

Aircraft maintenance

Revision 4
18 May 2009

General

Civil Aviation Authority Advisory Circulars contain information about standards, practices, and procedures that the Director has found to be an **Acceptable Means of Compliance (AMC)** with the associated rule.

An AMC is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate Advisory Circular.

An Advisory Circular may also include **guidance material (GM)** to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

Purpose

This Advisory Circular (AC) provides methods acceptable to the Director for showing compliance with the general maintenance rules set out in Part 43.

This material is intended for persons conducting the maintenance of New Zealand registered aircraft. The advisory circular provides acceptable techniques, methods, and practices in relation to general aircraft maintenance.

Related Rules

This AC relates specifically to Part 43 – General Maintenance Rules.

Change Notice

Revision 4 clarifies the requirements in Subpart B relating to direct supervision.

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Introduction

The objective of Part 43 is to establish, for all aircraft, the minimum standard of maintenance considered necessary to ensure the continued validity of their Airworthiness Certificate. The rule ensures that all aircraft are maintained to a standard that assures safe operation.

This is achieved by prescribing—

- the minimum standard of maintenance required for aircraft:
- the minimum standards for the performance of maintenance:
- the persons who may certify maintenance:
- the manner in which maintenance is to be recorded and certified.

Part 43 provides the performance standard for persons and companies providing maintenance services for operators of—

- air transport aircraft of less than 5700 kg MCTOW or having nine or less passenger seats:
- non-air transport commercial aircraft:
- private aircraft.

There is no requirement for these maintenance providers to be certificated.

Subpart A – General

43.1 Applicability

These rules apply to the maintenance of New Zealand registered aircraft for which a New Zealand Airworthiness Certificate is required. Exceptions or additional requirements will be specified in other rules governing specific operational activities, such as for gliders or microlight aircraft.

These rules provide the minimum standards of maintenance for all aircraft. Where aircraft are operating to a higher level of operational rule than Part 91, such as Part 121 or Part 135 for air transport operations, then the maintenance requirements of the higher level rule will be additional to Part 43.

43.3 Definitions

Words that are found to need definition during the development of a specific rule part will be defined in the NPRM for that rule. When that rule becomes final common definitions will be removed to Part 1. A definition will only be included in the rule Part with which it was developed if it has a specific meaning for that rule Part. Definitions in Part 1 which are associated with this rule include those for—

- aircraft radio station
- airworthiness data
- detailed inspection
- lifed
- maintenance
- major modification
- major repair
- modification
- overhaul
- progressive inspection
- required inspection
- routine inspection
- time in service

43.5 Falsification of documents

Introduces a requirement that a person shall not make and intentional false entry in a maintenance record, or change or reproduce a maintenance record for fraudulent purposes. This is to some extent covered in section 56 of the Civil Aviation Act but it is considered necessary to provide a more specific requirement for maintenance documentation.

Subpart B – Maintenance

43.51 Persons authorised to perform maintenance

Maintenance may only be carried out by persons meeting the requirements of rules 43.51(a)(1) to (a)(5) and 43.51(b) and (d), or by persons performing maintenance under direct supervision as provided for in rule 43.51(a)(6).

Note: - rule 43.54 details the demarcation of aircraft maintenance, and specific maintenance activities that can only be undertaken by Part 145 certificated maintenance organisations holding the appropriate ratings/authorisations.

43.51(a)(3) Maintenance within a Part 145 Maintenance Organisation

Maintenance may be performed by persons under the control of a maintenance organisation certificated under Part 145. These persons must be properly authorised by the certificated organisation.

43.51(a)(6) Direct Supervision

Rule 43.51(a)(6) enables a person not meeting the requirements of paragraphs (a)(1), (a)(2), (a)(3), (a)(4), or (a)(5) to perform maintenance provided that it is performed under *direct supervision* of an appropriate person referred to in paragraphs (a)(1), (a)(2), (a)(3), (a)(4), or (a)(5). To meet this requirement a maintenance provider must have appropriately licensed and rated, authorised or approved staff who are employed, contracted or otherwise engaged on a full time basis to provide direct supervision.

Direct supervision, involves a form of active participation. It imposes on the supervisor and persons performing maintenance, a joint responsibility to ensure that the work is carried out properly. This requires both parties to meet all relevant requirements of the Civil Aviation Rules.

Consequently, for direct supervision:

A supervisor must—

- have considered the competence (e.g. training, knowledge, experience) of those performing the tasks, and their capability to meet the performance requirements detailed in rule 43.53 (e.g. availability of appropriate resources - refer further in this AC):
- know when the maintenance is being undertaken:
- be immediately available, in person, for consultation with, and to provide, advice and direction to, the person/s carrying out the work:
- directly observe the work being done at important stages; to approve or disapprove of the work.

Persons performing the maintenance must—

- be aware of, and meet, the relevant performance requirements detailed in rule 43.53 (in conjunction with the supervisor):
- ensure that they are being directly supervised.

The extent and nature of the supervision will ultimately depend on the maintenance being performed, and the competence of those performing the maintenance. In all cases it must be made clear by the supervisor, to the person performing the work, at what stage, and under what circumstances, it is necessary for the supervisor to be consulted. For the proper control of the maintenance task it may be appropriate that this is recorded in the maintenance records.

Nevertheless, 'direct supervision' can only be achieved if the supervisor personally observes the work being carried out to the extent necessary to ensure that it is being carried out properly and if the supervisor is readily available, in person, for consultation.

Within a Part 145 certificated maintenance organisation the process for 'direct supervision' should be detailed in their exposition.

43.53 Performance of maintenance

This rule prescribes the standards for the performance of maintenance. It contains a number of necessary elements that must be present to provide conditions that are acceptable for the performance of maintenance.

Familiarity with the actions required

Persons are required to be familiar with the aircraft component and understand the technical data required to accomplish the maintenance.

This requirement places the responsibility on the engineer to ensure that they are competent to assess and certify an aircraft or component as fit for release to service. In assessing their own competence it may not be sufficient to rely solely on the appropriate rating on an aircraft maintenance engineer licence.

For example; if a LAME has a rating for a helicopter type but has been working on fixed wing aircraft for the previous three years, that engineer may not consider themselves familiar with the tasks involved in maintaining that type of helicopter. To rectify the situation the engineer may wish to study the manuals, attend a refresher course, or discuss the maintenance with another engineer who is familiar with the type of helicopter. These actions would generally satisfy the requirement to become familiar with the maintenance actions required.

Adequate housing and facilities

Persons performing maintenance should have available adequate housing and facilities to enable the maintenance to be satisfactorily carried out. Hangar accommodation must be available, appropriate for the aircraft to be maintained, and should have adequate lighting and power supplies.

If only simple maintenance or rectification is carried out hangar accommodation may not be necessary. This simple maintenance may include line maintenance such as ramp checks. It is not acceptable for a provider of heavy maintenance, or other maintenance services on a continuous basis, to lack access to permanent maintenance facilities.

Suitable accommodation should be available for the storage of publications, records, spares and equipment. Where aircraft components, parts or materials are held they should be stored and handled in accordance with the procedures of Advisory Circular AC43-15.

Methods techniques and practices

These methods, techniques, and practices are in most cases specified in the maintenance manuals and continuing airworthiness instructions published by the aircraft or equipment manufacturer.

Where there is a conflict between the manufacturer's information and the methods, techniques, and practices detailed in the New Zealand rules or advisory circulars, the rules and advisory circulars take precedence.

Under USA FAR Parts 23, 25, and 27 aircraft designers and manufacturers are required to provide Instructions for Continuing Airworthiness. Appendix G to each of these FARs defines the content of the Instructions for Continuing Airworthiness. Design standards of other foreign Aviation Authorities contain similar provisions. These are the maintenance documents referred to in Part 43.

Where the rules refer to acceptable practices this can be taken to mean practices acceptable to the Authority. Standard Practices are those which are published either by a manufacturer or by a reputable body such as an airworthiness authority. USA FAA Advisory Circulars, and UK CAA CAP 562 Civil Aircraft Airworthiness Information and Procedures, contain standard maintenance practices which will normally be acceptable to the Authority.

These accepted practices may be published as part of an Advisory Circular or referenced in an Advisory Circular as being an acceptable means of compliance. If any doubt exists as to the acceptability of any documented maintenance practice a request should be made to the CAA to confirm that it is acceptable.

The following FAA Advisory Circulars address subjects that are covered by Part 43. The information and guidance given in these circulars can be considered to be standard practices acceptable to the Director in carrying out maintenance under Part 43. However the specific requirements of Part 43 take precedence over the circulars where any conflict arises.

- AC20-5F - Plane Sense
- AC20-42C - Hand Fire Extinguishers
- AC20-77 - Use of Aircraft Manufacturers Maintenance manuals
- AC20-97A - High Speed Tyre Maintenance and Operational practice
- AC20-106 - Aircraft Inspection for the General Aviation Aircraft owner
- AC43-2B - Minimum Barometry for Calibration and Test of Atmospheric Pressure Instruments
- AC43-4 - Corrosion Control for Aircraft
- AC43-6A - Automatic Pressure Altitude Encoding Systems and Transponders Maintenance and Inspection Practices
- AC43-7 - Ultrasonic Testing for Aircraft
- AC43-9B - Maintenance Records
- AC43-15 - Recommended Guidelines for Instrument Shops
- AC43-203B - Altimeter and Static Systems Tests and Inspections
- AC91-26 - Maintenance and Handling of Air Driven Gyroscopic Instruments
- AC91-44A - Operational and Maintenance Practices for Emergency Locator Transmitters and Receivers
- AC91-59 - Inspection and Care of General Aviation Aircraft Exhaust Systems

Copies of these Advisory Circulars can be obtained on microfiche or CD-ROM from—

Aircraft Technical Publishers
101 South Hill Drive
Brisbane, CA 94005
USA

Fax +1 (415) 468 1596
Phone +1 (415) 468 1705.

The ACs can be obtained on CD-ROM from—

Summit Aviation
PO Box 759
Golden, CO 80402
USA

Fax +1 (303) 425 7138
Phone +1 (303) 425 5994.

Hard copies of the ACs are available from—

The Superintendent of Documents
US Government Printing Office
Washington D.C 20402
USA

Fax +1 (202) 512 2250
Phone +1 (202) 783 3238.

These are not the only source of Advisory Circular publications.

If it is intended to use equipment, documentation, or work practices which do not meet these criteria of acceptability then they should be submitted to the Authority for acceptance. Where the Authority determines that the proposal is acceptable, the relevant Advisory Circular will be amended in due course to include the accepted practice. The Director must be satisfied that the alternative methods, techniques or practices provide an equivalent level of safety.

Manuals and publications relevant to the range of aircraft to be maintained should be available. The rule specifies that the data used should be *current* data which means that it is the user's responsibility to ensure that it is to the latest amendment status. Manuals and publications should be maintained up-to-date through a subscription system or other amendment system.

Materials, parts, and appliances

Advisory circular AC43-13 details the criteria for assessing the acceptability of supplies for use during the maintenance of an aircraft or component.

Essentially three types of parts are considered. The three types of parts have differing requirements to be considered acceptable, including—

- airframes, engines, propellers, and rotors having export airworthiness documentation, normally in the form of an authorised release certificate such as—
 - FAA Form 8130-3
 - JAA Form One
 - CASA DA1
 - Transport Canada TC 24-0078
- life limited parts having the above documents, or foreign domestic repair station documents that can be used by a Part 145 certificated maintenance organisation to issue a CAA Form One
- other components having sufficient documentation to assure the engineer fitting the item that the part conforms to its design and will enable the aircraft to be returned to its original or properly modified condition

Tools equipment and test equipment

Adequate equipment, tooling, and test equipment should be available for the range of aircraft, engines, or components to be maintained. This should include, for the range of work to be undertaken, the equipment, tooling, and test equipment specified by the manufacturer's maintenance manual or equivalent maintenance document.

Test equipment should be calibrated or checked as frequently as is necessary to maintain confidence in its accuracy.

Information on calibration will be published as an AC at a later date.

The person performing the maintenance should use any special equipment or test equipment recommended by the aircraft or component manufacturer. If it is necessary to use other equipment then this must be acceptable to the Director.

Special test equipment is not in itself defined. Test equipment can generally take on a special role if detailed in a maintenance procedure. Special test equipment would generally be equipment that required specialist knowledge to connect, operate, and interpret the results. Persons using test equipment should ensure that they are adequately trained, are familiar with the equipment, and, in the case of special test equipment, have evidence of the required training.

Part 66 Appendix C contains the additional privileges of an aircraft maintenance engineer licence.

Airworthiness limitations

Compliance with any Airworthiness Limitations specified by the aircraft manufacturer is an essential part of an inspection programme. Under the USA FAR documentation system these requirements are clearly defined in the maintenance manual section titled Airworthiness Limitations. The following extract from FAR Part 23 Appendix G explains in detail the content of this part of the manufacturer's documentation. A similar statement appears in United Kingdom CAA BCAR A5-3 paragraph 4.

"G23.4 Airworthiness Limitations Section.

*The Instructions for Continued Airworthiness must contain a section titled **Airworthiness Limitations** that is segregated and clearly distinguishable from the rest of the document. The section must set forth each mandatory replacement time, structural inspection interval, and related structural inspection procedure required for type certification. If the Instructions for Continued Airworthiness consist of multiple documents, the section required by this paragraph must be included in the principal manual. This section must contain a legible statement in a prominent location that reads "The Airworthiness Limitations section is FAA approved and specifies maintenance required under 43.16 and 91.163 of the Federal Aviation Regulations unless an alternative programme has been FAA approved"*

Maintenance programmes

If an aircraft or component is subject to a maintenance programme approved under Part 91, or accepted under Part 119, the maintenance must be performed in accordance with that programme.

Before an aircraft can enter such a maintenance programme it is necessary to carry out a complete, detailed inspection of the aircraft. This would normally be equivalent to an Annual/100 hour inspection as detailed in Part 43 Appendix C. The reason for this is to ensure that the aircraft is fully inspected before entering the phased checks of the maintenance programme.

In order to meet the requirements of Part 91, for each aircraft to have a complete inspection each 100 hours or annually, it is necessary to establish a start point so that no part of the aircraft will exceed this time between detailed inspections.

Where the aircraft under consideration is a new aircraft then it will be necessary to establish a base line that will be dependent on the inspection carried out by the manufacturer before delivery. If the manufacturer has carried out a complete inspection before delivery then the programme should begin from that time. If the aircraft has been inspected for the issue of an Airworthiness Certificate, then this inspection can be considered a complete aircraft inspection and the programme can begin from the time of that inspection.

If the aircraft is not new, then an assessment must be made based on the maintenance history of the aircraft. This assessment must determine when the complete aircraft was last inspected to the same levels as an annual inspection.

The new operator's maintenance programme must be assessed to establish which level of check is then necessary. This check must ensure that when the aircraft enters its new maintenance programme no part of the aircraft will remain un-inspected beyond either—

- the inspection cycle for each part
- the annual inspection period

For air transport operators operating under an Air Operator Certificate it would be expected that the operator's exposition would contain the necessary procedures to—

- ensure the correct level of check is chosen, as described above
- achieve an acceptable assurance of safety

For aircraft leaving an approved or accepted maintenance programme and reverting to the Annual/100 hour cycle the next Annual/100 hour inspection is due 100 hours or twelve months from the last complete inspection. If the programme is ceased before the end of a complete maintenance cycle, if applicable, there may be a requirement to complete a penalty servicing to ensure all areas of the aircraft are addressed.

A requirement for owners to request approval to use a maintenance programme, and the basis for this approval, will be stated in Part 91 and Part 119.

Progressive inspection programmes

Progressive inspection programmes are a particular type of maintenance programme.

A progressive inspection programme is one where the inspection of the complete aircraft is split into a number of smaller checks. This allows quicker turnaround of the aircraft and assists in scheduling and utilisation.

At each of these small checks a routine inspection of the complete aircraft is carried out. This usually entails a visual inspection but without disassembly or removal of access panels. At the same time a detailed inspection is carried out of a particular section, or zone, of the aircraft, such as wings, engine, fuselage, and so on. This detailed inspection is an in-depth inspection including such disassembly and testing as is necessary to ensure that that section or zone meets the requirements of the schedule.

Maintenance demarcations

The rule provides a list of maintenance activities that are required to be completed within a maintenance organisation certificated under Part 145. The requirements do not apply to special category aircraft.

Completion of maintenance

The rule requires that the person shall, in completing the maintenance, ensure that the aircraft or component is satisfactory for release to service and at least equal to its original or properly modified condition. This is an all embracing statement to ensure that, after a required inspection is completed, the aircraft is fit for release to service.

To ensure that the aircraft condition can be easily determined, the person carrying out the inspection should use worksheets or check lists to provide assurance of compliance with an approved schedule. These worksheets or checklists should also provide a means of indicating that each inspection item has been completed. In many cases worksheets are provided by aircraft manufacturers based on the maintenance schedule contained in the aircraft maintenance manual.

Check lists normally contain a list of the items in the schedule and a means for the person doing the work to indicate that the item has been completed. They do not need to be signed. A Release to Service statement for the completed inspection will be made in the log book.

These check lists form part of the maintenance records of the aircraft. They are required, by Part 91, to be retained by the aircraft operator until the work is repeated or superseded, or for two years after the work is performed.

This rule is not intended to make a person performing the maintenance responsible for the design of an aircraft or a modification. The assurance of compliance with acceptable technical data is normally sufficient to ensure that the condition of an aircraft or component is at least equal to its original or properly modified condition.

43.55 Recording of overhaul

This rule defines the conditions under which certification may be given by a Part 145 certificated organisation to an aircraft or aircraft component that has been overhauled. The definition of overhaul is contained in Part 1. A further expansion of this definition would be returning the component to zero life by—

- the complete disassembly, cleaning, inspection, repair as necessary, and reassembly, in accordance with methods techniques and practices acceptable to the Director
- testing in accordance with the current standards and technical data developed and documented by the holder of the production certificate for the product

The procedures and practices are normally those found in the manufacturer's overhaul manual or equivalent document. The procedures and practices must also be acceptable to the Director. The rule states that these requirements must be met before the aircraft or component can be released to service from overhaul.

43.57 Annual and 100 hour inspections

43.59 Radio station tests and inspections

43.61 Altimeter system tests and inspections

43.63 SSR Transponder tests and inspections

43.65 Emergency location beacon tests and inspections

These four rules require that each person performing the specified inspection shall carry out the inspection as prescribed in the appropriate Appendix to Part 43. The responsibility to have the inspections carried out is placed on the aircraft operator under Part 91. These rules, of Part 43, require the certifying engineer to carry out the inspections properly and in accordance with the Appendices of the rule.

Under 43.59 the additional maintenance required for instruments and aircraft radio stations fitted to aircraft is specified. Part 43 Appendix B provides the minimum standard of maintenance for all aircraft radio stations.

Where an aircraft is operating under the provisions of an air transport operator's programme, accepted as part of an operator's Maintenance Manual required by Part 119, then the maintenance requirements of the operator's programme must be met. Programmes submitted as part of an air transport operator's manual must comply with this rule or show that an equivalent level of safety is achieved by some other means. A manufacturer's programme must therefore meet the minimum standards prescribed in Part 43.

43.67 Non-destructive testing

A non-destructive testing AC will be published later, and will include processes and certification bodies.

This rule sets out the general conditions for performing non-destructive testing on aircraft and aircraft components. All persons performing non-destructive testing, where the test procedure is a requirement of the maintenance data being used, must be suitably qualified. This would include where the non-destructive testing procedure is called up in—

- the inspection schedule
- an Airworthiness Directive
- an overhaul manual

The person performing the process must hold a certificate issued by the Certification Board for Inspection Personnel, or another certification body acceptable to the Director. Where other certification bodies are proposed and accepted by the Director they will be included in the non-destructive testing advisory circular. The certificate must be valid for the specific type of non-destructive application to be used.

The rule does not apply to routine dye penetrant inspections carried out during maintenance using non-fluorescent dye penetrant, and to visual inspection.

Organisations certificated under Part 145 may be authorised to carry out NDT processes as part of their certification. Alternatively an organisation could be approved under Part 145 specifically for the purpose of carrying out NDT processes.

The non-destructive testing AC will contain references to documents such as UK CAA Civil Aircraft Airworthiness Information and Procedures or USA FAA Advisory Circulars. Where this material is not appropriate to the New Zealand situation the information will be reformatted and published in full in the AC.

43.69 Maintenance records

Records can be kept electronically but systems should ensure the information security, integrity, and retrieval

This rule contains details of the log book entries that must be made after completion of any maintenance. These are the minimum details that must be entered in the aircraft, engine, or propeller logbook. Acceptable logbook formats are provided by the CAA and include instructions for their use. These instructions, normally on the inside cover, should be read as part of this advisory circular.

Additional work records, worksheets, and work cards may be used but any record should be in a permanent form and include the details listed in this rule. The additional records should be treated as part of the logbook and retained in the same way.

The use of additional or supplementary records does not in any way negate the requirement to enter into the logbook the details listed in 43.69(a).

The logbook should contain, as appropriate, a record of—

- the maintenance performed including a reference to any approved data which was used to perform the maintenance
- the identity of any inspection performed
- for each component removed or fitted—
- a description
- the part number and serial number
- if applicable, the time in service
- reference to the release document

Serial numbers are issued by the equipment manufacturer and should not be changed or removed from the equipment. If a serialised part does not contain the genuine manufacturer's serial number identification, or an identification authorised by the manufacturer, then the part should not be used.

- the results of any measurements or tests carried out during the course of the maintenance
- for required altimeter tests and inspections, the date of the test and the maximum altitude to which the altimeter was tested
- the date on which the work was completed and certified
- the location and name of the facility where the maintenance was performed
- where the maintenance has been performed to rectify damage or failure, caused by a forced landing or aircraft accident, then the log entry should state that this is so
- where additional work records, such as work sheets or work cards, are used to record the detail of the maintenance, a reference to these records should be made in the logbook

For rescue winches, associated cables, and equipment with specified cycle limitations a specific logbook is recommended to record maintenance.

The maintenance record should be made carefully and completely as it forms the official history of the aircraft and is critical in any subsequent fault finding, reporting, or other analysis.

The maintenance is required to be recorded in the applicable logbook or another maintenance record acceptable to the Director. These records form a history of the aircraft and are the operators responsibility to ensure that they are compiled. The operator also 'owns' the documents and maintenance providers should surrender the documents when required by the owner/operator to do so.

Computerised records may be an acceptable format for maintenance documents. If used as an assistant only, the computerised information should be transferred to the aircraft logbook as soon as

practicable. An operator wishing to use only a computer system – that is no physical logbook – should provide the Director with the details of the system abilities.

Records can be kept electronically but systems should ensure the information security, integrity, and retrieval. A system of backing up electronic data would be considered appropriate. Procedures for electronic record and document keeping should consider the following—

- avoidance of data loss in the event of power interruptions
- software control, including amendments and prevention of corruption
- unauthorised access
- audit trail facilities
- archiving of data in a similar manner to hardcopies, and for a similar period
- backup of critical information, preferably once a day, with storage for that backup information
- data verification, on entry and retrieval
- publication provision
- staff training
- amendment and protection of stored data
- a problem report register including the problem details and solutions

These requirements should be documented in an exposition and subject to a quality system's controls. This is not considered appropriate for, and will not normally be accepted for, un-certificated maintenance providers.

FAA AC21-35 contains more information on computerised record systems.

Subpart C – Release to service

43.101 Persons authorised to certify release to service

This rule lists those persons or organisations who may release aircraft or aircraft components to service after maintenance. The persons or organisations include a Licensed Aircraft Maintenance Engineer with appropriate ratings, and a person authorised by an organisation certificated under Part 145.

A pilot may release an aircraft or aircraft component to service after performing maintenance that he or she is permitted to perform under 43.51.

The Director may authorise other persons to certify release to service following specific maintenance. This provision relates to the issue of Maintenance Approvals. The provision of a Maintenance Approval is covered in Part 66 and is not intended to replace the AME licence. It applies where persons need to certify for limited maintenance tasks, but they do not satisfy all of the requirements for the issue of an AME licence or rating. Limited tasks may include—

- special processes or processes not covered in the present AME licence area, such as explosives or egress systems

- maintenance on new aircraft types where no AME licence holder can satisfy the experience criteria
- maintenance on amateur built aircraft

A person holding an appropriate licence issued by an ICAO contracting state may issue a Release to Service for a New Zealand aircraft for maintenance performed outside New Zealand. This provision is intended primarily for those occasions where New Zealand aircraft are transiting other countries and applies only to aircraft used on operations other than for hire or reward. Provisions for the approval of overseas maintenance personnel certifying air transport aircraft are contained in the operator's maintenance manual, or in the exposition of the contracting maintenance organisation.

43.103 Certifying requirements

The Release to Service statement is a statement that the work referred to in the entry has been properly carried out and in that respect the aircraft is fit for release to service. The statement relates only to the work that has been done.

A Release to Service statement may be issued for a single item, or a group of items, provided that the signatory is authorised and is satisfied that the work has been properly completed in accordance with Part 43.

For aircraft the Release to Service statement will take the form of a log book entry as detailed in 43.105 to 43.113. This certification should be entered in the aircraft's log book. If the log book is not available, then details of the maintenance and the Release to Service statement may be entered in the aircraft's Technical Log.

The statement may be in the form of a stamp, sticker, or a preprinted loose leaf page for attachment to the logbook. The certification can also be completed electronically in an acceptable computer based system. For components not installed on aircraft the certification will be given on CAA Form One or CAA Form Two. A sample of these forms and instructions for its use and completion can be found in advisory circular AC43-3.

This rule refers to the need to incorporate supplements into aircraft flight manuals when carrying out modifications that include such supplements. It is not intended to imply that engineers may make changes to the Flight Manual on their own authority. All amendments to flight manuals must be approved by the CAA either on the basis of changes made by the manufacturer or as part of the approval of a design change.

Design change approvals are covered by Part 21 Subparts C, D, E, and M. A design change could take the form of a modification or STC but, whichever is the case, where the approved data calls for a change to the flight manual, or the addition of a supplement, then the certifying engineer must ensure that the amendment is done.

43.105 Certifying after maintenance

This rule prescribes the release to service statement that must be given after maintenance has been performed. The statement must be placed in the log book, or other form of acceptable technical record, following or alongside the record of maintenance that is required by 43.69. The statement must indicate that the work recorded has been carried out in accordance with the New Zealand CAR and in respect of that work the aircraft or component is fit for release to service.

A signature alone may be acceptable to indicate the fitness for release to service of an aircraft or component. A maintenance provider should detail in supporting documentation – operating manuals, business manuals, expositions – that this signature does indicate the requirements of the rule.

A certificate of release to service may be provided in an electronic form provided the system meets the requirements detailed previously in this advisory circular. The electronic signature should—

- be identifiable to each individual
- be secure to each individual
- be permanently recorded against the maintenance records when entered
- be controlled by the organisation to ensure the above conditions are true

Due to the controls, electronic and procedural, required on the electronic systems it is unlikely that an uncertificated organisation will be able to utilise a fully computerised system.

Any statement must be accompanied by the signature, the licence, approval or authorisation number of the person releasing the aircraft or aircraft component to service, and the date of the entry.

43.107 Inoperative equipment

This rule requires that any equipment intended to be left inoperative in an otherwise serviceable aircraft to be identified.

The owner / operator of the aircraft should be provided with a list of the inoperative equipment and each item of equipment should be placarded for the information of the crew.

A detailed description of the inoperative equipment, the reason for its unserviceability, and a future date to reassess the maintenance required should be included in the maintenance records. A release to service statement should be made in the maintenance records that indicates the aircraft or component is fit for release to service.

If equipment is inoperative during an inspection or an annual review of airworthiness it should be reassessed. It is not necessary to rectify the inoperative equipment but an entry should be made in the appropriate record that the equipment has been assessed and may remain inoperative.

43.109 Discrepancies

The rule introduces the concept that the person performing an inspection may complete and certify the inspection without rectifying discrepancies that are found. Under these circumstances the aircraft cannot be released to service.

The person performing the inspection must make a log book entry stating that the inspection has been completed but that the aircraft is *not* released to service. They must also hand a list of the discrepancies to the owner or operator and record this fact in the log book. The owner or operator must have those discrepancies repaired and certified for release to service before operating the aircraft.

Instead of a separate list, an arrangement may be made with the owner or operator to enter these discrepancies in the unserviceability section of the appropriate logbook.

43.111 Reserved

This rule has been reserved to maintain the numbering of the following rules in Subpart C.

43.113 Duplicate inspection of controls

This rule requires that a duplicate inspection is carried out after the disturbance of control systems. The certifying person is not permitted to issue a release to service for maintenance that includes the initial assembly or disturbance of a control system unless the duplicate safety inspection is completed and entered in the logbook or technical log.

The first part of the duplicate inspection would normally be the person who is certifying the work that requires inspecting. The second part of the inspection is carried out and certified by a person whom the first certifying person considers to be adequately trained and experienced to perform the inspection. The inspecting person should also be made aware of the requirements to be familiar with the tasks and technical data involved.

For the purpose of this rule, a control system is a system by which the attitude, direction of flight, or aerodynamic characteristics of the aircraft may be changed. A control system includes all associated units, whether mechanical, electrical, electronic, hydraulic, or pneumatic.

For fixed wing aircraft, the systems include the attachments of, and means of actuating—

- primary control surfaces
- tabs
- air brakes
- flaps

For rotorcraft, the systems include—

- the attachments of all rotary control surfaces
- the means of operating collective pitch, cyclic pitch, and yaw control

For engines and propellers, the systems include all associated units – mechanical, hydraulic, electrical, electronic or pneumatic – that control

- power output
- power absorption
- emergency operation

A duplicate safety inspection must be made after assembly, disturbance, or adjustment of any part of a control system. The duplicate safety inspection shall apply to all parts of the control system that have been subject to assembly, disturbance, or adjustment.

A duplicate safety inspection, for freedom from defects and assembly errors, shall be made before the concealment of any parts of a control component when the component is being assembled. A duplicate safety inspection shall be made for correct functioning of the complete unit after the completion of the assembly, and before its installation, if correct functioning cannot be proved when installed.

During installation of control systems, all system components that will not be accessible for inspection after complete assembly of the aircraft must be inspected in duplicate before concealment.

After initial assembly of a new aircraft, or the reassembly of an aircraft after maintenance, a duplicate safety inspection must be completed as the final operation on the control system before flight.

Each of the persons completing the duplicate inspection must verify that—

- all parts of the system which have been disturbed are free from defects, including;
 - incorrect rigging

- incorrect locking
- any possibility of fouling or jamming
- for the complete system, the controls function throughout their range of travel in each mode, and with each alternative means of actuation—
 - freely and in the correct sense
 - without excessive backlash
 - with the correct static friction

In assessing the system for freedom from defects the inspecting person should carry out a circumstantial inspection where access permits. The circumstantial inspection provides the opportunity to confirm the overall aircraft or component serviceability. This circumstantial inspection would not necessarily prevent a release to service being issued for the work being inspected.

Certification of a duplicate safety inspection must be entered in the aircraft log book or other acceptable maintenance record. The wording of the certificate should indicate that the control system is free from defects and operates correctly.

The control system or component that has been inspected must be clearly identified and the scope or extent of the duplicate safety inspection detailed.

The certifying persons must enter their name, licence, approval, or authorisation number, the date of the inspection, and their signature adjacent to the above entry.

43.115 Ground running checks – piston engines

43.117 Ground running checks – turbine engines

These two rules detail the operational checks required following the Annual/100 hour inspection. It follows the requirements of FAR Part 43.

This AC is not the authority to run aircraft engines. A person must have completed appropriate training on the aircraft-engine combination before carrying out any engine running. The level of training to be completed should be acceptable to the owner.

The parameters to be checked for piston engines are specifically defined. These piston engine parameters are similar from one engine model to another.

In the case of turbine engines the parameters are more diverse and differ between manufacturers. As the manufacturer's documentation is usually more comprehensive, it is required that the manufacturer's procedures for ground running are followed.

The rules require that the results of any required ground running check must be recorded in the log book. A complete set of performance figures should be entered in the aircraft logbook—

- on initial installation of an engine
- after significant changes have been made to the engine system
- on subsequent engine ground runs

These records are important for the continued health monitoring of an aircraft engine, with piston or turbine.

43.119 Technical log completion

This rule requires that a person shall not certify an aircraft, or component, for release to service in the technical log unless each applicable section of the technical log is completed. This includes the details of any deferred maintenance.

The technical log is a document required by the owner of an aircraft under Part 91. An air transport operator may use other means of meeting the requirement for a technical log provided the procedures are established in the operator's manual. These procedures must provide an adequate means of establishing the maintenance status of the aircraft and making it known to the pilot.

The technical log is carried in the aircraft to provide the pilot with the necessary information to ascertain if the aircraft is airworthy. The log makes provision for the recording of—

- the name of the operator
- the registration, type and model of the aircraft
- the identity of the maintenance programme to which the aircraft is maintained
- the date the next review of maintenance is due
- the date or hours the next Annual /100 hour or other inspection is due
- the date any other required inspections are due
- details of any other maintenance that will be due prior to the next routine inspection
- the progressive hours flown and the total time in service
- the progressive cycles and the total cycles
- any defects occurring away from the operating base, and details of the rectification and certification of release to service after rectification
- any deferred rectification, including any inoperative equipment permitted to be inoperative by Part 91

The technical log should make provision for recording and clearance of defects when the aircraft is away from base or when the logbook is otherwise unavailable. It is not intended to be used for this purpose when the logbook is to hand.

The technical log advisory circular is AC91-6.

Subpart D – Annual review of airworthiness

The annual review of airworthiness is a condition and conformity inspection required by Part 91. The annual review of airworthiness is intended to be used by non-air transport operators. Air transport operators should have a maintenance review process included in their maintenance manuals.

Under Part 135 air transport operators of aircraft with nine passenger seats or less will be able to elect to use the annual review of airworthiness in lieu of their maintenance review process.

43.151 Persons to perform review

This rule prescribes who may certify an annual review of airworthiness. The annual review of airworthiness may only be certified by a person holding an Inspection Authorisation issued under Part 66.

The annual review of airworthiness for a glider may be certified by a person authorised by a gliding organisation certificated under Part 149.

43.153 Review requirements

This rule contains the detailed requirements for the accomplishment of the annual review of airworthiness that is included as a requirement of Part 91 – General Operating Rules. This requirement is intended to separate the ongoing inspection and maintenance of the aircraft from the periodical review of the aircraft's conformity and condition.

The Release to Service statement, required by Part 43, will be a statement that the work to which it refers has been carried out and the aircraft is fit for flight.

The **annual review of airworthiness**, required by Part 91, will be a statement that the aircraft's maintenance history has been reviewed against its maintenance programme. This includes the Airworthiness Limitations Section of the manufacturer's maintenance manual and any Airworthiness Directive listing published by the CAA. The review will also include a check for conformity against the aircraft's type certificate and a check that no unapproved modifications are installed. The logbook statement will be required to address each of the items listed in 43.153 (1) through (6).

For aircraft holding special category experimental airworthiness certificates the requirement of 43.153 (1) is not applicable.

At the time of the annual review of airworthiness it is also necessary to resolve any outstanding deficiencies that may have been carried forward during the previous period. This requirement ensures that the outstanding deficiencies are examined at least annually.

Any defective items of equipment that have been rendered inoperative and placarded in accordance with Part 91 must be inspected to ensure that the required maintenance has been completed. The required maintenance may include the re-certification of any inoperative equipment in accordance with Part 43. That is, it is not necessary to rectify the inoperative equipment but an entry should be found in the appropriate record that the equipment has been assessed and may remain inoperative.

43.155 Certifying review

This rule contains the wording of the annual review of airworthiness statement that must be entered in the aircraft logbook. The date of the review must be entered in the appropriate section of the Technical Log by the certifying person.

Subpart E – Certifying conformity following major modification or major repair

43.201 Applicability

The subpart details the requirements for the certification of conformity following major modifications or repairs. AC43-9 provides more information on modifications and repairs.

A major modification or repair is one that could potentially affect the safety of an aircraft or its occupants where, as a result of its embodiment, one or more of the following incidents may occur—

- structural collapse
- loss of control
- failure of motive power
- unintentional operation of, or inability to operate, any systems or equipment essential to the safety or operational function of the aircraft
- incapacitating injury to any occupant
- unacceptable unserviceability or maintainability

It is the responsibility of the engineer concerned to assess the particular modification or repair for its consequences. This assessment will determine whether the modification or repair is major or not.

43.203 Persons to certify conformity

The certification of a major modification or major repair requires the assessment of that work against the applicable technical data – a conformity check. The CAA runs the inspection authorisation courses to qualify personnel on the conformity aspects of aircraft maintenance. As a result the persons who can certify conformity are—

- holders of inspection authorisations issued under Part 66
- Part 145 authorisation holders who have had equivalent training
- for gliders, glider engineers with equivalent training

43.205 Certifying requirements

To ensure conformity of any modification or repair carried out the two aspects to consider are—

- correct technical data
- correctly used technical data

The correct technical data is listed on the form CAA 337 and should be assessed for applicability by the certifying person. This rule requires a physical check of the modification or repair to ensure that the work has been done in accordance with the technical data specified on the form CAA 337.

Advisory circular AC43-9 includes details on the use of the form CAA 337.

43.207 Certification

Certification of the conformity of a major modification or repair is completed in the form CAA 337. The form CAA 337 should be provided to the owner of the aircraft for retention in the maintenance records. A copy should be sent to the CAA within seven days for retention on the aircraft file.

The form CAA 337 is intended for use by the majority of industry, but certificated maintenance organisations may have systems and other documents that may fulfil the same function. Reference should be made on these alternative forms to indicate their function as being equivalent to the form CAA 337.

Appendices A to F

The appendices include the inspection requirements to be met when completing inspections required by Part 43, Part 91, and any other rule. Specifically—

- Appendix A – Pilot maintenance
in accordance with 43.51
- Appendix B – Aircraft radio station inspection
in accordance with 43.59 and 91.609
- Appendix C – Annual and 100-hour inspection
in accordance with 43.57 and 91.607
- Appendix D – Altimeter system tests and inspections
in accordance with 43.61 and 91.611
- Appendix E – SSR Transponder tests and inspections
in accordance with 43.63 and 91.613
- Appendix F – Emergency locator beacon tests and inspections
in accordance with 43.65 and 91.615