



U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: CIRCUIT PROTECTIVE DEVICE
ACCESSIBILITY

Date: 9/20/88
Initiated by:

AC No: 25.1357-1
Change:

ANM-110

1. PURPOSE. This advisory circular (AC) describes acceptable means of compliance with the requirements of § 25.1357(d) and (f) of the Federal Aviation Regulations (FAR) with respect to the accessibility of circuit protective devices (CPD), such as circuit breakers or fuses. These means are not mandatory. An applicant may elect to use any other means found to be acceptable by the FAA for compliance with the FAR.

2. RELATED FAR SECTIONS. 25.1307(c), 25.1351, and 25.1357(a).

3. DEFINITIONS. These definitions apply only to the requirements of § 25.1357(d) and (f) and to the guidance provided in this AC. They should not be assumed to apply to the same or similar terms used in other regulations or ACs.

a. Accessible. For the purpose of compliance with § 25.1357(d) and (f), an accessible CPD is one which can readily be reset or replaced by a flight crewmember without leaving his seat. However, extension of the accessible area to include other flight compartment locations is considered acceptable if necessitated by space limitations, provided that experienced engineering and operational judgment is applied to ensure that those CPDs that are more essential to safety in flight are located so that they can readily be reset or replaced by a flight crewmember without leaving his seat. An inaccessible, remotely-controllable CPD is considered to be accessible if its control device is accessible.

b. Essential to safety in flight. For the purpose of compliance with § 25.1357(d), a CPD is considered to be essential to safety in flight if its disconnection would result in a major, severe major, or catastrophic failure condition as defined in Paragraph 6h of AC 25.1309-1A dated 6-21-88, "System Design and Analysis."

4. ACCEPTABLE MEANS OF COMPLIANCE WITH § 25.1357(d). This section states that a CPD must be accessible if the ability to reset or replace it is essential to safety in flight. This means of compliance applies to airplanes with a type certification basis that includes Amendment 25-23 (effective 5-8-70) of Part 25 of the FAR, or later amendment, for the following sections of Part 25: 25.671, 25.672, 25.901, 25.903, 25.1309(a) through (d), 25.1333, and 25.1435. The reason for this applicability limitation is that compliance with the applicable requirements of these sections ensures that single failures and combinations of failures, which include automatic CPD disconnections, are considered in defining a safe

design, and that continued conduction through any single CPD, including those used to protect buses or power sources, is not essential to safety in flight.

a. Service experience shows that attempts by the flightcrew to restore power by resetting or replacing a CPD after its automatic disconnection can sometimes create a fire hazard and will often be unsuccessful because the majority of such disconnections are caused by faults that must be corrected by maintenance action. Therefore, designs should not require resetting or replacing CPDs in flight to cope with any failure condition, except as part of an approved fault clearing and isolation procedure.

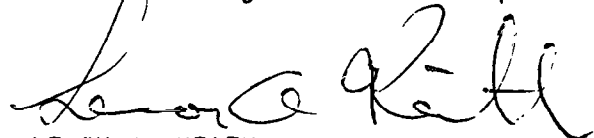
b. Service experience also shows that attempts by the flightcrew to clear and isolate faults at the individual load level can sometimes create a fire hazard, especially if the flightcrew is unable to confidently determine the faulty circuit or component and the limits of the fault's effects. Few circuits or components are located where such confident determinations can be made. Therefore, designs should allow the safe accomplishment of all necessary fault clearing and isolation procedures at the bus or power source level by ensuring that the disconnection of any bus or power source in accordance with any such procedure does not cause any loss of function that would result in a major, severe major, or catastrophic failure condition.

c. All fault clearing and isolation procedures should be approved.

d. Compliance with the applicable requirements of the sections of Part 25 cited in this paragraph is shown by analysis and appropriate tests. For new airplanes, such analysis and tests should show compliance regardless of whether CPDs are accessible. Automatic CPD disconnections, including disconnections of CPDs used to protect buses or power sources, should be considered in the same way that other failures are considered. This guidance should also be applied to modifications to previously-certificated airplanes if new inaccessible CPDs are used or if existing accessible CPDs are moved to new inaccessible locations.

5. ACCEPTABLE MEANS OF COMPLIANCE WITH § 25.1357(f). If fuses are used, this section requires a number of spare fuses for use in flight equal to at least 50 percent of the number of fuses of each rating required for complete circuit protection. This section applies only to accessible fuses.

6. FAA-APPROVED AIRPLANE FLIGHT MANUAL. Airplane Flight Manuals (AFM), or if appropriate, AFM revisions or supplements, should include all approved fault clearing and isolation procedures.



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