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135-TRC-03-002

SAFETY COMPLIANCE TESTING FOR FMVSS 135
Passenger Car Brake Systems

Mitsubishi Motors Corporation
2003 Mitsubishi Outlander XLS AWD, 4-Door Sedan
NHTSA No. C35600

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

Final Report Completed: January 23, 2003

FINAL REPORT

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

U.S. DEPARTMENT OF TRANSPORTATION
National Highway Traffic Safety Administration
Safety Assurance
Office of Vehicle Safety Compliance
400 Seventh Street, SW
Room 6115 (NSA-30)
Washington, DC 20590

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

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Prepared By

Approved By

Approval Date: 1/27/03

Final Report Acceptance By OVSC:

Contract Technical Manager, Office of Vehicle Safety Compliance

1/31/03

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16. ABSTRACT:

Compliance tests were conducted on the subject 2003 Mitsubishi Outlander XLS AWD, 4-Door MPV, 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

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1.0 INTRODUCTION

Tests were conducted on a 2003 Mitsubishi Outlander XLS AWD, manufactured by Mitsubishi Motors Corporation, 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

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
Heating Snubs and Hot Performance Stops
Brake Cooling and Recovery Stops

Brake Slope
Parking Brake

Average PFC during the test period was 1.00 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.

DATA SHEET 1 - VEHICLE INFORMATION

VEHICLE SPECS

Year: 2003
Mfr: MITSUBISHI MOTORS CORPORATION
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Mfr Date: SEP 2002
VIN: JA4LZ41G93U030448

NHTSA No: C35600
GVWR (Kg): 1980.0
GAWR Front(Kg): 1050.1
GAWR Rear(Kg): 1065.0
Wheelbase (mm): 2622.6
Odometer: Start:79 MI. End:530 MI.

BUSES ONLY

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

Engine Type: GASOLINE,SOHC,16V,4CYL.,MPI FUEL INJ.,PISTON.
Displacement: 2.4 LITER
Engine Hspwr: N/A
Idle Speed(rpm): 755
Transmission Type: AUTO. SPORTRONIC 4SPDW/OD
No. of Axles: 2

Tire Size: P225/60R16
Tire Type: GEOLANDAR,GC35,97H,M&S,ST.BEL
Tire Mfr.: YOKOHAMA
GVWR Front Press (kpa): 199.95
GVWR Rear Press.(kpa): 199.95

BRAKE APPLY SYSTEM

Brake Series: Front:DISC Rear:DRUM
Brake Actuation (Hydr. Circuit Split): DIAGONAL
Power Unit: VACUUM
Anti-Skid unit Mfr: SUMITOMO ELECTRONICS
Parking Mechanism: YES
Type of Parking Unit: AUTOMATIC TRANSMISSION WITH PARK DETENT.
Mstr Cylinder Dia(mm): 25.40

Power Assist Unit: YES
Pwr Unit w/Accumulator: NO
Pwr Asst./Pwr Unit w/Backup: NO
Variable Prop. System: NO
Anti-Skid Device: YES
Pedal Ratio: 3.71 : 1

FRONT SYSTEM BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE: DISC
Material: CAST

Drum Construction: N/A
Disc Construction: INTEGRAL CAST,VENTED
Front Brake Dia.(mm): 275.89
Fr Disc Thickness(mm): 26.01
Lining Construction: Bonded

LF Drum Shoe Cage Dia (mm): 0.00
RF Drum Shoe Cage Dia.(mm): 0.00
LF Drum Dia. RESET(mm): 0.00
RF Drum Dia. RESET(mm): 0.00

FRONT BRAKE COMPONENT DIMENSIONS AND CODES:

Inboard (Leading)
Width(mm): 45.52
Length(mm): 121.92
Thickness(mm): 9.68
Lining Code/Color: NS175H EF
Hyd. Piston Dia.(mm): 60.10

Outboard (Trailing)
Width(mm): 45.47
Length(mm): 121.89
Thickness(mm): 9.68
Lining Code/Color: NS175H EF

DATA SHEET 1 - (CONTINUED)

REAR SYSTEM BRAKE COMPONENT MATERIALS AND CONSTRUCTION:

BRAKE TYPE: DRUM
Drum Construction: CAST
Disc Construction: N/A
Lining Construction: BONDED
Rear Brake Dia.(mm): 228.30
Rr Disc Thickness(mm): 0.00

Material: CAST IRON
LR Drum Shoe Cage Dia.(mm): 228.14
RR Drum Shoe Cage Dia.(mm): 228.57
LR Drum Dia. RESET(mm): 227.97
RR Drum Dia RESET(mm): 227.97

REAR BRAKE COMPONENT DIMENSIONS AND CODES:

Inboard (Leading)
Width(mm): 29.06
Length(mm): 219.07
Thickness(mm): 4.85
Lining Code/Color: AK L609 EE
Hyd Piston Dia (mm): 20.04

Outboard (Trailing)
Width (mm): 29.06
Length (mm): 219.07
Thickness (mm): 4.62
Lining Code/Color: AK L609 EE

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 Easterday for KAREN EASTERDAY Date: January 27, 2003

Quality Assurance: Ken Webster KEN WEBSTER

VEHICLE: 2003 Mitsubishi Outlander XLS AWD NHTSA NO.: C35600 DATE: 01/20/03

3.0 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				161.5 km/h avg			NA
Burnish	GVWR	80				200. 80 - 0 km/h stops @ 3.0 mpsps			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	5	473.3	46.6	Pass
High Speed Effectiveness	GVWR	129.2	65	500	spd. depend.-124.7	5	467.3	72.5	Pass
Stops with Engine Off	GVWR	100	65	500	70	5	440.1	45.6	Pass
Cold Effectiveness	LLVW	100	65	500	70	5	484.4	43.5	Pass
High Speed Effectiveness	LLVW	129.2	65	500	spd. depend.-124.7	5	486.3	72.4	Pass
Failed Antilock	LLVW	100	65	500	85	5	131.1	54.2	Pass
Failed Proportioning Valve	LLVW	100	65	500	110	5	NA	NA	NA
Failed Hydraulic Circuit #1	LLVW	100	65	500	168	5	464.5	87.5	Pass
Failed Hydraulic Circuit #2	LLVW	100	65	500	168	5	478.0	92.4	Pass
Failed Hydraulic Circuit #1	GVWR	100	65	500	168	5	484.2	92.9	Pass
Failed Hydraulic Circuit #2	GVWR	100	65	500	168	5	474.5	95.9	Pass
Failed Antilock	GVWR	100	65	500	85	5	260.5	40.0	Pass
Failed Proportioning Valve	GVWR	100	65	500	110	5	NA	NA	NA
Power Brake Unit Failure	GVWR	100	65	500	168	5	499.0	135.8	Pass
Parking Brake - Uphill	GVWR	-	-	400	Hold for 5 min.?	NA	380.9	Yes-Holds	Pass
Parking Brake - Downhill	GVWR	-	-	400	Hold for 5 min.?	NA	392.2	Yes-Holds	Pass
Heating Snubs	GVWR	120-60	NA	NA	15 Snubs- 3.0 mpsps	5	43 V's Avg	NA	NA
Hot Performance Stop #1	GVWR	100	55	368 avg	70.7	5	346.9 (262.8)	48.6	Pass
Hot Performance Stop #2	GVWR	100	55	500	59	5	466.8	47.4	Pass
Brake Cooling	GVWR	50	NA	NA	4 Stops - 3.0 mpsps	5	49 V's. Avg.	NA	NA
Recovery Performance Stop #1	GVWR	100	55	388 avg.	One of the two stops between 82.0 and 34.2 meters	5	383.8 (230.9)	50.9	Pass
Recovery Performance Stop #2	GVWR	100	55	500		5	346.4 (255.8)	48.3	
Final Inspection-Brake Integrity	Check components for detachment, fracture or lubricants.					No detachments or fractures-normal appear. & color.			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.

DATA SHEET 3 - VEHICLE WEIGHT

VEHICLE: 2003 MITSUBISHI OUTLANDER XLS NHTSA No. C35600 Date: 12/16/02

Tire Pressure(cold): Front (kpa) 200 Rear (kpa) 200
Odometer: Start 79 MI End 530 MI
Scale(s) Used: TRC Toledo Scales

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

GVWR/GAWR INFORMATION
(From Veh. Certification Label)

GVWR(Kg): 1980
GAWR Front(Kg): 1050
GAWR Rear(Kg): 1065

UNLOADED VEHICLE WEIGHT(UVW)

L Front(Kg):	460	L Rear(Kg):	351
R Front(Kg):	464	R Rear(Kg):	332
T Front(Kg):	925	T Rear(Kg):	684

Total UVW(Kg): 1608

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):	505	L Rear(Kg):	401
R Front(Kg):	509	R Rear(Kg):	381
T Front(Kg):	1014	T Rear(Kg):	781

Total LLVW(Kg): 1795

ACTUAL LIGHT LOADED WEIGHT(LLVW):

L Front(Kg):	503	L Rear(Kg):	398
R Front(Kg):	511	R Rear(Kg):	381
T Front(Kg):	1014	T Rear(Kg):	779

Total Actual Test LLVW(Kg): 1793

Load: Driver/Observer 72(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):	499	L Rear(Kg):	497
R Front(Kg):	514	R Rear(Kg):	469
T Front(Kg):	1013	T Rear(Kg):	967

Total Fully Loaded GVWR(Kg): 1980

Load: Driver/Observer 72(Kg) + Instru. 41(Kg) + Ballast 258(Kg)= 371(kg)

Technician: Karen Easterday jm
KAREN EASTERDAY

Date: January 27, 2003

Quality Assurance: Ken Webster
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 Easterday per KAREN EASTERDAY Date: January 22, 2003

Quality Assurance: KEN WEBSTER

DATA SHEET 5 - VEHICLE MAX SPEED

VEHICLE: 2003 MITSUBISHI OUTLANDER XLS NHTSA No C35600 Date: 12/20/02

Ambient Temperature: 35.00°F Wind Velocity: 20.00(MPH)
Road PFC 1.00 Wind Direction: 223°
Odometer: Start 105(mi) End 121(mi)

TEST WEIGHT: Total (Kg): 1793 Front (Kg): 1014 Rear (Kg): 779

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.

IET: 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	165.7km/h	165.7	14.84
Run No. 2	North	157.3km/h	157.3	14.34

AVERAGE = 161.5 km/h

COMMENTS: INV DATA, Section 0001, 12/20/02, 10:39:30

Tester/Technician: Karen Easterday for KAREN EASTERDAY Date: January 27, 2003

Quality Assurance: Ken Webster KEN WEBSTER

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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10820 State Route 347
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Date Tested: 12/20/02

DATA SHEET 6 - BURNISH AT GVWR

Testing Conditions: INV DATA, Section 0002, 12/20/02, 13:57:13

Weather Conditions: 33°F Wind:15 mph 264° Start Odo.: 123 End Odo.: 382

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

Performance Requirements:
Interval between runs: Time necessary to reduce IBT to 100 C° or 2 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 IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	AVG. DECEL (m/sec²)
1	79.13	35	37	21	29	75.52	56.06	2.74
10	80.28	84	94	60	50	76.58	45.64	2.59
20	80.74	79	93	62	49	63.20	43.63	2.53
30	80.41	74	99	66	51	49.41	39.48	2.65
40	80.60	76	96	67	56	68.72	40.50	2.56
50	79.66	79	93	74	61	57.99	42.97	2.71
60	79.89	79	95	76	62	54.93	44.69	2.65
70	79.70	78	89	83	72	52.44	44.81	3.04
80	80.75	75	91	88	76	61.39	49.75	3.03
90	80.58	77	89	89	83	60.71	49.64	2.98
100	80.19	72	80	83	79	54.10	39.74	3.00
110	80.21	72	81	91	83	57.20	41.22	3.07
120	80.73	73	85	94	86	58.10	46.13	2.99
130	79.83	78	83	92	87	56.33	46.69	3.02
140	80.81	74	81	92	86	59.55	44.01	3.12
150	81.81	73	84	85	79	63.73	52.17	2.79
160	79.86	81	87	81	81	54.17	42.92	3.07
170	80.57	76	83	74	71	51.34	44.92	2.95
180	79.93	79	86	72	70	60.94	50.47	2.94
190	81.26	76	81	68	65	69.93	62.03	2.95
200	80.57	76	82	69	66	76.20	58.71	3.28

COMMENTS: THIS VEHICLE ABS EQUIPPED, DATA SHEETS 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: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/26/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 12/23/02

DATA SHEET 11 - COLD EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0015, 12/23/02, 09:12:36

Weather Conditions: 28°F Wind: 29 mph 244° Start Odo.: 395 End Odo.: 430

Schedule:
Initial Brake Temperature 65 - 100 C
Initial Speed 130 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 IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (SAE 2991 (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.51	69	67	49	41	49.7	50.2	420.19	270.96	13.57	7.76
2	99.81	83	81	56	52	46.8	47.0	455.45	350.35	12.51	7.95
3	100.60	89	86	63	56	47.3	46.8	466.84	358.38	12.16	8.01
4	99.51	86	82	63	56	47.4	47.9	472.53	361.24	12.65	8.07
5	99.78	76	73	56	48	46.4	46.6	473.63	388.13	12.78	8.07
6	99.88	73	71	55	47	46.5	46.6	497.87	379.76	12.76	8.02

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

Corrected Distances are used to determine shortest stopping distance.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MO70 NHTSA NUMBER: C35500
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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

Date Tested: 12/23/02

DATA SHEET 12 - HIGH SPEED EFFECTIVENESS AT GVWR

Testing Conditions: INV DATA, Section 0020, 12/23/02, 09:45:36

Weather Conditions: 29°F Wind: 15 mph 246° Start Odo: 401 End Odo: 412

Schedule:
Initial Brake Temperature: 65-100°C
Initial Speed: 80% max km/h, not greater than 160km/h
6 stops with transmission in gear

Performance Requirements:
One Stop with:
Stopping Distance less than: **124.7 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 TBT (°C)	RIGHT FRONT TBT (°C)	LEFT REAR TBT (°C)	RIGHT REAR TBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (EAS 200) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	125.59	53	93	63	50	77.6	77.1	469.55	390.77	11.66	8.24
2	127.52	84	82	61	52	72.8	74.8	503.68	389.72	12.63	8.57
3	129.88	84	82	66	53	73.3	72.5	467.25	388.26	12.53	8.63
4	131.31	81	76	65	52	76.4	72.9	427.65	331.79	12.76	8.83
5	128.91	73	70	67	52	73.7	74.0	475.78	391.11	12.25	8.78
6	129.00	88	84	77	59	74.3	74.5	488.56	409.78	12.66	8.52

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN MEASTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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DATA SHEET 13 - STOPS WITH ENGINE OFF AT GVWR

Testing Conditions: INV DATA, Section 0025, 12/23/02, 10:56:39

Weather Conditions: 32°F Wind: 15 mph 247° Start Odo.: 415 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 73m
Pedal force between 65N and 503N
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	99.11	85	86	52	47	47.1	48.0	379.35	208.74	11.04	7.99
2	99.82	78	78	61	46	46.6	46.8	431.20	306.83	12.35	7.70
3	99.26	81	80	67	50	45.8	46.5	526.84	331.64	12.63	7.97
4	99.62	85	84	72	54	46.6	46.9	454.32	329.72	11.74	8.30
5	99.29	85	82	74	53	44.9	45.5	440.06	324.29	12.19	8.41
6	98.81	85	83	78	54	45.0	46.1	468.50	341.67	11.71	8.05

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: ERN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI NOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 12/23/02

DATA SHEET 14 - COLD EFFECTIVENESS AT LLVW

Testing Conditions: INV DATA, Section 0030, 12/23/02, 13:53:41

Weather Conditions: 36°F Wind: 20 mph 244° Start Odo.: 425 End Odo.: 430

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 IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (EAE 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.08	74	80	51	46	44.2	45.0	311.43	179.77	11.97	8.27
2	98.25	78	82	52	46	43.6	45.2	441.42	293.93	12.40	8.63
3	99.09	79	80	54	46	43.8	44.6	497.61	325.42	12.51	8.53
4	100.52	86	86	58	48	43.9	43.5	484.37	344.50	13.05	8.46
5	99.30	83	82	56	47	45.8	46.5	272.56	237.23	11.74	8.01
6	99.43	76	76	50	46	45.0	45.5	455.07	286.23	12.44	8.18

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 12/23/02

DATA SHEET 15 - HIGH SPEED EFFECTIVENESS AT LLVW

Testing Conditions: INV DATA, Section 0035, 12/23/02, 14:29:13

Weather Conditions: 38°F Wind: 19 mph 267° Start Odo.: 432 End Odo.: 440

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 124.7m
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 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	129.20	89	93	58	54	72.9	72.9	422.00	334.77	12.85	8.70
2	129.09	86	83	52	47	72.3	72.4	436.83	372.67	13.03	8.76
3	128.95	86	83	56	50	73.0	73.2	440.67	322.82	12.40	8.41
4	128.34	75	71	54	47	72.6	73.5	363.47	260.31	11.07	8.75
5	127.34	79	76	53	48	72.3	74.7	445.43	353.55	13.87	8.58
6	129.36	76	75	53	47	73.2	73.0	452.43	354.46	12.52	8.71

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4CR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure. 200 (Kpa)

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DATA SHEET 16 - ANTILOCK FUNCTIONAL FAILURE AT LLVW

Testing Conditions: INV DATA, Section 0040, 12/23/02, 15:02:01

Weather Conditions: 35°F Wind: 14 mph 247° Start Odo.: 442 End Odo.: 448

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 **85m**
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 299) (meter)	MAX. PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	100.20	75	77	49	47	57.0	56.8	158.20	105.07	10.55	6.61
2	99.69	78	81	57	56	64.6	64.8	130.75	103.37	8.58	6.32
3	99.85	84	87	63	63	57.9	58.1	135.50	99.02	9.54	6.32
4	99.94	84	88	68	68	54.7	54.7	168.65	114.91	9.78	6.99
5	98.32	76	79	67	65	53.3	52.4	126.49	95.94	11.78	6.36
6	100.07	74	77	63	62	54.2	54.2	131.09	107.63	9.52	6.97

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 60 AMP FUSE FROM BOX UNDER HOOD ON THE LEFT SIDE.

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

Variable proportioning valve integral w/ABS can't separately disengage Data Sheet 17 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style- MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure- 200 (Kpa)

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Date Tested: 12/24/02

DATA SHEET 18 - HYDRAULIC CIRCUIT FAILURE #1 AT LLVW

Testing Conditions: INV DATA, Section 0050, 12/24/02, 11:28:51

Weather Conditions: 28°F Wind- 7 mph 69° Start Odo.: 456 End Odo.: 459

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

System Portion Failed: LF & RR

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 IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	ACTUAL DISTANCE (meter)	CORRECTED DISTANCE (BAE 299) (meter)	MAX PEDAL FORCE (N)	AVG. PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.46	9	85	41	15	85.6	87.5	464.46	365.96	6.64	4.33
2	99.06	9	89	58	12	88.4	90.1	482.98	378.45	6.11	4.23
3	99.51	8	87	60	9	89.7	90.6	481.58	392.77	6.60	4.38
4	98.19	4	92	53	6	88.5	91.8	474.23	394.28	7.09	4.40

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: 89

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: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 12/24/02

DATA SHEET 19 - HYDRAULIC CIRCUIT FAILURE #2 AT LLVW

Testing Conditions: INV DATA, Section 0055, 12/24/02, 13:52:04

Weather Conditions: 29°F Wind: 10 mph 49° Start Odo.: 464 End Odo.: 469

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 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	99.42	77	16	19	48	91.7	92.8	446.17	342.09	6.57	4.29
2	99.86	89	13	14	63	92.1	92.4	477.96	405.82	6.28	4.07
3	99.41	92	12	13	72	95.6	96.7	492.93	401.67	6.70	3.96
4	99.58	77	11	11	78	92.7	93.5	486.86	404.73	6.66	4.26

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: 89

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: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: NDV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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DATA SHEET 20 - HYDRAULIC CIRCUIT FAILURE #1 AT GVWR

Testing Conditions: INV DATA, Section 0060, 01/09/03, 00:14:37

Weather Conditions: 35°F Wind: 30 mph 263° Start Odo.: 484 End Odo.: 487

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 100 km/h to zero
5 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 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	100.35	12	64	47	23	98.7	98.0	480.91	396.55	7.63	3.99
2	99.41	12	67	63	18	94.4	95.5	474.26	377.63	6.66	4.15
3	100.13	12	94	94	20	96.2	96.0	468.45	333.46	5.87	3.78
4	100.25	3	84	89	16	93.2	92.8	484.53	412.79	6.88	4.21

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

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: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/23/03

Vehicle: 2003 MITSUBISHI MOTO ERTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 12/24/02

DATA SHEET 21 - HYDRAULIC CIRCUIT FAILURE #2 AT GVWR

Testing Conditions: JMV DATA, Section 0065, 12/24/02, 14:32:28

Weather Conditions: 30°F Wind: 4 mph 37° Start Odo.: 472 End Odo.: 476

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 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	100.28	79	13	13	83	100.1	99.5	493.50	399.10	6.09	3.04
2	99.56	84	11	12	95	98.4	99.2	472.31	389.98	5.95	3.85
3	100.47	66	11	9	77	96.8	95.9	474.49	394.96	6.36	3.83
4	99.65	74	9	8	86	95.9	96.6	470.23	373.76	6.08	3.69

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

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: JAREN BASTERDAY Observer: NONE
Recorded Data Processed by: CEUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/23/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

DATA SHEET 22 - ANTILOCK FUNCTIONAL FAILURE AT GVWR

Testing Conditions: INV DATA, Section 0070, 01/09/03, 09:24:56

Weather Conditions: 38°F Wind: 7 mph 336° Start Odo.: 490 End Odo.: 495

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 85m
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 299) (meter)	MAX. PEDAL FORCE (N)	AVG PEDAL FORCE (N)	MAX. DECEL (m/sec²)	AVG. DECEL (m/sec²)
1	99.57	67	96	77	48	56.2	56.7	186.87	128.95	9.60	6.70
2	99.25	62	90	79	56	59.0	59.9	139.82	116.30	8.85	6.46
3	100.01	59	76	71	56	53.2	53.2	269.45	132.12	10.20	7.03
4	99.50	72	87	84	67	50.6	51.2	261.40	135.07	10.49	7.46
5	99.63	72	82	74	64	48.7	49.0	280.55	146.36	10.36	7.92
6	99.12	84	94	87	73	53.9	54.9	173.24	130.12	9.92	7.40

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 60 AMP FUSE FROM BOX UNDER HOOD ON THE LEFT SIDE.

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

Vehicle not equipped with variable proportioning valve. Data Sheet 23 not included.

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/23/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

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

Testing Conditions: INV DATA, Section 0080, 01/30/03, 10:14:22

Weather Conditions: 40°F Wind: 15 mph 257° Start Odo.: 496 End Odo.: 502

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 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 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	99.07	91	95	71	55	133.3	135.6	499.03	471.54	4.63	3.04
2	100.89	89	93	67	56	132.3	130.0	501.98	466.94	4.65	3.06
3	98.71	89	94	66	58	146.0	149.8	487.67	443.22	4.15	2.82
4	99.64	91	95	64	58	127.6	128.5	504.32	472.37	4.58	3.20
5	99.83	84	89	60	58	142.3	142.8	490.38	449.23	4.66	3.95
6	100.73	79	84	57	53	141.6	138.5	488.65	454.93	4.35	3.04

DRIVER VEHICLE STOP COMMENTS
(Wheel Lock-Up - Direction of Stop - Stay in Lane)

STOP #	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

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

DATA SHEET 25 - PARKING BRAKE AT GVWR

Testing Conditions: INV DATA, Section 0085, 01/09/03, 11:39:45
Parking brake: AUTOMATIC TR Non-Service type: N/A Service type: HAND-OPERATED

Weather Conditions: 41°F Wind: 11 mph 224° Start Odo.: 504 End Odo.: 504

Test Weight: Total:1980kg Front:1013kg Rear: 967kg

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 furnished 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 IBT (°C)	RIGHT REAR IBT (°C)	AVG REAR IBT (°C)	DRIVER VEHICLE STOP COMMENTS (Direction of Stop (Up/Down) - Brake holds/fails)			
1	64.9	359.9	31	28	29.7	-	3 REAPPLY	UPHILL	HOLDS 20%
2	75.2	362.2	27	23	25.3	-	3 REAPPLY	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: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C05600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

DATA SHEET 26 - HEATING SNUBS AT GVWR

Testing Conditions: XMV DATA, Section 0090, 01/09/03, 12:54:15

Schedule:
Conduct 15 snubs from 120 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 WOT to initial speed.

Performance Requirements.
Initial IBT for first snub is 55-65°C
Maintain 3.0 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 IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)	INIT SPD (kph)
1	3.13	--NA--	42.40	58	62	34	32	119.87
2	3.17	51	34.97	98	101	57	52	121.02
3	3.03	42	37.99	139	146	71	66	120.06
4	2.93	44	43.01	172	182	82	76	119.62
5	2.84	45	43.51	197	209	94	89	121.19
6	2.76	44	40.67	216	231	104	98	120.42
7	2.68	45	44.22	232	248	113	105	120.93
8	2.80	45	42.30	243	257	122	112	119.91
9	2.80	47	38.06	249	264	129	119	119.25
10	2.77	44	41.72	257	266	134	125	120.03
11	2.75	44	47.50	261	266	137	130	122.35
12	2.84	45	42.03	271	274	142	137	120.70
13	2.78	45	45.73	281	285	148	142	120.82
14	2.86	45	48.94	284	292	155	148	121.99
15	2.92	45	49.88	286	297	161	152	119.62

STOP #	DRIVER VEHICLE SNUB COMMENTS (Wheel Lock-Up - Direction of Stop - Stay in Lane)		
1	-	NOX	NORTH	YES
2	-	NOX	EAST	YES
3	-	NOX	EAST	YES
4	-	NOX	SOUTH	YES
5	-	NOX	SOUTH	YES
6	-	NOX	SOUTH	YES
7	-	NOX	WEST	YES
8	-	NOX	NORTH	YES
9	-	NOX	NORTH	YES
10	-	NOX	NORTH	YES
11	-	NOX	NORTH	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: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2003 MITSUBISHI MO70 NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

DATA SHEET 27 - HOT PERFORMANCE AT GVWR

Testing Conditions: INV DATA, Section 0095, 01/09/03, 13:05:17

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 11 is: 5
Initial speed of Stop: 99.78 (kph)
Actual distance of stop: 46.4 (meter)
Average pedal force: 388.1 (N)

Performance Requirements:

Stop Number 1 must be less than: 98.7 (meter)
In addition the stopping distance for at least one of the of the two hot stops must be less than: 89 (meter)

STOP #	INIT SPD (kph)	LEFT FRONT TBT (°C)	RIGHT FRONT TBT (°C)	LEFT REAR TBT (°C)	RIGHT REAR TBT (°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	99.08	296	309	153	161	47.7	48.6	346.90	362.77	10.76	7.34
2	99.21	311	327	165	171	46.6	47.4	466.82	321.11	11.05	7.61

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer. NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/23/03

Vehicle: 2003 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

DATA SHEET 28 - BRAKE COOLING STOPS AT GVWR

Testing Conditions: TMV DATA, Section C100, 01/09/03, 13:08.03

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 IBT (°C)	RIGHT FRONT IBT (°C)	LEFT REAR IBT (°C)	RIGHT REAR IBT (°C)
1	50.04	2.41	43.54	266	287	177	162
2	51.01	2.77	50.79	209	224	155	144
3	50.64	2.53	47.77	159	173	139	132
4	50.99	2.68	54.37	127	132	126	123

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

Vehicle: 2001 MITSUBISHI MOTO NHTSA NUMBER: C35600
Make: MITSUBISHI
Model: OUTLANDER XLS
Body Style: MPV 4DR
Front Cold Tire Pressure: 200 (Kpa)
Rear Cold Tire Pressure: 200 (Kpa)

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Date Tested: 01/09/03

DATA SHEET 29 - RECOVERY PERFORMANCE AT GVWR

Towing Conditions: INV DATA. Section 0105, 01/09/03, 13:15:28

Weather Conditions: 42°F Wind: 14 mph 241° Start Odo.: 506 End Odo.: 523

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: 62.0 (meter)
Lower limit of corrected stopping distance: 34.3 (meter)

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 21 is:Stop5
Initial speed of stop: 99.78 (kph)
Actual distance of stop: 46.4 (meter)
Average pedal force: 388.1 (N)

STOP #	INIT SPD (kph)	LEFT FRONT TBT (°C)	RIGHT FRONT TBT (°C)	LEFT REAR TBT (°C)	RIGHT REAR TBT (°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	99.19	113	119	121	121	50.1	50.9	383.83	230.94	10.64	7.50
2	99.55	139	144	137	153	47.9	48.3	346.41	255.56	11.68	8.30

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

DATA INDICATES COMPLIANCE: YES (X) NO ( )

Driver: KAREN EASTERDAY Observer: NONE
Recorded Data Processed by: CHUCK JENKINS Date: 1/22/03
Approving Laboratory Official: KEN WEBSTER Date: 1/25/03

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

VEHICLE: 2003 Mitsubishi Outlander XLS AWD NHTSA NO.: C35600 DATE: 01/16/03

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, Slightly More Blue in Color	LR	None
RR	Normal Appearance, Slightly More Blue in 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: Karen Easterday

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

VEHICLE: 2003 Mitsubishi Outlander XLS AWD; NHTSA NO.: C35600; GVWR: 1980 kg
MASTER CYLINDER RESERVOIR:

DATE	01/15/03	Requirements	Pass	Fail
Reservoir Compartments (S5.4.1)				
(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 (S5.4.2)				
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)	168 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	100.2 ml*			

Comments: None
Technician: Karen Easterday

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

VEHICLE: 2003 Mitsubishi Outlander XLS AWD; NHTSA NO.: C35600; GVWR: 1980 kg

MASTER CYLINDER RESERVOIR:

DATE	01/15/03	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)	25 m	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)	23 ml			
Fluid displaced per stroke, Primary	8.3 ml			
Fluid displaced per stroke, Secondary	7.7 ml			
Fluid available in partial compartment Subsystem No. 1	25 ml		X	
Fluid available in partial compartment Subsystem No. 2	29 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 or 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 OR DOT 4 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 cap.		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	NA	

Comments: None

Technician: Karen Easterday

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

VEHICLE: 2003 Mitsubishi Outlander XLS AWD; NHTSA NO.: C35600; DATE: 01/15/03

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: Lower central portion of the instrument cluster.	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, then 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?___ Audible warning –continuous or flashing?__	Yes-Cont. No			

Comments: None.

Technician: Karen Easterday

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

VEHICLE: 2003 Mitsubishi Outlander XLS AWD; NHTSA NO.: C35600; DATE: 01/15/03
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 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"?	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	NA		
If separate indicator for:		X	
1. Low brake fluid per S5.5.1(a)(1), does indicator say "Brake Fluid"? NOTE: not required for mineral oil system Record wording	NA		
2. Gross pressure loss per S5.5.1(a)(2), does indicator say "Brake Pressure"? Record wording	NA		
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 – Yellow (or Amber).	Yes		
Does indicator say "Antilock" or "ABS" or "Brake Proportioning"? Record wording "ANTI LOCK"	Yes		
4. Parking brake per S5.5.1(c), does indicator say "Park" or "Parking Brake"? Record wording	NA		
5. Brake lining wear-out per S5.5.1(d), does indicator say "Brake Wear"? Record wording	NA		
6. For any other function? If yes, Record	NA		

Comments: None
Technician: Karen Easterday

DATA SHEET 31 (Part 1 of 2)
CALCULATION OF MINIMUM RESERVOIR VOLUME REQUIREMENTS

VEHICLE: 2003 Mitsubishi Outlander XLS AWD; NHTSA NO.: C35600; DATE: 01/16/03

BRAKE		LINING		
LOCATION	TYPE	DESCRIPTION	MINIMUM THICKNESS	THICKNESS TO FULLY WORN (1) mm*
Left Front	Drum	Leading	Pre-test 9.68 mm	2
		Primary	Post Test 9.30 mm	
		Inboard X	Δ 0.38 mm	
	Disc X	Trailing	Pre-test 9.68 mm	2
		Secondary	Post Test 9.19 mm	
		Outboard X	Δ 0.49 mm	
LINING CLEARANCE:	Diametrica (2): N/A	Inboard – 0 mm	Outboard – 0 mm	
WHEEL CYLINDER DIAMETER (3) N/A		CALIPER PISTON DIAMETER (3): 60.10 mm		
SHOE CAGE DIAMETER (4) N/A ; CENTER POINT OF BRAKE ASSY TO CENTER POINT OF W.C. N/A				
Right Rear	Drum X	Leading X	Pre-test 4.85 mm	1
		Primary	Post Test 4.78 mm	
		Inboard	Δ 0.07 mm	
	Disc	Trailing X	Pre-test 4.62 mm	1
		Secondary	Post Test 4.57 mm	
		Outboard	Δ 0.05 mm	
LINING CLEARANCE:	Diametrical (2): 0.25 mm to 0.40 mm	Inboard – N/A	Outboard N/A	
WHEEL CYLINDER DIAMETER (3): 20.04 mm		CALIPER PISTON DIAMETER (3): N/A		
SHOE CAGE DIAMETER (4): 227.87 mm		CENTER POINT OF BRAKE ASSY TO CENTER PT. OF W.C.: 88.9 mm		
CIRCUIT #1 CONSISTS OF:	LF – X	LR	RF	RR – X
CIRCUIT #2 CONSISTS OF:	LF	LR – X	RF – X	RR

(1) MFRS. RECOMMENDATIONS – Fronts – 2 mm; Rears – 2 mm.
(2) REAR - TOP OF RIVET HEADS – N/A.
FRONT - 1/32 INCH – N/A.

(2) DRUM BRAKES, MEASURED AT HORIZONTAL CENTERLINE: 0.6 mm

(3) MFRS. DATA: Front: 60.33 mm; Rear: 20.63 mm.

(4) RESET POSITION: Special Note: First set of received data: 0.25 to 0.40 mm. Second set of received data: 0.50 to 0.80 mm.

Comments: Manufacturer's new lining thickness: Frt.: 10 mm; Rear: 4.9 mm.

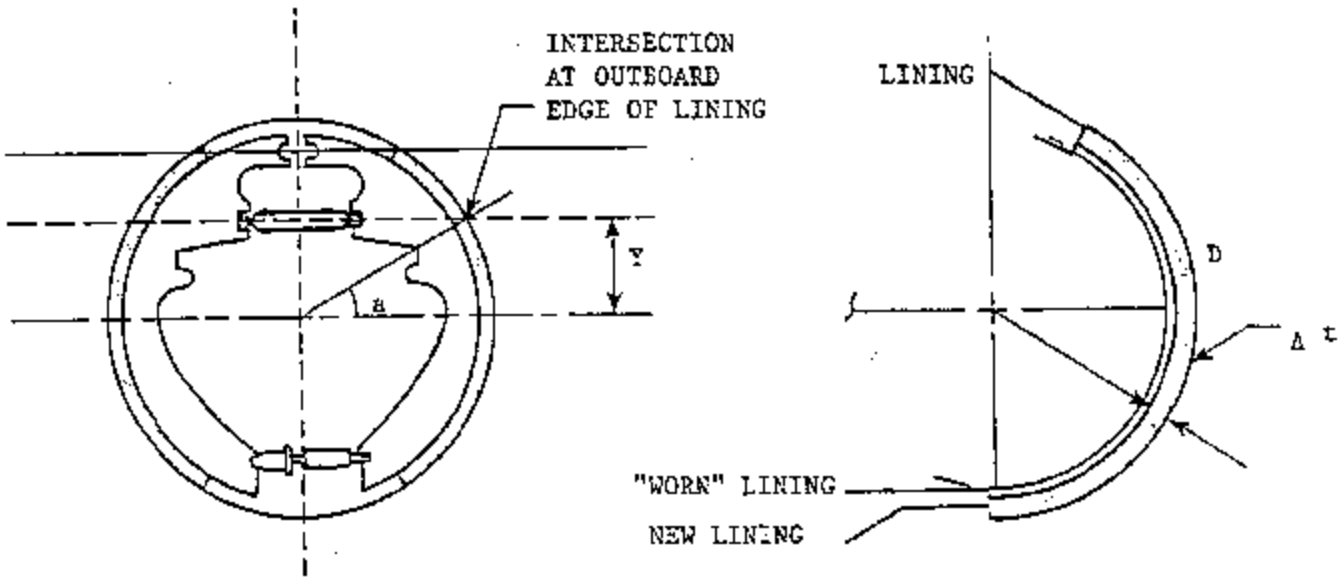
Technician: Karen Easterday

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

Vehicle: 2003 Mitsubishi Outlander XLS AWD; NHTSA No.: C35600; Date: 01/20/03

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

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, (Continued)

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

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

$C = 0.16$ mm $\quad a = \sin^{-1} \frac{2Y}{D}$ $\quad Y = 88.9$ mm $\quad D = 227.97$ mm $\quad A = \frac{\pi d^2}{4}$

$\Delta t_i = 3.9$ mm

$\Delta t_t = 3.9$ mm $\quad \sin^{-1} \frac{2(88.9)}{227.97} = 51.254°$ $\quad A = \frac{\pi(20.63 \text{ mm})^2}{4} = 334.263 \text{ mm}^2$

$V_r = \frac{2(0.16) + 3.9 + 3.9}{\cos 51.254°} (334.263) = 12.974 (334.263)$

$V_r = 4336.71 \text{ mm}^3 = 4.34$ ml

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

$\Delta t_i = 8$ mm

$\Delta t_o = 8$ mm

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

$d = 60.33$ mm

$V_r = (8 + 0 + 8 + 0) \frac{\pi(60.33)^2}{4}$

$= 16 (2858.62)$

$= 45737.93 \text{ mm}^3 = 45.74$ ml

Total Volume required 2(45.74) + 2(4.34) = 100.2 ml*

SECTION 6.0

Photographs

MFD. BY MITSUBISHI MOTORS CORPORATION . JAPAN
SEP 2002

GVWR 4365LBS/1980KG
GAWR 2315LBS/1050KG WITH P225/60R16 TIRES
FR 16X6JJ RIMS AT 200KPa/29PSI COLD.
GAWR 2348LBS/1065KG WITH P225/60R16 TIRES
RR 16X6JJ RIMS AT 200KPa/29PSI COLD.

THIS VEHICLE CONFORMS TO ALL APPLICABLE FEDERAL MOTOR VEHICLE SAFETY AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

JA4LZ41G93U030448

VEHICLE TYPE: MPV MU000470

2003 MITSUBISHI OUTLANDER XLS AWD NHTSA NO. C35600 DECEMBER 2002

TIRE INFLATION PRESSURE
(CHECK WITH TIRE COOL)

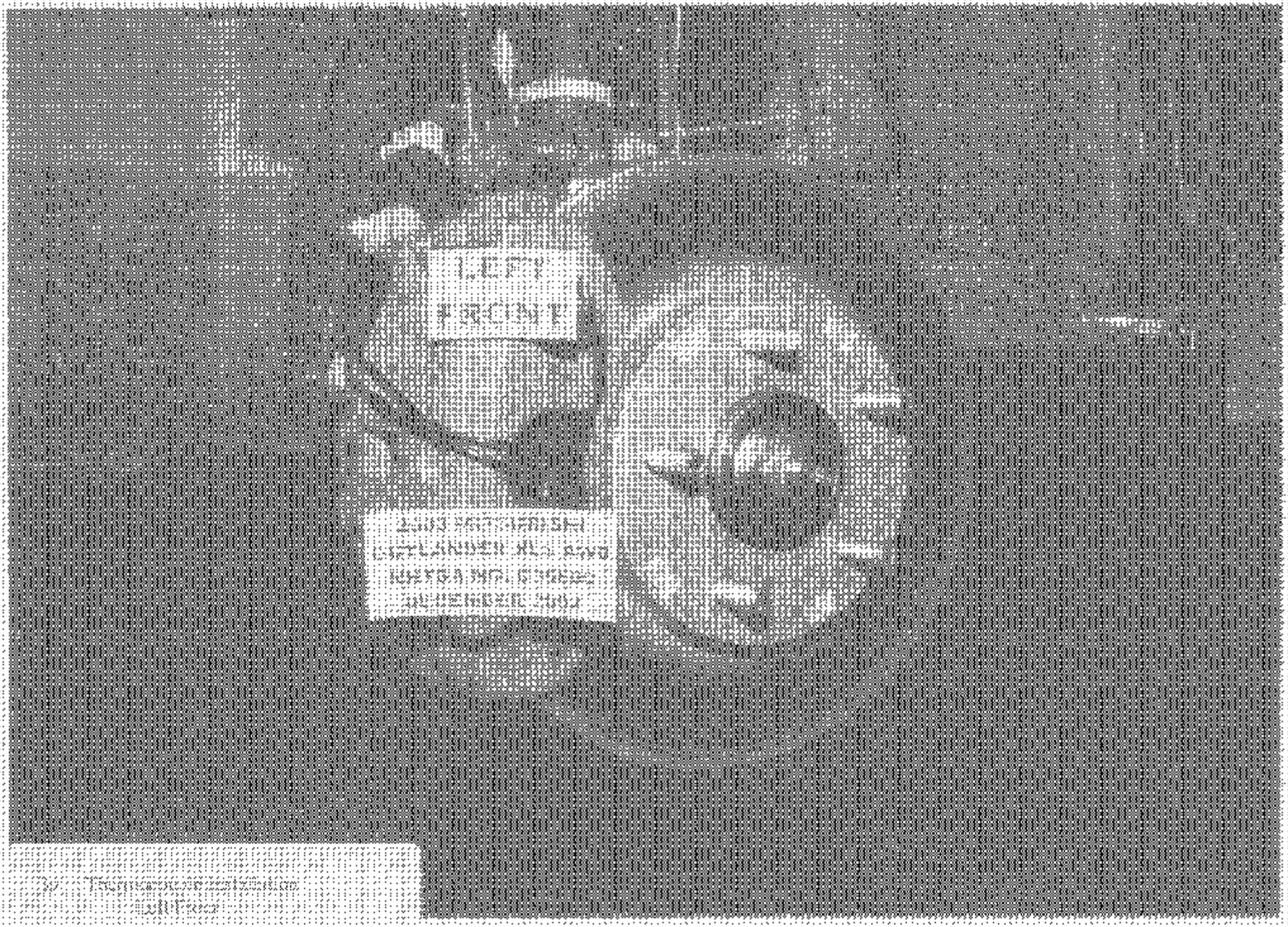
STANDARD INFLATION PRESSURE
FOR ALL LOAD.
1ST SEAT : 2 PASSENGERS
2ND SEAT : 3 PASSENGERS
TOTAL : 5 PASSENGERS
LUGGAGE : 35kg (77lbs)
TOTAL WEIGHT : 375kg (827lbs)

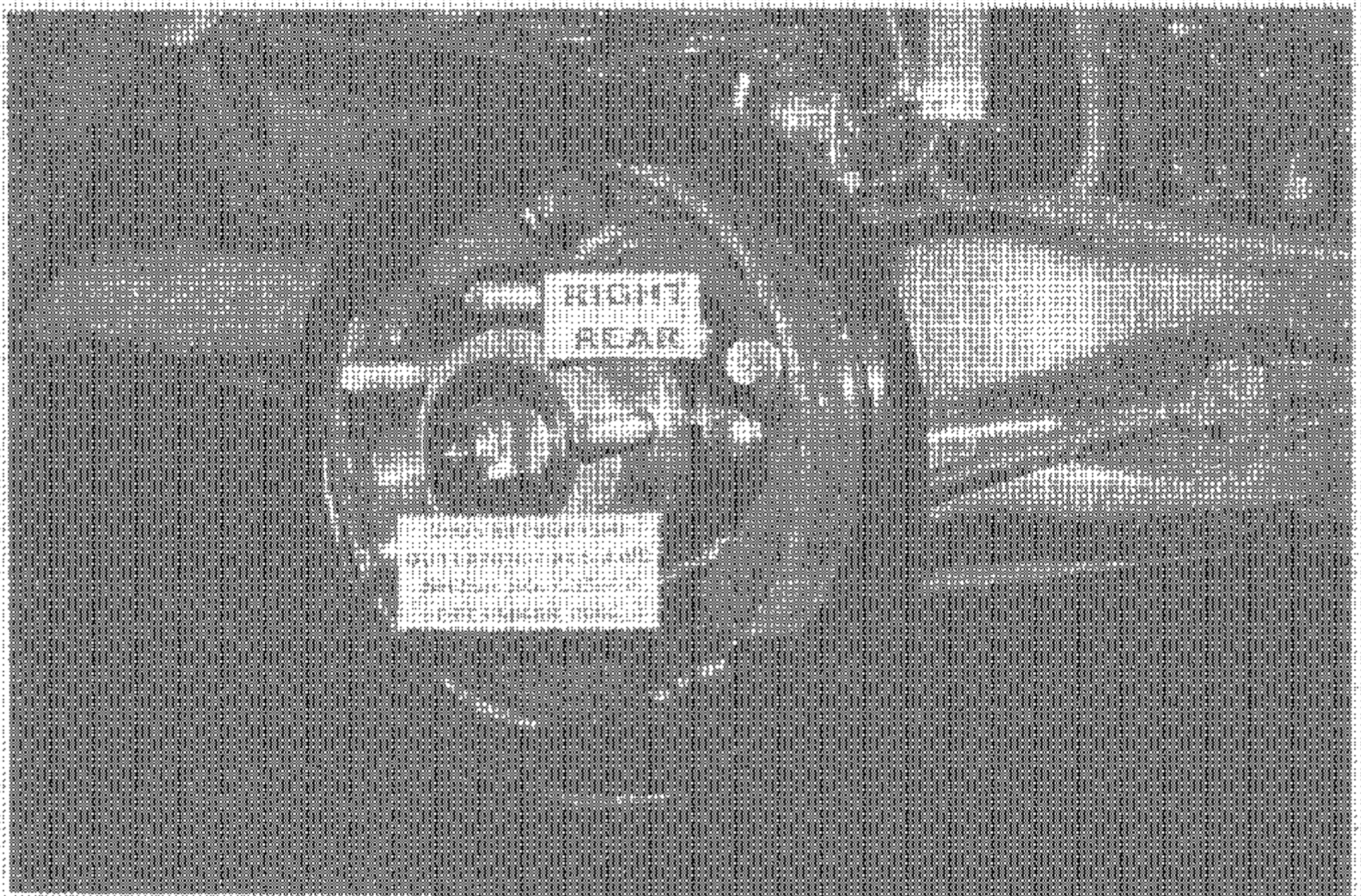
TIRE SIZE	FRONT & REAR
P225/60R16	29PSI {200kPa}

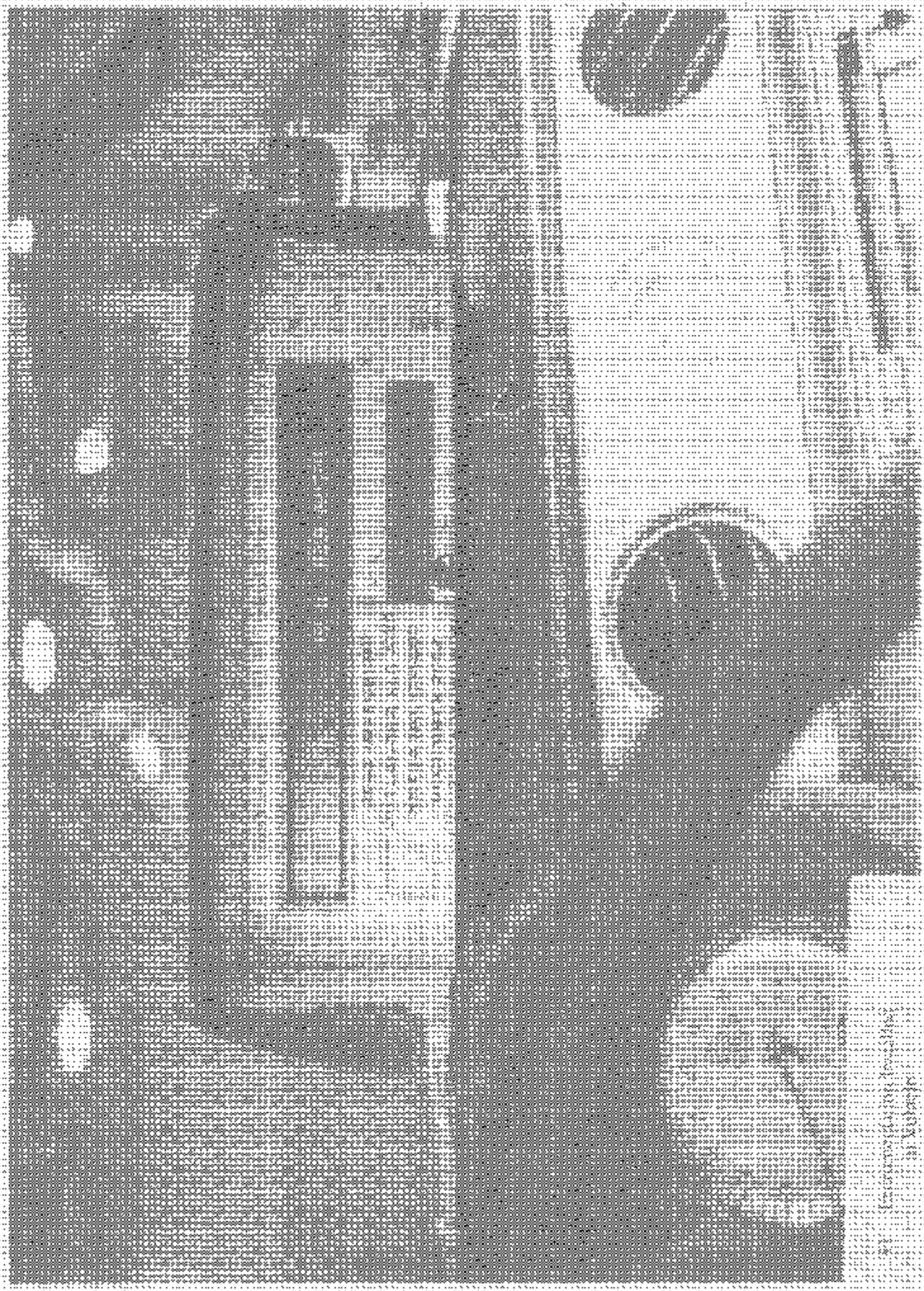
TEMPORARY TIRE SIZE
T135/90D16
60PSI {420kPa}

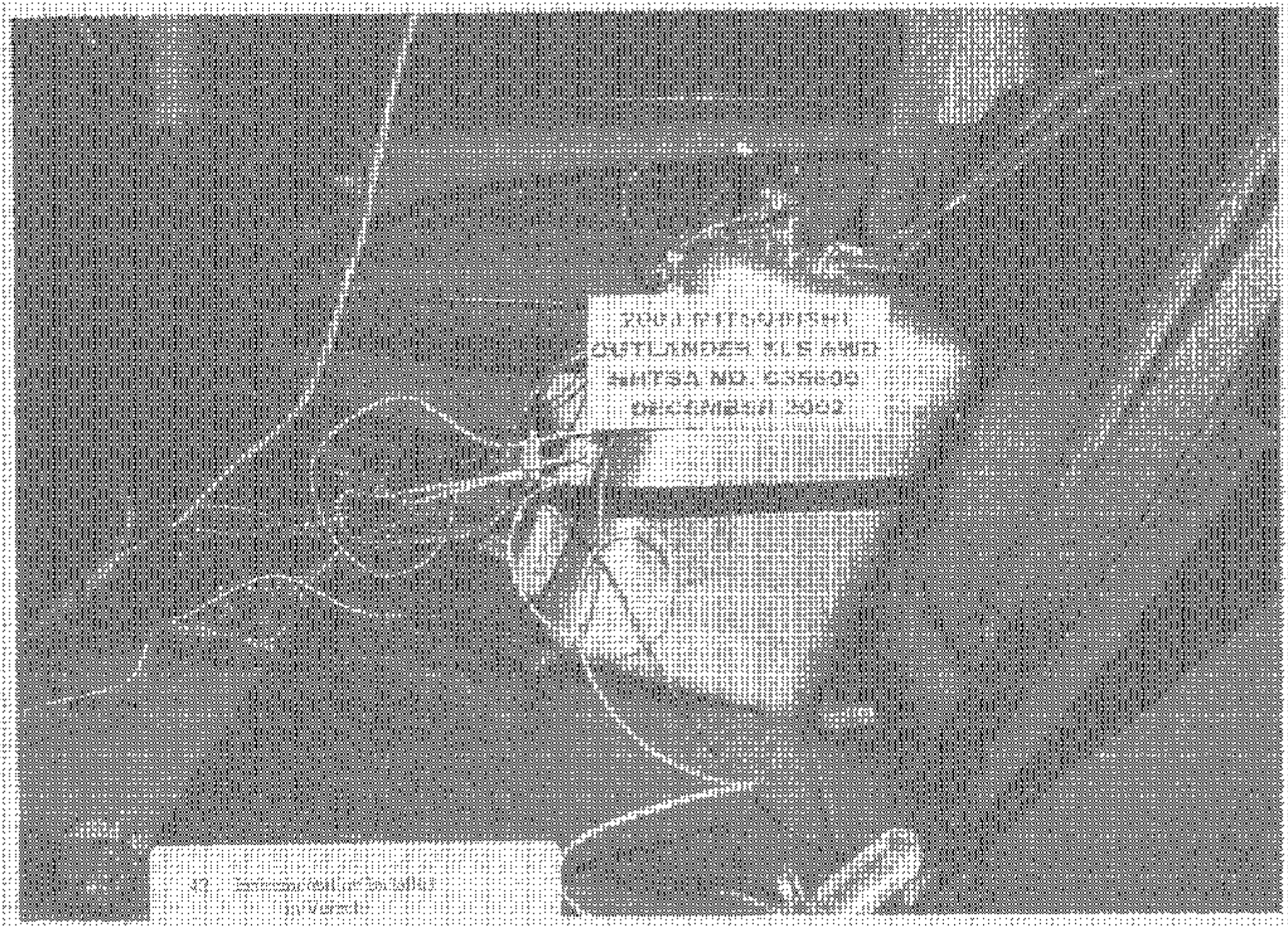
MR961383 F

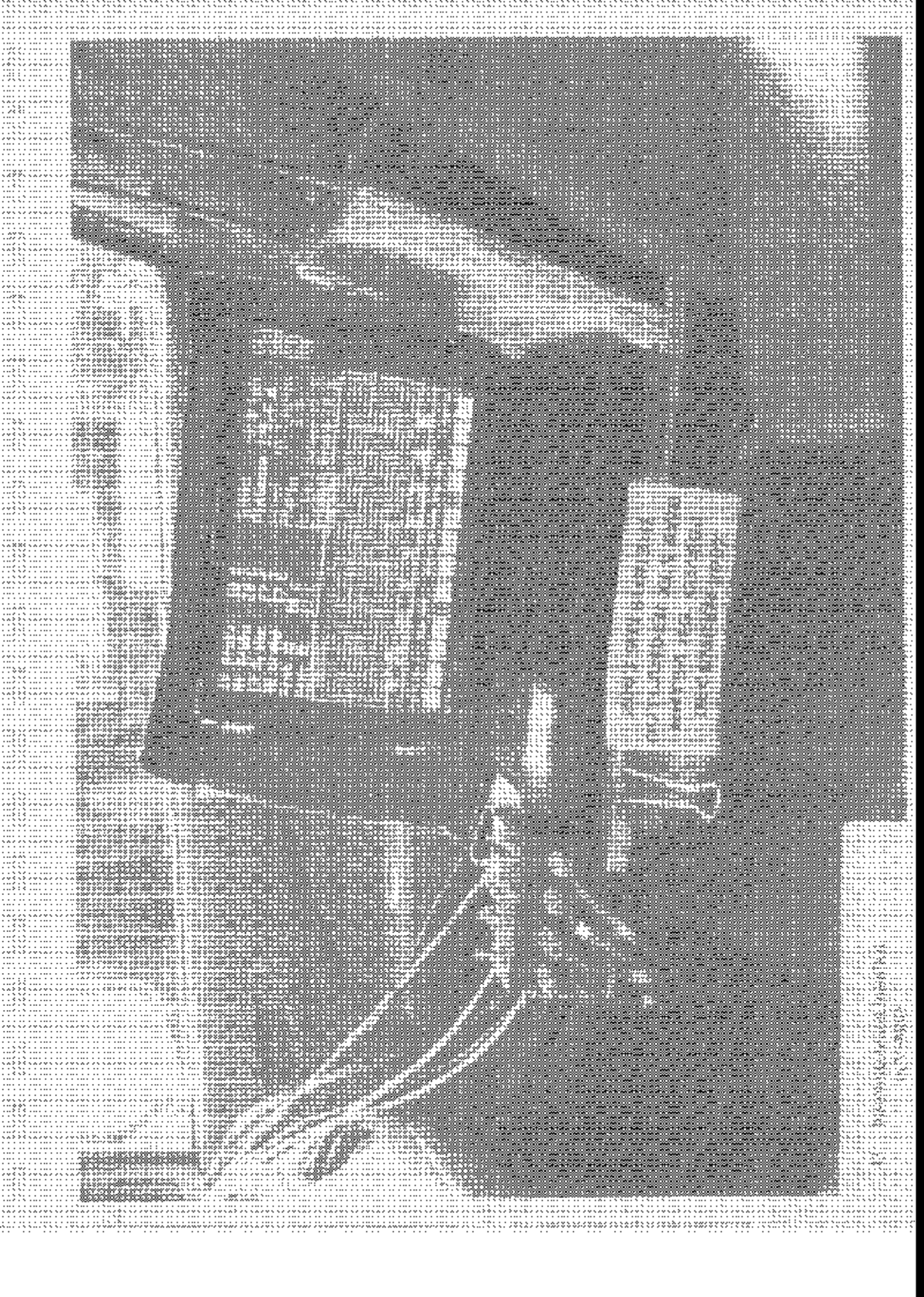
2003 MITSUBISHI OUTLANDER XLS AWD NHTSA NO. C35600 DECEMBER 2002

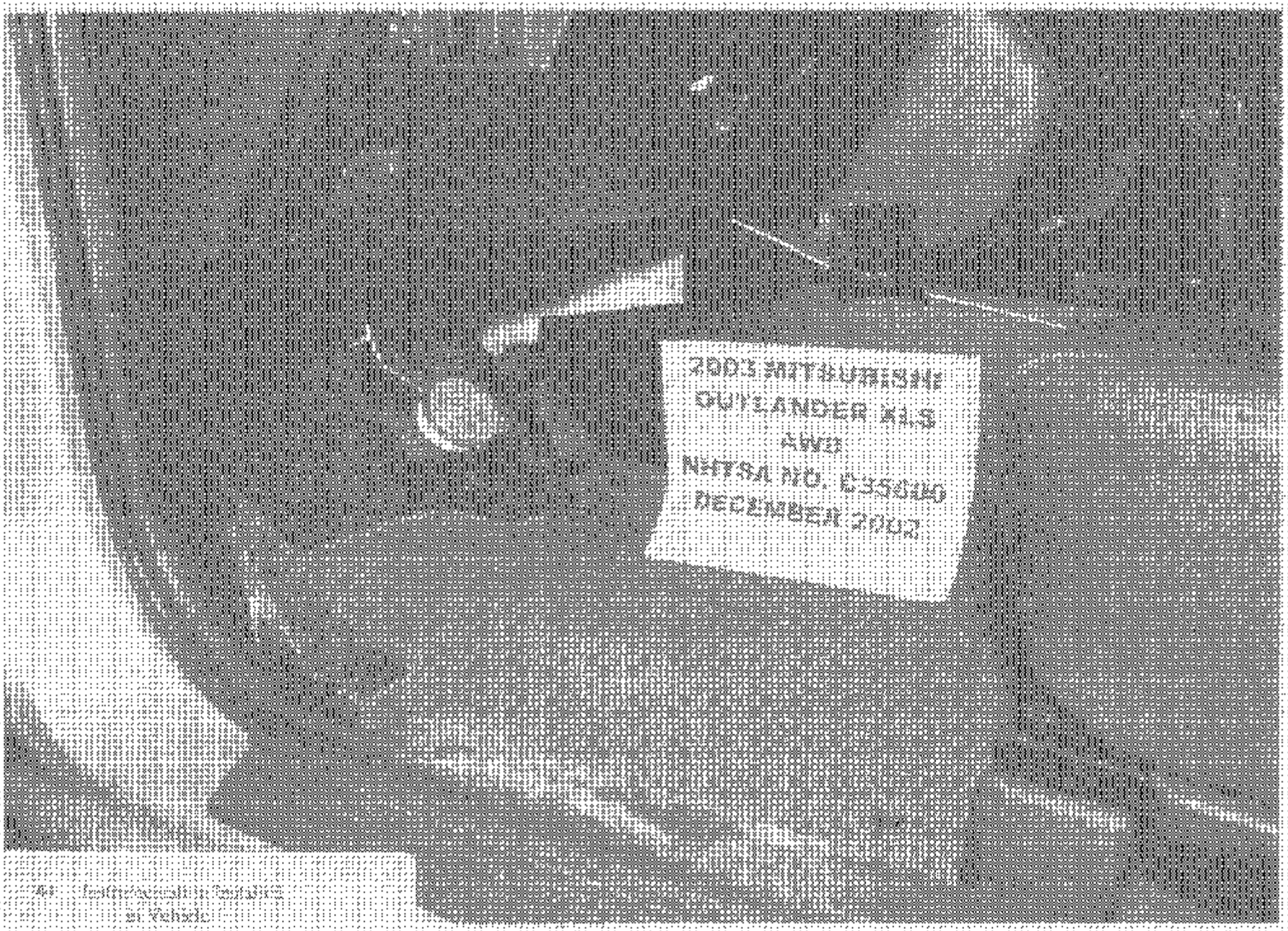


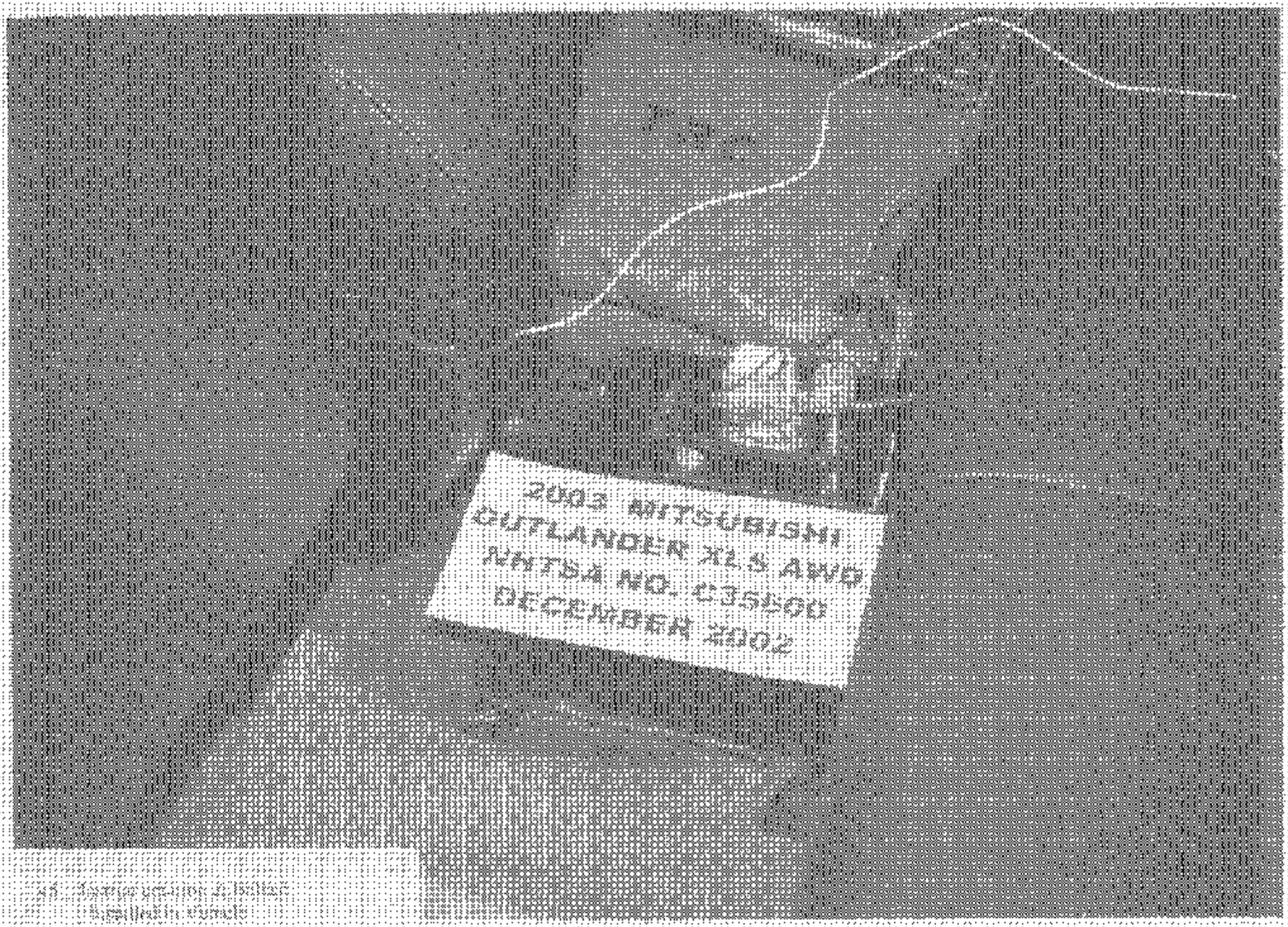

RIGHT
REAR



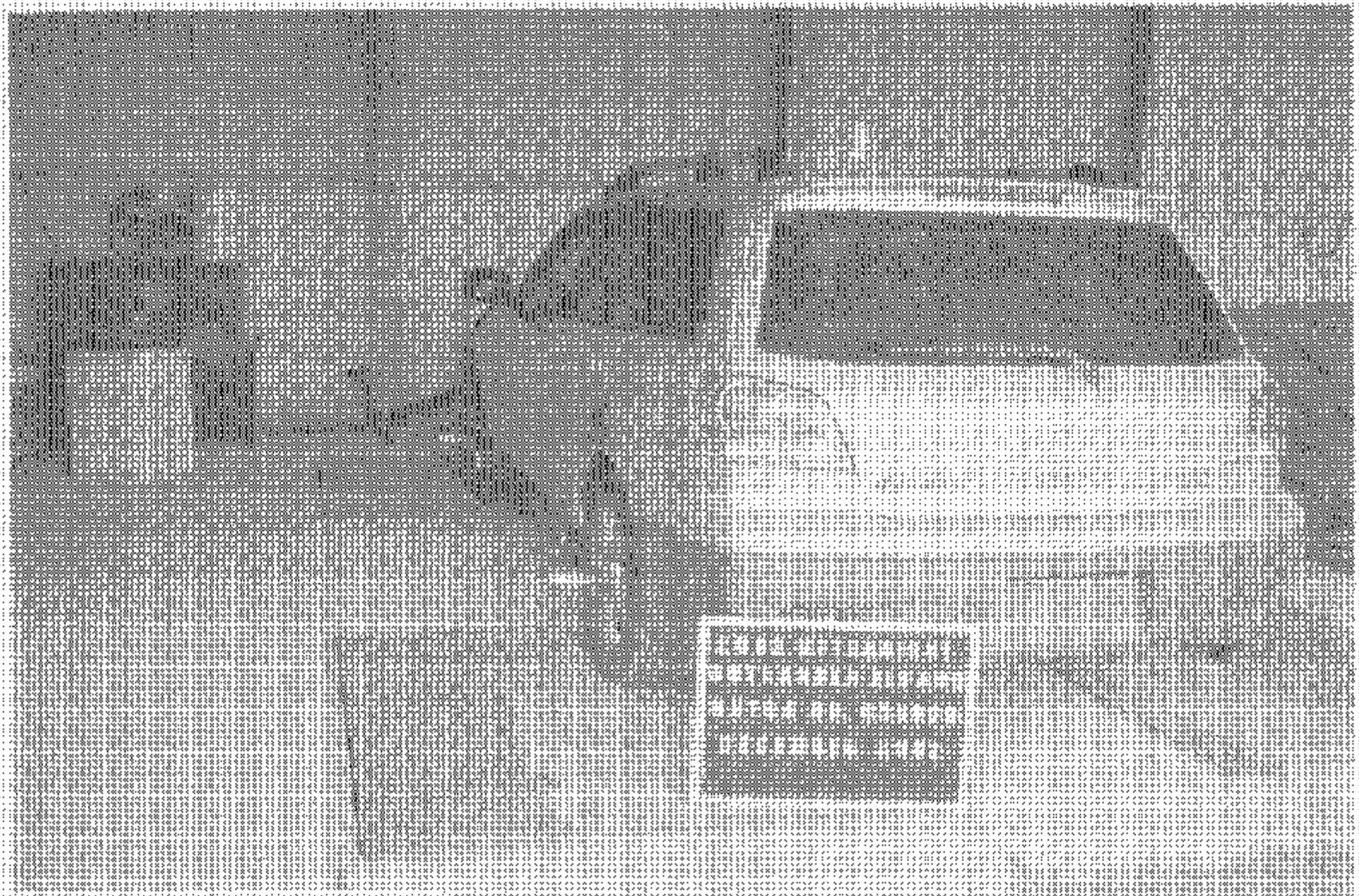


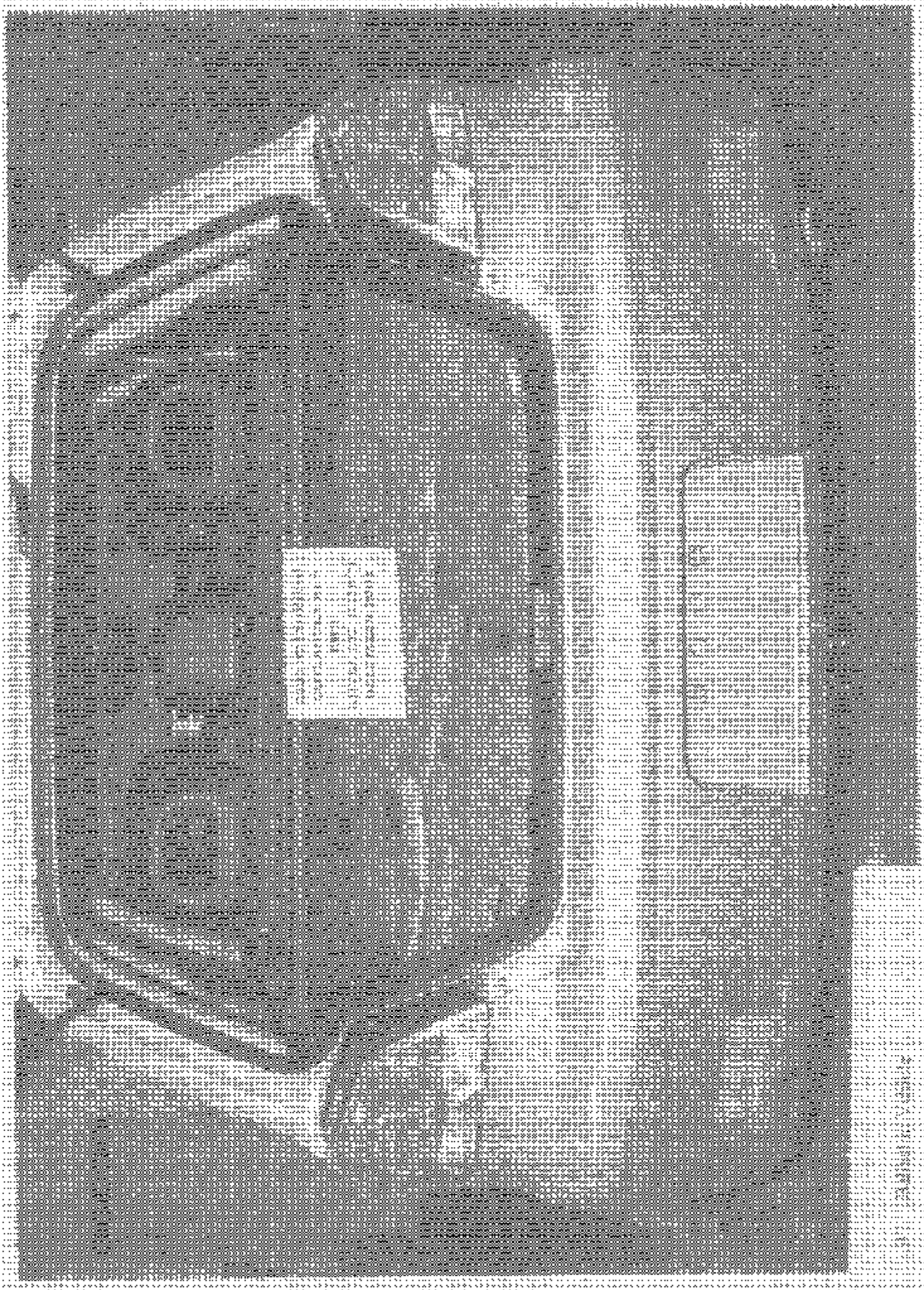


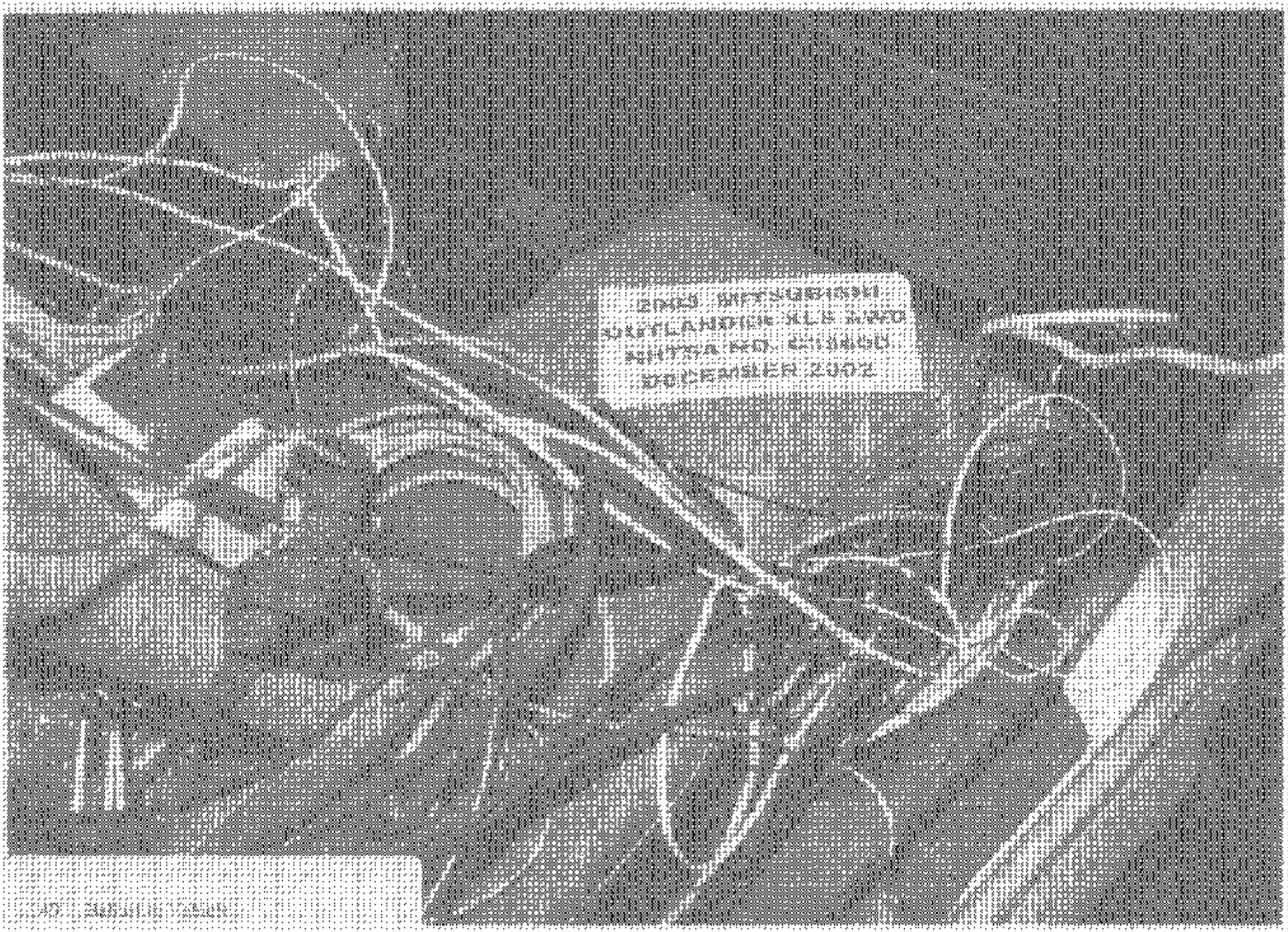

2003 MITSUBISHI
OUTLANDER XLS
AWD
NHTSA NO. E35040
DECEMBER 2002

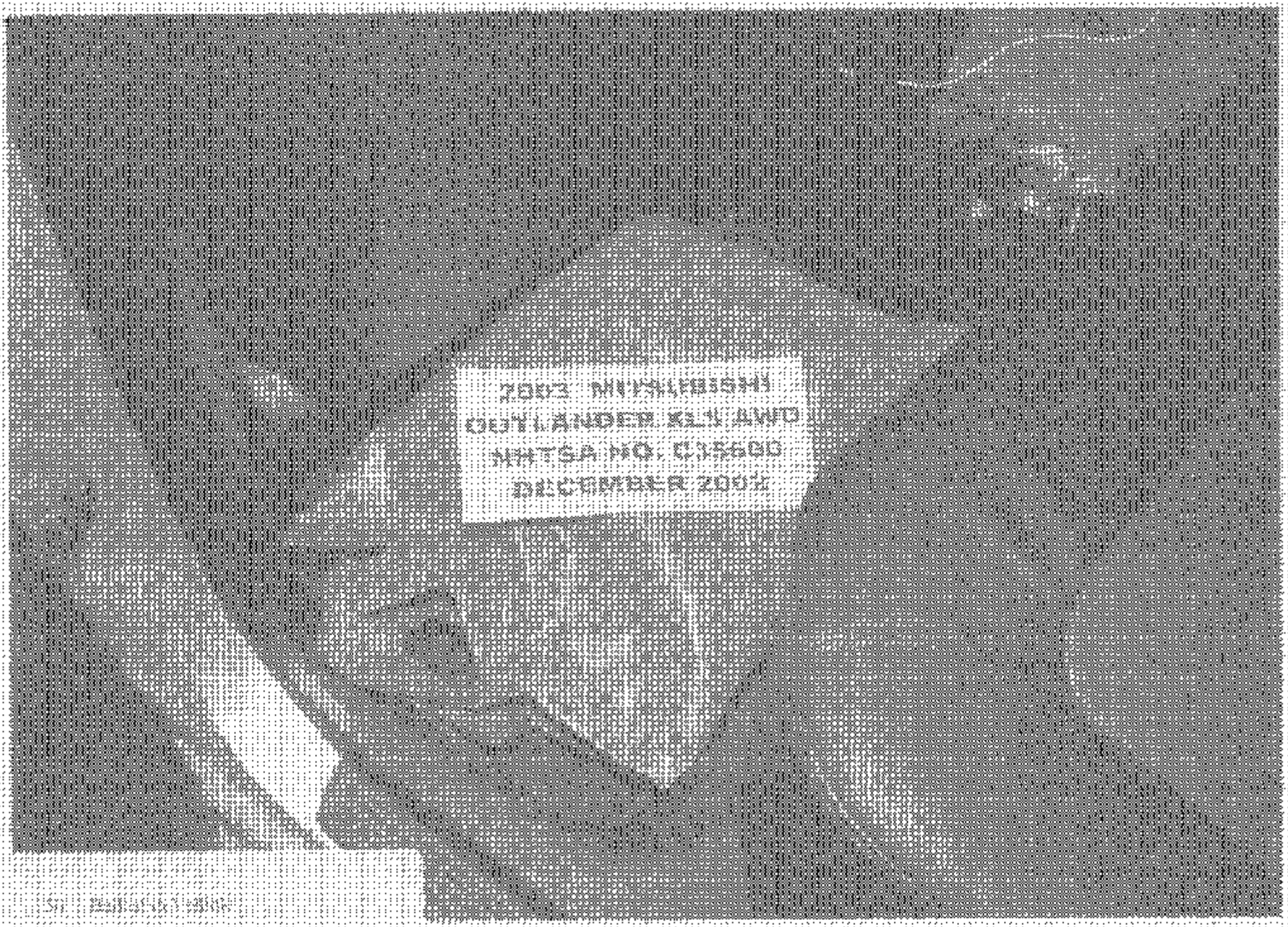


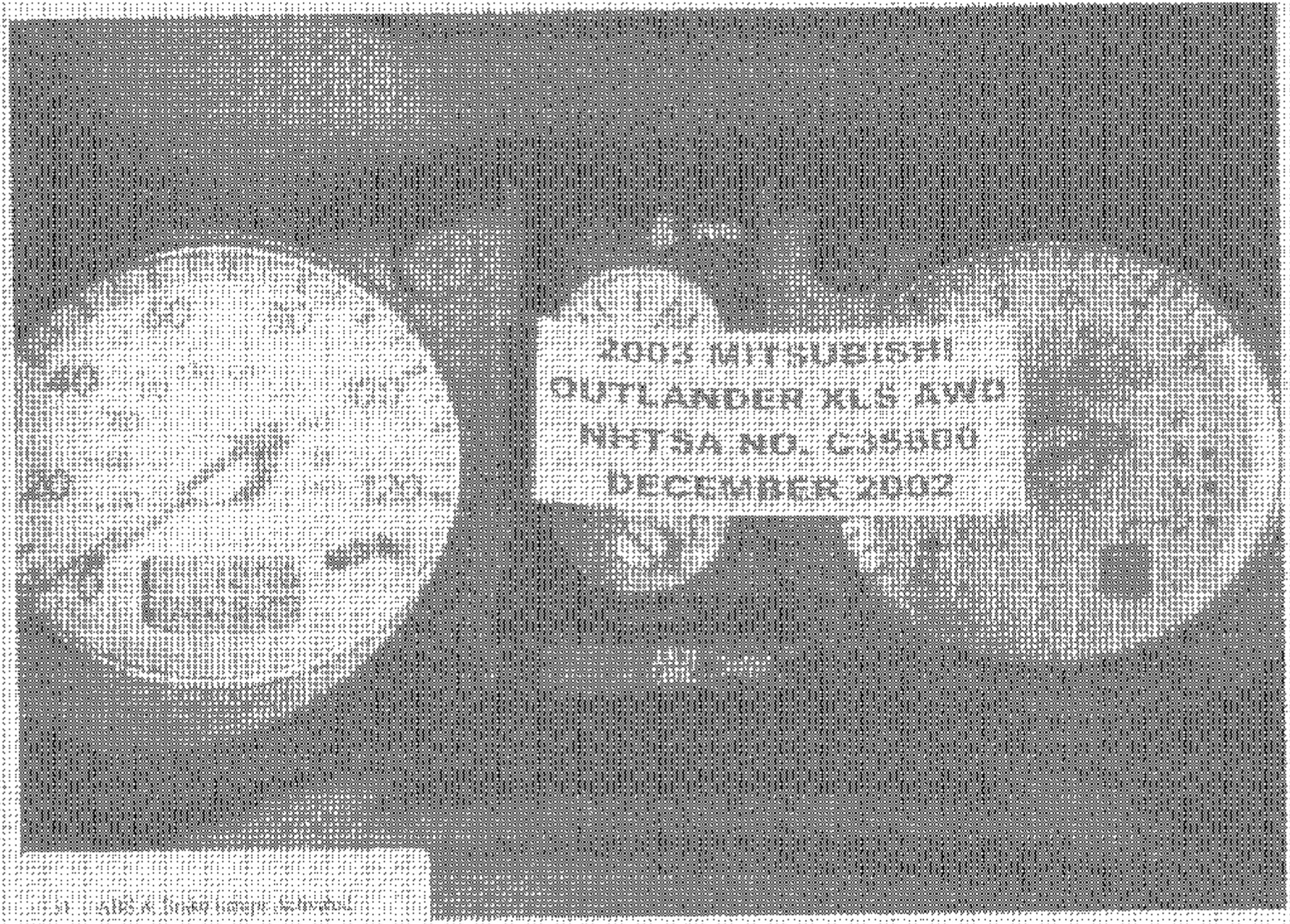
Air bag warning on sun visor
installed in vehicle

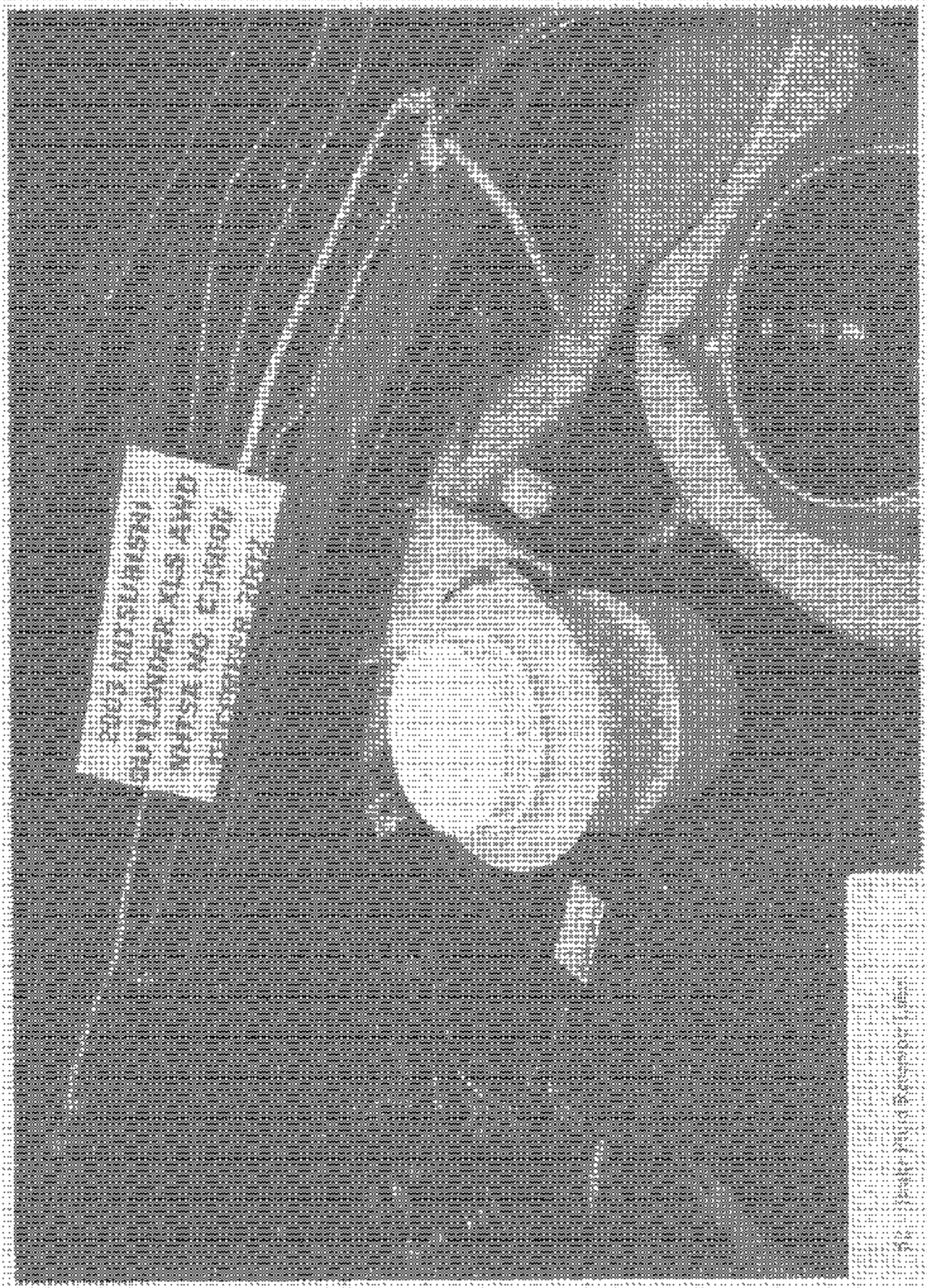





2MED MITSUBISHI
WHITLAKERS XLS 3.2D
WHITSA RD. CHICAGO
DECEMBER 2002


2003 MITSUBISHI
OUTLANDER XLS AWD
NHTSA NO. C15600
DECEMBER 2003


2005 MITSUBISHI
OUTLANDER XLS AWD
NHTSA NO. C35800
DECEMBER 2002



7.0 INSTRUMENT CALIBRATION (12 MONTH MAXIMUM INTERVAL)

VEHICLE:2003 Mitsubishi Outlander XLS AWD; NHTSA NO.: C35600; DATE: 12/09/02

INSTRUMENT	SERIAL NUMBER	CALIBRATION DATE	NEXT CALIBRATION
Data Acquisition System - Link DAS 2082	975015	09/13/02	09/13/03
Computer – Dell/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 – Fischer Scientific Accusplit	SW ST03	04/10/02	04/10/03
Tire Pressure Gauge – Ashcroft	AG-05	11/05/02	11/05/03
Frequency Counter – Hewlett Packard	M-1128A00670	09/19/02	09/19/03
Voltage Multimeter – Dana 4300	M-108639	11/16/02	11/16/03
Pedal Force Transducer – Sensor Devel.	169755	Each Test	Each Test
Assorted Pipe-Handle Steel Weights	Not Available	02/13/02	02/13/03
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)	A1055763	Each Test	Each Test
Fifth Wheel – ADAT DSR-06 Radar	140.0119	Each Test	Each Test
Wind Velocity/Direct. – Davis Model 6410	021023N09	10/24/02	10/24/03
Ambient Temp. Gage – Davis Model 6320	021024N11	10/29/02	10/29/03
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 Mettler/Toledo - Jag Extreme	5225831-5JC	07/03/02	01/03/03

QUALITY ASSURANCE _____

DAILY CALIBRATIONS (1 of 3)

Vehicle: 2003 Mitsubishi Outlander XLS AWD NHTSA No.: C35600

Deceleration Calibration Data for Unit 3352
Desired full scale value is: 9.81 m/s/s
Allowed deviation is: + or - 0.15 m/s/s

		"Date" "stp"	"Time" "stp"	Zero "Decel"	Cal "Decel"	
Accelerometer	Level to zero, then tilt to full scale	12/18/02	11:31:47	0.03	9.82	PRE-TEST CAL.
		12/20/02	10:28:41	0.01	9.81	
		12/23/02	8:42:44	0.10	9.69	
		12/23/02	15:29:45	-0.02	9.83	
		12/24/02	11:18:30	-0.02	9.83	
		12/24/02	15:04:44	-0.01	9.85	
		1/9/03	8:10:20	0.00	9.80	
		1/9/03	13:29:25	-0.06	9.95	

Pre-Test Linearity Check 12/18/02

Actual (m/s/s)	Rec. (m/s/s)
0.00	0.00
3.00	3.00
6.10	6.10
9.80	9.80

Post-Test Linearity Check 01/09/03

Actual (m/s/s)	Rec. (m/s/s)
0.00	0.00
3.00	3.00
6.10	6.10
9.80	9.80

Distance Calibration for 3352

Desired value is: 1000 m
Allowed deviation is: 3 m

		"Date" "stp"	"Time" "stp"	Distance for 1000 meters	
Light beam distance sensor	Drive from 0 to 100 to 0 km/h on a measured kilometer	12/20/02	8:59:20	999.9	PRE-TEST CAL.
		12/23/02	9:01:18	1001.9	
		12/23/02	15:36:21	996.1	
		12/24/02	11:25:03	997.1	
		12/24/02	15:11:38	1000.0	
		1/9/03	8:07:20	1000.9	
		1/9/03	13:33:56	999.8	POST-TEST CAL.

DAILY CALIBRATIONS CONTINUED (2 of 3)

VEHICLE: 2003 Mitsubishi Outlander XLS AWD NHTSA No.: C35600

Wheel Tachometer Calibrations for Unit 3352
Wheel tachometer calibrations: all wheel speeds should be 20 km/h

		"Date"	"Time"	Zero	@15kmh	Zero	@15kmh	Zero	@15kmh	Zero	@15kmh	
		stp	stp	LF	LF	RF	RF	LR	LR	RR	RR	
Wheel lock detector	While at a standstill, check zeros. Drive vehicle at approx. 15 km/h and engage zero speed switch for each wheel	12/23/02	8:55:59	0.0	17.4	0.0	15.6	0.0	19.0	0.0	17.2	PRE-TEST CAL.
		12/23/02	15:32:43	0.0	16.2	0.0	16.0	0.0	17.3	0.0	16.4	
		12/24/02	11:23:53	0.0	15.4	0.0	15.4	0.0	17.2	0.0	16.1	
		12/24/02	15:07:37	0.0	15.0	0.0	15.2	0.0	34.9	0.0	16.7	
		1/9/03	8:03:05	0.0	14.8	0.0	14.8	0.0	16.2	0.0	17.2	
		1/9/03	13:21:56	0.0	15.6	0.0	15.5	0.0	17.3	0.0	16.7	

When driven over 15 km/hr and the wheel tach generators are shunted to zero volts, do all four wheel lock indicators alight?: __X__ Yes, _____ No.

Pedal Force Meter Calibration for Unit 3352
Target shunt calibration is 500 N.

Desired recorded value is: 389 N
Allowed deviation is: 7 N

		"Date"	"Time"	Zero	Cal Val	
		stp	stp	Force	Force N	
Service brk. pedal effort	Driver engages a fixed shunt cal switch.	12/18/02	11:37:09	-0.6	498.6	PRE-TEST CAL.
		12/20/02	10:30:07	-0.6	389.6	
		12/23/02	8:41:26	0.0	389.8	
		12/23/02	15:29:07	-0.6	389.5	
		12/24/02	11:17:34	-0.1	389.8	
		12/24/02	15:06:17	-0.7	389.9	
		1/9/03	7:59:23	-0.5	390.0	
		1/9/03	13:28:06	-0.4	389.7	
		1/10/03	13:33:16	-0.3	499.4	POST-TEST CAL.

Pre-Test Linearity Check - 12/18/02

Actual Force (N)	Recorded Force (N)
0	0
222	222
445	444
498	498

Post-Test Linearity Check - 01/09/03

Actual Force (N)	Recrdd Frc(N)
0	2
222	223
445	445
498	498

DAILY CALIBRATIONS CONTINUED (3 of 3)

VEHICLE: 2003 Mitsubishi Outlander XLS AWD NHTSA No. C35600

Dynamic Speed Calibration for Unit 3352

Desired speed value is: 100 km/h
Allowed deviation is: 1.5 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.	12/20/02	9:05:26	100.1	35.93	PRE-TEST CAL.
		12/23/02	8:59:47	100.4	36.06	
		12/23/02	15:34:49	100.3	36.00	
		12/24/02	11:22:07	100.2	36.03	
		12/24/02	15:10:03	100.1	36.12	
		1/9/03	8:05:10	100.1	36.25	
		1/9/03	13:31:34	100.0	36.12	POST-TEST CAL.

APPENDIX A

Copy of Manufacturer's Sticker

MITSUBISHI
MOTOR SALES OF AMERICA, Inc.

CONSUMER INFORMATION

...bing, license and title fees, applicable federal, state and local ...s and dealer and distributor installed options and accessories ...not included in the manufacturer's suggested retail price. This ...t has been applied to this vehicle pursuant to federal law and ...not be removed or altered prior to delivery to ultimate purchaser.

PARTS CONTENT INFORMATION

...r vehicles in this carline:
...S./Canadian Parts Content: 2%
...ajor Sources of Foreign Parts Content:
JAPAN 98%

For this vehicle:
Final Assembly Point: KURASHIKI, JAPAN
Country of Origin:
Engine: JAPAN
Transmission: JAPAN

...ote: Parts content does not include final assembly, distribution, or other non-parts cost.

...Compare this vehicle to others in the FREE FUEL ECONOMY GUIDE available at the dealer.

CITY MPG	HIGHWAY MPG
20	25

Actual mileage will vary with options, driving conditions, driving habits and vehicle condition. Results reported to EPA indicated that the majority of vehicles with these estimates will achieve between

17 and 23 mpg in the city, and between 21 and 29 mpg on the highway

Fuel Economy Information

2003 MITSUBISHI OUTLANDER XLS AWD SUV
2.4L SOHC 16V 4-CYL W/MPI FUEL INJECTION
"SPORTRONIC"™ 4-SPD AUTO O/D TRANS
50 STATE EMISSION CONTROL SYSTEM

Estimated Annual Fuel Cost
$1024

For Comparison Shopping, all vehicles classified as SPECIAL PURPOSE have been issued mileage ratings ranging from

18 to 25 mpg city and
13 to 21 mpg highway.

See www.fueleconomy.gov

MITSUBISHI "wake up and drive"™

Year/Model: 2003 OUTLANDER XLS AWD
4-DOOR SPORT UTILITY VEHICLE
Color: MUNICH SILVER METALLIC

2.4L SOHC 16V 4-CYL W/MPI FUEL INJ
"SPORTRONIC"™ 4-SPD AUTO O/D TRANS
CHARCOAL LEATHER INTERIOR

STANDARD EQUIPMENT & INSTALLED OPTIONS

MANUFACTURER'S SUGGESTED RETAIL PRICE $ 20,790.00

SAFETY FEATURES	
♦ DUAL FRONT AIR BAGS	INCLUDED
♦ SIDE IMPACT DOOR BEAMS	INCLUDED
♦ CHILD SAFETY LOCKS	INCLUDED
♦ LOWER & UPPER ANCHORS FOR CHILD SEATS	INCLUDED
♦ 3-POINT SAFETY BELTS & SEE-THRU HEADRESTS	INCLUDED
PERFORMANCE/HANDLING	
♦ POWER ASSISTED STEERING	INCLUDED
♦ FULL-TIME ALL-WHEEL DRIVE (AWD)	INCLUDED
♦ FRONT & REAR STABILIZER BARS	INCLUDED
♦ POWER ASSISTED VENTED FRONT DISC/ REAR DRUM BRAKES	INCLUDED
♦ 4-WHEEL INDEPENDENT SUSPENSION	INCLUDED
DURABILITY/RELIABILITY	
♦ STAINLESS STEEL EXHAUST SYSTEM	INCLUDED
♦ UNIBODY CONSTRUCTION	INCLUDED
♦ MAINTENANCE FREE BATTERY	INCLUDED
COMFORT/CONVENIENCE	
♦ AIR CONDITIONING	INCLUDED
♦ 140W MITSUBISHI AM/FM STEREO CD PLAYER W/6 SPEAKERS	INCLUDED
♦ POWER DOOR LOCKS (INCL LIFTGATE)	INCLUDED
♦ POWER WINDOWS & SIDEVIEW MIRRORS	INCLUDED
♦ REMOTE KEYLESS ENTRY	INCLUDED
♦ CRUISE CONTROL	INCLUDED
♦ WHITE-FACED ANALOG INSTRUMENT CLUSTER AND ANALOG CLOCK	INCLUDED
♦ CENTER CONSOLE W/DUAL STORAGE	INCLUDED
♦ VAR INTERMITTENT WIPERS/WASHERS	INCLUDED
♦ REAR WIPER/DEFROSTER/WASHER	INCLUDED
♦ PREMIUM SEATING FABRIC	INCLUDED
♦ 10-WAY ADJUSTABLE DRIVER SEAT INCLUDES LUMBAR ADJUSTMENT	INCLUDED
♦ 60/40 SPLIT-RECLINE REAR SEATBACK	INCLUDED
♦ REAR CENTER ARMREST W/CUPHOLDERS	INCLUDED
♦ IN-FLOOR CARGO AREA STORAGE BIN	INCLUDED
♦ FULL CABIN LIGHTING + DIMMING	INCLUDED
♦ HEIGHT ADJUSTABLE STEERING COLUMN	INCLUDED
♦ DUAL VISOR VANITY MIRRORS	INCLUDED
♦ (2) 12V ACCESSORY OUTLETS	INCLUDED
♦ REAR CARGO TIE-DOWN HOOKS	INCLUDED
♦ STOWABLE CARGO COVER	INCLUDED
EXTERIOR FEATURES	
♦ 225/60 R16 MUD/SNOW TIRES	INCLUDED
♦ 16" ALLOY WHEELS	INCLUDED
♦ REAR PRIVACY GLASS	INCLUDED
♦ COLOR-KEYED SIDEVIEW MIRRORS	INCLUDED
♦ ROOF RAILS	INCLUDED
♦ AUTO-OFF HEADLAMPS	INCLUDED
♦ SIDE TURN INDICATOR LIGHTS	INCLUDED
♦ INTEGRATED FOG LIGHTS	INCLUDED
♦ WINDSHIELD SHADE BAND	INCLUDED
♦ CLEAR TAIL LAMP LENSES	INCLUDED
Options	
☒ ANTI-LOCK BRAKING SYSTEM	500.00
☒ SUN & SOUND PACKAGE	1,160.00
– 210W MITSUBISHI/INFINITY® AM/FM/CD AUDIO SYSTEM WITH 8 SPEAKERS	
– POWER SUNROOF	
☒ LUXURY PACKAGE	1,450.00
– AUTO-DIMMING REARVIEW MIRROR W/COMPASS AND OUTSIDE TEMP. DISPLAY	
– LEATHER SEATING SURFACES	
– DUAL FRONT SEAT SIDE AIRBAGS	
– HEATED SIDEVIEW MIRRORS	
– HEATED FRONT SEATS	

Sub-Total	$ 23,890.00
Destination/Handling	$ 580.00
TOTAL	**$ 24,470.00**

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 C25600.

For Data Sheets 20 and 21 and, due to the difficulty of accessing the brake lines, the test sequence of these two tests was reversed. Data Sheet 21 was tested immediately prior to Data Sheet 20.

Many of the data sheets state the test vehicle's model designation as an "Outlander XLS". For that field, the electronic data sheets have a limited number of characters available. The test vehicle's full designation is "Outlander XLS AWD."

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.

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 34-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

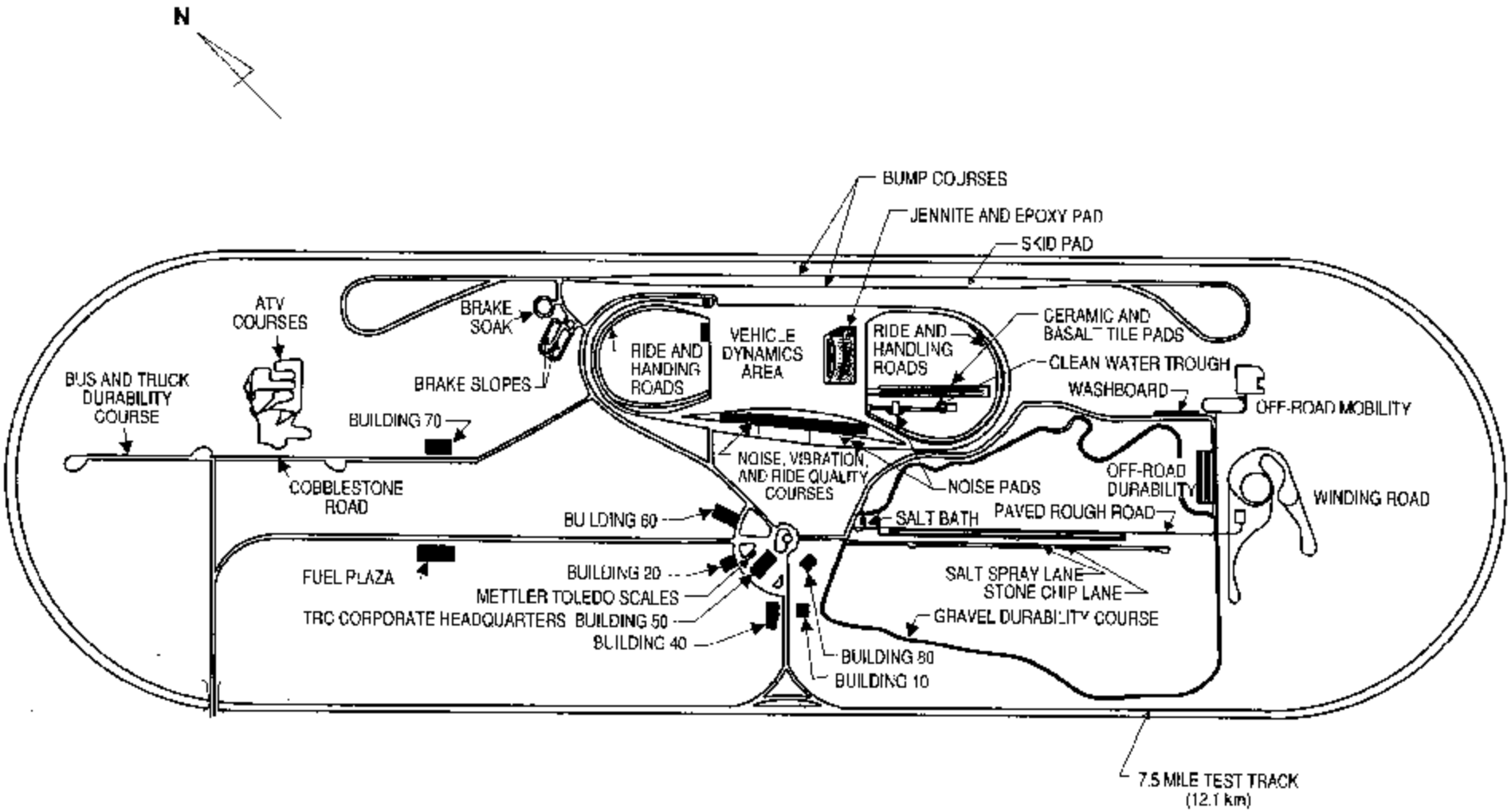
The Skid Pad is a test facility which is utilized primarily for the evaluation of tire and brake systems.

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.



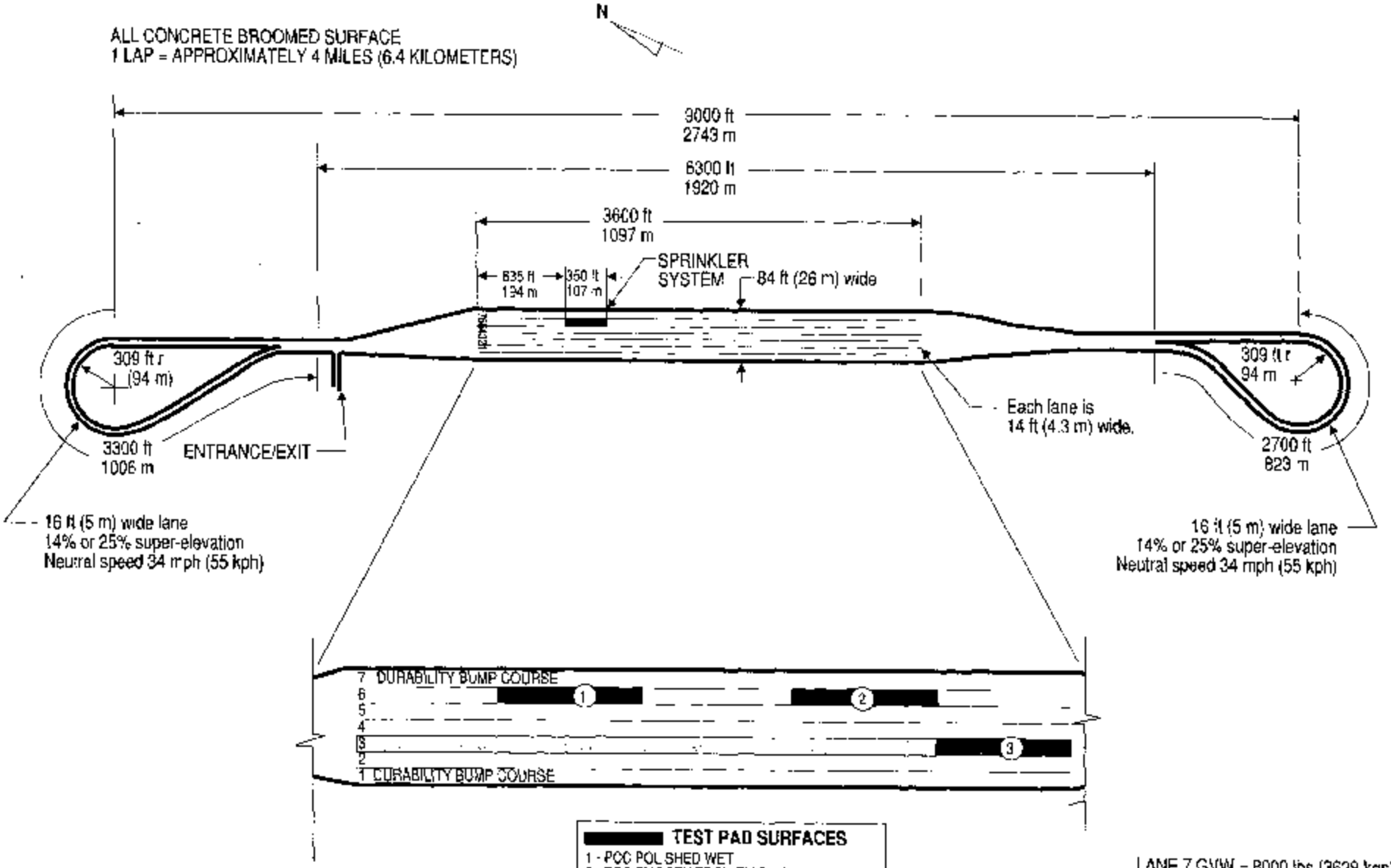
NOT TO SCALE

TEST FACILITY DETAIL

TRC® TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319 0367

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 (36,298 kgs)

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

Not to scale
All dimensions are approximate

SKID PAD

TRC®
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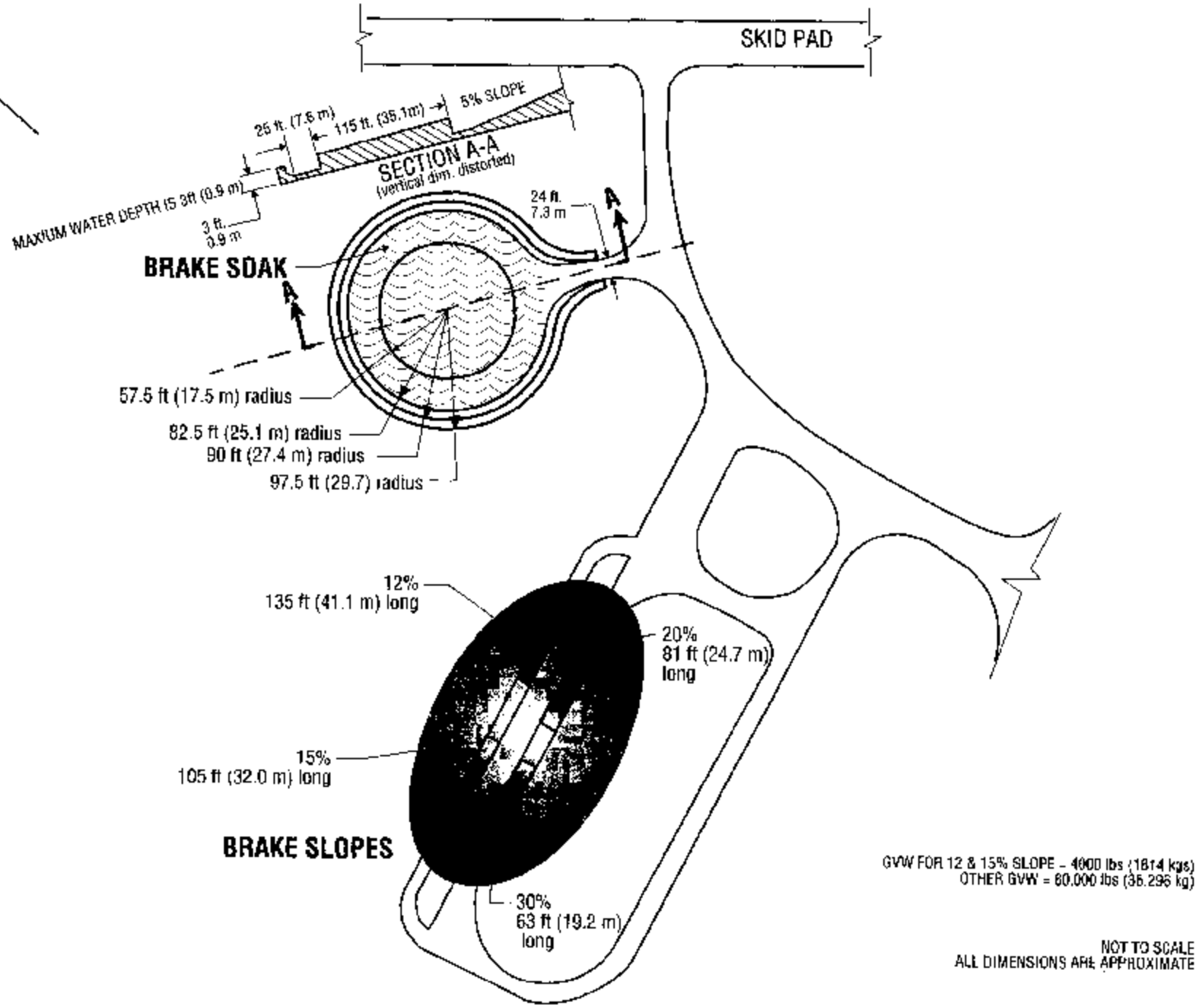
EAST LIBERTY, OHIO 43319-0367

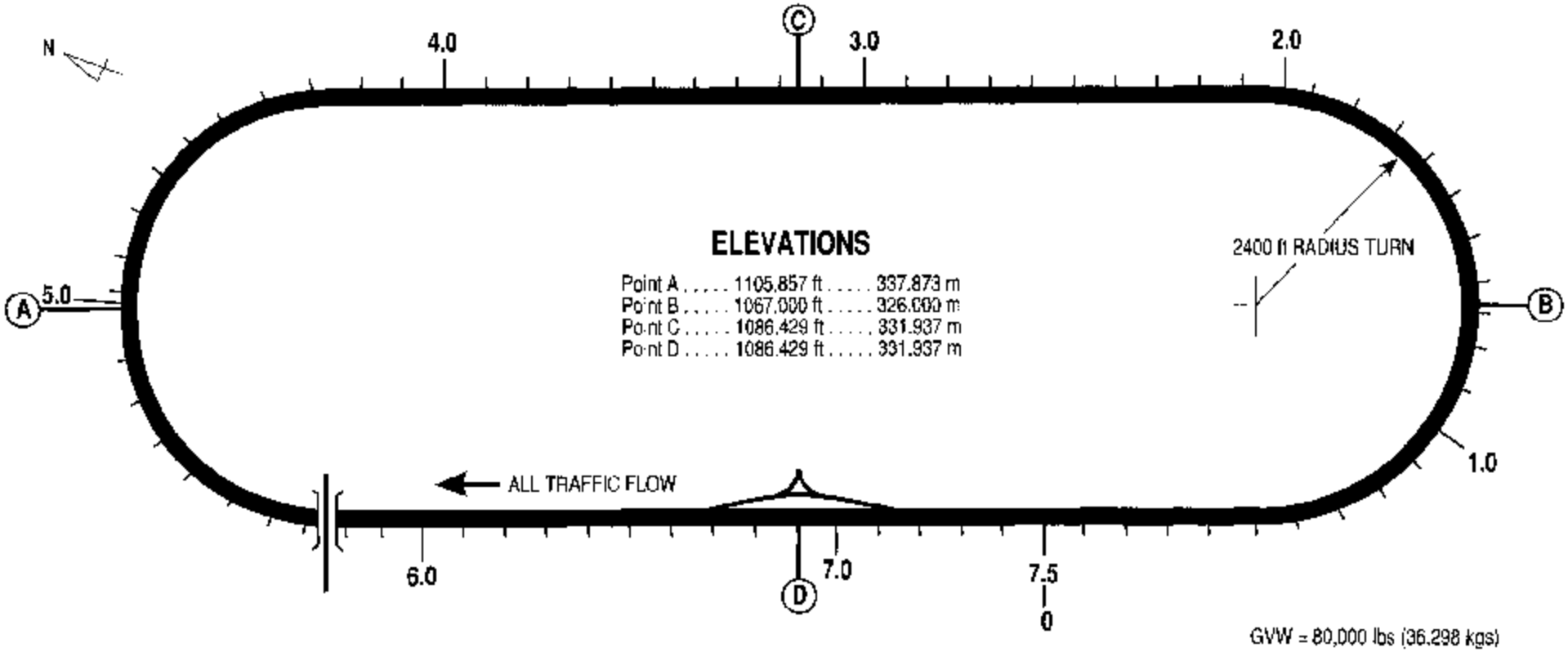
F-13 0699



BRAKE SOAK and BRAKE SLOPES

TRC® TRANSPORTATION RESEARCH CENTER INC.
EAST LIBERTY, OHIO 43319-0387

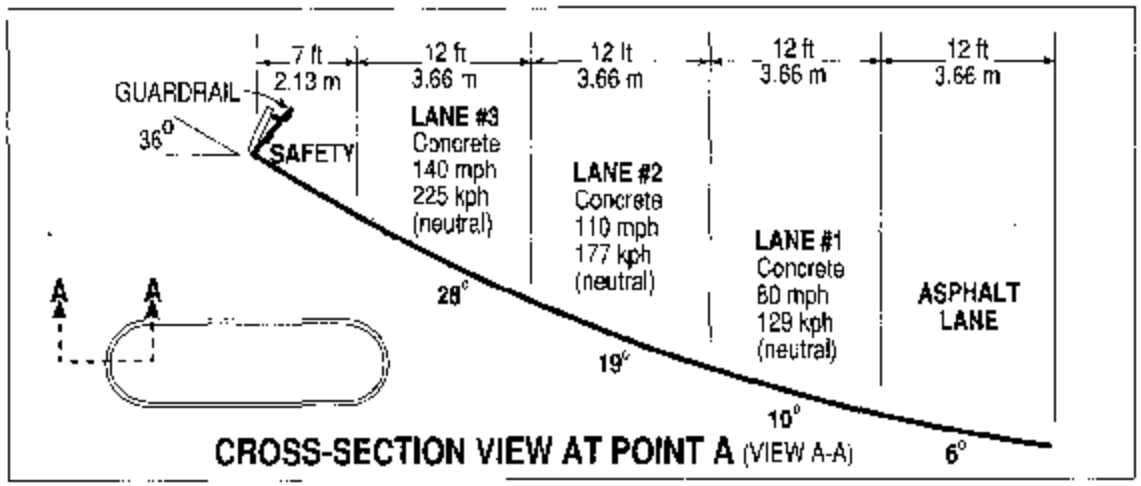
F-3 0500



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

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F10468

APPENDIX D

Notice of Possible Non-Compliance

This vehicle (C35600) met the requirements.