H-307

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: 6/14/82

Forwarded to:
Honorable Ray A. Barnhart
Administrator
Federal Highway Administration
Washington, D.C. 20590

SAFETY RECOMMENDATION(S)

H-82-16

About 2:25 p.m., on November 2, 1980, a tractor cargo tank-semitrailer, loaded with drilling mud and water, was traveling northbound on State Route 29, near Middletown, California. As the combination vehicle negotiated a right curve, it developed steering control problems. As a result, the vehicle crossed the highway centerline and struck two southbound vans. One of the southbound vans was redirected 180° and struck a Volkswagen stationwagon following in the southbound lane. The accident resulted in five fatalities and seven injuries. 1/ At the time of the accident, the weather was clear and the pavement was dry.

A postimpact inspection and laboratory analysis by the California Department of Transportation revealed that the left front aluminum wheel hub of the tractor had failed circumferentially through the outer spindle bearing cup retainer flange. (See figure 1.) Figure 2 is a schematic of the aluminum wheel hub and attached spindle bearings. The failure permitted excessive lateral and vertical movement of the aluminum wheel hub about the spindle.

The failure was probably caused by the improper installation of the outer bearing cup into the wheel hub compounded by the repeated tightening of the spindle adjustment nut against the bearing. The maintenance-induced failure would have eventually resulted in critical steering control problems for the driver, especially when the vehicle was being steered around right-hand curves. However, there were no reports of steering problems with the vehicle before this accident.

The Safety Board reviewed several maintenance and service manuals 2/ issued by the heavy truck manufacturers to determine what installation procedures were applicable. The majority of the manufacturers prescribed special procedures for installing bearing cups into aluminum wheel hubs. Several manufacturers indicated that the aluminum hub should be heated to approximately 200° F and that the bearing cup should be chilled in dry ice in order to facilitate an "easy" press fit seating of the bearing cup.

1/ For additional information read, Highway Accident Report—"Multiple Vehicle Collision on State Route 29, near Middletown, California, November 2, 1980," (Docket No. HY-307-81).
2/ Peterbilt Owner's Maintenance Manual for C.O.E. and Conventional Models section 9-8. Kenworth Maintenance Manual "Hubs, Wheels, and Tires" p. 1. Freightliner Service Manual and Factory Assembly Information, subject No. 32-10250 p. 2.

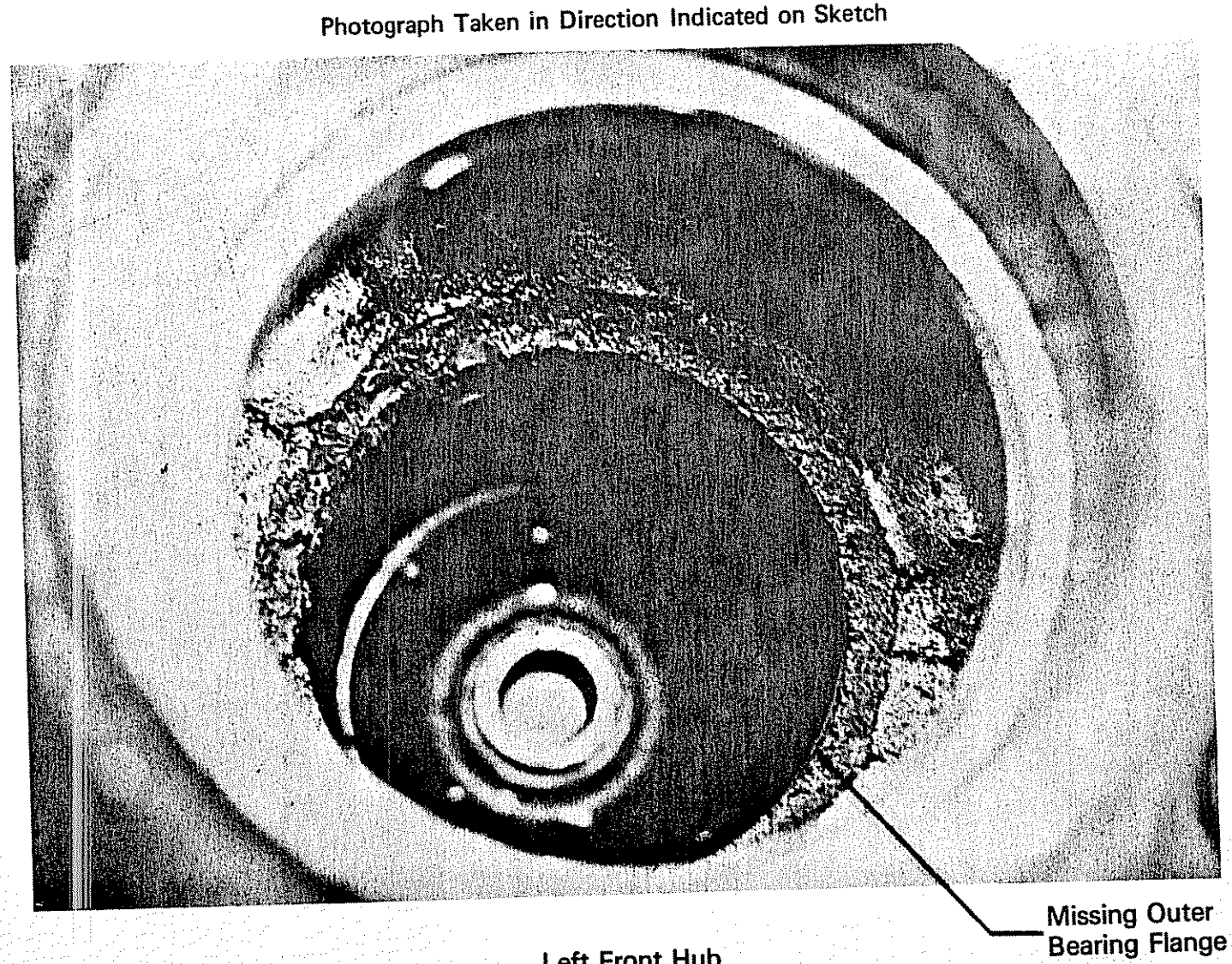

Figure 1.--Le :ont hub.

Section of Left Front Aluminum Wheel Hub

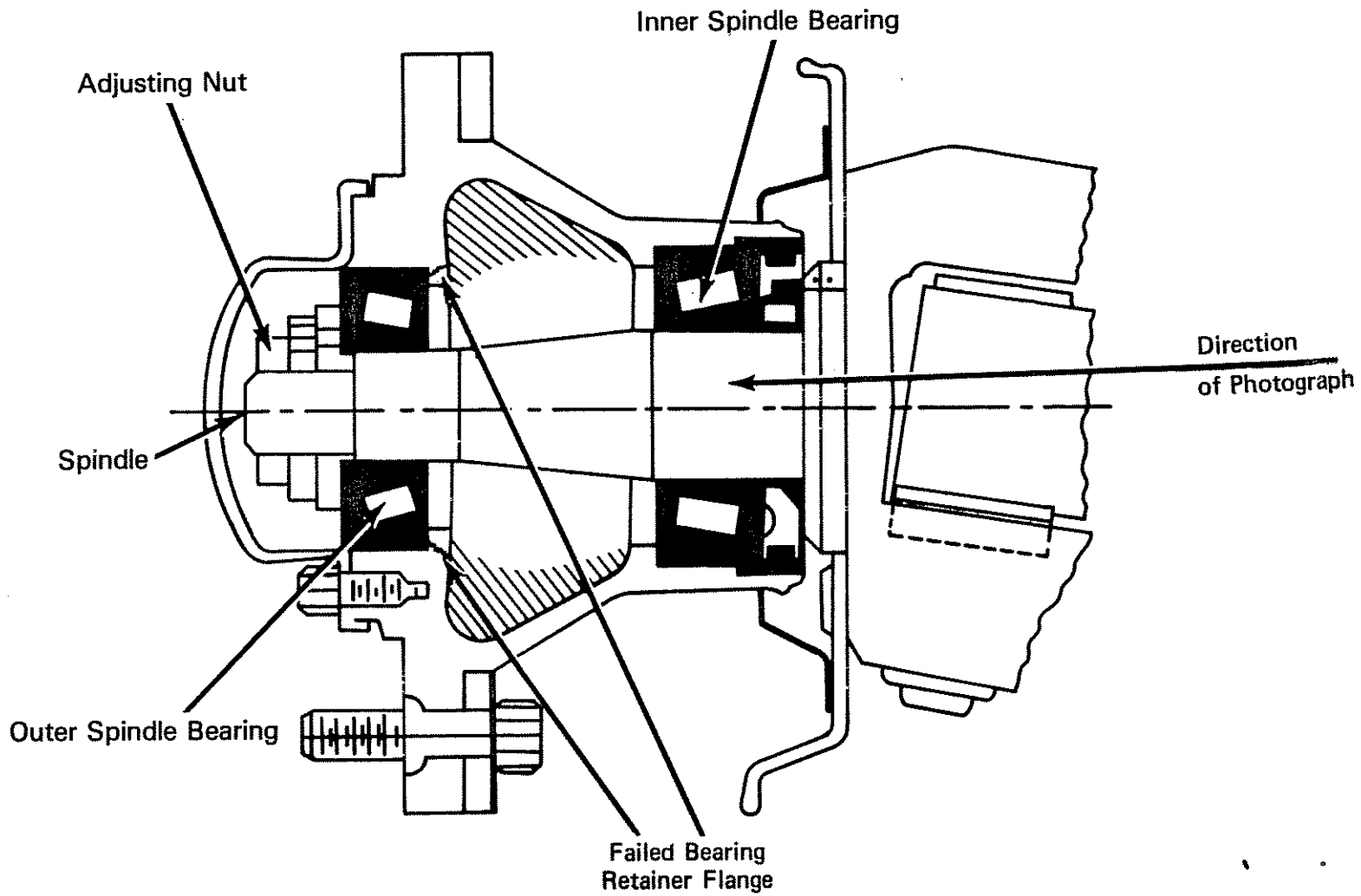

Figure 2.--Section of left front aluminum wheel hub.

Because some owners/operators who perform their own maintenance may not be aware of the special installation procedures for aluminum hubs, they may be continuing to install the aluminum hubs according to the procedures established over the years for cast iron hubs. Such practices could cause the aluminum hub to fail and subsequently result in dangerous steering control problems for the vehicle's driver.

The Safety Board also reviewed the commercial vehicle accident data compiled by the Bureau of Motor Carrier Safety (BMCS) for calendar years 1976 through 1978. 3/ The data indicated that in 1976, 1977, and 1978 there were, respectively, 15, 26, and 23 accidents reported to the BMCS of mechanical failures involving wheel bearings, wheel hubs, and flanges. The exact population of aluminum wheel hubs in the data could not be determined. Although the frequency of this type of failure has been relatively low in the past, the safety implications of this serious maintenance related problem identified as a result of this accident should be made known to all motor carriers.

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

> Issue an On Guard Bulletin to advise commercial vehicle owners, operators, and maintenance personnel of the correct procedures for installing spindle bearing cups into aluminum wheel hubs. State in the Bulletin that failure to follow the manufacturers' prescribed procedures could damage the aluminum wheel hub and result in critical steering control problems for drivers. (Class II, Priority Action) (H-82-16)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS and BURSLEY, Members, concurred in this recommendation.

By: Jim Burnett
Chairman

3/ U.S. Department of Transportation - Bureau of Motor Carrier Safety, "1976 - 1978 Analysis of Motor Carrier Accidents Involving Vehicle Defects or Mechanical Failure," November 1979.