



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: MAINTENANCE AND ALTERATION DATA **Date: 10/7/02** **AC No: 120-77**
Initiated by: AFS-300 **Change:**

1. PURPOSE. This advisory circular (AC) provides one means, but not the only means, of ensuring that the contemplated maintenance, alteration, or continue-in-service condition is in compliance with applicable regulations and existing policy. This AC is not mandatory and is not a regulation. This AC recommends acceptable methods by which:

a. Air carriers and commercial operators, operating under Title 14 of the Code of Federal Regulations (14 CFR) Part 121, Part 129, section 129.14, and Part 135, section 135.411(a)(2), may apply the special provisions of Part 43, section 43.13(c).

b. Repair stations certificated under 14 CFR Part 145 may perform work for the operators identified in paragraph a above in accordance with section 145.2 and the special provisions of section 43.13(c).

c. These air carriers and commercial operators may continue articles in service or perform maintenance and alterations in a different manner from the following:

- Methods, techniques, and practices contained in manufacturer's Instructions for Continued Airworthiness (ICA),
- Maintenance and restoration/overhaul manuals (such as a Structural Repair Manual (SRM)), or
- Other methods, techniques, and practices acceptable to the Administrator.

NOTE: The special provisions of section 43.13(c) do not exempt these air carriers and commercial operators from the "approved data" requirement of sections 121.379(b) and 135.437(b), nor does it exempt a repair station from the requirement of 145.51(d)(3).

2. SCOPE. This AC applies to 14 CFR Parts 121, 135, and section 129.14 operators that are required to provide a continuous airworthiness maintenance and inspection program and to the aircraft they operate. The aircraft include:

a. All that are type certificated in accordance with 14 CFR Part 25 and Civil Air Regulation (CAR) 4b, and

b. Aircraft that have been type certificated in accordance with 14 CFR Parts 23, 27, 29, and Special Federal Aviation Regulation (SFAR) 41.

3. REGULATIONS AND GUIDANCE MATERIAL.

a. **Regulations.** These acceptable means of compliance with operating regulations refer to the applicable sections of 14 CFR Parts 91, 121, and 135.

- Part 1, Definitions and abbreviations
- Part 21, Certification procedures for products and parts
- Part 23, Airworthiness standards: Normal, utility, acrobatic, and commuter category airplanes
- Part 25, Airworthiness standards: Transport category airplanes
- Part 27, Airworthiness standards: Normal category rotorcraft
- Part 29, Airworthiness standards: Transport category rotorcraft
- Part 33, Airworthiness standards: Aircraft engines
- Part 35, Airworthiness standards: Propellers
- Part 39, Airworthiness directives
- Part 43, Maintenance, preventive maintenance, rebuilding, and alteration
- Part 65, Certification: Airmen other than flight crewmembers
- Part 91, General operating and flight rules
- Part 119, Certification: Air carriers and commercial operators
- Part 121, Operating requirements: Domestic, flag, and supplemental operations
- Part 129, Operations: Foreign air carriers and foreign operators of U.S.-registered aircraft engaged in common carriage
- Part 135, Operating requirements: Commuter and on demand operations and rules governing persons onboard such aircraft
- Part 145, Repair stations

- Part 183, Representatives of the Administrator
- SFAR 36
- SFAR 41

b. Related Guidance Materials (Latest Revisions):

(1) FAA Orders. Copies of the following Orders may be purchased from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA, 15250-7954. These Orders may also be accessed online at <http://www.faa.gov/RegulatoryAdvisory/index.htm>.

- Order 8100.9, DAS, DOA, and SFAR 36 Authorization Procedures
- Order 8110.4, Type Certification Handbook
- Order 8110.37, Designated Engineering Representative (DER) Guidance Handbook
- Order 8130.2, Airworthiness Certification of Aircraft and Related Products
- Order 8300.10, Airworthiness Inspector's Handbook
- Order 8310.6, Airworthiness Compliance Check Sheets Handbook

(2) Advisory Circulars. You may obtain copies of these documents from the U.S. Department of Transportation, Subsequent Distribution Center, SVC-121.23, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, Maryland 20785.

- AC 20-107, Composite Aircraft Structure
- AC 20-114, Manufacturers' Service Documents
- AC 23.1309-1, Equipment, Systems, and Installations in Part 23 Airplanes
- AC 25.571-1, Damage Tolerance and Fatigue Evaluation of Structure
- AC 25.1309-1, System Design and Analysis
- AC 25.1529-1, Instructions for Continued Airworthiness of Structural Repairs on Transport Airplanes
- AC 27-1, Certification of Normal Category Rotorcraft
- AC 29-2, Certification of Transport Category Rotorcraft
- AC 33-2, Aircraft Engine Type Certification Handbook
- AC 33.4-1, Instructions for Continued Airworthiness

- AC 43-9, Maintenance Records
- AC 43.13-1, Acceptable Methods, Techniques and Practices—Aircraft Inspection and Repair
- AC 43.13-2, Acceptable Methods, Techniques and Practices—Aircraft Alterations
- AC 91-56, Continuing Structural Integrity Program for Large Transport Category Airplanes
- AC 91-60, The Continued Airworthiness of Older Airplanes
- AC 140-6, The Development and Use of Major Repair Data Under Provisions of Special Federal Aviation Regulation No. 36
- AC 145-3, Guide for Developing and Evaluating Repair Station Inspection Procedures Manuals

(3) Other documents.

- AN 8110.7, Approved Data
- FAA-G-8082-11, Inspection Authorization Knowledge Test Guide

4. BACKGROUND. Air carriers and other certificate holders have cited the ambiguity of existing policies and procedures for developing, substantiating, and documenting maintenance and/or alteration data for civil aviation products. Usually, this confusion arises when a certificate holder performs a maintenance or alteration task (or allows an existing condition to remain in service) that differs from that called out in a manufacturer's service document, such as a Structural Repair Manual, service bulletin, or maintenance manual. In response, the Federal Aviation Administration (FAA) Aircraft Certification and Flight Standards Services have jointly developed this AC.

5. DEFINITIONS. For the purposes of this AC, the following definitions apply:

a. Airworthiness Limitations Section. The FAA-approved section of the ICA that sets forth mandatory replacement times, structural inspection intervals, and related structural inspection procedures, such as those established in accordance with section 23.573 and section 25.571. Compliance with the Airworthiness Limitations section is required under section 43.16 and Part 91, section 91.403 unless an alternative is approved by the Administrator. (Reference sections 21.50(b), 43.16, and 91.403.)

b. Airworthy. To be airworthy:

(1) The aircraft must conform to its Type Certificate (TC). Conformity to type design is considered attained when the aircraft configuration and the components installed are consistent with the drawings, specifications, and other data that are part of the TC and would include any

Supplemental Type Certificate (STC) and field approved alterations incorporated into the aircraft.

(2) The aircraft must be in a condition for safe operation. The condition of the aircraft relative to wear and deterioration (e.g., skin corrosion, window delamination/crazing, fluid leaks, tire wear, etc.) must be acceptable.

c. Approved Data. Technical and/or substantiating data that has been approved by the FAA.

d. Article. An aircraft, airframe, aircraft engine, propeller, appliance, or component part.

e. Certificate Holder. Within the context of this AC, a person holding an Operating Certificate (air carrier or commercial operator) issued under Part 119 and conducting operations under Part 121 or section 135.411(a)(2), or a Part 145 repair station performing work under section 145.2 (new rule cross-references section 145.205). This also includes section 129.14 operators.

f. Certification Maintenance Requirements (CMR). Required periodic tasks established during the design certification of the airplane as an operating limitation of the TC.

g. Change. A variation from the method, technique, or practice specified in the manufacturer's service document for the article being maintained, altered, or otherwise evaluated. Such changes include, but are not limited to, developing new repairs, revising existing work instructions, using a substituted part other than the one "called out" in a maintenance manual, or revising a damage limit or wear tolerance.

h. Continue-in-Service Condition. An article that is authorized to operate with wear or damage outside a specified limit, tolerance, or other parameter specified in a manufacturer's service document.

i. FAA Designees. Designated Engineering Representatives (DER), Delegation Option Authorization (DOA) holders, and Designated Alteration Stations (DAS).

j. Instructions for Continued Airworthiness (ICA). The methods, techniques, and practices for performing maintenance, preventive maintenance, and alterations, which are provided by the design approval holder or its component manufacturers, and are considered acceptable to the Administrator under section 43.13(a). For example, under Part 25, appendix H, the ICA includes an airplane maintenance manual or section, maintenance instructions, and an Airworthiness Limitations section. (Reference sections 21.50(b), 25.1529, Part 25, appendix H, and 43.13(a).)

k. Major Alteration. An alteration not listed in the aircraft, aircraft engine, or propeller specifications.

(1) An alteration that might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness, or

(2) An alteration that is not done according to accepted practices or cannot be done by elementary operations. (Reference Part 1, section 1.1.)

l. Major Repair.

(1) A repair that, if improperly done, might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness, or

(2) A repair that is not done according to accepted practices or cannot be done by elementary operations. (Reference Part 1, section 1.1.)

m. Manufacturer's Service Documents. Publications by a design approval holder that provide acceptable methods, techniques, and practices for performing maintenance, preventive maintenance, and alterations. They include, but are not limited to, maintenance manuals, restoration/overhaul manuals, ICAs, Component Maintenance Manuals, Structural Repair Manuals, service bulletins, letters, or other similar information.

n. Methods, Techniques, and Practices. The step-by-step, "how-to" instructions for accomplishing maintenance, preventive maintenance, and alterations. These instructions are considered "acceptable to the Administrator" if the certificate holder shows that the instructions will return the aircraft, engine, or other article to its original or properly altered condition. (Reference sections 21.50(b), and 43.13(a).)

o. Minor Alteration. An alteration other than a major alteration. (Reference section 1.1.)

p. Minor Repair. A repair other than a major repair. (Reference section 1.1.)

q. Structural Repair Manuals (SRM). These typically provide repair instructions, material substitutions, and allowable damage limits for the aircraft's structure.

r. Substantiating Data. Technical data used to show that an article complies with the applicable airworthiness standards (e.g., Parts 25 or 33). Compliance may be shown by tests, analysis, experience, and/or computations appropriate to the maintenance, alteration, or continue-in-service condition of the article being evaluated. Substantiating data shown to comply with the applicable airworthiness standards is acceptable to the Administrator. This is because it establishes that the article meets the regulatory requirements and would be returned to its original or properly altered condition by use of this data. (Reference sections 21.31, 25.603, and 43.13(b).)

s. Supplemental Type Certificate (STC). A certificate issued by the Administrator approving a change in the type design of the product. (Reference section 21.117.)

t. Technical Data. Drawings and specifications, including a list of drawings and specifications, needed to define the configuration and design features of a particular article, repair, or alteration. Typically, this includes information on materials, dimensions, and processes necessary to define structural strength, any required airworthiness limitations, and any data necessary to determine the airworthiness, noise characteristics, fuel venting, and exhaust

emissions (as applicable) of the altered or repaired aircraft. Technical data also includes test data and engineering analyses and other engineering information, such as engineering handbooks or approved military or industry specifications. It may also include operational and service experience, maintenance and alteration experience, reliability data, and other documented factual information that can be shown to be directly applicable to the airworthiness of the article. (Reference Part 21, section 21.31.)

u. Type Certificate. The type design, the operating limitations, the type certificate data sheet (TCDS), the applicable regulations with which the Administrator records compliance, and any other conditions or limitations prescribed for the product in the pertinent airworthiness regulations. (Reference section 21.41.)

v. Type Design. In pertinent part, this includes:

(1) The drawings and specifications, and a listing of those drawings and specifications, necessary to define the configuration and the design features of the product shown to comply with the requirements applicable to the product;

(2) Information on dimensions, materials, and processes necessary to define the structural strength of the product; and

(3) The Airworthiness Limitations section of the ICA as required by Parts 23, 25, 27, 29, 33, and 35, or as otherwise required by the Administrator.

6. AIRWORTHINESS DIRECTIVES, THE AIRWORTHINESS LIMITATIONS SECTION OF THE ICA, AND CERTIFICATION MAINTENANCE REQUIREMENTS.

a. In several situations, prior approval must be obtained from the Administrator before a certificate holder or a repair station may implement changes to documents that are required by the regulations. For example, changes to Airworthiness Directives (AD) may not be made without the prior approval of the Administrator. Typically, this means that an alternative method of compliance (AMOC) must be obtained from the Aircraft Certification Office (ACO) or other designated FAA office. This is because Part 39, section 39.3 requires the operator of any product to which an AD applies to comply with the provisions of an AD. The AMOC procedure is incorporated into an AD; therefore, complying with an AMOC constitutes compliance with the AD. The aircraft manufacturer may have made arrangements for some of its DERs to approve repairs as an AMOC for an AD.

b. The Airworthiness Limitations section includes each mandatory replacement time, structural inspection interval, and related structural inspection procedures approved under sections 23.573, 25.571, etc. (damage tolerance and fatigue evaluation of structure). Changes to the Airworthiness Limitations section of an ICA require the approval of the Administrator. (See sections 43.16 and 91.403.)

c. CMRs incorporated by reference into the appropriate TCDS also require prior approval of the Administrator. For example, the TCDS for the Boeing 777-200/300 series airplanes states that the CMRs are listed in either the FAA-approved Section 9 of the Boeing Maintenance Planning Document (Airworthiness Limitations and CMRs) or the applicable engine TCDS. The

TCDS for the aircraft specifically states that “the more restrictive requirement from these two documents shall be in force.”

7. MANUFACTURERS’ SERVICE DOCUMENTS.

a. Manufacturers’ service documents contain methods, techniques, and practices acceptable to the Administrator for performing maintenance, preventive maintenance, and alterations. Manufacturers’ service documents include maintenance manuals, restoration/overhaul manuals, ICA, component maintenance manuals, SRM, service bulletins, service letters, and other similar information. Under section 21.50(b), design approval holders are required to prepare and make ICA available to operators, repair stations, and others required to comply with ICA. While the FAA does not approve all service documents, it approves the Airworthiness Limitations section of the ICA. Typically, for Part 25 airplanes, both the SRM and service bulletins are approved by the FAA.

b. Under 14 CFR Parts 65, 121, 135, and 145, maintenance providers are responsible for obtaining FAA approval of technical data prior to approving a major repair or major alteration for return to service. Sometimes, manufacturers elect to obtain the FAA’s approval of technical data supporting a maintenance or alteration action before issuing a service document. This is often the most efficient and cost-effective way to approve technical data because it eliminates the need for affected operators and maintenance providers to secure independent approval before doing the work. However, it remains the operator’s responsibility to ensure that the Administrator’s approval of technical data is obtained, if required, before approving for return to service a repair or alteration based on the advice or recommendation of a manufacturer. A No Technical Objection (NTO) letter or a statement that a particular maintenance or alteration action is “DER approvable” does not constitute FAA approval. However, such a statement may be considered, when supported along with other technical information, when evaluating the airworthiness of a particular maintenance or alteration action or continue-in-service condition.

c. When a manufacturer has obtained the FAA’s approval of technical data, a service document is often marked “FAA-Approved,” “FAA/DER-Approved,” or “DER-Approved.” Although the entire document is reviewed by the FAA, only the technical data (i.e., engineering information) associated with it is approved. In many cases, the technical data is not included in the body of the service document. This is because that document typically contains only the instructions (methods, techniques, and practices) for performing a particular repair or alteration, rather than the engineering information that established compliance with the applicable airworthiness standards. Refer to AC 20-114, Manufacturers’ Service Documents, for methods a manufacturer may use to indicate that the FAA has approved service information.

8. THE STRUCTURAL REPAIR MANUAL, MAINTENANCE AND RESTORATION/OVERHAUL MANUALS, AND THE INSTRUCTIONS FOR CONTINUED AIRWORTHINESS.

a. Under section 21.50(b), the holder of a design approval for which application was made after January 28, 1981 must prepare and give the ICA to the owner of the aircraft. The holder of the design approval must thereafter make it available to any other person (such as repair stations) required to comply with the ICA’s instructions. For transport category aircraft certificated under

Part 25, the ICA requirements are in section 25.1529 and Part 25, appendix H. Similar ICA requirements exist for small airplanes, rotorcraft, engines, and propellers. (Reference Parts 23, 27, 33, and 35.)

b. The SRM provides repair instructions, material substitutions, and allowable damage limits data for continue-in-service condition of the aircraft's structure. Thus, the SRM sets forth acceptable methods, techniques, and practices for performing structural repairs in the same manner as other service documents (e.g., maintenance, component, or restoration/overhaul manual in compliance with 43.13(a)). Manufacturers typically request FAA approval of the SRM so the operator or a repair station may have ready access to approved data to perform major repairs and return aircraft to service in accordance with the airworthiness standards and sections 121.379(b) and 145.201(c)(2) (formerly 145.51(d)).

(1) It is the operator's responsibility to classify repairs as major or minor. An operator may use an FAA-approved SRM to accomplish repairs it has classified as either major or minor. An operator must support changes to repairs.

(2) The SRM also provides limits of damage that an operator may use to continue an aircraft in service without repair. These damage limits are not necessarily the maximum limits that the aircraft is capable of withstanding while still complying with the airworthiness standards. An operator intending to operate an aircraft with damage beyond a manufacturer's established damage limit must support the position that the aircraft continues to meet the airworthiness standards.

c. Performing maintenance in accordance with the SRM is one way to maintain certain areas of an aircraft in an airworthy condition. Aircraft structural designs are certificated to meet the applicable airworthiness standards that were in effect when the TC was issued. These rules form the type certification basis for the aircraft. Any subsequent repairs must continue to comply with applicable airworthiness standards and be accomplished in accordance with Part 43.

d. In addition to providing acceptable methods, techniques, and practices for performing maintenance, the SRM may also be used, when supported by appropriate substantiating data, to develop new or different repairs, or to authorize damage limits beyond those set forth in that manual. The SRM may also contain specific procedures authorizing continued aircraft operation for a period of time before a permanent repair is required to be completed.

e. The SRM is not considered part of the Airworthiness Limitations section of the ICA or the CMR. Moreover, the SRM is not part of the type design, even though it is often referenced on the TCDS under the heading of "Service Information," as it is for the Boeing 777-200/300 series airplanes.

9. MAINTENANCE PERFORMANCE RULES.

a. Section 43.13(a) states that maintenance, preventive maintenance, and alterations may be performed in accordance with either of the following:

(1) Methods, techniques, and practices in the maintenance manual or the ICA prepared by the manufacturer, or

(2) Other methods, techniques, and practices acceptable to the Administrator.

b. Under section 43.13(b), each person must perform work in such a manner and use materials of such a quality that the article worked on will be returned to at least its original or properly altered condition. This does not mean that an article must be maintained in factory-new condition. Rather, it requires that the maintenance, preventive maintenance, and alterations result in an airworthy product (i.e., one that complies with Part 25, any other applicable airworthiness standards (such as Part 33), and the pertinent operating rules). Generally, that is accomplished by following the maintenance manuals prepared by the manufacturers, or using other information acceptable to the Administrator, such as ACs.

c. Section 43.13(c) states that (unless otherwise notified by the Administrator) the methods, techniques, and practices in the air carrier's maintenance manual constitute an acceptable means of compliance with section 43.13. Therefore, an air carrier that follows its maintenance manual procedures not only complies with sections 121.367 and 121.369 (see paragraph 11), but also complies with section 43.13(a) and (b). The special conditions of section 43.13(c) notwithstanding, each operator and repair station is responsible for determining that major repairs and major alterations have been accomplished in accordance with technical data approved by the Administrator. (Reference sections 121.379(b), 135.437(b), and 145.201(c)(2) (formerly 145.51(d)).

d. Pursuant to section 145.57 (new rule cross-references sections 145.109 and 145.201), repair stations are also required to comply with section 43.13(a) and (b). In addition, when they perform work for Part 121 air carriers, repair stations must do so in accordance with the carrier's maintenance manual, as required by section 145.2 (new rule cross-references section 145.205). When a repair station follows an air carrier's manual, it will also be in compliance with section 43.13(a) and (b).

10. METHODS, TECHNIQUES, AND PRACTICES VERSUS TECHNICAL DATA.

a. The terms "methods, techniques, and practices" and "technical data" have often been confused. While the concepts are related, each has a distinct meaning in 14 CFR.

(1) The methods, techniques, and practices referenced in section 43.13(a) are the step-by-step instructions for performing maintenance (including inspections), preventive maintenance, and alterations. These "how-to" instructions are normally contained in manufacturers' maintenance manuals and other service documents, and are usually based on approved technical data developed by the approval holder.

(2) Technical data consists primarily of engineering information. It includes drawings and specifications that define the configuration and design characteristics of an article, and information on materials, dimensions, and processes necessary to define structural strength. Substantiating data is technical data used to establish that the aircraft or other article, if repaired or altered using the instructions that the substantiating data supports, would be returned to its original or properly altered condition in accordance with section 43.13(b). The operator is responsible for showing that any substantiating data is directly related to the change that is being evaluated. This is especially important when it is necessary to substantiate a change using

service experience, maintenance and alteration experience, and reliability data. Accordingly, the technical data, when substantiated, is considered acceptable to the Administrator even in cases when it does not require the FAA's explicit approval.

b. Maintenance manuals and/or restoration/overhaul manuals may contain technical data. For example, if the manual specifies the required materials, dimensions, or other design information, this represents technical data.

c. An allowable damage limit in an SRM represents an acceptable method for accomplishing a repair or authorizing a continue-in-service condition. The TC holder's damage "limit" is based on approved substantiating data—i.e., an engineering analysis showing that even with such damage, the airplane would then still meet the appropriate airworthiness standards. In many cases a higher limit can also be shown to comply with those standards. (Refer to paragraph 12.)

11. MAINTENANCE AND RESTORATION/OVERHAUL MANUALS.

a. Parts 121, 135, and Section 129.14 Operators.

(1) Under sections 121.133 and 121.135, an air carrier must prepare and keep current a manual containing these items, among others:

- Instructions and procedures for performing maintenance, preventive maintenance, and servicing
- Time limitations, or standards for determining time limitations, for restoration/overhaul, inspections, and checks of aircraft and related components
- Airworthiness inspections, including instructions covering procedures, standards, responsibilities, and authority of inspection personnel

(2) Additional maintenance manual requirements are in sections 121.367 and 121.369. These rules also require the carrier to follow its manual when performing maintenance, preventive maintenance, and alterations. Similar rules exist for Part 135 and section 129.14 operators.

(3) An operator's maintenance manual generally includes two basic kinds of information. The first is product-specific and consists of the methods, techniques, and practices for performing maintenance and alterations on specific aircraft, engines, and related components. The second includes the carrier's maintenance practices, policies, and procedures, usually found in a General Maintenance Manual, Maintenance Policies and Procedures Manual, or similar document. Both kinds of information—the product-specific and the operator's general and policies and procedures manuals—are part of the operator's manual system required by Parts 121 and 135. When preparing its maintenance manual, the operator may designate the manufacturer's manuals as its own, develop its own maintenance information, or use some combination of the two. However, once its manual is established, the operator is required to comply with its terms.

(4) Operators may generally change their maintenance manuals without obtaining prior FAA acceptance. These changes, however, must be acceptable to the FAA. If an operator is following its maintenance manual, including its procedures for processing proposed changes to service documents, section 43.13(c) states that the operator will be in compliance with section 43.13(a) and (b). However, if the Administrator notifies an operator that a procedure in its manual is unacceptable, the carrier would no longer be authorized to use that procedure until the issue is resolved. Many operators have adopted procedures in their maintenance manuals to evaluate proposed changes to existing manufacturers' service documents. An operator's procedures must ensure that changes (and continue-in-service conditions) result in an aircraft configuration that meets the airworthiness standards. The procedures must also ensure that when interim changes are made, an appropriate maintenance action is accomplished at the appropriate time, as determined during the analysis phase of the operator's procedures. These changes (or variations) may involve the use of a different maintenance procedure, such as an interim repair, an equivalent part substitution, inspection technique, or revising repair or damage "limits," including those in an SRM. In some cases, revising a limit results in an article being approved for return to service without a repair having been performed.

(5) Operators typically process proposed changes through their engineering organizations. The engineers document the damage, condition, or contemplated action; conduct a technical analysis to determine whether the change would comply with the pertinent airworthiness standards (i.e., Parts 25, 33, etc.); and classify the maintenance action, alteration action, or continue-in-service condition as major or minor. If major, the technical and substantiating data supporting the change must be approved by the Administrator. If minor, an engineering analysis should be performed and documented in accordance with the procedures in the operator's maintenance manual, appropriate to the complexity of the situation. The change may be implemented if the analysis reveals that the proposed change would comply with the applicable airworthiness standards.

(6) Some operators may desire repair stations to develop technical and substantiating data on their behalf. These operators should have procedures in their maintenance manuals governing the manner in which this data may be evaluated under their procedures, including appropriate documentation and approval.

b. Repair Stations.

(1) Pursuant to section 145.2 (new rule cross-references section 145.205), repair stations performing work for air carriers must follow the procedures in the air carrier's manual for developing, documenting, and using technical data. An air carrier may use the technical data, substantiating data, or approved data developed by the repair station under this AC in accordance with the air carrier's procedures.

(2) A repair station manual submitted in accordance with section 145.45 (new rule cross-references section 145.207) governs the operations of certificated repair stations. Like the air carrier maintenance manual, the repair station manual is an accepted manual. This manual must be followed by the repair station when it performs maintenance, preventive maintenance, and alterations under Part 145. Unless otherwise prohibited by the repair station manual, repair stations may also implement changes to their manuals without obtaining prior FAA acceptance.

If the FAA notifies a repair station that a particular change to its manual would not comply with 14 CFR, the repair station would be required to rescind the change.

(3) Like air carriers, repair stations are governed by section 43.13 when they perform work. They must use methods, techniques, and practices acceptable to the Administrator, which are normally those in the manufacturer's or air carrier's service documents. However, when they are working on behalf of non-air carrier customers, the regulations allow repair stations to use other methods, techniques, and practices that are acceptable to the Administrator for performing the work. Paragraph 12(a) describes the general requirements for demonstrating that a particular variation from an existing service document would be acceptable to the Administrator.

(4) Like air carriers, a repair station must also obtain FAA approval of the technical data supporting a major repair or major alteration.

12. EVALUATING PROPOSED CHANGES TO DATA IN SERVICE DOCUMENTS.

a. General. Before an air carrier or repair station may change a repair, limit, or other procedure in an SRM or other service document, the following three requirements must be met. First, the change must be processed in accordance with procedures in the air carrier's maintenance manual. Second, the change must be shown to comply with the relevant airworthiness standards. Compliance with these standards will establish that the article will be returned to its original or properly altered condition in accordance with section 43.13(b). Third, if the change is classified as "major" in accordance with the operator's procedures, the technical data supporting the change must be approved before the article may be approved for return to service.

b. Manual Procedures. The certificate holder's manual procedures should be sufficiently detailed, but flexible enough to allow it to classify a change. If required, it should be able to obtain FAA-approved data, apply the approved data to the aircraft, and approve the aircraft for return to service. To help accomplish this, the certificate holder may take advantage of the latest communication media (fax, electronic mail, video, telex, etc.). These media can also be used to collect and transmit substantiating data in support of a proposed change. A certificate holder should not rely only on verbal communications. This could interfere with the proper classification of the data required to determine airworthiness. If a certificate holder intends to use these media, it should have procedures in its manual that explain how the media will be used. Procedures should also provide for a continuous loop of timely information and communications among the certificate holder, FAA principal inspector, ACO, designees, and the manufacturer, as appropriate. The procedures to evaluate proposed changes to service documents should be included in the air carrier manual. The procedures should contain the following elements:

(1) A method of ensuring only appropriately qualified and experienced personnel will make the engineering determinations required.

(2) A method of determining whether the proposed change requires FAA approval because it affects an AD, CMR, Airworthiness Limitation, Minimum Equipment List (MEL), maintenance program tasks, intervals, etc., and if the change requires FAA approval, procedures for obtaining that approval.

(3) A method of determining whether the proposed change is major or minor (see Appendix 1) and, if major, procedures to obtain FAA approval (or its equivalent, such as SFAR 36 in the case of repair data) of the technical data supporting the change.

(4) A method of developing technical/engineering justification, which includes the following: (Also see paragraphs 12d through f, below.)

- A review to determine if the existing technical data is sufficient to proceed with the proposed change.
- A method of consulting with the manufacturer, as appropriate. Such consultation brings together the best available knowledge and experience in the areas of design, production changes, and operations to ensure a well-designed repair.
- A procedure for obtaining additional technical data, as necessary.
- A procedure for substantiating compliance with pertinent airworthiness regulations, including citing the specific 14 CFR Part(s) for which compliance has been determined. This should be accomplished through tests, analyses, and/or computations appropriate to the complexity of the change being proposed.

NOTE: In each case, the procedures must establish the airworthiness standards that are applicable to the change and provide for documenting that the aircraft configuration after the change meets those standards.

- Document the substantiation process.

(5) The method of notification/reporting to principal inspector(s) of changes accomplished, as appropriate.

(6) For repair stations, a method of coordinating with the air carrier as required by section 145.2 (new rule cross-references section 145.205).

(7) A method of retaining the records of each action consistent with the recordkeeping requirements of 14 CFR.

c. Evaluating the Proposed Change. When determining whether a contemplated change from an existing service document is major or minor, the focus should be the change's effect on the capability of the aircraft configuration after the change to meet the applicable airworthiness standards. For example, a structural repair performed in accordance with an SRM may call for a specific size fastener, fastener edge margin, finish, corrosion treatment, or similar method, technique, or practice. In evaluating whether a proposed change (such as using an oversized fastener or a different finish than specified in the SRM) is major or minor, the analysis should address whether the change (including its effect on the repair and the aircraft configuration) will meet the definition of a major repair in Part 1. This is because the FAA only considered the configuration of the aircraft with the repair described in the repair instructions when it previously approved the technical data supporting that repair in the SRM. This evaluation should be made within the meaning of Part 1.

NOTE: Only major changes to FAA-approved technical data require FAA approval.

d. Showing Compliance with the Relevant Airworthiness Standards. Regardless of whether a proposed change is classified as major or minor, the certificate holder must establish that after the change the aircraft configuration complies with the pertinent airworthiness standards in Parts 23, 25, 27, 29, 33, 35, etc. This would therefore return the article to its original or properly altered condition in accordance with section 43.13(b). The certificate holder must document its determination so that the FAA can evaluate whether it is following its manual procedures. The certificate holder's procedures must ensure that the evaluation considers the effect of the change on the entire aircraft or article. This includes any other changes (approved or acceptable) that are affected by the change under consideration. The following procedure (paragraph 12f) will help certificate holders evaluate whether appropriate technical and substantiating data exists to accomplish the proposed change. The nature and extent of the data required will vary according to the complexity of the change and the other factors described below.

e. Initial Assessment.

(1) Description of the Affected Article. This description should include, but is not limited to:

- Nomenclature
- Part number
- Assembly number
- Serial number(s), if applicable
- Make and model of the article
- If known or as appropriate: hours or cycles, time-in-service, time since new, time since last maintenance action

(2) Description of the Discrepancy or Contemplated Change. A complete description of the damage, discrepancy, or change should include, but is not limited to:

- Specific location on the article
- Type (i.e., corrosion, limit exceeded, cracks, dents)
- Extent and/or dimensions
- Remaining dimensions of the affected area(s) or part(s)
- Associated, hidden and/or adjacent discrepancies, damage, or alteration(s)

- Previous maintenance action(s) or disposition(s) thereof, or alteration(s) at or adjacent to the affected area(s) or part(s)
- Cause, if known (i.e., environmental, accidental, design)

(3) Review Existing Data. As appropriate, review and document existing information (e.g., applicable maintenance documents, procedures, or process specifications) to determine whether it applies to the proposed change.

(4) Circumstances in Which Additional Data May Be Required. Situations in which further data collection and analysis may be required include, but are not limited to:

- Noticing that no methods, techniques, and practices are specified in the applicable service document, or the existing condition is beyond allowable limits or repair tolerances
- Performing an action in a different manner than prescribed by manufacturers' service documents
- Using maintenance or alteration data intended for a specific product on a like product
- Observing a substitution of materials or processes
- Noticing that an AD applies to the product in the area of the damage, discrepancy, or contemplated change
- Discovering that the area of the damage, discrepancy, or contemplated change has been defined as a primary structure or will create a Principle Structural Element (PSE) (see section 25.571)
- Noticing that CMRs apply in the area of the damage, discrepancy, or contemplated change
- Discovering that the article has an Airworthiness Limitation

f. Data Development.

(1) Technical Qualifications. The operator's procedures should prescribe the steps for reviewing, approving, and overseeing engineering authorizations, and specifying the minimum qualifications (particularly knowledge of applicable airworthiness standards) for the individuals engaged in these activities. These procedures should identify an individual who is responsible for the process, can delegate final engineering approval authority, and has the following qualifications:

- A thorough working knowledge of the applicable airworthiness standards of 14 CFR

- At least 1 year of satisfactory experience in processing engineering work, in direct contact with the FAA for type certification or major repair/alteration approval
- At least 8 years of aeronautical experience, which may include the 1 year of processing engineering work described above

(2) Technical Data. The data needed to substantiate changes may range from maintenance information referencing existing technical data to (in the case of critical systems) critical engine parts and primary structure, fully documented engineering analyses, and/or test(s). Additional data (such as endurance runs or destructive testing) should be collected if both of the following conditions apply:

- The proposed change uses processes that affect the part's performance characteristics, structural strength, or material properties
- Available data, analysis, or computation cannot satisfactorily establish compliance with the applicable airworthiness standards

(a) **Assessment.** As appropriate to the action being considered, the functions, interactions, environment, and consequence of the article's failure, as applicable, must be assessed. The assessment must determine the extent of analysis and the expertise needed to develop technical and substantiating data to comply with the airworthiness regulations. This assessment may include, but is not limited to:

- Functional information describing how the article functions within the assembly, how the assembly functions within the system, and/or how the system functions within the product
- Operating environment of the product
- Interaction with other systems and consequences of failure that could be most influenced by the maintenance, disposition, or alteration. Consider the most probable effect on its ability to perform its intended function
- Effect of the maintenance, alteration, or continued in service condition on the article's ability to meet the airworthiness standards specified in its type certification basis, including its operational characteristics or performance

(b) **Substantiating Data.** The technical data should be evaluated against each applicable regulatory section. The evaluation should be documented with sufficient detail to determine whether the technical data meets the applicable airworthiness standards.

(c) **Methods, Techniques, and Practices.** The methods, techniques, and practices should establish, as applicable, detailed work instructions, inspection criteria (incoming (initial), in-process, and/or final inspection), and description of or reference to processes and the instructions. For example, processes and instructions could include:

- i. Heat-treating, surface treatment, blending, and welding;

- limited to:
- ii. Consideration of specialized processes on engine hardware, such as, but not limited to:
 - HPT turbine blade repair (especially single crystal alloys)
 - LPT turbine blade repair
 - Subjecting engines and parts thereof to specialized processes (acid stripping, ultrasonic cleaning, etc.) outside of the manufacturer's ICA
 - iii. Continuous inspection requirements and/or future maintenance action requirements; and
 - iv. Acceptance of condition without further specific maintenance action.

13. RETENTION OF RECORDS. The above documentation must be retained for the period specified in sections 91.417(b), 121.380(c), 135.439(b), 145.61 (new rule cross-references section 145.219), and/or SFAR 36, as appropriate. Because the operator is responsible for the continuing airworthiness of these changes, it should retain these records for a sufficient period. These records may need to be used as reference material in addressing possible airworthiness concerns related to a repair or alteration.

/s/

James J. Ballough
Director, Flight Standards Service

**APPENDIX 1. MAJOR AND MINOR DETERMINATIONS—REPAIRS,
ALTERATIONS, AND CONTINUE-IN-SERVICE CONDITIONS**

