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FINAL REPORT

EXAMINATION OF FEATURES PROPOSED FOR IMPROVING TRUCK SAFETY

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Robert D. Ervin

May, 1989

UMTRI The University of Michigan Transportation Research Institute

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EXAMINATION OF FEATURES PROPOSED FOR IMPROVING TRUCK SAFETY

Prepared in cooperation with
The U.S. Department of Transportation
Federal Highway Administration
and
Michigan Department of Transportation

by

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"The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the Michigan State Transportation Commission, the Michigan Department of Transportation, or the Federal Highway Administration."

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16. Abstract

This study addresses three of the action plans recommended by the Michigan Interagency Truck Committee to improve truck safety in Michigan. The three topics analyzed here are: (1) Improved Truck Identification; (2) Mandatory Use of On-Board Recorders (OBR's); and (3) Maximum 22" height of Rear Bumpers for Trucks and Trailers.

The study summarizes and integrates the existing knowledge on each of the three topics. The sources of information used by the research team include: literature review, interviews of trucking companies and associations, interviews of instrument manufacturers and users, and discussions and study of research materials developed by enforcement agencies at the federal level (FHWA and NHTSA).

The study recommended: (1) mandating federal rule on truck indentification for all Michigan-based exempt carriers and initiating an experimental program for a State-based toll-free number; (2) not to mandate use of OBR's in Michigan; and (3) mandating the 22" guard for all Michigan-based trucks above 10,000 lbs GVWR, following the general form of NHTSA's proposed rule, and paying particular attention to the three types of exempt vehicles - low chassis, wheel-back, and utility trucks.

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1. INTRODUCTION

Truck accidents in Michigan increased by 65 percent between 1982 and 1985, although truck travel during the same period increased by only 15 percent. The causes of the increase are not completely understood, although the impact of economic deregulation of the trucking industry has been assumed by some to have contributed to the decline in safety due to the more competitive environment. It has been speculated that drivers and trucking companies might be under pressure to violate some driving rules, operate at higher speeds, and reduce maintenance. This study has been prompted,in part, by concerns that such practices may be contributing to the truck accident problem.

The Michigan Interagency Truck Committee in its report of May 1, 1987 (Michigan DOT, 1987), summarized the apparent causes of truck accidents and recommended nineteen action plans for improving truck safety. The Committee reported (p. 2) that truck accidents may be caused by:

Drivers who are inexperienced, or have poor driving records,
Drivers who operate too many hours or drive too fast,
Trucking companies or shippers who encourage violations of laws,
Inadequate truck maintenance,
Increased auto and truck traffic,
Unstable truck configuration and loading.

This study, conducted by the University of Michigan Transportation Research Institute (UMTRI), addresses three of the recommended action plans which follow on the suggested causes of accidents. The three topics analyzed here are:

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1. Improved Truck Identification
2. Mandatory Use of On-Board Recorders
3. Maximum 22" Height of Rear Bumpers for Trucks and Trailers.

These topics were selected for study by the Bureau of Transportation Planning, Michigan Department of Transportation (MDOT). The "Improved Truck Identification" would provide an obvious means for motorist identification of individual trucks such that unsafe driving practices would be effectively reported. The "On-Board Recorder" concept provides for continuous monitoring of driving behavior, and truck performance. The mandatory use of such devices was proposed as an aid in "weeding out" poor and unsafe drivers, and for assisting in the enforcement of various truck driving laws. The Maximum Height of 22" Rear Bumpers pertains to a proposal for limiting the height of truck and trailer bumpers to 22 inches above the ground as a means of reducing the severity of collisions in which passenger cars strike the rear of such vehicles.

2. METHODOLOGY

This study summarizes and integrates the existing knowledge on each of the three topics. The sources of information used by the research team include: literature review, interviews of trucking companies and associations, interviews of instrument manufacturers and users, and discussions and study of research materials developed by enforcement agencies at the federal level.

Specifically, the following steps were taken in conducting this study:

1. Literature review at the UMTRI library.

2. Electronic literature review of data bases organized by the National Technical Information Service (NTIS), the Engineering Index (U.S.), and the Institute of Mechanical Engineers (U.K.).

3. Discussion with personnel of the Federal Department of Transportation (USDOT), Office of Motor Carrier Standards.

4. Discussion with personnel, and review of material produced by the American Trucking Association (ATA).

5. Review of Dockets pertaining to these topics at the USDOT, National Highway Traffic Administration (NHTSA) and Federal Highway Administration (FHWA).

6. Site visit and/or telephone interviews of a sample of Michigan-based trucking companies, provided by the Michigan Trucking Association (MTA), to solicit responses to the three proposed new rules.

7. Discussion with, and review of publications by, manufacturers of on-board recorders.

8. Identification of national carriers who have been posting a toll-free (800) number on their trucks, followed by a telephone interview which inquired about their experience.

9. Discussion with, and review of materials provided by, the AT&T corporation to estimate the cost of a toll-free (800) number.

10. Integration and synthesis of findings.

3. IMPROVED TRUCK IDENTIFICATION

A. RULE PROPOSED BY MICHIGAN DEPARTMENT OF TRANSPORTATION

The Michigan Interagency Truck Committee proposed an action step as follows:

> "Provide for uniformity of identification of truck dimensions and ownership to aid in accident investigation and data needs. Also, provide a toll-free number of the trucking company on the rear of the vehicle for the public to call to voice concerns or praise."

The committee's justification for this proposal was based upon the concern that, "truck companies that operate in an illegal or dangerous way or spill loads and cause accidents cannot be easily identified."

Michigan Senate Bill No. 700, Section 723 proposed the following:

(1) All motor trucks, or trucks tractors, except as provided in subsection (4), of more than 5,000 pound registered weight and all towing or platform bed wrecker road service vehicles in operation upon public highways of this state shall have the name, city, and state or the registered logo or emblem of the registered owner of the vehicle, and lease of the vehicle if the vehicle is being operated under lease, painted or permanently attached on each side of the cab on a motor truck or truck tractor in letters of not less than 3 inches in height, not lower than the bottom of the door, except that motor truck with closed van bodies may replace the information on each side of the van not lower than the bottom edge of the cab door. This information shall be in sharp color contrast to the background.

(2) Except for towing or platform bed wrecker road service vehicles, the identification requirement of section (1) may be met through the use of removable device which meet the requirements of subsection (1). These devices shall be of durable construction and securely attached to each side of the motor truck or truck tractor. The removable device shall be attached so that the identification is in a horizontal position.

(3) Motor vehicles subjected to this section shall have 2 years after the effective date of this subsection to be in compliance with the marking locations required in section (1).

(4) This section shall not apply to trucks eligible for and equipped with farm license plates.

(5) A person who violates this section is responsible for a civil infraction.

Part of the amendment to Senate Bill No. 700 (not shown here) considered incorporating into Section 723 a requirement for a toll-free (800) number of the trucking company on the rear of the vehicle for the public to call to voice concerns or praise.

B. US DOT RULES ON TRUCK IDENTIFICATION

The Michigan proposal for a truck identification rule has been at least partially addressed in a very recent federal regulation. On May 19, 1988, the Federal Highway Administration (FHWA), Office of Motor Carrier Standards (OMCS) issued a new rule that required certain motor carriers to mark their vehicles in a specific manner (described below). The new rule became effective on November 15, 1988.

The new FHWA rules, and the history and rationale behind them were published in the Federal Register (FR), Vol 53, No.97, May 19 1988 (FHWA Docket No. MC-114). The revisions have been made in response to section 206 of the Motor Carriers Safety Act of 1984, and to comments received to a notice of proposed rulemaking (NPRM) published in the Federal Register on July 13, 1987 (52 FR 26278).

The first section below lists the new Federal truck identification rule. It is followed by a summary of the responses to the rule when it was first proposed in the Notice of Proposed Rule Making (NPRM) of July 13, 1987, and the discussion by the FHWA. We believe that the discussion by FHWA applies, for the most part, to the proposed rule in Michigan.

Section 390.21: Marking of Motor Vehicles

(a) General. Every self-propelled commercial motor vehicle operated by a private motor carrier of property in interstate commerce, and every self-propelled motor vehicle operated by an interstate motor carrier of migrant workers, must be marked as specified in paragraph (b) and (c) of this section.

(b) Nature of marking. The marking must display the following information:

(1) The name or trade of the motor carrier operating the self-propelled motor vehicle.
(2) The city or community and State in which the carrier maintains its principal place of business.
(3) The motor carrier identification number, if issued by the FHWA preceded by the letters "USDOT".
(4) If the name of any person other than the operating carrier appears on the motor vehicle operated under its own power, either alone or in combination , the name of the operating carrier shall be followed by the information required in

paragraphs (b) (1) and (2) of this section, and be preceded by the words "operated by."
(5) Other identifying information may by displayed on the vehicle if it is not inconsistent with the information required by this paragraph.

(c) Size, shape, and color of marking. The marking must-
(1) Appear on both side of the self-propelled vehicles;
(2) Be in letters that contrast sharply in color with the background on which the letter are placed;
(3) Be readily legible, during daylight hours, from a distance of 50 feet while the vehicle is stationary; and
(4) Be kept and maintained in a manner that retains the legibility required by paragraph (c)(3) of this section.

(d) Construction and durability. The marking may be painted on the motor vehicle or may consist of a removable device, if that device meets the identification and legibility requirements of this section, and such marking shall be maintained in such a manner as to remain legible as required by this section.

Coverage, Past Identification Rules, and Exemption

Currently, there are 198,908 motor carriers of record in the USDOT motor carriers census file. Of these 145,009 (76.3%) operate a single motor vehicle. An additional 25,253 (13.3%) operate from 2 to 6 vehicles.

In the past there were only two groups of carriers who were required to display a uniform identification on the vehicle, similar to the new (11/15/1988) rule:
1. Private motor carriers operating in interstate commerce, and laden with hazardous materials
2. For-hire motor carriers operating in interstate commerce under authority issued by the Interstate Commerce Commission (ICC). These carriers also display an ICC number.

There are certain segments of the motor carrier industry that are exempt from FHWA safety regulation, and as such would not be required to comply with the new USDOT truck identification rule. They obviously include commercial vehicles which operate solely within a State. They also include interstate commercial vehicles of less than 10,001 pounds, passenger-carrying vehicle which carry less than 15 passengers, and vehicles owned by Federal, State, and local government.

Another group of carriers known as "exempt carriers" include for-hire motor carriers that have been exempt from economic regulation. This group is currently subjected to federal safety regulation, but will not be required to provide identification marking. They include, for example, vehicles operating within limited commercial intracity zones established originally by the

Interstate Commerce Commission(ICC), and those involved in transportation of special, mainly agricultural, commodities.

Trucking Industry Comments on The (Now Promulgated) Federal Rule

Ten responses were received by the USDOT in response to the NPRM of July 1987 concerning truck identification. Four favoured the requirements as proposed. The major concerns, or opposing views, include the following:

(1) **Private motor carriers** opposed the requirement to display the name or trade name of the carriers and the name of the city and State which is their principal location. The main reasons were to avoid theft of ("advertised") high-value freight, and not to announce the delivery of products to competitors (e.g. the General Motors Corporation engaged in delivery of components to the Ford Motor Company).

(2) **The American Trucking Association (ATA)**, which supported the identification rules, asked DOT to extend them to include also the economically "exempt carriers." ATA argued that this action would put all carriers on an equal footing, and would enforce good driving by all carriers.

(3) **The Truck Rental and Leasing Association (TRALA)** supported the rule for private carriers and carriers of migrant workers. However, TRALA proposed that commercial rental vehicles, rented or leased to private carriers for less than one year, would be allowed to carry the rental company census number and address. They considered the requirement of removable identification marking from private carriers, who rent/lease a truck for a short duration to be impractical.

Relevance of USDOT Rule to The Proposed Michigan Rule.

The concern for an efficient means of reporting unsafe truck drivers raised by the Michigan Interagency Truck Committee in its proposed rule for truck identification has been recently addressed, to a large extent, by the federal rule on this subject. The new USDOT rule shows clearly that the concern for truck identification raised by Michigan truck safety policymakers has been acknowledged at the national level.

Because of the new USDOT rule, all Michigan-based trucking companies operating in interstate commerce have been posting the federally-mandated truck identification since November 15, 1988. Many Michigan based trucking companies are certified to operate in interstate commerce, and as such already have an "improved truck identification" system. Is seems redundant to impose an additional State-based rule on them. However, Michigan can enhance the USDOT rule by applying it to Michigan-based trucking

companies which operate only within the State and/or those which are exempt from the federal rule for other reasons.

The new USDOT rule does not require a posted toll-free telephone number. Most Michigan-based trucking companies surveyed in this study opposed mandatory posting of a toll-free telephone number, and, indeed, the cost may seem as prohibitive for small companies.

C. NATIONAL EXPERIENCE WITH A TRUCK TOLL-FREE (800) TELEPHONE NUMBER

Several truck companies have been voluntarily posting a toll-free (800) telephone number on the back of their trucks or trailers in recent years. Their purpose for posting is first, to solicit feed-back from other highway users which will "tell us how we are doing," and second, to serve as a recruiting tool for new drivers.

The exact number of carriers involved in this endeavor, or the length of time over which voluntary posting has been carried out, is unknown. Neither the American Trucking Association nor AT&T has a listing which identifies such carriers.

In order to contact them and learn about their experience with the toll-free number, a sample was drawn of "800" numbers encountered on trucks and trailers during several auto trips within Michigan, and from two trips between Michigan and the East Coast covering the states of Ohio, Pennsylvania, New-Jersey, and Maryland.

From this direct observation, it was clear that most trucks do not post such telephone numbers. The sample drawn from more than 50 hours of interstate highway driving resulted in only 9 different "800" telephone numbers of trucking companies (one more "800" number was drawn from the sample of Michigan-based companies).

Very significantly, this personal experience also showed that it is difficult for a lone motorist to copy such a number while driving behind a truck. The posted numbers are generally quite small, and the generally poor legibility required driving behind the truck for a considerable distance in an adjacent lane (which is not very safe).

The following list shows the companies which were identified, and summarizes the information which was gained upon calling the posted number (In general, calling the "800" number led to a connection with a main switchboard operator. From there we requested the "safety director" of the trucking company who, in most cases, was very cooperative). The interview also included, when possible, questions on the company's experience with on-board recorders and rear-end bumpers. The following summarizes

the information gathered through the interviews with companies which posted an "800" number on their trucks:

(1) ABC Trucking, (800) 455-0074 or (800) 255-8968, Little Rock, Arkansas.

ABC Trucking had the "800" number for 1.5 years. The company had no record of the phone number's use or of complaints.

(2) J.B. Hunt, (800) 643-3331, P.O. Box 130 Lowell, Arkansas 072745, B.J. Keller, Safety Director.

J.B. Hunt has 3440 Trucks. The "800" number has been posted since 1980/81. It is being used for many purposes. They receive about 3 to 4 calls per day, mostly complaints. They are very satisfied with the program which they believe has helped to improve fleet safety [In addition, J.B. Hunt also has on-board recorders (OBR) on all of their trucks].

(3) PST, (800) 535-0544, 1891 West 2100 South Salt Lake, Salt Lake, Utah 87119, Don Miller, Safety Director.

PST has 700 trucks, about 50% of which are company owned and 50% driver owned. They have had the "800" number since July 1986 both for communication and recruiting. They have averaged about 100 calls per year. The experience has been "excellent, second best thing for improved safety, after installing OBR's [Rockwell International, with no driver input] on all of their trucks."

(4) DART Transit Company, (800) 328-6501, 2102 University Avenue, P.O. Box 64110, St. Paul, Minnesota 55164-0110, Jim Tammus, safety director.

DART has 940 trucks, all owner-operated, and has had the "800" number for 2 years. DART has averaged about 1-2 calls per day, about 50% complaints, and 50% praises. In general, they are satisfied with this program. [DART does not have OBR's on their trucks, mainly because the trucks are owner-operated.]

(5) Gra-Bell (800) 632-5302 in Michigan, (800)253-3633 interstate, P.O.Box 1919 Holland, Michigan 49422, Ron Nyhoff, safety director.

Gra-Bell has 250 power units, about 2/3 company-owned and 1/3 driver-owned. They have had the "800" number since 1981/82, originally for recruiting. They average about 2-3 calls per month, only one of which is typically concerned with safety issues. They consider it a good program, and recommend it to others.

[Gra-Bell has no OBR's now. It could not justify the costs at this point in time . It finds controlling gas consumption and speed more efficient via the use of governors]

(6) Mural Transport, (800) 631-5588, B.O. Box 1785, North Brunswick, New-Jersey 08902, Bill Winch, Safety Director.

Mural Transport has 210 tractors, 100 of them owner-operated and 110 on a lease-purchase program. The company had the "800" number for at least 10 years. The use of the "800" number by Mural Transports is unique. It uses it for drivers' dispatching and reporting from the road (on a different 800 number), and for customers' orders. This usage is in addition to safety reports and recruiting. They average about 200 drivers' calls per day, and another 200-300 calls from customers. As for safety, they average 2-3 calls per week, mostly for complaints. They consider the safety program worth it because it make the drivers more aware of the public and eventually leads to safer driving.

(7) Eagle Expediting, in Michigan (800) 742-5646, US (800) 544-0730, 8163 West Grand River, Brighton, Michigan, Robert Keller, General Manager.

Eagle Expediting has 170 trucks (no tractor-trailers). Eagle Expediting is a general commodity carrier, specializing in auto part delivery, mostly in Michigan and the western part of the US. (Eagle Expediting was the only company from the Michigan-based sample which had an 800 posting program). The "800" number has been used for several years. It has been used mainly as a "marketing tool" for existing and potential clients. Communication with other highway users is only a very small fraction of the "800" use - they receive only 2-3 complaint calls per year.

(8) Warner (800) 228-2137. Unsuccessful attempt to gain information.

(9) Altruck, (800) 227-8935,
This telephone number has been disconnected.

In summary, all truck companies surveyed that had a toll-free "800" number found the system useful, and felt that its use contributed to their fleet safety. The number of complaints was relatively small: from 3-4 per day by J.B. Hunt which operates a large fleet of nearly 3,500 trucks, to 1-2 per day by DART which operates 950 trucks, about 2 per day by PST with 700 trucks, down to 2-3 per week by Mural with 210 tractors, 2-3 per month by Gra-

Bell with 250 power units, and down to 2-3 per year by Eagle Expediting with 170 trucks.

The companies indicated that they treat complaint calls very seriously, and act upon them immediately. They consider the posting useful in making the driver more aware of being exposed to complaints if not driving safely. Interestingly, there was no indication by any of the "800 companies" that the "800" number was abused with superfluous calls. This is in sharp contrast to the perception of companies that do not have a toll free number on their trucks, and that oppose its adoption.

D. ESTIMATING THE COST OF A TOLL-FREE (800) NUMBER

Appendix A contains detailed information from AT&T Primary Account Sales Center [(800) 327-0773] about the cost of an 800 number. There are three types of service: Michigan WATS, Interstate WATS/800 and Readyline. The cost varies with each type of service, the service area (up to 6) from which incoming calls arrive, time of day, and volumes of calls (cost per hour is reduced with increased volume). The exact cost per company is hard to assess without knowledge of the specific service which is requested and the usage. Hence the estimate here provides only a "ball park" figure.

One time installation and service ordering:	$100 - $225
Monthly service charges:	$ 20 - $ 60
Cost of use per month @ $17.50/hour, and 3 - 10 hours/month:	$ 52.5 -$175
Total monthly cost (calls and charges):	**$ 72.5 -$235**
This monthly estimate translates to **Total annual cost**	**$870- $2,820**

4. MANDATORY USE OF ON-BOARD RECORDERS

A. PROPOSED ACTION BY MICHIGAN DEPARTMENT OF TRANSPORTATION

The Interagency Truck Committee proposed action which would:

"Evaluate mandatory use of tachographs." The justification for this action is "Fatigue appears to be a major cause of truck accidents. The current law limiting drivers to 10 hours of daily driving and eight hours of rest (up to 70 hours of driving per week) is felt to be violated widely throughout the industry by falsification of log books. Tachographs would assist in the enforcement of hours-of-service laws."

B. ON-BOARD RECORDERS AND TACHOGRAPHS - BACKGROUND

Tachographs and On-Board Recorders (OBR) are mechanical or electronic instruments, respectively, which continuously record engine/truck performance in terms of RPM, speed, distance, time, energy consumption, brake application, etc.

Tachographs are mechanical devices which record the information on a circular paper chart, which is replaced at given time intervals (typically every 12 or 24 hours). Tachographs have been in use since the 1930's, adapted originally from industrial chart recorders. Established American manufacturers of this instrument include Argo Instruments Corporation (which has also developed an electronic on-board recorder) and Sangamo.

On-Board Recorders are a modern variation of the old idea of the tachographs. They are solid-state instruments which record the information electronically on memory chips. The information can be "downloaded" easily to a personal computer (PC). Additional software can provide the management of a trucking company and/or the regulating agency (USDOT, MDOT, etc.) with reports on truck and driver performance. An additional hardware device also allows for driver's input, such as time and place of operation, volume and type of load, and off-the-road activities (rest, sleep, etc.). There are several OBR manufacturers in the US. The most popular OBR's are "Tripmaster" manufactured by Rockwell International, and "CADEC" by Cummins Allied Products. In addition, the FHWA indicated that it had identified at least nine other manufacturers marketing OBR's.

With the development and refinement of electronic OBR's, tachographs have become almost obsolete. Hence, our discussion will concentrate on electronic OBR's, or in short, OBR's.

For a detailed review of various OBR's available in the U.S. in terms of attributes, costs, and applications see the article in Appendix B by Rich Cross, Senior Technical Editor, *Commercial Carrier Journal*, August 1987. This article also appeared with comments by the American Trucking Association (ATA) in its

response to FHWA request for comments on "Driver's Record of Duty Status;On-Board Recording Device."

Tachographs have never been mandatory in the U.S. The popularity of tachographs in the U.S. was reduced because operators found them cumbersome to interpret and because they were not tamper-proofed. Data could be easily altered by the drivers. However, tachographs were found useful in accident reconstruction. The problems of interpretation and of tampering has been eliminated for the most part by the new models of electronic OBR's.

Tachographs have been more popular and even mandatory in the Western Europe. First wide-spread mandatory use was in West Germany in the 1950's. Their use was legislated due to pressure by the trade unions as a mechanism for enforcement of work hours rules. However, the useful by-product was in truck accident investigations. In 1970 the European Economic Community (EEC) adopted the West German system for EEC communities requiring tachographs in all vehicles over 3.5 tons gross weight (EEC Tachograph Rule 1463/70). Since 1970 the United Kingdom , Denmark, Ireland, Portugal, and Spain accepted this mandatory use as well when they joined the EEC. Other countries with mandatory use of tachographs include Sweden, Norway, Finland, Syria, Jordan, and Japan.

In contrast, research conducted by the FHWA in 1978 indicated that "...automatic records, principally the recording tachographs, while very accurate, were unable to provide a driver's record of duty status sufficient to enforce the Federal Motor Carrier Safety Regulations (FMCRS) in team-driver operation, and automatically producing duplicate copies of the charts (i.e., logs)." (*Federal Register*, VOl. 53, No 49, pp 8229).

Over the last few years the federal government (US FHWA) has been actively involved in studying and evaluating the voluntary or mandatory use of OBR's. This was due to the advancement and improved performance of electronic OBR's, requests by some carriers to substitute the paperwork of the "Driver's Log Book" with an electronic reporting system, and a petition by the Insurance Institute for Highway Safety (IIHS) on October 1, 1986 ".. to require the installation and use of on-board automatic recordkeeping system to record vehicle operation." Both this original petition and a following petition for reconsideration (by IIHS) on February 25, 1987 were denied by the FHWA.

However, FHWA indicated that it "believes that automatic on-board recording devices may be an effective alternative to the current recordkeeping requirement." As a result FHWA issued in the Federal Register, Vol 53, No. 49 a proposed rule making "... to allow, at the motor carrier's option the use of on-board recording devices in lieu of the handwritten driver's record-of-duty status."

Previously, FHWA granted exemptions to only ten carriers to permit usage of on-board recorders in lieu of the driver's log book. The petition for exemption was a lengthy and time-consuming document. The prevailing idea now is to allow each carrier to select either the log book or an approved electronic on-board recorder. Until a final decision is made, FHWA postponed further petitions for exemptions.

As part of the validation of on-board recorders the FHWA has been monitoring a field test of OBR's manufactured by Rockwell International and by CADEC/Cummins in use by the 10 exempt carriers. In addition, in 1987 the FHWA reviewed a large-scale experiment of OBR use by 470 drivers of Frito-Lay, Inc. In summary, it found no degradation in the drivers' adherence to the hours-of-service and safety regulation. Also it found that the failure rate of the OBR's was only 1%. Some minor problems were discovered, and were eventually corrected.

In recent years, the FHWA has conducted quite an extensive study of the use of OBR's. We believe that many of the questions asked and issues examined by the FHWA are applicable to the proposed mandatory use of OBR's in Michigan. Hence, in the next section, we shall summarize the findings of the FHWA regarding the use of OBR's.

C. US DOT FINDINGS ON USE OF ON-BOARD RECORDERS

On July 13, 1987 the FHWA, Office of Motor Carrier Standards issued a request for comments in an Advanced Notice of Proposed Rulemaking (ANPRM) on the use of on-board recorders for recording the driver's hours-of-service (*Federal Register* Vol.52, No.133, pp. 26289-26291). This request for comments was part of the FHWA response to the petition for reconsideration of mandatory use of OBR's filed by the Insurance Institute for Highway Safety (IIHS) in February 1987 (which was previously denied).

The FHWA included as part of this request for comments on OBR's a list of 8 specific questions. They included question on the type of existing and/or plans to purchase,e OBR's; evaluation of their performance from both management and drivers view point; cost of purchasing and operation; contribution to safety and economy; failure rate and operational problems; and their utility in log book substitution.

FHWA received a total of 22 comments to the ANPRM. The comments can be found in Docket No. MC-130, closed on October 13,1987. The summary of comment and discussion appears in the *Federal Register* Vol.53, No.49 March 14, 1988, pp. 8229-8234.

The comments came from a wide range of interested parties. They include:

Eight (8) from motor carrier industry associations;
three (3) from manufacturers of electronic Obr's;
two (2) from tachograph manufacturers;
two (2) from insurance industry members;
four (4) from private motor carrier fleets;
one (1) each from labor union (Teamsters), a State highway patrol, and a State highway commission.

Analysis of the comments identified five issues of concern to these interested parties.

(1) Should OBR's be mandatory in Interstate commerce?

Fourteen of 22 comments (64%) opposed mandatory use of OBR's, only 5 (23%) favored them. In general, all trucking operators - companies, associations, drivers, and their unions opposed mandatory use. The major proponents of mandatory use were the American Automobile Association (AAA), and the Insurance Institute for Highway Safety (IIHS), plus one OBR manufacturer, Argo Instrument Inc.

The International Brotherhood of Teamsters (IBT), the American Trucking Association Inc. (ATA), and Owner-Operators Independent Drivers Association of America argued that there was no evidence at that time that OBR's improve highway safety. The National Private Trucking Association, IBT, Cadec Systems Inc. (major manufacturer of OBR's), and Frito-Lay (a company with one of the largest application of OBR in US truck fleets) indicated that OBR's by themselves do not contribute to improved safety. However, when management is committed to on-going analysis of OBR reports and to taking action based on such analysis, they can be useful tools for identifying and correcting safety problems.

The American Automobile Association, a major proponent of mandatory use of OBR's, cited the study "Effects of Driver Hours of Service on Tractor-Trailer Crash Involvement" (I.S. Jones and H.S. Stein, IIHS, September 1987), conducted in Washington State, which found high correlation between truck crashes and fatigue due for long driving hours. The IIHS study attributed 41% of accident studied to excessive driving hours. (The American Trucking Association in its response to the FHWA ANRPM contested the results of similar study: "A Report on the Determination and Evaluation of the Role of Fatigue in Heavy Truck Accidents," by F. Baker, Transportation Research and Marketing, Challis, Idaho. The ATA argued in part that the data pertain only to western states. Obviously, similar criticism could apply to the Washington State study).

Argo, a manufacture of OBR's, cited accident statistics from West Germany, where OBR's have been mandatory since the 1953 (due to trade-unions pressure) that since OBR's became mandatory "on the

basis of volume, the accident involvement of goods vehicles was cut down by almost 75% during the last 20 years."

The labor union (IBT) and representatives of small carriers indicated that it is unrealistic to require OBR use by small carriers. They argue that those carriers who do not practice safety programs under current rules, would probably circumvent them even under an automatic OBR environment.

Having considered all of the comments, the FHWA rejected the petition for a mandatory use of on-board recorders.

(2) Cost of Owning and Operating On-Board Recorders

Based on information provided by Cadec (one of the two major manufacturers of OBR's), the FHWA estimated that an investment in an OBR system (hardware, software and training) for a 10- vehicle fleet would cost approximately $35,000. The breakdown is as follows:

On-board Computers (@ $1,750/unit)	$17,500
Installation	$ 1,000
Personal computer and Printer	$ 4,500
Data link	$ 2,970
Software	$ 3,960
Training/Start-up	$ 3,000
Maintenance for 1 year	$ 2,000
Total	$34,930

FHWA estimated that more than 80% of all interstate motor carriers (180,000 out of 220,000) have fleets smaller than 10 vehicles. Given this reality, FHWA found current costs of Obr's to be excessive for the majority (i.e. small fleets) of US interstate carriers, in comparison to current practice of manual reporting. It appears that the current economics of OBR's was the main determinant in rejecting their mandatory use by the FHWA.

(3) Voluntary Use of OBR's In Lieu of Manual Recording

FHWA determined that OBR's should be allowed in lieu of handwritten reports, provided they meet the proposed performance requirements contained in section 395.15 of the regulations. This stipulation effectively approved for the present time OBR's manufactured by Rockwell International and by Cadec/Cummins. Other OBR's would probably be approved in the future.

This FHWA decision was based on data gathered from 10 motor carriers, who were exempt, on experimental basis, from manual record keeping. Instead, they provided data obtained from OBR's in their fleet. The experimental data showed that OBR's can

improve management efficiency and control in addition to providing a comparable quality of hours-of-service records maintained by the "log-book."

Until the mid 1980's, exemptions were given by FHWA only in response to applications submitted on an individual basis, which apparently required much paper-work. The opposition by the trucking industry to this bureaucratic rule was reflected in the response to the proposed rulemaking by the FHWA. Nine responses supported voluntary use of OBR in lieu of the "log book." Four of these nine respondents also made an explicit opposition to the case-by-case exemption system maintained by FHWA up to that time.

(4) How Tamperproof Are OBR's?

Eight of the twenty two responses (36%) indicated concern about possible tampering to alter data. Cadec indicated that 5% of its instruments which were sent for a first-time repair had failure due to tampering. However, they also indicated that this problem was reduced to 1% or less, once management was notified.

In a separate discussion with Rockwell International (not in the FHWA report) they indicated that their second generation OBR's are almost 100% tamper-proof.

Based on evaluation of the 10 exempt carriers, and the Cadec report, FHWA did not consider tampering a serious enough problem to halt the use of OBR's in lieu of "log books."

(5) Standardization

The two manufacturers participating in the FHWA experiment (i.e. Cadec and Rockwell International) plus one carrier called for standardization of the forms and other printed communication resulting from OBR data analysis. The existing software currently available provides all of the items required in the FHWA "hours-of-service" regulation. At the present time FHWA considers these items to be sufficient. FHWA supports standardization in that it reduces the burden placed upon the field officers who enforce hours-of-service rules.

D.PROPOSED RULE 395.15 AUTOMATIC ON-BOARD RECORDING DEVICE

See *Federal Register*/Vol.53 No.49/March 14, 1988/Proposed Rules/pp. 8233-8234, in Appendix D.

5. 22 INCHES BUMPERS FOR TRUCKS AND TRAILERS

A. PROPOSED RULE BY MICHIGAN DOT

The Michigan Interagency Truck Committee proposed an action plan as follows:

> "Maximum 22" maximum height rear bumpers for trucks and trailers"

Federal law currently allows a rear-end bumper to be 30" from the ground. Michigan requires all 53' trailers registered in Michigan to have a rear-end bumper height of 22" from the ground. The proposed action will expand the 22" bumper rule to all large trucks registered in Michigan. The Committee justification for this proposal was based upon the concern that current federal standards result in small passenger cars underriding trucks during a rear-end collision, which could lead to severe injuries or fatalities to the passenger car occupants. A 22" reinforced rear bumper for all trucks and trailers would stop most small compact cars from passing under the guard.

Michigan House Bill No. 5682 Section 719, Subsections (6) and (7) calls for:

(6) A motor vehicle, trailer, or semitrailer whose frame or body extends more than 36 inches beyond the rear of its rear axle and is more than 30 inches above the roadway shall not be operated on the highway of this state unless equipped with a fender or bumper on the extreme rear of the frame or body. The bumper shall extend downward from the rear of the frame or body to within 30 inches of the roadway and be of substantial construction. In addition to the requirements of subsection (7), no vehicle which is required by federal law to have an underride guard of not more than 22 inches above the roadway shall be operated upon the highway of this state without such an underride guard.

(7) A truck tractor and semitrailer combination with a semitrailer length longer than 50 feet whose frame extends more than 36 inches beyond the rear of its rear axle and is more than 30 inches above the roadway shall not be operated on the highways of this state unless equipped with an underride guard on the extreme rear of the frame or body. The underride guard shall meet all of the following requirements:

(a) Provide a continuous horizontal beam having a maximum ground clearance of 22 inches, as measured with the vehicle empty and on level ground.

(b) Extend to within 4 inches of the lateral extremities of the trailer on both left and right sides.

B. USDOT RESEARCH AND PROPOSED RULES ON REAR-END BUMPERS

Background

On January 8, 1981, the US Department of transportation (USDOT), National Highway Traffic Safety Administration (NHSTA) proposed a new rule on rear-end bumpers for trucks and trailer which would have required a bumper height of 21.65" above the ground on all trucks and trailers (with some exemptions) that have gross vehicle weight ratings (GVWR's) greater than 10,000 pounds. The proposed effective date for this rule was September 1, 1983.

The federal rule on 22" bumpers has not been implemented, in spite of extensive studies by NHTSA over a period of about ten years which have shown the effectiveness of such bumper installation.

A summary of the history behind this proposed federal rule, the rationale, and the results of studies upon which the proposed federal standard was established is found in the *Federal Register* (1981) Vol. 46. No. 5, January 8, 1981, "Federal Motor Vehicle Safety Standards; Rear Underride Protection." Responses to this proposed rule and other supporting materials are located in NHTSA Docket 10-11-Notice 8, which covers the period 12/29/80 to 4/13/83.

The current study draws from the extensive research conducted and/or monitored by NHTSA, in particular the "Supplementary Information" provided with the proposed rule of January 1981.

The concern of USDOT, the trucking industry, and the public with the problem of rear underride spans a period of about thirty years. NHTSA, [*Federal Register* (1981)] describes the underride problem as follows:

"Rear underride involves the front of a car or other small vehicle sliding under and colliding with the rear end of a truck or trailer. Underride occurs because the rear end of the truck vehicle is relatively high off the ground and there is too little structure under the rear end to resist the striking vehicle, or the structure present is not strong enough to accomplish that purpose. Underride occurs to some extent in most collisions in which a passenger car crashes into a truck rear end. This kind of crash typically results in substantial damage to the smaller vehicle and injury to the car occupants. In 1978, 500 deaths or more than one (1) percent of all traffic fatalities occurred in collisions involving a vehicle and a heavy truck rear end. Three hundred and thirty eight (338) of these fatalities were occupants of passenger cars. Sometimes when a car underrides a truck, the rear end of the truck body crashes through the windshield and penetrates the passenger compartment of the automobile. In those cases, the underride is considered "excessive." Death in accidents involving excessive underride usually results from severe head and upper body injuries. It has been estimated that

excessive underride occurs in 30-40 percent of all fatal accidents in which passenger cars crash into truck rear ends."

Early federal attempts to deal with the override problem date back to the 1953 rules "49 CFR 393.86, Rear End Protection," issued by the Bureau of Motor Carriers of the Interstate Commerce Commission (ICC) [now the Bureau of Motor Carrier Safety (BMCS) of the Federal Highway Administration]. The rule applied to trucks and trailers (t&t) manufactured after 12/31/52. The rule requires that the ground clearance of the bumper shall not exceed 30" when the vehicle is empty. The device is to be located no more than 24" forward of the rear end of the vehicle, and it has to be wide enough that its end are not more than 18" inboard from either side. The rule further requires that the device be "substantially constructed and firmly attached."

In 1967, NHTSA initiated its rulemaking on rear end underride protection to improve on the BMCS rule, and in 1969 it proposed a new rule which required a device with a ground clearance of 18" for unloaded vehicle of greater than 10,000 GVWR's, to be located no less than 15" from the rearmost part of the vehicle. Important addition to the BMCS rule was a requirement for a static test of strength. Initially it was proposed that the device should withstand a 75,000 pound load applied with a 4"x4" test block at the center of the device. Subsequently, it was lowered to 50,000 pounds, to be applied with 4"x12" test block at any point between the outmost sides of the guard. However, in 1971 after evaluating cost and accident data, and responses to the proposed rule, NHTSA terminated these rulemaking efforts. At that time NHTSA estimates that the proposed rule would save 50-100 lives per year at an annual cost to the consumer of $500 million. Most of the increase in cost was attributed to increase in the guard rail weight in order to withstand the 50,000 pound impact.

In 1977 NHTSA resumed work on the improvement of underride protection. This was a direct results of tests conducted by the Insurance Institute for Highway Safety (IIHS) in 1976, and eventually a US Senate Oversight Hearing. IIHS conducted five tests in which cars were crashed into the rear of a typical semi-trailer van. Two of the tests evaluated a prototype "Rigid Guards," developed by IIHS. A "Rigid Guard" is one that can withstand a load of 100,000 pounds without permanently deforming. The IIHS "rigid guards" were lightweight with struts which transmitted the collision forces from the guard to the uderframe of the van. These test shows that substantial reduction in underride damage can be achieved with this type of light guard.

As a result of the Senate hearing and a subsequent petition for rulemaking filed by the IIHS, BMCS and NHTSA jointly initiated a new research program and a new set of proposed rules on underride protection. On August 29, 1977 (42 *Federal Register*) they made an Advanced Notice of Proposed Rulemaking (ANPRM) was published to solicit comments. As NHTSA indicated (*Federal Register*,

1981), most comments were "in favor of increased underride protection," while the negative reactions were concerned mainly with which portion of the trucking industry will be exempt (off-road vehicle, hydraulic tailgates etc.).

Tests

As part of the joint program BMCS-NHTSA contracted with: (1) The Texas Transportation Institute of Texas A&M University (TTI) to develop a low cost, but practical underride protection device; and (2) Dynamic Science Inc., (DSI) to develop compliance test procedures. The research tested a "rigid guard" with low ground clearance, similar to the one tested in 1976. NHTSA concluded that "The tests performed by TTI and DSI demonstrated what the IIHS program had shown earlier: that excessive underride could be prevented with rigid guards."

However, these tests also showed that "rigid guards" increase the deceleration forces experienced by car passengers in a rear-end crash and as a consequence increase the risk of injury due to hazard other than underride. Crash tests with restrained dummies in passenger cars crashed at 35 mph into a rigid guard experienced injury responses not within the range allowable under FMVSS no. 208.

For comparison, DSI also tested collisions with current (ICC) guards. Results: "This guard was not able to prevent small cars from excessively underriding test trailers at collision speeds above 30 mph. In these tests, the dummies experienced injury responses that are not within the permissible limit of FMVSS no 208, ...The guard did not fail, i.e., did not permanently deform in some manner," probably because the small cars went too low under it to cause deformation.

"In tests of large cars at 30 mph underride was excessive in offset collisions but not when the collision was centric. Occupant response were also within the allowable limit of FMVSS No. 208 in these tests of large cars, and in all tests the guard did not fail. Occupant responses were also within the permissible range of standard No. 208 when the car crashed into the guard at 40 mph. However, in this test underride was excessive, and the guard was permanently deformed."

In addition, tests of a hydraulic energy absorbing guard manufactured by Quinton-Hazell Automotive Ltd. showed that this "off-the shelf" device "...was very effective both at preventing excessive underride, reducing occupant injury response, and reducing damage to the colliding vehicle." Obviously, the hydraulic device is more expensive. However, it is important to note that already in the mid 1970's it was available commercially.

Another important finding of the TTI tests showed that when the rear guard was removed, and readjustable rear wheels on the truck or trailer were set in the rearmost position, the repositioned wheels, by themselves, prevented excessive underride at approximately 35 mph. Further, the restrained dummies in these tests experienced a response which is within the allowable limits of FMVSS No. 208.

NHTSA also employed simulation models for conducting a comparative engineering risk analysis. For details, see Automated Science Group (1980), Coock (1980), and SAE (1980). In contrast to earlier studies supported by NHTSA, these analyses did not concentrate on the question of which guard type is most effective in preventive excessive underride. They evaluated cost/benefits, the risk of "no underride guard at all," and of four types of guards: namely, "rigid," "energy absorbing," "moderate strength" (i.e., one that will permanently deform when subjected to a load of approximately 45,000 pounds), and "current" (ICC).

The effectiveness of each guard (and of "no guard") was quantified by the risk of injury rated 3 or above on the Abbreviated Injury Scale (AIS), which covers the range of injuries from "serious" to "fatal." The results of the risk analysis were as follows:

(1) "Energy absorbing" guards provide the best protection for car occupants in a rear-end collision with a truck.

(2) "Current" (ICC) guards provide the least protection.

(3) "Moderate strength" guards provide an overall risk of injuries to both restrained and unrestrained occupants about the same as "rigid guards" (although "rigid" guards were still superior to "moderate" in reducing the risk of excessive override).

Proposed Rule

In light of the IIHS, TTI, and DSI tests, and the comparative risk analyses, NHTSA proposed on January 8, 1981 (*Federal Register*, 1981) to:

> **"Mandate the use of underride guards that are at least as strong as 'moderate strength' guards."**

The NHTSA rules were modelled on the existing European Economic Community (EEC Directive 79/490/EEC) and the Swedish regulation which in general mandated an underride guard capable of withstanding a load of 45,000 pounds on the vertical support members combined. NHTSA indicated that these rules were proposed in order to provide American and European rules consistent with

the Trade Agreement Act of 1979. For a copy of the proposed rule see Appendix E.

The proposed rule was to apply to most trucks and trailers with GVWR's greater than 10,000 pounds, and a ground clearance at the rear greater than 55 cm (21.56 inches). NHTSA further proposed that the rear guard will be wide enough such that its outmost edges are within 3.95 inches (10 cm) of the outmost sides of the vehicle. The guard also had strength specifications measured at different points on the guard rail, in line with a "medium strength" categorization. For details see Appendix E, Section S6.5 and Figure 2. The total applied load of 45,000 pounds ensures that the guard is at least moderately strong.

Exemptions

The proposed rule exempted three type of vehicles:

(1) "Low chassis" vehicles, such as household moving trailers, or passenger car haulers, where the low van structure prevents an underride.

(2) "Wheel back" vehicles, where the position of the wheels at the outmost position of the van prevents an underride, as shown in the tests discussed above. In order to qualify the rear axle must be permanently fixed and the rearmost part of the tires be no more than 30 cm (11.8 inches) from the rear extremity of the vehicle.

(3) "Special purpose" vehicles. These are trucks or trailers having work equipment located at the rear of the vehicle, such as drilling rigs, salt spreaders, and utility vehicles. This exempts vehicle which by their nature could not comply with the rule without imposing a severe economic hardship.

Costs and Benefits

In 1980, NHTSA estimated that if the proposed rule was implemented in 1977, it could have saved as many as 60 fatalities per year in the period 1977-1979, and an even greater number of serious injuries for passenger car and light trucks occupants. It added that in light of the trend for increasing numbers of vehicles and smaller cars, it was expected that the number of lives saved and injuries avoided would be even higher in future years.

NHTSA estimated that the proposed rule would have applied to 339,000 trucks and trailers a year (based on 1979 statistics), and that 85% of them carry the current (ICC) guard. The installing of the proposed guard was estimated, in 1980, to cost $50 more than the current (ICC) guard. The Consumer Price Index (CPI), increased from 100 to 140 between 1980 and 1988. So, in

todays prices, the additional cost is estimated at $70 more per unit. The aggregated national cost of the proposed guard installation, per year, was estimated at $9.89 million (1980 $'s) for heavy truck, and $8.84 million (1980 $'s) for trailers. These figures translate to $13.85 million (1988 $'s), and $12.37 million (1988 $'s) respectively.

An important component in the cost/benefit analysis is the weight of the guard which adds to fuel cost and replacement of commercial load. NHTSA estimated that, in 1980, the current (ICC) guard weight was about 60 pounds and cost the consumer about $35 per guard (about $50 in 1988 $'s). The proposed device would have weighed 100 pounds and cost the consumer around $85 per guard (about $120 in 1988 $'s). NHTSA projected an added fuel cost of about $0.5 million per year, in 1980 prices, for the affected fleet of 339,000 vehicles (Because in real terms fuel prices remained about constant during the period 1980-1988 this estimate could be accepted "as is"). The penalty for payload displacement for the affected fleet of 339,000 vehicles was calculated at $15,000 per year for the fleet listed above ($21,000 in 1988 dollars).

Comments to NHTSA Proposed Rules

As indicated above, the proposed federal rule on 22" bumpers has not been implemented, in spite of extensive studies by NHTSA showing its effectiveness. The *Federal Register* (1981) is the last official federal document pertaining to this proposed rule. Further information was obtained from NHTSA Docket 10-11 Notice 8, in particular, its (unpublished) "Summary of Comments to Rear Underride Protection," submitted by John Tomassoni, NHTSA, Safety Standard Engineer, on June 1981. This summary provides some insight on the reasons why the rule has not been implemented.

One hundred and ten (110) comments were submitted in response to the rear guard proposed rule. Support for the rule was stated by nine (9), while twenty-two (22) stated or strongly implied an opposition. In other words, opposition overruled support by a ratio of more than 2:1. Moreover, the opposition practically included the entire trucking industry - both manufacturers and haulers. Most responses, 61 of the 110 (55%), came from organizations which asked for exemptions (i. e., cement mixers, refuse and utility vehicles). Nineteen (19) responses favored "improved conspicuity" alternatives, or asked for postponement of the rules until further "conspicuity" research is completed.

The rule was supported by the Insurance Institute for Highway Safety (IIHS), the State of New Jersey (and its Safety Council and its Division of Motor Vehicles, the National Transportation Safety Board, and by three members of the U.S. House of representatives - Peter Rodino, James Howard, and Christopher Smith.

The opposition came from the entire trucking industry, from truck and trailers manufacturers and their association. The opposition included (but was not restricted to): American Trucking Association (ATA), The Budd Company Trailer Division, Truck Body and Equipment Association, Truck Trailer Manufacturers Association, Motor Vehicle Manufacturers Association (MVMA), National Truck Equipment Association, and the Association of American Railroads. To this list one should add the Ford Motor Company and the General Motors Corporation, both of whom implicitly opposed the rule by calling for postponement until an improved conspicuity program could be evaluated.

Much of the opposition centered on the validity of economic and accident data used by NHTSA in evaluating the proposed rule. For example, submitted estimated costs of the proposed guard rail (1980 $'s) ranged from $90 to $1,500 ($125 to $2,100 in 1988 $'s), where the higher numbers are associated with installation on single unit vehicles. Cost estimates also varied with respect to the truck type. For example, ATA estimated the cost in 1985 to be $150 per semitrailer and $600 for straight trucks.

The response given by the American Trucking Association (1982) is typical of the opposition viewpoints. In its letter to NHTSA of March 15, 1983 (with a supporting internal study on the "Cost of Truck Equipment Regulation"), ATA made the following statement.

ATA stated that it has not changed its (negative) position to a similar rulemaking in 1971, and believed that the Docket on underride guard should be terminated. It first argued about the validity of NHTSA cost estimates. It pointed to a similar 1971 study that indicated an expected saving of 50-100 lives at a capital outlay cost of approximately $0.5 billion; and than argued that such a rule in 1980 would have cost $2.8 billion.

It further argued that "The Fatal Accident Reporting System (FARS) provides no national counts of underride but instead gives estimates arrived at by statistical manipulation of small sample data. For example, one NHTSA analysis indicated 29 lives a year could be saved by the proposed rule, but since accident data in an unrelated Bureau of Motor Carrier Study was off by a factor of two, that figure was doubled to show 58 persons saved per year. In another NHTSA study the 236 fatal truck underride accidents reported were actually the nationally weighted total calculated from two actual truck underride fatalities

The ATA argued about the physical effectiveness of the proposed guard to prevent underride, because it was designed to withstand impacts (according to NHTSA) at 35 mph, while most accidents occur at higher speed. Among others it referred to a study by the University of Michigan Transportation Research Institute (without specific citation) which showed that "...closing speed in 2/3 of such incidents it studied were greater than 35 mph."

Finally, it turned the discussion around by stating that underride avoidance should be looking at other measures. In particular it called for improving and modifying auto front ends to increase their energy absorbing capacity "...and protect them when they strike bridges, trees, other cars, and other objects, as well as trucks."

Similar arguments were given by other opponents. In addition, automobile manufacturers called for an increase in the minimum weight requirement for trucks which will be required to install the proposed guard. The Ford Motor Company recommended a minimum GVWR of 12,000 pounds (versus the 10,000 pounds recommended by NHTSA), claiming that the benefits were conjectural because they were based on analysis and not test. The General Motors Corporation recommended even a higher limit, asking that the GVWR minimum will be set at 15,000 pound, because of commonalty with vehicles of less than 10,000 pounds.

Conclusion

As indicated throughout our analysis, the proposed NHTSA rule was never implemented. The exact reasons for not adopting it were never explicitly stated. However, one can infer that the strong opposition by the entire trucking industry combined with "deregulation" sentiments of the recent administration were the major factors in its failure to be implemented. We note that failure to implement a rule on underride guards took place despite extensive research indicating their expected effectiveness.

Based on the national experience, one might expect opposition by industrial groups in the State of Michigan. However, the sample of Michigan-based trucking companies which were interviewed in conjunction with this study indicated a positive attitude toward a Michigan rule for a minimum 22" guard for truck and trailers, but only if the rule is applied to newly-purchased vehicles, and not to refurbishing of existing ones.

6. SURVEY OF MICHIGAN-BASED CARRIERS

A. SAMPLE

The Michigan Trucking Association (MTA) provided the research team with a list of 20 Michigan-based carriers. The research team contacted these carriers to solicit their attitudes and comments on the three proposed regulations discussed here.

The list included: nine (9) "Private Carriers" - producers or distributors which truck their own merchandise; five (5) "Limited Carriers" - for-hire carriers which are limited to trucking of specific commodities; six (6) "General Commodity Common Carriers" - for-hire carriers which transport general commodities. In addition, the research team surveyed another two (2) Michigan-based carriers: Merillat, Inc., the largest US cabinet manufacturer (which installed OBR's in its private carrier fleet), and Gra-Bell (which has an "800" number on its trucks). The interviews where open-ended "on-site," or via telephone. The section below summarizes the results of these interviews.

B. SUMMARY OF INTERVIEWS

(1) Amway Corporation
Ada, MI, (616) 676-6348, Marvin Huttanga, 10/13/88

Operation and Fleet Size: Amway Corporation is a private carrier with common carrier authority. It has 25 drivers, 25 tractors, and 60 trailers.

On-Board Recorders: Amway Corporation does not use OBR's. It tested Rockwell International OBR's, without driver's input, about 3 years ago, and decided not to use them. Reasons: hardware was not dependable, cumbersome in use, required an additional full-time employee to operate and monitor results, and was not cost effective. Also, Amway trucks have similar runs from two distribution centers every day with a general knowledge of travel distance and time. OBR's would not add much information to this knowledge. Finally, one can slow down the operating speed with alternative methods (i.e. governors). For these reasons, Amway opposes mandatory use.

Truck Identification: Amway has identification now (i.e. logo) on its trucks. It sees no problems with truck identification. However, Amway suspects that an "800" telephone number will encourage the "wrong element" to make superfluous calls.

Rear-End Bumpers: Currently, Amway has only 45' trailers. They do not see a problem with 22" bumpers on new trailers; however they see a problem if the rules involve retrofit.

(2) Consumer Power Company
Jackson, MI, (517) 788-0266, Leo Porter, 10/18/88

Operation and Fleet Size: Consumer Power (CP) is a private carrier with a fleet of 3,300 vehicles, both cars and trucks. CP has 1,170 trucks, about 20 tractors, about 20 semitrailers, and 950 trailers (mostly small utility trailers). CP is the largest supplier of energy (gas & electricity) in Michigan, and uses its trucks with road crews.

On-Board Recorders: CP used tachographs on tractor during 1977-1979. The tachographs were high maintenance items ,and as such their use was discontinued. CP does not need OBR's because most of its trucks are used only for one day at a time, many of them off the road, where speed is not an issue. Ninety-nine percent of its trucks have two-way radio communication, which is effective enough to monitor use. In summary, Consumers Power Company believes that it does not need OBR's, and opposes mandatory use.

Truck Identification: CP does not see a problem with truck identification so long as a company's logo will suffice. CP has a logo on its vehicles, but no telephone number. A telephone number or address on its trucks is not meaningful because of its state-wide operation. CP is not regulated by the federal government because it operates only within the State. As such is not required to follow the federal identification rules. In summary CP is for logo (or company name), but against mandatory address and phone number.

(3) Farmers Petroleum
Grand Ledge, MI, (517) 232-7000, Frank Griswold, 10/14/88

Operation and Fleet Size: Farmers Petroleum (FP) has 10 tractor trailer tanks and 11 drivers. FP is a division of Michigan Farm Bureau, delivering liquid fuel throughout Michigan. FP is an interstate carrier because it operates (makes fuel "pick-ups") also in Ohio.

On-Board Recorders: Currently, FP has mechanical tachographs on three (3) trucks, at a cost of $950 per unit, and is considering expanding the programs to all trucks. With a bigger fleet it might consider switching to electronic OBR's. FM is not worried about tampering with the tachographs, and considers them accurate record keepers and good investments. FP supports ("think it is a good idea") mandatory use of OBR's, provided that they will be required by independent truckers as well.

Truck Identification: Currently, FP has identification on both the cabs (name and Michigan Personal Identification Number, PIN) and the trailers (logo) of its trucks. FP supports identification plus phone numbers on trucks, however, it has reservations about their use.

(4) Meijer, Inc.
Grand Rapids, MI, (616) 453-6711, David Frey, Director of Transportation

Operation and Fleet Size: Meijer, Inc. is a private carrier. It has 96 tractors, 585 trailers, and 222 drivers. It travels about eleven million miles/year in Michigan.

On-Board Recorders: Meijer, Inc. has only two (2) tractors with electronic OBR's. They are used solely for retraining drivers with problematic driving safety records. They do not consider OBR's useful for other purposes. Most of their trucks make repetitive, standard trips, which do not warrant monitoring. Also they have developed a productivity training program which increases efficiency, and have installed governors to control speed. Thus, OBR's are an unnecessary expense. Meijer opposes mandatory use.

Truck Identification: Meijer has a company name posted in four places on the trailer, and three places on the tractor. They are exempt from FHWA identification rule because they do not operate in interstate commerce. They post the logo, but no telephone number, as a marketing tool, and receive 4-5 complaint calls per year. They do not support an "800" number, because they do not see in it any particular value. Those who want to contact Meijer can, and do it now, even without a posted number. However, they do support some form of truck identification for owner-operated trucks.

Rear-End Bumpers: The maximum trailer length operated by Meijer is 50 ft. They do not consider a problem with 22" bumpers rule, provided that it will not involve a retrofit.

(5) Michigan Milk Producers Association
Novi, MI, (313) 474-6672, Carl Rasch, 10/5/88

Operation and Fleet Size: Michigan Milk Producers Association (MMPA) operates about 50 tank trailers. MMPA owns the trailers and contracts private tractor operators to haul the milk tanks to processing plants and/or markets. A different organization, Milk Callers Association collects milk from the farms to collection terminals. The latter contracts about 250 owner-operated trucks for the milk collection.

On-Board Recorders: MMPA is unique in that it does not own the power units. As such, it has no control over the use of OBR's, and it does not consider itself qualified to comment about their use, either mandatory or voluntary.

Truck Identification: Given the fact that MMPA does not own the power unit, no MMPA identification is posted on its trucks. It is in favor of mandatory identification of some sort, however, it prefers a centralized "800" number for the whole State.

Rear-End Bumper: MMPA has 40-43 ft single unit trucks. It does not see a problem with new (but not retrofit) 22" bumpers. All of MMPA tankers are purchased from Walker Brenner of Wisconsin, and it estimates no major difference in cost for new units.

(6) Michigan Packaging Company
Eaton Rapids, MI, (517) 663-8121, Wayne Miller, 10/14/88

Operation and Fleet Size: Michigan Packaging Company (MPC) is a manufacturer of corrugated boards. It is a private carrier using its trucks to deliver its product to costumers, mostly in Michigan and some in Ohio. MPC has 16 tractors, 34 trailers, and 13 drivers.

On Board Recorders: At the present, MPC does not have any OBR's. However, in the last year it became apparent that it will need them. MPC considers ORB an excellent tool to monitor speed, and would support mandatory use. It estimates that drivers attitude toward OBR's will be about equally divided for and against the device.

Truck Identification: At the present time MPC has its name and address posted on all of its trucks, and considers it a good practice. It does not have a telephone number, and considers it unnecessary. In summary, it will support truck identification of some sort, but not a phone number ("800," or regular). Finally, MPC estimates that the initial cost of signing is about $300 (design plus dye) and $10-15 for each set.

Rear-End Bumpers: MPC has two 53 ft. trailers with 22" bumpers which do not present any particular problem.

(7) Spartan Stores, Inc.
Wyoming, MI, (616) 878-2367, Frank Leech, 11/5/88

Operation and Fleet Size: Spartan is a private carrier having its own fleet of 150 tractors, 300 trailers. Its primary market area (supermarkets) includes Michigan, Indiana, and Ohio.

On-Board Recorders: Spartan has Cedac 3000 OBR's on all of its trucks. It considers Cedac 3000 a superior instrument because it offers more options than other OBR's. It experimented with them last year, and eventually installed them on all trucks this year. Currently, all of its drivers are going through training to familiarize them with the new technology. In general, drivers' response is positive because the Obr's eliminated paper work. As for mandatory use, Mr. Leech considered it "undue burden" on

independent operators, unless they are incorporated by all truck manufacturers. The main reason is cost, which averages about $1,300 per unit. He would like to see training for State Police and Motor Carrier Division personnel in interpreting OBR results.

Rear-End Bumpers: The longest trailers operated by Spartan Stores are of 50 ft. (which currently are not required to have 22" bumpers). However, Spartan considers it a good safety rule, and supports 22" bumpers on all trucks, provided that they will be required only on new trailers, and not as retrofits.

(8) Steelcase, Inc.
Grand Rapids, MI, (616) 247-2710, William Kaat, 10/13/88

Operation and Fleet Size: Steelcase Inc. is a private carrier. It has two fleets: first, a "highway, interstate fleet" which has 68 tractors, 230 trailers, and 230 drivers; and second, a "city fleet" which has 156 tractors and 115 trailers, and operates in Michigan within a 60 mile radius of Grand Rapids.

On-Board Recorders: Steelcase experimented with OBR's (by Rockwell International), and dismissed their use. They required "double check" (of both manual and automated records) and eventually increased paper work. Also, the "city fleet" operates in a repetitive and routine manner, which does not warrant OBR's. Based on its own experience and other reason, listed below, Steelcase opposes mandatory use of OBR's. It felt that those carriers who want to cheat will do so with or without OBR's, and that this does not justify "punishing" the majority of the safe/honest operators. Also, he did not believe that the devices, by themselves, improve safety.

Truck Identification: Steelcase has it logo on its trucks. It does not see an advantage in posting a telephone number ("800," or regular) and will oppose it. In the past Steelcase posted an "800" number on its trucks. The system was never used by the public, and as such, it was eventually eliminated.

Rear-End Bumpers: Steelcase has 43 ft., 48 ft., and 53 ft. trailers; the latter with 22" bumpers. Steelcase has no problem with 22" bumpers so long as there is a "grandfather clause." However, it stated that a different dual regulation system (federal and state) does not make much sense, when 75% of all trailers operating in Michigan are out-of-state.

(9) Thorn Apple Valley, Inc.
Grand Rapids, MI, (616) 774-0711, Richard Waite, Safety Director for the Grand Rapids fleets, 12/5/88

Operation and Fleet Size: Thorn Apple Valley is a meat product producer which has several truck fleets: In Grand Rapids (a) a private operator with 60 tractors and 125 trailers for food

related items, and (b) "National Food Express Inc.," an ICC-ruled and regulated fleet of 30 tractors; in Detroit (c) part of the "Frederick Division, 15 tractors and 35-40 trailers, and (d) "Wayne Soap Division" with 5 tank trucks.

On-Board Recorders: Thorn Apple Valley (TAV) tested OBR's by Rockwell International, but had problems with reading and interpreting the data. Nevertheless, it would like to see them on truck fleets in order to keep the industry operating in the most legal manner. In summary, it supports their use, but not mandatory.

Truck Identification: TAV has its logo on all of its trucks, but no telephone number. However it sees a problem with a requirement to post identification on all trailers, because many of them are interchangeable. It has no objection to mandatory identification of some sort, which could be helpful to the motoring public. However, it opposes a requirement for an "800" number, because it will generate superfluous calls.
Rear-End Bumper: TVA has no 53 ft. Trailers. Their longest is 48 ft. It has no objection to 22" bumper if required only on new (rather than retrofit) trailers.

(10) A&C Carriers of Detroit
(517) 423-7887, William Feight, 12/16/88

Operation and Fleet Size: A&C is a "limited carrier," hauling gasoline and petroleum products, mostly in Michigan (95%), and some in Indiana and Ohio. As such it is an interstate carrier. It has a fleet of tanker trailers with 45 power units. Three years ago it was bought by, and became part of Bassett Transportation.

On-Board Recorders: A&C had been using mechanical tachographs on all of its truck for many years. Two years ago it stopped using them due to changes in union contracts. Previously, drivers were paid on per-mile basis, recorded by the tachographs. Two years ago they switched to payment as percent of value, and the tachographs were not useful for this purpose anymore. However, A&C is in the process of reinstalling them, to be completed in several months. A&C elected to return to mechanical, rather than electronic, OBR's because the cost of the latter is too high ($2,000/unit plus $6,000 for PC and downloading device, according to A&C). Mr. Feight considers mandatory OBR's a "good idea," so long that it is legislated nationally. He felt that a State action alone is counterproductive. As such, he opposed mandating this use at this time. He was particularly worried about the out-of-state independent truckers who tend to violate safety rules.

Truck Identification: A&C has both a logo and an identification on its trucks. As an interstate carrier and carrier of hazardous materials A&C had to comply with the latter by law. Presently,

A&C does not post a telephone number. In the past it did post it, but it was not useful: " all of the complaints were about broken windshields." An "800" system "might be a good idea," but only if implemented on national level. Another problem with an "800" is the need to assign a person to handle the calls and complaints.

Rear-End Bumpers: A&C has many 53 ft. trailers with 22" bumpers. It has no problem with them because its trucks do not have to back-up into loading docks. However, A&C is aware of and sympathetic to such problems encountered by those carriers which do have to use loading docks.

(11) Davis Cartage Co.
Corruna, MI, (517) 743-4445, John Stehlic, 10/12/88

Operation and Fleet Size: Davis Cartage (DC) is a limited carrier with a 40-tractor fleet.

On-Board Recorders: DC has had Rockwell International OBR's (with no driver entry) on all of its trucks for almost one year. Six or seven years ago DC had tachographs, but eliminated them because they were not tamper-proof. DC considers OBR's "the best management tool" it has introduced for its truck fleet operation. The current system does identify the driver, and in the near future DC will experiment with the add-on of driver's entry. DC uses OBR's to monitor and reward safe driving: drivers with an average speed up to 57.1 mile/hr receive .5 cents/mile bonus, 57.1-59.1 mph no bonus, and if average speed is over 59.1 mph, 5% of the time the driver could lose his job. As a result, accident rates dropped sharply. In spite of its successful experience with OBR's DC opposes mandatory use. It is worried that if they become mandatory, they will be abused in litigation.

(12) Eagle Expediting, Inc.
Brighton, MI, (313) 227-4423, Robert Keller, President, 10/13/88

Operation and Fleet Size: Eagle Expediting (EE) is a limited carrier with a fleet of 170 trucks (no trailers). EE specializes in delivery of auto parts. It is a "niche" carrier, responding to short calls for delivery.

On-Board Recorders: Currently EE does not have OBR's. However, in 1985 it did install tachographs on all of its trucks, at an average cost of $850/unit, and "it was a nightmare." EE did not realize any benefits from the tachograph, and eventually dismantled all of them. EE, which seems to have a strong marketing philosophy and programs, indicated that it might utilize OBR's by Rockwell International as a marketing tool (e.g. high-tech image).

EE is using its "800" system to monitor drivers' travel time. Drivers report by telephone several times daily their location and/or completion of delivery. In addition, EE is considering a different technology - a satellite vehicle locater - for monitoring its fleet, and already had a first meeting on the subject with the Sony Company. Mr. Keller indicated that ORB might be a good management (not necessarily safety) tool for some companies, and it's their own decision whether to use it. But the state should not interfere. In summary, EE opposes mandatory use of OBR's.

Truck Identification: Eagle Expediting has had an "800" number on its trucks for a long time (for that reason it is included also in the national survey of "800" users). This is in addition to a large logo. EE considers the "800" an important marketing tool, and had an excellent experience with it. It is used by drivers, clients, and for communication with the motoring public. It cost EE about $12,000 per month "and it's worth it." EE supports mandatory truck identification, including an "800". With improved identification "the highways will become more pleasant".

Rear-End Bumpers: EE has had 21" bumpers on all of its trucks for the past six years. It designed its own 21" bumpers (see appendix), and will support 22" bumpers on all Michigan trucks.

(13) G&B Transportation Company
Grand Rapids, MI, (616) 459-7241, Robert Stouten, 9/8/88

Operation and Fleet Size: G&B is a limited carrier, operating in both interstate and intrastate commerce. G&B is unique in that it operates only "flat bed" trailers (of various sizes). G&B has a fleet of 28 company-owned and 27 contracted tractors, and 60 drivers.

On-Board Recorders: G&B had tachographs on its fleet about 10-15 years ago. It was not satisfied with them because they could be easily altered, and eliminated them. It has constant contact and control of drivers by telephone and has governors to control speed. It considers these methods sufficient. G&B has discussed with Rockwell International OBR's, but decided that at the present time it does not need them. G&B indicated that it opposes and will fight vehemently the concept of "black box." Mr. Stouten indicated that it is well known that some truckers have violated the log book, and that "the guy who cheats now, will find a way to cheat the OBR as well; in reality, the proposed regulation would just put more pressure on the honest."

Truck Identification: G&B has identification on the cabs of its trucks. It is practically impossible to post identification on a flat-bed trailer. The company receives about 3-5 call per year, but suspects that it would receive 100 uncalled-for calls with an

"800" system. It opposes any identification which is only Michigan-based, but will support any federal rule.

Rear-End Bumpers: G&B opposes any rule which is not federal, however, it will go along with federal and/or other regulations on this subject.

(14) Gorter Motor Express Inc.
Grand Rapids, MI, (616) 453-7573, Edith Gorter, 12/15/88

Operation and Fleet Size: Gorter Motor Express (GME) is an interstate carrier, specializing in furniture delivery. GME has 18 power units and 57 trailers. It has been in existence at least since 1919, and currently is one of the few Women Business Enterprise (WBE) trucking companies in Michigan.

On-Board Recorders: Ms. Gorter indicated that she "Does not like the concept of OBR's." She does not like to watch her employees every minute (with OBR's). GME prides itself on having good people, and it is unnecessary and demeaning to monitor them continuously. GME has engine computers (monitor engine performance) and governors on all of its trucks, and this is sufficient. GME will oppose any mandatory use of OBR's.

Truck Identification: GME has always posted identification on the cabs of its trucks (since 1919). It includes "Grand Rapids," but no phone number. GME does not like the idea of posting any phone number. It gets about 2 calls per year and "does not need any more." It will oppose mandatory "800" number. Also, it indicated that it uses many rental trailers, and as a result does not see that a requirement to post identification on trailers is applicable.

(15) Alvan Motor Freight
Kalamazoo, MI, (616) 382-4574, Lee Kundz, 11/9/88

Operation and Fleet Size: Alvan Motor Freight (AMF) is a general commodity common carrier, operating mostly in Michigan and northern Indiana. It has a fleet of 160 tractors and 450 trailers.

On-Board Recorders: AMF is in the process of experimenting with OBR's, installing five Cedac OBR's, with no drivers' input, on its trucks at the cost of about $900 per unit. In the future, the company might expand to units with drivers' input at the cost of about $1,500. AMF opposes mandatory use of OBR's, mainly because they are too expensive.

Truck Identification: AMF has always posted an identification, but no phone number, on the cabs of its trucks. It feel that every truck should post an identification. It sees a problem in

posting identification on trailers because many times it carries other companies' trailers.

Rear-End Bumpers: AMF does not see a problem with 22" bumpers, however, it prefers to see federal (rather than State) rules.]

(16) Bishop Motor Express, Inc.
Lansing, MI, (517) 332-0170, Cornie Bishop, 12/15/88

Operation and Fleet Size: Bishop Motor Express (BME) is an interstate carrier, operating nation-wide. It has a fleet of 80 tractors and 400 trailers. Mr. Bishop stated that on all of these issues the BME position is the same as the position taken by the American Trucking Association (ATA).

On-Board Recorders: BME has had Rockwell International OBR's on all of its trucks over the last 4-5 years. They are used purely as a management tool. Speed is controlled with governors. In spite of the fact that BME has OBR's on its fleet, it is against mandatory use. It argued that there are other, more effective means (e.g. governors) to control speed.

Truck Identification: BME has had an "800" number for about three years. It did not receive many calls, and did not find the system very useful. Hence, it discarded the posting of the "800" number on its new trailers. It opposes mandatory posting of identification and the "800" number on trailers, mainly because it carries many leased trailers, not only its own.

Rear End Bumpers: BME runs double 45' trailers, so it had no experience with 22" bumpers. Nevertheless, it opposes two sets of rules (federal and State). It believes in "one universal rule."

(17) Central Transport, Inc.
Sterling Heights, MI, (313) 939-7000, James D. Payne, 9/8/88

Operation and Fleet Size: Central Transport Inc. (CT) is a large interstate carrier, having more than 9000 tractor-trailers and 30 terminals, and operating mainly east of the Mississippi. In general, CT opposes any dual (federal and State) rules. It supports only one set of rules - by the federal government.

On-Board Recorders: CT has a "Geostar" system for truck location. It will support only federally mandated rules.

Truck Identification: As an interstate carrier CT already has an ICC identification. It opposes State regulation.

Rear-End Bumpers: CT opposes State rules.

(18) Jones Transfer Company
Monroe, MI, (313) 241-4120, Robert J. (Mick) Duffey II, 9/9/88

Operation and Fleet Size: Jones Transfer Company (JTC) is an interstate carrier, having a fleet of 500 tractors and 2000 trailers. It operates from 28 centers, mainly in Michigan, Ohio, Indiana, Kentucky, and Tennessee. The headquarters are in Monroe, Michigan.

On-Board Recorders: For the last half year, JTC has been testing 5 Rockwell International OBR's. They cost over $1,000 per unit. JTC already has a computerized log program (not connected to OBR's). JTC opposes mandatory OBR's in Michigan for two reasons. JTC claims that statistics shows that only 1% of federal DOT reported accidents are repeatable, so OBR's could not help in "sorting out" these accidents. More importantly, mandatory use only by Michigan will put Michigan-based carriers at a financial disadvantage.

Truck Identification: JTC has an identification (logo) on all of its trucks. Currently, JTC receives about 1 call per week. It expects that with an "800" it might go to 2 calls per week. However, JTC is worried that an "800" will be an open invitation to insurance "schemes," and fraud. A posted sign would cost about $5 per trailer, an additional cost of $10,000 to its fleet.

Rear-End Bumpers: JTC has about fifty 53 ft. trailers. It sees no problems for retrofits. However, it indicated that even though it might be an improved safety feature it presents a problem for shippers at loading docks. Another comment was that the 22" bumpers need bracing to serve their purpose.

(19) Kerry Transport
Saginaw, MI, (517) 754-6871, John Doyle, 12/5/88

Operation and Fleet Size: Kerry Transport (KT) is an interstate carrier having 6 tractors, 22 trailers, and 7 full time drivers. It operates mainly in Michigan, and also in northern Ohio and the Chicago area.

On-Board Recorders: KT does not have OBR's on its trucks. Years ago it used tachographs, but eliminated them because of much tampering by the drivers. KT opposes mandatory use of OBR's. It argued that mechanical failures cause only a small fraction of accidents, and that the ultimate responsibility lays with the driver. Technology is not a substitute for this fact. The cost of OBR's is too high, and it can not pass this cost to customers while remaining competitive.

Truck Identification: As an interstate carrier KT has identification on the cabs of its tractors. It does not believe that additional identification is needed on the trailer, and would oppose such rules.

Rear-End Bumpers: KT has ICC-regulated bumpers on its trailers. It considers 22" bumpers "not a bad idea," because of the increased number of small cars on the highways.

(20) Parker Motor Freight, Inc.
Petosky, MI, (616) 347-4120, John Parker, 12/20/88

Operation and Fleet Size: Parker Motor Freight (PMF) is an interstate carrier having a fleet of 100 power units, 270 semitrailers, and 270 employees. It has 9 terminals in Michigan and its gross revenue is about $50 million per year.

On-Board Recorders: PMF started installing Rockwell International OBR's on its fleet about five years ago, and by now, about 70% of its trucks have them. They were not installed on trucks which operate mostly within the city for short distances. The OBR's used by PMF do not have hardware for drivers' input. PMF considers this add-on to be too expensive. PMF opposes mandatory use of OBR's. It believes that they are effective only if and when a company is committed to react to their results. It does not believe that "fly-by-night" operators will react to them even if they were mandated.

Truck Identification: PMF has identification on the cab of its trucks, and a logo on the back and two sides of its trailers. It considers identification and logo a good advertising tool. However, "it is not enthusiastic" about posting phone numbers on its trucks because they use many leased trailers, and also because a mandatory phone number will put Michigan-based companies at disadvantage.

Rear-End Bumpers: PMF has two 53 ft. trailers with 22" bumpers. In addition, most of its bumpers are 24". The 24" bumpers seem to serve the purpose, in particular with auto manufacturing companies that lock trailers to the loading docks. In spite of it own positive experience, PMF would oppose mandatory 22" bumpers in Michigan. It prefers to see and follow a federal rule.

(21) Merrilat Industries, Inc.
Adrian, MI, (517) 263-8282, Chuck Hanneman, 7/29/88

Operation and Fleet Size: Merrilat is the largest cabinet maker in the US. It has plants throughout the U.S. (in Michigan, Minnesota, Ohio, Virginia, South Dakota, and Nevada) with headquarters in Adrian, Michigan. Merrilat at Adrian has its own fleet of 12 tractors. However, it also utilizes common carriers. About 50% of its delivery is made by common carriers. Its own fleet specializes in delivery among its plants and to customers on the East Coast. Its trucks usually make a weekly roundtrip averaging 2,400 miles/truck/week.

On-Board Recorders: Merrilat started installing Rockwell International OBR's on its fleet in 1980. Currently, all trucks, with the exception of those which operate short distances (i.e. haulers of scrap, and local) have OBR's with drivers' input. Merrilat is enthusiastic about the OBR's as a safety and management tool. Mr. Hanneman indicated that without the OBR's, Merrilat would have probably had to dismantle its own Michigan fleet. It is important for Merrilat to have its own fleet for marketing purposes, and in order to have self control of its operation. Merrilat experienced improved fuel efficiency and safety with the OBR's. The drivers receive a weekly report, and are kept informed about their performance. It is not a "black-box" operation.

The cost of the ORB system for Merrilat was (rounded): On-board recorder $14,400 - $18,000 (@ $1,200 - $1,400 per unit); Reader $4,500; Computer $1,500; and Software $2,000. The total cost of about $25,000 was estimated to be recovered ("pay-back") in 24 months. In reality, it was realized in 6 months.
Merrilat considers OBR's very useful as a management tool, but did not consider a mandatory requirement necessary.

Truck Identification: Merrilat has its logo on all of its trucks, and considers it an important marketing tool. It does not consider a telephone number necessary: "those who want to contact us, succeed," and would oppose a mandatory "800" number because it would generate superfluous calls.

Rear-End Bumpers: Merrilat has no problems with 22" bumpers, so long as they would not involve retrofits.

(22) Gra-Bell
Holland, MI, (800) 632-5302, Ron Nyhoff,
For details see survey of national "800" number.

7. SYNTHESIS AND RECOMMENDATIONS

A. GENERAL

Several observations and generalizations should be made before coming to conclusions about the specific proposed rules analyzed and evaluated in this study.

(1) In spite of the name "Trucking," the trucking industry is not homogeneous - not in company size, vehicle type, or mode of operation. Hence, one should be careful in applying a rule to this non-homogeneous industry.

Company size: The USDOT has on record about 200,000 (interstate) trucking companies, about 75% of which are single-vehicle "owner-operated," companies, and another 13.5% operate between 2 to 6 vehicles. Only slightly more than 10% have more than 6 vehicles. So, a cost of regulation which may be easily borne by a large fleet could impose an undue hardship on the vast majority of truck operators.

Type of Vehicles: There are short trucks and long trucks, tractor-trailers and doubles, van bodies and flat beds, hoppers and tanks, those with fixed wheels and those with adjustable tandem bogies - to mention only a few. A rigid rule for a structural feature may be difficult to implement across the full range of vehicle types.

Type of Operation: There are interstate and intrastate operators, general commodity and specialized carriers, haulers for-hire and private fleets, owner-operators and company drivers, commodity haulers and utility trucks. Again, it is difficult to identify a simple rule that could apply to all.

(2) Many trucks operate across State boundaries in interstate commerce, and as such are already subjected to the federal rules of the ICC and FHWA. In addition,all new trucks are subjected to the safety regulations of the NHTSA. Thus, any State-level rules must give due recognition to the interstate and federal issues.

(3) The proposed safety rules could be applied legally only to Michigan-based companies. Thus, the economic cost of compliance for Michigan-based companies must be considered as an issue pertaining to commercial competitiveness. All of the proposed rules have economic consequences, either large or small.

B. IMPROVED TRUCK IDENTIFICATION

The concern for an efficient means of reporting unsafe truck drivers, raised by the Michigan Interagency Truck Committee in its proposed rule for truck identification, has been recently addressed to a large extent by the federal rule on this subject (see Chapter 3, pages 4-5 of this report, "Section 390.21:

Marking of Motor Vehicles"). The new USDOT rule shows clearly that the concern for truck identification raised by Michigan policy makers has also been acknowledged at the federal level. Because of the new USDOT rule, all Michigan-based trucking companies operating in interstate commerce have been posting the federally-mandated truck identification since November 15, 1988. Many Michigan-based trucking companies are certified to operate in interstate commerce, and as such have already an "improved truck identification" system. It seems redundant to impose an additional State-based rule on them. However, Michigan can enhance the USDOT rule by applying it to Michigan-based trucking companies which operate only within the State and/or those which are exempt from the federal rule for other reasons.

The new USDOT rule does not require a posted toll-free telephone number. Most Michigan-based trucking companies surveyed in this study opposed mandatory posting of a toll-free telephone number. The cost of this action is prohibitive to small companies. Our conservative estimate of 3 to 10 hours use per month implies an annual cost of $870 to $2,820. This is quite a high cost to the independent trucker. Besides, who will answer the "800" calls when the owner-operator is on the road?

In contrast to the perception of companies which do not post a toll free number, our survey indicated that superfluous calls are almost non-existent. On the other hand, many companies surveyed in this study reported that their experience shows that the existing mandatory posting of owner identification to be sufficient, by itself, to enable reporting by concerned motorists.

As an alternative, the State might want to consider an MDOT "800" for reporting truck unsafe driving (or praises) to be operated and paid for by the State. Alternatively, the toll-free number could be operated by the Michigan Trucking Association (MTA), similar to the system initiated by the California Trucking Association (CTA) - The CTA Hot Line (see Appendix C).

In summary, we recommend mandating the new federal rule, as detailed in Chapter 3, pages 4-5 of this report, for all Michigan-based exempt (from federal rule) carriers, and initiating an experimental program for a State-based toll-free number.

C. MANDATORY ON-BOARD RECORDERS

With recent technological developments, On-Board Recorders (OBR), and particularly the electronic ones, have proven to be reliable instruments to continuously monitor vehicle and driver performance. They can also provide an excellent management tool for improved productivity as exemplified by Frito-Lay and the Merrilat companies, to mention only two. Their impact on

improved safety is inconclusive. Other less expensive means, such as governors, can control speed as well.

The main problem with OBR's is that their cost is still high, given the resources of the small operators (the great majority of all trucking companies). FHWA estimated that the cost of installing OBR's plus supporting hardware and software for a fleet of 10 vehicles will be approximately $35,000 during the first year. We note that this cost has been declining. OBR manufacturers and users indicated to the research team that a single unit cost was "only" $1,200 versus the FHWA estimate of $1,750. Nevertheless the system cost for a fleet of ten vehicles still remains in the neighborhood of $30,000.

Based mainly on consideration of cost, FHWA rejected mandatory use of OBR's. We see no compelling argument for imposing such costs peculiarly in Michigan. One should note that even the interviewed Michigan-based carriers which had and were satisfied with OBR's opposed mandatory use.

Finally, even if OBR's were mandated there is no indication that the regulatory authorities in Michigan are prepared to make use of the potentially immense amount of new data that would be generated. In our view, this final item is perhaps most significant. That is, it is an unattractive prospect that a new practice for monitoring truck operations would be mandated without a definitive plan and commitment for follow-through by the government sector. Since the technical, political, and administrative dimensions of such a plan are great, and since the cost/benefit argument for mandatory OBR's is not compelling (given that companies would not necessarily adopt the internal practices which are crucial to OBR effectiveness), we do not recommend mandatory use of OBR's in Michigan

D. 22" BUMPERS

Analyses of research done by NHTSA indicates that the 22" bumper is effective in reducing underride fatalities and injury. The additional cost of installing the 22" guard following, in general, the proposed NHTSA standards, is estimated to cost only about $70 more than current (ICC) guard. The cost, per guard, to the consumer (for payload displacement and extra fuel) is estimated to increase from $50 for current (ICC) guard to about $120 (1988 $'s). This cost is relatively low given the apparent potential for reducing injuries and fatalities. Also, Michigan already allows heavier-than-average loads on its highways, so the economic cost of the new guard could be offset by the additional load allowed in the State. Finally, most interviewed carriers support this rule for new (rather than retrofit) trucks.

Hence, we recommend to adoption of a simplified version of the proposed NHTSA rule, as it has already been implemented for 53' trucks in Michigan. See details in appendix F.
We believe that Michigan should (1) mandate the 22" guard for all trucks above 10,000 lbs GVWR, (2) follow the general form of NHTSA's proposed rule, and (3) pay particular attention to the three type of exempt vehicles - low chassis, wheel-back, and utility trucks.

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9. APPENDICES

A. AT&T Information on Cost of "800" Number
B. Cross R., "On-Board Computers Take a Byte Out of Fleet Costs," Commercial Carrier Journal, August 1987
C. California Trucking Association Safety HOT Line
D. Proposed Rule: Hours of Service Rule (FR No. 49)
E. Standard No. 2, Rear Underride Protection (FR No. 46)
F. Proposed Rule for Underride Guard in Michigan
G. Response of the American Trucking Association to NHTSA Proposed Rule on Underride Guard

APPENDIX A: AT&T Information on Cost of "800" Number

APPENDIX A

AT&T

Primary Account Sales Center
27700 Northwestern Hwy.
Suite 301
Southfield, Michigan 48034

November 9, 1988

Ann Arbor Planning Assoc.
Attn: Aaron Adiv
321 N. Main - Ste 205
Ann Arbor, MI 48104

Dear Mr. Adiv:

Thank you for your interest in our long distance calling services.

Enclosed is information on our optional calling plans, Michigan WATS, Interstate WATS/800 and Readyline.

If I can be of any further assistance, please feel free to call me on 1-800-327-0773, extension 5248 or 313 746-5248.

Sincerely,

Andrea Thomas
Sales Representative

Enclosures

AT&T INTERSTATE
WATS AND 800 RATES

OUTWARD WATS	1st - 25 Hrs Day	Eve	Next 75 Hours Day	Eve	Over 100 Hours Day	Eve	All Hours Night/Wkend
SA 1-S	$12.24-	9.01	$11.63-	8.56	$11.02-	8.13	$ 6.03
SA 2	$12.79-	9.41	$12.16-	8.95	$11.50-	8.49	$ 6.31
SA 3	$13.23-	9.74	$12.55-	9.25	$11.91-	8.77	$ 6.51
SA 4	$13.69-	10.08	$13.02-	9.58	$12.33-	9.09	$ 6.74
SA 5	$14.41-	10.61	$13.70-	10.10	$12.98-	9.56	$ 7.09
SA 6	$14.41-	10.61	$13.70-	10.10	$12.98-	9.56	$ 7.09

INCOMING 800	1st - 25 Hrs Day	Eve	Next 75 Hours Day	Eve	Over 100 Hours Day	Eve	All Hours Night/Wkend
SA 1	$12.46-	9.81	$11.83-	9.32	$11.21-	8.83	$ 7.01
SA 2	$12.82-	10.09	$12.17-	9.58	$11.53-	9.09	$ 7.22
SA 3	$13.10-	10.32	$12.45-	9.80	$11.79-	9.28	$ 7.37
SA 4	$13.37-	10.53	$12.69-	9.99	$12.04-	9.47	$ 7.54
SA 5	$13.80-	10.88	$13.13-	10.34	$12.45-	9.79	$ 7.78

RATE PERIODS:			
	BUSINESS DAY	8 AM - 5 PM	Monday thru Friday
	EVENINGS	5 PM - 11 PM	Sunday thru Friday
	NIGHT/WEEKEND	11 PM - 8 AM	All Days
		8 AM - 11 PM	Saturday
		8 AM - 5 PM	Sunday

(Evening rates also apply all day New Year's Day, Independence Day, Thanksgiving Day, Labor Day Christmas Day Veterans Day, Martin Luther King Jr. Day, President's Day, Memorial Day and Columbus Day)

MONTHLY RATE PER ACCESS LINE:	$39.55	SERVICE ORDER CHARGE:	$ 99.00
SERVICE GROUP CHARGE:	$20.00	INSTALLATION CHARGE:	$226.00
		SURCHARGE:	$29.10

A T & T

MICHIGAN WATS/800

Effective 9/1/88

* *

One-Time Installation Charges

Line Connection Charge (per line)	$42.00 + Time & Material

Potential Additional Charges - PBX Systems
(Would appear on Michigan Bell's portion of bill)

Special Access Surcharges	------	$30.79 monthly (per line)

Due Date Interval

Approximately - 15 business days to install service.

* *

AT&T Portion of the Bill - PER HOUR RATES

800 SERVICE

0 to 15 Hours	$17.05
15.1 to 40 Hours	$15.66
40.1 to 80 Hours	$14.18
Over 80 Hours	$12.62

OUTWATS

0 to 15 Hours	$15.75
15.1 to 40 Hours	$14.05
40.1 to 80 Hours	$12.31
Over 80 Hours	$10.44

Rev. 9/1/88 (K.E.)

READYLINE 800 RATES
- MONTHLY -

Monthly Service Charge Per Routing Arrangement - $20.00

Usage Service Charges - These charges are determined based on service areas, rate periods and a minimum average time requirement. Usage is billed per AT&T 800 Readyline telephone number, per hour of usage within each service area, based on time of day/day of week rate period. Charges for total chargeable hours of usage for each service area will be determined and rounded to the nearest cent.

	PER HOUR USE*		
SERVICE AREA	BUSINESS DAY	EVENING	NIGHT/WEEKEND
1	$15.89	$12.04	$ 9.63
2	$16.43	$12.45	$ 9.96
3	$16.70	$12.64	$10.12
4	$17.22	$13.05	$10.44
5	$17.51	$13.26	$10.61
6	$19.12	$14.48	$11.58

*If total usage charges exceed $100.00 in a billing month, the amount in excess of $100.00 and up to $500.00 will be reduced by 15%. The amount in excess of $500.00 and up to $1500.00 will be reduced by 20%. The amount in excess of $1500.00 will be reduced by 25%.

Minimum average time requirement - the minimum average time requirement for AT&T 800 Readyline is 30 seconds and applies per service area, per completed call and by time-of-day rate period.

- NON-RECURRING CHARGES -

Service Establishment for basic service - applies for each AT&T 800 Readyline number.

- Installation Charge	$43.50
- Service Ordering Charge	$54.00

Service establishment for customer-selected service areas and/or customer selected NPAs - applies for each AT&T 800 Readyline number.

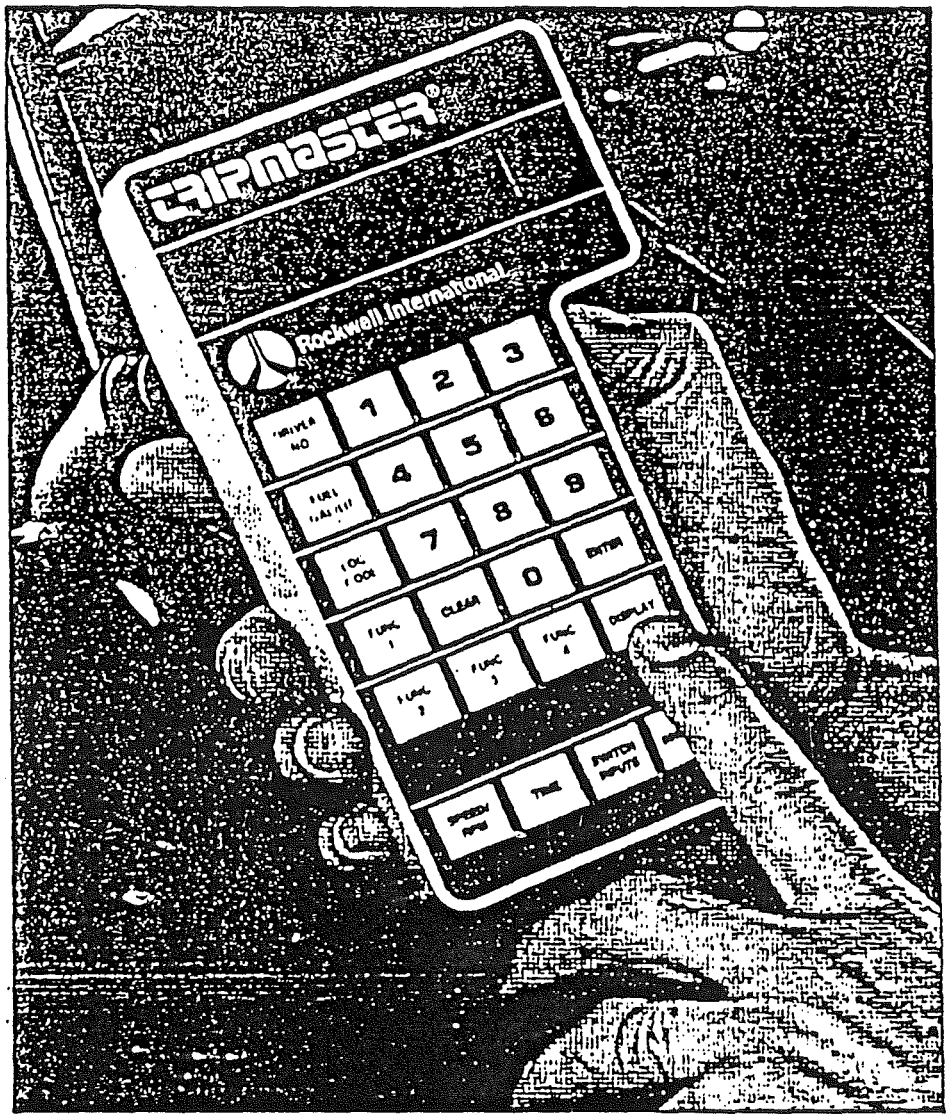
- Installation Charge	$50.00
- Service Ordering Charge	$99.00

*Michigan calls excluded from this service .

1/1/88

APPENDIX B: Cross R., "On-Board Computers Take a Byte Out of Fleet Costs," Commercial Carrier Journal, August 1987

ON-BOARD COMPUTERS TAKE A BYTE OUT OF FLEET COSTS



Here's an in-depth comparison of nine, on-board, computerized, vehicle management systems. These systems can help improve fuel economy, cost accounting, vehicle utilization, maintenance schedules and more.

By RICH CROSS
Senior Technical Editor

An on-board computer is a solid-state tachograph that records rpm / speed / distance / time on a memory chip instead of on a chart. It automatically records two or more on/off events (such as brake application) selected by fleet management and usually accepts data from an on-board fuel meter and driver keypad/display.

Typically, data in an on-board computer's memory can be transferred to an IBM or IBM-compatible personal computer (PC) that uses special software to display / print / store reports within minutes. That is enough to give the finest tachograph an inferiority complex.

Keypad/displays

Virtually all on-board computers offer a keypad/LED display for a driver to record: driver/equipment ID codes; location; state line crossings; volume of freight loaded/unloaded; trip expenses; log information; other data.

To record a state line crossing, for example, a driver pushes the 'STATE" function key and punches in the state's numerical code.

An LED display usually provides messages to help a driver enter data, lets a driver check/correct data before pushing the ENTER key and displays information (mph, time and more) on demand.

Most dash-mounted keypad/displays are connected by cable to a solid-state memory device mounted elsewhere in the cab. Of the units noted in this article, only the Centrodyne Silent 1000 and TRW's Electronic Recorder have

built-in (as opposed to remotely located) memories.

Cartridge memories

A memory cartridge looks like a tape cassette and contains a battery to prevent amnesia after removal from the cab.

The cartridge must be carried to the terminal office and plugged into a data reader linked with a PC (or telephone modem, if the PC is remotely located). Most data readers cost about $1,500.

The on-board computers with a removable-cartridge memory include the CADEC 300R, Stemco CTRS 7000 and Argo FMS 1330.

Since the TRW Electronic Recorder has a built-in memory, the whole recorder (not much bigger than a memory cassette) must be transferred from its vehicle-mounted cradle to an office cradle for data extraction.

Fixed memories

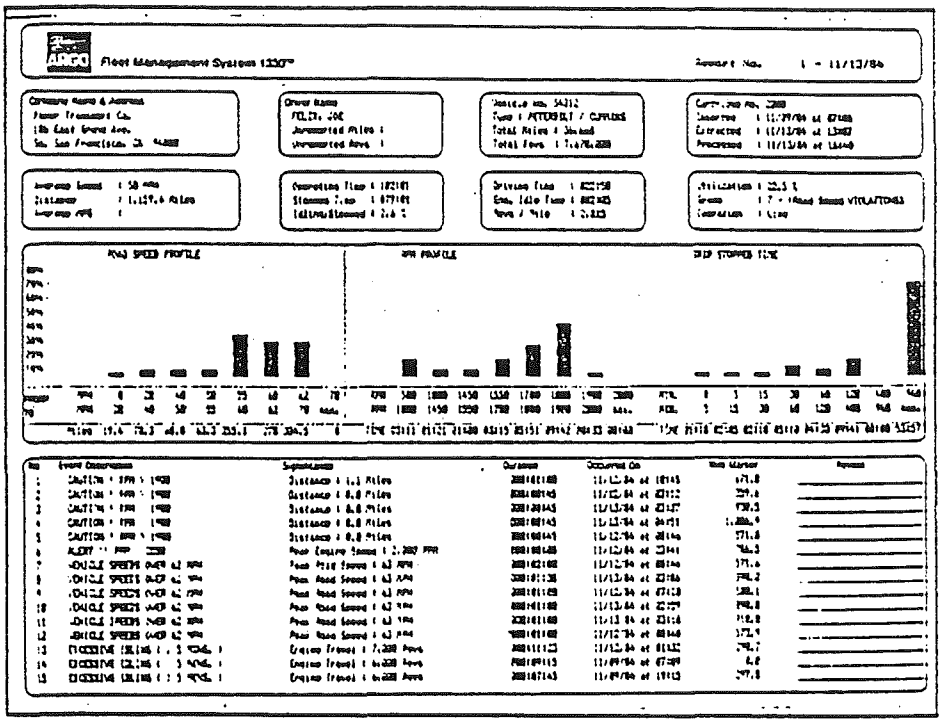
On-board computers including the Anchron Data-Com Plus, ARI Fleet Data Master, Bendix Fleet Tech, Rockwell Tripmaster and Centrodyne Silent 1000 (integral memory) have a memory device permanently mounted in the cab. These devices contain a back-up battery to retain data if the vehicle's battery dies or is disconnected.

Data can be extracted from a memory device in the cab by one or more of the following methods:

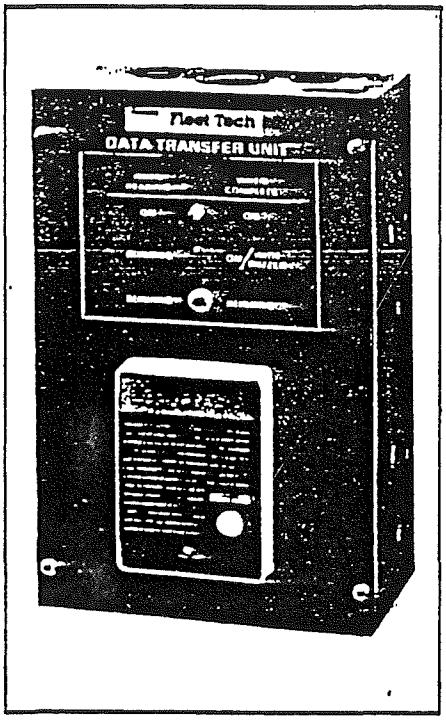
- Connect the memory device via cable to a hand-carried, battery-operated computer that's subsequently off-loaded to a PC or modem. Most hand-carried computers can hold data from numerous vehicles before off-loading.
- Connect the memory device via cable to a data-extraction device at the fuel island that off-loads to a PC or modem.
- Connect the memory device via cable directly to a PC or modem.

The time required to transfer data from any type of memory device to a PC depends largely on the volume of data it contains.

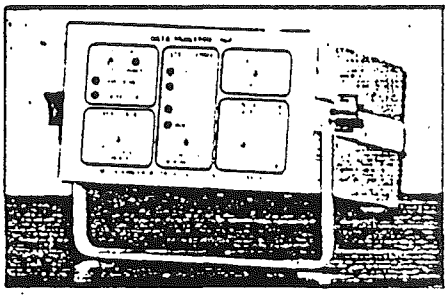
Continued



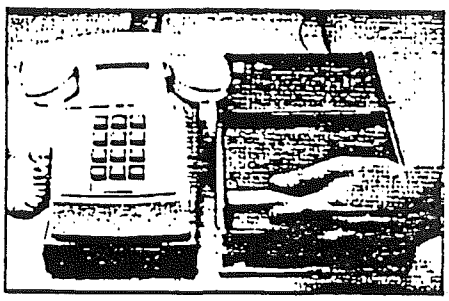
Example of trip report generated by software for Argo FMS 1330 on-board computer. Report flags speeding, excessive idling, engine overspeed, panic stops, and other violations of fleet standards. System provides "Driver Grade" predicated on degree of conformance with fleet standards. Also available: Driver/Vehicle Summary; Driver Performance Summary; maintenance related reports; daily log; accident analysis; speed/rpm profile; mph from fuel meter.



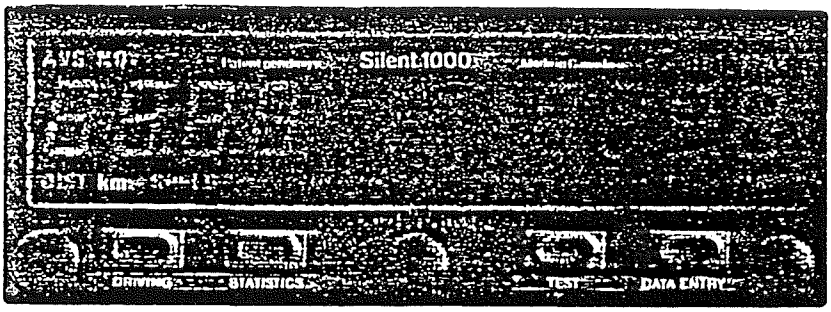
This stationary data-extraction device removes data from the Bendix Fleet Tech on-board computer's memory and automatically transfers it by cable to a PC or modem in the office. DTU runs off 12 volts supplied by vehicle. Unit has back-up battery for data transfer, but no internal memory.



This portable data-extraction device removes data from the ARI Fleet Data Master on-board computer's memory. Subsequently, data is off-loaded via cable to PC, printer or modem. Unit also operates on AC power.



Entire TRW Electronic Recorder is removed from its on-board cradle and transferred to a data extraction cradle in the office that's connected with a PC or, as illustrated, a telephone modem interfacing with a remote PC.



Centrodyne Silent 1000 has integral memory and keypad/display. Data extraction options: transmit data from vehicle to PC via cellular phone/modem; connect on-board memory to PC via cable; connect hand-carried, data-extraction device via cable to on-board memory.

Transfer time can range from five seconds to two minutes.

Memory storage capacity

A memory's maximum storage capacity is expressed in kilobytes (K). A kilobyte is 1,000 alphanumeric characters. For the units discussed in this article, memory capacity ranges from 8K to 96K.

The time it takes for a memory to become filled depends on the frequency and volume of data entry via programming, standard/accessory inputs and the driver's keypad. Typically, on-board memories can accumulate data for a week to a month before off-loading is required. For specific projections, consult on-board computer suppliers.

Software variables

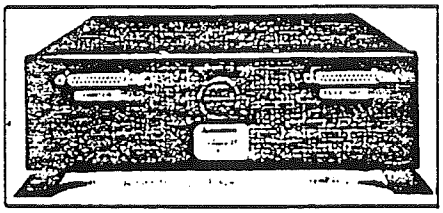
Virtually all software packages used with on-board computers can generate reports on speeding and excessive idling. Since it's common for fuel savings alone to cost-justify on-board computers within a few months to a year, most software packages have merit. But they are not created equal.

Basic software cost ranges from $700 to $5,000. Some packages provide less than 10 basic reports; others provide up to 30. Most software packages let users customize

PRODUCT COMPARISON

Make/Model	CADEC 300 Remote	Stemco CTRS 7000	Argo FMS 1330	TRW Electronic Recorder	Anchron DATA-COM II PLUS	ARI Fleet Data Master	Rockwell Tripmaster Plus	Bendix Fleet Tech	Centrodyne Silent 1000
Price: On-board equipment	$2,220	$1,000 to $2,100	$827 to $1,103	Request quote	$1,495 to $1,995	$630	$810	$1,050	$905
Memory housing	Portable cartridge	Portable cartridge	Portable cartridge	Portable recorder	Fixed remote	Fixed remote	Fixed remote	Fixed remote	Fixed integral
Memory capacity	8K - 16K	8K - 32K	2K - 32K	8K	16K	32K - 96K	16K	64K	16K
Driver keypad/display	Remote	Remote	Remote	None	Remote	Remote	Remote	Remote	Integral
Input for fuel meter	Yes (late '87)	Yes	Yes	No	Yes	Yes (modify)	No	Yes	Yes
Automatic input (user defined)	2 on/off	5 on/off	12 on/off	2 on/off	6 on/off + 5 analog	2 on/off + 2 analog	2 on/off	5 on/off	2 on/off
Price: Service contract per vehicle/year	$100	NA	$150 to $250	Request quote	$100	$95	NA	New program pending	$140 fixed repair cost
Warranty period	1 year	1 year	1 year	1 year or 100,000 mi.	1 year	1 year	1 year	1 year	1 year
Memory retention*	90 days minimum	10 years maximum	14 days maximum	2 years maximum	1 year maximum	1 year maximum	7 days maximum	40 hours maximum	180 days minimum
Rechargable battery	Yes by vehicle	No	No	No	No	No	Yes by vehicle	Yes by vehicle	No
Minimum battery life in service	Shelf life 3 months	10 years	3 years	2 years	1 year	1 year	1 year	3 years	3 years

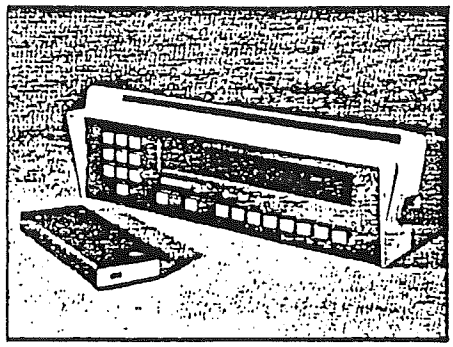
Source: Manufacturers' responses to CCJ survey



Anchron Data-Com II Plus on-board memory device accepts data from keypad/display, accessory fuel meter, plus a wide variety of on/off-type and analog sensors.

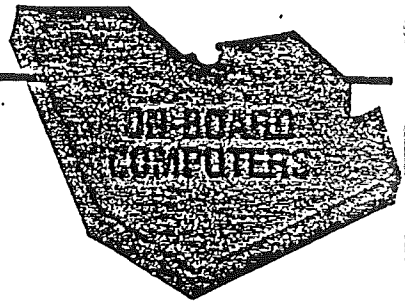
reports, but system flexibility and capabilities will vary substantially.

An especially user-friendly system reduces training time and allied expense. Purchasing certain brands of on-board computers entitles the user to some free training. In other instances, training may cost $500 per day, plus travel and other expenses.



Compact keypad/display of CADEC 300R connects with remotely-mounted memory device. Three other versions of CADEC on-board computers also are available.

For these reasons, the software should be scrutinized as closely as hardware before selecting an on-board computer. Ask for a hands-on demonstration with a PC and printer.



Hardware variables

A hidden cost associated with on-board computers is the price of installation.

TRW's Electronic Recorder easily can be installed on a vehicle equipped with an ETEC electronic engine control system, and some truck OEMs will handle the task. In other instances, on-board computers may have to be retrofitted by the fleet, a local dealer or technicians provided by the computer maker.

Installation costs will vary, especially if extra-cost sensors, fuel

Continued

Make/Model	CADEC 300 Remote	Stemco CTRS 7000	Argo FMS 1330	TRW Electronic Recorder	Anchron DATA-COM II PLUS	ARI Fleet Data Master	Rockwell Tripmaster Plus	Bendix Fleet Tech	Centrodyne Silent 1000
User-replaceable battery	No	No	No	No	Yes	No	Yes	Yes	Yes
Type of data transfer device	Office data reader	Office data reader	Office data reader	Office data reader	Direct by cable	Portable or post-mount	Portable or post-mount	Post-mount	Portable
Price: data transfer unit	$3,265	$1,450	$1,451 to $1,935	Request quote	Price of cable	$2,395 to $4,950	$1,500 to $3,650	$800	$1,620 to $2,390
Price: software	$1,200 to $5,940	$3,000 to $3,900	$1,795 to $2,795	$695 per copy	$1,195 to $4,995	$1,995 $935 each extra site	$2,600 to $5,000	$4,800	$750
User modify report format	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Service bureau to process/store fleet data	Yes via mail (24 hours)	No	Yes via mail (24 hours)	No	No	No	No	No	No
On-site training cost	2 persons free; $250 each extra	No charge	$150	Request quote	2 days free	$300 a day + expenses	$500 a day + expenses	No charge	No charge
Training aids for software	User manual	User manual	User manual	User manual	Manual and disc	Simulator $1,850	Manual and disc	None (free training)	User manual

*—Vehicle battery disconnected or cartridge removed; NA—Not available

BUYERS' GUIDE

TRIPMASTER PLUS
Rockwell International Corp.

DRIVER INPUT DEVICE OPTIONS:
• Keypad/display has 24 keys, including mode keys for: DRIVER; FUEL; LOCATION.
• Dash-mounted box with slot that accepts card factory-coded with driver ID.
• Dash-mounted box with slot for ID card pus five thumbwheels for entering codes/numbers. Has ENTER button.

DATA RETRIEVAL: (choice of one)
• Connect on-board memory device via cable to hand-carried, battery-powered computer (containing memory and cassette tape recorder). Unit can extract data from up to 180 trips and store on tape within two minutes. One unit can store data from 100 vehicles before off-loading via cable to PC or modem. Unit also used for initial programming of on-board recorder.
• AC-powered computer mounted at fuel island connects via cable to on-board memory device and automatically transfers data via cable to PC. Unit has back-up battery for data transfer only (no internal memory). It's also used for initial programming of on-board computer.

DATA PROCESSING: Basic software provides data base and 20 reports on driver/vehicle performance, other concerns. Expanded software with log-keeping option provides automatic auditing/exception reporting and computes available hours for each driver. Use of custom software, available from Microflex, Inc., Winston-Salem, NC., provides virtually unlimited report flexibility.
Circle 220 on Inquiry Card

CTRS 7000
Stemco Instruments Div., Colt Industries

DRIVER KEYPAD/DISPLAY: Contains 24 keys, including mode keys for: STATE; ACCIDENT.

ACCESSORIES:
• Fuel consumption meter with automatic totalized input to on-board memory device.
• Vehicle overspeed alarm.

DATA RETRIEVAL: Transfer memory cartridge from vehicle to office data reader connected to PC or modem.

DATA PROCESSING: Standard software provides data base with pull-down menu of 50 items and generates more than 30 basic reports on driver/vehicle performance, other concerns. Software enables user to: set parameters and customize system to provide specific data; make comparisons and exception reports; add/delete/modify types of reports generated. Select from list of 56 items. Basic reports include: speed/rpm/brake matrix; accident log; vehicle summary; road/engine speed histograms; exceptions summary; trailer utilization; route list; P&D report; delay analysis; fuel tax reconciliation. Also provides reports on: driver grading in 15 categories; driver daily log; available hours; log verification; missing logs; driver payroll; driver totals; driver summary.
Circle 221 on Inquiry Card

FLEET DATA MASTER
Advanced Recording Instruments, Inc.

DRIVER KEYPAD/DISPLAY: Contains 20 keys, including mode keys for: EQUIPMENT; CUSTOMER; PICKUP/DELIVERY; DELAY; FUEL; USER OPTION; STATE; DRIVER ID.

ACCESSORY: Unit resembling 16-key calculator with built-in printer, used for accident data retrieval and initial programming of on-board system.

DATA RETRIEVAL: (choice of one)
• Hand-carried, battery-powered computer connects via cable to on-board memory device and subsequently off-loads via cable to PC, printer or modem. Unit also operates on AC to charge internal battery.
• Above-mentioned data retrieval unit housed within waterproof case mounted at fuel island connects via cable to on-board memory device and automatically transfers data via cable to PC or modem within seconds.

DATA PROCESSING: Expandable software provides nine basic reports on driver/vehicle performance, other areas. Reports provide summary/exception reporting by vehicle/driver/terminal/state on a weekly/monthly/year-to-date basis. Basic information includes data on: departure/arrival time; warm-up/cool-down time; road speed; engine rpm; oil pressure; idle hours; trip miles, trip hours; stop hours; driver ID; state mileage; user

low meters, wiring harnesses and other devices are added. Another hidden cost is the price of a PC.

In theory, any "IBM-compatible" computer can use IBM-formatted software. But successful use of an especially complex software program might require a PC with greater memory capacity than provided by an IBM clone.

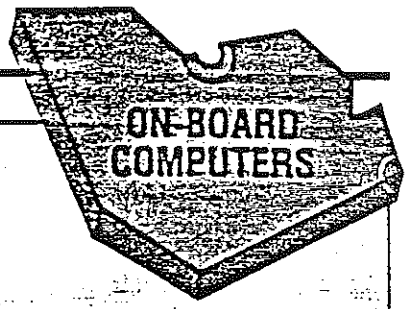
Further, some IBM clones fall short of being 100% compatible with certain software programs. If the initial cost of on-board equipment and office hardware constitutes a roadblock, look into leasing all or part of it.

A look ahead

A concept under development by Geostar Corp., Princeton, N.J., is to link an on-board computer and on-board transmitter with a satellite-based vehicle locating and communication system (CCJ, Sept. 1986).

This would permit an on-board computer to transmit data via a combination of satellite and telephone lines to a fleet's computer. A carrier also could locate and check the road speed, for instance, of a company vehicle anywhere in the country. This concept may become a reality within three years.

More than a concept is the use of on-board computers to keep driver's logs electronically. Rockwell and CADEC units are being



codes; accident data. As extra option, Advanced Recording Instruments will customize reporting system.

Circle 222 on Inquiry Card

ELECTRONIC RECORDER

TRW Transportation Electronics Division

DRIVER INPUT: No provision.

DATA RETRIEVAL: Transfer on-board recorder from vehicle to office data reader connected to PC or modem.

DATA PROCESSING: Software provides six basic reports:

- Vehicle Speed/Engine RPM matrix
- Usage Report of ETEC system modes
- Vehicle Trip Summary
- Vehicle Fault Report of ETEC and/or recorder
- Detailed Trip Report
- Route Summary

Circle 223 on Inquiry Card

ARGO FMS 1330

Argo Instruments, Inc.

DRIVER KEYPAD/DISPLAY: Contains 10 keys.

ACCESSORY: Fuel measuring device includes dash-mounted display, automatic input to memory device.

DATA RETRIEVAL: Transfer memory cartridge from vehicle to office data reader connected to PC or modem. Up to three reader units can be coupled for sequential off-loading. Direct data retrieval option to be introduced this year.

DATA PROCESSING: Software provides one-page trip report that flags speeding, excessive idling, engine overspeed, panic stops, and other violations of fleet standards. System provides "Driver Grade" predicated on degree of conformance with fleet standards. Additional reports indicate: when driver left a location; how far he drove; his average speed; time he arrived at next location; how long he stayed there. Reports detail quantities of freight loaded/unloaded by location, state line crossings, quantity of fuel purchased and other information desired by user. Input from optional fuel monitor affords ability to track mpg precisely. Also available: Driver/Vehicle Summary; Driver Performance Summary; maintenance related reports. Expansions for 1987 include daily log; accident analysis; speed/rpm profile.

Circle 224 on Inquiry Card

CADEC 300R

CADEC Systems, Inc.
Cummins Engine Company

DRIVER KEYPAD/DISPLAY: Contains 20 keys, including mode keys for: OFF DUTY; SLEEP; DRIVE; ON DUTY; EXPENSE; STATUS; LOG INFORMATION; STATE/TOLL; YES; NO; ACCIDENT.

DATA RETRIEVAL: Transfer memory cartridge from vehicle to office data reader connected with PC or modem.

DATA PROCESSING: Menu-driven software provides driver logs, available hours, DOT violations, data base, and wide variety of reports including driver delivery productivity. Special software programs provide for: a data link interface; file keeping; dispatching; report editing; system diagnosis; conversion of data for use with popular spreadsheet programs; more. Standard reports detail: trip; driver performance; vehicle maintenance scheduling; mpg; driver expense report; OS&D; state fuel tax; driver's log; driver's available hours; driver's trip violations; accident analysis; fuel tax report. Optional reports provide summaries of standard reports for user-defined periods of time. Other programs, purchased separately, provide reports on: account delay details; account delay summary; driver productivity; empty mile ratio; periodic driver violations.

Other Cummins Cadec on-board computers include: **CADEC 200R** ($1,890) which permits driver input without log-keeping ability; **CADEC 100** ($1,955), a recorder without input keys or display that generates reports on the trip, driver performance, maintenance scheduling and mpg performance. CADEC 100 has warning lights indicating when excessive idling/speeding is being recorded.

Circle 225 on Inquiry Card

BENDIX FLEET TECH VMS

Bendix Heavy Vehicle Systems Div.
Allied Automotive

DRIVER KEYPAD/DISPLAY: Contains 24 keys, including user-customized mode keys that could include, for example: PRE-TRIP (prompts en-

Continued

used for this purpose by a growing number of carriers. Private carrier Frito-Lay of Dallas, Tex., for example, is exclusively using electronic logs at 21 terminals.

What's the payoff?

Almost every on-board computer maker can provide a list of current users, accompanied by testimonials to support the cost-effectiveness of his system. Without doubt, the reports provided by just about any system can guide improvements in fuel economy, vehicle utilization and more.

But there is never a guarantee of cash savings, since no on-board computer or printed report is worth a penny in the hands of an inept or disinterested person.

Reports are merely tools. It is the top management "architects," the local management "contractors" and the front-line supervision "construction crews" who jointly determine the worth of a blueprint for saving money.

Nine on-board computer systems are detailed in the following buyer's guide. Also included is a chart comparing equipment costs and other concerns. □

For a free single copy of this article, write on company letterhead to: Editor, Commercial Carrier Journal, Chilton Way, Radnor, Pa. 19089.

BUYERS' GUIDE continued

try of driver/vehicle/route ID); DELAY; FUEL; STATE LINE CROSSING; YARD JOCKEY (for positioning trailers); MECHANICAL SERVICE PERFORMED (when and by whom); POST-TRIP; DEPART; ARRIVE.

DATA RETRIEVAL: Connect on-board memory device via cable to stationary data reader at fuel island. Unit runs off 12 volts supplied by vehicle. After connection to on-board memory device, unit automatically transfers data via cable to PC or modem. Unit has back-up battery (minimum life 10 hr) for data transfer, but no internal memory.

DATA PROCESSING: Standard software provides data base and 14 basic reports on driver/vehicle performance, other concerns. Reports cover: trip; accidents; driver performance; speeding violations; stop/idle; time interval (second-by-second accident analysis); speed vs. rpm; exceptions; driver's log. Operating standards can be changed by user. Software allows for virtually infinite data manipulation. Reports can be analyzed by route/driver/vehicle and other criteria.

Circle 226 on Inquiry Card

DATA-COM II PLUS

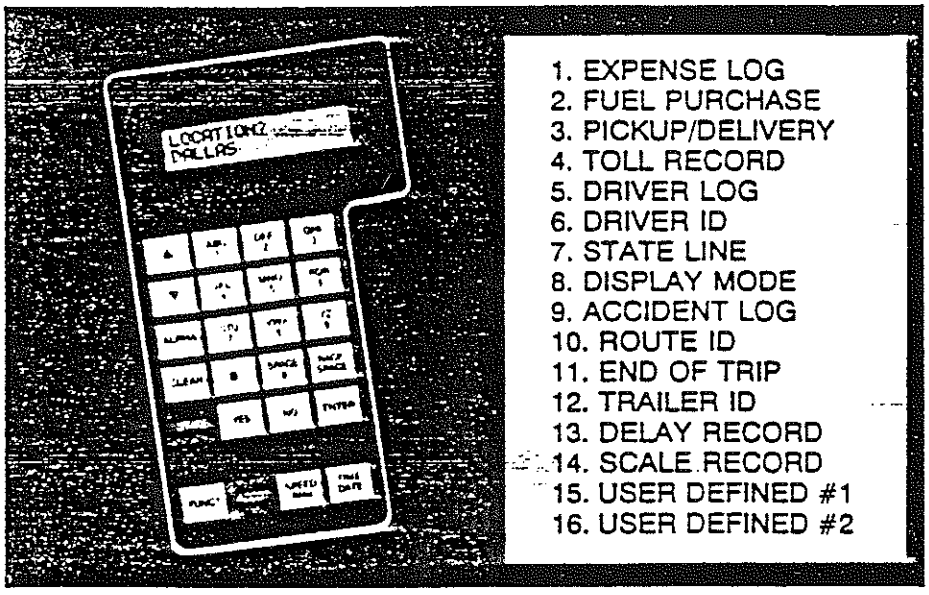
Anchron Truck Products Division

DRIVER KEYPAD/DISPLAY: Contains 20 keys, including mode keys for: PRINT; DRIVER ID; DISPATCH; WEIGHT; DESTINATION; TRUCK; STATE.

ACCESSORY: Fuel meter linked with memory device samples consumption every six seconds. Secondary readout provides average mpg for trip and is resetable. Calibration is automatic, using average mpg as baseline. Diagnostic mode monitors sensor function.

DATA RETRIEVAL: In 10 seconds, by connecting on-board memory device via cable directly to printer, PC, or modem.

DATA PROCESSING: Menu-driven software provides exception reports, driver logs, bar graphs, trip reports, idle time reports, speeding reports.



Keypad/display of Stemco CTRS 7000 permits a variety of data to be entered by the driver. Accessory input is provided by five, on/off-type sensors and an on-board fuel meter.

Additional software provides fuel tax reporting, maintenance status inquiries, mechanic work orders, cost per mile data for each vehicle/fleet. Also available are data base summaries, four of which rank the performance of all vehicles/drivers in fleet.

Circle 227 on Inquiry Card

SILENT 1000

Centrodyne Corp. of America

DRIVER KEYPAD/DISPLAY: Contains four, multi-function keys.

ACCESSORIES: Alarms for exceeding road speed limit, exceeding engine rpm limit, or user-defined event (ex: open door).

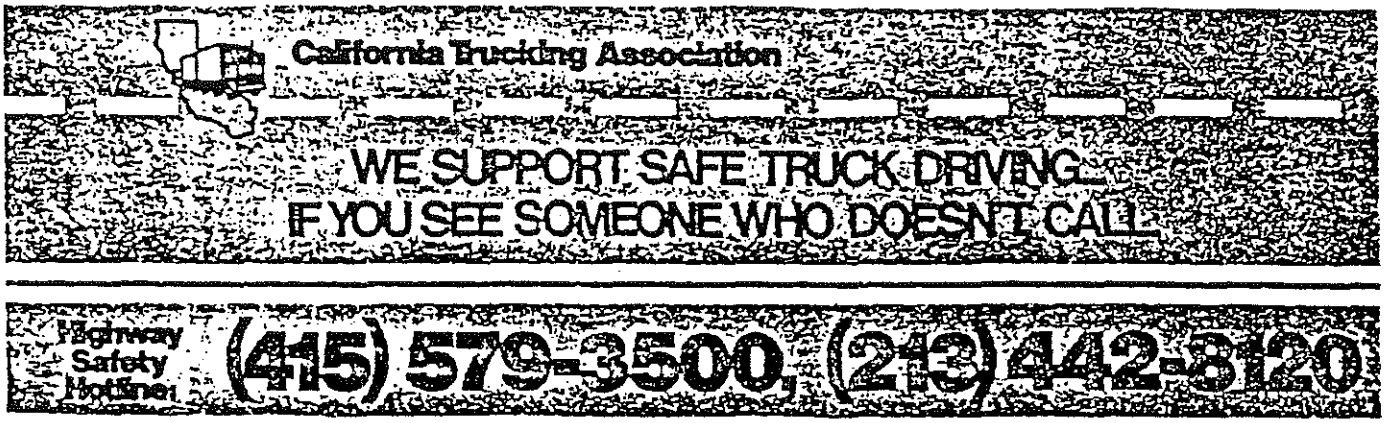
DATA RETRIEVAL: (four options)

- Transmit data from vehicle to company computer via cellular phone/modem.
- Connect on-board memory device direct to PC via cable.
- Connect hand-carried, battery-powered computer via cable to on-board memory device. Unit extracts and stores data from up to 240 engine operating hours plus stop/idle time. One device simultaneously can store data from 64 recorders before offloading via cable to PC or modem. Unit also used for initial programming of on-board recorder, diagnostic troubleshooting.
- At end of trip, on-board displays can call up data including: distance traveled; average road speed; average rpm; average mpg; number of stops; time above speed limit; road time; maximum speed; maximum rpm; fuel consumed; stopped time; idle time; time above rpm limits. Display can be user-programmed to restrict driver access to some/all data.

DATA PROCESSING: Basic software provides several reports. Included among reports are: activity summaries by driver/vehicle; trip profiles; external data input; accident reports; violation reports; bar charts of speed/rpm/stop time. User can devise other formats.

Circle 228 on Inquiry Card

APPENDIX C: California Trucking Association Safety HOT Line



Safety Hotlines: Unique Driver Monitoring

You can train, cajole, even plead with drivers to follow company policies, state and federal speed limits, driving laws and safe driving practices. But how do you know, once they leave the terminal headed for the open highways, that they're doing it?

A common phrase heard uttered often by frustrated fleet managers is, "We can't afford to have somebody following drivers around all the time to make sure they're doing their job right. Once they're gone it's virtually out of our hands."

But is it?

Several trucking associations throughout the country have recognized you can have somebody following your drivers constantly to monitor their performance and report any unsafe practices and moving violations. That somebody is John Q Public.

Safety hotlines have been an extremely successful means of monitoring truckers when they're on the road, helping fleets get rid of bad drivers, discipline careless ones and improve the general public's image of the trucking industry as a whole.

"We've had trucking company owners call us and say they had an idea a certain driver was not performing well on the road and that the citizen hotline report was just the ammunition they needed to terminate the driver," stated Connie Garcin, director of industry communications for the California Trucking Assn.

CTA implemented its "Safety Hotline" two years ago. They have sold some 10,000 large decals to truckers in the state that proclaim, "We support safe truck driving. If you see someone who doesn't, call the highway safety hotline." A phone number for CTA is listed at the bottom for drivers to call and report incidents.

Garcin emphasizes the aim of the program is not to play Big Brother.

"We recognize that 98% of the drivers are professionals, safety conscious and courteous. We're doing our best to weed out the bad 2%," she said.

CTA has received more than 2,500 telephone reports since inception of the program. Once a call is received, the information is verified with the trucking company whose driver was involved. Followup letters are sent to both the company and the motorist who reported the incident.

Garcin said to be effective hotline programs must be set up to get information processed quickly. The aim at CTA is to get reports verified and to trucking companies within 24 to 48 hours.

"You need to be able to discipline the driver immediately. Ten days later he won't remember a thing about the incident," Garcin said.

When acting on a complaint, CTA will recommend one of the following actions be taken:

- Sending the driver to remedial truck driving classes.
- Temporarily suspending the driver.
- Terminating the driver if there have been repeated incidents.

One additional side effect of the program not counted on by CTA is that it has also helped them in their membership drive, she added. "We've had new members join CTA when we notified them about a driver. They think the program is fantastic."

The CTA program is not expensive to administrate, she said. Virtually all the public relations efforts have been free. Garcin sends out a press release once every few months and gets coverage of the program in at least six or seven newspapers statewide with each release. Over the Labor Day weekend radio stations broadcast a number of public service spots informing motorists of the program.

"The vast majority of truck drivers are responsible, courteous and a credit to the industry," Garcin said. "Unfortunately, it's the few exceptions who seem to capture the public's attention.

"Our hotline service is beginning to change all that, however, as the general public begins to understand that truck drivers exist to help the public not hinder them."

AAPENDIX D: Proposed Rule: Hours of Service Rule (FR No. 49)

APPENDIX D

PART 395—HOURS OF SERVICE OF DRIVERS

1. The authority citation for 49 CFR Part 395 continues to read as follows:

Authority: 49 U.S.C. 3102; 49 U.S.C. App. 2505; 49 CFR 1.48 and 301.60.

2. Section 395.2 is amended by adding a definition of "automatic on-board recording device" as new paragraph (k) to read as follows:

§ 395.2 Definitions.

* * * * *

(k) *Automatic on-board recording device.* An electric, electronic, or electro/mechanical device capable of recording driver's duty status information accurately and automatically as required in § 395.15. The device must be connected with the vehicle to record vehicle operations.

3. In § 395.8, paragraph (e) is amended by adding, "of this section or § 395.15" between "activities," and "failure" and by removing, "as prescribed herein".

4. In § 395.8, paragraph (l) is amended by adding paragraph (4) to read as follows:

§ 395.8 Driver's record of duty status.

* * * * *

(l) * * *

(4) The requirements of this section, except paragraph (e) and paragraphs (k) (1) and (2) of this section, shall not apply to a motor carrier and its drivers who use automatic on-board recording devices and who comply with all of the requirements of § 395.15 of this part.

§ 395.13 [Amended]

5. In § 395.13, paragraph (b)(2) is amended by adding, "or 395.15" between "395.8" and "shall".

6. Part 395 is amended by adding a new § 395.15 to read as follows:

§ 395.15 Automatic on-board recording devices.

(a) *Authority to use automatic on-board recording device.* (1) A motor carrier may require a driver used by the motor carrier to use an automatic on-board recording device to record the driver's hours of service in lieu of complying with the requirements of § 395.8 of this part.

(2) Every driver required by a motor carrier to use an automatic on-board recording device shall use such device to record the driver's hours of service.

(b) *Information requirements.* (1) Automatic on-board recording devices shall produce, upon demand, a driver's record of duty status grid, chart, electronic display, or printout showing the time and sequence of duty status changes.

(2) The device shall provide a means whereby authorized Federal, State, or local officials can immediately check the status of a driver's hours of service, when used in conjunction with handwritten or printed records of duty status, for the previous 7 days.

(3) Support systems used on conjunction with on-board recorders at the home terminals or principal places of business must be capable of providing authorized Federal, State, or local officials with summaries of an individual driver's hours of service records, including the information specified in paragraph 395.8(d). Such support systems should meet the information interchange requirements of the American National Standard Code for Information Interchange (ANSCII) (EIARS-232/CCITT V.24 port (National Bureau of Standards "Code for Information Interchange." FIPS PUB 1-1)).

(4) The driver shall have in his/her possession records of duty status for the previous 7 consecutive days available for inspection while on duty. These records shall consist of information stored in and retrievable from the automatic on-board recording device, handwritten or computer generated records, or any combination thereof.

(5) All hard copies of the driver's record of duty status must be signed by the driver. The driver's signature certifies that the information contained therein is true and correct.

(c) The duty status shall be recorded as follows:

(1) "Off duty" or "OFF", or by identifiable code or character;

(2) "Sleeper berth" or "SB", or by identifiable code or character (only if the sleeper berth is used);

(3) "Driving" or "D", or by identifiable code or character; and

(4) "On-duty not driving" or "ON", or by identifiable code or character.

(d) *Additional information.* The following information shall also be included:

(1) Date;

(2) Truck or tractor and trailer number;

PART 395—HOURS OF SERVICE OF DRIVERS

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Authority: 49 U.S.C. 3102; 49 U.S.C. App. 2505; 49 CFR 1.48 and 301.60.

2. Section 395.2 is amended by adding a definition of "automatic on-board recording device" as new paragraph (k) to read as follows:

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* * * * *

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(4) The driver shall have in his/her possession records of duty status for the previous 7 consecutive days available for inspection while on duty. These records shall consist of information stored in and retrievable from the automatic on-board recording device, handwritten or computer generated records, or any combination thereof.

(5) All hard copies of the driver's record of duty status must be signed by the driver. The driver's signature certifies that the information contained therein is true and correct.

(c) The duty status shall be recorded as follows:

(1) "Off duty" or "OFF", or by identifiable code or character;

(2) "Sleeper berth" or "SB", or by identifiable code or character (only if the sleeper berth is used);

(3) "Driving" or "D", or by identifiable code or character; and

(4) "On-duty not driving" or "ON", or by identifiable code or character.

(d) *Additional information.* The following information shall also be included:

(1) Date;

(2) Truck or tractor and trailer number;

APPENDIX E: Standard No. 2, Rear Underride Protection (FR No. 46)

APPENDIX E

§ 571.2—— Standard No. 2——, Rear Underride Protection.

S1. *Scope.* This standard establishes rear underride protection requirements for heavy vehicles.

S2. *Purpose.* The purpose of this standard is to reduce the number of deaths and serious injuries occurring in rear underride accidents that involve heavy vehicles.

S3. *Applicability.* This standard applies to trucks and trailers that have gross vehicle weight ratings (GVWR's) greater than 10,000 pounds. It does not apply to truck tractors, pole trailers, wheels back vehicles, low chassis vehicles, or special purpose vehicles.

S4. *Definitions.*

"Low chassis vehicle" means a truck or trailer having a chassis which extends behind the rearmost point on the rear tires and whose rear lower surface meets the configurational requirements for underride guards specified in S5.1.1 and S5.1.2. The "chassis" is the load-supporting frame on a truck or trailer, exclusive of any appurtenances which might be added to accommodate cargo.

"Rear extremity" means the rearmost point on a vehicle that falls above a horizontal plane located 55 cm (21.65 inches) above the ground when the vehicle is loaded to its GVWR and when the vehicle's cargo doors, tailgate, or other permanent structures are positioned as they normally are when the vehicle is being driven. Nonstructural protrusions such as

taillights, hinges and latches are excluded from the determination of the rearmost point.

"Side extremity" means the outermost point on the sides of the vehicle that falls vertically above a horizontal plane located 55 cm (21.65 inches) above the ground and horizontally between a transverse vertical plane tangent to the vehicle rear extremity and a transverse vertical plane located 30 cm (11.8 inches) forward of that plane when the vehicle is loaded to its GVWR. Nonstructural protrusions such as taillights, hinges, and latches are excluded from the determination of the outermost point.

"Special purpose vehicle" means a truck or trailer having work-performing equipment that is located at the lower rear of the vehicle and whose function would be significantly imparied if an underride guard meeting the requirements of this standard were attached to the vehicle.

"Wheels back" vehicle is a vehicle having a permanently fixed rear axle. The rearmost part of the tires on that axle is not more than 30 cm (11.8 inches) from a transverse vertical plane tangent to the rear extremity of the vehicle.

S5. *Requirements.* Each vehicle shall be equipped with an underride guard that complies with the requirements of S5.1 and S5.2.

S5.1. *Configuration* (see Figure 1).

S5.1.1. The outermost edges of the underride guard shall be located within 10 cm (3.94 inches) of longitudinal vertical planes tangent to the side extremities, when measured transversely at a height of 55 cm or less. The underride guard shall be laterally continuous at a height of 55 cm or less.

S5.1.2. The vertical distance between the lower surface of the underride guard and the ground shall not exceed 55 cm (21.65 inches) at any point along the full width of the device when the vehicle is unloaded but has its full capacity of fuel and its tires are inflated in accordance with the vehicle manufacturer's recommendations.

S5.1.3. The cross sectional height of the underride guard shall not be less than 10 cm (3.94 inches) at any point across the full width of the device.

S5.1.4. The rearmost surface of the underride guard shall be located not more than 30 cm (11.8 inches) forward of a transverse vertical plane tangent to the rear extremity of the vehicle when measured longitudinally to any point across the full width of the underride guard at a height of 55 cm or less.

S5.2. *Strength.* When the underride guard of the vehicle is subjected to any of the force levels specified in S6.6(a) Test 1 and S6.6(b) Test 2 in accordance with the procedures and conditions specified in S6, the guard should not deflect so as to permit the center point on the contact surface of the test block specified in S6.5 to travel longitudinally forward more than 40 cm (15.7 inches) from the rear extremity of the vehicle.

S6. *Test conditions and procedures.*

S6.1. The vehicle is unloaded but has its maximum capacities of engine fuel, oil and coolant.

S6.2. The tires are inflated in accordance with the vehicle manufacturer's recommendations.

S6.3 The vehicle is placed on level ground.

S6.4. Restrain the vehicle so that it remains in place during the tests. No restraints are placed on the vehicle rearward of the centerline of the rearmost axle. The methods used to restrain the vehicle do not impair the movement of the underride guard or the test block specified in S6.5 during the testing.

S6.5. The test block used for determining compliance with S5.2 is a rectangular solid made of rigid steel. It is 20 cm (7.9 inches) ±1 mm in height and 20 cm (7.9 inches) ±1 mm in width. One of the 20 cm by 20 cm ends of the block is used as the contact surface. Each edge of the contact surface has a radius of curvature of 5±1 mm.

S6.6. Using the test block, subject the underride guard to the tests specified in paragraphs (a) and (b) of this section, as shown in Figure 2. An underride guard that has not been subjected to either of the tests is used for each test.

(a) Test 1. Apply a force (P_1) of 50,000 Newtons (11,240 pounds) to the guard 30 cm (11.8 inches) inboard of the longitudinal vertical plane tangent to the outermost point on the sides of the vehicle (either the right or the left side), and then apply a force (P_2) of 50,000 Newtons (11,240 pounds) to the same guard where it intersects the longitudinal vertical plane passing through the vehicle longitudinal axis.

(b) Test 2. Apply a force (P_3) of 100,000 Newtons (22,480 pounds) to the guard at any point not less than 35 cm (13.8 inches) and not more than 50 cm (19.7 inches) to the left of the longitudinal vertical plane passing through the vehicle longitudinal axis, and then apply the same force to the same guard at the point located at the same distance to the right of that plane.

S6.7. At the beginning of each force application, the test block is located as specified in paragraphs (a) through (c) of this section.

(a) The contact surface of the test block is touching the underride guard.

(b) The center point of the contact surface is located:

(1) In the same longitudinal plane as the point specified in S6.6; and

(2) In the horizontal plane which is tangent to the lowest point on the underride guard in the longitudinal vertical plane specified in paragraph (b)(1) of this section.

(c) The longitudinal axis of the test block and of the mechanism which propels the test block are parallel to the vehicle longitudinal axis.

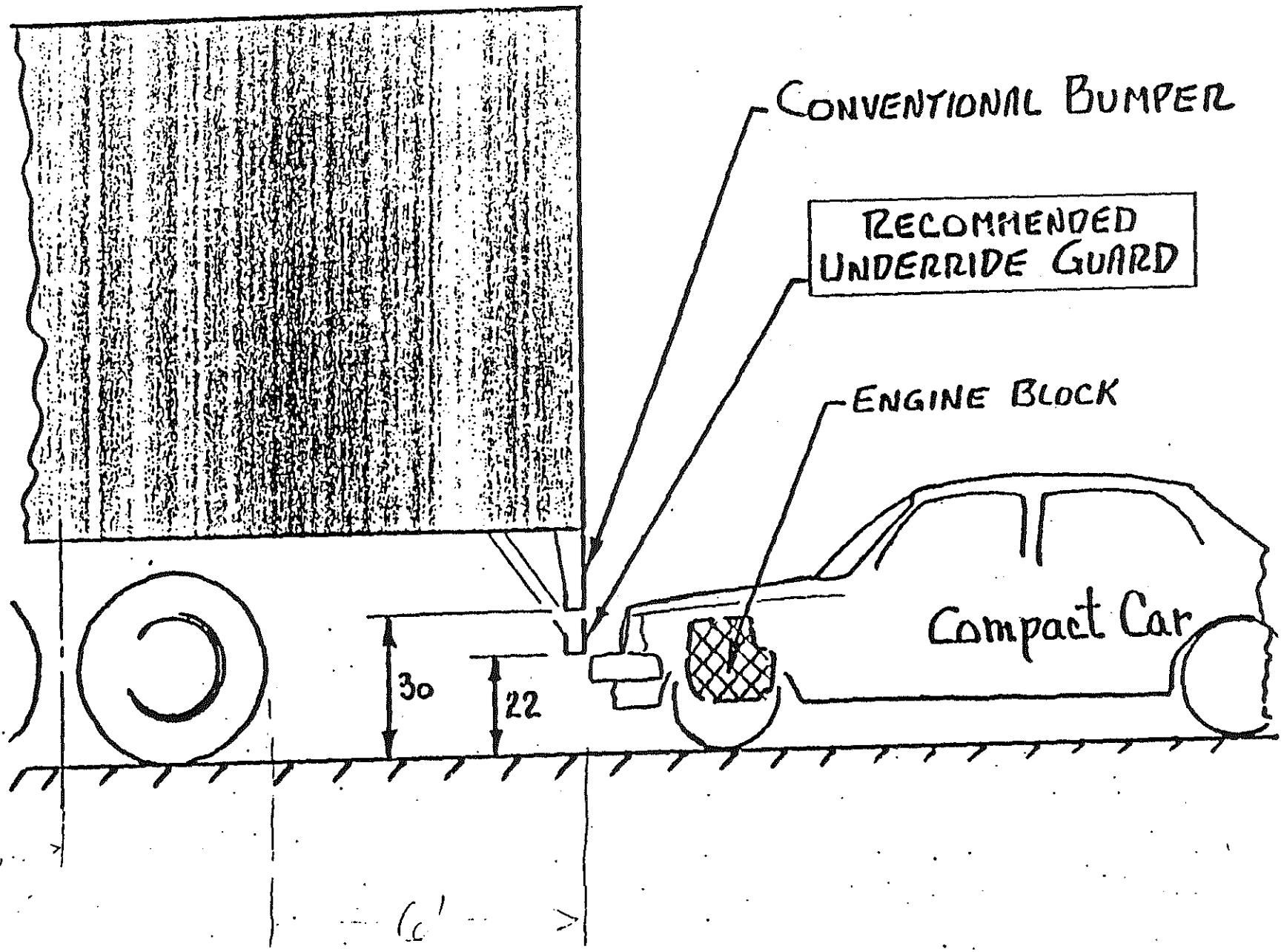
S6.8. Each of the forces specified in S6.6 is reached in not less than one minute and not more than two minutes by increasing the application of force at a constant rate.

S6.9. During each force application, the longitudinal axis of the test block and the mechanism which propels the test block remain parallel to the vehicle longitudinal axis and at the same distance from that axis and the ground as at the beginning of the force application.

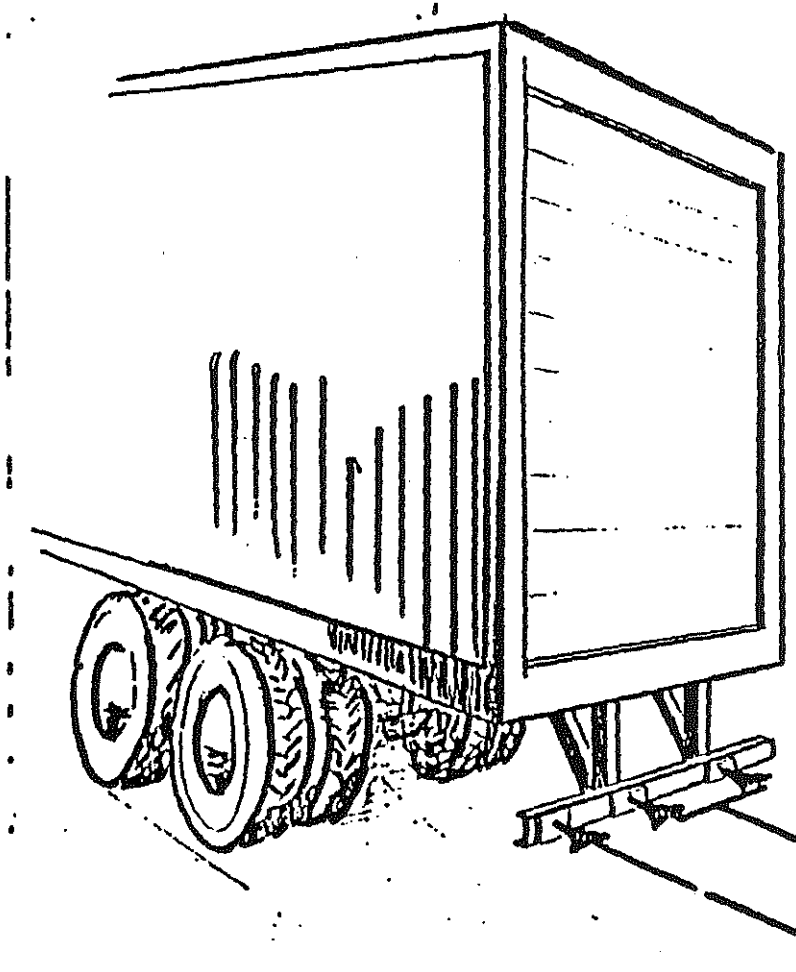
S6.9. When the force specified in S6.6 is initially reached, measure the distance which the center point of the test block contact surface has traveled longitudinally forward from the rear extremity of the vehicle.

BILLING CODE 4910-60-M

APPENDIX F: Proposed Rule for Underride Guard in Michigan



STRENGTH REQUIREMENTS



TOTAL LOAD ON UPRIGHTS
45,000 LBS

LOAD ON OUTER TIP
11,250 LBS

Underride Guard

- Max Ground Clearance = 22 inches
- Guard extends to within 4 inches of both sides of trailer
- Guard withstands 45,000 lbs on uprights
- Guard withstands 11,250 lbs on outer ends

Summary of Recommendations

1) 53-Ft Semitrailers should be required to have a wheelbase of 40.5 Ft (+/- 0.5 Ft)

2) 53-Ft Semitrailers should be required to incorporate a rear-underride guard of specified size and strength

Underride Guard for Semitrailers

The underride guard must satisfy the following provisions:

1) The guard must provide a continuous horizontal beam having a maximum ground clearance of 22 inches, as measured with the vehicle empty, on level ground.

2) The beam extends to within 4 inches of the lateral extremities of the trailer on both left and right side.

3) When each of the following longitudinal loads are applied to the beam, in turn, the loaded point deflects to no further than 15 inches forward of the rear extremity of the trailer,

a) a load of 11,250 lbs is applied at a point which is within 8 inches of either the left or right extremity of the beam

b) a combined load of 45,000 lbs is applied to the beam, distributed equally between the vertical uprights

The above loads are applied against an 8" x 8" rigid steel block. The load application point is defined as the center of the block. The elevation of the load application point in each test is 2 inches above the lower edge of the beam.

APPENDIX G: Response of the American Trucking Association to NHTSA Proposed Rule on Underride Guard

APPENDIX G

Docket 1-11; N. 08

ORIGINAL

Memorandum

U.S. Department of Transportation
National Highway Traffic Safety Administration

01-11-NPRM-N08-150 ah

Subject: Information: Submittal to Docket-Rear Underride Protection

Date: APR 13 1983

From: J.E. Tomassoni
Safety Standards Engineer

Reply to Attn of

To: Docket Section - 1-11, Notice 08

Thru: Courtney H. Price
Associate Administrator for Rulemaking

File: Chief Counsel

The attached information (6 copies) is submitted for inclusion on the above docket. The information is a letter from the American Trucking Association (ATA), which requested that the Rear Underride Protection rulemaking be terminated. The letter also included an ATA document titled "Cost of Truck Equipment Regulations."

This information is pertinent to the subject rulemaking.

Attachment (6 Copies)

Ficke #57 ATA Response

RECEIVED
'83 APR 13 AM 11:37
DOCKET
WASHINGTON, D.C. 20590

AMERICAN
TRUCKING
ASSOCIATIONS, INC.

1616 P Street, N.W., Washington, D. C. 20036

ENGINEERING DEPARTMENT
(202) 797-5391

01-11-NPRM-NO8-150

March 15, 1983

Mr. Raymond A. Peck Jr.
Administrator
National Highway Traffic Safety Administration
400 Seventh Street, SW
Washington, D.C. 20590

RECEIVED
83 MAR 17 AM 11:

DOCKET

Dear Mr. Peck:

We understand that you are near a decision about the action to take on Docket 1-11; Notice 8 Rear Underride Protection. We believe this docket should be terminated and since you are studying it we have taken this opportunity to provide a summary of our reasons.

Basically, the need for change from the current BMCS underride requirement has not been demonstrated. NHTSA terminated a similar rulemaking in 1971 because its costs could not be justified. At that time it was estimated that such a requirement might save 50-100 lives for a capital outlay of approximately $500 million. Today we believe that such guards would add $2.8 billion to the cost of trucks. This estimate is shown on page 4 of the enclosed booklet "Cost of Truck Equipment Regulations."

Despite the fact that an underride regulation would exceed the $100,000 threshold of Executive Order 12291, NHTSA has not responded to our formal request (made in April, 1981) to have Docket 1-11; Notice 8 declared a major rulemaking. We do not see how making such a declaration can be avoided, if this rulemaking is continued, without violating that order.

There was neither any real justification for reopening the Underride Docket in 1981 nor is there any for continuing it as this type of mishap is an infrequent occurrence. The Fatal Accident Reporting System (FARS) provides no national counts of underride but instead gives estimates arrived by statistical manipulation of small samples of data.

For example one NHTSA analysis indicated 29 lives a year could be saved by the proposed rule, but since accident data in an unrelated Bureau of Motor Carrier Study was off by a factor of two, that figure was doubled to show 58 persons saved per year. In another NHTSA study the 236 fatal truck underride accidents reported were actually the nationally weighed total calculated from two actual truck underride fatalities.

Even if there were a high number of proven fatalities resulting from truck underride accidents, consideration would have to be given to the extent to which they could be prevented by improved underride guards as such equipment is ineffective at speed differentials over 35 mph. Data from the University of Michigan Transportation Research Institute shows that closing speeds in 2/3 of such incidents

it studied were greater than 35 mph. In another underride study Calspan concluded that the most frequent occurrence involves a stopped truck. FARS data for the years 1976-1980 inclusive show that 73% of the combination vehicle fatal accident involvements occur on high speed (55 MPH) highways.

NHTSA's proposals for underride protection focus on preventive measures which will not cause impacts similar to those of crashing into a brick wall. Available data indicates, however, that rear end collision forces are so great that even with speed differential below 35 mph their energy can not be successfuly managed without using extremely costly equipment. Hence, in our past filings we have suggested that the problem requires attention to be directed toward modifying auto front ends to increase their energy absorbing capability and protect them when they strike bridges, trees, other cars, and other objects, as well as trucks. The design of the automobile as the striking vehicle must not be overlooked.

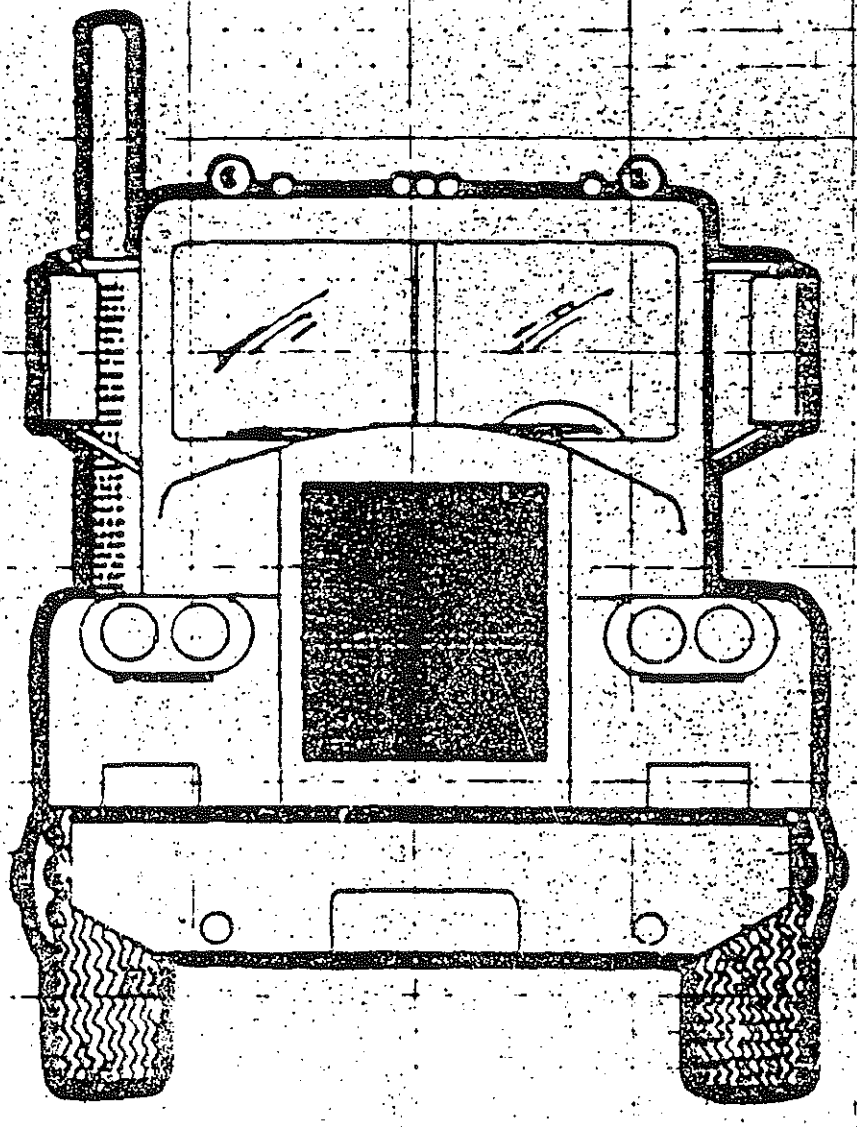
I hope that you will give our request for discontinuing the underride Docket full consideration and that you will call on us for additional information if you have any questions about our findings and our views.

Sincerely,

Wm. E. Johns

William E. Johns

COST OF TRUCK EQUIPMENT REGULATIONS



An Analysis of Safety and Environmental Truck Regulations Proposed by the U.S. Department of Transportation and the Environmental Protection Agency, and the Potential Costs of such Regulations to the Trucking Industry

Engineering Department
AMERICAN TRUCKING ASSOCIATIONS, INC.
Washington, D. C.
September 1, 1982

INTRODUCTION

Safety and environmental controls governing vehicular equipment in the trucking industry are primarily the responsibility of the U. S. Department of Transportation and the Environmental Protection Agency. Vehicular requirements imposed on the trucking industry by these two agencies in the past have had tremendous cost impacts.

This cost analysis by the Engineering Department of the American Trucking Associations is an estimate of the future cost impact on motor carriers if and when various matters now under consideration by the federal government are made mandatory. The purpose of the analysis is to assist those in the motor carrier industry who are responsible for financial planning and those who are responsible for determining needs of a motor carrier relative to the purchase and maintenance of vehicles.

The analysis is also designed as an overview of the costs of equipment regulations which can be of value to manufacturers, regulators and the trucking industry in seeking a determination of cost-benefit relationships of regulatory requirements.

The ATA analysis is based on two regulations which are scheduled to become effective in 1983 and 11 other proposed rules, or initiatives, which could become regulatory requirements within the next five years or less. Part I of the analysis deals with new regulations that will soon become effective, and with proposed rules that will probably be adopted as regulatory requirements. Part II deals with proposed rules that may be preempted by action of the manufacturing industry. If so that would negate the need for a regulatory requirement, but there would still be a cost impact on purchase and utilization of equipment.

The cost data herein is based on the estimated future purchase cost of vehicles equipped with safety devices and emission controls mandated by proposed regulations, and on the estimated increased direct expense of operating and maintaining such vehicles. The data does not include estimates of the impact such requirements have on productivity, vehicle utilization and similar cost factors.

ATA estimates a 30 billion dollar cost to the trucking industry if the bulk of the regulations herein are adopted.

Information concerning the base data and supporting calculations for this analysis may be obtained from the ATA Engineering Department.

Cost Summaries

PART I

(Final Rules & Proposed Rules

		FIRST YEAR[1]	TO EQUIP[2] ALL VEHICLES
1.	Hydraulic Brake Systems,	$ 13.0 Million	$440.0 Million
2.	Rear Underride Protection	151.9 Million	2.80 Billion
3.	Splash and Spray Reduction	1.73 Billion	2.98 Billion
4.	Improved Truck Visibility (Conspicuity)	234.0 Million	3.24 Billion
5.	Heavy Duty Vehicle Brake Systems	1.66 Billion	9.2 Billion
6.	Gaseous Emission Regulations- Light Duty Trucks & Heavy Duty engines, (1984 & Later model years)[3]	125.5 Million	2.11 Billion
7.	Gaseous Emission Regulations- Light Duty Trucks & Heavy Duty Engines, (1988 & Later Model Years)[4]	249.0 Million	4.77 Billion
8.	Heavy Duty Diesel Engine Particulate Emission Regulations	209.7 Million	4.70 Billion
9.	Heavy Duty Evaporative Emission Standards & Procedures	$ 2.9 Million	201.8 Million
			$ 30.45 Billion

TOTALS First Year Costs		
	1983 -	$ 13.0 Million
	1984 -	$ 3.51 Billion
	1985 -	$153.9 Million
	1986 -	$468.7 Million
	1987 -	$234.0 Million

1. First year costs include (a) equipping the number of affected vehicles, normally purchased in one year, with the mandated equipment and (b) operating those mandated systems.
2. Total Cost is the first cost of equipping all the vehicles in the population with the mandated equipment plus the annual operating cost
3. Based on EPA estimates. Industry estimates are higher: first year costs of $1.44 Billion & total cost of $17.25 Billion
4. Based on EPA estimates. Industry estimates indicate first year costs as high as $1.55 Billion and total costs as high as $32.80 Billion

2. REAR UNDERRIDE PROTECTION
Description & Cost Estimate

Proposed rulemaking dockets: NHTSA 1-11, Notice 8; and BMCS MC-77.

As proposed, underride rules would apply to newly manufactured trailers and trucks over 10,000 lbs. GVWR, with certain exceptions which have not yet been determined. Should a final rule be published in 1983, it would become effective in 1985. The proposed rule would lower the guard to within 21" of the ground and extend it across the rear of the vehicle to within 4" of each side. It also would impose a strength requirement of 22,480 lbs. The underride guard currently required by the Bureau of Motor Carrier Safety must be within 30" of the ground and must be within 18" of each side.

Cost Summary

First Costs	New Guard	Existing Guard	Difference
All vehicles built first year:	$162.8 Million	$10.9 Million	$151.9 Million
8 years to equip trailers	$351 Million	$60.3 Million	$290.7 Million
14½ years to equip trucks	$ 2.6 Billion	$73.5 Million	$ 2.5 Billion
Total Cost over years required to equip all affected vehicles	$2.95 Billion	$133.8 Million	$2.80 Billion

Comparison of estimated cost for new guard and cost for current guard.*

	New Guard	Current[7] Guard	Increment over Existing Guard
Trailers	$150[6]	$23.00	$127.00
Trucks	$600[6]	$23.00	$577.00
Weight, lbs.	120[6]	41.5	78.5

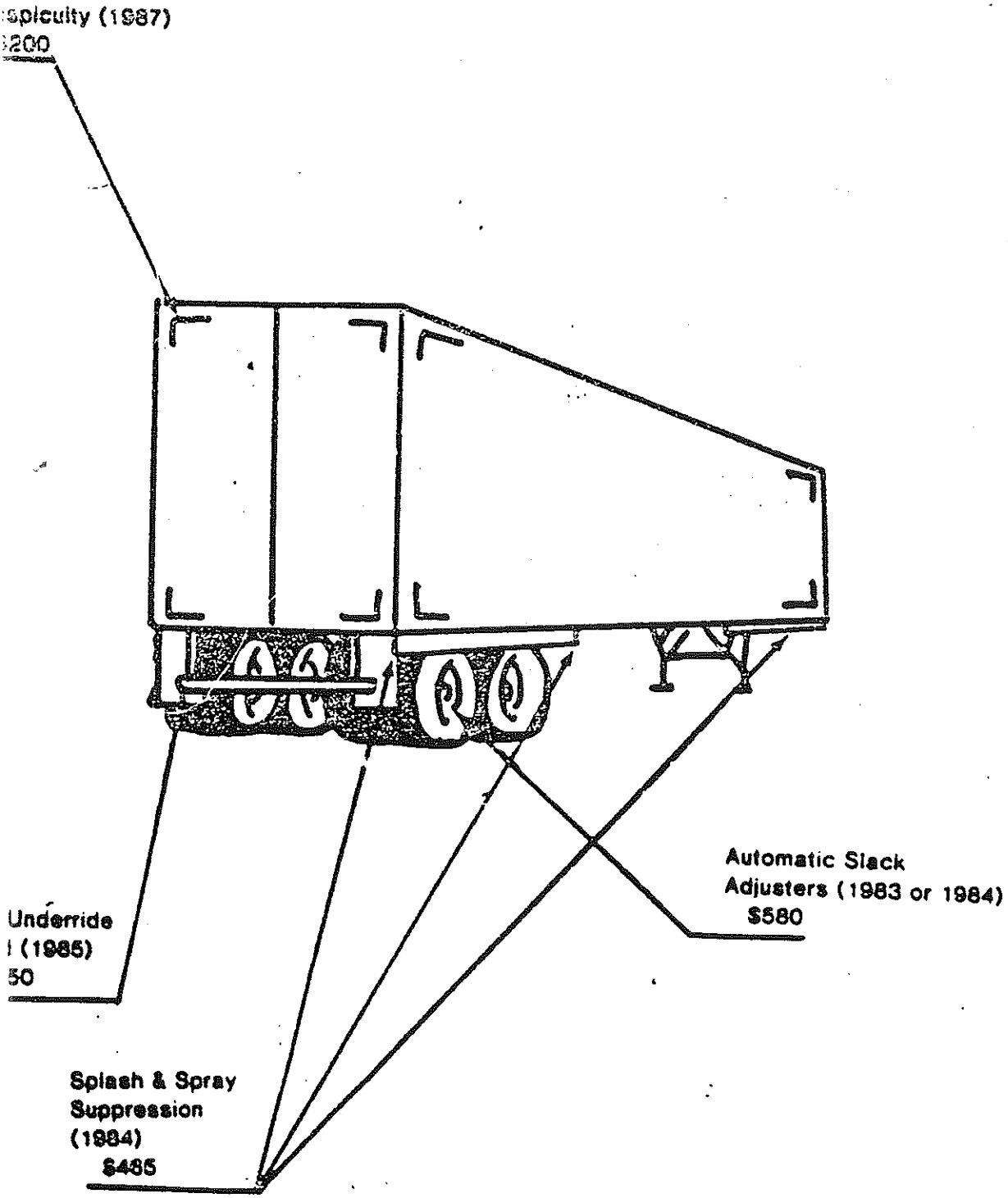
[6] Letter, Truck Trailer Manufacturers Association, subject: Estimated Cost of Rear Underride Guard and Supporting Structures, February 22, 1982.

[6] Comment O1-11-NPRM-08-077, Truck Body and Equipment Association

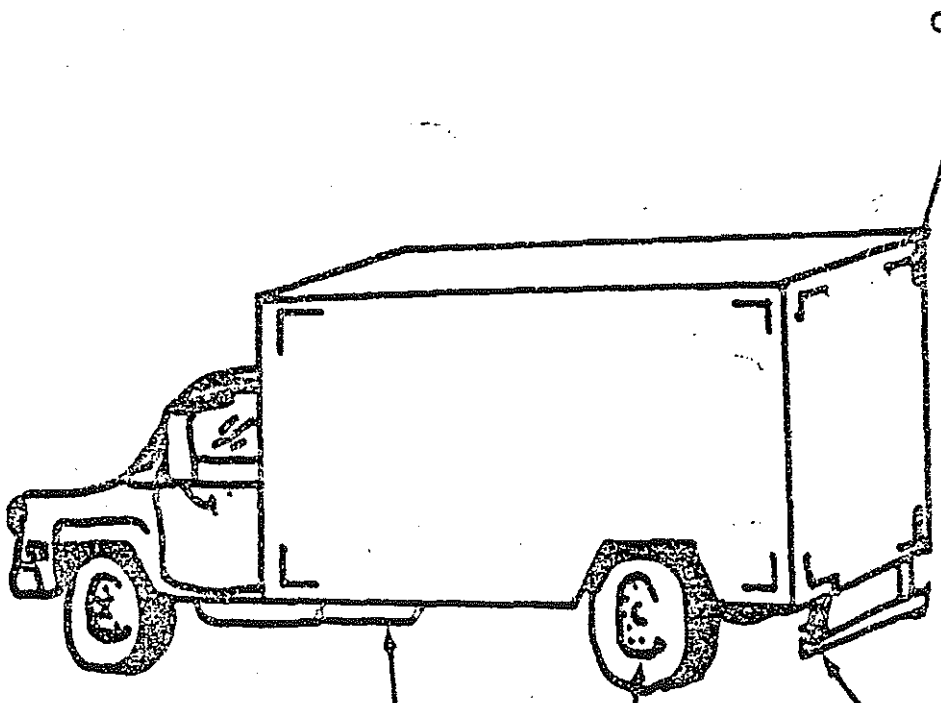
[7] "Alternate Approaches for Truck Underride Guard Protection," Pioneer Engineering and Manufacturing Co., Corporate Tech. Planning, Inc., October, 1980

*Based on 1980 data per vehicle

UNIT COST OF PROPOSED SAFETY EQUIPMENT FOR TRAILERS



UNIT COSTS OF FINAL AND PROPOSED SAFETY AND ENVIRONMENTAL EQUIPMENT FOR STRAIGHT TRUCKS



Conspicuity (1987)
$200

Rear Underride
(1985)
$600

Gaseous Emissions,
1984 & Later Model
Years, $477-$900

Gaseous Emissions,
1988 & Later Model
Years, $270

Diesel Engine Particulates,
If Applicable (1986)
$629-$756

Evaporative Emissions
If Applicable (1985)
$40

Hydraulic Brake Systems, Final Rule
$54 (Effective 1983)

Or

Heavy Duty Vehicle Brake
Systems, Potential Rules
Applicable To Air Brake
Systems.

a) Automatic Slack Adjusters	$435
b) Air Dryers	$350
	$785