



Part 43

Maintenance, Preventive Maintenance, And Alterations

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PART 43

43.1 Applicability

- (a) Except as provided in paragraph (b) of this section, this Part prescribes rules governing the maintenance, preventive maintenance rebuilding and alteration of any:
 - (1) Aircraft having an Egyptian airworthiness certificate;
 - (2) Foreign-registered civil aircraft used in air transportation or carriage of mail under provisions of Part 121; and
 - (3) Airframes engines, propellers, appliances, and component parts of such aircraft.
- (b) This Part does not apply to any aircraft for which an experimental airworthiness certificate has been issued, unless a different kind of airworthiness certificate had previously been issued for the aircraft.

43.3 Records of overhaul and rebuilding

- (a) No person may describe in any required maintenance entry or form an aircraft, airframe, aircraft engine, propeller, appliance, or component part as being overhauled unless:
 - (1) Using methods techniques, and practices acceptable to the ECAA, it has been disassembled, cleaned, inspected, repaired as necessary, and reassembled; and
 - (2) It has been tested in accordance with approved standards and technical data acceptable to the ECAA.
- (b) No person may describe in any required maintenance entry or form an aircraft, airframe, airframe engine, propeller, appliance, or component part as being rebuilt unless it has been disassembled, cleaned, inspected, repaired as necessary, reassembled and tested to the same tolerances and limits as a new item, using either new parts or used parts (that either conform to new part tolerances and limits or to approved oversized or under sized dimensions).

43.5 Persons authorized to perform maintenance, preventive maintenance, rebuilding, and alteration.

- (a) Except as prescribed in this section, no person may maintain, rebuild, alter, or perform preventive maintenance on an aircraft, airframe, aircraft engine, propeller, appliance, or component parts to which this Part applies. Those items, the performance of which is a major alteration or a major repair are listed in appendix B of this Part, and those items the performance of which is a preventive maintenance are listed in appendix A of this Part.
- (b) The holder of an aircraft maintenance, engineer's license type rating or the holder of a license without type rating after being granted the relevant approval from an approved maintenance organization as provided in Part 65 and Part 145.
- (c) (Reserved).
- (d) A person working under the supervision of paragraph 43.5 (b) may perform the maintenance, preventive maintenance, and alterations that his supervisor is authorized to perform, if the supervisor personally observes the work being done to the extent necessary to ensure that it is being done properly and if the supervisor is readily available, in person, for consultation. However, this paragraph does not authorize the performance of any inspection required by Part 91 or any inspection performed after a major repair, alteration or rebuilding.
- (e) The holder of a maintenance organization or a repair station approval may perform maintenance, preventive maintenance and alterations as provided in Part 145.
- (f) The holder of an air operator certificate issued under Part 121 may perform maintenance only as provided in Part 121.
- (g) A manufacturer acceptable to the ECAA may rebuild or alter any aircraft, aircraft engine, propeller, or appliance manufactured by him under an appropriate approving authority.
- (h) For aircrafts which having a maximum approved passenger seating configuration, excluding any required crewmember seat, of 10 seats or less, the flight crew may perform the Pre-departure check out of main base after being granted the relevant approval as provided in Part 65.

43.7 Approval for release to service after maintenance, preventive maintenance, rebuilding, or alteration

No person may approve for release to service any aircraft, airframe, aircraft engine, propeller, or appliance, that has undergone maintenance, preventive maintenance, rebuilding, or alteration unless:

- (a) The maintenance record entry required by Part 43-9 or 43-11, as appropriate, has been made;
- (b) The repair or alteration form authorized by or furnished by the ECAA has been executed in a manner prescribed by the ECAA; and
- (c) If a repair or an alteration results in any change in the aircraft operating limitations or flight data contained in the approved aircraft flight manual, those operating limitations or flight data are appropriately revised.

43.9 Persons authorized to approve aircraft, airframes, aircraft engines, propellers, appliances, or component parts for release to service after maintenance, preventive maintenance, rebuilding, or alteration

- (a) Except as provided in this section, no person other than the ECAA may approve an aircraft, airframe, aircraft engine propeller, appliance, or component part for release to service after it has undergone maintenance, preventive maintenance, rebuilding, or alteration.
- (b) The holder of an aircraft maintenance engineer's type rated license, or the holder of a license without type rating after being granted the relevant approval from an approved maintenance organization may approve an aircraft, airframe, aircraft engine, propeller, appliance, or component part for release to service as provided in Part 65.
- (c) The holder of an approved maintenance organization approval may approve an aircraft, airframe, aircraft engine, propeller, appliance, or component part for release to service as provided in Part 145.
- (d) A manufacturer of a product may approve for release to service any aircraft, airframe, aircraft engine, propeller, appliance, or component part, which he manufactured and has worked on. Except for minor repairs, the work must have been done in accordance with technical data, methods, techniques and practices acceptable to the ECAA.

43.11 Content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records

- (a) Maintenance record entries: Each person who maintains, performs preventive maintenance, rebuilds, or alters an aircraft, airframe, aircraft engine, propeller, appliance, or component part shall make an entry in the maintenance record of that equipment containing the following information:
 - (1) A description and reference to data acceptable to the ECAA of work performed;
 - (2) The date of completion of the work performed;
 - (3) The name of the person performing the work if other than the person specified in paragraph (a)(4) of this section; and
 - (4) If the work performed on the aircraft, aircraft engine, propeller, appliance, or component part has been performed satisfactorily, the signature, certificate number, and kind of certificate held by the person approving the work are entered on the work document or technical logbook. The signature constitutes the approval for release to service only for the work performed. In addition to the entry required by this paragraph, major repairs and major alterations shall be entered on a form, and the form processed in the manner prescribed in appendix B of this Part, by the person performing the work.

43.13 Content, form, and disposition of records for inspections

- (a) Maintenance record entries: The person approving or disapproving the release to service of an aircraft, airframe, aircraft engine, propeller, appliance, or component part after any inspection performed in accordance with the approved maintenance program, shall make an entry in the maintenance record of that equipment containing the following information:
 - (1) The type of inspection and a brief description of the inspection;
 - (2) The date of the inspection and aircraft total time in service, if that total time is not tracked under an ECAA approved method;

- (3) The signature, the license number, and type of license held by the person approving or disapproving for release to service, the aircraft, airframe, aircraft engine, propeller, appliance, component part, or portions thereof; and
 - (4) If the aircraft is found to be airworthy and approved for release to service, the following or a similarly worded statement should be used: "I certify that this aircraft has been inspected in accordance with (insert type per approved maintenance program) inspection and was determined to be in airworthy condition".
- (b) Listing of discrepancies and placards: If the person performing any inspection required by the approved maintenance program finds that the aircraft is unairworthy or does not meet the applicable type certificate data, airworthiness directives, or other approved data upon which its airworthiness depends, that person must give his supervisor, the owner or lessee a signed and dated list of those discrepancies or they must be listed in the aircraft technical logbook. For those items permitted to be inoperative under an approved MEL, that person shall place a placard, that meets the aircraft's airworthiness certification regulations, on each inoperative instrument and the cockpit control of each item of inoperative equipment, marking it "Inoperative" and shall add the items to a dated list of discrepancies given to the supervisor, owner or lessee or entered into the technical logbook.

43.15 Maintenance records: Falsification, reproduction, or alteration

- (a) No person may make or cause to be made:
- (1) Any fraudulent or intentionally false entry in any record or report that is required to be made, kept, or used to show compliance with any requirement under this Part;
 - (2) Any reproduction, for fraudulent purpose, of any record or report required under this Part; or
 - (3) Any alteration, for fraudulent purpose, of any record or report required under this Part.
- (b) The commission by any person of an act prohibited under paragraph (a) of this section is a basis for suspending or revoking the applicable airman license, operator certification, maintenance organization approval, or production certificate, authorization, approval or product or process specification issued by the ECAA and held by that person or company.

43.17 Performance rules: General

- (a) Each person performing maintenance, alteration, or preventive maintenance on an aircraft, engine, propeller, or appliance shall use the methods, techniques, and practices prescribed in the current manufacturers' maintenance manual or instructions for continued airworthiness prepared by its manufacturer, or other methods, techniques and practices acceptable to the ECAA. He shall use the tools equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices. If the manufacturer involved recommends special equipment or test apparatus, he must use that equipment or apparatus or its equivalent acceptable to the ECAA.
- (b) Each person maintaining, altering, or performing preventive maintenance, shall do that work in such a manner and use materials of such a quality, that the condition of the aircraft, airframe, aircraft engine, propeller, or appliance worked on will be at least equal to its original or properly altered conditions (with regard to aerodynamic, function, structural strength, resistance to vibration and deterioration and other qualities affecting airworthiness).
- (c) Unless otherwise notified by the ECAA, the methods, techniques, and practices contained in the maintenance manual or the maintenance part of the manual of the holder of an operating certificate under Part 121 (as required by its operating certificate or approved operating specifications to provide a continuous airworthiness maintenance program) constitute acceptable means of compliance with this section.

43.19 Additional performance rules for inspections

- (a) **General:** Each person performing a inspection required by Part 91, or 121 shall perform those inspections in such a manner as to determine whether the aircraft concerned meets all applicable airworthiness requirements.
- (b) **Rotorcraft:** Each person performing an inspection required by Part 91 on a rotorcraft shall inspect the following systems in accordance with the maintenance manual or instructions for continued airworthiness of the manufacturer concerned:
 - (1) The drive shafts or similar systems;
 - (2) The main rotor transmission gear box for obvious defects;
 - (3) The main rotor and center section (or the equivalent area); and
 - (4) The auxiliary rotor on a helicopter.
- (c) **Annual and 100-hour inspections:**
 - (1) Each person performing an annual or 100-hour inspection shall use a checklist while performing the inspection. The checklist may be of the person's own design, or one provided by the manufacturer of the equipment being inspected or one obtained from another source. This checklist must include the scope and detail of the items contained in appendix D to this Part and paragraph (b) of this section;
 - (2) Each person approving a reciprocating-engine-powered aircraft for release to service after an annual or 100-hour inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations of:
 - (i) Power output (static and idle RPM);
 - (ii) Magnetos;
 - (iii) Fuel and oil pressure; and
 - (iv) Cylinder and oil temperature.
 - (3) Each person approving a turbine-engine-powered aircraft for release to service after an annual, 100-hour, or progressive inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations.
- (d) **Progressive inspection:**
 - (1) Each person performing a progressive inspection shall, at the start of a progressive inspection system, inspect the aircraft completely. After this initial inspection, routine and detailed inspections must be conducted as prescribed in the progressive inspection schedule. Routine inspection consist of visual examination or check of the appliances, the aircraft, and its components and systems, insofar as practicable without disassembly. Detailed inspections consist of a thorough examination of the appliances, the aircraft, and its components and systems, with such disassembly as are necessary. For the purposes of this subparagraph, the overhaul of a component or system is considered to be a detailed inspection; and
 - (2) If the aircraft is away from the station where inspections are normally conducted, an appropriately licensed engineer, an approved maintenance organization, or the manufacturer of the aircraft may perform inspections in accordance with the procedures and using the forms of the person who would otherwise perform the inspection.

43.21 Airworthiness limitations

Each person performing an inspection or other maintenance specified in the airworthiness limitations section of a manufacturer's maintenance manual or instructions for continued airworthiness shall perform the inspection or other maintenance in accordance with that section, or in accordance with operations specifications approved by the ECAA.

APPENDIX A
Preventive Maintenance

43.aa.1 Preventive maintenance is limited to the following maintenance work, provided it does not involve complex assembly operations

- (a) Removal, installation and repair of landing gear tires.
- (b) Replacing elastic shock absorber cords on landing gear.
- (c) Servicing landing gear shock struts by adding oil, air, or both.
- (d) Servicing landing gear wheel bearings, such as cleaning and greasing.
- (e) Replacing defective safety wiring or cotter keys.
- (f) Lubrication not requiring disassembly other than removal of nonstructural items such as cover plates, cowlings and fairings.
- (g) Making single fabric patches not requiring rib stitching or the removal of structural paste or control surfaces. In the case of balloons, the making of small fabric repairs to envelopes (as defined in, and in accordance with, the balloon manufacturers' instructions) not requiring load tape repair or replacement.
- (h) Replenishing hydraulic fluid in the hydraulic reservoir.
- (i) Refinishing decorative coating of fuselage, balloon baskets, wings, tail, ground surfaces (excluding balanced control surfaces) fairings, cowlings, landing gear., cabin or cockpit interior when removal or disassembly of any primary structure or operating system is not required.
- (j) Applying preservative or protective material to components where no disassembly of any primary structure or operating system is involved and where such coating is not prohibited or is not contrary to good practices.
- (k) Repairing upholstery and decorative furnishings of the cabin, cockpit, or balloon basket interior when the repairing does not require disassembly of any primary structure or operating system or interfere with an operating system or affect the primary structure of the aircraft.
- (l) Making small simple repairs to fairings, nonstructural cover plates, cowlings and small patches, and reinforcements not changing the contour so as to interfere with proper airflow.
- (m) Replacing side windows where that work does not interfere with the structure or any operating system such as controls, electrical equipment.
- (n) Replacing safety belts.
- (o) Replacing seats or seat parts with replacement parts approved for the aircraft, not involving disassembly of any primary structure or operating system.
- (p) Trouble shooting and repairing broken circuits and landing light wiring circuits.
- (q) Replacing bulbs, reflectors, and lenses of position and landing lights.
- (r) Replacing wheels and skis where no weight and balance computation is involved.
- (s) Replacing any cowling not requiring removal of the propeller or disconnection of flight controls.
- (t) Replacing or cleaning spark plugs and setting of spark plug gap clearance.
- (u) Replacing any hose connection except hydraulic connections.
- (v) Replacing prefabricated fuel lines.
- (w) Cleaning or replacing fuel and oil strainers or filter elements.
- (x) Replacing and servicing batteries.
- (y) Cleaning of balloon burner pilot and main nozzles in accordance with the balloon manufacturer's instructions.
- (z) Replacement or adjustment of nonstructural standard fasteners incidental to operations.
- (aa) The interchange of balloon baskets and burners on envelopes when the basket or burner is designated as interchangeable in the balloon type certificate data and the basket and burners are specifically designed for quick removal and installation.
- (bb) The installation of anti-misfueling devices to reduce the diameter of fuel tank filler openings provided the specific device has been made a part of the aircraft type certificate data by the aircraft manufacturer, and he has provided approved instructions for the installation of the device, and installation does not involve the disassembly of the existing tank filler opening.
- (cc) Removing, checking, and replacing magnetic chip detectors.

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- (dd) The inspection and maintenance tasks prescribed and specifically identified as preventive maintenance in an aircraft type certificate or supplemental type certificate holder's approved special inspection and preventive maintenance program when accomplished on an aircraft provided:
- (1) They are performed by a holder of an appropriate license or approved maintenance organization authorization; and
 - (2) The inspection and maintenance tasks are performed in accordance with instructions contained by the special inspections and preventive maintenance program approved as part of the aircraft's type design or supplemental type design.

APPENDIX B **Major Repairs and Major Modifications or Alterations**

43.ab.1 Definition of major repairs modifications and alterations

- (a) Major repair: Means a repair:
 - (1) That, if improperly done, might appreciably affect weight, balance, structural strength, performance, power plant, operation, flight characteristics, or other qualities affecting airworthiness; or
 - (2) That is not done according to accepted practices or can not be done by elementary operation but following special practices and operation instructions approved by the manufacturer.
- (b) Minor repair: Means a repair other than a major repair.
- (c) Major modification or alteration: Means an alteration or modification approved by the manufacturer, but not listed in the aircraft, aircraft engine, or propeller specifications:
 - (1) That might appreciably affect weight, balance, structural strength, performance, power plant operation, flight characteristics, or other qualities affecting airworthiness; or
 - (2) That is not done according to accepted practices or cannot be done by elementary operations.
- (d) Minor modification or alteration: Means an alteration or modification other than a major alteration or modification.

43.ab.3 Airframe major repairs

Repairs to the following parts of an airframe and repairs of the following types, involving the strengthening, reinforcing splicing, and manufacturing of primary structural members or their replacement, when replacement is by fabrication such as riveting or welding, are airframe major repairs:

- (a) Box beams;
- (b) Monocoque or semimonocoque wings or control surfaces;
- (c) Wings stringers or chord members;
- (d) Spars;
- (e) Spar flanges;
- (f) Members of truss-type beams;
- (g) Thin sheet webs or beams;
- (h) Keel and chine members of boat hulls or floats;
- (i) Corrugated sheet compression members which act as flange material of wings or tail surface;
- (j) Wing main ribs and compression members;
- (k) Wing or tail surface brace struts;
- (l) Engine mounts;
- (m) Fuselage longerons;
- (n) Members of the side truss, horizontal truss, or bulkheads;
- (o) Main seat support braces and brackets;
- (p) Landing gear brace struts;
- (q) Axles;
- (r) Wheels;
- (s) Skies, and ski pedestals;
- (t) Parts of the control system such as control columns, pedals, shafts, brackets, or horns;
- (u) Repairs involving the substitution of material;
- (v) The repair of damaged areas in metal or plywood stressed covering exceeding six inches in any direction;
- (w) The repair of portion of skin sheets by making additional seam;
- (x) The splicing of skin sheets;
- (y) The repair of three or more adjacent wing or control surface ribs or the leading edge of wings and control surfaces, between such adjacent ribs;
- (z) Repair of fabric covering involving an area greater than that required to repair two adjacent ribs;

- (aa) Replacement of fabric on fabric covering parts such as wings, fuselages, stabilizers, and control surfaces; and
- (bb) Repairing, including rebottling of removable or integral fuel tanks and oil tanks.

43.ab.5 Powerplant major repairs

The following parts of an engine and repairs if the following types, are power plant major repairs:

- (a) Separation or disassembly of a crankcase or crankshaft of a reciprocating engine equipped with an integral supercharger;
- (b) Separation or disassembly of a crankshaft of a reciprocating engine equipped with other than spur-type propeller reduction gearing; and
- (c) Special repairs to structural engine parts by welding, plating, metalizing, or other methods.

43.ab.7 Propeller major repairs

The following types to a propeller are propeller major repairs:

- (a) Any repairs to, or straightening of steel blades;
- (b) Repairing or machining of steel hubs;
- (c) Shortening of blades;
- (d) Retipping of wood propellers;
- (e) Replacement of outer laminations on fixed pitch wood propellers;
- (f) Repairing elongated bolt-holes in the hub of fixed pitch wood propellers;
- (g) Inlay work on wood blades;
- (h) Repairs to composition blades;
- (i) Replacement of tip fabric;
- (j) Replacement of plastic covering;
- (k) Repair of propeller governors;
- (l) Overhaul of controllable pitch propellers;
- (m) Repairs to deep dents, cuts, scars, nicks, etc., and straightening of aluminum blades; and
- (n) The repair or replacement of internal elements of blades.

43.ab.9 Appliances major repairs

The following types to appliances are appliance major repairs:

- (a) Calibration and repair of instruments;
- (b) Calibration of radio equipment;
- (c) Rewinding the field coil of an electrical accessory;
- (d) Complete disassembly of complex hydraulic power valves; and
- (e) Overhaul of pressure type carburetors, and pressure type fuel, oil and hydraulic pumps.

43.ab.11 Air frame major modifications or alterations

Modifications or alterations of the following parts and of the following types, when not listed in the aircraft specifications issued by the manufacturer, are airframe major alterations, and should be approved from the ECAA before applying them on an aircraft:

- (a) Wings;
- (b) Tail surfaces;
- (c) Fuselage;
- (d) Engine mounts;
- (e) Control system;
- (f) Landing gear;
- (g) Hull or floats;
- (h) Elements of an airframe including spars, ribs, fittings, shock absorbers, bracing, cowling, fairing, and balance weights;
- (i) Hydraulic and electrical actuating system of components;
- (j) Rotor blades;
- (k) Changes to the empty weight or empty balance which result in an increase in the maximum certificated weight or center of gravity limits of the aircraft;
- (l) Changes to the basic design of the fuel, oil, cooling, heating, cabin pressurization, electrical, hydraulic, de-icing, or exhaust systems; and
- (m) Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics.

43.ab.13 Powerplant major alterations

The following alterations of a powerplant when not listed in the engine specifications issued by the manufacturer, are powerplant major alterations, and shall be approved from the ECAA before applying them on an aircraft powerplant:

- (a) Conversion of an aircraft engine from one approved model to another, involving any changes in compression ratio, propeller reduction gear, impeller gear ratios of the substitution of major engine parts which requires extensive rework and testing of the engine;
- (b) Changes to the engine by replacing aircraft engine structural parts with parts not supplied by the original manufacturer or parts;
- (c) Installation of an accessory which is not approved for the engine;
- (d) Removal of accessories that are listed as required equipment on the aircraft or engine specification;
- (e) Installation of structural parts other than the type of parts approved for the installation; and
- (f) Conversions of any sort for the purpose of using fuel of a rating or grade other than that listed in the engine specifications.

43.ab.15 Propeller major alterations

The following alterations of a propeller when not authorized in the propeller specifications issued by the manufacturer are propeller major alterations and should be approved from the ECAA before applying them on an aircraft propeller:

- (a) Changes in blade design;
- (b) Changes in hub design;
- (c) Changes in the governor or control design;
- (d) Installation of propeller governor or feathering system;
- (e) Installation of propeller de-icing system; and
- (f) Installation of parts not approved for the propeller.

43.ab.17 Appliance major alterations

Alterations of the basic design not made in accordance with recommendations of the appliance manufacturer or an ECAA airworthiness directive are appliance major alterations, and should be approved from the ECAA before applying it on any aircraft appliances. In addition, changes in the basic design of radio communication and navigation equipment approved under type certification or a technical standard order that have an effect on frequency stability, noise level, sensitivity, selectivity, distortion, spurious radiation, AVC characteristics, or ability to meet environmental test conditions and other changes that have an effect on the performance of the equipment are also major alterations.

43.ab.19 Recording of major repairs and alterations

- (a) Each person performing a major repair or, major alteration shall:
 - (1) Execute the required ECAA form in duplicate;
 - (2) Give a signed copy to the aircraft owner; and
 - (3) Forward a copy of that from to the ECAA within 72 hours after the aircraft, airframe, engine, propeller, or appliance is approved for release to service.
- (b) For major repairs made in accordance with a manual or specifications acceptable to the ECAA, an approved maintenance organization or a repair station may, in place of the requirements of paragraph (a):
 - (1) Use the customer's work order upon which the repair is recorded;
 - (2) Give the aircraft owner a signed copy of the work order and retain a duplicate copy for at least two years from the date of approval for release to service of the aircraft, airframe, aircraft engine, propeller, or appliance; and
 - (3) Give the aircraft owner a maintenance release signed by an authorized representative of the maintenance organization or the repair station and incorporating the following information:
 - (i) Identify of the aircraft, airframe, aircraft engine, propeller or appliance;
 - (ii) If an aircraft, the make, model, serial number, nationality and registration marks, and location of the repaired area; and

- (iii) If an airframe, aircraft engine, propeller, or appliance, give the manufacturer's name, name of the part, model, and serial numbers (if any); and
- (4) Include the following or a similarly worded statement:
 "The aircraft airframe, aircraft engine, propellers or appliance identified above was repaired and inspected in accordance with current regulations of the ECAA, and is approved for release to service.
 Pertinent details of the repair are on file at this approved maintenance organization or repair station under order No _____
 Date _____
 Signed _____
 (For signature of authorized representative)
 (Repair station name) (Certification No.)
 (Address) _____"

43.ab.21 Extended-range fuel tanks

For extended-range fuel tanks installed within the passenger compartment or a baggage compartment, the person who performs the work shall execute an ECAA form for major repair or major alteration in at least triplicate. One copy of that form shall be placed on board the aircraft as specified in Part 91. The remaining copies shall be distributed as required by paragraph 43.ab.19.

APPENDIX D
Annual and 100-hour inspections

43.ad.1 Scope and detail of items (as applicable to the particular aircraft) to be included in annual and 100-hour inspections

- (a) Each person performing an annual or 100-hour inspection shall before that inspection, remove or open all necessary inspection plates, access doors, fairing, and cowling, he shall thoroughly clean the aircraft and aircraft engine.
- (b) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the fuselage and hull group:
 - (1) Fabric and skin: For deterioration, distortion, other evidence of failure, and defective or insecure attachment of fittings;
 - (2) Systems and components: For improper installation, and unsatisfactory operation; and
 - (3) Envelope, gas bags, ballast tanks, and related parts: For poor condition.
- (c) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the cabin and cockpit group:
 - (1) Generally for uncleanness and loose equipment that might foul the controls;
 - (2) Seats and safety belts for poor condition, apparent defects, proper installation and approved TSO;
 - (3) Windows and windshields for deterioration and breakage;
 - (4) Instruments for poor condition, mounting, marking, and (where practicable) improper operation;
 - (5) Flight and engine controls. For improper installation and improper operation;
 - (6) Batteries for improper installation and improper charge; and
 - (7) All systems for improper installation, poor general condition apparent and obvious defects, and security of attachment.
- (d) Each person performing an annual or 100-hour inspection (where applicable) components of the engine and nacelle group as follows:
 - (1) Engine section for evidence of excessive oil, fuel, or hydraulic leaks, and sources of such leaks;
 - (2) Studs and nuts for improper torquing and obvious defects;
 - (3) Internal engine for cylinder compression and for metal particles or foreign matter on screens and sump drain plugs. If there is weak cylinder compression, for improper internal condition and improper internal tolerances;
 - (4) Engine mounts for cracks, looseness of mounting, and looseness of engine to mount;
 - (5) Flexible vibration dampers for poor condition and deterioration;
 - (6) Engine controls for defects, improper travel, and improper safety wiring;
 - (7) Lines, hoses, and clamps, for leaks, improper condition and looseness;
 - (8) Exhaust stacks for cracks, defects, and improper attachment;
 - (9) Accessories for apparent defects in security of mounting;
 - (10) All systems for improper installation, poor general condition, defects, and insecure attachment; and
 - (11) Cowling for cracks, and defects.
- (e) Each person performing an annual or 100-hour inspection shall inspect (when applicable) the following components of the landing gear group:
 - (1) All units for poor condition and insecurity of attachment;
 - (2) Shock absorbing devices for improper oleo fluid level;
 - (3) Linkages, trusses, and members for undue or excessive wear fatigue, and distortion;
 - (4) Retracting and locking mechanism for improper operation;
 - (5) Hydraulic lines for leakage;
 - (6) Electrical system for chafing and improper operation of switches;
 - (7) Wheels for cracks, defects, and condition of bearings;
 - (8) Tires for wear and cuts;
 - (9) Brakes for improper adjustment; and
 - (10) Floats and skis for insecure attachment and obvious or apparent defects.
- (f) Each person performing an annual or 100-hour inspection shall inspect (where applicable) all components for the wing and center section assembly for general

condition, fabric or skin deterioration, distortion, evidence of failure and insecurity of attachment.

- (g) Each person performing an annual or 100-hour inspection shall inspect (where applicable) all components and systems that make up the complete empennage assembly for poor general condition, fabric or skin deterioration, distortion, evidence of failure, insecure attachment, improper component installation, and improper component operation.
- (h) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the propeller group:
 - (1) Propeller assembly for cracks nicks binds, and oil leakage;
 - (2) Bolts for improper torquing and lack of safety;
 - (3) Anti-icing devices for improper operations and obvious defects; and
 - (4) Control mechanisms for improper operation, insecure mounting, and restricted travel.
- (i) Each person performing an annual or 100-hour inspection shall inspect (where applicable) the following components of the radio group:
 - (1) Radio and electronic equipment for improper installation and insecure mounting;
 - (2) Wiring and conduits for improper routing, insecure mounting, and obvious defects;
 - (3) Bonding and shielding for improper installation and poor condition;
 - (4) Antenna including trailing antenna for poor conditions insecure mounting, and improper operation; and
 - (5) Each person performing an annual or 100 hour inspection shall inspect (when applicable) each installed miscellaneous item that is not otherwise covered by this listing for improper installation and improper operation.

APPENDIX E
Altimeter System Test and Inspection

Each person performing the altimeter system tests and inspections required by Part 91 shall comply with this appendix.

43.ae.1 Static pressure system

- (a) Ensure freedom from entrapped moisture and restrictions.
- (b) Determine that leakage is within the tolerances established in Parts 23, 25, 27 or 29 whichever is applicable.
- (c) Determine that the static port heater if installed is operative.
- (d) Ensure that no alterations or deformations of the airframe surface have been made that would affect the relationship between air pressure in the static pressure system and true ambient static air pressure for any flight condition.

43.ae.3 Altimeter

- (a) Test by an appropriately rated repair facility in accordance with the following subparagraph. Unless otherwise specified, each test for performance may be conducted with the instrument subjected to vibration when tests are conducted with the temperature substantially different from ambient temperature if approximately 25 degree C, allowance shall be made for the variation from the specified condition:
 - (1) Scale error: With the barometric pressure scale at 29.92 inches of mercury, the altimeter shall be subjected successively to pressures corresponding to the altitude specified table 1 up to the maximum normally expected operating altitude of the airplane in which the altimeter is to be installed;
 - (2) The reduction in pressure shall be made at a rate not in excess of 20,000 feet per minute to within approximately 2,000 feet of the test point. The test point shall be approached at a rate compatible with the test equipment. The altimeter shall be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before a reading is taken. The error at all test points must not exceed the tolerances specified in table 1.
 - (3) Hysteretic: The hysteretic test shall begin not more than 15 minutes after the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error test prescribed in subparagraph (1); while the altimeter is at this pressure, the hysteretic test shall commence. Pressure shall be increased at a rate simulating a descent in altitude at the of 5,000 to 20,000 feet per minute until 3,000 feet of the first test point (50 percent of maximum altitude). The test point shall than be approached at a rate of approximately 3,000 feet per minute. The altimeter shall be kept at this pressure for at least 5 minutes, but not more than 15 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached. The altimeter shall be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is taken. After the reading has been taken, the pressure shall be increased further, in the same manner as before, until atmospheric pressure is reached. The reading of the altimeter at either of the two test points shall not differ by more than the tolerance specified in table 2 from the reading of the altimeter for the corresponding altitude recorded during the scale error test;
 - (4) After effect: Not more than 5 minutes after the completion of the hysteretic test, the reading of the altimeter (corrected for any change in atmospheric pressure) shall not differ from the original atmospheric pressure reading by more than the tolerance specified is table 2;
 - (5) Friction: The altimeter shall be subjected to a steady rate of decrease of pressure of approximating 750 feet per minute. At each altitude listed in table 3, the change in reading of the pointers after vibration shall not exceed the corresponding tolerance listed in table 3;
 - (6) Case leak. The leakage of the altimeter case, when the pressure within it corresponds to an altitude of 18,000 feet, shall not change the altimeter by more than the tolerance shown in table 2 during an interval of 1 minute; and

- (7) Barometric scale error: At constant atmospheric pressure, the barometric pressure scale shall be set at each of the pressures (falling within its range of adjustment) that are listed in table 4, and shall cause the pointer to indicate the equivalent altitude difference shown in table 4 with a tolerance of 25 feet.
- (b) Altimeters which are the air data computer type with associated computing systems, or which incorporate air data correction internally, may be tested in a manner and to specifications developed by the manufacturer which are acceptable to the ECASA.

43.ae.5 Automatic pressure altitude reporting equipment and ATC transponder system integration test

An appropriately rated person must conduct the test. Measure the automatic pressure altitude at the output of the installed ATC transponder when interrogated on Mode C at a sufficient number of test points to ensure that the altitude reporting equipment, altimeters, and ATC transponder perform their intended functions as installed in the aircraft. The difference between the automatic reporting output and the altitude display of the altimeter shall not exceed 125 feet.

43.ae.7 Records

Comply with the provisions of this Part for content form, and disposition of the records. The person performing the altimeter test shall record on the altimeter the date and maximum altitude to which the altimeter has been tested and the persons approving the aircraft for release to ensure shall enter that data in the aircraft log or other permanent record.

TABLE 1- Altimeter scale error tolerances

Altitude	Equivalent pressure (inches of mercury)	Tolerance (feet)
-1,000	31,018	20
0	29,921	20
500	29,385	20
1,000	28,856	20
1,500	28,335	25
2,000	27,801	30
3,000	26,817	30
4,000	25,842	35
6,000	23,978	40
8,000	22,225	60
10,000	20,577	80
12,000	19,029	90
14,000	17,577	100
16,000	16,216	110
18,000	14,942	120
20,000	18,750	130
22,000	12,636	140
25,000	11,104	155
30,000	8,885	180
35,000	7,41	205
40,000	5,538	230
45,000	4,355	255
50,000	3,425	280

TABLE 2- Test tolerances

Test	Tolerance (feet)
Case leak Test	100
Hysteresis Test:	
First Test point (50 percent of maximum altitude)	75
Second Test point (40 percent of maximum altitude)	75
After Effect Test	30

TABLE 3 - Friction

Altitude (fed)	Tolerance (feet)
1,000	70
2,000	70
3,000	70
5,000	70
10,000	80
15,000	90
20,000	100
25,000	120
30,000	140
35,000	160
40,000	180
50,000	250

TABLE 4 - Pressure - Altitude difference

Pressure (inches of HG)	Altitude Difference
28,10	- 1,727
28,50	- 1,340
29,00	- 863
29,50	- 392
29,92	0
30,50	+ 531
30,90	+ 893
30,99	+ 974

APPENDIX F
ATC Transponder Tests and Inspections

43.af.1 The ATC transponder tests

The ATC transponder tests required by Part 91 may be conducted using a bench check or portable test equipment and must meet the requirements prescribed in paragraphs (a) through (j) of this appendix. If portable test equipment with appropriate coupling to the aircraft antenna system is used, operate the test equipment for ATCRBS transponders at a nominal rate of 235 interrogations per second to avoid possible ATCRBS interference. Operate the test equipment at a nominal rate of 50 Mode S interrogations per second for Mode S. An additional 3 dB loss is allowed to compensate for antenna coupling errors during receiver sensitivity measurements conducted in accordance with paragraph (c)(1) when using portable test equipment.

- (a) Radio reply frequency:
- (1) For all classes of ATCRBS transponders, interrogate the transponder and verify that the reply frequency is 1090 ± 3 Megahertz (MHz);
 - (2) For classes 1B, 2B, and 3B Mode S transponders, interrogate the transponder and verify that the reply frequency is 1090 ± 3 MHz;
 - (3) For classes 1B, 2B, and 3B Mode S transponders that incorporate the optional 1090 ± 1 MHz reply frequency, interrogate the transponder and verify that the reply frequency is correct; and
 - (4) For classes 1A, 2A, 3A, and 4 Mode S transponders, interrogate the transponder and verify that the reply frequency is 1090 ± 1 MHz.
- (b) Suppression: When classes 1B and 2B ATCRBS transponders, or classes 1B, 2B, and 3B Mode S transponders are interrogated Mode 3/A at an interrogation rate between 230 and 1,000 interrogations per second; or when classes 1A and 2A ATCRBS transponders, or classes 1B, 2A, 3A, and 4 Mode S transponders are interrogated at a rate between 230 and 1,200 Mode 3/A interrogations per second:
- (1) Verify that the transponder does not respond to more than 1 percent of ATCRBS interrogations when the amplitude of P2 pulse is equal to the P1 pulse; and
 - (2) Verify that the transponder replies to at least 90 percent of ATCRBS interrogations when the amplitude of the P2 pulse is 9 dB less than the P1 pulse. If the test is conducted with a radiated test signal, the interrogation rate shall be 235 ± 5 interrogations per second unless a higher rate has been approved for the test equipment used at that location.
- (c) Receiver sensitivity:
- (1) Verify that for any class of ATCRBS transponder, the receiver minimum triggering level (MTL) of the system is -73 ± 4 dbm, or that for any class of Mode S transponder the receiver MTL for Mode S format (P6 type) interrogations is -74 ± 3 dbm by use of a test set either:
 - (i) Connected to the antenna end of the transmission line;
 - (ii) Connected to the antenna terminal of the transponder with a correction for transmission line loss; or
 - (iii) Utilized radiated signal.
 - (2) Verify that the difference in Mode 3/A and Mode C receiver sensitivity does not exceed 1db for either any class of ATCRBS transponder or any class of Mode S transponder.
- (d) Radio frequency (RF) Peak output power:
- (1) Verify that the transponder RF output power is within specifications for the class of transponder. Use the same conditions as described in (c)(1) (i), (ii), and (iii) above:
 - (i) For Class 1A and 2A ATCRBS transponders, verify that the minimum RF peak output power is at least 21.0 dbw (125 watts);
 - (ii) For Class 1B and 2B ATCRBS transponders, verify that the minimum RF peak output power is at least 18.5 dbw (70 watts);
 - (iii) For Class 1A, 2A, 3A, and 4 and those Class 1B, 2B, and 3B Mode S transponders that include the optional high RF peak output power, verify that the minimum RF peak output power is at least 21.0 dbw (125 watt);
 - (iv) For Classes 1B, 2B, and 3B Mode S transponders, verify that the minimum RF peak output power is at least 18.5 dbw (70 watts); and

- (v) For any class of ATCRBS or any class of Mode S transponders, verify that the maximum RF peak output power does not exceed 27.0 dbw (500 watts).
Note: The tests in (e) through (j) apply only to Mode S transponders.
- (e) Mode S diversity transmission channel isolation: For any class of Mode S transponder that incorporates diversity operation, verify that the RF peak output power transmitted from the selected antenna exceeds the power transmitted from the no selected antenna by at least 20 db.
 - (f) Mode S address: Interrogate the Mode S transponder and verify that it replies only to its assigned address. Use the correct address and at least two incorrect addresses. The interrogations should be made at a nominal rate of 50 interrogations per second.
 - (g) Mode S formats: Interrogate the Mode S transponder with uplink formats (UF) for which it is equipped and verify that the replies are made in the correct format. Use the surveillance formats UF = 4 and 5. Verify that the altitude reported in the replies to UF = 4 are the same as that reported in a valid ATCRBS Mode C reply. Verify that the identity reported in the replies to UF = 5 are the same as that reported in a valid ATCRBS Mode 3/A reply. If the transponder is so equipped, use the communication formats UF = 20, 21, and 24.
 - (h) Mode S all-call interrogations: Interrogate the Mode S transponder with the Mode S only all-call format UF = 11, and the ATCRBS/Mode S all-call formats (1.6 microsecond P4 pulse) and verify that the correct address and capability are reported in the replies (downlink format DF = 11).
 - (i) ATCRBS only all-call interrogation: Interrogate the Mode S transponder with the ATCRBS only all-call interrogation (0.8 microsecond P4 pulse) and verify that no reply is generated.
 - (j) Squitter: Verify that the Mode S transponder generates a correct squitter approximately once per second.
 - (k) Records: Comply with the provisions of Part 43.9 as to content, form, and disposition of the records.