



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

SAFO

Safety Alert for Operators

SAFO 18014
DATE: 10/25/18

Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.

Subject: Identification and Manipulation of Circuit Breakers During Abnormal or Emergency Situations.

Purpose: This SAFO serves to provide guidance to flightcrews on the effective identification and manipulation of circuit breakers during abnormal and emergency situations. This SAFO is being published in response to National Transportation Safety Board (NTSB) Safety Recommendation A-09-120.

Background: There have been several fatal accidents in which the pilot was unable to identify and pull a circuit breaker (typically the autopilot) during an abnormal or emergency situation.

- On June 4, 2007, a Cessna Citation 550, N550BP, impacted Lake Michigan shortly after departure from General Mitchell International Airport, Milwaukee, WI. The two pilots and four passengers were killed, and the airplane was destroyed. The NTSB determined the probable cause(s) of this accident to be the pilots' mismanagement of an abnormal flight control situation through improper actions. Shortly after departure, the flight reported a control problem and initiated an emergency return. The pilots believed they had a runaway trim condition. Nine seconds prior to impact, the captain stated he was trying to pull the circuit breakers (autopilot).
- On December 2, 2013, a Piper PA-46-310P, N87NF, was destroyed following an inflight breakup and impact with terrain in a heavily wooded area near Dawsonville, GA. The NTSB determined the probable cause(s) of this accident to be the pilot's in-flight loss of airplane control due to spatial disorientation. Contributing to the accident was the pilot's distraction by the reported malfunction of the autopilot system. The NTSB concluded the pilot should have been able to disable the autopilot if it was experiencing a problem and then continue to fly the airplane manually. However, given the available data and his conversation with the controller, it is likely that the pilot became focused on the autopilot system and diagnosing the reported problem.
- On November 20, 2015, a Beech A36TC, N7FG, descended into Clear Lake, Orlando, FL. The private pilot and the passenger were fatally injured, and the airplane was destroyed. During the flight, while the airplane was flying at 1,700 feet MSL, the pilot advised the controller that "for some reason" he could not get the airplane's autopilot to disengage. After the pilot's request for assistance, the pilot of another airplane said, "pull your circuit breaker." The accident pilot was confused and said that he was "relatively new" to the airplane.

Discussion: An airplane's Pilot's Operating Handbook (POH)/Airplane Flight Manual (AFM) describes the location of all circuit breakers and the appropriate responses to the various emergency situations that may be encountered. Advisory Circular (AC) 25-7D, Flight Test Guide for Certification of Transport Category Airplanes, discusses the location and identification of circuit protective devices whose actuation is called for in non-normal or emergency procedures. This AC advises that circuit protective devices whose activation is called for in non-normal or emergency procedures be accessible in flight and easily resettable. Non-normal or emergency procedures involving the use of circuit breakers should be minimized and should not call for pulling circuit breakers/resetting or replacing circuit protective devices in flight, except as part of an approved fault clearing and isolation procedure. Consider, for example, electric trim runaway, autopilot malfunction, or control system failure. In these examples, it is imperative that the pilot respond to immediate-action items from memory and locate emergency procedures quickly. In the case of trim runaway, the pilot needs to quickly assess the trim runaway condition, locate and depress the trim disconnect (if installed), or pull the trim power circuit breaker. Then, depending on control forces required, maintain pitch attitude.

The first and closest method of disconnecting a malfunctioning autopilot is the autopilot disconnect switch, typically mounted on the control yoke. Most systems may be disconnected by the mode buttons on the autopilot control panel. However, there are some failures (shorted relays, wires, etc.) that remove control of the servo actuator from the control unit itself. In those instances, the pilot must find and pull the circuit breakers that interrupt power to both the trim and autopilot systems. Some trim systems have separate circuit breakers for trim motors that operate different control surfaces (roll, pitch, yaw). It is important to understand that all functions and equipment associated with a circuit breaker are lost if that circuit breaker is disabled. In too many cases, a circuit breaker installed in an aircraft supplies power to more functions than the label implies. To be certain, flightcrews should not pull circuit breakers unless the POH/AFM directs that specific action. Essential Skills that should be trained and practiced include:

1. Location and identification of circuit breakers that need to be pulled during abnormal or emergency situations;
2. Proper preflight and ground check of the Flight Director/autopilot system; and
3. Demonstration of all methods used to disengage and disconnect an autopilot.

Additional Information: The following references contain information on non-normal or emergency operation of circuit breakers:

- Aeronautical Information Manual, Chapter 6, Emergency Procedures;
- AC-25-7D, Flight Test Guide for Certification of Transport Category Airplanes, Section 34.4, Circuit Protective Devices;
- FAA-H-8083-2, Risk Management Handbook, Chapter 7 Automation;
- FAA-H-8083-3B, Airplane Flying Handbook;
- FAA-H-8083-6, Advanced Avionics Handbook, Autopilot and Electric Trim System Failures;
- FAA-H-8083-15B, Instrument Flying Handbook; and
- FAA-H-8083-25B, Pilot's Handbook of Aeronautical Knowledge, Electrical System.

Recommended Action: Student pilots, pilots, flight instructor applicants, flight instructors, flight schools, Title 14 of the Code of Federal Regulations (14 CFR) Part 141 pilot schools, 14 CFR part 142

training centers, and evaluators should familiarize themselves with the information in this SAFO and are encouraged to thoroughly review the manufacturers' guidance regarding circuit breakers techniques and procedures during abnormal or emergency situations.

Contact: Questions or comments regarding this SAFO should be directed to the Air Transportation Division, at (202) 267-8166.