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Federal Aviation Administration
Office of the Chief Counsel
Attention: Rules Docket (AGC-200)
Docket No. 28906
Room 915G
800 Independence Avenue S.W.
Washington, D.C., 20591

Reference: Notice No. 97-7 -- Type Certification Procedures for Changed Products

To Whom it may concern:

The Aerospace Industries Association (AIA) has reviewed the above referenced document and by this letter is submitting comments to the docket

Sincerely,

/ss/ by receipt of this letter by e-mail

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enclosure (as electron file): icptf.doc

**COMMENTS TO NPRM 97-7
TYPE CERTIFICATION PROCEDURES
FOR CHANGED PRODUCTS
Docket No. 28903, Notice No. 97-7**

The Aerospace Industries Association is pleased to note the release of NPRM 97-7. As a participant of the Aviation Rulemaking Advisory Committee (ARAC) and the International Certification Procedures Task Force (ICPTF), the AIA commends the FAA for considering the recommendations of the ICPTF and the ARAC.

The NPRM and its associated Advisory Circular, AC 21.101-XX, proposed by the ARAC represent the culmination of work by the ICPTF initiated February 5, 1991 and finalized June 14, 1994. The AIA firmly believes this extensive study and resulting recommendations are the best achievable and should be mirrored in the adopted rule changes.

The rule changes proposed by the FAA in this NPRM, in principle, reflect the recommendations of the ICPTF. However, NPRM 97-7 includes a preface to the actual rule changes where there are substantive differences between the ICPTF proposal and the FAA. This preface, though not actual rule, summarizes both the historical policy on changed products and the proposed policy represented by the explicit rule changes. As such, it describes the guiding rationale in application of these rule changes. The AIA, therefore, proposes this preface be revised to directly reflect that of the ICPTF proposal.

The following comments are specific observations. They have been separated in two sections, (1) the actual rule changes, (2) the preface section of the NPRM.

Comments are structured to:

- Identify any substantive difference from the ARAC submittal, and
- Recommend changes addressing those differences

PROPOSED RULE CHANGES

PART 11 - GENERAL RULEMAKING PROCEDURES

Section 11.11 Docket

The FAA proposed text, while marginally different from the ICPTF proposal, incorporates its intent and is more easily understood.

Recommendation: Since this change does not involve a harmonization issue, the text proposed by the FAA in the NPRM is acceptable.

PART 21 - CERTIFICATION PROCEDURES FOR PRODUCTS AND PARTS

Section 21.101 Designation of applicable regulations

1. Paragraph (a) is identical to the ICPTF recommendation

Recommendation: Acceptable as written

2. Paragraph (a) (1) is identical to the ICPTF recommendation, excepting the use of “applicable” and “applies”. The meaning of the paragraph is unchanged.

Recommendation: Acceptable as written

3. Paragraph (b), (b)(1), and (b)(2) are identical to the ICPTF recommendation

Recommendation: Acceptable as written

4. Paragraph (b)(3) places the phrase “would be impractical” at the end of the paragraph. The ICPTF recommendation placed it prior to “not materially contributing to the level of safety”. The meaning is unchanged.

Recommendation: no change

5. Paragraph (c) is identical to the ICPTF recommendation

Recommendation: Acceptable as written

6. Paragraph (d) and (d)(1) are identical to the ICPTF recommendation

Recommendation: Acceptable as written

7. Paragraph (e) is redundant to the requirements of 21.101(a) which makes no exception for products originally certificated to regulations that existed prior to the codification of the applicable part(s) of 14 CFR nor for products certificated as restricted, surplus military, or other unique types.

Recommendation: Eliminate proposed 21.101, Paragraph (e) as redundant.

Recommendations Regarding the PREFACE to NPRM 97-7

As noted above, a detailed comparison of the ARAC Submittal as developed by the ICPTF with the FAA proposed NPRM 97-7 revealed many substantive differences. The AIA believes the extensive efforts of the ARAC generally resulted in the preferred wording for NPRM 97-7. In some instances, the wording proposed by the FAA in NPRM 97-7 is an improvement.

Given the importance of the Preface and the contribution of the ARAC, a comparison of these differences are identified by unique font styles as follows:

Text identical to ARAC submittal and FAA proposal

Text unique to ARAC submittal

Text unique to FAA Proposal

Observations and recommendations for the preferred text are noted for each of the major disparities. Simple grammatical differences are noted without comment and are acceptable as written.

PREFACE to NPRM 97-7

Statement of the Problem:

Under the regulations in effect prior to the early 1940's, an applicant for a changed product, such as an alternate engine installation, was required to apply for a new type certificate and comply with the standards current at the time of application. This did not present an unreasonable burden on the applicant then because the airworthiness standards did not change appreciably over short periods of time. That is, the standards current at the time of an application were essentially the same as those with which the original product had to comply. Since the early 1940's, however, rapid changes in technology have resulted in significant changes in the airworthiness standards over relatively short periods of time. Therefore, an applicant for an extensive change to a type certificated product, which required a new type certificate, could be faced with complying with safety standards that varied considerably from the standards for the original product. To relieve this situation, the FAA's predecessor agency required an application for a new type certificate only if the change was quite extensive.

In recent years, a trend has developed towards fewer products that are of such significantly new design that a new type certificate is required. In many cases, over a period of time, a series of changes could permissively be made to a product by amending its original type certificate such that the resultant model is substantially different from the original model. Although each changed product in such a series of changes may differ little from its immediate predecessor, the changes could collectively result in a product with substantial differences from the original product. As a result, many newly manufactured aeronautical products are not being required to comply with the more recent airworthiness standards. The procedural regulations need to be changed to correspond with this trend toward fewer new type certificates.

History of Type Certification:

Title 49 U.S.C. § 44701 authorizes the FAA Administrator to promote safety of flight of civil aircraft in air commerce by prescribing and revising minimum standards governing the design and construction of aircraft, aircraft engines, and propellers as may be required in the interest of safety, and such minimum standards governing appliances as may be required in the interest of safety.

Under 49 U.S.C. § 44704, the FAA may issue type certificates, including supplemental type certificates, for aircraft, aircraft engines, and propellers. The FAA may prescribe in any such certificates the duration of the certificate, and the terms, conditions, and limitations as required in the interest of safety.

The general certification procedures for products (aircraft, aircraft engines, and propellers) and parts are set forth in 14 CFR part 21 (part 21). As described in §§ 21.13 and 21.15, any interested person may apply for a type certificate by submitting an application accompanied by the required documentation to the FAA. Sections 21.16 through 21.21, 21.101, and 21.115 specify certain regulations and designate the applicable airworthiness standards for type certification of both new and changed products.

Section 21.17 designates the applicable regulations for the issuance of type certificates. In order to be issued a type certificate, the applicant must show that the product complies with the airworthiness standards contained in one of the following 14 CFR parts, as applicable: part 23 for normal, utility, acrobatic, and commuter category airplanes; part 25 for transport category airplanes; part 27 for normal category rotorcraft; part 29 for transport category rotorcraft; part 31 for manned free balloons; part 33 for aircraft engines; part 35 for propellers; and part 21 (§ 21.17(b) and (f)) for special classes of aircraft and primary category aircraft respectively.

The airworthiness standards in these parts of the regulations may be amended as needed to reflect continually changing technology, correct design deficiencies, and provide for safety enhancements. An applicant for a type certificate is required under current § 21.17, with certain exceptions, to show that the product meets the applicable airworthiness standards that are in effect at the date of the application. The exceptions include instances in which the Administrator specifies otherwise or in which the applicant either elects or is required under specific circumstances to comply with later effective amendments. In addition, the Administrator may prescribe special conditions.

Under § 21.16, special conditions may be prescribed if the Administrator finds that the existing airworthiness standards do not contain adequate or appropriate safety standards because of novel or unusual design features of the product to be type certificated ~~relative to the design features considered in the applicable airworthiness standards.~~

Comment: reminder of the context/parameters is worthwhile

Recommendation: acceptable as written

Also, under § 21.21(b)(1), if any applicable airworthiness standards are not complied with, an applicant may nevertheless be entitled to a type certificate if the Administrator finds that those standards not complied with are compensated for by factors that provide an equivalent level of safety. Such determinations are commonly referred to as "equivalent safety findings" ~~and are made with respect to the level of safety intended by the applicable standard.~~

Comment: reminder of the context/parameters is worthwhile

Recommendation: acceptable as written

In addition, under § 21.21(b)(2), an applicant may be denied a type certificate if the Administrator finds an unsafe feature or characteristic of the aircraft for the category in which type certification is requested, even though the aircraft may comply fully with the applicable airworthiness standards.

Taken together §§ 21.16, 21.17, and 21.21 designate the applicable airworthiness regulations for type certification and accommodate those circumstances when the airworthiness standards do not adequately cover the design features of a product. These sections recognize and balance the following four important considerations:

(1) The obligation of the FAA, under 49 U.S.C. § 44701, to keep the airworthiness standards required in the interest of safety, (i.e., parts 23, 25, 27, 29, 31, 33 and 35) as current as practicable;

(2) The type certificate applicant needs to know, ~~early in a certification program,~~

Recommendation: acceptable as written

what the applicable airworthiness standards will be in order to finalize the detailed design of its product and to enable the applicant to make reasonable performance guarantees to its potential customers;

(3) ~~In the interest of safety, rapid technological advances presently being made by the civil aircraft industry necessitate that the need for the FAA to be able to issue special conditions to address novel or unusual design features that it has, as yet, not had an opportunity to address in the airworthiness standards through the general rulemaking process, or to address novel or unusual design features that were not considered by the appropriate airworthiness standards applicable to changes to type certificates;~~ and

Comment: redundant

Recommendation: revise as worded in ARAC submittal

(4) To allow flexibility in design. ~~Wherever possible,~~ the airworthiness standards of 14 CFR Chapter 1, subchapter C, are intentionally objective in nature, and the procedural regulations permit design changes ~~over the operational life of a product.~~

Comment: adds no substance

Recommendation: revise as worded in ARAC submittal

Originally, the FAA would issue special conditions informally as an interpretation of the "no unsafe feature or characteristic" regulations; however, in 1967, the FAA formalized the process with the adoption of § 21.16. As provided in that section, special conditions are issued as regulations in accordance with public comment provisions of 14 CFR part 11 (part 11). The adoption of § 21.16 extended the special condition process to include aircraft engines and propellers. The provision in § 21.21(b)(2), that a type certificate would be issued for an aircraft only if no unsafe feature or characteristic existed, remained unchanged.

The phrase "novel or unusual" is used in describing design features for the issuance of special conditions under the provisions of § 21.16. These design features involve a state of technology not considered for the applicable airworthiness standards at the time they were written; in some areas, the state of the regulations may lag the state of the art of new designs. This disparity is due to both the rapidity in which the state of the art is advancing in civil aeronautical design and the need to develop a sufficient experience base ~~with new technology~~ before proceeding with general rulemaking. Therefore, there may be instances in which special conditions are required for design features considered "state of the art" in the aircraft industry. Conversely, many new design features that might be thought of as "novel or unusual" in the context of the product's original certification basis may already be covered by existing regulations, thereby obviating the need to issue special conditions. ~~*This fact is recognized in existing § 21.101(b)(1).*~~

Comment: this fact is not clearly recognized as special conditions have been written for designs that are not new or novel but deemed significant

Recommendation: revise as worded in ARAC submittal

For example, in 1980, the holder of a small airplane type certificate who installed turboprop engines in place of reciprocating engines did so by complying with appropriate later regulations. Because appropriate regulations were available for the installation of turboprop engines, special conditions were not issued for installation of the engines. These changes were made through the FAA issuing an amendment to the type certificate originally issued in 1964. The airworthiness regulations, part 23, were changed to accommodate turboprop engines in 1969.

Special conditions are not issued for general upgrading of the applicable airworthiness standards to achieve a higher level of safety. Whenever the FAA concludes that a compelling need exists for a higher level of safety in type designs, rulemaking is proposed in accordance with the general rulemaking procedures of part 11, the Administrative Procedure Act, and Executive Order 12866. Finally, §§ 23.2, 25.2, 27.2, and 29.2 provide retroactive regulations in the airworthiness standards. ~~*A complete statement of the FAA intent with respect to the application of special conditions is found in the preamble to amendment 51 to Part 21, (45 FR 60154, September 11, 1980). That intent is in no way changed by the proposals herein.*~~

Comment: reminder is worthwhile

Recommendation: acceptable as written

Sometimes new airworthiness standards contain provisions that, in the interest of safety, should be applied retroactively to ~~existing~~ aircraft. Typically this is accomplished by proposing changes to 14 CFR parts 121 and 135, and sometimes part 91, through rulemaking procedures.

History of Type Certification of Changes:

Part 21 designates the applicable airworthiness standards for changed products. Section 21.19 describes the circumstances in which an applicant for type certification of a changed product must apply for a new type certificate. Prior to the early 1940's, an applicant for a changed product, such as an airplane with an alternate engine installation, was required to apply for a new type certificate. The regulations in effect prior to the early 1940's required an applicant for a changed product to apply for a new type certificate for a change such as an alternate engine installation. When a new type certificate was required, the applicant had to comply with the standards current at the time of application. This did not present an unreasonable burden on the applicant then because the airworthiness standards did not change appreciably over a period of time. The then current standards were, therefore, essentially the same as those with which the original product had to comply. Later, more rapid changes in technology resulted in significant changes in the airworthiness standards over relatively short periods of time. An applicant for a type certificate for a changed product could thus be faced with complying with airworthiness standards that varied considerably from those with which the original product complied. In some instances, the differences in standards could be so great that an applicant would be discouraged from making any changes, including changes that would, in themselves, contribute to the safety of the product. To relieve this situation, by the early 1940's, an application for a new type certificate was required only if the change was extensive.

Section 21.19(a) requires a new type certificate when a change is considered so extensive that a substantially complete investigation of compliance with the regulations is required. In addition, §§ 21.19(b), (c), and (d) provide specific types of changes that require an application for a new type certificate ~~because those types had already been determined to be substantial per § 21.19(a).~~

Comment: reminder is worthwhile
Recommendation: acceptable as written

For a normal, utility, acrobatic, commuter, or transport category aircraft, paragraph (b) requires a new aircraft type certificate if the proposed change is (1) in the number of engines or rotors, or (2) to engines or rotors using different principles of propulsion or to rotors using different principles of operation. Similarly, paragraph (c) requires a new engine type certificate if the proposed change is in the engine's principle of operation, and paragraph (d) requires a new propeller type certificate if the proposed change is in the number of blades or in the principle of pitch change operation.

The basis for § 21.19(b)(1) originated in the early 1950's following the issuance of an amended type certificate to an applicant who altered a popular single-engine, four-passenger, light airplane into a twin-engine model. Although that conversion was approved by an amendment to the original type certificate, the agency recognized that the conversion from one to two engines added considerable complexity to the airplane and greatly affected its handling characteristics. Therefore, the predecessor of § 21.19(b)(1) was adopted requiring a new type certificate for a change in the number of engines or rotors. The regulatory language

was broad enough in scope to include any change in the number of engines or rotors whether such changes would simplify or add complexity to the type design.

The FAA does not require an applicant to apply for a new type certificate to add small auxiliary engines to an aircraft. In the 1960's, with the development of small turbojet engines to be used as auxiliary engines, the FAA defined a jet engine that develops less than 50 percent of the static thrust developed by one of the primary propulsion engines as an auxiliary engine. The FAA considers the "number of engines" as used in § 21.19(b)(1) to refer to the number of primary propulsion engines and not to any auxiliary engines to be installed. The FAA has issued a large number of exemptions from the regulation concerning a change in the number of engines.

Prior to 1957, predecessors of current § 21.19(b)(2) stated that an applicant must make a new application for type certificate if the proposed change was to engines employing different principles of operation or propulsion. This meant that an applicant desiring to replace reciprocating engines with the same number of turbopropeller engines would have to apply for a new type certificate. During that period, it was recognized that considerable advances in safety, reliability, and passenger comfort could be realized by replacing reciprocating engines in certain transport category airplanes with turbopropeller engines. In order to encourage such beneficial changes, the reference to different principles of operation was deleted in 1957 for transport category airplanes. As a result, an applicant may be granted approval for a conversion of this nature without applying for a new type certificate providing the applicant complies with certain later standards applicable to turbine-powered airplanes. In the broadest sense, all powered airplanes achieve propulsion by accelerating a mass of air and/or exhaust gases. In the narrower context of § 21.19(b)(2), however, "principles of propulsion" means propeller-driven versus turbojet.

Section 21.19(b)(2) also states that an applicant must make a new application for a type certificate if the proposed change is to rotors employing different principles of operation or propulsion. The FAA is not aware of any instance in which this specific section was the basis for requiring an application for a new type certificate; any change of this nature, together with all related changes, would have been so extensive that a new type certificate would have been required under the provisions of § 21.19(a).

The FAA has never granted any exemptions from the regulation for a new aircraft type certificate for a change to engines or rotors using different principles of propulsion. Similarly, no exemptions have been granted from the engine or propeller type certificate regulations for changes involving the principle of engine operation, for changes in the number of propeller blades, or for changes in the principle of pitch change operation.

Under § 21.101, the original type certificate may be amended to include changes to the product when the applicant demonstrates that it complies with the same airworthiness standards as the original product ~~plus appropriate special conditions~~, and the change does not warrant making a new application for a type certificate under § 21.19. Because § 21.101 (a) and (b) are incorporated by reference in § 21.115, these procedures are equally applicable

to persons applying for supplemental type certificates.

Section 21.101(a) requires that an applicant for a change to a type certificate must comply with either the regulations incorporated by reference in the type certificate or the applicable regulations in effect at the date of application, plus any other amendments the Administrator finds to be directly related. The "regulations incorporated by reference" are the regulations that were the certification basis for the original issuance of the type certificate. They are frequently referred to as the "original certification basis."

If an applicant chooses to show compliance with the regulations in effect at the date of the application for the change, the applicant must also comply with any other amendments that are directly related. In some instances, a regulation may be amended to become less stringent, but a related regulation may become more stringent. In a situation of this nature, the applicant must also comply with the related compensating regulation as well. ~~Current § 21.101(a) does not otherwise require compliance with later amendments and does not grant the Administrator the authority to require compliance with later regulations as a method to increase the level of safety of a product.~~

Comment: reminder of the context is worthwhile
Recommendation: revise as worded in ARAC submittal

An applicant for a change to a type certificated product is responsible for showing that the entire product, as altered, not just that the change itself, complies with the certification basis, because areas that have not been changed may be affected by the change. However, the applicant need not resubstantiate those areas of the product where the original substantiation has not been invalidated by the change.

Section 21.101(b) pertains to changes for which the regulations incorporated by reference do not provide adequate standards. Such changes generally involve features that were not envisaged at the time the regulations incorporated by reference were adopted and are, therefore, novel or unusual with respect to those regulations. For these changes, the applicant must comply with regulations in effect at the date of application for the change as found necessary to provide a level of safety equal to that established by the regulations incorporated by reference. ~~In this case, the applicant is not able to select any amendment of the regulation it chooses between those incorporated by reference and those in existence at the date of the application.~~

Comment: redundant
Recommendation: revise as worded in ARAC submittal

When regulations in effect at the date of application for the change fail to provide adequate standards, the applicant must comply with special conditions to provide a level of safety equal to that established by the regulations incorporated by reference.

Trends in Type Certification of Changes:

In recent years, a trend has developed toward fewer products that are of completely new designs, which would require new type certificates. Over a period of time, a series of changes to an original product may have been made so that the current model is substantially different from the original model. Although each changed product in such a series of changes may differ little from its immediate predecessor, the changes could result collectively in a product with substantial differences from the original product.

For example, one model originally manufactured as a normal category airplane with two reciprocating engines has been changed through a series of alterations to incorporate turbopropeller engines, a stretched and heightened fuselage, a tricycle landing gear, a modified wing planform and a 42 percent increase in maximum takeoff weight. In this particular case, the majority of changes were made through the FAA's issuing supplemental type certificates to modifiers other than the type certificate holder. However, the type certificate holder could have made the same incremental changes without applying for a new type certificate each time.

In another instance, a type certificate holder effected significant changes in the design of a turbojet transport category airplane without obtaining a new type certificate by making a series of changes to its existing type certificate. Each incremental change, by itself, was determined not to be so extensive as to require a new type certificate under § 21.19(a). This airplane evolved into a configuration approximately 40 percent greater in fuselage length and with a 92 percent greater maximum takeoff weight than the original model. These changes, which have been incorporated into newly manufactured airplanes, are possible because the FAA issued amendments to the type certificate.

Another trend in manufacturing is to keep products in production over several decades. Some currently manufactured transport category airplanes have, for example, evolved from airplane models originally type-certificated 25 years ago. This does not imply that those airplanes are "unsafe," because they do, in practice, have features that address the intent of most of the current airworthiness standards. However, current procedural regulations (part 21) do not require that changed products comply with the current airworthiness standards.

~~*The basic premise behind the FAA's current policies for the procedures and airworthiness standards for type certification is that the highest possible degree of safety in the public interest, should be achieved by products being certificated at any given time. In dealing with this premise, the FAA has had to continually weigh the desire for the highest level of safety with the cost to the manufacturers, operators, and traveling public for achieving that highest possible degree of safety in the public interest. This balance between safety and cost has been exacerbated by the introduction of highly sophisticated products whose development and manufacture have become enormously expensive. This is one reason why, as stated before, manufacturers choose to produce more and more changed products that, by the FAA regulations, are not required to have new type certificates.*~~

~~*The FAA maintains that the issue should not be whether a product is produced under a*~~

~~new type certificate or an amended one. The issue is whether or not the level of safety of the product, embodied in the airworthiness standards it complies with, is as high as practicable. In addition, to require areas unaffected by the change to comply with the later standards is not only unreasonably costly but may reduce the level of safety of the product due to unforeseen developmental problems. The manufacturers are constantly issuing service information that describes approved alterations that users may make to improve the level of safety of the product. Thus, it is common place that products in service today possess a level of safety significantly greater than that embodied in their certification basis.~~

~~When establishing the highest practicable level of safety for a changed product, the FAA has determined that it is appropriate to assess the service history of a product as well as the later airworthiness standards. It makes little sense to mandate changes to well understood designs, whose service experience has been acceptable, merely to comply with new standards. The clear exception to this premise is where the new standards were issued to address a deficiency in the design in question or where the service experience is not applicable to the new standards. This consideration of airworthiness standards and service experience should form the basis for developing the certification basis for a change in a product.~~

Comment: The essence of these paragraphs emphasizes that new standards do not make existing designs unsafe. And, the appropriate criteria are design deficiencies and service experience no longer relevant due to changes. _

Recommendation: acceptable as written

It can be argued, for consistency, that new airworthiness standards should apply across the board to the entire aircraft fleet; however, application of new standards would not be practicable in every case. Although newly designed aircraft are required to meet all applicable current airworthiness standards, in many cases a product being changed, for which only an amended type certificate is needed, is required to meet only the standards referenced in the original type certificate. Thus, there may be a considerable difference between the standards required for a new product and for a product undergoing change. A product undergoing change that met the applicable standards at the time of original type certification is not currently required to meet more current airworthiness standards except in those instances where retroactive regulations have been issued or the applicant elects to comply with later amendments.

In recent rulemakings, the FAA has carefully considered whether corresponding retroactive action is warranted whenever a change to the airworthiness standards for type certification was proposed. In those cases where it has been deemed that a safety benefit commensurate with the cost could be achieved, the rulemaking has also included a proposal to change the relevant operating regulations to require newly manufactured airplanes and/or airplanes in service to comply retroactively with the new standards, regardless of whether such compliance would be required as a condition of type certification. **In some instances, the action proposed for newly manufactured products differed from that proposed for products**

already in service. For instance, some of the regulations implemented in recent revisions to part 25 ~~for newly manufactured airplanes~~ were **not** required for the existing fleet and were **not** implemented in the operating regulations, such as part 121.

Comment: the point of the contrast is lost
Recommendation: revise as worded in ARAC submittal

In 1965, the FAA granted an exemption from the provisions of § 21.19(b)(1) to permit conversion of a four-engine amphibian to a twin-engine configuration without the applicant applying for a new type certificate. During the 1980's, three applicants petitioned for exemptions from the above regulations so they could convert Boeing 727 airplanes from the original three-engine configuration to ones with two engines without having to apply for new type certificates. Another applicant petitioned for a similar exemption to replace the four engines of a Lockheed 1329 Jetstar aircraft with two engines of more recent vintage. The FAA granted each exemption with the condition that the petitioner comply with the provisions of then current part 25 in all areas, systems, components, equipment, or appliances affected by the conversion.

The FAA also granted a number of exemptions that permitted increasing the number of engines without the need for the applicants to obtain new type certificates. In 1985, an applicant received an exemption to replace two reciprocating engines in Grumman Albatross amphibians with four turbopropeller engines without having to obtain a new type certificate. In granting the exemption, the FAA concurred that the alteration should improve the Albatross by increasing safety, increasing powerplant reliability, and improving overall aircraft efficiency. The exemption noted that compliance with § 21.19(b)(1) would have required changes to some basic systems that had provided satisfactory performance for many years and had contributed to the safety record of those airplanes. Applying then-current regulations to components and systems not affected by the installation of the four engines would have been time consuming and costly, and would not necessarily have ~~contributed any safety benefits~~ **led to a higher level of safety.**

Comment:there exists safety benefits in present designs, this issue is “higher levels”
Recommendation: revise as worded in ARAC submittal

As with the exemptions to reduce the number of engines, this exemption was granted with the condition that the petitioner comply with the provisions of then current part 25 in all areas, systems, components, equipment, or appliances affected by the conversion. A similar exemption was also granted in 1989 to enable an applicant to increase the number of engines from one to two in certain Bell 206 series rotorcraft. The petitioner cited the increased safety afforded by a twin-engine configuration in the event a failure occurred during hover, and also the enhanced altitude performance. As a condition of the grant of exemption, the applicant was required to show that the altered rotorcraft complied with the standards of part 27 in effect at the date of application for the change for all areas, systems, equipment, or appliances that were changed or significantly affected by the change.

These exemptions point out an important feature that has been included in this proposed rulemaking. The number of engines is not, in itself, an appropriate criterion for requiring an application for a new type certificate ~~as long as the type design complies with the regulations effective at the date of the application for the change in those areas changed or affected by the change.~~

Second, the concerns that prompted this regulation are satisfied by the condition of the exemptions that the applicants for the change in type design comply with the regulations effective at the date of the application for the change in those areas affected by the change.

Comment: ARAC wording is clearer
Recommendation: revise as worded in ARAC submittal

Recent FAA Actions:

Apart from safety considerations, there has also been a growing international concern that some changed products are given an unfair competitive advantage over those that are of new design and must comply with later standards.

Because of these concerns, the FAA participated in the activities of an ad hoc committee sponsored by the Aerospace Industries Association of America, known as the International Certification Procedures Task Force (ICPTF). In addition to the FAA, this task force included representatives of the European Joint Aviation Authorities, Transport Canada, Aerospace Industries Association of America, Air Transport Association of America, General Aviation Manufacturers Association, International Air Transport Association, Association Europeenne des Constructeurs de Materiel Aerospatial, Aerospace Industries Association of Canada, Air Line Pilots Association, and Association of European Airlines.

The ICPTF was organized to develop the philosophy and the necessary regulatory text and advisory material that would provide for the implementation of later regulatory amendments applicable to aeronautical products undergoing change, products in production, and products in service. The specific tasks of the ICPTF were: (1) Develop the type certification philosophy for changes to aeronautical products, including revisions to the regulations and associated advisory material; (2) Develop the necessary guidance information on the use of "service experience" in the type certification process; and (3) Develop a method to evaluate the safety impact and cost effectiveness of revisions to the airworthiness standards.

In order to develop future proposed safety standards by using a system-type analysis, the FAA chartered a committee of safety experts, known as the Aviation Rulemaking Advisory Committee (ARAC), on February 5, 1991. This committee established the International Certification Procedures **Harmonization** Working Group, which consists of the original ad hoc committee formerly known as the ICPTF. The ~~task assigned to~~ of this working group is ~~was~~ to recommend ~~present~~ to ARAC various proposals pursuant to its area of expertise. ARAC can then make ~~then had the option to submit these~~ recommendations to the FAA, and the FAA ~~would~~ decides whether or not to issue a proposal based on the ARAC recommendations.

The Working Group has made recommendations *presented* to ARAC ~~an NPRM and associated advisory material concerning~~ the type certification procedures for changes to aeronautical products, newly manufactured products, and products already in service. ~~ARAC, in turn, submitted these documents as recommendations to the FAA. The FAA recognizes the difficult task the working group undertook in the effort to address the issues in this proposed rule and in the advisory material. Much of the work done within the working group could not have been accomplished without the assistance of working group members representing the aviation community.~~

Comment: worthwhile noting
Recommendation: acceptable as written

The rulemaking proposed by the FAA in this notice reflects the **task force and ARAC** recommendations in the type certification procedures for changed products *with only minor changes*. Similar **corresponding proposed** changes are also being proposed by Transport Canada, and ~~have been published by~~ the Joint Aviation Authorities.

FAA's Proposed Policy on Changed Products:

The FAA intends to require that applicants for changes to type certificated products show compliance with the latest amendments to the airworthiness standards that are applicable to the product being changed. Exceptions to requiring a showing of compliance with the **latest later** amendments would be provided to accommodate variations in the kinds of type certificated products, of changes to these type certificated products, and revisions of the airworthiness standards. These exceptions would permit compliance with regulations issued prior to the regulations in effect at the date of the application for the change. **The exceptions would include products that have not undergone a significant change, and those portions of the product, undergoing a significant change, that are not related to the change. In addition, the exceptions would include those later amendments that would not materially increase the level of safety of the product to be changed, or those that compliance with which would be impractical.**

Comment: This is the only reference in the NPRM and the JAA NPA 21-7 that addresses the issue of "unrelated change". The intent of ICPTF to limit the application of this process to amended TC (derivatives) and the determination of New TC is lost if this paragraph is

omitted. Product improvements and other changes normally addressed in the L.O.D. and P.L.O.D. processes would become subject to the “Derivative Cert Process if this is not made clear.

Recommendation: revise as worded in ARAC submittal

This proposed rulemaking would amend the type certification procedures for changes to type certificated products to bring the certification basis for changed products and for newly type certificated products closer together. The intent is to ensure that when an essentially new product is developed through a series of changes, regardless of the extent of each change, the final product achieves a level of safety similar to that of a comparable new product.

However, This concept will be tempered with the knowledge that a good design does not become unsafe as soon as a new regulation has been published.

The FAA is already requiring certain type certificated products that undergo alteration to comply with later amendments of the airworthiness standards. By this rulemaking, the FAA intends to broaden the scope of this policy to include changes being proposed for all type certificated products.

Comment: this statement infers all changes are subject to NPRM 97-7

Recommendation: revise as worded in ARAC submittal

Some differences may be acceptable between the certification basis for a product undergoing a change and the current regulations that would be used **applicable** if a new product was being type certificated. This acceptance would be based on ~~whether~~ there **not being is** a defined safety issue involved in the specific product.

~~The FAA is already encouraging applicants of certain type certificated products undergoing alterations to comply with later amendments of the airworthiness standards. By this rulemaking, the FAA proposes to require all proposed changes for all type certificated products to comply with later amendments of the airworthiness standards.~~ The FAA has determined that the long term result of this approach will be that an amended type certificate will have a certification basis that provides a **comparable similar** level of safety to that ~~provided by the certification basis~~ of a new type certificate for the same product.

Comment: this broadens the scope of the changes to be included and implies rule changes are to be applied irrespective of the merits of the design change.

Recommendation: revise as worded in ARAC submittal

The FAA will issue an advisory circular based on **recommendations of the ARAC this rulemaking**. This advisory circular will provide guidance on determining the certification basis for changed aeronautical products, including identifying the conditions under which it will be necessary to apply for a new type certificate. By separate notice, ~~in this issue of the Federal Register,~~ the FAA is also inviting interested persons to comment on the proposed advisory circular. The FAA will consider comments from this notice and comments received on the advisory circular ~~before taking any final action on either.~~

Recommendation: acceptable as written

Discussion of the Proposed Rulemaking:

Sections 11.11, 21.19, 21.101, 21.115, and 25.2 would be amended as follows to implement the policy discussed above in relation to changes to products:

Section 11.11

Current § 11.11 lists special conditions required as prescribed under § 21.101(b)(2) as an FAA record that is maintained in current docket form in the Office of the Chief Counsel. To remain consistent with the proposed changes to § 21.101, described later, it is necessary to amend § 11.11 to refer to § 21.101(c) instead of § 21.101(b)(2). This is ~~would~~ not ~~be~~ a substantive change.

Section 21.19

Current § 21.19(a) states that any person who proposes to change a product must make a new application for a type certificate if the Administrator finds that the proposed change in design, configuration, power, power limitations (engines), speed limitations (engines), or weight is so extensive that a substantially complete investigation of compliance with the applicable regulations is required. This sentence has caused confusion because it covers several types of changes for all products -- airplanes, rotorcraft, aircraft engines, and propellers. In addition, current paragraphs (b), (c), and (d) list other specific types of changes that mandate a new application for a type certificate. Only the general language of current paragraph (a) would be incorporated into the new § 21.19, while the previously listed specific changes would be subject to case-specific evaluations to determine whether they are substantial. Application of § 21.19 would depend upon an evaluation of whether the proposed change in "design, power, thrust, or weight" would necessitate a substantially complete investigation of the compliance of the changed product. **Any ~~Each~~** of the following airplane design changes, considered alone, could typically be regarded as a substantial design change:

- (1) Change from a high wing to a low wing airplane, or vice versa;
- (2) Change of empennage configuration for larger airplanes (cruciform vs 'T' or 'V' tail);
- (3) Complete repositioning of engines (tail to wing, etc.); and
- (4) An increase in airplane design complexity resulting from an increase in the number of engines.

Current § 21.19(b) describes specific changes for which the applicant must apply for a new aircraft type certificate. These include (1) changes in the number of engines or rotors; and (2) changes to engines or rotors using different principles of propulsion or to rotors using different principles of operation. **Invariably *Historically***, these types of changes have fallen into one of two categories -- those that ~~are were~~ not **substantial *extensive*** enough to require a new application for a type certificate, as evidenced by the large number of exemptions that have been granted over the past quarter century, or those that ~~are were~~ so extensive that a new application **would be ~~was~~ required in any event** because a complete investigation of compliance is required. Accordingly, the provisions of current § 21.19(b) are not needed and

would be deleted altogether ~~are not included in this proposal~~.

Recommendation: acceptable as written

The exemptions that have been granted from current § 21.19(b) have typically required that those areas, systems, components, equipment, and appliances that are changed or significantly affected by the change must comply with the applicable regulations in effect at the date of the application for that change. This requirement would be embodied in proposed § 21.101, which would generally require that an applicant for a change to a type certificate must comply with the regulations in effect at the date of the application for that change, with an exception, however, that those areas, systems, components, equipment, and appliances not affected by the change could continue to comply with the regulations incorporated in the reference type certification basis. Accordingly, this proposed amendment would be consistent with the exemptions that have been granted on changes in the number of engines. The need for requiring a new application for a type certificate would be alleviated in many instances by the proposed changes to § 21.101.

Current § 21.19(c) describes **another** specific change in which the applicant must apply for a new aircraft engine type certificate. This change is in the principle of operation. Also, current § 21.19(d) describes specific changes in which the applicant must apply for a new propeller type certificate. These changes are in the number of blades or principle of pitch change operation. Invariably, the type of changes set forth in both of these sections are so extensive that a new application would be required in any event because a complete investigation of compliance is required. Accordingly, ~~this proposal would delete~~ these types of **changes would be deleted** from § 21.19 **altogether**. Under proposed § 21.101, with certain exceptions, these types of changes and all areas, systems, components, equipment, and appliances affected by the changes would have to comply with the regulations in effect at the date of application for the change to the type certificate.

Section 21.101

Current § 21.101(a) states that if a person applies for a change in a type certificate, the product must comply with either the regulations referenced in the type certificate or the applicable regulations in effect at the date of the application for the change, ~~if elected by the applicant~~, plus any other amendments the Administrator finds to be directly related.

Current paragraph (b) addresses novel or unusual design features where the Administrator finds that the regulations incorporated by reference in the type certificate do not provide adequate standards. In this case the applicant must comply with the regulations in effect at the date of the application for the change and any necessary special conditions "to provide a level of safety equal to that established by the regulations incorporated by reference in the type certificate for the product." This means that the level of safety must be at least equal to the level of safety that was required by the regulations referenced in the type certificate.

To ensure that the products meet the latest airworthiness standards wherever practicable, proposed § 21.101 **would specify specifies** that, with certain exceptions, the applicant for a

change must comply with the applicable regulations in effect at the date of the application for the change. The intent of this proposal is to apply the applicable regulations in effect at the date of the application to those areas, systems, components, equipment, and appliances affected by the change. For those areas, systems, components, equipment, and appliances not affected by the change, continued compliance with the regulations incorporated by reference in the type certificate is considered acceptable.

Section 21.101(a)

This proposed paragraph ~~would require~~ **requires** an applicant for a change to a type certificate to comply with the applicable regulations in effect at the date of the application for the change, ~~also referred to as the later regulations~~, and with parts 34 and 36.

Recommendation: acceptable as written

Section 21.101(b)

This proposed paragraph ~~would provide~~ **provides** exceptions to the regulation in proposed paragraph (a), permitting the applicant to comply with earlier amendments to the regulations. ~~A "regulation" as used herein means individual paragraphs of the Federal Aviation Regulations or predecessor regulations.~~ When choosing the amendment level of a regulation, all related regulations associated with that amendment level ~~should~~ **would have to** be included. The amendment level chosen would not be allowed to predate either the existing basis or anything required by the retroactive sections, §§ 23.2, 25.2, 27.2, or 29.2. Design changes **inevitably** vary in both complexity and magnitude so it is necessary for each proposed change to be evaluated on a case by case basis, taking into account previous changes and their certification basis. Individual incremental changes may be modest; however, the cumulative effect can result in a significant overall change. In this context, the following factors should be considered: (1) the extent of the previous changes and the extent to which later amendments have been addressed for these individual changes; and (2) the extent of revisions to the airworthiness standards from those of the original certification basis of the model being changed. When an essentially new product is developed, step by step, through a series of non-substantial design changes, it should achieve a level of safety similar to that of a comparable new product.

Design changes will be classified as either nonsignificant , significant or substantial. ~~Substantial changes are addressed in § 21.19. Those that are not substantial will be either nonsignificant or significant.~~ A small weight increase or the installation of a flight management system ~~is an example of a non-significant~~ **would not normally be considered a significant** change. A change from turboprop to turbofan engines would normally be a significant change. ~~The installation of a cargo door is an example of a significant change.~~ A change from a low wing to a high wing would normally be ~~is an example of~~ a substantial change.

Recommendation: revise as worded in ARAC submittal

~~*In evaluating a design and making the final determination of nonsignificant or significant, under the exceptions provided for in § 21.101(b), the FAA would rely on documented engineering, safety, and economic data. Any data submitted by the applicant should have the same degree of thoroughness and engineering quality expected for initial compliance with airworthiness standards.*~~

Comment: It is a reasonable expectation
Recommendation: acceptable as written

Section 21.101(b)(1)

This proposed paragraph **provides** ~~would provide~~ the first exception to the regulation in proposed paragraph (a), to show compliance with the **latest later** applicable regulations. The proposed paragraph would state that the applicant would be allowed to demonstrate compliance with earlier regulations, but not earlier than the regulations incorporated in the existing certification basis, if the effect of the proposed change is not significant, taking into account earlier design changes and previous updating of the type certification basis.

There may be concurrent significant and non-significant changes made to a product. For example, there may be a small change in the model of engines used at the same time large changes are made to the airframe. Each part of the total change would be evaluated to determine its significance on its own merit. It must be recognized, however, that a number of related non-significant changes may collectively represent a significant change to the product.

Section 21.101(b)(2)

This proposed paragraph would provide the second exception to the regulation in proposed paragraph (a), to show compliance with the later applicable regulations. The proposed paragraph would state that the applicant may show compliance with earlier regulations for those areas, systems, components, equipment, and appliances that are not affected by the change.

The FAA recognizes that arbitrarily requiring compliance with later regulations in areas, systems, components, equipment, and appliances not affected by the change may cause redesign of components that have an acceptable service record without an attendant improvement in safety, or may have the counterproductive effect of discouraging any changes at all, including those that would provide a **significant notable** improvement in safety.

Section 21.101(b)(3)

This proposed paragraph would provide the third exception to the regulation in proposed paragraph (a) to show compliance with the later applicable regulations. If compliance with a regulation in effect at the date of the application for the change would **be impractical or** would not contribute materially to the level of safety of the product to be changed, ~~or would be impractical~~, the applicant may demonstrate compliance with an earlier amendment of a regulation **for which such compliance would be practical and would contribute**

materially to the level of safety of the product to be changed,

Comment: The concepts of practicality and material contribution to safety are both required considerations.

Recommendation: revise as worded in ARAC submittal

provided that the amended regulation does not precede either the corresponding regulation in §§ 23.2, 25.2, 27.2, or 29.2 of this chapter, or the corresponding regulation incorporated by reference in the type certificate.

Compliance with the later amendment would be considered to "not materially contribute to the level of safety" if the level of safety achieved by the existing design with the proposed design change would not be enhanced by compliance with that later amendment. In demonstrating this, the applicant would show that the level of safety achieved by the existing design incorporating the proposed design change would achieve a safety level **commensurate with *similar to*** that reflected in the later amendment.

The factors that would be considered in comparing the level of safety achieved by the existing design incorporating the proposed design change with the level of safety achieved by compliance with the later amendment would include: whether the product has compensating design features; the extent that the service experience of the product shows that the ***operational*** performance and reliability of the product provides a level of safety **commensurate with *similar to*** that of later amendments; and whether compliance with a later amendment, notably when it necessitates a redesign, would have an adverse effect on safety in terms of ***operational*** performance and reliability.

Nothing would limit the future operation or transfer of a product after a design change is approved with an older certification basis; furthermore, the intent of this proposal is to establish certification bases appropriate to the designs of the products and the designs of the changes. Therefore, if an applicant for a design change is changing one or two ***items of a*** products, and another applicant is making the same change to 100 ***items*** of the same product, the applicants' design changes should be certificated to the same basis.

Demonstrating that compliance ***with later regulations*** would not materially contribute to the level of safety could necessitate analyses of the safety features of the existing design and the proposed change, and an analysis of the safety concerns addressed by the relevant amendment. The evaluation may be accomplished using a numerical - statistical approach, subject to the availability and relevance of applicable data. In practice, engineering judgment, based on scientific, rational, and reasoned analysis of the relevant data, would be used in the development of this evaluation. The essentials of the evaluation would involve:

- a. A clear understanding of the regulatory change and what prompted the change;
- b. A detailed knowledge of the proposed design feature; and
- c. A comprehensive review of the applicable service experience.

In some instances, An applicant may be unable to show that compliance with the original certification basis, together with ***the level of safety demonstrated by*** the applicable service

experience, provides a level of safety **comparable with the later standards** ~~similar to that of the later airworthiness regulations~~. If compliance with the later standards ~~airworthiness regulations~~ would then involve a design change, the benefits of such a redesign would be considered in the light of any possible adverse effects of the redesign on **operation, reliability, durability, etc. safety**.

Comment: safety is the issue
Recommendation: acceptable as written

An applicant for a change to a type certificate would not be required to demonstrate that the changed product complies with a later amendment to an airworthiness standard if the applicant shows that such compliance would be "impractical." Compliance with a later amendment would be considered "impractical" when the applicant can establish that the cost of the design change and related changes necessary to demonstrate compliance with the amendment would not be commensurate with the resultant safety benefit. Where compliance with the later amendment would prompt a redesign, the cost of redesigning other parts of the product to accommodate this redesign ~~also~~ **would also** be considered.

~~The FAA continually weighs the desire for the maximum level of safety with the cost to the manufacturers, operators, and traveling public for achieving that level of safety. If the designer of an aircraft in development is tasked with incorporating a "change" to a system in that new design, the designer usually has many more options in making "changes" to related systems to accommodate the "change." Conversely, the systems related to a system to be changed in a certificated design have been established, and there may be few such options, if any. These restraints are exacerbated by a change in the certification basis, and the consideration of the service experience of the product. Under these conditions, it may become unreasonably costly for the change to comply with the latest standards.~~

Comment: good contrast of the "New" vs. the "Existing" implications
Recommendation: acceptable as written

A safety benefit - resource evaluation ~~could be used to assist in~~ **to-determining** impracticality, ~~and would should~~ **be discussed** between the applicant and the Administrator. **An acceptable evaluation procedure, which compares the cost of achieving and demonstrating compliance with a later amendment with the benefit of the lives, injuries and hulls that may be saved by such compliance, has been developed and is included in the associated proposed advisory circular. This assessment, presented in the associated advisory circular, is based on the relationship between the cost and safety benefits of implementing a later airworthiness standard for a change to a type certificated product.**

The development of the procedure was based on the transport airplane category because of the greater worldwide interest and greater documentation for this category than for other categories. The hazard data use to develop the procedure reflect transport category airplanes used in airline service. The propose procedure was developed through a series of iterations attempting to relate the effect of the may revisions of part 25 on saftey and the cost complying with those regulatory revisions.

The procedure was adjusted to bring the results into close agreement with the objectives of this rulemaking. The results of the procedure were verified by using the procedure to analyze selected design changes of transport category airplanes. The procedure will assist in determining if a later regulatory revision should be implemented for a proposed design change of a type certificated product. The procedure is intended to be used, along with good judgment, by a team of technical experts to evaluate the relative merits of regulatory action governing the type certification of products. This procedure would be applicable to all kinds of products even though the procedure was developed based on experiences in certification of products used in commercial, revenue-production operations. ~~while establishing the certification basis. The economic issues associated with compliance with the later amended airworthiness standards would be a major portion of this evaluation. Any safety benefit-resource evaluation used to determine "impractical" should evaluate the enhancement of the safety involved with complying with the airworthiness regulation under consideration along with the cost associated with this compliance. This evaluation would weigh the factors associated with the safety benefit and the factors associated with the cost of compliance.~~

~~The factors involved with the safety issue could include seriousness of the consequences of the hazard that the regulatory change addresses, frequency of those consequences, and the effectiveness of applying the regulatory change to the changed product. The factors involved with the cost of compliance could include labor, new capital equipment needed, materials, operating cost increase, and revenue loss. The agency is seeking comments on this concept of using "Impractical" as defined herein.~~

~~Associated Advisory Circular~~

~~The proposed associated advisory circular includes guidance for purposes of complying with the requirements of this proposed rule. This advisory circular also contains a safety benefit-resource evaluation guide, which was recommended by the ARAC to be an acceptable means of compliance with the exceptions of proposed § 21.101(b). As elsewhere in this edition of the Federal Register, the safety benefit-resource evaluation guide has been included in the draft advisory circular for purposes of information only. The safety benefit-resource guide does describe some of the kinds of issues that the applicant would address, and the FAA would consider, in determining the certification basis in accordance with this proposed rule.~~

Comment: The essence of the FAA proposed wording dismisses the Safety/Resource Analysis method developed by the ICPTF. This methodology was developed to include all of the relevant parameters for determining the effectiveness of meeting the later requirements, not "some of the kinds of issues".

Recommendation: revise as worded in ARAC submittal

Section 21.101(c)

This proposed paragraph would contain the provisions of current § 21.101(b)(2) concerning special conditions. For consistency with the other proposed changes to § 21.101, this paragraph would state that an applicant for a change must comply with any special conditions, and amendments to those special conditions, if needed, that would provide a level of safety equal to that established by the regulations in effect at the date of the application for the

change. ~~The interpretation of "novel or unusual design features" shall be the same as present practice under current § 21.101(b)(2).~~

Recommendation: acceptable as written

The provisions of current § 21.101(b)(1), concerning the use of later regulations when the regulations incorporated by reference do not provide adequate standards with respect to the proposed change, would no longer be needed and would not be incorporated into the proposed regulation. This is because proposed § 21.101(a) **would already** requires the use of later regulations.

The provisions of current § 21.101(c), concerning the replacement of reciprocating engines with turbopropeller engines, are not incorporated into the proposed regulation. A change of this nature would be considered a significant change, and compliance with the regulations in effect at the date of application for the change, therefore, would be required.

Section 21.101(d)

This proposed paragraph would state that an application for a change to a type certificate for a transport category aircraft would be effective for 5 years, and an application for a change to a type certificate for all other products would be effective for 3 years. These proposed effectivity periods for an application are the same as those in current § 21.17(c) and (d) for an application for a type certificate. Because current § 21.101 requires compliance with the regulations incorporated by reference in the type certificate and because the certification basis of the original product doesn't change, having an effectivity period for an application for a design change has not been necessary. Under the proposed § 21.101, which **would** requires meeting the airworthiness standards in effect at the date of the application for the change, it is necessary to limit the effectivity of the application for a change, to support the intent of the proposed regulation. **If an application for a design change expires** This proposed section **would** states ~~that if an application for a design change expires,~~

Recommendation: acceptable as written

an applicant may file a new application or apply for an extension of the original application as in present § 21.17(c) and (d).

Unique Aircraft Categories

This section applies to, among others, surplus military aircraft type certificated under current S 21.27. Airworthiness standards for these aircraft were issued in the 1950's or, where no specific date is listed, the regulations that apply are those that were in effect on the date the first aircraft of the particular model was accepted for operational use by an Armed Force of the United States. These aircraft receive airworthiness certificates in the standard category and, therefore, are eligible to carry persons or property for compensation or hire. The certification basis for changes to these types of aircraft would be established under proposed S 21.101 (a).

Limited category aircraft, mostly World War II surplus military aircraft, were issued type certificates base on a satisfactory military safety record rather than on a finding of compliance with any specific civil airworthiness standards. Currently, alterations to limited category aircraft may be approved based on a showing that the alteration would not detract form the satisfactory military safety record. Operators of limited category aircraft are not permitted to carry persons or property for compensation or hire.

Restricted category aircraft are type certificated for special purpose operations such as aerial application of agricultural fertilizers and pesticides and forest fire retardants. They may be aircraft that comply with the airworthiness standards of another aircraft category except for those regulations that the administrator finds inappropriate for the special purpose operation or they may be surplus military aircraft that may have been issued type certificates based on a satisfactory military safety record. Operators of restricted category aircraft are not permitted to carry persons or property for compensation or hire.

Surplus military aircraft type certificated in the limited or restricted category normally are not required to comply with an applicable airworthiness standard when they are type certificated, thus permitting these aircraft to have a level of safety different from that required for aircraft that do comply with an applicable airworthiness standard. Therefore, it would be inconsistent to require compliance with later amendments of a regulation for a change when the aircraft may never have met any version of the regulation initially. Requiring these aircraft to comply with proposed S 21.101 (a) would not necessarily enhance the level of safety. However, proposed S 21.101 would be applicable for those changes where the regulations referenced in the type certificated no not provide adequate standards, e.g., installation of a turbopropeller engine in tan order agricultural airplane.

Section 21.101(e)

~~This proposed paragraph would contain procedures that would be applicable for changes of aircraft, aircraft engines, and propellers that have been type certificated using the airworthiness standards listed in Chapter 1. Proposed paragraph (e)(1) of § 21.101 would mandate that the certification basis for a change to a product certificated under the applicable regulations that preceeded parts 23, 25, 27, 29, 31, 33, or 35 would be established in the same manner as a change to a product certificated under one of these parts. For example, an applicant would be required to show compliance with the latest amendment(s) under part 23 that would apply to a change to a small airplane originally certificated under Part 3 of the Civil Air Regulations (CAR 3). A change to an airplane type certificated under Special Federal Aviation Regulation No. 41 (SFAR 41), would be handled somewhat differently. The SFAR 41 requirements incorporated by reference in the type certificate of such an airplane have expired, and may no longer be used for purposes of issuing certificates; accordingly, under proposed § 21.101, only the latest amendments of the part 23 requirements of the SFAR 41 certification basis would be applicable for a change to an SFAR 41 airplane design. Applicability of this proposed regulation would include changes to products type certificated under §§ 21.21 and 21.29. In addition, these proposed procedures would be applicable for changes of aircraft that have been type certificated under §§ 21.24, 21.25,~~

~~21.27, and special classes of aircraft, where a part of the certification basis contains regulations from the airworthiness standards listed in Chapter 1.~~
~~At first glance, because some of the certification basis of aircraft type certificated under §§ 21.24, 21.25, 21.27, and special classes of aircraft do not completely consist of airworthiness standards of the Federal Aviation Regulations, aircraft type certificated under these regulations may not appear to completely benefit from the procedures of this proposed rulemaking. However, after careful consideration, the FAA has determined that the level of safety of changes to an aircraft that has been type certificated under any of these regulations, would benefit from the enhanced safety associated with the appropriate later amendments of those portions of the airworthiness standards that are a part of the certification basis. This takes into consideration that the certification basis, in some cases, may consist of airworthiness standards as well as other requirements found by the Administrator to be necessary to provide an equivalent level of safety.~~
~~For example, the certification basis for a special class aircraft or primary category aircraft may be based, in part, on portions of those airworthiness standards contained in Chapter 1 that were found by the Administrator to be appropriate for the specific type design. Since revisions are frequently made to the airworthiness standards to upgrade the minimum level of safety required for civilian aircraft and to incorporate certification standards for modern state-of-the-art technology, it seems logical that the level of safety of changes to special class aircraft would benefit from compliance with the later airworthiness standards. These proposed procedures would apply only to those parts of the certification basis that were obtained from the airworthiness standards listed in Chapter 1.~~
~~Joint Aviation Requirements, JAR 22, is a published regulation being used as a means of compliance by the FAA for gliders, as a special class of aircraft, but this regulation is not listed in Chapter 1; therefore, the proposed procedures would not be applicable in this case. Although these procedures are not intended to be applicable to the Joint Aviation Requirements, an applicant may comply with these procedures when the Administrator finds them acceptable for a specific application.~~
~~Surplus military aircraft, type certificated in the restricted category under § 21.25(a)(2), normally are accepted on the basis of the previous military qualifications acceptance and service record in lieu of showing compliance with airworthiness standards in Chapter 1. However, a change to these aircraft for a special purpose operation usually is not supported by the military service history and needs to comply with an airworthiness standard. Compliance with the later amended airworthiness standard for the change would not be appropriate as the aircraft did not meet an airworthiness standard initially.~~
~~Limited category aircraft are surplus military aircraft, mostly from World War II, that were type certificated under Part 9 of the Civil Air Regulations for use other than air transport. These aircraft were not intended to carry persons or property for compensation or hire, and normally were accepted on the basis of their previous military qualifications acceptance and service record. However, a change to these aircraft usually is not supported by the military service history, therefore, the change must comply with appropriate airworthiness standards. It seems logical that the level of safety of changes to aircraft that have not been type certificated to an airworthiness standard would not benefit from compliance with the later airworthiness standards.~~

Comment: see comments to actual rule change 21.101(e)
Recommendation: revise as worded in ARAC submittal

Section 21.115

The type certificate holder may obtain approval for a change either by amending the type certificate under § 21.101 or by obtaining a supplemental type certificate under § 21.115. Any other modifier would have to obtain a supplemental type certificate under § 21.115. There should not be a difference in the certification basis for a change to a type certificated product between these two methods of approval, amended type certificate or supplemental type certificate.

Current § 21.115 incorporates the provisions of current § 21.101(a) and (b) by reference, making the provisions of the latter section equally applicable to applicants for supplemental type certificates. In view of the proposed changes to § 21.101, it is necessary to amend § 21.115 to refer simply to § 21.101 rather than specifically to § 21.101(a) and (b). This would not be a substantive change.

Section 25.2

Current § 25.2(c) incorporates the provisions of current §§ 21.101(a)(2) and (b) by reference, addressing the subsequent revisions to the special retroactive regulations. To remain consistent with the proposed changes to § 21.101, it is necessary to amend § 25.2(c) to refer to § 21.101(a). This would not be a substantive change.

Paperwork Reduction Act

~~*In accordance with the Paperwork Reduction Act of 1980 (Pub. L. 96-511), there are no requirements for information collection associated with this proposed rule.*~~

Recommendation: acceptable as written

International Compatibility:

The proposed procedures have been ~~proposal results, primarily, from a recommendation~~ harmonized with the aviation authorities of Canada and Europe. Similar corresponding changes to regulations governing type certification procedures for changed products are being proposed by Transport Canada and the Joint Aviation Authorities.

Regulatory Evaluation, Regulatory Flexibility Determination, and Trade Impact Assessment:

Three important requirements pertain to economic impacts of regulatory changes to the Federal Aviation Regulations. ~~Changes to federal regulations must undergo several economic analyses.~~ First, Executive Order 12866 directs Federal agencies to promulgate new regulations or modify existing regulations only if the potential benefits to society outweigh the potential costs. Second, the Regulatory Flexibility Act of 1980 requires agencies to analyze the economic impact of regulatory changes on small entities. Finally, the Office of Management and Budget directs agencies to assess the effects of regulatory changes on international trade. In conducting these assessments, the FAA has determined that this

regulation ~~proposed rule~~: 1) would generate benefits exceeding its costs and is **neither major ~~not "significant"~~** as defined in Executive Order ~~12866~~; 2) **nor ~~would not be~~** "significant" as defined in DOT's Policies and Procedures; 3) would not have a significant impact on a substantial number of small entities; and 4) would not restrain international trade. These analyses, available in the docket, are summarized below.

Regulatory Evaluation Summary:

The following discussion of costs and benefits is provided because the proposed procedures would be explicitly incorporated into formal regulations. By administrative policy, (**Action Notice A8110.23, Procedures for Developing the type Certification Basis for Derivative Aviation Products**) the FAA **has obtained agreements ~~is already urging designers to show~~** that certain changed products comply with selected amendments that were adopted after the initial application for type certification of the base product. It is likely that such administrative decisions would continue, to some unknown degree for an unknown proportion of type certificated products, in the absence of the proposed **regulation ~~rule~~**.

The proposed **regulation ~~rule~~** would not initiate a specific certification standard or requirement per se, but instead, would formally alter the manner in which existing and future standards would be determined to be applicable. As a result, the FAA can describe, but is not able to quantify, the costs and benefits of the proposal. A quantification of the impacts would require a forecast of potential future changes to all commuter and transport category airplane models; all rotorcraft; and all other categories of regulated aircraft, aircraft engines, and propellers. In addition, a quantified evaluation would require a review of all applicable regulations that have been adopted during the intervening period after the type certification of the product, plus engineering appraisals of the intended changes for each product, the effects of those changes on other systems and components, and the economics associated with bringing each affected system and component up to the standards of the intervening regulations. No reasonably accurate estimate of these factors can be made.

In addition to the absence of a comprehensive estimate, no examples of such cost estimates are available for this evaluation. In some instances, **some ~~the FAA has urged~~** manufacturers of changed products to **have complied ~~comply~~** with later regulations. In association with these actions, individual manufacturers of proposed changed products have evaluated the costs and benefits that would be incurred to meet the pertinent standards. Due to competitive economic considerations, however, such information is considered proprietary and is not available.

The attributable costs of this proposal are the incremental costs that would be incurred to meet any additional or more stringent standards, adopted after the application for type certification of the initial product, that would not be required in the absence of this proposal. Similarly, the direct benefit of the proposal is the augmented safety that would result from meeting such standards. Although the attributable costs and benefits cannot actually be quantified, the proposed rule is premised on an analysis to verify that any actions taken pursuant to it would be cost beneficial.

As noted in the description of the proposal, compliance with later regulations would not be required (1) for a change that is **determined not to be** classified as *being* significant, (2) for those areas or components not affected by the change, or (3) where compliance with later regulations or **would be impractical or** would not contribute materially to the level of safety ~~or would be "impractical."~~ **Although a formal cost-benefit analysis is not intended,** Compliance with later amendments would be considered impractical if the applicant can show that such compliance would result in costs that are not **commensurate consistent** with the possible safety benefits. Further guidance on the definition of what constitutes a significant change would be provided in an advisory circular. **The proposed circular would include a procedure for evaluating the practicality of applying later regulations in establishing the certification basis for a changed product. It is intended that the procedure would aid the engineering judgment of a team of technical experts in evaluating the relative merits of applying later regulatory actions. The procedure would compare a safety index to a resource index to determine whether a particular changed product should comply with later regulatory changes.**

The safety index would measure: (1) the seriousness of the consequences of the hazard that the later regulations address, (2) the projected frequency of those consequences, and (3) the expected incremental effectiveness of the later standards in addressing this hazard for the changed product in question. The resource index would gauge: (1) the incremental labor and capital equipment necessary for compliance, (2) the effect on scrap parts and part interchangeability, and (3) the potential increase in operating costs or reduction in revenue or utility.

Comment: The ARAC proposed wording rightly addresses the contribution of the Safety/Resource Methodology.

Recommendation: revise as worded in ARAC submittal

In addition to the benefits of any individual action taken pursuant to the proposed rule, the proposal would also generate procedural benefits. The formalization of this policy by regulation would expedite decisions about the certification basis of proposed changed products and, therefore, would provide manufacturers and modifiers with earlier and more dependable information on which to base their product development decisions. In addition, the proposed procedures have been harmonized with the foreign aviation authorities of Canada and Europe and the resulting common standards would reduce the costs and delays necessary to formally determine and fulfill dissimilar international requirements.

Although the attributable costs and benefits of the proposed rule cannot be quantified, the FAA **believes holds** that it would be cost beneficial.

Regulatory Flexibility Determination:

The Regulatory Flexibility Act of 1980 (RFA) was enacted by Congress to ensure that small entities are not unnecessarily or disproportionately burdened by Government regulations. The RFA requires a Regulatory Flexibility Analysis if a proposed rule would have a significant economic impact, either detrimental or beneficial, on a substantial number of small entities. FAA Order 2100.14A, Regulatory Flexibility Criteria and Guidance, establishes threshold cost values and small entity size standards for complying with RFA review requirements in FAA rulemaking actions. The proposed amendments would not have a significant economic impact on a substantial number of small entities.

Trade Impact Assessment:

The proposed rule would not constitute a barrier to international trade, including the export of American goods and services to foreign countries and the import of foreign goods and services into the United States. Instead, the proposed type certification procedures for changed products have been harmonized with those of foreign aviation authorities and would lessen the restraints on trade.

Federalism Implications:

The regulations proposed herein will not have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government. Therefore, in accordance with Executive Order 12612, it is determined that this proposal would not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

Conclusion:

For the reasons discussed in the preamble, and based on the findings in the Regulatory Flexibility Determination and the International Trade Impact Analysis, the FAA has determined that this proposed regulation is not a significant regulatory action under Executive Order 12866. In addition, the FAA certifies that this proposal, if adopted, will 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 proposal is considered nonsignificant under DOT Regulatory Policies and Procedures (44 FR 11034; February 26, 1979). An initial regulatory evaluation of the proposal, including a Regulatory Flexibility Determination and International Trade Impact Analysis, has been placed in the docket. A copy may be obtained by contacting the person identified under "FOR FURTHER INFORMATION CONTACT."

**COMMENTS TO PROPOSED AC 21.101-XX
FOR TYPE CERTIFICATION PROCEDURES
FOR CHANGED PRODUCTS
Docket No. 28903, Notice No. 97-7**

The body of AC 21.101-XX bears little resemblance to the document and process presented to the FAA by ARAC. Furthermore, the FAA proposal is de-harmonizing and ignores the results of four years of work by the ICPTF (of which the FAA was a part) to develop the ICPTF proposal.

Except for the three Appendices, the body of the draft Advisory Circular proposed by the FAA is a completely different document in terms of substance and format than that developed by the International Certification Procedures Task Force (ICPTF) and endorsed by the FAA's ARAC process. Whereas the ARAC proposal is clearly written, the proposed draft AC is very difficult to comprehend and interpret. If not revised and clarified, the AC as proposed will result in more difficult negotiations between the applicant and the FAA in agreeing on a certification basis for changed products.

It is recommended that the FAA replace the proposed AC 21.101-XX with the document as developed the ICPTF and submitted by ARAC. Anything short of this would fail to incorporate the intent of the process and prevent harmonization with the JAA (NPA 21.7).

Recommendation: The draft AC should be entirely rewritten using the ARAC recommended version as the baseline document for any proposed changes having validity.