



# Federal Aviation Administration

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## Memorandum

Date: March 18, 2011

From: Manager, Small Airplane Directorate, ACE-100

To: Manager, Fort Worth ACO, ASW-150

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

Subject: Equivalent Level of Safety (ELOS) for Air Tractor's AT-1002/AT-1002A  
Agricultural Use and Forest and Wildlife Conservation Airplanes:  
14 Code of Federal Regulation (CFR), part 23, § 23.1326(b)(1) Pitot Heat  
Indication Systems

ELOS Memo#: ACE-11-03

Regulatory Ref: 14 CFR § 23.1326(b)(1)

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This memorandum informs the Fort Worth Aircraft Certification Office of an evaluation made by the Small Airplane Directorate on the establishment of an ELOS finding for the Air Tractor Models AT-1002 and AT-1002A.

### **Background**

Air Tractor, Inc. (ATI) has applied for a new type certificate (TC) for the models AT-1002 and AT-1002A. The AT-1002A is similar in design to the legacy model AT-802A in that the AT-1002A is a single-seat, turbine powered airplane with conventional landing gear. The AT-1002 is similar to the AT-1002A except the cockpit has seating for two crew members side-by-side. The AT-1002 and AT-1002A will be certificated in the Restricted category for the special purposes of surveying, patrolling, agricultural use, and forest and wildlife conservation with a proposed maximum gross weight of 20,000 pounds and maximum altitude of 20,000 feet.

Unlike the previous airplane models, ATI has applied for night and instrument flight rules (IFR) operation; however, their application does not include flight into known icing conditions. Air Tractor is requesting an ELOS because its current design does not show compliance to § 23.1326(b)(1) amendment 23-49.

As stated above, the purpose of the AT-1002/1002A includes agricultural use and forest and wildlife conservation. The operating environment for these purposes normally involves visual, low-level operations in warm weather and in special use airspace.

Air Tractor's purpose for adding night and IFR capability is to increase the level of safety by allowing operators to safely reposition airplanes under IFR when adverse weather conditions prevail. This ELOS will only address the AT-1002 and AT-1002A models with currently proposed fuel quantities, since its purpose and operational environment will normally involve short durations of visual, low-level operations in warm weather and in special use airspace.

The certification criteria for the AT-1002/1002A was established on September 27, 2005, and is being documented in the G-1 issue paper which includes the appropriate rules for a Restricted category airplane under 21.25, and as part of the certification criteria §23.1326(b)(1) amendment 23-49 will apply and it is the subject of ATI's request for an ELOS.

By showing compliance with § 23.1326(b)(1), and referencing AC 23-17B, "System and Equipment Guide for Certification of Part 23 Airplane and Airships" 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 or flight manual prescribes when to operate the pitot heat." In addition, policy memorandum PS-ACE100-2002-007 clarifies which airplanes are eligible for an ELOS to § 23.1326(b)(1).

The AT-1002/1002A will be prohibited from flight into known icing conditions and have a maximum operating altitude of 20,000 feet. The Small Airplane Directorate has issued policy, PS-ACE100-2002-007 that is relevant to an ELOS for the proposed design. The intent of this policy was to further clarify the phrase "may be eligible" means the design may be considered for an ELOS; however, not all design configurations are eligible.

#### **Applicable regulation(s)**

14 CFR 23.1326(b)(1)

#### **Regulation requiring an ELOS finding**

14 CFR, part 23, § 23.1326(b)(1)

#### **Description of compensating design features or alternative Methods of Compliance (MoC) which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency):**

ATI plans to use a warning light as an indicating system to meet the requirements of § 23.1326(a) and 23.1326(b)(2). In order to meet § 23.1326(b)(1), however, the warning light must be illuminated for the duration of the flight which ATI feels will be a distraction to the pilot as well as greatly shortening the life of the heating components.

ATI would like to install a placard and have AFM instructions on when to operate the pitot heat in lieu of meeting the requirements of § 23.1326(b)(1). ATI has read Advisory Circular (AC) 23-17B that addresses heated pitot tubes and warning lights. We note that the Small Airplane Directorate (SAD) is proposing rulemaking to delete § 23.1326(b)(1) and the AC states that "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 or flight manual prescribes when to operate the pitot heat."

ATI believes the AT-1002 and AT-1002A should be eligible for Equivalent Level of Safety in regard to § 23.1326(b)(1) by installing a pitot heat system with warning annunciator(s) that are activated when the system has been selected ON by the pilot and it is inoperative. Additionally, a placard will be installed above the pitot heat switch(s), which will be located in plain view of the pilot, stating that pitot heat system must be activated and operational when flying in visible moisture with an outside air temperature of 40 degrees F, or less.

A warning statement will be published in the Limitations and Normal Operations sections of the Airplane Flight Manual, requiring pitot heat system to be operational and activated before flying into visible moisture with an outside air temperature of 40 degrees F, or less.

**Explanation of how design features or alternative Methods of Compliance (MoC) provide an ELOS to the level of safety intended by the regulation:**

The ELOS will require ATI to include in the flight manual information on how to perform checks to verify the "ON" and failure state of the pitot heating elements in accordance with the intent of the regulations. ATI will install a placard and have flight manual instructions on when to operate the pitot heat to include activating the pitot heat system before flying into visible moisture with an outside air temperature of 40 degrees F, or less.

**FAA approval and documentation of the ELOS finding:**

The FAA has approved the aforementioned ELOS finding in project 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 (TC's & ATC's) or in the Limitations and Conditions Section of the STC. 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 (documented in Small Airplane Directorate ELOS Memo ACE-11-03).

*Carl Lawrence*

Manager, Small Airplane Directorate,  
Aircraft Certification Service

*4/5/2011*

Date

ELOS Originated by: Fort Worth ACO	M. Monica Merritt, Manager, Fort Worth ACO	Routing Symbol: ASW-150
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