



Federal Aviation Administration

Memorandum

Date: February 5, 2014

To: See Distribution List

From: David W. Hempe, Manager, Aircraft Engineering Division, AIR-100 *D. Hempe*
James D. Seipel, Manager, Production and Airworthiness Division, AIR-200

Subject: Approval of Non-Required Angle of Attack (AoA) Indicator Systems

Memo No.: AIR100-14-110-PM01

Regulatory Reference: Title 14 of the Code of Federal Regulations 21.8(d)

This memorandum establishes requirements and procedures for issuing a design and production approval to a United States (U.S.) manufacturer under Title 14 of the Code of Federal Regulations (14 CFR) 21.8(d) for a non-required/supplemental Angle of Attack (AoA) indicator system. This memo will expire in three years from the date of issuance, unless otherwise extended or incorporated into an order. Under this memo, all applications for AoA approval will be directed to the Chicago Aircraft Certification Office (ACO), Des Plaines, IL

Preventing loss of control in general aviation (GA) is a top focus area of the FAA and the GA community. Installation of an AoA system may aid in preventing loss of control accidents. Manufacturers have requested a streamlined method of design and production approval for non-required/supplemental systems. Since these systems provide only supplemental information to the pilot and are not required by regulation, the FAA has developed the following approval process under 14 CFR 21.8(d).

Applicability

This memo applies only to supplemental AoA system(s), not those required for type certification of the aircraft. Further, the word "system" refers to the AoA indicator and all of its associated parts and hardware allowing it to be installed and operated as an independent and stand-alone system. This memo applies only to systems installed in U.S.-registered aircraft, excluding commuter and transport category airplanes.

Procedure for Approving a Non-Required AoA Indicator System

1. Applicant Responsibilities.

a. An applicant (i.e., AoA manufacturer) submits a request for a letter of approval (LOA) to the Chicago ACO. The letter should contain:

(1) General information such as the applicant's address of the principle manufacturing facility that controls the design and quality of the article.

(2) A description of the article, including part number, and any other information that provides a general overview of the article (e.g., design, performance, operation, etc.).

(3) A statement of compliance certifying that the applicant's article meets the design requirements of ASTM F3011-13, and the applicant has met the requirements of this memo for the requested article. The statement of compliance will state: "I certify that we have complied with all applicable requirements, as identified in the memo no. AIR100-14-110-PM01, issued on 02/05/2014, and that the article is produced in accordance under the required quality system."

b. If the submitted documents are deficient, the applicant is required, when requested by the FAA, to provide information necessary to show compliance with this memo.

2. AoA Design Requirements.

a. A failure of the AoA system to perform its intended function or display erroneous indications must not adversely affect the safety of the aircraft, its occupants, or the proper functioning of equipment and systems that are required by the airworthiness standards or operating rules. At a minimum, a qualitative evaluation of the design is required to determine that neither its normal operation nor its failure will affect the safety of the aircraft or pilot workload. In most cases, a qualitative evaluation will be sufficient to satisfy the system safety assessment.

b. When isolation between the AoA and aircraft required systems is provided by complex means, more detailed evaluation methods, such as System Safety Analysis (SSA), Functional Hazard Analysis (FHA), or Failure Modes and Effects Analysis (FMEA) may be necessary.

c. The performance of the AoA system must meet ASTM F3011-13 and the following requirements:

(1) The AoA system operating instructions must clearly state the accuracy of the AoA instrument (ref: F3011-13, section 5.1.2).

(2) The AoA system calibration instructions must include a test that after calibration of the AoA system, the AoA does not provide information conflicting with the stall warning from a certified stall warning system, if the aircraft is so equipped.

(3) The AoA system must be a stand-alone unit and must not interface with a certificated system (e.g., pitot-static system, stall warning, etc.) with the exception of supplying electrical power to the AoA unit and mounting requirements for the sensor and the display unit.

(4) When properly installed and calibrated, the AoA system must not provide misleading information to the pilot (i.e., audible or visual cues that may conflict or interfere with the aircraft stall warning, if so equipped) (ref ASTM F3011-13, 5.2).

(5) Marking and placards for the AoA system display must state the following: *“Not for use as a primary instrument for flight.”*

(6) The AoA system installation instructions must require that the installation of the AoA display will not interfere with the pilot’s view of the primary flight instruments.

(7) The following statement below must be included in the installation instructions:

“This AOA system has not been determined to be suitable for installation in any specific aircraft by _____ (the AOA system manufacturer). It may be installed in a type-certificated aircraft, provided that it has been determined suitable for installation by an appropriately rated mechanic by means such as field approval or as a minor alteration.”

(8) A notice advising the installer that the AoA indicator cannot be placed in the cockpit in such a manner as to obstruct the pilot's view or cause distraction.

(9) A notice advising the installer that installation of the AoA system in a commuter or transport category airplane is prohibited.

(10) A notice advising that installation of the AoA system as a replacement for or modification to an existing approved stall warning system is prohibited.

3. Operating Limitations. The operating limitations (ref ASTM F3011-13, 4.3.3) must include the following:

a. An advisory that the AoA system is non-required and is to be used only as supplemental information to the pilot. The AoA system may not be used as a substitution for the certified aircraft stall warning system.

b. No operational credit may be taken for such items as reduced approach speed and shorter landing distances.

4. AoA Manufacturing Requirements. The applicant is required to control both the design and quality of the article. To control the quality means the AoA system manufacturer must build the article in accordance with its approved design. This also means that each design change to the article or any of its components, features or functions is controlled by the manufacturer to ensure that after a change or modification to the article it still meets the specified requirements in this memo and the associated documents are updated accordingly. Applicants who hold a production approval under 14 CFR part 21 may produce a supplemental AoA system under their

existing quality system. Applicants who do not hold a part 21 production approval must have a quality system that contains the following elements:

Design data control	Document control
Supplier control	Manufacturing process control
Inspecting and testing	Inspection, measuring, and test equipment control
Inspection and test status	Nonconforming product and article control
Corrective and preventive actions	Handling and storage
Control of quality records	Internal audits
In-service feedback	Quality escapes

5. ACO Responsibilities. Applicants must state in the application letter that their AoA system meets the design and quality control requirements of this memo. The ACO may rely on the applicant's certifying statement and issue a production approval under § 21.8(d) and provide a copy of the approval to the geographical manufacturing inspection district office (MIDO). A MIDO audit is not required. A template for the approval is provided below.

Distribution List:

- All Aircraft Certification Directorates
- All Aircraft Certification Offices
- All Manufacturing Inspection Offices
- All Manufacturing Inspection District Offices/Satellite Offices
- All Certificate Management Offices/Units
- All Flight Standards Divisions
- All Flight Standards Field Offices
- All Flight Standards International Field Offices
- All Flight Standards Regional Offices
- Designee Standardization Branch, AFS-640



U.S. Department
of Transportation

**Federal Aviation
Administration**

Sample Letter of Approval

{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: Angle of Attack System Approval *{insert reference number}*

This is in reply to your letter of *{enter date of application}* requesting approval for the manufacture of your supplemental angle of attack system. We accept your statement certifying that your system meets the requirements of FAA memorandum number AIR-100-14-110xxxx.

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

You must allow the FAA to inspect your quality system, facilities, technical data, and any manufactured articles and witness any tests, including any inspections or tests at a supplier facility, necessary to determine compliance with this approval.

You must notify the FAA before making any changes to the location of any of your manufacturing facilities, company name or ownership.

This approval may not be transferred.

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

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 approval, 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}*