



# Federal Aviation Administration

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## Memorandum

Date: May 9, 2013

To: Manager, Boeing Aviation Safety Oversight Office, ANM-100B

From: Manager, Transport Airplane Directorate, ANM-100

Prepared by: Thomas Thorson, ANM-100B

Subject: INFORMATION: : Equivalent Level of Safety Finding for the Engine and API Fire Handle Design on Boeing Model 787 Series, FAA Project Number PS06-0496

ELOS Memo #: PS06-0496-F-18

Regulatory Ref: §§ 21.21(b)(1) and 25.1555(d)(1)

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This memorandum informs the certificate management aircraft certification office of an evaluation made by the Transport Airplane Directorate (TAD) on the establishment of an equivalent level of safety (ELOS) finding for the Boeing Model 787.

### **Background**

Following type certification of the Boeing Model 787-8, compliance of the engine and auxiliary power unit (APU) fire handle design with Title 14, Code of Federal Regulations (14 CFR) 25.1555(d)(1) was brought into question. This regulation requires cockpit emergency controls to be colored red. The engine and APU fire handles are considered emergency controls and are black in color rather than the prescriptive red as required by the regulation.

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

§ 25.1555(d)(1)

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

§ 25.1555(d)(1)

**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 engine and APU fire handles indicate red during fire conditions. The conditionally red control indications serve to decrease cockpit visual noise within the flight deck during normal operations while providing control distinction when required. Illumination of an engine fire control switch gives clear and prompt indication that an engine fire has been detected in the respective engine or APU compartment. The fire switches will display red only under fire conditions. This coincides with the quiet, dark flight deck philosophy and is an improvement to fire indication. The red color coding allows users to quickly identify these controls.

The fire handles have a mechanical lock to prevent inadvertent operation. The locking feature is automatically unlocked in response to engine and APU fire indications, or requires a separate and distinct crew action to unlock when the handle is required for use in procedures other than in response to annunciated fire warnings. The mechanical lock will prevent inadvertent crew action.

Additionally, crew checklists contain requirements to "confirm" which engine fire handle should be pulled for any emergency for which there is a necessity to insure that the correct fire handle is pulled. Flight crews are trained to identify and operate the fire handles during initial and recurrent type rating for the Boeing Model 787. Also, the fire handles are distinctive and unique flight deck controls with respect to their shape, method of operation, and location.

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

Under an annunciated fire condition in an engine or APU compartment, the fire handles are brightly illuminated in a red color. The illumination is sufficient for crew identification and crew alerting in all lighting conditions. The illumination of the fire handles is not required by 14 CFR part 25 regulations and is considered a compensating design feature to support a finding that the fire handle design provides an equivalent level of safety to that intended by § 25.1555(d)(1) under annunciated fire conditions. Illumination of the fire handle following a detected engine or APU fire provides prompt and accurate annunciation to the flight crew, and thus provides an equivalent level of safety to a fire handle that was colored red as required by the rule.

The fire handles have a mechanical lock to prevent inadvertent operation. Because one of the considerations in requiring emergency controls to be red under § 25.1555(d)(1) is to assist in preventing accidental selection or improper operation by flight crews, the FAA considers this locking feature to be a compensating feature in support of the equivalent level of safety. The locking feature is automatically unlocked in response to engine and APU fire indications, or requires a separate and distinct crew action to unlock when the handle is required for use in procedures other than in response to annunciated fire warnings. The mechanical lock will prevent inadvertent crew action and thus the design feature provides an equivalent level of safety in this regard.

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

The FAA has approved the aforementioned Equivalent Level of Safety Finding in project issue paper F-18. This memorandum provides standardized documentation of the ELOS 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) or in the Limitations and Conditions Section of the STC Certificate. An example of an appropriate statement is provided below.

Equivalent Safety Findings have been made for the following regulation(s):  
14 CFR 25.1555(d)(1) (documented in TAD ELOS Memo PS06-0496-F-18).

*Paul Siegmund*

5-9-13

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Manager, Transport Airplane Directorate,  
Aircraft Certification Service

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Date

ELOS Originated by Boeing Aviations Safety Oversight Office	Thomas Thorson	ANM-100B
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