



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

# **Advisory Circular**

## **GUIDANCE FOR APPROVED MODEL LIST (AML) SUPPLEMENTAL TYPE CERTIFICATE (STC) APPROVAL OF PART 23 AIRPLANE AVIONICS INSTALLATIONS**

**AC 23-22**

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## FOREWORD

The advisory circular (AC) system became effective in 1962. It provides a single, uniform, agency-wide system that the Federal Aviation Administration (FAA) uses to deliver advisory material to FAA customers, industry, the aviation community, and the public. This AC sets guidelines for using the Approved Model List (AML) Supplemental Type Certificate (STC) process for the installation approval of avionics for 14 CFR, part 23 airplanes.

S/

David R. Showers  
Acting Manager, Small Airplane Directorate  
Aircraft Certification Service



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## CHAPTER 1. GENERAL INFORMATION

### 1. What is the purpose of this AC?

a. This advisory circular (AC) sets guidelines for using the Approved Model List (AML) Supplemental Type Certificate (STC) process for the installation approval of avionics for 14 CFR, part 23 airplanes. It also applies to airplanes certified under a prior certification basis, such as Civil Air Regulations (CAR) part 3 or Aeronautics Bulletin 7-A. Guidance provided in this AC applies only to avionics installations using the AML STC process. For other types of modifications to part 23 airplanes seeking to use the AML STC process, the Aircraft Certification Office (ACO) should coordinate with the Small Airplane Directorate. Avionics AML STC guidance provided in this AC addresses the following:

- (1) Avionics eligible for the AML STC process
- (2) Model Qualification Process used by the STC holder and the FAA to either create or edit the AML
- (3) Level of Detail required for the installation instructions for an AML STC, including a list of acceptable equipment that can be integrated under the STC.

b. Material in this AC is neither mandatory nor regulatory in nature and does not constitute a regulation. In addition, this material is not to be construed as having any legal status and should be treated accordingly. However, it is designed to provide standardization guidelines for AML STC approvals. The AML STC process may be used whenever the ACO and the applicant agree that it is suitable. This AC is not applicable to any products certified under part 25, 27, or 29.

c. This guidance does not replace the ability of an applicant to get a field approval for a major alteration, as outlined in FAA order 8300.10, Volume 2, Chapter 1. It is meant to provide an alternative path for installation approval of avionics equipment and to promote standardization through Certification Engineering involvement on multiple-model installations of the same equipment.

### 2. Who does this Advisory Circular (AC) apply to?

This AC provides guidance to Federal Aviation Administration (FAA) personnel, equipment manufacturers, and avionics equipment installers.

### 3. What is incorporated or canceled by this AC?

a. This guidance does not address design approval for part 23 avionics systems, which is already addressed in existing FAA documents, such as Order 8150.1B. It is meant to clarify installation approval under the AML process for part 23 avionics.

b. The guidance in this AC augments and clarifies the information provided in cancelled Notice 8110.43, Supplemental Type Certificates Applicable to Several Type

Certificated Products, issued 3/6/1992. The information from Notice 8110.43 has been incorporated into this AC in Appendix 2.

c. This AC also cancels Policy Statement PS-ACE100-2002-002 on the installation approval of Multifunction Displays (MFD) using the AML STC process. PS-ACE100-2002-002 did not address Primary Flight Displays or other avionics systems and limited the use of the AML process to non-flight critical applications. This AC incorporates the information in PS-ACE100-2002-002 and provides guidance to expand the use of the AML to other types of avionics systems and standardize the AML approval process.

## CHAPTER 2. INTRODUCTION

### 1. Why write this AC?

a. The Safer Skies initiative and the Advanced General Aviation Transportation Experiment (AGATE) program determined that modern avionics could provide pilots with better information and reduce general aviation accidents. Until recently, hardware costs and certification costs made it impractical to build new technology avionics systems for part 23 use. As new technology is introduced, hardware costs continue to come down. In contrast, the avionics installation approval process has increasingly become more rigorous for applicants seeking installation approval of new systems in part 23 and CAR 3 airplanes. Also, the existing approval processes often provide an inconsistent level of FAA oversight.

b. Applicants sought the approval path of least resistance, which has increased the number of follow-on field approvals for installation of avionics systems in small airplanes. Field approvals are typically based on a single STC with little or no follow-on ACO involvement, which may only be suitable for certain types of installations. For more complex avionics installations, a follow-on field approval may not properly address interface considerations to existing equipment. This warrants a change in the avionics approval process for part 23 and CAR 3 airplanes. The resulting streamlined process needs to provide the proper measure of certification oversight, but it must provide similar advantages to the field approval process.

c. The “Industry and FAA Avionics Approval Guide” describes the certification process for design and installation approval and suggests expanded use of the AML process to streamline part 23 avionics installation approvals. However, the lack of clear guidance on AML approvals has led ACOs to develop their own avionics approval procedures, resulting in a lack of standardization. There is a clear need for a standardized approach to the AML avionics approval process, including criteria for the suitable use of the process, which this AC is designed to provide.

d. Existing AML approvals range in complexity from simple “single wire” installations of supplemental systems to complex Primary Flight Display (PFD) systems that provide flight critical information. Each avionics system presents a unique set of certification requirements. Complex systems require greater certification detail to deal properly with compliance issues for models with slightly different certification bases. For example, showings of compliance to part 23, § 23.1331 requirements for electrical power may be slightly different from model to model and must be clearly documented under the AML process.

e. This AC serves to clarify the AML process for part 23 avionics approvals. It clearly outlines the requirements for creating a Model Qualification Process, determining a suitable certification basis, creating detailed installation instructions with equipment suitable integration procedures, determining data package details, creating procedures for amending the AML, and other items. The AML process is designed to allow a single set of compliance data to be applied to multiple models, where suitable. The intent is to

avoid duplication of testing and data gathering while honoring the agency's primary responsibility to determine the airworthiness of the altered product.

f. It is important the applicant and the FAA ACO agree to the use of the AML process early in a certification project. The resulting STC, with its associated AML, should lessen the need for installers to request field approvals, but is not meant to lower the certification requirements for a particular installation approval. If done properly, an AML STC may save valuable resources for both industry and the FAA by reducing the number of individual STC approvals.

## 2. What documents are related to this AC?

### a. Orders, regulations, policy statements, and other FAA documents:

HBAW 98-18	Checklist for Instructions for Continued Airworthiness for Major Alterations
Order 8100.5A	Aircraft Certification Service Mission, Responsibilities, Relationships, and Programs
Order 8110.4B	Type Certification
Order 8150.1B	Technical Standard Order Procedures
Order 8300.10	Airworthiness Inspector's Handbook Volume 2, Chapter 1, Perform Field Approval of Major Repairs and Major Alterations, Change 16
Order 8110.37C	Designated Engineering Representative (DER) Guidance Handbook
Order 8110.48	How To Establish The Certification Basis For Changed Aeronautical Products
Order 8110.49	Software Approval Guidelines
Title 14 CFR, part 21	Certification Procedures for Products and Parts
Title 14 CFR, part 23	Airworthiness Standards: Normal, Utility, Acrobatic, and Commuter Category Airplanes

## b. Advisory Circulars

You may get copies of the current publication of the ACs listed below from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785. The ACs are also available on the Internet at <http://www.faa.gov/certification/aircraft>.

AC 21-40	Application Guide for Obtaining a Supplemental Type Certificate
AC 23.1309-1C	Equipment, Systems, and Installation in Part 23 Airplanes
AC 23.1311-1A	Installation of Electronic Displays in Part 23 Airplanes
AC 23-15A	Small Airplane Certification Compliance Program
AC 23-17A	Systems and Equipment Guide for Certification of Part 23 Airplanes
AC 23-8B	Flight Test Guide for Certification of Part 23 Airplanes
AC 43.13-1B	Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair
AC 43.13-2A	Acceptable Methods, Techniques, and Practices - Aircraft Alterations
AC 20-138A	Airworthiness Approval of Global Navigation Satellite System (GNSS) Equipment

## c. Other Applicable FAA and Industry Documents or Job Aids

The FAA and Industry Guide to Product Certification, January 1999, located on the web at: <http://www.faa.gov/certification/aircraft/av-info/dst/CPIGUIDE.pdf>

The FAA and Industry Guide to Avionics Approvals, April 2001, available on the web at: <http://www.faa.gov/certification/aircraft/AVCPIcov.pdf>

GAMA Publication Number 10, Recommended Practices and Guidelines for Part 23 Cockpit/Flight Deck Design, available on the web at: <http://www.gama.aero/pubs/onlineCatalog.php>

GAMA Publication No. 12 - Recommended Practices and Guidelines for an Integrated Cockpit/Flightdeck in a Part 23 Airplane, available on the web at: <http://www.gama.aero/pubs/onlineCatalog.php>

### 3. What are common definitions for the terms used in this AC?

AD	Airworthiness Directive
AML	Approved Model List
CFR	Code of Federal Regulations
CPI	Certification Process Improvement
DER	Designated Engineering Representative
FHA	Functional Hazard Assessment
GAMA	General Aviation Manufacturers Association
GPS	Global Positioning System
ICA	Instructions for Continued Airworthiness
MFD	Multi-Function Display
PSCP	Project Specific Certification Plan
STC	Supplemental Type Certificate
TC	Type Certificate
TCDS	Type Certificate Data Sheet

### 4. What is an AML STC?

a. An AML STC is similar to a multimodel STC, which applies to multiple airplanes listed on the same TCDS. However, an AML STC goes one step further by allowing the STC to apply to several different TCs. This allows a single STC to address several different TCs by documenting the data and limits suitable to each of the several different aircraft. This is a more efficient use of resources compared to multiple single-model approvals for an installation that is similar or identical for several different models. See Order 8110.4B for more information on the STC process.

b. To keep track of the various models, an AML is created and attached to the STC (FAA form 8110-2). Whenever another model is added or a document is amended, the AML is changed and not the STC. This lessens the number of STC approvals and may be a more efficient use of resources compared to multiple single-model approvals. However, any change to the AML requires FAA approval.

c. STC approvals with an AML have the same data requirements as an STC applicable to a single model of aircraft. However, when making avionics modifications it is possible to combine the current approval process with some of the advantages of the field approval process. Field approvals typically allow for data from a single STC to be reused for multiple approvals where similarity can be clearly shown. However, they are often carried out with little or no follow-on ACO involvement, which may only be suitable for simple installations where Part 43 “acceptable data” clearly addresses differences between the existing approval and the follow-on installation. The AML provides an advantage, since ACO engineering involvement is required for each

installation on each model on the AML and differences are evaluated and documented clearly in the installation instructions.

d. For more complex avionics installations (See Chapter 1, Section 6.c), it may be more suitable for the applicant to address interface considerations to existing equipment upfront for each proposed model on an AML through a prototyping approach.

e. This process allows portions of the compliance data to be reused, and new showings of compliance for each model to be provided as needed. The AML process is meant to provide the proper measure of certification oversight, but also provide a streamlined approval process for part 23 avionics. Further guidance on the STC process is available in AC 21-40.

## **5. What does existing guidance say about AML STC approvals?**

a. Order 8110.4B, section 4-2a(4), clearly provides for a single STC data package to be used for multiple airplane models, provided the following conditions are met:

(1) The STC data package consists of a principal design and certification data package for the change and either a master installation package for all eligible type certificated products or a separate installation package for each eligible type certificated product.

(2) Any design or installation differences between eligible products are identified in the design and installation data.

(3) Installation complexity is similar on all eligible products.

(4) The change does not require a large reevaluation of the type-certificated product's airworthiness.

(5) Either the flight or operational characteristics, or both, of the type-certificated product remain unchanged.

(6) The change does not create an acoustical change to the type-certificated product (See §21.93 and FAR Part 36 to define an acoustical change).

(7) The eligible type certificated products, applicable FAA approved documents, and the certification basis for each model are listed on a special page known as the "Approved Model List (AML)" attached to the STC under the following conditions:

(a) Whenever a type certificated product is added or one of the FAA approved documents is amended, deleted, or added, the AML itself is amended and approved by the FAA, not the STC.

(b) An AD is required to remove a product from an AML in the case where some unsafe condition exists unless the STC holder can prove no installation was made.

The applicant should always coordinate with the responsible ACO to determine the best course of action for removing a model from the AML using existing FAA process. Existing installations may be affected if the ACO determines that an unsafe condition exists for a particular model, which may require the removal of the equipment in question.

(c) An STC with an AML can be transferred in total to another holder but cannot be split into more than one STC.

b. The “Industry and FAA Avionics Approval Guide” states that, for avionics equipment with similar installation requirements on several aircraft models, a generic approach to the approval process should be considered. The goal of the generic STC approval process is to develop installation instructions that can be used to install avionics equipment in several different aircraft models. These installation instructions will not repeat complete STC programs and will allow the reuse of compliance data where suitable. Title 14 CFR, part 21, § 21.101, also supports this idea.

c. This AML STC approach can reduce the effort for follow-on approvals the avionics installers must get and should reduce the number of field approvals that are performed. It will streamline the STC approval process and allow multiple models to be approved at once. However, there has been some confusion of defining “type design” in discussions about this generic approval process. This guidance seeks to clarify that a single compliance data package is suitable for AML approvals if applicability of the data package to different models and likeness between type designs can be clearly shown and documented. By identifying installation requirements up front, the AML STC process simplifies the approval of installation data for other models.

## **6. What avionics can be approved under the AML STC process?**

a. Critical and noncritical avionics system installations can be addressed using the AML process, provided the ACO and applicant agree the process will adequately address the certification requirements for a given system, and its installation on other model aircraft. The term “critical” refers to those functions identified by a (§ 23.1309) hazard analysis whose failure would contribute to, or cause, a failure condition that would prevent the continued safe flight and landing of the airplane. AML STC approvals can be separated into two classifications, simple or complex, depending on the system installation complexity.

b. A simple system is defined as a stand-alone equipment installation that 1) has well understood requirements for power, antenna, and other interfaces, and 2) does not require substantial model specific configuration settings to be applied. A simple AML STC involves an installation that is repeated easily for all the airplanes listed on the AML using a generic set of installation instructions and a generic configuration setting. However, before using a generic set of installation instructions, the applicant must clearly document and show similarity between the aircraft on the AML. Further compliance findings and formal conformity inspections may not be required after an initial showing

of compliance to §21.33 for simple systems if similarity is clearly documented for every model on the AML. The ACO and applicant must agree on this approach, and it must be documented in the Certification Plan and the Model Qualification Process. This approach is clearly recommended in existing guidance for stand-alone GPS receivers in AC 20-138A and should also be applicable to radios, horizontal situation indicators, course deviation indicators, and other typical avionics components.

c. Complex systems are defined as systems that require model specific interface or installation configuration changes or as single or multiple component systems that require significant data communication and integration with existing equipment, or both. A complex AML STC may involve either an installation where similarity is not as easily shown between models or where the modification requires model specific changes for each airplane on the AML, or both. This may be handled by using model specific installation instructions added as an appendix to the generic set of instructions, or by separate model specific installation instructions clearly referenced on the AML. The applicant should “prototype” the system installation as each model is added to the AML to ensure that model specific requirements are addressed and integrated into the installation instructions. For complex installations, specific compliance and conformity inspections are necessary using model specific information in the installation instructions to comply with §21.33.

d. Complex AML STC approvals should be handled more like multimodel STC approvals, and require model specific documentation for each model listed on the AML. For example, it may be necessary to produce a model specific System Safety Assessment for each model on the AML to satisfy §23.1309 for complex systems. It may be possible to use one set of §23.1309 compliance data for simple systems.

e. Regardless of the equipment being approved, the AML STC installation instructions must be detailed to allow multiple model installations. This should reduce the number of deviations from the STC data package that are sought for follow-on installations. The idea is to reduce the number of cases where maintenance data, accepted under part 43 rules, is used to support an installation when the STC data package either 1) does not correspond to the airplane, 2) does not address a particular interface, or 3) is incomplete. This may require more work up front for the applicant, but should reduce the number of problems for future installations.

## **7. What are some limits of the AML STC process?**

a. The AML STC process is subject to the same guidelines and limits discussed in Order 8110.4B and 14 CFR, part 21, Subpart E. Therefore, it may not be suitable for new and novel features. The applicant and the ACO should coordinate on each specific certification project to determine if the AML process is applicable. The Small Airplane

Directorate should be involved in determining when an AML is applicable in cases where new and novel features are present through the Certification Project Notification (CPN) process according to Order 8110.4B.

b. Order 8110.4B states that if an applicant presents a foreign registered airplane as an article for inspection or test under any STC approval, the applicant must provide evidence the civil aviation authority of the State of Registration agrees to the modification to the airplane. This also applies to AML approvals.

c. The AML STC process should not be applied to those systems whose installation configuration varies significantly among various serial number aircraft of the same model, or those systems that can directly control the aircraft. For example, an AML STC would not be suitable for autopilot installations. For autopilot installations, there may be serial number specific airplane-rigging problems that have to be taken care of on a case-by-case basis. Another example would be a Reduced Vertical Separation Minimum (RVSM) STC approval where model and serial number specific static pressure system characteristics could preclude a generic approach to the certification project. There are cases where the static source error correction curve for RVSM approval is only applicable to a single serial number airplane. The part 91 RVSM guidance material contains details on group approval methods for RVSM approval.

d. High Intensity Radiated Fields (HIRF) and lightning compliance, as well as assumptions made during the Functional Hazard Analysis (FHA) and System Safety Assessment (SSA) for a particular system, may limit the use of the AML process since these items can be model dependent. The applicant and the ACO must agree on a process to allow these items to be addressed in a generic manner for the models on the AML, and agree on Continued Airworthiness procedures to maintain compliance for these items.

e. Deviations from the original approval to allow an installation on a particular model listed on the AML will require the installation instructions to be modified. The approval can also be completed under an individual STC, depending on the scope of the deviation. Existing processes in FAA Order 8300.10 must be used to determine when a deviation to the AML STC is necessary. A deviation is necessary when the installation does not match the equipment list and/or equipment integration approved in the original installation. Any deviations from the original STC must be documented and approved either by an ACO engineer, a DER, or the field inspector. The AML process is not meant to be a blanket approval that delegates the integration of additional equipment to the installer without FAA involvement.

## CHAPTER 3. AML STC PROCESS

### 1. What are the key process steps to an AML STC?

a. The AML STC process is similar to other STC processes, with added steps to allow the requirements for the approval to span across type data sheets. Avionics installation approvals should follow the requirements in 14 CFR, part 21, subpart E, the guidance in Order 8110.4B, and the “Industry Guide to Avionics Approvals,” with the guidance in this AC. Figure 1, on the next page, shows a generalized flowchart for the AML process. For AML STC projects, the applicant is expected to submit a Project Specific Certification Plan (PSCP), following the CPI Process.

b. It is important for the applicant and the responsible ACO to coordinate at the start of the program to document properly the AML process in the PSCP or other FAA approved Certification Plan, which should include:

- (1) Development of a Model Qualification Process (see Chapter 3, Section 3)
- (2) Development of AML amendment procedures (see Chapter 3, Section 4)
- (3) Agreement on data package requirements (see Chapter 4).

### 2. How is the AML created?

a. Eligibility for each model on the AML must be clearly documented by the applicant. For simple systems, it may be easier to prove similarity or identity. For complex systems, the applicant may need to “prototype” the system installation as each model is added to the AML. This will ensure that model specific requirements have been addressed and integrated into model specific sections in the installation instructions and other documentation.

b. An applicant cannot simply apply engineering judgment to create the AML, but the applicant must document a repeatable decision process to include each model on the AML and the methods used to determine applicability. Also, the assumptions and limits for the approval must be clearly stated to avoid confusion for future installations or amendments to the AML. For example, RTCA/DO-160 environmental qualification performed during design approval for a particular operating environment on one model may not be suitable for other models being proposed for addition to the AML. Also, assumptions made during the FHA may limit which models can qualify for addition to the AML.

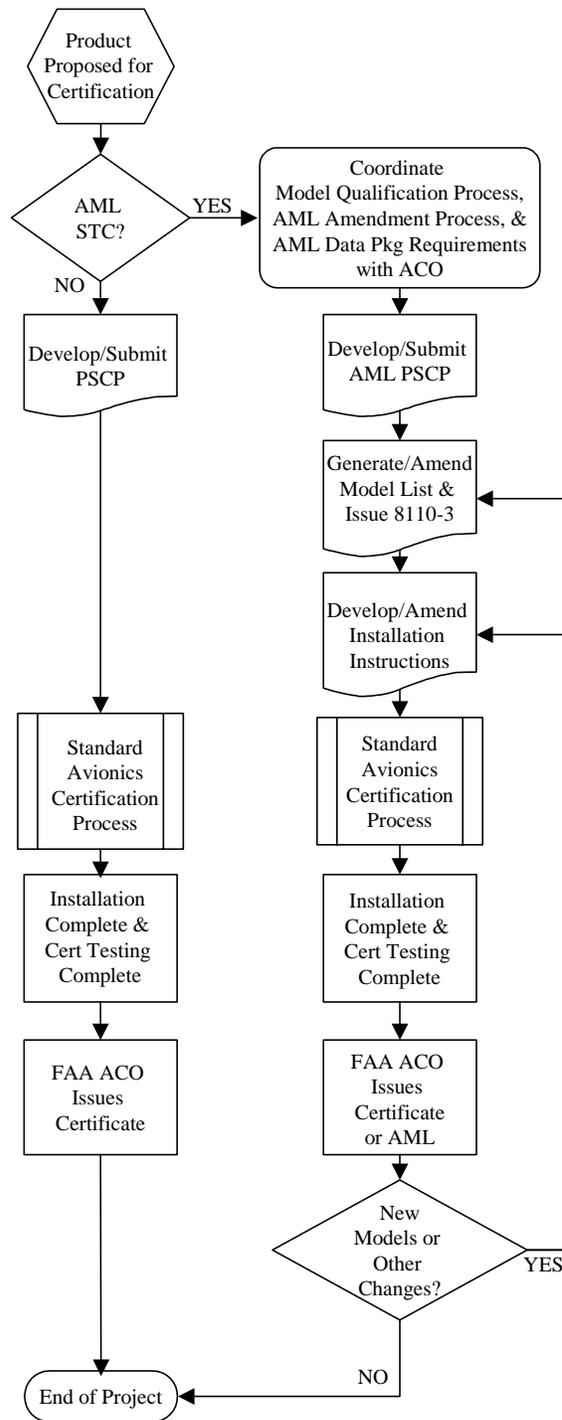


Figure 1 – General Process AML STC Approvals

c. It may necessary for an applicant to split an AML into sections to separate models into groups where similarity can be clearly shown. They may be split according to operational capabilities, certification basis, airplane classification under AC 23.1309, or by other model characteristics that can be clearly grouped. This would allow installation considerations for each group to be addressed separately.

d. The AML should contain a list of the most recent STC documentation to track revisions and changes as the AML is amended. It may be necessary for eligibility for each model on the AML to be revisited if a major change is made to an existing AML approval, such as a change to system design or intended function.

### **3. What is the Model Qualification Process?**

a. The Model Qualification Process is a procedure, agreed on by the ACO and the applicant, that is used by the STC holder to capture specific engineering decisions, design attributes, limitations, and assumptions made during the system development or Technical Standard Order (TSO)/design approval. This helps standardize the AML STC approval process by formally documenting the engineering analysis used to determine applicability and eligibility of a given model for the AML STC.

b. The Model Qualification Process should capture assumptions made during the design phase of a particular piece of equipment and may preclude a model from being included on the AML because of these assumptions. For example, a decision by the equipment manufacturer to develop system software to current revision of RTCA/DO-178 Level C for critical functions may limit the installation eligibility. According to AC 23.1309-1C, Figure 2, by only certifying to software level C for critical functions, installations for part 23 aircraft over 6,000 pounds are not acceptable and require a higher software development level. See Appendix 1 for more information.

c. The Model Qualification Process requires detailed foreknowledge of the system and the models proposed for the AML. The data submitted with the AML should include information showing the Model Qualification Process has been specifically applied to each model on the AML to verify applicability. The submittal should also include a form 8110-3 that approves the Model Qualification data package and recommends approval of the AML. The 8110.3 should include a clarifying note stating, "This approval is for engineering design data only and is not an installation approval," according to Order 8110.37C. The 8110-3 should reference applicable Part 23 requirements that could influence applicability for models on the proposed AML, given the design assumptions for the equipment being installed. Examples include §23.1301, §23.1309, and §23.1353. More detail on data package requirements is available in Chapter 4.

d. The Model Qualification Process should evaluate each model on the AML to verify the assumptions used during HIRF and lightning compliance, and during the System Safety Assessment, are valid. These items can be installation dependent, so a formal process must be in place to make sure compliance data is applicable to each model proposed for the AML and that common installation and wiring practices are adhered to.

The applicant and the ACO must agree on a process to allow these items to be addressed in a generic manner for the models on the AML, and agree on Continued Airworthiness procedures to maintain compliance for these items.

e. More information on this process may be found in Chapter 5, “Model Qualification Process Requirements.”

#### **4. How is an avionics AML STC amended?**

a. Changes that affect the original basic system approval must be addressed as an amendment to the STC itself and may require further showing of compliance. For example, changing the intended function of a box by installing modified software would require an amendment to the STC itself and may also influence what models can be on the AML. Another example would be a change to the way the equipment is installed that could influence system functionality or the certification assumptions made during the original approval.

b. When an AML STC is amended to add a model, the documentation associated with the AML is amended and not the STC itself. The responsible ACO and the applicant must agree on the procedures to amend the AML; however, the following is a list of the basic steps involved.

- (1) The applicant proposes a model to be added to the AML.
- (2) The applicant subjects the proposed model to the Model Qualification Process.
- (3) The applicant modifies installation instructions, and other documents, as needed to accommodate the new model.
- (4) The applicant submits a data package and a form 8110-3 documenting the applicability of the STC to the model in question and recommending approval to add the model to the AML. According to Order 8110.37C, form 8110-3 should contain a clarifying note stating, "This approval is for engineering design data only and is not an installation approval."
- (5) The FAA reviews the submittal and amends the AML.
- (6) The FAA issues the new AML with the new model added.

c. Changes to or approval of the AML is not delegated to a DER since this would allow new models to be added to the AML (new STC approvals) without FAA oversight. A Designated Alteration Station (DAS) with authorized privileges may amend an AML for which it holds an STC if the data package and other STC documentation discussed above is submitted for FAA review according to the existing DAS agreement for STC approvals.

d. As mentioned in Order 8110.4B, an AD must be issued to remove a model from an AML. See Chapter 2, Section 5.a.(7).b.

## CHAPTER 4. AML DOCUMENTATION REQUIREMENTS

### 1. What is the required detail in the data package submittal for an AML?

a. The detail contained in a data package submittal for an AML approval is agreed on between the applicant and the responsible ACO at the beginning of the AML approval process. The detail required will be directly related to the complexity and intended function of the installation and the complexity of the models listed on the AML. The data package can be split into a principal design and certification data package for the STC modification and into either a “master” installation package for all eligible type-certificated products, or into separate installation packages for each eligible type-certificated product.

b. According to Order 8110.4B, and 14 CFR, part 21, § 21.101, there are STC procedures in place to reduce unnecessary administrative burdens on the applicant and the FAA. Once an applicant has shown that a design change meets the airworthiness requirements necessary for FAA approval, later similar alterations may not require the same data package detail and may not require the same tests as the first approval. This philosophy is used to allow an applicant to benefit from previous work.

c. A key element of the AML process is a single set of compliance data to be applied potentially to multiple models. The intent is to avoid duplication of testing and data gathering while honoring the agency's primary responsibility to determine the airworthiness of the altered product. The compliance data package must be detailed enough to allow a compliance finding by the responsible ACO. However, it may be used to show compliance for multiple models on the AML if the Model Qualification Process clearly documents similarity between the models. For example, it may be possible to address electrical load analysis issues, hazard analysis issues, and other certification requirements in a generic fashion for the entire AML. The responsible ACO and the applicant must agree on this approach.

d. The FAA may minimize or waive the need for the applicant to provide supporting data for specific AML approval requirements. This is based on prior FAA knowledge gained from the first installation done by an applicant for the first model on the AML. This depends on the criticality and intended function of a particular component and the similarity or identity of the installations. This agreement should be documented in the AML STC Certification Plan. However, the intent is not to allow an applicant to use compliance data from another applicant's approval unless written permission is obtained to do so from the original STC holder. As with other STC approvals, the FAA will not supply an applicant with information submitted by a previous applicant.

e. The generic approach to the conformity plan should be well defined in the Certification Plan or Model Qualification Process document and must have FAA concurrence. FAA Order 8110.4B and AC 21-40, application guide for obtaining a STC, provide more details on conformity inspections.

f. The ACO and applicant must agree whether an Aircraft Flight Manual (AFM) supplement is necessary. This will depend on the need for an aircraft limitation (23.1583) based on the equipment, operational complexity and the compelling nature of the equipment to draw the pilot's attention. If it is determined that an AFM supplement is necessary, it should include a description of the system, aircraft limitations, emergency procedures, abnormal procedures, and normal procedures, and any changes to the performance of the airplane. The AFM supplement may also refer to the equipment user manuals for more detailed instructions on operating the equipment. For simple systems, a general supplement would be suitable for all approved models. The general supplement is then inserted into the existing flight manual with the cover page completed for make and model, registration number, and serial number. AC 23-8B, Flight Test Guide for Certification of Part 23 Airplanes, chapter 6, section 3, provides added guidance on AFM and approved manual material. If the airplane does not require an AFM, a "Supplemental Flight Manual" or pilot handbook should be developed to provide the same information. Order 8110.4B paragraphs 4-2.a. (4) (c) and (e) also set limits on expanding AFM model eligibility for an AML STC.

## **2. What is the required detail in the installation instructions?**

a. The installation instructions and the Model Qualification Process are vital parts of the AML process. The installation instructions should be suitable for the intended function of the system. These instructions must describe the installation in adequate detail such that the installation shop can determine if a particular serial number airplane is eligible. Follow-on installations are repeatable, so the installation will meet airworthiness requirements, and a conformity inspection can be performed to equipment lists and drawings, if required. If the system being certified is simple, it may be possible to use one set of generic installation instructions and apply them to all the models on the AML. The generalized installation guidelines could reference standard practices used in the installation, for example aircraft electrical wire selection as specified in Advisory Circular 43-13.

b. For more complex systems, a more detailed set of installation instructions may be necessary. This may include a general section, with model specific appendices to address model specific installation considerations. New model specific sections may also be added to the instructions and approved by the FAA as necessary when each system is "prototyped" or when the system is installed on a new model as an amendment to the AML. The procedures for revising the installation instructions should be part of the AML amendment procedures between the responsible ACO and the applicant and should be clearly documented.

c. In developing the installation instructions, the applicant may consult local avionics repair stations, the ACO, and Aviation Safety Inspectors from the FAA local Flight Standards District Office. Their support may provide insight into what is required for the installation instructions. The resulting AML STC should reduce the potential

need of Flight Standards to issue follow-on field approvals for similar equipment installations.

### **3. What must the installation instructions address?**

a. Definition of Intended Function for the System - The intended function of the system must be clearly stated so compatibility can be determined with existing equipment for each model on the AML. Also, the intended function should be the same for all the models on the AML, or it may be necessary to split the AML into different sections. There has been a trend to install equipment, mainly navigation related equipment such as moving maps, as nonrequired, "Not approved for primary navigation" or "SA-Only." The basis for their installation approval has been that they must perform their intended function and not present a hazard to other equipment or the airplane. However, it is not acceptable to label an instrument as "SA-Only" and assume its failure in normal operation is acceptable. A safety assessment conducted by guidelines in AC 23.1309-1C is required to help define the potential safety concerns for a particular installation for the models on the AML.

b. Human Factors Considerations - The FAA recognizes the need to address human factors issues. Human factors considerations must be addressed in the AML Certification Plan. Guidance to aid in this effort and other human factors considerations is contained in the FAA policy statement, PS-ACE100-2001-004. Also, AC 23.1523 addresses pilot workload, which should be considered for all the models on the AML.

c. Wiring Considerations - This includes system schematics and wiring diagrams to describe adequately the connectivity of the equipment, including antennas. For simple installations, it may be acceptable for the applicant to reference specific sections and figures in AC 43-13 to document accepted installation practices, including wire routing and wire separation. For more complex installations, more detailed wiring information may be necessary. For example, specific wiring instructions are required to maintain HIRF and lightning compliance for follow-on installations of critical equipment. If these practices are not followed for a particular installation, the potential for safety hazards may exist. Wire routing and separation considerations must also be addressed according to accepted practices for the certification basis of the model being altered. However, depending on the installation, exact three-dimensional wire routing diagrams may not be value added, even for critical systems. The applicant and ACO must agree early in the approval process on the acceptable means to document wiring installation. Also, only wire specifically designed for airborne use should be installed in the aircraft, such as wire presented in AC 43.13-1B.

d. Structural Considerations - If required, structural substantiation data must be submitted for antenna installations, and box mounting. AC 43-13 is not a satisfactory reference for antenna installations on pressurized airplanes. Also, depending on the certification basis of the airplane (Amendment 23-45 or later), damage tolerance issues must be addressed.

e. **STC Assumptions and Limitations** - Assumptions and limitations in the supporting data for the original approval of the STC must be clearly stated in the installation instructions. This is because an installation shop can address serial number specific considerations and seek further approval, if needed. For example, a particular serial number may have existing equipment or modifications that would preclude installation of the proposed modification or would require further FAA approval, despite being listed on the AML.

f. **Interface to Other Equipment** - Data must be provided to document what equipment is approved to interface with the proposed system under the AML STC. Enough detail must be provided to document interface compatibility and interoperability assurance with other equipment. This should include any approved variations in protocol or data word formats that might influence proper functionality, operational characteristics, or changes to intended function. This may also include a list of equipment that is specifically not approved to interface with the equipment being installed.

g. **Electrical Load Analysis and Functional Hazard Assessment**. Installation procedures should clearly state that electrical load analysis, functional hazard assessment, and other certification requirements remain in compliance. It is possible to apply a generic approach to the functional hazard assessment if worst-case assumptions are made for a typical installation. For example, the functional hazard assessment is performed during design approval with certain assumptions on system redundancy and back-up systems. The STC must contain details of these assumptions as limits to assure all models on the AML meet the terms of the original design approval assumptions.

h. **Pre- and Post-Installation Check Procedures**

(1) Provide either pre or post installation ground test or flight check procedures, or both, with clear and concise pass/fail criteria to verify the intended function of the system. Include a post-installation approval for return to service by the responsible party so a maintenance record entry can be made documenting the installation has been performed.

(2) The ground test or flight check procedures, or both, should 1) evaluate operation of the system, 2) determine if the system is interfaced properly with other systems, 3) determine if the system performs its intended function, and 4) determine if there is unacceptable interference with other systems. For example, day/night lighting considerations must be addressed for a particular installation.

(3) AC 23-8B, Flight Test Guide for Certification of Part 23 Airplanes, provides further guidance. Also consider part 91, § 91.407, to determine flight check requirements for post-installation test to verify intended function. In accordance with § 91.407(a) and (b) An operational flight check should be conducted by the applicant or designee to verify proper system function. Installations intended for Instrument Flight Rules (IFR) may be initially limited to Visual Flight Rules (VFR) until the proper functionality is shown to

avoid the requirement for a special airworthiness certificate in experimental category before conducting an operational flight check.

(4) Electromagnetic Interference (EMI) testing may reveal incompatibilities between the installed system and existing systems. For example, there may be potential interference from electric motors or ballasted lighting systems on sensitive navigation and attitude reference system sensors. The applicant should provide model specific checkout procedures for each model on the AML to address possible interference conditions. Laboratory EMI tests performed according to RTCA/DO-160 Section 21 for RF emissions provide confidence that installed equipment will perform without interference to existing aircraft systems. This represents the most efficient way to address the potential for EMI on multiple models. This approach would also account for variations in existing equipment and minimize EMI tests needed on each airplane model. Procedures for functional ground tests and flight checks should be provided as a final EMI check. Suggested remedies for interference include transfer of equipment, shielding techniques, or external filters. Recurrent EMI issues may warrant changes to the installation instructions that may need to be rolled back into the original AML STC approval.

i. Any other items the responsible ACO considers necessary for a given AML approval

#### **4. What Continued Airworthiness Considerations must be addressed?**

The following items should be addressed for each model on the AML to address continued airworthiness considerations:

a. Instructions for Continued Airworthiness (ICA).

(1) An ICA is required as part of the AML STC data package. Part 21, § 21.50(b), states that a holder of an STC must provide at least one set of complete ICA prepared following § 23.1529, including any Airworthiness Limitations.

(2) The ICA provides instructions necessary for authorized personnel to inspect and maintain the added equipment installed by the AML STC under the requirements of 14 CFR, part 43, including procedures to address approved equipment interfaces.

(3) The FAA is responsible under § 21.50 to accept the ICA. The Aircraft Evaluation Group (AEG) will aid the ACO engineer in showing the adequacy of the ICA and determining the acceptability of the ICA.

(4) The ICA must be in a printed form when the first airworthiness certificate is issued, or before delivery of the first product, whichever is later.

(5) FAA Order 8110.4B offers guidance on developing the ICA documents.

(6) The ICA should address maintaining HIRF and lightning protection compliance, including a list of specific wiring, bonding, or strapping requirements that must be maintained for the system.

## CHAPTER 5. MODEL QUALIFICATION PROCESS REQUIREMENTS

This chapter is designed to help the user of this AC design a Model Qualification Process. This process is used by the STC holder and the ACO to determine and document the applicability of an AML STC to a given airplane model. In contrast, the installation instructions are intended to be used by the installer to determine applicability of the STC to a particular serial number airplane. The Model Qualification Process is designed to be used to: 1) include a given aircraft model on the existing AML (to determine if the installation is appropriate under the AML), 2) determine if a particular model would require further compliance showing to be added to the AML, or 3) determine if an installation is complex enough to warrant an individual STC. The following list of items is meant only as a guideline and does not represent an exhaustive list of potential issues that must be addressed to qualify a model for an AML approval.

### 1. Evaluation of Physical Location of Installed Equipment

- a. Will the equipment for the proposed modification fit in the model being considered? This should include considerations for available space for new equipment and for systems that will need to be moved or displaced to complete the modification.
- b. Is the proposed installation location, or proposed alternate mounting locations, compatible with the criticality and visibility of displayed information, including required announcements and warnings?
- c. Is the environment suitable for the limitations of the equipment? This should include cooling considerations.

### 2. Evaluation of the Applicability of the Proposed STC

- a. Is a particular model airplane configured in such a way that would preclude it from being eligible for the STC, although it is listed on the AML? This might be caused by existing equipment, where the interface is not covered in the installation instructions for the system, inadequate electrical capacity because of existing equipment, or other factors.
- b. Are the operational characteristics of a particular model airplane compatible with the assumptions made during the initial certification? For example, an airplane may be approved for CAT II approach from the factory, where adding new equipment and replacing it with the new system might cancel this ability.

### 3. Evaluation of Intended Function of the Proposed Equipment

- a. Will the proposed equipment be able to perform its intended function in the model being considered?
- b. Is the intended function compatible with the equipment approval for the system, including software and hardware design assurance levels?

- c. Is the software development level of the proposed equipment compatible with the intended function for the category/classification of the model in question?
- d. Does the intended function change for the model being considered compared to other models already on the AML? If so, the applicant may need to split the AML into sections or seek separate approvals.

#### **4. Evaluation of the Installation Complexity of the Proposed Equipment**

- a. Will the proposed modification present unique model specific installation challenges for the models being considered? This should include an analysis of the complexity of the proposed modification with consideration to existing equipment that would typically appear on a given model.
- b. Will the proposed installation affect the electrical load analysis, the functional hazard assessment, or the calibration/operation of existing systems?
- c. How will calibration issues for the new equipment, EMI related issues, and the possible effects to the HIRF and lightning certification of the proposed model be addressed?
- d. How will the proposed modification interface with other existing systems on the model being proposed? What existing equipment is acceptable to interface with the new equipment?
- e. Is specific training needed to install the system? Consider the existing installation instructions to see if more model specific details are needed to include the model in question.
- f. Are there continued airworthiness issues that should also be evaluated to see if any model specific issues exist? For example, consider the installation location of the equipment and whether this might influence inspection, calibration, or maintenance schedules of the equipment.

#### **5. Evaluation of Operational Requirements of the Proposed Equipment**

- a. Will the proposed equipment change the operational capabilities of the model being considered? This should include an evaluation of possible changes to the following: 1) existing precision approach capabilities, 2) navigational accuracy and procedures, 3) current pilot workload, 4) special certification conditions, and 5) operational approvals for the model being proposed, such as RVSM or CAT II approval.
- b. Are there model specific limits and possible additions or changes to the AFM or AFM Supplements?

## **6. Pilot Evaluation and Human Factors Issues for the Proposed Equipment**

Will the proposed modification create any issues that would warrant a pilot evaluation or any human factors concerns for the model being considered? This should include an evaluation of existing equipment, how the modification will affect the pilot's primary field of view, and how the system will be ground and flight tested after installation. Ground and flight test procedures should contain exact test procedures and expected response data, with clear pass/fail criteria for each test.



**APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT***Disclaimer:*

*The following sample document provides an example of a generic framework for the process used to show applicability of a given STC to a particular airplane model. The document proposes a structure for the formal engineering process that must be followed before a model can be added to the AML for a given STC.*

*The sample Model Qualification Process document is provided only as an example for the agreement between the STC holder and the ACO. It is not meant to capture all the possible information that would be required to determine applicability or use of a particular airplane for a given STC. Depending on the complexity of the system being approved, the detailed steps of this process may need to be reduced or expanded in scope to allow suitable installation and certification requirements for a particular approval.*

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## **APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

### **1 Introduction**

#### **1.1 Summary**

This section should contain a brief summary of the scope and purpose of the document, including a brief description of the certification approval project itself.

#### **1.2 Definitions and Acronyms**

This section should contain any project specific definitions and acronyms applicable for the approval.

#### **1.3 Applicable Documents and References**

This section should contain a listing of applicable certification documentation for the STC being considered, any applicable regulatory references, and other guidance suitable for a particular approval.

### **2 Certification Considerations**

This section should contain an outline of the certification philosophy used by the ACO to approve the proposed modification. This information is provided so the reader is familiar with the basic certification assumptions surrounding the approval of the proposed modification.

#### **2.1 AML STC Definition**

This section should contain a clear definition of the AML STC as defined for the project approval in question. This includes a clear definition of the intended function of the equipment as provided in other certification documentation for the approval.

#### **2.2 AML STC Limitations and Assumptions**

This section should contain a summary list of assumptions made about the airplane, or equipment, for the initial certification that would influence the decision to include a given model on a proposed AML. One example would be the assumption that electromechanical back-up instruments are maintained and considered in the System Safety Assessment for a Primary Flight Display installation. Another example would be the software development assurance level that relates to the failure condition classification and airplane classification under AC 23.1309-1C.

## **APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

This summary list should allow an initial review by the reader to help define whether a given model should be considered for inclusion on the AML.

### **2.3 Installation Overview**

This section should provide an outline of the installation, including a brief description of the basic steps of the installation and the equipment being installed.

If a rearrangement of existing equipment or instruments is necessary, this section should provide an outline about what is being replaced, where the new instrumentation is to be placed, and the reinstallation of existing equipment. This section should reference sections that appear later in this document and other installation documentation that provides a greater level of detail for these items.

This section should also provide an outline of whether there are model specific installation issues to be evaluated, including references to specific sections later in the document. If model specific installation instructions are needed, this section should provide a summary list of applicable installation documents. Model specific installation instructions should be used for complex installations where model-to-model variations in the installation, or system configuration, are significant. Also, a “prototyping” approach can be used, where each new model is added to the AML as installations are performed and the model specific installation issues are addressed.

### **2.4 AML Revision Process**

This section should contain the agreed on process between the FAA and the applicant on how the AML is to be revised to add or remove a given model. This part of the document should provide a clear step-by-step process so the same method will be used each time the AML is revised. The process should state that the determining of eligibility should only be made by an individual with specific knowledge of the proposed model and the proposed modifications required by the STC. Also, AML revisions must be FAA approved. The step-by-step process should relate to later sections in this document and outline the steps for a determination of applicability.

## **3 Determination Of Applicability**

This section should contain a summary of general steps that are used to determine if a proposed model should be included on the AML. This section should include a review of the certification basis of the proposed model, prior certification considerations applicable to the particular model, model specific installation limitations, and relevant operational considerations for the proposed model. The section should provide an outline of the

## **APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

engineering process that the installer would use to assure the installation is applicable for a particular model airplane.

### **3.1 Certification Basis**

This section provides a detailed review of the certification basis that was briefly introduced earlier in the document for the AML approval. This should include information about the certification basis of the equipment and the airplane models on the AML. Order 8110.48 contains more detail on how to determine the certification basis for a changed product.

It is possible for an airplane on the AML to have a different certification basis than the equipment in the proposed installation. For example, applicability of an STC could be limited to older part 23 airplanes, but the proposed system could be certified to the latest amendment. The rest of the airplane is left at the older certification basis, while the latest certification requirements are applied to the proposed equipment, according to existing § 21.101 related guidance.

This section should also contain reference to any certification item that was documented in issue papers for the approval in question. This will allow the terms of that issue paper to be captured as part of the Model Qualification Process so a consistent approach can be used.

### **3.2 Prior Considerations**

This section should list any known items, related to prior STC approvals for the airplane model being proposed for the AML that would influence the proposed modification. This could include prior STC approvals or other considerations that are applicable to the project. For example, if a single model STC is being expanded to include other models where similarity can be clearly determined and documented, this section should contain that information.

Also, this section should outline the proposed modification that could be affected by the combined effects of other STC installations, such as critical hazard analysis details, or electrical system load analysis limitations.

### **3.3 Operational Considerations**

This section should contain an outline of the operational considerations for the proposed modification. For example, if the system is only certified for day VFR, this section should clearly state the limitations of the system so it is not misused. As another

## **APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

example, if the proposed installation can influence previously installed equipment and change an operational approval, such as CAT II approach capability or RVSM certification, these items should be addressed in this section.

### **3.4 Installation Considerations**

This section should contain details of the installation that may vary from model to model. This section should state clearly whether a generic set of installation instructions are being used or if model specific installation instructions are to be used. This section should also contain a summary of the assumptions that qualify a particular airplane for the proposed installation. In the case of an antenna installation only structurally approved for installation on a nonpressurized airplane, this section should draw attention to the further certification involvement that will be needed for installation on a pressurized airplane.

The section can refer to general guidelines and reference standard practices and procedures considered acceptable by FAA regulations. For example, for a generic installation where similarity between models on the AML can be clearly documented, specific references to AC 43.13-1B, "Acceptable Methods, Techniques, and Practices - Aircraft Inspection and Repair," and AC 43.13-2A, "Acceptable Methods, Techniques, and Practices - Aircraft Alterations," may be acceptable.

### **3.5 Final Approval**

The final step to include the aircraft on the STC AML is FAA approval. A form 8110-3 for Recommend Approval with a statement the proposed aircraft model(s) has been qualified through the FAA-approved Model Qualification Process and signed by an authorized DER should go with the AML data submittal. According to Order 8110.37C, the submittal should also include a clarifying note stating, "This approval is for engineering design data only and is not an installation approval." The FAA will review the form 8110-3 to approve the suggested revision to the AML as well as any applicable changes to the applicable documentation for the STC.

## **4 SPECIFIC AIRCRAFT EVALUATIONS**

A specific aircraft evaluation is required to determine relevance of a given serial number airplane as a potential candidate for the proposed modification. An individual with specific knowledge of the aircraft make and model should perform the engineering analysis. The person's knowledge must be extensive enough to answer each question in the AML decision tree and document those decisions to satisfy the ACO. This decision process can refer to specific written documentation from the original equipment manufacturer. This may be in the form of TCDS, specific aircraft drawings, photographs, or detailed reports.

## **APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

### **4.1 Intended Function**

This section should refer to any differences in intended function that may be present in the proposed installation, depending on the installed equipment for a given airplane. For example, it may be possible for one piece of equipment to be installed and used differently on two airplanes of the same model if one is approved for precision approach and the other is not. For another example, a multifunction display can be installed with varying capabilities, depending on the other equipment installed in the airplane. This section should document those variations so they can be evaluated when a particular airplane is being considered for the proposed modification.

### **4.2 Applicability Across Serial Numbers**

This section should include details on specific airplanes within a series that may not qualify for the installation or would require further certification involvement. For example, it is possible for an aircraft to have changed during its production so some serial numbers may not be applicable for a given STC while others are applicable.

### **4.3 Physical Location of Installed Equipment**

This section should provide details of the specific installation location proposed for the modification to determine if a given model will be able to accommodate the installation. Each aircraft identified as a potential candidate for the AML must provide a suitable mounting location for the proposed modification. The installation location may vary from model to model and from serial number to serial number, but the STC installation documentation should clearly state the installation requirements and limits for the proposed modification. This should include detailed instructions on how much an installation can vary before further certification involvement is needed.

This section should address requirements for acceptable location, structural mounting, cooling, and wiring related issues. Also, installation requirements for equipment that is sensitive to installation location because of EMI issues, such as an Attitude Heading Reference System (AHRS), should be clearly described.

For example, to install a GPS navigation system, this section should clearly state acceptable installation location, suitable remote annunciation requirements, and other items. Suitable guidance materials should be referenced where applicable, such as AC 20-138A and AC 23.1311-1A. For these installations, the GPS navigation receiver is typically found in the center radio stack. However, the location of the center radio stack varies from airplane to airplane model. This section should provide added information to clarify field of view requirements and acceptable installation locations for the AML installation.

## **APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

The proposed installation requirements should be consistent with existing FAA guidance materials suitable for the equipment. Also, references to specific sections in AC 43.13-1B should be used, rather than general references, to document installation procedures and to satisfy the requirements of § 21.31 to describe the type design, when suitable.

### **4.4 Interface to Existing Equipment**

The proposed modification may require interfaces into the aircraft's existing equipment. This section should provide enough detail for a specific model to be evaluated to make sure suitable interfacing can be performed for a given model. This could include, but is not limited to, the following:

- Navigation System Interface [(Horizontal Situation Indicator (HIS) and or Course Deviation Indicator (CDI)]
- Antenna Installations (GPS, Communication, and Navigation systems)
- Electrical System Interface (Including an electrical load analysis impact study)
- Interface to other systems, such as the Pitot Static system, autopilot, and Angle of Attack sensors.

When interfaced with external equipment, extensive instructions should be provided to ensure the interface with the equipment is properly wired, properly configured, and properly tested. The installation manual should contain detailed test procedures, with expected system response, for each interface. This can include both ground test and flight check procedures, when necessary.

### **4.5 Electromagnetic Interference**

This section should contain specific tests to ensure the proposed installation does not electronically or magnetically interfere with existing equipment, or conversely. This section should also list any equipment in the proposed installation that may be susceptible to EMI, such as an AHRS or a GPS system. The installation instructions should include ground tests and operational flight checks.

### **4.6 Human Factors**

This section should contain details related to human factors considerations for the proposed installation including the basic design of the system, the certification basis, the intended function of the equipment, and the installation location of the equipment.

**APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS  
SAMPLE DOCUMENT (CONTINUED)****5 ACCEPTANCE PROCESS****5.1 Model Qualification Diagram**

The following decision process in Figure A1 is presented as an example to determine applicability of a given model to the AML. It is a graphic representation of the decision points outlined previously in the document. Once an airplane has been identified as a potential candidate to be included on the AML, a qualified person with specific knowledge of the model in question may use this decision process to qualify the aircraft. Specific installation questions must be answered and clearly documented to prove the applicability of a particular model.

**APPENDIX 1 - GENERIC MODEL QUALIFICATION PROCESS SAMPLE DOCUMENT (CONTINUED)**

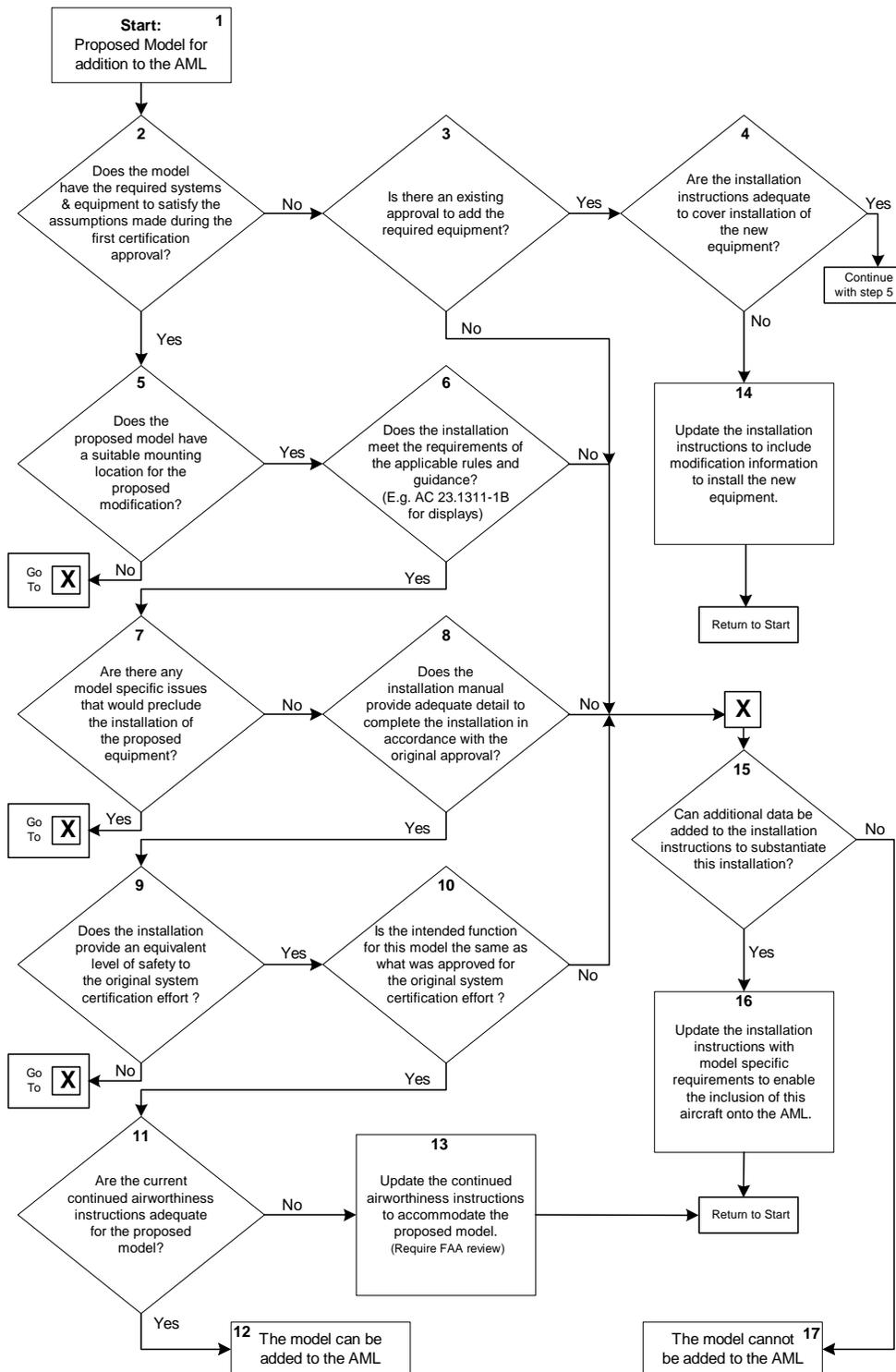


Figure A1-1 – AML Model Qualification Process Diagram

**APPENDIX 2 – EXAMPLE AML STC***Disclaimer:*

*The following sample STC documents are provided as an example and are not meant to capture all the possible information that would be required to document the applicability and limits of every STC. Depending on the complexity of the system being approved, the details contained on the STC and the AML may need to be reduced or expanded in scope to allow suitable installation and certification requirements for a particular approval.*

**APPENDIX 2 – EXAMPLE AML STC AND APPROVED MODEL LIST  
(CONTINUED)**

United States of America

Department of Transportation - Federal Aviation Administration

**Supplemental Type Certificate**

*Number* XXXXXX

*This Certificate  
is issued to*

Applicant Corporation Name  
Applicant Corporation Address

*certifies that the  
changes in the type design for the following product with the limitations and conditions therefore  
as specified herein meets the airworthiness requirements of Part 23 of the Federal Aviation  
Regulations.*

*Original Product Type Certificate Number:*

*Make:*

See attached FAA Approved Model List (AML), Document  
No. XXX-XX, Rev (X), or later FAA approved revisions for  
the list of approved airplane models, applicable installation  
data requirements and specific limitations.

*Model:*

*Description of Type Design*

*Change:*

Installation of System Description and Part Number in accordance with Applicant Corporation Name Master Document  
List referenced on the attached AML, or later FAA-approved revisions.

*Limitations and Conditions:*

List applicable limitations for the AML STC, including any important assumptions made during installation approval  
regarding existing equipment on the proposed serial number airplane or other important limitations that might influence  
installation of the STC on a particular serial number.

If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other  
person written evidence of that permission.

*This certificate and the supporting data, which is the basis for approval, shall remain in effect  
until surrendered, suspended, revoked or a termination date is otherwise established by the  
Administrator of the Federal Aviation*

*Date of application:* Application Date

*Date received:*

*Date of issuance:* Issuance Date

*Date amended:*

*Administration:*

*By direction of the Administrator*



\_\_\_\_\_  
(Signature)

Manager  
Aircraft Certification Office

\_\_\_\_\_  
(Title)

**APPENDIX 2 – EXAMPLE AML STC AND APPROVED MODEL LIST  
(CONTINUED)**

**Approved Model List For:**  
*Equipment Description and Part #*  
*Manufacturer Name*  
*STC Number*

FAA Approved: \_\_\_\_\_  
Manager  
Aircraft Certification Office  
Federal Aviation Administration  
Office Location

**APPENDIX 2 – EXAMPLE AML STC AND APPROVED MODEL LIST  
(CONTINUED)**

**1. AML Revision Log**

Revision No.	Pages	Description	FAA Approval	Date
(-)	ALL	Initial Release	Signature	Date

**APPENDIX 2 – EXAMPLE AML STC AND APPROVED MODEL LIST  
(CONTINUED)****2. Introduction**

This document is the FAA Approved Model List for STC No. XX for installing the *Model Number and Description of System* into eligible aircraft.

Revisions to the AML must be coordinated between the STC holder and the responsible ACO, and require FAA approval.

**IMPORTANT NOTES:** *(Example only, edit for specific STC approval)*

This STC is only applicable to the 14 CFR, part 23, Class I aircraft, as defined in Advisory Circular AC 23.1309-1C, which are listed in this AML. Installations in 14 CFR, part 23 Class II, III and IV, part 25, part 27 and part 29 aircraft are not authorized under this STC.

This STC assumes the following equipment is already installed on each airplane eligible for this proposed modification. The following equipment must be properly linked to meet the intended function for the system, as certified under this AML approval.

*List of required equipment that is not part of this approval.*

*List added limits of the STC that might influence applicability of the STC to any serial number being considered for the modification.*

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(CONTINUED)**

**3. Certification Basis**

The certification basis for each model qualified for this modification is detailed below.

*Note: Variation in cert basis from model to model is allowed if properly documented in this section and approved by the FAA. For such cases, it may be necessary to reflect these variations in model specific compliance checklists.*

*Note: List any regulations that have been applied to the system itself under the assumption the rest of the airplane stays at the original certification basis according to § 21.101 and associated guidance. Examples include §§ 23.1301 and 23.1309 for electronic systems, which may not have been considered in the original certification basis of each model.*

Aircraft Make	Aircraft Model	Type Data Sheet	Certification Basis
Manufacturer	Model	TCDS#	CAR3, Part 23 Amendment Level.

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**4. Approved Model List**

Aircraft Make	Aircraft Model	Type Certificate Number	Required Approved Data and Added Model Specific Limitations	AML Amendment Date
Make	Model	TCDS #	<p><b>Master Document List:</b> <i>List Manufacturer Master Document Number(s) and STC No.</i></p> <p><b>Airplane Flight Manual Supplement:</b> <i>List Generic or Model Specific Airplane Flight Manual Supplement</i></p> <p><b>Installation Instructions:</b> <i>List Generic or Model Specific Installation Instructions</i></p> <p><b>Instructions for Continued Airworthiness:</b> <i>List Generic or Model Specific System Instructions for Continued Airworthiness</i></p> <p><b>Equipment Configuration:</b> <i>List Generic or Model Specific Equipment Configuration Details</i></p> <p><b>Additional Limitations:</b> <i>List Limitations or reference to list of limitations in some other document associated with the STC</i></p> <p><b>Additional Documents</b> <i>As needed, such as Electrical Load Analyses, System Safety Assessments, Functional Hazard Assessments to meet §23.1309.</i></p>	