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EXECUTIVE SUMMARY

In September 1994, the Federal Aviation Administration (FAA) assigned the Aviation Rulemaking Advisory Committee (ARAC) the task of reviewing Title 14, Code of Federal Regulations (14 CFR) parts 43 and 91, and supporting policy and guidance material, for the purpose of determining the FAA's course of action for rulemaking and/or policy related to the issue of general aviation aircraft inspection and maintenance. ARAC was instructed to consider ongoing initiatives affecting the general aviation industry that relate to inspection, maintenance, maintenance recordkeeping, research and development, age of current aircraft fleet, harmonization, cost of inspection versus maintenance, and changes in technology.

To support this task, ARAC developed a General Aviation Maintenance Working Group (GA Maintenance Working Group). The working group was instructed to review and update all major alterations, major repairs, and preventive maintenance items in appendix A to part 43; expand the scope and detail of appendix D to part 43 to include rotorcraft, balloons, and gliders; analyze and review appendixes E and F to part 43 for accuracy, taking into consideration the requirements of 14 CFR part 121; and make recommendations regarding the use of advisory circulars (ACs) as the site to publish data and procedures subject to change because of technical upgrades.

The working group worked independently on this task; however, several members also participated as members of other working groups tasked with projects of a similar subject matter or having a potential impact on this task.

In 1999 the GA Maintenance Working Group began coordinating joint meetings with the Clarification of Major/Minor Repairs or Alterations Working Group (Major/Minor Working Group). This group was established in 1994 by ARAC to review 14 CFR and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy related to the issue of acceptable and/or approved data. The Major/Minor Working Group also was asked to determine the feasibility of removing the words "major" and "minor" associated with the repair and alteration of aircraft, and to review the current definitions of maintenance, major and minor repair, and major and minor alteration.

After the two working groups held several joint meetings, the FAA, ARAC, and members of both working groups decided that the work pertaining to major repairs and major alterations, previously accomplished by the GA Maintenance Working Group as part of its review of appendix A to part 43, should be incorporated into the Major/Minor Working Group's document. The GA Maintenance Working Group submitted its recommendations concerning appendix A to part 43 to the Major/Minor Working Group on January 12, 2000.

In March 2000, the FAA met with members of ARAC and jointly requested that both working groups submit their work in technical report format rather than in proposed rule language. This report represents the work accomplished by the GA Maintenance Working Group.

Conclusions

The GA Maintenance Working Group concluded that—

- Many of the current part 43 requirements are not systematized.
- The lists of major repairs, major alterations, and preventive maintenance items do not entirely reflect the use of modern aircraft materials or current maintenance practices.
- Certain parts of the current rule are complex and difficult to understand, and are sometimes interpreted differently by aviation maintenance personnel.

Recommendations

As a result of its review of part 43, the GA Maintenance Working Group provides specific recommendations in this report that would—

- Restructure parts of the current rule using a more systematic approach. For example, the working group recommends revising the scope and detail of the annual and 100-hour inspection requirements and organizing the requirements in a manner that would delineate the scope of the inspection.
- Revise the appendixes to part 43 to update certain requirements. For example, the working group recommends removing the procedures for the conduct of altimeter and transponder tests and inspections from the current regulations and placing the procedures in advisory material. The working group believes the tests and inspections of this equipment should be published in the same manner as all other aircraft equipment tests and inspections. The working group also believes that removing the altimeter and transponder test and inspection procedures from the regulations would enable other, more appropriate standards to be applied by operators of complex modern equipment.
- Clarify the intent of the rule by simplifying the language and, when appropriate, rewriting the rule language in plain English. The working group recommends revising the manner in which major repairs are recorded by making the documentation requirements clearer and less burdensome on the aviation community. The major repair and major alteration documentation requirements should be included with the recordkeeping requirements for other maintenance actions.

SECTION 1: AVIATION RULEMAKING ADVISORY COMMITTEE TASKING

Originally, the General Aviation Maintenance Working Group (GA Maintenance Working Group) was tasked to—

- Review and update all major alterations, major repairs, and preventive maintenance items in appendix A to part 43 of Title 14, Code of Federal Regulations (14 CFR);
- Review appendix B to part 43 to (1) identify harmonization issues between 14 CFR and the regulations used in Canada and Europe, with regard to FAA Form 337, Major Repair and Alteration Form, requirements; (2) explain the scope and detail of FAA Form 8130–3, Airworthiness Approval Form; and (3) revise the maintenance release (yellow tag) statement;
- Expand the scope and detail of appendix D to part 43 to include rotorcraft, balloons, and gliders; and
- Analyze and review appendixes E and F to part 43 for accuracy, taking into consideration the requirements of 14 CFR part 121, and make recommendations regarding the use of advisory circulars (ACs) as the site to publish data and procedures subject to change because of technical upgrades.
- Review part 91, subpart E and examine alternative inspection programs for general aviation aircraft, antique aircraft, and restricted category aircraft.

In June 2000 the working group's task was revised to focus on the following areas:

- Appendixes A and B to part 43: Review major repairs, major alterations, and preventive maintenance items and provide support to the Aviation Rulemaking Advisory Committee (ARAC)'s Clarification of Major/Minor Repairs or Alterations Working Group (Major/Minor Working Group) regarding general aviation issues.
- Appendix D to part 43: Review the scope and detail of this appendix, including rotorcraft, balloons, and gliders, and make recommendations in a technical memorandum.
- Appendixes E and F to part 43: Review these appendixes for accuracy. Draft ACs as appropriate.
- Subpart E of part 91: Revise the draft notice of proposed rulemaking (NPRM) on alternative inspection programs for general aviation aircraft (not for hire), antique aircraft, and restricted category aircraft (aerial applicators, pipeline patrol, firefighting, and warbirds), as appropriate.

SECTION 2: GENERAL AVIATION MAINTENANCE WORKING GROUP

The FAA established ARAC in February 1991 to provide advice and recommendations to the Administrator concerning FAA rulemaking activity with respect to safety-related issues (56 FR 2190, January 22, 1991). Its charter was renewed most recently in Order 1110.119F, effective April 7, 2000. ARAC includes representatives of air carriers, manufacturers, general aviation, labor groups, colleges, universities, associations, airline passenger groups, and the general public.

In 1994, the ARAC subcommittee on air carrier/general aviation maintenance issues established the GA Maintenance Working Group (59 FR 49460, September 28, 1994). The working group's tasks included reviewing and updating all major alterations, major repairs, and preventive maintenance items in appendix A to part 43; expanding the scope and detail of appendix D to part 43 to include rotorcraft, balloons, and gliders; analyzing and reviewing appendixes E and F to part 43 for accuracy, taking into consideration the requirements of part 121; and making recommendations regarding the use of ACs as the site to publish data and procedures subject to change because of technical upgrades.

Membership List

The membership of the GA Maintenance Working Group consists of representation from the following organizations:

Aircraft Electronics Association (AEA)

Aircraft Owners and Pilots Association (AOPA)

Aeronautical Repair Station Association (ARSA)

Experimental Aircraft Association (EAA)

Federal Aviation Administration (FAA)

General Aviation Manufacturers Association (GAMA)

Helicopter Association International (HAI)

International Association of Machinists (IAM)

National Air Transportation Association (NATA)

National Business (NBAA)

Worldwide Aircraft Propeller Association (WAPA)

Professional Aviation Maintenance Association (PAMA)

Rockwell Collins

Transport Canada Civil Aviation Authority (Transport Canada)

War Birds of America

Worldwide Aviation Propeller Association (WAPA)

SECTION 3: ANALYSIS OF THE GA MAINTENANCE WORKING GROUP'S GENERAL RECOMMENDATIONS

Organizational Changes

The GA Maintenance Working Group recommends revising the appendixes to part 43 to clarify their intent and provide aviation maintenance personnel with a more systematic organization of their contents. Specifically, the working group recommends reorganizing the appendixes by grouping similar maintenance requirements by subject in the same area of the rule.

- Currently, part 43 has requirements for maintenance recordkeeping in § 43.9 and in appendix B to part 43. The working group recommends grouping the requirements for documenting major repairs and major alterations, currently found in appendix B to part 43, with the requirements for documenting maintenance, preventive maintenance, rebuilding, and alteration, currently found in § 43.9. The inclusion in § 43.9 of the regulatory requirements of appendix B to part 43 would eliminate the need for appendix B to part 43. The working group notes that having the requirements for recordkeeping in one section of the rule makes the rule easier to read and understand, and therefore more useful to the aviation maintenance community.
- The working group also recommends removing the requirement for Canadian Engineers (AMEs) to complete FAA Form 337 for major repairs and alterations from appendix B to part 43 and incorporating the requirement in § 43.17. The working group notes that having the requirements for AMEs in one section of the rule makes the rule easier to read and understand, and therefore more useful to the aviation maintenance community.

Major Repairs and Major Alterations

The GA Maintenance Working Group recommends revising the manner in which major repairs are recorded, making the documentation requirements clearer and less burdensome on the aviation community. The major repair and major alteration documentation requirements currently located in appendix B to part 43 should be included with the recordkeeping requirements for other maintenance actions.

The GA Maintenance Working Group also made several recommendations to the Major/Minor Working Group regarding appendix A to part 43. Those recommendations will be discussed in the Major/Minor Working Group's technical report.[1]

[1] The Transport Canada working group member requested that the following dissenting view be included in this report: "The Transport Canada member of the working group regrets that the proposed amendments to part 43 still use the same term (i.e., "major") to classify both the extent of a design change and the difficulty of a maintenance task, despite the completely different criteria involved. He considers that this will continue to create confusion, to the detriment of cross-border acceptance of aeronautical products and services. Taken together with other changes proposed by the Major/Minor Working Group, the potential now actually exists for more problems in the future than we have experienced in the past. Transport Canada continues to urge that data and work performance issues be treated separately."

100-Hour Inspection

The GA Maintenance Working Group recommends revising the scope and detail of the annual and 100-hour inspection requirements and organizing the requirements in a manner that would delineate the scope of the inspection.

Specifically, the working group recommends revising appendix D to part 43, "Scope and Detail of Items (as Applicable to the Particular Aircraft) to be Included in Annual and 100-Hour Inspections." The proposed changes to appendix D to part 43 are made largely to organize and better structure the appendix and to delete redundant language. The working group also recommends expanding and reorganizing the scope of appendix D to part 43 to include sections specifically for balloons and rotorcraft. The working group notes that the detail for the conduct of these inspections depends on the aircraft design, and therefore should be determined by the manufacturer's recommendations. The working group further recommends changes to the appendix to group the general and all-inclusive inspection of aircraft structures together and set forth the inspection requirements for each aircraft system in its own section. To condense the inspection requirements, the elements contained in § 43.15 that address specific inspection items should be moved to appendix D to part 43.

Testing Altimeters and Transponders

The working group also recommends the removal of the procedures for the conduct of altimeter and transponder tests and inspections from appendixes E and F to part 43 and the placement of these procedures in advisory material. The working group notes that the requirements for testing and inspecting the equipment would remain in §§ 91.411 and 91.413. However, the working group believes that the specific test and inspection procedures of this equipment should be published in the same manner as all other aircraft equipment tests and inspections: for instance, in aircraft or equipment manufacturing maintenance manuals or in FAA advisory material. The purpose of the working group's changes to §§ 91.411 and 91.413 is to reduce redundant language and simplify 14 CFR. The revisions are not meant to change the requirements to perform the tests and inspections of the equipment.

The recommendations in this report would remove and reserve appendixes E and F to part 43, the detailed maintenance procedures for testing and inspecting altimeter, static, and air traffic control (ATC) transponder systems. This information would be placed in a revision to AC 43–6, *Automatic Pressure Altitude Encoding Systems and Transponders Maintenance and Inspection Practices*, and AC 43–203, *Altimeter and Static System Tests and Inspections*. The working group proposes that this would allow the procedures to be updated more easily and would modernize the rule to permit the safe use of new technology. The working group also proposes that removing the specific procedures for maintaining this equipment from the appendixes would enable other, more appropriate standards to be applied by operators of complex modern equipment. The existing standards would still be available in the ACs for general aviation operators and other operators to whom they remain applicable.

Repair Station Documentation

In an effort to reduce paperwork requirements and to harmonize better with the rules used in other countries, the working group recommends standardizing the use of the term "approval for return to service" in place of a maintenance release.

Currently, repair stations are required in appendix B to part 43 to give the aircraft owner a separate maintenance release signed by an authorized representative of the repair station. The recommendation would require that the information currently found in the maintenance release be combined with the information on the work order. Therefore, a repair station would no longer need to provide a separate maintenance release after performing a major repair. The repair station instead would give the owner a signed copy of the work order, with an approval for return to service with respect to the work performed.

The group also recommends requiring that, if applicable, the total time in service of the aircraft when the work was performed be recorded in the maintenance entry on the appropriate document. By requiring persons performing maintenance on aircraft to record the aircraft time in service on the maintenance entry, the FAA would be able to document the time in service of the maturing U.S. aircraft fleet.

SECTION 4: THE WORKING GROUP'S SPECIFIC RECOMMENDATIONS

The GA Maintenance Working Group submits the following recommendations:

1. Revise the title of § 43.9 from "Content, form, and disposition of maintenance, rebuilding, and alteration records (except inspections performed in accordance with part 123, part 125, § 135.411(a)(1), and § 135.419 of this chapter)" to "Maintenance, preventive maintenance, rebuilding, and alteration records (except inspections performed in accordance with parts 91, 121, and 125 and §§ 135.411(a)(1) and 135.419 of this chapter)." The revised title would clarify the applicability of § 43.9, reflect the removal of an obsolete reference to part 123 (which was incorporated in part 125), and add a needed reference to part 121.

2. Add a new maintenance record requirement by adding a new paragraph (a)(4) to § 43.9 to read:

> (a)(4) The total time in service of the aircraft when the work was performed, if applicable;

This paragraph would assist the FAA in documenting the time in service of the maturing U.S. aircraft fleet by adding a requirement to record the date and time in service of the aircraft when the work was performed.

3. Separate the documentation requirements for a major alteration from the requirements for a major repair. The working group recommends listing the recording requirements currently found in appendix B to part 43 in a separate and new paragraph under § 43.9(b) and (c).

4. Remove the requirement in current appendix B to part 43 for a repair station to provide an aircraft owner a separate maintenance release after the completion of a major repair. The working group notes that the information previously found on the maintenance release would be incorporated into the work order. The new paragraph would be designated § 43.9(d) and would read as follows:

> (d) Repair stations. Except for instrument repair and calibration, radio calibration, and major repairs made in accordance with a manual or specifications acceptable to the Administrator, a certificated repair station may, in place of paragraph (c)—
>
> (1) Use the customer's work order upon which the repair is recorded; and
>
> (2) Give the owner or operator a copy of the work order signed by an authorized representative of the repair station and retain a duplicate copy for at least 2 years from the date of approval for return to service. The work order must—

(i) Identify the aircraft, airframe, aircraft engine(s), propeller, or appliance;

(A) If an aircraft, include the make, model, serial number, nationality, and registration marks, as applicable, and the location of the repaired area;

(B) If an airframe, aircraft engine(s), propeller, or appliance, include the manufacturer's name of the part, model, part number, and serial number (if any); and

(ii) Include the following or similarly worded statement: "The aircraft, airframe, aircraft engine, propeller, appliance, component, or part (as applicable) identified above was repaired and inspected in accordance with current regulations of the FAA and is approved for return to service with respect to the work performed. Pertinent details of the repair are on file at this repair station under Order No. _____

Date signed _____

(Signature of authorized repair station representative)

(Repair station name) (Certificate number)

(Address of repair station)."

4. Relocate the requirements currently found in appendix B to part 43, paragraph (d) on major repairs or major alterations on extended range fuel tanks to § 43.9, with organizational and editorial changes to clarify the intent of the current rule. The revised paragraph should read as follows:

(e) Extended-Range Fuel Tanks. For extended-range fuel tanks installed within the passenger compartment or a baggage compartment, a person who performs a major repair or major alteration, and the person authorized to approve the work performed in these areas by § 43.7 of this part, must execute an FAA Form 337 in at least triplicate. FAA Form 337 must be distributed as follows:

(1) Give the original form to the aircraft owner;

(2) Place one copy on board the aircraft; and

(3) Forward a copy of the form to the local FSDO within 48 hours after the aircraft, airframe, aircraft engine, propeller, or appliance is approved for return to service.

5. Relocate the requirements currently found in § 43.9 (b) and (c) to § 43.9 (f) and (g), respectively. In addition, make editorial changes to reflect the removal of an obsolete reference to part 127 (paragraph (b)) and the addition of the reference to part 121 (paragraph (c)). The new paragraphs would read as follows:

> (f) Holders of operating certificates. Each holder of an air carrier operating certificate or an operating certificate issued under part 121 or part 135 that is required by its approved operations specifications to provide a continuous airworthiness maintenance program must make a record of the maintenance, preventive maintenance, and alteration on the aircraft, airframes, aircraft engine, propeller, appliances, components or parts it operates in accordance with the applicable provisions of part 121 or part 135 of this chapter, as appropriate.
>
> (g) Inspections. This section does not apply to persons performing inspections in accordance with parts 91, 121, or 125, or §§ 135.411 (a)(1) or 135.419 of this chapter.

6. Remove current paragraphs (b), (c)(2), and (c)(3) from § 43.15 and incorporate them into appendix D to part 43. This change would group these paragraphs with the other paragraphs addressing specific inspection items. Section 43.15 should contain only the requirements on performance rules for inspection programs, annual and 100-hour inspections, and progressive inspections. The revised section would read as follows:

> § 43.15 Additional performance rules for inspections.
>
> (a) Inspection programs.
>
> (1) Each person performing an inspection required by parts 91, 121, 125, or 135 of this chapter must perform the inspection so as to determine whether the aircraft, or portion(s) thereof under inspection, meet all applicable airworthiness requirements; and
>
> (2) Each person performing an inspection required by parts 91, 121, 125, or 135 or § 91.409(e) of this chapter must perform the inspection in accordance with the instructions and procedures set forth in the inspection program for the aircraft being inspected.
>
> (b) Annual and 100-hour inspections. Each person performing an annual or 100-hour inspection must use a checklist while performing the inspection. The checklist may be one of the person's own design, one provided by the manufacturer of the equipment being inspected, or one obtained from another source. This checklist must include the scope of the items contained in appendix D to this part.

(c) Progressive Inspection.

(1) Each person performing a progressive inspection must, at the start of a progressive inspection system, inspect the aircraft completely. After the initial inspection, routine and detailed inspections must be conducted as prescribed in the progressive inspection schedule. Routine inspections must consist of visual examinations or checks of the appliances, the aircraft, and its components and systems, with disassembly as necessary. For purposes of this paragraph, the overhaul of a component or system is considered a detailed inspection.

(2) If the aircraft is away from the station where inspections normally are conducted, an appropriately rated mechanic, a certificated repair station, 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.

7. Add a new paragraph to § 43.17, "Maintenance, preventive maintenance, and alterations performed on U.S. aeronautical products by certain Canadian persons," containing the information in the current paragraph (c) of appendix B to part 43.

8. Remove and reserve appendix B to part 43, "Recording of Major Repairs and Major Alterations." As previously discussed, the content and requirements of appendix B would be included in §§ 43.9 and 43.17 in their entirety, except for removing the requirement in paragraph (b) of appendix B to part 43 for a certificated repair station to provide a separate maintenance release after a major repair or major alteration. The information contained on the maintenance release should be incorporated into the repair station work order.

9. Revise and restructure appendix D to part 43 to address specific classes of aircraft.

The language "Scope and Detail of Items" in the title of appendix D to part 43 should be revised to "Scope of Items." The working group maintains that the list should identify the scope of the inspection, but that the detail would depend on the aircraft design and should be determined by the manufacturer's recommendations.

As stated earlier, the elements contained in § 43.15 that address specific inspection items should be transferred to appendix D to part 43. Section 43.15 should require compliance with appendix D to part 43. The working group also recommends clarifying the rule by listing all scheduled inspection items in the same place.

The original paragraph (a) of appendix D to part 43 should be revised to—

- Add propeller spinners so that an inspection of the propeller hub can be accomplished, and

- Remove the words "and aircraft engine" related to cleaning the aircraft. This would reduce redundancy because the engine is part of the aircraft, and therefore already requires cleaning as such.

The current paragraphs (b) through (j) of appendix D to part 43 group the components as follows:

- Fuselage and hull;
- Cabin and cockpit;
- Engine and nacelle;
- Landing gear;
- Wing and center section;
- Empennage assembly;
- Propeller; and
- Radio.

To provide a systematic approach to the inspection procedure, the proposed rule would group the systems instead of components as follows:

- Brakes;
- Electrical;
- Environmental;
- Exhaust;
- Flight control;
- Fuel;
- Hydraulic;
- Ice protection;
- Ignition;
- Induction;
- Avionics;
- Landing gear;
- Powerplant;
- Propeller;
- Other systems; and
- Miscellaneous.

10. Remove appendixes E and F from part 43. The information contained in those appendixes should be placed in the current version of AC 42–203 and AC 43–6, where appropriate.

11. In § 91.411, "Altimeter system and altitude reporting equipment tests and inspections":

- Remove the references to appendix E to part 43. The information currently in that appendix should be incorporated into AC 43–203C, *Altimeter and Static System Tests and Inspections.*
- Remove the current paragraph (b) of § 91.411 and incorporate it in AC 43–203C. The working group believes the revision does not change the requirement for persons conducting tests and inspections on altimeters to be properly rated or certificated. The working group believes those requirements are currently found in parts 43, 65, and 145.

12. In § 91.413, "ATC transponder tests and inspections":

- Remove the references to appendix F to part 43. The information currently in that appendix would be incorporated into AC 43–6B, *Automatic Pressure Altitude Encoding Systems and Transponders Maintenance and Inspection Practices.*
- Remove the reference to part 127 from paragraph (a). Part 127 was removed by Amendment No. 127–45 (60 FR 65832, December 20, 1995).
- Remove paragraph (c) and incorporate it in AC 43–203C. The working group believes the revision does not change the requirement that persons conducting tests and inspections on altimeters must be properly rated or certificated. The working group believes those requirements are currently found in parts 43, 65, and 145.

APPENDIX 1: Recommended Rule Language

PART 43—MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATIONS

1. The authority citation for part 43 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44703, 44705, 44707, 44711, 44713, 44717.

2. Revise 43.9 to read as follows:

§ 43.9 Maintenance, preventive maintenance, rebuilding, and alteration records (except inspections performed in accordance with part 91, part 121, part 125, §§ 135.411(a)(1) and 135.419 of this chapter).

(a) Maintenance record entries. Except as provided in paragraphs (f) and (g) of this section, each person who maintains, performs preventive maintenance, rebuilds, or alters an aircraft, airframe, aircraft engine, propeller, appliance, component, or part must make an entry in the maintenance record of that item and provide that record to the owner or operator. The entry must be in English or retrievable in the English language. The entry may be made in a logbook, on a Major Repair and Alteration Form (FAA Form 337), on an Airworthiness Approval Tag (FAA Form 8130-3), or in any other manner acceptable to the Administrator. The entry must contain the following information:

(1) The name of the person performing the work, if other than the person specified in paragraph (a)(5) of this section;

(2) A description of the work performed including a reference to any acceptable or approved data used to perform the work and a description of compliance with an airworthiness directive and the method of compliance;

(3) The date of completion of the work performed;

(4) The total time in service of the aircraft when the work was performed, if applicable; and

(5) If the work has been performed satisfactorily, the name, signature, certificate number, and type of certificate held by the person approving the work. The signature constitutes the approval for return to service only for the work performed.

(b) Major alterations. The maintenance record entry for documenting a major alteration must include a specific description of the work performed including a reference to approved technical data. Except as provided in paragraph (e) of this section, each person performing a major alteration must—

(1) Execute FAA Form 337 in duplicate at least;

(2) Give the original FAA Form 337 to the aircraft owner; and

(3) Forward a copy of FAA Form 337 to the local Flight Standards District Office (FSDO) within 48 hours after the aircraft, airframe, aircraft engine, propeller, appliance, component or part is approved for return to service;

(c) Major repairs. The maintenance record entry for documenting a major repair must include a specific description of the work performed including a reference to approved data or data developed under Special Federal Aviation Regulations (SFAR) No. 36. Except as provided in paragraphs (d) and (e) of this section, each person performing a major repair must execute FAA Form 337 and provide it to the owner or operator.

(d) Repair stations. Except for instrument repair and calibration, radio calibration, and major repairs made in accordance with a manual or specifications acceptable to the Administrator, a certificated repair station may, in place of paragraph (c)—

(1) Use the customer's work order upon which the repair is recorded; and

(2) Give the owner or operator a copy of the work order signed by an authorized representative of the repair station and retain a duplicate copy for at least 2 years

from the date of approval for return to service. The work order must—

(i) Identify the aircraft, airframe, aircraft engine(s), propeller, or appliance;

(ii) If an aircraft, include the make, model, serial number, nationality and registration marks, as applicable, and the location of the repaired area;

(iii) If an airframe, aircraft engine(s), propeller, or appliance, include the manufacturer's name of the part, model, part number, and serial number (if any); and

(iv) Include the following or similarly worded statement: "The aircraft, airframe, aircraft engine, propeller, appliance, component, or part (as applicable) identified above was repaired and inspected in accordance with current regulations of the FAA and is approved for return to service with respect to the work performed. Pertinent details of the repair are on file at this repair station under Order No. _____

Date signed _____

_____

(Signature of authorized repair station representative)

_____

(Repair station name) (Certificate number)

(Address of repair station)."

(e) Extended-Range Fuel Tanks. For extended-range fuel tanks installed within the passenger compartment or a baggage compartment, a person who performs a major repair or major alteration, and the person authorized to approve the work done in these areas, by § 43.7 of this part, must execute an FAA Form 337 in at least triplicate. FAA Form 337 must be distributed as follows:

(1) Give the original form to the aircraft owner;

(2) Place one copy on board the aircraft; and

(3) Forward a copy of the form to the local FSDO within 48 hours after the aircraft, airframe, aircraft engine, propeller, or appliance is approved for return to service.

(f) Holders of operating certificates. Each holder of an air carrier operating certificate or an operating certificate issued under part 121 or part 135 that is required by its approved operations specifications to provide a continuous airworthiness maintenance program must make a record of the maintenance, preventive maintenance, and alteration on the aircraft, airframes, aircraft engine, propeller, appliances, components or parts it operates in accordance with the applicable provisions of part 121 or part 135 of this chapter, as appropriate.

(g) Inspections. This section does not apply to persons performing inspections in accordance with parts 91, 121, or 125; or §§ 135.411 (a)(1) or 135.419 of this chapter.

3. Revise § 43.15 to read as follows:

§ 43.15 Additional performance rules for inspections.

(a) Inspection programs.

(1) Each person performing an inspection required by parts 91, 121, 125, or 135 of this chapter must perform the inspection so as to determine whether the aircraft, or portion(s) thereof under inspection, meet all applicable airworthiness requirements; and

(2) Each person performing an inspection required by parts 91, 121, 125, 135, or § 91.409(e) of this chapter must perform the inspection in accordance with the instructions and procedures set forth in the inspection program for the aircraft being inspected.

(b) Annual and 100-hour inspections. Each person performing an annual or 100-hour inspection must use a checklist while performing the inspection. The checklist may be of the person's own design, one provided by the manufacturer of the equipment being inspected, or one obtained from another source. This checklist must include

the scope of the items contained in appendix D to this part.

(c) Progressive Inspection.

(1) Each person performing a progressive inspection must, at the start of a progressive inspection system, inspect the aircraft completely. After the initial inspection, routine and detailed inspections must be conducted as prescribed in the progressive inspection schedule. Routine inspections must consist of visual examinations or checks of the appliances, the aircraft, and its components and systems, with disassembly as necessary. For the purposes of this paragraph, the overhaul of a component or system is considered to be a detailed inspection.

(2) If the aircraft is away for the station where inspections normally are conducted, an appropriately rated mechanic, a certificated repair station, 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.

4. Add paragraph (e)(3) to § 43.17 to read as follows:

§ 43.17 Maintenance, preventive maintenance, and alterations performed on U.S. aeronautical products by certain Canadian persons.

* * * * *

(e) * * *

(3) A person who performs a major repair or major alteration and the person authorized to approve that work under the provisions of this section must execute a Major Repair and Alteration Form (FAA Form 337), at least in duplicate. A completed copy of that form must be—

(i) Given to the aircraft owner; and

(ii) Forwarded to the Federal Aviation Administration, Aircraft Registration Branch, Post Office Box 25082, Oklahoma City, Oklahoma 73125, within 48 hours after the work is inspected.

* * * * *

5. Amend appendix A to part 43 to revise paragraphs (b) and (c) to read as follows:

Appendix A to part 43, Major alterations, major repairs, and preventive maintenance

* * * * *

(b) * * *

(1) 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, welding, or bonding, are airframe major repairs.

(xxi) The repairs involving substitution of materials and/or hardware design.

(xxii) The repair of a damaged area in stressed coverings made of metal or plywood where the damaged area exceeds 6 inches.

(xxiii) The repair of a damaged area in a composite or chemically milled structure.

(xxiv) * * *

(xxix) The repair of a removable or integral fuel tank or oil tank.

(xxx) Any repair to a damaged bulkhead in a pressurized hull.

(2) * * *

(i) Assembly of a crankcase or crankshaft of a reciprocating engine equipped with an integral supercharger.

(ii) Assembly of a crankcase or crankshaft of a reciprocating engine equipped with other than spur-type propeller reduction gearing.

(iii) The repair of a structural engine part by any method other than those contained in the manufacturer's instructions for continued airworthiness.

(3) Propeller and Governor major repairs. Repairs of the following types, excluding the treatment of corrosion and application of protective coatings, are major repairs:

(i) Repair of a steel hub or blade.

(ii) Straightening or shortening of blades.

(iii) Retipping and/or replacement of tip fabric of wood blades and fixed-pitch wood propellers.

(iv) Replacement of plastic covering and/or repairs to wood composition blades.

(v) Replacement of outer laminations or inlay work on wood blades and fixed-pitch wood propellers.

(vi) Repair of elongated bolt holes in the hub of fixed-pitch wood propellers.

(vii) Repair of a composite blade beyond the manufacturer's recommendations for field repair.

(viii) Repair of propeller governors, excluding external RPM adjustments.

(ix) Overhaul of controllable pitch propellers.

(x) Repairs such as deep dents, cuts, scratches, scars, and nicks in aluminum blades.

(vii) Any nonstructural cover plates.

(10) Applying preservative or protective material to components or parts.

(11) Making small fabric repairs to a balloon envelope not requiring load tape repair or replacement.

(12) Making small simple repairs to fairings, cowlings, and small patches and reinforcements not changing the contour so as to interfere with proper air flow.

(13) Replacing the side windows on nonpressurized aircraft, where the work does not interfere with the structure or any operating system, for example, controls and electrical equipment.

(14) Replacing seats, restraint belts, or seat parts.

(15) Replacing bulbs, reflectors, or lenses of position and landing light components.

(16) Replacing wheels with skis or skis with wheels, where no weight and balance computation is involved.

(17) Replacing any cowling not requiring removal of the propeller or disconnection of flight controls.

(18) Replacing or cleaning spark plugs and setting the spark plugs gap clearance.

(19) Replacing any hose connection, except hydraulic connections.

(20) Replacing prefabricated fuel lines.

(21) Cleaning or replacing fuel and oil strainers or filter elements or changing engine oil.

(22) Replacing nickel cadmium (NICAD) or lead-acid batteries and servicing lead-acid batteries.

(23) Cleaning the balloon-burner pilot and main nozzles.

(24) Replacement or adjustment of nonstructural standard fasteners.

(25) The interchange of balloon baskets and burners on envelopes when specifically designed for quick removal and installation.

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

(27) The inspection and maintenance tasks prescribed and identified specifically as preventive maintenance in a primary category aircraft type certificate or supplemental type certificate holder's approved special inspection and preventive maintenance program when accomplished on a primary category aircraft provided the inspection and maintenance tasks are:

(i) Performed by the holder of at least a private pilot certificate issued under 14 CFR part 61 of this chapter who is the registered owner (including co-owners)

of the affected aircraft and who holds a certificate of competency for the affected aircraft issued by—

(1) A school approved under 14 CFR § 147.21(e) of this chapter;

(2) The holder of the production certificate for that primary category aircraft that has a special training program approved under 14 CFR § 21.24 of this subchapter; or

(3) Another entity that has a course approved by the Administrator; and

(ii) Performed in accordance with instructions contained in the special inspection and preventive maintenance program approved as part of the aircraft's type design or supplemental type design.

(28) Removing and replacing self-contained, front instrument panel-mounted navigation and communication devices that use tray-mounted connectors to connect the unit to 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. Before the unit's intended use, an operational check must

be performed in accordance with the applicable sections of part 91 of this chapter.

(29) Updating self-contained, front instrument panel-mounted air traffic control navigational software data bases (excluding those for automatic flight control systems, transponders, and microwave frequency DME) provided no disassembly of the unit is required and pertinent instructions are provided. Before the unit's intended use, an operational check must be performed in accordance with applicable sections of part 91 of this chapter.

6. Appendix B to part 43 is removed and reserved.

Appendix B to part 43—[Removed and reserved.]

7. Revise appendix D to part 43 to read as follows:

Appendix D—Scope of items (as applicable to the particular aircraft) to be included in annual and 100-hour inspection

Any person approving an aircraft for return to service following an annual or 100-hour inspection must, before that inspection, have all necessary inspection plates, access doors, fairings, cowlings, and propeller spinners removed or open for inspection. That person must ensure the aircraft has been cleaned thoroughly.

I. Aircraft other than a balloon.

A. Aircraft structures. Each person approving an aircraft for return to service following an annual or 100-hour inspection must, as applicable, inspect the following structures for corrosion, debonding, exposure, delamination, erosion, distortion, evidence of failure, insecure attachment of fittings, missing parts or components, loose or missing fasteners, evidence of improper torque, improper safetying, leakage, stains, cracks, chafing, excessive wear, improper travel, binding, and general condition:

1. Cabin and cockpit (including seats and restraint systems);

2. Doors, windows, and windscreens, including emergency exits;

3. Engine nacelle and mounts;

4. Fairings and cowlings;

5. Landing gear;

6. Propeller;

7. Empennage;

8. Wing; and

9. Fabric and skin.

B. Aircraft systems. Each person approving an aircraft for return to service following an annual or 100-hour inspection must inspect the following systems, as applicable:

1. Brake.

a. Discs, drums and linings for excessive wear and cracks;

b. Hydraulic lines for wear, cracks, leaks, and security of attachment; and

c. Master/wheel cylinders for leakage.

2. Electrical.

a. Battery for corrosion, improper installation, and improper charge;

b. Interior and exterior lighting for operation;

c. Fuses, circuit breakers, switches for improper operation; and

d. Wiring and conduits for improper routing, insecure mounting, and obvious defects.

3. Environmental.

a. Heating ducts and heating system for leakage, cracks, distortion, stains, security, and general condition;

b. Cooling system for leakage, cracks, distortion, stains, security, and general condition;

c. Ventilation system for obstruction and general condition; and

d. Controls for secure mounting, operation, restricted travel, binding, and wear.

4. Exhaust.

a. Stacks and muffler for cracks, defects, leakage, distortion, and security; and

b. Turbocharger/controller for cracks, defects, leakage, distortion, and security.

5. Flight control.

a. Autopilot for security and general condition; and

b. Control surfaces for improper rigging, damage, corrosion, and operation.

6. Fuel.

a. Filters, sumps, and drains for leakage and contamination;

b. Lines, tanks, and selectors for chafing, leakage, security, deterioration, corrosion, and operation; and

c. Pumps for leakage, security of attachment, and improper operation.

7. Hydraulic.

a. Filters for leakage and contamination;

b. Lines and tanks for chafing, leakage, security, deterioration, corrosion, and operation; and

c. Pumps for leakage, security of attachment, and improper operation.

8. Ice protection.

a. Airframe boots for improper attachment, deterioration, and debonding;

b. Windshield deicing/anti-icing for improper operation and attachment;

c. Pitot-static heat for improper operation;

d. Propeller/rotor blade ice control systems for improper operation;

(1) Propeller boots, harnesses, and alcohol feed tubes for deterioration, and debonding; and

(2) Propeller slip rings, brush blocks, and harnesses for excessive wear.

9. Ignition.

a. Ignition system for proper timing and operation;

b. Harness for chafing, deterioration, and general condition; and

c. Spark plugs for wear and general condition.

10. Induction.

a. Carburetor/fuel injection unit for leakage and security;

b. Intake manifold for cracks, leakage, and security;

c. Air box for cracks, chafing, and loose or missing fasteners; and

d. Air filter for blockage, cleanliness, proper seal, and general condition.

11. Avionics.

a. Radio and electronic equipment for security and proper mounting;

b. Wiring and conduits for improper routing, insecure mounting, and obvious defects;

c. Bonding and shielding for improper installation and poor condition;

d. Antennas for poor condition and insecure mounting;

e. Static wicks for bonding and security; and

f. Emergency locating transmitter for security and battery life.

12. Landing gear.

a. Retraction system for rigging, chafing, and abnormal wear;

b. Emergency extension system for rigging and proper operation;

c. Shock absorbing devices for leakage, abnormal wear, and deterioration;

d. Wheels and tires for cracks, distortion, improper pressure, deterioration, and abnormal wear;

e. Floats, skids, cross tubes, and skis for cracks, deterioration, and corrosion;

f. Landing gear doors for cracks, distortion, corrosion, and rigging; and

g. Wheel bearings for abnormal wear, water spots, and general condition.

13. Powerplant.

a. Engine combustion chamber for proper compression;

b. Oil filters, screens, and sump drains for leakage and contamination;

c. Engine mount for cracks, corrosion, improper attachment, and chafing;

d. Flexible vibration dampers for deterioration and general condition;

e. Lines, hoses, and clamps for leakage, routing, chafing, and security;

f. Baffles for cracks, condition of rubber seal, and security; and

g. Engine controls for security, rigging, wear, binding, and proper operation.

14. Propeller.

a. Propeller hub, spinner, and bulkhead assembly for interference, insecurity, deterioration, and other defects;

b. Hub assembly for interference, insufficient protective coating, and other defects;

c. Hub lubricant for insufficient quantity and contamination from moisture;

d. Blades for evidence of lightning strike, object strike, excessive movement, insufficient protective coating, and other defects; and

e. Control mechanism for improper operation, insecure mounting, binding, wear, and restricted travel of the linkage hardware.

15. Other systems.

a. Instruments for security and markings, and placarding, as appropriate;

b. Vacuum system for blockage, cleanliness of filters, condition of hoses, and general condition; and

c. Pitot/static system for blockage and general condition.

16. Miscellaneous.

a. Inspect each installed miscellaneous item that is not otherwise covered by this listing for improper installation and improper operation.

C. Rotorcraft. In addition to the applicable requirements of section B of this appendix, rotorcraft must have the following items inspected:

1. Drivetrain.

a. Mast for condition;

b. Transmission for condition;

c. Transmission oil screen/filter for contamination;

d. Transmission magnetic chip plug for operation;

e. Transmission mount for condition;

f. Engine to transmission driveshaft for condition;

g. Freewheel unit/overrunning clutch for condition and operation;

h. Freewheel unit/overrunning clutch magnetic chip plug for operation;

i. Tail rotor driveshaft/mount for condition;

j. Tail rotor drive intermediate gearbox magnetic chip plug for operation;

k. Tail rotor drive intermediate gearbox for condition;

l. Tail rotor gearbox for condition; and

m. Tail rotor gearbox magnetic chip plug for operation.

2. Main rotor.

a. Swashplate for condition and smooth rotation;

b. Pitch links for condition;

c. Hub for condition; and

d. Blades for condition and corrosion.

3. Tail rotor for condition.

a. Pitch change mechanism for condition;

b. Hub for condition; and

c. Blades for condition and corrosion.

D. Operational checks. Each person approving an aircraft, other than a balloon, for return to service following an annual or 100-hour inspection must perform the following checks to determine satisfactory performance in accordance with the manufacturers recommendations:

1. Engine/rotor run up to ensure proper operation;

2. Propeller functional check to ensure proper operation;

3. Control surfaces for freedom and direction of movement;

4. Ice control system for proper operation;

5. Aircraft systems for proper operation;

6. Emergency locator transmitter for proper operation;

7. Communication and navigation systems for proper operation; and

8. All instrumentation for proper operation.

II. Balloons.

A. Balloon structures. Each person approving a balloon for return to service following an annual or 100-hour inspection must inspect the following items as indicated:

1. Envelope and top.

a. Envelope and top for evidence of over temperature;

b. Fabric for unrepaired damage, burns, tears, holes, and abrasions;

c. Repairs for compliance per manufacturer's specifications;

d. Fabric for strength and porosity;

e. Seams, stitching, webbing, and ropes for general condition;

f. Temperature sensor and lead for general condition;

g. Gore lines for integrity, fraying, and general condition; and

h. Attachments (anchor loops, velcro, etc.) for improper installation and general condition.

2. Suspension.

a. Cables and cords for fraying, kinks, discoloration, and broken strands;

b. Envelope and basket for improper attachment; and

c. Cables, ropes and tubes in basket for general condition.

3. Burner.

a. Burner for cracks and structural integrity;

b. Frame for corrosion and general condition;

c. Preheat coils and fittings for cracks and general condition;

d. Blaster, auxiliary, and pilot valves for improper operation; and

e. Pressure gauge for integrity.

4. Fuel system.

a. Hoses for leaks, proper routing, abrasions, and pressure test;

b. Valves and regulators for damage, security, operation and pressure test;

c. Tanks and straps for integrity and liquid level gauge for improper operation; and

d. Fittings for security.

5. Baskets.

a. Gondola assembly, including welds for structural integrity;

b. Wicker for damage, holes, and general condition;

c. Fuel tank mooring for security and damage; and

d. Bolts, nuts, and pins for security and corrosion.

6. Instruments.

a. Instruments for improper operation, security, attachment, and markings.

B. Operational checks. Each person approving a balloon for return to service following an annual or 100-hour inspection must perform operational checks of the following items:

a. Ignition system;

b. Fuel system;

c. Pilot light;

d. Burner; and

e. Auxiliary and redundant system

8. Remove and reserve appendixes E and F to part 43.

Appendix E to part 43—[Removed and reserved.]

Appendix F to part 43—[Removed and reserved.]

PART 91 - GENERAL OPERATING AND FLIGHT RULES

9. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(g), 1155, 40103, 40113, 40120, 44101, 44111, 44701, 44709, 44711,44712, 44715, 44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506-46507, 47122, 47508, 47528-47531.

10. Revise § 91.411 to read as follows:

§ 91.411 Altimeter system and altitude reporting equipment tests and inspections.

(a) No person may operate an aircraft, in controlled airspace under instrument flight rules, unless–

(1) Each static pressure system, each altimeter instrument, and each automatic pressure altitude reporting system has been tested and inspected within the preceding 24 calendar months according to methods, techniques, and practices of an inspection program acceptable to the Administrator and found to comply with the requirements of that inspection program.

(2) Except for the opening and closing of system drain and alternate static pressure valves, following any opening and closing of the static pressure system, that system has been tested and inspected according to methods, techniques, and practices of an inspection program acceptable to the Administrator and found to comply with the requirements of that inspection program.

(3) Following installation or maintenance on the automatic pressure altitude reporting system of the ATC transponder where data correspondence error could be

introduced, the integrated system has been tested and inspected and according to methods, techniques, and practices of an inspection program acceptable to the Administrator and found to comply with the requirements of that inspection program.

(b) Any altimeter and altitude reporting equipment approved under a technical standard order is considered to be tested and inspected as of the date of its manufacture.

(c) No person may operate an aircraft in controlled airspace, under instrument flight rules, at an altitude above the maximum altitude at which all altimeters and the automatic altitude reporting system of that aircraft was tested.

11. Revise § 91.413 to read as follows:

§ 91.413 ATC transponder tests and inspections.

(a) No person may use an air traffic control transponder that is specified in § 91.215(a), § 121.345(c), or § 135.143(c) of this chapter unless within the preceding 24 calendar months, that ATC transponder has been tested and inspected according to methods, techniques, and practices of an inspection program acceptable to the Administrator and found to comply with the requirements of that inspection program.

(b) Following any installation or maintenance on an ATC transponder where data correspondence error could be introduced, the integrated system has been tested and inspected according to methods, techniques, and practices of an inspection program acceptable to the Administrator and found to comply with the requirements of that inspection program.

Issued in Washington, DC, on

APPENDIX 2: Draft AC 43–203

DRAFT

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Altimeter and Static System Tests and Inspections	**Date:** 2/4/99 **Initiated by:** AFS-300	**AC No:** 43-203C **Change:**

1. PURPOSE. This advisory circular (AC) provides information and guidance concerning acceptable means, but not the only means for testing altimeters and static systems. It also provides general information concerning the test equipment that should be used and precautions that should be taken when performing such tests. This revision clarifies the intent of testing, incorporates the information formerly found in Appendix E to Part 43, and updates the material and includes guidance on testing methods that can be used on the advanced air data equipment found in today's aircraft.

2. EFFECTIVE DATE. TO BE DETERMINED.

3. CANCELLATION. AC 43-203B, dated June 29, 1979, is canceled.

4. RELATED MATERIAL.

a. Sections 23.1325, 25.1325, 27.1325, 29.1325, 43.3, 43.5, 43.9, 91.213, 91.215, 91.411, and 145.4 of Title 14, Code of Federal Regulations (14 CFR).

b. AC 43-2B, Minimum Barometry for Calibration and Test of Atmospheric Pressure Instruments.

5. GENERAL.

a. Aircraft flying in controlled airspace under instrument flight rules are required by § 91.411 to have altimeter and static system tests.

b. Manufacturer's instructions for continued airworthiness acceptable to the Administrator may be used to test and inspect altimeter and static systems.

c. The static pressure systems should be tested and checked following any opening and closing of the static pressure system, except for the use of system drain and alternate static pressure valves. Following installation or maintenance on the automatic pressure altitude reporting system of the air traffic control (ATC) transponder where data correspondence error could be introduced, the integrated system should be tested and inspected.

d. All persons conducting altimeter tests should receive specialized training in the performance of the test and in proper use of the test equipment. The tests required by § 91.411 and the tests described above should be conducted by—

(1) The manufacturer of the aircraft on which the tests and inspections are to be performed;

(2) A certificated repair station properly equipped to perform those functions and holding at least one of the following:

(i) A Class I instrument rating.

(ii) A limited instrument rating appropriate to the make and model of altimeter to be tested.

(iii) A limited rating appropriate to the test to be performed.

(iv) An airframe rating appropriate to the aircraft to be tested.

(v) A limited rating for a manufacturer issued for the appliance in accordance with § 145.101(b)(4).

(3) A certificated and appropriately rated aircraft mechanic.

(4) A holder of a maintenance program as provided in 14 CFR part 121 or 14 CFR § 135.411(a)(2).

6. STATIC PRESSURE SYSTEM TEST PRECAUTIONS. A person conducting a static system pressure test should take the following precautions during static system tests:

a. Before any static system is tested, it should be determined that the design limits of the instruments attached to it will not be exceeded during the test. To determine this, it is necessary to locate and identify all instruments attached to the system. In addition to the altimeter, airspeed indicator, and rate of climb indicator, many airplanes use static pressure for the operation of autopilots, flight recorders, air data computers, altitude reporting digitizers, and other equipment. The use of a current static system diagram of the airplane involved may be helpful in locating all of the instruments. If a current diagram is not available, the instruments can be located by physically tracing the system.

b. Damage can occur to instruments connected to both the static system and pitot system when only the static system is evacuated. This procedure could result in exceeding the maximum design differential pressure of these instruments. One method to prevent this type of damage is to link the pitot and static systems when conducting static system checks. This should result in zero differential pressure regardless of the degree of static system evacuation. It should be noted that a leak in either system will be indicated on a test set.

c. Avoid disconnecting the test equipment plumbing from the aircraft or the test equipment while the static system is evacuated. The resultant sudden pressure change may damage both the test instruments and the aircraft instruments.

d. If blockage of the static lines is suspected, the lines should be purged before the static pressure system test is performed. Besides the obvious benefits of removing foreign objects from the lines, purging may keep such objects from entering the test equipment. Because

purging applies positive pressure to lines, the following precautions should be taken:

(1) Disconnect all instruments and air data sensors.

(2) Cap lines not being purged.

(3) Restrain hoses, which can whip because of purge pressure.

(4) Ensure lines are clear by feeling the discharge pressure at ports.

(5) Clean system drains and traps after purging the system, because they can act as a sump for foreign material.

7. STATIC PRESSURE SYSTEM TEST. Performance of a static pressure system test with all of the static instruments connected to the system will ensure that leaks have not been introduced at instrument connection points. Compliance with the requirements in § 91.411, governing the testing of altimeter and static systems, may be demonstrated by adherence to the following procedure when conducting a static pressure system test:

a. Visually inspect the ports, plumbing, accessories, and instruments connected to the static system and repair or replace those parts that are defective; for example, broken "B" nuts, cracked flare sleeves, deteriorated flexible tubing, or bad valves. Ensure there are no restrictions or trapped moisture in the static pressure system lines. Purge the system, if necessary, to remove foreign matter that may have accumulated in the tubing.

b. Check the static port heater, if applicable, to ensure proper operation by noting either an ammeter current deflection or that the static port gets hot to the touch.

c. 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.

d. When an aircraft has more than one static system, test each system separately to ensure its independence and to ensure the leak rate for each system is within tolerances established in § 23.1325, § 25.1325, § 27.1325, or § 29.1325, as applicable.

e. Connect the test equipment directly to the static ports, if feasible. Otherwise, connect the test equipment to a static system drain or tee connection and seal off the static ports. If the test equipment is connected to the static system at any point other than the static port, it should be made at a point where the connection may be readily inspected for system integrity after the system is returned to its normal configuration. Remove all static port seals after completion of the static system test.

f. Test the alternate static system at a field elevation of +200 feet to ensure the selection valve, if applicable, functions. If the altimeter reading, when on the alternate static pressure system, differs from the reading of the altimeter, when on the primary system, by more than 50 feet, a correction card should be provided for the alternate static system. Reference §§ 23.1325, 25.1325, 27.1325, and 29.1325, as applicable.

g. For unpressurized aircraft, conduct the static pressure system proof test to the standards prescribed in § 23.1325(b)(2)(i) or § 25.1325(c)(2)(i), as applicable.

h. For pressurized aircraft, conduct the static pressure system proof test to the standards prescribed in § 23.1325(b)(2)(ii), § 23.1325(3), or § 25.1325(c)(2)(ii), as applicable.

(1) An accurate vacuum gauge referenced to atmospheric pressure and connected to the static pressure system may be used to measure the equivalent cabin differential pressure.

(2) Either the altimeter in the aircraft being tested or the altimeter in the test equipment may be used as a vacuum gauge provided that barometric pressure in inches of Mercury (Hg) is converted to pressure in pounds per square inch (psi). A convenient formula for this conversion is—

$$\text{psi} = \frac{\text{inches of Hg}}{2.036 \text{ inches of Hg/psi}}$$

(3) The following steps are suggested for using the altimeter as a vacuum gauge:

Step 1. Convert the actual local barometric pressure (not reduced to sea level) to psi.

Step 2. Subtract the approved maximum cabin differential pressure in psi from the actual local barometric pressure in psi obtained in Step 1 to obtain the test pressure.

Step 3. Convert the test pressure in psi obtained in Step 2 to inches of Hg, using the following formula:

Inches of Hg = psi x 2.036 inches of Hg/psi.

Step 4. The test pressure expressed in inches of Hg can be converted to test altitude using Table 1.

INSERT TABLE ONE HERE

EXAMPLES
Assuming an actual local barometric pressure of 25.39 inches of Hg and an approved maximum cabin differential pressure of 5.3 psi, the test pressure and test altitude would be determined as calculated below.

Step 1. $\text{psi} = \frac{25.39 \text{ inches of Hg}}{2.036 \text{ inches of Hg/psi}} = 12.47 \text{ psi}$

Step 2. 12.47 psi - 5.3 psi = 7.17 psi

Step 3. Inches of Hg = 7.17 psi x 2.036 inches of Hg/psi = 14.60 inches of Hg

Step 4. 14.60 inches of Hg = 18,600 feet altitude

8. ALTIMETER TEST PRECAUTIONS. In addition to the precautions listed for Static Pressure System Tests, a person testing an altimeter system should take the following precautions:

a. Altimeters using air data computers with associated computing systems or that incorporate air data correction internally should be tested in a manner and to specifications developed by the manufacturer that are acceptable to the Administrator. Aneroid type testers may not be suitable to test these digital systems.

b. The static leak test should be conducted first to ensure there are no static system leaks to influence altimeter indications.

c. The altimeter should be permitted to stabilize after a flight before being tested.

9. ALTIMETER TEST. Each altimeter system test and inspection required by § 91.411 should comply with the following:

a. The test may be conducted using portable test equipment or barometric test equipment as described in paragraph 10, Altimeter Test Equipment.

b. When vibration is applied to the instrument, ensure it is not of a magnitude that will mask a sticky altimeter.

c. At a minimum, the altimeter should be tested to the maximum operating altitude specified in the aircraft flight manual.

d. The following tests should not be conducted when the temperature is substantially different from an ambient temperature of approximately 25° Celsius, unless a Federal Aviation Administration-approved variation allowance is available for the specified condition.

(1) Scale error. With the barometric pressure scale at 29.92 inches of Hg, the altimeter should be subjected successively to pressures corresponding to the altitude specified in Table II up to the maximum normally expected operating altitude of the airplane in which the altimeter is to be installed. The rate of reduction in pressure should not exceed 20,000 feet per minute and should be reduced to within approximately 2,000 feet of the test point. The test points should be approached at a rate compatible with the test equipment. The altimeter should

be kept at the pressure corresponding to each test point for at least 1 minute, but not more than 10 minutes, before the test reading is recorded. The error at each test point should not exceed the tolerances specified in Table II.

TABLE II

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	27.821	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

(2) Hysteresis. The hysteresis test should begin (i) within 15 minutes of the altimeter's initial exposure to the pressure corresponding to the upper limit of the scale error test prescribed in paragraph 9(d)(1) above, and (ii) while the altimeter is at the upper limit of the scale error test pressure. Pressure should be increased at a rate simulating a descent 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 then should be approached at a rate of approximately 3,000 feet per minute. The altimeter should be kept at this pressure

for at least 5 minutes, but not more than 15 minutes, before the test reading is recorded. After the reading has been recorded, the pressure should be increased, in the same manner as before, until the pressure corresponding to the second test point (40 percent of maximum altitude) is reached. The altimeter should be kept at this pressure for at least 1 minute, but not more than 10 minutes, before the test reading is recorded. After the reading has been recorded, the pressure should be increased, in the same manner as before, until atmospheric pressure is reached. The reading of the altimeter at either of the two test points should 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 9(d)(1).

TABLE III — TEST TOLERANCES

Test	Tolerance (feet)
Case Leak Test	+/-100
Hysteresis Test: First Test Point (50 percent of maximum altitude)	75
Hysteresis Test: Second Test Point (40 percent of maximum altitude)	75
After Effect Test	30

(3) After effect. Within 5 minutes of the completion of the hysteresis test prescribed in paragraph 9(d)(2), the reading of the altimeter (corrected for any change in atmospheric pressure) should not differ from the original atmospheric pressure reading by more than the tolerance specified in Table III.

(4) Friction. The altimeter should be subjected to a steadily decreasing pressure at a rate of approximately 750 feet per minute. At each altitude listed in Table III, the change in reading of the pointers after vibration should not exceed the corresponding tolerance listed in Table IV.

TABLE IV – FRICTION

Altitude (feet)	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

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

(6) Barometric, scale error. At a constant atmospheric pressure, the barometric pressure scale should be set at each of the pressures (falling within its range of adjustment) listed in Table V and should cause the pointer to indicate the equivalent altitude difference shown in Table V with a tolerance of 25 feet.

TABLE V – 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

e. Altimeters tested on the bench should be tested to the limit of their maximum range of indication.

f. The automatic pressure altitude reporting equipment test and ATC transponder system integration test should be conducted in accordance with paragraph 5(d). 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 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 should not exceed 125 feet.

g. Comply with the provisions of § 43.9 as to the content, form, and disposition of the records. The person performing the altimeter tests should record on the altimeter the date and maximum altitude to which the altimeter has been tested and the persons approving the aircraft for return to service should enter that data in the aircraft log or other permanent record.

10. ALTIMETER TEST EQUIPMENT. Equipment, materials, and required tests for test equipment are specified in § 145.47. Persons authorized to perform these tests and inspections are specified in § 43.3. The following test equipment is acceptable for testing altimeters:

a. Mercurial, aneroid, or digital barometers maintained in accordance with AC 43-2B.

b. Test equipment (with appropriate correction card) maintained in accordance with § 145.47(b). It has been found that calibration checks of the test equipment in accordance with the following schedule provides a satisfactory level of performance:

(1) Each 6-calendar months, after initial calibration, the aneroid equipment should be checked for accuracy against—

(i) A standard derived from the National Institute of Standards and Technology;

(ii) A barometer described in paragraph 10(a); or

(iii) A standard provided by the equipment manufacturer.

(2) Before use, the equipment should be checked for proper operations within calibration limits at station pressure using a mercurial, aneroid, or digital barometer or in accordance with paragraph 10(b)(1)(ii) above.

(3) The 6-calendar months calibration period in paragraph 10(b)(1) may be extended provided the calibration records of the individual test equipment reflect continued accuracy and/or technical information/recommendations of the equipment manufacturer.

11. MAINTENANCE RECORD ENTRY. The following is an example of a permanent maintenance record entry that will be satisfactory for compliance with § 43.9:

Example: I certify that the altimeter and static system tests required by 14 CFR 91.411 have been performed. The altimeter was tested to _____ feet on (date of altimeter test)
Signature _____
Date (of static system test) _____
Certificate Number _____

[Name]
[Title], [Office]

APPENDIX 3: AIP Document (as delivered to ARAC on December 14, 1998)

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Parts 43, 65, and 91

[Docket No. XXXXX; Notice No. 9X-XXXX]

RIN 2120-XXXX

Alternate Inspection Program

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The FAA proposes to permit certain general aviation aircraft to be inspected under an alternate inspection program (AIP). With certain exceptions, current regulations require aircraft to undergo an annual inspection performed by an appropriately rated certificated mechanic who holds an inspection authorization (IA). Under the proposal, an alternate inspection could be performed by a certificated mechanic who has held airframe and powerplant (A & P) ratings for 3 years and meets the applicable recency-of-experience requirements. As proposed, an aircraft could be inspected under an AIP every other year, but would be subject to the current annual inspection requirement in alternate years. The use of the

AIP would provide some economic relief to the owners and operators of light general aviation aircraft.

DATES: Comments must be received on or before [*Insert date 30/45/60/90/120 days after date of publication in the Federal Register.*]

ADDRESSES: Comments on this proposed rulemaking should be mailed or delivered, in duplicate, to: U.S. Department of Transportation Dockets, Docket No. FAA-98-XXXX, 400 Seventh Street SW., Room Plaza 401, Washington, DC 20590. Comments also may be sent electronically to the following Internet address: 9-NPRM-CMTS@faa.dot.gov. Comments may be filed and/or examined in Room Plaza 401 between 10 a.m. and 5 p.m. weekdays except Federal holidays.

FOR FURTHER INFORMATION CONTACT: Algy F. Giles, AFS-340, Flight Standards Service, Federal Aviation Administration, 800 Independence Avenue SW., Washington, DC 20591, telephone (202) 267-3803.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in the making of the proposed rule by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, federalism, or

economic impact that might result from adopting the proposals in this notice also are invited. Substantive comments should be accompanied by cost estimates. Comments must identify the regulatory docket or notice number and be submitted in duplicate to the Rules Docket address specified above.

All comments received, as well as a report summarizing each substantive public contact with FAA personnel on this rulemaking, will be filed in the docket. The docket is available for public inspection before and after the comment closing date.

All comments received on or before the closing date will be considered by the Administrator before taking action on this proposed rulemaking. Late-filed comments will be considered to the extent practicable. The proposals contained in this notice may be changed in light of the comments received.

Commenters wishing the FAA to acknowledge receipt of their comments submitted in response to this notice must include a pre-addressed, stamped postcard with those comments on which the following statement is made: "Comments to Docket No. XXXXX." The postcard will be date stamped and mailed to the commenter.

Availability of NPRMs

Using a modem and suitable communications software, an electronic copy of this document may be downloaded from the FAA regulations section of the FedWorld electronic bulletin board service (telephone: 703-321-3339), the Government Printing Office's electronic bulletin board service (telephone: 202-512-1661), or the FAA's Aviation Rulemaking Advisory Committee bulletin board service (telephone: (800)322-2722 or (202)267-5948).

Internet users may reach the FAA's web page at http://www.faa.gov/avr/arm/nprm/nprm.htm or the Government Printing Office's web page at http://www.access.gpo.gov/su_docs/aces/aces140.html for access to recently published rulemaking documents.

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Rulemaking, ARM-1, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9680. Communications must identify the notice number or docket number of this NPRM.

Persons interested in being placed on the mailing list for future NPRMs should request from the above office a copy of Advisory Circular No. 11-2A, Notice of Proposed

Rulemaking Distribution System, that describes the application procedure.

Background

The United States is committed to the support and revitalization of the general aviation industry. For example, U.S. Congress enacted the General Aviation Revitalization Act of 1994, which provides an 18-year statute of repose for civil actions against aircraft manufacturers when the action arises out of an accident involving general aviation aircraft (Public Law 103-298; August 17, 1994). The FAA also has reviewed means to provide economic relief to the owners and operators of general aviation aircraft without compromising safety.

In 1994, the Aircraft Owners and Pilots Association (AOPA) filed a petition for rulemaking that proposed to amend the Federal Aviation Regulations to permit an alternative method of maintaining and inspecting general aviation aircraft. According to the AOPA, the proposal would provide an alternative to the current requirement for an annual inspection of general aviation aircraft, which would be cost-effective and maintain the level of safety provided by the current regulations. In addition, Mr. Paul H. Poberezny, the chairman of the board of the Experimental Aircraft Association, filed a petition in his

own behalf to extend the annual inspection interval to 200 hours or 2 years, whichever occurs first. After reviewing these petitions, the FAA referred the issues raised in the petitions to the Aviation Rulemaking Advisory Committee (ARAC).

The FAA established the ARAC in February 1991 to provide advice and recommendations to the Administrator concerning FAA rulemaking activity with respect to safety-related issues (56 FR 2190; January 22, 1991). Its charter most recently was renewed on February 18, 1998 (63 FR 8250). The ARAC includes representatives of air carriers, manufacturers, general aviation, labor groups, colleges, universities, associations, airline passenger groups, and the general public.

In 1994, the ARAC on air carrier/general aviation maintenance issues established the General Aviation Maintenance Working Group (59 FR 49460; September 28, 1994). The working group's tasks include reviewing maintenance-related regulations, specifically parts 43 and 91, supporting policy and guidance material, and developing an NPRM addressing general aviation aircraft inspection and maintenance. The working group presented to the ARAC a recommendation to establish an AIP for certain aircraft operated under part 91 on [*insert date*]. The ARAC

accepted this recommendation, which forms the basis for the changes proposed by the FAA in the NPRM.

History

Before 1956, the Civil Air Regulations (CAR) required that every 12 calendar months, certain aircraft undergo a "periodic inspection" performed by an appropriately rated certificated mechanic or repair station and an "annual inspection" performed by a representative of the Administrator or by an appropriately rated certificated repair station. Through the annual inspection requirement, the Administrator exercised an increased level of direct control over the conduct of inspections. The annual inspection essentially duplicated the periodic inspection.

On April 20, 1956, an amendment to the CAR was published that eliminated the annual inspection requirement. (21 FR 2585) That amendment, which became effective July 17, 1956, was adopted to prevent the duplication of inspection functions and place the primary responsibility for the performance of 12-month inspections on private industry subject to such surveillance activities as the Administrator determined necessary. The 12-month inspection continued to be known as a periodic inspection. At that time, the Civil Aeronautics Board also amended the CAR to provide that a periodic inspection could be

performed only by a certificated mechanic holding A & P ratings and an IA, an appropriately rated certificated repair station, or certain manufacturers. To emphasize that the periodic inspection was required each year, the term "annual inspection" was substituted for the term "periodic inspection" in 1966 (31 FR 3336; March 6, 1966).

Current Requirements

With certain exceptions, § 91.409 prohibits the operation of an aircraft unless within the preceding 12 calendar months that aircraft has had an annual inspection and been approved for return to service in accordance with part 43. Currently, a certificated mechanic who holds an IA issued under part 65, a 14 CFR part 145 certificated repair station, or certain manufacturers may perform this annual inspection and approve the aircraft for return to service.

General Discussion of the Proposals

Under this proposal, certain aircraft operated under part 91 would be able to undergo an alternate inspection every other year. The inspection could be performed by a certificated mechanic who has held valid and effective A & P ratings for 3 years. The mechanic would not be required to hold an IA to perform the alternate inspection. However, the FAA notes that a mechanic performing an

alternate inspection would have to meet the recency of experience requirement of current § 65.83 before performing the inspection. In addition, the mechanic would be subject to the same performance standards under part 43 that are applicable to mechanics performing an annual inspection. In alternate years, the aircraft would be subject to the annual inspection requirement of § 91.409(a) and returned to service by a mechanic who holds an IA. Therefore, aircraft inspected under an AIP would continue to be inspected on a yearly basis.

An aircraft would be eligible for an AIP only if it is unpowered or powered by a reciprocating engine. The AIP would not be available to turbine-powered aircraft. Turbine engines are considered sufficiently complex and are subject to an approved inspection program pursuant to the requirements of § 91.409(e). Aircraft with pressurized cabins also would be ineligible to participate in the AIP because of their complexity and the specialized inspection requirements associated with pressure vessels.

Because this program is meant to benefit owners and operators of personal and recreational aircraft, only aircraft that weigh 6,000 pounds or less would be eligible for the AIP. Certification requirements use a 6,000-pound limit to distinguish smaller aircraft of simplified design

from larger and significantly more complex aircraft. In addition, the FAA has determined that general aviation aircraft weighing 6,000 pounds or less generally are operated for personal, rather than commercial, use.

With a limited exception, the proposal would prohibit an aircraft that has undergone an alternate inspection from being used for flight instruction until the aircraft has had an annual or certification inspection as provided for in § 91.409(a). Flight instruction would be permitted if the instruction is being furnished to the person who owns the aircraft or an individual designated by the owner, provided the owner does not receive compensation for the use of the aircraft. In addition, the aircraft could not be operated for the carriage of persons or property for hire or rental purposes until the aircraft has had an annual or certification inspection.

The proposed alternate inspection would have the same scope and performance standards as an annual inspection performed under § 91.409(a). The proposal would require that an alternate inspection be performed using a checklist that includes the items in appendix D to part 43 that currently are included in an annual or a 100-hour inspection. In addition, the alternate inspection would be performed in accordance with § 43.13, which requires the

use of methods, techniques, and practices acceptable to the Administrator. Under § 43.13, the mechanic performing an alternate inspection also would be required to use the tools, equipment, and test apparatus necessary to assure completion of the work in accordance with accepted industry practices, and if special equipment or test apparatus is recommended by the manufacturer of any product inspected, the mechanic would have to use that equipment or apparatus or an equivalent equipment or apparatus that is acceptable to the Administrator.

As previously noted, the mechanic performing the alternate inspection would be required to have held A & P ratings for 3 years. The FAA determined that such a requirement would be an important element to any program permitting additional categories of persons to conduct inspections such as the alternate inspection proposed in this NPRM. In addition, the mechanic who performs an alternate inspection would be required to meet the recency-of-experience requirements of § 65.83. The FAA further notes that under § 65.81, a person performing an alternate inspection would be required to demonstrate competency by satisfactorily performing one of the inspections in appendix D to part 43 under the direct supervision of a certificated and appropriately rated

mechanic who has performed one of those inspections before that person can perform an unsupervised alternate inspection. Because the scope of an alternate inspection would be the same as the scope of an annual or a 100-hour inspection, the FAA has determined that previous experience performing either of these inspections would be sufficient to meet this experience requirement.

Because the inspection interval, the scope of the inspection, the performance standards for returning the aircraft to service, and the recency-of-experience requirements for the person performing the inspection would remain unchanged, the FAA has determined that the AIP would provide a level of safety equivalent to that provided under the current inspection requirements of § 91.409.

Because qualified mechanics with A & P ratings who do not hold an IA may offer a less expensive alternative for obtaining an inspection, the AIP could provide a small measure of economic relief to the owners and operators of light general aviation aircraft. In addition, by allowing a mechanic who holds A & P ratings but not an IA to perform the alternate inspection, the number of mechanics available to perform the inspection would be greater than the number of mechanics currently available to perform an annual inspection. Finally, some owners and operators who

currently have to relocate their aircraft to have an annual inspection performed by a mechanic who holds an IA may be able to have an alternate inspection performed at their home base if a qualified mechanic is available.

Section-by-Section Analysis

Section 43.15

This proposal would amend § 43.15(c) by requiring that an alternate inspection be performed using a checklist that includes the items listed in appendix D to part 43. Appendix D currently describes the scope and detail of the items that must be included in an annual and a 100-hour inspection. This amendment would ensure the scope and detail of an alternate inspection would be the same as the scope and detail of an annual inspection.

Section 43.17

Paragraph (d) of § 43.17 precludes Canadian aircraft maintenance engineers and approved maintenance organizations from performing the annual inspection required under § 91.409. Because the proposed alternate inspection would constitute the yearly inspection for that aircraft and the intent of paragraph (d) is to except the yearly inspection of an aircraft from the provisions of § 43.17, this proposal would amend paragraph (d) to preclude Canadian aircraft maintenance engineers and

approved maintenance organizations from performing the alternate inspection.

Appendix D to part 43

For the reasons previously discussed, appendix D would be amended to provide that its provisions apply to an alternate inspection.

Section 65.81

This section contains the general privileges and limitations of a mechanic certificate. The proposal would amend paragraph (a) to include a reference to the new section permitting certain certificated mechanics to perform alternate inspections.

Section 65.88

The proposal would add § 65.88 to permit a certificated mechanic who holds A & P ratings that are current and have been effective for at least the preceding 3 years to perform an alternate inspection.

Section 91.409

Section 91.409(a) would be amended to permit certain aircraft to be inspected under an AIP.

Proposed paragraph (i) would describe those aircraft eligible for an AIP. Only an aircraft that has had an annual inspection or an inspection for the issuance of an airworthiness certificate in the past year would be

eligible for an AIP. This ensures that an aircraft inspected under an AIP will undergo an annual inspection performed in accordance with § 91.409(a) at least every other year. Under an AIP, it also would be possible to use other combinations of inspections, such as 2 years of annual inspections followed by 1 year of an alternate inspection, provided the aircraft has an annual inspection in accordance with § 91.409(a) at least every other year.

During development of the AIP, an issue arose concerning owners and operators currently using progressive inspection programs who wish to change to an AIP. The proposal would require those owners and operators desiring to change inspection programs to obtain an annual inspection of the aircraft before electing to take advantage of the AIP. The FAA has determined that such a requirement is necessary because the annual inspection represents a baseline for inspection.

As previously noted, only aircraft that are unpowered or powered by a reciprocating engine, weigh 6,000 pounds or less, and have unpressurized cabins would be able to take advantage of the AIP. In addition, § 91.409(i) would prohibit aircraft subject to an AIP from being operated for compensation or hire. Specifically, the proposal would preclude those aircraft from being operated for the

carriage of persons or property for hire; flight instruction for hire unless the instruction is being provided to the aircraft owner or an owner designee, provided the owner does not receive compensation for the use of the aircraft; or for rental purposes until a qualified mechanic performs an annual or certification inspection of the aircraft.

Section 91.417

Section 91.417 would be amended to include the alternate inspection in the maintenance recordkeeping requirements currently applicable to annual inspections.

Paperwork Reduction Act

In accordance with the Paperwork Reduction Act of 1995 (44 U.S.C. 3507(d)), there are no requirements for information collection associated with this proposed rule.

International Compatibility

The FAA has determined that a review of the Convention on International Civil Aviation Standards and Recommended Practices is not warranted because there is not a comparable rule under International Civil Aviation Organization standards.

Regulatory Evaluation Summary

Changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs

that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effect of regulatory changes on international trade. In conducting these analyses, the FAA has determined that this proposed rule is not "a significant regulatory action" as defined in the Executive Order and the Department of Transportation Regulatory Policies and Procedures. This proposed rule would not have a significant impact on a substantial number of small entities and would not constitute a barrier to international trade. The FAA invites the public to provide comments and supporting data on the assumptions made in this evaluation. All comments received will be considered in the final regulatory evaluation.

The proposed Alternate Inspection Program (AIP) would allow owners of certain small aircraft to substitute for the currently required annual inspection, on alternate years, an inspection entitled the "alternate inspection." This inspection is to be performed by the holder of an Airframe and Powerplant (A&P) certificate who does not hold

an inspection authorization (IA). This program would be restricted to aircraft that weigh not more than 6,000 lbs., are unpowered or powered by reciprocating engines, have unpressurized cabins, and are not used for rent or hire. AIP inspections would be performed in the scope and detail of the currently required annual and 100-hour inspections. Regular annual inspections would continue to be required in the year before each alternate inspection, so that an alternate inspection would be performed on an aircraft no more frequently than every other year.

Although mechanics performing alternate inspections would have to have held A&P ratings for 3 years, as is the case for candidates for the IA examination, they are likely to have somewhat less total experience performing inspections than mechanics who hold an IA. However, the program will allow the owners of older aircraft who hold A&P ratings and meet the other applicable requirements to perform alternate inspections. These owners may be more familiar with unique features of their aircraft than are many mechanics who hold IAs. In addition, by increasing the number of sites at which an inspection could be performed in alternate years, the AIP may reduce the costs and risk exposure associated with flights to move an aircraft to a location where a mechanic who holds an IA is

available. While reductions in risk exposure may improve safety, these potential improvements are not expected to be measurable.

The present discounted value of the program's benefits, (that is, cost savings to owners) is likely to be at least $1.6 million, a level believed to be well in excess of the cost of producing the proposed new rule. Mechanics who hold an IA and perform annual inspections are likely to lose an amount of income approximately equal to the aircraft owners' savings. Almost all potential cost savings and effects on air safety, if any, would accrue to the aircraft owners who choose to make use of this voluntary program.

Initial Regulatory Flexibility Determination

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule has a significant economic impact on a substantial number of small business entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold costs and small entity size standards for complying with FRA requirements.

The proposed rule is not expected to have a significant economic impact on a substantial number of small entities. It is expected to provide cost savings to owners and operators of small aircraft while having no significant effect on aviation safety.

International Trade Impact Analysis

The proposed rule is expected to have no significant effects on international trade.

Federalism Implications

The regulations proposed herein will not have substantial direct effects on the States, on the relationship between the national Government and the States, or on the distribution of power and responsibilities among the various levels of Government. Therefore, in accordance with Executive Order 13083, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Unfunded Mandates Reform Act

Title II of the Unfunded Mandates Reform Act of 1995 (the Act), enacted as Public Law 104-4 on March 22, 1995, requires each Federal agency, to the extent permitted by law, to prepare a written assessment of the effects of any Federal mandate in a proposed or final agency rule that may

result in the expenditure by State, local, and tribal governments, in the aggregate, or by the private sector, of $100 million or more (adjusted annually for inflation) in any one year. Section 204(a) of the Act, 2 U.S.C. 1534(a), requires the Federal agency to develop an effective process to permit timely input by elected officers (or their designees) of State, local, and tribal governments on a proposed "significant intergovernmental mandate." A "significant intergovernmental mandate" under the Act is any provision in a Federal agency regulation that would impose an enforceable duty upon State, local, and tribal governments, in the aggregate, of $100 million (adjusted annually for inflation) in any one year. Section 203 of the Act, 2 U.S.C. 1533, which supplements section 204(a), provides that before establishing any regulatory requirements that might significantly or uniquely affect small governments, the agency shall have developed a plan that, among other things, provides for notice to potentially affected small governments, if any, and for a meaningful and timely opportunity to provide input in the development of regulatory proposals.

The FAA determines that this proposed rule does not contain a significant intergovernmental or private sector mandate as defined by Title II of the Unfunded Mandates Reform Act of 1995.

List of Subjects

14 CFR Part 43

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

14 CFR Part 65

Aircraft, Airmen, Reporting and recordkeeping requirements.

14 CFR Part 91

Aircraft, Airmen, Aviation safety, Reporting and recordkeeping requirements.

The Proposed Amendment

In consideration of the foregoing, the Federal Aviation Administration proposes to amend parts 43, 65, and 91 of Title 14, Code of Federal Regulations (14 CFR parts 43, 65, and 91) as follows:

PART 43 — MAINTENANCE, PREVENTIVE MAINTENANCE, REBUILDING, AND ALTERATIONS

1. The authority citation for part 43 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701, 44703, 44705, 44707, 44711, 44713, 44717.

2. Section 43.15 is amended by revising paragraph (c) to read as follows:

§ 43.15 Additional performance rules for inspections.

* * * * *

(c) Annual, 100-hour, and alternate inspections.

(1) Each person performing an annual, 100-hour, or alternate inspection shall use a checklist while performing the inspection. The checklist may be of the person's own design, 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 return to service after an annual, 100-hour, or alternate inspection shall, before that approval, run the aircraft engine or engines to determine satisfactory performance in accordance with the manufacturer's recommendations of—

* * * * *

3. Section 43.17 is amended by revising paragraph (d) to read as follows:

§ 43.17 Maintenance, preventative maintenance, and alterations performed on U.S. aeronautical products by certain Canadian persons.

* * * * *

(d) Performance requirements. A person authorized in paragraph (c) of this section may perform maintenance (including any inspection required by § 91.409 of this chapter, except an annual or alternate inspection), preventive maintenance, and alterations, provided:

* * * * *

4. Appendix D is amended by replacing the phrase "annual and 100-hour inspections" with "annual, 100-hour, and alternate inspections" in the appendix heading and replacing the phrase "annual or 100-hour inspections" with the phrase "annual, 100-hour, or alternate inspection" in paragraphs (a) through (j).

PART 65 — CERTIFICATION: AIRMEN OTHER THAN FLIGHT CREWMEMBERS

5. The authority citation for part 65 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701-44703, 44707, 44709-44711, 45102-45103, 45301-45302.

6. Section 65.81 is amended by revising the first sentence of paragraph (a) to read as follows:

§ 65.81 General privileges and limitations.

(a) A certificated mechanic may perform or supervise the maintenance, preventive maintenance or alteration of an aircraft or appliance, or a part thereof, for which that mechanic is rated (excluding major repairs to and major alterations of propellers and any repair to or alteration of instruments), and may perform additional duties in accordance with §§ 65.85, 65.87, 65.88, and 65.95. * * * * * * * * *

7. Section 65.88 is added to read as follows:

§ 65.88 Alternate inspections.

A certificated mechanic may conduct the alternate inspection specified in § 91.409 of this chapter, provided the mechanic holds airframe and powerplant ratings that have been current and effective for at least the 3 years preceding the alternate inspection.

PART 91 — GENERAL OPERATING AND FLIGHT RULES

8. The authority citation for part 91 continues to read as follows:

Authority: 49 U.S.C. 106(g), 1155, 40103, 40113, 40120, 44101, 44111, 44701, 44709, 44711, 44712, 44715,

44716, 44717, 44722, 46306, 46315, 46316, 46504, 46506-46507, 47122, 47508, 47528-47531.

9. Section 91.409 is amended by revising paragraph (a) and adding paragraph (i) to read as follows:

§ 91.409 Inspections.

(a) Except as provided in paragraphs (c) and (i) of this section, no person may operate an aircraft unless, within the preceding 12 calendar months, it has had—

* * * * *

(i) Alternate inspection program.

(1) A registered owner or operator of an aircraft may use an alternate inspection program in accordance with part 43 of this chapter in lieu of the inspection required under paragraph (a) of this section, provided the aircraft—

(i) Is unpowered or powered by a reciprocating engine;

(ii) Weighs 6,000 pounds or less;

(iii) Has an unpressurized cabin; and

(iv) Within the preceding 12 calendar months, has had an annual inspection and has been approved for return to service in accordance with part 43 of this chapter or has had an inspection for issuance of an airworthiness certificate in accordance with part 21 of this chapter.

(2) Until the aircraft has had an annual inspection and has been approved for return to service in accordance with part 43 of this chapter, an aircraft that has had an alternate inspection in accordance with part 43 of this chapter may not be used for:

(i) The carriage of persons or property for hire;

(ii) Flight instruction for hire unless the instruction is being provided to the aircraft owner or an owner designee, provided the owner does not receive compensation for the use of the aircraft; or

(iii) Rental purposes.

10. Section 91.417 is amended by revising paragraph (a)(1) to read as follows:

§ 91.417 Maintenance records.

(a) * * * * *

(1) Records of the maintenance, preventive maintenance, and alteration and records of the 100-hour, annual, alternate, progressive, and other required or approved inspections, as appropriate, for each aircraft (including the airframe) and each engine, propeller, rotor, and appliance of an aircraft. The records must include—

* * * * *

June 21, 2001

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: **AUTOMATIC PRESSURE ALTITUDE ENCODING SYSTEMS AND TRANSPONDERS: MAINTENANCE AND INSPECTION PRACTICES**

Date: xx/xx/xx
Initiated by: AFS–300

AC No: 43–6B
Change:

1. PURPOSE. This advisory circular (AC) provides information concerning acceptable methods of testing and installing altitude encoding systems and air traffic control (ATC) transponders.

2. CANCELLATION. AC 43–6A, dated November 11, 1977, is canceled.

3. RELATED MATERIAL. Title 14, Code of Federal Regulations (14 CFR) §§ 43.3, 43.5, 43.9, 43.13, 65.85, 91.213, 91.215, 91.217, 91.411, and 91.413; AC 43–203B, Altimeter and Static System Tests and Inspections; Technical Standard Order (TSO) C–74c, Airborne ATC Transponder Equipment; TSO C–88a, Automatic Pressure Altitude Reporting Code Generating Equipment.

4. BACKGROUND. Service difficulty reports, information reported through the malfunction or defects system, and observation by aviation safety inspectors show a need for expanded and updated guidance for maintenance and inspection of transponder and altitude encoding systems. A significant number of reports from air traffic facilities are related to erroneous altitude reporting. Evaluation of these reports has verified failures or malfunctions of encoding devices that were not evident to the pilot but would have been evident during inspection and/or proper testing of these systems after installation in the aircraft.

5. INSTALLATION. Only appropriately rated persons (as specified in § 43.3) may perform an aircraft alteration that consists of installing an encoding altimeter, blind encoder, or transponder system. The approval for return to service of the aircraft may only be accomplished after appropriate testing is performed to ensure that the system performs its intended function(s). When a certificated repair station is used to install an automatic pressure altitude reporting system, or any portion of such a system, the repair station must have an appropriate airframe rating for the installation. Radio and instrument rated repair stations may have limited airframe ratings for the installation of specific makes and models of transponders, digitizers, and encoding altimeters in specific makes and models of aircraft. Alternatively, the repair station may obtain the services of an appropriately rated aviation technician (for example, the

holder of an inspection authorization) to perform the final inspection and approval for return to service of the aircraft after the installation is completed. It is incumbent on the operator to ensure that the repair station has the appropriate rating or personnel to perform the installation and approve the aircraft for return to service. In addition, maintenance personnel must ensure that—

a. The required test equipment, technical data, and personnel are available to perform, or arrange to have performed, a static system check as required by § 91.411 to verify the integrity of the newly installed or altered system;

b. The capability is available to determine the actual altitude information transmitted by the transponder as referenced against the pilot's altimeter (altitude reference);

c. The appropriate repair station rating or an otherwise appropriately rated person to perform any necessary structural modifications is available;

d. The appropriate authority is available to approve the aircraft for return to service after all maintenance, modification, and testing has been completed; and

e. The approved data necessary for any substitution(s) of equipment installed that is not shown on the aircraft's approved equipment listing are used.

6. APPROVED DATA ALTERNATIVES.

a. FAA-approved manufacturer drawings or service bulletins that list approved replacement/substitution encoding altimeters or instructions for the installation of certain digitizers (blind encoders) may be used.

b. Where no prior approval has been given, a supplemental type certificate or field approval should be requested. The person approving the aircraft for return to service must comply with all provisions of § 43.9.

c. Field Approvals. In some cases, the facility making the installation meets the qualifications in paragraphs 5a through 5e of this AC and has demonstrated to the Administrator its ability to install this equipment on a representative number of similar type installations through prior field approvals. References to these previous approvals on FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller or Appliance), constitute previously approved data and may not require a separate field approval.

d. Alterations using data which do not differ appreciably from a previously approved alteration may not require new or additional approval. When questions arise, contact your local FAA field office for guidance.

7. TESTS AND INSPECTIONS.

a. Sections 91.411 and 91.413 require, in part, the performance of tests and inspection in accordance with methods, techniques, and practices of an inspection program acceptable to the Administrator. These tests and inspections may be performed only by persons possessing the requisite data and equipment to perform the required functions and meeting any of the following criteria:

(1) The manufacturer of the airplane or helicopter.

(2) A certificated repair station with—

(a) A Class I instrument rating,

(b) A Class III radio rating,

(c) A limited instrument or radio rating appropriate to the make and model of the appliance to be tested,

(d) A limited rating appropriate to the test to be performed,

(e) An airframe rating appropriate to the airplane or helicopter to be tested, or

(f) A limited rating for a manufacturer issued for the appliance to be tested.

(3) A holder of a continuous airworthiness maintenance program as provided in 14 CFR part 121, part 129, or part 135.

(4) An appropriately certificated and rated person under § 65.85.

b. Manufacturer's instructions for continued airworthiness are acceptable to the Administrator for use in testing and inspecting ATC transponders and altitude reporting equipment.

c. The following information sets forth one means, but not the only means, of demonstrating compliance with the maintenance requirements in § 91.413 governing the testing of ATC transponders.

(1) Reply Radio Frequency. Interrogate the transponder and verify, by use of any frequency measuring technique, that the reply frequency is 1090+3 MHz. The accuracy of the measuring device should be at least + or - .5 MHz. In the event the frequency measurement is not conducted by radiated method, necessary compensations should be made for any frequency deviation which may occur due to installation.

(2) Suppression. Interrogate the transponder with a Mode 3/A interrogation signal at a nominal repetition rate of 235 (nominal is considered to be 235 + or - 5 IPS) interrogations per second and at a signal level 3 db above receiver minimum trigger level. Adjust P2 pulse equal in amplitude to P1 pulse and verify that the reply rate is no greater than 3 replies per second. (Percentage of reply should not exceed 1.0 percent.) Adjust P2 pulse amplitude 9 db less than P1 pulse, and verify that the reply rate is at least 211 replies per second.

(3) Receiver Sensitivity. With the test set connected to the antenna end of the transmission line, or connected to the antenna terminal of the transponder with a correction for transmission line loss, interrogate the transponder with a Mode 3/A interrogation signal at any repetition rate recommended by the transponder manufacturer. When radiation techniques are used, the interrogation signal repetition rate should be a nominal 235 interrogations per second. This pulse repetition rate was selected to reduce interference to active aircraft in the air traffic control system. Adjust P1 and P3 equal in amplitude and apply a signal level known to be below receiver minimum trigger level (MTL). Increase the signal level until the transponder reply is 211 replies per second (90 percent reply rate). This is the receiver MTL. Verify the MTL is between 69 to 77 db below 1 milliwatt. Test equipment attenuator accuracy should be within + or -3 db. Repeat the test using a Mode C interrogation signal and verify the MTL is within 1 db of the reading obtained on Mode 3/A.

(4) Bench Tests. Transponders may be bench tested for compliance with § 91.413, and functionally checked after installation in the aircraft, provided that during the bench check the transponder operates into an antenna system presenting the same VSWR characteristics and cable attenuation as that in the airplane.

(5) Portable Line Test Equipment. Portable line test equipment may be used for any of the tests specified in paragraph 7c of this AC, provided it is maintained under a regular calibration program acceptable to the Administrator. If portable test equipment is used with appropriate coupling to the aircraft antenna system, an additional 3 db tolerance is permitted to compensate for antenna coupling errors during receiver sensitivity measurements. If the portable test equipment has a fixed radio frequency output, it may be necessary to use a fixed precision attenuator in conjunction with a variable precision attenuator to determine the receiver minimum triggering level. Such attenuators should be maintained on a regular calibration schedule and have appropriate calibration charts. The repair facility is responsible for ensuring the accuracy of the attenuators.

(6) Removal and Replacement. Removal and replacement of transponder units, during the 2-year period after testing in accordance with § 91.413, will not invalidate the test results. A repaired or replacement transponder may be installed without repeating the tests and inspections, provided the unit being installed has been tested by the agency for reply radio frequency, suppression, and receiver sensitivity in accordance with the manufacturer's instructions.

(7) Maintenance Records. Maintenance record entries should be made in accordance with § 43.9.

8. AN ACCEPTABLE MEANS OF TESTING FOR COMPLIANCE WITH § 91.217.

a. Section 91.217, Data correspondence between automatically reported pressure altitude data and the pilot's altitude reference, states, in part, that—

> No person may operate any automatic pressure altitude reporting equipment associated with a radar beacon transponder—
>
> Unless, as installed, that equipment was tested and calibrated to transmit altitude data corresponding within 125 feet (on a 95 percent probability basis) of the indicated or calibrated

datum of the altimeter normally used to maintain flight altitude, with that altimeter referenced to 29.92 inches of mercury.

b. The following simplified test of the automatic pressure altitude transmission system data correspondence, as required by § 91.217, can be used to demonstrate compliance of a newly installed altitude reporting system. Connect the transponder test set directly to the antenna terminal of the transponder, or to the antenna end of the transmission line, so as not to radiate an interfering signal.

(1) All aircraft that have altitude reporting transponders installed (Mode C capability) should be checked to ensure that only the framing pulses (F1 and F2) are transmitted in response to Mode C interrogations, when the altitude reporting feature is turned off.

(2) All transponder-equipped aircraft that have altitude reporting equipment installed should be tested at the flight levels set forth in appendix 1 (table 1 for encoding altimeters or table 2 for blind encoders), by alternately interrogating the transponder on Mode 3/A and Mode C and observing either the pulse train output, or the decoded altitude display on those test sets capable of decoding the pulse train.

(3) Set the altimeter normally used to maintain flight altitude to 29.92 inches of mercury (1013.2 millibars).

(4) Select the test points listed in table 1 or 2 (sea level) and the maximum operating altitude of the aircraft. Test each of these test points for increasing altitude and for decreasing altitude.

(5) Apply pressure to the static system, or directly to the altimeter. If separate static systems serve altimeters and digitizers, simultaneously apply identical pressure to each. Approach each test point slowly, decreasing pressure for increasing altitude, and vice versa, until a transition to the test point value occurs in the digital output. Record the pilot's altimeter reading at the instant of transition.

(6) Encoding digitizers, which are separate units (blind encoders) having their own individual pressure sensor, should be checked against the pilot's altimeter upon installation to ensure that the overall system accuracy of § 91.217 is met. It will be necessary to perform a check of the system accuracy any time either the encoder or altimeter is replaced. Matched components should be identified and the calibration information recorded.

(a) The matched set (blind encoder and altimeter) should be shop tested and calibrated at ambient temperature.

(b) This abbreviated environmental temperature test is only valid when both units are installed in the same environmental location (that is, both units mounted on instrument panel or in near vicinity of one another). Other installations require FAA engineering approval.

(7) In addition, where an installation allows for the blind encoder to be connected to a static source other than the static source connected to the altimeter normally used to maintain flight altitude, the following corrections should be applied during certification of compliance with § 91.217:

(a) The difference between both static sources should be determined (in flight) and recorded. (This information may be available from the original aircraft certification data.)

(b) The differences determined in paragraph 8(7)(a) (static source errors) should be used as a correction factor when checking for compliance with § 91.217.

9. TESTING PRECAUTIONS AND INSTALLATION RECOMMENDATIONS.

a. Adequate precautions should be taken to avoid damage to any instruments connected to the aircraft pitot-static system, either by "TEE" connecting the pitot and static lines together, or by connecting the vacuum source directly to the altimeter and encoder when separate units are involved. The aircraft static system should be returned to ambient pressures before disconnecting pneumatic test equipment from aircraft/instruments. After completion of all testing, a leakage test of the static system should be performed if the static system has been opened.

b. In aircraft equipped with plastic pitot or static lines, adequate precaution should be taken to avoid collapsing the plastic tubing at the higher differential pressures.

c. The blind encoder or encoding altimeter should have an altitude encoding capability up to at least the service ceiling or maximum certificated altitude of the aircraft in which it is installed. If the altitude reporting system will not function throughout the aircraft operational envelope (up to the aircraft maximum operating altitude), a placard stating the aircraft altitude limitation should be installed.

d. The barometric correlation adjustment should not be adjusted in the field; changing this adjustment will nullify the correspondence between the altimeter and its encoding digitizer or the associated blind encoder.

e. Some altimeters may exhibit a tendency toward jerkiness (when not under vibration). If the jerkiness appears excessive, then the friction test should be conducted as described in AC 43–203B.

f. Automatic altitude reporting system installations (either blind encoder or encoding altimeter types) may be shop tested for correspondence (using the transponder decoded output) and then functionally checked after installation in the aircraft, provided the same transponder encoding digitizer, altimeter and wiring harness, and coaxial cable are either installed in the aircraft or accurately compensated for.

APPENDIX 1 — TABLES

TABLE 1. ALTITUDE INFORMATION PULSE POSITIONS (Encoding Altimeters)

Range (see appendix E to Part 43)	Pulse Position (0 to 1 in a pulse position denotes absence or presence of a pulse, respectively)											Correspondence Tolerance
Increments (feet)	D2	D4	A1	A2	A4	B1	B2	B4	C1	C2	C4	
-50 to +50*	0	0	0	0	0	0	1	1	0	1	0	See appendix E to Part 43.
950 to 1,050	0	0	0	0	0	1	1	0	0	1	0	
1,050 to 1,150	0	0	0	0	0	1	1	0	1	1	0	
1,250 to 1,350	0	0	0	0	0	1	1	1	1	0	0	
1,750 to 1,850	0	0	0	0	0	1	0	1	0	0	1	
2,550 to 2,650	0	0	0	0	0	1	0	0	0	1	1	
2,750 to 2,850	0	0	0	0	1	1	0	0	0	0	1	
6,750 to 6,850	0	0	0	1	1	0	0	0	0	0	1	
14,750 to 14,850*	0	0	1	1	0	0	0	0	0	0	1	
30,750 to 30,850**	0	1	1	0	0	0	0	0	0	0	1	

NOTES:

* Identifies transponder pulse positions and altitude limits necessary to check Class 1B and 2B transponders (equipment designed to operate at 15,000 feet and below). Reference TSO C–74c, Airborne ATC Transponder Equipment.

** Identifies transponder pulse positions and altitude limits necessary to check Class 1A and 2A transponders (equipment designed to operate above 15,000 feet). Reference TSO C–74c, Airborne ATC Transponder Equipment.

TABLE 2. ALTITUDE INFORMATION PULSE POSITION (Blind Encoders)

Range	Pulse Position (0 to 1 in a pulse position denotes absence or presence of a pulse, respectively)											Altimeter Scale Error Tolerance	Correspondence Tolerance
Increments (feet)	D2	D4	A1	A2	A4	B1	B2	B4	C1	C2	C4		
-1,050 to -950	0	0	0	0	0	0	0	0	0	1	0	±20	See appendix E to Part 43.
-50 to +50	0	0	0	0	0	0	1	1	0	1	0	±20	
450 to 550	0	0	0	0	0	0	1	0	0	1	0	±20	
950 to 1,050	0	0	0	0	0	1	1	0	0	1	0	±20	
1,050 to 1,150	0	0	0	0	0	1	1	0	1	1	0	±20	
1,250 to 1,350	0	0	0	0	0	1	1	1	1	0	0	±23	
1,450 to 1,550	0	0	0	0	0	1	1	1	0	1	0	±25	
1,750 to 1,850	0	0	0	0	0	1	0	1	0	0	1	±27	
1,950 to 2,050	0	0	0	0	0	1	0	1	0	1	0	±30	
2,550 to 2,650	0	0	0	0	0	1	0	0	0	1	1	±30	
2,650 to 2,750	0	0	0	0	0	1	0	0	0	0	1	±30	
2,950 to 3,050	0	0	0	0	1	1	0	0	0	1	0	±30	
3,950 to 4,050	0	0	0	0	1	1	1	1	0	1	0	±35	
5,950 to 6,050	0	0	0	0	1	0	0	1	0	1	0	±40	
6,750 to 6,850	0	0	0	1	1	0	0	0	0	0	1	±48	
7,950 to 8,050	0	0	0	1	1	0	1	1	0	1	0	±60	
9,960 to 10,050	0	0	0	1	1	1	0	1	0	1	0	±80	
11,950 to 12,050	0	0	0	1	0	1	1	1	0	1	0	±90	
13,950 to 14,050	0	0	0	1	0	0	0	1	0	1	0	±100	
14,750 to 14,850	0	0	1	1	0	0	0	0	0	0	1	±104	
15,959 to 16,050	0	0	1	1	0	0	1	1	0	1	0	±110	
17,950 to 18,050	0	0	1	1	0	1	0	1	0	1	0	±120	
19,950 to 20,050	0	0	1	1	1	1	1	1	0	1	0	±130	
21,950 to 22,050	0	0	1	1	1	0	0	1	0	1	0	±140	
24,950 to 25,050	0	0	1	0	1	1	1	0	0	1	0	±155	
29,950 to 30,050	0	0	1	0	0	0	0	1	0	1	0	±180	
30,750 to 30,850	0	1	1	0	0	0	0	0	0	0	1	±184	
34,950 to 35,050	0	1	1	0	1	1	0	0	0	1	0	±205	
39,950 to 40,050	0	1	1	1	1	0	1	1	0	1	0	±230	
44,950 to 45,050	0	1	1	1	0	0	1	0	0	1	0	±255	
49,950 to 50,050	0	1	0	1	0	1	0	1	0	1	0	±280	

APPENDIX 2 — GLOSSARY OF TERMS

1. Approved: Unless used with reference to another person, this means approved by the Administrator.

2. Blind Encoder (Digitizer): An altitude reporting encoder that is pressure operated, having no altitude display; is not part of a pressure/altitude indicating device or system; does not contain an external means for barometric setting; and supplies the altitude reporting information to the ATC transponder.

3. Data: Any drawings, sketches, stress analysis, reports, operating limitations, or photographs that support or describe an alteration.

4. Encoding Altimeter (Pressure Altitude): An altitude indicator that displays to the pilot the pressure/altitude sensed by the device and produces an altitude-reporting digital code output.

5. Indicated Datum of the Altimeter: The altitude displayed by the altimeter when an ideal absolute pressure is applied to the sensing member of the altimeter. This altitude is not corrected for instrument error, nor for static source error.

6. Calibrated Datum of the Altimeter: The correction applied via a specific calibration card applicable to a specific altimeter to correct for instrument error (scale error) only.

7. Correspondence: The altimeter's displayed pressure/altitude (indicated or calibrated datum) compared to encoded altitude output from the blind encoder or encoding altimeter, for the entire period (from the moment the code output changes to a value to the moment the code output changes to the next value while the pressure/altitude is changing) that output code remains at the same digital information.

8. Matched Components: An altimeter and a blind encoder that have been tested and calibrated together and, as a combination, meet the requirements of § 91.217.