

Notification of the Department of Air Transport

Re: Maintenance, Preventive Maintenance, Rebuilding and Alteration

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By virtue of Clause 12 of the Regulations of the Civil Aviation Board No. 78 given on 4 January B.E. 2551 which states that those certified for aircraft operation and general operations are required to operate in accordance with relevant rules and regulations relating to the operation aircraft services of other aircrafts. Therefore the Department of Air Transport hereby issues this Notification relating to the maintenance, preventive maintenance, rebuilding, and alteration as follows:

Clause 1. The Notification of the Department of Air Transport relating to preventive maintenance, rebuilding, and alteration given on 21 August B.E. 2544 shall be repealed.

All Notifications, Regulations and orders or memos or guidelines specified in this Notification if conflict with this Notification, this Notification shall be used.

Clause 2. In this Notification,

“Preventive Maintenance” refers to work that is unrelated to complex operation assembly and limited to orders which details are stated in Appendix A of this Notification.

“Modification” refers to the aircraft modification of airframe, aircraft engine, propeller, appliances or component parts to meet the standards certified by the Director-General.

“Major Modification” refers to the modification of parts or type which has not been included in the aircraft specifications provided by the designing State.

“Overhaul” refers to the act of making the airframe, aircraft engine, propeller, appliances, or parts able to return to service using the methods and techniques approved by the state design. These include disassembling, cleaning, inspection, fixing as necessary, reassembling, and testing according to the current information and technical standards approved by officials, of which standards have to be made into documents

by the officials who holds the type certificate or supplement type certificate, or material, parts, procedures and appliances certificate under past manufacturer approval or technical standard order.

“Major Repair” refers to the repair of aircraft parts and repairing related to strengthening, reinforcing, splicing, and producing or replacing primary structure, when replacement involves construction, in accordance with Appendix A of this Notification.

“Rebuild” refers to making the aircraft, airframe, aircraft engine, propeller, appliances, and parts able to return to service using the techniques and procedures accepted by officials, including disassembling, cleaning, inspection, fixing as necessary and reassembling and testing tolerances and limitations with new models by using new parts or used parts with the same tolerances as new parts. This procedure has to be done by the manufacturer or technicians certified by the manufacturer and has received permission from the State of Registration.

“Required Inspection Items” refers to list of maintenances and modifications which have to be inspected by persons not involved in those procedures and also includes list of wrong doings, or when using the wrong materials or parts that will cause it to wear out, to not function properly, or to cause errors for the safety of aircraft usage.

“Life-limited Part” refers to parts that have expiration dates for replacement stated in the certificate, guidelines for continued usage of aircraft, or maintenance manual.

“Life Status” refers to the collective number of cycles used, the number of hours used or the length of time used of life limited parts.

Clause 3. Applicability

This Notification shall apply to maintenance, preventive maintenance, renovation, and modification of all sorts in respect of:

- (a) Aircrafts with or about to request for Thai standard Airworthiness Certificate;
- (b) Airframe, aircraft engine, propeller, and appliances of aircrafts in (a);

(c) Life-limited parts which have been taken out of the product which has a type certificate and controlled according to Clause 10.

Maintenance and inspection methods that have not been included in this Notification or Appendix which will be continuously revised shall proceed according to the manufacturer manual or standards accepted by the Department of Air Transport.

Clause 4. Persons authorized to perform maintenance, preventive maintenance, rebuilding, and alterations.

Persons authorized to perform maintenance, preventive maintenance, rebuilding, and alterations of aircraft, airframe, aircraft engine, propeller, appliances or parts shall be the following persons:

(a) Persons who hold a ground engineer license are authorized to perform maintenance, preventive maintenance and rebuilding according to the Regulations of the Civil Aviation Board.

(b) Persons who work under the management of those with a ground engineer license are authorized to perform maintenance, preventive maintenance, and rebuilding to which the project manager has authorized. The manager is required to manage and inspect necessary areas themselves to ensure everything is done correctly and is ready to provide consultation.

(c) Persons who hold a repair station certificate are authorized to perform maintenance, preventive maintenance, and rebuilding in accordance with the Notification of the Department of Air Transport relating to Certification of Repair Stations.

(d) Persons who hold an air operator certificate are authorized to perform maintenance, preventive maintenance, and rebuilding of its aircraft in accordance with the repairing and rebuilding manual approved by the Department of Air Transport.

(e) Persons who hold a pilot license are authorized to perform preventive maintenance of its aircraft or aircraft currently used in accordance with the Regulations of the Civil Aviation Board.

(f) Manufacturers are authorized to:

(1) Rebuild or alter the aircraft, aircraft engine, propeller or any other appliances manufactured by that manufacturer under the model certificate or production certificate.

(2) Rebuild or alter appliances or component parts of the aircraft, aircraft engine, propeller, or appliances which that manufacturer has manufactured under license by the Technical Standard Order Authorization – TSOA, or Part Manufacturer Approval – PMA.

Any act which includes major modification, major repairing and major preventive maintenance are to be carried out according to Appendix A of this Notification.

Clause 5. Persons authorized to approve aircrafts, airframes, aircraft engines, propellers, appliances, or component parts for return to service after maintenance, preventive maintenance, rebuilding or alteration.

Persons authorized to approve aircrafts, airframes, aircraft engines, propellers, appliances, or component parts shall be as follows:

(a) Persons who hold a ground engineer license are authorized to approve aircrafts, airframes, aircraft engines, propellers, appliances or component parts for return to service as stated in the license.

(b) Persons who hold a repair station certificate are authorized to approve aircrafts, airframes, aircraft engines, propellers, appliances or component parts for return to service in accordance with the Notification of the Department of Air Transport relating to Certification of Repair Stations.

(c) Persons who hold an air operator license are authorized to approve aircrafts, airframes, aircraft engines, propellers, appliances and component parts of its aircraft for returning to service according to general maintenance manuals.

(d) Persons who hold a pilot license are authorized to approve aircrafts for return to service after the aircraft has received preventive maintenance according to Clause 4 (e).

(e) Manufacturers are authorized to approve aircrafts, airframes, aircraft engines, propellers, appliances or component parts for return to service performing the works in accordance with Clause 4 (f).

Clause 6. Approval for return to service after maintenance, preventive maintenance, rebuilding or alteration.

Approval of aircrafts, airframes, aircraft engines, propellers or appliances for return to service after receiving maintenance, preventive maintenance, rebuilding or alteration procedures shall be as follows:

(a) Recording in maintenance history according to Clause 7 and inspection according to Clause 9.

(b) The form for the repair or alteration and records shall be as prescribed by the Department of Air Transport.

(c) If repair or alteration results in change in operating limitations of the aircrafts or information in the approved flight manual those changes must be modified and added to the manuals.

Clause 7 Content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records.

The content, form, and disposition of maintenance, preventive maintenance, rebuilding, and alteration records are to be completed according to the following rules:

(a) Any person who performs maintenance, preventive maintenance, rebuilding, and alterations of aircrafts, airframes, aircraft engines, propellers, appliances or component parts are required to record these acts in the history of that object and include the following information:

(1) Details (or refer to approved information by the Department of Air Transport) of the tasks performed.

(2) Date of task completion.

(3) After the work with the aircraft, airframe, aircraft engine, propeller, appliance or component part has been completed a signature and license number and license type of the person who has approved the work is required. This signature is to be used as approval for return for service only for the work that has been carried out.

(b) The person who holds an air operator license that maintains the aircraft for continuity of air operation following the maintenance program is required to record maintenance, preventive maintenance,

rebuilding and alteration performed on the aircrafts, airframes, aircraft engines, propellers, appliances or component parts according to related rules of the Department of Air Transport.

(c) The person who performed maintenances that include major repairing and major alteration are required to make records in the form in Appendix B of this Notification.

(d) Persons who work under the management of ground engineers are not allowed to perform inspection according to the maintenance program approved by the Department of Air Transport or perform any inspection after essential repairing or essential alteration has been completed.

Clause 8. Persons authorized to perform inspections of aircrafts, airframes, aircraft engines, propellers or appliances before or after maintenance, preventive maintenance, rebuilding or alteration.

Persons authorized to perform inspection of aircrafts, airframes, aircraft engines, propellers or appliances before or after maintenance, preventive maintenance, rebuilding or alteration shall be as follows:

(a) Ground engineers are authorized to inspect aircrafts, airframes, aircraft engines, propellers, appliances or component parts according to the rating stated in their license.

(b) Repair stations are authorized to inspect aircrafts, airframes, aircraft engines, propellers, appliances or component parts according to the rating stated in their repair station license.

(c) Air operators are authorized to inspect aircrafts, airframes, aircraft engines, propellers, appliances or component parts according to the rating stated in the general maintenance manual.

(d) Manufacturers are authorized to inspect aircrafts, airframes, aircraft engines, propellers, appliances or component parts manufactured by the manufacturer themselves and is to be performed under license or approved inspection system.

Clause 9. Content, form, and disposition of records for inspections

The content, form and disposition of records for inspection shall be as follows:

(a) Persons who approve or disapprove aircrafts, airframes, aircraft engines, propellers or appliances for return to service after inspection shall record the maintenance in the maintenance history of that object and include the following information:

(1) The type of inspection and details of inspection;

(2) The date of inspection and life status of that object;

(3) Signature, license number and license type or authorization certificate of approver or disapprover of the aircraft, airframe, aircraft engine, propeller, appliance or component part in question for return to service.

(4) If after inspection the aircraft is determined to be airworthy and approved for return to service, the following phrase shall be used “I certify that this aircraft has been inspected in accordance with (insert type) inspection and was determined to be in airworthy condition” or other phrases with the same meaning.

(5) If after inspection the aircraft is determined to be not airworthy and cannot be approved for return to service because maintenance is needed or other regulations have not been complied with, the following phrase shall be used “I certify that this aircraft has been inspected in accordance with (insert type) inspection and a list of discrepancies and unairworthy items dated (date) has been provided for the aircraft owner or operator” or other phrases with the same meaning.

(6) For progressive inspection the following phrase shall be used “I certify that in accordance with a progressive inspection program, a routine inspection of (identity aircraft or components) and a detailed inspection of (identity components) were performed and the (aircraft or components) are (approved or disapproved) for return to service”. In the case that it is not approved the following phrase will be added “and a list of discrepancies and unairworthy items dated (date) has been provided to the aircraft owner or operator”.

(7) If inspection has been carried out in accordance with an inspection program the record of the result of the inspection must include the inspection program type and state that inspection has been done in accordance to the steps of that inspection program.

(b) Persons who have performed an inspection and determined the aircraft to be unairworthy or not in accordance to aircraft model certificate for airworthy aircrafts or does not match approved information given must give details of these defects with a signature and date to the owner or operator of the aircraft. For the minimum equipment list, signs need to be put up in accordance with the air operation license of that aircraft. All disapproved components must be labeled “inoperative” and also labelled on the controls of those components inside the pilot’s room. These components have to be added to the list of discrepancies and unairworthy items that has been signed and dated and given to the aircraft owner or operator.

Clause 10. Disposition of life-limited aircraft parts

Disposition of life-limited aircraft parts shall be performed as follows:

(a) Persons who have removed the life-limited aircraft part from the product with license has to prevent the expired life-limited aircraft part from being returned to service by one of the following methods:

(1) Parts may be controlled by a record keeping system that contains the part number, serial number and life-status of those parts. Every time a part is removed from a licensed product the life-status of the part must be updated with the current information in the record keeping system. This system can be done electronically, in documents, or other methods of record keeping.

(2) Parts may be controlled by a tag or record attached to part in which the tag or attached record must include part number, serial number and life-status of that part. Every time a part is removed from a licensed product the life-status of the part must be updated or a new tag attached with updated information.

(3) Parts may be controlled by making non-permanent markings which indicate the life-status of the part. Every time the part is removed from a licensed product the marking must be changed

and life status updated or the marking can be removed and changed to a different record keeping system provided here. The markings used must be in accordance with the advice of the Department of Air Transport.

(4) Parts may be controlled by making permanent markings that show the life-status information of the part and must be updated every time the part is removed from a licensed product unless the part is being permanently removed. The markings used must be in accordance with the advice of the Department of Air Transport.

(5) Segregation may be used to control these parts to prevent the parts from being used on other licensed products. At a minimum the segregation procedures must include:

5.1 A record shall be kept of the part number, serial number, and life-status of each part.

5.2 Parts must be separated from the parts that are ready to be installed.

(6) Multilation may be used to control parts by wearing out the parts to prevent the parts from being installed and used again on licensed products. The parts shall be worn out to the point where it is unable to be fixed and cannot return to an airworthy state.

(7) Other methods which the Department of Air Transport has approved.

(b) When temporarily removing life-limited aircraft parts from licensed products for maintenance purposes procedures mentioned in (a) shall not be followed in the following cases:

(1) Life-status of the aircraft part remains unchanged.

(2) The aircraft part and licensed product it was removed from has the same serial number.

(3) Life-status has not changed during the time it was removed.

Clause 11. Records of overhaul and rebuilding

Records of overhaul and rebuilding shall be as follows:

(a) A record of overhaul of aircraft, airframe, aircraft engine, propeller, appliance, or component parts can be made in the following cases:

(1) Objects have been removed, cleaned, inspected, fixed as necessary and reinstalled in accordance with the techniques and procedures accepted by the Department of Air Transport; and

(2) Objects have been tested in accordance to the approved standards and techniques or standard and information currently accepted by the Department of Air Transport which has been revised and documented by those who hold type certificate and/or supplement type certificate or those authorized to manufacture those objects or components.

(b) A record of rebuild of aircraft, airframe, aircraft engine, propeller, appliance, or component parts can be made in the maintenance records only when the object has been removed, cleaned, inspected, fixed as necessary, and reinstalled in the same place and has been tested for tolerance and tolerance is to be the same as that of a new component or oversized or undersized approved values.

Clause 12. Maintenance records and retaining

Maintenance records and retaining shall be as follows

(a) Maintenance records in accordance with Clauses 2, 9 and 10 shall be recorded in the following documents:

(1) Log book of aircraft, aircraft engine, propeller or appliance depending on each case or

(2) In a permanent document that can be used to substitute (1) that has been approved by the Department of Air Transport;

(3) Document used to restrict maintenance for details of maintenance of aircraft, aircraft engine, propeller or appliance.

(b) Owner or air operator of aircraft shall keep documents in (a)(1) and (2) with the aircraft, aircraft engine, propeller or appliances until removed. When the aircraft, aircraft engine, propeller or appliance is removed the documents (a)(1) and (2) shall be passed on to the next owner or air operator of the aircraft. In the case where the aircraft, aircraft engine, propeller or appliance is being permanently removed the documents (a)(1) and (2) shall be kept by the owner or air operator for at least 90 days.

(c) Owner or air operator or persons who holds a repair station license shall keep document (a)(3) for at least 2 years from the when the part is certified to return to service.

Clause 13. General Performance Rules

Persons providing maintenance, preventive maintenance, rebuilding or alteration on aircraft, aircraft engine, propeller or appliance shall proceed in accordance to the following general performance rules:

(a) Methods used, techniques and performance shall be in accordance to the current manufacturer maintenance manual or guidelines to maintain airworthy status by manufacturer or techniques and methods approved by the Department of Air Transport.

(b) Tools, equipment, and testing tools required to guarantee that procedures have been according to procedures approved by the industry shall be used. If the manufacturer recommends equipment or testing tools, these equipment or testing tools or the equivalent as approved by the Department of Air Transport shall be used.

(c) Procedures shall be done with quality and materials used must be of good quality that makes the aircraft, aircraft engine, propeller, and appliance be in at least the same condition as the model or the correct alternated version (with reference to nature of aerodynamics, strength of frame, tolerance and deterioration and other qualities that affect the airworthiness).

Persons with an air operation license shall proceed with procedures and techniques indicated in the general maintenance manual, GMM, that has been approved by the Department of Air Transport.

Clause 14. General performance rules for inspections and additional performance rules for inspection

Persons inspecting aircrafts, aircraft engines, propellers or appliances shall perform inspection in accordance to the general performance rules for inspections and additional performance rules for inspection as follows:

(a) General inspections shall proceed as follows:

(1) Inspection shall determine whether the aircraft or aircraft part being inspected meets the all requirements of an airworthy aircraft or aircraft part.

(2) Inspection shall follow suggestions and techniques indicated in the maintenance program approved by the Department of Air Transport (if any).

(b) Rotorcraft inspection include inspection of the following systems in accordance to the maintenance manual or suggestions made by the manufacturer to maintain airworthiness:

(1) Drive shaft or similar system

(2) Gear transmission which drives the primary propeller to check for bugs

(3) Primary propeller driver and area driving the propeller or equivalent area.

(4) Helicopter tail rotor

(c) Annual inspection or inspection every 100 hours shall be as follows:

(1) The annual inspection or 100 hours inspection shall use a checklist during inspection. The checklist maybe designed by the inspector or received from the manufacturers and must include similar elements to appendix D of this Notification and (b) of the general performance rules of inspection.

(2) Approval of piston engine aircrafts for return to service after annual inspection or 100 hour inspection requires installment of aircraft engine for testing of the following capacities to correctly follow the guidelines made by the manufacturer.

2.1 Power output (constant RPM and idle RPM);

2.2 Magneto;

2.3 Fuel and lubricator pressure; and

2.4 Temperature of cylinder and lubricator.

(3) Approval of aircrafts that run with gas turbine engines for return to service after annual inspection or 100 hours inspection or progressive requires installation of engine for testing of capacity to meet requirements suggested by manufacturers.

(d) Progressive Inspection

(1) Progressive inspection initially begins with inspection of the whole aircraft followed by routine inspection and detailed inspection as indicated in progressive inspection procedures. Routine inspection includes testing how durable the aircraft and components and system are visually. Procedures do not include disassembling parts. Detail inspection includes testing how durable the aircraft and components and system are by disassembling as necessary.

(2) In the event that the aircraft is far from usual inspection station persons who hold a ground engineer license or repair station license or manufacturer may inspect the aircraft accordingly and in the format of the inspector.

Clause 15. Airworthiness limitation

Persons performing inspection or maintenance in accordance to the airworthiness limitations given in the manufacturer manual or recommendations for continued airworthiness shall perform inspection or maintenance in accordance to the airworthiness limitation or procedures or plans approved by the Department of Air Transport.

Clause 16. Maintenance records: Falsification, Reproduction, or Alteration.

Authorized persons or persons holding a license shall not perform or support in anyway any of the following acts:

(a) Make false records of any type assigned to perform or keep or use in accordance with this Notification for falsification purposes.

(b) Make false comments or intend to create errors in the records or reports of any type in accordance with this Notification assigned or keep or use in order to show procedures have been done in accordance with this Notification.

(c) Reproduce or alter any records assigned or keep or use for falsification purposes.

Clause 17. Transitional Provisions

Among maintenance, preventive maintenance, rebuilding, alteration, recording, or reporting performed in accordance to the Notification of the Department of Air Transport relating to maintenance, preventive maintenance, rebuilding, and alteration on 21 August B.E. 2544 shall be taken as maintenance, preventive maintenance, rebuilding, alteration, recording, and reporting in this Notification.

Henceforth

Issued on 5 January B.E. 2551

(Mr. Chaisak Ungsuwan)

Director-General of the Department of Air Transport

Appendix A

Major Alterations, Major repairs, and Preventive Maintenance

(a) Major Alteration

(1) Airframe major alteration

Airframe major alteration refers to the following alteration of parts or type not specified in the specifications released by the government design.

1.1 Wings

1.2 Tail surfaces

1.3 Fuselage

1.4 Engine mounts

1.5 Control system

1.6 Landing gear

1.7 Hull or floats

1.8 Elements of an airframe including spars, ribs, fittings, shock absorbers, bracing, cowling, fairings, and balance weights.

1.9 Hydraulic and electrical actuating system of components.

1.10 Rotor blades

1.11 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.

1.12 Changes to the basic design of the fuel, oil, cooling, heating, cabin pressurization, electrical, hydraulic, de-icing, or exhaust systems.

1.13 Changes to the wing or to fixed or movable control surfaces which affect flutter and vibration characteristics.

(2) Powerplant major alteration

Powerplant major alterations refer to the following alterations not specified in the powerplant details given in the government design

2.1 Conversion of an aircraft engine from one approved model to another, involving any changes in

compression ratio, propeller reduction gear, impeller gear ratios or the substitution of major engine parts which requires extensive rework and testing of the engine.

2.2 Changes to the engine by replacing aircraft engine structural parts with parts not supplied by the original manufacturer or parts not specifically approved by the Administrator.

2.3 Installation of an accessory which is not approved for the engine.

2.4 Removal of accessories that are listed as required equipment on the aircraft or engine specification.

2.5 Installing component parts with different frames other than approved components.

2.6 Conversions of any sort for the purpose of using fuel of a rating or grade other than that listed in the engine specifications.

(3) Propeller major alteration

Propeller major alteration refers to the following alterations not listed in the specifications of the propeller released by the government design.

3.1 Altering propeller type

3.2 Altering propeller cover type

3.3 Alter governor type or control

3.4 Installing propeller governor or systems preventing propellers from catching wind

3.5 Installing propeller ice protection systems

3.6 Installing parts unapproved for usage with propellers.

(4) Appliance major alteration

Appliance major alterations. Alterations of the basic design not made in accordance with recommendations of the appliance manufacturer or in accordance with an FAA Airworthiness Directive are appliance major alterations. 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.

(b) Major repair

(1) Airframe major repair

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.

1.1 Box beams

1.2 Monocoque or semimonocoque wings or control surfaces.

1.3 Wing stringers or chord members.

1.4 Spars

1.5 Spar flanges

1.6 Members of truss-type beams.

1.7 Thin sheet webs of beams

1.8 Keel and chine members of boat hulls or floats.

1.9 Corrugated sheet compression members which act as flange material of wings or tail surfaces.

1.10 Wing main ribs and compression members.

1.11 Wing or tail surface brace struts

1.12 Engine mounts

1.13 Fuselage longerons

1.14 Members of the side truss, horizontal truss, or bulkheads.

1.15 Main seat support braces and brackets.

1.16 Landing gear brace struts

1.17 Axle

1.18 Wheels

1.19 Skis and ski pedestals

1.20 Parts of the control system such as control columns, pedals, shafts, brackets, or horns.

1.21 Repairs involving the substitution of material.

1.22 The repair of damaged areas in metal or plywood stressed covering exceeding six inches in any direction.

1.23 The repair of portions of skin sheets by making additional seams.

1.24 The splicing of skin sheets.

1.25 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.

1.26 Repair of fabric covering involving an area greater than that required to repair two adjacent ribs.

1.27 Replacement of fabric on fabric covered parts such as wings, fuselages, stabilizers, and control surfaces.

1.28 Repairing, including rebottoming, of removable or integral fuel tanks and oil tanks.

2. Powerplant major repair

Powerplant major repair refers to the repair of powerplant components and the follow repairs:

2.1 Separation or disassembly of a crankcase or crankshaft of a reciprocating engine equipped with an integral supercharger.

2.2 Separation or disassembly of a crankcase or crankshaft of a reciprocating engine equipped with other than spur-type propeller reduction gearing.

2.3 Special repairs to structural engine parts by welding, plating, metalizing, or other methods.

(3) Propeller major repair

Propeller major repair refers to the following:

3.1 Any repairs to, or straightening of steel blades.

3.2 Repairing or machining of steel hubs.

3.3 Shortening of blades.

3.4 Retipping of wood propellers.

3.5 Replacement of outer laminations on fixed pitch wood propellers.

3.6 Repairing elongated bolt holes in the hub of fixed pitch wood propellers.

3.7 Inlay work on wood blades.

3.8 Repairs to composition blades.

- 3.9 Replacement of tip fabric.
- 3.10 Replacement of plastic covering.
- 3.11 Repair of propeller governors.
- 3.12 Overhaul of controllable pitch propellers.
- 3.13 Repairs to deep dents, cuts, scars, nicks, etc., and straightening of aluminum blades.
- 3.14 The repair or replacement of internal elements of blades.

(4) Appliance major repair

Appliance major repair refers to the following:

- 4.1 Calibration and repair of radio equipment
- 4.2 Calibration of radio equipment
- 4.3 Rewinding the field coil of an electrical accessory.
- 4.4 Complete disassembly of complex hydraulic power valves.
- 4.5 Overhaul of pressure type carburetors, and pressure type fuel, oil and hydraulic pumps.

(c) *Preventive maintenance.* Preventive maintenance is limited to the following work, provided it does not involve complex assembly operations:

- (1) Removal, installation, and repair of landing gear tires.
- (2) Replacing elastic shock absorber cords on landing gear.
- (3) Servicing landing gear shock struts by adding oil, air, or both.
- (4) Servicing landing gear wheel bearings, such as cleaning and greasing.
- (5) Replacing defective safety wiring or cotter keys.
- (6) Lubrication not requiring disassembly other than removal of nonstructural items such as cover plates, cowlings, and fairings.
- (7) Making simple fabric patches not requiring rib stitching or the removal of structural parts 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.
- (8) Replenishing hydraulic fluid in the hydraulic reservoir.

- (9) Refinishing decorative coating of fuselage, balloon baskets, wings tail group 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.
- (10) 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.
- (11) 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.
- (12) 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 air flow.
- (13) Replacing side windows where that work does not interfere with the structure or any operating system such as controls, electrical equipment, etc.
- (14) Replacing safety belts.
- (15) Replacing seats or seat parts with replacement parts approved for the aircraft, not involving disassembly of any primary structure or operating system.
- (16) Trouble shooting and repairing broken circuits in landing light wiring circuits.
- (17) Replacing bulbs, reflectors, and lenses of position and landing lights.
- (18) Replacing wheels and skis where no weight and balance computation is involved.
- (19) Replacing any cowling not requiring removal of the propeller or disconnection of flight controls.
- (20) Replacing or cleaning spark plugs and setting of spark plug gap clearance.
- (21) Replacing any hose connection except hydraulic connections.
- (22) Replacing prefabricated fuel lines.
- (23) Cleaning or replacing fuel and oil strainers or filter elements.
- (24) Replacing and servicing batteries.
- (25) Cleaning the balloon burner and main nozzle according to the guidelines of the manufacturer.
- (26) Replacement or adjustment of nonstructural standard fasteners incidental to operations.

(27) 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 baskets and burners are specifically designed for quick removal and installation.

(28) The installations 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, the aircraft manufacturer has provided FAA-approved instructions for installation of the specific device, and installation does not involve the disassembly of the existing tank filler opening.

(29) Removing, checking, and replacing magnetic chip detectors.

(30) Removing and replacing self-contained, front instrument panel-mounted navigation and communication devices that employ tray-mounted connectors that connect the unit when the unit is installed into the instrument panel, (excluding automatic flight control systems, transponders, and microwave frequency distance measuring equipment (DME)). The approved unit must be designed to be readily and repeatedly removed and replaced, and pertinent instructions must be provided. Prior to the unit's intended use, and operational check approved by the Department of Air Transport must be performed.

(31) Updating self-contained, front instrument panel-mounted Air Traffic Control (ATC) navigational software data bases (excluding those of automatic flight control systems, transponders, and microwave frequency distance measuring equipment (DME)) provided no disassembly of the unit is required and pertinent instructions are provided. Prior to the unit's intended use, an operational check approved by the Department of Air Transport must be performed.

Appendix B

Recording of Major Repairs and Major Alterations

- (a) Except in the cases of (b) and (c) major repair and major alteration approved by the Department of Air Transport shall:
- (1) Make at least 2 copies of the record in the format that is attached to the end of this appendix.
 - (2) Give a signed copy of the document in (1) to the owner of the aircraft.
 - (3) Send a copy of the document in (1) to the Department of Air Transport within 48 hours after the aircraft, airframe, aircraft engine or appliance has been approved for return to service.
- (b) For major repairs that have been carried out in accordance to the manual approved by the Department of Air Transport, certified repair stations may carry out work as follows instead of (a):
- (1) Work order received from customer who ordered repair can be used as maintenance record.
 - (2) Give a signed copy of the work order to the owner of the aircraft and keep a copy of the work order for at least 2 years after the day the aircraft, airframe, aircraft engine, propeller or appliances has been certified for return to service.
 - (3) Give maintenance release documents signed by an authorized representative of the repair stations to the aircraft owner and also record the following information in the document:
 - 3.1 Identity of the aircraft, airframe, aircraft engine, propeller, or appliance.
 - 3.2 In the case of an aircraft specify the manufacturer, model, serial number, nationality symbol, and area repaired.
 - 3.3 In the case of airframe, aircraft engine, propeller or appliance specify the manufacturer, component name, model and serial number (if any).
 - (4) Write the following statement or an equivalent in the maintenance records:

“The aircraft, airframe, aircraft engine, propeller, or appliance identified above was repaired and inspected in accordance with Air Navigation Act B.E. 2497 and related regulations of the Department of Air Transport and is approved for return to service.

Pertinent details of the repair are on file at this repair station under Order No.

Date

Signed

.....

for

(signature of authorized representative)

.....

.....

(repair station name)

(certificate number)

.....

.....

(address)

- (c) When installing an extended-range fuel tank in the passenger cabin or storage cabin, persons carrying out the work and persons authorized to approve the work according to Clause 5 of this Notification shall record notes in the format attached to the end of this appendix and make at least 3 copies of the document. The original copy of the document shall be placed inside the aircraft and the rest shall be distributed in accordance with (a) (2) and (3).

Appendix C

Scope and Detail of Items 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. Persons 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, apparent defects, and unsatisfactory operation.
 - (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 uncleanliness and loose equipment that might foul the controls.
 - (2) Seats and safety belts—for poor condition and apparent defects.
 - (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.
 - (7) All systems—for improper installation, poor general condition, apparent and obvious defects, and insecurity of attachment.
- (d) Each person performing an annual or 100-hour inspection shall inspect (where applicable) components of the engine and nacelle group as follows:
 - (1) Engine section—for visual 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 mount—for cracks, looseness of mounting, and looseness of engine to mount.
 - (5) Flexible vibration dampeners—for poor condition and deterioration.
 - (6) Engine controls—for defects, improper travel, and improper safety.
 - (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.
 - (11) Cowling—for cracks, and defects.
- (e) Each person performing an annual or 100-hour inspection shall inspect (where 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.
 - (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 of the wing and center section assembly for poor 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.
 - (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 condition, insecure mounting, and improper operation.
- (j) Each person performing an annual or 100-hour inspection shall inspect (where applicable) each installed miscellaneous item that is not otherwise covered by this listing for improper installation and improper operation.

Appendix D

Altimeter System Test and Inspection

Inspection of altimeter system shall be carried out as follows:

(a) Static Pressure System

- (1) Ensure freedom from entrapped moisture and restrictions.
- (2) Determine that leakage is within the tolerances approved by the Department of Air Transport.
- (3) Determine that the static port heater, if installed, is operative.
- (4) 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.

(b) Altimeter

- (1) Test by an appropriately rated repair facility in accordance with the following. 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 of approximately 25 degrees C., allowance shall be made for the variation from specified condition.
 - 1.1 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 in Table I up to the maximum normally expected operating altitude of the aeroplane in which the altimeter is to be installed. 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 I.
 - 1.2 Hysteresis 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 1.1 and while the altimeter is at this pressure, the hysteresis test shall commence. Pressure shall be increased

at a rate simulating a descent in altitude at the rate of 5,000 to 20,000 feet per minute until within 3,000 feet of the first test point (50 percent of maximum altitude). The test point shall then 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 II from the reading of the altimeter for the corresponding altitude recorded during the scale error test prescribed in paragraph (b)1.1.

1.3 After effect. Not more than 5 minutes after the completion of the hysteresis test prescribed in paragraph (b)(1.2), 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 in Table II.

1.4 Friction. The altimeter shall be subjected to a steady rate of decrease of pressure approximating 750 feet per minute. At each altitude listed in Table III, the change in reading of the pointers after vibration shall not exceed the corresponding tolerance listed in Table III.

1.5 Case leak. The leakage of the altimeter case, when the pressure within it correspond to an altitude of 18,000 feet, shall not change the altimeter reading by more than the tolerance shown in Table II during an interval of 1 minute.

1.6 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 IV, and shall cause the pointer to indicate the equivalent altitude difference shown in Table IV with a tolerance of 25 feet.

(2) 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 administrator.

(c) Automatic Pressure Altitude Reporting Equipment and ATC Transponder System Integration Test.

The test must be conducted by an appropriately rated person under the conditions specified in paragraph (a). 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 transponders perform their intended functions as installed in the aircraft. The difference between the automatic reporting output and the altitude displayed at the altimeter shall not exceed 125 feet.

(d) Records

Comply with the provisions of Clause 6 of this Notification as to content, form, and disposition of the records. The persons performing the altimeter tests shall record on the altimeter the date and maximum altitude to which the altimeter has been tested and the persons approving the airplane for return to service shall enter that data in the airplane log or other permanent record.

Table I

Altitude (feet)	Pressure (Bar)	Tolerance
-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	27.821	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	13.750	130
22,000	12.636	140
25,000	11.104	155
30,000	8.885	180
35,000	7.041	205
40,000	5.538	230
45,000	4.355	255
50,000	3.425	280

Table II

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 maximum altitude)	75
After Effect Test	30

Table III

Friction

Altitude (feet)	Tolerance
1,000	+/- 20
2,000	20
3,000	20
5,000	20
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 IV

Pressure – Altitude Difference

Pressure (inches of Hg)	Altitude Difference (feet)
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 E

ATC Transponder Test and Inspection

The ATC transponder tests required 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 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.

(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 1,000 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.

(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 -73+/- dbm by use of a test set either:

(1.1) Connected to the antenna end of the transmission line

(1.2) Connected to the antenna terminal of the transponder with a correction for transmission line loss
or

(1.3) Utilized radiated signal

(2) Verify that the difference in Mode 3/A and Mode C receiver sensitivity does not exceed 1 db 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 is within specifications for the class of transponder. Use the same conditions as described in (c)(1)(1.1)(1.2), and (1.3) above.

(1.1) For Class 1A and 2A ATCRBS transponders, verify that the minimum RF peak output power is at least 21.0 dbw (125 watts).

(1.2) For Class 1B and 2B ATCRBS Transponders, verify that the minimum RF peak output power is at least 18.5 dbw (70 watts).

(1.3) For Class 1A, 2A, 3A, and 4 and those Class 1B, 2B, and 3B Mode S transponder that include the optional high RF peak output power, verify that the minimum RF peak output power is at least 21.0 dbw (125 watts).

(1.4) For Class 1B, 2B, and 3B Mode S transponders, verify that the minimum RF peak output power is at least 18.5 dbw (70 watts).

(1.5) 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 on (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 non-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 Clause 7 and Clause 10 of this Notification.