



# National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Log H-525

Date: December 12, 1988

In reply refer to: H-88-30

Honorable Diane K. Steed  
Administrator  
National Highway Traffic  
Safety Administration  
Washington, D.C. 20590

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Truck safety on the nation's highways is a top priority at the National Transportation Safety Board. The Safety Board has had a longstanding commitment to reduce losses from all highway traffic accidents, and it is particularly concerned about accidents involving heavy trucks.

The Safety Board's most recent contribution to improving truck safety, in addition to its regular ongoing highway accident investigation program, has been a series of heavy truck safety studies dating from 1985. The first study focused on the training, licensing, and qualification standards for truck drivers.<sup>1</sup> Phase I of the second study focused on operational issues and was conducted from 1985 to 1987.<sup>2</sup> In this study, the Safety Board focused on 32 cases that involved heavy trucks with brake problems. One of the most prevalent vehicle-related safety issues in these 32 accidents was out-of-adjustment brakes.

Determining the extent of the brake system-related safety problem nationwide is difficult because there is a general lack of basic truck safety data nationwide. The only available information on the mechanical condition of nonaccident-involved trucks on the road is derived from Federal and State roadside inspections. In the past, this information could not be used to estimate the nationwide scope of mechanical deficiencies because the proportion of trucks being inspected was small (and was limited primarily to interstate trucks only) and because the trucks chosen for inspection were usually selected by the inspector because the truck appeared to be in poor mechanical condition. Thus, the findings from these inspections could not be assumed to be representative of the heavy truck population as a whole.

Even agreement on the number of accidents involving trucks is lacking. For example, in 1984, the National Safety Council reported 6.1 million accidents involving trucks, the National Highway Traffic Safety Administration (NHTSA)

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<sup>1</sup>Safety Study--*Training, Licensing, and Qualification Standards for Drivers of Heavy Trucks, April 1986 (NTSB/SS-86/02).*

<sup>2</sup>For more detailed information, read Safety Study--*Braking Deficiencies on Heavy Trucks in 32 Selected Accidents, November 22, 1988 (NTSB/SS-88/06).*

reported 364,000, and the Federal Highway Administration (FHWA) reported 37,000. The figures vary depending on the definition of a truck and the source of the accident information.

Although the Safety Board was unable to compare its findings to larger data bases for these reasons, its findings are consistent with previous Safety Board work and with data published by the NHTSA.

On June 23, 1978, the Safety Board issued the following recommendation to the NHTSA:<sup>3</sup>

H-78-48

Develop a Federal Motor Vehicle Safety Standard stating a performance requirement for all newly manufactured commercial vehicles to have equipment that would insure brakes being in proper adjustment at all times.

In the letter transmitting this Safety Recommendation to the NHTSA, the Safety Board stated:

Although the adjustment of air brakes is a relatively simple mechanical task, it appears that industry cannot be relied upon to implement the periodic inspections and routine maintenance necessary to detect and correct maladjusted brakes. The Safety Board is reluctant to recommend mandatory new hardware for brakes. However, repeated failures to inspect and maintain brakes properly have compelled consideration of such a solution. Automatic brake adjustment capability has the potential of insuring maximum brake performance at all times, not just in downhill speed-control situations. Improved axle by axle, and laterally, wheel by wheel, brake balance and timing will be enhanced with assured brake adjustment.

The wording of the recommendation was purposefully left in general terms, and the term "slack adjuster"<sup>4</sup> was not used because the Safety Board knew that the technology for this device for highway vehicles was not yet developed to the point that

<sup>3</sup>Several of the Safety Board accident cases that led to Safety Recommendation H-78-48 were downhill runaways in which a "domino effect" occurred in the braking systems; with some brakes out of adjustment, those still in adjustment overheated and lost effectiveness. This is the same phenomenon observed in some of the accidents in the Safety Board's heavy truck study.

<sup>4</sup>An automatic slack adjuster is a device with a built-in adjustment feature that maintains the cold static pushrod stroke at the vehicle manufacturer's recommended minimum level. In the cam brake, the air chamber pushrod applies linear force to the slack adjuster which converts the force into a rotary torque. The slack adjuster is attached to a cam shaft that connects with a cam located between the brakeshoes. During brake application, the cam shaft rotates and turns the cam forcing the brakeshoes equally against the brake drum. The friction generated between the brakeshoe linings and the brake drum provides the retarding force necessary to slow or stop the vehicle. The slack adjuster is equipped with an adjustment device that allows it to be repositioned automatically in relation to the cam shaft so that pushrod travel can be altered to coincide with wear in the brakeshoe lining.

they could be required immediately. The Safety Board was aware that a study of some length would have to be carried out before fulfilling the intent of Safety Recommendation H-78-48.

The most current NHTSA response to Safety Recommendation H-78-48 is a March 25, 1987 letter stating that a multi-year research program on self-adjusting brakes, begun in 1979, would be completed in 1987. The letter also said:

Early results of the current research on in-use performance of large truck brake adjusters show that the state-of-the-art in design and performance is not as well advanced as those brake adjuster systems now in use on passenger cars and light trucks.

The Commercial Vehicle Safety Alliance (CVSA), of which 41 states and 10 Canadian provinces are now members, has become a major force encouraging the increased use of automatic slack adjusters. As part of CVSA state inspections, specifications for air chamber brake rod stroke length have been developed and were recently adopted by the Office of Motor Carrier Standards for incorporation into the Federal Motor Carrier Safety Regulations.

The National Highway Traffic Safety Administration anticipates that two major truck manufacturers will make automatic brake adjusters standard as a result of their recent studies. Because of competitive pressure in the large truck market to increase safety and reliability, both vehicle manufacturers and fleet owners are expected to move toward making automatic adjusters standard equipment without Federal rulemaking.

We are continuing to monitor the situation, and have shared the results of our research with manufacturers to aid them in improving the performance of their products. When the current research program is completed this year, we will be in a better position to determine the next course of action.

The Safety Board replied to the NHTSA on July 9, 1987:

We appreciate the information concerning the development of automatic slack adjusters for heavy vehicles and NHTSA's action to monitor the research related to this recommendation. We also understand that, in lieu of Federal rulemaking, many vehicle manufacturers and fleet owners will take positive steps toward making automatic adjusters standard equipment. The Safety Board is currently engaged in collecting data for a safety study of heavy trucks. We, therefore, propose to classify Safety Recommendation H-78-48 as "Open--Acceptable Alternate Action" pending a determination as to whether use of automatic slack adjusters remains a safety problem which appears to continue to require regulatory action.

The NHTSA has been monitoring the use of automatic slack adjusters in nine fleets (179 vehicles) throughout the country. According to the NHTSA, performance among different brands varied, but overall, most automatic slack adjusters performed well. While the completed report has not yet been published, it is expected to strongly support the safety enhancement to be gained by using slack adjusters.

Based on the NHTSA effort, the Safety Board has classified Safety Recommendation H-78-48 "Closed--Superseded," and it will issue a new recommendation that is more specific.

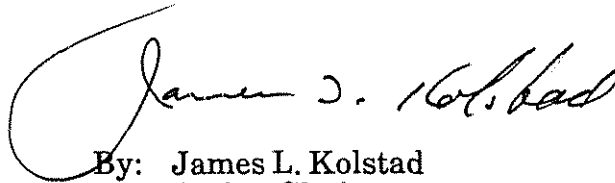
Safety Recommendation H-81-1 was issued to the NHTSA as a result of an investigation of a tractor-semitrailer accident in Pittsburgh, Pennsylvania, on April 28, 1980. Safety Recommendation H-81-1 asked the NHTSA to place a higher priority on Safety Recommendation H-78-48 and to "require manufacturers of air brake actuation devices to incorporate indicators which will warn users when brakes must be adjusted." In its recommendation letter, the Safety Board also stated that it was concerned about the February 22, 1980 Advance Notice of Proposed Rulemaking regarding the long-range research objective on automatic brake adjustments. The NHTSA still has not published the results of the long-term research program but expects to do so soon. In light of the recommendations being issued to the American Trucking Associations and the National Private Truck Council on brake adjustments and airbrake actuation devices, Safety Recommendation H-81-1 has been reclassified "Closed--Superseded."

Therefore, the National Transportation Safety Board recommends that the National Highway Traffic Safety Administration:

Publish a final rule by June 1990 that will require automatic slack adjusters on all new trucks equipped with air/mechanical brake systems. (Class II, Priority Action) (H-88-30)

Also, the Safety Board issued Safety Recommendations H-88-31 and -32 to the National Private Truck Council and the American Trucking Associations, Inc.

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



By: James L. Kolstad  
Acting Chairman