Federal Aviation Administration
Aviation Rulemaking Advisory Committee

Air Carrier/General Aviation Maintenance Issue Area Clarification of Major/Minor Repairs or Alteration Working Group Task 1 – 14 CFR Chapter 1

Task Assignment

[4910-13]

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

Aviation Rulemaking Advisory Committee; Clarification of Major/Minor Repairs or Alterations Working Group

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of establishment of Clarification of Major/Minor Repairs or Alterations Working Group.

SUMMARY: Notice is given of the establishment of the Clarification of Major/Minor Repairs or Alterations Working Group of the Aviation Rulemaking Advisory Committee (ARAC). This notice informs the public of the activities of the ARAC on air carrier/general aviation maintenance issues.

FOR FURTHER INFORMATION CONTACT: Mr. Frederick J. Leonelli, Assistant Executive Director for Air Carrier/General Aviation Maintenance Issues, Aviation Rulemaking Advisory Committee, Flight Standards Service (AFS-300), 800 Independence Avenue, SW., Washington, D.C. 20591, Telephone: (202) 267-3546; FAX: (202) 267-5230.

SUPPLEMENTARY INFORMATION: The Federal Aviation Administration (FAA) has established an Aviation Rulemaking Advisory Committee (ARAC) (56 FR 2190, January 22, 1991; and 58 FR 9230, February 19, 1993). One area the ARAC deals with is air carrier/general aviation maintenance issues. These issues involve mechanic certification and approved training schools outlined in parts 65 and 147 and the maintenance standards for parts 23, 25, 27, 29, 31, 33, and 35 aircraft, engines, propellers, and their component parts and parallel provisions in parts 21, 43, 91, 121, 125, 127, 129, 133, 135, and 137 of the Federal Aviation Regulations (FAR), which are the

responsibility of the FAA Director, Flight Standards Service.

Task

Specifically, ARAC tasked the working group as follows:

> Review Code of Federal Regulations (CFR) Title 14--Aeronautics and Space, Chapter I--Federal Aviation Administration, Department of Transportation, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of acceptable and/or approved data. If ARAC determines rulemaking documents or advisory circulars are appropriate to resolve the major/minor problem, such documents should be developed by ARAC, along with proper justifications and any legal and economic analyses.

Reports

The working group will develop and present to ARAC for consideration any combination of the following as it deems appropriate:

1. A draft notice of proposed rulemaking proposing new requirements with regard to the issue of acceptable and/or approved data with supporting economic and other required analysis, and any other collateral documents the working group determines appropriate; or

2. If new or revised requirements standards or compliance methods are not recommended, a draft report stating the rationale for those recommendations.

The working group chair (or his designee) should:

A. Recommend time line(s) for completion of the task, including rationale, for consideration at the meeting of the ARAC to consider air carrier/general aviation

maintenance issues held following publication of this notice.

B. Give a status report on this task at each meeting of ARAC held to consider air carrier/general aviation maintenance issues; and

C. Give a detailed conceptual presentation to ARAC of the working group's recommendations before proceeding with drafting of documents described in paragraphs A and B above.

The Clarification of Major/Minor Repairs or Alterations Working Group will be comprised of experts from those organizations having an interest in the task assigned. A working group member need not necessarily be a representative of one of the member organizations of the ARAC. An individual who has expertise in the subject matter and wishes to become a member of the working group should write the person listed under the caption **FOR FURTHER INFORMATION CONTACT** expressing that desire, describing his or her interest in the task, and the expertise he or she would bring to the working group. The request will be reviewed with the Assistant Chair of the ARAC for air carrier/general aviation maintenance issues and the Chair of the Clarification of Major/Minor Repairs or Alterations Working Group, and the individual will be advised whether or not the request can be accommodated.

The Secretary of Transportation has determined that the formation and use of the ARAC are necessary in the public interest in connection with the performance of duties imposed on the FAA by law. Meetings of the ARAC to consider air carrier/general aviation maintenance issues will be open to the public except as authorized by section 10(d) of the Federal Advisory Committee Act. Meetings of the Clarification of Major/Minor Repairs or Alterations Working Group will not be open to the public, except to the extent that individuals with an interest and expertise are selected to participate. No public announcement of working group meetings will be made.

Issued in Washington, DC, on January 5, 1994

/s/
Frederick J. Leonelli
Assistant Executive Director for Air Carrier/General
Aviation Maintenance Issues
Aviation Rulemaking Advisory Committee

Recommendation Letter

September 24, 2001

HAND DELIVERED

Mr. Thomas E. McSweeny
Associate Administrator for
Regulations and Certification
Federal Aviation Administration
800 Independence Avenue, S.W.
Room 1000W
Washington, D.C. 20591-0004

RE: Aviation Rulemaking Advisory Committee for
Air Carrier and General Aviation Maintenance Issues
Recommendations on Clarification of Major/Minor Repairs or Alterations Task
Recommendations on General Aviation Maintenance Task

Dear Mr. McSweeny:

Please find enclosed technical reports and draft advisory circulars from the above referenced ARAC regarding the noted tasks. These documents are being forwarded to the FAA for an appropriate disposition by the agency.

In addition to the recommendations contained in the reports and advisory material, the ARAC requests that the following issues be considered during the FAA's deliberations:

1. Before the FAA issue final documents as a result of the attached reports and advisory circulars it ensures that any changes are fully coordinated so that there will be uniform application, interpretation and enforcement.

2. The definition of "alteration" in the draft advisory circular entitled "Repair and Alteration Data" reflect changes other than those to an "original" product. You may consider changing the word "original" to "appropriate." In other words, please ensure that an aircraft can be changed from one altered state to another, not just from an "original" state to an altered state.

3. When finalizing the definition of major alteration by the FAA, the agency must ensure that all approved manufacturers are included in the product's "specification." For example, appliances are included in the specifications of the aircraft, aircraft engine or propeller. Therefore a change to an appliance would only be major if it was not incorporated in the specification of the product by the FAA-approved design and/or production authorization holder. The same would hold true for a Parts Manufacturer Approval holder who is supplying components to a type or production certificate holder (which would include their parts in the specifications of the product).

4. The concerns expressed by Transport Canada on page three of the General Aviation Working Group's technical report are limited to the confusion that could be created between the definition of major repair and major alteration contained in Part 1 and the list of major repairs and alterations contained in the Appendix to Part 43. Transport Canada is afraid that an action may be a minor repair under the definition while still being listed in the Appendix. Additionally, they are concerned with the recommended change to the definition of major repair in that the complexity of the repair (i.e., the difficulty of the work that needs to be done by the maintenance technician) does not require the technical or substantiating data to be approved in the Canadian system. Therefore, a repair that would be minor in Canada may be considered major in the United States. They are concerned about the confusion created when different definitions are developed by international partners. Ultimately, Transport Canada is concerned that one certificate holder will consider something minor and another will consider the exact same situation as major. This situation exists today and they do not see how the recommendations contained in the attached reports will solve that dilemna.

Finally, the ARAC recommends that the FAA adjust the AC associated with Major Repairs/Alterations to accommodate the current definition of major repair and major alteration in Part 1 and issue it as soon as possible.

We appreciate the opportunity to help the FAA by completing our tasks.

Very truly yours,

Sarah MacLeod
Assistant Chair for ARAC
Air Carrier and General Aviation Maintenance

Enclosures (4)

Acknowledgement Letter – Not Available

Recommendation

Technical Report of The Clarification of Major/Minor Repairs or Alterations Working Group

For

Aviation Rulemaking Advisory Committee

Issued
June 21, 2001

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EXECUTIVE SUMMARY

The classification of "major" vs. "minor" repairs and alterations has been a concern since the earliest days of aviation safety regulation. In 1994 the Aviation Rulemaking Advisory Committee (ARAC) established the "Clarification of Major/Minor Repairs or Alterations Working Group" (Major/Minor Working Group), with the following task (as amended):

- Review the aviation regulations to determine whether rulemaking and/or policy actions are needed on the issues of acceptable and/or approved data.

- Determine the feasibility of removing the words major and minor associated with the repair and alteration of aircraft.

- Review current definitions of maintenance, major and minor repair, and major and minor alteration.

The problem with the terms major and minor, since they became part of the regulations, has been their ambiguity. While there are clear cases where most people can agree that a particular repair or alteration is either major or minor, there are also many scenarios where few people would agree on the determination. The FAA's concern about this issue is that it believes industry treats too few repairs and alterations as major, where as industry's concern is that the FAA inspectors too often label minor repairs and alterations as major.

In order to fully understand the problems of classifying alterations and repairs the Major/Minor Working Group analyzed the history of the major/minor classification back to its inception in 1931. The Major/Minor Working Group also reviewed the practical effect of making a determination of major versus minor. Initial discussions by the Working Group concluded that the main problem was the need for approved data. The Working Group's developed an advisory circular outlining an acceptable means of developing data and obtaining appropriate approval of data, when required, to be used in making major repairs or major alterations. The Major/Minor Working Group also reviewed the definitions of "major" and "minor" and relevant regulations to determine the need for changes in the existing rules.

The primary areas of controversy regarding the definitions of major alteration and major repair revolve around the following questions: What does "appreciably affect" mean? What does "if improperly done" mean? What does paragraph (2) mean in both definitions? The Major/Minor Working Group has analyzed these questions and proposed recommendations for improving the definitions.

Recommendations

1. Revise 14 CFR 1.1 Definitions as follows:

Alteration means a planned change in type design.

Major repair means a repair:
(1) Where the damage to be repaired, or proposed repair, will significantly affect aircraft weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(2) Where the complexity of the repair may significantly affect proper accomplishment and thereby adversely affect, weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(3) That is not done according to accepted practices and cannot be done by elementary operations.

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications that:
(1) Significantly affects weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(2) Is not done according to accepted practices and cannot be done by elementary operations.

Repair means the elimination of damage or restoration of a damaged airframe, powerplant, propeller, appliance, or part thereof.

Replacement means the removal and installation of an airframe component, powerplant, propeller, appliance, or part thereof, in conformity with the approved type design.

2. Add § 43.14 to allow for an alternative approach to the major/minor classification that is approved by the Administrator and is based on the § 1.1 definitions. The lists in part 43, Appendix A, are presumed to be major in lieu of the use of an alternative methodology.

3. Revise part 43, Appendix A as proposed in appendix 3 of this Report.

4. Training of FAA Inspector and Industry Personnel (people subject to the rule).

The Working Group believes that part of the problem with the inconsistency of classification for major and minor repairs and alterations is a result of the inconsistency of enforcement by FAA inspectors and the inconsistency of interpretation by persons involved in process of performing maintenance. The Working Group recommends that the FAA develop additional guidance material (handbooks, checklists) to be used by the FAA inspectors beyond what is provided by the AC. The Working Group believes that such materials could be developed by a group such as itself. Advisory material, including but not limited to the inspectors handbooks should incorporate the reasoning outlined by the Working Group. In addition to improving the training, guidance and general

education of the inspectors there also needs to be an increased emphasis on the guidance and training provided to the certificate holders.

5. Advisory Circular

The Working Group recommends the issuance of the Advisory Circular 43.XXX, Repair And Alteration Data that appears in appendix 1. The Working Group believes that AC 43.XXX works in concert with the proposed changes to part 43 Appendix A. If the Appendix A changes go forward without the AC the result would be unworkable.

The Working Group recommends that the AC be finalized and published as soon as possible.

SECTION 1: HISTORY OF MAJOR/MINOR CLASSIFICATION

The classification of "major" vs. "minor" repairs and alterations has been a concern since the earliest days of aviation safety regulation. A memo on this subject to the Civil Aeronautics Board (CAB) dated March 7, 1941, from the Chief of the Safety Rules and Education Division stated, "It would be safe to say that no regulation affecting civil aeronautics has caused so many inconveniences, delays and confusions as this particular provision."

The first general regulation on aeronautical repairs and alterations was issued by the Aeronautics Branch of the Department of Commerce as Aeronautics Bulletin No. 7-H effective January 1, 1931. The overall concept of the distinctions between major and minor repairs and between repairs and alterations and the impact of those distinctions is evident in that regulation. It is also evident that the original concept and the issues and problems that flow from that concept have changed very little in the intervening years.

Section 1, "Application of Regulations" of the 1931 regulation reads as follows:

(A) A licensed aircraft which as been altered in such a manner as to affect the structure, balance, carrying capacity, or general airworthiness of the aircraft shall not be flown until technical data in accordance with section 36 have been submitted to and approved by the Secretary of Commerce and an authorized representative of the Secretary has inspected and approved the alterations.

(B) A licensed aircraft which is slightly damaged, but not damaged to such an extent as to come within the meaning of section 1(C) shall not be flown until it has been fully repaired and such repairs approved by a licensed mechanic. The repair and approval must be noted in the airplane log, together with the signature of the mechanic involved.

(C) When a licensed aircraft or a major component thereof, such as the fuselage, tail surfaces, control system, wings, or landing gear, has been damaged to such an extent that it constitutes a major repair in the judgment of the Department of Commerce inspector, the airplane shall not be flown until the requirements of these regulations have been completely fulfilled and the repairs have been approved by a Department of Commerce inspector.

Section 5, "Technical Data" of the 1931 regulation reads as follows:

A repair station holding an approved repair station certificate may make major repairs in accordance with the original design on aircraft of the class or classes of structure specified in the terms of its certificate. No stress analysis, drawings, or other technical data will be required for such repairs, except as otherwise specified in Chapter IV of these regulations, and except as may be deemed necessary in special cases by the Secretary of Commerce. In cases where no technical data are required the repaired aircraft may be eligible for license upon approval by a Department of Commerce inspector. In cases requiring technical data, the repaired

aircraft may be eligible for license upon approval of such data and an inspection by a Department of Commerce inspector."

Section 20 of the 1931 regulation was titled, "Classification According to Extent of Damage." The section stated that in any case where the extent of damage was not clearly defined the final decision would "be made by the inspector for the Department of Commerce." While there was no definition of "minor repair," subdivision (E) (what we now refer to as a paragraph) stated: "Repairs of less importance and less magnitude than those listed in subdivision (D) above may be classed as minor repairs, and may be repaired in accordance with the provisions of section 1(B) in which case no technical data of any kind will be required."

It is clear from the history of the Federal Aviation Regulations that the word "repair" has been used to mean fixing or restoring something on an aircraft, that was damaged, in order that the aircraft continues to meet its certification basis. This use of the word "repair" is consistent with its dictionary definition. If a repair was considered minor no technical data was needed to accomplish the repair (Bulletin No. 7-H), although the fact of the repair and the signature of the licensed mechanic who approved the repair had to be noted in the aircraft log. If a repair was major it had to be accomplished in accordance with approved data. In all major repair cases a Department of Commerce inspector had to approve the repair. If technical data needed to be developed before the repair could be made, a Department of Commerce inspector also had to approve that data.

While "alteration" was not defined, it is clear that from the 1931 regulation that, as with "repair," the Department of Commerce was using alteration in its normal dictionary meaning, that is, to make something different without changing it into something else. While the original regulation did not use the terms major and minor with respect to alteration, the 1931 rule language distinguished between types of alterations with the same effect as if it had. It did not require all alterations to be supported by technical data or to be inspected and approved by a Department of Commerce inspector. Rather, it applied these requirements only to alterations that affected "the structure, balance, carrying capacity or general airworthiness of the aircraft." This applicability requirement came very close to today's definition of a "major alteration."

By 1940 the applicable regulation had evolved into part 18 of 14 CFR (which was the predecessor to current part 43). Section 18.1 addressed both major and minor repairs as follows:

> 18.1 TYPES OF REPAIR. An aircraft will be deemed to have been repaired when
>
> 18.10(a) any non-structural member (such as a fairing, cowling or turtleback; 5 percent or less of the surface of a fabric covered wing or control surface; not more than two adjacent wing ribs; and the trailing edge of a wing or control surface) has been repaired, or when a structural component (such as a wheel; a landing gear, wing or control surface strut; and a control surface, but excluding a wing panel and a landing gear) has

been replaced by one purchased from the original manufacturer, in which cases the repair will be designated as a minor repair, or when

18.11(b) any structural member (such as a spar; a wing or control surface leading edge or tip strip; a control surface rib; three or more adjacent wing ribs; a wing or cabin strut wire; a wing compression member; a fitting; a landing gear or tail surface strut or wire; a fuselage longeron, cross tube, diagonal or bulkhead; any portion of the wooden or metal cover of a stressed-skin wing, control surface, fuselage or landing gear; and any bracket supporting a seat, baggage compartment, fixed equipment or control system part) has been repaired or replaced, in which case the repair will be designated as a major repair, or when...

As was true in the 1931 regulation, part 18 did not distinguish between major and minor alterations. Rather, it described those alterations that would be considered alterations subject to part 18 requirements in section 18.1 as follows:

"18.2 TYPES OF ALTERATION. An aircraft will be deemed to have been altered when

18.20(a) the aircraft structure has been changed, except in a manner which incorporates the use of a member or a portion of a member of greater strength than the original member in accordance with Civil Aeronautics Manual (CAM 18), or when

18.21(b) any change has been made in the engine, propeller, equipment or arrangement of equipment, which change may affect the balance, stability, local strength of supporting structures, or any other aspect of the airworthiness of the aircraft, or when

18.22(c) the engine has been altered, or when

18.23(d) the propeller has been altered.

As noted above, before 1942 the Federal regulations did not specifically define major and minor alterations. Rather, the regulations were written to cover only certain alterations, such as any alteration of an engine or propeller or an alteration that could "affect the balance, stability, local strength of supporting structures..." When the first definitions of major and minor alterations appeared in 1942 the approach taken was the reverse of the current major/minor repairs approach. "Minor alterations" was defined in some detail, while "major alterations" were "all alterations not within the definition of minor alterations." Before a 1952 revision of part 18, the definitions of major and minor alterations were reversed to parallel the definitions of major and minor repairs, that is, a minor alteration became "an alteration other than a major alteration."

As the quote from the 1941 memo cited above indicates, the major/minor distinctions have caused problems from the earliest Federal attempts to regulate aviation safety. Apparently of significant concern was the requirement for an inspection by an authorized representative of the Administrator before an aircraft could be returned to service after a major repair or major alteration (this term was being used in memos even though it was not contained in the rules). This requirement was proving to be very burdensome and the CAB was seriously considering amending the regulation to eliminate

that requirement in certain cases. A draft revision of a proposed rule to accomplish this was circulated to over 900 potentially interested persons (repair station operators, air carriers, etc.) and public meetings to discuss the issue were held in Tulsa, Oklahoma, on April 27, 1940, and in St. Paul, Minnesota, on July 15, 1940.

Ultimately this change is reflected in a 1952 publication of part 18 (issued by the CAB March 31, 1952, effective June 15, 1952) in which § 18.11(b) permitted major repairs and major alterations to be examined, inspected, and approved by either an authorized representative of the Administrator, or an appropriately rated certificated repair station.

§ 18.11(b) reads as follows:

> "(b) *Major repairs and major alterations.* No airframe, powerplant, propeller, or appliance, which has undergone any major repair or major alteration, shall be returned to service until such repair or alteration has been examined, inspected, and approved as airworthy by one of the following:
>
> (1) An authorized representative of the Administrator, or
>
> (2) An appropriately rated certificated repair station, if the work has been performed by such repair station in accordance with a manual, specification, or other technical data approved by the Administrator,[4] or
>
> * * * * *
>
> [4] Major repairs and major alterations whose design has not previously been approved by the Administrator may require the submittal of technical data and/or flight tests in order to establish compliance with the applicable airworthiness provisions. Examples of such major alterations for which it would be desirable to contact a representative of the Administrator prior to accomplishment of the alteration are given in Civil Aeronautics Manual 18.

By the early 1950's the CAB's definitions of major/minor repairs or alterations had matured to a point that with only slight rewording in the 1960's recodification they are identical to the current definitions. The words excluding alterations "not listed in the aircraft, aircraft engine, or propeller specifications" were added to the definition of major alteration when former part 18 was codified into present part 43. The explanation for the addition of these words was that it would make the definition "consistent with Appendix A of part 43 [new]."

The Appendix A of part 43 referred to above was added as part of the FAA's 1960's recodification of all of the regulations it had inherited from its predecessor agencies. The material included in Appendix A had previously appeared in Civil Aeronautics Manual (CAM) material issued by the Department of Commerce's Administrator of Civil Aeronautics to supplement the CAB's rules in their part 18.

A footnote to § 18.1 in the CAB's June 15, 1952, publication of part 18 stated:

> The Administrator publishes Civil Aeronautics Manual 18 which lists operations considered to be maintenance, preventive maintenance, minor and major repairs, and alterations, sets forth acceptable procedures, methods, and practices under the provisions of this part.

Earlier versions of the CAB's part 18 contained similar statements.

It is not clear from the historical record to what extent the major/minor examples in CAM 18 were intended to be rules or guidance. The fact that the FAA codifiers included this material as Appendix A to part 43 rather than in the FAA's then new Advisory Circular system, indicates that the codifiers considered the examples more mandatory rule than guidance. To some extent, this treatment may have exacerbated the many problems that had historically confused the major/minor demarcations.

However, not all of the material related to major and minor classifications was transferred from CAM 18 to Appendix A. The lists of examples of minor repairs and minor alterations, which had existed in CAM 18, were not made part of Appendix A during the recodification.

SECTION 2: WORKING GROUP TASKING

ARAC Tasking Statement

The FAA established the Aviation Rulemaking Advisory Committee (ARAC) on February 5, 1991 (56 FR 2190, January 22, 1991) and the Committee was most recently renewed on February 11, 1998 (63 FR 8250, February 18, 1998). The ARAC was established to assist the FAA in the rulemaking process by providing input from outside the Federal Government on major regulatory issues affecting aviation safety. The ARAC includes representatives of air carriers, manufacturers, general aviation, labor groups, universities, associations, airline passenger groups, and the general public.

ARAC established the "Clarification of Major/Minor Repairs or Alterations Working Group" on January 11, 1994 (59 FR 1583) (hereafter, Major/Minor Working Group or Working Group). The Major/Minor Working Group was tasked as follows:

> Review Code of Federal Regulations (CFR) Title 14--Aeronautics and Space, Chapter I--Federal Aviation Administration, Department of Transportation, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of acceptable and/or approved data. If ARAC determines rulemaking documents or advisory circulars are appropriate to resolve the major/minor problem, such documents should be developed by ARAC, along with proper justifications and any legal and economic analyses.

The original tasking statement was amended on October 12, 1995, by the FAA Associate Administrator for Regulation and Certification to read as follows:

> Review Code of Federal Regulations (CFR) Title 14--Aeronautics and Space, Chapter I--Federal Aviation Administration, Department of Transportation, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of acceptable and/or approved data. Determine the feasibility and any actions removing the words major and minor as associated with repair and alteration of aircraft. In addition, the FAA believes a comprehensive review of current definitions including maintenance, major and minor repair, and alteration may be in order. The FAA is concerned these definitions may not be consistent with allowing the aviation community and the FAA to make unambiguous decisions with reference to the requirement for FAA-approved data.

The Major/Minor Working Group has met every two to three months for the last six years. Initially the thrust of the Major/Minor Working Group's effort was to establish an advisory circular containing a logic diagram outlining the acceptable means of developing data and obtaining appropriate approval of data, when required, to be used in making major repairs or major alterations. The Major/Minor Working Group also

reviewed the definitions of "major" and "minor" and relevant regulations to determine the need for changes in the existing rules.

In 1994 ARAC established a second working group titled "General Aviation Maintenance Working Group" (59 FR 49460, September 28, 1994) (hereafter, "GA Working Group"). The GA Working Group was specifically tasked as follows:

> Review Title 14 Code of Federal Regulations, parts 43 and 91, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of general aviation aircraft inspection and maintenance, specifically section 91.409, part 43, and Appendices A and D of part 43. In your review, consider any inspection and maintenance initiatives underway throughout the aviation industry affecting general aviation with a maximum certificated takeoff weight of 12,500 pounds or less. Also consider ongoing initiatives in the areas of: maintenance recordkeeping; research and development; the age of the current aircraft fleet; harmonization; the true cost of inspection versus maintenance; and changes in technology.

Starting in 1999, at the request of some ARAC participants who were members of both Working Groups, the GA Working Group and the Major/Minor Working Group began having occasional joint meetings. During these joint meetings the groups briefed each other on their progress and discussed issues relevant to both groups such as: the definitions of major repairs and major alterations, and Appendix A to Part 43. As a result of these joint meetings it was determined that Appendix A should be addressed by the Major Minor Working Group rather than the Maintenance Working Group.

Membership List for the Major/Minor Working Group

Name	Organization
Skip Averman	Federal Aviation Administration
Jodi Diamant Boustead	Transport Canada
Gregg Delker	US Airways
Bob DeRosa	United Airlines
Carolina Forrester	Federal Aviation Administration
Carlton Holmes	Boeing
Wendell Kawakami	Northwest Airlines
Pete Lauria	Northwest Airlines
John Lewis	Professional Aviation Maintenance Association
Maureen Moreland	Federal Aviation Administration
John Pervorse	Boeing
Charlie Schuck	Experimental Aircraft Association
Fred Sobeck	Federal Aviation Administration

Mike Whissell	Transport Canada
Rick Macklosky	Pratt & Whitney - Regulatory Compliance FAA Liaison Office Operations
Terry Pearsall	Aircraft Electronics Association
Brian Whitehead	Transport Canada

SECTION 3: ANALYSIS OF MAJOR/MINOR CLASSIFICATION

Background

Under current Federal aviation regulations, there are a number of requirements that apply if a repair or alteration is classified as major:

1. The repair or alteration must be accomplished in accordance with data approved by the FAA. (See §§ 43.7(d), 43.17(e)(2), 65.95(a)(1), 121.379(b), 135.437(b), 145.51.)

2. The repair or alteration must be inspected and approved for return to service (see § 91.407(a)(1)) by one of the following:

   (a) A certificated mechanic with inspection authorization (see §§ 43.7(b), 65.95(a)(1)).

   (b) A certificated and rated repair station (see § 43.7(c) and the flush paragraph at the end of § 145.51).

   (c) An air carrier (see §§ 43.7(e), 121.379(b), 135.437(b)).

   (d) The manufacturer (see § 43.7(d)).[1]

   (e) Persons approved by Transport Canada Transport Group (see § 43.17(c)).

3. Records of the repair or alteration must be retained (see the flush paragraph at the end of § 43.9(a) and Appendix B of part 43).

4. The repair or alteration must be reported to the FAA (see the flush paragraph at the end of § 43.9(a) and Appendix B of part 43).

Because of the above described requirements (i.e., data approval, record keeping, reporting and return to service) that apply, the distinction between "major" and "minor" repairs and alterations is important. As stated earlier, the definitions of "major repair" and "major alteration" have been controversial for many years.

Section 1.1 of the current FAA regulations define "major alteration" and "major repair" as follows:

> *Major alteration* means an alteration not listed in the aircraft, aircraft engine, or propeller specifications—
>
> (1) That might appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

[1] One Working Group member commented that on reading § 43.7, that manufacturers can approve return to service of repaired and maintained items; they just need to use approved data for all but minor alterations. Another member disagreed with this statement.

(2) That is not done according to accepted practices or cannot be done by elementary operations.

Major repair means a repair:

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

(2) That is not done according to accepted practices or cannot be done by elementary operations.

As is true throughout aviation safety regulations, the dividing line between "major" and "minor" is not clear, whether dealing with a repair or an alteration. There are many repairs and alterations that virtually everyone would agree are always major (splicing and reinforcing of primary structural members) and there are others that virtually everyone would agree are minor (e.g. repairs within the allowable damage or rework limits). The difficulty arises in the gray areas where considerable analysis and exercise of judgment may be needed to make the determination.

The primary areas of controversy revolve around answering the following questions:

1. What does "appreciably affect" mean in paragraph (1) of both definitions?

2. What does "if improperly done" mean in paragraph (1) of the definition of major repair?

3. What does paragraph (2) mean in both definitions?

Data Development Issues and "Appreciable effect"

Without the word "appreciably" any change in a type design, however small, that could affect the weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness would be considered a major repair or major alteration. This would mean that virtually all repairs or alterations to an aircraft would be major and would trigger the requirements discussed above. The modifier "appreciably" is thus intended to establish a level of significance to avoid this result.

However, some observers have argued that the word "appreciably" is vague and does not clarify what types of effects on airworthiness should be classified as "major." The dictionary defines "appreciable" as "possible to estimate, measure, or perceive." (*The American Heritage® Dictionary of the English Language, Third Edition* © 1996 by Houghton Mifflin Company). This definition does not provide much help in understanding the meaning of "appreciably" with respect to the concept of an appreciable

effect on airworthiness. Too literal an interpretation would lead one to conclude that any effect on airworthiness is measurable and therefore would lead to the classification of major. Furthermore, such a reading would lead one to conclude that the term "appreciably" adds nothing to the definition and could be removed without affecting the meaning of the definition. However, such a conclusion undermines the logical intent of the drafters, as well as the common usage of word "appreciable."

The drafters would not have included the adverb "appreciably" as a modifier of the word "affect" unless they intended the phrase to mean something more than just "any effect on airworthiness." The dictionary provides an example of the word "appreciable" in the phrase "*appreciable changes in temperature.*" (*The American Heritage® Dictionary of the English Language, Third Edition* © 1996 by Houghton Mifflin Company). A scientist could argue that all change is measurable or perceivable with modern technology, and therefore it is redundant to say "appreciable change." However, such a conclusion is a misinterpretation of the word appreciable. Appreciable changes or affects are perceived as such by the human observer. An appreciable effect seems to be something more than just the slightest scientifically discernable effect.

Some have argued that if "appreciable" means something closer to "significant," then why did the drafters not use the word "significant." There are several possible reasons for the drafters actions: 1) they wanted to convey a meaning that was different, perhaps less severe than "significant," 2) they wanted to avoid the use of the word "significant" which is used and given specific meaning in other regulations and they considered "appreciable" a synonymous alternative, or 3) they intended to be vague. It is also possible that drafters had all three of these reasons in their minds.

The drafters of the Canadian Aviation Regulations tried to avoid this dilemma by using neither "appreciable" nor "significant." Canadian Aviation Regulation § 101.01 defines Major Repair using the phrase "has other than a negligible effect" on airworthiness. The problem here is the same as it is with the words "significant" and "appreciable"; what does "negligible" mean? The dictionary definition of negligible is "not significant or important enough to be worth considering; trifling." (*The American Heritage® Dictionary of the English Language, Third Edition* © 1996 by Houghton Mifflin Company). This raises the question whether the Canadian definition of Major Repair would really be very different if the words "significant effect" were used rather than the phrase "other than a negligible effect." To make things worse, or to further illustrate the point of this discussion, the thesaurus provides as a synonym for negligible the word "inappreciable." (*The Original Roget's Thesaurus of English Words and Phrases* (Americanized Version) Copyright © 1994 by Longman Group UK Limited.)

The result is the same whether the phrase "other than negligible effect," "significant effect" or "appreciably affects" is used. The concern raised by many observers is that these words do not clarify with obvious certainty whether a particular alteration or repair is major or minor. However, considering the impact and the complexity of the subject matter this result is not a defect, but a necessity. The definitions must rely on advisory material to explain the intricacies of the issues involved.

The definitions require at some level a judgment call to be made. To try and rewrite the definitions to avoid any judgment decisions would be both imprudent and ineffective.

The European Joint Aviation Authorities (JAA) has come to the same conclusion in trying to understand the definition of major repairs and its ramifications. The following is the introduction to the advisory material produced by the JAA working group:

> ACJ 21.435(a) Classification of repairs.
>
> 1. Clarification of the terms Major/Minor
>
> In line with the definitions given in JAR 21.91, a new repair is classified as 'major' if the resulting change to the approved type design has an appreciable effect on structural performance, weight, balance, systems, operational characteristics or other characteristics affecting the airworthiness of the product, part or appliance. In particular, a repair is classified as major if it needs extensive static fatigue and damage tolerance strength justification and/or testing in its own right, or if it needs methods, techniques or practices that are unusual (i.e. unusual material selection, heat treatment, material processes, jigging diagrams, etc...)
>
> Repairs that are significant and require a re-assessment and re-evaluation of the original certification substantiation data to ensure that the aircraft still complies with all the relevant requirements, are to be considered as major repairs. (Emphasis added)

The Major/Minor Working Group had a tangential discussion of the intent of the above JAA clarification. One Working Group member raised a question as to JAA's intent when it said "a new repair is classified as 'major'..." The question was whether JAA's clarification was intended to apply only to the first time a repair is accomplished or were these words used just to highlight the thought process when a new repair is considered. Another working group member proposed that the answer to the question was that the intent of this phrasing by JAA was to highlight the thought process.

The JAA working group tasked with this issue described the problem of defining major and minor repairs as follows:

> It is necessary to state from the outset, that distinguishing between major and minor repairs is a subjective exercise. Those repairs that lie at either end of the repair spectrum (i.e. clearly major and clearly minor) should not cause too many problems in classification. The problem in classification lies in the mid-band "grey" area. In order to distinguish between the two, in unambiguous terms, there is the danger of inflexibility and possible lack of engineering good sense. Such a method might be to classify major repairs in terms of the component they were repairing (i.e. all rear pressure bulkhead repairs shall be major repairs), or by virtue of their size or some

> other consideration. The [JAA] Working Group, however, has chosen to define the difference in terms that are, by their nature, subjective (i.e. "appreciable effect," "significant change"). There appears to be no escaping from the need to exercise good engineering judgement, suitably aided by as much advisory material as is necessary. This we believe, has been the procedure for many years within Europe, but has lacked the guidance material.
>
> NPA 21-8 Revised JAR-21 Subpart M, Justification § 2.1.

The Major/Minor Working Group, like the JAA Working Group, concluded that it is necessary to use subjective terms in the definitions. It is therefore important to provide advisory material to aid people in the major/minor determination. Put simply a major repair or major alteration is one that has an appreciable effect on certain characteristics affecting airworthiness. These characteristics are weight, balance, structural strength, performance, operational characteristics and other characteristics affecting airworthiness. Some alterations or repairs will have no effect on these characteristics, while other alterations or repairs will have some effect, but not an appreciable effect. There are three degrees of "effect" to be considered: no effect, some effect, and appreciable effect. If a determination is made that a repair or alteration has either no effect or some effect, then it is classified as a minor repair or a minor alteration. If the determination is that the repair or alteration has an appreciable effect then it is either a major repair or major alteration.

While the Working Group concludes that the phrase "appreciably affect" was intended to mean the same as "significantly affect" the group is concerned that many readers will not come to that same conclusion. To avoid this problem the Working Group recommends that phrase "appreciably affect," with respect to major/minor determinations, be changed to "significantly affect" throughout the definitions and advisory material. By making this change the Working Group hopes to avoid the problem of interpretations that conclude any measurable effect is an appreciable effect.

Performance Issues

If improperly done

The phrase "if improperly done" appears in the definition of major repair, but not in the definition of "major alteration." The word "repair" is not defined in the FAA's current regulations, although it is included in the 14 CFR § 1.1 definition of maintenance as a subset of maintenance. From its use throughout the regulations it is clear that the word "repair" is used in its normal dictionary meaning which is "To restore to sound condition after damage or injury; fix" (*The American Heritage® Dictionary of the English Language, Third Edition* © 1996 by Houghton Mifflin Company). The phrase "if improperly done" has created a great deal of confusion as a result of people trying to

interpret its meaning divorced from the rest of the words that make up the definition of major repair.

The phrase "if improperly done," which was added 50 years ago, modifies the word "repair" in the definition of major repair. While there is no clear regulatory history related to the addition of the phrase "if improperly done" it can only be understood if it is read together with the rest of the sentence, always mindful that the issue to be determined is whether a proposed repair is major or minor. The current definition can be paraphrased to say a proposed repair should be considered "major" if the repair task being considered is one that, if it were improperly performed, would have an appreciable effect on qualities affecting airworthiness.

The person responsible for the proposed repair work must look at the damaged aircraft and determine how the airworthiness of the aircraft would be affected if the repair work were not properly done. This determination must be made before the repair work is performed because of the requirements that apply if the proposed repair is considered major. A great deal of confusion has occurred by people interpreting the definition to require mechanics to look backwards to determine whether a completed repair task was properly done.

The above explanation of the meaning of the phrase "if improperly done" is supported by other Federal aviation regulations that require the same type of determination. Sections 121.369(b)(2) and 135.427(b)(2), Manual Requirements, read as follows:

> A designation of the items of maintenance and alteration that must be inspected (required inspections), including at least those that could result in a failure, malfunction, or defect endangering the safe operation of the aircraft, if not performed properly or if improper parts or materials are used. [emphasis added]

The language in the above paragraph makes clear that those items that will be designated for required inspection will be determined in advance based on the likelihood that they "could result in a failure . . . if not performed properly . . ." Just like the definition of major repair the discussion of not properly performing a mechanical task is used in §§ 121.369 and 135.427 to consider the potential risks related to a future task.

Review of FAA historical files did not reveal why the term "if improperly done" was only added to the definition of major repair and not to the definition of major alteration. The existence of the phrase "if improperly done" only in the definition of major repair is obviously related to the unique differences between the term alteration and repair. An alteration changes the aircraft, or a part thereof, from one sound state to another, whereas a repair restores the aircraft, or part thereof, from an unsound state (damaged) to a sound state.

In the case of an alteration a sound state is represented by the altered aircraft, or part thereof, conforming to an approved type design. The type design is defined in 14

CFR § 21.31 and includes 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 of the applicable airworthiness standards.

In the case of a repair, a sound state is represented by restoring the aircraft or part thereof to a condition in which the requirements of applicable airworthiness standards (i.e. type certification basis) is met. The term type certification basis (14 CFR § 21.17) refers to the airworthiness standards that the Administrator finds necessary to establish an acceptable level of safety. The type certification basis is listed on the type certificate data sheet which is included in the type certificate. The type certificate (defined in 14 CFR § 21.41) includes the type design, the operating limitations, the applicable regulations, and any other conditions or limitations prescribed by the Administrator.

The use of the phrase "if improperly done" has nothing to do with the performance capability of any particular mechanic, nor the mechanic's training, nor whether a completed repair task was or was not done properly. One purpose of the phrase is to tell a mechanic to consider the criticality and complexity of the repair task in determining whether he or she is authorized to do the repair and return the aircraft to service. An assessment of the criticality and complexity of a task requires the mechanic to ask the question; "What would be the likely consequence if the repair is improperly performed?"

The FAA notes that the performance of maintenance and alterations---whether major or minor---must always comply with § 43.13(a), which requires methods, techniques, and practices acceptable to the Administrator. In other words, major repairs and alterations must be accomplished in accordance with data approved by the FAA and minor repairs and alterations must be accomplished in accordance with acceptable data or other acceptable methods, techniques, and practices.

Under the current definition there are two reasons why a repair might be labeled as major. The first, as previously discussed, relates to the degree of damage done to the aircraft. The second relates to the complexity of the repair task. For example, a repair would be considered major in a situation where the damage itself is not significant but in order to repair the damage significant work must be done. The damage itself might not appreciably affect the airworthiness established by the aircraft's certification basis; however, due to the complexity of the repair task, an improperly executed repair could bring the aircraft appreciably below the level of the airworthiness established by the aircraft's certification basis.

Although the above discussion tries to explain why the phrase "if improperly done" was inserted in the definition of major repair some 50 years ago, and what the theoretical implications of the phrase are, it does not negate the fact that the phrase has led to 50 years of confusion. Although people tend to know intuitively what they think a "major repair" is, most people get confused when wrestling with the words used in the part 1 definition.

FAA inspectors, repair station employees, air carriers and industry groups differ in their interpretation of the definitions of major repairs and minor repairs. At one extreme, repair station mechanics tend to label few repairs as major by reasoning that a) they plan to do the repair properly therefore it is minor or b) they did the repair properly therefore it was minor. At the other extreme FAA inspectors often label all repairs as major by reasoning that it is possible to perform any repair improperly therefore all repairs are major. The result of this confusion is that the general aviation community has largely ignored the § 1.1 definitions and has relied exclusively on part 43 Appendix A. The air carrier industry has largely adopted individual interpretations of the § 1.1 definitions, so that many air carriers have their own way of defining major and minor repairs. The Working Group has proposed the FAA adopt new definitions that avoid the use of the phrase "if improperly done."

In the recommended definitions the Working Group has tried to separate the issues of data and performance. One concern addressed by the Working group was that the current definition focuses on the repair task, but not the damage. By focussing only on the repair task the analysis fails to address the effect of the repair itself. The recommended definition attempts to address both the repair task, as well as the degree of damage. This may be covered by the data issues addressed in the recommended Advisory Circular.

The classification of a repair would also be affected by technology innovations and mechanic expertise. Some maintenance shops could presumably have greater expertise for accomplishing the repair task. The process for determining the classification of the repair may be the same for each but the conclusions reached may be different because of the different variables brought to the project by the different carriers.

Paragraph (2) of "major alteration" and "major repair" definitions

As discussed above, the intent of paragraph (1) in both "major" definitions is to designate as major certain changes (weight, balance, etc.) that have the potential for having a significant effect on the airworthiness of an aircraft. The original intent of paragraph (2) was to state that even though a repair or alteration might not be considered major under the criteria in paragraph (1), it would still be considered "major" if the repair or alteration was "not done according to accepted practices or cannot be done by elementary operations." That is, if the person who was to do the repair or alteration developed a new or unusual method, technique or practice for accomplishing the work that was not found in maintenance manuals, etc., then the FAA wanted that person to develop data to support the new approach and to comply with the necessary inspection, record keeping, and reporting requirements. The Working Group has retained the second paragraph of the current definitions in its recommended changes to the definitions.

Proposed Changes to 14 CFR 1.1

To avoid the previously described misunderstandings of the meanings of major alteration and major repair, both definitions should be amended. Paragraph (1) of the definition of major alteration the word "might" should be removed and in paragraph (1) of the major repair definition the words "might appreciably" should be replaced with "will significantly." The concern is that use of the word "might" allows an "anything is possible" interpretation. Such that if there is any possible way that a particular alteration or repair could result in a significant affect then it must be classified as major.

The first paragraph of the major repair definition should be changed to "Where the damage to be repaired, or the proposed repair, will." This change would help focus attention on the damaged state of the aircraft which is the point during which the determination of major or minor must be made. Furthermore, the phrase "if improperly done" should be removed because it is not necessary with this new drafting of the definition. This proposed change is intended to alleviate the years of confusion related to the phrase "if improperly done," discussed above, and to clarify that the classification of major or minor occurs while the aircraft is in its damaged state.

During its meetings the Major/Minor Working Group had considered using other alternative phrases to replace the phrase "if improperly done." Two alternatives considered by the Major/Minor Working Group were "if left unrepaired" and "unrepaired." The Major/Minor Working Group concluded that these alternatives would not make clear that the determination of whether a repair is major or minor focuses on the existing impact on airworthiness caused by the damaged condition, as opposed to the future effect on airworthiness that would occur if the aircraft remained in an unrepaired state for a period of time.

The Major/Minor Working Group also suggests adding a new paragraph 2 to the definition of Major Repair. This paragraph focuses on the complexity of the repair task and the effect it will have on the qualities affecting airworthiness. With the changes to paragraph 1 and the addition of paragraph 2 the phrase "if improperly done" is no longer necessary in the definition.

Two new definitions would be added to the definition section by this proposal: alteration and repair. Much of the confusion in interpreting the meaning of major repair and major alteration results from misunderstandings about the meanings of alteration and repair. These terms are defined to be consistent with the dictionary definitions of the words, but tailored with respect to aviation. Paragraph 2 of the current definition would become paragraph 3 of the revised definition.

The word "alteration" should be defined in § 1.1 as a planned change in type design. The word "repair" should be defined as the elimination of damage or restoration of a damaged airframe, powerplant, propeller, appliance, or part thereof. The word "replacement" should be defined as the removal and installation of an airframe component, powerplant, propeller, appliance, or part thereof, in conformity with the approved type design.

Maintenance is currently defined in 14 CFR part 1 to mean "inspection, overhaul, repair, preservation, and the replacement of parts, but excludes preventive maintenance." No changes have been proposed for this definition; however, the Major/Minor Working Group found that there is some confusion about the relationship between the different activities that are collectively categorized as maintenance. There is no reason for the reader to assume that the activities that are subsets of maintenance cannot also be subsets of each other. For example, some aspects of overhaul, preservation and replacement of parts are included in the definition of repair. One can see this same interrelationship in the Canadian system in the following definitions:

> "maintenance" - means the overhaul, repair, required inspection or modification, or removal and installation of components of, an aeronautical product, but does not include
> (a) elementary work, or
> (b) servicing;
>
> "repair" - means the rectification of deficiencies in an aeronautical product or the restoration of an aeronautical product to an airworthy condition;
>
> "overhaul" - means a restoration process that includes the disassembly, inspection, repair or replacement of parts, reassembly, adjustment, refinishing and testing of an aeronautical product, and ensures that the aeronautical product is in complete conformity with the service tolerances specified in the applicable instructions for continued airworthiness; (Emphasis added)

As is evident in these definitions there is considerable overlap between the meanings of overhaul, repair, restoration, and replacement even though these activities are all considered within the meaning of maintenance. The same type of overlap exists in the definitions of 14 CFR part 1.

Another area of confusion is when the definition is applied to the replacement of parts where a number of simple steps are involved. The area of contention was how many simple steps make a replacement of a part a complex undertaking and therefore considered a significant (or major) repair. The number of steps in a repair is not the determining factor of whether a repair is major or minor. The determining factor should be if replacement involves fabrication or installation of primary structural members or critical components which differs from the original type design.

Proposed Changes to 14 CFR part 43

Section 43.3 should be amended to make minor changes in paragraph (a) to conform to the changed status of Appendix A as discussed below.

Proposed new § 43.14(a) should state clearly what is now only implied in the regulations, namely that a classification or determination of each repair or alteration

should be made before the task is begun. This is so the person performing the repair or alteration would know in advance whether it would be major and require approved data. This proposal should not require that a record be made of that determination. Nevertheless, proposed § 43.14(b) would set forth, in one location in the regulation, the current requirements that flow from repairs and alterations that are major, including the need to know in advance if approved data will be needed.

Appendix A has apparently worked well over the years particularly for the general aviation community (i.e., those operating under 14 CFR part 91). If a certificated mechanic was asked whether he or she could accomplish a repair or an alteration and then approve the aircraft for return to service, the mechanic for the most part felt comfortable in relying on the lists in Appendix A. On the other hand, the lists in Appendix A if taken literally are too inflexible for the air carrier community and therefore this community has, in effect, viewed the lists in Appendix A as examples of repairs or alterations that might be presumed to be major rather than hard and fast rules. This proposal would amend the regulations to provide both a level of certainty and of flexibility needed by both communities.

Proposed new § 43.14(a) would state that each person performing a repair or alteration must determine whether the proposed action is a major repair or major alteration as defined in part 1 of this chapter. Furthermore, this proposed section would state that paragraphs (a) and (b) of Appendix A specify items that are major alterations or major repairs. However, § 43.14(a) would also state that any person to whom part 43 applies could determine that a particular repair or alteration is minor, even though the repair or alteration is listed in Appendix A, if the repair or alteration is properly classified as minor using an alternative method of classification approved by the Administrator.

SECTION 4: RECOMMENDATIONS AND DISCUSSION ISSUES

Recommendations

1. Revise 14 CFR 1.1 Definitions as follows:

Alteration means a planned change in type design.

Major repair means a repair:
(1) Where the damage to be repaired, or the proposed repair, will significantly[2] affect aircraft weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(2) Where the complexity of the repair will significantly affect, weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(3) That is not done according to accepted practices and cannot be done by elementary operations.

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications that:
(1) Significantly affects weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(2) Is not done according to accepted practices and cannot be done by elementary operations.

Repair means the elimination of damage or restoration of a damaged airframe, powerplant, propeller, appliance, or part thereof.

Replacement means the removal and installation of an airframe component, powerplant, propeller, appliance, or part thereof, in conformity with the approved type design.

2. Revise § 43.14 to allow for an alternative approach to the major/minor classification that is approved by the Administrator and is based on the § 1.1 definitions. The lists in part 43, Appendix A, are presumed to be major in lieu of the use of an alternative methodology.

3. Revise part 43, Appendix A as proposed in appendix 3 of this Report.

[2] Some Working Group members are concerned that the use the word "significant," as a replacement for "appreciable," might be in conflict with the recent FAA final rule and advisory circular regarding type certification procedures for changed products (see 65 FR 36244, June 7, 2000 and 65 FR 51052, Aug. 22, 2000). The changed products final rule relies on the introduction of two new classification terms, substantial and significant, to drive the determination of the certification basis to be used for a modification or derivative aircraft. Other Working Group members disagree that there is a potential conflict here. In the changed product rule, the word "significant" is used to modify the change; while in the Major/Minor proposal "significant" is used to modify characteristics affecting airworthiness.

4. Training of FAA Inspector.

The Working Group believes that a large part of the problem with the classification of major versus minor repairs and alterations is related to the inconsistency of enforcement by FAA inspectors. The Working Group recommends that the FAA develop additional guidance material (handbooks, checklists) to be used by the FAA inspectors. The Working Group believes that such materials could be developed by a group such as itself. Advisory material, including but not limited to the inspectors handbooks should incorporate the reasoning outlined by the Working Group. More training, guidance and general education is needed for the inspectors than is currently provided by the AC.

5. Advisory Circular

The Working Group recommends the issuance of the Advisory Circular 43.XXX, Repair And Alteration Data that appears in appendix 1 of this Report. The Working Group believes that AC 43.XXX works in concert with the proposed changes to part 43 Appendix A. If the Appendix A changes go forward without the AC the result would be unworkable.

Discussion Issues

1. 14 CFR 1.1 Definitions

The Working Group raised the concern that the recommended definition focuses on the damage whereas the current definition focuses on the repair task. The concern is that the analysis loses the effect of the repair itself. This may be covered by the data issues addressed in the AC.

Technology changes also have consequences for the classification of a rule. Some maintenance shops could presumably have greater expertise for accomplishing the repair task. The process for determining the classification of the repair may be the same for each airline but the conclusions reached may be different because of the different variables brought to the project by the different carriers.

2. Memo from Carey Terasaki, Manager, Airworthiness Law Branch, March 13, 2000

The Working Group raised some concerns about the notion (raised in GC memo) that every single repair should be classified the same across the board. Operators may not come to the same conclusions about repair classification for similar types of damage. The Working Group does not agree that it is necessary for all repairs will be classified the same throughout the industry.

While two repairs may be identical the damage that drives the repairs may be different, and therefore the classification of the repairs may be different. The classification of a repair must account for the peripheral issues related to the damage, the consequences of performing the repair, and the methodology used to approve the repair data. Because air carriers and repair stations use different methodologies to approve repair data the Working Group tried to craft the NPRM to allow for these differences. A goal of the NPRM was to provide an alternative means for making the Major/Minor determination so as to exempt certain entities from requirements of Appendix A.

The appendix was likened to tax schedules that itemize deductions as opposed to those that apply a standard deduction. The list of major repairs and major alterations in Appendix A of part 43 would be similar to the standard deduction. A mechanic would use the list in Appendix A to provide a simple answer for major versus minor determinations. The list of repairs and alterations in Appendix A are presumed to be major. However, by using the analysis in proposed § 43.14 this presumption can be overcome. Using the analysis of § 43.14 is like opting for the itemized deduction. The § 43.14 analysis requires the person to apply the § 1.1 definition of major repair and major alteration based on a methodology approved by the Administrator. The Working Group believes this kind of alternative scheme is necessary and appropriate. The Working Group believes that the determination of major versus minor is often dependent on several factors, such as:

- Airplane characteristics
  - Operation limitations
  - Model
  - Design
  - Type of operation (91 vs. 121 vs. 135)

- Expertise (skill/training) of the maintenance organization
  - Mechanic,
  - Engineer,
  - Repairman

3. Some members of the Working Group wanted a listing in the AC or Appendix A that would cover minor repairs. Such a list existed in the old CAM 18.

4. Canadian and JAA Harmonization:

   The Working Group has struggled with the issue of harmonization.

5. Replacement of Parts

6. Maintenance Definition –

The definition of maintenance includes replacement and repair, but does not differentiate between the two.

Replacement in the context of a repair is a subset of repair, which is consistent with the dictionary definition of repair.

7. Separation of Data from Performance -

The current § 1.1 definitions do not differentiate between the data issues and the performance issues involved in repairs.

The Working Group struggled with the fact that the part 43 performance rules specifically address the relevant performance concerns for a repair. The FAA claims that the 43 performance issues are different than the performance issues addressed in the 14 CFR 1.1 definition, however, the Working Group does not see such a clear distinction.

Current § 43.3 suggests that the Appendix A lists "are" the major repairs rather than addressing the Appendix as examples of major repairs. The Working Group recommends that this reference be clarified.

The Working Group has proposed that Appendix A repairs are presumed to be Major but can be determined otherwise.

The part 43 Appendix focuses on the mechanic and does not appropriately take into account the systems in which the mechanics operate.

8. Consequence of using Approved Data

The Working Group believes the FAA should clarify when approved data must be used and when approved data may be used. Major Repairs must have technical data approved by the Administrator, however, just because approved data exists and is used does not mean that the repair which relies on this data is a major repair. Some FAA inspectors have used this circular logic to determine that a repair is major merely because the mechanic performing the repair used approved data.

Manufacturers often develop data that is Designated Engineering Representative (DER) approved to support their maintenance manuals for their aircraft. Any repair (major or minor) can utilize approved data. Only major repairs must use approved data. Minor repairs may use approved or acceptable data. Often inspectors will look at a minor repair and treat it as a major repair merely because a similar repair is covered by a structural repair manual (SRM). A repairman performing a minor repair should be permitted to use the SRM as guidance without fear of becoming bound by the use of "approved data." For minor repairs the repairman may follow the guidance of the airline maintenance manual, even if such guidance is inconsistent with the SRM. (43.13(a) and (c))

Currently no approved data exists for many critical process systems (complex operations) which are considered major repairs under Appendix A (e.g. there is often no approved data for overhauls). According to Appendix A paragraph (b)(2)(i) one would need approved data to take an engine apart but not to put it together.

The determination of major and minor, under the current rules, does not become relevant until the repair entity fails to find an answer in Appendix A. If the answer is found in Appendix A then the person never looks at the definitions in 1.1.

9. When data becomes approved does the repair become minor?

Once a major repair is accomplished and the data becomes approved does a subsequent similar repair become minor because it is now an elementary operation? One objection to this is that the repair is still missing the authorized inspection. Approved data does not absolve one from the need for inspection/second set of eyes and record keeping.

The Working Group believes that the precedence of a major repair (creating approved data) should not permit subsequent similar repairs to become minor. Previously approved data may be applied to the subsequent repair if it is determined to be appropriate and applicable, but the repair will remain classified "major." The recommended definition covers this problem by addressing the damage precipitating the repair.

10. Is Appendix A more appropriately AC material?

The Working Group discussed the possibility of removing Appendix A from part 43 and putting it in an AC. The items in Appendix A were originally derived from advisory CAM 18 material during the 1964 recodification. At the time the intention was that the FAA would periodically update the Appendix as necessary. However, the list of major repairs in Appendix A have not been kept current. The Working Group concluded through compromise with the ARAC that Appendix A should remain in the rule. Some members of the Working Group want the Appendix A lists to remain as part of the rule to prevent ambiguity and therefore alleviate unnecessary enforcement actions.

11. Should references to "primary structure" in part 43 Appendix A be replaced with "principal structural element"?

The working group is divided on this matter. Principal Structural Elements (PSE's) are a subset of Primary Structure. The Advisory Circular developed by the Working Group considered Primary Structure when developing the logic process. Applying only Principal Structural Elements to the logic criteria warrants a reassessment of the data development logic process.

12. Specific Examples that the current rules fail to address:

- Replacements (or perhaps alterations) that deviate from type design.

- Replacement of a single rivet is not a major repair.

- Replacements that conform to the type design are simple maintenance processes, but the failure to accomplish properly can result in catastrophic events. (Today's Rule) For example, replacement of control cable is classed minor and has been for 50 years without record of any needed change. Appendix A, paragraph (b) can be interpreted to exclude the above but current § 1.1 catches you.

APPENDIX 1: AC 43.XXX, Repair And Alteration Data

U.S. Department of Transportation

ADVISORY CIRCULAR

Federal Aviation Administration

SUBJECT:	REPAIR AND ALTERATION DATA	Date: Initiated by:	AC No. 43.XXX

Purpose: This Advisory Circular sets forth an acceptable means, but not the only means to develop repair or alteration data while establishing compliance with regulatory requirements.

Effective Date:

Cancellation:

Related 14 CFR Federal Aviation Administration Regulations

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 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	Certification and operations: Domestic, flag, and supplemental air carriers and commercial operators of large aircraft
Part 125	Certification and Operations: airplanes having a seating capacity of 20 or more passengers or a maximum payload capacity of 6,000 pounds or more
Part 127	Certification and operations of scheduled air carriers with helicopters
Part 129	Operations: foreign air carriers and foreign operators of U.S. registered aircraft engaged in common carriage
Part 133	Rotorcraft External Load Operations
Part 135	Air taxi operators and commercial operators
Part 145	Repair stations
Part 183	Representatives of the administrator
SFAR36	Development of Major Repair Data

Related Reading Materials (latest revision):

Order 8000.42	Authority to develop and use major repair data not specifically approved by the Administrator
Order 8110.37	Designated Engineering Representative Guidance Handbook
Order 8110.4	Type Certification Handbook
Order 8300.10	Airworthiness inspector's handbook
Order 8310.6	Airworthiness compliance handbook
AC 20.107	Composite aircraft structure
AC 23.1309-1	System Design analysis for small airplanes
AC 25.571-1	Damage Tolerance and Fatigue Evaluation of Structures
AC 25.1309-1	System Design 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 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 65.19	Inspection Authorization Study Guide
AC 91.56	Supplemental structural inspection program for large transport category aircraft
AC 91.60	The continued airworthiness of older airplanes
AC 140.6	Development and use of major repair data under provisions of SFAR-36
AC 145.3	Guide for developing and evaluating repair station inspection procedures manuals
AN 8110.7	Approved Data

Background:

The Federal Aviation Administration (FAA) and certificate holders have cited the ambiguity of existing policies and procedures for repair and/or alteration data for civil aviation products. This has resulted in inconsistent data requirements with potential safety implications. A means is needed to generate the data necessary to define and to substantiate that the maintenance action or disposition thereof, or alteration is in compliance with the applicable regulations.

It is essential that any person or organization developing substantiating data for maintenance and alterations have a thorough working knowledge of the applicable requirements of the regulations. Therefore, to ensure compliance with the applicable regulations, each certificate holder must follow delineated procedures acceptable to the Administrator for developing, documenting and substantiating maintenance and alteration data.

Definitions of Terms Used in This Advisory Circular:

Accepted or Acceptable means accepted by or acceptable to the Administrator.

Accepted Practices means practices demonstrated to conform to a standard developed and/or used by the aviation industry.

Administrator means the FAA or any person to whom authority has been delegated in the matter concerned (14 CFR Part 1).

Airworthy means the product is in compliance with its certification basis and subsequent FAA approved design changes and is in a condition for safe operation.

Alteration means the modification of an aircraft from one sound state to another sound state; the aircraft meets the original airworthiness specifications and standards both before and after the modification.

Appliance means any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is used or intended to be used in operating or controlling an aircraft in flight, is installed in or attached to the aircraft, and is not part of an airframe, engine or propeller. (14 CFR Part 1)

Appreciably affect means to cause a significant change.

Certificate Holder means a person certificated under the provisions of 14 CFR Part 21, 65, 119, 121, 127, 135 and/or 145 such as certificated mechanic or certificated repairman or the holder of an air carrier operating certificate, the holder of a type or production certificate, or the holder of a repair station certificate.

Critical Engine Parts means engine components which have the greatest potential for having a significant impact on the qualities affecting airworthiness. These critical parts should be reviewed to identify most critical features in terms of stress characteristics, failure modes, and probability of detection (POD) of cracks or flaws.

As applied to Gas Turbine Engines includes high energy rotating parts, Containment Structure, High Pressure Vessels, and other Structural components, and Electronic Controls and/or as identified by the type certificate holder, the failure of which could result in a significant impact on the

engine's or aircraft's airworthiness, due to non-containment, structural failures, or loss of mount integrity.

- High energy rotating parts include hubs, disks, blisks (single cast, forged or machined bladed disk), impellers, shafts, "hollow" or composite fan blades, main thrust bearings, spools, drum rotors, rotating airseals and spacers.

- High Pressure Vessels include those cases subjected to high pressure differentials across the case wall being reviewed (e.g. compressor discharge, combustor flowpath pressure, high turbine pressures).

- Other structural components include Structural Mounts, main bearing supports, and principal load carrying structures

- Electronic Controls include Full Authority Digital Engine Control (FADEC) / Electronic Engine Controls (EECs).

As applied to Reciprocating Engines includes crankshafts, connecting rods, pistons, and wrist pins in supercharged engines, cylinders, cylinder heads, and mounts and/or as identified by the type certificate holder.

As applied to Propellers includes steel hubs and blades, blade retention devices, counterweights, pitch control systems, propeller control units (PCUs) and mechanisms, governors, propeller electronic controls, propeller valve modules, pitch links, pitch change rods, and pitch control knobs and/or as identified by the type certificate holder.

Damage means any physical deterioration (e.g., scratch, nick, gouge, dent, crack, deformation, corrosion, wear, erosion, delamination) as determined by comparison to the applicable standard (e.g., drawing, specification, maintenance procedure).

Data see, as appropriate, "maintenance or alteration data", "substantiating data" and/or "technical data."

Discrepancy means any deviation as determined by comparison to the applicable standard (e.g., drawing, specification, maintenance procedure) including damage.

Elementary Operation means, in the context of maintenance or alteration, when:

(a) The operation, procedure or action is clearly defined;
(b) Housing, facilities, equipment and tooling are sufficient to perform the operation, procedure or action;

(c) Proper training and qualifications to perform the operation, procedure or action are established and accomplished; and
(d) The operation, procedure or action is controlled to consistently yield a measurable standard.

FAA Designee means a person delegated authority by the Administrator. For example, Designated Engineering Representative, Designated Airworthiness Representative, Designated Manufacturing Inspection Representative.

Maintenance means inspection, overhaul, repair, preservation, and the replacement of parts, but excludes preventive maintenance. (14 CFR Part 1)

Maintenance or Alteration Data means documented instructions necessary to accomplish the maintenance action or the alteration.

Major Alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications that:
(1) Significantly affects weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(2) Is not done according to accepted practices or cannot be done by elementary operations.

Major Repair means a repair:
(1) Where the damage to be repaired, or proposed repair, will significantly affect aircraft weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(2) Where the complexity of the repair will significantly affect, weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or
(3) That is not done according to accepted practices or cannot be done by elementary operations.

Minor Alteration or Minor Repair means an alteration or repair other than a major alteration or a major repair. (14 CFR part 1)

Person means an individual, firm, partnership, corporation, company, association or governmental entity. It includes a trustee, receiver, assignee, or similar representative of any of them. (14 CFR part 1)

Primary Structure means structure that is identified by the type certificate holder as primary structure or that significantly contributes to the carrying of flight, ground, or pressure loads. It is also known as a structurally significant item (SSI). (See AC 25.1529-1)

As applied to aircraft structure includes structural members listed / specified in the applicable Structural Repair Manual (SRM) or identified by the original equipment manufacturer (OEM).

For Engine / Powerplant and Propellers, see Critical Engine Parts.

Product means a type certificated aircraft, aircraft engine, propeller, *or an* appliance, component, or part thereof.

Repair means the elimination of damage and/or process of restoration.

Substantiating Data means documented factual information that establishes compliance with the applicable airworthiness regulations.

Technical Data means documented factual information to support maintenance or alteration or substantiating data.

Discussion:

Maintenance actions or dispositions thereof, or alterations are accomplished by methods, techniques and practices acceptable to the Administrator. Examples of these data are manufacturer's repair and overhaul manuals, service documents, engineering orders, Airworthiness Directives and other accepted technical documents. Other data acceptable to, or approved by the Administrator, includes but is not limited to the methods, techniques and practices developed under parts 119, 121, 127, 135, 145, or 183 and field approvals. This AC provides for the development of data by an appropriately authorized FAA designee when there is no applicable or appropriate maintenance action, disposition or alteration method, technique or practice available. This AC may be used as guidance material for developing data used to support maintenance and/or alterations. This information sets forth an acceptable means, but not the only means, of complying with applicable regulations. A flow chart outlining the process of this AC is included in Appendix 2.

Person(s) accomplishing maintenance and/or alterations for other certificate holders must ensure their system for developing data either has been accepted by the certificate holder for which the work is being performed, or is consistent with the certificate

holder's system for developing data. Certificate holders with ultimate responsibility for determining airworthiness must ensure work contracted out to others complies with their continued airworthiness maintenance plan. (Ref. 14 CFR Parts 91.403, 121.363, 135.413 and 145.2)

Procedure:

I. Initial Assessment

To determine whether applicable and appropriate data exists to accomplish the contemplated action, or disposition, or alteration, all of the following steps must be taken by the certificate holder:

(A) Description of the Product Affected.
This description should include but is not limited to:
1. Nomenclature.
2. Part number.
3. Assembly number.
4. Serial number(s), if applicable.
5. Make and model of product.
6. If known or as appropriate: hours cycles, time in service, time since new, time since last maintenance action.

(B) Description of the discrepancy or contemplated alteration.
A complete description of the damage, discrepancy or alteration should include, but is not limited to:
1. Explicit location on the product.
2. Type (i.e. corrosion, limit exceeded, cracks, dents).
3. Extent and/or dimensions.
4. Remaining dimensions of the affected area(s) or part(s).
5. Associated, hidden and/or adjacent discrepancies, damage or alteration(s).
6. Previous maintenance action(s)or disposition(s) thereof, or alteration(s) at *or* adjacent to the affected area(s) or part(s).
7. Cause, if known (i.e. environmental, accidental, design).

(C) Review existing data.
Review existing acceptable data, such as maintenance documents, procedures or process specifications as applicable, to determine whether an existing method, technique or practice is explicitly applicable to the discrepancy or contemplated action. Situations which

will require further data collection and analysis include, but are not limited to:

1. Conditions beyond existing allowable damage or repair limits, such as but not limited to:
   a) No instructions or limits exist.
   b) Conditions beyond tolerances.
   c) No method, technique or practice is specifically delineated for the particular discrepancy or contemplated *action*
2. Performing an approved or accepted repair or alteration in a different manner than prescribed.
3. Using repair or alteration data intended for a specific product on another like product.
4. Substitution of materials or processes.
5. AD applies to the product in the area of the discrepancy, repair or contemplated alteration.
6. The area of the discrepancy, repair or contemplated alteration has been defined as a primary structure or will create a Principle Structural Element (PSE). (See § 25.571)
7. Certification maintenance requirements (CMRs) apply to the product in the area of the discrepancy or contemplated *action*.

If it is determined that *existing data is* appropriate and applicable to the discrepancy or contemplated maintenance action or disposition thereof, or alteration, then an assessment must be performed to determine if the action significantly affects airworthiness as described in Section III.

II. Data Development

For critical engine parts and primary structure, as applicable, special attention should be paid to development of supporting data. If the repair or alteration utilizes processes that affect the part's structural strength or material properties; and available data, analysis or computation cannot satisfactorily support approval of the repair without endurance runs or destructive testing, the repair or disposition being developed could have a significant impact on the qualities affecting airworthiness.

If it is determined that no appropriate or applicable data exists, it will be necessary to develop and document the data required to accomplish the maintenance action or disposition thereof, or the alteration. This process should be accomplished by technically competent persons with the experience necessary to make required decisions. The necessary data ranges from maintenance data referencing specific technical data to fully documented analyses and/or test(s).

(A) Assessment

As appropriate to the action being considered, the functions, interactions, environment and consequence of failure of the product, as applicable, must be assessed to determine the extent of analysis and the expertise needed to develop technical and substantiating data required to comply with the airworthiness regulations. This assessment may include, but is not limited to:

1. Functional information - how the part functions within the assembly; how the assembly functions within the system; and/or how the system functions within the product. This outlines the nature of the product being maintained or altered.
2. Operating environment of the product - the conditions an/or specification under which the product is intended to operate.
3. Interaction with other systems and consequences of failure - which of the part's failure modes could be most influenced by the maintenance, disposition or alteration and what would be the most probable effect on its capability to perform its intended function. For parts other than those listed above as primary structural parts or critical engine parts, consider the effect on airworthiness due to part failure (e.g. secondary bearing and bearing support repairs, secondary structure forward of control surfaces).
4. Effect of the repair and/or alteration - which may ultimately change the part's type certification, operational characteristics, or performance.

(B) Develop Maintenance or Alteration Data.

The maintenance or alteration data should establish, as applicable:

1. Detailed work instructions;
2. Inspection criteria - incoming (initial), in-process and/or final inspection;
3. Description of, or reference to, processes and the instructions for their accomplishment
   a) heat treating, surface treatment, blending, welding)
   b) Consideration of specialized processes on engine hardware, such as, but not limited to:
      i. HPT turbine blade repair (especially single crystal alloys)
      ii. LPT turbine blade repair
      iii. Subjecting engines and parts thereof to specialized processes (acid stripping, ultrasonic cleaning etc.) outside of the manufacturer's maintenance manual or

instructions for continued airworthiness;

4. Continuous inspection requirements and/or future maintenance action requirements;
5. Acceptance of condition without further specific maintenance action.

(C) Substantiating Data

In order to substantiate regulatory compliance, the data collected and documented must be evaluated to establish that it meets all the requirements of the applicable airworthiness standards of the regulations. One tool to accomplish this is the use of a compliance checklist. See Appendix 3 for examples of checklists.

III. Assess Effect

Persons deciding whether a particular maintenance action or disposition thereof, or alteration will significantly affect the product must have the technical expertise to make the determination. This may require consultation with specialists in several disciplines before a determination can be made.

(A) Determine if the maintenance action or disposition thereof, or alteration will significantly affect the airworthiness characteristics of the product. See Appendix 1 for example items which may be applicable to the product being evaluated.

1. Maintenance action or disposition thereof, or alteration significantly affecting the airworthiness characteristics of the product will require approval of data by an authorized FAA designee or directly by the FAA.
2. If it is determined that the maintenance action or disposition thereof, or alteration does not significantly affect the airworthiness characteristics of the product, then the data may be applied per the FAR's.
3. If a determination cannot be readily made whether the maintenance action or disposition thereof, or alteration will significantly affect the airworthiness characteristics of the product, then consultation with appropriate person(s) is necessary to perform the evaluation. See Appendix 1.

(B) The following types of technical data may be used during the assessment of determining effect.

1. Data obtained from the design approval holder;
2. Data developed from recognized engineering reference sources (*e.g.* Roarke, Bruhn, Timoshenko, NACA technical notes, Shanley, etc.);
3. Data consisting of static, dynamic, fatigue or damage tolerance analysis;
4. Data developed from tests and/or analyses acceptable to the FAA.
5. Data developed to deviate from Type Certificate Holder (TCH) published allowable damage limits, tolerances or repair limits;
6. Data developed to substantiate time limited/ interim repairs;
7. Data developed by rational analytical process, including derivation from approved or accepted data, using methods which have been shown to be reliable, or data which has been derived from service experience that is appropriate to the operational and certification requirements for the product thereof;
8. Data based on industry specifications, practices, standards and procedures, design approval holder's or manufacturer's service instructions, instructions for continued airworthiness and airworthiness limitations;
9. Data developed from properly collected and analyzed reliability data, warranty data, service test data and operational experience.
10. Data developed from design standards (e.g. Civil Aeronautics Regulations (CAR's); Federal Aviation Regulations; Civil Aeronautics Manuals (CAM's), etc.)

IV. Approval of Data

(A) If it is determined that the maintenance action or disposition thereof, or alteration will significantly affect airworthiness, then the data requires approval by the FAA. See Appendix 1.

(B) The FAA Aircraft Certification Office (ACO) may reserve certain approvals to itself when the maintenance action or disposition thereof, or alteration affects or requires any of the following: (ref. FAA Orders 8110.37 and 8110.4)

1. Long term inspection requirements;
2. Changes to an aircraft flight manual (AFM) or flight manual supplement:

3. Certified life limits or certified safe life limits:
4. Supplemental type certificate or type certificate amendment;
5. Compliance with an Airworthiness Directive (AD);
6. Damage tolerance evaluation of structure certified to or affected by applicable regulations or AD's due to a repair or alteration;
7. Development of a test plan to establish compliance with applicable regulations.

(C) The approval of the data must be recorded in a form and manner acceptable to the Administrator.

V. Data Application:

Data developed under this process may be applied in accordance with the Federal aviation regulations.

Appendix 1: Examples of Items to be Considered for Effect on Airworthiness

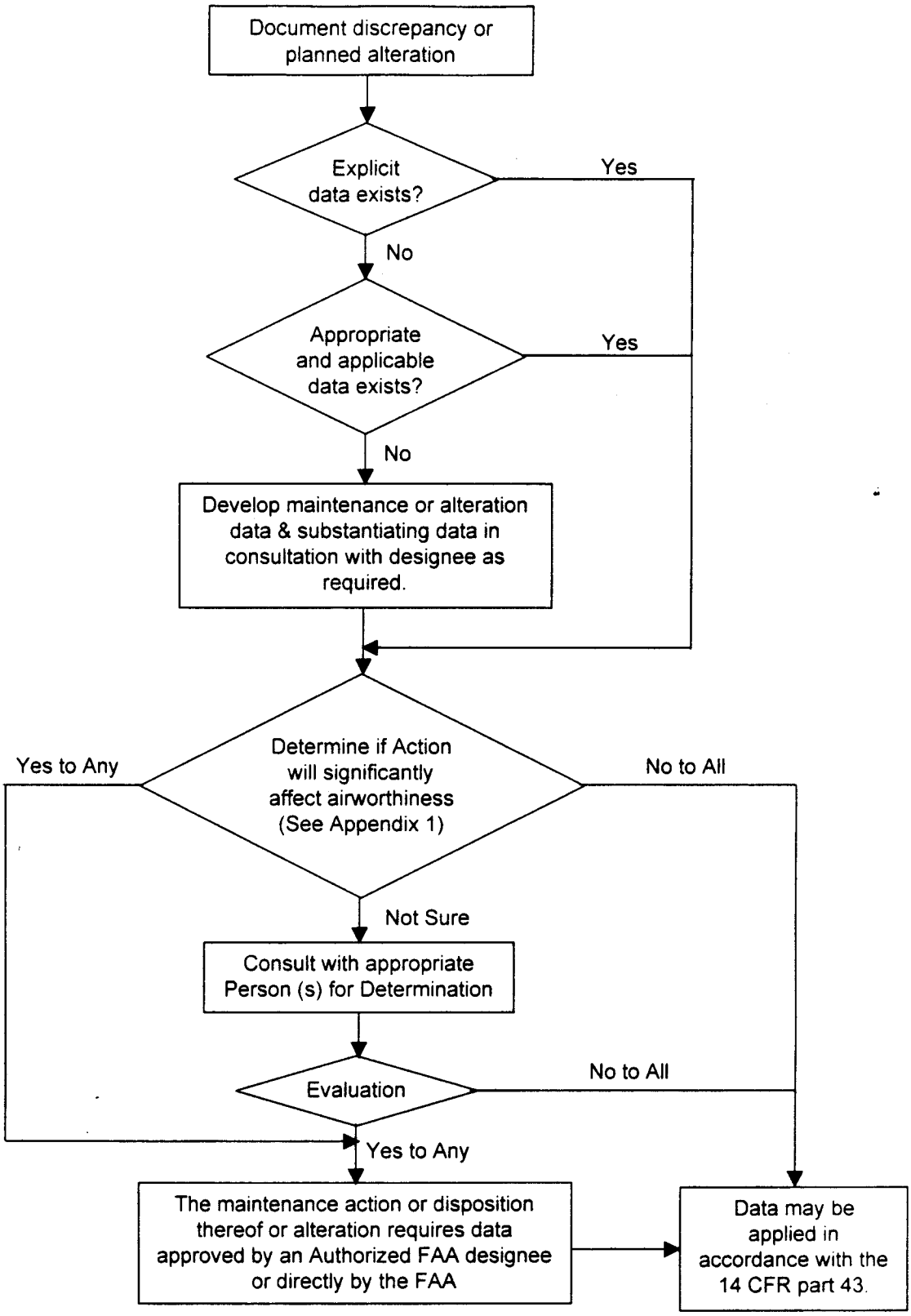
- Engine, powerplant, propeller or appliance operation;
- Strength of structural parts of propellers and appliances;
- Weight; (change in certificated weights)
- Balance; (exceedance of center of gravity limits)
- Structural properties of primary structure, including, but not limited to, the following characteristics;
  ⇒ Static
  ⇒ Fatigue
  ⇒ Fail-safe
  ⇒ Damage tolerance
  ⇒ Aeroelasticity (stiffness)
- Life limited parts;
- Inspectability;
- Operational characteristics, for example;
  ⇒ Buffeting
  ⇒ Acoustics
  ⇒ Fuel consumption
- Aerodynamic performance;
- Flight critical systems or components; (for example: airspeed, altitude, altitude indicating equipment and systems, flight critical controls including fly-by-wire, fly-by-light, full authority digital engine controls (FADEC) and other systems that may be critical in certain phases of flight such as autoland systems)
- Other characteristics affecting the airworthiness, for example;
  ⇒ Vibration
  ⇒ Static discharge
  ⇒ Utilization of methods, techniques or practices novel or unusual to the aeronautical field;
  ⇒ Use of other than elementary operations

⇒ Corrosion prevention

- Other regulatory requirements;
  - ⇒ Noise
  - ⇒ Flammability
  - ⇒ Emissions
  - ⇒ Crash worthiness

- Other systems:
  - ⇒ Avionics
  - ⇒ Software

APPENDIX 2: DATA DEVELOPMENT LOGIC DIAGRAM



APPENDIX 3 - EXAMPLES OF COMPLIANCE CHECKLISTS
(Note: This appendix contains examples only of a recommended format for compliance checklists)

SAMPLE COMPLIANCE CHECKLIST - PART 23, SUBPART F, SYSTEMS & EQUIPMENT

Legend: Analysis=A, Test=T, Document=D, Mockup=MU, Demonstration=DM, Not Applicable=N/A

FAR Section and Title	Paragraph	Means of Compliance						Document / Drawing No.
Associated (CAR) Reference		A	T	D	MU	DM	N/A	
FAR 21.1301 - Function and Installation	(a) thru (d)							
CAR 3.652								
FAR 23.1303 - Flight and Navigation Instruments	(a) thru (c)							
CAR 3.655								
FAR 23.1307 - Miscellaneous Equipment	(b)(1) thru (3)							
CAR 3.690								
FAR 23.1309 - Equipment, Systems and Installation	(a)(1)(i)							
CAR 3.681								

SAMPLE COMPLIANCE CHECKLIST - PART 25, SUBPART C, STRUCTURE

FAR Section and Title	Paragraph	Means of Compliance						Document / Drawing No.
Associated (CAR) Reference		A	T	D	MU	DM	N/A	
FAR 25.301 - Loads	(a) thru (c)							
CAR 4b.200	(a) thru (d)							
FAR 25.303 - Factor of Safety								
CAR 4b.200	(a)							
FAR 25.305 - Strength and Deformation	(a) thru (f)							
CAR 4b.201	(a) thru (d)							
FAR 25.307 - Proof of Structure	(a) thru (d)							
CAR 4b.202	(a) thru (d)							

SAMPLE COMPLIANCE CHECKLIST - PART 33, SUBPART C & D, RECIPROCATING AIRCRAFT ENGINES ONLY

FAR Section and Title	Paragraph	Means of Compliance						Document / Drawing No.
Associated (CAR) Reference		A	T	D	MU	DM	N/A	
FAR 33.33 - Vibration								
CAR 13.103								
FAR 33.35 - Fuel & Induction System	(a) thru (e)							
CAR 13.110								
FAR 33.37 - Ignition System								
CAR 13.111								

FAR 33.39 - Lubrication System	(a) thru (c)							
CAR 13.112								

APPENDIX 2: Memo by Carey Terasaki, Airworthiness Law Branch, FAA

Below is a copy of a memo from Carey Terasaki, Manager, Airworthiness Law Branch, FAA, to Fred Sobeck, Flight Standards Service, FAA, dated March 13, 2000. The document expresses FAA Chief Counsel's response to questions and concerns raised by the Major/Minor Working Group during the February, 2000 meeting session.

MAR 13 2000

To: Fred S.

From: Carey T.

BACKGROUND

The working group had asked—

1. Why only the definition of *major repair* refers to "if improperly done?"

2. Why the definition of *major alteration* does not refer to "if improperly done?"

3. How does one interpret the *major repair* definition?

AGC-210 had previously advised—

Excluding the phrase "if improperly done" in the definition of *major repair* would render a literal reading of that definition senseless. Including "if improperly done" in the definition of *major alteration* would broaden that definition such that all alterations would be "major."

The plain meaning of "repair" connotes a restoration; that is, when one repairs something, one restores its qualities. In the context of an "alteration," a change from the existing design is a given. A repair to a product can result in an alteration when the repair only restores part of the product to its undamaged state. It can also "result" in an alteration when the extensiveness of the damage is such that the measures to restore the product will necessarily entail additional or different design elements.

Each definition refers to qualities normally thought of as needing "repair" or restoration (e.g., structural strength), and qualities normally associated with design choices that can be "altered" (e.g., weight and balance). In each case, the FAA is concerned when the maintenance action might appreciable affect any of the qualities affecting airworthiness. In this regard, the *major repair* and *major alteration* definitions work in concert. If the failure to restore the product, or the extent of the change due to the restoration measures, might have an appreciable effect on the qualities affecting airworthiness, the maintenance action is "major," whether one calls it a "repair" or an "alteration."

AGC-210 described a logical construction of "major repair" using the example of the "appropriate" torque range for a bolt pattern as an illustration. I.e., there is a range of torque values within which there clearly would be no appreciable effect on that joint, much less an appreciable effect on any of the qualities affecting airworthiness of the product. (The joint would carry the necessary loads, no stress risers would be created, etc.) If the bolts were torqued outside that range—"improperly done"—and returning the product to service with that joint might appreciably affect the airworthiness of the product, the repair is "major." Conversely, if

Where the complexity of the repair will significantly affect, weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

That is not done according to accepted practices or cannot be done by elementary operations.

Major alteration means an alteration not listed in the aircraft, aircraft engine, or propeller specifications that:

Significantly affects weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness; or

Is not done according to accepted practices or cannot be done by elementary operations.

III. Also, the regulatory approach could include various levels of requirements, depending on the aspect(s) of concern, e.g., recordkeeping, data approval, or "second set of eyes."

However, the group also developed some concepts that are unworkable, e.g.,---

Using a "replacement" definition to exclude some actions from being "major." That definition was based on using parts identical to those already approved as part of the type design. The problem is that the concept ignores the fact that novel or unique methods, techniques, or practices for accomplishing the replacement can have significant impacts on the qualities affecting airworthiness; there appears to be no safety rationale for the FAA to ignore those kinds of major repairs. Also, the concept suffered from the logical inconsistency of excluding some (literal) replacements from the term, depending on whether the item being replaced was damaged or not. (A more limited approach may be possible. The working group could consider the perspective that some alterations that are done 100% in accordance with already approved data are considered to be "listed in the aircraft, aircraft engine, or propeller specifications" and are, thus, not considered to be major alterations. Skip Averman has a ccMail on this.)

"Requiring" a determination of "major" or "minor." Although one needs to address the issue as a matter of attempting to comply with the pertinent regulations, FAA does not want to identify an action as a "requirement" unless the failure to do so would be considered a violation of law (punishable by civil penalty or certificate action) or a legal barrier to an entitlement (which would implicate some return-to-service paperwork or other rules). The working group is free to recommend those. However, AGC-210 does not see the need to add that layer of bureaucracy.

Incorporating "who 'does' the necessary determination?" into the definitions. Regulated persons engage in much decision-making as they attempt to comply with the vast array of FAA regulations. This does not mean, however, that those persons have been delegated the legal authority to interpret FAA regulations; that function is, as a matter of law, non-delegable. The

returning the product to service with that joint would not have any of those appreciable effects, the repair is "minor."

The working group stated that a common opinion is that the determination of the effect of "if improperly done" is obviated if compliance with § 43.13(b) is assured. AGC-210 explained how that common opinion is incorrect.[123]

In retrospect, it has become clear that the group, when originally tasked, set an unrealistic goal, i.e., that one could devise major repair and alteration definitions that could be more literally enforced, but not have a significantly disruptive impact on the repair industry.

A POSSIBLE APPROACH.

The working group already has developed an approach that attempts to (1) use revised definitions in 14 CFR § 1.1 to trigger the *major repair/alteration* requirements; (2) use a revised part 43 appendix as examples that generally will presumed to be "major"; and (3) provide that a repair listed in the appendix is, nonetheless, "minor," based on the specific aspects of that repair. This appears to be a good approach. Two important things to consider---

I. Developing the way for determining that a specific repair or alteration is minor must be based on applying the § 1.1 definitions.

II. In reviewing the possible revisions to the § 1.1 definition of *major repair*, AGC-210 and the FAA rep had discussed the possibility that some form of "if improperly done" needed to be retained, or that concept needed to be replaced. E.g., one could draft a *major repair* definition as follows---

Major repair means a repair:

Where the damage to be repaired has significantly affected weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting airworthiness;

---

1 The major repair regulations are distinct from § 43.13(b) and are cited differently.

2 One can comply with § 43.13(b), and still violate the applicable major repair regulation. Using the bolt torque example, the major repair regulations would require that the product be returned to service only if the bolts were torqued within the range of values approved by the FAA. But § 43.13(b) would require that the product be returned to service only if the bolts were torqued within the range of values within which the product would be at least equal to its original or properly altered condition in terms of the qualities affecting airworthiness. (I.e., § 43.13(b) would be satisfied if the joint would carry the loads as well as the original, the joint would be as durable as the original, etc.)

3 It would be nonsensical for the FAA to create a regulatory scheme where the requirement to keep a record of a repair would be triggered only if the maintenance person returned the product to service in violation of § 43.13(b). That person returns the product to service based on the belief that the maintenance was properly performed. Why would an operator record something that it believes to be untrue, and operate an aircraft it believes to have been maintained improperly?

working group had developed a proposal whereby a *determination* of "minor" would be **defined** as the "proper" result of an approved person following the FAA-developed process. That in and of itself would create a tautology—a repair is minor if it is correctly determined to be minor and it is major if it is incorrectly determined to be minor. The same repair for the same aircraft should be classified the same, regardless of status of the person attempting to "classify" the repair.[4] Thus, the process for "determining major" should be "de-personalized" and left to the AC as a means of compliance.

Barry Franklin

[4] This is not to imply that subjective regulations cannot, as a matter of fact, be "interpreted" differently. It is to state that, as a matter of law, the government should try to eliminate those inequities, rather than codify them.

APPENDIX 3: Proposed Changes to Part 43 Appendix A

Discussion:

Paragraph (b)(1) would be amended to add the word "bonding" to the list of types of fabrication processes that constitute a major repair when used to manufacture a replacement for a primary structural member. The addition of the term "bonding" to the types of fabrication processes would modernize the rule to reflect the use of composite materials in modern aircraft airframes.

In paragraph (b)(1)(xxii), "the repair of damaged areas in metal or plywood stressed coverings exceeding 6 inches in any direction" would be changed to "repair of a damaged area in stressed coverings made of metal or plywood where the damage or removed material exceeds 6 inches." In addition, the proposed rule would clarify that the 6 inches specified is a measure of the damage, or, if material is required to be removed for the repair, the 6 inches specified is a measure of the removed material and not the total area of the repair. The wording "in any direction" also would be deleted because of redundancy.

A new paragraph (b)(1)(xxiii) would add "repair of a pressurized vessel." This paragraph would be added to reflect the critical importance of repairs to pressurized vessels.

A new paragraph (b)(1)(xxiv) would add "repair of a damaged area in a composite or chemically milled structure." This change would reflect the use of new materials and manufacturing techniques on modern aircraft primary structures.

Current paragraph (b)(1)(xxiii) would be redesignated as paragraph (b)(1)(xxv).

Current paragraph (b)(1)(xxiv) would be deleted because it is redundant of current paragraph (b)(1)(xxiii).

Current paragraph (b)(1)(xxv) would be redesignated as paragraph (b)(1)(xxvi).

Current paragraph (b)(1)(xxvi) would be redesignated as paragraph (b)(1)(xxvii) and modified to replace the language "greater than that required to repair" with the language "extending beyond."

Current paragraph (b)(1)(xxvii) would be redesignated as paragraph (b)(1)(xxviii).

Current paragraph (b)(1)(xxviii) would be revised to remove the redundant language "including rebottoming" and would be redesignated as paragraph (b)(1)(xxix). The FAA maintains that rebottoming is considered a method of repair and, therefore, does not need to be mentioned specifically.

A new paragraph (b)(1)(xxx) would add "repairs involving strengthening, splicing, reinforcing, or blendouts on life limited primary structure." This paragraph would be added to reflects concerns over life limited primary structure.

In paragraphs (b)(2)(i) and (b)(2)(ii), the term "separation or disassembly" would be revised to read "assembly." This change would stress the importance of the assembling process. This change also would delete the need to complete FAA Form 337 when the crankcase or crankshaft of a reciprocating engine equipped with an integral supercharger is disassembled.

Paragraph (b)(2)(iii) would be amended to remove the word "special" because it is old terminology that has no measurable limit. The language "by welding, plating, metalizing, or other methods" would be revised to read "by any method other than those contained in the maintenance manual or type certificate holder's instructions for continued airworthiness." The FAA believes removing this would clarify the rule by reducing ambiguous wording.

In paragraph (b)(3), "Repairs of the following types to a propeller are propeller major repairs," would be amended to read "Repairs of the following types, excluding the treatment of surface corrosion and application of protective coating, are major repairs." The change would remove redundant language and clarify that the treatment of surface corrosion and application of protective coating is not a major repair.

The list of propeller and governor major repairs would be clarified by grouping together repairs to propeller types.

Paragraphs (b)(3)(i) and (b)(3)(ii) would be combined into the new paragraph (b)(3)(i). The term "machining" would be removed because it refers to a specific method of repair rather than a type of repair and therefore does not need to be identified specifically.

Paragraph (b)(3)(iii) would be redesignated as paragraph (b)(3)(ii) and amended to add the term "straightening" previously found in paragraph (b)(3)(i).

Paragraph (b)(3)(iv) and (b)(3)(ix) would be combined into the new paragraph (b)(3)(iii).

Paragraph (b)(3)(v) would be amended to add "inlay work," which previously was found in paragraph (b)(3)(vii).

Paragraph (b)(3)(vii) and (b)(3)(x) would be combined into the new paragraph (b)(3)(iv).

Paragraph (b)(3)(viii) would be redesignated as paragraph (b)(3)(vii) and amended to read "repair of a composite blade beyond the type certificate holder's recommendations for field repair." The FAA notes the change was necessary to modernize the rule to reflect current terminology on the use of composites in propeller

design. The change also was necessary because some type certificate holders of composite propeller blades have published field repair manuals.

Paragraph (b)(3)(xi) and (xii) would be redesignated as paragraphs (b)(3)(viii) and (ix), respectively. The FAA notes that under current paragraph (b)(3)(xi) and proposed paragraph (b)(3)(viii), external RPM adjustments are not considered repairs.

Paragraph (b)(3)(xiii) would be redesignated as paragraph (b)(3)(x), with minor editorial changes.

Paragraph (b)(3)(xiv) would be redesignated as paragraph (b)(3)(xi) and amended to add the word "hubs." The FAA determined this change was necessary to clarify the importance of repairs made to the internal elements of hubs.

In paragraph (b)(4), Appliance major repairs, the language would be amended to make the rule less restrictive.

Under the proposal a new paragraph (b)(4)(i) would be added to include as a major repair "repairs not made in accordance with the recommendations of the applicable type certificate holder or in accordance with an FAA Airworthiness Directive."

As proposed current paragraph (b)(4)(i) would be redesignated as paragraph (b)(4)(ii). This paragraph would be amended by replacing the "and" with an "or" and by adding "excluding direct reading compasses." The FAA notes that an instrument does not have to be calibrated and repaired to be considered a major repair, merely one or the other is enough. The FAA also notes that maintenance to direct reading compasses does not require special data, equipment, or training and can be accomplished in the field by mechanics.

The term "radio equipment" which appears in current paragraph (b)(4)(ii) would be retained in the proposed rule in paragraph (b)(4)(iii) because the FAA defines the term to include navigation and communication equipment as well as weather radar and all other equipment that involves the transmission and reception of radio waves.

Paragraphs (b)(4)(iii), (b)(4)(iv), and (b)(4)(v) would be removed. The FAA notes that the data, equipment, and training required for these tasks is now widely available to mechanics.

In paragraph (c), Preventive maintenance, the words "or the assembly of any primary structure or operating system" would be added. This would not be a new requirement; it merely would remove this language from individual preventive maintenance tasks in paragraphs (c)(9), (c)(10), (c)(11), and (c)(15). The word "disassembly" in current paragraphs (c)(9), (c)(10), (c)(11), and (c)(15) would be removed.

The proposal would redesignate paragraph (c)(7) as paragraph (c)(8). This would help group the servicing of hydraulic reservoirs with other servicing/lubrication items and group the making of fabric patches with other fabric related maintenance. The language

"or the removal of structural parts or control surfaces" would be removed and addressed by the proposed introductory language in paragraph (c). The language regarding making balloon small fabric repairs was removed from paragraph (c)(7) and added as new paragraph (c)(11).

Paragraph (c)(8) would be redesignated as paragraph (c)(7). The term "replenish" would be changed to "servicing." The proposal also would include the servicing of deicing fluid and would specify that the servicing of hydraulic reservoirs refers to the servicing of nonpressurized reservoirs only.

Paragraph (c)(9) would be revised to group the common areas and items of an aircraft together and to add the more inclusive term "repairing." The individual items would be removed from paragraph form and listed separately. The revision also would remove the "repair of upholstery" from current paragraph (c)(11) and "nonstructural cover plates" from current paragraph (c)(12) and add "upholstery" and "any nonstructural cover plates" to the list of repairs in paragraph (c)(9).

Paragraph (c)(10) would be revised by removing the wording "where no disassembly of any primary structure or operating system is involved and where such coating is prohibited or is not contrary to good practices." This requirement would be addressed by the proposed introductory language in paragraph (c).

New paragraph (c)(11) would contain the language "making small fabric repairs to a balloon envelope not requiring load tape repair or replacement," which was taken from current paragraph (c)(7).

Paragraph (c)(13) would be revised to specify its applicability to nonpressurized aircraft only. The FAA proposes that this change is necessary to prevent incidents or accidents caused by the incorrect installation of a critical side window on a pressurized aircraft.

Paragraphs (c)(14) and (c)(15) would be combined and redesignated as paragraph (c)(14). The language from current paragraph (c)(15) "with replacement parts approved for the aircraft not involving disassembly of any primary structure or operating system" would be removed. The disassembly provision would be addressed by the proposed introductory language in paragraph (c). In addition, the FAA notes that the requirements for using approved parts are not the focus of this appendix and are found elsewhere in the regulations. Therefore, this language is being removed from the proposed paragraph.

Current paragraphs (c)(16) and (c)(17) would be redesignated as paragraphs (c)(15) and (c)(16), respectively.

Current paragraph (c)(18) would be revised to clarify that it is permissible under preventive maintenance rules to replace wheels with skis and skis with wheels when no weight and balance computation is required. This change would pertain to aircraft certificated to use this type of equipment. Current paragraph (c)(18) would be redesignated as paragraph (c)(17).

Current paragraphs (c)(19) through (c)(22) would be redesignated as paragraphs (c)(18) through (c)(21), respectively.

Current paragraph (c)(23) would be revised to include the changing of engine oil as a preventive maintenance task and would be redesignated as paragraph (c)(22). The FAA notes that the previous omission of changing engine oil from the list of preventive maintenance items was cause for confusion in the industry because cleaning or replacing fuel and oil strainers or filter elements often requires changing the engine oil.

Current paragraph (c)(24) would be revised to specify that it is permissible to replace nickel cadmium (NICAD) batteries and to service lead-acid batteries. The FAA proposes that this distinction is necessary to avoid injury to personnel and damage to property caused by persons servicing NICAD batteries who are not familiar with the hazards that can be associated with these types of batteries. Current paragraph (c)(24) would be redesignated as paragraph (c)(23).

Current paragraph (c)(25) would be redesignated as paragraph (c)(24) and would be revised to remove the language "in accordance with the balloon manufacturer's instructions." The FAA notes that this language is unnecessary because § 43.2(a)(1) requires the use of methods, techniques, and practices acceptable to the Administrator.

Current paragraph (c)(26) would be redesignated as paragraph (c)(25) and would be revised to remove the language "incidental to operations." The FAA believes that the term "incidental to operations" caused confusion in the industry.

Current paragraph (c)(27) would be redesignated as paragraph (c)(26) and would be revised for clarity.

Current paragraph (c)(28) would be removed. The proposal would update the rule by deleting the installation of antimisfueling devices, as most aircraft already have the smaller diameter fuel tank filler openings incorporated.

Current paragraph (c)(29) would be redesignated as paragraph (c)(27).

Current paragraph (c)(30) would be redesignated as paragraph (c)(28) and would be revised with certain editorial and organizational changes. The content of current paragraph (c)(30) would remain unchanged.

Current paragraphs (c)(31) and (c)(32) would be redesignated as paragraphs (c)(29) and (c)(30), respectively, with editorial changes.

Recommended Rule Language:

APPENDIX A TO PART 43, MAJOR ALTERATIONS, MAJOR REPAIRS, AND PREVENTIVE MAINTENANCE.

7. Revise Appendix A to read as follows:

* * * * *

(b) * * *

(1) Airframe major repairs. Repairs to the following parts of an airframe and repairs of the following types, involving the strengthening, reinforcing, splicing, and manufacturing of primary structural members or their replacement, when replacement is by fabrication such as riveting, welding, or bonding, are major repairs.

* * * * *

(xxii) Repair of a damaged area in non-pressurized stressed coverings made of metal or plywood where the damaged or removed material exceeds 6 inches in any direction or when a repair is within 3 inches of another repair.

(xxiii) Repair of a pressurized vessel.

(xxiv) Repair of a damaged area in a composite or chemically milled structure.

(xxv) Repair of portions of skin sheets by making additional seams.

(xxvi) Repair of three or more adjacent wing or control surface ribs or the leading edge of wings and control surfaces, between such adjacent ribs.

(xxvii) Repair of a fabric covering involving an area extending beyond two adjacent ribs.

(xxviii) Repair of fabric on fabric covered parts such as wings, fuselages, stabilizers, and control surfaces.

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

(xxx) Repairs involving strengthening, splicing, reinforcing, or blendouts on life limited primary structure.

(2) Powerplant major repairs. Repairs of the following parts of an engine and repairs of the following types are major repairs:

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

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

(iii) Repair of a structural engine part by any method other than those contained in the maintenance manual or type certificate holder's instructions for continued airworthiness.

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

(i) Repair of a steel hub or blade.

(ii) Straightening or shortening of blades.

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

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

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

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

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

(viii) Repair of propeller governors.

(ix) Overhaul of controllable pitch propellers.

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

(xi) Repair and/or replacement of internal elements of hubs and blades.

(4) Appliance major repairs. Repairs of the following types are major repairs:

(i) Repairs not made in accordance with the recommendations of the applicable type certificate holder or in accordance with an FAA Airworthiness Directive.

(ii) Calibration or repair of instruments, excluding direct reading compasses.

(iii) Calibration of radio equipment.

(c) Preventive maintenance. Preventive maintenance is limited to the following work, provided it does not involve complex assembly operations or the assembly of any primary structure or operating system:

* * * * *

(7) Servicing deicing fluid and servicing hydraulic fluid in nonpressurized hydraulic reservoirs.

(8) Making simple fabric patches not requiring rib stitching.

(9) Repairing or refinishing the decorative coatings of—

(i) A fuselage, wing, and tail group;

(ii) A balloon basket;

(iii) The fairings and cowlings;

(iv) The landing gear;

(v) The cabin and/or cockpit interior;

(vi) The upholstery; and

(vii) Any nonstructural cover plates.

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

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

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

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

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

(15) Troubleshooting and repairing broken circuits in landing light wiring circuits.

(16) Replacing bulbs, reflectors, or lenses of position and landing lights.

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

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

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

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

(21) Replacing prefabricated fuel lines.

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

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

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

(25) Replacing or adjusting nonstructural standard fasteners.

(26) Interchanging balloon baskets and burners on envelopes when specifically designed for quick removal and installation.

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

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

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

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

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

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

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

(29) Removing and replacing self-contained, front instrument panel-mounted navigation and communication devices that use tray-mounted connectors to connect the unit to the instrument panel (excluding automatic flight control systems, transponders, and microwave frequency distance measuring equipment (DME)). The approved unit must be designed to be readily and repeatedly removed and replaced, and pertinent instructions must be provided. Before the unit's intended use, an operational check must be performed.

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

[4910-13] June 2, 1997

DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 43

[Docket No. ; Notice No. 97-]

RIN 2120-

Major/Minor Repairs and Alterations

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes to amend 14 CFR part 43 to provide an alternative to the current 14 CFR part 43, Appendix A, paragraphs (a) and (b), for the determination of major/minor classification of repairs and alterations. This amendment is necessary to provide the option to utilize a process which expands the repair and alteration classification process to address both the data development and classification of the intended action. This proposal, in conjunction with new advisory material, will assist certificate holders in developing repair and alteration data and in determining the classification of repairs and alterations. The advisory material will also establish procedures to determine when approved data is required.

DATES: Comments must be received on or before [Insert date XX days after date of publication in the Federal Register].

ADDRESSES: Comments on this NPRM should be mailed, in triplicate to: Federal Aviation Administration, Office of the Chief Counsel, Attention: Rules Docket (AGC-200), Docket No. XXXXX, 800 Independence Avenue, SW., Washington, DC 20591. Comments may also be sent electronically to the Rules Docket by using the following Internet address: 9-nprm-cmts@faa.dot.gov. Comments must be marked Docket No. XXXXX. Comments may be examined in the Rules Docket in Room 915G on weekdays between 8:30 a.m. and 5:00 p.m., except on Federal holidays.

FOR FURTHER INFORMATION CONTACT: Mr. Fred Sobeck, AFS-330, Aircraft Maintenance Division, Federal Aviation Administration, 800 Independence Avenue, SW., Washington, DC 20591; Telephone: (202) 267-7355.

SUPPLEMENTARY INFORMATION:

Comments Invited

Interested persons are invited to participate in this proposed rulemaking by submitting such written data, views, or arguments as they may desire. Comments relating to the environmental, energy, federalism, or economic impact that may result from adopting the proposals in this notice are also invited. Comments that provide the factual basis

supporting the views and suggestions presented are particularly helpful in developing reasoned regulatory decisions. Communications should identify the regulatory docket number and be submitted in triplicate to the above specified address. All communications and a report summarizing any substantive public contact with FAA personnel on this rulemaking will be filed in the docket. The docket is available for public inspection both before and after the closing date for receiving comments.

Before taking any final action on this proposal, the Administrator will consider all comments made on or before the closing date for comments, and the proposal may be changed in light of the comments received.

The FAA will acknowledge receipt of a comment if the commenter includes a self-addressed, stamped postcard with the comment. The postcard should be marked "Comments to Docket No. ." When the comment is received by the FAA, the postcard will be dated, time stamped, and returned to the commenter.

Availability of the NPRM

Any person may obtain a copy of this NPRM by submitting a request to the Federal Aviation Administration, Office of Rulemaking, 800 Independence Avenue SW., Washington, DC 20591, or by calling (202) 267-9677. Communications must

identify the notice number of this NPRM. Persons interested in being placed on a mailing list for future FAA NPRM's should request a copy of Advisory Circular No. 11-2A, Notice of Proposed Rulemaking Distribution System, which describes application procedures.

An electronic copy of this document may be downloaded using a modem and suitable communications software from the FAA regulations section of the Fedworld electronic bulletin board service (telephone: 703-321-3339) or the Federal Register's electronic bulletin board service (telephone: 202-512-1661). Internet users may reach the FAA's web page at http://www.faa.gov or the Federal Register's webpage at http://www.access.gpo.gov/su_docs for access to recently published rulemaking documents.

History

The issue of "major" vs. "minor" repairs and alterations has been a concern since the earliest days of aviation safety regulation. A memo on this subject to the Civil Aeronautics Board dated March 7, 1941, from the Chief of the Safety Rules and Education Division stated, "It would be safe to say that no regulation affecting civil aeronautics has caused so many inconveniences, delays and confusions as this particular provision."

The first general regulation on aeronautical repairs and alterations was issued by the Aeronautics Branch of the Department of Commerce as Aeronautics Bulletin No. 7-H effective January 1, 1931. The overall concept of the distinctions between major and minor repairs and between repairs and alterations and the impact of those distinctions is evident in that regulation. It is also evident that the original concept and the issues and problems that flow from that concept have changed very little in the intervening years.

Section 1, "Application of Regulations" of the 1931 regulation reads as follows:

"(A) A licensed aircraft which as been altered in such a manner as to affect the structure, balance, carrying capacity, or general airworthiness of the aircraft shall not be flown until technical data in accordance with section 36 have been submitted to and approved by the Secretary of Commerce and an authorized representative of the Secretary has inspected and approved the alterations.

(B) A licensed aircraft which is slightly damaged, but not damaged to such an extent as to come within the meaning of section 1(C) shall not be flown until it has been fully repaired and such repairs approved by a licensed mechanic. The repair and approval must be noted in the airplane log, together with the signature of the mechanic involved.

(C) When a licensed aircraft or a major component thereof, such as the fuselage, tail surfaces, control system, wings, or landing gear, has been damaged to such an extent that it constitutes a major repair in the judgment of the Department of Commerce inspector, the airplane shall not be flown until the requirements of these regulations have been completely fulfilled and the repairs have been approved by a Department of Commerce inspector."

Section 5, "Technical Data" of the 1931 regulation reads as follows:

"A repair station holding an approved repair station certificate may make major repairs in accordance with the original design on aircraft of the class or classes of structure specified in the terms of its certificate. No stress analysis, drawings, or other technical data will be required for such repairs, except as otherwise specified in Chapter IV of these regulations, and except as may be deemed necessary in special cases by the Secretary of Commerce. In cases where no technical data are required the repaired aircraft may be eligible for license upon approval by a Department of Commerce inspector. In cases requiring technical data, the repaired aircraft may be eligible for license upon approval of such data and an inspection by a Department of Commerce inspector."

Section 20 of the 1931 regulation was titled, "Classification According to Extent of Damage." The section stated that in any case where the extent of damage was not clearly defined the final decision would "be made by the inspector for the Department of Commerce." While there was no definition of "minor repair," subdivision (E) (what we now refer to as a paragraph) stated: "Repairs of less importance and less magnitude than those listed in subdivision (D) above may be classed as minor repairs, and may be repaired in accordance with the provisions of section 1(B) in which case no technical data of any kind will be required."

From the above it can be seen that from the beginning of Federal regulation of aeronautics, the concept was clear that a "repair" had to do with fixing or restoring something

on an aircraft that was damaged so as to return the aircraft to its original design (that is, repair was being used in its normal dictionary meaning). If a repair was considered minor no technical data was needed to accomplish the repair, although the fact of the repair and the signature of the licensed mechanic who approved the repair had to be noted in the aircraft log. If a repair was major it had to be accomplished in accordance with the original design. In all major repair cases a Department of Commerce inspector had to approve the repair. If technical data needed to be developed before the repair could be made, a Department of Commerce inspector also had to approve that data.

While "alteration" was not defined, it is clear that from the 1931 regulation that, as with "repair," the Department of Commerce was using alteration in its normal dictionary meaning, that is, to make something different without changing it into something else. While the original regulation did not use the terms major or minor with alteration, Section 1(A) had a similar effect. It did not require all alterations to be supported by technical data and to be inspected and approved by a Department of Commerce inspector. Rather, it applied these requirements only to alterations that affected "the structure, balance, carrying capacity or general airworthiness of the aircraft." This

applicability requirement came very close to today's definition of a "major alteration."

By 1940 the applicable regulation had evolved into part 18 of 14 CFR (which was the predecessor to current part 43). Section 18.1 addressed both major and minor repairs as follows:

"18.1 TYPES OF REPAIR. An aircraft will be deemed to have been repaired when

18.10(a) any non-structural member (such as a fairing, cowling or turtleback; 5 percent or less of the surface of a fabric covered wing or control surface; not more than two adjacent wing ribs; and the trailing edge of a wing or control surface) has been repaired, or when a structural component (such as a wheel; a landing gear, wing or control surface strut; and a control surface, but excluding a wing panel and a landing gear) has been replaced by one purchased from the original manufacturer, in which cases the repair will be designated as a minor repair, or when

18.11(b) any structural member (such as a spar; a wing or control surface leading edge or tip strip; a control surface rib; three or more adjacent wing ribs; a wing or cabin strut wire; a wing compression member; a fitting; a landing gear or tail surface strut or wire; a fuselage longeron, cross tube, diagonal or bulkhead; any portion of the wooden or metal cover of a stressed-skin wing, control surface, fuselage or landing gear; and any bracket supporting a seat, baggage compartment, fixed equipment or control system part) has been repaired or replaced, in which case the repair will be designated as a major repair, or when..."

As was true in the 1931 regulation, part 18 did not distinguish between major and minor alterations. Rather, it described those alterations that would be considered alterations subject to part 18 requirements in section 18.1 as follows:

"18.2 TYPES OF ALTERATION. An aircraft will be deemed to have been altered when

18.20(a) the aircraft structure has been changed, except in a manner which incorporates the use of a member or a portion of a member of greater strength than the original member in accordance with Civil Aeronautics Manual (CAM 18), or when

18.21(b) any change has been made in the engine, propeller, equipment or arrangement of equipment, which change may affect the balance, stability, local strength of supporting structures, or any other aspect of the airworthiness of the aircraft, or when

18.22(c) the engine has been altered, or when

18.23(d) the propeller has been altered."

As noted above, before 1942 the Federal regulations did not specifically define major and minor alterations. Rather, the regulations were written to cover only certain alterations, such as any alteration of an engine or propeller or an alteration that could "affect the balance, stability, local strength of supporting structures..." When the first definitions of major and minor alterations appeared in 1942 the approach taken was the reverse of the major/minor repairs approach. "Minor alterations" was defined in some detail, while "major alterations" were "all alterations not within the definition of minor alterations." Before a 1952 revision of part 18, the definitions of major and minor alterations were reversed to parallel the definitions of major and minor repairs, that is, a minor alteration became "an alteration other than a major alteration."

As the quote from the 1941 memo cited above indicates, the major/minor distinctions have caused problems from the earliest Federal attempts to regulate aviation safety. Apparently of significant concern was the requirement for an inspection by an authorized representative of the Administrator before an aircraft could be returned to service after a major repair or major alteration (this term was being used in memos even though it was not contained in the rules). This requirement was proving to be very burdensome and the Civil Aeronautics Board was seriously considering amending the regulation to eliminate that requirement in certain cases. A draft revision of a proposed rule to accomplish this was circulated to over 900 potentially interested persons (repair station operators, air carriers, etc.) and public meetings to discuss the issue were held in Tulsa, Oklahoma, on April 27, 1940, and in St. Paul, Minnesota, on July 15, 1940.

Ultimately this change is reflected in a 1952 publication of part 18 (issued by the CAB March 31, 1952, effective June 15, 1952) in which § 18.11(b) reads as follows:

"(b) *Major repairs and major alterations.* No airframe, powerplant, propeller, or appliance, which has undergone any major repair or major alteration, shall be returned to service until such repair or alteration has been examined, inspected, and approved as airworthy by one of the following:

(1) An authorized representative of the Administrator, or

(2) An appropriately rated certificated repair station, if the work has been performed by such repair station in accordance with a manual, specification, or other technical data approved by the Administrator,[4] or

* * * * *

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[4] Major repairs and major alterations whose design has not previously been approved by the Administrator may require the submittal of technical data and/or flight tests in order to establish compliance with the applicable airworthiness provisions. Examples of such major alterations for which it would be desirable to contact a representative of the Administrator prior to accomplishment of the alteration are given in Civil Aeronautics Manual 18."

With one exception, by the early 1950's the CAB's definitions of major/minor repairs or alterations had matured to a point that with only slight rewording in the 1960's recodification they are identical to the current definitions. The one exception is that the words excluding alterations "not listed in the aircraft, aircraft engine, or propeller specifications" were added to the definition of major alteration when former part 18 was codified into present part 43. The explanation for the addition of these words was that it would make the definition "consistent with Appendix A of part 43 [new]."

The Appendix A of part 43 referred to above was added as part of the FAA's 1960's recodification of all of the regulations it had inherited from its predecessor agencies.

The material included in Appendix A had previously appeared in Civil Aeronautics Manual (CAM) material issued by the Department of Commerce's Administrator of Civil Aeronautics to supplement the CAB's rules in their part 18. A footnote to § 18.1 in the CAB's June 15, 1952, publication of part 18 stated:

> The Administrator publishes Civil Aeronautics Manual 18 which lists operations considered to be maintenance, preventive maintenance, minor and major repairs, and alterations, sets forth acceptable procedures, methods, and practices under the provisions of this part. (Earlier versions of the CAB's part 18 contained similar statements.)

One problem with Appendix A is that it is not clear from the historical record to what extent the major/minor examples in CAM 18 were intended to be rules or guidance. However, the fact that the FAA codifiers included this material as appendix A to part 43 rather than in the FAA's then new Advisory Circular system, indicates that the codifiers considered the examples more mandatory rule than guidance. To some extent, this treatment may have exacerbated the many problems that had historically confused the major/minor demarcations.

Another problem with Appendix A is that it was developed for an older generation of aircraft and has not been kept up to date to provide adequate information for newer aircraft. Thus, the information in paragraphs (a), major alterations, and (b), major repairs, of Appendix A

would be more appropriate in the FAA's Advisory Circular system where updating for new technology could be accomplished more speedily. The material contained in paragraph (c), preventive maintenance, would remain in Appendix A to part 43.

Meaning of "if improperly done."

Since at least 1952 the definition of major repairs has included the words "if improperly accomplished" or "if improperly done" in the following context:

"Major repair. A major repair to an aircraft or any component thereof shall mean:

(1) A repair which, if improperly accomplished, would adversely affect the structural strength, performance, flight characteristics, powerplant operation, or other qualities affecting airworthiness, or"

* * * * *

The "improperly clause" was not part of the "major repair" definition in the August 15, 1949, version of part 18 published for the CAB. It was in the September 1, 1942, version. **[We have not been able to find any explanation of the reason why this clause was added to the definition and will continue our research. A logical explanation is that the CAB was merely trying to further distinguish between**

major repairs and major alterations. Since a repair is returning an aircraft to its original type design it could be argued that no repair should be considered major since no change is being made as is true in an alteration. Thus, the "improperly accomplished" clause could have been added to make it clear that the reason why certain repairs (e.g., to engines, propellers, or those that might appreciably affect weight, balance, etc.) are considered major is because the potential for a serious airworthiness problem exists if the repair is not properly done.]

Formation of and Assignment to ARAC Working Group

In an effort to seek a solution to the problems described above, the FAA asked its Aviation Rulemaking Advisory Committee (ARAC) to accept a task to review the relevant regulations and guidance material in existence to determine what course of action should be taken.

The FAA established the ARAC on February 5, 1991 (56 FR 2190, January 22, 1991) and the Committee was most recently renewed on March 3, 1997 (62 FR). The ARAC was established to assist the FAA in the rulemaking process by providing input from outside the Federal Government on major regulatory issues affecting aviation safety. The ARAC includes representatives of air carriers, manufacturers,

general aviation, labor groups, universities, associations, airline passenger groups, and the general public.

An ARAC working group was established, titled, "Clarification of Major/Minor Repairs or Alterations Working Group." (59 FR 1583, January 11, 1994) (hereafter , Major/Minor Working Group). The Major/Minor Working Group was specifically tasked as follows:

"Review Code of Federal Regulations (CFR) Title 14--Aeronautics and Space, Chapter I--Federal Aviation Administration, Department of Transportation, and supporting policy and guidance material for the purpose of determining the course of action to be taken for rulemaking and/or policy relative to the issue of acceptable and/or approved data. If ARAC determines rulemaking documents or advisory circulars are appropriate to resolve the major/minor problem, such documents should be developed by ARAC, along with proper justifications and any legal and economic analyses."

The Proposal

The Major/Minor Working Group has met every two to three months for the last two years. Initially the thrust of the Working Group's effort was to establish an advisory circular containing a logic diagram that contains an acceptable means of developing data and obtaining appropriate approval of data, when required, to be used in making major repairs or alterations.

The Working Group also reviewed the need for changes in the existing rules. Compliance with parts 121, 135, and 145 of 14 CFR requires approved data for major repairs or

alterations. This requirement necessitates that the certificate holder make a determination of whether a repair or alteration is "major" or "minor." The classification will determine the level of approval required for proper accomplishment of the work, recording the accomplishment and the correct procedures for returning the repaired or altered product to service.

To determine the proper classification of a repair, maintenance action associated with the repair or alteration, persons accomplishing the task must refer to the definitions in part 1 and part 43, Appendix A, paragraphs (a) and (b). While the definitions in part 1 provide the fundamental distinction between "major" and "minor" repairs, § 43.3(a) directs the certificate holder to Appendix A, paragraphs (a) and (b) which provide specific lists of major repairs and alterations. These lists of specific items are frequently misinterpreted as being all inclusive and has resulted in improper classification of repairs and alterations. In addition, the Appendix A lists frequently fail to deal with repair and alteration situations encountered on modern aircraft.

To address the above described problems, the Major/Minor Working Group recommended that paragraphs (a) and (b) of Appendix A to part 43 be deleted from the appendix and included in an advisory circular so that the

status of this information as "guidance" would be clear. Consistent with this change, the Working Group recommended that § 43.3(a) be amended to remove the reference to Appendix A for repairs and alterations and instead refer to the new relevant Advisory Circulars. Section 43.3(a) would continue to refer to Appendix A for preventive maintenance material.

Regulatory Evaluation Summary

Proposed changes to Federal regulations must undergo several economic analyses. First, Executive Order 12866 directs that each Federal agency shall propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic effect of regulatory changes on small entities. Third, the Office of Management and Budget directs agencies to assess the effect of regulatory changes on international trade. A regulatory evaluation of the proposal is in the docket.

Initial Regulatory Flexibility Analysis

By both law and executive order, Federal regulatory agencies are required to consider the impact of proposed

regulations on small entities. Executive Order 12866 "Regulatory Planning and Review," dated September 30, 1993, states that:

> Each agency shall tailor its regulations to impose the least burden on society, including individuals, businesses of different sizes, and other entities (including small communities and governmental entities), consistent with obtaining the regulatory objectives, taking into account, among other things, and to the extent practicable, the costs of cumulative regulations.

The 1980 "Regulatory Flexibility Act" (RFA) requires Federal agencies to prepare initial regulatory flexibility analysis of any notice of proposed rulemaking that would have a significant economic impact on a substantial number of small entities. The definition of small entities and guidance material for making determinations required by the RFA were published in the Federal Register on July 29, 1982 (47 FR 32825). FAA Order 2100.14A outlines the agency's procedures and criteria for implementing the RFA.

The FAA has determined that this proposal **[TBC]**

International Trade Impact Assessment

The FAA has determined that the proposed rulemaking would **[TBC]**

Federalism Implications

The regulations herein would not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12866, it is determined that this rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Paperwork Reduction Act

Conclusion

For the reasons set forth above, the FAA has determined that this proposed rule is **[not?]** a significant regulatory action under Executive Order 12866. In addition, the FAA certifies that this proposal would **[not?]** have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act. This proposed rule is **[not?]** considered significant under DOT Regulatory Policies and Procedures.

List of Subjects

14 CFR Part 43

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

The Proposed Amendment

For the reasons set forth above, the Federal Aviation Administration proposes to amend 14 CFR part 43 as follows:

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

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

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

2. Section 43.3(a) is revised to read as follows:

§ 43.3 Persons authorized to perform maintenance, preventive maintenance, rebuilding, and alterations.

(a) Except as provided in this section and § 43.17, no person may maintain, rebuild, alter, or perform preventive maintenance on an aircraft, airframe, aircraft engine, propeller, appliance, or component part to which this part applies. Advisory Circular (AC) 43.XXX, "Repair and Alteration Data," AC 43.13-1A, "Acceptable Methods,

Techniques and Practices - Aircraft Inspection and Repair," and AC 43.13-2A, "Acceptable Methods, Techniques and Practices - Aircraft Alterations" contain guidance information relating to the classification of major alterations and major repairs (copies of these ACs may be obtained from the U.S. Department of Transportation, Publications Section..., Washington, DC). Those items, the performance of which is preventive maintenance, are listed in Appendix A of this part.

[Note: ACs are sale items which should be obtained from the US Government Printing Office].

* * * * *

Appendix A [Amended]

3. Appendix A is amended by removing paragraphs (a) and (b) and by removing the designation to paragraph (c).

Issued in Washington, DC on