

AIRCRAFT CIRCUIT BREAKER AND FUSE ARRANGEMENT

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1. PURPOSE - The purpose of this standard is to set forth the desired location, arrangement and general requirements of aircraft circuit breakers and fuses.
2. SCOPE - The recommendations of this standard apply to all civil type multi-engine transport aircraft.
3. DEFINITION - The definitions used herein are made as brief as possible and in familiar cockpit language. They are intended only to identify the devices mentioned rather than to prescribe their application.
 - 3.1 Circuit Breakers - A circuit breaker is a resettable circuit-protective device. Circuit breakers can be divided by function into two classes:
 - 3.1.1 Control Circuit Breakers - A control circuit breaker is one whose function is to protect the wiring used to operate control devices, such as relays.
 - 3.1.2 Power Circuit Breakers - A power circuit breaker, as distinguished from a control circuit breaker, is one whose function is to protect the wiring carrying the power to using equipment.
 - 3.2 Fuses - A fuse is a replaceable circuit protecting device depending on the melting of a conductor for circuit interruption.
 - 3.3 Limiters - The term "limiter" is applied to certain types of fuses having higher melting points and longer inverse-time characteristics than the more common types of fuses.
4. LOCATION
 - 4.1 Circuit breakers and fuses in electric systems essential to flight, navigation, communication, emergency systems, and in those circuits that require load monitoring, shall be so selected, located, and installed that open circuit breakers and open fuses will be readily discernible to a crew member. Supplemental indicating devices may be used. Accessibility for opening and resetting of circuit breakers and fuse replacement shall be possible from crew operating position.
 - 4.2 Circuit breakers and fuses of systems not essential in the operation of the aircraft may be located anywhere in the habitable portion of the aircraft provided that they can be readily inspected for open condition and are accessible for resetting or replacement in flight. Protective covers and placards discouraging unnecessary opening and closings of the circuits are desirable (examples: passenger reading lights, beverage heating, electric-shaver inverter). (Circuit breakers and fuses in systems not usable while the airplane is in self-powered operation need not comply.)

(NOTE: "A" Revision is addition of Figure 1.)

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- 4.3 If remote circuit breakers are used as power circuit breakers to minimize runs of large wire and extended bus distribution systems, such circuit breakers shall include a reset control and indicating device located to conform to the requirements specified in paragraph 4.1 or 4.2, as applicable. Reset controls may be electrically operated, except in the case where tripping of the circuit breaker might leave the reset control without current supply (example: generator circuit breakers).
- 4.4 Limiters may be remotely located, provided that the limiter can be checked by noting the functioning of some usually operating device or equipment. In the event that only non-operating standby equipment (such as a spare inverter) is supplied through the limiter, a failure-indicating device shall be located to conform to the requirements specified in paragraph 4.1.

5. ORIENTATION

- 5.1 Circuit breakers and fuses located in Zone A, as defined in ARP 268 (in reach of crew members while they are seated), shall be oriented from left to right, relative to the crew member when facing the controls, as numbers 1, 2, 3, 4 ... (Ref. ARP 268)
- 5.2 Circuit breakers and fuses located outside Zone A shall be oriented 1, 2, 3, 4 ... from port to starboard. (Ref. ARP 268)
6. ACTUATION - Actuation of circuit breakers of the switch type shall be in conformity with the provisions in the latest issue of ARP 268, for actuation of controls ("forward", "upward", and "clockwise" designate "on"; "aft", "downward", and "counterclockwise" designate "off").

Actuation of circuit breaker of the "push-pull" type shall be "push-for-on" and "pull-for-off".

7. ARRANGEMENT

- 7.1 An area, consisting of one or more panels, shall be provided for location of circuit breakers and fuses in compliance with Section 4.
- 7.2 Area Allocation - The area designated for circuit breakers and fuses shall be divided into a-c and d-c areas, where applicable. It shall be further subdivided into nacelle and system areas or, alternatively, into bus groupings in installations where nacelle or system items are dispersed among several busses. All areas so divided shall be clearly marked and shall have contrasting painted borders to indicate their boundaries. It is desirable that each area have space provision for at least one additional circuit breaker for each five breakers installed (for an example, see Figure 1).
- 7.3 Within the area locations (paragraph 7.2), emergency and high priority circuit breakers and fuses shall be placed in the most conspicuous and accessible positions.

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8. GENERAL

- 8.1 Suitable lighting shall be provided for circuit breaker and fuse panels.
- 8.2 Marking - All marking, including abbreviations, used on the electrical devices described herein shall be in conformance with the latest issue of AS 425, Flight Control Compartment Nomenclature and Abbreviations.
- 8.3 Identifying placards shall be affixed below each circuit breaker or fuse. Groups of related circuit breakers or fuses shall be further identified by placard.
- 8.4 In the event a circuit breaker or fuse is used for multiple circuits, a placard near the breaker or fuse and readily identified with it, must indicate all circuits affected.
- 8.5 All circuit breakers (except remote) shall be capable of being tripped and reset manually. A tripped circuit breaker must be unmistakably apparent. All circuit breakers subject to accidental actuation due to their location must be protected against inadvertent tripping.
- 8.6 Nomenclature published in airframe manufacturers' technical material shall agree with corresponding nomenclature used in the flight deck to identify circuit breakers and fuses.
- 8.7 All emergency circuit breaker and fuse zones shall have contrasting borders using diagonal stripes visible under all operating conditions (examples: feathering, fire control, emergency radio).

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