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, 3446

B. Avionics: 5414, 5416, 5446

3. OBJECTIVE. This chapter provides guidance in determining the category of a repair or alteration and ensuring that the aircraft, engine, or accessory can be returned to service in accordance with (IAW) the field approval process, regardless of the rules under which the aircraft is operated.

5. GENERAL.

A. Definitions.

(1) Acceptable Data. The drawings and specifications necessary to define the configuration and design features of the repair or alteration. These drawings and specifications include information on weight, balance, operating limitations, flight characteristics, dimensions, materials, and processes that are necessary to define the repair or alteration. The following are examples of acceptable data and may be used as a basis for developing approved data to substantiate repairs or alterations:

(a) Manufacturer's manuals are acceptable data that may be used as a basis for developing approved data for major alterations.

(b) Federal Aviation Administration (FAA) Form 337, Major Repair and Alteration, when the specified data has been previously approved as a one-time alteration or repair, is acceptable data that may be used as a basis for developing approved data for subsequent alterations.

(c) If it is not FAA-approved, data contained in a Structural Repair Manual (SRM); Advisory Circular (AC) 43.13-2, Acceptable Methods, Techniques, and Practices—Aircraft Alterations, as revised; and AC 43.13-1B, Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair, as revised, are acceptable. (The Original Equipment Manufacturer (OEM) SRM is a preferred manual even though the SRM is not FAA-approved.)

(2) Alter. To change or modify.

(3) Approval for Return to Service. The approval given by an appropriately rated person that enables an aircraft to be returned to service.

(4) Approved Data. Substantiating and descriptive technical data, used to make a major repair or alteration, that is approved by the Administrator. The following list, although not all-inclusive, contains sources of approved data:

(a) Type Certificate Data Sheets (TCDS).

(b) Supplemental Type Certificate (STC) data, provided it specifically applies to the item being repaired/altered. Such data may be used in whole or part as included within the design data associated with the STC.

(c) Appliance manufacturer's manuals or instructions, unless specifically not approved by the Administrator, are approved for major repairs.

(d) Airworthiness Directives (AD).

(e) FAA Form 337, which has been used to approve multiple identical aircraft (only by the original modifier).

NOTE: Aviation safety inspectors (ASI) no longer approve data for use on multiple aircraft.

(f) U.S. Civil Airworthiness Authority (CAA) Form 337, dated before October 1, 1955.

(g) FAA-approved portions of SRMs.

(h) Designated Engineering Representative (DER)-approved data, only when approval is authorized under his/her specific delegation.

(i) Designated Alteration Station (DAS) FAA-approved data, when the major alteration is performed specific to the authorization granted.

(j) Data in the form of an Appliance Type Approval issued by the Minister of Transport Canada for those parts or appliances for which there is no current Technical Standard Order (TSO) available. The installation manual provided with the appliance includes the Transport Canada certificate (see paragraph 13) as well as the date of issuance and an environmental qualification statement.

(k) Repair data issued under Special Federal Aviation Regulations (SFAR) 36.

(l) Foreign bulletins, for use on U.S.-certificated foreign aircraft, when approved by the foreign authority.

(m) 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 installed only if further evaluation by the operator (applicant) documents an acceptable installation which may be approved by the Administrator.

(n) 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 (TC) aircraft, other than the aircraft for 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 FAA Form 337 that will serve as a basis for "follow-on" field approval.

(o) Any FAA-approved Service Bulletins (SB) and letters or similar documents, including DER approvals.

(p) Foreign bulletins as applied to use on a U.S.-certificated product made by a foreign manufacturer located within a country with whom a Bilateral Agreement (BA) is in place and by letter of specific authorization issued by the foreign civil air authority.

(q) Other data approved by the Administrator.

(r) AC 43.13-1, as revised, for FAA-approved major repairs on non-pressurized areas of aircraft only when the user determines that it is:

- Appropriate to the product being repaired
- Directly applicable to the repair being made
- Not contrary to the airframe, engine, propeller, product, or appliance manufacturer's data

(5) Field Approval. One of the means used by the FAA to approve technical data used to accomplish a major repair or major alteration. It is an approval by the Administrator, through an authorized ASI (airworthiness), of technical data and/or installations used to accomplish a major repair or major alteration. Technical data so approved becomes "technical data approved by the Administrator." This type of approval may be accomplished for one-time approval.

(6) Follow-On Approval. Approval of equipment of the same make and model on an aircraft using data from the initial approval. The make and model of the aircraft may be different if the installation is similar.

(7) Initial Approval. The first approval of equipment of a given make and model.

(8) Major/Minor Repair/Alterations. See Title 14 of the Code of Federal Regulations (14 CFR) part 1 and part 43, appendix A.

(9) Major/Minor Type Design Changes. See 14 CFR part 21, §§ 21.93 and 21.113.

(10) Meet the Minimum Standards Established in a TSO. Means that the equipment need not have TSO approval, but only meet requirements set by the TSO.

(11) Return to Service. The action of making an aircraft operational, after an appropriately rated person grants approval.

(12) Substantiating. To support and verify with proof or evidence.

NOTE: For other definitions, see FAA Order 8300.10, Airworthiness Inspector's Handbook, vol. 1, ch. 1, General Information.

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

(1) The ASI must determine if, by granting a field approval, the affected product can be expected to result in 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, an airworthiness determination must not be given. He/she will seek assistance to the extent necessary to enable him/her to reach a clear decision before approval or denial is given.

(3) Flight Standards District Offices (FSDO) must ensure that an ASI's lack of experience or qualifications does not necessarily stop the approval process. The ASI's lack of qualifications does not mean the FSDO should deny a field approval and tell the applicant that they need an STC. The ASI can seek assistance from another ASI or FSDO, as appropriate.

(4) ASIs occasionally receive requests to approve alterations or repairs that do not require a field approval. These requests should be denied. Typically, these requests fall into one of two categories: minor alterations or repairs, or alterations or repairs that already have adequate approved data. Minor alterations and repairs do not need approved data and, therefore, should not receive field approvals. Alterations and repairs that are supported by sufficient previously approved DER-approved data may not require further approval. ASIs should review the data packages for each requested approval to ensure that a field approval is needed and is appropriate. ASIs who deny field approval requests to operators for alterations or repairs that do not need or qualify for field approvals should explain to the operator the reason for the denial and, if requested, provide the reason(s) in writing or via e-mail. The operator can then retain this as part of the aircraft records for future reference.

C. DER. If the applicant employs an appropriately authorized DER to provide supporting data for a field approval, then the ASI should coordinate activities with both the applicant and the DER. If the data addresses the entire alteration or repair, and all of the requirements of part 21 and part 43 are met, there is no requirement for any further approval by the ASI. The DER may be limited to technical areas that do not fully cover the entire project. For specific DER authorizations and limitations, reference FAA Order 8110.37, Designated Engineering Representative Guidance Handbook; FAA Order 8110.45, Use of Data Approved by Designated Engineering Representatives to Support Major Alterations; and AC 183.29-1, Designated Engineering Representatives Directory, as revised. The FAA must evaluate any area not covered by this approval.

D. DER Data. FAA Orders 8110.37 and 8110.45 address field approvals by reinforcing that although DERs are not authorized to approve alterations/repairs via a block 3 entry in FAA Form 337, DER data may still be used as the basis for an alteration in support of FAA Form 337. It also recommends inclusion of a note in the body of FAA Form 8110-3, Statement of Compliance with the Federal Aviation Regulations, stating, "This approval is for engineering design data only and is not an installation approval." DER data is not a field approval, but is approved data which, like other approved data, can be used to perform major alterations or repairs without further approval. DER data can also be included in the data package to support a field approval request.

E. Part 121 Air Carriers. Aircraft operated by 14 CFR part 121 air carriers, although not specifically prohibited from receiving field approvals, are not generally eligible for them. Field approvals may be performed on part 121 aircraft in rare instances for extenuating circumstances, and each request must be evaluated on a case-by-case basis. If an ASI from a FSDO/certificate management office (CMO)/ international field office (IFO) believes that a field approval request is appropriate, the FSDO/CMO/IFO will obtain concurrence from the Flight Standards Division regional office prior to performing the approval.

(1) The Flight Standards Division regional office will maintain a database of part 121 field approvals that it concurred or non-concurred with. This database will contain:

- A unique control number for each instance
- The date of concurrence or non-concurrence
- The name of the ASI assigned to field approve the alteration/repair
- The FSDO/CMO/IFO's routing symbol

- An indication of concurrence or non-concurrence
- The air carrier identifier
- The make/model of the aircraft
- A brief description of the requested approval

(2) Annually, the Flight Standards Division regional office will forward a report of the above information to the Aircraft Maintenance Division, AFS-300, by October 15.

7. REPLACEMENT AND MODIFICATION PARTS. Parts or appliances developed, manufactured, and shipped before the dates established by the policy published in the Federal Register on February 27, 1995, 60 FR 10480/10482, and installed or intended for installation in TC'd 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 TC'd aircraft. The intent of this paragraph is to protect the used value of previously installed parts that were installed and approved through the field approval process prior to the Federal Register Notice.

9. ALTERATIONS THAT MAY REQUIRE ENGINEERING EVALUATION, AIRCRAFT CERTIFICATION OFFICE (ACO) ASSISTANCE, OR STCs.

A. The list in Figure 1-3, Major Alterations Job Aid, describes methods of approval for typical major alterations. This list is not all-inclusive, and each project should be examined on a case-by-case basis. If an alteration is not identified on the list, it is eligible for a field approval unless the project is determined to be beyond the scope of the field approval process.

B. An alternative to the field approval process is the use of FAA DER-approved data on FAA Form 8110-3 (with data). If all the data supporting compliance with applicable airworthiness regulations is DER-approved, then the product can be altered IAW those data. The person(s) signing blocks 6 and 7 of FAA Form 337, not the DER, is then responsible for conforming and approving the installation. Refer to FAA Order 8110.45 for further details.

11. INCOMPLETE AND/OR INCREMENTAL INSTALLATIONS.

A. Incomplete or incremental installation field approvals are intended to approve partial-major alterations 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 have been accomplished:

(1) The alteration data has been FAA-approved;

(2) The incomplete/incremental alteration has been determined to not affect the safe operation of the aircraft;

(3) The equipment installed remains deactivated and has placards affixed to prevent use;

(4) The weight and balance reflects the incomplete installation; and

(5) The maintenance records, including the logbooks and Form 337, have been completed and signed for the work that was actually accomplished.

NOTE: In order to maintain an effective Airworthiness Certificate, the approval for return to service must be accomplished by an authorized person as defined in 14 CFR part 43, § 43.7.

B. The applicant must conduct a conformity inspection on the completed alteration. FAA approval of the incremental installation may provide for use of installed equipment if it can be determined that such equipment can be used safely (i.e., may require placards, Flight Manual Supplements, crew training.)

13. MAJOR REPAIR DESIGN APPROVALS BY TRANSPORT CANADA CIVIL AVIATION (TCCA) AND CANADIAN DESIGN APPROVAL REPRESENTATIVE (CANADIAN EQUIVALENT TO A U.S. DER). The FAA and TCCA have agreed in a Memo of Understanding (MOU) that certain TCCA and TCCA-delegated repair design approvals are considered to be FAA-approved data. The following information is provided for reference, but the MOU should be reviewed if additional guidance is required. The MOU is available at http://www.tc.gc.ca/CivilAviation/certification/Int/Memoranda/usa.htm.

A. For U.S.-held TCs, only repair design approvals issued by TCCA are considered to be approved data. Repair design approvals issued solely by a TCCA delegate are not approved data and, to be used as such, require TCCA approval or direct approval by the FAA or FAA designee.

B. For Canadian-held TCs, repair design approvals issued by either TCCA or a TCCA delegate are considered to be approved data.

C. For TCs held by all other countries, TCCA or TCCA-delegated repair design approvals are not considered to be approved data.

D. A TCCA Repair Design Certificate (equivalent to FAA Form 8110-3) can accompany data and can be signed by either a TCCA-approved Design Approval Representative or TCCA airworthiness authority.

15. USE OF MANAGEMENT DESIGNATED AIRWORTHINESS REPRESENTATIVES (DAR, FUNCTION CODE 50).

A. Management DARs serve as representatives of the Administrator. They review and certify alteration data packages for modifications to determine that:

(1) STC approval is not required.

(2) All regulatory aspects of the alteration(s) are addressed.

(3) Data approvals by DERs are within the scope and limitations of the DER's authority.

(4) Appropriate approvals exist for data that encompasses the entire alteration.

(5) Instructions for Continued Airworthiness (ICA) requirements are met.

B. To accomplish this task, the management DAR must:

(1) Determine the data package is complete with all FAA-approved data.

(2) If the data package is not complete, recommend completion of data approval by DERs, the ACO, or FSDO, as appropriate.

(3) Coordinate with the applicant and the FSDO when the alteration does not meet airworthiness requirements.

(4) If the data package meets all FAA requirements, complete Form 337, block 3, for certification of completeness.

(5) Return the package to the applicant for alteration completion.

(6) Maintain records of the work completed for review by the designee managing office.

C. Make the following entry in Form 337, block 3, for certification of completeness: "The alteration identified herein has been reviewed and found to be complete with appropriate DER approvals. All aspects of the alteration(s) are compatible and eligible for use on the above described aircraft, subject to conformity inspection by a person authorized in § 43.7."

17. FLIGHT TEST/OPERATIONAL CHECK REQUIREMENTS AND LIMITATIONS.

A. An alteration requiring a part 21, § 21.191(b) flight test to show compliance with the regulations must be coordinated with the appropriate engineering office or flight test DER. An Experimental Airworthiness Certificate to show compliance must be authorized by the Manufacturing Inspection District Office (MIDO) IAW FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products, as revised. If the flight test is unsatisfactory, the applicant must develop additional data.

B. Alterations requiring a flight manual supplement or operations limitations changes must be coordinated with the ACO, unless the Flight Standards inspector has been specifically authorized by Flight Standards to sign the document(s).

C. Any alteration or repair that will appreciably change the aircraft flight characteristics or substantially affect its operation in flight must be operationally checked IAW 14 CFR part 91, § 91.407, and the results recorded in the aircraft records.

19. FAA FORM 337, MAJOR REPAIR AND ALTERATION.

A. Types of Field Approval Data/Alteration Approvals.

(1) Data/alteration approvals issued for one aircraft are applicable only to the aircraft described in block 1 of FAA Form 337. The data/alteration may be used as acceptable data as a basis for obtaining approval on other aircraft.

NOTE: ASIs must not approve data for use on multiple aircraft.

(2) Data based on inspection or testing, such as approval of technical data by physical inspection (see section 2, paragraph 5D(3)).

B. Recording Data Deviations. Alterations that use data that does not differ appreciably from previously approved data do not require new or additional approval. Minor deviations that have no bearing on safety are acceptable without formal approval and without submission of a formal application by the applicant. A field approval is not required; however, the deviation should be recorded on FAA Form 337.

C. Disposition of FAA Form 337. Upon receipt of a completed FAA Form 337, 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, in the upper right-hand corner of the form; and

(4) Mail the form to Civil Aviation Registry, AFS-700, Oklahoma City, OK 73169.

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, review and mail as in paragraph 19C(1) through (4) above.

NOTE: Military aircraft without a civil TC, foreign-registered aircraft, and component parts not installed on an aircraft cannot have 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.

21. INSTRUCTIONS FOR CONTINUED AIRWORTHINESS (ICA).

A. The Administrator has determined that the field approval data package must include ICAs. The purpose of the ICA is to provide instructions on how to maintain aircraft that are altered and appliances that are installed IAW a field-approved major alteration. The ICA Checklist (Figure 1-1) is a guide for both the applicant who creates the ICA and the FAA Flight Standards inspector who accepts the ICA. The ICA developed IAW this guidance constitutes methods, techniques, and practices acceptable to the Administrator. If the ICA for the submitted field approval major alteration is not acceptable to the FAA inspector, that inspector should not sign block 3 of the applicant's FAA Form 337.

B. The ICA provides the aircraft owner/operator with the following advantages when included in block 8 of Form 337:

(1) The major alteration and reference to ICA is contained in one document;

(2) The ICA becomes a permanent aircraft record as required by part 91, § 91.417(a)(2)(vi); and

(3) The owner/operator can contact FAA registry for a replacement FAA Form 337 if the ICA is lost or destroyed. The additional reference to the presence of ICA as part of the major alteration in the aircraft's maintenance entry will ensure that maintenance personnel appropriately address ICAs during future inspections.

C. The applicant is to develop the ICA and present it in conjunction with the field approval request. The FAA inspector accepts the ICA if it meets the applicable requirements in 14 CFR part 23, § 23.1529; part 25, § 25.1529; part 27, § 27.1529; part 29, § 29.1529; part 31, § 31.82; part 33, § 33.4; and part 35, § 35.4. The checklist in Figure 1-1 is a guide so the applicant can be assured that all applicable requirements are met.

D. For field-approved major alterations to aircraft, engines, and propellers certificated under the Civil Air Regulations (CAR), the ICA must meet the original type design requirements. In cases where the major alteration is a total new design, or a substantial complete redesign which the CAR did not address, the major alteration must meet the applicable 14 CFR requirements. The checklist provides acceptable guidance for these types of installations.

E. The ICA requirements are the same for a field approval or STC. The vast majority of field-approved major alterations are simplistic in design and execution. Therefore, the applicant's ICA may not need as much detail as an ICA required for a complicated STC. If the manufacturers' instructions

are not available, the applicant may use FAA publications such as AC 43.13-1 and AC 43.13-2, as revised; appendix D of part 43, as revised; or other applicable aviation standards to develop the ICA.

F. Major alterations approved before October 7, 1998, were not required to have ICAs. However, if an owner/operator wishes to formally incorporate an ICA for existing field-approved major alterations, they may do so using the revision process in checklist item number 16 in Figure 1-1.

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SECTION 2. PROCEDURES

1. PREREQUISITES AND COORDINATION REQUIREMENTS.

A. Prerequisites:

- Knowledge of the regulatory requirements of 14 CFR parts 21, 43, and 65
- Successful completion of the Airworthiness Inspector Indoctrination course(s) or equivalent
- Successful completion of the Aircraft Alterations and Repair Course
- Identification and authorization to perform field approvals by the FSDO office manager and the regional Flight Standards manager in the form of a signed statement of authorization placed in the ASI's file or in the office manual (the authorization will state that the ASI is authorized to perform field approvals)

B. Coordination. This task may require coordination or assistance from FAA engineering, other technical personnel, and the operator. Direct communication between field personnel to permit a rapid exchange of technical information is recommended.

3. REFERENCES, FORMS, AND JOB AIDS.

A. References (current editions):

- 14 CFR parts 1, 21, 23, 25, 27, 29, 31, 33, 34, 35, 36, 39, 43, and 91
- Applicable Special Federal Aviation Regulations (SFAR)
- FAA Order 8000.50, Repair Station Production of Replacement or Modification Parts
- FAA Order 8100.8B, Designee Management Handbook
- FAA Order 8100.9, DAS, DOA, and SFAR 36 Authorization Procedures
- FAA Order 8110.37, Designated Engineering Representative (DER) Guidance Handbook
- FAA Order 8110.45, Use of Data Approved by Designated Engineering Representatives to Support Major Alterations
- FAA Order 8130.2, Airworthiness Certification of Aircraft and Related Products
- FAA Order 8310.6, Airworthiness Compliance Check Sheet Handbook
- FAA Order 8340.1, Maintenance Bulletins
- AC 20-114, Manufacturers' Service Documents
- AC 23-17, Systems and Equipment Guide for Certification of Part 23 Airplanes
- AC 33.4-1, Instructions for Continued Airworthiness
- AC 43-9, Maintenance Records
- AC 43.9-1, Instructions for Completion of FAA Form 337 (OMB No. 2120-0020), Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance)
- AC 43.13-1, Acceptable Methods, Techniques, and Practices—Aircraft Inspection and Repair
- AC 43.13-2, Acceptable Methods, Techniques, and Practices—Aircraft Alterations
- CAR 3, 4a, 4b, 6, 7, and 8
- Aeronautics Bulletins 7A, 7H, and 8
- TCDS
- ATOS Element: 1.2.2

B. Forms:

- FAA Form 337, Major Repair and Alteration
- FAA Form 8110-3, Statement of Compliance with the Federal Aviation Regulations
- FAA Form 8110-12, Application for Type Certificate, Production Certificate, or Supplemental Type Certificate

C. Job Aids:

- FAA Order 8310.6
- Figure 1-1, ICA Checklist
- Figure 1-2, Decision Flow Chart for Field Approval Process
- Figure 1-3, Major Alterations Job Aid
- JTAs: 3.2.4, 4.8.11

5. PROCEDURES.

A. Review the Applicant's Request for a Field Approval. Ensure that the information supplied is complete enough and is appropriate to proceed with the field approval process for the proposed alteration or repair. The applicant should specify the certification rule used as a basis for the field approval (ref. part 21, § 21.101).

(1) Review and evaluate the following before the operator starts the actual work, as applicable:

(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, such as engineering orders

(b) Proposed Flight Manual Supplements.

(c) FAA Form 8110-3.

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

(e) Methods, sketches, drawings, stress analyses, photographs, electrical load analyses, etc., to ensure that the operator has considered all applicable design standards and has analyses to substantiate the findings in this regard. The inspector must consider at least the following:

- The certification basis, including special conditions (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

(f) Ensure that all ground and flight tests and operational checks meet applicable certification requirements to substantiate the alteration or repair.

(g) ICAs.

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

B. Evaluate the Proposal. Determine if the applicant has conducted a conformity evaluation to ensure that the proposed alteration will not impact the airworthiness of the aircraft. The applicant will provide verification that he/she has inspected the aircraft and reviewed the aircraft records to ensure compatibility of this alteration or repair with previously approved modifications.

C. Evaluate Data Package.

(1) If a determination is made that the proposed alteration is beyond the scope of a field approval, advise the applicant that an STC is necessary. Assistance to the applicant will include the following:

- Furnish FAA Form 8110-12 application for an STC
- Advise that supporting data must be attached

(2) If assistance from an ACO is needed for approving a major alteration/repair, the ASI, not the applicant, should make the request for engineering evaluation/assistance and/or approval of non-approved engineering data for the field approval. This request should be made through the Flight Standards regional office. A memorandum from the ASI's office to the ACO through the regional office should accompany the file. The memorandum should provide pertinent and detailed information, such as the ASI's recommendations and specific requests for advice. The regional office should forward the request to the ACO. After the ACO has completed its evaluation, the file should be returned to the ASI through the regional office. Coordination with the applicant will include the following:

(a) Request that the applicant provide all supporting data.

(b) Caution against proceeding with the alteration/repair before receiving engineering approval.

(c) Provide the applicant with a proposed schedule for completion of the project that is consistent with available resources.

(d) Specific authorization:

- Flight Manual Supplement signature authority may be authorized by ACs, bulletins, or other written documentation

- Interior compliance inspections as authorized by an ACO
- Other written authorizations as requested by the ACO and MIDO during the coordination process

D. Data Package Accepted for Field Approval.

(1) ACO Concurrence. If engineering assistance was requested, written ACO concurrence (e.g., memo or e-mail) becomes an attachment to FAA Form 337.

(2) Approval for Data Only. If the repair or alteration data complies with regulations, record data approval by entering the appropriate statement and signing block 3 of FAA Form 337; return both copies to the applicant. When recording FAA approval in block 3, use the following statement for approval of technical data by examination of the data for use on only one aircraft:

> "The technical data identified herein has been found to comply with applicable airworthiness requirements and is hereby approved for use only on the above described aircraft, subject to conformity inspection by a person authorized in § 43.7."

(3) Approval of Technical Data by Physical Inspection. Schedule a physical inspection with the applicant to verify workmanship and compliance of the data submitted. If the repair or alteration complies with regulations, record alteration approval by entering the appropriate statement and signing block 3 of FAA Form 337, and return copies to the applicant. When recording FAA approval in block 3, use the following statement:

> "The alteration or repair identified herein complies with the applicable airworthiness requirements and is approved for use only on the above described aircraft, subject to conformity inspection by a person authorized in § 43.7."

NOTE: ASIs must not approve data for use on multiple aircraft.

(4) Denial of Proposed Alteration/Repair. If the applicant is unwilling or unable to comply with the requirements to obtain the requested field approval, terminate the process by notification in writing to the applicant. This notification should include the reason for denial. The applicant should be given the opportunity to make corrections as necessary.

E. ICAs. ASIs will ensure that each major alteration that requires additional maintenance or inspections not covered by original manufacturer's instructions approved under the field approval process will have ICAs prepared IAW §§ 23.1529, 25.1529, 27.1529, 29.1529, 31.82, 33.4, or 35.4, as applicable. The ICA will be documented on FAA Form 337. The ASI will advise the applicant that the entry for the major alteration in the aircraft's maintenance records required by part 43, § 43.9 will also include a reference to the ICA and identify FAA Form 337 where the instructions are documented. The form will be kept in the aircraft's permanent records IAW § 91.417a(2)(vi). The checklist in Figure 1-1 is a guide so the applicant can be assured that all applicable requirements are met.

7. TASK OUTCOMES.

A. File PTRS Data Sheet.

B. Completion of this task can result in the approval of the data, alteration, or repair; reference to the ACO for an STC; or denial of a request for a field approval.

9. FUTURE ACTIVITIES. None.

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FIGURE 1-1. ICA CHECKLIST

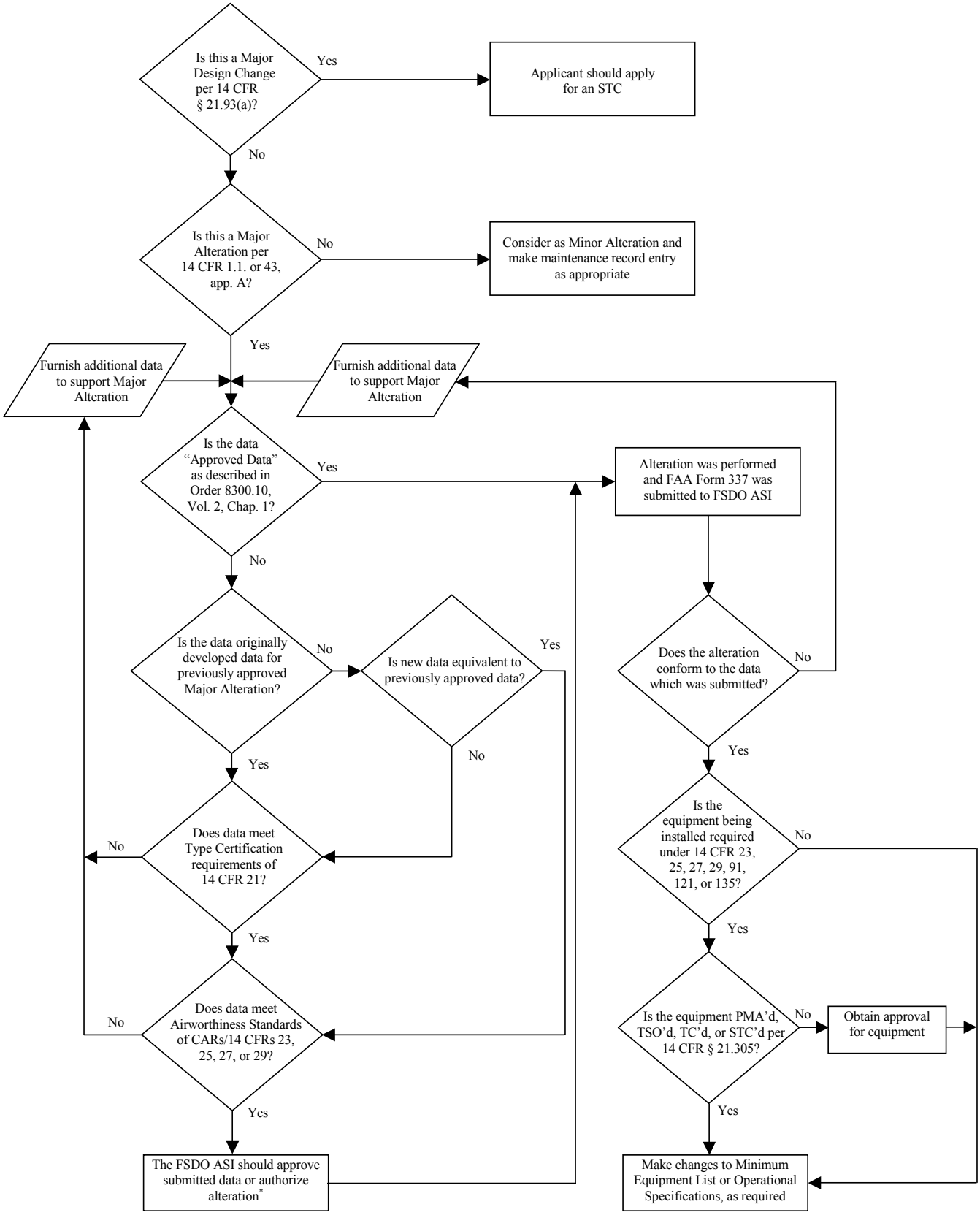
A/C Make: _____ Model: _____ S/N: _____ Reg. # N. _____
Revision: _____Date: _____ System: _____

Item	Subject
1.	**Introduction:** This section briefly describes the aircraft, engine, propeller, or component that has been altered. Include any other information on the content, scope, purpose, arrangement, applicability, definitions, abbreviations, precautions, units of measurement, referenced publications, and distribution of the ICA as applicable.
2.	**Description:** Of the major alteration, its functions, including an explanation of its interface with other systems, if any.
3.	**Control, operation information:** Or special procedures, if any.
4.	**Servicing information:** Such as types of fluids used, servicing points, and location of access panels, as appropriate.
5.	**Maintenance instructions:** Such as recommended inspection/maintenance periods in which each of the major alteration components are inspected, cleaned, lubricated, adjusted, and tested, including applicable wear tolerances and work recommended at each scheduled maintenance period. This section can refer to the manufacturer's instructions for the equipment installed where appropriate (e.g., functional checks, repairs, inspections). It should also include any special notes, cautions, or warnings, as applicable.
6.	**Troubleshooting information:** Information describing probable malfunctions, how to recognize those malfunctions, and the remedial actions to be taken.
7.	**Removal and replacement information:** This section describes the order and method of removing and replacing products, parts, and any necessary precautions. This section should also describe or refer to manufacturer's instructions to make required tests, trim checks, alignment, calibrations, center of gravity changes, lifting or shoring, etc., if any.
8.	**Diagrams:** Of access plates and information, if needed, to gain access for inspection.
9.	**Special inspection requirements:** Such as X-ray, ultrasonic testing, or magnetic particle inspection, if required.
10.	**Application of protective treatments:** To the affected area after inspection and/or maintenance, if any.
11.	**Data:** Relative to structural fasteners such as type, torque, and installation requirements, if any.
12.	**List of special tools:** Special tools that are required, if any.
13.	**For commuter category aircraft:** The following additional information must be furnished, as applicable: A. Electrical loads. B. Methods of balancing flight controls. C. Identification of primary and secondary structures. D. Special repair methods applicable to the aircraft.
14.	**Recommended overhaul periods:** Are required to be noted on the ICA when an overhaul period has been set by the manufacturer of a component or equipment. If there is no overhaul period, the ICA should state for item 14: "No additional overhaul time limitations."

FIGURE 1-1. (Continued)

Item	Subject
15.	**Airworthiness limitation section:** Include any "approved" airworthiness limitations identified by the manufacturer or FAA Type Certificate Holding Office (e.g., an STC incorporated in a larger field-approved major alteration may have an airworthiness limitation). The FAA inspector shall not establish, alter, or cancel airworthiness limitations without coordinating with the appropriate FAA Type Certificate Holding Office. If there are no changes to the airworthiness limitations, the ICA should state for item 15: "No additional airworthiness limitations" or "Not Applicable."
16.	**Revision:** This section should include information on how to revise the ICA. For example, a letter will be submitted to the local FSDO with a copy of the revised FAA Form 337 and revised ICA. The FAA inspector accepts the change by signing block 3 and including the following statement: "The attached revised/new Instructions for Continued Airworthiness (date_____) for the above aircraft or component major alteration have been accepted by the FAA, superseding the Instructions for Continued Airworthiness (date_____)." Once the revision has been accepted, a maintenance record entry will be made, identifying the revision, its location, and date of the Form 337.

FIGURE 1-2. DECISION FLOW CHART FOR FIELD APPROVAL PROCESS



*** NOTE: ASIs should see guidance in Figure 1-3 to determine when additional coordination with a DER or the ACO may be necessary.**

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FIGURE 1-3. MAJOR ALTERATIONS JOB AID

The following lists indicate which method(s) may be used for approving major alterations to TC'd and STC'd products. These lists are not all-inclusive, and each alteration should be evaluated on a case-by-case basis. Consult *each* section that concerns your product. Additionally, ASIs should review current bulletins, ACs, etc., for specific types of installations that have been identified as candidates for field approval. The legend is as follows:

- Items with the letters "STC" require an *STC*.
- Items with the letters "EVL" may be eligible for approval by means other than an STC, depending on the scope and complexity of the alteration. These items will not automatically qualify for a field approval; they require *evaluation* and review of guidance to determine if the field approval process may be used.
- Items with the letters "ENG" may be eligible for approval by means other than an STC, but require either supporting DER *engineering* data or concurrence from the ACO for field approval.

1. GENERAL AVIATION AIRCRAFT.	
The following list applies to aircraft certificated under 14 CFR parts 23 and 31 (or the earlier equivalents), SFAR 41, or Joint Aviation Regulation (JAR) 22.	
A. Weight and Balance.	
(1) Changes that increase the certificated maximum weight limits (increases in the maximum gross weight, maximum take-off, or landing weights).	**STC**
(2) Changes in the certificated center of gravity range limits (for example, decreasing the forward limit or increasing the aft limit).	**STC**
(3) Changes that increase the operational limits (maximum speed limits, such as V_A, V_{FE}, V_{NE}; minimum speed limitations, such as stall speed; increases in service ceiling; and so forth).	**STC**
B. Structural Strength.	
(1) Changing primary structures (structure that carries flight, ground, or pressure loads as defined in AC 25.571-1, Damage Tolerance and Fatigue Evaluation of Structure, as amended).	**ENG**
(2) Substituting airframe primary structural materials.	**STC**
(3) Substituting an engine or propeller (such as replacing a reciprocating engine with a turbine engine).	**STC**
(4) Substituting or altering a reciprocating engine such that the net result is an increase of more than 10 percent greater horsepower.	**STC**
(5) Substituting blind fasteners in primary load structures.	**ENG**
NOTE: All field approvals for blind fasteners (Cherry Max, or equivalent) in primary load structures must be coordinated with the ACO or supported by DER-approved data.	
(6) Altering passenger-carrying aircraft to an all-cargo or combination configuration.	**STC**

FIGURE 1-3. (Continued)

C. Reliability.	
(1) Changes to manifolding, air induction systems or air intake doors, engine cowling, or baffle that affect the flow of engine cooling air and carburetor/fire ignition heat rises.	**ENG**
(2) Changes to the basic engine or propeller design, controls, and operating limitations.	**ENG**
(3) Changes that include engine/propeller adjustments and settings limitations that affect power output.	**ENG**
(4) Modifications to approved avionics equipment that affect reliability or airworthiness, such as changes:	
• Deviating from the design environment performance.	**STC**
• Deviating from the component manufacturer's operating limitations.	**STC**
• To software.	**STC**
• To wire shielding that may affect High Intensity Radiated Fields (HIRF) and Electromagnetic Interference (EMI).	**EVL**
D. Operational Characteristics.	
(1) Changes or relocation of system components (including hydraulic, oil, and fuel systems components) and equipment that affect structural integrity, flight, ground handling characteristics, or noise/acoustics of the aircraft.	**ENG**
(2) Changes that alter the movable control surfaces that affect the dynamic and/or static balance, alter the aerodynamic contour of movable control surfaces, or change the weight distribution.	**STC**
(3) Changes in control surface travel, control system mechanical advantage, location of control system component parts, or direction of motion.	**STC**
(4) Changes in basic dimensions or external aerodynamic contour/configuration of the aircraft such as wing and tail planform or incidence angles, canopy, contour or radii, the location of wing and tail fairings, winglets, wing lift struts, tiptanks, windows, and doors.	**STC**
(5) Changes in canopies, windows, and doors on unpressurized aircraft.	**EVL**
(6) Changes in engine cowlings.	**ENG**
(7) Changes to flight-critical electrical/electronic systems such as electronic flight controls or the engine control system, Full Authority Digital Engine Control (FADEC), fly-by-wire, and so forth.	**STC**
(8) Changes that affect aircraft performance, drag, engine power, revolutions per minute (RPM), or exhaust muffler.	**EVL**
(9) Changes affecting noise.	**ENG**
(10) Changes affecting flight characteristics.	**ENG**
(11) Installation of:	
• Avionics systems performing critical functions or involving complex interfaces to other systems.	**STC**
• Heads up displays used for primary navigation.	**STC**
• Traffic Alert and Collision Avoidance Systems I (TCAS I).	**EVL**

FIGURE 1-3. (Continued)

• Traffic Alert and Collision Avoidance Systems II (TCAS II).	**STC**
• Autopilots.	**STC**
• Flight data recorders (FDR).	**STC**
• Ground proximity warning systems (GPWS).	**STC**
• Electronic flight instrument systems (EFIS) (see relevant bulletin(s)).	**STC**
• Terrain Awareness and Warning Systems (TAWS-A).	**STC**
• Terrain Awareness and Warning Systems (TAWS-B).	**EVL**
• Emergency Vision Assurance Systems (EVAS).	**STC**
• Global positioning system (GPS) (see relevant bulletin(s)).	**EVL**
NOTE: ASIs should also review current guidance for specific types of installations that have been identified as candidates for field approval.	
(12) Changes that increase the differential pressure limits of an atmospheric or climatic control system of aircraft interior compartments.	**ENG**
(13) Changes in engine and propeller combination (vibration approval).	**ENG**
(14) Any alteration that requires flight testing to show compliance with the regulations (not applicable to operational flights conducted under § 91.407(b)).	**ENG**
(15) Anti-terrorism countermeasures, including flares.	**STC**
E. Airworthiness.	
(1) Changes to landing gear and related components, such as internal parts of shock struts, length, geometry of members, brake and brake systems, or additions.	**EVL**
(2) Changes to systems that affect aircraft airworthiness, such as:	
• Relocation of exterior fuel vents, fuel drains, or battery vents. (Applicable to components not attached to the basic engine.)	**EVL**
• Crew or passenger liquid oxygen (LOX) or on-board generating systems.	**ENG**
• External critical access doors, Auxiliary Power Unit (APU) ram air, nacelle blowout doors, fuel drain.	**ENG**
(3) Changes to oil, hydraulic, pneumatic, and fuel lines, or systems that affect their operation or installation and flammability requirements, such as:	
• New types of hoses and/or hose fittings that may not meet installation requirements, such as flow rate and flammability requirements.	**ENG**
• Changes to fuel dump valves.	**EVL**
• New oil/fuel/hydraulic line materials beyond the scope of AC 43.13-1, as revised.	**EVL**
• Change to, or addition of, permanent fuel tanks or fuel system components, including sealants.	**EVL**

FIGURE 1-3. (Continued)

(4) Changes in fixed fire extinguisher or detector systems that affect the system's effectiveness or reliability, such as:	
• Relocating discharge nozzles, detector units, or fixed fire extinguisher bottles.	**ENG**
• Using new or different detector components.	**ENG**
• Decreasing the amount or changing the type of extinguishing agents.	**ENG**
(5) Changes that include substituting airframe materials that affect structural integrity, lightning protection, or flight characteristics.	**ENG**
(6) Alterations or repairs that include:	
• Use of synthetic covering materials.	**EVL**
• New titanium applications.	**ENG**
• Ceramic coatings.	**ENG**
• Use of synthetic coatings.	**ENG**
• Use of new plated coatings.	**ENG**
F. Crashworthiness.	
(1) Changes to the aircraft structure, cabin interiors, or equipment relocation.	**EVL**
(2) Changes that affect emergency exits (i.e., emergency medical services, sport parachute jumping).	**ENG**
2. ROTORCRAFT.	
The following section applies to aircraft with a certification basis of 14 CFR parts 27, 29, or the earlier equivalents.	
A. Weight and Balance.	
(1) Changes that increase the certificated maximum weight limits affecting structural, performance, handling qualities, and so forth (for example, increases in the maximum gross weight, maximum takeoff weight, or landing weight).	**STC**
(2) Changes in the certificated center of gravity range limits (for example, decreasing the forward limit or increasing the aft limit).	**STC**
(3) Changes that increase the operational limits (maximum speed limits, such as V_A, V_{FE}, V_{NE}; minimum speed limitations, such as stall speed; increases in service ceiling; and so forth).	**STC**
B. Structural Strength.	
(1) Changing primary structures (structures that carry flight, ground, or pressure loads as defined in AC 25.571-1) as well as the following additional modifications or structural members:	
• Installation of significant structure and/or appliances to the exterior of the aircraft (i.e., Forward Looking Infrared (FLIR), cameras, firefighting, and spray/dusting equipment).	**ENG**
• Changes to landing gear and related system and structural components, including wheels, brakes, and tires.	**EVL**

FIGURE 1-3. (Continued)

• Internal frame, longeron, or structural members.	**STC**
• Consideration of flutter and vibration for any of the aforementioned changes.	**STC**
(2) Substituting engine, propeller, rotor, or airframe primary structure materials.	**STC**
(3) Substituting blind fasteners in primary load structures.	**ENG**
NOTE: All field approvals for blind fasteners (Cherry Max, or equivalent) in primary load structures must be coordinated with the ACO or supported by DER-approved data.	
(4) Changing the structural panels and load-bearing components that could affect service life.	**STC**
(5) Installing Health Usage Monitoring Systems (HUMS).	**STC**
(6) Installing systems that extract power from drive systems, such as air conditioning power drawn from the tail rotor driveshaft.	**STC**
C. Reliability.	
(1) Changes to manifolding, air induction systems or air intake doors, engine cowling, or baffle that affect the flow of engine cooling air and carburetor/fire ignition heat rises.	**STC**
(2) Change to the basic engine, rotor or propeller design, controls, or operating limitations.	**STC**
(3) Changes that include engine/propeller adjustments and setting limitations that affect power output.	**STC**
(4) Modifications to approved avionics equipment that affect reliability or airworthiness, such as changes:	
• Deviating from the design environment performance.	**STC**
• Deviating from the component manufacturer's operating limitations.	**STC**
• To software.	**STC**
• To wire shielding that may affect High Intensity Radiated Fields (HIRF) and Electromagnetic Interference (EMI).	**EVL**
D. Operational Characteristics.	
(1) Changes or relocation of systems (including hydraulic, oil, and fuel systems) and equipment that affect structural integrity, flight, ground handling characteristics, or noise/acoustics of the aircraft.	**STC**
(2) Changes that alter the movable control surfaces that affect the dynamic and/or static balance, alter the aerodynamic contour of movable control surfaces, or change the weight distribution.	**STC**
(3) Changes in control surface travel, control system mechanical advantage, location of control system components parts, or direction of motion.	**STC**
(4) Changes in basic dimensions or external aerodynamic contour/configuration of the aircraft such as wing and tail planform or incidence angles, canopy, cowlings, contour or radii, the location of wing and tail fairings, winglets, wing lift struts, tiptanks, windows, and doors.	**STC**
(5) Changes to flight-critical electrical/electronic systems such as electronic flight controls or the engine control system, FADEC, fly-by-wire, and so forth.	**STC**

FIGURE 1-3. (Continued)

(6) Installation of:	
• Avionics systems that perform critical functions or involve complex interfaces to other systems.	**STC**
• Heads up displays used for primary navigation.	**STC**
• Traffic Alert and Collision Avoidance Systems I (TCAS I).	**EVL**
• Traffic Alert and Collision Avoidance Systems II (TCAS II).	**STC**
• Autopilots.	**STC**
• Flight data recorders (FDR).	**STC**
• Ground proximity warning systems (GPWS).	**STC**
• Electronic flight instrument systems (EFIS) (see relevant bulletin(s)).	**EVL**
• Terrain Awareness and Warning Systems (TAWS-A).	**STC**
• Terrain Awareness and Warning Systems (TAWS-B).	**EVL**
• Emergency Vision Assurance Systems (EVAS).	**STC**
• GPS (see relevant bulletin(s)).	**EVL**
NOTE: ASIs should also review current guidance for specific types of installations that have been identified as candidates for field approval.	
(7) Changes that affect aircraft performance, drag, engine power, RPM, or exhaust muffler.	**EVL**
(8) Changes affecting noise.	**ENG**
(9) Changes affecting flight characteristics.	**ENG**
(10) Any alteration that requires flight testing to show compliance with the regulations (not applicable to operational flights conducted under § 91.407(b)).	**ENG**
(11) Anti-terrorism countermeasures, including flares.	**STC**
E. Airworthiness.	
(1) Changes to systems, such as:	
• Relocation of exterior fuel vents or battery vents.	**EVL**
• Crew or passenger liquid oxygen (LOX) or on-board generating systems.	**ENG**
• External critical access doors, APU ram air, nacelle blowout doors, and fuel drain.	**ENG**
(2) Changes to oil, hydraulic, pneumatic, and fuel lines, or systems or their components that affect their operation or installation and flammability requirements, such as:	
• New types of hoses and/or hose fittings that may not meet installation requirements, such as those of flow rate and flammability.	**ENG**
• Changes to fuel dump valves.	**EVL**

FIGURE 1-3. (Continued)

• New oil/fuel/hydraulic line materials.	**EVL**
• New fuel tanks or fuel system components, including sealants.	**EVL**
(3) Changes in fixed fire extinguisher or detector systems that affect the system's effectiveness or reliability, such as:	
• Relocating discharge nozzle, detector units, or fixed fire extinguisher bottles.	**ENG**
• Using new or different detectors.	**ENG**
• Decreasing the amount or changing the type of extinguishing agents.	**ENG**
(4) Changes that include substituting rotor/airframe materials that affect structural integrity, lightning protection, or flight characteristics.	**ENG**
(5) Changes that alter dynamic components of rotorcraft, such as loads, vibration, fatigue, damage tolerance, flaw tolerance, characteristics of main or tail rotor system, transmission system, gearbox, driveshafts, driveshaft support bearings, and main and tail rotor blades.	**STC**
(6) Installation of a new or modification of an existing icing protection system.	**ENG**
(7) Changes to a critical or life-limited part, including engine/APU rotating parts.	**STC**
(8) Alteration of passenger-carrying aircraft to an all-cargo or combination configuration.	**STC**
(9) Additional items include:	
• Changes that may require a human factors compliance finding (for example, in flight deck instrumentation and controls).	**STC**
• Flight deck lighting changes to support night vision goggle use, or any approvals related to night vision goggles.	**STC**
• Changing or substituting engine/aircraft instrumentation required by a unique characteristic of the particular type design.	**STC**
NOTE: RPM changes of main and tail rotor may affect handling performance characteristics and/or noise or acoustics.	
(10) Alterations or repairs that include:	
• Use of synthetic covering materials.	**EVL**
• New titanium applications.	**ENG**
• Ceramic coatings.	**ENG**
• Use of synthetic coatings.	**ENG**
• Use of new plating coatings.	**ENG**
F. Crashworthiness.	
(1) Changes to the aircraft structure, cabin interiors, or equipment relocation that affect crashworthiness and/or emergency evacuation. This includes initial installation or relocation of seats or litter systems.	**STC**

FIGURE 1-3. (Continued)

(2) Changes that affect emergency exits (e.g., emergency medical services, sport parachute jumping).	**ENG**
3. TRANSPORT AIRPLANES.	
The following list applies to airplanes certificated under 14 CFR part 25 (or the earlier equivalents).	
A. Weight and Balance.	
(1) Changes that increase the certificated maximum weight limits (maximum gross weight, maximum takeoff or landing weights, and maximum zero fuel weight).	**STC**
(2) Changes in the certificated center of gravity range limits (for example, decreasing the forward limit or increasing the aft limit).	**STC**
(3) Changes that increase the operational limits (e.g., maximum speed limits, such as V_A, V_{FE}, V_{NE}, $V_{MO,}$ and V_{MO}/M_{MO}; minimum speed limitations, such as stall speed; and increases in service ceiling).	**STC**
B. Structural Strength.	
(1) Changes to principal or primary structural elements (principal elements that carry flight, ground, or pressure loads) defined by AC 25.571-1, as amended.	**STC**
(2) Substitution of engine, propeller, or airframe primary structure materials.	**STC**
(3) Substitution of blind fasteners in primary load structures.	**ENG**
NOTE: All field approvals for blind fasteners (Cherry Max, or equivalent) in primary load structures must be coordinated with the ACO or supported by DER-approved data.	
(4) Alteration of passenger-carrying aircraft to an all-cargo or combination configuration.	**STC**
C. Reliability.	
(1) Significant changes to manifolding, air induction systems or intake doors, engine cowling, or baffle that affect the flow of engine cooling air.	**STC**
(2) Changes to the basic engine or propeller design, controls, and operating limitations.	**STC**
(3) Changes that include engine/propeller changes to the adjustments and setting limitations.	**STC**
(4) Modifications to approved avionics equipment that affect reliability or airworthiness, such as changes:	
• Deviating from the design environmental performance.	**STC**
• Deviating from the component manufacturer's operating limitations.	**STC**
• To software.	**STC**
• To wire shielding that may affect High Intensity Radiated Fields (HIRF) and Electromagnetic Interference (EMI).	**EVL**
D. Operational Characteristics.	
(1) Changes or relocation of systems (including hydraulic, oil, and fuel systems) and equipment that affect structural integrity, flight, and ground handling characteristics of the aircraft.	**STC**
(2) Significant changes to the movable control surfaces that affect the dynamic and/or static balance, alter the aerodynamic contour of movable control surfaces, or change the weight distribution.	**STC**

FIGURE 1-3. (Continued)

(3) Changes to control surface travel, method of control system mechanical advantage, or direction of motion.	**STC**
(4) Changes in basic dimensions or external aerodynamic contour/configuration of the aircraft, such as wing and tail planform or incidence angles, canopy, cowlings, contour or radii, the location of wing and tail fairings, winglets, wing lift struts, tiptanks, windows, and doors that would require flight or performance revalidation.	**STC**
(5) Installation of new flight-critical electrical/electronic systems, electronic flight controls, or engine control systems such as FADEC and fly-by-wire.	**STC**
(6) Changes that affect aircraft performance, drag, engine power, RPM, or exhaust muffler.	**STC**
(7) Changes that alter the aerodynamic contour that affect noise or flight characteristics.	**ENG**
(8) Installation of:	
• Avionics systems performing critical functions or involving complex interfaces to other systems.	**STC**
• Heads up displays used for primary navigation.	**STC**
• Traffic Alert and Collision Avoidance Systems I (TCAS I).	**EVL**
• Traffic Alert and Collision Avoidance Systems II (TCAS II).	**STC**
• Autopilots.	**STC**
• Flight data recorders (FDR).	**STC**
• Ground proximity warning systems (GPWS).	**STC**
• Electronic flight instrument systems (EFIS) (see relevant bulletin(s)).	**EVL**
• Terrain Awareness and Warning Systems (TAWS-A).	**STC**
• Terrain Awareness and Warning Systems (TAWS-B).	**EVL**
• Emergency Vision Assurance Systems (EVAS).	**STC**
• GPS (see relevant bulletin(s)).	**EVL**
NOTE: ASIs should also review current guidance for specific types of installations that have been identified as candidates for field approval.	
(9) Any alteration that requires flight testing to show compliance with the regulations (not applicable to operational flights conducted under § 91.407(b)).	**ENG**
(10) Anti-terrorism countermeasures, including flares.	**STC**
E. Airworthiness.	
(1) Changes to landing gear and related components, such as internal parts of shock struts, length, geometry of members, brake and brake systems, or additions.	**ENG**
(2) Changes to systems, such as:	
• Relocation of fuel vents or drains.	**EVL**

FIGURE 1-3. (Continued)

• Crew or passenger liquid oxygen (LOX) or on-board generating systems.	**ENG**
• External critical access doors, APU ram air, nacelle blowout doors, and fuel drain.	**ENG**
(3) Changes to oil, hydraulic, pneumatic, and fuel lines, or systems or their components that affect their operation or installation and flammability requirements, such as:	
• New types of hoses and/or hose fittings that may not meet the installation requirements, such as flow rate and flammability requirements.	**ENG**
• Changes to fuel dump valves.	**ENG**
• New oil/fuel/hydraulic line materials.	**ENG**
• New flammable fluid tanks or system components.	**STC**
• Change to, or addition of, permanent fuel tanks or fuel system components, including sealants.	**ENG**
(4) Changes in fixed fire extinguisher or detector systems that affect the system effectiveness or reliability, such as:	
• Relocation of discharge nozzle, detector units, or fixed fire extinguisher bottles.	**ENG**
• Using new or different detector components (including TSO-approved detectors in new or existing circuit arrangements).	**ENG**
• Decreasing the amount or changing the type of extinguishing agents.	**ENG**
(5) Changes that include the substitution of airframe materials that affect structural integrity, lightning protection, or flight characteristics.	**ENG**
(6) Installation of new systems that affect their operation or installation and flammability requirements, such as:	
• Changing or adding permanent fuel tanks or fuel system components.	**STC**
• Emergency backup electrical power sources.	**STC**
• Crew or passenger oxygen systems.	**STC**
• Auxiliary Power Unit (APU).	**STC**
• Installing new fire extinguisher or detector systems or changing the type of extinguisher agents.	**STC**
(7) Changes to critical or life-limited parts.	**STC**
(8) Installation of a new or modification of an existing icing protection system.	**STC**
(9) Changes that alter critical or life-limited parts, including engine/APU rotating parts.	**STC**
(10) Changes that increase the differential pressure limits of an atmospheric or climatic control system of the aircraft and aircraft interior compartments.	**STC**
(11) Alterations or repairs that include:	
• Use of synthetic covering materials.	**ENG**
• New titanium applications.	**ENG**

FIGURE 1-3. (Continued)

• Ceramic coatings.	**ENG**
• Use of synthetic coatings.	**ENG**
• Use of new plating coatings.	**ENG**
F. Crashworthiness.	
(1) Changes to the aircraft structure, cabin interiors, or equipment relocation that affect crashworthiness and/or emergency evacuation. This includes initial installation or relocation of seats.	**STC**
(2) Changes that affect emergency exits (i.e., emergency medical services, sport parachute jumping).	**ENG**
4. ENGINES, PROPELLERS, AND APUs.	
The following list applies to engines certificated under 14 CFR parts 33, 34, and 36 or JAR E, propellers certificated under 14 CFR part 35 or JAR P, or APUs approved under TSO-C77a or b.	
A. Weight and Balance. Changes that increase or decrease the certificated weight or center of gravity.	**STC**
B. Structural Strength. Changes to an engine, APU, or propeller's primary or critical structure.	**STC**
C. Reliability and Airworthiness.	
(1) Changes to the approved ratings or operational or installation limits.	**STC**
(2) Changes to the engine, propeller, or APU control system.	**STC**
(3) Changes to engine, propeller, or APU adjustments and setting limitations that have an affect on power output or control functions or operability.	**STC**
(4) Changes that alter the aerodynamic contour of any blades, vanes, or internal or external aerodynamic surfaces.	**STC**
(5) Changes affecting engine or propeller performance, power, or RPM.	**ENG**
(6) Changes to inlet induction or exhaust components.	**STC**
(7) Changes to components, assemblies, or systems, such as:	
• Relocation of fuel vents or drains.	**ENG**
• Using new or different alternators, generators, starters, vacuum pumps, or magnetos.	**EVL**
• Using new or different hydraulic components, pumps, or turbo or superchargers.	**STC**
• Pressure fuel lines and oil lines.	**ENG**
• External critical access doors, APU ram air, nacelle blowout doors, bleed ports and doors, and so forth.	**STC**
• Installing new or modifying existing icing protection systems.	**STC**
(8) Changes that include substituting engine/APU/propeller materials that affect structural integrity, lightning protection, operating characteristics, fire protection, or noise/acoustics.	**STC**
(9) Major alterations to propellers.	**STC**
(10) Changes to critical or life-limited parts.	**STC**

FIGURE 1-3. (Continued)

(11) New propeller and engine combinations (vibration approval).	**STC**
(12) Modification to approved electrical equipment, such as:	
• Deviating from the design environmental performance compliance requirements.	**STC**
• Deviating from the component manufacturer's operating limitations.	**STC**
• Changing wire shielding or components that may affect HIRF, EMI, or lightning compliance.	**STC**
• Changing flight-critical electrical/electronic systems, such as electronic controls or engine, propeller, or APU control systems such as FADEC.	**STC**
• Changing or substituting engine, propeller, or APU instrumentation.	**EVL**
• Changes that do not conform to the minimum standards in a TSO under which a particular component or appliance is manufactured.	**STC**
(13) Changes to or relocation of any systems (including hydraulic, oil, and fuel systems) and equipment that affect structural integrity, operating characteristics, noise/acoustics, fire protection, or emissions and fuel venting.	**STC**
(14) Changes affecting the Airworthiness Limitations section (i.e., Chapter 4 or 5) of the ICAs.	**STC**
D. Other Considerations.	
(1) Changes affecting exhaust emissions (14 CFR part 34).	**STC**
(2) Changes affecting engine noise (14 CFR part 36).	**STC**