



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

SAFO

Safety Alert for Operators

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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: Effects of Aircraft Electrical Faults Resulting in Main Battery Depletion

Purpose: To recommend comprehensive procedures and training for all electrical failures with a potential for main battery depletion.

Background: Many aircraft electrical systems are designed to use the battery as a power source for systems or components critical to flight. In addition, the only source of power for these systems during degraded power conditions is the battery. Because of this, Title 14 of the Code of Federal Regulations (14 CFR) part 121, § 121.305 (k) (1) and (2) requires the battery to supply needed power for a minimum of 30 minutes. During a recent flight, air carrier pilots experienced an electrical failure while en route. By correctly following the operator's procedure in their quick reference handbook (QRH), the pilots isolated the *standby AC bus*, the *standby DC bus*, the *battery bus* and the *hot battery bus* from the rest of the electrical power system. Following the procedure also deactivated the main battery charger, thus the main battery became the sole power source for the four isolated busses. All remaining AC and DC busses remained powered by the engine-driven generators. The flightcrew elected to continue to destination in this configuration. While en route, the battery became depleted and systems on the four isolated busses, powered by the battery, failed. The flightcrew made an emergency landing at a diversion airport resulting in an incident with no injuries.

Discussion: Other instances of electrical faults resulting in main battery depletion in transport category aircraft have occurred in recent history. Although these cases have not resulted in incidents or accidents, their recurrence causes concern to the crews, manufacturers and regulatory authorities. Aircraft Flight Manual (AFM) procedures used by operators generally identify only the time-limited main battery life during conditions described above and usually do not prompt the crew to consider any further action or consequences. Although some operators provide a list of inoperative equipment, few operators give a complete list of the critical systems or components rendered inoperative by complete loss of battery power. In most transport category airplanes, systems such as those for fire protection and detection, flight control, navigation and flight instruments, engine fuel control, braking, auto-flight functions, standby horizon, and others are either fully or partially inoperative with no main battery power. If flightcrews do not have appropriate understanding of the effects of lost battery power on critical airplane systems powered by the battery, they may be faced with a rapidly compounding emergency situation.

Recommended Action: Directors of Safety, Directors of Training, Directors of Operations, trainers and check airmen for operators of transport category aircraft should review Additional, Irregular, Non-Normal and Emergency procedures regarding electrical difficulties for conformance with manufacturer's recommended procedures. Review QRH or other procedural guidance to ensure that the procedures lead to problem resolution rather than complication. In addition, operators should reemphasize or develop procedures that supplement any QRH electrical loss procedure to include consideration of diversion, planning landings on the longest available runway, and preparations for equipment loss. Operators should ensure that their AFM and training reflect accurate abnormal indications and inoperative systems associated with depletion of the main battery.

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