (CMR's) (if applicable)			
	c. Airworthiness Directives (AD)			
	d. Instructions for Continued Airworthiness (ICA) specified for air-operator-installed equipment or required by supplemental type certificate (STC) modifications, including emergency equipment			
	Specific identification of the above items mandatory status			
1.1.17	Reliability programme or statistical methods of continuous Surveillance (if applicable)			
1.1.18	A statement that practices and procedures should be the standards specified by the TC holders			
1.1.19	Each maintenance task (i.e. inspections – detailed, scan, general) should be defined in a definition section			
1.1.20	The periods at which overhauls should be made			
2. PROGRAMME BASIS				
		Compliance Yes	No	Notes
2.1	Is the programme based upon the MRB report, the TC holder's maintenance planning document or Chapter 5 of the maintenance manual?			
2.2	For newly type-certified aircraft / comprehensively appraise the manufacturer's recommendations (and MRB report where applicable)			

2.3	For existing aircraft types, comparisons with maintenance programmes previously approved			
3. AMENDMENTS				
		Compliance Yes	Compliance No	Notes
3.1	Amendments (revisions) to reflect changes: See Appendix 2			
	a. In the TC holder's recommendations			
	b. Introduced by modifications			
	c. Introduced by repairs			
	d. Discovered by service experience			
	e. As required by the BCAA			
4. PERMITTED VARIATIONS TO MAINTENANCE PERIODS (with the exception of items identified in 1.1.16)				
		Compliance Yes	Compliance No	Notes
4.1	Vary the periods through a Procedure approved by the BCAA?			
	Vary the periods with the approval of the BCAA (see appendix 3)?			
5. PERIODIC REVIEW OF MAINTENANCE PROGRAMME CONTENTS				
		Compliance Yes	Compliance No	Notes
5.1	Periodic review to ensure that the programme reflects current:			
	a. TC holder's recommendations			
	b. Revisions to the MRB report (if applicable)			
	c. Mandatory requirements			
	d. Maintenance needs of the aircraft			
5.2	Annual review defined			
6. RELIABILITY PROGRAMMES				
		Compliance Yes	Compliance No	Notes
6.1	Applicability			
6.1.1	Developed in the following cases:			
	a. Programme is based upon MSG-3 logic			
	b. Programme includes condition monitored components			
	c. Programme does not contain overhaul time periods for all significant system components			
	d. Specified by the Manufacturer's MPD or MRB			
6.1.2	Need not be developed in the following cases:			
	a. Programme is based upon the MSG-1 or 2 logic (only hard times or on condition items)			
	b. Not a large aircraft (= or < 5700 kgs MTWA or single engine helicopter)			
	c. Programme provides overhaul time periods for all significant system components			

6.1.3	Operator may develop own reliability monitoring programme			
6.2	Applicability, small fleets			
6.2.1	Less than 6 aircraft of the same type			
6.2.2	Reliability programme is irrespective of the fleet size			
6.2.3	Tailor reliability programmes to suit the size and complexity of operation			
6.2.4	Use of "Alert levels" should be used carefully			
6.2.5	When establishing a reliability programme, consider the following:			
	a. Focus on areas where a sufficient amount of data is likely to be processed			
	b. How is engineering judgement applied?			
6.2.6	Pool data and analysis (paragraph 6.6 specifies conditions)			
6.2.7	If unable to pool data / additional restrictions on the MRB/MPD tasks intervals specified			
6.3	Engineering judgement			
6.3.1	Are there appropriately qualified personnel (with appropriate engineering experience and understanding of reliability concept) for the reliability programme?			
6.4	Contracted maintenance			
6.4.1	Maintenance programme / may delegate certain functions to the Part-145 organisation			
6.4.2	These are:			
	a. Developing the maintenance and reliability programmes			
	b. Collection and analysis of the reliability data			
	c. Providing reliability reports			
	d. Proposing corrective actions			
6.4.3	Approval to implement a corrective action / Subpart G prerogative and responsibility			
6.4.4	Maintenance contract / CAME, and MOE procedures			
6.5	Reliability programme			
6.5.1	Objectives			
6.5.1.1	Statement summarising the prime objectives of the programe			
	a. Recognise the need for corrective action			
	b. Establish what corrective action is needed			
	c. Determine the effectiveness of that action			
6.5.1.2	The extent of the objectives should be directly related to the scope of the new programme			

6.5.1.3	All MSG-3 related tasks are effective and their periodicity is adequate			
6.5.2	Identification of items			
	The items controlled by the programme should be stated			
6.5.3	Terms and definitions			
	Significant terms and definitions should be clearly identified			
6.5.4	Information sources and collection			
6.5.4.1	Sources and procedures in the Exposition			
6.5.4.2	Type of information to be collected should be related to the objectives, examples of the normal prime sources:			
	a. Pilots Reports			
	b. Technical Logs			
	c. Aircraft Access Terminal / On-board readouts			
	d. Maintenance Worksheets			
	e. Workshop Reports			
	f. Reports on Functional Checks			
	g. Reports on Special Inspections			
	h. Stores Issues/Reports			
	i. Air Safety Reports			
	j. Reports on Delays and Incidents			
	k. Other sources: i.e. EDTO, RVSM, CAT II/III			
6.5.4.3	Due account of Continuing Airworthiness information promulgated under Part-21			
6.5.5	Display of information			
	Information displayed graphically or tabular or a combination			
6.5.5.1	Provisions for “nil returns”			
6.5.5.2	Where “standards” or “alert levels,” information oriented accordingly			
6.5.6	Examination, analysis, and interpretation of the information			
	Method for examining, analysing, and interpreting the information should be explained			
6.5.6.1	Methods of examination may be varied – content and quantity			
6.5.6.2	The whole process should enable a critical assessment of the effectiveness of the programme as a total activity. May involve:			
	a. Comparisons of operational reliability with established or allocated standards			
	b. Analysis and interpretation of trends			
	c. 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			

	h. Stores issues/reports			
	i. Air Safety Reports			
	j. Reports on Delays and Incidents			
	k. Other sources: i.e. EDTO, RVSM, CAT II/III			
6.5.6.3	Range and depth of analysis should be related to the particular programme:			
	a. Flight defects and reductions in reliability			
	b. Defects – line and main base			
	c. Deterioration observed – routine maintenance			
	d. Workshop and overhaul findings			
	e. Modification evaluations			
	f. Sampling programmes			
	g. Adequacy of maintenance equipment and publications			
	h. Effectiveness of maintenance procedures			
	i. Staff training			
	j. Service bulletins, technical instructions, etc.			
6.5.6.4	Contracted maintenance – arrangements established and details for information input included			
6.5.7	Corrective Actions			
6.5.7.1	Procedures / time scales for implementing corrective actions / monitoring – should be fully described and could include:			
	a. Changes to maintenance, operational procedures or techniques			
	b. Changes requiring amendment of the approved maintenance programme?			
	c. Amendments to approved manuals			
	d. Initiation of modifications			
	e. Special inspections / fleet campaigns			
	f. Spares provisioning			
	g. Staff training			
	h. Manpower and equipment planning			
6.5.7.2	Procedures for effecting changes should be described			
6.5.8	Organisational Responsibilities			
	Organisational structure – chains of responsibility should be defined			
6.5.9	Presentation of information to the competent authority			
	Information submitted to the BCAA for approval of the reliability programme:			
	a. Format and content of routine reports			
	b. Time scales for reports / distribution			

	c. Format and content of reports requesting amendments			
6.5.10	Evaluation and review			
	Describe procedures and individual responsibilities – continuous monitoring of the effectiveness of the programme			
6.5.10.1	Procedures for revising the "standards" or "alert levels"			
6.5.10.2	Criteria to be taken into account during the review includes:			
	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			
6.5.11	Approval of organisation to implement maintenance programme changes arising from the reliability programme results:			
	a. Does the reliability programme monitor the content of the maintenance programme in a comprehensive manner?			
	b. Is appropriate control exercised by owner / operator over the internal validation of such changes			
6.6	Pooling arrangements			
6.6.1	Pooling information – must be substantially the same, including:			
	a. Certification / modification / SB compliance			
	b. Operational Factors			
	c. Maintenance Factors			
6.6.2	Is there a substantial amount of commonality / has the BCAA agreed?			
6.6.3	Is the aircraft on short-term lease? BCAA may grant more flexibility			
6.6.4	Changes to any M.A. (G) requires assessment in order that the pooling benefits can be maintained			
6.6.5	Reliability programme managed by the aircraft manufacturer if agreed by the BCAA			
7. BCAA REQUIRED ITEMS				
		Compliance Yes	No	Notes
7.1	Details of who may issue a CRS			
7.2	Define which inspections/checks are considered to be base maintenance			
7.3	Maintenance Requirements, in the absence of specific recommendations. See Appendix 4			
7.3.1	Aircraft battery capacity check/deep cycle?			
7.3.2	Emergency equipment			
7.3.3	Emergency escape provisions:			

	a. Portable valise type life-rafts			
	b. Door and escape chutes/slides			
	c. Emergency exits/hatches			
7.3.4	Flexible hoses			
7.3.5	Fuel/ oil system contamination checks			
7.3.6	Pressure vessels			
7.3.7	Seat belts and harnesses			
7.3.8	*Reserved*			
7.3.9	Vital points and control systems			
7.3.10	BCAA Specifications. See Appendix 4			
7.3.11	Maintenance applicable to special operations approvals, if applicable:			
	AWOPS			
	MNPS			
	RVSM			
	EDTO			
	Sea Pilot transfers			
	Offshore operations			
	HEMS			
	Transport of dangerous goods			
	Other (Specify) …….			
7.3.12	Customer furnished equipment			
7.3.13	Engine and APU condition monitored maintenance			
7.3.14	*Reserved*			
7.3.15	Flight data recorder systems			
7.3.16	Mode “S” transponder ICAO 24-bit aircraft addresses			
7.3.17	In-flight entertainment systems (IFE)			

Completed by: [Name]

Signed:

Date:

APPENDIX 2

MAINTENANCE PROGRAMME AMENDMENT APPROVAL SUBMISSION

CAA Programme Reference.....Issue No.....Aircraft Type.....

Operator's Programme Reference.....Issue Date.....Amendment No.....

Item	Action to be Taken	Reason	CAA Remarks

COMPLIANCE STATEMENT: This Maintenance Programme complies with the manufacturer's minimum maintenance and inspection requirements and the requirements of the Bahrain Civil Aviation Affairs for the airframe, engines (on wing), propeller (if applicable) systems and components except wherein previously or hereby approved by the Civil Aviation Affairs.

Signed.....Date: .....

Name .....

CAA use only

The above amendments are approved.....With the exception of.....

Signed.....Date: .....

Name .....

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APPENDIX 3

PERMITTED VARIATIONS TO MAINTENANCE PERIODS

Where the TC/STC holder has not prescribed any variation that may be applied to inspection 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 tolerances that may be applied to inspection intervals in the Programme, the operator shall use those tolerance and not 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 reasonably have been foreseen by the operator. The decision to vary any of the prescribed periods shall be made only by the operator. Particulars of every variation so made shall be entered in the appropriate Log Book(s).

Period Involved	Maximum Variation of the Prescribed Period
(a) Items Controlled by Flying Hours.	
(i) 5000 flying hours or less	10%
(ii) More than 5000 flying hours	500 flying hours
(b) Items Controlled by Calendar Time.	
(i) 1 year or less	10% or 1 month, whichever is the lesser
(ii) More than 1 year but not exceeding 3 years	2 months
(iii) More than 3 years	3 months
(c) Items Controlled by Landing/Cycles	
(i) 500 landings/cycles or less	10% or 25 landings/cycles, whichever is the lesser
(ii) 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

1. The variations or tolerances permitted above do not apply to:

(a) 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 ormanuals, and are included in the preface pages to the Maintenance Programme.

(b) Those tasks included in the Maintenance Programme, which have been classified as mandatory by the Type Certificate/Supplemental Type Certificate holder or the CAA

(c) Certification Maintenance Requirements (CMR) unless specifically approved by the manufacturer and agreed by the CAA.

2. These permitted variations are to be included in the operator's Continuing Airworthiness Management Exposition.

APPENDIX 4

REQUIRED CONTENTS OF AMP INTRODUCTORY PAGES

1. SUGGESTED CERTIFICATION STATEMENT

Note: The following may be modified as required but must incorporate the responsibilities of the operator/organisation and the compliance issues.

In the preparation of this Maintenance Programme to meet the requirements of ANTR Part M, the recommendations made by the airframe constructors and engine, APU, propeller and equipment manufacturers have been evaluated and, where appropriate, have been incorporated.

This Maintenance Programme lists the tasks and identifies the practices and procedures, which form the basis for the scheduled maintenance of the aeroplane(s)/helicopter(s). The ANTR M Subpart G organisation/owner* undertakes to ensure that the aeroplane(s)/helicopter(s)* will continue to be maintained in accordance with thisprogramme.

The data contained in this programme will be reviewed for continued validity at least annually in the light of operating experience and instructions from the 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 in accordance with ANTR 21.

It is accepted that this programme does not prevent the necessity for complying with any new or amended ANTR from time to time where these new or amended regulations 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 aeroplane, such that continuing safe operation can be assured. It is further understood that the CAA reserves the right to suspend, vary or cancel approval of the Maintenance Programme if the CAA 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.....Date: .....

* *Delete as required*

Note: The post holder identified above is either the Accountable Manager/Continuing Airworthiness Manager for an AOC operator's ANTR Part M subpart G organisation, a nominated post holder within the Part M Subpart G organisation when the aircraft's continuing airworthiness is contracted to an approvedorganisation or the aircraft owner when the aircraft's continuing airworthiness isnot contracted to an approved organisation.

2. MAINTENANCE PROGRAMME APPLICABILITY

REGISTRATION	TYPE	SERIAL NO.

Note : Any changes in aircraft applicability must have prior approval of the Civil Aviation Affairs.

3. FLYING TIMES

All periods in this Programme quoted in hours flying are to be calculated and recorded on a `Take-off' to `Touch-down' basis.

4. CERTIFICATION OF MAINTENANCE, CMR AND CRS

Attention is drawn to the necessity of ensuring that the appropriate Certification of Maintenance is completed. The requirements are specified in the Approval Document under the Endorsement relating to the Programme.

5. PERMITTED VARIATION TO MAINTENANCE PERIODS

The periods prescribed by this Programme may be varied subject to the conditions and limits contained in Appendix A to the Maintenance Programme Approval document.

6. AIRWORTHINESS DIRECTIVES AND MANUFACTURERS SERVICE INFORMATION

Operators are required to institute a system for the assessment of continuing airworthiness information. This information will originate from the Responsible Authority of the State of Manufacture in the form of Airworthiness Directives or documents of comparable intent and from the Constructor/Manufacture in the form of Service Bulletins, Letters, Information Leaflets etc. resulting from in-service experience.

Compliance with the Mandatory requirements of the Responsible Authority of the country of origin must be achieved unless this requirement is varied by the CAA.

Continuing Airworthiness and other Service Information must be continuously evaluated by the Operator or his Contracted Maintenance Organisation and, where necessary, appropriate action must be taken to amend the Maintenance Programme.

7. GAS TURBINE ENGINE PARTS SUBJECT TO RETIREMENT OR ULTIMATE (SCRAP) LIVES

The Operator or his contracted Maintenance Organisation will comply with the Mandatory Life Limitations as published in the respective manufacturers Engine Manuals, Service Bulletins, Service Memoranda, Notices to Operators, Maintenance Manuals etc. for the benefit of operators and engine overhaul agencies.

8. FATIGUE LIVES AND MANDATORY LIFE LIMITATIONS

Structural "fatigue" lives published by the Constructor/Manufacturer or by the CAA are mandatory.

All other life limitations classified as mandatory by the Constructor/Manufacturer, must also be observed unless varied by the CAA.

9. MAINTENANCE PRACTICES AND PROCEDURES

The practices and procedures necessary to accomplish the requirements of this Programme or work resulting from its application should be as a minimum to the standards recommended in the relevant Maintenance, Overhaul and Repair Manuals.

10. ALL VITAL POINTS AND CONTROL SYSTEMS

(a) Whenever inspections are made or work is undertaken on vital parts, flying or engine control systems, a detailed investigation must be made on completion of the task to ensure that all tools, rags or any other loose articles which could impede the free movement and safe operation of the system(s) have been removed, and that the systems and installation in the work area are clean and un-obstructed.

(b) If, as a result of the application of this Programme, any part of either the main or any associated system is dismantled, adjusted, repaired or renewed, that part of the system(s) which has been disturbed shall be subjected to a duplicate inspection, with free movement, range direction and tension checks, and shall be certified in accordance with the ANTRs.

11. FUEL SYSTEM CONTAMINATION CHECKS

The following checks must be made to establish that fuel systems are free from contamination.

Fuel system water drain checks are to be carried out at periods not exceeding 24 hours elapsed time and in accordance with company instructions.

Note: The operator must be satisfied with the quality of all fuel taken on board his aircraft, particularly in respect of water contamination, and monitor the supplier's quality performance.

12. PORTABLE VALISE TYPE LIFERAFTS

At the appropriate overhaul period ten percent of all life rafts installed in fleets using system bottle and release mechanism, are to be inflated and tested. Ensure that deployment and inflation is satisfactory.

13. DATE MARKING OF EQUIPMENT

Equipment which should be date marked after inspection or re-test, to comply with this Programme, should be re-marked with the date at which the inspection test is next due.

14. AREA OR ZONAL INSPECTION

Where the term `AREA' or `ZONAL' is used in this Programme, this is to be interpreted to mean that a general visual inspection is made for general condition, security and leaks in the structure, systems and components and their installation in the specified zone or area. The inspection must be of sufficient dept to establish that any significant deterioration is identified and rectified to ensure that the general quality/condition of the zone/area issatisfactory until the next higher inspection becomes due.

15. INSPECTION STANDARDS

(a) Unless otherwise stated, all inspection requirements are to be applied without removing an item from the aircraft or dismantling the item, group or sub-assembly, unless dismantling is considered essential in order to ensure airworthiness. Where dismantling is required by this Programme, this is stated against the item concerned.

(b) Throughout this Programme where the abbreviation `CHK' or term Check has been used to signify the inspection requirements it is to be interpreted to mean:

(1) METAL PARTS:

e.g. applicable to all metal parts, bodies or casings of units in systems and in electrical instrument and radio installations, metal pipes ducting, tubes, rods, levers etc.

Inspect for: Cleanliness, external evidence of damage, leaks, overheating, or discharge. Fluid ingress. Obstruction of drainage or vent holes or overflow pipe orifices. Correct seating of fairings and serviceability of fasteners.

Freedom From: Distortion, dents, scores, chafing, pulled or missing fasteners, rivets, bolts, screws. Evidence of cracks and wear. Separation of bond. Failure of welds and spot welds. Deterioration of protective treatment and corrosion. Security of attachments, fasteners, connections, locking and bonding.

(2) RUBBER, FABRIC, FIBREGLASS AND PLASTIC PARTS:

e.g. coverings, ducting, flexible pipes, flexible mountings, seals, insulation of electrical cables, windows etc.

Inspect for: Cleanliness, cracks, cuts, chafing, kinking, twisting, crushing, contraction - sufficient free length. Deterioration. Crazing. Loss of flexibility (other than fabric covered components), overheating. Fluid soakage. Security of attachment (supports, packing and electrical bonding correctly positioned, serviceable and secure), connections and locking.

(3) CONTROL SYSTEM COMPONENTS:

Inspect for: Correct alignment, no fouling. Free movement. Distortion. Evidence of bowing. Scores, chafing, fraying, kinking. Evidence of wear. Flattening. Cracks, loose rivets. Deterioration of protective treatment and

corrosion. Electrical bonding correctly positioned, undamaged and secure. Attachments, end connections and locking secure.

(4) ELECTRICAL MOTORS, ALTERNATORS, GENERATORS AND ACTUATORS:

Inspect for: Cleanliness, obvious damage, evidence of overheating, corrosion and security of attachments and connections. If protective covers are required to be removed: Cleanliness, pitting and burning of contacts, evidence of overheating and security of contacts exposed.

Note: Any other inspection or work requirements not covered by the above standards must be specifically written into this Programme.

16. COMPONENT RELIABILITY PROGRAMME

A method of data collection, analysis, corrective actions and the setting of alert levels indicating significant trends of component reliability shall constitute part of this Programme.

17. ON CONDITION

This concept can be applied to any item in this Maintenance Programme which has no controlling overhaul (fixed or "hard time"), period that required the item to be removed from the aircraft for either partial or complete stripping. The item(s) must, however, always be subject to their condition being established to ensure continued airworthiness.

This is to be achieved by making the item(s) subject to e.g. routine visual inspections, tests, calibrations, etc. as appropriate, these being completed at approved periods specified in this Maintenance Programme.

When radio equipment is removed because of a defect, such measures shall be taken and recorded as are necessary to show that the defect has been rectified and the performance of the equipment has not been impaired.

18. USE OF INSPECTION SCHEDULE

This Schedule must be used in conjunction with the manufacturer's recommended maintenance programme, significant structural inspections and corrosion prevention and corrosion protection programmes, to ensure the continued structural integrity of the aeroplane.

19. ABBREVIATIONS, TERMS AND DEFINITIONS

SECURITY

Means the component is properly mounted or attached to the related equipment. It covers such aspects as related to proper securing, bolt torque, attachment, excessive play, misalignment, loose pipes and electric connections, missing rivets and bolts and screws, loose connections and joints etc.

GENERAL CONDITION

It is a term used to describe an inspection of an area, part or system encompassing the following:

(a) Inspection of structural metal parts, such as bulkheads, fittings, stringer, supports etc. for:

Loose rivets, nicks, dents, cracks, bonding, corrosion cleaning, erosion deformations, wrinkling, protective treatment and overheating.

(b) Inspection of fluid and piping system components, such as hydraulic, fuel, air-conditioning, pitot-static, oxygen systems, etc. for:

Nicks, dents, cleaning, cracks, chafing, bonding, leakage, distortion, wear, corrosion, obstructions, cuts and overheating.

(c) Inspection of electrical and electronic system components and cabling for:

Erosion, insulation, cuts, deformations, cleaning, chafing, fraying, bonding, corrosion, overheating, loose wires and soldering.

(d) Inspection of portions, parts of areas made of plastic, fabric etc. for:

Scratches, cleaning, cracks, chafing, crazing, deterioration, erosion, wear, deformation, tears, protection, peeling off, discolouration, loss of flexibility, overheating and contamination.

(e) Inspection of control mechanism components for:

Alignment, deformation, buckling, cleaning, cuts, splits, chafing, cable fraying and wear, cracks and bonding.

When an inspection for "General Condition" is called for, followed by a proviso regarding a specific aspect which is already covered by the definition of "General Condition", as for instance, flaps for general condition and deformation etc. This is aimed at directing attention to a type of defect which should be supposed rather unlikely and which would lieat the extreme interpretive borders of the aspects covered by the expression "GeneralCondition". But it does not mean at all that other, such as corrosion, leaks etc. may be ignored, or during inspection be deferred to a lower level of thoroughness.

OPERATIONAL TEST

That procedure required to ascertain that a system or unit is operable. These tests should require no special equipment or facilities other than that installed on the aircraft and should be comparable to the tests performed by the flight crews.

FUNCTIONAL TEST

That procedure required to ascertain that a system or unit is functioning in all aspects in accordance with minimum acceptable system or unit design specifications. These tests may

require supplemental ground support equipment and should be more specific and detailed than an operational test. It should contain all necessary information to perform proficiency tests to maintain system or unit reliability at an acceptable level.

ADJUSTMENT

Means checking a component or an assembly for adjustment to establish if it is within the prescribed limits and tolerances, implying that any faulty adjustment evidenced ruing this check is to be corrected.

LUBRICATION

Means the accomplishment of the correspondent lubrication operation, as prescribed in the Maintenance Manual and Lubrication Section.

CALIBRATION

Means checking a unit, an assembly or a system for indication within the prescribed ranges and tolerances.

TEST

Calls for the accomplishment of all test requirements mentioned in the Maintenance and Overhaul Manuals for the component part of assembly being inspected.

BENCH CHECK

Component is to be removed from the aircraft and a simulated operational and calibration check is to be performed in accordance with manufacturer's specifications.

OVERHAUL

Component should be removed from the aircraft and disassembled to allow proper checking of clearances, dimensions and for evidence of corrosion, distortion, contamination, wear etc. Replace all seals, if discrepancies are noted, corrective action should be taken in accordance with manufacturer's specifications and recommendations.

APPENDIX 5

CRITERIA TO BE CONSIDERED WITH RESPECT TO AGEING AIRCRAFT FLEET

1. RESPONSIBILITIES OF OPERATOR

1.1 General

The Operator is responsible for incorporating approved DAH actions necessary to maintain airworthiness into its aircraft specific maintenance programmes, in accordance with ANTR M.

1.2 Supplemental Structural Inspection Programme (SSIP)

The role of the operator in respect to the SSIP is principally to comment on the practicality of the inspections and any other procedures defined by the TCH and to implement them effectively.

1.3 Baseline Programme

In order to operate an aeroplane in compliance with the maintenance programme of ANTR M an operator must adopt the baseline programme provided by the DAH. This is a BCAA requirement due to the limited number of aging aircraft on the Bahraini register. This Baseline Programme is intended to form a basis for operators to derive a systematic and comprehensive CPCP for inclusion in the operator's maintenance programme. CPCPs should not be developed by operators due to the limited number of aging aircraft on the Bahraini register and must be developed by the DAH.

1.4 Repair Evaluation Guidelines (REG)

Where repair evaluation guidelines, repair assessment programmes or similar documents have been published by the TCH they should be incorporated into the aircraft's maintenance programme according to ANTR M requirements.

This fatigue and damage-tolerance evaluation of repairs will establish an appropriate inspection programme or a replacement schedule if the necessary inspection programme is too demanding or not possible.

1.5 Widespread Fatigue Damage (WFD)

The operator's role is to provide service experience, to help ensure the practicality of the programme and to ensure it is implemented effectively.

1.6 Supplemental Type-Certificates and Modifications

Any modification or supplemental type-certificates (STC) affecting an aircraft's structure could have an effect on one or all aspects of ageing aircraft assessment. Such structural changes will need the same consideration as the basic aircraft and the operator should seek support from the STC holder (who has primary responsibility for the design/certification of the STC), or an approved Design Organisation, where, for example an STC holder no longer

exists. Significant STCs that may adversely affect fatigue critical structure

(a) Passenger-to-freighter conversions (including addition of main deck cargo doors).

(b) Gross weight increases (increased operating weights, increased zero fuel weights,increased landing weights, and increased maximum takeoff weights).

(c) Installation of fuselage cut outs (passenger entry doors, emergency exit doors or crew escape hatches, fuselage access doors, and cabin window relocations).

(d) Complete re-engine or pylon modifications.

(e) Engine hush-kits.

(f) Wing modifications such as installing winglets or changes in flight control settings (flap droop), and modification of wing trailing edge structure.

(g) Modified skin splices.

(h) Antenna Installations.

(i) Any modification that affects several stringer or frame bays.

(j) Any modification that covers structure requiring periodic inspection by the operator's maintenance programme.

(k) Any modification that results in operational mission change that significantly changes the manufacturer's load or stress spectrum (e.g., passenger-to-freighter conversion).

(l) Any modification that changes areas of the fuselage that prevents external visual inspection (e.g., installation of a large external fuselage doubler that results in hiding details beneath it).

(m) Interior monuments include large items of mass such as galleys, closets, and lavatories.

1.7 Maintenance Programme

In compliance with ANTR M, operators must amend their current structural maintenance programmes to comply with and to account for new and/or modified maintenance instructions promulgated by the DAH. A period of up to one year may be allowed to incorporate the necessary actions into the operator's maintenance programme once they become available from the DAH. Unless data is available on the dates of incorporation of repairs and modifications (STCs) they will need to be assumed as having the same age as theairframe. The operator should include the following in their Maintenance Programme:

(a) A process to ensure that all new repairs and modifications that affect FCBS will have Damage Tolerance data and inspections or other procedures implemented.

(b) A process to ensure that all existing repairs and modifications to FCBS are evaluated for damage tolerance and have inspections or other procedures implemented. This process includes:

(1) A review of operator processes to determine if damage tolerance data for repairs and modifications affecting FCBS have been developed and incorporated into the operator's maintenance programme for the operational life of the aircraft. If an operator is able to demonstrate that these processes ensure that damage tolerance data are developed for all repairs and modifications affecting FCBS, then no further action is required for existing repairs and modifications.

(2) A process to identify or survey existing repairs and modifications that affect FCBS and determine damage tolerance inspections for those repairs and modifications. This should include an implementation schedule that provides timing for incorporation of the damage tolerance data into the operator's maintenance programme, within the timeframe given in the applicable TCH or STC Holder's approved documentation.

Note 1: Under ANTR M requirements it is expected that an operator will automatically incorporate the Supplemental Structural Inspection Document (SSID) into their maintenance programme.

Note 2: Programme implementation times in flight hours, flight or landing cycles, orcalendar period, as appropriate, should be established by the TC/STC Holder.

1.8 Reporting Requirements

Operators are required to report in accordance with ANTR 21.A.3 and ANTR 145.60. Due to the potential threat to structural integrity, the results of inspections must be accurately documented and reported in a timely manner to preclude the occurrence of WFD. Operators must report all cases of Multiple Site Damage and Multiple Element Damage to the TCH, STC Holder and the CAA, irrespective of how frequently such cases occur. Cracked areas from in-service aircraft (damaged structure) may be needed for detailed examination. Operators are encouraged to provide fractographic specimens whenever possible. Aeroplanes undergoing heavy maintenance checks are perhaps the most useful sources for such specimens.

Although manufacturers' documents may vary somewhat in format, each contains a Baseline Program, guidelines for implementing that program, a mandatory reporting system, and general program information. The Baseline Program includes a Basic Task, numbered Corrosion Tasks, Implementation Ages, and Repeat Intervals. Section five, the reporting section, contains procedures for documenting and reporting the results of the inspections required by the AD. Although this section does not address documentation of Level 1 Corrosion determinations, such documentation is recommended in order to justify Repeat Interval adjustments.

The manufacturer will normally participate in the determination of Level 3 Corrosion. It should be noted that while the AD, in general, requires CPCP adjustments for corrosion exceeding Level 1, Level 3 Corrosion is especially severe and requires other expeditious actions as specified in the AD.

1.9 Continuous Analysis and Surveillance

The operator's continuous analysis and surveillance system should contain procedures to review corrosion inspection task findings and establish corrosion levels. These procedures

should provide criteria for determining if findings that exceed allowable limits are an isolated incident not typical of the operator's fleet.

The operator's programme should also provide for notifying the CAA whenever a determination of Level 2 or Level 3 corrosion is made. Due to the potential urgent airworthiness concern associated with a Level 3 finding, the operator's procedures should provide for notification as soon as possible but not later than 3 calendar days after the Level 3 determination has been made.

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