FINAL REPORT NUMBER 201U-MGA-04-15

SAFETY PRE-STANDARD TESTING FOR FMVSS 201U
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection

DAIMLERCHRYSLER
1996 DODGE GRAND CARAVAN
NHTSA No. PT0301

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083



Test Dates: August 9-11, 2004
Report Date: August 12, 2004

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF PLANNING, EVALUATION AND BUDGET
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16. Abstract A pre-standard test series was conducted on the subject 1996 Dodge Grand Caravan, NHTSA No. PT0301, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U pre-standard compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on August 9-11, 2004.			
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TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE NO.
1.0	**PURPOSE OF TEST**	1-1
2.0	**TEST DATA SUMMARY**	2-1
3.0	**TEST DATA** (Including Acceleration and Velocity Plots)	3-1
4.0	**TEST EQUIPMENT LIST AND CALIBRATION INFORMATION** 4.1 Pre-Test Calibration FMH #36 4.2 Post-Test Calibration FMH #36 4.3 Pre-Test Calibration FMH #37 4.4 Post-Test Calibration FMH #37 4.5 Pre-Test Calibration FMH #38 4.6 Post-Test Calibration FMH #38	4-1
5.0	**PHOTOGRAPHS**	5-1
APPENDIX A	TEMPERATURE TRACE	A-1
APPENDIX B	CALIBRATION INFORMATION	B-1

LIST OF TABLES

TABLE	DESCRIPTION	PAGE NO
2-1	SUMMARY TABLE OF TEST RESULTS	2-2
2-2	GENERAL TEST AND VEHICLE PARAMETER DATA	2-4
2-3	HORIZONTAL IMPACT ANGLE RANGE FOR A- AND B-PILLARS	2-8
2-4	VERTICAL IMPACT ANGLE RANGES	2-9
2-5	TARGET MEASUREMENTS	2-11
2-6	SUMMARY OF TARGETING RESULTS	2-14
4-1	LIST OF ITEMS USED	4-1
4-2	FMH CALIBRATION SUMMARY	4-2

1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact pre-standard test series was to measure the performance of the subject vehicle, a 1996 Dodge Grand Caravan, for FMVSS 201U, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on August 9-11, 2004 on a 1996 Dodge Grand Caravan, manufactured by DaimlerChrysler Corporation.

All tests were conducted in accordance with the U. S. Department of Transportation, National Highway Traffic Safety Administration's Laboratory Test Procedure TP-201U-01 dated April 3, 1998 and the corresponding MGA Research Corporation's FMVSS 201U procedure number MGATP201U_FRAME#2 dated March 20, 2003.

All tests were conducted at MGA Research Corporation in Troy, Michigan and were performed by MGA engineers and technicians. The FMVSS 201U impactor test machine was used to conduct the testing. Target locations were determined by using a Coordinate Measurement Machine in conjunction with the MGA EZ-Target™ program and MGA procedure MGATP201U_Test Series dated March 20, 2003.

2.0 TEST DATA SUMMARY

The 1996 Dodge Grand Caravan was equipped with A, B, C, and Rear-Pillars, an adjustable seat belt anchorage on each B and C-Pillar, a fixed seat belt anchorage on each side rail between the C and R-Pillars, a coat hook located on each side rail between the B and C-Pillars and, between the C and Rear-Pillars, and three overhead light consoles.

Upon completion of targeting the test vehicle, ten (10) targets were chosen to be impacted based upon engineering judgment and discussion with the COTR. Targets were chosen which appeared most likely to give high HIC(d) values. The ten (10) targets chosen were:

AP1	BP2	SR1	UR4
AP2	BP3	SD	
AP3	OP2	UR2	

TABLE 2-1

SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Dodge Grand Caravan

VEH. NHTSA NO.: PT0301 VIN: 2B4GP2434TR COLOR: Green

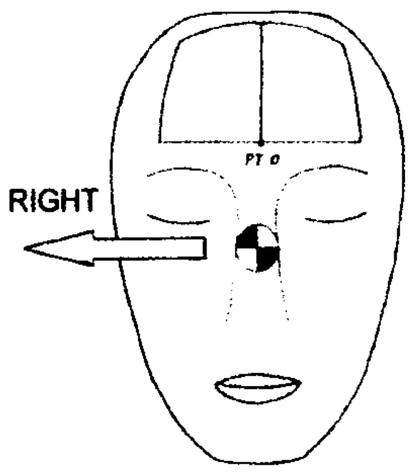
VEH. BUILD DATE: Not Available TEST DATES: August 9-11, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Right	115	50	23.9	1749	2098	6	0
AP2	Left	205	46	23.9	1417	1658	12	0
AP3	Right	157	42	23.9	1597	1896	4	4 Right
BP2	Right	90	13	23.7	811	854	25	0
BP3	Left	270	5	23.5	707	716	17	8 Left
OP2	Left	270	3	24.0	716	729	25	30 Left
SR1	Left	270	28	23.9	1466	1722	33	7 Right
SD	Right	90	50	23.0	694	700	13	0
UR2	Left	270	50	24.1	791	828	28	3 Right
UR4	Right	90	49	23.8	1335	1549	38	0

Above and left/right refers to the position relative to reference pt. 0 where the target made contact with the Free Motion Headform. See the diagram below for details.



POST TEST COMMENTS:

The following description lists any post-test damage or other test observations for each target.

AP1 Right: Crack in the pillar trim.

BP2 Right: D-ring cover fractured.

OP2 Left: Cracked the plastic trim on the pillar.

No damage was observed for any other targets.

REMARKS:

The targets listed were impacted in the following order:

Left: AP2, BP3, SR1, UR2, OP2

Right: AP3, AP1, BP2, UR4, SD

The 150 mm rule was observed for targets horizontal to each other and the 200 mm rule was observed for vertical components.

RECORDED BY: David G. Gotwals DATE: August 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Dodge Grand Caravan

VEH. NHTSA NO.: PT0301 VIN: 2B4GP2434TR COLOR: Green

VEH. BUILD DATE: Not Available TEST DATES: August 9-11, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

INTERIOR TRIM INFORMATION: A, B, C, and Rear-Pillars, an adjustable seat belt anchorage on each B and C-Pillar, a fixed seat belt anchorage on each side rail between the C and R-Pillars, a coat hook located on each side rail between the B and C-Pillars and, between the C and Rear-Pillars, and three overhead light consoles.

SUNROOF INFORMATION:

Installed:	___Yes	_X_ No
Operation:	___Electric	_____Manual

ROLL-BAR INFORMATION:

Installed:	_____Yes	_X_ No
Padded:	_____Yes	_X_ No
Braces:	_____Yes	_X_ No

GENERAL INFORMATION:

Date Received: 8/6/04; Odometer Reading: 99,730 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL (some information not available):

Vehicle Manufactured By: DaimlerChrysler Corporation

Date of Manufacture: June, 1997; VIN: 2B4GP2434TR

GVWR: -- lbs; GAWR FRONT: -- lbs.

GAWR REAR: -- lbs.

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 35 psi REAR: 35 psi

Recommended Tire Size: P205/75R14

Recommended Cold Tire Pressure:

FRONT: 35 psi REAR: 35 psi

Size of Tire on Test Vehicle: P205/75R14

Type of Spare Tire: T125/70D14; Space Saver: X; Standard: ____

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench _____; Bucket X; Split Bench ___

Number of Occupants: Front 2; Rear 5; TOTAL 7

VEHICLE CAPACITY WEIGHT (VCW) = 522 kg

No. of Occupants x 68 kg = 476 kg

Rated Cargo/Luggage Weight (RCLW) = 46 kg (difference)

WEIGHT OF TEST VEHICLE AS DELIVERED AT LABORATORY: (with maximum fluids)

Right Front =	488.0 kg	Right Rear =	357.0 kg
Left Front =	499.0 kg	Left Rear =	361.0 kg
TOTAL FRONT =	987.0 kg	TOTAL REAR =	718.0 kg
% Total Weight =	57.9 %	% Total Weight =	42.1 %

TOTAL DELIVERED WEIGHT = 1705.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1705.0 kg

Rated Cargo/Luggage Wt. = 46.0 kg

TARGET TEST WEIGHT 1751.0 kg

WEIGHT OF FULLY LOADED TEST VEHICLE:

Right Front =	488.0 kg	Right Rear =	379.0 kg
Left Front =	499.0 kg	Left Rear =	384.0 kg
TOTAL FRONT =	987.0 kg	TOTAL REAR =	763.0 kg
% Total Weight =	56.4 %	% Total Weight =	43.6 %

TOTAL TEST WEIGHT = 1750.0 kg

Weight of ballast secured in vehicle's cargo area = 45 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 757 mm; Left Front 760 mm;
Right Rear 769 mm; Left Rear 762 mm

Pitch Angle at Right Door Sill = 1.9 front higher
Pitch Angle at Left Door Sill = 1.5 front higher
Roll Angle at Front Bumper = 0.1 left higher
Roll Angle at Rear Bumper = 0.3 left higher

FULLY LOADED: Right Front 755 mm; Left Front 758 mm;
Right Rear 760 mm; Left Rear 757 mm

Pitch Angle at Right Door Sill = 1.7 front higher
Pitch Angle at Left Door Sill = 1.4 front higher
Roll Angle at Front Bumper = 0.1 left higher
Roll Angle at Rear Bumper = 0.4 left higher

AS TARGETED:

Pitch Angle at Right Door Sill = 1.7 front higher
Pitch Angle at Left Door Sill = 1.4 front higher
Roll Angle at Front Bumper = 0.1 left higher
Roll Angle at Rear Bumper = 0.4 left higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = 1.6 rear higher
Pitch Angle at Left Door Sill = 1.4 rear higher
Roll Angle at Front Bumper = 0.1 right higher
Roll Angle at Rear Bumper = 0.4 left higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill = 1.7 rear higher

Pitch Angle at Left Door Sill = 1.4 rear higher

Roll Angle at Front Bumper = 0.1 right higher

Roll Angle at Rear Bumper = 0.4 left higher

VEHICLE WHEELBASE = 3050 mm

REMARKS: The seat travel distance was measured to be 200 mm for the driver front seat and 200 mm for the passenger front seat.

Please note that the vehicle weight placard was worn down, making some values unreadable.

RECORDED BY: David G. Gotwals DATE: August 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Dodge Grand Caravan

VEH. NHTSA NO.: PT0301 VIN: 2B4GP2434TR COLOR: Green

VEH. BUILD DATE: Not Available TEST DATES: August 9-11, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

	HORIZONTAL ANGLE SPECIFIED RANGE	MINIMUM HORIZONTAL ANGLE	MAXIMUM HORIZONTAL ANGLE
A-PILLAR	L 195°-255°	L 204.6°	L 249.6°
	R 105°-165°	R 110.9°	R 157.2°
B-PILLAR	L 195°-345°	L 201.6°	L 278.6°
	R 15°-165°	R 86.5°	R 147.2°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: David G. Gotwals DATE: August 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Dodge Grand Caravan

VEH. NHTSA NO.: PT0301 VIN: 2B4GP2434TR COLOR: Green

VEH. BUILD DATE: Not Available TEST DATES: August 9-11, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

VERTICAL IMPACT ANGLE RANGES

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
FRONT HEADER	FH1	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
	FH2	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
SIDE RAIL	SR1	L 0°-50°	L 0°	L 28°
		R 0°-50°	R 0°	R 31°
	SR2A	L 0°-50°	L 0°	L 25°
		R 0°-50°	R 0°	R 27°
	SR2B	L 0°-50°	L 0°	L 30°
		R 0°-50°	R 0°	R 25°
	SR3-1	L 0°-50°	L 0°	L 46°
		R 0°-50°	R 0°	R 50°
	SR3-2*	L 0°-50°	L 0°	L 41°
		R 0°-50°	R 0°	R 37°
SLIDING DOOR	SD	R 0°-50°	R 0°	R 50°
A-PILLAR	AP1	L -5°-50°	L -5°	L 44°
		R -5°-50°	R -5°	R 50°
	AP2	L -5°-50°	L -5°	L 46°
		R -5°-50°	R -5°	R 50°
	AP3	L -5°-50°	L -5°	L 42°

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
		R -5°-50°	R -5°	R 42°
B-PILLAR	BP1	L -10°-50°	L -10°	L 1°
		R -10°-50°	R -10°	R 20°
	BP2*	L 0°-50°	L 0°	L 15°
		R 0°-50°	R 0°	R 13°
	BP3	L -10°-50°	L -10°	L 5°
		R -10°-50°	R -10°	R 5°
	BP4	L -10°-50°	L -10°	L -3°
		R -10°-50°	R -10°	R -7°
OTHER PILLAR	OP1*	L 0°-50°	L 0°	L 6°
		R 0°-50°	R 0°	R 10°
	OP2	L -10°-50°	L -10°	L 3°
		R -10°-50°	R -10°	R 0°
REAR PILLAR	RP1	L -10°-50°	L -10°	L 38°
		R -10°-50°	R -10°	R 38°
	RP2	L -10°-50°	L -10°	L 8°
		R -10°-50°	R -10°	R 17°
REAR HEADER	RH	L 0°-50°	L -10°	L 50°
		R 0°-50°	R -10°	R 50°
UPPER ROOF 1		0°-50°	0°	50°
UPPER ROOF 2		0°-50°	0°	50°
UPPER ROOF 3		0°-50°	0°	50°
UPPER ROOF 4		0°-50°	0°	49°
UPPER ROOF 5		0°-50°	0°	38°
UPPER ROOF 6		0°-50°	0°	42°

As determined using the Procedures specified in S8.13.4.2. *Targets BP2, OP1, and SR3-2 are seat belt anchorage location(s).

RECORDED BY: David G. Gotwals DATE: August 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Dodge Grand Caravan

VEH. NHTSA NO.: PT0301 VIN: 2B4GP2434TR COLOR: Green

VEH. BUILD DATE: Not Available TEST DATES: August 9-11, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	200 mm	200 mm
T°	Horizontal ∠ {CG-F1 (Left Seat) to (Right A-Pillar)}	110.4°	--
A1°	360° - T°	249.6°	--
W°	Horizontal ∠ {CG-2 (Left Seat) to (Left A-Pillar)}	204.6°	--
A2°	A2° = W°	204.6°	--
U°	Horizontal ∠ {CG-2 (Left Seat) to (Left B-Pillar)}	278.6°	--
B1°	B1° = U°	278.6°	--
V°	Horizontal ∠ {CG-R (Left Seat) to (Left B-Pillar)}	201.6°	--
B2°	B2° = V°	201.6°	--
W° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right A-Plillar}}	--	157.2°
A1° (right)	A1° (right) = W° (right)	--	157.2°
T ° (right)	Horizontal ∠ {CG-F1 (Right Seat) to (Left A-Pillar)}	--	249.1°
A2° (right)	360°-T° (right)	--	110.9°
V ° (right)	Horizontal ∠ {CG-R (Right Seat) to (Right B-Pillar)}	--	147.2°
B1° (right)	B1° (right) = V° (right)	--	147.2°
U ° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right B-Pillar)}	--	86.5°
B2° (right)	B2° (right) = U° (right)	--	86.5°
J	A-Pillar {(Plane 3) - (Plane 5)}	366.1 mm	393.5 mm
J/2	J ÷ 2	183.1 mm	196.8 mm
D1	Upper Roof {(Plane A) - (Plane B)}	2760.0 mm	
D1/2	D1 ÷ 2	1380.0 mm	
D2	Upper Roof {(Plane C) - (Plane D)}	1315.6 mm	
D2/2	D2 ÷ 2	657.8 mm	
.35D1	.35 x D1	966.0 mm	
.35D2	.35 x D2	460.5 mm	

Measurement	Description	Left Side	Right Side
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	576.1 mm	554.4 mm
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	288.1 mm	277.2 mm
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	144.0 mm	138.6 mm
Q	O-Pillar (Plane 13 – Plane 14)	570.2 mm	541.4 mm
Q/2	Q / 2	285.1 mm	270.7 mm
D	R-Pillar (Point 7 - Point M)	1080.0 mm	1080.0 mm
3/D7	3 * D / 7	462.9 mm	462.9 mm
MM	Sliding Door (Widest opening)	--	901.2 mm
MM/2	MM / 2	--	450.6 mm

As determined using the Procedures specified in S10.1-10.13.

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1744.5	-413.0	697.5	1767.4	426.0	697.5
Rear Row	2602.6	-400.0	720.3	2602.6	175.0	720.3
Third Row	3482.4	-355.5	745.5	3284.2	355.5	745.5

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1745.5	-414.1	699.0	1768.2	424.6	699.3
Second Row	2606.8	-402.8	723.8	2606.6	172.0	723.9
Third Row	3489.9	-360.2	751.0	3290.7	351.0	750.7

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	1705.5	-414.1	1359.0	1728.2	424.6	1359.3
CGF2	1905.5	-414.1	1359.0	1928.2	424.6	1359.3
CGR-2	2766.8	-402.8	1383.8	2766.6	172.0	1383.9
CGR-3	3649.9	-360.2	1411.0	3450.7	351.0	1410.7

REFERENCE FOR VEHICLE COORDINATE SYSTEM:

REMARKS: Driver upper door striker bolt (x, y, z) = (1927.3, -841.1, 715.6)

RECORDED BY: David G. Gotwals DATE: August 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Dodge Grand Caravan

VEH. NHTSA NO.: PT0301 VIN: 2B4GP2434TR COLOR: Green

VEH. BUILD DATE: Not Available TEST DATES: August 9-11, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

SUMMARY OF TARGETING RESULTS

Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
A-Pillar Left Side								
AP1	1490.5	-613.7	1439.3	249	44	No	--	No
AP2	1326.5	-676.9	1351.3	205	46	No	--	Yes
AP3	1176.3	-715.2	1255.7	205	42	No	--	No
A-Pillar Right Side								
AP1	1493.7	612.0	1440.5	115	50	No	--	Yes
AP2	1332.1	675.7	1352.5	157	50	No	--	No
AP3	1158.2	715.8	1243.1	157	42	No	--	Yes
B-Pillar Left Side								
BP1	1978.5	-560.0	1556.8	270	1	No	--	No
BP2	1955.0	-644.3	1327.3	270	15	No	--	No
BP3	1938.4	-702.4	1269.3	270	5	No	--	Yes
BP4	2027.9	-777.0	1126.4	--	--	Yes	--	--
REL	2016.2	-760.9	1138.0	202	-3	--	1	No
B-Pillar Right Side								
BP1	1960.7	535.3	1548.3	90	20	No	--	No
BP2	1955.9	643.5	1332.0	90	13	No	--	Yes
BP3	1940.2	700.3	1271.8	90	5	No	--	No
BP4	1988.4	759.9	1134.4	--	--	Yes	--	--
REL	1970.7	738.4	1180.1	115	-7	--	2	No
Other Pillar Left Side								
OPR	2954.3	-550.4	1588.3	--	--	No	--	--
OP1	2996.3	-682.7	1330.5	270	6	No	--	No

SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
OP2	2958.0	-730.2	1304.1	270	3	No	--	Yes
Other Pillar Right Side								
OPR	2981.9	521.4	1569.7	--	--	No	--	No
OP1	3009.4	622.4	1434.5	90	10	No	--	No
OP2	2986.1	725.0	1298.2	90	0	No	--	No
Rear Pillar Left Side								
RP1	3887.2	-549.1	1494.4	320	38	No	--	No
RP2	3737.8	-604.9	1482.9	270	8	No	--	No
Rear Pillar Right Side								
RP1	3888.0	551.3	1487.2	32	38	No	--	No
RP2	3741.0	596.5	1497.6	90	17	No	--	No
Front Header Left Side								
FH1	1436.7	-524.9	1489.3	--	--	Yes	--	--
REL	1435.0	-499.7	1484.5	180	50	--	1	No
FH2	1423.7	-375.5	1498.2	180	50	No	--	No
Front Header Right Side								
FH1	1437.0	520.0	1492.1	--	--	Yes	--	--
REL	1438.7	494.3	1490.6	180	50	--	1	No
FH2	1422.1	369.8	1499.7	180	50	No	--	No
Side Rail Left Side								
SR1	1639.9	-564.4	1527.5	270	28	No	--	Yes
SR2A	1791.4	-563.5	1548.5	270	25	No	--	No
SR2B	1677.9	-564.1	1533.7	270	30	No	--	No
SR3-1	2129.2	-581.3	1541.5	270	46	No	--	No
SR3-2	3104.9	-573.4	1565.7	270	41	No	--	No
Side Rail Right Side								
SR1	1642.9	559.0	1530.4	90	31	No	--	No
SR2A	1793.2	559.5	1550.2	90	27	No	--	No
SR2B	1660.3	559.8	1534.0	90	25	No	--	No
SR3-1	2109.8	535.9	1518.7	90	50	No	--	No
SR3-2	3132.1	578.8	1549.6	90	37	No	--	No

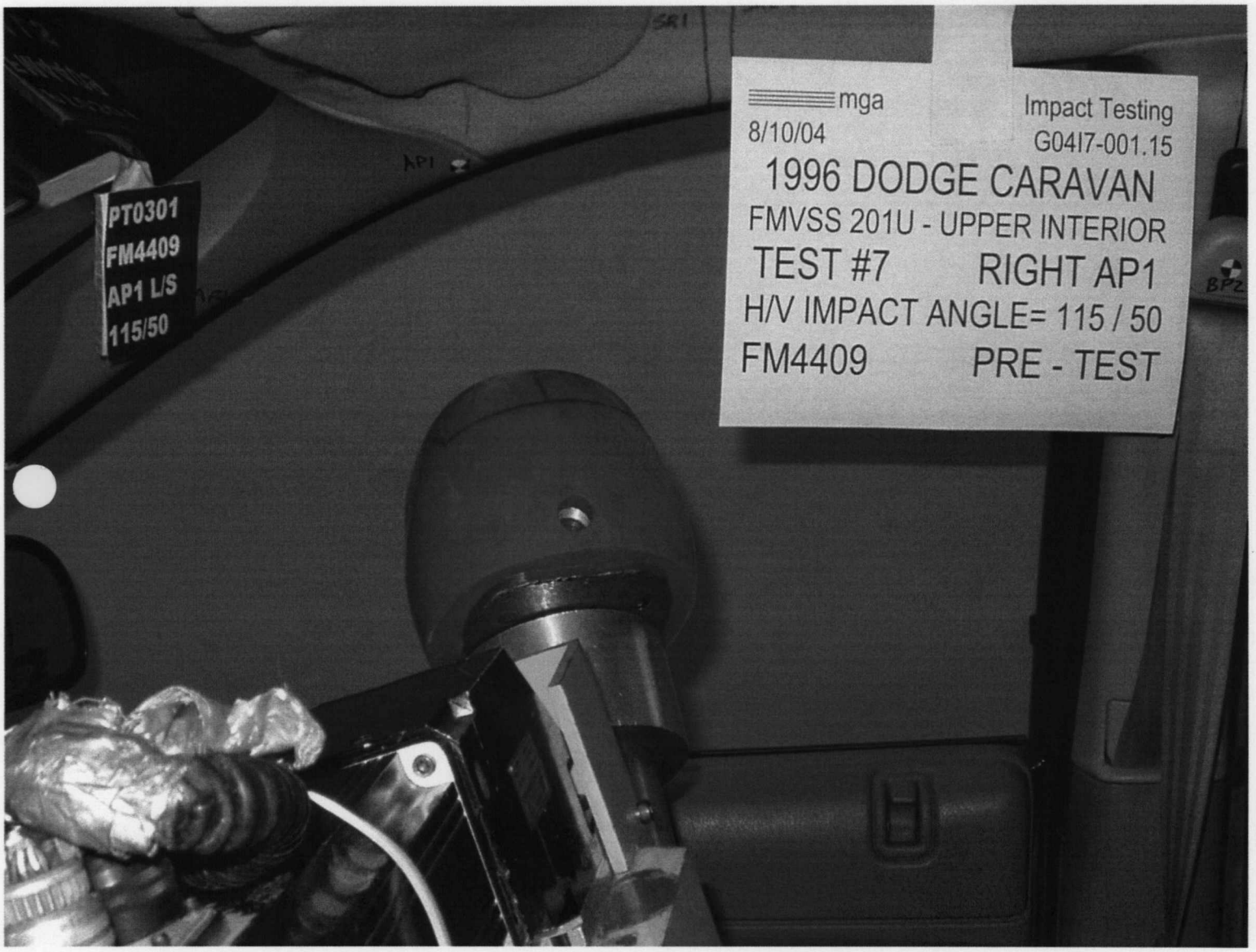
SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
Sliding Door Right Side								
SD	2465.9	553.9	1571.8	--	--	Yes	--	--
REL	2468.9	585.1	1528.1	90	50	--	2	Yes
Rear Header Left Side								
RH	3916.3	-360.1	1525.2	0	50	No	--	No
Rear Header Right Side								
RH	3916.5	352.9	1525.8	0	50	No	--	No
Upper Roof Left Side								
UR1	1771.8	-454.7	1580.6	270	50	No	--	No
UR2	1977.1	-454.9	1594.5	270	50	No	--	Yes
UR3	2958.2	-457.7	1615.5	270	50	No	--	No
Upper Roof Right Side								
UR4	1774.1	453.8	1582.9	90	49	No	--	Yes
UR5	1959.7	452.7	1588.8	90	38	No	--	No
UR6	2990.6	452.5	1600.7	90	42	No	--	No

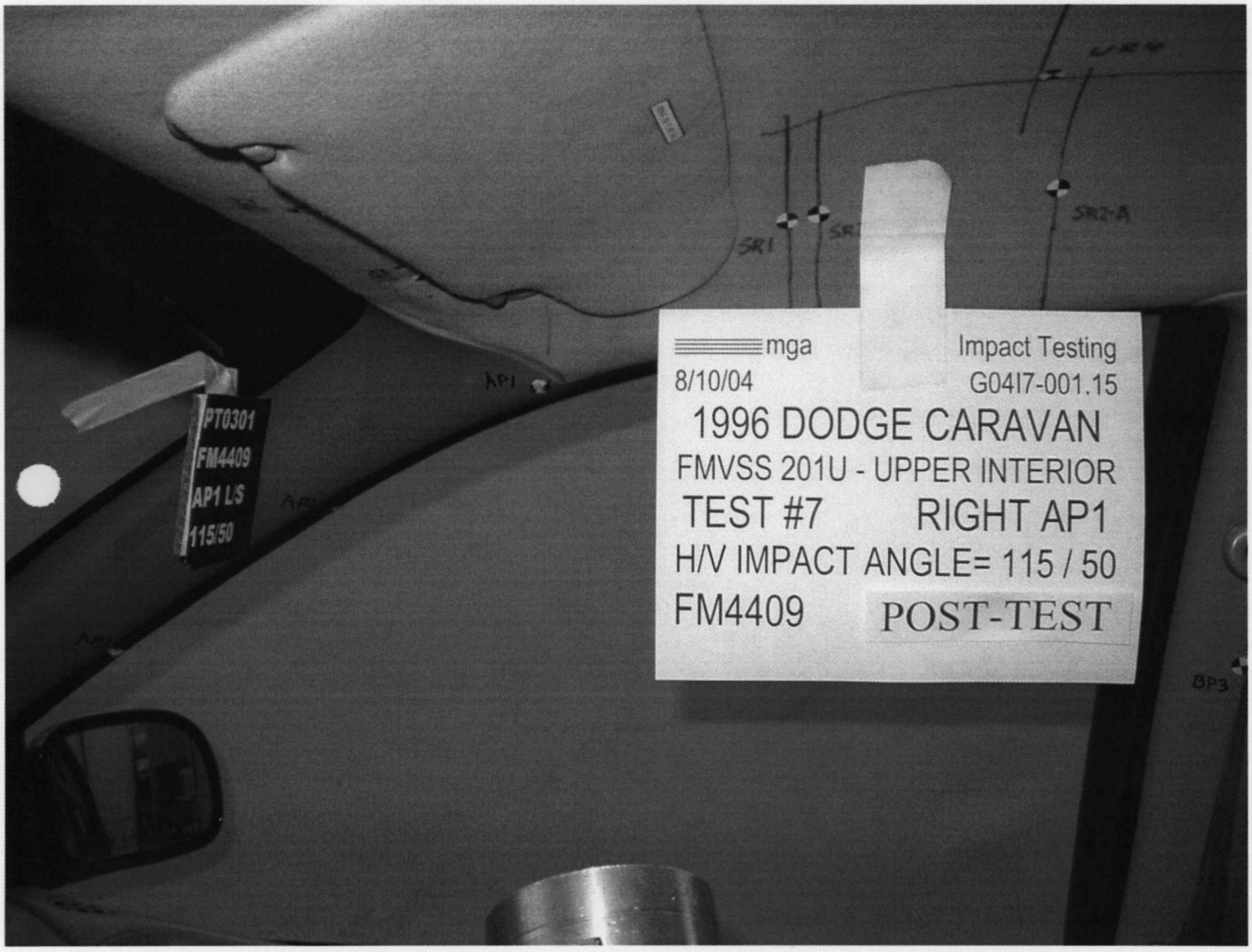
As determined using the Procedures specified in S10.1-10.13.

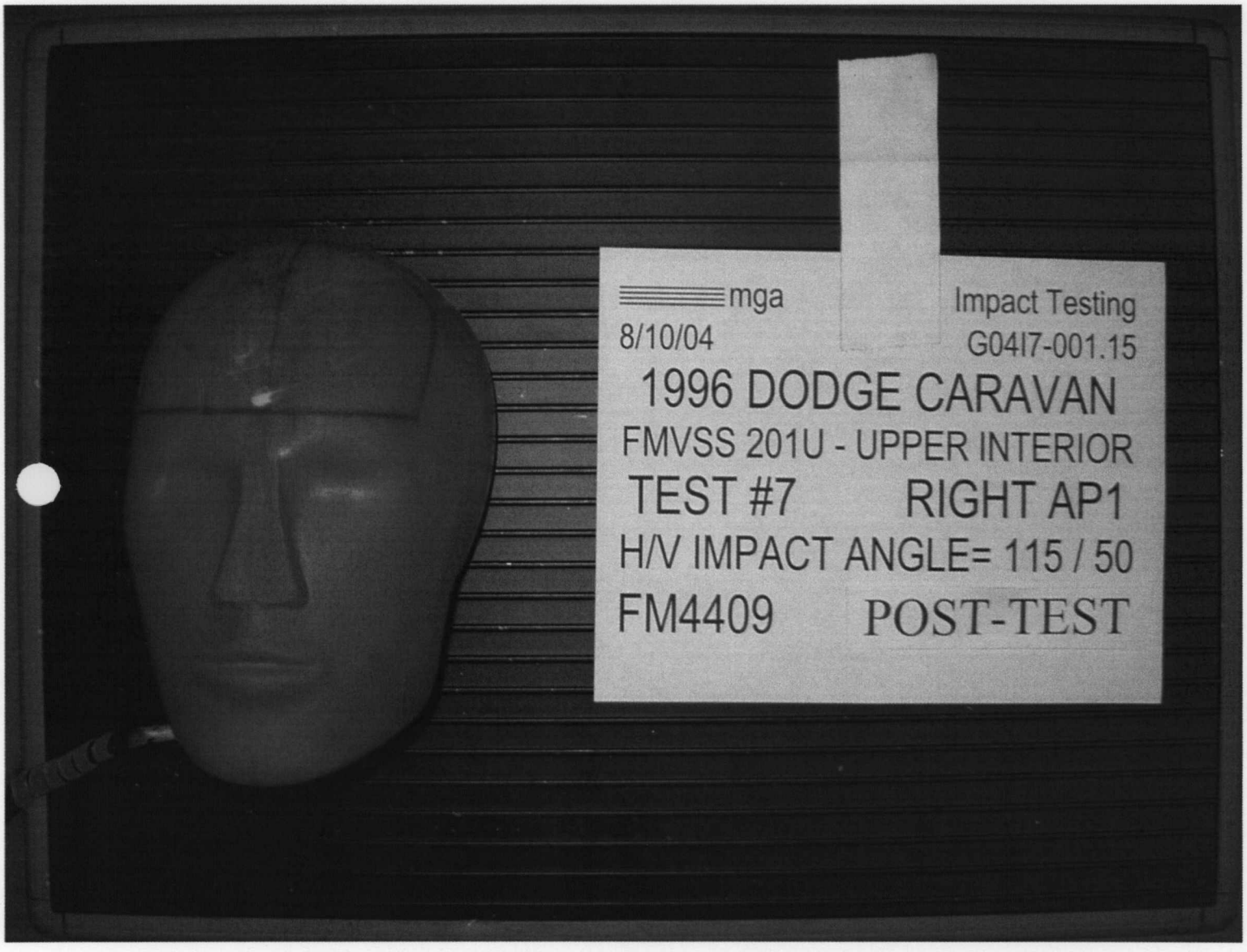
REMARKS:

RECORDED BY: David G. Gotwals DATE: August 8, 2004

APPROVED BY: Helen A. Kaleto


PT0301
FM4409
AP1 L/S
115/50
mga
8/10/04
Impact Testing
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP1
H/V IMPACT ANGLE= 115 / 50
FM4409 PRE - TEST


SR1
SR2-A
AP1
PT0301
FM4409
AP1 L/S
115/50
mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #7
RIGHT AP1
H/V IMPACT ANGLE= 115 / 50
FM4409
POST-TEST
BP3


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #7
RIGHT AP1
H/V IMPACT ANGLE= 115 / 50
FM4409
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP1 Right

MGA Test Reference No.:FM4409

Approach Horizontal Angles:115°

Approach Vertical Angles:50°

Test Number:#7

Temperature:22C

Humidity:57%

Time of Test:4:15 PM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1749	2098	2.9	23.9	6	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.68	1.67
Y	6	J35916	100.2	1.54	1.55
Z	7	J35918	97.9	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Crack in the pillar trim

Recorded By: _____ Approved By*: _____ Date: 03-10-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

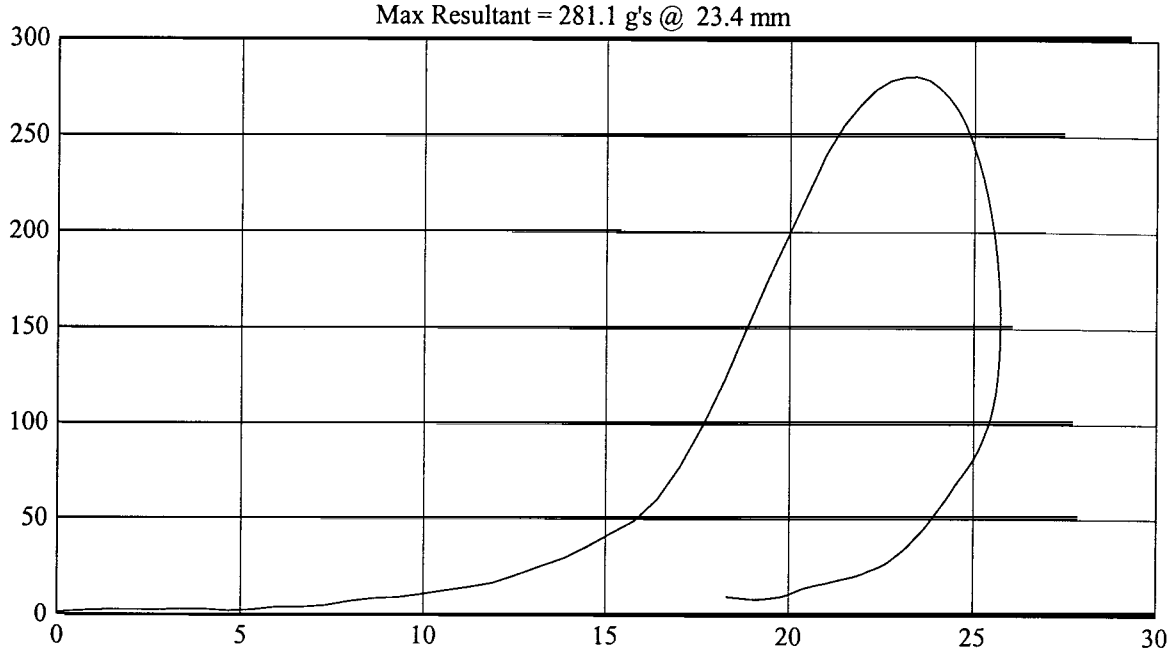
Customer: DODGE
Test # 7
FM4409
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 115/50

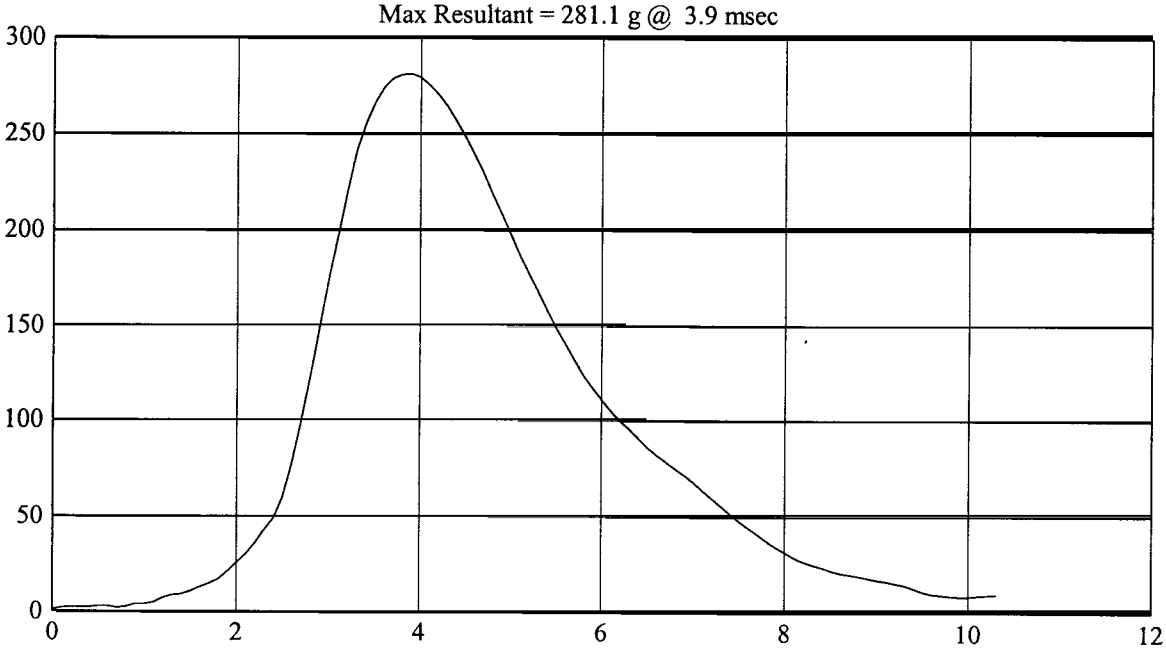
HIC(d) = 1749, HIC = 2098, Delta T = 2.9 msec

Max Resultant = 281.1 g's @ 23.4 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 281.1 g @ 3.9 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

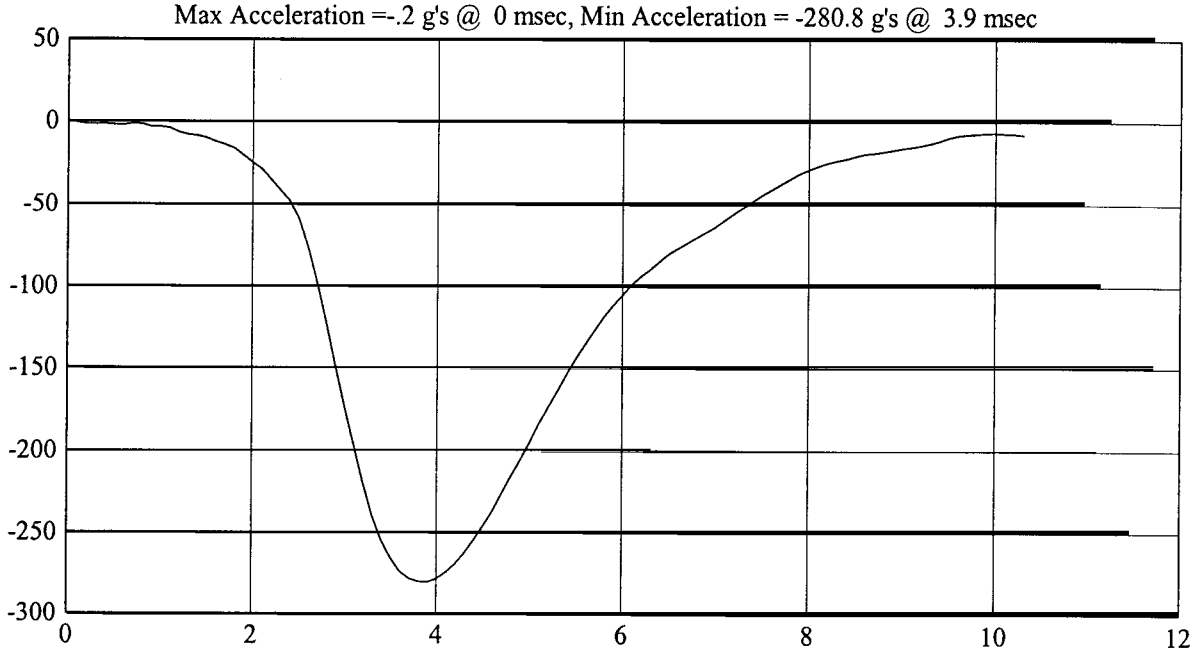
Customer: DODGE
Test # 7
FM4409
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 115/50

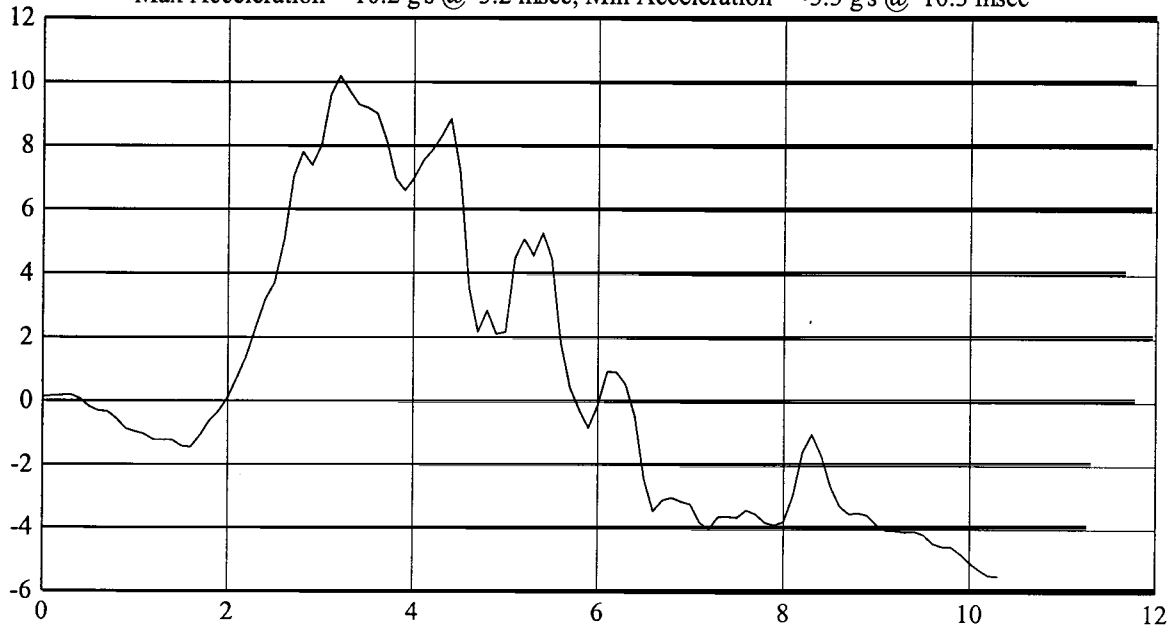
HIC(d) = 1749, HIC = 2098, Delta T = 2.9 msec

Max Acceleration =-.2 g's @ 0 msec, Min Acceleration = -280.8 g's @ 3.9 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 10.2 g's @ 3.2 msec, Min Acceleration = -5.5 g's @ 10.3 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

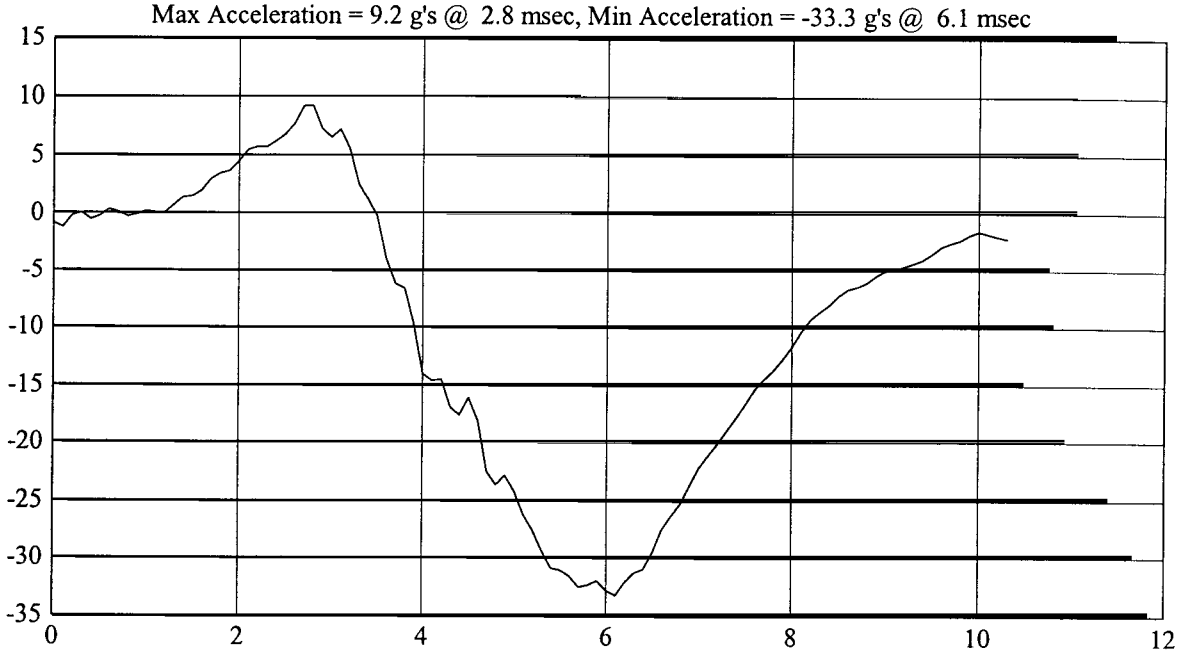
Customer: DODGE
Test # 7
FM4409
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 115/50

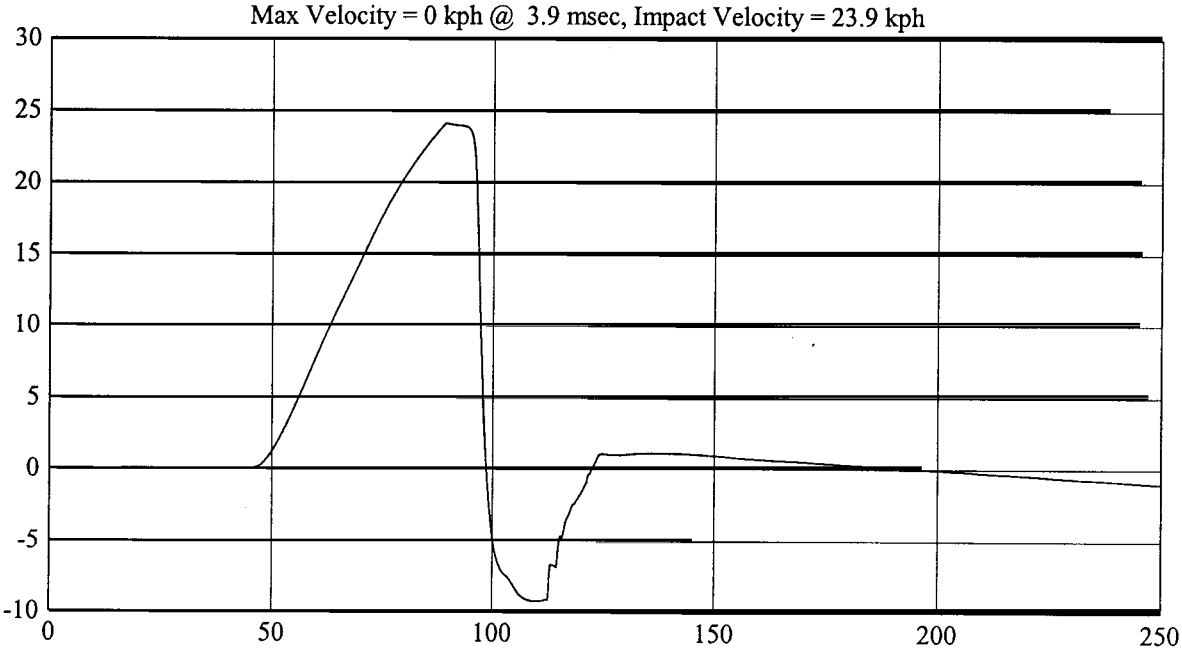
HIC(d) = 1749, HIC = 2098, Delta T = 2.9 msec

Max Acceleration = 9.2 g's @ 2.8 msec, Min Acceleration = -33.3 g's @ 6.1 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 3.9 msec, Impact Velocity = 23.9 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

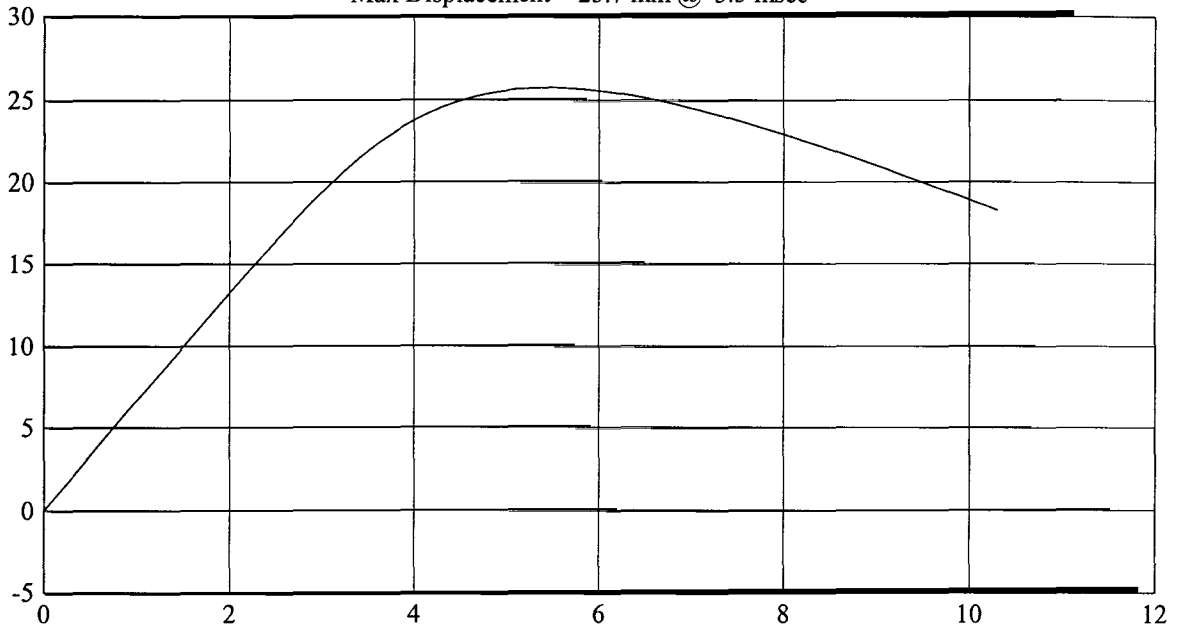
Customer: DODGE
Test # 7
FM4409
Additional Desc: N/A

Vehicle Program : CARAVAN

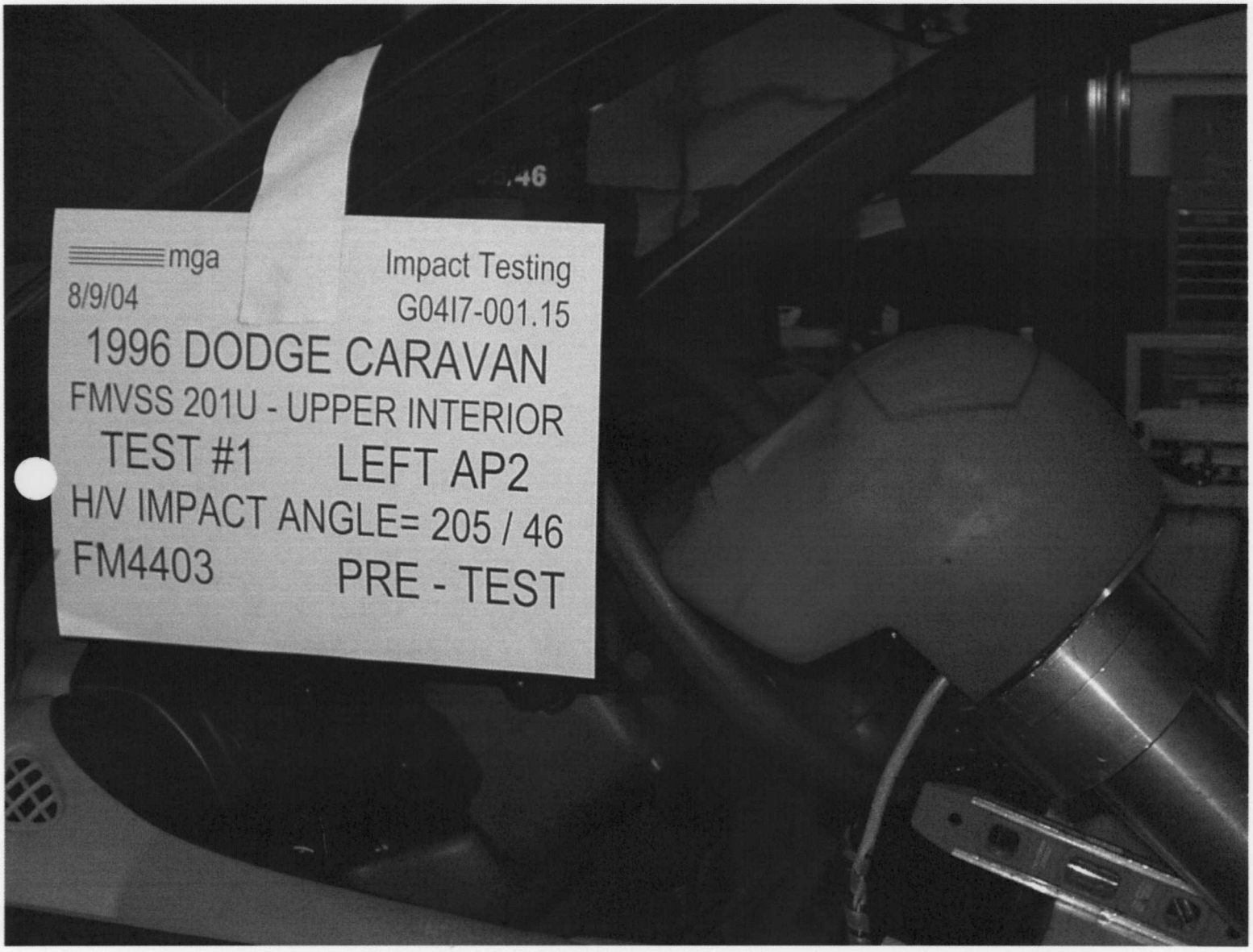
Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 115/50

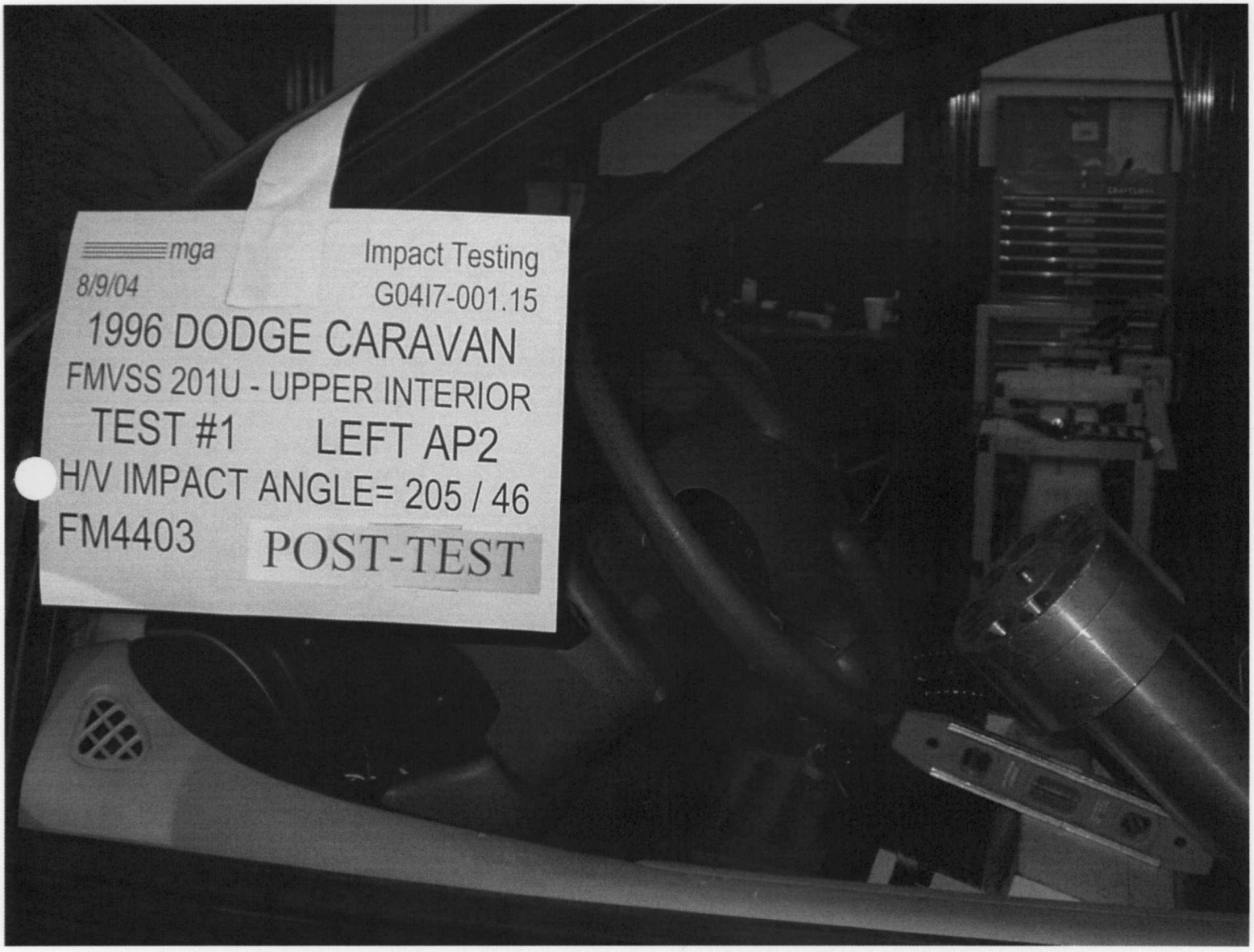
HIC(d) = 1749, HIC = 2098, Delta T = 2.9 msec

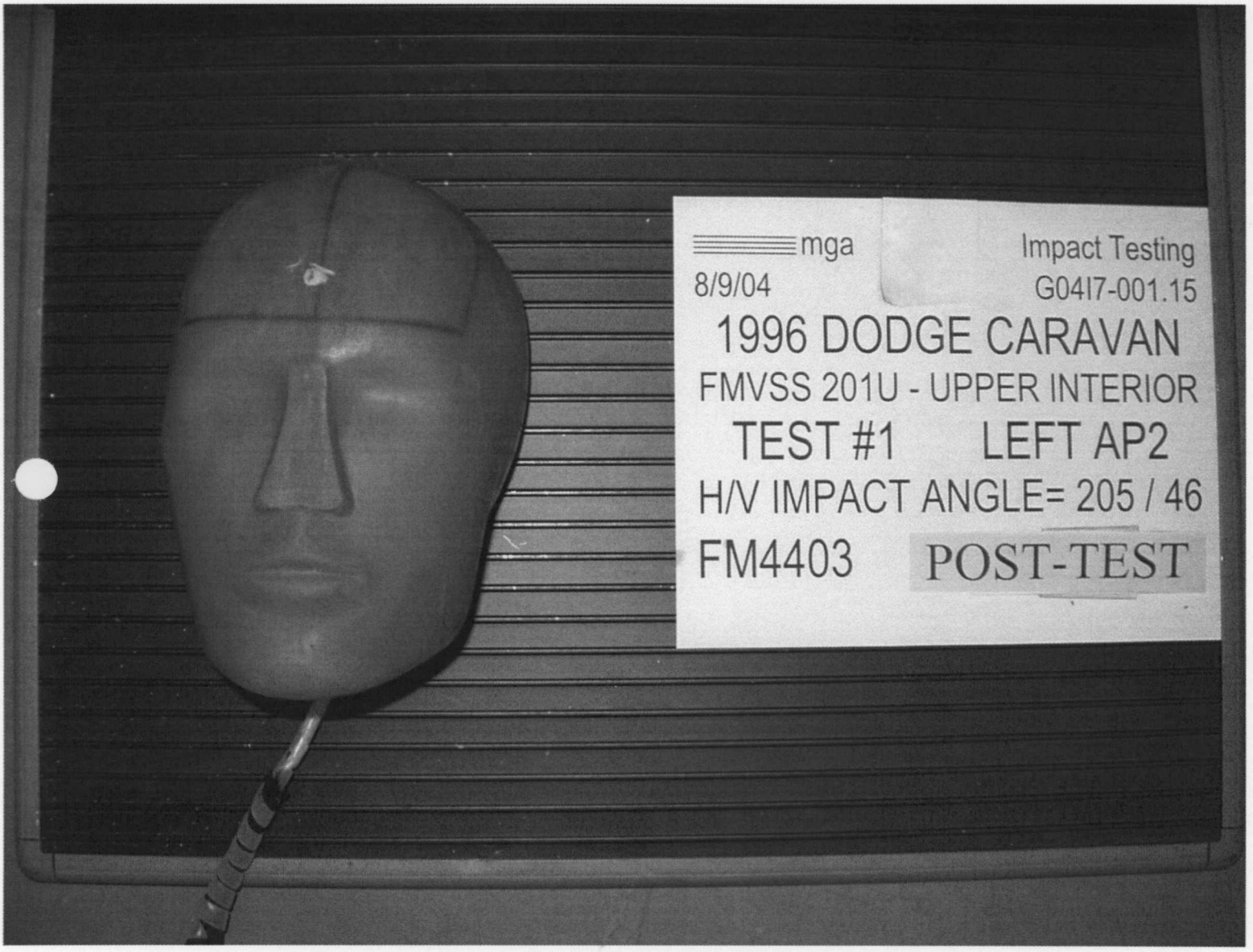
Max Displacement = 25.7 mm @ 5.5 msec



Displacement (mm) vs. Time (msec)


mga
8/9/04
Impact Testing
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 205 / 46
FM4403 PRE - TEST


mga
Impact Testing
8/9/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 205 / 46
FM4403
POST-TEST


mga
Impact Testing
8/9/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 205 / 46
FM4403
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP2 Left

MGA Test Reference No.:FM4403

Approach Horizontal Angles:205°

Approach Vertical Angles:46°

Test Number:#1

Temperature:22C

Humidity:51%

Time of Test:6:15 PM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1417	1658	3.1	23.9	12	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.67	1.67
Y	6	J35916	100.2	1.55	1.54
Z	7	J35918	97.9	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 6-9-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

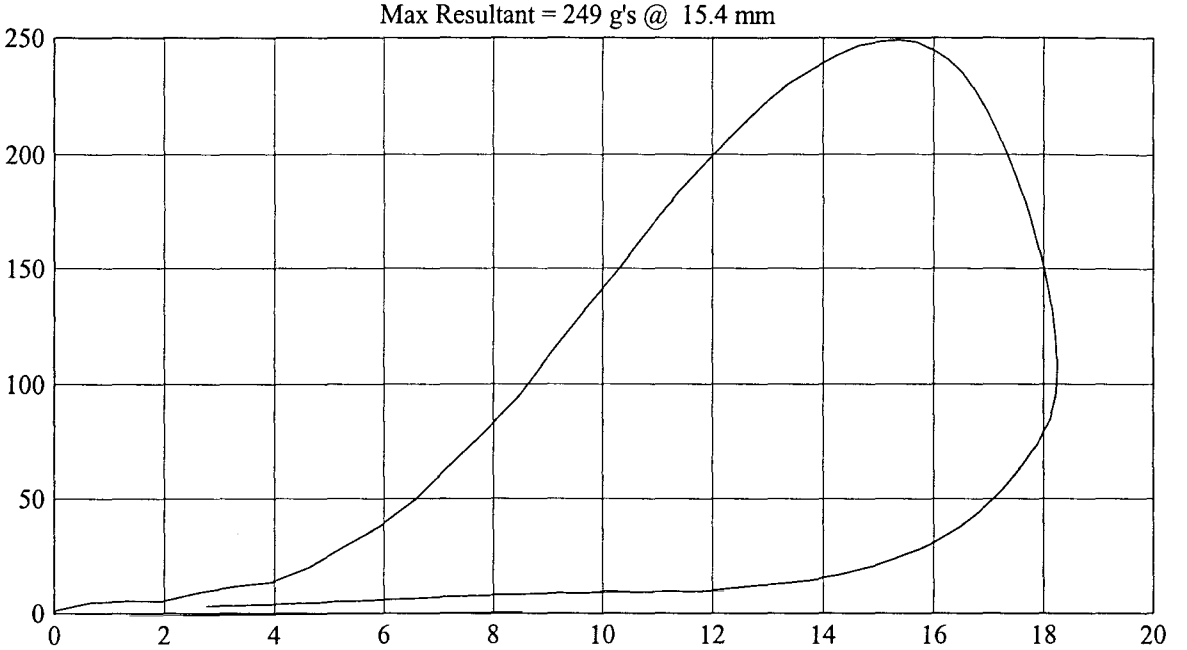
Customer: DODGE
Test # 1
FM4403
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 205/46

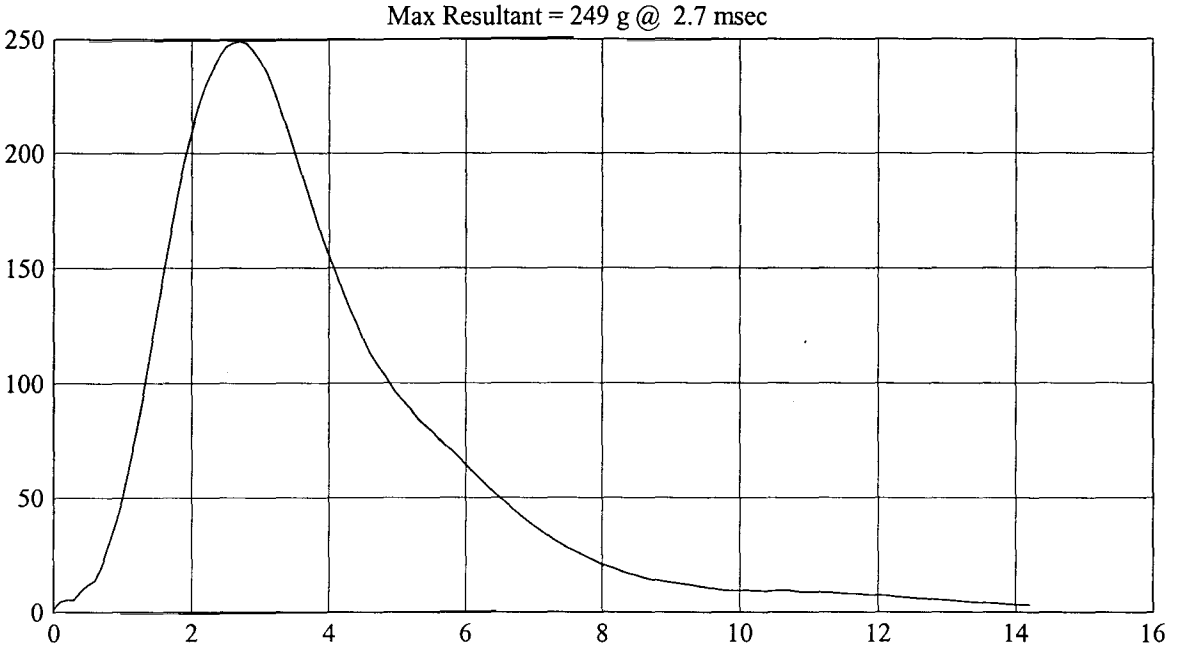
HIC(d) = 1417, HIC = 1658, Delta T = 3.1 msec

Max Resultant = 249 g's @ 15.4 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 249 g @ 2.7 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

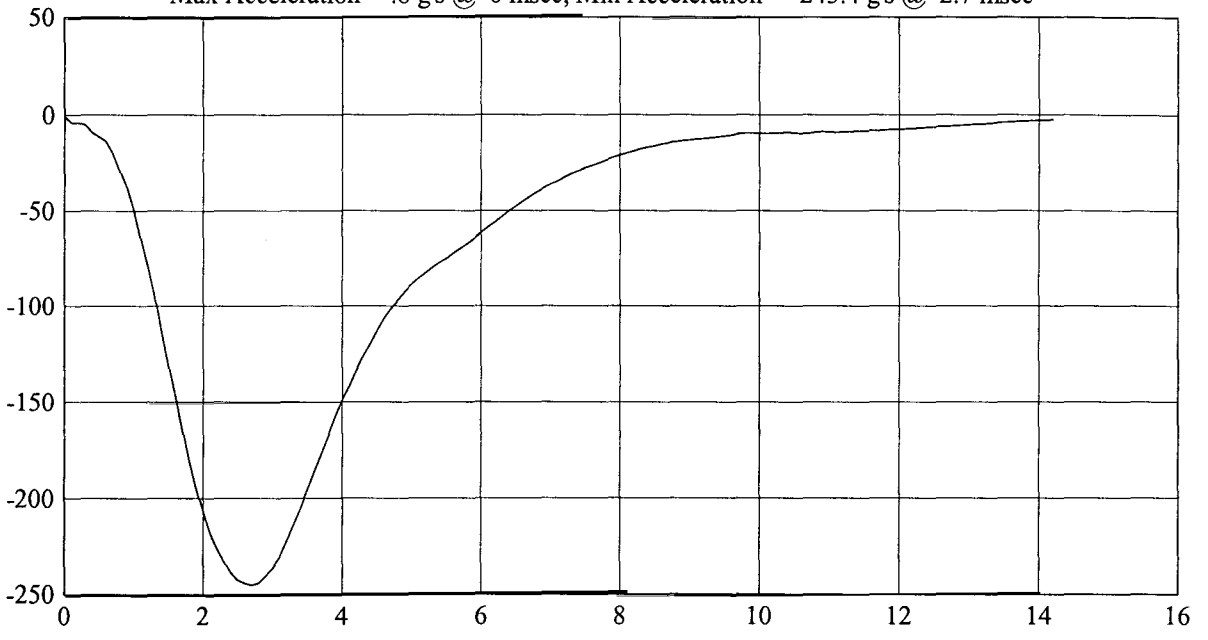
Customer: DODGE
Test # 1
FM4403
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 205/46

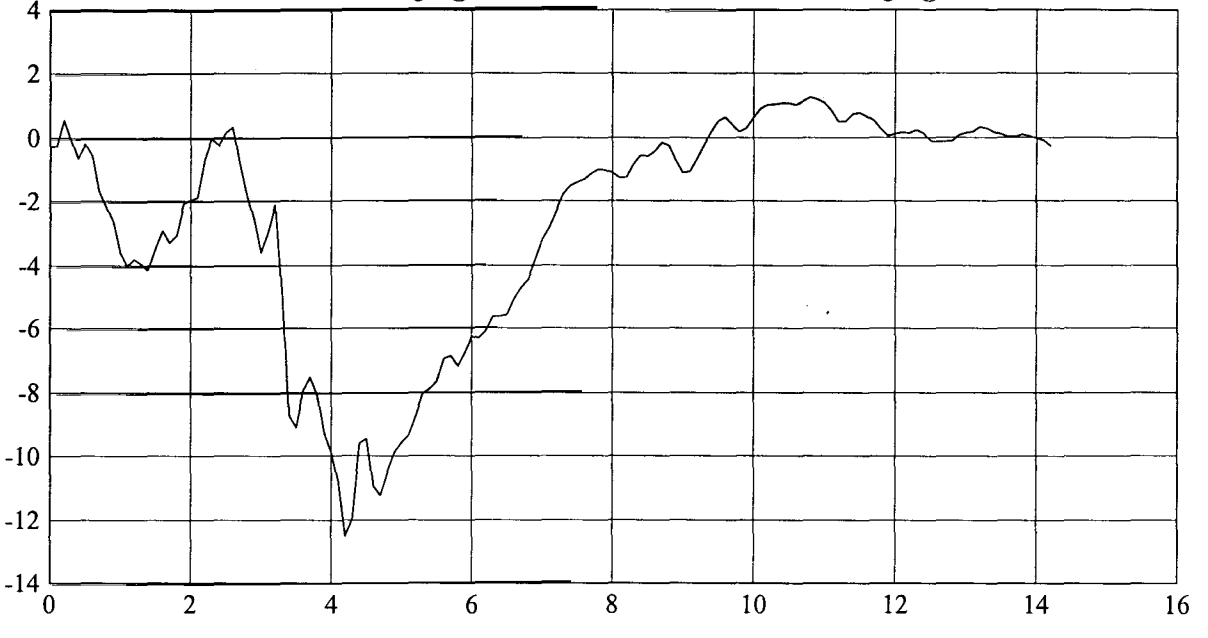
HIC(d) = 1417, HIC = 1658, Delta T = 3.1 msec

Max Acceleration =-.8 g's @ 0 msec, Min Acceleration = -245.4 g's @ 2.7 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 1.3 g's @ 10.8 msec, Min Acceleration = -12.5 g's @ 4.2 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

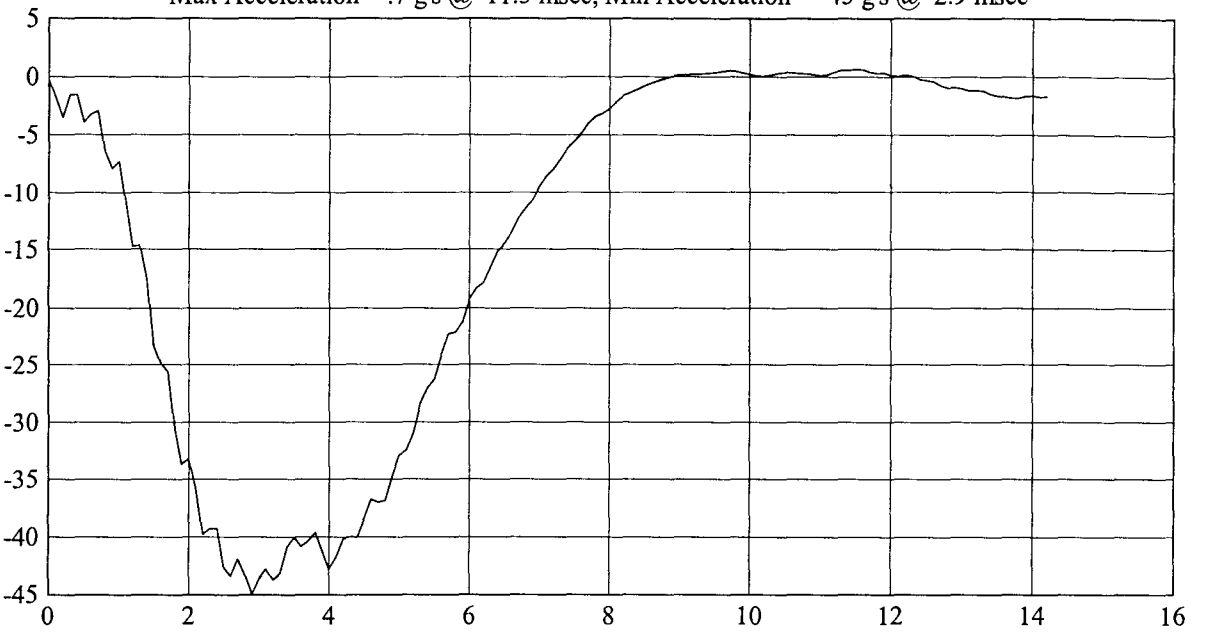
Customer: DODGE
Test # 1
FM4403
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 205/46

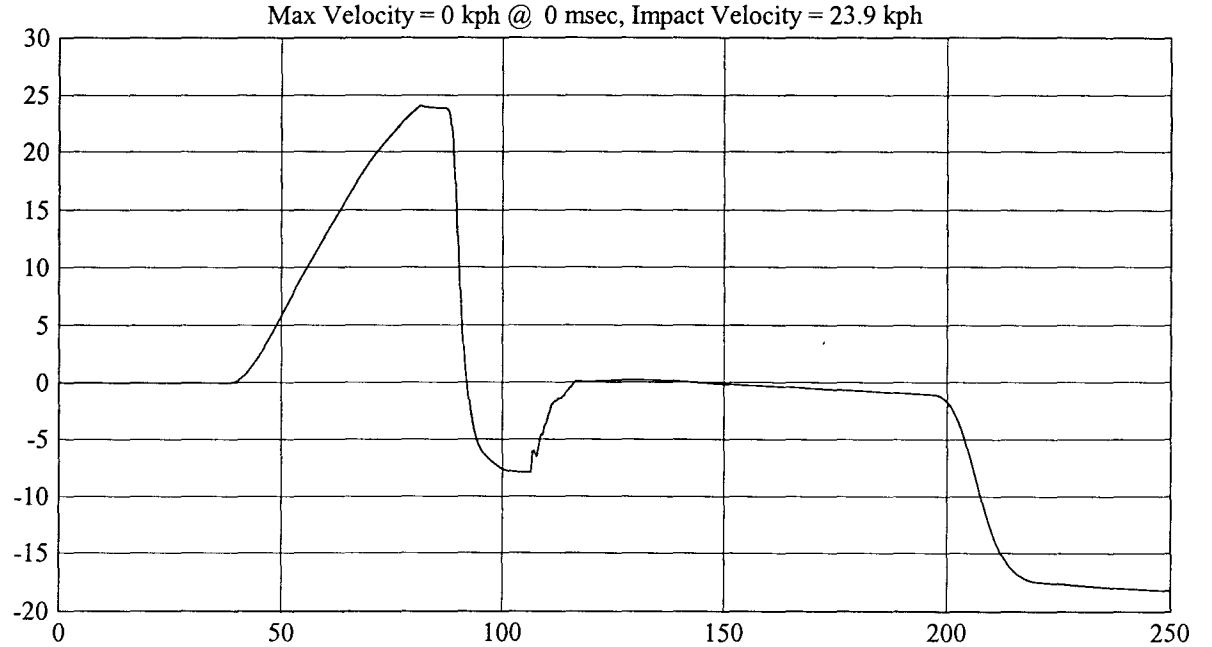
HIC(d) = 1417, HIC = 1658, Delta T = 3.1 msec

Max Acceleration = .7 g's @ 11.5 msec, Min Acceleration = -45 g's @ 2.9 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 0 msec, Impact Velocity = 23.9 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

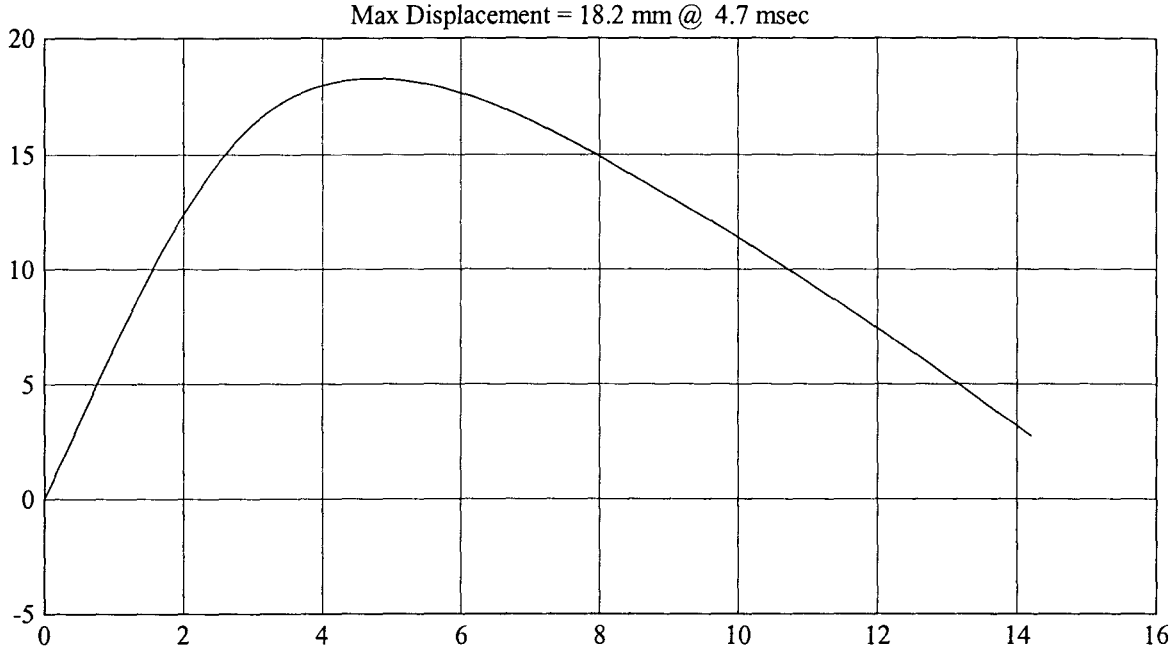
Customer: DODGE
Test # 1
FM4403
Additional Desc: N/A

Vehicle Program : CARAVAN

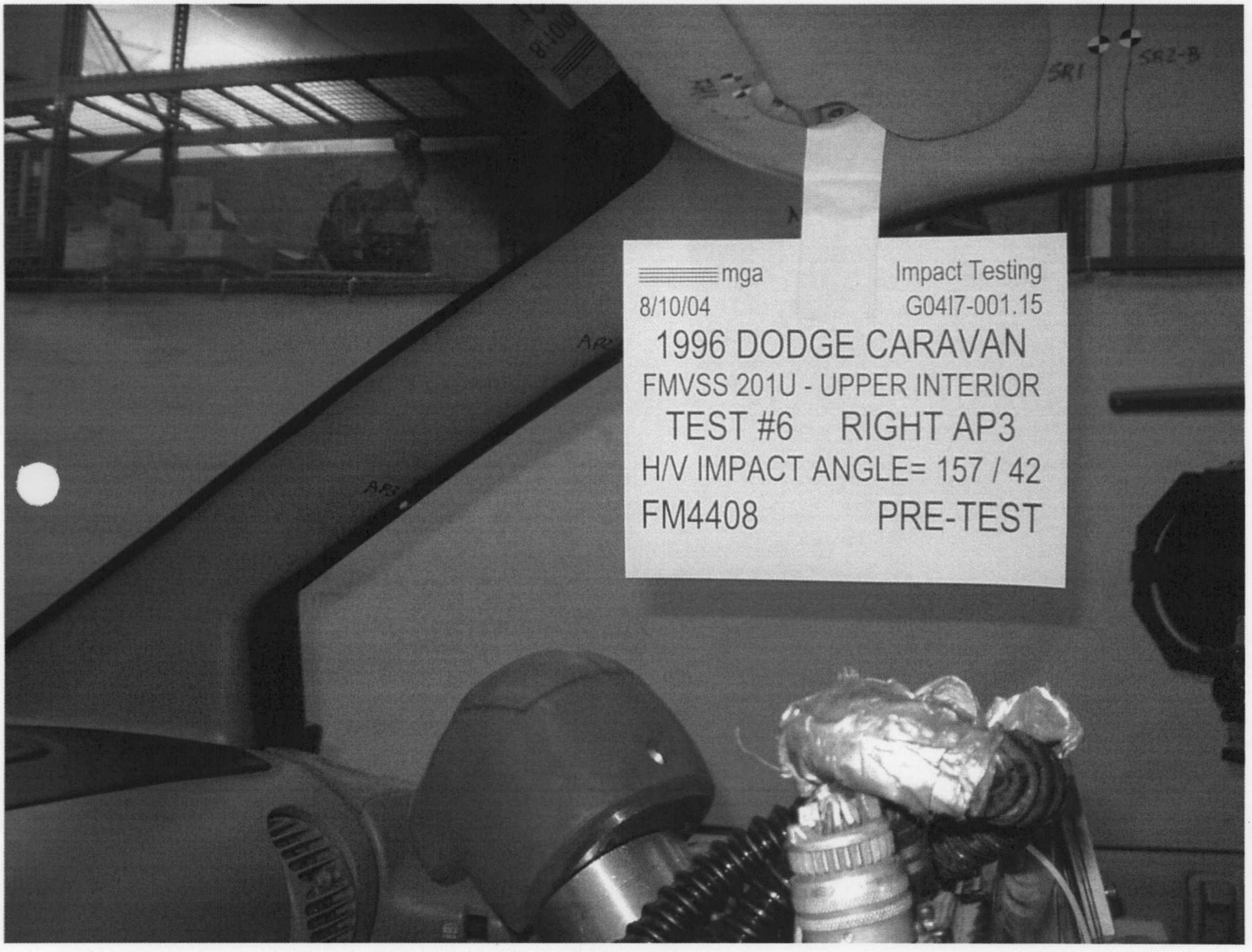
Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 205/46

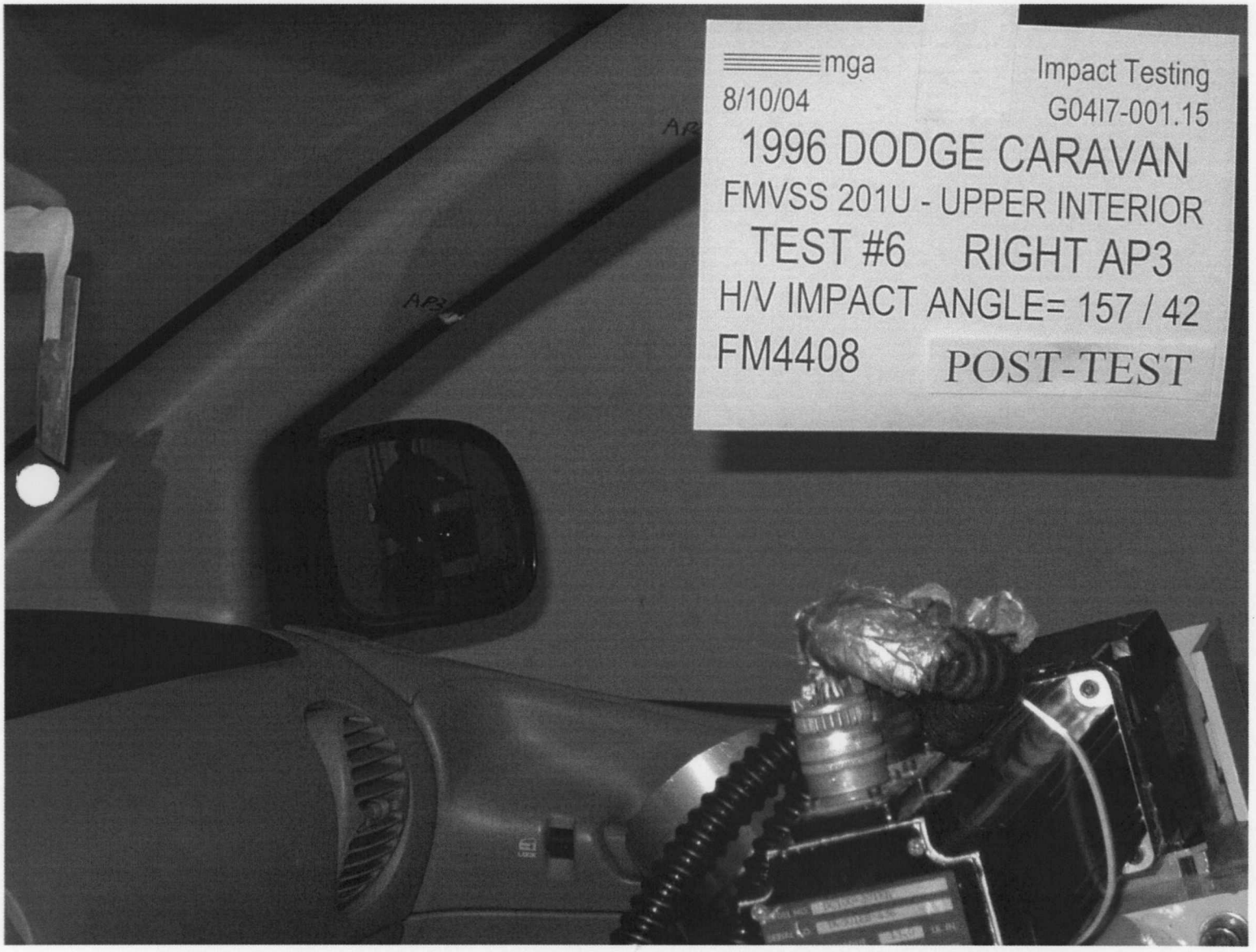
HIC(d) = 1417, HIC = 1658, Delta T = 3.1 msec

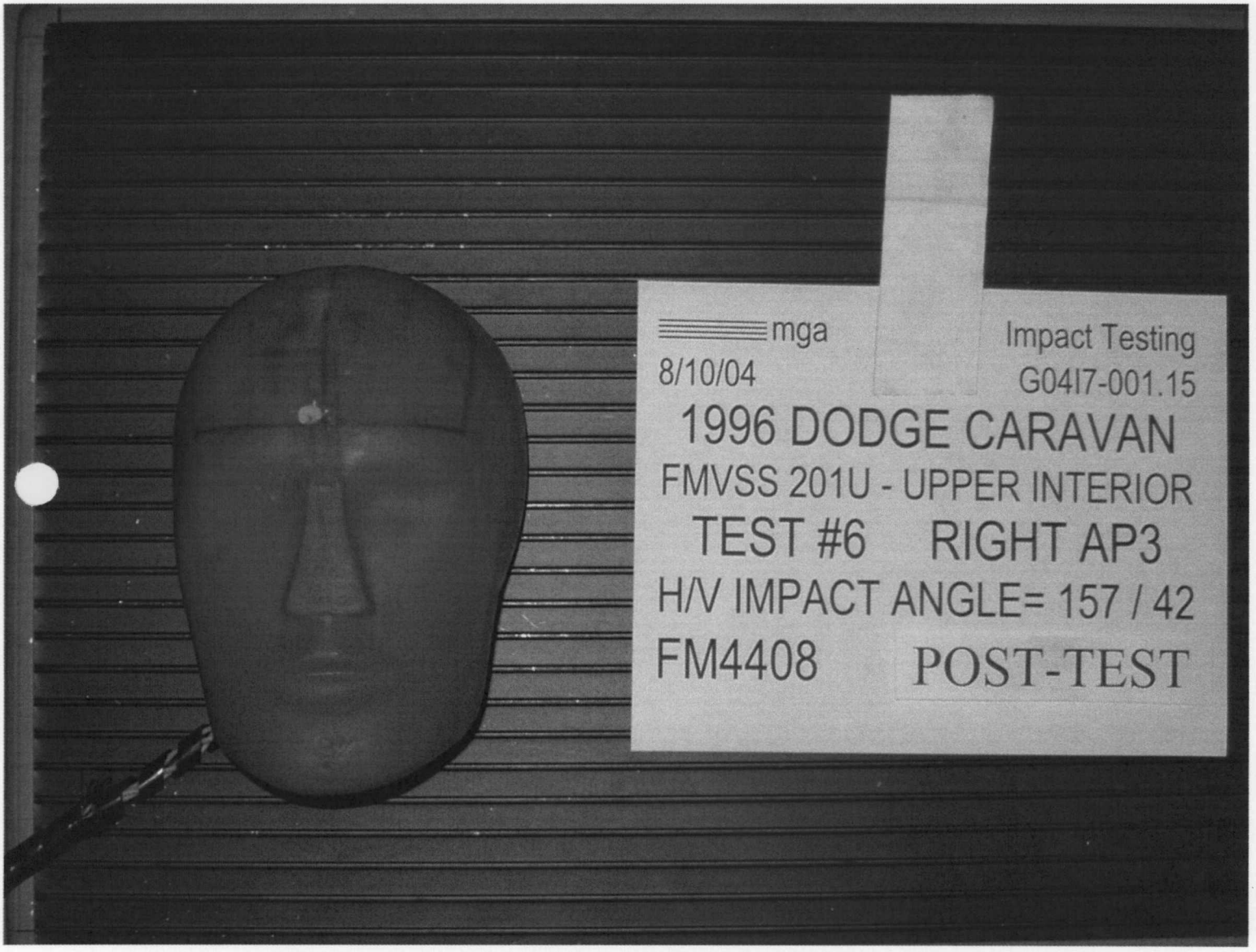
Max Displacement = 18.2 mm @ 4.7 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT AP3
H/V IMPACT ANGLE= 157 / 42
FM4408 PRE-TEST


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT AP3
H/V IMPACT ANGLE= 157 / 42
FM4408
POST-TEST


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT AP3
H/V IMPACT ANGLE= 157 / 42
FM4408
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP3 Right

MGA Test Reference No.:FM4408

Approach Horizontal Angles:157°

Approach Vertical Angles:42°

Test Number:#6

Temperature:22C

Humidity:54%

Time of Test:3:45 PM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1597	1896	3.2	23.9	4	4 R

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-108	1.67	1.67
Y	6	J36193	101.4	1.54	1.55
Z	7	J36353	96.8	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 8/10/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

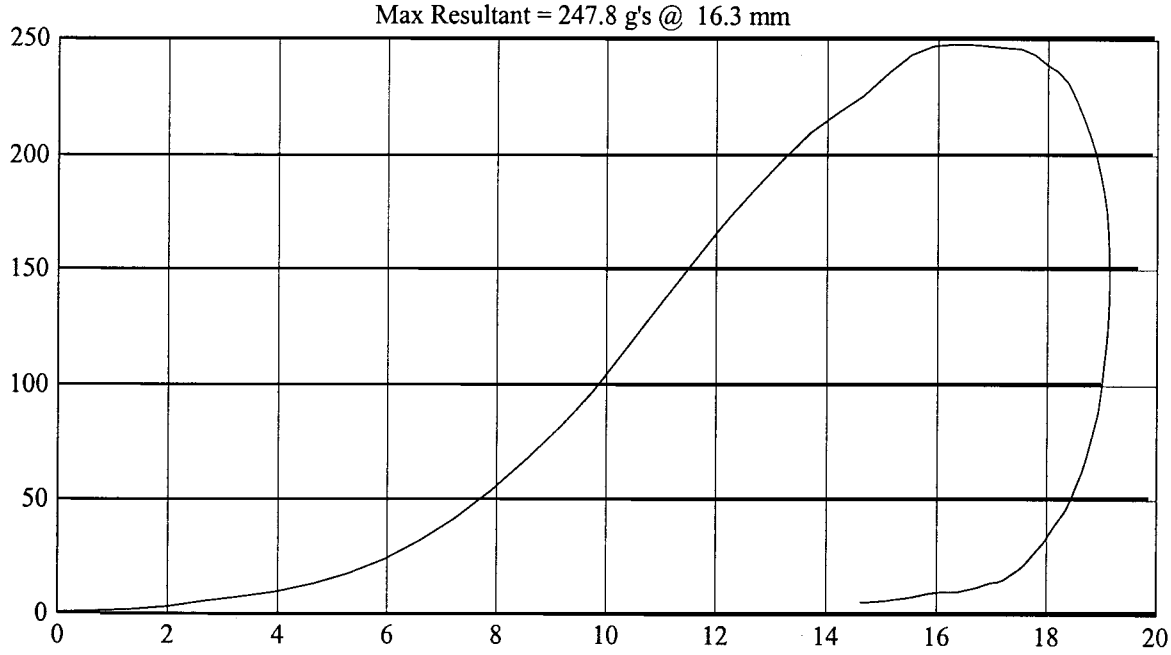
Customer: DODGE
Test # 6
FM4408
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/42

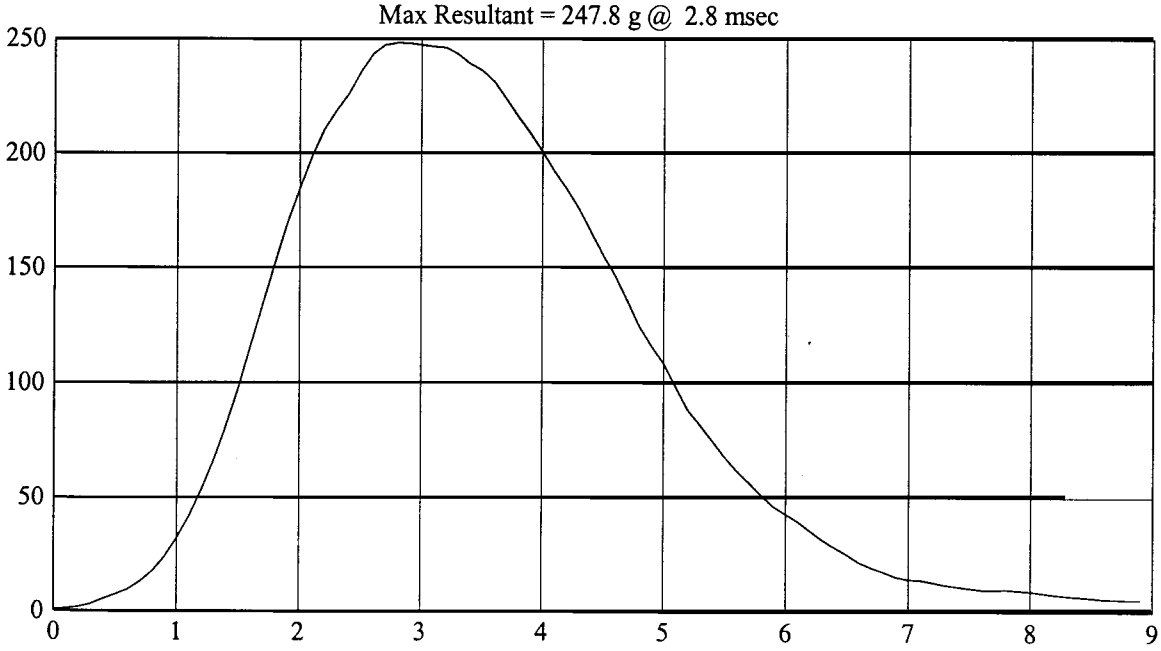
HIC(d) = 1597, HIC = 1896, Delta T = 3.2 msec

Max Resultant = 247.8 g's @ 16.3 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 247.8 g @ 2.8 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

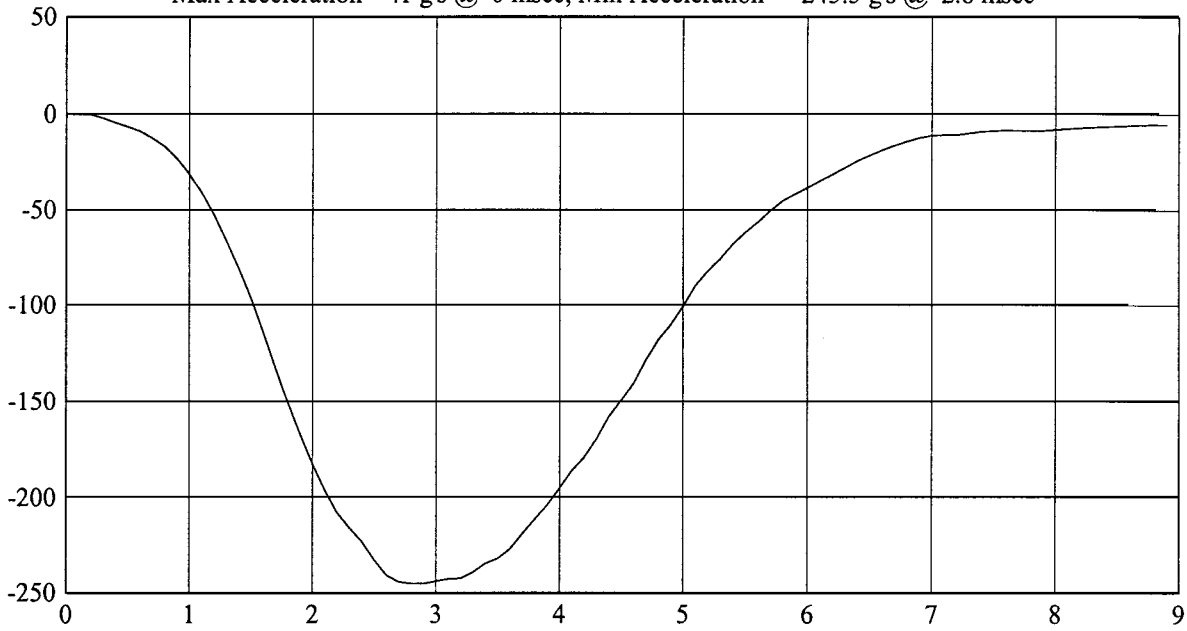
Customer: DODGE
Test # 6
FM4408
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/42

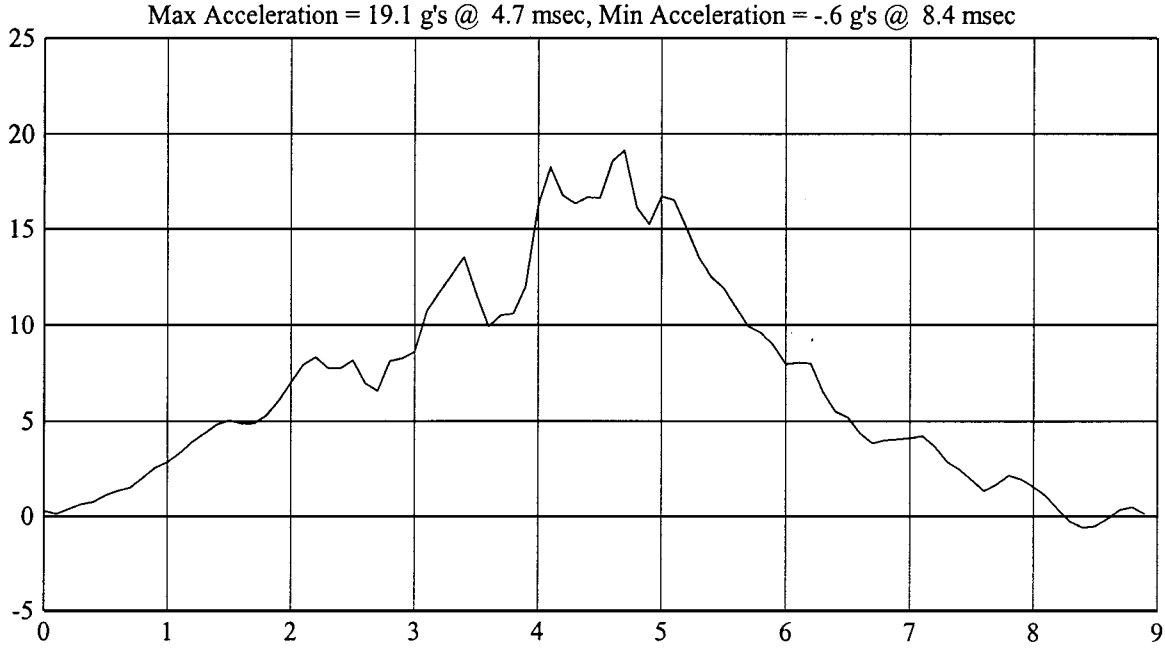
HIC(d) = 1597, HIC = 1896, Delta T = 3.2 msec

Max Acceleration =-.1 g's @ 0 msec, Min Acceleration = -245.5 g's @ 2.8 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 19.1 g's @ 4.7 msec, Min Acceleration = -.6 g's @ 8.4 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

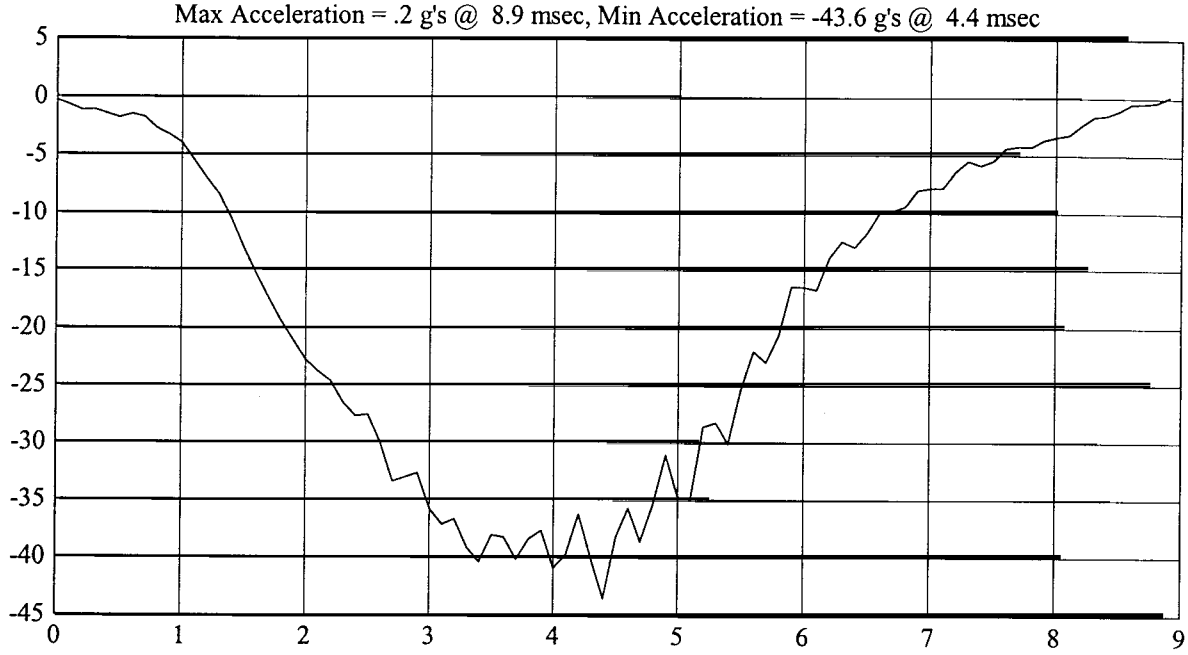
Customer: DODGE
Test # 6
FM4408
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/42

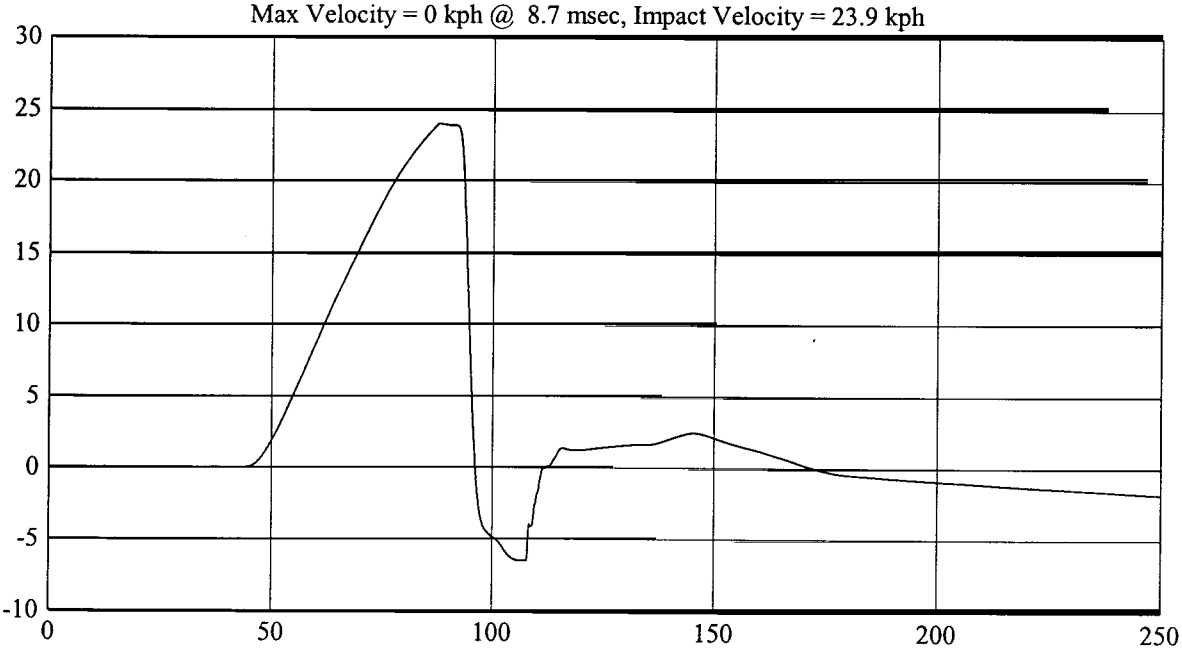
HIC(d) = 1597, HIC = 1896, Delta T = 3.2 msec

Max Acceleration = .2 g's @ 8.9 msec, Min Acceleration = -43.6 g's @ 4.4 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 8.7 msec, Impact Velocity = 23.9 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

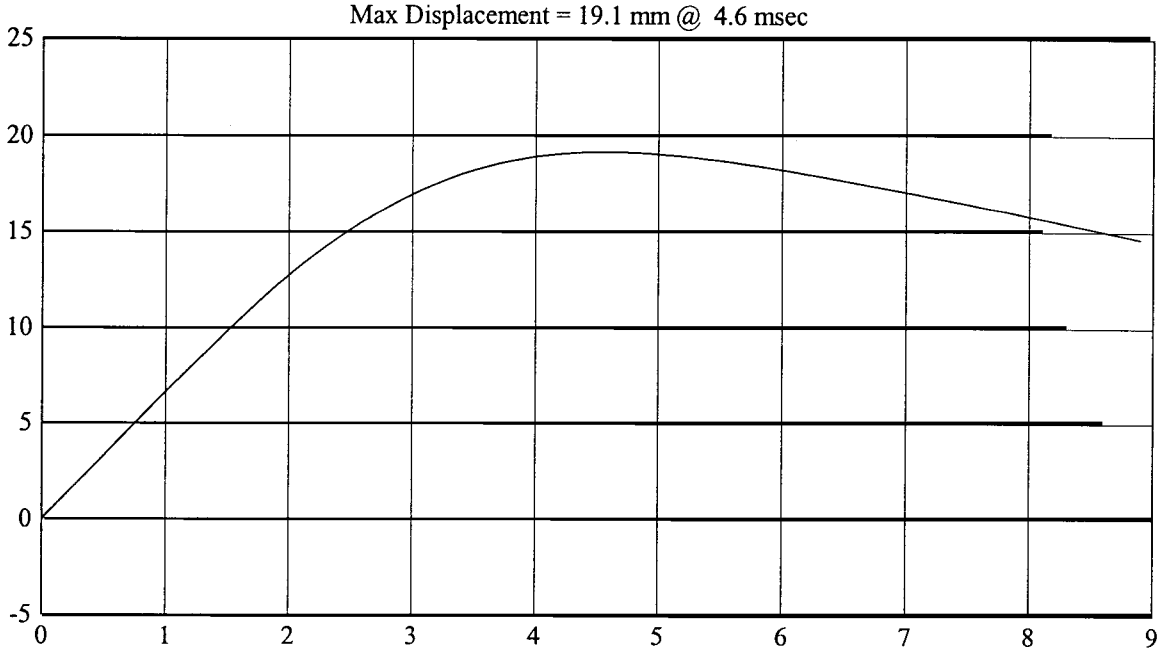
Customer: DODGE
Test # 6
FM4408
Additional Desc: N/A

Vehicle Program : CARAVAN

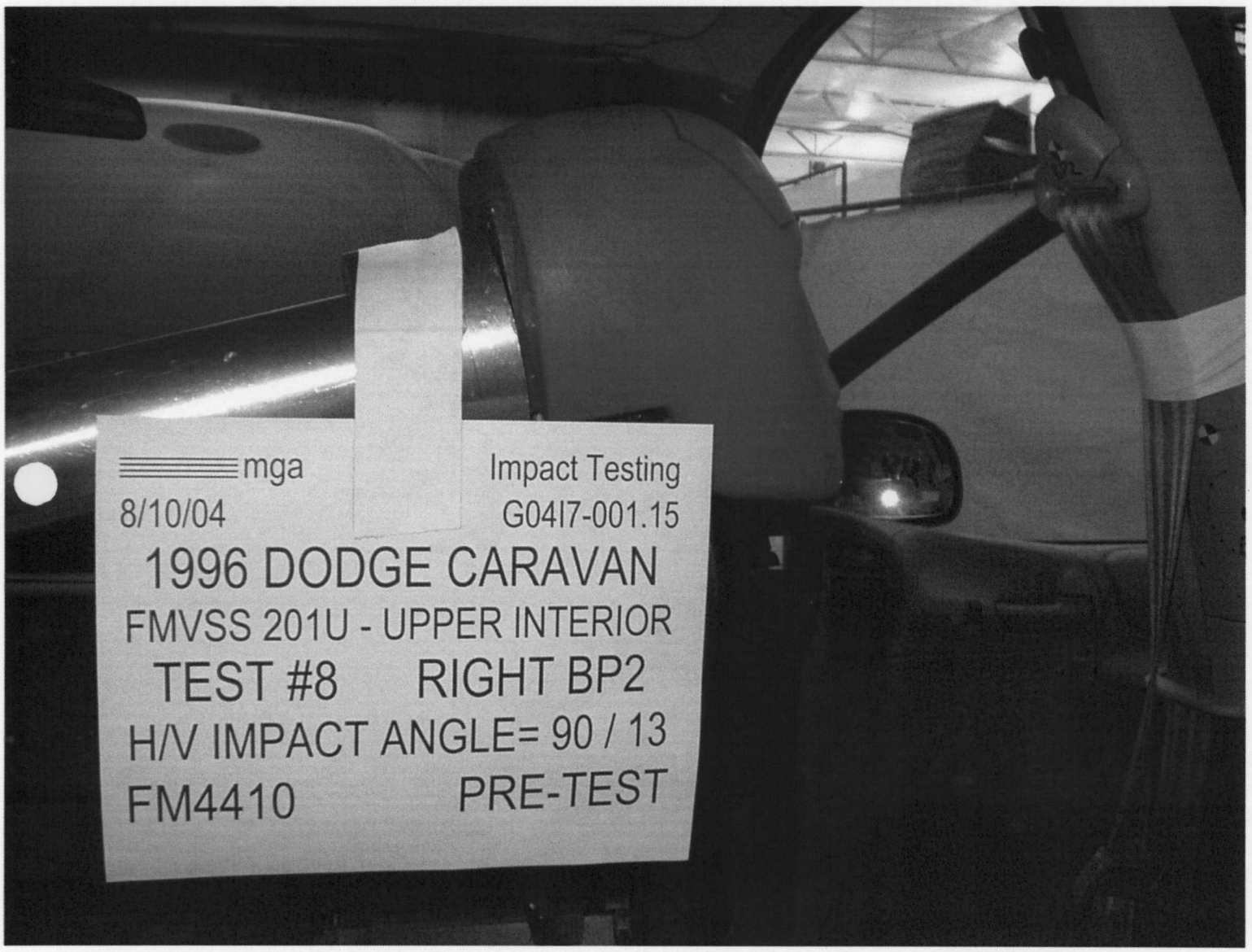
Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/42

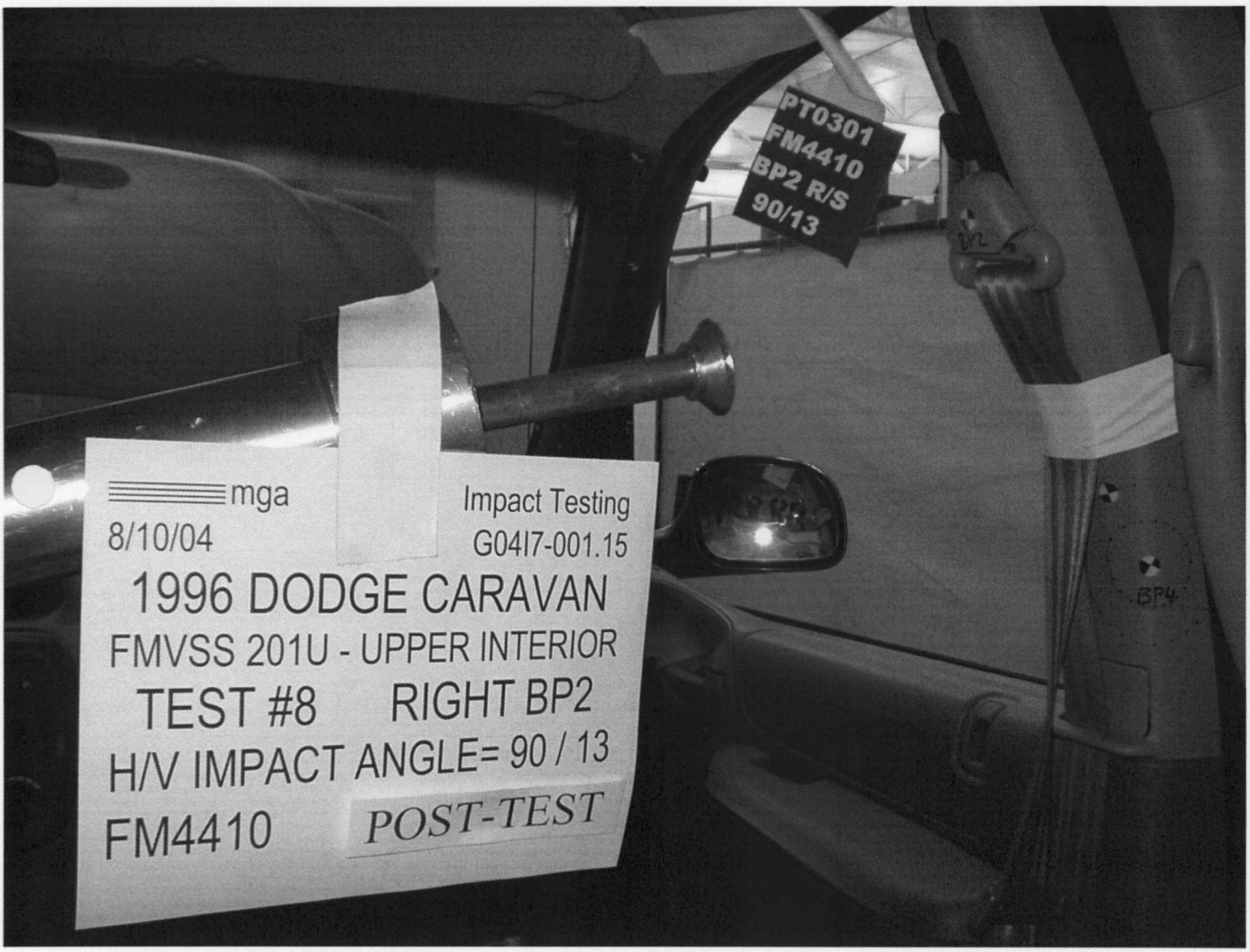
HIC(d) = 1597, HIC = 1896, Delta T = 3.2 msec

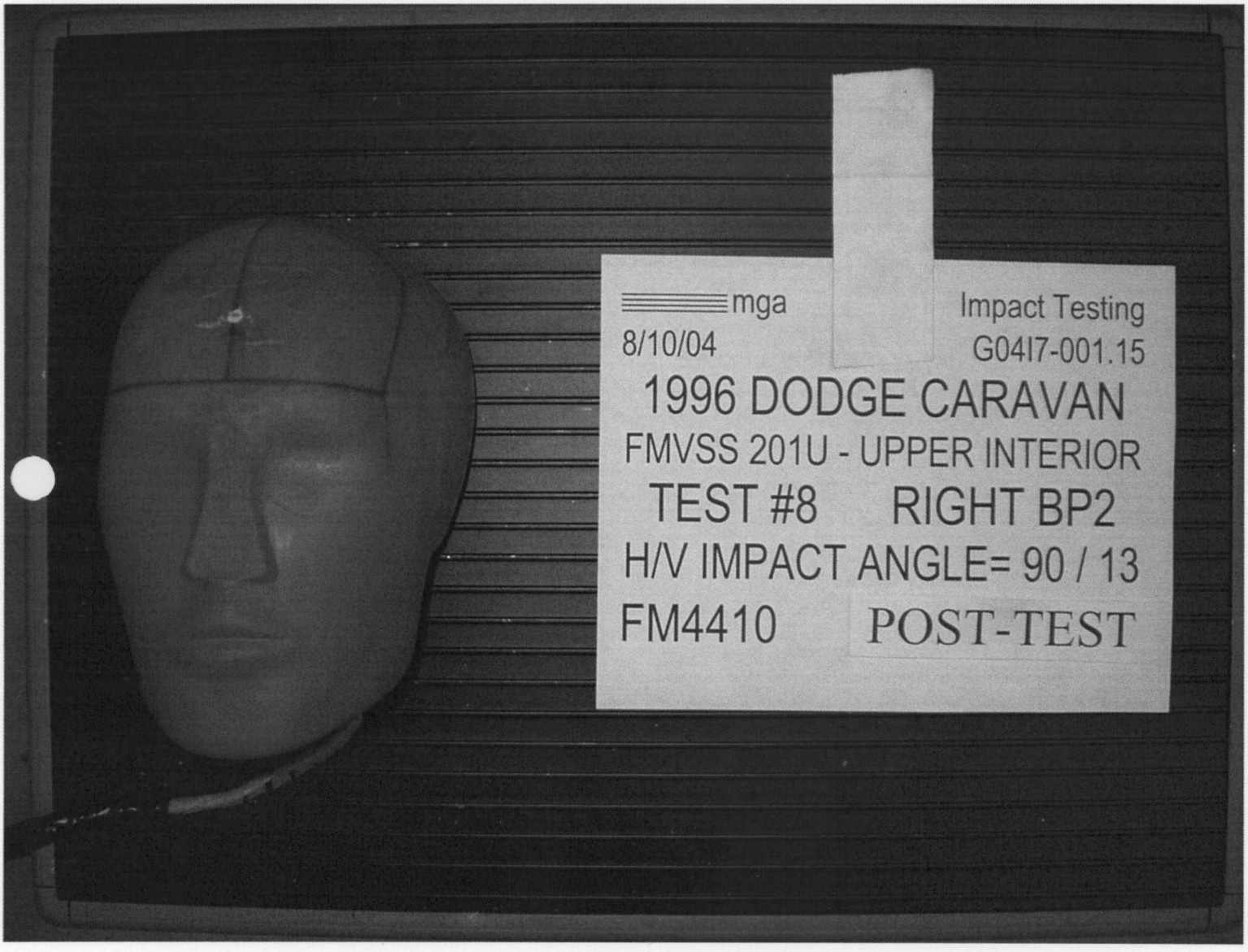
Max Displacement = 19.1 mm @ 4.6 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT BP2
H/V IMPACT ANGLE= 90 / 13
FM4410 PRE-TEST


PT0301
FM4410
BP2 R/S
90/13
mga
8/10/04
Impact Testing
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT BP2
H/V IMPACT ANGLE= 90 / 13
FM4410
POST-TEST
BP4


mga
8/10/04
Impact Testing
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT BP2
H/V IMPACT ANGLE= 90 / 13
FM4410
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP2 Right

MGA Test Reference No.:FM4410

Approach Horizontal Angles:90°

Approach Vertical Angles:13°

Test Number:#8

Temperature:22C

Humidity:56%

Time of Test:5:01 PM

FMH Serial No:037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
811	854	3.4	23.7	25	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-96.6	1.67	1.68
Y	6	J35841	92.5	1.54	1.54
Z	7	J35791	90	1.59	1.59

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

D-ring cover fractured.

Recorded By: _____ Approved By*: _____ Date: 8-10-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

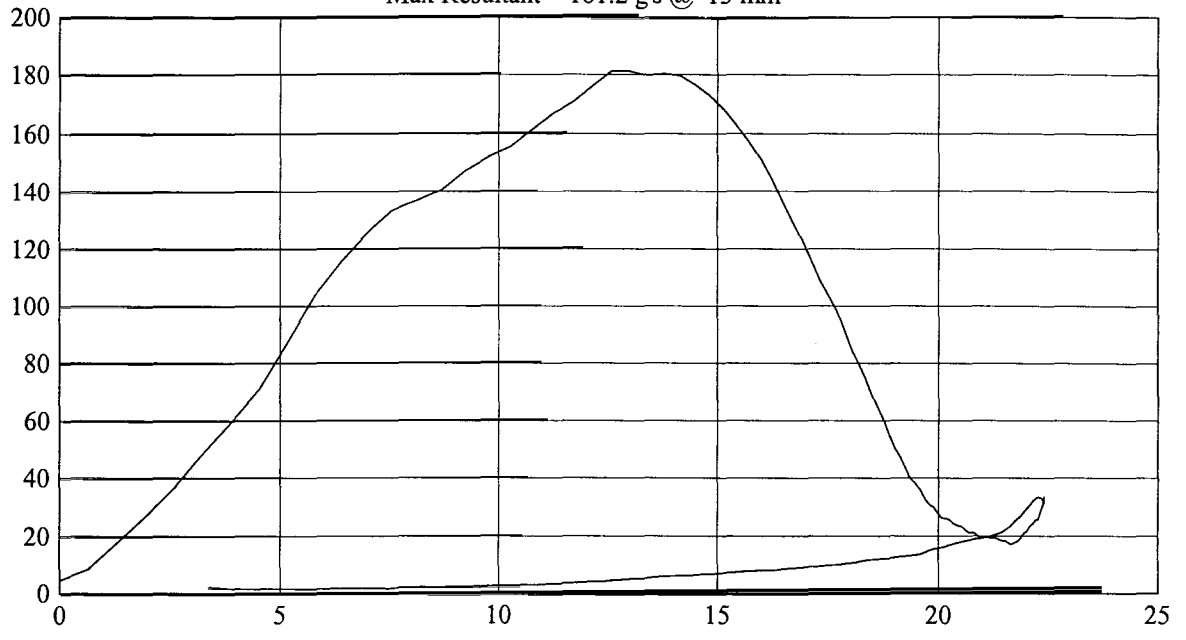
Customer: DODGE
Test # 8
FM4410
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/13

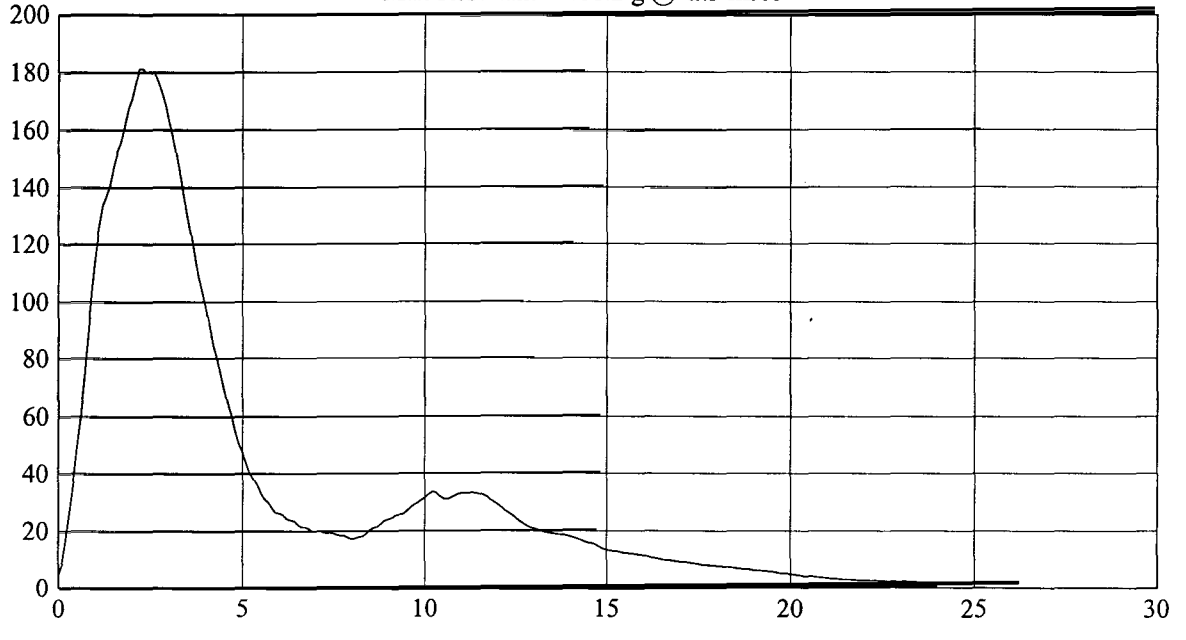
HIC(d) = 811, HIC = 854, Delta T = 3.4 msec

Max Resultant = 181.2 g's @ 13 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 181.2 g @ 2.3 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

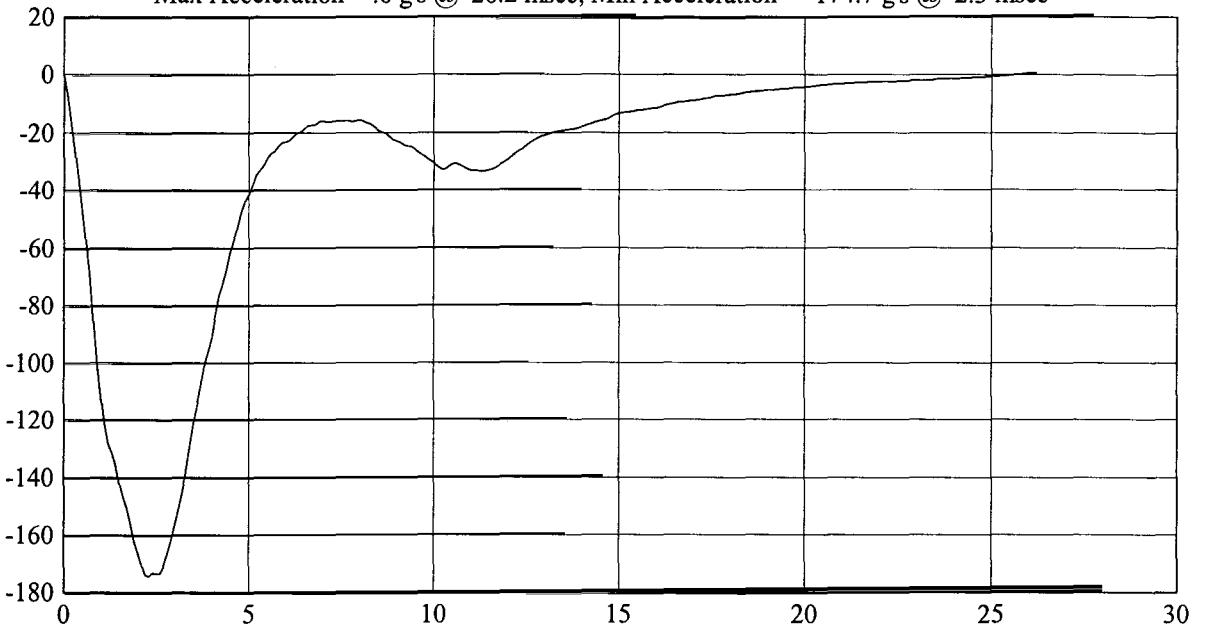
Customer: DODGE
Test # 8
FM4410
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/13

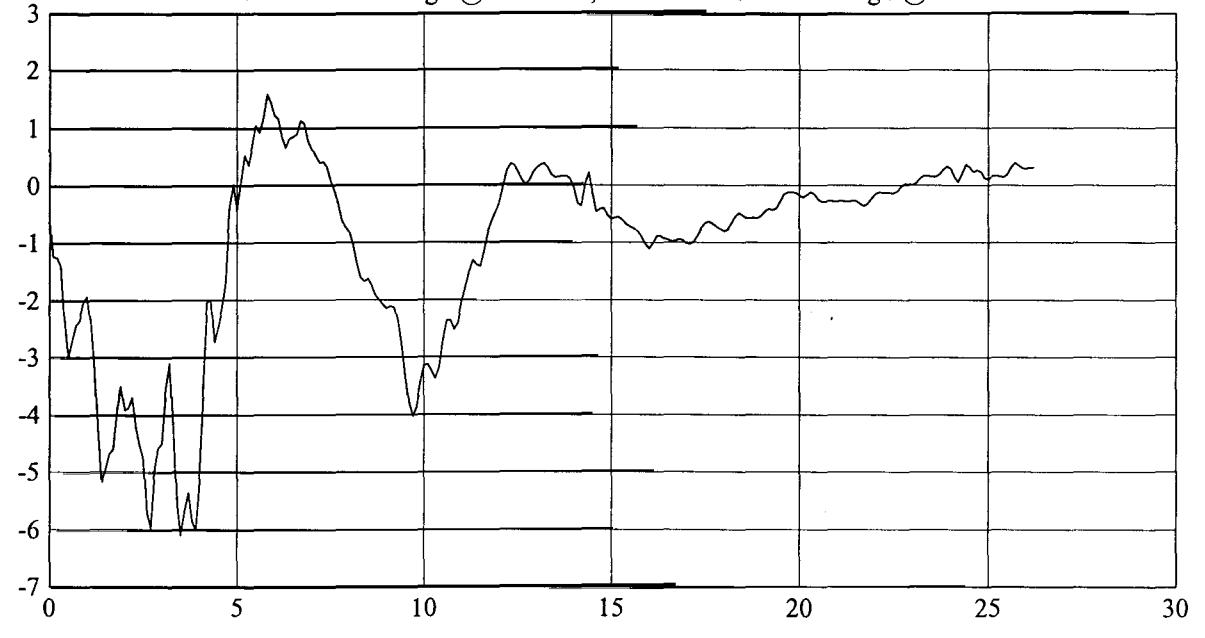
HIC(d) = 811, HIC = 854, Delta T = 3.4 msec

Max Acceleration = .6 g's @ 26.2 msec, Min Acceleration = -174.7 g's @ 2.3 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 1.6 g's @ 5.8 msec, Min Acceleration = -6.1 g's @ 3.5 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

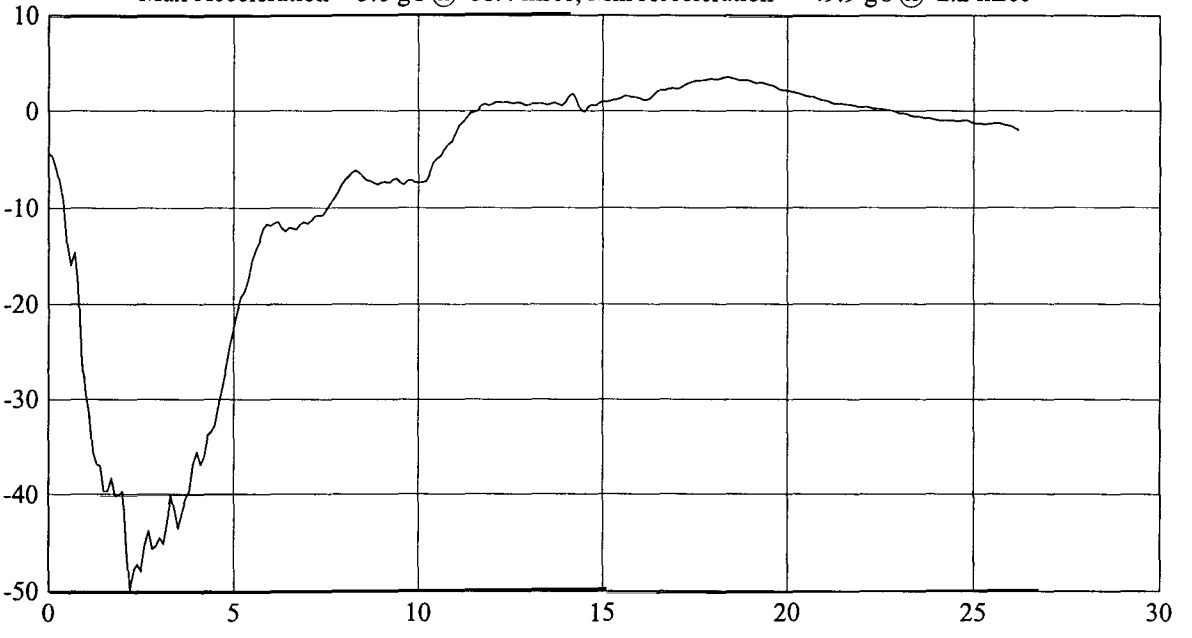
Customer: DODGE
Test # 8
FM4410
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/13

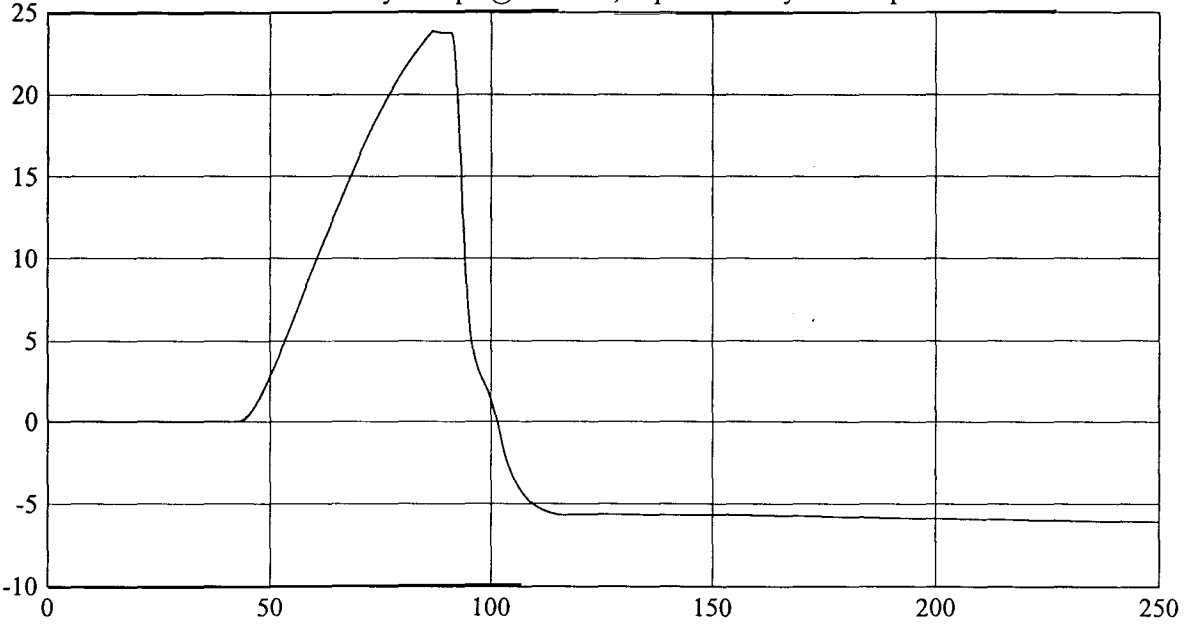
HIC(d) = 811, HIC = 854, Delta T = 3.4 msec

Max Acceleration = 3.6 g's @ 18.4 msec, Min Acceleration = -49.9 g's @ 2.2 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 26 msec, Impact Velocity = 23.7 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

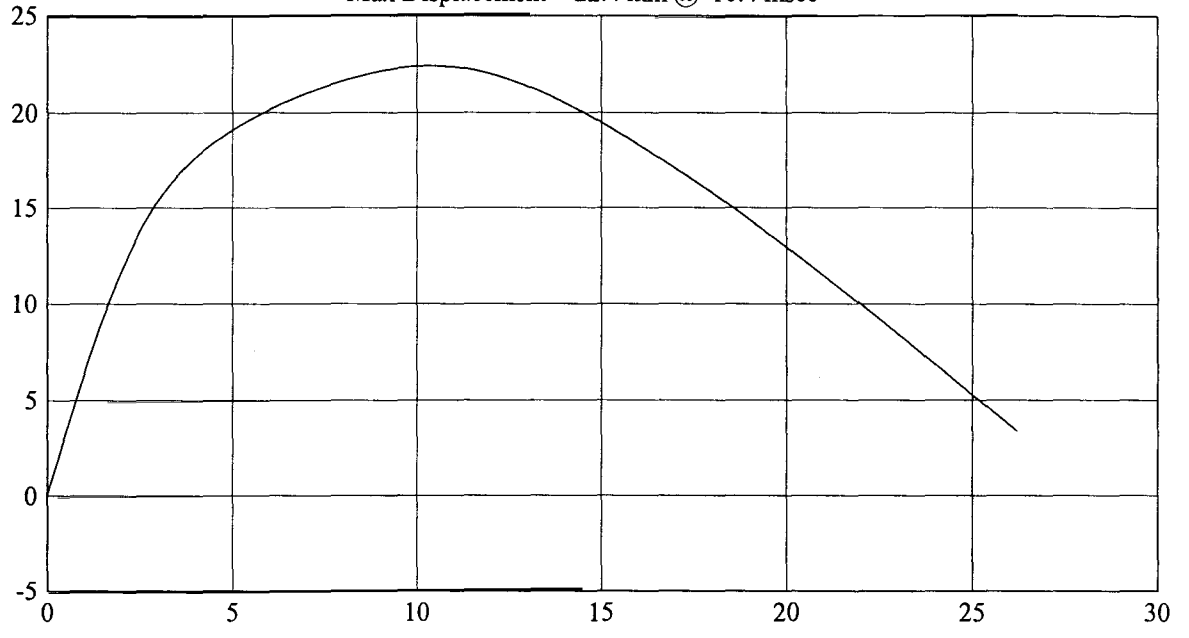
Customer: DODGE
Test # 8
FM4410
Additional Desc: N/A

Vehicle Program : CARAVAN

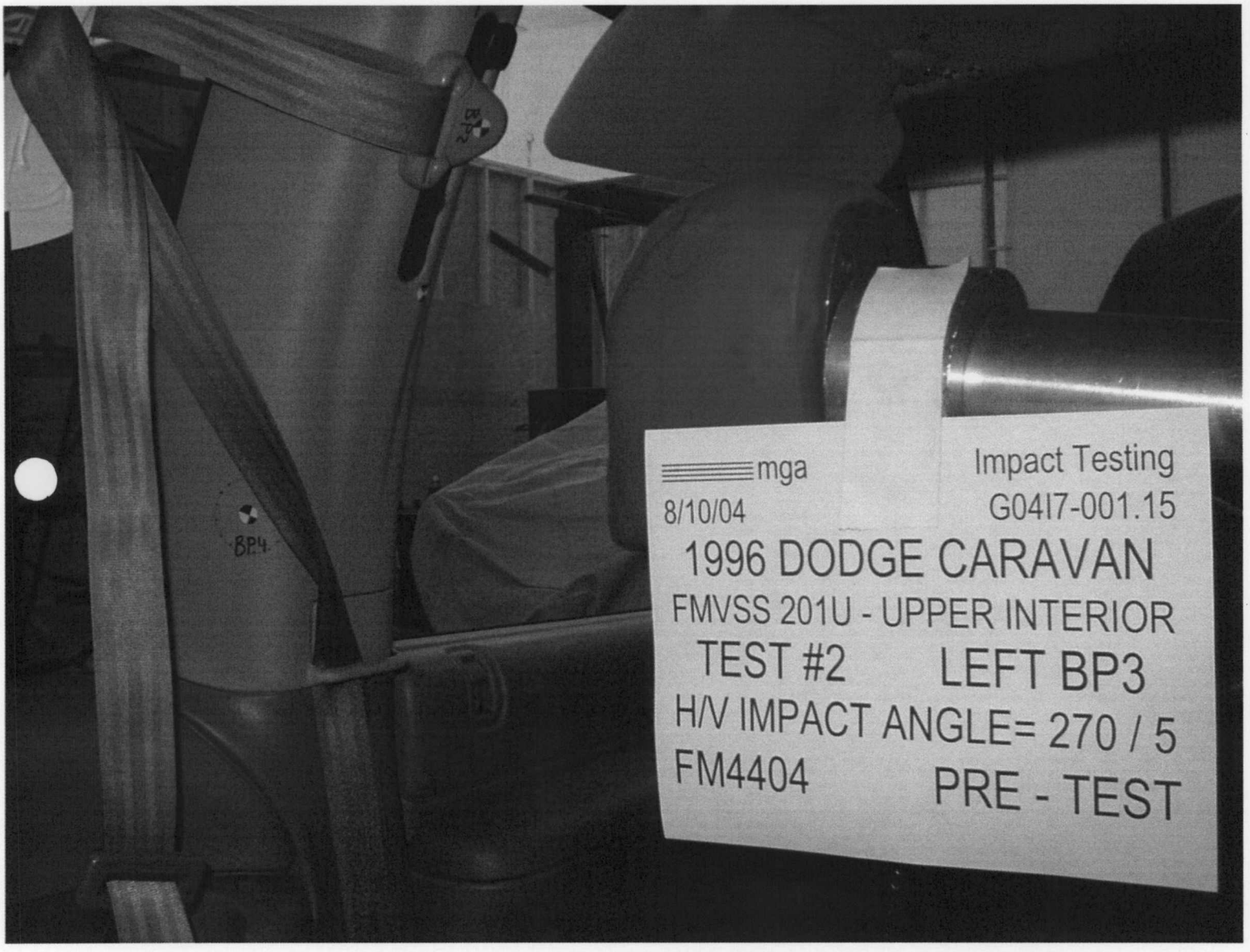
Model Year: 1996
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/13

HIC(d) = 811, HIC = 854, Delta T = 3.4 msec

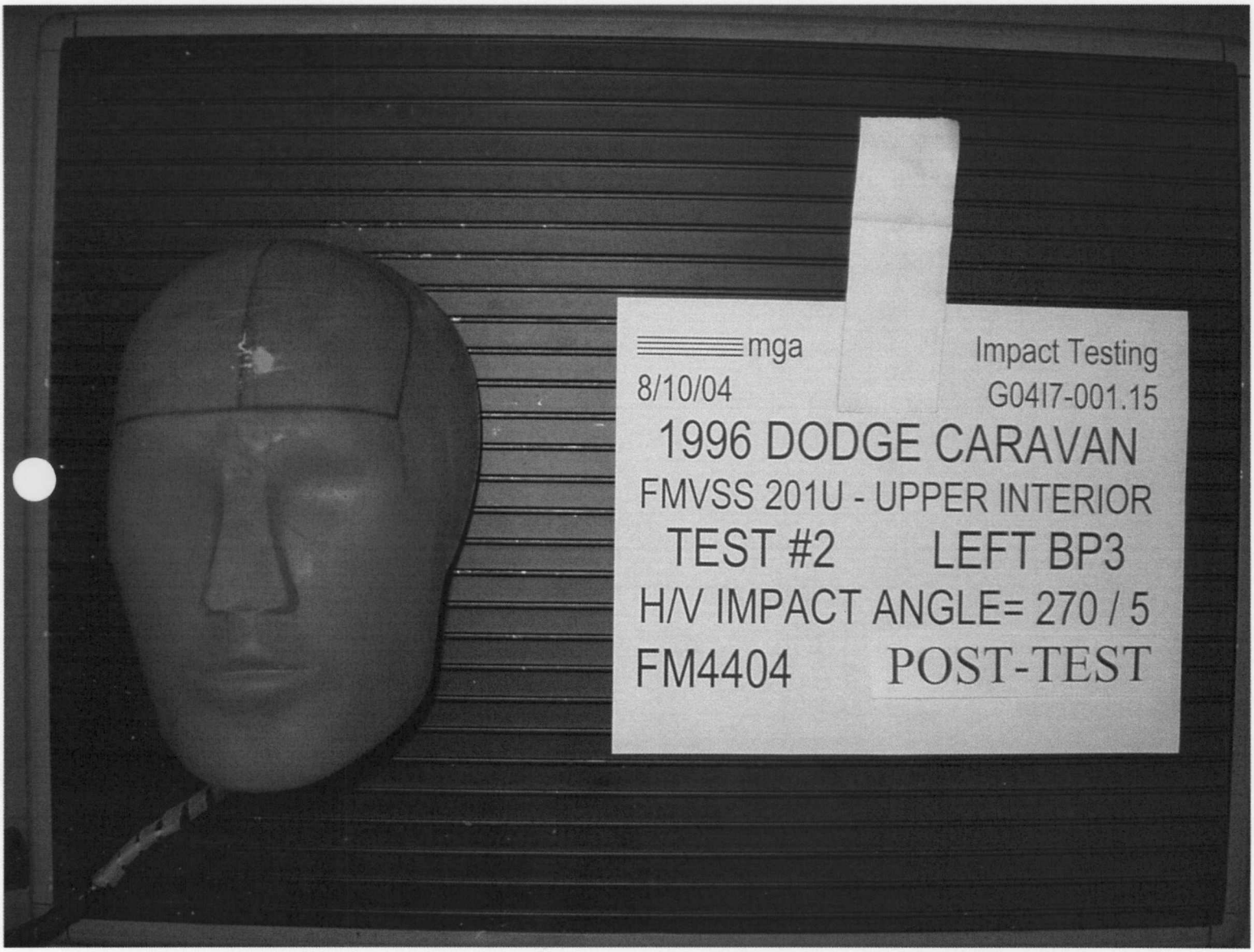
Max Displacement = 22.4 mm @ 10.4 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #2
LEFT BP3
H/V IMPACT ANGLE= 270 / 5
FM4404
PRE - TEST
BP4


PT0301
FM4404
BP3 L/S
270/5
BP4
mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #2
LEFT BP3
H/V IMPACT ANGLE= 270 / 5
FM4404
POST-TEST


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #2
LEFT BP3
H/V IMPACT ANGLE= 270 / 5
FM4404
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP3 Left

MGA Test Reference No.:FM4404

Approach Horizontal Angles:270°

Approach Vertical Angles:5°

Test Number:#2

Temperature:22C

Humidity:53%

Time of Test:10:00 AM

FMH Serial No:037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
707	716	5.2	23.5	17	8 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-96.6	1.68	1.68
Y	6	J35841	92.5	1.54	1.54
Z	7	J35791	90	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 8-10-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

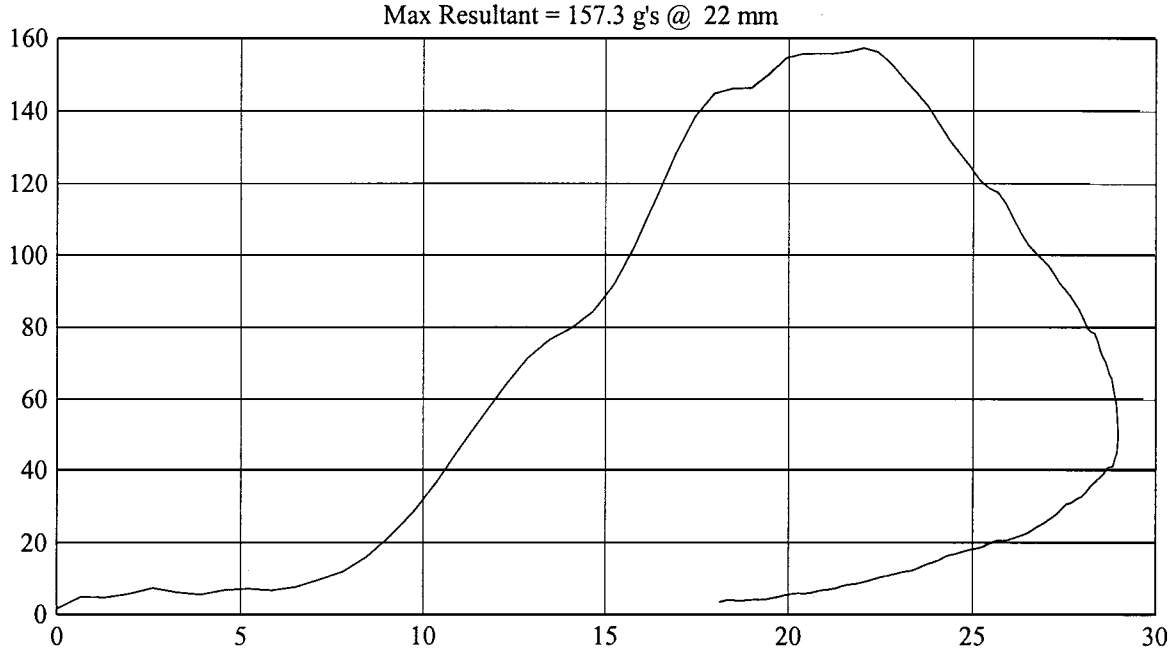
Customer: DODGE
Test # 2
FM4404
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/5

HIC(d) = 707, HIC = 716, Delta T = 5.2 msec

Max Resultant = 157.3 g's @ 22 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 157.3 g @ 3.8 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

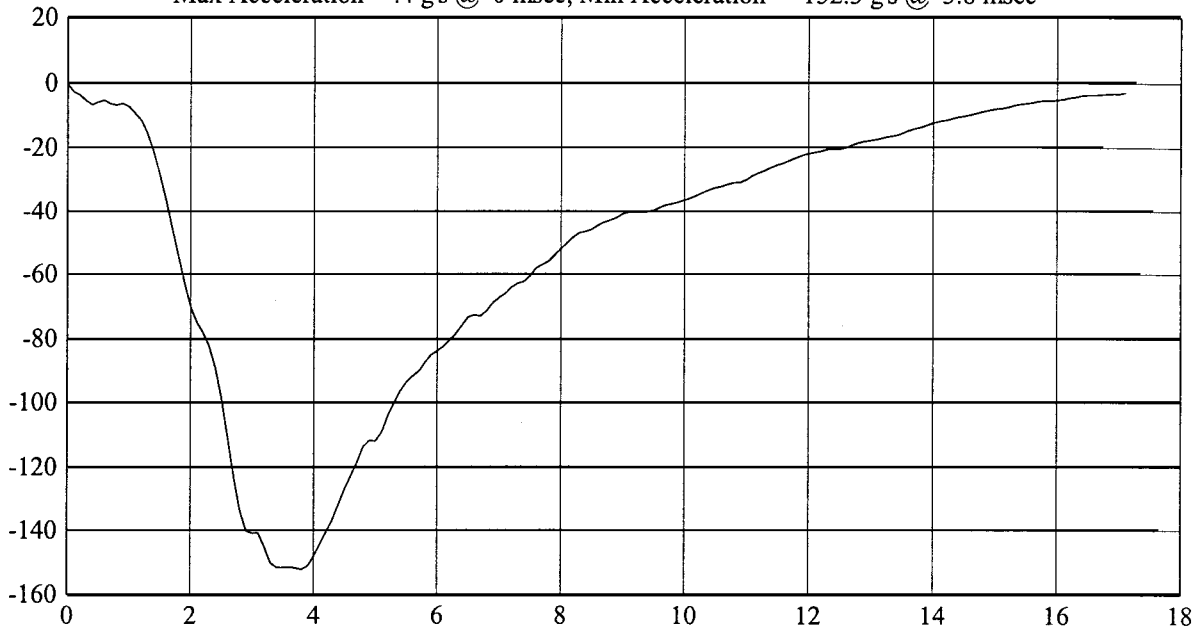
Customer: DODGE
Test # 2
FM4404
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/5

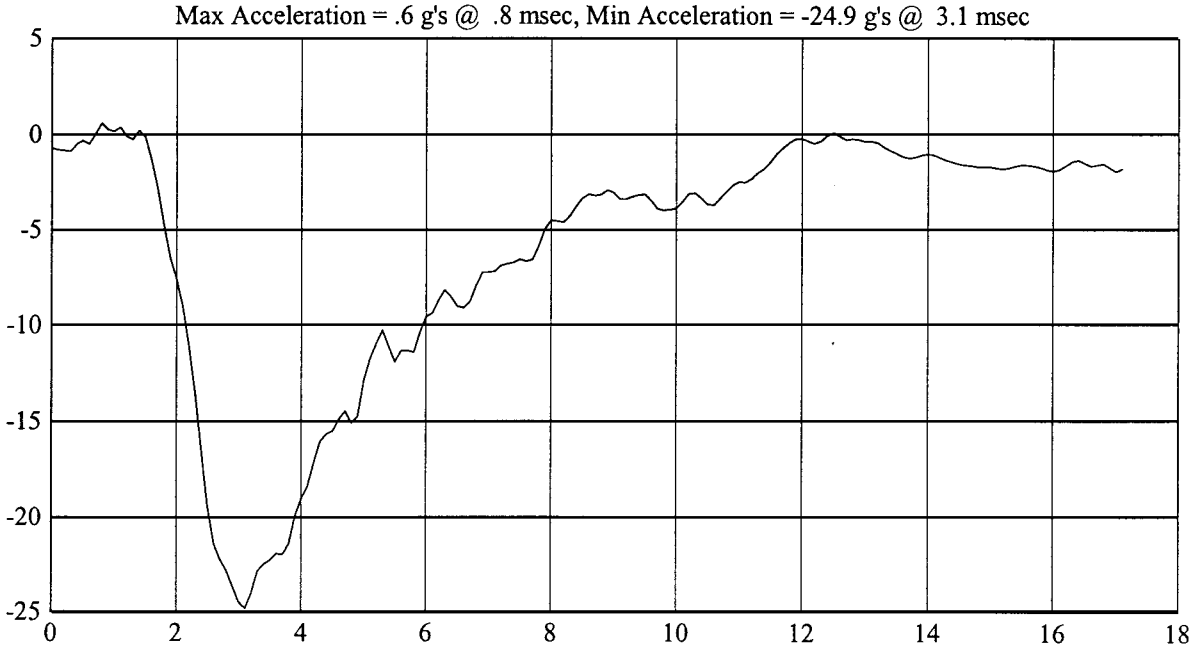
HIC(d) = 707, HIC = 716, Delta T = 5.2 msec

Max Acceleration =-.4 g's @ 0 msec, Min Acceleration = -152.3 g's @ 3.8 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = .6 g's @ .8 msec, Min Acceleration = -24.9 g's @ 3.1 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

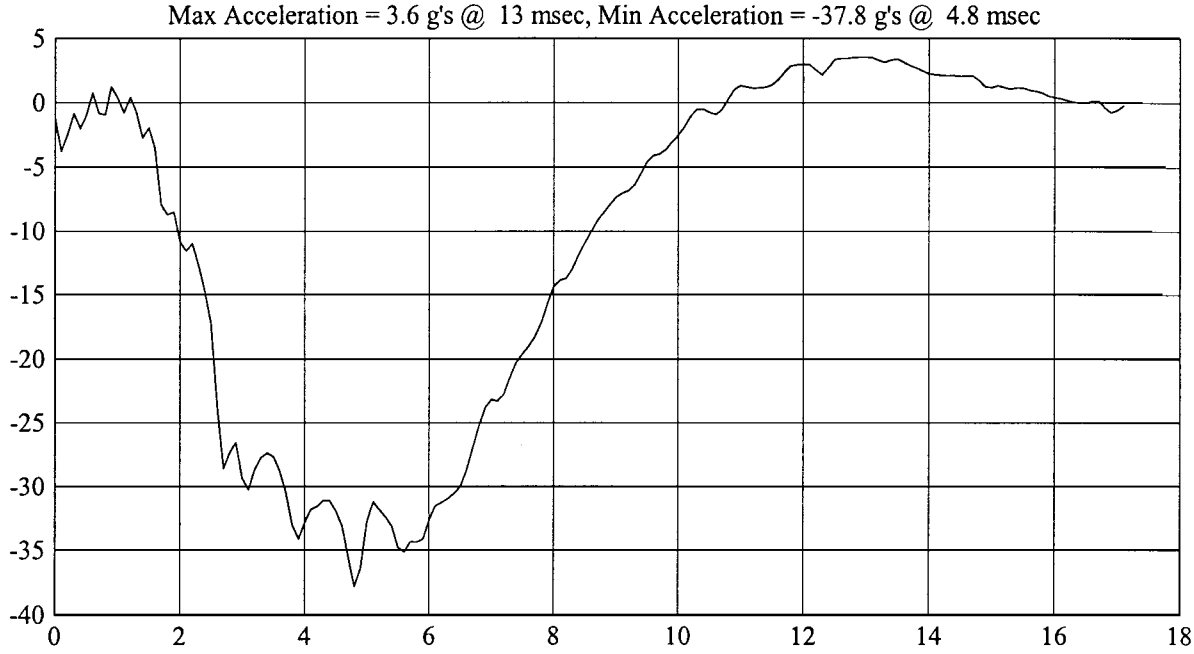
Customer: DODGE
Test # 2
FM4404
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/5

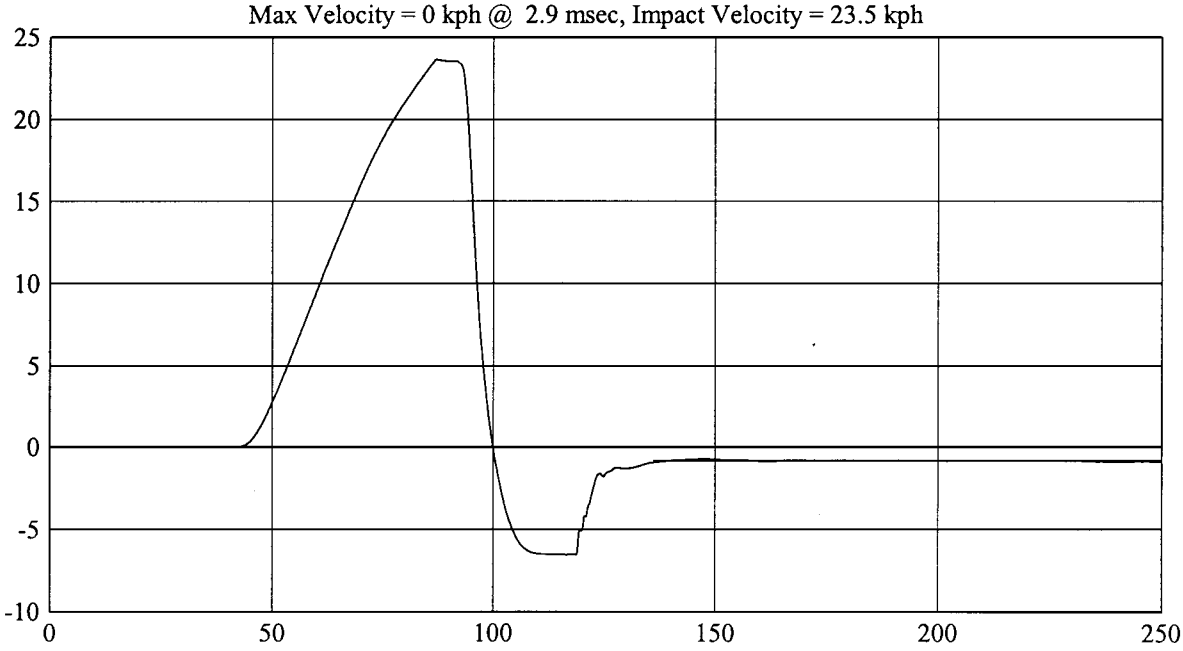
HIC(d) = 707, HIC = 716, Delta T = 5.2 msec

Max Acceleration = 3.6 g's @ 13 msec, Min Acceleration = -37.8 g's @ 4.8 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 2.9 msec, Impact Velocity = 23.5 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

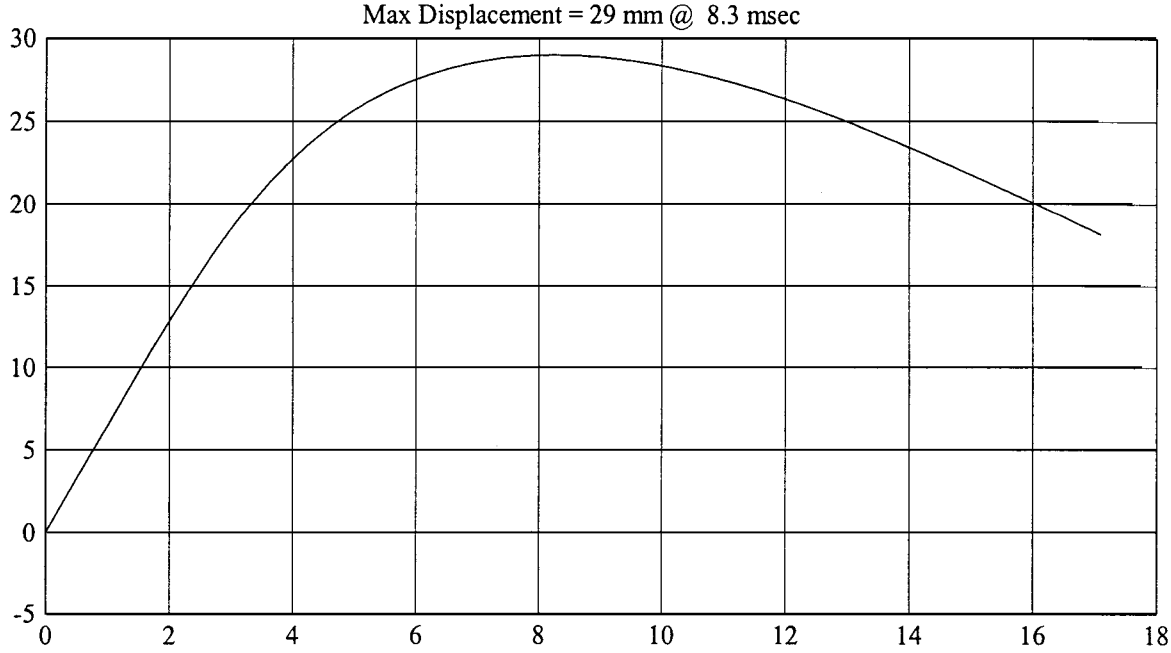
Customer: DODGE
Test # 2
FM4404
Additional Desc: N/A

Vehicle Program : CARAVAN

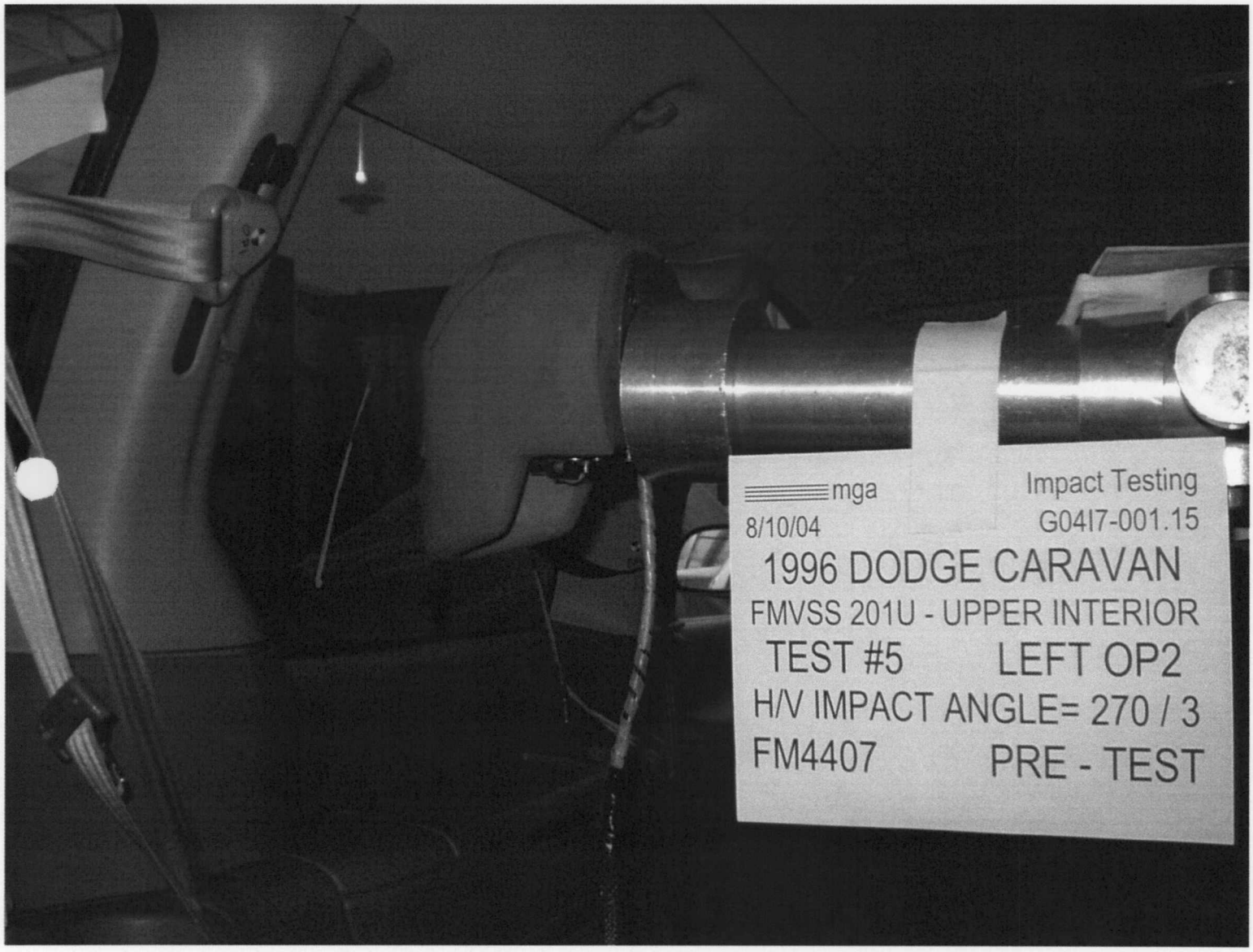
Model Year: 1996
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 270/5

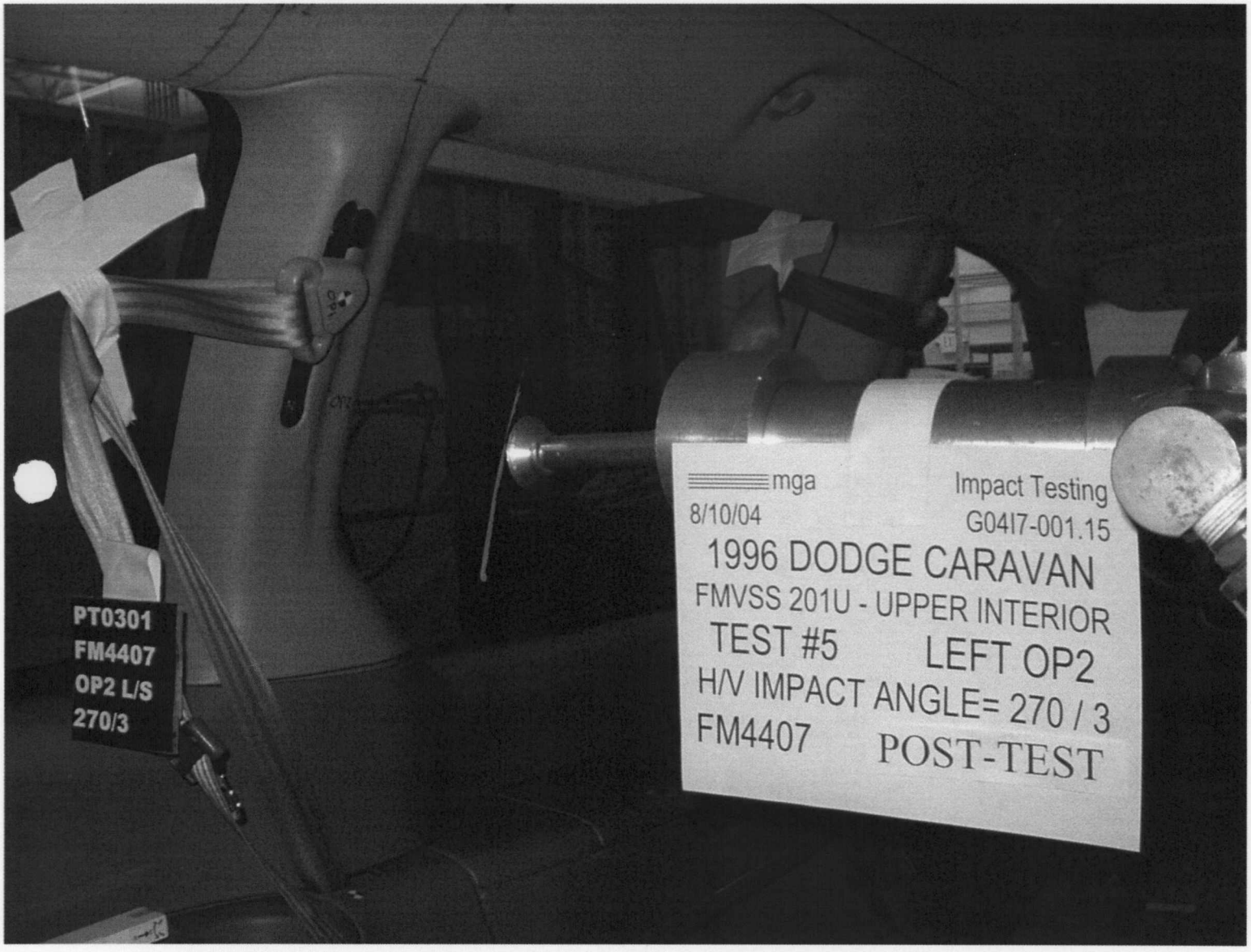
HIC(d) = 707, HIC = 716, Delta T = 5.2 msec

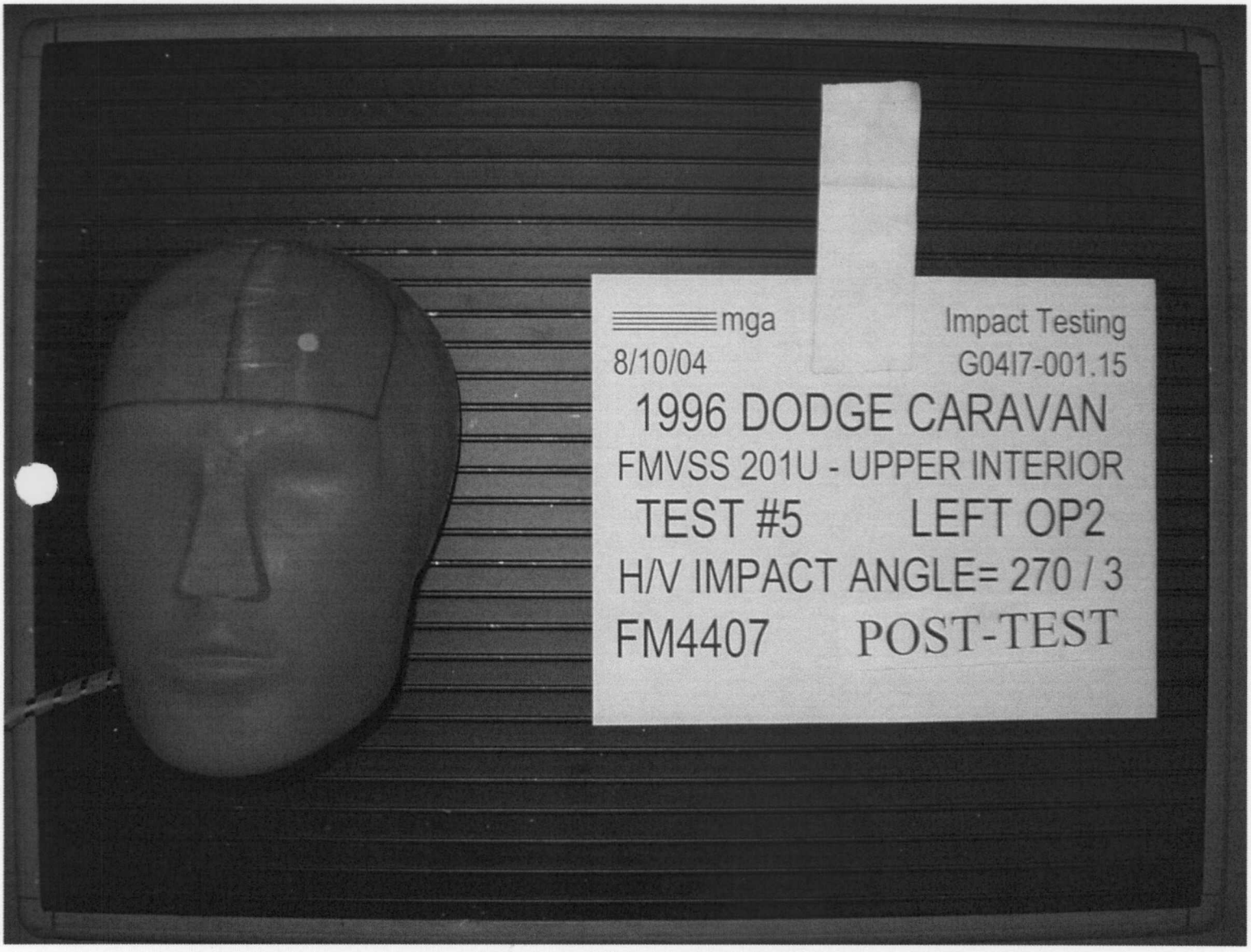
Max Displacement = 29 mm @ 8.3 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #5
LEFT OP2
H/V IMPACT ANGLE= 270 / 3
FM4407
PRE - TEST


PT0301
FM4407
OP2 L/S
270/3
mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #5
LEFT OP2
H/V IMPACT ANGLE= 270 / 3
FM4407
POST-TEST


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #5
LEFT OP2
H/V IMPACT ANGLE= 270 / 3
FM4407
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): OP2 Left

MGA Test Reference No.:FM4407

Approach Horizontal Angles:270°

Approach Vertical Angles:3°

Test Number:#5

Temperature:22C

Humidity:53%

Time of Test:1:00 PM

FMH Serial No:037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
716	729	6.6	24.0	25	30 L

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-96.6	1.68	1.68
Y	6	J35841	92.5	1.54	1.54
Z	7	J35791	90	1.59	1.59

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

Cracked the plastic trim on pillar

Recorded By: _____ Approved By*: _____ Date: 03-10-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

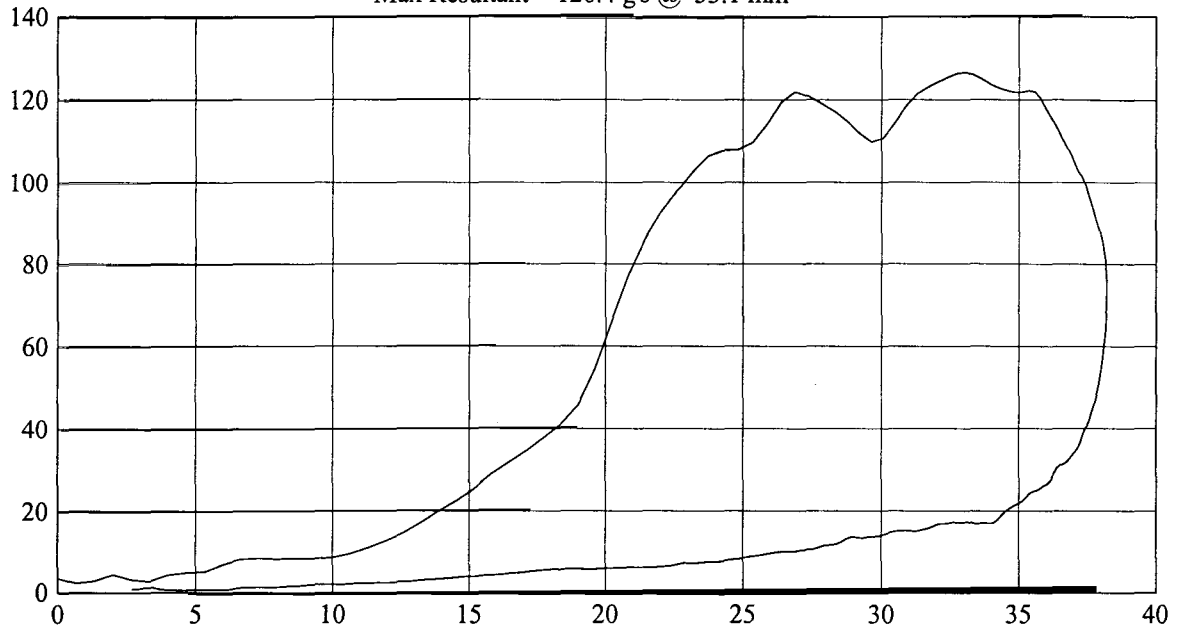
Customer: DODGE
Test # 5
FM4407
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: OP2
Vehicle Side: Left
Horz/Vert Angle: 270/3

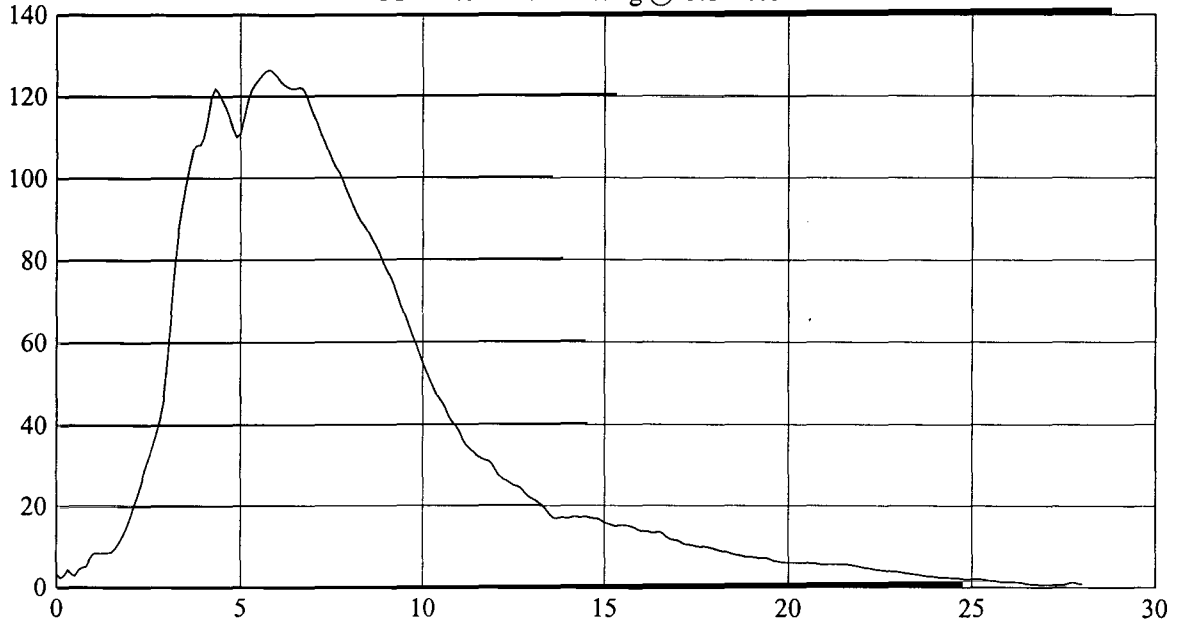
HIC(d) = 716, HIC = 729, Delta T = 6.6 msec

Max Resultant = 126.4 g's @ 33.1 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 126.4 g @ 5.8 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

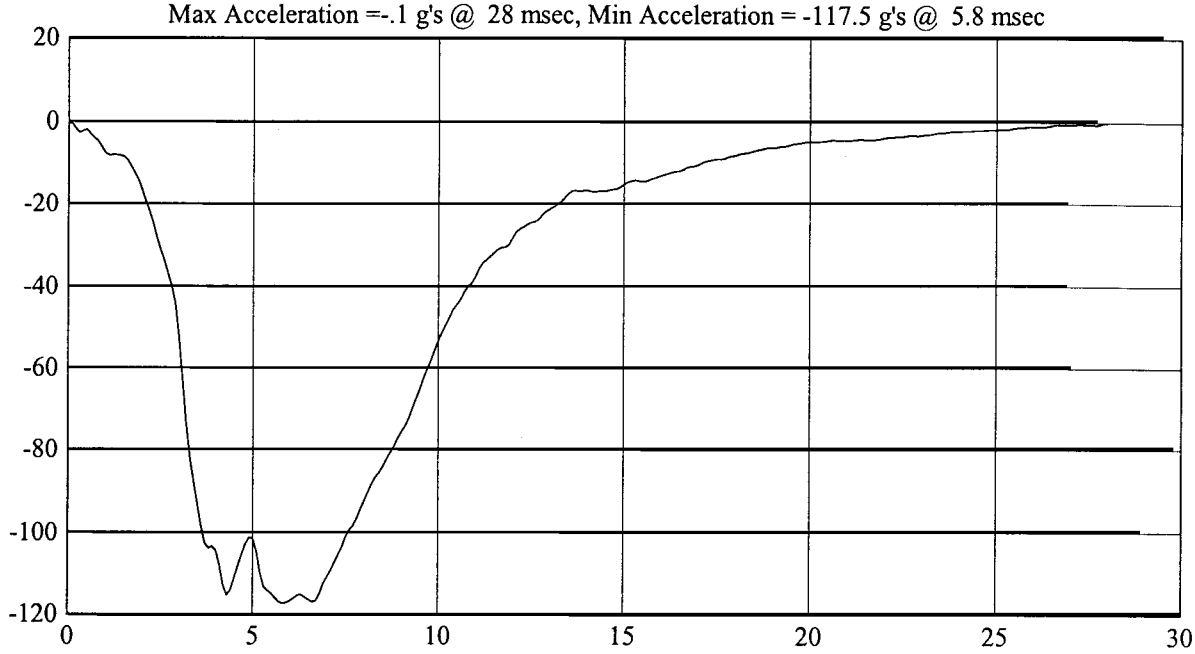
Customer: DODGE
Test # 5
FM4407
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: OP2
Vehicle Side: Left
Horz/Vert Angle: 270/3

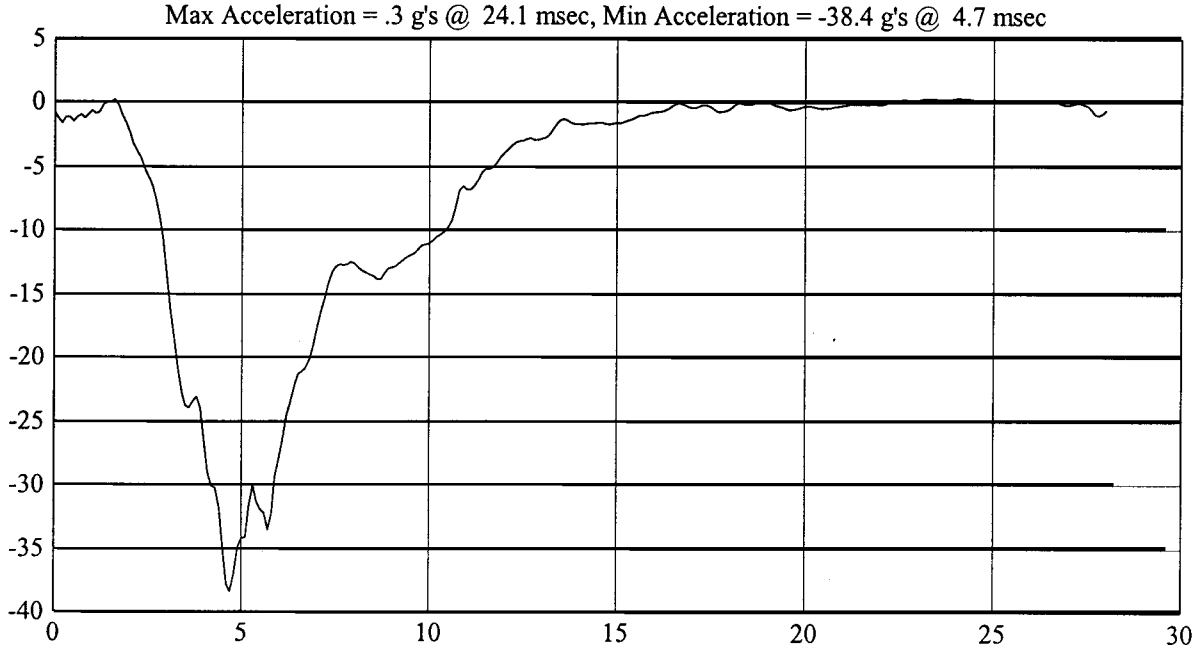
HIC(d) = 716, HIC = 729, Delta T = 6.6 msec

Max Acceleration =-.1 g's @ 28 msec, Min Acceleration = -117.5 g's @ 5.8 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = .3 g's @ 24.1 msec, Min Acceleration = -38.4 g's @ 4.7 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

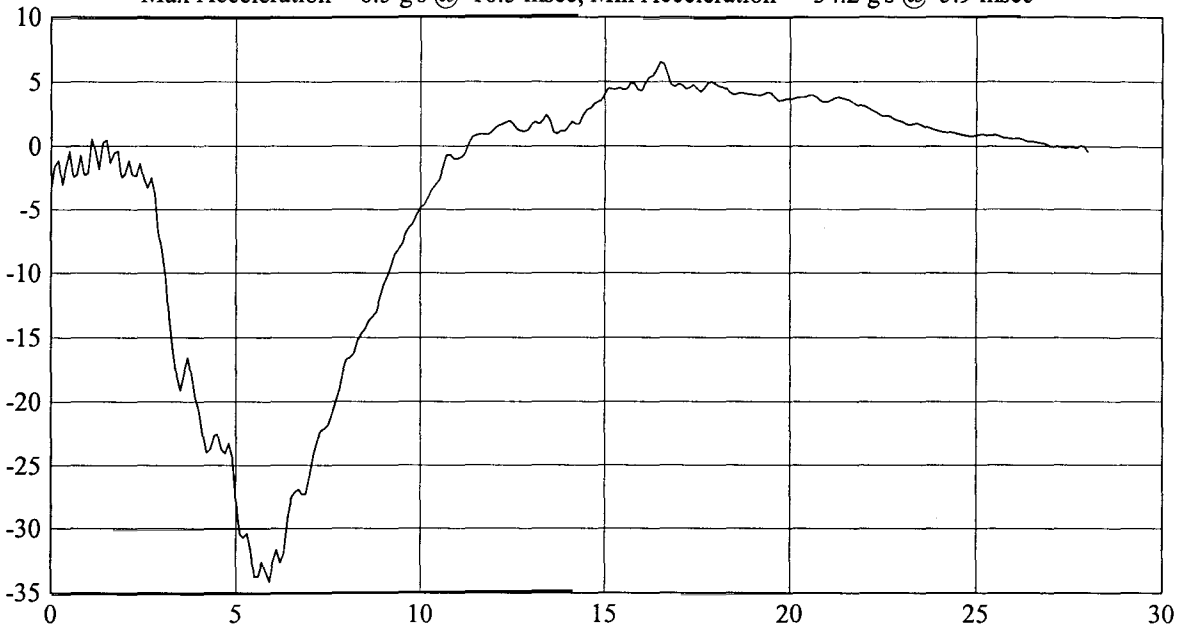
Customer: DODGE
Test # 5
FM4407
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: OP2
Vehicle Side: Left
Horz/Vert Angle: 270/3

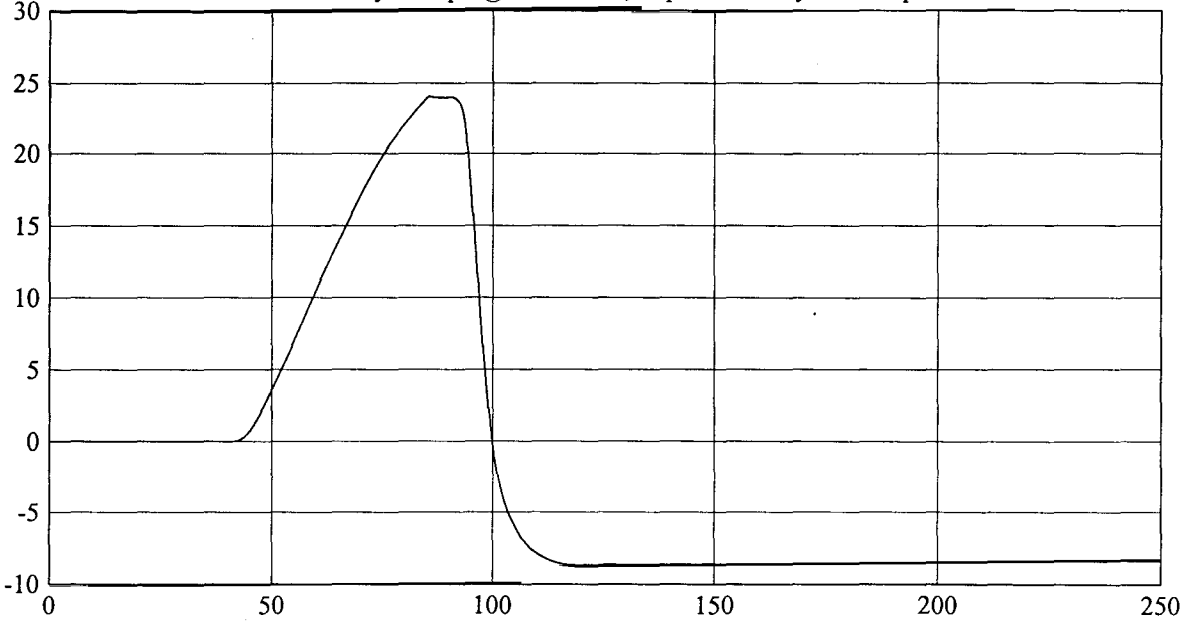
HIC(d) = 716, HIC = 729, Delta T = 6.6 msec

Max Acceleration = 6.5 g's @ 16.5 msec, Min Acceleration = -34.2 g's @ 5.9 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 21.1 msec, Impact Velocity = 24.0 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

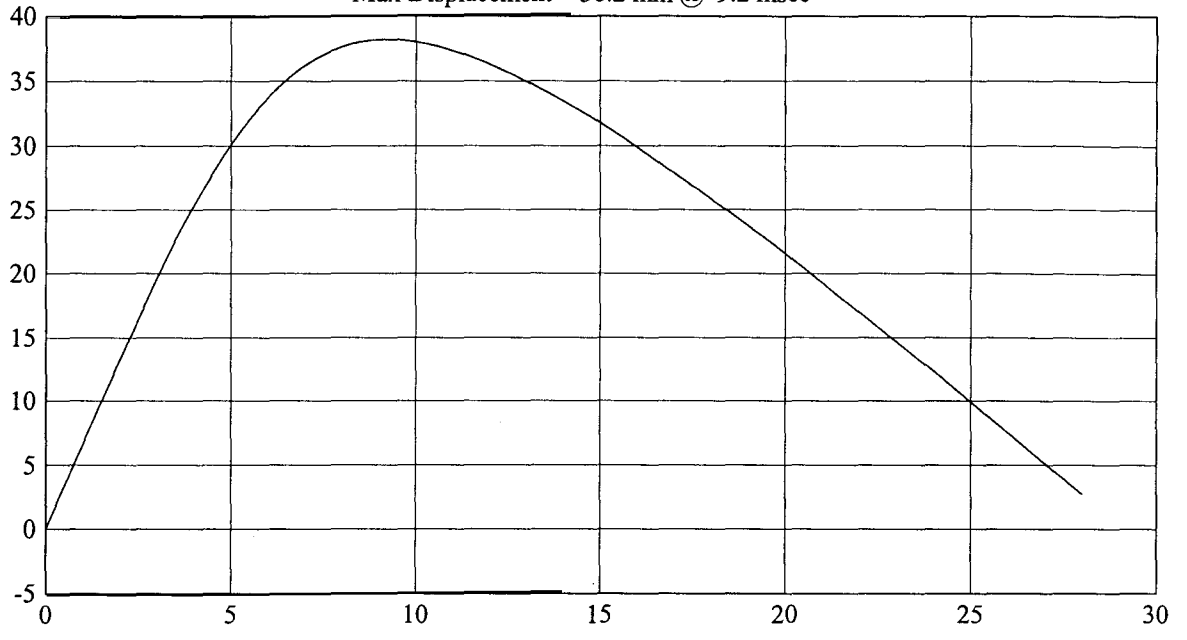
Customer: DODGE
Test # 5
FM4407
Additional Desc: N/A

Vehicle Program : CARAVAN

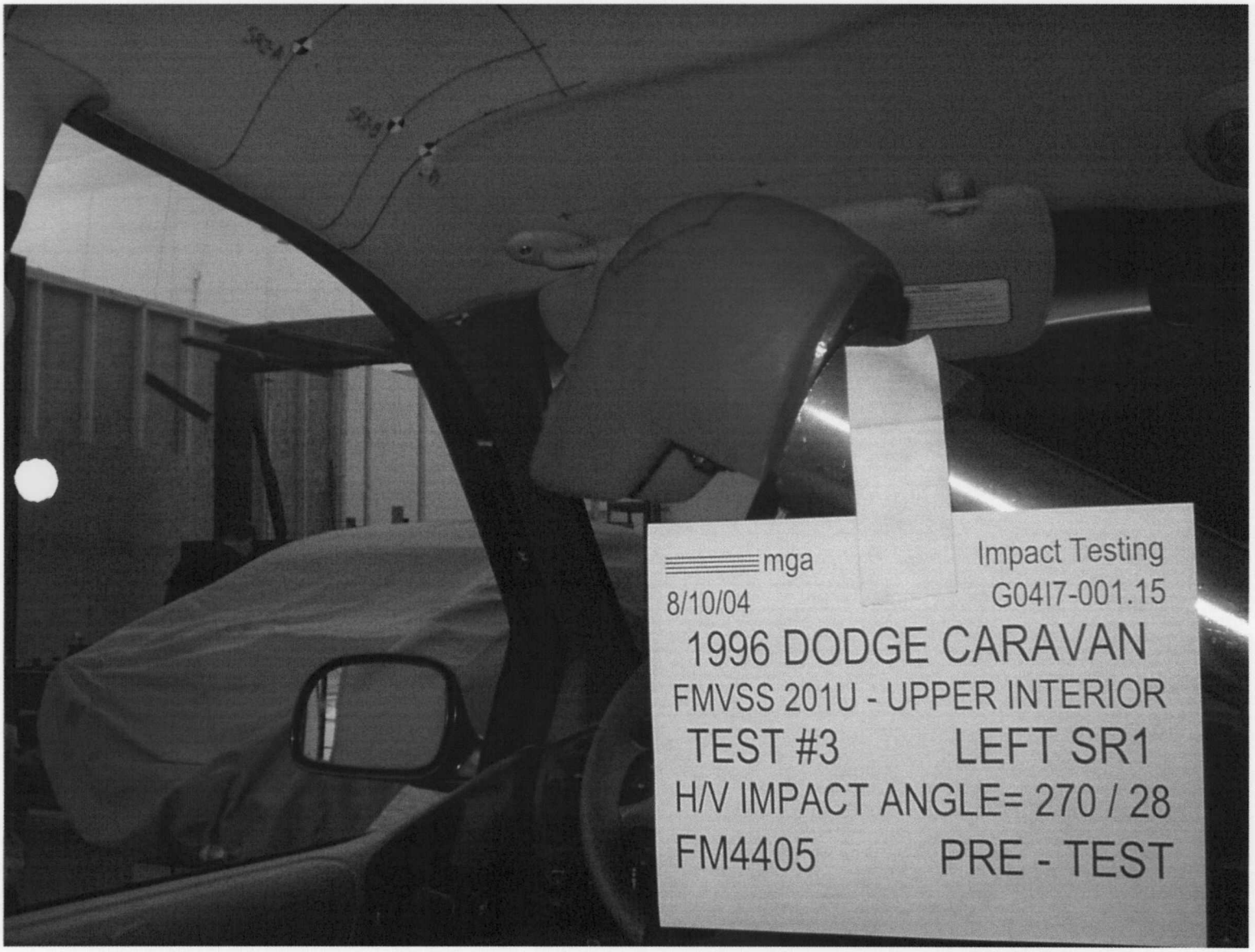
Model Year: 1996
Target: OP2
Vehicle Side: Left
Horz/Vert Angle: 270/3

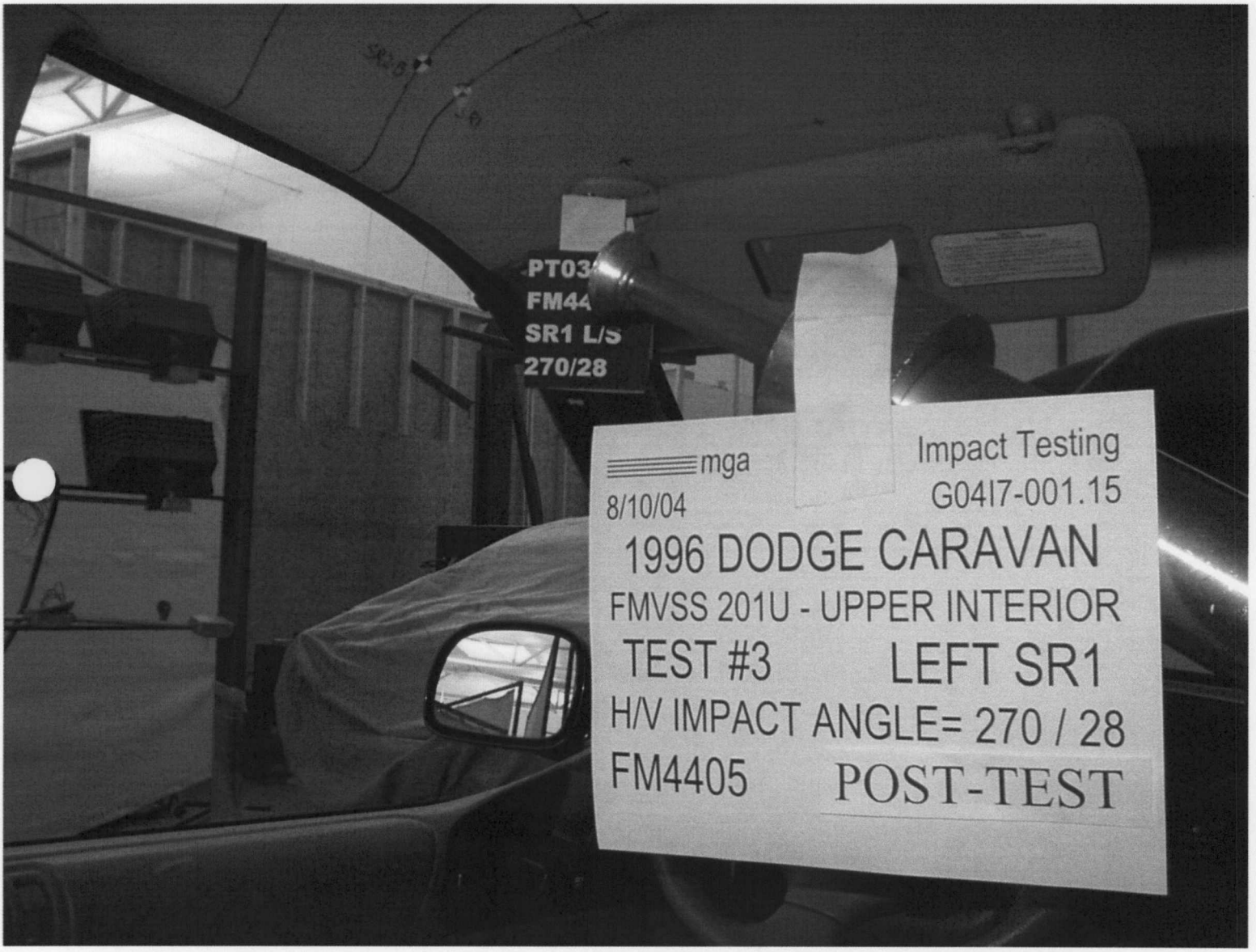
HIC(d) = 716, HIC = 729, Delta T = 6.6 msec

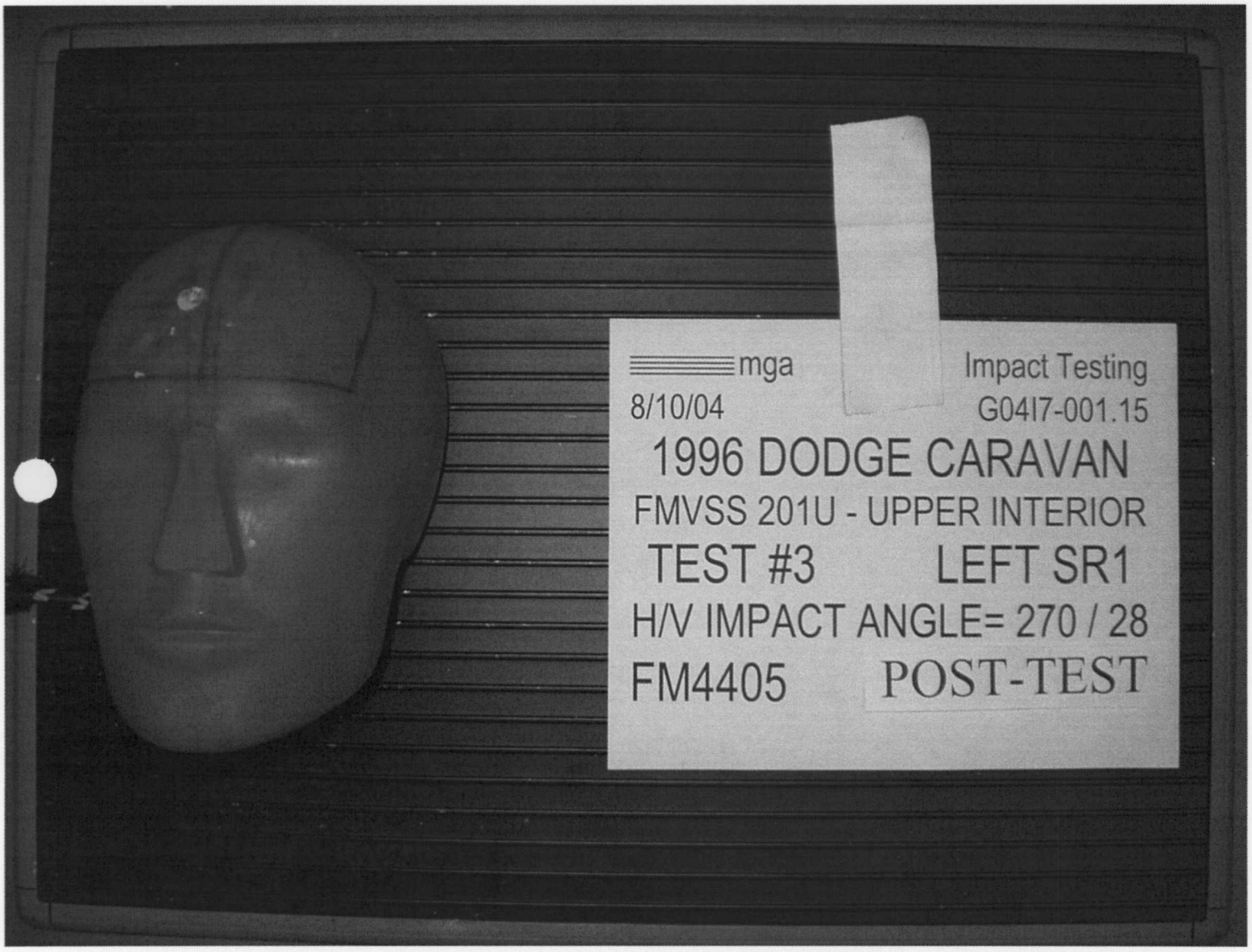
Max Displacement = 38.2 mm @ 9.2 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #3
LEFT SR1
H/V IMPACT ANGLE= 270 / 28
FM4405
PRE - TEST


PT03
FM44
SR1 L/S
270/28
mga
8/10/04
Impact Testing
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #3
LEFT SR1
H/V IMPACT ANGLE= 270 / 28
FM4405
POST-TEST


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #3
LEFT SR1
H/V IMPACT ANGLE= 270 / 28
FM4405
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR1 Left

MGA Test Reference No.:FM4405

Approach Horizontal Angles:270°

Approach Vertical Angles:28°

Test Number:#3

Temperature:22C

Humidity:54%

Time of Test:10:30 AM

FMH Serial No:038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1466	1722	3.3	23.9	33	7 R

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-108	1.68	1.68
Y	6	J36193	101.4	1.54	1.54
Z	7	J36353	96.8	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 8-10-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

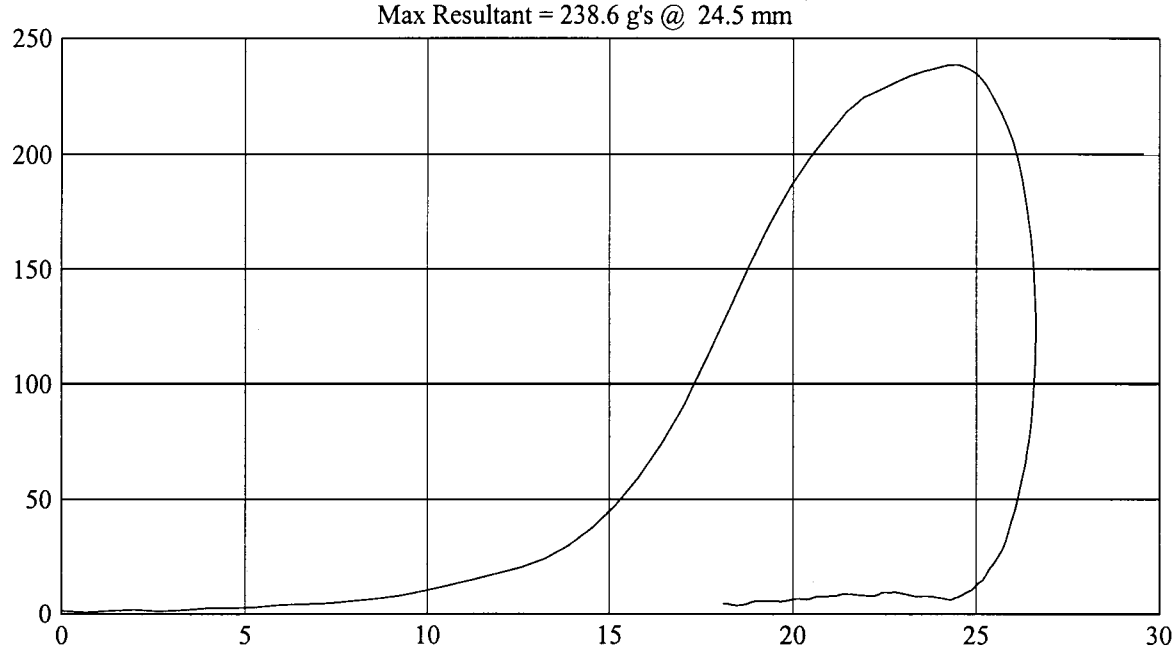
Customer: DODGE
Test # 3
FM4405
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/28

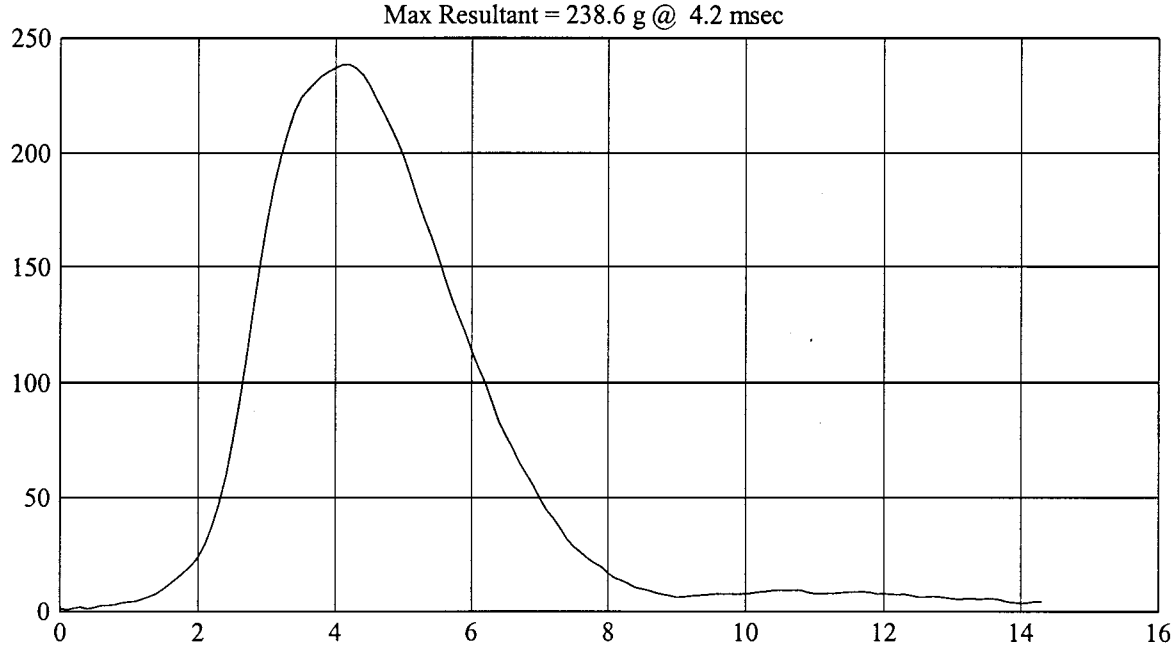
HIC(d) = 1466, HIC = 1722, Delta T = 3.3 msec

Max Resultant = 238.6 g's @ 24.5 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 238.6 g @ 4.2 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

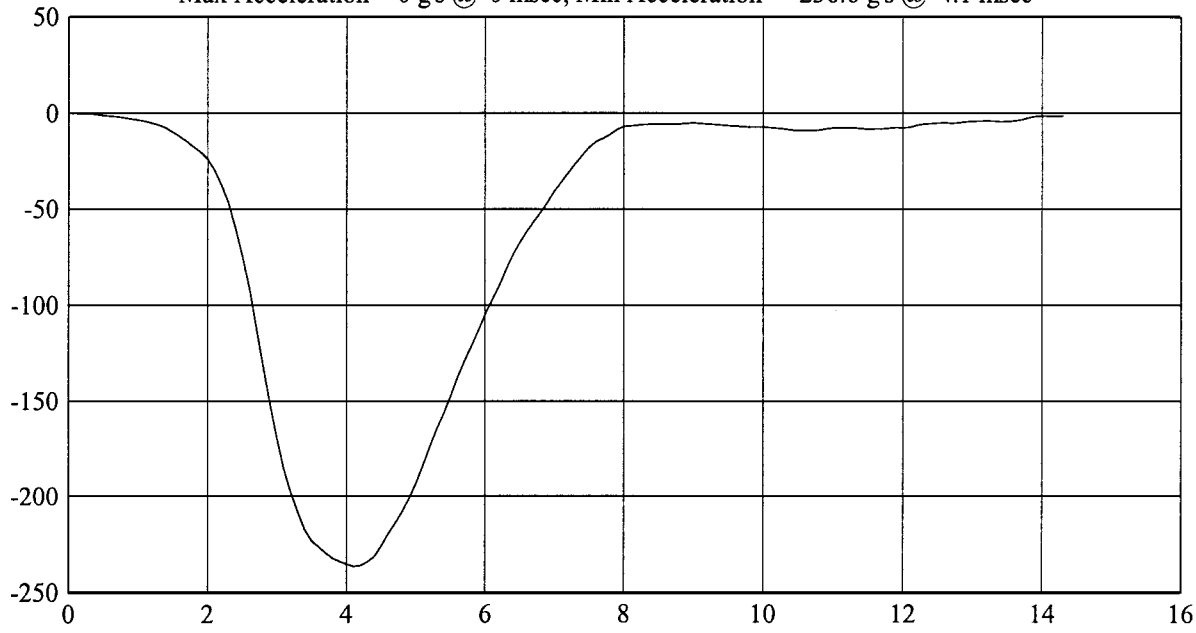
Customer: DODGE
Test # 3
FM4405
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/28

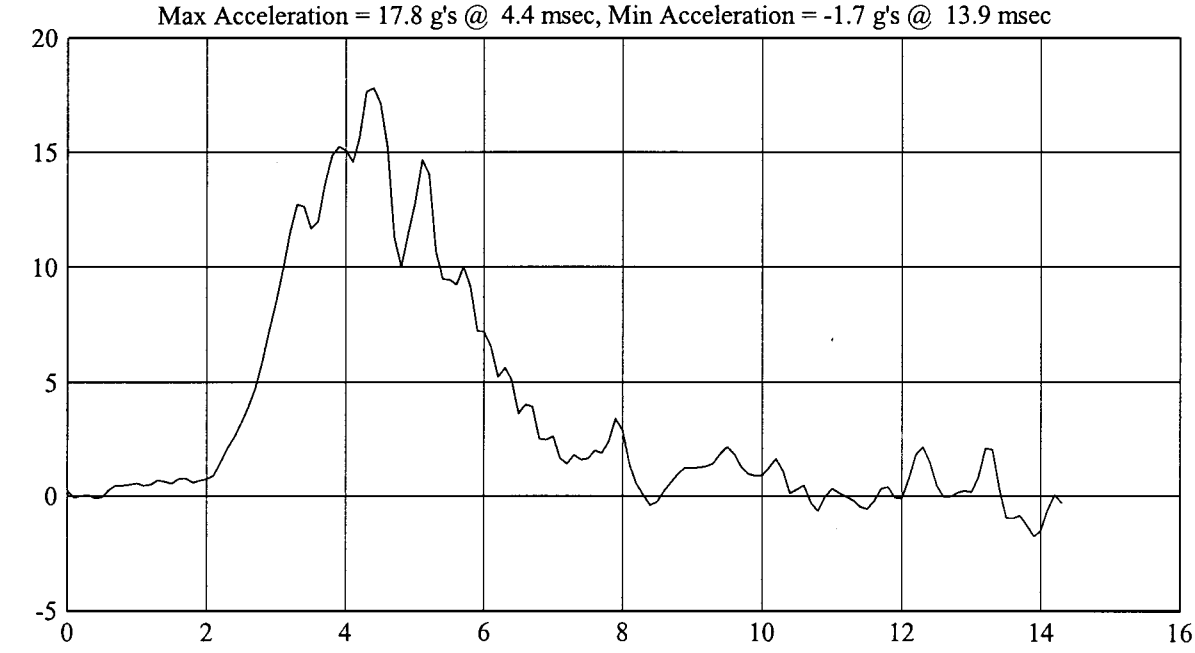
HIC(d) = 1466, HIC = 1722, Delta T = 3.3 msec

Max Acceleration = 0 g's @ 0 msec, Min Acceleration = -236.6 g's @ 4.1 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 17.8 g's @ 4.4 msec, Min Acceleration = -1.7 g's @ 13.9 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

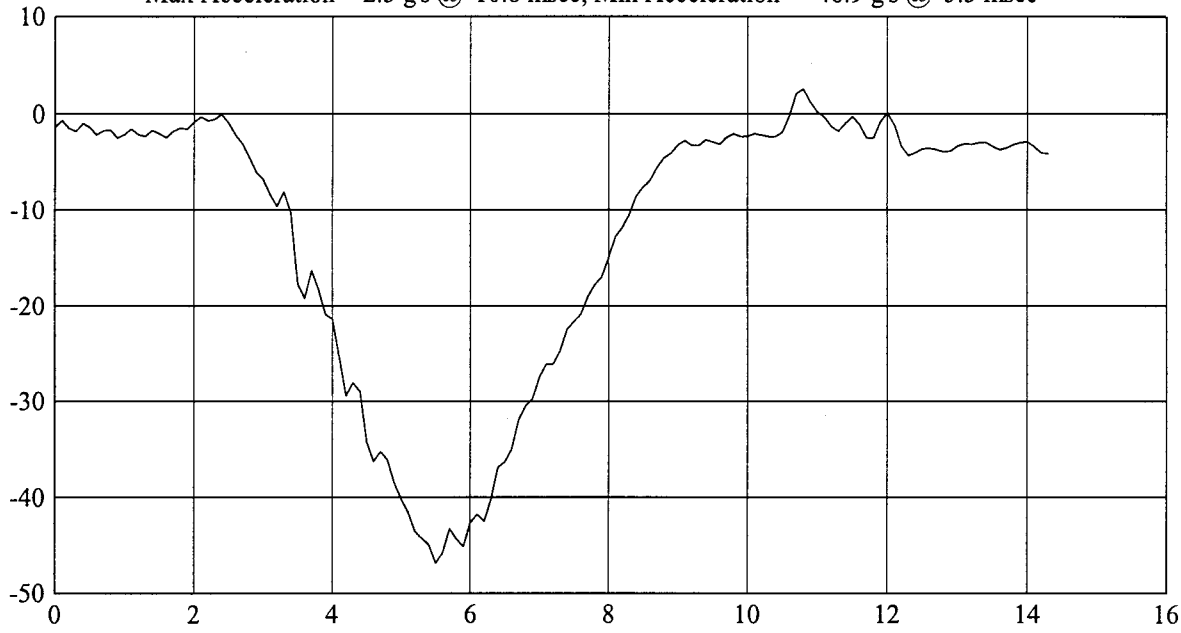
Customer: DODGE
Test # 3
FM4405
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/28

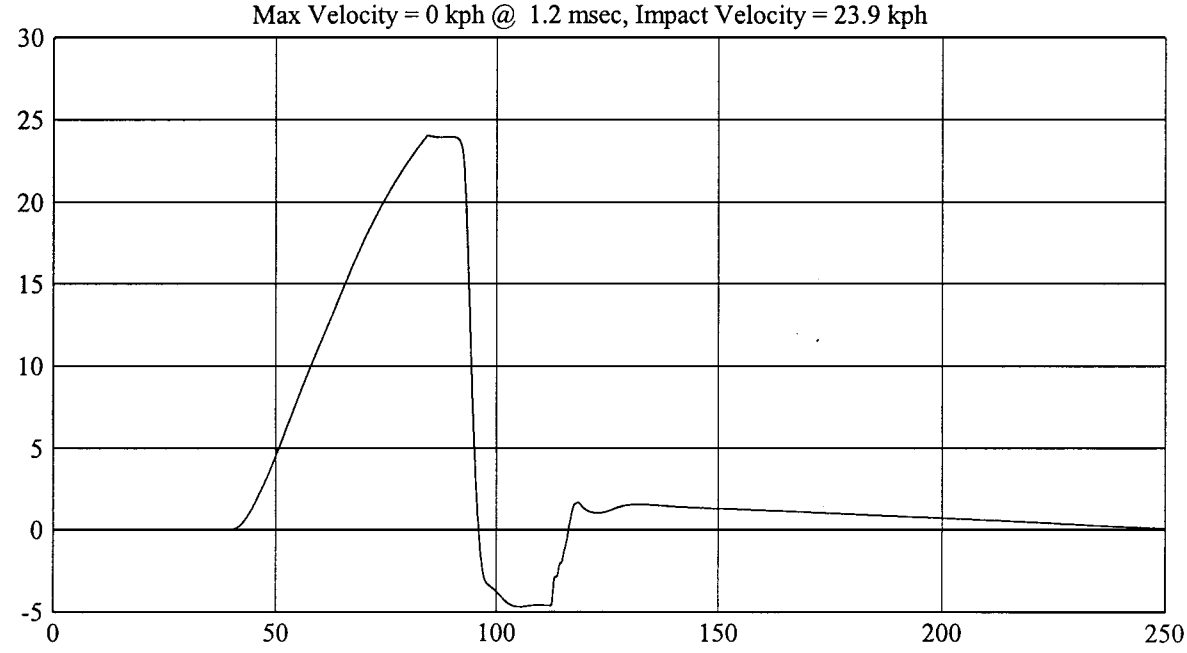
HIC(d) = 1466, HIC = 1722, Delta T = 3.3 msec

Max Acceleration = 2.5 g's @ 10.8 msec, Min Acceleration = -46.9 g's @ 5.5 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 1.2 msec, Impact Velocity = 23.9 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

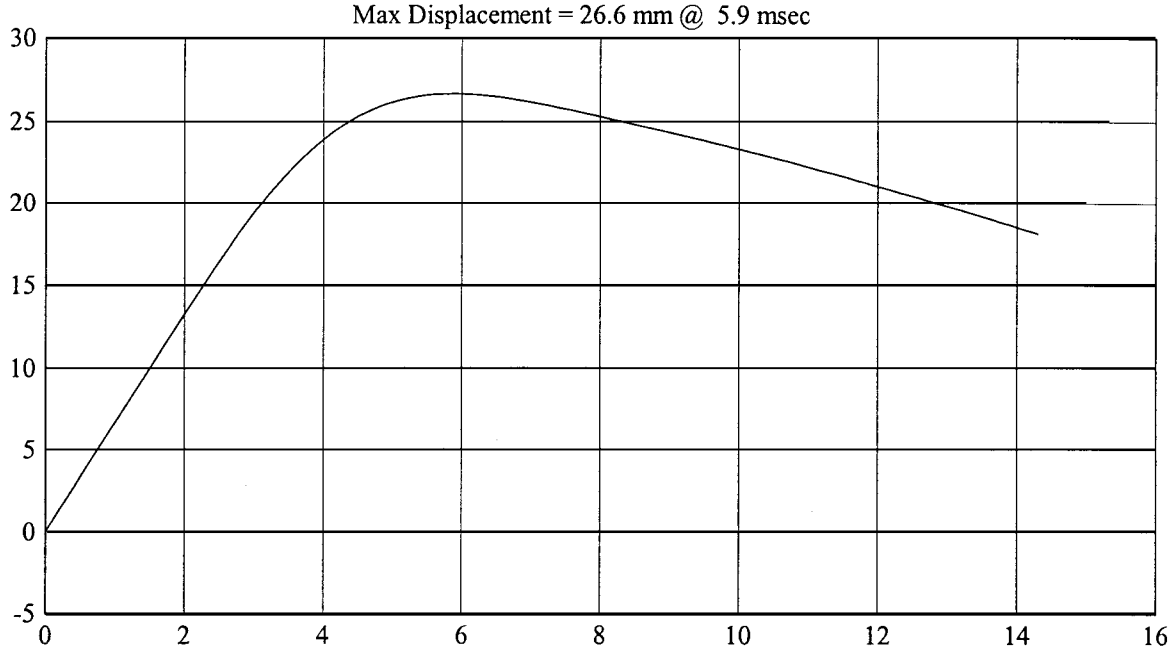
Customer: DODGE
Test # 3
FM4405
Additional Desc: N/A

Vehicle Program : CARAVAN

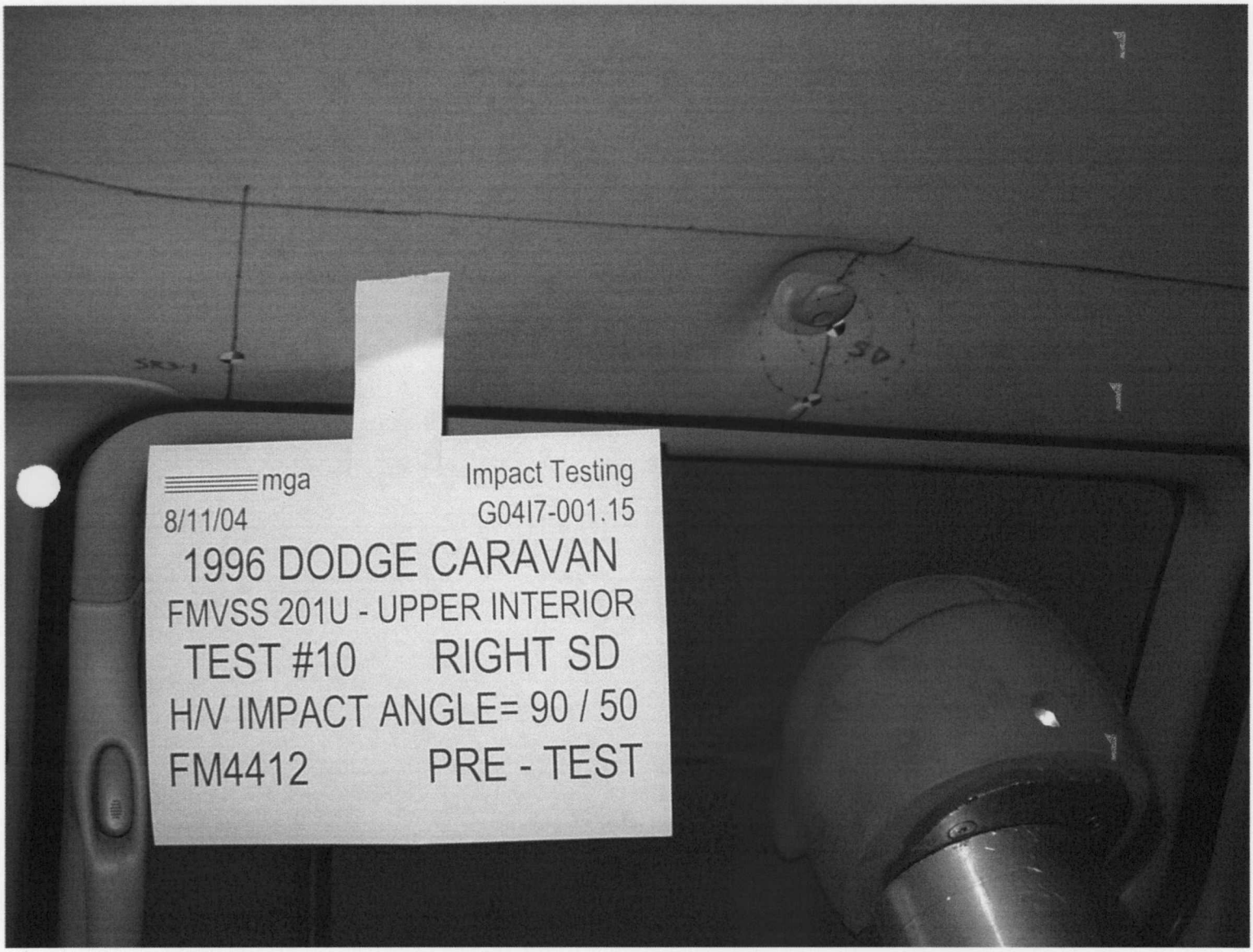
Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/28

HIC(d) = 1466, HIC = 1722, Delta T = 3.3 msec

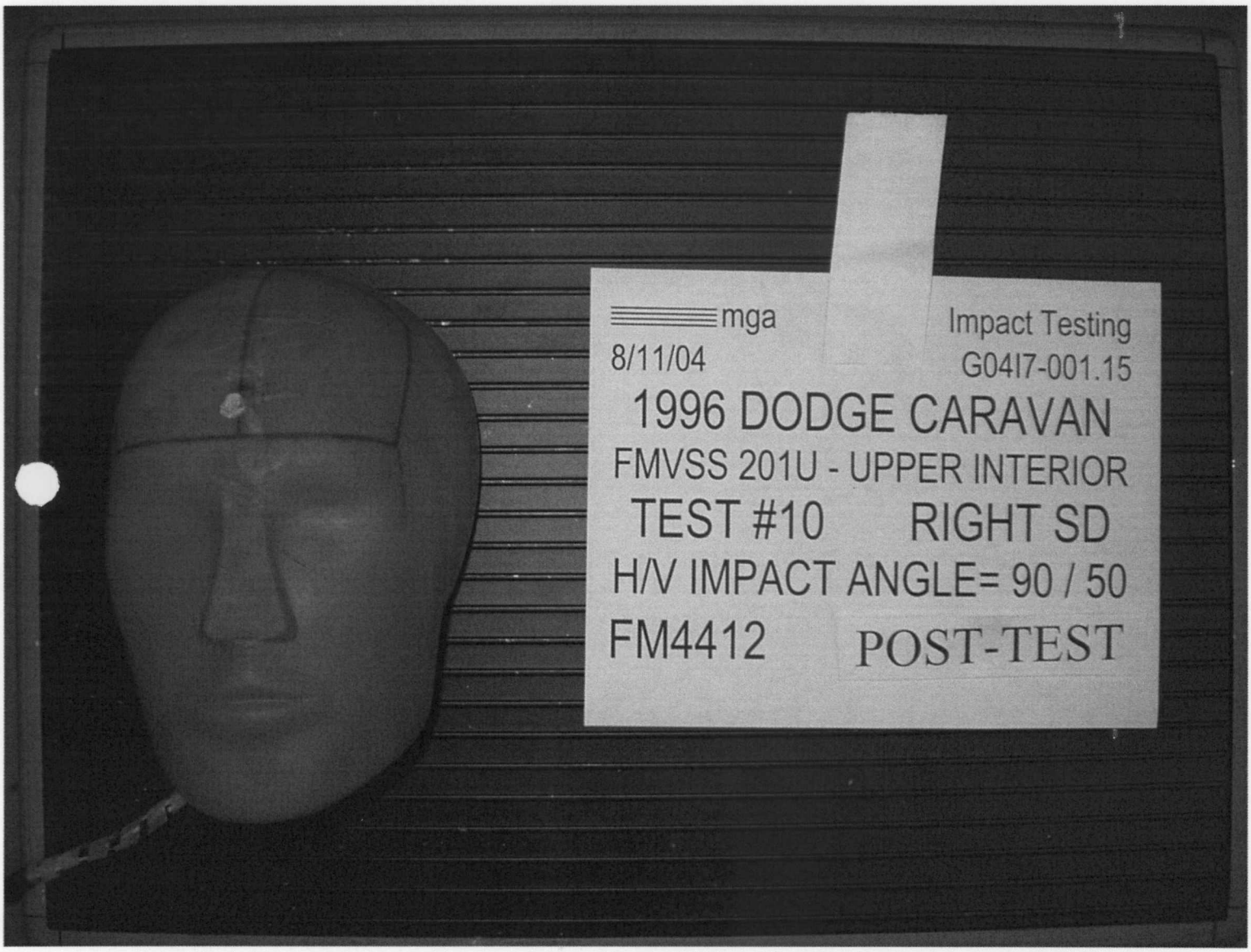
Max Displacement = 26.6 mm @ 5.9 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
8/11/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT SD
H/V IMPACT ANGLE= 90 / 50
FM4412 PRE - TEST


mga
Impact Testing
8/11/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT SD
H/V IMPACT ANGLE= 90 / 50
FM4412
POST-TEST
SD


mga
Impact Testing
8/11/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT SD
H/V IMPACT ANGLE= 90 / 50
FM4412
POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SD Right

MGA Test Reference No.:FM4412

Approach Horizontal Angles:90°

Approach Vertical Angles:50°

Test Number:#10

Temperature:22C

Humidity:48%

Time of Test:10:14 AM

FMH Serial No:037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
694	700	7.2	23.0	13	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-96.6	1.68	1.68
Y	6	J35841	92.5	1.54	1.54
Z	7	J35791	90	1.59	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 8-11-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

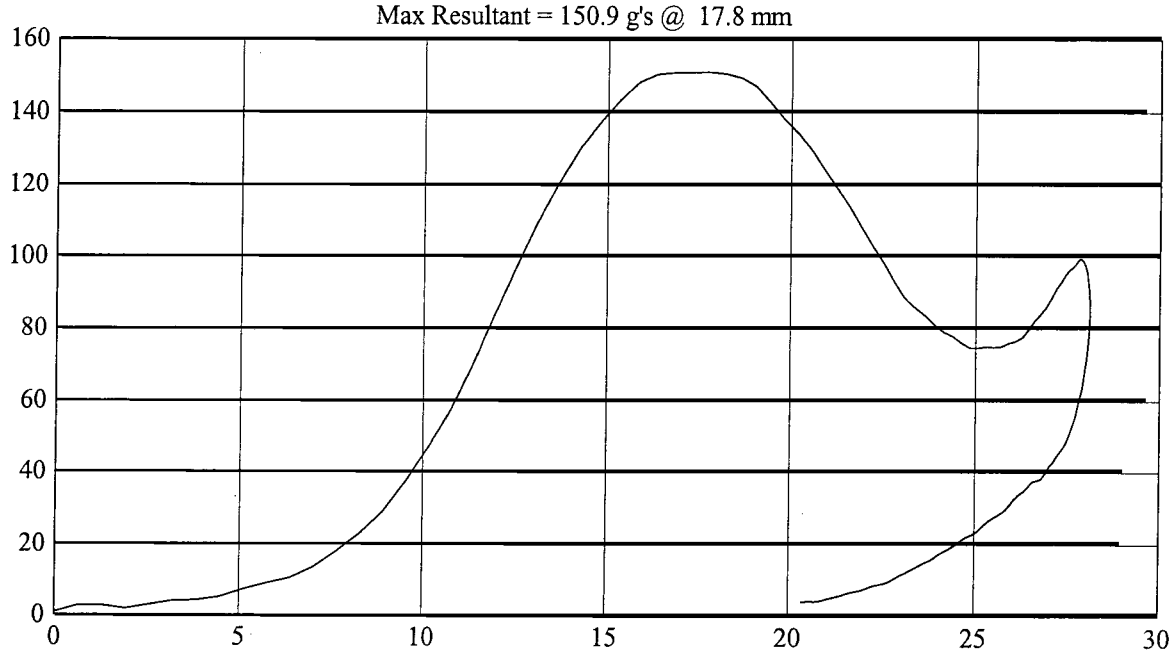
Customer: DODGE
Test # 10
FM4412
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SD
Vehicle Side: Right
Horz/Vert Angle: 90/50

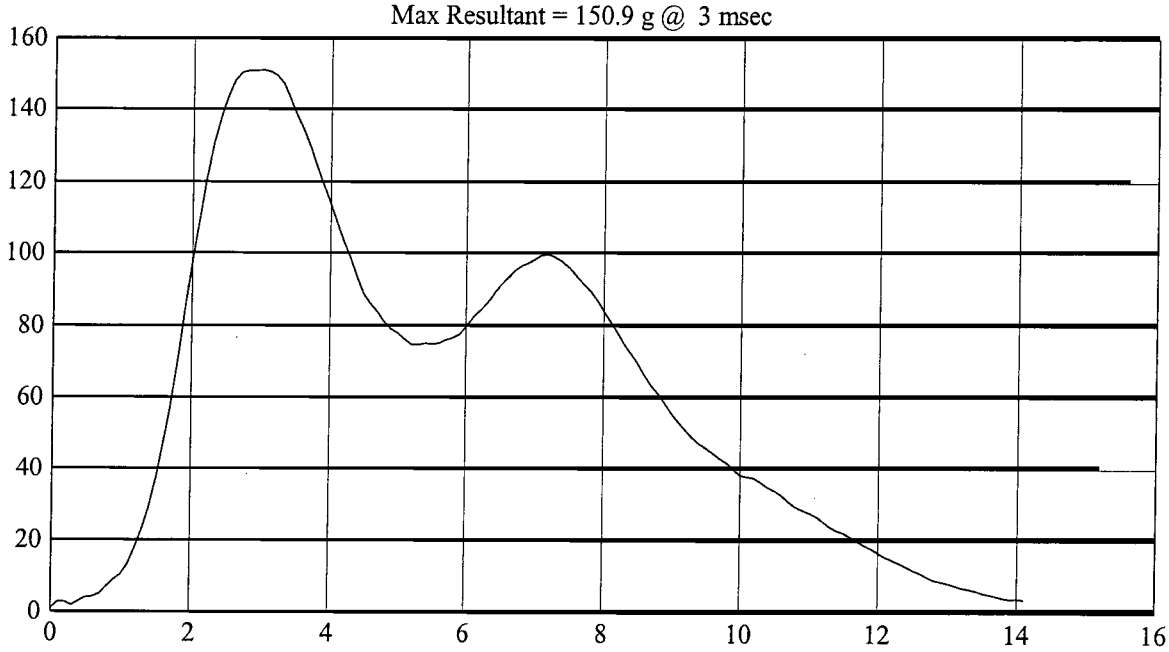
HIC(d) = 694, HIC = 700, Delta T = 7.2 msec

Max Resultant = 150.9 g's @ 17.8 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 150.9 g @ 3 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

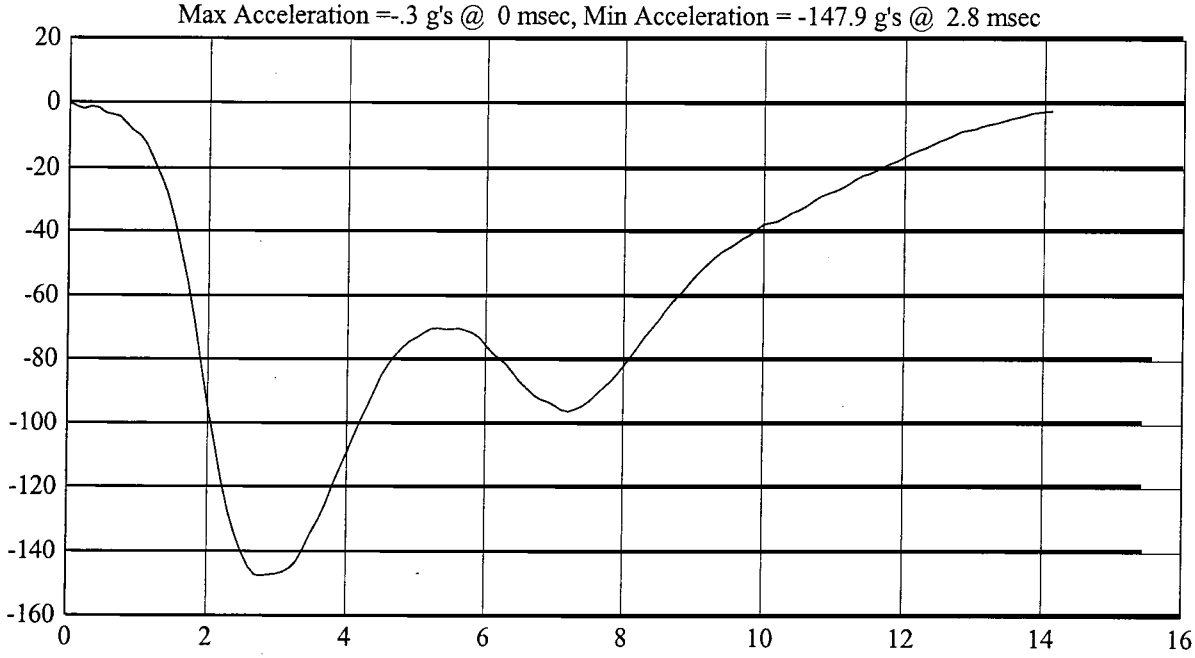
Customer: DODGE
Test # 10
FM4412
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SD
Vehicle Side: Right
Horz/Vert Angle: 90/50

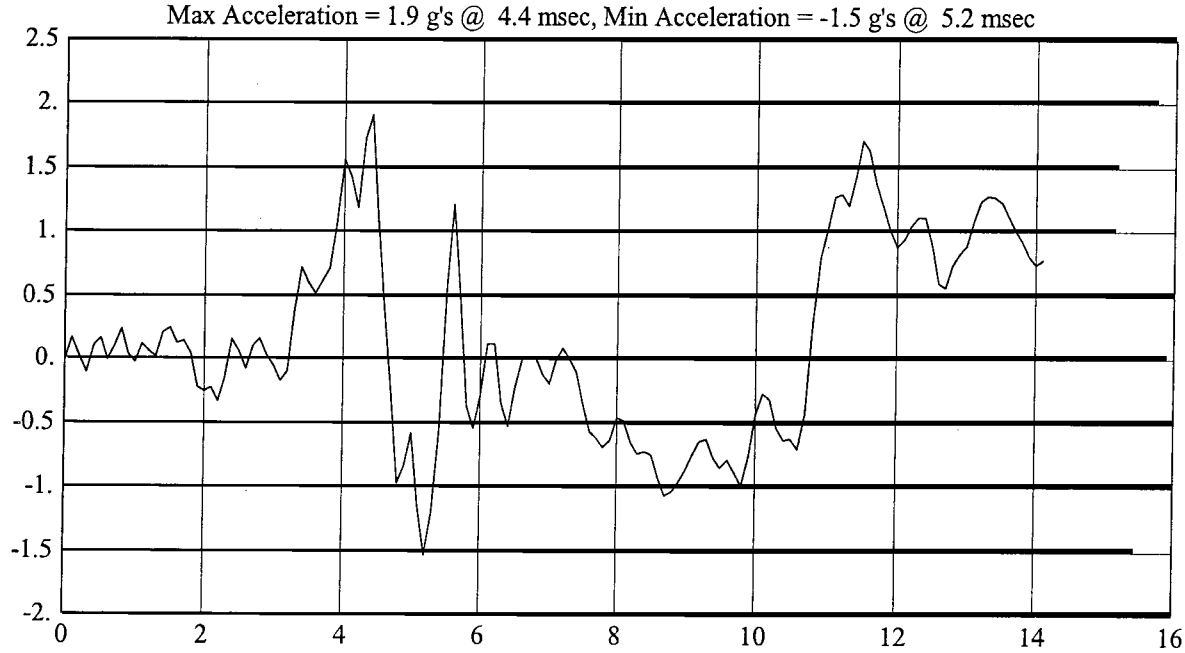
HIC(d) = 694, HIC = 700, Delta T = 7.2 msec

Max Acceleration =-.3 g's @ 0 msec, Min Acceleration = -147.9 g's @ 2.8 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 1.9 g's @ 4.4 msec, Min Acceleration = -1.5 g's @ 5.2 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

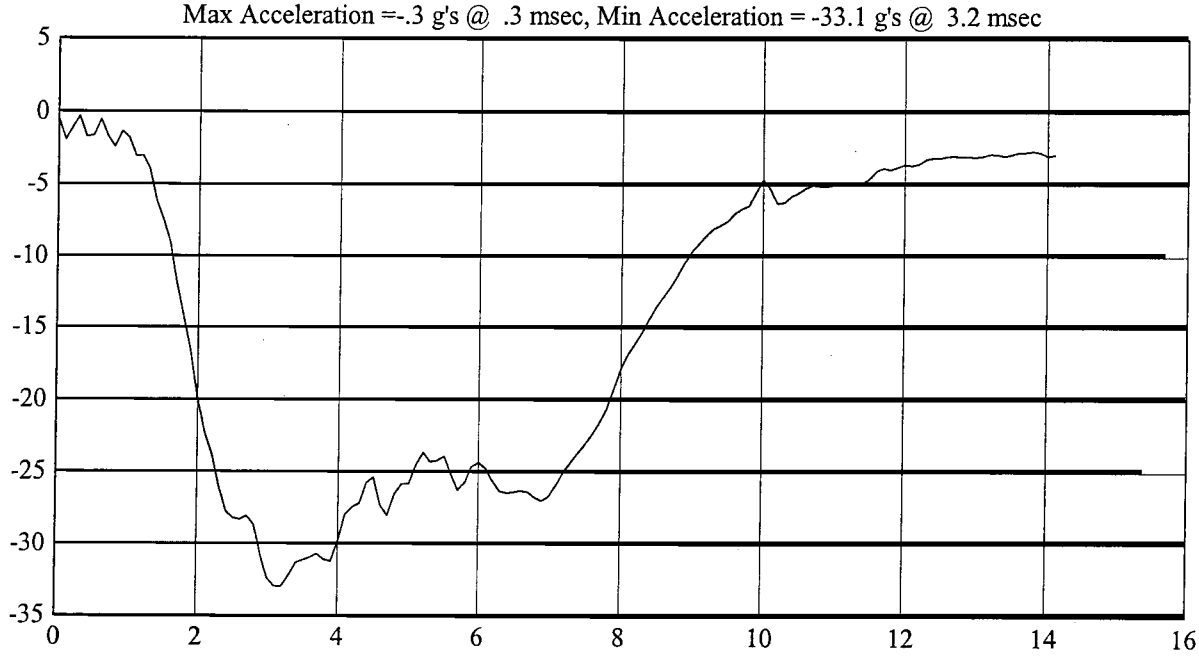
Customer: DODGE
Test # 10
FM4412
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SD
Vehicle Side: Right
Horz/Vert Angle: 90/50

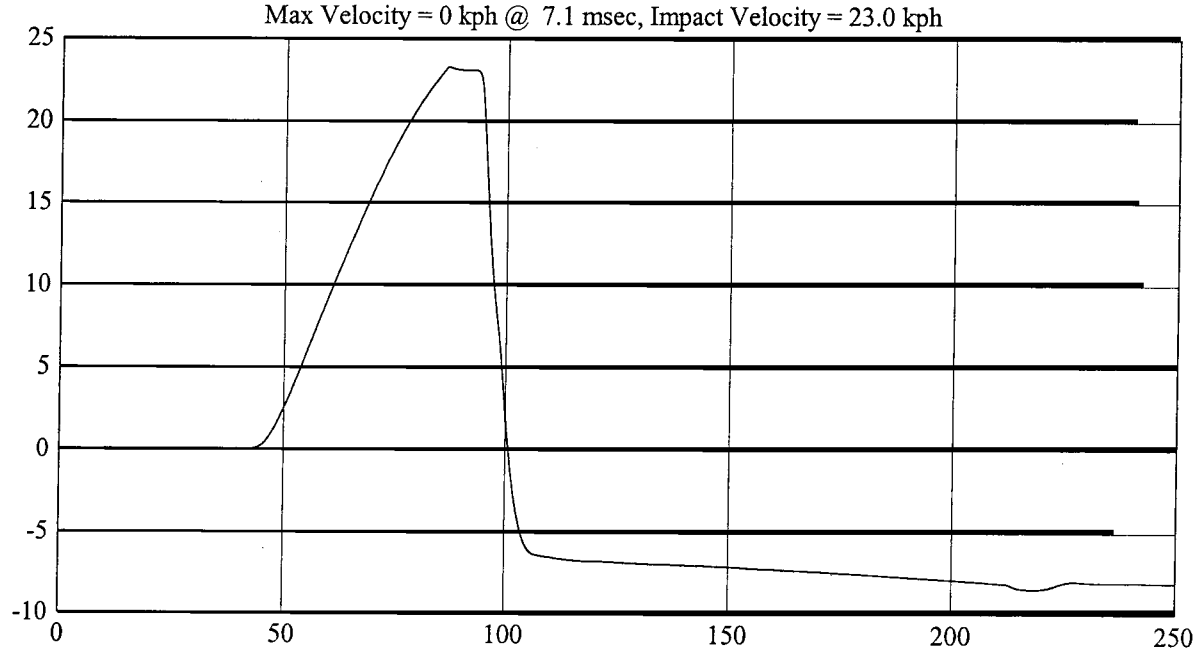
HIC(d) = 694, HIC = 700, Delta T = 7.2 msec

Max Acceleration =-.3 g's @ .3 msec, Min Acceleration = -33.1 g's @ 3.2 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 7.1 msec, Impact Velocity = 23.0 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

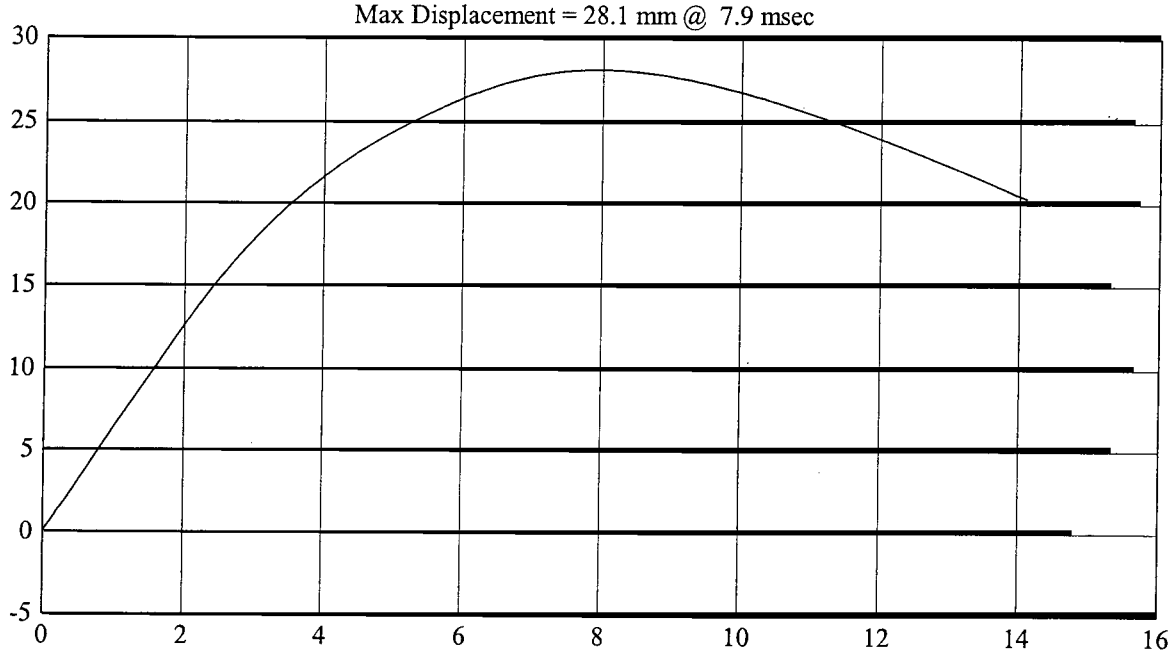
Customer: DODGE
Test # 10
FM4412
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: SD
Vehicle Side: Right
Horz/Vert Angle: 90/50

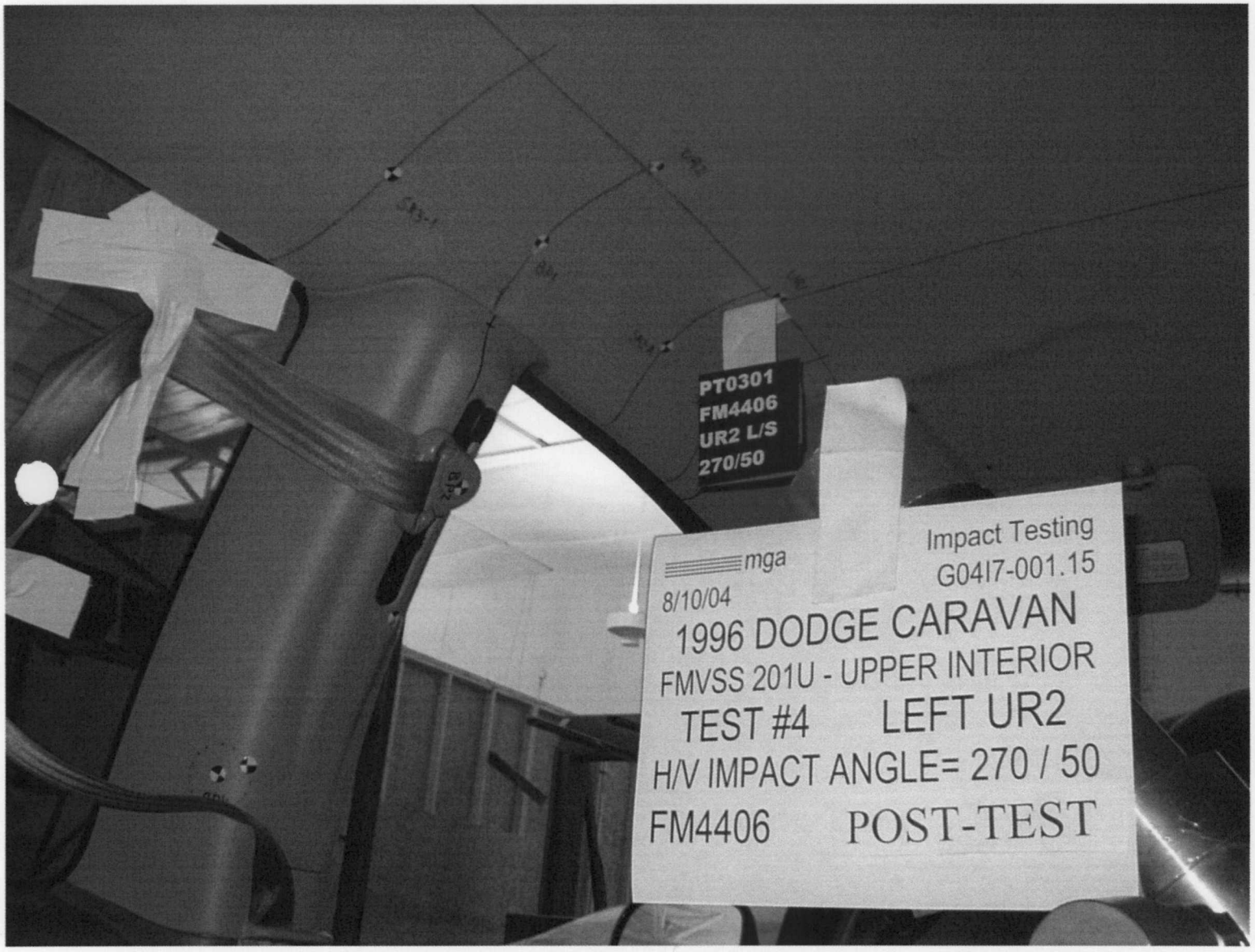
HIC(d) = 694, HIC = 700, Delta T = 7.2 msec

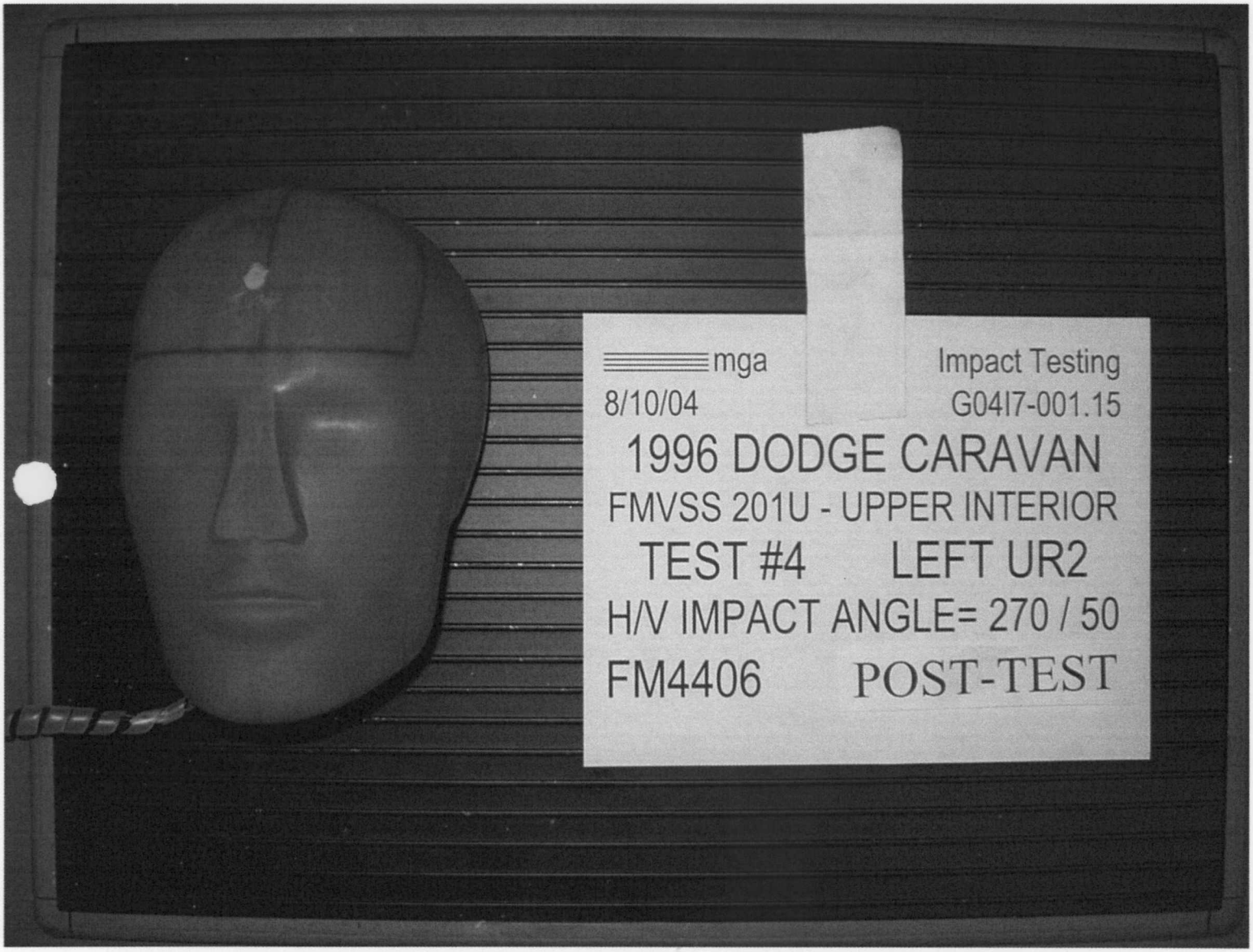
Max Displacement = 28.1 mm @ 7.9 msec



Displacement (mm) vs. Time (msec)


mga
Impact Testing
G04I7-001.15
8/10/04
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
FM4406 PRE - TEST


PT0301
FM4406
UR2 L/S
270/50
mga
Impact Testing
G04I7-001.15
8/10/04
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
FM4406 POST-TEST


mga
Impact Testing
8/10/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR2
H/V IMPACT ANGLE= 270 / 50
FM4406 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR2 Left

MGA Test Reference No.:FM4406

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Test Number:#4

Temperature:22C

Humidity:56%

Time of Test:11:00 AM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
791	828	8.3	24.1	28	3 R

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.67	1.67
Y	6	J35916	100.2	1.55	1.54
Z	7	J35918	97.9	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 8-10-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.15

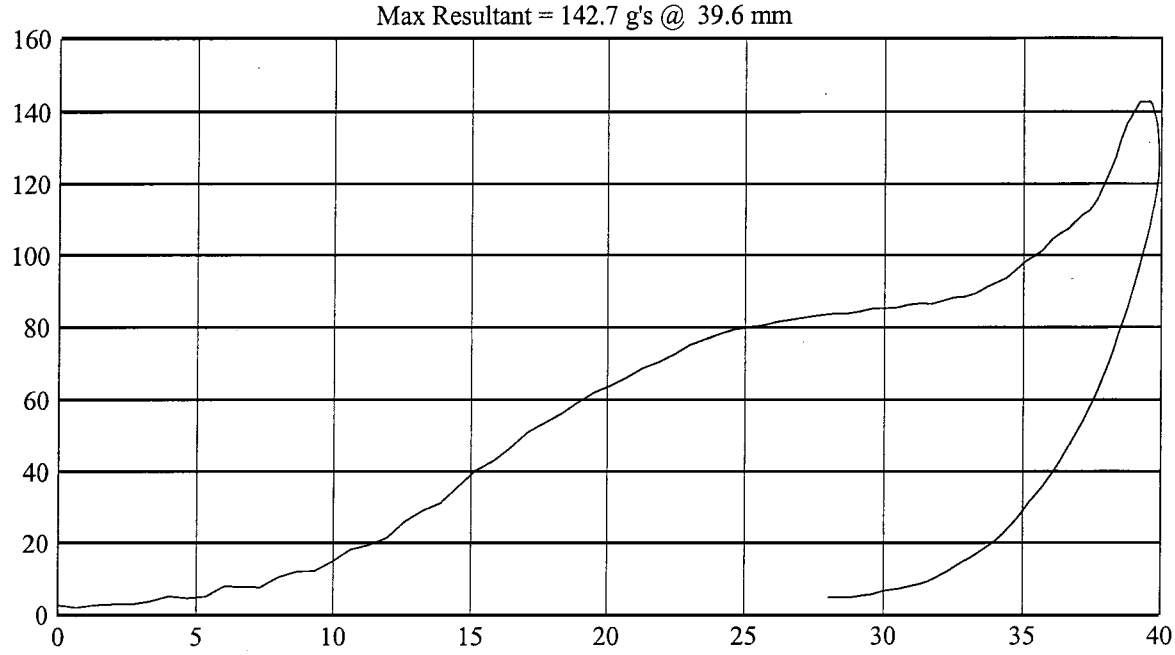
Customer: DODGE
Test # 4
FM4406
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

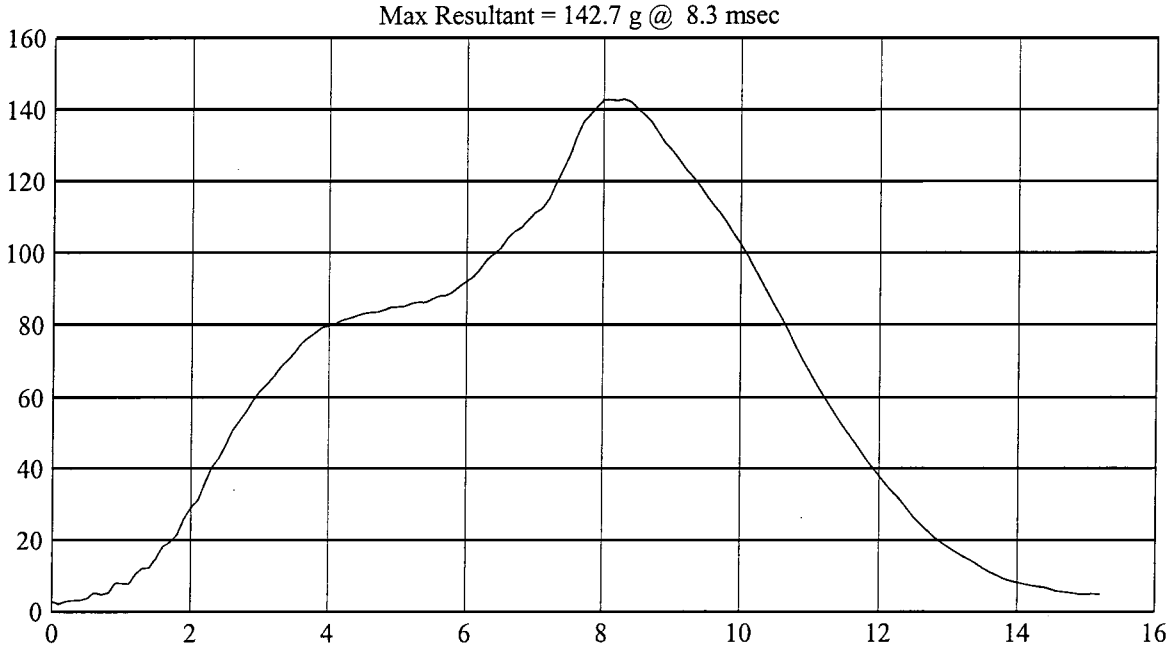
HIC(d) = 791, HIC = 828, Delta T = 8.3 msec

Max Resultant = 142.7 g's @ 39.6 mm



Resultant (g's) vs. Displacement (mm)

Max Resultant = 142.7 g @ 8.3 msec



Resultant Accel (g's) vs. Time (msec)

FMH
G04I7-001.15

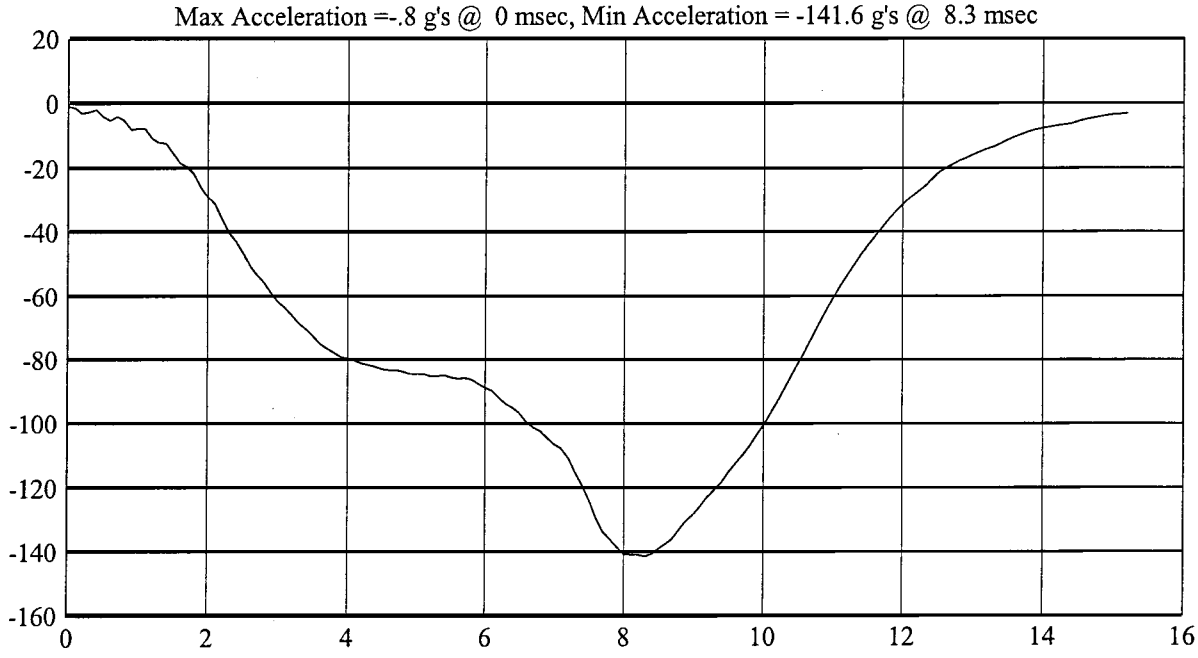
Customer: DODGE
Test # 4
FM4406
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

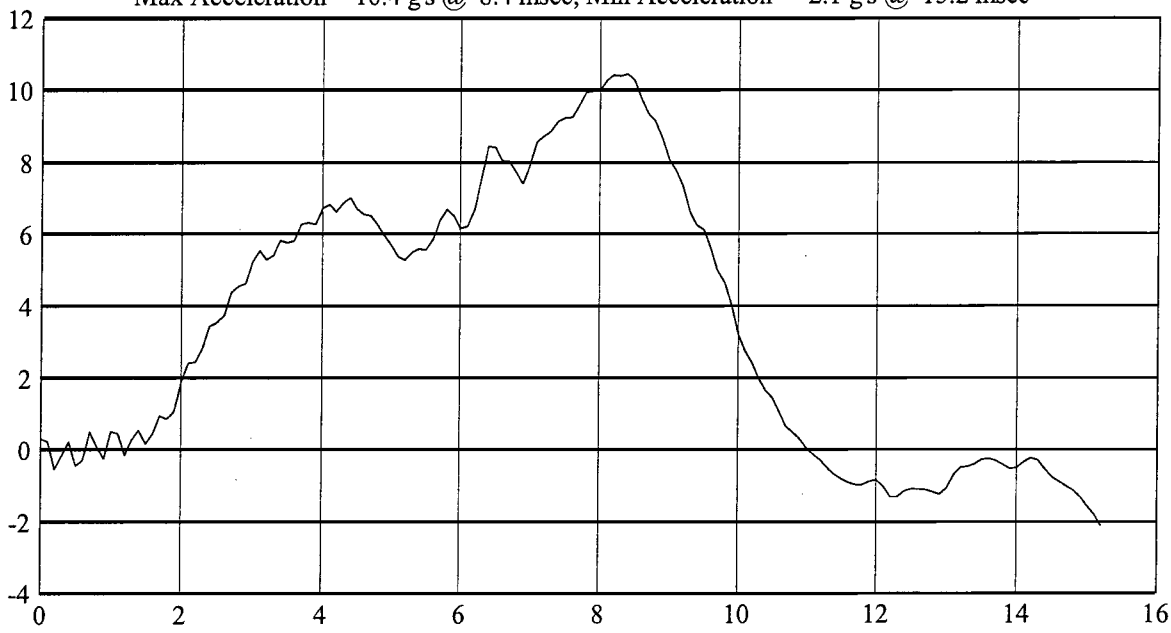
HIC(d) = 791, HIC = 828, Delta T = 8.3 msec

Max Acceleration =-.8 g's @ 0 msec, Min Acceleration = -141.6 g's @ 8.3 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 10.4 g's @ 8.4 msec, Min Acceleration = -2.1 g's @ 15.2 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

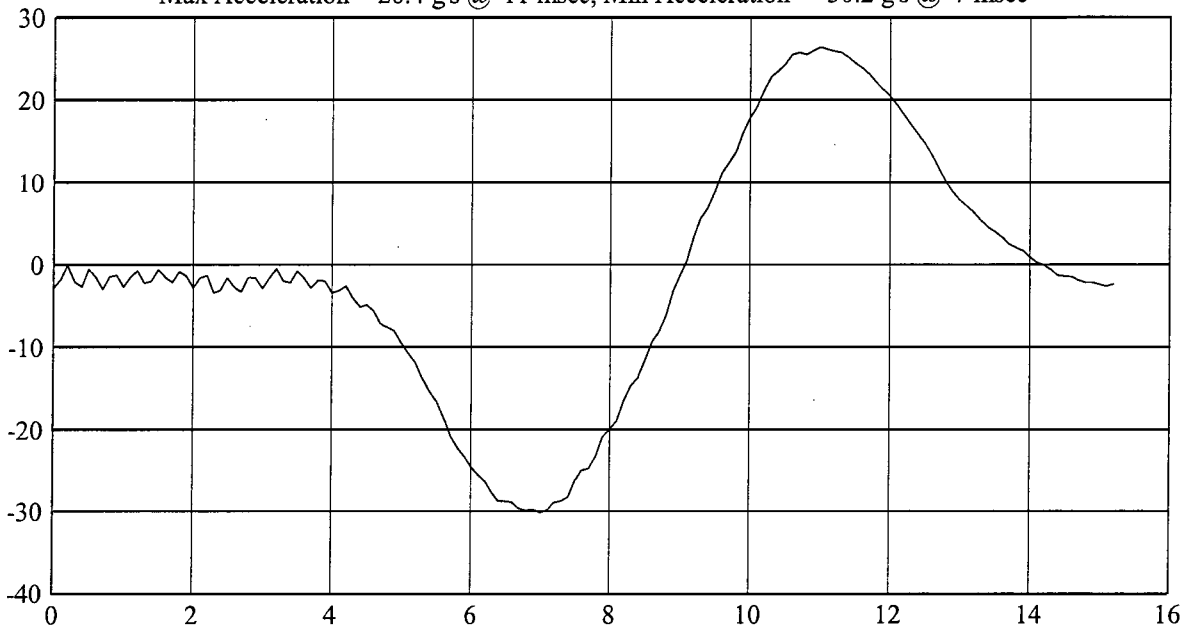
Customer: DODGE
Test # 4
FM4406
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

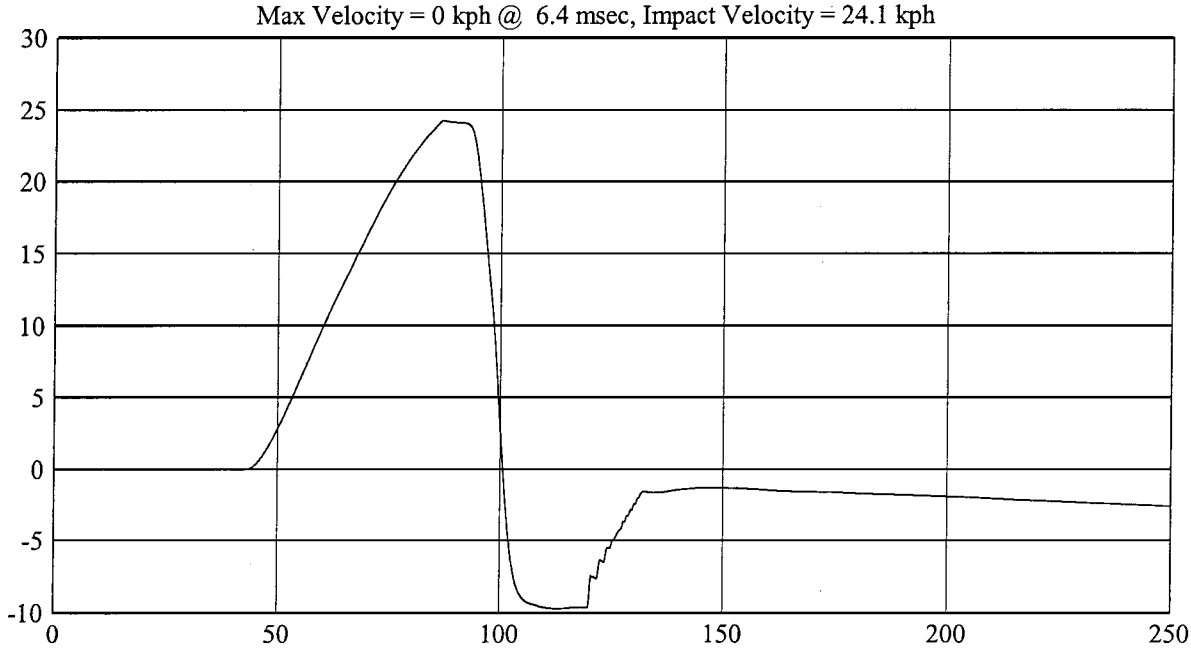
HIC(d) = 791, HIC = 828, Delta T = 8.3 msec

Max Acceleration = 26.4 g's @ 11 msec, Min Acceleration = -30.2 g's @ 7 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 6.4 msec, Impact Velocity = 24.1 kph



Velocity (kph) vs. Time (msec)

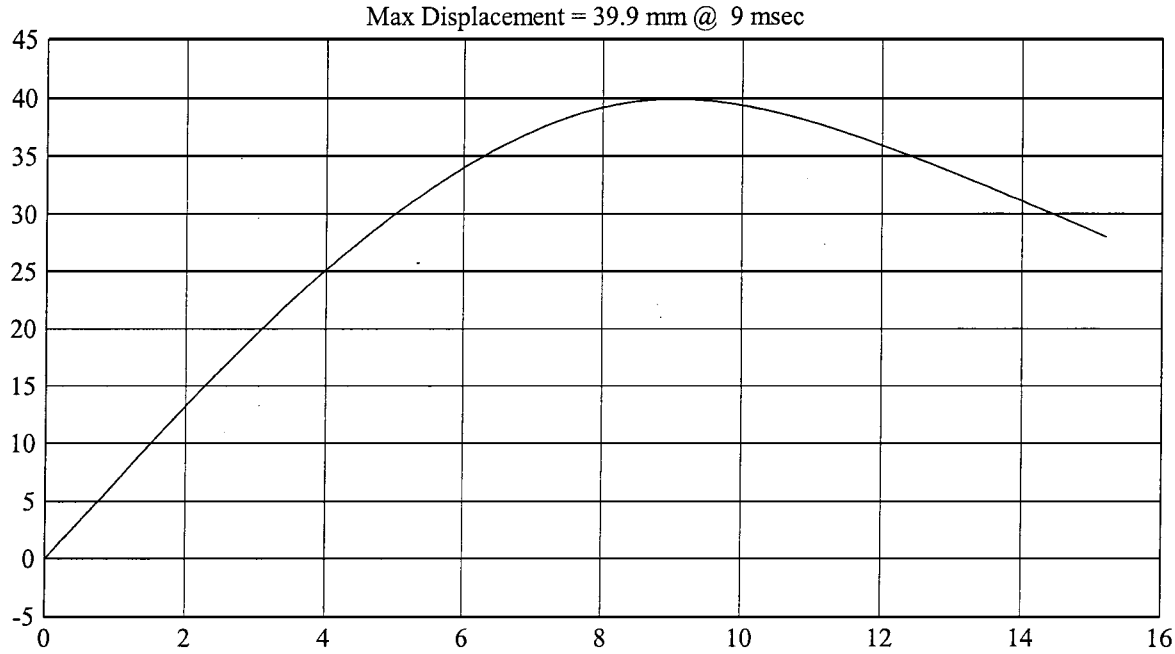
FMH
G04I7-001.15

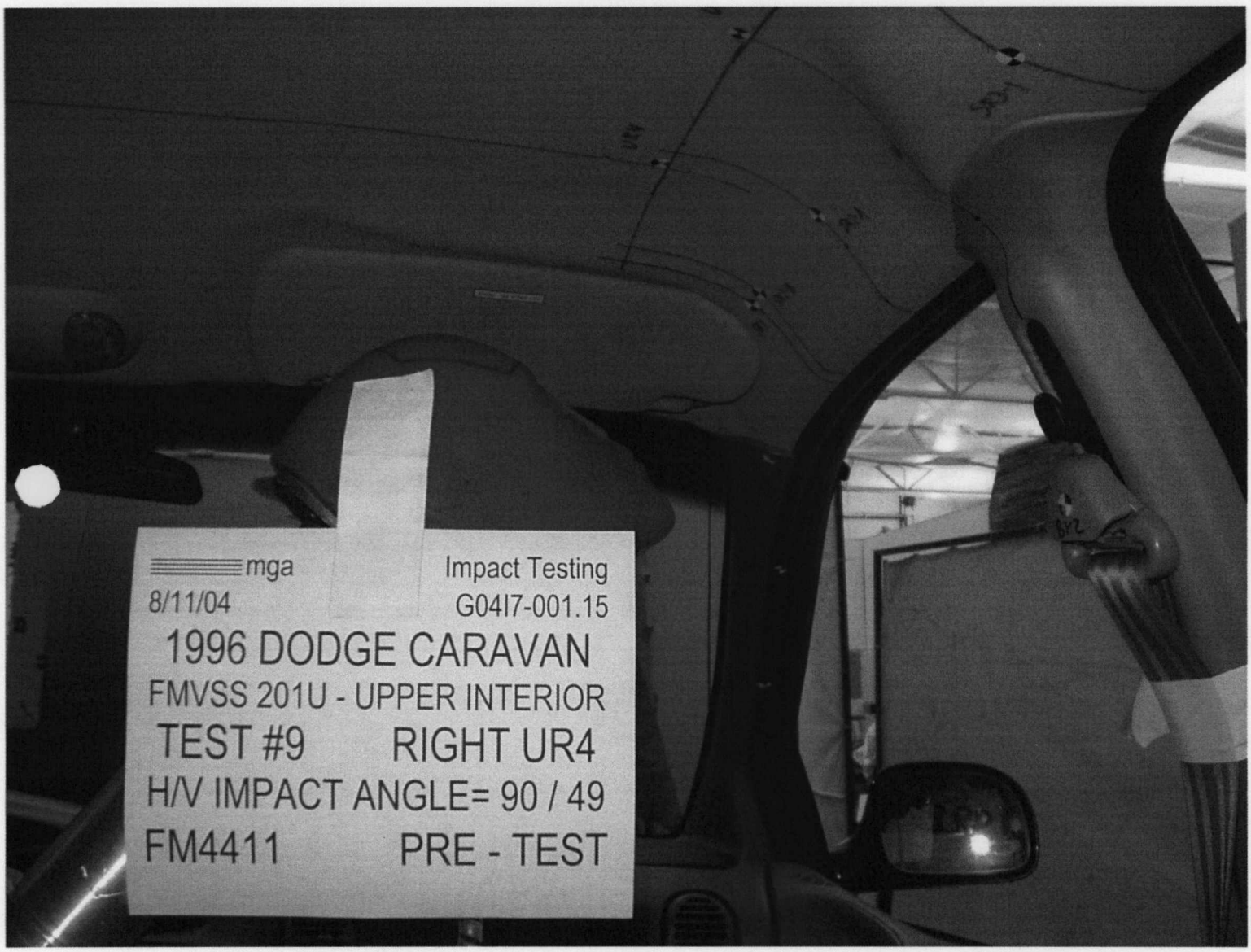
Customer: DODGE
Test # 4
FM4406
Additional Desc: N/A

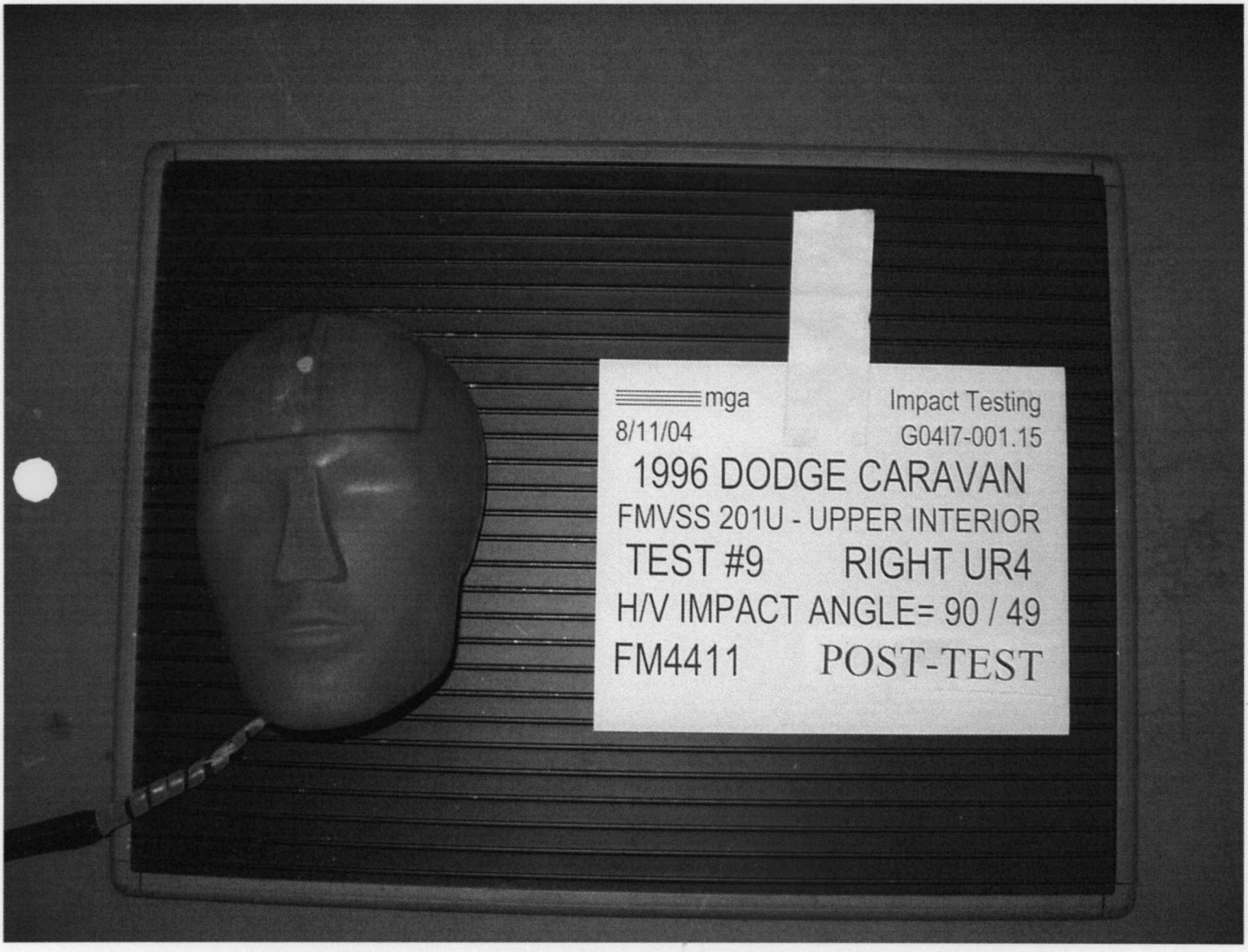
Vehicle Program : CARAVAN

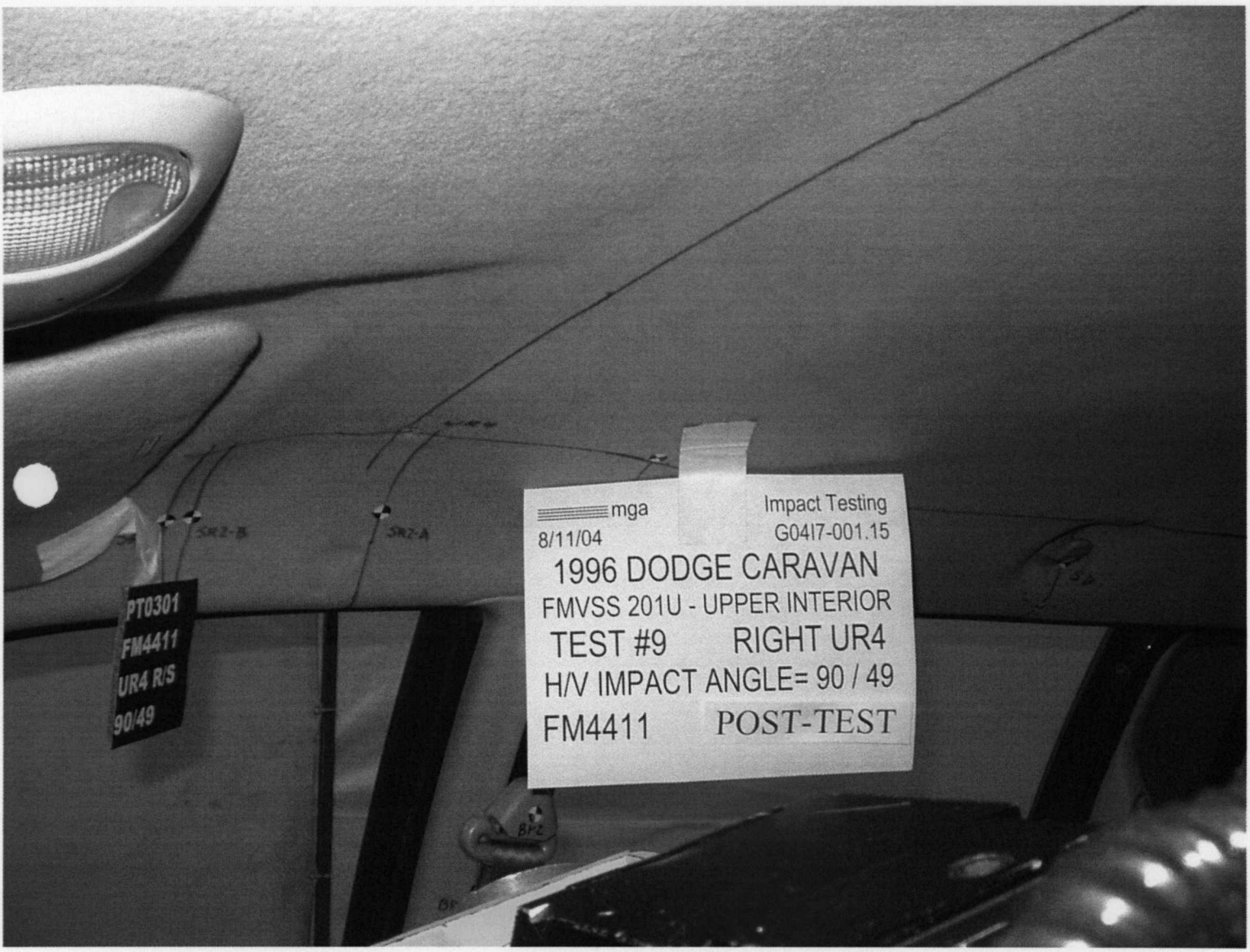
Model Year: 1996
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/50

HIC(d) = 791, HIC = 828, Delta T = 8.3 msec




mga
Impact Testing
8/11/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR4
H/V IMPACT ANGLE= 90 / 49
FM4411 PRE - TEST


mga
Impact Testing
8/11/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR4
H/V IMPACT ANGLE= 90 / 49
FM4411 POST-TEST


PT0301
FM4411
UR4 R/S
90/49
mga
Impact Testing
8/11/04
G04I7-001.15
1996 DODGE CARAVAN
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR4
H/V IMPACT ANGLE= 90 / 49
FM4411 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.15 VEHICLE YR/MAKE/MODEL:CARAVAN 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR4 Right

MGA Test Reference No.:FM4411

Approach Horizontal Angles:90°

Approach Vertical Angles:49°

Test Number:#9

Temperature:22C

Humidity:48%

Time of Test:9:00 AM

FMH Serial No:036

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1335	1549	3.6	23.8	38	0

INSTRUMENTAION INFORMATION: (all accelerometers are Endevco 7264-2000)

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35923	-100.8	1.67	1.67
Y	6	J35916	100.2	1.55	1.54
Z	7	J35918	97.9	1.58	1.58

REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 8-11-04

*Only necessary for NHTSA (Government) Compliance testing.

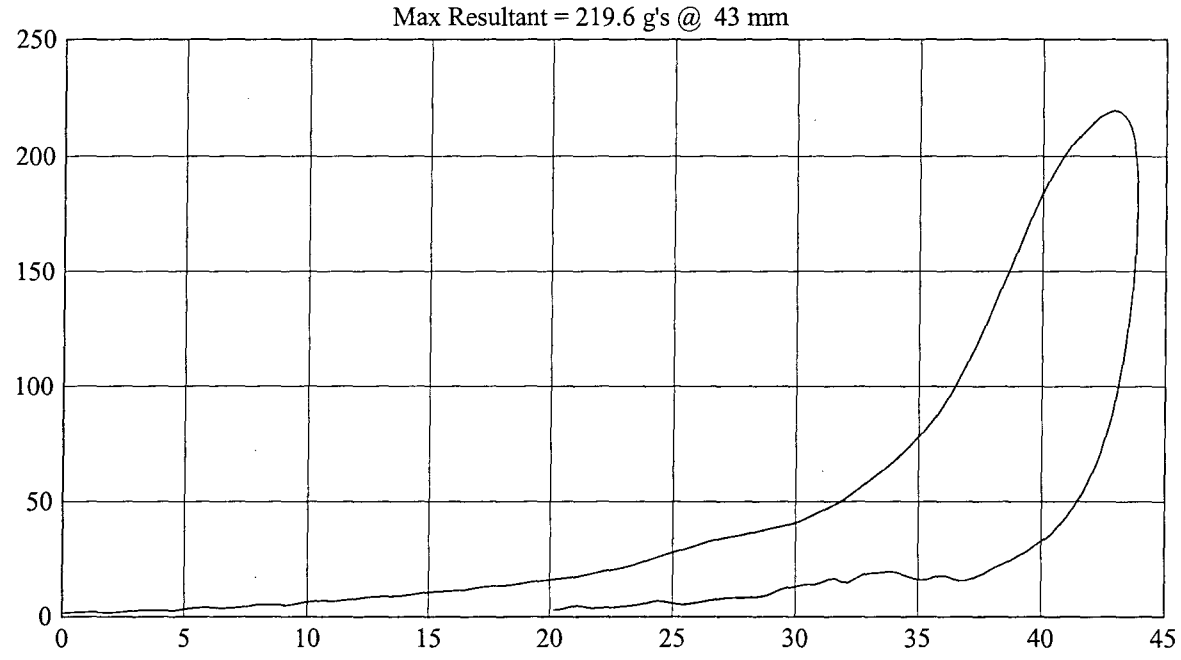
FMH
G04I7-001.15

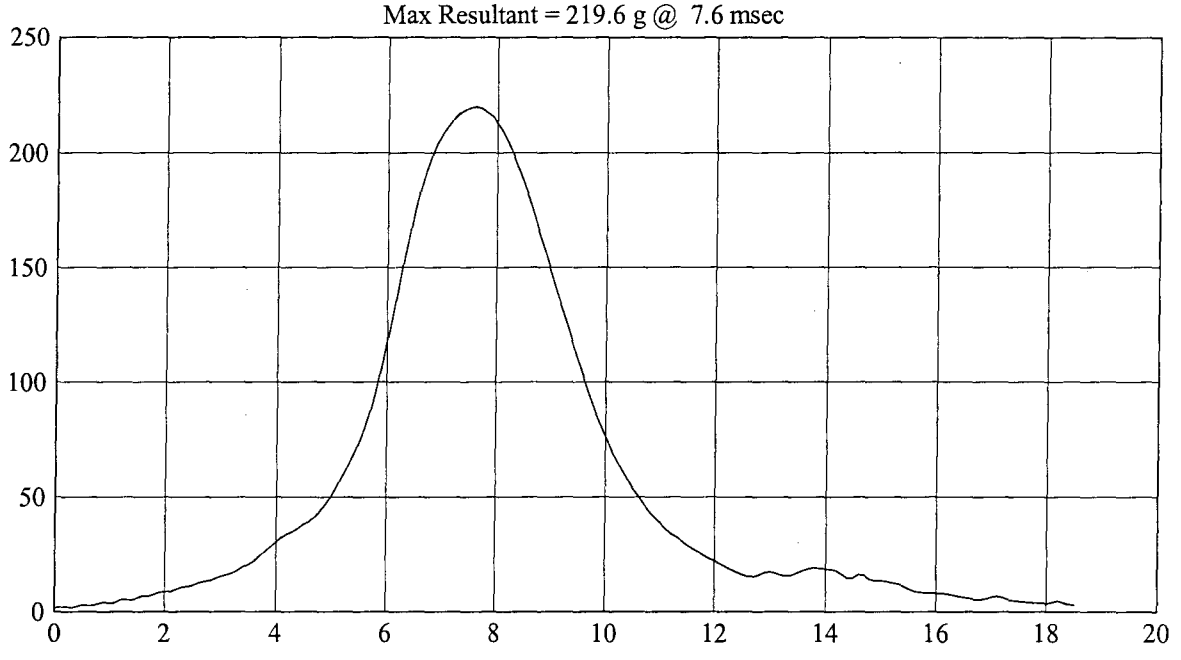
Customer: DODGE
Test # 9
FM4411
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/49

HIC(d) = 1335, HIC = 1549, Delta T = 3.6 msec





FMH
G04I7-001.15

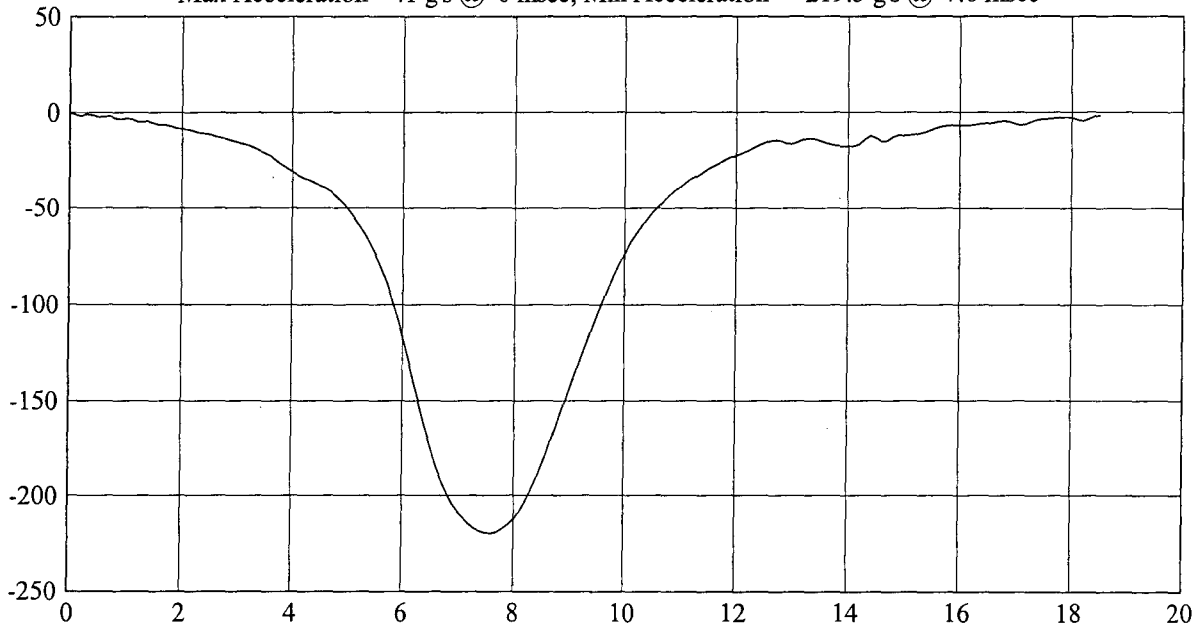
Customer: DODGE
Test # 9
FM4411
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/49

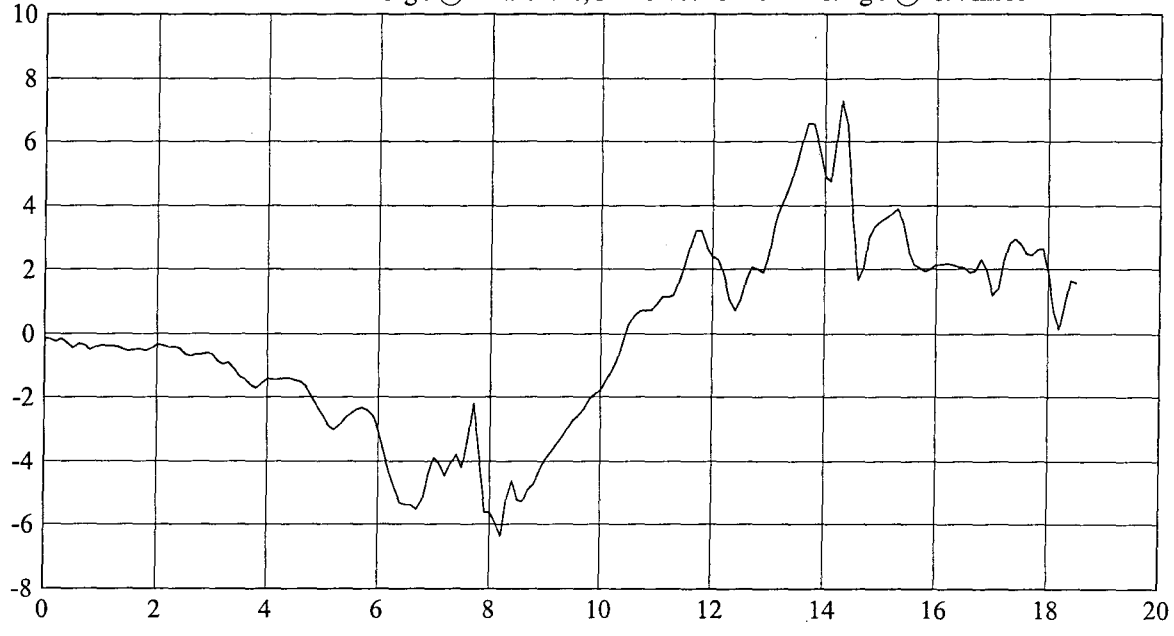
HIC(d) = 1335, HIC = 1549, Delta T = 3.6 msec

Max Acceleration =-.1 g's @ 0 msec, Min Acceleration = -219.5 g's @ 7.6 msec



Accel X (g's) vs. Time (msec)

Max Acceleration = 7.3 g's @ 14.3 msec, Min Acceleration = -6.4 g's @ 8.2 msec



Accel Y (g's) vs. Time (msec)

FMH
G04I7-001.15

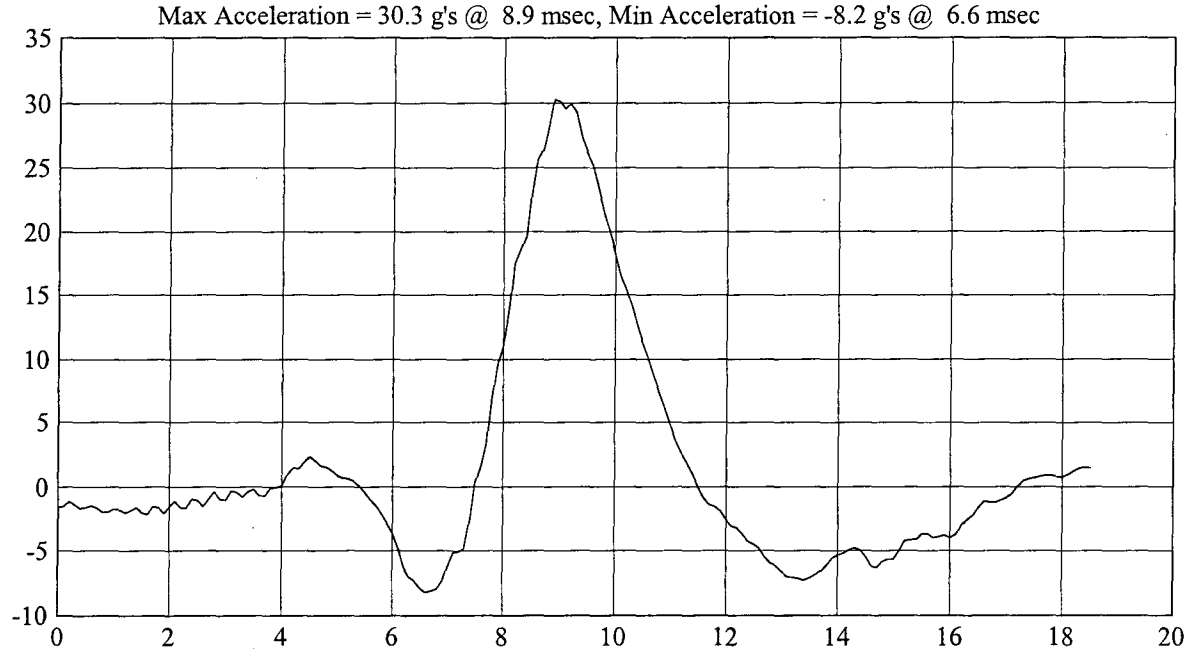
Customer: DODGE
Test # 9
FM4411
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/49

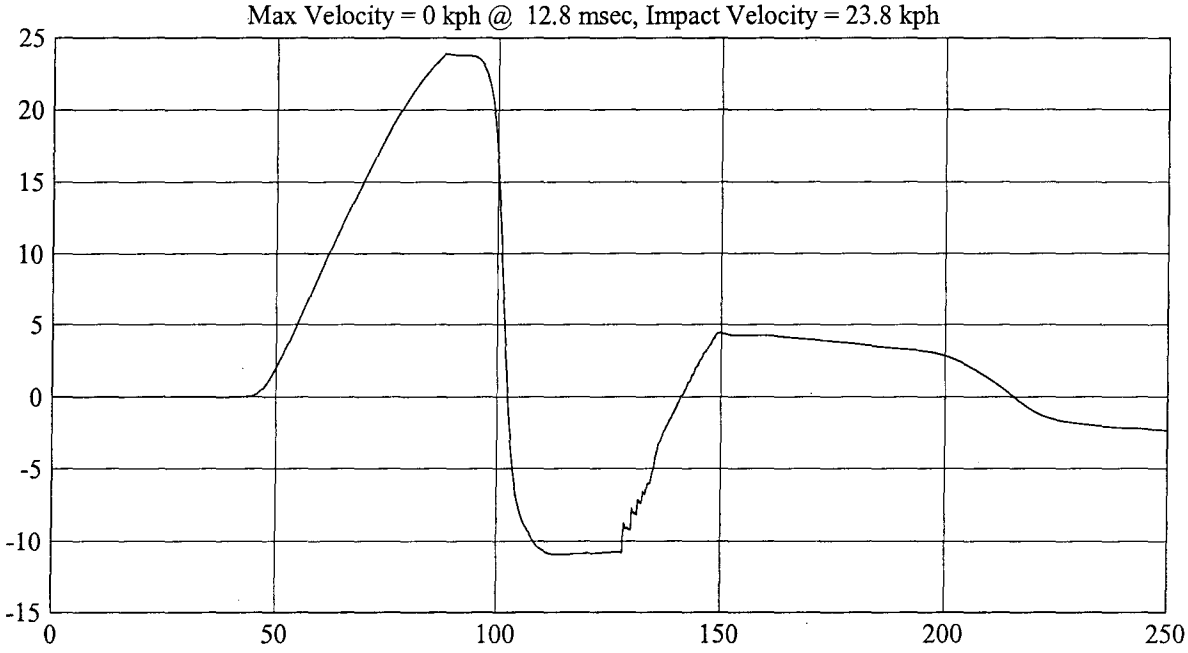
HIC(d) = 1335, HIC = 1549, Delta T = 3.6 msec

Max Acceleration = 30.3 g's @ 8.9 msec, Min Acceleration = -8.2 g's @ 6.6 msec



Accel Z (g's) vs. Time (msec)

Max Velocity = 0 kph @ 12.8 msec, Impact Velocity = 23.8 kph



Velocity (kph) vs. Time (msec)

FMH
G04I7-001.15

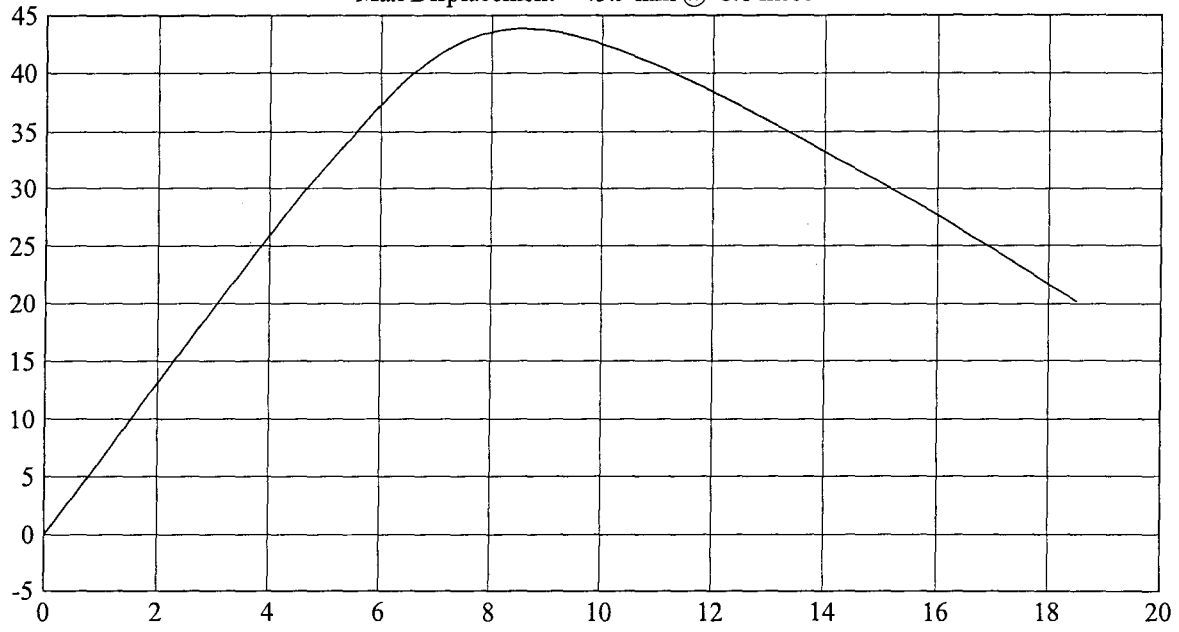
Customer: DODGE
Test # 9
FM4411
Additional Desc: N/A

Vehicle Program : CARAVAN

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/49

HIC(d) = 1335, HIC = 1549, Delta T = 3.6 msec

Max Displacement = 43.9 mm @ 8.6 msec



Displacement (mm) vs. Time (msec)

4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the test series. Items marked with an asterisk are calibrated by an external lab. An additional summary table is given for the pre and post-test calibration data for the Free Motion Headforms. The temperature trace to confirm testing was conducted between 66°F and 78°F (19°C - 26°C) is included in Appendix A. Calibration information can be found in Appendix B.

TABLE 4-1 LIST OF ITEMS USED

ITEM	MANUFACTURER NAME	MODEL #	FUNCTION OF ITEM	ACCURACY	CAL. INTERNAL
Head Drop Tower (includes test frame and DAS)	MGA Research Corp.	MGA-100-DC	FMH Calibration	N/A	N/A
Accelerometers	Endevco	7264-2000	Acceleration Data	±0.5%	6 months
*Digital Inclinometer	Mitutoyo	PRO 360	Set Angle of FMH/Targeting	0.1°	Annual
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	036 037 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Kodak	RO1000	Record Event	N/A	N/A
*FARO™	Faro Technologies	G08020203122	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Protractor	 Stanley N/A Mitutoyo	 289 -- --	Measurement Targeting FMH setup Horizontal Measurement	 1 mm N/A 0.5°	Annual
*Vehicle Scale 9804-022/9805-175	Cardinal	8950F	Weighing Vehicle	± .5 kg	Annual
* Scale	Detecto	AP-20	Weigh FMH Head	± 0.01 lb	Annual
*Temperature Recorder	Dickson	TR-320	Record Temperature and Humidity	± 1°C ± 1% RH	Annual

TABLE 4-2 FMH CALIBRATION SUMMARY DATA SUMMARY TABLE

FMH Serial #		Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#36	10.03	22.0	51.0	237.8	14.0	Yes
Post	#36	10.03	22.0	48.0	240.2	8.2	Yes
Pre	#37	9.96	22.0	46.0	242.3	10.2	Yes
Post	#37	9.96	22.0	48.0	244.6	5.9	Yes
Pre	#38	9.99	220	46.0	238.1	4.7	Yes
Post	#38	9.99	22.0	48.0	241.8	5.0	Yes

RECORDED BY: David G. Gotwals DATE: August 11, 2004

APPROVED BY: Helen A. Kaleto

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 36 CALIBRATION DATE: 8-9-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	10.03
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	51
Peak Resultant Acceleration	225 G's to 275 G's	237.8
Peak Lateral Acceleration	15 G's Maximum	14.0
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION

HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35923	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J35916	5-23-04	11-23-04
4	ENDEVCO	7264-2000	835918	5-23-04	11-23-04

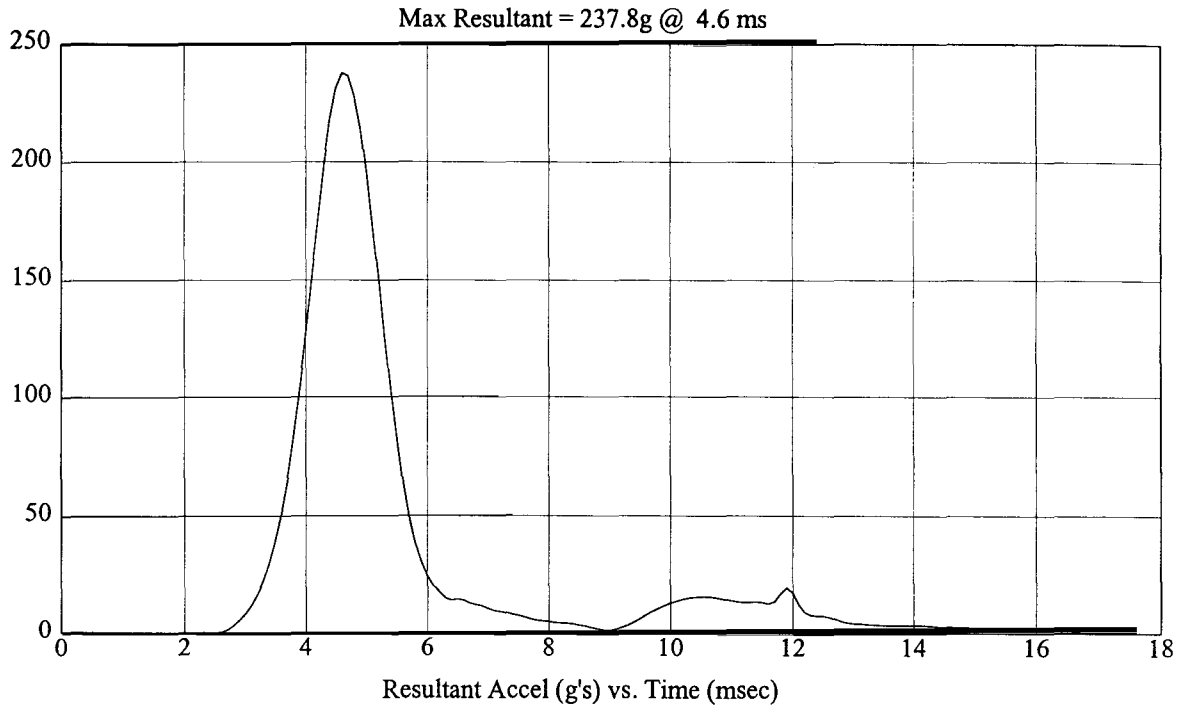
REMARKS:

RECORDED BY: _____ DATE: 8-9-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

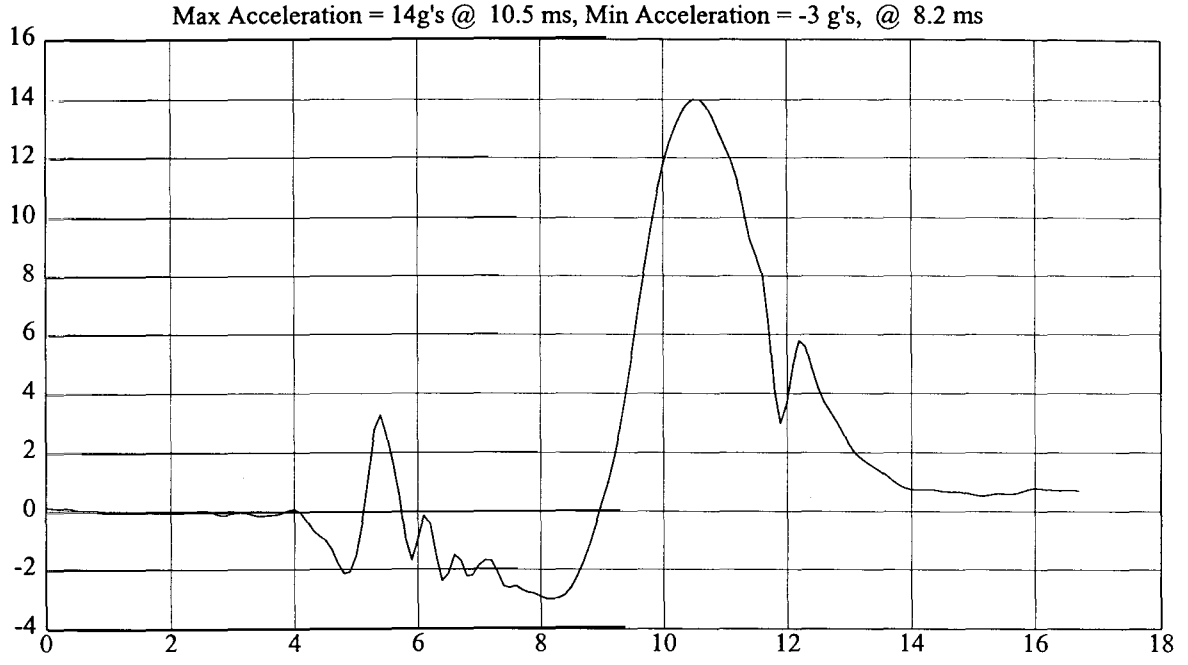
Test Number: H36242 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 36



Head Drop
(Preliminary Test Report)

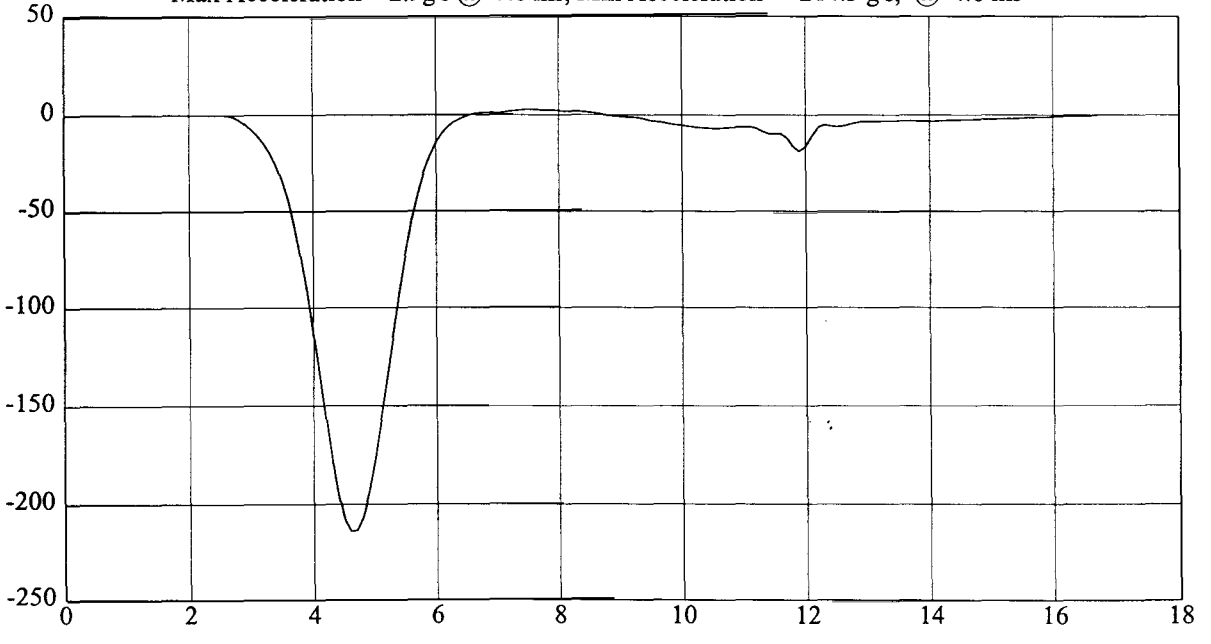
Test Number: H36242 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 36

Max Acceleration = 14g's @ 10.5 ms, Min Acceleration = -3 g's, @ 8.2 ms



Accel Y(g's) vs. Time (msec)

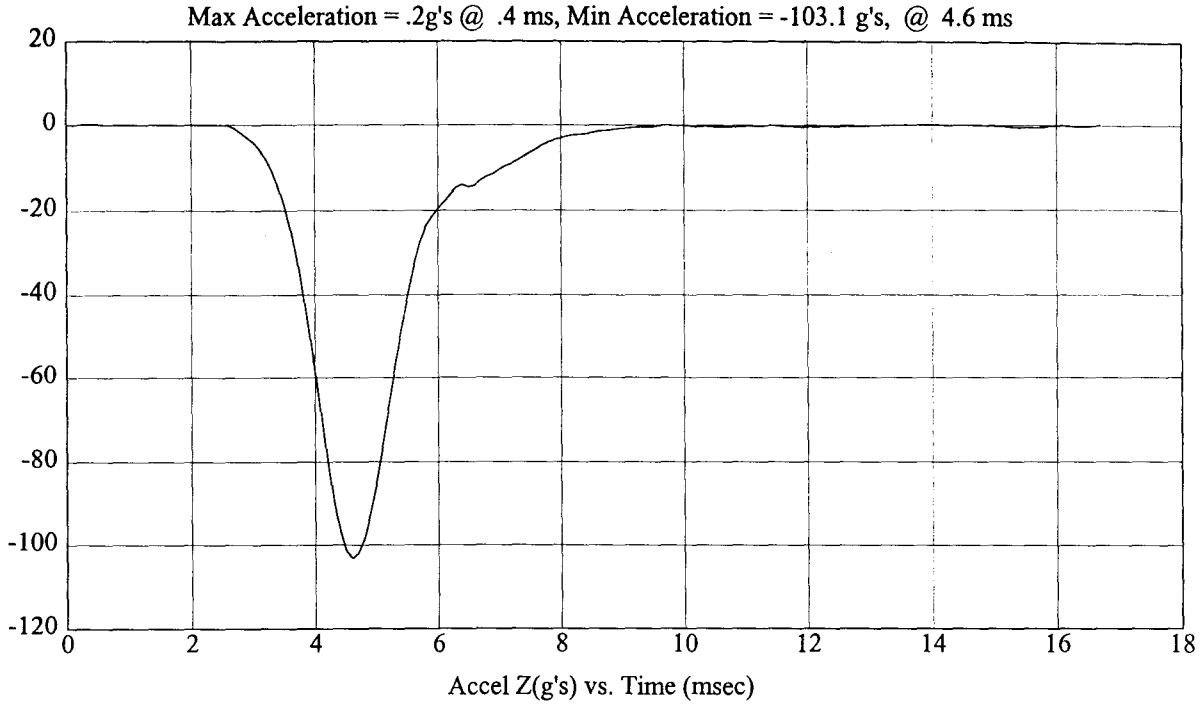
Max Acceleration = 2.9g's @ 7.6 ms, Min Acceleration = -214.3 g's, @ 4.6 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H36242 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 36



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 36	CALIBRATION DATE: 8-11-04	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.03
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	48
Peak Resultant Acceleration	225 G's to 275 G's	240.2
Peak Lateral Acceleration	15 G's Maximum	8.2
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35923	5/23/04	11/23/04
3	ENDEVCO	7264-2000	J35916	5/23/04	11/23/04
4	ENDEVCO	7264-2000	J35918	5/23/04	11/23/04

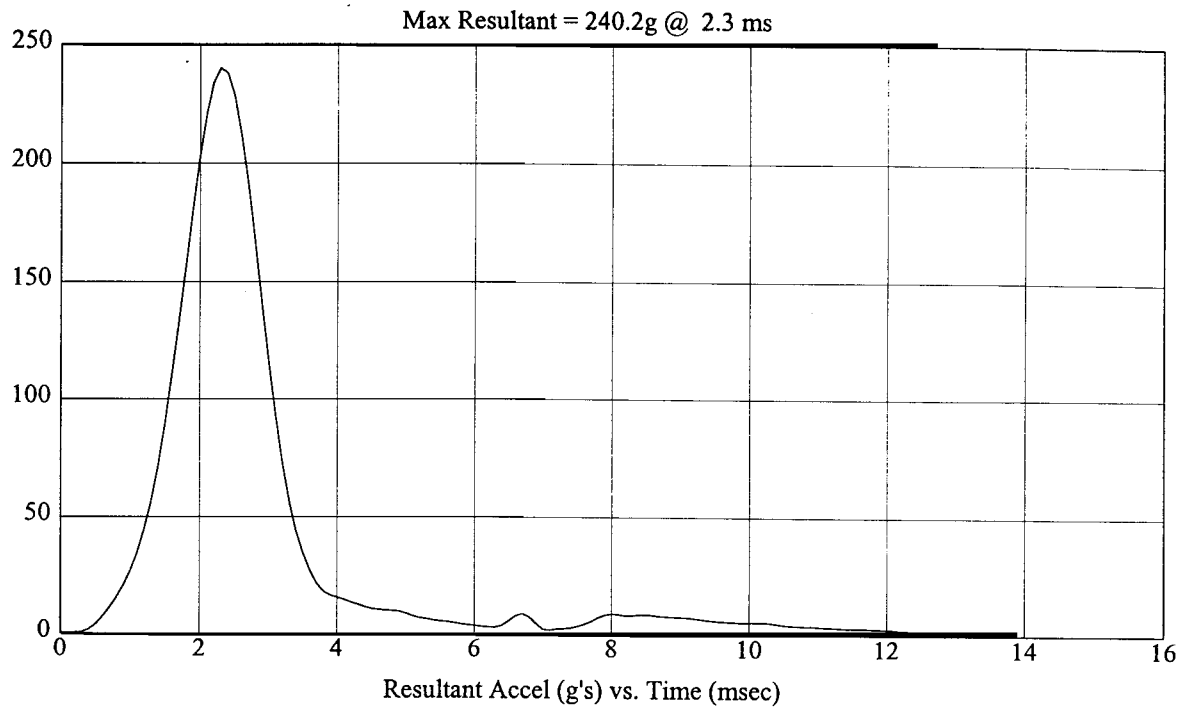
REMARKS:

RECORDED BY: _____ DATE: 8-11-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

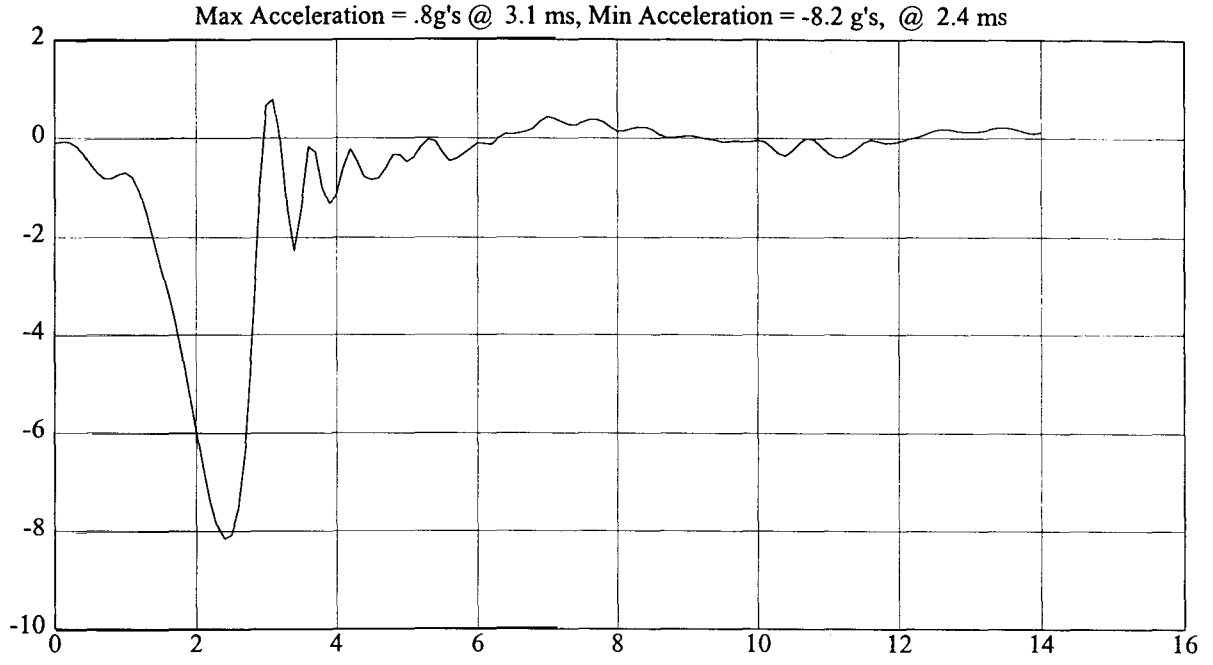
Test Number: H36243 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 36



Head Drop
(Preliminary Test Report)

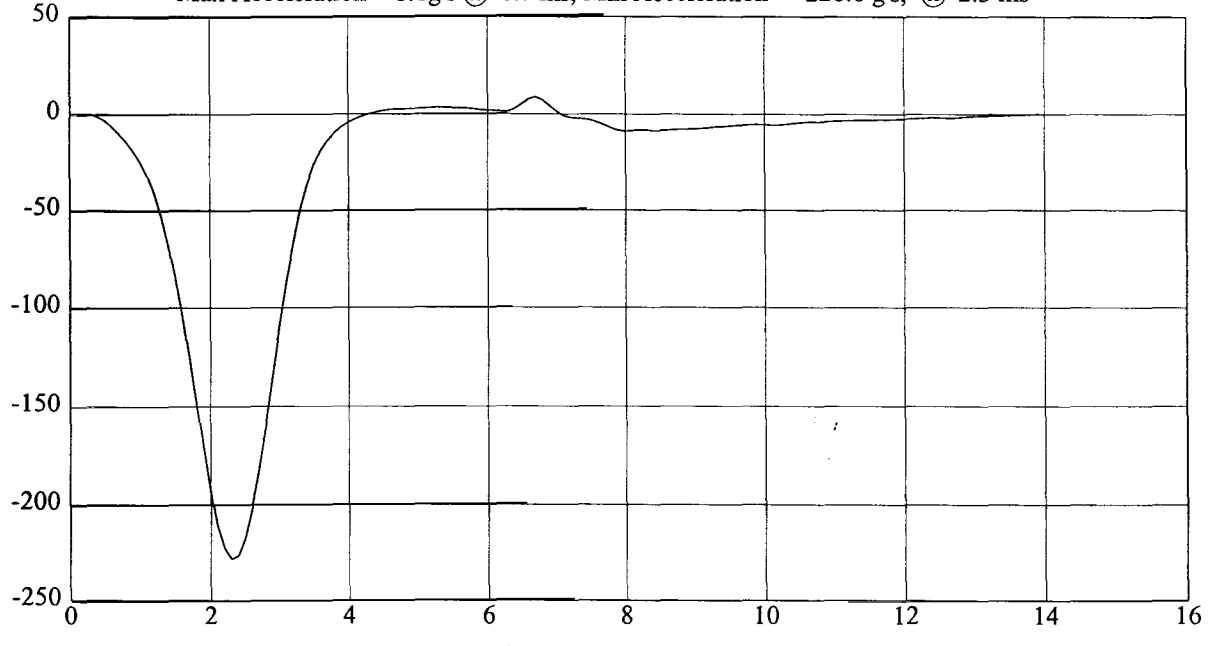
Test Number: H36243 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 36

Max Acceleration = .8g's @ 3.1 ms, Min Acceleration = -8.2 g's, @ 2.4 ms



Accel Y(g's) vs. Time (msec)

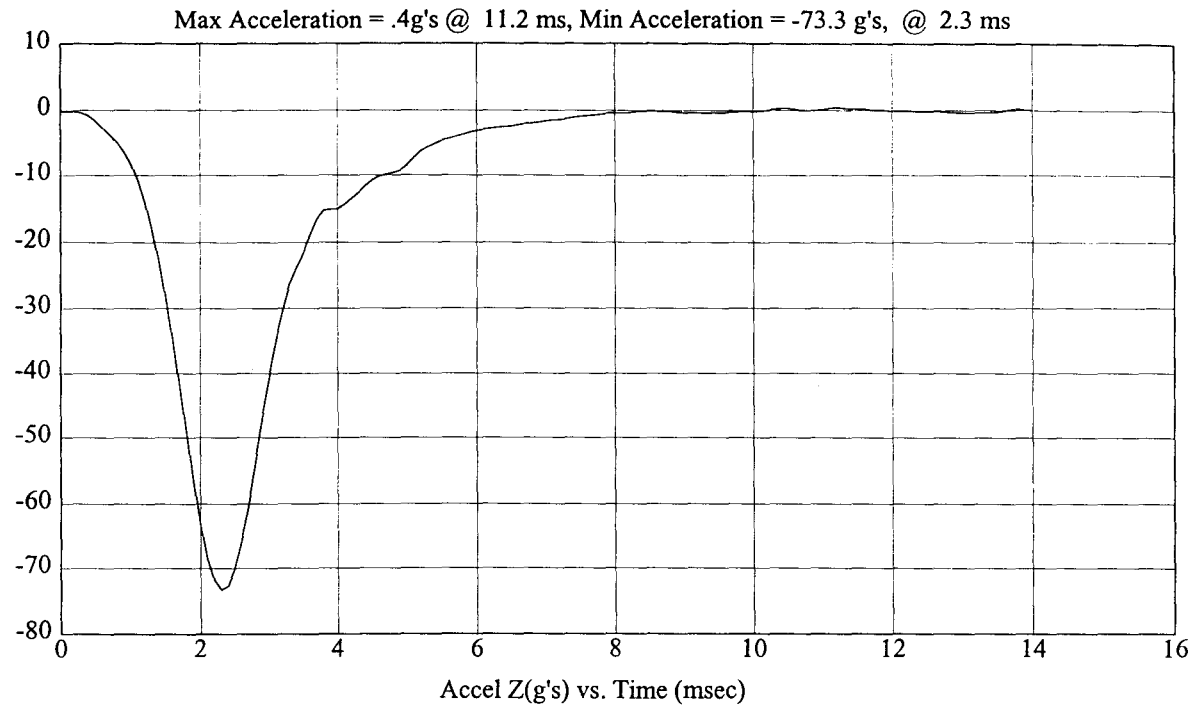
Max Acceleration = 8.6g's @ 6.7 ms, Min Acceleration = -228.6 g's, @ 2.3 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H36243 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 36



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 37 CALIBRATION DATE: 8-4-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	46
Peak Resultant Acceleration	225 G's to 275 G's	242.3
Peak Lateral Acceleration	15 G's Maximum	10.2
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION

HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35800	5-3-04	11-3-04
3	ENDEVCO	7264-2000	J35841	5-3-04	11-3-04
4	ENDEVCO	7264-2000	J35791	5-3-04	11-3-04

REMARKS:

RECORDED BY: _____ DATE: 8-9-04

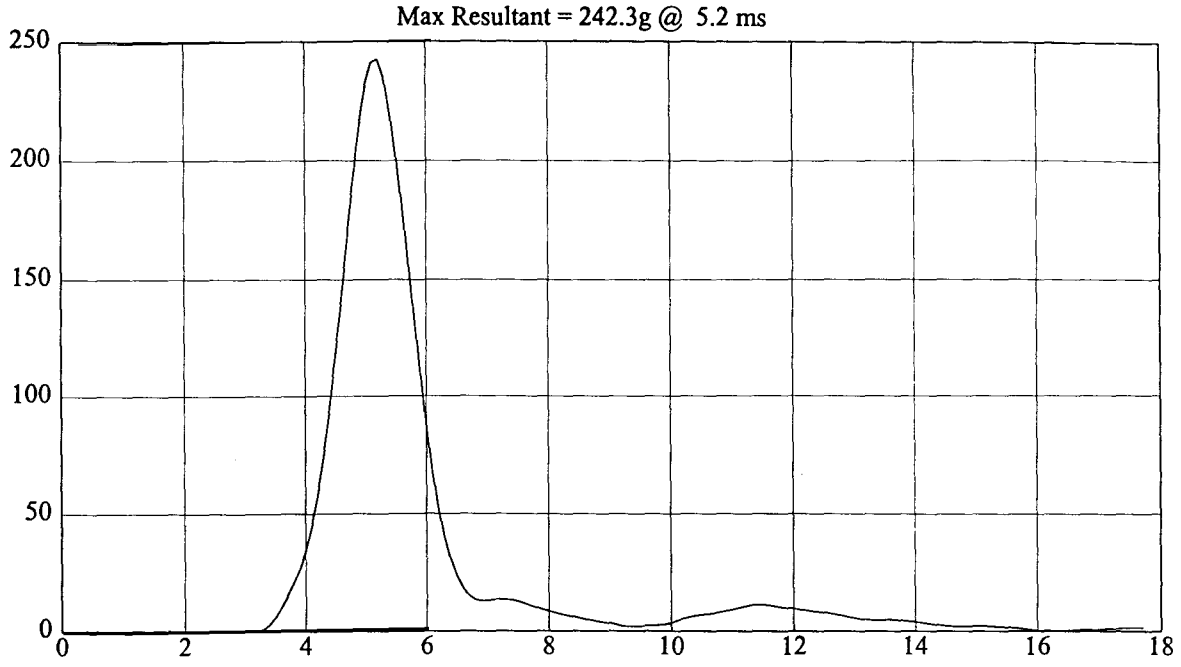
APPROVED BY: _____

Head Drop
(Preliminary Test Report)

Test Number: H37124
Test Description: Pre - Test Calibration

MGA Job Number: G04I7-001

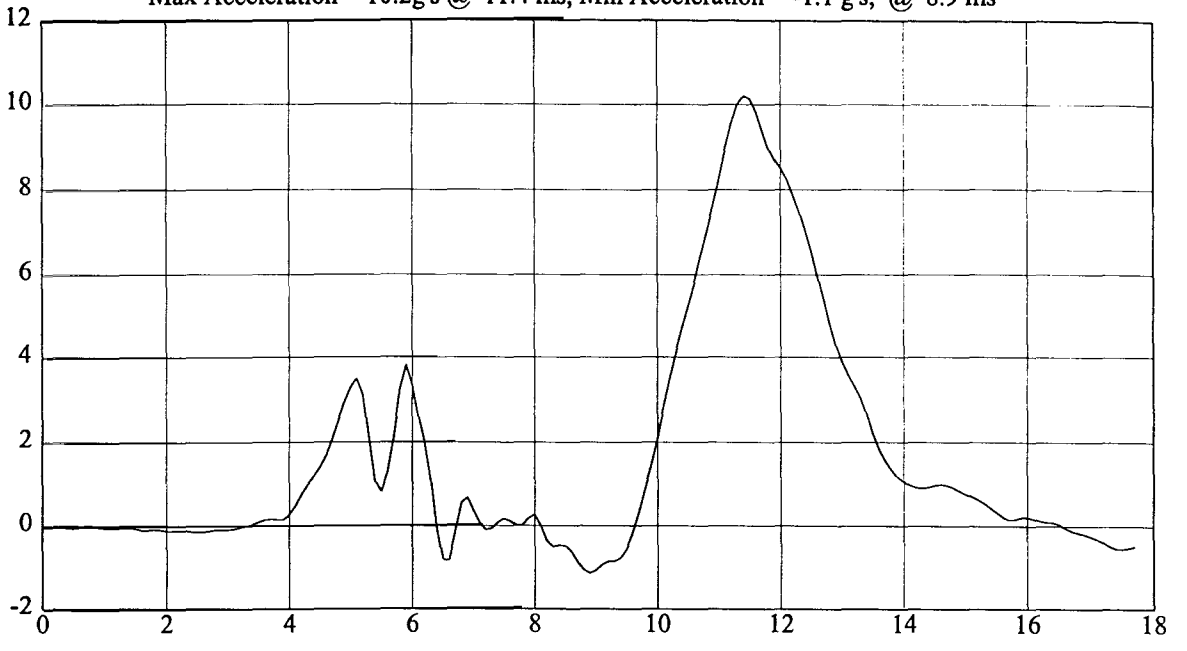
Test Date: 8/9/04
Head # : 37



Head Drop
(Preliminary Test Report)

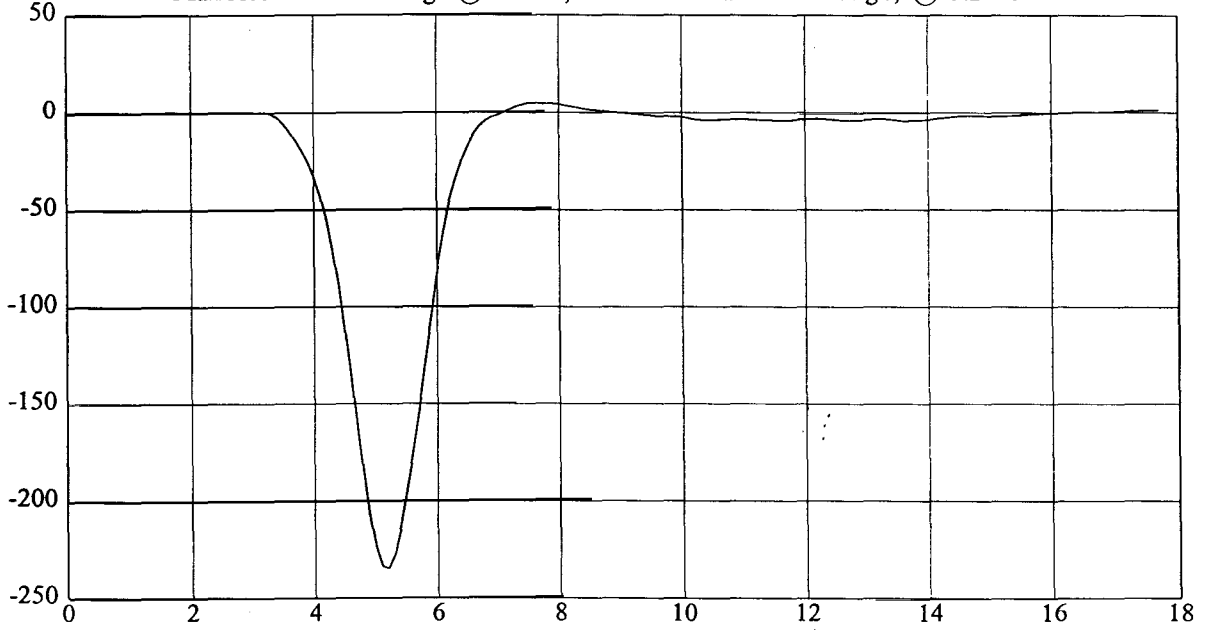
Test Number: H37124 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 37

Max Acceleration = 10.2g's @ 11.4 ms, Min Acceleration = -1.1 g's, @ 8.9 ms



Accel Y(g's) vs. Time (msec)

Max Acceleration = 4.9g's @ 7.6 ms, Min Acceleration = -234.4 g's, @ 5.2 ms

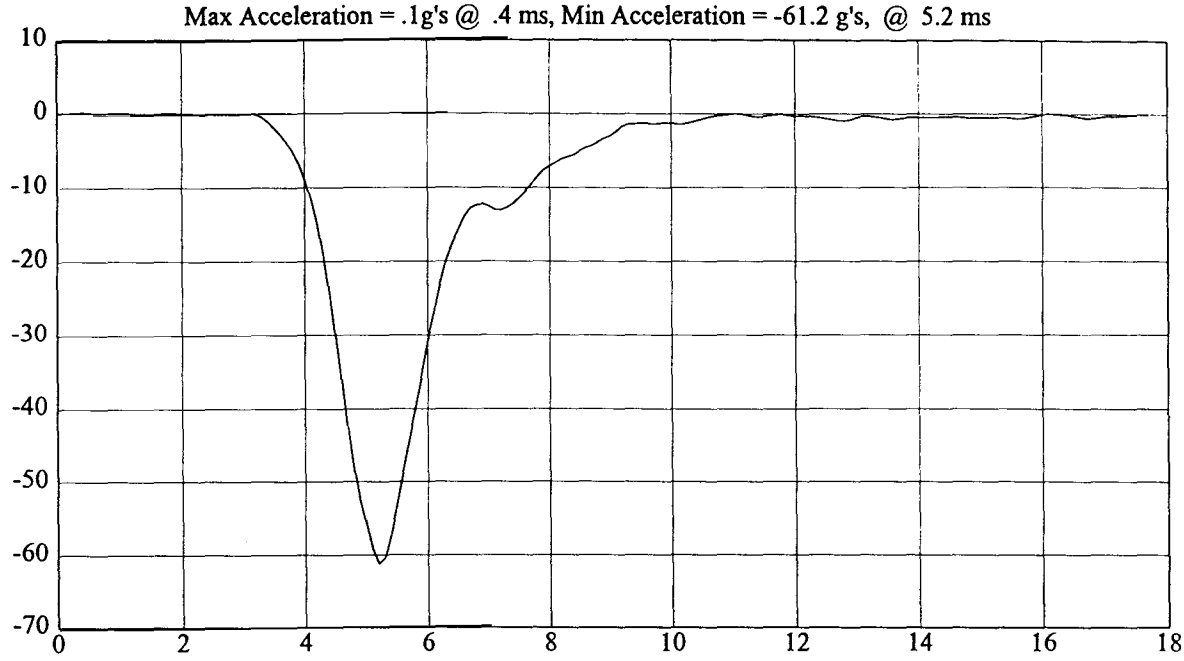


Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H37124 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 37

Max Acceleration = .1g's @ .4 ms, Min Acceleration = -61.2 g's, @ 5.2 ms



Accel Z(g's) vs. Time (msec)

60417-001.4515
Post-Test

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 37 CALIBRATION DATE: 8-11-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	48
Peak Resultant Acceleration	225 G's to 275 G's	244.6
Peak Lateral Acceleration	15 G's Maximum	5.9
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION

HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35800	5/3/04	11/3/04
3	ENDEVCO	7264-2000	J35841	5/3/04	11/3/04
4	ENDEVCO	7264-2000	J35791	5/3/04	11/3/04

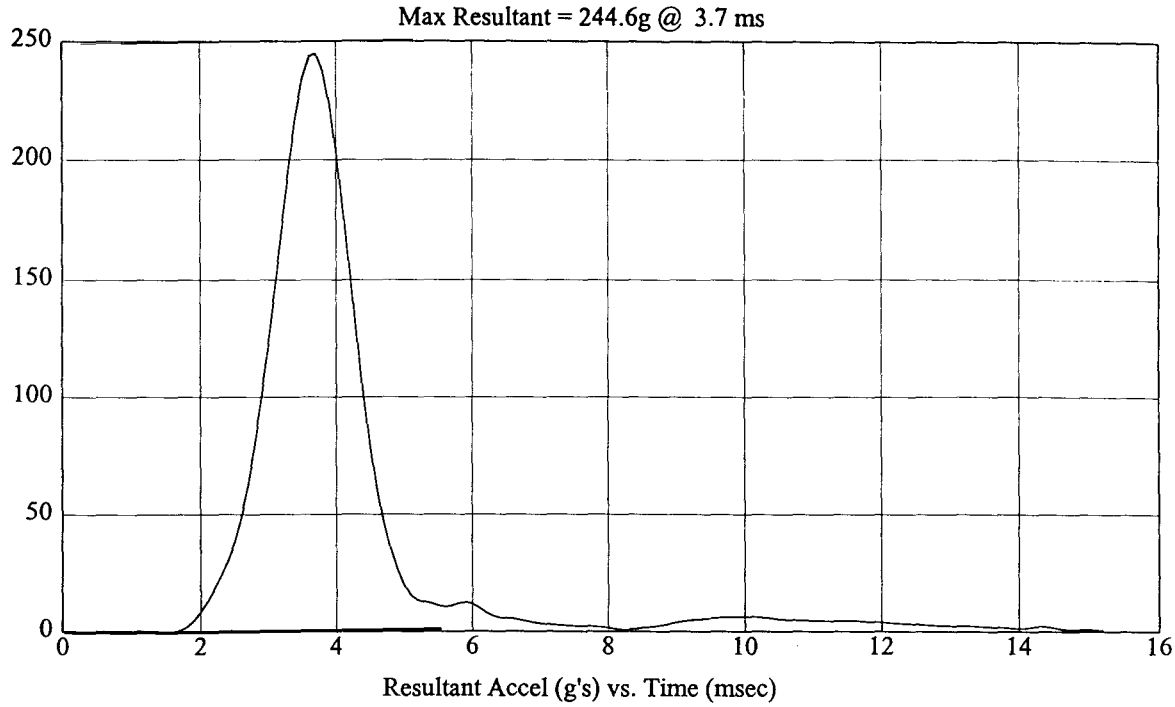
REMARKS:

RECORDED BY: _____ DATE: 8-11-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

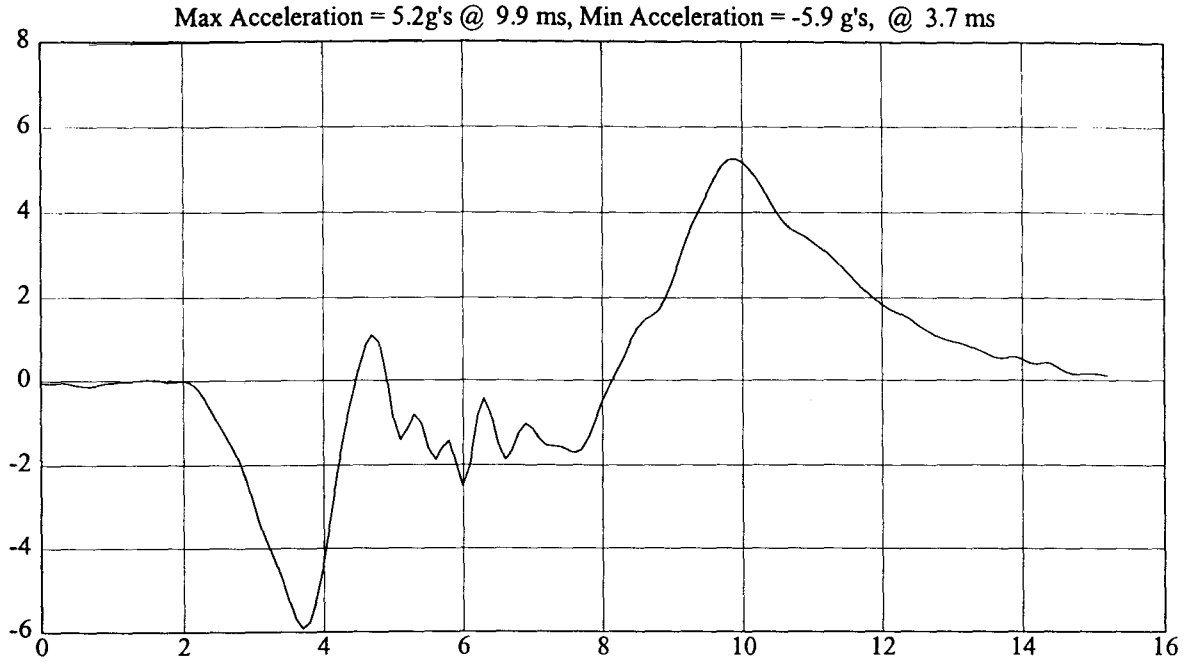
Test Number: H37125 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 37



Head Drop
(Preliminary Test Report)

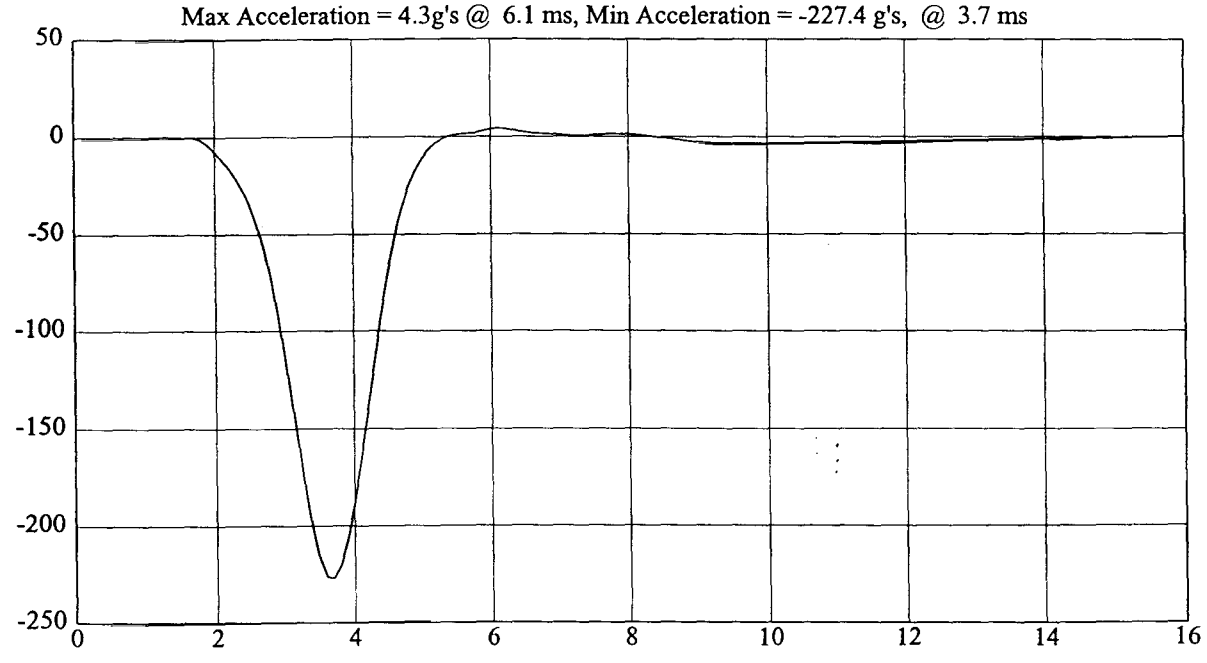
Test Number: H37125 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 37

Max Acceleration = 5.2g's @ 9.9 ms, Min Acceleration = -5.9 g's, @ 3.7 ms



Accel Y(g's) vs. Time (msec)

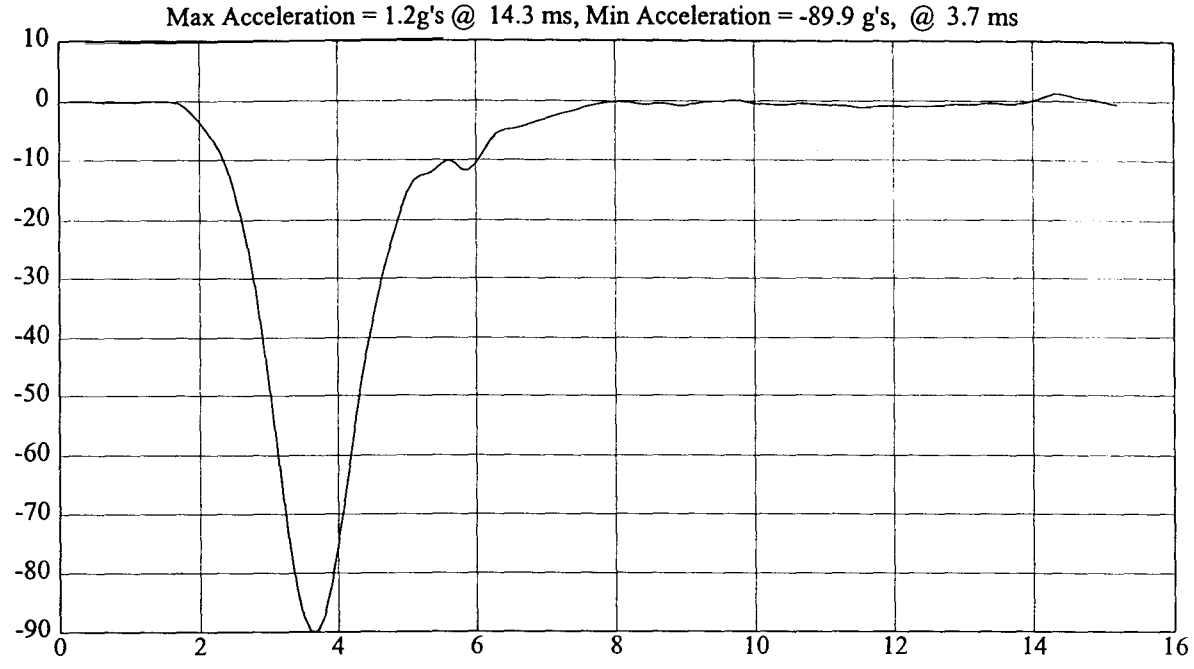
Max Acceleration = 4.3g's @ 6.1 ms, Min Acceleration = -227.4 g's, @ 3.7 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H37125 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 37



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 38 CALIBRATION DATE: 8-9-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.99
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	41
Peak Resultant Acceleration	225 G's to 275 G's	238.1
Peak Lateral Acceleration	15 G's Maximum	4.7
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION

HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J36197	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J36193	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J36353	5-23-04	11-23-04

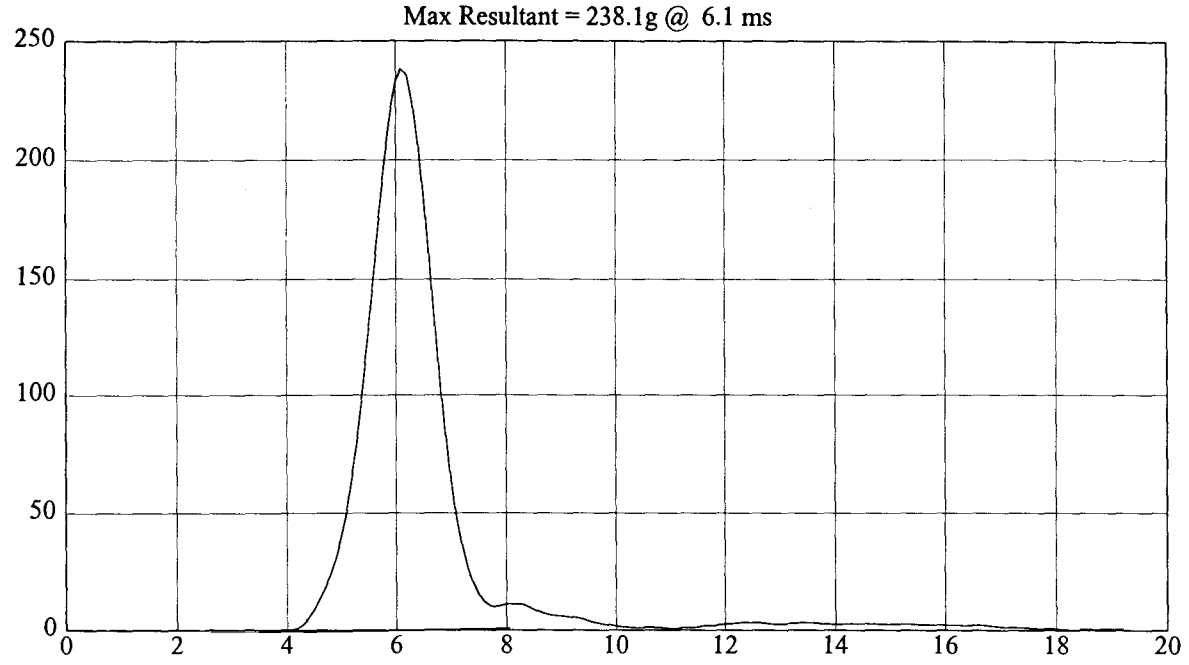
REMARKS:

RECORDED BY: _____ DATE: 8-9-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

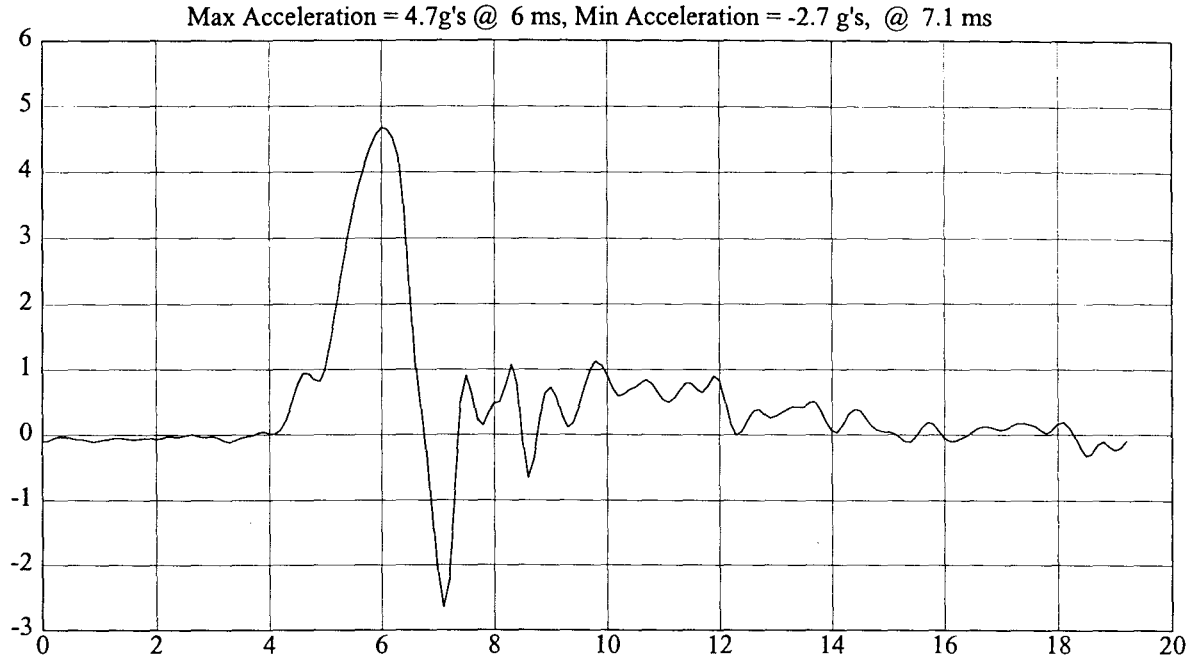
Test Number: H38230 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 38



Head Drop
(Preliminary Test Report)

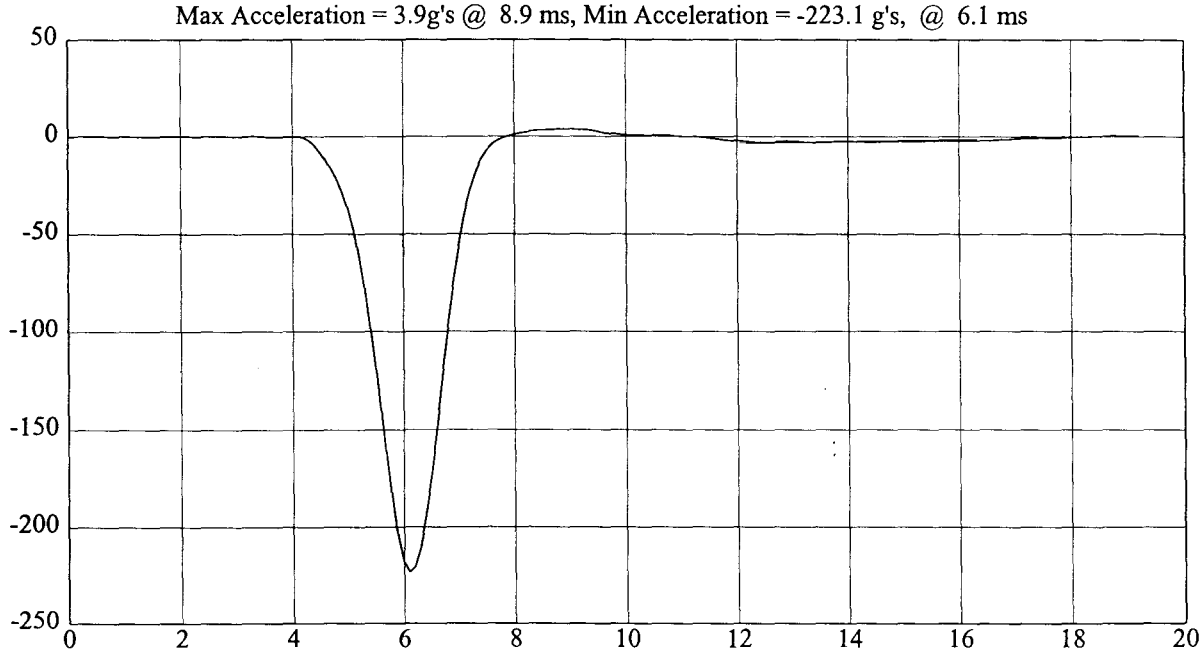
Test Number: H38230 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 38

Max Acceleration = 4.7g's @ 6 ms, Min Acceleration = -2.7 g's, @ 7.1 ms



Accel Y(g's) vs. Time (msec)

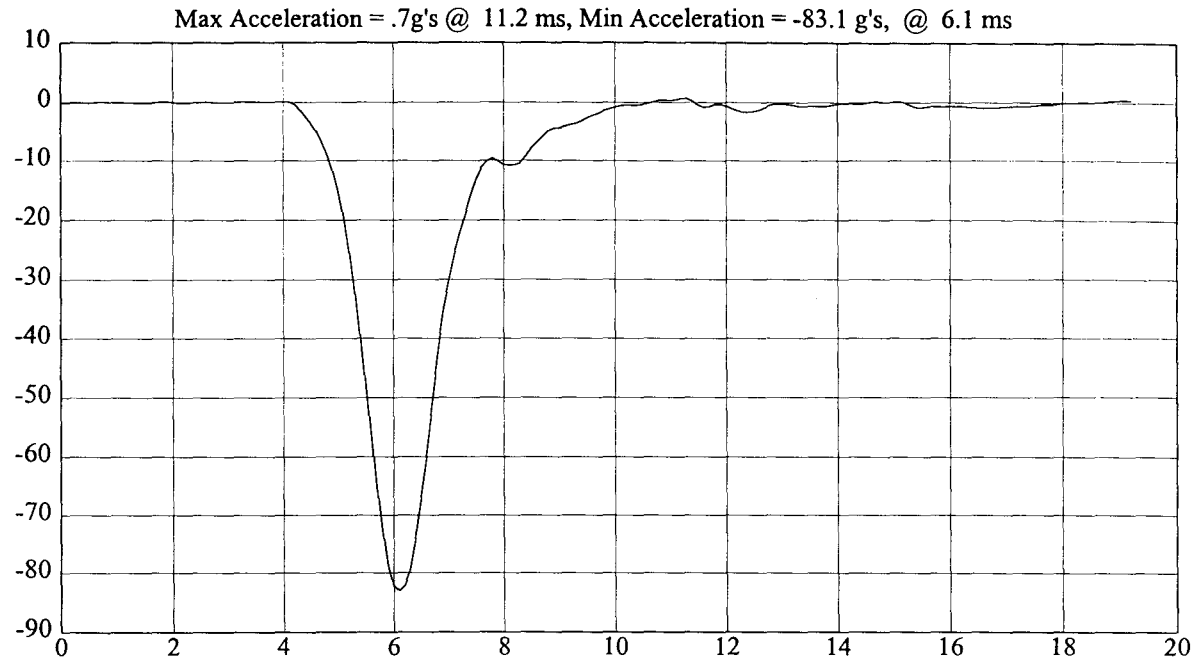
Max Acceleration = 3.9g's @ 8.9 ms, Min Acceleration = -223.1 g's, @ 6.1 ms



Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

Test Number: H38230 MGA Job Number: G04I7-001 Test Date: 8/9/04
Test Description: Pre - Test Calibration Head # : 38



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 38 CALIBRATION DATE: 8-11-04

TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.99
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	48
Peak Resultant Acceleration	225 G's to 275 G's	241.8
Peak Lateral Acceleration	15 G's Maximum	5.0
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J36197	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J36193	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J36353	5-23-04	11-23-04

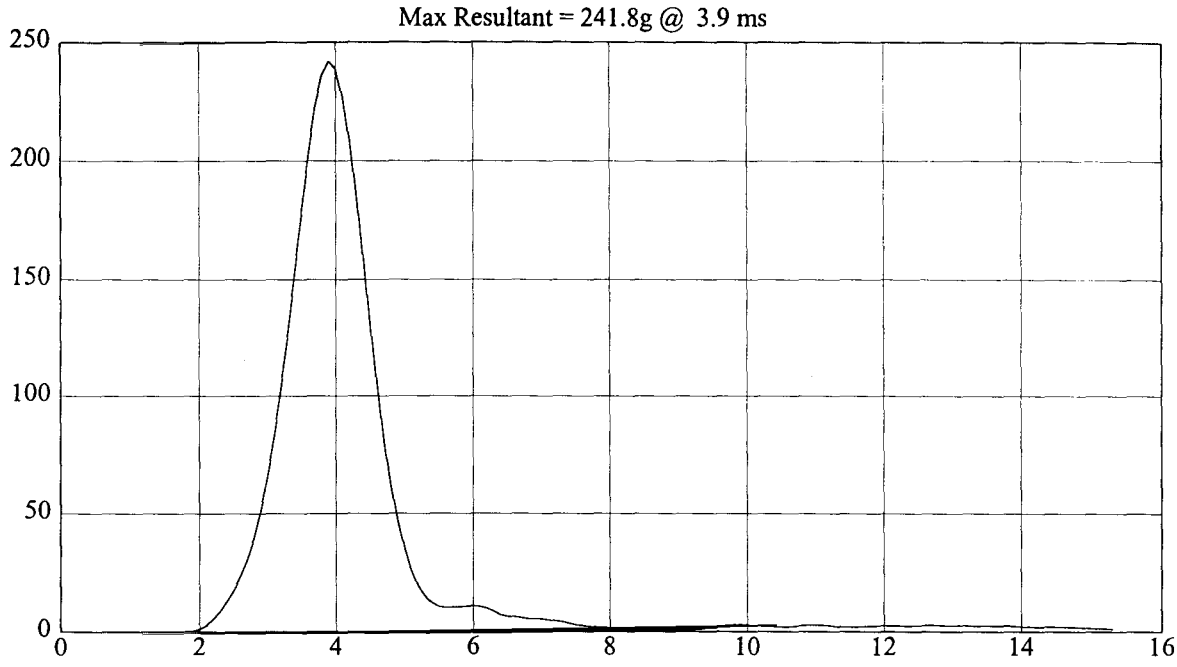
REMARKS:

RECORDED BY: _____ DATE: 8-11-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

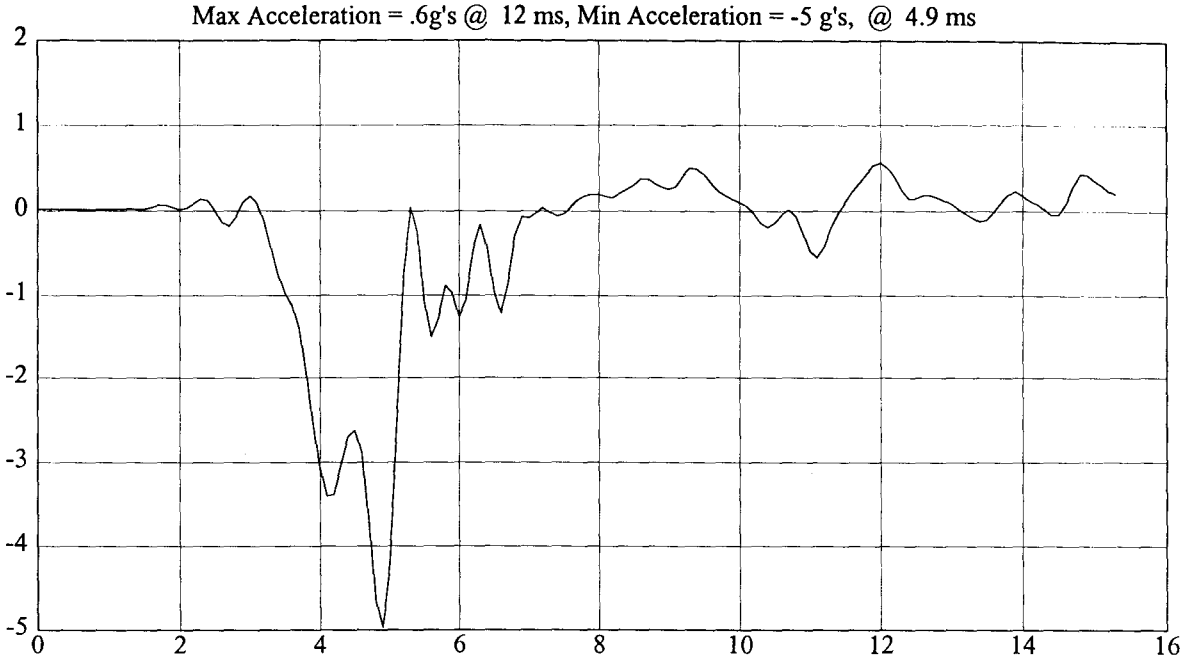
Test Number: H38231 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 38



Head Drop
(Preliminary Test Report)

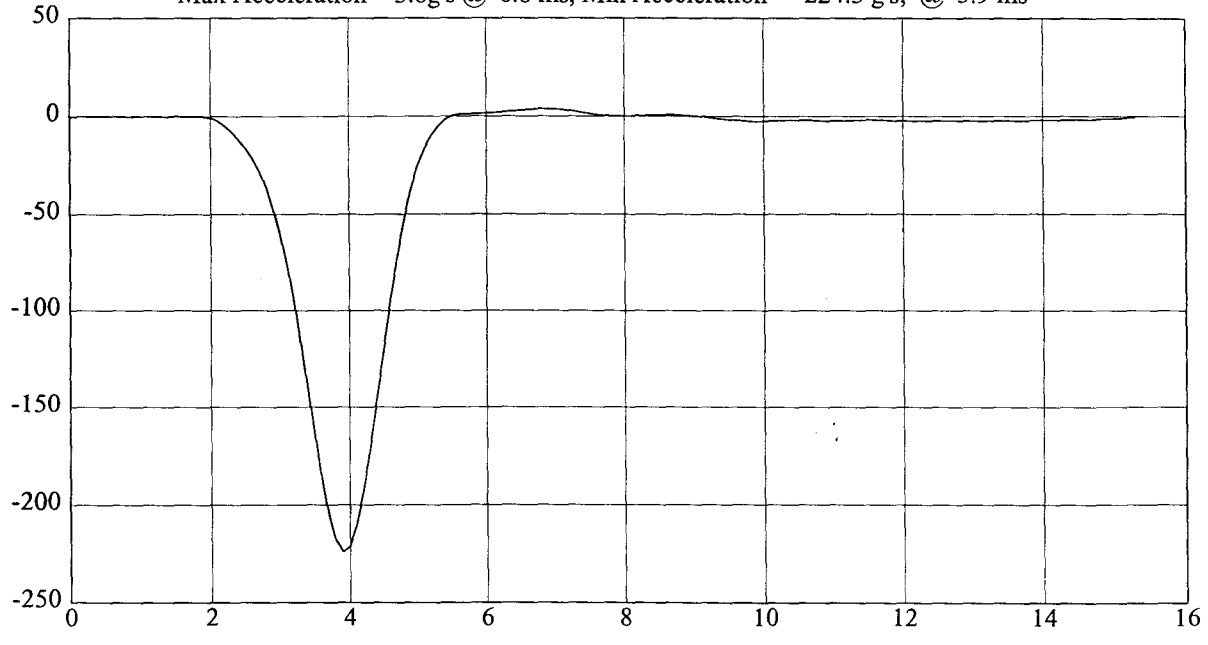
Test Number: H38231 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 38

Max Acceleration = .6g's @ 12 ms, Min Acceleration = -5 g's, @ 4.9 ms



Accel Y(g's) vs. Time (msec)

Max Acceleration = 3.8g's @ 6.8 ms, Min Acceleration = -224.3 g's, @ 3.9 ms

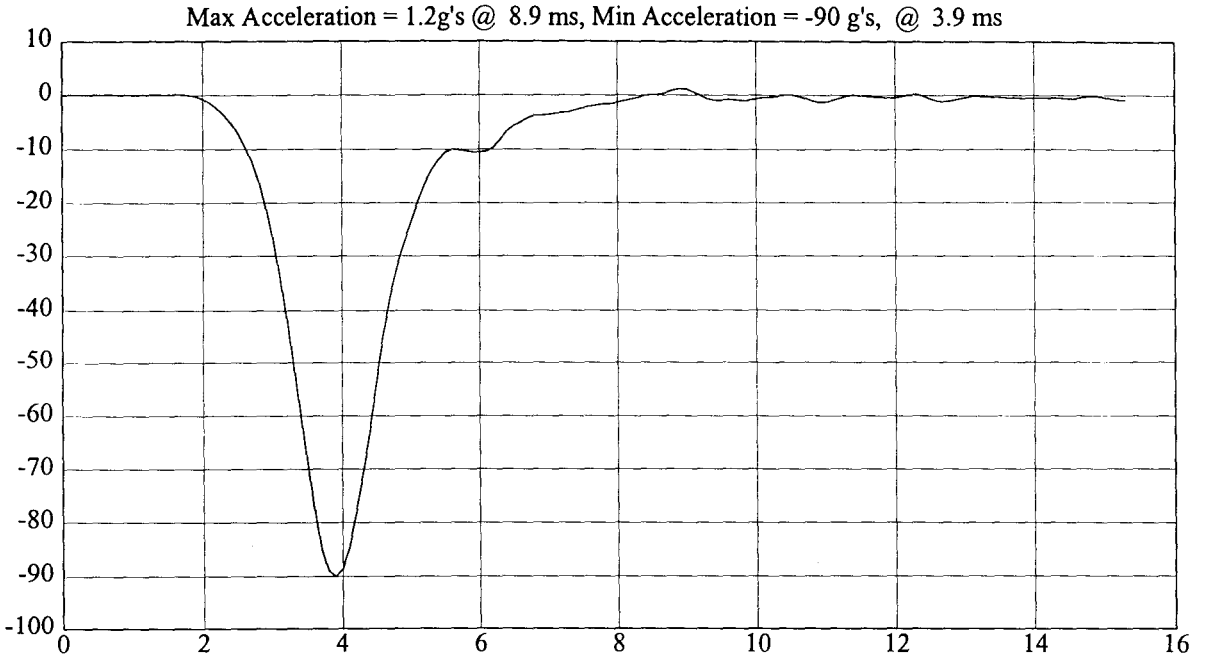


Accel X(g's) vs. Time (msec)

Head Drop
(Preliminary Test Report)

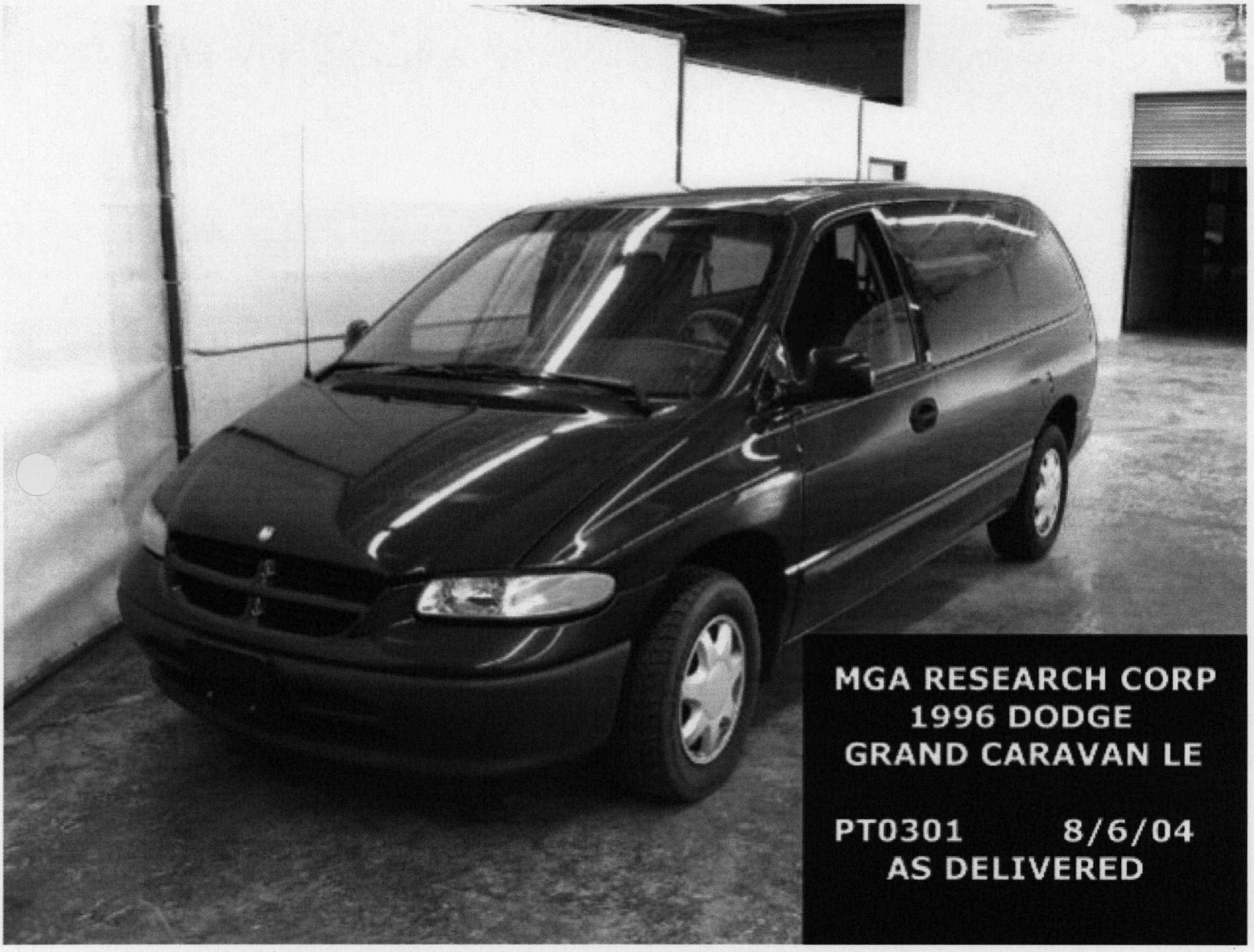
Test Number: H38231 MGA Job Number: G04I7-001 Test Date: 8/11/04
Test Description: Post - Test Calibration Head # : 38

Max Acceleration = 1.2g's @ 8.9 ms, Min Acceleration = -90 g's, @ 3.9 ms



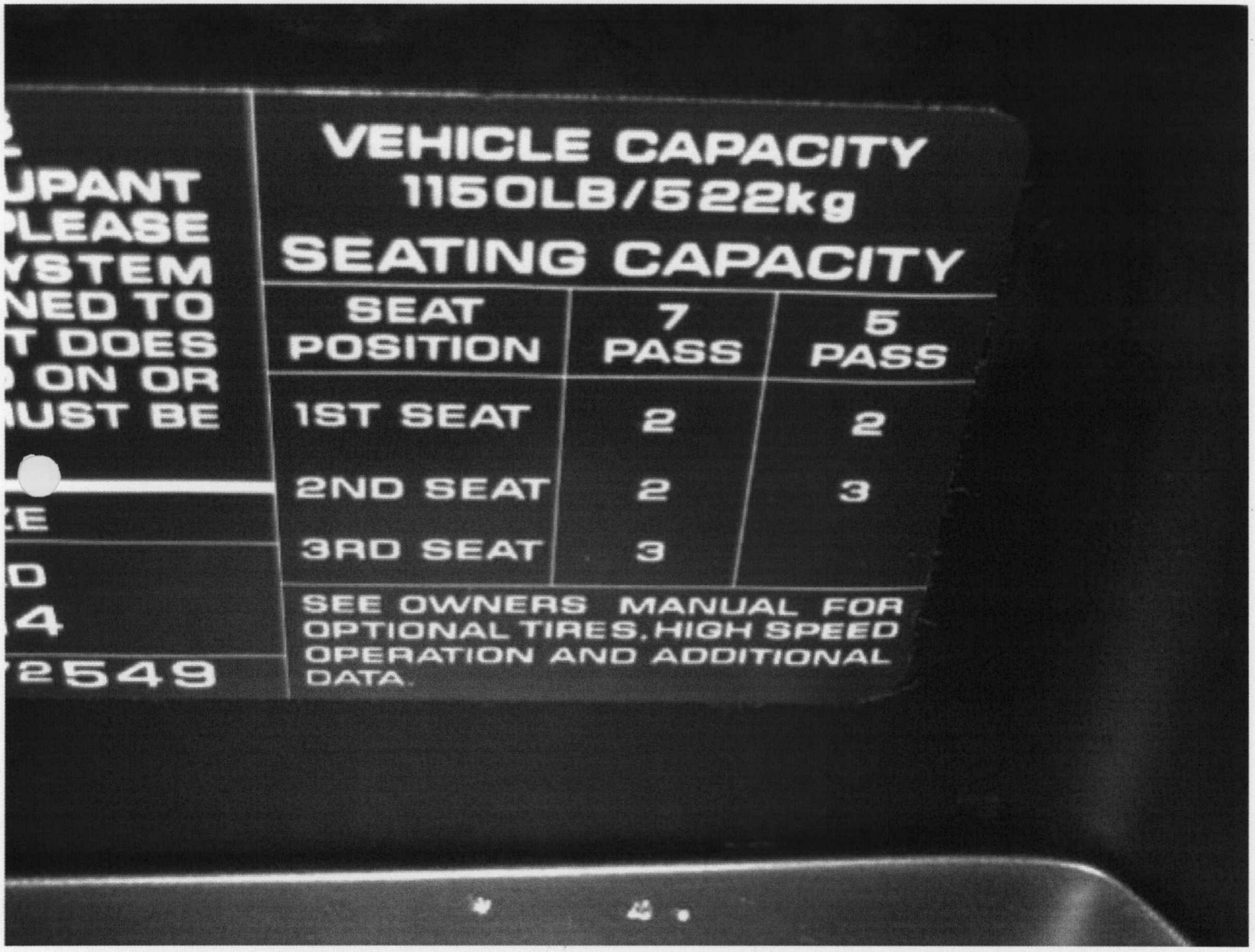
Accel Z(g's) vs. Time (msec)


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1996 DODGE
GRAND CARAVAN LE
PT0301 8/6/04
AS DELIVERED

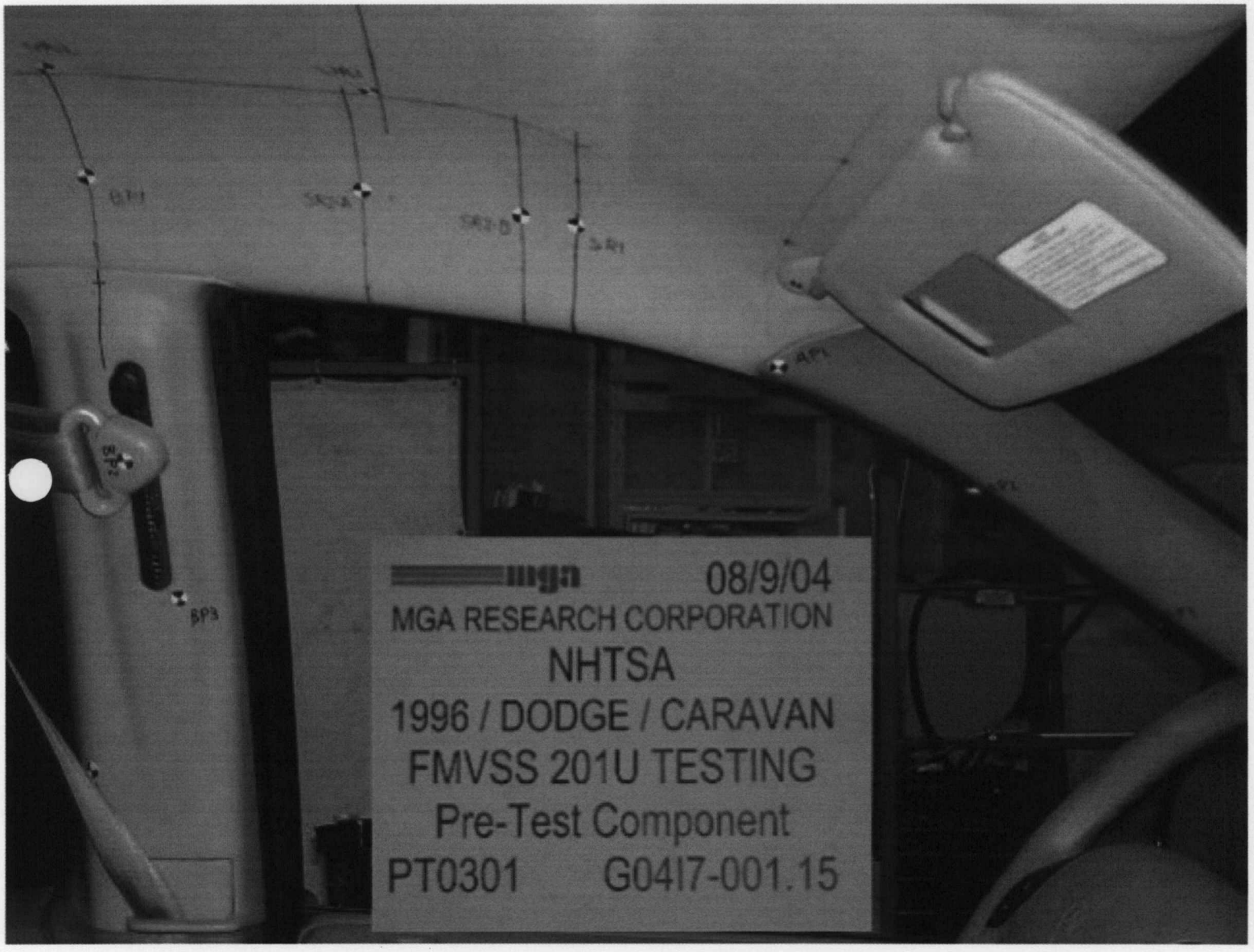

MGA RESEARCH CORP
1996 DODGE
GRAND CARAVAN LE
PT0301 8/6/04
AS DELIVERED

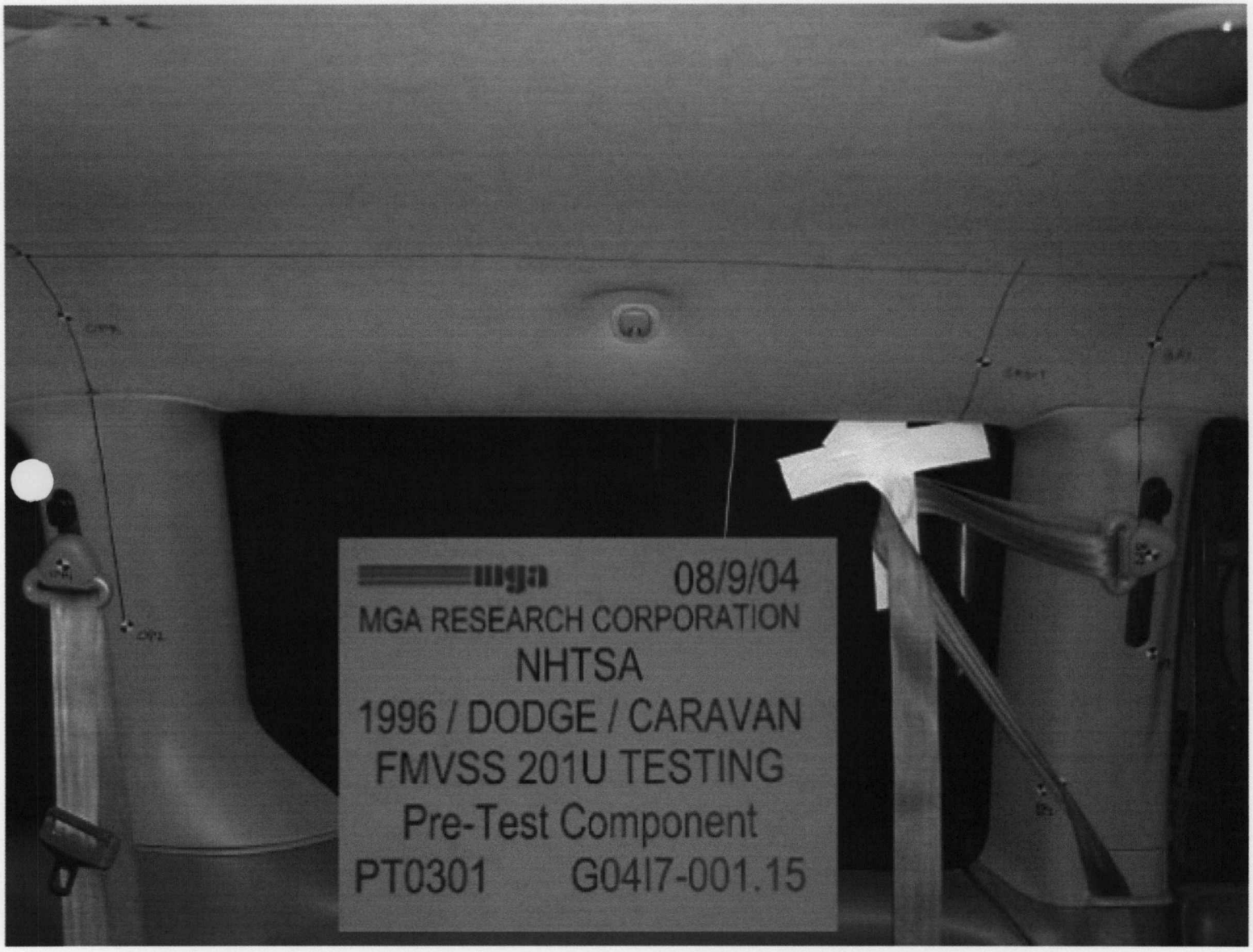

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1996 DODGE
GRAND CARAVAN LE
PT0301 8/6/04
AS DELIVERED

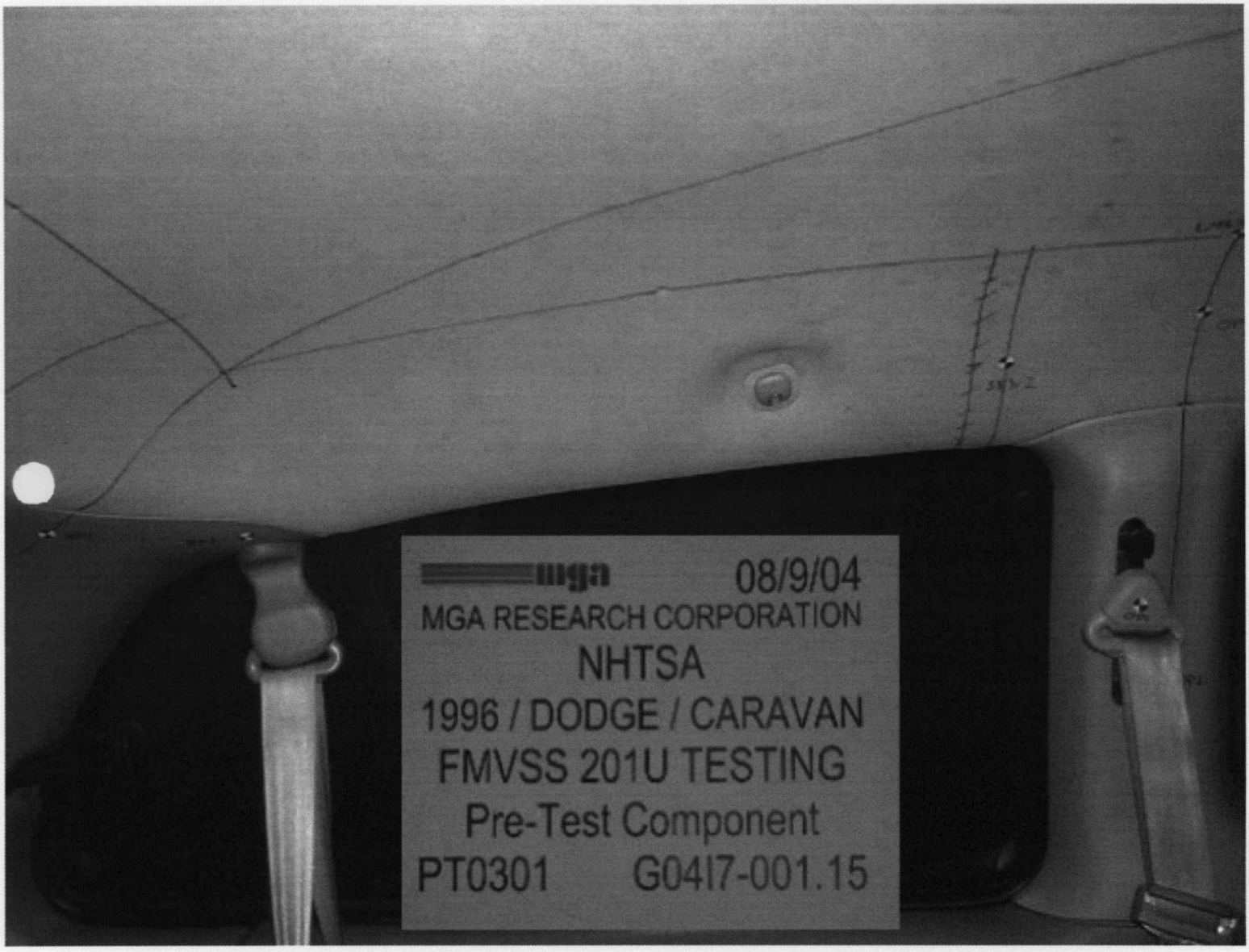

MGA RESEARCH CORP
1996 DODGE
GRAND CARAVAN LE
PT0301 8/6/04
AS DELIVERED

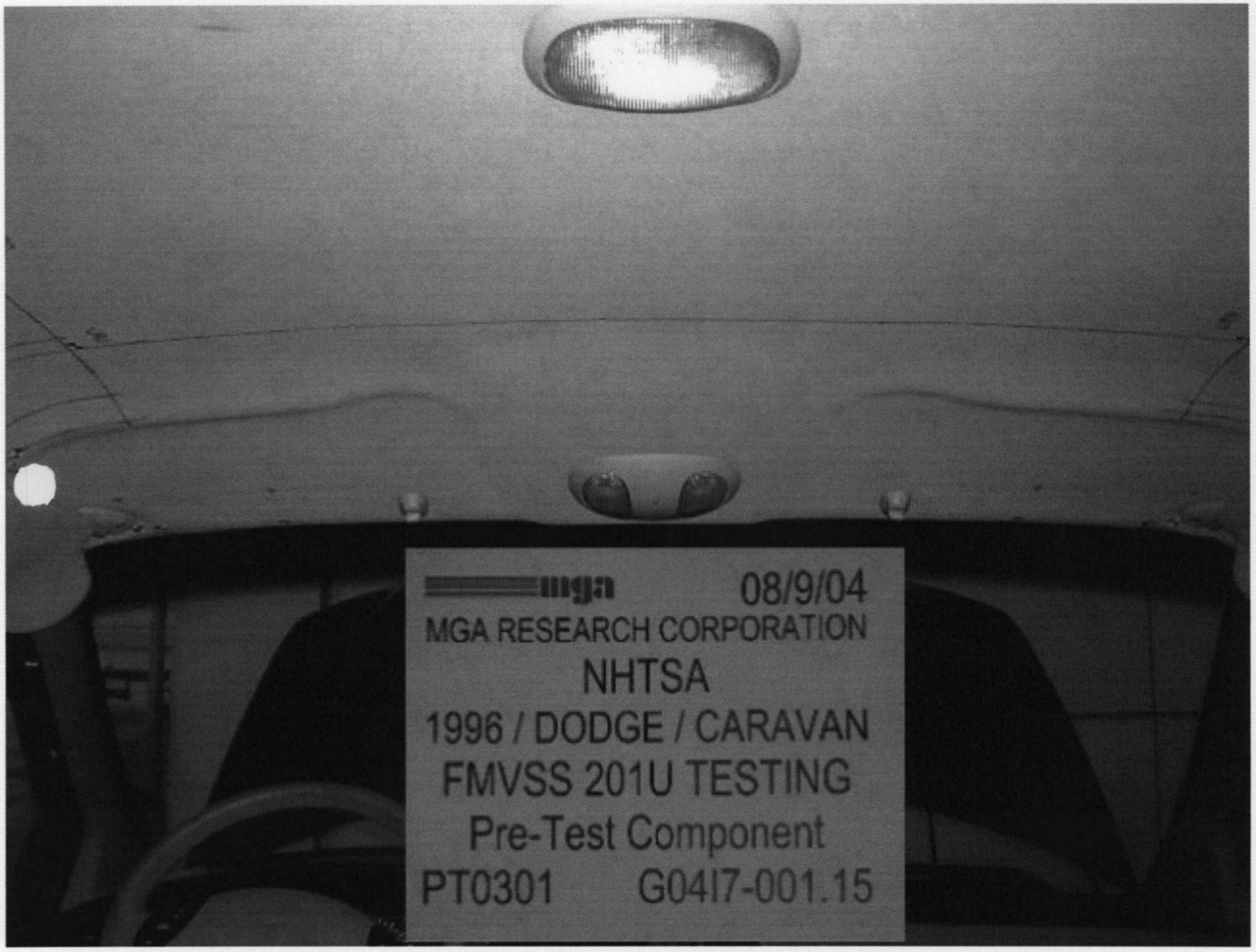

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VEHICLE CAPACITY
1150LB/522kg
SEATING CAPACITY
SEAT POSITION
7 PASS
5 PASS
1ST SEAT
2
2
2ND SEAT
2
3
3RD SEAT
3
SEE OWNERS MANUAL FOR OPTIONAL TIRES, HIGH SPEED OPERATION AND ADDITIONAL DATA.

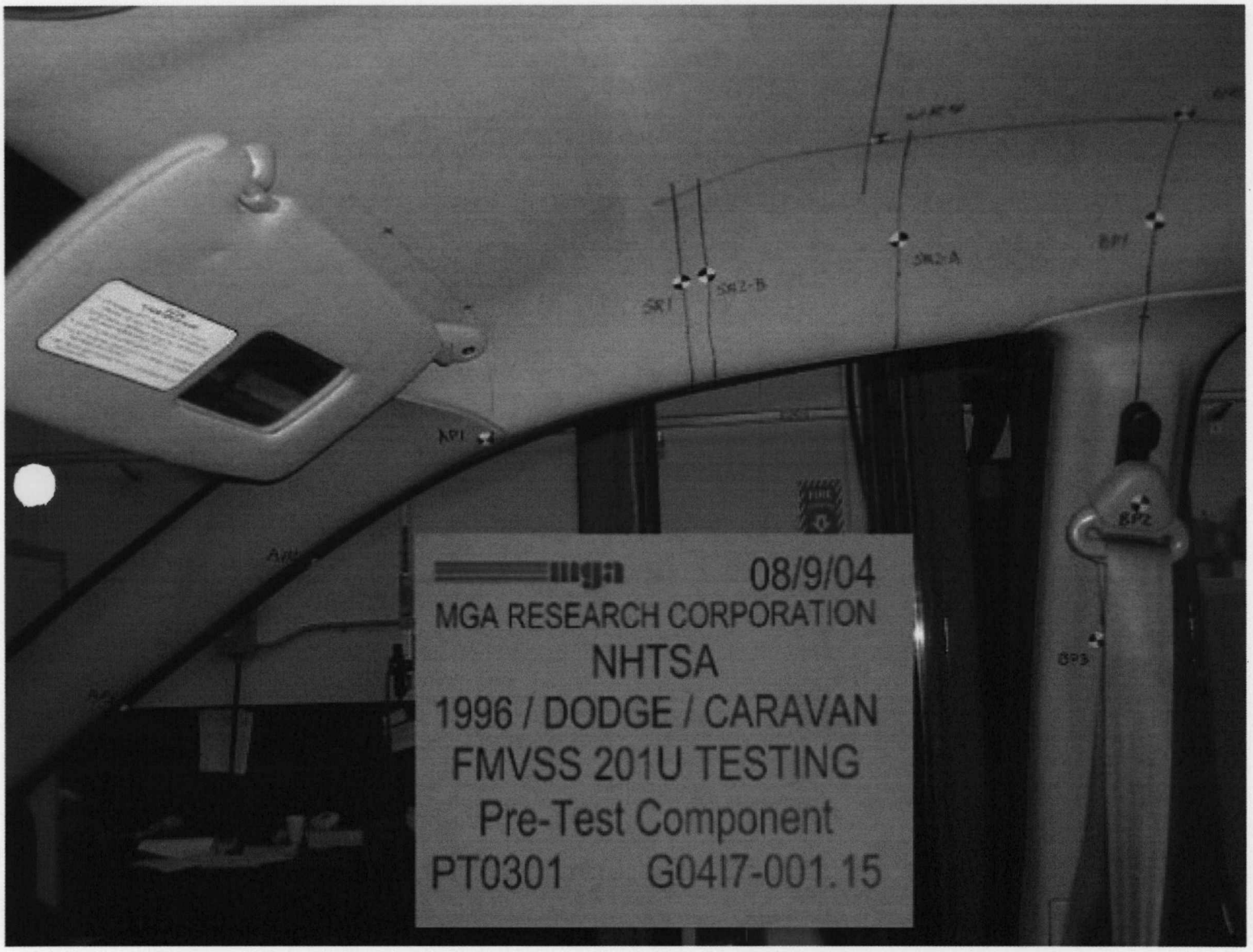

AIR BAG SYSTEMS MAINTENANCE INSTRUCTIONS
THIS VEHICLE IS EQUIPPED WITH A FRONT OCCUPANT
PLEMENTAL RESTRAINT SYSTEM (SRS/AIR BAG). PLEASE
ER TO THE OWNERS MANUAL FOR DETAILS ON SYSTEM
RATION. WARNING - THE AIR BAG SYSTEM IS DESIGNED TO
MAINTENANCE FREE HOWEVER IF THE "AIR BAG" LIGHT DOES
COME ON MOMENTARILY WHEN IGNITION IS TURNED ON OR
ES ON OR FLASHES WHILE DRIVING, THE SYSTEM MUST BE
CED PROMPTLY BY AN AUTHORIZED DEALER.
COMMENDED COLD TIRE
INFLATION PRESSURE
FRONT
REAR
35 psi
240 kPa
35 psi
240 kPa
MINIMUM TIRE SIZE
STANDARD LOAD
P205/75R14
PRINTED IN USA
4472549

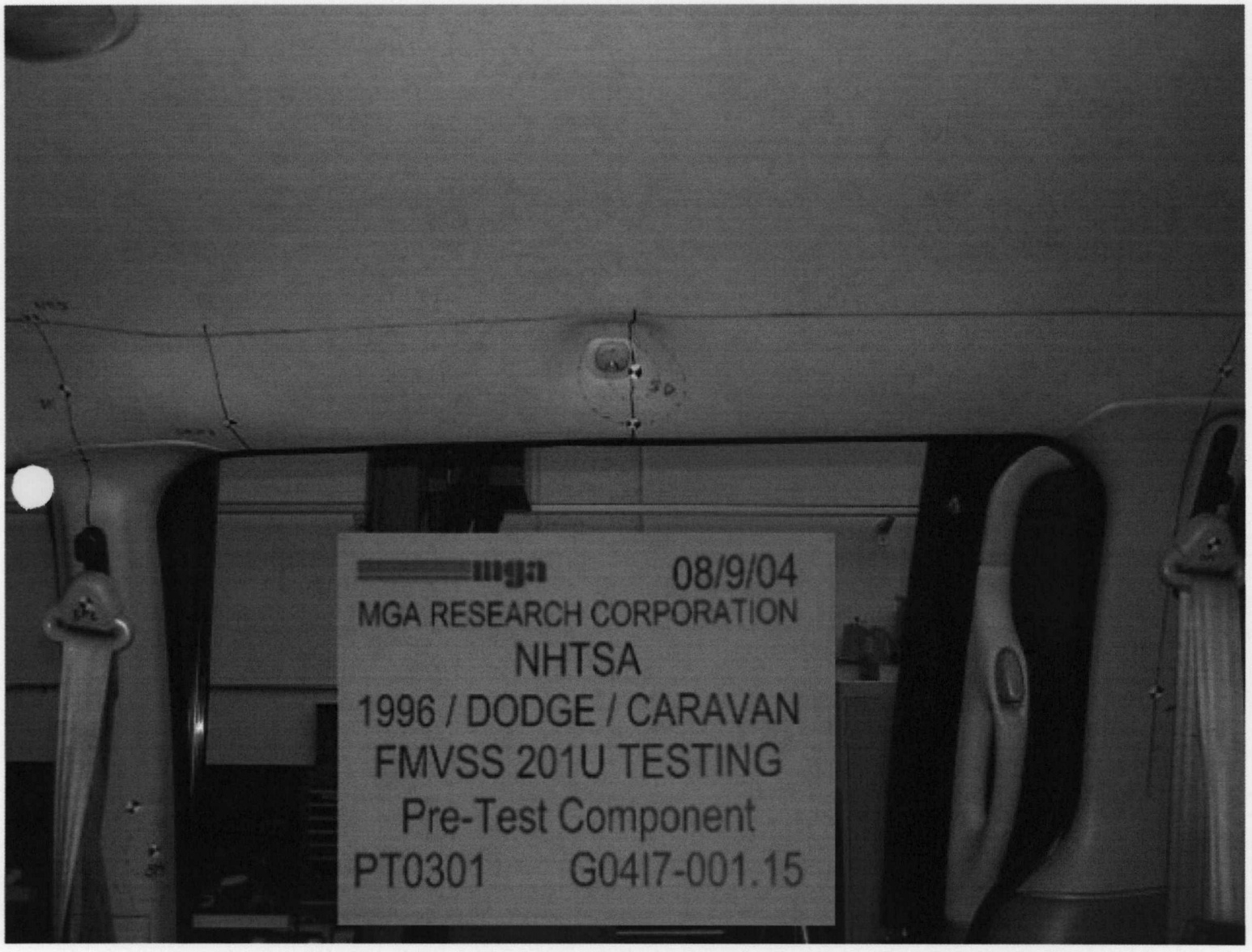

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1996 / DODGE / CARAVAN
FMVSS 201U TESTING
Pre-Test Component
PT0301
G04I7-001.15


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Pre-Test Component
PT0301
G04I7-001.15

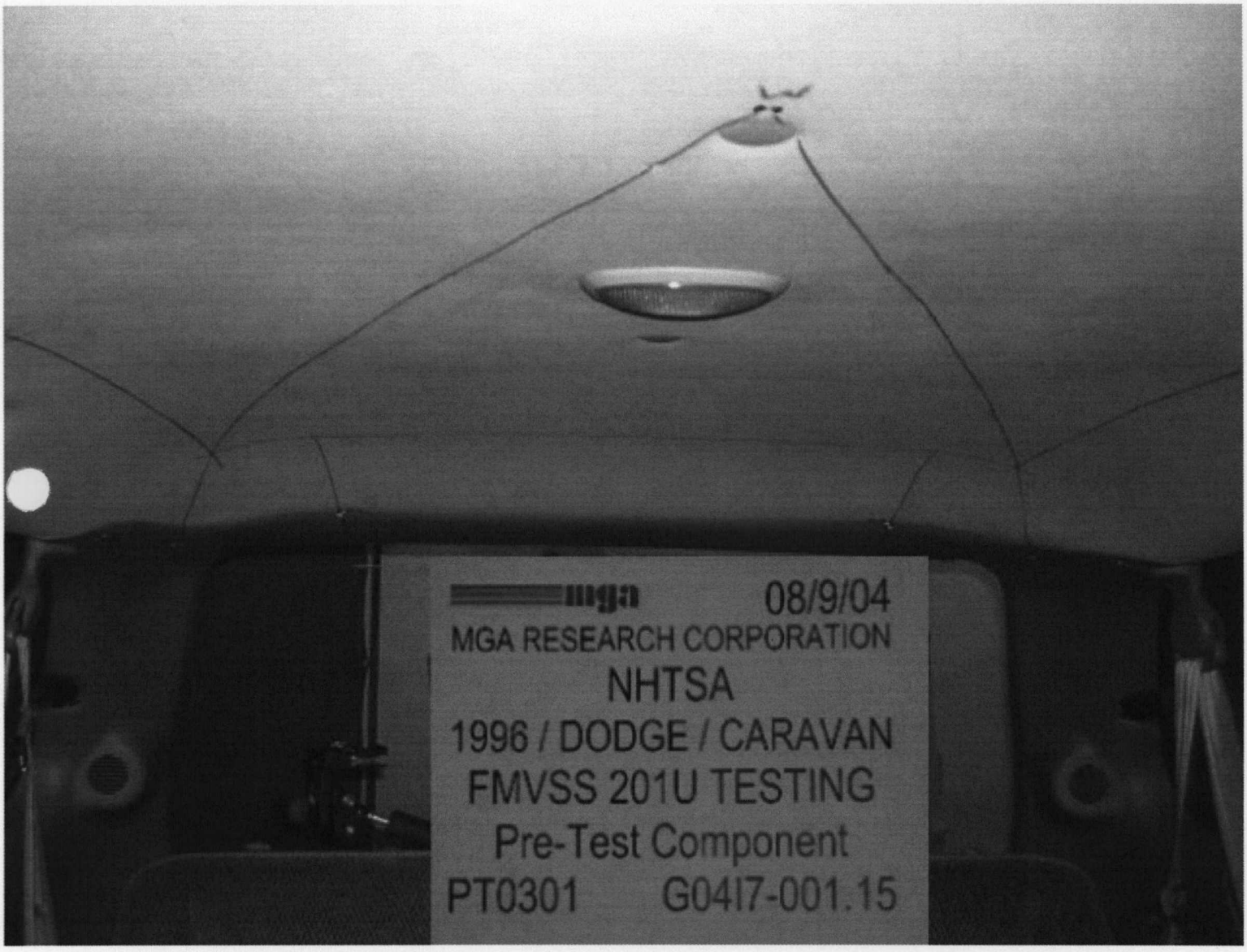

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FMVSS 201U TESTING
Pre-Test Component
PT0301
G04I7-001.15

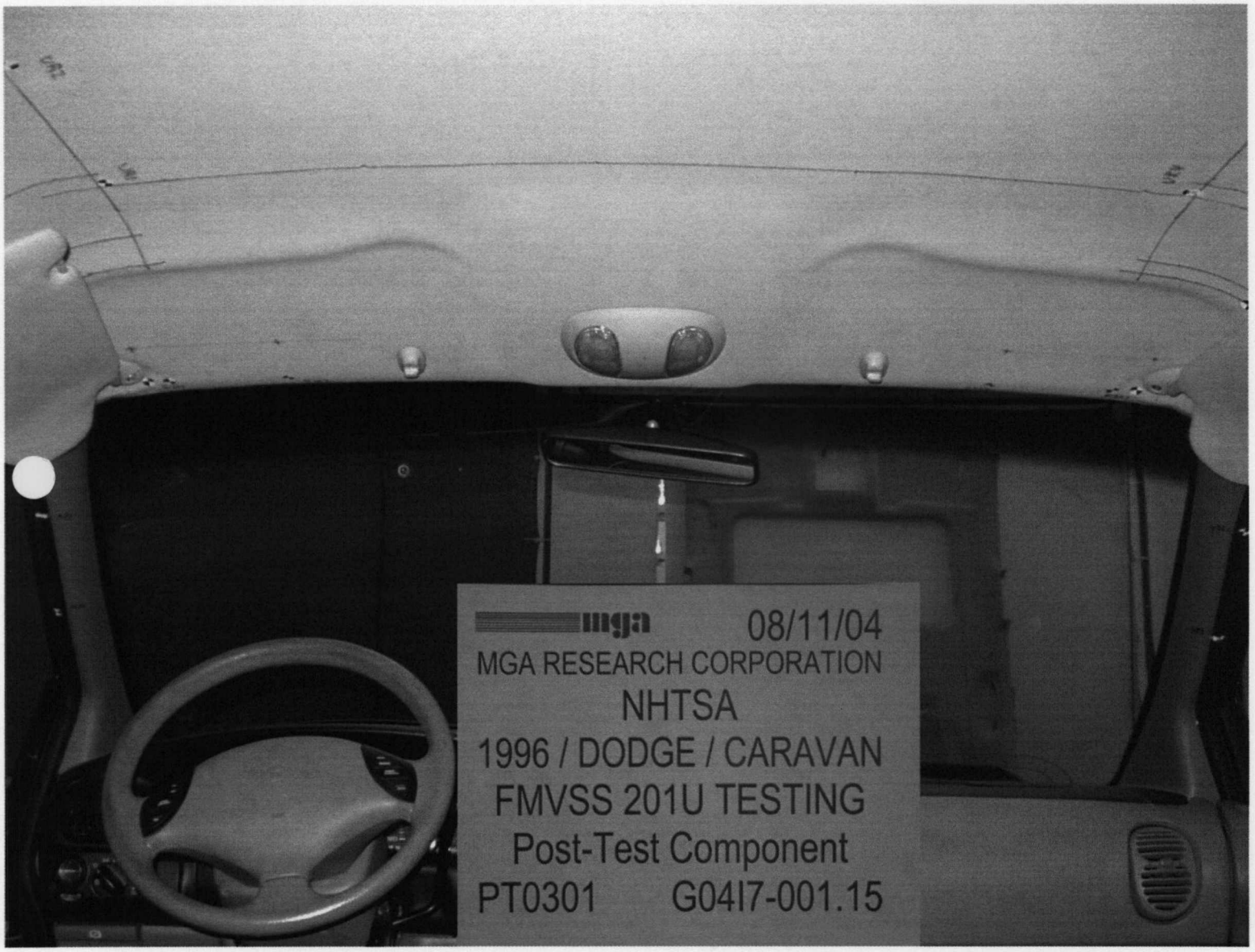

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Pre-Test Component
PT0301
G04I7-001.15

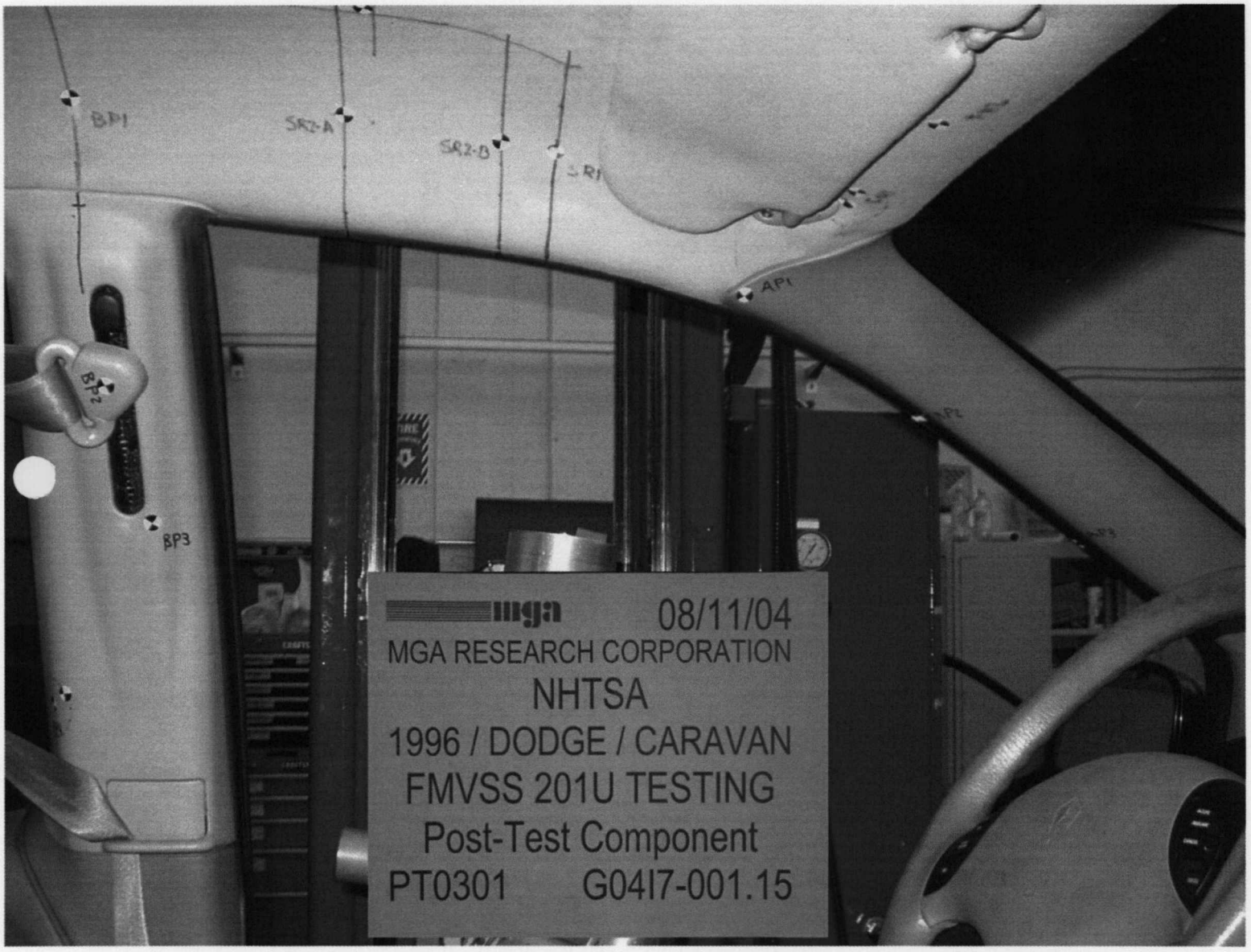

SR1
SR2-B
SR2-A
BP1
AP1
BP2
BP3
mga
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NHTSA
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FMVSS 201U TESTING
Pre-Test Component
PT0301
G04I7-001.15

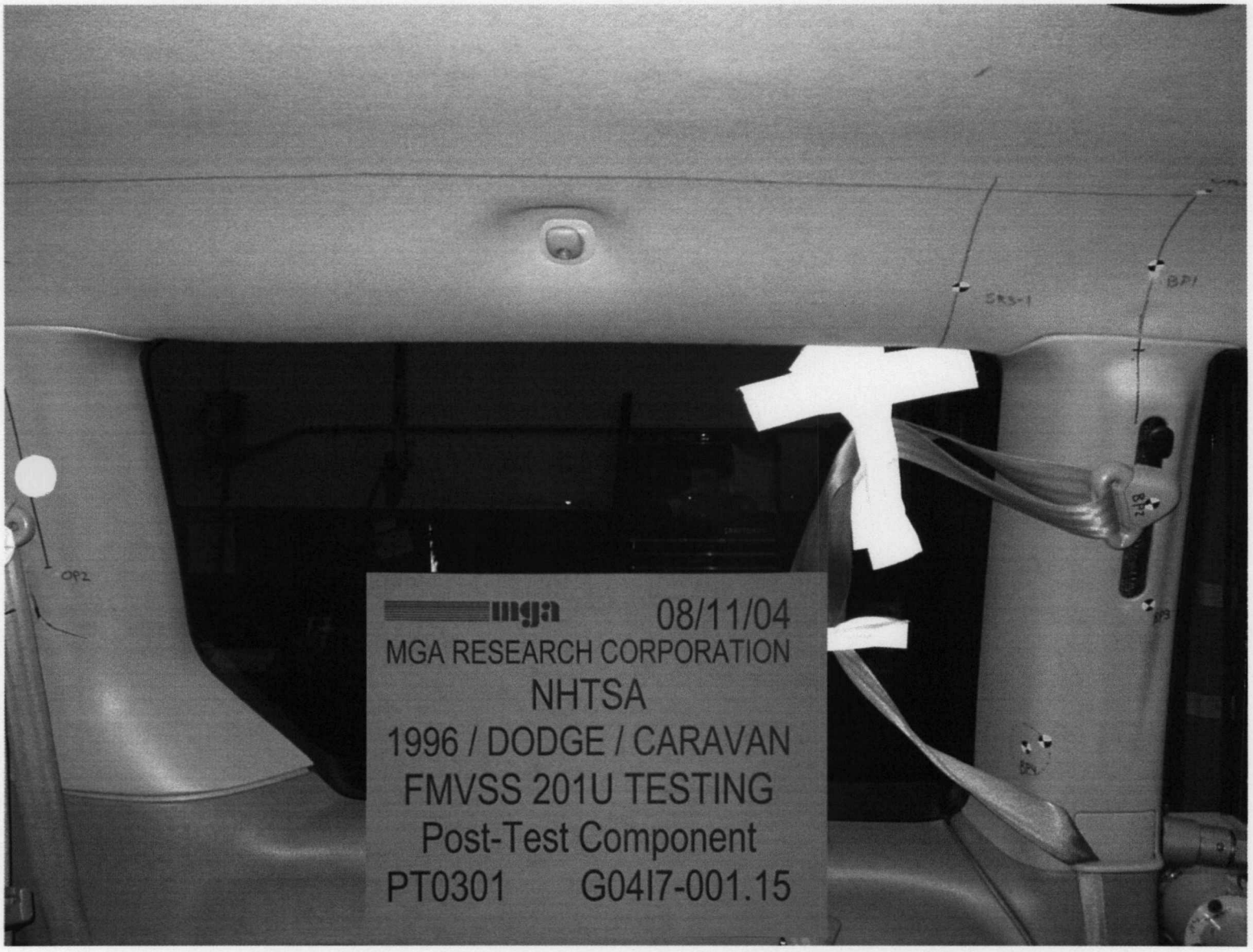

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NHTSA
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FMVSS 201U TESTING
Pre-Test Component
PT0301
G04I7-001.15

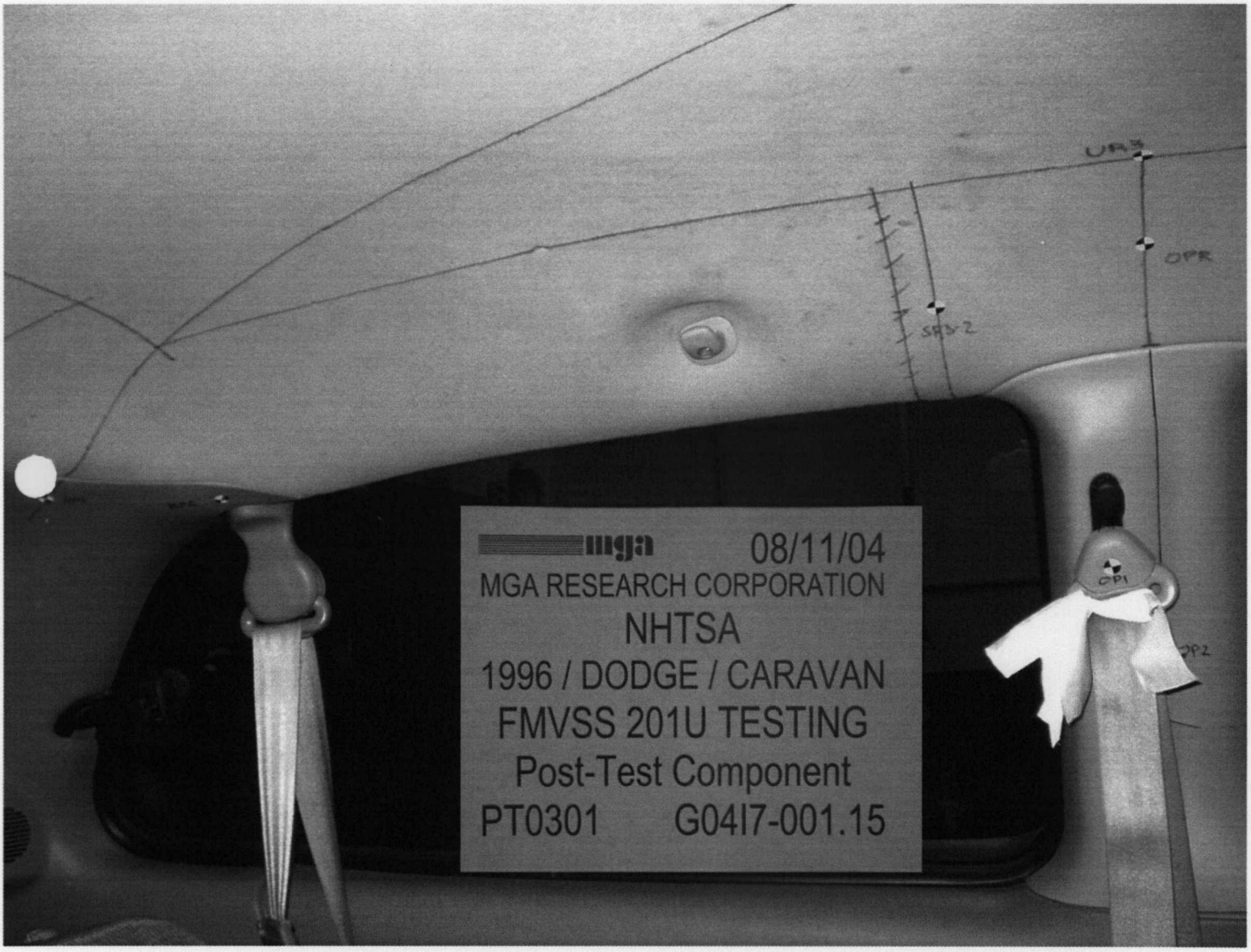

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NHTSA
1996 / DODGE / CARAVAN
FMVSS 201U TESTING
Pre-Test Component
PT0301 G04I7-001.15

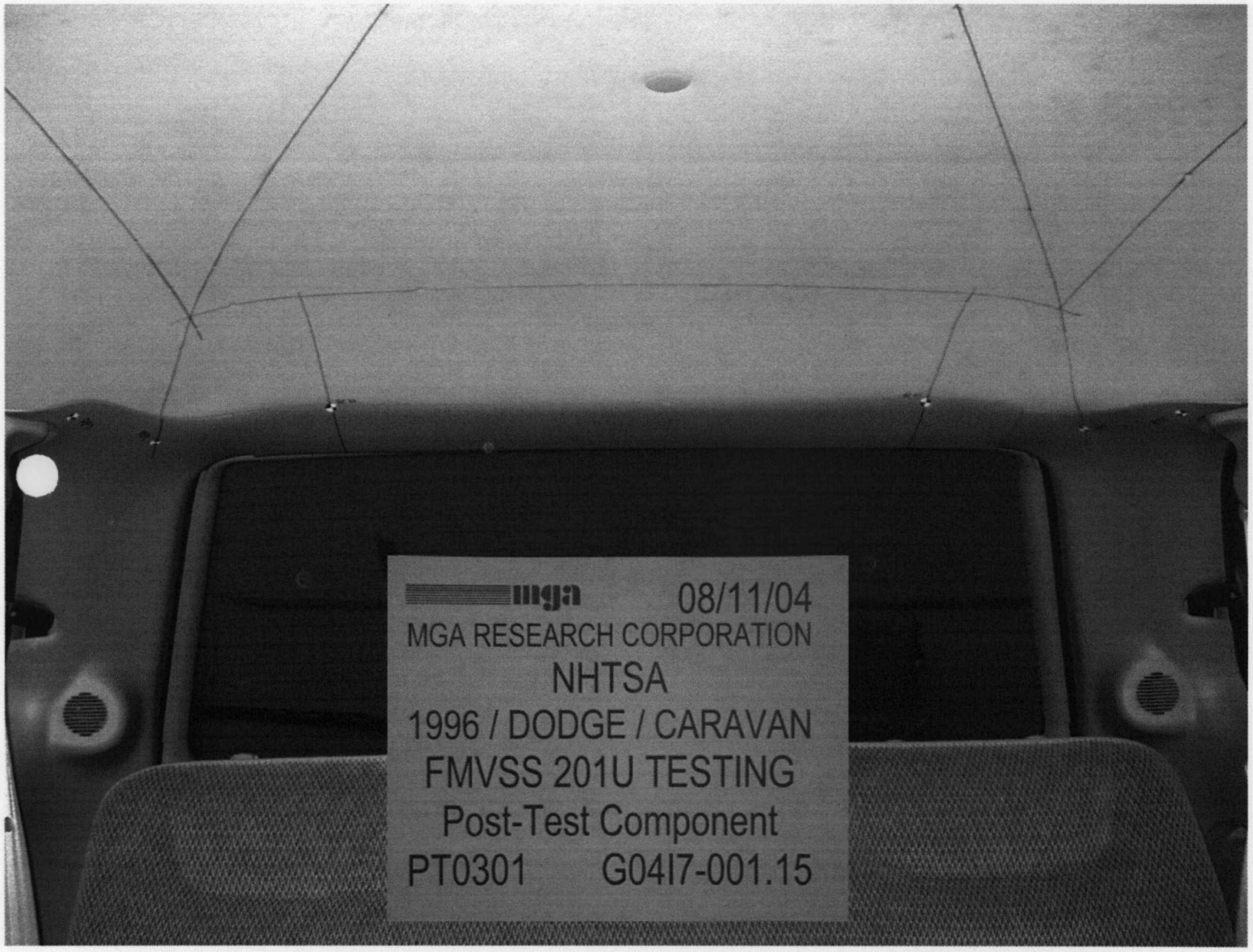

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FMVSS 201U TESTING
Pre-Test Component
PT0301
G04I7-001.15

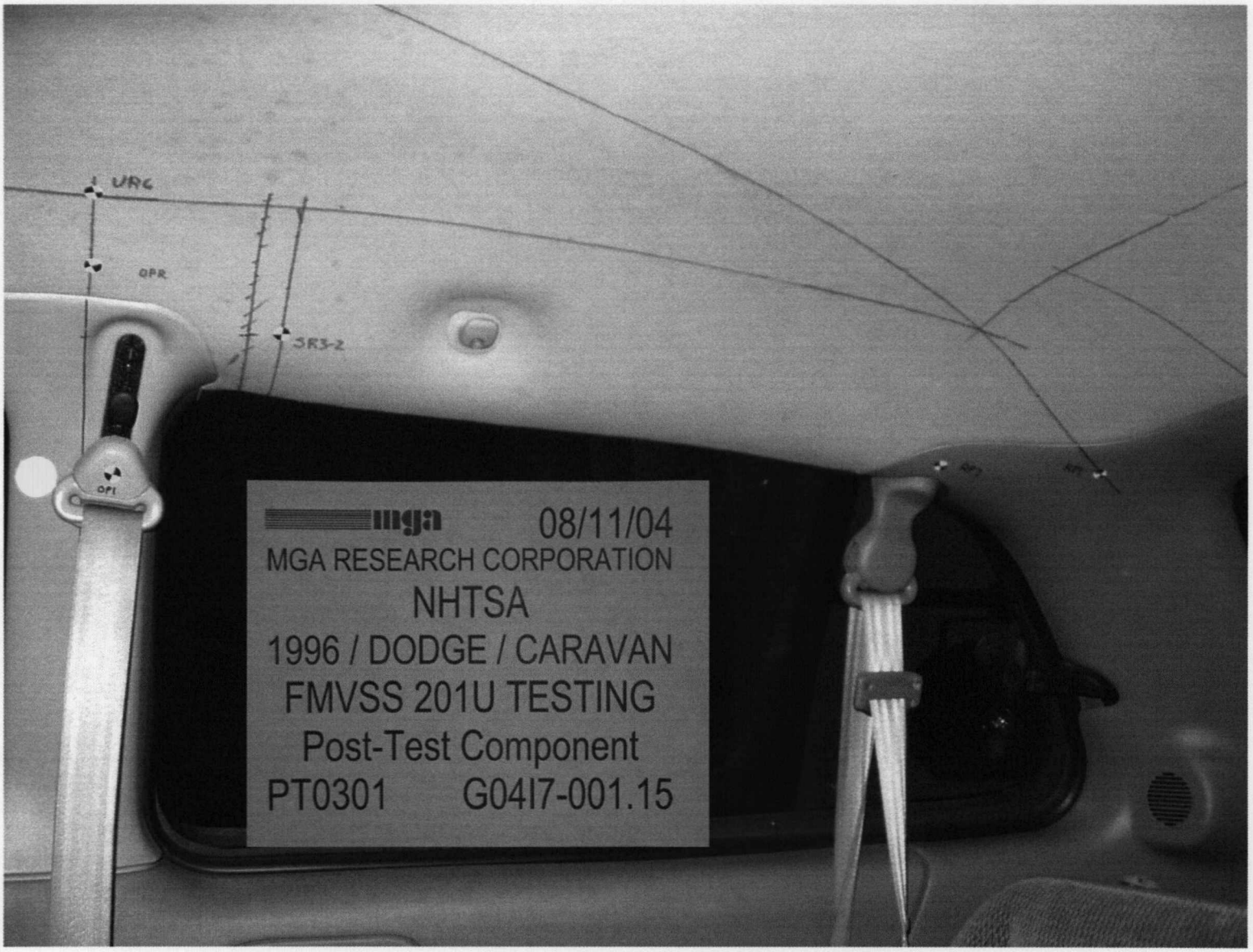

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08/11/04
MGA RESEARCH CORPORATION
NHTSA
1996 / DODGE / CARAVAN
FMVSS 201U TESTING
Post-Test Component
PT0301
G04I7-001.15

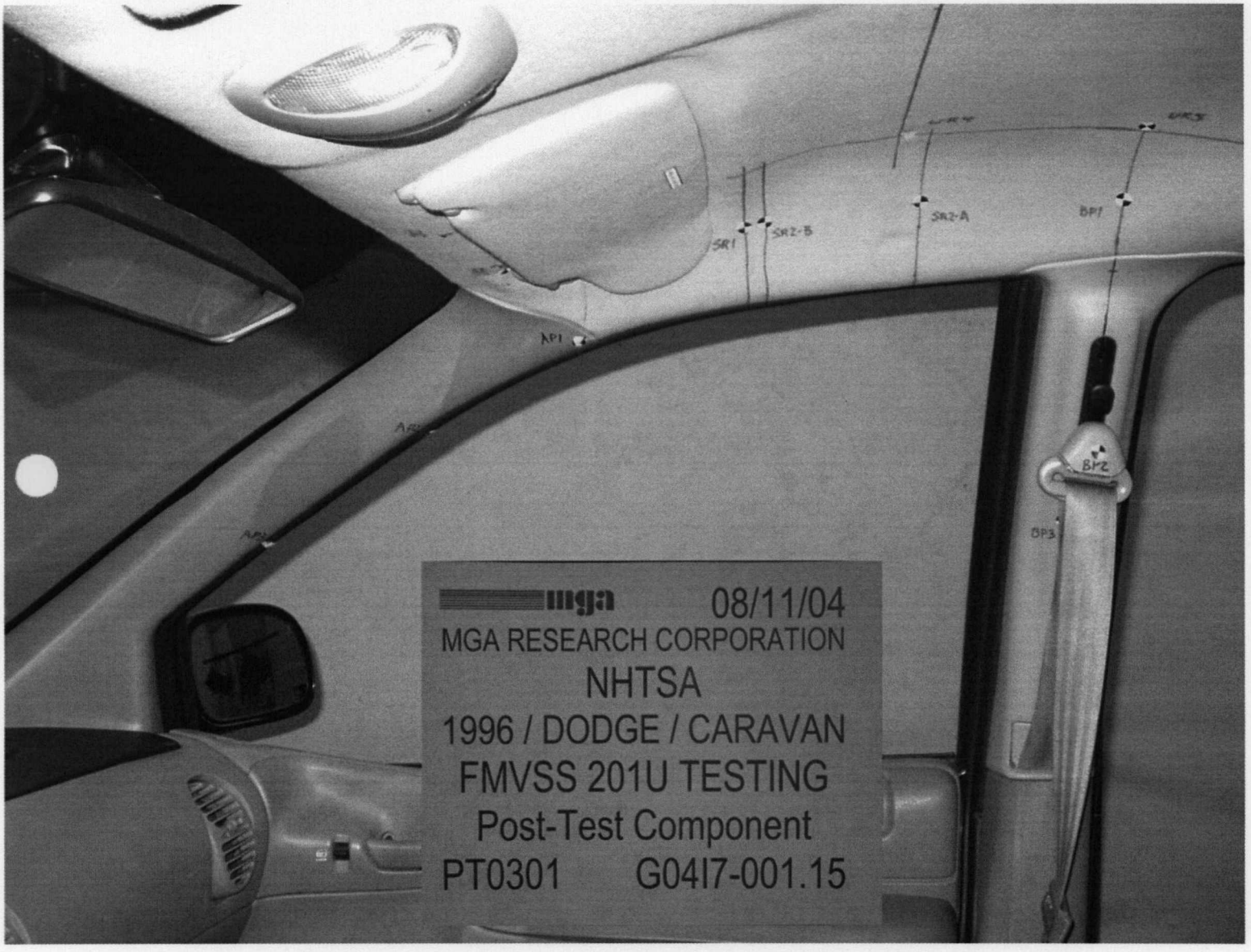

BP1
SR2-A
SR2-B
SR1
AP1
BP2
BP3
mga
08/11/04
MGA RESEARCH CORPORATION
NHTSA
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FMVSS 201U TESTING
Post-Test Component
PT0301
G04I7-001.15

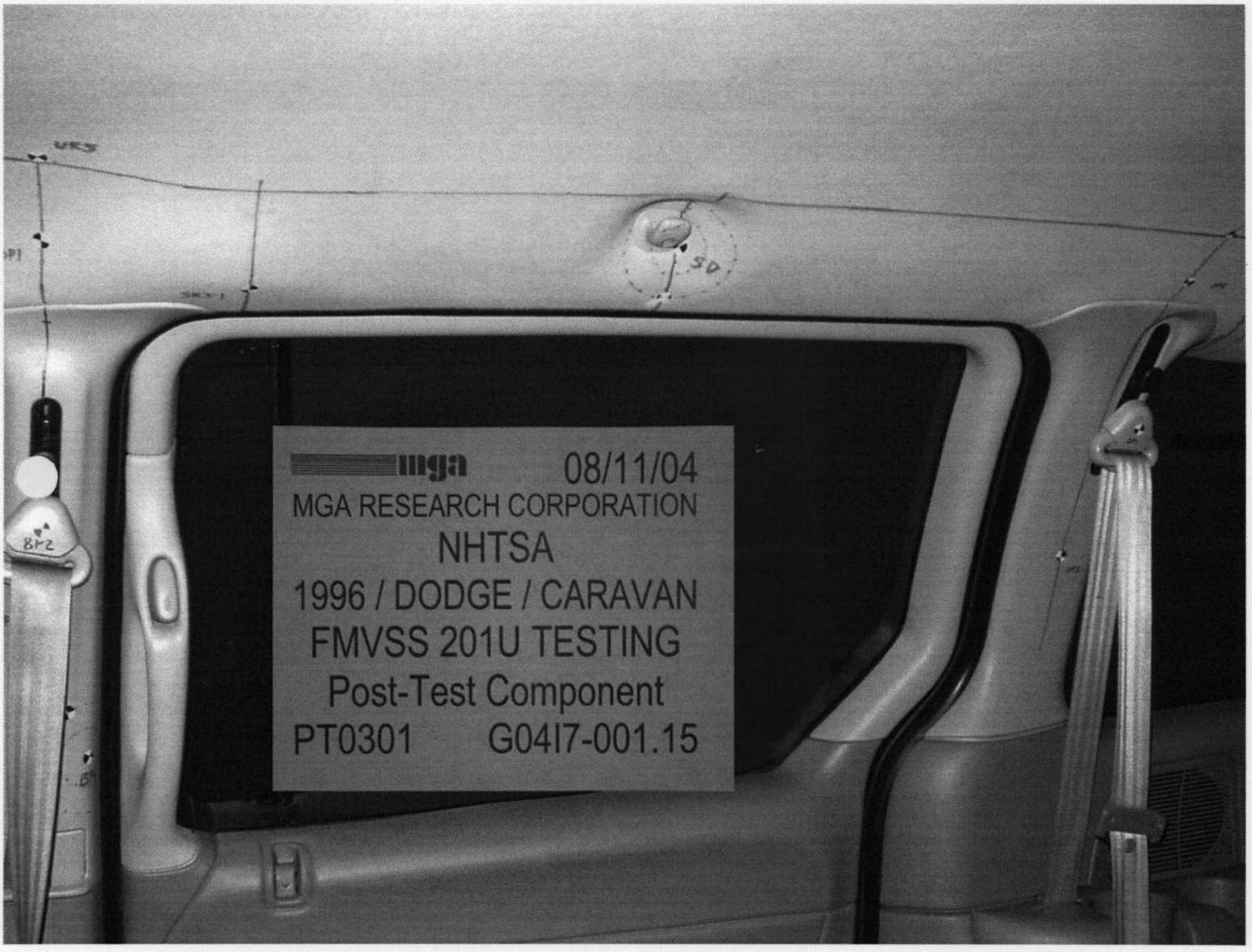

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FMVSS 201U TESTING
Post-Test Component
PT0301 G04I7-001.15


URS
OPR
SRS-2
CP1
CP2
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PT0301
G04I7-001.15


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FMVSS 201U TESTING
Post-Test Component
PT0301
G04I7-001.15

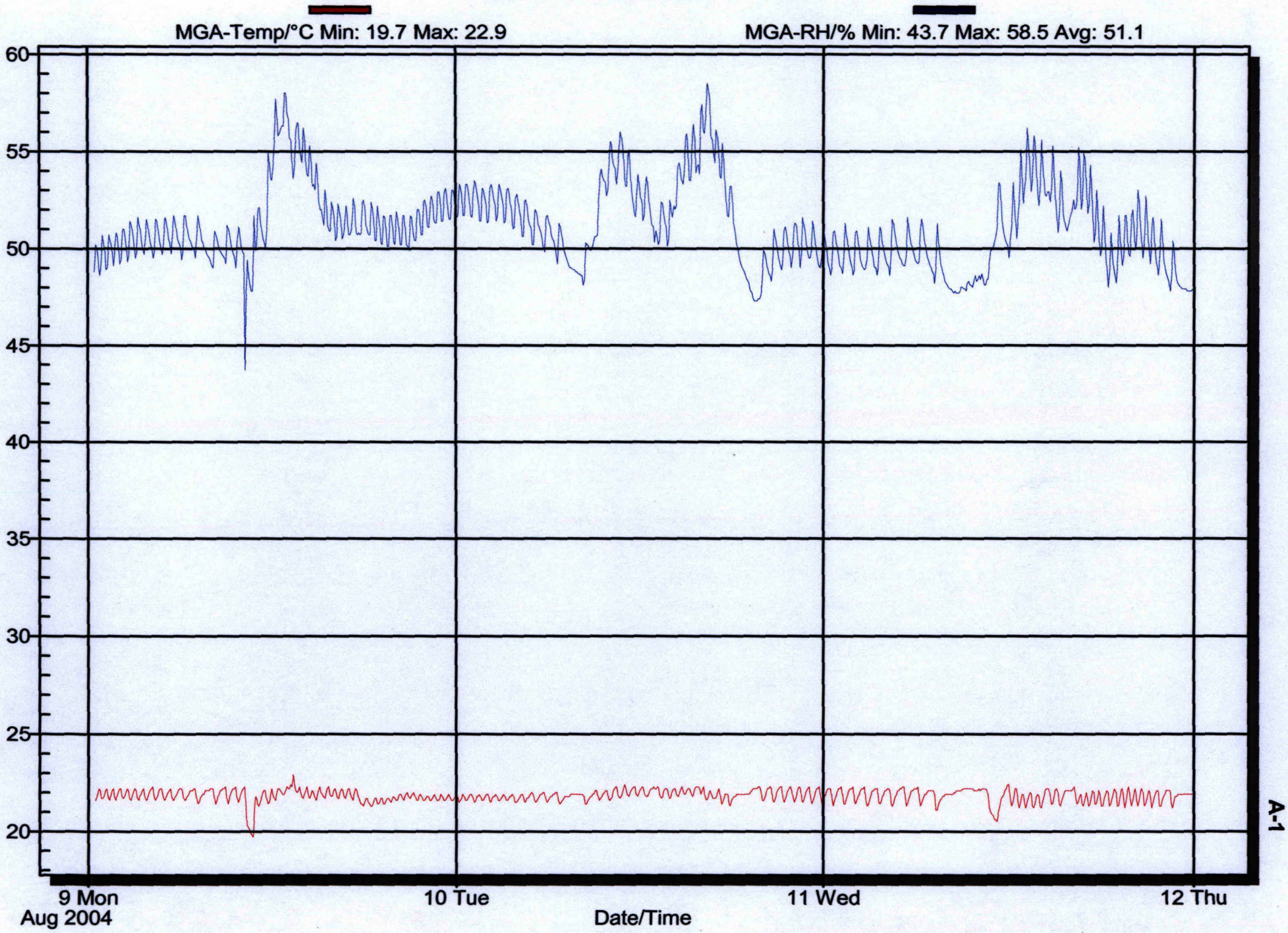

URC
QPR
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Post-Test Component
PT0301
G04I7-001.15


SR1
SR2-B
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Post-Test Component
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FMVSS 201U TESTING
Post-Test Component
PT0301
G04I7-001.15

1996 Dodge Gra.. Caravan PT0301

Temperature Trace August 9-11, 2004



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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35800	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/3/04	**Calibration Date:** *4/8/03*
	Calibrated By: *Kevin J. Rust/MTS*

Test Reference Number: A0408

New DLR (100k , Units: G): 96.6

StdDeviation (%) 0.109

% Difference in DLR (New vs. Old): 0.741

Temperature (°F): 68

Humidity (%): 31

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35841	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/3/04	**Calibration Date:** *4/8/03*
	Calibrated By: *Kevin J. Rust/MTS*

Test Reference Number: A0408

New DLR (100k , Units: G): 92.5

StdDeviation (%) 0.578

% Difference in DLR (New vs. Old): 0.496

Temperature (°F): 68

Humidity (%): 31

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35791	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/3/04	**Calibration Date:** *4/8/03*
	Calibrated By: *Kevin J. Rust/MTS*

Test Reference Number: A0408

New DLR (100k , Units: G): 90.0

StdDeviation (%) 0.402

% Difference in DLR (New vs. Old): 0.702

Temperature (°F): 68

Humidity (%): 31

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J36197	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 108.0

StdDeviation (%) 0.915

% Difference in DLR (New vs. Old): 0.719

Temperature (°F): 74

Humidity (%): 50

Performed By: Travis Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

446 executive drive • troy, mi 48083
248 / 577-5001 • fax 248 / 577-5025
www.mgaresearch.com

mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J36193	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 101.4

StdDeviation (%) 0.375

% Difference in DLR (New vs. Old): -3.509

Temperature (°F): 74

Humidity (%): 50

Performed By: Scott Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J36353	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 96.8

StdDeviation (%) 0.376

% Difference in DLR (New vs. Old): -0.677

Temperature (°F): 74

Humidity (%): 50

Performed By: James Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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www.mgaresearch.com

mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35923	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 100.8

StdDeviation (%) 0.782

% Difference in DLR (New vs. Old): -1.506

Temperature (°F): 74

Humidity (%): 50

Performed By: David Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35916	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 100.2

StdDeviation (%) 0.215

% Difference in DLR (New vs. Old): 0.872

Temperature (°F): 74

Humidity (%): 50

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7624-2000	**Model:** *301M09/484B*
S/N: J35918	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 5/23/04	**Calibration Date:** *5/11/04*
	Calibrated By: *Chris Vega/PCB Piezotronics, Inc.*

Test Reference Number: A0412

New DLR (100k , Units: G): 97.9

StdDeviation (%) 0.929

% Difference in DLR (New vs. Old): -0.762

Temperature (°F): 74

Humidity (%): 50

Performed By: Travis Campbell

Approved By: Helen A. Kaleto

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.8%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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248 / 577-5001 • fax 248 / 577-5025
www.mgaresearch.com

NuWeigh, Inc.
10421 Enterprise Drive
Davisburg, MI 48350
248-922-1435 Fax: 248-922-1465
ISO/IEC/17025 ACCREDITED

CALIBRATION / TEST REPORT

Page 1 of 1

SCR 4365

Customer: M.C.A Research	Date of service: 3-23-04	Location: C S
Address: 446 Executive Dr	Last known test date: 3-28-03	Environmental conditions acceptable: ☑ Yes ☐ No
City: Troy State: MI Zip: 48083	Frequency: ☒ Annual ☐ Semi Annual ☐ Quarterly ☐ Monthly ☐ Bi Monthly ☐ Other	

Indicator Mfg: Cardinal	Platform Mfg: Cardinal	Indicator Mfg.	Platform Mfg.
Model: 708	Model: 8950 F	Model	Model
Serial No: 9804-022	Serial No: 9805-175	Serial No.	Serial No.
Seal Applied? ☐ Yes ☒ No	Platform size: 28"x28"	Seal Applied? ☐ Yes ☐ No	Platform size
Customer Id: Shop	Cap. x Grads: 2000x1 lb	Customer Id.	Cap. x Grads.
Printer Mfg./model	General device condition ☒ Good ☐ Fair ☐ Poor	Printer Mfg./model	General device condition ☐ Good ☐ Fair ☐ Poor

Weight Applied	Reading as Found	Error as Found	Reading as Left	Error as Left	Weight Applied	Reading as Found	Error as Found	Reading as Left	Error as Left
0	0	0							
100 lb	100	0							
300 lb	300	0							
500 lb	500	0							
300 lb	300	0							
100 lb	100	0							
0	0	0							
X	X	X							
Load Section #1	100	0			Load Section #1				
Load Section #2	100	0			Load Section #2				
Load Section #3	100	0			Load Section #3				
Load Section #4	100	0			Load Section #4				

Scale meets HB44 tolerance: Yes X No___
Standards used (serial nos.): 6-15
Estimated measurement uncertainty of applied load is .038 %
Traceable report nos. MI 10-01-6285

Scale meets HB44 tolerance: Yes___ No___
Standards used (serial nos.):
Estimated measurement uncertainty of applied load is ___ %
Traceable report nos.

RECOMMENDATIONS/OPINIONS

NO adjustments needed
Scale Tested good.

RECOMMENDATIONS/OPINIONS

Test procedure: NuWeigh Quality Manual and Procedures, Handbook 44

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Mike Knight — TECHNICIAN
3-23-04 — DATE
George Baber — CUSTOMER

White - Customer Copy Canary - File Copy

MTS Systems Corporation
Metrology Laboratory

14000 Technology Drive
Eden Prairie, MN 55344
Web Site: www.mts.com/services/metrology

ACCREDITED
Certificate # 1044.01

Certificate of Calibration

For MTS Asset Number: SN862

Description: STANDARD ACCELEROMETER **Serial Number:** 862 / 2470

Mfr / Model: PCB/301M09 / 484B

Customer: MGA RESEARCH **Certificate #:** SN862:1049812898

This document applies only to the calibration of the item described above and the specific calibration performed by the MTS Metrology Laboratory. If shown below, the calibration interval has been requested by the customer or is a recommended interval established by the MTS Metrology Laboratory. The stability of the UUT over time depends on many factors outside our control. It is the responsibility of those using the item described above to quantify their measurement uncertainty and evaluate the adequacy of their measurement process to demonstrate that measurement traceability is credibly maintained.

The MTS Metrology Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA) to perform calibration in electrical, mechanical, dimensional, time/frequency, temperature/humidity, vibration, and acoustics. A2LA Certificate Number 1044.01 is valid to May 31, 2004. The basis for this accreditation is the international standard for calibration laboratories, ISO/IEC 17025 "General Requirements for the Competence of Calibration and Testing Laboratories".

Calibrations are performed with standards whose values or measurement results are traceable to one or more of the following: National Institute of Standards and Technology, natural physical constants, consensus standards, or by a ratio technique.

CALIBRATION INFORMATION

Received:	SEE REPORT	Calibration Date: (mmddyyyy)	04/08/2003	Temperature:	72°F
Returned:	SEE REPORT	Calibration Due: (mmddyyyy)	04/08/2004	Humidity:	18 %
Calibration Procedure:	1365	Procedure Revision:	B		
Note:	NONE				

STANDARDS USED FOR CALIBRATION

MTS Asset #	Manufacturer	Model Number	Description	Cal. Date	Cal. Due
16780	KISTLER	8802 SYSTEM	REFERENCE ACCELEROMETER	10/16/2002	10/16/2003
11774	HEWLETT PACKARD	35660A	SIGNAL ANALYZER	01/10/2003	04/29/2003
16700	MB DYNAMICS	CAL50	CALIBRATION SHAKER	NA	NA
11882	BRUEL+KJAER	2706	POWER AMPLIFIER	NA	NA

CALIBRATION UNCERTAINTY STATEMENT

Certified by: Kevin J. Rust, Metrology Technician Printed on: 04/08/2003

If you have questions regarding this Certificate of Calibration please call 952-937-4208. This certificate may not be reproduced, except in full, without written approval from the MTS Metrology Laboratory. The Calibration Uncertainty Statement is valid for the print date of the Certificate of Calibration.
QMS #0407, Rev. 10, Rev. Date 17-Dec-01.

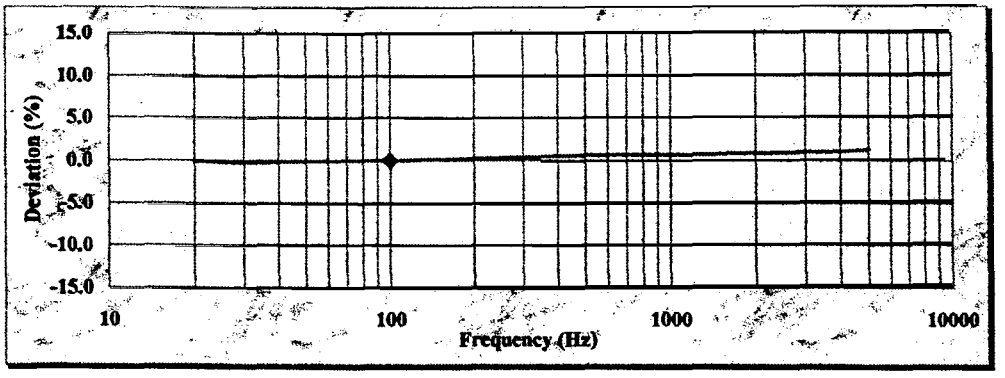
MTS

MTS METROLOGY LABORATORY
CALIBRATION REPORT OF TEST

A2LA Accredited
A2LA Certificate
1044.01

MANUFACTURER:	PCB	**CUSTOMER NAME:**	MGA Research
MODEL NUMBER:	301M09 / 484B	**CALIBRATION DATE:**	08-Apr-03
SERIAL NUMBER:	862 / 2470	**TEMP. / HUMIDITY:**	72°F / 18%
MTS ASSET NUMBER:	SN862	**CERTIFIED BY:**	Kevin J. Rust

SENSITIVITY / FREQUENCY RESPONSE



Test Frequency (Hz):									
20	30	50	100	500	1000	2000	3000	4000	5000
Acceleration (g's pk):									
2	5	10	10	10	10	10	10	10	10
Output Sensitivity (mV/g):									
31.15	31.06	31.12	31.17	31.34	31.37	31.43	31.48	31.49	31.56
Frequency Response (%):									
-0.06	-0.35	-0.16	**Ref.**	0.55	0.64	0.83	0.99	1.03	1.25

NOTES:

1) Sensitivity derived from the output of matching 484B power unit (SN 2470) set to the AC coupling and 11V bias modes.
2) Accelerometer Bias Voltage: 8.7 VDC, Excitation Current: 4 mA nominal.

REMARKS:

1) The accelerometer listed above was calibrated using a comparison technique against a MTS Working Standard Accelerometer per MTS Metrology Calibration Procedure 1366 (RevB).
2) The uncertainties of the calibration process do not exceed: 1.5% from 10Hz to <100Hz, 1.2% from 100Hz to 2.5kHz, 2.5% from >2.5kHz to 10kHz. These calibration process uncertainties are expressed at approximately the 95% confidence level (k=2).
3) This report shall not be reproduced, except in full, without written permission from the MTS Metrology Laboratory.

CALIBRATION STANDARDS USED: MTS Asset #16780, #11774, #16700, #11882

~Certificate of Calibration~

Model Number: 484B	**N.I.S.T. Project #: 6720012**
Serial Number: 2470	**Calibration Date: 05/11/2004**
Description: Signal Conditioner	**Recalibration Date:**
Test Procedure: AT-106-1	**Calibration Technician:** Chris Vega CV. #36
Temperature: 74° F	**Relative Humidity: 42%**

TESTS	BEFORE	AFTER
INPUT VOLTAGE (24 ± 0.1V)	24.02	24.02
ICP CURRENT (4 ± 0.6mA)	3.97	3.97
DC OFFSET A.C. MODE (volts)	-.001	-.001
GAIN (REF 1 VRMS, 1kHz)	1.0000	NOT ADJUSTABLE
DRIFT (DC MODE)	< 2mV/min.	NOT ADJUSTABLE
FREQUENCY RESPONSE 10 Vp-p, 1 kHz REFERENCE	FLAT TO 200kHz	NOT ADJUSTABLE

As Received: In tolerance

As Left: In tolerance

Special Notes: MGA Research

This document certifies that the equipment referenced above meets published specifications. The calibration procedure is in compliance with ISO 10012-1, and former MIL-STD-45662A and is traceable to NIST. *Measurement uncertainty (95% confidence level w/coverage factor of 2) for scale factors is +/- 0.2%.

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~ Calibration Certificate ~

Per ISO 16063-21

Model Number: 301M09/484B (394M17 SYSTEM)

Serial Number: 862/2470

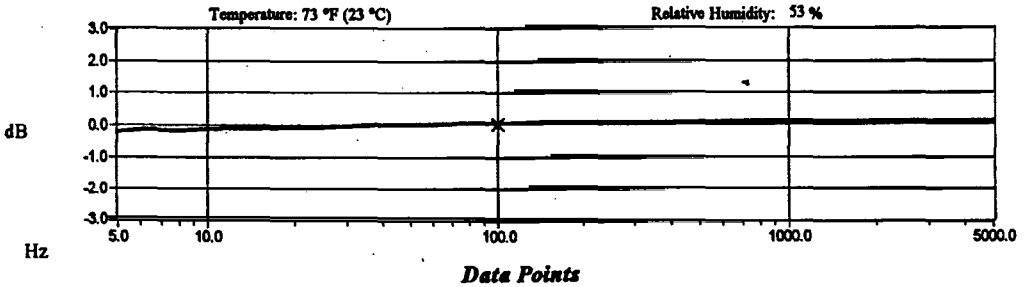
Description: ICP® Accelerometer Method: Back-to-Back Comparison Calibration

Manufacturer: PCB

Calibration Data

Sensitivity @ 100.0 Hz	**31.17**	**mV/g**	Output Bias	8.6	VDC
	(3.179	**mV/m/s²)**	Transverse Sensitivity	3.0	%

Sensitivity



Data Points

Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)
5.0	-2.5	REF. FREQ.	0.0	5000.0	1.1
10.0	-1.9	300.0	0.7		
15.0	-1.4	500.0	0.8		
30.0	-0.6	1000.0	1.0		
50.0	-0.2	3000.0	1.1		

Mounting Surface: Stainless Steel w/Silicone Grease Coupling Fastener: Stud Mount Vertical
Acceleration Level (peak): 10.0 g (98.1 m/s²)
*The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude; Acceleration Level (g) = 0.010 x (freq)². *The gravitational constant used for calculations by the calibration system is: 1 g = 9.8066 m/s².

Condition of Unit

As Found: In Tolerance. No Adjustment Necessary

As Left: In Tolerance

Notes

1. Calibration is NIST Traceable thru Project 822/267400 and PTB Traceable thru Project 1055.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025.
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%.

Technician: Chuck DiMaggio CD Date: 05/13/04

ACCREDITED
Cert No 1662.01

PCB PIEZOTRONICS
VIBRATION DIVISION
3425 Walden Avenue · Depew, NY 14043
TEL: 888-684-0013 · FAX: 716-685-3886 · www.pcb.com

PAGE 1 of 1

Interim Certification Document

Part Description: Gold Series Faro Arm **Serial Number:** G08020203122

Single Point 2 Sigma: G08-00 +/-0.051mm (+/-0.0020 in)
Linear Displacement 2 Sigma: G08-00 +/-0.072mm (+/-0.0028 in)

Certification Date: February 03, 2004

MEASUREMENT STANDARDS, N.I.S.T. U.K.A.S. TRACEABILITY

Bal-Tec Invar Ball Bar Kit — Kit Serial Number: 473	N.I.S.T. Test No.: FBB-473-12012003	Date: 12/01/2003
	U.K.A.S. Cert. No.: FBB-473-12012003	Date: 12/01/2003
Mitutoyo Corporation 10mm Step Gage — Code No.: 515-744 Serial No.: 810107	N.I.S.T. Control No.: 279517	Date: 01/13/2003
Measuring Range: 13in	U.K.A.S. Cert. No.: 133193	Date: 12/18/2002

CERTIFICATION RESULTS

A basic 4 quadrant certification included with all Gold Series and comprised of: 2 vertical level single point repeatability test in 4 quadrants with 5 repeats from 4 directions	PASSED
12 Step gauge test in 12 positions	PASSED
FARO ball bar: 10 points per quadrant in 4 quadrants	PASSED
3 lengths in 8 positions three ball bar test	PASSED

This instrument, as received, was within specifications.

Ambient Temperature: 22°C ± 3°C **Technician:** Rafael Rocha 02/03/04

This certificate shall not be reproduced, except in full, without the written permission of FARO Technologies, Inc.

The results of this certificate relate only to the items calibrated or tested

Faro Technologies, Inc. ph: (407) 333-9911 | 125 Technology Park 1-800-736-2771 | Lake Mary, FL 32746 (407) 333-8056 fax

FARO

Certificate Number: 20040204Cal

Detroit Testing Laboratory, Inc.

ACCREDITED
Certificate No. 38.05

7111 E. 11 Mile Road, Warren, MI 48092-2709 • (586) 754-9000 • FAX (586) 754-9045 • www.dtl-inc.com

Certificate of Calibration

Equipment Information

Customer:	MGA Research Corporation 446 Executive Drive Troy, MI 48083	**Model:**	Pro 360
		Serial Number:	NONE
		Manufacturer:	Mitutoyo
		Description:	Protractor
System ID:	MGA00072		
Customer Asset No.:	MGA00072(012904)		

Calibration Information

Calibration Date:	1/28/04	**Procedure Used:**	33K6-4-1597-1/99
Calibration Due:	1/28/05	**Calibrated to:**	MFR SPEC
Calibration Interval:	12 Month		
Revd In Tol: [1]	Yes/Pass	**Temperature:**	20 °C
Returned In Tol: [1]	Yes/Pass	**Humidity:**	35 %RH
Performed On Site:	No		

Calibration Limitation:

The Uncertainty of the Measurements Pertaining to This Calibration are Estimated to be: Various

[1] Pass/Fail or In/Out of Tolerance statements are opinions only of the person performing the calibration based on data from measurements at the time they were made, procedure utilized, professional experience, and the uncertainty associated with this calibration. It is ultimately up to the user of this equipment to determine if this item meets their specific requirements for accuracy for its intended application.

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer	Description:	Date Due:
09098	CT485B	61201094	Omega	Thermohumidigraph	7/28/04
07748	2 X 2'	13928	TRU-STONE	Granite Surface Plate	2/19/04
10493	SP-66-S1	9902	Suburban Tool, Inc.	Sine Plate	2/17/06
09156	CHALLENGER 81 P 09156		AA JANSSON	Gage Blocks	3/5/04

Any calibration interval and due date of this device, if stated, is at the request of the customer. Due to the fact that many variables may effect drift of reported values over time there is no assurance implied that this item will maintain it's stated accuracy through the end of this interval.

This Calibration has been performed per requirements of ISO 17025-1999. Reported results are from standards with accuracies that are traceable to the International Systems of Units (SI), derived from physical constants, ratio measurements, national measurement standards, or compared to consensus standards. Measurement uncertainty is expressed at a confidence level of approximately 95% (coverage factor k=2).

Signature: Paul Wonsowicz Date: 1-29-04 Paul Wonsowicz Technician	Approved: Date: 1/30/04

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Certificate Number: 20040729Cal

Detroit Testing Laboratory, Inc.

ACCREDITED Certificate No. 38.05

7111 E. 11 Mile Road, Warren, MI 48092-2709 • (586) 754-9000 • FAX (586) 754-9045 • www.dtl-inc.com

Certificate of Calibration

Equipment Information

Customer:	MGA Research Corporation 446 Executive Drive Troy, MI 48083	**Model:**	AP 20
		Serial Number:	E33603-0213
		Manufacturer:	Detecto
		Description:	Scale
System ID:	MGA00081		
Customer Asset No.:			

Calibration Information

Calibration Date:	3/24/04	**Procedure Used:**	33K6-4-72-1/98
Calibration Due:	3/24/05	**Calibrated to:**	MFR SPEC
Calibration Interval:	12 Month		
Recvd In Tol:[1]	Yes/Pass	**Temperature:**	24 °C
Returned In Tol:[1]	Yes/Pass	**Humidity:**	37 %RH
Performed On Site:	No		

Calibration Limitation:

The Uncertainty of the Measurements Pertaining to This Calibration are Estimated to be: (0.006 + 0.01% Ind) lb

[1] Pass/Fail or In/Out of Tolerance statements are opinions only of the person performing the calibration based on data from measurements at the time they were made, procedure utilized, professional experience, and the uncertainty associated with this calibration. It is ultimately up to the user of this equipment to determine if this item meets their specific requirements for accuracy for its intended application.

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer	Description:	Date Due:
09126	CT485B	61201050	OMEGA	Thermohumidigraph	5/12/04
07580	CLASS C	07580	TROEMNER	WEIGHT SET	9/11/04

Any calibration interval and due date of this device, if stated, is at the request of the customer. Due to the fact that many variables may effect drift of reported values over time there is no assurance implied that this item will maintain it's stated accuracy through the end of this interval.

This Calibration has been performed per requirements of ISO 17025-1999. Reported results are from standards with accuracies that are traceable to the International Systems of Units (SI), derived from physical constants, ratio measurements, national measurement standards, or compared to consensus standards. Measurement uncertainty is expressed as a confidence level of approximately 95% (coverage factor k=2).

Signature: Jerry Wells Date: 3-24-04 Technician	Approved: Paul W... Date: 3-24-04

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Detroit Testing Laboratory, Inc.

CALIBRATION DATA SHEET

Date: 3/24/04
DTL I.D: MGA00081
Cert. Number: 20040729Cal

Cal Point lb std	Reading As Found lb uut	Reading As Left lb uut	Deviation As Found lb	Deviation As Left lb	% of Allowed Dev as Found	% of Allowed Dev as Left
5.00	5.00	5.00	0.00	0.00	0.0	0.0
10.00	10.01	10.00	0.01	0.00	100.0	0.0
15.00	15.01	15.00	0.01	0.00	100.0	0.0
20.00	20.01	20.00	0.01	0.00	100.0	0.0

Tape Measure Calibration Certificate

Reference Steel Rule

Brand: GE
S/N: C/8033
Calibration Date: 11 24 3

Subject Tape Measure

Brand: Stanley
S/N: 289
Calibration Date: 1.7.4

Reference mm	Subject Tape Measure	Difference	Reference mm	Subject Tape Measure	Difference
0	0	0	450	450	0
25	25	0	475	475	0
50	50	0	500	500	0
75	75	0	525	525	0
100	100	0	550	550	0
125	125	0	575	575	0
150	150	0	600	600	0
175	175	0	625	625	0
200	200	0	650	650	0
225	225	0	675	675	0
250	250	0	700	700	0
275	275	0	725	725	0
300	300	0	750	750	0
325	325	0	775	775	0
350	350	0	800	800	0
375	375	0	825	825	0
400	400	0	850	850	0
425	425	0	875	875	0

If all differences are ± 1 mm, then the tape measure is acceptable.
Pass X Fail ____ Maximum Difference = 0

Date: 1.7.05 Performed By: RJ Mill

Certificate of Instrument Calibration and Testing

Calibration report shall not be reproduced, except in full, without written authorization from Dickson.

Customer Instrument

Dickson Model Number: TR320

Serial Number: 04018409

Calibration Technician: *Kitty McReynolds*

Calibration Date: 01/22/2004

Calibration Standards

ACCREDITED

General Eastern: Model # M3
Ser. # 0050808 / 2360502
Accuracy: ± 4% FS RH and ± 4 °F
Certified: February, 2003 / August, 2003

Ansuz: Model # A1811 Ser. # 12513-9027
RTD Platinum Probe Ser. # 496813 Accuracy: ± .2 °F
Certified: February, 2003

Cole Parmer: Model # PT1000/ 90111-00
Ser. # 10067469 / Ser. # 10148057 Accuracy: ± .4 °F
Certified: June, 2003

The calibration standards are traceable through the National Institute of Standards and Technology

Calibration Procedure P1130

The customer instrument was compared to the calibration standard. Drifts and faults were determined, and any necessary mechanical or electronic adjustments were taken. The Dickson calibration system conforms to the requirements of MIL-STD-45662A, ANSI/NCSL Z540, ISO/IEC guide 25, and ISO 17025 as appropriate. Recalibration of the customer instrument is recommended within 6 months after the unit is placed into service. Any number of factors may cause the calibration item to drift before the recommended interval has expired. A2LA Certificate Number - 1621.01

Environmental Conditions

72 °F 41 %RH

Calibration Standard Reading	Customer Instrument Reading	Unit Specification
Humidity (%RH)	Humidity (%RH)	Humidity
22.1	22.0	± 3% RH
55	58.1	± 3% RH
86.6	88.2	± 3% RH
Temperature °F	Temperature °F	Temperature
7.6	7.1	± 1.8 °F (± 1.0 °C)
75.1	75	
111.5	111.4	

The TR320 has an ISO/IEC 17025 required NIST Technical note 1297, Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results, estimated measurement uncertainty at 95% CL (K=2) of ±0.7°F and ±1.1 %RH.

FOR YOUR NEXT CALIBRATION NO PHONE CALLS REQUIRED

Fill out and send this form along with your instrument to Dickson. Label the outside of the box with "CCM"- that is your RA#.

That's all there is to it!

1. Purchase Order #: _____
   Name: _____
   Phone: _____
   Model #: TR320
   Serial #: 04018409

2. ☐ 1-Point Deluxe NIST Calibration $149.00
   ☐ 3-Point Deluxe NIST Calibration $199.00
   ☐ 3-Point Ultima Deluxe A2LA NIST $299.00 (with incoming reading)
   ☐ N995 - User selectable NIST Temperature points $50.00 each
   (to be selected in addition to one of the above calibration options)
   ☐ N997- Next Day Service $50.00 (Not available for ULTIMA service)

3. Please return via:
   ☐ Ground Freight*
   ☐ 2nd Day Air*
   ☐ Next Day Air*
   *Charges added at factory

4. Ship To: _____

   Bill To: _____

Charts/Pens
(Order now and receive them with your calibrated unit)

	Order No.	Qty.	Price Ea.
☐ 6 Red Pens	P222	____	$36 pk.
☐ 3 Red/3 Blue Pens	P246	____	$36 pk.
☐ Charts* (60 per box)	C___	____	$24 box

*Please fill in the chart order number. For a listing of available charts go to www.dicksonweb.com, click on "product search" and select the product type, "Parts Accessories."

Prices are subject to change

Let Dickson remind you the next time your unit is due for calibration. Register for our FREE Calibration Club now at www.dicksonweb.com

Dickson Calibration Services
930 South Westwood Avenue, Addison, Illinois 60101 630-543-3747 Fax 630-543-0498