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DEPARTMENT OF TRANSPORTATION

Federal Highway Administration

49 CFR 393

[OMCS Docket No. MC-124; Amendment No. 83-]

Parts and Accessories Necessary for Safe Operation; Front Wheel Brakes

AGENCY: Federal Highway Administration (FHWA), DOT.

ACTION: Final rule.

SUMMARY: As directed by the 99th Congress in the Commercial Motor Vehicle Safety Act of 1986, the Office of Motor Carrier Standards, FHWA, is amending the Federal Motor Carrier Safety Regulations (FMCSR) to require operational brakes on all wheels of commercial motor vehicles of over 10,000 pounds gross vehicle weight rating (GVWR) and manufactured after July 24, 1980. This action is needed to enhance the operational safety of commercial motor vehicles on the Nation's highways by establishing rules that are consistent with those of the National Highway Traffic Safety Administration (NHTSA) that govern the manufacture of new motor vehicles.

EFFECTIVE DATE: This rule is effective February 26, 1987.

FOR FURTHER INFORMATION CONTACT: Mr. Neill L. Thomas, Office of Motor Carrier Standards, (202) 366-2999; or Mrs. Kathleen S. Markman, Office of the Chief Counsel, (202) 366-0834, Federal Highway Administration, Department of Transportation, 400 Seventh Street SW., Washington, DC 20590. Office hours are from 7:45 a.m. to 4:15 p.m. ET, Monday through Friday.

SUPPLEMENTARY INFORMATION: Section 12015 of the Commercial Motor Vehicle Safety Act of 1986 (Pub. L. 99-570) (the Act) states:

> Not later than the 90th day after the date of the enactment of this title, the Secretary shall revise the regulations of the Administrator of the Federal Highway Administration contained in section 393.42(c) of title 49 of the Code of Federal Regulations to require trucks and truck tractors manufactured after July 24, 1980, to have brakes operating on all wheels. The Secretary may provide for a delayed effective date (not exceeding 1 year) for trucks and truck tractors manufactured after July 24, 1980, and before such date of enactment.

The FHWA is amending the FMCSR to require all commerical motor vehicles of over 10,000 pounds GVWR, manufactured after July 24, 1980, have operational brakes on all wheels. This action is also taken in response to a petition from the Insurance Institute for Highway Safety, dated February 4, 1986, requesting the same. A notice of proposed rulemaking (NPRM) appeared in the **Federal Register** on Thursday, July 3, 1986 (Docket No. MC-124) (51 FR 24413). The FHWA proposed to amend the FMCSR by revising the brake rule which currently allows trucks and truck tractors having three or more axles to be operated with no brakes on the front wheels. This action is needed to enhance the operational safety of commercial motor vehicles on the Nation's highways by establishing rules that are consistent with those of the National Highway Traffic Safety Administration (NHTSA) that govern the manufacture of new motor vehicles. It is the position of the FHWA that safe braking performance is more than a question of whether there are brakes on the steering axle. The design of a properly balanced, compatible braking system is much more complex and involves many factors which must be optimized to result in short stable stops under a variety of load, road, and driver training conditions. The absence of front brakes creates a major imbalance in braking as compared to the performance required by NHTSA's Federal Motor Vehicle Safety Standards (FMVSS), specifically, FMVSS 121.

The lack of front brakes increases the following:

1. The risk of drive and trailer axle wheel(s) locking, and resulting in instability (jackknife or trailer swing);
2. The stopping distance since the number of axles available to apply retarding forces is reduced by one; and
3. The demand for work on the remaining brakes. This may lead to premature brake fade on downgrades and an increase in brake wear.

Clearly, the front steering axle brakes are an essential element of a fully balanced truck braking system. Proper brake system maintenance, including maintenance of fully functional front brakes is necessary to ensure short stable stops under a variety of road and load conditions.

There were a total of 45 commenters to Docket MC-124, Notice No. 86-8. The issue raised in these comments can be categorized as follows:

1. 26 commenters supported the proposal;
2. 6 commenters addressed loss of steering ability;
3. 2 commenters addressed steering wheel pull;
4. 11 commenters addressed the feasibility of and concern regarding retrofit;
5. 6 commenters addressed front wheel limiting devices; and
6. 8 commenters addressed other miscellaneous items. The supporters of the proposed rule range from vehicle manufacturers to end users.

Loss of Steering Ability

Six commenters expressed their concerns that, at times, vehicles with brakes on the front wheels will experience instances when one or both wheels will "lock-up" when the brakes are applied. Steering wheel lock-up will cause a vehicle to continue in the same direction as the vehicle was heading at the time of the wheel lock-up. If one steering wheel locks up, greater brake force will occur on one side of the axle. The resulting unequal brake force on the steering axle will cause the vehicle to turn in the direction of the side with the greater brake force. Research reviewed or conducted by the FHWA, including results of a braking demonstration and tests sponsored by the FHWA and NHTSA at a test facility in East Liberty, Ohio, during September 1986 (51 F.R. 32115, September 9, 1986), led FHWA to conclude that stopping distances for trucks with properly operating brakes on both front wheels (the steering wheels) are shorter than the stopping distances for these same vehicles without properly operating brakes on the front wheels. Specifically, the tests conducted on low coefficient of friction surfaces at East

Liberty showed that with one front brake connected and one front brake disconnected, drivers were able to stop shorter and with better control than with no front brakes. The pull resulting from having only one brake did not cause as much of a problem as having no front brakes. This was true even with a fully loaded tractor-trailer combination (80,000 pounds) with manual steering.

Since January 1982, the State of California has required front wheel brakes on all vehicles operating in that State. California officials have reported that loss of steering control due to front wheel brakes has not been a problem in the State of California. The Commonwealth of Pennsylvania also requires that service brakes must act on all wheels upon application except the steering axle of a truck or truck-tractor manufactured before March 1975, having three or more axles. Resultant loss of steering control has not been reported to the FHWA as a problem. Consolidated Freightways, operating truck tractors having operable front brakes, has reported in excess of 600 dispatches over Donner Pass in California each month, including the winter months. Its accident records reflect that front wheel brakes do not have any adverse effect on the safe operation of its equipment.

It is the belief of the FHWA that the braking performance of a vehicle with brakes on all wheels is so greatly improved that the FHWA will require brakes on all wheels of commercial vehicles having a GVWR in excess of 10,000 pounds. No brake regulation can meet all of the various situations that may exist. However, based on the NHTSA's research, this rule provides for the best braking capability for the most situations.

Steering Wheel Pull

Only two respondents addressed the issue of steering wheel pull. One commenter strongly supported front wheel brakes while the other commenter supported some degree of front braking as desirable. The latter commenter wanted the Office of Motor Carrier Standards to be aware of the problems of brake imbalance and maintenance. Steering wheel pull, in the case of front braking means that because of a sudden grabbing action by one of the steering axle wheels due to a brake force imbalance, the driver's steering wheel suddenly shifts in that direction. This situation can be caused by improper maintenance, tire blow out, or ice, among other things. In a previous study performed by Ultrasystems, Inc., of Phoenix, Arizona, covering a 5-year time period, front tire failures resulted in an accident rate of 0.02 per million vehicle-miles.[1] The magnitude of the steering movement is dependent upon whether the failure occurs on a straightaway or on a curve. This study also showed that a tire going flat on a straightaway would easily be in the force range a driver could be expected to handle. One of the respondents operates over 49,000 vehicles. This commenter has concluded that removal of the front brakes has a potential of creating more traumatic loss of vehicle control. This respondent believes that steering wheel pull and controllability problems can be minimized through proper maintenance procedures and should not be used as an argument against adopting the proposed rule. The FHWA concurs.

Feasibility of Cost of Retrofit

Eleven comments were received specifically relating to this subject. Six commenters were opposed to a retrofit requirement. Five commenters were in favor of a retrofit for vehicles manufactured during or after 1980. In general, those opposed were against retrofit because they were against steering axle brakes or opposed because of cost and lack of proof as to public benefit.

It should be pointed out that nearly all trucks with air brakes built for the U.S. market since 1975 have an emergency brake system operated by means of the service brake control. Most of these vehicles have a "dual" or "split" air reservoir system having one side operating the front brakes and the other side operating the rear brakes. When the front brakes are disconnected, the tractor no longer has an operable modulated emergency brake system in the event of a failure in the remaining brake system. For this reason, and the reasons stated earlier in this document and in the NPRM, benefit to the public is clearly served. To our knowledge, the major brake component manufacturers in business in 1980 are still in business today, so parts availability should not be a problem. The July 24, 1980 date for retrofit was chosen because that was the effective date of the amendment to FMVSS 121 which required brakes on all axles. One commenter suggested that older vehicles that are rebuilt with glider units be required to be retrofitted also. It is felt that this would make the issue overly complex so it has not been adopted. Retrofit costs have been estimated as high as $3,000 per vehicle. This may be an accurate estimate, but it is felt that for vehicles originally manufactured with front wheel brakes (post-July 24, 1980), these costs will in actuality be much less as noted below and in the economic evaluation. In addition, the retrofit requirement is mandated by the Act and has a one-year delay in the effective date for truck and truck tractors manufactured after July 24, 1980, and before October 27, 1986. Thus, the burden of retrofit can be spread out over time and more efficiently absorbed by both the supply side and the user side.

Front Wheel Limiting Device

Six comments were received on front wheel limiting devices. Two commenters wanted a manually operated front wheel limiting device as opposed to the automatic front axle limiting device as expressly permitted in section 393.48 of the FMCSR. One commenter noted that section 393.48 specifically prohibits the use of manually adjusted limiting devices and restricts the use of automatic limiting devices to vehicles manufactured after January 1975 and suggested that a published final rule specifically call attention to the fact that drivers or carriers may not circumvent the new front wheel brake rule by the use of such a device. One commenter stated that there are times when a front wheel limiting device is beneficial and times when such a device is not beneficial. Two commenters opposed front wheel limiting devices and front axle brakes in general. The FHWA regulations permit the use of an automatic front wheel limited device to reduce front wheel braking effort (49 CFR 393.48).

The FHWA does plan to conduct more tests in this area. It is well established that 90 percent of the braking applications of an air brake system occurs at application pressures below 40 psi. Front wheel limiting devices do depower the front brakes under low pressure applications, which is where most maneuvering problems are encountered but allow the system to deliver full pressure when the driver makes a full pedal application.

Front brakes are often removed or deactivated because of the erroneous perception among some drivers that such brakes may contribute to jackknifing in panic brake applications. However, FHWA and NHTSA tests indicate that operable front brakes, in fact, reduce the likelihood of jackknifing and other vehicle instability. The FHWA believes that the 10-year experience with automatic front-wheel limiting devices and an effective education

[1] "Control of Large Commercial Vehicle Accidents Caused by Front Tire Failures," Contract No. DOT-FH-11-8562, Final Report, August 1975. A copy is available through the National Technical Information Service, Springfield, Virginia 22161.

program for drivers will help to overcome these fears and inaccurate perceptions. Although six comments were received on front wheel limiting devices, this rulemaking action does not address that issue.

With respect to brakes which have been merely disabled rather than removed, it is quite likely that old brakes which have been disconnected for quite some time will pull violently one way or the other when first reactivated. In most cases, this pull can be cured by making a few high-temperature "burn-in" runs to clean up the rust and dirt which collected during the period of brake inactivity. The FHWA is prepared to ask the manufacturers of brake components for a fact sheet to aid users in reinstalling and reactivating front brakes.

Miscellaneous

Center point steering has been suggested by one commenter as having many safety benefits for heavy commercial motor vehicles. Center point steering has been available for heavy-truck use for many years. The purpose of the design is to reduce steering effort and road shock. The center point steer front axle provides easier steering as the wheel pivots about a vertical king pin which is perpendicular to the ground. Road shocks can be transmitted more directly into the axle beam as the steering parts are located within the wheel assembly and wheel overhang.

Acceptably engineered center point steering has been on the market for over 20 years. At this time, the FHWA believes that the main issue is front wheel brakes and does not wish to address center point steering.

Another commenter pointed out that maintenance is a major issue in proper braking. The commenter's specific point was that front brakes are needed because of the increased demand placed on brakes and a general deterioration of brake maintenance. Vehicle loads (weight) and speeds are increasing. These factors do place an increased demand on braking performance. The FHWA agrees that maintenance must be considered as part of the overall system of braking. The FHWA wants all parties to know that its goal is good braking capability based on adequate and continuing maintenance of the brake system.

One commenter stated that brakes add weight and cost. It is the FHWA's position that the weight added and the increase in cost (presumably maintenance cost since front brakes are required on all new vehicles) are overshadowed by the increase in safety, both in stopping distance and controllability.

One commenter stated that front wheel brakes would be more dangerous now than in the past, because today's driver is not as professional as in earlier days. We believe there are a great number of professional drivers on the road today. We agree with the commenter's position that training and education are needed for the demands placed on today's drivers. Training and education have been and will continue to be important parts of the FHWA's approach to safety.

One commenter suggested that the retrofit requirement should be made applicable to a model year as opposed to a calendar year. However, Federal law specifically requires all vehicles manufactured after July 24, 1980, to be equipped with brakes on all wheels. It is felt that this date is easily enforceable and in addition less confusing than the use of a model year criterion.

Another commenter indicated that finding front brake parts for retrofit would be too great a burden for small to medium sized carriers. Even though truck tractors were required to be manufactured with brakes on all wheels after July 24, 1980, it is felt that a one-year grace period will allow small to medium sized carriers to meet the requirement in a reasonable and cost efficient manner.

Several commenters wanted to be furnished more information as to the reasoning behind the adoption of the rule requiring front wheel brakes. It is not possible for the FHWA to address all of these requests. However, copies of the April 15, 1986, NHTSA report entitled "NHTSA Heavy Duty Vehicle Brake Research Program Report No. 1—Stopping Capability of Air Braked Vehicles, Volume 1—Technical Report," (DOT HS 806-738) may be obtained from the National Technical Information Service, Springfield, Virginia 22161 (703-487-4650).

The FHWA has determined that this document does not contain a major rule under Executive Order 12291 nor a significant regulation under the regulatory policies and procedures of the Department of Transportation.

It is estimated that the economic impact of this rulemaking action on motor carriers will be approximately $36 million. In comparison with the overall operating costs faced by a motor carrier, the cost of complying with this regulation will not be a heavy burden. The burden imposed by this regulation will be significant for some small entities, for example the owner operator who must now budget an additional $300-$1,000 to replace the brakes that either the owner or a previous owner removed. This burden cannot be avoided. The Congress requires this regulation. The 1-year delay of the effective date places the most moderate burden on small entities that the law will allow.

For the foregoing reasons and under the criteria of the Regulatory Flexibility Act, the FHWA hereby certifies that this action will not have a significant economic impact on a substantial number of small entities.

For a more complete discussion of potential impacts, please refer to the Regulatory Evaluation which has been prepared and is available for inspection and copying in the docket room at the times and address provided under the heading "For Further Information Contact."

List of Subjects in 49 CFR Part 393

Highways and roads, Highway safety, Motor carriers, Motor vehicle safety, Parts and accessories.

(Catalog of Federal Domestic Assistance Program Number 20.217, Motor Carrier Safety)

Issued on: January 23, 1967.

R.A. Barnhart,

Federal Highway Administrator.

In consideration of the foregoing, Title 49, Code of Federal Regulations, Subtitle B, Chapter III, Part 393 is amended as set forth below.

PART 393—PARTS AND ACCESSORIES NECESSARY FOR SAFE OPERATION

1. The authority citation for Part 393 is revised to read as follows:

Authority: 49 U.S.C. App. 2509; Pub. L. 99-570, section 12015; 49 U.S.C. 3102; 49 CFR 1.48 and 301.60.

2. Section 393.42 is revised to read as follows:

§ 393.42 Brakes required on all wheels.

(a) Every commercial motor vehicle shall be equipped with brakes acting on all wheels.

(b) *Exception.* (1) Trucks or truck tractors having three or more axles—

(i) Need not have brakes on the front wheels if the vehicle was manufactured before July 25, 1980; or

(ii) Manufactured between July 24, 1980, and October 27, 1986, must be retrofitted to meet the requirements of this section within one year from February 26, 1987, if the brake components have been removed.

(2) Any motor vehicle being towed in a driveaway-towaway operation must have operative brakes as may be

necessary to ensure compliance with the performance requirements of § 393.52. This paragraph is not applicable to any motor vehicle towed by means of a tow-bar when any other vehicle is full-mounted on such towed motor vehicle or any combination of motor vehicles utilizing three or more saddle-mounts. (See § 393.7(a)(3).)

(3) Any full trailer, any semitrailer, or any pole trailer having a GVWR of 3,000 pounds or less must be equipped with brakes if the weight of the towed vehicle resting on the towing vehicle exceeds 40 percent of the GVWR of the towing vehicle.

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