



# Federal Aviation Administration

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## Memorandum

Date: June 29, 2010

To: Manager, Seattle ACO, ANM-100S

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Shannon Lennon, ANM-150S

Subject: INFORMATION: Equivalent Level of Safety (ELOS) Finding for Graphical Exit Signs on a Model 787, Boeing Commercial Airplanes Delegated Compliance Organization (BDCO) Project # PS07-0585

ELOS Memo#: PS07-0585-CS-10

Regulatory Ref: 14 CFR 25.811, 25.812

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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 (ELOS) finding for the Model 787.

### Background

The Boeing Company proposed installation of graphical exit signs currently permitted by the Certification Specifications of the European Aviation Safety Agency (EASA) instead of the conventional red text-based exit signs required by the existing Federal Aviation Administration (FAA) regulations on Model 787 series aircraft. The FAA has not previously accepted the use of graphical, in lieu of textual, exit signs.

In March 2003, the Joint Aviation Authorities (JAA) of Europe adopted Notice of Proposed Amendment (NPA) 25D-327 allowing the use of graphical exit signs as an alternative to language based signs. The graphical signs, accepted as a means of complying with the revised JAA regulations, were derived from international standards for graphical symbols and subsequently evaluated in a comprehension study performed by Cranfield University. The Cranfield University study results, published in April 1997, were used by the JAA to conclude that some of the graphical signs evaluated were sufficiently understood by members of the traveling public to be put into use. The level of comprehension of the graphical signs as compared to the language based signs varied and was dependent on the type of sign. The graphical signs accepted by the JAA consist of exit locator signs, exit identifiers, exit marking signs, and bulkhead/divider exit signs incorporating symbols (a white figure running to a white

rectangle) within a green background. These requirements were transferred into the Certification Specifications of EASA, which is the successor agency to the JAA under the European Union.

The FAA existing regulations for textual exit signs read as follows:

- Title 14, Code of Federal Regulations (14 CFR) 25.811(d) states, “The location of each passenger emergency exit must be indicated by a sign visible to occupants approaching along the main passenger main aisle (or aisles).”
- Section 25.811(g) states, “Each sign required by paragraph (d) of this section may use the word exit in its legend in place of the term emergency exit.”
- Section 25.812(b)(i) states, “Each passenger emergency exit locator sign required by section 25.811(d)(1) and each passenger emergency exit marking sign required by section 25.811(d)(2) must have red letters at least 1 ½ inches high on an illuminated white background, and must have an area of at least 21 square inches excluding the letters.
- Section 25.812(b)(ii) states, “Each passenger emergency exit sign required by section 25.811(d)(3) must have red letters at least 1 ½ inches high on a white background having an area of at least 21 square inches excluding the letters.”

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

Sections 25.811, 25.812

#### **Regulation(s) requiring an ELOS finding**

Sections 25.811(d), 25.811(g), 25.812(b)(1)(i) and 25.812(b)(1)(ii)

#### **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)**

In conjunction with the actions listed below, graphical exit signs are found to be equivalent to the text signs required by the existing FAA regulations based on the following compensating feature:

- The use of graphical exit signs can increase safety by providing an exit symbol that will be understood by all aircraft passengers, regardless of their native language.

Accomplishing the following actions will establish an overall comprehension of the graphical exit signs by the flying public:

- Incorporation of an FAA-accepted special emphasis briefing to be included in the aircraft flight manual along with the requirement that the briefing be given to the passengers prior to each flight and prior to each landing.
- Development of an FAA-accepted implementation plan that will ensure incorporation of appropriate graphical exit sign information in standard passenger information cards (such

as those required by section 121.571(b)) at each passenger seat place that can be occupied for taxi, takeoff and landing. The specific exit sign artwork, placards and graphics identified in this plan must also be incorporated as part of the airplane type design.

- The graphical exit signs must be evaluated on the aircraft to ensure that there are no visual cues in the vicinity of the signs (e.g., symbolic signs or placards such as lavatory occupied signs) that could inadvertently mislead passengers from the exits. Illumination of the symbolic signs must also provide equivalent visibility to the illumination levels specified for the text based signs.

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

Since not all passengers are English speaking, and may not understand the word "Exit," the use of graphical exit signs can increase safety by providing a common exit symbol that does not require knowledge of the English language. However, the comprehension of the graphical signs requires reinforcement in order to provide an equivalent level of safety. Research has shown that exposure to such symbols significantly increases comprehension, and exposure in context is a very effective means to accomplish this. Specifically, the FAA determined that special emphasis briefings must be utilized to explain the graphical signs to passengers, as discussed above. The FAA also determined that special emphasis briefings must include passenger review of an information card containing the text meaning of the signs.

The FAA considers the above compensating feature for graphical exit signs to establish the means by which an equivalent level of safety may be shown for the requirements of sections 25.811(d), 25.811(g), 25.812(b)(1)(i) and 25.812(b)(1)(ii).

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

The FAA has approved the aforementioned equivalent level of safety finding in project issue paper CS-10. This memorandum provides standardized documentation of the ELOS finding that is non-proprietary and can be made available to the public. The Transport 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 have been made for the following regulations:

14 CFR 25.811, Emergency Exit Marking and 14 CFR 25.812, Emergency Lighting  
(documented in ELOS Memo PS07-0585-CS-10)

*for Franklin Jangsey*  
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Manager, Transport Airplane Directorate,  
Aircraft Certification Service

*6/30/10*  
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Date

ELOS Originated by Seattle ACO:	Shannon Lennon	ANM-150S
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