



# National Transportation Safety Board

Washington, D.C. 20594

## Safety Recommendation

---

**Date:** January 11, 1999

**In reply refer to:** A-99-3

Honorable Jane F. Garvey  
Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

---

On September 2, 1998, at 2018 eastern daylight time, Swissair flight 111,<sup>1</sup> a McDonnell Douglas MD-11 registered as HB-IWF, departed from John F. Kennedy International Airport in Jamaica, New York. Swissair flight 111 was a regularly scheduled passenger flight from New York to Geneva, Switzerland, operating under the provisions of 14 Code of Federal Regulations Part 129.

About 56 minutes after departure while at flight level 330, the flightcrew declared "PAN PAN PAN"<sup>2</sup> and advised air traffic control (ATC) of smoke in the cockpit. The flightcrew requested to divert to a convenient airport and was cleared direct to Halifax International Airport in Nova Scotia, Canada. About 11 minutes after the report of smoke, the airplane's electrical systems began to deteriorate. The flightcrew then declared an emergency, and communications between ATC and the flightcrew ceased shortly thereafter. Approximately 6 minutes later, at 2231 Atlantic daylight time,<sup>3</sup> the airplane crashed into the Atlantic Ocean near Peggy's Cove, Nova Scotia, Canada. All 14 crewmembers and 215 passengers were killed, and the airplane was destroyed. The Transportation Safety Board of Canada (TSB) is in charge of the accident investigation, and the National Transportation Safety Board is participating in accordance with the provisions of Annex 13 to the Convention on International Civil Aviation.

Approximately 85 percent of the airplane's wreckage has been recovered to date. Examination of the wreckage revealed evidence of considerable heat damage to ceiling areas both forward and aft of the cockpit bulkhead. This damage is consistent with the effects of a fire. Numerous sections of wiring from the cockpit overhead area also exhibited heat damage and burned insulation, and several of the

---

<sup>1</sup> The flight was also operating as Delta Air Lines flight 111 under a code-sharing agreement.

<sup>2</sup> According to the Federal Aviation Administration's (FAA) Aeronautical Information Manual, the signal "PAN-PAN" is used for an urgency condition.

<sup>3</sup> The Atlantic time zone is 1 hour ahead of the eastern time zone.

wires from those sections showed evidence consistent with electrical arcing. Although some of the wires exhibiting arcing characteristics are from the entertainment system that is unique to the Swissair MD-11 fleet, others have been identified as original MD-11 wires.

On December 22, 1998, the TSB issued Aviation Safety Advisory 980031-1 to the Safety Board as the representative of the MD-11's State of Manufacturer; a copy of the advisory was also sent to Switzerland's Aircraft Accident Investigation Bureau, Transport Canada, and the FAA. The advisory points out that TSB investigators recovered two MD-11 electrical bus feed wires that show signs of arcing. The two wires are identified as the left emergency alternating current bus feed wire (wire number B205-1-10) and the left emergency direct current bus feed wire (wire number B205-4-6). If the wires were in place, the area of apparent arcing damage would be located approximately 2 inches aft of the right cutout in the "tub" that encloses the overhead circuit breaker panel.<sup>4</sup> According to the advisory, the potential safety ramifications appear to be confined only to the MD-11 fleet.

TSB investigators also recovered the overhead circuit breaker panel and the upper avionics circuit breaker panel. Portions of each panel show evidence of substantial heat damage. The avionics circuit breaker panel is located along the right side of the cockpit behind the first officer's seat, but the upper portion of that panel extends into the area near the overhead circuit breaker panel.

In addition, TSB investigators participated in examinations of several other MD-11 airplanes that concentrated on the area from the cockpit to station 600 (near the forward doors of the airplane). The examinations showed the following:

- chafed, cracked, broken, and cut electrical and bonding wires in several areas, including the overhead and avionics circuit breaker panels and the forward drop ceiling area above the left (L) 1 and right (R) 1 doors and
- inconsistencies in the routing of wires and wire bundles, loose terminal connections, excessively small bend radii, unsealed electrical conduits, and open smoke barriers between the cockpit and cabin areas.

On December 10, 1998, the FAA issued Airworthiness Directive 98-25-11, "McDonnell Douglas MD-11 Series Airplanes," requiring a one-time inspection above the L1 and R1 doors to address the wire chafing issue discovered as part of the accident investigation. Also in December 1998, Boeing issued two MD-11 Alert Service Bulletins—MD-24A068 Revision 1 and MD-25A194 Revision 4—which address the specific discrepancies regarding the door areas. Further, SR Technics, on behalf of Swissair and along with Boeing, has voluntarily developed an engineering order that defines a comprehensive inspection of the wiring in the forward areas of the Swissair MD-11 airplanes. The Safety Board understands that the inspections completed to date have not uncovered any discrepancies that warrant regulatory action.

Although the apparent electrical arcing on Swissair flight 111 has not been determined to be a source of a fire, and Swissair's voluntary inspections of its MD-11 airplanes have not uncovered

---

<sup>4</sup> The overhead circuit breaker panel is located in the cockpit ceiling between and behind the pilot seats. The tub is a fiberglass enclosure that forms a cavity for the overhead circuit breakers and associated wiring. The wiring is routed through oval cutouts located in the left and right aft portions of the tub.

serious discrepancies, the Safety Board is concerned about the recent discoveries of apparent electrical arcing damage to wiring near the accident airplane's overhead and avionics circuit breaker panels, the heat damage to those panels, and the wiring anomalies discovered in TSB's examination of MD-11 airplanes.

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

Require, on an expedited basis, an inspection of all MD-11 airplanes for discrepancies of wiring in and around the cockpit overhead circuit breaker panel (including the area just aft of the tub enclosure) and the avionics circuit breaker panel. The inspection should include examinations for loose wire connections, inconsistent wire routings, broken bonding wires, small wire bend radii, and chafed and cracked wire insulation.  
(A-99-3)

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in this recommendation.

*[original signed]*

By: Jim Hall  
Chairman