Federal Aviation

Administration

Memorandum

Date:	May 16, 2011
To:	Manager, Chicago Aircraft Certification Office, ACE-115C
From:	Manager, Transport Airplane Directorate, ANM-100
Prepared by:	William J. Jaconetti, ACE-117C
Subject:	INFORMATION: Equivalent Level of Safety (ELOS) Finding for Airborne Maintenance and Engineering Services project on Boeing aircraft model DC-9-15, FAA Project # ST7406CH-T
ELOS Memo#:	ST7406CH-T-S-1
Regulatory Ref:	§ 25.773(a)(2)

This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety finding for Boeing aircraft model DC-9-15.

Background

Airborne Maintenance and Engineering Services (AMES) of Wilmington, OH, is requesting a new "one-only" STC which installs a Universal EFI-890R Electronic Flight Instrument System (EFIS) along with a corresponding Flight Management System (FMS), Radio Control Unit (RCU) and Electronic Standby Instrument System (ESIS) on the flight deck of a Boeing aircraft model DC-9-15 (MSN: 45797). AMES has applied for an equivalent level of safety finding to 14 CFR 25.773(a)(2) by requesting to conduct ground tests in-lieu of a night flight evaluation to determine the presence of any glare or reflection. Day flight test will be performed as required by 14 CFR 25.773(a)(2).

Flight deck glare can be introduced by a variety of internal and external environmental conditions. The level of safety intended by the regulation 14 CFR 25.773 was to ensure no flight deck glare or reflections were introduced which could interfere with normal duties of the minimum flight crew as established under 14 CFR 25.1523. This regulation applies to any installed equipment which might obstruct the pilots' view or produce glare and reflection within the flight deck. Examples of external conditions include sunlight reflecting from flight deck displays, instruments, or even the flight crew's clothing. Night sources may include airfield and other cultural lighting in addition to actual flight deck displays and installed equipment.

The EFIS, FMS & RCU displays manufactured by Universal Avionics Inc, as well as the ESIS manufactured by L-3 Communications will be installed in the flight deck of the Boeing DC-9-15 airplane and the installation will be accomplished at the AMES maintenance facility at the Wilmington Air Park in Wilmington, Ohio.

The requirements for pilot compartment view are addressed in 14 CFR 25.773. Additionally, guidance regarding installation of electronic flight deck displays may be found in AC 25-11A.

14 CFR 25.773(a)(2) requires that the applicant show that the pilot compartment is free from glare or reflection that could interfere with normal flight crew duties in day and night flight tests under non-precipitation conditions.

AMES intends to use a ground test (instead of flight test) to show that the pilot compartment is free from interfering glare or reflection in night non-precipitation conditions. This does not meet the requirements of 14 CFR 25.773(a)(2). Therefore, in accordance with the provisions of § 21.21(b)(1), AMES has made a request for an equivalent level of safety to the requirements of § 25.773(a)(2) Amdt Original. This equivalent level of safety request is for performing a night ground test in lieu of night flight test on the Boeing DC-9-15 aircraft equipped with the aforementioned EFIS, FMS, RCU and ESIS installed in the flight deck. A day flight test will be performed per the requirements of § 25.773(a)(2) Amdt Original

Applicable regulation(s)
§§ 25.773 (a)(2), CAR 04b § 04b.601, 25.1309, and 25.1523

Regulation(s) requiring an ELOS finding
§ 25.773(a)(2) Pilot Compartment View

Description of compensating design features or alternative standards which allow the granting of the ELOS (including design changes, limitations or equipment need for equivalency)

With regard to Pilot Compartment View, AMES intends to demonstrate direct compliance with §§ 25.773 (a)(2), CAR 04b § 04b.601, 25.1309, and 25.1523.

The following sections detail test requirements for an equivalent level of safety by conducting ground tests in-lieu of a night flight evaluation to determine the presence of any glare or reflection.

AMES has provided ground flight deck evaluation procedures to check that each pilot compartment be free of glare and reflection that could interfere with the normal duties of the flight crew in order to show compliance to 14CFR, 25.773(a)(2) Pilot Compartment View. The following compensating factors provide an equivalent level of safety:

- AMES has proposed a test configuration and procedure to replicate the conditions to produce glare and reflection levels equivalent to actual night test flight conditions An outline of the Cockpit Lighting Test procedure providing a detailed description of test procedures, specifically means used to darken exterior ambient lighting and provide low light levels equivalent to night conditions, was provided for FAA review.

- The Cockpit Lighting Test procedure addresses accomplishing the test from the Captain's and First Officer's positions and the evaluation of determining unacceptable glare will be performed by an appropriately rated DER, FAA Test Pilot or FAA Engineer as part of installations in support of STC project ST7406CH-T.

- The Cockpit Lighting Test procedure addresses the requirements for flight deck instrument lighting for displays, control panels and Captain's and First Officer's seating position.

- The Cockpit Lighting Test will be accomplished by an appropriately rated DER, FAA Test Pilot or FAA Engineer and any significant glare or reflection noted during the proposed ground test. It is understood that any significant glare or reflection noted might require further evaluation during an actual night flight test as required by regulation to determine interference with normal duties of the flight crew.

- A day flight test with the EFIS, FMS, RCU and ESIS installed in the flight deck will be performed as a part of this project to complete the showing of compliance to 14 CFR 25.773(a)(2).

Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

The FAA has found that the AMES planned testing complies with the applicable requirements for pilot compartment view or provides an equivalent level of safety in demonstrating the absence of pilot compartment glare or reflection. Specifically, AMES has addressed the following items in a manner acceptable to the FAA:

- We have determined that the proposed test configuration and procedure adequately replicates the glare and reflections that would be seen in an actual night test flight.
- We have determined that the proposed static ground test will allow a thorough means for identification of glare and reflections from the new displays.
- Any significant glare or reflections caused by the new displays that are identified during the ground test will be further evaluated in a night flight test, to determine if the glare or reflections are acceptable, in accordance with 25.773(a(2).

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned equivalent level of safety 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 Transport 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 Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below.

An Equivalent Level of Safety Finding has been made for the following regulation(s):
§ 25.773(a)(2), EFB installation (documented in TAD ELOS Memo ST7406CH-T-S-1)

Original signed by:
S. Boyd — 6/2/11

Manager, Transport Airplane Directorate, Aircraft Certification Service — Date

ELOS Originated by:	ACO Manager:	Routing Symbol
Chicago ACO	Charles L. Smalley	ACE-115C