



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 25, 2001

In reply refer to: H-01-12 through -14

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The National Transportation Safety Board is an independent Federal agency charged by Congress with investigating transportation accidents, determining their probable cause, and making recommendations to prevent similar accidents from occurring. We are providing the following information to urge your organization to take action on the safety recommendations in this letter. The Safety Board is vitally interested in these recommendations because they are designed to prevent accidents and save lives.

These recommendations address informing the public and commercial drivers about, and training commercial operators in, the technological solutions for the prevention of rear-end collisions. The recommendations are derived from the Safety Board's special investigation report *Vehicle- and Infrastructure-Based Technology for the Prevention of Rear-End Collisions*¹ and are consistent with the evidence we found and the analysis we performed. As a result of this investigation, the Safety Board has issued 11 safety recommendations, 3 of which are addressed to truck and automobile manufacturers. Information supporting the recommendations is discussed below. The Safety Board would appreciate a response from you within 90 days addressing the actions you have taken or intend to take to implement our recommendations.

Although requiring the use of the collision warning system (CWS) is critical, consumer acceptance of the technology is equally critical. For example, educating the public of the benefits

¹ For more information, read: National Transportation Safety Board, *Vehicle- and Infrastructure-Based Technology for the Prevention of Rear-End Collisions*, Special Investigation Report NTSB/SIR-01/01 (Washington, DC: NTSB, 2001).

of seat belts has been as important as equipping the vehicles with or requiring the use of seat belts. The U.S. Department of Transportation (DOT) study on consumer acceptance of various automotive technologies reported that drivers, particularly older drivers, were enthusiastic about the adaptive cruise control (ACC) and the CWS, but were wary of how they operated and their reliability. While only 43 percent of the drivers surveyed would purchase an ACC system, 98 percent of drivers who actually drove with an ACC in the field operational test said they would purchase the system. Some drivers may be wary of new technology before using it; when air bags were first employed, people were initially apprehensive. To educate the public, the DOT and Allstate Insurance Company sponsored a demonstration of air bags using crash dummies.² The exhibit traveled to 100 cities over a 3-year period beginning in 1990. The purpose of the exhibit, according to Allstate's chairman and chief executive officer, was to "encourage consumers to purchase cars with air bags because we know they save lives and reduce injuries." A similar program could be developed to educate the public on the safety benefits of the CWS. The average driver, whether a passenger car or commercial vehicle driver, does not know what actually exists in the way of Intelligent Transportation Systems and has never experienced what it is like to drive with some of these technologies.³

From August 31 through September 2, 1999, the Safety Board held the public hearing Advanced Safety Technologies for Commercial Vehicle Applications.⁴ In discussing what the Government can do to promote the implementation of technology at the public hearing, a trucking company representative said that the Government could provide more information on the technologies, so that the data presented by the manufacturers is not suspect (consumers may think the manufacturer is just trying to sell something). He added that electronics in trucks is still relatively new and that consumers are not yet completely comfortable with it. If the Government would publish solid data on the benefit of a certain technology and the benefits of multiple technologies, the trucking industry may be more apt to adopt the electronics. Transmitting this information to the public is crucial to the acceptance of the ACC and the CWS technologies. The Safety Board has concluded that information concerning the use and benefits of effective CWSs and ACCs is critical to their acceptance by the driving public.

The object of training is to ensure that specific skills or procedures are learned. Training can occur through verbal instruction, demonstration, guidance, practice,⁵ or the use of videos or computers. Training is one of the standard methods used to aid people in acquiring safe behavioral practices.⁶

According to the president of U.S. Xpress Enterprises, Inc., that company provides its drivers with extensive training on all the technologies that are employed in its trucks. For example, a driver will receive orientation on the ACC so he understands what happens if the

² Insurance Institute of Highway Safety, *IHS Status Report*, Volume 25, Number 10 (Arlington, VA: November 17, 1990).

³ Michael A. Regan, Claes Tingvall, David Healy, and Laurie Williams, "Trial and Evaluation of Integrated In-Car ITS Technologies: Report on an Australian Research Program," *Seventh World Congress on Intelligent Transport Systems, November 5-9, 2000, Turin, Italy*.

⁴ National Transportation Safety Board, Docket No. DCA-99-FH-002.

⁵ Gavriel Salvendy, ed., *Handbook of Human Factors* (New York: John Wiley and Sons, Inc., 1987).

⁶ Mark S. Sanders and Ernest J. McCormick, *Human Factors in Engineering and Design*, 7th ed. (McGraw Hill, Inc., 1993).

truck begins to slow down, why the truck is slowing (because a vehicle is ahead), and how the driver should react. Recurrent training is also provided and is considered by U.S. Xpress to be necessary for drivers to be successful and to understand the technology.

Training has been provided in the operational tests that have been conducted to date with the ACC or the CWS. In the ACC operational test conducted by the National Highway Traffic Safety Administration and the University of Michigan Transportation Research Institute in 1996 and 1997, the drivers received a limited introduction to the functions and capabilities of the system. This understanding allowed the drivers to use the ACC in the manner for which it was intended and made them aware of the necessity of intervening when harder braking was necessary.⁷ The drivers surveyed during a U.S. Army field test believed that training was imperative because the systems were not intuitive without training.⁸

A July 1991 accident investigated by the Safety Board demonstrates the necessity of training on new technologies. A 1989 school bus, descending a two-lane roadway near Palm Springs, California, increased speed, left the road, plunged down an embankment and collided with several large boulders. The busdriver and 6 passengers were killed, and 47 other passengers were injured.⁹ The bus engine was equipped with a then-new automatic upshift overspeed protection feature¹⁰ to prevent engine and transmission damage. While information on this feature was provided in the operator manual for the transmission, neither the training coordinator nor the busdriver's behind-the-wheel instructor had seen the operator manual, and the instructor was not aware of the automatic upshift capability. The busdriver training program did not discuss the upshift feature. The Safety Board concluded that although the automatic transmission upshift feature did not cause or contribute to this accident, an upshift occurrence may be the first warning that the transmission can no longer help maintain speed control and immediate action must be taken to reduce speed to effect a downshift back to the desired gear range. The Safety Board advised that the training curriculum be expanded to include automatic transmission upshift characteristics and proper operation in mountainous terrain.

The importance of training cannot be overstated, based on the experience of U.S. Xpress, the operational tests, and previous Safety Board accident investigations. Training is critical to the understanding of complex technical system functionalities so that drivers can respond adequately when the technology is in use. The Safety Board has concluded that commercial drivers need to be oriented to the use of CWSs and ACCs in order to understand system capabilities, how the driver interface works, and how the system functions. Commercial vehicle drivers receive training and refresher courses throughout their driving career. These courses provide an opportunity for drivers to learn about new safety technologies that are incorporated into their vehicles.

⁷ U.S. Department of Transportation, *Intelligent Cruise Control Field Operational Test Final Report, May 1998*, DOT-HS-808-849 (Springfield, VA: NTIS).

⁸ K. Luckscheiter, "National Automotive Center Collision Warning Safety Convoy," *U.S. Army Tank-Automotive and Armaments Command* (Warren, Michigan: September 1996).

⁹ National Transportation Safety Board, *Mayflower Contract Services, Inc., Tour Bus Plunge From Tramway Road and Overtum Crash Near Palm Springs, California, July 31, 1991*, Highway Accident Report NTSB/HAR-93/01 (Washington, DC: NTSB, 1993).

¹⁰ This feature upshifts the transmission to the next higher gear if the vehicle momentum on a downgrade drives the engine beyond its maximum governed rpm setting. The engine also cannot be downshifted until the speed is brought into the gear's speed range.

Therefore, the National Transportation Safety Board recommends that the truck and automobile manufacturers:

Develop and implement, in cooperation with the National Highway Traffic Safety Administration, the Federal Highway Administration, the Intelligent Transportation Society of America, and automobile manufacturers, a program to inform the public and commercial drivers on the benefits, use, and effectiveness of collision warning systems and adaptive cruise controls. (H-01-12)

Develop a training program for operators of vehicles equipped with a collision warning system or an adaptive cruise control and provide this training to the vehicle operators. (H-01-13)

Develop and implement, in cooperation with the National Highway Traffic Safety Administration, the Federal Highway Administration, the Intelligent Transportation Society of America, and the truck and motorcoach manufacturers, a program to inform the public and commercial drivers on the benefits, use, and effectiveness of collision warning systems and adaptive cruise controls. (H-01-14)

The Safety Board also issued safety recommendations to the U.S. Department of Transportation; the National Highway Traffic Safety Administration; the Federal Highway Administration; motorcoach manufacturers; the Intelligent Transportation Society of America; the American Trucking Associations, Inc.; the Owner-Operator Independent Driver Association; and the National Private Truck Council. In your response to the recommendations in this letter, please refer to H-01-12 through -14. If you need additional information, you may call (202) 314-6440.

Acting Chairman CARMODY and Members HAMMERSCHMIDT, GOGLIA, and BLACK concurred in these recommendations.

[original signed]

By: Carol J. Carmody
Acting Chairman