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HS#
637214

135-TRC-04-008

SAFETY COMPLIANCE TESTING FOR FMVSS 135
Passenger Car Brake Systems

GM Daewoo Auto & Technology Company
2004 Chevrolet Aveo LS, 5-Door Passenger Car
NHTSA No. C40110

TRANSPORTATION RESEARCH CENTER INC.
10820 State Route 347
East Liberty, Ohio 43319

Final Report Completed: June 9, 2004

FINAL REPORT

Prepared Under Contract No.: DTNH22-01-C-21025

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Enforcement
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NVS-220)
Washington, DC 20590

Prepared for the Department of Transportation, National Highway Traffic Safety Administration, under Contract No. DTNH22-01-C-21025.

Prepared By Randall Landes

Approved By

Approval Date: 6/14/04

Final Report Acceptance By OVSC:

Contract Technical Manager, Office of Vehicle Safety Compliance

6/21/04

Acceptance Date

1. REPORT NUMBER: 135-TRC-04-008	2. GOVERNMENT ACCESSION NO.:	3. RECIPIENTS CATALOG NO.:
4. TITLE AND SUBTITLE: Final report of FMVSS 135 Compliance Testing of a 2004 Chevrolet Aveo LS, 5-Door Passenger Car, NHTSA No. C40110		5. REPORT DATE: June 9, 2004 6. PERFORMING ORGANIZATION CODE: TRC 20000113/4359
7. AUTHOR(S): Project Manager: WALTER DUDEK Project Engineer: RANDALL A. LANDES		8. PERFORMING ORGANIZATION REPORT NO.: TRC-DOT-135-053
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Transportation Research Center Inc. 10820 State Route 347 East Liberty, Ohio 43319		10. WORK UNIT NUMBER: 11. CONTRACT OR GRANT NO.: DTNH22-01-C-21025
12. SPONSORING AGENCY NAME AND ADDRESS: U.S. Department of Transportation National Highway Traffic Safety Administration Enforcement Office of Vehicle Safety Compliance (NVS-220) 400 Seventh Street, SW, Room 6115 Washington, DC 20590		13. TYPE OF REPORT AND PERIOD COVERED: Final test report Tested: 04/30/04 to 05/24/04 14. SPONSORING AGENCY CODE: NVS-220
15. SUPPLEMENTARY NOTES:		
16. ABSTRACT: Compliance tests were conducted on the subject 2004 Chevrolet Aveo LS, 5-Door Passenger Car, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-135-00 for the determination of FMVSS 135 compliance. Test failures identified were as follows: None.		
17. KEY WORDS: Compliance Testing Safety Engineering FMVSS 135		18. DISTRIBUTION STATEMENT: Copies of this report are available from: NHTSA Technical Reference Division Mail Code: NAD-40 400 Seventh Street, SW, Rm. 5108 Washington, DC 20590 Telephone No. (202) 366-4949
19. SECURITY CLASSIF. (OF THIS REPORT): Unclassified	20. SECURITY CLASSIF. (OF THIS PAGE): Unclassified	21. NO. OF PAGES: 69 / 22. PRICE:

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1.0 INTRODUCTION

Tests were conducted on a 2004 Chevrolet Aveo LS, 5-door passenger car, manufactured by GM Daewoo Auto & Technology Company, Republic of Korea, to determine compliance with FMVSS 135 "Passenger Car Brake Systems." All tests were conducted in accordance with the U.S. D.O.T., NHTSA Laboratory Procedure TP 135-00 and/or the corresponding TRC Inc. test procedure that was submitted to NHTSA for their approval. The test procedure was clearly described in the submitted document and has not been repeated in this report.

All stops were performed manually.

All tests were conducted by TRC Inc. personnel using the following TRC facilities:

7.5-Mile Test Track
Vehicle Maximum Speed
Burnish
Heating Snubs and Hot Performance Stops
Brake Cooling and Recovery Stops

Skid Pad
Cold Effectiveness Stops
High Speed Effectiveness Stops
Stops with Engine Off
Failed Antilocks
Failed Variable Proportioning Valve (if applicable)
Failed Hydraulic Circuits
Brake Power Assist Unit Failures

Brake Slope
Parking Brake

Average PFC during the test period was 0.97 (Skid Pad) and 0.94 (Test Track) utilizing the ASTM E1337 w/E1336 tire method.

The test vehicle was ABS equipped. Therefore, the Wheel Lock Sequence and Adhesion Utilization Tests were not performed.

This vehicle met the requirements of FMVSS 135.

DATA SHEET 1 - VEHICLE INFORMATION

VEHICLE SPECS

Year:	2004	NHTSA No:	C40110
Mfr:	GM DAEWOO AUTO & TECHNOLOGY CO	GVWR (Kg):	1486.0
Make:	CHEVROLET	GAWR Front(Kg):	830.1
Model:	AVEO LS	GAWR Rear(Kg):	801.5
Body Style:	5-DR. HATCHBACK	Wheelbase (mm):	2476.5
Mfr. Date:	12/03	Odometer:	Start:67 MI. End:508 MI.
VIN:	KL1TJ62684B158294		

BUSES ONLY

Chassis Mfg.:	N/A
Serial No.:	N/A
No. of Seats:	N/A
Manufacture Date:	N/A

Engine Type:	GASOLINE,16V,E-TECII,DOHC,FI, I-4 CYLINDER		
Displacement:	1.6 LITER	Tire Size:	P185/60R14
Engine Hspwr:	N/A	Tire Type:	82H,M+S,STEEL RADIAL 722,TUBE
Idle Speed(rpm):	830	Tire Mfr.:	KUMHO
Transmission Type:	MANUAL 5-SPEED, FWD	GVWR Front Press.(kpa):	206.84
No. of Axles:	2	GVWR Rear Press.(kpa):	206.84

BRAKE APPLY SYSTEM

Brake Series:	Front:DISC Rear:DRUM	Power Assist Unit:	YES
Brake Actuation (Hydr. Circuit Split):	DIAGONAL	Pwr Unit w/Accumulator:	NO
Power Unit:	VACUUM	Pwr Asst./Pwr Unit w/Backup:	NO
Anti-Skid unit Mfr:	KDAC:PER MANU.RESPONSE	Variable Prop. System:	NO
Parking Mechanism:	NO	Anti-Skid Device:	YES
Type of Parking Unit:	N/A		
Mstr Cylinder Dia(mm):	22.22	Pedal Ratio:	3.7 : 1

FRONT SYSTEM BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE:	DISC	Material:	CAST
Drum Construction:	N/A	LF Drum Shoe Cage Dia.(mm):	0.00
Disc Construction:	INTEGRAL CAST,VENTED	RF Drum Shoe Cage Dia.(mm):	0.00
Front Brake Dia.(mm):	255.80	LF Drum Dia. RESET(mm):	0.00
Fr Disc Thickness(mm):	23.98	RF Drum Dia. RESET(mm):	0.00
Lining Construction:	Bonded		

FRONT BRAKE COMPONENT DIMENSIONS AND CODES:

	Inboard (Leading)	Outboard (Trailing)
Width(mm):	43.46	43.48
Length(mm):	117.96	117.93
Thickness(mm):	10.82	10.95
Lining Code/Color:	KDAC SAC L500 GREEN 3L24A	KDAC SAC L500 GRE
Hyd. Piston Dia.(mm):	53.90	

DATA SHEET 1 - (CONTINUED)

REAR SYSTEM BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE: DRUM
Material: CAST IRON

Drum Construction:	CAST
Disc Construction:	N/A
Lining Construction:	BONDED
Rear Brake Dia.(mm):	199.87
Rr Disc Thickness(mm):	0.00
LR Drum Shoe Cage Dia.(mm):	199.49
RR Drum Shoe Cage Dia.(mm):	199.54
LR Drum Dia. RESET(mm):	199.26
RR Drum Dia. RESET(mm):	199.29

REAR BRAKE COMPONENT DIMENSIONS AND CODES:

Inboard (Leading)		Outboard (Trailing)	
Width(mm):	173.05	Width (mm):	173.05
Length(mm):	34.85	Length (mm):	34.87
Thickness(mm):	4.70	Thickness (mm):	4.67
Lining Code/Color:	SBI DE04A FF 3J27A	Lining Code/Color:	SBI DE04A FF 3J27A
Hyd Piston Dia (mm):	20.65		

OTHER COMPONENT INFORMATION:

Friction-type Park Brake: HAND-OPERATED
Non-Service Brake Type
Parking Brake: N/A

NOTE: If at any time after the test series has begun, any brake system part requires replacement or the brake system requires adjustments other than permitted in burnish and reburnish procedures, discontinue testing and notify the COTR immediately.

Technician: Karen Eastersday KAREN EASTERDAY Date: 6/11/04

Quality Assurance: KEN WEBSTER

VEHICLE: 2004 Chevrolet Aveo LS NHTSA NO.: C40110 DATE: 06/07/04

SUMMARY OF TESTING

		Specification and Limit				TEST RESULTS (In compliance if one stop meets requirement)			
TEST	Loading Condition	Speed (km/h)	Min. Pedal Force (N)	Max. Pedal Force (N)	Stopping Distance Requirement (m)	Shortest Stop Min. Pedal Force (N)***	Shortest Stop Max. Pedal Force Newtons (Average – N)	Shortest Stop Stopping Distance (m) (Corrected)	PASS Fail
Equipment Requirements					Specified Equipment	Vehicle contains specified equipment			Pass
Vehicle Maximum Speed	LLVW	NA				183.6 km/h avg.			NA
Burnish	GVWR	80				200, 80 - 0 km/h stops @ 3.0 mpspa			NA
Wheel Lockup Sequence w/o ABS	GVWR				Lockup of front wheels prior to rear	ABS Equipped			NA
Wheel Lockup Sequence w/o ABS	LLVW					ABS Equipped			NA
Adhesion Utilization w/o ABS	LLVW				Rear axle adhesion utilization curve below specified value	ABS Equipped			NA
Adhesion Utilization w/o ABS	GVWR					ABS Equipped			NA
Cold Effectiveness	GVWR	100	65	500	70	6	477.9	49.8	Pass
High Speed Effectiveness	GVWR	130.9	65	500	spd. depend. – 127.9	6	466.9	80.5	Pass
Stops with Engine Off	GVWR	100	65	500	70	5	474.3	48.5	Pass
Cold Effectiveness	LLVW	100	65	500	70	6	500.0	48.1	Pass
High Speed Effectiveness	LLVW	130.9	65	500	spd. depend. – 127.9	6	467.5	76.7	Pass
Failed Antilock	LLVW	100	65	500	85	6	186.2	80.2	Pass
Failed Proportioning Valve	LLVW	100	65	500	110	5	NA	NA	NA
Failed Hydraulic Circuit #1	LLVW	100	65	500	168	5	470.8	90.9	Pass
Failed Hydraulic Circuit #2	LLVW	100	65	500	168	5	491.3	85.3	Pass
Failed Hydraulic Circuit #1	GVWR	100	65	500	168	5	479.1	104.8	Pass
Failed Hydraulic Circuit #2	GVWR	100	65	500	168	5	486.7	102.5	Pass
Failed Antilock	GVWR	100	65	500	85	5	182.3	86.4	Pass
Failed Proportioning Valve	GVWR	100	65	500	110	5	NA	NA	NA
Power Brake Unit Failure	GVWR	100	65	500	168	5	486.6	104.1	Pass
Parking Brake - Uphill	GVWR	-	-	400	Hold for 5 min.?	NA	330.9	Yes-Holds	Pass
Parking Brake - Downhill	GVWR	-	-	400	Hold for 5 min.?	NA	378.3	Yes-Holds	Pass
Heating Snubs	GVWR	120-60	NA	NA	15 Snubs- 3.0 mpspa	5	44 Vis. Avg.	NA	NA
Hot Performance Stop #1	GVWR	100	65	368.5 avg.	75.0	5	400.6 (252.0)	51.1	Pass
Hot Performance Stop #2	GVWR	100	65	500	88	5	431.3	49.0	Pass
Brake Cooling	GVWR	60	NA	NA	4 Stops - 3.0 mpspa	5	43 Vis. Avg.	NA	NA
Recovery Performance Stop #1	GVWR	100	65	368.5 avg.	One of the two stops between 66.7 and 38.0 meters	6	349.6 (218.6)	50.6	Pass
Recovery Performance Stop #2	GVWR	100	65	368.5 avg.		6	429.9 (291.6)	48.7	
Final Inspection-Brake Integrity	Check components for detachment, fracture or lubricants.					No detachments or fractures-normal appear. & colr.			Pass
Final Inspection-Reservoirs/Warning Indicators	Master cylinder or brake power reservoir shall meet the volume and label requirements of S5.4.2 and S5.4.3.					Brake system has sufficient capacity and indicators are in compliance.			Pass

*** Note: The Shortest Stop Minimum Pedal Force represents the minimum force value required to engage the data acquisition's recording mode. *See Appendix C.

DATA SHEET 3 - VEHICLE WEIGHT

VEHICLE: 2004 CHEVROLET AVEO LS NHTSA No. C40110 Date: 05/12/04

Tire Pressure(cold): Front (kpa) 207 Rear (kpa) 207
Odometer: Start 67 MI. End 508 MI.
Scale(s) Used: TRC Scales

NOTE: GVWR, LLVW and axle weights to be measured within +0% and -1%.

GVWR/GAWR INFORMATION
(From Veh. Certification Label)

GVWR(Kg): 1486
GAWR Front(Kg): 830
GAWR Rear(Kg): 802

UNLOADED VEHICLE WEIGHT(UVW)

L Front(Kg): 353 L Rear(Kg): 218
R Front(Kg): 358 R Rear(Kg): 204
T Front(Kg): 711 T Rear(Kg): 422
Total UVW(Kg): 1133

TARGET LIGHT LOADED WEIGHT(LLVW):

NOTE 1: LLVW = UVW+181.4Kg
NOTE 2: Weight distributed in front passenger seat area.
NOTE 3: Neither axle load at LLVW less than at UVW; ballast as required.

L Front(Kg): 398 L Rear(Kg): 264
R Front(Kg): 403 R Rear(Kg): 249
T Front(Kg): 801 T Rear(Kg): 513
Total LLVW(Kg): 1315

ACTUAL LIGHT LOADED WEIGHT(LLVW):

L Front(Kg): 407 L Rear(Kg): 264
R Front(Kg): 393 R Rear(Kg): 250
T Front(Kg): 800 T Rear(Kg): 514
Total Actual Test LLVW(Kg): 1315

Load: Driver/Observer 73(Kg) + Instru.41(Kg) + Ballast 68(Kg) = 181(Kg)

FULLY LOADED TEST WEIGHT (ACTUAL GVWR)

NOTE 1: Vehicle loaded so axle loads proportional to GAWR shown previously.
NOTE 2: But no axle weight to be less than at LLVW.
NOTE 3: If weight on any axle at LLVW exceeds the axle's proportional share of the GVWR, the load required to reach GVWR is placed so that the weight on that axle remains the same as at LLVW.

L Front(Kg): 400 L Rear(Kg): 349
R Front(Kg): 401 R Rear(Kg): 336
T Front(Kg): 801 T Rear(Kg): 685
Total Fully Loaded GVWR(Kg): 1486

Load: Driver/Observer 73(Kg) + Instru. 41(Kg) + Ballast 240(Kg)= 353(kg)

Technician: Karen Easterday KAREN EASTERDAY Date: 6/4/04

Quality Assurance: KEN WEBSTER

DATA SHEET 4 - EQUIPMENT REQUIREMENTS (S5)

SERVICE BRAKE SYSTEM (S5.1)

Vehicle equipped with a service brake system acting on all wheels? YES

Wear Adjustment (S5.1.1):
Service Brakes are compensated for wear by means of a system of automatic adjustment? YES
Describe: DISC-AUTOMATIC CLEARANCE TAKE-UP.DRUM-AUTO.ADJUST.

Wear Status (S5.1.2):
Wear status of service brakes is indicated by:
(A) Acoustic or optical device? YES
Describe: METAL TAB EMITS HIGH FREQUENCY SQUEAL WHEN WORN.
(B) Visual check outside or under vehicle? YES
Describe: FRONT:LOOK THROUGH CALIPER. REAR:LOOK THROUGH INSP.HOLE

PARKING BRAKE SYSTEM (S5.2)

Vehicle equipped with a parking brake system of a friction type with solely mechanical means to retain engagement: YES

CONTROLS (S5.3)

(A) Service brakes activated by means of a foot control? YES
(B) Parking brake control is independent of the service brake control? YES
(C) Parking brake control is hand or foot operated? YES
(D) ABS, if equipped, cannot be manually disabled? YES

DATA INDICATES COMPLIANCE: YES

COMMENTS: NONE.

Tester/Technician: Karen Eastenday KAREN EASTENDAY Date: 6/11/04

Quality Assurance: Ken Webster KEN WEBSTER

DATA SHEET 5 - VEHICLE MAX SPEED

VEHICLE: 2004 CHEVROLET AVEO LS NHTSA No. C40110 Date: 05/12/04

Ambient Temperature: 78°F Wind Velocity: 10(MPH)
Road PFC: .95 Wind Direction: 205°
Odometer: Start 80(mi) End 99(mi)

TEST WEIGHT: Total (Kg): 1315 Front (Kg): 800 Rear (Kg): 514

ESTABLISH VEHICLE MAXIMUM SPEED

VEHICLE LOAD: LLVW
GEAR: Drive
PEDAL FORCE: N/A
TEST SPEED: Maximum attainable from a standing start in 3.2 km.

IBT: N/A
DECEL RATE: N/A
WHEEL LOCKUP: N/A
INTERVAL: N/A

1. Ballast Vehicle to LLVW
2. Accelerate at a maximum rate from a standing start for a distance of 3.2 km on a level surface.
3. Repeat in opposite direction.
4. Record speed attained in each direction and use the average of the two runs.

	DIRECTION	MAX SPEED (km/h)		Time 0 - 100 KPH (seconds)
		Visual	Recorded	
Run No. 1	South	158.5 kph	158.5	15.09
Run No. 2	North	168.6 kph	168.6	14.74

AVERAGE = 163.6 km/h

COMMENTS: INV DATA, Section 0001, 05/12/04, 11:17:13

Tester/Technician: Karen Easterday KAREN EASTERDAY Date: 6/4/04

Quality Assurance: KIM WEBSTER

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C40110
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

Transportation Research Center, Inc.
10820 State Route 347
East Liberty, Ohio 43319
(937)666-2011 www.trcpg.com

Date Tested: 03/12/04

DATA SHEET 6 - BURNISH AT GVWR

Testing Conditions: INV DATA, Section 0803, 03/12/04, 13:36:37

Weather Conditions: 70°F Wind: 6 mph 106° Start Odo.: 101 End Odo.: 358

Schedule:
Initial Brake Temperature Less Than 100°C
Initial Speed 80 km/h to zero
100 stops with transmission in gear

Performance Requirements:
Interval between runs: Time necessary to reduce INT to 100 C° or 3 km distance, whichever occurs first.
Constant decel rate: 3.0 m/s²
Pedal force adjusted to maintain constant decel.
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IRT (°C)	RIGHT FRONT IRT (°C)	LEFT REAR IRT (°C)	RIGHT REAR IRT (°C)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	AVG. DECEL (m/sec²)
1	78.84	52	43	36	34	71.53	54.11	2.68
10	80.88	94	103	101	87	70.05	48.96	2.82
20	79.75	101	101	102	97	76.83	44.97	3.01
30	79.34	102	103	108	94	69.85	46.89	2.92
40	80.13	97	104	98	89	61.91	42.02	2.82
50	80.08	106	103	95	88	66.24	46.53	2.84
60	79.76	102	104	93	87	88.64	40.71	2.71
70	80.30	101	102	80	78	61.03	41.86	2.86
80	80.27	103	109	94	68	59.96	42.14	2.91
90	79.57	111	106	94	91	60.94	35.21	3.00
100	79.62	100	106	89	90	60.39	41.88	3.06
110	78.89	108	109	79	92	58.86	47.26	3.12
120	79.44	111	108	87	91	56.47	44.88	3.07
130	79.37	110	111	87	93	59.17	40.48	3.04
140	79.18	106	110	88	93	63.83	37.06	3.07
150	79.60	110	106	85	97	64.68	38.53	3.04
160	79.30	111	110	84	97	54.78	44.36	2.91
170	79.84	100	97	89	74	61.09	39.98	2.95
180	79.35	102	101	79	87	53.74	40.58	2.81
190	80.04	103	88	79	86	57.23	39.97	2.94
200	79.84	102	88	78	87	59.44	38.06	2.96

COMMENTS: THIS VEHICLE WAS EQUIPPED. DATA RUNS# 7-10 NOT INCLUDED.

BRAKE ADJUSTMENT

Schedule:
Adjust service brakes; record procedure and amount adjusted.

Left Front: DISC DISC BRAKE NO ADJUSTMENT REQUIRED
Right Front: DISC DISC BRAKE NO ADJUSTMENT REQUIRED
Left Rear: DRUM DRUM BRAKE NO ADJUSTMENT REQUIRED.
Right Rear: DRUM DRUM BRAKE NO ADJUSTMENT REQUIRED.
DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: HOWE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO MTSA NUMBER: 040218
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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East Liberty, Ohio 43319
(937)666-2011 www.trcpg.com

Date Tested: 05/13/04

DATA SHEET 11 - COLD EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0018, 05/13/04, 09:52:16

Weather Conditions: 74°F Wind: 3 mph 180° Start Ods.: 368 End Ods.: 370

Schedule:
Initial Brake Temperature 65 - 100 C
Initial Speed 100 km/h to zero
6 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 70m
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.64	82	86	43	43	49.2	49.6	485.97	376.62	12.78	7.37
2	99.84	91	92	54	54	49.8	50.2	350.36	289.21	11.36	7.07
3	99.08	91	91	58	57	48.2	49.1	612.06	338.89	12.17	6.98
4	99.36	95	94	62	61	49.4	50.1	478.76	398.97	12.11	7.06
5	100.18	93	93	62	60	48.6	48.5	582.87	414.79	12.32	7.33
6	99.48	97	93	66	63	49.0	48.6	477.85	368.49	13.38	6.83

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock up - Direction of Skop - Stay in Lane)		
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES

Corrected Distances are used to determine shortest stopping distance.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN HARTENDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEN MERATHE Date: 06/04/04

Vehicle: 2004 GM HANDO AUTO NHTSA NUMBER: C40110

Make: CHEVROLET

Model: AVEO LS

Body Style: 5-DR. HATCHBACK

Front Cold Tire Pressure: 207 (Kpa)

Rear Cold Tire Pressure: 207 (Kpa)

Transportation Research Center, Inc.
10820 State Route 347
East Liberty, Ohio 43319
(937)666-2511 www.trcpg.com

Date Tested: 08/13/04

DATA SHEET 12 - HIGH SPEED EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0020, 08/13/04, 10:02:08

Weather Conditions: 77°F Wind: 14 mph 174° Start Odo: 373 End Odo: 391

Schedule:

Initial Brake Temperature: 65-135°C

Initial Speed: 099 mph km/h, not greater than 160km/h

6 stops with transmission in gear

Performance Requirements:

One Stop with:

Stopping Distance less than: 137.4 meter

Pedal force between 65N and 500N

No Lock-Up allowed longer than 0.1 sec above 15 km/h

Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec^2)	AVG. DECEL (m/sec^2)
1	130.35	75	58	46	43	80.8	80.7	447.84	364.44	13.08	8.04
2	129.61	92	81	64	56	79.1	80.6	496.15	388.56	13.35	7.66
3	126.87	93	78	86	58	78.6	81.0	497.84	373.94	13.14	8.01
4	129.58	84	63	62	58	78.8	80.5	466.58	386.82	12.43	7.82
5	130.04	80	65	64	50	80.2	81.2	476.98	372.36	12.78	7.88
6	130.46	82	84	64	58	82.3	82.6	482.68	378.94	13.42	7.83

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock up - Direction of Stop - Stay in Lane)		
1	-	NOE	SOUTH	YES
2	-	NOE	SOUTH	YES
3	-	NOE	SOUTH	YES
4	-	NOE	SOUTH	YES
5	-	NOE	SOUTH	YES
6	-	NOE	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KASTERDAY Observer: NONE

Recorded Data Processed by: CHUCK JENKINS Date: 08/30/04

Approving Laboratory Official: KEN WEBSTER Date: 08/24/04

Vehicle: 2004 GM DAEWOO AUTO METRA NUMBER: C48110
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (kpa)
Rear Cold Tire Pressure: 207 (kpa)

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Date Tested: 05/13/04

DATA SHEET 13 - STOPS WITH ENGINE OFF AT GVWR

Testing Conditions: INV DATA, Section 0025, 05/13/04, 10:57:21

Weather Conditions: 77°F Wind: 17 mph 203° Start Odo.: 382 End Odo.: 387

Schedule:
Initial Brake Temperature: 65-100°C
Initial Speed 100 km/h to zero
6 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 70m
Pedal force between 65N and 890N
No Lock-Up allowed longer than 0.1 sec above 16 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.35	91	77	71	66	50.8	51.7	473.49	400.69	11.16	7.36
2	100.08	80	75	62	58	50.5	50.4	489.85	391.87	11.51	7.38
3	100.08	96	91	72	64	48.8	48.8	493.47	386.81	13.18	7.66
4	100.35	88	82	64	60	48.6	48.8	481.35	387.44	12.37	5.65
5	99.15	89	84	63	59	47.7	48.8	474.28	384.62	11.87	7.62
6	98.46	89	89	58	55	48.4	48.9	482.34	383.82	12.64	7.43

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)			
1	-	NOE	SOUTH	YES
2	-	NOE	SOUTH	YES
3	-	NOE	SOUTH	YES
4	-	NOE	SOUTH	YES
5	-	NOE	SOUTH	YES
6	-	NOE	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NOBE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C60318
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/13/04

DATA SHEET 14 - COLD EFFECTIVENESS AT LLVW

Testing Conditions: ZEV DATA, Section 6038, 05/13/04, 13:11:19

Weather Conditions: 79°F Wind: 16 mph 229° Start Odo.: 388 End Odo.: 395

Schedule:
Initial Brake Temperature: 65-100°C
Initial Speed 100 km/h to zero
6 stops with transmission in Neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 100.
Pedal force between 65N and 580N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in Lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	100.11	79	74	48	46	49.7	49.6	472.58	339.76	11.82	7.35
2	99.74	86	81	58	52	48.9	48.1	518.42	395.45	12.94	7.68
3	100.08	88	80	53	49	46.2	46.1	493.96	389.88	13.19	7.76
4	99.48	96	91	56	52	47.3	47.8	488.44	331.69	13.78	7.78
5	99.49	90	87	54	51	48.3	48.8	481.35	376.17	12.84	7.52
6	99.63	86	83	51	49	47.2	47.5	489.12	348.49	13,48	7.61

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)			
1	-	NOE	SOUTH	YES
2	-	NOE	SOUTH	YES
3	-	NOE	SOUTH	YES
4	-	NOE	SOUTH	YES
5	-	NOE	SOUTH	YES
6	-	NOE	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEN WEBSTER Date: 05/24/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: 040118
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/13/04

DATA SHEET 15 - HIGH SPEED EFFECTIVENESS AT LLVW

Testing Conditions: INV DATA, Section 0035, 05/13/04, 15:02:22

Weather Conditions: 79°F Wind: 28 mph 104° Start Odo.: 387 End Odo.: 486

Schedule:
Initial Brake Temperature: 65-100°C
Initial Speed: 80% max Km/h
6 Stops with transmission in gear

Performance Requirements:
One Stop with:
Stopping Distance less than 127.0m
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INITIAL SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J99) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	129.22	77	76	48	47	79.0	81.8	439.71	318.48	13.83	7.67
2	130.69	84	78	52	49	75.6	75.7	467.52	388.09	12.97	8.24
3	130.53	88	76	52	48	76.5	76.8	489.30	361.37	13.26	7.99
4	129.76	87	69	51	46	74.1	75.3	544.40	373.39	15.35	8.25
5	131.39	88	72	52	48	75.2	74.3	518.23	371.32	13.38	8.01
6	129.88	82	69	52	48	75.4	77.5	472.85	341.19	12.88	8.13

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)			
1	-	NOE	SOUTH	YES
2	-	NOE	SOUTH	YES
3	-	NOE	SOUTH	YES
4	-	NOE	SOUTH	YES
5	-	NOE	SOUTH	YES
6	-	NOE	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO TESTER NUMBER: 040218
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/14/04

DATA SHEET 16 - ANTILOCK FUNCTIONAL FAILURE AT LLVW

Testing Conditions: INT DATA, Section 6846, 05/14/04, 11:02:53

Weather Conditions: 73°F Wind: 30 mph 280° Start Odo.: 418 End Odo.: 422

Schedule:
Initial Brake Temperature: 65-100°C
Initial Speed 100 km/h to zero
6 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 58m
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.12	77	78	45	48	59.5	60.8	178.33	130.46	9.80	6.26
2	99.85	76	79	52	51	61.1	61.3	152.26	124.61	8.88	5.57
3	99.85	77	81	57	54	65.9	65.9	141.70	113.94	9.39	5.88
4	101.13	87	88	62	61	61.5	59.2	166.16	128.24	9.51	6.11
5	99.52	93	92	64	64	60.7	61.3	149.38	118.21	9.36	6.15
6	99.26	85	87	54	56	59.7	58.6	154.33	117.28	9.15	6.26

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)			
1	-	REX-RIU	SOUTH	YES
2	-	REX-RIU	SOUTH	YES
3	-	NOZ	SOUTH	YES
4	-	NOZ	SOUTH	YES
5	-	NOZ	SOUTH	YES
6	-	NOZ	SOUTH	YES

How was the ABS failure induced: REMOVED 50 AMP FUSE FROM BOX UNDER HOOD-LEFT SIDE.

Is brake system indicator lamp activated: YES (X) NO ( )

Vehicle not equipped with variable proportioning valve. Data Sheet 17 Not Included.

Data INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN HASTERLAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO METRA NUMBER: C40118
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/14/04

DATA SHEET 18 - HYDRAULIC CIRCUIT FAILURE #1 AT LLVM

Testing Conditions: INV DATA, Section 0089, 05/26/04, 11:57:48

Weather Conditions: 72°F Wind: 21 mph 192° Start Odo.: 426 End Odo.: 429

Method of simulating failure: Disconnected Brake Line @ R/C Front Port

System Portion Failed: LF & RR

Schedule:
Initial Brake Temperature: 65-100°C
Initial Speed 160 km/h to zero
4 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 168M
Pedal force between 65N and 580N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.75	38	69	47	24	95.5	94.0	482.02	389.66	7.15	4.05
2	99.88	33	88	49	24	90.2	90.5	479.80	391.70	6.89	4.19
3	99.85	37	82	84	26	99.7	100.8	476.53	397.34	6.77	3.88
4	99.83	37	73	46	26	95.4	96.5	484.24	412.78	7.21	4.11

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)			
1	-	NOT	SOUTH	YES
2	-	NOT	SOUTH	YES
3	-	NOT	SOUTH	YES
4	-	NOT	SOUTH	YES

Force Needed to Activate Brake Failure Lamp (N): N/A
Fluid Removed (mL) to Activate Brake Failure Lamp: 195

Is brake system indicator lamp activated: YES (X) NO ( )

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C492A6
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/17/04

DATA SHEET 19 - HYDRAULIC CIRCUIT FAILURE #2 AT LLVW

Testing Conditions: INV DATA, Section 8058, 05/17/04, 09:56:56

Weather Conditions: 62°F Wind: 13 mph 172° Start Odo.: 436 End Odo.: 441

Method of simulating failure: Disconnected Brake Line @ M/C Rear Port

System Portion Failed: RF & LR

Schedule:
Initial Brake Temperature 65-100°C
Initial Speed 100 km/h to zero
4 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance Less than 168m
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT TMP (°C)	RIGHT FRONT TMP (°C)	LEFT REAR TMP (°C)	RIGHT REAR TMP (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	100.24	90	24	22	46	86.4	86.8	490.47	385.17	8.87	6.28
2	99.56	87	21	21	54	84.8	85.3	491.38	488.86	7.88	6.52
3	99.69	82	19	22	55	85.8	86.6	509.74	486.86	8.81	6.17
4	99.78	69	13	25	45	90.8	98.1	496.96	422.87	7.01	3.89

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES

Force Needed to Activate Brake Failure Lamp (N): N/A
Fluid Removed (mL) to Activate Brake Failure Lamp: 15E

Is brake system indicator lamp activated: YES (X) NO ( )

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO VEHICLE NUMBER: C40118
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/17/04

DATA SHEET 20 - HYDRAULIC CIRCUIT FAILURE #1 AT GVWR

Testing Conditions: INT DATA, Section 0060, 05/17/04, 13:23:09

Weather Conditions: 77°F Wind: 17 mph 203° Start Odo.: 451 End Odo.: 454

Method of simulating failure: Disconnected Brake Line @ W/C front Port

System Portion Failed: LF & RR

Schedule:
Initial Brake Temperature 65-150°C
Initial Speed 100 km/h to zero
6 stops with transmission in Neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 168m
Pedal Force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT TMP (°C)	RIGHT FRONT TMP (°C)	LEFT REAR TMP (°C)	RIGHT REAR TMP (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	100.54	31	89	45	26	107.7	106.5	488.17	420.21	6.92	3.84
2	99.81	34	81	52	28	107.8	106.2	484.53	428.48	6.90	3.88
3	99.76	37	86	56	29	108.1	105.9	580.80	434.17	6.51	3.88
4	100.47	39	76	54	31	108.8	104.6	479.13	426.43	6.88	3.68

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	NOT	SOUTH	YES
2	NOT	SOUTH	YES
3	NOT	SOUTH	YES
4	NOT	SOUTH	YES

Is brake system indicator lamp activated: YES (X) NO ( )

SAE INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C46110
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (kpa)
Rear Cold Tire Pressure: 207 (kpa)

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Date Tested: 05/17/04

DATA SHEET 21 - HYDRAULIC CIRCUIT FAILURE #2 AT GVWR

Testing Conditions: IMV DATA, Section 0088, 05/17/04, 10:08:28

Weather Conditions: 67°F Wind: 10 mph 180° Start Odo.: 444 End Odo.: 442

Method of simulating failure: Disconnected Brake Line @ M/C Rear Port

System Portion Failed: RF & LR

Schedule:
Initial Brake Temperature 65-100°C
Initial Speed 100 km/h to zero
4 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 168ft
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J88) (meter)	MAX. PEDAL FORCE -(N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.64	91	26	28	49	101.7	102.5	485.65	418.04	7.43	3.73
2	100.31	71	24	29	43	107.8	106.3	489.85	428.50	6.68	3.61
3	99.82	86	24	29	47	93.3	93.7	501.42	414.34	7.58	3.99
4	100.50	81	25	31	56	104.3	103.7	481.24	417.77	7.10	3.66

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	-	NOE	SOUTH	YES
2	-	NOE	SOUTH	YES
3	-	NOE	SOUTH	YES
4	-	NOE	SOUTH	YES

Is brake system indicator lamp activated: YES (X) NO ( )

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: 040118
Make: CHEVROLET
Model: AVEO LS
Body Style: 4-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/17/04

DATA SHEET 22 - ANTILOCK FUNCTIONAL FAILURE AT GVWR

Testing Conditions: INV DATA, Section 8078, 05/17/04, 16:41:53

Weather Conditions: 78°F Wind: 19 mph 208° Start Odo.: 487 End Odo.: 463

Schedule:
Initial Brake Temperature 65-100°C
Initial Speed 100 km/h to zero
6 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 80m
Pedal force between 65N and 500N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.54	72	82	62	67	65.5	66.1	162.84	124.28	8.48	6.02
2	100.47	89	94	61	61	65.8	65.2	145.89	113.79	8.14	5.84
3	99.55	86	91	63	68	56.0	56.5	177.90	137.81	10.22	6.48
4	99.83	87	84	62	62	62.1	62.3	162.14	122.97	8.81	6.06
5	99.13	80	76	58	58	59.1	59.1	187.96	131.83	9.38	6.50
6	100.11	79	74	56	56	56.6	56.4	162.29	135.66	9.62	6.62

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	-	NOX	SOUTH	YES
2	-	NOX	SOUTH	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES

How was the ABS failure induced: REMOVED 50 AMP FUSE FROM BOX UNDER HOOD-LEFT SIDE.

Is brake system indicator lamp activated: YES (X) NO ( )

Vehicle not equipped with variable proportioning valve. Data Sheet 22 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C40218
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/18/04

DATA SHEET 24 - BRAKE POWER UNIT OR PWR ASSIST UNIT IN/OP AT GVWR

Testing Conditions: INV DATA, Section 8088, 05/18/04, 09:08:26

Weather Conditions: 68°F Wind: 15 mph 262° Start Odo.: 472 End Odo.: 479

Failure Simulation: Disconnect primary source of power.

Method of rendering inoperative: Removed Engine Vacuum Hose At Booster

Schedule:
Initial Brake Temperature 65-100°C
Initial Speed 100 km/h to zero
6 stops with transmission in neutral

Performance Requirements:
One Stop with:
Stopping Distance less than 168ft
Pedal force between 65N and 440N
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.03	78	75	39	41	108.6	110.7	492.30	463.83	7.05	3.86
2	99.98	96	88	51	53	106.2	106.3	495.65	489.26	7.22	3.79
3	99.33	90	85	51	56	104.2	105.6	490.80	462.24	5.73	3.87
4	100.46	89	77	51	57	107.4	106.4	492.43	483.71	6.16	3.76
5	99.51	86	81	51	58	103.1	104.1	489.75	463.01	5.64	3.93
6	99.17	91	89	54	61	104.3	105.6	491.60	454.90	5.49	3.88

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)			
1	-	NOE	SOUTH	YES
2	-	NOE	SOUTH	YES
3	-	NOE	SOUTH	YES
4	-	NOE	SOUTH	YES
5	-	NOE	SOUTH	YES
6	-	NOE	SOUTH	YES

Is the brake system indicator lamp activated: YES ( ) NO (X)

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN HASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEF MEMSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C40118
Make: CHEVROLET
Model: AVEO LS
Body Style: 4-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/18/04

DATA SHEET 25 - PARKING BRAKE AT GVWR

Testing Conditions: IMV DATA, Section 0005, 05/18/04, 11:10:05
Parking brake: N/A Non-service type: N/A Service type: HAND-OPERATED

Weather Conditions: 67°F Wind: 10 mph 184° Start Odo.: 461 End Odo.: 461

Test Weight: Total:1486kg Front: 801kg Rear: 685kg

Schedule:
Initial Brake Temperature <100°C or (Ambient temp. if non-service brake type materials)
Loaded to GVWR with transmission in neutral
Drive onto 20% slope in forward and reverse directions.

Performance Requirements:
Up to Three Applies in each direction:
Parking brake must hold the vehicle stationary in both directions for 5 minutes each.
Pedal force: Hand control: <400 N
Foot control: <500 N

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 recommendation as furnished to the purchaser. If no recommendations are furnished, test the system in an unburnished condition. If recommendations are furnished, record method used.

APPLY #	MAX SERVICE FORCE (N)	MAX P-BRAKE FORCE (N)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	AVG REAR INT (°C)		DRIVER VEHICLE STOP COMMENTS (Direction of Stop (Up/Down) - Brake Holds/fails)			
1	73.8	338.8	28	28	28.1	-	0 SNAPPLY	UPHILL	HOLDS	20%
2	76.5	378.2	28	28	28.1	-	0 SNAPPLY	DOWNHILL	HOLDS	20%

Is brake system indicator lamp activated: YES (X) NO ( )

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 06/30/04
Approving Laboratory Official: KEN WENGYEN Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C40310
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (kpa)
Rear Cold Tire Pressure: 207 (kpa)

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Date Tested: 05/18/04

DATA SHEET 26 - HEATING SNUBS AT GVWR

Testing Conditions: INV DATA, Section 8090, 05/18/04, 13:55:38

Schedule:
Conduct 15 snubs from 129 Km/h or 80% Vmax, whichever is slower, to 1/2 of initial speed.
Attain required decel in 1 second and maintain that decel.
Interval between snubs is 45 seconds and NOT to initial speed.

Performance Requirements:
Initial INT for first snub is 55-65°C
Maintain 8.0 m/s/s deceleration
Vehicle Must stay in Lane of 3.5m

SNUB #	AVG. DECEL (m/sec²)	Time Between Snubs (second)	AVG. PEDAL FORCE (N)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)	INIT SPD (kph)
1	8.25	--NA--	50.33	86	84	34	37	119.10
2	8.93	47	45.21	92	92	44	47	120.38
3	8.86	48	47.74	121	134	57	61	119.28
4	8.93	44	44.57	159	166	68	73	118.52
5	8.78	48	37.38	184	194	81	86	118.60
6	8.58	46	38.98	201	216	93	99	117.93
7	8.24	46	45.08	216	228	104	110	118.56
8	8.89	48	41.70	226	241	118	120	118.22
9	8.74	46	43.59	229	251	126	129	118.62
10	8.00	47	44.54	248	254	135	138	120.86
11	8.80	42	35.06	256	257	144	147	120.83
12	8.79	45	37.52	260	261	152	155	119.37
13	8.91	45	42.10	260	264	159	163	120.77
14	8.87	45	41.21	259	269	167	172	120.72
15	8.98	45	49.88	256	273	174	181	117.91

STOP #	DRIVER VEHICLE SNUB COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	-	NOX	NORTH	YES
2	-	NOX	EAST	YES
3	-	NOX	SOUTH	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	WEST	YES
7	-	NOX	WEST	YES
8	-	NOX	NORTH	YES
9	-	NOX	NORTH	YES
10	-	NOX	NORTH	YES
11	-	NOX	EAST	YES
12	-	NOX	EAST	YES
13	-	NOX	SOUTH	YES
14	-	NOX	SOUTH	YES
15	-	NOX	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AVEO NHTSA NUMBER: C40110
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/18/04

DATA SHEET 27 - HOT PERFORMANCE AT GVWR

Testing Conditions: INV DATA, Section 0095, 05/18/04, 15:18:43

Schedule:
Make 2 stops from 100 kph
Pedal Force: 1st stop is done with an average force less than the average recorded in the shortest GVWR Cold Effectiveness stop.
2nd stop is done with a force less than 500 N.
No lock-up allowed longer than 0.1 sec above 15 km/h.
Distance requirements are based on the following:
shortest stop in Data Sheet 31 is: 6
Initial speed of stop: 99.45 (kph)
Actual distance of stop: 49.6 (meter)
Average pedal force: 368.5 (N)

Performance Requirements:
Stop number 1 must be less than: 75.8 (meter)
In addition the stopping distance for at least one of the of the two hot stops must be less than: 69 (meter)

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (MAX 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	100.14	288	287	184	191	51.2	51.1	400.64	282.08	12.71	7.29
2	100.81	276	300	192	199	49.8	49.8	431.30	384.88	13.28	7.47

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up -	Direction of Stop -	Stay in Lane)
1	-	NOR	WEST	YES
2	-	NOR	WEST	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/18/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: 040110
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/18/04

DATA SHEET 28 - BRAKE COOLING STOPS AT GVWR

Testing Conditions: INV DATA, Section 8100, 05/18/04, 13:19:53

Schedule:
Initial Brake Temperature:
Achieved on completing Hot Performance
Initial Speed 50 km/h to zero
4 stops with transmission in gear

Performance Requirements:
Constant Decel rate: 3.0 m/s/s
Pedal force adjusted as necessary
No Lock-Up allowed longer than 0.1 sec above 15 km/h
Vehicle Must stay in lane of 3.5m

STOP #	INIT SPD (kph)	AVG. DECEL (m/sec²)	AVG. PEDAL FORCE (N)	LEFT FRONT INT (°C)	RIGHT FRONT INT (°C)	LEFT REAR INT (°C)	RIGHT REAR INT (°C)
1	50.84	2.97	48.07	231	256	188	187
2	50.39	2.81	38.59	180	208	171	178
3	52.12	2.21	38.04	160	159	161	166
4	50.80	2.59	46.21	127	128	136	137

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock up - Direction of Stop - Stay in Lane)		
1	-	NOX	NORTH	YES
2	-	NOX	NORTH	YES
3	-	NOX	NORTH	YES
4	-	NOX	EAST	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 05/30/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

Vehicle: 2004 GM DAEWOO AUTO NHTSA NUMBER: C60110
Make: CHEVROLET
Model: AVEO LS
Body Style: 5-DR. HATCHBACK
Front Cold Tire Pressure: 207 (Kpa)
Rear Cold Tire Pressure: 207 (Kpa)

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Date Tested: 05/19/04

DATA SHEET 29 - RECOVERY PERFORMANCE AT GVWR

Testing Conditions: INV DATA, Section 0103, 05/19/04, 11:35:29

Weather Conditions: 76°F Wind: 11 mph 248° Start Odo.: 483 End Odo.: 509

Schedule:
Make 2 stops from 100 kph
Pedal Force: Both stops are performed with an average force less than the average recorded in the shortest GVWR Cold Effectiveness stop.

Performance Requirements:
One of the two stops must be within the following limits:
Upper limit of corrected stopping distance: 48.7 (meter)
Lower limit of corrected stopping distance: 26.8 (meter)

No Lock-Up allowed longer than 0.1 sec above 15 km/h.

Distance Requirements are based on the following:
Shortest stop Data Sheet 11 is:Stop 4
Initial speed of stop: 99.45 (kph)
Actual distance of stop: 49.8 (meter)
Average pedal force: 268.5 (N)

STOP #	INIT SPD (kph)	LEFT FRONT IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE J39) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.73	128	122	130	129	50.5	50.8	348.61	318.78	12.78	7.26
2	99.79	144	141	136	133	48.5	48.7	429.80	291.83	13.45	7.63

STOP #	DRIVER VEHICLE STOP COMMENTS (Wheel Lock-Up - Disruption of Stop - Stay in Lane)		
1	-	NOX	EAST	YES
2	-	NOX	SOUTH	YES

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN KARTHEDAY Observer: ROSS
Recorded Data Processed by: CHUCK JENKINS Date: 05/20/04
Approving Laboratory Official: KEN WEBSTER Date: 06/04/04

DATA SHEET 30 (Part 1 of 5)
6.0 Test Completion Inspection (7.17)

VEHICLE: 2004 Chevrolet Aveo LS NHTSA NO.: C40110 DATE: 05/24/04

System Integrity (S5.6)

Each vehicle shall meet the complete performance requirements of this standard without:
(a) Detachment or fracture of any component of the braking system such as brake springs and brake shoes or disc pad facings, other than minor cracks, that do not impair attachment of the friction facings. All mechanical components of the braking system shall be intact and functional. Friction facing tearout (complete detachment of lining) shall not exceed 10 percent of the lining on any single frictional element.
(b) Any visible brake fluid or lubricant on the friction surface of the brake or leakage at the master cylinder or brake power unit reservoir cover, seal, and filler openings.

Friction Material Condition: Primary/Inner		Friction Material Condition: Secondary/Outer	
LF	Normal Appearance & Color	LF	Normal Appearance & Color
RF	Normal Appearance & Color	RF	Normal Appearance & Color
LR	Normal Appearance & Color	LF	Normal Appearance & Color
RR	Normal Appearance & Color	RR	Normal Appearance & Color
Drum (or Rotor) Condition:		**Brake Fluid/Lubricant Inside Brakes:**	
LF	Normal Appearance & Color	LF	None
RF	Normal Appearance & Color	RF	None
LR	Normal Appearance & Color	LR	None
RR	Normal Appearance & Color	RR	None
Hydraulic Component Condition:		**Mechanical Component Condition:**	
LF	Good	Brk/Pedal	Good
RF	Good	Power Brk	Good
LR	Good	Stop/Lamp	Good
RR	Good	Linkage	Good
M/Cyl	Good	Other	NA

COMPLIANCE: Yes X No____
Comments: None.

Technician: K. Easterday

DATA SHEET 30 (Part 2 of 5)
TEST COMPLETION INSPECTION (S7.17)

VEHICLE: 2004 Chevrolet Aveo LS; NHTSA NO.: C40110; GVWR: 1486 kg
MASTER CYLINDER RESERVOIR:

DATE	06/20/04	Requirements	Pass	Fail
Reservoir Compartments (S6.4.1)				
(1) Does master cylinder have a reservoir compartment for each brake subsystem?	Yes / No	Master cylinder shall have a reservoir compartment for each subsystem.	X	
(2) Does loss of fluid in one compartment result in complete loss from another compartment?	Yes / No	Loss of fluid from one compartment shall not cause complete loss from another compartment.	X	
Reservoir Capacity (S6.4.2)				
Shall conform to requirements (1) or (2), state units:				
(1) For reservoirs having completely separate compartments for each subsystem (two separate, independent reservoirs):				
Subsystem 1 Subsystem reservoir capacity		Each compartment (reservoir) shall have a minimum capacity equivalent to the fluid displacement resulting when all wheel cylinders or caliper pistons serviced by that independent compartment/reservoir moves from a new lining, fully retracted position to a fully worn, properly adjusted, fully applied position. **(Use Data Sheet 31 and Appendix 1A)**	NA	NA
Subsystem 1 Fluid displaced from new to worn lining				
Subsystem 2 Subsystem reservoir capacity			NA	NA
Subsystem 2 Fluid displaced from new to worn lining				
2) For reservoirs utilizing a portion of the reservoir for a common supply to two or more subsystems:				
Total minimum capacity for the entire master cylinder reservoir (includes individual compartment reservoirs)	284 ml	Shall have total minimum capacity for entire reservoir for displacement resulting from all subsystem wheel cylinders or caliper positions moving from new lining to full worn condition as above.	X	
Fluid displaced from new to worn linings (ALL linings) *Value calculated from Data Sheet 31	88.9 ml*			

Comments: None

DATA SHEET 30 (Part 3 of 5)
TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2004 Chevrolet Aveo LS; NHTSA NO.: C40110; GVWR: 1486 kg

MASTER CYLINDER RESERVOIR:

DATE	05/20/04	Requirements	Pass	Fail
Master Cylinder Piston Displacement(S5.4.2) [If Common Reservoir Supply - continued from previous page]				
Fluid displaced by three strokes of master cylinder piston for Primary (Subsystem No. 1)	20 ml	Individual partial compartments of reservoir shall each have a minimum of fluid equal to at least the volume displaced by the master cylinder piston servicing the subsystem during a full stroke of the piston. **NOTE:** Procedure uses three strokes to ensure an accurate measurement.		
Fluid displaced by three strokes of master cylinder piston for Secondary (Subsystem No. 2)	18 ml			
Fluid displaced per stroke, Primary	6.6 ml			
Fluid displaced per stroke, Secondary	6.0 ml			
Fluid available in partial compartment Subsystem No. 1	15 ml		X	
Fluid available in partial compartment Subsystem No. 2	39 ml		X	
Brake Power Unit Reservoir (S5.4.2)				
Volume displaced in charging system piston or accumulator to normal operating pressure plus wheel cylinder or caliper piston displacement.		Shall have a capacity at least equal to fluid displacement required to charge the system pistons on accumulators to normal operating pressure plus displacement when wheel cylinders or caliper pistons move from new lining to full worn condition as above.	NA	
Reservoir Labeling (S5.4.3)				
Exact copy of reservoir label: On master cylinder reservoir cap: WARNING. CLEAN FILLER CAP BEFORE REMOVING. USE ONLY DOT 3 BRAKE FLUID FROM A SEALED CONTAINER.		Label shall read: "Warning, clean filler cap before removing; use only * fluid from a sealed container". * Fluid type specified in 49 CFR 571.116	X	
Measure letter height	3.2 mm	Letters shall be at least 3.2 mm/ 0.125" high	X	
Describe label attachment method and location. Embossed on the top of the master cylinder reservoir.		Lettering shall be permanently affixed, engraved or embossed and located so as to be visible by direct view either on or within 100 mm/3.94 inches of the brake fluid reservoir filler plug or cap.	X	
Does the lettering contrast with the background?	Yes *No*	If label is not engraved or embossed, letters shall be of a color that contrasts with the background	X	

Comments: None

Technician: K. Easterday

DATA SHEET 30 (Part 4 of 5)
TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2004 ;Chevrolet Aveo LS NHTSA NO.: C40110; DATE: 05/20/04

BRAKE SYSTEM WARNING INDICATOR (S5.5)

CONDITION	ANSWER	REQUIREMENTS	PASS	FAIL
Brake Systems Indicator Lamp Function Check (S5.5.2) (Bulb and systems check)				
Describe location of brake indicator lamp: In front of driver between speedometer & tach.	NA	Shall be in front, and in clear view, of driver.	X	
Does lamp light with ignition (start) switch at ON/RUN?	Yes	Automatic activation when ignition switch is "on" when engine not running, or ignition between "on" and "start" if is manufacturer check position- OR -single manual action by driver	X	
Does lamp light with ignition between ON and Start?	Yes			
Brake check description in owner's manual?	Yes	Manufacturer shall explain the brake check function test procedure in the owner's manual.	X	
Brake System Warning Indicator ACTIVATION (S5.5.1) DURATION (S5.5.3) FUNCTION (S5.5.4)				
CONDITION	**Light ON?**	**REQUIREMENT**	**PASS**	**FAIL**
A. In event of hydraulic leak (1) On or before appearance of pressure differential of 218 psi (split system)	NA	When ignition (Start) switch is ON, lamp must light whenever (A), (B), (C), or (D) occurs. In addition, if service brake system is not a split system, audible warning must be activated when any condition in (A) exists. Visual warning indicator for non-split systems must be flashing.	X	
(2) If any reservoir falls below either "safe" level or 25% of capacity, whichever is greater.	Yes			
(3) On or before supply pressure to brake power unit falls to 50%	NA			
B. Electrical functional failure in an antilock or variable brake proportioning system.	Yes		X	
C. Application of the parking brake.	Yes			
D. Brake lining wear-out if optical warning	NA			
Must have Audible alarm if not split system and a condition in (a) above exists?	NA			
If condition (A) (2) above does not exist, than fluid reservoir must be transparent for fluid check without the need for reservoir to be opened? (S5.4.4)	NA			
Indicator lamps remain activated as long as condition exists - ignition "on", and engine on or off? _____ (S5.5.3 DURATION))	Yes			
Visual warning – continuous or flashing?	Yes-Cont.			
Audible warning –continuous or flashing?	NA			

Comments: None.

Technician: K. Easterday

DATA SHEET 30 (Part 5 of 5)
TEST COMPLETION INSPECTION (S7.18)

VEHICLE: 2004 Chevrolet Aveo LS; NHTSA NO.: C40110; DATE: 05/20/04

BRAKE SYSTEM WARNING INDICATOR LABELING (S5.5.5)

CONDITION AND REQUIREMENT	ANSWER NOTE: Standard requires that the answer to questions be YES	PASS	FAIL
Are visual indicators legible to driver in daylight and nighttime conditions when activated?	Yes	X	
Are visual indicator words 3.2 mm (.125") high minimum? Record Height: "Brake" - 3.2 mm; "ABS" – 3.2 mm.	Yes	X	
Visual indicator words and background contrasting colors, one of which is red. Record colors Letters –red, Lens - Black	Yes	X	
If split system, is there one brake indicator? If yes, does it say the word "Brake"? w/ ! symbols	Yes	X	
If not split system; is there a separate indicator for loss of fluid or fluid pressure? Does this indicator say "Stop-Brake Failure"? Are the letters block and not less than 6.4 mm (.25") in height? Record letter height	NA		
If separate indicator for: 1. Low brake fluid per S5.5.1(a)(1), does indicator say "Brake Fluid"? NOTE: not required for mineral oil system Record wording 2. Gross pressure loss per S5.5.1(a)(2), does indicator say "Brake Pressure"? Record wording 3. Electrical functional failure in antilock or variable proportioning system per S5.5.1(b), letters and background contrasting colors one of which is yellow? Record colors Lens – Black, Letters – Amber or yellow Does indicator say "Antilock" or "ABS" or "Brake Proportioning"? Record wording "ABS" within symbol. 4. Parking brake per S5.5.1(c), does indicator say "Park" or "Parking Brake"? Record wording 5. Brake lining wear-out per S5.5.1(d), does indicator say "Brake Wear"? Record wording 6. For any other function? If yes, Record	NA NA Yes Yes NA NA NA	X	

Comments: None.

Technician: K. Easterday

DATA SHEET 31 (Part 1 of 2)
CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS
VEHICLE: 2004 Chevrolet Aveo LS Pass Car; NHTSA NO.: C40110; DATE: 05/20/04

BRAKE		LINING		
LOCATION	TYPE	DESCRIPTION	MINIMUM THICKNESS	THICKNESS TO FULLY WORN (1) mm*
Left Front	Drum	Leading	Pre-test 10.82 mm	2.0
		Primary	Post Test 10.21 mm	
		Inboard X	Δ 0.61 mm	
	Disc X	Trailing	Pre-test 10.95 mm	2.0
		Secondary	Post Test 10.69 mm	
		Outboard X	Δ 0.26 mm	
LINING CLEARANCE:	Diametrical (2): N/A	Inboard – Approx. 0 mm.	Outboard – Approx. 0 mm.	
WHEEL CYLINDER DIAMETER (3) N/A		CALIPER PISTON DIAMETER (3): 53.90 mm		
SHOE CAGE DIAMETER (4) N/A : CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C. N/A				
Right Rear	Drum	Leading	Pre-test 4.70 mm	1.6
		Primary	Post Test 4.65 mm	
		Inboard X	Δ 0.05 mm	
	Disc X	Trailing	Pre-test 4.67 mm	1.6
		Secondary	Post Test 4.65 mm	
		Outboard X	Δ 0.025 mm	
LINING CLEARANCE:	Diametrical (2) – 0.8 mm	Inboard – N/A	Outboard – N/A	
WHEEL CYLINDER DIAMETER (3): 20.65 mm		CALIPER PISTON DIAMETER (3): N/A		
SHOE CAGE DIAMETER (4): 199.29 mm		CENTER POINT OF BRAKE ASSY TO CENTER PT. OF W.C.: 73.1 mm		
CIRCUIT #1 CONSISTS OF:	LF – X	LR	RF	RR - X
CIRCUIT #2 CONSISTS OF:	LF	LR – X	RF – X	RR
(1) MFRS. RECOMMENDATIONS – Frt.: 2.0 mm; Rear: 1.6 mm.				
(2) REAR - TOP OF RIVET HEADS – N/A. FRONT - 1/32 INCH – N/A. MFRS. DATA – N/A.				
(2) DRUM BRAKES, MEASURED AT HORIZONTAL CENTERLINE: 199.67 mm.				
(3) MFRS. DATA: N/A.				
(4) RESET POSITION: 199.29 mm.				

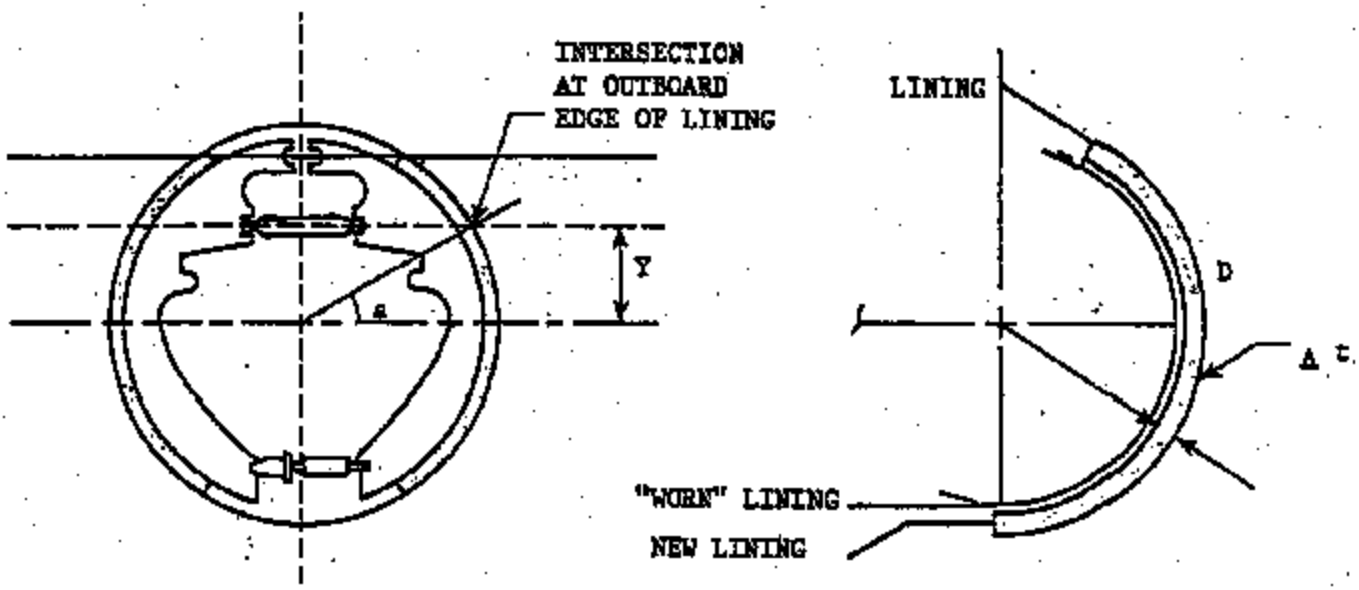
Comments: Manufacturer's lining thickness: Frt.: 11 mm; Rear: 4.7 mm;
Slave pistons: Frt.: 54mm, rear: 20.64 mm.
Technician: K. Easterday

DATA SHEET 31 – SECTION CONTINUED (Part 2 of 2)

Vehicle: 2004 Chevrolet Aveo LS; NHTSA No.: C40110; Date: 05/20/04

Procedure and Example for Determining Master Cylinder Volume Requirement

The procedure followed for determining the minimum volume requirements is outlined in the example shown below. The required data is taken from the previous page. Both measured and manufacturer's provided data utilized to obtain the greatest amount of fluid volume.



Drum Brake: $V_r = \frac{2C + \Delta t_l + \Delta t_t}{\cos a} \times \frac{1}{2} A$

Where: V_r = Volume required per wheel
C = Manufacturer's recommend radial drum-to-lining clearance
Δt_l = Change in thickness of Leading lining
Δt_t = Change in thickness of Trailing lining
Y = Center point of wheel cylinder to center point of brake assembly
A = Cross sectional area of the wheel cylinder bore
NWC = Number of wheel cylinders serviced by the reservoir in question
$a = \sin^{-1} \frac{2Y}{D}$
D = Cage diameter
d = Wheel cylinder diameter

Procedure and Calculations for Determining Master Cylinder Volume Requirement, (Contd)

Drum Brake: $V_r = \frac{2C + \Delta t_p + \Delta t_s}{\cos a} A$

$C = 0.3$ mm $\quad a = \sin^{-1} \frac{2Y}{D}$ $\quad Y = 73.1$ mm $\quad D = 199.29$ mm $\quad A = \frac{\pi d^2}{4}$

$\Delta t_p = 3.5$ mm

$\Delta t_s = 3.5$ mm $\quad \sin^{-1} \frac{2(73.1)}{199.29} = 47.189°$ $\quad A = \frac{\pi(20.65 \text{ mm})^2}{4} = 334.91 \text{ mm}^2$

$V_r = \frac{2(0.3) + 3.5 + 3.5}{\cos 47.189°} (334.91) = 11.183 (334.91)$

$V_r = 3745.4 \text{ mm}^3 = 3.75 \text{ ml}$

Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$

Where:
- V_r = Volume required per wheel
- Δt = Change in thickness (average)
- i = Inboard
- o = Outboard
- d = Caliper cylinder diameter
- C = Average radial drum-to-lining clearance

Disc Brake: $V_r = (\Delta t_i + t_{ic} + \Delta t_o + t_{oc}) \times \frac{\pi d^2}{4}$

$\Delta t_i = 9$ mm

$\Delta t_o = 9$ mm

$t_{ic} + t_{oc} = 0$ mm

$d = 54.0$ mm

$V_r = (9 + 0 + 9 + 0) \frac{\pi(54.0)^2}{4}$

$= 18 (2290.22)$

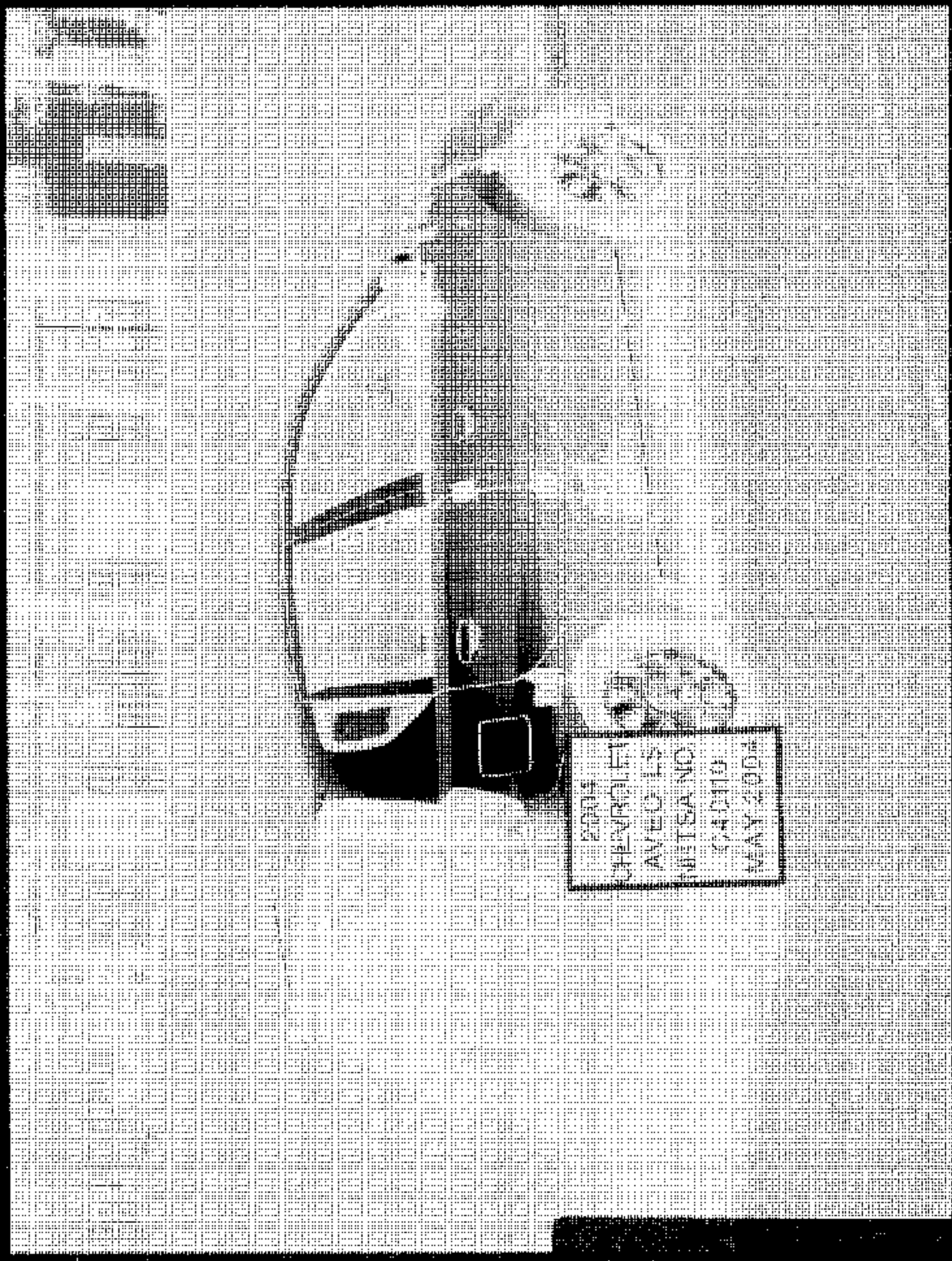
$= 41223.98 \text{ mm}^3 = 41.22 \text{ ml}$

Total Volume required $2(41.22) + 2(3.75) = 89.9$ ml*

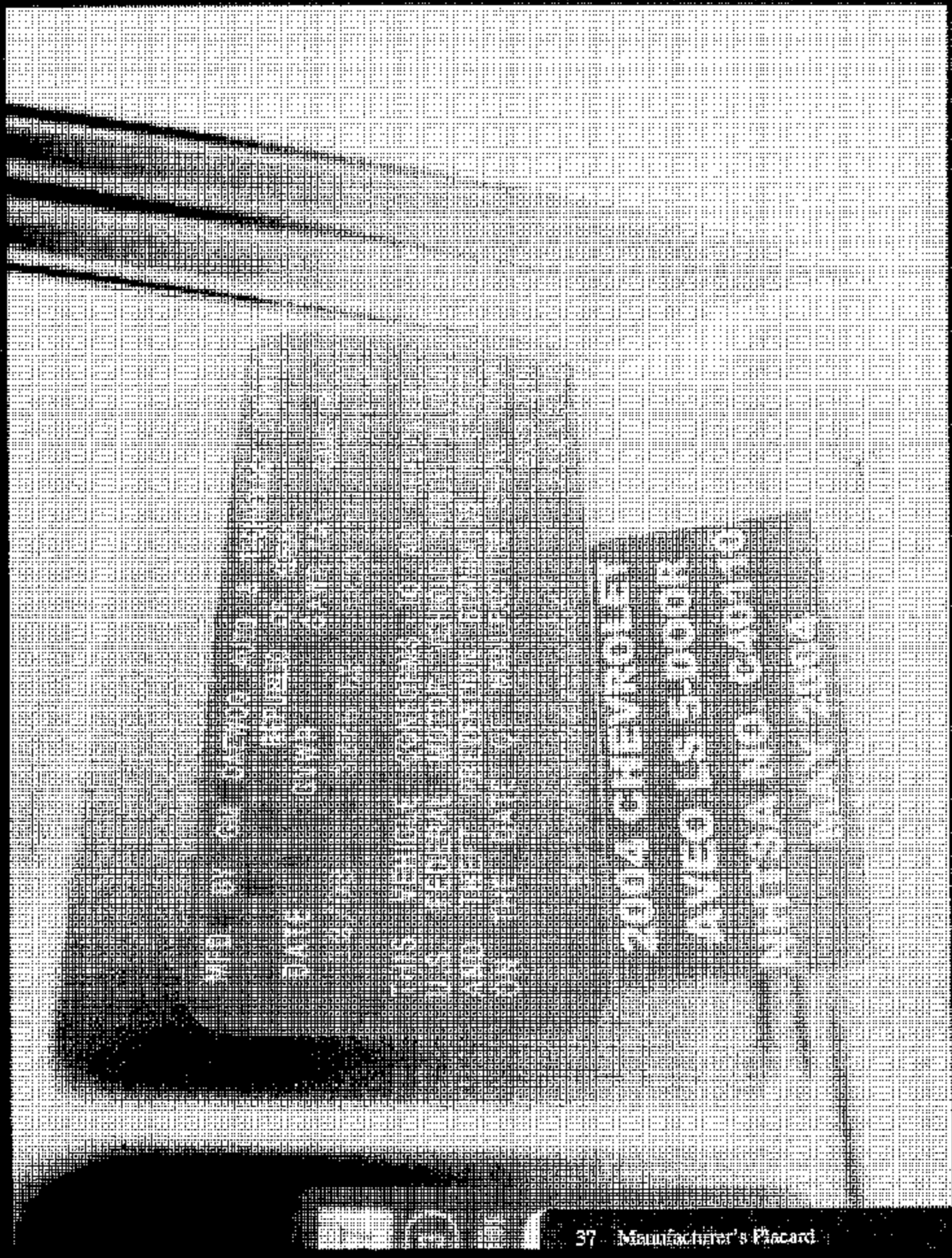
SECTION 6.0

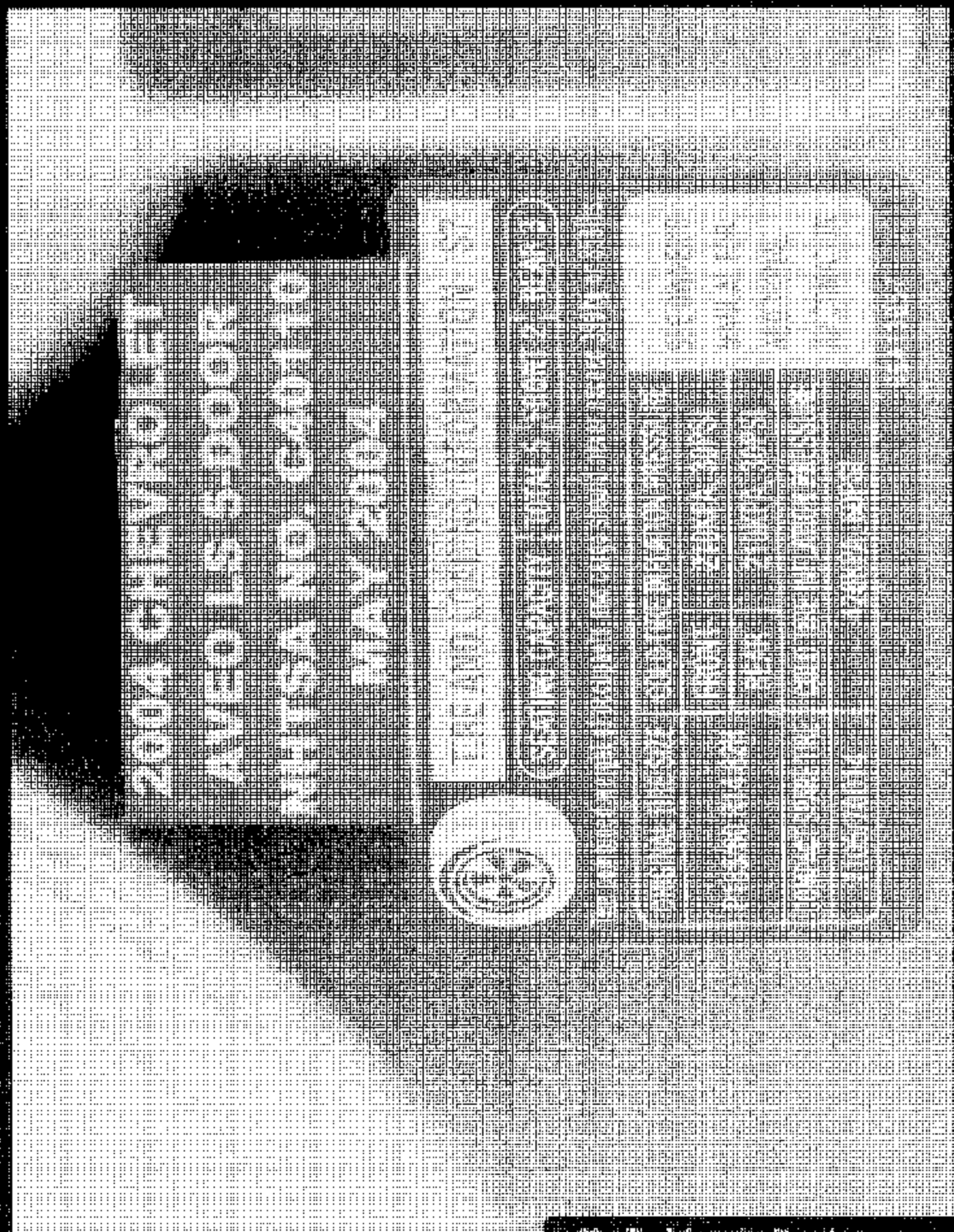
Photographs

35 3/4 Left Frontal

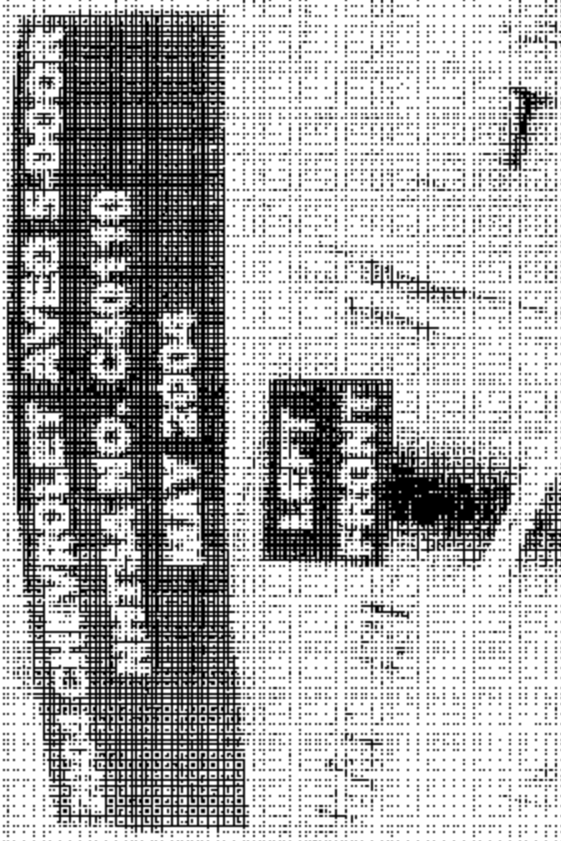


36 3/4 Right Rear

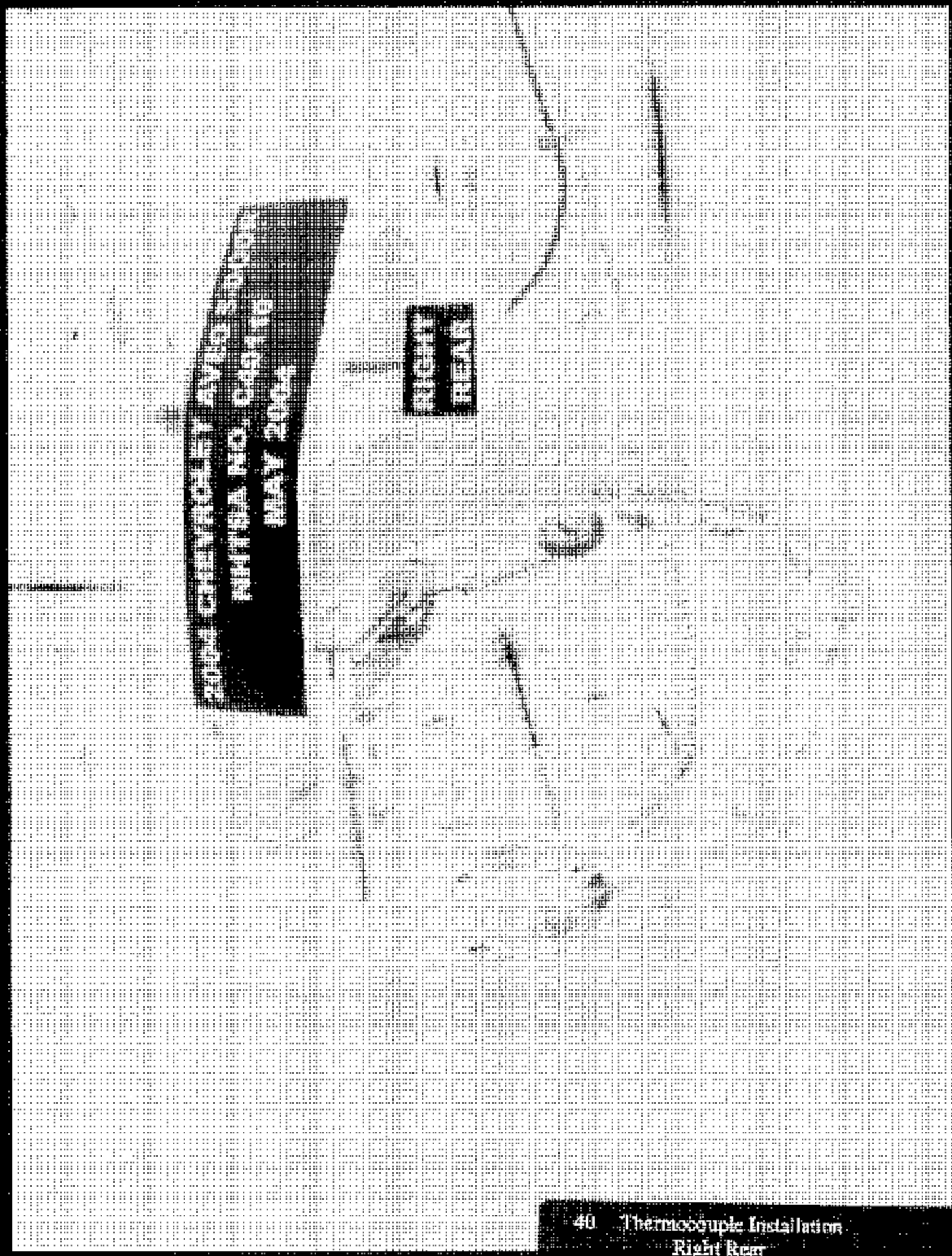

37 Manufacturer's Placard



58 Tire Information Placard

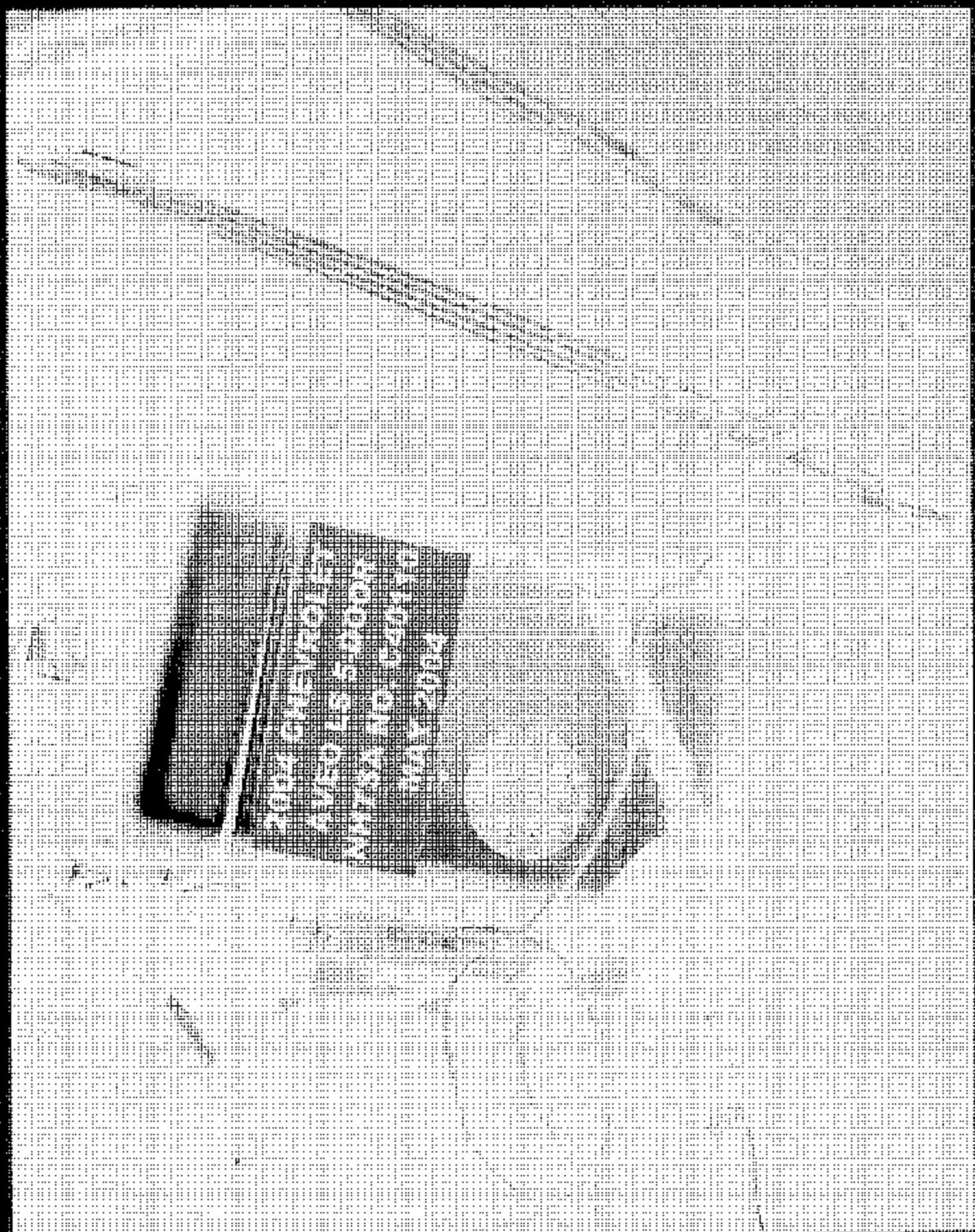


39 Thermocouple Installation
Left Front

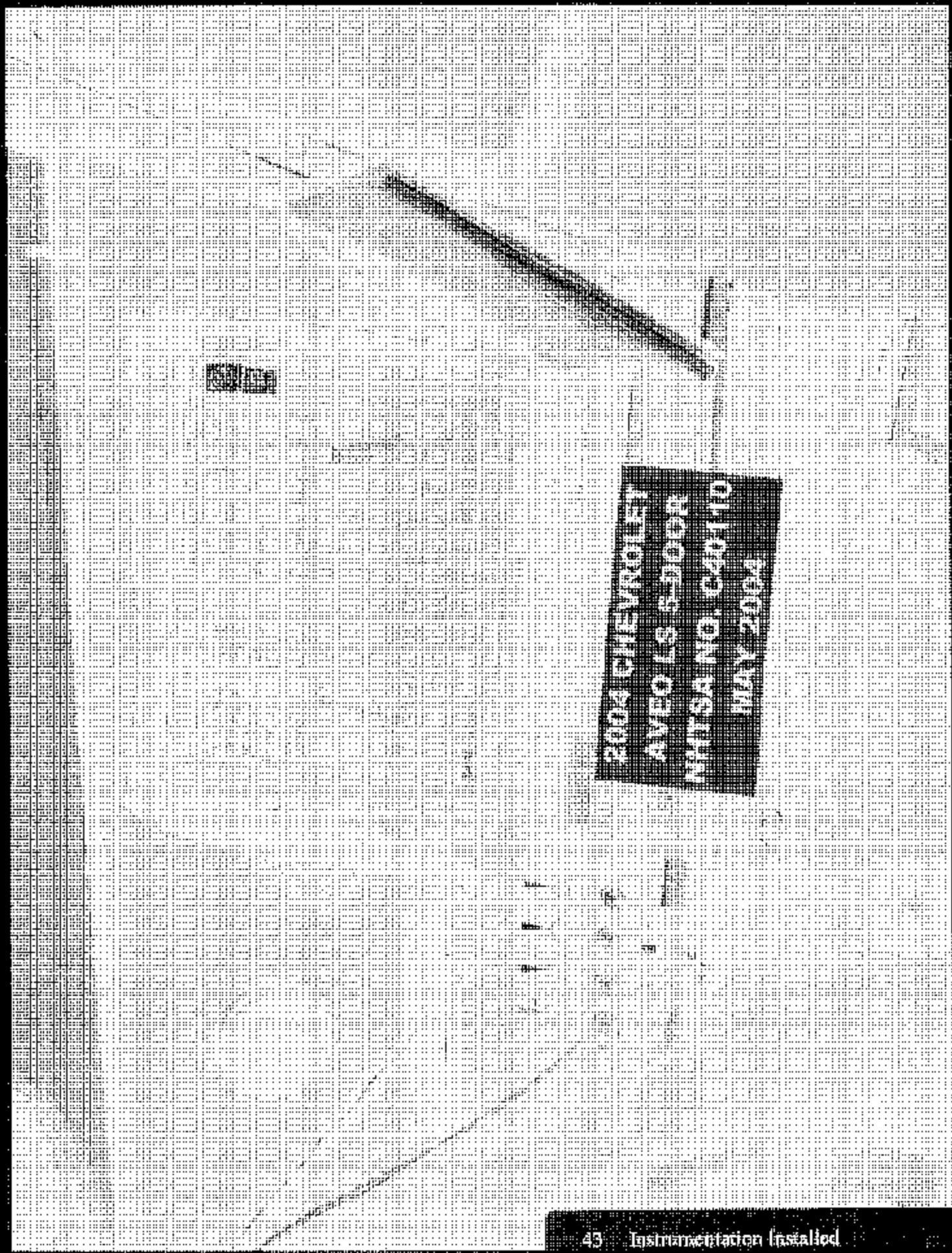


40 Thermocouple Installation
Right Rear

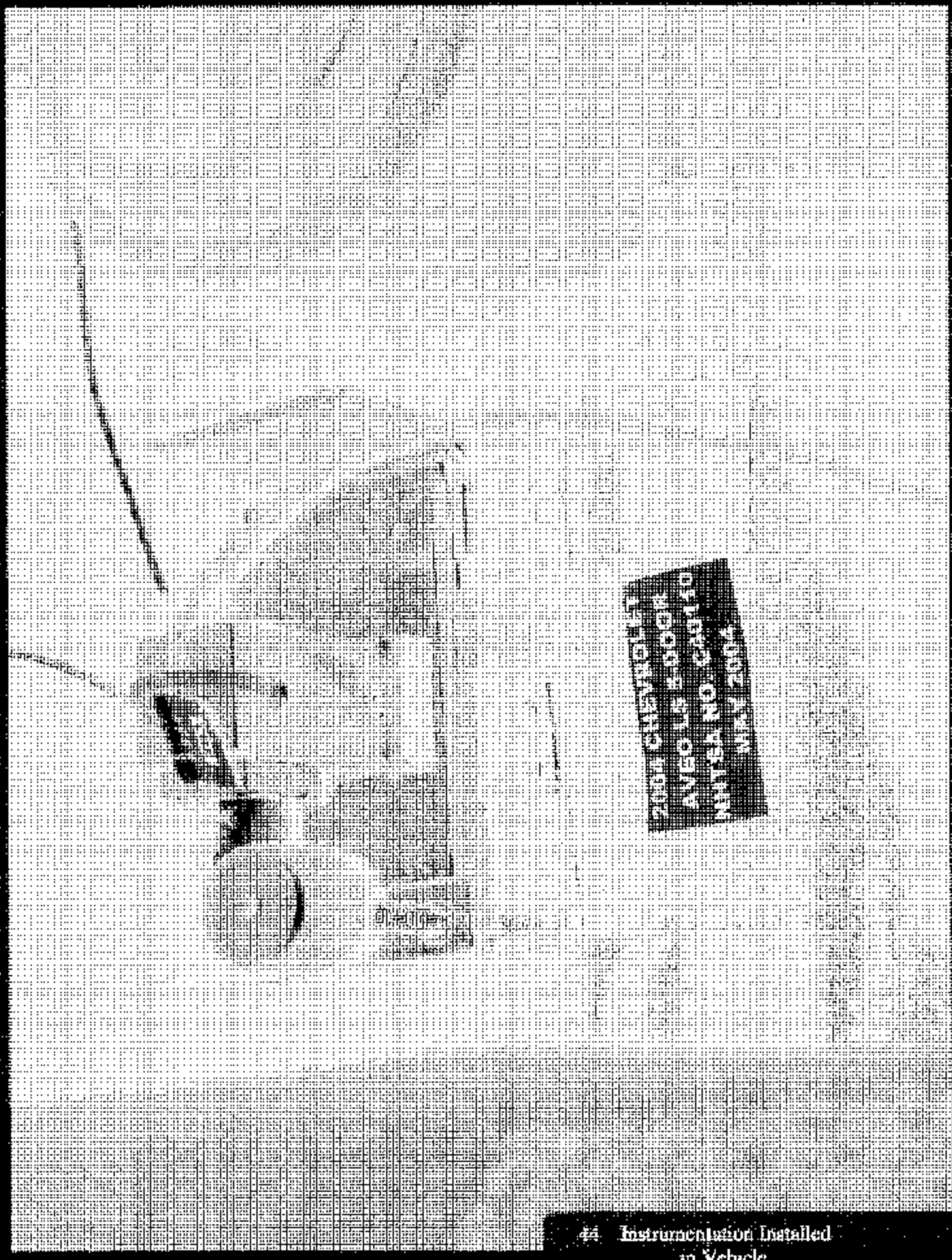
41 Instrumentation Installed in Vehicle



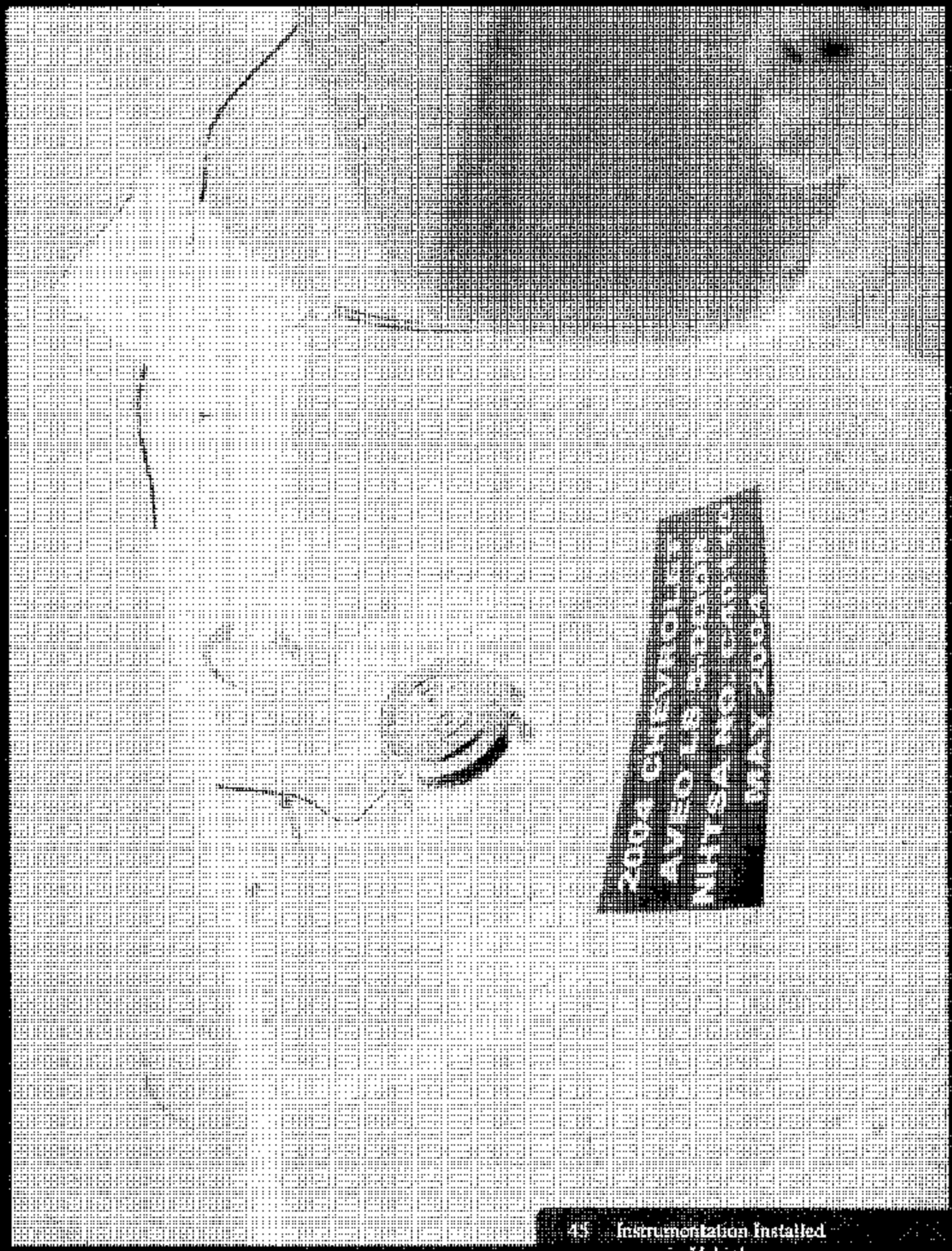
42 Instrumentation Installed in Vehicle



43 Instrumentation Installed in Vehicle



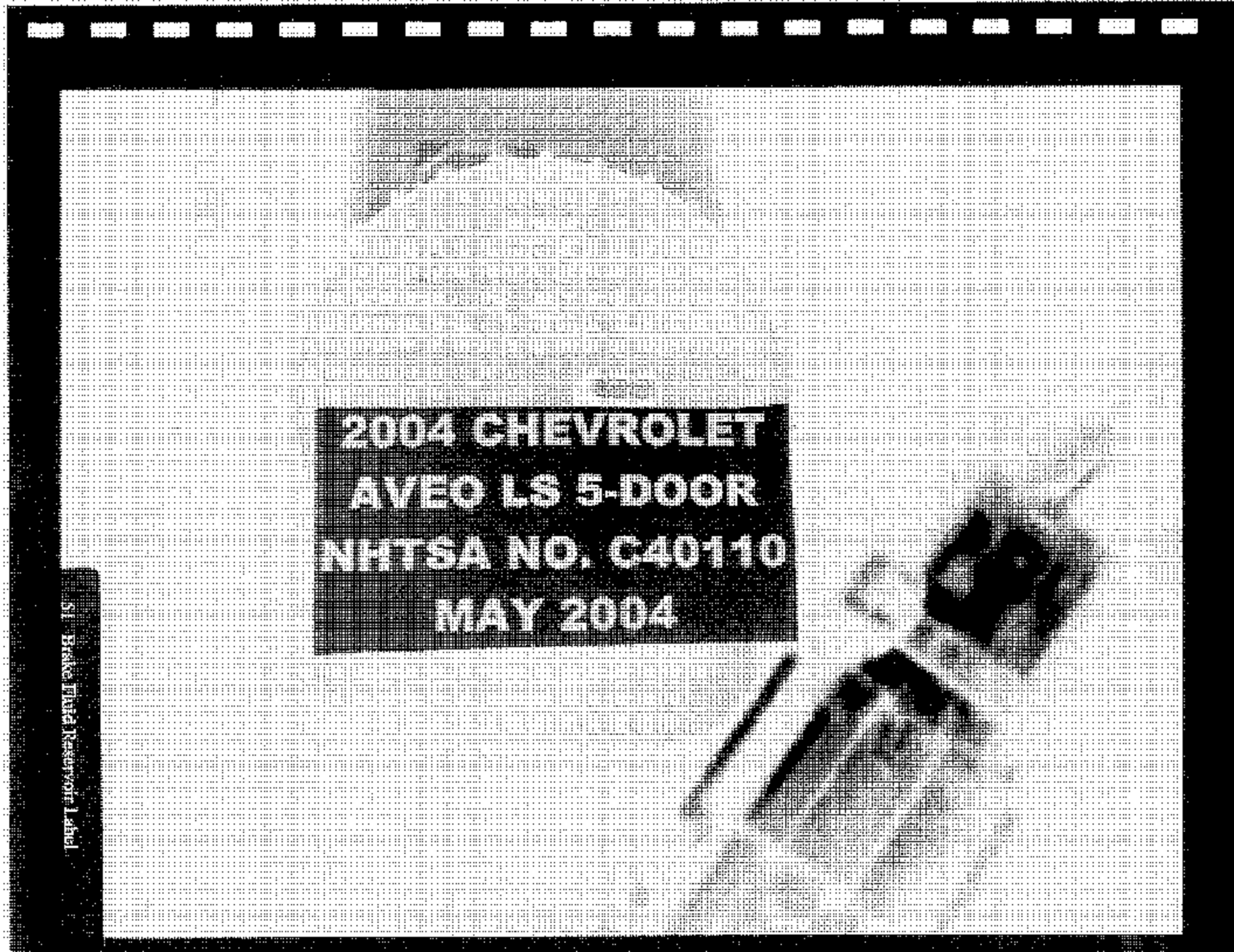
44. Instrumentation Installed in Vehicle



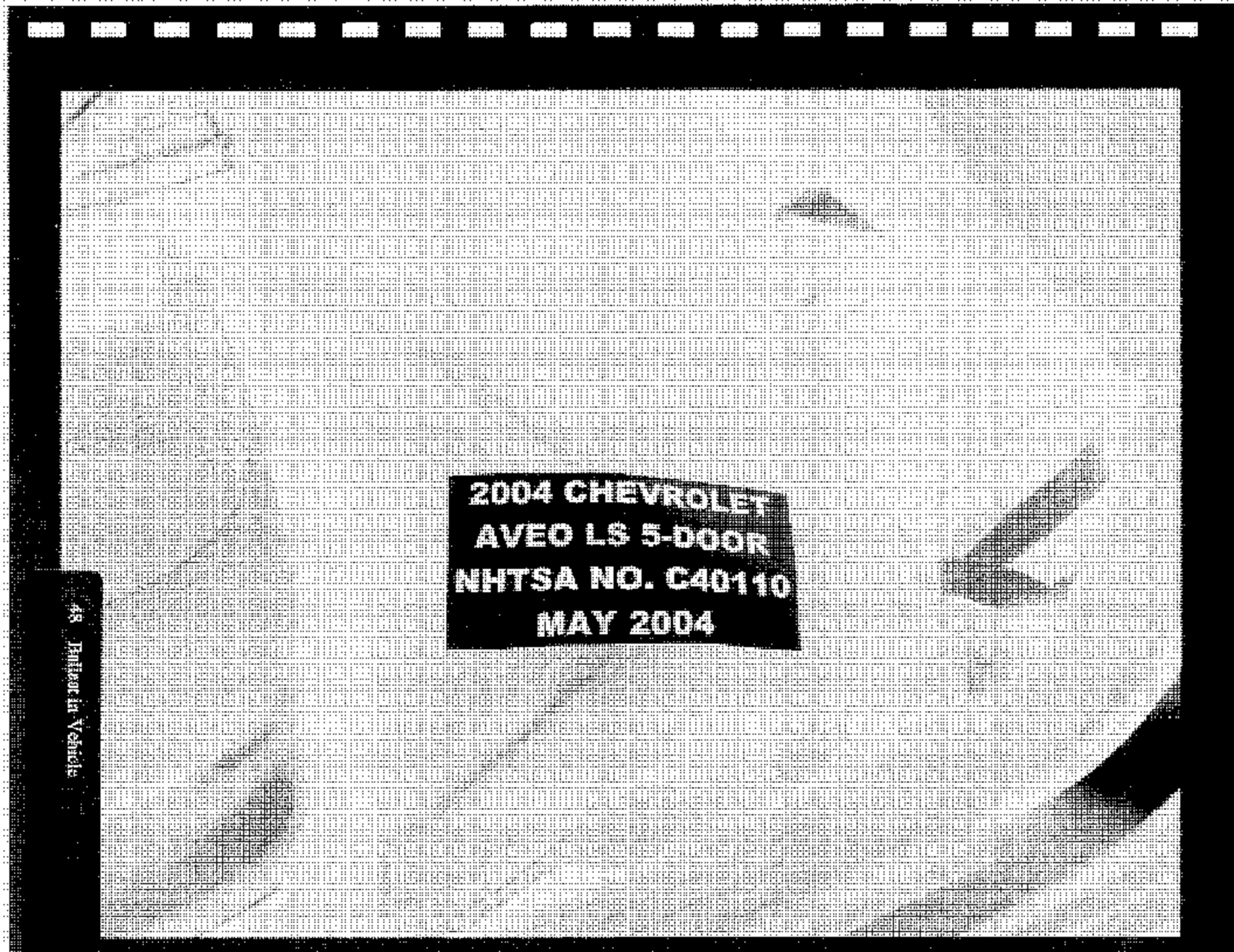
45 Instrumentation Installed in Vehicle

CHEVROLET
AVEO LS
NHTSA NO
C4011O4
MAY 2004

47 Ballast in Vehicle

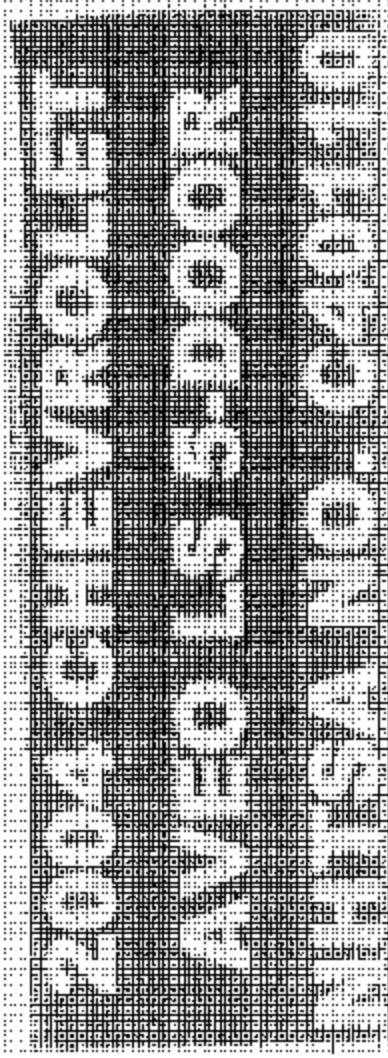


St. Brake Fluid Reservoir Label


2004 CHEVROLET
AVEO LS 5-DOOR
NHTSA NO. C40110
MAY 2004

BRAKE (49)

49 Brake Lamp Activated



50 ABS Lamp Activated

7.0 INSTRUMENT CALIBRATION (12 MONTH MAXIMUM INTERVAL)

VEHICLE: 2004 Chevrolet Aveo Pass. Car; NHTSA NO.: C40110; DATE: 05/24/04

INSTRUMENT	SERIAL NUMBER	CALIBRATION DATE	NEXT CALIBRATION
Data Acquisition System - Link DAS 2030	975016	10/23/03	10/23/04
Computer – Dell Latitude/Link Engrg.	TRC-43207	Not Applicable	Not Applicable
Software - Link Engrg. Rev Data	TRC Propr.	NA	NA
LF Torque Wheel	Not Utilized		
RF Torque Wheel	Not Utilized		
LR Torque Wheel	Not Utilized		
RR Torque Wheel	Not Utilized		
Stopwatch – Accusplit	SW ST03	04/08/03	04/08/04
Tire Pressure Gauge – Ashcroft	AG-05	11/25/03	11/25/04
Voltage Multimeter – Dana 4300	M-108639	11/25/03	11/25/04
Pedal Force Transducer – Sensor Devel.	LC-169755	Each Test	Each Test
Asst. Pipe-Handle Steel Weights - Ohaus	LB-0002	05/12/03	05/12/04
Park Brake Force Transducer – Interface	41721	Each Test	Each Test
LF Hydraulic Pressure Transducer	Not Utilized		
RF Hydraulic Pressure Transducer	Not Utilized		
LR Hydraulic Pressure Transducer	Not Utilized		
RR Hydraulic Pressure Transducer	Not Utilized		
Accelerometer - Setra (+ or – 15 g) 141A	A-1055763	Each Test	Each Test
Fifth Wheel – ADAT DSR-06 Radar	140.0119	Each Test	Each Test
Wind Velocity/Direct. – Davis Model 6410	WXB308193A	09/15/03	09/15/04
Ambient Temp. Gage – Davis Model 6320	WXB308193A	09/15/03	09/15/04
LF Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
RF Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
LR Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
RR Brake Thermocouple - Temprel/Link	T52-0B-24K	Ea. Test w/Link	Ea. Test w/Link
Lock-up Detection System	TRC Propr.	Each Test	Each Test
Vehicle Weight – Toledo/Mettler Scales JAGXTREME JXGA, (Bldg. 70)	SN 5225831-530	02/06/04	06/06/04

QUALITY ASSURANCE

DAILY CALIBRATIONS (1 of 3)

Vehicle: 2004 Chevrolet Aveo LS NHTSA No.: C40110

Deceleration Calibration Data for Unit 4359
Desired full scale value is: 9.81 m/s/s
Allowed deviation is: + or - 0.15 m/s/s

		"Date"	"Time"	Zero	Cal	
		"stp"	"stp"	"Decel"	"Decel"	
Accelerometer	Level to zero, then tilt to full scale	5/12/2004	8:34:08	-0.01	9.78	PRE-TEST CAL.
		5/12/2004	10:55:10	0.04	9.72	PRE-TEST CAL.
		5/13/2004	8:38:08	0.06	9.78	
		5/13/2004	15:49:43	0.05	9.92	
		5/14/2004	9:35:45	-0.03	9.80	
		5/14/2004	14:33:46	0.00	9.81	
		5/17/2004	8:54:35	-0.02	9.81	
		5/17/2004	15:21:02	0.05	9.80	
		5/18/2004	8:45:32	0.13	9.82	
		5/18/2004	13:43:00	0.02	9.82	
		5/20/2004	10:50:48	0.02	9.80	POST-TEST CAL.

Pre-Test Linearity Check 05/12/04

Actual (m/s/s)	Rec. (m/s/s)
0.0	0.0
3.0	3.0
6.1	6.1
9.8	9.8

Post-Test Linearity Check 05/18/04

Actual (m/s/s)	Rec. (m/s/s)
0.0	0.0
3.0	3.0
6.1	6.1
9.8	9.8

Distance Calibration Data for Unit 4359
Desired full scale value is: 1000 m
Allowed deviation is: 3 m

		"Date"	"Time"	Distance for	
		"stp"	"stp"	1000 meters	
Light beam distance sensor	Drive from 0 to 100 to 0 km/h on a measured kilometer	5/12/2004	10:43:50	1000.0	PRE-TEST CAL.
		5/13/2004	8:46:32	1001.1	
		5/13/2004	15:54:30	999.9	
		5/14/2004	10:52:16	1000.8	
		5/14/2004	14:39:48	1001.2	
		5/17/2004	9:02:00	1001.0	
		5/17/2004	15:28:29	1000.8	
		5/18/2004	8:54:52	1000.9	
		5/18/2004	13:49:08	1001.3	POST-TEST CAL.

DAILY CALIBRATIONS CONTINUED (2 of 3)

VEHICLE: 2004 Chevrolet Aveo LS NHTSA No.: C40110

Wheel Tachometer Calibrations for Unit 4359
Wheel tachometer calibrations: all wheel speeds should be 15 km/h

		"Date"	"Time"	Zero	@15km/h	Zero	@15km/h	Zero	@15km/h	Zero	@15km/h	
		stp	stp	LF	LF	RF	RF	LR	LR	RR	RR	
Wheel lock detector	While at a standstill, check zeroe. Drive vehicle at approx. 15 km/h and engage zero speed switch for each wheel	5/13/2004	8:45:13	0.0	15.8	0.0	15.8	0.0	17.5	0.0	17.3	
		5/13/2004	15:50:58	0.0	15.6	0.0	16.4	0.0	19.4	0.0	16.4	
		5/14/2004	10:51:29	0.0	16.5	0.0	17.9	-0.1	18.9	0.0	16.7	
		5/14/2004	14:38:45	0.0	16.2	0.0	17.1	0.0	19.8	0.0	17.6	
		5/17/2004	8:57:29	0.0	17.2	0.0	17.5	0.0	18.3	0.0	22.0	
		5/17/2004	15:24:21	0.0	16.3	0.0	14.6	0.0	16.1	-2.3	14.2	
		5/18/2004	8:49:06	0.0	17.5	0.0	15.8	0.0	18.8	-0.5	17.3	
		5/18/2004	13:47:33	0.0	15.8	-0.1	14.8	0.0	28.5	0.0	16.3	POST-TEST CAL.

When driven over 15 km/hr and the wheel tach generators are shunted to zero volts, does the graphical screen indicate wheel lock at each wheel position?: __X__ Yes, _____ No.

Pedal Force Meter Calibration for Unit 4359
Target shunt calibration is 390 N

Desired recorded value is: 390 N
Desired recorded calibration value is: 500 N
Allowed deviation is: 6.5 N

		"Date"	"Time"	Zero	Cal Val	
		stp	stp	Force	Force lb	
Service brk. pedal effort	Driver engages a fixed shunt cal switch.	5/12/2004	8:55:14	-1.3	500.9	PRE-TEST CAL.
		5/12/2004	10:53:26	-0.5	390.5	PRE-TEST CAL.
		5/13/2004	8:36:56	-0.1	390.7	
		5/13/2004	16:49:16	-0.4	390.5	
		5/14/2004	9:33:36	-0.2	390.8	
		5/14/2004	14:35:35	-0.4	390.5	
		5/17/2004	8:55:14	-0.2	391.0	
		5/17/2004	15:23:06	-0.5	390.6	
		5/18/2004	8:47:12	-0.3	390.8	
		5/18/2004	13:42:20	-0.2	390.9	
		5/20/2004	10:49:21	-0.6	499.9	POST-TEST CAL.

Pre-Test Linearity Check - 05/12/04

Actual Force (N)	Recorded Force (N)
0	0
222	222
445	445
498	498

Post-Test Linearity Check - 05/18/04

Actual Force (N)	Recrdd Frc(N)
0	0
222	222
445	445
498	498

DAILY CALIBRATIONS CONTINUED (3 of 3)

VEHICLE: 2004 Chevrolet Aveo LS NHTSA No. C40110

Dynamic Speed Calibration for Unit 4359

Desired speed value is: 100 km/h
Allowed deviation is: 1.6 km/h
Desired time value is: 36 seconds
Allowed deviation is: + or - 0.6 seconds

		"Date"	"Time"	"Speed"	Time"	
		stp	stp	km/h	sec	
Light beam speed sensor	Drive vehicle at a steady 100 km/h through a kilometer.	5/12/2004	10:47:33	100.2	36.03	PRE-TEST CAL.
		5/13/2004	8:43:26	100.4	35.93	
		5/13/2004	15:52:50	100.1	36.25	
		5/14/2004	10:49:22	100.0	36.15	
		5/14/2004	14:37:04	100.3	36.12	
		5/17/2004	8:59:52	100.6	36.12	
		5/17/2004	15:26:18	100.3	36.09	
		5/18/2004	8:52:42	100.5	36.12	
		5/18/2004	13:45:42	99.9	36.28	POST-TEST CAL.

APPENDIX A

Copy of Manufacturer's Sticker

2004 AVEO LS 4DOOR

E-TEC II 1.6L DOHC 103HP ENGINE

5-SPEED MANUAL TRANSMISSION

EXTERIOR GALAXY SILVER METALLIC

INTERIOR GRAY

CHEVROLET WE'LL BE THER

STANDARD EQUIPMENT

Items Featured Below are Included at NO EXTRA CHARGE in the Standard Vehicle Price Shown at Right

MECHANICAL

- BRAKES, FRONT VENTILATED DISC / REAR DRUM
- POWER RACK & PINION STEERING
- SUSPENSION-INDEPENDENT FRONT MCPHERSON STRUT W/STABILIZER BAR AND REAR TORSION BEAM
- STAINLESS STEEL EXHAUST

SAFETY & SECURITY

- DRIVER & PASS FRONT AIR BAGS
- RR CHILD SEAT LATCH SYSTEM
- DAYTIME RUNNING LAMPS
- HEATED FOLD-AWAY OUTSIDE MIRRORS - DRIVER, MANUAL & PASSENGER, POWER

EXTERIOR

- 14" STEEL WHEELS WITH COVERS
- P185/60R14 ALL SEASON TIRES
- INTERMITTENT WIPERS
- COMPOSITE HALOGEN HEADLAMPS
- REAR WINDOW WIPER & WASHER

INTERIOR

- AIR CONDITIONING WITH CABIN AIR FILTRATION
- REAR WINDOW DEFOGGER
- TILT STEERING COLUMN
- REMOTE KEYLESS ENTRY
- POWER DOOR LOCKS
- POWER WINDOWS
- CARPETED FLOOR MATS
- DELUXE CLOTH FRONT BUCKET SEATS WITH MANUAL RECLINE & DRIVER SEAT HEIGHT ADJUSTER
- AM/FM STEREO W/ CD/MP3
- 60/40 FLIP & FOLD REAR SEAT
- REAR CARGO SHADE
- VISORS WITH VANITY MIRRORS
- FUEL FILLER RELEASE LEVER

- 5-YEAR / 60,000-MILE LIMITED POWERTRAIN WARRANTY SEE DEALER FOR DETAILS

[redacted] FREE FUEL ECONOMY GUIDE [redacted]

CITY MPG

27

HIGHWAY MPG

35

ACTUAL MILEAGE
WILL VARY WITH OPTIONS, DRIVING CONDITIONS, DRIVING HABITS AND VEHICLE'S CONDITION. RESULTS REPORTED TO EPA INDICATE THAT THE MAJORITY OF VEHICLES WITH THESE ESTIMATES WILL ACHIEVE BETWEEN

22 AND 32 MPG IN THE CITY AND BETWEEN

35 AND 41 MPG ON THE HIGHWAY.

2004 AVEO
1.6 LITER L4 ENGINE
FUEL INJECTION MANUAL
5 SPEED TRANSMISSION
CATALYST, FEEDBACK FUEL SYSTEM

ESTIMATED ANNUAL FUEL COST: $696

FOR COMPARISON SHOPPING,
ALL VEHICLES CLASSIFIED AS
COMPACT

HAVE BEEN ISSUED MILEAGE RATINGS RANGING FROM

15 TO 46 MPG CITY AND

19 TO 51 MPG HIGHWAY.

KL1TJ62684B158294 | 09096 | 2DB

MANUFACTURER'S SUGGESTED RETAIL PRICE

STANDARD VEHICLE PRICE	**$12,045.00**
Options Installed by Manufacturer	
4-WHEEL ANTI-LOCK BRAKES	400.00
WHEELS, 14" ALUMINUM	375.00
REAR SPOILER	225.00
TOTAL OPTIONS	$1,000.00
TOTAL VEHICLE & OPTIONS	$13,045.00
DESTINATION CHARGE	540.00
TOTAL VEHICLE PRICE*	**$13,585.00**

[redacted] DELIVERED TO DEALER AT COLUMBUS OH DEALER NO 09096 SHIP TO DEALER NO [redacted]

FINAL ASSEMBLY SUPPLIER MFR. IN KOREA

VIN KL1TJ62684B158294

BYERS CHEVROLET, LLC
PO BOX 163168
COLUMBUS, OH 43216-3168

This label has been applied pursuant to Federal law—Do not remove prior to delivery to the ultimate purchaser. *Includes Manufacturer's Recommended Pre-Delivery Service. Does not include dealer installed options or accessories not listed above, taxes or license fees.

10990498

APPENDIX B

Discussion on Data

DISCUSSION ON DATA

Symbols for Brake Components

4	-	4 Wheel	G	-	Groan	DL	-	Deceleration (State FPSPS)
X	-	Skid	SQ	-	Squeal	PF	-	Pedal on Floor
L	-	Left	SQK	-	Squeak	SCP	-	Shoe Scrape
R	-	Right	PO	-	Pinchout	RB	-	Rubber Banding
R	-	Rear	P	-	Pull	O	-	Odor
F	-	Front	R	-	Shudder	NOX	-	No Skid
B	-	Both	M	-	Momentary			

INT or INIT	-	Initial Part of Stop
MID	-	Middle of Stop
END	-	End of Stop

All stops were made manually.

APPENDIX C

Contractor's Comments
Procedure Modifications
and
Test Facility

Comments for vehicle C40110.

For all recorded decelerations:

The recorded *average* deceleration values for the tests are slightly lower than that which is required or targeted for certain test sections. However, in all cases and in reality, the driver maintained the correct required/target deceleration values for the majority of time for each of those stops. The recorded deceleration is acquired from the moment the service brake pedal is moved until the vehicle reaches zero speed. Therefore, the time needed to achieve the target deceleration (rise time) and the time the vehicle goes from the target deceleration to zero (fall time) is included in the average deceleration calculation. The rise and fall times were added to the entire length of the stops. Hence the recorded average deceleration values were generally and slightly less than the required/target deceleration values.

For Data Sheets 20 & 21 – Hydraulic Circuit Failure #1 and #2 at GVWR:

Due to the difficult accessibility and resultant complexity of accessing the master cylinder output ports, these two test sequences were performed in reverse order; #21 first, #20 second.

7.5-MILE TEST TRACK

The 7.5-mile test track encloses a 1,600-acre area, one mile wide and 3.5 miles long.

The track has a downward grade, north to south, of 0.228 percent and a cross slope in the straightaways of 3/16 inch per foot. The 1.88 mile long straightaways flow into transition areas 2,300 feet in length and then into 5,275-foot long curves with a constant radius of 2,400 feet. The 36-foot wide straightaways and the 42-foot wide curves provide three test lanes. Paved berms, 12 feet in width, border the straightaways and the inside of the curves.

As a vehicle moves toward the outside of the track in the curves, it encounters a progressively steeper bank. The inside lane (or "slow" lane) has a bank of 10 degrees allowing a neutral speed of 80 mph with no side forces. In the center lane, the slope increases to 19 degrees resulting in a neutral speed of 110 mph. The outside lane's 28-degree bank allows a 140 mph neutral speed. Rimming the outer lane is a seven-foot safety lane culminating in a 36-degree slope at the guardrail.

The facility is paved with Portland cement concrete. It carries a maximum single axle load of 36,000 pounds and a maximum tandem axle load weight of 48,000 pounds. Special provisions can be made for heavier weight loads.

With 22.5 lane miles, our track will accommodate many vehicles simultaneously. Research which utilizes the track includes component performance and durability studies, brake tests, aerodynamic studies, fuel economy studies, drive line efficiency tests, and the determination of vehicular acceleration and cruise characteristics. In addition, it supports maximum speed determination, road load power, noise and emission measurements and tire durability test programs.

The 7.5-mile test track can be used in conjunction with other facilities at TRC. It provides an excellent area for pre-test conditioning of equipment such as brake burnishing, tire break-in, and vehicle warm-up.

TRC SKID PAD

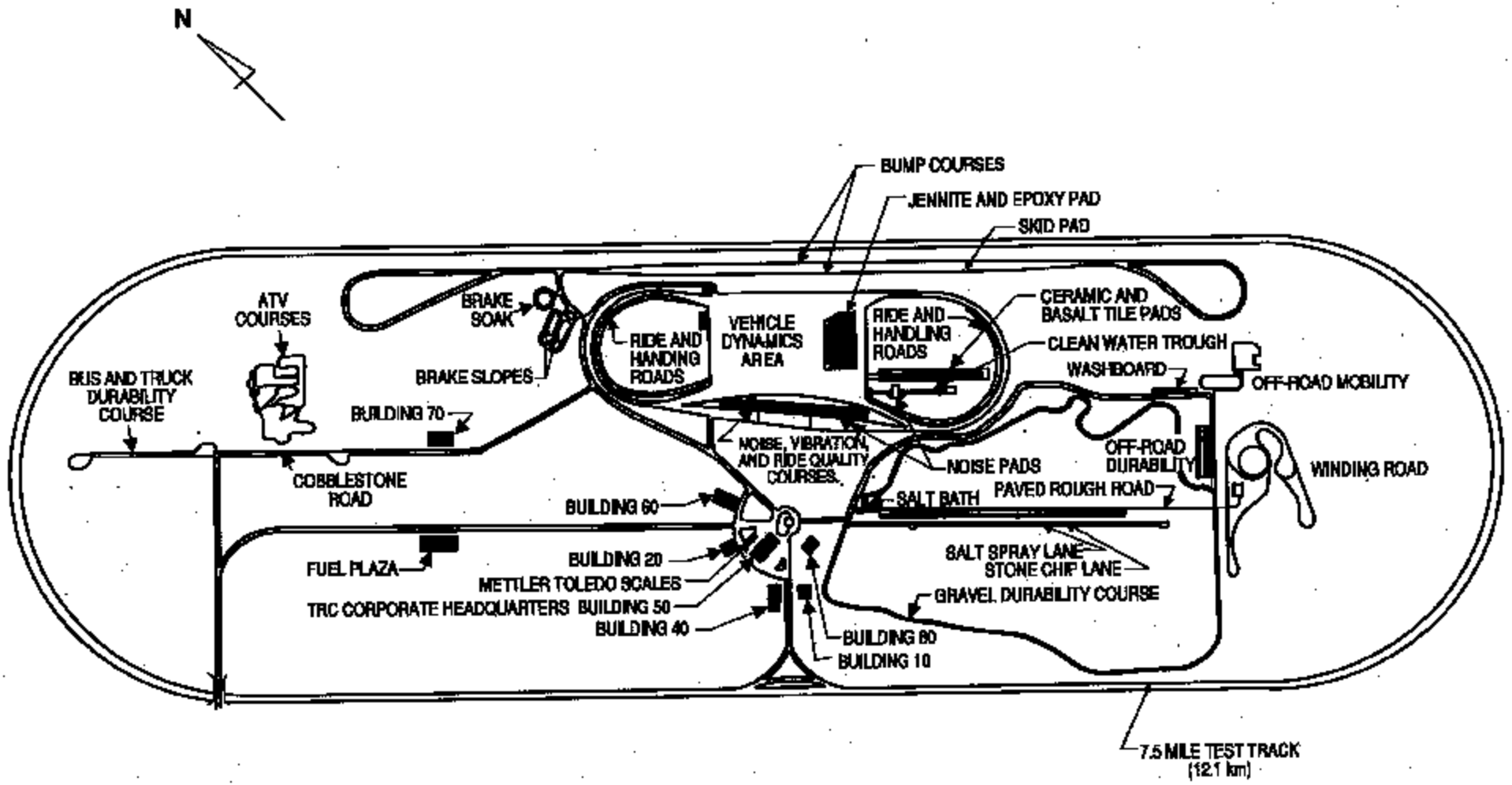
The Skid Pad is a test facility which is utilized primarily for the evaluation of tire and brake systems.

The overall dimensions of the pad are 9,000 feet by 84 feet with loops on the north and south ends. Both turnaround loops have a 309-foot radius and are 16 feet wide with a 25 percent super elevation. They will accommodate speeds of 45 mph with zero side force and 60 mph with .5 g's lateral acceleration. The acceleration/deceleration lanes at each end are 3,280 feet in length.

A test area of 210,000 square feet is situated in the center of the skid pad containing several test pads with varying surface textures. Skid numbers in this area range from 30 (wet) to 80 (dry).

The skid pad is paved with Portland cement. The load capacity of the skid pad is 36,000 pounds maximum single axle weight and 48,000 pounds maximum tandem axle weight.

Varying surface textures in the main test area are ideal for testing tire and/or brake system performance on different surfaces as characterized by "skid numbers." The skid pad is also used for acceleration studies, aerodynamics, rolling resistance, noise testing, and vehicle top speed determination.



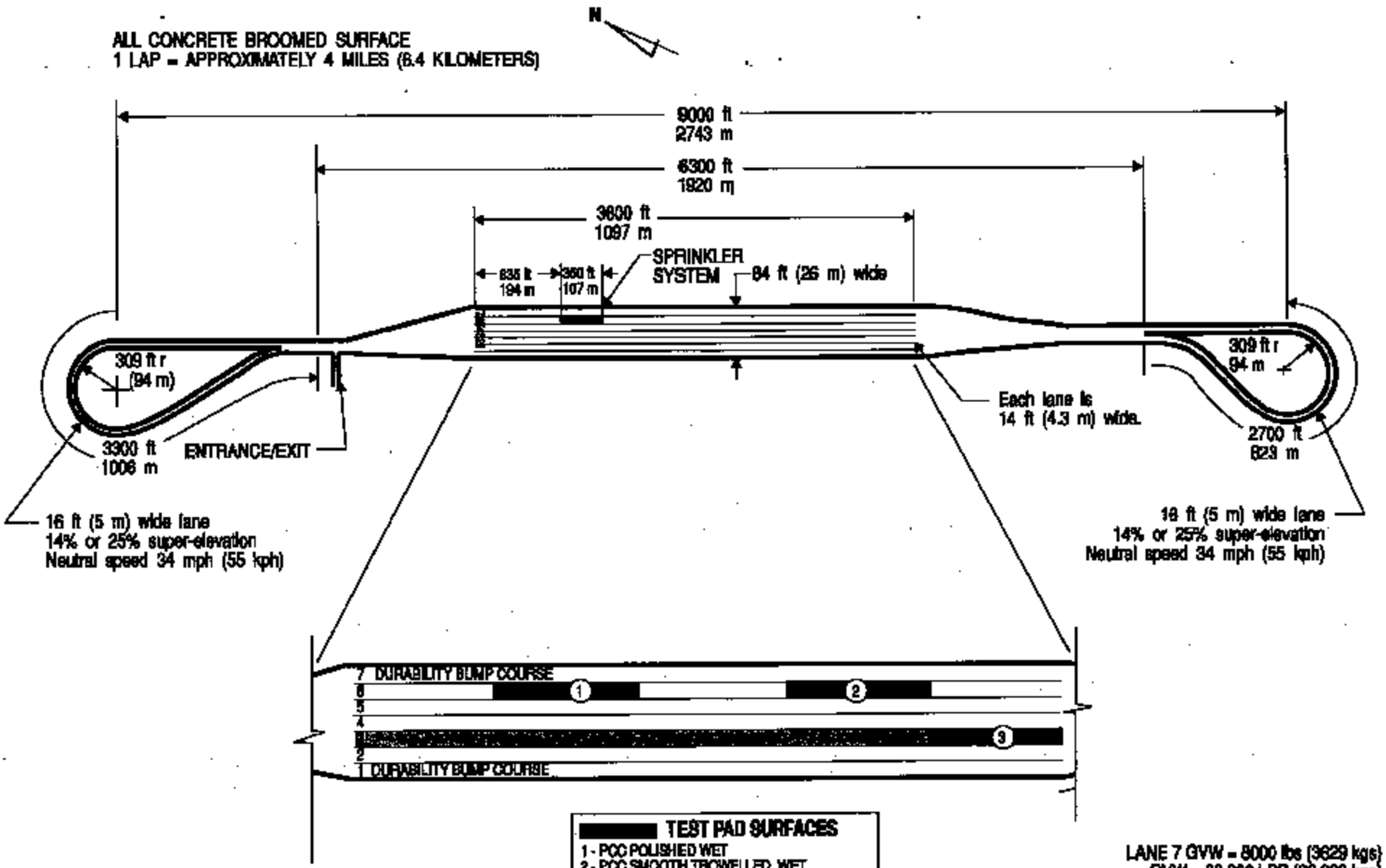
NOT TO SCALE

TEST FACILITY DETAIL

TRC® TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0287

F-15 0801

ALL CONCRETE BROOMED SURFACE
1 LAP = APPROXIMATELY 4 MILES (6.4 KILOMETERS)

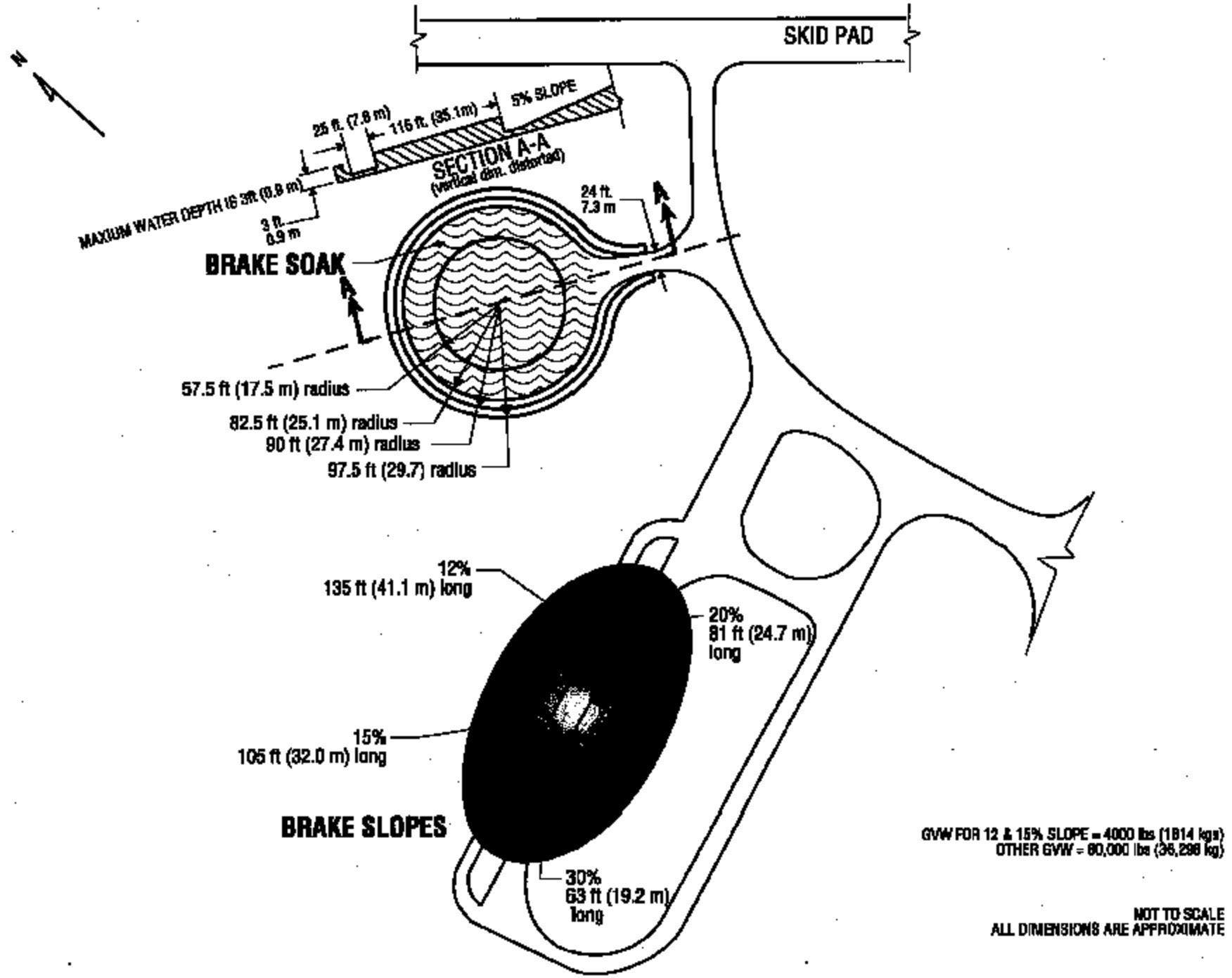


LANE 7 GVW = 8000 lbs (3629 kgs)
GVW = 80,000 LBS (36,296 kgs)

NOTE: BUMP COURSES PARALLEL THE PERIMETERS OF LANES 1 AND 7.

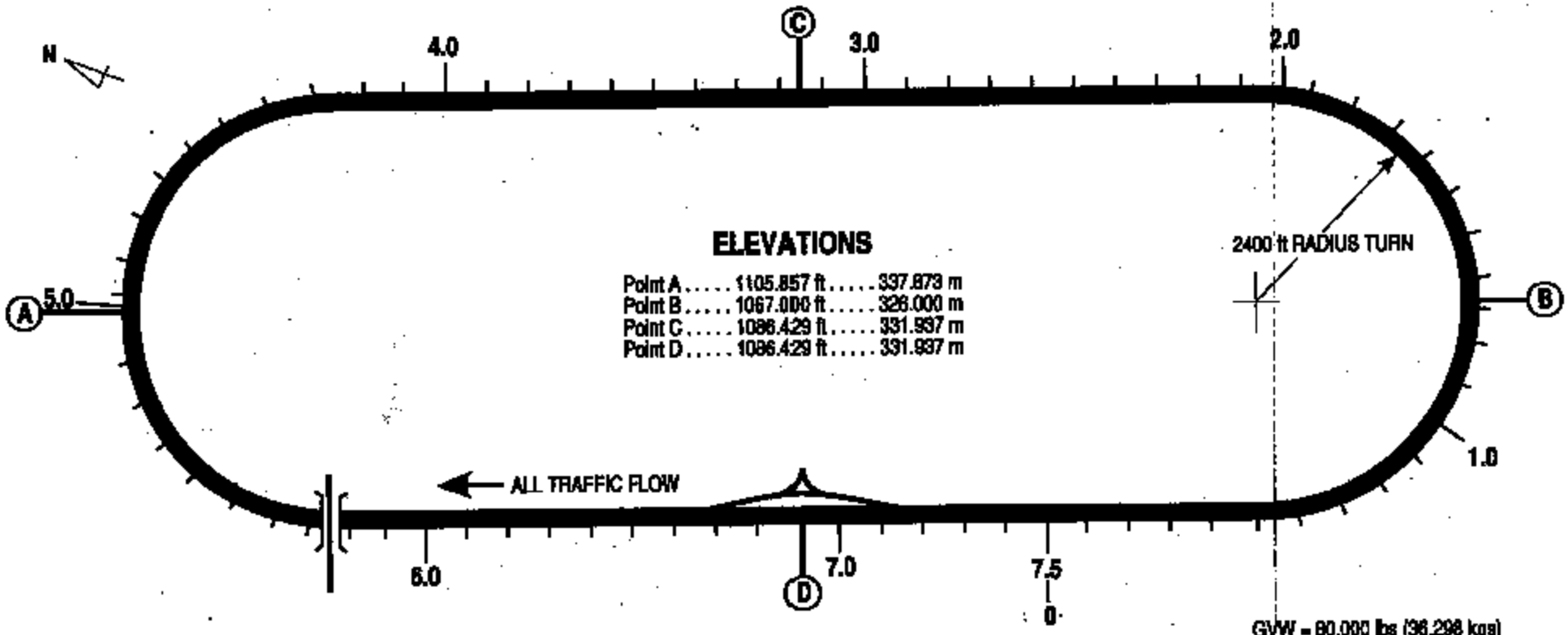
Not to scale
All dimensions are approximate

SKID PAD



BRAKE SOAK and BRAKE SLOPES

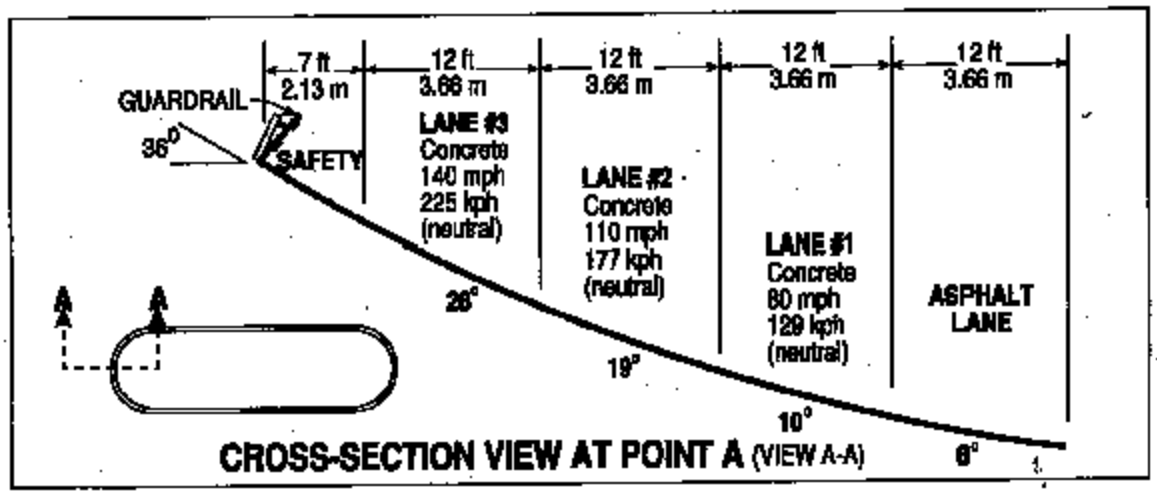
TRC®
TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0357
F-8 0800



ELEVATIONS

Point A	1105.857 ft	337.873 m
Point B	1067.000 ft	326.000 m
Point C	1086.429 ft	331.937 m
Point D	1086.429 ft	331.937 m

GVW = 80,000 lbs (36,298 kgs)



CROSS-SECTION VIEW AT POINT A (VIEW A-A)

DISTANCES

Lane 3	7.539 mi	12.133 km
Lane 2	7.521 mi	12.104 km
Lane 1	7.507 mi	12.081 km
Point A to Point B	3.333 mi	5.364 km
Point C to Point D	.947 mi	1.524 km

NOT TO SCALE

7.5-MILE TEST TRACK

TRC

TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0867

F-19 0499

APPENDIX D

Notice of Possible Non-Compliance

This vehicle (C40110) met the requirements of the FMVSS 135 standard.