Log H-566 C

National Transportation Safety Board

Washington, D. C. 20594

Safety Recommendation

Date: June 26, 1992

In Reply Refer To: H-92-79 and -80

Mr. Norman Clark, President
Motor Vehicle Manufacturers Association
7430 Second Avenue, Suite 300
Detroit, Michigan 48202

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]

Among the problems highlighted by the accident and inspection data, the Safety Board found that first, it is difficult to keep the brakes found on most commercial vehicles adjusted appropriately because these brakes have only a small tolerance range before becoming out of adjustment; and second, most brakes on heavy vehicles are not well maintained, often resulting in out-of-adjustment brakes.

The Safety Board believes that this is because today's air/mechanical brake systems are too maintenance sensitive and because many carriers do not establish maintenance policies that ensure proper brake adjustment under ordinary operating conditions.

However, the Safety Board also believes that these problems could be mitigated by the installation of components that increase reserve stroke, such as long stroke Type 30 chambers . Not only would the long stroke chambers greatly increase the reserve stroke, but, used in combination with automatic slack adjusters,

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

could also greatly decrease the number of heavy vehicles placed out of service due to brake adjustment violations.

Another change that the Safety Board believes will help to reduce the frequency and consequences of out-of-adjustment brakes is the more frequent installation and use of air disc brakes. When subjected to intense braking demands, air disc brakes do not suffer from the same performance degradations as do drum brakes. Disc brakes also reduce downhill runaways as well as brake imbalances caused by varied brake adjustments on the same vehicle.

Another issue examined by the study was the sizing of airbrake components for heavy vehicles. When Safety Board investigators examined some of the brake maintenance literature seeking a suitable method of calculating braking force at the tire/road surface, they found the AL-Factor formula in the Kenworth Manual and in the "Grey-Rock Diagnostic Engineering Service Manual." However, when investigators compared calculated results of braking force using the AL-Factor formula to results from NHTSA dynamometer work, they discovered that the AL-Factor formula predicted braking force values that were consistently 40 percent higher than the measured values from the NHTSA dynamometer. (Details and some examples of this work are found in SAE paper 910126, "Heavy Truck Deceleration Rates as a Function of Brake Adjustment.")

Although none of the major tractor manufacturers interviewed by the Safety Board said that they used the AL-Factor formula in sizing brakes, this methodology is discussed often in the literature available to the fleets. Consequently, the Safety Board is concerned that some maintenance facilities may be using this procedure to size replacement parts and thus are undersizing brake components.

Therefore, the Safety Board recommends that the Motor Vehicle Manufacturers Association:

> Encourage member manufacturers of heavy air-braked vehicles to develop, promote, and install brake systems that are less sensitive to adjustment and more resistant to brake system fade (such as long stroke chambers and air disc brakes). (Class II, Priority Action) (H-92-79)
>
> Encourage members to discontinue the use of the AL-Factor formula. (Class II, Priority Action) (H-92-80)

Also as a result of this study, the Safety Board issued Safety Recommendations H-92-50 through -55 to the National Highway Traffic Safety Administration, 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-92-81 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 93-633). 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-92-79 and -80 in your reply.

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

By: Susan M. Coughlin
Acting Chairman