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

Policy Statement

Subject: Approval of Non-Required Safety Enhancing Equipment (NORSEE)

Date: (11/10/15)

Policy No: DRAFT

Initiated By:
AIR-100

Summary

This policy addresses equipment that is not required by any Federal regulation, installed with the intent to measurably increase aircraft safety. Section 1 provides guidance and procedures for issuing a design, production, and installation approval to a U.S. manufacturer pursuant to Title 14 of the Code of Federal Regulations (14 CFR) 21.8(d), Approval of articles, for equipment designated as "Non-Required Safety Enchancing Equipment" (NORSEE) that is determined to be a minor change to type design and whose failure condition is minor. Section 2 of this policy statement provides a path to install NORSEE when the change to the type design is major and the introduced system has a failure condition that rises above minor.

Definition of Key Terms

In the policy statement below, the terms "must," "should," and "recommend" have specific meanings that are explained in appendix B.

Applicability

This policy statement applies to 14 CFR part 23, 27, and 29 category aircraft. It excludes unmanned aircraft for all aircraft categories.

Mission Objective

The Federal Aviation Administration's (FAA) mission is to provide the safest, most efficient aerospace system in the world. AIR: 2018 calls on the FAA to improve aviation safety through a variety of methods. One of those is "to encourage and enable voluntary safety enhancements" as found in the AIR 2015 Roadmap for AIR: 2018. Until recently, the FAA has not differentiated between non-required equipment and the special class of non-required equipment that can enhance safety. To support its mission, the FAA is implementing an approval process to allow installation of NORSEE in the general aviation (GA) and rotorcraft fleets. The intent is not to

bypass the existing certification processes or the current level of FAA oversight, but to standardize the approval process specific to NORSEE.

Equipment approved as NORSEE has a variety of uses including—

1. Increasing overall situation awareness;
2. Providing additional information other than the aircraft primary system;
3. Providing independent warning, cautionary, or advisory indications; and
4. Providing additional occupant safety protection.

Most NORSEE categories fall under the avionics, electronic instrument, and display categories. However, mechanical and other NORSEE categories can use the same methodology and evaluation approach, as outlined in this policy statement. The types of equipment that may be considered NORSEE include, but are not limited to the following:

- Traffic advisory system,
- Terrain advisory (such as a terrain awareness and warning system (TAWS)),
- Attitude indicator,
- Weather advisory,
- Crashworthiness (such as energy-absorbing seats, seatbelts, and airbags),
- Configuration advisory (such as gear advisory for floats and takeoff/landing configuration),
- Supplemental indication (such as a fuel flow or fuel quantity indicator),
- Monitoring/detection system (such as a smoke, carbon monoxide, or fire detector),
- Extinguishing system (such as a fire extinguisher), and
- Stability and control (such as an autopilot or stability augmentation system).

The goal is to establish one policy that is scalable and adjustable to accommodate and encourage the installation of new technology safety enhancements into all aircraft product types.

Policy

Section 1 of this policy statement provides guidance and procedures for issuing a design, production, and installation approval to a U.S. manufacturer pursuant to § 21.8(d) for equipment designated as NORSEE that is determined to be a minor change to type design and whose failure

condition is minor. Section 2 of this policy statement provides a path to install NORSEE when the change to the type design is major and the introduced system has a failure condition that rises above minor. Specifically, this policy addresses equipment that is not required by any Federal regulation with the intent to measurably increase aircraft safety.

NORSEE approval is based on the premise that it offers safety benefits that outweigh the potential risks. Ideally, a NORSEE failure should not result in a reduction in safety. However, as the intricacy in operation, functionality, and installation increases, the potential safety risks stemming from the failure of integrated and complex systems also increases. This relationship between safety benefits and potential risks requires careful evaluation. The applicant is required to present an acceptable safety benefit case before seeking NORSEE approval.

There may be a situation in which NORSEE approval requires modifications that are considered a major change to type design. In this case the applicant is required to pursue another certification path (such as a supplemental type certificate (STC)) for its approval, regardless of the "non-required" designation.

1 NORSEE APPROVAL PROCESS PURSUANT TO § 21.8(d) WITH A MINOR FAILURE CONDITION.

1.1 **Minimum Design Requirements.** Minimum design requirements (MDR) are design requirements found acceptable by the FAA that satisfy the approval of equipment pursuant to § 21.8(d). MDRs are usually industry standards proposed by the applicant. The FAA can accept the proposed industry standard or partially accept it with additional requirements to meet the objectives of the MDR. Once accepted, this standard becomes the MDR for any subsequent equipment with a similar design and creates standardization for the equipment.

1.2 **Selection of Suitable Industry Standards.** For non-required equipment, the applicant has the flexibility to determine which industry standard to use for the equipment's design. Therefore, the applicant can select a standard that is practical to produce and also meets the design requirements for its equipment.

The FAA recommends that applicants adopt one of the widely accepted industry standards such as those produced by RTCA, Inc. (RTCA), SAE International (SAE), or ASTM International. The FAA has long-established working relationships with these organizations and comprehensive knowledge concerning the development of these industry standards. However, the FAA also can recognize other industry standards if an applicant's proposal satisfies the MDR for the particular equipment. The FAA has the discretion to accept the standard in full or accept the standard in part (with additional requirements) to satisfy the MDR.

1.3 **Safety Objective.** Equipment approved pursuant to § 21.8(d) is intended to enhance safety and is considered complementary (that is, secondary or non-essential) to the required equipment. NORSEE can improve safety for a number of aircraft under most operational conditions. The FAA expects the safety benefits to be greater than the potential risks introduced by the installation of NORSEE.

1.4 **Safety Evaluation.** The overall safety evaluation for non-required equipment assumes the equipment will fail, regardless of the system or subsystem and the probability of such a failure. The safety evaluation must show evidence that such failures do not reduce the capability of the aircraft or the ability of the pilot/flightcrew to cope with a failure condition worse than minor.

For integrated systems, the evaluation process also should take into account any additional interdependencies that may arise because of integration. In all cases involving integrated systems, the safety evaluation process is of fundamental importance in meeting the safety objective for the system. Design considerations should include, but are not limited to—

1. *Separation* from those systems that are considered primary (required by airworthiness standards or operating rules, or critical to the operation of the aircraft);

2. *Independence* in operation that does not require input, signal, or information acquired from a primary system to operate; and

3. *Protection* from adverse effects on the rest of the system during normal operating conditions or when failure occurs.

A more robust safety evaluation may be necessary if it concerns complex systems with a high degree of integration, unproven new technology, or systems that can directly control the aircraft. There are appropriate safety assessment tools (such as failure modes and effects analyses or functional hazard analyses) tailored specifically to evaluate these types of systems. The overall safety evaluation process should consider a system's architecture, functionality, operational capabilities and limitations, human factors, and whether the system requires pilot training. Once the evaluation is completed, it should provide the necessary assurance that all foreseeable failure conditions (such as loss of function or misleading information) have been identified and assessed.

A safety evaluation conducted by the applicant may include either a qualitative or quantitative approach, depending on the complexity of the equipment. The qualitative approach may include service experience data from similar, previously approved systems. The determination of complexity under this approach requires engineering judgment, experience, common knowledge, and similarities to other systems also designated complex.

The safety evaluation must determine the failure modes associated with the NORSEE installation, integration, and operation. If the safety evaluation results in an above-minor failure condition, refer to section 2 of this policy statement.

1.5 **Human Factors Considerations.** The design of NORSEE should consider interactions and operational interfaces related to human factors. The system status (that is, operation or failure) should be conveyed to the pilot/flightcrew. In addition, the intended use of the equipment should not require exceptional skill, create unreasonable workload for the pilot, or necessitate unreasonable training. To use NORSEE safely and effectively, it is

vital for pilots to thoroughly understand its functionality, limitations, and intent to enhance, but not replace, the existing primary systems.

1.6 **Applicant Responsibilities.** An applicant (an individual or manufacturer) must submit a request for a letter of approval (LOA) to the Chicago Aircraft Certification Office (ACO) for NORSEE approval pursuant to § 21.8(d). Before submitting a request for an LOA, the applicant should discuss the design of non-required equipment with its local FAA certification office (preferably during the early stages) so the FAA and applicant can determine whether the proposed system qualifies as safety-enhancing equipment. An applicant's data submittal should contain sufficient detail and substantiating data to describe the design and demonstrate it complies with the proposed standards and requirements of this policy statement.

Depending on the type of equipment, the letter should contain the following:

1.6.1 General Information. For example, the address of the applicant's principal place of business and the manufacturing facility that controls the design and quality of the article.

1.6.2 Equipment Description. The equipment description should include the following information:

1.6.2.1 Configuration. Outline the design of the article with drawings, specifications, part numbers, aircraft model(s) (if applicable), or other relevant data that adequately establishes the configuration. If the equipment has software as part of the hardware, the software revision is approved as part of that configuration.

1.6.2.2 Functional Capabilities. Description of the equipment's functional characteristics, performance parameters, limitations, accuracy, and other pertinent information that provides an adequate overview of the equipment's functional capabilities.

1.6.2.3 Installation Instructions. The installation instructions should describe the installation in adequate detail (for example, pictorial or descriptive) such that follow-on installations result in a consistent installation that complies with the manufacturer's instructions when properly followed. The following or similar notice must be included in the installation instructions:

> Installation of the XXX system is supplemental only; it is not intended as a replacement for or modification to an existing, approved, or required system.

1.6.2.4 Instructions for Continued Maintenance and Operation. Applicants applying for a design approval are responsible for developing and providing Instructions for Continued Maintenance and Operation (ICMO), including providing documentation of recommended methods, practices,

inspections, maintenance intervals, calibration, processes, and procedures. The ICMO outlines the methods used in maintaining the equipment in proper condition and ensures continued safe operation of the equipment as it was intended.

Note: ICMOs are not the same as Instructions for Continued Airworthiness required pursuant to 14 CFR 21.50. The manufacturer is responsible for providing documentation to satisfy the ICMO requirement.

1.6.2.5 Operating Limitations. The operating limitations that are part of the ICMO must include the following or similar statements:

1. "The XXX system may not be used as a substitution for the certificated aircraft system."

2. "No operational credit may be taken for installation of XXX system."

1.6.2.6 Reporting. The design approval holder is responsible for post-issuance activities such as notifying the FAA of safety-critical service problems and expediting development of corrective actions. Applicants must report failures, malfunctions and defects pursuant to 14 CFR 21.3

1.6.2.7 Placards. A placard displaying the following or similar notice must be placed in a suitable location in the cockpit:

> Not for use as a primary XXX (instrument, visual display, etc.) for flight.

1.6.2.8 Certifying Statement: A certifying statement of compliance is required stating that the equipment XXX meets the requirements of XXX standard and this policy statement. The statement of compliance should state the following:

> I, (agent or representative name), certify that (company name) has/have complied with all applicable requirements, as identified in standard XXX, and policy statement XXX, issued on XX/XX/XXXX and that the article is produced under the required quality system.

If the submitted documents listed above are insufficient to meet the requirement, the applicant is required, when requested by the FAA, to provide additional information necessary to show compliance.

1.7 **Design Changes.** Minor design changes to a NORSEE should be accomplished in a manner that is agreed upon between the ACO and the equipment manufacturer. Changes that require reevaluation of the equipment may require a new product identifier

(such as a part number) to differentiate between the modified and the previously approved configuration.

1.8 **Data Retention Agreement.** The FAA may enter into a data retention agreement with the applicant. Data retained must be made available to the FAA when requested.

1.9 **Manufacturing Requirements.** The applicant is required to control both the design and quality of the equipment. To meet the quality control requirements, the system manufacturer must build the equipment in accordance with its approved design. The manufacturer also must control each design change to the equipment or any of its components, features, or functions to ensure that after a change or equipment modification, the change or modification will continue to meet the requirements specified in this policy statement and that the associated documents are updated accordingly. It is recommended that applicants adopt an industry standard for their quality system, such as SAE document AS9100 or ASTM document F2972, or refer to the elements identified in 14 CFR 21.137 as a guide.

> Note: Applicants who already hold production approval under 14 CFR part 21 may produce a NORSEE under their existing quality system.

1.10 **Aircraft Certification Office Responsibilities.** The applicant must state in the application letter that its system meets the design and quality control requirements of this policy statement and the standard. Upon examination of the submitted data, the ACO may accept the applicant's certifying statement and issue a production approval pursuant to § 21.8(d). Applicants who do not hold a part 21 production approval must declare that their quality system meets the requirements pursuant to paragraph 1.9. Provide a copy of the NORSEE approval letter to the geographical manufacturing inspection district office (MIDO). A MIDO audit is not required.

1.11 **NORSEE Implementation Office.** Only one ACO should be designated as the focal point for accepting NORSEE applications for the initial implementation. This procedure is recommended until other ACO engineers receive training in issuing NORSEE approval. The ACO should coordinate with its respective directorates for all NORSEE-related projects. Directorates and ACOs have the discretion to identify additional requirements to meet the intent of this policy statement.

1.12 **Safety Performance Evaluation of NORSEE.** To evaluate the effectiveness of NORSEE equipment, a safety measuring performance database should be implemented. The recommended performance database should include—

1. Number of units delivered or shipped to the field;

2. Feedback from equipment end users, such as an "in-service report;" and

3. Other measures deemed appropriate by the ACO for gathering data to evaluate NORSEE.

2 NORSEE APPROVAL WITH FAILURE CONDITIONS ABOVE MINOR.

2.1 The regulations applicable to NORSEE include 14 CFR xx.1301 and xx.1309 for parts 23, 27, 29. NORSEE can improve safety when installed in aircraft, even though it is not required for certification or the rules under which the aircraft operates (such as 14 CFR parts 91, 133, 135, 136, and 137). The premise of these rules is that systems and equipment in aircraft must be appropriately designed, manufactured, and installed so each performs its intended function and does not present an unacceptable hazard to the aircraft because of malfunction or failure.

2.2 To show compliance with the requirements pursuant to § xx.1309, it is necessary to show that the NORSEE installation will not cause unacceptable adverse effects and to verify that the aircraft is adequately protected against any hazards that could result from malfunctions or failures caused by NORSEE. If it is determined that failure or malfunction could result in a hazard to the aircraft, that hazard must be minimized through mitigating means to an acceptable level, or prevented altogether depending on the severity of the failure and its effect on the aircraft. Design features should be taken into account to prevent hazards either by ensuring the failure condition will not occur or by having redundancy or annunciation with acceptable corrective action by the associated flightcrew.

2.3 **Reference Documents.** For approval of those NORSEE installations with failure conditions above minor, use section 2 of this policy and other guidance material including, but not limited to the following:

- SAE Aerospace Recommended Practice (ARP) 4754A, *Guidelines for Development of Civil Aircraft and Systems*;
- Advisory Circular (AC) 27-1B, *Certification of Normal Category Rotorcraft*;
- AC 29-2C, *Certification of Transport Category Rotorcraft*;
- AC.23.1309-1E, *System Safety Analysis and Assessment for Part 23 Airplanes*;
- Policy Statement PS-ASW-27,29-10, *Policy Statement Concerning Non-Required Safety Enhancing Equipment (NORSEE) in Rotorcraft*; and
- RTCA Document Order (DO)-313, *Certification Guidance for Installation of Non-Essential, Non-Required Aircraft Cabin Systems and Equipment*.

Implementation

The accountable directorate can provide guidance and may identify additional requirements to meet the intent of this policy statement.

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Sample Letter of Authorization

U.S. Department
of Transportation
Federal Aviation Administration

{ACO}
{ACO address}

{Date}

{Name of applicant point of contact (POC)}
{POC's title}
{Name of company}
{Street address}
{City and zip code}

Dear *{Mr. /Mrs. /Ms. Name of applicant POC}*:

Subject: XXX System Authorization *{insert reference number}*

This is in reply to your letter of *{enter date of application}* requesting authorization for the manufacture of your XXX system. We have reviewed your submitted data package and accept your certifying statement that your system meets the requirements of FAA policy statement number XXX.

All major components of the equipment produced under this authorization must be permanently and legibly marked with the authorization holder's name, trademark, or symbol; part number; and "21.8(d)."

Major changes to the original approval must be FAA-approved.

Minor change submittal may be established through Memorandum of Agreement (MOA) with the ACO.

This authorization may not be transferred.

This authorization, issued pursuant to 14 CFR 21.8(d), is effective until surrendered, withdrawn, or otherwise terminated by the FAA.

As a design approval holder you are responsible for post-issuance activities listed below:

1. Maintaining the design data current including revisions, changes, or updates to your product.
2. Maintaining your quality control system current with the latest design changes.
3. Notifying the FAA of safety-critical service problems, and expediting development of corrective actions for unsafe conditions.

4. Please note that technical data the FAA retains may be subject to Freedom of Information Act requests. This office will notify you of any requests pertaining to your data and give you the opportunity to protect the data from public disclosure. If you have any questions regarding this authorization, contact *{enter FAA ACO contact and phone number.}*.

Sincerely,

{Name of ACO manager}
{Name of FAA ACO}
cc: AIR-112; *{insert routing symbol of responsible MIDO}*
AIR-111; Certification Procedures Branch

Definition of Terms

The terms defined in this appendix are exclusive to this policy statement and may not conform to other FAA documents. This appendix is not intended to supersede or contradict other FAA documents and should only be read within the context of this document, unless specifically noted otherwise.

Table 1-1 defines the use of key terms in this policy statement. The table describes the intended functional impact.

Table 1-1. Definition of Key Terms

	Regulatory Requirements	Acceptable Methods of Compliance (MOC)	Recommendations
Language	Must	Should	Recommend
Meaning	Refers to a regulatory requirement that is mandatory for design approval	Refers to instructions for a particular MOC	Refers to a recommended practice that is optional
Functional Impact	No Design Approval if not met	Alternative MOC has to be approved by issue paper.	None, because it is optional

Aircraft: Categories listed pursuant to 14 CFR parts 23, 27, and 29.

Adverse Effect: A response of a system that results in an undesirable operation of an aircraft system or subsystem.

Component: Any self-contained part, combination of parts, subassemblies, or units that perform a distinct function necessary to the operation of the system.

Complex: System characteristics that make the system's operation difficult to comprehend. Increased system complexity is often caused by sophisticated components and multiple interrelationships. A highly integrated system may require a structured safety evaluation (for example, a failure modes and effects analysis, or a functional hazard assessment). Further, the determination of a complex system requires engineering judgment, experience, common knowledge, and similarities to other systems that are designated complex. A thorough examination of a system's architecture, functionality, and level of integration is required to determine whether the system may be designated complex.

Continued Safe Flight and Landing: The capability for continued controlled flight and landing at a suitable airport, possibly using emergency procedures, but without requiring exceptional pilot skill or strength.

Critical Function: Function whose loss would eliminate the capability for continued controlled flight and landing at a suitable airport, possibly using emergency procedures, but without requiring exceptional pilot skill or strength.

Equipment: A part or component, or a system composed of parts and components.

Failure: A malfunction or loss of function of a system or a part.

Failure Condition: The effects on the aircraft and its occupants, both direct and consequential, caused or contributed to by the failure of a component or system.

Foreseeable Conditions: The full environment in which the equipment or system is assumed to operate, given its intended function. This includes operating in normal, non-normal, and emergency conditions.

Hazard: A real or perceived condition, event, or circumstance that a pilot encounters when faced with an abnormal event. Note: The pilot assesses the hazard based on various factors such as immediacy of action or increased pilot workload due to the hazardous condition.

Minimum Design Requirement (MDR): Minimum requirements found acceptable by the FAA that satisfy the approval of the equipment pursuant to § 21.8(d).

Minor Failure: A faulty condition, caused by equipment, that has no safety effect on the certificated aircraft (for example, structural integrity, electrical, mechanical, pneumatic, hydraulic, navigation, communication, stability and control, or performance), and is within the pilot's capability and control.

Primary System: A system required by airworthiness standards or operating rules, or one that is critical to the operation of the aircraft.

Similar: The equipment type, form, function, design, and installation have only minor differences to previously approved equipment.

Qualitative: Analytical processes that evaluate a system in a non-numerical manner using engineering evaluation and experience.

Quantitative: Analytical processes that evaluate a system in an accepted numerical methodology (mathematical).