



COMPTROLLER GENERAL OF THE UNITED STATES  
WASHINGTON, D.C. 20548

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B-164497(3)

The Honorable Harrison A. Williams, Jr.  
Chairman, Committee on Labor and  
Public Welfare  
United States Senate

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Dear Mr. Chairman:

Your letter of June 2, 1976, requested our Office to examine certain facets of the implementation of Federal Motor Vehicle Safety Standard No. 121--Air Brake Systems--administered by the National Highway Traffic Safety Administration, Department of Transportation. Specifically, you asked that we (1) review the origin and initial promulgation of the standard, (2) analyze public comments received in response to notices for proposed rulemaking, (3) analyze failures and malfunctions of the anti-wheel-lock systems placed in service under the provisions of the standard, and (4) determine how many fatal and disabling injury accidents were related to the standard.

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The basis for issuing the airbrake standard is the subject of proceedings in the Ninth Circuit Court of Appeals. Because our Office policy is not to review matters pending in the court, we discussed the situation with your office and agreed to carry out the following work.

1. Summarize public comments concerning antilock devices received in response to 10 notices of proposed rulemaking.
2. Contact about 10 major truck operators to obtain data on their experiences with failures and malfunctions of antilock systems placed in service under the provisions of the standard.

The standard establishes performance and equipment requirements for braking systems on vehicles equipped with air-brakes. It was issued as a final rule in 1971 and has been amended several times, partially as a result of public comments responding to proposed rulemaking. It addresses many aspects of a brake system, including antilock. An antilock device is intended to help a driver maintain safe control of his vehicle during a sudden stop. The device controls wheel lockup through an electronic system designed to sense wheel-spin at each wheel. Principal components of an antilock

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system include (1) a computer module to process wheel speed information from wheel speed sensors, (2) air control valves that receive signals from the computer module and adjust air pressure in the brake chambers, (3) sensors which relay wheel speed information to the computer module, and (4) wiring connecting the components. The standard stipulates that, if the antilock system fails, the brake system will return to the normal braking mode. The standard went into effect for trailers in January 1975 and for trucks in March 1975.

SUMMARY OF PUBLIC COMMENTS  
CONCERNING ANTILOCK DEVICES

Between June 1970 and December 1975, the National Highway Traffic Safety Administration published 15 notices of proposed rulemaking concerning Federal Motor Vehicle Safety Standard No. 121. We reviewed public comments submitted in response to 10 of the more recent notices of proposed rulemaking issued between June 1973 and December 1975. One hundred forty-three comments submitted by vehicle operators, manufacturers, and other interested organizations contained references to antilock devices. Some organizations submitted comments several times, but we did not include their opinions more than once in the following discussion.

A majority of the respondents addressed one or more of three major antilock issues--reliability, cost, and safety. The remaining respondents did not discuss these issues but addressed other matters, such as various aspects of the antilock system's warning signal.

Of the 57 respondents commenting on the antilock system's reliability, 53 generally questioned its reliability and expressed such concerns as the lack of proper testing of the device, frequent antilock malfunctions, and maintenance difficulties. The remaining four respondents indicated that the device was operating satisfactorily.

Forty-eight respondents referred to various cost factors of the antilock system. Forty were dissatisfied with what they felt to be high costs associated with antilock devices. Examples of these comments include references to increased maintenance costs, high cost for antilock parts due to the lack of standardization, and increased operating cost that would have to be passed on to the consumer. Eight of those commenting favored implementing the antilock requirement for economic reasons. Most of these respondents indicated

that considerable amounts of time and money had been expended in researching and developing a system to comply with the requirements.

Thirty-four respondents discussed the extent to which antilock systems would help to provide a safer highway vehicle. Of the 34 respondents, 27 questioned the safety value of the systems, stating, in some instances, that antilock malfunction could result in a potentially hazardous vehicle. The remaining seven indicated that the devices would be a positive influence on highway safety, noting, for example, that they helped improve vehicle control.

ANTILOCK MALFUNCTION DATA  
FROM SELECTED OPERATORS

We made a brief telephone survey of 11 major truck operators to obtain data on their experiences with antilock system malfunctions. A larger, more detailed survey was not possible due to the relatively short time frame of the request. As discussed with your office, the information we developed is subject to the following limitations.

1. The operators contacted were not intended to represent a valid statistical sample. Any attempt to extrapolate or draw conclusions solely on the basis of the data they provided would therefore be unjustified.
2. The survey was informal and responses were sometimes approximations. In addition, there was the possibility of differences in respondents' interpretations of the information requested.
3. The information obtained was not verified.

Safety Administration officials pointed out that such limitations would make interpreting the data difficult and possibly misleading.

Of the 11 operators contacted, 4 were unable to give us meaningful information because they had relatively limited experience with vehicles equipped to meet the new brake standard or they did not have data that was readily available. In many cases we were unable to obtain similar data from the remaining seven operators. For this reason, we have presented the following information on an individual basis. In addition, the terms "brake failure" and "brake malfunction" as

used in this report do not necessarily imply total loss of braking capability.

Operator A operates about 2,590 total road units; about 595 units are equipped according to the standard. The brake system failure frequency rate was about 1.27 for each road unit a month for all road units, and about 1.79 for each road unit a month for those road units equipped according to the standard. Less than one failure for each vehicle a month is directly related to the antilock system. The primary cause of antilock malfunction concerned computer module problems. During the time this company has operated vehicles equipped according to the standard, the frequency of antilock malfunction on these vehicles has remained relatively constant.

Operator B operates about 940 vehicles; about 280 are equipped according to the standard. During a 6-month period, there were about 216 brake system malfunctions for all vehicles. About 31 malfunctions were directly attributable to the antilock device. A primary cause of antilock malfunction concerned air valve problems. The frequency of antilock malfunction on vehicles with standard No. 121 brake systems has generally increased during the period this company has operated these vehicles.

Operator C operates about 990 total vehicles; about 200 vehicles have standard No. 121 brake systems. In the last 12 months there were over 500 brake system malfunctions with about 90 percent of them attributable to vehicles having standard No. 121 brake systems. About 60 percent of the standard No. 121 brake system malfunctions were related to the antilock device. A company official indicated that primary causes of antilock malfunction concerned problems with wiring and computer modules. He also stated that, during the time his company had operated vehicles equipped according to the standard, the frequency of antilock malfunction on these vehicles had decreased considerably.

Operator D conducted a 5-month test of 150 tractors equipped with standard No. 121 brake systems. A company official indicated that there were 28 absolute antilock failures during this period. In attempting to put a perspective on the number of failures, he indicated operators did not expect new equipment to fail.

Operator E operates about 5,000 vehicles; of which about 275 are equipped with standard No. 121 brake systems. During

the past 12 months, the total fleet experienced about 300 brake system malfunctions. During a 3-month period, there were about 60 brake complaints on vehicles equipped to meet the standard. A company official indicated that 80 percent of the standard No. 121 brake system malfunctions were attributable to antilock devices, with electrical failures being the primary cause of antilock malfunctions. He also indicated that during the period his company had operated vehicles with standard No. 121 brake systems, the frequency of antilock malfunction on these vehicles had remained relatively constant.

Operator F operates 1,300 total road units; approximately 55 units are equipped according to the standard. During the 10 months that standard No. 121 equipped vehicles have been operating, they had about 20 antilock failures. The primary cause of antilock malfunction was computer failure. During the period this company has operated vehicles equipped according to standard, the frequency of antilock failure on these vehicles has remained relatively constant.

Operator G operates about 70 tractors and 297 trailers that have standard No. 121 brake systems. Of the 70 tractors, 30 are 1975 models and 40 are 1976 models put in service by the end of June 1976. Of the 297 trailers, 147 are 1975 models and 150 are 1976 models put in service by the end of June 1976. Thirty of 38 standard No. 121 brake system repairs involved tractors that were recalled due to radio frequency interference with the brake system. Regarding brake failures on trailers, we were told that for a 9-month period, 50 trailers equipped with standard No. 121 brake systems had 82 brake repairs. For the same period of time, 100 trailers not equipped to meet the standard had 50 brake repairs. The repair cost for standard No. 121 trailers was over four times the cost to repair the older trailers. Notable brake malfunctions on the new trailers involved six sensor problems which were responsible for up to an 8-second delay in brake application.

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At the request of your office, we did not obtain written comments from the Safety Administration on this report; however, we obtained oral comments and considered them in this report.

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As discussed with your office, this report is also being  
*ca* sent to Congressman Bud Shuster.

Sincerely yours,

*Robert K. ...*  
ACTING Comptroller General  
of the United States