



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

---

**Date:** April 24, 2009

**In reply refer to:** A-09-41 and -42

Ms. Lynne A. Osmus  
Acting Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

---

On September 22, 2008, about 1342 central daylight time, a Boeing 757-223, N197AN, operated by American Airlines as flight 268, experienced electrical system anomalies in flight and then ran off the side of runway 22R while performing an emergency landing at Chicago O'Hare International Airport (ORD), Chicago, Illinois.<sup>1</sup> None of the 2 flight crewmembers, 5 flight attendants, and 185 passengers was injured, and the airplane received minor damage to the landing gear. Visual meteorological conditions prevailed, and an instrument flight rules flight plan was filed for the 14 *Code of Federal Regulations* Part 121 domestic passenger flight from Seattle-Tacoma International Airport, Seattle, Washington, to John F. Kennedy International Airport (JFK), New York, New York.

The National Transportation Safety Board's investigation of this incident is ongoing; however, preliminary findings suggest that a critical safety issue exists regarding Boeing Airplane Company's 757/767 procedures for addressing an illuminated Standby Power Bus OFF light.

### Background

In postincident interviews, the captain reported that, while en route, the Standby Power Bus OFF light illuminated.<sup>2</sup> As a result, the flight crew referred to the American Airlines 757/767 Operating Manual's quick reference handbook (QRH), which, at the time of the event, was based on Boeing procedures and stated that an illuminated Standby Power Bus OFF light indicated that either the standby AC or DC bus was unpowered; the QRH also included procedures to follow when this occurred. Per the first step in the procedures, the captain should move the standby power selection knob to the "BAT" position. According to the QRH, with the knob in this

---

<sup>1</sup> More information about this incident, CHI08IA292, is available on the Safety Board's website at <<http://www.nts.gov/ntsb/query.asp>>.

<sup>2</sup> At the same time that the Standby Power Bus OFF light illuminated, the captain also received several engine indicating and crew alert system (EICAS) messages. EICAS messages advise the pilots of system failures and non-normal operational conditions.

position, the battery would provide standby bus power for approximately 30 minutes. Because the standby buses would receive power, the Standby Power Bus OFF light would go out. The second and final step stated that, if the Standby Power Bus OFF light remained illuminated and right AC power was available, the standby power selector should be positioned back to AUTO, which would restore the battery charger. The captain reported that he did not switch the standby power selector back to AUTO because the Standby Power Bus OFF light did not remain illuminated.

According to the captain, after placing the standby power selector in the BAT position, the performance of the airplane's systems stabilized, but several systems were inoperative; therefore, he contacted maintenance control via radio, was told that it was okay to continue at his discretion, and subsequently elected to continue the flight.<sup>3</sup> Approximately 1 hour and 40 minutes later, while the airplane was flying over western Michigan, the battery power had been depleted, and numerous cockpit systems began to fail. The captain elected to turn around and divert to ORD.

The captain reported that, as he aligned the airplane to land on runway 22R at ORD, all main systems—for example, AC power, hydraulic, fuel, pressurization—were fully functioning. However, as a precaution, he declared an emergency with the air traffic control tower. As the airplane neared the runway, the flight crew noted that both the primary and standby elevator trim systems were inoperative. The captain assisted the first officer with the flight controls as they continued the landing approach. The captain reported that, during the landing approach, it was very difficult to maintain pitch control of the airplane, so he stopped the flap extension at 20°. In addition, because of the control issues, he did not request to change to the longest available runway at ORD.

According to the captain, during the landing rollout, the thrust reversers and spoilers did not deploy; therefore, he manually placed the spoiler handle in the deploy position, but he was not sure if the spoilers had deployed. He also was concerned about the brake function and accumulator pressure, so he made one smooth application of the brakes, which he reported did not “perform well.” Because of obstructions off the end of the runway, the captain elected to steer the airplane off the left side of the runway into the grass. The airplane came to rest with the main landing gear on the grass to the left of the runway pavement. The nose of the airplane came to rest approximately 100 feet before the end of the runway.

---

<sup>3</sup> The captain contacted maintenance twice. In the first call, the captain told maintenance about the inoperative systems and asked if he should continue to JFK or divert; maintenance replied that the decision would be at the captain's discretion. Moments later, the captain reported a “change of plans” and stated that only the main aircraft battery and the main battery charger had been lost. He also stated that the other status messages did not appear to be severe and that there were no fault indications. Then, the call was dropped, but the captain immediately called maintenance again. During the second call, the captain reported that he had decided to continue the flight to JFK and that everything seemed to be operating normally except for the main battery charger; he also stated that the battery may fail. The maintenance technician who answered the call stated that he would discuss the situation with the other technicians and would contact the captain if he received any other information but that it sounded like the airplane was okay to continue the flight.

## Discussion

Postincident inspection of the airplane indicated that a relay failure resulted in the standby electrical buses being unpowered.<sup>4</sup> Further investigation determined that moving the standby power selector to the BAT position (per the procedures in the existing QRH) resulted in the main aircraft battery providing power to four electrical buses;<sup>5</sup> it also disconnected the main battery charger from the battery, and, thus, the battery was no longer being recharged.

When a battery charge has been depleted, the aircraft electrical systems powered by the four electrical buses can all become unpowered and can lead to the loss of engine and cargo fire-extinguishing capability; loss of alternate gear-extension capability; loss of the ability to shut down the engines using any available means, including the fire handles; loss of inboard wheel antiskid system operation; loss of cabin public address system and cockpit-to-cabin interphone; loss of primary and alternate stabilizer trim; and loss of hydraulic system fire shutoff valve operation.

The Safety Board is concerned that Boeing procedures outlining actions to take when the Standby Power Bus OFF light illuminates are inadequate because they do not address the situation that existed in this incident. Specifically, the procedures offer no guidance if the Standby Power Bus OFF light extinguishes when the standby power selection knob is placed in the BAT position, which ultimately drains the battery. As a result of this accident, on November 4, 2008, American Airlines released its revised QRH, which included the addition of a step stating to land at the nearest suitable airport if the Standby Power Bus OFF light is not illuminated or the right Bus OFF light is illuminated. American Airlines' QRH also lists action to take if a suitable airport is not available before battery power is depleted. Boeing has made no such changes to its procedures.

On January 13, 2009, the Federal Aviation Administration (FAA) issued Safety Alert for Operators (SAFO)<sup>6</sup> 09001, "Effects of Aircraft Electrical Faults Resulting in Main Battery Depletion," which recommended improved procedures and training for resolving electrical failures without depleting the main battery. The SAFO recommended that directors of safety, directors of training, directors of operations, trainers, and check airmen for operators of transport category aircraft review additional, irregular, non-normal, and emergency procedures for electrical difficulties to ensure that they conform to manufacturers' recommended procedures. SAFO 09001 also recommended that operators:

- Review their QRH or other procedural guidance to ensure that the procedures resolve problems rather than introduce other complications;

---

<sup>4</sup> Data from aircraft and relay manufacturers indicate that failures of this relay are relatively rare. The electrical system architecture is designed such that the flight crew, by following the proper procedures, generally can mitigate the results of an individual relay failure.

<sup>5</sup> The four electrical buses are the DC standby bus, battery bus, hot battery bus, and the AC standby bus.

<sup>6</sup> FAA Order 8000.87A, "Safety Alerts for Operators," dated October 24, 2006, established SAFOs and stated, in part, that they conveyed "important safety information" directly to operators as that information became available.

- Reemphasize or develop procedures that supplement any QRH electrical loss procedure to include consideration to divert to another airport, plans to land on the longest available runway, and preparation in the event of an equipment loss; and
- Ensure that their airplane flight manual and training accurately reflect abnormal indications and inoperative systems that result when main battery power is depleted.

However, the Board does not consider these improvements to be sufficient because SAFOs are not mandatory nor do they necessarily have a long-term impact. Improved procedures should be specified and required because of the potential severity of loss of battery power.

The Safety Board concludes that current Boeing 757/767 Standby Power Bus OFF procedures are inadequate because they do not indicate that all power could be lost if the standby power selection knob remains in the BAT position and that, once the BAT position is selected, the flight crew should land at the nearest suitable airport before the battery is completely drained nor do the procedures indicate steps to take if landing is not possible. Therefore, the Safety Board believes that the FAA should require Boeing to revise its 757/767 procedures and training for addressing an illuminated Standby Power Bus OFF light, to include specific steps to take so that complete loss of battery power is avoided. These steps should include landing at the nearest suitable airport before the power is depleted and actions to take if landing is not possible. The Safety Board believes that, once Boeing has revised its procedures and training per Safety Recommendation A-09-41 for addressing an illuminated Standby Bus Power OFF light without depleting the main battery, the FAA should require all operators of 757/767 airplanes to adopt these procedures.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require the Boeing Airplane Company to revise its 757/767 procedures and training for addressing an illuminated Standby Power Bus OFF light, to include specific steps to take so that complete loss of battery power is avoided. These steps should include landing at the nearest suitable airport before the power is depleted and actions to take if landing is not possible. (A-09-41)

Once Boeing Airplane Company has revised its procedures and training per Safety Recommendation A-09-41 for addressing an illuminated Standby Bus Power OFF light without depleting the main battery, require all operators of 757/767 airplanes to adopt these procedures. (A-09-42)

In response to the recommendations in this letter, please refer to Safety Recommendations A-09-41 and -42. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: [correspondence@ntsb.gov](mailto:correspondence@ntsb.gov). If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our Tumbleweed secure mailbox

procedures. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Acting Chairman ROSENKER and Members HERSMAN, HIGGINS, and SUMWALT concurred with these recommendations.

*[Original Signed]*

By: Mark V. Rosenker  
Acting Chairman