



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

H-545B

Date: March 19, 1990
In reply refer to: H-89-55

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In 1977, a series of new and modified Federal Motor Vehicle Safety Standards (FMVSS) relating to school buses became effective, mandating different performance standards for school buses compared to other buses. Data on the crash performance of school buses built to these standards were lacking, so the National Transportation Safety Board conducted a series of accident investigations from 1984 to 1988 to determine how well the standards are working to protect passengers from injury and whether changes in the standards are needed. Two reports were planned because Federal standards and guidelines differentiate between school buses by size.

The first report, published in 1987, examined the crash performance of Type C and Type D school buses (the types commonly called large or Type I school buses) built to Federal school bus standards.^{1/} The Safety Board found, overall, that these large poststandard school buses provided excellent crash protection to their passengers but issued recommendations to further refine the safety of large school buses.

^{1/} National Transportation Safety Board. 1987. Safety study: Crashworthiness of large poststandard schoolbuses. NTSB/SS-87/01. Washington, DC. 300p.

The second report on school bus safety is now completed; it focuses on the crash performance of poststandard Type A and Type B school buses, the types referred to in some statistics as Type II or small school buses. The safety issues and the basis for the subsequent recommendations issued by the National Transportation Safety Board are discussed in detail in the report about the study.^{2/} A copy of the report is enclosed.

The Safety Board found that occupants of the small school buses built to Federal school bus standards generally fared well in the accidents investigated. Only 22 of the 167 passengers received more than a minor injury, but several safety shortcomings were identified.

Improper use and installation of restraints aboard these small school buses was one safety issue. In some cases, passenger lapbelts and other restraints had been installed or modified after initial purchase of the vehicle by employees of the school district or bus contractor in a manner inconsistent with Federal guidelines or standards for seatbelts, diminishing crash protection and increasing the potential to induce injury.^{3/} The misused restraints and incorrectly installed restraints are described in the report in the section on "Restraint Use" (p. 20-27) and in the case summaries in the report appendixes.

Examples of unusual restraints and installations included:

- Lapbelts shortened by looping over the webbing, punching a hole through the looped-over webbing, and then remounting the belt to the seat using a bolt.
- "Knots" in the webbing of lapbelts, in an attempt to shorten the belts. One belt was too long because it was anchored to the wheel well rather than to the floor on one side, adding 9 inches to the belt webbing (the wheel well was higher than the floor).

^{2/} National Transportation Safety Board. 1989. Safety study: Crashworthiness of small poststandard school buses. NTSB/SS-89/02. Washington, DC. 223p.

^{3/} The Type A school buses in the study originally were equipped by the manufacturer with lapbelts meeting Federal standards, as required by Federal regulations. The Type B school buses in the study were not required by Federal regulations to have factory-installed lapbelts; if lapbelts were installed by the school district, they did not have to meet Federal seatbelt standards.

- A mix of lapbelt types. Some lapbelts had pushbutton release latchplates, like those commonly found on passenger cars; others had lift-type release buckles like those in airplanes. This mix was found throughout the vehicle, even on the same bench seat.
- Jury-rigged restraints: one consisted of two lapbelt assemblies, joined together by two metal plates and secured with four bolts. The plates were exposed and the bolts protruded 1 3/8 inches. The restraint was looped around the junction of the seatback and seat cushion and was designed to be placed around three children. Two children shared this "loopbelt" and an unrestrained child sat next to them on the same bench seat.

The second restraint consisted of two belts: one was a form of shoulder strap and the other a large "loopbelt." The shoulder strap was wrapped horizontally around the seat; the other belt was placed over it, like a large lapbelt encircling the seat. The lap portion of the restraint fit across the occupant's upper torso.

Neither restraint was anchored to the seat frame or floor: they were merely wrapped around the seat frames.

The modified lapbelts and jury-rigged restraints provided school bus passengers with a degraded level of protection at best. Moreover, some of them exposed the occupant to danger of injury from the belt itself, as in the loopbelt held together by a metal plate with exposed bolts. The unrestrained child seated on the bench seat next to the two children encircled by this belt could have been harmed in an accident by contact with the metal plate and protruding bolts. The children within the loopbelt also were in danger of injury caused by their bodies slipping around in this large belt and interacting forcefully with one another. Moreover, because the loopbelt was not secured to the seat or floor, it could move upward, beyond the children's chests, and position itself near the neck.

Even when restraints were properly installed, they were not necessarily worn correctly. The school bus drivers and passengers in the study sometimes did not wear their seatbelts properly. The most common mistake was failure to adjust the manual lapbelt to fit snugly. Almost one-third of the lapbelted passengers were wearing their belts improperly.

A loosely worn lapbelt cannot provide the same level of protection as a snugly worn belt and exposes the occupant to injury: in the Safety Board's cases, passengers slipped out from the restraint in a crash, incurring injuries from contact with components of the vehicle interior normally not reachable. Loose fit also increases the chance of ejection, and an occupant with a loosely fitted lapbelt may be at more risk of abdominal or spinal injury.

Other forms of misuse included: large belts formed by joining the latchplate of the aisle-side lapbelt with the latchplate of the lapbelt at the window seating position, and students who, to give the appearance of being belted, inserted the lapbelt latchplate into the buckle, but not far enough to engage the buckle. Vandalized lapbelts and lapbelts stowed underneath the bottom seat cushions, and therefore unusable, were also seen in the Safety Board's cases.

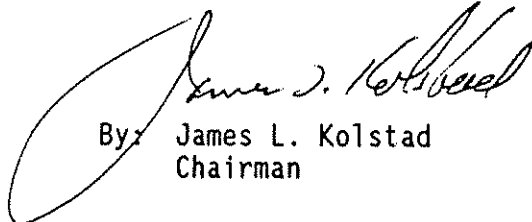
Therefore, as a result of its study, the National Transportation Safety Board recommends that the National Association of State Directors of Pupil Transportation, the National Association of Pupil Transportation, and the National School Transportation Association:

Alert your members to the dangers inherent in improper installation of seatbelts and/or installation of restraint systems not meeting Federal standards or guidelines in school buses and urge them to correct such installations. Also alert your members of the need to instruct students to wear lapbelts properly. (Class II, Priority Action) (H-89-55)

Also as a result of the safety study, the National Transportation Safety Board issued Safety Recommendations H-89-46 through -52 to the National Highway Traffic Safety Administration, and H-89-53 and -54 to members of the School Bus Manufacturers Institute and manufacturers of van conversion school buses.

The National Transportation Safety Board is an independent Federal agency with statutory responsibility "...to initiate and conduct special studies and special investigations on matters pertaining to safety in transportation..." (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendation in this letter. Please refer to Safety Recommendation H-89-55 in your reply.

KOLSTAD, Chairman, BURNETT, LAUBER, NALL, AND DICKINSON, Members concurred in this recommendation.


By: James L. Kolstad
Chairman