



Federal Aviation Administration

Memorandum

Date: April 20, 2009

To: Manager, Chicago Aircraft Certification Office, ACE-115C

From: Manager, Small Airplane Directorate, ACE-100

Prepared by: Roy Boffo, Senior Systems Engineer, Chicago Aircraft Certification Office,

Subject: Equivalent Level of Safety (ELOS) to § 23.1326; Cirrus
Design Corporation Model SR22

ELOS #: ACE-09-06

Regulatory Ref: 14 Code of Federal Regulations (CFR), part 23, § 23.1326

This memorandum requests that your office review and concur with the proposed Equivalent Level of Safety (ELOS) in accordance with § 21.21(b)(1), for the Pitot Heat Indication System requirements of § 23.1326(b)(1). The proposed ELOS will allow for the elimination of the continuous amber caution indication whenever the pitot heat is turned off and the Outside Air Temperature (OAT) is five degrees Centigrade (°C) or above.

BACKGROUND:

The Cirrus Design SR22 is a 3400 pound single engine, 4 place, airplane. The airplane is powered by a Teledyne Continental Motors 310 horsepower engine. The service ceiling of the airplanes is below 18,000 feet and the airplane is certified for IFR flight. The airplane has a service ceiling of 25,000 feet if it has been modified by Engine Technologies turbo-normalized Supplemental Type Certificate (STC).

Section 23.1326 was added to 14 CFR by Amendment 23-49. This section was first proposed under Notice of Proposed Rulemaking (NPRM) Notice No. 94-21 issued on 07/14/94. The proposal was adopted as final rule in Docket No 27806, issued on 01/29/96 and became effective on 03/11/96.

Part 23 airplanes certificated for flight under instrument flight rules or for flight in icing conditions are required by current § 23.1323(d) to have a heated pitot system or an equivalent means of preventing an airspeed indicating system malfunction due to ice accumulation. Section 23.1326 requires such airplanes equipped with a heated pitot tube under the requirements of § 23.1323(d) to also be equipped with a pitot tube heat indicating system.

When pitot tube heating system requirements were added to part 25, the Federal Aviation Administration (FAA) noted the occurrence of at least one accident and several incidents in which an airspeed indicating error occurred that might have been avoided, if a pitot tube heat indicating system had been installed. Part 23 airplanes operate at lower airspeeds and lower altitudes than do part 25 airplanes; therefore, their exposure to moisture and temperature conditions where icing may occur is higher than it is for transport category airplanes. Because of this environmental exposure, the FAA believes that the potential for an inoperative heated pitot tube becoming a hazard to part 23 airplanes is greater.

This requirement also responded to the National Transportation Safety Board (NTSB) recommendation A-92-85, which recommended requiring a modification to certain part 23 airplanes to provide for a pitot heat operating light similar to the light required by § 25.1326 for transport category airplanes. NTSB issued the safety recommendation, among others, as a result of special investigation and analysis of a series of fatal accidents that occurred from May 31, 1989 through March 17, 1991.

Cirrus proposes to use a pitot heat indication system which shows an amber light when the OAT is below 5°C and the pitot heat is not operating. If the OAT is above 5°C or the pitot heat is operating there is no indication.

APPLICABLE REGULATIONS:

Section 23.1326 states that:

“If a flight instrument pitot heating system is installed to meet the requirements specified in § 23.1323(d), an indication system must be provided to indicate to the flight crew when that pitot heating system is not operating. The indication system must comply with the following requirements:

- (a) The indication provided must incorporate an amber light that is in clear view of a flightcrew member.
- (b) The indication provided must be designed to alert the flight crew if either of the following conditions exist:
 - (1) The pitot heating system is switched "off."
 - (2) The pitot heating system is switched "on" and any pitot tube heating element is inoperative.”

REGULATIONS REQUIRING AN ELOS:

In considering the proposed design, the applicant has requested an ELOS for § 23.1326(b)(1), Pitot Heat Indication System, and the FAA has determined that an appropriate level of safety can be provided by the issuance of an ELOS, in accordance with the provisions of 14 CFR, part 21, § 21.21.

This ELOS is applicable to the Cirrus SR22 airplanes with Flight into Known Icing (FIKI) equipment installed. Should Cirrus Design at a later date apply for a follow-on model aircraft on the same type certificate, Cirrus may request an extension of this ELOS to the later model.

DESCRIPTION OF COMPENSATING FEATURES:

The proposed design of the SR22 Pitot Heat Indication system meets the intent of 14 CFR, part 23, § 23.1326(b)(1) by providing compensating features to the regulation as allowed by Policy Memorandum, PS-ACE100-2002-007. Therefore, an Equivalent Level of Safety Finding to 14 CFR, part 23, § 23.1326(b)(1) can be made.

The elimination of the continuous amber caution whenever the pitot heat switch is turned “off” and the OAT is above 5°C is a safety enhancement beyond what is required by § 23.1326(b)(1). The Cirrus approach follows the general intent of § 23.1326(b)(1); however, annunciation is provided to the operator only when pitot heat is necessary. A continuous amber annunciation would become an annoyance and could be overlooked by the operator over time. Providing annunciation only when OAT is below 5°C increases the likelihood that the operator will notice that he failed to activate the pitot heat system. This annunciation provides a compensating feature for better ensuring the pitot heat is activated when needed than the explicit requirement of § 23.1326(b)(1).

The initial Cirrus SR22 certification basis lists § 23.1326 as Not Applicable. As a result, there is currently no pitot heat annunciation for SR22 airplanes equipped with the Avidyne Entegra Electronic Flight Information Systems (EFIS). Cirrus has proposed a design for an SR22 equipped with Garmin EFIS that incorporates the pitot heat annunciation as described above. If strict adherence to § 23.1326(b)(1) is required, existing operators and operators that frequently fly multiple aircraft (e.g. flying club members and student pilots) could become confused by different annunciation methods based upon whether or not the aircraft is approved for FIKI operations. Further, since FIKI equipment will be optional, aircraft units produced within the same year with a Garmin EFIS would provide different annunciation for the same function. Consistency in the user interface could increase safety for these operators and reduce training complexity.

EXPLANATION OF COMPENSATING FEATURES:

On Cirrus SR22 aircraft equipped for FIKI conditions, the Pitot Heat Indication System will annunciate only when the OAT is below 5°C which provides an Equivalent Level of Safety to 14 CFR, part 23, § 23.1326(b)(1). Since the indication that the pitot heat is not “On” is displayed automatically when the OAT is below 5°C, thereby allowing the indication to be off when it is not needed, this is considered a compensating feature for better ensuring the pitot heat is activated when needed than the explicit requirement of § 23.1326(b)(1).

FAA approval and documentation of the ELOS finding:

The FAA has approved the aforementioned equivalent level of safety finding in FAA Project TD6406CH-A, Issue Paper, S-1. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Small Airplane Directorate has assigned a unique ELOS Memorandum number (see front page) to facilitate archiving and retrieval of this ELOS. This ELOS Memorandum number should be listed in the Type Certificate Data Sheet under the Certification Basis section. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings has been made for the following regulation(s):

14 CFR, part 23, § 23.1326(b)(1), Pitot Heat Indication Systems

Scott A. Horn for
 Kim Smith, Manager, Small Airplane Directorate,
 Aircraft Certification Service

4-20-09
 Date

ELOS Originated by Chicago ACO:	Charles L. Smalley, Manager(/s/ Charles L. Smalley)	Routing Symbol ACE-115C
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