CIVIL AVIATION AUTHORITY
OF NEW ZEALAND
Te Mana Rererangi Tūmatanui o Aotearoa

Advisory Circular
AC91-12 & 119-5

Revision 2

Aircraft maintenance programmes

5 April 2025

General

Civil Aviation Authority Advisory Circulars (ACs) contain information about standards, practices and procedures that the Authority has found to be **an acceptable means of compliance** with the associated rule.

Consideration will be given to other methods of compliance which may be presented to the Authority. When new standards, practices or procedures are found to be acceptable they will be added to the appropriate AC.

Purpose

The AC describes an acceptable means of compliance with the requirement relating to the development and acceptance of aircraft operator's maintenance programmes. This material is intended to assist persons using and applying for the approval of maintenance programmes for non-air transport operations under Part 91 and air transport operations under Part 119.

Related Rules

This AC relates specifically to Civil Aviation Rule Part 91, Subpart G – *General Operating and Flight Rules, Operator Maintenance Requirements* and Part 119 – *Air Transport Operator – Certification.*

Change Notice

Revision 2 makes changes and removes specific form numbers. It also adds a Version History, corrects minor errors and makes changes to align with current AC style.

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Version History

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Revision No.	Effective Date	Summary of Changes
AC 90-1, Rev 0	25 Dec 1997	Initial issue.
AC91-12 & 119-5, Rev 1	21 May 2007	Replaced AC 90-1 by re-numbering it to AC 91-12 & 119-5 as part of a project to standardise the numbering of all ACs.
AC91-12 & 119-5, Rev 2	5 April 2025	Removes specific form numbers. Adds a Version History. Fixes minor errors and aligns with current AC style.

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Introduction

Maintenance requirements for aircraft have traditionally been based upon three assumptions:

- The reliability and safety of all components can be improved by maintenance operations
- All components demonstrate an initially high failure rate, a lesser constant failure rate, and a final sharp increase in failure rate - the *Bath-Tub Curve*
- All failures have an adverse effect on safety.

These principles led to maintenance programmes that required frequent inspections, frequent testing, and a long list of hard-time overhaul lives.

Aircraft have developed over the years with an increased use of fail-safe designs and improved components. This means the traditional maintenance systems derived from the three assumptions leads to unnecessary and expensive maintenance activities. The current approach to maintenance systems considers different assumptions:

- The reliability of the aircraft, system, or component is a function of design. Maintenance can only limit deterioration and not improve the item, modification or re-design must be used for improvement
- Reliability must be known before maintenance policies can be set and programmes developed
- Failures must be assessed with respect to their effect on safety.

An operator may develop a maintenance programme to suit a particular aircraft type carrying out a particular operation. This AC provides guidance on the development and content of maintenance programmes.

General

The operating rules contained in Parts 91, 121, 133, 135, and 137 specify that the operator is responsible for the airworthiness of the aircraft and associated equipment. The responsibility of an operator for an aircraft's airworthiness includes ensuring that the aircraft is maintained in accordance with (IAW) an appropriate maintenance programme.

The rules provide the minimum maintenance standards that apply to all operators and also specify a straightforward maintenance programme in Part 43. Should operators be required to, or elect to, compile an alternative maintenance programme the minimum rule requirements must be included but further inspection requirements may be tailored to suit a particular operation.

Common terminology

The following terms are commonly used with respect to maintenance programmes.

Damage tolerant. A qualification standard for aircraft structure. An item is determined to be damage tolerant if it can sustain damage and the remaining structure can withstand reasonable loads without failure or excessive structural deformation until the damage is detected.

Failure related sampling programme. Inspection of specific aircraft selected from a fleet as having the highest operating usage or age to identify the first evidence of deterioration in their condition caused by fatigue damage.

Inherent level of reliability and safety. That level which is built into the item and therefore inherent in its design. This is the highest level of reliability and safety that can be expected from an item, system, or product if it receives effective maintenance. To achieve higher levels requires modification.

Maintenance programme review. A survey of the total maintenance programme of an aircraft that may result in major changes to the programme.

Maintenance significant items. An item whose failure could:

- affect safety
- be undetectable during operations
- have significant operational impact
- have significant economic impact

MSG-3. The Air Transport Association of America Maintenance Programme Development Document.

Safe-life. For an item that is not damage tolerant, that item's reliability is protected by a life limit that removes the item from service before damage is expected.

Scheduled maintenance. Those maintenance activities predetermined and identified in a programme as being required to maintain the continued airworthiness of the aircraft and its components.

Structurally significant item. Any detail, item, or assembly that contributes significantly to carrying flight, ground, pressure, or control loads and whose failure could affect the integrity necessary for the safety of the aircraft.

Unscheduled maintenance. Those maintenance activities that occur from unplanned occurrences. This maintenance may require action outside the maintenance programme's schedules.

What is a maintenance programme?

A maintenance programme details what, when, who, and how maintenance is performed.

The primary objective of a maintenance programme is to maintain the inherent airworthiness throughout the operational life of an aircraft in an economical manner.

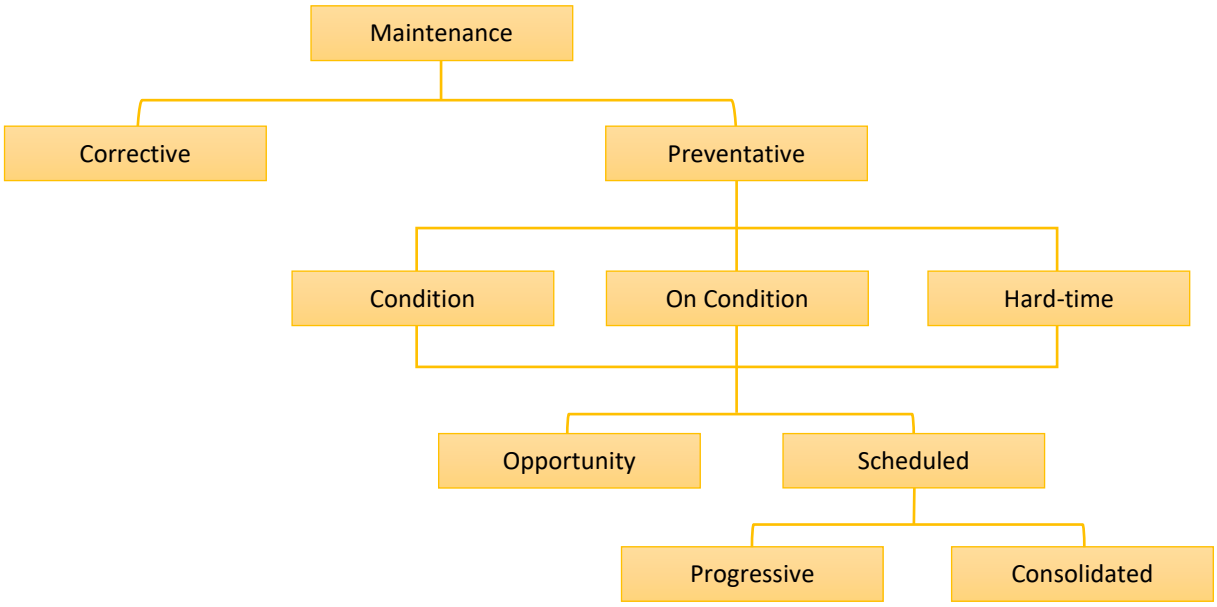
A maintenance programme is a compilation of the individual maintenance and inspection functions, referred to as schedules, used by an operator to maintain the airworthiness of an aircraft. The programme should include policies and procedures, detailed instructions for the accomplishment of the scheduled inspection programme, and references to technical manuals for maintenance standards and methods.

Maintenance programmes provide a basis for the control by an operator of:

- the operator's responsibility for airworthiness
- the maintenance and inspection personnel
- the performance of maintenance
- the arrangements for maintenance performed by other persons
- the continuing suitability of the programme.

An efficient maintenance programme is one that schedules only those tasks necessary to meet the stated objectives and does not schedule additional tasks that will increase maintenance costs without a corresponding increase in safety.

Figure 1. Types of maintenance



The necessary maintenance provisions are examined for the application of one of three maintenance processes:

- **Hard-time limit**: A maximum interval for performing maintenance tasks
- **On-condition**: Scheduled repetitive inspections or tests to determine the condition of items
- **Condition-monitoring**: For items that have neither hard-time limits nor on-condition maintenance, condition-monitoring is accomplished by analysing the performance of equipment and developing inspections on an *as required* basis

The analysis system and associated support for a condition-monitored programme are normally only efficient for operators of larger aircraft or larger fleets of aircraft.

Maintenance programmes include the necessary provisions for:

- Aircraft inspections
- Scheduled maintenance
- Unscheduled maintenance
- Engine, propeller, and appliance repair and overhaul
- Structural inspection programme
- Specified inspection items
- Support, role, and other equipment maintenance.

Why have a maintenance programme?

Rule requirements

Part 91 specifically requires each operator of:

- an aircraft with a MCTOW of greater than 5700 kg
- a turbine-powered multi-engine aircraft
- a turbine-powered helicopter
- an aircraft issued with a special category airworthiness certificate

to maintain that aircraft IAW an acceptable maintenance programme.

Part 91 requires that each operator ensure that each of its aircraft is maintained:

- IAW Part 43 and the airworthiness limitations of a manufacturer's maintenance manual

  An operator may elect to operate an aircraft by complying with these requirements for maintenance - they are the minimum standards.

- IAW a maintenance programme:
  - approved under Part 91

    An operator may be required to have a maintenance programme approved under Part 91 depending on the type of aircraft to be operated. An operator that would otherwise be maintained in accordance with Part 43 may elect to have a maintenance programme approved if this is beneficial to their operation.

  - accepted under Part 119

    Air transport operators are required to have a maintenance programme included in their documented system. This programme is accepted as part of the issue of their air operator certificate.

  - otherwise acceptable to the Director.

Objectives of a programme

The intent of a maintenance programme is to:

- maintain the inherent safety and reliability levels of the equipment
- restore safety and reliability to their inherent levels when deterioration has occurred
- obtain the information necessary for desi.gn improvement of those items whose inherent reliability proves inadequate
- accomplish the above goals at a minimum total cost, including maintenance costs and the costs of resulting failures

These objectives recognise that maintenance programmes, as such, cannot correct deficiencies in the inherent safety and reliability levels of the equipment. The maintenance programme can only prevent deterioration of such inherent levels. If the inherent levels are found to be unsatisfactory, modification will be necessary to obtain improvement.

For an air transport operator there is another aspect of the maintenance programme to consider, which is customer satisfaction. This may drive maintenance decisions but operators must not consider these factors without an equivalent consideration of safety.

How are maintenance programmes established?

The primary objective of a maintenance programme is to maintain the inherent airworthiness throughout the operational life of an aircraft in an economical manner.

The approach can be summarised as a series of decisions about the failure type, the failure consequence, and the action to minimise the failure's effect. Safety is key, then availability, operational capability, and then economics.

Initial scheduled maintenance tasks are normally established for each aircraft type based on:

- The manufacturer's requirements
- A typical operator's experience
- Considerations of systems analysis.

For new aircraft the manufacturer prescribes a programme based upon the analysis completed during design and manufacture. Before a manufacturer's programme can be changed some analysis of operator experience is required. Where no service experience exists the maintenance requirements should be based on the manufacturer's recommendations.

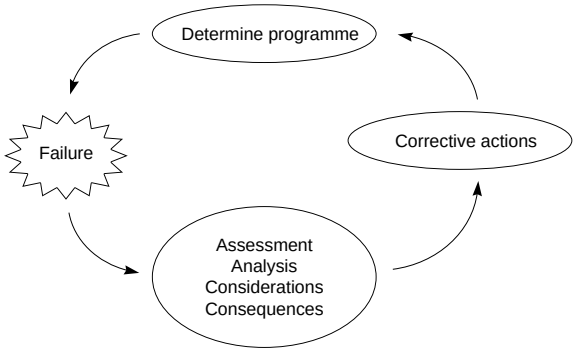


Figure 2. Establishing a programme

Maintenance programmes are normally derived using an accepted form of analysis such as MSG-3. In MSG-3, maintenance programmes are established using a consequence-of-failure approach. This approach includes:

- Assessment
- Analysis
- Damage considerations
- Consequences
- Determining the programme.

Assessment

Functional failures are assessed for the consequence of that failure and assigned one of two basic categories:

- Safety
- Economic.

Failures are further classified into sub-categories based on:

- whether the failure was evident to, or hidden from, the operating crew
- fatigue
- corrosion
- accidental damage
- wear and tear
- other concepts such as:
    - multiple failures
    - effect of failure on other components
    - detection levels.

The remaining maintenance will be non-scheduled or non-routine maintenance and will consist of maintenance actions to correct discrepancies noted during normal operation.

Analysis

During the analysis of each item of an aircraft or component the consequence-of-failure approach identifies the significant items on that aircraft. An acceptable process would be to:

- Partition the aircraft into major functional areas such as the ATA Systems and Sub-Systems
- Continue the partitioning process until sub-components are identified that are not normally replaced.

The process of identifying significant items is normally a conservative process using engineering judgement based on the anticipated consequences of failure.

The significant items are those items whose failure could:

- Affect safety
- Be undetectable, or not likely to be detected, during operations
- Have significant operational impact
- Have significant economic impact.

A **significant item** is usually a system or sub-system that is identified as manageable in terms of analysis of failures. That is, unnecessary analysis is avoided but the analysis used will ensure that all functions, failures, and causes are covered.

Manufacturers of aircraft generally produce these lists of items as part of the aircraft's specification. The list is continually assessed by the manufacturer and amendments made on the availability of other information, such as accident analysis of similar aircraft and components.

Damage considerations

The considerations of damage are commonly used in terms of aircraft structure but are equally valid for general maintenance programme development. These include:

- **Accidental Damage.**
    - Susceptibility, based on frequency of exposure and the location of damage
    - Residual strength, based on the likely size of damage relative to the critical damage size
    - Timely detection of damage, based on the relative rate of damage growth after it is sustained.
- **Environmental Deterioration.**
    - Exposure to a deteriorating environment such as cabin condensation, galley spillage, toilet spillage, and cleaning fluids
    - Contact between dissimilar materials
    - Breakdown of surface protection systems such as paint, primer, bonding, sealant, corrosion inhibiting compounds, and cladding systems
    - Material characteristics and their inherent resistance to the environment
    - Timely detection of damage, based on the relative rate of damage growth after it is sustained.
- **Other Damage.**
    - Residual strength, including the effects of multiple failures
    - Detection standards for applicable inspection methods
    - Applicable inspection levels and methods
    - Damage tolerance period, based on the time between a failure being detectable and becoming critical
    - Timely detection of damage, based on the relative rate of damage growth after it is sustained.

As discussed, a significant item is any item that contributes significantly to the safety and integrity of an aircraft. Other items, when considering damage, may be considered simply by defining zonal boundaries.

When the analysis and damage factors are considered each significant item is categorised generally as damage- tolerant or safe-life.

For a **safe-life** item a life limit is established and included in the aircraft Airworthiness Limitations. As the item design identifies a period that the item can be satisfactorily be operated and then discarded, no special inspection schedules are required to assure the continuing airworthiness of these items.

The continued airworthiness of damage-tolerant items depends on scheduled inspections. The maintenance programme will provide for the inspection of items frequently enough to ensure that an item damaged between inspections is detected before safety is compromised.

For **damage-tolerant** items, the setting of the inspection intervals relies on appropriate data being available that suggests an effective interval for task accomplishment. Appropriate information may consist of one or more of the following:

- Prior knowledge from other similar aircraft or systems that show a scheduled maintenance task has offered substantial evidence of being effective and economically worthwhile
- Manufacturer's test data which indicates that a scheduled maintenance task will be effective for the item being evaluated
- Data established by an experienced working group using sound engineering judgement and operating experience.

Resulting safe-life components are identified and mandatory replacement times included in the Airworthiness Limitations section of the programme. **Safe-life** limitations may include fatigue-critical items, corrosion-critical items, and other items that warrant inclusion, based on the in-service experience of the developer of the programme.

Consequences

After a list of significant items has been identified each of the following are considered for each item:

- **Functions**. The normal characteristic actions of an item
- **Functional Failure**. How an item fails to perform its function
- **Failure Effect**. What is the result of a functional failure
- **Failure Cause**. Why the functional failure occurs.

The analysis of each of these considerations includes asking specific questions about the consequences of failures and how maintenance actions can ensure continued airworthiness and safety.

These questions define a flow of analysis, or a decision tree, by asking:

- Is the occurrence of a **functional failure** evident to the operating crew during the performance of normal duties? If not, is it a **hidden functional failure**?
- Does the **functional failure** or secondary damage resulting from the functional failure have a direct adverse effect on operating safety?
- Does the combination of a **hidden functional failure** and one additional failure of a system-related or back-up function have an adverse effect on operating safety?
- Does the **functional failure** have a direct adverse effect on operating capability?
- Is a lubrication or servicing task applicable and effective?
- Is a check to verify operation applicable and effective?
- Is an inspection or functional check to detect degradation of function applicable and effective?
- Is a restoration task to reduce failure rate applicable and effective?
- Is a discard-task to avoid failures or to reduce the failure rate applicable and effective?
- Is there a task or combination of tasks applicable and effective?

The programme

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

Overall, a maintenance programme should ensure:

- Task effectiveness
- Safety applicability
- Operational effectiveness
- Economic effectiveness.

The maintenance programme is assembled by identifying those significant items that require inspections, and building schedules for those inspections. The programme is the top-level document that sets the policy for the maintenance and details the inspection intervals for specific items.

Specific maintenance programme considerations

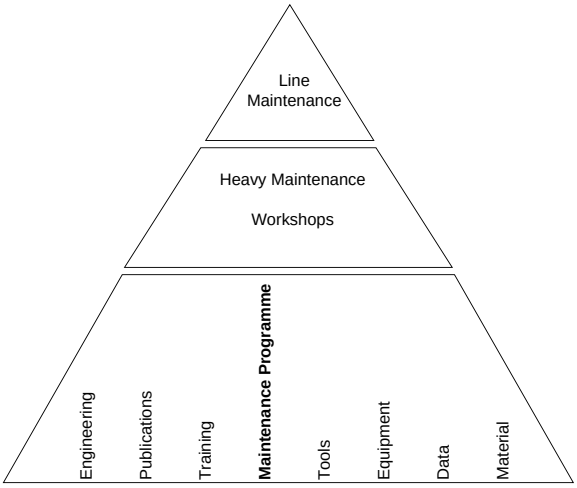


Figure 3. Aspects of maintenance

Content

The development of a scheduled maintenance programme requires many decisions, including:

- Which individual tasks are necessary
- How frequently these tasks should be scheduled
- What facilities are required to enable these tasks to be accomplished
- Where these facilities should be located
- Who should accomplish these tasks
- Which tasks should be accomplished concurrently, in the interests of economy.

When deciding on the content of the maintenance programme the following questions should be asked:

For each failure mode of an item:

  - Is a reduction in the item's performance detectable by routine flight crew monitoring?
  - Is a reduction in the item's performance detectable by in-situ maintenance or unit test?
  - Does the failure mode have a direct adverse effect upon operating safety?

- For each function of an item:
  - Is the function of the item hidden from the viewpoint of the flight crew?

- For each item as a whole:
    - Is there an adverse relationship between age and reliability?

Note: *Performance in this context is a measure of an item's resistance to fail. For example, if an item is damage-tolerant and that item partially fails, then the item's failure resistance is reduced.*

The maintenance programme itself will consist of two groups of tasks:

- A group of scheduled tasks to be accomplished at specified intervals to prevent deterioration of the inherent safety and reliability levels of the equipment, including:
    - Lubrication and Servicing
    - Operational or Visual Check
    - Inspection or Functional Check
    - Restoration
    - Discard.
- A group of non-scheduled tasks that restore the equipment to an acceptable condition and result from:
    - The scheduled tasks accomplished at specified intervals
    - Reports of malfunctions
    - Data analysis by the operator, the manufacturer, or CAA.

The maintenance programme should specifically address those significant items or systems identified by the manufacturer or from service experience that have a direct effect on safety. The programme should include:

- A description of each significant item and its functions
- A list of the item's failure modes and effects
- The expected failure rate of the item
- Any functions hidden during normal operation
- Any system redundancy
- The potential indications of reduced failure resistance
- The identification of whether the item needs to be on MEL, if applicable.

Categories

A maintenance programme is normally based around four general categories:

- Systems and their components
- Powerplants and their components
- Aircraft and powerplant checks and inspections

- Structural inspection.

All four can be controlled by a composite programme, or each may be handled individually. Each category would provide information relating to maintenance intervals and inspection schedules.

Sources of information

To monitor and control a maintenance programme information should be assembled on a regular basis. Sources of information, the content of which may subsequently require the amendment of the programme, include:

- pilot reports
- technical log entries
- maintenance work sheets
- workshop reports
- functional check reports
- special inspection reports
- stores reports
- safety reports
- service bulletins, letters, and notices
- airworthiness directives.

Types of inspections and actions

Combination

A combination task that includes two or more tasks that must be accomplished by the same person and normally involve a sequence of operations.

Circumstantial

A maintenance task that is carried out on an *as required* basis and is not a scheduled maintenance task.

Crew inspection

A visual inspection by flight crew before or following a flight to detect obvious external discrepancies.

Detailed visual inspection

An intensive visual examination of a specified detail, assembly, installation, or system to detect damage, failure, or irregularity. Available lighting is normally supplemented with a direct source of good lighting and inspection aids such as mirrors or magnifying lenses. Surface cleaning and elaborate access procedures may be required.

Discard

The removal from service of an item. The discarding of an item may be:

- at a specified life limit

- circumstantially on failure
- as a matter of course for consumable items such as seals, gaskets, and split pins.

Discarded, or scrapped, finite-life items should be mutilated in such a way as to prevent inadvertent use. AC00-1, *Acceptability of Parts,* provides guidance on scrapping finite-life items.

Functional check

A quantitative check to determine if one or more functions of an item perform within specified limits.

General visual inspection

A visual examination of an interior or exterior area, installation, or assembly to detect obvious damage, failure, or irregularity. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, or flashlight and may require removal or opening of access panels or doors. Stands, ladders, or platforms may be required to gain proximity to the area being checked.

Lubrication

Any act of lubricating or servicing for the purpose of maintaining inherent design capabilities. Lubrication also constitutes a scheduled discard task in as much as the old lubricant is replaced by the new lubricant.

Operational check

An operational check is a task to determine that an item is fulfilling its intended purpose. The task does not require quantitative tolerances and is a failure finding task. These checks are normally carried out to ensure the availability of hidden functions.

Replenishment

Replenishment includes the actions of oiling, fuelling, charging, and inflating. This is a task not normally considered as maintenance, although a maintenance programme may refer to replenishment when detailing other tasks.

Restoration

That work necessary to return the item to a specific standard of functional performance. Restoration may vary from cleaning or replacement of single parts up to a complete overhaul.

Special detailed inspection

An intensive examination of a specific detail, installation, or assembly to detect damage, failure, or irregularity. The examination is likely to make extensive use of specialised inspection techniques and equipment such as NDT and video probes. Intricate cleaning and substantial access or disassembly procedures may be required.

Visual inspection

A visual check is an observation to determine that an item is fulfilling its intended purpose. Does not require quantitative tolerances. This is a failure-finding task.

Zonal visual inspection

A general visual inspection of each aircraft zone, an area defined by access and area, to check all systems and assemblies for security, damage, leaks, and wear and tear. These inspections are not

directed at a particular failure but a survey of general conditions and visually evident deterioration in a discrete space.

Maintenance patterns

Maintenance programmes normally establish one of three scheduled servicing patterns.

Periodic

In this type of programme each inspection is more detailed than the last and includes all those actions required to be completed more frequently. The inspections are arranged at regular intervals as shown in Figure 1 where the inspections are numbers 1, 2, 3, and 4.

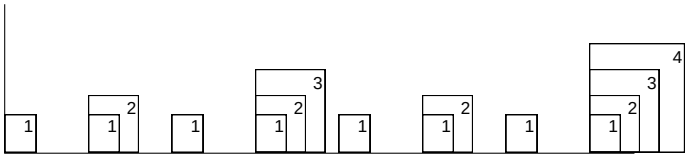


Figure 4. Periodic maintenance programme

Flexible

This type of maintenance programme provides a certain flexibility in application. The scheduled inspections should be divided into tasks of roughly equal size that can be undertaken on an opportunity basis. Each task has a latitude built in to allow the flexibility.

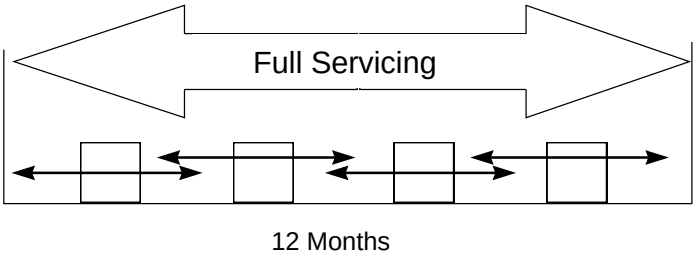


Figure 5. Flexible maintenance programme

Progressive

Similar to the flexible programme, the progressive programme breaks down a complete inspection into tasks of roughly equal size. The progressive programme however defines specific inspection intervals that equalises the tasks over a given twelve-month period.

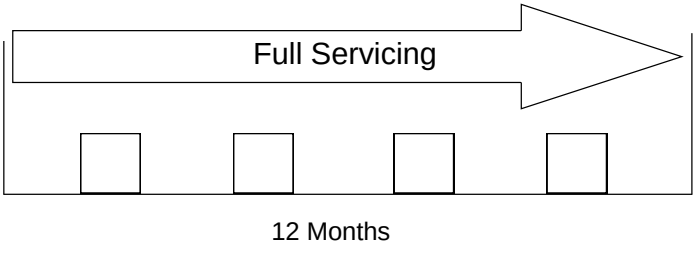


Figure 6. Progressive maintenance programme

Equalised

An equalised, or phased, maintenance programme is similar to the periodic programme but does not divide the inspections into such small units. Larger, less frequent inspections are defined of

equal size to ensure that turn-around time is constant and that all required replacements occur at their required frequencies.

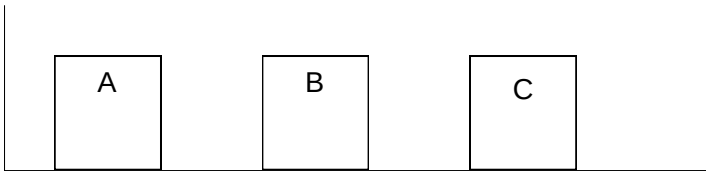


Figure 7. Equalised maintenance programme

Latitudes

Part 91 provides a latitude of 10% for the planning of maintenance actions. The concept of latitudes is to provide the maintenance planner the ability to move scheduled servicings to fit in with operational needs. Part 91 specifically limits the application of this extension to allow the accomplishment of the inspection during other routine maintenance or to deliver the aircraft to a maintenance location. When devising a maintenance programme, different to Part 91, latitudes may be introduced to provide a similar planning flexibility.

The concept of maintenance programmes is that inspections occur at regular intervals, but not so regular as to over-service the aircraft. Over-servicing is not necessarily an improvement in safety and is generally not economically efficient. The application of latitudes should therefore be restricted because the variation of the planned intervals negates the effect of the developed programme. For this reason the application of a latitude in one inspection interval must be adjusted for in the next interval.

If a 100-hour servicing is due at 1000 hours but is extended by 10 hours to 1010 hours, the next scheduled inspection remains due at 1100 hours.

Maintenance programmes work on nominal inspection intervals and these nominal intervals should be maintained.

Special requirements

Certain types of operation require specific maintenance programmes to be developed, such as ETOPS, RNP, RVMS, and MNPS. These programmes are required to include analysis systems, reliability reporting, modification incorporation, and other checks to ensure their continued applicability and the aircraft's ability to continue operating in that way.

These types of programmes are normally for larger aircraft types and are well supported by manufacturers and regulatory authorities. They are not further discussed in this AC.

Escalation

Escalation is a method of increasing a maintenance interval based upon analysis of equipment performance. Escalation can be included in maintenance programmes to vary specified time limitations for aircraft inspections or component inspections, checks, or replacements. To apply an escalation programme, the maintenance manual must include manufacturer's data and operator analysis procedures.

Using programmed escalation the time limitations may be individually extended under the following conditions:

- The need for escalation results from some unforeseen event that inhibits accomplishing the task at the scheduled period

- Escalations should not exceed 10% without a change to the maintenance programme
- The escalation does not result in exceeding the:
    - Intervals specified by an airworthiness directive
    - Life limitations
    - Limitations specified by MELs
    - Mandatory or special structural inspections.

Escalation is not carried out routinely and in most cases individuals will not be able to provide the required analysis to determine a suitable escalation period.

New Zealand maintenance programme requirements

The requirements for a maintenance programme will vary depending on the type of aircraft, operation, and support available to the operator.

The maintenance manual

The operator's maintenance manual serves to define the maintenance programme and to provide procedures and instructions for its use. Under the rules, the following is required for an application for the approval of a maintenance programme:

- the name and address for service in New Zealand of the applicant
- the identification of the maintenance organisation that is to conduct the maintenance
- the maintenance status of the aircraft prior to the commencement of the programme, and
- the means of introducing the programme.

These requirements ensure that the maintenance programme can be introduced and continued by the operator. The means of introducing a programme should consider the current status of the aircraft and what is required to ensure the aircraft remains airworthy. In general, a complete inspection under the new programme will be required to ensure the integrity of subsequent inspections.

The maintenance programme will normally be contained within the maintenance manual and must be available to all personnel required to use it. A maintenance manual should include:

- A maintenance policy and procedures section that includes an explanation of the programme, including the continuity of inspection responsibility, administration procedures, test flight requirements, and many other subjects that are peculiar to each individual operator
- A list of inspections, their intervals, and any latitudes, expressed in terms of the time in service, cycles, calendar time, number of system operations, or any combination of these – **the maintenance programme**

Note: *As programmes are adjusted from service experience of the operator on the aircraft type, where little or no service experience exists with similar aircraft, the maintenance programme shall be based on manufacturer's recommendations.*

- A set of inspection descriptions that detail the requirements for completing the inspections including those instructions for recurring non-routine requirements such as engine changes and abnormal landing inspections – **the inspection schedules** – including:
    - a reference number
    - an issue date
    - the type and model of aircraft, engine, or propeller
    - the class of work involved in the inspection.

  Note: *In most cases individuals will not be able to provide the required analysis to determine a suitable schedule and must rely upon manufacturer's recommendations.*

- Details of procedures for the maintenance of the appropriateness of the programme including instructions for changing an inspection interval because of service experience
- References to appropriate technical data and manuals for the accomplishment of maintenance. These are usually manufacturers' publications, the applicability of which is designated by the policy and procedures manual. Technical manuals can be supplemented by the operator. The content of these manuals is the operator's responsibility regardless of who publishes them

  Note: *The operator may elect to detail the inspection requirements on the work sheets that form part of the maintenance package. These instructions should detail the methods, techniques, and practices, the tools and equipment, and the standards to be used when completing the work.*

- The responsibilities of the various maintenance personnel
- Details of certification requirements, sign off sheets, and the compilation and retention of records, reports, and technical reference material including:
    - AD compliance procedures and record keeping
    - Life-limited parts record keeping
    - Time-controlled components record keeping
    - General aircraft record keeping.

When developing a programme, an operator should also include procedures that ensure the required airworthiness directives are added to the programme and that the programme continues to meet at least the standards of Part 91 and Part 43 and the manufacturer's recommendations.

The operator is required to maintain the airworthiness of an aircraft. Maintaining the airworthiness requires the maintenance of the programme to ensure it continues to reflect the stated objectives. To achieve this, the maintenance manual should include a revision system and, most importantly, a procedure for assessing manufacturer's recommendations and applying them to the programme.

Fitted equipment

An aircraft can be fitted with many different configurations of instruments and equipment depending on the type of operation to be conducted. Fitted equipment is that equipment permanently installed to enable the aircraft to conduct a particular operation.

A maintenance programme is required to address the aircraft as a whole and should, therefore, consider the requirements of the additional fitted equipment. If that equipment is changed then the maintenance programme should be examined for its continued applicability, and amended if necessary.

Role equipment

Items of role equipment regularly used should be identified in the maintenance programme and schedules similarly to other components on the aircraft. Role equipment procedures should also include provisions for:

- storage
- inspection before use
- identification of the equipment
- installation and removal of the equipment
- personnel required to install and remove the equipment.

Occurrence inspections

The maintenance programme should identify those inspections required after abnormal occurrences such as heavy landings or severe turbulence. These inspections will generally have specific inspections to be performed as detailed in the appropriate schedule.

Acceptable programmes

Part 91 requires that each operator ensure that an aircraft is maintained IAW a maintenance programme:

- approved under Part 91
- accepted under Part 119
- otherwise acceptable to the Director.

Manufacturer's maintenance programmes are acceptable to the Director without further approval. An operator using a manufacturer's programme must ensure that the requirements and standards of Part 91 and Part 43 are met by that programme.

Application for approval of maintenance programme

The applicant should provide the information required by the applicable CAA form, for approval or amendment of a maintenance programme (hire or reward aircraft). To find the form, go to the 'Forms ' tab on the CAA website and click on the filter for Part 91.

General

The applicant should identify themselves, the maintenance organisation that will conduct the maintenance IAW the programme, and the aircraft, engine, and propeller descriptions as required by the form.

Maintenance status

The maintenance status of the aircraft should be detailed to enable the induction programme to be adequately assessed.

The completion of an Annual Review of Airworthiness or Maintenance Review will generally be acceptable in indicating the maintenance status of the aircraft. This review should be fully documented and a copy of any discrepancies and associated rectification provided with the application.

Induction

The induction of an aircraft onto a maintenance programme is important as it ensures that no maintenance is overlooked during the transition period. The method of induction should be fully stated on the application, including any subsequent checks that may be necessary to ensure the induction was successful.

Compliance with programmes

Continuity of programmes

Maintenance programmes are integrated carefully and aspects of programmes can not normally be combined. When using a maintenance programme, and particularly a manufacturer's programme, all aspects of the programme must be applied.

If an operator wishes to change their current maintenance programme the provision of rule 91.625 must be applied to ensure the satisfactory continuation of the maintenance.

When introducing a previously private aircraft to an air transport operation the outstanding maintenance must be carefully assessed to ensure all required maintenance actions are rescheduled. The only practical way of achieving this assessment is by the completion of an annual review of airworthiness. This ensures that the aircraft is conforming with its type certificate and all maintenance is up to date.

Compliance with manufacturer's recommendations

Under Part 43, the maintenance need only include those items in the airworthiness limitations section of the manufacturer's manual.

If the manufacturer's programme is selected, the life recommendations must be applied from all sections of the manual. If any operator does not wish to apply all the other limitations, that operator must apply for the approval of a separate programme.

Programme suitability

The operator is required to maintain the airworthiness of an aircraft. To maintain the airworthiness requires the maintenance of the programme to ensure it continues to reflect the stated objectives. To enable this revision the maintenance manual should include a revision system and, most importantly, a procedure for assessing manufacturer's recommendations and applying them to the programme.

The programme must be continually assessed for its suitability and for amendments of Civil Aviation Rules that must be incorporated.

Typical systems used in assessing the applicability of the programme include:

- data collection
- data analysis
- corrective action
- performance standards
- data display and report
- maintenance interval adjustment and process change
- programme revision.

Arrangements with other persons for maintenance

When an operator uses the services of another person to accomplish all, or part, of its maintenance programme that person's organisation becomes, in effect, an extension of the operator's organisation. The operator must determine the person's capability to do the work and must provide appropriate material from its maintenance manual for that work.

The operator should execute contractual agreements with the persons performing its work on a continuing basis to ensure the operator's interests are met. In the case of major operations such as engine overhaul, the agreement should denote a specification for the work and that specification should be included, or referenced, as part of the operator's manual system.

There will be unplanned occasions where it will be necessary for the operator to make arrangements for maintenance away from its regular maintenance facilities. The operator may institute procedures whereby the pilot-in-command or other person can make on-the-spot arrangements for maintenance. However, the person performing the work should be specifically authorised by a designated person in the operator's organisation for that work. The operator's procedures should outline the steps that must be taken for the operator to control the work performed.

Appendix A

Example of programme one

This example of a section of a manufacturer's programme is detailed in a tabular form indicating the periods that inspections must be completed. The programme description refers to the aircraft maintenance manual for the instruction on performing the tasks.

		Each 50 hours	Each 100 hours	As specified
Fuel System				
1	Fuel strainer, drain valve, and control	•		
2	Fuel strainer screen and bowl		•	
3	Electric fuel pump, throttle switch, and electric connections	•		
4	Fuel tanks, fuel accumulator tank, fuel lines, drains, filler caps, and placards		•	
5	Drain fuel and check tank interior, attachment, and outlet screens			**5**
6	Fuel vents and vent valves		•	
7	Fuel selector and/or shut off valve and placards		•	
8	Fuel quantity gauges and transmitter units		•	
9	Engine primer		•	
10	Vapour return line and check valve		•	
Landing Gear				
1	Brake fluid, lines and hoses, linings, disc and clips, brake assemblies, and master cylinders		•	
2	Main gear wheels, wheel bearings, step and spring strut, tyres, and fairings		•	
3	Main and nose gear wheel bearing lubrication			**6**
4	Torque link lubrication	•		
5	Tailgear lubrication and nose gear strut servicing		•	
6	Nose gear shimmy dampener servicing			**7**
7	Tailwheel friction check		•	**8**
8	Nose gear wheels, wheel bearings, steering system, shimmy dampener, tyre, fairing, and torque links		•	
9	Tailwheel tyre, wheel bearings, steering system, anti-swivel mechanism, tailwheel locking system, cables, and spring tube		•	
10	parking brake system		•	

Specified inspections (refer third column)

1 Each 25 hours, if not equipped with an external filter

2 Each 1000 hours, or to coincide with engine overhauls, replace garter-type filters

3 Starters and generators each 200 hours; alternators each 500 hours

4 Check timing each 200 hours. Check breather compartment each 500 hours, unless timing is off (except on Slick Model 4001 magneto)

5 Each 1000 hours, each 500 hours thereafter

6 First 100 hours, each 500 hours thereafter

7 Without temperature compensating mechanism, service every 100 hours; with temperature compensating mechanism, check at 50 hour intervals

8 First four 25 hours, each 100 hours thereafter

Example programme two

This maintenance programme layout differs from the first programme in that it combines the tabular format and a written format to describe the inspections required. The programme itself is relatively straightforward and common for smaller operators. The programme includes the descriptions of inspections, periods of inspections, and references to maintenance manuals and other maintenance standards.

Aircraft Maintenance Programme – PA32-260 – ZK-ABC, ZK-XYZ

- All relevant provisions of New Zealand CAA Airworthiness Directives shall be complied with.
- Components shall be overhauled / retired from service at the periods recommended by the manufacturer.
- All applicable periodic inspections and maintenance, except pre-flight, is to be released to service IAW Part 43.
- The aircraft shall be inspected IAW the following:

Daily and/or preflight	Pilots' handbook	
Schedule	50, 100, 500, 1000 flying hours	
Inspections	IAW Piper report 230, 210	
Calendar time inspection periods	Flexible oil lines – at engine overhaul Valve rockers – check freedom every 400 hours Flexible fuel tank supply hose – at engine overhaul	Lycoming SI 1009 SSP 2070
Propellers	Manufacturer's manual	
Radio stations and Navigation equipment – ZK-ABC	1 x Narco Comm – in accordance with rule 91.609 not to exceed 24 months	Part 43 Appendix B
Radio stations and Navigation equipment – ZK-XYZ	1 King 175 Nav Comm, 1 x Narco Comm, 1 x Bendix T12C ADF – in accordance with rule 91.609 not to exceed 24 months	Part 43 Appendix B
Emergency locator transmitter	In accordance with rules 91.615(a) and (2) not to exceed 12 months	Part 43 Appendix F
Instruments	Altimeters – in accordance with rules 91.611(a)(1), (2), and (3) not to exceed 24 months	Part 43 Appendix D
Transponder	In accordance with rule 91.613 not to exceed 24 months	Part 43 Appendix E
Safety equipment	First aid kit, fire extinguisher, life jackets – period not to exceed 12 months	AC AC43-6
Additional equipment	In accordance with manufacturer's requirements	Manufacturer's manual
Maintenance review	12-monthly	Part 43 and ACs
Abnormal occurrence	Piper maintenance manual	

Example programme three

This maintenance programme layout differs from the other programmes in that it does not use the tabular format to describe the inspections required. The programme itself is relatively straightforward as it includes references to maintenance manuals and other schedules.

General

Maintenance of the organisation's aircraft will be accomplished in New Zealand. Refuelling, repair, and maintenance is to be undertaken by authorised personnel.

Routine maintenance

In accordance with New Zealand CAA rules a review of maintenance will be carried out and a Certificate of Maintenance Review issued valid for 12 months.

In addition to the regular rectification of current defects, routine maintenance will be carried out as follows:

1. **Transit check** – Schedule TR-12345-4-987
   To be accomplished on arrival at all stations

***Note**: For overseas operations compliance with New Zealand requirements is necessary.*

2. **Stayover check** – Schedule ST-34567-9-098
   To be accomplished, in addition to transit check:

   - on arrival at all stations when scheduled out of service for a period of eight ~~8~~ hours; and
   - repeated before aircraft entering service if out of service for a period over 24 hours.

3. **Departure check** – Schedule DC-56789-0-123
   To be accomplished at all stations following transit, stayover, or scheduled maintenance checks.

4. **Line terminating check** – Schedule LT-09876-5-654
   To be accomplished before hanger visits.

5. **Out of service aircraft**
   Out of service aircraft are to be maintained in accordance with the manufacturer's manual.

6. **A check** – Maintenance manual
   To be accomplished at intervals of not more than 500 hours or 40 days, whichever occurs first. A tolerance of 50 hours may be applied.

7. **C check** – Maintenance manual
   Phased programme to use no more than four inspections over a period of 25 000 hours or 60 months and be accomplished at intervals of not more than 5000 hours or 12 months, whichever occurs first. A tolerance of 200 hours may be applied.

8. **D check** – Maintenance manual
   To be accomplished at intervals of not more than 25 000 hours or 60 months, whichever occurs first.

9. **Structural inspections** – Maintenance planning document
   External inspections to be sampled at 100 % on all aircraft. Internal inspections to be sampled at 20% unless identified as a structurally significant item.

Inspection initially between 15 000 and 30 000 hours and subsequently each 25 000 hours.

Appendix B

Example maintenance schedule

This schedule includes the schedule's identification, its applicability, and its effective date. Note also that the schedule includes:

- personnel requirements
- recording requirements
- reference to maintenance manuals and figures for clarity
- removal instructions, installation instructions, and standards that the inspection must be carried out to
- requirements to report findings of the inspection
- an amendment to include an alert service bulletin requirement
- documentation requirements of the maintenance.

Departure Check – Schedule DC-56789-0-123 – 19 March 1999

To be completed after transit, stayover, or A check

Fuelling

1. Refuel completely and record quantities in log.
2. Fuel measuring sticks locked and secured. Refuelling cap fitted, manual refuel and defuel valves closed and lockwired. Access panels closed.
3. Enter engine oil uplift on performance monitoring log.

Fuel tank water drains

1. All fuel tanks drained of water content at sump drains

***Note**: To be carried out irrespective of fuel uplift.*

Chip detectors – in accordance with ALERT SB 787-24F5431

1. Open access panels
2. Remove chip detector
    - Refer Maintenance Manual Figure 123, depress probe, rotate anti-clockwise, release bayonet lock, withdraw from housing

    ***Note:** Upon removal probes must be functionally identified and retained for inspection. Inform engineer in charge if contamination found. Wash detector in clean Kerosine in a non-metallic container.*
3. Install chip detector
    - Refer Maintenance Manual Figure 124, rinse probe and wipe clean

- Lubricate seal rings
- If seal ring damaged or swollen, remove and replace
- Check two o-rings are fitted to each detector and lubricate with Mobil Jet 2

***CAUTION**: INFLIGHT SHUTDOWNS DUE TO RAPIDLY DECREASING OIL QUANTITIES HAVE BEEN CAUSED BY OIL LEAKING FROM CHIP DETECTORS. THE O-RINGS CAN BE DISTORTED DURING INSERTION.*

- Carefully enter probe into housing, depress fully and rotate clockwise to engage bayonet until probe cannot be further rotated, check probe cannot be turned anti-clockwise

***Note:** Check all areas for foreign objects prior to closing access panels. Duplicate inspection is required to be performed before release-to-service certified.*

Circuit breakers

After checking with supervisor, check all circuit breaker panels and reset circuit breakers pulled during maintenance.

Cleaning

Check that cleaning has been completed.

Documentation

1. Check relevant documentation has been completed.
2. Check necessary in-flight documentation is complete.

Snow and ice

1. Carry out cold weather maintenance as required.
2. When de-icing/anti-icing procedures have been carried out enter the anti-icing code in aircraft maintenance records.

Departure preparation

1. All blanks and covers removed.
2. Check all pitot static probes and ports to ensure they are free from obstructions.
3. Landing gear doors closed and pins removed. Clear appropriate entries in maintenance records.
4. Nose wheel steering lock removed.
5. Panels and doors checked closed.
6. Check operations area clear of foreign objects and debris.
7. It is the responsibility of the departure engineer to ensure that all equipment is clear of aircraft and all aircraft doors are closed.