

was also used as a remedy part for the EC-17 1030R recall.

The Petitioner alleges that the algorithm used in the EC-17 Version 2.3 only corrected for potential low speed (less than 12 MPH) braking problems on rough road surfaces. His concern is that extended vehicle braking distances could otherwise occur at higher speeds on rough surfaces. To illustrate his concern, the Petitioner referenced a "hardware-in-loop simulation" that depicted an extended vehicle braking distance on a washboard-type surface. During the simulation, the Petitioner reported that there was no air "pressure in the brake chamber for the first 15 seconds." The Petitioner also referenced a Kansas City area customer who complained of "non-effective brakes" when the vehicle was operated on a rough surface as a possible example of such an occurrence.

Bendix Response

Subsequent to the recall, Bendix continued to monitor complaints of extended vehicle braking distances and identified the potential for extended vehicle stopping distances on unpaved and "severely bumpy" road surfaces, such as those occasionally found in rural areas. The company's analysis, which included individual contact with complainants, revealed that an extended braking distance event was only likely to occur on severely rough road surfaces that extended for more than 100 feet. During field-testing, Bendix was unable to reproduce an extended braking event on a typical "washboard" ² surface.

Regarding the Petitioner's allegation that extended braking distances could occur at high speeds on washboard surfaces, Bendix reported that such occurrences have not materialized in field testing or through owner complaints. Bendix advised that the Petitioner's allegations are based upon computer simulations "involving artificially induced electronic inputs" that "are more extreme even than worst case scenarios." According to Bendix, although "many of these signals are not realistic or real world conditions," they are often bench-tested with an ECU ³ to assist engineers with evaluating possible algorithm changes. Bendix concludes that although the Petitioner cites potential scenarios of extended braking distances, the basis for his conclusions involve conditions not applicable to "real world" conditions.

Regarding the Petitioner's allegation that a Kansas City-area complaint concerned extended vehicle braking distances on rough road surfaces, Bendix noted that at the time of the complaint, the remedy for the EC-17 1030R recall had not been performed on several vehicles from the fleet in question. Bendix reported satisfactory resolution of the complaint upon completion of the recall remedy and, for two of the vehicles, the correction of foundation brake problems.

Bendix reasserted that potential events of extended braking distances are only likely to occur on severe rough roads where the "washboard" surface extends more than 100 feet. The company concludes that such conditions are atypical highway conditions and that the potential can be mitigated through driver intervention. Bendix stated that investigation of the few complaints of extended braking distances revealed that the vehicles were being operated on unpaved surfaces and that by assuring increased driver awareness of ABS operation the complaints or concerns were resolved.

In consideration of these "extreme conditions," Bendix introduced the EC-30 ABS controller in June 2001. The company reports that the EC-30 Version 2.02 "provides improved performance on extreme washboard surfaces." In sum, Bendix asserts that there is no safety defect with the EC-17 Version 2.3 controller.

Bendix reported no knowledge of any crashes or injuries attributable to poor performance of either EC-17 version. Although Bendix did acknowledge the occurrence of a property damage collision ⁴ wherein an ABS-equipped bus rear ended another bus, separate investigations by law enforcement, the local school system, and Bendix all concluded that the sole cause was unrelated to the brake system operation and was attributed to driver inattention.

Bendix Complaint and Warranty History

ODI queried Bendix with regard to complaints and warranty claims that referenced the EC-17 controller, excluding those that referenced the model 1030R that was recalled. Bendix reported that it has received 18 complaints (including reports of incidents or inquiries) regarding poor performance, including extended braking distances (complaint rate equals to 8.5 per 100,000 units). Of the 18 complaints, only four specifically mentioned performance issues related to the vehicle being operated on a rough or

"washboard" surface (corrected complaint rate 1.8 per 100,000 units). Within these complaints, where the surface condition was known, it was described as unpaved. Of the remaining 14 complaints, five were conclusively identified as unrelated to the ABS ECU. The nine remaining complaints were resolved through other component repairs or by providing additional information to the complainant (presumably the complainant used the information to resolve the complaint).

Bendix identified a total of 10th ⁵ warranty claims related to the EC-17 ABS control unit between September 2000 and January 2003. ⁶ Although the basis for the warranty claims are not identified, at least two claims were identified as involving the 1030R model in circumstances where the recall remedy had not been installed.

ODI Actions

ODI research of the NHTSA vehicle owner (or consumer) complaint database revealed no complaints regarding malfunction, failure, or extended vehicle braking distance with regard to a Bendix brand pneumatic antilock braking system component.

ODI also communicated informally with International and Blue Bird (two manufacturers that participated in the 1030R recall) and was advised that these manufacturers had not received any new complaints after the recall remedy was performed.

M-12 Modulator Issue

Background

The Petitioner alleges that his review and work on the modulator revealed that it could become ineffective at maintaining pneumatic brake pressure under cold ambient temperatures (less than 20-degrees Fahrenheit). The Petitioner stated that his research revealed that under cold ambient temperatures, the rubber diaphragm in the modulator could become rigid, thereby not permitting it to effectively seal the pilot chamber drain hole during a brake application. Should the drain not seal, sufficient pneumatic pressure may not be delivered to the brake chamber. The Petitioner reported that "an internal test" confirmed his suspicion of the diaphragm becoming rigid at cold temperatures.

M-12 Modulator and Relay Valve Assembly

Bendix describes the M-12 as a combination modulator and relay valve

² Bendix advised ODI that there is not an industry "benchmark" for the evaluation of rough road or "washboard" performance.

³ Defined as "hardware in loop" simulation.

⁴ March 2002, West Virginia—paved, straight, level, dry road surface at a controlled intersection.

⁵ Corrected warranty rate is 3.7 per 100,000 units.

⁶ As of June 2003.