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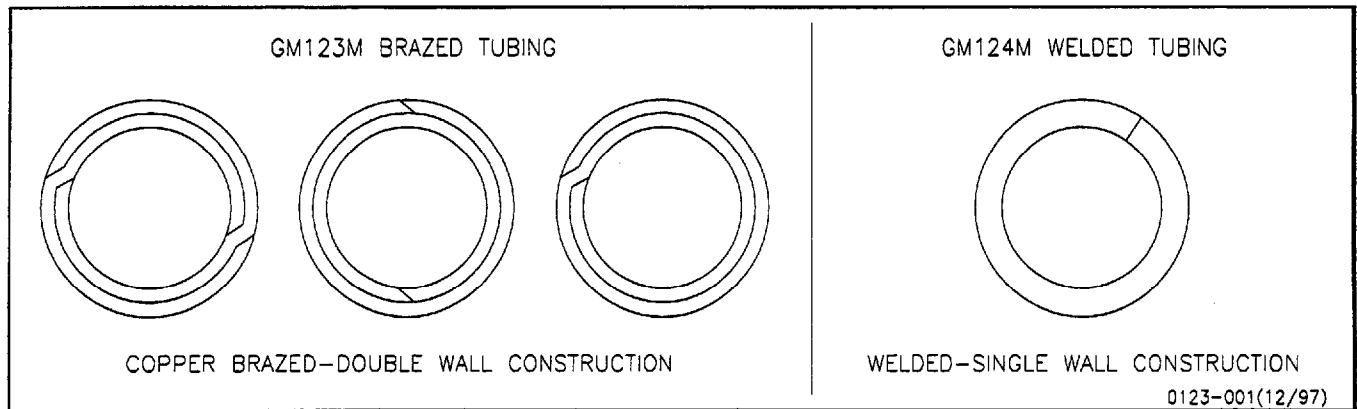
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Q_08_A

AUTOMOTIVE STEEL TUBING FOR FLUID HANDLING**GM123M GM124M****FIGURE 1**

1 SCOPE. These specifications cover two types of steel tubing suitable for automotive uses. There are requirements for the base metal, the optional coating materials, and the coated tubing. These requirements are applicable to the product coming out of the tube mills and the coating application lines, which are sometimes separate facilities. This tubing is used in the production of customized parts and assemblies. It is recommended that those parts and assemblies be validated for corrosion performance, conductivity and continuity, strength, appearance, and other critical properties unique to the particular application.

1.1 GM123M. Covers double wall construction tubing wherein the 2 walls and the joints are copper brazed in a reducing atmosphere to produce tubing satisfactory for hydraulic lines. It should not be used for fuel lines because residual copper can contribute to the formation of sour gas. See Figure 1.

1.2 GM124M. Covers single wall construction tubing wherein the joint is electric resistance welded. It is recommended for fuel lines, power steering lines, transmission oil cooler lines, lubricating oil lines, vacuum lines, etc. See Figure 1.

1.2.1 Restricted and Reportable Substances for Parts (GMW3059). All materials supplied to this specification must comply with the requirements listed in GMW3059, **Restricted and Reportable Substances for Parts.**

1.3 TUBING DESIGNATION CODE. It is recommended that the codes in Section 3 be used on drawings and purchase orders to designate tubing type, outside diameter, wall thickness, and manufactured condition finish.

2 REFERENCED STANDARDS.

GM4260P	GM9516P	ASTM B750
GM4298P	GM9540P	SAE 1006
GM4465P	GMW3059	SAE 1008
GM4653M	9985010	SAE 1010
GM6277M	9985687	SAE J463
GM6416M	9985912	SAE J525
GM9071P	ASTM A254	SAE J526
GM9102P	ASTM A309	SAE J527
GM9505P	ASTM A875	SAE J533
GM9508P	ASTM B117	SAE J1290
GM9509P	ASTM B499	

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3 MATERIAL. Basic tubing material shall be SAE 1006, SAE 1008 or SAE 1010 cold rolled steel. Brazing material should be copper or copper alloy as designated in SAE J463, Copper Alloy UNS C51000.

GM123M (I/II/III/IV/V)

GM124M (I/II/III/IV/V)

'I' = First item in parenthesis, a B or a W.

B = Brazed, W = Welded

'II' = Outside diameter (mm)

'III' = Wall thickness (mm)

'IV' = Manufacturing Process (*)

'V' = Automotive

(*) Manufacturing Process Abbreviations:

A = Annealed

P = Plain

U = Unannealed (as welded)

T = Terne Metal Coating

S = Super Terne Metal Coating

G = Zinc-aluminum-alloy Metal Coating

F = Copper Fused

E = Extended Corrosion Protection Paint Coating

N = Extruded Nylon 12

C = Copper Plate - Standard copper plate thickness is 0.009 mm minimum. If other than standard thickness is required, numeral(s) should be used immediately following the letter C, e.g., C13 indicates 0.013 mm min.

Example:

GM124 (W/6.00/0.7/AGE/V) - indicates welded single walled tubing, 6 mm O.D., 0.7 mm wall thickness, annealed tubing, protected from corrosion with a base coating of a zinc-aluminum-alloy metal followed with a topcoat paint layer, approved for automotive application.

4 MECHANICAL PROPERTIES. The following requirements shall apply only to the more common types of steel tubing; that is, welded-annealed and brazed-as-manufactured. Properties of other classes of tubing, such as welded

mechanical tubing or work hardened tubing, shall be as specified through special agreement between supplier and purchaser.

4.1 Tensile tests shall be conducted on straight sections of fabricated parts in accordance with methods of testing tubes outlined in ASTM E8.

4.2 Tubing shall be capable of being bent on a centerline radius of 3 times the tubing outside diameter without undue reduction of area or flattening when suitable bending fixtures are used. Using this formula, reduction of area should not exceed 6%.

4.3 Tubing shall be capable of being expanded over a tapered mandrel having a slope of 1 in 10 until the outside diameter at expanded end is increased 20% without cracking or showing flaws (ASTM A254, Paragraph 6.3). Prior to expansion test, tubing shall be cut off square, edge crowned, and deburred. It shall be held firmly and squarely in the die, and punch must be guided on the axis of the tubing.

4.4 Unless otherwise specified, tubing shall be capable of withstanding the following internal static hydraulic pressure:

SI Units:

Through 10.0 mm OD.....35 MPa

Over 10.0 mm through 16.0 mm OD.....15 MPa

NOTE: Subsequent cold working of the tube (coiling, straightening, bending, drawing, etc.) will increase the strength and hardness of the tube. Considerably higher strength and hardness for specific applications can be obtained by cold working or case hardening of the tube.

5 DIMENSIONS. Tubing shall conform to the dimensions and tolerances listed by the purchaser.

5.1 WELDED TUBING. Nominal diameter and wall thickness shall conform to those listed in SAE J526. Maximum OD for the Zinc aluminum alloy plus Nylon 12 topcoat, GN, can be found in Table 2.

5.2 BRAZED TUBING. Nominal diameter and wall thickness shall conform to those listed in SAE J527. Maximum OD for the Zinc aluminum alloy plus Nylon 12 topcoat, GN, can be found in Table 2.

5.3 FLARE ENDS.

5.3.1 SAE-type flares shall conform to the dimensions and tolerances shown in SAE J533.

5.3.2 ISO-type flares shall conform to the dimensions and tolerances shown in SAE J1290.

6 FINISHES. Finish on outside of the tubes shall conform to the specified finish as shown in Table 1.

7 ENVIRONMENTAL RESISTANCE (TE, SE AND GE).

7.1 SALT SPRAY TESTING (GM4298P). Painted tubing shall be subjected to the following corrosion tests and evaluation methods. All corrosion tests shall be conducted on

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fabricated parts or on the test sample in Figure 2. Test samples as described in Figure 2 shall be aligned in the test chamber with the formed elbow facing down but not contacting the test fixture. Fabricated parts shall be aligned in the test chamber as agreed upon between the testing facility and reviewing authority. The frequency for running all of the corrosion tests shall be documented in the control plan.

7.1.1 Terne and Superterne extended corrosion protection (TE, SE): When formed into fabricated parts or the test configuration shown in Figure 2, the extended corrosion protected tubing (TE, SE) must withstand 200 h of salt spray exposure per GM4298P. The exposed tubing, except for the flare and surface under the tube nut, must exhibit no more than 1 base metal corrosion spot, 1.5 mm diameter or less in any 500 square mm area as determined by visual inspection.

NOTE: Surface contaminants can cause staining in a corrosion test. Stains in the absence of corrosion should not be recorded as a corrosion failure.

7.1.2 Zinc - Aluminum Alloy - Extended Corrosion Protection (GE): The GE extended corrosion protection tubing must withstand 1000 h of salt spray exposure per GM4298P

with no more than 1.5 mm of creepback (See GM9102P) from longitudinally placed scribes and no other loss of adhesion after GM4298P exposure and air blow-off.

7.1.3 Zinc - Aluminum Alloy - Extruded Nylon 12 (GN) Low Temperature Chip Resistance plus Salt Spray (GM9508P, GM4298P): Subject formed tubing samples (see Figure 2) to the chip resistance test, GM9508P, Method B, 5 times each. The tubing shall be placed in the gravelometer such that the plane created by the bend is parallel to the panel. Within 24 h of gravelometer exposure, place the specimens into salt spray per ASTM B117 or GM4298P.

The tubing shall show no base metal corrosion extending more than 1 mm from gravel impacted area after 2000 h. Non gravel impacted areas shall be free from rust after 2000 h.

7.2 HUMIDITY TESTING (GM4465P, GM9071P). Extended corrosion protected tubing (TE, SE and GE) shall be subjected to 96 h of humidity testing per GM4465P. Immediately after the humidity test, the tubing shall be wiped dry and a tape adhesion tested per GM9071P, except a linear scribe should be made longitudinally on the tube. There shall be at least 90% adhesion for TE/SE tubing and at least 99% adhesion for GE tubing.

TABLE 1 - EXTERNAL FINISH CODES AND REQUIREMENTS

Finish	Finish Code	Description and Material Requirements	Applicable GM Standard
PLAIN	P	No coating; base metal only (SAE 1006, SAE 1008/SAE 1010)	GM123M, GM124M
TERNE	T	Hot-dip lead-tin alloy coating. Chemical Composition: 7% tin-balance lead per ASTM A309.	GM124M
SUPER TERNE	S	Hot-dip lead-tin alloy coating. Chemical Composition: 12% tin-balance lead per ASTM A309. Coating mass: 49 g/m ² per GM4260P, Method 3, using methylene chloride as a solvent, on 200 mm length specimens.	GM123M, GM124M
ZINC-ALUMINUM ALLOY	G	Hot-dip zinc-aluminum alloy coating. Chemical Composition: 5% aluminum-balance zinc alloy per ASTM B750. Coating mass: 50 g/m ² per ASTM A875, Section 8. Thickness shall be 3 micrometers minimum anywhere on the tube per Appendix A.	GM123M, GM124M
TERNE - EXTENDED CORROSION PROTECTION	TE	Terne as described above, followed by an approved zinc-rich epoxy coating.	GM124M
SUPER TERNE - EXTENDED CORROSION PROTECTION	SE	Super terne as described above, followed by an approved zinc-rich epoxy coating.	GM123M, GM124M

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TABLE 1 - EXTERNAL FINISH CODES AND REQUIREMENTS - Continued

Finish	Finish Code	Description and Material Requirements	Applicable GM Standard
ZINC-ALUMINUM ALLOY - EXTENDED CORROSION PROTECTION	GE	Zinc-aluminum alloy as described above, followed by an approved pretreatment process and an approved aluminum-rich epoxy coating. Thickness Measurements: The aluminum-rich epoxy paint of the GE finish shall have a minimum thickness of 3 microns anywhere on the tube as measured by the procedures in Appendix A. Actual thickness of the coatings in the GE finish shall be monitored circumferentially and longitudinally for each tube line. A sampling plan shall be referenced in the control plan.	GM123M, GM124M
COPPER PLATE	C	Electroplated tubing.	GM123M
Zinc - Aluminum Alloy - Extruded Nylon 12	GN	Zinc aluminum alloy as described above, followed by a topcoat of Nylon 12. Appearance: The topcoat shall be uniform in color and free from discontinuities such as flow lines, pin holes, craters, or abnormal roughness. The topcoat shall be black in color unless otherwise specified on the engineering drawing. Film Thickness: The Nylon 12 topcoat shall have a minimum thickness of 170 μm when tested by microscopic examination. Maximum thickness of the coating shall be controlled by the maximum OD (Table 2)	GM123M, GM124M*
OTHER	Z	TBD	GM123M, GM124M

*Note: GN topcoat should not be used on fuel line applications until full material approval is given for fuel line applications.

TABLE 2 - MAXIMUM OD FOR GN COATING

Tube Size, Nominal (mm)	Coated Tube OD, Max (mm)
4.76	5.28
6.00	6.52
6.35	6.87
7.94	8.46
8.00	8.52
9.53	10.05
10.00	10.52
11.11	11.65
12.70	13.24
14.29	14.83
15.88	16.42

7.3 SOLVENT RUB TEST (GM9509P). Extended corrosion protected tubing, (TE, SE and GE) when MEK solvent rub tested per GM9509P, shall exhibit a rating of 1 or better after testing to 50 double rubs. This test shall be run on each production batch of tubing and shall be documented in the control plan. A production batch shall be defined in the quality system documents.

7.4 FLUID RESISTANCE.

7.4.1 Extended corrosion protected tubing (TE, SE and GE) shall show no softening or film defects when immersed for 24 h in brake fluid (GM4653M), gasoline (TF2 perGM6416M), power steering fluid (9985010) and automotive transmission fluid (9985912). This test shall be run with brake fluid at least once a week on production parts or samples per Figure 2 and shall be documented in the control plan.

7.4.2 Zinc-Aluminum Alloy - Extruded Nylon 12 (GN).

7.4.2.1 Sample Preparation. Samples shall be a minimum 80 mm long. Make two parallel cuts (2.45 ± 0.05 mm apart) longitudinal to the tube using a Stanley utility knife with a #99E blade or equivalent. The cuts must be through the nylon layer and primer down to the substrate along the entire length of the tube. Place 6 samples per fluid in a sealable container. Fill the jar with a required fluid from Table 3 such that approximately half of each sample is submerged. Seal the container. Soak the samples for the appropriate time and temperature as required in Table 3. After the required soak time remove the samples from the fluid and dry them with a paper towel.

7.4.2.2 Coating Separation Procedure. Using the utility knife, make a perpendicular cut between the two parallel cuts near the end of the sample which was submerged in fluid. With the edge of the blade in the perpendicular cut, try and lift up or peel back the strip of nylon until the section can be grabbed with a pair of pliers or equivalent. Peel until either the

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section breaks or the section is removed from the entire length of the tube. If the strip was not completely removed, repeat the procedure from the vapor end of the sample.

7.4.2.3 Acceptance Criteria. There shall be no evidence of any blistering or delamination of the nylon prior to the coating separation procedure. After the coating separation procedure, the sample is considered acceptable if the nylon strip lifts less than 1.5 cm before tearing.

TABLE 3 - FLUID RESISTANCE

Fluid	Time (hrs)	Temp (°C)
Distilled Water	504	23 ± 2
Brake Fluid (GM4653M)	504	60 ± 2
TF1 per GM6416M	504	23 ± 2
TF2 per GM6416M	504	23 ± 2
TF3 per GM6416M	504	23 ± 2
Peroxide Fuel Mix per GM6416M	504	23 ± 2
C4E10 per GM6416M	504	23 ± 2
Power Steering Fluid (9985010)	504	60 ± 2
Automotive Transmission Fluid (9985912)	504	60 ± 2
Engine Coolant (GM6277M)	504	23 ± 2
Engine Oil (9985687)	504	60 ± 2
Windshield Washer Solvent (9985670)	504	23 ± 2

7.5 CYCLICAL CORROSION TESTING (GM9505P, CYCLE J).

7.5.1 Extended corrosion protected tubing (TE, SE and GE) shall be subjected to a performance test consisting of properly formed tubing samples (See Figure 2) subjected to 10 cycles (20 weeks) of GM9505P Cycle J or GM9540P Method B, test duration D. After cycling, the tubing shall exceed a pressure test of 14 MPa for tubing through 10.0 mm OD or 7 MPa for tubing over 10 mm OD. In order for this test to be valid, there cannot be corrosion from inside out that causes a failure in the pressure test. Therefore, it is recommended that the tube fittings be fastened into a solid block of aluminum, to keep the system closed during exposure

Furthermore, sealing the fittings with a wax is acceptable to keep these parts functional for the pressure test.

The minimum acceptable frequency for running this test shall be agreed upon by the supplier and GM Supplier Contact and shall be documented within the quarterly PPAP submission.

7.5.2 Zinc - Aluminum Alloy - Extruded Nylon 12 (GN). Knife Cut plus Cyclical Corrosion GM9505P, Cycle J, 10 cycles (20 weeks). Using straight tubing with standard fittings, scribe parallel lines, 4 cm long and 2.4 ± 0.1 mm apart, near the center. Within 24 h of scribing, perform cyclical corrosion per GM9505P, Cycle J, 10 cycles (20 weeks). After cycling, the tubing shall exceed a pressure test of 14 MPa for tubing through 10.0 mm OD or 7 MPa for tubing over 10 mm OD. Results shall be reported with the submission for engineering approval.

7.6 RUBBING WEAR RESISTANCE (GM9516P).

7.6.1 Zinc-Aluminum Alloy - Extruded Nylon 12 (GN). Test Method: Section ends of 5 tubing samples for coating thickness measurements by microscopic examination. Note where the thickest and thinnest areas in the coating appear. Place tubing sample on the rubbing wear tester of GM9516P (or equivalent) such that the thinnest section is exposed to the abrasive surface. Conduct the wear test @ 20 cycles per minute per GM9516P for 1 million cycles. The test will be terminated when the coating wears through or 1 million cycles is reached, whichever occurs first.

7.6.2 Requirements: The specimens shall not exhibit any wear through the nylon coating(s) to the substrate for at least 1 million cycles.

8 FORM, SIZE, AND QUALITY. Automotive steel tubing shall be commercially round, smooth and free from rust and defects which impair processing or serviceability. Joint bead on outside diameter of tubing may be acceptable by agreement with individual purchasers. However, this shall not exceed outside diameter tolerance and shall not interfere with flare forming operation or with the accomplishment of leak-tight coupling joints. A bead on the inside is permissible but must be held to a minimum of good welding or brazing practice. When specific lengths are specified, they shall be reasonably straight and ends shall be free from burrs.

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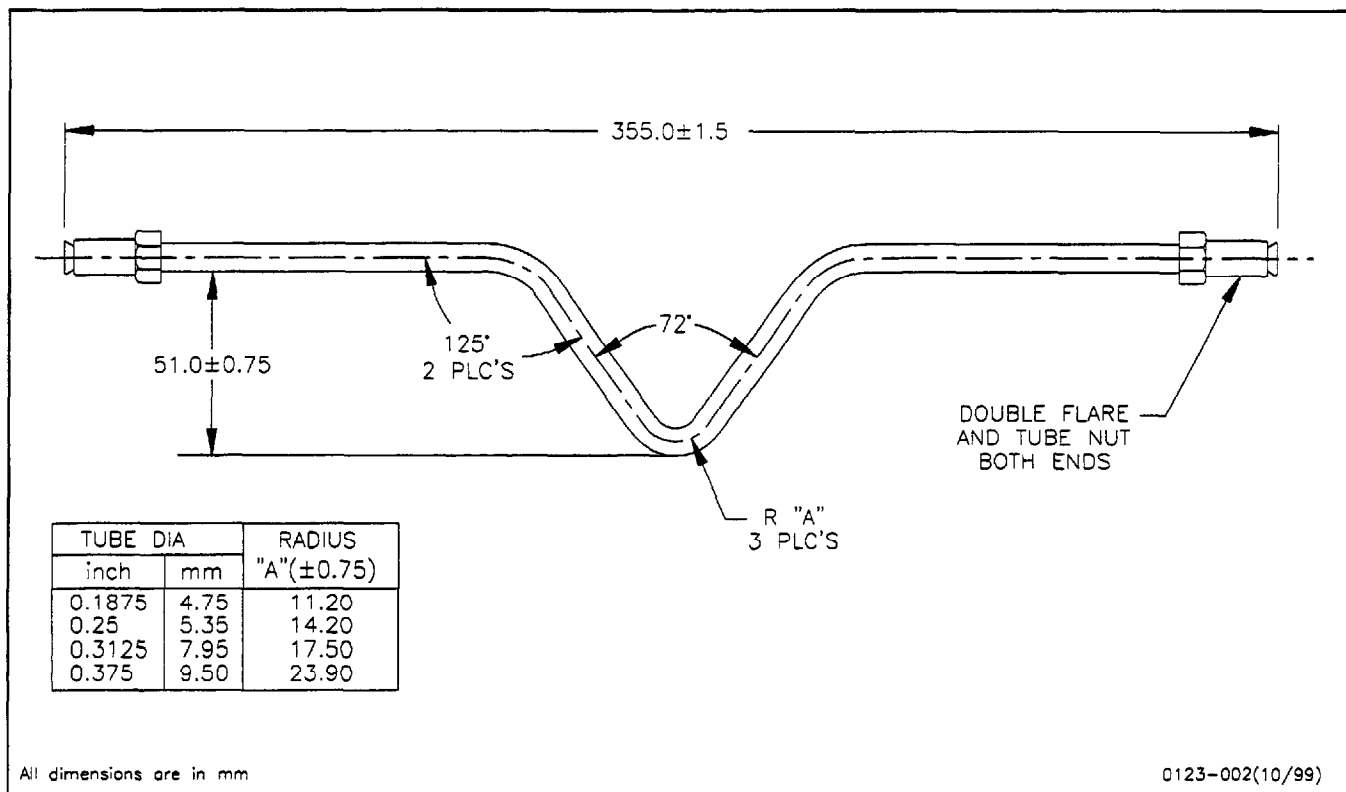


FIGURE 2

8.1 Tubing for use as hydraulic brake lines shall have internal cleanliness conforming to a maximum of 0.20 grams per square meter of internal surface as determined by ASTM A254, Section 11. Special cleanliness requirements shall be as agreed upon by supplier and purchaser.

8.2 All coatings shall withstand normal forming, handling and storage conditions encountered by tubing without evidence of chipping, flaking or loss of adhesion to base metal. Longitudinal or peripheral burnishing resulting from processing and handling is acceptable.

9 SPECIAL REQUIREMENTS. Special requirements pertaining to dimensions, finishes, physical properties or applications shall be as agreed upon between supplier and purchaser.

10 PACKING AND MARKING. Material shall be shipped as specified by purchaser. Containers shall be legibly marked with supplier's name and address, material specification number and name, purchase order number, net weight, and any other information specified by the purchaser.

11 INITIAL SOURCE APPROVAL. No shipment shall be made by any supplier until representative initial production samples have been approved by engineering as meeting the requirements of this specification.

12 INSPECTION AND REJECTION. All shipments of material or parts under contract or purchase order manufactured to this specification shall be equivalent in every respect to the initial samples approved by engineering. There shall be no changes in either formulation or manufacturing processes permitted without prior notification and approval by engineering. Lack of notification by the supplier constitutes grounds for rejection of any shipment. While samples may be taken from incoming shipments and checked for conformance to this specification, the supplier shall accept the responsibility for incoming shipments meeting this specification without dependence upon purchaser's inspection.

13 APPROVED SOURCES. Engineering qualification of an approved source is required for this specification. Only sources listed in the GM Corporate Materials File under this specification number have been qualified by engineering as meeting the requirements of this specification. Sources are available through the on-line MATSPC System.

14 GENERAL INFORMATION. These standards were first published in April 1943. The latest revisions include:

Rev	Date	Description
X	12/97	Complete Revision
Y	10/99	Added GN Material and related testing. Reorganized testing section.

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APPENDIX A

A PROCEDURE FOR MEASURING THICKNESS OF THE DUAL LAYER COATING ON AUTOMOTIVE STEEL TUBING

A1 SCOPE. The procedure is used to determine compliance with a specified minimum coating thickness and to set up correlation with equipment used for monitoring coating thickness in production. The coating system is a low carbon steel tube substrate with a zinc-aluminum alloy followed by an aluminum rich epoxy coating. The external finish can be found listed in GM123M/GM124M; under Table 1 designation (GE).

A2 REFERENCED STANDARDS

GM123M/GM124M

A3 EQUIPMENT USED.

Metallograph
Metallurgical Polishing Equipment

A4 SAMPLE PREPARATION* The tubing shall be sectioned at several transverse locations to determine compliance to a minimum thickness of coating. The sections are to be deburred, cleaned and dried. Each section is wrapped separately in aluminum foil prior to mounting and molded to the part with the fingers (See Figure A1). Only 1 layer of foil is required, and the tube should be covered in its entirety, being careful not to puncture the foil. The excess folds and overlaps should be above the plane of polish. Exercise care in mounting being sure each section is perpendicular to the plane of polish. The samples should be compression mounted with a thermosetting powder such as diallyl phthalate. Compression molding also serves to mold the foil tight to the contour of the coating providing excellent edge retention and a well defined interface. The mount(s) should be cooled to ambient temperature to prevent edge separation.

*Note: An alternative procedure may be used if approved by Engineering.

A5 PROCEDURE.

A5.1 METALLOGRAPHIC PREPARATION

- (1) The mounted section is ground with a series of successively finer grinding papers beginning with 180 grit, then 320, and finally 600 grit, with a good flow of water as a lubricant. All grinding is done with light to moderate pressure to minimize smearing of the coating.
- (2) The mount is washed between each grind operation to remove any of the coarser media from the previous step. It also serves to prevent contamination of subsequent grinding and polishing wheels.
- (3) The specimen should be rotated 90° between each grinding step to minimize pull-out of the softer coatings and prevent smearing of the epoxy paint to zinc-aluminum coating interface and zinc-aluminum to steel interface.

- (4) After the final grinding operation wash thoroughly, alcohol rinse and dry prior to the final polishing sequence.
- (5) Final polishing is carried out using cloth wheels and diamond polishing compounds. Recommended sequence is a 6 micron followed by 3, 1 and 0.25 micron. A 0.05 micron alumina suspension can be used as a last step if a scratch free surface is desired. However, the alumina is alkaline and could promote staining of the zinc layer, making it difficult to measure coating thickness. It is therefore recommended to delete this step until thickness measurements are completed.
- (6) Moderate pressure is applied only long enough to remove any of the scratches incurred by the last step. Rotate the sample 90° between each polishing wheel to insure the integrity of the coating is not disturbed.
- (7) The sample is washed between each micron grade to remove any contaminant from the preceding step as similarly done with the grind sequence. After completion of polishing, the mount is washed with a mild soap, rinsed, and dried thoroughly with methanol.

A5.2 METALLOGRAPHIC EXAMINATION & THICKNESS MEASUREMENTS.

- (1) The prepared sample is viewed on the metallograph to ensure the mount is relatively scratch free and the layers are adhered to the tube. Each of the coating interfaces should show good contrast with no smear or pullout of the microstructural components.
- (2) Choose a suitable magnification to resolve the 2 layers clearly around the periphery of the transverse tube section. Measurements are generally done @ 500 or 1000 X.
- (3) Insert an appropriate measurement reticule into the light path to measure the thickness of each layer. Calibrate the reticule with a known micrometer scale or slide prior to any measurements.
- (4) Divide the tube periphery into 4 separate quadrants. Mark the intersection of the aluminum foil wrap ends 12 O'clock. From there moving clockwise, mark each subsequent section 3, 6, and 9 O'clock with respect to the 12 O'clock position. In each quadrant field of view take 3 random readings which include the minimum thickness value (See Figures A2 and A3). Report each of the 3 readings per quadrant, 12 readings total, for both the zinc-aluminum and epoxy paint layers.
- (5) Record all thickness values and compare to the applicable sections of GM123M/GM124M. The required minimum values are as follows for the GE extended corrosion coatings.

Coating Thickness (min μm)
Zinc-aluminum alloy 3.0
Aluminum rich epoxy paint 3.0

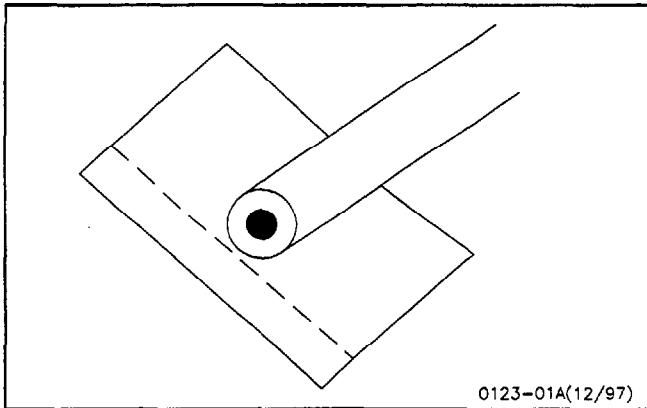
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FIGURE A1 - VIEW OF THE FOIL WRAP AROUND THE TUBE CROSS SECTION PRIOR TO MOUNTING. CRIMP OVER (DASHED LINE AREA) TRANSVERSE SURFACE AND GRIND AWAY.

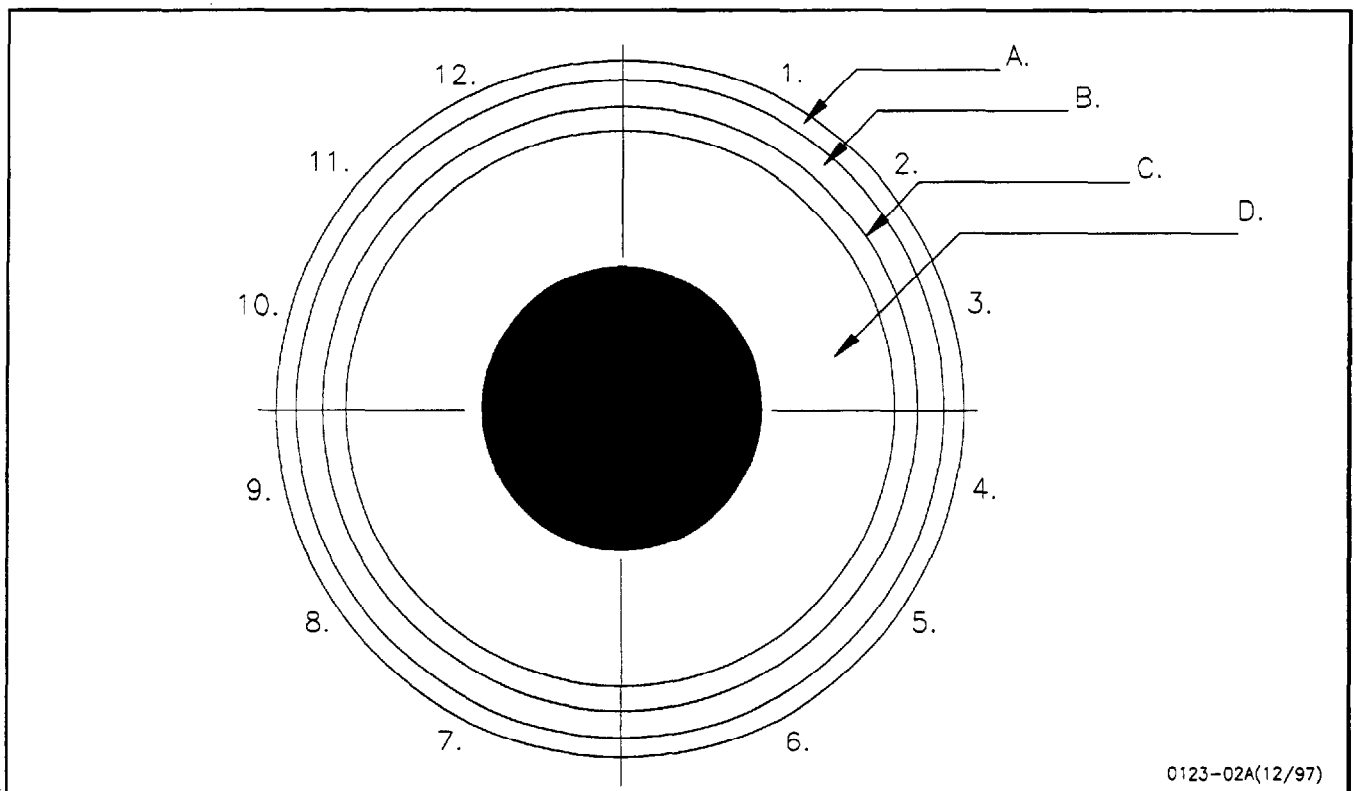


FIGURE A2 - TUBING CROSS SECTIONAL VIEW WITH QUADRANTS AND THICKNESS READING LOCATIONS. REFER TO FIGURE 3 FOR INDIVIDUAL FILM LAYER IDENTIFICATION (DENOTED BY CONCENTRIC CIRCLES AND LETTER DESIGNATIONS).

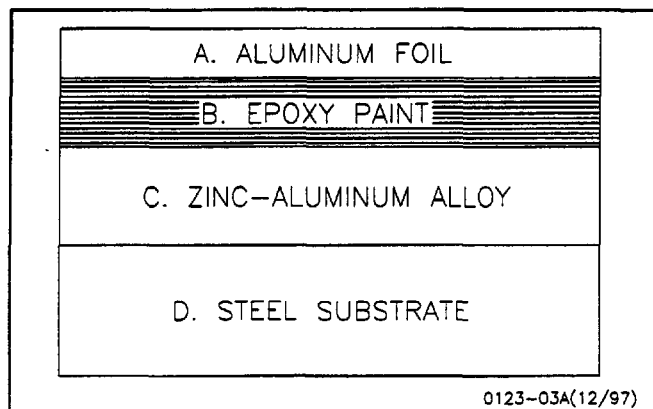
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FIGURE A3 - EXPLODED VIEW OF THE INDIVIDUAL FILMS SHOWN AFTER METALLOGRAPHIC SAMPLE PREPARATION.

**Corrosion Protective Coatings Zinc/Organic Type****Scheduled for Deletion. Do Not Use on New Designs****1 Scope**

This specification covers the basic requirements for a non-oily corrosion protective coating consisting of zinc plate and subsequent aluminum rich organic topcoat.

1.1 The coating is suitable for internally and externally threaded and nonthreaded ferrous parts where high levels of corrosion protection are required. When applied over steel that is to be coupled to aluminum, the coating provides exceptional galvanic protection.

1.2 This coating system shall be completely free of hexavalent chromate by July 2005. The final product shall conform to the requirements of GMW3059. All the approved sources listed in MATSPC database (section 6 Approved Sources) shall be hexavalent chromate free by July 2005. At present the MATSPC database lists both applicators with and without hexavalent chromate.

1.3 Typical Application. It is required that the internally threaded part (nut) be coated in a variable speed, canting centrifuge, which applies paint coating by a gravity flow-through system. Parts without internal threads may be coated by other processes.

1.4 This specification is intended for use on carry over parts only. Contact Materials Engineering before using this specification on any new designs.

1.5 Use of this finish on threaded surface and/or bearing surface of joints could affect the torque-tension relationship. It is recommended that a torque-tension study of the fastener joint be performed before releasing the finish on a new application.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

SAE/USCAR-1

SAE/USCAR-5

2.2 GM Standards/Specifications.

GM4298P

GM9501P

GM4465P

GM9508P

GM9064P

GMW3001

GM9071P

GMW3059

3 Requirements

3.1 Appearance. The coating shall have a uniform gray/green appearance and shall be free from tears, sags, and excess coating which affects appearance and Performance. The coating shall not be oily or tacky to the touch. During normal handling practice, parts shall not leave particulate residue on equipment, hands or gloves.

3.2 Thickness. When applied to threaded products, the coating shall not have an adverse effect on normal installation and removal practices. The zinc chromate plating thickness shall be minimum of 6 μm unless otherwise specified.

3.2.1 The typical total coating thickness shall be 12 to 20 μm .

3.2.2 The maximum thickness of coating which may be applied to threads on threaded products is limited by the basic thread size (tolerance h or H). After coating, parts must gage with appropriate basic size GO thread gage. Threads may be produced undersize/oversize (before coating) to accommodate the coating thickness, providing the finish product (after coating) meets all specified mechanical properties. Where mechanical properties are not specified, undersizing/oversizing is subject to approval by the pertinent engineer, and all under size/oversize shall be within permissible limits as agreed upon.

3.3 Gasoline Resistance. Coated parts shall be exposed per GM9501P. There shall be no color change or coating removal to previous surface or lifting or peeling of film or visible defect in the film after exposure.

3.4 Corrosion Resistance. Parts coated to this specification shall be capable of withstanding neutral salt spray testing per GM4298P for a minimum of 400 h. After testing, there shall be

no red rust on significant surfaces. (see 3.4.4.1 and 3.4.4.2).

The corrosion testing of the threaded fasteners must follow the procedures as outlined in SAE/USCAR-1.

3.4.1 For normal production process, NSS test shall be part of applicator's statistical process control to ensure that the parts meet the corrosion resistance requirements.

3.4.2 A periodic NSS test of the parts being processed on each line running this coating shall be conducted using sample size of three pieces minimum per line per shift.

3.4.3 When this coating is specified for fasteners, the parts shall be power-driven, with properly maintained equipment, into a nut or tapped hole, in a manner simulated to production and perpendicular against a flat surface. After salt spray exposure, the significant surfaces of the fastener shall be evaluated. For normal production, Processes that are in statistical process control shall yield parts that are capable of meeting the salt spray requirements.

3.4.4.1 Significant surfaces for test evaluation of fasteners shall be all exposed surfaces of the fastener when installed, including but are not limited to fastener heads, socket recess, sems washers and external surface of nuts. Fastener threads and point are excluded unless otherwise specified on the drawing.

3.4.4.2 Significant surfaces on parts other than threaded fasteners shall be all surfaces. Deep recesses, such as blind holes and the interior of tubes are excluded unless otherwise specified on the drawing

3.5 Relief Of Embrittlement. All parts heat-treated or highly cold worked to the specified core hardness greater than HRC 32 or surface hardness HRC 35, which are processed through the hydrogen generating processes shall be processed per SAE/USCAR-5.

3.5.1 When supplementary treatment is specified for a part that requires baking after plating,

the supplementary treatment shall be applied after the baking operation. Hardened parts which have been tempered at less than 175°C shall be heated at 150°C and held for 8 h or longer.

3.6 Flexibility and Chip Resistance. The coating must withstand the normal extensions, flexing and compressions encountered by springs and spring clips during end product assembly, without evidence of flaking or loss of adhesion from the base metal. It shall withstand normal handling and storage conditions without chipping or flaking.

3.6.1 Panels or parts coated with the coating, excluding thread fasteners - under the discretion of the user, shall be exposed per GM9508P After exposed the minimum rating shall be 6.

3.7 Adhesion Characteristics. Part coated to this specification shall show no evidence of blistering or other appearance changes, other than a whitish blush, after exposure to humidity testing per GM4465P for 96 h, min. When tape tested per GM9071P, Method B, 10 minutes after removal from humidity there shall be minimum 99.0% of coating retention. In case of threaded fasteners, steel test panels shall be processed with fasteners for the tape adhesion test.

3.7.1 This test is applicable for initial approval and PPAP submission parts and yearly thereafter. Sample size of 3 minimum shall be used for this test.

3.8 Torque Tension Requirements. Machine threaded fasteners M6 and larger shall be subject to torque-tension monitoring through the use of surrogate M10 x 1.5 test bolts. Ten (10) surrogate bolts shall be processed with the production parts. A minimum of 1 set of 10 bolts per finish line, per shift, shall be monitored per GM9064P. The 6-sigma torque value must be within the listed range (see Table 1). The test results shall be maintained in a file to be submitted when required by GM.

Table 1: Torque Tension

Thread Size	Surrogate Bolt Part Number	Test Nut Part Number	Test Washer Part Number	Torque (N-m)	Tension (kN)
M10 x 1.5	11616105	11516090	11502644	40 - 55	28.3

4 Manufacturing Process

Not applicable.

5 Rules and Regulations

5.1 All materials supplied to this specification must comply with the requirements of GMW3001, **Rules and Regulations for Material Specifications**.

5.2 All materials supplied to this specification must comply with the requirements of GMW3059, **Restricted and Reportable Substances for Parts**.

6 Approved Sources

Engineering qualifications of an approved source is required for this specification. Only sources listed in the GM Materials File (i.e., MATSPC) under this specification number have been qualified by engineering as meeting the requirements of this specification.

7 Coding System

This material specification shall be referenced in other documents, drawings, VTS, CTS, etc. as follows:

Material per GM7113M

8 Release and Revisions

8.1 Release. This standard was originated and approved by the Finish Committee in April 1993.

8.2 Revisions.

Rev	Approval Date	Description (Organization)
D	SEP 1998	Revised 3.9 and Table 1 (GMNA)
E	APR 2005	Updated the specification in current template, revised paragraphs 1.2, 1.4, 3.4.4.1, 3.4.4.2 and 3.7 and deleted 5.3, 5.3.1 and 5.4 (GM Finish Committee)

DESERT PROVING GROUND

D63034

ENGINEERING REPORT

SUBJECT : BRAKE SYSTEM TESTING

FEB 1 2 REG.

TO : T.C. LANGE

TEST #: 7020K

FROM : T.R. HICKEY

TWO NO.: P9R06-41

SEQ. NO : 005

MODEL LINE : K15753

Model Year : 1999

PROCEDURE/FMVSS : 8548V

UPC : 5

VEH. NO.: KP9042

ENGINE: 4.8L/LR4

DATE EVALUATED FROM: 07/Mar/97

TO: 10/Mar/97

DATE PUBLISHED: 29/Jan/98

E.O.T. REPORT ☒

PROGRESS REPORT ☐

REISSUE ☐

REISSUE DATE: _____

REASON FOR REISSUE:

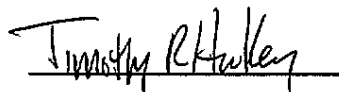
OBJECTIVE : To measure the R2 FMVSS 105 Validation performance of a 1999 J45 brake system on vehicle KP9042 at 6400 lbs. GVWR.

RESULTS : Vehicle completed test and met all requirements. Park brake section of test was omitted.

PROCEDURE: FMVSS R2-105 Cert. Test (R2-5-105G-82)

COMMENTS : Akebono AKNS161H front linings, Akebono AKNS161H rear linings, Firestone Wilderness P265/75R16 tires and ABS software GM124AAL.

MATERIAL: See attached test specification sheet.



1-28-98

T.R. HICKEY

Date

Test Engineer

Desert Proving Ground

(8) 674-5890

GENERAL MOTORS CORPORATION**Uniform Test Specifications****Truck Engineering Operation****Vehicle and Component Tests**

VEHICLE: **KP9042** Make: CHEVROLET Model: K15753 WB: 143.50 Axle: 3.08:1 S Test No.: **7020K**
 Engine: 4.8L/LR4 Transmission: A4/M30 Tires: FIRESTONE P265/75R16 44/44 TWO Number: P9R06-41
 PURPOSE: TO MEASURE THE R2 FMVSS 105 VALIDATION PERFORMANCE OF A 1999 JC5 BRAKE SYSTEM ON VEHICLE KP9042 AT 6400 LBS. GVWR.

RESULTS: VEHICLE COMPLETED THE TEST AND MET ALL OF THE REQUIREMENTS

BRAKES: 1999 JC5	Size/Type	Piston	Linings	Total	Front	%Front
Fronts:	305x29 MM / DISC	2x51 MM	AKNS161H	GVWR 6594	3188	48.3
Rears:	325x20 MM / DISC	1x54 MM	AKNS161H	LLVW 4996	3090	61.8

APPLY SYSTEM: Booster VACUUM/TANDEM M/C Dia. 34 Pedal Ratio: 4.72:1
 ANTI-LOCK: 4WAL / EBC325 / GM124AAL
 BALANCE SYSTEM: DRP / TEST LOCATION: DPG EAST STR From Date: 07MR97 2476 To Date: 10MR97 2973

TEST	PORTIONS	REQ.	TEST RESULTS	%PASS (Failed)	APPLY FORCE MAX	COMMENTS
1st Eff.	30 mph 60 mph	65 ft 242 ft	50 ft 183 ft	23% 24%	146 150	OK OK
2nd Eff.	30 mph 60 mph	57 ft 216 ft	49 ft 179 ft	15% 17%	140 146	OK OK
PARK BRAKE	GVWR Uphill GVWR Dnhill LLVW Uphill LLVW Dnhill	90 lbs w/Hndl. 125 lbs pedal Hold 5 minutes Warn Lt Opr.				
3rd Eff.	60 mph	216 ft	151 ft	30%	144	OK
Partial System 60 mph	LLVW Rears Only LLVW Frts Only GVWR Rears Only GVWR Frts Only	517 ft	473 ft 205 ft 349 ft 250 ft	9% 60% 33% 52%	148 146 149 149	LT.N/A lbs. LT.N/A lbs. LT.N/A lbs. LT.N/A lbs. Passed or (Failed)
Failed Comp.	Anti-Lock 60 mph L.S.P.V.	517 ft	180 ft 177 ft	65% 66%	144 144	NO W/S NO W/S
Failed Power	Sys 1 Sys 2	60 mph 517 ft	447 ft	13%	149	NO ABS, NO W/S
1st Fade	Baseline 30 mph Fade 1-5 60 mph Fade 6-10 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	30% 85% 48% 70% 40%	25 44 90 22 19	OK LIGHT FADE FADE, ODOR OK OK
2nd Fade	Baseline 30 mph Fade 1-10 60 mph Fade 11-15 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	23% 90% 87% 93% 73%	22 35 38 21 19	OK OK ODOR OK OK
4th Eff.	30 mph 60 mph 80 mph	65 ft 242 ft 459 ft	42 ft 150 ft 259 ft	36% 38% 43%	141 149 144	OK OK OK
Water Rec.	Baseline 30 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 10ft/sec2 Base + 45 lbs	10 ft/sec2 10 ft/sec2 10 ft/sec2	29% 94% 81%	24 32 33	OK OK OK
Spike Stops	10 Spikes 30 mph	200 lbs .08 sec.		Yes	380	
Final Eff.	60 mph	242 ft	162 ft	33%	145	OK

* unless otherwise specified, the max apply force will be 150 lbs.

Tester: D. HOOKEY

Summarized by: T. R. HICKEY

Summary Print Date: 22JA98

R2-5-105G-82 Summary Sheet

MPVs, Trucks, Buses (Except School Buses) w/GVWR < 8,000 lbs

GM CONFIDENTIAL

BUILD AND TEST SPECIFICATION SHEET

T.W.O. No: P9R06-41 Page 3 of 24

TWO No : P9R06-41

Seq No : 005

DPG No : 0513

Veh No : KP9042

Test No : 7020K

Test Purpose : To measure the R2 FMVSS 105 Validation performance of a 1999 JC5 brake system on vehicle KP9042 at 6400 lbs. GVWR.

Test Results : Vehicle completed test and met all requirements. Park brake section of test was omitted.

Comments : Akebono AKNS161H front linings, Akebono AKNS161H rear linings, Firestone Wilderness P265/75R16 tires and ABS software GM124AAL

VEHICLE INFORMATION

Year : 1999
Brake RPO : JC5
Name Plate : Chevrolet
Veh Model : K15753
Vehicle VIN : 1GCEK1943XX
Wheel Base : 143.5
Engine : 4.8L/LR4
Transmission : A4/M30
Axle Ratio : 3.08:1
Single/Dual : Single
Odo Cal :
Engine RPM :

TIRE INFORMATION

Tire Size : P265/75R16
Tire Make : Firestone
Tire Type : M+S
Wheel Code : RJP
Wheel Size : 16x6.5
Tire Pressure (PSI) : 44/44
Steel

TEST INFORMATION

Procedure No : 8548V

Test Type : FMVSS R2-105 Cert. Test (R2-5-105G-82)

Start Date : 3/7/97

Start Odo : 2476

Finish Date : 3/10/97

Finish Odo : 2973

TEST WEIGHT (lbs)

	As Tested		Design Weights	
	GVWR	LLVW	GVWR	LLVW
Front :	3188	3090	3091	3073
Rear :	3406	1906	3309	1598
Total :	6594	4996	6400	4671
%Front :	48.3	61.8	48.3	65.8
Tire Radius :	15.3	15.1	14.2	14.3
Frt Axle to CG	74.1	54.7	74.2	49.1
CG Height :	29.8	28.4	28.5	27.1

FRONT SYSTEM

Type : DISC
Rotor ASM : 15716362A
Rotor Size : 305x29 mm
Piston Dia : 51 mm
No Pistons : 2
Notes : S/N L: 2465 , R: 2464

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : DP
Service Kit : 18025698AA
Noise Treat : CLD6
Caliper ASM : 18025706/7AA

Rivet/Bonded	Min Thick
Bonded	0.502
Bonded	0.502

REAR SYSTEM

Type : Disc -PBR Calipers
Rotor ASM : 15712800A
Rotor Size : 325x20 mm
Piston Dia : 54 mm
No Pistons : 1
PB Lining : 15703331A
Notes : S/N L: 6U113R, R: 6U108R

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : FD
Service Kit : 18026447AA
Noise Treat : None
Caliper ASM : 18024190/1
PB Service Kit : TX123278A
PB Min Thk :

Rivet/Bonded	Min Thick
Bonded	0.415
Bonded	0.415

APPLY SYSTEM

Booster Type : Vacuum/Tandem
Size : 260 mm
ASM : 18022485C
Code : DC
Pedal Ratio : 4.72:1
Pedal Apply Radius :
P.T. @ 50 LBS : 37 mm

Master Cyl ASM : 18021494E
Code : XD
Dia : 34 mm
Min Dis Frt Port : 13.49 cc
cc @ 0psi Rear Port : 13.47 cc

Code: Meter / Split / Slope

BALANCE SYSTEM

Comb Valve ASM : None
Height Sens Valve : None

ANTI LOCK

Anti Lock System : 4WAL
Anti Lock Comments : EBC325 - System balance controlled by DRP.

Anti Lock Software Level : GM124AAL

Engineer: T.R. HICKEY

Date : 1/22/98

* Measurements in INCHES unless otherwise specified

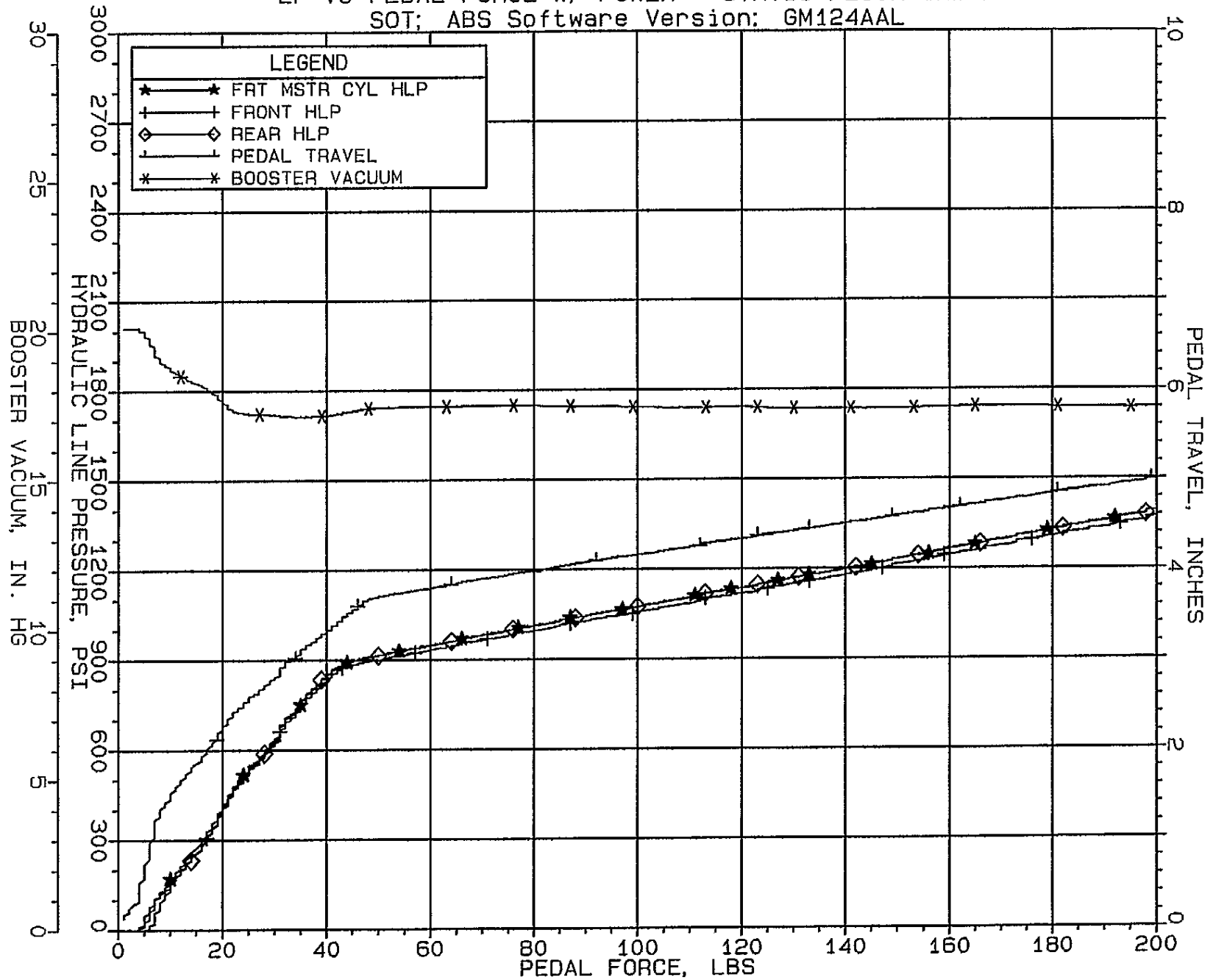
SPECCKDK rev. 082495

GM CONFIDENTIAL

MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

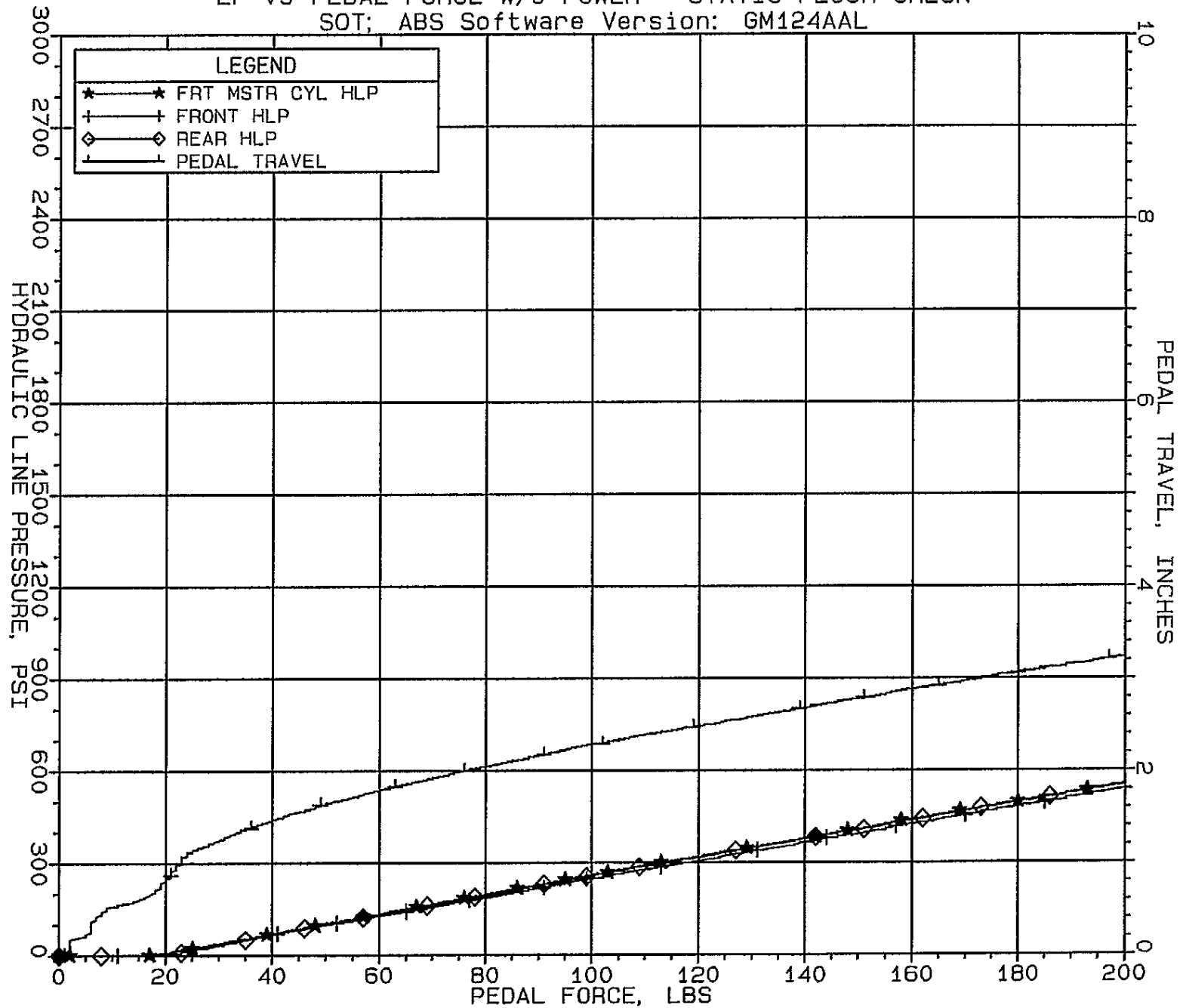
SOT; ABS Software Version: GM124AAL



MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

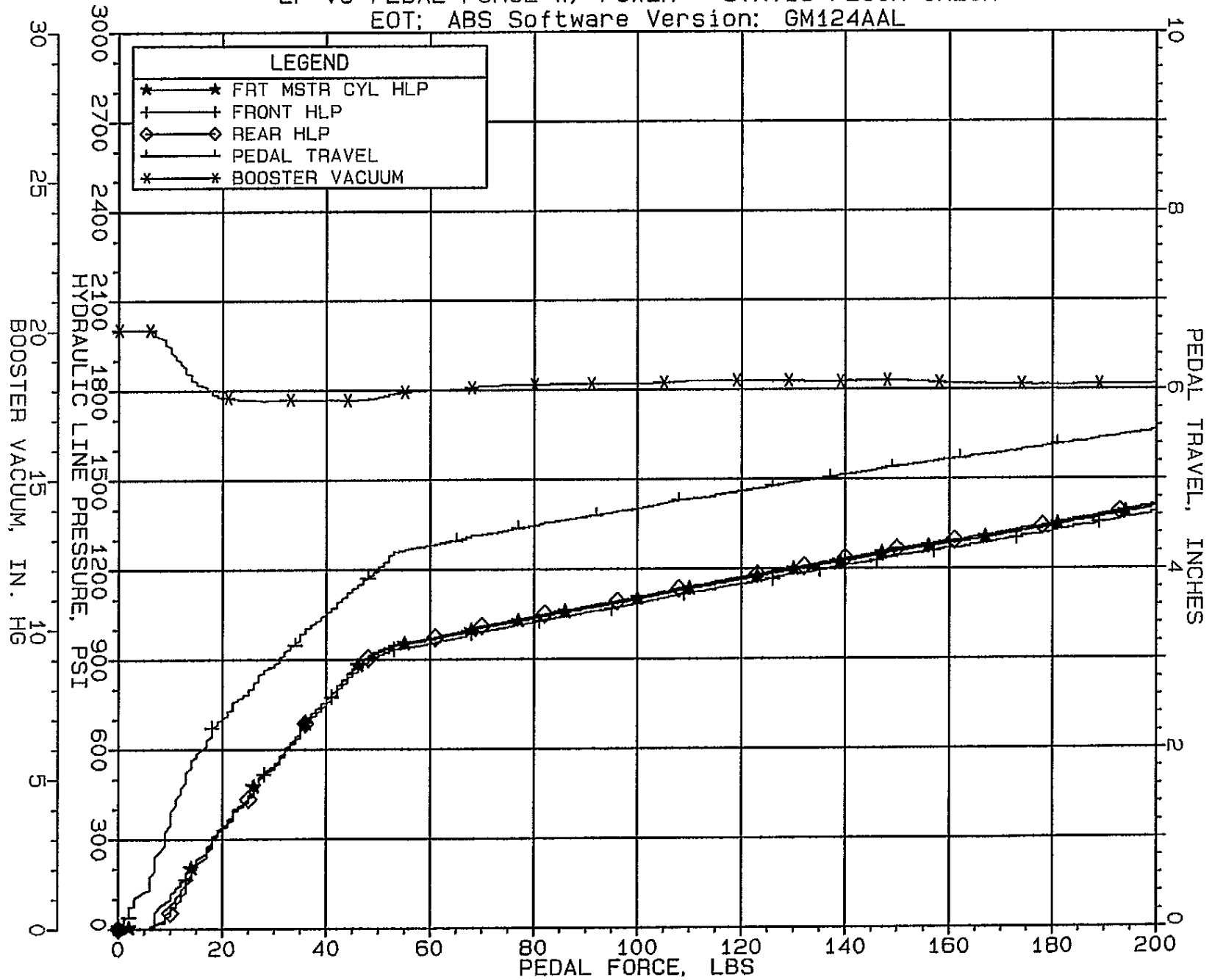
SOT; ABS Software Version: GM124AAL



MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

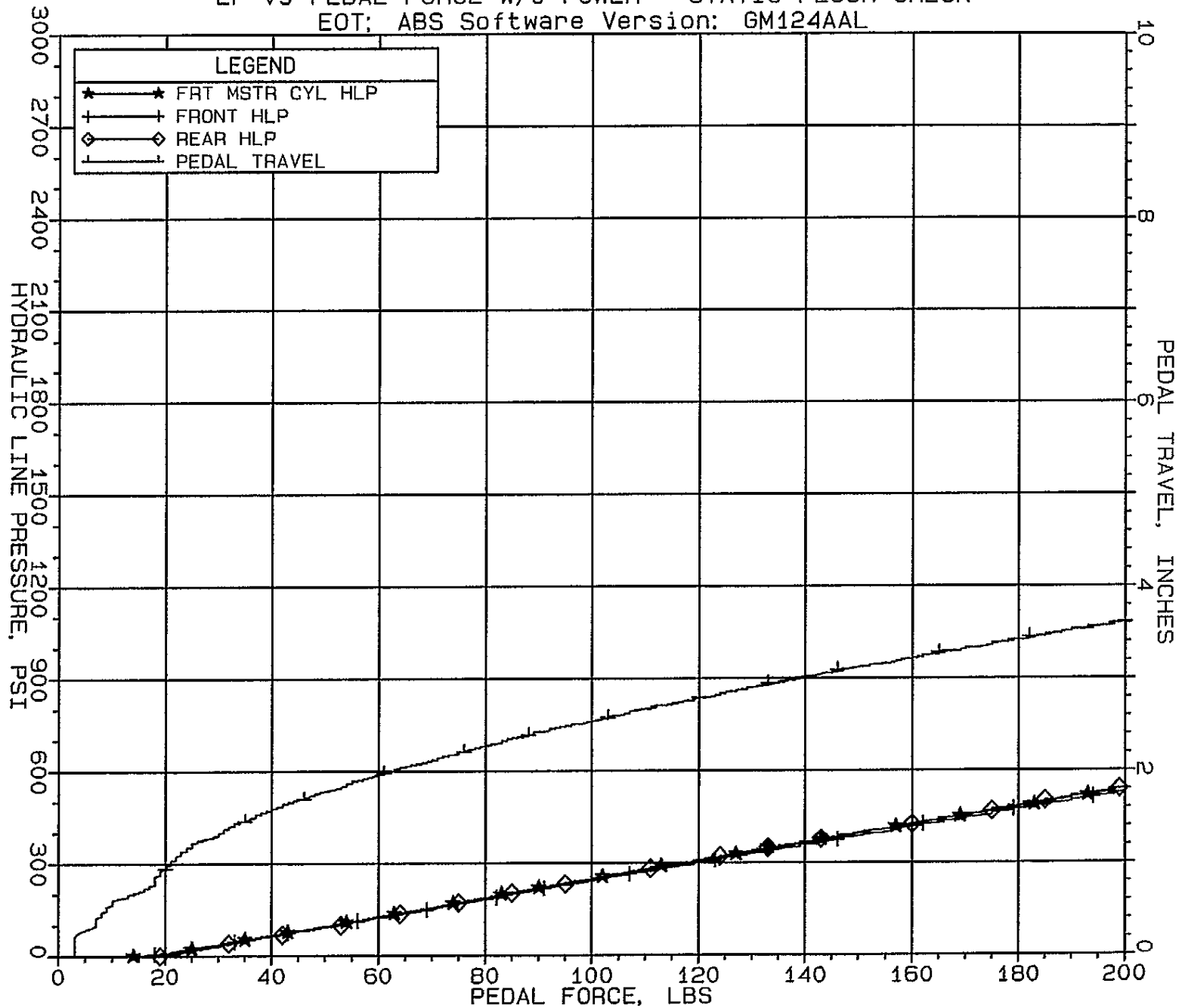
EOT; ABS Software Version: GM124AAL



MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

EOT; ABS Software Version: GM124AAL



GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 78° F.	WIND DIR./VEL.: S/W 0-5	ODO: 2485 TIME: 3:20 A.M.

3.3.5 FIRST EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			ft	lb			
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.6	52.6	50.6	76	148	OK
	2	30.3	52.2	51.2	104	144	OK
	3	30.4	51.3	50.0	96	146	OK
	4	30.4	53.3	51.9	115	161	P.F. LIMIT
	5	30.7	53.2	50.8	117	142	OK
	6	30.3	52.6	51.6	99	138	OK
60 mph	1	60.5	191.0	187.9	90	147	OK
	2	60.4	185.2	188.8	101	150	OK
	3	60.5	189.6	186.5	107	144	OK
	4	60.3	184.8	183.0	103	161	P.F. LIMIT
	5	60.5	187.4	184.3	95	146	OK
	6	60.2	180.7	179.5	121	156	P.F. LIMIT

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel HooleyDate: 3-7-97

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.:	WIND DIR./VEL.:	ODO: 2501 / 2502 TIME:

3.3.6. BURNISH Gear: Highest Gear Ratio (Example: Overdrive) Speed: 40 - 0 mph = 30
Deceleration: 12 ft/s² Pedal Force: Limit does not apply here.

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	103	102	106	100		S E E
10	240	248	223	238	1.0	"
20	250	248	293	250	"	"
30	250	261	293	248	"	"
40	252	289	285	242	"	"
50	254	258	277	248	"	"
60	247	257	266	235	"	"
70	249	262	284	243	.9	"
80	237	245	257	235	"	"
90	232	243	261	228	"	"
100	226	241	260	220	"	"
110	233	248	258	229	"	"
120	237	255	280	235	"	"
130	243	258	283	241	"	"
140	244	256	275	238	"	"
150	243	247	272	243	"	"
160	228	235	268	235	"	"
170	226	230	268	234	"	"
180	223	229	271	233	"	"
190	221	231	275	229	"	"
200	225	229	273	238	"	"

RECORDED BY CE / TD

DATE 3-6-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: 4 wheel disc brake

Adjusted by: _____

Signature

Date: _____

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 88° F.	WIND DIR. / VEL.: CAF 11	ODO: 2195	TIME: 9:45 A.M.

3.3.7 SECOND EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ft					
		ACTUAL	MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.2	52.5	51.8	113	150	OK
	2	30.5	50.3	48.7	102	140	OK
	3	30.3	49.9	48.9	110	148	OK
	4	30.5	50.8	49.1	120	145	OK
	5	30.3	49.6	48.6	128	170	P.F. LIMIT
	6	30.6	51.3	49.3	91	135	OK
60 mph	1	60.2	193.4	192.1	103	142	OK
	2	60.6	182.8	179.2	94	144	OK
	3	60.3	178.2	177.0	89	152	P.F. LIMIT
	4	60.3	180.3	178.5	111	146	OK
	5	60.5	184.0	181.0	104	151	P.F. LIMIT
	6	60.9	186.8	181.3	113	143	OK

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)

Recorded by:

Daniel K. Hickey

Date:

3-8-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 72° F.	WIND DIR./VEL.: CALM	ODO: 2705 TIME: 11:55

3.3.16 FIRST RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Pedal Force: Not Required

Maintain Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	109	108	107	101	—	5, 5, 5
10	247	254	259	238	1.0	
20	234	240	272	249	(	
30	230	236	279	245	(	
35	230	238	278	245	1.0	5, 5, 5

RECORDED BY

David Hooley

DATE

3-8-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: WHEEL DISC ADJUSTERS

ADJUSTED BY:

Signature

DATE:

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: LLVW
AMBIENT TEMP.: 79° F.	WIND DIR./VEL.: N/A 0-5	ODO: 2742 TIME: 1:45 P.M.

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:			5000	61.0
Measured:	3090	1906	4996	61.8

3.3.10 THIRD EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED		STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS	
DESIRED	STOP P ACTUAL						
60 mph	1	60.2	171.5	172.4	41	136	OK
	2	60.3	153.0	151.5	103	144	OK
	3	60.3	162.6	161.0	99	146	OK
	4	60.3	160.3	159.7	90	153	P.F. LIMIT
	5	60.2	165.1	164.0	98	150	OK
	6	60.3	158.1	156.5	97	144	OK

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel H. HinesDate: 3-8-97

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: LLVW	
AMBIENT TEMP.: 80°F.	WIND DIR./VEL.: N/A 0-6	ODO: 2752	TIME: 2:45 P.M.

3.3.11 PARTIAL FAILURE (HYDRAULIC SYSTEM)

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Initial Brake Temperature: 150° - 200° F.

Speed: 60 - 0 mph

Lockup: Wheel lock-up permitted at any speed

3.3.11.1 Fluid level indicators, Remove brake fluid from one chamber of master cylinder reservoir until level is less than manufacturer's safe level, or to less than 1/4 of the chamber fluid capacity, whichever results in the higher level. Replace m/c cap, turn ignition on, and allow one minute. Record fluid level indicator operation. Yes _____ No _____ N/A ☒

3.3.11.2 Differential Pressure Indicators. Cause complete loss of one portion of brake system. Record brake pedal force or brake pressure differential to cause brake system failure indicator to operate. PF: _____ lb
Press: _____ psi. N/A ☒

3.3.11.3 Subsystem Failed: REARS Method of Simulating Failure: VALVING

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED		ACTUAL	ft		lb			
			MEASURED	CORRECTED	MIN	MAX		
60 mph	1	60.6	218.4	24.1	90	150	N	OK
	2	60.7	214.5	209.6	101	148	/	OK
	3	60.3	207.1	2050	109	146	)	OK
	4	60.3	206.7	2046	106	168	N	P.F. LIMIT

3.3.11.4 Restore brakes to normal operation and bleed brakes thoroughly (if required).

3.3.11.5 Repeat 3.3.11.1 through 3.3.11.4 above for the other subsystems of brake system:

Fluid Level Indicators: Yes _____ No _____ N/A ☒

Differential Pressure Indicators:

PF: _____ lb., Press: _____ psi. N/A ☒

Subsystem Failed: FRONTS Method of Simulating Failure: VALVING

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE
DESIRED		ACTUAL	ft		lb			AND
			MEASURED	CORRECTED	MIN	MAX		STABILITY COMMENTS
60 mph	1	60.5	490.9	462.8	94	157	N	P.F. LIMIT
	2	60.4	500.8	494.2	64	163	/	P.F. LIMIT
	3	60.4	478.9	472.6	27	148	/	OK
	4	60.3	481.8	472.0	107	146	N	OK

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by: Denise Hooker Date: 3-8-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 54°F	WIND DIR./VEL.: CALM	ODO: 2770	TIME: 7:45 A.M.

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3091	3309	6400	48.3
Measured:	3182	3404	6586	48.3

3.3.12 PARTIAL FAILURE (HYDRAULIC SYSTEM)

3.3.12.1 REPEAT 3.3.11. Fluid Level Indicator: Yes _____ No _____ N/A ☒

Differential Pressure Indicator: PF _____ lb Pressure: _____ psi N/A ☒

4 Stops: Minimum Stopping Distance Pedal Force: 15 - 150 lbs.

Gear: Highest Gear Ratio (Example: Overdrive) Speed 60 - 0 mph

Initial Brake Temperature: 150° - 200° F.

Lockup: Wheel lock-up permitted at any speed.

Subsystem Failed: FRONTS Method of Simulating Failure: VALVING

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	ft.		lb			
		MEASURED	CORRECTED	MIN	MAX		
60 mph	1	40.7	420.2	407.9	82 147	N	OK
	2	40.7	368.6	362.1	105 150	I	OK
	3	40.9	372.5	366.6	92 148	I	OK
	4	40.8	358.3	349.9	124 149	N	OK

Restore brakes to normal operation and bleed brakes thoroughly.

Repeat 3.3.11 for the other subsystem of brake system:

Fluid Level Indicators: Yes _____ No _____ N/A ☒

Differential Pressure Indicators:

PF: _____ lb., Press: _____ psi. N/A ☒

Subsystem Failed: REARS Method of Simulating Failure: VALVING

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	ft.		lb			
		MEASURED	CORRECTED	MIN	MAX		
60 mph	1	40.3	296.3	293.4	102 148	N	OK
	2	40.4	261.4	257.9	100 149	I	OK
	3	40.7	255.6	249.7	104 149	I	OK
	4	40.7	258.0	252.1	104 149	N	OK

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by Daniel R. Rios

Date: 3-9-97

GM

UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 62 °F.	WIND DIR./VEL.: S/W 0-5	ODO: 2784 TIME: 9:05 A.M.

PARTIAL FAILURE (APPLY SYSTEM)

NO ABS

Pedal Force: 15 - 150 lb

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Wheel lock-up: Permitted at any speed

Initial Brake Temperature: 150° - 200° F.

3.3.13 SERVICE BRAKE SYSTEM - PARTIAL FAILURE ANTILOCK AND/OR VARIABLE PROPORTIONING SYSTEMS (Where applicable)

Disconnect functional power source or otherwise render antilock system inoperative.

Method of simulating failure DISCONNECT FUSE

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.8	230.4	224.4	25	133	Y	NO W/S
	2 60.9	209.9	203.7	56	143	I	NO W/S
	3 60.8	183.9	179.1	72	160	I	P.F. LIMIT NO W/S
	4 60.2	181.4	180.2	98	144	Y	NO W/S

Restore antilock system to normal operation.

NO ABS 2

Disconnect variable proportioning system (if applicable). Method of simulating failure DISCONNECT ELECTRICAL PLUG

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.6	206.7	202.6	51	142	Y	NO W/S
	2 60.6	180.3	176.7	97	144	I	NO W/S
	3 60.6	189.0	185.3	102	144	I	NO W/S
	4 60.4	180.5	178.1	105	147	Y	NO W/S

Restore variable proportioning system to normal operation. Repeat for each subsystem provided.

3.3.14 Service Brake System - Inoperative Brake Power Unit or Brake Power Assist Unit. Perform either 3.3.14.1. or 3.3.14.2.

3.3.14.1 Disconnect the primary source of power. (Deplete all reserve power capability).

Method of rendering inoperative. NO BOOST

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.4	422.1	415.7	86	150	N	NO ABS NO W/S
	2 60.7	468.5	457.3	110	151	I	P.F. LIMIT NO W/S
	3 60.7	457.2	447.3	136	149	I	NO ABS NO W/S
	4 60.7	463.7	453.1	86	150	N	NO ABS NO W/S

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by Daniel HootenDate: 3-9-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 82° F.	WIND DIR./VEL.: N/A 0-5	ODO: 2815 TIME: 12:50 P.M.

3.3.15 FIRST FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.**3.3.15.1 Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².**

Initial Brake Temperature: 150° - 200° F.

Pedal Force: 10 - 60 lbs.

3.3.15.2 Fade - 10 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 10th fade stop, drive 1 mile @ 30 mph, then immediately into recovery stops.

3.3.15.3 Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s². Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop. Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 - 5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (>5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	25.0	10	146	137	163	156	OK
2	25.0		168	160	181	174	OK
3	25.0		183	175	193	187	OK
Avg.	25.0						
1	39.0	15	130	122	141	134	OK
2	39.0		221	213	240	217	
3	41.0		306	299	326	298	
4	41.0		386	382	402	371	OK
5	49.0		457	457	468	433	LIGHT FADE
6	52.0		520	524	530	492	FADDF
7	90.0		574	578	568	549	ODOR
8	71.0		626	630	611	586	
9	48.0		668	674	655	629	
10	46.0		698	705	686	662	FADE ODOR
1	22.0	10	640	631	601	617	OK
2	11.0		497	486	455	467	
3	17.0		407	389	371	405	
4	18.0		397	329	347	348	
5	19.0		306	284	307	311	OK

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by

David R. [Signature]

Date:

3-8-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 84° F.	WIND DIR./VEL.: N/E 0-3	ODO: 2330 TIME: 1:30 P.M.

3.3.16 SECOND RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Interval: Make stops at .5 mile intervals until average initial brake temperature ($250^{\circ} \pm 20^{\circ}$ F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE DEGREES F SECONDARY SHOE OR HOTTEST PAD				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	205	189	203	196	—	5, 5, 5
10	251	227	273	245	1.0	}
20	254	229	277	252	1	
30	257	232	274	257	1	
35	250	230	278	248	1.0	5, 5, 5

RECORDED BY

David Hoffman

DATE

3-9-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: 4 WHEEL DISC BRAKES

Adjusted by

Signature

Date:

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 87°F.	WIND DIR./VEL.: CALM	ODO: 2864 TIME: 2:48 PM

3.3.17 SECOND FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.

Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².

Pedal Force: 10 - 60 lbs.

Fade - 15 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² **WITHIN 1 SECOND** without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 15th fade stop, drive 1 mile at 30 mph, then immediately into recovery stops.

Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s² Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop.

Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 -5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE * F.				COMMENTS
	lb		LF	RF	LR	RR	
1	21.0	10	153	155	151	149	OK
2	23.0	5	176	176	174	168	OK
3	21.0	5	196	196	194	189	OK
Avg.	21.67						
1	33.0	15	138	123	146	137	OK
2	33.0	5	232	214	234	209	
3	35.0	5	317	305	315	276	
4	31.0	5	400	396	385	335	
5	28.0	5	469	472	445	389	
6	28.0	5	529	535	495	436	
7	50.0	5	581	586	521	489	OK
8	32.0	5	636	632	572	523	NDAP
9	31.0	5	668	677	620	565	
10	32.0	5	702	710	656	602	
11	32.0	5	732	734	676	637	
12	35.0	5	758	753	689	669	
13	34.0	5	781	775	706	699	
14	36.0	5	801	798	729	724	
15	38.0	5	822	818	745	719	NDAP
1	21.0	10	680	689	638	612	OK
2	11.0	5	537	562	531	473	
3	11.0	5	439	451	439	398	
4	18.0	5	374	377	380	347	
5	19.0	5	330	325	334	308	OK

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by: Donal R. [Signature]

Date: 3-7-93

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 56° F.	WIND DIR. / VEL.: S 0-8	ODO: 2885	TIME: 6:00 A.M.

3.3.16 THIRD RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature (250 ± 20° F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE °F				STOP INTERVAL	COMMENTS
	SECONDARY SHOE OR HOTTEST PAD					
	LF	RF	LR	RR		
1	87	82	85	83	—	S, S, S
10	264	250	242	224	.5 / .7	}
20	263	246	259	234	.8	
30	261	247	267	234	.8	
35	262	247	264	235	.8	S, S, S

RECORDED BY

Daniel Hooker

DATE

3-10-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used:

4 WHEEL DISC BRAKES

Adjusted by

Signature

Date:

GM

UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 67°F.	WIND DIR./VEL.: CALM	ODO: 2915 TIME: 8:20 A.M.

3.3.19 FOURTH EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

Stops as Noted below: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED		STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP ACTUAL	MEASURED	CORRECTED	MIN	MAX	
30 mph	1 30.5	43.2	41.8	85	141	OK
	2 30.4	43.3	42.2	108	140	OK
	3 30.2	41.7	41.1	125	152	P.F. LIMIT
	4 30.4	43.7	42.6	111	146	OK
	5 30.0	44.1	44.1	114	149	OK
	6 30.4	44.4	43.2	113	146	OK
60 mph	1 60.4	155.4	153.3	109	155	P.F. LIMIT
	2 60.5	152.1	149.6	116	149	OK
	3 60.2	155.2	154.2	99	151	P.F. LIMIT
	4 60.4	159.9	157.8	100	147	OK
	5 60.4	157.2	155.7	107	147	OK
	6 60.1	159.2	159.3	96	149	OK

NOTE: For vehicles with speed attainable in 2 miles of not less than 84 mph.
Record speed attainable in 2 miles 100 + mph.

80 mph	1 80.4	269.5	266.8	89	147	OK
	2 80.3	261.3	259.4	91	144	OK
	3 80.6	277.6	273.5	89	156	P.F. LIMIT
	4 80.4	276.6	273.9	81	152	P.F. LIMIT

Wind Speed: ☒ Below 15 mph (Any Direction) ☐ Between 15 & 30 mph (Cannot be Headwind)

Recorded by: Daniel Hooper Date: 3-10-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 79° F.	WIND DIR. / VEL.: N/E 0-5	ODO: 2942 TIME: 10:20 A.M.

3.3.20 WATER RECOVERY

Force: (Readings may be terminated at 5 mph although deceleration must be maintained throughout stop).

3.3.20.1 Baseline - 3 stops.Speed: **30 - 0 mph**Gear: **Highest Gear Ratio (Example: Overdrive)**Pedal Force: **10 - 60 lbs.**Deceleration: **10 ft/s²**Initial Brake Temperature: **150° - 200° F.**

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb	ft/s ²	LF	RF	LR	RR	
1	26.0	11.3	168	153	161	149	OK
2	24.0	12.1	188	181	185	165	OK
3	23.0	11.5	187	175	181	164	OK
Avg.	24.33						

3.3.20.2 WET RECOVERY - 5 STOPS

- (a) With brakes fully released at all times, wet brakes for at least 2 minutes by driving at a speed of 5 mph maximum in any combination of reverse and forward directions, in a trough with water depth of 6.0 in.
- (b) After leaving trough, immediately accelerate at maximum rate to 30 mph without brake application. Make 5 successive stops, each from 30 mph at deceleration of 10 ft/s² in normal driving gear. After each stop, except the last, immediately accelerate at maximum rate to 30 mph and begin the next stop.

Each stop must obtain a 10 to 10.5 ft/s² deceleration using a ramp apply not a spike apply. Maintain 10 ft/s² throughout stop.**PEDAL FORCE:**

Max. Pedal Force: Stops 1 - 4, 150 lb., Stop 5, Baseline avg. + 60 lb. (< 110 lb.)

Min. Pedal Force: Baseline avg. - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.)

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	COMMENTS
	lb	ft/s ²	
1	21.0	12.4	OK
2	23.1	12.8	}
3	29.0	12.3	
4	32.0	11.5	
5	33.0	11.3	OK

Recorded by: Daniel HooleyDate: 3-10-97

GM

UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 84°F	WIND DIR./VEL.: N/E 0-12	ODO: 2946 TIME: 12:05 P.M.

3.3.21 SPIKE STOPS

(a) Force - Controlled Stops, Make 10 successive Spike Stops.

Pedal Force: 200 lb in 0.08 seconds or less. 200 lb minimum required throughout stop.

Lock - up: Wheel lock - up permitted at any speed.

Speed: 30 - 0 mph

Gear: Neutral

Initial Brake Temperature: 150° - 200° F. average across axle.

10 Stops

STOP NUMBER	PEDAL FORCE lb	INITIAL SPEED mph	TIME TO REACH 200 lb PEDAL FORCE seconds	MAINTAIN 200 lbs	COMMENTS
1	348	30.5	0.05	Y	OK
2	365	30.5	0.05	Y	OK
3	342	30.7	0.05	Y	OK
4	340	30.5	0.05	Y	OK
5	335	30.3	0.05	Y	OK
6	346	30.0	0.05	Y	OK
7	354	30.3	0.05	Y	OK
8	320	30.6	0.05	Y	OK
9	328	30.4	0.05	Y	OK
10	374	30.3	0.05	Y	OK

(b) Effectiveness (Check) Stops

Pedal Force: 15 - 150 lb

Speed: 60 - 0 mph

Gear: Neutral

6 Stops for Minimum Stopping Distance

TEST SPEED MPH			STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			MEASURED	CORRECTED	MIN	MAX	
60 mph	1	60.5	176.0	173.1	82	181	P.F. LIMIT
	2	60.6	176.3	172.2	65	130	OK
	3	60.5	168.3	165.5	79	175	P.F. LIMIT
	4	60.3	170.3	168.6	65	139	OK
	5	60.4	165.1	162.9	57	139	OK
	6	60.6	165.0	161.7	95	145	OK

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel KosterFinish ODO: 2973Date: 3-10-97

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	ODO: 2000	TIME: 18.20
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3.3.22 FINAL INSPECTION

YES

NO

3.3.22.1 Test completed without detachment or fracture of any component of the braking systems, such as brake springs, brake shoe or disc pad facing, other than minor cracks. A major crack does not meet the requirement. A major crack is a crack across the shoe with an obvious gap.

All mechanical components of the braking system are intact and functional.

Friction facing tearout does not exceed 10% of the lining on any single frictional element.

3.3.22.2 Test completed without any visible brake fluid or lubricant on:

- (1) the friction surface of the brake
- (2) at the master cylinder
- (3) at the power unit reservoir cover
- (4) at the seal and filler openings

Lining and/or Drum/Rotor Appearance LH N/A & RH N/A LINING TO DRUM CLEARANCE

	CONTACT	GLAZE	STREAK	DUST	OTHER COMMENTS	
PRI OR OUT	LF 100 %	MOD	Light	Light		
	RF 100 %	MOD	Light	Light		
	LR 100 %	MOD	Light	Light		
	RR 100 %	MOD	Light	Light		
SEC OR IN	LF 100 %	MOD	Light	Light		
	RF 100 %	MOD	Light	Light		
	LR 100 %	MOD	Light	Light		
	RR 100 %	MOD	Light	Light		
	RESIN	BLUING	RINGING	STREAKS	FINISH	
DRUM OR DISC	LF Light	MOD	Light	Light	Glossy	
	RF Light	MOD	Light	Light	Glossy	
	LR Light	Light	Light	Light	Glossy	
	RR Light	Light	Light	Light	Glossy	

Recorded by: Chris Schumann Date: 10/11/1998

NOTE: Sections 3.3.22.4, 3.3.22.5, and 3.3.22.6 may be completed using engineering documentation, i.e., drawings, layouts, or lab tests.

3.3.22.4 Measure minimum reservoir fluids capacity

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.5 Inspect labeling (master cylinder, brake power unit, etc.).

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.6 Inspect brake system indicator lamps method used.

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.23 Moving barrier Test

Method Used. Reference "Motor Vehicle Safety Compliance Summary"



Model Year	Platform	Model #	Requirement #	UPC/Veh. Partition	Procedure #	Project #	PER/Report #
2000	GMT830	K15906	See Below	5	8548V	8035K	P0R13-73 Seq. 005

NAO Evaluation Report

GM Confidential

Reference Issue Report (IR) #: _____ Category: _____

Date: 29Dec98☒ FinalTitle: Brake System Testing☐ Interim☐ Reissue Date of Reissue: _____To: R.J. HicksFrom: T.R. HickeyDates of Evaluation: 28Apr98 to 07May98

Objective: To measure the R2 FMVSS 105 Validation performance of a MY 2000 JC5 brake system. Park brake section of test omitted.

Conclusions: Vehicle completed test.

Requirements: GMT800 VTS, Rev 3+, 17Aug97 / GMT800 20.4, Rev.-15, 14Sep98

3.2.1.1.3.1 The vehicle shall comply with all requirements specified in FMVSS 105.

Design Evaluated:

Name	Veh/Buck/Part No./RPO	Revision Date/Level
Brake System	KS0027/JC5	

Procedure/Method: Procedure 8548V

Results: Vehicle completed test. Park brake section was not performed. See summary sheet for results.


 Author: T.R. Hickey Date: 2-9-99
 Engineer-
 Brake Test/Development
 DPG


 Approver: R.R. Iglewski Date: 09Feb99
 Supervisor-
 GMTG Brake Development/Validation
 DPG

GENERAL MOTORS CORPORATION

Truck Engineering Operation

Uniform Test Specifications

Vehicle and Component Tests

T.W.O. No: P0R13-73 Page 2 of 27

VEHICLE: **KS0027** Make: CHEVROLET Model: 10906 WB: 130.00 Axle: 3.73:1 SINGLE Test No.: **8035K**
 Engine: 5.3L/LM7 Transmission: A4/MT1 Tires: FIRESTONE P265/70R16 40/40 TWO Number: P0R13-73
 PURPOSE: TO MEASURE THE R2 FMVSS 105 VALIDATION PERFORMANCE OF A MY 2000 JC5 BRAKE SYSTEM

RESULTS: VEHICLE COMPLETED TEST AND MET ALL REQUIREMENTS. PARK BRAKE SECTION OF TEST WAS OMITTED.

BRAKES: 2000 JC5	Size/Type	Piston	Linings	Total	Front	%Front
Fronts:	305X29MM/DISC	2X51MM	AKNS161H	GVWR 7206	3414	47.4
Rears:	330X30MM/DISC	2X45MM	AKNS161H	LLVW 5724	3212	56.1

APPLY SYSTEM: Booster VACUUM/TANDEM M/C Dia. 34 Pedal Ratio: 4.72:1
 ANTI-LOCK: 4WAL / EBC325 / GM124BDA
 BALANCE SYSTEM: DRP / TEST LOCATION: DPG EAST STR From Date: 28AP98 789 To Date: 07MY98 1435

TEST	PORTIONS	REQ.	TEST RESULTS	%PASS (Failed)	APPLY FORCE MAX	COMMENTS
1st Eff.	30 mph 60 mph	65 ft 242 ft	50 ft 177 ft	24% 27%	144 148	ABS ABS
2nd Eff.	30 mph 60 mph	57 ft 216 ft	49 ft 180 ft	13% 17%	140 147	ABS
PARK BRAKE	GVWR Uphill GVWR Dnhill LLVW Uphill LLVW Dnhill	90 lbs w/Hndl. 125 lbs pedal Hold 5 minutes Warn Lt Opr.				
3rd Eff.	60 mph	216 ft	167 ft	23%	133	ABS
Partial System 60 mph	LLVW Rears Only LLVW Frts Only GVWR Rears Only GVWR Frts Only	517 ft	378 ft 230 ft 330 ft 261 ft	27% 55% 36% 49%	137 129 127 144	LT.N/A lbs. LT.N/A lbs. LT.N/A lbs. LT.N/A lbs. (Failed)
Failed Comp.	Anti-Lock 60 mph L.S.P.V.	517 ft	203 ft 203 ft	61% 61%	101 139	NO WS NO WS
Failed Power	Sys 1 60 mph Sys 2	517 ft	358 ft	31%	148	NO WS
1st Fade	Baseline 30 mph Fade 1-5 60 mph Fade 6-10 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	25% 88% 3% 76% 58%	23 38 146 20 19	FADE, FADE, FADE! GOOD RECOVERY
2nd Fade	Baseline 30 mph Fade 1-10 60 mph Fade 11-15 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	21% 88% 88% 99% 90%	20 35 36 22 19	VERY STABLE GOOD RECOVERY
4th Eff.	30 mph 60 mph 80 mph	65 ft 242 ft 459 ft	44 ft 168 ft 277 ft	33% 31% 40%	130 145 138	ABS ABS ABS
Water Rec.	Baseline 30 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 10ft/sec2 Base + 45 lbs	10 ft/sec2 10 ft/sec2 10 ft/sec2	31% 98% 98%	26 28 26	
Spike Stops	10 Spikes 30 mph	200 lbs .08 sec.		Yes	326	
Final Eff.	60 mph	242 ft	164 ft	32%	146	ABS

* unless otherwise specified, the max apply force will be 150 lbs.

Tester:

Summarized by: T.R. HICKEY

Summary Print Date: 08MY98

BUILD AND TEST SPECIFICATION SHEET

T.W.O. No: P0R13-73 Page 3 of 27

TWO No : P0R13-73

Seq No : 005

DPG No :

Veh No : KS0027

Test No : 8035K

Test Purpose : To measure the R2 FMVSS 105 Validation performance of a MY 2000 JC5 brake system.

Test Results : Vehicle completed test. See data for results.

Comments : Akebono AKNS161H front linings, Akebono AKNS161H rear linings, Firestone P265/70R16 tires and ABS software GM124BDA. Park brake section of test was omitted.

VEHICLE INFORMATION

Year : 2000
Brake RPO : JC5
Name Plate : Chevrolet
Veh Model : K15906
Vehicle VIN : 1GCFK16U4YX
Wheel Base : 130.0

Engine : 5.3/LM7
Transmission : A4/MT1
Axle Ratio : 3.73:1
Single/Dual : Single
Odo Cal :
Engine RPM :

TIRE INFORMATION

Tire Size : P265/70R16
Tire Make : Firestone
Tire Type : ALS
Wheel Code : RJP
Wheel Size : 16X6.5
Tire Pressure (PSI) : 40/40

Steel

TEST INFORMATION

Procedure No : 8548V

Test Type : FMVSS R2-105 Cert. Test (R2-5-105G-82)

Start Date : 04/28/98

Start Odo : 789

Finish Date : 05/07/98

Finish Odo : 1435

TEST WEIGHT (lbs)

As Tested

Design Weights

	GVWR	LLVW	GVWR	LLVW
Front :	3414	3212	3411	3080
Rear :	3792	2612	3789	2458
Total :	7206	5824	7200	5538
%Front :	47.4	55.2	47.4	55.6
Tire Radius :	14.9	15.0	14.9	15.0
Frt Axle to CG	68.4	58.3	68.4	57.7
CG Height :				

FRONT SYSTEM

Type : Disc, Delphi
Rotor ASM : 15716362B
Rotor Size : 305 x 29 mm
Piston Dia : 51 mm
No Pistons : 2

Notes : CALIPER S/N L: R:

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : KA
Service Kit : 18026217AA
Noise Treat : CLD-6
Caliper ASM : 18025706/7BA

	Rivet/Bonded	Min Thick
Bonded		0.502
Bonded		0.502

REAR SYSTEM

Type : Disc, Delphi
Rotor ASM : 15712802BA
Rotor Size : 330x30 mm
Piston Dia : 45 mm
No Pistons : 2
PB Lining :

Notes : CALIPER S/N L: R:

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series :
Service Kit : TX118361A
Noise Treat : None
Caliper ASM : 18024200/1
PB Service Kit :
PB Min Thk :

	Rivet/Bonded	Min Thick
Bonded		0.415
Bonded		0.415

APPLY SYSTEM

Booster Type : Vacuum/Tandem
Size : 260T mm
ASM : 18022485Q
Code : DC
Pedal Ratio : 4.72:1
Pedal Apply Radius :
P.T. @ 50 LBS : 45 mm

Master Cyl ASM : 18024194F

Code : XD

Dia : 34 mm

Min Dis Frt Port : 12.9 cc
cc @ 0psi Rear Port : 12.8 cc

Code: Meter / Split / Slope

BALANCE SYSTEM

Comb Valve ASM : None
Height Sens Valve : None

ANTI LOCK

Anti Lock System : 4WAL
Anti Lock Comments : EBC325 - System balance controlled by DRP.

Anti Lock Software Level : GM124BDA

Engineer: T.R. HICKEY

Date : 01/29/99

* Measurements in INCHES unless otherwise specified

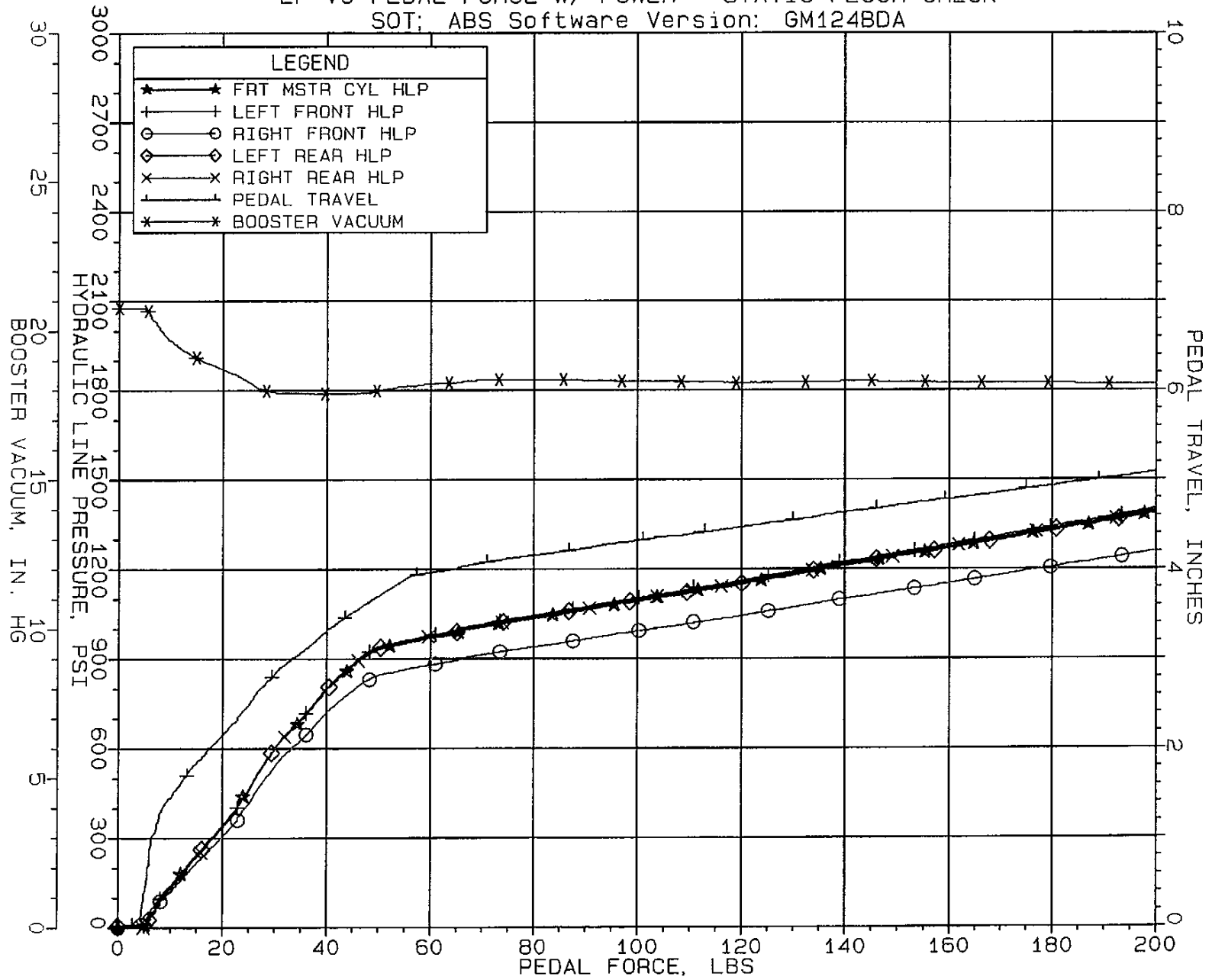
SPECCKOK rev. 082495

GM CONFIDENTIAL

MVSS 105 VALIDATION TEST 8035K [KS0027]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

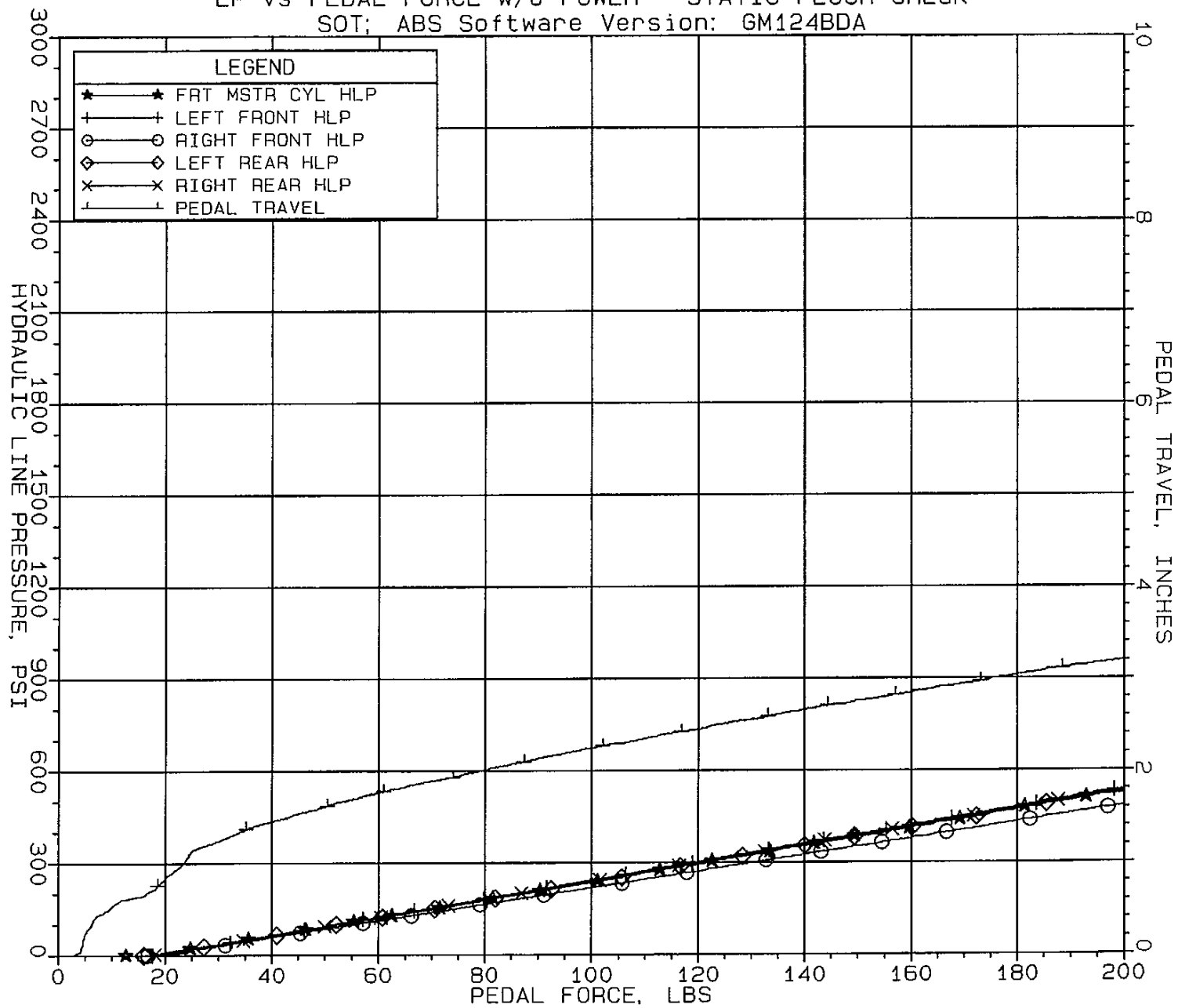
SOT; ABS Software Version: GM124BDA



MVSS 105 VALIDATION TEST 8035K [KS0027]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

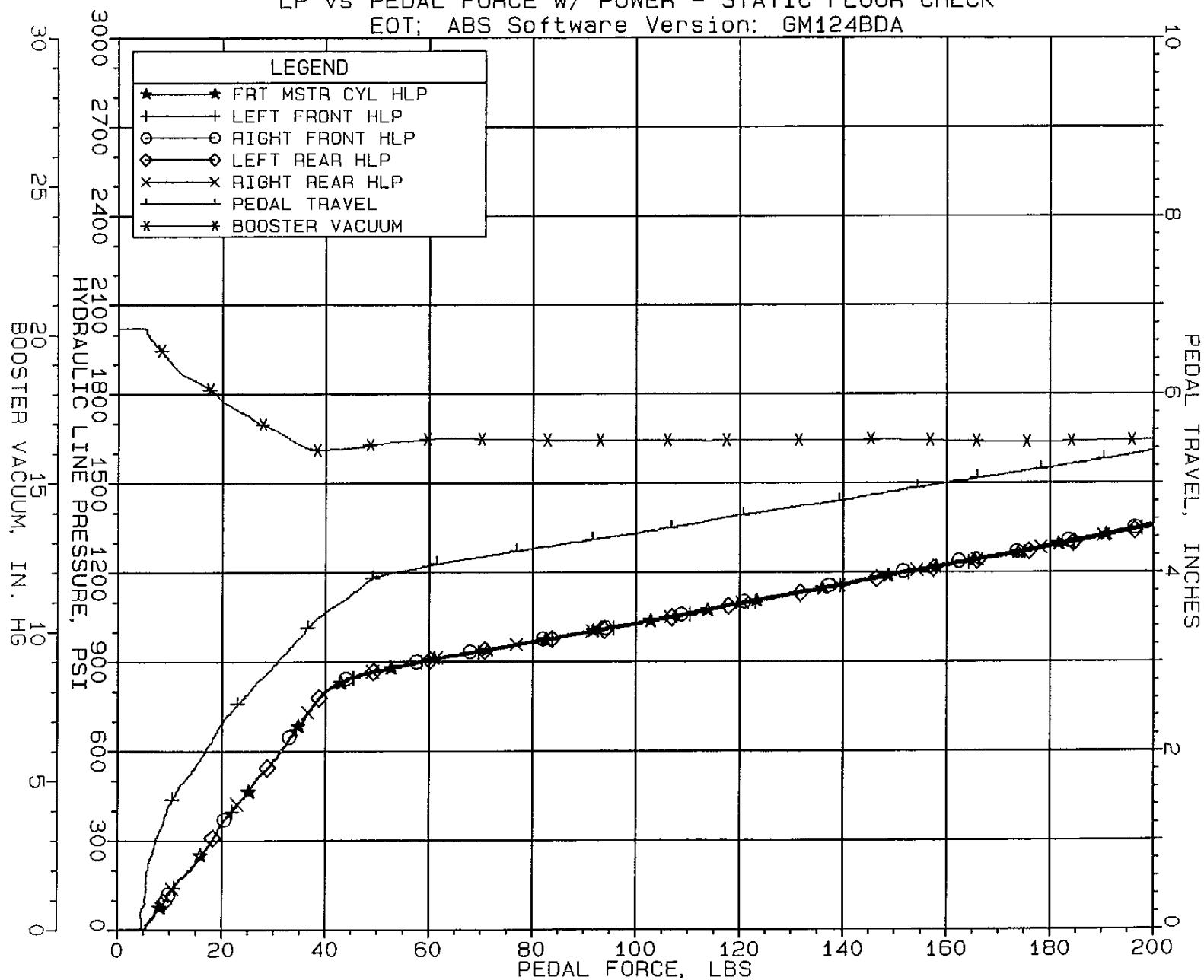
SOT; ABS Software Version: GM124BDA



MVSS 105 VALIDATION TEST 8035K [KS0027]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

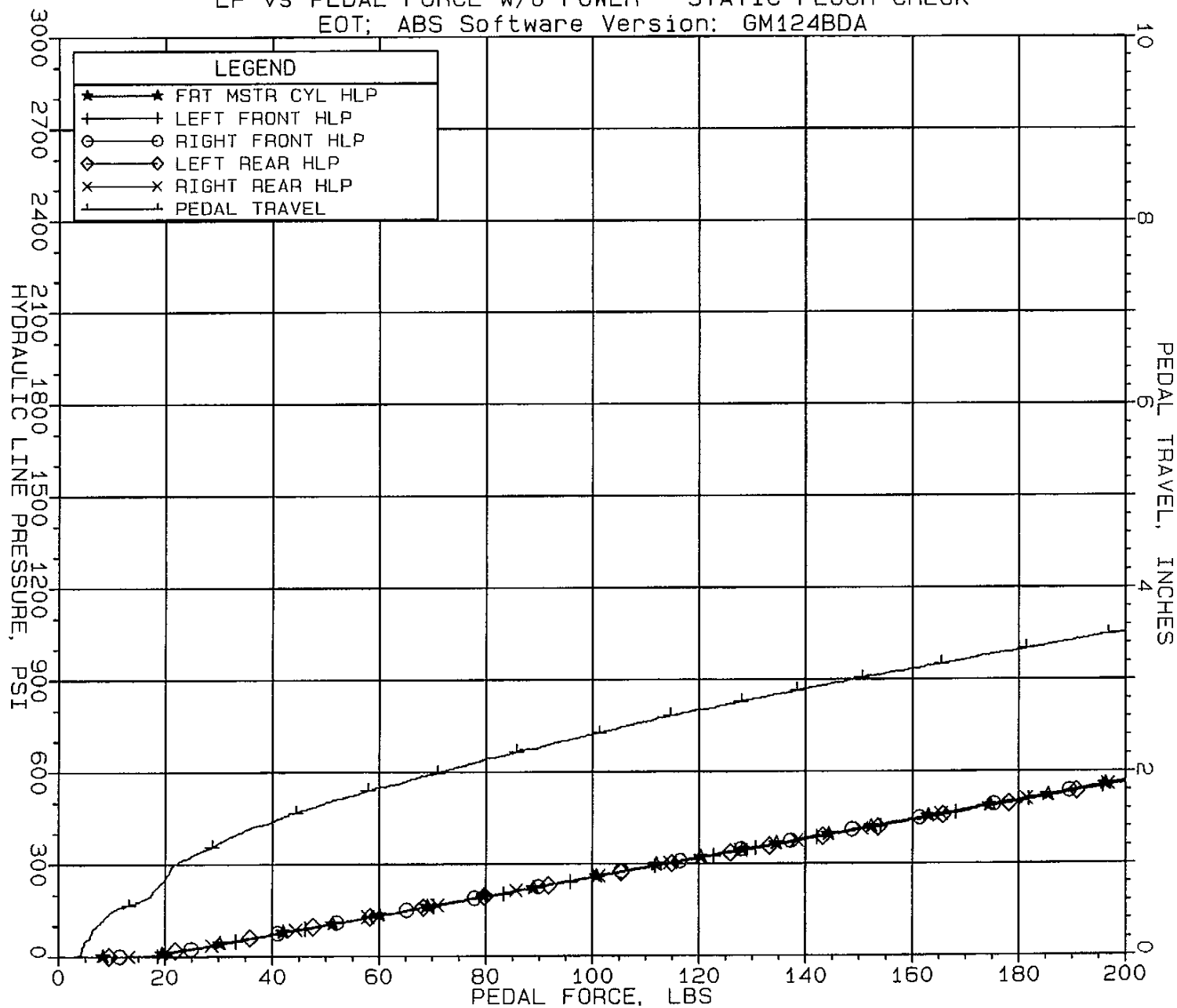
EOT; ABS Software Version: GM124BDA



MVSS 105 VALIDATION TEST 8035K [KS0027]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

EOT; ABS Software Version: GM124BDA



Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.:	WIND DIR. / VEL.: <i>VA / 15 mph</i>	ODO: <i>774</i>	TIME: <i>0740</i>

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3,411.00	3,789.00	7,200.00	47.4
Measured:	3414	3792	7206	47.32%

3.3.4 PRETEST CHECK

10 Stops, 40 mph between stops.

Deceleration: 10 ft/s^2

Gear: Highest Gear Ratio (Example: Overdrive)

Interval: 1 mile

Speed: 30 - 0 mph

Brake Temperature: Are recorded 0.2 to 0.1 mile prior to stop.

[illegible]

In the event of instrumentation malfunction and / or repair, do not make more than 10 additional stops.

Recorded by: m

Date: 29 April 8

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.:	WIND DIR./VEL.: <i>VA / 15 mph</i>	ODO: <i>803</i>	TIME: <i>1015</i>

3.3.5 FIRST EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP P	ACTUAL					
			ft		lb		
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.6	58.4	56.13	49.3	91.8	
	2	30.7	58.6	55.95	47.1	136.7	
	3	30.8	52.2	49.52	58.6	144.0	ABS
	4	30.7	53.8	51.37	63.5	145.3	ABS
	5	30.6	50.8	48.82	87.1	152.8	> P.F. limit!
	6	30.7	53.0	50.60	27.8	135.5	ABS
60 mph	1	60.6	195.6	191.74	93.8	141.1	
	2	60.5	181.4	181.35	69.9	133.1	ABS
	3	60.3	181.0	177.12	80.1	120.1	ABS
	4	61.2	181.4	177.23	88.4	137.9	ABS
	5	60.5	23.1	145.52	74.2	123.8	ABS
	6	60.5	181.5	176.50	92.8	140.9	ABS

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: *m*Date: *29 Apr 98*

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.:	WIND DIR./VEL.: E / 8 mph	ODO: 851 TIME: 2:34 PM

3.3.6. BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Pedal Force: Limit does not apply here.

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

1868

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	144	145	146	154	10 @ .5	Straight, smooth - no noises. Held temps (.1) from readings
10	226	231	286	285	10 @ 1.0	
20	222	236	296	293	10 @ 1.0	
30	222	233	293	294	↓ ↓	
40	223	231	293	296		
50	223	231	288	294	↓ ↓	
60	217	218	267	277		
70	216	218	276	289	10 @ 1.0	
80	224	221	285	296	↓ ↓	
90	214	215	273	287		
100	220	218	261	272	30-5 30-9 10 @ 1.0	
110	207	208	266	278	10 @ 1.0	
120	205	206	265	275	10 @ 1.0	
130	205	203	260	270	↓ ↓	
140	205	203	259	268		
150	205	201	248	256	30-5 30-9 30-7 40-10	
160	213	210	266	275	30-10 30-9	
170	198	197	251	260	30-9 10 @ 1.0	
180	197	196	247	256	10 @ 1.0	
190	256	242	281	289	5 @ .5 / 5 @ .6	
200	231	230	291	298	10 @ .7	

RECORDED BY Don Burns DATE 4-29-98

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: n/aAdjusted by: n/a m

Signature

Date: _____

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST # : 8035K	VEHICLE # : KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.: 73.2°F / 61.0°F	WIND DIR. / VEL.: E / 15.1 mph	ODO: 1058 TIME: 0720

3.3.7 SECOND EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			ft	lb			
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.7	56.6	54.04	73.5	113.3	
	2	30.6	53.3	51.23	75.0	107.2	
	3	30.7	51.8	49.46	126.0	160.2	> P.F. limit!
	4	30.8	54.3	51.51	71.2	134.2	
	5	30.7	52.5	50.13	95.2	137.4	
	6	30.6	51.4	49.40	88.6	140.1	
60 mph	1	60.6	187.8	181.10	60.3	149.1	ABS
	2	60.5	186.8	182.21	70.8	146.2	ABS
	3	60.3	181.6	179.80	81.5	130.6	ABS
	4	60.5	185.9	182.83	89.6	137.3	ABS
	5	60.2	180.8	177.60	127	146.2	ABS
	6	60.0	174.3	176.40	81.4	131.8	1.

Wind Speed: ~~14~~ Below 15 mph (Any Direction)

[] Between 15 & 30 mph (Cannot be Headwind)

Recorded by: WDate: 30 Apr 8

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 73.2°F / < 100°F	WIND DIR. / VEL.: calm	ODO: 1074	TIME: 08:15

3.3.16 FIRST RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Pedal Force: Not Required

Maintain Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	204	202	167	175	—	
10	222	222	227	226	0.5 - 1.0	
20	270	216	286	286	1.0	
30	271	219	286	287	1.0	
35	233	212	28	236	1.0	

RECORDED BY: mDATE: 2011-03

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: 1/2ADJUSTED BY: m

Signature

DATE: 2011-03

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: LLVW	
AMBIENT TEMP.: 73.2°F / 4100°F	WIND DIR./VEL.: W / 510 mph	ODO: 1120	TIME: 1345

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3,080.00	2,458.00	5,538.00	55.6
Measured:	<u>3,212</u>	<u>2,612</u>	<u>5,824</u>	<u>55.15 %</u>

3.3.10 THIRD EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP P	ACTUAL					
60 mph	1	60.4	188.0	188.51	24.5	128.9	ABS
	2	60.5	171.7	171.56	49.6	117.4	ABS
	3	60.5	126.0	123.18	60.8	131.6	ABS
	4	60.0	171.0	171.00	65.9	126.0	ABS
	5	60.1	121.0	122.92	56.2	121.0	ABS
	6	60.7	121.0	120.50	51.5	133.1	ABS

Wind Speed: ☒ Below 15 mph (Any Direction) ☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: WJDate: 30 Apr 98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: LLVW
AMBIENT TEMP.: 73.2°F / 23.5°C	WIND DIR./VEL.: E / 10 mph	ODO: 1138 TIME: 11:00

3.3.11 PARTIAL FAILURE (HYDRAULIC SYSTEM)

Fluid Jumper

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Initial Brake Temperature: 150° - 200° F.

Speed: 60 - 0 mph

Lockup: Wheel lock-up permitted at any speed

3.3.11.1 Fluid level indicators. Remove brake fluid from one chamber of master cylinder reservoir until level is less than manufacturer's safe level, or to less than 1/4 of the chamber fluid capacity, whichever results in the higher level. Replace m/c cap, turn ignition on, and allow one minute. Record fluid level indicator operation. Yes ☒ No ☐ N/A ☐

3.3.11.2 Differential Pressure Indicators. Cause complete loss of one portion of brake system. Record brake pedal force or brake pressure differential to cause brake system failure indicator to operate. PF: _____ lb
Press: _____ psi. N/A ☒

3.3.11.3 Subsystem Failed: 2-Wheel Method of Simulating Failure: bypass valve

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	ft MEASURED	ft CORRECTED	lb MIN	lb MAX		
60 mph	1 60.3	246.4	244.0	50.3	130.9	Y	RUN 1
	2 60.5	234.0	230.1	51.6	128.2	Y	RUN 3
	3 60.3	235.9	233.6	58.9	135.5	Y	RUN 5
	4 60.4	241.5	238.3	53.3	134.1	Y	RUN 7

3.3.11.4 Restore brakes to normal operation and bleed brakes thoroughly (if required).

3.3.11.5 Repeat 3.3.11.1 through 3.3.11.4 above for the other subsystems of brake system:

Fluid Level Indicators: Yes ☒ No ☐ N/A ☐

Differential Pressure Indicators:

PF: _____ lb., Press: _____ psi. N/A ☒

Subsystem Failed: Front Method of Simulating Failure: bypass valve

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	ft MEASURED	ft CORRECTED	lb MIN	lb MAX		
60 mph	1 59.8	388.1	390.7	77.2	150.9	Y	2 PF limit ABS RUN 2
	2 60.7	386.5	377.6	57.8	136.2	Y	ABS RUN 4
	3 59.6	383.1	388.3	60.8	141.6	Y	ABS RUN 6
	4 60.4	383.9	388.7	45.0	110.7	Y	ABS RUN 8

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: [☒ Below 15 mph (any direction)] [☐ Between 15 & 30 mph (cannot be headwind)]Recorded by: WDate: 30 April 78

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 73.2°F / 2100°F	WIND DIR. / VEL.: calm	ODO: 1155	TIME: 0655

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3,411.00	3,789.00	7,200.00	47.4
Measured:	<u>3,426</u>	<u>3,784</u>	<u>7,210</u>	<u>47.51%</u>

3.3.12 PARTIAL FAILURE (HYDRAULIC SYSTEM)

Fluid Jumper

3.3.12.1 REPEAT 3.3.11.

Fluid Level Indicator: Yes ☒ No ☐ N/A ☐Differential Pressure Indicator: PF ☐ lb Pressure: ☐ psi N/A ☒

4 Stops: Minimum Stopping Distance

Pedal Force: 15 - 150 lbs.

Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 60 - 0 mph

Initial Brake Temperature: 150° - 200° F.

Lockup: Wheel lock-up permitted at any speed.

Subsystem Failed: Rear Method of Simulating Failure: bypass valve

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED		ACTUAL	ft.		lb			
			MEASURED	CORRECTED	MIN	MAX		
60 mph	1	60.2	275.9	273.74	47.4	141.1	Y	Run 1
	2	60.2	262.9	261.16	37.0	103.3	Y	" 3
	3	60.4	266.2	262.68	82.3	133.3	Y	" 5
	4	60.2	262.1	264.45	90.8	137.2	Y	" 7

Restore brakes to normal operation and bleed brakes thoroughly.

Repeat 3.3.11 for the other subsystem of brake system:

Fluid Level Indicators: Yes ☒ No ☐ N/A ☐

Differential Pressure Indicators:

PF: ☐ lb., Press: ☐ psi. N/A ☒Subsystem Failed: Front Method of Simulating Failure: bypass valve

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS	
DESIRED		ACTUAL	ft.		lb				
			MEASURED	CORRECTED	MIN	MAX			
60 mph	1	60.4	348.1	343.50	61.3	132.8	Y	ABS	Run 2
	2	60.2	335.2	330.43	57.6	126.2	Y	ABS	" 4
	3	60.6	334.5	331.83	6.6	125.2	Y	ABS	" 6
	4	60.2	336	331.17	80.1	145.5	Y	ABS	" 8

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: 11 Below 15 mph (any direction) [] Between 15 & 30 mph (cannot be headwind)Recorded by: W Date: 01MY98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.: >32°F / <100°F	WIND DIR./VEL. NA / 0 mph	ODO: 1175 TIME: 0930

PARTIAL FAILURE (APPLY SYSTEM)

Pedal Force: 15 - 150 lb

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Wheel lock-up: Permitted at any speed

Initial Brake Temperature: 150° - 200° F.

3.3.13 SERVICE BRAKE SYSTEM - PARTIAL FAILURE ANTILOCK AND/OR VARIABLE PROPORTIONING SYSTEMS (Where applicable)

Disconnect functional power source or otherwise render antilock system inoperative.

Method of simulating failure disable switch to: ABS-off/DRP-on

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED		ACTUAL	ft.		lb			
			MEASURED	CORRECTED	MIN	MAX		
60 mph	1	60.5	206.9	203.43	31.0	101.5	Y	no ws
	2	60.2	202.2	201.55	11.8	18.2	Y	< PF limit, moderate-LRWS
	3	60.9	215.3	208.44	18.8	100.4	Y	LRWS
	4	60.1	224.2	223.55	23.2	83.8	Y	no effect, -!

Restore antilock system to normal operation.

Disconnect variable proportioning system (if applicable). Method of simulating failure disable switch to: ABS-off/DRP-off

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED		ACTUAL	ft		lb			
			MEASURED	CORRECTED	MIN	MAX		
60 mph	1	60.5	228.8	225.02	24.7	123.8	Y	No WS
	2	60.2	213.8	208.12	15.2	142.1	Y	No WS
	3	60.4	203.6	202.58	27.4	128.2	Y	No WS
	4	60.1	- .6	202.72	20.0	122.0	Y	No WS

Restore variable proportioning system to normal operation. Repeat for each subsystem provided.

3.3.14 Service Brake System - Inoperative Brake Power Unit or Brake Power Assist Unit. Perform either 3.3.14.1. or 3.3.14.2.

3.3.14.1 Disconnect the primary source of power. (Deplete all reserve power capability).

Method of rendering inoperative disconnect from battery

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED		ACTUAL	ft		lb			
			MEASURED	CORRECTED	MIN	MAX		
60 mph	1	60.6	103.2	97.5	121.1	151.5	N	> PF limit 4
	2	60.3	110.6	96.23	91.1	102.1	N	no ws
	3	60.2	377.1	171.24	120.6	13.5	N	no ws
	4	60.4	262.8	358.01	128.2	113.2	N	no ws

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by [signature]Date: 01/11/98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.: 72.2° / 21.0°	WIND DIR. / VEL.: N / 0.0 mph	ODO: 1210 TIME: 12:10

3.3.15 FIRST FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.**3.3.15.1 Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².**

Initial Brake Temperature: 150° - 200° F.

Pedal Force: 10 - 60 lbs.

3.3.15.2 Fade - 10 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 10th fade stop, drive 1 mile @ 30 mph, then immediately into recovery stops.

3.3.15.3 Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s². Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop. Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 - 5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (>5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	23.2	10.73	149	149	162	170	
2	22.0	11.26	166	163	180	188	
3	22.0	11.23	172	171	193	199	
Avg.	22.73	—	—	—	—	—	
1	41.2	16.32	132	129	145	154	
2	13.0	16.45	212	201	222	225	
3	18.8	16.49	298	274	302	312	
4	51.0	16.29	274	344	275	386	
5	18.1	16.85	440	407	429	450	
6	20.8	16.66	417	461	412	502	
7	11.1*	14.56	545	522	524	550	Fade, Fade, Fade! *0.1.0 mph, > RE limit!!
8	61.5	17.26	605	595	555	566	
9	70.2	16.53	644	638	513	606	
10	62.4	16.61	672	671	627	640	
1	20.2	11.42	577	518	566	585	Good recovery!
2	20.5	11.60	456	477	471	476	
3	17.8	11.22	371	408	357	433	
4	20.5	11.21	317	327	364	371	
5	17.8	11.20	384	377	326	356	

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by: W Date: 01/11/98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.: >22°F / <100°F	WIND DIR./VEL.: VA / ≤ 15 mph	ODO: 1232	TIME: 1440

3.3.16 SECOND RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Interval: Make stops at .5 mile intervals until average initial brake temperature (250° ± 20° F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE DEGREES F SECONDARY SHOE OR HOTTEST PAD				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	187	187	212	206	—	
10	234	227	279	293	0.5 - 1.0	
20	228	228	283	299	1.0	
30	232	232	282	305	1.0	
35	235	234	284	304	1.0	

RECORDED BY m DATE 01M498

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: auto adjAdjusted by m/a

Signature

Date:

GM

UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.: 73°F / 100°F	WIND DIR./VEL.: VA / 15 mph	ODO: 1275 TIME: 0630

3.3.17 SECOND FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.

Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².

Pedal Force: 10 - 60 lbs.

Fade - 15 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 15th fade stop, drive 1 mile at 30 mph, then immediately into recovery stops.

Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s². Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop.

Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 - 5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	21.2	10.87	157	157	163	167	
2	21.0	10.85	172	174	179	182	
3	18.8	10.58	188	189	195	199	
Avg.	20.33	—	—	—	—	—	
1	33.9	16.60	111	111	137	124	
2	41.0	16.23	188	188	201	203	
3	46.9	16.44	269	271	287	283	
4	34.9	17.61	343	345	356	354	
5	30.5	17.56	401	409	415	419	
6	28.8	16.90	466	465	466	471	
7	31.0	17.08	520	513	504	510	
8	27.8	17.13	572	560	537	528	
9	28.6	17.11	614	603	578	584	
10	27.3	16.18	648	636	615	620	
11	27.4	16.40	678	662	642	652	
12	32.7	16.28	703	686	667	681	
13	33.1	16.52	725	708	686	704	
14	35.1	16.21	740	726	701	723	
15	37.8	16.02	756	742	711	739	Very stable!
1	22.2	11.22	637	647	636	654	Good recovery!
2	20.7	11.28	478	525	526	535	
3	18.8	10.24	397	434	460	477	
4	21.5	11.51	326	356	400	414	Shot slipped on pedal!
5	19.5	10.23	272	273	352	362	

Wind Speed: VA Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by VWDate: 02/11/98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.: >32°F / <100°F	WIND DIR./VEL.: VA / 15 mph	ODO: 1302	TIME: 0810

3.3.16 THIRD RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature (250 ± 20° F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	154	156	151	161	—	
10	223	222	250	266	0.5 - 1.0	
20	204	213	252	261	1.0	
30	207	212	248	260	1.0	
35	207	212	247	251	1.0	

RECORDED BY *m*DATE 06 MAY 98

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: auto lockAdjusted by *n/a*

Signature

Date: —

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.: > 22° / 100° F <	WIND DIR. / VEL.: VA / ≤ 15 mph	ODO: 1233 TIME: 0910

3.3.19 FOURTH EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

Stops as Noted below: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.8	47.4	44.96	66.7	126.7	ABS
	2	30.2	45.8	43.23	68.9	127.7	ABS
	3	30.7	46.9	44.78	54.9	133.3	ABS
	4	30.7	47.8	45.64	78.6	124.8	ABS
	5	30.2	48.1	45.73	72.0	127.4	ABS
	6	30.7	47.4	45.26	96.9	128.7	ABS
60 mph	1	60.6	170.9	167.52	89.9	125.3	ABS
	2	60.5	170.6	167.78	82.5	123.2	ABS
	3	60.3	167.6	167.92	88.6	126.7	ABS
	4	60.7	173.2	173.17	106.2	121.9	ABS
	5	60.6	174.4	170.76	67.7	121.5	ABS
	6	60.3	170.0	168.21	11.1	142.6	ABS
NOTE: For vehicles with speed attainable in 2 miles of not less than 84 mph. Record speed attainable in 2 miles <u>99.8 (2nd cutoff)</u> mph.							
80 mph	1	80.9	282.9	276.64	11.0	137.5	ABS
	2	80.2	278.4	277.10	10.5	137.1	ABS
	3	81.6	280.1	282.92	10.4	140.2	ABS
	4	80.5	282.1	278.60	103.2	136.0	ABS

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: mmDate: 06 May 98

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR
AMBIENT TEMP.: 72° / 10° C	WIND DIR. / VEL.: VA / ≤ 15 mph	ODO: 1375 TIME: 1248

3.3.20 WATER RECOVERY

Force: (Readings may be terminated at 5 mph although deceleration must be maintained throughout stop).

3.3.20.1 Baseline - 3 stops.

Speed: 30 - 0 mph

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: 10 - 60 lbs.

Deceleration: 10 ft/s²

Initial Brake Temperature: 150° - 200° F.

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	26.1	10.81	167	162	148	143	
2	25.6	12.4	181	174	154	156	
3	26.1	11.61	201	193	184	173	
Avg.	25.93	—	—	—	—	—	

3.3.20.2 WET RECOVERY - 5 STOPS

- (a) With brakes fully released at all times, wet brakes for at least 2 minutes by driving at a speed of 5 mph maximum in any combinatic reverse and forward directions, in a trough with water depth of 6.0 in.
- (b) After leaving trough, immediately accelerate at maximum rate to 30 mph without brake application. Make 5 successive stops, each from 30 mph at deceleration of 10 ft/s² in normal driving gear. After each stop, except the last, immediately accelerate at maximum rate to 30 mph and begin the next stop.

Each stop must obtain a 10 to 10.5 ft/s² deceleration using a ramp apply not a spike apply. Maintain 10 ft/s² throughout stop.

PEDAL FORCE:

Max. Pedal Force: Stops 1 - 4, 150 lb., Stop 5, Baseline avg. + 60 lb. (< 110 lb.)

Min. Pedal Force: Baseline avg. - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.)

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	COMMENTS
	lb		
1	21.8	12.14	
2	21.3	11.13	
3	27.6	11.51	
4	27.4	11.18	
5	23.4	11.31	

Recorded by: WDate: 06M498

Vehicle and Component Tests

TEST #: 8035K	VEHICLE #: KS0027	TEST WEIGHT: GVWR	
AMBIENT TEMP.: $73.2^{\circ}/100^{\circ}$	WIND DIR. / VEL.: ≤ 15 mph	ODO: 1395	TIME: 0750

3.3.21 SPIKE STOPS

- (a) **Force - Controlled Stops.** Make 10 successive Spike Stops.

Pedal Force: 200 lb in 0.08 seconds or less. 200 lb minimum required throughout stop.

Lock - up: Wheel lock - up permitted at any speed.

Speed: 30 - 0 mph

Gear: Neutral

Initial Brake Temperature: 150° - 200° F. average across axle.

10 Stops

STOP	PEDAL FORCE	INITIAL SPEED	TIME TO REACH 200 lb PEDAL FORCE	MAINTAIN 200 lbs	COMMENTS
NUMBER	lb	mph	seconds	— Avg	
1	322.7	30.8	0.05	255.8	
2	325.7	30.6	0.05	262.4	
3	324.0	30.7	0.04	256.9	
4	323.0	30.7	0.04	258.5	
5	313.2	30.6	0.05	252.2	
6	301.1	30.7	0.04	247.6	
7	324.0	30.8	0.05	26.0	
8	323.0	30.7	0.04	257.0	
9	304.2	30.8	0.04	262.1	
10	323.7	30.8	0.05	260.7	

- (b) Effectiveness (Check) Stops

Pedal Force: 15 - 150 lb

Speed: 60 - 0 mph

Gear: Neutral

6 Stops for Minimum Stopping Distance

TEST SPEED MPH			STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			MEASURED	CORRECTED	MIN	MAX	
60 mph	1	60.6	188.5	185.08	11.9	126.7	ABS
	2	60.5	120.0	167.19	88.6	163.1	> REF. L. 11-11
	3	60.6	167.5	164.20	57.1	142.5	ABS
	4	60.6	121.2	121.25	30.5	133.5	100% / 100% 1
	5	60.6	167.3	165.76	91.3	137.0	ABS
	6	60.6	162.4	164.10	76.7	146.0	ABS

Wind Speed: Below 15 mph (Any Direction)

[] Between 15 & 30 mph (Cannot be Headwind)

Recorded by: _____

Finish ODO: 1435

Date: 07 MAY 98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST # : 8035K	VEHICLE # : KS0027	ODO: 1440	TIME: 1:00
-----------------------	---------------------------	------------------	-------------------

3.3.22 FINAL INSPECTION

YES

NO

3.3.22.1 Test completed without detachment or fracture of any component of the braking systems, such as brake springs, brake shoe or disc pad facing, other than minor cracks. A major crack does not meet requirement. A major crack is a crack across the shoe with an obvious gap.

All mechanical components of the braking system are intact and functional

Friction facing tearout does not exceed 10% of the lining on any single frictional element.

☒	☐
☒	☐
☒	☐

3.3.22.2 Test completed without any visible brake fluid or lubricant on:

- (1) the friction surface of the brake
- (2) at the master cylinder
- (3) at the power unit reservoir cover
- (4) at the seal and filler openings

☒	☐
☒	☐
☒	☐
☒	☐

Lining and/or Drum/Rotor Appearance

LH Disk & RH Disk LINING TO DRUM CLEARANCE

	CONTACT	GLAZE	STREAK.	DUST	OTHER COMMENTS	
PRI OR OUT	LF <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	RF <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	LR <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	RR <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
SEC OR IN	LF <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	RF <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	LR <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	RR <u>100</u> %	<u>LT</u>	<u>LT</u>	<u>LT</u>		
	RESIN	BLUING	RINGING	STREAKS	FINISH	
DRUM OR <u>DISC</u>	LF <u>LT</u>	<u>LT</u>	<u>LT</u>	<u>LT</u>	<u>Glossy</u>	
	RF <u>LT</u>	<u>LT</u>	<u>LT</u>	<u>LT</u>	<u>Glossy</u>	
	LR <u>LT</u>	<u>LT</u>	<u>LT</u>	<u>LT</u>	<u>Glossy</u>	
	RR <u>LT</u>	<u>LT</u>	<u>LT</u>	<u>LT</u>	<u>Glossy</u>	

Recorded by: Paul GreerDate: 5-7-98

NOTE: Sections 3.3.22.4, 3.3.22.5, and 3.3.22.6 may be completed using engineering documentation, i.e., drawings, layouts, or lab tests.

3.3.22.4 Measure minimum reservoir fluids capacity

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.5 Inspect labeling (master cylinder, brake power unit, etc.).

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

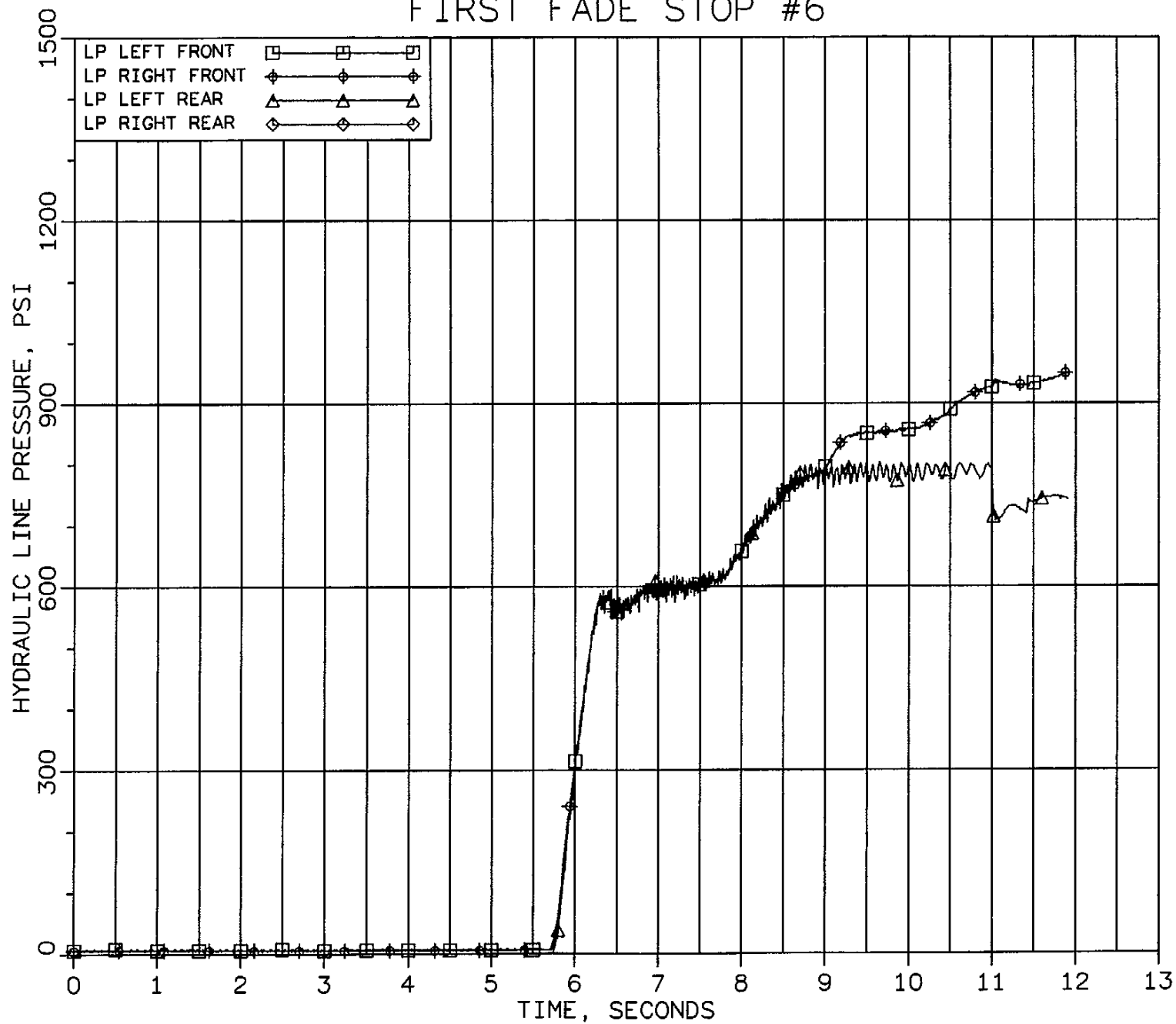
3.3.22.6 Inspect brake system indicator lamps method used.

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.23 Moving barrier Test

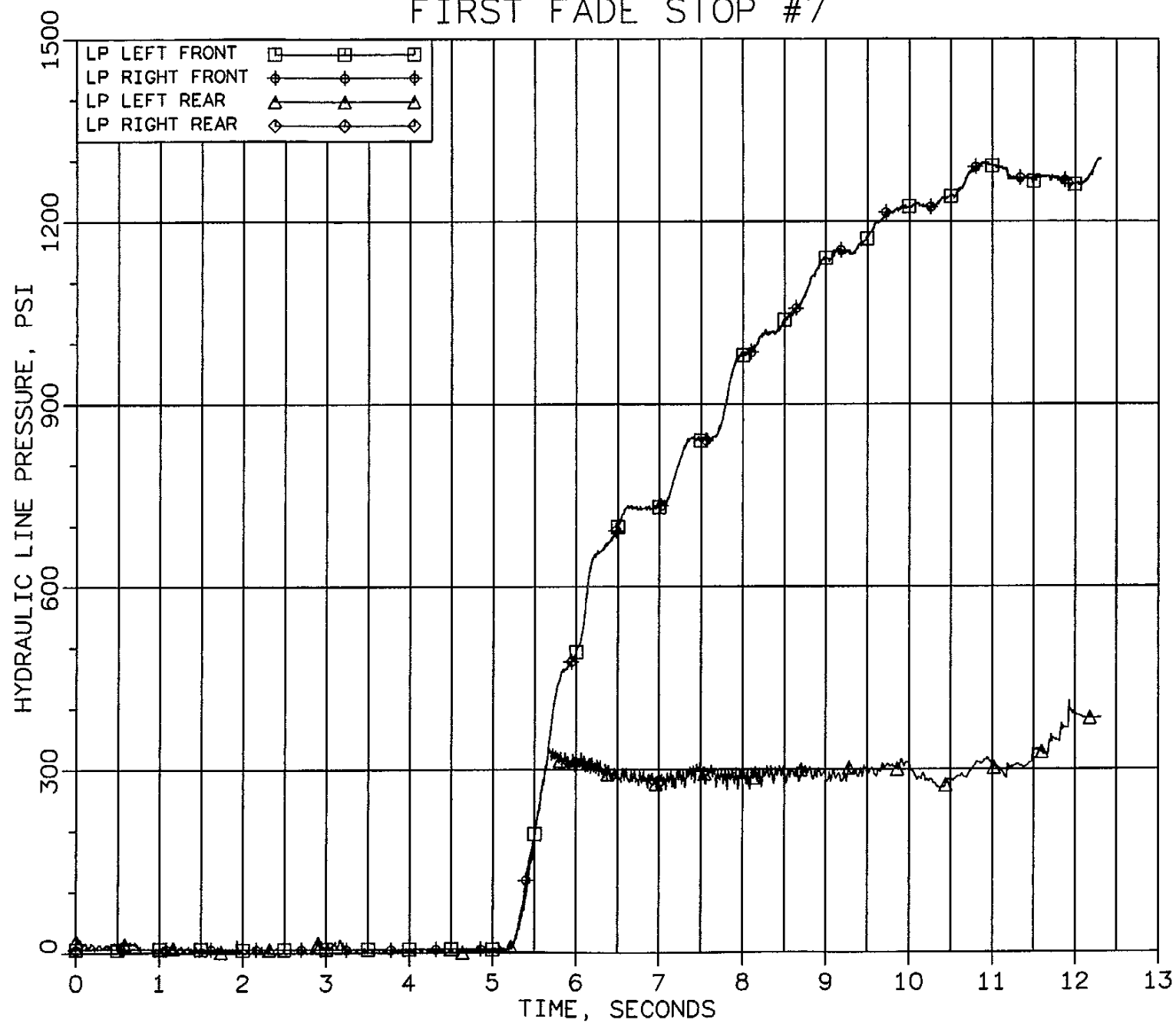
Method Used. Reference "Motor Vehicle Safety Compliance Summary"

MVSS105 TEST 8035K, VEHICLE KS0027
FIRST FADE STOP #6



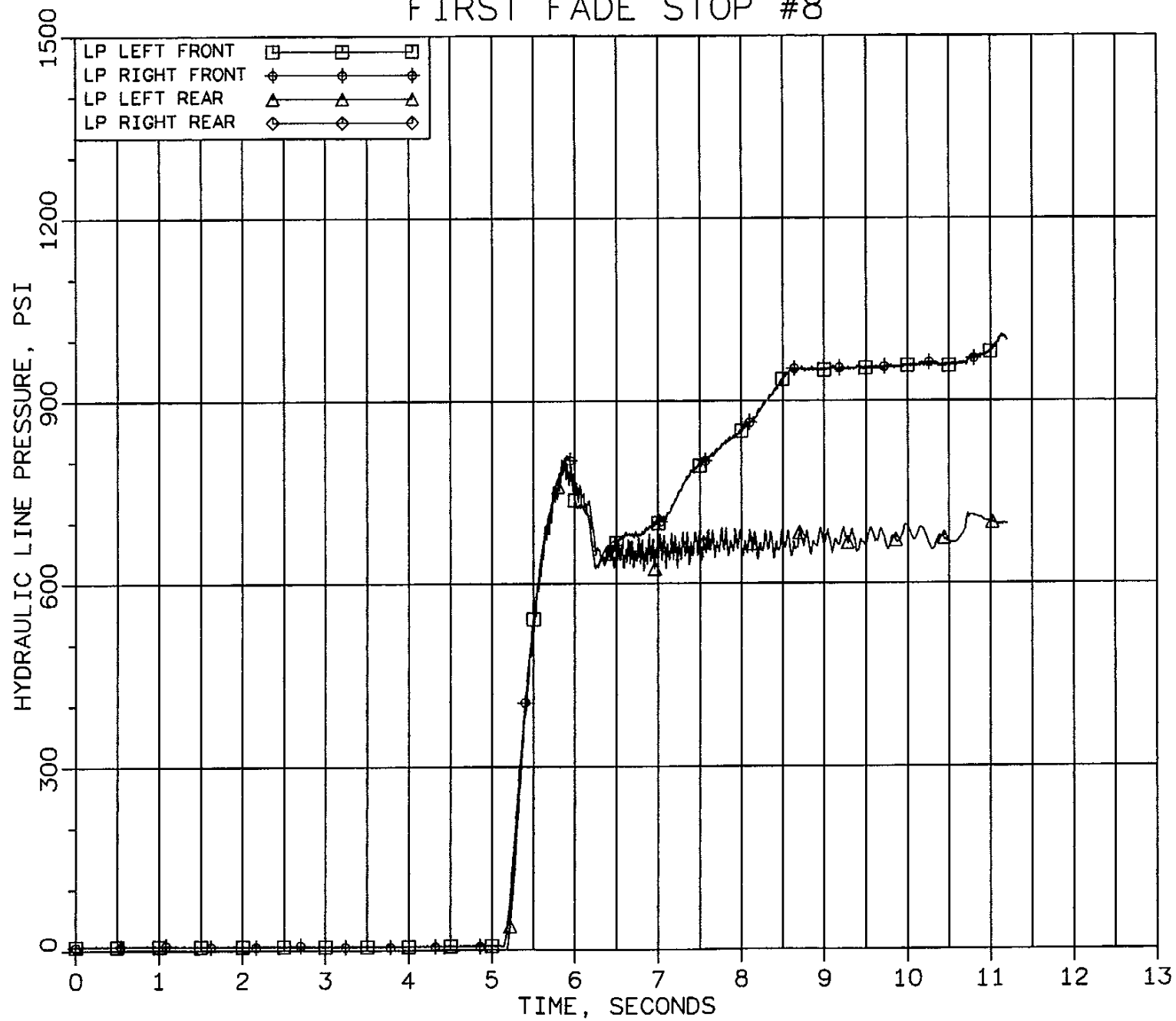
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MVSS105 TEST 8035K, VEHICLE KS0027
FIRST FADE STOP #7



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MVSS105 TEST 8035K, VEHICLE KS0027 FIRST FADE STOP #8



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Model Year	Platform	Model #	Requirement #	UPC/Veh. Partition	Procedure #	Project #	PER/Report #
2000	GMT830	C25906	See Below	5	8548V	8005C	P0R13-74 Seq. 005

FEB 17 1999

NAO Evaluation Report

GM Confidential

Reference Issue Report (IR) #: _____ Category: _____

Date: 30Dec98

X Final

Title: Brake System Testing☐ Interim☐ Reissue Date of Reissue: _____To: R.J. HicksFrom: T.R. HickeyDates of Evaluation: 19Mar98 to 28Mar98

Objective: To measure the R2 FMVSS 105 Validation performance of a MY 2000 JH6 brake system. Park brake section of test omitted.

Conclusions: Vehicle completed test.

Requirements: GMT800 VTS, Rev 3+, 17Aug97 / GMT800 20.4, Rev.-15, 14Sep98

3.2.1.1.3.1 The vehicle shall comply with all requirements specified in FMVSS 105.

Design Evaluated:

Name	Veh/Buck/Part No./RPO	Revision Date/Level
Brake System	CS0628/JH6	

Procedure/Method: Procedure 8548V

Results: Vehicle completed test. Park brake section was not performed. See summary sheet for results.

Timothy R. Hickey 2-9-99
 Author: T.R. Hickey Date:
 Engineer-
 Brake Test/Development
 DPG

Robert R. Iglewski 09FE99
 Approver: R.R. Iglewski Date:
 Supervisor-
 GMTG Brake Development/Validation
 DPG

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GENERAL MOTORS CORPORATION

Truck Engineering Operation

Uniform Test Specifications

Vehicle and Component Tests

T.W.O. No: POR13-74 Page 2 of 24

VEHICLE: **CS0628** Make: CHEVROLET Model: C25906 WB: 130.00 Axle: 3.73:1 SINGLE Test No.: **8005C**
 Engine: 8.1L/L18 Transmission: A4/MT1 Tires: FIRESTONE LT245/75R16E 50/80 TWO Number: POR13-74
 PURPOSE: TO MEASURE THE R2 FMVSS 105 VALIDATION PERFORMANCE OF A MY 2000 JH6 BRAKE SYSTEM.

RESULTS: VEHICLE COMPLETED TEST AND MET ALL REQUIREMENTS. PARK BRAKE SECTION OF TEST WAS OMITTED.

BRAKES: 2000 JH6	Size/Type	W/Pist. Dia.	Lining	Total	Front	%Front
Fronts:	325x38 mm / DISC	2 x 57 mm	AKNS161H	GVWR 8598	3334	38.8
Rears:	330x29 mm / DISC	2 x 51 mm	AKNS161H	LLVW 6334	3438	54.3

APPLY SYSTEM: Booster HYDRAULIC M/C Dia. 37 mm Pedal Ratio: 6.4:1
 ANTI-LOCK: 4WAL / EBC325 / G3A12DAP
 BALANCE SYSTEM: DRP TEST LOCATION: DPG EAST STR From Date: 19MR98 2689 To Date: 28MR98 3324

TEST	PORTIONS	REQ.	TEST RESULTS	%PASS (Failed)	APPLY FORCE MAX	COMMENTS
1st Eff.	30 mph 60 mph	72 ft 267 ft	45 ft 169 ft	37% 37%	124 140	ABS ACT. ABS ACT.
2nd Eff.	30 mph 60 mph	57 ft 216 ft	44 ft 159 ft	24% 27%	133 140	ABS ACT. ABS ACT.
PARK BRAKE	GVWR Uphill GVWR Dnhill LLVW Uphill LLVW Dnhill	90 lbs w/Hndl. 125 lbs pedal Hold 5 minutes Warn Lt Opr.				
3rd Eff.	60 mph	242 ft	151 ft	37%	126	ABS ACT.
Partial System 60 mph	LLVW Rears Only LLVW Frts Only GVWR Rears Only GVWR Frts Only	517 ft	397 ft 217 ft 307 ft 287 ft	23% 58% 41% 45%	148 133 134 145	LT.N/A lbs. LT.N/A lbs. LT.N/A lbs. LT.N/A lbs. Passed or (Failed)
Failed Comp.	Anti-Lock 60 mph L.S.P.V.	517 ft	169 ft 179 ft	67% 65%	77 65	DRP ACT. NO W/S L/R W/S
Failed Power	Sys 1 60 mph Sys 2	517 ft	341 ft	34%	148	NO ABS NO W/S
1st Fade	Baseline 30 mph Fade 1-5 60 mph Fade 6-10 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	21% 76% 70% 98% 93%	21 51 60 23 20	OK OK ODOR OK OK
2nd Fade	Baseline 30 mph Fade 1-10 60 mph Fade 11-15 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	19% 86% 86% 95% 99%	19 38 38 26 19	OK OK ODOR OK OK
4th Eff.	30 mph 60 mph 80 mph	72 ft 267 ft 510 ft	43 ft 161 ft 269 ft	40% 40% 47%	130 138 129	ABS ACT. DRP ACT. ABS ACT. DRP ACT. ABS ACT. DRP ACT.
Water Rec.	Baseline 30 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 10ft/sec2 Base + 45 lbs	10 ft/sec2 10 ft/sec2 10 ft/sec2	25% 99% 95%	23 24 25	S.S.S S.S.S S.S.S
Spike Stops	10 Spikes 30 mph	200 lbs .08 sec.		Yes	326	
Final Eff.	60 mph	267 ft	154 ft	42%	137	ABS & DRP ACT.

* unless otherwise specified, the max apply force will be 150 lbs.

Tester: D. HOOKEY

Summarized by: T.R. HICKEY

Summary Print Date: 07AP98

R2-5-105G-82 Summary Sheet

MPVs, Trucks, Buses (Except School Buses) w/GVWR 8,000 to 10,000 lbs

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BUILD AND TEST SPECIFICATION SHEET

T.W.O. No.: POR13-74 Page 3 of 24

TWO No : POR13-74

Seq No : 005

DPG No :

Veh No : CS0628

Test No : 8005C

Test Purpose : To measure the R2 FMVSS 105 Validation performance of a MY 2000 JH6 brake system.

Test Results : Vehicle completed test. See data for results.

Comments : Akebono AKNS161H front linings, Akebono AKNS161H rear linings, Hydroboost P/N 15706056D, Firestone LT245/75R16E tires and ABS software G3A12DAP. Park brake section of test was omitted.

VEHICLE INFORMATION

Year : 2000 Engine : 8.1L/L18
Brake RPO : JH6 Transmission : A4/MT1
Name Plate : Chevrolet Axle Ratio : 3.73:1
Veh Model : C25906 Single/Dual : Single
Vehicle VIN : 1GCHC26U0Y Odo Cal :
Wheel Base : 130.0 Engine RPM :

TIRE INFORMATION

Tire Size : LT245/75R16E
Tire Make : Firestone
Tire Type : ALS
Wheel Code : RJT
Wheel Size : 16x6.5 Steel
Tire Pressure (PSI) : 50/80

TEST INFORMATION

Procedure No : 8548V

Test Type : FMVSS R2-105 Cert. Test (R2-5-105G-82)

Start Date : 03/19/98

Start Odo : 2689

Finish Date : 03/28/98

Finish Odo : 3324

TEST WEIGHT (lbs)

	As Tested		Design Weights	
	GVWR	LLVW	GVWR	LLVW
Front :	3334	3438	3335	3386
Rear :	5264	2896	5265	2852
Total :	8598	6334	8600	6238
%Front :	38.8	54.3	38.8	54.3
Tire Radius :	14.8	14.8	14.8	14.8
Frt Axle to CG	79.6	59.4	79.6	59.4
CG Height :				

FRONT SYSTEM

Type : DISC
Rotor ASM : 15718986C
Rotor Size : 325X38 mm
Piston Dia : 57 mm
No Pistons : 2

Notes : Caliper S/N L: 7301-L06 R: 7301-L08

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : DC3-25
Service Kit : 18026219AA
Noise Treat : CLD-6
Caliper ASM : 18025728/9FA

REAR SYSTEM

Type : DISC
Rotor ASM : 15712803BB
Rotor Size : 330X29 mm
Piston Dia : 51 mm
No Pistons : 2

PB Lining : 15706955H

Notes : Caliper S/N L: 7303-L09 R: 7303-L05

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : DC3-251
Service Kit : 18026217AA
Noise Treat : CLD-6
Caliper ASM : 18025706/7
PB Service Kit :
PB Min Thk :

APPLY SYSTEM

Booster Type : Hydraulic
Size : mm
ASM : 15706056E
Code : UR
Pedal Ratio : 6.4:1
Pedal Apply Radius :
P.T. @ 50 LBS : 66 mm

Master Cyl ASM : 18024196F
Code : YN
Dia : 37 mm
Min Dis Frt Port : 16.25 cc
cc @ 0psi Rear Port : 18.30 cc

Code: Meter / Split / Slope

BALANCE SYSTEM

Comb Valve ASM : None
Height Sens Valve : None

ANTI LOCK

Anti Lock System : 4WAL Anti Lock Software Level : G3A12DAP
Anti Lock Comments : EBC325 - System balance controlled by DRP.

Engineer: T.R. HICKEY

Date : 12/30/98

* Measurements in INCHES unless otherwise specified

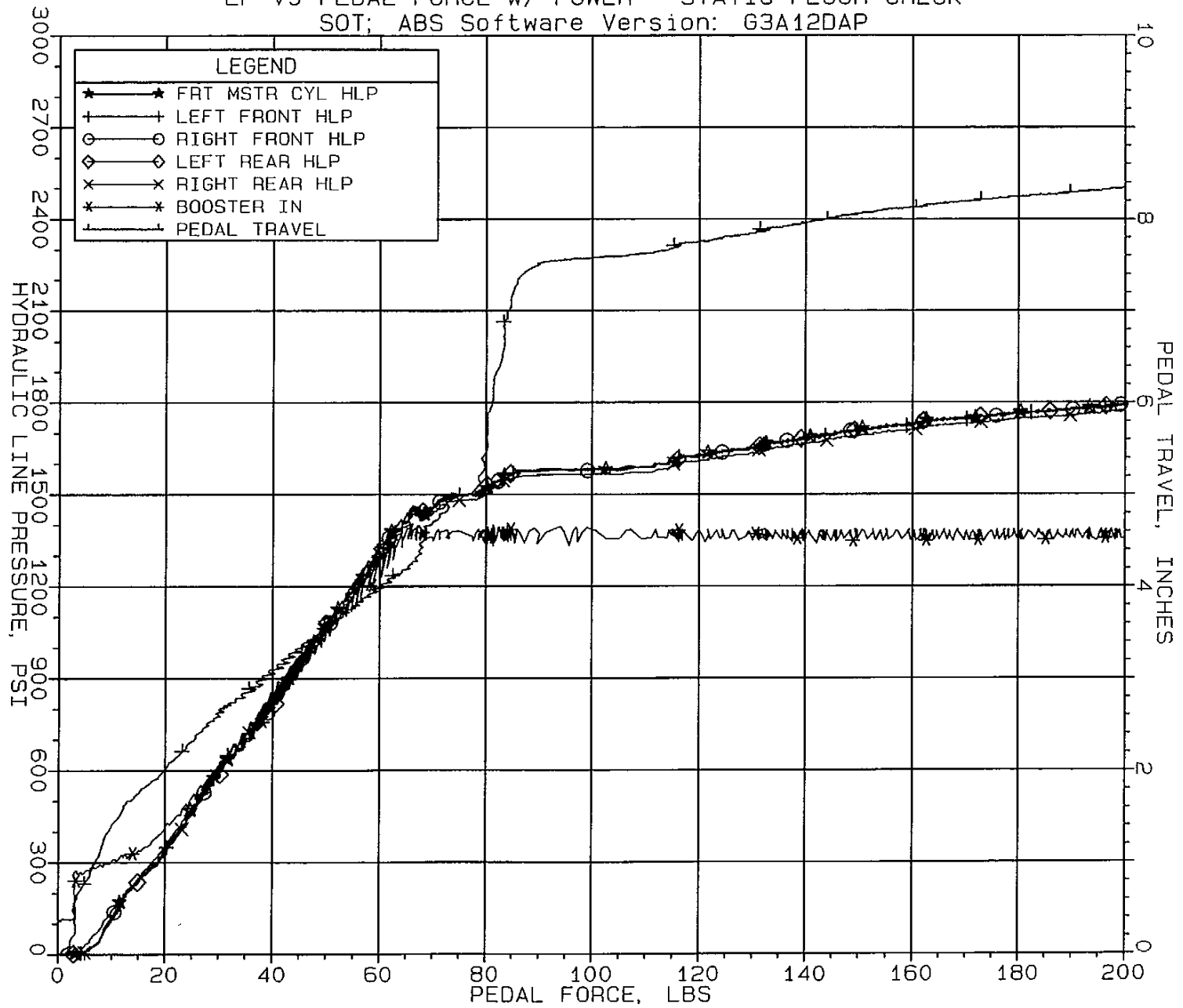
SPECCKDK rev. 082495

GM CONFIDENTIAL

MVSS 105 VALIDATION TEST 8005C [CS0628]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

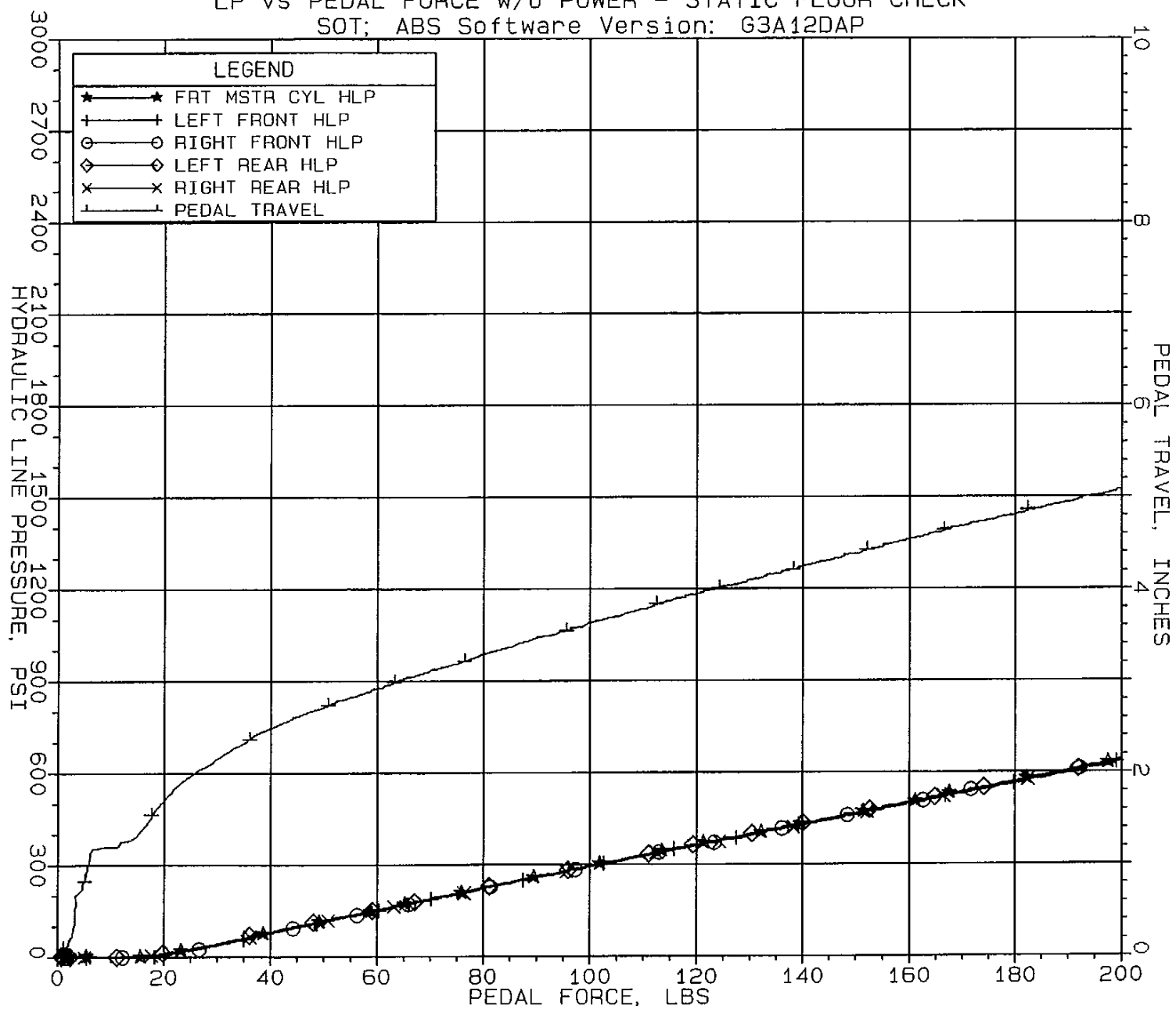
SOT; ABS Software Version: G3A12DAP



MVSS 105 VALIDATION TEST 8005C [CS0628]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

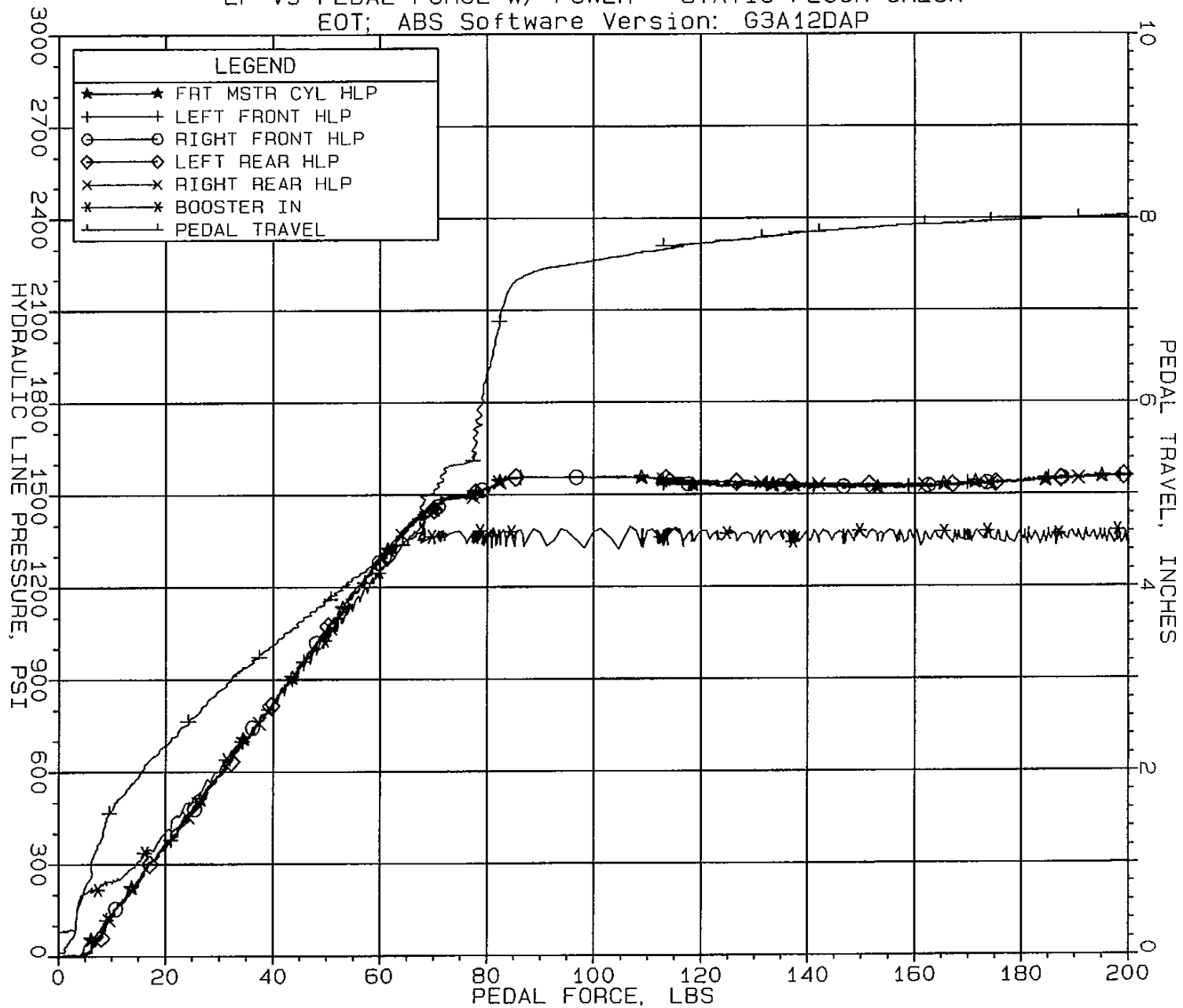
SOT; ABS Software Version: G3A12DAP



MVSS 105 VALIDATION TEST 8005C [CS0628]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

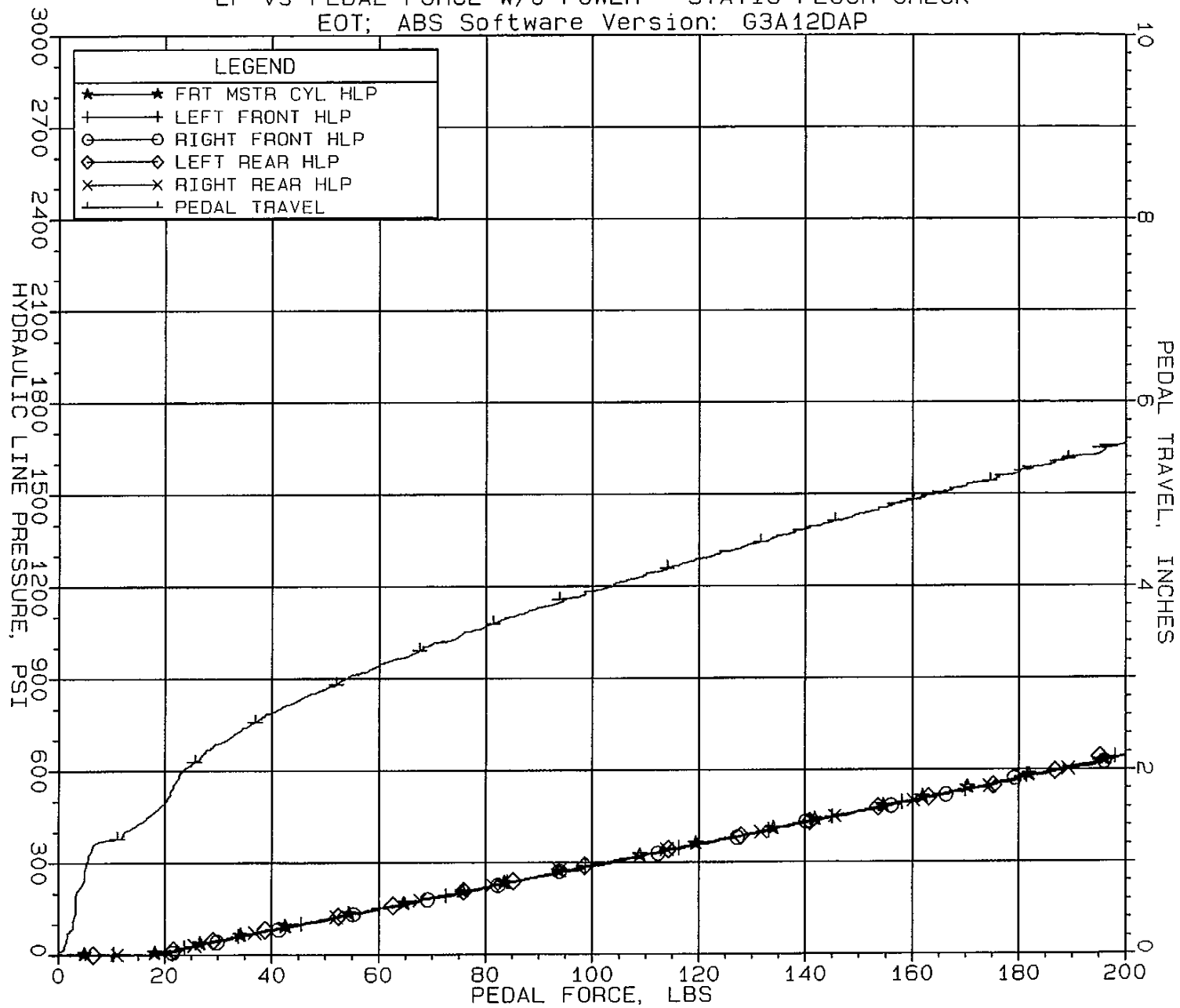
EOT; ABS Software Version: G3A12DAP



MVSS 105 VALIDATION TEST 8005C [CS0628]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

EOT; ABS Software Version: G3A12DAP



Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 25°F.	WIND DIR. / VEL.: SE / 0-8	ODO: 2693	TIME: 1:35 PM

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3,335.00	5,265.00	8,600.00	38.8
Measured:	3,334	5,264	8,598	38.8

3.3.4 PRETEST CHECK

10 Stops, 40 mph between stops.

Deceleration: 10 ft/s^2

Gear: Highest Gear Ratio (Example: Overdrive)

Interval: 1 mile

Speed: 30 - 0 mph

Brake Temperature: Are recorded 0.2 to 0.1 mile prior to stop.

[illegible]

In the event of instrumentation malfunction and / or repair, do not make more than 10 additional stops.

Recorded by:

Date: 3-19-98

Vehicle and Component Tests

TEST # : 8005C	VEHICLE # : CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 76°F.	WIND DIR. / VEL.: SE / 0-8	ODO: 2703 TIME: 2:10 PM

3.3.5 FIRST EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

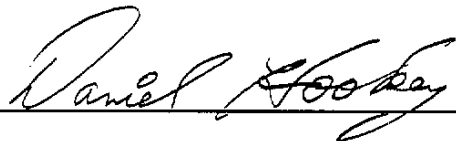
6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE ft		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.5	49.7	48.1	56.4	118.9	ABS ACT.
	2	30.6	46.9	45.1	46.1	123.5	ABS ACT.
	3	30.5	47.9	46.3	66.9	133.8	ABS ACT.
	4	30.4	52.4	51.0	90.1	147.9	ABS ACT.
	5	30.4	49.0	47.7	110.1	175.0	P.F. LIMIT ABS ACT.
	6	30.5	55.4	53.6	73.0	149.7	ABS ACT.
60 mph	1	60.7	212.3	207.4	27.8	138.7	ABS ACT.
	2	61.0	178.4	172.6	52.5	142.8	ABS ACT.
	3	60.8	183.3	178.5	54.4	150.9	P.F. LIMIT ABS ACT.
	4	60.9	181.2	175.9	66.4	154.1	P.F. LIMIT ABS ACT.
	5	60.6	173.9	170.5	67.9	150.9	P.F. LIMIT ABS ACT.
	6	60.6	172.6	169.2	66.9	140.4	ABS ACT.

Wind Speed: ☒ Below 15 mph (Any Direction) ☐ Between 15 & 30 mph (Cannot be Headwind)

Recorded by:



Date:

3-19-98

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: <u>50°</u>	WIND DIR./VEL.:	ODO: <u>2933-2937</u> TIME: <u>4:50</u>

3.3.6. BURNISH Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Pedal Force: Limit does not apply here.

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	103	98	116	113	.5 until 2.5	then every 1.0 Veh. located & ready at 4:50
10	190	188	301	291	1.0	
20	194	196	336	321	"	
30	190	194	327	309	"	"0" reading : Driver brought to garage.
40	192	195	0	309		Wire connections & brakes ck'd by Mark & ok.
50	186	179	262	248		Driver had pushed hold again after "0" reading
60	185	185	291	273		had printed & an accurate # had appeared.
70	184	185	297	281		
80	187	188	297	283		
90	184	185	287	275		odo 2826 16.81 g at G #1 pump
100	184	183	258	250		
110	185	185	278	268		
120	182	181	274	268		
130	188	186	275	276		
140	179	177	258	260		
150	175	173	255	257		
160	193	194	285	281		
170	218	216	258	240	.5 MI	AND: 2.5 MI / STOPPED AFTER 173 TO SECURE BALLAST
180	169	169	255	236	1 MI.	
190	162	164	255	238	1 MI.	
200	161	164	256	239	1 MI.	

RECORDED BY ANN E. WOODR. J. CUMPTONDATE 3-19-98 // 3/20/98

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: N/A FOUR WHEEL DISC BRAKES

Adjusted by: _____

Signature

Date: _____

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 56 °F.	WIND DIR./VEL.: 5/0-5	ODO: 2944 TIME: 8:25 AM

3.3.7 SECOND EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			ft		lb		
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.5	45.0	43.5	64.5	132.6	ABS ACT.
	2	30.6	51.5	49.5	77.6	147.5	ABS ACT.
	3	30.4	50.5	49.2	98.9	155.8	P.F. LIMIT ABS ACT.
	4	30.5	47.1	45.6	71.0	138.9	ABS ACT.
	5	30.5	51.3	49.6	73.5	118.4	ABS ACT.
	6	30.5	45.9	44.4	72.8	129.9	ABS ACT.
60 mph	1	61.2	167.8	161.3	61.0	121.3	ABS ACT.
	2	60.4	171.9	169.6	66.7	138.7	ABS ACT.
	3	60.4	160.7	158.6	67.1	139.6	ABS ACT.
	4	60.3	173.7	172.0	69.3	156.5	P.F. LIMIT ABS ACT.
	5	60.3	172.7	171.0	66.9	140.4	ABS ACT.
	6	60.3	171.6	169.9	70.3	145.0	ABS ACT.

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)

Recorded by:

Daniel Hooley

Date:

3-20-98

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 70°F.	WIND DIR./VEL.: SW/0-5	ODO: 2959 TIME: 12:00PM

3.3.16 FIRST RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Pedal Force: Not Required

Maintain Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	84	80	86	84	—	S, S, S
10	201	201	311	283	.5/1.0	S, S
20	197	200	331	297	1.0	S, S, S
30	196	204	326	296	1.0	S, S, S
35	199	203	319	297	1.0	S, S, S

RECORDED BY

Daniel Hooper

DATE

3-20-98

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: ~~MAN~~ **FOUR WHEEL DISC BRAKES**

ADJUSTED BY:

Signature

DATE:

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: LLVW
AMBIENT TEMP.: <i>68° F.</i>	WIND DIR. / VEL.: <i>CALM</i>	ODO: <i>2998</i> TIME: <i>9:35 A.M.</i>

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3,386.00	2,852.00	6,238.00	54.3
Measured:	<i>3,438</i>	<i>2,896</i>	<i>6,334</i>	<i>54.3</i>

3.3.10 THIRD EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
	P		MEASURED	CORRECTED	MIN	MAX	
60 mph	1	<i>59.9</i>	<i>152.1</i>	<i>152.6</i>	<i>64.2</i>	<i>137.2</i>	<i>ABS ACT.</i>
	2	<i>60.4</i>	<i>154.9</i>	<i>152.9</i>	<i>62.5</i>	<i>146.5</i>	<i>ABS ACT.</i>
	3	<i>60.3</i>	<i>153.2</i>	<i>151.7</i>	<i>71.0</i>	<i>134.3</i>	<i>ABS ACT.</i>
	4	<i>60.4</i>	<i>153.5</i>	<i>151.5</i>	<i>64.2</i>	<i>126.0</i>	<i>ABS ACT.</i>
	5	<i>60.2</i>	<i>160.3</i>	<i>159.2</i>	<i>68.4</i>	<i>148.2</i>	<i>ABS ACT.</i>
	6	<i>60.1</i>	<i>154.2</i>	<i>153.7</i>	<i>66.9</i>	<i>147.2</i>	<i>ABS ACT.</i>

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: *Daniel Hooker*Date: *3-21-98*

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: LLVW	
AMBIENT TEMP.: 70°F	WIND DIR. / VEL.: CALM	ODO: 3008	TIME: 10:25AM

3.3.11 PARTIAL FAILURE (HYDRAULIC SYSTEM) * LOW FLUID SENSOR INSTALL WITH

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Initial Brake Temperature: 150° - 200° F.

Speed: 60 - 0 mph

Lockup: Wheel lock-up permitted at any speed

3.3.11.1 Fluid level indicators. Remove brake fluid from one chamber of master cylinder reservoir until level is less than manufacturer's safe level, or to less than 1/4 of the chamber fluid capacity, whichever results in the higher level. Replace m/c cap, turn ignition on, and allow one minute. Record fluid level indicator operation. Yes ☒ No ☐ N/A

3.3.11.2 Differential Pressure Indicators. Cause complete loss of one portion of brake system. Record brake pedal force or brake pressure differential to cause brake system failure indicator to operate. PF: _____ lb
Press: _____ psi. N/A ☒

3.3.11.3 Subsystem Failed: REARS Method of Simulating Failure: VALVING

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE
DESIRED		ACTUAL	ft		lb			AND
			MEASURED	CORRECTED	MIN	MAX		STABILITY COMMENTS
60 mph	1	60.9	226.4	219.8	43.7	135.3	Y	ABS ACT.
	2	60.7	222.0	216.9	68.8	133.3	Y	ABS ACT.
	3	60.7	223.1	218.0	26.1	140.4	Y	ABS ACT.
	4	60.9	225.1	218.5	52.0	137.5	Y	ABS ACT.

3.3.11.4 Restore brakes to normal operation and bleed brakes thoroughly (if required).

3.3.11.5 Repeat 3.3.11.1 through 3.3.11.4 above for the other subsystems of brake system:

Fluid Level Indicators: Yes ☒ No ☐ N/A

Differential Pressure Indicators:

PF: _____ lb., Press: _____ psi. N/A ☒

Subsystem Failed: FRONTS Method of Simulating Failure: VALVING

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE
DESIRED		ACTUAL	ft		lb			AND
			MEASURED	CORRECTED	MIN	MAX		STABILITY COMMENTS
60 mph	1	60.8	411.3	400.5	35.2	141.6	Y	DRP ACT.
	2	60.8	409.5	398.8	24.0	155.5	Y	P.F. LIMIT DRP ACT.
	3	60.8	408.1	397.4	71.3	142.7	Y	DRP ACT.
	4	60.2	408.0	405.3	43.5	152.1	Y	P.F. LIMIT DRP ACT.

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) [] Between 15 & 30 mph (cannot be headwind)

Recorded by: Daniel Hooper Date: 3-21-98

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 67 °F.	WIND DIR./VEL.: NE/0-5	ODO: 3025	TIME: 8:45 AM

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3,335.00	5,265.00	8,600.00	38.8
Measured:	3,334	5,264	8,598	38.8

3.3.12 PARTIAL FAILURE (HYDRAULIC SYSTEM)

* Low Fluid Sensor Installed **WTH**

3.3.12.1 REPEAT 3.3.11.

Fluid Level Indicator: Yes ☒No ☐N/A ☐Differential Pressure Indicator: PF ☐

lb

Pressure: ☐

psi

N/A ☒

4 Stops: Minimum Stopping Distance

Pedal Force: 15 - 150 lbs.

Gear: Highest Gear Ratio (Example: Overdrive)

Speed 60 - 0 mph

Initial Brake Temperature: 150° - 200° F.

Lockup: Wheel lock-up permitted at any speed.

Subsystem Failed: **FRONTS**Method of Simulating Failure: **VALVING**

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE
DESIRED		ACTUAL	ft.		lb			AND
			MEASURED	CORRECTED	MIN	MAX		STABILITY COMMENTS
60 mph	1	60.5	312.3		55.2	133.8	Y	DRP ACT.
	2	60.6	328.7		66.2	146.0	Y	DRP ACT.
	3	60.5	325.4		84.5	136.2	Y	DRP ACT.
	4	60.6	325.9		69.6	148.7	Y	DRP ACT.

Restore brakes to normal operation and bleed brakes thoroughly.

Repeat 3.3.11 for the other subsystem of brake system:

Fluid Level Indicators: Yes ☒No ☐N/A ☐

Differential Pressure Indicators:

PF: ☐

lb.

Press: ☐

psi

N/A ☒Subsystem Failed: **REARS**Method of Simulating Failure: **VALVING**

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE
DESIRED	ACTUAL	ft.		lb		AND		
		MEASURED	CORRECTED	MIN	MAX	STABILITY COMMENTS		
60 mph	1	60.5	301.9	296.9	72.5	128.7	Y	ABS ACT.
	2	60.7	299.3	292.4	45.2	141.1	Y	ABS ACT.
	3	60.6	292.6	286.8	85.0	145.5	Y	ABS ACT.
	4	60.5	293.0	288.2	74.2	145.8	Y	ABS ACT.

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction)☐ Between 15 & 30 mph (cannot be headwind)Recorded by: **Daniel Hooker**Date: **3-23-98**

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 84 °F.	WIND DIR./VEL.: SW/0-10	ODO: 3050 TIME: 1:15 PM

PARTIAL FAILURE (APPLY SYSTEM)

Pedal Force: 15 - 150 lb

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Wheel lock-up: Permitted at any speed

Initial Brake Temperature: 150° - 200° F.

3.3.13 SERVICE BRAKE SYSTEM - PARTIAL FAILURE ANTILOCK AND/OR VARIABLE PROPORTIONING SYSTEMS (Where applicable)

Disconnect functional power source or otherwise render antilock system inoperative.

Method of simulating failure **SWITCH - ABS OFF DRP ON**

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS	
DESIRED		ACTUAL	ft.		lb				
			MEASURED	CORRECTED	MIN	MAX			
60 mph	1	60.2	191.8	190.5	30.0	85.7	Y	DRP ACT. NO W/S	
	2	60.5	183.4	180.4	30.0	86.2	Y	DRP ACT. NO W/S	
	3	60.5	171.6	168.8	34.9	76.9	Y	DPP ACT. NO W/S	
	4	60.5	181.0	178.0	18.3	90.8	Y	DRP ACT. R/F W/S	

Restore antilock system to normal operation.

Disconnect variable proportioning system (if applicable). Method of simulating failure **SWITCH - ABS OFF DRP OFF**

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE
DESIRED		ACTUAL	ft		lb			AND
			MEASURED	CORRECTED	MIN	MAX		STABILITY COMMENTS
60 mph	1	60.5	198.8	195.5	25.9	59.1	Y	NO W/S
	2	60.3	189.6	187.7	20.5	53.7	Y	L/R W/S
	3	60.7	183.0	178.8	32.2	64.9	Y	L/R W/S
	4	60.6	189.8	186.1	33.4	51.3	Y	NO W/S

Restore variable proportioning system to normal operation. Repeat for each subsystem provided.

3.3.14 Service Brake System - Inoperative Brake Power Unit or Brake Power Assist Unit. Perform either 3.3.14.1. or 3.3.14.2.

3.3.14.1 Disconnect the primary source of power. (Deplete all reserve power capability).

Method of rendering inoperative **BY - PASS**

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND	
DESIRED		ACTUAL	ft		lb			STABILITY COMMENTS	
			MEASURED	CORRECTED	MIN	MAX			
60 mph	1	60.4	380.5	375.5	131.6	147.5	N	NO ABS	NO W/S
	2	60.5	366.1	360.1	111.8	146.7	N	NO ABS	NO W/S
	3	60.4	348.8	344.2	133.3	146.7	N	NO ABS	NO W/S
	4	60.4	345.4	340.8	79.8	148.4	N	NO ABS	NO W/S

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by **Daniel Hooker**Date: **3-24-98**

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 63°F.	WIND DIR./VEL.: SE/0-5	ODO: 3115 TIME: 6:55 AM

3.3.15 FIRST FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.

3.3.15.1 Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².

Initial Brake Temperature: 150° - 200° F.

Pedal Force: 10 - 60 lbs.

3.3.15.2 Fade - 10 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 10th fade stop, drive 1 mile @ 30 mph, then immediately into recovery stops.

3.3.15.3 Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s². Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop.

Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 - 5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (>5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	19.8	11	137	137	173	155	OK
2	20.3	11	151	151	191	170	OK
3	21.5	11	147	154	188	165	OK
Avg.	20.53						
1	31.5	17	109	115	137	135	OK
2	35.4	16	162	168	210	202	
3	36.9	16	222	231	289	274	
4	44.7	17	280	293	359	344	
5	51.0	17	332	352	426	406	OK
6	51.3	17	379	393	487	469	ODOR
7	59.6	16	422	442	541	525	
8	46.9	17	464	491	575	560	
9	48.6	17	502	529	615	605	
10	56.6	17	533	560	650	646	ODOR
1	22.5	11	507	499	597	604	OK
2	21.0	11	424	416	528	534	
3	19.8	11	338	343	466	456	
4	18.8	12	281	295	423	399	
5	19.8	11	240	259	387	358	OK

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by

Daniel Hooley

Date:

3-25-98

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 72°F	WIND DIR. / VEL.: SE / 0-8	ODO: 3134	TIME: 7:55 AM

3.3.16 SECOND RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Interval: Make stops at .5 mile intervals until average initial brake temperature (250° ± 20° F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE DEGREES F SECONDARY SHOE OR HOTTEST PAD				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	123	123	128	128	—	S, S, S
10	191	195	273	265	.5 / 1.0	S, S, S
20	187	189	292	282	1.0	S, S, S
30	191	194	306	285	1.0	S, S, S
35	191	195	302	285	1.0	S, S, S

RECORDED BY

Daniel Hooley

DATE

3-25-98

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: *N/A FOUR WHEEL DISC BRAKES*

Adjusted by

Signature

Date:

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 80 °F.	WIND DIR./VEL.: S/0-10	ODO: 3177 TIME: 10:05AM

3.3.17 SECOND FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.

Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².

Pedal Force: 10 - 60 lbs.

Fade - 15 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 15th fade stop, drive 1 mile at 30 mph, then immediately into recovery stops.

Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s². Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop.

Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 - 5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	20.3	12	136	134	155	164	OK
2	18.8	12	149	145	172	180	OK
3	19.0	11	158	158	166	170	OK
Avg.	19.37						
1	32.5	17	124	122	134	145	OK
2	31.3	17	173	172	203	217	}
3	38.1	18	227	231	279	293	
4	34.9	18	284	292	348	360	
5	27.8	17	340	347	409	422	
6	29.8	18	396	398	465	477	
7	28.8	18	446	445	514	529	OK
8	32.0	18	485	444	558	573	ODOR
9	29.5	17	520	518	596	610	}
10	29.8	16	550	546	634	645	
11	29.1	17	574	571	668	674	
12	31.3	17	596	592	695	703	
13	33.2	15	614	610	718	728	
14	33.4	16	630	629	744	748	}
15	38.1	17	643	644	764	764	ODOR
1	26.1	11	589	587	701	690	OK
2	21.0	11	506	499	612	605	}
3	18.3	11	439	426	541	541	
4	20.5	11	363	357	475	470	}
5	19.3	11	300	300	422	411	OK

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by: Daniel Foster

Date: 3-25-98

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 85° F.	WIND DIR./VEL.: SE/0-15	ODO: 3202 TIME: 1:10 PM

3.3.16 THIRD RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature (250 ± 20° F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F				STOP INTERVAL	COMMENTS
	SECONDARY SHOE OR HOTTEST PAD					
	LF	RF	LR	RR		
1	97	99	108	106	—	S, S, S
10	208	206	263	252	0.5/1.0	S, S, S
20	203	205	275	260	1.0	S, S, S
30	211	209	280	283	1.0	S, S, S
35	221	213	279	294	1.0	S, S, S

RECORDED BY

Daniel Hooley

DATE

3-25-98

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used:

N/A 4 WHEEL DISC BRAKES

Adjusted by

Signature

Date:

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR 3-26-98
AMBIENT TEMP.: <u>57° F.</u>	WIND DIR./VEL.: <u>SE / 10-15</u>	ODO: <u>3244</u> TIME: <u>1:40 PM</u>

3.3.19 FOURTH EFFECTIVENESS
 56° F. SE / 0-5 3281 2:40 AM
 3-27-98

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

Stops as Noted below: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND	
DESIRED	STOP	ACTUAL						
			ft.	lb	MIN	MAX	STABILITY COMMENTS	
30 mph	1	30.4	50.3	49.0	63.2	135.5	ABS ACT.	
	2	30.3	53.7	52.6	98.9	151.4	P.F. LIMIT ABS ACT.	
	3	30.5	49.9	48.3	84.2	151.4	P.F. LIMIT ABS ACT.	
	4	30.4	49.1	47.8	78.6	135.5	ABS ACT.	
	5	30.6	44.6	42.9	91.3	130.1	ABS ACT, DRP ACT.	
	6	30.5	44.7	43.2	95.0	149.4	ABS ACT. DRP ACT.	
60 mph	1	60.3	167.1	116.5.4	64.2	124.5	ABS ACT, DRP ACT.	
	2	60.5	164.9	162.2	60.8	127.9	ABS ACT. DRP ACT.	
	3	60.5	163.5	160.8	53.7	138.2	ABS ACT. DRP ACT.	
	4	60.1	167.3	166.7	54.4	112.1	ABS ACT, DRP ACT.	
	5	60.3	166.9	165.2	45.2	73.5	ABS ACT, DRP ACT.	
	6	60.4	165.3	163.1	54.2	126.2	ABS ACT, DRP ACT.	

NOTE: For vehicles with speed attainable in 2 miles of not less than 84 mph.

Record speed attainable in 2 miles 98.9 mph. FUEL SHUT OFF

80 mph	1	80.3	287.7	285.6	33.2	75.2	ABS ACT. DRP ACT.
	2	80.7	286.6	281.6	36.6	82.5	ABS ACT. DRP ACT.
	3	80.5	272.3	268.9	35.4	128.7	ABS ACT. DRP ACT.
	4	80.4	271.8	269.1	40.3	127.2	ABS ACT. DRP ACT.

Wind Speed: ☒ Below 15 mph (Any Direction) ☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel HookerDate: 3-27-98

DUE TO RAIN

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 57°F.	WIND DIR. / VEL.: S / 0-10	ODO: 3298 TIME: 10:25 AM

3.3.20 WATER RECOVERY

Force: (Readings may be terminated at 5 mph although deceleration must be maintained throughout stop).

3.3.20.1 Baseline - 3 stops.

Speed: 30 - 0 mph

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: 10 - 60 lbs.

Deceleration: 10 ft/s²

Initial Brake Temperature: 150° - 200° F.

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	23.2	10	134	134	164	160	S, S, S
2	22.7	11	147	141	177	175	S, S, S
3	22.0	11	157	156	195	193	S, S, S
Avg.	22.63						

3.3.20.2 WET RECOVERY - 5 STOPS

- (a) With brakes fully released at all times, wet brakes for at least 2 minutes by driving at a speed of 5 mph maximum in any combinatic reverse and forward directions, in a trough with water depth of 6.0 in.
- (b) After leaving trough, immediately accelerate at maximum rate to 30 mph without brake application. Make 5 successive stops, each from 30 mph at deceleration of 10 ft/s² in normal driving gear. After each stop, except the last, immediately accelerate at maximum rate to 30 mph and begin the next stop.

Each stop must obtain a 10 to 10.5 ft/s² deceleration using a ramp apply not a spike apply. Maintain 10 ft/s² throughout stop.

PEDAL FORCE:

Max. Pedal Force: Stops 1 - 4, 150 lb., Stop 5, Baseline avg. + 60 lb. (< 110 lb.)

Min. Pedal Force: Baseline avg. - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.)

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	COMMENTS
	lb		
1	18.3	11	S, S, S
2	19.8	11	
3	21.5	11	
4	23.7	11	
5	24.9	11	S, S, S

Recorded by:

Daniel Hooker

Date:

3-27-98

UNIFORM TEST SPECIFICATIONS

GM

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	TEST WEIGHT: GVWR
AMBIENT TEMP.: 59°F,	WIND DIR./VEL.: SE/0-8	ODO: 3304 TIME: 10:00 AM

3.3.21 SPIKE STOPS

(a) Force - Controlled Stops, Make 10 successive Spike Stops.

Pedal Force: 200 lb in 0.08 seconds or less. 200 lb minimum required throughout stop.

Lock - up: Wheel lock - up permitted at any speed.

Speed: 30 - 0 mph

Gear: Neutral

Initial Brake Temperature: 150° - 200° F. average across axle.

10 Stops

STOP NUMBER	PEDAL FORCE lb	INITIAL SPEED mph	TIME TO REACH 200 lb PEDAL FORCE seconds	MAINTAIN 200 lbs	COMMENTS
1	321.8	30.7	0.06	Y	ABS ACT, DRP ACT.
2	319.6	30.4	0.06	Y	ABS ACT, DRP ACT.
3	324.7	30.4	0.06	Y	ABS ACT, DRP ACT.
4	323.7	30.6	0.06	Y	ABS ACT, DRP ACT.
5	326.4	30.5	0.06	Y	ABS ACT, DRP ACT.
6	323.0	30.4	0.06	Y	ABS ACT, DRP ACT.
7	325.0	30.5	0.06	Y	ABS ACT, DRP ACT.
8	324.7	30.3	0.06	Y	ABS ACT, DRP ACT.
9	324.0	30.4	0.06	Y	ABS ACT, DRP ACT.
10	323.0	30.4	0.06	Y	ABS ACT, DRP ACT.

(b) Effectiveness (Check) Stops

Pedal Force: 15 - 150 lb

Speed: 60 - 0 mph

Gear: Neutral

6 Stops for Minimum Stopping Distance

TEST SPEED MPH			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	S T O P	ACTUAL	ft.		lb		
			MEASURED	CORRECTED	MIN	MAX	
60 mph	1	60.7	170.3	166.4	19.0	151.9	P.F. LIMIT ABS + DRP ACT.
	2	60.6	177.8	174.3	83.5	147.2	ABS + DRP ACT.
	3	60.8	162.5	158.3	68.6	157.5	P.F. LIMIT ABS + DRP ACT.
	4	60.6	171.0	167.6	68.1	145.8	ABS + DRP ACT.
	5	60.6	160.5	157.3	70.3	130.1	ABS + DRP ACT.
	6	60.9	158.3	153.7	72.8	137.0	ABS + DRP ACT.

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel HookerFinish ODO: 3324Date: 3-28-98

Vehicle and Component Tests

TEST #: 8005C	VEHICLE #: CS0628	ODO: 3325	TIME: 2:30P
----------------------	-------------------	------------------	--------------------

3.3.22 FINAL INSPECTION

YES

NO

3.3.22.1 Test completed without detachment or fracture of any component of the braking systems, such as brake springs, brake shoe or disc pad facing, other than minor cracks. A major crack does not meet requirement. A major crack is a crack across the shoe with an obvious gap.

✓

All mechanical components of the braking system are intact and functional

✓

Friction facing tearout does not exceed 10% of the lining on any single frictional element.

✓

3.3.22.2 Test completed without any visible brake fluid or lubricant on:

(1) the friction surface of the brake

✓

(2) at the master cylinder

✓

(3) at the power unit reservoir cover

✓

(4) at the seal and filler openings

✓

Lining and/or Drum/Rotor Appearance

LH

& RH

LINING TO DRUM CLEARANCE

	CONTACT	GLAZE	STREAK.	DUST	OTHER COMMENTS	
PRI OR OUT	LF 100 %	MOD	MOD	MOD		
	RF 100 %	MOD	MOD	MOD		
	LR 100 %	LIGHT	LIGHT	LIGHT		
	RR 100 %	LIGHT	LIGHT	LIGHT		
SEC OR IN	LF 100 %	MOD	MOD	MOD		
	RF 100 %	MOD	MOD	MOD		
	LR 100 %	MOD	MOD	LIGHT		
	RR 100 %	LIGHT	LIGHT	LIGHT		
	RESIN	BLUING	RINGING	STREAKS	FINISH	
DRUM OR DISC	LF LIGHT	LIGHT	LIGHT	MOD		
	RF LIGHT	LIGHT	LIGHT	MOD	GLOSSY	
	LR LIGHT	LIGHT	LIGHT	LIGHT	GLOSSY	
	RR LIGHT	LIGHT	LIGHT	LIGHT	GLOSSY	

Recorded by: J. GREEN / K. NELSON

Date: 3-28-98

NOTE: Sections 3.3.22.4, 3.3.22.5, and 3.3.22.6 may be completed using engineering documentation, i.e., drawings, layouts, or lab tests.

3.3.22.4 Measure minimum reservoir fluids capacity

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.5 Inspect labeling (master cylinder, brake power unit, etc.).

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.6 Inspect brake system indicator lamps method used.

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.23 Moving barrier Test

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

*** NOTE: THIS IS THE FIRST HALF OF A 2-PART PAGE ***
*** YOU MUST ALWAYS PRESS "ENTER" TO GET SECOND-HALF OF THE PAGE ***
DISPLAY COMPLETE

PAGE REQ: = 15:48:11 04/04/02
SW31E

** CPC TEST WORK ORDER **

TO: DESERT PRVNG GRNDS

ORDER-NO: 03CK0 - 088 -

ISSUED: 07MR02 REISSUED:

PAGE: 1

PROGRAMS: 03CK0

UPC: 5A

SUBJECT: 2003 CKMCE FMVSS135 KP3123

CHARGE TO: 111XX41RT

PRELIMINARY CONTACTS: STEVE LEVCHAK 248-753-0327

MATERIAL REQ-WO REF: -

MATERIAL TYPE: EXPER: PROTO: X PILOT: LEAD UNIT BLD: PROD:

VEHICLE REQUIRED: YES X NO VEHICLE NUMBER: KP3123

TEST PROCEDURE NO: 4630

*** NOTE: THIS IS THE SECOND HALF OF THE TEST WO DISPLAY PAGE
*** PRESS "ENTER" OR ANY OTHER KEY SPECIFIED ON THIS PAGE
DISPLAY COMPLETE

TEST OBJECTIVE/DESCRIPTION:
HYDRAULIC BRAKE SYSTEM
BILL SEAY, 8-674-5371

GMUTS: R1-5-135G .

FMVSS135 (4630) ON KP3123 VALIDATION TEST

MATERIAL DESCRIPTION:
KP3123

DISPOSITION OF MATERIALS:

REQUESTED BY: D H VINCKE / E R REEMMER
PHONE NO.: 8-535-0370 / 753-3500

PF1 = RETURN TO INPUT SCREEN PF7 = LEAD SHEET PF10 = HELP PF11 = MENU

GM Evaluation Report

Platform	Project/EWO No.	Requirement No.	Procedure No.	VPP/VIA/UPC	Model Year	Model No.	PER/Report No.
GMT800	38HS061	VTs 3.2.1.1.3.1 SSTS 3.2.1.1.9	MTL #4630	20.4 / 5	2003	K15703	03CK0088 SEQ 005

Reference Issue Report (IR) No. _____

Category: BRK (T)Function ☐ Development ☒ ValidationMethod: ☐ Math Based ☒ Hardware BasedDate: 25MAR02☒ FinalTitle: HYDRAULIC BRAKE SYSTEMS -
PASSENGER CAR AND LIGHT TRUCK
VEHICLES☐ Interim No.TEST #: 2002TK-059☐ Reissue

Date of Reissue: _____

To: S. LEVCHAK

Date of Request: _____

From: R. R. IGLEWSKIDates of Evaluation: 13MAR02 - 25MAR02

Objective:

To evaluate hydraulic brake system performance consistent with the requirements of Federal Motor Vehicle Safety Standard (FMVSS) 135.

Foreword:

The objective of this test was to measure the FMVSS 135 Validation performance of a 2003 Alpha 2 model K15703 with a JC3 (2A) brake system at 6400 lbs (2903 kg) GVWR. The tire P/N was 9593506 and RPO code was QIX.

Conclusions:

The vehicle completed the test and met all of the VTS and SSTS requirements tested.

Design Evaluated: See Appendix A

GMUTS Rating: N/A

Veh. Mileage: 609 test miles

Part/Test Object Name(s)	Veh/Buck/PT/Part No./RPO	Revision Date/Level
Vehicle	KP3123	Alpha 2
See Attached Build and Test Specification Sheet in Appendix A.	JC3(2A) Brake System	Beta

Distribution:

Name: Document MGT (Original) Loc: 483-585-324
 Name: S. Levchak Loc: 483-524-2D2
 Name: J. Mathis Loc: 483-524-2D2
 Name: T. Flaim Loc: 483-327-101
 Name: A. Avery Loc: 852-524-2D2
 Name: DPG Brake File (FOLDER) Loc: 852-B33-000

Robert Iglewski 3/25/02
 Author: Robert Iglewski Date:
 (Title/Phone) Development Engineer / 8-674-5178
 (Location) GMNA Desert Proving Ground

Steve Hastings 25MAR02
 Approver: Steve Hastings Date:
 (Title) EGM Brake Development
 (Location) GMNA Desert Proving Ground

GM Evaluation Report

Platform	Project/EWO No.	Requirement No.	Procedure No.	VPP/VIA/UPC	Model Year	Model No.	PER/Report No.
GMT800	38HS061	VTs 3.2.1.1.3.1 SSTS 3.2.1.1.9	MTL #4630	20.4 / 5	2003	K15703	03CK0088 SEQ. 005

Reference Issue Report (IR) No. _____

Category: BRK (T)Function ☐ Development ☒ ValidationMethod: ☐ Math Based ☒ Hardware Based

Requirements:

C/K 03-04 Vehicle Technical Specification; WIP; April 30, 2001; Revision 9.

3.2.1.1.3.1 Government Regulations. The vehicle shall comply with all requirements specified in FMVSS 135 for vehicles with GVWR of 3500 kg (7716 lb) or less and FMVSS 105 for vehicles with GVWR greater than 3500 kg (> 7716 lb). Vehicles designated for export shall meet the country specific requirements as specified in the Global Legal Database.

C/K 03-04 Subsystem Technical Specification Chassis; May 2, 2001; Revision 3.

3.2.1.1.9 Brake Lamp Telltale. The brake telltale lamp shall be illuminated as follows:

- a. If the usable brake fluid volume in the brake fluid reservoir is less than the quantity required to activate the caliper pistons, the telltale shall illuminate until the condition is corrected.
- b. During the engine ignition sequence for 2 seconds records to verify operation of the lamp.
- c. On vehicles equipped with a differential pressure brake proportioning valve, the brake telltale lamp shall illuminate when the differential pressure switch activates due to a partial hydraulic system failure. The brake telltale lamp shall not illuminate when the differential pressure switch returns to the center position.
- d. When an output is sent from the ABS/TCS/VSES module to illuminate the lamp.

Procedure/Method:

MTL#4630, Hydraulic Brake System – Passenger Car and Light Truck Vehicles, Revision November 1997.

Ref: Federal Motor Vehicle Safety Standard No. 135, Hydraulic Brake System, Revision 63 FR29143 May 28, 1998.

DPG Check-off and Data Sheets, Revision March 2001 (on file at the DPG).

Used the export speed calibration (Vmax) at 170.6 kph (106 mph) for this test in place of the domestic speed calibration (Vmax) at 157.7 kph (98 mph).

Equipment / Calibration Report:

See Appendix B.

Results:

See summary sheet for performance results in Appendix B. See data sheets for details. The brake telltale lamp was illuminated for sections 'c' and 'd' of the SSTS requirement. Section 'a' did not apply and section 'b' was not tested in this procedure.

Appendix:

Appendix A: Build and Test Specification Sheet and CG583 Form

Appendix B: Results

Appendix C: Glossary of Engineering Technical Terms

GM Evaluation Report

Platform	Project/EWO No.	Requirement No.	Procedure No.	VPP/VIA/UPC	Model Year	Model No.	PER/Report No.
GMT800	38HS061	VTs 3.2.1.1.3.1 SSTS 3.2.1.1.9	MTL #4630	20.4 / 5	2003	K15703	03CK0088 SEQ. 005

Reference Issue Report (IR) No. _____

Category: BRK (T)Function ☐ Development ☒ ValidationMethod: ☐ Math Based ☒ Hardware Based

APPENDIX A

BUILD AND TEST SPECIFICATION SHEET AND CG583 FORM

CG583 (rev 4/97)



Truck Group

VALIDATION TEST AND VEHICLE REVIEW

Test Task No.: 03CK0088 ☒ Validation ☐ Development ☐ Info ☐ Witness
SEQ. # 005
Test Title: FMVSS-135 Hydraulic Brake System
Test Purpose: To determine the performance of the vehicle relative to FMVSS-135 requirements.

Technical Spec.: _____

GMTG Test Procedure: 4630 FMVSS: _____

Special Instruction: _____

Test Veh. No.: KP3123 Data Acquisition Veh.: _____ Test Buck No.: _____

Test Material Part Number	Test Material Noun Name	Test Material Part Number	Test Material Noun Name
See Attached	(Please initial and		
Build and Test	date attached		
Specification Sheet.	(Specification Sheet)		
Test #: 2002TK-059			

The undersigned agree that the test setup, test method, test material, and when applicable, the test vehicle, data acquisition vehicle and test buck are appropriate for this test.

Iglewski, RR

Test Engineer

Signature

Date

Supervisor Signature

S. J. Levchuk

Signature

Date

UPC

Part Content Description

Design Resp. Engr.

Signature

Date

UPC

Part Content Description

Design Resp. Engr.

Signature

Date

UPC

Part Content Description

GM CONFIDENTIAL

BUILD AND TEST SPECIFICATION SHEET

TWO: 03CK0088

Seq: 005

Work Order No. NE8XXG030

Vehicle: KP3123

Test : 2002TK-059

Test Purpose: To determine the performance of the vehicle relative to FMVSS135 requirements.

Test Results: The vehicle completed the test and met the requirements tested.

Comments: This test was performed on a 2003 Alpha 2 GMT800 model K15703 with a JC3 (2A) brake system at 6400 lbs (2903 kg) GVWR. Tire P/N was 9593506 and RPO code was QIX.

TEST INFORMATION

Test Type: FMVSS-135 Hydraulic Brake System
 Procedure No: 4630
 Start Date: 3/13/02 Start Odo: 7297
 Finish Date: 3/25/02 Finish Odo: 7906
 PFC or Skid No: 0.99 Odo.Corr.Fact:

TEST WEIGHT

	GVWR	LLVW	GVWR	LLVW
Front (lbs):	1202	1552	1202	1552
Rear (lbs):	1702	910	1701	908
Total (lbs):	2904	2462	2903	2460
% Front:	41.39	63.04	41.41	63.09
Tire Radius:	371.00	384.00	371.00	384.00
Frt Axle to CG:	69.70	44.00	69.70	43.90
CG Height:	650.00	668.00	650.00	668.00

DESIGN WEIGHT**VEHICLE INFORMATION**

Vehicle VIN: 1GCEK14T81Z
 Year: 2003 Brake RPO: JC3
 Name Plate: Chevrolet Axle Ratio: 3.73:1
 Model: K15703 Wheelbase: 119.0
 Engine: 5.3L/LM7 PCM Op. S/W: 12577216AN
 Transmission: A4/M30 Idle RPM:

TIRE INFORMATION

Tire Size: LT265/75R16C Wheel Size: 16x7
 Tire Make: Goodyear Wheel Mat'l: Aluminum
 Tire Type: OOR Wheel Code:
 Tire Pressure: 40/35 (PSI) Single/Dual: Single

FRONT SYSTEM

Type: DISC Series: DC3-251 LF Caliper Asm: 15064409A
 Piston Dia: 2 X 51 mm Rotor ASM: 15716362QS RF Caliper Asm: 15064408A
 Rotor Size: 305x29x9 mm Noise Treat: Rubore RPNS13001 Service Kit: TX172625A
 Notes: Pad kit TX172625A is the same as TX172932A

	Material	NY-Code	Lining Attachment	Useable Thick.
Inboard:	Akebono	NS265HFF	Molded	0.490
Outboard:	Akebono	NS265HFF	Molded	0.490

REAR SYSTEM

Type: DISC Series: DCP-154 LR Caliper ASM: 15065069A
 Piston Dia: 1 X 54 mm Rotor ASM: 15712800QR RR Caliper ASM: 15065070A
 Rotor Size: 325x20x6.5 mm Noise Treat: CLD6.4 Service Kit: 18043346
 PB Service Kit: 12477911 PB Min Thk:
 PB Lining: JBI T103
 Notes: Rear service kit shim p/n: TX168700A
 Set park brake lining clearance to 0.032".

	Material	NY-Code	Lining Attachment	Useable Thick.
Inboard:	Akebono	NS161HEF	Molded	0.375
Outboard:	Akebono	NS161HEF	Molded	0.375

APPLY SYSTEM

Booster Type: Vacuum SBA Master Cyl ASM: 15087877B
 ASM: 15087880B Code: SS Pedal Ratio: 4.0
 Code: ACA Dia: 31.8x42strok mm Pedal Apply Radius:
 Size: 260T mm Disp: @1500psi Frt Port: 12.90 cc Pedal Travel: @ 50 LBS: 41 mm
 @1500psi Rear Port: 18.20 cc @ 100 LBS: 52 mm

BALANCE SYSTEM

Comb Valve ASM: 15166886A
 Height Sens Valve: None

Code	Meter	Split	Slope
F3	0	470	0.43

ANTI LOCK

Anti Lock System: 4WAL Anti Lock Software Level: GM124GDC
 Anti lock Comments: EBC325 - System balance controlled by DRP. HCU s/n was Z-A083.

Engineer: Iglewski, RR

Date: 3/25/02

*Measurements in INCHES unless otherwise specified

SPECSHEET rev. 10/30/01

GM CONFIDENTIAL

BUILD AND TEST SPECIFICATION SHEET

TWO: 03CK0088

Seq: 005

Work Order No. NEBXXG030

Vehicle: KJ3123

Test: 2002TK-059

Test Purpose: To determine the performance of the vehicle relative to FMVSS135 requirements.

Test Results:

Comments: This test was performed on a 2003 Alpha 2 GMT800 model K15703 with a JC3 (2A) brake system at 6400 lbs (2903 kg) GVWR. Tire P/N was 9593506 and RPO code was QIX. 6400 2903 ✓

TEST INFORMATION				TEST WEIGHT		DESIGN WEIGHT	
Test Type:	Procedure No:	Start Date:	Start Odo:	Front (lbs):	GVWR	GVWR	LLVW
FMVSS-135 Hydraulic Brake System	4630	3/14/02		Rear (lbs):		2656	3421
Finish Date:		Finish Odo:		Total (lbs):		3750	2002
PFC or Skid No:	0.99	Odo Corr. Fact:		% Front:		6400	5423
				Tire Radius:		41.4	63.1
				Frt Axle to CG:		371.00	384.00
				CG Height:		550.00	668.00

VEHICLE INFORMATION				TIRE INFORMATION			
Vehicle VIN:	1GCEK14T81Z	Brake RPO:	JC3	Tire Size:	265/75R18C	Wheel Size:	16x7
Year:	2003	Axle Ratio:	3.73:1	Tire Make:	Goodyear	Wheel Matl:	Aluminum
Name Plate:	Chevrolet	Wheelbase:	119.0	Tire Type:	OOR	Wheel Code:	
Model:	K15703	PCM Op. S/W:	12577216AN	Tire Pressure:	40/35 (PSI)	Single/Dual:	Single
Engine:	5.3L/LM7	Idle RPM:					
Transmission:	A4/M30						

FRONT SYSTEM	Type: DISC	Series: DC3-251	LF Caliper Asm: 15064409A
	Piston Dia: 2 X 51 mm	Rotor ASM: 16716362QB	RF Caliper Asm: 15064408A
	Rotor Size: 305x29x9 mm	Noise Treat: Rubore RPNS13001	Service Kit: TX172625A
	Notes: Pad kit TX172625A is the same as TX172932A		
	<u>Material</u>	<u>NY-Code</u>	<u>Lining Attachment</u>
Inboard:	Akebono	NS265HFF	Molded
Outboard:	Akebono	NS265HFF	Molded
			<u>Useable Thick.</u>
			0.490
			0.490
REAR SYSTEM	Type: DISC	Series: DCP-154	LR Caliper ASM: 15065069A
	Piston Dia: 1 X 54 mm	Rotor ASM: 15712800QR	RR Caliper ASM: 15065070A
	Rotor Size: 325x20x6.5 mm	Noise Treat: GLD6.4	Service Kit: 18043346
	PB Service Kit: 12477811	PB Min Thk:	
	<u>Material</u>	<u>NY-Code</u>	<u>Lining Attachment</u>
Inboard:	Akebono	NS161HEF	Molded
Outboard:	Akebono	NS161HEF	Molded
			<u>Useable Thick.</u>
			0.375
			0.375
APPLY SYSTEM	Booster Type: Vacuum SBA	Master Cyl ASM: 15087877B	Pedal Ratio: 4.0
	ASM: 15087880B	Code: SS	Pedal Apply Radius:
	Code: ACA	Dia: 31.8x42stroke mm	Pedal Travel: @ 50 LBS: mm
	Size: 260T mm	Disp: @1500psi Frt Port: 12.90 cc	@ 100 LBS: mm
		@1500psi Rear Port: 18.20 cc	
BALANCE SYSTEM	Comb Valve ASM: 15166886A	<u>Code</u>	<u>Meter</u>
	Height Sens Valve: None	F3	0
		<u>Split</u>	<u>Slope</u>
		470	0.43
ANTI LOCK	Anti Lock System: 4WAL	Anti Lock Software Level	GM124GDC
	Anti lock Comments: EBC325 - System balance controlled by DRP. HCU s/n was		Z-A083.

Engineer: Iglewski, RR
*Measurements in INCHES unless otherwise specified

SPECSHEET rev 10/30/01

Date: 3/12/02
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GM Evaluation Report

Platform	Project/EWO No.	Requirement No.	Procedure No.	VPP/VIA/UPC	Model Year	Model No.	PER/Report No.
GMT800	38HS061	VTs 3.2.1.1.3.1 SSTS 3.2.1.1.9	MTL #4630	20.4 / 5	2003	K15703	03CK0088 SEQ. 005

Reference Issue Report (IR) No. _____

Category: BRK (T)Function ☐ Development ☒ ValidationMethod: ☐ Math Based ☒ Hardware Based

APPENDIX B

RESULTS

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number: **2002TK-059** Date Completed: **3/25/02** Facility Location: **DPG - Mesa**
 Vehicle Number: **KP3123** Make: **CHEVROLET** Model: **K15703**
 Final Drive Ratio: **3.73:1** Engine: **5.3L/LM7** Transmission: **A4/M30**
 Year: **2003** Max. Speed **170.6** km/h Test Surface: **E. Straightaway** P.F.C. **0.99** Date Measured: **03/07/02**

Brake Type: **Drum/Disc** Brake Size **305x29x9 mm** W/Cyl. / Piston Dia. **2x51 mm** Lining Material **AKEBONO NS265HFF**
 Front **DISC** **305x29x9 mm** **2x51 mm** **AKEBONO NS265HFF**
 Rear **DISC** **325x20x6.5 mm** **1x54 mm** **AKEBONO NS161HEF**

ABS System **EBC325** S/Ware Level **GM124GDC** Power Assist **VACUUM SBA** Booster Code **ACA**

M/Cyl. Dia.: **31.8 x 42.0 mm stroke** Pedal Ratio **4.0:1** Proportioning **0/470/0.43**

Target Test	GVWR	LLVW	Total	Max % Front Front	Pct. Front	Total	Min % Front Front	Pct. Front
Weights (kg)			2903	1780.4	61.3%	2903	1202.1	41.4%
			2460	1552.3	63.1%	2245.0	1270.7	56.6%

Tire Manufacturer **GOODYEAR** Tire Size **LT265/75R16C** Part No. **9593506**

Tire Pressure: Front: **275** kPa Rear: **241** kPa Static Tire Rolling Radius (mm) **GVWR 371** **LLVW 384**

Test Portion			Spec/Limit				Test Results				
			Speed (km/h)	Dist. (m) or MFDD (m/s ²)	Min Pedal Force (N)	Max Pedal Force (N)	Min Pedal Force (N)	Max Pedal Force (N)	Speed Corr. Dist. (m) or MFDD (m/s ²)	Adhes. Corr. Dist. (m)	Pass Margin %
Adhesion Utilization w/o ABS	LLVW	MAX%	100/50	Rear axle adhesion utilization curve below specified value			Brake Balance Region				II
Adhesion Utilization w/o ABS	GVWR	MAX%	100/50				Brake Balance Region				II
Cold Effectiveness	GVWR	MIN%	100	70	65	500	248	480	58.2	63.0	10.0%
High Speed Effectiveness	GVWR	MIN%	136.5	138.4	65	500	262	469	96.3	104.5	24.5%
Stops With Engine Off	GVWR	MIN%	100	70	65	500	270	496	55.3	59.8	14.5%
Cold Effectiveness	LLVW	MAX%	100	70	65	500	248	458	49.6	53.5	23.5%
High Speed Effectiveness	LLVW	MAX%	136.5	138.4	65	500	213	420	92.5	100.4	27.5%
Failed Antilock	LLVW	MAX%	100	85	65	500	117	269	71.2	77.3	9.1%
Failed Variable Proportioning Valve	LLVW	MAX%	100	110	65	500	N/A	N/A	N/A	N/A	N/A
Hyd. Circuit Failure #1 (REAR)	LLVW	MIN%	100	168	65	500	192	475	63.4	68.8	59.1%
Hyd. Circuit Failure #2 (FRONT)	LLVW	MAX%	100	168	65	500	257	406	147.0	160.7	4.4%
Hyd. Circuit Failure #1 (REAR)	GVWR	MIN%	100	168	65	500	273	480	87.5	95.3	43.3%
Hyd. Circuit Failure #2 (FRONT)	GVWR	MAX%	100	168	65	500	293	478	144.9	158.4	5.7%
Failed Antilock	GVWR	MIN%	100	85	65	500	150	473	60.9	66.0	22.3%
Failed Variable Proportioning Valve	GVWR	MIN%	100	110	65	500	N/A	N/A	N/A	N/A	N/A
Power Brake Unit Failure	GVWR	MIN%	100	168	65	500	241	493	85.8	N/A	49.0%
Parking Brake Performance (20% Grade)	Uphill	GVWR	MIN%	--	--	500	197	N/A	N/A	N/A	60.6%
	Downhill	GVWR	MIN%	--	--	500	214	N/A	N/A	N/A	57.2%
Hot Performance Stop 1	GVWR	MIN%	100	≥ 3.30	N/A	136.0	N/A	N/A	* 4.428	N/A	34.2%
Hot Performance Stop 2	GVWR	MIN%	100	89	65	500	204.0	411.0	62.2	N/A	30.1%
Fade Recovery	GVWR	MIN%	100	≤ 3.85 ≤ 8.25	N/A	136.0	N/A	N/A	* 6.016	N/A	81.3%

* Actual MFDD adjusted to target pedal force.

Summarized by: **Robert Iglewski** Date: **3/25/02**

Revised
March 2001

R1-5-135G (MTL 4630)
SUMMARY

GM CONFIDENTIAL

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle No.	KP3123	Date:	
T.W.O.	03CK0088	P.R.R.	---	Odom:	

S5.1 thru S5.5 of FMVSS 135 specifies detailed requirements for brake system warning indicators, labeling, equipment and controls, and master cylinder reservoir capacity.

THIS TEST REPORT DOES NOT CHECK THE FOLLOWING BRAKE SYSTEM REQUIREMENTS

EQUIPMENT AND CONTROLS

The responsible Lead System Engineer and Validation Engineer must certify that the brake system covered by this report meets all of the equipment and controls requirements of S5.1 thru S5.3.2.

BRAKE SYSTEM WARNING INDICATORS

The responsible Electrical Center personnel at the vehicle platform must certify that ALL RELEASED INSTRUMENT CLUSTERS meet the warning requirements of S5.5.1 through S5.5.5.

Limited information concerning the warning indicators for the specific vehicle test are provided in Data Sheets 13, 14, 15, 16, 17, 18, 19, 20, and 22.

MASTER CYLINDER RESERVOIR CAPACITY AND LABELING.

The responsible Lead System Engineer and Validation Engineer must certify that the brake system covered by this report meets all of the master cylinder volume and labeling requirements of S5.4.1 thru S5.4.4.

Certified by: _____
Validation Engineer

Date _____

Date _____

Revised
March 2001

GM CONFIDENTIAL

R1-5-135G (MTL 4630)
Warning Indicators

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

Test Number	<u>2002TK-059</u>	Vehicle No.	<u>KP3123</u>	Date:	<u>3/19/02</u>
T.W.O.	<u>03CK0088</u>	P.R.R.	<u>----</u>	Odom:	<u>7562</u>

INSTRUMENT CALIBRATION

FMVSS 135

	<u>Instrument Description</u>	<u>Instrument Number</u>	<u>Channel Location</u>	<u>Calib. Shunt Values</u>	<u>Next Calibration Date</u>
1	<u>Data Acquisition Chassis</u>	<u>A10115</u>	<u>NA</u>	<u>NA</u>	<u>Nov-02</u>
2	<u>Lap Top Computer</u>	<u>A30813</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>
3	<u>Controller Software Release</u>	<u>4.0 beta5</u>	<u>NA</u>	<u>NA</u>	<u>Sep-00</u>
4	<u>Vacuum Transducer</u>	<u>A10061</u>	<u>1-5</u>	<u>61.244</u>	<u>Aug-02</u>
5	<u>Pedal Travel Transducer</u>	<u>A10191</u>	<u>4-2</u>	<u>---</u>	<u>Jul-02</u>
6	<u>LF Torque Wheel</u>	<u>A02749</u>	<u>8-1</u>	<u>2679</u>	<u>Aug-02</u>
7	<u>RF Torque Wheel</u>	<u>A02763</u>	<u>8-2</u>	<u>2697</u>	<u>Jun-02</u>
8	<u>LR Torque Wheel</u>	<u>A05788</u>	<u>8-3</u>	<u>2428</u>	<u>Jul-02</u>
9	<u>RR Torque Wheel</u>	<u>A02742</u>	<u>8-4</u>	<u>2547</u>	<u>Aug-02</u>
10	<u>LF Slip Ring</u>	<u>A07236</u>	<u>8-1</u>	<u>---</u>	<u>Sep-02</u>
11	<u>RF Slip Ring</u>	<u>A10155</u>	<u>8-2</u>	<u>---</u>	<u>Sep-02</u>
12	<u>LR Slip Ring</u>	<u>A10504</u>	<u>8-3</u>	<u>---</u>	<u>Sep-02</u>
13	<u>RR Slip Ring</u>	<u>A00469</u>	<u>8-4</u>	<u>---</u>	<u>Sep-02</u>
14	<u>Service Brake Pedal Force Transducer</u>	<u>A10849</u>	<u>4-1</u>	<u>609.8</u>	<u>Aug-02</u>
15	<u>Park Brake Pedal Force Transducer</u>	<u>A10046</u>	<u>4-3</u>	<u>561.7</u>	<u>Jul-02</u>
16	<u>LF Hydraulic Pressure Transducer</u>	<u>A07612</u>	<u>6-2</u>	<u>4916</u>	<u>Aug-02</u>
17	<u>RF Hydraulic Pressure Transducer</u>	<u>A10649</u>	<u>6-3</u>	<u>6184</u>	<u>Jun-02</u>
18	<u>LR Hydraulic Pressure Transducer</u>	<u>A06750</u>	<u>6-4</u>	<u>4019</u>	<u>Aug-02</u>
19	<u>RR Hydraulic Pressure Transducer</u>	<u>A08409</u>	<u>6-5</u>	<u>4467</u>	<u>Aug-02</u>
20	<u>Decelerometer</u>	<u>A05935</u>	<u>1-8</u>	<u>32.2</u>	<u>Aug-02</u>
21	<u>Fifth Wheel</u>	<u>A08382</u>	<u>1-9</u>	<u>---</u>	<u>Aug-02</u>
22	<u>LPMCF</u>	<u>A05847</u>	<u>6-1</u>	<u>5074</u>	<u>Aug-02</u>
23	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>
24	<u>CART #10</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>	<u>NA</u>

Recorded by ParrDate 3/21/02Revised
February 2002R1-5-135G (MTL 4630)
Data Sheet 1

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GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	<u>2002TK-059</u>	Vehicle No.	<u>KP3123</u>	Date:	<u>3/19/02</u>
T.W.O.	<u>03CK0088</u>	P.R.R.	<u>----</u>	Odom:	<u>7562</u>

3.3.1 Start of Test Floor Check (Required)

Channel Configuration

Channel	Sample Rate	Title	Metric Eng'rg Units	Collect Mode
Analog	100 HZ	VACB	kPa	Averaged
Analog	100 HZ	VACE	kPa	Averaged
*Strain	100 HZ	LPBI	kPa	Averaged
Strain	100 HZ	LPLF	kPa	Averaged
Strain	100 HZ	LPRF	kPa	Averaged
Strain	100 HZ	LPLR	kPa	Averaged
Strain	100 HZ	LPRR	kPa	Averaged
Strain	100 HZ	PFSB	N	Averaged
Strain	100 HZ	PTSB	mm	Averaged

* Hydraboost System Only

Vehicle Conditions

- (a) Transmission Range: **PARK / NEUTRAL**
 (b) Engine: **AT IDLE DURING POWER BRAKE APPLY**
OFF DURING NO POWER APPLY

Test Conditions

- Pedal Force: Apply to 890 N at 133 N/sec rate.
 Number of runs: 1 with power assist
 1 with no power assist

Test Procedure

Start engine and idle for 2 minutes. After 2 minutes, rev engine to obtain 67 kPa of vacuum. With engine idling, apply service brake to 890 N at 133 N/sec apply rate. Record pedal travel at 90 N pedal force in space provided.

Turn engine off and pump service brake pedal to deplete booster vacuum. Apply service brake to 890 N at 133 N/sec. apply rate. Record pedal travel at 445 N pedal force in space provided.

	Pedal Travel (mm)	Pedal Force (N)	Vacuum (kPa)
Run 1 with power assist	52.3	90.1	67.4
Run 2 with no power assist	54.6	445.2	---

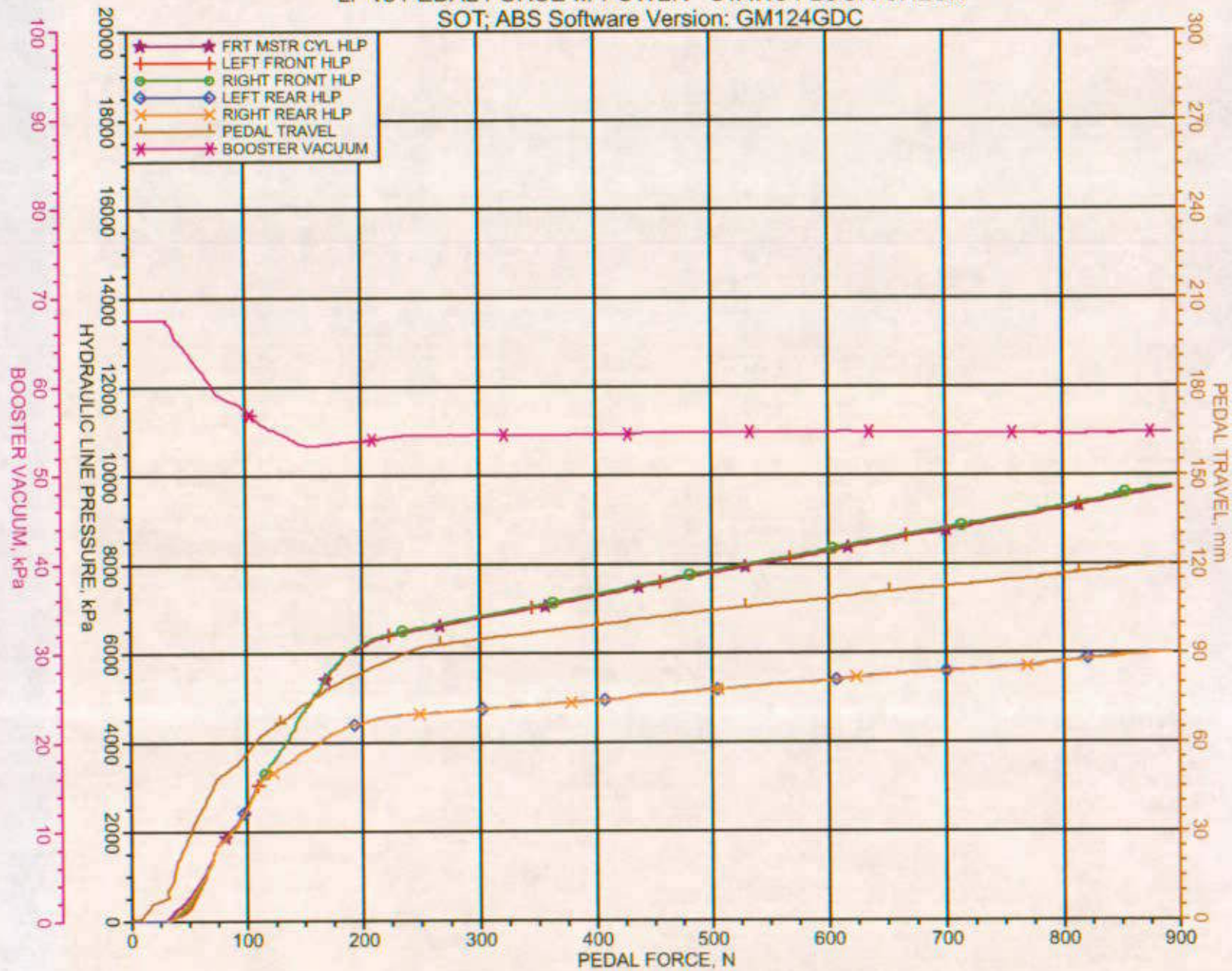
Copy data to disk and have plot made to verify correct proportioning. Obtain Engineer's approval before proceeding with test.

Tested by Deron Blake Date 3/19/02

FMVSS135 VALIDATION TEST 2002TK-059 [KP3123]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

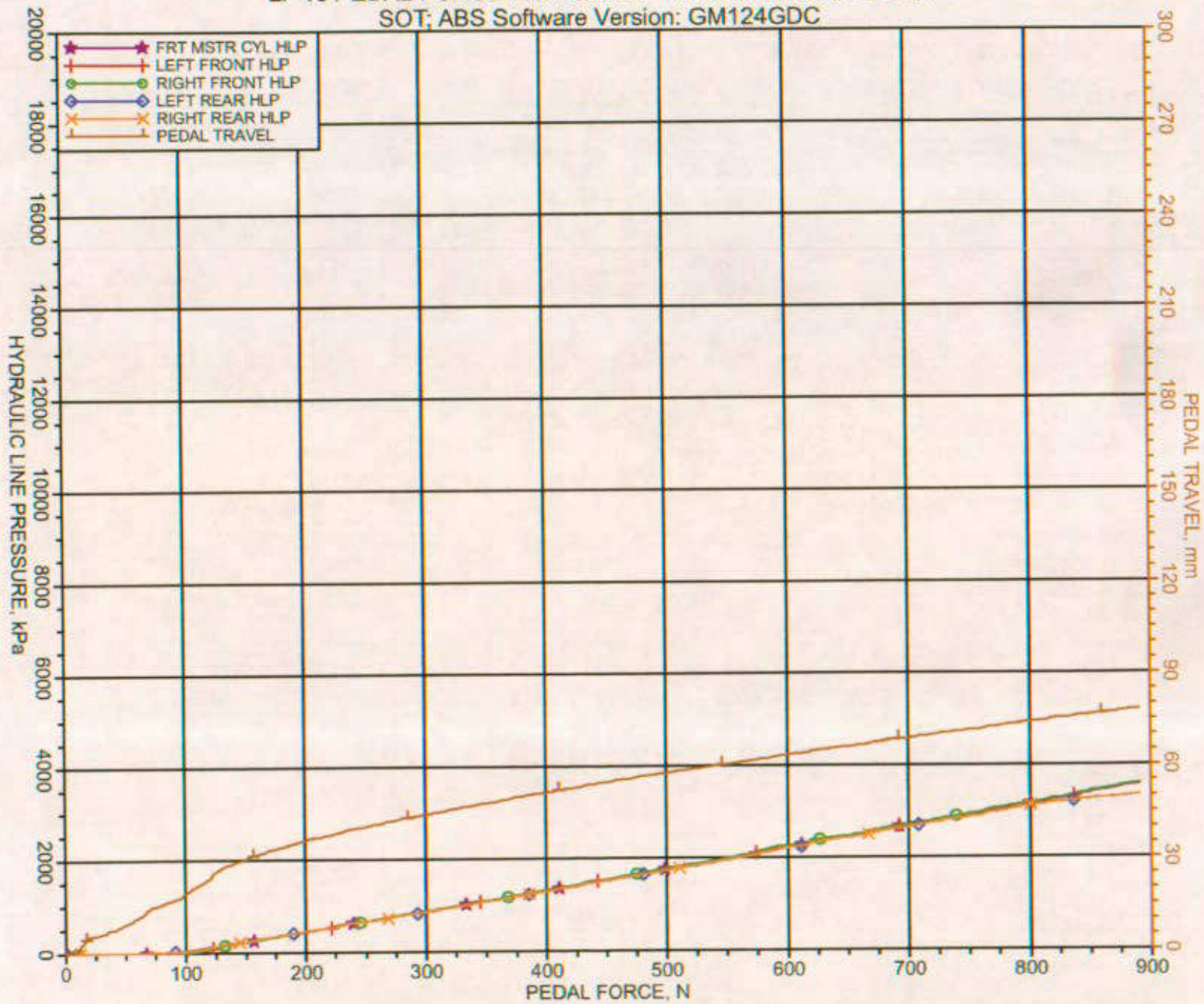
SOT; ABS Software Version: GM124GDC



FMVSS135 VALIDATION TEST 2002TK-059 [KP3123]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

SOT; ABS Software Version: GM124GDC



GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Nbr.	KP3123	Time	
T.W.O.	03CK0088	Odometer	7297	Stop Location	CIRCLE TRACK
P.R.R.	---	Temperature	17° C	Peak Coefficient	
GP DAS FILE NAME	BURN.RAW	Wind Dir. / Vel.		Date Measured	
Target Test Weight Total	2903 kg	Front	1780 kg	Pct.	61.3%
		Rear	1123 kg		
Actual Test Weight Total	2903 kg	Front	1778 kg	Pct.	61.2%
		Rear	1125 kg		

3.3.2 BurnishVEHICLE LOAD: **GVWR**GEAR: **Drive**PEDAL FORCE: **Adjust as necessary to maintain constant decel rate.**TEST SPEED: **80 km/h to 0**IBT: **≤100° C** Record temperatures **.32 km** before stopDECEL RATE: **3.0 m/s²**WHEEL LOCKUP: **None longer than 0.1 seconds at speeds greater than 15 km/h.**INTERVAL: **The interval from the start of one service brake application to the start of the next is either the time necessary to reduce the IBT to 100° C or less, or the distance of 2 km, whichever occurs first.**

Stop No.	GP DAS Run Number	Brake Temperature °C (Secondary Shoe or Hottest Pad)				Stop Interval	Comments
		LF	RF	LR	RR		
1	1	33	32	31	28	0.2 km	
10	2	91	105	99	84	0.2 km	
20	3	102	121	123	92	0.2 km	
30	4	102	104	120	85	0.2 km	
40	5	98	102	116	80	0.2 km	
50	6	98	100	115	83	0.2 km	
60	7	97	103	117	83	0.2 km	
70	8	96	96	112	86	0.2 km	
80	9	92	92	111	83	0.2 km	
90	10	96	95	113	87	0.2 km	
100	11	96	96	113	88	0.2 km	
110	12	95	95	108	86	0.2 km	NO NOISE, GOOD STABILITY
120	13	91	98	96	71	2 km	NO NOISE, GOOD STABILITY
130	14	99	102	110	85	2 km	NO NOISE, GOOD STABILITY
140	15	95	96	107	84	2 km	NO NOISE, GOOD STABILITY
150	16	101	108	98	74	2 km	NO NOISE, GOOD STABILITY
160	17	102	106	110	84	2 km	NO NOISE, GOOD STABILITY
170	18	97	103	107	80	2 km	NO NOISE, GOOD STABILITY
180	19	93	100	102	79	2 km	NO NOISE, GOOD STABILITY
190	20	93	105	106	81	2 km	NO NOISE, GOOD STABILITY
200	21	92	104	105	79	2 km	NO NOISE, GOOD STABILITY

Tested by L. COLLINS, E. SCHAFER & L. CHRISTIDate 3/15/02

Brake Adjustment (Post Burnish)

Adjust to manufacturer's published recommended practice

Record method used: _____

Adjusted by _____

Date _____



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Nbr.	KP3123	Time	
T.W.O.	03CK0088	Odometer		Stop Location	N/A
P.R.R.	----	Temperature		Peak Coefficient	N/A
GPDAS FILE NAME	VMAX.RAW	Wind Dir. / Vel.		Date Measured	N/A
Target Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	
Actual Test Weight	Total _____ kg	Front _____ kg	Pct. _____	Rear _____ kg	

3.3.3 Vehicle Maximum Speed

Establish vehicle maximum speed (if not furnished by requesting engineer).

VEHICLE LOAD: **LLVW**
 GEAR: Drive
 PEDAL FORCE: Not applicable
 TEST SPEED: Maximum attainable from a standing start in 3.2 km.
 IBT: Not applicable
 DECEL RATE: Not applicable
 WHEEL LOCKUP: Not applicable
 INTERVAL: Not applicable

Ballast vehicle to LLVW prior to installing Torque Wheels.

Accelerate at a maximum rate from a standing start for a distance of 3.2 km on a level surface.

Repeat in opposite direction if using the east straightaway. If using the circle track, start second run 180 degrees from start of first run.

Record speed attained in each direction and use the average of the two runs.

	Direction	Max. Speed
Run No. 1	<u>NA</u>	<u>NA</u> km/h
Run No. 2	<u>NA</u>	<u>NA</u> km/h
	Average	<u>NA</u> km/h

NOTE: The export maximum speed calibration of 170.6 kph was used for this test.

Average speed must be entered in cell D52 of "data" sheet prior to printing Part B of test packet.
This is required for speed and distance calculations on Data Sheet 9 and Data Sheet 12.

Tested by _____ Parr _____ Date 3/19/02

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	12:30 PM
T.W.O.	03CK0088	Odometer	7585	Stop Location	E. Straightaway
P.R.R.	----	Temperature	19° C	Peak Coefficient	0.99
GPDAS FILE NAME	ADHL.RAW	Wind Dir. / Vel.	W @ 10 KPH	Date Measured	3/7/02
Target Test Weight Total	2460 kg	Front	1552 kg	Pct.	63.1%
Actual Test Weight Total	2457 kg	Front	1551 kg	Pct.	63.1%
		Rear	908 kg		
		Rear	906 kg		

3.3.5 Adhesion utilization (Torque Wheel Method).

Adhesion Utilization results are not an FMVSS 135 compliance requirement for ABS equipped vehicles.

NOTE: If vehicle is equipped with ABS and Electronic Brake Force Distribution such as EBD or DRP, both ABS and Electronic Brake Force Distribution System must be completely disabled prior to running this test section. If unsure how to disable both, check with Test Engineer.

3.3.5.1 Vehicle conditions. DISABLE ABS AND EBD/DRP - RECORD METHOD REMOVED 60 AMP ABS FUSE

(a) Vehicle load: **LLVW** **Red Brake Light Illuminated?** Yes ☒ No ☐

(b) Transmission position: **In neutral**

(c) Tires: For this test, a separate set of tires, identical to those used for all other sections of this test, may be mounted on torque wheels and used to complete this portion of test.

3.3.5.2 Test conditions and procedures.

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEEDS: 100 km/h and 50 km/h
 PEDAL FORCE: 100 km/h test speed

Ramp apply between **100 and 150 N/sec apply rate** until the first axle locks or a max. of 1000 N pedal force is reached, whichever occurs first.

50 km/h test speed

Ramp apply between **100 and 200 N/sec apply rate** until the first axle locks or a max. of 1000 N pedal force is reached, whichever occurs first.

COOLING: Between brake applications, drive at speeds up to 100 km/h until IBT is reached.
 NUMBER OF RUNS: 5 Stops from 50 km/h and 5 stops from 100 km/h, alternating between speeds after each stop.
 TEST SURFACE: PFC of at least 0.9
 DATA TO BE RECORDED: **VEHICLE SPEED, PEDAL FORCE, WHEEL VELOCITY, DECEL, BRAKE TORQUE AT EACH WHEEL, AND HYDRAULIC LINE PRESSURE IN EACH BRAKE CIRCUIT (AT LEAST ONE FRONT WHEEL AND ONE REAR WHEEL DOWNSTREAM OF THE PROPORTIONING VALVE).**
SAMPLE RATE: 10 HZ ON TEMP CHANNELS - 100 HZ ON ALL OTHER CHANNELS.

Stop Number	Speed (km/h)		Max. Pedal Force (N)	Vehicle Speed at Lockup (km/h)				Maximum Decel (m/s ²)	Rate of Apply (N/s)	Comments
	Target	Actual		LF	RF	LR	RR			
1	100	98.7	212.8	--	--	71.6	--	7.9	133.0	LRWS
2	50	50.0	201.9	--	--	26.6	--	8.1	133.0	LRWS
3	100	99.6	221.5	--	--	71.5	--	8.7	133.0	LRWS
4	50	50.0	207.4	--	--	29.3	--	8.1	133.0	LRWS
5	100	99.1	197.6	--	--	74.0	--	8.5	133.0	LRWS
6	50	50.3	199.8	--	--	28.6	25.8	8.0	133.0	BRWS
7	100	98.7	197.6	--	--	68.2	--	8.5	133.0	LRWS
8	50	50.9	221.5	--	--	27.3	23.5	8.3	133.0	BRWS
9	100	98.6	217.1	--	--	69.4	--	8.9	133.0	LRWS
10	50	50.5	208.5	--	--	26.9	23.7	8.2	133.0	BRWS

Tested by Deron Blake Date 3/19/02
 Signature

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	9:30 AM
T.W.O.	03CK0088	Odometer	7566	Stop Location	E. Straightaway
P.R.R.	----	Temperature	12° C	Peak Coefficient	0.99
GPDAS FILE NAME	ADHG.RAW	Wind Dir. / Vel.	E @ 8 KPH	Date Measured	3/7/02
Target Test Weight	Total 2903 kg	Front 1780 kg	Pct. 61.3%	Rear 1123 kg	
Actual Test Weight	Total 2906 kg	Front 1781 kg	Pct. 61.3%	Rear 1125 kg	

3.3.5 Adhesion utilization (Torque Wheel Method).

Adhesion Utilization results are not an FMVSS 135 compliance requirement for ABS equipped vehicles.

NOTE: If vehicle is equipped with ABS and Electronic Brake Force Distribution such as EBD or DRP, both ABS and Electronic Brake Force Distribution System must be completely disabled prior to running this test section. If unsure how to disable both, check with Test Engineer.

3.3.5.3 Vehicle conditions. DISABLE ABS AND EBD/DRP - RECORD METHOD REMOVED 60 AMP ABS FUSE

(a) Vehicle load: **GVWR** **Red Brake Light Illuminated?** Yes ☒ No ☐

(b) Transmission position: **In neutral**

(c) Tires: For this test, a separate set of tires, identical to those used for all other sections of this test, may be mounted on torque wheels and used to complete this portion of test.

Test conditions and procedures.

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEEDS: 100 km/h and 50 km/h
 PEDAL FORCE: 100 km/h test speed

Ramp apply between **100 and 150 N/sec apply rate** until the first axle locks or a max. of 1 kN pedal force is reached, whichever occurs first.

50 km/h test speed

Ramp apply between **100 and 200 N/sec apply rate** until the first axle locks or a max. of 1 kN pedal force is reached, whichever occurs first.

COOLING: Between brake applications, drive at speeds up to 100 km/h until IBT is reached.
 NUMBER OF RUNS: 5 Stops from 50 km/h and 5 stops from 100 km/h, alternating between speeds after each stop.
 TEST SURFACE: PFC of at least 0.9
 DATA TO BE RECORDED: **VEHICLE SPEED, PEDAL FORCE, WHEEL VELOCITY, DECEL, BRAKE TORQUE AT EACH WHEEL, AND HYDRAULIC LINE PRESSURE IN EACH BRAKE CIRCUIT (AT LEAST ONE FRONT WHEEL AND ONE REAR WHEEL DOWNSTREAM OF THE PROPORTIONING VALVE).**
SAMPLE RATE: 10 HZ ON TEMP CHANNELS - 100 HZ ON ALL OTHER CHANNELS.

Stop Number	Speed (km/h)		Max. Pedal Force (N)	Vehicle Speed at Lockup (km/h)				Maximum Decel (m/s ²)	Rate of Apply (N/s)	Comments
	Target	Actual		LF	RF	LR	RR			
1	100	99.5	302.9	--	--	61.5	--	7.7	133.0	LRWS
2	50	50.1	324.7	--	--	9.0	--	7.9	133.0	LRWPO
3	100	99.4	309.5	--	--	67.3	--	7.9	133.0	LRWS
4	50	50.0	350.7	--	--	10.6	--	7.9	133.0	LRWPO
5	100	99.1	283.4	--	--	63.5	--	8.0	133.0	LRWS
6	50	50.3	343.1	--	--	11.7	--	7.5	133.0	LRPO
7	100	99.5	255.2	--	--	66.5	--	7.9	133.0	LRWS
8	50	50.9	296.4	--	--	15.7	--	7.7	133.0	LRWS
9	100	99.9	257.3	--	--	63.1	--	7.9	133.0	LRWS
10	50	50.5	297.5	--	--	16.6	--	7.7	133.0	LRWS

Tested by Deron Blake Date 3/19/02

Revised
February 2002

GM CONFIDENTIAL

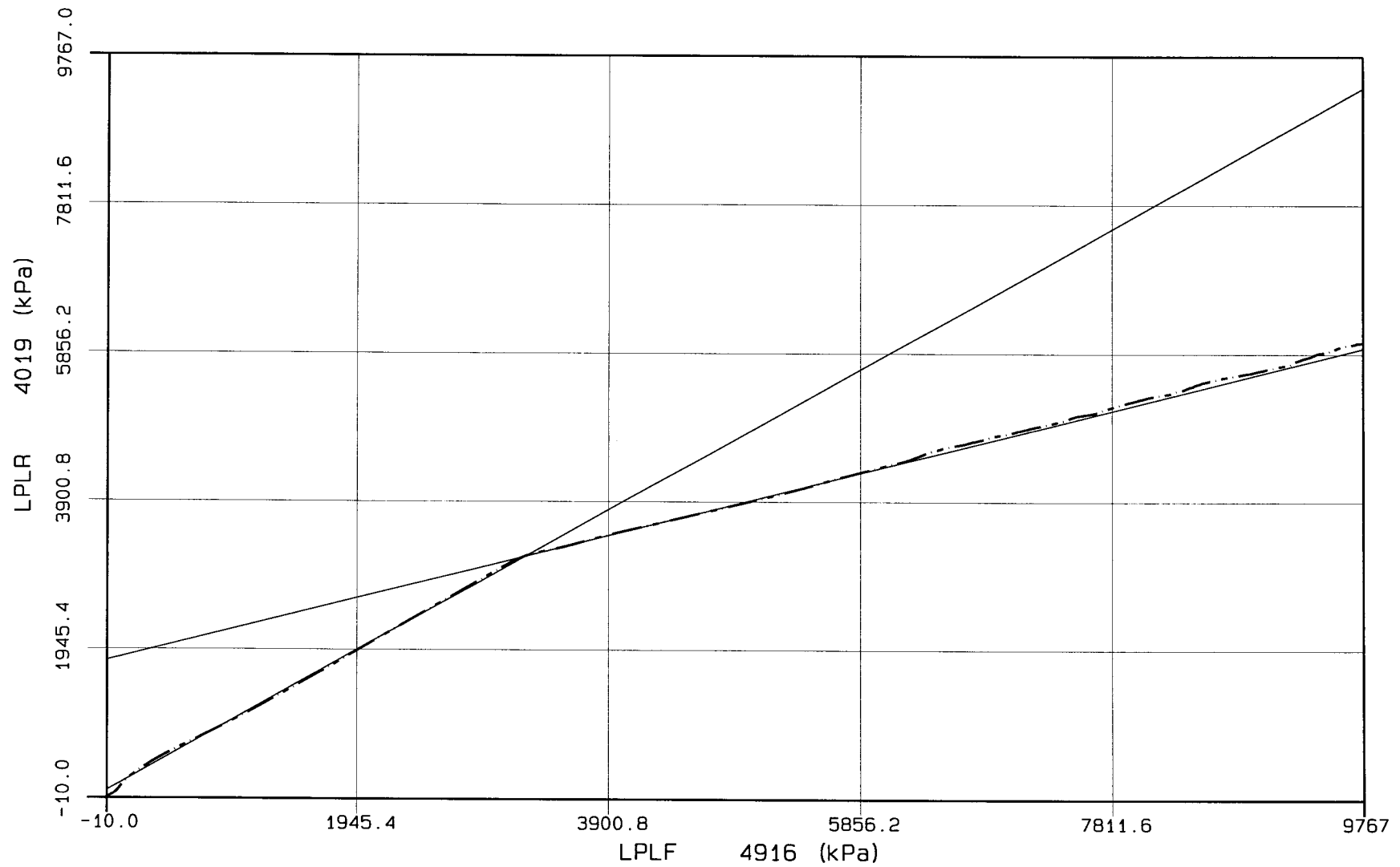
R1-5-135G (MTL 4630)
Data Sheet 6

FMVSS135 TEST (PROPORTIONER PLOT)

Raw File: SOTFC.RAW
Calculated Knee: 3235.06303
Test Number:

Primary Slope: 0.94653
Primary r^2 : 0.99925

Proportioner Slope: 0.42285
Proportioner r^2 : 0.99950

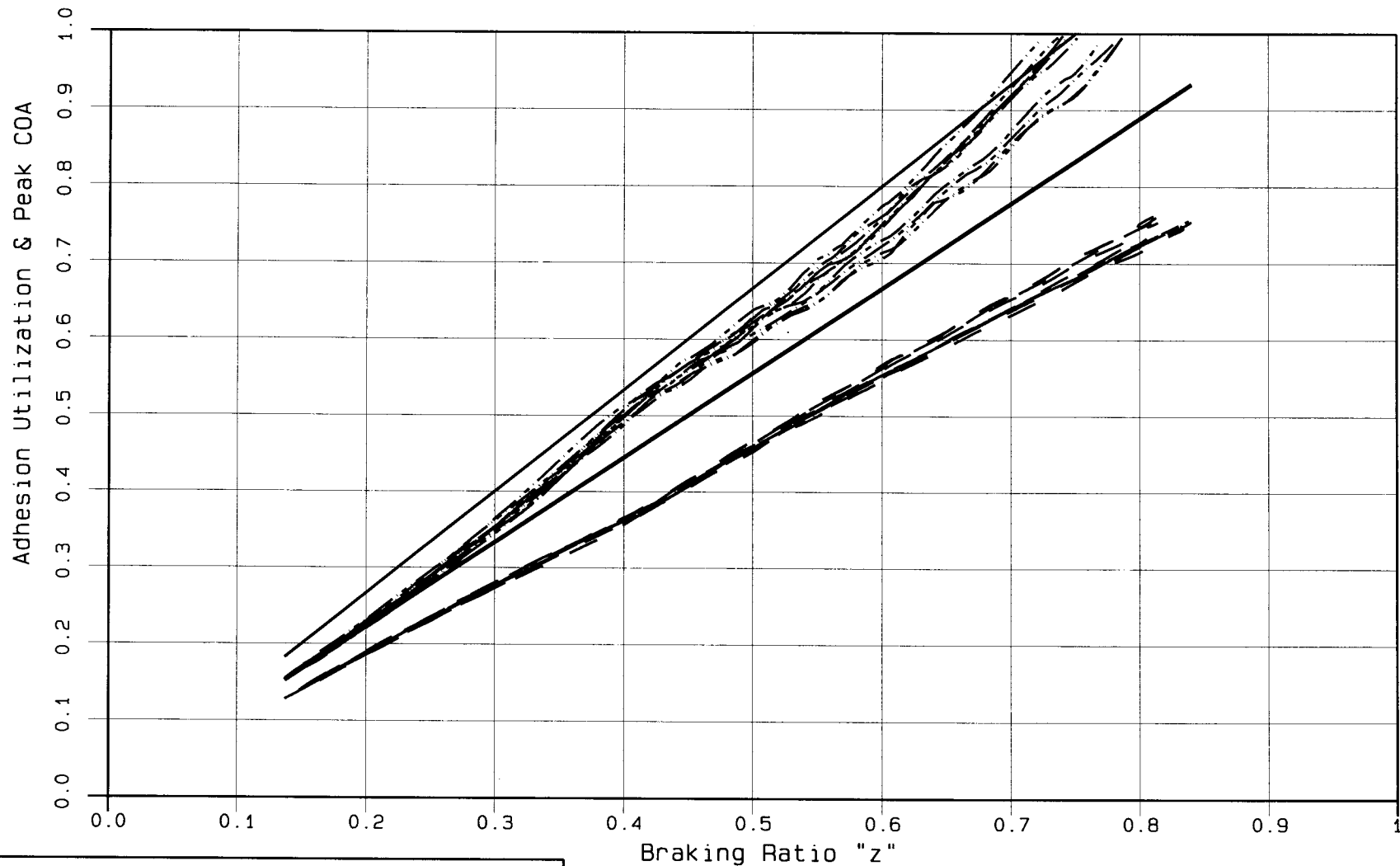


FMVSS135 TEST (MEASURED ADHESION UTILIZATION - 10 STOPS)

Raw File: ADHL.RAW
 COMMENTS: 2003 ALPHA 2 GMT800 MODEL K15703 JC3 (2A)
 COMMENTS: VALIDATION (LLVW)

Test WT./% FRT: 2457 kg / 63.1%
 SCHEDULE: MTL #4630
 LOCATION: DPG-MESA
 DRIVER: DERON BLAKE

TWO: 03CK0088
 TEST NO: 2002TK-059
 VEH. NO: KP3123
 ODOMETER: 7585 miles



Front-Axle Rolling Radius (mm)---	384.0000
Rear-Axle Rolling Radius (mm)----	384.0000
Total Vehicle Weight (kg)-----	2457.0000
Static Weight on Front Axle (kg)->	1551.0000
Static Weight on Rear Axle (kg)-->	906.0000
CG Height of Vehicle (mm)-----	667.5000
Wheel Base (mm)-----	3023.0000
Proportioner Knee (kPa)-----	3235.0630
Primary Slope-----	0.9465
Proportioner Slope-----	0.4228

— — F1 Front AU
- - - F2 Rear AU
— Limit=z/0.90
- - - Limit=z/0.75

FMVSS135 TEST -- ADHESION UTILIZATION (REGRESSION ANALYSIS)

Raw File: ADHL.RAW

Test WT./% FRT: 2457 kg / 63.1% TWO: 03CK0088
 SCHEDULE: MTL #4630 TEST NO: 2002TK-059
 LOCATION: DPG-MESA VEH. NO: KP3123
 DRIVER: DERON BLAKE ODOMETER: 7585 miles
 COMMENTS: 2003 ALPHA 2 GMT800 MODEL K15703 JC3 (2A)
 COMMENTS: VALIDATION (LLVW)

Front-Axle Rolling Radius (mm)----> 384.0000
 Rear-Axle Rolling Radius (mm)----> 384.0000
 Total Vehicle Weight (kg)-----> 2457.0000
 Static Weight on Front Axle (kg)--> 1551.0000
 Static Weight on Rear Axle (kg)--> 906.0000
 CG Height of Vehicle (mm)-----> 667.5000
 Wheel Base (mm)-----> 3023.0000
 Proportioner Knee (kPa)-----> 3235.0630
 Primary Slope-----> 0.9465
 Proportioner Slope-----> 0.4228

LF			RF			LR			RR		
BF	HOP	r ²	BF	HOP	r ²	BF	HOP	r ²	BF	HOP	r ²
Nm/kPa	kPa		Nm/kPa	kPa		Nm/kPa	kPa		Nm/kPa	kPa	
0.3776	297.0	0.9898	0.3248	-94.3	0.9942	0.1879	-240.1	0.9988	0.1815	-300.0	0.9983
0.3943	2.7	0.9997	0.3965	70.9	0.9998	0.2202	3.2	0.9988	0.2175	-29.7	0.9992
0.4433	312.4	0.9967	0.3913	178.5	0.9984	0.1930	-239.5	0.9984	0.1872	-333.5	0.9987
0.3862	24.9	0.9996	0.3935	192.3	0.9999	0.2097	-55.7	0.9994	0.2079	-76.5	0.9993
0.4448	340.9	0.9948	0.3922	198.2	0.9980	0.1918	-196.0	0.9990	0.1882	-274.0	0.9988
0.4029	76.4	0.9996	0.4185	186.6	0.9999	0.2110	-26.0	0.9995	0.2161	22.2	0.9989
0.4707	419.4	0.9948	0.4258	264.4	0.9976	0.1965	-135.2	0.9994	0.1934	-204.3	0.9985
0.3875	15.5	0.9997	0.4040	164.3	0.9999	0.2113	-27.4	0.9996	0.2107	-1.9	0.9986
0.4621	446.7	0.9927	0.4269	315.1	0.9968	0.1927	-180.2	0.9991	0.1877	-245.5	0.9976
0.3973	20.9	0.9997	0.4023	68.8	0.9999	0.2132	0.6	0.9994	0.2116	-22.9	0.9989
0.4141	195.7	0.9967	0.3954	154.5	0.9984	0.2022	-109.6	0.9991	0.1993	-146.6	0.9987
0.4046	175.1	0.9976	(Front Axle)			0.2007	-128.1	0.9989	(Rear Axle)		
											Avg/Wheel
											Avg/Axle

BF = Brake Factor

HOP = Hold-Off Pressure

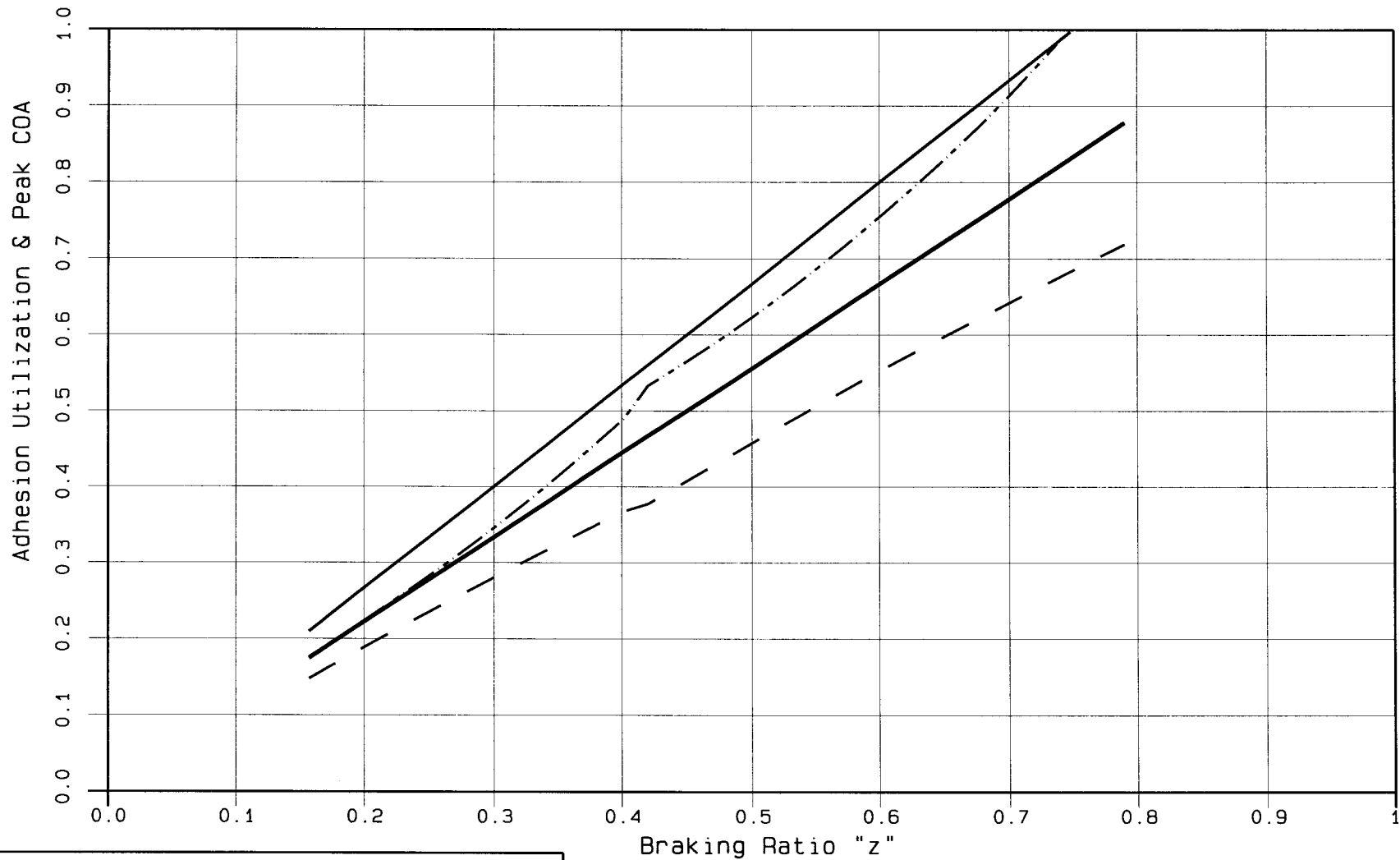
r² = Sample Coefficient of Determination

FMVSS135 TEST (COMPOSITE ADHESION UTILIZATION - 10 STOPS)

Raw File: ADHL.RAW
 COMMENTS: 2003 ALPHA 2 GMT800 MODEL K15703 JC3 (2A)
 COMMENTS: VALIDATION (LLVW)

Test WT./% FRT: 2457 kg / 63.1%
 SCHEDULE: MTL #4630
 LOCATION: DPG-MESA
 DRIVER: DERON BLAKE

TWO: 03CK0088
 TEST NO: 2002TK-059
 VEH. NO: KP3123
 ODOMETER: 7585 miles



Front-Axle Rolling Radius (mm)---	384.0000
Rear-Axle Rolling Radius (mm)----	384.0000
Total Vehicle Weight (kg)-----	2457.0000
Static Weight on Front Axle (kg)->	1551.0000
Static Weight on Rear Axle (kg)-->	906.0000
CG Height of Vehicle (mm)-----	667.5000
Wheel Base (mm)-----	3023.0000
Proportioner Knee (kPa)-----	3235.0630
Primary Slope-----	0.9465
Proportioner Slope-----	0.4228

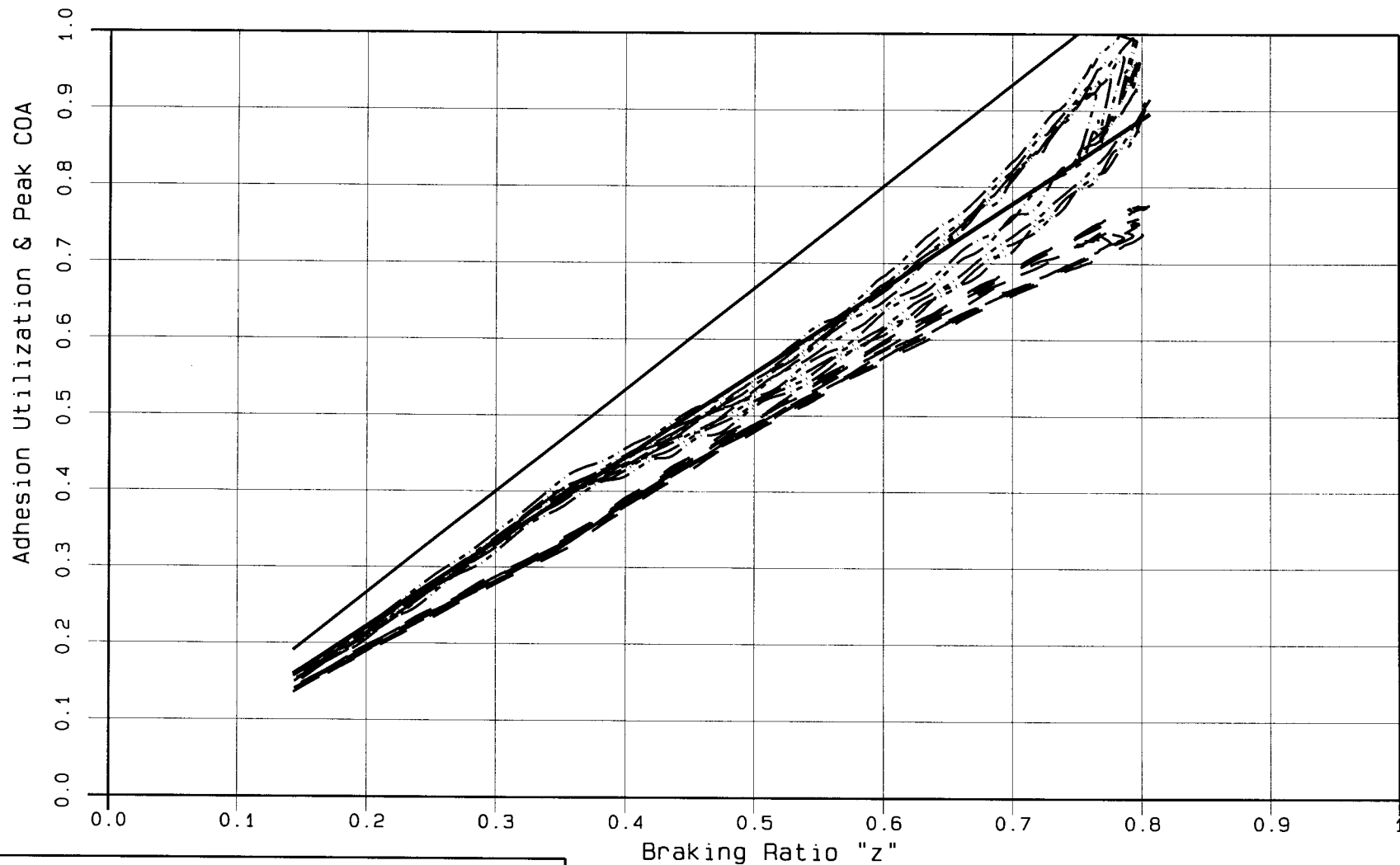
---	F1 Front AU
....	F2 Rear AU
——	Limit=z/0.90
——	Limit=z/0.75

FMVSS135 TEST (MEASURED ADHESION UTILIZATION - 10 STOPS)

Raw File: ADHG.RAW
 COMMENTS: 2003 ALPHA 2 GMT800 MODEL K15703 JC3 (2A)
 COMMENTS: VALIDATION (GVWR)

Test WT./% FRT: 2906 kg / 61.3%
 SCHEDULE: MTL #4630
 LOCATION: DPG-MESA
 DRIVER: DERON BLAKE

TWO: 03CK0088
 TEST NO: 2002TK-059
 VEH. NO: KP3123
 ODOMETER: 7566 miles



Front-Axle Rolling Radius (mm)---	371.0000
Rear-Axle Rolling Radius (mm)----	371.0000
Total Vehicle Weight (kg)-----	2906.0000
Static Weight on Front Axle (kg)->	1781.0000
Static Weight on Rear Axle (kg)-->	1125.0000
CG Height of Vehicle (mm)-----	637.5000
Wheel Base (mm)-----	3023.0000
Proportioner Knee (kPa)-----	3235.0630
Primary Slope-----	0.9465
Proportioner Slope-----	0.4228

— —	F1 Front AU
- - -	F2 Rear AU
—	Limit= $z/0.90$
—	Limit= $z/0.75$

FMVSS135 TEST -- ADHESION UTILIZATION (REGRESSION ANALYSIS)

Raw File: ADHG.RAW

Test WT./% FRT: 2906 kg / 61.3% TWO: 03CK0088
 SCHEDULE: MTL #4630 TEST NO: 2002TK-059
 LOCATION: DPG-MESA VEH. NO: KP3123
 DRIVER: DERON BLAKE ODOMETER: 7566 miles
 COMMENTS: 2003 ALPHA 2 GMT800 MODEL K15703 JC3(2A)
 COMMENTS: VALIDATION (GVWR)

Front-Axle Rolling Radius (mm)----> 371.0000
 Rear-Axle Rolling Radius (mm)----> 371.0000
 Total Vehicle Weight (kg)-----> 2906.0000
 Static Weight on Front Axle (kg)--> 1781.0000
 Static Weight on Rear Axle (kg)--> 1125.0000
 CG Height of Vehicle (mm)-----> 637.5000
 Wheel Base (mm)-----> 3023.0000
 Proportioner Knee (kPa)-----> 3235.0630
 Primary Slope-----> 0.9465
 Proportioner Slope-----> 0.4228

LF			RF			LR			RR		
BF	HOP	r ²	BF	HOP	r ²	BF	HOP	r ²	BF	HOP	r ²
Nm/kPa	kPa		Nm/kPa	kPa		Nm/kPa	kPa		Nm/kPa	kPa	
0.3905	158.1	0.9993	0.3479	-66.9	0.9986	0.1837	-255.0	0.9981	0.1859	-317.0	0.9984
0.3683	153.5	0.9966	0.3783	212.0	0.9931	0.2200	212.6	0.9285	0.2335	230.4	0.9855
0.4004	392.9	0.9986	0.3501	7.2	0.9996	0.1849	-246.8	0.9979	0.1829	-412.8	0.9981
0.3695	158.1	0.9964	0.3718	210.5	0.9955	0.2108	123.6	0.9511	0.2291	265.0	0.9881
0.4269	392.6	0.9983	0.3800	151.6	0.9991	0.1860	-227.5	0.9985	0.1862	-309.1	0.9985
0.3749	87.3	0.9977	0.3687	28.6	0.9965	0.2152	198.7	0.9563	0.2235	233.8	0.9891
0.4234	292.6	0.9976	0.3773	85.2	0.9989	0.1855	-190.7	0.9985	0.1831	-264.1	0.9973
0.3815	208.8	0.9962	0.3767	196.5	0.9958	0.2152	195.9	0.9540	0.2210	185.8	0.9936
0.4466	480.4	0.9973	0.4006	407.0	0.9976	0.1893	-135.7	0.9988	0.1851	-261.1	0.9983
0.3848	277.4	0.9950	0.3780	213.5	0.9955	0.2127	169.5	0.9602	0.2218	215.7	0.9943
0.3951	260.2	0.9973	0.3724	144.5	0.9970	0.1993	-15.5	0.9742	0.2031	-43.3	0.9941
0.3834	202.3	0.9972	(Front Axle)			0.2012	-29.4	0.9842	(Rear Axle)		
											Avg/Axle

BF = Brake Factor

HOP = Hold-Off Pressure

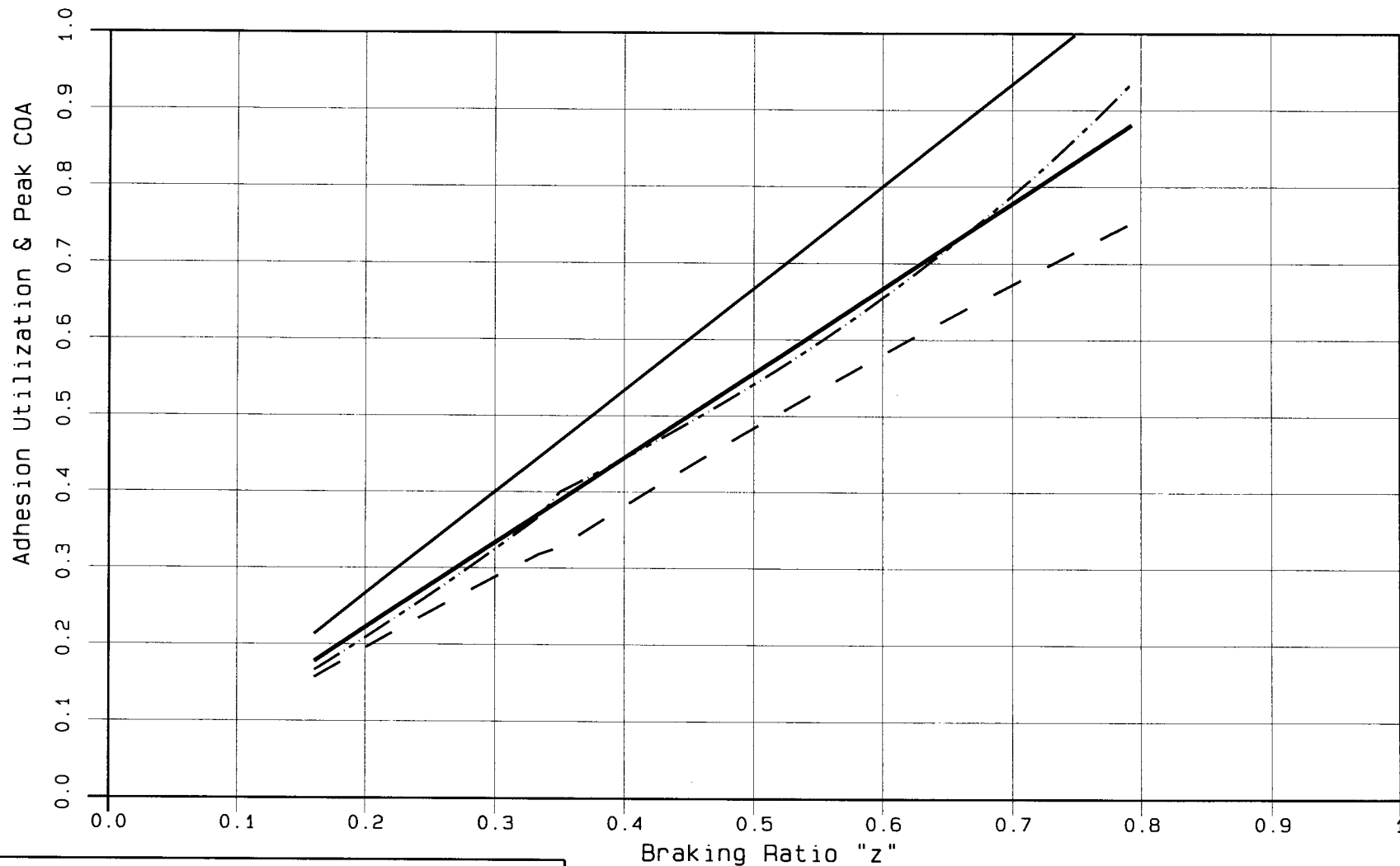
r² = Sample Coefficient of Determination

FMVSS135 TEST (COMPOSITE ADHESION UTILIZATION - 10 STOPS)

Raw File: ADHG.RAW
 COMMENTS: 2003 ALPHA 2 GMT800 MODEL K15703 JC3 (2A)
 COMMENTS: VALIDATION (GVWR)

Test WT./% FRT: 2906 kg / 61.3%
 SCHEDULE: MTL #4630
 LOCATION: DPG-MESA
 DRIVER: DERON BLAKE

TWO: 03CK0088
 TEST NO: 2002TK-059
 VEH. NO: KP3123
 ODOMETER: 7566 miles



Front-Axle Rolling Radius (mm)---	371.0000
Rear-Axle Rolling Radius (mm)----	371.0000
Total Vehicle Weight (kg)-----	2906.0000
Static Weight on Front Axle (kg)->	1781.0000
Static Weight on Rear Axle (kg)-->	1125.0000
CG Height of Vehicle (mm)-----	637.5000
Wheel Base (mm)-----	3023.0000
Proportioner Knee (kPa)-----	3235.0630
Primary Slope-----	0.9465
Proportioner Slope-----	0.4228

— —	F1 Front AU
- - -	F2 Rear AU
—	Limit=z/0.90
—	Limit=z/0.75

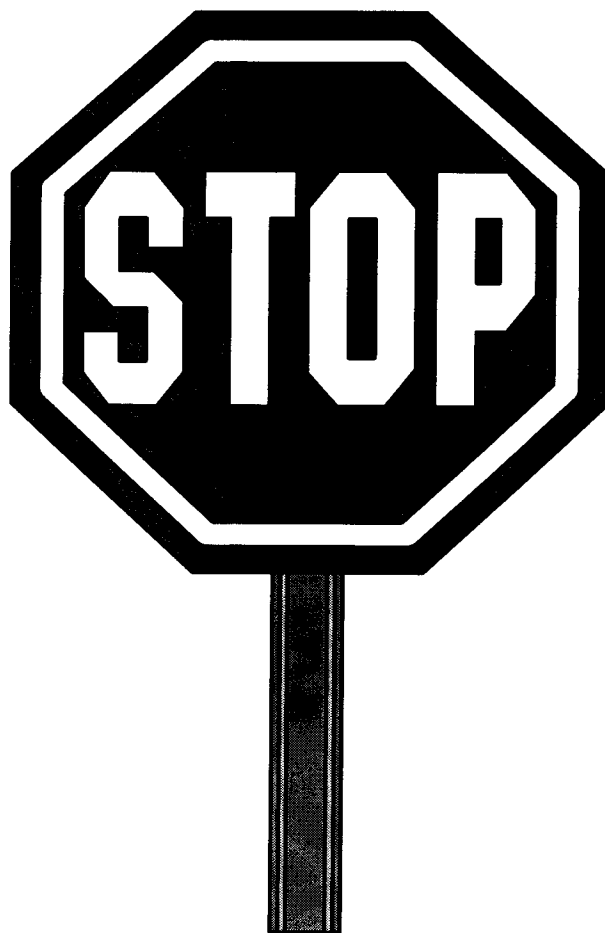
GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	
T.W.O.	03CK0088	Odometer		Stop Location	E. Straightaway
P.R.R.	----	Temperature		Peak Coefficient	0.99
GPDAS FILE NAME		Wind Dir. / Vel.		Date Measured	3/7/02
Target Test Weight	Total		kg	Front	
				Pct.	
				Rear	
				kg	
Actual Test Weight	Total		kg	Front	
				Pct.	
				Rear	
				kg	

Note: Analysis of adhesion utilization data to determine worst case mass distributions must be performed prior to conducting the remainder of the test sequence.

Copy raw data files ADHL.RAW and ADHG.RAW to diskette and turn in to data processing for analysis.



Tested by _____ Parr _____ Date _____
Signature

Revised
February 2002

GM CONFIDENTIAL

R1-5-135G (MTL 4630)
Data Sheet 7

Test Number: 2002TK-059
Vehicle Number: KP3123

FULL SYSTEM TESTING

'Worst Case' Mass Distribution Worksheet
Based on Adhesion Utilization Criteria

Brake distribution for failed system (Place X in shaded cell).

Frt/Rear

X

Diagonal

Front axle rolling radius, (meters)
Rear axle rolling radius, (meters)
Total vehicle weight, (kg)
Front axle mass fraction, (0.XXX)
CG height, (meters)
Wheelbase, (meters)
Prop knee, (kPa)
Prop slope, (0.XXX)
Front axle average brake factor, (N·m/kPa)
Front axle holdoff pressure, (kPa)
Rear axle average brake factor, (N·m/kPa)
Rear axle holdoff pressure, (kPa)

Adhesion limited decel,(g)

Worst case mass distribution (Full System)

GVWR		LLVW	
Min % Front	Max % Front	Min % Front	Max % Front
0.371	0.371	0.384	0.384
0.371	0.371	0.384	0.384
2903	2903	2460	2460
41.4%	61.3%	56.6%	63.1%
0.638	0.638	0.668	0.6675
3.0230	3.023	3.023	3.023
3235	3235	3235	3235
0.4228	0.4228	0.4228	0.4228
0.3834	0.3834	0.4046	0.4046
202.3	202.3	175.1	175.1
0.2012	0.2012	0.2007	0.2007
-29.4	-29.4	-128.1	-128.1
0.6912	0.7707	0.8505	0.6933
GVWR MIN% FRONT		LLVW MAX% FRONT	

PARTIAL SYSTEM TESTING

X

FRONT/REAR SPLIT

"Worst Case" Mass Distribution always
minimum % mass on functioning axle.

N/A

DIAGONAL SPLIT

'Worst Case' Mass Distribution Worksheet
Based on Adhesion Utilization Criteria

GVWR		LLVW	
Rears Failed	Fronts Failed	Rears Failed	Fronts Failed
Min % Front	Max % Front	Min % Front	Max % Front
41.4%	61.3%	56.6%	63.1%

GVWR		LLVW	
LF/RR Failed	RF/LR Failed	LF/RR Failed	RF/LR Failed
N/A		N/A	
N/A		N/A	

Note: These calculations are based on the assumption that the vehicle is not pedal
force or hydraulic fluid displacement limited and Kpeak = 0.9.



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	1:30 AM						
T.W.O.	03CK0088	Odometer	7596	Stop Location	E. Straightaway						
P.R.R.	----	Temperature	27° C	Peak Coefficient	0.99						
GPDAS FILE NAME	CEG.RAW	Wind Dir. / Vel.	NW @ 8 KPH	Date Measured	3/7/02						
Target Test Weight	Total	2903	kg	Front	1202	kg	Pct.	41.4%	Rear	1701	kg
Actual Test Weight	Total	2904	kg	Front	1202	kg	Pct.	41.4%	Rear	1702	kg

3.3.6 Cold Effectiveness

Vehicle Conditions.

- (a) Vehicle Load: **GVWR**
- (b) Transmission position: **In Neutral**

NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.

IBT: $\geq 65^{\circ}\text{C}, \leq 100^{\circ}\text{C}$
TEST SPEED: 100 km/h
PEDAL FORCE: 65 N minimum - 500 N maximum
WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
NUMBER OF RUNS: 6 stops.
TEST SURFACE: PFC of 0.9
WIND SPEED: Not greater than 5 m/s

Performance Requirements.

* STOPPING DISTANCE: ≤ 70 m from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min.	Max.	Avg.				
1	100 km/h (70 m)	100.8	63.4	62.5	67.7	234	461	364	Y	NWS	3.3%	6.80
2		100.4	61.5	61.1	66.2	241	481	414	Y	NWS	5.5%	7.00
3		100.3	60.4	60.1	65.1	203	470	410	Y	NWS	7.0%	7.30
4		99.6	58.8	59.2	64.2	248	478	410	Y	NWS	8.3%	7.40
5		100.6	58.8	58.2	63.0	248	480	420	Y	NWS	10.0%	7.50
6		100.0	58.6	58.6	63.5	215	463	397	Y	NWS	9.3%	7.50

* $S \leq 0.10V + 0.0060V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by Parr Signature Date 3/21/02



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	7:00 AM
T.W.O.	03CK0088	Odometer	7614	Stop Location	E. Straightaway
P.R.R.	----	Temperature	7° C	Peak Coefficient	0.99
GPDS FILE NAME	HSEG.RAW	Wind Dir. / Vel.	E @ 8 KPH	Date Measured	3/7/02
Target Test Weight	Total 2903 kg	Front 1202 kg	Pct. 41.4%	Rear 1701 kg	
Actual Test Weight	Total 2904 kg	Front 1202 kg	Pct. 41.4%	Rear 1702 kg	

3.3.7 High Speed Effectiveness (Not required if vehicle maximum speed is ≤ 125 km/h)

Vehicle conditions.

- (a) Vehicle load: **GVWR**
 (b) Transmission position: **In Drive**

Test conditions and procedures.

NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 80 % of vehicle maximum speed but not greater than 160 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s

Performance requirements.

STOPPING DISTANCE: $S \leq 0.10V + 0.0067V^2$

Calculated distance **138.4** m

Stop No.	Test Speed (km/h) Reference Speed and Distance	Actual (km/h)	Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
			Measured (m)	Corrected to Speed (m)		Min	Max	Avg.				
1	80% V Max	136.7	107.6	107.3	116.6	216	463	411	Y	NWS	15.8%	7.20
2		136.2	100.6	101.0	109.7	245	468	410	Y	NWS	20.7%	7.80
3	136.5 (km/h)	136.6	98.0	97.8	106.3	298	470	428	Y	NWS	23.2%	8.10
4		137.2	99.3	98.3	106.8	245	470	404	Y	NWS	22.9%	8.20
5	138.4 (meters)	136.7	96.6	96.3	104.6	241	476	426	Y	NWS	24.5%	8.30
6		138.1	98.4	96.3	104.5	262	469	417	Y	NWS	24.5%	8.30

Comments

Tested by Parr Signature _____ Date 3/21/02



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	7:30 AM
T.W.O.	03CK0088	Odometer	7638	Stop Location	E. Straightaway
P.R.R.	----	Temperature	11° C	Peak Coefficient	0.99
GP DAS FILE NAME	EOG.RAW	Wind Dir. / Vel.	E @ 6 KPH	Date Measured	3/7/02
Target Test Weight	Total 2903 kg	Front 1202 kg	Pct. 41.4%	Rear 1701 kg	
Actual Test Weight	Total 2904 kg	Front 1202 kg	Pct. 41.4%	Rear 1702 kg	

3.3.8 Stops with Engine Off

General Information.

This test is for vehicles equipped with one or more brake power or assist units.

Vehicle Conditions.

- (a) Vehicle load: GVWR only.
 (b) Transmission position: In Neutral
 (c) Vehicle engine: Off (not running)
 (d) Ignition key position: May be returned to "on" position after turning engine off.

Test conditions and procedures.

NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.

NOTE: All system reservoirs (brake power and / or assist units) are fully charged and the vehicle's engine is off (not running) at the beginning of each stop.

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s

Performance Requirements.

* STOPPING DISTANCE: $\leq 70\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max	Avg.				
1	100 km/h (70 m)	101.1	58.4	57.2	62.0	246	490	444	N	NWS	11.5%	7.80
2		100.5	58.1	57.6	62.3	208	488	442	Y	NWS	11.0%	7.60
3		100.3	57.1	56.8	61.5	243	495	450	Y	NWS	12.2%	7.70
4		100.9	60.3	59.3	64.3	246	488	451	N	NWS	8.2%	7.50
5		99.9	55.7	55.8	60.4	230	486	444	Y	NWS	13.7%	8.10
6		100.2	55.5	55.3	59.8	270	496	441	Y	NWS	14.5%	8.20

* $S \leq 0.10V + 0.0060V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

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 Signature

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	9:30 AM
T.W.O.	03CK0088	Odometer	7665	Stop Location	E. Straightaway
P.R.R.	---	Temperature	24° C	Peak Coefficient	0.99
GPDAS FILE NAME	CEL.RAW	Wind Dir. / Vel.	N @ 8 KPH	Date Measured	3/7/02
Target Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	
Actual Test Weight	Total 2462 kg	Front 1552 kg	Pct. 63.0%	Rear 910 kg	

3.3.9 Cold Effectiveness**Vehicle Conditions.**

- (a) Vehicle Load: **LLVW**
 (b) Transmission position: **In Neutral**

**NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE
 (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s

Performance Requirements.

* STOPPING DISTANCE: ≤ 70 m from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min.	Max.	Avg.				
1	100 km/h (70 m)	100.4	51.5	51.1	55.2	305	469	431	Y	NWS	21.1%	8.70
2		100.4	51.1	50.7	54.8	259	470	431	Y	NWS	21.7%	8.80
3		100.1	51.0	50.9	55.0	276	471	431	Y	NWS	21.4%	8.70
4		99.9	51.2	51.3	55.4	266	478	432	Y	NWS	20.8%	8.70
5		99.8	51.6	51.8	56.0	236	484	431	Y	NWS	20.0%	8.70
6		99.9	49.5	49.6	53.5	248	458	409	Y	NWS	23.5%	9.00

* $S \leq 0.10V + 0.0060V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

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GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	6:30 AM
T.W.O.	03CK0088	Odometer	7695	Stop Location	E. Straightaway
P.R.R.	----	Temperature	10° C	Peak Coefficient	0.99
GPDAS FILE NAME	HSEL.RAW	Wind Dir. / Vel.	SE @ 2 KPH	Date Measured	3/7/02
Target Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	
Actual Test Weight	Total 2462 kg	Front 1552 kg	Pct. 63.0%	Rear 910 kg	

3.3.10 High Speed Effectiveness (Not required if vehicle maximum speed is ≤ 125 km/h (77.7 mph))**Vehicle conditions.**

- (a) Vehicle load: **LLVW**
 (b) Transmission position: **In Drive**

Test conditions and procedures.

**NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE
 (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 80 % of vehicle maximum speed but not greater than 160 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s

Performance requirements.STOPPING DISTANCE: $S \leq 0.10V + 0.0067V^2$ Calculated distance **138.4** m

Stop No.	Test Speed (km/h) Reference Speed and Distance	Actual (km/h)	Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
			Measured (m)	Corrected to Speed (m)		Min.	Max.	Avg.				
1	80% V Max	137.3	100.7	99.6	108.2	224	510	429	Y	NWS	21.9%	7.60
2		137.5	94.9	93.6	101.6	208	446	388	Y	NWS	26.6%	8.30
3	136.5 (km/h)	136.6	93.6	93.4	101.4	288	435	398	Y	NWS	26.7%	8.30
4		137.1	93.3	92.5	100.4	213	420	378	Y	NWS	27.5%	8.40
5	138.4 (meters)	137.1	93.5	92.7	100.6	235	444	388	Y	NWS	27.3%	8.40
6		137.4	95.1	93.9	101.9	218	384	319	Y	NWS	26.4%	8.30

Comments

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GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	7:30 AM
T.W.O.	03CK0088	Odometer	7724	Stop Location	E. Straightaway
P.R.R.	---	Temperature	13° C	Peak Coefficient	0.99
GPDAS FILE NAME	AFL.RAW	Wind Dir. / Vel.	SE @ 2 KPH	Date Measured	3/7/02
Target Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	
Actual Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	

3.3.11 Antilock functional failure.

NOTE: If vehicle is equipped with **ABS** and **Electronic Brake Force Distribution** such as **EBD** or **DRP**, both **ABS** and **Electronic Brake Force Distribution System** must be completely disabled prior to running this test section. If unsure how to disable both, check with Test Engineer.

Vehicle Conditions.(a) Vehicle load: **LLVW**(b) Transmission position **In Neutral****Test conditions and procedures.**

NOTE: **STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s
 FAILURE SIMULATION: (a) Disconnect the functional power source, or any electrical connector that creates a functional failure.
 Record method used. **REMOVED 60 AMP ABS FUSE**

(b) Brake system indicator light activated? **YES** ☒ **NO** ☐

(c) Restore the system to normal at the completion of this test.

NOTE: If more than one antilock brake subsystem is provided, repeat test for each subsystem.

Performance Requirements.

* STOPPING DISTANCE: $\leq 85\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max	Avg.				
1	100 km/h (85 m)	100.1	72.9	72.8	79.0	102	309	140	N	BRWS	7.0%	5.70
2		99.8	74.9	75.2	81.7	101	350	143	N	NWS	3.9%	5.40
3		100.7	72.1	71.2	77.3	117	269	140	N	NWS	9.1%	5.80
4		100.6	73.9	73.1	79.4	105	317	150	N	NWS	6.6%	5.60
5		100.5	73.1	72.4	78.7	92	266	150	N	NWS	7.5%	5.80
6		100.8	72.3	71.2	77.4	98	250	146	N	NWS	9.0%	5.90

* $S \leq 0.10V + 0.0075V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by Parr Date 3/22/02
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GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	
T.W.O.	03CK0088	Odometer		Stop Location	E. Straightaway
P.R.R.	----	Temperature		Peak Coefficient	0.99
GP DAS FILE NAME	VBPL.RAW	Wind Dir. / Vel.		Date Measured	3/7/02
Target Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	
Actual Test Weight	Total kg	Front kg	Pct. %	Rear kg	

3.3.12 Variable brake proportioning system functional failure.

NOTE: Electronic Brake Force Distribution commonly referred to as EBD or DRP is not considered a variable brake proportioner. If you have questions, check with Test Engineer.

Is vehicle equipped with variable proportioning?

Yes ☐No ☒

If no, skip this section and continue to section 3.3.13

Vehicle Conditions.(a) Vehicle load: **LLVW**

In Neutral

Test conditions and procedures.

NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE
(BEST EFFORT) ON ALL STOPS.

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s
 FAILURE SIMULATION: (a) Disconnect the functional power source or mechanical linkage to render the variable brake proportioning system inoperative.
 Record method used.

(b) Brake system indicator light activated?

YES ☐NO ☐

(c) Restore the system to normal at the completion of this test.

NOTE: If more than one variable brake proportioning subsystem is provided, repeat the test for each subsystem.

Performance Requirements.

* STOPPING DISTANCE: $\leq 110\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheel slide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max	Avg.				
1	100 km/h (110 m)			----	----						----	
2				----	----						----	
3				----	----						----	
4				----	----						----	
5				----	----						----	
6				----	----						----	

* $S \leq 0.10V + 0.0100V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by _____ Parr _____ Date 3/22/02
 Signature

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	9:30 AM
T.W.O.	03CK0088	Odometer	7760	Stop Location	E. Straightaway
P.R.R.	----	Temperature	25° C	Peak Coefficient	0.99
GP DAS FILE NAME	HCFL.RAW	Wind Dir. / Vel.	SE @ 6 KPH	Date Measured	3/7/02
Target Test Weight Total	2245 kg	Front	1271 kg	Pct.	56.6%
		Rear	974 kg		
Actual Test Weight Total	2250 kg	Front	1273 kg	Pct.	56.6%
		Rear	977 kg		

3.3.13 Hydraulic circuit failure. Circuit number 1 (REAR)**General information.**

This test is for vehicles manufactured with a split service brake system.

Stops can be alternated between circuits to expedite brake cooling between stops.

Vehicle Conditions.(a) Vehicle load: **LLVW**(b) Transmission position: **In Neutral****Test conditions and procedures.****NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 4 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s
 FAILURE SIMULATION: Method of simulating failure

BY PASS VALVE**System Portion Failed:****REARS FAILED**

Determine the control force pressure level or fluid level necessary to activate the brake warning indicator.

(a) Force to activate light . **57** or (b) Fluid level required to activate light .

Brake system indicator light activated? **YES** ☒ **NO** ☐
Make stops after the brake warning indicator has been activated.

(c) Restore the system to normal at the completion of this test.

Performance Requirements.* STOPPING DISTANCE: $\leq 168\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)		ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD	GP DAS Run No.
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max					
1	100 km/h (168 m)	100.3	68.1	67.7	73.5	159	484	N	NWS	56.3%	6.70	5
2		99.3	62.6	63.4	68.8	192	475	Y	NWS	59.1%	7.00	6
3		100.4	65.8	65.3	70.8	178	476	Y	NWS	57.8%	6.90	7
4		100.8	64.9	64.0	69.3	236	476	Y	NWS	58.7%	7.00	8

* $S \leq 0.10V + 0.0158V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

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GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	8:00 AM
T.W.O.	03CK0088	Odometer	7746	Stop Location	E. Straightaway
P.R.R.	----	Temperature	18° C	Peak Coefficient	0.99
GP DAS FILE NAME	HCFL.RAW	Wind Dir. / Vel.	SE @ 4 KPH	Date Measured	3/7/02
Target Test Weight	Total 2460 kg	Front 1552 kg	Pct. 63.1%	Rear 908 kg	
Actual Test Weight	Total 2462 kg	Front 1552 kg	Pct. 63.0%	Rear 910 kg	

3.3.13 Hydraulic circuit failure. Circuit number 2 (FRONT)**General information.**

This test is for vehicles manufactured with a split service brake system.

Stops can be alternated between circuits to expedite brake cooling between stops.

Vehicle Conditions.(a) Vehicle load: **LLVW**(b) Transmission position: **In Neutral****Test conditions and procedures.****NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 4 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s
 FAILURE SIMULATION: Method of simulating failure

BY PASS VALVE**System Portion Failed:****FRONTS FAILED**

Determine the control force pressure level or fluid level necessary to activate the brake warning indicator.

(a) Force to activate light.

55

or

(b) Fluid level required to activate light.

Brake system indicator light activated?

YES☒**NO**☐**Make stops after the brake warning indicator has been activated.**

(c) Restore the system to normal at the completion of this test.

Performance Requirements.* STOPPING DISTANCE: $\leq 168\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)		ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD	GP DAS Run No.
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max					
1	100 km/h (168 m)	100.5	148.4	147.0	160.7	257	406	Y	NWS	4.4%	2.60	1
2		100.6	151.1	149.4	163.3	181	462	Y	NWS	2.8%	2.60	2
3		100.1	147.5	147.2	160.9	165	293	Y	NWS	4.2%	2.70	3
4		100.7	149.2	147.2	160.9	149	284	Y	NWS	4.2%	2.70	4

* $S \leq 0.10V + 0.0158V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by

Parr

Signature

Date

3/22/02

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GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	1:00 PM
T.W.O.	03CK0088	Odometer	7804	Stop Location	E. Straightaway
P.R.R.	----	Temperature	28° C	Peak Coefficient	0.99
GP DAS FILE NAME	HCFG.RAW	Wind Dir. / Vel.	S @ 10 KPH	Date Measured	3/7/02
Target Test Weight Total	2903 kg	Front	1202 kg	Pct.	41.4%
Actual Test Weight Total	2906 kg	Front	1204 kg	Pct.	41.4%
		Rear	1701 kg		
		Rear	1702 kg		

3.3.14 Hydraulic circuit failure. Circuit number 1 (REAR)**General information.**

This test is for vehicles manufactured with a split service brake system.

Stops can be alternated between circuits to expedite brake cooling between stops.

Vehicle Conditions.(a) Vehicle load: **GVWR**(b) Transmission position: **In Neutral****Test conditions and procedures.****NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 4 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s
 FAILURE SIMULATION: Method of simulating failure

BY PASS VALVE**System Portion Failed:****REARS FAILED**

Determine the control force pressure level or fluid level necessary to activate the brake warning indicator.

(a) Force to activate light .

57

or

(b) Fluid level required to activate light.

Brake system indicator light activated? **YES**☒**NO**☐**Make stops after the brake warning indicator has been activated.**

(c) Restore the system to normal at the completion of this test.

Performance Requirements.* STOPPING DISTANCE: $\leq 168\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)		ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD	GP DAS Run No.
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max					
1	100 km/h (168 m)	100.3	89.3	88.8	96.7	232	451	Y	NWS	42.5%	4.70	5
2		101.0	89.2	87.5	95.3	273	480	Y	NWS	43.3%	4.70	6
3		100.7	90.0	88.8	96.7	193	485	Y	NWS	42.4%	4.70	7
4		100.4	91.5	90.8	98.9	247	423	Y	NWS	41.1%	4.50	8

* $S \leq 0.10V + 0.0158V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by

Parr

Signature

Date

3/22/02



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	<u>2002TK-059</u>	Vehicle Number	<u>KP3123</u>	Time	<u>12:00 PM</u>						
T.W.O.	<u>03CK0088</u>	Odometer	<u>7782</u>	Stop Location	<u>E. Straightaway</u>						
P.R.R.	<u>----</u>	Temperature	<u>28° C</u>	Peak Coefficient	<u>0.99</u>						
GPDA5 FILE NAME	<u>HCFG.RAW</u>	Wind Dir. / Vel.	<u>S @ 9 KPH</u>	Date Measured	<u>3/7/02</u>						
Target Test Weight	Total	<u>2903</u>	kg	Front	<u>1780</u>	kg	Pct.	<u>61.3%</u>	Rear	<u>1123</u>	kg
Actual Test Weight	Total	<u>2903</u>	kg	Front	<u>1780</u>	kg	Pct.	<u>61.3%</u>	Rear	<u>1123</u>	kg

3.3.14 Hydraulic circuit failure. Circuit number 2 (FRONT)

General information.

This test is for vehicles manufactured with a split service brake system.

Stops can be alternated between circuits to expedite brake cooling between stops.

Vehicle Conditions.

(a) Vehicle load: **GVWR**

(b) Transmission position: **In Neutral**

Test conditions and procedures.

NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.

IBT:	≥ 65° C , ≤ 100° C
TEST SPEED:	100 km/h
PEDAL FORCE:	65 N minimum - 500 N maximum
WHEEL LOCKUP:	No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h .
NUMBER OF RUNS:	4 stops.
TEST SURFACE:	PFC of 0.9
WIND SPEED:	Not greater than 5 m/s
FAILURE SIMULATION:	Method of simulating failure

System Portion Failed:

BY PASS VALVE

FRONTS FAILED

Determine the control force pressure level or fluid level necessary to activate the brake warning indicator.

(a) Force to activate light .	56	or	(b) Fluid level required to activate light.
-------------------------------	-----------	----	---

Brake system indicator light activated?	YES	X	NO
---	-----	---	----

Make stops after the brake warning indicator has been activated.

(c) Restore the system to normal at the completion of this test.

Performance Requirements.

* STOPPING DISTANCE: ≤ 168 m from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)		ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD	GPDAS Run No.
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max					
1	100 km/h (168 m)	100.7	146.9	144.9	158.4	293	478	Y	NWS	5.7%	2.80	1
2		100.3	150.5	149.6	163.6	225	381	Y	NWS	2.6%	2.60	2
3		100.4	150.9	149.7	163.7	240	473	Y	NWS	2.6%	2.60	3
4		100.8	147.7	145.4	159.0	141	298	Y	NWS	5.4%	2.70	4

* $S \leq 0.10V + 0.0158V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by Parr Date 3/22/02
Signature



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059		Vehicle Number	KP3123		Time	
T.W.O.	03CK0088		Odometer			Stop Location	E. Straightaway
P.R.R.	----		Temperature			Peak Coefficient	0.99
GP DAS FILE NAME	VBPG.RAW		Wind Dir. / Vel.			Date Measured	3/7/02
Target Test Weight	Total	2903	kg	Front	1202	kg	Pct. 41.4%
Actual Test Weight	Total		kg	Front		kg	Pct.
				Rear	1701	kg	
				Rear		kg	

3.3.16 Variable brake proportioning system functional failure.

NOTE: Electronic Brake Force Distribution commonly referred to as EBD or DRP is not considered a variable brake proportioner. If you have questions, check with Test Engineer.

Is vehicle equipped with variable proportioning?

Yes ☐

No ☒

If no, skip this section and continue to section 3.3.17

Vehicle Conditions.

(a) Vehicle load: GVWR

In Neutral

Test conditions and procedures.

NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE
(BEST EFFORT) ON ALL STOPS.

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$

TEST SPEED: 100 km/h

PEDAL FORCE: 65 N minimum - 500 N maximum

WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.

NUMBER OF RUNS: 6 stops.

TEST SURFACE: PFC of 0.9

WIND SPEED: Not greater than 5 m/s

FAILURE SIMULATION: (a) Disconnect the functional power source or mechanical linkage to render the variable brake proportioning system inoperative.
Record method used.

(b) Brake system indicator light activated?

YES ☐

NO ☐

(c) Restore the system to normal at the completion of this test.

NOTE: If more than one variable brake proportioning subsystem is provided, repeat the test for each subsystem.

Performance Requirements.

* STOPPING DISTANCE: $\leq 110\text{ m}$ from 100 km/h speed

Stop No.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max	Avg.				
1	100 km/h (110 m)			-----	-----						-----	
2				-----	-----						-----	
3				-----	-----						-----	
4				-----	-----						-----	
5				-----	-----						-----	
6				-----	-----						-----	

* $S \leq 0.10V + 0.0100V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by _____ Parr _____ Date 3/23/02
Signature

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	8:00 AM
T.W.O.	03CK0088	Odometer	7850	Stop Location	E. Straightaway
P.R.R.	----	Temperature	17° C	Peak Coefficient	0.99
GPDAS FILE NAME	FPG.RAW	Wind Dir. / Vel.	SE 8 KPH	Date Measured	3/7/02
Target Test Weight	Total 2903 kg	Front 1202 kg	Pct. 41.4%	Rear 1701 kg	
Actual Test Weight	Total 2906 kg	Front 1204 kg	Pct. 41.4%	Rear 1702 kg	

3.3.17 Power brake unit or brake power assist unit inoperative (System depleted)**General Information.**

This test is for vehicles equipped with one or more brake power units or brake power assist units.

Vehicle Conditions.(a) Vehicle load: **GVWR**(B) Transmission Position: **In Neutral****Test conditions and procedures.****NOTE: STOP IN SHORTEST DISTANCE ACHIEVABLE (BEST EFFORT) ON ALL STOPS.**

IBT: $\geq 65^{\circ}\text{C}$, $\leq 100^{\circ}\text{C}$
 TEST SPEED: 100 km/h
 PEDAL FORCE: 65 N minimum - 500 N maximum
 WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.
 NUMBER OF RUNS: 6 stops.
 TEST SURFACE: PFC of 0.9
 WIND SPEED: Not greater than 5 m/s
 FAILURE SIMULATION: Disconnect the primary source of power. (Deplete all reserve power capability.)

Method of rendering inoperative

DISCONNECT PRIMARY VACUUM SOURCE

Restore the system to normal at the completion of this test.

Performance requirements.*STOPPING DISTANCE: $\leq 168\text{ m}$

Stop o.	Test Speed		Stopping Distance		Corrected Distance Adjusted to 0.9 PFC	Pedal Force (N)			ABS Activation (Y/N)	Wheelslide Comments (NWS, etc)	% From Reference	MFDD
	Reference (Distance)	Actual (km/h)	Measured (m)	Corrected to Speed (m)		Min	Max	Avg.				
1	100 km/h (168 m)	100.6	93.0	92.0	N/A	314	497	467	N	NWS	45.3%	4.70
2		100.7	88.3	87.1	N/A	309	495	461	N	NWS	48.1%	5.00
3		99.9	85.6	85.8	N/A	241	493	463	N	NWS	49.0%	5.00
4		100.3	87.7	87.2	N/A	283	496	467	N	NWS	48.1%	5.00
5		100.4	89.9	89.2	N/A	244	489	464	N	NWS	46.9%	4.90
6		100.5	87.1	86.3	N/A	289	497	468	N	NWS	48.6%	5.00

* $S \leq 0.10V + 0.0158V^2$ (Stopping Distance formula for vehicles with top speed of less than 100 km/h).

Comments

Tested by Parr Signature _____ Date 3/23/02

Revised
February 2002

GM CONFIDENTIAL

R1-5-135G (MTL 4630)
Data Sheet 21

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	9:30 AM
T.W.O.	03CK0088	Odometer	7875	Stop Location	N/A
P.R.R.	---	Temperature	21° C	Peak Coefficient	N/A
GP DAS FILE NAME	PB.RAW	Wind Dir. / Vel.	S 10 KPH	Date Measured	N/A
Target Test Weight	Total 2903	Front 1202	kg	Pct. Front 41.4%	Rear 1701 kg
Target Test Weight	Total 2906	Front 1204	kg	Pct. Front 41.4%	Rear 1702 kg

3.3.18

Static Parking brakeHand Control? ☐Foot Control? ☒

Pedal Force Limit < 400 N

Pedal Force Limit < 500 N

Vehicle Conditions.

GVWR with transmission in neutral.

Note: For vehicles with parking brake systems not utilizing the service brake friction elements, the friction elements of such systems are to be burnished prior to parking brake tests according to the manufacturer's published recommendations as furnished to the purchaser. If no recommendations are furnished, test the system in an unburnished condition. If recommendations are furnished, record method used.

Test conditions and procedures.**(a) Parking brake systems utilizing service brake friction materials.**

IBT: < 100 °C (No additional burnishing or artificial heating prior to the start of the parking brake test is allowed).

(b) Parking brake systems utilizing non-service brake friction materials.

IBT: Ambient Temperature (No additional burnishing or artificial heating prior to the start of the parking brake test is allowed).

- (A)** Drive onto 20% grade. Shift to neutral and apply service brake just enough to hold vehicle stationary. Apply park brake up to pedal force limit or pedal travel limit - whichever occurs first. Release service brake. If vehicle is not held stationary, re-apply service brake just enough to stop vehicle on the grade. Re-apply the same force as in the initial apply **without releasing ratchet mechanism**. Release service brake. If vehicle still doesn't hold, repeat application. **If vehicle is not held stationary after two re-applications, check with test engineer before proceeding.** If vehicle is held stationary for five minutes on initial or either re-apply, repeat process with vehicle headed in the opposite direction. Record data in (A) columns. If vehicle is held stationary for five minutes in both directions proceed to Step (B). **If vehicle is not held stationary, check with test engineer before proceeding.**

UPHILL

- * **(B)** Return to grade and determine (by trial and error) minimum force and number of ratchet "clicks" to just hold vehicle on grade. Record data in space provided. After determining minimum force, return to grade and complete (B) columns using this force and clicks as the initial apply.

Force: 197 Clicks: NA

Force: 214 Clicks: NA

- * **(C)** Repeat step (B) at one "click" less (if it held) or one "click" more (if it didn't) to further define minimum. Record data in (C) columns.

Did parking brake indicator operate each time the parking brake was applied? Yes ☒ No ☐* **NOTE:** If system does not have audible "clicks", reduce or increase force in 5% to 10% increments.**Performance requirements.**

The parking brake must hold the vehicle stationary on a 20% grade in both directions for 5 minutes.

Vehicle Load and Direction	Apply	Service Brake Force Just Enough to hold Vehicle Stationary (N)			Park Brake Force Applied (N)			Number of Clicks (Optional)			Vehicle Stationary for 5 Minutes?			Initial Brake Temperature (°C)		
		(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)	(A)	(B)	(C)
GVWR Uphill	Initial	61	57	57	312	197	134				Y	Y	N	53	47	44
	1st Reapply			54			206						Y			44
	2nd Reapply															
GVWR Downhill	Initial	59	59	58	315	179	151				Y	N	N	50	46	43
	1st Reapply		32	44		222	181					Y	N		46	43
	2nd Reapply			34			214						Y			43

Comments

Tested by Parr SignatureDate 3/23/02



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	8:15 AM						
T.W.O.	03CK0088	Odometer	7882	Stop Location	Circle Track						
P.R.R.	----	Temperature	12° C	Peak Coefficient	0.98						
GP DAS FILE NAME	FADE.RAW	Wind Dir. / Vel.	W 12 KPH	Date Measured	1/28/02						
Target Test Weight	Total	2903	kg	Front	1202	kg	Pct.	41.4%	Rear	1701	kg
Actual Test Weight	Total	2906	kg	Front	1204	kg	Pct.	41.4%	Rear	1702	kg

3.3.20 Heating Snubs.

GVWR

IBT: $\geq 55^{\circ}\text{C}$, $\leq 65^{\circ}\text{C}$. Establish IBT before the first brake application. IBT before subsequent snubs are those occurring at the distance intervals.

TRANSMISSION POSITION: In gear.

NUMBER OF SNUBS: 15

TEST SPEEDS: The initial speed for each snub is 120 km/h or 80% of Vmax, whichever is slower. Each snub is terminated at one-half the initial speed.

DECELERATION RATE: Maintain a constant deceleration rate of 3.0 m/s². Attain the specified deceleration within one second and maintain it for the remainder of the snub.

PEDAL FORCE: Adjust as necessary to maintain the specified constant deceleration rate.

TIME INTERVAL: Maintain an interval of 45 seconds between the start of brake applications (snubs).

NOTE 1: Accelerate as rapidly as possible to the initial test speed immediately after each snub.

NOTE 2: Immediately after the 15th snub, accelerate to 100 km/h and commence the hot performance test.

Snub No.	Avg. Decel Rate (m/s ²)	Time Interval (sec)	Avg. P.F.	Brake Lining Temperatures (°C)				Comments
				LF	RF	LR	RR	
1	3.2	45	73	53	64	57	48	S&S
2	3.0	45	66	103	113	95	81	S&S
3	2.9	45	71	155	166	133	117	S&S
4	2.8	45	73	194	209	170	149	S&S
5	2.9	45	75	221	242	199	170	S&S
6	2.9	45	79	234	259	221	185	S&S
7	3.0	45	78	248	270	239	203	S&S
8	2.9	45	80	261	281	257	220	S&S
9	2.9	45	85	276	295	275	236	S&S
10	3.0	45	82	288	308	288	251	S&S
11	3.0	45	81	297	322	299	259	S&S
12	3.0	45	76	295	327	304	259	S&S
13	3.0	45	78	297	325	308	265	S&S
14	3.0	45	83	301	324	314	272	S&S
15	3.0	45	82	305	325	317	278	S&S

Comments

Tested by Parr Signature _____ Date 3/24/02



UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	8:15 AM
T.W.O.	03CK0088	Odometer	7882	Stop Location	Circle Track
P.R.R.	---	Temperature	12° C	Peak Coefficient	0.98
GPDAS FILE NAME	FADE.RAW	Wind Dir. / Vel.	W 12 KPH	Date Measured	1/28/02
Target Test Weight	Total 2903 kg	Front 1202 kg	Pct. 41.4%	Rear 1701 kg	
Actual Test Weight	Total 2906 kg	Front 1404 kg	Pct. 48.3%	Rear 1502 kg	

3.3.21 Hot performance.

GVWR

IBT: Temperature achieved at completion of heating snubs.
 TRANSMISSION POSITION: In neutral.
 NUMBER OF RUNS: 2 stops.
 TEST SPEEDS: 100 km/h. If vehicle is incapable of attaining 100 km/h, it is tested at the same speeds used for the cold effectiveness test.

PEDAL FORCE: Stop No. 1: The average pedal force established with the 3 baseline stops completed in Section 3.3.19 (Data Sheet 23).

NOTE: A constant pedal force equal to this value must be achieved within one second of the onset of service brake force > 22.2 N.

Stop No. 2: ≤ 500 N. (BEST EFFORT STOP)

WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.

Performance requirements: Stop Number 1: The MFDD, adjusted to the target pedal force established with the baseline stops, must be ≥ 60% of 5.5 m/s² (3.3 m/s²) from a test speed of 100 km/h.

Stop Number 2: The stopping distance for the second stop must be ≤ 89 meters from a test speed of 100 km/h or, for reduced test speed $S \leq 0.10V + 0.0079V^2$. The results of the second stop may not be used to meet the requirements of the first stop.

Target Pedal Force for Stop No. 1

136.0 N

NOTE 1: Accelerate as rapidly as possible to the initial test speed immediately after each stop.

NOTE 2: Immediately after the hot performance stops, drive 1.5 km at 50 km/h before the first cooling stop.

Stop & Run No.	Required MFDD (m/s ²)	Actual Speed	Measured Distance	Distance Corrected to Speed	PFD	MFDD (m/s ²) Adjusted to Target Pedal Force	ABS Activation (Y/N)	Wheelslide Comments (NWS, etc.)	% From Reference	MFDD (m/s ²)
					Dist Avg. Pedal Force This Stop					
Stop 1 Run 16	3.3	100.7	93.3	92.1	129.0	4.428	N	NWS	34.2%	4.20

Stop No.	Required Distance (m)	Actual Speed	Measured Distance	Distance Corrected to Speed	Pedal Force			ABS Activation (Y/N)	Wheelslide & Stability Comments	% From Reference	MFDD
					Min.	Max.	Average				
Stop 2 Run 17	89	100.2	62.4	62.2	204	411	357	N	NWS	30.1%	6.90

Comments

Tested by Parr Date 3/24/02
 Signature _____

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle Number	KP3123	Time	8:04 AM
T.W.O.	03CK0088	Odometer	7882	Stop Location	Circle Track
P.R.R.	---	Temperature	12° C	Peak Coefficient	0.98
GPDAS FILE NAME	FADE.RAW	Wind Dir. / Vel.	W 12 KPH	Date Measured	1/28/02
Target Test Weight	Total 2903	kg	Front 1202	kg	Pct. 41.4%
Actual Test Weight	Total 2906	kg	Front 1204	kg	Pct. 41.4%
				Rear 1701	kg
				Rear 1702	kg

3.3.22 Brake cooling stops: GVWR

IBT: Temperature achieved at completion of hot performance.
TRANSMISSION POSITION: In gear.
NUMBER OF RUNS: 4 stops.
TEST SPEEDS: 50 km/h.
PEDAL FORCE: Adjust as necessary to maintain specified constant deceleration rate.
DECELERATION RATE: Maintain a constant deceleration rate of 3.0 m/s².
WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds at speeds greater than 15 km/h.

- NOTE 1:** Immediately after the hot performance stops, drive 1.5 km at 50 km/h before the first cooling stop.
- NOTE 2:** For the first through third cooling stops, immediately accelerate at the maximum rate to 50 km/h. Maintain that speed until beginning the next stop at a distance of 1.5 km from the beginning of the previous stop.
- NOTE 3:** Immediately after the fourth stop, accelerate at the maximum rate to 100 km/h. Maintain that speed until beginning the recovery performance stops at a distance of 1.5 km after the beginning of the fourth cooling stop.

Stop No.	Test Speed (km/h)	Avg. Decel Rate (m/s ²)	Avg. P.F.	Brake Lining Temperatures				Comments
				LF	RF	LR	RR	
1	50	2.9	82	302	339	302	257	
2	50	2.8	77	223	274	245	199	
3	50	2.9	79	171	214	209	170	
4	50	3.0	84	137	171	183	148	

Comments

Tested by Parr Date 3/24/02
Signature _____

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

Test Number	2002TK-059	Vehicle Number	KP3123	Time	8:10 AM
T.W.O.	03CK0088	Odometer	7882	Stop Location	Circle Track
P.R.R.	----	Temperature	12° C	Peak Coefficient	0.98
GPDAS FILE NAME	FADE.RAW	Wind Dir. / Vel.	W 12 KPH	Date Measured	1/28/02
Target Test Weight	Total 2903 kg	Front 1202 kg	Pct. 41.4%	Rear 1701 kg	
Actual Test Weight	Total 2906 kg	Front 1204 kg	Pct. 41.4%	Rear 1702 kg	

3.3.23 Recovery performance. GVWR

NOTE: The recovery performance test is conducted immediately after completion of the brake cooling stops.

IBT: Temperature achieved at completion of cooling stops.
TRANSMISSION POSITION: In neutral.
NUMBER OF RUNS: 2 stops.
TEST SPEED: 100 km/h. If vehicle is incapable of attaining 100 km/h, it is tested at the same speeds used for the cold effectiveness test.
PEDAL FORCE: The average pedal force established with the 3 baseline stops completed in section 3.3.19 (Data Sheet 23).

NOTE: A constant pedal force equal to this value must be achieved within one second of the onset of service brake force > 22.2 N.

WHEEL LOCKUP: No lockup of any wheel for longer than 0.1 seconds allowed at speeds greater than 15 km/h.

Immediately after the fourth cooling stop, accelerate at the maximum rate to 100 km/h. Maintain that speed until beginning the first recovery performance stop at a distance of 1.5 km after the beginning of the fourth cooling stop.

Immediately after completion of the first recovery performance stop, accelerate as rapidly as possible to the specified test speed and conduct the second recovery performance stop.

Performance requirements: The MFDD, adjusted to the target pedal force established with the baseline stops, must be within the following limits on at least one of the two stops.

Greater than 70% of 5.5 m/s² (3.85 m/s²) and less than 150% of 5.5 m/s² (8.25 m/s²)

TARGET PEDAL FORCE FROM SECTION S7.13. (DATA SHEET 23)**136.0 N**

Stop & Run No.	MFDD (m/s ²) Requirement		Actual Speed (km/h)	Measured Distance (meters)	Distance Corrected to Speed	PFd		MFDD (m/s ²) Adjusted to Target Pedal Force	ABS Activation	Wheelslide Comments (NWS, etc.)	% From Reference
	Min.	Max.				Distance Avg. Pedal Force (N)	Measured MFDD (m/s ²)				
Stop 1 Run 22	3.85	8.25	100.5	69.9	69.3	119.5	6.13	6.976	N	NWS	46.3%
Stop 2 Run 23	3.85	8.25	100.5	79.7	78.9	120.5	5.33	6.016	N	NWS	81.3%

Comments

Tested by Parr Date 3/24/02
Signature

GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle No.	KP3123	Date:	3/25/02
T.W.O.	03CK0088	P.R.R.	----	Odom:	7906

END OF TEST FLOOR CHECK

Channel Configuration

Channel	Sample Rate	Title	Metric Eng'rg Units	Collect Mode
Analog	100 HZ	VACB	kPa	Averaged
Analog	100 HZ	VACE	kPa	Averaged
*Strain	100 HZ	LPBI	kPa	Averaged
Strain	100 HZ	LPLF	kPa	Averaged
Strain	100 HZ	LPRF	kPa	Averaged
Strain	100 HZ	LPLR	kPa	Averaged
Strain	100 HZ	LPRR	kPa	Averaged
Strain	100 HZ	PFSB	N	Averaged
Strain	100 HZ	PTSB	mm	Averaged

* Hydraboost System Only

Vehicle Conditions

- (a) Transmission Range: **PARK / NEUTRAL**
 (b) Engine: **AT IDLE DURING POWER BRAKE APPLY
OFF DURING NO POWER APPLY**

Test Conditions

- Pedal Force: **Apply to 890 N at 133 N/sec rate.**
 Number of runs: **1 with power assist
1 with no power assist**

Test Procedure

Start engine and idle for 2 minutes. After 2 minutes, rev engine to obtain 67 kPa of vacuum. With engine idling, apply service brake to 890 N at 133 N/sec apply rate. Record pedal travel at 90 N pedal force in space provided.

Turn engine off and pump service brake pedal to deplete booster vacuum. Apply service brake to 890 N at 133 N/sec. apply rate. Record pedal travel at 445 N pedal force in space provided.

	Pedal Travel (mm)	Pedal Force (N)	Vacuum (kPa)
Run 1 with power assist	61	90.1	67.6
Run 2 with no power assist	64	444	0

Copy data to disk and have plot made to verify correct proportioning. Obtain Engineer's approval before proceeding with test.

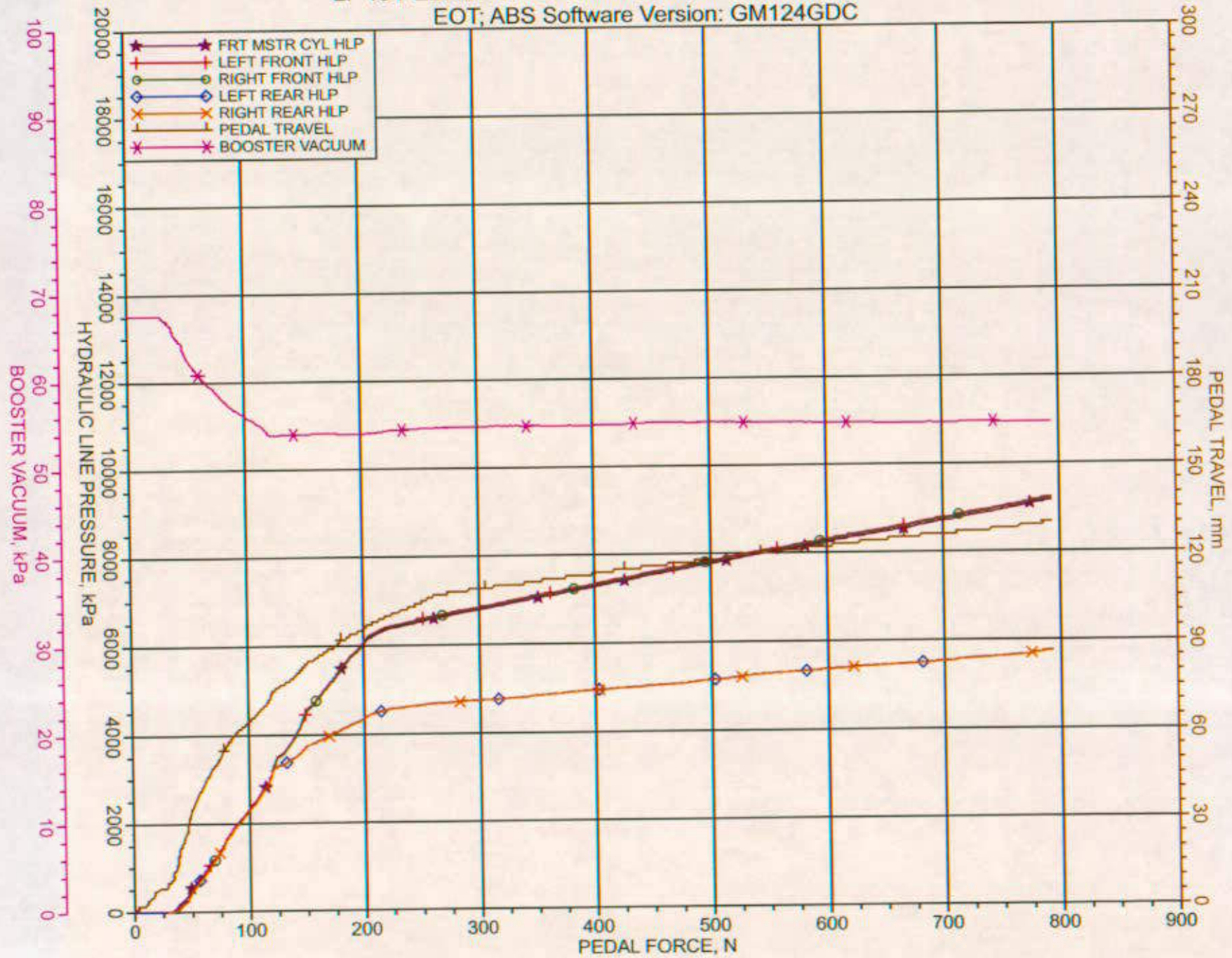
Tested by Parr Date 3/25/02

Revised
February 2002

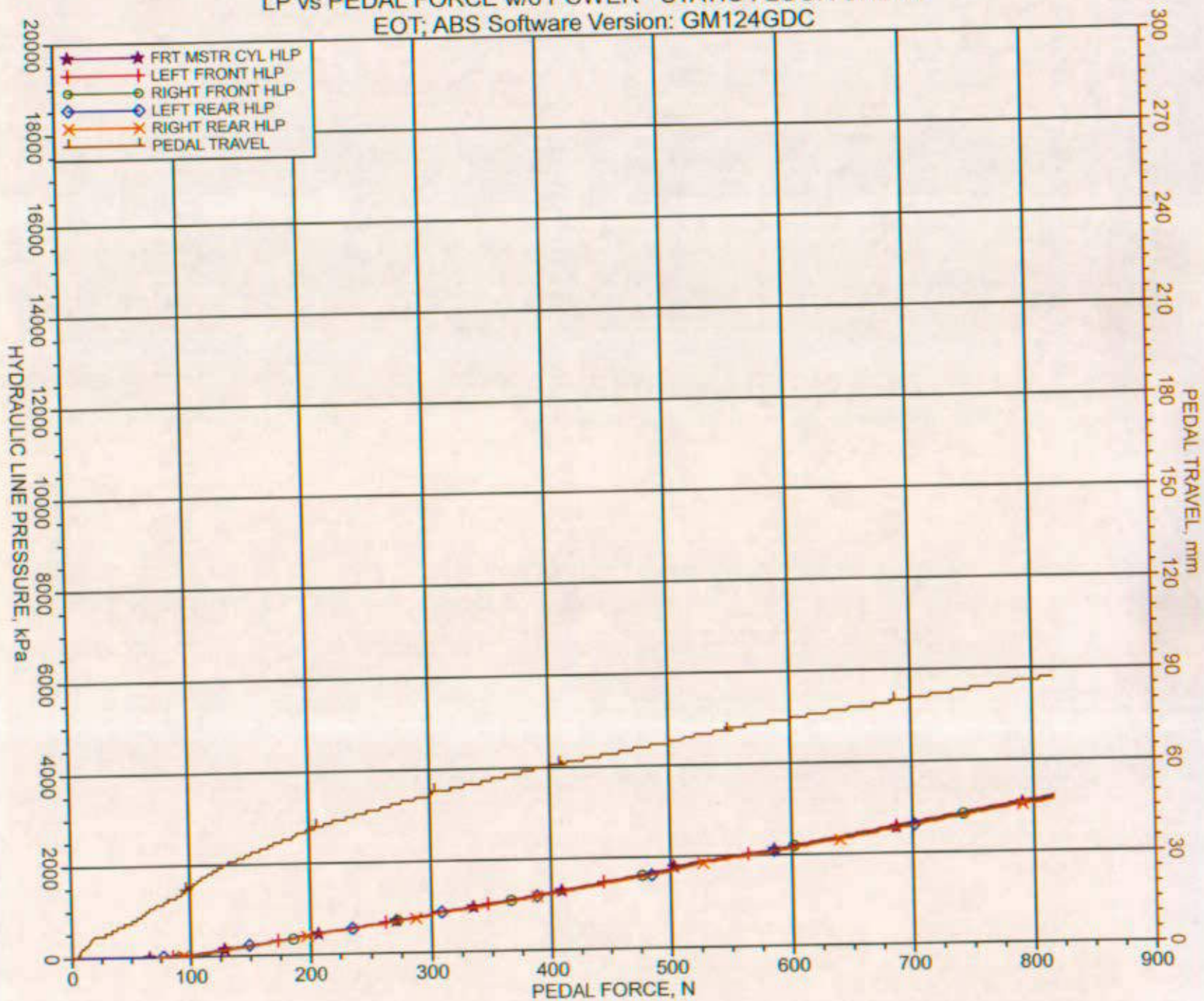
R1-5-135G (MTL 4630)
Data Sheet 28

GM CONFIDENTIAL

TEST 2002TK-059 [KP3123]
 LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK
 EOT; ABS Software Version: GM124GDC



TEST 2002TK-059 [KP3123]
 LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK
 EOT; ABS Software Version: GM124GDC



GM**UNIFORM TEST SPECIFICATIONS****Vehicle and Component Tests**

Test Number	2002TK-059	Vehicle No.	KP3123	Date:	3/25/02
T.W.O.	03CK0088	P.R.R.	---	Odom:	7906

3.3.24 Final Inspection

			Yes	No
3.3.24.1	1	Test completed without detachment or fracture of any component of the braking system?	☒	☐
	2	All mechanical components of the brake system are intact and functional?	☒	☐
3.3.24.2	3	Test completed without any visible brake fluid or lubricant on:		
	(a)	the friction surface of the brake	☒	☐
	(b)	at the master cylinder	☒	☐
	(c)	at the power unit reservoir cover	☒	☐
	(d)	at the seal and filler openings	☒	☐

End of test centerline clearance: LR 0.0275" RR 0.0195"**Lining and/or Drum/Rotor Appearance**

		Contact %	Glaze	Streak	Dust	Other Comments
Primary or Outboard Lining	LF	100	MOD	MOD	LT	LIGHT SURFACE CRACKS
	RF	100	MOD	MOD	LT	LIGHT SURFACE CRACKS
	LR	100	LT	LT	LT	
	RR	100	LT	LT	LT	

		Contact %	Glaze	Streak	Dust	Other Comments
Secondary or Inboard Lining	LF	100	MOD	MOD	LT	
	RF	100	MOD	MOD	LT	
	LR	100	LT	LT	LT	
	RR	100	LT	LT	LT	

		Resin %	Ringing	Streaks	Finish	Other Comments
Disc or Drum	LF	LT	LT	LT	MIRROR	
	RF	LT	LT	LT	MIRROR	
	LR	LT	LT	LT	MIRROR	
	RR	LT	LT	LT	MIRROR	

Recorded by: THOMPSON/JAIMES Date: 3/25/02
(Signature)

Revised
February 2002

R1-5-135G (MTL 4630)
Data Sheet 29

GM CONFIDENTIAL

GM Evaluation Report

Platform	Project/EWO No.	Requirement No.	Procedure No.	VPP/VIA/UPC	Model Year	Model No.	PER/Report No.
GMT800	38HS061	VTS 3.2.1.1.3.1 SSTS 3.2.1.1.9	MTL #4630	20.4 / 5	2003	K15703	03CK0088 SEQ. 005

Reference Issue Report (IR) No. _____

Category: BRK (T)Function ☐ Development ☒ ValidationMethod: ☐ Math Based ☒ Hardware Based

APPENDIX C

GLOSSARY OF ENGINEERING TECHNICAL TERMS

GM Evaluation Report

Platform	Project/EWO No.	Requirement No.	Procedure No.	VPP/VIA/UPC	Model Year	Model No.	PER/Report No.
GMT800	38HS061	VTS 3.2.1.1.3.1 SSTS 3.2.1.1.9	MTL #4630	20.4 / 5	2003	K15703	03CK0088 SEQ. 005

Reference Issue Report (IR) No. _____

Category: BRK (T)Function ☐ Development ☒ ValidationMethod: ☐ Math Based ☒ Hardware Based

GLOSSARY OF ENGINEERING TECHNICAL TERMS

ABBR	DEFINITION	ABBR	DEFINITION	ABBR	DEFINITION	ABBR	DEFINITION
4WAL	4 WHEEL ANTILOCK	PC	PEAK COUNT	TLBRF	LOWER BALLJOINT BOOT - RF	TUCBRR	UPPER CALIPER BOLT - RR
ACCEL	ACCELERATION	PFPP	PEDAL FORCE - PARK BRAKE	TLCLBF	LOWER CALIPER BOLT - LF	TUCLF	UPPER BALLJOINT BOOT - LF
ACCF	ACCUMULATOR - FRONT	PFBS	PEDAL FORCE - SERVICE BRAKE	TLCLRF	LOWER CALIPER BOLT - RF	TUBRF	UPPER BALLJOINT BOOT - RF
ACCR	ACCUMULATOR - REAR	PO	PINCH OUT	TLCLBL	LOWER CALIPER BOLT - LR	VACB	VACUUM BOOSTER
ABS	ANTILOCK BRAKE SYSTEM	PRATE	PITCH RATE	TLCBRR	LOWER CALIPER BOLT - RR	VACE	VACUUM - ENGINE
ATLR	AXLE TORQUE - LR	PSTQ	PROP SHAFT TORQUE	TLPLF	LEAD PISTON - LF	VDFW	
ATRR	AXLE TORQUE - RR	PTPB	PEDAL TRAVEL - PARK BRAKE	TLPLR	LEAD PISTON - LR		
BF	BOTH FRONTS	PTSB	PEDAL TRAVEL - SERVICE BRAKE	TLPRF	LEAD PISTON - RF		
BIT	BOOSTER INPUT FORCE	PULSLS	SENSOR - LEFT	TLPRR	LEAD PISTON - RR		
BIT	BOOSTER INPUT TRAVEL	PULSRS	SENSOR - RIGHT	TLRP	LEFT REAR - PIVOT		
BKSW	BRAKE SWITCH - 12 VOLTS	RAMP	CONSTANT RATE	TLRT	LEFT REAR - THREAD		
BOF	BOOSTER OUTPUT FORCE	RAWR	REAR AXLE WEIGHT RATIO	TLSLR	LEAD SHOE - LR		
BOT	BOOSTER OUTPUT TRAVEL	RPMS	RPM STEERING PUMP	TLSSR	LEAD SHOE - RR		
BR	BOTH REARS	RRATE	ROLL RATE	TOBLF	OUTER BEARING - LF		
CTF	CABLE-TENSION - PARK BRAKE FRT	RWAL	REAR WHEEL ANTILOCK	TOBLR	OUTER BEARING - LR		
CTLR	CABLE TENSION - PARK BRAKE LR	RWS	REAR WHEEL SLIDE	TOBRF	OUTER BEARING - RF		
CTPB	CABLE TENSION - PARK BRAKE	S&S	STRAIGHT AND SMOOTH	TOBRR	OUTER BEARING - RR		
CTRF	CABLE TRAVEL - PARK BRAKE FRT	SOT	START OF TEST	TOPLF	OUTBOARD PAD - LF		
CTRLR	CABLE TRAVEL - LR	SPARE	SPARE CHANNEL DESCRIPTOR	TOPLR	OUTBOARD PAD - LR		
CTRR	CABLE TENSION - PARK BRAKE RR	SWA	STEERING WHEEL ANGLE	TOPRF	OUTBOARD PAD - RF		
CTRRR	CABLE TRAVEL - PARK BRAKE RR	SWE	STEERING WHEEL EFFORT	TOPRR	OUTBOARD PAD - RR		
DECL	DECELERATION	TABSLF	ABS SENSOR - LF	TPBAMLR	PARK BRAKE AMBIENT - LR		
DISF	DISPLACEMENT - FRT	TABSRF	ABS SENSOR - RF	TPBAMRR	PARK BRAKE AMBIENT - RR		
DISLF	DISPLACEMENT - LF	TAMB	AMBIENT	TPBLR	CALIPER PISTON BOWL LEAD - LR		
DISLR	DISPLACEMENT - LR	TAO	AXLE OIL	TPBLRR	CALIPER PISTON BOWL LEAD - RR		
DISR	DISPLACEMENT - REAR	TEC	ENGINE COOLANT	TPBTLR	CALIPER PISTON BOWL TRAIL - LR		
DISRF	DISPLACEMENT - RF	TEO	ENGINE OIL	TPBTRR	CALIPER PISTON BOWL TRAIL - RR		
DISRR	DISPLACEMENT - RR	TATLR	AXLE TUBE - LR	TPCLF	PISTON CASTILATION - LF		
DOE	DESIGN OF EXPERIMENT	TATRR	AXLE TUBE - RR	TPCRF	PISTON CASTILATION - RF		
ECMLO	ECM LOW VOLTAGE POTENTIAL	TBBLR	BANJO BOLT - LR	TPCSLF	PISTON BEL CAST. & SLOT - LF		
ECMV	ECM INPUT VOLTAGE	TBBRR	BANJO BOLT - RR	TPCSR	PISTON BEL CAST. & SLOT - RF		
EMCO	GLENCOVE AND TOLLGATE	TBCL	BOOT CALIPER - LEFT	TPICLF	PISTON INNER/CLOSED - LF		
EMMI	MILE MARKER	TBCR	BOOT CALIPER - RIGHT	TPICRF	PISTON INNER/CLOSED - RF		
EMSP	EVENT MARKER	TBHLF	BRAKE HOSE @ BANJO - LF	TPLR	PISTON - LR		
EOT	END OF TEST	TBHLR	BRAKE HOSE @ BANJO - LR	TPRR	PISTON - RR		
ERPM	ENGINE RPM	TBHRF	BRAKE HOSE @ BANJO - RF	TPSLR	PRIMARY BRAKE SHOE - LR		
ETCC	TORQUE CONVERTER CLUTCH	TBHRR	BRAKE HOSE @ BANJO - RR	TPSRR	PRIMARY BRAKE SHOE - RR		
ETPS	ENGINE THROTTLE POSITION SENSOR	TBILF	BEARING INNER RACE - LF	TRILF	INBOARD ROTOR - LF		
FAWR	FRONT AXLE WEIGHT RATIO	TBILR	BEARING INNER RACE - LR	TRILR	INBOARD ROTOR - LR		
FBD	FREE BODY DIAGRAM	TBIRF	BEARING INNER RACE - RF	TRIRF	INBOARD ROTOR - RF		
FWS	FRONT WHEEL SLIDE	TBIRR	BEARING INNER RACE - RR	TRIRR	INBOARD ROTOR - RR		
GVWR	GROSS VEHICLE WEIGHT	TBOLF	BEARING OUTER RACE - LF	TRMK	TRANSITION MARKER		
HBAP	HYDROBOOST/ACCUMULATOR PRESSURE	TBOLR	BEARING OUTER RACE - LR	TROLF	OUTBOARD ROTOR - LF		
		TBORF	BEARING OUTER RACE - RF	TROLR	OUTBOARD ROTOR - LR		
HBIFLOW	HYDROBOOST INPUT FLOW	TBORR	BEARING OUTER RACE - RR	TRORF	OUTBOARD ROTOR - RF		
HBIP	HYDROBOOST CHAMBER PRESSURE	TBRLR	CALIPER BRIDGE - LR	TRORR	OUTBOARD ROTOR - RR		
HBOFLOW	HYDROBOOST OUTPUT FLOW	TBRRR	CALIPER BRIDGE - RR	TRRT	RIGHT REAR - PIVOT		
HC	HEAT CYCLE	TBSKIN	BOOSTER SKIN	TRRT	RIGHT REAR - THREAD		
HLP	HYDRAULIC LINE PRESSURE	TCBLLF	CALIPER BOOT-LEAD - LF	TSABLF	STEER ARM BOOT - LF		
HVY	HEAVY	TCBLLR	CALIPER BOOT-LEAD - LR	TSABRF	STEER ARM BOOT - RF		
IAB	INPUT-CURRENT - ABS	TCBLR	CALIPER BOOT - LR	TSFLF	SENSOR FACE - LF		
IRFB	INPUT ROD FORCE BOOSTER	TCBLRF	CALIPER BOOT-LEAD - RF	TSFRF	SENSOR FACE - RF		
IRTB	INPUT ROD TRAVEL BOOSTER	TCBLRR	CALIPER BOOT-LEAD - RR	TSHCLF	SENSOR HEAD CENTER - LF		
LACCEL	LATERAL ACCELERATION	TCBRR	CALIPER BOOT - RR	TSHCRF	SENSOR HEAD CENTER - RF		
LLVW	LIGHTLY LOADED VEHICLE WEIGHT	TCBTLF	CALIPER BOOT-TRAIL - LF	TSLSLF	SENSOR LEFT SIDE - LF		
LPBI	HLP - BOOSTER INPUT	TCBTLR	CALIPER BOOT-TRAIL - LR	TSLSRF	SENSOR LEFT SIDE - RF		
LPBLF	HLP - BEFORE HOSE LF	TCBTRF	CALIPER BOOT-TRAIL - RF	TSPL	SENSOR PULSE - LEFT		
LPBO	HLP - BOOSTER OUTPUT	TCBTRR	CALIPER BOOT-TRAIL - RR	TSPL	SENSOR PULSE - REAR		
LPBR	HLP - BEFORE HOSE REAR	TCIULR	CALIPER INBOARD UNDERCUT - LR	TSRSLF	SENSOR RIGHT SIDE - LF		
LPBRF	HLP - BEFORE HOSE - RF	TCIURR	CALIPER INBOARD UNDERCUT - RR	TSRSLR	SENSOR RIGHT SIDE - RF		
LPF	HLP - FRONT	TCOULR	CALIPER OUTBOARD UNDERCUT - LR	TSRSLF	SENSOR RIGHT SIDE - FF		
LPFAC	HLP - AFTER COMBO	TCOURR	CALIPER OUTBOARD UNDERCUT - RR	TSS1LF	SPLASH SHIELD POSITION #1 - LF		
LPFBA	HLP - BEFORE ABS	TDDL	DRUM DOWN - LR	TSS1RF	SPLASH SHIELD POSITION #1 - RF		
LPFBC	HLP - BEFORE COMBO	TDDRR	DRUM DOWN - RR	TSS2LF	SPLASH SHIELD POSITION #2 - LF		
LPFL	HLP - LF	TDLR	DRUM UP - LR	TSS2RF	SPLASH SHIELD POSITION #2 - RF		
LPFL4	HLP - 4WAL UNIT - LF	TDLRR	DRUM UP - RR	TSSBLF	SENSOR INSIDE BEARING - LF		
LPLR	HLP - LR	TDLRR	DRUM UP - RR	TSSBRF	SENSOR INSIDE BEARING - RF		
LPMC	HLP - MASTER CYLINDER	TELLR	CALIPER EAR LEAD - LR	TSSILF	SHIELD SURFACE INSIDE - LF WIRE		
LMCF	HLP - MASTER - FRT	TELR	CALIPER EAR LEAD - RR	TSSIRF	SHIELD SURFACE INSIDE - RF WIRE		
LMCR	HLP - MASTER - REAR	TETRL	CALIPER EAR TRAIL - LR	TSSL	SENSOR SHIELD LOWER		
LPR	HLP - REAR	TETRR	CALIPER EAR TRAIL - RR	TSSLR	SECONDARY BRAKE SHOE - LR		
LPRAP	HLP - 4WAL PUMP - REAR	TFGLR	CALIPER FLANGE - LR	TSSOLF	SHD SURFACE OUTSIDE - LF ROTOR		
LPRAA	HLP - AFTER ABS - REAR	TFGRR	CALIPER FLANGE - RR	TSSORF	SHD SURFACE OUTSIDE - RF ROTOR		
LPRAC	HLP - AFTER ABS - REAR	TFLF	FLUID - LF	TSSRR	SECONDARY BRAKE SHOE - RR		
LPRBA	HLP - BEFORE ABS - REAR	TFLR	FLUID LEAD - LR	TSSU	SENSOR SHIELD UPPER		
LPRBC	HLP - BEFORE ABS - REAR	TFLR	FLUID - LR	TSTLF	SENSOR TOP FRONT - LF		
LPRF	HLP - RF	TFLRR	FLUID LEAD - RR	TSTRF	SENSOR TOP FRONT - RF		
LPRF4	HLP - 4WAL COMBO - RF	TFPS	FLUID - POWER STEERING	TSWACLF	SHIELD @ CLIP - LF		
LPRR	HLP - RR	TFRF	FLUID - RF	TSWACRF	SHIELD @ CLIP - RF		
MAP	MANIFOLD ABSOLUTE PRESSURE	TFRR	FLUID - RR	TTO	TRANSMISSION FLUID		
MBFI	MASS FLOW BOOSTER INPUT	TIBLF	INNER BEARING - LF	TTPLF	TRAIL PISTON - LF		
MBFO	MASS FLOW BOOSTER OUTPUT	TIBLR	INNER BEARING - LR	TTPLR	TRAIL PISTON - LR		
NWS	NO WHEEL SLIDE	TIBRF	INNER BEARING - RF	TTPLR	TRAIL PISTON - RF		
PBAF	PARK BRAKE APPLY - FOOT LEVER	TIBRR	INNER BEARING - RR	TTPLR	TRAIL PISTON - RR		
PBAH	PARK BRAKE APPLY - HAND LEVER	TIPLF	INBOARD PAD - LF	TTSLR	TRAIL SHOE - LR		
PBRF	PARK BRAKE RELEASE FORCE	TIPLR	INBOARD PAD - LR	TTSLR	TRAIL SHOE - RR		
PBSLR	PARK BRAKE - STRUTLOAD - LR	TIPLR	INBOARD PAD - RF	TUCBLF	UPPER CALIPER BOLT - LF		
PBSRR	PARK BRAKE - STRUTLOAD - RR	TIPLR	INBOARD PAD - RR	TUCBRF	UPPER CALIPER BOLT - RF		
		TLBLF	LOWER BALLJOINT BOOT - LF	TUCBLR	UPPER CALIPER BOLT - LR		

DESERT PROVING GROUND

D63034

ENGINEERING REPORT

SUBJECT : BRAKE SYSTEM TESTING

FEB 1 2 REG.

TO : T.C. LANGE

TEST #: 7020K

FROM : T.R. HICKEY

TWO NO.: P9R06-41

SEQ. NO : 005

MODEL LINE : K15753

Model Year : 1999

PROCEDURE/FMVSS : 8548V

UPC : 5

VEH. NO.: KP9042

ENGINE: 4.8L/LR4

DATE EVALUATED FROM: 07/Mar/97

TO: 10/Mar/97

DATE PUBLISHED: 29/Jan/98

E.O.T. REPORT ☒

PROGRESS REPORT ☐

REISSUE ☐

REISSUE DATE: _____

REASON FOR REISSUE:

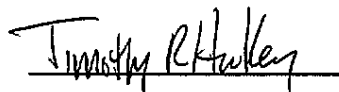
OBJECTIVE : To measure the R2 FMVSS 105 Validation performance of a 1999 J45 brake system on vehicle KP9042 at 6400 lbs. GVWR.

RESULTS : Vehicle completed test and met all requirements. Park brake section of test was omitted.

PROCEDURE: FMVSS R2-105 Cert. Test (R2-5-105G-82)

COMMENTS : Akebono AKNS161H front linings, Akebono AKNS161H rear linings, Firestone Wilderness P265/75R16 tires and ABS software GM124AAL.

MATERIAL: See attached test specification sheet.



1-28-98

T.R. HICKEY

Date

Test Engineer

Desert Proving Ground

(8) 674-5890

GENERAL MOTORS CORPORATION**Uniform Test Specifications****Truck Engineering Operation****Vehicle and Component Tests**

VEHICLE: **KP9042** Make: CHEVROLET Model: K15753 WB: 143.50 Axle: 3.08:1 S Test No.: **7020K**
 Engine: 4.8L/LR4 Transmission: A4/M30 Tires: FIRESTONE P265/75R16 44/44 TWO Number: P9R06-41
 PURPOSE: TO MEASURE THE R2 FMVSS 105 VALIDATION PERFORMANCE OF A 1999 JC5 BRAKE SYSTEM ON VEHICLE KP9042 AT 6400 LBS. GVWR.

RESULTS: VEHICLE COMPLETED THE TEST AND MET ALL OF THE REQUIREMENTS

BRAKES: 1999 JC5	Size/Type	Piston	Linings	Total	Front	%Front
Fronts:	305x29 MM / DISC	2x51 MM	AKNS161H	GVWR 6594	3188	48.3
Rears:	325x20 MM / DISC	1x54 MM	AKNS161H	LLVW 4996	3090	61.8

APPLY SYSTEM: Booster VACUUM/TANDEM M/C Dia. 34 Pedal Ratio: 4.72:1
 ANTI-LOCK: 4WAL / EBC325 / GM124AAL
 BALANCE SYSTEM: DRP / TEST LOCATION: DPG EAST STR From Date: 07MR97 2476 To Date: 10MR97 2973

TEST	PORTIONS	REQ.	TEST RESULTS	%PASS (Failed)	APPLY FORCE MAX	COMMENTS
1st Eff.	30 mph 60 mph	65 ft 242 ft	50 ft 183 ft	23% 24%	146 150	OK OK
2nd Eff.	30 mph 60 mph	57 ft 216 ft	49 ft 179 ft	15% 17%	140 146	OK OK
PARK BRAKE	GVWR Uphill GVWR Dnhill LLVW Uphill LLVW Dnhill	90 lbs w/Hndl. 125 lbs pedal Hold 5 minutes Warn Lt Opr.				
3rd Eff.	60 mph	216 ft	151 ft	30%	144	OK
Partial System 60 mph	LLVW Rears Only LLVW Frts Only GVWR Rears Only GVWR Frts Only	517 ft	473 ft 205 ft 349 ft 250 ft	9% 60% 33% 52%	148 146 149 149	LT.N/A 1bs. LT.N/A 1bs. LT.N/A 1bs. LT.N/A 1bs. Passed or (Failed)
Failed Comp.	Anti-Lock 60 mph L.S.P.V.	517 ft	180 ft 177 ft	65% 66%	144 144	NO W/S NO W/S
Failed Power	Sys 1 Sys 2	60 mph 517 ft	447 ft	13%	149	NO ABS, NO W/S
1st Fade	Baseline 30 mph Fade 1-5 60 mph Fade 6-10 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	30% 85% 48% 70% 40%	25 44 90 22 19	OK LIGHT FADE FADE, ODOR OK OK
2nd Fade	Baseline 30 mph Fade 1-10 60 mph Fade 11-15 60 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 15 ft/sec2 5-15 ft/sec2 10 ft/sec2 Base + 20 lbs	10 ft/sec2 15 ft/sec2 15 ft/sec2 10 ft/sec2 10 ft/sec2	23% 90% 87% 93% 73%	22 35 38 21 19	OK OK ODOR OK OK
4th Eff.	30 mph 60 mph 80 mph	65 ft 242 ft 459 ft	42 ft 150 ft 259 ft	36% 38% 43%	141 149 144	OK OK OK
Water Rec.	Baseline 30 mph Rec 1-4 30 mph Rec 5 30 mph	10-60 lbs 10ft/sec2 Base + 45 lbs	10 ft/sec2 10 ft/sec2 10 ft/sec2	29% 94% 81%	24 32 33	OK OK OK
Spike Stops	10 Spikes 30 mph	200 lbs .08 sec.		Yes	380	
Final Eff.	60 mph	242 ft	162 ft	33%	145	OK

* unless otherwise specified, the max apply force will be 150 lbs.

Tester: D. HOOKEY

Summarized by: T. R. HICKEY

Summary Print Date: 22JA98

R2-5-105G-82 Summary Sheet

MPVs, Trucks, Buses (Except School Buses) w/GVWR < 8,000 lbs

GM CONFIDENTIAL

BUILD AND TEST SPECIFICATION SHEET

T.W.O. No: P9R06-41 Page 3 of 24

TWO No : P9R06-41

Seq No : 005

DPG No : 0513

Veh No : KP9042

Test No : 7020K

Test Purpose : To measure the R2 FMVSS 105 Validation performance of a 1999 JC5 brake system on vehicle KP9042 at 6400 lbs. GVWR.

Test Results : Vehicle completed test and met all requirements. Park brake section of test was omitted.

Comments : Akebono AKNS161H front linings, Akebono AKNS161H rear linings, Firestone Wilderness P265/75R16 tires and ABS software GM124AAL

VEHICLE INFORMATION

Year : 1999
Brake RPO : JC5
Name Plate : Chevrolet
Veh Model : K15753
Vehicle VIN : 1GCEK1943XX
Wheel Base : 143.5
Engine : 4.8L/LR4
Transmission : A4/M30
Axle Ratio : 3.08:1
Single/Dual : Single
Odo Cal :
Engine RPM :

TIRE INFORMATION

Tire Size : P265/75R16
Tire Make : Firestone
Tire Type : M+S
Wheel Code : RJP
Wheel Size : 16x6.5
Tire Pressure (PSI) : 44/44
Steel

TEST INFORMATION

Procedure No : 8548V

Test Type : FMVSS R2-105 Cert. Test (R2-5-105G-82)

Start Date : 3/7/97

Start Odo : 2476

Finish Date : 3/10/97

Finish Odo : 2973

TEST WEIGHT (lbs)

	As Tested		Design Weights	
	GVWR	LLVW	GVWR	LLVW
Front :	3188	3090	3091	3073
Rear :	3406	1906	3309	1598
Total :	6594	4996	6400	4671
%Front :	48.3	61.8	48.3	65.8
Tire Radius :	15.3	15.1	14.2	14.3
Frt Axle to CG	74.1	54.7	74.2	49.1
CG Height :	29.8	28.4	28.5	27.1

FRONT SYSTEM

Type : DISC
Rotor ASM : 15716362A
Rotor Size : 305x29 mm
Piston Dia : 51 mm
No Pistons : 2
Notes : S/N L: 2465 , R: 2464

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : DP
Service Kit : 18025698AA
Noise Treat : CLD6
Caliper ASM : 18025706/7AA

Rivet/Bonded	Min Thick
Bonded	0.502
Bonded	0.502

REAR SYSTEM

Type : Disc -PBR Calipers
Rotor ASM : 15712800A
Rotor Size : 325x20 mm
Piston Dia : 54 mm
No Pistons : 1
PB Lining : 15703331A
Notes : S/N L: 6U113R, R: 6U108R

	Material	NY-Code
Inboard :	AKNS161H	NS161HEF
Outboard :	AKNS161H	NS161HEF

Series : FD
Service Kit : 18026447AA
Noise Treat : None
Caliper ASM : 18024190/1
PB Service Kit : TX123278A
PB Min Thk :

Rivet/Bonded	Min Thick
Bonded	0.415
Bonded	0.415

APPLY SYSTEM

Booster Type : Vacuum/Tandem
Size : 260 mm
ASM : 18022485C
Code : DC
Pedal Ratio : 4.72:1
Pedal Apply Radius :
P.T. @ 50 LBS : 37 mm

Master Cyl ASM : 18021494E
Code : XD
Dia : 34 mm
Min Dis Frt Port : 13.49 cc
cc @ 0psi Rear Port : 13.47 cc

Code: Meter / Split / Slope

BALANCE SYSTEM

Comb Valve ASM : None
Height Sens Valve : None

ANTI LOCK

Anti Lock System : 4WAL
Anti Lock Comments : EBC325 - System balance controlled by DRP.

Anti Lock Software Level : GM124AAL

Engineer: T.R. HICKEY

Date : 1/22/98

* Measurements in INCHES unless otherwise specified

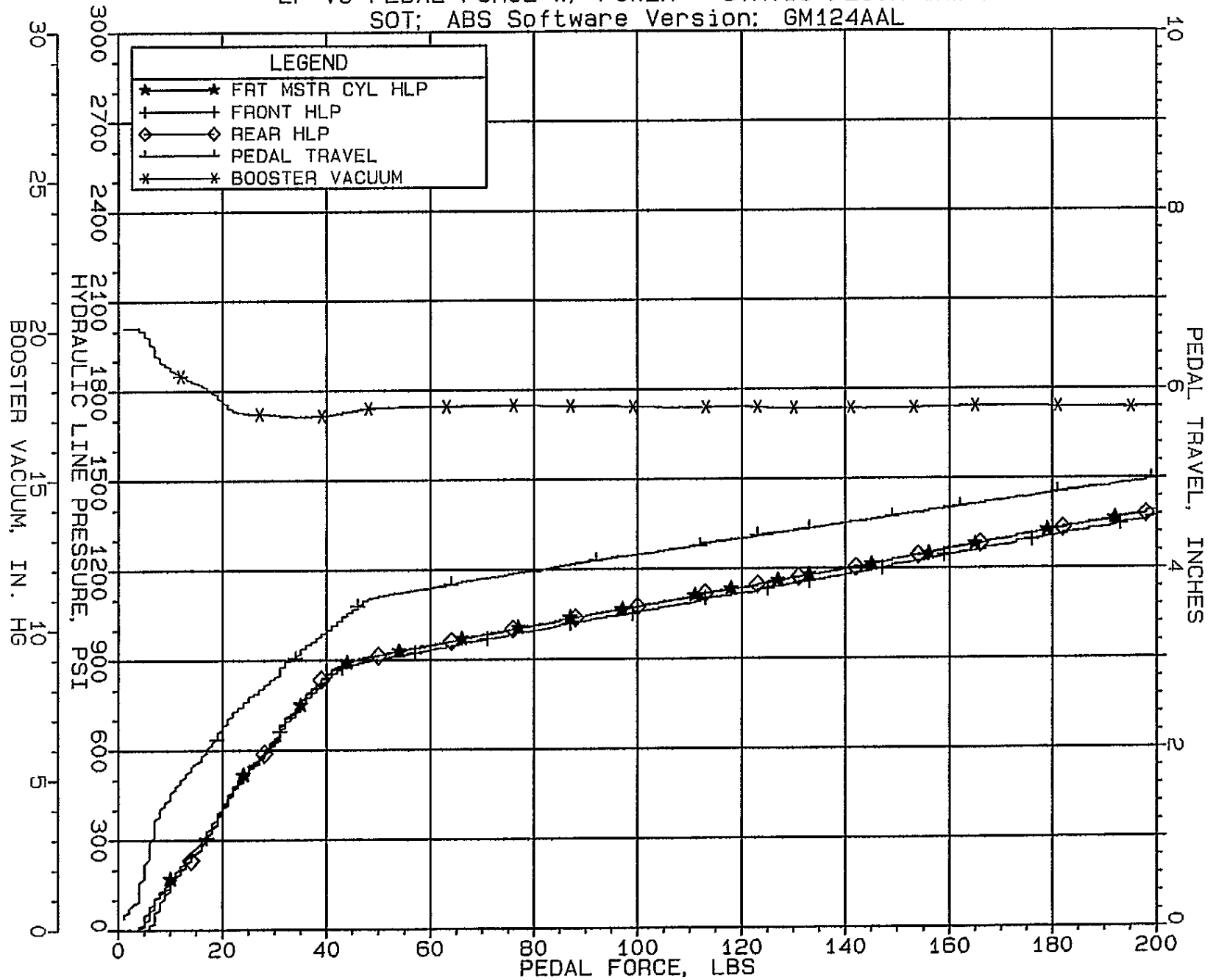
SPECCKDK rev. 082495

GM CONFIDENTIAL

MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

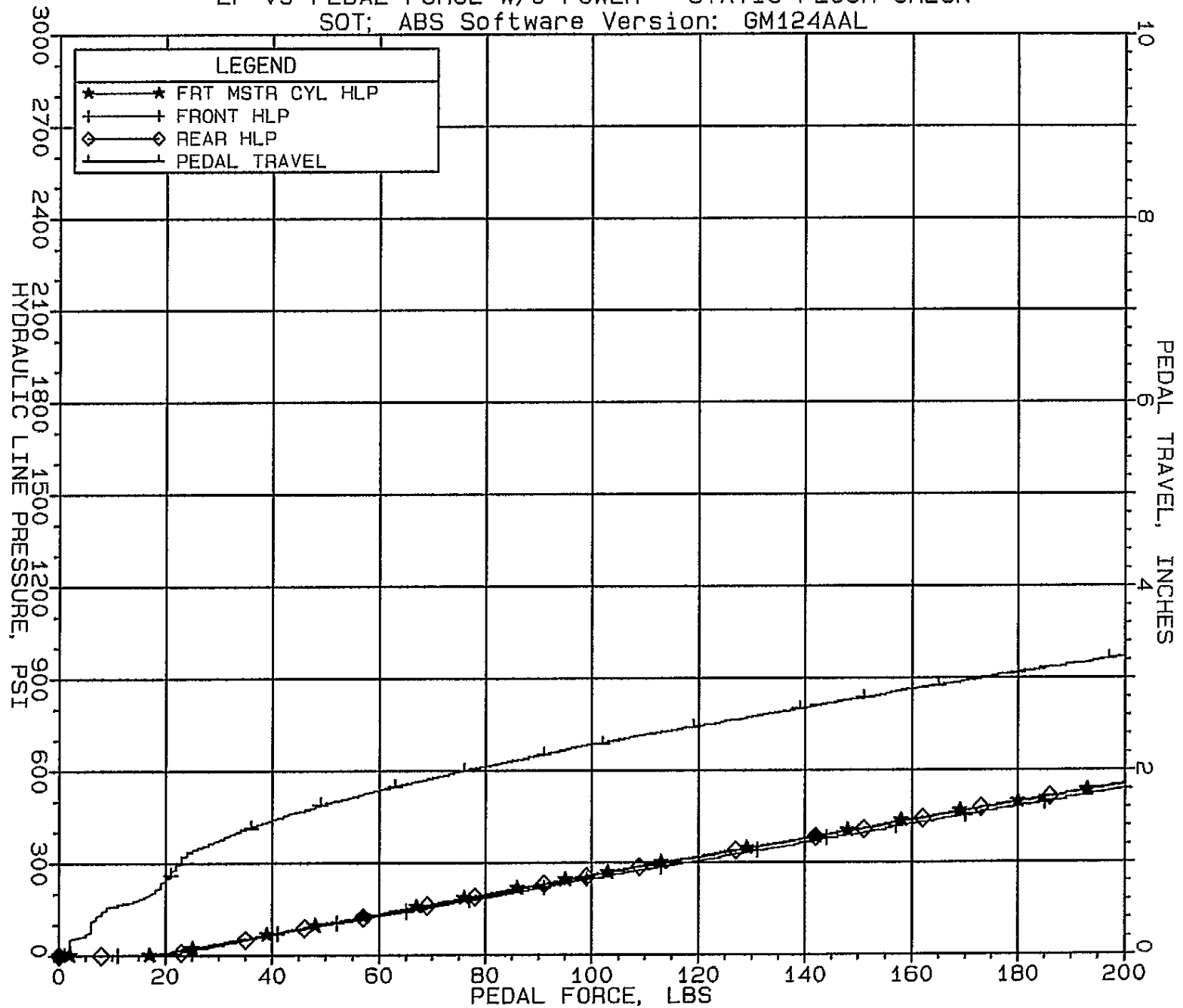
SOT; ABS Software Version: GM124AAL



MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

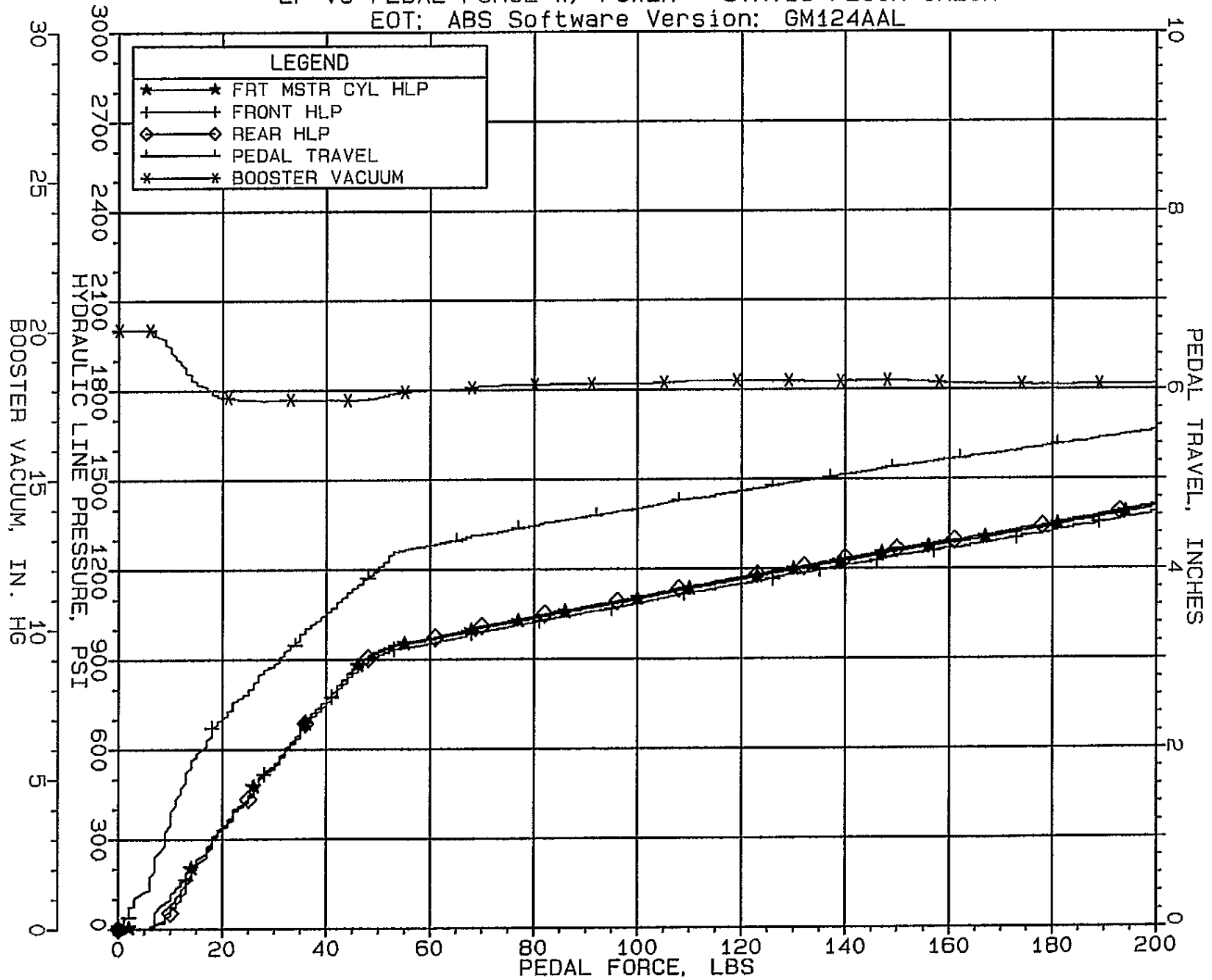
SOT; ABS Software Version: GM124AAL



MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/ POWER - STATIC FLOOR CHECK

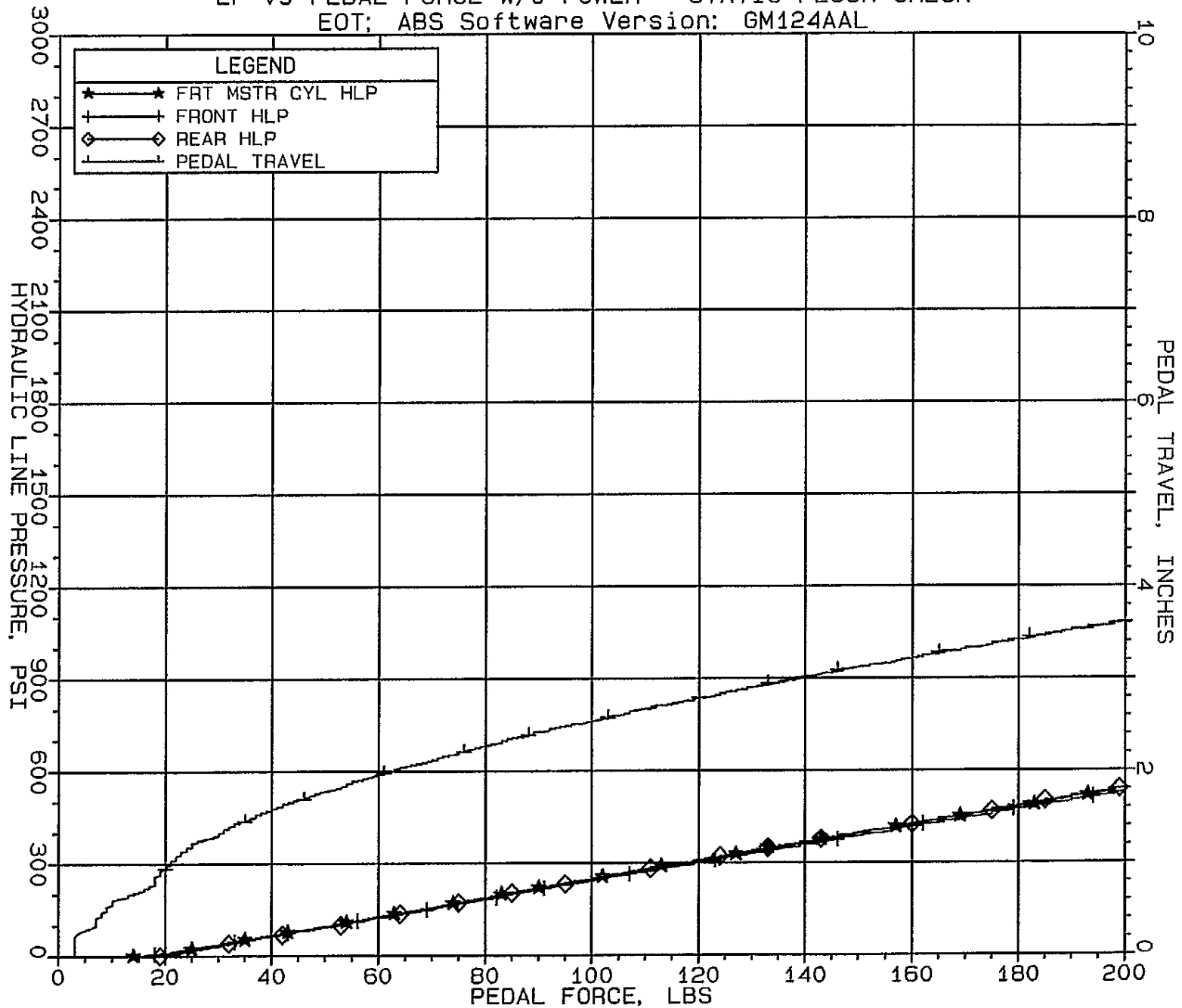
EOT; ABS Software Version: GM124AAL



MVSS 105 VALIDATION TEST 7020K [KP9042]

LP vs PEDAL FORCE w/o POWER - STATIC FLOOR CHECK

EOT; ABS Software Version: GM124AAL



GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 78° F.	WIND DIR./VEL.: S/W 0-5	ODO: 2485	TIME: 3:20 A.M.

3.3.5 FIRST EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			ft	lb			
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.6	52.6	50.6	76	148	OK
	2	30.3	52.2	51.2	104	144	OK
	3	30.4	51.3	50.0	96	146	OK
	4	30.4	53.3	51.9	115	161	P.F. LIMIT
	5	30.7	53.2	50.8	117	142	OK
	6	30.3	52.6	51.6	99	138	OK
60 mph	1	60.5	191.0	187.9	90	147	OK
	2	60.4	185.2	188.8	101	150	OK
	3	60.5	189.6	186.5	107	144	OK
	4	60.3	184.8	183.0	103	161	P.F. LIMIT
	5	60.5	187.4	184.3	95	146	OK
	6	60.2	180.7	179.5	121	156	P.F. LIMIT

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel HooleyDate: 3-7-97

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.:	WIND DIR./VEL.:	ODO: 2501 / 2502 TIME:

3.3.6. BURNISH Gear: Highest Gear Ratio (Example: Overdrive) Speed: 40 - 0 mph = **30**
 Deceleration: 12 ft/s² Pedal Force: Limit does not apply here.

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	103	102	106	100		S E E
10	240	248	223	238	1.0	"
20	250	248	293	250	"	"
30	250	261	293	248	"	"
40	252	289	285	242	"	"
50	254	258	277	248	"	"
60	247	257	266	235	"	"
70	249	262	284	243	.9	"
80	237	245	257	235	"	"
90	232	243	261	228	"	"
100	226	241	260	220	"	"
110	233	248	258	229	"	"
120	237	255	280	235	"	"
130	243	258	283	241	"	"
140	244	256	275	238	"	"
150	243	247	272	243	"	"
160	228	235	268	235	"	"
170	226	230	268	234	"	"
180	223	229	271	233	"	"
190	221	231	275	229	"	"
200	225	229	273	238	"	"

RECORDED BY CE / TD

DATE 3-6-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: 4 wheel disc brake

Adjusted by: _____

Signature

Date: _____

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 88° F.	WIND DIR. / VEL.: CAF 11	ODO: 2195	TIME: 9:45 A.M.

3.3.7 SECOND EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED			STOPPING DISTANCE		PEDAL FORCE		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			MEASURED	CORRECTED	MIN	MAX	
30 mph	1	30.2	52.5	51.8	113	150	OK
	2	30.5	50.3	48.7	102	140	OK
	3	30.3	49.9	48.9	110	148	OK
	4	30.5	50.8	49.1	120	145	OK
	5	30.3	49.6	48.6	128	170	P.F. LIMIT
	6	30.6	51.3	49.3	91	135	OK
60 mph	1	60.2	193.4	192.1	103	142	OK
	2	60.6	182.8	179.2	94	144	OK
	3	60.3	178.2	177.0	89	152	P.F. LIMIT
	4	60.3	180.3	178.5	111	146	OK
	5	60.5	184.0	181.0	104	151	P.F. LIMIT
	6	60.9	186.8	181.3	113	143	OK

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel HoxleyDate: 3-8-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 72° F.	WIND DIR./VEL.: CALM	ODO: 2705 TIME: 11:55

3.3.16 FIRST RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Pedal Force: Not Required

Maintain Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature. Do Not Exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Notify Engineer if side to side temperatures exceed 150° F. Maintain 40 mph cooling speed. Brake Temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE ° F. (SECONDARY SHOE OR HOTTEST PAD)				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	109	108	107	101	—	5, 5, 5
10	247	254	259	238	1.0	
20	234	240	272	249	(	
30	230	236	279	245	(	
35	230	238	278	245	1.0	5, 5, 5

RECORDED BY

David Hooley

DATE

3-8-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.
Record method used: WHEEL DISC BRAKES

ADJUSTED BY:

Signature

DATE:

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: LLVW
AMBIENT TEMP.: 79° F.	WIND DIR./VEL.: N/A 0-5	ODO: 2742 TIME: 1:45 P.M.

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:			5000	61.0
Measured:	3090	1906	4996	61.8

3.3.10 THIRD EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

6 Stops: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED		STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS	
DESIRED	STOP P ACTUAL						
60 mph	1	60.2	171.5	172.4	41	136	OK
	2	60.3	153.0	151.5	103	144	OK
	3	60.3	162.6	161.0	99	146	OK
	4	60.3	160.3	159.7	90	153	P.F. LIMIT
	5	60.2	165.1	164.0	98	150	OK
	6	60.3	158.1	156.5	97	144	OK

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: *Daniel D. Hoober*Date: **3-8-97**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: LLVW	
AMBIENT TEMP.: 80°F.	WIND DIR./VEL.: N/A 0-6	ODO: 2752	TIME: 2:45 P.M.

3.3.11 PARTIAL FAILURE (HYDRAULIC SYSTEM)

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Initial Brake Temperature: 150° - 200° F.

Speed: 60 - 0 mph

Lockup: Wheel lock-up permitted at any speed

3.3.11.1 Fluid level indicators, Remove brake fluid from one chamber of master cylinder reservoir until level is less than manufacturer's safe level, or to less than 1/4 of the chamber fluid capacity, whichever results in the higher level. Replace m/c cap, turn ignition on, and allow one minute. Record fluid level indicator operation. Yes _____ No _____ N/A ☒

3.3.11.2 Differential Pressure Indicators. Cause complete loss of one portion of brake system. Record brake pedal force or brake pressure differential to cause brake system failure indicator to operate. PF: _____ lb
Press: _____ psi. N/A ☒

3.3.11.3 Subsystem Failed: REARS Method of Simulating Failure: VALVING

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.6	218.4	24.1	90	150	N	OK
	2 60.7	214.5	209.6	101	148	/	OK
	3 60.3	207.1	2050	109	146	/	OK
	4 60.3	206.7	2046	106	168	N	P.F. LIMIT

3.3.11.4 Restore brakes to normal operation and bleed brakes thoroughly (if required).

3.3.11.5 Repeat 3.3.11.1 through 3.3.11.4 above for the other subsystems of brake system:

Fluid Level Indicators: Yes _____ No _____ N/A ☒
Differential Pressure Indicators:
PF: _____ lb., Press: _____ psi. N/A ☒

Subsystem Failed: FRONTS Method of Simulating Failure: VALVING

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.5	490.9	462.8	94	157	N	P.F. LIMIT
	2 60.4	500.8	494.2	64	163	/	P.F. LIMIT
	3 60.4	478.9	472.6	87	148	/	OK
	4 60.3	481.8	472.0	107	146	N	OK

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by: Denial Hooker Date: 3-8-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 54°F	WIND DIR./VEL.: CALM	ODO: 2770	TIME: 7:45 A.M.

	Fronts (lbs)	Rears (lbs)	Total (lbs)	% Front
Test Weight:	3091	3309	6400	48.3
Measured:	3182	3404	6586	48.3

3.3.12 PARTIAL FAILURE (HYDRAULIC SYSTEM)

3.3.12.1 REPEAT 3.3.11. Fluid Level Indicator: Yes _____ No _____ N/A ☒

Differential Pressure Indicator: PF _____ lb Pressure: _____ psi N/A ☒

4 Stops: Minimum Stopping Distance Pedal Force: 15 - 150 lbs.

Gear: Highest Gear Ratio (Example: Overdrive) Speed 60 - 0 mph

Initial Brake Temperature: 150° - 200° F.

Lockup: Wheel lock-up permitted at any speed.

Subsystem Failed: FRONTS Method of Simulating Failure: VALVING

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	ft.	ft.	lb	lb		
		MEASURED	CORRECTED	MIN	MAX		
60 mph	1	40.7	420.2	407.9	82 147	N	OK
	2	40.7	368.6	362.1	105 150	I	OK
	3	40.9	372.5	366.6	92 148	I	OK
	4	40.8	358.3	349.9	124 149	N	OK

Restore brakes to normal operation and bleed brakes thoroughly.

Repeat 3.3.11 for the other subsystem of brake system:

Fluid Level Indicators: Yes _____ No _____ N/A ☒

Differential Pressure Indicators:

PF: _____ lb., Press: _____ psi. N/A ☒

Subsystem Failed: REARS Method of Simulating Failure: VALVING

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	ft.	ft.	lb	lb		
		MEASURED	CORRECTED	MIN	MAX		
60 mph	1	40.3	296.3	293.4	102 148	N	OK
	2	40.4	261.4	257.9	100 149	I	OK
	3	40.7	255.6	249.7	104 149	I	OK
	4	40.7	258.0	252.1	104 149	N	OK

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by Daniel R. Rios

Date: 3-9-97

GM

UNIFORM TEST SPECIFICATIONS

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 62 °F.	WIND DIR./VEL.: S/W 0-5	ODO: 2784 TIME: 9:05 A.M.

PARTIAL FAILURE (APPLY SYSTEM)

NO ABS

Pedal Force: 15 - 150 lb

4 Stops: Minimum Stopping Distance

Gear: Highest Gear Ratio (Example: Overdrive)

Wheel lock-up: Permitted at any speed

Initial Brake Temperature: 150° - 200° F.

3.3.13 SERVICE BRAKE SYSTEM - PARTIAL FAILURE ANTILOCK AND/OR VARIABLE PROPORTIONING SYSTEMS (Where applicable)

Disconnect functional power source or otherwise render antilock system inoperative.

Method of simulating failure DISCONNECT FUSE

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.8	230.4	224.4	25	133	Y	NO W/S
	2 60.9	209.9	203.7	56	143	I	NO W/S
	3 60.8	183.9	179.1	72	160	I	P.F. LIMIT NO W/S
	4 60.2	181.4	180.2	98	144	Y	NO W/S

Restore antilock system to normal operation.

NO ABS 2

Disconnect variable proportioning system (if applicable). Method of simulating failure DISCONNECT ELECTRICAL PLUG

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.6	206.7	202.6	51	142	Y	NO W/S
	2 60.6	180.3	176.7	97	144	I	NO W/S
	3 60.6	189.0	185.3	102	144	I	NO W/S
	4 60.4	180.5	178.1	105	147	Y	NO W/S

Restore variable proportioning system to normal operation. Repeat for each subsystem provided.

3.3.14 Service Brake System - Inoperative Brake Power Unit or Brake Power Assist Unit. Perform either 3.3.14.1. or 3.3.14.2.

3.3.14.1 Disconnect the primary source of power. (Deplete all reserve power capability).

Method of rendering inoperative. NO BOOST

TEST SPEED		STOPPING DISTANCE		PEDAL FORCE		WARNING LIGHTS OPERATION Y/N	WHEELSLIDE AND STABILITY COMMENTS
DESIRED	ACTUAL	MEASURED	CORRECTED	MIN	MAX		
60 mph	1 60.4	422.1	415.7	86	150	N	NO ABS NO W/S
	2 60.7	468.5	457.3	110	151	I	P.F. LIMIT NO W/S
	3 60.7	457.2	447.3	136	149	I	NO ABS NO W/S
	4 60.7	463.7	453.1	86	150	N	NO ABS NO W/S

Restore system to normal and bleed thoroughly (if required). Repeat for other subsystems as required.

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by Daniel HootenDate: 3-9-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 82° F.	WIND DIR./VEL.: N/A 0-5	ODO: 2815 TIME: 12:50 P.M.

3.3.15 FIRST FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.**3.3.15.1 Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².**

Initial Brake Temperature: 150° - 200° F.

Pedal Force: 10 - 60 lbs.

3.3.15.2 Fade - 10 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 10th fade stop, drive 1 mile @ 30 mph, then immediately into recovery stops.

3.3.15.3 Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s². Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop. Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 - 5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (>5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	25.0	10	146	137	163	156	OK
2	25.0	10	168	160	181	174	OK
3	25.0	10	183	175	193	187	OK
Avg.	25.0						
1	39.0	15	130	122	141	134	OK
2	39.0	15	221	213	240	217	
3	41.0	15	306	299	326	298	
4	41.0	15	386	382	402	371	OK
5	49.0	15	457	457	468	433	LIGHT FADE
6	52.0	15	520	524	530	492	FADDF
7	90.0	15	574	578	568	549	ODOR
8	71.0	15	626	630	611	586	
9	48.0	15	668	674	655	629	
10	46.0	15	698	705	686	662	FADE ODOR
1	22.0	10	640	631	601	617	OK
2	11.0	10	497	486	455	467	
3	17.0	10	407	389	371	405	
4	18.0	10	397	329	347	348	
5	19.0	10	306	284	307	311	OK

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)

Recorded by

David R. [Signature]

Date:

3-8-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 84° F.	WIND DIR./VEL.: N/E 0-3	ODO: 2330 TIME: 1:30 P.M.

3.3.16 SECOND RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Interval: Make stops at .5 mile intervals until average initial brake temperature ($250^{\circ} \pm 20^{\circ}$ F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE DEGREES F SECONDARY SHOE OR HOTTEST PAD				STOP INTERVAL	COMMENTS
	LF	RF	LR	RR		
1	205	189	203	196	—	5, 5, 5
10	251	227	273	245	1.0	}
20	254	229	277	252	1	
30	257	232	274	257	1	
35	250	230	278	248	1.0	5, 5, 5

RECORDED BY

David Hoffman

DATE

3-9-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used: 4 WHEEL DISC BRAKES

Adjusted by

Signature

Date:

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 87°F.	WIND DIR./VEL.: CALM	ODO: 2864 TIME: 2:48 PM

3.3.17 SECOND FADE AND RECOVERY

Gear: Highest Gear Ratio (Example: Overdrive)

NOTE: MAINTAIN DECELERATION AT OR ABOVE SPECIFICATION.

Baseline - 3 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s².

Pedal Force: 10 - 60 lbs.

Fade - 15 stops. Speed: 60 - 0 mph. Deceleration: Obtain 15 ft/s² WITHIN 1 SECOND without exceeding 150 lb pedal force.

Initial Brake Temperature (1st stop): 130° - 150° F.

Interval: 0.4 mile. Accelerate immediately to initial speed after each stop.

Interval: 1.0 mile. After 15th fade stop, drive 1 mile at 30 mph, then immediately into recovery stops.

Recovery - 5 stops. Speed: 30 - 0 mph. Deceleration: 10 ft/s² Interval: 1.0 mile. Accelerate immediately to initial stop speed after each stop.

Max. Pedal Force: Stop 1 - 4, 150 lb max., Stop 5, Baseline + 20 lbs. Min. Pedal Force: Stops 1 -5, Baseline - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.).

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb		LF	RF	LR	RR	
1	21.0	10	153	155	151	149	OK
2	23.0	5	176	176	174	168	OK
3	21.0	5	196	196	194	189	OK
Avg.	21.67						
1	33.0	15	138	123	146	137	OK
2	33.0	5	232	214	234	209	
3	35.0	5	317	305	315	276	
4	31.0	5	400	396	385	335	
5	28.0	5	469	472	445	389	
6	28.0	5	529	535	495	436	
7	50.0	5	581	586	521	489	OK
8	32.0	5	636	632	572	523	NDAP
9	31.0	5	668	677	620	565	
10	32.0	5	702	710	656	602	
11	32.0	5	732	734	676	637	
12	35.0	5	758	753	689	669	
13	34.0	5	781	775	706	699	
14	36.0	5	801	798	729	724	
15	38.0	5	822	818	745	719	NDAP
1	21.0	10	680	689	638	612	OK
2	11.0	5	537	562	531	473	
3	11.0	5	439	451	439	398	
4	18.0	5	374	377	380	347	
5	19.0	5	330	325	334	308	OK

Wind Speed: ☒ Below 15 mph (any direction) ☐ Between 15 & 30 mph (cannot be headwind)Recorded by: Donal R. [Signature]Date: 3-7-93

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR	
AMBIENT TEMP.: 56° F.	WIND DIR. / VEL.: S 0-8	ODO: 2885	TIME: 6:00 A.M.

3.3.16 THIRD RE-BURNISH

Gear: Highest Gear Ratio (Example: Overdrive)

Pedal Force: Not Required

Speed: 40 - 0 mph

Deceleration: 12 ft/s²

Initial Brake Temperature: 250° ± 20° F.

Interval: Make stops at .5 mile intervals until average initial brake temperature (250 ± 20° F.) across either axle reaches above temperature. Then increase interval to 0.6, 0.7 miles, etc. to maintain temperature, do not exceed 1.0 mile interval. Temperatures may exceed 250° F. if 1 mile intervals are used. Maintain 40 mph cooling speed. Brake temperatures are recorded 0.2 to 0.1 miles prior to stop.

STOP NUMBER	BRAKE TEMPERATURE °F				STOP INTERVAL	COMMENTS
	SECONDARY SHOE OR HOTTEST PAD					
	LF	RF	LR	RR		
1	87	82	85	83	—	S, S, S
10	264	250	242	224	.5 / .7	}
20	263	246	259	234	.8	
30	261	247	267	234	.8	
35	262	247	264	235	.8	S, S, S

RECORDED BY

Daniel Hooker

DATE

3-10-97

Brake Adjustment (Post Burnish)

Adjust to manufacturer's recommendation manually or by making stops if the automatic adjusters were not locked out.

Record method used:

4 WHEEL DISC BRAKES

Adjusted by

Signature

Date:

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 67° F.	WIND DIR./VEL.: CALM	ODO: 2915 TIME: 8:20 A.M.

3.3.19 FOURTH EFFECTIVENESS

Gear: Neutral

Initial Brake Temperature: 150° - 200° F

Pedal Force: 15 - 150 lb.

Stops as Noted below: Minimum Stopping Distance

No more than one wheel lock-up above 10 mph unless anti-lock controlled

TEST SPEED		STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP ACTUAL	MEASURED	CORRECTED	MIN	MAX	
30 mph	1 30.5	43.2	41.8	85	141	OK
	2 30.4	43.3	42.2	108	140	OK
	3 30.2	41.7	41.1	125	152	P.F. LIMIT
	4 30.4	43.7	42.6	111	146	OK
	5 30.0	44.1	44.1	114	149	OK
	6 30.4	44.4	43.2	113	146	OK
60 mph	1 60.4	155.4	153.3	109	155	P.F. LIMIT
	2 60.5	152.1	149.6	116	149	OK
	3 60.2	155.2	154.2	99	151	P.F. LIMIT
	4 60.4	159.9	157.8	100	147	OK
	5 60.4	157.2	155.7	107	147	OK
	6 60.1	159.2	159.3	96	149	OK

NOTE: For vehicles with speed attainable in 2 miles of not less than 84 mph.
Record speed attainable in 2 miles 100 + mph.

80 mph	1 80.4	269.5	266.8	89	147	OK
	2 80.3	261.3	259.4	91	144	OK
	3 80.6	277.6	273.5	89	156	P.F. LIMIT
	4 80.4	276.6	273.9	81	152	P.F. LIMIT

Wind Speed: ☒ Below 15 mph (Any Direction)

[] Between 15 & 30 mph (Cannot be Headwind)

Recorded by: Daniel HooperDate: 3-10-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 79° F.	WIND DIR. / VEL.: N/E 0-5	ODO: 2942 TIME: 10:20 A.M.

3.3.20 WATER RECOVERY

Force: (Readings may be terminated at 5 mph although deceleration must be maintained throughout stop).

3.3.20.1 Baseline - 3 stops.Speed: **30 - 0 mph**Gear: **Highest Gear Ratio (Example: Overdrive)**Pedal Force: **10 - 60 lbs.**Deceleration: **10 ft/s²**Initial Brake Temperature: **150° - 200° F.**

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	TEMPERATURE ° F.				COMMENTS
	lb	ft/s ²	LF	RF	LR	RR	
1	26.0	11.3	168	153	161	149	OK
2	24.0	12.1	188	181	185	165	OK
3	23.0	11.5	187	175	181	164	OK
Avg.	24.33						

3.3.20.2 WET RECOVERY - 5 STOPS

- (a) With brakes fully released at all times, wet brakes for at least 2 minutes by driving at a speed of 5 mph maximum in any combination of reverse and forward directions, in a trough with water depth of 6.0 in.
- (b) After leaving trough, immediately accelerate at maximum rate to 30 mph without brake application. Make 5 successive stops, each from 30 mph at deceleration of 10 ft/s² in normal driving gear. After each stop, except the last, immediately accelerate at maximum rate to 30 mph and begin the next stop.

Each stop must obtain a 10 to 10.5 ft/s² deceleration using a ramp apply not a spike apply. Maintain 10 ft/s² throughout stop.**PEDAL FORCE:**

Max. Pedal Force: Stops 1 - 4, 150 lb., Stop 5, Baseline avg. + 60 lb. (< 110 lb.)

Min. Pedal Force: Baseline avg. - 10 lb. or 0.6 * Baseline, whichever is lower (> 5 lb.)

STOP NUMBER	MAXIMUM PEDAL FORCE	DECELERATION	COMMENTS
	lb	ft/s ²	
1	21.0	12.4	OK
2	23.1	12.8	}
3	29.0	12.3	
4	32.0	11.5	
5	33.0	11.3	OK

Recorded by: Daniel HooleyDate: 3-10-97

GM**UNIFORM TEST SPECIFICATIONS**

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	TEST WEIGHT: GVWR
AMBIENT TEMP.: 84°F	WIND DIR./VEL.: N/E 0-12	ODO: 2946 TIME: 12:05 P.M.

3.3.21 SPIKE STOPS

- (a) Force - Controlled Stops, Make 10 successive Spike Stops.

Pedal Force: 200 lb in 0.08 seconds or less. 200 lb minimum required throughout stop.

Lock - up: Wheel lock - up permitted at any speed.

Speed: 30 - 0 mph

Gear: Neutral

Initial Brake Temperature: 150° - 200° F. average across axle.

10 Stops

STOP	PEDAL FORCE	INITIAL	TIME TO REACH	MAINTAIN	COMMENTS
NUMBER	lb	SPEED mph	200 lb PEDAL FORCE seconds	200 lbs	
1	348	30.5	0.05	Y	OK
2	365	30.5	0.05	Y	OK
3	342	30.7	0.05	Y	OK
4	340	30.5	0.05	Y	OK
5	335	30.3	0.05	Y	OK
6	346	30.0	0.05	Y	OK
7	354	30.3	0.05	Y	OK
8	320	30.6	0.05	Y	OK
9	328	30.4	0.05	Y	OK
10	374	30.3	0.05	Y	OK

- (b) Effectiveness (Check) Stops

Pedal Force: 15 - 150 lb

Speed: 60 - 0 mph

Gear: Neutral

6 Stops for Minimum Stopping Distance

TEST SPEED MPH			STOPPING DISTANCE ft.		PEDAL FORCE lb		WHEELSLIDE AND STABILITY COMMENTS
DESIRED	STOP	ACTUAL					
			MEASURED	CORRECTED	MIN	MAX	
60 mph	1	60.5	176.0	173.1	82	181	P.F. LIMIT
	2	60.6	176.3	172.2	65	130	OK
	3	60.5	168.3	165.5	79	175	P.F. LIMIT
	4	60.3	170.3	168.6	65	139	OK
	5	60.4	165.1	162.9	57	139	OK
	6	60.6	165.0	161.7	95	145	OK

Wind Speed: ☒ Below 15 mph (Any Direction)☐ Between 15 & 30 mph (Cannot be Headwind)Recorded by: Daniel KosterFinish ODO: 2973Date: 3-10-97

Vehicle and Component Tests

TEST #: 7020K	VEHICLE #: KP9042	ODO: 2000	TIME: 18.20
---------------	-------------------	-----------	-------------

3.3.22 FINAL INSPECTION

YES

NO

3.3.22.1 Test completed without detachment or fracture of any component of the braking systems, such as brake springs, brake shoe or disc pad facing, other than minor cracks. A major crack does not meet the requirement. A major crack is a crack across the shoe with an obvious gap.

All mechanical components of the braking system are intact and functional.

Friction facing tearout does not exceed 10% of the lining on any single frictional element.

3.3.22.2 Test completed without any visible brake fluid or lubricant on:

- (1) the friction surface of the brake
- (2) at the master cylinder
- (3) at the power unit reservoir cover
- (4) at the seal and filler openings

Lining and/or Drum/Rotor Appearance

LH

& RH

LINING TO DRUM CLEARANCE

	CONTACT	GLAZE	STREAK	DUST	OTHER COMMENTS	
PRI OR OUT	LF 100 %	MOD	Light	Light		
	RF 100 %	MOD	Light	Light		
	LR 100 %	MOD	Light	Light		
	RR 100 %	MOD	Light	Light		
SEC OR IN	LF 100 %	MOD	Light	Light		
	RF 100 %	MOD	Light	Light		
	LR 100 %	MOD	Light	Light		
	RR 100 %	MOD	Light	Light		
	RESIN	BLUING	RINGING	STREAKS	FINISH	
DRUM OR DISC	LF Light	MOD	Light	Light	Glossy	
	RF Light	MOD	Light	Light	Glossy	
	LR Light	Light	Light	Light	Glossy	
	RR Light	Light	Light	Light	Glossy	

Recorded by:

Chris Schumann

Date:

10/11/1998

NOTE: Sections 3.3.22.4, 3.3.22.5, and 3.3.22.6 may be completed using engineering documentation, i.e., drawings, layouts, or lab tests.

3.3.22.4 Measure minimum reservoir fluids capacity

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.5 Inspect labeling (master cylinder, brake power unit, etc.).

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.22.6 Inspect brake system indicator lamps method used.

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

3.3.23 Moving barrier Test

Method Used. Reference "Motor Vehicle Safety Compliance Summary"

PE10-010

GM

7-2-10

ATTACHMENT

Q_08_B Field Surveys -
Summary Photos

01 GMC Sierra -

VIN 2GTEK61U311 [REDACTED]

approx 52k miles-





01 GMC Sierra -

VIN 2GTEK61U311 [REDACTED]

approx 52k miles-

01 GMC Sierra -

VIN 2GTEK61U311 [REDACTED]

approx 52k miles-



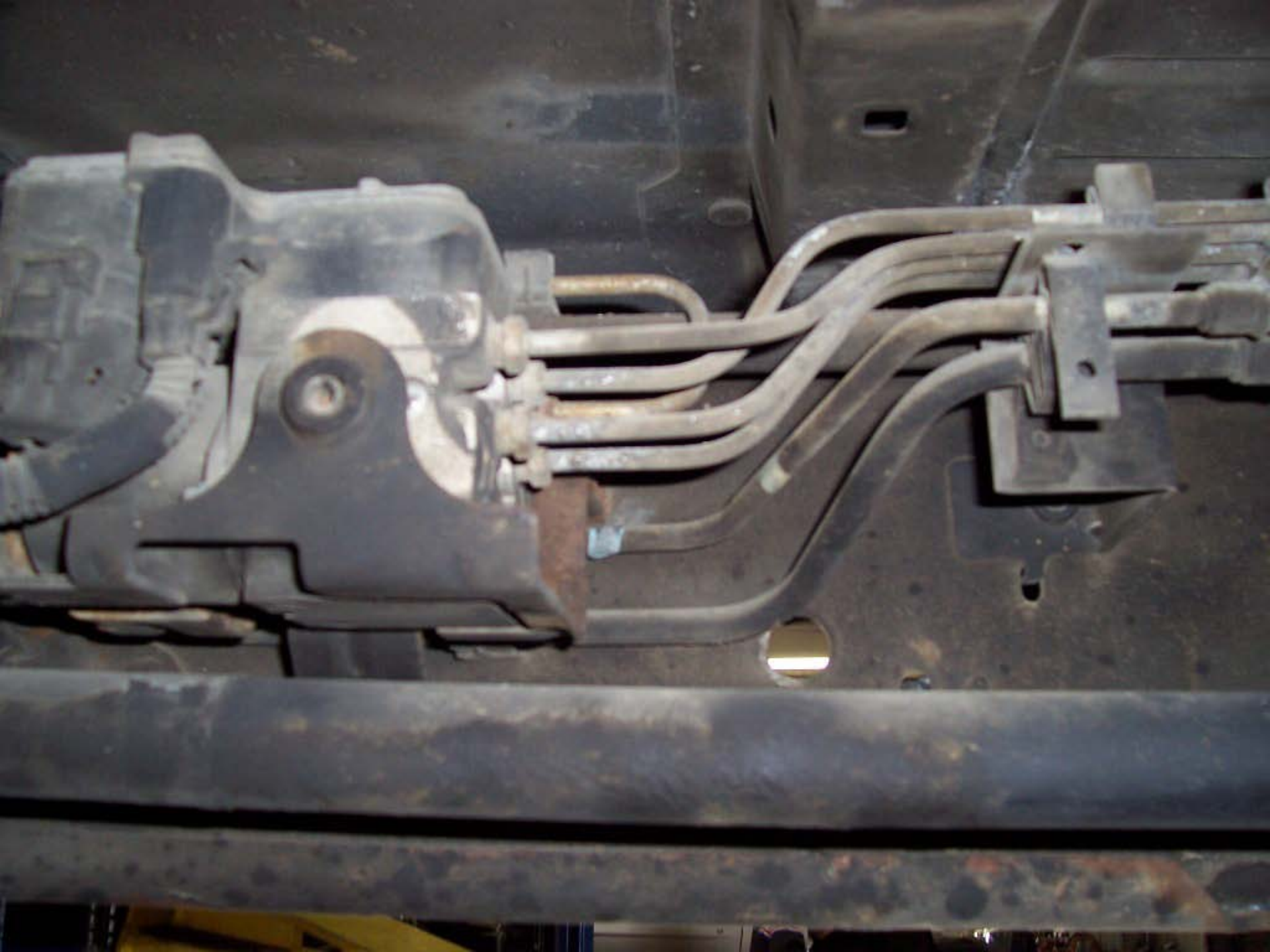
01 GMC Sierra -

VIN 2GTEK61U311 [REDACTED]

approx 52k miles-















3GDEC16T419 [REDACTED]
MI 170 897



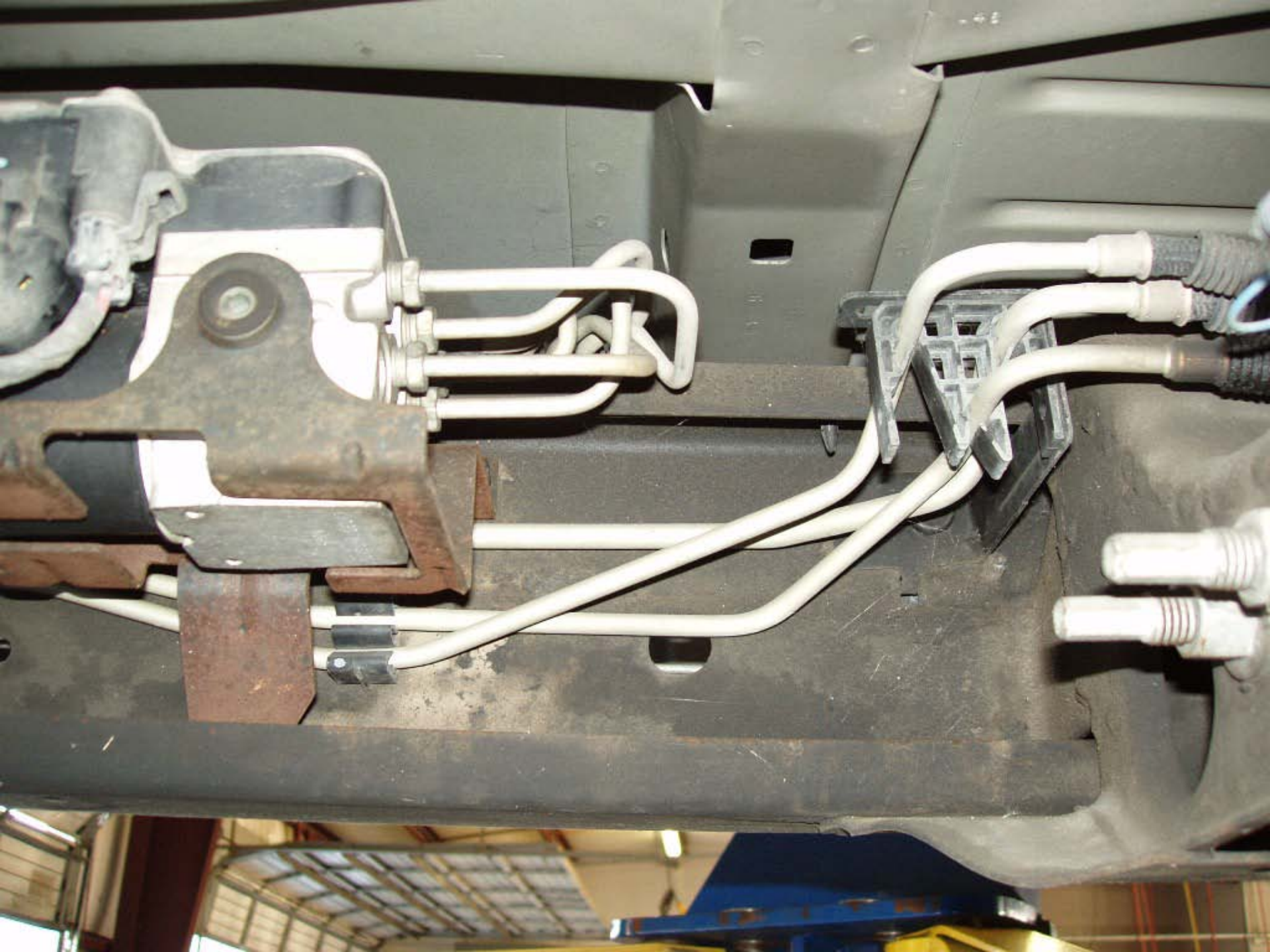


100,056

IS 167759



100,056





15746921

66,020
2GCEK 19T 621

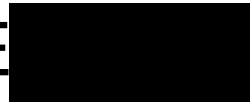


2GCEK 19T 621

66.020

2002 Silverado (K2)

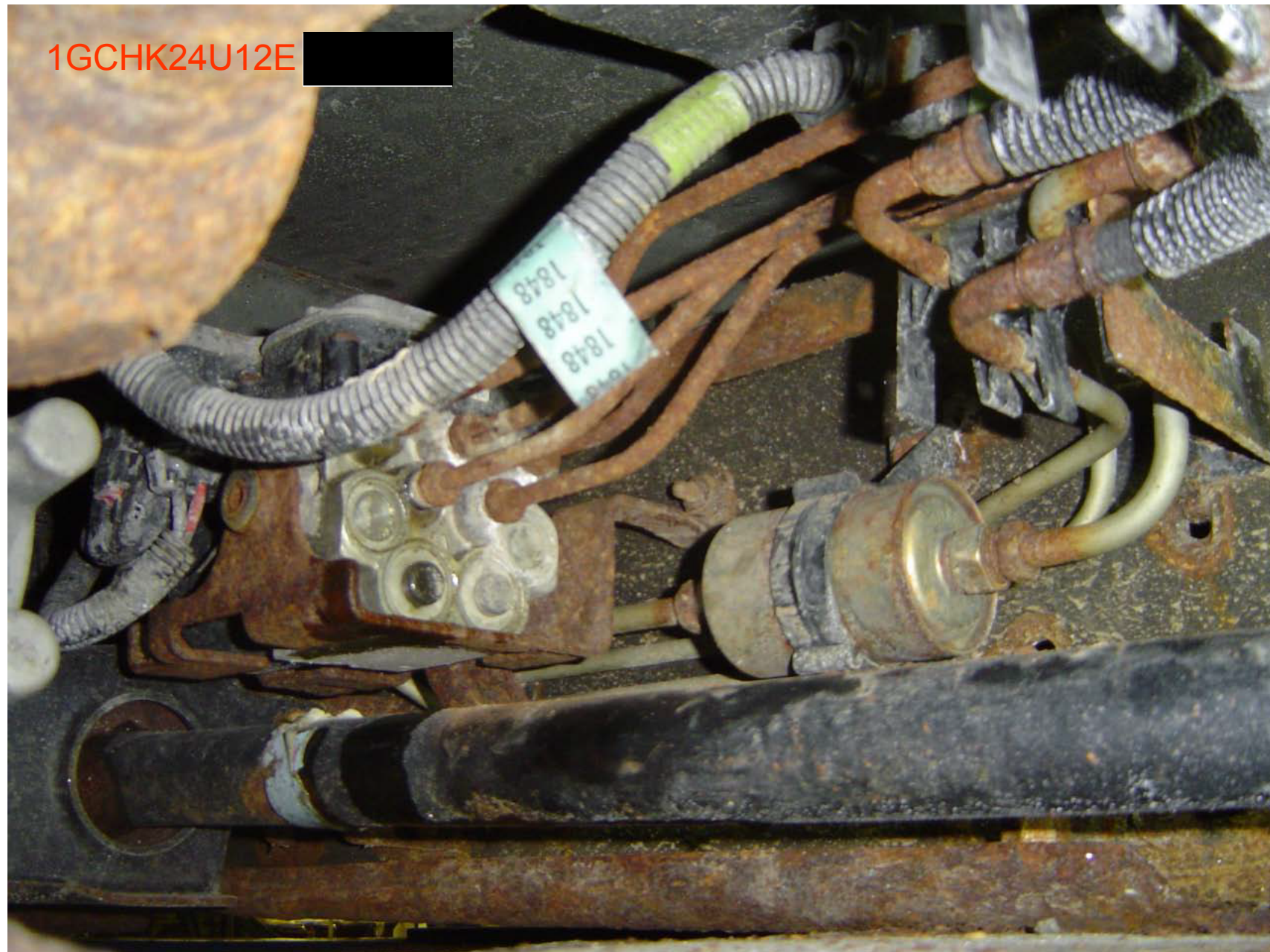
1GCHK24U12E



64780 MILES

IN DEALER TO HAVE BRAKE PIPES
REPLACED

1GCHK24U12E











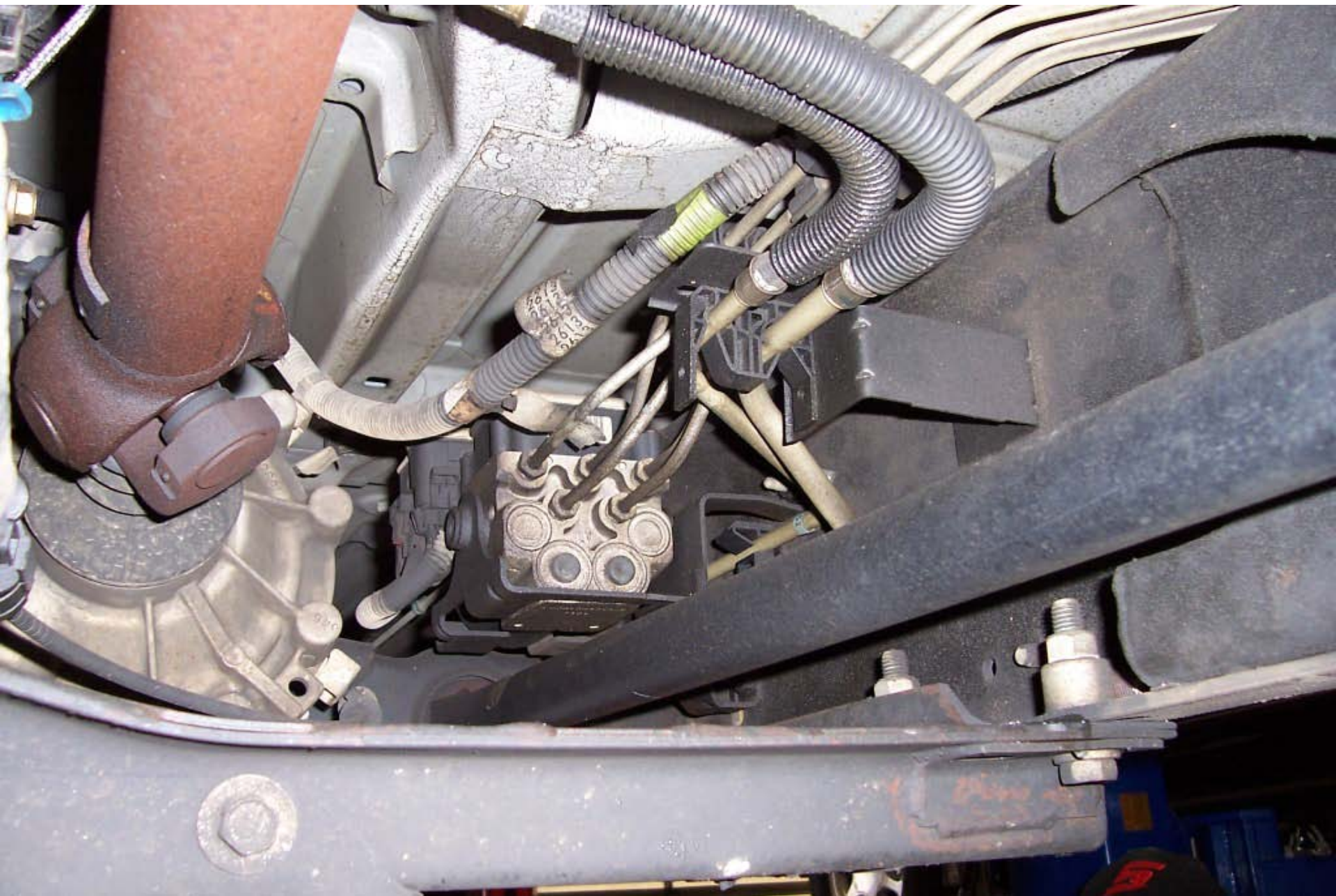
75
DA
13/02/20
P
75T
N6504
K157502



2F

65,775









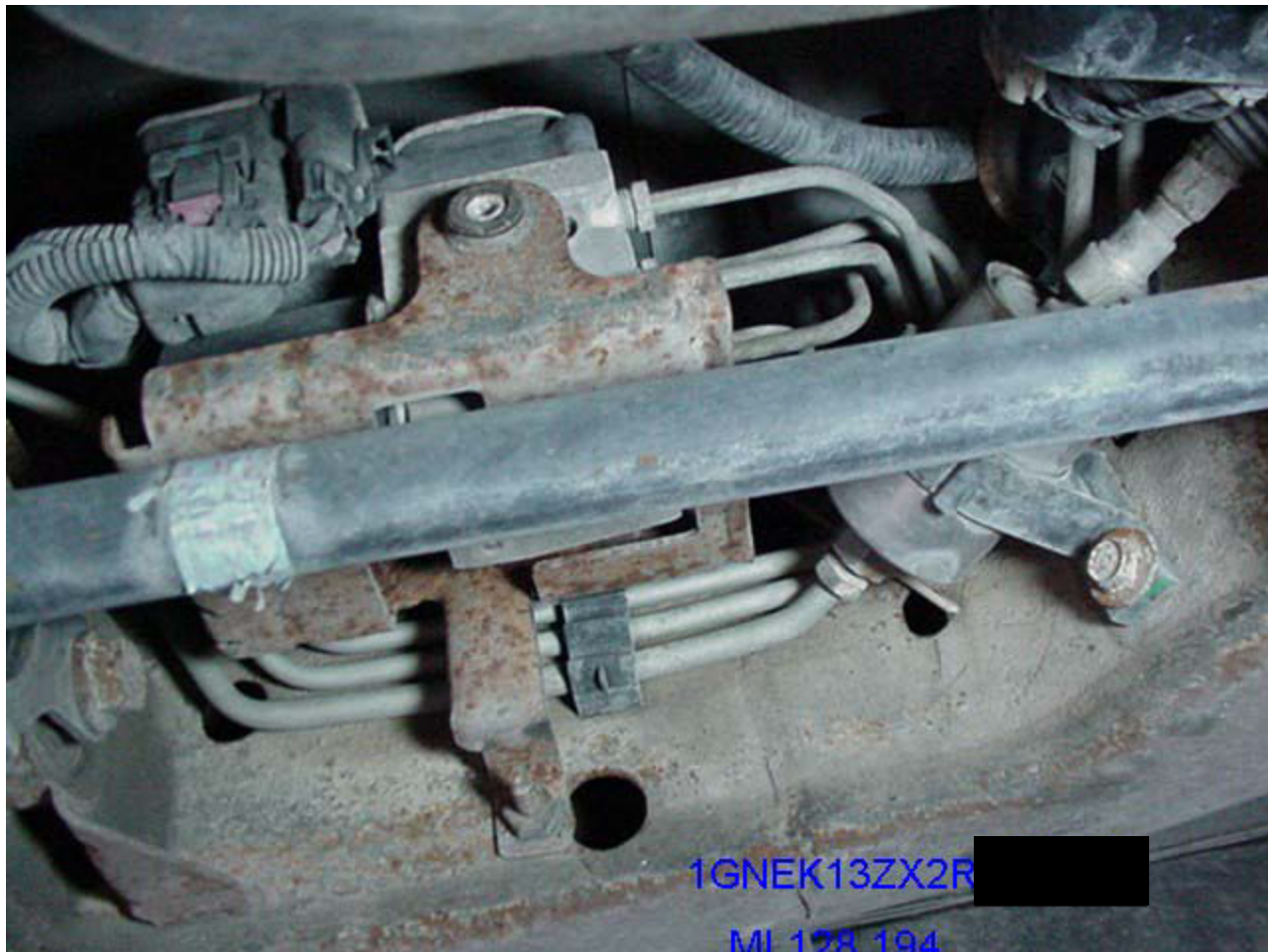












Brake Line Survey

- 1GCEK19T83E 
- 56792 Miles
- Frederick, Md



SA 51079604



Model No. K15753
Production Date 1-29-2003
N

Frame Code 75T







3E 280655 0.952

101,952
3E 280655

7347
7347
7347

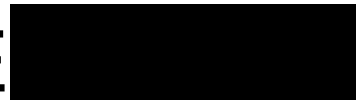






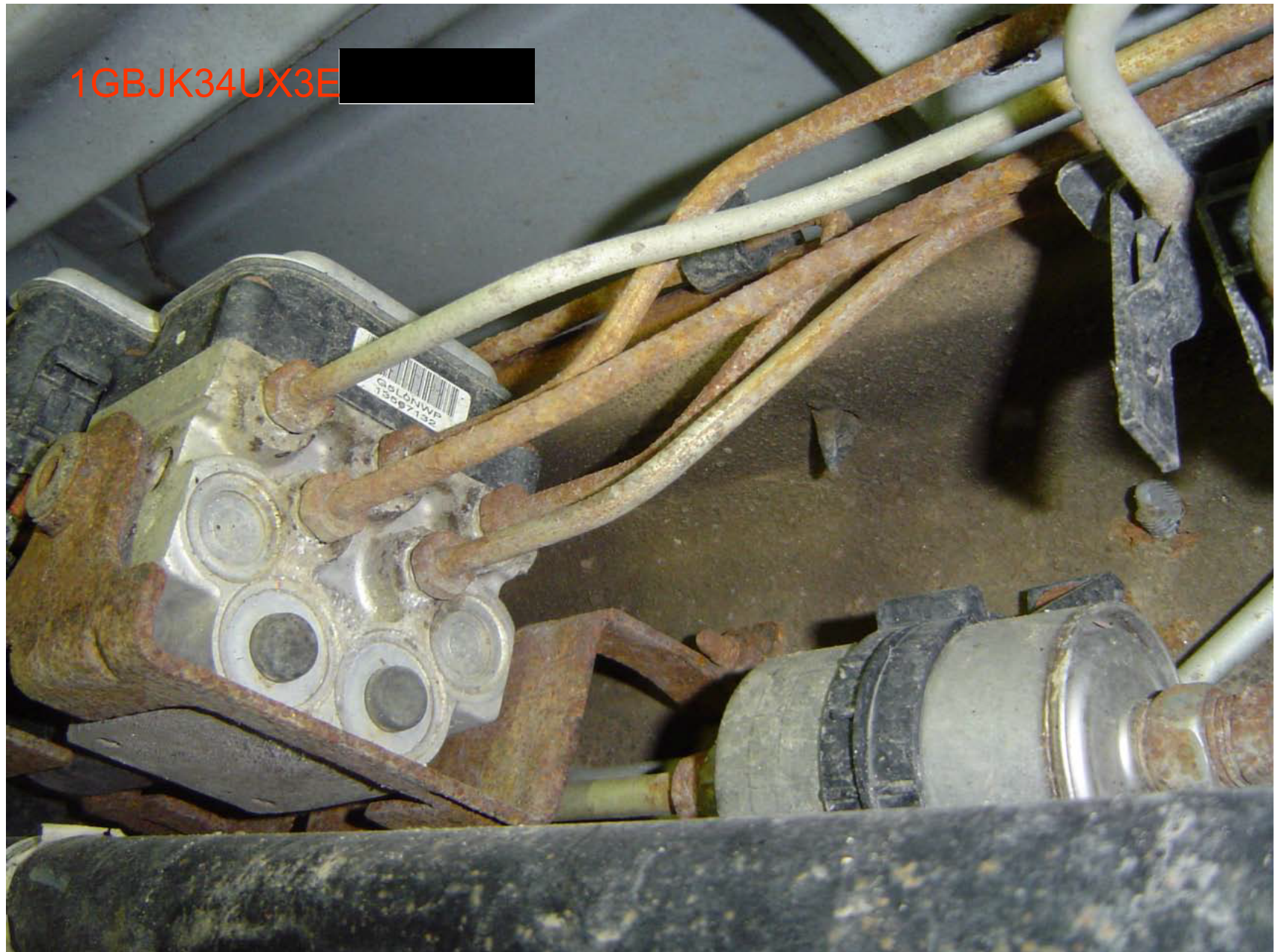
2003 SILVERADO (K3)

1GBJK34UX3E

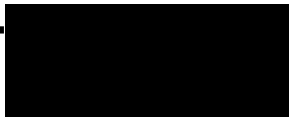


56299 MILES

1GBJK34UX3E



Brake Line Survey

- 1GTJK33GX3F 
- 84534 Miles
- Frederick, Md













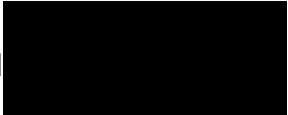








Brake Line Survey

- 3GNGK26G33G 
- 37121 Miles
- Frederick, Md



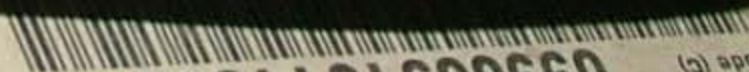
96K
Code (M)



Model No.
K25906

Production Date
1-30-2003

Castler/Camber
099089101104C
Code (C)





100TFM
1354737

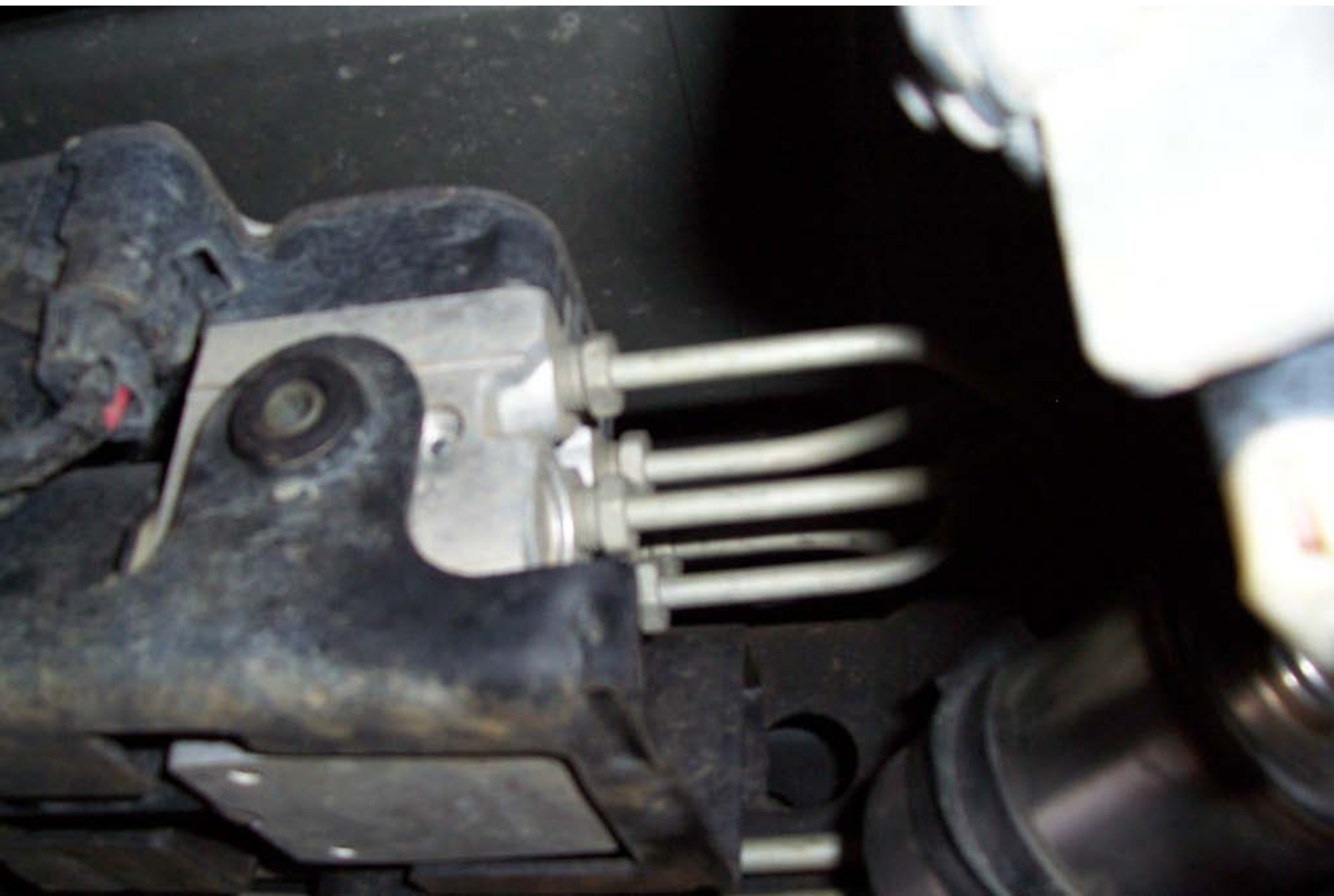
LV



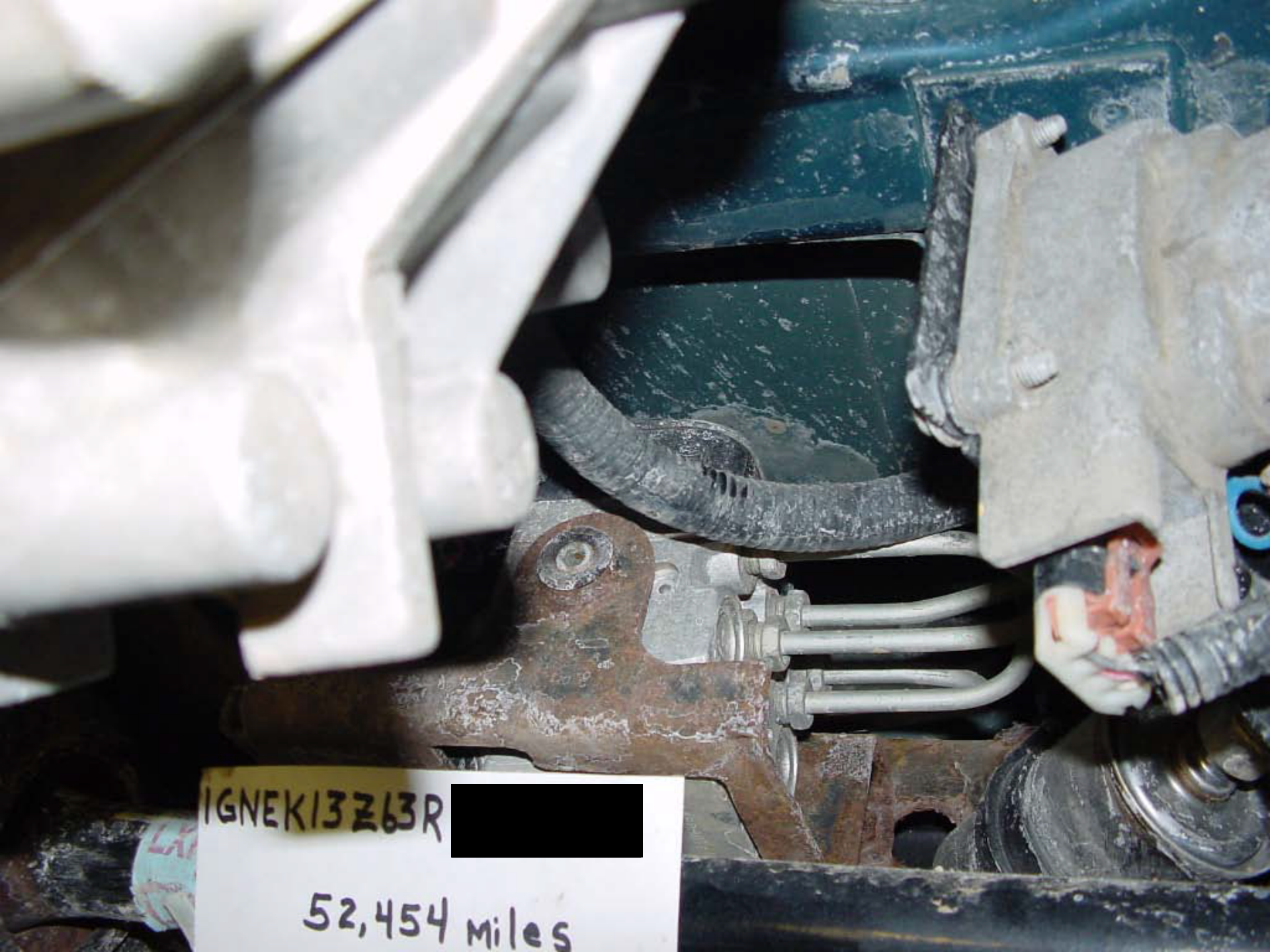












1GNEK13Z63R [REDACTED]

52,454 miles

VEK13Z63R

52,454 Miles





Brake Line Survey

- 1GYEK63N83R [REDACTED]
- 30475 Miles
- Frederick, MD









1GKEC13Z13R [REDACTED]
MI 53847







Brake Line Survey

- 1GCEK19T05E [REDACTED]
- 26931 Miles
- Frederick, Md



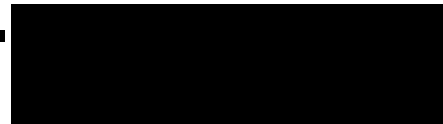








1GTHK23122F



Inspected: October 31, 2007

Dealer: Faulkner PBG, West Chester, PA

Mileage: 62608

Condition: Tech stated as he was pulling into his shop, Brake pedal went to floor.

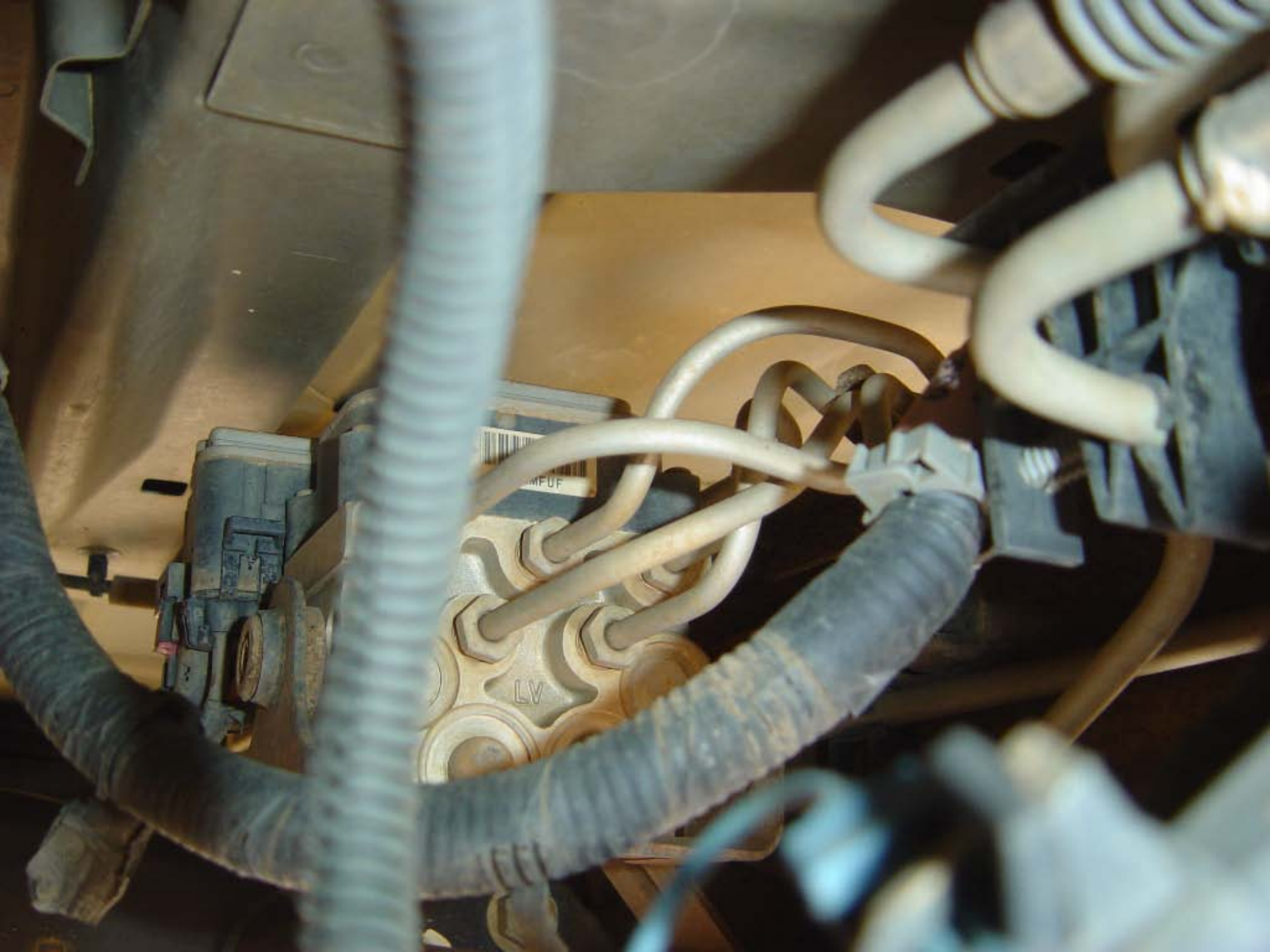
Cause: Front brake circuit corroded and losing brake fluid just in front of EBCM near frame rail

Correction: Dealer splicing in new brake line.





<u>Build Date</u>	<u>Service Date</u>	<u>VIN - Mileage - Location - Received Date</u>
6/7/99	7/22/99	XE [REDACTED] - 87k mi - Collierville TN - 12-11-07.ppt
7/21/99	8/26/99	YE [REDACTED] - 48k mi - SLC UT - 1-22-09.ppt
3/17/00	5/1/00	YZ280282 - 92k mi - KY - 12-12-07.ppt
4/4/00	4/14/00	YE [REDACTED] - 89k mi - Eden Prarie MN - 12-19-07.ppt
10/25/00	10/30/00	1J [REDACTED] - 127k mi - Knoxville TN - 1-9-08.ppt
11/6/00	12/14/00	1J [REDACTED] - 100k mi - Minneapolis MN - 12-18-07.ppt
12/14/00	6/30/01	1G [REDACTED] - 115k mi - SLC UT - 1-22-08.ppt
4/4/01	4/18/01	1G [REDACTED] - 171k mi - Corpus Christie TX - 12-13-07.ppt
4/20/01	10/24/01	11 [REDACTED] - 52k mi - Patchoughe NY - 12-10-07.ppt
4/26/01	5/8/01	1E [REDACTED] - 202k mi - KY - 12-12-07.ppt
8/10/01	9/27/01	2E [REDACTED] - 65k mi - Pittsburgh PA - 12-12-07.ppt
10/23/01	11/24/01	2J [REDACTED] - 104k mi - Collierville TN - 12-11-07.ppt
11/5/01	11/27/01	RISTICH - 2F [REDACTED] - 62k mi - West Chester PA - 10-31-07.ppt
11/20/01	1/30/02	21 [REDACTED] - 60k mi - Thibodaux LA - 12-12-07.ppt
11/23/01	6/19/02	2G [REDACTED] - 61k mi - Thibodaux LA - 12-12-07.ppt
11/26/01	9/30/02	2F [REDACTED] - 66k mi - Fridley MN - 12-14-07.ppt
1/25/02	2/28/02	21 [REDACTED] - 66k mi - Minneapolis MN - 12-18-07.ppt
2/18/02	4/30/02	2E [REDACTED] - 134k mi - Patchoughe NY - 12-10-07.ppt
2/27/02	3/31/02	2F [REDACTED] - 80k mi - Knoxville TN - 1-9-08.ppt
4/4/02	6/7/02	2E [REDACTED] - 81k mi - Knoxville TN - 1-9-08.ppt
4/8/02	5/28/02	2R [REDACTED] - 128k mi - Corpus Christie TX - 12-13-07.ppt
4/9/02	6/30/02	2J [REDACTED] - 114k mi - KY - 12-12-07.ppt
5/7/02	7/11/02	2G [REDACTED] - 82k mi - American Fork UT - 1-22-08.ppt
7/23/02	8/28/02	3G [REDACTED] - 121k mi - KY - 12-12-07.ppt
8/6/02	1/24/03	3F [REDACTED] - 85k mi - Frederick MD - 12-6-07.ppt
8/8/02	12/7/02	3R [REDACTED] - 52k mi - Knoxville TN - 1-9-08.ppt
8/19/02	11/11/02	3F [REDACTED] - 203K mi - Knoxville TN - 1-10-08.ppt
10/29/02	12/23/02	3R [REDACTED] - 52k mi - Lenzen MN - 12-14-07.ppt
12/3/02	12/20/02	3J [REDACTED] - 104k mi - Layton UT - 1-22-08.ppt
1/14/03	3/24/03	3Z [REDACTED] - 41k mi - FL - 12-11-07.ppt
1/21/03	4/16/03	3G [REDACTED] - 76k mi - Salt Lake City UT - 1-22-08.ppt
2/6/03	3/10/03	3E [REDACTED] - 57k mi - Frederick MD - 12-6-07.ppt
2/19/03	3/21/03	3G [REDACTED] - 37k mi - Frederick MD - 12-6-07.ppt
3/11/03	4/19/03	3R [REDACTED] - 30k mi - Frederick MD - 12-6-07.ppt
3/12/03	5/29/03	3E [REDACTED] - 102k mi - Fridley MN - 12-14-07.ppt
4/25/03	6/30/03	3E [REDACTED] - 42k mi - Middletown CT - 12-11-07.ppt
5/13/03	6/11/03	3R [REDACTED] - 54k mi - Corpus Christie TX - 12-13-07.ppt
6/18/03	10/24/03	3E [REDACTED] - 56k mi - Pittsburgh PA - 12-12-07.ppt
4/26/05	6/24/05	5E [REDACTED] - 27k mi - Frederick MD - 12-6-07.ppt





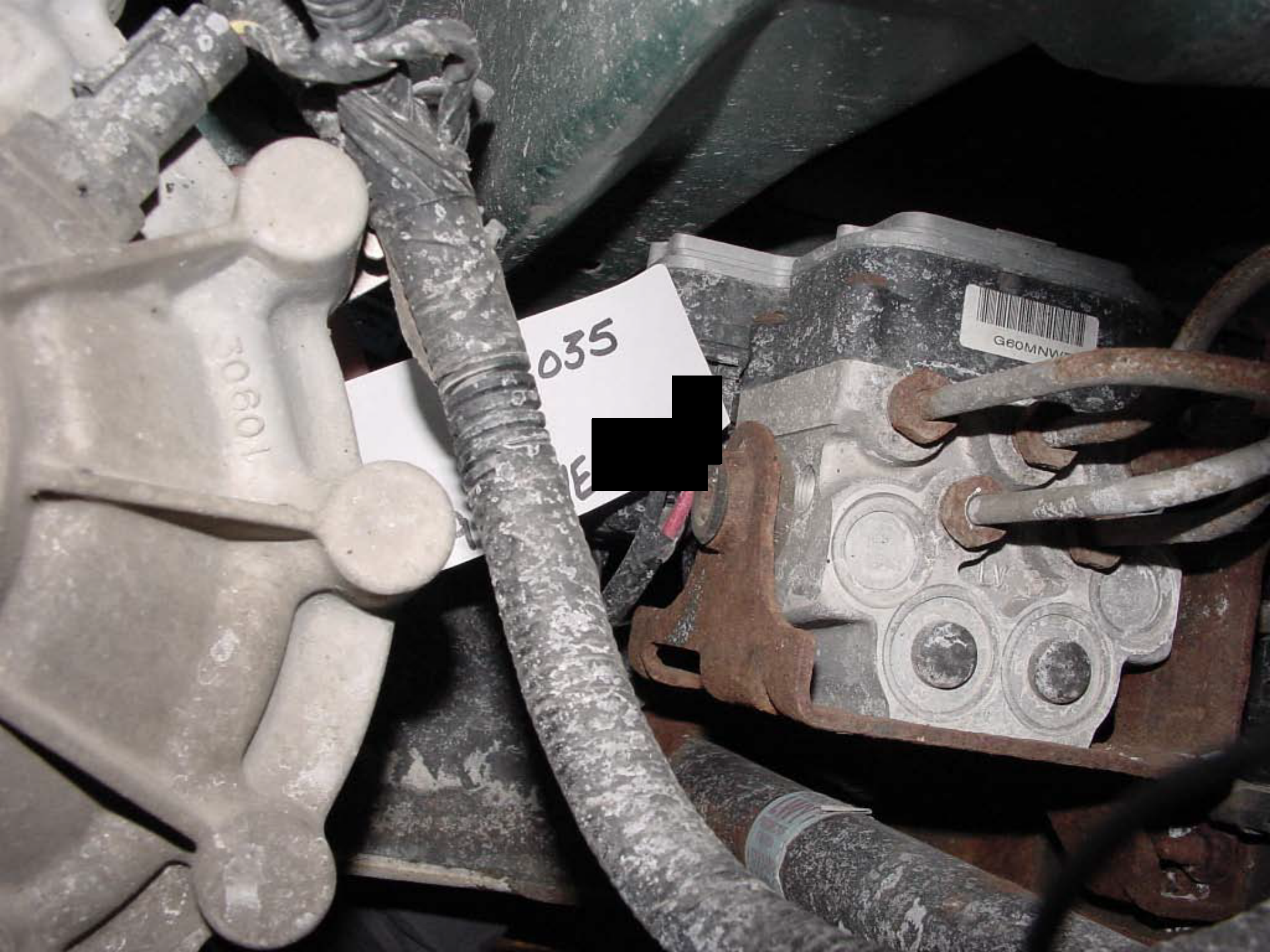


89,035

1GCEK19T2YE

CAUTION
TORSION
BAR
ADJUSTMENT

To help a
torsion b
when the
front brak
Printed in U



035

G80MNV





PE10-010

GM

7-2-10

ATTACHMENT

Q_08_D

PE10-010

GM

7/2/2010

21JN2010

Status Update

Status Update 6/21/2010
NHTSA Investigation – PE10-010

Subject Vehicles/Population: 1999-2003 MY C/K (GMT 800 series)
Pickups and SUVs/ 6.0 M

Date Opened: 3/30/10

Alleged Defect: Fluid leaks from steel brake lines due to corrosion

Current Status:

- At the time NHTSA opened this investigation, NHTSA had received 110 Vehicle Owner Questionnaires (VOQs). Most of these (80%) are from the 21 corrosion states.
- Currently there are 297 VOQs – 14 allege a crash
- GM provided a partial response (GM Reports/Warranty Claims) on 6/18/10
 - o 1411 Warranty Claims
 - o 320 GM Reports
 - o 15 crashes including 3 with injuries
- GM completed a prior internal investigation on this topic in 2008

Next Steps:

- Inspecting/acquiring brake lines from approximately 12 customer vehicles for further analysis
- The remainder of GM's response to the PE due to NHTSA on 7/2/10.

Will include:

- Current and projected rates across the U.S. & corrosion states
- Comparison of rates with previous GM & competitor field actions
- GM's risk assessment

PE10-010

GM

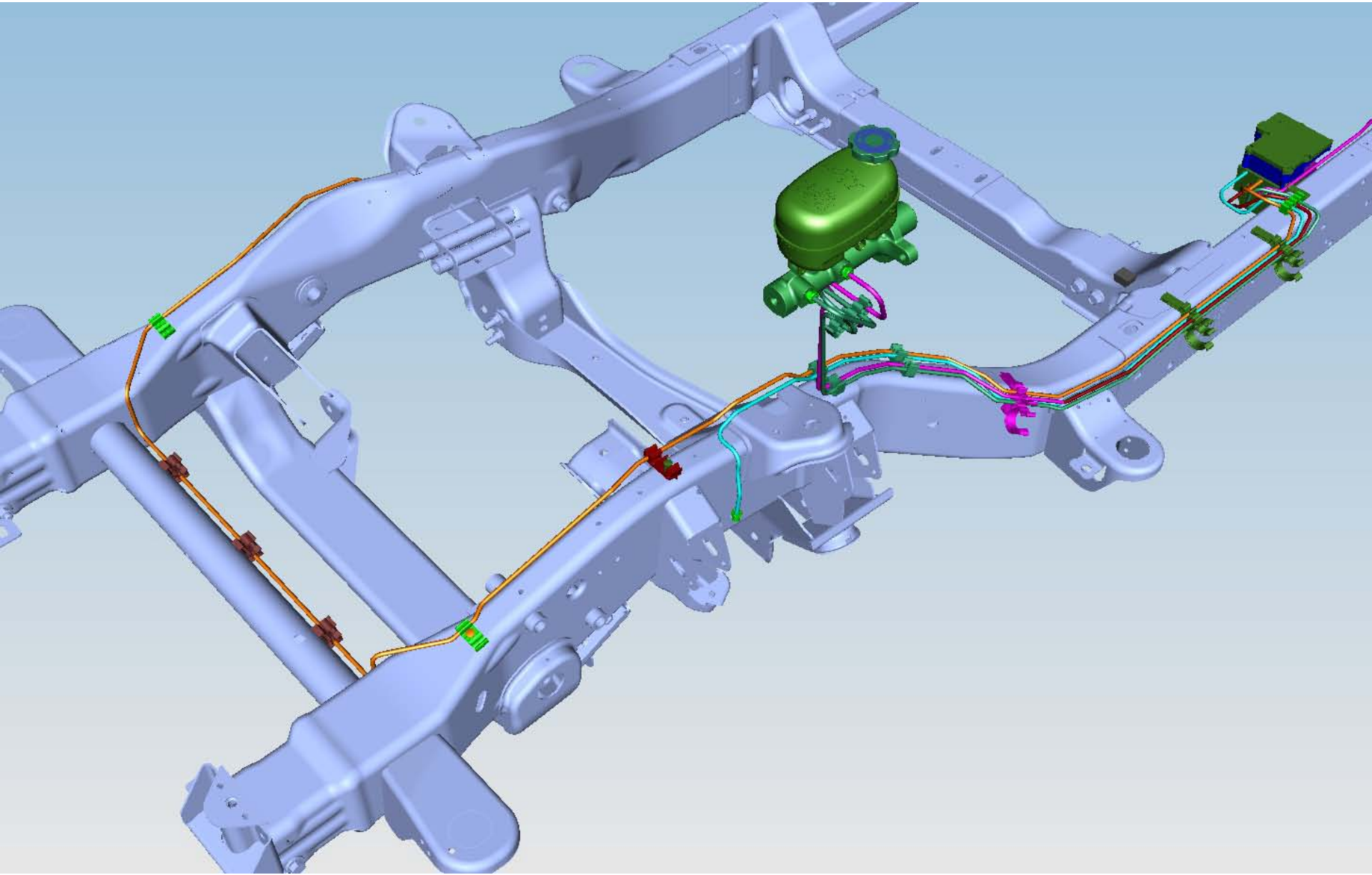
7/2/2010

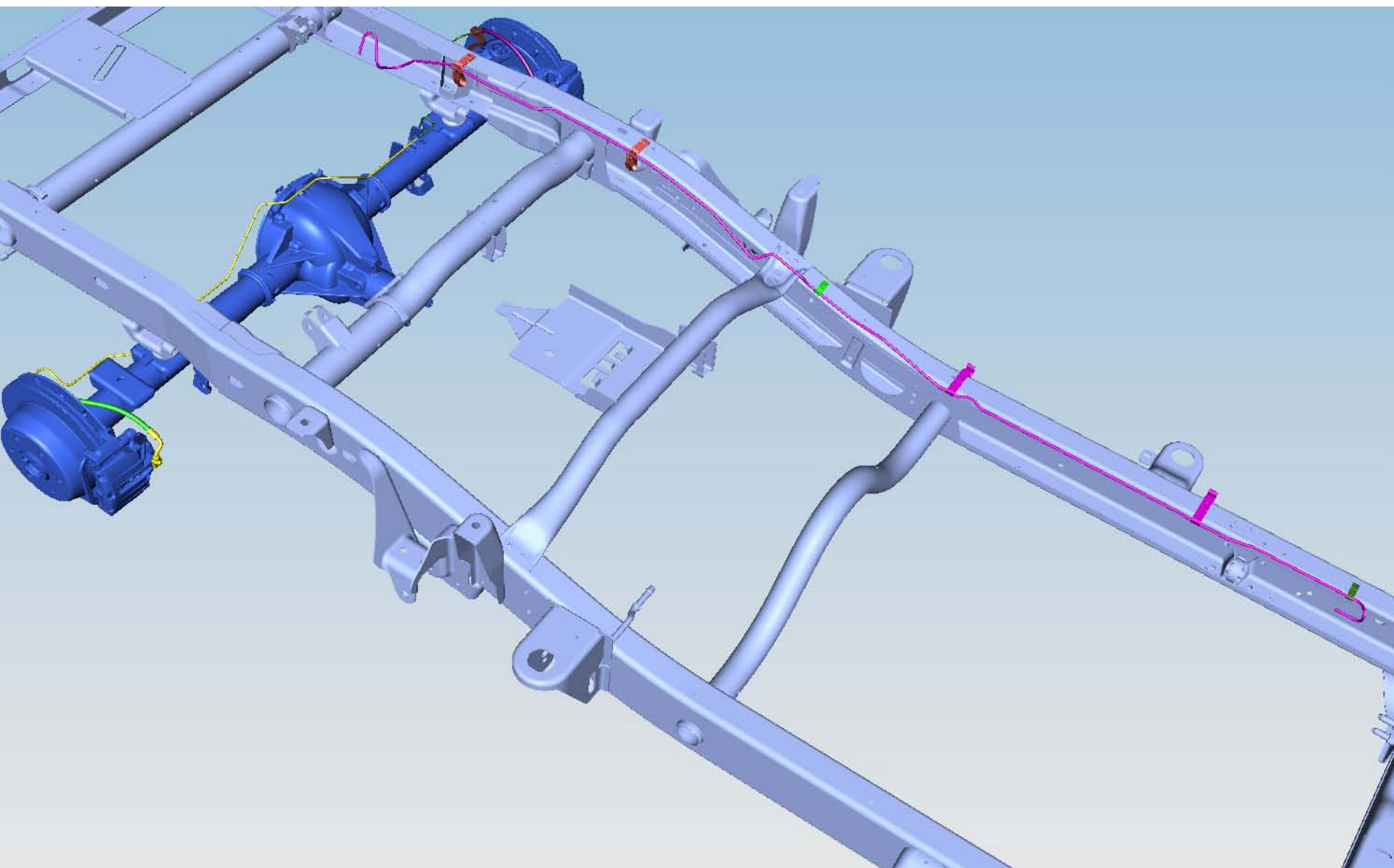
Brake pipes

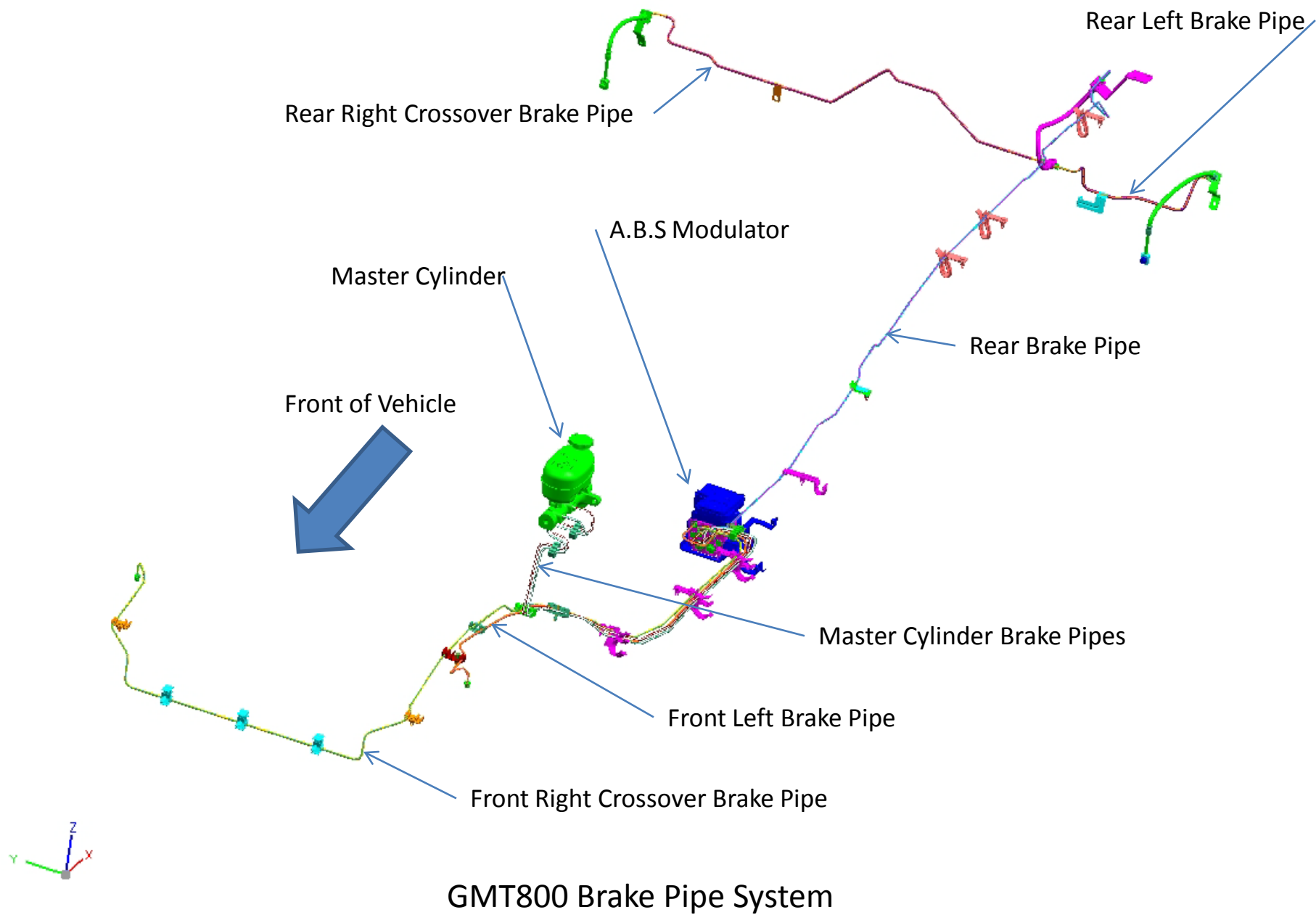
GMT 800

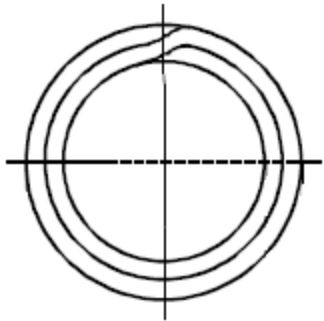
06-21-10

GMT 800 1999 to 2003 I/R investigation









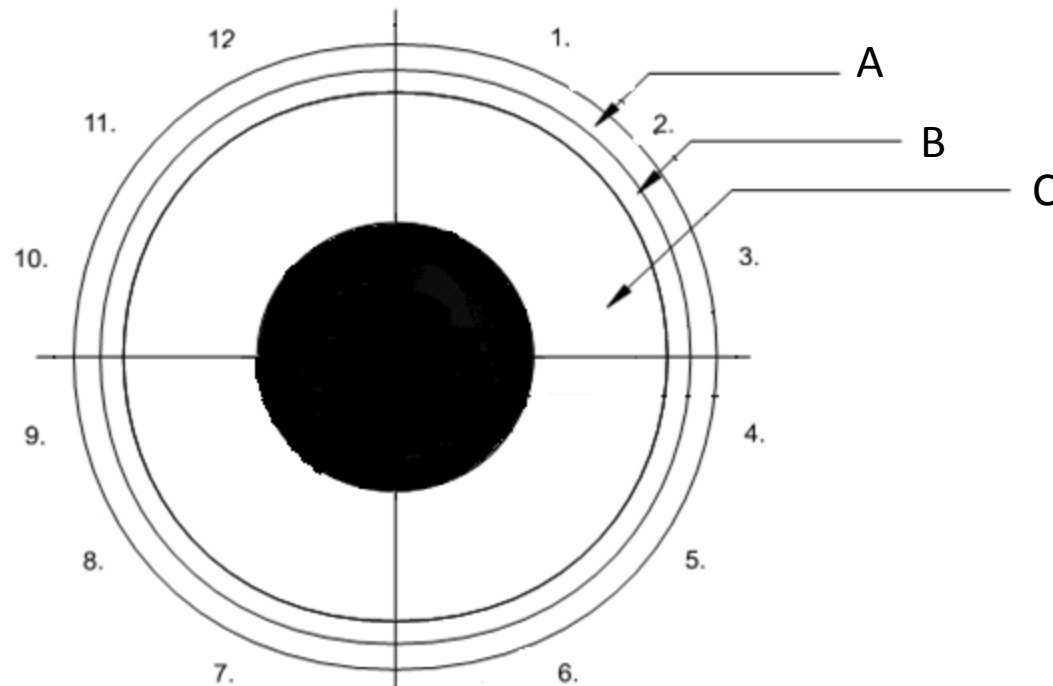
Common brake pipe construction
720 degrees 1008-1010 cold rolled steel.
Copper coated and brazed

AGE (aluminum rich paint coating)

GMT 800 1999 to 2003

- A. Aluminum Rich Epoxy Paint 3 μm minimum
- B. "GALFAN" epoxy primer 95% Zinc and 5% Aluminum 3 μm minimum
- C. 1008-1010 Steel Tubing Double Wall with a .71mm wall thickness

1000 hours salt spray protection



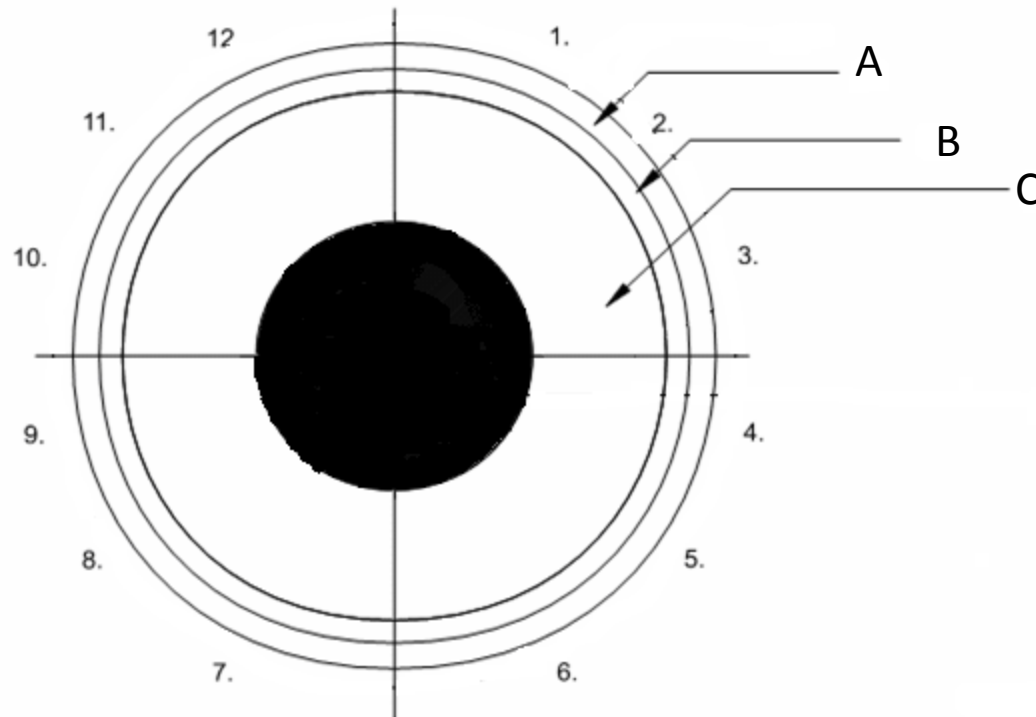
* AGE is the same coating used on fuel lines

AGN (nylon coated)

GMT 900 SOP to Current

- A. Nylon 12 topcoat minimum thickness of 150 μm
- B. "GALFAN" epoxy primer 95% Zinc and 5% Aluminum 3 μm minimum
- C. 1008-1010 Steel Tubing Double Wall with a .71mm wall thickness

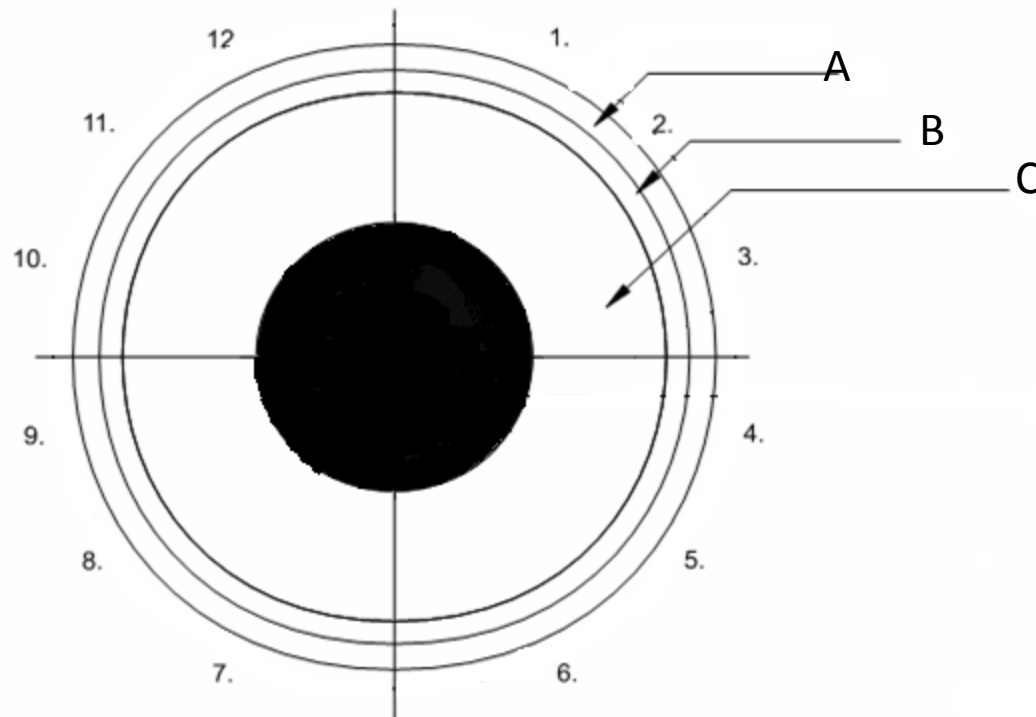
6000 hours of salt spray protection



PFV (Polyvinyl Fluoride)

- A. Polyvinyl fluoride topcoat thickness is 30 μm minimum
- B. Electro plated zinc coating, chromate treatment 3 μm minimum
- C. 1008-1010 Steel Tubing Double Wall with a .71mm wall thickness

Salt spray requirement is 4000 hours



Current Vehicle Brake Pipe Coatings

	Coating	Tier 1
GMT345	Nylon Coated	TI
GMT355	PFV and Nylon	USUI
	Nylon Coated	Cooper
Sigma	Nylon Coated	Cooper
Epsilon	Nylon Coated	TI
Theta Epsilon		
GMT166/168	Nylon Coated	Martin Rea
GMT 900	Nylon Coated	Martin Rea
Lambda	Nylon Coated	Martin Rea
Y Car GMT		
215/245	Nylon Coated	Cooper Std
222/272	Aluminum paint	Martin Rea
W Car GMX 211	Aluminum paint	Martin Rea
	Nylon Coated	Martin Rea

All Next Generation vehicles use nylon coated brake
pipes

I.E. Alpha, K2XX, EREV including all global programs.

Investigation has requested 1999 -2003 model year data.

Note:

There are no changes for 2003 to 2007 model year brake pipe designs

- Same coatings for brake and fuel lines
- Same modules TRW
- Same master cylinder

GMT 800 BRAKE LINES TECHNICAL SPECIFICATION

SEPTEMBER, 1999

The brake lines shall be capable of operating under the hood or body in the following environments):

Minimum Temperature:	-50C
Maximum Sustained (>10 minutes):	100C
Maximum Excursion (<10 minutes):	120C
Relative Humidity range:	0-100%
Salt Spray	168 Hours

3.2.1.11 Corrosion

The brake line assemblies shall be exposed to the 95th percentile corrosive environment that occurs in the Northeast United States and Southeast Canada. The environment is composed of appropriate combinations of temperature, humidity, salt, splash and mud during component usage.

Lab testing utilizing ASTM B117, Method of Salt Spray (Fog) testing, for a period of 168 hours will be required.

Corrosion will also be evaluated on durability vehicles completing the 15 year corrosion schedule. (MTL-9964).

3.2.3.1 Target Life

The target life of the subsystem shall be 15 years of exposure and 175,000 miles of customer usage for truck applications.

Competitive Brake Line Coatings

- Ford: Started 1999 some car production with nylon coated brake pipes (per TI Group)
- Ford: Started truck production in 2002 with nylon coated brake pipes (per Cooper Standard)
- Chrysler: Started production in 1997 some car with nylon coated brake pipes(per Ti Group)
- Chrysler: Started truck production in 2004 with nylon coated brake pipes (per Cooper Standard)
- Toyota: History TBD but currently is using PVF coating

IR PE10-010 Brake Pipe Corrosion ISR Meeting

June 22, 2010

		MODEL YEARS					
MAKE/MODEL	1999	2000	2001	2002	2003	TOTAL	
Chevrolet Silverado	431,010	626,540	622,609	642,096	710,234	3,032,489	
Chevrolet Tahoe	N/A	72,539	194,341	207,229	214,942	689,051	
Chevrolet Suburban	N/A	85,464	162,776	148,244	146,749	543,233	
Chevrolet Avalanche	N/A	N/A	N/A	128,440	86,209	214,649	
GMC Sierra	143972	186,541	180,719	195,781	193,452	900,465	
GMC Yukon	N/A	26,882	70,851	75,931	89,374	263,038	
GMC Yukon XL	N/A	31,612	70,066	68,309	76,691	246,678	
Cadillac Escalade	N/A	N/A	N/A	54,006	47,022	101,028	
Cadillac Escalade EXT	N/A	N/A	N/A	12,513	11,131	23,644	
TOTAL	574,982	1,029,578	1,301,362	1,532,549	1,575,804	6,014,275	

•Table 1 GM Subject Vehicle (GMT800 Series) Production

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/ FATALITIES*	NUMBER WITH FIRES
Owner Reports	282	37	4	8	1	0
Field Reports	31	0	0	0	0	0
Not-In-Suit Claims	11	3	10	9	3	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	324	40	14	17	4	0
Total Vehicles with Reports (Unique VIN)	320	39	12	15	3	0

Table 2-1: GM Subject Vehicle - May relate to Alleged Defect - Report Classification

* There were no fatalities associated with this issue

		MODEL YEARS					
MAKE/MODEL		1999	2000	2001	2002	2003	TOTAL
Chevrolet Silverado		35	64	105	90	147	441
Chevrolet Tahoe		N/A	2	6	8	13	29
Chevrolet Suburban		N/A	5	12	10	4	31
Chevrolet Avalanche		N/A	N/A	N/A	0	4	4
GMC Sierra		29	39	31	31	43	173
GMC Yukon		N/A	0	1	3	7	11
GMC Yukon XL		N/A	0	1	1	3	5
Cadillac Escalade		N/A	N/A	N/A	7	10	17
Cadillac Escalade EXT		N/A	N/A	N/A	0	4	7
TOTAL		64	110	156	150	235	715

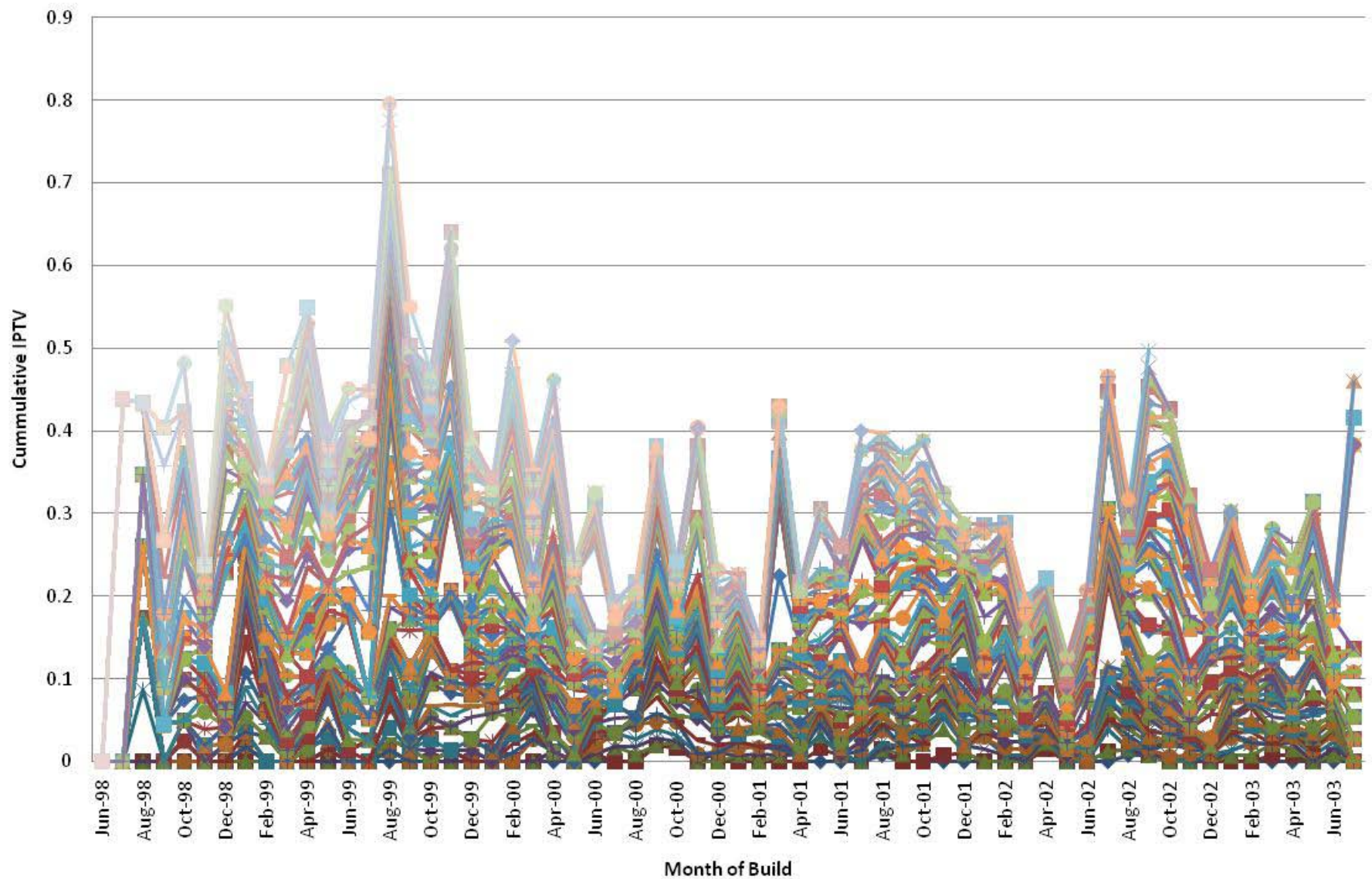
Table 5-1 GM Regular Warranty and Goodwill Claims for the Subject Vehicles

MODEL YEARS						
MAKE/MODEL	1999	2000	2001	2002	2003	TOTAL
Chevrolet Silverado	44	103	130	70	93	440
Chevrolet Tahoe	N/A	5	3	6	11	25
Chevrolet Suburban	N/A	4	4	11	6	25
Chevrolet Avalanche	N/A	N/A	N/A	23	9	32
GMC Sierra	15	25	17	51	34	142
GMC Yukon	N/A	2	0	1	6	9
GMC Yukon XL	N/A	1	1	0	4	6
Cadillac Escalade	N/A	N/A	N/A	1	13	14
Cadillac Escalade EXT	N/A	N/A	N/A	3	0	3
TOTAL	59	140	155	166	176	696

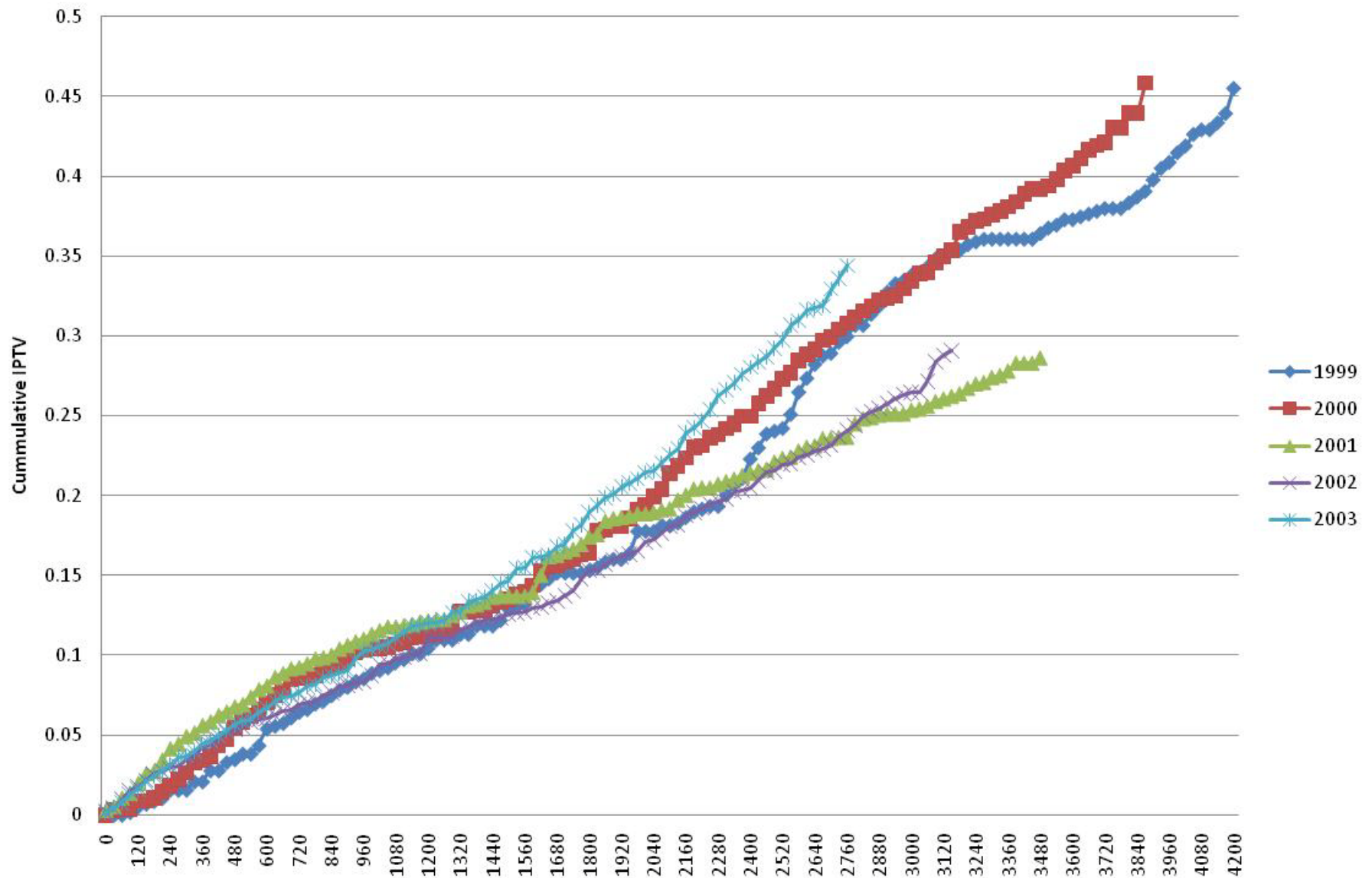
Table 5-2 MIC and UWC Service Contract Claims for the Subject Vehicles

1999 to 2003 GMT800 - Brake Line Issue

Filtered Warranty, Reports, VOQ



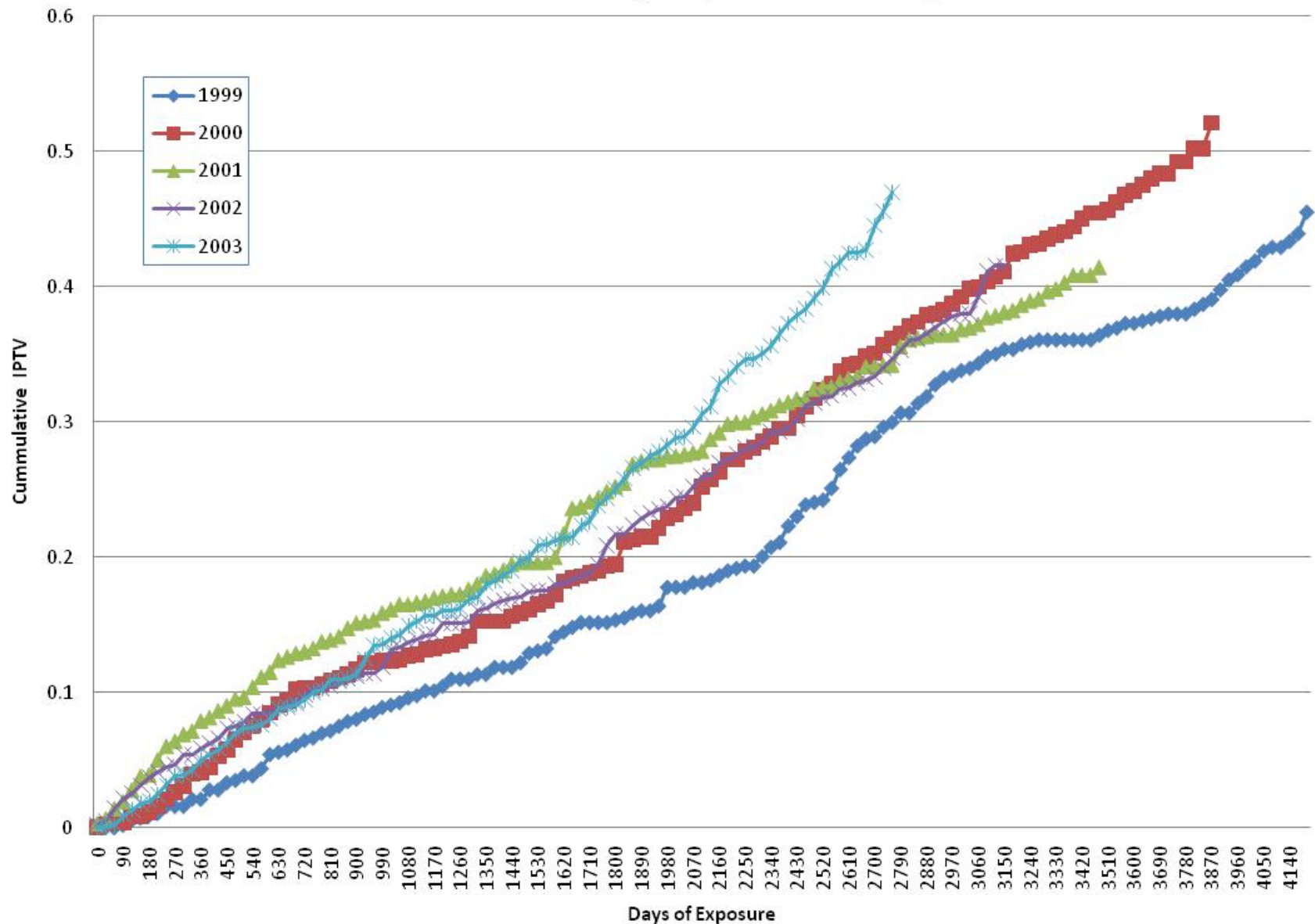
1999 to 2003 GMT800 Filtered Warranty, Reports and VOQ



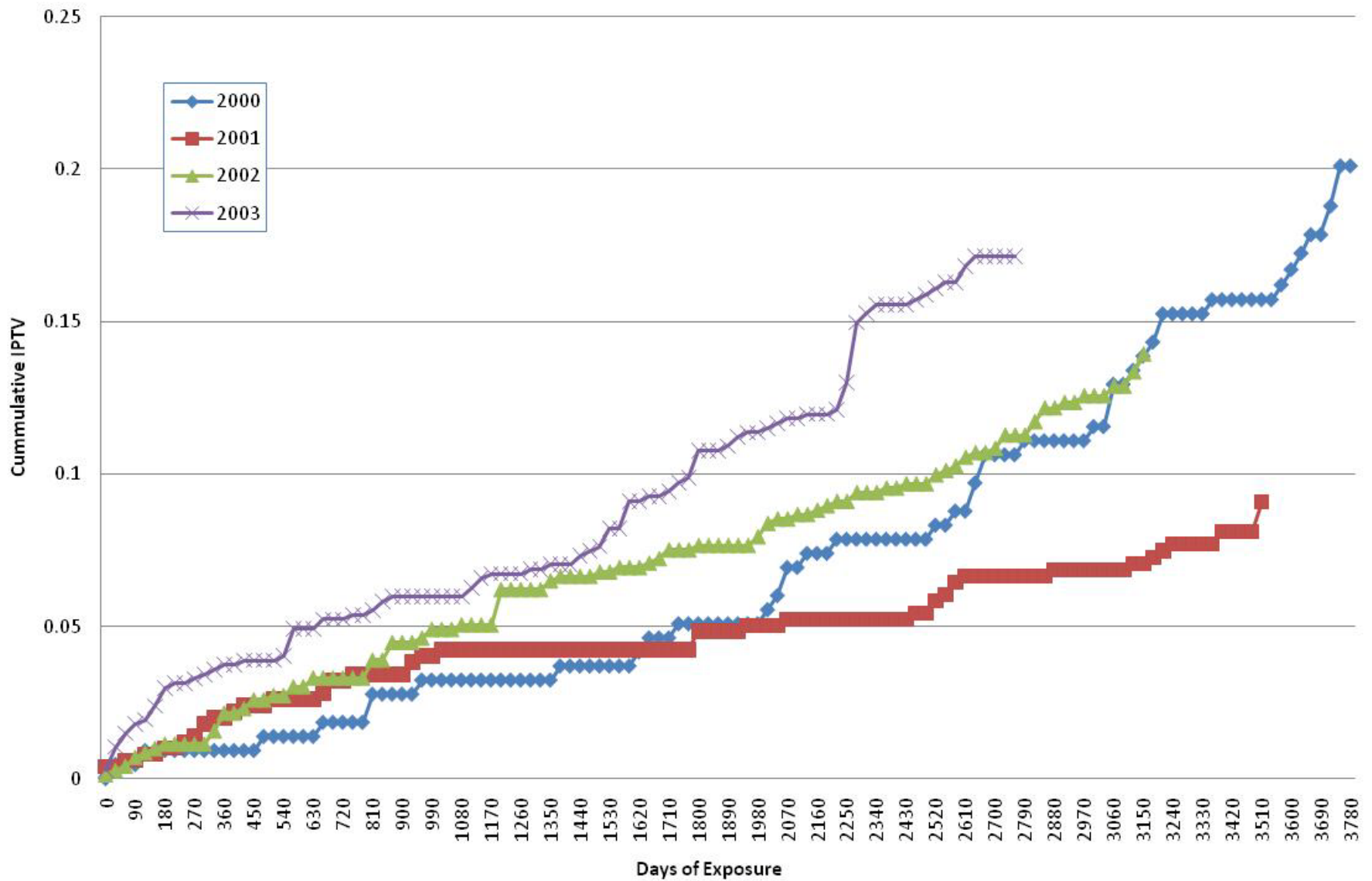
Combined Reports, Warranty, VOQs Cumulative IPTV

	1999	2000	2001	2002	2003
1080	0.095863	0.106862	0.117884	0.097672	0.110993
2760	0.299791	0.307956	0.236544	0.240647	0.344101
3150	0.353823	0.353634	0.262162	0.290921	
3480	0.364285	0.391814	0.286181		
3870	0.390652	0.458282			
4200	0.455233				

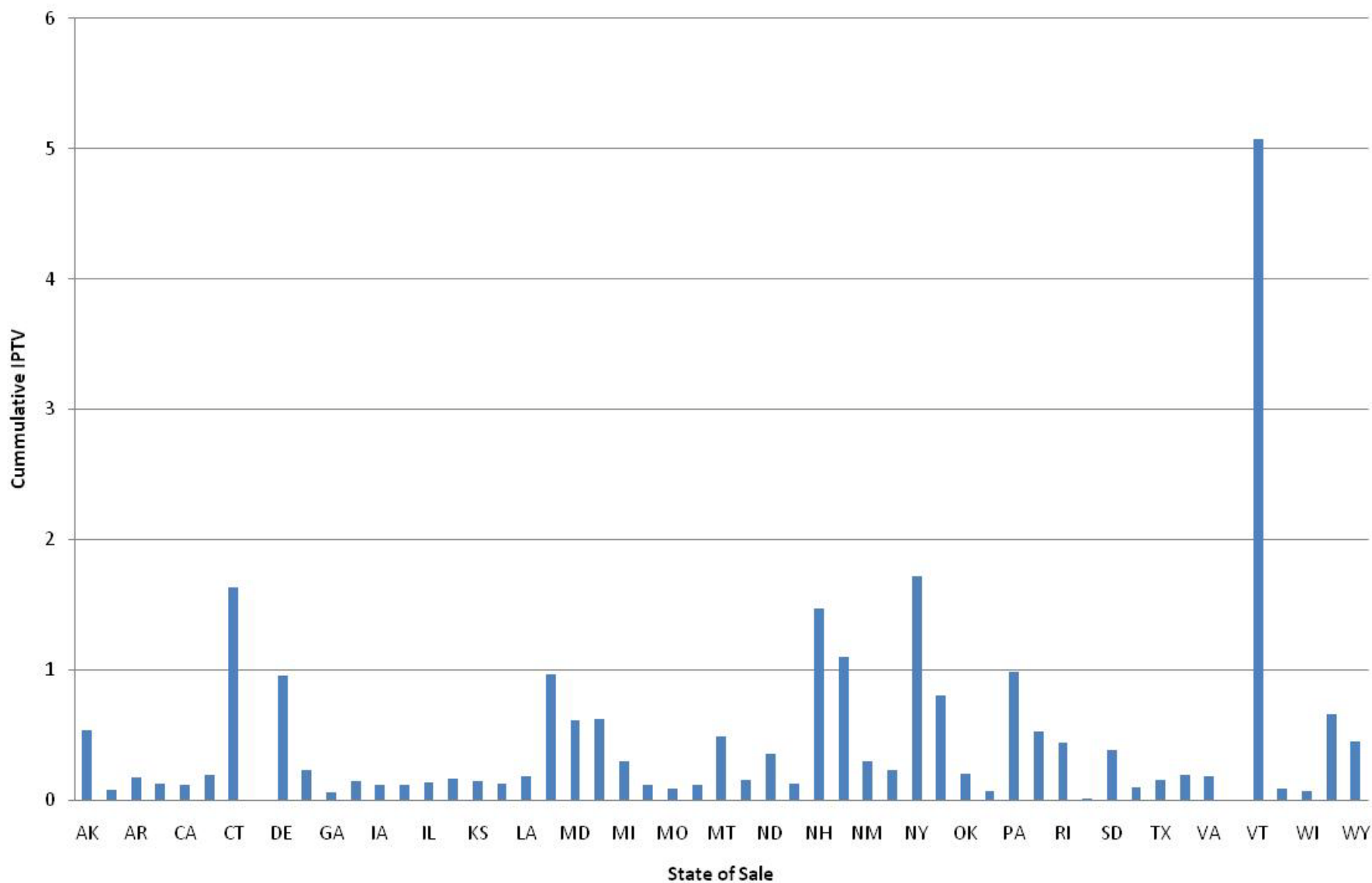
1999 to 2003 GMT800 Pickups Filtered Warranty, Reports and VOQ



2000 to 2003 GMT800 Utilities Filtered Warranty, Reports and VOQ



1999 to 2003 GMT800 Brake IR Filtered Warranty, Reports and VOQ - IPTV at 3000 Days



	1	2	3	4	5	6	7	8	9	10	11	12	
OEM	General Motors	Ford	Ford	Ford	General Motors	Mercedes-Benz USA	Ford	Toyota	Toyota	Ford	Ford	General Motors	General Motors
MY	1995-1999	1995-1996	1995-1997	1992	1999	1999-2002	2010	2010	2010	1995-1996	1997	2003-2007	1999-2003
Model	Roadmaster, LeSabre, Caprice, Impala, Bonneville, Eighty Eight	Windstar	Crown Victoria	Aerostar	C/K Trucks	ML 430/500/55 w V-8 engine	Fusion and Milan Hybrid	Prius & HS250h	Camry w / 4-cyl engine	Windstar	Crown Victoria built after March 19, 1997	CTS	GMT800 Pickups Utilities
Population	1,519,056	273,256 Non-Corr US	785,181	150,000	228,618	49,291	17,600 Built on or after October 17, 2009	148,539	7,314	293,709 Corr USCAN	43,626	155,039 Corr ALL	6,014,275
VOQ	0	9	21	7	1	3	3	523	3	None	NA	10	297 (262)
TC Report	NA	NA	NA	NA	NA	NA				3	NA	1	unknown
Cause	Rear brake hose leak by corrosion PEER IR for Ford Crown Victoria	Brake hose contact a dash panel insulator and abrade the coating and result in corrosion	Rear brake hose contact/chafe with floor pan stiffening rib and corrode	Front brake hose ruptures between rubber hose and brass fitting	Frt hose contact with the wheel rim	Brake line rupture due to contact of fuel and brake lines	software that governs the transition from regenerative braking to conventional braking can give the impression that the brakes have failed	Inconsistent brake feel after ABS actuation on rough or slick road surfaces	The left rear brake hose interfere with power steering crimp causing to wear and perforate.	Brake hose contact a dash panel insulator and abrade the coating and result in corrosion	Rear brake hose contact/chafe with floor pan stiffening rib and corrode	Front brake hose corrosion	Brake line leak resulting from corrosion.
IPTV 1-yr					0.07								
IPTV 3-yr	0.23												~0.10
IPTV 5-yr												1.1	~0.17
IPTV 7-yr										1.63 CAN 0.73 US		11	~0.28
IPTV 9-yr		~0.3	~0.53			~2.9					~3.44		99-00 ~0.39@10yrs
Field Action	None	None	None	None	Service Update (letter, inspection, replace)	Service Update (letter, inspection, replace)	Customer Satisfaction (OEM)	Safety (OEM)	Safety (OEM)	Safety (OEM)	Safety (NHTSA)	Safety (NHTSA)	TBD
Stopping Distance			49 m with full circuit and 61 m with front half circuit								49 m with full circuit and 61 m with front half circuit	46 m full circuit and average 95 m half circuit	



Scheduled Maintenance -- Gasoline Engines

+ A good time to check your brakes is during tire rotation ([Recommended every 7,500 miles](#)) . See “Brake System Inspection” under “Periodic Maintenance Inspections” in Part C of this schedule.

Part C: Periodic Maintenance Inspections

Listed in this part are inspections and services which should be performed at least twice a year (for instance, each spring and fall). *You should let your dealer’s service department or other qualified service center do these jobs. Make sure any necessary repairs are completed at once.*

Proper procedures to perform these services may be found in a service manual. See “Service and Owner Publications” in the Index.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Inspect other brake parts, including calipers, parking brake, etc. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

From 1999
Chevrolet
Silverado
Owner’s Manual
(other models similar)

Scheduled Maintenance

+ A good time to check your brakes is during tire rotation (Recommended every 7,500 miles) . See Brake System Inspection on page 6-17.

Part C: Periodic Maintenance Inspections

Listed in this part are inspections and services which should be performed at least twice a year (for instance, each spring and fall). You should let your dealer’s service department do these jobs. Make sure any necessary repairs are completed at once.
Proper procedures to perform these services may be found in a service manual. See Service Publications Ordering Information on page 7-11.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Inspect other brake parts, including calipers, parking brake, etc. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

From 2003
Chevrolet
Tahoe/Suburban
Owner’s Manual
(other models similar)

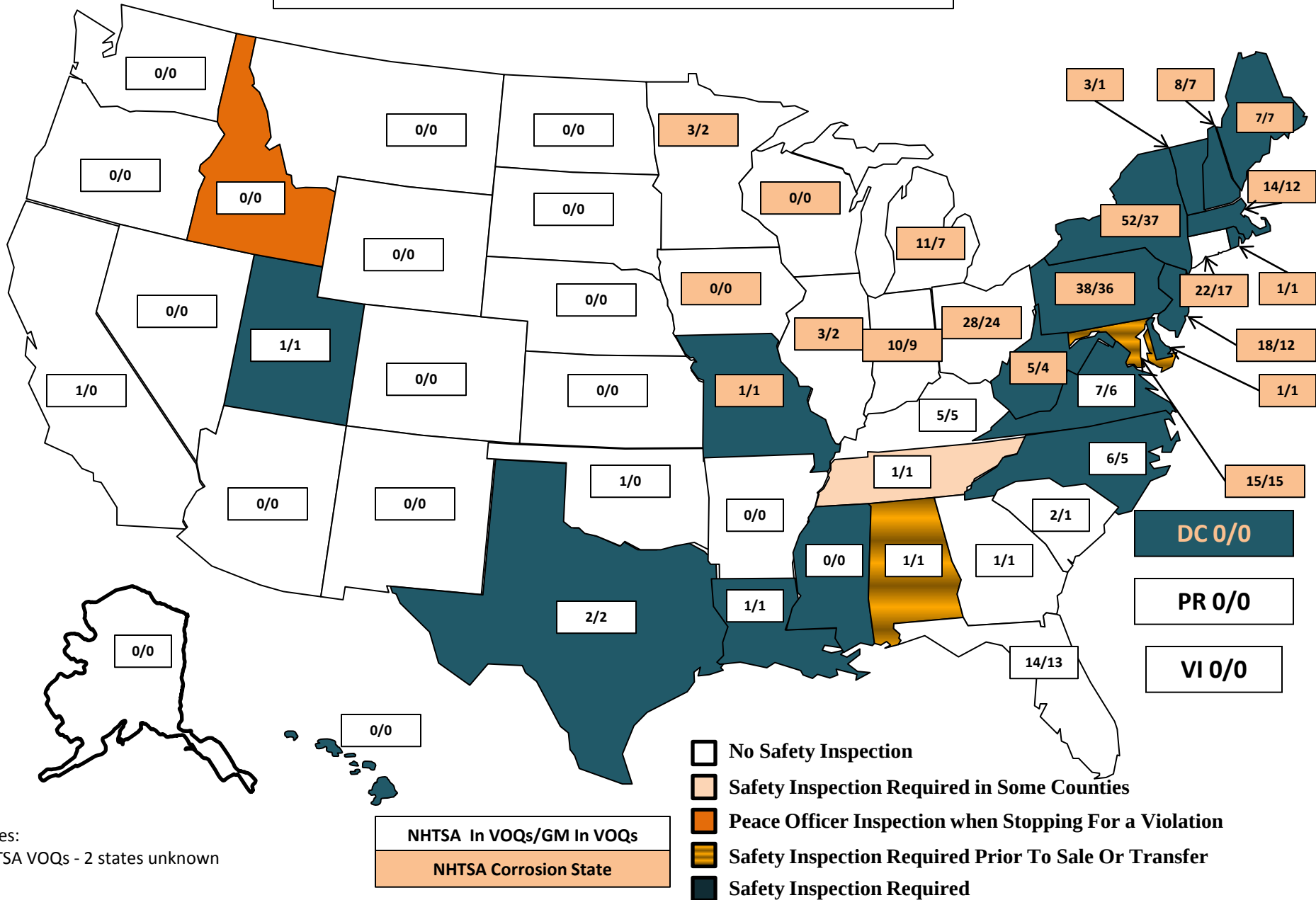
Location of initial VOQs from NHTSA:



VOQ Data

State Vehicle Safety Inspections

Corrosion States



Based on preliminary analysis

☐ No unreasonable risk to safety

- Low rate of occurrences
- No trends by date of build
- In the event of a leak, there will be either a fluid level or pressure differential warning light.
- In the event of a leak, there is no indication that the system performs other than what is intended by FMVSS 105 or FMVSS 135.
- Brake pipe design is the same as other manufacturers at that time and the same as has been used since the 1930s.
- Many vehicles more than 10 years old
- Periodic inspections of entire brake system provided in the Owner's Manual.
- Maybe some effect of State Safety Inspections but analysis is inconclusive

GMT800 FST Brake Line Inspection

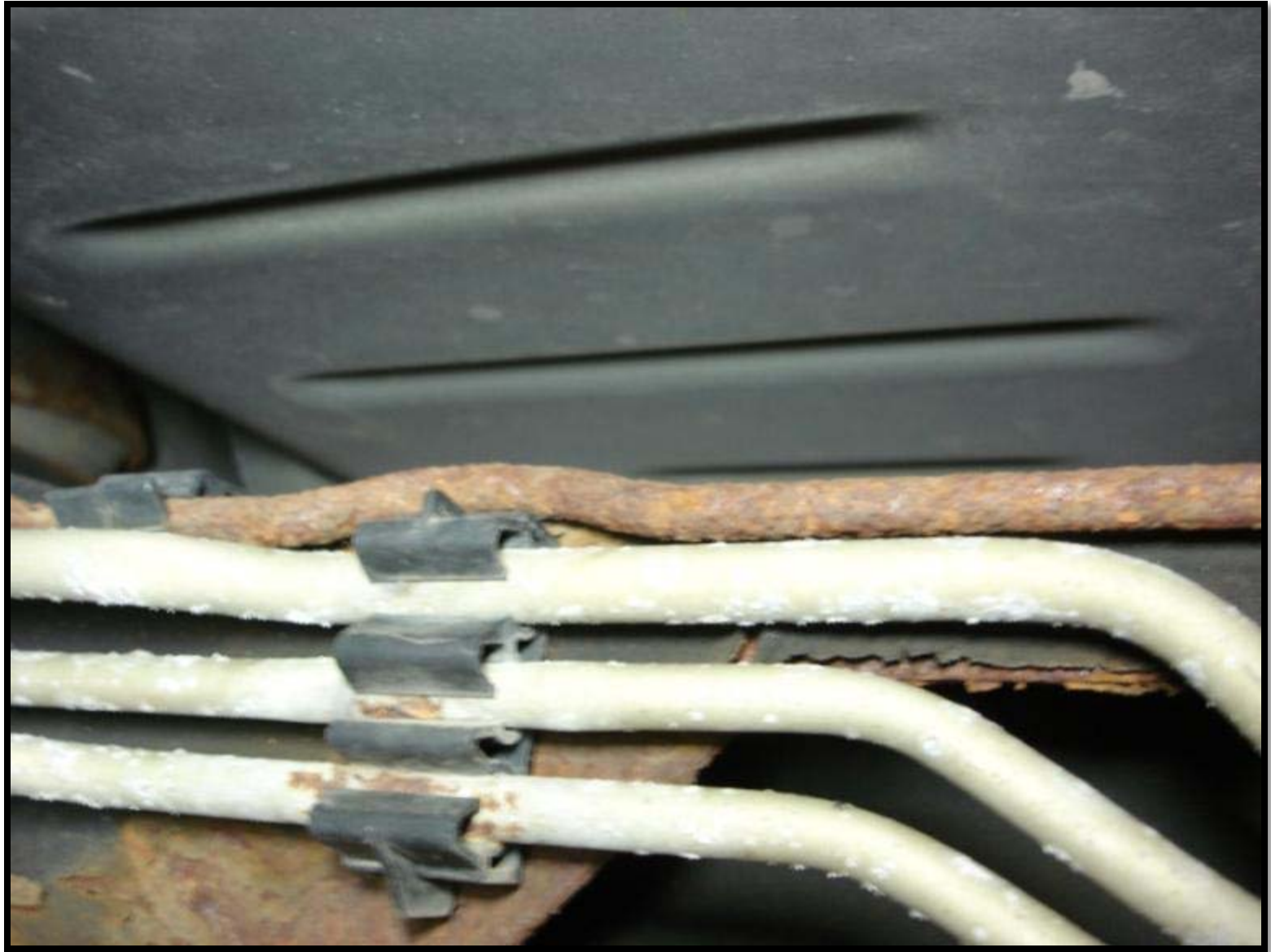
SPO Garage

June 2, 2010

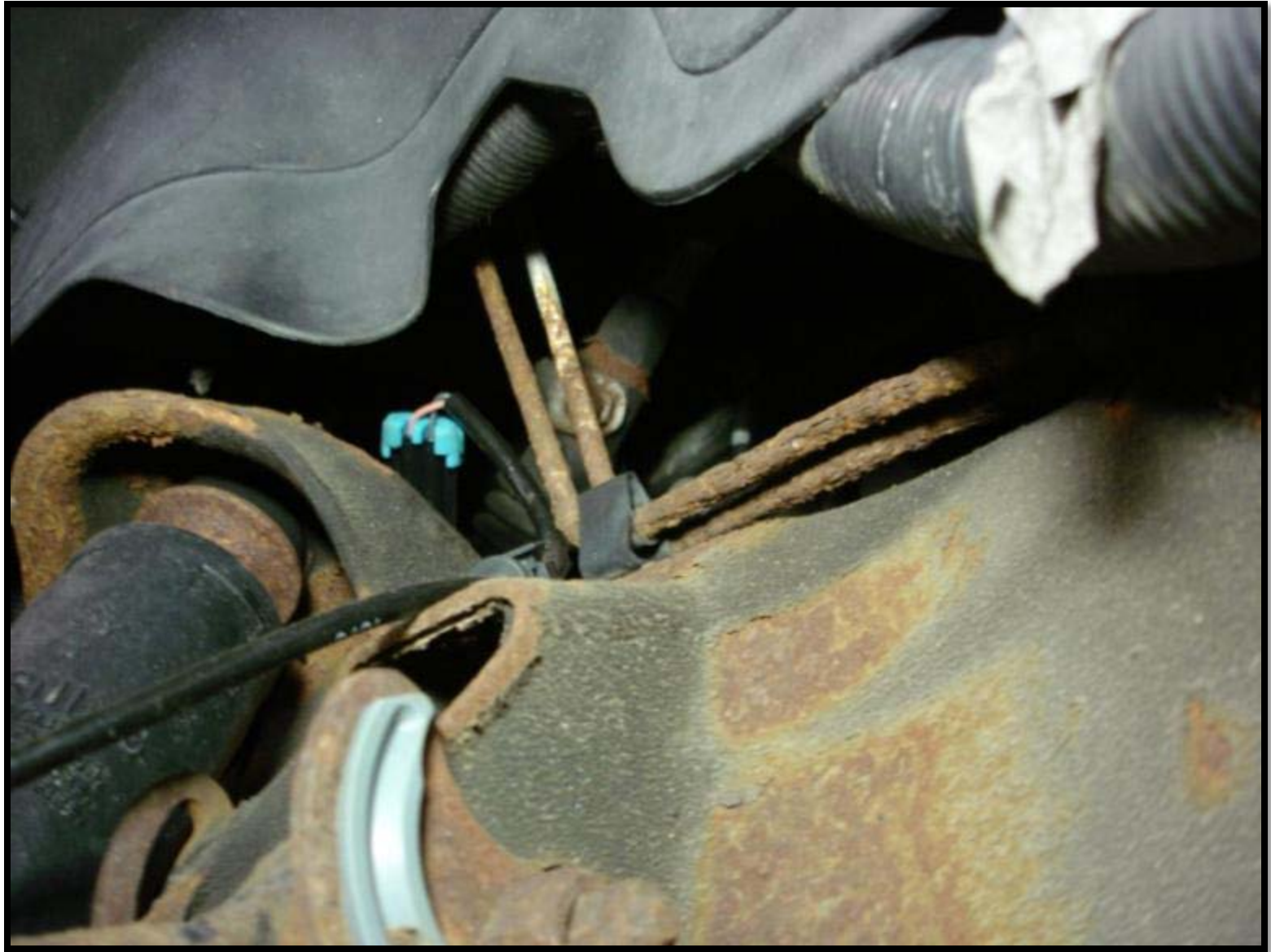
2000 GMC Sierra 2500 (VIN 77940)















2001 GMC Sierra 2500 (VIN [REDACTED])
In Florida until Oct '09



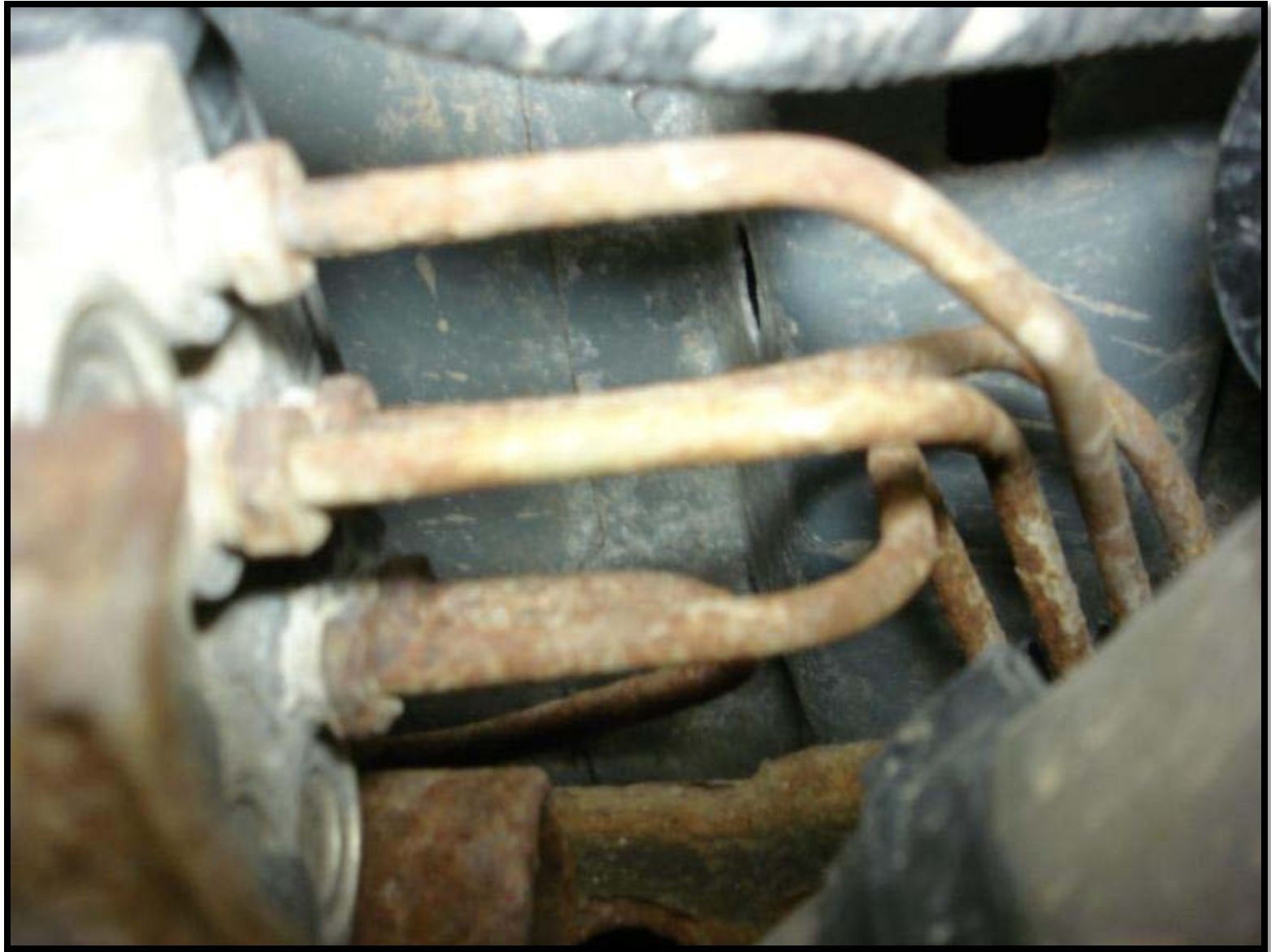


2001 Chevy Tahoe (VIN [REDACTED])
In Texas 2001-2006



2003 Chevy Avalanche (VIN [REDACTED])











2002 GMC



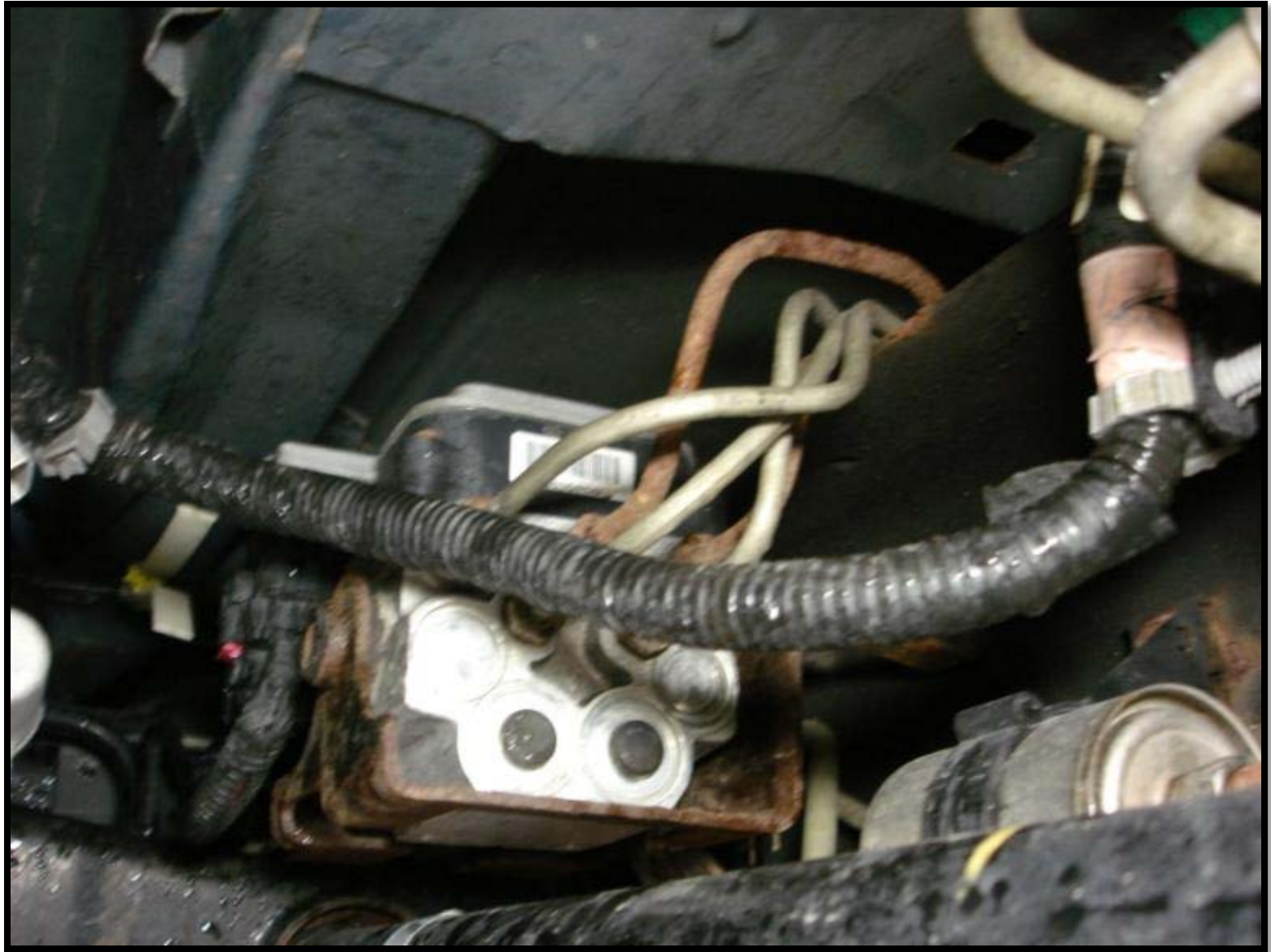






2001 GMC Yukon XL (VIN [REDACTED])

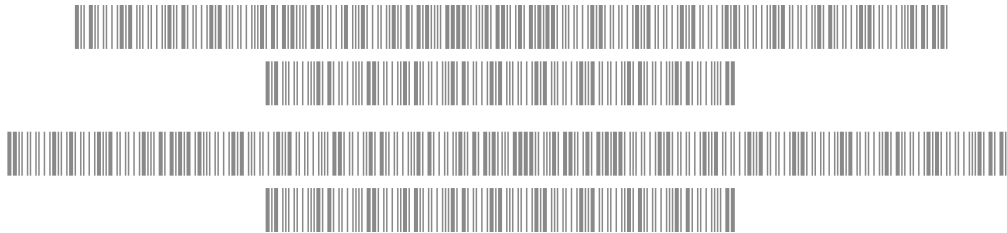








GMT800 Brake Line Corrosion Analysis – Michigan Field Returns



As Received



Vehicle: 2000 GMC Sierra 1500

VIN: 2GCEK19T9Y1 [REDACTED]

ODO: 49,859 miles

Location: MI

Vehicle Age: 10.8 years

% Metal Loss (Max): 63%

% Metal Loss (Avg.): 46%

Estimated time to perforation from current state: 1.9 yrs

Estimated total time to perforation: 12.7 yrs

After Removal of Corrosion Products



As Received



Vehicle: 2000 GMC Sierra 2500

VIN: 1GTGK29U4YE [REDACTED]

ODO: 134,482 miles

Location: MI

Vehicle Age: 10.4 years

% Metal Loss (Max): 51%

% Metal Loss (Avg.): 32%

Estimated time to perforation from current state: 2.4 yrs

Estimated total time to perforation: 12.8 yrs

After Removal of Corrosion Products



As Received



Vehicle: 2001 GMC Yukon XL

VIN: 3GKGK26G31G [REDACTED]

ODO: 80,006 miles

Location: MI

Vehicle Age: 9.6 years

% Metal Loss (Max): 33%

% Metal Loss (Avg.): 15%

Estimated time to perforation from current state: 3.4 yrs

Estimated total time to perforation: 13.0 yrs

After Removal of Corrosion Products



Current service strategy

1. Splice in a section of new brake pipe material
 - Union
 - Flair the end of the tubes
 - Nuts
 - Bleed the system
2. Replace the entire pipe with bulk material
 - Dealer to hand bend
 - Bleed the system

GMT 800 Brake line EWO's

Engineering has reviewed all EWO associated with the brake pipes, looking for any work order that would have any affect on brake pipe corrosion performance.



Microsoft
cel 97-2003 v

Next steps

- Investigating grounding of ABS module. (cathodic reaction).
- Investigation of the Cavalier same coating.
- Investigating GMT 400 same coating.

Part Inspection Timing Plan

Timing plan for the analysis of the 3 sets of GMT800 brake lines that were delivered to the Lab:

Photograph the parts.

Identify a "clean" area that will be cut off of a line from each set and send to Materials Lab for Coating Thickness measurement.

Identify a most corroded area from each set and conduct a perforation corrosion assessment. (Depth of pitting and predicted time to pinhole perforation)

Photos and Perforation Corrosion Assessment to be completed by COB Thursday June 24th.

Estimated completion time for Thickness measurement work is July 2nd.

I

Back up

Brake pipe read across



Microsoft
e Excel Works

Vaba Brake Pipe Benchmarking



Microsoft
owerPoint Pre:

Brake pipe coating thickness

• Code	GE	GN
-		
• Aluminum rich epoxy paint (μm)	3.0	-
-		
• Nylon 12 (μm)	-	150
• Epoxy Primer (μm)	3.0	3.0

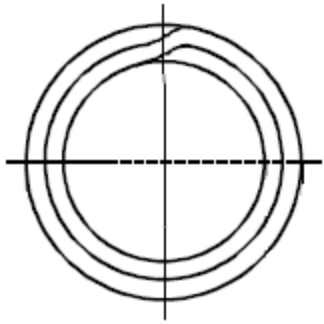
Zinc-Aluminum Alloy + Extruded Nylon 12

Zinc-aluminum alloy followed by a conversion coating, an epoxy resin based primer, and a topcoat of Nylon 12.

Appearance: The topcoat shall be uniform in color and free from discontinuities such as flow lines, pin holes, craters, or abnormal roughness. The topcoat shall be black in color unless otherwise specified on the engineering drawing

Film Thickness: The epoxy primer shall be 3 μm minimum and the Nylon 12 topcoat shall have a minimum thickness of 150 μm when tested by microscopic examination per Appendix A. Max thickness of the coating shall be controlled by the max OD (Table 6). Actual thickness of the coatings in the GN finish shall be monitored circumferentially and longitudinally for each tube line. A sampling plan shall be referenced in the control plan.

Salt spray requirement is over 6000 hours



Common brake pipe construction
720 degrees 1008-1010 cold rolled steel.
Copper coated and brazed

Zinc-Aluminum Alloy +Aluminum Rich Epoxy Paint

Hot dip zinc-aluminum alloy coating consisting of a 5% aluminum-balanced zinc alloy per ASTM B750 with a coating mass of 50 g/m² per ASTM A875, Section 8 and a thickness of 3 µm minimum anywhere on the tube per Appendix A. The hot dip zinc-aluminum coating is then subsequently coated with an approved pretreatment process and an approved aluminum-rich epoxy coating.

Film Thickness: The aluminum-rich epoxy paint of the GE finish shall have a minimum thickness of 3 µm anywhere on the tube as measured by the procedures in Appendix A. Actual thickness of the coatings in the GE finish shall be monitored circumferentially and longitudinally for each tube line. A sampling plan shall be referenced in the control plan.

Salt Spray requirements 1000 hours

PE10-010

GM

7/2/2010

GMT800 FST

Brake Line Inspection
Compressed

GMT800 FST Brake Line Inspection

SPO Garage

June 2, 2010

2000 GMC Sierra 2500 (VIN 77940)

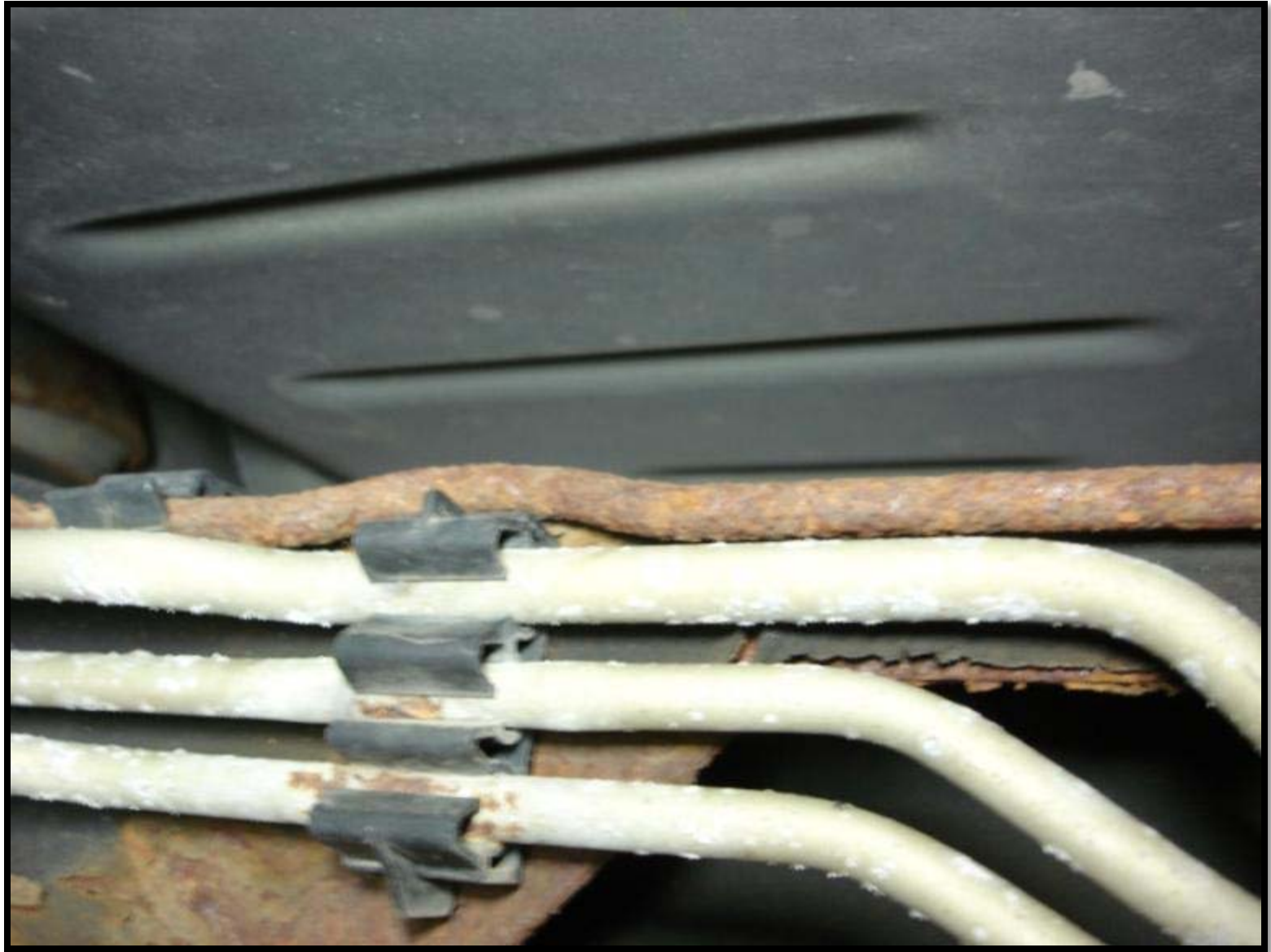






2000 Chevy Silverado 1500 (VIN [REDACTED])



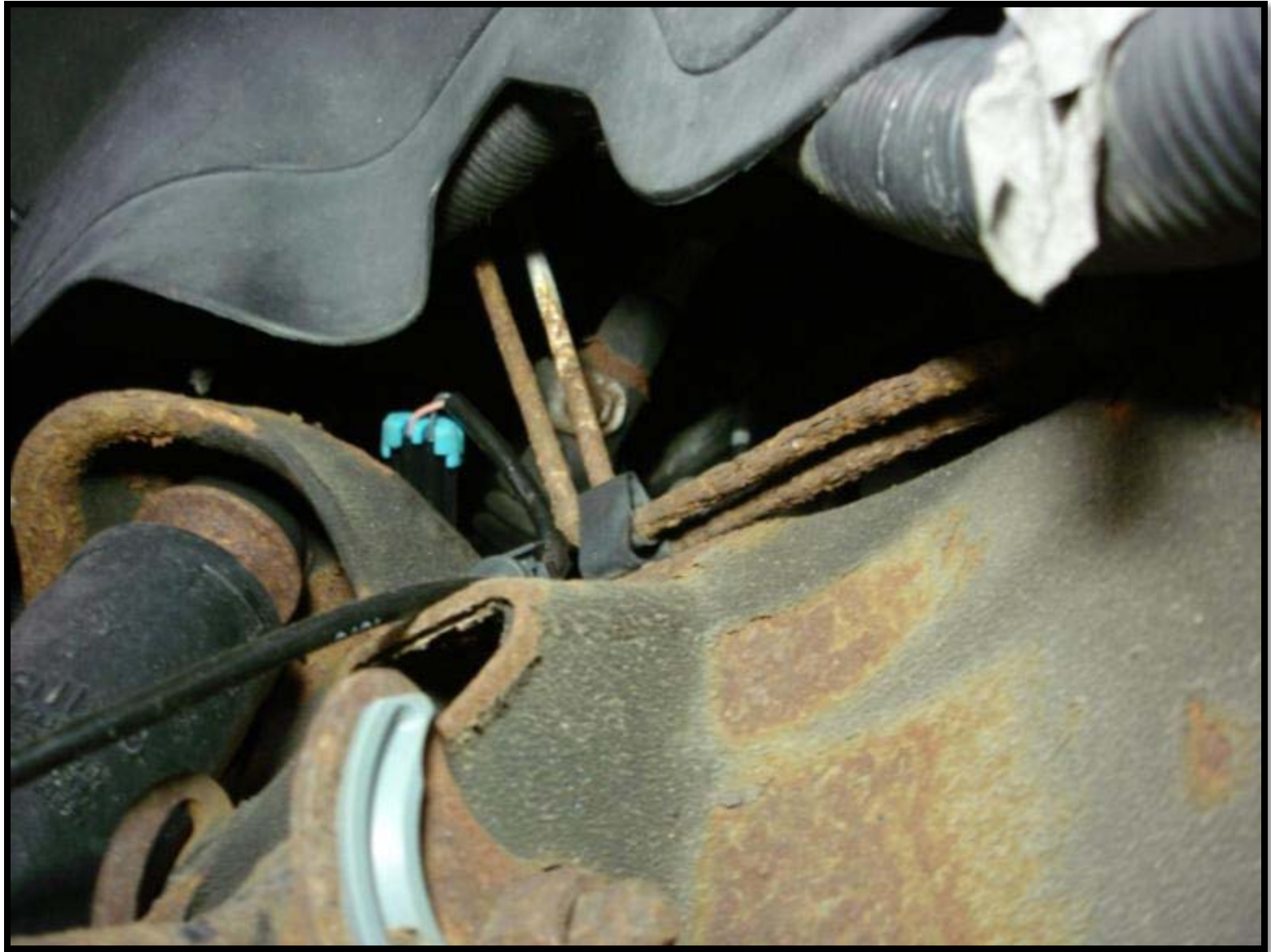


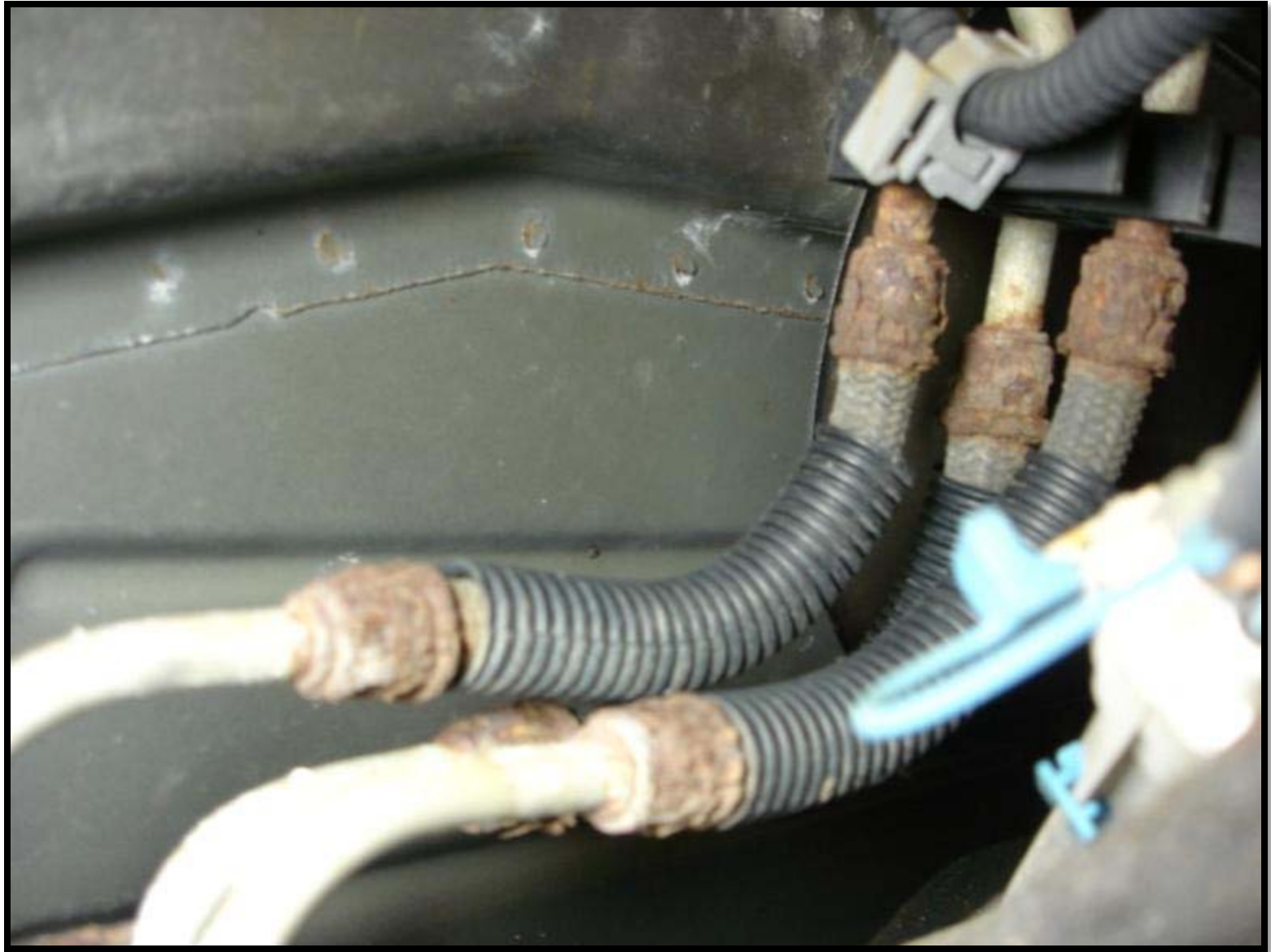


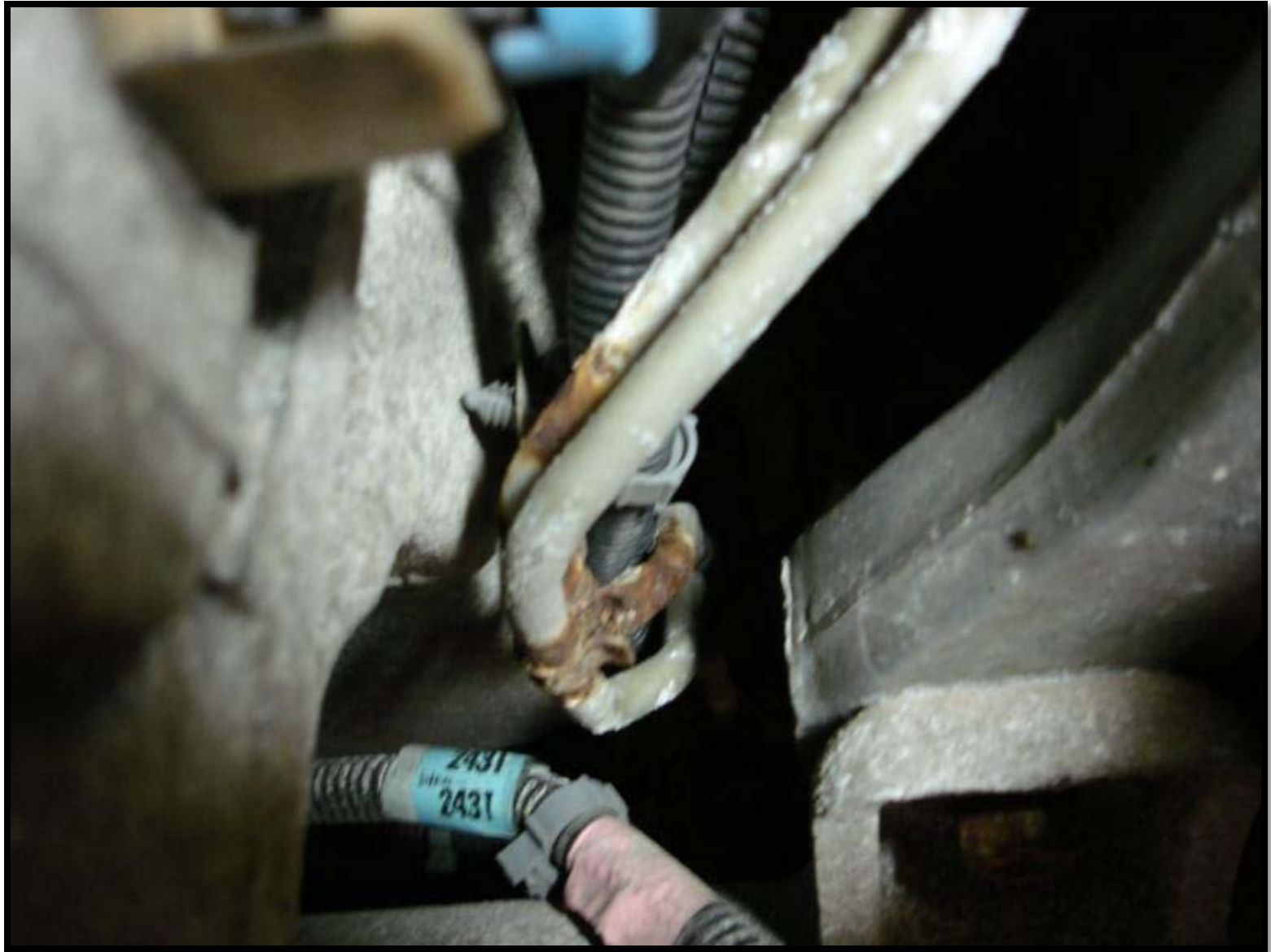












2000 GMC Sierra Ext Cab (VIN [REDACTED])







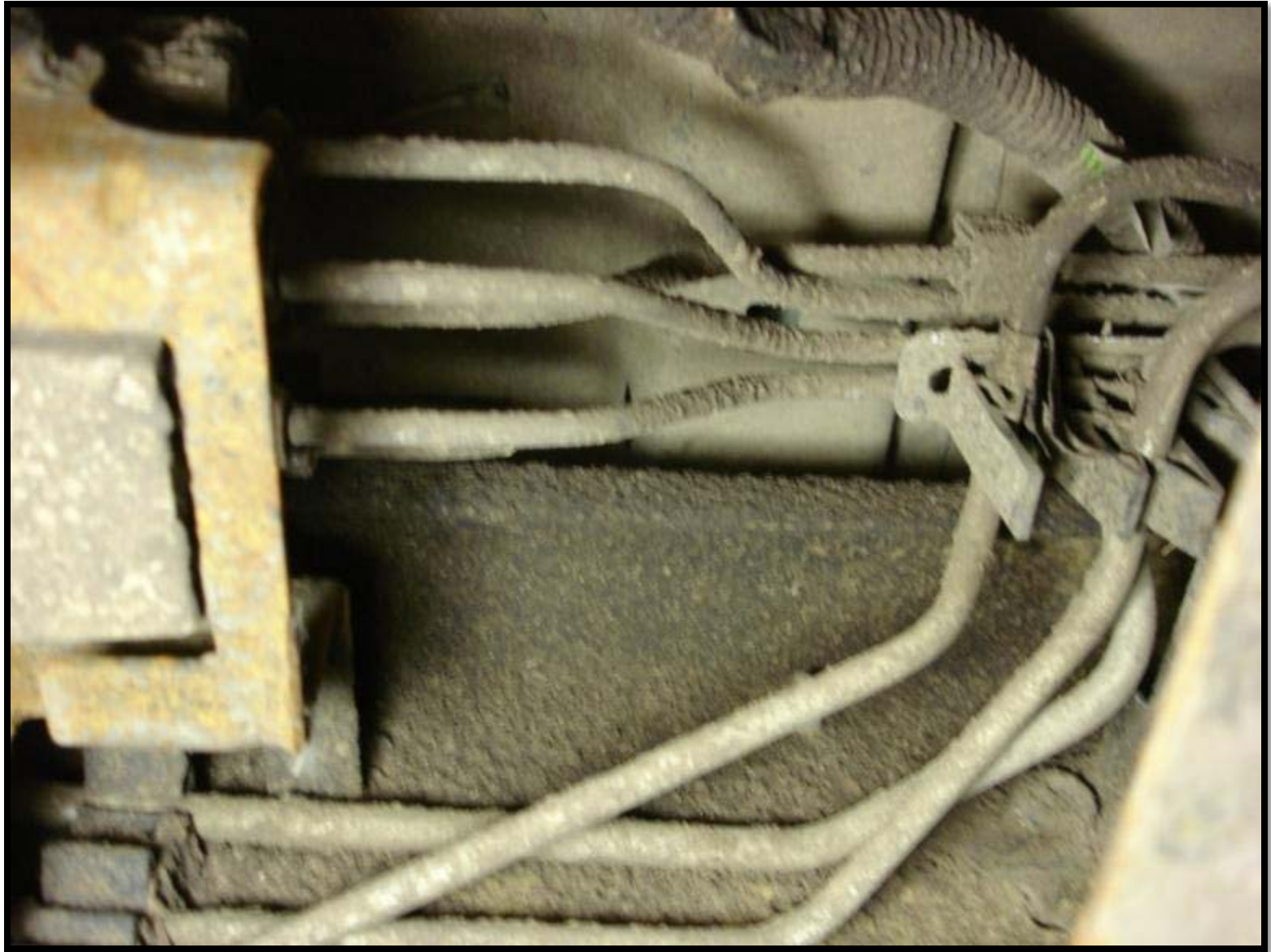






2001 GMC Sierra 2500 (VIN [REDACTED])
In Florida until Oct '09









2001 Chevy Tahoe (VIN [REDACTED])
In Texas 2001-2006

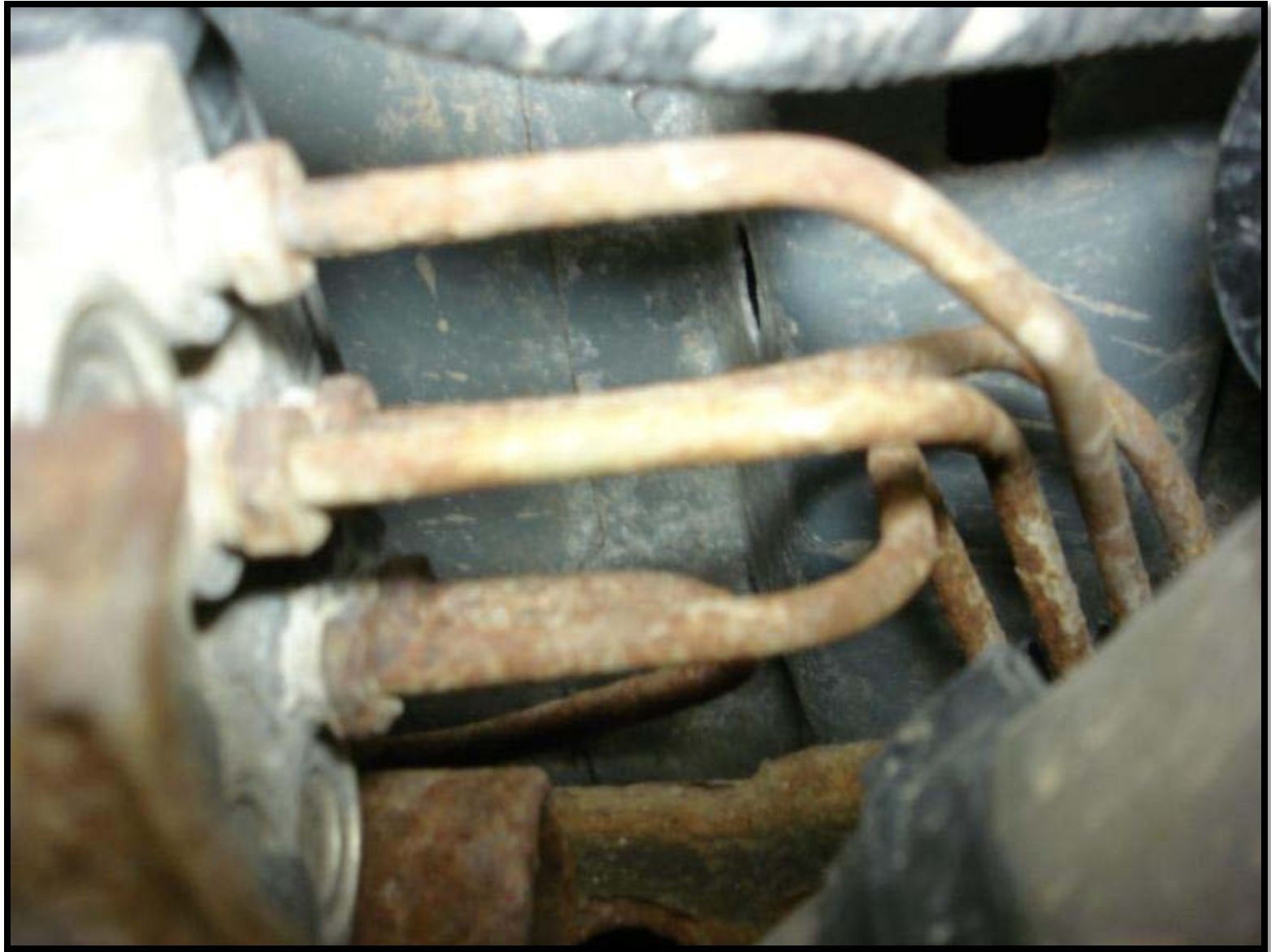






2003 Chevy Avalanche (VIN [REDACTED])















2002 GMC



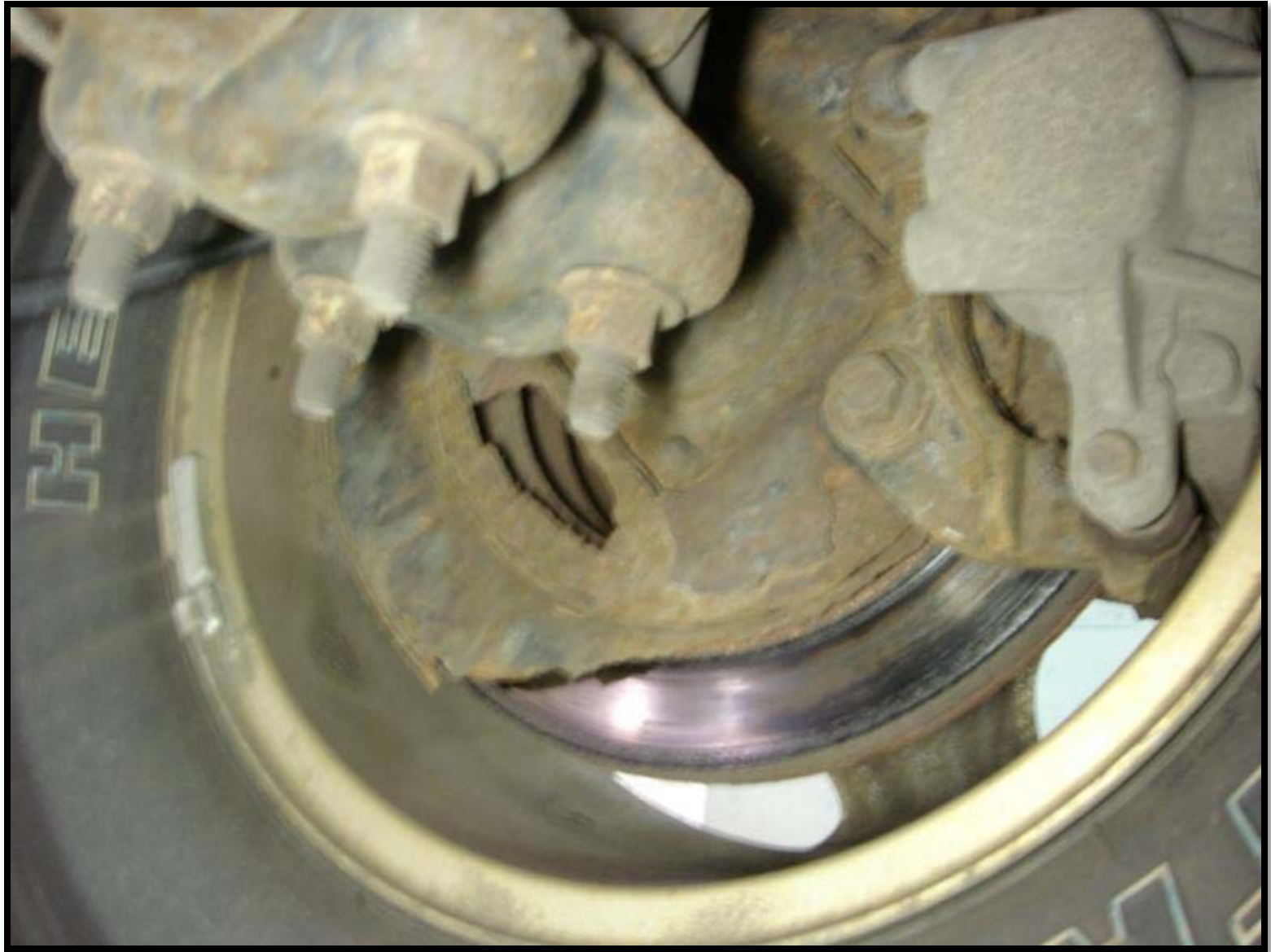






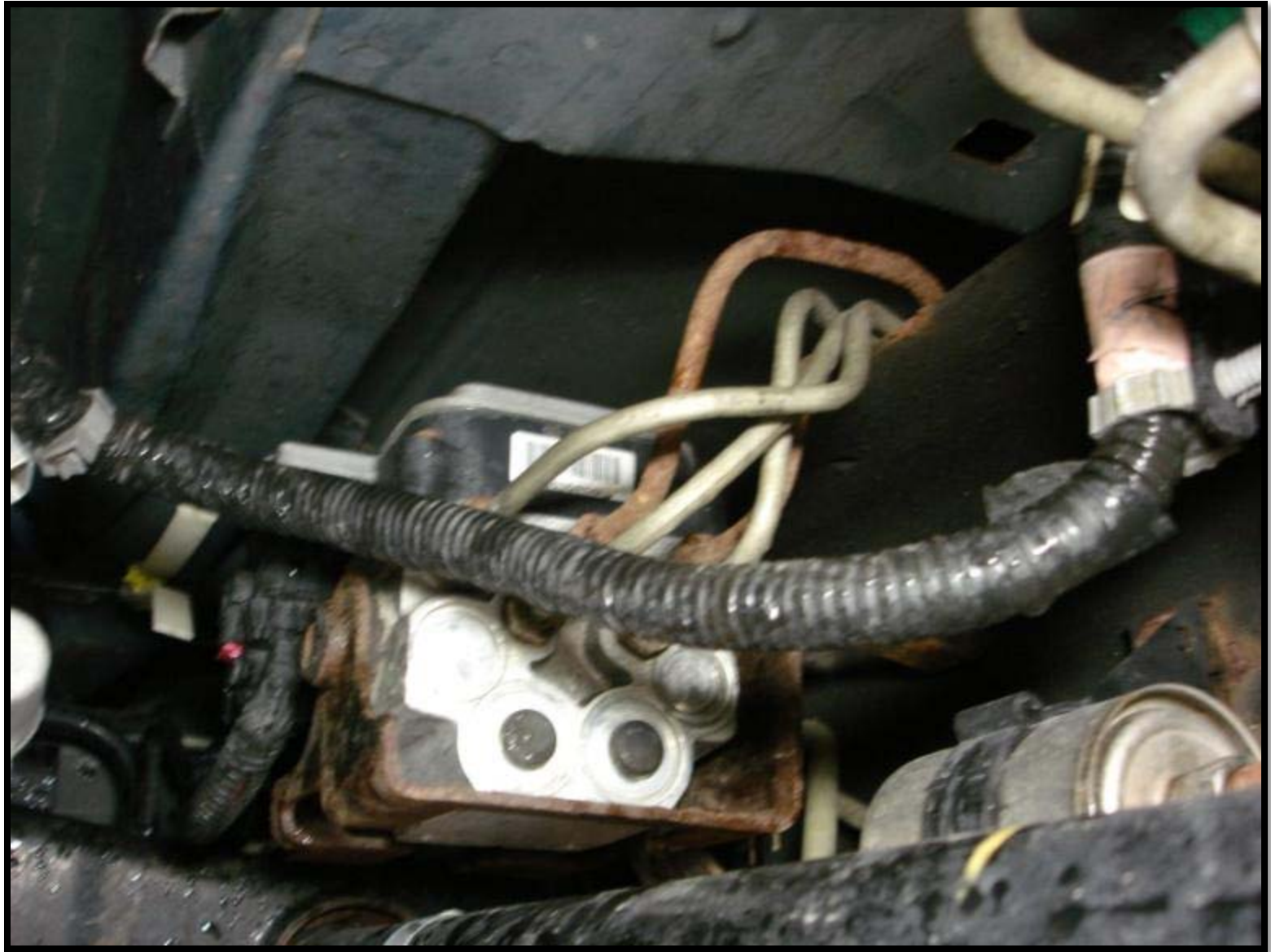








2001 GMC Yukon XL (VIN [REDACTED])









PE10-010

GM

7/2/2010

Initial meeting agenda
and presentation

051210

IR PE10-010 Brake Pipe Corrosion

Initial Review Meeting

- Review IR
 - oAlleged Defect
 - oSubject Vehicles
 - oQuestions
- Status
 - oCoding
 - oRead
 - oTo Read
- Issues
- Next Steps

IR PE10-010 Brake Pipe Corrosion Initial Review Meeting

- Review IR

- oAlleged Defect
- oSubject Vehicles
- oQuestions

- Status

- oCoding
- oRead
- oTo Read

- Issues

- Next Steps

- **Alleged defect:** fluid leaks from steel brake lines.

As detailed from discussions with NHTSA, this only includes fluid leaks resulting from corroded brake lines.

- **Subject component:** Steel brake lines.
- **Subject vehicles:** all MY 1999 through 2003 C/K series GMT800 platform pickup trucks and sport utility vehicles manufactured for sale or lease in the United States.

Subject Vehicle Counts	
Model Year	Number Vehicles
1999	574,982
2000	1,029,578
2001	1,301,362
2002	1,532,549
2003	1,575,804
Total	6,014,275

Location of initial VOQs from NHTSA:



IR PE10-010 Brake Pipe Corrosion

Initial Review Meeting

- Review IR
 - Alleged Defect
 - Subject Vehicles
 - Questions
- **Status**
 - Coding
 - Read
 - To Read
- Issues
- Next Steps

Code's for N100097								
IN/OUT	Code 1	Code 1 Code Definition:	Code 2	Code 2 Code Definition:	Code 3	Code 3 Code Definition:	Code 4	Code 4 Code Definition:
IN	Rusty Line With Leak	Rusty, Corroded, Corrosion, Pitted, Brake Line that is Leaking, Dripping, Oozing, Wet	Brake Failure	Alleged Brake Failure	All Brake Lines	All Brake Lines failed or were replaced	Not in motion	Vehicle was not in Motion was parked, starting vehicle and putting in gear,
IN/OUT	Rusty Lines No Mention of Leak	Rusty, Corroded, Corrosion, Pitted, Brake Line that there is no mention of it Leaking, Dripping, Oozing, or Wet but may have symptoms indicated in Code 2 Like Brake Failure, No Brakes, Low Brake Pedal, Hard to Stop, Brake Pedal got Softer Over Time	No Brakes	Alleged No Brake	Under hood Brake Lines	Under hood Brake Lines failed or were replaced	Below 10mph-Parking lot	Vehicle in Motion below 10 mph, in a parking lot, in a driveway, backing up with vehicle
OUT	Rusty No Leak	Rusty, Corroded, Corrosion, Pitted, Brake Line that is indicated that they are NOT Leaking, Dripping, Oozing or are Wet	Low Brake Pedal	Brake Pedal is Low, Brake Pedal is Soft, Excessive braking effort as Low or soft Brake Pedal,	Front Brake Lines	Front Brake Lines failed or were replaced	Speed 11-30 mph	Vehicle in Motion speed between 11-30 mph, driving on residential street
IN	Line Failure	Indicated that Brake Line Failure, and is Leaking, Dripping, Oozing, Wet	Hard to Stop	Vehicle Hard to Stop, Excessive braking effort,	Rear Brake Lines	Rear Brake Lines failed or were replaced	Speed 31-55 mph	Vehicle in Motion speed between 31-55 mph, driving on main road, on rural two lane road,
IN	Brake Fluid Visible	Brake Fluid noticeable, like Leaking, Dripping, Oozing, Wet, puddle on floor or ground	Brake Pedal got Softer Over Time	Gradual Occurrence over time, Brake Pedal got Softer Over Time	Chassis under Driver	Brake Lines at Chassis under Driver failed or were replaced	Speed 56 mph or Expressway	Vehicle in Motion speed between 56 mph and above, driving on Expressway, Highway, Toll Road, Turn Pike,
IN	Brake Line Leak	Brake Line that is Leaking, Dripping, Oozing, Wet but NO Mention of the line being Rusty, Corroded, Corrosion, Pitted,	Failed Inspection	Failed safety Inspection, Discovered by Inspection	Rear Axle Brake Line	Brake Lines on the rear axle failed or were replaced	Unknown Speed traveling	Vehicle in Motion but speed not mentioned
OUT	Request Info Only	Request for Information Only, Customer calling asking questions on recall or other information but NOT that they had a problem.	Unrelated Issue	Totally Unrelated Issue	Not indicated	Unknown Not enough information to be Coded with any other Codes, not specific enough Information, Not	Unknown	Unknown Not enough information to be Coded with any other Codes.
OUT	Rear Caliper Leak	Service Bulletin # 04-05-23-001, Low Brake Pedal, Red Brake Light On, Brake System Warning Message On (Tighten Rear Brake Caliper Banjo Bolts, Replace Gaskets and Install Shields)	No Mention of Failure	No Mention of Failure or Leak				
OUT	Other Brake	Other type of Brake Issue or complaint but not rusty lines or line leaking, Non Steel flexible line leak. Or Service Information # 00093A: Product Safety - Front Brake Pipe Contact with Body Cross Sill. Or Service Information # 00024: Customer Satisfaction-Front Brake Hose Abrasion	Brake Pedal to the Floor	Brake Pedal goes to floor, Excessive braking effort as Brake Pedal goes to floor,				
OUT	Unknown	Unknown Not enough information to be Coded with any other Codes.	Unknown	Unknown Not enough information to be Coded with any other Codes.				
		Yes/No	Warning Light or Chime					
		Yes/No	DIC Warning Message					
		Yes/No	DTC-Diagnostic Trouble Code Indicated					
Location of this Code file:		S:\PRODUCT INVESTIGATIONS\NHTSA Investigations\N100097-PE10-010 C-K Pickup and SUV Brake Line\N100097 Codes.xls						
Database Location:		S:\PRODUCT INVESTIGATIONS\Databases\IR\NHTSA\Apps\N100097 Siebel.mdb						

VOQ's from NHTSA to Date	
Model Year	Number VOQs
1999	41
2000	76
2001	21
2002	42
2003	38
Total	218

GM Reports				
Owner Reports				
Read	To Read	IN's to Date	Crash	Injury
1112	3545	9	0	0
Field Reports				
Read	To Read	IN's to Date	Crash	Injury
2972	0	38	0	0
Legal Reports				
Read	To Read	IN's to Date	Crash	Injury
79	851	0	0	0

Preliminary Warranty Counts						
Source	1999	2000	2001	2002	2003	Totals
Regular	68	110	156	156	242	732
MIC	52	127	151	160	177	667
UWC	10	17	8	8	13	56
Totals	130	254	315	324	432	1455

IR PE10-010 Brake Pipe Corrosion Initial Review Meeting

- Review IR
 - oAlleged Defect
 - oSubject Vehicles
 - oQuestions
- Status
 - oCoding
 - oRead
 - oTo Read
- Issues
- Next Steps

IR PE10-010 Brake Pipe Corrosion

Initial Review Meeting

- Review IR
 - Alleged Defect
 - Subject Vehicles
 - Questions
- Status
 - Coding
 - Read
 - To Read
- Issues
- **Next Steps**

PE10-010

GM

7/2/2010

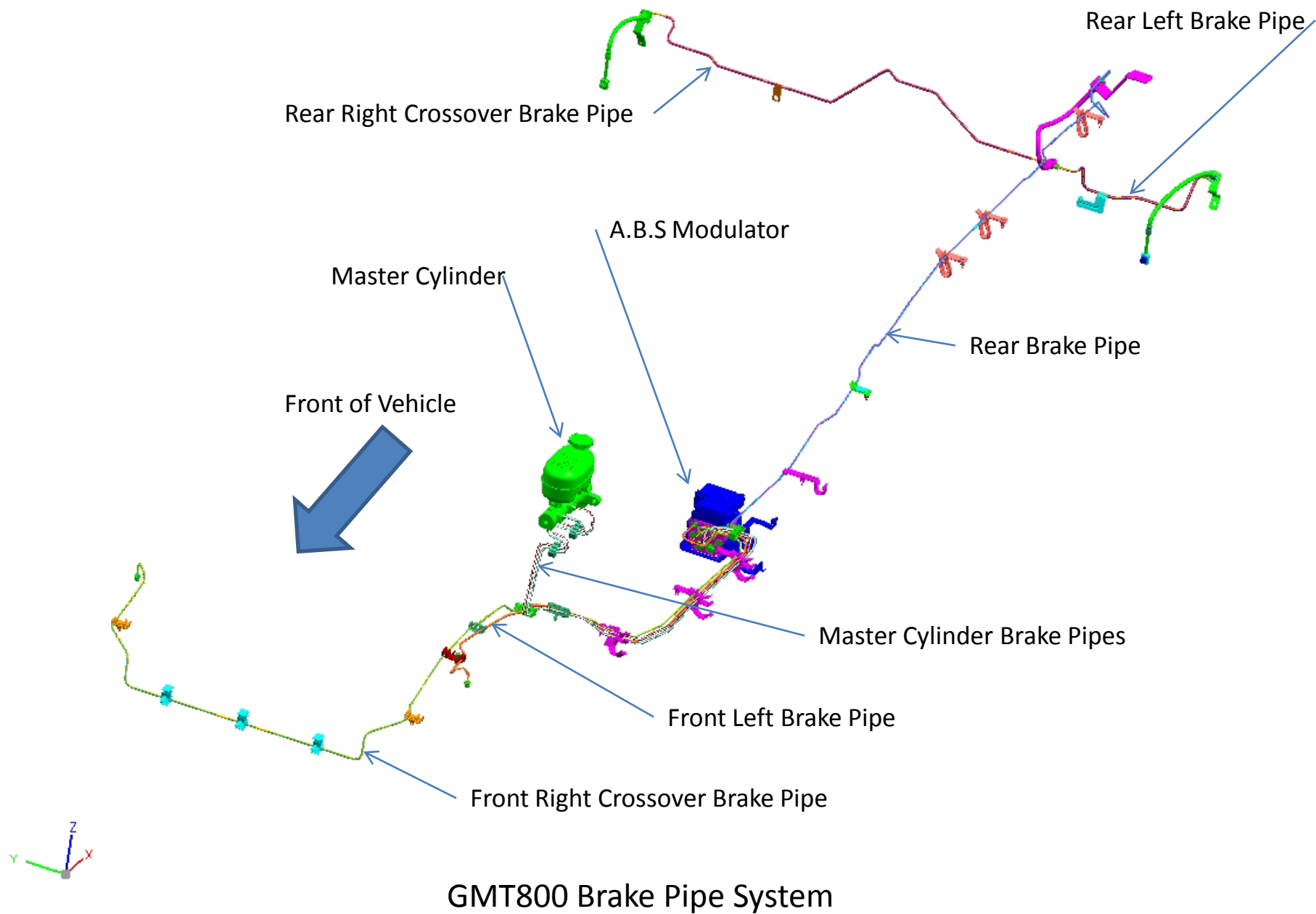
IR PE10-010 ISR

Review 22Jn10

without backup

IR PE10-010 Brake Pipe Corrosion ISR Meeting

June 22, 2010



GMT800 Brake Pipe System

		MODEL YEARS					
MAKE/MODEL	1999	2000	2001	2002	2003	TOTAL	
Chevrolet Silverado	431,010	626,540	622,609	642,096	710,234	3,032,489	
Chevrolet Tahoe	N/A	72,539	194,341	207,229	214,942	689,051	
Chevrolet Suburban	N/A	85,464	162,776	148,244	146,749	543,233	
Chevrolet Avalanche	N/A	N/A	N/A	128,440	86,209	214,649	
GMC Sierra	143972	186,541	180,719	195,781	193,452	900,465	
GMC Yukon	N/A	26,882	70,851	75,931	89,374	263,038	
GMC Yukon XL	N/A	31,612	70,066	68,309	76,691	246,678	
Cadillac Escalade	N/A	N/A	N/A	54,006	47,022	101,028	
Cadillac Escalade EXT	N/A	N/A	N/A	12,513	11,131	23,644	
TOTAL	574,982	1,029,578	1,301,362	1,532,549	1,575,804	6,014,275	

•Table 1 GM Subject Vehicle (GMT800 Series) Production

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/ FATALITIES*	NUMBER WITH FIRES
Owner Reports	282	37	4	8	1	0
Field Reports	31	0	0	0	0	0
Not-In-Suit Claims	11	3	10	9	3	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	324	40	14	17	4	0
Total Vehicles with Reports (Unique VIN)	320	39	12	15	3	0

Table 2-1: GM Subject Vehicle - May relate to Alleged Defect - Report Classification

* There were no fatalities associated with this issue

		MODEL YEARS					
MAKE/MODEL		1999	2000	2001	2002	2003	TOTAL
Chevrolet Silverado		35	64	105	90	147	441
Chevrolet Tahoe		N/A	2	6	8	13	29
Chevrolet Suburban		N/A	5	12	10	4	31
Chevrolet Avalanche		N/A	N/A	N/A	0	4	4
GMC Sierra		29	39	31	31	43	173
GMC Yukon		N/A	0	1	3	7	11
GMC Yukon XL		N/A	0	1	1	3	5
Cadillac Escalade		N/A	N/A	N/A	7	10	17
Cadillac Escalade EXT		N/A	N/A	N/A	0	4	7
TOTAL		64	110	156	150	235	715

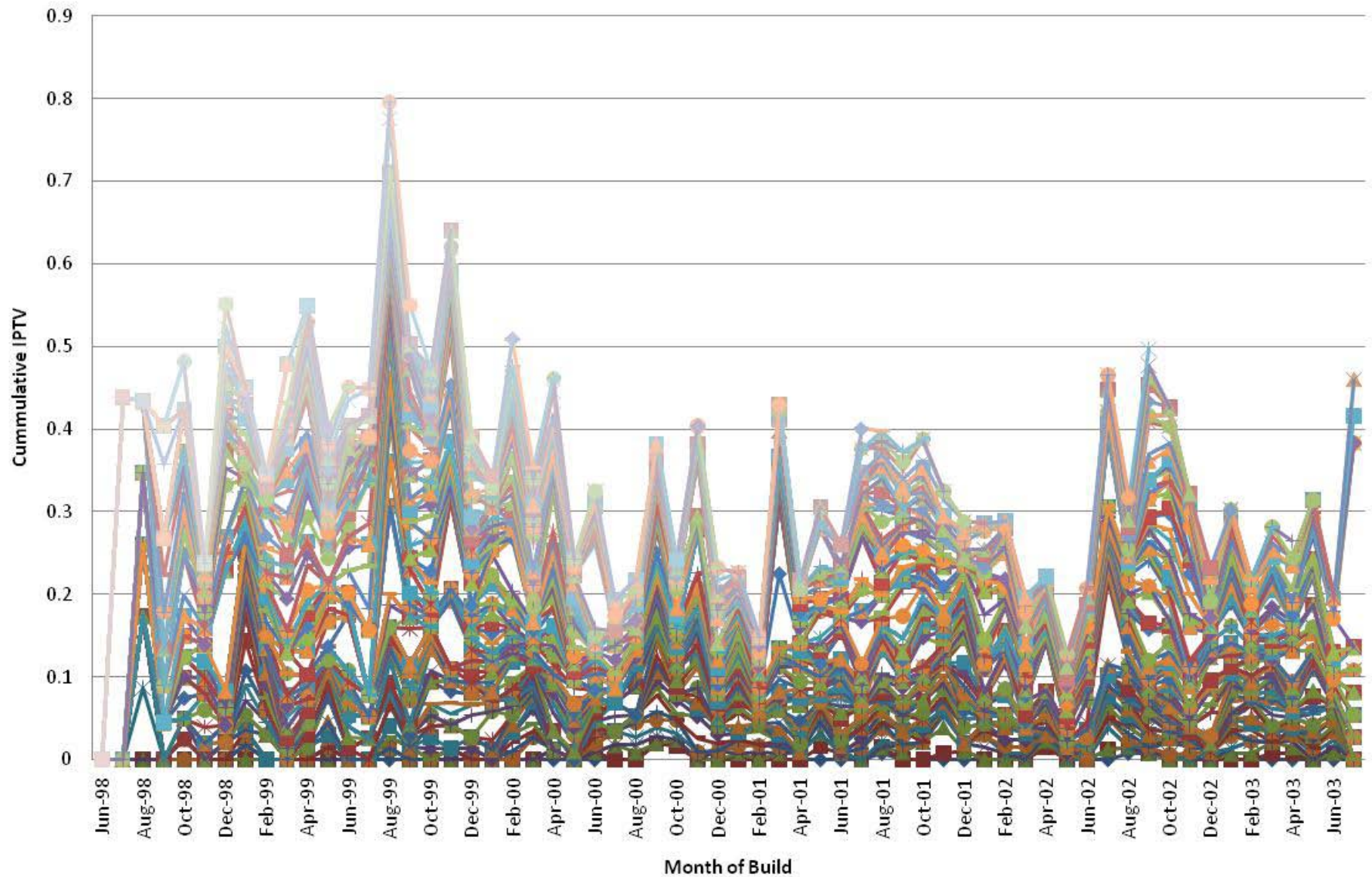
Table 5-1 GM Regular Warranty and Goodwill Claims for the Subject Vehicles

MODEL YEARS						
MAKE/MODEL	1999	2000	2001	2002	2003	TOTAL
Chevrolet Silverado	44	103	130	70	93	440
Chevrolet Tahoe	N/A	5	3	6	11	25
Chevrolet Suburban	N/A	4	4	11	6	25
Chevrolet Avalanche	N/A	N/A	N/A	23	9	32
GMC Sierra	15	25	17	51	34	142
GMC Yukon	N/A	2	0	1	6	9
GMC Yukon XL	N/A	1	1	0	4	6
Cadillac Escalade	N/A	N/A	N/A	1	13	14
Cadillac Escalade EXT	N/A	N/A	N/A	3	0	3
TOTAL	59	140	155	166	176	696

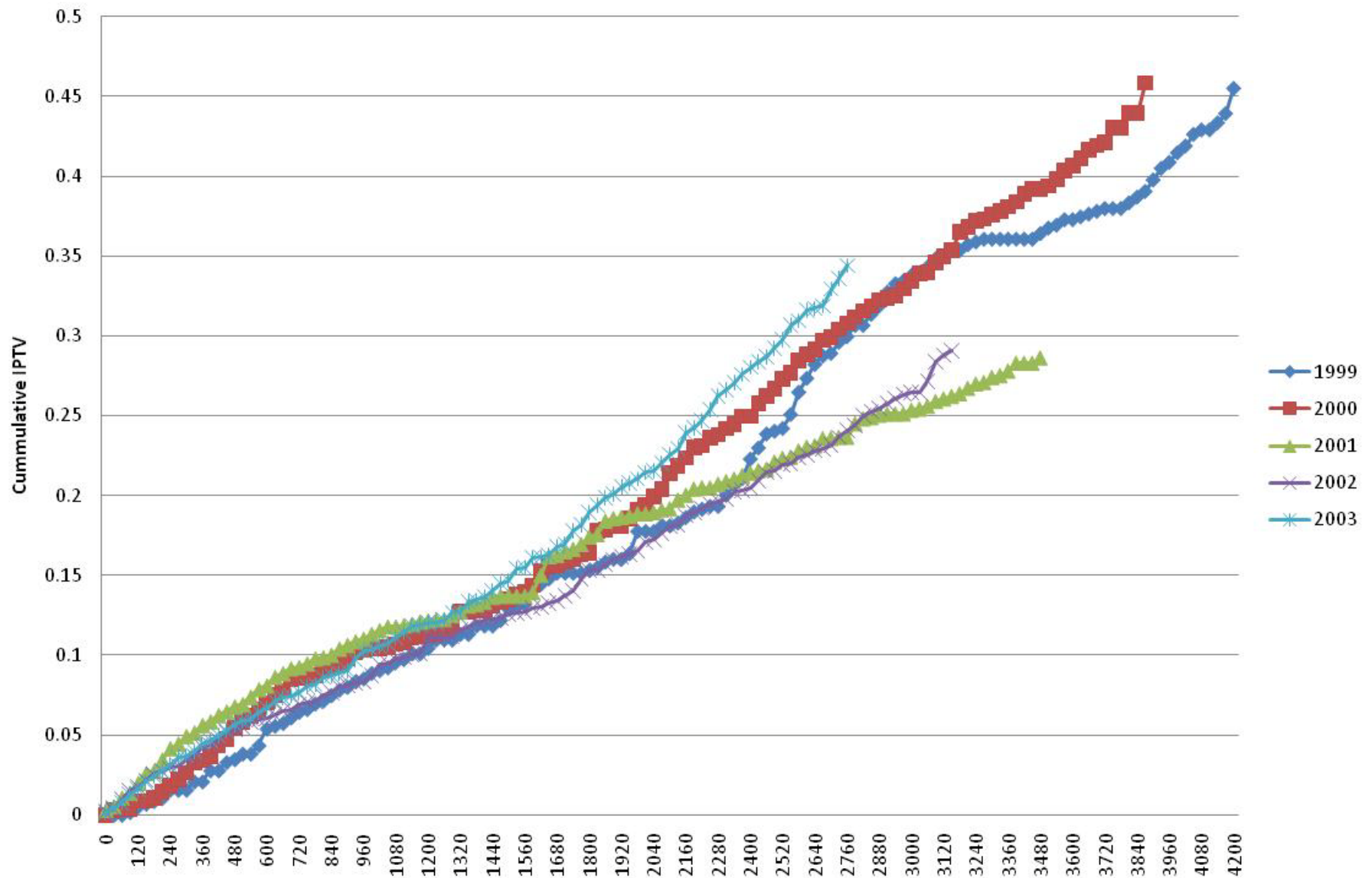
Table 5-2 MIC and UWC Service Contract Claims for the Subject Vehicles

1999 to 2003 GMT800 - Brake Line Issue

Filtered Warranty, Reports, VOQ



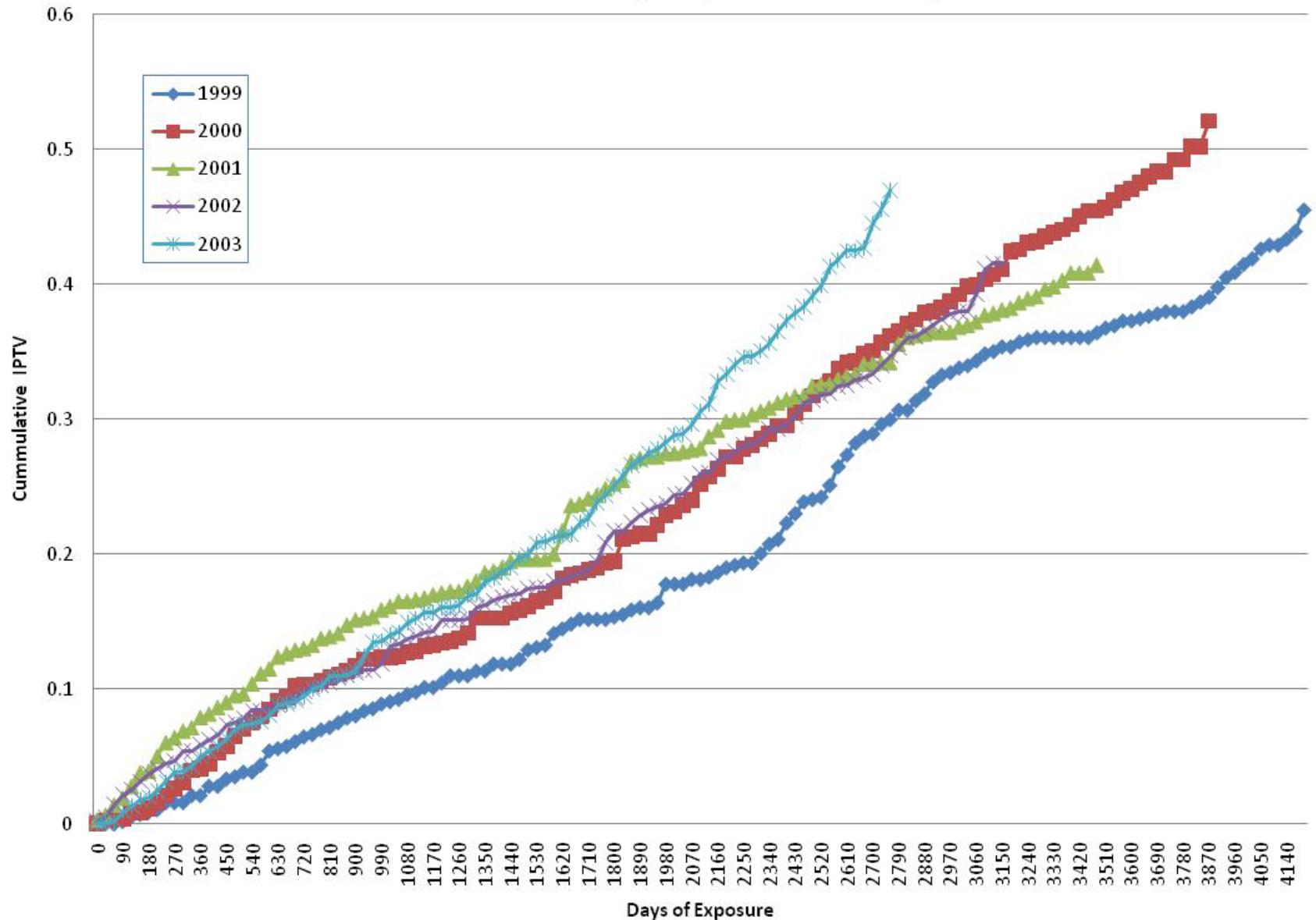
1999 to 2003 GMT800 Filtered Warranty, Reports and VOQ



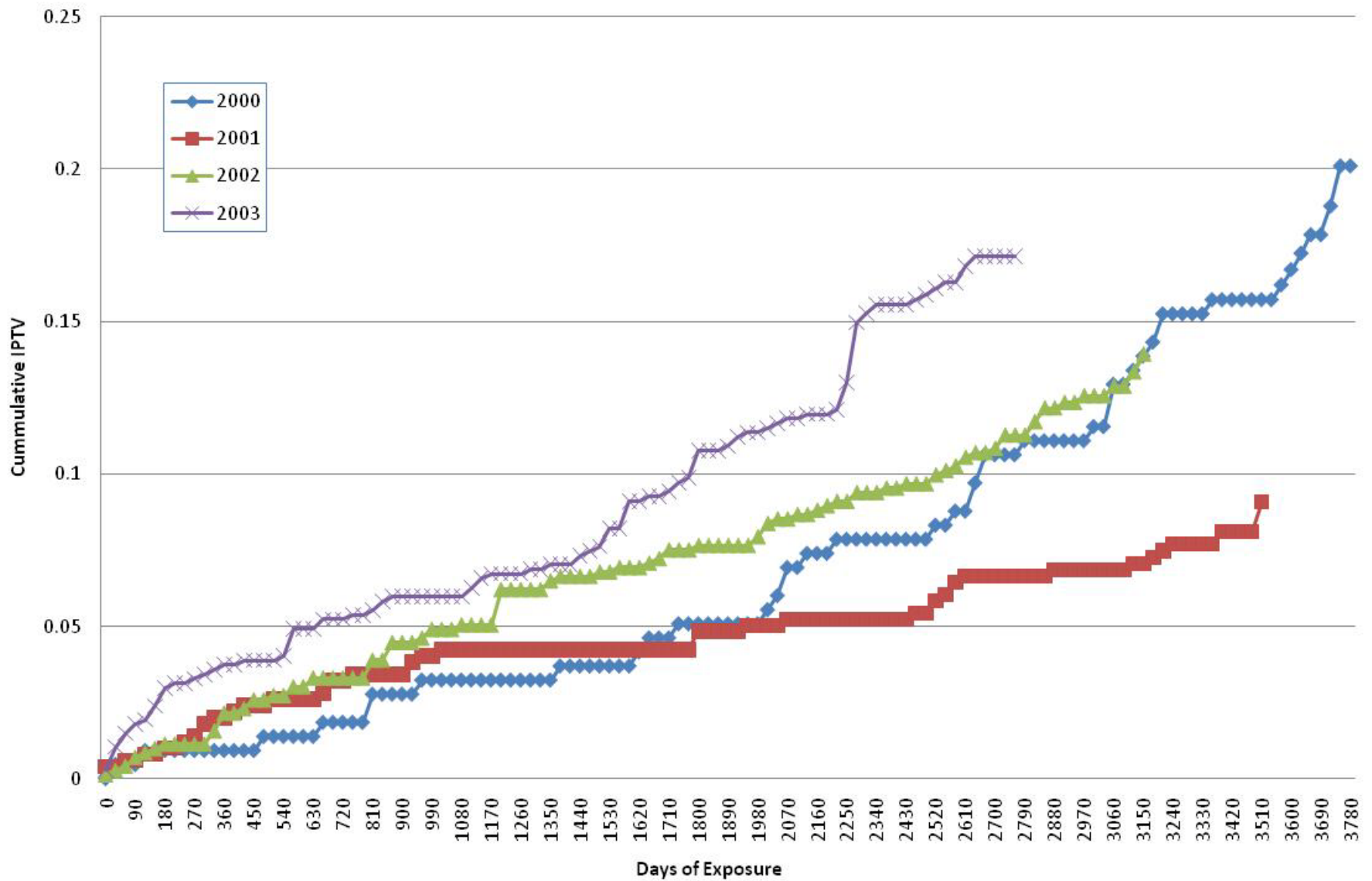
Combined Reports, Warranty, VOQs Cumulative IPTV

	1999	2000	2001	2002	2003
1080	0.095863	0.106862	0.117884	0.097672	0.110993
2760	0.299791	0.307956	0.236544	0.240647	0.344101
3150	0.353823	0.353634	0.262162	0.290921	
3480	0.364285	0.391814	0.286181		
3870	0.390652	0.458282			
4200	0.455233				

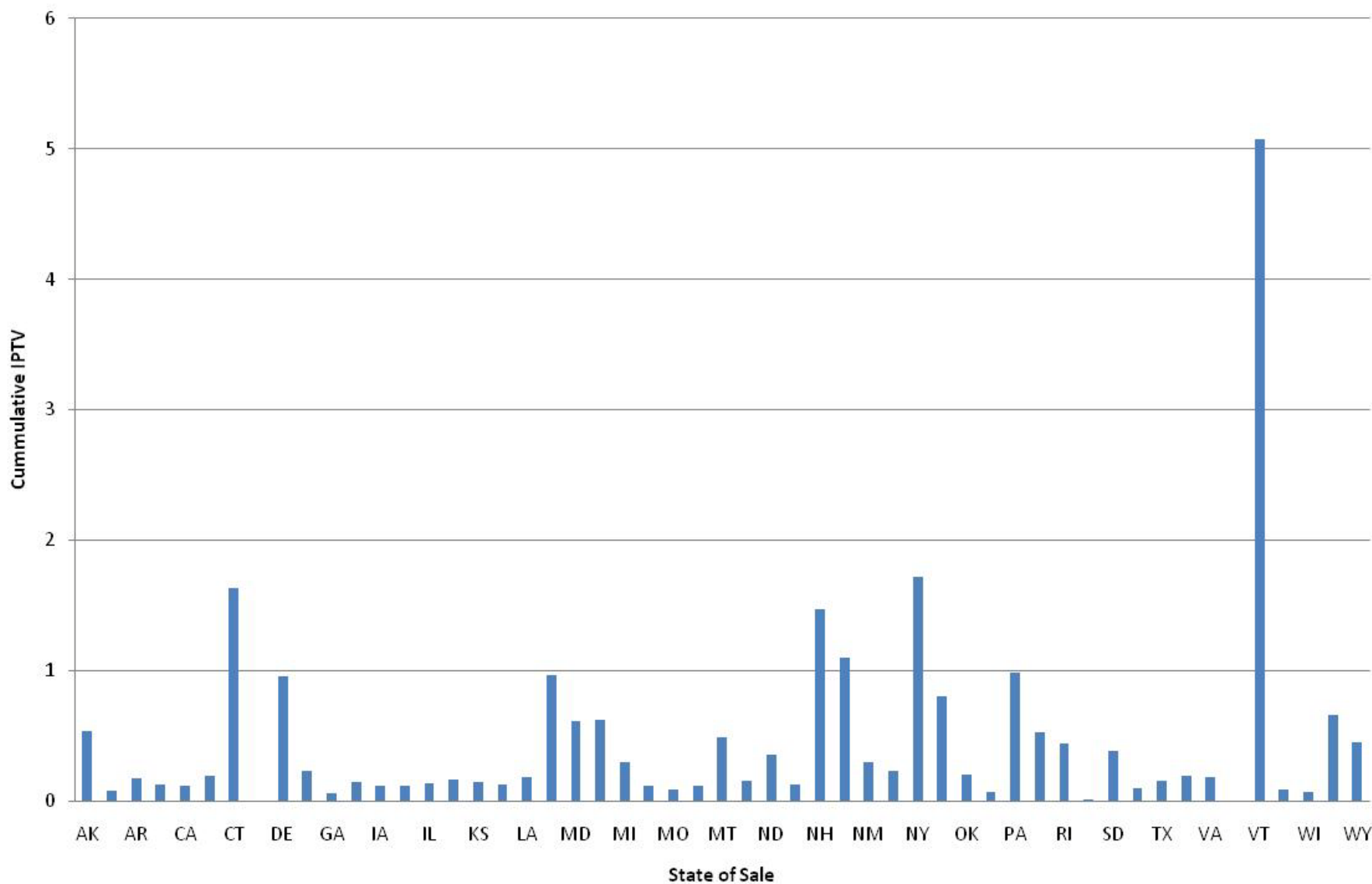
1999 to 2003 GMT800 Pickups Filtered Warranty, Reports and VOQ



2000 to 2003 GMT800 Utilities Filtered Warranty, Reports and VOQ



1999 to 2003 GMT800 Brake IR Filtered Warranty, Reports and VOQ - IPTV at 3000 Days



	1	2	3	4	5	6	7	8	9	10	11	12	
OEM	General Motors	Ford	Ford	Ford	General Motors	Mercedes-Benz USA	Ford	Toyota	Toyota	Ford	Ford	General Motors	General Motors
MY	1995-1999	1995-1996	1995-1997	1992	1999	1999-2002	2010	2010	2010	1995-1996	1997	2003-2007	1999-2003
Model	Roadmaster, LeSabre, Caprice, Impala, Bonneville, Eighty Eight	Windstar	Crown Victoria	Aerostar	C/K Trucks	ML 430/500/55 w V-8 engine	Fusion and Milan Hybrid	Prius & HS250h	Camry w / 4-cyl engine	Windstar	Crown Victoria built after March 19, 1997	CTS	GMT800 Pickups Utilities
Population	1,519,056	273,256 Non-Corr US	785,181	150,000	228,618	49,291	17,600 Built on or after October 17, 2009	148,539	7,314	293,709 Corr USCAN	43,626	155,039 Corr ALL	6,014,275
VOQ	0	9	21	7	1	3	3	523	3	None	NA	10	297 (262)
TC Report	NA	NA	NA	NA	NA	NA				3	NA	1	unknown
Cause	Rear brake hose leak by corrosion PEER IR for Ford Crown Victoria	Brake hose contact a dash panel insulator and abrade the coating and result in corrosion	Rear brake hose contact/chafe with floor pan stiffening rib and corrode	Front brake hose ruptures between rubber hose and brass fitting	Frt hose contact with the wheel rim	Brake line rupture due to contact of fuel and brake lines	software that governs the transition from regenerative braking to conventional braking can give the impression that the brakes have failed	Inconsistent brake feel after ABS actuation on rough or slick road surfaces	The left rear brake hose interfere with power steering crimp causing to wear and perforate.	Brake hose contact a dash panel insulator and abrade the coating and result in corrosion	Rear brake hose contact/chafe with floor pan stiffening rib and corrode	Front brake hose corrosion	Brake line leak resulting from corrosion.
IPTV 1-yr					0.07								
IPTV 3-yr	0.23												~0.10
IPTV 5-yr												1.1	~0.17
IPTV 7-yr										1.63 CAN 0.73 US		11	~0.28
IPTV 9-yr		~0.3	~0.53			~2.9					~3.44		99-00 ~0.39@10yrs
Field Action	None	None	None	None	Service Update (letter, inspection, replace)	Service Update (letter, inspection, replace)	Customer Satisfaction (OEM)	Safety (OEM)	Safety (OEM)	Safety (OEM)	Safety (NHTSA)	Safety (NHTSA)	TBD
Stopping Distance			49 m with full circuit and 61 m with front half circuit								49 m with full circuit and 61 m with front half circuit	46 m full circuit and average 95 m half circuit	



Scheduled Maintenance -- Gasoline Engines

+ A good time to check your brakes is during tire rotation ([Recommended every 7,500 miles](#)) . See “Brake System Inspection” under “Periodic Maintenance Inspections” in Part C of this schedule.

Part C: Periodic Maintenance Inspections

Listed in this part are inspections and services which should be performed at least twice a year (for instance, each spring and fall). *You should let your dealer’s service department or other qualified service center do these jobs. Make sure any necessary repairs are completed at once.*

Proper procedures to perform these services may be found in a service manual. See “Service and Owner Publications” in the Index.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Inspect other brake parts, including calipers, parking brake, etc. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

From 1999
Chevrolet
Silverado
Owner’s Manual
(other models similar)

Scheduled Maintenance

+ A good time to check your brakes is during tire rotation (Recommended every 7,500 miles) . See Brake System Inspection on page 6-17.

**Part C: Periodic
Maintenance Inspections**

Listed in this part are inspections and services which should be performed at least twice a year (for instance, each spring and fall). You should let your dealer’s service department do these jobs. Make sure any necessary repairs are completed at once.
Proper procedures to perform these services may be found in a service manual. See Service Publications Ordering Information on page 7-11.

Brake System Inspection

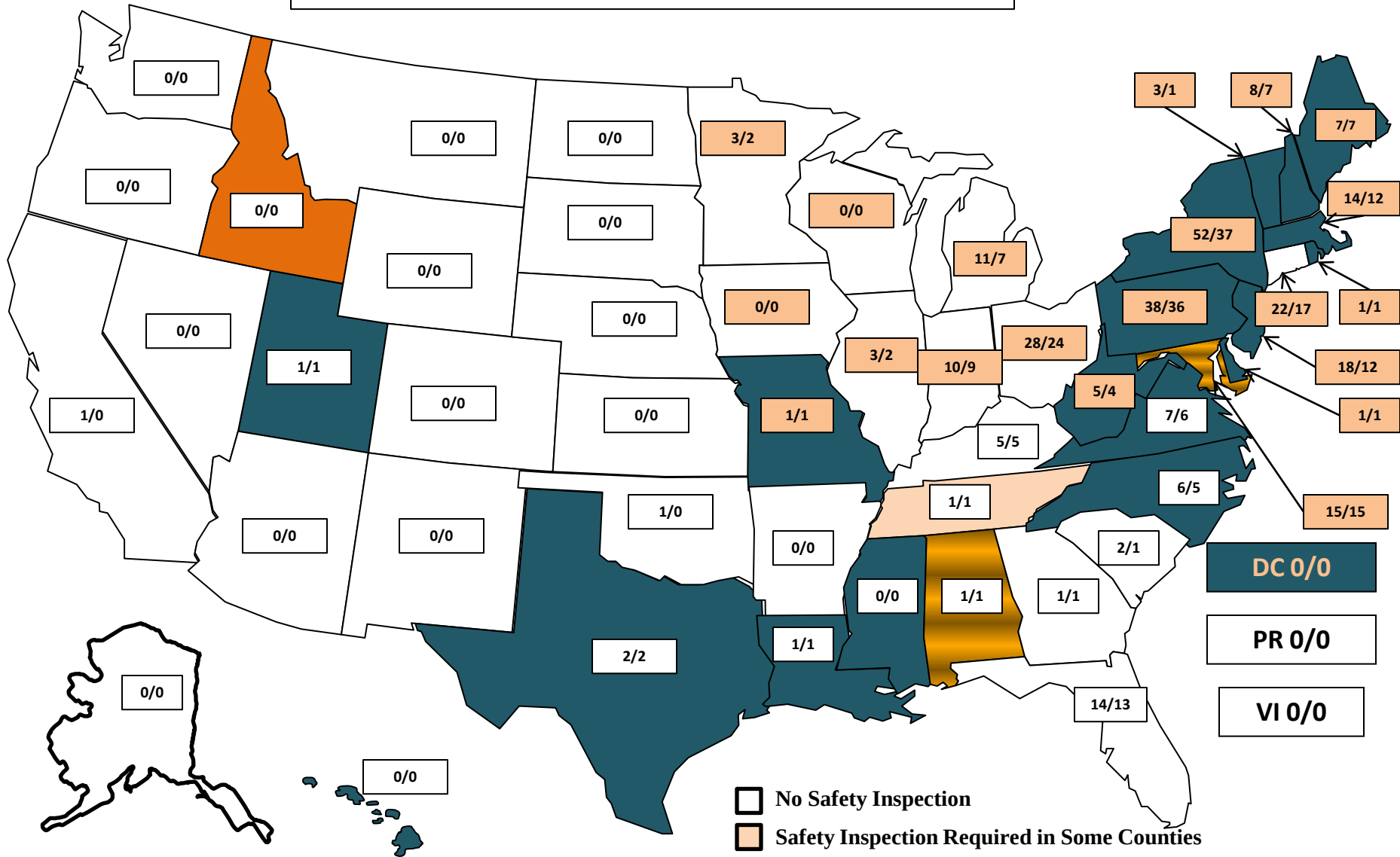
Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Inspect other brake parts, including calipers, parking brake, etc. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

From 2003
Chevrolet
Tahoe/Suburban
Owner’s Manual
(other models similar)

Location of initial VOQs from NHTSA:



VOQ Data State Vehicle Safety Inspections Corrosion States



- No Safety Inspection
- Safety Inspection Required in Some Counties
- Peace Officer Inspection when Stopping For a Violation
- Safety Inspection Required Prior To Sale Or Transfer
- Safety Inspection Required

NHTSA In VOQs/GM In VOQs
NHTSA Corrosion State

Notes:
NHTSA VOQs - 2 states unknown

Based on preliminary analysis

☐ No unreasonable risk to safety

- Low rate of occurrences
- No trends by date of build
- In the event of a leak, there will be either a fluid level or pressure differential warning light.
- In the event of a leak, there is no indication that the system performs other than intended by FMVSS 121 or FMVSS 135.
- Brake pipe design is the same as other manufacturers at that time and the same as has been used since the 1930s.
- Many vehicles more than 10 years old
- Periodic inspections of entire brake system provided in the Owner's Manual.
- May be some effect of State Safety Inspections but analysis is inconclusive

PE10-010

GM

7/2/2010

IR PE10-010 ISR

Review 2Jn10

IR PE10-010 Brake Pipe Corrosion

ISR Meeting

- On 3/29/2010 NHTSA opened PE10-010 to determine the frequency, scope and safety consequences of the alleged defect in the subject vehicles.
 - NHTSA ODI received a defect petition March 2, 2010, requesting the investigation of 2003 MY Chevrolet Silverado 2500HD 4WD pickup trucks for corrosion failures
 - The petitioner alleged a sudden loss of brake effectiveness and extended stopping distance after a corroded brake burst during a brake application.
- ODI has received 218 owner complaints for the subject vehicles.
 - 10 complaints allege that corroded brake line failure resulted in a crash.
 - No reports of injuries or fatalities.

- **Alleged defect:** fluid leaks from steel brake lines.

As detailed from discussions with NHTSA, this only includes fluid leaks resulting from corroded brake lines.

- **Subject component:** Steel brake lines.
- **Subject vehicles:** all MY 1999 through 2003 C/K series GMT800 platform pickup trucks and sport utility vehicles manufactured for sale or lease in the United States.

Subject Vehicle Counts	
Model Year	Number Vehicles
1999	574,982
2000	1,029,578
2001	1,301,362
2002	1,532,549
2003	1,575,804
Total	6,014,275

VOQ's from NHTSA to Date	
Model Year	Number VOQs
1999	41
2000	76
2001	21
2002	42
2003	38
Total	218

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/FATALITIES	FIRE
Owner Reports	291	37	4	8	1	0
Field Reports	32	0	0	0	0	0
Not-In-Suit Claims	11	*	10	10	2	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	323	37	14	18	3#	0
Total Vehicles with Reports (Unique VIN)	315	34	*	*	*	0

Preliminary data - GM REPORTS N100097 – PE10-010

*Values from these categories not currently available and not included in totals cross checks not complete

No Fatalities

Warranty Summary

Preliminary data

Month of Build Max. Cumulative IPTV

All Models	.47 (8/99)
Pickup Models	.78 (7/02)
Utility Models	.34 (7/03)

Time To Repair Month of Build Max. Cumulative IPTV

All Models	.27 @2730 days ~7.5 years (2003)
Pickup Models	.36 @2730 days ~7.5 years (2003)
Utility Models	.14 @2280 days ~6.3 years (2003)

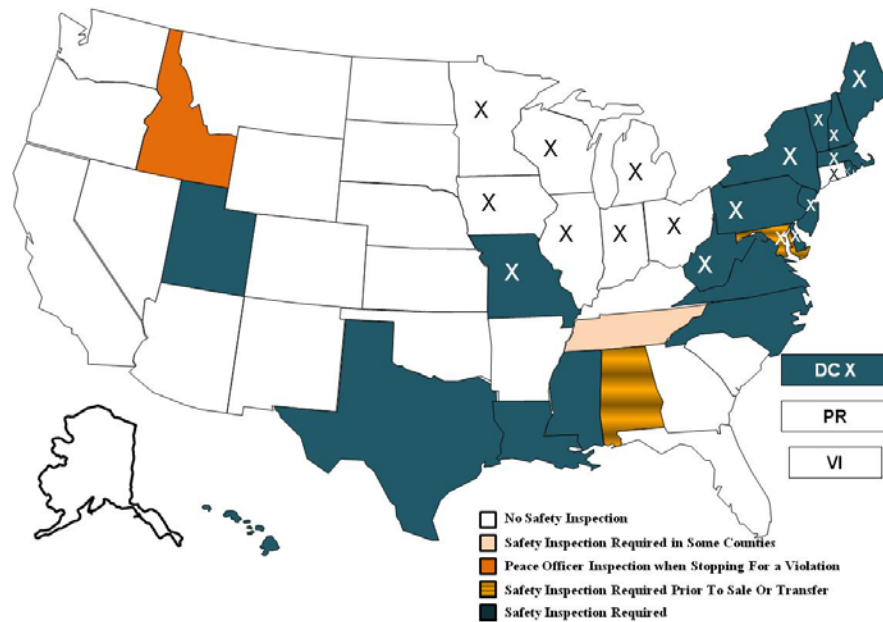
State Analysis IPTV at 5 Years Exposure

All Models	2.93 (Vermont) .72 (New Hampshire – next highest)
Pickup Models	3.02 (Vermont) .95 (New York – next highest)
Utility Models	2.46 (Vermont) .30 (New York – next highest)

Location of initial VOQs from NHTSA:

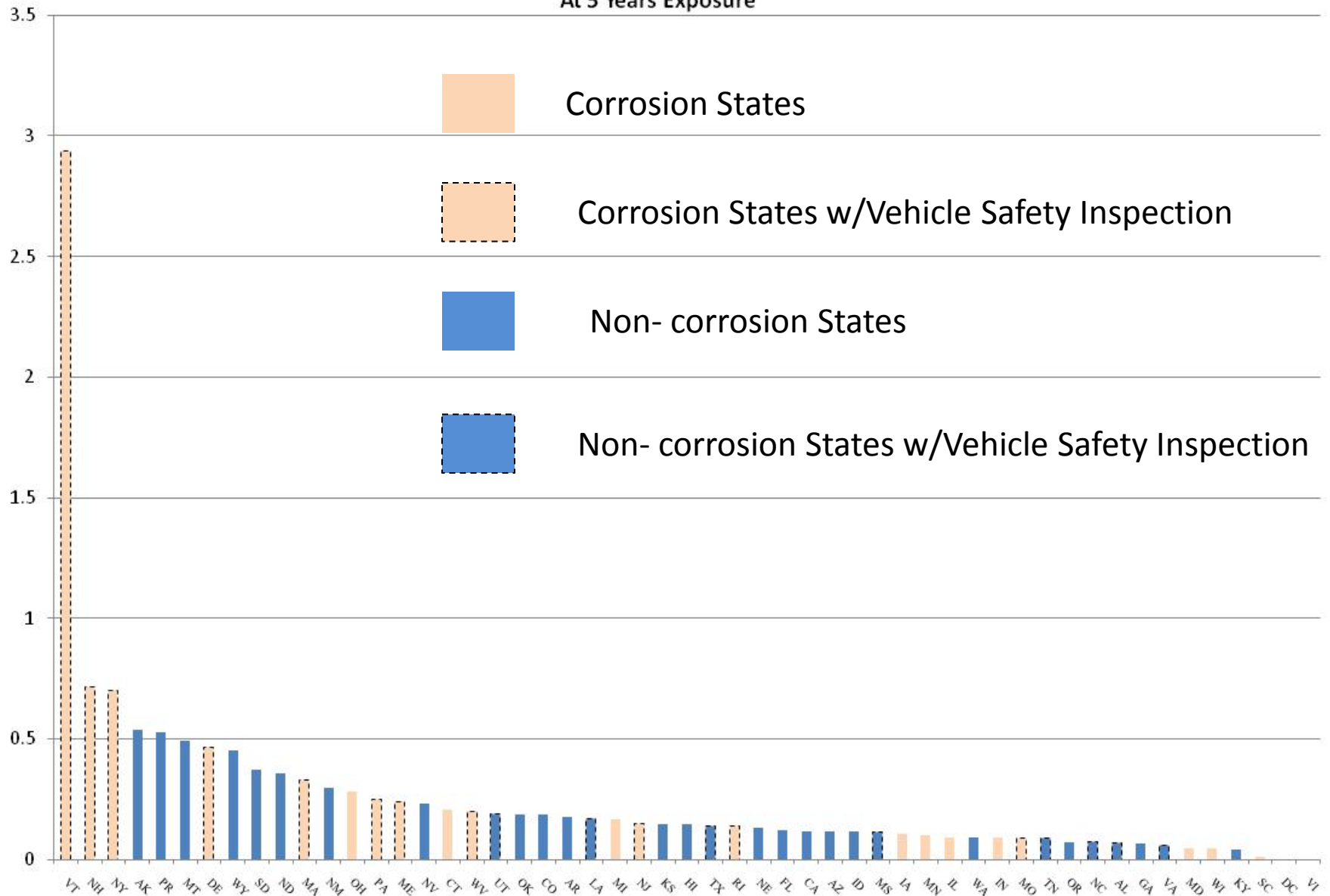


State Vehicle Safety Inspections



1999 to 2003 GMT800 - Filtered Warranty - Brake Corrosion

At 5 Years Exposure



Status

- IR response originally due on June 18, 2010
 - Have requested and received an extension to July 2nd.
 - Responses to Questions 1-6 will be supplied by the original date.
- Engineering inspection of subject vehicles owned by GM personnel to occur on June 2.
- Projection for FPERC presentation projection of Risk Assessment is July 2nd.

Backup

Injury Summary N10097

██████████ ██████████ NISM

From PAR:

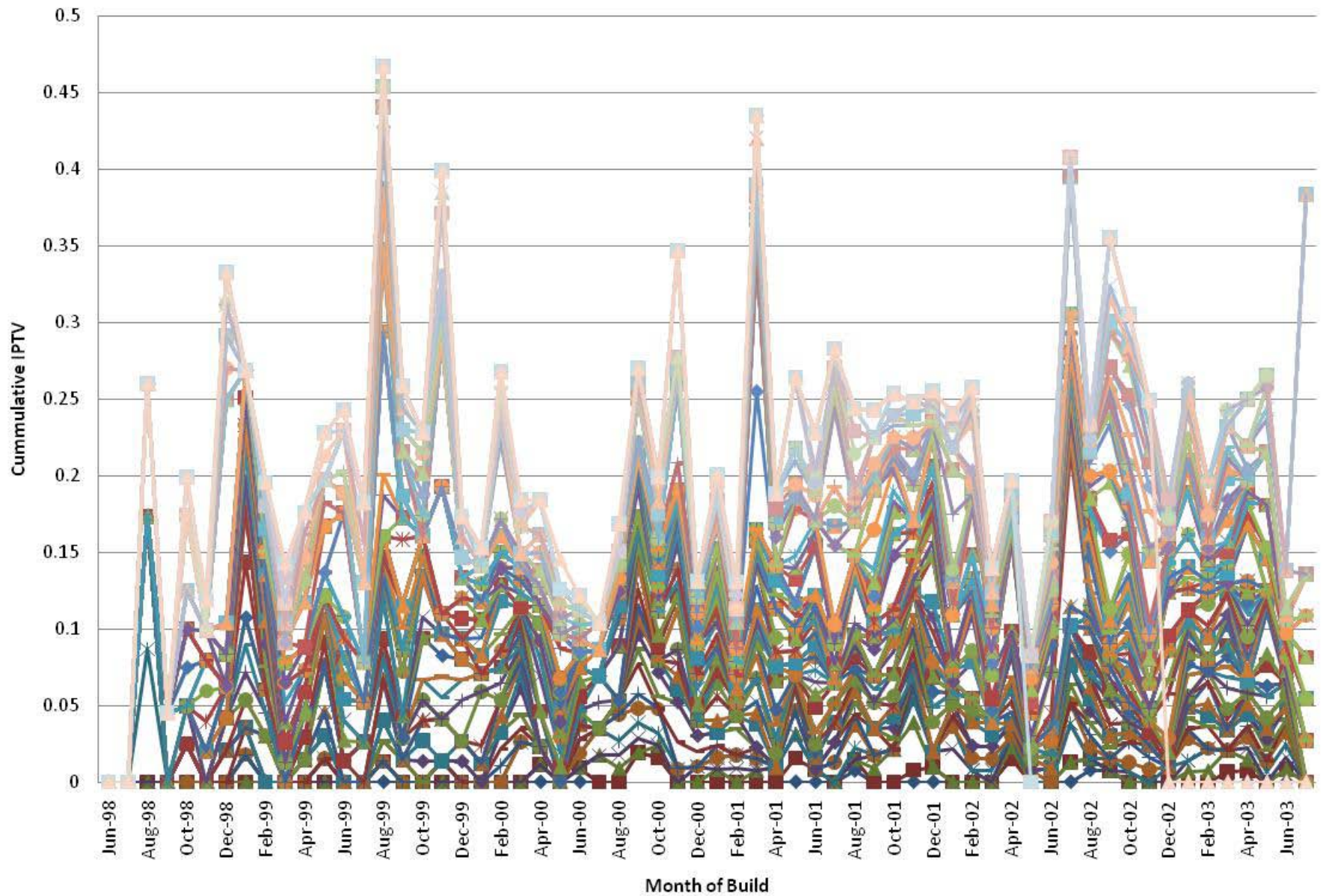
Customer was driving he hit one vehicle from behind and it hit another vehicle in front of it. Customer says the people in the first vehicle he hit are claiming injuries – 4 people in vehicle – no information regarding injuries how many or extent of injuries. Customer then states in the other vehicle 3 people are claiming injuries, no information regarding injuries how many or extent of injuries.

████████████████████ NISM

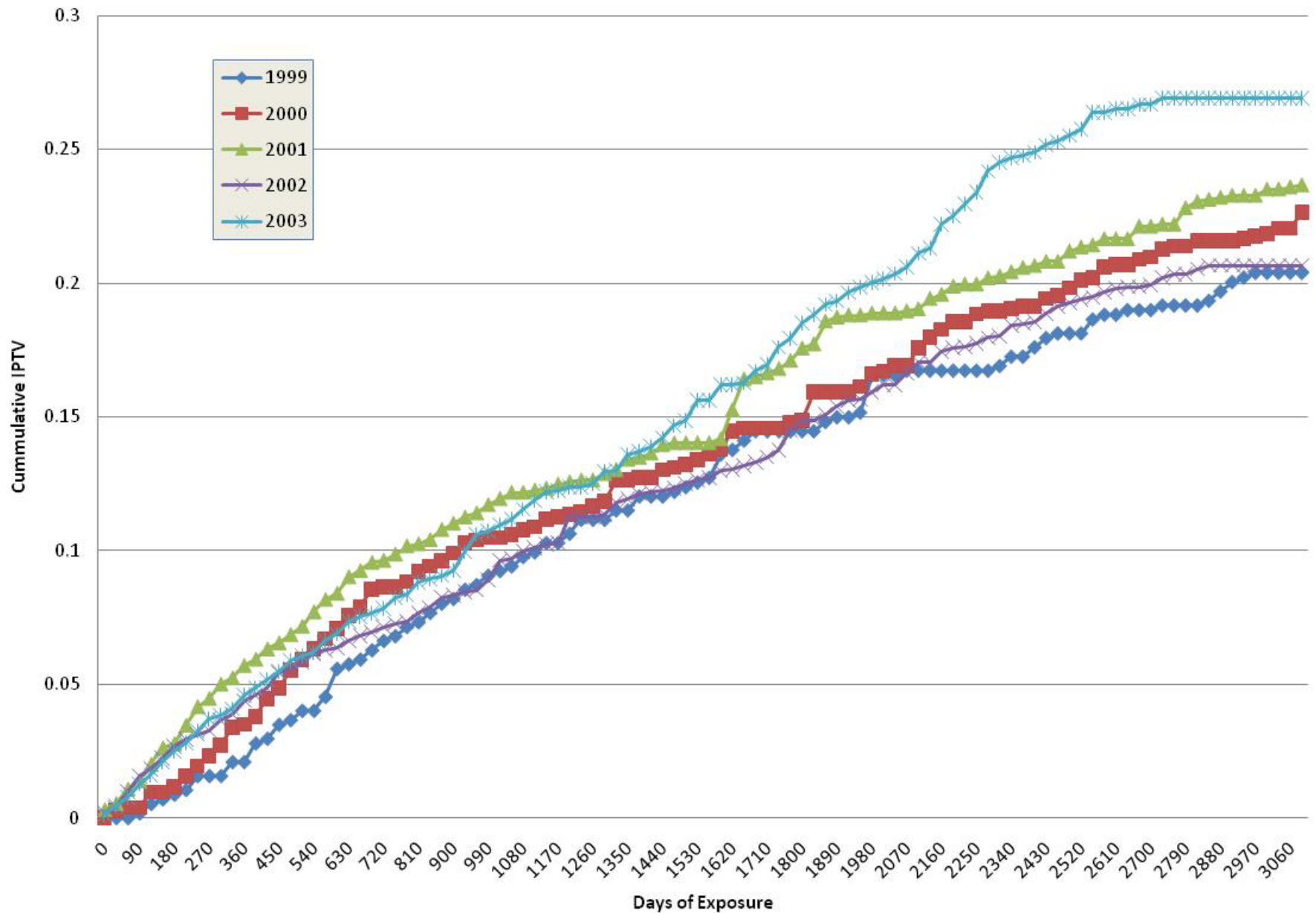
From PAR:

Customer hit another vehicle; rear ended a vehicle because the brakes failed. Driver of the vehicle that was hit had bruises and was sore but refused medical treatment. This NISM matches a Siebel Record 71-745982673 and that is the 1 record with injury for owner reports in the table.

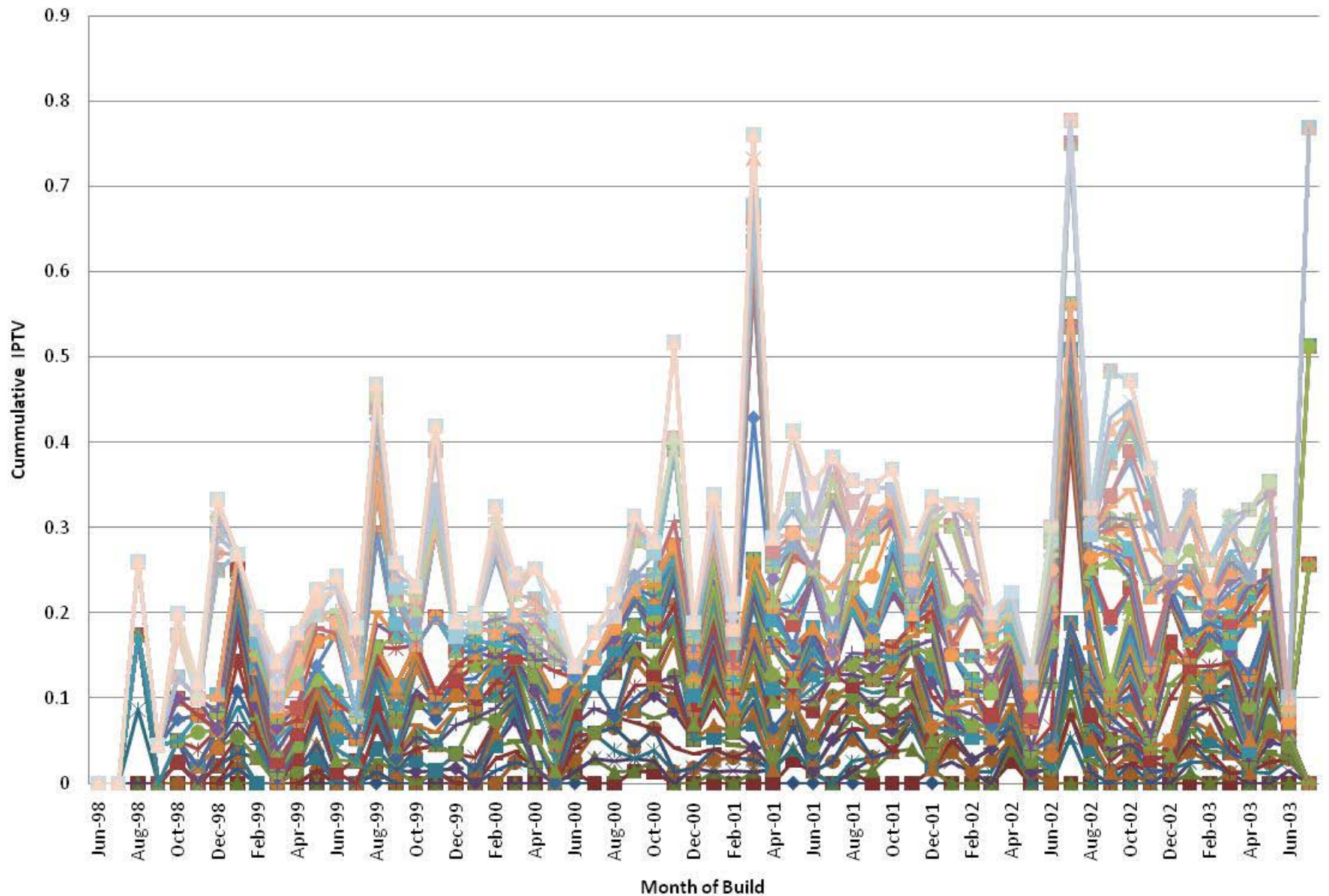
1999 to 2003 GMT800 - Brake Corrosion Issue - Filtered Warranty



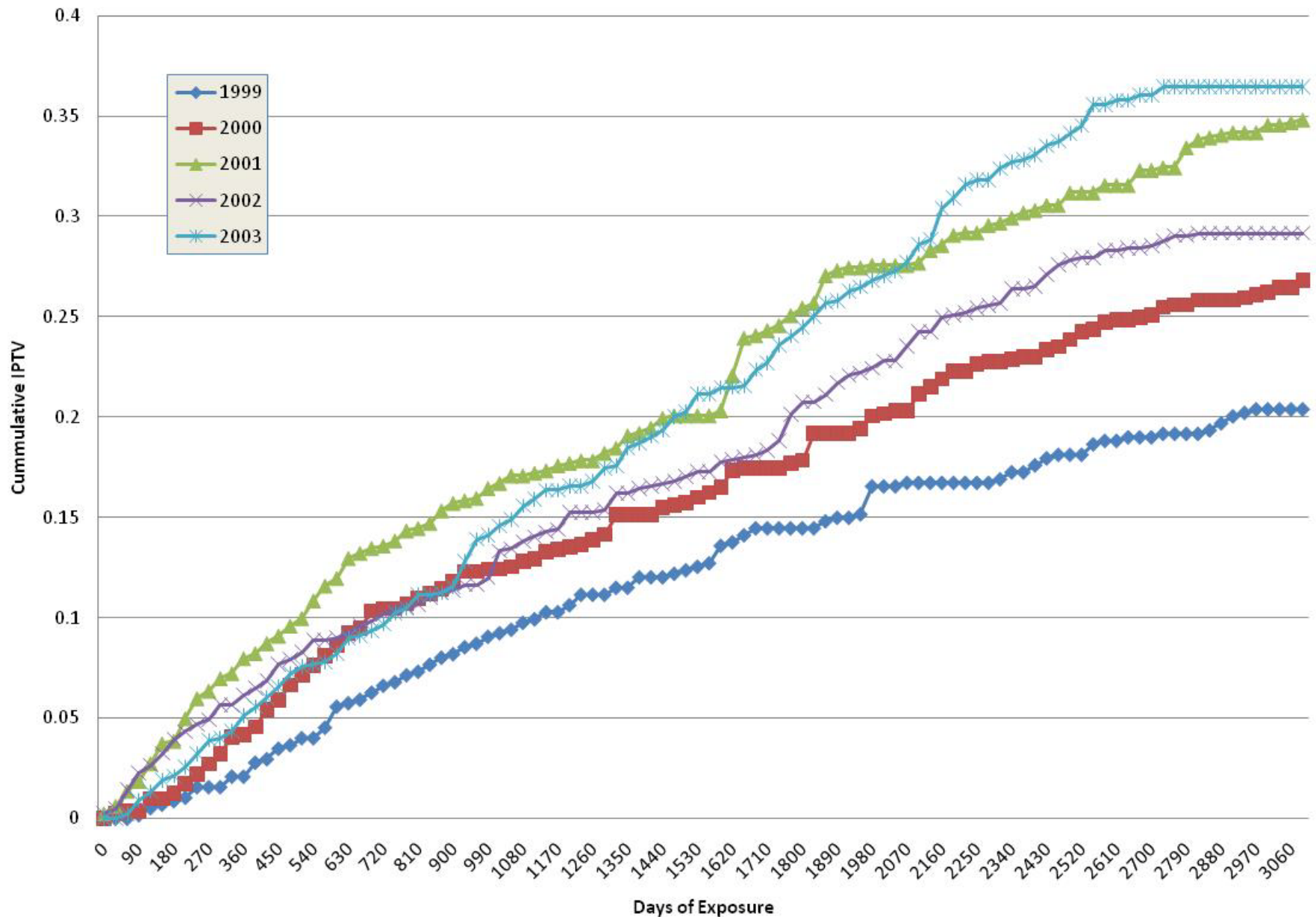
1999 to 2003 GMT800 - Brake Corrosion - Filtered Warranty



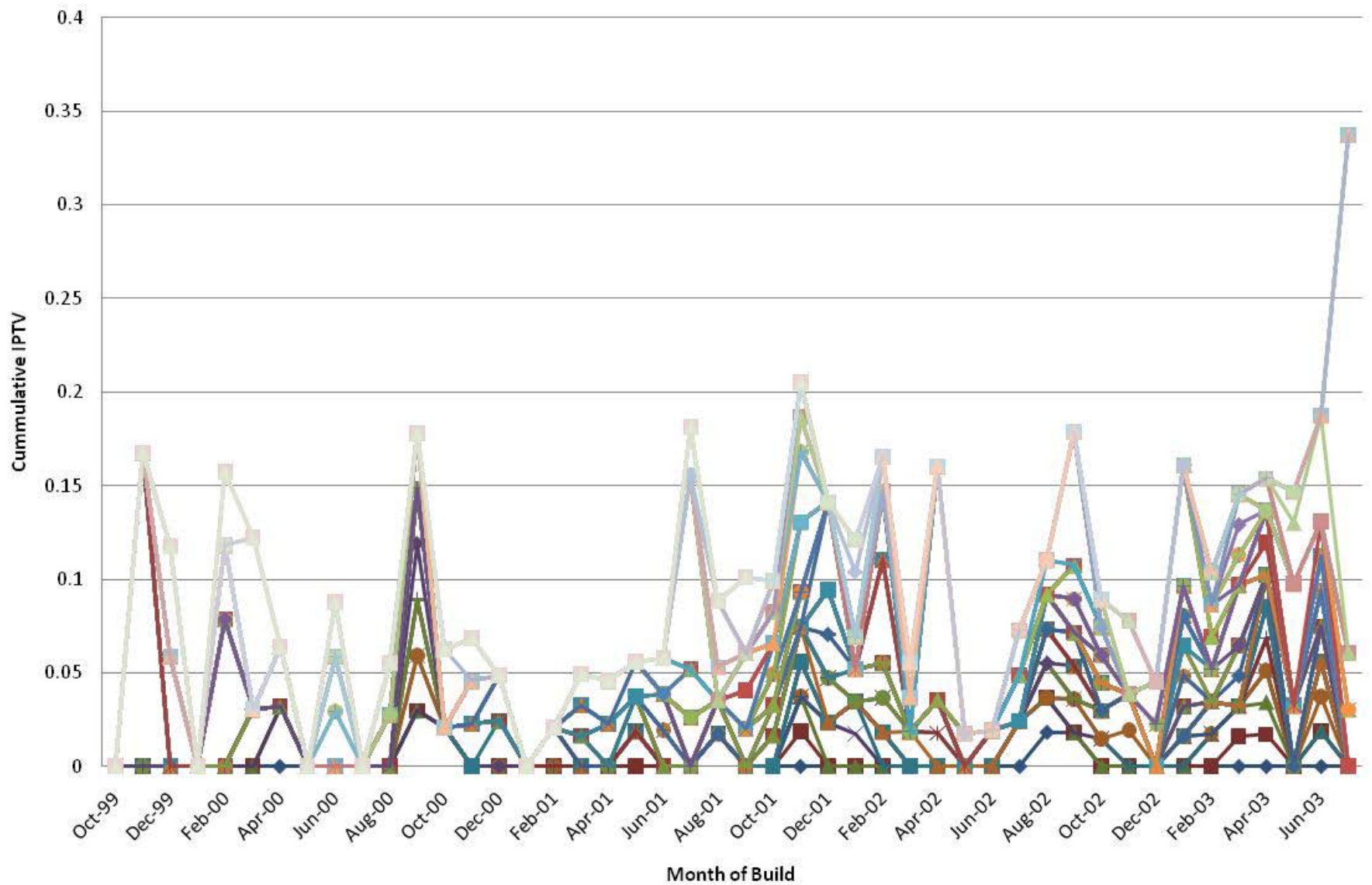
1999 to 2003 GMT800 Pickups - Filtered Warranty - Brake Corrosion



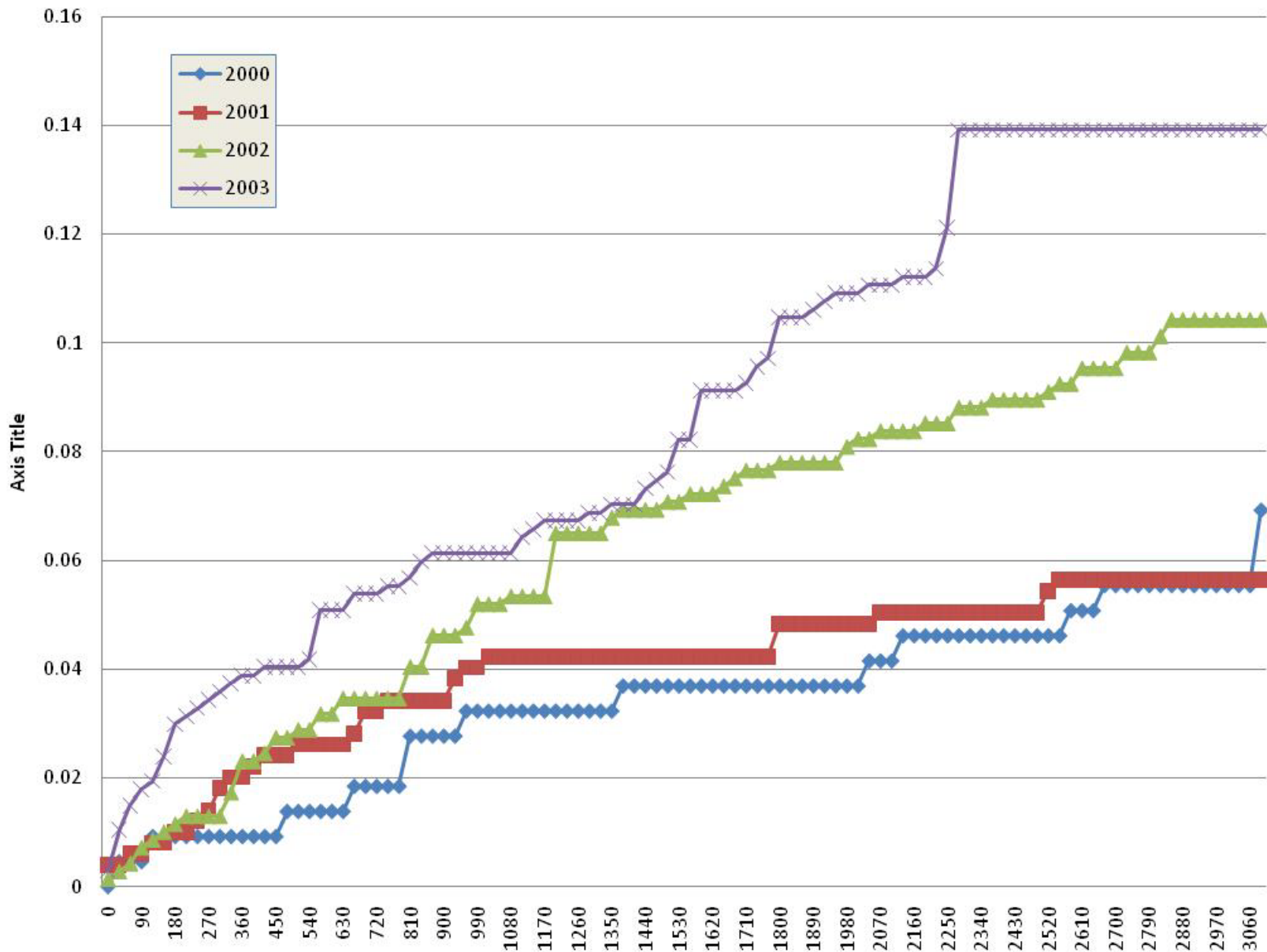
1999 to 2003 GMT800 Pickups - Filtered Warranty - Brake Corrosion



2000 to 2003 GMT800 Utilities - Filtered Warranty - Brake Corrosion

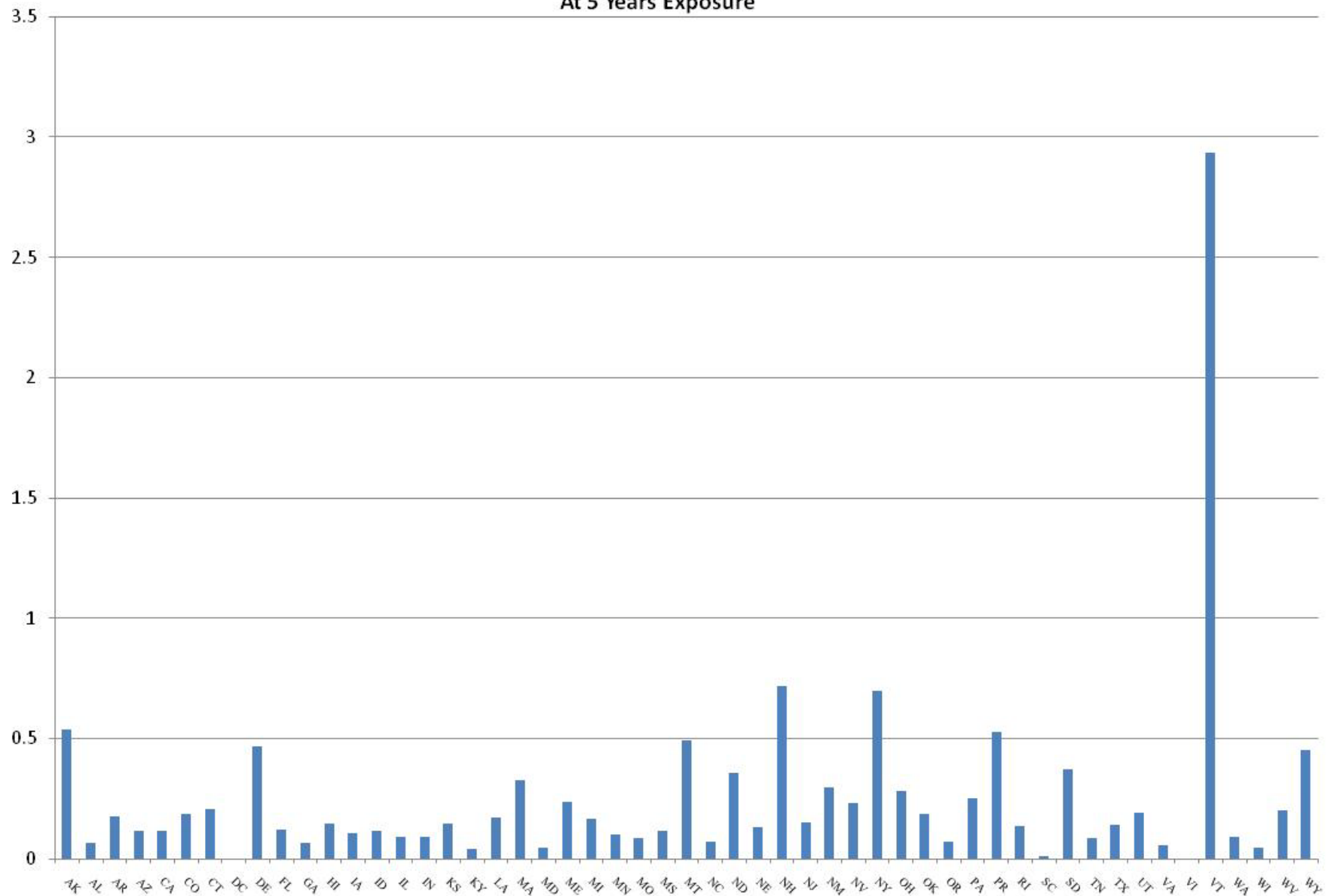


2000 to 2003 GMT800 Utilities - Filtered Warranty - Brake Corrosion

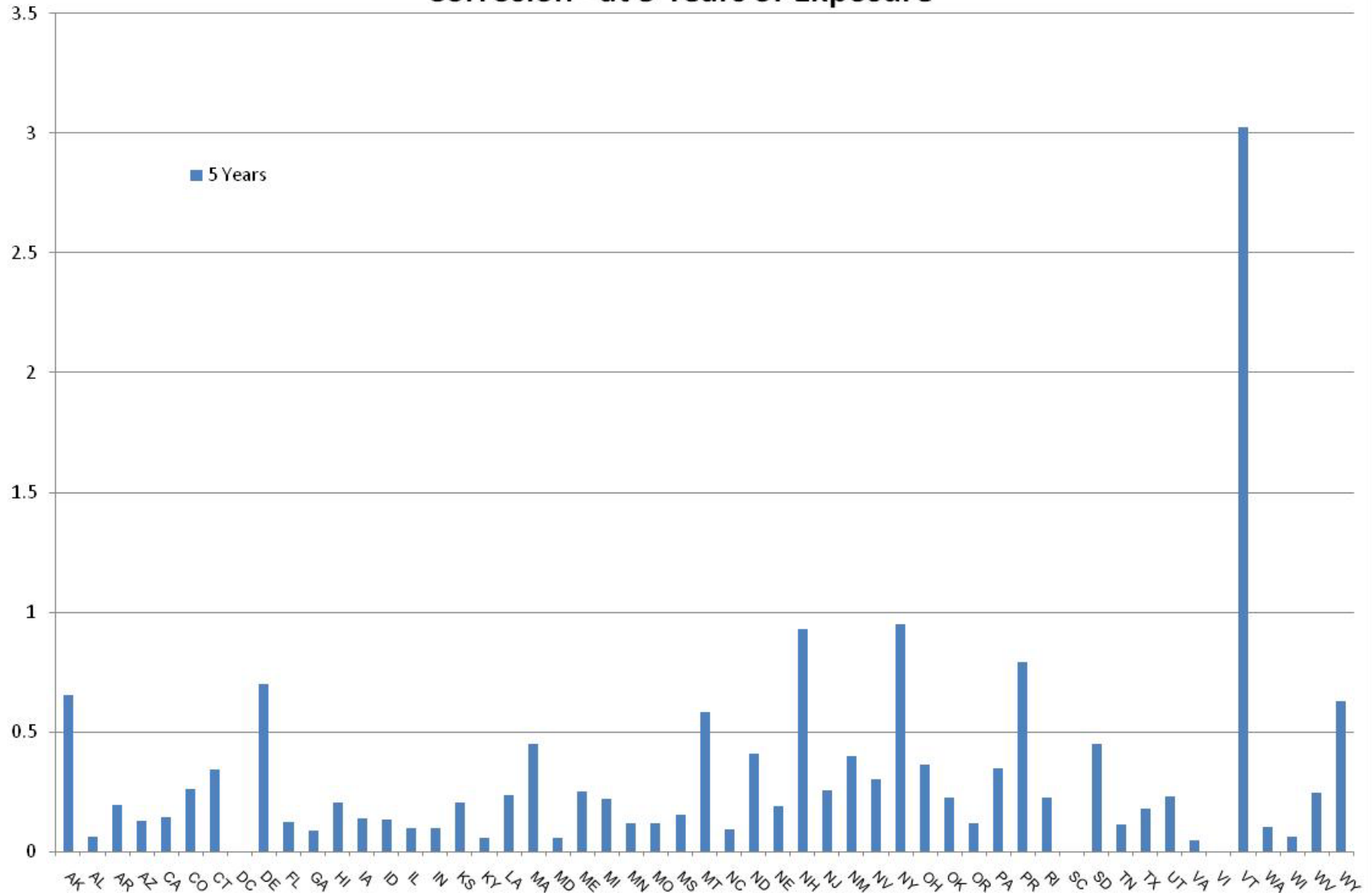


1999 to 2003 GMT800 - Filtered Warranty - Brake Corrosion

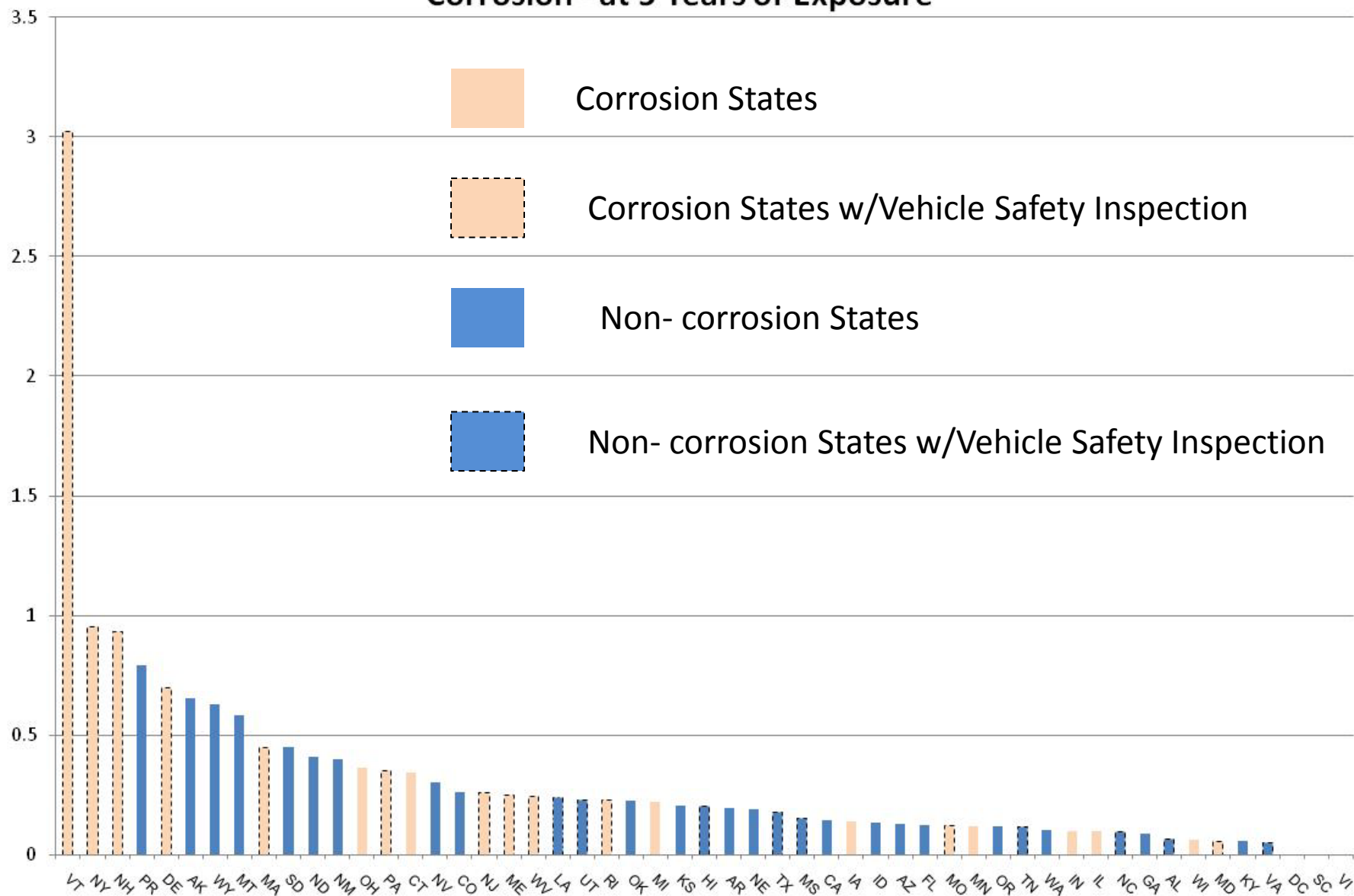
At 5 Years Exposure



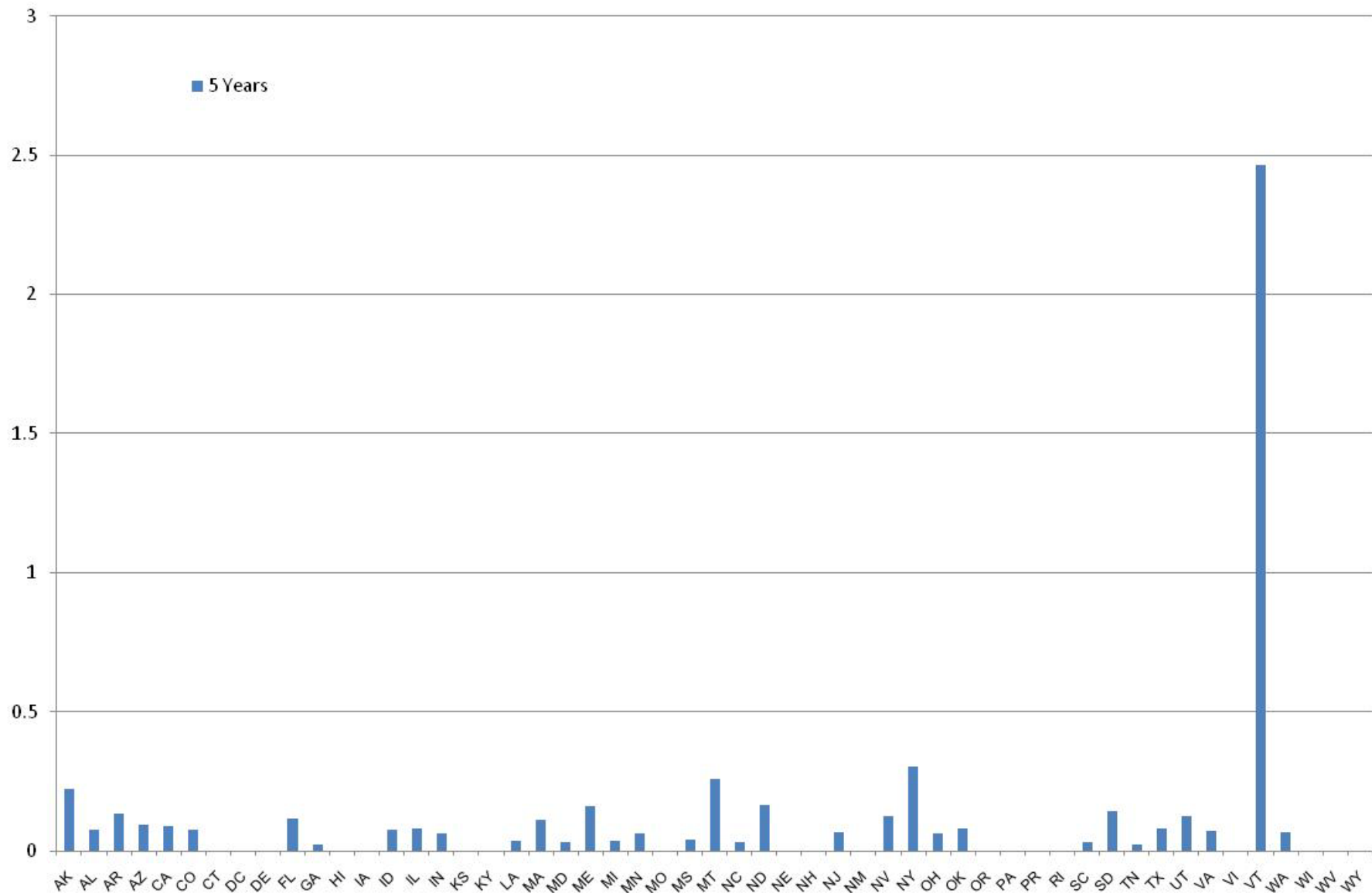
1999 to 2003 GMT800 - Pickups Only - Filtered Warranty - Brake Corrosion - at 5 Years of Exposure



1999 to 2003 GMT800 - Pickups Only - Filtered Warranty - Brake Corrosion - at 5 Years of Exposure

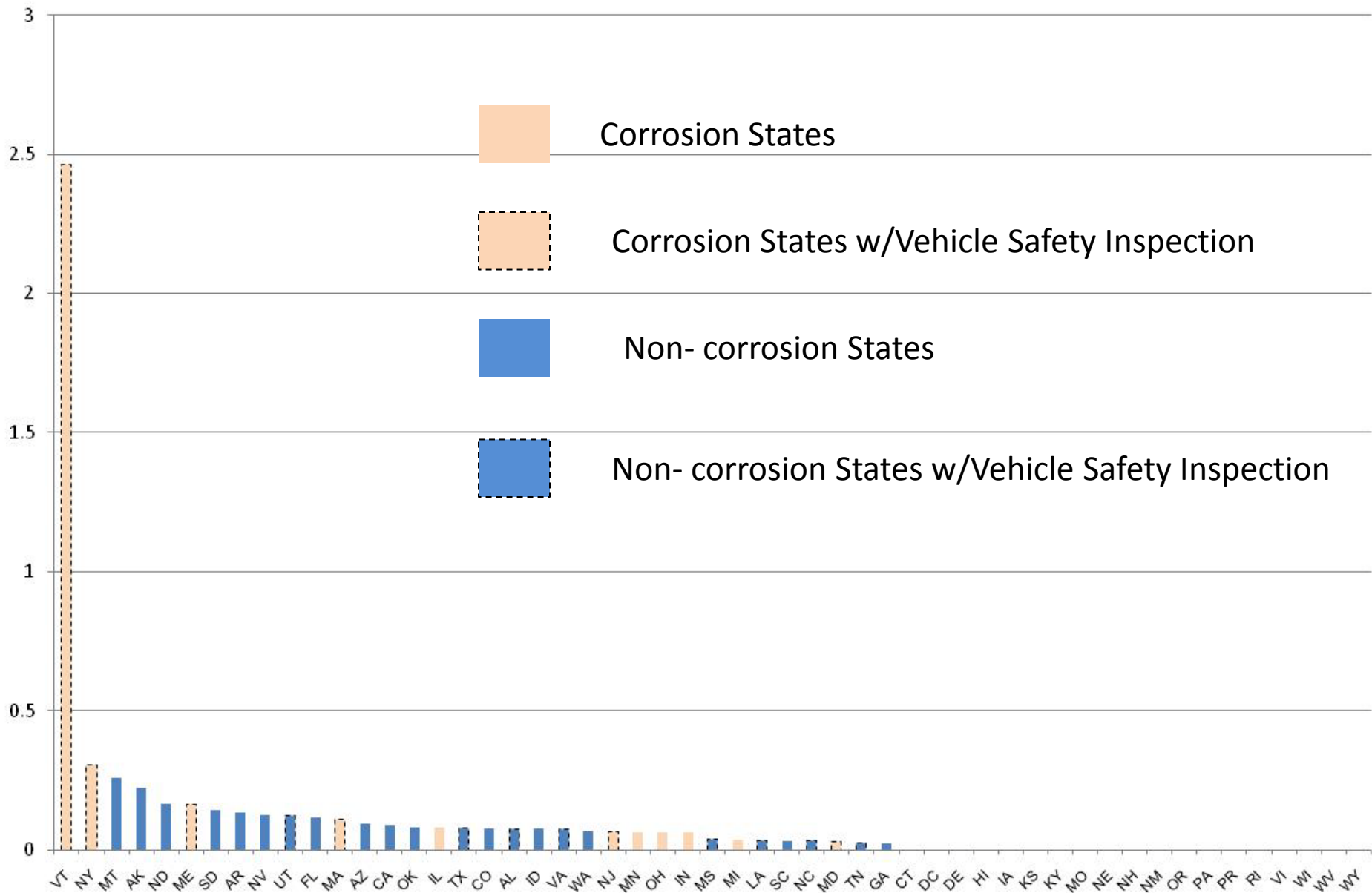


2000 to 2003 GMT800 - Filtered Warranty - Brake Corrosion at 5 Years Exposure



2000 to 2003 GMT800 - Utilities - Filtered Warranty - Brake Corrosion

at 5 Years Exposure



Vermont Vehicle Safety Inspection

Brake Requirements

Brakes:

- Check for brake failure and ABS indicator lamp operation
- Check brake system integrity
- Check parking brake functionality
- Check brake failure lamp
- Check master cylinder lines and wheel brakes for signs of leakage
- Check brake hoses for integrity, cracks, and wear
- Road test brakes (stop within 25 feet at 20 mph)

New Hampshire Vehicle Safety Inspection

Brake Requirements

(17) Hydraulic hoses, tubing or connections are leaking, chaffed, restricted, crimped, cracked, broken, corroded, flattened or insecurely fastened;

Code's for N100097								
IN/OUT	Code 1	Code 1 Code Definition:	Code 2	Code 2 Code Definition:	Code 3	Code 3 Code Definition:	Code 4	Code 4 Code Definition:
IN	Rusty Line With Leak	Rusty, Corroded, Corrosion, Pitted, Brake Line that is Leaking, Dripping, Oozing, Wet	Brake Failure	Alleged Brake Failure	All Brake Lines	All Brake Lines failed or were replaced	Not in motion	Vehicle was not in Motion was parked, starting vehicle and putting in gear,
IN/OUT	Rusty Lines No Mention of Leak	Rusty, Corroded, Corrosion, Pitted, Brake Line that there is no mention of it Leaking, Dripping, Oozing, or Wet but may have symptoms indicated in Code 2 Like Brake Failure, No Brakes, Low Brake Pedal, Hard to Stop, Brake Pedal got Softer Over Time	No Brakes	Alleged No Brake	Under hood Brake Lines	Under hood Brake Lines failed or were replaced	Below 10mph-Parking lot	Vehicle in Motion below 10 mph, in a parking lot, in a driveway, backing up with vehicle
OUT	Rusty No Leak	Rusty, Corroded, Corrosion, Pitted, Brake Line that is indicated that they are NOT Leaking, Dripping, Oozing or are Wet	Low Brake Pedal	Brake Pedal is Low, Brake Pedal is Soft, Excessive braking effort as Low or soft Brake Pedal,	Front Brake Lines	Front Brake Lines failed or were replaced	Speed 11-30 mph	Vehicle in Motion speed between 11-30 mph, driving on residential street
IN	Line Failure	Indicated that Brake Line Failure, and is Leaking, Dripping, Oozing, Wet	Hard to Stop	Vehicle Hard to Stop, Excessive braking effort,	Rear Brake Lines	Rear Brake Lines failed or were replaced	Speed 31-55 mph	Vehicle in Motion speed between 31-55 mph, driving on main road, on rural two lane road,
IN	Brake Fluid Visible	Brake Fluid noticeable, like Leaking, Dripping, Oozing, Wet, puddle on floor or ground	Brake Pedal got Softer Over Time	Gradual Occurrence over time, Brake Pedal got Softer Over Time	Chassis under Driver	Brake Lines at Chassis under Driver failed or were replaced	Speed 56 mph or Expressway	Vehicle in Motion speed between 56 mph and above, driving on Expressway, Highway, Toll Road, Turn Pike,
IN	Brake Line Leak	Brake Line that is Leaking, Dripping, Oozing, Wet but NO Mention of the line being Rusty, Corroded, Corrosion, Pitted,	Failed Inspection	Failed safety Inspection, Discovered by Inspection	Rear Axle Brake Line	Brake Lines on the rear axle failed or were replaced	Unknown Speed traveling	Vehicle in Motion but speed not mentioned
OUT	Request Info Only	Request for Information Only, Customer calling asking questions on recall or other information but NOT that they had a problem.	Unrelated Issue	Totally Unrelated Issue	Not indicated	Unknown Not enough information to be Coded with any other Codes, not specific enough Information, Not	Unknown	Unknown Not enough information to be Coded with any other Codes.
OUT	Rear Caliper Leak	Service Bulletin # 04-05-23-001, Low Brake Pedal, Red Brake Light On, Brake System Warning Message On (Tighten Rear Brake Caliper Banjo Bolts, Replace Gaskets and Install Shields)	No Mention of Failure	No Mention of Failure or Leak				
OUT	Other Brake	Other type of Brake Issue or complaint but not rusty lines or line leaking, Non Steel flexible line leak. Or Service Information # 00093A: Product Safety - Front Brake Pipe Contact with Body Cross Sill. Or Service Information # 00024: Customer Satisfaction-Front Brake Hose Abrasion	Brake Pedal to the Floor	Brake Pedal goes to floor, Excessive braking effort as Brake Pedal goes to floor,				
OUT	Unknown	Unknown Not enough information to be Coded with any other Codes.	Unknown	Unknown Not enough information to be Coded with any other Codes.				
		Yes/No	Warning Light or Chime					
		Yes/No	DIC Warning Message					
		Yes/No	DTC-Diagnostic Trouble Code Indicated					
Location of this Code file:		S:\PRODUCT INVESTIGATIONS\NHTSA Investigations\N100097-PE10-010 C-K Pickup and SUV Brake Line\N100097 Codes.xls						
Database Location:		S:\PRODUCT INVESTIGATIONS\Databases\IR\NHTSA Apps\N100097 Siebel.mdb						

VEHICLE	EOVP Recall (initiated by)	RATE INFORMATION	CAUSE	VOQs (VOQ/1K)
General Motors 1999 C/K Trucks 228,618 Vehicles	Loss of front braking effectiveness.	1 Complaint	Front brake hose contact with the wheel rim may result if front brake calipers are removed improperly.	1
		16 Warr Claims		0
	GM Service Campaign -> NHTSA called it a "Safety Improvement Campaign" 00X001000 (PE99003) (NHTSA)	0.07 IPTV @ 12 MIS		
General Motors 1995-1999 Roadmaster, LeSabre, Caprice, Impala, Bonneville, Eighty Eight 1,519,056 vehicles	Extended stopping distance.	22 Complaints	Rear brake line leakage caused by corrosion.	0
		320 Warranty Claims		
	No Field Action - EA03012 GM-660 Peer IR requested by Ford	0.01 IPTV Complaints		
		0.21 IPTV@36 MIS Warranty		
General Motors 2004 XLR, 2005 XLR & C6 5,914 vehs	Increased pedal travel & stopping distance. Fluid can contact hot exhaust components.	Present on:	Rear brake line contact with the exhaust manifold or pipe, or rear drive differential	0
	Recall 04V5250000 (040086) (Mfg)	93% of XLRs		
		50% of C6s		
Ford 1995-1997 Crown Victoria 785,181 Vehicles	NHTSA EA03-012 Brake pedal may develop a spongy feel and drops of brake fluid may be observed under vehicle. Brake performance may be compromised and stopping distance could be extended which could lead to a crash.	0.16 Mfg Complaint IPTV 0.53 Warranty IPTV@ ~ 9 yrs	Rear brake line may chafe due to contact between it & a floor pan stiffening rib. EA03-012 opened July 25, 2003, closed April 11, 2005. Peer IR sent to GM and Daimler Chrysler rates were low for both. Ford notified ODI it would do a Customer Satisfaction program. Ford's position is that the subject condition does not represent an unreasonable risk to motor vehicle safety because the brake fluid leakage that results from an abraded rear brake line is minimal and there is no notable affect on stopping distance until well after the low fluid indicator light has been illuminated. ODI believes that the facts in this investigation show otherwise because the insufficient clearance in the routing of those brake lines may result in leaks that may result in increased stopping distances. ODI is designating the campaign a safety recall 05V-086. ON CERTAIN PASSENGER VEHICLES (43,626) BUILT AFTER MARCH 19, 1997 WITH ELECTRONIC TRACTION CONTROL, THESE VEHICLES HAVE AN ADDITIONAL REAR BRAKE LINE AND A MASTIC PATCH CAUSING REDUCED CLEARANCE THAT DUE TO CONTACT BETWEEN IT AND A FLOOR PAN STIFFENING RIB, MAY ABRABE AND CORRODE AND A BRAKE FLUID LEAK MAY OCCUR. PREVIOUS TESTING CONDUCTED BY FORD SHOWED THAT APPROXIMATELY 60 HIGH-DELERATION STOPS COULD BE PERFORMED WITH A LEAKING BRAKE LINE BEFORE THE WARNING LAMP WOULD BE ILLUMINATED AND THAT "NUMEROUS ADDITIONAL HIGH DECELERATION STOPS CAN BE MADE" AFTER THE WARNING WITH NO NOTABLE EFFECT ON STOPPING DISTANCE. DURING THIS PERIOD, THE OPERATOR MAY NOTICE A SOFT BRAKE PEDAL FEEL, INCREASED PEDAL TRAVEL OR BRAKE FLUID ON THE PAVEMENT AFTER PARKING. IF THE CONDITION IS NOT ADDRESSED AND THE FLUID IS COMPLETELY DRAINED FROM THE REAR BRAKE SYSTEM RESEVOIR, FORDS TESTING SHOWED THAT THE STOPPING DISTANCE FROM 60 MPH INCRESSES FROM ABOUT 160 FT WITH A FULL BRAKE SYSTEM TO ABOUT 200 FT WITH LOSS OF THE REAR CIRCUIT.	21
Ford 1997 Crown Victoria built after March 19, 1997 43,626 Vehicles	Recall 05V086000 (NHTSA EA03012) see recall file, recall data is subset of IR closing resume data	1.17 mfg Complaint IPTV 3.44 Warranty claim IPTV@ ~9 yrs.		-0.03
				2 w/crashes

Ford	If hose is damaged, brake fluid could leak and stopping distances may be increased.	Not available	Left front brake hose was damaged during final assembly.	Not available
2001 F150	Recall 01V095000 (Mfg)			
670 Vehicles				
Ford	Extended stopping distance.	Not available	Front brake hose ruptures or fails at the interface between the rubber hose and the brass fitting resulting in loss of brake fluid.	7
1992 Aerostar				-0.05
150,000 vehicles	No Field Action. (PE99035)			2 w/crashes
Ford	Extended stopping distance.	59 complaints, 2 w/crashes	Ford notified ODI of mis-positioned brake lines that could contact a dash panel insulator which could abrade the protective brake line coating and result in corrosive failure of the lines.	9
1995-1996 Windstar		14 warranty claims		-0.03
273,256 vehicles	No field action. (RQ04003) – rate was determined to be low outside of corrosion states (ref recall 02V10100) (Mfg)	0.3 IPTV@ ~ 9 yrs		
Ford	Leaking of brake fluid will result in brake light activation, extended stopping distance and increased risk of a crash.	Canada: 31 reports and 37 warranty 1.63 IPTV	Mis-positioned brake lines that could contact a dash panel insulator which could abrade the protective brake line coating and result in corrosive failure of the lines.	3 (CA)
1995-1996 Windstar 43,426 veh (CAN)	Recall 02V101000 (Mfg, TC initiated) (Corrosion States)	U.S.: 182 Owner & Field reports		
250,283 vehicles (U.S.)		U.S. 0.73 IPTV @ 7 yr		
Mercedes-Benz USA	Extended stopping distance.	18 complaints	Brake line rupture due to contact between fuel and brake lines.	3 VOQ
1999-2002	EA08009 (NHTSA) closed Dec09 due to low rate of “leaks”: Leaks: 36.5 complaints/100K, & 2.9 IPTV warranty rate	125 warranty claims		(0.06)
ML 430/500/55 w V-8 engine	And low rate of “leakage that resulted in allegations of reduced brake effectiveness”: 22.3 complaints/100K, & 0.4 IPTV warranty rate	2.9 IPTV@ 9 yr		
49,291 vehicles	Service Update (Customer letter, inspection, Replacement as needed)			
Gen Motors 2003-2007	When one of the front brake hose joints break, some customers may experience one or more the following conditions:	1.1 @ 5 yr 11.0 @ 7 yr	A front brake hose with the zinc coated steel end fitting (on the caliper side of the hose) inside the routing sleeve cover may corrode and leak the brake fluid.	9 reports in US
CTS 155,039 vehicles in corrosion state/provinces/countries	1. See brake fluid on the ground as a witness mark. 2. See check brake fluid symbol illumination in the Driver Information Center. 3. See brake system warning light (red) illumination in the Instrument Panel with ignition on. 4. Stopping distance lengthened when the brake is applied.			1 report in CAN

NHTSA ID	VEHICLE	MANUFACTURER	MODEL YEAR	SYSTEM COMPONENT	COMPONENT	ALLEGED CONDITION	EOVP	RECALL	NUMBER OF VEHICLES INVOLVED	VOQs	VOQs/K VEHICLE	MANUFACTURER COMPLAINTS WARRANTY	CPTV	COMMENTS
EA03012	Buck Roadmaster Buck rebuilder Chevrolet Caprice Chevrolet Impala Pontiac Bonneville Oldsmobile Eighty-Eight	GENERAL MOTORS	1995 - 1999	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	rear brake line leakage caused by corrosion	EXTENDED STOPPING DISTANCE	NO ACTION	1,519,056	No VOQs Ford request peer R		22 Complaints 320 Warranty Claims	0.01 CPTV for Complaints 0.21 PTV@36 mos Warranty	
EA03003	NEWAIR W22	NEWMAR CORPORATION WORKHORSE CUSTOM CHASSIS	2001-2002	HYDRAULIC	ROTOR/DISC/CALIPER/DRUM	OVERHEATING FRONT AND REAR BRAKES	EXTENDED STOPPING DISTANCE	04/019000	1,832	1 VOQ	0.5	9 COMPLAINTS 0 Warranty Claims	4.9 CPTV	
EA03012	CROWN VICTORIA GRAND MARQUE TOWN CAR	FORD MOTOR COMPANY	1995-1997	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	REAR BRAKE LINE FAILURE. Certain vehicles built with ETC, the rear brake line may chafe due to contact with floor pan stiffening rib. Resulting in brake fluid leak.	EXTENDED STOPPING DISTANCE	05/086000	785,181	21 VOQs 2 w Crash	0.03	128 COMPLAINTS 419 WARRANTY	0.16 Mfg Complaint PTV 0.53 Warranty PTV@ 36 mos	NHTSA EA03012 Ford notified ODI it would do a Customer Satisfaction program. Ford's position is that the subject condition does not represent an unreasonable risk to motor vehicle safety because the brake fluid leakage that results from an abraded rear brake line is minimal and there is no notable affect on stopping distance until well after the low fluid indicator light has been illuminated. ODI believes that the facts in this investigation show otherwise because the insufficient clearance in the routing of those brake lines may result in leaks that may result in increased stopping distances. ODI is designating the campaign a safety recall 05V-086.
EA03024	WRK W20 W22 W24	SUBARU OF AMERICA, INC.	2002-2003	HYDRAULIC	ABS	EXTENDED STOPPING DISTANCES ON BUMPS, GRAVEL, RIPPLES DUE TO ABS CALIBRATION FAILURE	EXTENDED STOPPING DISTANCE	NO ACTION	50,703	129 VOQs 16 w CRASH 6 INJURIES	2.5	200 COMPLAINTS 13 CRASHES 1 INJURY	11.9 CPTV	Ford notified ODI it would do a Customer Satisfaction program. Ford's position is that the subject condition does not represent an unreasonable risk to motor vehicle safety because the brake fluid leakage that results from an abraded rear brake line is minimal and there is no notable affect on stopping distance until well after the low fluid indicator light has been illuminated. ODI believes that the facts in this investigation show otherwise because the insufficient clearance in the routing of those brake lines may result in leaks that may result in increased stopping distances. ODI is designating the campaign a safety recall 05V-086.
EA07016		WORKHORSE CUSTOM CHASSIS	2000-2004	HYDRAULIC	ROTOR/DISC/CALIPER/DRUM	OVERHEATED BRAKE CALIPERS	EXTENDED STOPPING DISTANCE	09/110000	42,907	20 VOQs 2 CRASHES	0.47	3 CRASHES 3,782 WARRANTY	103 PTV@36 mos	
EA06017	Explorer	FORD MOTOR COMPANY	1993-1994	HYDRAULIC	ROTOR/DISC/CALIPER/DRUM	Rear brake lock up	EXTENDED STOPPING DISTANCE	NO ACTION	668,000	187 VOQs 33 w/Crash	0.28	567 Mfg. Complaints 12 w/Injury 15,698 Warranty claims	56.1/100,000 for rear lockup 50.2/100,000 for unspecified lockup	
EA09008	Isuzu Rodeo Isuzu Amigo Honda Passport ML 55 ML430 ML500 CLSS AMG ML-CLASS	Isuzu Motors America, Inc.	1998-1999	HYDRAULIC	ABS	Loss of braking capability that results in extended stopping distance due to an error in the ABS algorithm.	EXTENDED STOPPING DISTANCE	02/002000	214,861	204 VOQs 36 w crash 7 w injury	0.95	624 Complaints 160 w/crash 16 injuries	Complaint Rate 385/100,00 vehicles Crash rate 83.3/100,000 vehicles Injury producing crash rate 8.4/100,000	
EA08009		MERCEDES-BENZ USA, LLC	2000-2002	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	BRAKE LINE RUPTURE	EXTENDED STOPPING DISTANCE		52,000	1 VOQ 1 w CRASH	0.01	7 COMPLAINTS 66 WARRANTY	1.4 PTV@36 mos	
EA09014	HONDA ODYSSEY	HONDA (AMERICAN HONDA MOTOR CO.) SUBARU OF AMERICA, INC.	2007-2008	HYDRAULIC	AIR IN BRAKE SYSTEM	AIR IN BRAKE SYSTEM	EXTENDED STOPPING DISTANCE		343,924	62 VOQs 4 w crash 7 injuries	0.18	574 Complaints 8 w crash 2 injuries 2,186 Warranty	8.0 CPTV	
PE03029	WRK		2002-2003	HYDRAULIC	ABS	ABS FAILURE	EXTENDED STOPPING DISTANCE	NO ACTION	N/A	N/A	N/A	N/A	N/A	
PE04065	SPECTRA RIO	HYUNDAI-KIA AMERICA TECHNICAL CENTER INC	2002	HYDRAULIC	ROTOR/DISC/CALIPER/DRUM	REAR DRUM BRAKE WHEEL CYLINDER LEAKAGE	EXTENDED STOPPING DISTANCE	NO ACTION	71,837	0 VOQs BASED ON EWR	N/A	5 COMPLAINTS 813 WARRANTY	11.38 PTV@ 28 mos	
PE07032	W20 W22 W24	WORKHORSE CUSTOM CHASSIS	2000-2004	HYDRAULIC	ROTOR/DISC/CALIPER/DRUM	OVERHEATED BRAKE CALIPERS	EXTENDED STOPPING DISTANCE	UPGRADE TO EA07-016	42,907	20 VOQs 2 CRASHES EWR	0.47	3 CRASHES 3,782 WARRANTY	103 CPTV	
PE08002	ML55 ML500	MERCEDES-BENZ USA, LLC	2002	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	BRAKE LINE RUPTURE	LOSS OF BRAKE EFFECTIVENESS	UPGRADED EA08-009	19,227	1 VOQ 1 w CRASH	0.05	7 COMPLAINTS 66 WARRANTY	3.8 PTV@36 mos	
PE08038	VISION	BLUE BIRD BODY COMPANY	2004-2008	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	HYDRAULIC BRAKE HOSE CHAFING/LEAKING Front brake hose ruptures or fails at the interface between the rubber hose and the brass fitting resulting in loss of brake fluid	LOSS OF BRAKE EFFECTIVENESS	08/312000	5,422	7 VOQs	1.3	63 COMPLAINTS	11.6 CPTV	
PE09035	Aerostar	FORD MOTOR COMPANY	1992	HYDRAULIC	HOSES/LINES/PPES/FITTINGS		EXTENDED STOPPING DISTANCE	NO ACTION SERVICE CAMPAIGN by GM NHTSA called it a Safety Improvement 0000031000	150,000 estimated	7 VOQs 2 w crash	0.05	N/A	N/A	
PE09003	CK Series Trucks	GENERAL MOTORS CORP.	1999	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	HYDRAULIC BRAKE HOSE CHAFING/LEAKING	LOSS OF BRAKE EFFECTIVENESS		228,618	1 VOQ	0	1 Complaint 16 Warranty Claims	0.07 PTV@ about 12 mos	
EA05018	Explorer Ranger	Ford Motor Company	1991 - 1994	HYDRAULIC	BRAKE BOOSTER	Studs holding master cylinder to brake booster are breaking on vehicles in California	LOSS OF BRAKE EFFECTIVENESS	96/024001	108,000 Vehicles	4 VOQs	0.002	59 COMPLAINTS No Available Warranty Data	0.04 CPTV	No public responsive documents available at NHTSA
PE05001	Explorer Ranger	Ford Motor Company	1991 - 1994	HYDRAULIC	BRAKE BOOSTER	Studs holding master cylinder to brake booster are breaking on vehicles in California.	LOSS OF BRAKE EFFECTIVENESS	96/024002	2500 Vehicles	4 VOQs	0.002	59 COMPLAINTS No Available Warranty Data	0.04 CPTV	
PE09004	THOMAS BUILT BUSES EF THOMAS BUILT BUSES FS-65	FREIGHTLINER LLC	2005-2008	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	BRAKE HOSE/TUBE ABRADING	LOSS OF BRAKE EFFECTIVENESS	09/114000	865	11 VOQs 69 VOQs 4 w CRASH 7 INJURIES	16.5	11 COMPLAINTS 613 Complaints 12 w injury	16.5 CPTV	
PE09024	HONDA ODYSSEY GRAND MARQUE CROWN VICTORIA TOWN CAR	HONDA (AMERICAN HONDA MOTOR CO.) FORD MOTOR COMPANY	2006-2008	HYDRAULIC	AIR IN BRAKE SYSTEM	AIR IN BRAKE SYSTEM	EXTENDED STOPPING DISTANCE	Upgraded to EA09014	536,904	40 VOQs 2 w Crash	0.1	2259 Warranty	0.67% alleged defect rate	
RQ03004			1995-1997	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	REAR BRAKE LINE FAILURE	EXTENDED STOPPING DISTANCE	Upgrade EA03-012	785,181		0.05	192 COMPLAINTS 478 WARRANTY	0.85 PTV@36 mos	
RQ04003	WINDSTAR	FORD MOTOR COMPANY	1995-1996	HYDRAULIC	HOSES/LINES/PPES/FITTINGS	HYDRAULIC BRAKE LINE FAILURE	EXTENDED STOPPING DISTANCE	NO ACTION	273,256	9 VOQs	0.03	59 COMPLAINTS 2 w CRASH 14 WARRANTY	0.22 Mfg Complaint PTV 0.05 Warranty Claim PTV@ 36 mos	FORD NOTIFIED ODI OF A DEFECT CONDITION THAT COULD RESULT IN EXTENDED STOPPING DISTANCES IN APPROXIMATELY 250,000 1995 AND 1996 WINDSTAR MINIVANS SOLD OR REGISTERED IN SALT BELT STATES (RECALL 02V-101). ACCORDING TO FORD, IMPROPER BRAKE LINE ROUTING IN VEHICLES MANUFACTURED AT THE OKAVILLE ASSEMBLY PLANT FROM JANUARY 14, 1994 THROUGH MAY 21, 1996 RESULTED IN SOME VEHICLES WITH MIS-POSITIONED BRAKE LINES THAT COULD CONTACT A DASH PANEL INSULATOR. SUCH CONTACT COULD ABRADE THE BRAKE LINE PROTECTION COATING AND RESULT IN CORROSIVE FAILURE OF THE BRAKE LINES. ODI OPENED RQ04-003 TO INVESTIGATE COMPLAINTS OF BRAKE LINE FAILURE IN WINDSTAR VEHICLES THAT WERE: (1) LOCATED OUTSIDE THE RECALL REGION; OR (2) BUILT AFTER THE RECALL PERIOD. REGARDING THE LATTER GROUP, FORD CHANGED THE ASSEMBLY PROCESS AFTER MAY 21, 1996 TO ELIMINATE THE IMS-BUILD PROBLEM. THE FAILURE RATES IN THE MY 1996 WINDSTAR VEHICLES BUILT AFTER THE PROCESS CHANGE ARE RELATIVELY LOW IN BOTH THE SALT-BELT STATES. WITH RESPECT TO THE MY 1995 AND 1996 VEHICLES BUILT DURING THE PERIOD OF CONCERN THAT WERE NOT SOLD OR REGISTERED IN SALT BELT STATES, THE FAILURE RATE IS ALSO LOW. THE RELATED BRAKE LINE WARRANTY CLAIM RATE FOR THOSE VEHICLES IS ALSO LOW. ACCORDINGLY, A SAFETY-RELATED DEFECT TREND HAS NOT BEEN IDENTIFIED IN THE MY 1995-96 WINDSTAR VEHICLES THAT WERE NOT INCLUDED IN RECALL 02V-101. FURTHER USE OF AGENCY RESOURCES DOES NOT APPEAR TO BE WARRANTED.

Scheduled Maintenance -- Gasoline Engines

+ A good time to check your brakes is during tire rotation ([Recommended every 7,500 miles](#)) . See “Brake System Inspection” under “Periodic Maintenance Inspections” in Part C of this schedule.

Part C: Periodic Maintenance Inspections

Listed in this part are inspections and services which should be performed at least twice a year (for instance, each spring and fall). *You should let your dealer’s service department or other qualified service center do these jobs. Make sure any necessary repairs are completed at once.*

Proper procedures to perform these services may be found in a service manual. See “Service and Owner Publications” in the Index.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Inspect other brake parts, including calipers, parking brake, etc. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

From 1999
Chevrolet
Silverado
Owner’s Manual
(other models similar)

Scheduled Maintenance

+ A good time to check your brakes is during tire rotation ([Recommended every 7,500 miles](#)) . See Brake System Inspection on page 6-17.

Part C: Periodic Maintenance Inspections

Listed in this part are inspections and services which should be performed at least twice a year (for instance, each spring and fall). You should let your dealer’s service department do these jobs. Make sure any necessary repairs are completed at once.

Proper procedures to perform these services may be found in a service manual. See Service Publications Ordering Information on page 7-11.

Brake System Inspection

Inspect the complete system. Inspect brake lines and hoses for proper hook-up, binding, leaks, cracks, chafing, etc. Inspect disc brake pads for wear and rotors for surface condition. Inspect other brake parts, including calipers, parking brake, etc. You may need to have your brakes inspected more often if your driving habits or conditions result in frequent braking.

From 2003
Chevrolet
Tahoe/Suburban
Owner’s Manual
(other models similar)

PE10-010

GM

7/2/2010

NHTSA Investigation
status summary

08Ap10

NHTSA IR PE10-010

Opening Resume Received 03/30/2010

Subject:

Brake line failure due to corrosion

Subject Vehicles:

1999-2003 MY GMT800 Vehicles

GMT800	1999 MY	2000 MY	2001 MY	2002 MY	2003 MY	TOTAL
Pickups	430,389	605,347	786,547	824,092	893,387	3,539,762
Utilities	N/A	222,841	484,897	680,608	656,561	2,044,907
TOTAL	430,389	828,188	1,271,444	1,504,700	1,549,948	5,584,669

Problem Description/Alleged Defect:

Brake line corrosion allegedly can result in rupture during brake application, resulting in sudden loss of brake effectiveness

Summary:

- ODI has opened PE10-010 to determine the frequency, scope and safety consequences of the alleged defect in the subject vehicles.
 - NHTSA ODI received a defect petition March 2, 2010, requesting the investigation of 2003 MY Chevrolet Silverado 2500HD 4WD pickup trucks for corrosion failures
 - The petitioner alleged a sudden loss of brake effectiveness and extended stopping distance after a corroded brake burst during a brake application.
- ODI has received 110 owner complaints for the subject vehicles.
 - 3 complaints allege that corroded brake line failure resulted in a crash.
 - No reports of injuries or fatalities.
 - 37 complaints, the brake line failure confirmed by a dealer inspection.

Location of VOQs:

**Status:**

- IR questions not sent
- NHTSA ODI expected to send IR questions by April 9, 2010.
- GM response should be due around the end of May 2010.
- VOQ's being summarized
- Responsible SMT Fuel Systems Integration engaged

PE10-010

GM

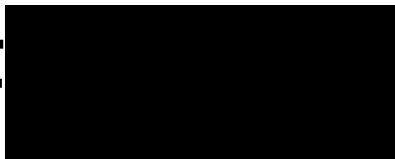
7/2/2010

Q_08_B

Brake lines PPT

Ristich.ppt

1GTHK23122F



Inspected: October 31, 2007

Dealer: Faulkner PBG. West Chester, PA

Mileage: 62608

Condition: Tech stated as he was pulling into his shop, Brake pedal went to floor.

Cause: Front brake circuit corroded and losing brake fluid just in front of EBCM near frame rail

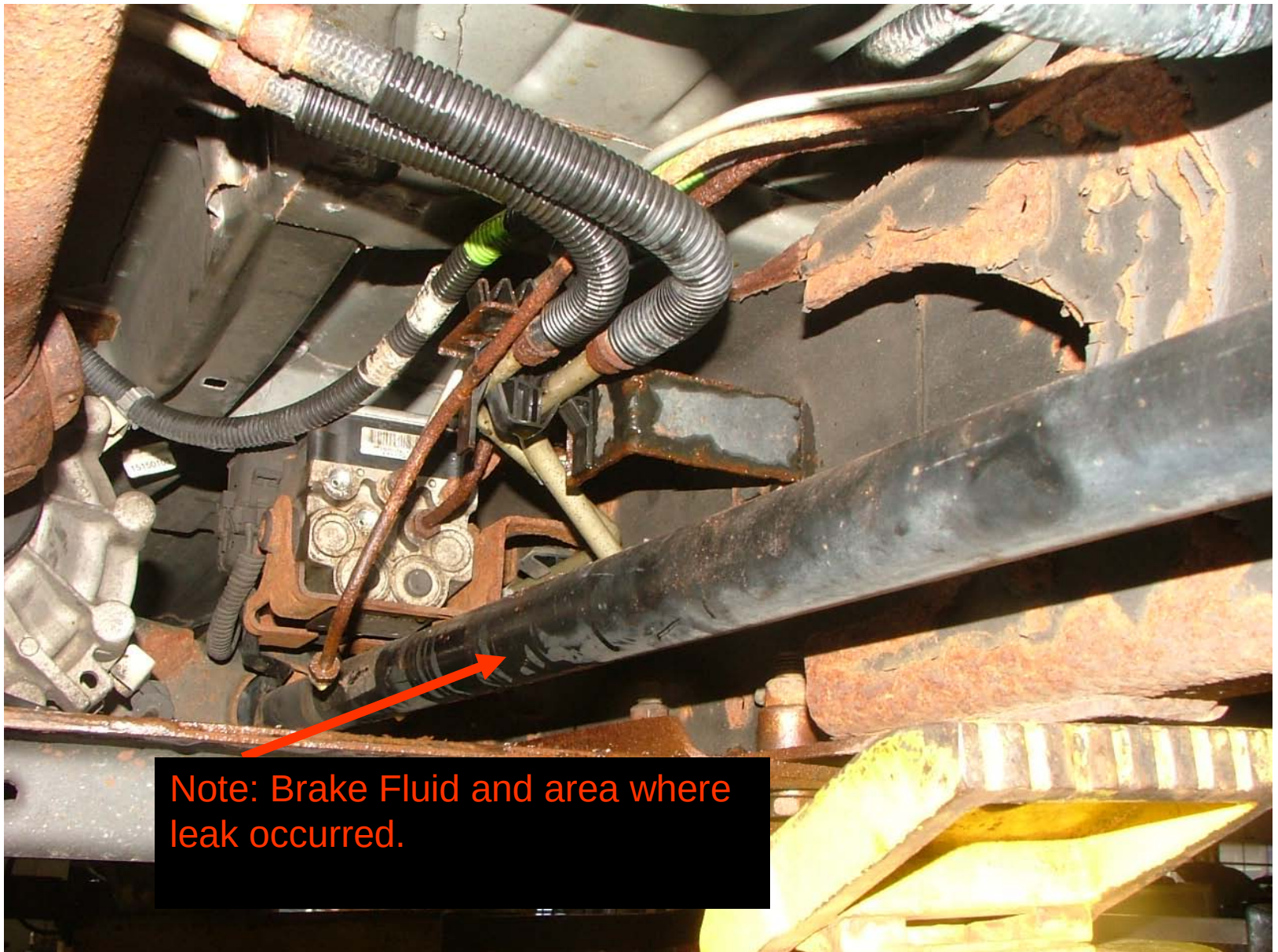
Correction: Dealer splicing in new brake line.

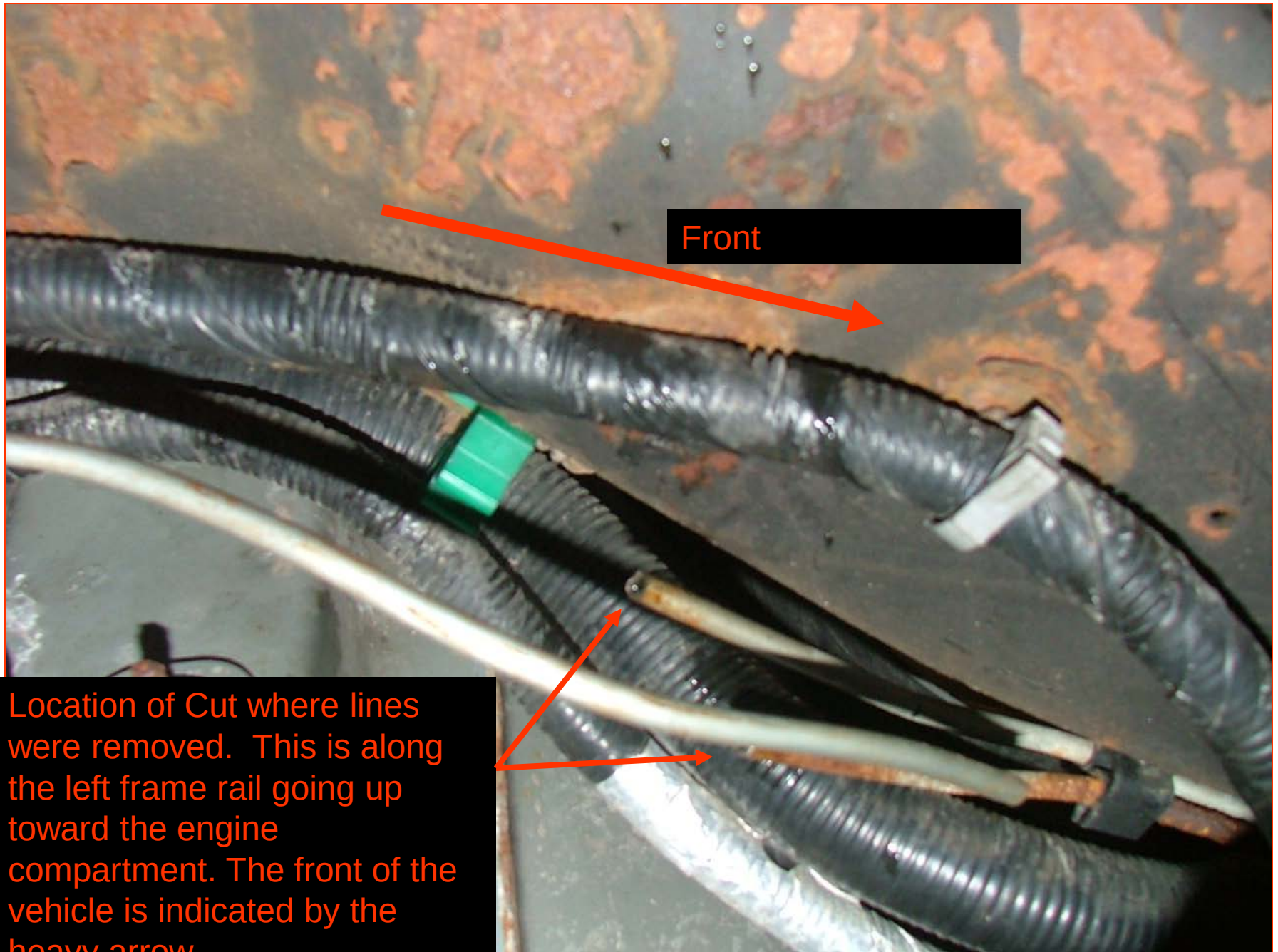
1GTHK23122F

Miles: 62608
October 31,
2007









Front

Location of Cut where lines were removed. This is along the left frame rail going up toward the engine compartment. The front of the vehicle is indicated by the heavy arrow.

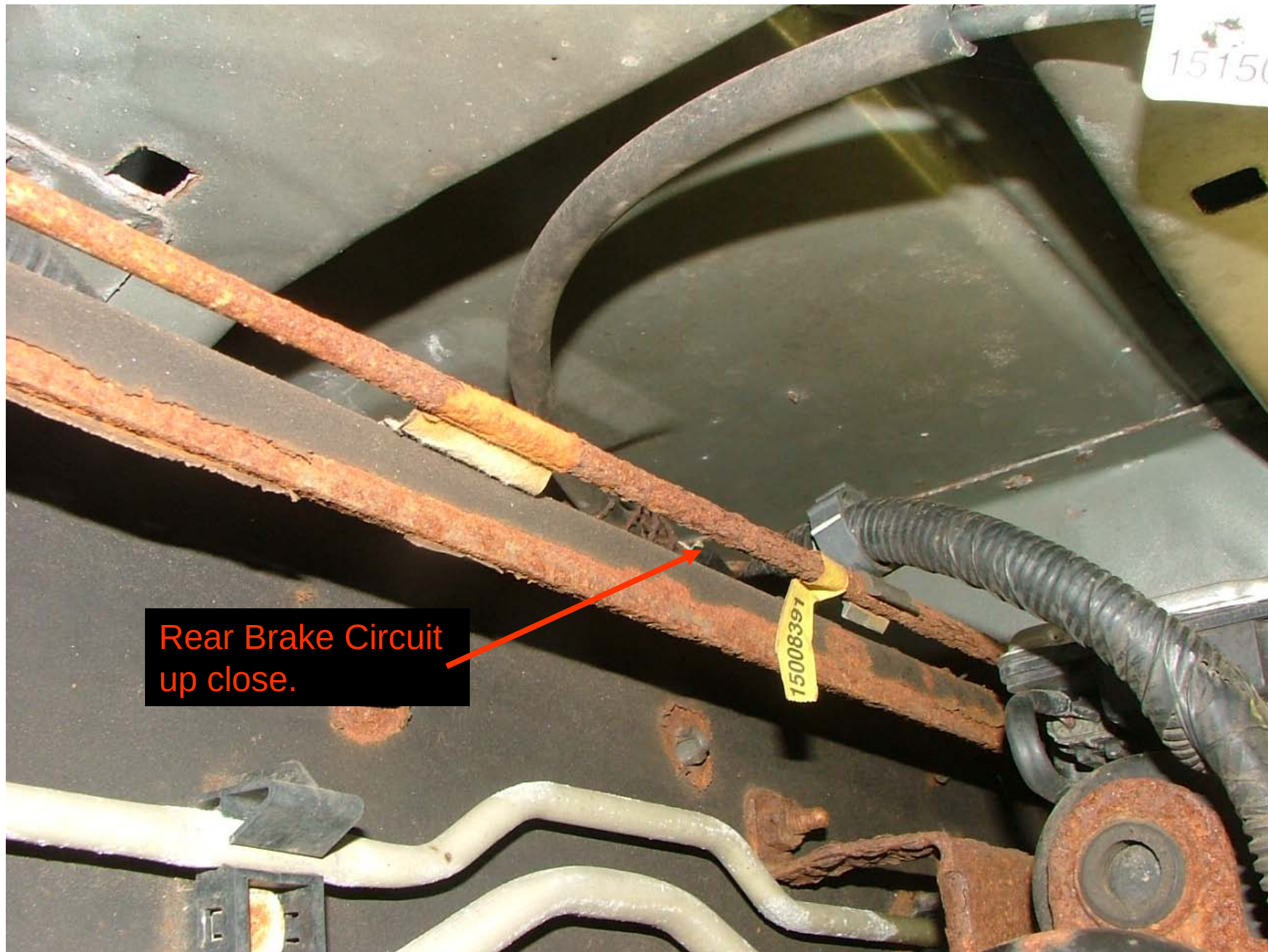


Front Circuit Brake lines after tech had cut them out. Note wet areas indicating leak. Note line on right still has fitting on it where it connects to the EBCM.





Rear Jounce Hose connection



Rear Brake Circuit
up close.



Area near brake line leak. Note
brake fluid on bottom of floor
pan.

2005 Owners Manual Flushing recommendations:

Underbody Maintenance

Chemicals used for ice and snow removal and dust control can collect on the underbody. If these are not removed, corrosion and rust can develop on the underbody parts such as fuel lines, frame, floor pan, and exhaust system even though they have corrosion protection.

At least every spring, flush these materials from the underbody with plain water. Clean any areas where mud and debris can collect. Dirt packed in close areas of the frame should be loosened before being flushed. Your dealer or an underbody car washing system can do this for you.

PE10-010

GM

7/2/2010

OTHER

Product Investigations has determined that the investigation of brake pipe corrosion near the ABS modulator can be closed. There is no evidence of a trend by region or date of build, and regular/extended warranty claims for the C/K are low and consistent with claims from other platforms. The few incidents observed may be attributable to normal process variation that occurs for over 2.2 million vehicles produced.

Subject: Investigation Seq #141 - C/K Brake Pipe Corrosion at ABS Modulator

Condition:

Brake pipe corrosion reported on a 2002 Sierra HD 4WD Crew Cab serviced in PA appeared to be concentrated near the ABS modulator.

Effects of the Condition

If the brake tubing corrodes to the extent that structural integrity of the base steel tube is compromised, a slow loss of brake fluid may occur at first and would possibly be noticed by the vehicle operator as fluid spotting under the vehicle while parked. Depending on the rate of the leak, a vehicle operator may notice more pedal travel to achieve the desired braking.

Also, if enough fluid has leaked from either half of the brake system (front or rear), there may not be sufficient fluid for the brakes to perform optimally and the system may reach a performance level such that brake pedal application can no longer build pressure in the half system that was compromised. Braking will then be limited to that available with the remaining half system and there would be extended pedal travel. After sufficient fluid had leaked from the system, the brake light would illuminate due to activation of the low fluid level switch in the master cylinder reservoir. These conditions would meet the half system requirements of MVSS 135.

If a brake pipe sustained adequate loss of the base steel tube material due to corrosion, and application of the brake developed enough hydraulic pressure to burst the brake pipe, brake pedal travel would immediately increase and braking performance would be reduced. In this instance, braking would be limited to that available with the remaining half system. After sufficient fluid had leaked from the system, the brake light would illuminate due to activation of the low fluid level switch in the master cylinder reservoir. These conditions would meet the half system requirements of MVSS 135.

No Crashes/Injuries

There have been no crashes/injuries associated with the condition.

Low Regular Warranty Claim Rates (P/U & SUV - 2002 and 2003 only)

Claims are low and consistent with same model years S/T truck.

Labor Ops Used:

H0799	Pipe, Brake - Repair
H0815, H0816, H0817	Pipe, Brake - ABS to Junction Block or Front Wheel (R/L)
H0851, H0852	Pipe, Brake - ABS to Proportioner Valve (R/L)
H0858, H0859	Pipe, Brake - ABS to Rear Wheel (R/L)

C/K: Rusted/Corroded 24 out of 1,141 claims (2.1%). = .0082 IPTV

S/T: Rusted/Corroded 5 out of 129 claims (3.9%) = .0086 IPTV

Low Extended Warranty Claim Rates (P/U & SUV - 1999 - 2003 model years)

Approximately 26% of vehicles purchase an extended warranty policy, or ~500k policies for '99 - '03 C/K Truck

Same Labor Ops as Regular Warranty.
Total for 5 model years = 38 claims

Expected Extended Warranty Claims from States/Provinces

Claims are from the higher percentile corrosion environments. There is an absence of claims from <50th percentile.

MA 1	MD 1	ME 1	MI 2
MO 1	NH 1	NJ 4	NY 10
OH 1	ON 3	PA 5	PQ 1
TX 1	VT 5	WV 1	

Random Production Dates

The build dates of vehicles for all warranty claims were not concentrated and suggest there was not a quality issue for a certain build range or ranges.

Typical VOQ Rates (Customer complaints to NHTSA) for 1999 - 2003 Model Years Pick-Up only

GM - 30
Ford - 25
DCX - 12

Random Vehicle Survey does not Indicate a pervasive issue.

38 vehicles ranging from 4 to 9 years of service and from random locations have shown an absence of corrosion in the lower percentile corrosion environments. This does not appear to be a systemic issue.

Anecdotal Dealer Service Manager Information

Dealer service is not associating corroded pipes with the ABS module location

GM Material Engineering analysis (STR 27235) of brake pipes from the incident (discovery) vehicle in PA concluded that the components met plating specifications:

- The galfan plating thickness ranged from 4µm to 10µm; which met the 3µm minimum thickness requirements.
- The Al rich epoxy topcoat paint thickness ranged from 4µm to 17µm; which met the 3µm minimum thickness requirements.

Corrosion Eng: No specific reason for this anomaly. Requires more in depth analysis.

H0799	Pipe, Brake - Repair
H0800	Pipe, Brake - Master Cyl To Connector - Replace
H0810	Pipe, Brake - Master Cyl To Modulator Valve - Replace
H0812	Pipe, Brake - Master Cyl To ABS Modulator Valve - Front - Replace
H0813	Pipe, Brake - Master Cyl To ABS Modulator Valve - Rear - Replace
H0815	Pipe, Brake - ABS Modulator Valve To Junction Block - Replace
H0816	Pipe, Brake - ABS Modulator Valve To Wheel - Right Front - Replace
H0817	Pipe, Brake - ABS Modulator Valve To Wheel - Left Front - Replace
H0818	Pipe, Brake - Master Cyl To Combination Valve Flex Hose - Primary - Replace
H0819	Pipe, Brake - Master Cyl To Combination Valve Flex Hose - Secondary - Replace
H0822	Pipe, Brake - Master Cyl To Combination Valve - Front - Replace
H0823	Pipe, Brake - Master Cyl To Combination Valve - Rear - Replace
H0830	Pipe, Brake - Master Cyl To Wheel - Right Front - Replace
H0831	Pipe, Brake - Master Cyl To Wheel - Left Front - Replace
H0840	Pipe, Brake - Master Cyl To Wheel - Right Rear - Replace
H0841	Pipe, Brake - Master Cyl To Wheel - Left Rear - Replace
H0847	VALVE/MASTER CYLINDER TO REAR BRAKES.
H0851	Pipe, Brake - ABS Modulator Valve To Proportioner Valve - Right Rear - Replace
H0852	Pipe, Brake - ABS Modulator Valve To Proportioner Valve - Left Rear - Replace
H0853	Pipe, Brake - Proportioner Valve To Wheel - Right Rear - Replace
H0854	Pipe, Brake - Proportioner Valve To Wheel - Left Rear - Replace
H0855	Pipe, Brake - Proportioner Valve To Junction Block - Replace
H0857	Pipe, Brake - ABS Modulator Valve To Wheel - Right Rear - Replace
H0858	Pipe, Brake - ABS Modulator Valve To Wheel - Left Rear - Replace
H0859	Pipe, Brake - ABS Modulator Valve To Rear Hose - Replace
H0860	Pipe, Brake - Combination Valve To Front Wheel - Right - Replace
H0861	Pipe, Brake - Combination Valve To Front Wheel - Left - Replace
H0862	Pipe, Brake - Combination Valve To Front Junction Block - Replace

#1

Make : CHEVROLET

Model : C1500

Year : 1999

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10156446

Number of Deaths: 0

Date of Failure: March 22, 2006

VIN : 2GCEK19T0X1...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

AFTER CHANGING ALL FOUR BRAKE ROTORS AND BRAKE PADS BECAUSE THEY WERE BADLY RUSTED, MY BRAKES FAILED SOON AFTER LEAVING HOME . A PIN HOLE LEAK DEVELOPED IN THE BRAKE LINE BECAUSE OF RUST. THE LEAK WAS IN A PLACE THAT WAS NOT ACCESSIBLE BY ME. I HAD TO HAVE THE VEHICLE TOWED TO A DEALER FOR REPAIRS. THEY FOUND FOUR BADLY RUSTED BRAKE LINES AND REPLACED ALL FOUR AT A COST OF \$953.16. THE TOWING CHARGES WERE COVERED BY MY ALLSTATE AUTO CLUB. I FORGET TO REQUEST THE OLD PARTS. I WAS FORTUNATE THE FAILURE OCCURRED SHORTLY AFTER LEAVING HOME AND DID NOT CAUSE AN ACCIDENT LIKE THE FAILURE OF THE RUSTED BRAKE LINE IN MY 1988 CHEVY TRUCK CAUSED. I REAR ENDED A CAR IN THAT INCIDENT.

*JB

#2

Make : GMC

Model : C3500

Year : 1999

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10125920

Number of Deaths: 0

Date of Failure: June 17, 2005

VIN : 1GTHC33J7XF...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT: CONTACT HAS 1999 GMC,. HE HAD TO REPLACE THE BRAKE LINES 6 TIMES. THE BRAKE LINES WERE CORRODED. WHEN THE BRAKE PEDAL WAS PRESSED THE BRAKE LINE BLEW OUT. CONTACT LOST THE FRONT BRAKES ON 4 DIFFERENT OCCASIONS, AND LOST REAR BRAKES ONLY ONCE. VEHICLE HAS NOT BEEN TO A SERVICE DEALER FOR REPAIRS. CONTACT HAS REPLACED THE BRAKE LINES WITH AFTER MARKET EQUIPMENT.*AK

#3

Make : CHEVROLET	Model : C2500	Year : 2000
Manufacturer : GENERAL MOTORS CORP.		
Crash : No	Fire : No	Number of Injuries: 0
ODI ID Number : 10137283		Number of Deaths: 0
Date of Failure: July 22, 2005		
VIN : 1GCGK24U0YE...		
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS		
Summary: DT: THE CALLER SAID BRAKE LINES RUSTED. HE BELIEVED THE REAR BRAKES WERE AFFECTED. DEALER SAID THERE WAS A PROBLEM WITH RUST AND CORROSION. MANUFACTURER OFFERED NO HELP. THE FIRST FAILURE WAS REPAIRED , AND THE SECOND TIME THERE WAS A DIFFERENT SECTION.*AK		

#4

Make : CHEVROLET	Model : SILVERADO 1500	Year : 1999
Manufacturer : GENERAL MOTORS CORP.		
Crash : No	Fire : No	Number of Injuries: 0
ODI ID Number : 10169454		Number of Deaths: 0
Date of Failure: September 16, 2006		
VIN : 1GCEK14V8XE...		
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS		
Summary: I HAVE A 1999 CHEVROLET SILVERADO PICK UP TRUCK THAT THE BRAKE LINES HAVE CORRODED AND FAILED RENDERING THE BRAKES USELESS. FORTUNATELY, THIS HAPPENED IN MY DRIVEWAY AND NOT ON THE HIGHWAY. I HAVE HAD TO HAVE ALL THESE LINES REPLACED. THIS TRUCK IS ONLY 7 YEARS OLD AND MY SERVICE GARAGE HAS STATED TO ME THAT THEY REPLACE BRAKE LINES ON LATE MODEL CHEVROLET TRUCKS AT LEAST ONCE A MONTH. I HAVE WRITTEN CHEVROLET ABOUT THIS PROBLEM AND I DID NOT RECEIVED A RESPONSE. I BELIEVE THERE IS A SERIOUS PROBLEM WITH THE BRAKE LINE MATERIAL OR MANUFACTURE OF THESE ITEMS. *NM		

#5

Make : CHEVROLET

Model : SILVERADO 1500

Year : 1999

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10169454

Number of Deaths: 0

Date of Failure: September 16, 2006

VIN : 1GCEK14V8XE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

I HAVE A 1999 CHEVROLET SILVERADO PICK UP TRUCK THAT THE BRAKE LINES HAVE CORRODED AND FAILED RENDERING THE BRAKES USELESS. FORTUNATELY, THIS HAPPENED IN MY DRIVEWAY AND NOT ON THE HIGHWAY. I HAVE HAD TO HAVE ALL THESE LINES REPLACED. THIS TRUCK IS ONLY 7 YEARS OLD AND MY SERVICE GARAGE HAS STATED TO ME THAT THEY REPLACE BRAKE LINES ON LATE MODEL CHEVROLET TRUCKS AT LEAST ONCE A MONTH. I HAVE WRITTEN CHEVROLET ABOUT THIS PROBLEM AND I DID NOT RECEIVED A RESPONSE. I BELIEVE THERE IS A SERIOUS PROBLEM WITH THE BRAKE LINE MATERIAL OR MANUFACTURE OF THESE ITEMS. *NM

#6

Make : CHEVROLET

Model : SILVERADO 2500

Year : 1999

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10161138

Number of Deaths: 0

Date of Failure: June 28, 2006

VIN : 1GCGK29U6XE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT*: THE CONTACT STATED THAT THE VEHICLE HAD TROUBLE STOPPING WHEN DRIVEN 15 MPH. THE HYDRAULIC BRAKES WOULD DEPRESS TO THE GROUND WHEN PRESSURE WAS APPLIED UNDER NORMAL BRAKING. THE VEHICLE'S EMERGENCY BRAKE WAS APPLIED TO HELP STOP THE VEHICLE. THE CONTACT INSPECTED THE VEHICLE AND NOTICED A FLUID SQUIRTED OVER THE DRIVER SIDE REAR WHEEL, AND SHOCK ABSORBER. CHUNKS OF RUST WERE ALSO OBSERVED WHERE THE BRAKELINE FRACTURED WHICH WAS HOOKED TO THE BACK AXLE. THE VEHICLE WAS DRIVEN HOME. THE MANUFACTURER WAS CONTACT ON 06/29/06 WHO DETERMINED THAT THERE WAS NO RECALL OR REMEDY. THE DEALER HAS YET TO BE CONTACTED. THERE WAS NO WARNING PRIOR TO THE INCIDENT. THE INCIDENT OCCURRED ON A DRY AND FLAT SURFACE. ALL 5 BRAKE LINES CONNECTED TO THE ABS UNIT WERE BADLY RUSTED. UPDATED 07/25/06. *JB

#7

Make : CHEVROLET **Model :** AVALANCHE 1500 **Year :** 2002
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 10209961 **Number of Deaths:** 0
Date of Failure: November 23, 2007
VIN : 3GNEK13T42G...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

TL*THE CONTACT OWNS A 2002 CHEVROLET AVALANCHE 1500. WHILE DRIVING 55 MPH, THE VEHICLE WOULD NOT STOP. THE BRAKE PEDAL EXTENDED TO THE FLOOR WHEN IT WAS DEPRESSED. THE CONTACT HAD TO DOWNSHIFT AND CRUISE TO A STOP. AS OF NOVEMBER 26, 2007, THE DEALER HAD NOT INSPECTED OR REPAIRED THE VEHICLE. THE CONTACT FELT THAT THE RUSTED BRAKE LINES CAUSED THE FAILURE. THE CURRENT AND FAILURE MILEAGES WERE 93,800.

#8

Make : CHEVROLET **Model :** SILVERADO **Year :** 2000
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 897872 **Number of Deaths:** 0
Date of Failure: May 1, 2001
VIN : 2GCEK19T6Y1...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

WHILE PULLING INTO DRIVEWAY BRAKES WENT OUT, AND CONSUMER HAD TO STOP VEHICLE WITH EMERGENCY BRAKE. WHEN LOOKING UNDER VEHICLE NOTICED BRAKE FLUID LEAKING, AND THE BRAKE LINE WAS BROKEN. PLEASE PROVIDE ANY FURTHER INFORMATION.*AK

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10136069

Number of Deaths: 0

Date of Failure: September 7, 2005

VIN : 1GCEK19T0YE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

BRAKE LINES (PIPES) ARE RUSTED SO SEVERELY THAT ALL FLUID SUDDENLY LEAKED OUT AS I WAS DRIVING IN HEAVY TRAFFIC. THE RUSTING CONDITION MUST HAVE ORIGINATED WHEN THE VEHICLE WAS MANUFACTURED, AS I REPORTED BRAKE PROBLEMS TO THE DEALER FROM WHOM I PURCHASED THE VEHICLE. AFTER SEVERAL COMPLAINTS THE DEALER MADE MAJOR REPAIRS IN 2002 ON THE BRAKES DUE TO RUSTED OUT COMPONENTS, BUT DID NOT REPLACE THE HYDRAULIC LINES. THE SERVICE MANAGER EXCLAIMED THAT HE HAD NEVER SEEN SO MUCH RUST ON BRAKE SYSTEMS. AS A RETIRED PROFESSOR, HAVING TAUGHT METALLURGY AND INDUSTRIAL MATERIALS, THERE ARE METAL TREATMENT PROCEDURES THAT MUST BE FOLLOWED WHEN MANUFACTURING PIPING FOR VEHICLE HYDRAULIC SYSTEMS. OBVIOUSLY, GENERAL MOTORS USED INFERIOR PARTS AND MATERIALS IN BRAKE SYSTEMS. IF THEY DO NOT RECALL ALL VEHICLES WITH BRAKE COMPONENT RUSTING PROBLEMS, MANY ACCIDENTS WILL OCCUR. THE VEHICLE I AM REPORTING IS CURRENTLY UNDER REPAIR AND THE COST ESTIMATES BY THE SERVICE DEPARTMENT AT TOM GILL CHEVROLET IN FLORENCE, KENTUCKY ARE QUOTED AT \$1500.00, OR MORE. BRAKE LINES SHOULD NOT RUST OUT IN FIVE YEARS. I HAVE NEVER HAD RUSTED OUT BRAKES LINES ON ANY OF 14 VEHICLES I HAVE OWNED. GENERAL MOTORS IS RESPONSIBLE FOR THE PENDING REPAIR COSTS, AND IF PAST HISTORY IS AN INDICATION, THEY WILL DENY RESPONSIBILITY AND BLAME THE CONSUMER ONE MORE TIME. *JB

#10

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10141285

Number of Deaths: 0

Date of Failure: June 1, 2005

VIN : 2GCEC19T1Y1...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT: THE CONTACT STATES THAT HE HAS EXPERIENCED SOME PROBLEMS WITH THE BRAKING SYSTEM. A FEW DAYS AGO THE BRAKE PEDAL WENT ALL THE WAY TO THE FLOOR. UPON INSPECTION HE DISCOVERED THAT THE BRAKE LINE COMPLETELY RUSTED. HE WAS LEFT WITH ONLY SECONDARY BRAKES OR JUST THE EMERGENCY BRAKE. THIS SAME PROBLEM OCCURRED ABOUT FOUR MONTHS AGO. DURING THE FIRST BRAKE FAILURE THE ABS LIGHT ILLUMINATED ON THE DASHBOARD. THREE BRAKE LINES HAVE BEEN REPLACED BY THE CONTACT AT THIS TIME. HE PLANNED TO REPLACE ALL THE BRAKE LINES. *AK

#11

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10099466

Number of Deaths: 0

Date of Failure: November 1, 2004

VIN : 2GCEC19T7Y1...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

WHILE DRIVING BRAKE LINE BUSTED DUE TO CORROSION. *AK ALL THE BRAKE LINES TO THE FRONT WHEEL AND FROM THE MASTER CYLINDER WERE UNSAFE DUE

#12

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10120805

Number of Deaths: 0

Date of Failure: May 11, 2005

VIN : 1GCEK14W5YE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT CONTACT STATED THAT ALL THE VEHICLE'S BRAKE LINES BROKE. WHEN THE BRAKE WAS PRESSED IT PULSATED AND THE PEDAL WENT TO THE FLOOR. *NM

#13

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10101736

Number of Deaths: 0

Date of Failure: November 19, 2004

VIN : 1GCEK19T2YE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

THE BRAKE LINES RUSTED, AND BRAKE FLUID SPILLED ON THE FLOOR WHILE VEHICLE WAS PARKED IN THE GARAGE. THE BRAKE LINE WAS DISCOVERED TO BE CORRODED AND THE PARKING BRAKE DID NOT WORK.*AK THE CONSUMER STEPPED ON THE BRAKE PEDAL TO PUT THE VEHICLE INTO DRIVE WHEN THE BRAKE PEDAL HIT THE FLOOR. THE CONSUMER THEN HIT THE PARKING BRAKE WHICH ALSO HIT THE FLOOR. THE CORRODED LINES LEAKED BETWEEN THE MASTER CYLINDER AND THE ABS UNIT. THE CONSUMER HAS THE CORRODED LINES IN HIS POSSESSION. *NM

#14

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10046248

Number of Deaths: 0

Date of Failure: November 1, 2003

VIN : 1GCGC24U4YE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

THE BRAKE LINE LOCATED ON THE OUTSIDE OF THE FRAME RUSTED. THE LINE WAS COVERED WITH A THIN SPRING ,AND ANY TIME IT RAINED OR THE VEHICLE WENT THROUGH WATER, THE SPRING HELD WATER RIGHT NEXT TO THE LINE, CAUSING THE LINE TO RUST. THE DEALER REPLACED THE BRAKE LINE AT THE EXPENSE OF THE CONSUMER.*AK *PH

#15

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10146758

Number of Deaths: 0

Date of Failure: December 24, 2005

VIN : 1GCGK29U1YE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT*:THE CONTACT STATED THE BRAKES FAILED TO STOP THE VEHICLE. THE EMERGENCY BRAKE WAS USED TO COMPLETELY STOP THE VEHICLE. THERE WERE NO WARNING INDICATORS PRIOR TO COMPLETE BRAKE FAILURE. THE VEHICLE WAS TAKEN TO THE AN INDEPENDENT REPAIR SHOP, AND UPON INSPECTION THEY DISCOVERED THE BRAKE LINE WAS COMPLETELY RUSTED. ALSO, THE REPAIR SHOP PERSONNEL DETERMINED PREMATURE RUSTING OF OTHER METAL BRAKE LINES. *AK

#16

Make : CHEVROLET

Model : SILVERADO

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10155753

Number of Deaths: 0

Date of Failure: February 28, 2006

VIN : 2GCEK19T2Y1...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

ALL OF THE BRAKE LINES RUSTED THROUGH CAUSING A COMPLETE BRAKE FAILURE ON THE 2000 SILVERADO TRUCK. HAD TO HAVE ALL OF THE LINES REPLACED ALONG WITH THE CALIPERS. TRUCK HAD APPROXIMATELY 52590 MILES. *JB

#N/A Note: 10172982 below is **FUEL** line corrosion. Reference only.

Results : **1** | All records displayed

Make : CHEVROLET

Model : SILVERADO 1500

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10172982

Number of Deaths: 0

Date of Failure: November 1, 2006

VIN : 1GCEK14T9YZ...

Component: FUEL SYSTEM, GASOLINE:DELIVERY:HOSES, LINES/PIPING, AND FITTINGS

Summary:

FUEL LINES RUNNING UNDER THE TRUCK ARE RUSTED , CAUSING A LEAK WHEN THE TRUCK IS RUNNING AND THEREAFTER UNTIL THE FUEL LINE IS DRAINED WHEN THE MOTOR IS TURNED OFF. *NM

#17

Make : CHEVROLET **Model :** SUBURBAN **Year :** 2000
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 751613 **Number of Deaths:** 0
Date of Failure: September 2, 2001
VIN : 3GNFK16T7YG...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS
Summary:
BRAKE LINE FAILURE THAT WOULD HAVE CAUSED BRAKE FAILURE. *AK

#18

Make : GMC **Model :** SIERRA **Year :** 2000
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 10140508 **Number of Deaths:** 0
Date of Failure: June 10, 2005
VIN : 1GTFC24T4YE...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS
Summary:
BRAKE LINES CORRODED (RUSTED). *JB

#19

Make : GMC **Model :** SIERRA **Year :** 2000
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 8017692 **Number of Deaths:** 0
Date of Failure: August 22, 2002
VIN : 2GTEC19T6Y1...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS
Summary:
WHILE DRIVING REAR BRAKE LINE SNAPPED, CAUSING FLUID TO LEAK OUT,
AND RESULTING IN HEAVY VIBRATION. WILL BE HARD TO STOP. *AK

#20

Make : GMC

Model : SIERRA

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10134578

Number of Deaths: 0

Date of Failure: July 28, 2005

VIN : 2GTEK19T8Y1...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT:THE OWNER HAD PROBLEMS WITH THE LOW SPEED BRAKE APPLICATIONS WHEN COMING TO A STOP AT STOP SIGNS. THE ABS PROBLEMS BEGAN LAST YEAR. THE OWNER HAD TO HAVE THE FRONT WHEEL SENSORS AND RINGS REPLACED. THE BRAKES WORKED OKAY FOR A WHILE. THEN ON JULY 28 2005 WHILE DRIVING AT 30 MPH AND APPROACHING A RED LIGHT TRIED TO STOP BUT THE BRAKES FAILED. COULD NOT STOP AND HIT THE CURB. THE OWNER ADDED A QUART OF BRAKE FLUID AND LOOKED UNDERNEATH AND SAW THE BRAKE FLUID SQUIRTING OUT OF THE BRAKE LINES. THEN, AT HOME THE OWNER LET THE VEHICLE SIT AND THE REST OF THE BRAKE FLUID DRAINED OUT. THEN, THE OWNER CALLED GMC, AND TOLD THEM WHAT HAPPENED. HE DID NOT THINK IT WAS NORMAL FOR THE BRAKE LINES TO RUST AT 47,000 MILES. GMC ADVISED THE OWNER TO TAKE THE CAR TO THE LOCAL DEALERSHIP, WHO KEPT THE CAR FOR ONE WEEK. GMC SENT AN INVESTIGATOR WHO COULD NOT FIND A LEAK IN THE BRAKE LINES. THE INSPECTOR WAS CONTACTED BY THE OWNER ,AND THE OWNER ASKED IF THE INSPECTOR HAD FILLED THE BRAKE FLUID AND PUSHED THE BRAKE AND HE SAID NO. THE OWNER ASKED HOW CAN THE FLUID LEAK OUT IF BRAKE FLUID WAS NOT PUT IN. THEN, THE OWNER EXAMINED THE BRAKE LINES AND SAW THAT THEY WERE RUSTED/CORRODED. THE OWNER CONTACTED GMC AGAIN ADVISING GMC THAT THE INSPECTOR HAD NOT FILLED THE BRAKE LINES. GMC DENIED THE OWNER'S CLAIM. HOWEVER, THE OWNER DID NOT KNOW WHY THE BRAKE LINES RUSTED. THE DEALERSHIP ADVISED THAT THE OWNER THAT HE WOULD HAVE TO PAY FOR THE REPAIR OF RUSTED BRAKE LINES. THE OWNER PAID THE REPAIR COST. UPON INSPECTION OF THE VEHICLE THE OWNER NOTICED THE BRAKE LINES WERE ONLY PARTIALLY REPLACED. THE COST OF REPAIRS WAS \$894.78 FOR ABOUT 4 FEET OF BRAKE LINES.*AK

#21

Make : GMC **Model :** SIERRA 1500 **Year :** 2000
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 10169452 **Number of Deaths:** 0
Date of Failure: September 25, 2006
VIN : 2GTEC19VXY1...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS
Summary:
ON 9-25-06 I WAS DRIVING TO WORK AND LOST MY BRAKES . AFTER
STOPPING I NOTICED BRAKE FLUID LEAKING FROM UNDER MY PICKUP
.TOOK THE TRUCK TO THE DEALER AND WAS TOLD THE HYDRAULIC BRAKE
LINE WAS CORRODED FROM THE FRONT OF THE TRUCK TO THE BACK
.HAVING BRAKE LINE REPLACED . *NM

#22

Make : GMC **Model :** SIERRA 2500 **Year :** 2000
Manufacturer : GENERAL MOTORS CORP.
Crash : No **Fire :** No **Number of Injuries:** 0
ODI ID Number : 10188274 **Number of Deaths:** 0
Date of Failure: April 18, 2007
VIN : 1GTGK29U6YE...
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS
Summary:
TL*THE CONTACT OWNS A 2000 GMC SIERRA 2500. THE CONTACT
STATED THAT THE VEHICLE HAS A LEAK IN THE BRAKE LINE THAT FLOWS
BELOW THE FRAMEWORK. THIS FAILURE CAUSES THE VEHICLE TO LOSE
BRAKING ABILITY. WHILE DRIVING 35 MPH IN DRY CONDITIONS, THE
CONTACT HAD TO DEPRESS THE BRAKE PEDAL TO THE FLOORBOARD IN
ORDER TO STOP THE VEHICLE. THE CONTACT BROUGHT THE VEHICLE TO
THE DEALER WHO FOUND RECALL # 00V345000 FOR THE SERVICE BRAKES,
HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND
FITTINGS. THE CONTACT'S VEHICLE IS EXCLUDED FROM THE RECALL. HE
ADDS BRAKE FLUID EVERYDAY TO ENSURE THE VEHICLE STOPS
PROPERLY. THE CURRENT AND FAILURE MILEAGES WERE 100,000.

#23

Make : GMC

Model : SIERRA 2500

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10174241

Number of Deaths: 0

Date of Failure: November 25, 2006

VIN : 1GTGK24U8YE...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

2000 GMC 2500 SIERRA BRAKE LINES RUSTING THROUGH AT FRAME CLIP
NEAR LEFT FRONT WHEEL. ALL BRAKE LINES VERY RUSTED. *JB

#24

Make : GMC

Model : YUKON

Year : 2000

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries:
0

ODI ID Number : 10128333

Number of Deaths:
0

Date of Failure: April 4, 2005

VIN : 1GKEC13T4YJ...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

DT: THE CONTACT OWNS A 2000 GMC YUKON. THE CONSUMER
EXPERIENCED TOTAL BRAKE FAILURE AT A LOW SPEED ON A BUSY
INTERSECTION. THE DEALERSHIP LATER FOUND THAT THE STAINLESS BRAKE
LINES RUSTED THROUGH. THERE WAS NO PRIOR WARNING. THE ROAD
CONDITION WAS PAVEMENT ON A DRY ROAD. THE FAILURE OCCURRED UNDER
NORMAL BRAKING. THE CONSUMER HAD THE REPAIR PERFORMED ON HER
VEHICLE. THIS IS THE FIRST TIME SHE HAS EXPERIENCED BRAKING
PROBLEMS. REPAIR INVOICES ARE AVAILABLE. THE VEHICLE HAD TO BE
TOWED TO THE DEALERSHIP. *NM *JB

#25

Make : CHEVROLET **Model :** SILVERADO 1500 HD **Year :** 2001

Manufacturer : GENERAL MOTORS CORP.

Crash : No **Fire :** No **Number of Injuries:** 0

ODI ID Number : 10196371 **Number of Deaths:** 0

Date of Failure: June 29, 2007

VIN : 2GCEK19V411...

Component: SERVICE BRAKES, HYDRAULIC:POWER
ASSIST:HYDRAULIC:HOSES, LINES/PIPING, AND FITTINGS

Summary:

REAR BRAKE LINE FAILURE DUE TO ROTTING LINE. CATASTROPHIC BRAKE FAILURE.... NO FRONT OR REAR BRAKES. ALL BRAKE LINES NEED TO BE REPLACED. LUCKILY NO CRASH OR INJURIES WITH THIS INCIDENT, BUT VEHICLE NEEDED TO BE TOWED TO REPAIR SHOP. *TR

#26

Make : CHEVROLET **Model :** TAHOE **Year :** 2001

Manufacturer : GENERAL MOTORS CORP.

Crash : No **Fire :** No **Number of Injuries:** 0

ODI ID Number : 10206351 **Number of Deaths:** 0

Date of Failure: September 20, 2007

VIN : 1GNEK13T41J...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION
COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS

Summary:

BRAKE FAILURE. COMPLETE LOSS OF BRAKE FUNCTION WITHOUT WARNING. MASTER CYLINDER REPLACED, BUT DID NOT CORRECT. HAD TO REPLACE 2 BRAKE LINES. BOTH HAD RUSTED THOUGH (BESIDE THE FRAME UNDER THE DRIVERS SEAT). THE 2 FAILED BRAKE LINES EACH HAD AT LEAST 10 RUST BLISTERS THAT COULD EASILY RUPTURE. VEHICLE WAS NOT FROM THE NORTH EAST OR NEAR THE OCEAN.

#27

Make : CHEVROLET

Model : SILVERADO

Year : 2002

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10160497

Number of Deaths: 0

Date of Failure: February 8, 2006

VIN : 1GCEK19T22Z...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES,
LINES/PIPING, AND FITTINGS

Summary:

2002 SILVERADO K1500 BRAKE PEDAL FAILED TO STOP THE VEHICLE. *TS
NAR THE CONSUMER WAS TOLD ALL OF THE BRAKE LINES BETWEEN THE
MASTER CYLINDER AND ELECTRO HYDRAULIC CONTROL UNIT WERE RUSTED AND
SOME WERE LEAKING FLUID. *JB

#28

Make : CHEVROLET

Model : SILVERADO

Year : 2002

Manufacturer : GENERAL MOTORS CORP.

Crash : No

Fire : No

Number of Injuries: 0

ODI ID Number : 10168116

Number of Deaths: 0

Date of Failure: September 10, 2006

VIN : 1GCHK23U92F...

Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES,
LINES/PIPING, AND FITTINGS

Summary:

2002 CHEVY SILVERADO WAS BEING DRIVEN AND A STEEL BRAKE LINE POPPED
WHILE BRAKING FOR A DOWNHILL GRADE, CAUSING LOSS OF BRAKING. IF WE HAD
BEEN TOWING OUR HORSE TRAILER AN ACCIDENT WOULD CERTAINLY HAVE
OCCURRED. THE BRAKE LINE IS SEVERELY ROTTED AND RUST FLAKES OFF EASILY.
THE LINE IS HELD TO THE FRAME, UNDER THE CAB AND NOT IN A LOCATION WHERE
DAMAGE OR WEAR SHOULD OCCUR. THE VEHICLE IS TOO NEW AND HAS LOW MILES
(55K) AND THIS FAILURE SHOULD NOT HAVE HAPPENED. *JB

#29

Make : CHEVROLET	Model : SILVERADO 1500	Year : 2002
Manufacturer : GENERAL MOTORS CORP.		
Crash : No	Fire : No	Number of Injuries: 0
ODI ID Number : 10199947		Number of Deaths: 0
Date of Failure: July 14, 2007		
VIN : 2GCEC19V521...		
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS		
Summary:		
TL*THE CONTACT OWNS A 2002 CHEVROLET SILVERADO 1500. WHILE DRIVING 30 MPH THE VEHICLE LOST THE ABILITY TO STOP WHEN HE ATTEMPTED TO MAKE A TURN. THE ROAD CONDITIONS WERE NORMAL. THE VEHICLE WAS TOWED TO THE DEALER AND THEY STATED THAT THE BRAKE LINES RUSTED WHICH CAUSED BRAKE FLUID TO LEAK. THE DEALER REPLACED TWO BRAKE LINES AND THE CONTACT WAS ADVISED TO REPAIR THE OTHER BRAKE LINES THAT STARTED TO RUST. THE CURRENT AND FAILURE MILEAGES WERE 90,000.		

#30

Make : CHEVROLET	Model : SILVERADO 2500 HD	Year : 2002
Manufacturer : GENERAL MOTORS CORP.		
Crash : No	Fire : No	Number of Injuries: 0
ODI ID Number : 10180807		Number of Deaths: 0
Date of Failure: January 24, 2007		
VIN : 1GCHK29U02E...		
Component: SERVICE BRAKES, HYDRAULIC:FOUNDATION COMPONENTS:HOSES, LINES/PIPING, AND FITTINGS		
Summary:		
TL* - THE CONTACT STATED THAT WHILE DRIVING AT 10 MPH THE 2002 CHEVROLET SILVERADO THE HARD BRAKE LINE RUPTURED. T THERE WERE NO WARNING INDICATORS. . THE CONTACT HAD JUST PICKED UP THE VEHICLE FROM THE DEALER AFTER HAVING ROUTINE MAINTENANCE PERFORMED ON THE VEHICLE. THE DEALER DIAGNOSED THE FAILURE AS THE BRAKE LINE HAVING CORRODED. *AK		

[illegible]

PE10-010

GM

7-2-10

ATTACHMENT

Q_12

Master Cylinder Usage

Model Years	Master Cylinder Part Number	Master Cylinder Bore Dia. (mm)	Model/Option Restriction Statement	Fluid Level Sensor	Differential Pressure Switch
1999,	1802419 4	34	CK100200(00) &JC5	Yes	No
2000, 2001	1802419 4	34	CK100(00) &JC5, CK100(00) &JE1&JH5	Yes	No
1999, 2000	1802419 6	37	CK200(00) &JH6	Yes	No
2001,	1804132 7	37	CK100200300(00) &JH6/JH7	Yes	No
2002,	1509166 1	34	CK100(00) &JC5, CK100(00) &JE1&JH5	Yes	No
2002,	1509166 2	37	CK100(00) &JH5-JE1, CK100200300(00) &JH6/JH7	Yes	No
2003,	1508787 7	31.8	CK100(00) &JC3/JC4-JL4	No	Yes
2003,	1508801 0	31.8	CK100(06) &JC4&JL4	Yes	Yes
2003,	1509898 7	34	K100(0636) &JH2&JL4	Yes	Yes
2003,	1506594 6	37	CK100(43) &JH6, CK200300(00) &JH6/JH7-JL4	Yes	No