National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Log 2116

Date: January 17, 1989
In reply refer to: A-88-158

Honorable T. Allan McArtor
Administrator
Federal Aviation Administration
Washington, D.C. 20591

About 1825 on November 23, 1987, a Beech Aircraft Corporation 1900C (Be 1900), N401RA, operated by Ryan Air Service, Inc., crashed short of runway 3 at the Homer Airport, Homer, Alaska. Flight 103 was a scheduled Title 14 Code of Federal Regulations (CFR) Part 135 flight operating from Kodiak, Alaska, to Anchorage, Alaska, with intermediate stops in Homer and Kenai. Both flightcrew members and 16 passengers were fatally injured; 3 passengers were seriously injured.[1]

In this accident, the passengers remained secured to their seats by the seat-mounted seatbelts. All seatbelts were examined and found to be fully functional. However, all of the seats separated from their floor- and wall-mounted seat tracks, thereby negating the effectiveness of the seatbelts.

When the seats separated from the tracks, the passengers tumbled about and struck interior structure, other seats, and occupants. Seat damage also was typical of damage which would be expected from vertical decelerations of the magnitude calculated by the National Transportation Safety Board (19.8 to 35.7 G.).

The majority of the injuries sustained by the passengers were as a result of secondary impact after the seats separated from their tracks. Also, some injuries, such as aortic ruptures, were typical of a severe vertical deceleration.

Effective August 15, 1988, the Federal Aviation Administration (FAA) amended the airworthiness standards of 14 CFR Part 23.[2] The regulations implemented new test standards for seat/restraint systems of small general aviation airplanes in the normal, utility, and aerobatic category, i.e., those airplanes with nine passenger seats or less. Each seat/restraint system must comply successfully with dynamic tests according to specific test conditions.

[1]For more detailed information, read Aircraft Accident Report--*Ryan Air Service, Inc., Flight 103, Beech Aircraft Corporation 1900C, N401RA, Homer, Alaska, November 23, 1987* (NTSB/AAR-88/11).
[2]Part 23--Small Airplane Airworthiness Review Program, Amendment No. 1., Federal Aviation Administration, Federal Register/Vol. 53, No. 157 / Monday, August 15, 1988.

Seats to be installed in the first row must successfully complete tests that subject the seat to a deceleration in the vertical direction that reaches a minimum peak of 19 Gs. in not more than 0.05 second. Other seats must be tested to a vertical deceleration minimum of 15 Gs. occurring in not more than 0.06 second. The vertical velocity change of the test article must not be less than 31 feet per second.

Seats to be installed in the first row must successfully complete tests that subject the seat to a deceleration in the longitudinal direction that reaches a minimum peak of 26 Gs. in not more than 0.05 second. Other seats must be tested to a deceleration in the longitudinal direction of 21 Gs. occurring in not more than 0.06 second. The change in velocity of the test article must not be less than 42 feet per second. Certain additional provisions must be included in these tests to account for airplane yaw and floor warpage.

The acceleration and velocity change calculations in this accident show that the crash loads generated in the vertical direction exceeded the new dynamic testing criteria of 14 CFR 23.562. Nevertheless, had the seats in this airplane been designed to the new standards, they may have been capable of withstanding the dynamic loads and structural distortions that occurred and probably would have dissipated more efficiently the energy generated in the accident. Thus, had these seats been designed to the new standards, the severity of the occupants' injuries may have been reduced and more passengers could have survived.

The rulemaking process to require dynamic testing of seats for airplanes certificated under 14 CFR Part 23 was initiated after the rulemaking process that proposed the establishment of commuter category airplane within the provisions of 14 CFR Part 23. However, the final action for the adoption of standards for the commuter category airplane was not complete when the Notice of Proposed Rulemaking to establish new seat/restraint standards for Part 23 airplanes was published. Therefore, the commuter category airplane with 19 passenger seats or less was not addressed in the final rule issued on August 15, 1988.

For the past 20 years, based on data collected during its accident investigations, the Safety Board has issued numerous recommendations to the FAA which require dynamic testing of aircraft seats. For a number of reasons, the FAA has rejected the Safety Board's recommendations. One reason cited was a lack of sufficient crash data even though the Board had amassed considerable crash data through numerous accident investigations over the years.

In 1983, the General Aviation Safety Panel (GASP), a government/industry group that included representatives of the General Aviation Manufacturers' Association, recommended specific test loads and velocity changes that formed the basis for the recent CFR Part 23 rule changes. The Safety Board provided to the GASP Committee crashworthiness data from its then on-going crashworthiness studies.[3] The Safety Board concurred with the GASP proposals, and in 1985 it recommended that the FAA adopt them.

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[3]Safety Reports--*General Aviation Crashworthiness Project: Phase Two--Impact Severity and Potential Injury Prevention in General Aviation Accidents* (NTSB/SR-85/01); and *Phase Three--Acceleration Loads and Velocity Changes of Survivable General Aviation Accidents (NTSB/SR-85/02).*

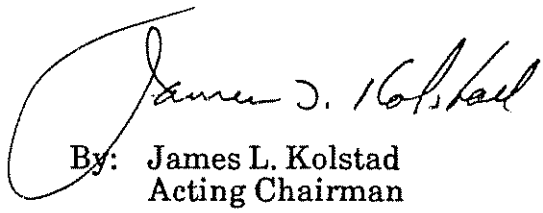
The Safety Board is disheartened that the FAA has delayed for two decades needed safety crashworthiness improvements in small airplanes and is just now addressing commuter category airplanes. However, the Safety Board is aware that the FAA has initiated a rulemaking project to address dynamic testing of seats for airplanes certificated in the commuter category (up to 19 seats), such as the Beech 1900. The Safety Board urges early completion of this project.

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

> Expedite the rulemaking project to provide for dynamic testing of seat/restraint systems for airplanes in the commuter category. (Class II, Priority Action) (A-88-158)

Also, as a result of its investigation, the Safety Board issued Safety Recommendation A-88-159 to the National Fire Protection Association.

KOLSTAD, Acting Chairman, and LAUBER, NALL, and DICKINSON, Members, concurred in this recommendation. BURNETT, Member, dissented.



By: James L. Kolstad
Acting Chairman