Advisory Circular

AC43-1

Aircraft Maintenance **Initial Issue**

01 July 2002

GENERAL

Civil Aviation Authority Advisory Circulars (AC) 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.

This Advisory Circular also includes Explanatory Material (EM) where it has been shown that further explanation is required. Explanatory Material must not be regarded as an acceptable means of compliance.

PURPOSE

This Advisory Circular provides methods, acceptable to the Director, for showing compliance with the general maintenance requirements of Part 43 and explanatory material to assist in showing compliance.

RELATED CAR

This AC relates specifically to Civil Aviation Rule Part 43.

CHANGE NOTICE

There was no previous issue of this AC, consequently no change is in effect.

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Subpart A — General

EM 43.1 Purpose

These rules apply to the maintenance of Papua New Guinea registered aircraft for which a Papua New Guinea 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 operations, then the maintenance requirements of the higher level rule will be additional to Part 43.

Part 43 also contains the requirements relating to release to service certification and the conduct of a periodic maintenance review.

EM 43.3 Definitions

The defintions shown in this rule are specific to Part 43.

Definitions associated with more than one Part are contained in Part 1. 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
- overhaul
- progressive inspection
- required inspection
- routine inspection
- time in service

EM 43.5 Reserved

Subpart B — Maintenance

EM 43.51 Persons authorised to perform maintenance

Maintenance may only be carried out by, or under the direct supervision of, the persons meeting the requirements of 43.51.

Supervision involves a form of active participation and includes the acceptance by the supervisor of a responsibility to see that the task will be carried out appropriately. Consequently a supervisor should—

- know when the work is being undertaken
- see that the work is done at crucial stages
- approve or disapprove of the work at those important stages.

When the task involves the maintenance or repair of an aircraft, so that the work is directly related to human safety, such supervision could only be achieved by the personal physical presence of the supervisor. In other words, the supervising engineer should be on site or in the vicinity of the aircraft being repaired.

The extent or nature of the supervision will ultimately depend on the type of work being performed. In all cases it must be made clear to the person performing the work at what stage, and under what circumstances, it is necessary for the supervisor to be consulted.

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.

The pilot of an aircraft is permitted to carry out certain simple maintenance tasks as listed in Part 43 Appendix A. This list relates to work that may be done without significant disassembly or removal of panels, other than non-structural access panels or fairings.

The pilot is required to be appropriately trained and authorised by the owner or operator of the aircraft to perform the maintenance. The training of a pilot to complete a maintenance task should be carried out by a licensed aircraft maintenance engineer with the appropriate ratings on the particular aircraft or system.

In completing the task the appropriate technical data should be available to the pilot to ensure that the task is completed in accordance with acceptable methods, techniques, and practices.

The pilot performing the work must make an entry in the aircraft logbook or other acceptable record such as a technical log stating what work has been done. This entry is a statement of Release to Service. It is part of the responsibilities of the pilot-in-command to ensure that the aircraft is fit for flight before operating it.

A person may perform maintenance on a glider or a glider component if they are authorised, or supervised by a person holding an appropriate Aviation Maintenance Specialist certificate.

EM 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 or 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 himself 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. Generally 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 and housing.

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 AC20-1.

Methods techniques and practices

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 Papua New Guinea rules or advisory circulars, the rules and advisory circulars take precedence.

Under USA FAR Parts 23, 25, 27 and 29 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.

AMC 43.53(a)(3)(ii)

Where the rules refer to acceptable practices this can be taken to mean practices acceptable to the Director. 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 Director.

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 Airworthiness Authority 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 Locater Transmitters and Receivers
- AC91-59 - Inspection and Care of General Aviation Aircraft Exhaust Systems

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 CAA for acceptance. Where the CAA 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.

EM 43.53(a)(3)(ii)

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 AC20-2 details the criteria for assessing the acceptability of supplies for use during the maintenance of an aircraft or component.

Essentially three type 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.

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 A contains references to the use of specialist equipment in regard to the scope of certain aircraft maintenance engineer licence ratings.

Airworthiness limitations

Compliance with any Airworthiness Limitations specified by the aircraft manufacturer is an essential part of an inspection programme. Under the system of documentation required for aircraft type certificated under FARs 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.

AC 91-10 provides detailed information on maintenance programmes.

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.

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. Any signatures on these check lists do not constitute release to service certification. A Release to Service statement for the completed inspection must be made in the log book referencing the checklists used.

These check lists form part of the maintenance records of the aircraft. They are to be retained for the service life of the aircraft, either by the operator or by the maintenance organisation carrying out the work provided they can be identified through logbook entries and made available to the operator at any time.

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.

Rule 43.53(c) requires all maintenance to be carried out by a Part 145 certificated maintenance organisation except for maintenance carried out by an authorised pilot and maintenance of balloons and gliders.

EM 43.55 Recording of overhaul

This rule defines the conditions under which certification may be given 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 standards and technical data approved by the Director.

The procedures and practices are normally those found in the manufacturer's overhaul manual or equivalent document. Alternative procedures and practices must be either acceptable to the Director or approved by the Director.

EM 43.57 Minimum inspection

The intent of this rule is to precsribe the minimum level of inspection that must be applied to an aircraft in order for the airworthiness certificate to remain valid.

When selecting a pre-existing schedule of inspection, regardless of whether or not it is periodic or progressive, it should be assessed to ensure all the elements listed in Appendix C are covered. If an inspection schedule is being developed for inclusion in a maintenance programme, the content of Appendix C provides the basis for that schedule.

EM 43.59 Radio station tests and inspections

EM 43.61 Altimeter system tests and inspections

EM 43.63 SSR Transponder tests and inspections

EM 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 Part 43 rules 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 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 operator's programme, accepted under Part 119, then the maintenance requirements of that operator's programme must include compliance with these rules or show that an equivalent level of safety is achieved by some other means. A manufacturer's programme must also be shown to meet the minimum standards prescribed in these rules.

EM 43.67 Non-destructive testing

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 an aviation maintenance specialist certificate issued under Part 66 appropriate to the technique being used.

The rule does not apply to routine dye penetrant inspections carried out during maintenance using non-fluorescent dye penetrant, and to visual inspection. These inspections may be carried out without the need to hold NDT qualifications.

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.

AMC 43.67 Non-destructive testing

In due course, an AC on non-destructive testing will be issued referencing documents such as UK CAA Civil Aircraft Airworthiness Information and Procedures or USA FAA Advisory Circulars which contain methods, techniques and practices the Director finds acceptable.

EM 43.69 Maintenance records

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. 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 form 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 operator's 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 in a supplementary or support role, 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 the controls of a quality system. This will normally only be considered appropriate for, and accepted for, large organisations supporting Part 121 air operators.

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

Subpart C — Release to service

EM 43.101 Persons authorised to certify release to service

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

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

In addition, the Director may authorise other persons to certify release to service following specific maintenance. This provision relates to the issue of Aviation Maintenance Specialist certificates. The provision for an Aviation Maintenance Specialist certificate is covered in Part 66. It is not intended to replace the AME licence. It applies where persons need to certify for limited maintenance tasks, but in circumstances where 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 PNC or amateur built aircraft

A person holding an appropriate licence issued by an ICAO contracting state may issue a Release to Service for a Papua New Guinea aircraft for maintenance performed outside Papua New Guinea. This provision is intended primarily for those occasions where Papua New Guinea 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 aircraft conducting international air operations must be contained in the operator's exposition, or in the exposition of the contracting maintenance organisation.

EM 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 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 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. Further information on the CAA Form One can be found in advisory circular AC20-2.

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 F, G, and H. 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.

EM 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 Papua New Guinea CARs and in respect of that work the aircraft or component is fit for release to service.

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

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

In regard to release to service of components, the rule distinguishes between components which are to be released outside the certiying organisation and those which will be used within the organisation.

Those being released outside the organisation must be certified released to service on an Authorised Release Certificate (CAA Form One). In the case of those components being used within the organisation, because records will exist within that organisation regarding the work done and hence evidence of design conformity is accessible to provide an audit trail, it is not necessary to complete and certify all the detail called for on a CAA Form One.

In lieu, a Serviceable Part tag may be used which references a job number and which containes a pre-printed release to service statement.

EM 43.107 Inoperative equipment

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

The owner or 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 at the time of an inspection or a maintenance review 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.

EM 43.109 Defects

The rule introduces the concept that the person performing an inspection may complete and certify the inspection without rectifying defects 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 provide a list of the defects to the owner or operator and record this fact in the log book. The owner or operator must have those defects rectified 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 defects in the unserviceability section of the appropriate logbook.

EM 43.111 Reserved

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

EM 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 carried out by the person who is certifying the work that requires inspecting. The second part of the inspection is carried out and certified by a person who is able to provide the first certifying person with evidence of adequate training and experience to perform the inspection. This evidence may be a licence, company authorisation, maintenance specialist certiifcate or pilot maintenance approval. The second 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, certificate, or authorisation number, the date of the inspection, and their signature adjacent to the above entry.

EM 43.115 Ground running checks – piston engines

EM 43.117 Ground running checks – turbine engines

These two rules require an engine ground run following a periodic inspection to determine that the engine manufacturer's parameters can be met.

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 or operator.

The rules require that the results of the ground running check be recorded in the logbook. 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, piston or turbine.

EM 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 operator may use other means of meeting the requirement for a technical log provided the procedures are established in the operator’s exposition. These procedures must provide an adequate means of establishing the maintenance status of the aircraft and making it known to the flight crew.

The technical log is carried in the aircraft to provide the crew 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 maintenance review is due
- the date or hours the next routine 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
- if applicable, 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 of these defects

- 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.

AC91-6 provide further information on the Technical Log.

Subpart D — Maintenance review

EM 43.151 Persons to perform review

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

EM 43.153 Review requirements

This rule contains the detailed requirements for the accomplishment of the maintenance review that is required by Part 91. This maintenance review is a periodic review of the aircraft's conformity and condition, separate from the ongoing inspection and maintenance of the aircraft.

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 maintenance review required by Part 91, requires a certification 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 (a)(1) through (10).

For aircraft issued with special category experimental airworthiness certificates the requirements of 43.153(a)(1) and (2) are not applicable.

At the time of the maintenance review it is also necessary to review any outstanding discrepancies that may have been carried forward during the previous period. This ensures that the outstanding discrepancies are re-assessed 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 made in the appropriate record that the equipment has been assessed and may remain inoperative.

EM 43.155 Certifying review

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

EM 43.157 Discrepancies

This rule is self-explanatory.

Subpart E — Certifying conformity following major modification or major repair

EM 43.201 Purpose

This subpart details the requirements for the certification of conformity following major modifications or repairs. AC43-8 provides more information on modifications and repairs.

A major modification or repair is one where potentially, incorrect embodiment could affect the safety of an aircraft or its occupants through one or more of the following incidents occurring—

- 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.

EM 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 persons who can certify conformity are—

- holders of inspection authorisations issued under Part 66
- Part 145 authorisation holders who have had equivalent training
- authorised representatives of the manufacturer

Inspection authorisation courses to qualify personnel on the conformity aspects of aircraft maintenance will be run by the CAA.

EM 43.205 Certifying requirements

To ensure conformity of any modification or repair carried out, the Authorised Inspector needs to consider two aspects —

- that the correct technical data has been used; and
- that the technical data has been used correctly.

The correct technical data is listed on the form CAA 337 and should be assessed for applicability by the certifying person. This rule also 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 AC43-8 includes details on the use of the form CAA 337.

EM 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.

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 – Minimum 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*