



Federal Aviation Administration

Memorandum

Date: December 6, 2010

To: Manager, Seattle Aircraft Certification Office, ANM-100S

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Susan Letcher

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for the Boeing and Aviation Partners Boeing Winglet-Equipped Model 737-800 Airplanes for Position Light Overlapping Intensities (FAA Project Numbers TD5046SE-T and SA4726SE-T)

ELOS Memo #: TD5046SE-T-SE-2

Reg. Ref.: §§ 21.16, 25.1389(b)(3), and 25.1395

The purpose of this memorandum is to inform the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate on the establishment of an equivalent level of safety (ELOS) finding for Boeing Model 737-800 airplanes equipped with winglets incorporated in production and incorporated via an Aviation Partners Boeing Supplemental Type Certificate (STC).

Background

Boeing and Aviation Partners Boeing have submitted a joint request for an ELOS finding to Title 14, Code of Federal Regulations (14 CFR) 25.1389(b)(3) and 25.1395 for Model 737-800 airplanes modified to install winglets in production and via STC, respectively, on which position light overlapping intensities exceed the maximums allowable per §§ 25.1389(b)(3) and 25.1395.

The winglet-equipped 737-800 position light system consists of red and green lights mounted on the left and right wing tips, respectively, and aft-facing white lights mounted on each winglet trailing edge. Position light overlap areas are those areas where the area of coverage of one position light overlaps the area of coverage of another position light. Sections 25.1389(b)(3) and 25.1395 specify maximum allowable position light overlapping intensities depending on viewing angle. The intent of §§ 25.1389(b)(3) and 25.1395 is to limit the angle and intensity of overlapping signals to ensure that an observer in another aircraft can visually

detect the orientation and direction of travel of the observed airplane. The winglet-equipped 737-800 position light overlapping intensities exceed the maximum allowable overlapping intensities in the following areas:

- The red position light exceeds the maximum allowable overlapping intensity in the green position light area of coverage.
- The green position light exceeds the maximum allowable overlapping intensity in the red position light area of coverage.
- The white position light exceeds the maximum allowable overlapping intensity in the red and green position light areas of coverage.

Applicable regulation(s)

§§ 25.1389(b)(3) and 25.1395

Regulation(s) requiring an ELOS finding

§§ 25.1389(b)(3) and 25.1395

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

The FAA considered the winglet-equipped 737-800 position light system design and the specific overlap conditions, and determined that the compensating design features and specific overlap conditions allow granting of an ELOS for §§ 25.1389(b)(3) and 25.1395 provided both lamps in the red position light are operable, based on the following:

- The design of the airplane is such that the high main beam intensity levels and the physical separation between the position light assemblies will maintain signal clarity.
- In all cases, the exceeding intensities in the overlap areas are small or they are only observable at extreme viewing angles that are small or narrow.
- A trained observer could not visually discriminate between the position light system producing the overlapping intensities described above, and one without the exceeding overlapping intensities. The difference can be discriminated only with sensitive precision instruments.
- Each position light is equipped with lamps that provide intensities that are substantially greater than the minimum intensities required by §§ 25.1391 and 25.1393.

As such, the FAA granted an ELOS for §§ 25.1389(b)(3) and 25.1395 to allow position light overlapping intensities in excess of the maximum allowable overlapping intensities identified

in §§ 25.1389(b)(3) and 25.1395 for winglet-equipped 737-800 airplanes, provided a limitation is placed in the Boeing Airplane Flight Manual (AFM) or in the Aviation Partners Boeing Airplane Flight Manual Supplement (AFMS), whichever is applicable to the specific airplane, which prohibits dispatch of the airplane with either of the two lamps in the red position light inoperative.

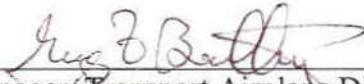
Explanation of how design features or alternative standards provide an equivalent level of safety to the level of safety intended by the regulation

The high main beam intensity of the position lights, their physical separation on the airplane, the relatively small exceeding overlapping intensities, and the size/location of the viewing angles at which the exceeding overlapping intensities occur minimize the potential for confusion by an observer in another aircraft regarding the orientation and direction of travel of the winglet-equipped 737-800, provided a limitation is placed in the Boeing AFM or in the Aviation Partners Boeing AFMS, whichever is applicable to the specific airplane, which prohibits dispatch of the airplane with either of the two lamps in the red position light inoperative.

FAA approval and documentation of the ELOS finding

The FAA has approved the aforementioned ELOS finding in project issue paper SE-2. 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 Type Certificate Data Sheet under the Certification Basis section (TC's & ATC's) and in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below.

Equivalent Level of Safety Findings have been made for the following regulation(s):
§§ 25.1389(b)(3) and 25.1395 (documented in TAD ELOS Memo TD5046SE-T-SE-2).

 FOR STEVE BOYD

Manager, Transport Airplane Directorate,
Aircraft Certification Service

12/7/10

Date

ELOS Originated by Seattle ACO:	Project Engineer Susan Letcher	Routing Symbol ANM-130S
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