CHAPTER 1. PERFORM FIELD APPROVAL OF MAJOR REPAIRS AND MAJOR ALTERATIONS

SECTION 1. BACKGROUND

1. PROGRAM TRACKING AND REPORTING SUBSYSTEM (PTRS) ACTIVITY CODES.

A. Maintenance: 3414/3416

B. Avionics: 5414/5416

3. OBJECTIVE. This chapter provides guidance in determining the category of a repair or alteration and ensuring that the aircraft can be returned to service in accordance with approved technical data.

5. GENERAL.

A. Definitions:

(1) Aircraft: For purposes of this chapter, means aircraft, aircraft engine, propeller, appliances and any component thereof.

(2) Alter: To change or modify.

(3) Major alteration: An alteration not listed in the aircraft, aircraft engine, or propeller specifications that also fits one or more of the following:

- Might appreciably affect airworthiness by changing weight, balance, structural strength, performance, powerplant operation or flight characteristics.
- Is not done according to accepted practices or cannot be done by elementary operations

(4) Major repair: A repair that fits one or more of the following:

- Might appreciably affect airworthiness by changing weight, balance, structural strength, performance, powerplant operation or flight characteristics if improperly done
- Is not done according to accepted practices or cannot be done by elementary operations

(5) Minor alteration: Any alteration that is not classified as a major alteration.

(6) Minor repair: Any repair that is not classified as a major repair.

(7) Field approval: An approval by an authorized Airworthiness Aviation Safety Inspector (ASI) of a major repair or major alteration that is accomplished by one or more of the following, as appropriate:

- Examination of data only - one aircraft
- Physical inspection, demonstration, testing, etc. - one aircraft
- Examination of data only - duplication on identical aircraft

(8) Data: Information that supports and/or describes the alteration or repair, including the following:

- Drawings, sketches, and/or photographs
- Stress analysis
- Service Bulletins
- Engineering Orders
- Operating limitations

(9) Approved data: Data that can be used to substantiate major repairs/major alterations, derived from the following:

- Type Certificate Data Sheets
- Supplemental Type Certificates (STC) data, provided that it specifically applies to the item being repaired/altered
- Airworthiness Directives (AD)
- Airframe, engine, and propeller manufacturer's "FAA-approved" maintenance manuals or instructions
- Appliance manufacturer's manuals or instruction, unless specifically not approved by the Administrator or resulting in an alteration to the airframe, engine, and/or propeller
- FAA Form 337, Major Repair or Alteration, when the specified data has been previously approved and will be used as a basis for a field approval
- CAA Form 337, dated prior to 10/1/55

- FAA Form 337, used to approve multiple usage only, by the original modifier
- Structural Repair Manuals (SRM), only as a source of approved data for a major repair, when it is an FAA-approved document. Data that is contained in an SRM that is not FAA-approved, can be used on a case-by-case basis if prior FAA approval is granted for that repair.
- Part Manufacturer Authorization (PMA), is considered approved data for the part only, an STC may be required for the actual installation
- Technical Standard Order Authorization (TSOA)
- Delegation Option Authorization produced FAA-approved data
- Designated Engineering Representative (DER) approved data, only within authorized limitations
- Designated Alteration Station (DAS) FAA-approved data
- Repair data, under SFAR 36, for the holder's aircraft only
- Foreign bulletins, for use on U.S.-certificated foreign aircraft, when approved by the foreign authority
- Data describing an article or appliance used in an alteration which is FAA-approved under a TSO. As such, the conditions and tests required for TSO approval of an article are minimum performance standards. The article may be stalled only if further evaluation by the operator (applicant) documents an acceptable installation which may be approved by the Administrator
- Data in the form of (TCA) Appliance Type Approval issued by the Minister of Transport Canada for those parts or appliances for which there is no current TSO available. The TCA certificate is included within the installation manual provided with the appliance and includes the date of issuance and environmental qualification statement.
- Data describing a part or appliance used in an alteration which is FAA-approved under a Parts Manufacturer Approval (PMA). (An STC may be required to obtain a PMA as a means of assessing airworthiness and/or performance of the part.)

NOTE: Installation eligibility for subsequent installation or reinstallation of such part or appliance in a type-certificated aircraft, other than the aircraft within which airworthiness was originally demonstrated is acceptable, provided the part or appliance meets its performance requirements and is environmentally and operationally compatible for installation. The operator (applicant) must provide evidence of previously approved installation by TC, STC, or field approval on a From 337 which will serve as a basis for "follow-on" field approval.

Parts or appliances developed, manufactured, and shipped prior to the dates established by the policy published in the Federal Register on February 27, 1995 (60 FR 10480/ 10482), installed or intended for installation in type-certificated aircraft by TC, STC, or field approval process, may continue to be considered approved upon removal from the aircraft in which it was originally approved, for the purpose of repair or resale including installation in a different type-certificated aircraft.

In those cases where a manufacturer with current parts or appliances in production prior to February 27, 1995 FRN, has an application for PMA or TSO on file with the FAA, the manufacturer may continue to manufacture for sale such parts or appliances that do not have PMA or TSO until the application is acted upon and production approval is obtained provided the manufacturer has an FAA-approved fabrication inspection system. Such parts and appliances remain candidates for installation approval by TC, STC, or field approval provided that the operator (applicant) can show that the part or appliance has a satisfactory service experience, has not contributed to a prior adverse safety finding, and as installed, will perform its intended function.

- Service bulletins and letters or similar documents which are specifically approved by the Administrator (under a TSO, PMA, or other type certificated basis)
- Foreign bulletins as applied to use on a U.S.-certificated product made by a foreign manufacturer who is located within a country with whom a Bilateral Agreement is in place and by letter of specific authorization issued by the foreign civil air authority
- Other data approved by the Administrator
- FAA Advisory Circular 43.13-1, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair, as amended

NOTE: AC 43.13-1, as amended, may be used as approved data, only if the following three prerequisites are met:

- The user has determined that it is appropriate to the product being repaired/altered
- The user has determined that it is directly applicable to the repair/alteration being made
- The user has determined that it is not contrary to manufacturer's data

(10) Approval for return to service: The approval given by appropriately rated personnel that enables an aircraft to be returned to service.

(11) Return to service: The action of making an aircraft operational, after approval has been granted by appropriately rated personnel.

B. ASI Qualifications. The Airworthiness ASI must be authorized, experienced, and/or trained with the methods, techniques, and materials involved in the major repair/major alteration.

C. ASI Responsibilities.

(1) The ASI must be able to determine if, by granting a field approval, the affected product can be expected to result in reasonably safe operation and conform to regulatory requirements.

(2) If the ASI is not thoroughly familiar with all aspects of the alteration or repair or has any doubt about the expected airworthiness, approval/denial must not be given. Approval/denial can be given once the necessary assistance has been acquired and the ASI has made a determination about the expected airworthiness.

D. Data Requirements and Coordination.

(1) The source of the data used by an operator is strictly the operator's responsibility. ASI's should not obtain nor provide data for the operator's use. Source, cost, and other matters concerning an operator's acquisition of data, presented as part of an alteration approval action, should not be questioned.

(2) Acceptable data that may be used on an individual basis to obtain approval are:

- AC's 43.13-1 and 43.13-2, as amended
- Manufacturer's technical information (e.g., manuals, bulletins, kits, etc.)
- FAA Field Approvals

E. Designated Engineering Representatives (DER). If an appropriately rated DER is employed by the operator, the ASI should coordinate with both the operator and the DER.

(1) The DER may be limited to technical areas that do not fully cover the entire project. Any area not covered by this approval must be reevaluated by the FAA.

(2) The DER should not be permitted to make any determination as to which inspections are necessary for the pertinent alteration or repair, since this activity is outside the scope of the DER's authorization.

(3) DER's do not have the authority, by virtue of their delegation, to:

- Grant field approvals or otherwise "sign off" FAA Form 337
- To issue STC's
- Grant data approvals by signing log books or other similar documents

NOTE: Only one manufacturer's DER's may submit data to the appropriate Aircraft Certification Office (ACO) for approval on FAA Form 8110-3.

7. REQUIRED ENGINEERING APPROVAL.

A. Major alterations are actually major design changes and may require an STC. Previously unapproved major changes to structural strength, reliability, and operational characteristics affect the airworthiness of the product and therefore require engineering approval. Typical major alterations in this category include the following:

(1) Increase in gross weight and/or changes in center of gravity range

(2) Installation, changes, or relocation of equipment and systems that may adversely affect the structural integrity, flight, or ground handling characteristics of the aircraft

(3) Any change (alteration) of movable control surfaces that may adversely disturb the dynamic and static balance, alter the contour, or make any difference (plus or minus) in the weight distribution

(4) Change in control surface travel outside approved limits, control system mechanical advantage, location of control system component parts, or direction of motion of controls

(5) Changes in basic dimensions or external configuration of the aircraft, such as wing and tail platform or incidence angles, canopy, cowlings, contour or radii, or location of wing and tail fairings

(6) Changes to landing gear, such as internal parts of shock struts, length, geometry of members, or brakes and brake systems

(7) Any change to manifolding, engine cowling, and/or baffling that may adversely affect the flow of cooling air

(8) Changes to primary structure that may adversely affect strength or flutter and vibration characteristics or damage the tolerance design philosophy

(9) Changes to systems that may adversely affect aircraft airworthiness, such as:

- Relocation of exterior fuel vents
- Use of new type or different hydraulic components
- Tube material and fittings not previously approved

(10) Changes to oil and fuel lines or systems that may adversely affect their operation, such as:

- New types of hose and/or hose fittings
- Changes in fuel dump valves
- New fuel cell sealants
- New fuel or oil line materials
- New fuel or oil system components

(11) Any change to the basic engine or propeller design controls, operating limitations, and/or unapproved changes to engine adjustments and settings having an affect on power output

(12) Changes in a fixed fire extinguisher or detector system that may adversely affect the system effectiveness or reliability, such as:

- Relocation of discharge nozzle or detector units
- Use of new or different detector components in new circuit arrangements
- Decreasing amount or different type of extinguishing agent

(13) Changes that do not meet the minimum standards established in a Technical Standard Order (TSO) under which a particular aircraft component or appliance is manufactured

NOTE: "Meet the minimum standards established in a Technical Standard Order" means that the equipment does not have to have TSO approval, but only needs to meet the requirements set by the TSO.

(14) Modifications to approved type (TSO) radio communications and navigational equipment that may adversely affect reliability or airworthiness, such as:

- Changes that deviate from the vacuum tube or semiconductor manufacturer's operating limitations
- Any changes to IF frequency
- Extension of receiver frequency range above or below the manufacturer's extreme design limits
- Major changes to the basic design of low approach aids
- Changes that deviate from the design environmental performance

(15) Changes to aircraft structure or cabin interior of aircraft that may adversely affect evacuation of occupants in any manner

B. Engineering assistance and advice must be requested when working in areas that include:

- Use of synthetic covering material
- Substitution of parts
- Processes on which insufficient information is available
- New chrome plating applications
- New titanium applications
- Ceramic coatings
- New magnesium applications
- Use of synthetic resin glues
- New stripping or plating coatings
- New welding or brazing techniques
- Welding of certain types of propeller or engine parts
- Application of TSO's to specific installations
- Alternative means for complying with AD's
- Any change to a required aircraft instrument system
- Any other complex special process that if not properly performed could have an adverse effect on the integrity of the product

C. The ASI, not the operator, should make a request for engineering evaluation/assistance and/or approval of non-approved engineering data for field approvals.

D. When the alteration or repair data file is forwarded to engineering for review, a memorandum of transmittal must accompany the file. When necessary,

the transmittal will provide pertinent and detailed information not contained in the submitted data, such as the Airworthiness ASI's recommendations, viewpoints, and specific requests for advice.

E. When engineering assistance is requested for field approval purposes, the ASI who will complete the field approval will be expected to coordinate and implement the assistance requested by engineering.

F. Be aware that the data approved by FAA engineering may not cover all the steps and procedures needed to accomplish the alteration or repair. A field approval by the ASI may be required for the completion of the task.

9. INCOMPLETE AND/OR PIECEMEAL INSTALLATIONS.

A. Incomplete or piecemeal installation field approvals are intended to approve partial major modifications on aircraft that will be operated for an unspecified period of time. Aircraft having an incomplete equipment installation may be released for service only if the following has been accomplished:

- The alteration data has been FAA-approved
- The incomplete/piecemeal alteration has been determined to not affect the safe operation of the aircraft
- The equipment installed remains deactivated and has placards affixed to prevent use
- The weight and balance reflects the incomplete installation
- The maintenance records have been completed and signed for the work that was actually accomplished

B. In order to maintain the validity of the Certificate of Airworthiness, the approval for return to service must be conducted by an authorized person as defined in FAR 43.7.

C. The operator should be advised that alterations accomplished on a piecemeal basis may be subject to a complete conformity inspection when the entire project is presented for approval.

NOTE: The formal approval of each step of the alteration could eliminate this possibility and may provide for the utilization of equipment which, in itself, could be used safely.

11. FLIGHT TEST AND OPERATION CHECK REQUIREMENTS

A. An alteration or repair requiring either an operational flight test to show compliance with the regulations, or a change to a flight manual or operations limitations must be coordinated with the appropriate engineering office.

B. Alterations requiring a flight manual supplement or operations limitations changes must be coordinated with the Aircraft Certification Office.

C. Any alteration or repair that may have changed the aircraft flight characteristics appreciably or substantially affected its operation in flight, will be operationally checked in accordance with FAR Section 91.407 and the results recorded on the aircraft records.

D. If an operational check is unsatisfactory as a result of using approved data, additional data must be developed by the operator.

13. FAA FORM 337.

A. Data Approval.

(1) Data approval issued for one aircraft is applicable only to the aircraft described in Block 1 of FAA Form 337. This data cannot be used automatically as approved data for other aircraft. The data may be used only with the approval of the local office as the basis for obtaining approval on other aircraft.

(2) Data approval issued for duplication of identical aircraft may be used as approved data only when the identical alteration is performed on an aircraft of identical make, model, and series by the original modifier.

(3) When the alteration has been performed by persons other than the original modifier, this data may be used as the basis for obtaining approval on other aircraft.

B. Alteration Approval. Alteration approval, issued for one aircraft, is applicable only to the aircraft described in Block 1 of FAA Form 337. This alteration cannot automatically be applied to other aircraft. The alteration may be used only with the approval of the local office as the basis for performing alterations on another aircraft.

C. Recording Data Deviation. Alterations that use data which does not differ appreciable from previously approved data does not require new or additional approval. Minor variations which have no bearing on safety are acceptable without formal approval and without submission of a formal application by the applicant. However, the deviation should be recorded on the FAA Form 337.

D. Alterations to Fuel Tanks and/or Systems. Within 24 hours of receipt of an FAA Form 337 that describes a modification to an aircraft fuel system or

shows additional fuel tanks installed in the passenger or baggage compartment, accomplish the following:

(1) Review the form to ensure that all airworthiness requirements are met

(2) Ensure that all applicable sections, signatures, and dates are affixed to the form

(3) Ensure that the office identifier and the inspector's initials are entered in the place provided for, in the upper right-hand corner of the form

(4) Mail the form to FAA Aircraft Registry, AFS-700 by first class mail

SECTION 2. PROCEDURES

1. PREREQUISITES AND COORDINATION REQUIREMENTS

A. Prerequisites:

- Knowledge of the regulatory requirements of FAR Parts 21, 43, and 65
- Successful completion of the Airworthiness Inspectors Indoctrination Course for General Aviation and Air Carrier Inspections, or previous equivalent
- Successful completion of the Aircraft Alteration and Repair Course, as available
- Identification and authorization to perform field approvals by the Manager, Flight Standards Division

B. Coordination: This task may require coordination or assistance from FAA engineering, other technical personnel, and the operator.

3. REFERENCES, FORMS AND JOB AIDS.

A. References:

- FAR Parts 1, 23, 25, 27, 29, 31, 33, 35, 36, 39, 91, 121, 135, and 145
- Applicable SFAR's
- Order 8000.42, Authorization to Develop and Use Major Repair Data Not Specifically Approved by the Administrator, as amended
- Order 8110.37, DER Guidance Handbook, as amended
- Order 8130.2, Airworthiness Certification of Aircraft and Related Approvals, as amended
- AC 20-114, Manufacturer's Service Documents, as amended
- AC 43.9, Maintenance Records, as amended
- AC 43.13-1, Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair, as amended
- AC 43.13-2, Acceptable Methods, Techniques, and Practices - Aircraft Alterations, as amended
- CAR 3, 4a, 4b, 6, 7, and 8
- TC Data Sheets

B. Forms:

- FAA Form 337, Major Repair or Alteration
- FAA Form 8110-03, DER Data Approval
- FAA Form 8110-12, Application for Type Certificate, Production Certificate, or Supplemental Type Certificate

C. Job Aids: None.

5. PROCEDURES.

A. Review the Operator Submitted Data. Ensure that the data supplied is complete enough to proceed with an evaluation of the proposed alteration or repair.

(1) Review and evaluate the following, prior to the operator starting the actual work:

(a) A formal request submitted on one of the following:

- FAA Form 337 completed in duplicate (in triplicate, for extended range fuel tanks)
- Other administrative forms used by a manufacturer or operator that are acceptable to the Administrator

(b) Data that may include, but is not limited to, the following:

- Detailed description of the proposed alteration or repair
- Detailed design standards such as methods, sketches, drawings, stress analyses, photographs, electrical load analyses, etc.
- Testing procedures or methods to meet certification and/or operating rules, such as flammability, carbon monoxide, and noise requirements

(c) The description of proposed alteration or repair to ensure that it correctly and accurately describes the alteration or repair

(d) Detailed design standards, to ensure that the operator has considered all applicable design standards and has analyses to substantiate the findings in this regard. The standards must consider at least the following:

- The certification basis (fail safe, damage tolerance, etc.)
- The structural requirements that may be affected by the alteration or repair
- Any hazards that may affect the aircraft or its occupants

- Weight and balance computations
- Operating limitations
- Any other factors affecting safety or airworthiness

(e) Test procedures, to ensure that they include all tests necessary to substantiate that the alteration or repair meets applicable certification requirements and are appropriate to the alteration or repair.

(f) Instructions for continued airworthiness, if applicable

(2) If data is not complete, the operator must supply any additional information needed.

B. Evaluate the Proposal to Determine Compatibility With the Current Aircraft Configuration. Make a preliminary evaluation of the proposed alteration or repair and an inspection of the aircraft, as required. Accomplish at least the following as applicable:

(1) Review the aircraft records for previous alterations and repairs that may have an effect on the proposed alteration or repair

(2) Review the maintenance and inspection procedures to ensure that the alteration or repair is referenced

(3) Inspect the aircraft for the following:

- Previous alterations or repairs that may not have been recorded
- Compatibility of previous alterations or repairs with intended alterations or repairs

(4) If a determination is made that the proposed alteration is beyond the scope of a field approval, advise the operator that an FAA engineering approval is necessary. Assistance to the operator will include the following:

- Furnishing FAA Form 8110-12 or STC
- Advising that supporting data must be attached
- Cautioning against proceeding with the alteration prior to receiving engineering approval

(5) If assistance from engineering is needed for approving a major repair, contact FAA engineering. Coordination with the operator will include:

- Requesting that the operator provide all supporting data
- Cautioning against proceeding with the repairs prior to receiving engineering approval

C. Evaluate Alteration or Repair After Data Approval or Acceptance, When Appropriate. . Schedule a conformity inspection with the operator to verify workmanship and compliance to accepted or approved data.

(1) The inspection must account for activities during and after the alteration or repair process. This includes, but is not limited to, the following:

- Proof of loading structure
- Operational tests and checks
- Any other techniques or methods as deemed necessary

(2) If, during the conformity inspection, it is determined that the operator cannot comply with the submitted data, the operator must revise the data accordingly.

(3) When an operator's data is "data approved only," check the operator's workmanship, conformity, and compliance with the alteration or repair data as part of normal surveillance.

D. Review the Approval for Return to Service. The aircraft must be approved for return to service by a person authorized by FAR Section 43.7 by completing block 7 of FAA Form 337 and making a maintenance record entry.

7. TASK OUTCOMES.

A. File PTRS Data Sheet.

B. Completion of this task can result in the approval of the data, alteration, or repair. District office processing of the forms will depend upon whether or not the operator used previously approved data.

(1) Approved Data. If the data used in performing the major repair or major alteration was previously approved, the operator will complete Block 7, "Approval for Return to Service." The original will be kept by the aircraft owner and the duplicate will be given to the district office for processing.

NOTE: For a part, like a wing, that will not be used immediately, attach the FAA Form 337 to the part until needed (ref. AC 43.9, as amended).

(2) Unapproved Data. When the data used in the major repair or major alteration was not previously approved, the operator will submit both copies of the form to the district office. If the repair or alteration

data complies with regulations and is in conformity with accepted industry practices, record data approval by entering the appropriate statement in Block 3 of the FAA Form 337 and return both copies to the operator. After the operator completes Block 7, "Approval for Return to Service," the duplicate copy will be returned to district office for processing.

(3) When recording approval in Block 3, use one of the following statements:

(a) Approval by Examination of Data Only - One Aircraft: "The data identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized in FAR Section 43.7."

(b) Approval by Physical Inspection, Demonstration, Testing, etc. - One Aircraft: "The alteration or repair identified herein complies with the applicable airworthiness requirements and is approved for the above described aircraft, subject to conformity inspection by a person authorized in FAR Part 43, Section 43.7."

(c) Approval by Examination of Data Only - Duplication of Identical Aircraft: "The data identified herein complies with the applicable airworthiness requirement and is approved for duplication on identical aircraft make, model, and altered configuration when accomplished by the original modifier."

(4) Within two weeks of receipt of an FAA Form 337, that describes a major repair or alteration to an aircraft, submit to AFS-700.

(5) Within 24 hours of receipt of an FAA Form 337, that describes a modification to an aircraft fuel system or an installation of additional fuel tanks, submit the FAA Form 337 to the FAA Aircraft Registry, AFS-700, PO Box 25082, Oklahoma City, Ok., 73125, by first class mail.

NOTE: Military aircraft, foreign registered aircraft, and component parts not installed on an aircraft cannot have an FAA Form 337 submitted to AFS-700. This is because they cannot be identified by aircraft make, model, serial number, and U.S. Registration Number.

9. FUTURE ACTIVITIES. None.