

NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

ISSUED: March 20, 1981

Forwarded to:

Honorable Ray A. Barnhart
Administrator
Federal Highway Administration
400 Seventh Street, S. W.
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

H-81-17 and -18

At about 5 p.m., on February 18, 1981, a southbound commuter bus, traveling at approximately 60 mph, ran off Interstate 95 near Quantico, Virginia, struck and climbed a "W" beam guardrail, rammed the end surface of a concrete bridge railing, vaulted, and plunged into a creek 25 feet below the road surface. Eleven of the 24 occupants were fatally injured and 12 others were seriously injured.

The National Transportation Safety Board's investigation of this accident is continuing and the probable cause has not yet been determined. However, the investigation disclosed an unsafe mechanical condition within the bus steering mechanism which we believe should be brought to the immediate attention of operators of large commercial vehicles.

The commuter bus involved in this accident was manufactured in 1959 and appeared to have been in relatively good overall mechanical condition at the time of the accident. Its tires were not excessively worn, brake linings were relatively new, brake adjustments were within acceptable limits, and wear points were properly lubricated. The bus had been inspected on January 29, 1981, in accordance with State of Virginia regulations and was deemed roadworthy; these inspections are required every 6 months.

The crash severely damaged the front axle and steering linkage components of the bus. However, in examining these components, it was found that the ball joint which attaches the piston rod end of the power steering actuator to the vehicle's suspension was separated. This ball joint is a standard type commonly found in heavy vehicles of different manufacture. Six such fittings were incorporated in the steering linkage of the accident bus. Detailed inspection revealed that all mating parts of the ball joint (ball, ball seat, and socket body) were severely worn. The wear was such that the ball could be pulled by hand, with little effort, through the ball seat and socket body. The ball seat itself was worn to the extent that the lubrication grooves were completely obliterated. (See photograph attached.) The Safety Board is concerned that this ball joint wear was not detected during routine vehicle maintenance or inspection; it apparently did not manifest itself as a steering problem to the drivers of the bus.

The National Highway Traffic Safety Administration's steering system inspection standards as set forth in 49 CFR 570 Subpart B apparently are the basis for the inspection procedures used not only by Federal inspectors, but by State and local inspectors and voluntarily by motor carriers. These inspection standards require a measurement of steering system lash by observing the steering wheel movement required to produce perceptible movement of the front wheels, and a check of the freeplay exhibited when turning the wheels by grasping the front and rear of the tire with the vehicle on jacks.

While this test procedure may be acceptable for mechanical steering systems, the Safety Board's experience suggests that a more thorough procedure is essential for vehicles equipped with power steering assist mechanisms. The design of the operating power assist mechanism and the steering linkage in the bus involved in the accident, and in many other commercial vehicles, is such that a worn ball joint or end assembly will not be detected using the procedures described by the NHTSA standard. On vehicles equipped with power assist mechanisms, all ball joints and end assemblies should be visually inspected for excessive relative motion while the steering wheel freeplay test is conducted. If relative movement between the ball and socket or end assembly is detected, the parts should be disassembled and inspected for wear. Necessary repairs should be made to all ball joints, end assemblies, and steering gears to assure continued steering system integrity.

Because of the potentially serious consequences of steering linkage ball joint or end fitting wear, the National Transportation Safety Board recommends that the Bureau of Motor Carrier Safety of the Federal Highway Administration:

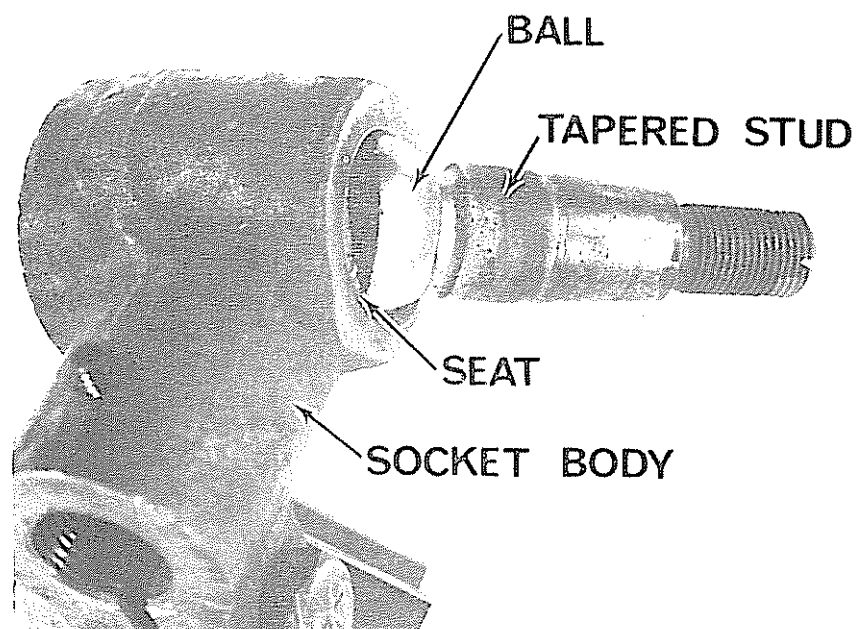
Issue an ON-GUARD Bulletin and other appropriate material to alert both interstate and intrastate operators of large commercial vehicles to the preliminary findings of this accident investigation and point out that worn ball joint assemblies and end fittings on power assist mechanisms may not be detectable using the procedures prescribed in the National Highway Traffic Safety Administration inspection standards. (Class I, Urgent Action) (H-81-17)

Develop, in coordination with the National Highway Traffic Safety Administration, steering mechanism inspection procedures and inspection intervals that will ensure the detection of all worn ball joint assemblies and end fittings in the steering linkages with particular attention to those vehicles equipped with power assist mechanisms. (Class II, Priority Action) (H-81-18)

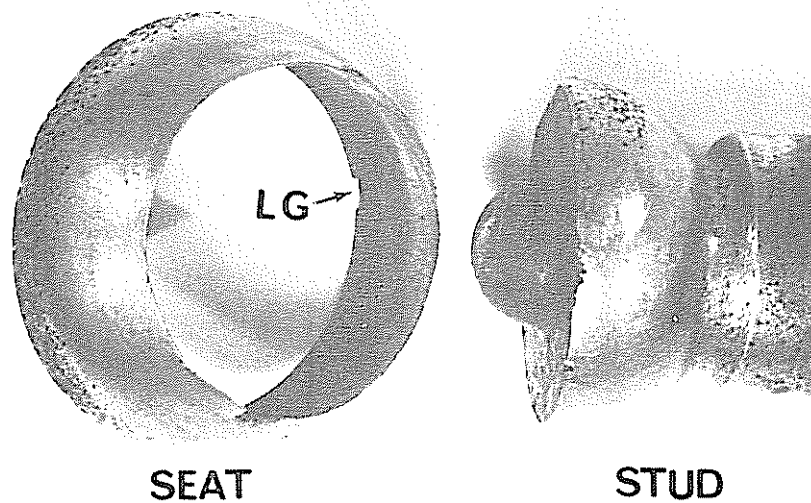
KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.



By: James B. King
Chairman



PHOTOGRAPH NO. 1 - Steering Linkage End Assembly.



PHOTOGRAPH NO. 2 - Close Up of Stud and Seat (LG is the obliterated lubrication groove).

