



# Federal Aviation Administration

---

---

## Memorandum

Date: MAY 08 2014  
To: Manager, Chicago Aircraft Certification Office, ACE-115  
From: Manager, Small Airplane Directorate, ACE-100  
Prepared by: Pete Rouse and Scott Fohrman  
Subject: Installation of non-required angle of attack (AOA) systems.

---

---

### Summary

This memorandum provides guidance on the requirements for Aircraft Certification (ACO) approval of installation instructions associated with non-required angle of attack (AOA) systems which have been granted production approval under AIR Policy Memo AIR100-14-110-PM01. The purpose of approving installation instructions associated with AIR Policy Memo AIR100-14-110-PM01 is to provide FAA Approved data to support a simple, and consistent, approach for the installation of non-required, supplemental AOA systems. The installation determination may be influenced by the aircraft's configuration. If the AOA system installation meets the criteria in the Installation Instruction Requirements section of this memorandum, the ACO approved installation data may be used to support the AOA system installation as either a major alteration or a minor alteration. A Major Change to type design is beyond the scope of this memo. This memo does not make the installation determination, as this is the responsibility of the certificated maintenance provider. It is necessary to clarify that the ACO is authorized to approve the installation instructions, the requirements for approving these instructions and the applicability of the installation instructions once approved. This policy is necessary to define and simplify the installation requirements and promote safety enhancing equipment, a long-standing FAA goal.

### Applicability

This memo statement provides the ACO engineers with information on approving installation instructions associated with AIR Policy Memo AIR100-14-110-PM01 for non-required AOA systems on Normal, Utility, and Acrobatic Category airplanes operated under Title 14 of the Code of Federal Regulations (14 CFR) part 91 (not operating under part 91, subpart F or K).

These AOA systems have not been determined to be suitable for operational credit (reduced takeoff or landing distance requirements) or as a primary source of required stall warning information by the FAA. It does not apply to any airplane operator seeking to use an AOA system to replace required stall protection system.

## Installation Instruction Requirements

In order to be eligible for ACO approval, installation instructions must be associated with a current AOA system production approval granted under AIR Policy Memo AIR100-14-110-PM01. In addition to the requirements of AIR Policy Memo AIR100-14-110-PM01, in order to be eligible for approval under this memorandum, the installation instructions must include the following requirements:

1. The following statement must be present:  
*“These installation instructions are FAA Approved data to be utilized only for the installation of the AoA system described herein on aircraft certified under 14 CFR Part 23 (or predecessors). Provided all the requirements of section \_\_\_\_\_ of this document are met, no further FAA approval is required for the installation of this AoA system on a Part 23 Aircraft.*  
  
*If the limitations of section \_\_\_\_\_ are not met, further FAA approval may be required.*
2. The document must include a unique document number, revision level and date.
3. A requirements section containing all the limits required by AIR Policy Memo AIR100-14-110-PM01 and the following.

### Approved Installation Data Criteria:

1. The AOA system can be installed according to accepted practices and elementary operations.
2. The installation of the AOA system does not result in a change to the empty weight or empty balance which requires an increase in the maximum certificated weight or center of gravity limits of the aircraft.
3. The installation of the system is on an unpressurized aircraft:
  - a. The installation of the AOA probe is in a location that does not interfere with the pitot-static system or aircraft stall warning system, and:
    - i. On the wing:
      1. On an inspection panel, or is substituting for an inspection panel, on the underside of the wing provided that the probe is located where it does not interfere with the functioning of a primary flight control surface (aileron or spoiler).
    - ii. On the fuselage:
      1. On an inspection panel, or is substituting for an inspection panel.
      2. On an area of the fuselage that would accommodate a like installation of an antenna, and is installed in accordance with

- acceptable practices such as the aircraft maintenance manual or Advisory Circulars AC 43.13-1B and AC 43.13-2B.
- b. The installation of the AOA probe pressure tubes, wiring, etc. do not require adding additional openings within the aircraft wing or fuselage primary structure.
  - c. The installation of the AOA indicator is:
    - i. In an existing opening in the instrument panel, or on the glareshield; or
    - ii. If an additional opening in the instrument panel is required to install the AOA indicator, the following requirements must be met:
      1. The instrument panel cannot be part of the aircraft primary structure; or
      2. If the instrument panel is part of the aircraft primary structure, the aircraft manufacturer's instructions must contain provisions for providing an additional opening within the instrument panel.
    - iii. In a manner in which the AOA indicator display does not interfere with the pilot's view of the primary flight instruments.
4. The AOA system may be installed on a pressurized aircraft, provided the installation meets the following criteria:
- a. The installation of the AOA probe is in a location that does not interfere with the pitot-static system or aircraft stall warning system, and:
    - i. On the wing:
      1. On an inspection panel, or is substituting for an inspection panel, on the underside of the wing provided that the probe is located where it does not interfere with the functioning of a primary flight control surface (aileron or spoiler).
    - ii. On the fuselage:
      1. On an area of the fuselage in the unpressurized section on an inspection panel, or is substituting for an inspection panel.
      2. On an area of the fuselage in the pressurized section that would accommodate a like installation of an antenna, provided the aircraft manufacturer's instructions must contain provisions for providing a mounting location.
  - b. The installation of the AOA probe pressure tubes, wiring, etc. do not require adding additional openings within the aircraft wing or fuselage primary structure and the AOA manufacturer's installation instructions must contain provisions for providing a means to install them into the pressure vessel.
  - c. The installation of the AOA indicator is:
    - i. In an existing opening in the instrument panel, or on the glareshield; or
    - ii. If an additional opening in the instrument panel is required to install the AOA indicator, the following requirements must be met:
      1. The instrument panel cannot be part of the aircraft primary structure; or
      2. If the instrument panel is part of the aircraft primary structure, the aircraft manufacturer's instructions must contain provisions for providing an additional opening within the instrument panel.

- iii. In a manner in which the AOA indicator display does not interfere with the pilot's view of the primary flight instruments.
5. The AOA components located in the airstream do not exceed six square inches in frontal area.
6. The AOA system does not interface with the powerplant or its associated systems.
7. The system is non-required and used in an advisory or supplementary manner:
  - a. There can be no changes to any aircraft operating limitations.
  - b. There can be no changes to any aircraft operating procedures: Normal, Abnormal, and Emergency.
  - c. There can be no performance credit taken for the AOA installation, such as reduced stall speeds, reduced approach speeds, reduced takeoff or landing distances, etc.
8. Accuracy of indication of stall must coincide with the stall horn, or be conservative (indicate stall at a higher airspeed) as compared to existing stall warning devices.
9. The installation of the AOA system does not interface with the pitot-static system.
10. The AOA system cannot be used as an input source to any automation or system that controls the aircraft, such as an autopilot or stick pusher unless done by STC.
11. If the AOA system provides an aural warning, it cannot be a source of nuisance warnings.
12. The electrical load requirements of the AOA system do not exceed 80 percent of the output load limits of the generator or alternator when operating in conjunction with the aircraft's required equipment.
13. All electrical wiring is installed in accordance with acceptable practices such as the aircraft maintenance manual, Advisory Circulars AC 43.13-1B and AC 43.13-2B or ASTM standards F2639, F2696 and F2799.
14. The calibration procedure must be simple, and repeatable. Calibration procedures, if done in flight, can be safely accomplished by a pilot of average skill, and any required maneuvers are contained within the Private Pilot Practical Test Standard.
15. The operating instructions for the AOA system are provided by the manufacturer. The operating instruction should be a separate document, rather than part of the installation instructions. The operating procedures should include the following items:
  - a. Procedures for activating and deactivating the AOA system (ON/OFF).
  - b. Procedures for recommended operations.
  - c. Operational indications.
  - d. Annunciations.
  - e. AOA system failure mitigations.

NOTE: Any recommended procedures in the operating instructions should reference the applicable Pilot's Operating Handbook (POH) or Airplane Flight Manual (AFM).

16. The AOA manufacturer provides an evaluation of the effect of the AOA system installation on the airplane with regards to a major change in type design (per 14CFR 21.93), a major alteration or a minor alteration.

## **Aircraft Certification Office Evaluation**

The ACO should review the AOA manufacturer's supplied data. If the manufacturer's supplied data meets the criteria contained within this memo, the installation data may be approved by the ACO for an installer to use in either a major alteration or a minor alteration. The ACO approval of the installation data must include a statement that the installation data approval is only valid if it meets the criteria in the Installation Instruction Requirements section of this memorandum.

## **Installer Responsibilities**

The installer must make the final determination of the AOA system installation requirements (major change in type design, a major alteration, or a minor alteration). The installation determination may be influenced by the aircraft's configuration. If the installer determines that the AOA system installation meets the criteria in the Installation Instruction Requirements section of this memorandum, the ACO approved installation data may be used to support the AOA system installation as a major alteration or a minor alteration. If the AOA system installation in a particular aircraft requires additional alteration data, outside of that contained within the manufacturer's installation instructions, then the installer must make the final determination of the additional AOA system installation requirements (major change in type design, a major alteration or a minor alteration).

If you have any questions or need additional information, please contact:

Peter L. Rouse at 816-329-4135, or by email at [Peter.Rouse@faa.gov](mailto:Peter.Rouse@faa.gov)

Scott Fohrman at 847-294-7136, or by e-mail at [Scott.Fohrman@faa.gov](mailto:Scott.Fohrman@faa.gov).

Sincerely,



Earl Lawrence  
Manager, Small Airplane Directorate

**PREVIOUS VIEW**