



Federal Aviation Administration

Memorandum

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To: See Distribution

From: *EL* Manager, Small Airplane Directorate, Earl Lawrence, ACE-100 *EL*

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Subject: PS-ACE100-2010-001; Policy Statement; 14 CFR Part 23, § 23.1357, Advisory Circulars (AC) 23-17B, 25-16 and 120-80; Re-setting Circuit Breakers and Replacing Fuses

Summary

This policy memorandum provides guidance on re-setting circuit breakers (C/Bs) that have tripped and replacing fuses that have blown. Re-setting C/Bs after they have tripped or a fuse after it has blown could be a fire hazard. Therefore, C/Bs that have tripped and fuses that have blown should be reset/replaced one time only if they are for systems and equipment whose loss of function is essential to safety in flight. All other C/Bs and fuses should not be reset/replaced in flight.

This memorandum also addresses marking recommendations for essential and non-essential C/Bs and fuses.

Definition of Key Terms

In the policy statement below, the formatting in *italics* is for rule language, plain text is for means of compliance, or [square brackets] is for recommendations.

Current Regulatory and Advisory Material

Section 23.1357(d) states: If the ability to reset a circuit breaker or replace a fuse is essential to safety in flight, that circuit breaker or fuse must be so located and identified that it can be readily reset or replaced in flight. Civil Air Regulation 3.691, original issue, had a similar requirement. AC 120-80 describes in flight fire causes including: "Wiring Failures. A majority of hidden in-flight fires are the result of electrical arcs along wire bundles. In most cases, the electrical arc acts as the initiating event, igniting other surrounding materials. The surface of insulation materials is often a conveyer of these initiating events, as contamination from spillage, accumulated dirt/dust, lubrication or corrosion inhibitors on these surfaces can promote flame

spread (uncontaminated insulation materials are generally very fire resistant). In other instances, the re-setting of a tripped circuit breaker and replacement of a blown fuse can overheat wiring.” AC 120-80, Paragraph 11.a, also states in relevant part: The FAA reiterates its concern about re-setting C/Bs during flight. Crewmembers may create a potentially hazardous situation if they reset a C/B without knowing what caused it to trip. A tripped C/B should not be reset in flight unless doing so is consistent with explicit procedures specified in the approved operating manual used by the flightcrew or unless, in the judgment of the pilot in command, re-setting the C/B is necessary for the safe completion of the flight.

Relevant Past Practice

Historically, we have allowed the re-setting of any circuit breaker or replacement of any fuse although the rule does not require that all of them must be resettable/replaceable in flight. Some preflight checklists tell pilots to verify all circuit breakers “In”.

Current guidance for part 25, Transport Airplanes in AC 25-16, *Electrical Fault and Fire Prevention and Protection* that has been accepted for small airplanes, is to recommend that no pilot should reset any circuit breaker more than once.

National Transportation Safety Board (NTSB) Recommendation A-09-14

That Safety Recommendation reads: “Require aircraft manufacturers and those responsible for post-manufacture modifications to improve existing guidance, or create new guidance, regarding which circuit breakers pilots should and should not attempt to reset before or during flight and to disseminate the resultant guidance to airplane mechanics, pilots, and owners.” The day before an accident, a pilot had a weather radar failure and a “burning smell.” The weather radar was turned off and the associated circuit breaker was pulled. The next day another pilot and copilot reported a problem 10 minutes into the accident flight and crashed two minutes later. The evidence suggests the weather radar circuit breaker was reset and the radar was turned on which caused a fire that was catastrophic.

Policy

1. *The rules, either CAR 3 or Part 23, require the C/Bs and fuses that are essential for safety in flight be located and marked so they can be reset/replaced in flight.* The rules do not require segregation of non-essential C/Bs/fuses.
 - a. You should group those C/Bs/fuses essential for safety in flight in the most accessible position and placard them as “Essential” or placard each essential for safety in flight C/B/fuse as “Essential”; or use markings rather than segregation if C/B locations are based on the electrical bus location.
 - b. You should also group non-essential C/Bs/fuses together and placard them as “Non-Essential” or placard each non-essential C/B/fuse as “Non-Essential”; or use markings rather than segregation if C/B locations are based on the electrical bus location.

- c. Other markings other than “Essential” and “Non-Essential” that provide the same effect (such as color coding or abbreviations) can be used.
2. You should add an Aircraft Flight Manual (AFM) limitation that “Essential” C/Bs/fuses can be reset/replaced in flight once only if the pilot-in-command determines that system and equipment is essential to safety in flight for the completion of that flight:
 - a. after at least one minute, and
 - b. if there is no remaining smoke or “burning smell.”
 3. You should add an AFM limitation to prohibit re-setting/replacing of “Non-Essential” C/Bs/fuses in flight.
 4. You should omit from or revise any preflight checklist to delete “Circuit-breakers-In.” Replace or add the following to the AFM: “If any circuit breaker is not “In” or any fuse is blown, investigate the cause prior to re-setting/replacing.”
 5. Essential for Safety In Flight C/Bs/Fuses
 - a. For a Day Visual Flight Rules (VFR)-Only approved airplane, there may be no essential functions that require electrical power. However, it may be necessary to supply power for certain communication capacities.
 - b. For other types of operating approvals, you should consider the equipment requirements of the applicable operating rule. As a minimum and considering operations under Instrument Flight Rules (IFR), consider the instruments required in part 23 and part 91, Section 91.205.

Effect of Policy

The general policy stated in this document does not constitute a new regulation. The Federal Aviation Administration (FAA) individual who implements policy should follow this policy when it is applicable to a specific project. Whenever a proposed method of compliance is outside this established policy, that individual has to coordinate it with the policy issuing office using an issue paper. Similarly, if the implementing office becomes aware of reasons that an applicant’s proposal should not be approved, the office must coordinate its response with the policy issuing office. Applicants should expect that certificating officials would consider this information when making findings of compliance relevant to new certificate actions. In addition, as with all advisory material, this statement of policy identifies one means, but not the only means, of compliance.

Implementation

This policy discusses compliance methods that should be applied to type certificate, amended type certificate, supplemental type certificate, and amended supplemental type certification programs. The compliance methods apply to those programs with an application date that is on

or after the effective date of the final policy. If the date of application precedes the effective date of the final policy, and the methods of compliance have already been coordinated with and approved by the FAA or its designee, the applicant may choose to either follow the previously acceptable methods of compliance or follow the guidance contained in this policy.

Conclusion

In flight fires leave little time to make an emergency landing. There were only about 12 minutes in the airplane accident investigated by the NTSB. Consequently, only those circuit breakers and fuses needed for safe flight should be reset/replaced in flight and only once.

For questions and support on this policy statement, please contact Mr. Leslie B. Taylor at (816) 329-4134, by fax (816) 329-4090, or by e-mail at leslie.b.taylor@faa.gov.



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