MINUTES

JOINT HEARING
ASSEMBLY AND SENATE TRANSPORTATION COMMITTEES
APRIL 2, 1975

Members Present: Senators: Schofield, Gojack, Monroe, Herr Neal, Blackmore, Raggio

Assemblyman: Glover

Guests: (See Attached Sheet)

Senator Herr, Chairman of the Senate Transportation Committee, called the meeting to order at 12:40 p.m. She introduced Mr. Brad Crittencler from the U.S. Dept of Transportation in San Francisco who in turn introduced the main speaker, Frank Grenier, U.S. Dept of Transportation, Washington D.C.

Mr. Grenier presented written testimony of his entire presentation. (See attached) The time was very limited so he very briefly went thru his testimony as to why these inspections were necessary and why it was important to require that the wheels be removed to detect defects in the brake system. He said it would take about 5 minutes to remove a wheel, but by removing both wheels, 3/4 of the defects could be detected in the brake system.

Senator Herr announced that time was running out. She suggested that Mr. Grenier get together with the Dept of Motor Vehicle and the Highway Safety Board to determine the exact cost to the constituents for this type of inspection and to also find a way to sell this inspection to the constituents.
There was no time for questions. Mr. Hill did inquire as to how many states required that the wheels be pulled in the inspection. Mr. Grenier stated that 10 now and 10 more were working on it. The meeting was adjourned at 1:15 p.m.

JOINT SENATE AND ASSEMBLY

HEARING

This agenda cancels and supersedes the agenda of April 2, 1975

COMMITTEE ON TRANSPORTATION

Wednesday

Date April 2, 1975 Time 12:00 Noon Room 131

168

Bill or Resolution to be considered	Subject
SB 121	Requires vehicle safety inspections

(PMVI Demonstration)

Joint Hearing ~~SENATE~~ Transportation COMMITTEE

ROOM # 131
DAY Wednesday DATE 4-2-75

Please Print

170

NAME	ORGANIZATION	ADDRESS
Joe Zemaitis	DOT/NHTSA/REG IX	450 GOLDEN GATE AVE SAN FRANCISCO CA. 94102
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DICK KING	O.H.S.	C.C.
Wayne Tetrault	O.H.S.	C.C.
DAVID LAWSON	O.H.S.	C.C.
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Frank [illegible]	D.O.T. U.S.	Wash D.C.
Brud [illegible]	DOT. U.S.	San Francisco Calif
JOHN R. RYAN	D.O.T. - NHTSA	450 Golden Gate Ave SAN FRANCISCO, CA 94102
Howard Hill	DMV	
Freddie Little	DMV	

It is surprising to discover the number of motorists who believe that their cars, much like their bodies, are destined never to wear out regardless of abuse or lack of care. At the risk of being repetitive, I should like to say that "until we discover how to achieve perpetual motion, the best engineered machine we can build is goint to wear out."

Lets compare the automotive brake system to our body. Comparing the automobile brake system to the human body would replace the brake system with the heart. The driver replaces the brain.

Fig. I It becomes obvious that a defect in the brake system could be fatal. A hydraulic leak, a frayed hose, cracked or worn off lining, could be equivalent to a coronary. The severity of the coronary is proportional to the extent of the defect. The criticality of the braking system is of the highest magnitude.

Fig. II & III Thus, thin or inadequate brake linings are equated to high blood pressure causing excessive strain to the heart. When emergency situations such as a panic stop, or sustained heavy braking is required, the overworked brake systems cannot perform adequately. The result could be a collision, which is equivalent to a coronary. If the collision or coronary is too severe, death will result.

With present automobile brake designs and current inspection technology, it becomes obvious that to inspect the brake linings for thickness and cracks, to inspect brake slave cylinders, to inspect calipher assemblies, wheels must be pulled.

Fig. IV The well-known Indiana study of accident causes concluded that brake system factors were a certain cause in 4 percent of the accidents investigated, and were a definite or probable factor in six percent of the cases studied.

Fig. V Other studies such as Contract No. HS-354-3-716 showed a 34 percent vehicle rejection rate because of brakes. Well over half (approximately 65 percent) were defects which were exposed when the wheels were removed. This study was conducted in our D.C. inspection lanes and included the inspection of 936 passenger vehicles.

Fig. VI An additional 119 passenger vehicles were inspected at the D.C. inspection lanes. Fifty-seven cars were rejected from mechanical defects exposed when wheel removals were executed.

Fig. VII Ultrasystems, Inc., under Contract No. FH-11-7525 recorded from 2,476 inspected vehicles the following:

Fig. VIII TRW under Contract No. FH-11-6964 recorded from 20,909 vehicles the following brake defects.

Figures V, VI, VII and VIII show brake defects which are detected from wheel pulling. For practical reasons, the current design of brake systems, coupled with the available diagnostic techniques leaves no other method of inspecting these components other than visual.

In a study completed by TRW entitled "Component Degradation, Braking Systems Performance" (Contrace No. DOT-FH-11-6964) December 30, 1969, it was recorded that those vehicles that have worn through the brake lining and have metal to metal surfaces, the stopping distance from 60 to 0 mph increased an average of 20%.

The Bendix Corporation ran dynamometer tests in which shoes for both the front disc and rear drum brakes were tested with no friction material on them. The test was adjusted so that only the 35 reburnish stops and the effectiveness stops were to be run. The brakes seized-up due to friction welding during the fifth burnish stop. During this stop, the front torque went from approximately 10,000 in-lb to greater than 22,500 in-lb where the stud bolts sheared off causing a lost of front torque. Also, the rear torque increased from 7,500 in-lb to over 20,000 in-lb where the shoes bent and the stud holes in the drum back were severly deformed. The instantaneous torque may have been very much higher since the response of the instrumentation recording system is limited to approximately 10 Hz. The result of such torque imbalance is an uncontrolled

Movie 11 min

vehicle.

The foremost objection to removing the wheels for brake inspection has been the cost. Figures have been quoted as high as $15.00 for pulling wheels.

Fig. IX Figure IX shows an estimated cost under $1 for pulling two wheels. The assumption is based on a time factor of 10 minutes for the two wheels and inspector salaries of 8 to 10 thousand dollars per year. Not considering overhead, vacation and insurance, the 8 to 10 thousand per salary equates into $3.85 and $4.81/hr. respectively.

Fig. X Figure X is a breakdown of the wheel pulling functions. The elapsed time (shown as Δt) is derived from our own experience in the D.C. lane, an Alaska study, and from an AVCO contract DOT-HS-5-0137 shown in Figures XI, XII and XIII.

Fig. XI XII XIII

According to the 1974 edition of "Accident Facts" there were 41,020 non-pedestrian, non-motorcycle rider fatalities, 21,362,400 property damage involvements. Using the data from the NHTSA 1972 edition of "Societal Costs of Motor Vehicle Accidents" we observe the following information:

Fig. XIV

Loss per fatality	-	$200,000
Loss per injury	-	7,200
Property damage only	-	300 per involvement

The total 1973 societal loss therefore was $26.54 billion.

Fig. XV Referring again to the Indiana study, a definite involvement as causative factors was established in not less than 6 percent of accidents with a statistical confidence of 95 percent. In Figure XV this 95 percent confidence is portrayed as certain. The probable has an 80 percent confidence and possible has not been estimated with a confidence level.

Certain was established when there was no doubt or difference of opinion whatever, in each case strong supportable evidence was manifested. By the way, the "Rosig" report presented at the 1970 International Automobile Safety Conference recorded 452 brake deficient vehicles in a 1,172 vehicle population. Their 38 percent brake deficiencies compares with our Indiana report of 40 percent. That is 40 or 38 percent of the mechanical deficiencies which cause or contribute to an accident.

The probable category is likewise always supported by good evidence but either due to the nature of the judgment being made, or due to the necessity of relying on a witness's statement, the credibility of which can only be estimated or some similar reason, the possibility of error is recognized and expressed by application of the probable rating.

Of the total $26.54 billion societal costs of motor vehicle accidents, vehicular defects contribute at least $1.6 billion and perhaps as much as $7.0 billion but probably not more than $4.3 billion.

It should be reasonable to complete the emphasis standards with other safety checks in 15 to 20 minutes. This includes two wheel pulls and requires no interpretations during the inspection. The additional five to ten minutes are for inspecting the tires, brake light, other brake components, and additional safety systems other than the required brakes and tires.

Using a $6/per hr. labor rate, 20 minutes will cost the inspection facility $2. Because our new cost effective inspection procedures have eliminated the cost of capital equipment, the high cost of amortization is no longer a factor.

Raising the garage door, driving the car into the bay, scraping off the sticker, writing the report, vacations, insurance, overhead, and let's not forget our honest profit, can double the $2 cost.

We can now understand why and how States such as Pennsylvania and New Hampshire charge $4 to $4.50 for removing two wheels. In Virginia, which charges $3 for one wheel removal, try and remove an inspection station's certificate!

By the way, the average charge in the State of Virginia charged during 1973 to repair cars to comply with inspection at the inspection station was $1.35. This is not to say that the vehicle did not have a brake repair done elsewhere, in fact, more than likely did. I emphasize this point to

illustrate that under State supervision "Rip-offs" can be 177 minimized.

Justifications for motor vehicle inspections have been known for many years, and various opinion polls (e.g., in Belgium, France and Germany) have shown that the public supports this need. Most experts also accept this, but based on heuristic judgments rather than hard, quantitative data. Indeed, few concrete conclusions can be drawn from the available accident data. Thus, estimates as to the number of accidents in which vehicle defects can be listed as a causative factor, range from 6 to 18 percent. Almost no data are available on the number of accidents that were averted because some defect identified in an inspection was corrected.

The difficulty is readily seen in numerically described the positive results of motor vehicle inspections or, for that matter, any other accident avoidance or primary safety action. While one can readily count the accidents that occur, it is virtually impossible to count the accidents that were averted. The motorist might know that because recently repaired brakes he was saved from having an accident, but this fact never appears in any official statistical summary.

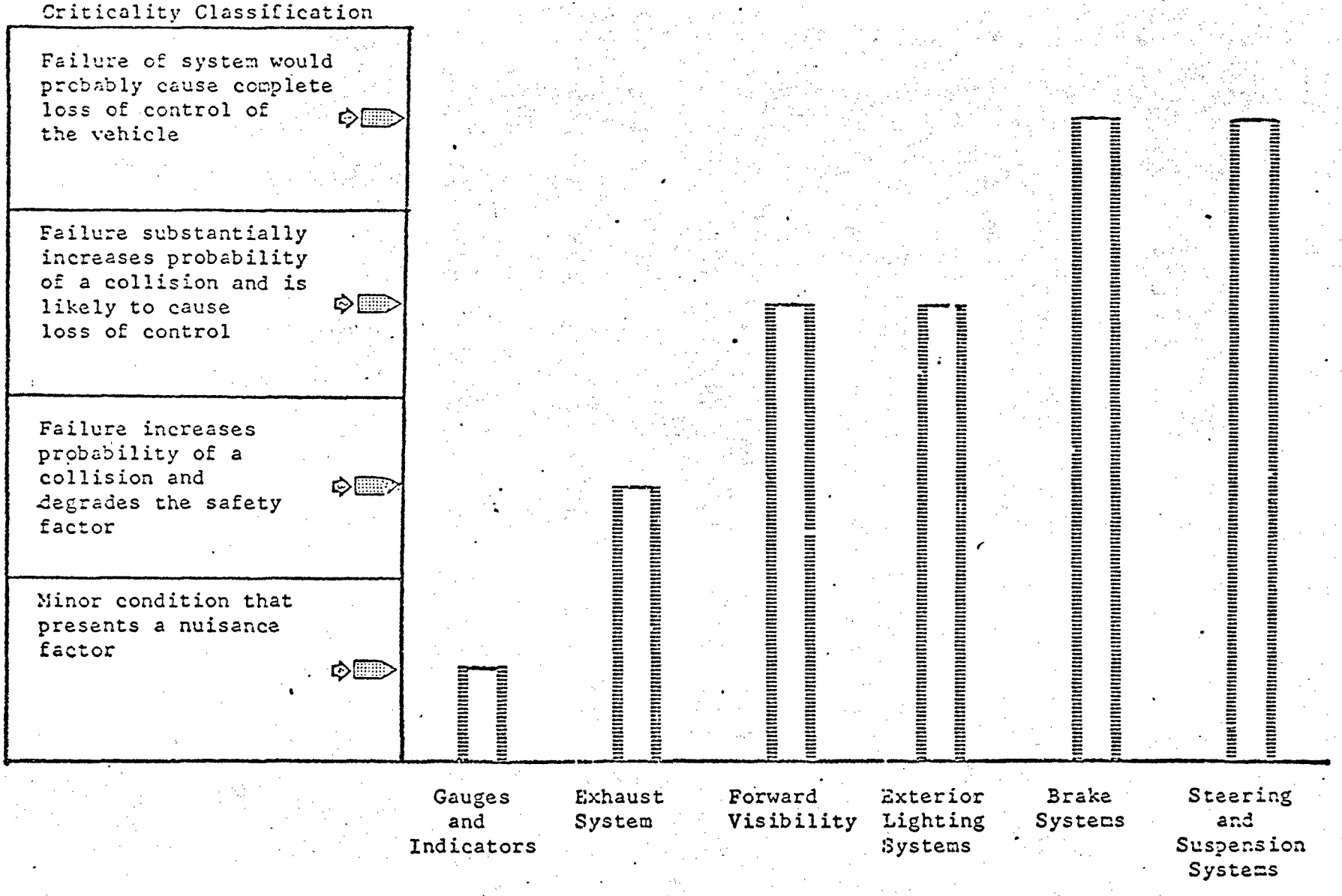
Notwithstanding seemingly indisputable logic in its support, motor vehicle inspection is subject to much questioning and controversy regarding both its technology and its benefits. Both are closely interrelated; better inspection

techniques should result in lives saved by better identifying needed repairs before they cause accidents. Better inspection techniques should reduce the likelihood that owners will be required to spend money on unnecessary repairs. Modern technology can guard against "under inspection" which requires owners to complete unnecessary repairs. 178

There is a continuing need in upgrading various aspects of motor vehicle inspections. This upgrading is primarily in the inspection procedures and techniques involved in the safety inspection of the brake systems.

Because of the high criticality and at the same time to the highest known vehicle cause of motor vehicle accidents it becomes obvious that improvements and upgrading of motor vehicle inspections can be implemented most efficiently in the brake and tire systems. The results of such a program will be to improve vehicle inspection programs that otherwise permit unsafe vehicles to be operated on public thoroughfares. It will guard against subjective and overly strict inspections which cause owners to pay for unnecessary repairs.

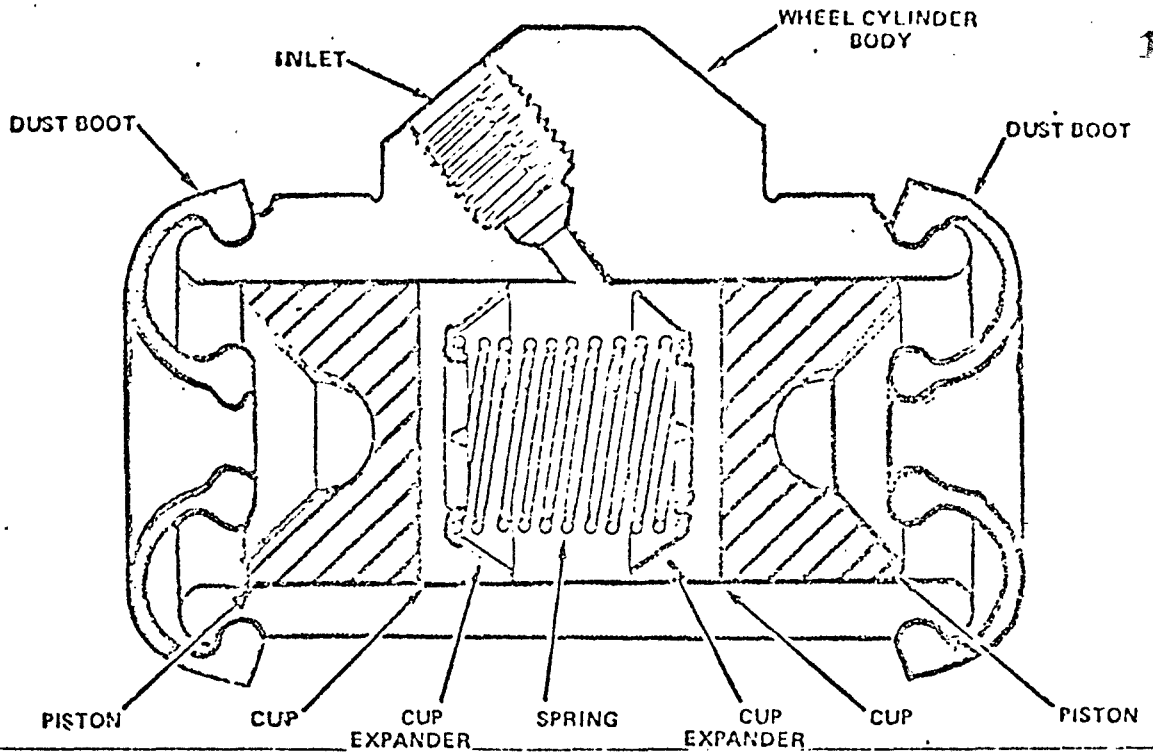
M. V. SAFETY SYSTEMS CRITICALITY CLASSIFICATION



* Contract FH-11-6522 (Operations Research, Inc.) National Highway Safety Bureau

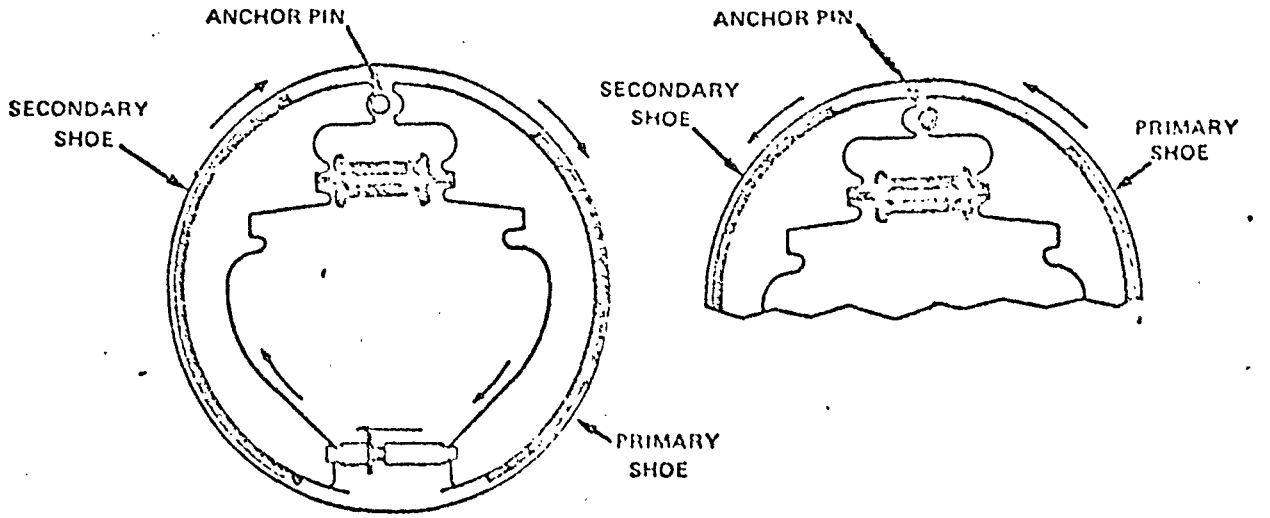
FIGURE 1

DRUM BRAKE



P-24607-15

CROSS SECTION TYPICAL WHEEL CYLINDER



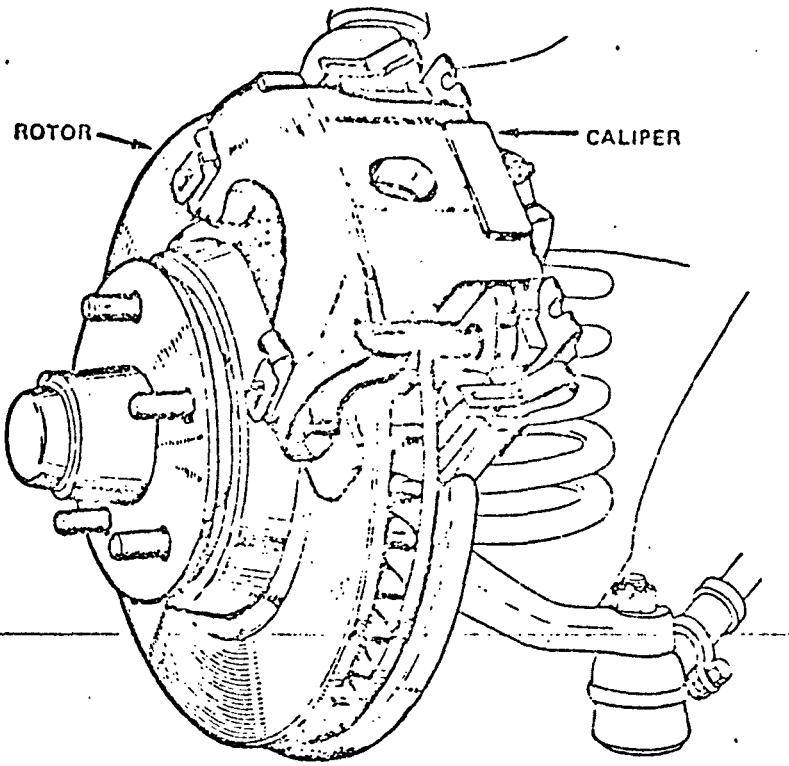
FORWARD BRAKING

REVERSE BRAKING

P-24607-20

BRAKING ACTION

DISK BRAKE



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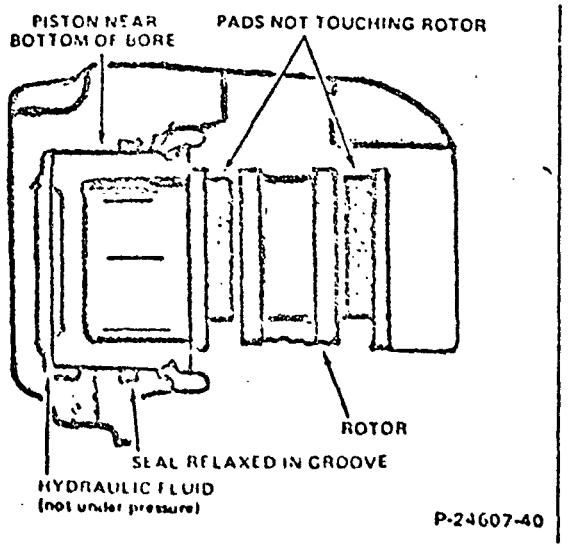
DISK AND ROTOR ASSEMBLY



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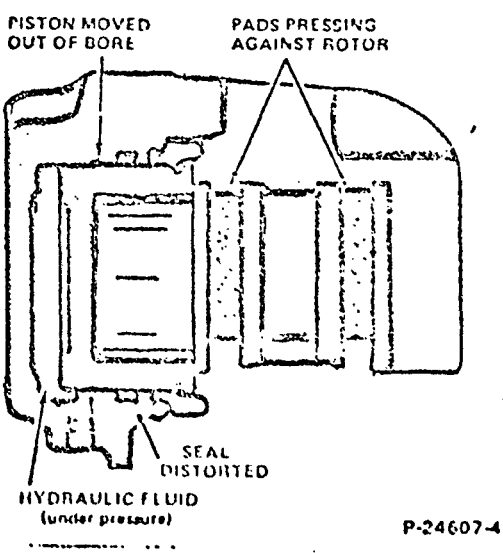
CROSS SECTION CALIPER - RELEASED



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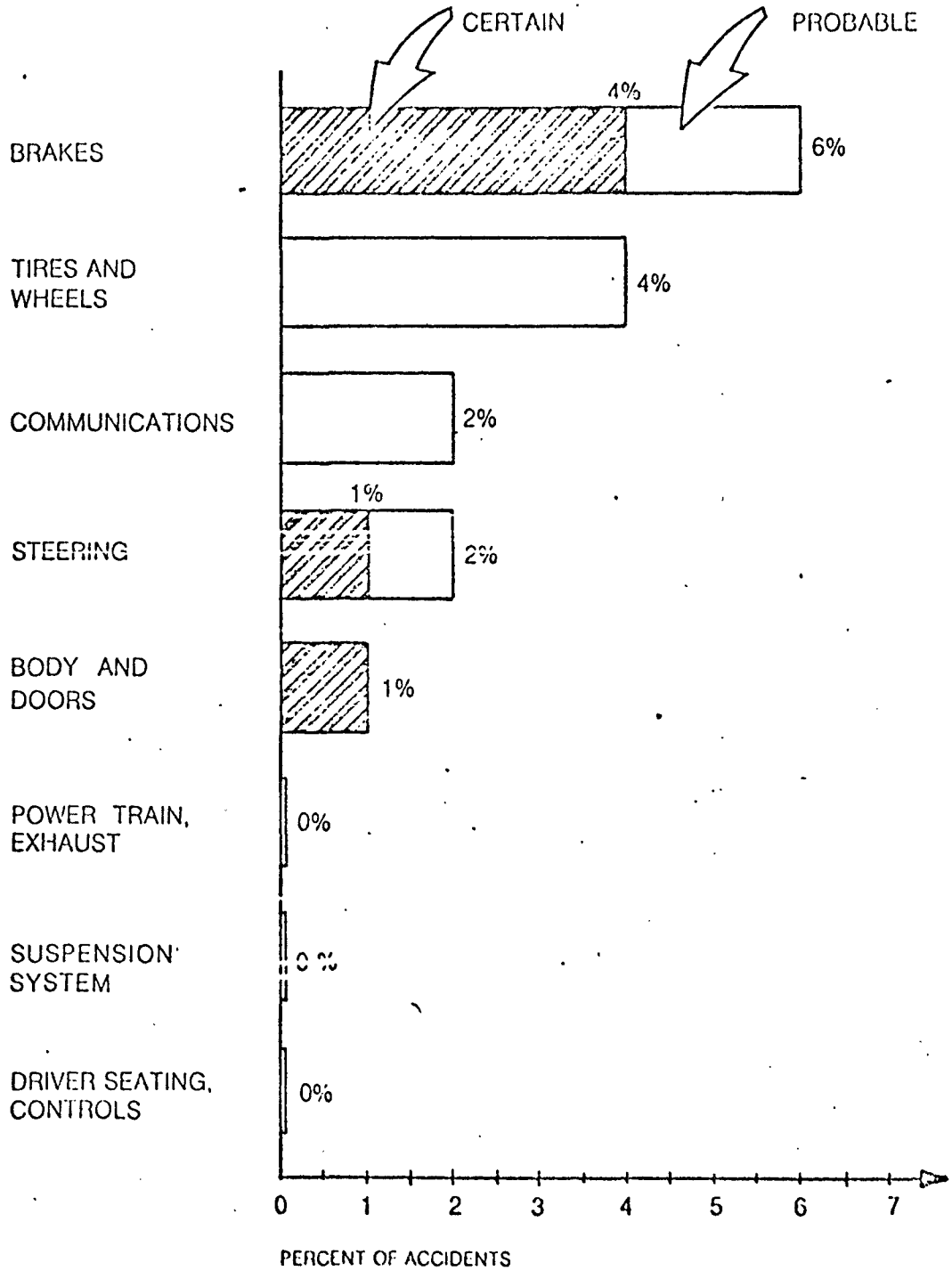
CROSS SECTION CALIPER - APPLIED

FIG. 11

Brake Systems, Tires and Wheels Were the Most Frequent Vehicular Accident Causes



Based on Phase II, Level C Causal Data

(a) D.C. report of 9/16/74 - Roy Dennison

Re: DOT HS-354-3-716 - of 936 vehicles inspected from March 28, 1974 through August 1974, 317 or 34% were rejected for brakes. From pulling wheels the following data was recorded:

	Advise	Reject
Brake lining thickness	93	108
Wheel cylinders	56	64
Brake drums and rotors	107	21
Brake lining pattern & condition	77	45

Of the 34% brake defective rejected vehicles, approximately 65% of those defects were detected from wheel removal.

Fig. V

(b) D.C. report of 10/19/74 - Paul Honke

"Brake Inspection Methods Study Phase III" - of 119 passenger vehicles inspected between May 29, 1973 and November 27, 1973, 57 or 48% were rejected from wheel pulling inspections. The following data was recorded:

Number of Vehicles	Percentages	Outage
21	18%	Wheel cylinder leakage
19	16%	Thin lining (0-1/32)
19	16%	Scored drum or rotor
16	13%	Grease seal Leakage
9	8%	Poor shoe contact
9	8%	Oversize drum or thin rotor
8	7%	Contaminated lining
3	2%	Stuck wheel cylinder

Fig. VI

(c) In a study entitled "Vehicle-In-Use Safety Standards Study" performed by Ultrasystems, Inc., under Contract No. FH-11-7525, and reported in their final report dated August 1971, vehicle condition data was recorded from 2,476 vehicles in four states. The following list of brake component outages (requiring wheel removal for inspection) versus percent was obtained:

Component	% Outage
Front lining condition	11
Front lining thickness	10
Front drum or disc	11
Rear lining condition	9
Rear lining thickness	6
Rear drum condition	7
Front wheel cylinder	9
Rear wheel cylinder	6

Fig. VII

(d) The following visual inspection defect data were gathered from (1964-1968 models) automobiles inspected at diagnostic centers located in various parts of the country and reported by TRW in their report "Component Degradation: Braking Systems Performance", dated December 30, 1969, under Contract No. FH-11-6964. Up to 20,909 vehicles were involved under each defect type.

Defect Type	% Vehicles Defective
Lining/pad thickness	14.6
Wheel cylinders	7.1
Drum/disc condition	5.3
Lining/pad condition	4.4
Return Springs	3.3

Defect rates shown are not additive as more than one defect could be present at the same time.

Fig. VIII

INSPECTION COSTS FOR WHEEL PULL

INSPECTION TIME: UNDER 10 MINUTES FOR PULLING TWO WHEELS.

(DATA FROM ALASKA AND D.C. STUDIES)

INSPECTION COST: UNDER $1.00

(INSPECTOR SALARIES $8-10K; MARYLAND STUDY)

ACTUAL AVERAGE STATE INSPECTION FEES INCLUDING:

- TWO WHEELS PULLED - $4.50 (2 STATES)
- ONE WHEEL PULLED - $2.50 (8 STATES)

Fig. IX

WHEEL REMOVAL

Estimated Time Study and Cost

Item	Time - Min.*	$ Cost/Wheel @ $6/Hr.
Lift up	.75	.075
Wheel removal	1.5	.15
Inspection	1.25	.125
Wheel mount	1.25	.125
Lift down	.25	.025
Total	5.00	.50

*Experienced Inspector

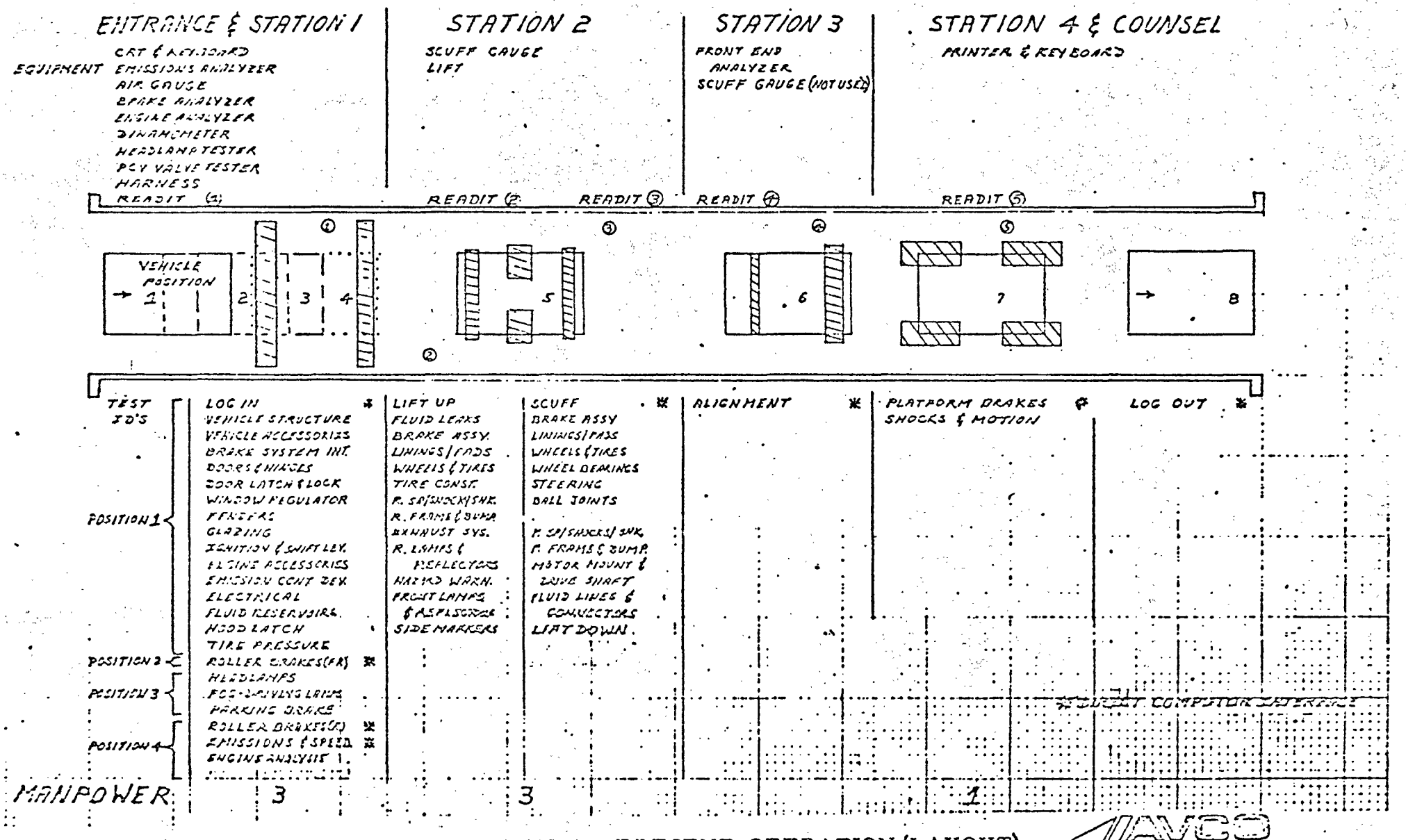
Fig. X

VUGRAPH

TIME AND MOTION RESEARCH LANE

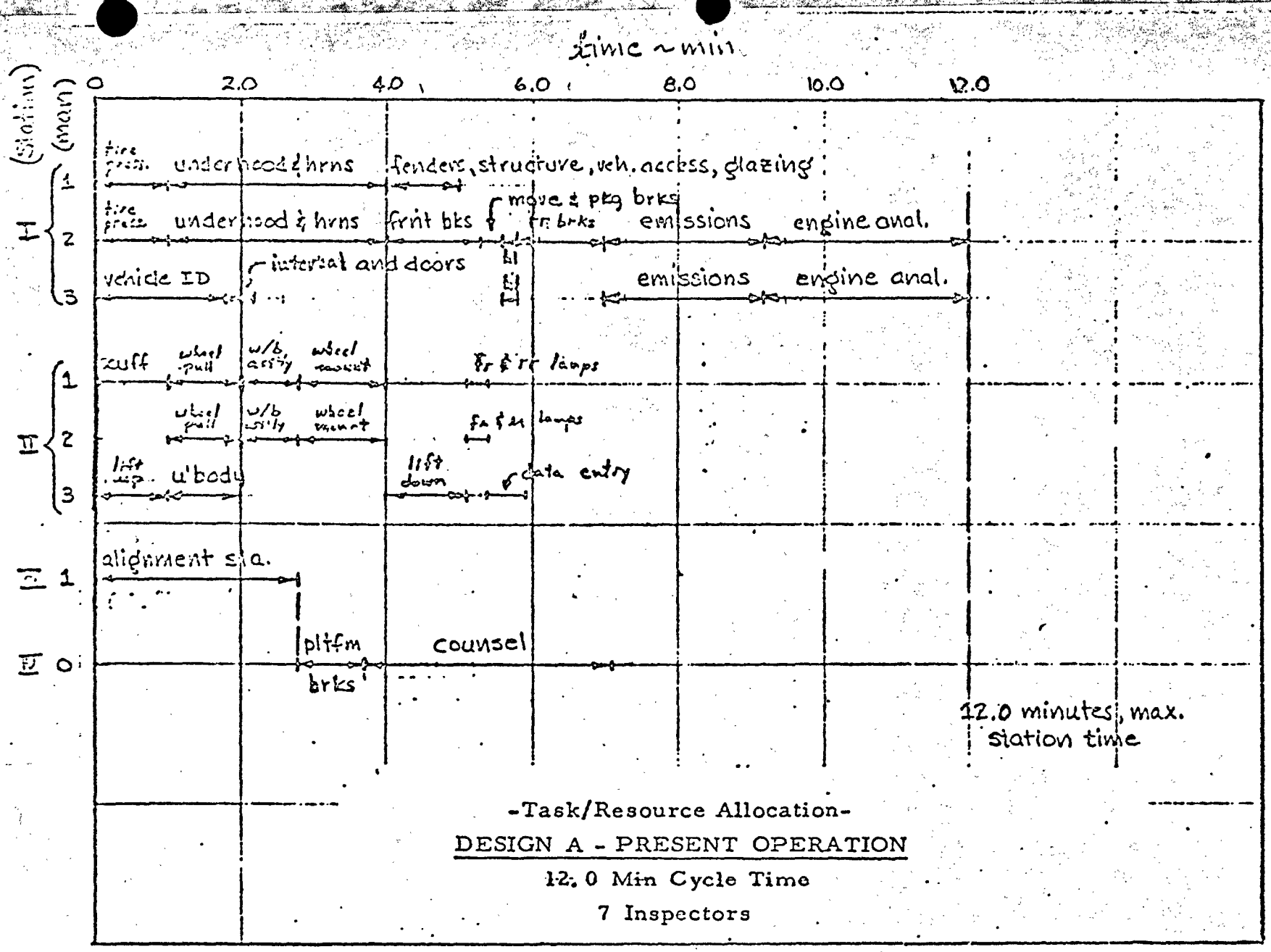
DESCRIPTION	MANPOWER	Ave Δ t (min)	Std. Dev. (min)	Min Δ t (min)	Max Δ t (min)
Vehicle ID	1	1.8	0.5	1.2	2.8
Fenders	1	0.1*			
Vehicle Structure	1	0.3*			
Vehicle Accessories (interior)	1	0.4*			
Glazing	1	0.2*			
Tire Pressure	2	1.0	0.4	0.5	2.5
Internal & Doors (ignition & shift, window reg., doors & hinges, door latch & lock)	1	0.4*			
Underhood and harness on	2	3.0	0.9	1.0	5.0
Hunter Station (alignment, etc.) (includes pendant time)	1	2.8	0.6	1.9	4.6
Headlamps	2	0.2	-0-	0.2	0.2
Front and Rear Lamps	2	0.3	-0-	0.3	0.3
Roller Brakes (fr)	1	1.3	0.5	0.8	2.6
Car Move and Park Brakes	1	0.3*			
Roller Brakes (rr)	1	1.2	0.3	0.7	1.7
Scuff (during move-to-lift)	1	0.2*			
Lift up	1	1.0	0.3	0.4	1.3
Underbody	1	1.0	0.5	0.4	2.2
Wheel Pull	2	1.0	0.4	0.5	1.8
Wheel/Brake Assembly	2	0.8	0.5	0.2	1.8
Wheel Mount	2	1.2	0.4	0.4	2.3
Lift Down	1	1.1	0.3	0.7	1.9
Enter Data in Pendant (lift station)	1	0.5*			
Platform Brakes	1	0.9	0.3	0.5	1.9
Emissions and Speedometer	2	2.2	0.5	0.9	3.2
Engine Analysis	2	2.8	1.1	1.3	6.1
Counsel (includes 1.5 minutes for printout)	1	3.4	1.6	1.8	8.0

Fig. XI



DESIGN A - PRESENT OPERATION (LAYOUT)

VUGRAPH XXI



-Task/Resource Allocation-

DESIGN A - PRESENT OPERATION

12.0 Min Cycle Time

7 Inspectors

VUGRAPH XXI

17 I 75

Loss Per Fatality	-	$200,000
Loss Per Injury	-	7,200
Property Damage Only	-	300 per involvement

Ref: Societal Costs of Motor Vehicle Accidents

NHTSA - 1972

Fig. XLV

Percent of Accidents Caused by Vehicle Defects

Degree of Certainty	Causal (%)	Societal Cost ($ billion)
Certain (95% confidence)	6.0	1.6
Probable (80% confidence)	15.9	4.3
Possible*	25.8	7.0

*Confidence level not estimated.

Fig. XV

Issued June 27, 1967

Highway Safety Program Standard 1

PERIODIC MOTOR VEHICLE INSPECTION

Purpose

To increase, through periodic vehicle inspection, the likelihood that every vehicle operated on the public highways is properly equipped and is being maintained in reasonably safe working order.

Standard

Each State shall have a program for periodic inspection of all registered vehicles or other experimental, pilot, or demonstration program approved by the Secretary, to reduce the number of vehicles with existing or potential conditions which cause or contribute to accidents or increase the severity of accidents which do occur, and shall require the owner to correct such conditions.

I. The program shall provide, as a minimum, that:

A. Every vehicle registered in the State is inspected either at the time of initial registration and at least annually thereafter, or at such other time as may be designated under an experimental, pilot, or demonstration program approved by the Secretary.

B. The inspection is performed by competent personnel specifically trained to perform their duties and certified by the State.

C. The inspection covers systems, subsystems, and components having substantial relation to safe vehicle performance.

D. The inspection procedures equal or exceed criteria issued or endorsed by the National Highway Traffic Safety Administration.

E. Each inspection station maintains records in a form specified by the State, which include at least the following information:

1. Class of vehicle.
2. Date of inspection.
3. Make of vehicle.
4. Model year.
5. Vehicle identification number.
6. Defects by category.
7. Identification of inspector.
8. Mileage or odometer reading.

F. The State publishes summaries of records of all inspection stations at least annually, including tabulations by make and model of vehicle.

II. The program shall be periodically evaluated by the State and the National Highway Traffic Safety Administration shall be provided with an evaluation summary.

Issued August 29, 1973
(Effective date: September 28, 1973)

PART 570 — VEHICLE IN USE INSPECTION STANDARD

Title 49—Transportation

CHAPTER V—NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION, DEPARTMENT OF TRANSPORTATION

[Docket No. 73-9; Notice 2]

PART 570—VEHICLE IN USE INSPECTION STANDARDS

This notice adds Part 570, Vehicle In Use Inspection Standards, to Chapter V, Title 49, Code of Federal Regulations.

Part 570 does not in itself impose requirements on any person. It is intended to be implemented by the States through the highway safety program standards issued under the Highway Safety Act (23 U.S.C. 402) with respect to inspection of motor vehicles with a gross vehicle weight rating of 10,000 pounds or less, except motorcycles and trailers. General provisions regarding vehicle inspection are set forth in NHTSA Highway Safety Program Manual Vol. 1, Periodic Motor Vehicle Inspection. Standards and procedures are adopted for hydraulic service brake systems, steering and suspension systems, tire and wheel assemblies.

Interested persons have been afforded an opportunity to participate in the making of these amendments by a notice of proposed rulemaking published in the FEDERAL REGISTER on April 2, 1973 (38 FR 8451), and due consideration has been given to all comments received in response to the notice, insofar as they relate to matters within the scope of the notice. Except for editorial changes, and except as specifically discussed herein, these amendments and the reasons therefore are the same as those contained in the notice.

Policy considerations.—A total of 120 comments were received in response to the notice. These comments were submitted by State motor vehicle agencies, national safety organizations, motor vehicle associations, vehicle and equipment manufacturers, antique car clubs and owners, public interest groups, and individual citizens. The commenters were predominantly in favor of periodic motor vehicle inspection (PMVI) and the establishment of uniform motor vehicle in use safety standards throughout the United States.

As the NHTSA stated in the prior notice, cost-benefit factors were the primary policy consideration in developing the inspection standards and procedures. The primary concern of the States was the socioeconomic impact on the motoring public as well as the impact on the State itself. The general consensus was that the proposed inspection requirements would require a significant increase in facilities, operating personnel, and equipment. Though cost effectiveness was a predominant concern the States nevertheless felt that inspections should include vehicles over 10,000 pounds gross vehicle weight and be extended to include other vehicle systems. Several States expressed concern for the cost of implementing the proposed standards, estimating it at from $10 to $14 per car. Even though these States favored PMVI and now have PMVI or random inspection they felt that implementation costs would have a decided economic impact.

NHTSA has responded to these comments allowing an optional road test as a check of service brake system performance, adopting neither of the proposed parking brake procedures, and simplifying test procedures where possible so that tests may be conducted with a minimum added expenditure for equipment, personnel, and facilities. These matters will be discussed subsequently.

The establishment of the proposed standards as "minimum requirements" was questioned by several States as leading to a "watering down" of current requirements in those States which currently meet or exceed them. The NHTSA repeats its intent that the standards are not intended to supplant State standards that establish a higher performance or to discourage them from establishing or maintaining standards for other vehicle systems not covered by NHTSA.

A number of comments were received from antique car clubs and individual owners who believe that antique, special interest, and vintage cars should be exempt from the proposed standards. These comments should be directed to the States. Each State has its own definitions and registration requirements for vehicles of this nature, and the NHTSA intends the States to implement Part 570 to the extent that it is compatible with its current requirements for these special vehicles.

Several respondents commented that the proposed standard should be expanded to include lighting, glazing, exhaust, wipers, horns, controls, and instrumentation systems. The consensus was that the cost-benefit ratio would materially increase if these systems were included in the proposed standard since inspection of these systems does not require time-consuming procedures or special tools, and corrective measures are less costly to the owner. Some considered it contradictory that safety systems covered by the Federal standards must meet safety performance requirements at the time of manufacture and not during the service life of the vehicle. As the NHTSA stated in the prior notice, the initial Federal effort is intended to cover those vehicles and vehicle systems whose maintenance in good order has proven critical to the prevention of traffic accidents. Requirements for motorcycles and trailers, and for less critical systems are under study, and the NHTSA intends to take such rulemaking action in the future as may be appropriate to cover them.

Applicability.—A frequent comment was that the standards and procedures should be extended to cover vehicles whose GVWR exceeds 10,000 pounds. Because braking and steering and suspension systems on these vehicles differ materially from those on lighter vehicles, different criteria must be established and the proposed standards simply cannot be extended to cover them. The NHTSA, however, is developing appropriate inspection standards and procedures for heavy vehicles and will propose them in a notice to be issued by mid-October 1973.

Brake systems.—Several comments were received questioning the procedure for determining operability of the brake failure indicator lamp. In some vehicles the parking brake indicator and service brake system failure indicator use the same lamp and the methods of simulating failure vary.

It is realized that the procedure specified by the standard is general in nature and cannot cover all possible systems. In those vehicles where a lamp test cannot be executed in the normal manner the test will have to be conducted in accordance with the manufacturer's specifications, as determined by the vehicle inspector.

The brake system integrity test for fluid leakage has been modified on the basis of comments that it was not stringent enough. It was proposed that decrease in pedal height under 125 pounds force for 10 seconds should not exceed one-quarter of an inch. The requirement adopted is that there be no perceptible decrease in pedal height when 125 pounds of force is applied to the brake pedal and held for 30 seconds.

The brake pedal reserve test has been adopted substantially as proposed, and specifies that the engine be operating at the time of the test. Vehicles with full power (central hydraulic) brake systems are exempted from this test as the service brake performance test will be adequate to test such systems.

The service brake performance test offers the option of a road test, or testing upon a drive-on platform or roller-type brake analyzer (originally proposed under the title "Brake equalization"). States that conduct random inspections, and those that designate agents to perform vehicle inspections, objected strenuously to a test requiring the use of roller-type or drive-on test equipment. Consequently, an alternate test has been adopted which requires vehicles to stop from 20 mph in 25 feet or less without leaving a 12-foot wide lane. It is intended that this option be used only by States where it is current practice, and it is hoped that such States where practicable will change to the drive-on brake platform or roller-type brake analyzer tests. The terms "crimped" and "damaged" have been eliminated as causes for rejection of brake hoses, as redundant. If brake discs and drums are not embossed with safety tolerances, the requirement has been added that they be within the manufacturer's recommended specifications.

The primary concern regarding power assist units was that the brake pedal will

rise instead of falling on a full-power brake system when tested according to the procedure proposed. In view of the basic design of a full-power brake system this test would not be a proper check of system operation, and will not be required. As noted earlier, the service brake performance test will be used as the primary test of the full-power brake performance. To accord with the terminology of Standard No. 105a this section has been renamed "Brake power units."

The parking brake system inspection proposal proved controversial. The NHTSA proposed two objective, alternate tests, the first requiring the system to hold the vehicle on a 17 percent grade, and the second requiring the system to stop the vehicle from 20 mph within 54 feet. The first was objected to principally on the ground that each inspection station would have to construct a 17 percent grade. This would present problems for both in-line and bay-type inspection facilities. The stopping distance test, on the other hand, was opposed as a dynamic test more appropriate for service brake evaluation. In view of these objections, the parking brake inspection requirements were not adopted.

Steering and suspension systems.—The primary objections to the steering wheel test for free play concerned the test condition with the engine off on vehicles equipped with power steering, the linear measure of system free play (instead of angular measure to eliminate the variance due to steering wheel diameters), and the 2 inch free play limit for rack and pinion type steering gear.

The tolerance proposed and adopted for steering wheel free play is 2 inches for wheels of 16 inches diameter or less, since few passenger car steering wheels exceed this diameter. However, a table of free play values for older vehicles with steering wheels over 16 inches in diameter has been added to the standard. The requirement to have the engine running is being added to the procedure since steering wheel play can be greater with the engine off than with the engine on for cars equipped with power steering. Steering play on cars equipped with rack and pinion type steering will require further review to determine if the 2 inch tolerance should be changed.

Some comments argued that wheel alignment tolerances were considered too restrictive in the toe-in condition, and too lenient in toe-out. Some comments recommended visual inspection of tire wear as criteria to determine alignment. However, visual inspection of tire wear is not considered a valid method of checking alignment, and therefore was not adopted as an alternate method. No consensus of alternative values could be derived from the comments, and the proposed tolerances of 30 feet per mile have been adopted.

The requirements for the condition of shock absorber mountings, shackles, and U-bolts have been changed from "tight" to "securely attached" as a clarification.

Tire and wheel assembly standards and inspection procedures.—Several comments were received suggesting that rim deformation in excess of one-sixteenth of an inch be permitted, as the proposed tolerance would result in rejection of otherwise safe vehicles. The primary concern of the requirement is air retention, and since vehicles with wheel deformation of one-sixteenth of an inch apparently perform satisfactorily in service without hazard the deformation tolerance has been increased to three thirty-seconds of an inch runout for both lateral and radial bead seat areas.

Effectivity.—Several commenters questioned the proposed effective date, 30 days after publication of the final rule. The NHTSA considers it in the public interest that minimum Federal standards for motor vehicles in use become effective without further delay. Implementation by the States will take place within the context of their highway safety programs, and the plans approved by the NHTSA under the Highway Safety Act, 23 U.S.C. 402.

In consideration of the foregoing, Title 49, Code of Federal Regulations is amended by adding Part 570 to read as set forth below.

Effective date.—September 28, 1973. Since this part does not in itself impose requirements on any person it is determined for good cause shown that an effective date earlier than 180 days after publication of the final rule is in the public interest.

(Secs. 103, 108, 119, Pub. L. 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1397, 1407; delegation of authority at 49 CFR 1.51.)

Issued on August 29, 1973.

JAMES B. GREGORY,
Administrator.

AUTHORITY: Secs. 103, 108, 119, Public Law 89-563, 80 Stat. 718, 15 U.S.C. 1392, 1397, 1407; delegation of authority at 49 CFR 1.51.

§ 570.1 Scope.

This part specifies standards and procedures for inspection of hydraulic service brake systems, steering and suspension systems, and tire and wheel assemblies of motor vehicles in use.

§ 570.2 Purpose.

The purpose of this part is to establish criteria for the inspection of motor vehicles by State inspection systems, in order to reduce death and injuries attributable to failure or inadequate performance of motor vehicle systems.

§ 570.3 Applicability.

This part does not in itself impose requirements on any person. It is intended to be implemented by States through the highway safety program standards issued under the Highway Safety Act (23 U.S.C. 402) with respect to inspection of motor vehicles with gross vehicle weight rating of 10,000 pounds or less, except motorcycles or trailers.

§ 570.4 Definitions.

Unless otherwise indicated, all terms used in this part that are defined in 49 CFR Part 571, Motor Vehicle Safety Standards, are used as defined in that part.

§ 570.5 Service brake system.

(a) *Failure indicator.*—The brake system failure indicator lamp, if part of a vehicle's original equipment, shall be operable. (This lamp is required by Federal Motor Vehicle Safety Standard No. 105, 49 CFR 571.105, on every new passenger car manufactured on or after January 1, 1968, and on other types of motor vehicles manufactured on or after September 1, 1975.)

(1) *Inspection procedure.*—Apply the parking brake and turn the ignition to start. verify lamp operation by other means indicated by the vehicle manufacturer that the brake system failure indicator lamp is operable.

(b) *Brake system integrity.*—The brake system shall demonstrate integrity as indicated by no perceptible decrease in pedal height under a 125 pound force applied to the brake pedal or by no illumination of the brake system failure indicator lamp. The brake system shall withstand the application of force to the pedal without failure of any line or other part.

(1) *Inspection procedure.*—With the engine running on vehicles equipped with power brake systems, and the ignition turned to "on" in other vehicles, apply a force of 125 pounds to the brake pedal and hold for 30 seconds. Note any decrease in pedal height, and whether the lamp illuminates.

(c) *Brake pedal reserve.*—When the brake pedal is fully depressed, the distance that the pedal has traveled from its free position shall be not greater than 80 percent of the total distance from its free position to the floorboard or other object that restricts pedal travel.

Inspection procedure.—Measure the distance (A) from the free pedal position to the floorboard or other object that restricts brake pedal travel. Depress the brake pedal, and with the force applied measure the distance (B) from the depressed pedal position to the floorboard or other object that restricts pedal travel. Determine the percentage as

$$\frac{A-B}{A} \times 100.$$

The engine must be operating when power-assisted brakes are checked. The pedal reserve check is not required for vehicles equipped with full-power (central hydraulic) brake systems, or to vehicles with brake systems designed to operate with greater than 80 percent pedal travel.

(d) *Service brake performance.*—Compliance with one of the following performance criteria will satisfy the requirements of this section. Verify that tire inflation pressure is within the limits recommended by vehicle manufacturer before conducting either of the following tests.

(1) *Roller-type or drive-on platform tests.*—The force applied by the brake on a front wheel or a rear wheel shall not differ by more than 20 percent from the force applied by the brake on the other front wheel or the other rear wheel respectively.

(i) *Inspection procedure.*—The vehicle shall be tested on a drive-on platform, or a roller-type brake analyzer with the capability of measuring equalization. The test shall be conducted in accordance with the test equipment manufacturer's

specifications. Note the left to right brake force variance.

(2) *Road test.*—The service brake system shall stop the vehicle in a distance of 25 feet or less from a speed of 20 miles per hour without leaving a 12-foot-wide lane.

(i) *Inspection procedure.*—The road test shall be conducted on a level (not to exceed plus or minus one percent grade) dry, smooth, hard-surfaced road that is free from loose material, oil, or grease. The service brakes shall be applied at a vehicle speed of 20 miles per hour and the vehicle shall be brought to a stop as specified. Measure the distance required to stop.

(e) *Brake hoses and assemblies.*—Brake hoses shall not be mounted so as to contact the vehicle body or chassis. Hoses shall not be cracked, chafed, or flattened.

(i) *Inspection procedure.*—Examine visually, inspecting front brake hoses through all wheel positions from full left to full right for conditions indicated.

NOTE.—To inspect for (f), (g), and (h) below, remove at a minimum one front wheel and one rear wheel.

(f) *Disc and drum condition.*—If the drum is embossed with a maximum safe diameter dimension or the rotor is embossed with a minimum safety thickness dimension, the drum or disc shall be within the appropriate specifications. These dimensions will be found on motor vehicles manufactured since January 1, 1971, and may be found on vehicles manufactured for several years prior to that time. If the drums and discs are not embossed, the drums and discs shall be within the manufacturer's specifications.

(i) *Inspection procedure.*—Examine visually for condition indicated, measuring as necessary.

(g) *Friction materials.*—On each brake the thickness of the lining or pad shall not be less than one thirty-second of an inch over the rivet heads, or the brake shoe on bonded linings or pads. Brake linings and pads shall not have cracks or breaks that extend to rivet holes except minor cracks that do not impair attachment. Drum brake linings shall be securely attached to brake shoes. Disc brake pads shall be securely attached to shoe plates.

(i) *Inspection procedure.*—Examine visually for conditions indicated, and measure height of rubbing surface of lining over rivet heads. Measure bonded lining thickness over shoe surface at the thinnest point on the lining or pad.

(h) *Structural and mechanical parts.*—Backing plates and caliper assemblies shall not be deformed or cracked. System parts shall not be broken, misaligned, missing, binding, or show evidence of severe wear. Automatic adjusters and other parts shall be assembled and installed correctly.

(i) *Inspection procedure.*—Examine visually for conditions indicated.

§ 570.6 Brake power unit.

Vacuum hoses shall not be collapsed, abraded, broken, improperly mounted, or audibly leaking. With residual vacuum exhausted and a constant 25 pound force on the brake pedal, the pedal shall fall slightly when the engine is started, demonstrating integrity of the power assist system. This test is not applicable to vehicles equipped with full power brake system as the service brake performance test shall be considered adequate test of system performance.

(i) *Inspection procedure.*—With engine running, examine hoses visually and aurally for conditions indicated. Stop engine and apply service brakes several times to destroy vacuum in system. Depress brake pedal with 25 pounds of force and while maintaining that force, start the engine. If brake pedal does not fall slightly under force when the engine starts, there is a malfunction in the power assist system.

§ 570.7 Steering systems.

(a) *System play.*—Lash or free play in the steering system shall not exceed values shown in Table 1.

(i) *Inspection procedure.*—With the engine on and the wheels in the straight ahead position, turn the steering wheel in one direction until there is a perceptible movement of a front wheel. If a point on the steering wheel rim moves more than the value shown in Table 1 before perceptible return movement of the wheel under observation, there is excessive lash or free play in the steering system.

TABLE 1.—STEERING SYSTEM FREE PLAY VALUES

Steering wheel diameter (inches):	*Lash (inches)*
16 or less	2
18	2¼
20	2½
22	2¾

(b) *Linkage play.*—Free play in the steering linkage shall not exceed one-quarter of an inch.

(i) *Inspection procedure.*—Elevate the front end of the vehicle to load the ball joints. Insure that wheel bearings are correctly adjusted. Grasp the front and rear of a tire and attempt to turn the tire and wheel assembly left and right. If the free movement at the front or rear tread of the tire exceeds one-quarter inch there is excessive steering linkage play.

(c) *Free turning.*—Steering wheels shall turn freely through the limit of travel in both directions.

(i) *Inspection procedure.*—Turn the steering wheel through the limit of travel in both directions. Feel for binding or jamming in the steering gear mechanism.

(d) *Alignment.*—Toe-in and toe-out shall not exceed 30 feet per mile, as recorded on a scuff gauge, or equivalent measuring device.

(i) *Inspection procedure.*—Use instructions of measuring device manufacturer.

(e) *Power steering system.*—The power steering system shall not have cracked or slipping belts, or insufficient fluid in the reservoir.

(i) *Inspection procedure.*—Examine fluid reservoir and pump belts for conditions indicated.

§ 570.8 Suspension system.

(a) *Suspension condition.*—Ball joint seals shall not be cut or cracked. Structural parts shall not be bent or damaged. Stabilizer bars shall be connected. Springs shall not be broken, or extended by spacers. Shock absorber mountings, shackles, and U-bolts shall be securely attached. Rubber bushings shall not be cracked, extruded out from or missing from suspension joints. Radius rods shall not be missing or damaged.

(i) *Inspection procedure.*—Examine front and rear end suspension parts for conditions indicated.

(b) *Shock absorber condition.*—There shall be no oil on the shock absorber housing attributable to leakage by the seal, and the vehicle shall not continue free rocking motion for more than two cycles.

(i) *Inspection procedure.*—Examine shock absorbers for oil leaking from within, then with vehicle on a level surface, push down on one end of vehicle and release. Note number of cycles of free rocking motion. Repeat procedure at other end of vehicle.

§ 570.9 Tires.

(a) *Tread depth.*—The tread on each tire shall be not less than two thirty-seconds of an inch deep.

(i) *Inspection procedure.*—Passenger car tires have tread depth indicators that become exposed when tread depth is less than two thirty-seconds of an inch. Inspect for indicators in any two adjacent major grooves at three locations spaced approximately equally around the outside of the tire. For vehicles other than passenger cars, it may be necessary to measure tread depth with a tread gauge.

(b) *Type.*—Vehicles should be equipped with tires on the same axle that are matched in nominal size, construction, and profile.

(i) *Inspection procedure.*—Examine visually. A major mismatch in nominal size, construction, and profile between tires on the same axle, or a major deviation from the size as recommended by the manufacturer (e.g. as indicated on the glove box placard on 1968 and later passenger cars) are causes for rejection.

(c) *General condition.*—Tires shall be free from chunking, bumps, knots, or bulges evidencing cord, ply, or tread separation from the casing or other adjacent materials.

(i) *Inspection procedure.*—Examine visually for conditions indicated.

(d) *Damage.*—Tire cords or belting materials shall not be exposed, either to the naked eye or when cuts or abrasions on the tire are probed.

(i) *Inspection procedure.*—Examine visually for conditions indicated, using an awl if necessary to probe cuts or abrasions.

§ 570.10 Wheel assemblies.

(a) *Wheel integrity.*—A tire rim, wheel disc, or spider shall have no visible cracks, elongated bolt holes, or indication of repair by welding.

(i) *Inspection procedure.*—Examine visually for conditions indicated.

(b) *Deformation.*—The lateral and radial runout of each rim bead area shall not exceed three thirty-seconds of an inch total indicated runout.

(i) *Inspection procedure.*—Using a runout indicator gauge, and a suitable stand, measure lateral and radial runout of rim bead through one full wheel revolution and note runout in excess of three thirty-seconds of an inch.

(c) *Mounting.*—All wheel nuts and bolts shall be in place and tight.

(i) *Inspection procedure.*—Check wheel retention for conditions indicated.

UNITED STATES GOVERNMENT

Memorandum

U.S. DEPARTMENT OF TRANSPORTATIO
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION

198

SUBJECT: Motor Vehicle Inspection and Vehicle-In-Use Standards Implementation Procedures

DATE: FEB 20 1975

In reply refer to:
N42-32

FROM : Associate Administrator
Traffic Safety Programs

TO : Regional Administrators
Regions I through X

This memorandum cancels the memorandum of May 7, 1974, Subject: Vehicle-In-Use Standards Implementation Schedule.

The purpose of this memorandum is to provide information and guidance to the States on minimum requirements for implementing a motor vehicle inspection program. The guidelines are based on a favorable mix of cost of inspection and detection of critical vehicle safety defects.

After careful examination and review of all available data it has been determined that a minimum inspection offering maximum safety benefits should be directed at the vehicle's braking system and tires. The minimum criteria for braking systems and tires have been selected for the emphasis inspection (see Attachment A) because these two systems have been established by research as being involved in approximately two-thirds of all accidents caused by mechanical defects.

All States must include provisions for implementing the emphasis inspection criteria in their revised comprehensive program plan and FY 1976 annual work program. All States must have an approved motor vehicle inspection program by June 30, 1975. The States that select a pilot, experimental or demonstration program must include at least the emphasis inspection and should start operation no later than January 1, 1976.

This emphasis inspection will remain in effect until June 30, 1978. We will continue to collect data concerning parts of the VIU standards other than those being emphasized. Subsequently, we will emphasize the most cost effective implementation schedule based on research data and State experience.

We recognize other vehicle safety systems contribute to accidents. It is not the intent of this memorandum to discourage the States from the inspection of these other safety related systems -- in fact such inspections are encouraged.

I have now had the opportunity to review in some detail the most current data concerning the motor vehicle inspection program. It is clear to me that in the case of the special emphasis items we are on absolutely sound ground and our actions are based on supportable facts. The staff of the Office of State Vehicle Programs is available to assist you in working with the States to implement this program.

Fred W. Vetter, Jr.

Attachment

EMPHASIS INSPECTION

Service Brake System

Unless otherwise noted, the force to be applied during inspection procedures to power-assisted and full-power brake systems is 25 lb, and to all other systems, 50 lb. Inspector judgment for measuring the 25- and 50-pound force is acceptable.

(a) Failure indicator - The brake system failure indicator lamp, if part of a vehicle's original equipment, shall be operable. (This lamp is required by Federal Motor Vehicle Safety Standard No. 105, 49 CFR 571.105, on every new passenger car manufactured on or after January 1, 1968, and on other types of motor vehicles manufactured on or after September 1, 1975.)

Inspection procedure - Apply the parking brake and turn the ignition to start, or verify lamp operation by other means indicated by the vehicle manufacturer that the brake system failure indicator lamp is operable.

(b) Brake system integrity - The brake system shall demonstrate integrity as indicated by no perceptible decrease in pedal height under a 125-pound force applied to the brake pedal or by no illumination of the brake system failure indicator lamp. The brake system shall withstand the application of force to the pedal without failure of any line or other part.

Inspection procedure - With the engine running on vehicles equipped with power brake systems, and the ignition turned to "on" in other vehicles, apply a force of 125 pounds to the brake pedal and hold for 10 seconds. Note any decrease in pedal height, and whether the lamp illuminates. Inspector judgment for measuring the 125-pound force is acceptable.

(c) Brake hoses and assemblies - Brake hoses shall not be mounted so as to contact the vehicle body or chassis. Hoses shall not be cracked, chafed, or flattened. Protective devices, such as "rub rings," shall not be considered part of the hose or tubing.

Inspection procedure - Examine visually, inspecting front brake hoses through all wheel positions from full left to full right for conditions indicated.

Note - To inspect for (d), (e), and (f) below, remove a minimum one front wheel.

(d) Disc and drum condition - If the drum is embossed with a maximum safe diameter dimension or the rotor is embossed with a minimum safety thickness dimension, the drum or disc shall be within the appropriate specifications. These dimensions will be found on motor vehicles manufactured since January 1, 1971, and may be found on vehicles manufactured for several years prior to that time. If the drums and discs are not embossed, the drums and discs shall be within the manufacturer's specifications.

Inspection procedure - Examine visually for condition indicated, measuring as necessary.

(e) Friction materials - On each brake the thickness of the lining or pad shall not be less than one thirty-second of an inch over the rivet heads, or the brake shoe on the bonded linings or pads. Brake linings and pads shall not have cracks or breaks that extend to rivet holes except minor cracks that do not impair attachment. Drum brake linings shall be securely attached to brake shoes. Disc brake pads shall be securely attached to shoe plates.

Inspection procedure - Examine visually for conditions indicated, and measure height of rubbing surface of lining over rivet heads. Measure bonded lining thickness over shoe surface at the thinnest point on the lining or pad.

202

(f) Structural and mechanical parts - Backing plates and caliber assemblies shall not be deformed or cracked. System parts shall not be broken, misaligned, missing, binding, or show evidence of severe wear. Automatic adjusters and other parts shall be assembled and installed correctly.

Inspection procedure - Examine visually for conditions indicated.

Brake Power Unit

Vacuum hoses shall not be collapsed, abraded, broken, improperly mounted, or audibly leaking. With residual vacuum exhausted and a constant 25-pound force on the brake pedal, the pedal shall fall slightly when the engine is started, demonstrating integrity of the power assist system. This test is not applicable to vehicles equipped with full power brake system as the service brake performance test shall be considered adequate test of system performance.

Inspection procedure - With engine running, examine hoses visually and aurally for conditions indicated. Stop engine and apply service brakes several times to destroy vacuum in system. Depress brake pedal with 25 pounds of force and while maintaining that force, start the engine. If brake pedal does not fall slightly under force when the engine starts, there is a malfunction in the power assist system.

Tires

(a) Tread depth - The tread on each tire shall be not less than two thirty-seconds of an inch deep.

Inspection procedure - Passenger car tires have tread depth indicators that become exposed when tread depth is less than two thirty-seconds of an inch. Inspect for indicators in any two adjacent major grooves at three locations spaced approximately equally around the outside of the tire. For vehicles

other than passenger cars, it may be necessary to measure tread depth with a tread gauge.

(b) Type - Vehicle shall be equipped with tires on the same axle that are matched in tire size designation, construction, and profile.

Inspection procedures - Examine visually. A major mismatch in tire size designation, construction, and profile between tires on the same axle, or a major deviation from the size as recommended by the manufacturer (e.g., as indicated on the glove box placard on 1968 and later passenger cars) are causes for rejection.

(c) General condition - Tires shall be free from chunking, bumps, knots, or bulges evidencing cord, ply, or tread separation from the casing or other adjacent materials.

Inspection procedure - Examine visually for conditions indicated.

(d) Damage - Tire cords or belting materials shall not be exposed, either to the naked eye or when cuts or abrasions on the tire are probed.

Inspection procedures - Examine visually for conditions indicated, using a blunt instrument if necessary to probe cuts or abrasions.

NHTS13 DATE 01/28/75

STATE CONFORMANCE WITH VEHICLE IN USE INSPECTION STANDARDS

PARA	--REGION 1-						REGION 2'			--REGION 3-						---REGION 4----							--REGION 5-						--REGION 6			REGION 7			--REGION 8-						REGION 9			REGION10		
STATE	C	M	M	N	R	V	N	N	P	D	D	M	P	V	W	A	F	G	K	M	N	S	T	I	I	M	M	O	W	A	L	N	O	T	I	K	V	N	C	M	N	S	U	W	A	C	H	N	A	I	O	W
CODE	T	E	A	H	I	T	J	Y	R	E	C	O	A	A	V	L	L	A	Y	S	C	C	N	L	N	I	A	H	I	F	A	M	K	X	A	S	C	E	O	T	D	D	T	Y	Z	A	I	V	K	D	R	A
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D2	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
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B	N	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	N	N	N	N	N	Y	Y	N	N	N	N	Y	Y	N	N	N	N	Y	N	N
C	N	Y	Y	Y	Y	Y	N	Y	N	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	N	N	N	Y	N	N	N	N	Y	Y	N	Y	Y	N	N	Y	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N	N
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B	N	Y	Y	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N	N	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N
570.09																																																
A	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y	Y	Y	Y	N	N	N	Y	Y	N	N	N	Y	N	Y	Y	N	N	N	N	N	N
B	N	Y	N	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
C	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N
D	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	N	N	Y	N	N	N	N	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N
570.10																																																
A	N	Y	N	Y	Y	Y	Y	N	N	Y	Y	N	Y	Y	Y	N	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	Y	Y	N	N	Y	N	N	Y	Y	N	N	N	Y	Y	Y	N	N	N	N	Y	N	N
B	N	Y	N	Y	Y	Y	N	N	N	Y	Y	N	Y	N	N	N	N	Y	N	N	N	N	N	N	N	Y	N	N	N	N	Y	N	N	N	N	N	Y	Y	N	N	N	N	N	N	N	N	N	N	Y	N	N
C	N	Y	N	Y	Y	Y	N	N	N	Y	Y	N	Y	Y	Y	N	N	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	Y	Y	N	Y	Y	N	N	Y	Y	N	N	N	Y	N	Y	Y	N	N	N	Y	N	N

REFERENCE KEY

570.05 SERVICE BRAKE SYSTEM
- A. FAILURE INDICATOR
- B. BRAKE SYSTEM INTEGRITY
- C. BRAKE PEDAL RESERVE
- D. SERVICE BRAKE PERFORMANCE
  - 1. ROLLER-TYPE/PLATFORM TESTS
  - 2. ROAD TEST
- E. BRAKE HOSES AND ASSEMBLIES
- F. DISC AND DRUM CONDITION
- G. FRICTION MATERIALS
- H. STRUCTURAL AND MECHANICAL PARTS

570.06 BRAKE POWER UNIT

570.07 STEERING SYSTEMS
- A. SYSTEM PLAY
- B. LINKAGE PLAY
- C. FREE TURNING
- D. ALIGNMENT
- E. POWER STEERING SYSTEM

570.08 SUSPENSION SYSTEMS
- A. SUSPENSION CONDITION
- B. SHOCK ABSORBER CONDITION

570.09 TIRES
- A. TREAD DEPTH
- B. TYPE
- C. GENERAL CONDITION
- D. DAMAGE

570.10 WHEEL ASSEMBLIES
- A. WHEEL INTEGRITY
- B. DEFORMATION
- C. MOUNTING