



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: February 19, 1999

In reply refer to: A-99-10 and -11

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

On February 9, 1998, N845AA, a Boeing 727-223 (B-727), operating as American Airlines flight 1340, landed 180 feet short of the runway 14R threshold at the Chicago O'Hare International Airport while attempting a category II instrument landing system approach. Of the 116 passengers and 6 crewmembers on board, 22 passengers and 1 crewmember reported minor injuries. The airplane was substantially damaged.

During the ground impact sequence, the main landing gear and aft air stairs separated from the airplane, and the nose gear folded back into the avionics compartment. The airplane came to rest on its fuselage along the south side of runway 14R and 2,245 feet from the initial impact point.

Although the investigation continues, the Safety Board has identified two safety issues that affect the safety and survivability of passengers and their rapid egress during an emergency evacuation.

The first safety issue was the blockage of the aisle to the forward entry door (L-1) and the partial blockage of the forward galley door (R-1 exit) caused by the open door to the stowage compartment (formerly used to stow liferafts) near the R-1 exit. Also, several of the overhead ceiling panels separated from their support structure, but they did not block the aisle because lanyards attached to the panels and ceiling supports prevented them from falling down completely.

The B-727 is equipped with four single door liferaft ceiling stowage compartments that contain liferafts when the airplane is being operated as an extended over-water flight. For flights that are not operated over water, the stowage compartments may be empty. The 4 X 2 foot door panels are latched along their forward and aft edges; however, the doors were not equipped with any device to prevent them from falling down and blocking the aisle. The ceiling panels installed fore and aft of the liferaft stowage compartments were equipped with lanyards that limit their downward travel and prevent the panel from blocking the aisle.

The Safety Board previously addressed a similar issue during its investigation of the United Airlines B-747-122, N4713U, accident near Honolulu, Hawaii, on February 24, 1989. The accident involved the in-flight separation of a cargo door and subsequent emergency landing and evacuation of the airplane. During the accident, two liferaft stowage compartments had opened downward and blocked the R-2 and L-2 exits. In its accident report, the Safety Board issued Safety Recommendation A-90-59, which asked the Federal Aviation Administration (FAA) to do the following:

Issue an airworthiness directive (AD) to require that stronger latches be installed in oversized storage compartments that formerly held liferafts on all B-747 airplanes and also limit the distance that these compartments can be opened.

On October 7, 1991, the FAA issued AD 91-22-05, applicable to B-747s. The AD required the replacement of overhead stowage compartment doors with improved doors and improved counterbalance assemblies and operational checks of associated equipment for certain stowage compartments located near entry doors or the deactivation of those compartments. Based on the issuance of the AD, the Board classified Safety Recommendation A-90-59 “Closed—Acceptable Action” on November 1, 1991.

The safety recommendation and the AD were not applicable to commercial transport-category airplanes other than B-747s. The Safety Board is concerned that if there had been a need for immediate evacuation, rapid egress would not have been possible at door L-1 because it was blocked by the open liferaft stowage compartment. Also, a liferaft stowage compartment door could open during a hard landing or turbulence and could injure a flight attendant. Thus, the Safety Board believes that the FAA should identify all airplanes operated under Title 14 Code of Federal Regulations Part 121 with liferaft ceiling stowage compartments or compartments that formerly held liferafts that open downward and issue an AD to limit the distance that those compartments can open.

The second safety issue that the Safety Board has identified in its investigation of the flight 1340 accident involved two passenger seatbelts that released at their seat attachments during the airplane’s impact with the ground. The seatbelts on the aisle side of seats 25C and 27C remained buckled but became unhooked at their seat shackles. The passenger in seat 25C was not injured; he stated that he noticed that his seatbelt had separated (at the seat attachment) when he reached down to unbuckle it. However, the passenger in seat 27C reported minor injuries; he stated that his seatbelt released during the airplane’s second impact. After his seatbelt released, he pitched forward to the left, and struck the seat in front of him.

Both seatbelt assemblies are of a design commonly used in commercial airplanes. The seatbelt assembly consists of the standard release buckle, webbing, and an attachment fitting with a spring clip keeper at each end of the belt (see figure 1). The attachment fitting clips over a shackle that is bolted to the seatframe.

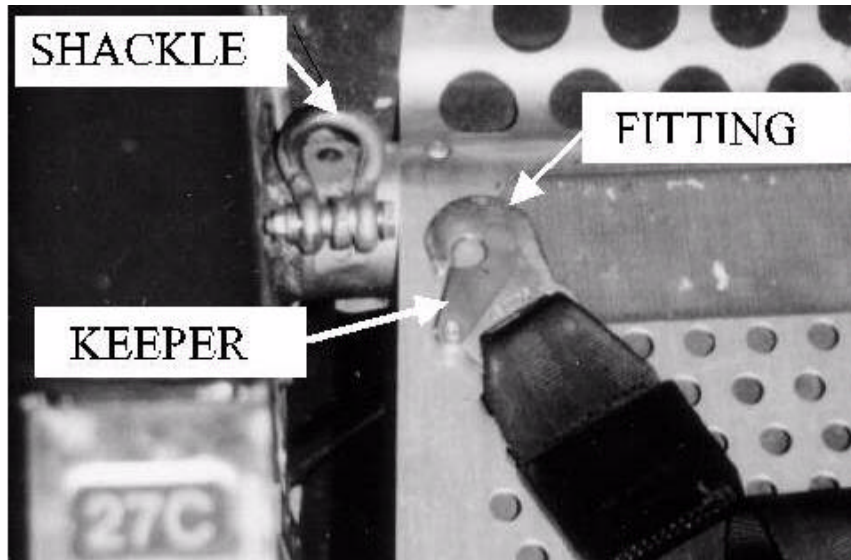


Figure 1.—Seatbelt Assembly

The Safety Board has previously addressed the issue of seatbelts becoming unhooked. During its investigation of a British Aircraft BAC-1-11 that encountered severe turbulence near Orlando, Florida, on May 24, 1988, the Safety Board found that three passenger seatbelts had detached during the turbulence. The passengers were displaced in their seats and sustained minor injuries. Safety Board investigators and Civil Aeromedical Institute (CAMI) engineers conducted tests at CAMI to identify ways that seatbelt attachment fittings could detach from the shackles bolted to the seatframes. The tests revealed that when the bolt used to fasten the shackle to the seatframe is overtightened, the shackle cannot move vertically to self-center, preventing the seatbelt end fitting from centering on the shackle. When this condition occurs, the end fitting cannot align with the seat occupant, and minimal side loads can force open the end fitting's spring-loaded keeper and detach the end fitting from the shackle.

Consequently, the Safety Board issued Safety Recommendations A-90-20 and A-90-21, which asked the FAA to do the following:

A-90-20

Issue a maintenance alert to principal maintenance inspectors (PMIs) to inspect seatbelt attachment shackles installed on passenger seats on air carrier, air taxi, and commercial airplanes to verify that the correct bolts are used to fasten the shackles to the seats, the bolts are torqued to the correct value, and the shackles are free to self-center after the correct torque has been applied to the bolts.

A-90-21

Require PMIs to verify that air carrier, air taxi, and commercial operators have maintenance instructions for the proper installation of passenger seatbelt attachment shackles.

On May 3, 1991, the FAA issued Notice 8300.101, "Seatbelt Maintenance Requirements." The notice identified seatbelt maintenance discrepancies and recommended that PMIs alert operators of the need to inspect seatbelt attachment shackles to ensure that correct shackle bolts are installed, the bolts are torqued to the correct value, and the shackles are free to self-center after the correct torque has been applied to the bolts. The notice also asked PMIs to review and ensure that the carrier's maintenance and inspection procedures include periodic inspection of seatbelt restraint systems; notify the air carrier, in writing, of any problems or discrepancies that require changes to the inspection program; inspect and replace unserviceable seatbelts during ramp and en route inspections; and ascertain that quality control and assurance exists to maintain the integrity of seatbelts and restraints. The Safety Board subsequently classified the recommendations "Closed—Acceptable Action."

During the investigation of the American Airlines flight 1340 accident, Safety Board investigators examined the seatbelt shackles at seats 25C and 27C. In contrast to the CAMI findings in the earlier detachments, both shackles were found to move freely in the vertical direction, and the torque values for each shackle bolt did not exceed the recommended torque limits of 65- to 90-inch pounds. The Safety Board was unable to determine why the seatbelts became unhooked from the shackles at seats 25C and 27C.

On April 18, 1998, a seatbelt released from its seat attachment when a Boeing 747-200, N623FF, operated by Tower Air, Inc. as flight 37, encountered turbulence about 120 nautical miles east of Kennebunkport, Maine, at flight level 350. Investigation of the incident revealed that a passenger's seatbelt released at seat 58F during the encounter with turbulence and that a flight attendant had reattached the seatbelt to its shackle after the turbulence had ended.

The Safety Board is concerned that the current seatbelt fitting with a spring clip keeper that clips over a shackle does not provide enough assurance that the seatbelt will remain fastened to a seat during turbulence or during an emergency landing. The Safety Board is also concerned that operators may not be aware of this unsafe condition and that appropriate corrective measures have not been taken to alert operators and to prevent this condition from occurring. Thus, the Safety Board believes that the FAA should reexamine the design of seatbelts installed on passenger seats on air carrier, air taxi, and commercial airplanes to determine the reason some have become unhooked from their seat attachments during turbulence or a hard landing and establish a suitable means of ensuring that the seatbelts remain attached to their shackles during all modes of flight.

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

Identify all airplanes operated under Title 14 Code of Federal Regulations Part 121 with liferaft ceiling stowage compartments or compartments that formerly held liferafts that open downward and issue an airworthiness directive to limit the distance that those compartments can open. (A-99-10)

Reexamine the design of seatbelts installed on passenger seats on air carrier, air taxi, and commercial airplanes to determine the reason some have become unhooked from their seat attachments during turbulence or a hard landing and establish a suitable means of ensuring that the seatbelts remain attached to their shackles during all modes of flight. (A-99-11)

Chairman HALL, Vice Chairman FRANCIS, and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

By: Jim Hall
Chairman