ORDER

8110.4C

TYPE CERTIFICATION

March 28, 2007

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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Initiated by: AIR-110

RECORD OF CHANGES DIRECTIVE NO. **8110.4C**

CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL	CHANGE TO BASIC	SUPPLEMENTS			OPTIONAL

FAA Form 1320-5 (6-80) USE PREVIOUS EDITION

CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
8110.4C
CHG 6

National Policy

Effective Date:
03/06/2017

SUBJ: Type Certification

1. Purpose. This change transmits revised pages to Order 8110.4C, *Type Certification*. This change is issued to remove outdated forms and the corresponding instructions for Type Certificates (TCs), Supplemental Type Certificates (STCs), Type Inspection Authorization (TIAs), and Type Inspection Reports (TIRs). All of these forms are now available at https://employees.faa.gov/tools_resources/forms. In addition, this change removes policy related to procedures for non-technical standard order (TSO) function data submitted with an application for TSO authorization (TSOA). This policy is now available in the FAA Order 8150.1, *Technical Standard Order Program*. This change also includes several revisions to policy and procedures throughout the whole order necessary to keep affected topics up to date.

2. Who this change affects. The Washington headquarters branch level of the Aircraft Certification Service; branch levels of the aircraft certification directorates; and all certification field offices.

3. Effective Date. The provisions of this change for this directive become effective on the date of signature.

4. Where to Find This Order. You can find this order at the MYFAA Employee website (https://employees.faa.gov/tools_resources/orders_notices) and at the Regulatory and Guidance Library (RGL) website (http://rgl.faa.gov).

5. Disposition of Transmittal. Retain this transmittal sheet until this directive is cancelled by a new directive.

Susan J. M. Cabler
Acting Manager, Design, Manufacturing, & Airworthiness
Division
Aircraft Certification Service

PAGE CHANGE CONTROL CHART

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i (and ii)	10/26/2005	i (and ii)	03/06/2017
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64	10/26/2005	None	
65	12/20/2011	65	03/06/2017
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98	10/26/2005	98	03/06/2017
99	10/26/2005	99	03/06/2017
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101	3/28/2007	None	
102	10/26/2005	None	
104	10/26/2005	104	03/06/2017
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121	03/28/2007	121	03/06/2017
129	03/28/2007	129	03/06/2017
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134	08/14/2008	134	03/06/2017
138	03/24/2011	138	03/06/2017
139	03/24/2011	None	
140	03/24/2011	None	
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Appendix 16	03/15/2010	None	
Directive Feedback Information	12/10/2011	Directive Feedback Information	03/06/2017

CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
8110.4C
CHG 5

National Policy

Effective Date:
12/20/2011

SUBJ: Type Certification

1. Purpose. This change transmits revised pages to Order 8110.4C, *Type Certification*. This change is issued to remove procedures and forms related to the notification process used when initiating type certification projects, for the determination of directorate involvement, and for aircraft certification office (ACO) to ACO coordination. The revised certification project notification (CPN), directorate involvement determination, and ACO to ACO coordination procedures are now published in Order 8110.115, *Certification Project Initiation and Certification Project Notification.* This change also introduces a requirement for ACOs to submit updated Type Certificate Data Sheets (TCDSs) for posting on the RGL website no later than 30 calendar days after TC transfer to a new TC holder. And finally this change also includes a corrected title for figures 1 and 7 of appendix 2.

2. Who this change affects. Washington headquarters branch level of the Aircraft Certification Service; branch levels of the aircraft certification directorates; and all certification field offices.

3. Effective Date. The provisions of this change for this directive become effective on the date of signature.

4. Where to Find This Order. You can find this order at MYFAA Employee website: https://employees.faa.gov/tools_resources/orders_notices and on the Regulatory and Guidance Library (RGL) website: http://rgl.faa.gov.

5. Disposition of Transmittal. Retain this transmittal sheet until this directive is canceled by a new directive.

Susan M Caldes

FOR David W. Hempe
Manager, Aircraft Engineering Division, AIR-100
Aircraft Certification Service

PAGE CHANGE CONTROL CHART

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v	03/24/11	v	12/16/2011
vi	03/24/11	vi	12/16/2011
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24	10/26/05	24	12/16/2011
25	10/26/05	25	12/16/2011
26	10/26/05	26 Blank page	12/16/2011
65	10/26/05	65	12/16/2011
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92	10/26/05	92	12/16/2011
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		Appendix 13, page A13-1	12/16/2011

CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
8110.4C
CHG 4

National Policy

Effective Date:
03/24/2011

SUBJ: Type Certification

1. Purpose. This change transmits revised pages to Order 8110.4c, *Type Certification.* This change is issued to remove procedures related to the issue paper process and the development of Equivalent Levels of Safety (ELOS) memorandums. The revised issue paper procedures are now published in Order 8110.112, *Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums.* In addition, this change is issued to introduce revised policy related to procedures for non-technical standard order (TSO) function data submitted with an application for TSO authorization (TSOA). Note that this revised policy cancels the policy as published in paragraph 6-9 of change 3 to Order 8110.4c, dated 03/15/2010, and the new policy in paragraph 6-9 of change 4 is now in effect. In addition this change adds a requirement to coordinate with AIR-100 when approvals are sought under the authority of Title 14 of the Code of Federal Regulations (14 CFR) §21.8(d).

2. Who this change affects. Branch levels of the aircraft certification directorates and all certification field offices.

3. Effective Date. The provisions of this change for this directive become effective on the date of signature.

4. Where to Find This Order. You can find this order at MYFAA Employee website: https://employees.faa.gov/tools_resources/orders_notices and on the Regulatory and Guidance Library (RGL) website: http://rgl.faa.gov.

5. Disposition of Transmittal. Retain this transmittal sheet until the directive is canceled by a new directive.

Susan M Cahler

FOR David W. Hempe
Manager, Aircraft Engineering Division, AIR-100
Aircraft Certification Service

PAGE CHANGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
v	03/15/10	v	03/24/11
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30	10/26/05	30	03/24/11
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CHANGE

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

ORDER
#8110.4C
CHG 3

National Policy

Effective Date:
03/15/2010

SUBJ: Type Certification

1. Purpose. This change transmits revised pages to Order 8110.4C, *Type Certification*. This change is issued to introduce policy related to the approval procedures for non-TSO function data submitted with an application for TSO authorization. The Chapter 7 pages (144-155) are included in this change because of pagination issues, but the text of those pages is not changed.

2. Who this change affects. Branch levels of the regional aircraft certification directorates and all aircraft certification field offices.

3. Effective Date. The provisions of this change for this directive become effective on the date of signature.

4. Disposition of Transmittal. Retain this transmittal sheet until the directive is canceled by a new directive.

PAGE CHANGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
v	08/14/08	v	03/15/10
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148	10/26/05	149	03/15/10
149	10/26/05	150	03/15/10
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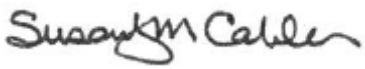

FOR David W. Hempe
Manager Aircraft Engineering Division
Division

CHANGE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

National Policy

8110.4C CHG 2

Effective Date: 08/14/08

SUBJ: Type Certification

1. Purpose. This change transmits revised pages to Order 8110.4C, *Type Certification.* This change is issued to clarify policy found in chapter 6, paragraph 6-6, Type Certification of Surplus Military Aircraft, 14 CFR § 21.27.

2. Who this change affects. Branch levels of the regional aircraft certification directorates and all aircraft certification field offices.

3. Effective Date. The provisions of this change for this directive become effective on the date of signature.

4. Disposition of Transmittal. Retain this transmittal sheet until the directive is canceled by a new directive.

PAGE CHANGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
v	03/28/07	v	08/14/08
134	03/28/07	134	08/14/08
135	03/28/07	135	08/14/08
136	03/28/07	136	08/14/08
137	03/28/07	137	08/14/08
138	03/28/07	138	08/14/08

/S/
David W. Hempe
Manager, Aircraft Engineering
Division, AIR-100

CHANGE

U.S. DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

National Policy

8110.4C CHG 1

Effective Date: 03/28/07

SUBJ: Type Certification

1. Purpose. This change transmits revised pages to Order 8110.4C, *Type Certification*. This change is issued to –

a. Revise parts of the order related to the equivalent level of safety (ELOS) coordination memorandum between the project ACO and the accountable directorate and introduce appendix 15 which contains the ELOS memorandum template.

b. Revise parts of the order related to the Certification Project Notification Form, continued airworthiness, major and minor changes in type design, concurrent testing, ACO to ACO coordination, restricted category, and other items.

c. Update references to FAA Order 1270.1, Freedom of Information Act Program and the National Environmental Policy Act (NEPA).

2. Who this change affects. Branch levels of the regional aircraft certification directorates and all aircraft certification field offices.

3. Effective Date. The provisions of this change for this directive become effective 6 months from the date of signature.

4. Disposition of Transmittal. Retain this transmittal sheet until the directive is canceled by a new directive.

PAGE CHANGE CONTROL CHART

Remove Pages	Dated	Insert Pages	Dated
iii	10/26/05	iii	03/28/07
iv	10/26/05	iv	10/26/05
v	10/26/05	v	03/28/07
vi	10/26/05	vi	10/26/05
vii (and viii)	10/26/05	vii (and viii)	03/28/07
5	10/26/05	5	10/26/05

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Initiated by: AIR-110

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95	10/26/05	95	03/28/07
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97	10/26/05	97	03/28/07
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99	10/26/05	99	10/26/05
100	10/26/05	100	03/28/07
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102	10/26/05	102	10/26/05
107	10/26/05	107	03/28/07
108	10/26/05	108	10/26/05
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128	10/26/05	128	03/28/07
129 thru 130	10/26/05	129	03/28/07
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140	10/26/05	140	03/28/07
141 (and 142)	10/26/05	141 (and 142)	03/28/07
143	10/26/05	143	10/26/05
144	10/26/05	144	03/28/07
149	10/26/05	149	10/26/05
150	10/26/05	150	03/28/07
151	10/26/05	151	03/28/07
152	10/26/05	152	03/28/07
153	10/26/05	153	03/28/07
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A1-8	10/26/05	A1-8	03/28/07
A1-9	10/26/05	A1-9	03/28/07
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A2-6	10/26/05	A2-6	03/28/07
A2-7	10/26/05	A2-7	03/28/07
A2-8	10/26/05	A2-8	10/26/05
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A12-6	10/26/05	A12-6	03/28/07
A12-7	10/26/05	A12-7	03/28/07
A12-8	10/26/05	A12-8	03/28/07
A12-9 (and A12-10)	10/26/05	A12-9 (and A12-10)	03/28/07
N/A	10/26/05	A15-1 and A15-2	03/28/07

/s/

David W. Hempe
Manager, Aircraft Engineering
Division, AIR-100

FOREWORD

This order sets procedures for evaluating and approving aircraft, engine, and propeller type design data and changes to approved type design data. It applies to Aircraft Certification Service personnel, Flight Standards Service personnel, Aircraft Evaluation Groups, and persons and organizations designated by the Administrator associated with the certification processes required by Title 14 of the Code of Federal Regulations part 21. Because it is impractical to cover all situations or conditions, supplement these instructions with good judgment to handle problems that may arise.

If you find any deficiencies, need clarification, or want to suggest improvements on this order, send a copy of FAA Form 1320-19, Directive Feedback Information (written or electronically), to the Aircraft Certification Service, Attention: Directives Management Officer at 9-AWA-AVS-AIR-DMO@faa.gov. Form 1320-19 is on the last page of this order. You may also send a copy to the Design, Manufacturing, & Airworthiness Division (AIR-100), Attention: Comments to Order 8110.4C. If you urgently need an interpretation, contact the Certification Procedures Branch, AIR-110 at (202) 267-1575. Always use Form 1320-19 to follow up each verbal conversation.

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CHAPTER 1. GENERAL

1-1. PURPOSE. This order is for the Federal Aviation Administration's (FAA) Aircraft Certification Service, Flight Standards Service, Aircraft Evaluation Groups (AEG), and persons and organizations designated by the Administrator associated with the certification processes required by Title 14 of the Code of Federal Regulations (14 CFR) part 21. It prescribes the responsibilities and procedures the FAA must follow to certify new civil aircraft, aircraft engines, and propellers, or changes thereto, as required by 14 CFR part 21.

1-2. DISTRIBUTION. This order is distributed to Washington headquarters branch levels of the Aircraft Certification Service, Flight Standards Service, and Office of Environment and Energy; to branch levels of the regional aircraft certification directorates and regional Flight Standards Divisions; to all aircraft certification field offices, to the international field offices in Brussels and Singapore, to all AEGs, and to all designated engineering representatives (DER).

1-3. CANCELLATION. This order cancels Order 8110.4B, Type Certification Process, dated April 24, 2000.

1-4. DEVIATIONS. Adherence to the procedures in this order is essential for uniform administration of this directive material. AIR-100 coordinates and dispositions any deviations. If a deviation from this directive becomes necessary, the FAA employee involved must ensure that the deviations are substantiated, documented, and concurred with by the appropriate supervisor. Submit deviations for review with recommendations to AIR-100. Title 28 of the United States Code (U.S.C.) § 2679 defines the limits of federal protection for FAA employees.

1-5. EXPLANATION OF CHANGES. This revision contains the following changes:

a. Type, and Supplemental Type, Certificates. This revision adopts a longstanding practice for discussing type certificates. Now, the term "type certificate," or "TC," applies to the original TC, supplemental TCs, and amended TCs, unless otherwise specified. The reason for this follows:

(1) U.S. Code. A supplemental type certificate (STC) is a type certificate for a change to an aircraft, engine, propeller, or appliance. This is established in 49 U.S.C. § 44704(b), which also states that an STC is issued with respect to the previously issued TC. Because an STC is a TC, it is issued using the same process of investigating and testing as called for in the basic type certification process. An STC approves major changes in type design made by persons other than the TC holder, or by the TC holder itself.

(2) Regulation. Because an STC is a TC, 14 CFR part 21, Subpart B, Type Certificates, applies. Differences unique to STCs are listed in 14 CFR part 21, Subpart E, Supplemental Type Certificates. The requirements of 14 CFR part 21, Subpart D, Changes to Type Certificates, applies to STCs and TCs.

(3) Directive. Within the scope of this order, the basic type certification process described in chapter 2 is to be followed for STCs and amendments to the TC that are deemed

major changes in type design. Chapter 4 of this order provides material unique to STCs and differences from the basic type certification process described elsewhere in this order.

b. Certification Plans, Certification Project Plans (CPP), and Project Specific Certification Plans (PSCP). This revised order corrects the non-standard use of terms that occurred as individual offices implemented Certification Process Improvement (CPI). The term *certification plan* remains (with little change) the applicant's plan for showing compliance discussed in Order 8110.4B and other orders. However, instead of "strongly recommending" that applicants share this information with the FAA, it is now required. The CPP remains the aircraft certification office's (ACO) high-level project management plan. This revision of Order 8110.4 still permits project managers to forego the use of the CPP form when they ensure the CPP data are included in the applicant's planning material. New in this revision is the link between the certification plan, the CPP, and the PSCP. CPI introduced the PSCP as a certification plan that combines the applicant's and FAA's project planning information. Therefore, the PSCP = certification plan + CPP + details recommended in *The FAA and Industry Guide to Product Certification*. Also, this revision places greater emphasis on the evolutionary nature of the certification plan and PSCP. These are living documents subject to change and refinement as project events unfold.

c. FAA Employees and Designees. Delegation often makes discussions of FAA duties ambiguous. In this revision, unless otherwise specified, any authorized person acting on behalf of the Administrator can perform FAA duties. When the actions of offices (such as ACOs and manufacturing inspection district offices (MIDO)) or positions (such as engineer, flight test pilot, or MIDO inspector) are described, their authorized designees can perform the actions, unless otherwise specified. In previous revisions, the phrase "and their designees" was often, but inconsistently, used to address delegation.

d. Other Changes.

(1) Paragraph 1-4 describes procedures for deviations to this order.

(2) Paragraph 1-5 was paragraph 1-4.

(3) Paragraph 1-6 lists definitions.

(4) Paragraph 1-7 was paragraph 1-5.

(5) Paragraph 1-8 describes the scope of this order.

(6) Paragraph 1-9 lists related publications.

(7) Paragraph 1-10 lists the records management provisions.

(8) Paragraphs 2-2, 2-3, 2-4, 2-5, 2-6, and 2-7 reflect the five phases of the type certification process model.

(9) Paragraph 2-3 removes references to applying for a STC.

(10) Paragraph 2-7 includes information from paragraphs 5-18 and 5-19 from Order 8110.4b.

(11) Paragraphs 2-10 thru 2-17 from Order 8110.4b have been incorporated into the above listed paragraphs in chapter 2.

(12) Paragraph 3-2 clarifies the different reasons for canceling a TC.

(13) Paragraph 3-3 updates the type certificate data sheet (TCDS) requirements for each model aircraft. The paragraph also updates the production basis, equipment listing, and information on spare or surplus parts.

(14) Paragraph 4-1 is modified to address the reorganization of the chapter in three groups or sets. The first grouping includes items that are either general to product modifications, or that apply to more than just the STC process. The second grouping consists of sections describing FAA STC procedural considerations. And the third grouping includes sections providing procedural instructions unique to an STC project.

(15) Paragraph 4-2 classifies major and minor design changes.

(16) Paragraph 4-3 addresses the certification basis for changed aviation products.

(17) Paragraph 4-4 addresses field approvals.

(18) Paragraph 4-5 addresses compliance inspections.

(19) Paragraph 4-6 addresses experimental certificates.

(20) Paragraph 4-7 addresses revisions to performance data.

(21) Paragraph 4-8 was paragraph 5-20 and addresses supplemental type inspection report (STIR).

(22) Paragraph 4-9 discusses conditions when the FAA will issue STCs.

(23) Paragraph 4-10 discusses conditions when the FAA will not issue an STC.

(24) Paragraph 4-11 addresses technical requirements for an STC.

(25) Paragraph 4-12 addresses compatibility examination.

(26) Paragraph 4-13 addresses approved model list (AML) STCs.

(27) Paragraph 4-14 addresses non-interference STCs.

(28) Paragraph 4-15 addresses STC projects involving foreign-registered aircraft and import products.

(29) Paragraph 4-16 addresses STC and amended STC applications.

(30) Paragraph 4-17 addresses the establishment of an STC project.

(31) Paragraph 4-18 addresses ACO to ACO coordination.

(32) Paragraph 4-19 was paragraph 4-4.

(33) Paragraph 4-20 was paragraph 4-6.

(34) Paragraph 4-21 was paragraph 4-8.

(35) Paragraph 4-22 addresses the FAA validation of a Civil Aviation Authority (CAA) STC under bilateral agreements.

(36) Paragraph 4-23 addresses how to obtain a Canadian STC by validation of a U.S. STC.

(37) Paragraph 5-1 was subparagraph 5-1, General.

(38) Paragraph 5-2 was subparagraphs 5-1b and 5-1c.

(39) Paragraph 5-3 was paragraph 5-2, except for 5-2e, Conformity Discrepancies. Old paragraph 5-2e is now 5-5f.

(40) Paragraph 5-4 was paragraph 5-15.

(41) Paragraph 5-5 introduces the streamlined conformity inspection notification process.

(42) Paragraph 5-6 was paragraph 5-3, but with a more accurate title.

(43) Paragraph 5-7 was paragraph 5-16.

(44) Paragraph 5-8 was paragraph 5-17.

(45) Paragraph 5-9 was paragraph 5-4.

(46) Paragraph 5-10 was paragraph 5-5.

(47) Paragraph 5-11 was paragraph 5-6.

(48) Paragraph 5-12 was paragraph 5-7.

(49) Paragraph 5-13 was paragraph 5-8.

(50) Paragraph 5-14 was paragraph 5-9.

(51) Paragraph 5-15 was paragraph 5-11.

(52) Paragraph 5-16 was paragraph 5-10.

(53) Paragraph 5-17 was paragraph 5-12.

(54) Paragraph 5-18 was paragraph 5-13.

(55) Paragraph 5-19 was paragraph 6-4, but has been revised due to issuance of revised FAA Order 8110.41, *Aircraft Certification Service FAA Flight Test Responsibilities, Procedures, and Training.*

(56) Paragraph 5-20 was paragraph 5-14.

(57) Paragraph 6-1 addresses provisional TCs.

(58) Paragraphs 6-2 through 6-6 were paragraphs 6-1 and 6-2.

(59) Paragraph 6-7 addresses multiple airworthiness certification, 14 CFR § 21.187.

(60) Paragraph 6-8 addresses procedures for approving aerial dispensing of liquids.

(61) Chapter 7 was created to capture all 14 CFR part 36 (noise) requirements. These requirements were in paragraph 6-3.

(62) Appendix 1 incorporates numerous revised forms and guidance for establishing certification projects.

(63) Appendix 2, figure 7 incorporates products codes (designations) used on TCDSs for small airplanes, rotorcraft, and engines.

(64) Appendix 5, figure 2 lists current Transport Canada Aircraft Certification Divisions' addresses.

(65) Appendix 12 includes a format and guidance for the preparation of a TSOA letter that includes a non-TSO function.

1-6. DEFINITIONS.

a. Amended TC – an approval for a change to a TC, made by the TC holder. Only the holder of the TC may apply for an amended TC.

b. Certificate Management ACO (CMACO) – the ACO managing the product's TC. The CMACO also manages the continued airworthiness for all products it approves for as long as the products are in service.

c. Certification Plan – the applicant's intended means for showing that a product complies with the applicable regulations.

d. Certification Process Improvement (CPI) – an initiative to improve safety by fostering better communications, project management, and accountability between design approval applicants and the FAA, set forth by a job aid titled *The FAA and Industry Guide to Product Certification.*

e. Certification Project Notification (CPN) – the process (see Order 8110.115, *Certification Project Initiation and Certification Project Notification*) used by the project manager to notify the accountable directorate, AEG, and CMACO of a new certification or type validation project. The accountable directorate, AEG, and CMACO also uses a CPN process to provide comments to the ACO and to specify their level of involvement in the project.

f. Certification Project Plan (CPP) – a living document (see appendix 1, figure 7 of this order) used to coordinate schedules, responsibilities, and personnel resources between the accountable directorate and project ACO.

g. Designees – a non-FAA person appointed by the FAA in accordance with 14 CFR part 183, Subpart A. This person has been delegated the responsibilities of a FAA manufacturing inspector, engineer, or test pilot. Designees may be authorized to perform the functions listed in 14 CFR part 183, Subpart C.

h. Field Approval – a method by which FAA approves technical data used to accomplish a major repair or a major alteration on a single aircraft, provided the repair or alteration is not classified as a major change in type design. An FAA inspector's signature in Block 3 of an FAA Form 337, Major Repair and Alteration, approves the data referenced on the form.

i. Flight Test – for the purpose of this order, any ground or flight test performed on the product test article that is controlled or evaluated by FAA flight test personnel (or their designees), in support of appropriately authorized official testing.

j. Partnership for Safety Plan (PSP) – an agreement between a design approval applicant and the FAA describing how they will work together to certify an maintain integrity of the design approvals.

k. Parts Manufacturer Approval (PMA) – an FAA design and production approval to manufacture replacement and modification parts that comply with the regulations. See Order 8110.42, *Parts Manufacturer Approval Procedures.*

l. Product – for type certification, an aircraft, an aircraft engine, or a propeller. The word product has other meanings in different contexts, such as export airworthiness approvals (see 14 CFR 21.1(b)).

m. Production Certificate (PC) – an approval by the FAA to manufacture or alter a product after having shown compliance with an approved type design. The FAA issues a PC to a TC holder (this includes STC holders) or a license of a TC holder, who meets the requirements of

§§ 21.135, 21.137, and 21.138.

n. Project ACO (PACO) – the ACO working a certification or validation project. The PACO may need to coordinate with the CMACO, if the project is a follow-up certification activity, such as an STC or PMA.

o. Project Specific Certification Plan (PSCP) – an integrated planning and project management tool combining the information from the applicant's certification plan, the FAA's CPP, and other information recommended in *The FAA and Industry Guide to Product Certification.*

p. Provisional Type Certificate – a time and operationally limited design approval that the FAA issues, upon request. Even though the FAA has not completed its findings of compliance to issue a TC, the FAA issues a provisional type certificate after the applicant has completed the necessary tests, analyses, and computations to show that the product complies with the applicable regulations. See 14 CFR part 21 subpart C.

q. Significant Change – as defined in Order 8110.48, *How to Establish the Certification Basis for Changed Aeronautical Products*, a change to the TC is significant to the extent it changes one or more of the following: general configuration, principles of construction, or the assumptions used for certification. The change is not extensive enough to be considered a substantial change. See Order 8110.48 for more information.

r. Supplemental Type Certificate (STC) – a TC that the FAA issues to an applicant who alters a product by introducing a major change in type design (as defined by § 21.93(a)). The STC process is essentially the same as the TC process; differences are discussed in chapter 4 below.

(1) One-Only STC – a special case of limiting the change to a specific serial numbered aircraft, the FAA does not require the STC data to be sufficient for accurate reproducibility.

(2) Multiple STC – any STC that is not "One-Only."

(3) Approved Model List (AML) STC – a special case of multiple STC using an AML to control installation eligibility, such that adding new make and model products does not require amendment of the STC.

(4) Non-Interference STC – a special case of STC approving a product modification that provides a convenience or function that is not required by the applicable operating rules or airworthiness standards applicable to the aircraft's intended operations.

s. Type Certificate (TC) – a design approval issued by the FAA when the applicant demonstrates that a product complies with the applicable regulations. As defined by § 21.41, the TC includes the type design, the operating limitations, the TCDS, the applicable regulations, and other conditions or limitations prescribed by the Administrator. The TC is the foundation for other FAA approvals, including production and airworthiness approvals.

u. Type Certification Board (TCB) – an FAA management team responsible for acquainting the applicant with the certification process, resolving significant problems, and establishing a schedule for the overall accomplishment of the type certification project.

v. Type Certification Board Meeting (TCBM) – any formal meeting between the TCB and the applicant to coordinate the move to the next project phase or resolve issues preventing progress to the next phase. Examples include preliminary, interim, pre-flight, and final TCBMs.

w. Type Design – the engineering definition of a particular product. The type design consists of the following (see 14 CFR § 21.31):

(1) Drawings and specifications,

(2) Dimensions, materials, and processes,

(3) Airworthiness limitations,

(4) (for primary category aircraft, if desired) A special inspection and preventive maintenance program designed to be accomplished by an appropriately rated and trained pilot-owner, and

(5) Other data to describe the product design, and to determine the airworthiness, noise characteristics, fuel venting, and exhaust emissions (where applicable).

x. Validation – as defined in Order 8110.52, Type Validation and Post-Type Validation Procedures, a special form of certification used to establish the compliance of an imported product to the importing state's applicable airworthiness standards. See Order 8110.52 for additional information.

1-7. BACKGROUND AND DISCUSSION.

a. Order 8110.4, Type Certification, is primarily written for internal use by the FAA, its designees, and delegated organizations. The order provides procedures and policy for the type certification of products. The office of primary responsibility for this order is the Aircraft Certification Service's (AIR), Aircraft Engineering Division's (AIR-100), Certification Procedures Branch (AIR-110). Unless stated otherwise, the type certification process in this order applies to all U.S. TCs, including amended TCs and STCs.

b. Title 49 of the United States Code (49 USC) section 40101 and Subsequent.

(1) 49 U.S.C. § 40101 and subsequent re-codifies the Federal Aviation Act of 1958. Title 49 U.S.C. § 44701 directs the FAA to promote safety of flight of civil aircraft in air commerce by prescribing and revising minimum standards. These standards set requirements for the design, materials, workmanship, construction, operation, and performance of aircraft, aircraft engines, and propellers. The Aircraft Certification Regulatory Program (ACRP) was developed to accomplish this mission. Appendix 11 of this order gives the history of aircraft airworthiness regulations.

(2) As part of the ACRP, AIR administers the type certification program to determine compliance with the prescribed regulations and to ensure continued operational safety. Appendix 9 of this order shows an organizational diagram of AIR. The organization is composed of the following:

(a) Three headquarters divisions: the Aircraft Engineering Division, the Production and Airworthiness Certification Division, and the Planning and Program Management Division,

(b) The International Policy Office, and

(c) Four certification directorates: the Small Airplane Directorate (Central Region), the Transport Airplane Directorate (Northwest Mountain Region), the Rotorcraft Directorate (Southwest Region), and the Engine and Propeller Directorate (New England Region).

(3) Figure 1-1 below shows how AIR's responsibility for administering 14 CFR is divided. When an airworthiness standard is listed under a directorate, responsibilities include regulation, policy, and guidance related to the standard. The directorate is also responsible for standardizing type certification and continued airworthiness oversight of the products they type certificated to that airworthiness standard. The standardization includes the issuance of special conditions, exemptions, airworthiness directives (AD), equivalent level of safety (ELOS) findings.

FIGURE 1-1. AIRCRAFT CERTIFICATION SERVICE'S (AIR) RESPONSIBILITIES

Organization	Responsibility
Aircraft Engineering Division	• Regulations, policy, and guidance for engineering under the Aircraft Certification Regulatory Program (ACRP), • Title 14 CFR part 21, Certification Procedures for Products and Parts, • Title 14 CFR part 39, Airworthiness Directives, • Title 14 CFR part 183, Representatives of the Administrator, • Special Federal Aviation Regulations for type certification, and • Certification of restricted category and primary category aircraft.
Production and Airworthiness Certification Division	• Regulations, policy, and guidance for manufacturing and airworthiness certification under the ACRP, • Title 14 CFR part 21, Certification Procedures for Products and Parts, • Title 14 CFR part 45, Identification and Registration Marking, • Title 14 CFR part 183, Representatives of the Administrator, and • Special Federal Aviation Regulations for certification conformance, airworthiness certification, and production.
Planning and Program Management Division	• Coordination of the Service's strategic and tactical planning initiatives and processes, • The Service's technical, general, and managerial training requirements, and • Administrative and program management guidance, coordination, and support for Service headquarters organizations.
Small Airplane Directorate (Central Region)	• Title 14 CFR part 23, Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Category Airplanes, • Title 14 CFR part 31, Airworthiness Standards: Manned Free Balloons, • Technical guidance for restricted category small airplanes, • Airworthiness criteria for gliders and airships, • Technical guidance for primary category airplanes, • Title 14 CFR part 23 glider and airship import TC projects, • Issuance of airworthiness directives (AD) for the above products, and • Participation in consensus standards development for light sport aircraft.

FIGURE 1-1. AIR'S RESPONSIBILITIES (CONTINUED)

Organization	Responsibility
Transport Airplane Directorate (Northwest Mountain Region)	• Title 14 CFR part 25, Airworthiness Standards: Transport Category Airplanes, • Technical guidance for restricted category transport airplanes, • Title 14 CFR part 25 import type certification projects, and • Issuance of ADs for the above product.
Rotorcraft Directorate (Southwest Region)	• Title 14 CFR part 27, Airworthiness Standards: Normal Category Rotorcraft, • Title 14 CFR part 29, Airworthiness Standards: Transport Category Rotorcraft, • Technical guidance for restricted category rotorcraft, • Powered lift aircraft, • Technical guidance for primary category rotorcraft, • Title 14 CFR part 27 and part 29 import TC projects, and • Issuance of ADs for the above products.
Engine and Propeller Directorate (New England Region)	• Title 14 CFR part 33, Airworthiness Standards: Aircraft Engines, • Title 14 CFR part 35, Airworthiness Standards: Propellers, • Technical guidance on auxiliary power units (APU), • Title 14 CFR part 33 and 35 import TC projects, and • Issuance of ADs for the above products.
International Policy Office, including the staff in Brussels and Singapore	• Policy guidance on bilateral agreements, import and export of aeronautical products, and other international airworthiness issues, programs, and procedures.
Aircraft Certification Offices (ACO), including the Engine Certification Office (ECO), Military Certification Office (MCO), Special Certification Office (SCO), and the Rotorcraft Certification Office	• Certificating products, • Monitoring continued operational safety, • Develop and administer ADs, • Work directly with the applicants, and • Designee oversight and management.

FIGURE 1-1. AIR'S RESPONSIBILITIES (CONTINUED)

Organization	Responsibility
Chief Scientific and Technical Advisors (CSTA)	• Technical consultants in specific, specialized topics, • Use their technical expertise to help AIR apply regulatory policies and practices to certify state-of-the-art technology, • Influence the research agendas of U.S. and foreign aviation industries, military, academia, and other research institutions, and • Interact with and assist other U.S. Government agencies and foreign CAAs in technology-related issues.
Aircraft Evaluation Groups (AEG)	• Assigned to each Aircraft Certification Directorate, • Address Flight Standards considerations during type certification, • Evaluate operational and maintenance aspects of certification, and • Evaluate continuing airworthiness requirements of newly certificated or modified products and parts.
Manufacturing Inspection District Office (MIDO), Manufacturing Inspection Satellite Office (MISO), Certificate Management Office (CMO), and Certificate Management Unit (CMU)	• Issue original airworthiness certificates, • Certification and certificate management of manufacturing facilities (and their designees) that produce aircraft, aircraft engines, propellers, parts and appliances, and • Support ACOs during design approvals by conducting conformity inspections and possibly witnessing tests.

1-8. SCOPE.

a. Type certification, the subject of this order, is one way the FAA promotes safety of flight. Although the FAA is organized to focus on the various aspects of safety through separate internal organizations, these aspects are not independent. For example, before manufacturing a product, an applicant must have a design approval (that is, TC, STC, amended TC, amended STC) and a PC or other FAA production approval. Similarly, before manufacturing a component or spare part (for sale) the applicant must have a PMA or a TSO authorization. These approvals require concurrent work between the ACO and the MIDO. This order focuses on the design approval process conducted by ACOs. It also addresses other aspects of safety, such as airworthiness (airworthiness certificates), manufacturing (production approval), maintenance, and operations (continued airworthiness) as they relate to design approval (type certification). For a more complete understanding of aircraft certification, see the related material listed on the FAA web page and particularly the FAA orders listed in paragraph 1-9, Related Publications, below.

b. The experienced applicant recognizes value in addressing various safety aspects in a unified, coordinated approach. The FAA encourages applicants to develop a plan for working with their geographic ACO that considers all safety aspects. Find guidance on developing such a plan, known as the Partnership for Safety Plan (PSP), in *The FAA and Industry Guide to Product Certification* (www.faa.gov/aircraft/air_cert/design_approvals/media/CPI_guide_II.pdf). This plan:

(1) Is a tool that helps determine how much attention the various safety aspects warrant and helps the FAA establish priorities that best promote safety,

(2) Addresses the unique characteristics of the applicant's affiliation with the FAA,

(3) Remains independent of specific projects,

(4) Identifies expectations and develops specific interface procedures between the applicant and the FAA, within the limits of FAA regulations and policy, and

(5) Helps the FAA build a constructive relationship with the applicant, including how the FAA and the applicant hold each other accountable.

c. Although *The FAA and Industry Guide to Product Certification* is broader in scope than this order, we mention it because its principles and tools are intended to improve the efficiency of the type certification process described here.

1-9. RELATED PUBLICATIONS.

a. FAA Manual IR-04-01, Records Management Requirement Manual

b. FAA Orders.

(1) FAA Order 1050.1, Policies and Procedures for Considering Environmental Impacts

(2) FAA Order 1270.1, *Freedom of Information Act Program. (FOIA)*

(3) FAA Order 1350.14, *Records Management*

(4) FAA Order 4040.26, *Aircraft Certification Service Flight Risk Management Program*

(5) FAA Order JO 7110.65, *Air Traffic Control*

(6) FAA Order 8000.79, *Use of Electronic Technology and Storage of Data*

(7) FAA Order 8000.95, *Designee Management Policy*

(8) FAA Order 8100.5, *Aircraft Certification Service – Mission, Vision, Organizational Structure and Functions*

(9) FAA Order 8100.8, *Designee Management Handbook*

(10) FAA Order 8100.11, *Requirements for Finding Undue Burden and No Undue Burden Under 14 CFR Part 21*

(11) FAA Order 8110.37, *Designated Engineering Representative (DER) Guidance Handbook*

(12) FAA Order 8110.42, *Parts Manufacturer Approval Procedures*

(13) FAA Order 8110.48, *How to Establish the Certification Basis for Changed Aeronautical Products*

(14) FAA Order 8110.49, *Software Approval Guidelines*

(15) FAA Order 8110.52, *Type Validation and Post-Type Validation Procedures*

(16) FAA Order 8110.54, *Instructions for Continued Airworthiness Responsibilities, Requirements, and Contents*

(17) FAA Order 8110.56, *Restricted Category Type Certification*

(18) FAA Order 8110.112, *Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums*

(19) FAA Order 8110.115, *Certification Project Initiation and Certification Project Notification*

(20) FAA Order 8120.22, *Production Approval Procedures*

(21) FAA Order 8120.23, *Certificate Management of Production Approval Holders*
(22) FAA Order 8130.2, *Airworthiness Certification of Products and Articles*
(23) FAA Order 8150.1, *Technical Standard Order Program*
(24) FAA Order 8300.16, *Major Repair and Alteration Data Approval*
(25) FAA Order 8900.1, *Flight Standards Information Management System (FSIMS)*

c. FAA Advisory Circulars (AC).

(1) AC 20-135, *Powerplant Installation and Propulsion System Component Fire Protection Test Methods, Standards, and Criteria*
(2) AC 20-166, *Issue Paper Process*
(3) AC 21.17-1, *Type Certification – Airships*
(4) AC 21.17-2, *Type Certification-Fixed Wing Gliders (Sailplanes), Including Powered Gliders*
(5) AC 21.17-3, *Type Certification of Very Light Airplanes Under FAR 21.17(b)*
(6) AC 21-23, *Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products Imported into the United States*
(7) AC 21-24, *Extending a Production Certificate to a Facility Located in a Bilateral Airworthiness Agreement Country*
(8) AC 21-40, *Guide for Obtaining a Supplemental Type Certificate*
(9) AC 23-8, *Flight Test Guide for Certification of Part 23 Airplanes*
(10) AC 25-7, *Flight Test Guide for Certification of Transport Category Airplanes*
(11) AC 25-19, *Certification Maintenance Requirements*
(12) AC 25.571-1, *Damage Tolerance and Fatigue Evaluation of Structure*
(13) AC 27-1, *Certification of Normal Category Rotorcraft*
(14) AC 29-2, *Certification of Transport Category Rotorcraft*
(15) AC 33-2, *General Type Certification Guidelines for Turbine Engines*
(16) AC 36-4, *Noise Standards: Aircraft Type and Airworthiness Certification*
(17) AC 121-22, *Maintenance Review Boards, Maintenance Type Boards, and OEM/TCH Recommended Maintenance Procedures*

d. National Aeronautics and Space Administration (NASA) documents.

(1) Burk, Sanger M. Jr., *Summary of Design Considerations for Airplane Spin-Recovery Parachute Systems*; NASA TN D-6866, August 1972.

(2) Bradshaw, Charles F., *A Spin-Recovery System for Light General Aviation Airplanes*; NASA CP-2127, 14th Aerospace Mechanics Symposium, May 1980.

(3) Stough, Paul H. III, *A Summary of Spin-Recovery Parachute Experience on Light Airplanes*; AIAA Paper Number 90-1317, AIAA/SFTE/DGLR/SETP Fifth Biannual Flight Test Conference, May 1990.

1-10. RECORDS MANAGEMENT. For guidance on keeping or disposing of records, see FAA Orders 0000.1, FAA Standard Subject Classification System; and 1350.14, Records Management. Or, see your office Records Management Officer or Directives Management Officer.

CHAPTER 2. TYPE CERTIFICATION PROCESS

2-1. GENERAL. This chapter describes the process for U.S. applicants to obtain a U.S. TC for their product under 14 CFR § 21.21. Follow Order 8110.52 when U.S. applicants seek foreign TCs and when non-U.S. applicants seek U.S. TCs. The process given in this chapter applies to the four kinds of TCs: TC, amended TC, STC, and amended STC. Some of the steps or procedures in this chapter may not apply to all certification projects because some of the steps or procedures may not be needed due to the design features of the proposed product or the design features of the proposed change to the product. However, if an official flight test was required, then all steps and procedures related to issuance and closure of a TIA are necessary and cannot be omitted. This chapter models the standard type certification process, describes responsibilities of the parties, and presents the administrative methods and tools FAA personnel use in conducting a type certification project. Processes unique to STCs are discussed in chapter 4.

2-2. A MODEL OF THE TYPE CERTIFICATION PROCESS.

a. Description. The model presented in the following sections is a high-level flow diagram of the certification events that typically make up the life cycle of an aircraft. It is meant to explain the type certification process, not to dictate precisely how the project should flow. Certain assumptions and simplifications were made so that the model clearly shows the relationship of the various events and milestones. Although the model shows the proper sequence of events for certificating a product, the various aspects of the project generally progress through the process at different times and at different rates. It is useful to think of a project as multiple certification items worked to this model on individual but inter-related schedules.

b. Applying the Model. Below are factors for the FAA and the applicant to consider while using this model to plan and manage the project.

(1) At times, the model implies a transport category airplane intended for 14 CFR part 121 air carrier operations. However, the basic certification principles of the model apply to any FAA design approval project.

(2) The scope, magnitude, and complexity of the project influence the relative importance of the events specified in the model. On less-demanding projects, events may be combined, conducted informally, or skipped all together.

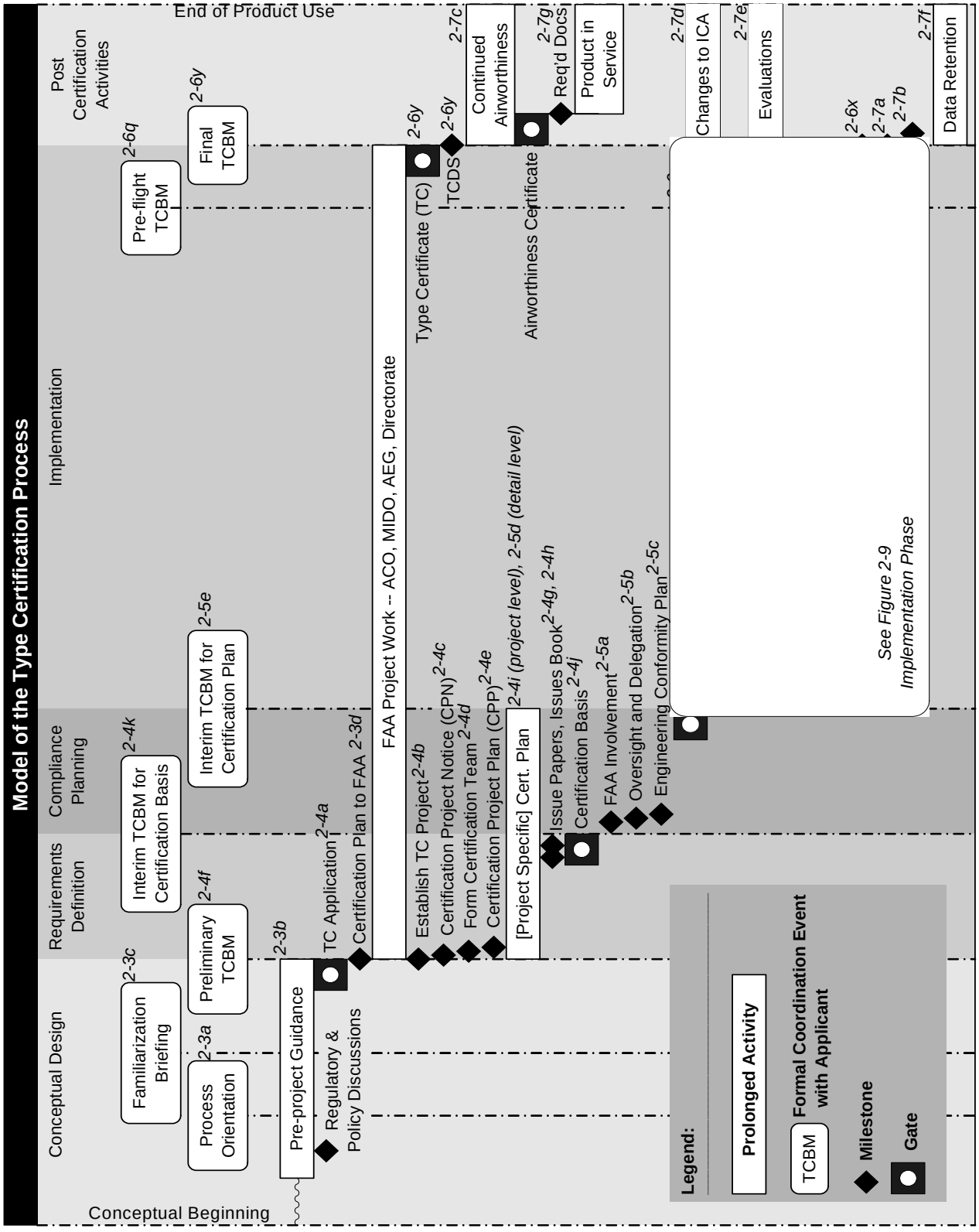
(3) Engineering design is an iterative process. Few projects will traverse the timeline directly from left to right.

(4) Planners work with limited information. As the project progresses, keep plans flexible and revise as necessary.

(5) Allocate lead-time for meeting the milestone. None are shown in the figure.

c. Overview of a Typical Type Certification Process. The model divides the product's type certification life cycle into phases based on *The FAA and Industry Guide to Product Certification.* Figure 2-1, Typical Type Certification Process, diagrams the flow of events through these phases. The numbers next to each event correspond to descriptive paragraphs for the event.

FIGURE 2-1. TYPICAL TYPE CERTIFICATION PROCESS



d. Events Marking Each Phase. The events depicted in figure 2-1 are listed in figure 2-2 below and grouped by phase. Their paragraph numbers are on the right of each column.

FIGURE 2-2. EVENTS IN A TYPICAL TYPE CERTIFICATION PROCESS

CONCEPTUAL DESIGN

REQUIREMENTS DEFINITION

COMPLIANCE PLANNING

IMPLEMENTATION

POST CERTIFICATION ACTIVITIES

2-3. CONCEPTUAL DESIGN.

FIGURE 2-3. TASKS DURING THE CONCEPTUAL DESIGN PHASE

a. Process Orientation [previously Familiarization TCBM]. An applicant seeking a TC approval is encouraged to contact the ACO in their geographic area (see www.faa.gov/aircraft/air_cert/locate_office/aco/) before submitting a TC application. During this initial contact, an ACO project manager should discuss the type of requested approval with the applicant and assess the applicant's knowledge of certification procedures. The project manager needs to conduct a process orientation for applicants who are unfamiliar with certification. The process orientation establishes a partnership with the applicant and provides an opportunity to develop an understanding of the type certification process as it applies to the applicant's design. The orientation should explain the need for certification, the certification process, the FAA's role, and the applicant's responsibilities. For applicants choosing to implement the techniques and guidance described in *The FAA and Industry Guide to Product Certification*, this information becomes the foundation for the Partnership for Safety Plan (PSP). Depending on the applicant's previous certification experience, the process orientation may be conducted by phone or in person.

b. Pre-Project Guidance (Regulatory and Policy Discussions). The FAA requires a TC application before providing full access to the FAA resources necessary to complete a project. However, before this application, the FAA responds to the potential applicant's questions about the FAA's procedural and technical requirements that may arise after the applicant's process orientation. The ACO will first direct the potential applicant to appropriate regulatory, policy, and guidance material, then, at the ACO's discretion, involve itself directly. Further involvement may be necessary to determine how unique or novel a proposed design is, or to research past policy applications. However, expect potential applicants to educate themselves as much as possible on the certification process. Finally, encourage potential applicants to give the ACO an initial familiarization briefing soon after they commit to applying for a TC.

c. Familiarization Briefings give potential applicants an opportunity to describe their project to the ACO before application. These briefings are intended for products the applicant is committed to bringing to market through type certification. The main purpose is to familiarize the FAA with the proposed design as it is currently known. Learning about projects before submittal of the application also allows the ACO to consider FAA involvement and begin planning resources. Special emphasis should be placed on technical issues and unique or novel features. Beyond being briefed on the design features, expect to hear about the intended operation, major suppliers and unusual vendor relationships, reliance on approved equipment, project schedule, and reliance on designees or delegated organizations.

d. Certification Plan. All TC applicants are required to submit a certification plan to the FAA and to keep it current throughout the project. A certification plan addresses the information listed below. For simple projects, expect complete certification plans as part of the application package. For complex projects, portions of the information needed in the certification plan will not be known at the time of application. Expect the applicant to provide as much information as possible with the initial submittal and supply the rest as it becomes known. At the time of application, the extent and depth of the information in the certification plan should be sufficient to determine the feasibility of the applicant's proposed schedule. When the certification plan does not give the FAA assurance to the applicant's understanding of the scope and magnitude of the certification project, the FAA should reject the application and consider the need for another familiarization briefing. When the FAA accepts the application with an incomplete certification plan, the certification plan must be completed (see paragraph 2-5d of this order) and include the following information before entering the implementation phase:

(1) General information including applicant identification, application date, model designation, and so forth.

(2) A description of the proposed design or design change including sketches and schematics.

(3) The intended regulatory operating environment (for example, 14 CFR parts 91, 121, and 137). This should identify the kinds of operations for which the product will be used, and the kind of program under which the product will be maintained.

(4) The proposed certification basis including applicable regulation paragraphs and subparagraphs with amendment levels, exemptions, ELOS findings, and special conditions.

(5) A description of how compliance will be shown (ground test, flight test, analysis, similarity, or other acceptable means of compliance). The description of the means of compliance should be sufficient to determine that all necessary FAA data will be collected and all findings can be made.

(6) A list of documentation that will be submitted to show compliance with the applicable certification basis, and how the applicant will ensure that all showings have been made. This can be accomplished using a compliance checklist addressing each section of the regulations applicable to the product.

(7) A list of test articles to be used to generate compliance data. Identify any features or attributes for which special instructions to the manufacturing inspector will be necessary to ensure the test article meets the requirements of its tests (for example, dimensions at one or the other end of a tolerance band).

(8) A description of how the continued operational safety requirements will be met after the TC is issued.

(9) A project schedule including major milestones, such as preliminary hazard analysis submittal dates, substantiating data submittal dates, conformity and testing completion dates, and expected date of final certification.

NOTE: The applicant is responsible for meeting their milestones in the schedule contained in the certification plan. Any slippage in the milestone dates may result in a delay in the final certification.

(10) Identification of all DERs intended for use in the certification project, their areas of authority, and whether they will be approving data or recommending approval of data.

(11) Identification of all designated manufacturing inspection representatives (DMIR), designated airworthiness representatives (DAR), and organizational designated airworthiness representatives (ODAR) intended for use, their authorized function codes, and their proposed inspection activities.

2-4. REQUIREMENTS DEFINITION.

FIGURE 2-4. TASKS DURING THE REQUIREMENTS DEFINITION PHASE

a. Application for TC, Amended TC, and PC. According to 14 CFR part 21, any person may apply for a TC. Application is made on a form and in a manner prescribed by the Administrator, and is submitted to the geographic ACO, which is also called the PACO. The applicant submits an application using FAA Form 8110-12, Application for Type Certificate, Production Certificate, or Supplemental Type Certificate (see appendix 1, figure 2 of this order). See chapter 4 of this order for STC application instructions. The application package must also include a certification plan according to paragraph 2-3d above, and the specific product information described below. Although certification plans are required at the time of application, the level of completeness will vary depending upon the project's complexity and the applicant's experience (see paragraph 2-3d of this order).

(1) TC Application. An aircraft TC application must be accompanied by a three-view drawing of the aircraft and available basic data. An aircraft engine TC application must have a description of the engine design features, operating characteristics, and the proposed operating limitations. The applicant should complete blocks 1, 2, 3, 4, and 7 of the application in each of the following situations:

(a) When submitting a TC application for design approval of a new model aircraft (e.g., airplane, glider, rotorcraft, balloon, or airship), aircraft engine, or propeller (see §§ 21.15 and 21.19), or for extensions of time according to § 21.17(d);

(b) When submitting an amended TC application for approval of a change in model designation, for adding new models before original issuance of the TC, and for approving a follow-on model after the initial issuance of the TC (see §§ 21.91 through 21.101) (the applicant must check Type Certificate in block 2, then, in block 4a, specify that the application is for an amendment and include the TC number; applicants may apply for any other amendments to the TC by a letter or other written notification);

(c) When submitting an application for a provisional TC (class I or II) or changes to a provisional TC (class I or II) that is desired before the standard TC is issued (see §§ 21.75, 21.81, and 21.83);

(d) When submitting an application for a provisional amendment to a TC for a follow-on model (see § 21.85); or

(e) When submitting an application for a change in category to a type certificated model.

(2) PC Application. Application for a PC is made on FAA Form 8110-12 (refer to http://www.faa.gov/forms). Application for a PC may be made at the same time application is made for a TC, an amended TC, STC, or an Amended STC. However, the applicant cannot get a PC before a TC or STC is issued. The applicant must submit the application, accompanied by a document describing the organization in accordance with § 21.135 and one copy of their Quality Control (QC) procedures showing compliance with §21.137, to the manager of the manufacturing inspection office (MIO) in the directorate in which the applicant's principal manufacturing facility is located (refer to Order 8120.22).

b. The establishment of a TC Project. The ACO assigns a project number, a project manager, and specialists as required. For the determination of directorate involvement, the accountable directorate assigns a project officer.

(1) Project Number. The ACO or ODA holder assigns a project number to each certification project. See Appendix A of Order 8110.115 for numbering system details for FAA assigned project numbers. You must use the assigned project number in all correspondence, reports, and other documents pertaining to the project. If the project is either cancelled or closed before completion, then the ACO must close or cancel the assigned project number within 90 days.

(2) Assignments and Duties of the Project Manager.

(a) The project manager is the assigned focal point in the ACO who plans, reviews, evaluates, and coordinates all aspects of a certification project according to the CPP. When the project is small, generally involving a single ACO engineer, the duties of project manager may be filled by that engineer. In this case, the engineer is called project engineer. For the purpose of this order, the term project manager includes project engineer. The applicant should be instructed to direct all project correspondence to the project manager at the ACO where the application was submitted. See paragraph 2-4e of this order for further details on CPP development.

(b) The project manager initiates the CPP and coordinates with the project officer and CMACO, if necessary. The final CPP is not prepared until detailed roles and responsibilities are discussed with the applicant at the preliminary type certification board (preliminary TCB) meeting.

(c) The project manager will identify the data required for the CPN as discussed in Order 8110.115.

(d) The project manager establishes all projects requiring significant involvement by technical personnel. The project manager also coordinates with the appropriate ACO, MIDO, AEG, and directorate managers in selecting project team members. The project team normally consists of the following:

1 A project manager,

2 Engineers or technical specialists,

3 Flight test pilots and flight test engineers,

4 Manufacturing inspectors,

5 AEG operations and airworthiness inspectors, and

6 A project officer and other persons at the discretion of the accountable directorate.

NOTE: The certification project team is comprised of the individuals needed to conduct a certification project. A TCB is an FAA management team. The TCB is discussed further in paragraph 2-4d below.

(e) The project manager sends an acknowledgment letter to the applicant identifying the project number, project manager's name, office mailing address, telephone number, and electronic mail address.

NOTE: Responses to applications can be sent by an electronic mail message, as well as a written response, to an applicant. The FAA policy on electronic records is found in Order 1370.81, *Electronic Mail*, Order 8000.79, *Use of Electronic Technology and Storage of Data*, and AIR Manual IR-04-01, *Records Management Requirements Manual*.

3) Assignments and Duties of Pilots and Engineers. Engineers and pilots are signed to fill the technical needs of the particular project. The engineer or pilot evaluates the adequacy of the type design and substantiation data related to their assigned disciplines. They have discretion to review any of these data, such as critical material process specifications. Engineers or pilots maintain appropriate oversight of their designees. They use available resources, for example, peers, designees, technical specialists, Chief Scientific and Technical Advisors (CSTA), policy staff, and management, to make sound and timely technical decisions.

Engineers and pilots contribute to the preparation of Type Inspection Authorizations (TIA), request conformity inspection, and coordinate with FAA inspectors and their designees.

(4) Assignments and Duties of the Project Officer. The project officer is the focal point in the accountable directorate for policy and is assigned to monitor a significant certification project according to the CPN. The project officer is responsible for ensuring that the project team is using current policy and guidance. The project officer also provides project- specific rules (for example, special conditions and exemptions) and policy (for example, acceptable means of compliance, ELOS, and certification basis) to the project team. The project officer works with the project manager to develop the CPP.

c. Certification Project Notification (CPN). The PACO will notify electronically the accountable directorate, AEG, and CMACO of a certification project initiation for each project by transmitting the required CPN data as shown in figure 1 of Order 8110.115.

d. Form the Certification Team (and TCB). The FAA type certification team includes those FAA personnel needed to conduct the certification project and an FAA management team—the type certification board (TCB)—that oversees the project. A TCB is established only for projects of a certain magnitude. When a TCB is not necessary, the certification team manages the project and performs any functions of the TCB to the degree necessary.

(1) Certification Team members are assigned to a project by their respective managers. However, the project manager plays a critical role in the formation of the certification team by coordinating with the appropriate managers to ensure proper technical representation on

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the team. These duties and the project team members are discussed as part of establishing a project. See paragraph 2-4b above.

(2) Type Certification Board (TCB).

(a) A TCB is established for the following:

1 Projects involving major changes to the type design,

2 Significant projects,

3 Aircraft and aircraft engine projects that involves new type certification, and

4 Variable pitch propeller projects.

(b) The project manager coordinates with the cognizant AEG manager when establishing the TCB membership. The AEG manager provides the project manager with the names of the AEG inspectors assigned to the TCB. The ACO manager or representative serves as chairman of the TCB. The members of a TCB include:

1 The ACO manager (or representative),

2 Directorate project officer (for significant projects),

3 Project manager, and

4 Other members including the managers, supervisors, or senior personnel from the appropriate engineering disciplines; and flight test, manufacturing inspection, and assigned AEG personnel.

(3) Additional TCB Participants. The TCB may request other participants, such as those listed below, to join the certification team or participate on an advisory basis in the TCB meetings.

(a) ACO engineers, flight test pilots, and manufacturing inspectors,

(b) Washington Headquarters specialists,

(c) CSTAs,

(d) Additional AEG and FSDO personnel,

(e) The project officer from the accountable directorate (if not serving as a board member),

(f) Representatives of the CMACO, other ACOs, and directorates, and

(g) The applicant and its representatives.

(4) TCB Functions. The TCB's purpose is to acquaint the applicant and the FAA certification team with the certification project. They also identify and resolve significant problems, establish milestones and schedules for the overall accomplishment of the type certification project, review the applicant's certification plan, review the proposed certification basis, and ensure all outstanding certification issues are resolved. The TCB establishes clear expectations and project assignments for the applicant and FAA certification team. When needed by the TCB, the project manager requests technical assistance or guidance for the project from the accountable directorate. Such a request should be made as far in advance as possible to facilitate work scheduling.

(5) TCB Meetings (TCBM) (for example, preliminary, interim, pre-flight, final) are held with the applicant throughout the project. Some meetings may be combined, and some meetings may be duplicated or divided by discipline or system as necessary. The chairman convenes the TCB as necessary and notifies the appropriate representatives with the time, date, and location of the meetings. If the number of meetings is decreased or combined, or the meetings are divided by discipline or system, the TCB chairman is responsible for determining all elements of the process are addressed, integrated, and completed. Members, with concurrence of the chairman, may designate an alternate as their representative at TCB meetings. Members of the TCB should be familiar with the project during the development phases and in advance of TCB meetings. This practice ensures knowledgeable participants in the TCB meetings. Members participate in the specific periods of the TCB activity, as required by the project under consideration. It is not mandatory for members to participate in every meeting.

(6) TCB agenda items and subsequent meeting minutes should be sent to the applicant. The meeting minutes should include the following information:

(a) TCB meeting type: familiarization briefing, preliminary, interim, pre-flight, or final,

(b) Manufacturer,

(c) Model and project number,

(d) Location and date of meeting,

(e) Personnel present at meeting,

(f) Purpose of meeting,

(g) Discussion of agenda items, and

(h) Specialty items: Major problems and actions to take.

NOTE: Each item or subject discussed should be identified and summarized under a separate heading with the appropriate regulations referenced. These items should include a discussion, expectations, and a conclusion. Expectations should include action item assignments and a schedule for completing any action items.

Individuals participating in discussions should be identified by titles only.

e. Develop Certification Project Plan (CPP). The CPP defines the working relationship between the accountable directorate and PACO for a specific type certification project. The CPP is the principal project coordination tool that the project manager updates throughout the project. The CPP sets the proposed project schedule as well as the resources and responsibilities to be allocated from both the accountable directorate and PACO in order to support the applicant's schedule. Early commitment of FAA resources combined with a realistic project schedule will enable the accountable directorate and PACO to plan and direct their resources more effectively. The CPP represents our plan to support the applicant's schedule. The project manager and project officer should follow the CPP in draft form until the project develops sufficiently for preparation of a final CPP. The project manager submits the CPP final plan through the ACO manager to the accountable directorate manager for approval. The applicant's certification plan may take the place of the CPP when it includes all of the information that should be in the CPP and is coordinated with the project officer. See appendix 1, figure 7, of this order for a sample type CPP.

NOTE: The applicant's certification plan and the CPP are combined to form the basis of the PSCP for those projects using the techniques and guidance from *The FAA and Industry Guide to Product Certification.*

f. The Preliminary TCB Meeting is the initial formal meeting that establishes the basis for all integrated certification planning combining the interests of engineering, flight test, manufacturing, and maintenance and operations. Use this meeting to determine if the TCB and the applicant are adequately familiar with the various aspects of the project and to determine whether the project is mature enough to begin defining the requirements. Obtain mutual commitment to the issues and acceptance of the risks before proceeding into the requirements definition phase. This meeting should:

(1) Update and further acquaint FAA personnel with the project,

(2) Work toward establishing the certification basis,

(3) Open discussion of design details and possible problem areas with specialists,

(4) Identify areas needing the formation of special compliance teams to attain the earliest possible resolution of potential problems,

(5) Identify novel or unique design features, materials, or processes, and

(6) Establish a schedule for the certification project.

NOTE: Developing the certification basis may require follow-up meetings between the ACO and the applicant. If the certification basis can't be established quickly and easily, consider re-assembling the certification team by scheduling an interim TCB meeting for finalizing the certification basis.

g. Issue Paper. An issue paper provides a means for identifying and resolving significant technical, regulatory, and administrative issues occurring during the certification

process. Issue papers are primarily intended to provide an overview of significant issues, a means of determining the status of issues, and a basis for a post-certification summary statement on how issues were resolved. See FAA Order 8110.112, *Standardized Procedures for Usage of Issue Papers and Development of Equivalent Levels of Safety Memorandums,* for detailed information regarding issue paper procedures, issue paper forms and templates, and a sample issue paper.

h. Issues Book. The project manager assembles issue papers and publishes them in the form of an issues book for distribution to the TCB members, project team members, applicant, and the accountable directorate. The issues book may be revised to add new issue papers or update existing papers without holding a formal TCB meeting, provided that the new or updated issue paper can be coordinated through the applicant and TCB.

i. The Project Specific Certification Plan (PSCP) is the primary project management tool for coordinating activities between the FAA and applicants choosing to implement the techniques and guidance described in *The FAA and Industry Guide to Product Certification.* The PSCP combines information from the applicant's certification plan and the FAA's CPP with additional project details to support an effective certification project. It is also the depository for milestones, performance measures, and information unique to the certification project. The FAA and the applicant's certification teams begin developing the PSCP when they have collected the information needed in the applicant's certification plan (discussed in paragraph 2-3d of this order) and the CPP (discussed in paragraph 2-4e of this order). This combined certification team adds additional planning information to meet the objectives outlined in *The FAA and Industry Guide to Product Certification.* Although the PSCP is a plan subject to change, the commitments made by each party are the expectations of the signatories. When developing a PSCP, ensure commitments:

(1) Remain within the authority of the signatories,

(2) Are consistent with FAA regulations or policy,

(3) Do not redefine certificate eligibility (for example, agreeing to a fixed certification date),

(4) Can be met even in circumstances less than ideal, and

(5) Consider obligations made to other projects and applicants.

j. Certification Basis. Early in a TC project, the FAA establishes the certification basis, defining the applicable requirements of 14 CFR for the issuance of the TC. The certification basis identifies the specific 14 CFR parts and amendment levels with which the applicant must show compliance before the issuance of the TC. The certification basis includes the applicable airworthiness standards for the category of the TC to be issued. It also includes the applicable aircraft noise, fuel venting, and exhaust emission requirements contained in 14 CFR. The FAA makes every effort to ensure the certification basis is correct at the beginning of the project and the applicant is advised of all regulatory aspects including operational requirements contained in other subchapters in 14 CFR. The certification basis is established by the FAA and agreed to by the applicant, based on a mutual understanding of the design features of the product to be certificated. Upon agreement of the certification basis, new policy will not be imposed unless

the policy is needed to address an unsafe design condition the FAA has corrected by mandating a change on other projects with the same design feature.

(1) Framework. For initial issuance of a TC, the date of application establishes the amendment level of the airworthiness standards to be met. For changes to a TC, see Order 8110.48 for guidance on establishing the amendment level of the airworthiness standards. As required in 14 CFR § 21.17(a), the product meets the applicable airworthiness standards for the TC to be issued, unless otherwise specified by the FAA. This allows the FAA to make adjustments for individual TC projects by developing special conditions, ELOS findings, or exemptions. As stated in 14 CFR § 21.17(b), the FAA may also permit development of a set of airworthiness standards appropriate to special classes of aircraft. The following subparagraphs define each of these adjustments to the certification basis.

(2) Special Classes of Aircraft. Many kinds of aircraft do not have airworthiness standards established in 14 CFR. These aircraft may be defined as Special Class aircraft. Title 14 CFR § 21.17(b) permits the FAA and the public to develop airworthiness criteria equivalent to those published in 14 CFR. Currently, special class aircraft include airships, gliders, motor gliders, and very light airplanes. The procedures necessary to establish the certification basis for these special classes of aircraft are provided in the guidance material shown in figure 2-5 below. Other special classes of aircraft, such as powered lift, require individual airworthiness standards to be developed as provided for in 14 CFR § 21.17(b). Contact the Aircraft Engineering Division (AIR-100) and the appropriate product directorate to discuss the process for defining new special class aircraft and developing appropriate airworthiness criteria:

FIGURE 2-5. SPECIAL CLASS AIRCRAFT GUIDANCE

For this special class of aircraft:	See this guidance material (current revision):
Airships	Advisory Circular (AC) 21.17-1, Type Certification – Airships
Gliders	AC 21.17-2, Type Certification – Fixed Wing Gliders
Very Light Airplanes	AC 21.17-3, Type Certification of Very Light Airplanes

(3) Special Conditions (Novel or Unusual Design Features). The authority for issuing and amending special conditions is found in 14 CFR § 21.16. Under that provision, special conditions are issued only if the existing applicable airworthiness standards do not contain adequate or appropriate safety standards for the aircraft, aircraft engine, or propeller because of novel or unusual design features of the product to be type certificated. Special conditions can also be used when developing the certification basis for changes to a product's type design. The phrase "novel or unusual" applies to design features of the product to be certificated when compared to the applicable airworthiness standards. Special conditions will not be used to upgrade the applicable airworthiness standards when novel or unusual design features are not involved. Special conditions contain additional airworthiness standards necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

(a) FAA/Applicant Development of the Special Condition. Special conditions are rules of particular applicability that are developed for a particular certification project due to its unique (with respect to the airworthiness standards in the certification basis) design features. Special conditions may be developed using parts taken from other airworthiness standards. For example, a normal category 14 CFR part 23 airplane certification basis may include 14 CFR part 25 airworthiness standards appropriate to the design feature in question. The FAA will publish special conditions for public comment unless the circumstances in 14 CFR § 11.38 apply to the project. The Administrator has delegated authority for issuing special conditions to the accountable directorate or to the Aircraft Engineering Division (AIR-100) for areas of responsibility not assigned to a directorate. The FAA uses the issue paper procedures described in FAA Order 8110.112 to develop the Federal Register Notice requesting public comment. Guidance for the applicant is found in AC 20.166, *Issue Paper Process.*

(b) Urgency of Action. At the time of the preliminary TCB meeting, the ACO sets a date to establish the initial special conditions. These special conditions may be modified and additional ones issued as technical information develops during the type certification project. In certain cases, the project's importance or urgency may require faster handling than typically scheduled. When the ACO believes it has such a case, it should arrange a meeting with the accountable directorate and the applicant. The accountable directorate should be able to expedite the rule making procedure for the special conditions with the input from this meeting.

(c) Procedures for Issuing Special Conditions. An ACO drafts proposed special conditions with reference to the application date for a TC. The applicant, the accountable directorate, and any other interested persons deemed appropriate work together to formulate the proposal. The proposals are forwarded to the accountable directorate with full particulars and justification for each special condition as described in the next paragraph. It is essential that the list of special conditions be complete, as it becomes part of the certification basis and forms an exact record of the rules applicable to the product. When the application is for an amended TC, an STC, or an amended STC, apply the requirements of 14 CFR § 21.101(d). The basis and content of special conditions are generally developed via the issue paper process. In cases where the design feature is covered by a specific objective rule, do not use a special condition as a method or technique to show compliance with the rule. For example, in the 1980s the use of composites for primary structure on 14 CFR part 23 airplanes generated a need for special conditions. In 1993, 14 CFR part 23 was revised to include appropriate standards for using composites as primary structural components. So, composite special conditions are no longer appropriate. If the FAA determines that a special condition is appropriate, and the applicant indicates that they intend to comply voluntarily, then the special condition should still be proposed.

(d) Justification. Complete information from the ACO is needed to cover the general characteristics of the aircraft, or other products, and their unusual design features. When the ACO prepares special conditions, they should include all the necessary details and justification before forwarding them to the accountable directorate. Incomplete information or insufficient justification may delay the processing of the special conditions. The following information should be included:

1 The complete certification basis, indicated in a manner similar to what would be shown on the TCDS,

2 A general description of the product, such as (for an airplane): the location of the wings, number and type of engines, maximum weights, speeds, seating capacity, and so forth,

3 A description of features requiring the issuance of special conditions,

4 For an amended TC or an STC, a statement of the extent and features of the modification,

5 The exact nature of the novel or unusual design feature, including, if appropriate, an evaluation that the design feature would produce an unsafe condition unless the proposed special conditions were applied,

6 The relationship between the design feature and the applicable regulations indicating how the standard is inadequate or inappropriate, and

7 An evaluation stating the proposed special condition establishes a level of safety that neither raises nor lowers the standard set in the applicable regulations.

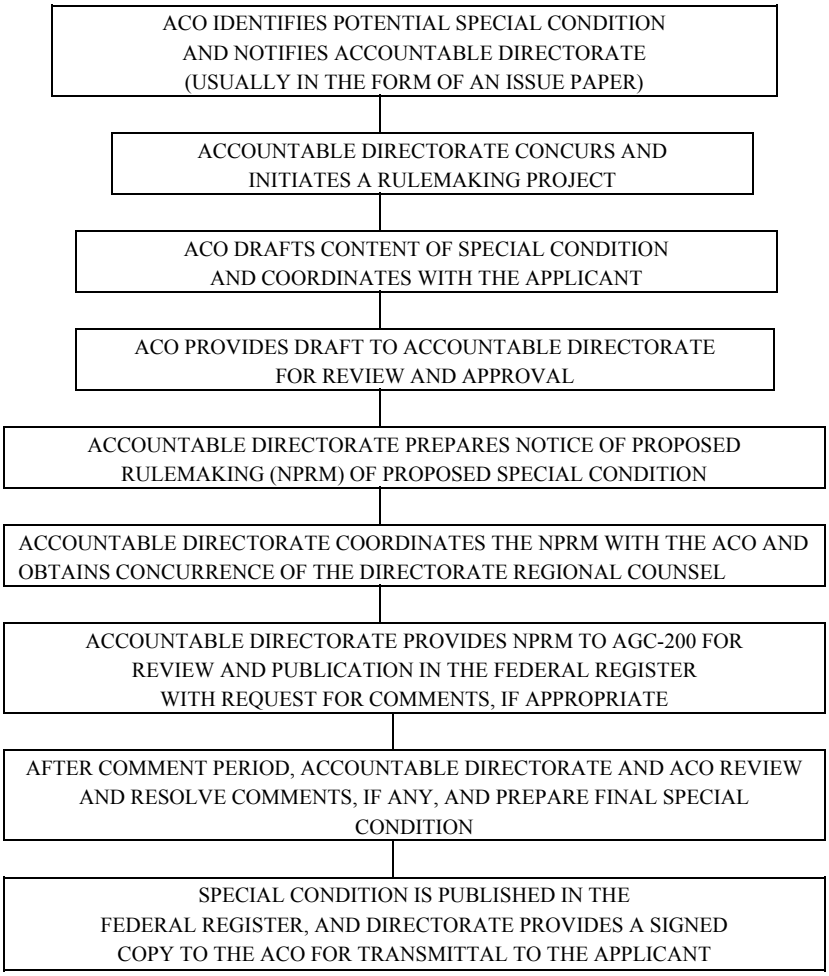
(e) Changes to a Special Condition. As technical information develops during the design and testing of a product, it may become appropriate to modify a previously issued special condition or to add a new one. Follow the original issuance procedure when amending a special condition or adding a new one.

(f) General Applicability. Special conditions that are used on one certification project may apply to other projects using the same design feature. Pending adoption of amendments to the airworthiness standards, a directorate may apply a special condition proposed by an ACO to any subsequent design case for which the criteria would be appropriate.

(g) Voluntary Compliance With Later Amendment. Following adoption of an amendment to the airworthiness standards, an applicant may choose to comply voluntarily with the later amendment instead of a special condition. The FAA must determine if complying with the later airworthiness standard requires compliance with any other amendments, as stated in 14 CFR § 21.17(e). If the applicant and the FAA agree to show compliance to the later amendment, then document this agreement in the certification plan and the project's certification basis.

(h) Flow Chart of Special Conditions Process. The flow in the processing of a special condition, from the identification of the design feature by the ACO to the publication of the final special condition, is shown below in figure 2-6, Special Condition Process.

FIGURE 2- 6. SPECIAL CONDITION PROCESS.



(4) Equivalent Level of Safety (ELOS) Finding. ELOS findings are made by the accountable directorate when literal compliance with a certification regulation cannot be shown and compensating factors in the design can be shown to provide a level of safety equivalent to that established by the airworthiness standards. An ELOS finding may document a method of compliance that is different from what is stated in the rule, but is judged as acceptable by the FAA.

(a) Use Issue Paper to Develop the ELOS Finding. The FAA and the applicant work together using the issue paper process to develop the proposed ELOS finding for submittal to the directorate. See FAA Order 8110.112 for the procedures to follow. All ELOS findings must be listed on the TCDS or the STC. The TCDS or STC identifies an ELOS memorandum, explaining the basis for the FAA's acceptance of the applicant's proposal that the compensating features provide an ELOS to the literal airworthiness standard.

(b) Develop ELOS Memorandum. Unlike special conditions or exemptions, the ELOS finding is not developed through a public comment process. The ELOS memorandum is a publicly releasable document that is a part of the certification basis. 14 CFR § 21.41 identifies among other items, the certification basis of an aircraft as part of the TC. A certification basis is releasable to the public, in contrast to an issue paper that may contain proprietary information. The issue paper originator or the project manager constructs the ELOS memorandum from the issue paper, ensuring that the memorandum contains the information called for in FAA Order 8110.112. Use the issue paper conclusion to the maximum extent practical and assure that the language in the public document accurately reflects the issue paper conclusion.

NOTE: Ensure all sensitive or proprietary information is kept out of the ELOS memorandum. Refer to paragraph 2-6 k.(1) of this order.

(c) The accountable directorate, in turn, will inform the certification office of its evaluation and concurrence of the ELOS. See appendix C of FAA Order 8110.112 for the standardized ELOS memorandum template. Also, refer to the ELOS section on the RGL for examples of an ELOS memorandum request and acceptance documents.

(d) The accountable directorate staff will assign a reference number to the ELOS memorandum to allow its access from the FAA's RGL electronic database. This ELOS memorandum number should be listed in the TCDS under the Certification Basis section (TCs and ATCs) or in the Limitations and Conditions section of the STC.

(5) Exemptions. An exemption is a grant of relief to an applicant from the requirement of a specified airworthiness standard. A petition for exemption follows the procedures for public comment on rulemaking that are described in 14 CFR part 11. The applicant should submit a petition for exemption to the FAA accountable directorate through the ACO. This permits the directorate to monitor the progress of the development of the certification basis.

Title 14 CFR § 11.81 states the information that the applicant must provide in a petition for exemption. The FAA considers the following before granting an exemption: the requested exemption must benefit the public as a whole; and, granting the exemption would either not adversely affect safety or the exemption would provide a level of safety at least equal to that provided by the rule from which relief is sought.

> **NOTE:** If the applicant submits the petition for exemption according to the instructions in 14 CFR § 11.63(b), also request that a copy be provided to the ACO for coordination with the accountable directorate.

(a) Use ELOS Finding Instead of an Exemption, if Possible. If the applicant's petition for exemption makes a case that the proposal would provide a level of safety at least equal to that provided by the rule from which relief is sought, the FAA may agree to make an ELOS finding rather than go through the rulemaking process of an exemption. ELOS findings can generally be made more quickly than exemptions. Coordinating the petition for exemption with the accountable directorate will allow this determination to be made.

(b) Granting the Exemption Would Be in the Public Interest. The FAA may determine that the public interest would be served by granting an exemption. For example, the FAA may grant a time-limited exemption to allow the applicant time to resolve unanticipated inconsistencies between an optional equipment variant and the original type-certificated equipment. Also, the FAA may permit a time-limited exemption in situations where new guidance for standardized methods of compliance needs to be developed, such as for dynamic testing of side-facing.

j. Interim TCB Meeting for Certification Basis is the formal meeting to finalize the amendment level of applicable seats airworthiness, noise, and emissions regulations; special conditions; exemptions; and ELOS findings for the project. Although not always necessary, consider holding this TCB meeting to expedite the resolution of certification basis issues.

(1) If the meeting does not result in an established certification basis, it should establish a clear understanding of the actions needed to resolve the issues and assignment of those actions to the responsible people. Record duty assignments and due dates in the TCBM minutes.

(2) Use this meeting to clarify the certification risks of proceeding without a complete definition of the certification requirements. The applicant has risks that include the project schedule, redesign, and retesting. The FAA risks not being able to assign resources at critical times to complete the project. Before proceeding into the next phase, obtain mutual commitment to resolving the issues and an acceptance of the risks. If the project is not ready to proceed, schedule a follow-up interim TCB meeting for certification basis.

2-5. COMPLIANCE PLANNING.

FIGURE 2-7. TASKS DURING THE COMPLIANCE PLANNING PHASE

a. FAA Involvement. For planning purposes, the FAA's and the applicant's certification teams need to know in which aspects of the project the FAA intends involvement and at what level. The heavy workloads for FAA personnel limit involvement in certification activities to a small fraction of the whole. FAA type certification team members must review the applicant's design descriptions and project plans, determine where their attention will derive the most benefit, and coordinate their intentions with the applicant.

(1) When a particular decision or event is critical to the safety of the product or to the determination of compliance, the FAA must be directly involved (as opposed to indirect FAA involvement by, for example, DERs). Project team members must build on their experience to identify critical issues. Some key issues that will always require direct FAA involvement include rulemaking (such as for special conditions), ELOS determinations, development of issue papers, and compliance findings considered unusual or typically reserved for the FAA. While these items establish the minimum direct FAA involvement, additional critical safety findings must also be identified based on the safety impact or the complexity of the requirement or the method of compliance. Additional factors to consider in determining the areas of direct FAA involvement include the FAA's confidence in the applicant, the applicant's experience, the applicant's internal processes, and confidence in the designees.

(2) Focusing FAA resources on the most critical areas maximizes the use of the delegation system while allowing for oversight and best use of the ACO's limited resources. FAA confidence in designees allows for full delegation for other than inherently governmental areas or new standards that are developing an experience base. Furthermore, confidence that the important safety areas are covered promotes greater delegation.

b. Oversight and Delegation.

(1) Once the project team has determined the findings requiring FAA involvement, all other compliance requirements should be considered acceptable for delegation. Once a finding is delegated, any increase in direct FAA involvement should be determined based on the value of the direct FAA involvement. Keep in mind, the value of involvement decreases when appropriate trust and designee capability exists to make the finding. However, when confidence in the designee is lacking or the designee is inexperienced, the value of direct FAA involvement increases. There will also be less tangible reasons for direct FAA involvement in a delegated finding, including involvement that is the result of project oversight or DER oversight, or to develop FAA team-member knowledge of the product. This type of direct FAA involvement should be planned so that is does not adversely impact the project schedule.

(2) Team members should establish levels of individual designee oversight they will perform based on the value of the FAA review and the risk of not reviewing the delegated

finding. For the purpose of estimating the amount of direct FAA involvement in making compliance findings, the DER managers should classify findings into the following three categories:

(a) Findings that will need no further ACO review – The FAA accepts that the designees are solely responsible for scheduling and making the finding. The FAA will accept the finding without additional involvement or impact to the project schedule. Findings in this category require no direct FAA involvement.

(b) Findings that will benefit from ACO review – Although the designees will be delegated to make these findings, the FAA may review the findings for the purpose of project oversight or DER oversight. The FAA will have discretion to identify what to review and the amount of review necessary. FAA review can vary from a cursory review of the DER's submittal to complete evaluation of the DER's methods. Deficiencies identified during review should be addressed with the DER or applicant as appropriate. Findings in this category require judicious use of the available FAA resources to manage the project and DERs effectively.

(c) Findings requiring ACO involvement – Although the designees may be involved by recommending approval of data, the FAA is responsible for making these findings. These findings should be related to key areas reserved for the FAA, derive significant value from direct FAA involvement, or result in unacceptable risk if the ACO is not involved. Findings in this category result in a commitment of ACO resources to support the agreed-to project schedule.

> **NOTE:** Although the applicant needs to be informed of which findings are reserved for the FAA, the review or non-review of delegated findings is a matter of internal ACO resource planning, and should not be communicated to the applicant or designees. Items planned to be accepted without review may change status and require review due to applicant and designee performance during the project (for example, when deficiencies are identified in other findings).

c. Conformity for Engineering Purposes. The FAA uses conformity inspections for both quality assurance and engineering purposes. FAA conformity is a validation of the applicant's conformity. As part of the type certification process, the ACO must identify the minimum level of conformity inspections needed for certification. During the inspection, FAA manufacturing inspectors base the depth of their assessment on factors such as quality of the applicant's conformity paperwork, comparison of inspection results, and magnitude and complexity of the inspection.

(1) The applicant is responsible for identifying the test articles that will be used to generate compliance data, and for conducting 100 percent applicant conformity of those test articles as required by 14 CFR § 21.33(b). The ACO is responsible for identifying features, attributes, and components critical to the test results and for requesting FAA conformity on these test articles with special instructions as necessary. The MIDO is responsible for determining what conformity inspections will be necessary for processing production approvals. Because both offices need FAA conformity inspections for different purposes, the ACO and MIDO should finalize a comprehensive conformity plan (also known as conformity verification plan) together. Base this conformity plan on the test article and schedule data in the applicant's certification plan.

(2) To expedite agreement of a completed PSCP, applicants should develop their test article and schedule data into a conformity plan that the ACO and MIDO can accept with

minimal further development (see paragraph 5-5 of this order). Applicants should consider the conformity requirements elsewhere in this and other orders and present a plan that supports their showing of compliance for a TC and the FAA's finding of compliance for the TC and PC. While applicant involvement in the conformity plan is strongly encouraged (only the supporting data listed in paragraph 2-3d of this order are required), the FAA must retain the discretion to make the inspections necessary to determine compliance with the applicable 14 CFR requirements. Therefore, the FAA is responsible for the final content of the plan.

(3) Using Parts Produced by Technical Standard Order (TSO) Authorization or PMA in Certification Testing.

(a) Either of these approvals indicates that the production system has determined that the part produced conforms to a specifically defined FAA-approved design, and that any deviations from that approved design have been dispositioned and found to have no effect on form, fit, or function of the article. In accordance with § 21.601(b)(4), an article manufactured under a TSO authorization is an FAA-approved article. For parts produced under a Parts Manufacture Approval (PMA), the corresponding regulatory definition for the quality control system is § 21.307. Marking of the part in accordance with § 45.15 conveys the same indication that a part meets the FAA-approved design.

(b) Because of a part's approval by TSO or PMA, a part conformity may not be necessary for its use in a certification project. ACO engineering should consider whether the testing to be accomplished requires a test article definition more specific than the "form, fit, or function" of the part provided by the TSO or PMA. For example, the engineer may be concerned about a test article having features biased to one or the other end of a tolerance. If ACO engineering wants to ensure the part does not have a bias that may affect the outcome of the test, the engineer may ask the inspector to review any MRB action for deviations to the test article referencing the characteristic the engineer identifies. Indicate this in the "Special Instructions" section of the Request for Conformity Inspection. For the purpose of this order, a deviation is a non-conformance that is found and accepted by means of ACO engineering evaluation or MRB action.

(c) ACO engineering may determine that an installation inspection is adequate for its needs. The installation conformity inspection, which follows the ACO review of the substantiating data, is performed to verify the installation was accomplished in accordance with the approved data, with all or any discrepancies noted, before official FAA testing. It is during the installation conformity inspection that the article's TSO number, part number, serial number, software part number or version, and so forth, as referenced in the installation data, are verified and recorded.

d. Completed [Project Specific] Certification Plan. By this point in the project, the details of the applicant's plan for showing compliance, including the remaining elements outlined in paragraph 2-3d above should be captured in the certification plan or PSCP. From this information, the certification team should be able to determine that, if the plan was successfully executed, its results would show compliance. The amount of detail necessary to avoid ambiguity will vary from finding to finding, but, in general, it decreases when the applicant chooses common means of compliance such as those described in ACs. The certification team should find the plan agreeable before processing conformity requests, approving test plans, witnessing or observing certification tests, or performing any other certification project activities, to ensure the certification team and the applicant are working with the same fundamental understanding of the certification data.

e. Interim TCB Meeting for [Project Specific] Certification Plan Agreement. This is the formal meeting to establish consensus on all integrated certification planning. During this meeting, use the PSCP (or the certification plan and CPP) to assess the certification risks of proceeding into the actions of showing and finding compliance. Obtain mutual agreement to the adequacy of the plan and acceptance of the risks before proceeding with implementation. The certification team may hold one main Interim TCB Meeting to reach agreement on how the project will be conducted, followed by splinter meetings to address the certification activities required for the various systems, disciplines, or components of the aircraft design. When dividing the TCBM this way, the project-level agreement of the certification plan must include a realistic schedule for splinter meetings. The TCB meeting for certification plan agreement concludes with the completion of its splinter meetings. Use an Interim TCBM to establish agreement with the certification plan when the following happens:

(1) The project requires significant coordination of resources,

(2) A face-to-face meeting would better help all involved parties understand how compliance will be shown,

(3) The applicant requests one,

(4) Issues with the certification plan need management visibility,

(5) The project manager wishes to encourage teamwork within the FAA and with the applicant,

(6) Numerous comments and questions could be more efficiently addressed in person, and

(7) Ambiguities in the plan need to be resolved.

NOTE: The expected level of detail in a PSCP allows the project manager/engineer to identify the applicant's deliverables and hold the appropriate parties responsible for fulfilling their commitments and vice versa.

2-6. IMPLEMENTATION.

FIGURE 2-8. TASKS DURING THE IMPLEMENTATION PHASE

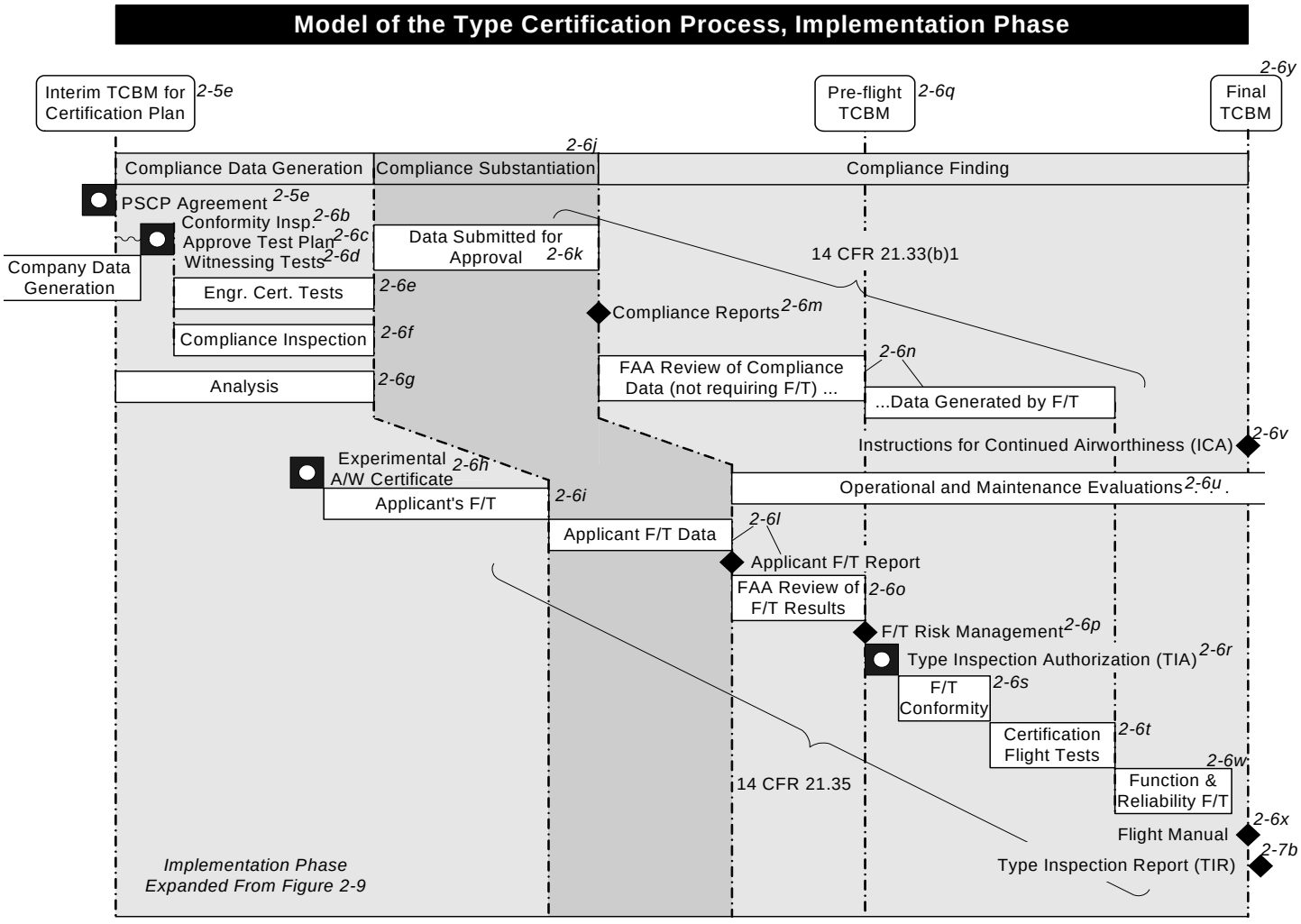
Compliance Data Generation Activities

Compliance Substantiation Activities

Compliance Finding Activities

a. Considerations for the Implementation Phase. In this phase, the FAA and applicant conduct the certification project by implementing the certification plan. The activities and events in this phase are not always chronological. However, these events do organize neatly in other ways. In figure 2-9 of this order, you will see the implementation phase divided into: Compliance Data Generation, Compliance Substantiation, and Compliance Finding. Furthermore, the certification process for engineering and flight tests are similar but not exactly the same. Two rules establish the differences indicated on the figure. This paragraph, 2-6, is organized to maximize the similarities while showing the differences between the certification process for engineering and flight test as each process progresses through the three categories of activities in this phase.

FIGURE 2-9. TYPICAL TYPE CERTIFICATION PROCESS, IMPLEMENTATION PHASE



(1) Engineering and Flight Test Certification Processes. Title 14 CFR §§ 21.33 and 35 establish two processes for tests and inspections. For flight tests, the applicant performs the necessary tests and inspections and submits the results to the FAA for review. For certain flight tests the FAA may choose to conduct certification flight testing concurrently with the applicant (see paragraph 5-19c of this order). The FAA determines which results will be repeated in FAA flight testing to validate the applicant's entire flight test data package. Engineering tests and inspections (see paragraph 2-6. e. in this order) do not need to be performed by the applicant before the FAA witnesses the demonstration.

(2) Generating Data for Substantiating and Finding Compliance. The activities and events in the implementation phase are categorized by whether they involve the development of certification data, showing compliance with that data, or finding compliance. The Generation of Compliance Data category is distinct from the Showing Compliance category and includes activities such as running tests, making compliance inspections, and performing analyses. To illustrate the distinction, consider a part used in the type design of a certificated helicopter. The helicopter's TC holder may wish to include the part in a new helicopter design. The data

generated for the first TC is still valid FAA data. However, the use of the part in a new application requires a new showing of compliance. The previously generated data may or may not be adequate to make the new showing of compliance. The Showing Compliance category includes activities – like writing compliance and flight test reports – in which the applicant presents the various data in a logical order with explanations of how the data prove compliance. The Finding Compliance category includes FAA activities based on 14 CFR § 21.21. These FAA activities include: determination that the applicant's substantiating data shows compliance to the certification basis; identification and examination of the type design; and (if the product is an aircraft) determination that no feature or characteristic makes the aircraft unsafe for the category for which the type certificate is to be issued.

FIGURE 2-10. IMPLEMENTATION PHASE – COMPLIANCE DATA GENERATION ACTIVITIES

b. Conformity Inspections. Conformity inspections verify and provide objective documentation that the test articles, parts, assemblies, installations, functions, and test setups conform to the design data. Title 14 CFR § 21.33(a) requires the applicant to allow the FAA to conduct any conformity inspections it chooses during the type certification process. It is the responsibility of FAA engineering personnel to determine the need to conduct conformity inspections and then request that the project MIDO performs the required conformity inspections. Because of the complex nature of the conformity process and the necessity for parts conformity inspections early in the certification project, the project MIDO should be consulted early in the project. This ensures the necessary inspections are scheduled at appropriate times. The FAA manufacturing inspector verifies the product conforms to the drawings, specifications, and special processes. An FAA conformity inspection must be successfully accomplished before any certification ground or flight tests are conducted. Conformity inspections are requested by FAA engineering using FAA Form 8120-10, Request for Conformity, or FAA Form 8110-1, Type Inspection Authorization. Additional information on the responsibilities and functions of manufacturing and engineering is located in chapter 5 of this order.

(1) In accordance with 14 CFR § 21.33(b): "Each applicant must make all inspections and tests necessary to determine:

(a) Compliance with the applicable airworthiness, aircraft noise, fuel venting, and exhaust emission requirements,

(b) Materials and products conform to the specifications in the type design,

(c) Parts of the products conform to the drawings in the type design, and

(d) The manufacturing processes, construction, and assembly conform to those specified in the type design."

(2) The applicant must submit FAA Form 8130-9, Statement of Conformity, attesting that the articles are in conformity with the proposed design. The FAA should receive these forms from the applicant before conducting any FAA conformity inspections. Only in this manner can the FAA ascertain that the test articles are true representations of the proposed test article (see 14 CFR § 21.53(b)).

c. Applicant Test Plan and FAA Approval. The applicant must prepare a test plan when testing is necessary to show compliance to the regulations. The applicant should also submit the test plan early enough to allow the FAA time to review and approve the test plan before the start of the test. The test plan is used to ensure orderly and complete testing is accomplished. At a minimum, a description of the items to be tested and a list of all equipment necessary to conduct the test should be in the test plan. It is also important to include a description of how the equipment is to be calibrated (when calibration is required) and approved before the test, required conformities of the test article and test setup, a list of the specific airworthiness standards, a description of how compliance is expected to be shown, and a test procedure written in a step-by-step format with defined pass/fail criteria. After the ACO engineer or FAA pilot approves the test plan, they request an FAA conformity inspection of the test article and test setup to ensure conformance to the engineering drawings and test plan.

d. Before Witnessing Engineering and Flight Tests. When witnessing official tests, the FAA-authorized witness will verify that the test procedures described in the applicant's FAA-approved test plan are followed and that any data captured by test instrumentation appears to be valid data for the test in question. If the test is lengthy, witness at least the most appropriate or critical portions of the tests and conduct a post-test examination. If the ACO engineer or pilot will not be able to witness the test, they will authorize another qualified ACO engineer, FAA pilot, or DER; or request help from a manufacturing inspector to witness the test. See chapter 5, paragraph 5-10 of this order for a discussion of MIDO inspectors witnessing tests.

(1) The minimum participants for witnessing the test are the FAA-authorized witness and the applicant's knowledgeable representative who is capable of performing the test. But there are some cases such as flight tests of certain single-seat aircraft, agricultural airplanes and gliders, where the minimum number of participants can only be one person, the FAA flight test pilot or his designated DER flight test pilot. After the test, the FAA-authorized witness must sign a record showing the results were obtained by properly following the approved test plan. This record should identify the test and include the results obtained, the decisions reached, and any recommendations made to the applicant. Add a copy of this record to the test report. This record is not a substitute for the applicant's test report showing completion of the test plan.

(2) If a MIDO inspector or DER is to be the witness, the ACO engineer or pilot will provide them with the appropriate instructions and a reference to the applicant's test plan. The FAA-authorized witness should not witness any tests without prior coordination with the ACO engineer or pilot.

e. Engineering Certification Tests are used by applicants to demonstrate compliance with a requirement, or to collect quantifiable product or component data necessary for showing compliance. In contrast, certification flight tests rely on, or supplement quantifiable data with, the pilot's qualitative evaluation and are conducted on a test article of the product. Most certification tests are either quantifiable engineering certification tests or certification flight tests to accomplish a qualitative assessment. A certification flight test may provide both a compliance demonstration for the engineer, as well as a qualitative assessment for the pilot. A few examples of engineering certification tests include part qualification, system function, iron bird, fatigue, flammability, landing gear drop test, ground vibration, and electro-magnetic interference tests. Most of these tests are performed to satisfy the requirement of 14 CFR§ 21.35(a)(2). The FAA has established that a reliable way to determine the safety of an aircraft is to show its compliance with the minimum standards established by the applicable airworthiness requirements. Therefore, it is essential for the applicant to conduct adequate evaluation of the aircraft by performing engineering tests, analysis, and flight tests. Each applicant test must be accomplished successfully before conducting any FAA certification flight test to validate an applicant's showing of compliance. For certain flight tests the FAA may choose to conduct certification flight testing concurrently with the applicant (see paragraph 5-19e of this order). To show compliance with a type certification requirement, the conformity of the test article, test setup, and test procedures used, and the validity of the test results must be established for each certification test conducted.

f. Engineering Compliance by Inspection. An engineering compliance inspection should be done for any aspect of product design and installation where compliance with the certification requirements cannot be determined through the review of drawings or reports. Do not confuse this inspection with a conformity inspection done by manufacturing inspectors as described previously in paragraph 2-6b above.

(1) An engineering compliance inspection determines compliance to the regulations. An engineering compliance inspection provides an opportunity to review an installation and its relationship to other installations on a product. This inspection ensures systems and components are compatible with each other and meet the applicable requirements of the airworthiness and operational standards (see 14 CFR § 21.33).

(2) Sample Inspections. The product must conform to the type design before conducting the engineering compliance inspection. Document the findings for the applicant to include as part of the substantiating data. Engineering compliance inspections may be delegated to DERs. However, DERs should receive proper guidance in order to effectively make the findings on behalf of the FAA.

(a) Interior Inspections. Engineering compliance inspections for aircraft interiors are generally more complex than other compliance inspections. This is primarily due to the many varied regulations and paragraphs with which the applicant must comply such as emergency lighting, emergency exit arrangement, ordinance signs, aisle widths, cockpit controls, waste containers, placards, and occupant protection. As with all findings, in accomplishing an interior compliance inspection, the certification team makes many determinations and, therefore, should be very familiar with current regulations and policy.

(b) Control System Inspections. Control system compliance inspections are accomplished to determine ease of control operation, strength of components, detection of interference, or deflection of control system linkages.

(c) Fire Protection Inspections. Flammable fluid fire protection compliance requires inspection to ensure that proper separation and isolation of flammable fluid carrying lines from ignition sources is maintained.

(d) System Routing Inspections. Hydraulic and electrical systems routing requires inspection to ensure that proper support and separation is maintained.

g. Analysis. Engineering analysis is an integral part of showing compliance. It encompasses the full range of analytical techniques such as textbook formulas, computer algorithms, computer modeling/simulation, or structured assessments (for example, the processes in SAE International's Aerospace Recommended Practice (ARP) 4761, Guidelines and Methods for Conducting the Safety Assessment Process on Civil Airborne Systems and Equipment, dated December 1, 1996. The FAA approves the data, not the analytical technique, so the FAA holds no list of acceptable analyses, approved computer codes, or standard formulas. Use of a well-established analysis technique is not enough to guarantee the validity of the result. The applicant must show the data are valid. Consequently, the ACO and its representatives are responsible for finding the data accurate, and applicable, and that the analysis does not violate the assumptions of the problem.

h. Experimental Airworthiness Certificate. With certain exceptions, the applicant must get a special airworthiness certificate in the experimental category before conducting research or developmental flight tests on test aircraft. Order 8130.2, Airworthiness Certification of Aircraft and Related Products, explains the issuance of experimental airworthiness certificates. Also, the applicant must get a special airworthiness certificate in the experimental category before conducting flight tests to show compliance. For more information, see Order 8130.29, Issuance of a Special Airworthiness Certificate for Show Compliance Flight Testing.

(1) Before flying the aircraft, applicants must notify air traffic so that they can make special accommodations for the aircraft with the normal terminal and enroute air traffic (see Order 7110.65, Air Traffic Control). The applicant must provide the following information to the Air Traffic Organization – Terminal Services, Terminal Safety and Operations Support (WAJT20000, 600 Independence Avenue, SW, Washington, D.C. 20591, or fax: (202) 493-4567):

(a) Aircraft type designation (B-777, A340, and so forth),

(b) Number and type of powerplant (Piston, Turboprop, Jet),

(c) Aircraft weight or weight classification (heavy, large, small),

(d) Average rate of climb (or descent if appropriate) (feet per minute), and

(e) Max cruising and landing speeds (MPH or KTS or MACH).

i. Applicant's Flight Tests. To comply with § 21.35(a)(4), the applicant conducts flight tests and inspections before the TIA for research and development. The research and development flight test results are not part of the type certification process. The applicant's flight tests, conducted to satisfy § 21.35(a)(4), are not explicitly part of the FAA's flight test program, unless the FAA agrees to conduct concurrent testing with the applicant and issues a TIA for the test. Official FAA flight testing begins only after the FAA issues a TIA. However, the applicant conducts the tests and inspections to demonstrate that the test article to be submitted for FAA certification ground and flight tests meets the minimum requirements for quality, conforms to the design data, and is safe for the planned tests. The applicant will report the data generated in these tests to the FAA for review of its acceptability. Since the validity of flight test data generated with test articles that don't represent the type design is indeterminable, ensure the applicant understands the importance of controlling the configuration and recording the conformity of the test article for each flight.

FIGURE 2-11. IMPLEMENTATION PHASE – COMPLIANCE SUBSTANTIATION ACTIVITIES

j. Compliance Substantiation – General.

(1) Applicant Flight Test Data and Report. Paragraph 2-6l below discusses the certification process involving tests and inspections. This process needs to be successfully accomplished by the applicant before presentation to the FAA. Title §§ 21.33 and 21.35 provide criteria for making that determination. The compliance substantiation data generated during these tests are reported to the FAA in the applicant's flight test report. In the event the FAA agrees to conduct testing concurrently with the applicant, it is understood that the report will not contain compliance substantiation for those specific tests. All other tests are accomplished in the presence of the FAA, and applicants submit their data for approval as discussed in paragraph 2-6k, Data Submitted for Approval, and paragraph 2-6m, Compliance Reports. In either case, the applicant has the following responsibilities:

(2) Applicant Responsibility. Applicants are responsible for complying with the regulations that apply to the specific product or operation. They must:

(a) Submit the necessary type design and substantiating data to show that the product being certificated meets the applicable airworthiness, aircraft noise, and emissions requirements of the regulations, and any special conditions prescribed by the FAA (see 14 CFR§ 21.21). The FAA does not give a specific format for submitting technical data (if it is an original paper copy). However, if data are submitted in any form other than an original paper copy or photocopies, the format must be acceptable to the FAA (refer to Order 8000.79).

(b) Submit a statement of conformity to the FAA for each aircraft, engine, and propeller presented for type certification, and each aircraft or part thereof presented for testing (see § 21.53).

(c) Allow the FAA to make any inspection and any flight or ground test necessary to determine compliance with the applicable requirements of the regulations (see 14 CFR§ 21.33).

(d) Accomplish the requirements of 14 CFR § 21.35(a) before making their flight tests and, upon showing compliance, complete all flight tests the FAA finds necessary. Applicants must provide a person holding an appropriate pilot certificate to perform the flight tests (see 14 CFR §§ 21.35 and 21.37).

k. Data Submitted for Approval. During this period of activity, the TC applicant is submitting to the FAA the necessary design data, test reports, and computations to show that the product to be certificated meets the applicable airworthiness, noise, and emission requirements of 14 CFR and any special conditions identified by the FAA. The applicant should submit the compliance data as soon as the data are complete and in a logical format for review, so the FAA's review can be accomplished during the normal course of a certification project. This activity culminates with submittal of compliance reports. The following are requirements for technical data and their use by the FAA:

(1) Disclosure of Technical Data. The policy for disclosure of FAA information is contained in Order 1270.1, Freedom of Information Act Program, and contains 9 exemptions for release of technical data. The FAA must not release proprietary information (descriptive, design, and substantiating data received from applicants) to any party who does not have written permission from the applicant (or the certificate holder). The certification basis information is not proprietary data, because it is a part of the TC.

(2) FAA Use of Technical Data. FAA personnel may use the applicant's or certificate holder's data for reference or evaluation of any subsequent applicant's submitted data if the information is used solely for that purpose. This FAA use of technical data does not permit designees who may be working for a subsequent applicant to request access to another applicant's data.

(3) Applicant-Provided Data. The FAA will not question the source or the method by which an applicant for a design approval obtains the data submitted by an applicant. An applicant showing compliance to the applicable requirements may obtain certification credit for previously approved data without showing further compliance if the applicant:

(a) Provides sufficient evidence that the presented data were, in fact, approved by the FAA. The applicant does not need to submit the data if they were obtained with the consent of the original approval holder.

(b) Establishes that the previously approved data are applicable to the applicant's design to the extent that any design deviations will have no effect on the design's airworthiness or on showing compliance with the applicable regulations.

(c) Provides sufficient substantiation and descriptive data of its own modification so that FAA can make a finding of compliance.

(d) Has sufficient engineering data necessary to provide continued airworthiness information should the modification be the subject of a service difficulty report or an AD.

(e) Has sufficient descriptive data to produce detail parts and installations if multiple STC approval is requested.

(1) FAA Discretion and Subsequent Applicants. For a particular modification, FAA experience with previous applicants may permit the FAA to conclude that subsequent applicants need not conduct all the same tests formerly required. This would be a judgment by the FAA that the product has adequate margins so that a demonstration by test would not produce different results from previous experience with the particular modification. While needless duplication of testing and data gathering should be avoided, the FAA's primary responsibility is to determine the airworthiness of the aircraft with the modification. The FAA will not supply a subsequent applicant with information submitted by a previous applicant, either directly or indirectly. If the FAA minimizes or waives the need for an applicant to provide substantiating data for specific requirements based on prior FAA knowledge, a brief rationale explaining these findings will be made by the FAA and included in the project file. Substantiating data from a previous project file will not be copied and put in the subsequent project file.

l. Applicant Flight Test Data and Report. During this period, the applicant collects flight test data, analyzes it, and reports it to the FAA for review. The applicant prepares a test report (§ 21.35(a)(4)) detailing the data with an explanation of the calculations (§ 21.39(a)) necessary to evaluate the data. The test report should also show compliance to 14 CFR part 21, Subpart B or other appropriate flight regulations in the certification basis. The flight test report should be signed by the applicant's test pilot, if the aircraft will be certificated under 14 CFR part 25.

m. Compliance Reports. A claim to have a compliant type design is not the only requirement of § 21.21(b). Applicants are entitled to a TC after they show compliance, the FAA finds compliance, and the FAA finds that the type design has no unsafe features. It is the FAA who determines whether or not the applicant has shown compliance. Compliance reports are the applicant's way of proving compliance (that is, showing compliance). Adequate compliance reports present appropriate evidence to convince the FAA of the overwhelming likelihood of the claim. The claim is a declaration that the type design meets a particular airworthiness, aircraft noise, fuel venting, or exhaust requirement levied by regulations identified in the certification basis. The substantiation case presents and explains the inter-relationship of the evidence in a logical order leading from the requirement to the claim. Evidence is certification data collected from FAA publications, certification testing, analysis, engineering examinations, similarity, and software design assurance, and any other data deemed acceptable by the FAA standards staffs. The FAA will make the final finding of compliance and indicate that by issuing the certificate or approval. The applicant is also responsible to provide a statement of compliance in accordance with § 21.20. The statement is subject to the falsification provisions in § 21.2, *Falsification of applications, reports, or records*. Unless the applicant has a data retention agreement that preserves FAA access to all data used to show compliance at any time in the future, the deliverables necessary to show compliance must be documented in the applicant's statement of compliance and submitted to the FAA. Further, although the FAA may elect to not review any type design or substantiating data submitted by the applicant, we always have the authority to do so at any time.

FIGURE 2-12. IMPLEMENTATION PHASE – COMPLIANCE FINDING ACTIVITIES

n. FAA Review of Compliance Data. During this review, the FAA finds compliance with specific paragraphs of applicable airworthiness standards and aircraft noise and emissions requirements. The data are approved after all inspections, analyses, and necessary tests are accomplished with satisfactory results.

(1) Discontinuance Letter. The TCB will notify the applicant by letter when it becomes necessary to discontinue official FAA type certification inspections or tests for any reason. The letter should cite the applicable regulations and advise the applicant to notify the ACO when the cause of the discontinuance has been corrected and a resumption of the type certification testing is desired.

(2) Notification of Non-Compliance, including projects that do not warrant a TCB. The TCB, or the project manager for projects that do not warrant a TCB, notifies the applicant (in writing) when a non-compliant item is found during FAA ground or flight tests and it does not necessitate discontinuing type certification tests. The written notification must identify the non-compliant item and cite applicable regulations. The applicant must satisfactorily resolve all non-compliances before the FAA issues the TC.

o. The Review of Applicant's Flight Test Results. The FAA reviews the applicant's flight test report to determine that the airplane conforms with the type design and identifies the specific flight tests that will be reevaluated by the FAA's test pilot. The project may proceed after a satisfactory examination of the applicant's technical data.

p. The Flight Test Risk Management Process. The TIA will reflect adherence with the PACO/accountable directorate's established flight test risk management process following Order 4040.26, *Aircraft Certification Service Flight Test Risk Management Program*. This ensures the acceptability of flight test risks. Risk assessment is normally done by a safety review process where project and non-project personnel review a flight test plan. This determines potential hazards and recommended mitigating (or minimizing) procedures. In the risk management process:

(1) Hazards are identified,

(2) An assessment is made of the risks involved,

(3) Mitigating procedures are established to reduce or eliminate the risks, and

(4) A conscious decision is made at the appropriate level to accept residual risks.

q. The Pre-Flight TCB Meeting. The pre-flight TCB meeting is held to discuss and clarify any questions the applicant may have about required FAA flight testing of aircraft. For engine and propeller certification projects, the pre-flight TCB meeting is referred to as the pre-type inspection authorization (pre-TIA) meeting. These meetings also identify any outstanding conformity inspection issues and engineering compliance determinations. Normally the TCB chairman, or the individual's representative, issues the TIA after all issues are resolved. Either the TCB or the applicant may request this meeting. Include a MIDO representative for the coordination of conformity inspections required for compliance flight testing.

r. Type Inspection Authorization (TIA). The TIA is issued after the FAA reviews the applicant's test results package and determines its acceptability. The ACO prepares the TIA on FAA Form 8110-1 (refer to https://employees.faa.gov/tools_resources/forms). It also authorizes official conformity, airworthiness inspections, and ground and flight tests necessary to fulfill TC certification requirements. In addition, if there are operational and airworthiness requirements to be addressed, include AEG operational evaluations in the TIA. If it has been found that 14 CFR part 33 and/or part 35 certification requirements are not completed at the time of issuing TIA, the PACO must coordinate with the ACO(s) responsible for the engine and/or propeller for concurrence or comments.

(1) Preparing and Issuing the TIA. The TIA is not prepared until coordination is accomplished with each appropriate engineering discipline and, when appropriate, the AEG, so that all required information for each disciplines' portion of the inspection or authorization is included. The TIA is issued when examination of technical data required for type certification is completed or has reached a point where it appears the aircraft or component being examined is expected to meet the applicable regulations. The TIA may be phased or issued in increments to ensure basic airworthiness and that flight test safety has been established before proceeding to the next phase.

NOTE: To assist the manufacturing inspector, the following information should be included in block 12, part 1, of FAA Form 8110-1.

Point of contact at conformity site: _____

Phone number of point of contact: _____

Location of aircraft/conformity site: _____

DAR requested by the applicant: _____**(**as applicable**)**_____

(2) Coordination. Coordinate the TIA with the PACO, the project MIDO, and when requested, the accountable directorate. Also, coordinate with the AEG when appropriate.

(3) Notification. Notify and provide the applicant with a copy of the TIA after it is issued.

(4) Inspections. FAA manufacturing inspection personnel do conformity inspections before ground and flight tests. All unsatisfactory items must be resolved before conducting the test.

(5) Tests. After the applicant complies with 14 CFR § 21.35(a), FAA personnel witness and conduct official certification tests. FAA designees may also witness or conduct the tests when authorized to do so.

(6) Outside ACO Requests. The project MIDO should request the geographically appropriate MIDO to perform the conformity inspection if the TIA conformity is done by FAA personnel outside the project MIDO's geographic area. If the TIA test is to be conducted by FAA personnel outside the geographic area of the PACO, the PACO may delegate the witnessing (at their discretion) to the geographically appropriate ACO.

s. Flight Test Conformity Inspections. The ground inspection physically verifies that the aircraft submitted for flight test meets the minimum requirements for quality, conforms with the technical data, and is safe for the intended ground and flight tests. The results are recorded together with any other data requested by FAA engineering and flight test personnel.

(1) Normally a progressive ground inspection is performed in three phases. This depends, however, on the complexity of the project. The three phases are: preliminary ground inspection, official ground inspection, and coordinated ground-flight inspection. See chapter 5, paragraph 5-15 of this order for detailed information on these three phases.

(2) The manufacturing inspector makes the initial acceptance of the test aircraft for FAA flight testing. The initial acceptance is based on the determination of the aircraft condition for safe operation and the testing to be conducted. The manufacturing inspector and the flight test personnel should establish a mutually agreeable system for informing the project manager of daily changes to the aircraft and any problems encountered during flight test.

t. Certification Flight Tests are used by the FAA to verify the flight test data reported by the applicant or to obtain compliance data for flight testing conducted concurrently with the applicant. These tests evaluate the aircraft's performance, flight characteristics, operational qualities, and equipment operation. They also determine operational limitations, procedures, and pilot information. Certification flight tests are conducted under the TIA and may include flight, ground, and functional and reliability testing. ACs 23-8, 25-7, 27-1, and 29-2 provide guidance for certification flight tests. Also, for type certification testing of prototypes, the applicant provides first-pilot-checkout flight time for the FAA flight test and AEG pilots assigned to the project before the FAA compliance flight tests. For more information, see chapter 5, paragraph 5-19 of this order.

u. Operational and Maintenance Evaluations (AEG Responsibilities). The AEGs were established to meet FAA's operations and maintenance responsibilities during the type certification process. The AEGs are comprised of operations and airworthiness inspectors who work directly with aircraft certification personnel to contribute an operational perspective to engineering activities. The AEGs advise manufacturers of applicable operational and maintenance requirements during the design and certification process and also make recommendations to Flight Standards about flight training, inspection programs, and flight crew

qualifications. The AEGs participate in the maintenance review board (MRB), flight standardization board (FSB), and the flight operations evaluation board (FOEB). They are also the Flight Standards focal for the master minimum equipment list (MMEL), instructions for continued airworthiness (ICA), and post-certification activities such as ADs.

(1) AEGs perform the following functions related to certification:

(a) Participate in compliance and TIA testing to evaluate the operational suitability of the aircraft and its systems,

(b) Review ICA. Develop the MRB report per Flight Standards policy,

(c) Review aircraft flight manuals (AFM) and revisions,

(d) Review and issue MMELs,

(e) Establish type rating requirements,

(f) Participate in crew complement determinations,

(g) Participate in emergency evacuation demonstrations,

(h) Determine the acceptability of flight crew sleeping quarters and flight deck observer seats,

(i) Establish any unique or special training requirements,

(j) Participate in function and reliability testing,

(k) Manage the FSB, FOEB, and MRB, and

(l) Serve as a member of the TCB, FSB, and FOEB.

(2) AEG Liaison.

(a) Each AEG is responsible for the AEG functions dealing with the TC product for which its directorate has responsibility. The AEG collocated with the accountable directorate may delegate some functions to another AEG or flight standards district office (FSDO).

(b) AEG operations and airworthiness personnel should communicate directly with the project manager on the degree of AEG participation to carry out their assignments. The project manager notifies AEG personnel of significant project milestones, progress, and meetings. The AEG TCB members should meet with each engineering TCB member to coordinate the maintenance and operations requirements for each of their disciplines, particularly those that are required to maintain the continued airworthiness and operation of the type-certificated product.

(c) The AEG team members meet with the applicant's technical publications department as often as necessary to monitor the progression of the ICA publications. They also

meet to advise the applicant on any noncompliance with the airworthiness standards and appendixes. These efforts should be coordinated with the project manager.

(d) The AEG team members report the status of the ICA and AFMs to the project manager during the regular FAA internal meetings and whenever there is a need or awareness of concerns. The AEG team members should also provide a status briefing on the ICA and AFMs at each formal TCB meeting.

(e) During the type certification process, the AEG airworthiness team member uses past experience and knowledge of current maintenance practices to select items from the ICA for validation. These items may include instructions and procedures for maintenance, preventive maintenance, and servicing. Validation of a procedure may require it to be demonstrated on the product.

(f) It is possible an aircraft could be type certificated and not be determined to be operationally acceptable under the applicable regulations. These inconsistencies may be avoided by proper and timely AEG involvement. The AEG responsibility to evaluate operational suitability and type rating requirements may require the AEG pilots fly the aircraft through prescribed type rating maneuvers using AFM procedures. This may be accomplished during the certification flight test program and may require the allocation of flight time so that appropriate findings can be made.

(3) Flight Standardization Board (FSB). An FSB determines the aircraft type rating requirement for both new and modified models of aircraft that require type ratings. It also develops the minimum training requirements used for flight crewmember qualification. Board membership includes operations inspectors from district offices, representatives from the Air Transportation Division at FAA headquarters, a board chairperson from AEG-Operations who performs or directs the tasks of the FSB, and an alternate chairperson. The FSB determines the operational suitability of the aircraft and its systems; requirements for flight crew training aids; type rating requirements for pilots; any unique or special training requirements; and jump seat, flight crew rest, and sleeping quarters suitability. The FSB also determines emergency evacuation capability, the closure of flight standards issue papers, and other tasks as appropriate.

(4) Flight Operations Evaluation Board (FOEB). The FOEB develops the MMEL and accomplishes an operational evaluation of the aircraft. Board membership typically includes airworthiness inspectors, an operations inspector, a flight test pilot, an FAA headquarters representative, and, as chairperson, an AEG operations inspector.

(5) Maintenance Review Board (MRB). An applicant may use the procedures in AC 121-22, Maintenance Review Board, for those aircraft intended primarily for air carrier environment use. Those procedures will develop and produce tasks and associated time-in-service intervals for the initial maintenance time limitations in an air carrier's continuous airworthiness maintenance program. Also, the manufacturer may use the appropriate tasks and time intervals produced by the MRB process to show compliance with the inspection program requirements of the certification rules (for example, 14 CFR §§ 33.75, XX.571, XX.901, XX.1309, XX.1529). However, the applicant is not required to use the MRB process. An MRB

is comprised of Flight Standards inspectors, the ACO project manager, and ACO and ECO engineering personnel from the accountable directorate, as described in AC 121-22.

> **NOTE:** The FAA Maintenance Review Board should not be confused or associated with a manufacturer's Material Review Board. These are two entirely separate boards that perform completely different functions.

(a) ACO engineers assigned to the MRB will attend MRB meetings and industry steering committee meetings, if invited by the MRB chairperson. They also review working group meeting minutes and provide comments to the MRB chairperson, when appropriate. This review should encompass an assessment of the engineering aspects of working group activities and include a notification of any potential problem areas. The engineers provide the MRB with the appropriate engineering expertise with regard to design, inherent reliability, and required function information.

(b) The ACO engineer assigned to the MRB may need to enlist expert engineering assistance for the MRB for specialized topics such as: the aging aircraft program and the associated specific AD and 14 CFR requirements; the corrosion prevention and control program (CPCP) and the associated specific AD and 14 CFR requirements; or the management of certification maintenance requirements (per AC 25-19, Certification Maintenance Requirements), airworthiness limitations, and damage tolerance requirements (per AC 25.571-1, Damage Tolerance and Fatigue Evaluation of Structure).

v. Instructions for Continued Airworthiness (ICA). ICA are prepared according to 14 CFR §§ 21.50, 23.1529, 25.1529, 27.1529, 29.1529, 31.82, 33.4, or 35.4. Also, see Order 8110.54.

(1) The Airworthiness Limitations section of the ICA is required for type certification. Specifically, this requirement is called for in the type design, under 14 CFR § 21.31(c), and as one of the requirements for a TC under 14 CFR § 21.41. Note, in the case of the ICA, only the airworthiness limitations section is FAA-approved.

(2) According to 14 CFR §§ xx.1529, 31.82, 33.4, and 35.4, the ACO, with AEG concurrence, is responsible for compliance findings for requirements of the ICA and airworthiness limitations in the applicant's maintenance manuals.

(3) The ICA may be incomplete at the time of type certification. However, the airworthiness limitations are required (see 14 CFR § 21.31) and must be FAA-approved at the time of type certification. They do not necessarily have to be in the final publishable form. The ICA must be in final printed form by the date of the first standard airworthiness certificate or on delivery of the first product, whichever occurs later.

(4) AEG and engineering personnel review the ICA.

(a) The responsibilities of the AEG team members include determining the acceptability of ICA for operational and maintenance requirements.

(b) The AEG assists the ACO establish the adequacy of the ICA and determine compliance with the regulations.

(5) CMRs are part of the maintenance instruction portions of the ICA. CMRs are operating limitations and part of the TC. Examples of CMRs are systems and powerplant maintenance requirements developed during the certification process; they contain the frequency and extent of inspections. For detailed information, see AC 25-19 and Order 8110.54.

w. Function and Reliability (F&R) Flight Testing. Applicants for aircraft TCs (other than under 14 CFR §§ 21.24 through 21.29) must make all flight tests that the Administrator finds necessary (14 CFR §§ 21.35(b) and 21.39(b)). This determines whether there is reasonable assurance the aircraft, its components, and equipment are reliable and function properly (see 14 CFR § 21.35(b)(2) and (f)). Function and reliability flight tests are conducted after the applicant shows compliance with the applicable structural requirements, completes all necessary ground inspections and tests, demonstrates that the aircraft conforms with the type design, and submits a flight test report to the ACO containing the results of the tests. ACs 23-8, 25-7, 27-1, and 29-2 provide guidance for function and reliability testing.

> **NOTE:** FSB activities may be done concurrently with function and reliability testing upon mutual agreement between the applicant, the ACO, and AEG.

x. Aircraft Flight Manual (AFM). An AFM is required for each aircraft (see 14 CFR § 21.5). These manuals contain information on the operating limitations and procedures, performance, and loading information. ACs 23-8, 25-7, 27-1, and 29-2 provide guidance for AFMs.

(1) Approvals. The ACO approves the AFMs and AFM supplements. The AFM should not be approved until three conditions are met. First, the flight test pilot, flight test engineer, AEG operations specialist, and appropriate FAA engineers concur with the operational limitations and normal and abnormal emergency procedures sections. Second, the FAA flight test engineer recommends approval of the performance section. Third, the AEG reviews and accepts the AFM in its entirety.

(2) Revisions or Supplements. Changes to AFMs submitted by the TC holder are handled by the FAA in the same manner as original manuals. Each revised page should bear a revision date or symbol so that required revisions may be properly identified. Changes to AFMs submitted by someone other than the TC holder must be accomplished by using the flight manual supplement. AFM supplement approval is handled by the certifying ACO and in the same manner as the original manuals.

y. Final TCB Meeting, Issuance of TC and TCDS.

(1) The final TCB meeting is held when the ACO determines the applicant has demonstrated compliance with all applicable airworthiness standards in the certification basis. This is according to technical policies established by the accountable directorate and the Aircraft Engineering Division. The final TCB meeting is held to do the following:

(a) Review all outstanding items, the AFM, ICA, and items where there may be some question of compliance with the established airworthiness standard,

(b) Determine the status of any outstanding technical data, and

(c) Formalize the decision to issue the TC and TCDS.

(2) The meeting is also held to issue the TC and TCDS. The TC is signed when the applicant has complied with § 21.20 requirements, including submitting a statement of compliance, and the ACO and the accountable directorate concur that all items have been resolved. Each TC includes the type design, operating limitations, the TCDS, applicable regulations with which the FAA records compliance, and any other conditions or limitations prescribed for the product (Refer to § 21.41). The type design consists of the drawings, specifications, and information on the dimensions, materials, and processes necessary to define the product. The TCDS documents the conditions and limitations necessary to meet the airworthiness requirements of the certification basis. Sample of a TCDS can be found in Appendix 2 of this order.

> **NOTE:** In addition to the noise requirements of 14 CFR part 36, the FAA must make a Noise Control Act finding before issuing an original TC (see chapter 7 of this order).

2-7. POST-CERTIFICATION ACTIVITIES

FIGURE 2-13. TASKS DURING THE POST-CERTIFICATION ACTIVITIES PHASE

a. Certification Summary Report.

(1) The Certification Summary Report should be tailored to the complexity and significance of the project and should be an executive summary containing a high-level description of major issues and their resolution. The report should be used as a means for retaining corporate knowledge and lessons learned that could be beneficial for future type certification projects involving the same or similar type design. Another benefit of this summary report is in a non-concurrent validation type certification project, it serves as a useful tool for a foreign CAA to learn what FAA concerns surfaced during the type certification project.

(2) The FAA project manager prepares the certification summary report. The accountable directorate determines which projects warrant a summary report since not all projects will require one. Summary reports should generally be prepared for the following:

(a) All new airplane models over 75,000 pounds maximum gross weight and new transport category rotorcraft (and their significant modifications),

(b) Aircraft which involve significant technology issues, aircraft with unusual or novel features, or aircraft that are of controversial design, or

(c) Projects with the potential for unusual public interest.

(3) The certification summary report, if required, should be in an acceptable "draft" form when the TC is issued.

b. Type Inspection Report (TIR).

(1) General. The TIR provides a record of the inspections and ground and flight tests conducted as authorized on the TIA, to show compliance with applicable regulations (§§ 21.33 and 21.35). Both manufacturing inspection and flight test personnel complete the TIR. The TIR also provides a record of other information identifying the test article and FAA certification activities applicable to each project with an issued TIA. Use FAA TIR form 8110-31, located at https://employees.faa.gov/tools_resources/forms. Detailed instructions on how to complete the TIR is now included in the form. The TIR must:

(a) Be completed within 90 days after certificate issuance,

(b) Contain all of the TIA inspection and test results,

(c) Contain a chronological list of all changes made to the prototype product during the test program and identified as "made by the applicant" or "required by FAA as a result of type certification tests showing noncompliance,"

(d) Be approved by appropriate supervisors,

(e) Be retained by the certifying ACO for reference purposes (unless the certificate and control of the project is transferred to another ACO), and

(f) Be provided to the certificate holder (courtesy copy).

(2) FAA Form 8110-26, Supplemental Type Inspection Report (STIR), provides a way for the manufacturing inspector to record the inspection and test results conducted on modified products presented for supplemental type certification. Use the STIR Form 8110-26, located at https://employees.faa.gov/tools_resources/forms, and complete the report in a similar manner as the TIR.

c. Continued Airworthiness. Continued airworthiness is the preservation of the product's level of safety as defined at the time of certification (or its approved altered condition) throughout the end of the product life cycle. It is applied to the product design/production and its operation, maintenance, modification, and repair.

(1) AIR is responsible for overseeing the design approval holder and production approval holder (PAH) to preserve the safety of the approved product, part, or article. AIR preserves safety by identifying and evaluating safety concerns and by developing and implementing corrective action.

(2) AIR is also responsible for interfacing with operating environments through a proactive collaboration with AFS and others involved in the operations, maintenance, and alteration of in-service products.

(3) Data such as stress analysis, damage tolerance assessment, or process specifications used to substantiate a major repair to primary structure can only be approved by:

an ACO, a DER with specific authorization for major repairs and/or alterations in the necessary engineering discipline, and Organization Designation Authorization (ODA) holders.

d. Changes to Instructions for Continued Airworthiness (ICA). The rule, § 21.50(b), requires ICA changes to be made available to any person who must comply with them. The design approval holder should provide these changes according to a plan that was accepted by both the ACO/ECO and AEG. The changes should be formatted to directly supplement the original ICA and should clearly say what's being changed.

e. Post-Certification Evaluations.

(1) Special Certification Review (SCR).

(a) An SCR is a way to evaluate the type certification project and potentially unsafe design features of previously approved products. The accountable directorate may initiate an SCR after the certification project or as service experience dictates (§ 13.19).

(b) Potential safety problem areas for which an SCR may be appropriate include:

1. Complex or unique design features,

2. Advanced state-of-the-art concepts in design and manufacturing,

3. Potentially unsafe features used on similar previous designs requiring further analysis and evaluation,

4. Compliance areas critical to safety and operational suitability that require evaluations,

5. Unsafe operational or maintainability characteristics,

6. ELOS determinations with potential major effects on safety, and

7. Complicated interrelationships of unusual features.

(c) Results of an SCR include a detailed review and evaluation of a product's applicable airworthiness and operational certification requirements, recommendations for revisions, if appropriate, and improvement in achieving uniform application of certification rules throughout the FAA.

(d) The accountable directorate establishes the SCR team. The team may be comprised of FAA personnel from the CMACO, the PACO, the accountable directorate, AEG personnel, MIDO personnel, or other FAA personnel, as appropriate. The team may use governmental agencies, outside consultant firms, and industry to get technical expertise to do a thorough evaluation. If an SCR is deemed necessary for an imported product, then representatives of the original certifying CAA must also be invited.

(e) Evaluation procedures used during the SCR include examination of the applicant's or certificate holder's data, discussions with FAA personnel and the applicant's or certificate holder's personnel, inspection of the prototype or production articles, and any other way for the team to perform a complete and comprehensive evaluation consistent with the purpose of the review.

(f) Thoroughly explore every significant aspect and ramification of the potential safety problem in question. Consider the adequacy of the applicable regulations and policy material.

(g) The SCR chairperson prepares a report of the team's findings and recommendations. The accountable directorate may use the report to develop regulatory changes or guidance material.

(h) The certifying ACO is responsible for appropriate action on the SCR team's findings and recommendations.

(2) Fact-Finding Investigations.

(a) Fact-finding investigations are authorized under 49 U.S.C. 46104 and conducted pursuant to 14 CFR part 13, subpart F. This is an investigation where the compulsory processes of the Federal Aviation Act of 1958, Section 1004, are used to assist the FAA in finding material facts to support the performance of FAA functions. This procedure is not used either as a substitute for a routine investigation or as an investigation of violations that constitute felonies under Federal law.

(b) Reports or allegations of certification basis noncompliance may be received after a TC is issued. Complainants should furnish full facts to support all allegations of noncompliance. Depending on the circumstances and the extent of factual substantiation of the allegations, it may be necessary to develop evidence through a fact-finding investigation. The objective of a fact-finding investigation is to get the information necessary to decide what FAA action, if any, should be taken. The FAA may determine that this type of investigation is necessary even without an external complaint.

f. Data Retention.

(1) Project. The ACO or the MIDO maintains the project file for each type certification project at a federal facility. The project file must contain records associated with the project. Records are defined as documents showing a decision or action taken by the FAA on the project. The project file must contain the documents listed in Appendix 10, Figure 1.

(2) Type Design and Substantiation Data. The FAA maintains data critical to type certification, such as type design and substantiation data (see Appendix 10 of this order). "All information received, created, or compiled by the officers and employees of the Federal Government for the use of the Government is official Government record material and is, therefore, property of the U.S." (see Order 1350.14, *Records Management*). The applicant/TC holder, at the ACO manager's discretion, may maintain portions of these data on behalf of the FAA. In either case, it must be recognized that type design records, including all substantiating data, are permanent and must not be destroyed. Data maintained by the applicant/TC holder must be made available to the FAA for such routine activities as production inspection, surveillance, design change reviews, or any other reasons deemed necessary by the FAA. An appropriate and coordinated MOA between the FAA and the applicant/TC holder must be established before entering into such an arrangement. Data that are required to be maintained by the applicant/TC holder under these conditions are listed in Appendix 10, Figure 2 of this order. Refer to FAA AC 20-179, *Certification Data Retention Agreements and Government Records*, for detailed guidance related to data retention agreements.

(3) Working Papers. Other information such as personal notes, correspondence, or issue papers that do not document an FAA decision, action, or position, or schedules are considered working papers. Those documents may be retained after the TC is issued at the ACO manager's discretion. This information is considered "corporate memory" and no longer part of

the project. Information that falls into this category is listed in Appendix 10, Figure 3 of this order.

g. Required Documents. The holder of a TC or STC, or the licensee of a TC, must supply the following documents at the time of aircraft delivery:

(1) A current approved Airplane or Rotorcraft Flight Manual,

(2) A current weight and balance statement,

(3) An ICA,

(4) Compliance status of ADs (see § 21.183 and 14 CFR part 39), and

(5) Other appropriate documents as necessary.

CHAPTER 3. TYPE CERTIFICATES

3-1. GENERAL. Chapter 3 provides guidance for preparing the Type Certificate Data Sheet (TCDS). The TCDS is a part of the TC, providing a concise definition of the configuration of a type-certificated product. Therefore, a standard format for the TCDS is necessary to enable any person to easily find information about a specific product.

3-2. TYPE CERTIFICATE.

a. Issuing a TC.

(1) The certifying ACO issues a TC when the applicant completes the 14 CFR airworthiness requirements. Refer to https://employees.faa.gov/tools_resources/forms for FAA Form 8110-9, Type Certificate, in a pdf-fillable format.

(2) Only one name can be identified as the TC holder, consisting of an individual, a partnership, or a corporation. This ensures the FAA has a single point of contact responsible for continued airworthiness of the type certificated product.

b. TC Numbers. The certifying ACO assigns a TC number, reflecting the issuing ACO and the type of product. See FAA Order 8110.115, *Certification Project Initiation and Certification Project Notification*, for details on the numbering system.

c. Amendment to a TC.

(1) A TC holder who wants to change a product's type design may apply for either an STC or an amendment of the original TC. Any other applicant must apply for an STC.

(2) Some design changes may not require alteration of the TC or TCDS. Use an FAA approval letter, ODA, or DER approval for these changes. For minor changes in type design, the TC or TCDS will not be affected (see §§ 21.93 and 21.95). Also, some major changes in type design may be indicated in the Airplane Flight Manual or Rotorcraft Flight Manual rather than on the TCDS, e.g., different cockpit equipment configurations for the same model aircraft.

(3) To amend a TC, applicants must send an FAA Form 8110-12 to the appropriate ACO. Refer to https://employees.faa.gov/to ols_resources/forms, for FAA Form 8110-12, in pdf-fillable format.

(4) The ACO sends the completed amendment to the applicant and publishes the revised TCDS, if required, as soon as possible.

d. Notification of TC Approval. The manager of the PACO is responsible for sending a notice to the accountable directorate after issuing, reissuing, or amending a TC. There is no standard form for this notification, a memorandum to the accountable directorate is acceptable. The manager of the PACO also sends a copy of the TC to the Design, Manufacturing, & Airworthiness Division, Attention: Operational Oversight Policy Branch, AIR-140.

e. Record Requirements. The issuing ACO keeps a copy of the TC or STC with an original signature for official record purposes.

f. Reissuing Duplicate TC. A TC holder who cannot find the original TC may obtain a duplicate by sending a written request to the CMACO. They must submit an affidavit attesting that the original TC is lost, misplaced, or destroyed. The FAA will reissue a duplicate TC with the following statement under the TC number: "Reissued on (date) to supersede the original TC, which has been lost or misplaced." The FAA will put a note in its records to show the original TC is null and void. If the TC holder later finds the original, then the TC holder should give the original to the FAA.

g. Transferring a TC.

(1) Assuming TC Holder Privileges and Responsibilities. The transfer of a TC (and STC) is the process of changing the holder of a TC (and STC). After receiving a TC through a transfer, the TC holder agrees to all privileges of a TC holder as authorized in § 21.45. The TC holder also agrees to all responsibilities, including the continued airworthiness responsibilities for all aircraft produced under that TC, inclusive of those aircraft produced by previous TC/PC holders.

(2) Certificate Transfer to a New Certificate Holder Located in the US, Including Transfer to Another Geographic Area. When a TC holder transfers a TC to a new certificate holder located in the U.S., the receiving ACO must reissue the TC only after verifying the complete set of the FAA files for the certificate has been transferred from the previous CMACO to the receiving ACO, which is now the new CMACO. The TC holder submits the original TC to the CMACO after completing and signing the transfer endorsement on the reverse side of the TC. This changes the TC holder, and the effective date is the date of the TC holder's signature. The signature must be that of the individual shown as the TC holder. For a TC issued to an organization, the former TC holder must submit an affidavit (with the corporate seal if the holder is a corporation) signed by an officer of the grantor organization. The affidavit certifies that the grantor organization's officer has authority to sign the transfer endorsement on the organization's behalf. To reissue or transfer a TC to a holder in another geographic area, the CMACO must prepare a new TC in the new holder's name. When a TC holder transfers its TC, the complete TC files must also transferred to the geographic ACO for the new holder. The TC holder must send all correspondence to the receiving ACO, which is now the CMACO. Under "Date of Issuance," the ACO will enter the date of the TC holder's signature on the transfer endorsement. All other items on the TC remain the same as on the original. Reissuance of a TC requires the TCDS to be revised to show the new holder and the record of previous holders.

(3) Transferring when the Original TC is Missing. The normal process is for the TC holder to complete the transfer endorsement on the reverse side of the original TC; however, in some cases the original TC may be missing. In that case the TC holder must submit an affidavit attesting that: the original TC is lost or destroyed; include a statement that the TC holder is transferring the TC to a new holder; and provide the new holder's company name and address. When this transfer information is provided as part of the affidavit then the FAA can forego the step of reissuing a duplicate TC and issue an original TC directly to the new TC holder in the new holder's name.

(4) Maintaining FAA Data File. If the TC holder maintains the FAA data file, the FAA must not reissue the TC until the FAA and the new TC holder reach an agreement on how to maintain and store the FAA data file.

(5) A Holder's Name Change requires reissuing the TC.

(6) Certificate Transfer to a Foreign Holder. Transfers to or from a non-U.S. entity require special coordination with the foreign CAA and the International Division, AIR-400.

h. Cancelling a TC.

(1) A TC is effective until revoked or suspended (see § 21.51).

(2) Revocation of a TC is a legal action canceling the TC. For example, the FAA will revoke a TC when the TC holder is unwilling or unable to ensure the continued airworthiness of the product. Suspension of a TC is a temporary revocation of the TC. The revocation or suspension of a TC may be a basis for invalidating the airworthiness certificates of all the products certificated under that TC.

(3) When the FAA begins the process to revoke a certificate, it should request all data used to substantiate the basis for issuing the TC. This action may also be appropriate when the FAA is suspending a TC, if it is likely that a TC revocation will follow.

(4) Upon revocation or suspension of a TC, the holder must provide the original TC to the FAA. The accountable directorate cancels the TC. The word "canceled" is stamped or typed on the body of the original TC, and the manager of the accountable directorate signs and dates the TC. The "canceled" original TC is then returned to the holder. The ACO manager also records the TC cancellation on the ACO file copy of the TC. For suspended TCs, when the suspension ends, the TC should be reissued to the holder.

(5) A note is added to the TCDS documenting the cancellation date of the TC, stating this TCDS is not valid for aircraft manufactured after the cancellation date. Changes to the TCDS are forwarded to the Operational Oversight Policy Branch (AIR-140) in Oklahoma City.

i. Surrendering a TC. Refer to FAA Order 8110.120, *Processing Surrendered, Abandoned, and Historical Aircraft Type Certificate,* for the most current policy and procedures for processing type certificates (TC) or supplemental type certificate (STC) surrendered by a design approval holder (DAH).

j. Procedures When Certificate Holders Cannot Be Located. Refer to FAA Order 8110.120, *Processing Surrendered, Abandoned, and Historical Aircraft Type Certificate,* for the most current policy and procedures when the certificate holder cannot be located.

k. No Splitting a TC.

(1) The FAA receives requests from TC holders to "split out" one or more models (aircraft, engines, or propellers) from a TC, to allow the TC holder to transfer the type design approval of the specific model(s) to another party without transferring the complete TC. The FAA does **not** allow this practice. Splitting out models would require the issuance of a new TC to the transferee and the airworthiness requirements of 14 CFR part 21 would prevail. In particular, the airworthiness requirements specified by § 21.17(a)(1) must be met. If petitions for exemptions from the requirements of § 21.17(a)(1) were allowed, new

families of aircraft, engines, or propellers could be developed without showing compliance to the latest airworthiness standards.

(2) A TC holder may still sell or otherwise make its design data available to another party. If the transferee (receiving party) wants to produce aircraft, engines, or propellers and the designs are eligible for FAA airworthiness certification or acceptance, several alternatives are available. The receiving party may:

(a) Produce the product under license to the extent allowed under 14 CFR part 21, Subparts F or G without becoming the TC holder.

(b) Produce the product under license following a program outlined in AC 21-24, *Extending a Production Certificate to a Facility Located in a Bilateral Airworthiness Agreement Country*, and complying with the requirements of § 21.139.

(c) Apply for a new TC for the aircraft, engine, or propeller under 14 CFR part 21, Subpart B.

(3) If the receiving party selects the option in paragraph 3-2k(2)(a) or 3-2k(2)(b) above, then the original TC holder remains responsible for the continued integrity of the approved type design. Also, the original TC holder continues to be the FAA's contact point for resolving safety issues requiring corrective action (for example, ADs).

(4) If the receiving party selects the option in paragraph 3-2k(2)(c) above, then the certification basis is effective on the date of the new application. The FAA allows the new applicant as much credit for previously approved design data and tests as is practicable in showing compliance with the later requirements. In determining the aircraft certification basis, consideration of the original special conditions, ELOS findings, and exemptions must be addressed. Applicants must give clearly documented evidence showing their product meets the objectives of the later regulatory requirements.

(5) Under the option in paragraph 3-2k(2)(c) above, when the applicant for the new TC is located outside the U.S., the FAA must not issue a new TC unless the applicant is located in a country having a bilateral airworthiness agreement with the U.S. In these cases, the applicant should seek a new FAA TC through the airworthiness authority of their country. The FAA will work through that country's aviation authority to agree on special conditions, equivalent safety findings, and exemptions associated with the product.

l. Provisional TC. The FAA uses FAA Form 8110-9 to issue a provisional TC (see chapter 6, paragraph 6-1 of this order). The FAA uses the same TC number for both the provisional and the final TC. Type the word "PROVISIONAL" above the line "TYPE CERTIFICATE." Delete or mark through the line (near the bottom of the form) on how to transfer the certificate, since a provisional TC is not transferable. Provisional TC are issued for the following:

(1) Flight crew training;

(2) Demonstration flights by the manufacturer for prospective purchasers;

(3) Market surveys by the manufacturer;

(4) Flight checking of instruments, accessories, and equipment; and

(5) Service testing of the aircraft (see 14 CFR part 21, Subpart C; §§ 91.317 and 121.207 for regulations on issuing provisional TCs and limitations for operating provisionally certificated aircraft).

3-3. TYPE CERTIFICATE DATA SHEET (TCDS).

a. What is a TCDS? The TCDS is the part of the TC documenting the conditions and limitations necessary to meet certification airworthiness requirements.

b. Approving the TCDS. The ACO manager approves the TC and the ACO publishes the TCDS as required by § 21.41, after it is prepared in Microsoft Word (or equivalent) format by the project manager. The TC approval may be a written notification or an email to the applicant. The TCDS must also be electronically sent to AIR-140 for processing. The contents of the TCDS are described in this chapter.

c. Completing the TCDS. The TCDS can be partially completed when the TIA is issued. However, the TCDS must be completed within two weeks after issuance of the TC. The CMACO must send an informational copy of the TCDS to the accountable directorate and to AIR-140 within two weeks after the issuance of the TC.

d. Formatting the TCDS. The format of the TCDS should be consistent for all type-certificated products, containing only the information applying to the particular product.

(1) Include the following information (in the order listed) in the TCDS title box in the upper right-hand corner of page 1:

(a) The TCDS number (which is the same as the TC number),

(b) The revision number,

(c) The name of the TC holder in abbreviated form (for military surplus aircraft, do not use the original manufacturer's name; use only the current TC holder's name),

(d) All approved models listed in alphabetical or numerical order for convenience in filing, and

(e) The issue date.

(2) The ACO updates the TCDS to reflect the name of the new TC holder when a TC is transferred or when a company name changes. The ACO changes the name in the title box on the TCDS and opposite the item "TC Holder" and adds the old TC holder's name into the Type Certificate Holder Record. The ACO will transmit the updated TCDS to AIR-140 for posting on the RGL website within 30 calendar days of the transfer to the new TC holder.

(3) The title of the document appears in the center of the page as "TYPE CERTIFICATE DATA SHEET NO. XXX."

(4) Insert the applicant's name and address opposite the words "TC Holder." The name and address should be the same as shown on the application for TC.

(5) The paragraph titled "Type Certificate Holder Record" identifies the original holder and any subsequent holders of the TC. This is a cumulative record; each revision will

show all previous holders. Provide information in the following form: "ABC Corporation transferred TC 123 to XYZ Corporation on January 1, 1999." Add all known transfers to the Holder Record paragraph when a TCDS is revised for any reason. See an example of the first page of a TCDS with the Holder Record in Appendix 2, figure 6 of this order.

(6) One or more sections follow the identification of the TC holder and holder record. Each section addresses an individual model of the general type covered by the TC.

(a) Start each model's section with a Roman numeral, followed by the model designation, copied from the application for TC.

NOTE: Do not include unofficial common, popular, or marketing nomenclature in the TCDS.

(b) Include the category or categories in which the aircraft is certificated, in parenthesis following the model designation. Next is the approval date, which is the date on the TC. Also, see Appendix 2, figure 7 of this order for the product codes (designations) used for some small airplanes, rotorcraft, and engines.

(c) Immediately below the heading for the new model, show the differences between the new model added to the TCDS and a previously approved model. This information helps in determining the eligibility of a conversion from one model to another.

b. Information Required for Each Model Aircraft TCDS. The TCDS contains each item listed below, under the same headings shown. If several models are included under the same TC, a section covers each model and items are repeated under each section with the exception of the datum, mean aerodynamic chord, leveling means, control surface movements, and production basis. If these items are common to all models, list them under "Data Pertinent to All Models." Include a reference to detailed information for each item, if that information is in an approved FAA document and is readily available. For example, information in the aircraft flight manual could be referenced via the TCDS if copying that information into the TCDS would be voluminous. The following are instructions for completing the TCDS.

(1) Engine. Show the abbreviated name of the engine manufacturer, the number of engines installed the engine TC number, and the complete model designation for all engines for which the manufacturer has obtained approval under this certificate.

(2) Fuel. Show the minimum fuel grade and approved alternate fuels for the basic engine and any optional engines approved for the aircraft.

(3) Engine Limits. Show the installed maximum continuous and takeoff ratings of the engines, including power setting parameters (for example, manifold pressure, and engine pressure ratio), revolutions per minute (rpm), and power or thrust output. The limits may be less than, but must never exceed, the rating for the engine shown on the applicable engine TCDS. Any reduction may be dictated by structural, vibration, performance, or other requirements. For altitude engines, that is, supercharged engines, the limits are shown for sea level and for the critical altitude or altitudes. Include a statement about variation between altitudes such as "straight line manifold pressure variation with altitude from sea level to 10,000 feet."

(4) Propeller and Propeller Limits. Show the name of the propeller manufacturer, the number of propellers installed, the propeller TC number, and the model designation for each propeller for which the manufacturer has obtained approval. Include the propeller limits and any operating restrictions peculiar to the propeller or propeller-engine combination.

(a) Show the static rpm limits and diameter limits for fixed-pitch propellers. For example, if the TIR shows that the static rpm limits are between 2,200 and 2,350, the TCDS would include a note as follows: "Static rpm at permissible throttle setting: Not over 2,350 rpm, not under 2,200 rpm. No additional tolerance permitted." In the basic limits, give all tolerances that the FAA permits.

(b) Show the diameter limits and blade angle settings (feathering, high, low, and reverse, as applicable) for adjustable, two-position, controllable, and automatic propellers. Also, show the applicable static rpm limits (with tolerances), if considered desirable. The diameter limits should include both the maximum and minimum allowable limits for repairs and the following note: "No further tolerance permitted."

(c) The FAA requires additional information in certain circumstances, such as:

1 The model designation of both the hub and the blades if the propeller blades are not an integral part of the hub.

2 If interchangeable blades are listed, include a note showing where to find the listing of any eligible blades.

3 The reference blade station at which the angle is measured for propellers. This enables the blade angle setting to be varied.

(5) Rotor Speed Limits. Include helicopter rotor speed limitations, with power on and power off.

(6) Transmission Torque Limits. Include helicopter transmission torque limits.

(7) Airspeed Limits. Show all applicable airspeed limits in mph and/or knots, as appropriate, and indicate whether the airspeeds are calibrated or indicated. Use the airspeed found in the Civil Aviation Regulations or in the 14 CFR sections under which the aircraft is type certificated.

(8) Center of Gravity (C.G.) Range. The C.G. range approved for the extreme loading conditions of the aircraft are provided in distance from the datum. It is satisfactory for dimensions to be measured to the nearest tenth of an inch, or equivalent. If the landing gear is retractable, the limits should be given in terms of landing gear extended and a statement should be added to that effect. Include the moment change due to the retraction of the landing gear. No specific standard for presentation can be set in the case of aircraft where the C.G. limits vary with loaded weight.

(9) Empty Weight C.G. Range. An empty weight C.G. range may be established. If not, insert the word "none" after the heading. If provided, the forward and aft limits are in

distance from the datum. Include a full explanation if the C.G. range is affected by items of equipment. If an empty weight C.G. range is established, include the following statement, with the wording modified to suit the individual case:

> "When the empty weight C.G. falls within the range given, complete computations of critical forward and aft C.G. positions are unnecessary. Range is not valid for nonstandard arrangements."

(10) Datum. The datum, designated by the applicant, is a definite, unmistakable, and unchangeable point for the purpose of taking measurements to identify locations on the aircraft. The applicant defines it so that it may be readily identified.

(11) Leveling Means. Include the description of the means provided for leveling the aircraft, with information for location and accessibility of a leveling point. The leveling point is always a definite, unmistakable, and unchangeable point on the aircraft.

(12) Maximum Weights. Include all applicable maximum weights such as ramp, landing, takeoff, and zero fuel weights. Include engine-out ferrying operation weight, if available.

(13) Minimum Crew. Include the minimum crew required for normal operation when established by regulation. Identify the location of the pilot-in-command station, as necessary.

(14) Number of Seats. The following are some design considerations that may limit the number of seats:

(a) In *transport category aircraft*, the following may limit the passenger capacity: emergency exit requirements, oxygen requirements, demonstration of emergency evacuation procedures, or the structural strength of the floor. Other considerations may also apply. Note that cabin attendants are not included in the maximum number of passengers.

(b) For *aircraft other than transport category*, indicate the number of seats and the moment arms of the seats. The seat moment arms are typically those of the seat occupants rather than the actual seats. The occupant's C.G. may be assumed at a point 8.5 inches forward and 10.5 inches above the intersection of the seat back and the seat bottom, with the upholstery compressed approximately the same as when the seat is occupied. Typically, the moment arms of adjustable seats are given for the mean or average location. If the C.G. range is critical, the extreme positions may be defined.

(c) If the *aircraft is not approved for passenger seats*, insert "none."

(15) Maximum Compartments Weights. Show the maximum weight capacity and moment arm of each baggage compartment. List the floor loading densities, as appropriate.

(16) Fuel Capacity. Give the total capacity of each fuel tank installed in the aircraft and its moment arm, and the amount of usable and unusable fuel in each. Include a note to add the unusable fuel to the certificated empty weight of the aircraft.

(17) Oil Capacity. Same considerations as fuel capacity.

(18) Maximum Operating Altitude (when appropriate).

(19) Control Surface Movements. Include the total travel in each direction of each movable control surface on the aircraft. This information is included as a convenience to maintenance personnel and FAA representatives and is not intended to prescribe control movements as an item of inspection unless a specific statement to that effect is included. If the flight characteristics of the aircraft require close tolerance on the control movements, it is necessary to have a method to make accurate measurements. In such cases, it is generally satisfactory to list the maximum movements either in terms of degrees or in terms of distance from a well-defined point. In either case, the points of measurement must be defined to ensure accurate measurements. If the description of the maximum movement or the specified means of measuring control surface movement is too complicated to be included in the TCDS, refer to an FAA-accepted maintenance manual or FAA-approved drawing that defines the maximum movement and method of measurement.

(20) Manufacturer's Serial Numbers. Include the manufacturer's serial numbers for each aircraft under a particular model. The number should be in the same form as it appears on the manufacturer's aircraft data plate. If aircraft are being manufactured under more than one manufacturer or production approval, separate the serial numbers by the manufacturer or production approval.

(21) Import Requirements.

(a) For imported aircraft, describe the document used by the country of manufacture to certify that the individual aircraft conforms to the type design and is in a condition for safe operation (see 14 CFR § 21.183(c)). This document is the basis for showing if an imported aircraft is eligible for a U.S. airworthiness certificate. The description must be clear and complete. An acceptable import statement follows:

> "A U.S. airworthiness certificate may be issued on the basis of [NAME OF COUNTRY] Certificate of Airworthiness for Export signed by a representative of [FOREIGN CIVIL AVIATION AUTHORITY], containing the following statement: "The aircraft covered by this certificate has been examined and found to comply with [DOCUMENT IDENTIFIER, TITLE REVISION, AND SO FORTH] approved under U.S. Type Certificate No. [TYPE CERTIFICATE NUMBER] and to be in a condition for safe operation."

(b) Title 14 CFR § 21.183(c) or § 21.185(c) is the U.S. airworthiness certification basis for an aircraft type certificated under 14 CFR § 21.29 and imported from the country of manufacture.

(c) Title 14 CFR § 21.183(d) or § 21.185(b) is the U.S. airworthiness certification basis for an aircraft type certificated under 14 CFR § 21.29 and imported from a country other than the country of manufacture (for example, a third-party country).

(d) Title 14 CFR §§ 21.183(d) or 21.183(b) is the U.S. airworthiness certification basis for issuing an airworthiness certificate to an aircraft type certificated under 14 CFR § 21.21 and imported from a country in which it was manufactured under a licensing arrangement.

(e) Title 14 CFR § 21.183(d) is the U.S. airworthiness certification basis for an aircraft originally type certificated under 14 CFR § 21.21, transferred outside the United States, and re-imported.

(f) Find additional guidance in FAA AC 21-23, Airworthiness Certification of Civil Aircraft, Engines, Propellers, and Related Products Imported into the United States.

(22) Certification Basis.

(a) Define the applicable regulations and amendments, special conditions, and the effective date of the applicable 14 CFR sections. For each change in the TC, record the applicable regulations that are different from the regulations recorded at TC issuance.

(b) Include a note if the manufacturer obtained a TC under the delegation option authorization.

(c) Indicate whether the applicant showed compliance with the applicable ditching provisions and ice protection criteria.

(d) Identify all special conditions, exemptions, and ELOS findings.

(e) Include the TC number and the date the FAA issued the TC.

(f) Include the date of application for the TC.

(g) For small airplanes, and other aircraft if applicable, indicate if the aircraft has an operational restriction, such as: Day VFR only, Day-Night VFR only.

(h) If the airplane is RVSM capable, indicate the effectivity and modifications required to be RVSM approved, if necessary.

(23) Production Basis.

(a) If the FAA has issued a PC to the TC holder, list the PC number. If the FAA issued a PC under the delegation option authorization procedure, include the following statement:

> A production certificate was issued and the manufacturer is authorized to issue airworthiness certificates under the delegation option authorization provisions of 14 CFR part 21.

(b) If the FAA has not issued a PC, insert the following:

> "None. Before original airworthiness certification of each aircraft, an FAA representative must perform a detailed inspection for workmanship, materials, conformity with the approved technical data, and a check of the flight characteristics. In the event of an application for a standard airworthiness certificate or, if an applicant intends to produce a new aircraft under 14 CFR § 21.183(d), and the applicant is manufacturing, building, or assembling to another

person's type certificate, the applicant must provide written evidence of permission from the type certificate holder. Conduct of such activity without written evidence of permission may be a violation of 49 U.S.C. § 44704(a)(3)."

(c) If a licensee of the TC holder is manufacturing aircraft, list the licensee's name and PC number, with the aircraft serial numbers produced by the licensee.

(d) If the PC is canceled and the TC remains active, the production status is defined as follows:

"None. Before original airworthiness certification of each aircraft manufactured subsequent to (date of cancellation of PC), an FAA representative must perform a detailed inspection for workmanship, materials, conformity with the approved technical data, and a check of the flight characteristics. In the event of an applications for a standard airworthiness certificate or if an applicant intends to produce a new aircraft under 14 CFR § 21.183(d) , and the applicant is manufacturing, building, or assembling to another person's type certificate, the applicant also must provide written evidence of permission from the type certificate holder. Conduct of such activity without written evidence of permission may be a violation of 49 U.S.C. § 44704(a)(3)."

(24) Equipment.

(a) Use the following statement:

"The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification."

(b) List the additional or special equipment found necessary for type certification, and the exceptions to the prescribed minimum equipment. List alternates to equipment found necessary for certification. Do not list on the TCDS the optional items of equipment, except engines and propellers for which the aircraft manufacturer gets approval. Show the equipment list supplied by the manufacturer with each aircraft.

(25) Service Information. For import products only, add a statement on the TCDS to reflect how service information will be handled. For example:

"Service bulletins, structural repair manuals, vendor manuals, AFMs, and overhaul and maintenance manuals, which contain a statement that the document is approved by the [NAME OF THE FOREIGN CIVIL AVIATION AUTHORITY], are accepted by the FAA and are considered FAA approved. (These approvals pertain to the design data only)."

"Service bulletins, structural repair manuals, vendor manuals, AFMs, and overhaul and maintenance manuals, which contain a statement that the document is approved by the [NAME OF THE FOREIGN CIVIL AVIATION AUTHORITY], are accepted by the FAA and are considered FAA approved. (These approvals pertain to the design data only)."

(26) Notes. Refer to FAA Order 8110.121, *Type Certificate Data Sheet (TCDS) Notes*, for additional guidance and instructions in the preparation of TCDS notes.

(a) Do not use a lot of notes, if possible. Include applicable explanatory material with the item to which the note refers. Do this even if you must repeat the information several times. If it is impractical to include the explanatory material with the item to which it refers because of its length or complexity, then the information may be included in a separate note. In this case, the applicable items would include a reference to the note.

(b) When referring to a note, explain what the note discusses. The following note is an example of a cross-reference inserted after the fuel capacity:

See NOTE 1 for data on weight and balance.

(c) Use extreme care in choosing the language in a note. Many difficulties have arisen in the past because of misinterpreted notes. Examine material carefully to ensure the meaning is unmistakable.

1. Reserve NOTE 1 for the "weight and balance note." Use this note for weight and balance data, equipment lists, and loading instructions. This note is standardized, except for special considerations about weight and balance (such as information on unusable fuel, system fuel and oil, variations in center of gravity (CG) ranges, or removable ballast). The standardized part of this note is as follows:

"*A current weight and balance report, including a list of equipment included in the certificated empty weight, and loading instructions when necessary must be provided for each aircraft at the time of original certification. This requirement is in accordance with 14 CFR xx.xx."*

2. Reserve NOTE 2 for information pertaining to the required placards.

a. Include the following statement:

"All placards required by either the FAA-approved [Aircraft] Flight Manual, the applicable operating rules, or the Certification Basis must be installed as specified."

b. Make reference to the appropriate regulation, as applicable.

c. If the aircraft was certified prior to the requirement for a flight manual and does not have a flight manual with placards, then list the placards that were required by the aircraft's certification basis in NOTE 2. The listing should contain both the exact language of the placard and the placard's location.

3. Reserve NOTE 3 for reference to the Instructions for Continued Airworthiness (ICA).

a. The note related to the ICA (see §§ 23.1529, 25.1529, 25.1729, 27.1529, and 29.1529) should address methodology; avoid referring to a specific facility or company. Avoid language promoting a TC holder or their suppliers as the sole source for maintenance or overhaul.

b. It is contrary to 14 CFR parts 43 and 21 to include a note that all repairs or modification schemes must be approved by the TC holder prior to FAA approval.

c. For import products only, add a statement in NOTE 3 to reflect how service information will be handled, including a reference to where the service information can be found (e.g., a manual service document or a service bulletin). Do not reference a specific facility or company.

(27) Restricted Category Aircraft. When the applicant has developed advisory information for restricted category operation of aircraft, include the following information in a note on the TCDS (Refer to Order 8110.56, *Restricted Category Type Certification*):

(a) Restricted category weights, speeds, ranges, and altitudes at which the applicant has shown compliance with § 21.25.

(b) Additional operating restrictions for the special operations approved under § 21.25(b).

(c) A statement that applicants did not necessarily comply with standard category airworthiness design and airworthiness standards, under restricted category certification.

(28) Information on Spare or Surplus Parts. If the applicant for an airworthiness certificate is building aircraft to another person's TC from spare or surplus parts, then the builder must provide written evidence of permission from the TC holder. This is to ensure the applicant has all the data necessary to establish conformity to the type design. For these types of aircraft, the aircraft make is that of the builder, not the PAH. For these aircraft, enter the serial number assigned by the builder. That number should not be confused with the serial number assigned by the original PAH who builds the same type of aircraft under a production approval. It is suggested that a letter prefix or suffix, such as the builder's name or initials, be used with the serial number for positive identification. Add the following note:

> **NOTE:** (PAH's name) did not produce the following aircraft. The FAA lists them by the builder's name and serial numbers.

f. Information Required for an Engine TCDS. See AC 33-2, *General Type Certification Guidelines for Turbine Engines*, for details of engine TCDS. Also, refer to FAA Order 8110.121, *Type Certificate Data Sheet (TCDS) Notes*, for standardized TCDS notes for engines.

g. Information Required for a Propeller TCDS.

(1) Type. Briefly describe the propeller (e.g., ground adjustable, manually controllable, mechanical, two-position hydraulic, constant speed, electrical). Describe pitch control in Note 3, and feathering and reversing in Note 4. Refer to these notes when applicable.

(2) Engine Mounting. Describe the type of engine mounting necessary for the propeller, (e.g., SAE No. 50, SAE No. 60, SAE No. 2 flange, or Special flange 6.75-inch bolt circle). Refer to Note 1 when applicable.

(3) Hub Material. Describe the basic material used for fabrication of the hub.

(4) Blade Material. Describe the basic material for fabrication of the blades.

(5) Number of Blades. List the number of blades.

(6) Hub Models or Propeller Model Designations. List hub model, propeller model, or designations. Refer to Note 1 when applicable. Add suffixes to the basic hub model designation to show hub drillings or special design features. For instance, an "L" may mean one size bolt circle and a "K" another, or add a "60" to show that the propeller fits an SAE No. 60 shaft, and a "50" to show it fits an SAE No. 50 shaft. Explain what the suffixes mean here or in a Note on the TCDS.

(7) Blades.

(a) The blades approved for use in the hub or hubs listed are shown on the data sheet in tabular form as follows:

Blades (see Note 2)	Maximum Continuous HP RPM	Takeoff HP RPM	Diameter Limits (see Note 2)	Approximate Propeller Weight	Notes

(b) If the blades listed have been approved at different ratings in more than one hub model, separate tabulations should be made under each applicable hub model. Under each heading list the following information:

1. Approved propeller blade in the column marked "Blades." First, list the model designation of the blade resulting in a propeller of the largest diameter approved with that particular blade. Next, list the model designation of the blade resulting in a propeller of the smallest diameter approved with that particular blade. The preposition "to" should be inserted in between the two dimensions. The method used by the applicant to denote a reduction in diameter is explained in Note 2. Therefore, this note is referenced by placing "(see Note 2)" below "Blades".

2. Maximum continuous horsepower and revolutions per minute (rpm) ratings for which the FAA approved the propeller under the appropriate headings.

3. Takeoff ratings under the appropriate headings.

4. Maximum and minimum propeller diameters as shown by the corresponding blade model designations. An applicant may use the same blade model in several propeller models. In each case, check the resulting propeller diameter because the FAA cannot assume that the resulting propeller diameters are identical. This is because the blade socket of one hub may be further from the hub centerline than the blade socket of another hub. The diameter limits are nominal limits as explained in Note 2. Therefore, Note 2 should be

referenced under the heading of "Diameter Limits." Do not include nominal propeller diameter limits in an aircraft data sheet or specification. Instead, the appropriate manufacturing tolerances are added to the maximum permissible diameter and subtracted from the minimum permissible diameter.

5. Total weight of the propeller under the column heading "Approximate Propeller Weight." Include hub, blade, and spinner weight, and refer to appropriate notes.

6. Number of any appropriate note in the "Notes" column.

(8) Certification Basis. List the following:

(a) 14 CFR part number and date (including latest amendment) at the time the application was submitted,

(b) Any special conditions, ELOS findings, or exemptions,

(c) The foreign certification basis for imported propellers,

(d) The TC number and date issued, and

(e) The date of application for TC.

(9) Approval Basis for Import Propellers. Title § 21.500 gives information on the airworthiness acceptance of aircraft propellers manufactured outside of the U.S. These propellers must have a U.S. TC. The FAA offers more guidance in AC 21-23.

(10) Include the following sample statement on the TCDS:

"To be considered eligible for installation on U.S.-registered aircraft, each propeller imported into the U.S. must be accompanied by a certificate of airworthiness for export or a certifying statement endorsed by the exporting cognizant civil airworthiness authority. Include the following language in the certifying statement:

(1) "This propeller conforms to its U.S. type design (Type Certificate Number_____) and is in a condition for safe operation; and

(2) The manufacturer has performed a final operation check on this propeller and it is in a proper state of airworthiness."

(11) Production Basis. List the PC number.

(12) Notes. Use the same numbering system and subject heading for Notes 1 through 12 on propeller data sheets. If a particular subject does not apply, insert "not applicable." The explanation for Notes 1 through 12 is as follows:

(a) NOTE 1. Hub Model Designation or Propeller Model Designation. Describe the hub or propeller model, whichever applies. The FAA usually uses numerals or letters in the hub or propeller model to identify features such as basic design, number of blades, blade shank size, or the size of the engine flange or spline required for mounting the propeller. Use suffixes for minor changes that do not affect eligibility or involve major design features. Use a diagram to define each numeral or letter in the model designation. Sometimes, when military agencies also use the propeller, identify the propeller by adding a suffix to the hub model designation. In such a case, the FAA gives Note 1 the title "Propeller Model Designation" and explains the suffix. Add the propeller blade model to this designation, if the FAA included it in the

applicable aircraft data sheet. Otherwise, include a parts list to determine the blade model and propeller diameter involved.

(b) NOTE 2. Blade Model Designation. Use a diagram similar to that used for the hub model designation to define any numerals or letters and to describe the system for showing propeller diameter reductions. When applicable, below the diagram, describe the system the applicant used to identify telescoped blades or blades with square cutoffs. Include the following sample note to explain "Diameter Limits" in the "Blades" table:

> "Diameter limits are nominal diameters of the assembled propeller. They do not include the + or - 1/8-inch manufacturing tolerance the FAA allows for propellers with a basic diameter of less than 14 feet. They also do not include the + or - 1/4-inch the FAA allows for propellers with a basic diameter of 14 feet or larger."

(c) NOTE 3. Pitch Control. Describe the pitch control components substantiated by the applicant. Indicate whether the applicant included the pitch control components in the propeller type design. The applicant should have identified the pitch control components by name and model. For integrated control systems, add the following sample statement to show the relationship between the propeller manufacturer and engine manufacturer (the engine TCDS should have a similar statement):

> "The propeller model xxx complies with the propeller airworthiness requirements when used with yyy engine only. If you change the engine or its control system, then you must show that the propeller – as integrated with the changed engine and its control system – still complies with the propeller certification basis. Also, if a change to the propeller changes the engine, then show that the engine still complies with the engine certification basis."

(d) NOTE 4. Feathering and Reversing. Identify any models that feather and/or reverse and show any special control that the FAA approved.

(e) NOTE 5. Left-Hand Models. Show the approval status of the left-hand blade model of an approved right-hand blade model. When applicable, refer to Note 5 in the "Blade." The following sample note may be used rather than repeating the ratings and diameter limits for the left-hand model: The left-hand version of an approved propeller model is eligible at the same rating and diameter limitations as listed for the right-hand model."

(f) NOTE 6. Interchangeable Blades. Include all information about limitations associated with interchangeability, such as interchangeability in one direction only, aerodynamic similarity, and structural similarity.

(g) NOTE 7. Accessories. Describe the accessories that the applicant substantiated, such as spinners, governors, and de-icing and anti-icing equipment. Show whether the applicant included the substantiated accessories in the propeller type design. The propeller manufacturer must show that accessories not included in the propeller type design, but included in the propeller approved parts list, comply.

(h) NOTE 8. Shank Fairings. Show when a blade has been modified to include shank fairings or cuffs. If the blade model included shank fairings or cuffs when originally certificated, then you don't need Note 8 because the blade model designation is enough.

(i) NOTE 9. Special Limits. List the propeller-engine combinations approved considering vibration for use on normal category, single reciprocating engine tractor aircraft or approved installations of propellers approved under § 21.21.

1. A conventional aluminum-bladed propeller model is eligible vibration-wise in any normal category, single reciprocating engine tractor installation when it is installed on the same engine model used for the vibration approval of the particular propeller-engine combination. If the propeller vibration stress survey was conducted on a multi-engine or pusher installation, then any placard found applicable in such a survey is applied to the single reciprocating engine tractor installation until a vibration re-survey shows that the placard is not required on the single reciprocating engine tractor application. Approvals of this type should be listed under Note 9 as follows:

Table of Propeller-Engine Combinations
Approved for Use on Normal Category
Single-Reciprocating Engine Tractor Aircraft

Below are the maximum and minimum propeller diameters you may use from a vibration standpoint. The FAA does not allow any measurements below the minimum diameter listed, since this figure includes the smallest diameter that the FAA will allow for repair purposes.

Hub Model	Blade Model	Engine Model	Max. Diameter. (inches)	Min. Diameter. (inches)	Placards

2. The approval of most import propellers (see § 21.29) includes the vibration and performance approval of the propeller for use on a particular engine-airplane combination. List these approvals under Note 9. The format should be appropriate to the data on the TC from the country of origin or as follows:

Approved Installations

The FAA approves propellers in this data sheet for use only in the engine-aircraft combinations listed below:

Propeller Model	Aircraft Model	Engine Model	Maximum Takeoff Weight	FAA Data Sheet Aircraft Engine

(j) NOTE 10. As part of the propeller TC, engine TC, or aircraft TC, the FAA may approve some components required to operate the propeller system. These components typically include governors, spinners, and de-icing systems. To complete the approval process, these components may require additional compliance with the applicable engine and airplane airworthiness requirements. Include the following statement:

"The propeller installation must be approved as part of the aircraft type certificate to demonstrate compliance with the applicable aircraft airworthiness standards."

(k) NOTE 11. Special Limits. List, or include by appropriate reference, all propeller life limits and airworthiness limitations identified in Appendix A – Instructions for

Continued Airworthiness, A35.4 Airworthiness Limitations Section. Include the following statement:

> "The propeller CMACO must evaluate the propeller installation for each new aircraft installation to assess possible changes in airworthiness limitations."

(l) NOTE 12. Special Notes. Use when a special note applies. For example, the FAA may occasionally grant the TC before the applicant has completed the required service manual. Use Note 11 when that happens to show that the propeller is not eligible for installation until a manual becomes available. Upon approval of a manual, delete that portion of Note 11 from the data sheet.

c. Information Required for Fixed-Pitch Propellers. Data sheets for fixed-pitch propellers are similar to those for propellers with detachable blades except as follows:

(1) Type – Fixed-Pitch (Single-Piece).

(2) Engine Shaft – Omit.

(3) Material – Describe the basic material and fabrication of the propeller.

(4) Number of Blades.

(5) Hub Models Applicable – Omit.

(6) Instead of the table of "blades," the following table of models should be used:

Model	Takeoff Max. Cont.			Standard	Hub Drilling			Diameter Pilot	Hub Dimensions		Weight (lb.)
					No.	Diameter	Diameter Bolt Circle				
(see NOTE 2)	HP	RPM	Diameter	Pitch	Holes	Holes		Hole	Diameter	Thickness	(Max. Diameter)

(7) NOTES. Use the following examples of typical notes:

(a) NOTE 1. Installation. These models are for installation on flanged propeller shaft ends (see NOTE 2). Do NOT use the front plate supplied by the engine manufacturer. Use the special steel bolts that the propeller manufacturer provides or specifies.

(b) NOTE 2. Model Designation. Use a diagram to show what the digits and letters in the propeller model designation represent. This diagram includes the data in Notes 1 and 2 for detachable blade propellers.

(c) NOTES 3, 4, 5, 6, 7, and 8. Mark "Not applicable" on the data sheet.

(d) NOTE 9. Special Limits. In the table of propeller-engine combinations, replace the "hub model" and "blade model" columns with a "propeller model" column. The table applies only to fixed-pitch metal propellers. List or include by appropriate reference all propeller life limits and airworthiness limitations identified in Appendix A, Instructions for Continued Airworthiness, A35.4 Airworthiness Limitations Section. Include the following statement:

"The propeller CMACO for each new aircraft installation must assess how the propeller installation could change the airworthiness limitations."

3-4. PREPARATION OF TCDS AND SPECIFICATIONS FOR PRINTING

a. TCDS Master. Within two weeks after issuance of a TC, the ACO prepares the TCDS and transmits it electronically to the Delegation and Airworthiness Programs Branch, AIR-140. AIR-140 posts it in RGL and prepares a monthly publication, which is forwarded to the Government Printing Office for distribution to paid subscribers in paper format.

(1) Printed Version Format. The TCDS are prepared on an 8-1/2 by 11 page using a universally accepted font of size 9 or 10. Margins should be 1 inch top to bottom and left to right.

(2) Page Numbering. The first page does not have a page number. Succeeding pages are numbered in a consecutive sequence indicating the total number of pages, as "2 of 34." The headers should be used for page numbering with the 0.5 default spacing (1/2-inch) from the top of page. Type in the TCDS number and page number as shown below:

Page number example:

A97CE 3 of 47

(3) The page grid at the bottom of the first page (optional) should reflect what pages have been changed in the latest revision.

Page No.	**1**	**2**	**3**	**4**
Rev. No.	**8**	**4**	**5**	**8**

Assumes this is Rev. 8 and only pages 1 and 4 were affected.

b. TCDS Revision. When a TCDS is revised, the revision number should be shown in the upper right-hand corner block of the first page. The date should also be revised to reflect the status. Indicate where text changes or additions have occurred by placing a vertical black line along the border margin.

A97CE
Revision 8
Smith Aviation
AA-11
BB-22
CC-33
August 16, 2004

3-5. CHANGING A SPECIFICATION DOCUMENT TO A TCDS

a. Aircraft Specification Documents. Before the FAA started to use the TCDS, the Civil Aeronautics Administration (CAA) (the FAA's predecessor) published a "specification" document after approval of an aircraft, engine, or propeller type design.

b. Including an Equipment List. Although the FAA can change aircraft specification documents to a TCDS, the conversion is complicated because a TCDS must include an equipment list. The FAA should convert specification documents only if:

(1) The TC holder provides an equipment list to be referenced in the TCDS or

(2) The equipment in the specification document is compatible with the TCDS concept.

c. Engine and Propeller Specifications. When the TC holder adds new models of engines and propellers to the TC, the FAA should change the specification document to a TCDS.

d. Changing a Specification Document to a TCDS. Pay particular attention to the information required under "Certification Basis," such as the applicable regulations, the date the FAA issued the TC, and the date of application for the TC. If the regulations applicable to a new model differ from those under which the FAA approved the original model, then the FAA needs to add the date of application for the new model to the TCDS under the "Certification Basis."

CHAPTER 4. CHANGES IN TYPE DESIGN

4-1. GENERAL.

a. Introduction. Title 14 of the Code of Federal Regulations (14 CFR) part 21 addresses changes to TCs (see 14 CFR Subpart D) and STCs (see 14 CFR Subpart E). Also, ACO engineers are requested to provide technical assistance to support the different FAA offices approving changes to in-service aeronautical products. The FAA permits a wide latitude in the approval process for minor changes to type design. Major changes to type design are approved using a process that mirrors the type certification process described in chapter 2 of this order. Most frequently, a major change to type design is approved by STC process. The STC process has some considerations different from the TC process. These include the major and minor change decision, and addressing the "fit" of the STC on the TC'd product.

b. Organization of this Chapter. The sections in this chapter use the following organizational scheme. The first grouping (paragraphs 4-2 through 4-7) includes items that are either general to product modifications or that apply to more than just the STC process. The second grouping (paragraphs 4-8 through 4-15) describes FAA STC approval process considerations. And the third grouping (paragraphs 4-16 through 4-22) are "how-to" instructions unique to STC projects.

4-2. MAJOR AND MINOR DESIGN CHANGES. The FAA issues amended TCs or STCs for approval of major changes to type design. The FAA classifies minor and major changes in 14 CFR § 21.93 by outlining what constitutes a "minor change." As such, the FAA and the applicant agree on the magnitude of the effects of the proposed change to determine its classification. In 14 CFR § 21.95, the rule states that minor changes in type design may be approved under a method acceptable to the Administrator prior to the submittal to the Administrator of any substantiating or descriptive data. Minor changes to a type design are at a minimum recorded in the descriptive data, with the FAA and the applicant determining an acceptable process for approving the data supporting the type design changes. Approval of changes deemed to be major (14 CFR § 21.97) requires the applicant to submit all substantiating and descriptive data for inclusion in the type design before FAA approval.

4-3. CERTIFICATION BASIS FOR CHANGED AVIATION PRODUCTS. In Amendment 21-77 to 14 CFR part 21, Subparts B, D, and E, the FAA established the current rules for determining the certification basis for changes to TCs. See the current version of Order 8110.48 for FAA directive material on determining the certification basis for changes to TCs. Specifically, 14 CFR § 21.101 requires an applicant for a change to a TC to show the changed product complies with the airworthiness requirements applicable to the category of the product in effect on the date of application for approval of the change, except where the following happens:

a. The change is not significant,

b. Areas of the product are not affected by the change,

c. Compliance of the affected areas with the current version of the airworthiness requirements would not contribute materially to the level of safety of the changed product, or

d. It would be impractical (on a cost basis) to require that compliance be shown to the latest version of the applicable airworthiness requirements.

e. If the change consists of a new or substantially complete redesign of a component or system and the existing certification basis does not provide adequate standards for the design change – that is, the change includes features that were not foreseen in the existing certification basis, then the applicant must comply with later appropriate regulations. If no later regulation(s) exist, special conditions (14 CFR § 21.101(d)) are required.

4-4. FIELD APPROVALS. The differences between major changes in type design, major alterations or repairs are a source of misunderstanding in the aviation industry. All major changes to type design must be approved using the STC or amended TC procedures. Order 8300.10, Airworthiness Inspector's Handbook, Vol. 2, Chapter 1, Field Approval Process, provides a decision flow chart for the field approval process, and a major alteration job aid containing specific examples of when the FAA will require a proposed modification to be approved as an STC. Both the flow chart and the job aid aim to ensure the field approval process is not used when the applicant either changes a TC's limits or changes many individual features that collectively must be evaluated to assure a changed product complies with its certification basis. Flight Standards Aviation Safety Inspectors (ASIs) may consult the ACO to determine if the scope and complexity of the proposed modification warrant an STC, or if other methods may be used to approve the data.

a. "Field Approvals Are Modifications to Individual Products."

(1) Field approvals are a means by which Flight Standards ASIs, under the provisions of 14 CFR parts 43 and 145, return an altered or repaired product to service. To return the product to service, Flight Standards may approve data applicable to an individual item by endorsing an FAA Form 337, Major Repair and Alteration. The ASI signs block 3 of FAA Form 337 to show FAA approval of the technical data or installations used to accomplish the major repair or major alteration.

(2) A modifier may create descriptive or substantiating data to support a field approval (FAA Form 337 with FAA inspector approval). Also, a modifier may give the FAA inspector acceptable data seeking the inspector's approval of the data for a specific major repair and alteration.

(3) DERs with the appropriate special authorization may also develop data in support of a specific major alteration or repair. If the DER data are all that are needed to support the FAA Form 337, then there is no need for an FAA inspector's endorsement. However, care must be taken to insure that all aspects of the alteration are addressed by the data presented. If the major alteration or repair requires data in addition to the DER-approved data, then the FAA inspector may determine that a field approval is appropriate. In such a case, when the FAA inspector is satisfied that all the appropriate requirements have been met, then the FAA inspector approves the FAA Form 337 by signing in the space on the form indicated "For FAA Use Only."

b. Informal Support Request for Field Approvals. For more information on the field approval process, see Order 8300.10, Vol. 2, Chapter 1. This order provides a process by which a modifier and an ASI determine whether a proposed modification should be an STC. The ASI may informally ask for ACO engineering help in determining if the complexity of either the modification or the aircraft being modified requires an STC.

(1) Flight Standards inspectors may request FAA engineering personnel to help them confirm the assumptions on which they base their approval of the data supporting the major alteration or repair. See Order 8300.10 for examples that aid the ASIs in the "evaluation" determination of major alterations/repairs.

(2) The inspector may also ask ACO engineering personnel to help determine whether a proposed modification has appropriate and comprehensive data or whether additional data are needed. (Examples of this are categorized as the "engineering" determination in Order 8300.10, Vol. 2, Chapter 1, Figure 1-3, "Major Alterations Job Aid").

c. Formal Request for Support of Field Approvals. Order 8300.10 also describes a process by which the FSDO inspector may formally request FAA engineering help to support a field approval. Note, when ACO engineering assistance is formally requested for review of the data associated with a major alteration or repair, the ACO's concurrence becomes an attachment to the FAA Form 337.

4-5. COMPLIANCE INSPECTION. For changes to a type design, a compliance inspection may ensure the boundaries and interfaces of the change to the original type design are correctly addressed. Because a change to a type design may consist of many individual changes, a compliance inspection will help to determine the individual pieces fit together to make a compliant whole changed product. For example, the installation of a complete interior for a transport category airplane typically requires a cabin compliance inspection. Many of the cabin safety rules contained in 14 CFR §§ 25.78 through 25.820 are addressed by a cabin compliance inspection. Because the applicant rarely has access to the original design data, compliance inspections are all the more important for STCs. See paragraph 2-6f of this order for general discussions of compliance inspections.

4-6. EXPERIMENTAL CERTIFICATE. FAA engineering and manufacturing inspection personnel will discuss with the applicant if an experimental certificate will be required for the project aircraft.

a. The FAA requires the applicant to conduct developmental flight testing under an experimental certificate issued for research and development. Also, FAA engineering may require certification flight testing to be conducted under an experimental certificate issued to show compliance to the regulations. For more information, see Order 8130.29.

b. The FAA must issue an experimental certificate if operating limitations are required to protect the public on the ground. The FAA must also issue an experimental certificate if the flight test requires that an aircraft be flown in a manner that approaches the limits set in the existing type certificate. This condition would happen if the flight test would require or may encounter performance that is significantly outside the aircraft's normal operations.

c. The ACO engineer will indicate on the TIA if an experimental certificate for showing compliance with the regulations is required. Indicate this in the instructions to the Manufacturing Inspector on the supplemental page for Block 12.

4-7. REVISIONS TO PERFORMANCE DATA. The applicant must review existing published performance data for the TC'd product to determine if the change to the aircraft adversely affects performance. Applicants must correct performance data that could mislead the operator (due to changes in performance caused by the STC) in their proposed AFM supplement. If the data that is adversely affected by the STC is not data of the type requiring FAA approval, then the AFM supplement must contain a note stating that the STC makes the published data invalid. The ACO may approve the continued use of the performance data that remain correct or become more conservative as a result of the change. The ACO does not issue the STC until it approves the AFM supplement.

4-8. SUPPLEMENTAL TYPE INSPECTION REPORT (STIR). Manufacturing inspectors should use FAA Form 8110-26 to record results of inspections and tests conducted on a modified product. These inspections and test results are part of the STC project. For STCs resulting in extensive structural or mechanical changes to a certificated product, use the appropriate TIR form as a guide for inspections to identify if the STC makes existing product features non-compliant. Engineering personnel and the manufacturing inspector should discuss if this will be done when planning the conformity inspection. The manufacturing inspector should complete the STIR in the same manner as the TIR (refer to https://employees.faa.gov/tools_resources/forms). See paragraph 5-3 of this order for more information on factors that manufacturing inspectors should employ to determine an appropriate level of inspection and evaluation, based on the complexity of the modification.

4-9. WHEN WILL THE FAA ISSUE STCs?

a. The FAA will issue an STC for a major change to type design of a type-certificated product when the change is not great enough to require a new TC (§ 21.113). Any person may apply for an STC; however, TC holders may apply for an amendment to their original TC.

b. STCs are not normally issued for replacement parts; PMAs are issued instead. Only in unique circumstances where the installation of the replacement part represents a major change in type design would an STC be issued. This STC would then be the design approval basis for the subsequent approval of a PMA so that replacement parts for that STC design can be manufactured and supplied as such.

c. The FAA will issue an STC for the installation of an article approved by a TSO when the addition of the TSO-approved article is a major change in type design for the product on which it is being installed. Persons other than the TSO authorization holder may get approval for design changes to the TSO article as part of the approval for a change to the TC'd product under 14 CFR part 43 or under the applicable airworthiness regulations. In any case, the STC must address installation requirements of the changed TSO article on the certificated product.

4-10. WHEN WILL THE FAA NOT ISSUE AN STC? The FAA will not issue an STC to manufacturers or applicants outside of the United States except under the terms of a bilateral agreement. Also, the FAA will **not** issue an STC to do the following:

a. Approve minor changes in type design,

b. Approve replacement or modification parts, unless the installation of the replacement or modification part represents a major change in type design for the product,

c. Approve design changes to TSO articles,

d. Combine two or more STCs without additional showing of compliance,

e. Modify foreign-registered aircraft without the involvement of the CAA of the state of registry, as described in paragraph 4-15 of this order, or

f. Approve a one-only modification of a foreign-registered aircraft, unless the particular conditions listed in paragraph 4-15c of this order are satisfied.

4-11. TECHNICAL REQUIREMENTS FOR AN STC.

a. The applicant must comply with the requirements of § 21.115, including the submittal of the data to show compliance with the applicable certification basis (See paragraph 2-6 of this order).

b. The applicant must ensure that the changes to the product comply with the latest amendments to the regulations when the FAA considers the change to be significant (see § 21.101 and Order 8110.48).

c. The applicant must comply with § 21.20 requirements and submit a statement of compliance.

d. The FAA issues an STC after it:

(1) Completes all necessary tests and compliance inspections,

(2) Finds that the applicant's technical data meet the applicable regulations, and

(3) Finds no feature or characteristic makes the changed product unsafe.

e. STCs for "Multiple" or "One-Only" Installations. For multiple STCs, all drawings or other data must be adequate to produce the parts approved under the STC and to install the STC on other serial numbers of the same model TC product identified on the STC certificate. For one-only STCs, submitted drawings or other descriptive data only need to be sufficient for one modification. The descriptive data may consist of marked photographs, sketches, and word descriptions. As with multiple STCs, the data supporting a one-only STC must show that the aircraft complies with applicable airworthiness regulations. A one-only STC cannot be amended and the holder is not eligible for an FAA production approval (e.g., PMA).

4-12. COMPATIBILITY EXAMINATION.

a. A new design change should be compatible with previous design changes. This insures that the changed product continues to comply with its certificated airworthiness requirements. The PACO should ensure the STC is specific in identifying the productfor which the change is approved. The PACO does this by ensuring that the applicant determines that previously approved modifications are compatible with the design change.

b. Changes Requiring Coordination with the CMACO. Appendix C of Order 8110.115 lists product changes requiring the PACO coordination with the CMACO during the project and to get concurrence from the CMACO before issuing the STC. See paragraph 4-18 of this order for information on establishing CMACO participation on the project. For PMA projects, see Order 8110.42 for information on coordination with the CMACO.

> **NOTE:** The PACO will coordinate installation eligibility determination with the CMACO for projects making extensive structural or mechanical changes to the certification product.

c. Changes Affecting Existing ADs. Appendix C of Order 8110.115 requires the PACO to coordinate with the CMACO for proposed modifications involving any part affected by an AD. The applicant must evaluate the proposed design change's effect on compliance with ADs that apply to the product. If the design change affects AD compliance, then applicants must get approval for alternative methods of compliance (AMOC) per the AD. The PACO should coordinate this with the CMACO to verify that the applicant's review of applicable ADs is complete and accurate before issuing the STC. If an applicant must get approval for AMOCs, indicate on the STC a reference to the AMOC approval letter issued by the CMACO. Before concurring, the CMACO will issue the AMOC letter to the PACO. The PACO then issues the STC.

d. Discretionary CMACO Project Participation. Aside from the changes listed in Appendix 1, Figure 6 of this order, the PACO may request CMACO participation at the beginning of the project. The PACO may indicate this in the CPN data. Alternatively, the PACO may communicate informally with the CMACO on any project to explore whether the proposed modification may affect any specific design features requiring special consideration, tests, or analyses during the certification program. The accountable directorate may also be able to provide the PACO information on relevant experience from the product's original certification program. For projects not involving the changes listed in Appendix C of Order 8110.115, the CMACO's concurrence is not required for issuance of the STC.

4-13. APPROVED MODEL LIST (AML) STCs.

a. An AML STC is a multi-model approval method that allows a set of compliance data (i.e., type design data and substantiating data) to be designated as "baseline data" that is applicable to various aircraft models. This method of approval may apply to multiple aircraft on the same type certificate data sheet (TCDS) or multiple aircraft on various TCDSs. Refer to FAA AC 20-180, *Approved Model List Supplemental Type Certificate (AML-STC)*, for detailed guidance related to AML STCs.

b. Administering the AML STC.

(1) The ACO lists the eligible TC'd products and FAA-approved documents on a special page and attaches the page to the STC. This list is known as the AML. Whenever the ACO adds a TC'd product or amends, deletes, or adds a document to the STC package, the ACO also amends and approves the AML—not the STC.

(2) The ACO must issue an AD to remove a product from an AML. This occurs unless the STC holder can show no completed installations were accomplished or that the product was mistakenly listed on the AML.

(3) STC holders can transfer an STC with an AML in its entirety to a new holder. However, they cannot split it into more than one STC.

4-14. NON-INTERFERENCE STCs. A non-interference STC is a modification to a product that may provide a convenience or function that is not required by operating rules or airworthiness standards applicable to the aircraft's intended operation. Examples include searchlights, low-light vision equipment for ground observation, or air-ground radio communications equipment for emergency medical services.

a. These non-interference STCs offer no relief from airworthiness standards or from the product's operating limitations. Evaluating a non-interference STC requires a determination that operating the equipment will not result in the aircraft becoming noncompliant with its certification basis. The non-interference STC may impose limitations or operational procedures in the AFM supplement to ensure the equipment is used in a manner that keeps the aircraft compliant with its certification basis.

b. When the ACO approves non-interference STCs, the ACO requires an explicit disclaimer in the "Limitations and Conditions" section of the STC (FAA Form 8110-2). The disclaimer must indicate that the modification has not been evaluated to check its proper operations for its intended function.

4-15. STC PROJECTS INVOLVING FOREIGN-REGISTERED AIRCRAFT AND IMPORT PRODUCTS. Applicants who want to modify foreign-registered aircraft or develop modifications for import products (the United States is not the original state of design) should notify the ACO as soon as possible. This will help minimize delays in the completion of the project.

a. Import Products. The FAA may need to consult the foreign CAA (the product's original certificating authority) on proposed STCs to import products. The PACO should determine if the STC's complexity requires consultation with the foreign CAA. The PACO should coordinate the CAA's involvement through the appropriate CMACO/standards staff.

b. Foreign-Registered Aircraft.

(1) An applicant may develop an STC using aircraft registered outside of the United States. The FAA allows this if the applicant modifies the aircraft per the airworthiness requirements of the country of registry (See ICAO Annex 6). The FAA encourages applicants to present U.S.-registered aircraft for modification. Applicants may not present a foreign-registered aircraft for inspection or test unless the State of Registry agrees and identifies its requirements for acceptance of the modification (See ICAO Annex 6).

(2) If the applicant does not offer evidence showing that the CAA of the country of registry agrees to the proposed modification, then the PACO notifies the CAA and invites them to participate in the project. The PACO must get written authorization from the CAA stating they concur with the modification before accepting an application and initiating a project.

(3) ACOs may accept applications for an STC when the CAA of the State of Registry requests FAA support to modify a U.S. type designed aircraft. Many foreign airworthiness authorities rely on FAA approvals as bases for accepting modifications to U.S. type-designed aircraft that are registered in their country.

(4) When using a foreign-registered aircraft as a test article to validate the modification's compliance to U.S. requirements, the applicant must ensure the aircraft conforms to its FAA-approved type design. This defines an appropriate baseline aircraft for the U.S. STC. Review the CAA differences (if any) on the foreign-registered aircraft to ensure those differences would have no effect on the STC.

(5) The FAA does not issue experimental airworthiness certificates for the flight testing of foreign-registered aircraft but may issue a special flight authorization. This requirement should be discussed with the CAA and the owner/operator of the aircraft to address any unique procedural requirements of the country of registry. The CAA will

decide whether, under their system, a change to the CAA's airworthiness certificate is necessary. Order 8130.2, *Airworthiness Certification of Products and Articles*, guides ASIs on the issuance of special flight authorizations for foreign-registered aircraft. If the flight testing is not conducted in U.S. airspace, coordinate with the local CAA responsible for issuing the appropriate airspace authorization.

c. Considerations for One-Only STCs on Foreign-Registered Aircraft. ACOs may accept applications for one-only STCs involving non-U.S. registered aircraft when the United States is the state of design and one or more of the following conditions are present:

(1) Mandated safety enhancements such as Traffic Collision Avoidance Systems (TCAS II), Enhanced Ground Proximity Warning Systems (EGPWS), and Reduced Vertical Separation Minimum (RVSM) equipment;

(2) Diplomatic aircraft;

(3) Aircraft owned by Heads of State;

(4) The response to a CAA request for support as described in subparagraph 4-15.b.(3) above; and

(5) U.S. Manufactured aircraft that receive their final outfitting as one-only STC out of "completion centers." The completion centers can be either inside or outside the United States (e.g., Executive Aircraft Interiors or Boeing Business Jets (BBJ)), if the aircraft is completed under U.S. control.

> **NOTE:** An ACO can authorize an ODA holder to develop an STC applicable to a foreign-registered, U.S. state-of-design aircraft as long as one of the above conditions is met. The ACO and the ODA must follow the procedures in Order 8100.15, *Organization Designation Authorization Procedures.*

4-16. STC AND AMENDED STC APPLICATIONS.

a. Using the Application Form. The applicant must submit the STC application, FAA Form 8110-12 (refer to http://www.faa.gov/forms/index.cfm/go/document.list), to the geographic ACO, as listed in Appendix 7 of this order. The geographic ACO contacts other ACOs, if it needs their technical support. Applicants must complete FAA Form 8110-12, Blocks 1, 2, 3, 6, and 7 when the following occurs:

(1) They introduce a major change in the type design (to be accomplished per §§ 21.111 through 21.119); or

(2) They intend to make major changes to the type design of an STC they hold (amended STC). Applicants must check Supplemental Type Certificate in block 2. Then, in block 6b, they must specify that the application is for an amendment and give the STC number. Examples of cases when the STC should be amended are:

(a) An STC holder wants to add product models to the STC, unless the FAA has given the STC holder an AML STC as discussed in paragraph 4-13 above.

(b) The STC amendment introduces a new major change in type design as discussed in paragraph 4-2 above.

(c) The proposed change will revise the limitations and conditions section of the STC.

b. In addition to FAA Form 8110-12, the applicant must include a detailed description of the modification, the type of aeronautical product, information on the manufacturer and model number of the aeronautical product as specified on the TCDS involved, location of the modification to be conducted (design and installation), a letter outlining who will prepare the engineering data required to substantiate the change, and a schedule for completion of the project. The applicant should also submit a statement, if necessary, that a project initiation meeting is needed or desired.

4-17. ESTABLISHING AN STC PROJECT. The ACO establishes STC and amended STC projects using the same process for establishing TC and amended TC projects. See Order 8110.115 for detailed information on how to establish a certification project and how to transmit the CPN required data to the accountable directorate, the CMACO, and AEG. Also, direct the applicant to review FAA AC 21-40, Application Guide for Obtaining a Supplemental Type Certificate.

4-18. ESTABLISHING ACO TO ACO COORDINATION. Refer to Order 8110.115 for procedures to be followed by both the PACO and the CMACO. Refer to appendix C of Order 8110.115 for a list of types of projects that must be coordinated between the PACO and the CMACO.

4-19. PREPARING FAA FORM 8110-2, SUPPLEMENTAL TYPE CERTIFICATE.

STC Numbers. The certifying ACO assigns an STC number that identifies the type of product and the location of the issuing ACO. See Order 8110.115, *Certification Project Initiation and Certification Project Notification,* for details on how to number an STC. Use FAA Form 8110-2, located at https://employees.faa.gov/tools_resources/forms, in order to prepare the certificate.

4-20. ACO REPORT OF STC.

a. Information Required for the RGL Website.

(1) All ACOs must send pdf copies of STCs, with certification basis continuation sheets, to the Operational Oversight Policy Branch (AIR-140) within 2 weeks of STC issuance. AIR-140 will publish the STC and its continuation sheets on the RGL website so they will be available to the public. However, the published STCs will not have the ACO manager's signature. It is important to indicate that the two week time limit does not apply to STCs issued by ODAs and that ODAs are to follow procedures from Order 8100.15.

(2) The STC data on the RGL website are for informational purposes only. Possession of the STC document does not constitute rights to the design data or installation of the modification. The STC and its supporting data (drawings, instructions, specifications, and so forth) are the property of the STC holder. Anyone using the STC must contact the STC holder for rights to use the STC and the associated design data.

b. Availability of STC Data. ACOs must make copies of STCs, including the continuation sheets, available to anyone who requests them. The ACO must answer the requestor in writing, identifying the STC by number, and attach a copy of the STC to the correspondence. In the correspondence, the ACO must state, "Possession of the supplemental type certificate (STC) does not constitute rights to the installation of the modification or its design data. The STC and related information (drawings, data, specifications, and so forth) are the property of the STC holder. The FAA will not release proprietary data without authorization from the holder. The user must get installation approval or data rights from the STC holder."

4-21. OTHER FOREIGN STCs. When a product is exported to another country, the CA supports their acceptance by the importing country. To minimize duplicate certifications, the CA acts for the importing authority. The CA, therefore, makes compliance findings to their own airworthiness standards and, when agreed in a bilateral agreement, makes compliance determinations to the importing country's airworthiness standards. Note, however, that bilateral agreements are not required for exporting a product. The U.S. can export a product to a foreign country even though we do not have a bilateral agreement with that country. Applications to non-bilateral countries for their STCs approvals or import acceptance are still transmitted from the FAA to the other aviation authority. Once a determination has been made that the STC holder may apply, a project manager must follow Order 8110.52. If a CAA seeks to issue its own approval for a design change based on a U.S. STC, and the agreement makes no provisions for validation, then a project manager should support the CAA by ensuring that the applicant provides them the information that the CAA will need to act as state of design for its issued approval.

If the CAA does not communicate any specific data needs, the list of information required by Transport Canada is a good example of useful supporting data (See appendix 5 of this order for the list of information).

4-22. FAA VALIDATION OF A CAA STC UNDER BILATERAL AGREEMENTS.

a. IPA with STC provisions. A foreign holder of an STC may apply for U.S. validation of the STC when there is an established Bilateral Aviation Safety Agreement, Implementation Procedures for Airworthiness (BASA IPA) that includes STCs in its scope. The specific procedures are covered in each individual BASA IPA agreement and Order 8110.52.

b. IPA with no STC Provisions. If there are no provisions for § 21.29 validation in the IPA, then the ACO must consider whether undue burden provisions (§§ 21.43 and 21.137) apply. When an undue burden provision applies, the ACO should not accept the application. For more information on guidance on undue burden decision papers refer to Order 8100.11, *Requirements for finding Undue Burden and No Undue Burden Under 14 CFR part 21*.

4-23. OBTAINING A CANADIAN STC BY VALIDATION OF A U.S. STC.

a. Request for Canadian STC. A U.S. resident and holder of a U.S. STC may apply for a Canadian STC under the United States/Canada BASA IPA.

b. Applicability of Canadian STC. Transport Canada's CAA only issues a Canadian STC to an aeronautical product that has either a Canadian Type Approval, an FAA TC accepted by Canada, or an equivalent approval document recognized by Transport Canada.

c. Canadian STC Application Procedures.

(1) A Canadian STC applicant applies through the FAA ACO that certified the STC. See Appendix 5, Figure 1 of this order for the Canadian STC application request format. This is a multi-purpose form for U.S. and Canadian applicants to use. The granting authority fills in the STC number and issue date.

(2) The PACO sends the Canadian STC application to the Transport Canada regional managers (See Appendix 5, Figure 2 of this order for the address list) in the Canadian region where the aeronautical product is to be modified. The applicant should identify the location of the aeronautical product. The PACO sends this information to the regional manager.

(3) The application is sent to Transport Canada headquarters in Ottawa, Canada, if a product is not being presently modified (e.g., there is no current Canadian customer for the modification).

(4) Typically, the Canadian STC applicant must submit the following documents with the application to Transport Canada (see Appendix 5, Figure 3 for a sample letter):

(a) A Canadian STC application,

(b) A copy of an FAA STC,

(c) A compliance checklist, include any special conditions, ELOS findings, or exemptions applicable to the FAA STC,

(d) A copy of the AFM supplement,

(e) A copy of the master drawing list,

(f) A copy of the manufacturing and installation instruction drawings,

(g) An ICA,

(h) Weight and balance data,

(i) Maintenance or repair manual supplements, and so forth, and

(j) A required statement from the ACO stating that it found compliance to the applicable Transport Canada regulations.

d. Document Review. After Transport Canada reviews the documents, it may request additional reports and documents or request a familiarization meeting with the applicant to assist in processing the STC application. Transport Canada may also require special conditions, additional airworthiness requirements, or familiarization flights for the modified aircraft. If this happens, then the PACO must cooperate fully with Transport Canada and provide all documents and assistance consistent with the United States/Canada BASA IPA.

e. Issuance of Canadian STC. After satisfactory completion of the familiarization flights, Transport Canada issues an STC to the applicant. Transport Canada then sends the STC original to the applicant and a copy to the PACO.

CHAPTER 5. MANUFACTURING AND ENGINEERING RESPONSIBILITIES AND FUNCTIONS RELATIVE TO INSPECTION, TEST, AND FLIGHT TEST

5-1. GENERAL. This chapter describes the procedures manufacturing inspectors and ACO engineers must follow during a certification project. The applicant must conduct all (100 percent) of the inspections and tests necessary to determine whether the item conforms to the proposed type design data. The manufacturing inspector verifies that the applicant's conformity is accurate and complete and the applicant complies with 14 CFR § 21.33(b). The manufacturing inspector also coordinates tests and evaluations when the PACO requests them. The manufacturing inspector and the ACO engineer determines the product can be consistently produced according to the type design data. This chapter refers to the manufacturing inspection project office as a MIDO. In actuality, the manufacturing inspection project office may be a manufacturing inspection satellite office (MISO), a certificate management office (CMO), or a certificate management unit (CMU), as applicable.

5-2. FAA AVIATION SAFETY INSPECTORS (MANUFACTURING INSPECTORS).

a. Manufacturing Inspectors' Functions and Responsibilities. Manufacturing inspectors should be alert for any design feature that does not appear to comply with the type design data. They should pay particular attention to fits, tolerances, clearance, interference, ventilation, drainage, compatibility with other installations, servicing, and maintenance requirements of the product. Although the appropriate ACO approves the final type design, manufacturing inspectors determines whether the applicant satisfactorily shows the final product conforms to the type design and is in a condition for safe operation. Manufacturing inspectors can also issue an airworthiness approval. Accordingly, they should coordinate with the ACO engineer about questionable design features and airworthiness considerations as soon as possible. When the ACO engineer asks the manufacturing inspector to witness conformity inspections, the engineer must provide necessary instructions following the procedures in this chapter.

b. Designees. Under 14 CFR part 183, Subpart A, the FAA may authorize qualified FAA designees to perform certain manufacturing inspector's duties and responsibilities on the Administrator's behalf. The FAA defines those duties and responsibilities in 14 CFR part 183, Subpart C. Designees who perform type certification inspections on the manufacturing inspector's behalf should follow the reporting and inspection procedures in the current policy material, Order 8100.8, Designee Management Handbook. The assigned FAA principal inspector (PI) supervises the designee.

5-3. REQUEST FOR CONFORMITY AND TYPE INSPECTION AUTHORIZATION.

a. Forms ACOs Use to Request Inspections. To request conformity inspections, the ACO uses FAA Form 8120-10 (see appendix 4, figure 1 of this order for instructions on how to complete this form) or FAA Form 8110-1 (see appendix 4, figure 6 of this order). The ACO should use FAA Form 8120-10 as an interim request before issuing a TIA. The manufacturing inspector will not conduct a conformity inspection without proper documentation.

b. Submitting the Statement of Conformity.

(1) The FAA encourages applicants to submit FAA Form 8130-9 (see Appendix 4, Figure 5, of this order), as early as possible. This prevents delays in the type certification approval process. Except for in-process evaluations, such as process reviews, hidden inspections (that is, parts buried in assemblies), etc., a Statement of Conformity should be submitted to the FAA before the FAA begins its conformity inspections. The FAA and the applicant should discuss how they will handle in-process inspections during the conformity planning.

(2) The applicant or an authorized individual who holds a responsible position in the manufacturing organization must sign the statement of conformity.

(3) When the conformity inspection is conducted away from the applicant's manufacturing facility, the applicant may use one of the following procedures for signing the statement of conformity:

(a) Procedure #1 – The applicant may send an authorized representative to the manufacturer's facility to inspect the prototype article and sign the statement of conformity, or

(b) Procedure #2 – The applicant may delegate, in a written document, a representative at the supplier to complete the FAA Form 8130-9. This representative is an agent of the applicant and acts on the applicant's behalf. In this case, the agent must submit a copy of the agent's letter with the FAA Form 8130-9.

c. Conformity Determination.

(1) The applicant's policies, quality control procedures, experience, inspection personnel, equipment, and facilities dictate the degree of witnessing and the level of scrutiny an FAA manufacturing inspector must determine when verifying the applicant's conformity inspections. The manufacturing inspector should adjust the conformity plan (also known as the conformity verification plan) to fit the differences between applicants. For example:

(a) When applicants are inexperienced, their abilities are unknown. They may need to conduct several conformity inspection verifications until they are confident that they can safely rely on the company inspectors. Manufacturing inspectors may then gradually reduce their own level of involvement.

(b) Manufacturing inspectors should have greater confidence in applicants who have quality control systems that have been found acceptable in the past and who subject their prototypes to these controls. For these applicants, the manufacturing inspector may reduce the scrutiny needed to determine conformity by inspecting a sampling of products and records. If using sampling procedures, the manufacturing inspector should base them on nationally recognized standards that establish a confidence level of 90 percent or greater. The FAA files should include a complete description of the procedure used.

(c) Some applicants subject experimental and prototype parts through inspection channels that are distinct from the normal quality control system for production articles. In these cases, the applicant should provide the manufacturing inspector with detailed information on this

inspection system, an explanation of how it ensures conformity, and (to maintain configuration control) documentation of the prototype configuration as design changes are incorporated. This information is essential and it helps the manufacturing inspector develop a conformity plan with the proper level of involvement.

(d) The product's complexity and effect on air safety are used to determine how much the manufacturing inspector needs to inspect and evaluate an item. The manufacturing inspector considers, for example, product designs using relatively new materials or methods of construction, manufacturing technologies, and destructive and nondestructive inspection techniques. In these cases, because there may not be well-established or industrywide recognized standards for ensuring process and quality control, the manufacturing inspector should adjust the conformity plan accordingly.

(2) Based on the aforementioned circumstances, the manufacturing inspector (in coordination with the applicant) should develop an appropriate conformity plan. The plan should focus on the following:

(a) Verifying the conformity of the critical and major characteristics of materials, parts, and assemblies.

(b) Evaluating process controls to ensure production of consistent and uniform products. The applicant may use statistical quality control methods for process evaluation. The FAA file should include records of such activity and complete descriptions of such statistical methods.

(c) Observing tests of important functional parameters of systems, modules, components, and completed products.

d. Areas of Consideration. Regardless of the applicant's experience, manufacturing inspectors are responsible for determining that the applicant performed a complete conformity inspection. They also are responsible for determining the results of the inspections are properly recorded and reported on FAA Form 8130-9. In witnessing conformity inspections, the manufacturing inspector should consider the following:

(1) Materials.

(a) Were raw materials used in the fabrication process in conformity with the design data?

(b) Is evidence available to ensure the chemical and physical properties were identified and checked as appropriate?

(c) Is there documented evidence to show traceability from the raw material to the prototype part?

(d) Are there any part or process deviations recorded against the submitted design data (including material review dispositions)?

(2) Processes and Processing.

(a) Is there a process specification for each special process?

(b) Has the applicant submitted the process specification for FAA engineering review?

(c) Does a check of the processed articles show the process produces consistent parts that meet the type design? Is there statistical or other evidence to show this?

(d) Is the process being operated following the process specification? Are any deviations recorded?

(3) Critical and Major Characteristics.

(a) Has the applicant identified and inspected all critical and major characteristics?

(b) Does the applicant have a record of these inspections?

(c) Does witnessing the re-inspection and surveillance show the above inspections were accurate and adequate?

(d) Are there any deviations recorded against the submitted design data (including material review disposition)?

(4) Workmanship.

(a) Does the workmanship add to the quality of the product?

(b) Could the workmanship be duplicated during production?

(c) Has the applicant set criteria to identify workmanship practices?

(5) Adequacy of Drawings and Related Change Records.

(a) Can the part be produced and inspected using the information on the drawing?

(b) Are drawing tolerances practicable and attainable during production? What evidence supports this?

(c) Has the applicant included all changes in the drawing submitted for FAA approval (including one-time only deviations in the prototype article submitted for FAA testing)?

(d) What procedure does the applicant use to ensure an engineering change is included in the production part and on the drawing?

(e) Did the drawing include all information needed to inspect the part, the material to be used, the treatment of the material (such as hardness, finish, and any special process specifications)?

(f) Did the drawing include applicable test specifications? Did the ACO engineer review these test specifications?

(6) Adequacy of Inspection Records.

(a) Do the inspection records show all inspections conducted?

(b) Do they show who conducted the inspection?

(c) Do they indicate the results of the inspection and disposition of unsatisfactory conditions?

(d) Are procedures adequate to ensure re-inspection of parts that are reworked or replaced? (This includes inspection of installation of new parts and inspection of the parts.)

(7) Material Review Action.

(a) Is the material review procedure documented and adequate to ensure disposition for nonconformities?

(b) Is there adequate corrective action for observed nonconformities to prevent reoccurrence?

(c) Have "use as is" or "repair" dispositions for non-conformances been submitted to FAA engineering for review, and have they been incorporated in the type design (one-time only engineering orders)?

(8) Previously Produced Parts.

(a) If the design specifies parts of previously type-certificated products and these parts are taken from production stock, were precautions taken to determine whether these parts may have been subjected to material review action? Nonconforming parts should not be used unless it can be shown that they will have no adverse effects or they are re-inspected to record all deviations for FAA engineering evaluations.

NOTE: Additional guidance for the use of previously produced parts is located in paragraph 2-5.c(3) of this order.

(b) Have the previously accepted deviations been made a part of the current design data submitted? Are they listed by the applicant on FAA Form 8130-9?

(9) Software.

(a) Are all software products (version description document, source code, object code, documentation, test procedures, loaded hardware/firmware, and so forth) properly identified, including revision levels, when compared to the hardware and software engineering drawings?

(b) Have all software problem reports been properly dispositioned?

(c) Do the records indicate all software products, including support software, and procedures have been placed under configuration control?

(d) Have the verification and acceptance tests been successfully executed, to approved test procedures, and recorded?

(e) Are there records indicating the object code was compiled from released source code by approved procedures?

(f) Do records indicate technical acceptance of the software, before loading into the system or product?

(g) Does the product load correctly with released object code to released procedures?

(h) Is the load verified per applicable procedures, for example, checksums, cycle redundancy checks, load maps?

(i) Does the software successfully execute the initialization procedure?

(j) Are there any indications of noncompliance with the manufacturer's procedures?

NOTE: See Chapter 4 of Order 8110.49, Software Approval Guidelines, of this order for more information on the process for software part conformity inspection and software installation conformity inspection.

5-4. INSPECTIONS CONDUCTED OUTSIDE THE DISTRICT OFFICE. When the conformity inspection is conducted outside its geographic area of responsibility, the project MIDO sends FAA Form 8120-10 (with all applicable information) to the MIDO conducting the conformity. After sending the conformity request, direct contact between the ACO engineer and the manufacturing inspector may resolve questionable items quickly. The manufacturing inspector should:

a. Record the inspections on the FAA Form 8100-1.

b. Forward the Form 8100-1 to the project MIDO.

c. Attach FAA Form 8130-3, Airworthiness Release Certificate, to the prototype parts. The Form 8130-3 should show the part number, the drawing change to which it was inspected, and the serial number or other identification.

5-5. STREAMLINED CONFORMITY INSPECTION NOTIFICATION PROCESS.

a. Several ACOs and MIDOs streamline their conformity request/inspection process for certain applicants. This speeds up the notification of conformity inspections to designated

inspection representatives, which include DMIRs, DARs, or ODARs. This streamlining also makes better use of FAA personnel and designees.

b. The FAA offers the streamlined conformity process as a preferred method for requesting conformity inspections. For this to work, the FAA and applicant must define:

(1) The most effective conformity notification process before the TC board meetings; and

(2) Criteria for determining ACO, MIDO, and designee involvement.

c. Expanded Use of the Conformity Plan.

(1) The most important component for a successful conformity notification is the up-front conformity plan. The conformity plan allows both the applicant and the FAA to coordinate conformity inspections better. The plan details areas where the ACO, manufacturing specialist, and MIDO need to be involved. It also details when the FAA authorizes the applicant to use direct notification of conformity requirements. One expected benefit of using the conformity plan is that it helps identify when DERs should fill out FAA Form 8120-10 for parts or tests.

(2) If the applicant and ACO previously agree, the applicant's DER may fill out this form and the applicant's properly authorized designated inspection representative may perform the conformity inspection without prior ACO review. Also, in the plan, the ACO will define those Form 8120-10s it will need to review before the conformity inspection. Finally, the MIDO helps determine which conformity inspections are eligible for DERs to notify the properly authorized designated inspection representative.

(3) For a successful inspection, the applicant should address details of conformity delegation early in the certification project. The ACO project manager should notify the applicant as soon as possible of the need for upfront planning and development of the conformity plan, ideally before the initial TC board meeting. The applicant **must** draft the plan and the ACO and MIDO representatives must accept it before issuing the first conformity request. Applicants also should know that if they do not ask to use the direct conformity notification process early in the program and do not do any upfront planning, they can not use this process.

(4) In the early phase of the certification project, the applicant needs to identify a DER coordinator (not necessarily a DER) by name. The DER coordinator ensures efficient scheduling of the designated inspection representatives and serves as a focal point with the ACO. Depending on scheduling and locations of the conformity inspections, the DER coordinator may identify the designated inspection representatives who will receive conformity requests. Based on criteria in subparagraph 5-5c(6) below, the FAA will approve specific DERs and designated inspection representatives for the process.

(5) The applicant needs to generate a matrix and schedule for conformity inspection requirements as part of the overall certification plan. At a minimum, the matrix should list:

(a) The proposed conformity activities,

(b) Where each proposed activity is to take place,

(c) When each proposed activity is to take place (to the extent possible), and

(d) Whether the activity will have ACO or MIDO direct involvement.

NOTE: The ACO must also authorize the method for resolving unsatisfactory conformity findings.

(6) The conformity plan must identify how the applicant, the PACO, and the project MIDO communicate with each other. It also identifies designee involvement, based on the following conditions:

(a) The applicant's upfront planning with the ACO and MIDO.

(b) The designee's technical and regulatory expertise.

(c) Determination of whether the part or component is critical.

(d) The applicant's and designee's working history with the FAA.

(e) Common parts versus unique parts (or materials and processes).

(f) Completion of certain training (such as training for designated inspection representatives).

(g) The FAA's confidence in the applicant's quality systems (such as production and prototype).

(7) The ACO project manager will define how to track conformity requests and maintain a master list during conformity plan development. The DER coordinator will control any tracking by the applicant for the FAA.

(8) The conformity plan will include procedures for the applicant's designated inspection representative to perform conformity inspections outside the project MIDO's geographic area. Both the project MIDO and designated inspection representative should communicate with the geographic MIDO where they perform the inspection. Order 8100.8 requires a "Geographic Expansion Form" to be filled out each time designees go outside their region to perform inspections.

(9) When the ACO or MIDO limits or denies applicant participation in the conformity notification process, the applicable office should explain to the applicant the reasons for limitations or denials. This explanation should help the applicant prepare better for future participation in the conformity notification process.

(10) In this chapter, the FAA defines criteria for determining ACO and MIDO involvement in requests for conformity inspections. These criteria include previous designee performance, applicant experience, designee expertise, part criticality, and the history of

unsatisfactory and satisfactory findings. Existing designee supervision requirements remain in effect.

d. Notification Procedures.

(1) The DERs can create and send FAA Form 8120-10 to the DER coordinator, if the ACO or MIDO defines this authority in the conformity plan. This is the most direct flow for a conformity request. The DER coordinator then sends the form to the designated inspection representative and a copy to the ACO. The DER coordinator notifies the designated inspection representatives as soon as possible, so they have time to plan for the inspection. The DER coordinator should try to make the conformity schedule available to all participating designated inspection representatives.

(2) Throughout the TC project, the FAA requires the applicant to perform conformity inspections. The ACO project manager determines whether the FAA Form 8120-10 requires ACO review **before** performing the FAA conformity inspection (hereafter called an "ACO pre-inspection review").

(3) If a DER has permission to generate a specific FAA Form 8120-10 without the ACO project manager's pre-inspection review, the DER completes the form and sends it to the DER coordinator. The DER coordinator sends an information copy to the ACO, and notifies any other involved ACOs of the request.

(4) If a DER has permission to use a specific FAA Form 8120-10 with the ACO project manager's pre-inspection review, the DER completes a draft form and sends it to the DER coordinator. The DER coordinator sends the draft FAA Form 8120-10 to the ACO for review before the designated inspection representative performs the inspection. During the initial planning phase, the MIDO may request copies of all FAA Form 8120-10s the DER produced. If the ACO project manager agrees, the DER coordinator also will issue a tracking number for the FAA Form 8120-10s.

(5) Before sending out a FAA Form 8120-10, the DER coordinator or ACO reviewer must determine if the MIDO has authorized direct submittal of the form to a designated inspection representative. If so, the DER coordinator or ACO (depending on who did the final form review) sends it to the designated inspection representative to perform the conformity inspection. If not, the DER coordinator or ACO (depending on who did the final form review) sends it to the project MIDO's manufacturing specialist or PI within 2 business days of approval. Then the manufacturing specialist or PI sends FAA Form 8120-10 to the appropriate designated inspection representative within 4 business days.

(6) If the conformity inspection is outside the project MIDO's geographic area, the DER coordinator or ACO (depending on who did the final form review) sends the FAA Form 8120-10 to the project MIDO as described in paragraph 5-5e below.

(7) There are times during a TC program when the MIDO determines the MIDO inspector, rather than an agreed-to designated inspection representative, should perform a particular conformity inspection. When this happens, the MIDO will tell the applicant the reason, such as designee supervision or special process review.

(8) If the designated inspection representative determines unsatisfactory findings, they should contact the DER as soon as possible. The ACO project manager or DER will address unsatisfactory findings as agreed to in the conformity plan. On FAA Form 8100-1, the ACO project manager or authorized DER must disposition any non-conformities found during the conformity inspection. Periodically, the ACO project manager and MIDO must review unsatisfactory findings identified by the designated inspection representative, and how the DER addresses those findings.

(9) After the ACO project manager or DER closes all unsatisfactory findings, they send the conformity paperwork, including FAA Form 8100-1, to the appropriate office (the designee's MIDO/MISO, ACO, or DER coordinator) per the conformity plan. Finally, they send the paperwork to the organization responsible for tracking FAA Form 8120-10 for closure.

e. Non-Local Conformity Request.

(1) Applicants use this procedure when the conformity inspection will be outside the project MIDO's geographic area. The project MIDO may authorize a designated inspection representative to perform these types of conformity inspections on a trip-by-trip basis, or for a specific time, as defined in Order 8100.8.

(2) The DER coordinator or ACO project manager, depending on who performed the FAA Form 8120-10 final review, sends the form to the project MIDO within 2 business days of final review.

(3) The project MIDO coordinates with the geographic MIDO where the inspection will be performed and, if authorized by the geographic MIDO, sends FAA Form 8120-10 to the designated inspection representative within 4 business days. The designated inspection representative is now authorized to travel, and do the conformity inspection.

> **NOTE:** Any designated inspection representative planning to perform a conformity inspection in another geographic area must comply with the requirements in Order 8100.8 before traveling.

(4) After satisfactorily completing the conformity inspection, the designated inspection representative sends the complete conformity package, including or consisting of the FAA Form 8100-1, to the project MIDO's manufacturing specialist or MIDO/MISO PI for review. The project manufacturing specialist or MIDO/MISO PI sends the package to the appropriate office (the ACO or DER coordinator) as defined in the conformity plan. Finally, the ACO project manager or DER coordinator sends the package to the organization responsible for tracking the FAA Form 8120-10 for closure.

f. Conformity Discrepancies. A part that does not conform to its descriptive design data is considered a nonconforming part. This situation is known as a discrepancy. If manufacturing inspectors find discrepancies, they can request a complete re-inspection by the applicant. The ACO project manager does not intend nor recommend that manufacturing

inspectors personally conduct a complete conformity inspection of each part they record on FAA Form 8100-1. The manufacturing inspector should, however, witness the applicant's inspection of critical characteristics previously identified. Manufacturing inspectors may witness inspection of large assemblies and subassemblies on a progressive basis. This ensures that they witness inspection of critical areas before final assembly. On FAA Form 8100-1, the ACO project manager or authorized DER must disposition any nonconformities found during the conformity inspection. The applicant must resolve all discrepancies by correction, MRB action, or engineering change. The applicant or agent should provide copies of MRB and engineering activity to the manufacturing inspector to clear the MRB condition on the inspection record.

5-6. PROCESS SPECIFICATION REVIEW.

a. Specifications for Consistently Producing Conforming Parts. Design regulations require fabrication methods that will consistently produce conforming parts. To attain this objective, approved process specifications must cover all methods requiring close control. The applicant should identify all such process specifications on the related drawings. The manufacturing inspector and ACO project manager should thoroughly evaluate these specifications.

b. Method of Presenting Information. Process specifications should be orderly and complete. Use the following as a checklist of the content of a typical process specification:

(1) Scope.

(2) Applicable documents.

(3) Quality requirements.

(4) Materials used in the process.

(5) Manufacturing:

(a) Manufacturing operation,

(b) Manufacturing controls,

(c) Test specimen (construction),

(d) Tooling qualifications, and

(e) Tooling control.

(6) Inspection:

(a) Process inspection,

(b) Inspection records,

(c) Inspection test, and

(d) Inspection controls.

NOTE: Make sure the data submitted in any process for approval do not contain terms that are subject to interpretation, such as adequate, as necessary, as required, room temperature, periodically. Also, make sure the applicant defined any tolerances that are required to control the process.

c. Operations Within Processes. Because the use of process specifications varies greatly in the industry, the manufacturing inspector should note those operations in processes requiring surveillance during conformity checks. The manufacturing inspector should evaluate the process controls to ensure the quality of the articles being produced is within the type design limits. Any deviations in these areas should be approved before they are used in processing articles.

d. Evaluation of Processes. In evaluating processes, the manufacturing inspector's primary concerns are performance and conformity. The process should consistently produce articles that meet the requirements in the type design.

(1) Process conformity is determined by checking the articles being processed to determine that they are being processed per the process specification and that the called-for materials, tools, and equipment are being used. Since the end results depend on closely following the process instructions, correct any deviation or discrepancy on the initial runs. The manufacturing inspector recommends using statistical data to determine process capability.

(2) Determine product conformity by inspecting the processed articles. The applicant should determine whether the process can consistently produce articles in conformity with the design requirements. The method for determining product conformity should be measurable and required by the process specification.

e. Process Submittal.

(1) At type certification board meetings, the ACO project manager encourages applicants to develop and submit their process specifications for approval early in the program. Also, the ACO project manager should remind them that the FAA cannot issue the TC until all processes are reviewed.

(2) Applicants can submit process specifications, called for in the type design data, on a separate listing for approval by the appropriate engineering section.

(3) The ACO project manager and the manufacturing inspector should carefully evaluate major changes, amendments, and so forth, to the process. This evaluation should help determine how major changes, amendments, and so forth, could affect the quality of the end products before the manufacturing inspector approve the products. Sometimes, this may require a re-inspection of the operations depending on the extent of the changes.

f. Process Phase Evaluation. The manufacturing inspector and the ACO project manager can recommend approval or rejection of the process after the five phases that follow have been completed:

(1) Phase I. The manufacturing inspector and the ACO project manager should evaluate the basic information of the process. It is important to see that the process information is orderly and complete. Otherwise, it may lead to misinterpretation and confusion, causing the end article to exceed type design limits.

(2) Phase II. Manufacturing inspectors and ACO project manager should review the actual process and the process specification. During the review, they should look for the variables that must be controlled to ensure a conforming and consistent product. Some variables that may affect product quality are:

(a) Raw materials and equipment used to make the part,

(b) Production facilities and environment,

(c) Inspection and test equipment, and

(d) Production operators.

(3) Phase III. The manufacturing inspectors and the ACO project manager should verify that the process specification identifies ways to control the variables. These controls should establish:

(a) The unit of measure and acceptance limits,

(b) A description of the measurement techniques, and

(c) Actions to take when the actual measurement does not meet acceptance standards.

(4) Phase IV. Manufacturing inspectors should verify that the articles are being processed following the process specification. They should also verify the material, methods, tools, and equipment called for in the specification are being used. Since the end results depend on closely following the process instructions, correct any deviation or discrepancy on the initial runs.

(5) Phase V. Since the inspection of the processed articles is the main point of any process evaluation, the manufacturing inspector should determine whether the process can consistently produce articles in conformity with the type design requirements. The applicant should describe this process in the quality plan. When the process is followed, all parts produced should be of equal quality.

g. Non-Destructive Inspection Method Evaluation. The procedure for evaluating a nondestructive inspection (NDI) method is similar to the procedure in paragraph 5-6f above.

However, the applicant should show the following (to the manufacturing inspector's satisfaction):

(1) The NDI method can detect the allowable defect size and location specified by the engineering drawing,

(2) The inspection results are repeatable, and

(3) Instruments required to perform the inspection meet the procedural acceptability requirements.

5-7. REQUESTS FOR CONFORMITY INSPECTION FROM FOREIGN CAAs.

a. Requirements Under a Bilateral Agreement. When allowed by the bilateral agreement, the FAA may request a foreign CAA to conduct a conformity inspection on our behalf. Request for conformity inspection or other technical assistance under a bilateral agreement must be forwarded by the FAA and cannot be delegated to another organization or FAA designee.

b. Request for a Conformity Inspection. To request the inspection, the PACO should send the foreign CAA a short cover letter with an FAA Form 8120-10 attached. In the letter, the ACO should include an FAA point of contact with phone and fax numbers. On the Form 8120-10, the ACO should identify the company, location, part number, drawing and revision level, and other necessary data to conduct the inspection. The ACO must also show the name of an FAA project manager to contact for project questions. The request should include any special instructions or items of special emphasis that the CAA should consider while performing any conformity inspections. For example, the ACO may ask the CAA to verify critical drawing dimensional and interface dimensional requirements, plating, heating treating, welding, and so forth.

c. Disposition of Deviations. After completing all conformity inspections on behalf of the requesting authority, the FAA or the foreign CAA will complete and return all their respective documentation to the requesting authority, as notified. On the conformity certification for the particular part, the foreign CAA of the country in which the supplier is located will note all deviations from the requirements notified by the design approval applicant's airworthiness authority. Any nonconformity described as a deviation should be brought to the attention of the FAA or the foreign CAA for evaluation and disposition of its effect on safety and the validity of the test under consideration. The FAA or the foreign CAA should receive a report stating the disposition required on each deviation before an FAA Form 8130-3 or issuance of the foreign equivalent form.

5-8. CONFORMITY INSPECTION RECORD REPORTING.

a. Reporting Conformity Inspections. On the FAA Form 8100-1, manufacturing inspectors should report all conformity inspections they conducted or tests they witnessed. They should include all discrepancies, nonconformities, and corrective actions. When they find nonconformities or discrepancies, manufacturing inspectors should send a copy of the applicable documents to the ACO project manager following previously agreed-on procedures for

disposition. They should coordinate all documentation through the project MIDO. The project MIDO keeps the documentation in the MIDO project file and records ACO dispositions and subsequent corrective action.

b. Verbal Notification. When quick action is necessary to conclude the project, manufacturing inspectors should notify the MIDO verbally that they have completed a satisfactory inspection. They should enter the date of the verbal notification on the FAA Form 8100-1.

c. Addressing Irregularities. The manufacturing inspector should receive a report stating the disposition of, or corrective action required for, each irregularity reported on an FAA Form 8100-1. If a CAA identifies an unsatisfactory condition in a conformity inspection that has been delegated, the ACO must disposition and reply to the CAA to resolve the situation.

d. Resolving Unsatisfactory Items. The MIDO should determine that the applicant has satisfactorily resolved all unsatisfactory or nonconformity items before coordinating on the final approval document.

5-9. TEST ARTICLES – GENERAL. Before inspecting the conformity of test articles, the applicant, the ACO project manager, and the manufacturing inspectors must clearly understand the test article configuration, test equipment configuration, and expected results. Consider the type of test being conducted and the calibration expiration date of the test equipment. The applicant may need to recalibrate the test equipment to ensure the equipment is within its calibration expiration date when testing begins. The applicant should submit this information to the ACO in test proposal reports. The PACO may issue an FAA Form 8120-10 referencing these reports. The TIA should reference the final test flight article configuration.

5-10. WITNESSING OFFICIAL TEST. Manufacturing inspectors may witness official FAA tests – such as static, endurance, operational, pressure, and environmental tests – as requested by the ACO project manager. Test requirements may be included in the FAA Form 8110-1 **or** in the FAA Form 8120-10. In all cases, the ACO project manager should give the manufacturing inspector the appropriate instructions and a reference to the applicant's test proposal report. The manufacturing inspector should not witness any test without prior coordination with the ACO project manager. When witnessing official tests delegated by the ACO project manager, the manufacturing inspector should determine whether the applicant followed the instructions and test schedule described in the applicant's test proposal report. After a test, the test witness must sign a record that shows the results were obtained by properly following the approved test plan. This record should identify the test and include the results obtained, the decisions reached, and any recommendations made to the applicant. The manufacturing inspector must add a copy of this record to the test report. They should send a copy of the applicant's test log or report, and the completed FAA Form 8100-1 to the PACO.

5-11. STRUCTURAL TEST ARTICLES – AIRCRAFT.

a. Conformity Determination. Determining conformity of structural test articles is an essential part of type certification. While witnessing these inspections, manufacturing inspectors should detect and report any nonconformities on an FAA Form 8100-1.

b. Conformity Inspection. Title 14 CFR part 21, subpart B requires the applicant to allow the manufacturing inspector to perform conformity inspections on structural test articles while making and assembling the articles. The applicant must submit an FAA Form 8130-9 to the FAA before testing. Also, 14 CFR part 21 Subpart B requires that the final design submitted for FAA approval must include all changes found necessary as a result of the test. The configuration control system must also ensure that the applicant included all changes in the production drawings. This is the only way the manufacturing inspector can be certain that subsequent production articles conform to the tested articles.

c. Nonconformities. On an FAA Form 8100-1, the ACO project manager or authorized DER must disposition any nonconformities found as a result of the conformity inspection. Because nonconformities affect structural test articles differently than they affect flight articles, the FAA strongly recommends the applicant clearly identify parts and assemblies destined for official structural testing. This should be necessary only when the applicant is manufacturing structural test articles concurrently with prototype flight articles. It is important that, once manufacturing inspectors subject parts and assemblies to structural testing beyond limit load testing, they should clearly and permanently identify the parts and assemblies. This prevents their use in production products.

5-12. PROTOTYPE FLIGHT TEST ARTICLES – AIRCRAFT. During the fabrication process, manufacturing inspectors should begin determining the conformity of prototype flight test articles, including system checks. It is important flight test articles conform to the data in the TIA and the applicant's statement of conformity. 14 CFR § 21.33 requires applicants submit the FAA Form 8130-9 to the FAA before the applicant releases prototype flight articles for FAA flight test. They should alert the ACO project manager about any nonconformities described under deviations, so the project manager can evaluate the nonconformities and decide how they affect safety and the validity of the test under consideration. The manufacturing inspector should also ensure the applicant has provided specific aircraft identifier and performance information to FAA air traffic control as required by paragraph 2-6h(1).

5-13. ENDURANCE TEST ARTICLES – ENGINES AND PROPELLERS.

a. Conformity Determination. As in the case of aircraft, determining the conformity status of test engines and propellers is an important part of the type certification project. Normally, only parts subject to distortion, fatigue, and wear are inspected for conformity and witnessed by the manufacturing inspector before and after the endurance test. Before the endurance test, the manufacturing inspector should coordinate with the ACO engineer to identify the parts subject to inspection. The manufacturing inspector should note the condition of all surfaces subject to distortion, fatigue, and wear, and record the actual dimensions on the FAA Form 8100-1. Also, these and other critical parts should be serialized or otherwise positively identified for pre-test and post-test comparison. 14 CFR part 21, Subpart B requires the applicant to submit FAA Form 8130-9 before the start of FAA test.

b. Conformity Inspection. When the endurance test and teardown inspection ends, the manufacturing inspector should spot-check conformity of major and critical parts. They do this by witnessing the applicant's inspection, giving particular attention to critical characteristics.

5-14. TEARDOWN INSPECTION. The manufacturing inspectors may need to witness teardown inspection of test articles after structural testing. Teardown inspection of test articles after endurance testing is a specific requirement of 14 CFR parts 33 and 35. The manufacturing inspector and the ACO project manager should witness these activities. The applicant should not clean or disassemble the test article until the authorized manufacturing inspector is present. The applicant's inspections should be conducted as follows:

a. Step 1 – The manufacturing inspector should verify the applicant carefully notes the appearance of subassemblies during the teardown and before complete disassembly. The applicant should specifically note:

(1) Any abnormal leakage in valves, seals, fittings, and so forth,

(2) Signs of excessive, or lack of, lubrication,

(3) Excessive coking,

(4) Metal or foreign particles in the oil screens or passages,

(5) Parts that stick or break,

(6) Lack of freedom of moving parts,

(7) Breakaway torques, and

(8) Any other condition that may not be noticeable after complete disassembly and cleaning.

b. Step 2 – Manufacturing inspectors should:

(1) Verify all parts are thoroughly clean and visually inspected for signs of galling, metallic pickup, corrosion, distortion, interference between moving parts, and cracks,

(2) Check highly finished surfaces for condition and discoloration due to excessive heat and lack of lubrication,

(3) Pay special attention to bearings, gears, and seals, and

(4) Carefully inspect engine pistons, cylinder heads, and turbine assemblies for signs of cracking or burning.

c. Step 3 – Per the test plan, the manufacturing inspector should verify both ferrous and nonferrous stressed parts are inspected for incipient failures by suitable nondestructive testing methods. Examples of nondestructive methods are magnetic particle inspection, x ray, penetration, and ultrasonics.

d. Step 4 – Manufacturing inspectors should verify that all parts subject to wear or distortion are dimensionally inspected to determine the extent of change during the test. To do

this, they may compare pre-test and post-test dimensions. The applicant should record the results.

e. Step 5 – After completing steps (1) through (4), the manufacturing inspector verifies the applicant's inspection report and submits it to the ACO project manager as an attachment to FAA Form 8100-1. This report should contain the results of the inspection, giving a comprehensive description of all defects, failures, wear, or other unsatisfactory conditions including photographs. The FAA cannot overemphasize the importance of this report. ACOs use it for their evaluations.

f. Step 6 – The manufacturing inspector should also ensure that the applicant identified questionable parts and kept them in safe storage for review by ACO engineering.

5-15. GROUND INSPECTION – AIRCRAFT.

a. Purpose of Ground Inspections. The basic purpose of the ground inspection is physically to verify the aircraft submitted for FAA flight test meets the minimum requirements for quality, conforms to the technical data, and is safe for the intended flight tests. The manufacturing inspector records the results with any other data requested by FAA engineering and flight test personnel.

b. Phases of the Ground Inspection. The ground inspection is normally a progressive inspection performed in three phases, depending on the project's complexity.

(1) Phase I – Preliminary Ground Inspection. This phase includes all inspections that can be performed satisfactorily during development and construction of the prototype. The applicant should arrange to notify the manufacturing inspector promptly whenever they change components, systems, or installations previously cleared through the manufacturing inspector. The manufacturing inspector should then witness these re-inspections as necessary. When re-inspection creates undue duplication of effort because of numerous development changes, go to Phase II if practicable. Title 14 CFR part 21, Subpart B requires the applicant to submit a final FAA Form 8130-9 before testing.

(2) Phase II – Official Ground Inspection. This is the final inspection of the complete prototype and should be performed just before the FAA flight test. As far in advance as possible, manufacturing inspectors should work out detailed procedures for conducting inspections and testing for both phases. They should also coordinate these procedures with the applicant to avoid unnecessary delays and duplication of effort. This also ensures that all required inspections and tests are properly accomplished. To notify the manufacturing inspector that their aircraft is ready for inspection, applicants submit an FAA Form 8130-9. This is the applicant's commitment that the aircraft is ready for FAA inspection and flight test.

(a) To give FAA flight test personnel enough time to prepare for the flight test, the manufacturing inspector should notify them when Phase II of the Official Ground Inspection starts.

(b) The applicant should prepare the aircraft for inspection by providing all necessary assistance, equipment, and data essential for the inspection. The applicant should

perform no work on the aircraft after completion of the Phase II inspection, unless the manufacturing inspector agrees.

NOTE: FAA personnel or designees are not authorized to perform any mechanical work on the aircraft.

(c) The manufacturing inspector can witness the inspection using the following:

1 The TIR form 8110-31, as a guide,

2 Title 14 CFR or Civil Air Regulations (CAR) as a basic reference, and

3 Applicable TIA instructions.

(d) If the inspection reveals unsatisfactory conditions, then the manufacturing inspector should discuss them with the applicant's representatives. The manufacturing inspector should make every reasonable effort to communicate and coordinate with the applicant and the ACO. The manufacturing inspector should witness all ground operable systems as required by the TIA. Only the applicant's personnel should operate the particular system. Manufacturing inspectors should also witness the weighing of the aircraft and verify scale accuracy as required by the TIA. During each flight test, they should verify equipment installed, including test equipment, to determine flight loadings. They should also verify the weight and balance report. The report should show the actual empty weight center of gravity and the list of equipment installed. The manufacturing inspector and flight test engineer should keep a copy of the report.

NOTE: During this phase, it may be necessary to verify weights and moment arms of equipment items.

(e) Almost invariably, there will be inspection items left over that cannot be determined at this time, such as instrument markings, placards, unusable fuel, and so forth. These inspections can be completed during Phase III when an opportunity arises and before type certification.

(3) Phase III – Coordinated Ground-Flight Inspection.

(a) **Return to Flight Status.** When aircraft has been returned to flight status after completing Phase II, the manufacturing inspector must ensure that the aircraft is airworthy and ready for flight testing. Manufacturing inspectors must also determine that the applicant corrected all unsatisfactory items before the FAA flight test. They also should coordinate all nonconformities with the ACO project manager before releasing aircraft for a FAA flight test. It is important that the assigned manufacturing inspector be knowledgeable of the TIA requirements and the operation of the aircraft and its systems. This ensures the safe completion of TIA-mandated flight test. The MIDO manager determines that the manufacturing inspector has the appropriate knowledge, experience, skills, and proficiency to assess the aircraft's condition before flight testing. Initially, manufacturing inspectors decide if test aircraft is ready for FAA flight testing. They base their decision on whether they find that the aircraft is in safe operating condition for testing to be conducted. The manufacturing inspector and flight test personnel should mutually agree on a system for informing the ACO

project manager of daily changes to the aircraft and any problems encountered during flight test. Cooperation between the assigned manufacturing inspector and flight test pilot is crucial to the safe and professional completion of flight testing. The FAA flight test pilot should not fly a test aircraft without coordinating with the assigned manufacturing inspector or the ACO project manager, as previously approved by the manufacturing inspector. This ensures that the manufacturing inspector or project manager released the aircraft for flight. This should not prohibit multiple flights, so long as the assigned manufacturing inspector has:

1 Reviewed all planned aircraft configurations for the desired test,

2 Conducted any necessary inspections, and

3 Coordinated this information with the FAA flight test pilot.

NOTE: The FAA flight test pilot makes the final acceptance of the test aircraft for flight, as it relates to the operation of the aircraft and the integrity of the test. In this phase, coordination with the FAA flight test specialist is emphasized.

(b) Instrumentation. A qualified agency should calibrate instruments, gauges, recording devices, and so forth, which are used in official flight test. Applicants should provide affidavits signed by the qualified agency. The qualified agency should give copies of the affidavits to the flight test personnel before flight. Also, the manufacturing inspector must determine that the equipment is properly installed and safe for operation. Additional functional test may be required after installation.

(c) Flight Loadings. The manufacturing inspector should determine if the applicant carried out the various loading conditions specified by the flight test specialist. This includes a determination that the ballast used is accurately weighed, located, and safely secured.

(d) Periodic Safety Checks. Throughout the FAA flight test program, the manufacturing inspector should determine that the applicant has a plan to ensure that the aircraft is given adequate inspection. The inspection should reveal any unsafe conditions that may develop. The applicant must correct those conditions before further FAA flight test participation. The applicant should coordinate the frequency and extent of such checks with the manufacturing inspector. The manufacturing inspector should participate in the checks whenever practicable to determine compliance. The manufacturing inspector and flight test specialist should have a system for informing each other of daily changes to the airplane and problems encountered during flight test.

5-16. USING ENGINEERING DATA.

a. Inspecting to Original and Final Production Drawings. For conformity inspection purposes only, the ACO project manager encourages applicants to submit drawings that they can readily expand into final production drawings. The ACO project manager realizes that this may not always be practical during product development and that it may be necessary for the manufacturing inspector to inspect engineering layouts or even sketches. When this happens, ACO project managers should advise the applicant that, before they will approve the TC or STC,

the manufacturing inspector may need to conduct a complete conformity inspection on the first production article using not only approved production drawings, but also original sketches and layouts. As an alternative, if applicants can show that they included the original sketches and layouts in the production drawings, then the ACO project manager will not require this double conformity inspection before approving the type design. The manufacturing inspector may require additional validation when the applicant submits products for airworthiness certification or approval to ensure that the products represent the test articles.

b. Accepting Drawings a DER Approved. When a DER may be involved, it should be accepted practice to conduct conformity inspections using DER-approved drawings. If the DER has been properly authorized, the ACO project manager can accept as engineering approval a copy of the DER's FAA Form 8110-3. The form should list drawings approved by the DER. The ACO project manager can also create a program to allow DERs to issue request for conformity inspections and to disposition nonconforming hardware recorded on FAA Form 8100-1. In the request for conformity or TIA, ACO project managers should mention by name DERs who they authorize to disposition unsatisfactory conditions. The FAA and applicant should document and agree on this program before the initial TCBMs.

5-17. AIRWORTHINESS CERTIFICATION OF PROTOTYPE PRODUCTS.

a. Determining Need for Airworthiness Certificate. When a potential type certification project becomes known, the manufacturing inspector should determine whether the applicant intends to seek an airworthiness certificate for the prototype product. If so, applicants should seek FAA conformity inspection when they start making the parts. Manufacturing inspectors should inform applicants that 14 CFR part 21, Subpart B requires them to include in the prototype all changes found necessary as a result of the test program. They should also inform the applicant their product must completely conform to the type design.

> **NOTE:** If this is not done progressively, then extensive disassembly, modification, and inspection may be necessary before airworthiness approval. Other manufacturing inspectors and designees can perform the progressive inspection. The inspector who completes the final airworthiness certification does not need to complete the entire progressive inspection personally.

b. Aircraft Requirements. Manufacturing inspectors should process the airworthiness certification of an aircraft following the requirements of 14 CFR part 21 and the directions of Order 8130.2. They should ensure applicants satisfactorily include all required changes in the prototype. Also, they should get a final FAA Form 8130-9 from the applicant. When applicable, the manufacturing inspector should review the final TCB report to determine whether the applicant resolved all outstanding items recorded in the report. Manufacturing inspectors should handle airworthiness approval of prototype engines and propellers in a similar manner. Before testing, they must get a final FAA Form 8130-9 for each product.

c. Requirements for Engines and Propellers.

(1) Applicants may need to modify engines or propellers that are not yet type certificated and that they supply for use on experimental aircraft. They may need to do this, so these aircraft conform to their approved type design and applicants can properly identify them per 14 CFR part 45. Under these circumstances, manufacturing inspectors at the engine or propeller manufacturer's plant should be fully aware of the approval status of the engines or propellers originally supplied. They should also be aware of the modifications necessary to bring the engines and propellers up to fully approved status.

(2) Also, applicants should attach an FAA Form 8130-3 to any replacement or newly designed parts they give to the aircraft manufacturer. A representative of the engine or propeller manufacturer should perform or personally supervise the modification. If manufacturers will modify the aircraft at their plant, they should give a list of the modifications to the manufacturing inspector responsible for certificating the aircraft (with copies to the FAA offices concerned). The modification list should bear a statement signed by the manufacturer. The statement should certify that:

(a) The applicant modified the engine or propeller originally supplied following the manufacturer's instructions,

(b) The manufacturing inspector has satisfactorily inspected the engine or propeller, and

(c) The engine or propeller conforms to the type design.

5-18. ACCOUNTING FOR ENGINEERING CHANGES. The applicant should establish a procedure to inform the manufacturing inspector of all changes made to parts, assemblies, or complete products during type certification. This is especially important once manufacturing inspectors have given such items inspection clearance, so they can witness conformity of the changes. When checking changes to previously inspected items for conformity, the manufacturing inspector should report changes on an FAA Form 8100-1. When checking changes during a ground inspection, the manufacturing inspector should report the results on the TIR if changes will affect the TIR. For example, if the previously inspected TIR items were originally unsatisfactory and change makes them satisfactory, the manufacturing inspector should report that fact. Conversely, if the previously inspected TIR items were originally satisfactory and the change appears to make them unsatisfactory, manufacturing inspectors should report that fact with a suitable explanation of the condition. Also, they should determine satisfactory procedures are in effect for ensuring the applicant included in production drawings all changes required in the test and prototype articles.

5-19. FLIGHT TEST.

a. General Responsibilities. Flight test personnel accomplish flight tests and evaluate engineering data on all new or modified aircraft pertaining to performance, flight characteristics, operational qualities, equipment operations, and operational limitations, procedures, and information. They should pay particular attention to the entire system in which airmen and their aircraft must operate. The system includes not only the airman and the aircraft, but airports, air

navigation facilities, the air traffic system, the safety rules, operating procedures, and environmental factors such as weather.

b. Specific Responsibilities. The FAA flight test personnel:

(1) Review the applicant's flight test report (see 14 CFR § 21.35(a)(4)).

(2) Review the applicant's objectives for the flight test to ensure that the test will help determine if the aircraft complies.

(3) Determine if test instrumentation, other required equipment including flight crew safety equipment and emergency egress provisions, and aircraft test configuration are acceptable for the proposed flight tests.

(4) Determine if they can delegate flight test tasks to a DER.

(5) Conduct the preflight briefing to obtain final agreement on test procedures, test cards, and test sequence. This ensures the aircraft is ready for flight testing and helps determine the test environment including weather considerations are satisfactory for flight test.

(6) Conduct and direct flight tests per the TIA.

(7) Participate in the post-flight debriefing.

(8) Analyze and approve the flight test data.

(9) Review, coordinate, and approve the AFM or revisions to the AFM.

(10) Prepare and coordinate the TIR.

(11) Serve as a member of an FOEB, when requested.

(12) Serve as a member of an FSB, when requested.

(13) Ensure that a flight test risk management process is followed per Order 4040.26.

c. Specific Qualifications.

(1) Qualification on Test Aircraft. As a part of the flight test program for TC projects, the applicant is expected to provide the necessary first pilot checkout qualification flight time for the FAA flight test pilots and AEG pilots assigned responsibility for the project. The assigned project flight test pilots will contact a responsible official of the applicant's organization to arrange for an adequate and agreed upon checkout in the applicant's aircraft. The checkout must be completed before the FAA flight test pilots conduct any flight tests requiring action in an official flight test pilot capacity.

(2) Familiarization Flight Time on New Models. Familiarization flying may be arranged for additional FAA flight test pilots as a part of function and reliability testing, production testing, or during extensive type testing provided it does not impose an additional

burden on the manufacturer or interfere with the PACO's conduct of the required compliance tests. When additional flight test pilots, not assigned directly to the project, need qualification flight training (as a convenience to the government) in a manufacturer's prototype or in first production models, arrangements should be made to contract for this training. Such arrangements should be made through internal service channels of the pilot's training organization, and not directly with the manufacturer. Since it is unlikely that the FAA Academy can provide such training, the funds will come from the training budget.

(3) Airman Rating Qualification During TC/STC Tests. Each TC project involving a new design or any major STC project that significantly modifies the flight characteristics or procedures (such as change from reciprocating engine to turboprop) will include those airman competency tests and maneuvers specified in 14 CFR part 61. A flight test pilot is required to perform these tests and maneuvers to determine how the aircraft will perform in the operations and atmospheric conditions for which it will be approved.

(4) Airman Competency Maneuvers. Develop the airman competency maneuvers and minimum crew evaluation with the assigned AEG inspector during the type certification program. This ensures satisfactory determinations of speeds, handling characteristics, procedures, and systems operations for such maneuvers and the adequacy of the proposed minimum flight crew.

(5) Initial Type Rating. If a test aircraft requires a new type rating, the project's flight test pilot should make every effort to obtain a type rating on that aircraft as soon as possible. The preferred method of obtaining a type rating on a new aircraft is by participating as an advisor to the AEG's FSB. A flight test pilot's participation in the FSB benefits both the AEG and AIR. The benefit to the AEG is that the FSB is able to use the flight test pilot's knowledge of the aircraft from the certification aspect to make more accurate FSB findings. AIR benefits when one of its flight test pilots receives a type rating in a new aircraft type. This benefit to AIR is especially true for foreign aircraft validated by the FAA under a bilateral agreement where training opportunities for the flight test pilot are more difficult to obtain. An alternative to flight test pilot participation in the FSB is for the flight test pilot to make arrangements to attend and complete ground school training acceptable by the AEG and undergo an oral and practical flight check ride in the new aircraft. A second alternative is for the flight test pilot to schedule formal type rating training for that aircraft through the FAA Academy.

(6) Additional Type Ratings. During development of the type certification program and in conjunction with the AEG activity, the appropriate flight test pilots must receive additional certificate or type rating flight checks in the subject aircraft.

d. Actions Before Official Type Tests.

(1) Official Flight Tests. Official flight tests will not be started until a TIA or letter of authorization (LOA) has been issued. All official tests, including those conducted by a DER, will be conducted in concurrence with any restrictions and limitations issued to ensure safety and to determine compliance with 14 CFR. The TIA may be phased or issued in increments to ensure basic airworthiness and that flight test safety has been established before proceeding to the next phase. An LOA will be used instead of a TIA, in cases where a TIA would be

inappropriate, such as foreign type-validation flight testing, or tests in support of field approvals. In these cases, a letter will be prepared by the appropriate office authorizing participation by FAA flight test and manufacturing inspection personnel. In this letter, the office will specify in detail, what is to be accomplished. When applicant flight tests are performed early in a program (before the TIA), before an FAA conformity inspection is conducted, the resulting data may still be valid if it can be established that:

(a) Testing took place on an aircraft that was essentially identical to the article that is later conformed to the type design, and

(b) No significant changes were made between the time of the test and the subsequent conformity inspection.

(2) Conformity of Test Article with Type Design. Before starting any official flight tests, the responsible test personnel for the project and ground inspection personnel should verify that a conformity inspection has been conducted to ensure that the aircraft is in conformity with the design data appropriate for accomplishing the tests and the aircraft is determined to be safe for the flight intended. The manufacturing inspector must have documented any nonconformities. Flight tests should not start until the appropriate TIA issuing office issues a release and notifies the flight test personnel.

(3) Checkout on Test Aircraft. Test pilots for the assigned project arrange with a responsible official of the applicant's organization for an adequate and agreed upon checkout in the applicant's aircraft. They must complete the checkout before the FAA pilots conduct any official FAA flight tests. See Order 8110.41.

(4) Pilot-in-Command. The pilot-in-command is the applicant's pilot (except for single place aircraft). The FAA pilot should emphasize the pilot-in-command responsibility as part of the pre-flight briefing.

(5) Spin Recovery Parachutes.

(a) Spin recovery parachutes should be installed on all aircraft requiring spin testing for certification. Also, the FAA may require these installations for other high-angle-of-attack tests on aircraft where inadvertent spins or deep stalls are likely during testing.

(b) The FAA will consider other types of spin recovery devices such as anti-spin rockets, when the applicant proposes them. These systems have many unknown characteristics, which would require considerable engineering research and wind tunnel testing. The tail-mounted spin recovery parachute system has been proven to be an effective spin recovery system and is the preferred system. For help in sizing a spin chute, see NASA Technical Paper 1076, Spin-Tunnel Investigation of the Spinning Characteristics of Typical Single-Engine General Aviation Airplane Designs, dated November 1977.

(c) ACOs must carefully evaluate a spin recovery system installation to determine its structural integrity, reliability, susceptibility to inadvertent or unwanted deployment or jettison, and adequate or redundant jettison ability. The chute size, porosity, riser length, and lanyard length should be designed following NASA recommended practices to

ensure that the system is effective in spin recovery. Also, ACOs should refer to NASA recommendations when evaluating the design of the chute deployment and jettison systems. Find appropriate NASA recommendations in the following publications:

1 Burk, Sanger M. Jr., Summary of Design Considerations for Airplane Spin-Recovery Parachute Systems; NASA TN D-6866, August 1972.

2 Bradshaw, Charles F., A Spin-Recovery System for Light General Aviation Airplanes; NASA CP-2127, 14th Aerospace Mechanics Symposium, May 1980.

3 Stough, Paul H. III, A Summary of Spin-Recovery Parachute Experience on Light Airplanes; AIAA Paper Number 90-1317, AIAA/SFTE/DGLR/SETP Fifth Biannual Flight Test Conference, May 1990.

(6) Emergency Provisions. The project test pilots should make sure all necessary safety equipment is provided and that all crew members know and are briefed on how to use this equipment. The pilots should anticipate the possible emergencies that could happen during a particular test phase and outline crew duties during emergencies.

(7) Aircraft Characteristics for Air Traffic Control. The project test pilot should ensure that the applicant has provided the specific aircraft identifier and performance information required by paragraph 2-6h(1) of this order.

(8) Risk Management Process. The signed TIA should reflect adherence with the Flight Test Risk Management Process established by the ACO/directorate in accordance with Order 4040.26. This ensures that the associated flight test risks are acceptable.

e. Test Flight Planning. Carefully plan each flight test before actual flight. FAA flight test personnel and the applicant should agree on a written schedule of what will be done during the test. The agreed upon schedule should show the applicable 14 CFR airworthiness regulations to which the flight tests are being conducted.

(1) Concurrent Testing: The FAA defines concurrent testing as those FAA certification tests that are performed simultaneously with the applicant's own tests. Concurrent testing may be performed in certain unique cases when the cognizant FAA manager considers them appropriate and practical to ease the burden on the applicant. Examples of typical concurrent tests are tests that are considered low risk such as avionics installation where a successful compliance showing will most likely occur. In addition, concurrent testing may include but not be limited to V_{mu}, V_{mcg}, V_{mca}, maximum brake energy tests and wet runway tests, which by their nature are impractical to repeat. For such tests, concurrent testing by the FAA may be performed provided that an appropriate level of risk management evaluation is completed per Order 4040.26. The regulatory support for this kind of testing is justified by 14 CFR 14 §§ 21.33 and 35. 14 CFR § 21.33 (a) requires that the applicant allow the FAA to do any inspection and any ground and flight test necessary to determine compliance with the applicable requirements of the Federal Aviation Regulations. 14 CFR § 21.35(a) and (b) require that the applicant make all the tests necessary to show compliance with the Federal Aviation Regulations. During concurrent testing, the FAA is making a judicious selection of flight tests that it may choose to participate in (14 CFR § 21.33). The FAA is also jointly determining compliance with the applicant thereby meeting the intent of 14 CFR § 21.35 which requires the applicant to make "all flight tests that the Administrator finds necessary". For concurrent flight

testing, all requirements of § 21.33 (b)(2) through (b)(4) and § 21.35 (a)(1) through (a)(4) must be met (see an explanation of (a)(4) (Applicant's Flight Test Report) below. Concurrent flight testing is not the same as conducting research and development with the applicant prior to TIA. The main concern in the development of these regulations has been to prevent FAA crews from being exposed to undue hazards during flight tests. Since the advent of FAA Order 4040.26, this concern has been mitigated by the mandatory Risk Management Process imposed by the Order. This is a requirement prior to any FAA flight test (regardless of its risk level) and with a corresponding TIA or LOA.

(2) Applicant's Flight Test Report. The applicant's flight test report described in §21.35(a)(4) should detail the results of the applicant's company or developmental testing, completed for the purpose of showing compliance with the applicable regulations. In the event concurrent testing (described in Paragraph 5-19(e)(1) above) is agreed by the FAA, it is recognized that reporting cannot be accomplished for tests the applicant has not previously completed. Before testing is conducted concurrently with the FAA under TIA, the applicant's flight test report should sufficiently document that the aircraft has flown previously, is airworthy, and that it is in safe operating condition.

f. Hazardous Flight Tests. FAA flight test personnel are not authorized to participate in or conduct potentially hazardous flight tests until the flight test risk management process has been completed by the ACO or the ACO has reviewed and accepted the risk mitigation procedures proposed by an applicant with an FAA-approved risk management process.

g. Certification Flight Hours.

(1) As part of the TIR, the flight test crew (pilot and/or engineer) records certification flight test time. The TIR may also include all flights during which an FAA crew member is conducting required evaluations, including flight to and from local test areas, flight in the traffic pattern, and so forth. The TIR also includes the time required to conduct or witness systems evaluations and other certification tests, regardless of whether an FAA pilot is at the controls. Initial pilot familiarization may be considered official test time even though no specific tests are conducted.**(2)** Certification flight time does not include ferrying to remote areas or tests conducted for purposes other than for determining compliance, regardless of whether an FAA pilot is at the controls.

5-20. FUNCTION AND RELIABILITY TESTING.

a. Responsibility. All technical specialties on the TCB may have some involvement in the function and reliability testing program.

b. Monitoring and Evaluation. The manufacturing inspector monitors the functioning of all cabin installations, evaluation of maintenance, and refueling at each stop. The manufacturing inspector should:

(1) Check critical parts and components as much as possible at each landing.

(2) Ensure the accuracy of the weight and balance, and the loading schedule

(3) Determine that the product being tested conforms to approved data.

(4) Perform other duties and inspections assigned by the TCB.

(5) Maintain a record of all demonstrations witnessed and all inspections conducted. Also, the manufacturing inspector should obtain records from the applicant of all maintenance performed.

(6) Report all information obtained during function and reliability testing on the applicable FAA Form 8110-31, TIR, and provide a copy to a FAA flight test engineer for inclusion in the consolidated report of the test.

(7) Advise the FAA flight test pilot/specialist, or the alternate, of any special inspections or observations that are to be made.

CHAPTER 6. ADDITIONAL INFORMATION ON SELECTED TOPICS

6-1. PROVISIONAL TCs.

a. Showing Compliance with Regulations. Applicants are entitled to a Class I or Class II provisional TC if they show compliance with §§ 21.81 or 21.83. Also, the Administrator must find no feature, characteristic, or condition that would make the aircraft unsafe when operated under established limitations. The FAA has found that the most reliable way to determine an aircraft satisfies the regulatory airworthiness requirements for obtaining a provisional TC is to have the applicant certify compliance with the minimum applicable airworthiness requirements. Therefore, it is essential for the applicant to establish compliance with the regulations as required by §§ 21.81 and 21.83.

b. Learning from Past Experience. The FAA's past experience with issuing provisional TCs shows that, at a minimum, their involvement was the issuance of a TIA for conformity purposes. The FAA's experience also shows that applicants had started the official FAA flight test program before the ACO considered issuing them a TC. For a Class I or Class II provisional TC, applicants must certify that the aircraft has been designed and constructed per the airworthiness requirements that apply to the TC they seek. The aircraft also must substantially meet the applicable flight characteristics requirements.

c. Before the ACO will issue or amend a Class I provisional TC, an applicant must be an aircraft manufacturer within the United States (US), a US citizen, and:

(1) Show compliance with § 21.81 (the Administrator must find that there is no feature, characteristic, or condition that would make the aircraft unsafe when operated under the limitations in 14 CFR §§ 21.81(e) and 91.317);

(2) Apply for a TC for the aircraft;

(3) Certify to the FAA that the aircraft;

(a) Has been designed and constructed per the airworthiness requirements applicable to the TC they seek;

(b) Substantially meets the applicable flight characteristic requirements for the TC they seek; and

(c) Can be operated safely under the requirements specified in § 21.81(a).

(4) Submit a report showing the aircraft had been flown in all maneuvers required to show compliance with the flight requirements for a TC;

(5) Set limitations for getting the TC they seek (this includes limitations on weights, speeds, flight maneuvers, loading, and operation of controls and equipment (See § 21.81(e)), unless applicants set operating restrictions for each limitation not established);

(6) Establish an inspection and maintenance program for the aircraft's continued airworthiness.

(7) Show that a prototype aircraft has been flown for at least 50 hours under an experimental certificate issued under 14 CFR §§ 21.191 through 21.195, or under the auspices of an Armed Force of the United States. However, if the applicant is amending a provisional TC, the Administrator may reduce the number of required flight hours.

d. The requirements for issuing and amending a Class II provisional TC only, are as follows:

(1) Applicants who manufacture aircraft in the United States are entitled to a new or amended Class II provisional TC, if they show compliance with 14 CFR § 21.83. The Administrator must also find that there is no feature, characteristic, or condition that would make the aircraft unsafe when operated under the limitations required by 14 CFR §§ 21.83(h), 91.317, and 121.207.

(2) An applicant who manufactures aircraft in a country with which the United States has an agreement for the acceptance of those aircraft for export and import is entitled to a new or amended Class II provisional TC for transport category aircraft only. To be issued a Class II provisional TC, the country in which the aircraft was manufactured must certify:

(a) The applicant has shown compliance with 14 CFR § 21.83,

(b) The aircraft meets the requirements of 14 CFR § 21.83(f), and

(c) There is no feature, characteristic, or condition that would make the aircraft unsafe when operated under the limitations in 14 CFR §§ 21.83(h), 91.317, and 121.207.

(3) The applicant must apply for a TC in the transport category for the aircraft.

(4) The applicant must hold a U.S. TC for at least one other aircraft in the same transport category as the subject aircraft.

(5) The FAA's official flight test program or the flight test program conducted by the authorities of the country in which the aircraft was manufactured, must be in progress.

(6) The applicant – or, in the case of a foreign-manufactured aircraft, the country in which the aircraft was manufactured – must certify that the aircraft:

(a) Has been designed and constructed per the airworthiness requirements applicable to the TC they seek,

(b) Substantially meets the applicable flight characteristic requirements for the TC they seek, and

(c) Can be operated safely under the appropriate operating limitations in this chapter.

(7) The applicant must submit a report showing that the aircraft had been flown in all maneuvers that show compliance with the flight requirements for getting an approved TC. The report should also address the limitations specified in 14 CFR §§ 21.83(h), 91.317, and 121.207.

(8) Applicants must prepare a provisional AFM containing all applicable limitations for operating the aircraft with a Class II provisional TC. The AFM must include limitations on weights, speeds, flight maneuvers, loading, and operation of controls and equipment, unless the applicant sets operating restrictions for each limitation not established.

(9) The applicant must establish an inspection and maintenance program to ensure the continued airworthiness of the aircraft.

(10) The applicant must show that a prototype aircraft has been flown for at least 100 hours. If the applicant is seeking to amend a provisional TC, the Administrator may reduce the number of required flight hours.

6-2. TYPE CERTIFICATION IN RESTRICTED CATEGORY, 14 CFR § 21.25. The FAA issues TCs to restricted category aircraft for use only in certain special-purpose operations specified by the Administrator. Restricted category aircraft include both civil-derived and military-derived aircraft. Each aircraft must meet its respective requirements for restricted category before the FAA issues a restricted category TC, approving it for one or more specific special-purpose operations. Refer to FAA Order 8110.56, Restricted Category Type Certification, for additional type certification policy.

a. Civil-Derived Aircraft. Title 14 CFR § 21.25(a)(1) addresses civil-derived aircraft that meet the airworthiness requirements of a standard category except those requirements that the Administrator finds inappropriate for the special purpose for which the aircraft is to be used. A standard category is one of: normal, utility, acrobatic, commuter or transport categories. The accountable directorate determines which requirements are inappropriate.

b. Military-Derived Aircraft. Title 14 CFR § 21.25(a)(2) addresses military-derived aircraft that are of a type manufactured in accordance with the requirements of, and accepted for use by, an armed force of the United States. Military aircraft types must have a 10-year satisfactory service history with the U.S. Armed Forces to be considered for restricted category type certification. Coordinate technical issues with the designated focal point MCO for the military aircraft model. Also, coordinate all military-derived restricted category aircraft certification projects with AIR-110.

c. Special-Purpose Operations. An aircraft TC'd in restricted category may only perform the special-purpose operations for which it has been approved. The FAA has approved the special-purpose operations identified in 14 CFR §§ 21.25(b)(1) through (b)(6), and those specified under 14 CFR § 21.25(b)(7) by AIR-100, acting on the Administrator's behalf. See FAA Order 8110.56 for a list of approved special-purpose operations.

d. Safe for Its Intended Use. To comply with 14 CFR § 21.25(a), applicants must show that no feature or characteristic of the aircraft makes it unsafe when it is operated under the limitations prescribed for its intended use. "Intended use" means any operation supporting the approved special-purpose operation. Expect the applicant to complete an assessment of the aircraft in the special-purpose mission operating environment. This might require a fatigue and loads analysis of the aircraft in the mission operating environment to establish the limitations for safe operation, including life limits of fatigue-critical and fatigue-sensitive components.

NOTE: For military surplus aircraft, the fatigue and load assessment can be based on a comparison of the special-purpose, mission operating environment with the aircraft's previous military operating environment. Nevertheless, the applicant must still comply with any other requirements necessary to ensure it is safe for its intended use.

e. Level of Safety. The level of safety for restricted category aircraft can be lower than the level for a standard category aircraft. However, to maintain an equivalent level of safety for the public, the FAA imposes certain operating restrictions (see § 91.313). This policy is not intended to eliminate any type certification procedural requirements, such as the need to address continued airworthiness.

f. Noise Compliance. Restricted category aircraft must comply with the applicable noise requirements of 14 CFR part 36 (see Chapter 7, Noise Certification, of this order for more guidance).

g. Coordination with AIR-110. Coordinate all military-derived, restricted category, aircraft certification projects with AIR-110. This coordination is in addition to any other coordination and review activity with ACOs and directorates. Provide a copy of CPNs to AIR-110. Also, coordinate all issue papers and TCDSs with AIR-110 before issuing them.

h. Refer to Order 8110.56, for additional policy regarding restricted category type certification.

6-3. TYPE CERTIFICATION OF CIVIL-DERIVED AIRCRAFT (RESTRICTED CATEGORY), § 21.25(a)(1). [RESERVED]

6-4. TYPE CERTIFICATION OF MILITARY-DERIVED AIRCRAFT (RESTRICTED CATEGORY), § 21.25(a)(2). [RESERVED]

6-5. ESTABLISHING NEW RESTRICTED CATEGORY SPECIAL PURPOSES, § 21.25(b)(7). [RESERVED]

6-6. TYPE CERTIFICATION OF SURPLUS MILITARY AIRCRAFT IN NORMAL, UTILITY, ACROBATIC, COMMUTER AND TRANSPORT CATEGORIES, § 21.27. Aircraft designed and constructed in the United States, accepted for operational use, and declared surplus by an Armed Force of the United States may receive type certification in normal, utility,

acrobatic, commuter, or transport categories.

surplus by an Armed Force of the United States may receive type certification in normal, utility, acrobatic, commuter, or transport categories.

a. Compliance, 14 CFR § 21.27(a). The applicant must show compliance with the following requirements:

(1) Civil Air Regulations or the 14 CFR regulations in effect when the aircraft was accepted for operational use by the United States Armed Forces,

(2) Applicable retroactive requirements of 14 CFR § 23.2, 25.2, 27.2, 29.2, and

(3) Fuel venting, emissions, and noise requirements of 14 CFR parts 34 and 36.

b. Compliance, 14 CFR § 21.27(b). Some surplus military aircraft have FAA type certificated civil counterparts. These aircraft may be listed on the civil TCDS with information about modifications required to make them eligible under the civil type certificate. Modifications may include the removal of equipment as well. The applicant must show compliance with the following requirements:

(1) Regulations governing the original civil aircraft TC,

(2) Applicable retroactive requirements of 14 CFR § 23.2, 25.2, 27.2, 29.2,

(3) Fuel venting, emissions, and noise requirements of 14 CFR part 34 and part 36, and

(4) Address service difficulties and potential unsafe conditions, while showing compliance to any applicable FAA Airworthiness Directives issued against the civilian type certificate.

c. Engine, Propellers, and Related Accessories Approval, 14 CFR § 21.27(c). Engines, propellers, and their related accessories will be approved for use on these aircraft if the applicant shows the product provides substantially the same level of airworthiness as would be provided by the appropriate sections of 14 CFR parts 33 and 35. The applicant shows this on the basis of the product's military qualification, acceptance, and service record. Engines and propellers that have an FAA type certificated civilian counterpart and are installed on surplus Armed Forces aircraft will be approved for use on these aircraft if the applicant shows compliance with regulations governing their original civil type certificates. In this case the applicant must address all service difficulties and potential unsafe conditions, while showing compliance to FAA airworthiness directives issued against the civilian type certificate. The applicant must also ensure the engine, propeller, and related accessory has been properly maintained.

d. Alternate Path to Compliance, 14 CFR § 21.27(d). The FAA may relieve the applicant of strict compliance to certain airworthiness regulations (Civil Airworthiness Regulations/14 CFR) under 14 CFR § 21.27(d) if applicant can show that strict compliance with those airworthiness regulations would impose a severe burden and the method of compliance proposed provides substantially the same level of airworthiness.

(1) *Severe burden* is regarded as proof by the applicant that any extensive modification(s) required by the applicable airworthiness regulation is shown not to be

commensurate with the relatively small increase in safety achieved by compliance and critical to the viability of the program. Severe burden must be keyed to specific provisions of the airworthiness regulations.

(2) When applying 'substantially the same level of airworthiness' in accordance with 14 CFR § 21.27(d) the applicant must show compliance to individual airworthiness regulations. However, the applicant may use satisfactory Armed Forces service experience as a method of compliance. The Armed Forces service experience must be in a format acceptable to the FAA. This method is allowed only when the applicant makes a case for severe burden when applying strict compliance to the regulations. The intent is to meet all the applicable regulations and show that no feature or characteristic makes the aircraft unsafe for the category in which certification is requested. Satisfactory Armed Forces service experience under 14 CFR § 21.27(d) may consist of, but not limited to:

(a) Data on systems/component failures – Reliability data

(b) Major repairs/alterations

(c) Maintenance and overhaul findings

(d) In-service Flight Data (Usage, altitude, airspeeds, vertical acceleration exceedances, etc.)

(e) Present service history in context of the operating environments (military vs. proposed civilian)

(f) Safety Data (Incident & Accident Data)

(3) Substantially the same level of airworthiness is not the same as equivalent level of safety. It involves a reduced effort than finding an equivalent level of safety. A level of airworthiness is established when an applicant shows and the FAA finds that an aircraft is in compliance with applicable airworthiness regulations and that no feature or characteristic makes it unsafe for the category in which certification is requested. The airworthiness regulations are minimum safety standards established by the FAA. 14 CFR § 21.27 (d) provides the applicant relief from strict compliance to an applicable airworthiness regulation, however the applicant must show that substantially the same level of airworthiness is achieved. This level can be achieved by providing applicable data such as the items noted above in paragraph 6-6(e)(2) a-f.

e. Special Conditions 14 CFR § 21.27(e). Special conditions and later requirements may be imposed under 14 CFR § 21.27(e).

f. Substantiation Package. The following are a list of items in the substantiation package provided by the applicant to the FAA:

(1) A comparison of relevant military standards and specifications used in original military certification to applicable civilian regulations, and/or

(2) The design philosophy used in military certification and comparison to any existing civil aircraft systems and design, and/or

(3) Any relevant analysis and testing conducted during military certification, and/or

(4) A differences document comparing the proposed civilian aircraft, engine, and propeller to the military version. This is necessary to document any design changes incorporated for civilian use, so that the validity of any military service history submitted can be confirmed. Any design changes made for civilian use purposes may be held to more recent certification requirements, and/or

(5) Any other relevant data items applicant finds necessary to help FAA provide finding for substantially the same level of airworthiness.

g. Other Considerations. Clarification on a few items:

(1) DoD category "B" aircraft as defined by DoD 4160.21-M, Defense Materiel Disposition Manual, are not eligible for 14 CFR § 21.27 type certification.

(2) Issues to be handled through the issue paper process. Final decision is with appropriate Directorate.

h. Import of Foreign Owned Aircraft. Surplus aircraft of a foreign military or government entity are not eligible, unless the U.S. designed and built aircraft was brought into the U.S. Armed Forces inventory, operated and maintained after its foreign service, and subsequently deemed surplus.

6-7. MULTIPLE AIRWORTHINESS CERTIFICATION, 14 CFR § 21.187. Aircraft can be certificated in multiple categories under 14 CFR § 21.187. See Order 8110.56 and Order 8130.2 for details.

6-8. AERIAL DISPENSING OF LIQUIDS.

a. When approving firefighting aircraft, indicate on the TCDS or STC that the approval is for "aerial dispensing of liquids." Do NOT use terms such as "firefighting" as the mission or purpose. (For restricted category aircraft, the "aerial dispensing of liquids" mission is approved under the special purpose of forest and wildlife conservation.) The use of the term "aerial dispensing of liquids" is intended to avoid confusion over who approves firefighting operations. The U.S. Forest Service, Bureau of Land Management, and state forestry agencies approve firefighting operations. Each has the final responsibility for its own firefighting operations. The FAA approves the aircraft only for the dispensing function. The aircraft must be evaluated in its mission operating environment to ensure that "no feature or characteristic makes it unsafe."

b. FAA can accept applications for TC and STC projects for aircraft to be converted for air tanker operations under "aerial dispensing of liquids." All type certification projects for aerial dispensing of liquids should be considered as significant in accordance with this order and in coordination with the accountable directorate.

c. The FAA should not spend the resources to approve additional requirements the U.S. Forest Service, or other government agencies, impose on aircraft performing firefighting. This includes the determination of aircraft life limits, such as an operational service life (OSL), when the FAA does not have a requirement to establish one.

d. Coordinate all "aerial dispensing of liquids" certification projects with AIR-110. This includes providing a copy of the CPN, and coordinating issue papers, TCDSs, and STCs, as appropriate, before their issuance.

6-9. [RESERVED]

6.10. [RESERVED]

CHAPTER 7. NOISE CERTIFICATION

7-1. OVERVIEW OF NOISE CERTIFICATION RULES. Aircraft must comply with 14 CFR part 36, Noise Standards: Aircraft Type and Airworthiness Certification, before the FAA issues certain TCs, amended TCs, STCs, and airworthiness certificates, as specified in various sections of 14 CFR part 21.

a. Some type certification actions require the FAA to conduct an environmental analysis under Order 1050.1, *Policies and Procedures for Considering Environmental Impacts*. See paragraph 7-4 below for more information on this requirement.

b. Before issuing an original TC, the FAA must conduct a finding per the Noise Control Act of 1972 as amended by 49 U.S.C Section 44715. The FAA must conduct this finding regardless of whether the aircraft complies with 14 CFR part 36 or the National Environmental Policy Act (NEPA). Paragraph 7-3 gives more guidance on the Noise Control Act.

7-2. NOISE CERTIFICATION BASIS. The regulatory basis for complying with 14 CFR part 36 noise certification is the amendment in effect on the date of application. The PACO specialist or project manager should notify the noise certification applicant of any pending regulatory changes that may affect the project.

7-3. NOISE CONTROL ACT FINDING.

a. Under the Noise Control Act of 1972, the FAA must determine whether the applicant for an aircraft can substantially decrease noise, before the FAA issues an original TC. The FAA must determine this for any aircraft of any category, regardless of whether 14 CFR part 36 applies to the aircraft. If the FAA can prescribe standards and regulations to help the aircraft's noise level substantially decrease, then it must use the regulatory process to determine how much noise reduction it will require before issuing an original TC. The standards and regulations must be consistent with the limitations of Title 49 U.S.C. § 44715(e).

b. The Noise Control Act finding must be made by the FAA, notwithstanding any delegation to companies, other private persons, or CAAs, or any procedures for type certificating foreign-manufactured aircraft. The FAA's Office of Environment and Energy (AEE) delegates the authority to make this finding to the appropriate directorate depending on the aircraft type. That directorate may not re-delegate the authority. This finding must meet the Noise Control Act of 1972 for original type certifications. A copy of each finding should be sent to the AEE.

c. The FAA must base its findings on actual examination of each type design. This examination must start as soon as possible after applicants submit their application for type certification. It must reflect noise reduction potentials that become evident during the certification process. The noise finding documentation is not limited to, but should include:

(1) The sources of audible noise – aerodynamic or otherwise – in the particular type design, including any noise measurements made, who made them, whether the FAA witnessed them, and an estimate of their reliability, Technical alternatives and potential ways to reduce noise, including recommendations for choosing practical technical alternatives that may reduce noise,

(2) An estimate of the expected degree of potential noise reduction associated with each alternative identified in paragraph 7-3c(2) above,

(3) Investigation and review of the manufacturer's design information, data, and tests, and

(4) The economical and technical reasons the FAA did not require the applicant to include noise reduction technical alternatives in the type design. There should be reasons for each noise reduction technical alternative identified in paragraph 7-3c(2) above (for example, acoustical lining).

d. If the FAA concludes that prescribing standards and regulations can substantially reduce noise, it should refer the matter to AEE for appropriate action.

7-4. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA).

a. Order 1050.1 sets policies and procedures and assigns responsibility for ensuring that the FAA complies with environmental procedures in the Council on Environmental Quality regulation. The Council on Environmental Quality regulation outlines how to implement NEPA procedures. To comply with NEPA requirements, the FAA must assess and analyze the potential environmental consequences.

b. Chapter 4 (paragraph 401) of Order 1050.1 contains examples of actions that normally require an environmental assessment. Chapter 4 (paragraph 404) of that order includes a decision process on whether to prepare a finding of no significant impact (FONSI) or environmental impact statement (EIS) for a proposed action based on its potential environmental impacts. Chapter 3 (paragraphs 303 and 307- 312) of Order 1050.1 identifies FAA actions that are categorically excluded from the requirement for an environmental analysis or an EIS, with the exception of extraordinary circumstances (paragraph 304).

7-5. ACCEPTABLE MEANS OF COMPLIANCE.

a. Federal aircraft noise certification regulations require that the demonstration of compliance must be made by the set of specified procedures under 14 CFR part 36 or an FAA-approved equivalent procedure, which may be substituted for one or more of the 14 CFR part 36 specifications. In general, applicants may propose equivalent procedures for any specification under the noise measurement and the evaluation portions of 14 CFR part 36. However, they may not use equivalent procedures for the noise limits portion of 14 CFR part 36.

b. FAA-approved equivalent procedures are those procedures shown to yield the same noise levels as if the applicant fully performed specified 14 CFR part 36 tests or analyses as prescribed. The FAA does not grant prior approval of generic equivalent procedures. Applicants must identify equivalent procedures in their Noise Compliance Demonstration Plan. The FAA must approve the procedures before applicants use them in their noise certification demonstration.

c. The AEE approves equivalent procedures. Coordinate with the appropriate directorate noise certification specialist (NCS) on any equivalent procedures requiring review and approval by AEE. Requests for approval of equivalent procedures shall be processed from the certification office through the directorate NCS to AEE.

d. Historically, equivalent procedures have been complex and required a lot of time and resources to review. The process may include several discussions between the AEE and the

applicant, and supplemental data and information may be required to further substantiate the equivalent procedure's validity.

e. The certifying ACO should advise applicants on the approval process. Applicants should allocate the proper amount of time, depending on the specific equivalency, to achieving approval of an equivalent procedure. As experience is gained with the application of a particular equivalent procedure, AEE may identify that procedure as available for use without additional approval from them. This would effectively mean that AEE had delegated to the ACO the authority to approve that specific procedure.

f. AC 36-4, Noise Certification Handbook, outlines test, analysis, and documentation procedures for subsonic turbojet airplanes that the FAA accepts as showing compliance with 14 CFR part 36. Some equivalencies in AC 36-4 (for example, family plan, tone-corrected perceived noise level time (PNLT) history merging techniques, use of analytical procedures, and so forth) are conceptual in nature and the specific application of the equivalency must be approved by AEE before use. ACO specialists who are in doubt about their authority to approve a particular equivalency should contact the appropriate directorate NCS for guidance.

7-6. WITNESSING TESTS.

a. The following need to witness all flight and other tests in support of noise certification:

(1) FAA engineering personnel, or

(2) A representative of a foreign CAA with which the United States/FAA has an agreement that specifically addresses noise certification, or

(3) An acoustical DER appointed under Order 8110.37, Designated Engineering Representative (DER) Guidance Handbook.

b. Under Order 8110.37, acoustical DERs may:

(1) Witness and approve noise certification tests conducted per an FAA-approved test program, when the FAA specifically authorizes them to do so.

(2) Approve noise analysis techniques and computer programs, and certify the noise values reduced by these computer programs. The applicant should have measured and evaluated these values per 14 CFR part 36 or an equivalent procedure the AEE previously approved for that noise test series.

c. Acoustic DERs who have been delegated the authority to witness a test must contact the FAA to make alternative arrangements if they cannot witness the test. Acoustic DERs may not determine whether a type design change is an acoustic change under 14 CFR § 21.93(b). Acoustical DERs also may not approve:

(1) Test plans or equivalent procedures,

(2) Operating limitations or other AFM information, or

(3) Certificated aircraft noise levels.

7-7. CORRECTION PROCEDURES EVALUATION.

a. To ensure applicants and independent DERs are implementing 14 CFR part 36 noise certification requirements, the FAA has a policy of evaluating the measurement and analysis practices for aircraft noise certification. As part of the evaluation, the FAA requires an audit of the applicant's 14 CFR part 36, subpart B or H correction procedures and analysis methods. This audit compares the applicant's correction procedures and analysis methods to the current regulations and approved procedures.

b. The U.S. Department of Transportation Volpe National Transportation Systems Center (VNTSC) conducts this audit for the FAA. To help the VNTSC, the PACO specialist must instruct applicants, who are not previously approved, to send the proper information to the VNTSC. The PACO specialist must also inform the appropriate directorate NCS that the evaluation has started. The ACO specialist may also obtain a description of the required information from the directorate NCS. To determine the VNTSC checkout status for a particular applicant, the ACO specialist should contact the appropriate directorate NCS.

c. In addition to the VNTSC evaluation, applicants should develop software control procedures, which ensure the applicant and the FAA that the validated software maintains its integrity. These procedures also ensure any future audits would not find changes in the evaluation or analysis procedures. The FAA reserves the right to re-inspect applicants' measurement and analysis procedures any time, but it will perform periodic audits based on the criteria in paragraphs 7-7d and 7-7e below.

d. The VNTSC will evaluate future amendments to 14 CFR part 36 to find out whether it needs to re-evaluate previously approved correction procedures and analysis methods. When it does, the VNTSC will send notices to each entity that has undergone an evaluation, requesting to re-evaluate their procedures and methods. Applicants can get guidelines for the re-evaluation from the appropriate directorate NCS.

e. In certain instances, the VNTSC must also audit how foreign applicants are implementing 14 CFR part 36 data correction procedures and analysis methods. For noise certifications involving a foreign certification authority with which the United States has a noise certification agreement, that authority's NCSs must provide the ACO written proof that they have evaluated the foreign applicant's data correction procedures. Otherwise, the VNTSC must evaluate the foreign applicant's data correction procedures.

7-8. NOISE-RELATED TYPE CERTIFICATION REQUIREMENTS.

a. An applicant for a TC must show that the aircraft meets the applicable airworthiness requirements, special conditions, and 14 CFR part 36 noise standards. Figure 7-1 below, summarizes 14 CFR part 36 applicability and conditions that require compliance.

b. The FAA may issue a TC for an aircraft in the primary, normal, utility, acrobatic, commuter, transport, or special class of aircraft if:

(1) The product qualifies under 14 CFR § 21.27, Issue of type certificate: surplus aircraft of the U.S. Armed Forces, or

(2) The type design and the product meet the applicable aircraft noise and airworthiness requirements of the regulations, and the aircraft has no feature or characteristic that makes it unsafe.

c. The FAA may issue a TC for an aircraft in the restricted category for special purposes if the applicant shows that the aircraft:

(1) Meets the applicable 14 CFR part 36 noise requirements,

(2) Meets the airworthiness requirements of the aircraft category, except those requirements that the FAA finds inappropriate for the special purpose for which the aircraft will be used, or

(3) Is a type manufactured per the requirements of – and accepted for use by – the U.S. Armed Forces, and that the TC holder has later modified for a special purpose.

d. The FAA may issue a TC for an aircraft manufactured in a country with which the United States has an agreement to import aircraft if:

(1) The country in which the aircraft was manufactured certifies that the aircraft:

(a) Has been examined, tested, and found to meet 14 CFR part 36 noise and applicable U.S. airworthiness standards and any special conditions that the FAA may prescribe, or

(b) Meets the applicable noise and airworthiness standards of the country in which the aircraft was manufactured.

(2) The applicant has submitted technical data showing that the aircraft complies with FAA noise and airworthiness standards required.

(3) The manuals, placards, listings, and instrument markings required by the applicable airworthiness and noise requirements are in English.

7-9. CHANGES TO THE TYPE DESIGN OF AN AIRCRAFT. Figures 7-2 through 7-4 below, summarize 14 CFR part 36 applicability for acoustical changes and conditions for compliance. As specified in 14 CFR § 21.93(b), to comply with 14 CFR part 36, any voluntary change in type design that may increase an aircraft's noise levels is an acoustical change for the following:

a. Transport category large airplanes.

b. Turbojet-powered airplanes (regardless of category). Acoustical changes do not include changes in type design that are limited to one of the following:

(1) Gear down flight with one or more retractable landing gears down during the entire flight,

(2) Spare engine and nacelle carriage external to the skin of the airplane (and return of the pylon or other external mount), or

(3) Time-limited engine or nacelle changes, where the change in type design specifies that the airplane may not be operated for a period of more than 90 days, unless the applicant shows that the aircraft's change in type design complies with the applicable acoustical change provisions of 14 CFR part 36.

c. Helicopters, except those that applicants designate only for agricultural aircraft operations, for dispensing firefighting materials, for carrying external loads, or for installing or removing external equipment [14 CFR § 21.93(b)(4)].

d. Propeller-driven commuter category and small airplanes in the primary, normal, utility, acrobatic, transport (less than 75,000 lbs.), and restricted categories except the following:

(1) Airplanes designated for agricultural operations as defined in 14 CFR § 137.3 or for dispensing firefighting materials,

(2) U.S.-registered airplanes that had flight time before January 1, 1955, or

(3) Land-configured airplanes reconfigured with floats or skis.

7-10. SUPPLEMENTAL TYPE CERTIFICATES. Each applicant for an STC must show that the altered product meets airworthiness requirements in paragraphs 14 CFR § 21.101(a) and (b). For an acoustical change, the applicant must show that the aircraft complies with 14 CFR §§ 36.7, 36.9, or 36.11.

7-11. STANDARD AIRWORTHINESS CERTIFICATES. In addition to the requirements in paragraphs (a), (b), (c), and (d) of § 21.183, the following – as required by § 21.183(e) – must comply with the original issuance of a standard airworthiness certificate:

a. For transport category large airplanes and turbojet-powered airplanes without flight time before the dates in § 36.1(d), the type design must comply with the noise requirements of § 36.1(d) and applicable airworthiness requirements.

b. For primary, normal, utility, acrobatic, commuter, or transport category propeller-driven small airplanes without flight time before January 1, 1980, the type design must comply with 14 CFR part 36 and applicable airworthiness requirements.

c. For import airplanes, the country in which the airplane was manufactured must certify and the FAA must find that 14 CFR part 36 or the applicable airplane noise requirements of the country of manufacture and any other FAA requirements provide noise levels no greater than those provided by compliance with 14 CFR part 36.

7-12. AIRWORTHINESS CERTIFICATES FOR RESTRICTED CATEGORY AIRCRAFT. Before the FAA can issue a restricted category airworthiness certificate, aircraft must meet requirements in paragraphs 7-12a and 7-12b below:

a. For propeller-driven small airplanes, § 21.185(d) specifies that the type design must comply with applicable 14 CFR part 36 noise requirements and airworthiness requirements. These airplanes do not include those designed for agricultural use, as defined in § 137.3, or those that dispense firefighting materials. They also must not have had any flight time before January 1, 1980.

b. For import airplanes, § 21.185(d) specifies that the country in which the airplane was manufactured must certify – and the FAA must find – that 14 CFR part 36 or the applicable airplane noise requirements of the country of manufacture and any other FAA requirements provide noise levels no greater than those provided by compliance with 14 CFR part 36.

FIGURE 7-1. TYPE OF FAA APPROVAL CERTAIN AIRCRAFT NEED TO MEET 14 CFR PART 36 NOISE STANDARDS

If aircraft is:	**And has no flight time before:**	**1-1**And:	**2-1**Applicants must obtain:
Transport category large airplane or turbojet powered airplane [14 CFR § 36.1(d)]	Dec. 1, 1973	Weighs greater than 75,000 lbs. and is NOT powered by JT3D engine	• An original standard airworthiness certificate (14 CFR § 21.183) • Acoustical change approval under 14 CFR § 21.93 (see figure 7-2) • A TC, amended TC, or STC
same as above	Dec. 31, 1974	Weighs greater than 75,000 lbs. and powered by JT3D engine	same as above
same as above	Dec. 31, 1974	Weighs 75,000 lbs or less	same as above
Commuter category or small propeller-driven airplane [14 CFR § 36.1(e)]	Jan. 1, 1980	Is not designed for: • Agricultural operations as defined in 14 CFR § 137.3, effective Jan. 1, 1966 • Dispensing firefighting materials	• An original standard (14 CFR § 21.183) OR restricted (14 CFR § 21.185) airworthiness certificate • Acoustical change approval under 14 CFR § 21.93 (see figure 7-3) • A TC, amended TC, or STC
Helicopter (first civil version of a military helicopter)	—	Demonstrates noise levels no greater than the Stage 1 noise limits in 14 CFR § H36.305(a)(1)(ii) of Appendix H	• A TC • FAA approval for a change in type design (see figure 7-4)
Helicopter (subsequent versions of a military helicopter)	—	Complies with Stage 2 noise limits	• A TC • FAA approval for a change in type design (see figure 7-4)

NOTE: 14 CFR part 36 applies to all primary, normal, transport, and restricted category helicopters for which applicants submitted applications for a TC or a change in type design on or after March 6, 1986.

It does NOT apply to helicopters used for agricultural aircraft operations (14 CFR § 137.3), for dispensing firefighting materials, or for carrying external loads (14 CFR part 133 operations).

FIGURE 7-2. CRITERIA FOR ENSURING DESIGN CHANGES TO STAGE 1, 2, 3, AND 4 SUBSONIC TRANSPORT CATEGORY LARGE OR TURBOJET-POWERED AIRPLANES MEET 14 CFR § 36.7 NOISE STANDARDS

If subsonic transport category large airplane or turbojet powered airplane is:	And:	Then airplane:
Stage 1 before change in type design	Application submitted AFTER Sept. 17, 1971	• Cannot exceed noise levels before change • Must use highest airworthiness approved power or thrust, before and after change • Must use quietest configuration for highest takeoff weight, during takeoff and sideline noise tests before change • Applicant cannot use tradeoff provisions in 14 CFR § C36.5(b) of Appendix C to increase Stage 1 noise levels
same as above	Application submitted BEFORE Sept. 17, 1971	• Cannot exceed noise levels before change Applicant cannot use tradeoff provisions in 14 CFR § C36.5(b) of Appendix C to increase Stage 1 noise levels
Stage 2 before change in type design	Airplane powered by turbojet engine with bypass ratio of 2 or more	• Cannot exceed quieter of Stage 3 noise limit + 3 EPNdB or Stage 2 noise limit • Must use quietest configuration for highest takeoff weight, during takeoff and sideline noise tests before change Applicant CAN use tradeoff provisions in 14 CFR § C36.5(b) of Appendix C to determine noise limits
same as above	Airplane NOT powered by turbojet engine with bypass ratio of 2 or more	• Cannot be Stage 1 after change • Must use quietest configuration for highest takeoff weight, during takeoff and sideline noise tests before change

FIGURE 7-2. CRITERIA FOR ENSURING DESIGN CHANGES TO STAGE 1, 2, 3, AND 4 SUBSONIC TRANSPORT CATEGORY LARGE OR TURBOJET-POWERED AIRPLANES MEET 14 CFR § 36.7 NOISE STANDARDS (CONTINUED)

If subsonic transport category large airplane or turbojet powered airplane is:	And:	Then airplane:
Stage 3 before change in type design	Application submitted ON OR AFTER Aug. 14, 1989	• Must remain a Stage 3 airplane after change
same as above	Application submitted BEFORE Aug. 14, 1989 *AND* The FAA required that the airplane be Stage 3 compliant before change	• Must remain a Stage 3 airplane after change
same as above	Application submitted BEFORE Aug. 14, 1989 *AND* The FAA did NOT require that the airplane be Stage 3 compliant before the change	• Must be a Stage 2 or Stage 3 airplane after the change
same as above	Airplane becomes a Stage 4after the change	Must remain a Stage 4 airplane after the change
Stage 4 before change in type design		• Must remain a Stage 4 airplane after the change

NOTE: If the applicant is NOT proposing an acoustical change to the subsonic transport category large airplane or turbojet-powered airplane, 14 CFR § 36.7 does not apply.

FIGURE 7-3. CRITERIA FOR ENSURING DESIGN CHANGES TO COMMUTER CATEGORY AND PROPELLER-DRIVEN SMALL AIRPLANES MEET 14 CFR § 36.9 NOISE STANDARDS

If applicant:	And airplane is:	Then:
Makes acoustical change	• Designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or • U.S.-registered airplane with flight time BEFORE Jan. 1, 1955; or • Land-configured airplane reconfigured with floats or skis	Title 14 CFR § 36.9 does not apply
Makes acoustical change AND Submitted application BEFORE Jan. 1, 1975	• NOT designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or • NOT U.S.-registered airplane with flight time AFTER Jan. 1, 1955; or • NOT land-configured airplane reconfigured with floats or skis	Title 14 CFR § 36.9 does not apply
Makes acoustical change AND Submitted application AFTER Jan. 1, 1975	• NOT designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or • NOT U.S.-registered airplane with flight time AFTER Jan. 1, 1955; or • NOT land-configured airplane reconfigured with floats or skis AND • Type certified under Appendix F or G of Part 36	Airplane may not exceed limits defined in 14 CFR § 36.501
same as above	• NOT designed for agricultural operations or for dispensing firefighting materials to which 14 CFR § 36.1583 does not apply; or • NOT U.S.-registered airplane with flight time AFTER Jan. 1, 1955; or • NOT land-configured airplane reconfigured with floats or skis AND • NOT type certified under Appendix F or G of Part 36	After change in type design, airplane may not exceed the higher of these two: • Noise limits in 14 CFR § 36.501 or • Noise level before change in type design, measured and corrected per 14 CFR § 36.501

FIGURE 7-4. CRITERIA FOR ENSURING DESIGN CHANGES TO HELICOPTERS MEET 14 CFR PART 36 NOISE STANDARDS

If helicopter is:	And:	Then the applicant:
Excepted from acoustic change requirements for change in type design under 14 CFR § 21.93	—	Only needs to show that parent (original), not derivative (modified), helicopter meets applicable 14 CFR part 36 requirements
Not excepted from acoustic change requirements for change in type design under 14 CFR § 21.93	Change in type design will NOT increase helicopter's certification noise levels	same as above
same as above	Change in type design WILL increase helicopter's certification noise levels	Must ensure derivative helicopter meets applicable 14 CFR part 36 requirements

Stage 1 helicopter:

- If the Stage 1 parent exceeds any Stage 1 limit for helicopters, the derivative's noise levels must not be greater than levels for the parent. The ACO will not approve the change in type design until the applicant reduces the derivative's noise levels to at least the parent helicopter's levels.

- If the Stage 1 parent helicopter does NOT exceed any Stage 1 limits, the derivative helicopter cannot exceed Stage 1 noise limits. The derivative may "acoustically grow" up to Stage 1 limits.

Stage 2 helicopter: If the parent is a Stage 2 helicopter, the derivative helicopter must be a Stage 2 helicopter. The derivative may "acoustically grow" up to the Stage 2 limits for helicopters.

APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS

FIGURE 1. ACOS PROJECT, TC, AND STC NUMBERING SYSTEM

PROJECT NUMBERING SYSTEM

Project Number = AA nnnnn YY-X

Where:

AA = Two alpha digits to identify the type of project; i.e.,
- **TC** = New Type Certificate (TC)
- **ST** = New Supplemental Type Certificate (STC)
- **AT** = Amended Type Certificate
- **SA** = Amended Supplemental Type Certificate
- **TD** = Type Design Change
- **SP** = Special Project
- **PM** = Parts Manufacturer Approval (PMA)

nnnnn = ACOS assigned number; e.g., 00146

YY = Two alpha digits to identify the project Aircraft Certification Office (ACO); that is,
- **AC** = ASW-140, Ft. Worth Airplane Certification Office
- **AK** = ACE-115N, Anchorage Aircraft Certification Office
- **AT** = ACE-115A, Atlanta Aircraft Certification Office
- **BO** = ANE-150, Boston Aircraft Certification Office
- **CE** = ACE-112, Small Airplane Directorate
- **CH** = ACE-115C, Chicago Aircraft Certification Office
- **DE** = ANM-100D, Denver Aircraft Certification Office
- **DS** = ASW-130, Delegation Systems Certification Office
- **EN** = ANE-140, Engine Certification Office, Boston
- **LA** = ANM-100L, Los Angeles Aircraft Certification Office
- **MC** = ACE-115M, Military Certification Office
- **NY** = ANE-170, New York Aircraft Certification Office
- **SE** = ANM-100S, Seattle Aircraft Certification Office
- **WI** = ACE-115W, Wichita Aircraft Certification Office

X = An alpha digit to identify the type of product; that is,
- **A** = Small Airplane
- **B** = Balloon
- **E** = Engine
- **G** = Glider
- **P** = Propeller
- **R** = Rotorcraft
- **S** = Airship
- **T** = Transport Airplane
- **I** = Experimental
- **Q** = Other, or not product

As an example, TC00125AT-A would be a TC project assigned by the Atlanta ACO on a small airplane with the assigned number 00125.

APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

FIGURE 1. ACOS PROJECT, TC, AND STC NUMBERING SYSTEM (CONTINUED)

TYPE CERTIFICATE NUMBERING SYSTEM

Certificate Number = SX nnnnn YY-D

Where:

S indicates a supplemental type certificate (blank if a type certificate)
X = An alpha digit to identify the type of product; that is,

- **A** = Small Airplane
- **B** = Balloon
- **E** = Engine
- **G** = Glider
- **P** = Propeller
- **R** = Rotorcraft
- **S** = Airship
- **T** = Transport Airplane

nnnnn = assigned number automatically generated by ACOS; for example, 00146.

YY = Two alpha digits to identify the issuing Aircraft Certification Office (ACO)

- **AC** = ASW-140, Ft. Worth Airplane Certification Office
- **AK** = ACE-115N, Anchorage Aircraft Certification Office
- **AT** = ACE-115A, Atlanta Aircraft Certification Office
- **BO** = ANE-150, Boston Aircraft Certification Office
- **CE** = ACE-112, Small Airplane Directorate
- **CH** = ACE-115C, Chicago Aircraft Certification Office
- **DE** = ANM-100D, Denver Aircraft Certification Office
- **DS** = ASW-130, Delegation Systems Certification Office
- **EN** = ANE-140, Engine Certification Office, Boston
- **LA** = ANM-100L, Los Angeles Aircraft Certification Office
- **MC** = ACE-100M, Military Certification Office
- **NY** = ANE-170, New York Aircraft Certification Office
- **SE** = ANM-100S, Seattle Aircraft Certification Office
- **WI** = ACE-115W, Wichita Aircraft Certification Office

D = Indicates Delegation Organization (Delegated Alteration Station (DAS)) and early Organization Delegation Authorization (ODA)) issued STC.

As an example, SA00125AT would be an STC issued by the Atlanta ACO on a small airplane with the assigned number 00125.

APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

FIGURE 3. EXAMPLE TYPE CERTIFICATION PROJECT PLAN

A. Project No. _____, Revision No. _____, Revision date _____

B. Model designation: _____

C. Applicant: _____

D. Address: _____

E. Date of application: _____

F. Type of project: ____TC ____STC ____Amended.

G. Certification office:

H. Project Manager: _____; Telephone No. _____

I. Accountable Directorate:

J. Project Officer: _____; Telephone No. _____

K. General description:

L. Significant features:

M. Proposed certification basis:

N. Exemptions needed: _____yes; _____no.

O. Special conditions needed: _____yes; _____no.

P. Proposed schedule:

1. Preliminary type board _____
2. Preflight type board _____
3. Other type boards _____
4. TIA issuance _____
5. Certificate issue/amend _____

Q. Estimated employee/hours:

1. Accountable directorate _____
2. Certification office _____
3. Other _____

APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

FIGURE 3. EXAMPLE TYPE CERTIFICATION PROJECT PLAN (CONTINUED)

R. Portions of certification basis where accountable directorate will:

1. Find compliance:
2. Witness tests:

S. Coordination required (and means of indicating concurrence):

1. TIA
2. Issues book
3. Certification Summary Report

T. Reporting requirements:

1. Recurrent
   a.
   b.
   c.
2. One-time
   a.
   b.
   c.

U. Documentation requirements:

1. Issues book? _____yes, _____no.
2. Certification Summary Report? _____yes, _____no.
3. Federal Register notices? _____yes, _____no.

V. Delegations by accountable directorate:

1. Certification Summary Report signature? _____
2. Certificate signature? _____
3. Other? _____

W. Approved on _____by :

_____

Manager, Accountable Directorate, XXX-XXXX

APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (CONTINUED)

FIGURE 7. SAMPLE TYPE CERTIFICATION PROJECT PLAN (CONTINUED)

R. Portions of certification basis where accountable directorate will:

1. Find compliance:
2. Conduct tests:
3.

S. Coordination required (and means of indicating concurrence):

1. TIA
2. Issues book
3. Certification Summary Report

T. Reporting requirements:

1. Recurrent
   a.
   b.
   c.
2. One-time
   a.
   b.
   c.

U. Documentation requirements:

1. Issues book? _____yes, _____ no.
2. Certification Summary Report? _____yes, _____no.
3. Federal Register notices? _____yes, _____no.

V. Delegations by accountable directorate:

1. Certification Summary Report signature? _____
2. Certificate signature? _____
3. Other? _____

W. Approved on _____ by :

_____
Manager, Accountable Directorate, XXX-XXXX

APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

FIGURE 5. SAMPLE WRITTEN PERMISSION STATEMENTS FOR AN STC

Use the following sample statements as written evidence of permission when the STC holder agrees to permit another person to use the certificate to modify an aircraft, aircraft engine, propeller, or appliance:

(Name of person given consent) may hereby use STC#_____ to modify (aircraft, aircraft engine, propeller, or appliance per (serial number).

(STC holder signature)

Date

or,

Date

Starting on (effective date), (name of person given consent) is authorized to use STC#_____ to modify (product types) for (specific number of products), identified by (serial numbers).

(STC holder signature)

APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

FIGURE 6. SAMPLE TYPE CERTIFICATE DATA SHEET FIRST PAGE WITH TC HOLDER RECORD PARAGRAPH

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

TC123
Revision 3
XYZ
100
February 15, 1998

TYPE CERTIFICATE DATA SHEET NO. TC123

This data sheet which is part of Type Certificate No. 123 prescribes conditions and limitations under which the product for which the type certificate was issued meets the airworthiness requirements of the Federal Aviation Regulations.

Type Certificate Holder	XYZ Aircraft Company 123 Anywhere Avenue Nowhere, Kansas 67677
Type Certificate Holder Record	AAA Corporation transferred TC 123 to ABC Corporation on July 4, 1997 ABC Corporation transferred TC 123 to XYZ Corporation on February 15, 1998

I - Model 100, (Transport Category), Approved September 9, 1991

Engine	Two Pratt and Whitney Aircraft of Canada, Ltd. (formerly United Aircraft of Canada, Ltd.) JT15D-1 turbofans, or Pratt and Whitney Aircraft JT15D-1 turbofans. Engines may be interchanged in any combination. (S/N 100-0001 through 100-0349) (See NOTES 9 and 11)	
	Two Pratt and Whitney Aircraft of Canada, Ltd. JT15D-1A turbofans. (S/N 100-0350 through 100-0664 except 100-0417 and 100-0654)	
Fuel	Jet A, Jet A-1, Jet B, JP-4, JP-5 or JP-8. For required use of anti-icing additives and emergency use of aviation gasoline, refer to the FAA-approved Airplane Flight Manual.	
Engine Limits	Static thrust, standard day, sea level:	
	Takeoff (5 min.)	2,200 lb.
	Max. continuous	2,090 lb.
	Max. permissible engine rotor operational speeds:	
	N_1 (Fan) JT15D-1 99 percent	15,840 r.p.m.
	N_1 (Fan) JT15D-1A 102.1 percent	16,336 r.p.m.
	N_1 (Fan) JT15D-1B 103.4 percent	16,540 r.p.m.
	N_2 (Gas gen.) 95 percent	31,120 r.p.m.

APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

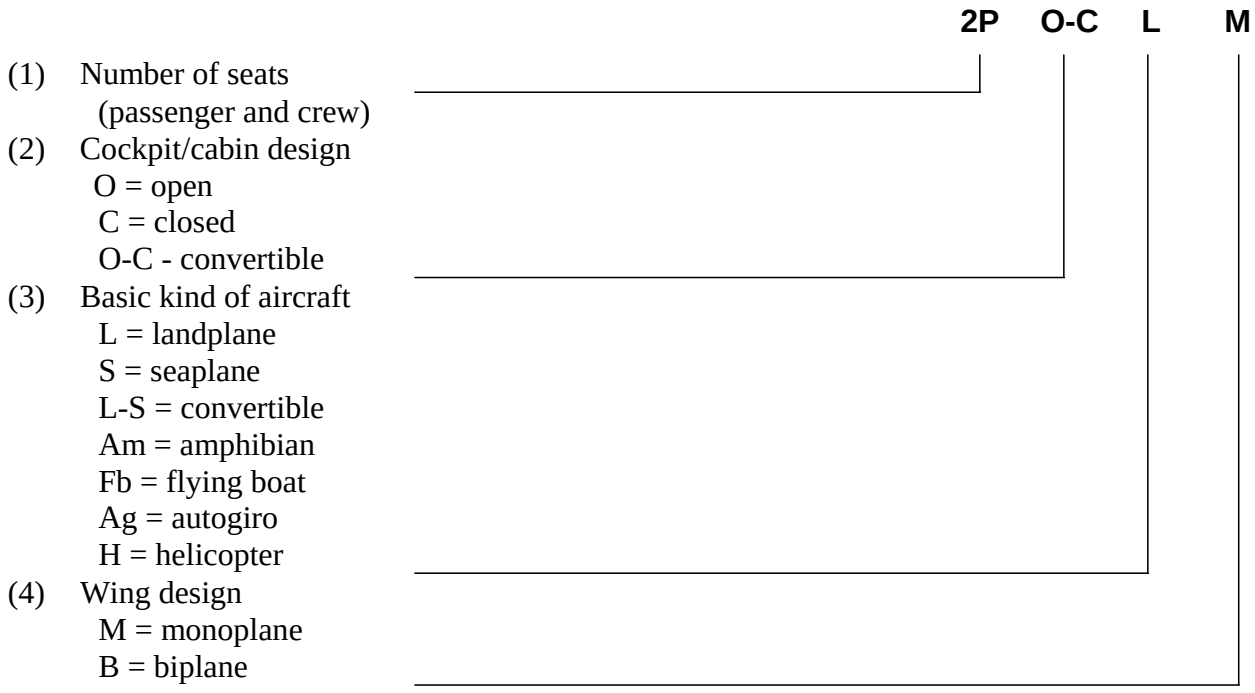
FIGURE 7. EXAMPLE TYPE CERTIFICATE DATA SHEET FIRST PAGE WITH PRODUCTS CODES (DESIGNATIONS)

Coded Entries

Many aircraft and engine specifications and some type certificate data sheets carry coded information to describe the general characteristics of the product. These may be found in the model caption or on a separate line entry titled "Type" or "Designation."

Aircraft codes (Designations) are as follows:

Example: 2 PO-CLM

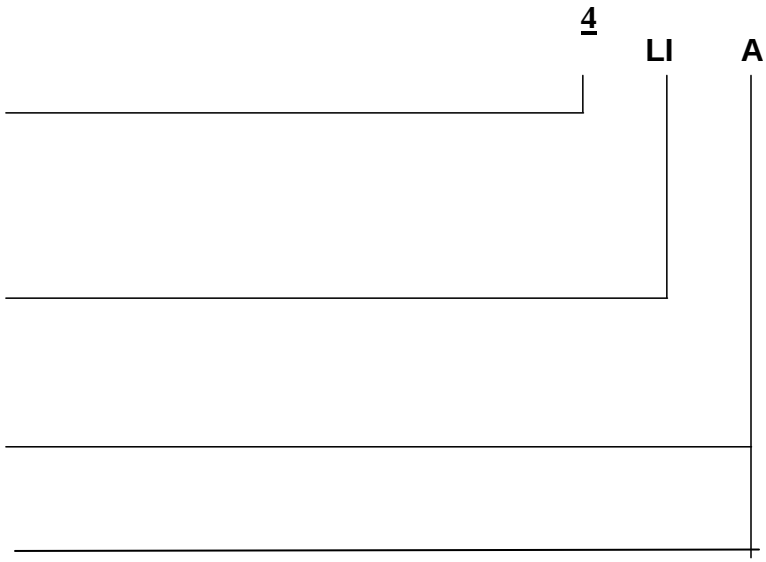


APPENDIX 2. ISSUANCE OF CERTIFICATES (CONTINUED)

FIGURE 7. EXAMPLE TYPE CERTIFICATE DATA SHEET FIRST PAGE WITH PRODUCTS CODES (DESIGNATIONS) (CONTINUED)

Engine codes (Type) are as follows:

Example: 4LIA (sometimes 4LAI)



(1) Number of cylinders

(2) Cylinder arrangement
- L = inline
- V = vee
- R = radial
- HO = horizontal opposed
- I = inverted

(3) Coolant
- A = air cooled
- W = liquid cooled

(4) Modified engines
- M = modified
- (rarely used)

APPENDIX 3. LIST OF FAA FORMS

1. FAA Form 337, Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance)

2. FAA Form 8000-4, Air Agency Certificate

3. FAA Form 8000-5, Certificate of Designation

4. FAA Form 8100-1, Conformity Inspection Record

5. FAA Form 8110-1, Type Inspection Authorization

6. FAA Form 8110-2, Supplemental Type Certificate

7. FAA Form 8110-3, Statement of Compliance with Airworthiness Standards

8. FAA Form 8110-9, Type Certificate

9. FAA Form 8110-12, Application for Type Certificate, Production Certificate, or Supplemental Type Certificate

10. FAA Form 8110-14, Statement of Qualifications (DAR - DMIR - DER)

11. FAA Form 8110-26, Supplemental Type Inspection Report

12. FAA Form 8110-31, Type Inspection Report

13. FAA Form 8120-10, Request for Conformity

14. FAA Form 8130-3, Airworthiness Approval Tag

15. FAA Form 8130-9, Statement of Conformity

APPENDIX 4. CONFORMITY

FIGURE 1. COMPLETION OF FAA FORM 8120-10, REQUEST FOR CONFORMITY

1. Request for Conformity Inspection: Enter the FAA office that the applicant asks to perform the conformity inspection.

2. Project No.: Enter the FAA project number for the project.

3. Date: Enter the current date.

4. Part Conformity/Installation/Other: Check the applicable blocks.

5. Applicant Name: Enter the name of the applicant as shown on the original project application.

6. Company Name: Enter the name of the supplier, vendor, or test firm where the desired inspection will occur.

7. Street/City/State/Zip: Enter the address of the company named above. A post office box is not acceptable.

8. Time/Date Available: If you know when the product, part, assembly, appliance, or test article will be ready, enter the expected date.

9. Type Installation: Enter a brief descriptive statement, which includes the product, part, assembly, appliance, or test article to be inspected (for example, landing gear assembly, galley flammability test articles, wing spars, and so forth).

10. Make/Model: Identify the end product being certificated or modified.

11. Quantity: Enter the quantity of parts requiring inspection (for example, 1 shipset, 5 test samples, and so forth).

12. Requesting document such as a purchase order (P.O.) and date: Reference the applicant's letter or other correspondence identifying the pending certification test.

13. Design Data: Identify the data to be used for the inspection, that is, drawings (including revision and date).

14. Special Instructions: Enter any special instructions, as necessary.

15. Applicant Contact: Enter the name, title (if known), and telephone number of the person to contact at either the applicant's or the vendor organization to arrange the inspection.

16. FAA Project Manager: Enter the name and telephone number of the FAA project manager.

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 1. COMPLETION OF FAA FORM 8120-10, REQUEST FOR CONFORMITY (CONTINUED)

17. FAA Project Engineer: Enter the name and telephone number of the FAA project specialist involved in the pending test. In "Remarks," (if applicable), enter:

a. The name of the designated engineering representative authorized to disposition unsatisfactory conditions found during conformity inspection.

b. The name of the designated airworthiness representative requested by the applicant.

18. MIO type certification management specialist (TCMS): Enter the name and office symbol of the manufacturing inspection office (MIO) TCMS, who covers the project manufacturing inspection district office's principle inspector (PI) conformity activities.

19. MIDO Project Principle Inspector: Enter the name and office symbol of MIDO PI responsible for the conformity request.

20. "Form Blocks": Place a check mark in each applicable block:

a. TIA Issued: Check this block for requests to supplement a previously issued type inspection authorization (TIA).

b. TIR Required: Check this block to have related conformity inspection records placed in the pending type inspection report (TIR) or supplemental type inspection report (STIR) (when the FAA has issued a TIA).

c. 8130-3 Tags Required: Check this block when you will move or ship the inspection articles from the inspection site to a remote testing site, and want assurance that the article will be inspected. FAA Form 8130-3 is the conformity inspection tag.

d. FAA Form 8100-1 Required: Check this block for every request. FAA Form 8100-1 is the conformity inspection record.

e. FAA Form 8130-9 Required: Check this block for every request. The FAA requires this form under 14 CFR § 21.53.

21. **NOTE:** Enter "Please return this request for conformity, with the FAA conformity document, to the project PI. The project PI sends the documents to the MIO TCMS, who sends them to the FAA project engineer."

22. Reviewed By: Enter the name, title, and office symbol of FAA project engineer reviewing the FAA conformity document.

23. Continuation Sheet: Enter additional information on Design Data, Special Instructions, and Remarks, if necessary.

APPENDIX 4. CONFORMITY

FIGURE 2. REQUEST FOR CONFORMITY, FAA FORM 8120-10

U.S. Department of Transportation
Federal Aviation Administration

REQUEST FOR CONFORMITY
RFC Tracking Number:
Revision: , Rev. Date:
Page 1 of

To: _____ Attention: _____
_____ Project No.: _____
_____ Initial Date: _____

Request for Conformity Inspection

☐ Part Conformity _____
☐ Installation _____
☐ Other (Specify) _____

A conformity inspection pertaining to the subject is requested for the following:

Applicant Name: _____
Company Name: _____
Street: _____
City: _____ State: _____ Zip: _____

Time/Date Available: _____ ☐ Applicant will Contact FAA
Type Installation: _____
Make/Model: _____ Quantity: _____
Requesting Document (P.O.) and Date: _____

Design Data:
(with Rev/Date) _____

Special
Instructions: _____

Applicant Contact: _____ Phone: _____
FAA Project Manager: _____ Phone: _____
FAA Project Engineer: _____ Phone: _____
MIO Type Certification Mgmt. Spec: _____ Phone: _____
MIDO Project Principal Inspector: _____ Phone: _____

Remarks: _____

☐ T.I.A. Issued (Type Inspection Authorization)
☐ FAA Form 8100-1 Required (Conformity Inspection Report)
☐ T.I.R. Required (Type Inspection Report)
☐ FAA Form 8130-9 Required (Statement of Conformity)
☐ 8130-3 Tags Required (Airworthiness Approval Tag)

Note: Please return this request for conformity with the FAA conformity documentation to the Project Principal Inspector (PI), then to the MIO Type Certification Management Specialist (TCMS), and then to the FAA Project Engineer (PE).

Reviewed By: FAA Project Engineer, Axx-xxx

FAA Form 8120-10 (Representation)

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 2. REQUEST FOR CONFORMITY, FAA FORM 8120-10 (CONTINUED)

U.S. Department of Transportation Federal Aviation Administration	**REQUEST FOR CONFORMITY** RFC Tracking Number: Revision: Continuation Sheet	Page of

DESIGN DATA (continued):

Special Instructions (continued):

Remarks (continued):

FAA Form 8120-10 (Representation)

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 3. COMPLETION OF FAA FORM 8100-1, CONFORMITY INSPECTION RECORD

CONFORMITY INSPECTION RECORD. Completion instructions are as follows (refer to numbered blocks on the form):

Block #1: List the FAA-assigned project number, with the date of FAA Form 8110-1, Type Inspection Authorization (TIA), or FAA Form 8120–10, Request for Conformity, as applicable.

Block #2: Page identification and number of pages. For example: (Page 1 of 1).

Block #3: List the applicant or the manufacturer, or both. (Information can be obtained from FAA Form 8120–10.)

Block #4 and #5: Period during which the inspection was performed.

Block #6: If inspecting an aircraft, list the make, model, registration number, and serial number. For an engine or propeller, list the make, model, and serial number.

Block #7: Manufacturing inspectors must type or print name and FAA office number and then sign. Designees must type or print name and designee number and then sign. Assign consecutive numbers for each item inspected.

Block #9: List the name or description of the part, appliance, assembly, drawing, document, specification, or name of the process being evaluated and as referenced on FAA Form 8120-10 and Form 8110-1.

Block #10: List the technical data that describe the item listed in block #9, that is, drawing number, document number, process specification number.

Block #11: List the revision level and date of the technical data in block #9 and #10.

Block #12: List the number of items that were determined satisfactory or unsatisfactory. Do not record individual characteristics.

> **NOTE:** An item is a single article or unit containing one or more dimensional characteristics or features.

Block #13: Enter comments that will support any information given in blocks 8 through 12, that is, unsatisfactory conditions, corrective actions taken, reference to other item numbers listed, serial numbers, type of inspection accomplished, destination of exported products, buyer furnished equipment, parts processed through manufacturer's maintenance facility, part new or newly overhauled, condition of part or assembly, and so forth. Leave several spaces for corrective action effort. Attach additional sheets, if necessary. Unsatisfactory conditions/nonconformities will be reentered in block #9 with corrective action described in block #13.

When corrective action is completed, the unsatisfactory block is lined through and initialed.

This block can also be used for remarks, serial numbers, part numbers, work order numbers, special processes, and to list FAA forms.

The following information should be recorded on the top margin (extracted from the Conformity Request, FAA Form 8120-10).

a. Originator – Engineering office and request date.

b. If FAA Form 8100-1 is issued for TIA attachment, record TIA number and attachment number.

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 3. COMPLETION OF FAA FORM 8100-1, CONFORMITY INSPECTION RECORD (CONTINUED)

To: **ANM-172W** (Add TIR attachment No. if applicable)

Conformity Inspection Record	1. Project Number, TIA/Request Date: ANM-100L - 123 / 10-24-87	2. SHEET 1 of 1 Sheets
3. Applicant/Manufacturer: Aircraft Co. (Air Med. Inc.)	4. Beginning Date: 10/24/87	5. Ending Date: 10/27/87
6. Model: 767	7. Inspected By: Bob Jones NM-MIDO-46 Bob Jones	

8. Item No	9. Nomenclature of Item Inspected	10. Drawing, Document, Specification, etc.	11. Revision and Date	12. No. of Items Determined SAT.	12. No. of Items Determined UNSAT.	13. Comments
1	Air Med. MDL	2001	U 3-6-87		~~1~~ BJ	Parts are being manufactured to Rev. V
2	Air Med. MDL	2001	V 4-6-87	1		C/A coordinated later changes with ANM-172W by telecon 10/27/87.
3	Air Med. Stretcher	2009	M 4-6-87	1		-01 Config. verified critical dim. and heat treat.
						8130-9 obtained 1 each 8130-3 tag issued.

FAA Form 8100-1 (5-92) **Supersedes Previous Edition (Representation)**

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 4. STATEMENT OF CONFORMITY, FAA FORM 8130-9 FROM APPLICANT

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft N/A (Parts)

1. Make	2. Model
3. Serial No.	4. Registration No.

Section II — Engine

1. Make	2. Model
3. Serial No.	

Section III — Propeller

1. Make	2. Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that: Parts are in conformity with Air Medical Inc. Master Drawing List 2001, Rev. V, dated 4/6/87

☒ A. I have complied with Section 21.33(a.).

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefore.

☐ D. The engine or propeller described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ *(Date)*

Deviations: None

Signature of Certifier: W. A. Smith W.A.Smith	Title: Quality Control Manager
Organization: Aircraft Company	Date: 10/27/87

FAA Form 8130-9 (11-88) Use Previous Edition (Representation)

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 4. STATEMENT OF CONFORMITY, FAA FORM 8130-9 FROM APPLICANT (CONTINUED)

INSTRUCTIONS

This form should be submitted to a representative of the Administrator under the following circumstances:

1. By the applicant for a type certificate or a supplemental type certificate at the time he presents an aircraft or parts thereof to the FAA for tests.

2. By the applicant for a type certificate or a supplemental type certificate for each engine or propeller submitted for type certification.

3. By the type certificate holder or licensee manufacturing products under a type certificate only, upon the initial transfer by him of the ownership of each product or upon application for the original issue of an aircraft airworthiness certificate, or an Airworthiness Approval Tag (FAA Form 8130-3)

This form should be completed as follows:

Section I. Aircraft. Complete the pertinent part of any of only this section when certification covers an aircraft or part thereof.

Section II. Engine. Complete this section when certification covers an engine.

Section III. Propeller. Complete this section when certification covers a propeller.

Section IV. Certification.

Item A. Check this block when an aircraft or part thereof is presented for flight or ground tests during type certification or supplemental type certification.

Item B. Check this block when the holder or licensee of a type certificate only, initially transfers the ownership of an aircraft manufactured under the type certificate, or applies for the original issuance of an airworthiness certificate.

Item C. Check this block when an engine of propeller is presented for type certification.

Item D. Check this block when an engine or propeller is presented for airworthiness approval and insert the date the product completed a final operational check.

The certification must be signed by an authorized person who holds a responsible position in the manufacturing organization.

Paperwork Reduction Act Statement:

This information on FAA Form 8130-9, Statement of Conformity, is collected for the purpose of obtaining mandatory information by an applicant as stated below. The FAA uses the information to maintain and update the current database for products and parts during the type certification program and for original airworthiness approvals. The burden associated with completing Form 8130-9 is 48 minutes. Providing this information is mandatory by an applicant at the time the aircraft or parts are submitted for FAA tests during the type certification program, for each aircraft, aircraft engine, or propeller submitted for type certification, and by a TC holder or licensee manufacturing products under a TC only: (a) with the initial transfer of ownership of each product; (b) upon application for the original issue of an airworthiness certificate; or (c) an Export Airworthiness Approval. The information is protected under the provisions of the Privacy Act and the Privacy Act system of records DOT/FAA-801, Aircraft Registration System. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection of information is 2120-0018.

FAA Form 8130-9 **(4-03) Supersedes Previous Edition** **NSN: 0052-00-025-3002**

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 5. STATEMENT OF CONFORMITY, FAA FORM 8130-9 FROM AGENT FOR APPLICANT

OMB: 2120-0018

STATEMENT OF CONFORMITY

Section I — Aircraft N/A (Parts)	
1. Make	2. Model
3. Serial No.	4. Registration No.
Section II — Engine	
1. Make	2. Model
3. Serial No.	
Section III — Propeller	
1. Make	2. Model
3. Blade Model	4. Hub Serial No.
5. Blade Serial Nos.	

Section IV — Certification

I hereby certify that: Parts are in conformity with Air Medical Inc. Master Drawing List 2001, Rev. V, dated 4/6/87

☒ A. I have complied with Section 21.33(a.).

☐ B. The aircraft described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate, is in a condition for safe operation, and was flight checked on _____ *(Date)*

☐ C. The engine or propeller described above, presented herewith for type certification, conforms to the type design therefore.

☐ D. The engine or propeller described above, produced under type certificate only (FAR 21 Subpart F), conforms to its type certificate and is in a condition for safe operation. The engine or, if applicable, the variable pitch propeller was subjected by the manufacturer to a final operation check on _____ *(Date)*

Deviations: None

NOTE: Applicant's Agent Authorization Letter must be attached to this document (Ref. Paragraph 5-3b).

Signature of Certifier	Title
J. Dent *J. Dent*	Applicant's Agent
Organization	**Date**
Applicant	10/27/XX

FAA Form 8130-9 (11-88) Use Previous Edition (Representation)

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 5. STATEMENT OF CONFORMITY, FAA FORM 8130-9 FROM AGENT FOR APPLICANT (CONTINUED)

INSTRUCTIONS

This form should be submitted to a representative of the Administrator under the following circumstances:

1. By the applicant for a type certificate or a supplemental type certificate at the time he presents an aircraft or parts thereof to the FAA for tests.

2. By the applicant for a type certificate or a supplemental type certificate for each engine or propeller submitted for type certification.

3. By the type certificate holder or licensee manufacturing products under a type certificate only, upon the initial transfer by him of the ownership of each product or upon application for the original issue of an aircraft airworthiness certificate, or an Airworthiness Approval Tag (FAA Form 8130-3).

This form should be completed as follows:

Section I. Aircraft. Complete the pertinent part of any of only this section when certification covers an aircraft or part thereof.

Section II. Engine. Complete this section when certification covers an engine.

Section III. Propeller. Complete this section when certification covers a propeller.

Section IV. Certification.

Item A. Check this block when an aircraft or part thereof is presented for flight or ground tests during type certification or supplemental type certification.

Item B. Check this block when the holder or licensee of a type certificate only, initially transfers the ownership of an aircraft manufactured under the type certificate, or applies for the original issuance of an airworthiness certificate.

Item C. Check this block when an engine of propeller is presented for type certification.

Item D. Check this block when an engine or propeller is presented for airworthiness approval and insert the date the product completed a final operational check.

The certification must be signed by an authorized person who holds a responsible position in the manufacturing organization.

Paperwork Reduction Act Statement:

This information on FAA Form 8130-9, Statement of Conformity, is collected for the purpose of obtaining mandatory information by an applicant as stated below. The FAA uses the information to maintain and update the current database for products and parts during the type certification program and for original airworthiness approvals. The burden associated with completing Form 8130-9 is 48 minutes. Providing this information is mandatory by an applicant at the time the aircraft or parts are submitted for FAA tests during the type certification program, for each aircraft, aircraft engine, or propeller submitted for type certification, and by a TC holder or licensee manufacturing products under a TC only: (a) with the initial transfer of ownership of each product; (b) upon application for the original issue of an airworthiness certificate; or (c) an Export Airworthiness Approval. The information is protected under the provisions of the Privacy Act and the Privacy Act system of records DOT/FAA-801, Aircraft Registration System. An agency may not conduct or sponsor and a person is not required to respond to a collection of information unless it displays a currently valid OMB control number. The OMB control number associated with this collection of information is 2120-0018.

FAA Form 8130-9 **(4-03) Supersedes Previous Edition** **NSN: 0052-00-025-3002**

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 6. TYPE INSPECTION AUTHORIZATION, FAA FORM 8110-1

The TIA is prepared by the ACO on FAA Form 8110-1 and is used to authorize official conformity, airworthiness inspections, and flight tests necessary to fulfill certain requirements for TC, STC, and amended TC certification. The TIA is not prepared until coordination is accomplished with each appropriate engineering discipline such that all required information relative to the engineering discipline's portion of the inspection or authorization is included. The TIA is issued when the examination of the technical data required for type certification is completed or has reached a point where it appears that the aircraft or component being examined will meet the applicable regulations.

1. Type Inspection Authorization: Enter the FAA flight test and/or manufacturing office that is requested to perform the flight test and/or ground inspection.
2. Project No.: Enter the FAA project number established for the project.
3. Date: Enter the current date.
4. Name of applicant: As shown on the project application.
5. Address: As shown on the project application. Note: A post office box is not acceptable.
6. Block 1 Inspection Authorized For: Identify type of product, whether new or altered, and if altered, the original type certificate number.
7. Block 2 Certification Basis: List the complete certification basis for the project. A reference may be made to additional pages as required.
8. Block 3 Category: For aircraft only, identify the proper category.
9. Block 4 Description of Alteration: For alteration, include a complete description of the alteration being made. A reference may be made to additional pages as required.
10. Block 5 through 10 and 12: Reference page that identifies approved limitations or reference to approved flight manual.
11. Block 11: Identify location and maximum loads of cargo and baggage compartments.
12. Block 13: Identify engine information and operating limitations and type certificate data sheet number. For turbine engine operating limitations, reference supplemental page that identifies approved limitations or reference to approved flight manual or engine operating instructions.
13. Block 14: Identify propeller information and type certificate data sheet number. Reference supplemental page that identifies approved limitations or reference to approved flight manual.
14. Block 15: For rotorcraft, identify rotor rpm limits.
15. Block 16: Identify if 100-hour inspection has been completed.
16. Block 17: Identify if equipment list has been verified for correct weight and moment arm of each item of installed equipment. Indicate if equipment list is attached and identify the manufacturer's report number if appropriate.
17. Block 18 (Part 1): Indicate if the manufacturing inspector is requested to accomplish ground inspection in support of Type Inspection Report - Part 1. Identify on supplemental page the specific instructions for inspections to be accomplished. Include the following information at the beginning of Block 18:

NOTE:
Point of contact at conformity site:_____
Phone number of point of contact: ____-_____
Location of aircraft/conformity site:_____
DAR requested by the applicant:_____(as applicable)_____

18. Block 18 (Part 2): Indicate if the flight test office is requested to accomplish flight test in support of Type Inspection Report - Part 2. Identify on supplemental page the specific instructions for tests to be accomplished.
19. Block 18 (special): The TIA may contain a section titled "Operational and Maintenance Requirements" that provides for certain other operational evaluations identified by the AEG.
20. Originated By: Indicate the project office symbol.
21. Concurrences: Identify the office symbol of all participating offices. Initials are evidence of office concurrence.
22. Approval: Identify date and title of approval authority. This may be ACO manager or the manager may delegate to appropriate branch or project manager.

APPENDIX 4. CONFORMITY (CONTINUED)

FIGURE 6. TYPE INSPECTION AUTHORIZATION, FAA FORM 8110-1 (CONTINUED)

TYPE INSPECTION AUTHORIZATION | PAGE 1 OF ____ PAGES | PROJECT NO.

TO: ☐ FLIGHT _____ (Routing Symbol) ☐ MANUFACTURING _____ (Routing Symbol) | DATE

NAME OF APPLICANT | ADDRESS (Number, street, city, state, and ZIP code)

1. INSPECTION AUTHORIZED FOR

☐ AIRPLANE	OTHER (Specify)	☐	NEW MODEL (Give model no.)	
☐ ENGINE				
☐ PROPELLER		☐	ALTERED MODEL (Give name of original manufacturer and model no.)	ORIGINAL T.C. DATA SHEET NO.
☐ ROTORCRAFT				

2. CERTIFICATION BASIS

3. CATEGORY–FOR AIRCRAFT ONLY (Check all applicable items)

☐ NORMAL ☐ UTILITY ☐ ACROBATIC ☐ TRANSPORT ☐ RESTRICTED ☐ OTHER (Specify)

4. DESCRIPTION OF ALTERATION

5. DESIGN SPEEDS - MPH (EAS) – SEE PAGE _____	6. MAXIMUM MACH NO. (DESIGN) – SEE PAGE _____	7. DESIGN WEIGHTS – SEE PAGE _____
8. MAXIMUM OPERATING ALTITUDE (Feet)	9. MAXIMUM CABIN PRESSURE DIFFERENTIAL (p.s.i.)	10. CG. LIMITS – SEE PAGE _____

11. CARGO AND BAGGAGE COMPARTMENTS - LOCATION AND MAXIMUM LOADS – SEE PAGE _____	12. STRUCTURAL/MANEUVERING LIMITS – SEE PAGE _____

13. OPERATION LIMITATIONS

ENGINE MAKE AND MODEL (FOR TURBINE ENGINE SEE PAGE _____) | ENGINE DATA SHEET NO.

ITEM	ON TAKEOFF (Specify) (Minutes)	LOW RATIO SUPERCHARGER: SEA LEVEL	LOW RATIO SUPERCHARGER: ALT. HEIGHT (Specify) (Feet)	HIGH RATIO SUPERCHARGER: ALT. (MIN) (Specify) (Feet)	HIGH RATIO SUPERCHARGER: ALT. (MAX) (Specify) (Feet)
IN. HG.					
RPM					
HP					

MAXIMUM ALLOWABLE TEMPERATURE	°F.
CYLINDER HEAD (OR COOLANT OUTLET) – WASHER	
CYLINDER HEAD (OR COOLANT OUTLET) – BAYONET	
CYLINDER BASE	
OIL INLET	
MINIMUM CARBURETOR HEAT RISE REQUIRED AT _____ % MC POWER	

14. PROPELLER

MAKE AND MODEL | DATA SHEET NO. | DIAMETER

HUB MODEL NO. | BLADE MODEL NO. | LIMITATIONS – SEE PAGE _____

15. ROTORCRAFT	MAXIMUM	MINIMUM
POWER ON ROTOR LIMITS–RPM		
POWER OFF ROTOR LIMITS–RPM		

16. INSPECTION REPORT: 100-HOUR INSPECTION COMPLETED ☐ YES ☐ NO

17. EQUIPMENT LIST: IS EQUIPMENT LIST CORRECT AS TO WEIGHT AND ARM OF EACH ITEM ☐ YES ☐ NO

EQUIPMENT LIST ATTACHED ☐ YES ☐ NO | MFGR. REPORT NO.

18. TYPE INSPECTION REPORT

☐ COMPLETE APPLICABLE PORTIONS OF TYPE INSPECTION REPORT, PART 1
☐ COMPLETE APPLICABLE PORTIONS OF TYPE INSPECTION REPORT, PART 2
☐ SEE ATTACHED PAGES FOR INSTRUCTIONS
☐ SEE ATTACHED PAGES FOR SPECIAL TESTS (Define divisions of responsibilities)

ORIGINATED BY	CONCURRENCES					
ROUTING SYMBOL	ROUTING SYMBOL	INITIALS	ROUTING SYMBOL	INITIALS	ROUTING SYMBOL	INITIALS

APPROVAL

DATE	TITLE	SIGNATURE

FAA Form 8110-1 (3–66) FORMERLY FAA FORM 316 FAA AC 71-6232 0052-025-2000

APPENDIX 5. CANADIAN STC

FIGURE 1. FORMAL CANADIAN STC APPLICATION REQUEST

Request for: (Specify)_____ Date:_____

Canadian Supplemental Type Certificate ☐
Canadian Supplemental Type Certificate Revision ☐ STC ____ Issue_____

Limited Canadian Supplemental Type Certificate ☐

Supplemental Type Certificate ☐
Supplemental Type Certificate Revision ☐ STC ___ Revision____

Supplemental Type Certificate Familiarization ☐ STC_____

Name and Address:
of Applicant:

Aeronautical Product:
Make/Model:

Canadian Type Certificate-Basis of Certification: and/or Type certificate-Basis of Certification:

Description of Proposed Change:

Proposed Basis of Approval: Same as Canadian TC ☐ Same as TC ☐
Other ☐ Specify _____

Documentation Checklist	Applicable Yes	Applicable No	Submitted Yes	Submitted No
Compliance Program				
Flight Manual Supplement				
Maintenance Manual Supplement				
Repair Instructions				
Engineering Reports				
Design Drawings				
Installation Drawings and Instructions				
Electrical Load Analysis				
Weight and Moment Change				
Flight Test Data				

APPENDIX 5. CANADIAN STC (CONTINUED)

FIGURE 2. TRANSPORT CANADA REGIONAL MANAGERS, AIRCRAFT CERTIFICATION

PACIFIC REGION

Transport Canada
Regional Manager, Aircraft Certification
Aircraft Certification Division (TAI)
620-800 Burrard Street
Vancouver, B.C.
V6Z 2J8
Tel: (604) 666-5591

PRAIRIE & NORTHERN REGION

Transport Canada
Regional Manager, Aircraft Certification
Aircraft Certification Division (RAED)
1100 - 9700 Jasper Avenue
Edmonton, Alberta
T5J 4E6
Tel: (780) 495-3856

QUEBEC REGION

Transport Canada
Regional Manager, Aircraft Certification
Aircraft Certification Division (NAI)
700 Leigh Capréol Street
Dorval, Quebec
H4Y 1G7
Tel: (514) 633-3593

ONTARIO REGION

Transport Canada
Regional Manager, Aircraft Certification
Aircraft Certification Division (PAI)
4900 Yonge Street, Suite 300
Toronto, Ontario
M2N 6A5
Tel: (416) 952-6033

ATLANTIC REGION

Transport Canada
Regional Manager, Aircraft Certification
Aircraft Certification Division (MAI)
P.O. Box 42, 95 Foundry Street
Moncton, New Brunswick
E1C 8K6
Tel: (506) 851-7411

APPENDIX 5. CANADIAN STC (CONTINUED)

FIGURE 3. SAMPLE LETTER OF REQUEST

Transport Canada
Regional Airworthiness
Engineer
(Address)

Dear Mr. _____

We received from a United States applicant, _____, an application for a Supplement Type Certificate (STC) to install _____ on _____.

We reviewed the applicant's submission, and we certify that this installation complies with the basis of certification specified in Transport Canada Type Certificate _____. We issued STC _____ dated _____.

Please consider this request as a formal application for a Canadian STC under the terms of the Canada/United States Bilateral Aviation Safety Agreement with Implementation Procedures for Airworthiness. To support this application, we enclosed the following:

a. Copy of STC _____, dated _____.
b. Application for STC, dated _____.
c. Compliance Checklist _____.
d. Flight Manual Supplement _____.
e. List any other documentation being forwarded in support of the STC application.

Should you require any additional information, please do not hesitate to contact us.

Sincerely,

Signature

Enclosures

APPENDIX 6. LIST OF ACRONYMS

14 CFR Title 14 of the Code of Federal Regulations

AC Advisory Circular

ACO Aircraft Certification Office

ACOS Aircraft Certification Office Subsystem

ACRP Aircraft Certification Regulatory Program

AD Airworthiness Directive

AEE FAA's Office of Environment and Energy

AEG Aircraft Evaluation Group

AFM Aircraft Flight Manual

AML Approved Model List

AMOC Alternative Methods of Compliance

APU Auxiliary Power Unit

BASA Bilateral Aviation Safety Agreement

CAA Civil Aviation Authority

CAR Civil Air Regulations

CMACO Certificate Management Aircraft Certification Office

CMO Certificate Management Office

CMR Certification Maintenance Requirements

CMU Certificate Management Unit

COS Continued Operational Safety

CPI Certification Process Improvement

CPN Certification Project Notification

CPPCertification Project Plan

CSR Certification Summary Report

CSTA Chief Scientist and Technical Advisors

APPENDIX 6. LIST OF ACRONYMS (CONTINUED)

DAR Designated Airworthiness Representative

DAS Designated Alteration Station

DER Designated Engineering Representative

DMIR Designated Manufacturing Inspection Representative

EASA European Aviation Safety Agency

ECAA Exporting Civil Aviation Authority

ELOS Equivalent Level of Safety

FAA Federal Aviation Administration

FOEB Flight Operations Evaluation Board

FSBFlight Standardization Board

FSDO Flight Standards District Office

GPO Government Printing Office

ICA Instructions for Continued Airworthiness

IPA Implementation Procedures for Airworthiness

JAA Joint Aviation Authorities of Europe

JARJoint Aviation Requirements

MIDO Manufacturing Inspection District Office

MISO Manufacturing Inspection Satellite Office

MMEL Master Minimum Equipment List

MOA Memorandum of Agreement

MRB Maintenance Review Board

NDINon-Destructive Inspection

NPRM Notice of Proposed Rulemaking

ODAR Organizational Designated Airworthiness Representative

PACO Project Aircraft Certification Office

PAH Production Approval Holder

APPENDIX 6. LIST OF ACRONYMS (CONTINUED)

PC Production Certificate

PI Principal Inspector

PMA Parts Manufacturer Approval

PSCP Project Specific Certification Plan

PSP Partnership for Safety Plan

RGL Regulatory and Guidance Library

SCR Special Certification Review

SFAR Special Federal Aviation Regulation

STC Supplemental Type Certificate

STIR Supplemental Type Inspection Report

TC Type Certificate

TCB Type Certification Board

TCBM Type Certification Board Meeting

TCDS Type Certificate Data Sheet

TIA Type Inspection Authorization

TIR Type Inspection Report

TSO Technical Standard Order

U.S.C. United States Code

APPENDIX 7. AIRCRAFT CERTIFICATION OFFICES

Anchorage Aircraft Certification Office (ACE-115N)
Federal Aviation Administration
222 West 7th Ave #14
Anchorage, AK 99513-7587
Telephone: (907) 271-2668
FAX: (907) 279-6365

Atlanta Aircraft Certification Office (ACE-115A)
Federal Aviation Administration
1895 Phoenix Blvd., Suite 450
Atlanta , GA 30349
Telephone: (770) 703-6035
FAX: (770) 703-6097

Boston Aircraft Certification Office (ANE-150)
Federal Aviation Administration
12 New England Executive Park
Burlington, MA 01803
Telephone: (781) 238-7150
FAX: (781) 238-7170

Chicago Aircraft Certification Office (ACE-115C)
Federal Aviation Administration
2300 East Devon Avenue
Des Plaines, IL 60018
Telephone: (847) 294-7357
FAX: (847) 294-7834

Denver Aircraft Certification Office (ANM-100D)
Federal Aviation Administration
26805 E. 68th Ave., Room 214
Denver, CO 80249
Telephone: (303) 342-1080
FAX: (303) 342-1088

Engine Certification Office (ANE-140)
Federal Aviation Administration
12 New England Executive Park
Burlington, MA 01803
Telephone: (781) 238-7140
FAX: (781) 238-7199

Fort Worth Airplane Certification Office (ASW-150)
Federal Aviation Administration
2601 Meacham Blvd.
Fort Worth, TX 76137
Telephone: (817) 222-5150
FAX: (817) 222-5959

Fort Worth Rotorcraft Certification Office (ASW-170)
Federal Aviation Administration
2601 Meacham Blvd.
Fort Worth, TX 76137
Telephone: (817) 222-5170
FAX: (817) 222-5959

Fort Worth Special Certification Office (ASW-190)
Federal Aviation Administration
2601 Meacham Blvd.
Fort Worth, TX 76137
Telephone: (817) 222-5190
FAX: (817) 222-5959

Los Angeles Aircraft Certification Office (ANM-100L)
Federal Aviation Administration
3960 Paramount Blvd.
Lakewood, CA 90712
Telephone (562) 627-5200
FAX: (562) 627-5210

New York Aircraft Certification Office (ANE-170)
Federal Aviation Administration
1600 Stewart Avenue, Suite 410
Westbury, NY 11590
Telephone: (516) 228-7300
FAX: (516) 794-5531

Seattle Aircraft Certification Office (ANM-100S)
Federal Aviation Administration
1601 Lind Avenue SW
Renton, WA 98055-4056
Telephone: (425) 227-2180
FAX: (425) 227-1181

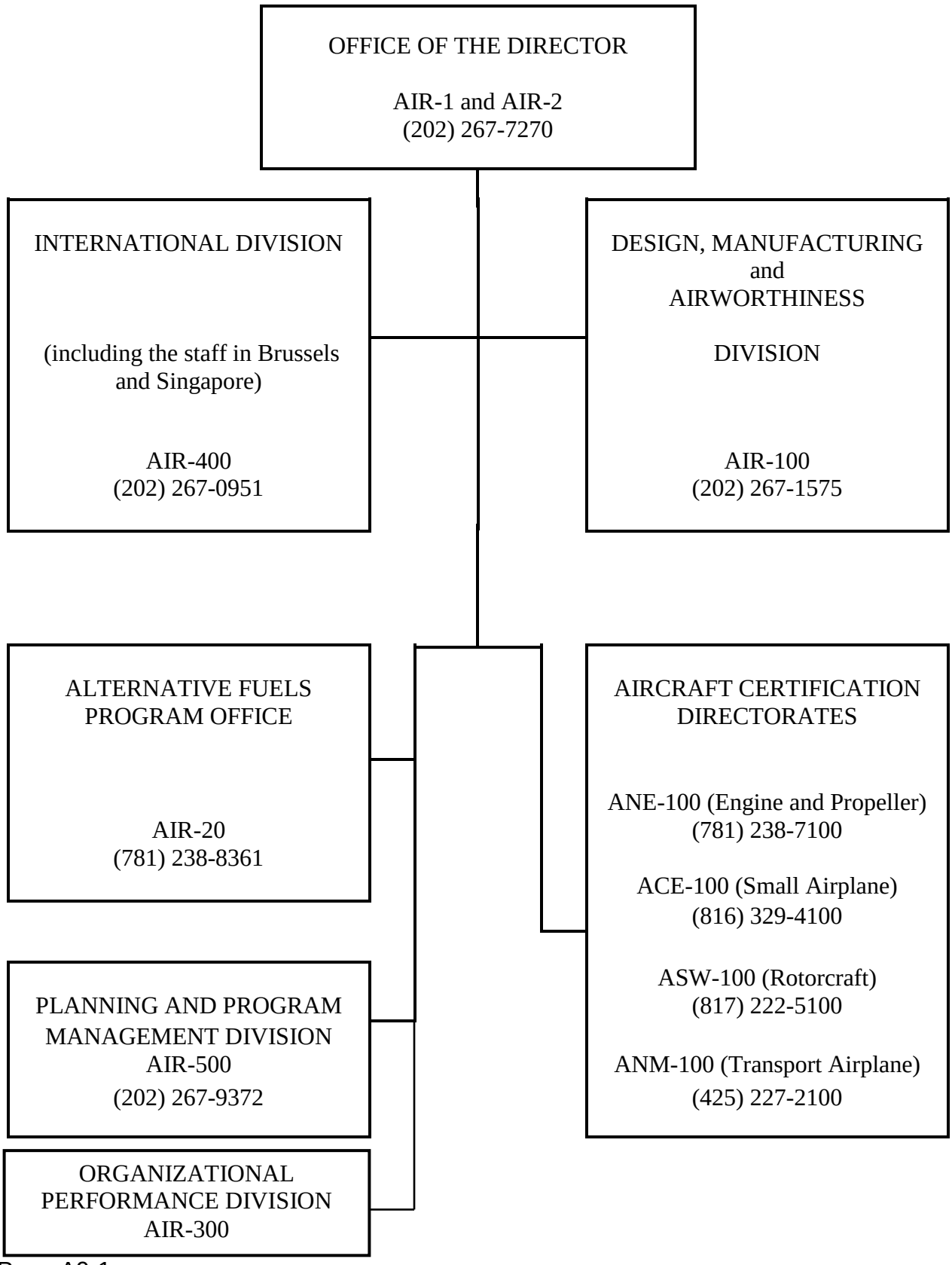
Wichita Aircraft Certification Office (ACE-115W)
Federal Aviation Administration
1801 Airport Road, Room 100
Wichita, KS 67209
Telephone: (316) 946-4100
FAX: (316) 946-4107

Military Certification Office (ACE-100M)
8200 E. 34th. St. N.
Bldg. 1000, Suite 1005
Wichita, KS 67226
Telephone: (316) 350-1580
FAX: (316) 350-1586

APPENDIX 8. AIRCRAFT EVALUATION GROUP

AIRCRAFT EVALUATION GROUP	RESPONSIBLE FOR:
Kansas City Aircraft Evaluation Group, MKC AEG Central Region Headquarters 901 Locust Kansas City, MO 64106-2641 Phone (816) 329-3234	14 CFR part 23 14 CFR part 25 Business Jet Commuter Special Federal Aviation Regulation (SFAR) 41 14 CFR part 31 Manned Free Balloons
Fort Worth Aircraft Evaluation Group, FTW AEG 2601 Meacham Boulevard Fort Worth, TX 76137-4298 Phone (817) 222-5269	14 CFR part 27 14 CFR part 29
Seattle Aircraft Evaluation Group, SEA AEG 1601 Lind Ave. S.W. Renton, WA 98055-4056 Phone (425) 917-6601	14 CFR part 25
Los Angeles Aircraft Evaluation Group, LGB AEG 3960 Paramount Blvd., Suite 100 Lakewood, CA 90712 Phone (562) 627-5270	14 CFR part 25
Boston Aircraft Evaluation Group, BOS AEG 12 New England Executive Park Burlington, MA 01803 Phone (781) 238-7887	14 CFR part 33 14 CFR part 35 APUs

APPENDIX 9. AIRCRAFT CERTIFICATION SERVICE



APPENDIX 10. DATA RETENTION

FIGURE 1. PROJECT RECORDS

(The ACO or MIDO must maintain these records, at an FAA facility, unless there is a data retention agreement in place.)

- Type certificate (TC) application (FAA Form 8110-12), including all preliminary data or drawings and cover letter
- Certification Project Notification (CPN)
- Minutes of Type Certification Board (TCB) meetings (familiarization, preliminary, interim, pre-flight, and final)
- Certification Project Plan (CPP)
- Equivalent Level of Safety findings
- Special conditions
- Exemptions
- Findings of Compliance (FAA Form 8110-3s) and approval letters
- Requests for Conformity (FAA Form 8120-10) and Statements of Conformity (FAA Form 8130-9)
- Conformity Inspection Record (FAA Form 8100-1)
- Airworthiness approval tags (FAA Form 8130-3) issued for conformity
- Certification Plan
- Completed compliance checklist
- Type Inspection Authorization form (FAA Form 8110-1)
- Type Inspection Report (FAA Form 8110-31) and Supplemental Type Inspection Reports (FAA Form 8110-26)
- Application for Airworthiness Certificate (FAA Form 8130-6)
- Special Airworthiness Certificate and Operating Limitations
- Aircraft Evaluation Group’s correspondence
- Chief Scientist and Technical Advisors’ correspondence
- Significant correspondence with the CMACO
- FAA approval of test and analysis reports
- Flight manual approval page
- Approval letter for Airworthiness Limitations Section
- Approval of referenced Master Drawing List
- Type Certificate Data Sheet (TCDS)
- Copy of TC (FAA Form 8110-9) or STC (FAA Form 8110-2)
- Certification Summary Report (CSR)
- Statement(s) of Compliance
- For import products, FCAA compliance statements as well as all required import product records.

APPENDIX 10. DATA RETENTION (CONTINUED)

FIGURE 2. TYPE DESIGN AND SUBSTANTIATING DATA (The ACO or TC holder must maintain these data.)

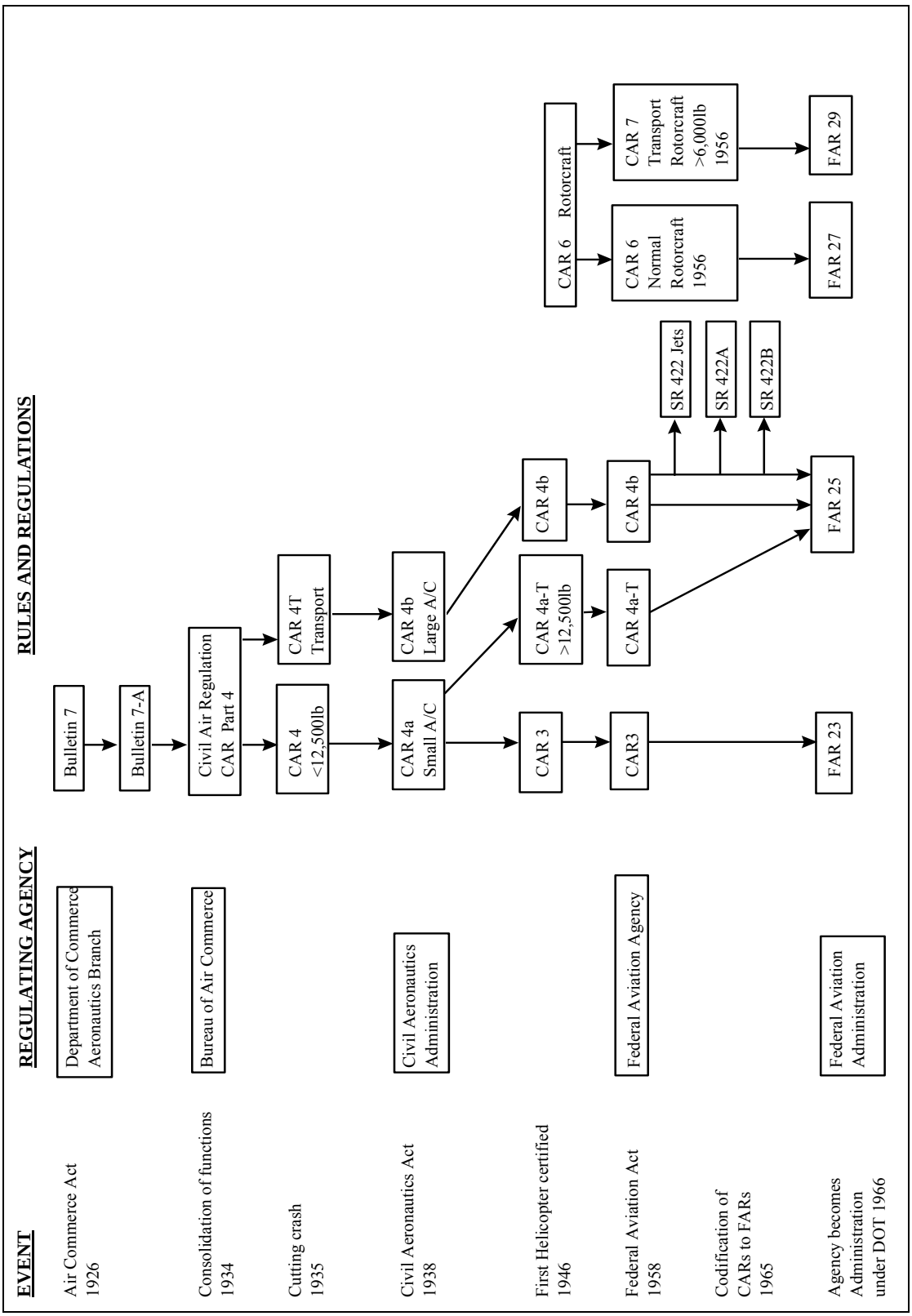
- Type design data, drawings, processes, materials specifications, operations limitations
- Test plans (final approved version, and all approved revisions)
- Test and analysis reports
- Original of approved manuals (flight manual), and all revisions
- Original of all accepted manuals (ICA, engine or propeller installation)
- Service Bulletins (includes alerts, service letters, all operator letters, and so forth)

APPENDIX 10. DATA RETENTION (CONTINUED)

FIGURE 3. WORKING PAPERS
The ACO retains these papers at an FAA facility as "corporate memory"
(at the ACO manager's discretion.)

- Operational project data (for example, milestones)
- Correspondence not documenting an FAA action or position
- Personal notes from technical meetings
- Issue papers that do not document an FAA decision, action, or position
- Schedules
- Downloaded data or drawings from manufacturer's electronic data base
- Photocopies of submitted data

APPENDIX 11. HISTORICAL BACKGROUND OF AIRCRAFT AIRWORTHINESS REGULATIONS



APPENDIX 13. ADMINISTRATIVE INFORMATION

1. Distribution. Distribute this order to the branch level in Washington headquarters, branch levels of the Aircraft Certification Service; the branch levels of the regional aircraft certification directorates; branch level of International Division; all aircraft certification offices (ACO); aircraft evaluation groups, and chief scientific and technical advisors.

2. Authority to Change This Order. The issuance, revision, or cancellation of the material in this order is the responsibility of the Certification Procedures Branch (AIR–110).

3. Suggestions for Improvement. If you find deficiencies, need clarification, or want to suggest improvements to this order, send FAA Form 1320-19, Directive Feedback Information to the Directives Management Officer at 9-AWA-AVS-AIR-DMO@faa.gov or complete the form online at https://ksn2.faa.gov/avs/dfs/Pages/Home.aspx . You can also send a copy to the Design, Manufacturing, & Airworthiness Division, AIR-100, Attention: Comments to Order 8110.4C. If you urgently need an interpretation, contact the Certification Procedures Branch, AIR-110, at 202-267-1575. Always use Form 1320-19 to follow up each verbal conversation.

4. Records Management. Refer to Orders 0000.1, FAA Standard Subject Classification System; and 1350.14, Records Management or your office Records Management Officer or Directives Management Officer for guidance regarding retention or disposition of records.

U.S. Department
of Transportation

**Federal Aviation
Administration**

Directive Feedback Information

Please submit any written comments or recommendations for improving this directive or suggest new items or subjects that should be added to it. If you find an error, please tell us about it.

Subject: Order 8110.4C, Change 6

To: Directive Management Officer, at 9-AWA-AVS-AIR-DMO@faa.gov or complete the form online at https://ksn2.faa.gov/avs/dfs/Pages/Home.aspx .

(*Please check all appropriate line items)*

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ I recommend paragraph _____ on page _____ be changed as follows:
(attach separate sheet if necessary)

☐ In a future change to this directive, please include coverage on the following subject:
(briefly describe what you want added)

☐ Other comments:

☐ I would like to discuss the above. Please contact me.

Submitted by: _____ Date: _____

FTS Telephone Number: _____ Routing Symbol: _____

FAA Form 1320–19 (dated 10/98)