



# Federal Aviation Administration

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## Memorandum

Date: JAN 16 2008

From: Manager, Airplane Certification Office, ASW-150

To: Manager, Small Airplane Directorate, ACE-100

Prepared by: Patrick Massie, Aerospace Engineer, ASW-150

Subject: Review and Concurrence, Equivalent Level of Safety (ELOS) to 14 Code of Federal Regulations (CFR), part 23, § 23.1326(b)(1), Amendment 23-49, Finding No. ACE-07-16

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This memorandum requests that your office review and provide concurrence with the proposed finding of Equivalent Level of Safety (ELOS) in accordance with § 21.21(b)(1), to the requirements of § 23.1326(b)(1) for the pitot heating system in the Quartz Mountain Aerospace (QMA) airplane Model 11E.

### **STATEMENT OF ISSUE:**

The Quartz Mountain Aerospace (QMA) Model 185-11E airplane was type certificated for only day/VFR operation in 2002. QMA has applied for an amended type certificate (ATC) that will authorize night and Instrument Flight Rules (IFR) operations with this airplane, but not to include flight into icing conditions. Section 23.1323(d), amendment 23-49 requires heated pitot tube, or an equivalent means of preventing malfunction due to icing. QMA pitot system installation includes a heated pitot tube. Section 23.1326(b)(1), amendment 23-49 requires pitot heat indication system functionality that QMA has requested an ELOS finding.

### **DISCUSSION:**

The model 185-11E is a four-place airplane, certified in normal category only. A single piston engine and a fixed-pitch propeller drive the airplane. Night and IFR operations with this airplane will require installation of pitot heat. The airplane will be prohibited against flight into known icing conditions, and the airplane will have a maximum operating altitude less than 18,000 feet. Many of these airplanes are intended to be flown by trainees and by low-time private pilots.

**FAA POSITION:**

The requirements of § 23.1326, amendment 23-49 are as follows:

“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 flight crew 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.”

Due to advancements in technology, many part 23 airplane installations now utilize equipment whose data sources are critical to the accurate and dependable operation of that equipment. The heated pitot tube is one such data source. The pitot heat indicating system will advise the pilots of any inoperative heating element in the pitot tube and that subsequent inaccuracies may result.

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. When a pitot heat system is used to show compliance to § 23.1323(d), the heated pitot tube must be equipped with a pitot tube heat indicating system. This requirement will provide greater assurance that the pilots will not be dangerously misled by faulty flight instrument indications caused by pitot tube icing.

When pitot tube heat indicating 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 over shorter distances than 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 potential for an inoperative heated pitot tube becoming a hazard to part 23 airplanes is greater.

Section 23.1326, requires a caution annunciation whenever the pitot heat is off or switched on and there is a failed heating circuit in the pitot tube heater. The second annunciation cause is fully justified in that it represents a failure condition. The first can have a positive safety effect, if it causes pilots to activate the pitot heat in all environmental conditions. This eliminates the

A caution annunciation when the pitot heat is off has two negative issues as follows:

- (1) It violates the "dark cockpit" where caution and warning lights only represent failure conditions; and
- (2) Adherence to a "dark cockpit" will cause pitot heat operation in all environmental conditions, which will shorten the life of the system.

An aircraft design that does not include a caution annunciation, when the pitot heat is "off", may be eligible for an ELOS finding that preserves a "dark cockpit" provided a placard and/or flight manual prescribes how to operate the pitot heat in a safe manner. The placard and/or flight manual should address switching pitot heat "on" in a failed condition.

**APPLICANT'S POSITION:**

Applicant requested an ELOS, and applicant agrees with the FAA position.

**RECOMMENDATION:**

The FAA concurs with the issuance of an ELOS for 14 CFR, part 23, § 23.1326(b)(1) requirements to indicate to the flight crew when the pitot heating system is switched "OFF". The ELOS will not require alerting the flight crew when pitot heating system is switched "OFF." The ELOS will require the applicant to include in the flight manual information on how to perform tests to ensure the "ON" and failure state of the pitot heating elements annunciate in accordance with the intent of the regulations.

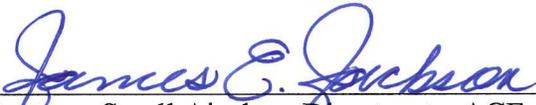
**CONCURRENCES:**

Michele M. Owsley  
 Manager, Airplane Certification Office, ASW-150

12-17-07  
 Date

*by*   
 Manager, Standards Office, ACE-110

1-10-08  
 Date

*for*   
 Manager, Small Airplane Directorate, ACE-100

1-16-08  
 Date