

Log H-566



National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: June 26, 1992

In Reply Refer To: H-92-50 through -55

Mr. Frederick H. Grubbe
Acting Administrator
National Highway Traffic Safety Administration
Washington, D.C. 20590

In accidents investigated by the National Transportation Safety Board, numerous brake deficiencies are cited as causal or contributing factors. Although the Safety Board has recommended changes to address these recurring problems, brake system deficiencies continue to be factors in accidents. In 1989, the Safety Board began a study to determine the effectiveness of airbrake systems on heavy trucks and buses. This study focuses on brake system issues, highlights potential problems, and makes recommendations that address the systemic problems associated with heavy vehicle brake-related accidents.¹

A serious deficiency found by this study was out-of-adjustment brakes. In 1981, the Safety Board issued Recommendation H-81-1 to the National Highway Traffic Safety Administration (NHTSA) requiring manufacturers of airbrake actuation devices to incorporate indicators that will warn users when brakes must be adjusted. In 1988, the Safety Board issued Recommendation H-88-30 to the NHTSA that automatic slack adjusters be required on all newly manufactured vehicles equipped with air-mechanical brakes. As a result, the NHTSA published a Notice of Proposed Rulemaking in May 1991 to amend the Federal Motor Vehicle Safety Standards to include these requirements. If adopted, the amended standard will help carriers and drivers to keep their vehicle brakes in proper adjustment.

However, now the Safety Board believes that the requirement should be amended further to require that the adjustment indicator be able to display the brake adjustment condition with the brakes in an unapplied position. The indicator that remains visible after release would allow one person to walk around a vehicle

¹For more detailed information, read Safety Study--*Heavy Vehicle Airbrake Performance* (NTSB/SS-92/01).

and visually check the brake adjustment. Most current adjustment indicators (such as pushrod marking) generally require two people to perform this task: one to apply the brakes and the other to watch the indicators.

This study also identified automatic limiting valves installed on steering axles as a contributing factor in truck accidents. Further, the Safety Board's inspections of heavy truck brakes show that this condition is not a rare or isolated occurrence.

The Safety Board's five-State inspection project revealed that 33 percent of the five-axle combination vehicles inspected on the interstate system and 47 percent on the off-interstate system had an automatic limiting valve installed on the steering axle brakes. (These percentages reflect only those tractors with brakes installed on the steering axles.) However, numerous NHTSA studies and published reports agree that automatic limiting valves result in increased stopping distances and in some instances, dynamic instability.

With respect to stopping distances, the Safety Board believes, based on its review of current Federal regulations for new vehicles, that Federal regulations should be upgraded to stipulate stopping distances for air-braked vehicles, both in straight and curved sections of roadway, and particularly under light load or variant friction conditions. However, the Safety Board believes that any new standards should require the use of an antilock system.

During the course of its investigations, the Safety Board identified six accidents that involved an unstable situation. Each of these accidents was analyzed using the UMTRI Phase 4 computer simulation. In every simulated case, adding an antilock system to the drive axles of the vehicle eliminated the instability and allowed the driver to avoid the accident.

The Safety Board realizes that an antilock system is no substitute for a preventative maintenance program; however, in many situations, the antilock braking system can get a driver out of trouble when the driver makes an error in judgment or has a lapse in attention or when there are minor maintenance problems.

Another issue examined by the study was the practicality of conducting stopping tests during routine roadside inspections. Most existing inspection facilities do not have enough space to conduct any type of stopping performance test. During its heavy vehicle inspections, the Safety Board observed that many facilities had only limited space to park a few out-of-service vehicles. While most facilities could set aside the 40 feet needed for the actual stop, few have the distance necessary for acceleration and turn-around. In addition, the Safety Board believes that most drivers would be hesitant to subject their vehicles and loads to the demands of an emergency stop from any speed.

The Safety Board believes that the braking performance of in-service vehicles could be evaluated better and more safely by means other than a full-scale vehicle stop. For example, the technology exists to develop relatively inexpensive roller dynamometers for installation at roadside inspection facilities. The Safety Board believes that a dynamometer capable of measuring brake force at each axle would enable an inspector to isolate deficiencies within the braking system that could lead to unbalanced braking and vehicle instabilities. Any brake force values measured by the dynamometer could be converted to a braking efficiency value that inspectors could use in deciding if a vehicle should be placed out of service. The advantage of

using a dynamometer is that force and efficiency values are calculated for a vehicle's actual loading and maintenance conditions. This device could simplify an evaluation of braking system component performance and has the advantage of not subjecting the vehicle, cargo, or inspection personnel to the rigors of stopping tests.

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

Require that air-braked vehicles be equipped with visible adjustment indicators that will allow one person to check the level of adjustment. (Class II, Priority Action) (H-92-50)

Expedite the proposed rulemaking to require automatic adjusters on vehicles equipped with airbrake systems. (Class II, Priority Action) (H-92-51)

Adopt braking performance regulations that restrict the general use of automatic limiting valves on steering axle brakes of vehicles equipped with airbrake systems. (Class II, Priority Action) (H-92-52)

Adopt performance standards for vehicles equipped with airbrake systems that require stopping performance criteria on varying friction surfaces with varying loading conditions for both straight and curved sections of roadways. (Class II, Priority Action) (H-92-53)

Require through a performance standard the use of antilock braking systems on all newly manufactured vehicles with airbrake systems. (Class II, Priority Action) (H-92-54)

Promote, in conjunction with the Federal Highway Administration, the development and use of hardware, such as the roller dynamometer, capable of measuring the braking capability of a heavy vehicle at roadside inspection facilities. (Class II, Priority Action) (H-92-55)

Also as a result of this study, the Safety Board issued Safety Recommendations H-92-56 through -59 to the Federal Highway Administration, H-92-60 through -62 to the 50 States and the District of Columbia, H-92-63 to the Interstate Towing Association and to the Towing and Recovery Association of America, H-92-64 through -68 to the National Private Truck Council, H-92-69 through -73 to the Owner-Operator Independent Drivers Association, H-92-74 through -78 to the American Trucking Associations, H-92-79 and -80 to the Motor Vehicle Manufacturers Association, H-92-81 to the Professional Truck Driver Institute of America, H-92-82 to the Society of Automotive Engineers, and H-92-83 and -84 to airbrake component manufacturers.

The National Transportation Safety Board is an independent Federal agency with statutory responsibility "to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 98-633). The Safety Board is vitally interested in any action taken as a result of its safety recommendations. Therefore, it would appreciate a response from you regarding action taken or contemplated with

respect to the recommendations in this letter. Please refer to Safety Recommendations H-92-50 through -55 in your reply.

COUGHLIN, Acting Chairman, and LAUBER, HART, HAMMERSCHMIDT, and KOLSTAD, Members, concurred in these recommendations.



By: Susan M. Coughlin
Acting Chairman