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.

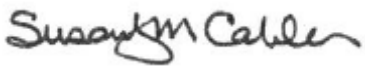
3. Effective Date. The provisions of this change for this directive become effective on the date of signature.

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
vii	03/28/07	vii	03/15/10
138	08/14/08	138	03/15/10
		139	03/15/10
		140	03/15/10
		141	03/15/10
		142	03/15/10
		143	03/15/10
143	10/26/05	144	03/15/10
144	03/28/07	145	03/15/10
145	10/26/05	146	03/15/10
146	10/26/05	147	03/15/10
147	10/26/05	148	03/15/10
148	10/26/05	149	03/15/10
149	10/26/05	150	03/15/10
150	03/28/07	151	03/15/10
151	03/28/07	152	03/15/10

152	03/28/07	153	03/15/10
153	03/28/07	154	03/15/10
154	03/28/07	155	03/15/10
		Appendix 16, page 1	03/15/10
		Appendix 16, page 2	03/15/10



FOR David W. Hempe
Manager Aircraft Engineering Division
Division

CHAPTER 6. ADDITIONAL INFORMATION ON SELECTED TOPICS

CHAPTER 7. NOISE CERTIFICATION

APPENDIX 1. FORMS AND GUIDANCE FOR CERTIFICATION PROJECTS (14 pages)

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. DECLARED NON-TSO FUNCTION INTEGRATED IN A TSO ARTICLE AND APPROVED UNDER THE AUTHORITY OF 14 CFR § 21.305(d).

a. Evaluating TSO articles under the TC process. When a manufacturer submits an application for a TSO authorization, the design of the article concerned is evaluated against the minimum performance standards (MPS) in the applicable TSO. When a TSO approval (a TSO authorization for US manufacturers or a letter of TSO design approval for foreign manufacturers) is issued, it attests that an article's design has been shown to meet the MPS of the applicable TSO and in the case of a TSOA that the manufacturer's quality system meets applicable regulatory requirements. TSO articles must always have separate approval for installation in a product. Frequently TSO article designs include added performance capability that is not addressed by the MPS of the TSO. This additional performance is called a non-TSO function. Although these are acceptable designs to submit for TSO approval, TSO approval for the article means its design, including the additional functional performance, still meets the MPS of the applicable TSO. Put another way, the additional performance does not interfere with the article's design in meeting the TSO. Furthermore the additional performance has not been evaluated under the TSO approval and therefore no approval credit has been given for the additional performance. A non-TSO function is a performance characteristic within the article that cannot be evaluated to the TSO because either there are no criteria in the TSO or the criteria in the TSO are inadequate to evaluate the characteristic. A non-TSO function must be evaluated during the installation approval under the type certification (or STC) process. The installer must develop appropriate criteria for the article to meet the airworthiness requirements when installed in the product (such as, airplane, engine or propeller). It typically requires involvement from the installation approval ACO in the development of test plans, test witnessing, and test report approval as well as other data approval for the non-TSO function. It is essential to note that the TSO article and any integrated non-TSO function(s) are inseparable at the article level and if the non-TSO function fails to meet the product certification requirements, the TSO article must not be installed in the product. This traditional method is still an acceptable way to approve non-TSO function(s).

b. **Approving declared non-TSO function under 14 CFR § 21.305(d) at the time of the TSO approval process.** The evaluation of non-TSO function can begin in conjunction with a TSO approval, if the TSO applicant includes in the application a request to receive approval credit for the declared non-TSO function(s) associated with airworthiness requirements. The TSO applicant must clearly define the performance of the integrated non-TSO function to the ACO in the application. The TSO applicant must submit performance criteria to which the non-TSO function can be evaluated. The TSO applicant must submit data adequate to substantiate to the performance criteria. The ACO is not required to be involved with the development of test plans, test witnessing, or test reporting. In this regard, it is similar to the self-certification process for the basic TSO article. This submittal of non-TSO function data will allow the ACO to determine if the data adequately support the performance criteria. The approval of the article by the TSO ACO with respect to the declared non-TSO function under 14 CFR § 21.305(d) is a finding that the non-TSO function in the TSO article meets the applicant submitted performance criteria. You can see a sample letter in appendix 16. This approval does not attest that the non-

TSO function meets the applicable airworthiness requirements necessary for the article's installation in a product. The non-TSO function always requires a separate approval for installation to ensure the performance criteria submitted by the TSO applicant are adequate for meeting the airworthiness requirements of the product. It is the responsibility of the person seeking approval to install the TSO article in a product to show the previously approved non-TSO function is appropriate and adequate for meeting the airworthiness requirements. If the non-TSO function data is lacking in any regard, it is the responsibility of the person seeking approval to install the TSO article to develop the appropriate data. Again, it is essential to note that the TSO article and any integrated non-TSO function(s) are inseparable and if the non-TSO function fails to meet the product certification requirements, the TSO article must not be installed in the product. The ACO engineer must perform two separate, but parallel tasks when reviewing a TSO application that includes a request for approval of any non-TSO function. The first task, under the TSO process, is to issue an approval that the applicant's article design meets the applicable TSO, recognizing that the design included non-TSO function; this is the non-interference aspect discussed above. The second task, which can be conducted in parallel with the TSOA, is to issue a second approval of the article which finds that the data supporting the non-TSO function has been evaluated and supports the performance criteria submitted by the applicant. This article approval is under 14 CFR § 21.305(d).

(1) Definition of Non-TSO Function. A non-TSO function:

(a) Is anything that adds a performance capability to the article that is not covered or evaluated by any TSO MPS.

(b) Does not support or must not affect the performance of the article addressed by the TSO MPS.

NOTE: "Characteristics" or "features" added to enhance performance, usability or integrity of the TSO article, are inherent in the design of the TSO article, and have a direct bearing on the basic TSO operation are evaluated under the TSO approval and are not non-TSO function. Compliance with the software and hardware considerations in RTCA/DO-178 and RTCA/DO-254, when required by the TSO, provide the basis for approval of these characteristics or features of the article with respect to the RTCA/DO-178 and RTCA/DO-254 requirements. Examples might include: the capability to flip-flop the "active" and "standby" frequencies of a communication or navigation radio, facility information (such as, airport frequencies, runways, airport services available, etc.), built in test (BIT) capability on start-up, and health monitoring to name just a few. These examples are all associated with supporting the MPS of the TSO.

(2) Approval of declared non-TSO Function. The TSO ACO may approve, under § 21.305(d), non-TSO function(s) incorporated by the TSO article manufacturer. Note that environmental, software and complex electronic hardware qualifications (such as RTCA/DO-160, RTCA/DO-178, and RTCA/DO-254 when required by the TSO) are accomplished at the article level as part of the TSO approval for both TSO and non-TSO functions. In most cases the manufacturer has the expertise and knowledge to best evaluate the non-TSO function. The § 21.305(d) approved non-TSO function is limited to the extent that the article meets the TSO applicant's submitted performance criteria. The installation office must verify that the non-TSO function data is applicable to and adequate for the installation.

(3) Conditions for Approval of Declared Non-TSO Function. We use the following conditions to determine if it is appropriate to approve the declared non-TSO function:

(a) The manufacturer has clearly identified to the TSO approving office the non-TSO function(s) in the article for which they request approval. Note that if the TSO specifically requires identification of non-TSO functions, the manufacturer must identify all non-TSO functions whether or not approval is requested.

(b) The article must meet the MPS of the TSO with non-TSO function(s) incorporated.

(c) There is no applicable performance standard within any TSO for the non-TSO function.

(d) The article manufacturer controls the design and quality of the article with respect to the non-TSO function data as well as the TSO performance standards.

(e) For foreign manufacturers, a bilateral agreement is in place between the country of manufacture and the United States. The bilateral agreement must include provisions for non-TSO function.

(f) The manufacturer has submitted appropriate analysis and/or testing data for the non-TSO function that will allow the ACO to determine if they can approve the non-TSO function in the approval letter. The letter will state that subsequent evaluation is only required to determine if the non-TSO function meets the applicable airworthiness requirements if installation approval is requested.

(4) Approval Procedures for declared non-TSO Function Submitted with an Application for TSO authorization.

(a) Manufacturers Data Submittal. The ACO reviewing the application is also responsible for evaluating data submitted by the manufacturer in support of declared non-TSO function. At a minimum, the manufacturer must submit:

1 A clear description of the declared non-TSO function(s).

2 A copy of all test data and analyses intended to support the installation approval of the non-TSO function(s).

3 The manufacturer's specified performance requirements for the declared non-TSO function(s). Where possible, the manufacturer is encouraged to adopt existing industry accepted standards (RTCA, EUROCAE, SAE, ARINC, or others). The manufacturer is also encouraged to establish performance criteria with the intent that the article meets the applicable airworthiness requirements when installation approval is requested.

4 The manufacturer's specified test procedures used to validate the performance requirements for the declared non-TSO function(s), including applicable RTCA/DO-160 environmental test conditions (when not already required by the TSO).

5 Installation instructions, operating instructions/limitations, and instructions for maintenance and inspections needed to maintain compliance with the applicable TSO and the applicant's performance criteria;

(b) Evaluation Criteria.

1 If the declared non-TSO function is within the manufacturer's expertise and the performance is easily understood, ACO evaluation of the manufacturer's data package can be accomplished during the normal TSO data package review.

2 If the performance requirements specified by the manufacturer require evaluation under RTCA/DO-178 and/or RTCA/DO-254, and the TSO does not address RTCA/DO-178 or RTCA/DO-254 compliance, the ACO may have to conduct additional coordination and review with the article's manufacturer (Refer to 6-9.b.(2) above).

3 If the ACO determines that the non-TSO function has a high degree of flight deck to pilot interface, the system has multiple TSOs bundled together, or has a large content of non-TSO functions, the ACO should recommend a parallel TC/STC evaluation. At a minimum, the ACO should coordinate with the FAA office approving the installation to verify that the performance standards proposed by the manufacturer for the non-TSO function(s) are adequate to support the installation. Failure to coordinate may result in the FAA and the manufacturer expending needless resources to generate valid data that is insufficient to support installation approval.

(c) Manufacturing and Quality Control. The ACO also must ensure that the manufacturer's quality system is adequate to control the approved non-TSO function. At a minimum, the ACO must request the responsible MIDO to evaluate the manufacturer's quality system to ensure the system:

1 Is capable of controlling the declared non-TSO function in addition to the TSO requirements.

2 Is capable of producing articles that meet the TSO with approved declared non-TSO function(s).

NOTE: Since conformity of the TSO article is only possible at the manufacturer's facility, no conformity can be accomplished on the article after it leaves the manufacturer.

(d) ACO Approval of declared Non-TSO Function. Once the ACO is confident that the data provided by the manufacturer is valid, and the MIDO has indicated that the manufacturer's quality system is adequate to control the declared non-TSO function, the ACO may approve the manufacturer's non-TSO function under § 21.305(d). The ACO approves the article separately, but only in conjunction with the issuance of a TSOA. If a manufacturer requests approval of non-TSO function(s) of a previously approved article, the ACO issues a new non-TSO function approval letter. In either case, the TSOA addresses approval of the non-TSO function with the following conditions:

1 The non-TSO function approval letter is referenced,

2 TSOA for the article (design and production) applies only to the TSO performance standard,

3 The non-TSO function data must include operating instructions and equipment limitations, maintenance instructions, and installation instructions, and

4 Design changes which affect the declared non-TSO function are addressed in sub-section (e) below.

(e) Design Changes to an Article with Declared Non-TSO Functions. Design changes to the article must be addressed as follows:

1 Design changes to the article (both TSO and non-TSO function) are submitted to the ACO issuing the original TSOA and are evaluated in accordance with 14 CFR § 21.611. The design changes must result in an article that meets the TSO.

2 Design changes to the article that affect the non-TSO function(s) are evaluated to assess the continued validity of the function.

(i) Design changes that do not affect the validity of the previously approved non-TSO function are submitted to the ACO issuing the original TSOA. The ACO reviews the change and either concurs or non-concurs with the affect of the change on the validity of the function.

(ii) Design changes that affect the validity of the previously approved non-TSO function data are submitted to and accepted by the ACO issuing the original TSOA. The manufacturer must change the part number of the article. The article with the changed part number requires a new installation approval.

(5) Approval Procedures for declared non-TSO Function Submitted with an application for a letter of TSO design approval (LODA.)

NOTE: For foreign manufacturers, check the bilateral agreement to verify that it specifically includes provisions for non-TSO function(s). If the bilateral agreement does not include provisions for non-TSO function(s), then we cannot evaluate or acknowledge any non-TSO function.

(a) Manufacturer's Data Submittal. The ACO reviewing the LODA application is also responsible for evaluating data submitted by the manufacturer in support of declared non-TSO function(s). At a minimum, the application must contain the following:

1 A certifying statement from the applicable CAA that includes taking responsibility for the non-TSO function data,

2 A clear description of the declared non-TSO function(s),

3 A copy of all test data and analyses intended to support the installation approval of the non-TSO function(s),

4 The manufacturer's specified performance requirements for the declared non-TSO function(s). Where possible, the manufacturer is encouraged to adopt existing industry accepted standards (RTCA, EUROCAE, SAE, ARINC, or others),

5 The manufacturer's specified test procedures used to validate the performance requirements for the declared non-TSO function(s), including applicable RTCA/DO-160 environmental test conditions (when not already required by the TSO), and

6 Installation and operating instructions/limitations, including any ICA, for the declared non-TSO function(s).

(b) Evaluation Criteria. The CAA, from a country with which the United States has a bilateral agreement that includes provisions for non-TSO function, submits the non-TSO function data to the ACO. The ACO evaluates the non-TSO function data during the normal LODA data package review.

(c) Manufacturing and Quality Control. The CAA oversees manufacturing and quality control in accordance with the bilateral agreement.

(d) Approval of Non-TSO Function. Once the ACO has determined the manufacturer's data for the non-TSO function are included in the CAA certifying statement, the ACO may approve the function. The ACO approves the article under § 21.305(d) separately, but in conjunction with the issuance of a LODA. If a manufacturer requests approval of non-TSO function for a previously approved appliance, the ACO issues a new non-TSO function approval letter. In either case, the LODA addresses the approval of the non-TSO function with the following conditions:

1 The non-TSO function approval letter is referenced,

2 The approval of the appliance's design, through a LODA, applies only to the TSO MPS,

3 Since the non-TSO function(s) is approved under § 21.305(d) and is not covered or approved by the LODA, the non-TSO function data must include operating instructions, maintenance instructions, installation instructions and limitations needed to maintain the validity of the approved function, and

4 Design changes which affect the declared non-TSO function are addressed in sub-section (e) below.

(e) Design Changes to an Appliance with Declared non-TSO Function(s). Design changes to the appliance are addressed in accordance with the provisions of the applicable bilateral agreement. The CAA must approve design changes that affect the validity of the previously approved article, prior to submission to the FAA for approval. The manufacturer must change the part number of the appliance. The appliance with the changed part number requires a new installation approval.

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), and (c), and (d) of 14 CFR § 21.183, the following – as required by 14 CFR § 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 14 CFR § 36.1(d), the type design must comply with the noise requirements of 14 CFR § 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, 14 CFR § 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 14 CFR § 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, 14 CFR § 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.

7-13. DESIGNATED ALTERATION STATION (DAS) LIMITS. A DAS may not issue an STC involving the acoustical change requirements of 14 CFR part 36 until the FAA finds that the DAS meets the requirements in 14 CFR § 21.451(d).

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 16.

Appendix 16. Format and Guidance for the Preparation of a Letter That Approves Non-TSO Function Under 14 CFR § 21.305(d)

U.S. Department of Transportation
{enter appropriate ACO }
{enter ACO address}
Federal Aviation Administration

{enter date}

In reply refer to: *{enter reference number} enter name of applicant point of contact (POC)}*
{enter POC's title} {enter name of company} {enter street address} {enter city and mail code}

Dear *{Mr./Ms. enter name of applicant POC}:*

This is in reply to your letter of *{enter date of application}* requesting TSO authorization for your *{insert type of article}*.
Certain declared non-TSO function(s) included in that letter is (are) approved under 14 CFR § 21.305(d) as described below.

Declared non-TSO function(s) contained in this article are:

Non-TSO Function(s)	Performance Requirements
{enter name and basic description of each added function}	*{List manufacturer's declared performance requirements document, or appropriate section(s) thereof, that refer to the non-TSO function(s).}*

The above mentioned non-TSO function(s) has (have) been evaluated and approved under 14 CFR § 21.305(d). This approval of the article is a finding that the non-TSO function(s) in the TSO article meets (meet) the applicant submitted performance criteria.

The statement of conformance for functional performance at the equipment level, as well as the hardware and software design assurance, and environmental qualification for the non-TSO function(s) is also approved on a non-interference basis. The applicable installation manual contains the information on the non-TSO function(s) necessary to support installation approval. Your quality system, as defined in your Quality Control Manual, *{insert date of manual}*, is considered satisfactory for production of this article at your *{enter location of applicant's manufacturing facility}* facility. The following statement must be furnished to the original owner/installer of each article or multiple articles, if furnished to one source: "The conditions and tests required for TSO approval of this article are minimum performance standards. It is the

responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the standards applicable to the TSO article including the integrated non-TSO function. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements." *{A summary statement must be included to describe any approved deviations.}* Any design change to this TSO article, or the non-TSO function contained within, must be forwarded to this office as outlined in 14 CFR § 21.611 with minor change submittal intervals not to exceed six months. Also, as recipient of this authorization, you are required to report any failure, malfunction, or defect relating to this authorization in accordance with the provisions of 14 CFR § 21.3. This authorization is not transferable to another person or location and is effective until surrendered, withdrawn, or otherwise terminated by the FAA. Please note that technical data retained by the FAA may be subject to Freedom of Information Act (FOIA) requests. As such, this office will notify you of all such requests pertaining to your data and afford you the opportunity to defend the release of the data.

If you have any questions regarding this authorization, contact {*enter FAA ACO contact and phone number}*

Sincerely, *{insert name of ACO manager} {enter appropriate FAA ACO}* cc: AIR-140; *{insert routing symbol of responsible MIDO/MISO}*

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 to be added to it. Also if you find an error, please tell us about it.

Subject:Order 8110.4C, Change 3

To: Directive Management Office, AIR-510

(Please check all appropriate line items)

☐ An error (procedural or typographical) has been noted in paragraph _____ on page_____

☐ 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: _____

Telephone Number: _____ Routing symbol: _____

FAA Form 1320-19 (10-98)