FAA
Aviation Safety

EMERGENCY AIRWORTHINESS DIRECTIVE

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DATE: April 18, 2019
AD #: 2019-08-51

Emergency Airworthiness Directive (AD) 2019-08-51 is sent to owners and operators of Cirrus Design Corporation (Cirrus) Model SF50 airplanes.

Background

This emergency AD was prompted by Cirrus reporting three incidents on Cirrus Model SF50 airplanes of the stall warning and protection system (SWPS) or Electronic Stability & Protection (ESP) System engaging when not appropriate, with the first incident occuring in November 2018 and the latest in April 2019. The SWPS or ESP systems may engage even when sufficient airspeed and proper angle of attack (AOA) exists for normal flight. The SWPS includes the stall warning alarm, stick shaker, and stick pusher. The ESP includes under speed protection (USP). The SWPS system engaging inappropriately could potentially result in a STALL WARNING crew alert (CAS) message activation, accompanied by an audio alarm and stick shaker activation, followed possibly by either low speed ESP/USP engaging, and/or the stick pusher engaging. The pilot will also observe the dynamic and color-coded (Red) airspeed awareness ranges displaying the stall band, regardless of actual indicated airspeed.

The information below presents information on each incident.

1. While the airplane was under manual pilot control, the airplane activated several downward pitch commands coincident with stall warning, stick shaker, and several associated alerts. The pilot reported “AOA FAIL” and “STICK PUSHER FAIL CAS” messages preceding the pitch command. The pilot was able to stop the automatic pitch commands by pressing and holding the autopilot disconnect button in accordance with the emergency procedure in the airplane flight manual and safely landed at his destination.

2. The operator reported stall warning and stick pusher failure in flight.

3. The airspeed indicator went red and the stall warning and stick shaker were heard and felt while on descent. The autopilot was disengaged with the same results. The system settled with stick pusher fail, stall warning fail, and low speed awareness (LSA) fail under the airspeed. The pilot hand flew the approach and had no V_{REF} indicator but AOA appeared to be operating normally.

Cirrus and Aerosonic (manufacturer of the technical standard order AOA sensor) have identified the probable root cause as an AOA sensor malfunction due to a quality escape in the assembly of the AOA sensor at Aerosonic. Two set screws that secure the potentiometer shaft to the AOA vane shaft may have improper torqueing and no application of thread locker (Loctite) to secure the two set screws. The AOA sensor with this quality escape is labeled with part number 4677-03.

Potential erroneous AOA derived indications may occur before, during, and after unintended automatic control system engagement. These indications include an abnormal appearing low speed red band or VREF green donut presented on the airspeed tape. Failed indications or intermittent indication may result in one or more of the following:

- Unintended automatic flight control activations;
- The flight crew having difficulty controlling the airplane;
- Excessive nose-down attitude; and/or
- Possible impact with terrain.

Relevant Service Information

We reviewed Cirrus Design Corporation SF50 Service Bulletin Number: SB5X-34-03, dated April 16, 2019 (SB5X-34-03). The service information provides instructions for replacing the AOA sensor with an improved flight sensor.

FAA's Determination

We are issuing this AD because we evaluated all the relevant information and determined the unsafe condition described previously is likely to exist or develop in other products of the same type design. The noted condition presents an immediate danger to pilots and passengers of Cirrus Design Corporation Model SF50 airplanes because an uncommanded pitch down may be difficult to recover from in some flight regimes with potential fatal consequences. The before further flight compliance time and need to replace the AOA sensors due to the potential fatal consequences does not allow for prior notice and opportunity to comment for the public.

AD Requirements

This AD requires replacing the AOA sensors with improved AOA sensors using the instructions in SB5X-34-03.

Differences Between This AD and the Service Information

SB5X-34-03 specifies 5 hours time-in-service (TIS) before replacing the AOA sensors. We determined that allowing 5 hours TIS to replace the AOA sensors does not mitigate the unsafe condition; thus, this AD requires such replacement before further flight.

Authority for this Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, Section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the Agency's authority.

We are issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701, "General requirements." Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Presentation of the Actual AD

We are issuing this AD under 49 U.S.C. Section 44701 according to the authority delegated to me by the Administrator.

2019-08-51 Cirrus Design Corporation: Product Identifier 2019-CE-020-AD.

(a) Effective Date

This Emergency AD is effective upon receipt.

(b) Affected ADs

None.

(c) Applicability

This AD applies to Cirrus Design Corporation Model SF50 airplanes, all serial numbers, certificated in standard category.

(d) Subject

Joint Aircraft System Component (JASC)/Air Transport Association (ATA) of America Code 27; Flight Controls.

(e) Unsafe Condition

This AD was prompted by Cirrus reporting three incidents of the stall warning and protection system (SWPS) or Electronic Stability & Protection (ESP) System engaging when not appropriate. The SWPS and ESP may engage even when sufficient airspeed and proper angle of attack (AOA) exists for normal flight. SWPS includes the stall warning alarm, stick shaker and stick pusher. ESP includes under speed protection (USP). The SWPS and ESP engaging could potentially result in a STALL WARNING crew alert (CAS) message activation, accompanied by an audio alarm and stick shaker activation, followed possibly by either low speed ESP/USP engaging and/or the stick pusher engaging. The pilot will also observe the dynamic and color-coded (Red) airspeed awareness ranges displaying the stall band, regardless of actual indicated airspeed. These conditions, if not addressed, could result in the flight crew having difficulty controlling the airplane, lead to excessive nose-down attitude, significant altitude loss, and possible impact with terrain.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Corrective Action

(1) Before further flight after receipt of this emergency AD, replace the AOA sensor with an improved AOA sensor, Aerosonic part number 4677-03 Mod 1 or Cirrus part number 32159-004 in accordance with section 11. ACCOMPLISHMENT INSTRUCTIONS, paragraphs A, B, and C of Cirrus Design Corporation SF50 Service Bulletin Number: SB5X-34-03, dated April 16, 2019.

(2) Before further flight after replacement of the AOA sensor per paragraph (g)(1) of this AD, perform final installation checkout procedures and flight tests in accordance with a method approved by the Manager, FAA, Chicago ACO Branch. For the checkout procedures and flight test to be approved by the Manager, FAA, Chicago ACO Branch as required by this paragraph, the Manager's approval letter must specifically refer to this AD.

(3) As of the effective date of this emergency AD, do not install any AOA sensor on any affected airplane unless it is an improved AOA sensor as identified in paragraph (g)(1) of this AD.

(h) Special Flight Permit

A special flight permit is allowed with the following limitation: Operators may fly the airplane to a location where the modification/corrective action can be incorporated. However, the pilot must follow the procedures listed in section 4., Pilot Actions Required, in Cirrus SF50 Alert Service Advisory SA19-08, dated April 8, 2019.

(i) Alternative Methods of Compliance (AMOCs)

(1) The Manager, Chicago ACO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the certification office, send it to the attention of the person identified in paragraph (j)(1) of this AD.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(j) Related Information

(1) For further information about this AD, contact: Wess Rouse, Small Airplane Program Manager, 2300 East Devon Avenue, Room 107, Des Plaines, Illinois 60018; telephone: (847) 294-8113; fax: (847) 294-7834; email: wess.rouse@faa.gov.

(2) For copies of the service information referenced in this AD, contact: Cirrus Worldwide Headquarters, 4515 Taylor Circle, Duluth, Minnesota, 55811; telephone: (800) 921-2737 or after hours (800) 921-2737; fax: (218) 788-3500; email: fieldservice@cirrusaircraft.com; Internet: https://cirrusaircraft.com/service-support/. You may view this referenced service information at the FAA, Small Airplane Standards Branch, 901 Locust, Kansas City, Missouri 64106. For information on the availability of this material at the FAA, call (816) 329-4148.

Issued in Kansas City, Missouri, on April 18, 2019.

Lance T. Gant,
Director, Compliance & Airworthiness Division,
Aircraft Certification Service.