

NATIONAL TRANSPORTATION SAFETY BOARD
Public Meeting of September 1, 2009
(Information subject to editing)

Highway Special Investigation Report
Pedal Misapplication in Heavy Vehicles
(SIR-09/XX)

This is a synopsis from the Safety Board's report and does not include the Board's rationale for the conclusions, probable cause, and safety recommendations. Safety Board staff is currently making final revisions to the report from which the attached conclusions and safety recommendations have been extracted. The final report and pertinent safety recommendation letters will be distributed to recommendation recipients as soon as possible. The attached information is subject to further review and editing.

SUMMARY

In May 2005, the National Transportation Safety Board (NTSB) began its investigation of a school bus accident that occurred in Liberty, Missouri. During the course of the investigation, information was uncovered that suggested pedal misapplication as a factor in the accident—that is, depressing the accelerator instead of, or in addition to, the brake pedal.

The NTSB subsequently investigated four additional accidents involving heavy vehicles in which pedal misapplication was determined to be a factor. (See appendix A.) Despite varying circumstances, these five accidents share common elements. In all five, the drivers either reported a loss of braking or were observed by vehicle occupants to be unsuccessfully attempting to stop the vehicles, though no evidence of braking system failure was found.

Pedal misapplication is not a new phenomenon. In a 1989 study using light vehicles, the National Highway Traffic Safety Administration (NHTSA) concluded that pedal misapplication is the most probable explanation for sudden acceleration in which no vehicle malfunction is evident; and, in cases where vehicle malfunctions occur, pedal misapplications are often the direct cause of high engine power.¹

One of the recommendations of the NHTSA study was to install brake transmission shift interlock (BTSI) devices, which require the driver to apply the brakes to shift the transmission out of the "park" position—thus precluding inadvertent and unintentional application of motive power at the time of vehicle startup. As manufacturers began to voluntarily install interlock devices, the occurrences of sudden acceleration sharply decreased. Comparisons of the same model vehicle with and without a BTSI device showed a 60 percent reduction in sudden acceleration complaints for the interlock-equipped model.² In July 2006, NHTSA stated that

¹ *An Examination of Sudden Acceleration*, DOT HS 807 367 (Washington, DC: U.S. Department of Transportation, National Highway Traffic Safety Administration, 1989).

² DOT HS 807 367.

80 percent of model year 2006 motor vehicles³ were being equipped with interlock devices. Currently, all model lines appear to be equipped with BTSI devices. The focus of recent legislation⁴ is strictly on motor vehicles weighing less than 10,000 pounds. Heavy vehicles are not required to have BTSIs.

Despite the efforts of the NTSB, NHTSA, and others, unintended acceleration incidents attributed to pedal misapplication continue to occur. Such accidents warrant serious attention because they can be so injurious. To date, both the NTSB and NHTSA have focused on passenger cars. However, as the accidents discussed in this report demonstrate, pedal misapplication can occur in heavy vehicles as well as light vehicles. Any vehicle operated by a driver is susceptible to the loss of control caused by human error.

The NTSB has investigated both light and heavy vehicle sudden acceleration accidents. In 1997, the NTSB investigated a Normandy, Missouri, accident involving a transit bus.⁵ The bus driver had just discharged passengers when the bus accelerated into pedestrians, resulting in four fatalities. In 2003, the NTSB investigated an accident in Santa Monica, California, in which a passenger car accelerated into a farmers' market, resulting in 10 fatalities.⁶ The Board concluded that pedal misapplication was the probable cause in both of these accidents.

This special investigation report summarizes the NTSB's recent investigative work on unintended acceleration incidents; reviews previous work on pedal misapplication; examines the potential benefits and challenges of BTSI devices, pedal design, positive separation, and event data recorders (EDRs) with respect to pedal misapplication in heavy vehicles; and presents recommendations to prevent or mitigate the consequences of pedal misapplication involving heavy vehicles.

CONCLUSIONS

1. Neither the licensing nor the training of the Liberty, Missouri, driver contributed to the accident, and neither drugs nor alcohol impaired the driver's performance.
2. The Liberty, Missouri, accident cannot be attributed to a mechanical failure of the school bus.
3. The circumstances of the Liberty, Missouri, accident are consistent with driver pedal misapplication.
4. Neither the licensing nor the training of the Falls Township, Pennsylvania, driver was a factor in the accident, and neither drugs nor alcohol impaired the driver's performance.

³ NHTSA defined motor vehicles as passenger cars, light trucks, multipurpose vehicles (minivans), and buses produced for the U.S. market with a gross vehicle weight rating (GVWR) up to 10,000 pounds.

⁴ Cameron Gulbransen Kids Transportation Safety Act of 2007, H.R. 1216, 110th Congress, 2nd Session (2008).

⁵ *Bus Collision With Pedestrians, Normandy, Missouri, June 11, 1997*, Highway Accident Summary Report NTSB/HAR-98/01/SUM (Washington, DC: National Transportation Safety Board, 1998).

⁶ *Rear-End Collision and Subsequent Vehicle Intrusion Into Pedestrian Space at Certified Farmers' Market, Santa Monica, California, July 16, 2003*, Highway Accident Report NTSB/HAR-04/04 (Washington, DC: National Transportation Safety Board, 2004).

5. The Falls Township, Pennsylvania, accident cannot be attributed to a mechanical failure of the school bus.
6. The circumstances of the Falls Township, Pennsylvania, accident are consistent with driver pedal misapplication.
7. The Falls Township, Pennsylvania, driver's unfamiliarity with the school bus contributed to the occurrence of pedal misapplication.
8. Pedal misapplication was the initiating event in the accidents in Asbury Park, New Jersey; Nanuet, New York; and Newtown, Pennsylvania.
9. A brake transmission shift interlock device would have prevented the accidents in Falls Township, Pennsylvania; Asbury Park, New Jersey; and Newtown, Pennsylvania.
10. Given the demonstrated benefits of brake transmission shift interlock systems in passenger cars and the fact that the mechanisms that cause pedal misapplications are dependent on the human driver and are, therefore, similar in both light and heavy vehicles, requiring interlock devices in heavy vehicles susceptible to pedal misapplication would provide a safety benefit by reducing such instances and unintended acceleration.
11. The Falls Township, Pennsylvania, and Nanuet, New York, accidents demonstrate that unfamiliarity with the pedal configuration of an alternate bus may lead to error and pedal misapplication.
12. Given the variability in results of experiments on pedal design, there is no consensus on the role of pedal design in pedal misapplication and unintended acceleration.
13. The nature of the bus loading and unloading activities at schools creates a situation where an errant vehicle, such as one experiencing an unintended acceleration, could easily strike pedestrians.
14. Event data recorders would provide essential and specific information regarding the causes and mechanisms of pedal misapplication and unintended acceleration in heavy as well as light vehicles.

PROBABLE CAUSE

Liberty, Missouri, Accident

The National Transportation Safety Board determines that the probable cause of the Liberty, Missouri, accident on May 9, 2005, was a pedal misapplication by the school bus driver.

Falls Township, Pennsylvania, Accident

The National Transportation Safety Board determines that the probable cause of the January 12, 2007, accident in Falls Township, Pennsylvania, was a pedal misapplication by the driver. Contributing to the occurrence of pedal misapplication was the driver's unfamiliarity with the school bus.

RECOMMENDATIONS

New Recommendations

As a result of the investigation of the five accidents covered in this special investigation report, the National Transportation Safety Board makes the following safety recommendations:

To the National Highway Traffic Safety Administration:

1. Require the installation of brake transmission shift interlock systems or equivalent in newly manufactured heavy vehicles with automatic transmissions and other transmissions susceptible to unintended acceleration associated with pedal misapplication when starting from a parked position. (H-09-XX)
2. Analyze pedal configurations in heavy vehicles, including innovative designs, to determine the effect of pedal design on the driving task, examining—among other things—pedal error, reaction time, driver acceptance, and driver adaptation. (H-09-XX)
3. Once the analysis of pedal configurations requested in Safety Recommendation [2] is complete, publish pedal design guidelines for designers and manufacturers. (H-09-XX)

To the National Association of State Directors of Pupil Transportation Services and to the National Association for Pupil Transportation:

4. Advise your members—through your newsletters, website, and conferences—of the following safety issues: (1) the risk of pedal misapplication and the need to educate school bus drivers about such incidents, and the need to develop and implement plans to ensure that school bus drivers undergo annual refamiliarization training on all bus types that they might drive; and (2) the risk of unintended acceleration during loading and unloading activities, as exemplified by the Falls Township, Pennsylvania, accident on January 12, 2007; and suggest possible mitigation strategies, such as installing bollards or starting buses only after loading is complete. (H-09-XX)

Previously Issued Recommendations Reiterated and Reclassified in This Report

The National Transportation Safety Board reiterates and reclassifies Safety Recommendations H-99-53 and -54. These two recommendations, previously classified “Open—Acceptable Response,” are reclassified “Open—Unacceptable Response” in the “Highway Vehicle Event Data Recorders” section of this report.

To the National Highway Traffic Safety Administration:

Require that all school buses and motorcoaches manufactured after January 1, 2003, be equipped with on-board recording systems that record vehicle

parameters, including, at minimum, lateral acceleration, longitudinal acceleration, vertical acceleration, heading, vehicle speed, engine speed, driver's seat belt status, braking input, steering input, gear selection, turn signal status (left/right), brake light status (on/off), head/tail light status (on/off), passenger door status (open/closed), emergency door status (open/closed), hazard light status (on/off), brake system status (normal/warning), and flashing red light status (on/off) (school buses only). For those buses so equipped, the following should also be recorded: status of additional seat belts, airbag deployment criteria, airbag deployment time, and airbag deployment energy. The on-board recording system should record data at a sampling rate that is sufficient to define vehicle dynamics and should be capable of preserving data in the event of a vehicle crash or an electrical power loss. In addition, the on-board recording system should be mounted to the bus body, not the chassis, to ensure that the data necessary for defining bus body motion are recorded. (H-99-53)

Develop and implement, in cooperation with other government agencies and industry, standards for on-board recording of bus crash data that address, at a minimum, parameters to be recorded, data sampling rates, duration of recording, interface configurations, data storage format, incorporation of fleet management tools, fluid submersion survivability, impact shock survivability, crush and penetration survivability, fire survivability, independent power supply, and ability to accommodate future requirements and technological advances. (H-99-54)

Previously Issued Recommendation Reclassified in This Report

The National Transportation Safety Board reclassifies Safety Recommendation H-98-6 from its current classification of "Open—Await Response" to "Closed—Unacceptable Action/No Response Received" in the "Positive Separation" section of this report.

To the Community Transportation Association of America:

Ensure, in cooperation with the Federal Highway Administration, the Federal Transit Administration, the American Association of State Highway and Transportation Officials, and the American Public Transit Association, that future transit facility designs incorporating "saw-tooth" bus parking bays, or other types of designs that direct errant vehicular traffic toward pedestrian-occupied areas, include provisions for positive separation between the roadway and pedestrian areas sufficient to stop a bus operating under normal parking area speed conditions from progressing into the pedestrian area. (H-98-6)