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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: December 8, 1977

Forwarded to:

Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-77-70 and 71

On June 16, 1977, the Federal Aviation Administration amended 14 CFR 23 and 91 to require the installation and use of shoulder harnesses on small general aviation aircraft. The amended airworthiness standards of 14 CFR 23 now require that front seats of general aviation aircraft be equipped with approved safety belts and shoulder harnesses, and the amended operating and flight rules of 14 CFR 91 require that shoulder harnesses be installed at each front seat location and be worn during takeoff and landing. These regulations, which become mandatory for flight crewmembers on all aircraft manufactured after July 18, 1978, represent a notable improvement to occupant safety.

Although the National Transportation Safety Board is encouraged by FAA's commitment to improving crash survivability, it believes that occupants of the existing fleet of fixed-wing general aviation aircraft -- over 164,000 active airplanes -- will be denied the level of protection afforded the occupants of aircraft manufactured after July 18, 1978. Furthermore, the occupants of seats other than front seats also will be denied the benefit of the impact protection afforded by shoulder harnesses.

For example, on December 2, 1976, a Beech-Debonair crashed near Glenville, New York. The aircraft cabin remained structurally intact, providing a survivable environment. However, the pilot was killed when he struck the control yoke; a broken rib punctured the pilot's heart. The Safety Board's investigation disclosed that seats did not fail and that, had the pilot been wearing a shoulder harness, upper torso rotation would have been reduced and the thoracic injury prevented.

On July 12, 1975, a Piper PA-28 crashed near Leadville, Colorado. Investigation revealed that the right front seat shoulder harness was inoperative and was not being worn by the occupant, who died when he struck the control yoke and instrument panel. The occupant of the left front seat was wearing a shoulder harness and survived. The aircraft maintained a survivable occupant environment.

More recently, on August 26, 1976, a Piper PA-28 crashed near Lake City, Colorado, and on March 30, 1976, a Cessna C-340 crashed near Ruidoso, New Mexico. These accidents were similar to those cited above, in that cabin integrity was maintained but front seat occupants were killed. Moreover, it is significant that, in the Lake City PA-28 accident, the two children in aft cabin seats were fatally injured. Our investigators noted that the front seats remained virtually intact, yet the two children received severe head injuries. The circumstances of these two accidents and the occupant injuries indicate that had the occupants been wearing shoulder harnesses they would have survived.

On August 28, 1970, the Safety Board recommended that the FAA require shoulder harnesses on all general aviation aircraft at the earliest practical date. When Notice of Proposed Rule Making (NPRM) 73-1 was issued, the Safety Board supported the proposed rule changes. However, during the rulemaking process, major portions of NPRM 73-1 were deleted. As a result, the amendments to 14 CFR 23 and 91 now require that shoulder harnesses be installed at front seat locations only and the amendments limit the requirement to aircraft manufactured after July 18, 1978. The argument against retrofitting existing general aviation aircraft with shoulder harnesses was based on the contention that a "substantial financial burden would be placed upon consumers over a short period of time" (1 year). Moreover, the installation of shoulder harnesses on other than front seats was rejected on the contention that cabin interiors can be effectively designed to protect those occupants; i.e., cabins can be "delethalized."

The Safety Board does not agree with these arguments and believes that shoulder harnesses should be installed in older aircraft and that they should be installed at all seat locations. The Safety Board believes that rejecting the retrofit aspects of NPRM 73-1 on the grounds that this would place a financial burden on consumers "over a short period of time" is not warranted. A compliance date could have been established which would have allowed aircraft owners ample time to comply without encountering a short-term financial burden. (Compliance for noise and emission standards are being handled in such a way.) Neither does the Safety Board believe that current cabin delethalization requirements will provide occupants of aft cabin seats protection comparable to occupants wearing shoulder harnesses. The Board maintains that cabin delethalization in conjunction with the use of shoulder harnesses will provide the occupants of all seats the best impact protection.

The Civil Aeronautical Authorities of both Sweden and Australia require shoulder harnesses on all general aviation airplanes before an airworthiness certificate is issued. This requirement has been in effect in Sweden since 1970 and Australia since 1973; the general aviation fleets of both countries largely consist of U. S. manufactured aircraft.

In view of the above, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Amend 14 CFR 23.785 to require installation of approved shoulder harnesses at all seat locations as outlined in NPRM 73-1. (Class II - Priority Action) (A-77-70)
>
> Amend 14 CFR 91.33 and .39 to require installation of approved shoulder harnesses on all general aviation aircraft manufactured before July 18, 1978, after a reasonable lead time, and at all seat locations as outlined in NPRM 73-1. (Class II - Priority Action) (A-77-71)

BAILEY, Acting Chairman, McADAMS, HOGUE, and KING, Members, concurred in the above recommendations.

Kay Bailey

By: Kay Bailey
Acting Chairman