Proposed Equivalent Safety Finding on JAR/FAR 25.1555(d)(1) at Ch 10 / Amdt 1 through 37 – "Engine and APU fire switch handle design"

Applicable to Boeing 747/757/767/777

Introductory Note:

The hereby presented Equivalent Safety Finding has been classified as an important Equivalent Safety Finding and as such shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.*"

Statement of Issue:

On Boeing models 747, 757, 767, 777 airplanes, the engine and APU fire switch handles are black but indicate red during detected fire conditions or when the FIRE/OVHT test switch is pushed. The engine and APU fire switch handle design in the referenced Boeing models do not meet the requirments of JAR/FAR 25.1555(d)(1) which requires emergency controls to be coloured red.

The full compliance to JAR/FAR 25.1555(d)(1) was questioned during the post type certification validation activity with a foreign civil aviation authority on the Boeing 787 program. In addition to the Issue Paper (IP) F-18 applicable on the Boeing 787 program, the FAA raised then the IP F-4 on the Boeing models 747, 757, 767, 777 to formally document the the compliance acceptability of the engine and APU fire switch design. Similarly, in addition to the Certification Review Item (CRI) G-04 applicable for the Boeing 787 program, the EASA has raised the CRI G-GEN2 to administratively cover the extension to the remaining Boeing models. The original condition recorded in CRI G-04 was not subject to public consultation.

The conditionally illuminated 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 or APU fire control switch gives clear and prompt indication that a fire has been detected in the respective engine or APU compartment. The fire switch handles will display red only under detected fire conditions. This coincides with the Boeing quiet, dark flight deck philosophy and is an improvement to fire indication. The illuminated red colour coding under all lighting conditions of the fire switch handle following a detected engine or APU fire provides prompt and accurate annunciation to the flight crew allowing users to quickly identify these controls.

The fire switch 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 switch handle should be pulled for any emergency for which there is a necessity to insure that the correct fire switch handle is pulled. Flight crews are trained to identify and operate the fire switch handles during initial and recurrent type rating. The fire switch handles are distinctive and unique flight deck controls and common to Boeing models including the 747, 757, 767, and 777 with respect to their shape and method of operation. Except for the 747, placement and location of the handles are common across all Boeing models and are adjacent to fuel cut-off handles.

Considerable service experience of the Boeing commercial fleet having the same design of fire switch handle has shown no adverse history of incidents or accidents related to this design.

Equivalent Safety Finding G-GEN2 on JAR/FAR 25.1555(d)(1) at Ch 10 / Amdt 1 through 37

– Applicable to Boeing 747/757/767/777 –

Applicant Safety Equivalency Demonstration:

The compensating factors/features that provide an ESF for the regulations not complied with are as follows:

- Conditional illumination

  Under an annunciated fire condition in an engine or APU compartment, the fire switch handles are brightly illuminated in a red colour. The illumination is sufficient for crew identification and crew alerting in all lighting conditions. The illumination of the fire switch handles is not required by CS/FAR25 specifications and is considered as a compensating design feature to support a finding that the fire switch handle design provides an equivalent level of safety to that intended by CS/FAR 25.1555(d)(1) under annunciated fire conditions. Illumination of the fire switch 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 compared to a red coloured fire switch handle as required by the rule.

- Mechanical lock

  The fire switch handles have a mechanical lock to prevent inadvertent operation. Because one of the considerations in requiring emergency controls to be red coloured under CS/FAR 25.1555(d)(1) is to assist in preventing accidental selection or improper operation by flight crews, this locking feature is considered 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.