



**SAIB:** CE-10-11

**Date:** December 23, 2009

**SUBJ:** Electrical: Fire Hazard in Resetting Circuit Breakers (C/Bs)

*This is information only. Recommendations aren't mandatory.*

## **Introduction**

This Special Airworthiness Information Bulletin (SAIB) advises pilots, owners, maintenance personnel, and operators of an airworthiness concern on all 14 CFR, part 23/Civil Air Regulations (CAR 3) airplanes. It gives best practices regarding tripped circuit breakers (C/B), inspection and maintenance of systems, and aging wires. There is a potential hazard when resetting an opened circuit breaker.

At this time, this airworthiness concern is not considered an unsafe condition that would warrant an airworthiness directive action under Title 14 of the Code of Federal Regulations (14 CFR), part 39.

## **Background**

On a flight in the accident airplane, the day before an accident, a pilot had a weather radar failure and a burning smell in the airplane. In response, the pilot turned off the weather radar and manually pulled the related circuit breaker. The burning smell went away according to the pilot's entry in the airplane's maintenance discrepancy binder. The pilot continued the flight with the circuit breaker pulled for another hour.

The next day it is likely the pilots reset the weather radar C/B, restoring power to the weather radar system wiring. This is consistent with routine or the "Before Starting Engines" checklist. Then 10 minutes after takeoff, they announced a problem and crashed about two minutes later. The National Transportation Safety Board (NTSB) determined that the most likely failure was from the weather radar and its associated wiring, which would be possible only if that crew reset the weather radar circuit breaker.

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. In the accident airplane, we do not know if the circuit breaker tripped again but, if it did, it was after an uncontrollable fire was started.

## **Recommendations**

We recommend that all airplane owners and operators do the following:

The rules, either CAR 3, § 3.691 or 14 CFR part 23, § 23.1357, require the C/Bs that are essential for safety in flight be located and marked so they can be reset in flight. The rules do not require segregation of non-essential C/Bs. This SAIB references the most current "best practices" for circuit breakers, the electrical system and aging wiring. It is important to note that many older aircraft may have little or no guidance on resetting policy in their airplane flight manuals.

1. Mark those essential for safety in flight.
2. "Essential" C/Bs should be reset in flight only once:

- a. after at least one minute;
  - b. if there is no remaining smoke or “burning smell”; and
  - c. the affected system and equipment is needed for the operational environment.
3. Do not reset any non-essential C/Bs in flight.
  4. Revise the preflight checklist to delete “Circuit breakers-In” if applicable and insert: “Check circuit breakers and if a circuit breaker is not set, do not reset the circuit breaker if there is a related maintenance malfunction.”

### Essential for Safety In Flight C/Bs

For a Day 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.

For other types of operating approvals, consider the following for providing power. Assuming operations under IFR conditions for 14 CFR part 91 or part 135 operations, consider the following systems as essential for safety:

1. Any electrical loads unique for the airplane characteristics and needed for continued safe flight and landing for the intended operations.
2. If needed to comply with 14 CFR §§ 23.1323 and 23.1325, one airspeed indicator with a heated pitot tube and an altimeter with either a heated static pressure source or an alternate static pressure source.
3. The magnetic compass and any display necessary for continued safe flight and landing that is sufficiently illuminated for night operation.
4. One navigation system installation appropriate to the ground facilities.
5. One communication installation system.
6. One gyroscopic pitch and bank indicator.
7. One clock.
8. Any display for the powerplant parameter necessary for continued safe flight and landing.

The following items should be reviewed by pilots during initial and recurrent training and flight reviews:

1. Review the circuit breaker reset policy in Advisory Circular (AC) 120-80, *In-Flight Fires*.
2. A tripped circuit breaker should not be reset in flight unless doing so is consistent with explicit procedures specified in an approved operating manual or airplane flight manual, or unless, in the judgment of the pilot in command, resetting the breaker is necessary for safe completion of the flight.
3. While on the ground, avoid resetting circuit breakers without first exploring reasons for them “tripping” in the first place, unless instructed by the maintenance manual.

4. Review the indications of hidden fires and the importance of not arbitrarily resetting circuit breakers.
5. Review the actions required by 14 CFR Section 91.213 dealing with inoperative instruments and equipment.
6. Include this SAIB in initial and recurrent training and flight reviews.

The following items should be reviewed by maintenance personnel:

1. Conduct an electrical load analysis, or make electrical measurements that account for all electrical loads in probable combinations when installing additional electrical devices.
2. Review standard wiring practices including, but not limited to, wire size, splicing, routing/clamping issues, loop bend radius, and terminal condition.
3. Replace wires that show evidence of damage due to chafing, fraying, contamination, moisture, dirt, cracks, overheating, or are crushed or kinked.

#### **For Further Information Contact**

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