Log 2528

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: November 1, 1994

In reply refer to: A-94-176

Honorable David R. Hinson
Administrator
Federal Aviation Administration
Washington, D.C. 20591

On January 7, 1994, a Jetstream J4101, N304UE, operated by Atlantic Coast Airlines as United Express flight 6291, was on a scheduled commuter flight from Dulles International Airport to Port Columbus International Airport, in Gahanna, Ohio. At 2321 eastern standard time, while on an instrument landing system approach to runway 28L, the airplane struck a concrete block building that was about 1.2 miles east of the runway. The pilot, co-pilot, flight attendant, and two passengers were fatally injured. The three other passengers, a husband and wife and their 5-year-old daughter, sustained minor injuries. The airplane was destroyed by postcrash fire.

The surviving male passenger remained in his seat upright and the seats remained attached to the airplane's floor. He experienced a "terribly difficult time removing his seatbelt," as the plastic release lever on the buckle was "difficult" to operate because he believed that it had to be moved greater than 90°. After releasing his own safety belt, he noticed that his daughter had slid down onto her back and under her safety belt, and because he could not find the safety belt release lever, he pulled her out from under the belt. His wife also experienced the same difficulty releasing her safety belt.

Because of the difficulty that the husband and wife experienced in removing their safety belts, Safety Board investigators examined the safety belts in three other Jetstream J-4101 airplanes operated by Atlantic Coast Airlines. The safety belts were manufactured by the Pacific Scientific Company, Yorba Linda, California, to Technical Standard Order (TSO)-C22f. About 27,000 are in service worldwide and about 10,000 are in U.S. military and civilian aircraft.

The buckle insert consists of a flat plate with a "D"-shaped hole. The buckle half consists of a bottom plate and the top release lever. The bottom plate has a "D"-shaped protrusion so that when the insert half of the belt is inserted into the buckle (between the release lever and the bottom plate), the "D"-shaped hole drops over the protrusion. A lockbar attached to the same shaft as the release lever is spring-loaded into a position to prevent disengagement of the insert and the buckle. When the release lever is pulled, it rotates the lockbar, permitting the insert half

of the buckle to move upward and disengage from the protrusion in the bottom plate of the buckle

During examination of the buckles, investigators found two specific conditions that prevented the buckles' release. First was the geometric relationship between the flat plate and the "D"-shaped hole in the insert half, and the "D"-shaped protrusion and the lockbar on the buckle half. It was found that under some circumstances, even with the lockbar rotated into the "release" position, the end of the flat plate on the insert half would contact the lockbar shaft so that the insert would not lift completely off the "D"-shaped protrusion. This would happen when the buckle/insert assembly was subjected to an outward load, causing a misalignment between the two parts. With the release lever held in the normal release position, the insert could be disengaged from the buckle if pulled outward to align the two parts. The second condition that prevented release was when the release lever was pulled past its normal release position to its full open position. In this case, the end of the release lever itself interfered with the end of the insert and prevented the insert from being raised above the "D"-shaped protrusion on the bottom plate of the buckle. This occurred regardless of the alignment of the buckle and insert.

On February 8 and 9, 1994, the Safety Board and representatives from the Federal Aviation Administration's (FAA) Aircraft Certification Management Office, Jetstream Aircraft Company, Atlantic Coast Airlines, and Air Line Pilots Association met to examine the safety belt release buckles at the Pacific Scientific Facility. During this meeting, Pacific Scientific demonstrated that the safety belts and release buckles met the requirements contained in FAA's TSO-C22f. Once it was demonstrated that the safety belt complied with the TSO, a 1-inch piece of dense foam was placed between the body block and the safety belt to represent the seat occupant's soft abdominal tissue. It was found that with the foam pad in place and with the belt loaded to the requirements of the TSO, the buckle would not release when its lever was opened. Although the restraint system met the requirements of the TSO, the TSO does not take into account the effect that soft abdominal tissue exerting pressure on the release buckle may have on a person's ability to release a safety belt.

On March 14, 1994, the Safety Board issued Safety Recommendation A-94-69, asking the FAA to:

> Amend TSO-C22f to incorporate procedures which would place material representative of soft abdominal tissue between the test apparatus and the release buckle to ensure that safety belts can be released when subjected to loads specified to the TSO.

On June 6, 1994, The FAA responded to the recommendation and stated that the FAA had issued TSO-C22g to supersede and improve the seatbelt requirements of TSO-C22f.

On September 1, 1994, The Safety Board responded to the FAA letter and stated that TSO-C22g did not adequately address the Board's concerns. The Safety Board pointed out that the diagram of the test fixture on the test block for the safety belt buckle was the same as the

one used in TSO-C22f This cutout, when the safety belt is under load, allows the buckle to pivot and, in the case of the Pacific Scientific safety belts, allows the buckle to release. However, as stated in the recommendation letter, when a piece of foam representative of soft tissue was placed between the buckle and the test block, the buckle was not allowed to pivot, and as a result, the safety belt failed to release. The Safety Board classified Safety Recommendation A-94-69, as "Open--Unacceptable Response" and continues to believe that an amendment to the TSO is necessary to prevent approval of designs with the deficiency noted in the accident. The Safety Board strongly urges FAA to reconsider its response to Safety Recommendation A-94-69.

On March 14, 1994, the Safety Board also issued Class I, Urgent Action, Safety Recommendation A-94-67, asking the FAA to:

> Immediately notify all operators of the Safety Board's finding, including the U.S. Department of Defense and foreign governments, and require all operators whose aircraft have the affected Pacific Scientific safety belt buckles to inform passengers and crewmembers about the need to align the buckle insert to assure easy release of the safety belts.

The FAA's June 6, 1994, response to the recommendation stated that the FAA believed that the intent of this recommendation was satisfied by Service Bulletin (SB) 1108435-25-01, issued by the Pacific Scientific Company on April 28, 1994, which notifies operators of deficiencies with the buckles and informs them of a forthcoming airworthiness directive (AD) to mandate replacement of the buckles.

On September 1, 1994, the Safety Board responded to the FAA's letter and stated that "neither the SB nor the FAA have addressed the need for operators to warn passengers of the possibility of in-service buckles not operating properly. The intent of the recommendation can only be met by requiring operators to inform crewmembers and passengers of the need to align the buckle insert to assure that the seatbelt will release. The Safety Board believes that the FAA should reconsider its position, and classifies Safety Recommendation A-94-67 'Open--Unacceptable Response'"

Subsequent conversations with the FAA show that it intends to take no further action on this recommendation. Therefore, the Safety Board now classifies Safety Recommendation A-94-67 "Closed--Unacceptable Response."

The Safety Board is concerned that the FAA has not addressed the passenger and crew safety issue associated with this safety belt design. The Safety Board reminds the FAA that Title 14 Code of Federal Regulations (CFR) 91.107(a)(3) states, in part, that each person on board a U.S.-registered civil aircraft must occupy an approved seat or berth with a safety belt and, if installed, shoulder harness, properly secured about him or her during movement on the surface, takeoff, and landing. This same requirement is also reflected in other regulations, such as 14 CFR 135.128(a), and 14 CFR 121.311(b). The Safety Board believes that if passengers and crew are required by the CFRs to wear safety belts, then it is the responsibility of the FAA to ensure that

the safety belts function properly. Although the FAA is in the final stages of issuing an AD to remove these safety belts from service, it will take several months to accomplish this task. The Safety Board believes that when passengers board an aircraft, they have the right to assume that everything on that aircraft is functioning properly. If, as in this case, the safety belt, under emergency conditions, may not function as designed, then it is the FAA's responsibility to ensure that operators advise passengers and crew that they must align the insert with the buckle to ensure that the buckle will release should an emergency evacuation become necessary.

The Safety Board strongly believes that until these restraint systems are replaced, the FAA should immediately notify all operators and require them to explain to passengers and crewmembers, before each flight, how to release these safety belts based upon the design deficiency found in this investigation.

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

> Immediately issue an emergency airworthiness directive informing all operators and affected parties, including the U.S. Department of Defense and foreign governments, of the Safety Board's findings, and require all operators whose aircraft have the affected Pacific Scientific safety belt buckles to inform passengers and crewmembers before each flight about the need to align the buckle insert when lifting the buckle release lever to ensure easy release of the safety belts. (Class I, Urgent Action) (A-94-176)

Chairman HALL, and Members LAUBER, HAMMERSCHMIDT, and VOGT concurred in this recommendation.

By: Jim Hall
Chairman