

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

CHRYSLER CORPORATION
1996 Jeep Grand Cherokee 4-Door
NHTSA No. PT0400

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083



Test Date: September 9, 2004
Report Date: September 10, 2004

FINAL REPORT

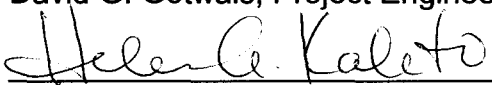
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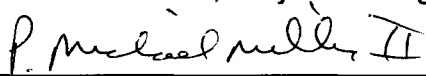
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Prepared By:


David G. Gotwals, Project Engineer


Helen A. Kaleto, Project Manager

Approved By:

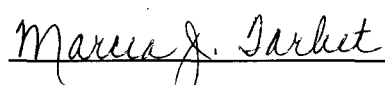


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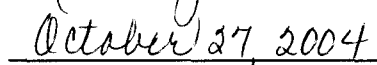


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16. Abstract A pre-standard test series was conducted on the subject 1996 Jeep Grand Cherokee 4-Door, NHTSA No. PT0400, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U pre-standard compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on September 9, 2004.			
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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 Jeep Grand Cherokee 4-Door, for FMVSS 201U Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on September 9, 2004 on a 1996 Jeep Grand Cherokee 4-Door, manufactured by Chrysler 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 Jeep Grand Cherokee 4-Door was equipped with A, B, C, and rear-pillars, a grab handle over the passenger front door and over both rear doors, an adjustable seat belt anchorage on each B and C-pillar, and an upper roof storage console.

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	BP3	OP2	UR4
AP2	BP4	SR1	
AP3	OP1	SR2A	

TABLE 2-1
SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Jeep Grand Cherokee 4-Door

VEH. NHTSA NO.: PT0400 VIN: 1J4GZ58YXTC COLOR: Maroon

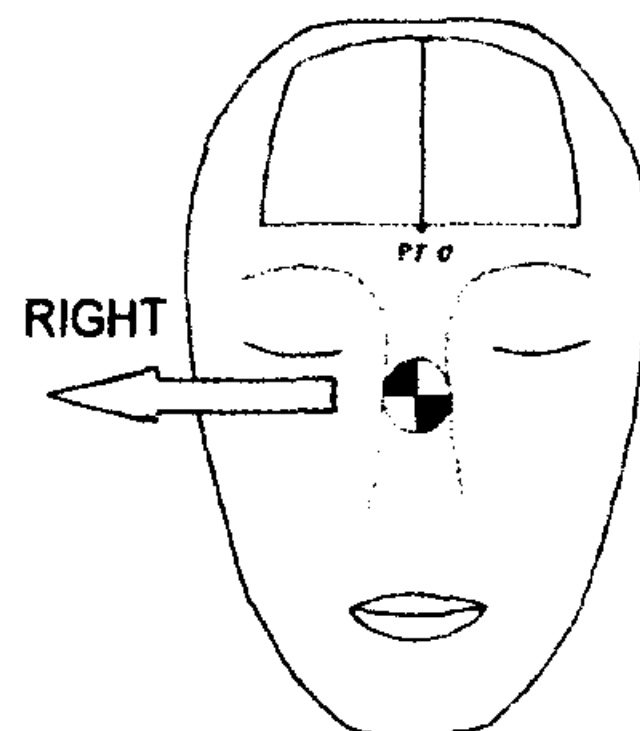
VEH. BUILD DATE: November, 1995 TEST DATE: September 9, 2004

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	105	31	23.5	1319	1527	30	6 Left
AP2	Left	201	41	23.6	1309	1514	20	0
AP3	Right	160	39	23.3	1348	1566	15	0
BP3	Right	90	-3	23.5	648	638	25	28 Right
BP4	Left	215	-6	23.5	734	752	20	35 Left
OP1	Left	270	6	24.0	798	837	25	0
OP2	Right	90	1	23.7	816	861	23	6 Left
SR1	Left	270	35	23.8	1412	1651	44	3 Right
SR2A	Left	270	33	23.7	1061	1185	35	6 Left
UR4	Right	90	50	23.8	1131	1278	45	5 Left

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.

BP3 Right: Cracked the pillar trim.

No damage was observed for any other targets.

REMARKS:

The targets listed were impacted in the following order:

Left: AP2, SR1, SR2A, BP4, OP1

Right: AP3, AP1, UR4, BP3, OP2

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: September 9, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Jeep Grand Cherokee 4-Door

VEH. NHTSA NO.: PT0400 VIN: 1J4GZ58YXTC COLOR: Maroon

VEH. BUILD DATE: November, 1995 TEST DATE: September 9, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

INTERIOR TRIM INFORMATION: A, B, C, and rear-pillars, a grab handle over the passenger front door and over both rear doors, an adjustable seat belt anchorage on each B and C-pillar, and an upper roof storage console.

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: 9/6/04; Odometer Reading: 106,210 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Chrysler Corporation

Date of Manufacture: November, 1995; VIN: 1J4GZ58YXTC

GVWR: 2495 kg; GAWR FRONT: 1248 kg

GAWR REAR: 1339 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 248 kpa REAR: 248 kpaRecommended Tire Size: P225/75R15

Recommended Cold Tire Pressure:

FRONT: 248 kpa REAR: 248 kpaSize of Tire on Test Vehicle: P225/75R15Type of Spare Tire: P225/75R15; Space Saver: ; Standard: X

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ; Bucket X; Split Bench Number of Occupants: Front 2; Rear 3; TOTAL: 5VEHICLE CAPACITY WEIGHT (VCW) = Not availableNo. of Occupants x 68 kg = 340 kgRated Cargo/Luggage Weight (RCLW) = 136 kg (201U limit)

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

Right Front = 527.0 kg Right Rear = 395.5 kgLeft Front = 523.0 kg Left Rear = 412.0 kgTOTAL FRONT = 1050.0 kg TOTAL REAR = 807.5 kg% Total Weight = 56.5 % % Total Weight = 43.5 %TOTAL DELIVERED WEIGHT = 1857.5 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1857.5 kgRated Cargo/Luggage Wt. = 136.0 kgTARGET TEST WEIGHT 1993.5 kg

WEIGHT OF TEST VEHICLE:

Right Front =	<u>532.0</u> kg	Right Rear =	<u>467.5</u> kg
Left Front =	<u>517.5</u> kg	Left Rear =	<u>477.0</u> kg
TOTAL FRONT =	<u>1049.5</u> kg	TOTAL REAR =	<u>944.5</u> kg
% Total Weight =	<u>52.6</u> %	% Total Weight =	<u>47.4</u> %
TOTAL TEST WEIGHT = <u>1994.0</u> kg			
Weight of ballast secured in vehicle's cargo area = <u>136</u> kg			

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 810.0 mm; Left Front 808.0 mm;
 Right Rear 825.0 mm; Left Rear 830.0 mm
 Pitch Angle at Right Door Sill = 0.5 Rear higher
 Pitch Angle at Left Door Sill = 0.7 Rear higher
 Roll Angle at Front Bumper = 0.5 Right side higher
 Roll Angle at Rear Bumper = 0.5 Right side higher

FULLY LOADED: Right Front 810.0 mm; Left Front 811.0 mm;
 Right Rear 803.0 mm; Left Rear 801.0 mm;
 Pitch Angle at Right Door Sill = 0.1 Rear higher
 Pitch Angle at Left Door Sill = 0.1 Rear higher
 Roll Angle at Front Bumper = 0.2 Right side higher
 Roll Angle at Rear Bumper = 0.4 Right side higher

AS TARGETED: Right Front 1015.0 mm; Left Front 1021.0 mm;
 Right Rear 1022.0 mm; Left Rear 1038.0 mm;
 Pitch Angle at Right Door Sill = 0.5 Rear higher
 Pitch Angle at Left Door Sill = 0.6 Rear higher
 Roll Angle at Front Bumper = 0.3 Right side higher
 Roll Angle at Rear Bumper = 0.5 Right side higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = 0.5 Rear higher
 Pitch Angle at Left Door Sill = 0.6 Rear higher
 Roll Angle at Front Bumper = 0.3 Right side higher
 Roll Angle at Rear Bumper = 0.5 Right side higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill = 0.5 Rear higher
Pitch Angle at Left Door Sill = 0.6 Rear higher
Roll Angle at Front Bumper = 0.3 Right side higher
Roll Angle at Rear Bumper = 0.5 Right side higher

VEHICLE WHEELBASE = 2650 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.

RECORDED BY: David G. Gotwals

DATE: September 8, 2004

APPROVED BY: Helen A. Kalet

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Jeep Grand Cherokee 4-Door

VEH. NHTSA NO.: PT0400 VIN: 1J4GZ58YXTC COLOR: Maroon

VEH. BUILD DATE: November, 1995 TEST DATE: September 9, 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 200.8°	L 255.0°
	R 105°-165°	R 105.0°	R 160.0°
B-PILLAR	L 195°-345°	L 195.0°	L 285.6°
	R 15°-165°	R 80.2°	R 165.0°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: David G. Gotwals

DATE: September 8, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Jeep Grand Cherokee 4-DoorVEH. NHTSA NO.: PT0400 VIN: 1J4GZ58YXTC COLOR: MaroonVEH. BUILD DATE: November, 1995 TEST DATE: September 9, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: 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 35°
		R 0°-50°	R 0°	R 50°
	SR2A	L 0°-50°	L 0°	L 33°
		R 0°-50°	R 0°	R 50°
	SR2B	L 0°-50°	L 0°	L 35°
		R 0°-50°	R 0°	R 50°
	SR3-1	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
	SR3-2	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
	SR3-3	L 0°-50°	L 0°	L 32°
		R 0°-50°	R 0°	R 32°
A-PILLAR	AP1	L -5°-50°	L -5°	L 31°
		R -5°-50°	R -5°	R 31°
	AP2	L -5°-50°	L -5°	L 41°
		R -5°-50°	R -5°	R 41°

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
	AP3	L -5°-50°	L -5°	L 39°
		R -5°-50°	R -5°	R 39°
B-PILLAR	BP1	L -10°-50°	L -10°	L 14°
		R -10°-50°	R -10°	R 14°
	BP2*	L 0°-50°	L 0°	L 5°
		R 0°-50°	R 0°	R 5°
	BP3	L -10°-50°	L -10°	L -3°
		R -10°-50°	R -10°	R -3°
	BP4	L -10°-50°	L -10°	L -6°
		R -10°-50°	R -10°	R -6°
OTHER PILLAR	OP1*	L 0°-50°	L 0°	L 6°
		R 0°-50°	R 0°	R 6°
	OP2	L -10°-50°	L -10°	L 1°
		R -10°-50°	R -10°	R 1°
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°	50°
UPPER ROOF 5		0°-50°	0°	50°
UPPER ROOF 6		0°-50°	0°	50°

As determined using the Procedures specified in S8.13.4.2. *Targets BP2 and OP1 are seat belt anchorage locations.

RECORDED BY: David G. Gotwals

DATE: September 8, 2004

APPROVED BY: Helen A. Kalet

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Jeep Grand Cherokee 4-DoorVEH. NHTSA NO.: PT0400 VIN: 1J4GZ58YXTC COLOR: MaroonVEH. BUILD DATE: November, 1995 TEST DATE: September 9, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: 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)}	103.2°	--
A1°	360° - T°	255.0°	--
W°	Horizontal ∠ {CG-2 (Left Seat) to (Left A-Pillar)}	200.8°	--
A2°	A2° = W°	200.8°	--
U°	Horizontal ∠ {CG-2 (Left Seat) to (Left B-Pillar)}	285.6°	--
B1°	B1° = U°	285.6°	--
V°	Horizontal ∠ {CG-R (Left Seat) to (Left B-Pillar)}	193.4°	--
B2°	B2° = V°	195.0°	--
W° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right A-Pillar)}	--	160.0°
A1° (right)	A1° (right) = W° (right)	--	160.0°
T° (right)	Horizontal ∠ {CG-F1 (Right Seat) to (Left A-Pillar)}	--	255.8°
A2° (right)	360° - T° (right)	--	105.0°
V° (right)	Horizontal ∠ {CG-R (Right Seat) to (Right B-Pillar)}	--	166.4°
B1° (right)	B1° (right) = V° (right)	--	165.0°
U° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right B-Pillar)}	--	80.2°
B2° (right)	B2° (right) = U° (right)	--	80.2°
J	A-Pillar {(Plane 3) - (Plane 5)}	354.3 mm	392.6 mm
J/2	J ÷ 2	177.2 mm	196.3 mm
D1	Upper Roof {(Plane A) - (Plane B)}	2270.0 mm	
D1/2	D1 ÷ 2	1135.0 mm	
D2	Upper Roof {(Plane C) - (Plane D)}	1264.8 mm	
D2/2	D2 ÷ 2	632.4 mm	
.35D1	.35 x D1	794.5 mm	
.35D2	.35 x D2	442.7 mm	

Measurement	Description	Left Side	Right Side
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	514.8 mm	519.6 mm
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	257.4 mm	259.8 mm
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	128.7 mm	129.9 mm
Q	Q-Pillar (Plane 13 – Plane 14)	492.0 mm	493.9 mm
Q/2	Q / 2	246.0 mm	247.0 mm
D	R-Pillar (Point 7 – Point M)	915.0 mm	915.0 mm
D/2	D / 2	457.5 mm	457.5 mm
3D/7	3 D / 7	392.1 mm	392.1 mm

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

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	2069.7	-459.0	865.8	2092.2	459.7	867.2
Rear	2861.0	-460.3	884.3	2860.6	458.4	885.6

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	2029.7	-459.0	1525.8	2052.2	459.7	1527.2
CGF2	2229.7	-459.0	1525.8	2252.2	459.7	1527.2
CGR	3021.0	-460.3	1544.3	3020.6	458.4	1545.6

REFERENCE FOR VEHICLE COORDINATE SYSTEM:

- Vehicle coordinate information for the SgrP's was not available so a world coordinate system was used.

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

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1996 Jeep Grand Cherokee 4-DoorVEH. NHTSA NO.: PT0400 VIN: 1J4GZ58YXTC COLOR: MaroonVEH. BUILD DATE: November, 1995 TEST DATE: September 9, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: 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	1836.3	-555.5	1583.9	255	31	No	--	No
AP2	1767.2	-630.7	1496.1	201	41	No	--	Yes
AP3	1631.4	-660.1	1407.7	201	39	No	--	No
A-Pillar Right Side								
AP1	1830.9	554.0	1583.1	105	31	No	--	Yes
AP2	1767.0	631.8	1496.0	160	41	No	--	No
AP3	1603.8	670.2	1386.7	160	39	No	--	Yes
B-Pillar Left Side								
BP1	2320.9	-528.8	1633.1	270	14	No	--	No
BP2	2302.0	-642.7	1377.3	270	5	No	--	No
BP3	2268.3	-668.9	1376.6	270	-3	No	--	No
BP4	2344.8	-721.4	1249.3	215	-6	No	--	Yes
B-Pillar Right Side								
BP1	2323.7	530.3	1632.4	90	14	No	--	No
BP2	2300.1	638.4	1377.8	90	5	No	--	No
BP3	2266.9	665.4	1373.4	90	-3	No	--	Yes
BP4	2341.3	715.6	1244.9	145	-6	No	--	No
Other Pillar Left Side								
OPR	3058.1	-525.4	1648.0	--	--	--	--	--
OP1	3134.6	-616.5	1399.9	270	6	No	--	Yes
OP2	3128.0	-643.9	1401.9	--	--	Yes	--	--
REL	3083.7	-639.2	1397.2	270	1	--	1	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					
Other Pillar Right Side								
OPR	3059.6	521.4	1646.8	--	--	--	--	--
OP1	3137.6	614.2	1396.2	90	6	No	--	No
OP2	3119.9	640.4	1400.7	--	--	Yes	--	--
REL	3067.0	638.9	1398.3	90	1	--	1	Yes
Rear Pillar Left Side								
RP1	3715.5	-532.4	1593.8	Exempt from testing.				
RP2	3766.6	-651.7	1444.8	Exempt from testing.				
Rear Pillar Right Side								
RP1	3716.1	533.1	1593.9	Exempt from testing.				
RP2	3755.2	670.8	1444.9	Exempt from testing.				
Front Header Left Side								
FH1	1731.6	-430.9	1576.4	180	50	No	--	No
FH2	1701.3	-286.0	1580.5	180	50	No	--	No
Front Header Right Side								
FH1	1730.2	437.4	1575.7	180	50	No	--	No
FH2	1698.1	289.2	1579.6	180	50	No	--	No
Side Rail Left Side								
SR1	1986.3	-541.6	1613.3	270	35	No	--	Yes
SR2A	2136.0	-542.9	1620.9	270	33	No	--	Yes
SR2B	2020.5	-542.0	1615.9	270	35	No	--	No
SR3-1	2785.9	-512.2	1614.8	270	50	No	--	No
SR3-2	2924.4	-512.5	1616.3	270	50	No	--	No
SR3-3	3208.2	-548.4	1627.9	270	32	No	--	No
Side Rail Right Side								
SR1	1981.2	530.3	1586.3	90	50	No	--	No
SR2A	2130.7	535.3	1622.6	--	--	Yes	--	--
REL	2129.6	532.6	1587.4	90	50	--	2	No
SR2B	2024.3	538.2	1617.5	--	--	Yes	--	--
REL	2027.0	531.1	1584.7	90	50	--	2	No
SR3-1	2782.6	510.0	1619.1	90	50	No	--	No
SR3-2	2919.2	509.2	1619.3	90	50	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					
SR3-3	3210.5	549.3	1623.2	90	32	No	--	No
Rear Header Left Side								
RH	3746.9	-459.8	1611.4	Exempt from testing.				
Rear Header Right Side								
RH	3749.0	457.6	1609.9	Exempt from testing.				
Upper Roof Left Side								
UR1	1972.4	-438.8	1624.6	270	50	No	--	No
UR2	2321.4	-438.7	1649.8	270	50	No	--	No
UR3	3056.2	-438.9	1666.5	270	50	No	--	No
Upper Roof Right Side								
UR4	1970.5	435.8	1625.1	90	50	No	--	Yes
UR5	2323.0	438.3	1652.8	90	50	No	--	No
UR6	3057.6	438.0	1666.8	90	50	No	--	No

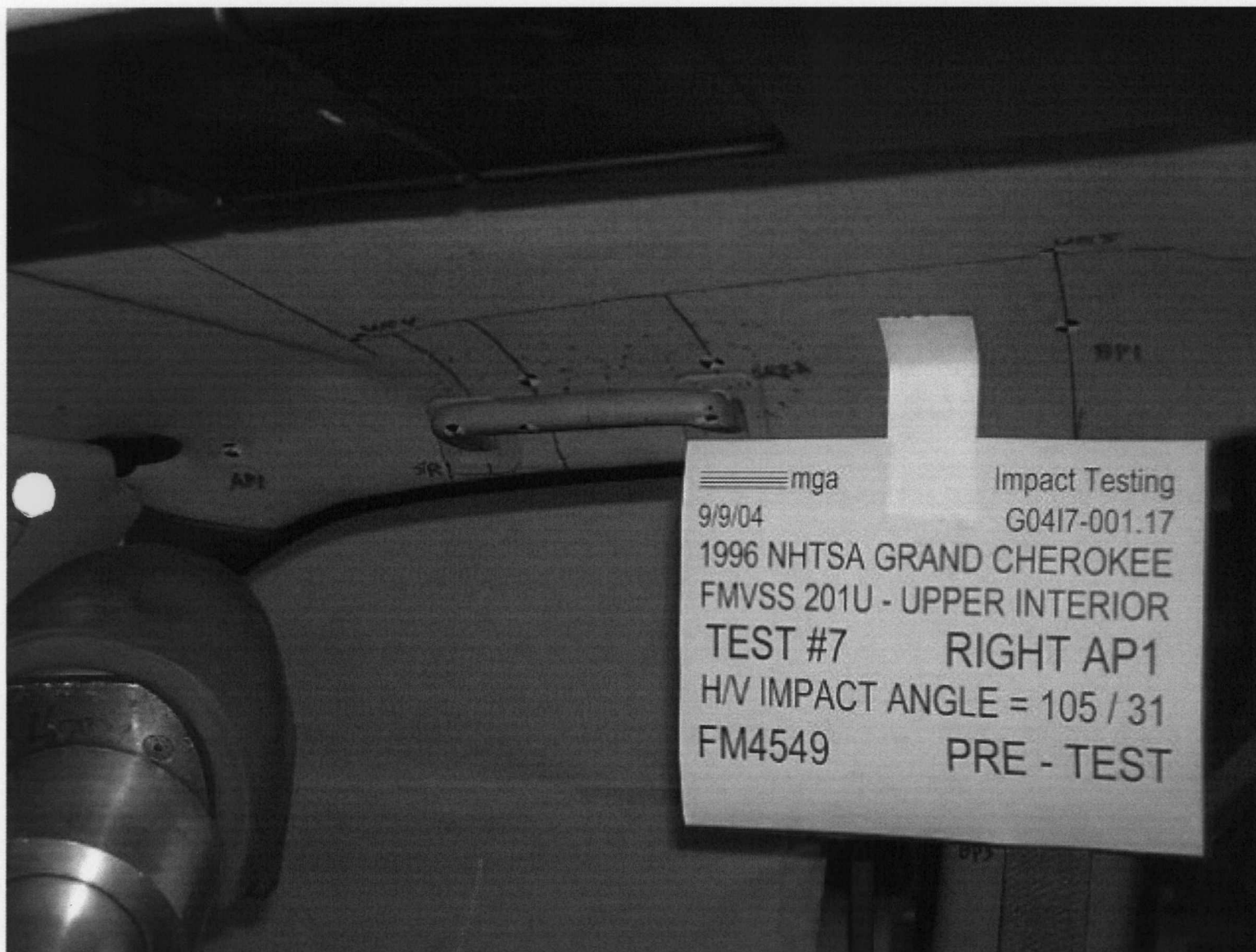
.s determined using the Procedures specified in S10.1-10.13.

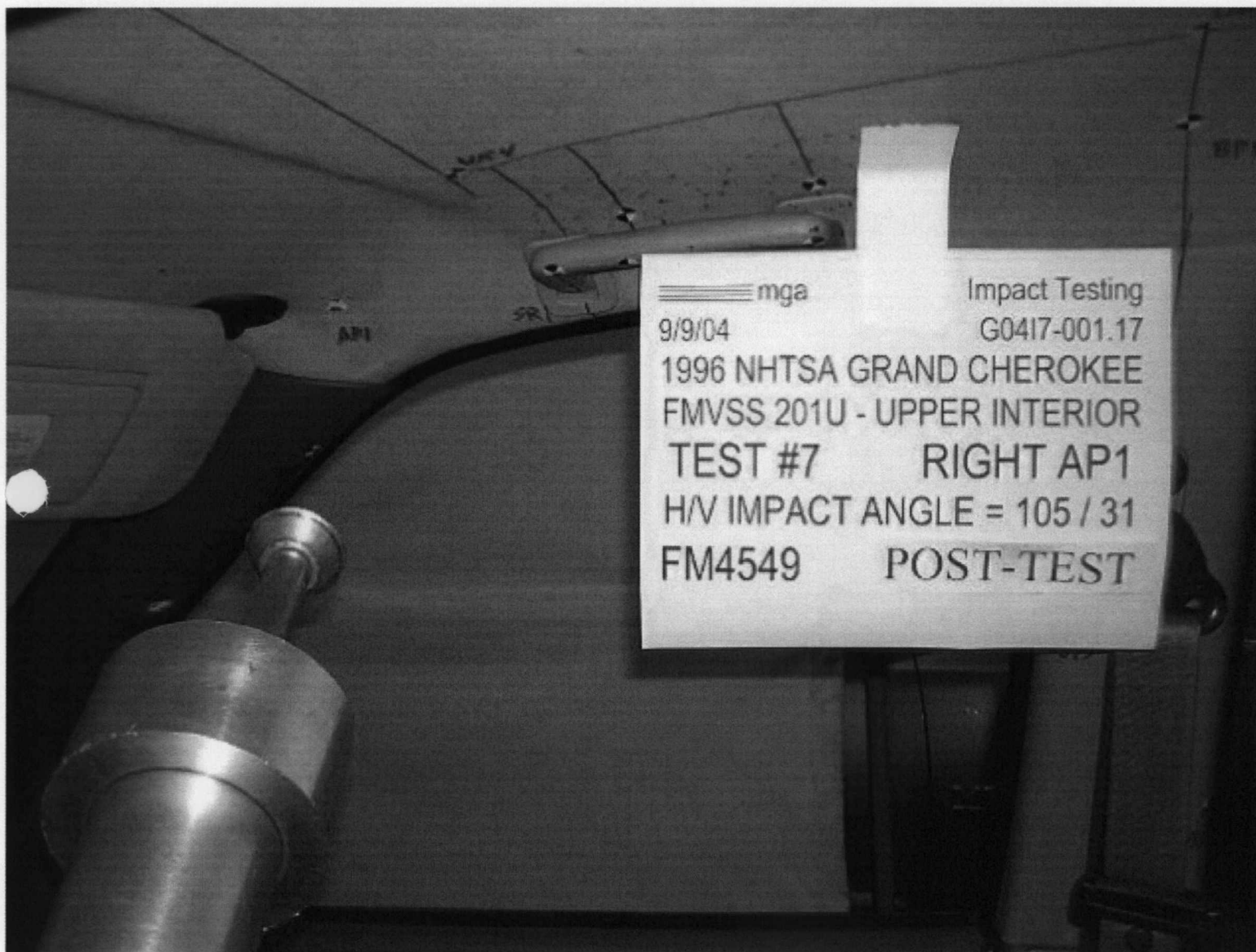
REMARKS: Targets RP1 and RH were located rearward of the 600 mm cut-off line (measured rearward of the rearmost SgRP). Therefore, they are exempt from testing.

RECORDED BY: David G. Gotwals

DATE: September 8, 2004

APPROVED BY: Helen A. Kalet







===== mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #7 RIGHT AP1

H/V IMPACT ANGLE = 105 / 31

FM4549 POST-TEST

MICHIGAN OPERATIONS
DATE: 2/8/01
SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
REVISION NO.: 2
PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.17 VEHICLE YR/MAKE/MODEL:GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): AP1 Right

Temperature:22C

MGA Test Reference No.:FM4549

Humidity:57%

Approach Horizontal Angles:105°

Time of Test:4:00 PM

Approach Vertical Angles:31°

FMH Serial No:035

Additional Description:

TEST RESULTS:

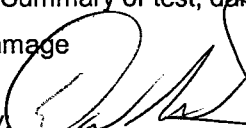
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1319	1527	2.7	23.5	30	6 L

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

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

No visible damage

Recorded By:  Approved By*: Helen Q. Kaloto Date: 9/9/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

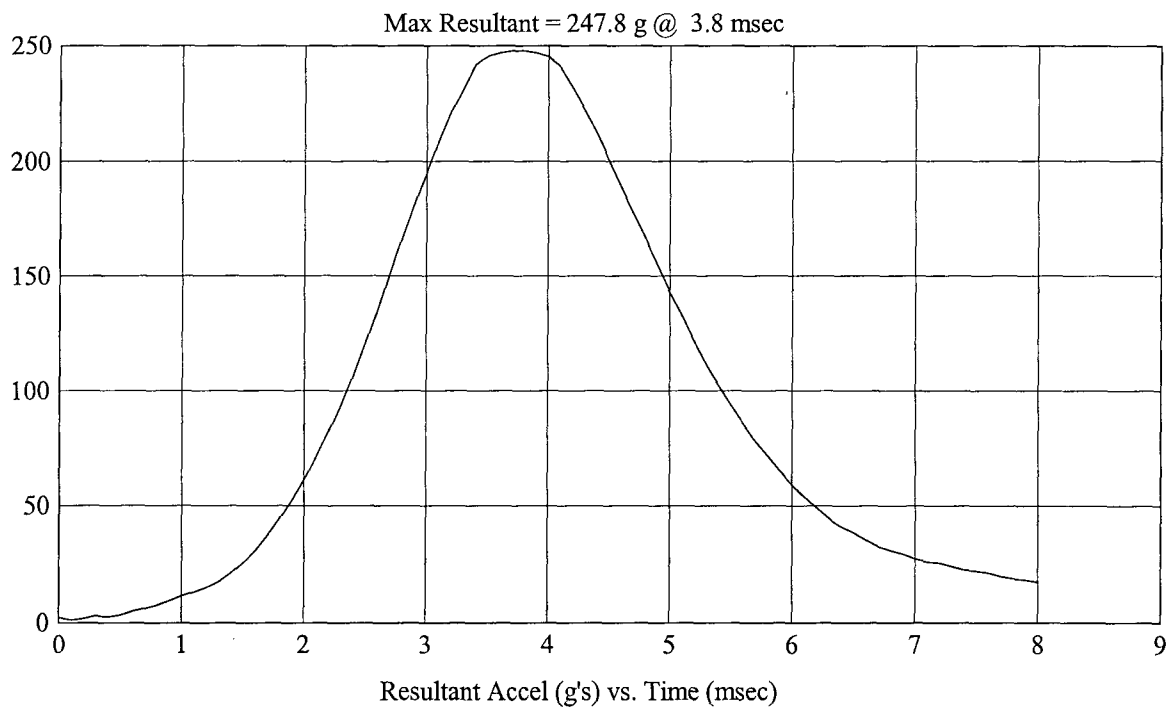
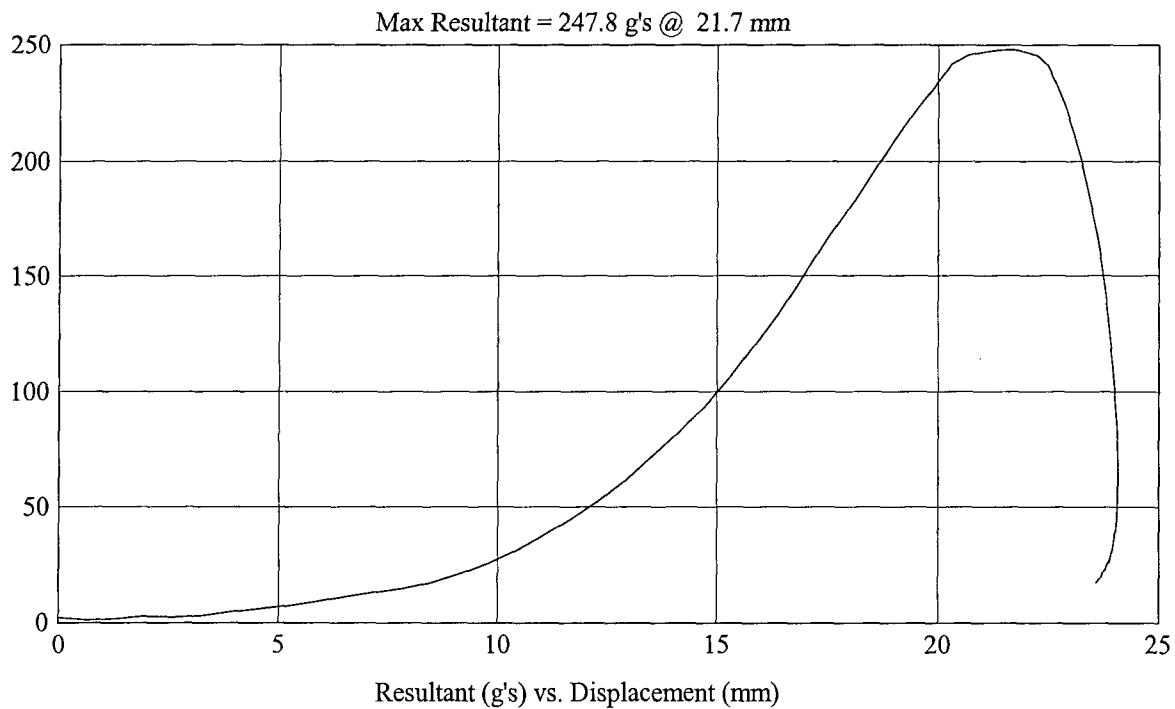
Customer: NHTSA
Test # 7
FM4549
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 105/31

HIC(d) = 1319, HIC = 1527, Delta T = 2.7 msec



FMH
G04I7-001.17

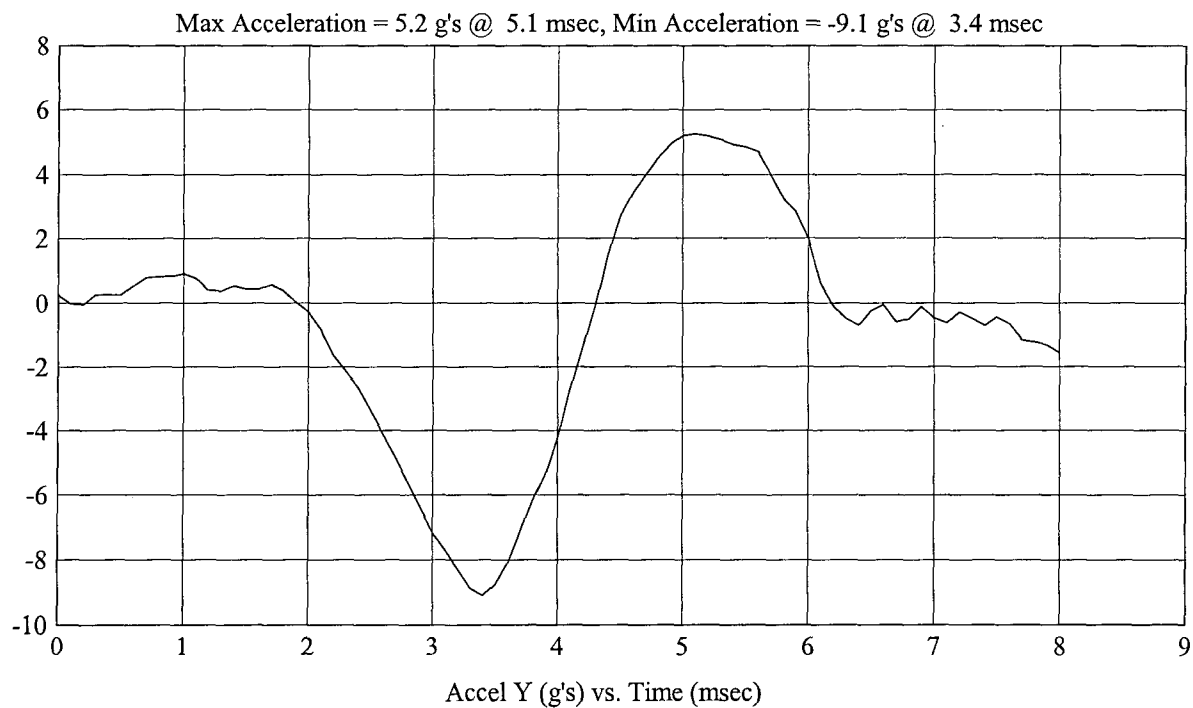
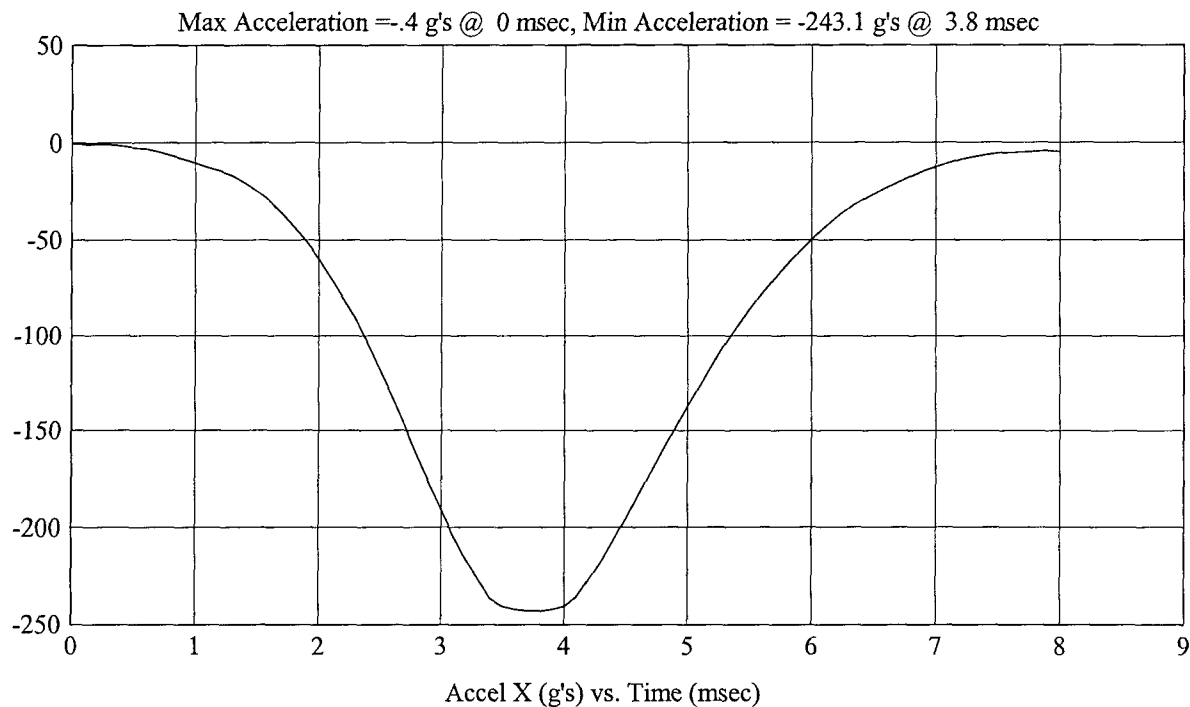
Customer: NHTSA
Test # 7
FM4549
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 105/31

HIC(d) = 1319, HIC = 1527, Delta T = 2.7 msec



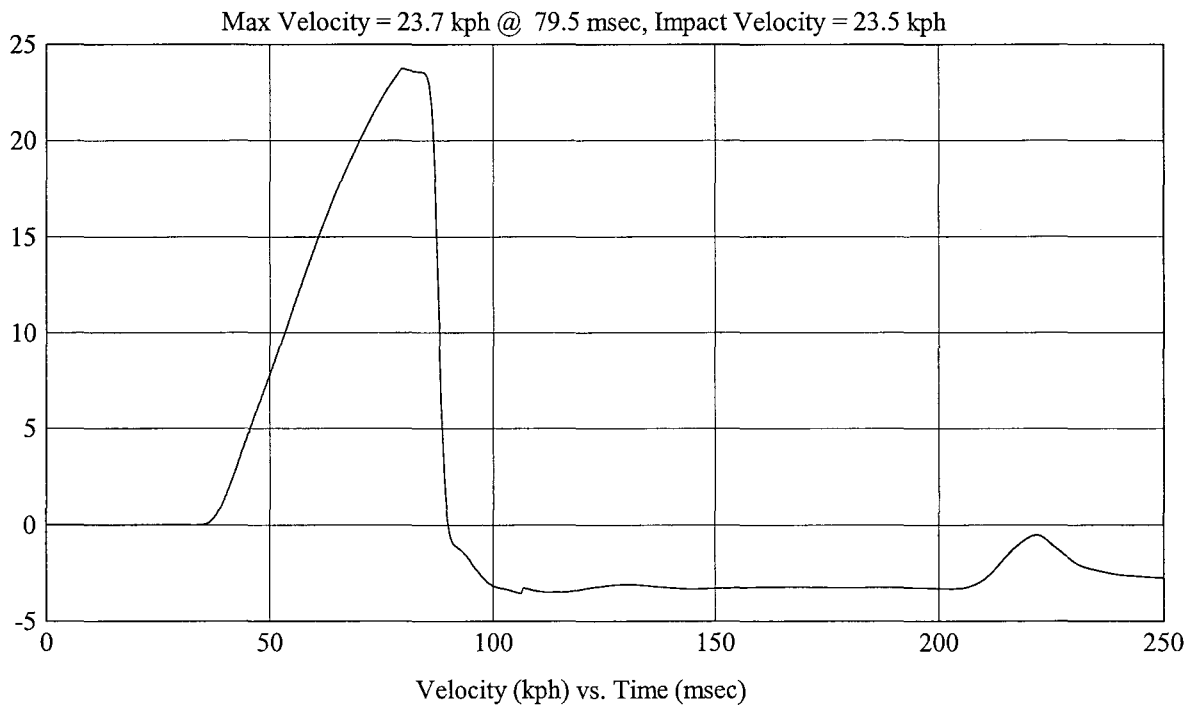
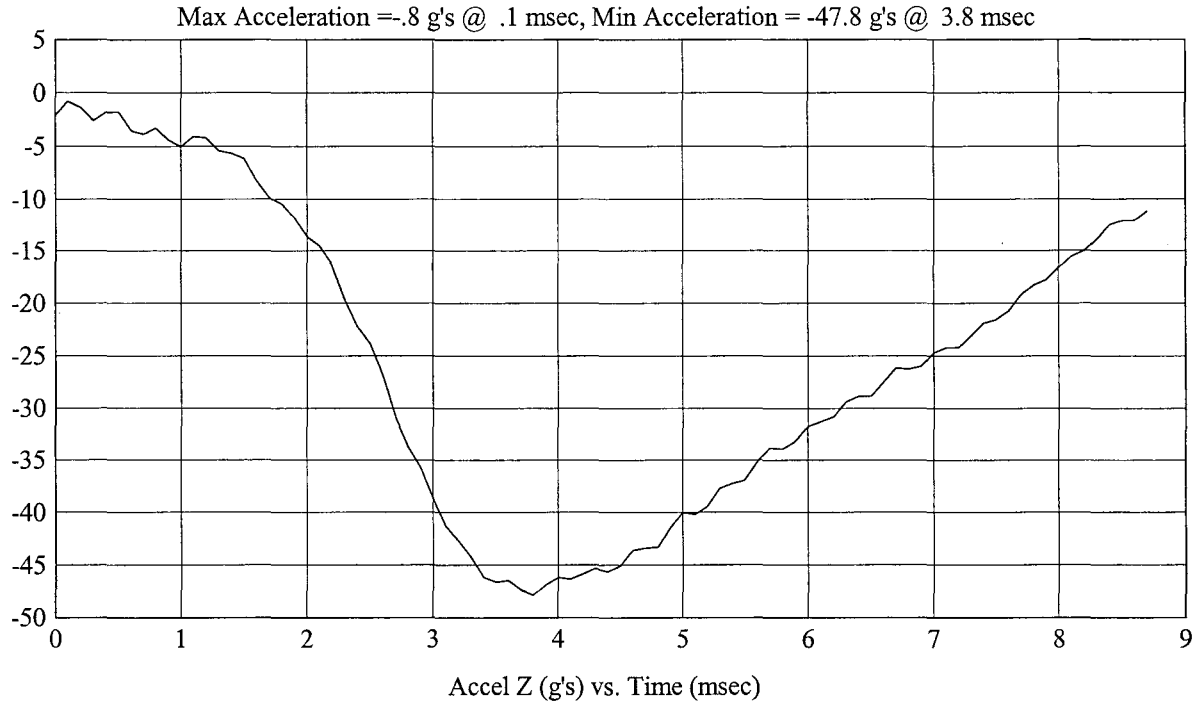
Customer: NHTSA
Test # 7
FM4549
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 105/31

HIC(d) = 1319, HIC = 1527, Delta T = 2.7 msec



FMH
G04I7-001.17

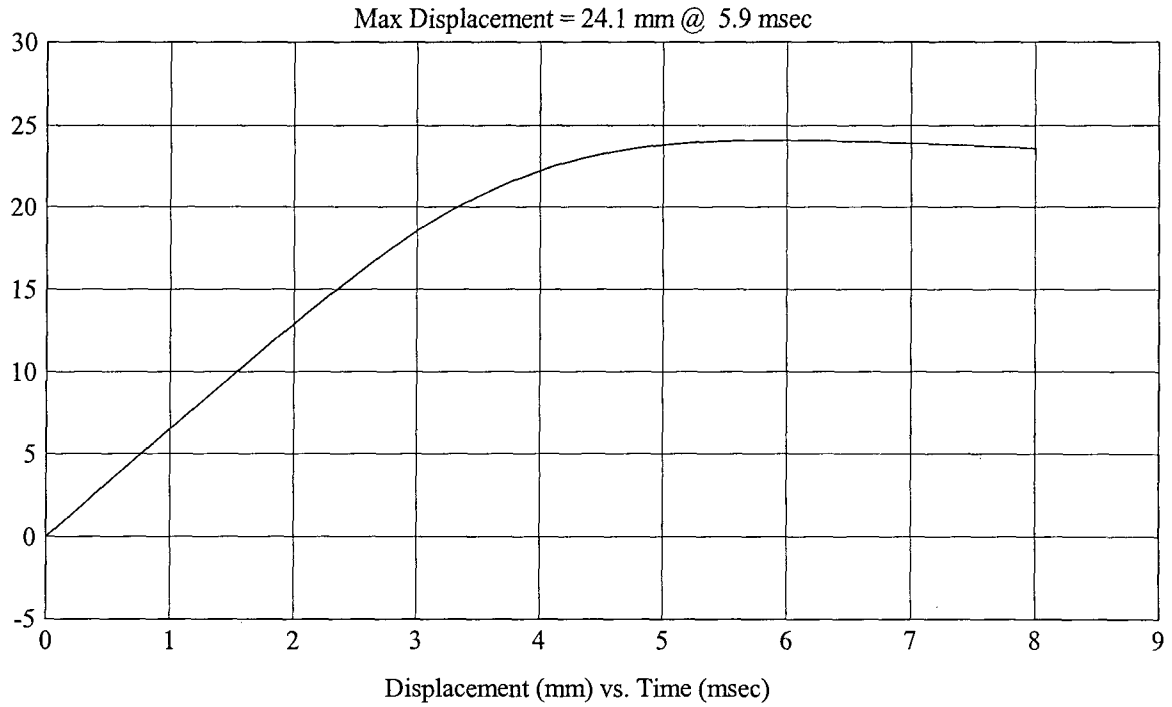
Customer: NHTSA
Test # 7
FM4549
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

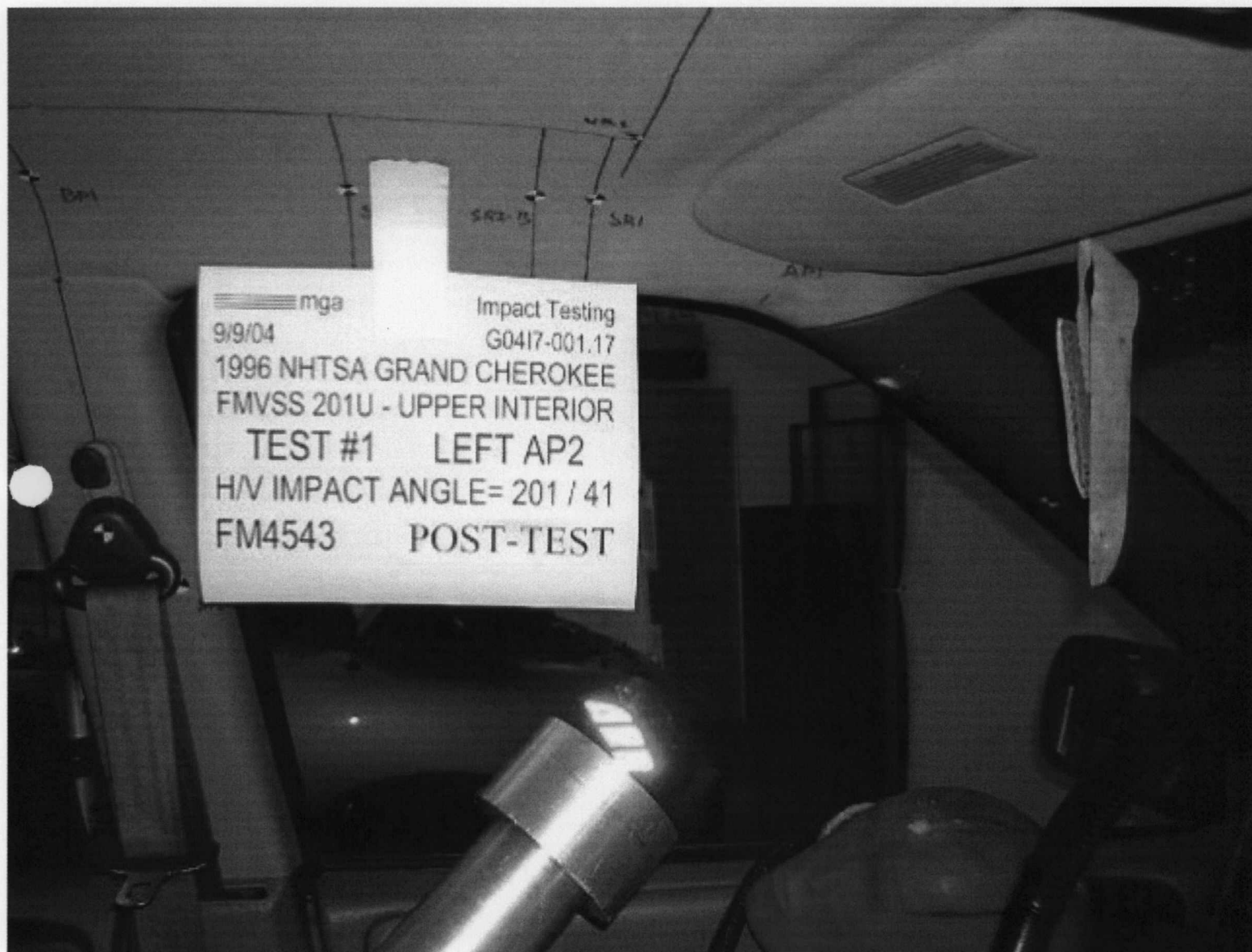
Test Date: 9/9/04

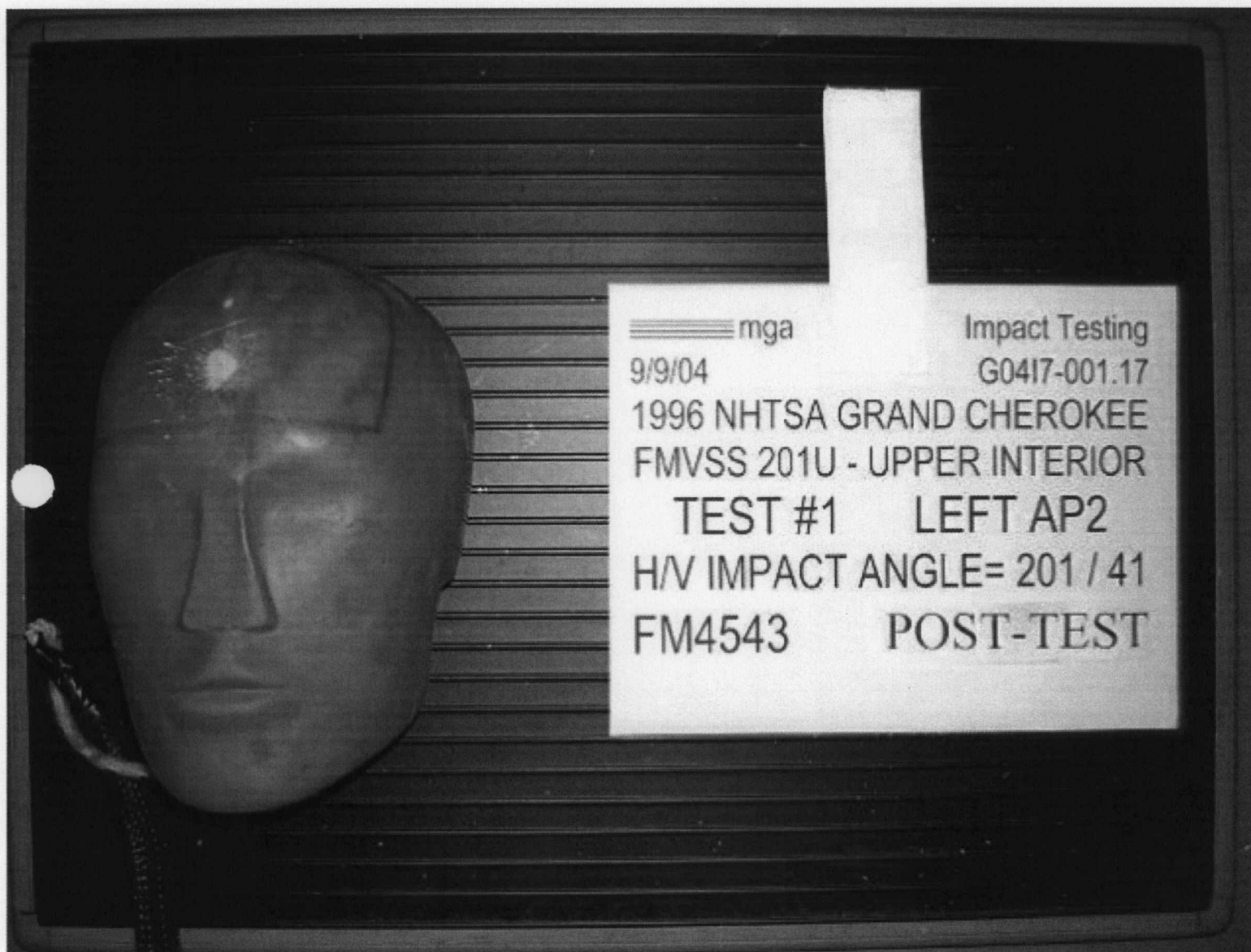
Model Year: 1996
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 105/31

HIC(d) = 1319, HIC = 1527, Delta T = 2.7 msec









==== mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #1 LEFT AP2

H/V IMPACT ANGLE= 201 / 41

FM4543 POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.17 VEHICLE YR/MAKE/MODEL:GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): AP2 Left

Temperature:22C

MGA Test Reference No.:FM4543

Humidity:60%

Approach Horizontal Angles:201°

Time of Test:10:00 AM

Approach Vertical Angles:41°

FMH Serial No:035

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1309	1514	2.6	23.6	20	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

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

No visible damage

Recorded By: mtz Approved By: Helen G. Kalish Date: 9/9/04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

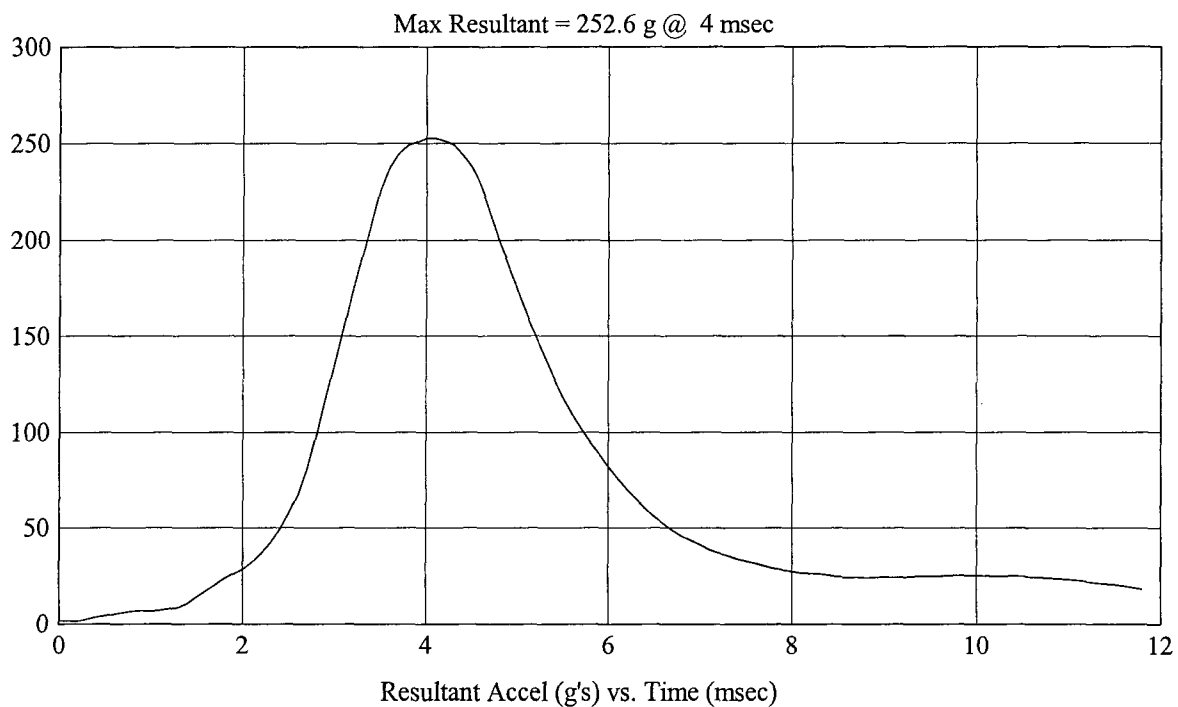
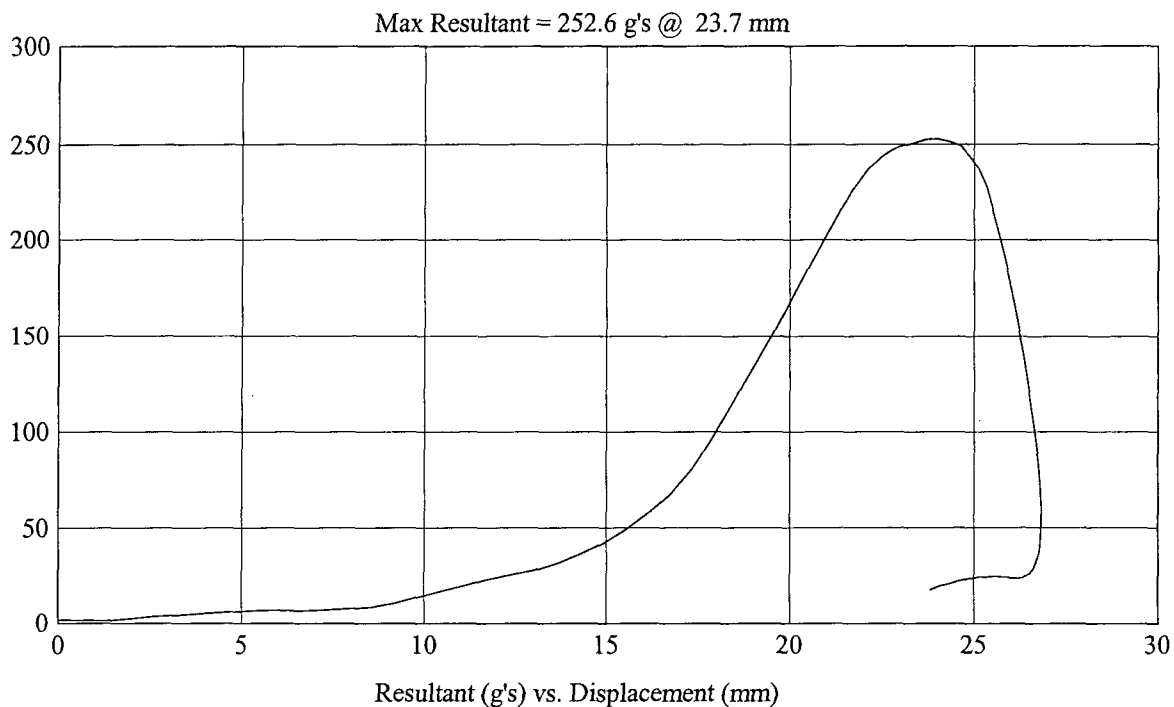
Customer: NHTSA
Test # 1
FM4543
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/41

HIC(d) = 1309, HIC = 1514, Delta T = 2.6 msec



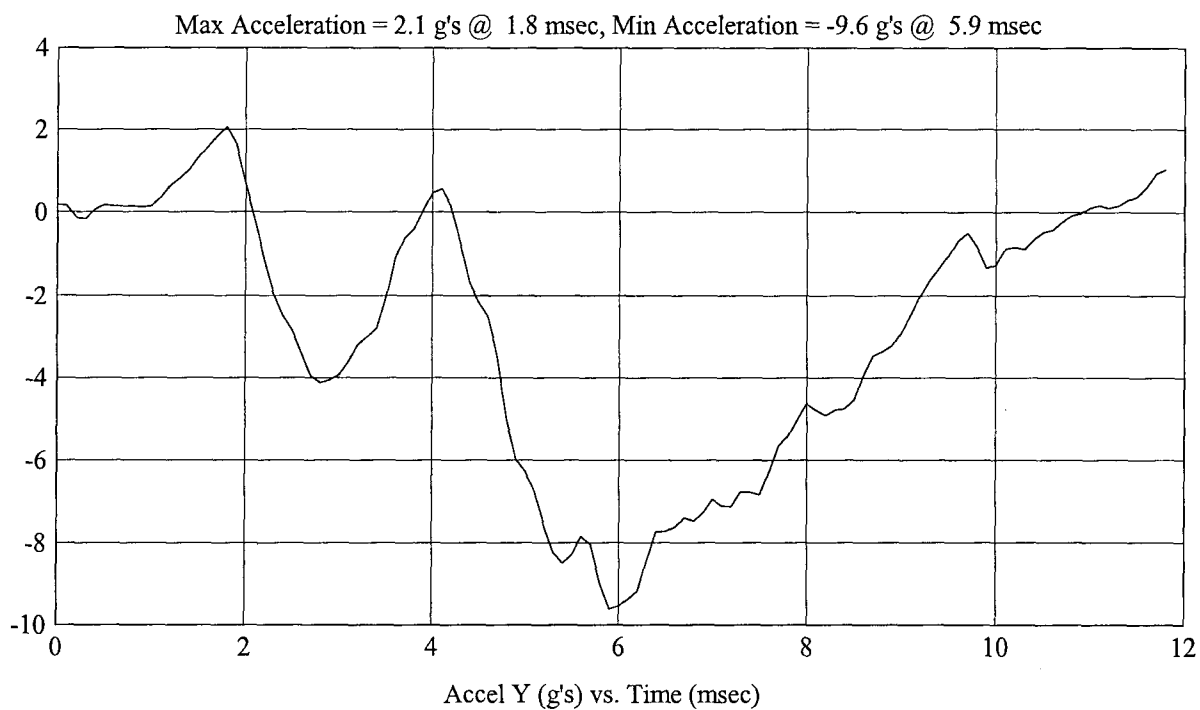
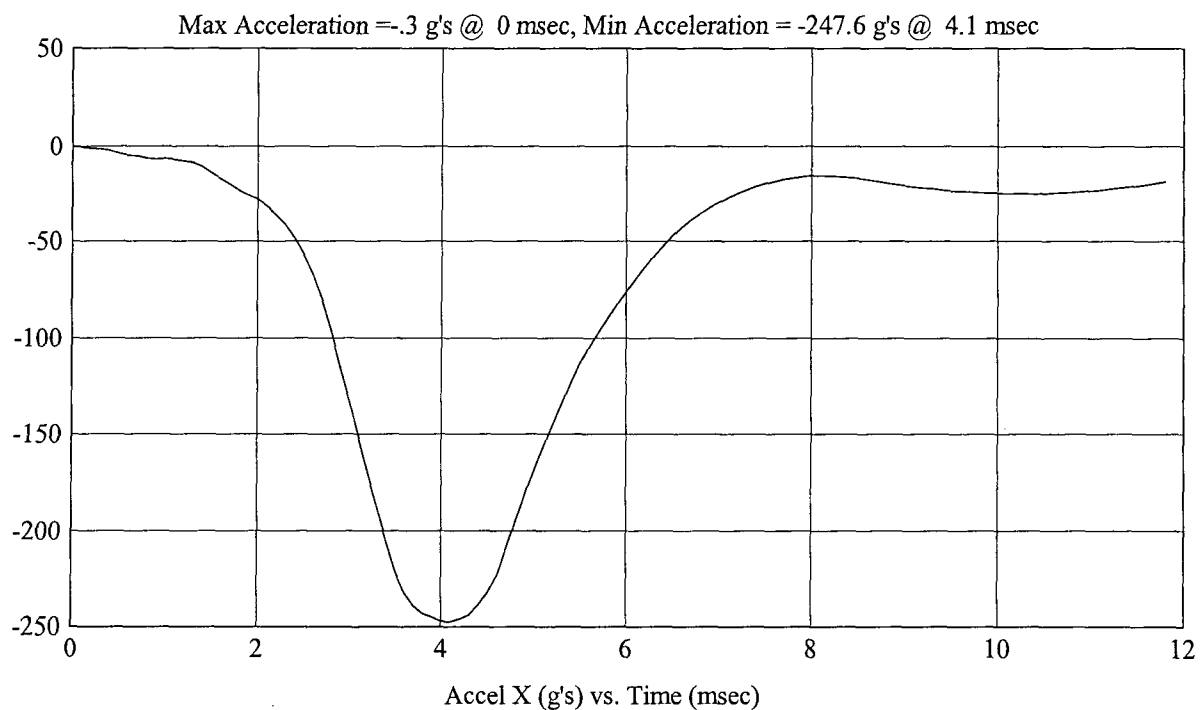
FMH
G04I7-001.17Customer: NHTSA
Test # 1
FM4543
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/41

HIC(d) = 1309, HIC = 1514, Delta T = 2.6 msec



FMH
G04I7-001.17

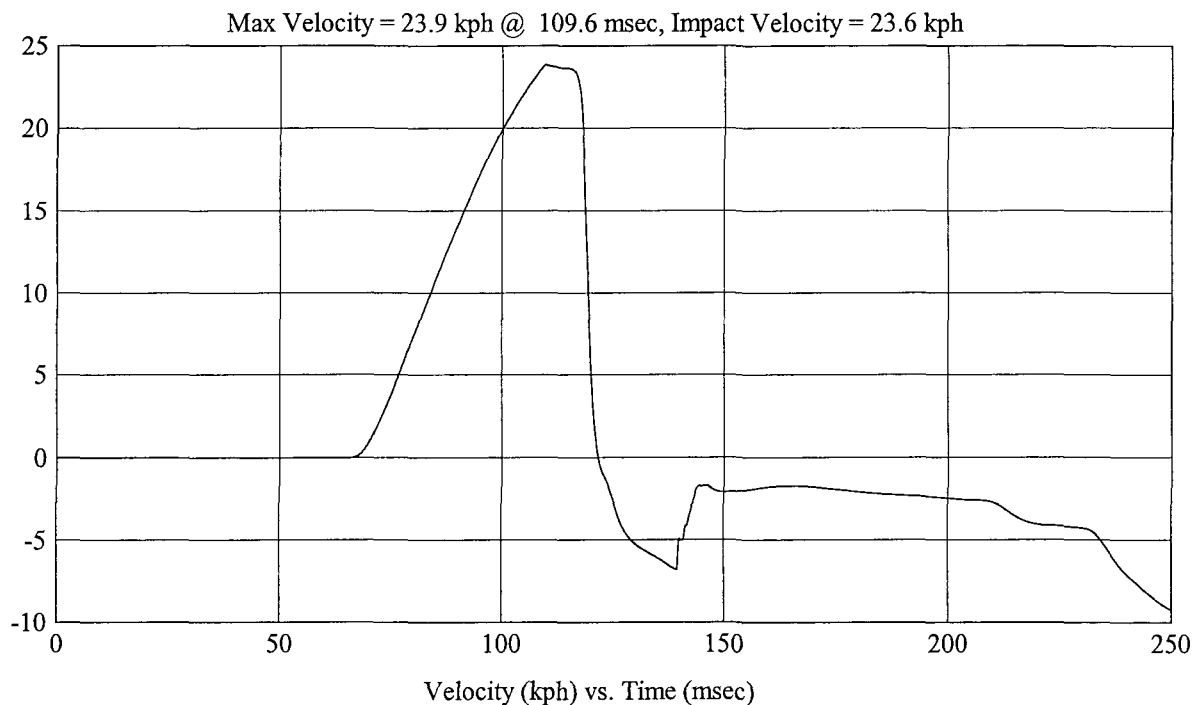
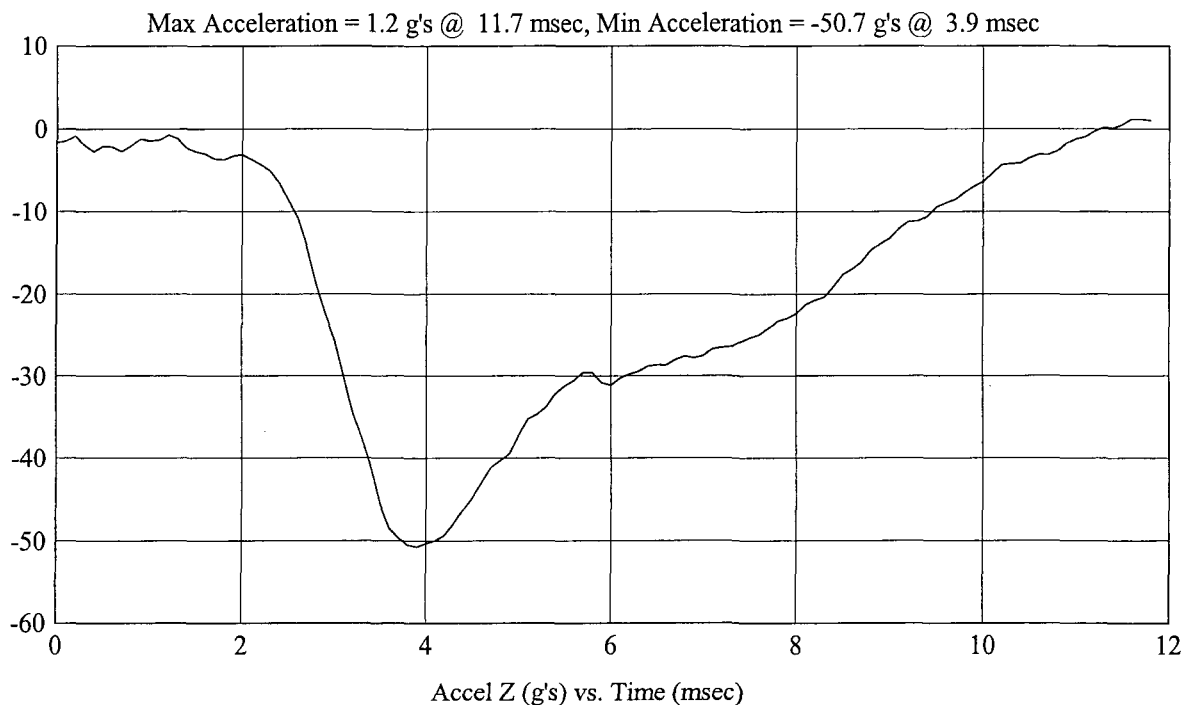
Customer: NHTSA
Test # 1
FM4543
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/41

HIC(d) = 1309, HIC = 1514, Delta T = 2.6 msec



FMH
G04I7-001.17

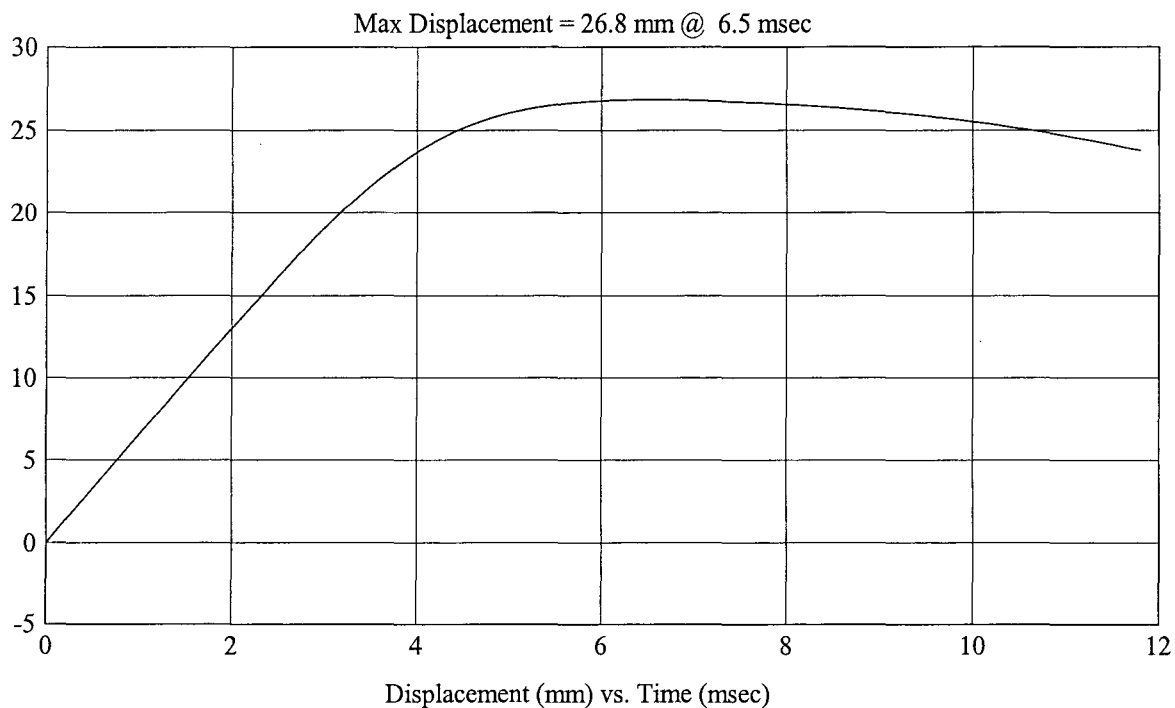
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Test # 1
FM4543
Additional Desc: N/A

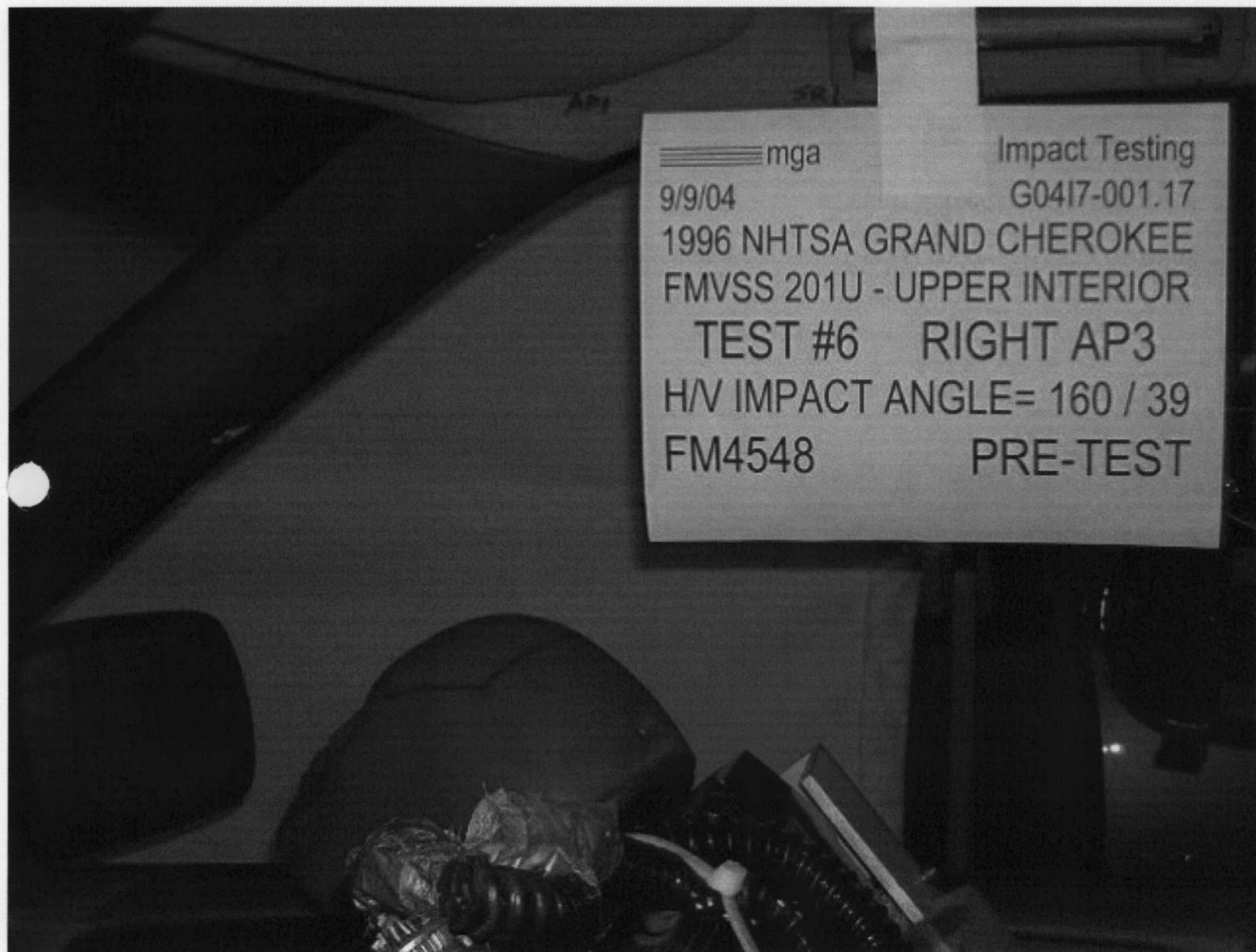
Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04

Model Year: 1996
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 201/41

HIC(d) = 1309, HIC = 1514, Delta T = 2.6 msec





===== mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #6 RIGHT AP3

H/V IMPACT ANGLE= 160 / 39

FM4548

PRE-TEST





MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.17 VEHICLE YR/MAKE/MODEL:GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): AP3 Right

Temperature:22C

MGA Test Reference No.:FM4548

Humidity:58%

Approach Horizontal Angles:160°

Time of Test:3:30 PM

Approach Vertical Angles:39°

FMH Serial No:035
038

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1348	1566	3.2	23.3	15	0

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	1.54
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: 9-9-04

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

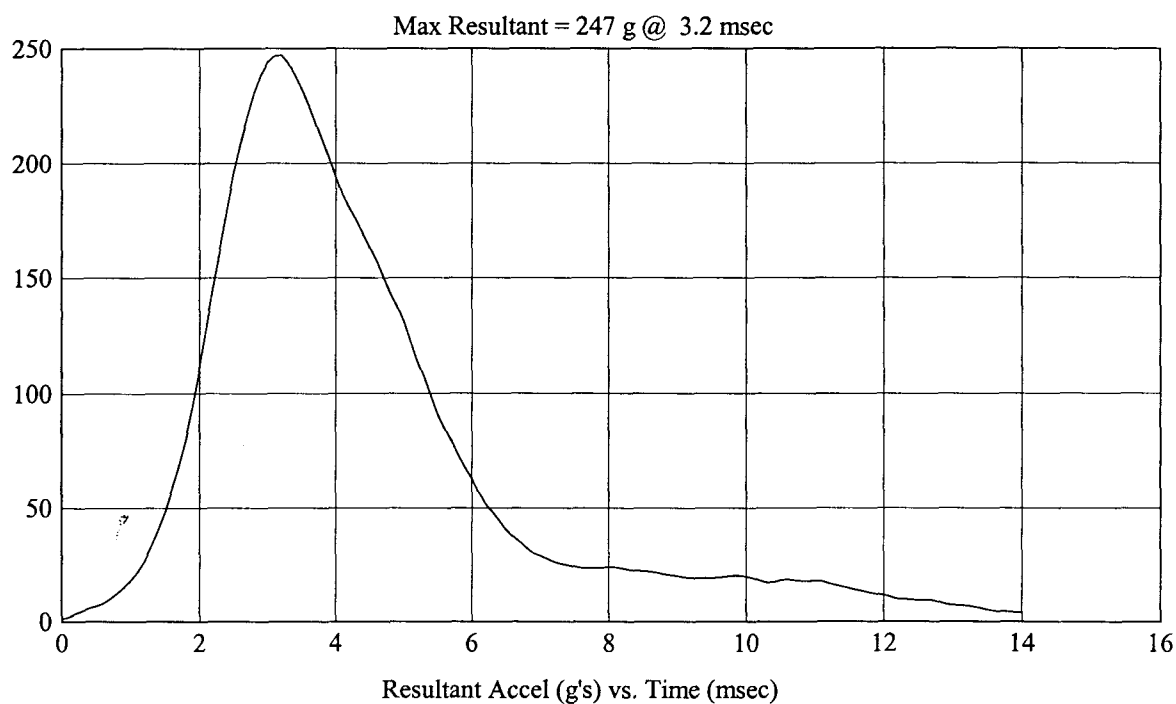
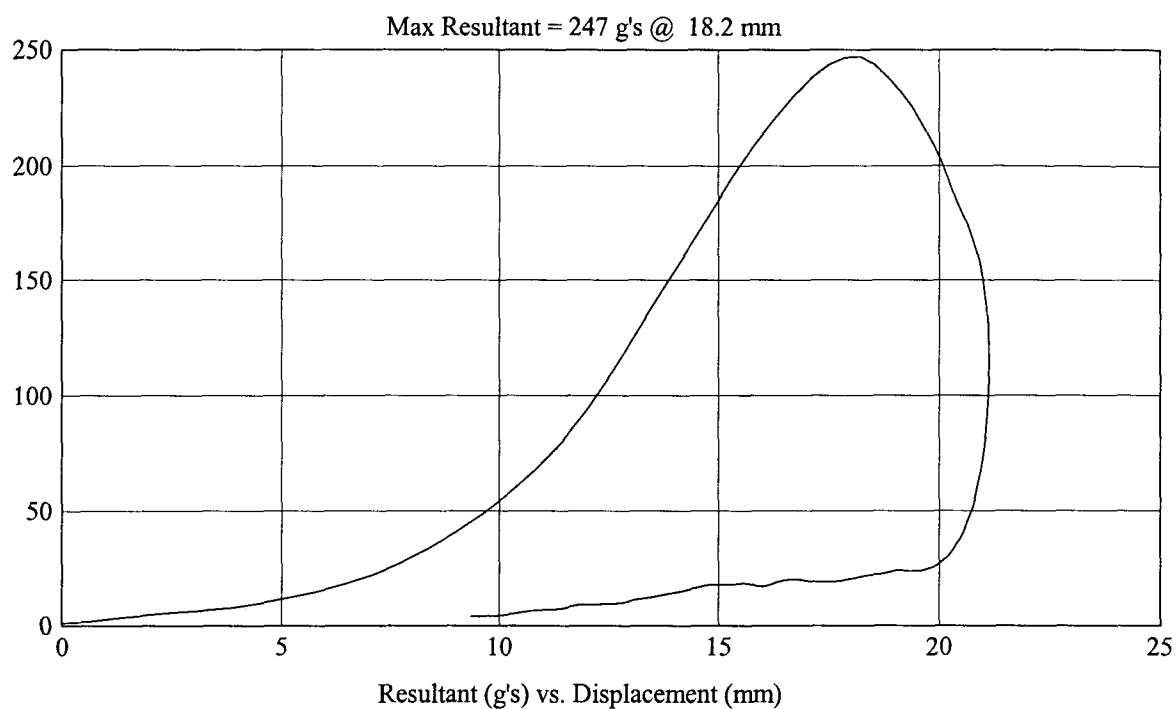
Customer: NHTSA
Test # 6
FM4548
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 160/39

Test Date: 9/9/04

HIC(d) = 1348, HIC = 1566, Delta T = 3.2 msec



FMH
G04I7-001.17

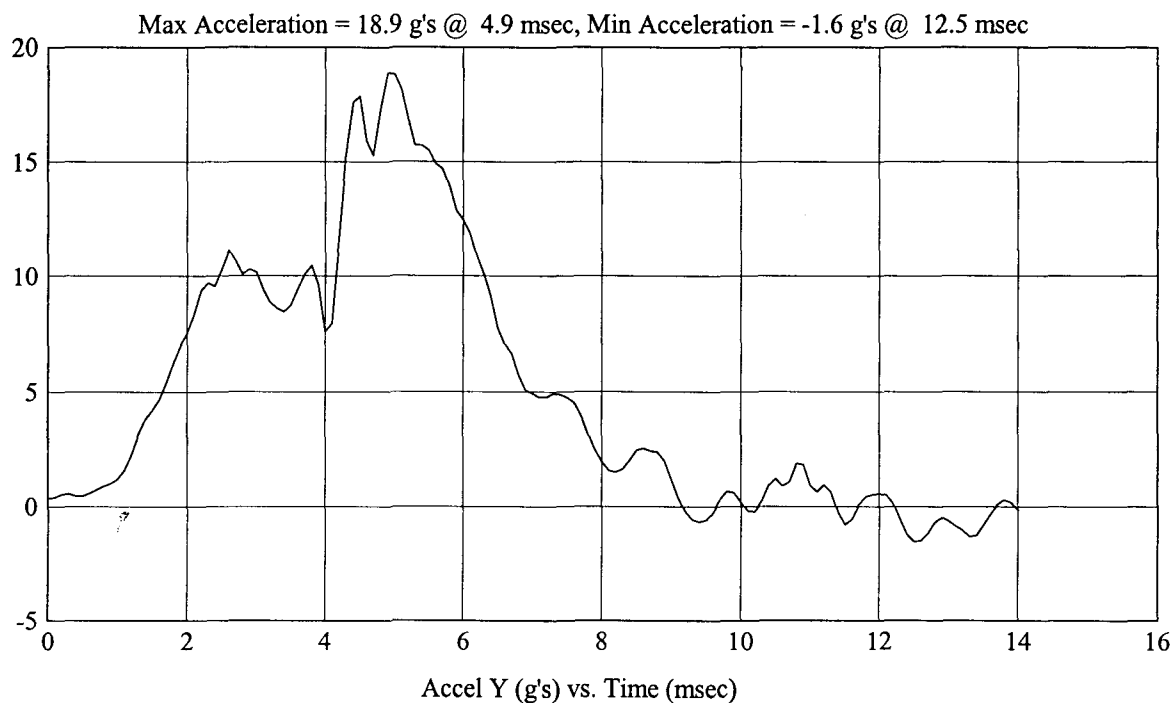
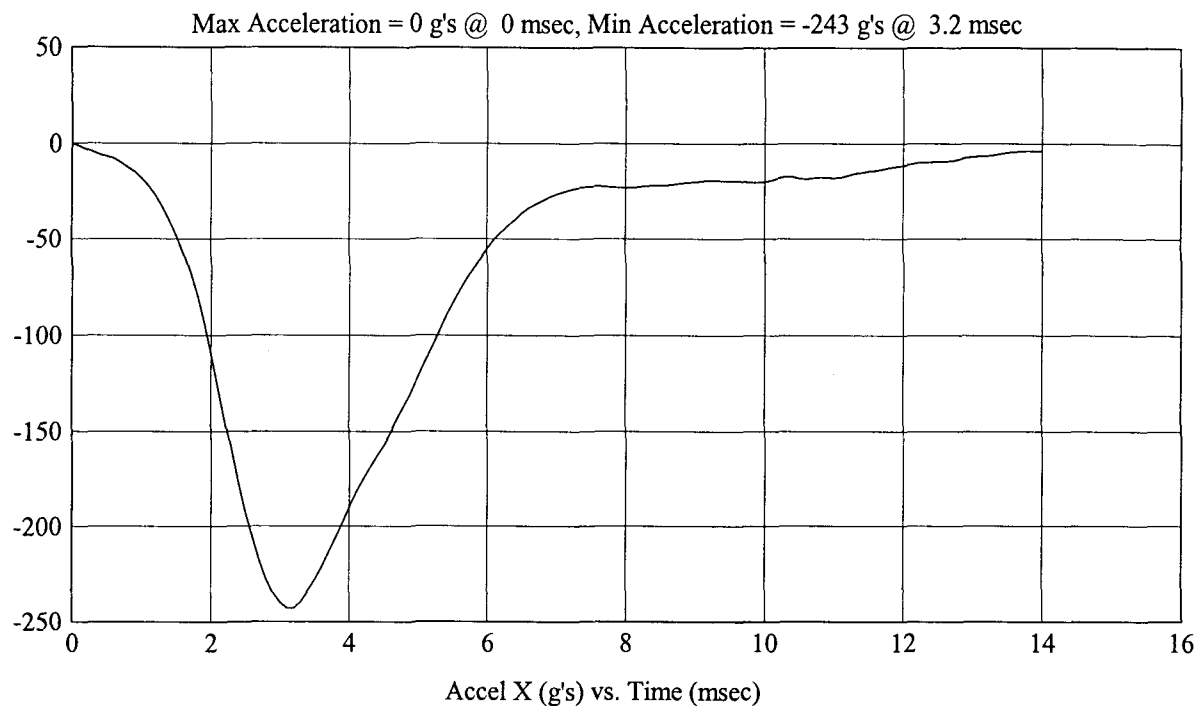
Customer: NHTSA
Test # 6
FM4548
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 160/39

Test Date: 9/9/04

HIC(d) = 1348, HIC = 1566, Delta T = 3.2 msec



FMH
G04I7-001.17

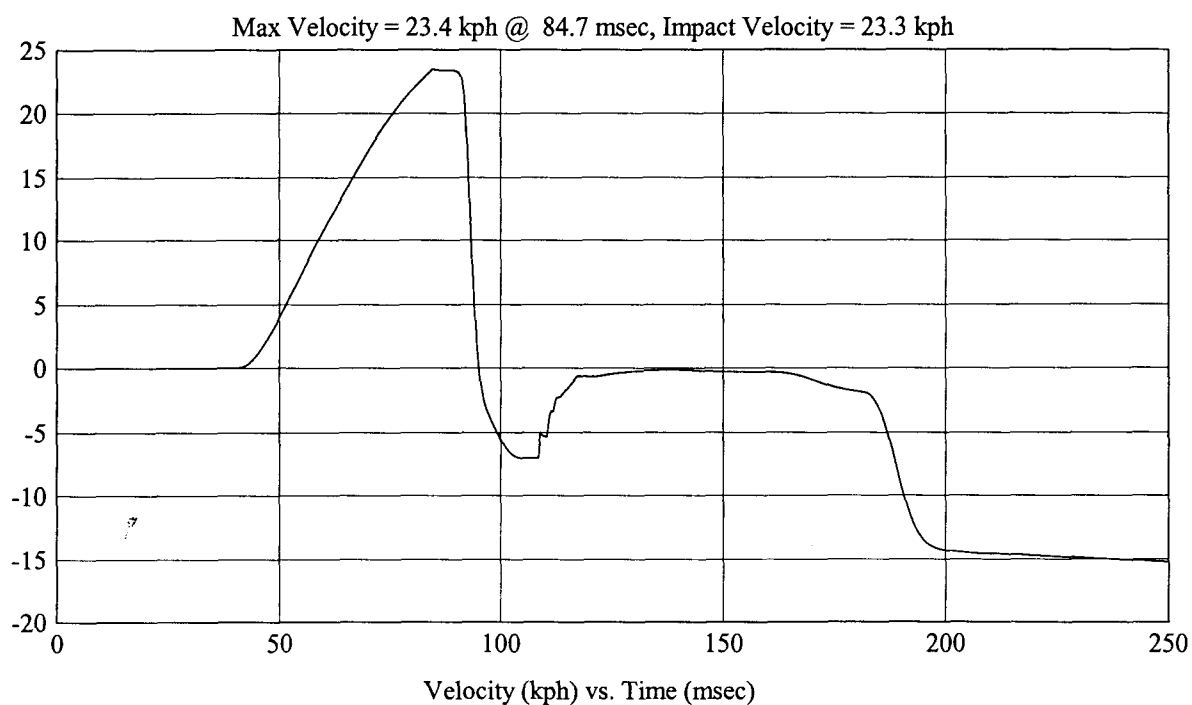
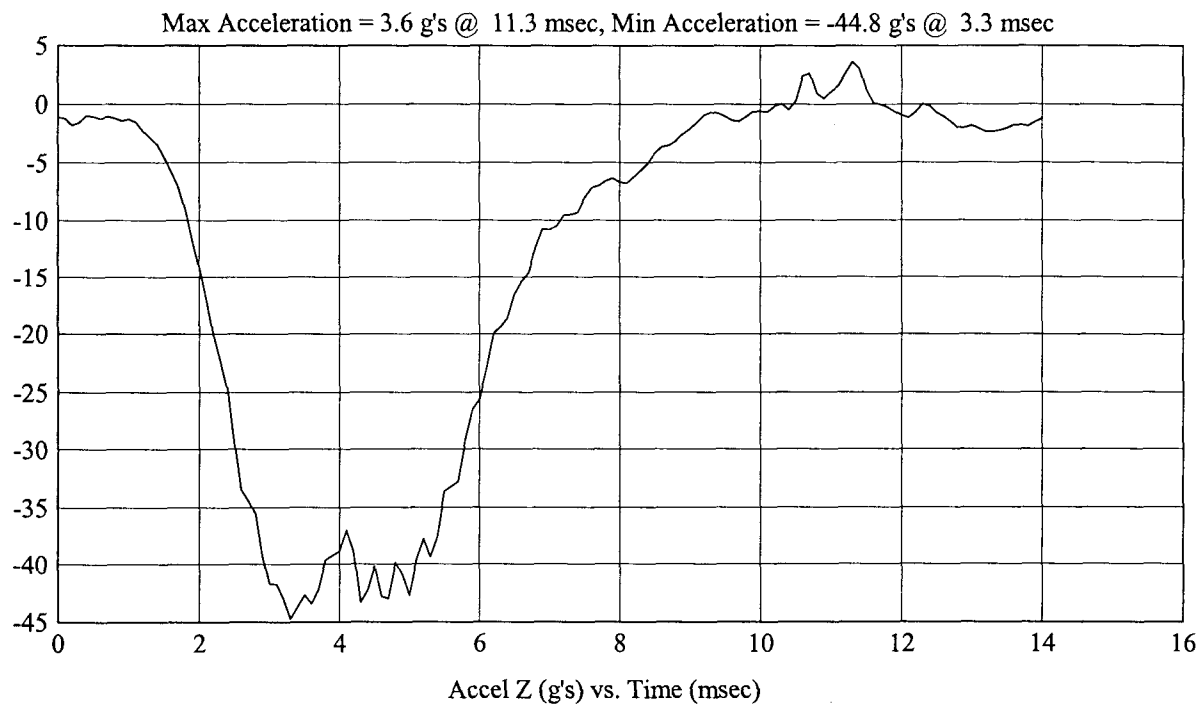
Customer: NHTSA
Test # 6
FM4548
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 160/39

Test Date: 9/9/04

HIC(d) = 1348, HIC = 1566, Delta T = 3.2 msec



FMH
G04I7-001.17

Customer: NHTSA
Test # 6
FM4548
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996

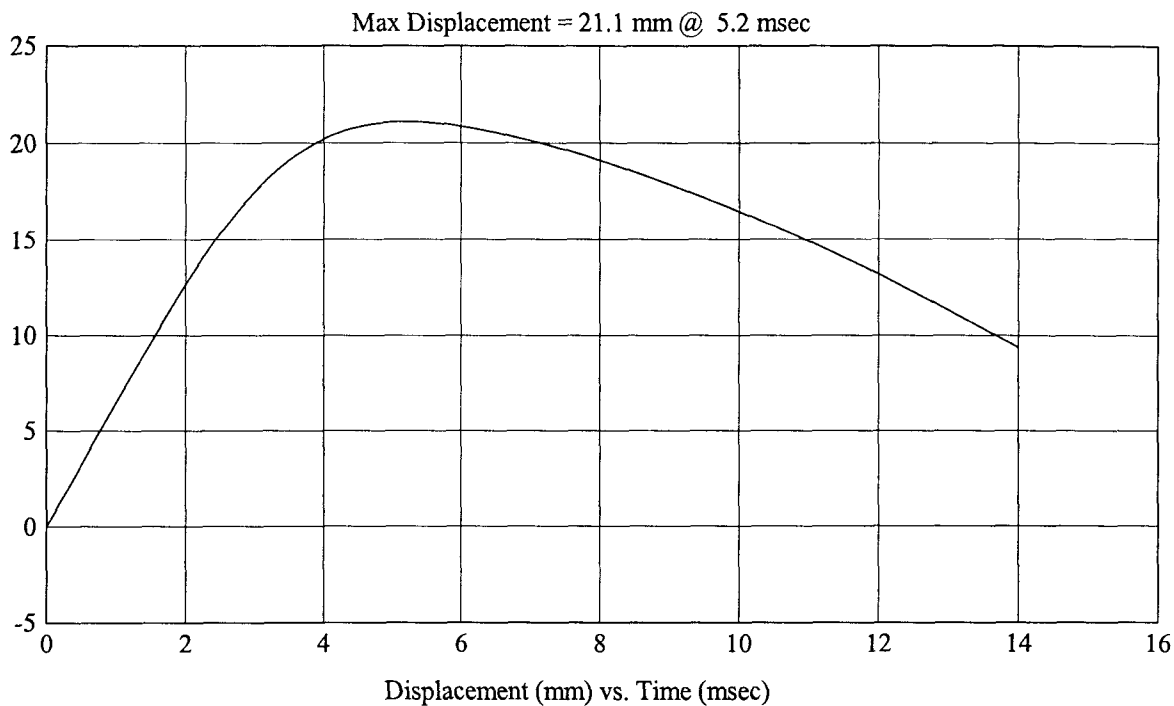
Target: AP3

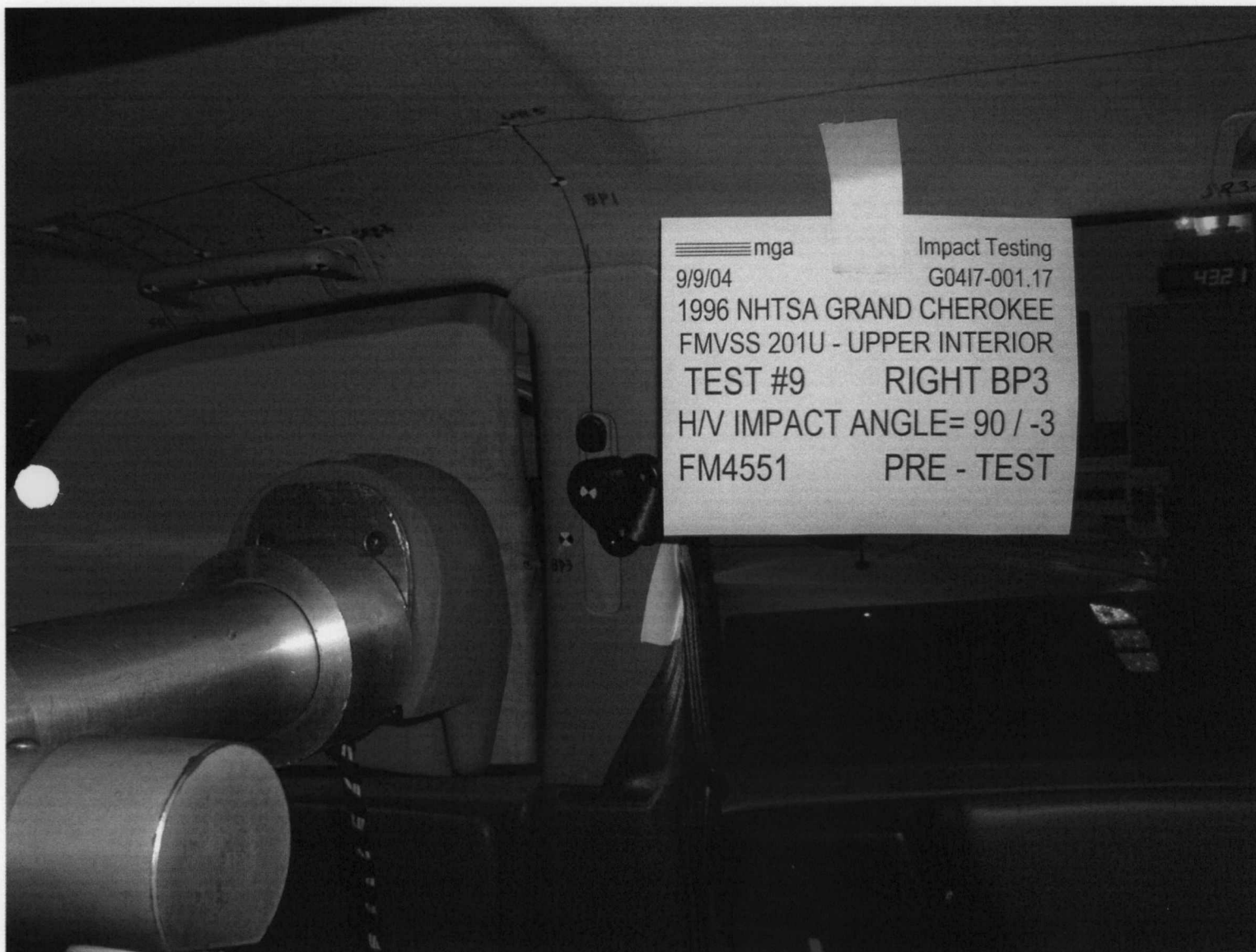
Vehicle Side: Right

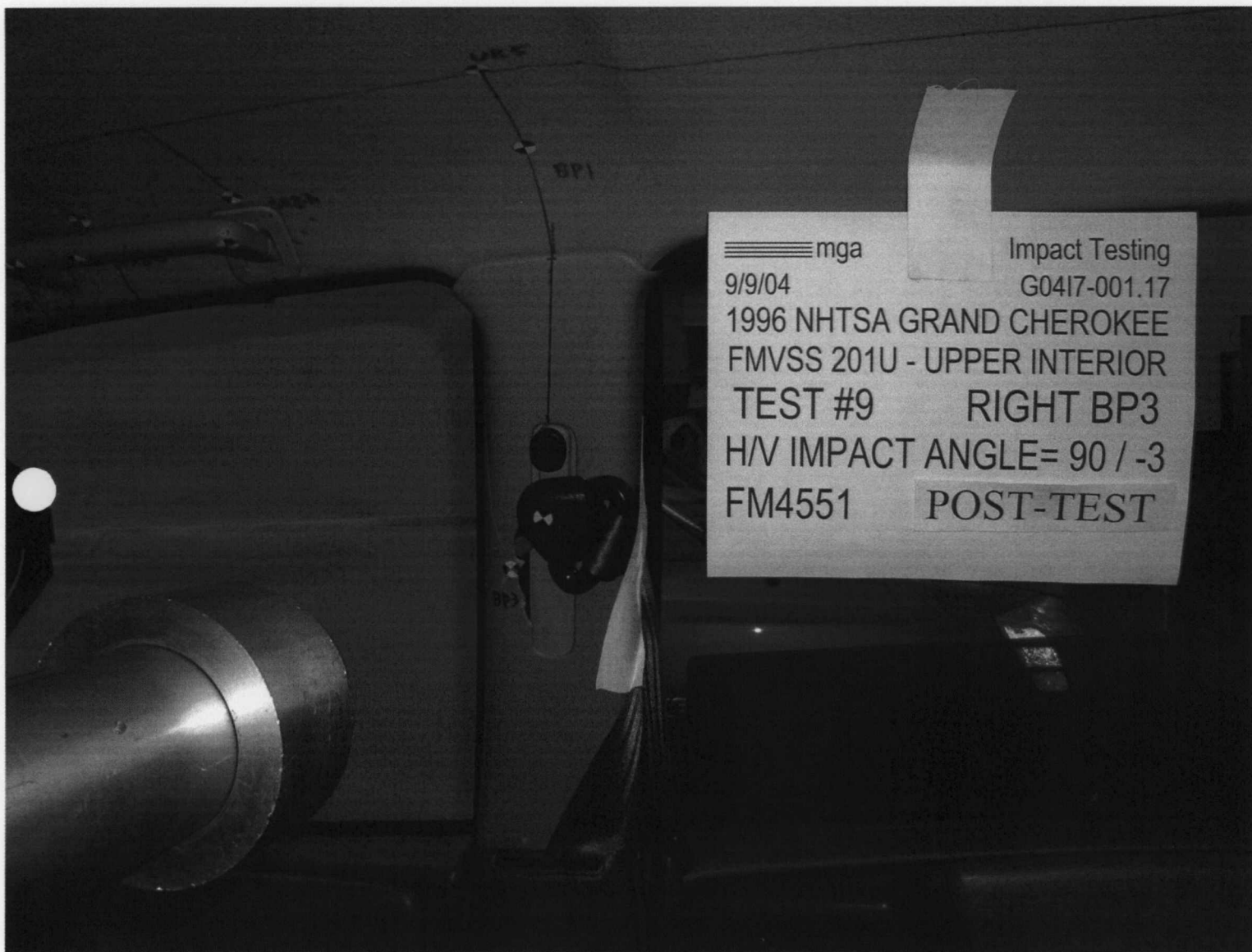
Horz/Vert Angle: 160/39

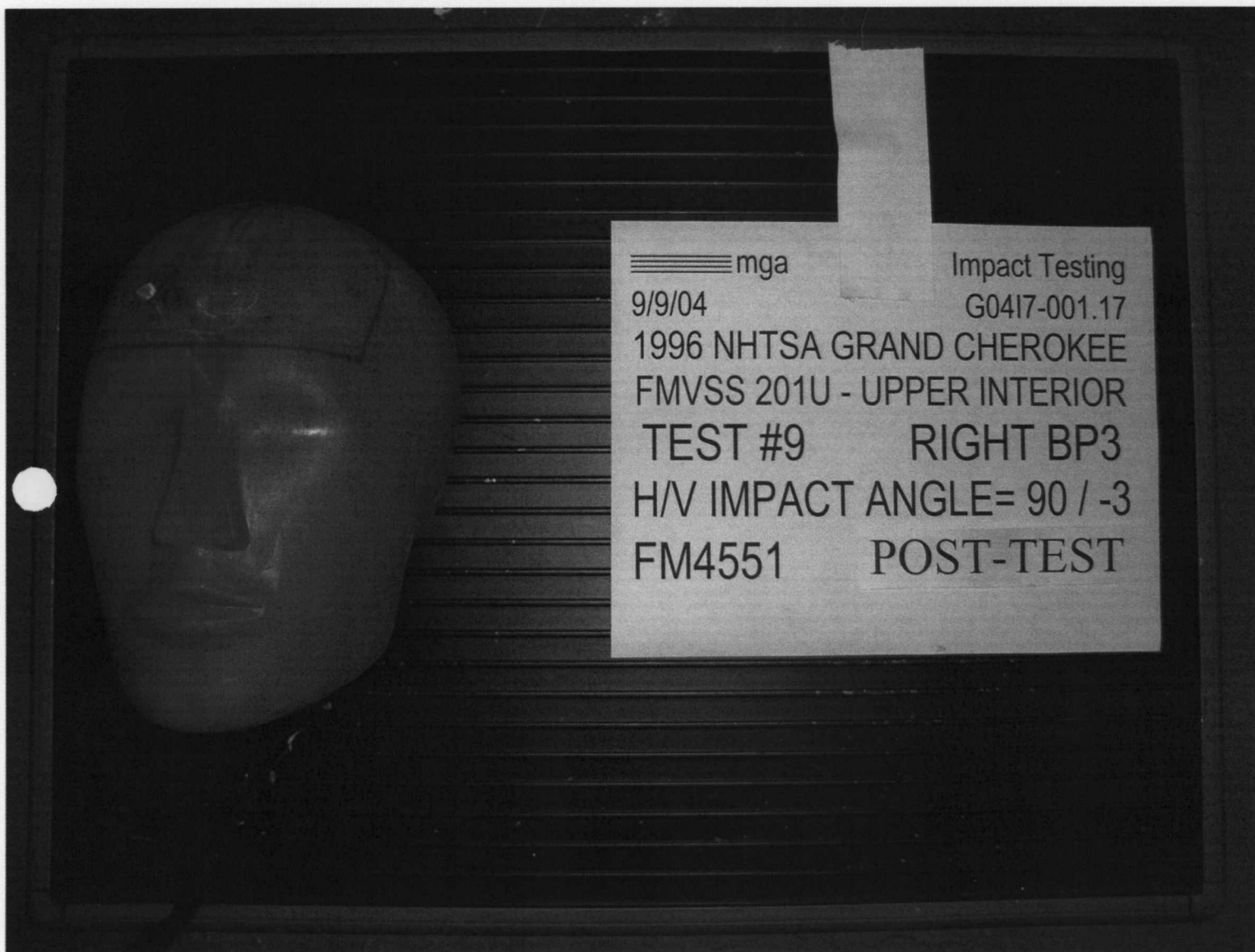
Test Date: 9/9/04

HIC(d) = 1348, HIC = 1566, Delta T = 3.2 msec









=====mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR

TEST #9 RIGHT BP3

H/V IMPACT ANGLE= 90 / -3

FM4551 POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.17 VEHICLE YR/MAKE/MODEL:GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number:# 9

Target (Vehicle Side): BP3 Right

Temperature:22C

MGA Test Reference No.:FM4551

Humidity:58%

Approach Horizontal Angles:90°

Time of Test:6:30 PM

Approach Vertical Angles:-3°

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
648	638	2.9	23.5	25	28 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	1.67
Y	6	J36193	101.4	1.54	1.54
Z	7	J36353	96.8	1.58	1.60

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

Cracked the pillar trim.

Recorded By: *Mike J. Paul* Approved By: *[Signature]* Date: 9-9-04

*Only necessary for NHTSA (Government) Compliance testing.

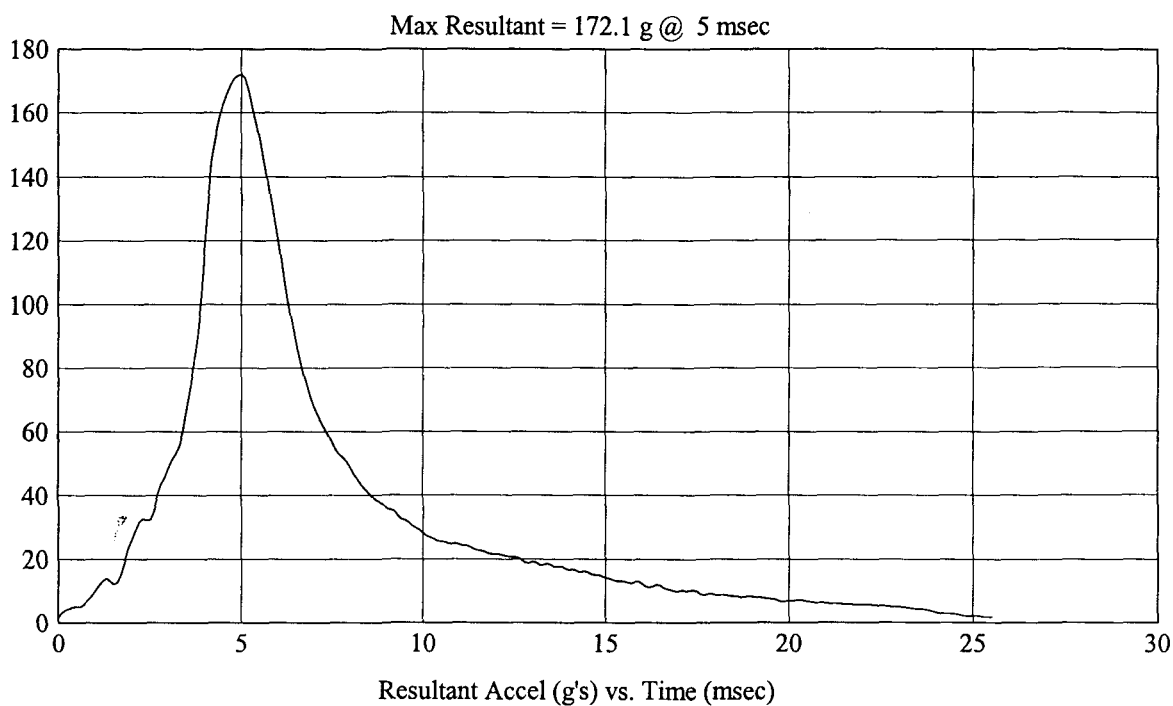
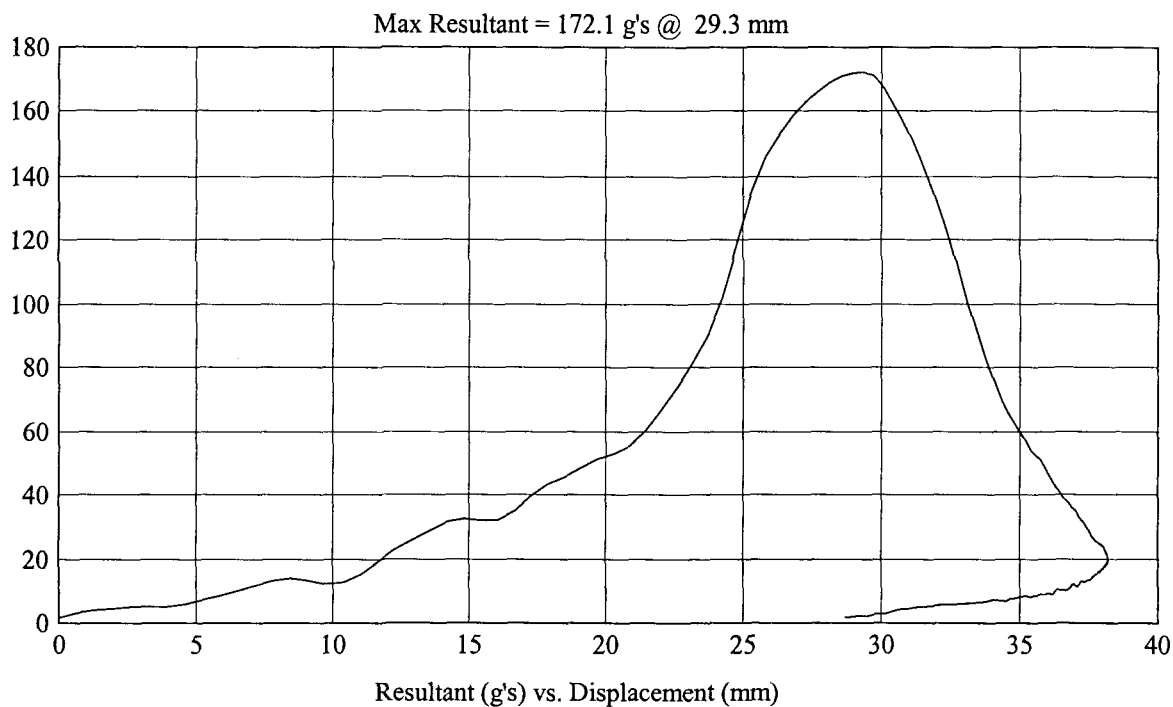
FMH
G04I7-001.17

Customer: NHTSA
Test # 9
FM4551
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: BP3
Vehicle Side: Right
Horz/Vert Angle: 90/-3

Test Date: 9/9/04
HIC(d) = 648, HIC = 638, Delta T = 2.9 msec



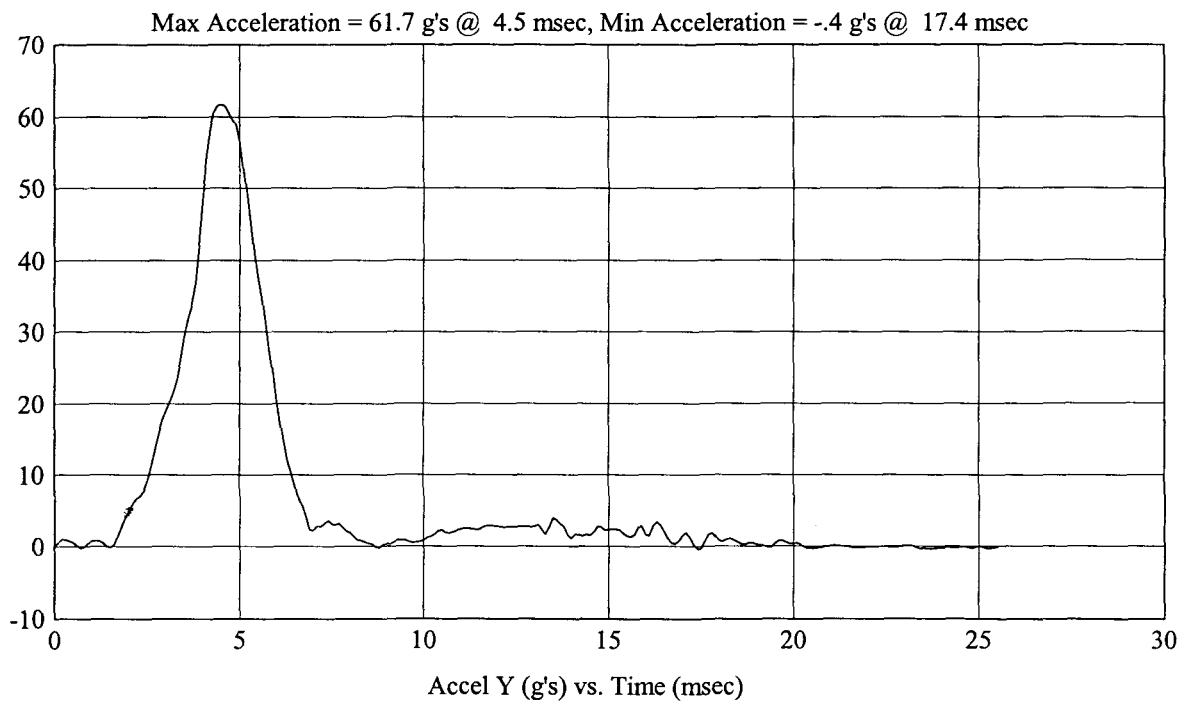
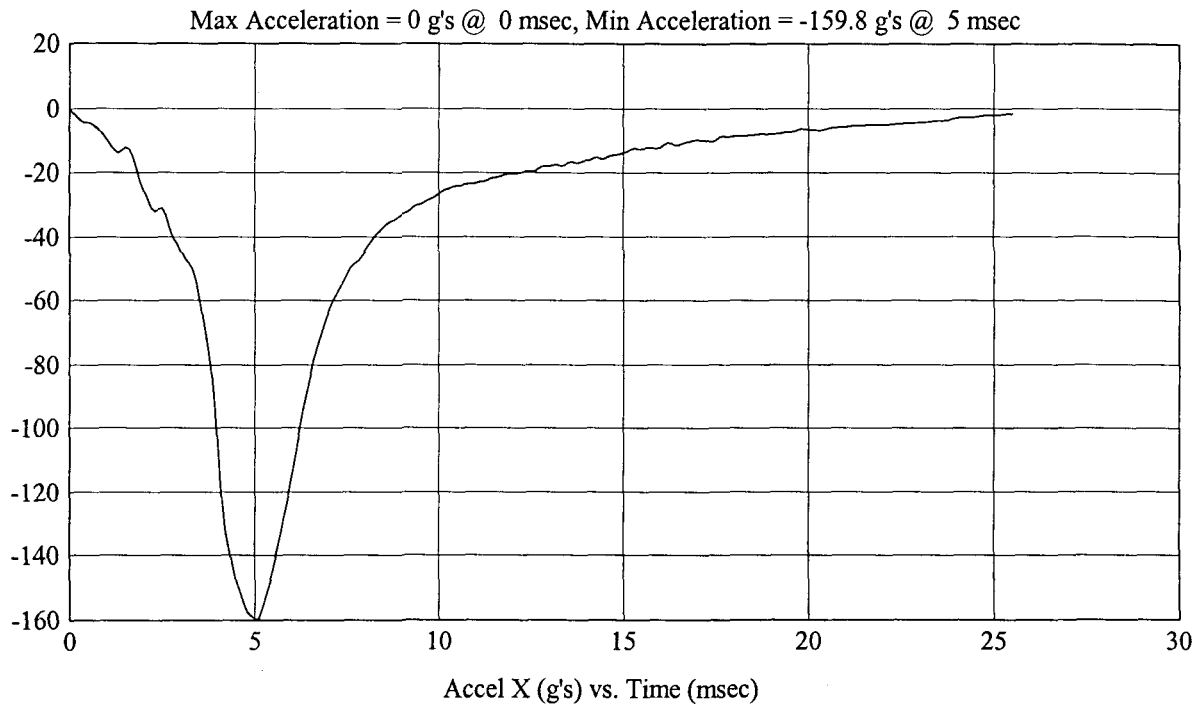
FMH
G04I7-001.17

Customer: NHTSA
Test # 9
FM4551
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04
HIC(d) = 648, HIC = 638, Delta T = 2.9 msec

Model Year: 1996
Target: BP3
Vehicle Side: Right
Horz/Vert Angle: 90/-3



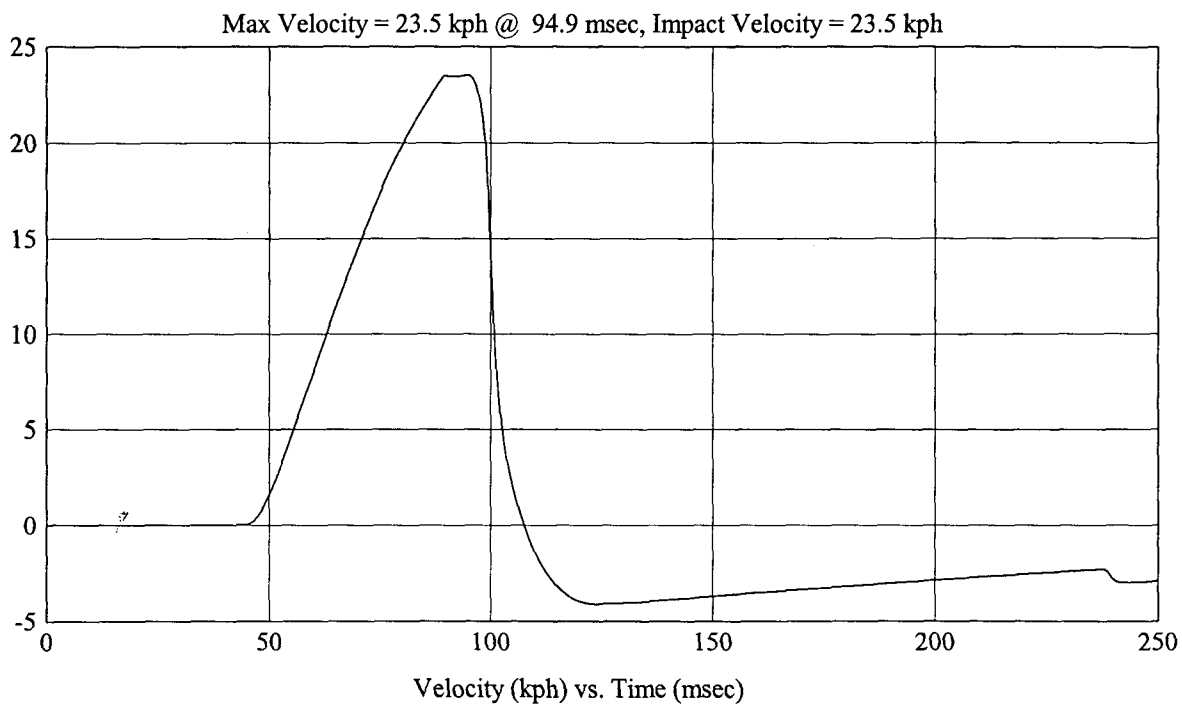
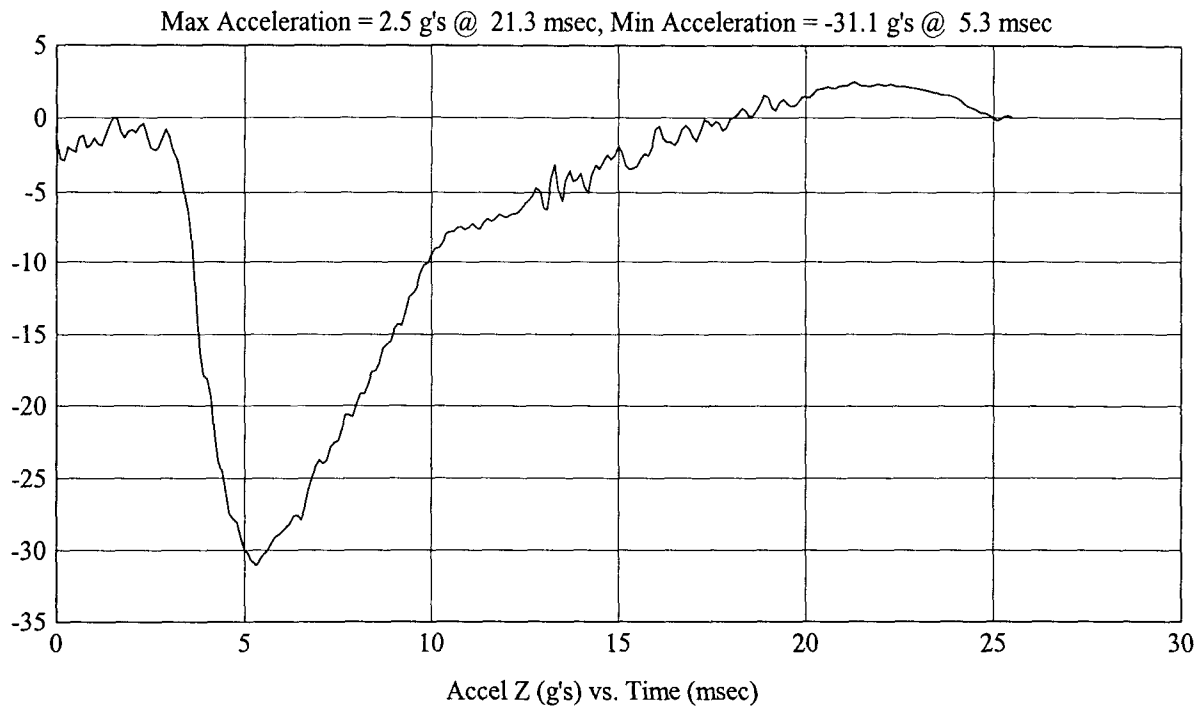
FMH
G04I7-001.17

Customer: NHTSA
Test # 9
FM4551
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04
HIC(d) = 648, HIC = 638, Delta T = 2.9 msec

Model Year: 1996
Target: BP3
Vehicle Side: Right
Horz/Vert Angle: 90/-3



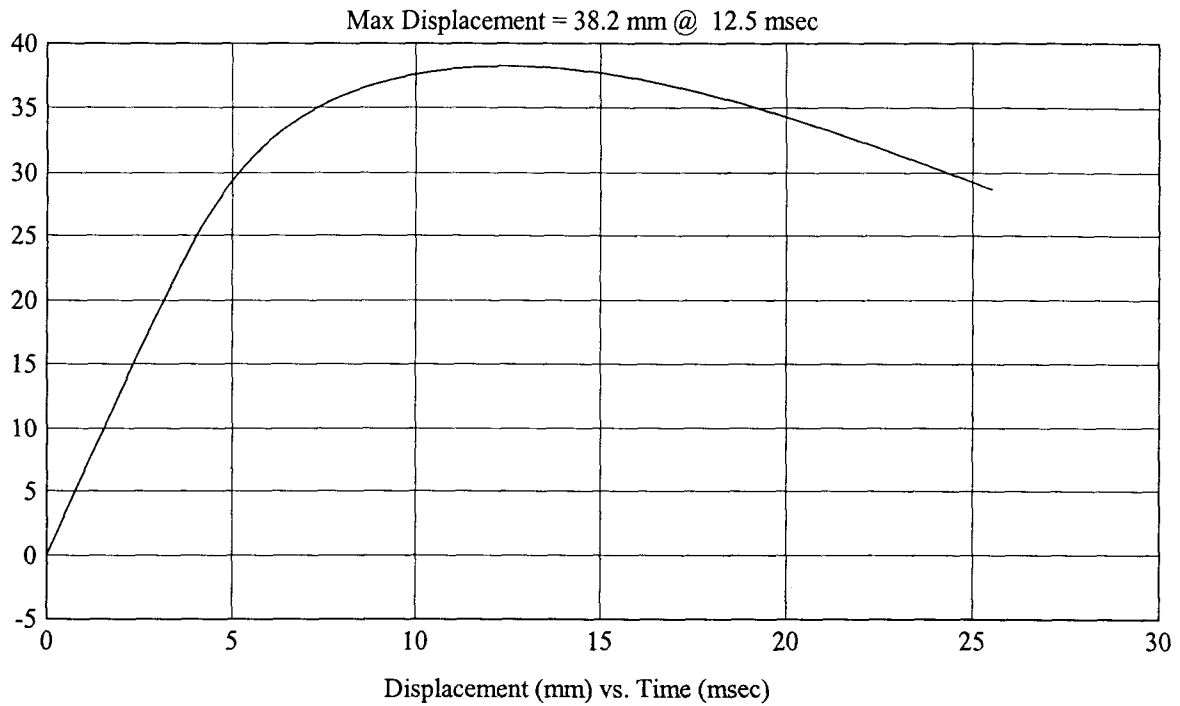
FMH
G04I7-001.17

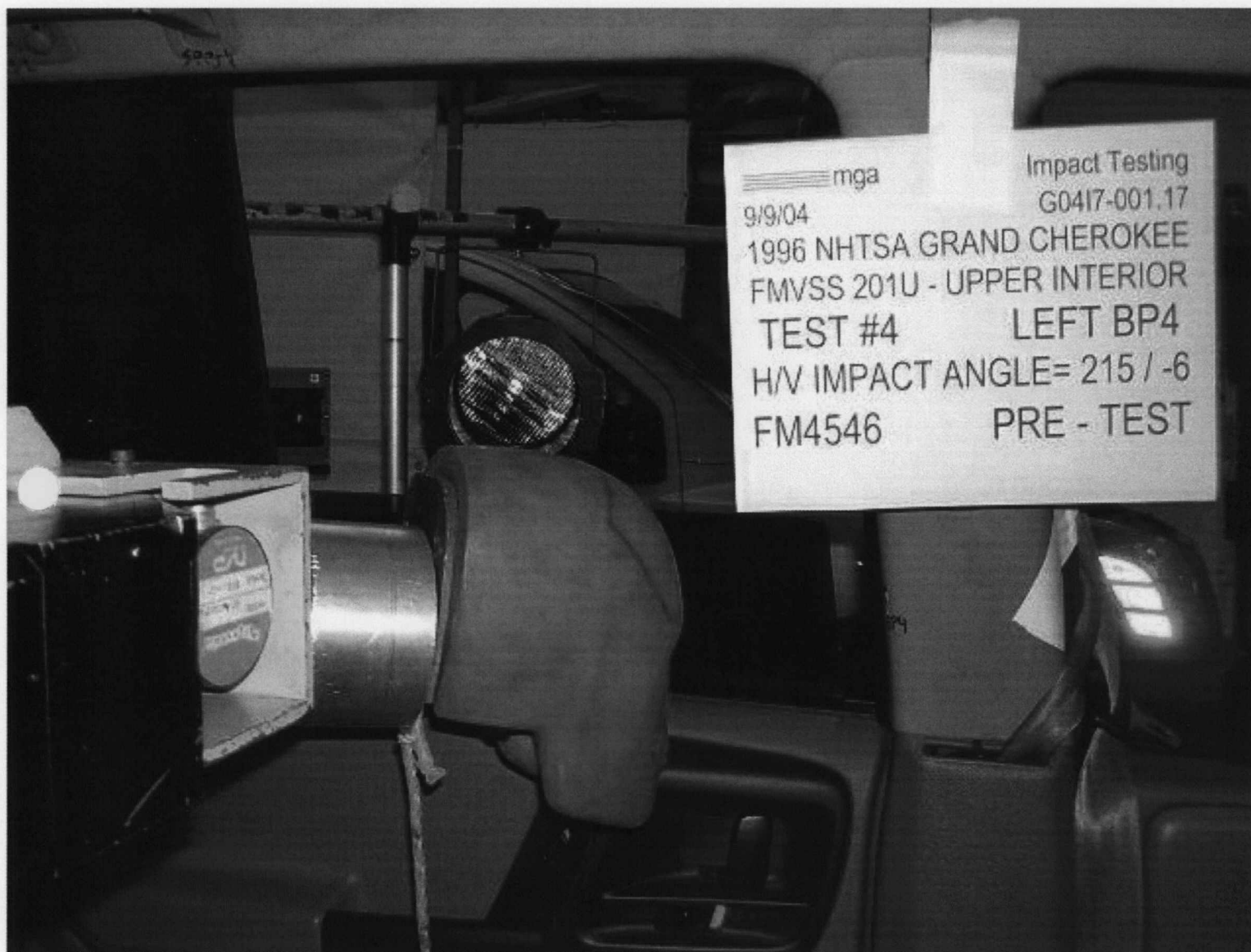
Customer: NHTSA
Test # 9
FM4551
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: BP3
Vehicle Side: Right
Horz/Vert Angle: 90/-3

Test Date: 9/9/04
HIC(d) = 648, HIC = 638, Delta T = 2.9 msec

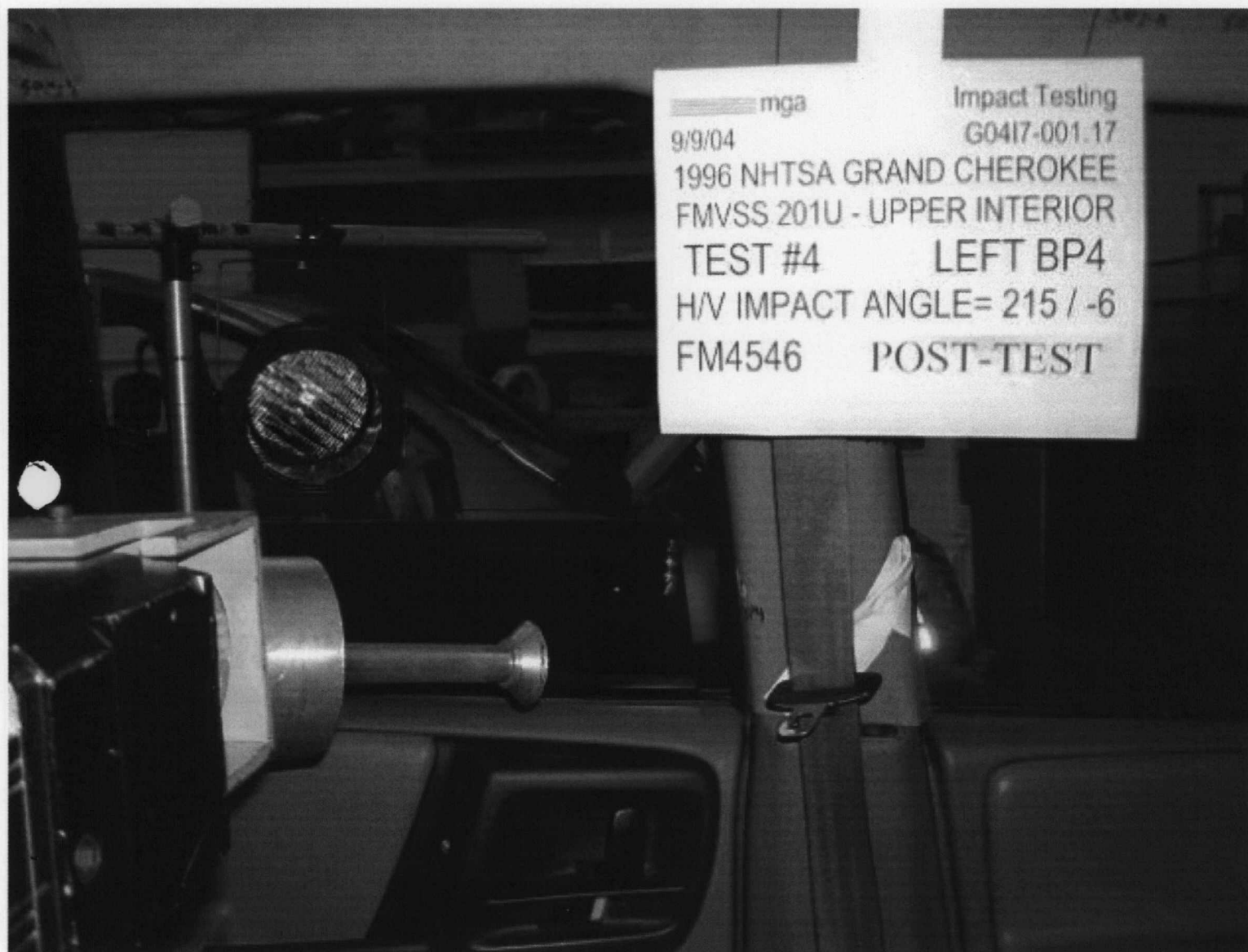




mga
9/9/04

Impact Testing
G0417-001.17

1996 NHTSA GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT BP4
H/V IMPACT ANGLE= 215 / -6
FM4546 PRE - TEST





mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #4

LEFT BP4

H/V IMPACT ANGLE= 215 / -6

FM4546

POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.17 VEHICLE YR/MAKE/MODEL: GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number: #4

Target (Vehicle Side): BP4 Left

Temperature: 22C

MGA Test Reference No.: FM4546

Humidity: 58%

Approach Horizontal Angles: 215°

Time of Test: 1:00 PM

Approach Vertical Angles: -6°

FMH Serial No: 035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
734	752	3.6	23.5	20	35 L

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

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

No visible damage

Recorded By: [Signature] Approved By*: [Signature] Date: 9-9-07

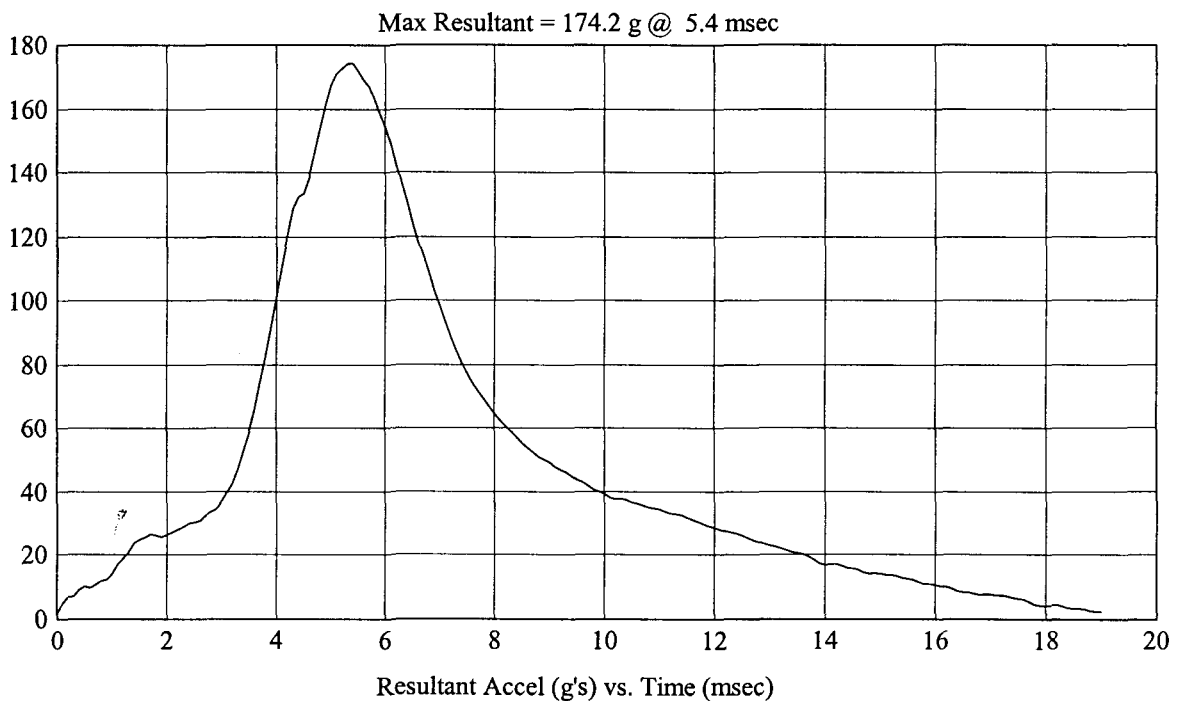
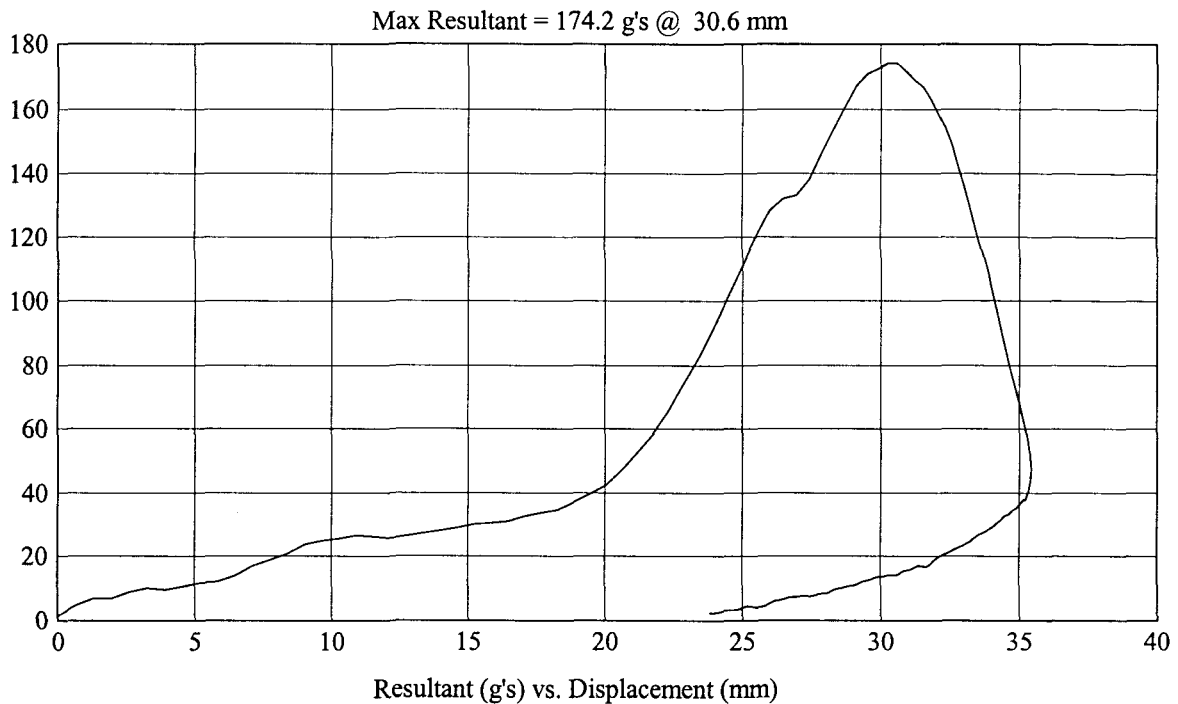
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

Customer: NHTSA
Test # 4
FM4546
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 734, HIC = 752, Delta T = 3.6 msec

Model Year: 1996
Target: BP4
Vehicle Side: Left
Horz/Vert Angle: 215/-6



FMH
G04I7-001.17

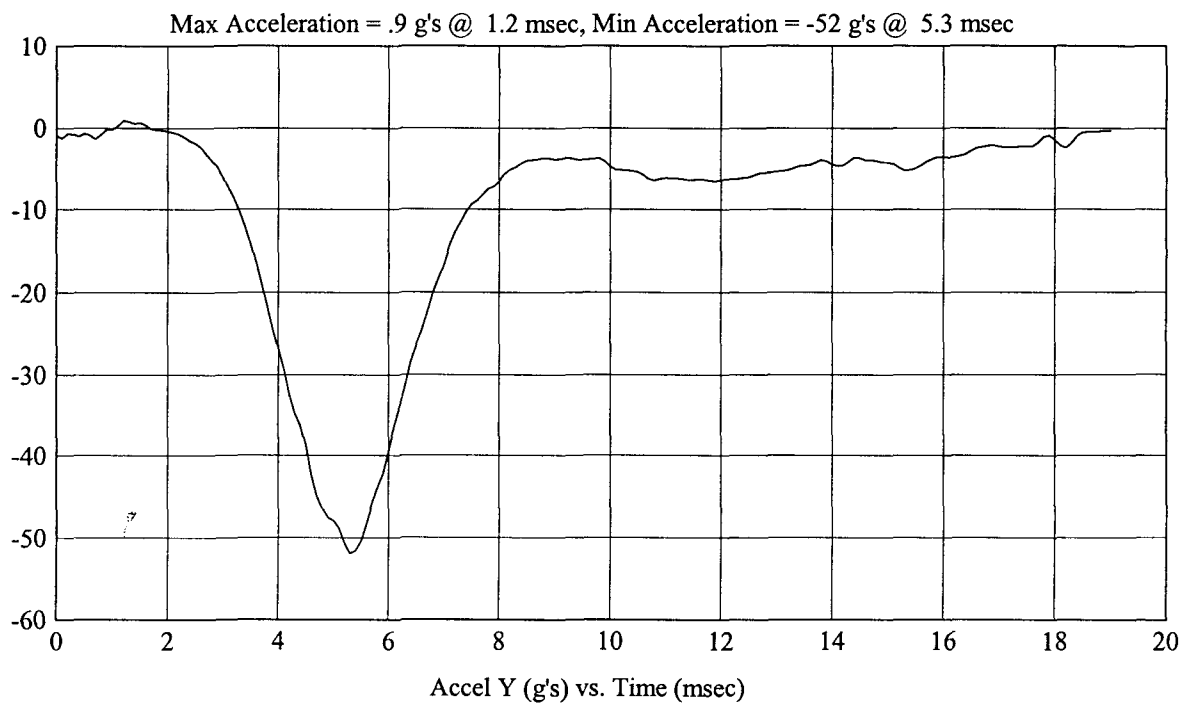
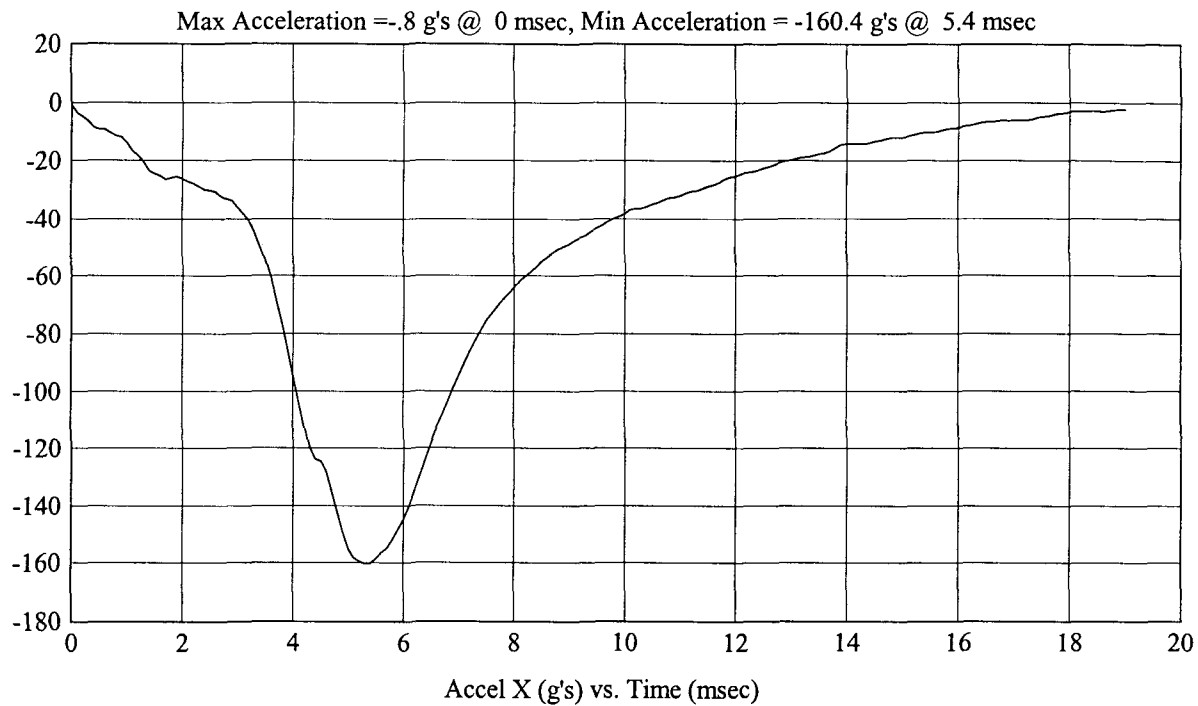
Customer: NHTSA
Test # 4
FM4546
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: BP4
Vehicle Side: Left
Horz/Vert Angle: 215/-6

Test Date: 9/9/04

HIC(d) = 734, HIC = 752, Delta T = 3.6 msec



FMH
G04I7-001.17

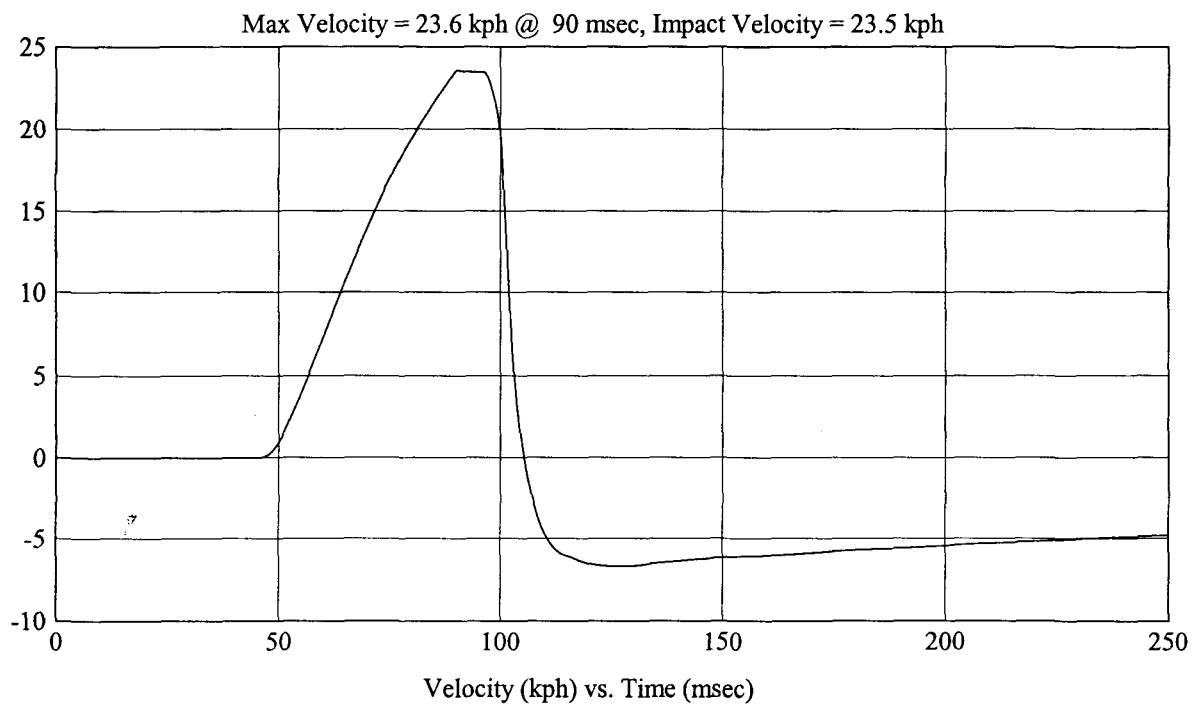
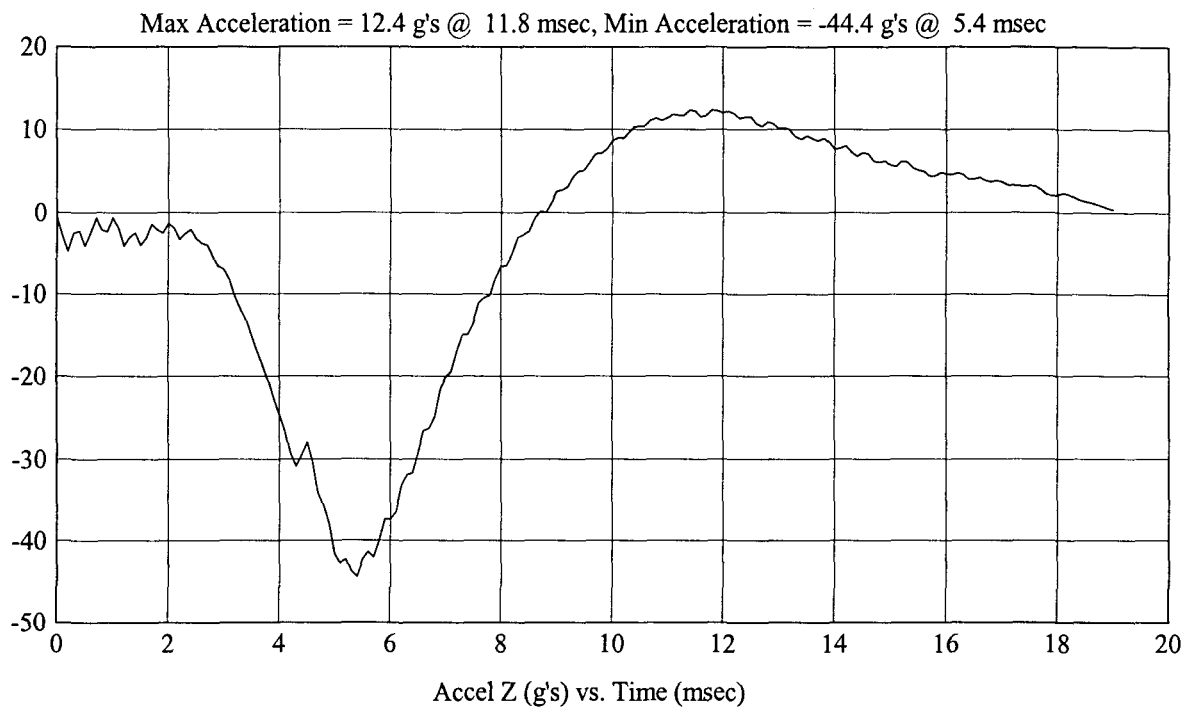
Customer: NHTSA
Test # 4
FM4546
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: BP4
Vehicle Side: Left
Horz/Vert Angle: 215/-6

Test Date: 9/9/04

HIC(d) = 734, HIC = 752, Delta T = 3.6 msec



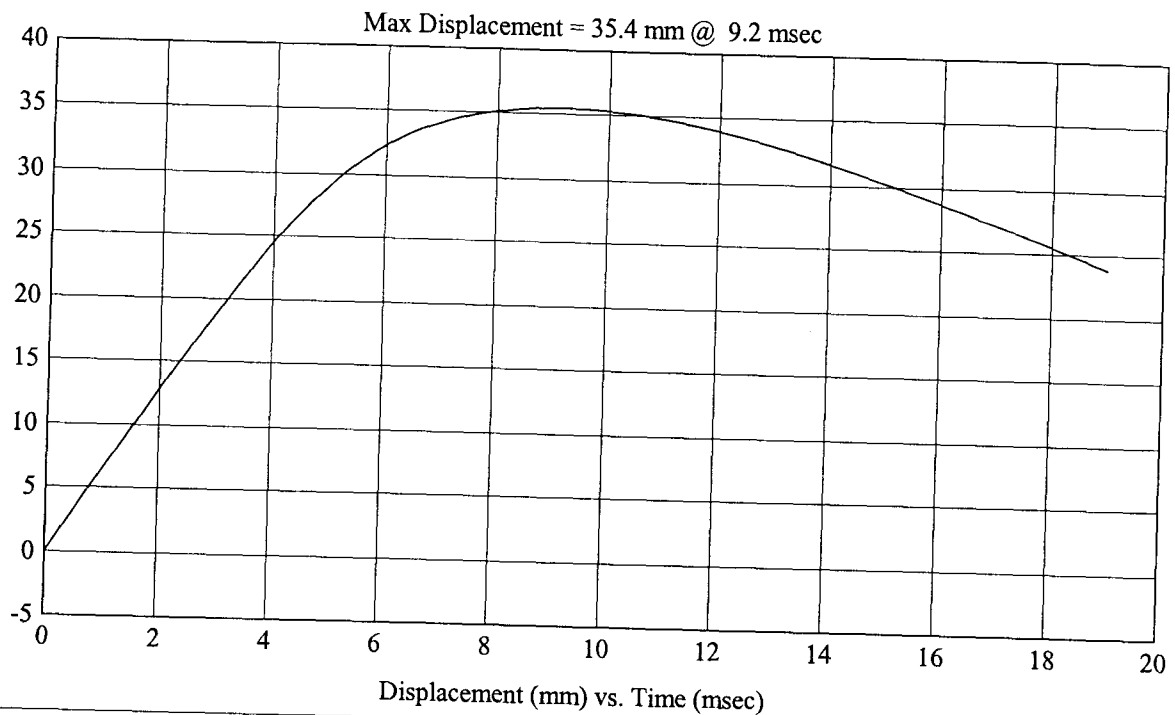
FMH
G04I7-001.17

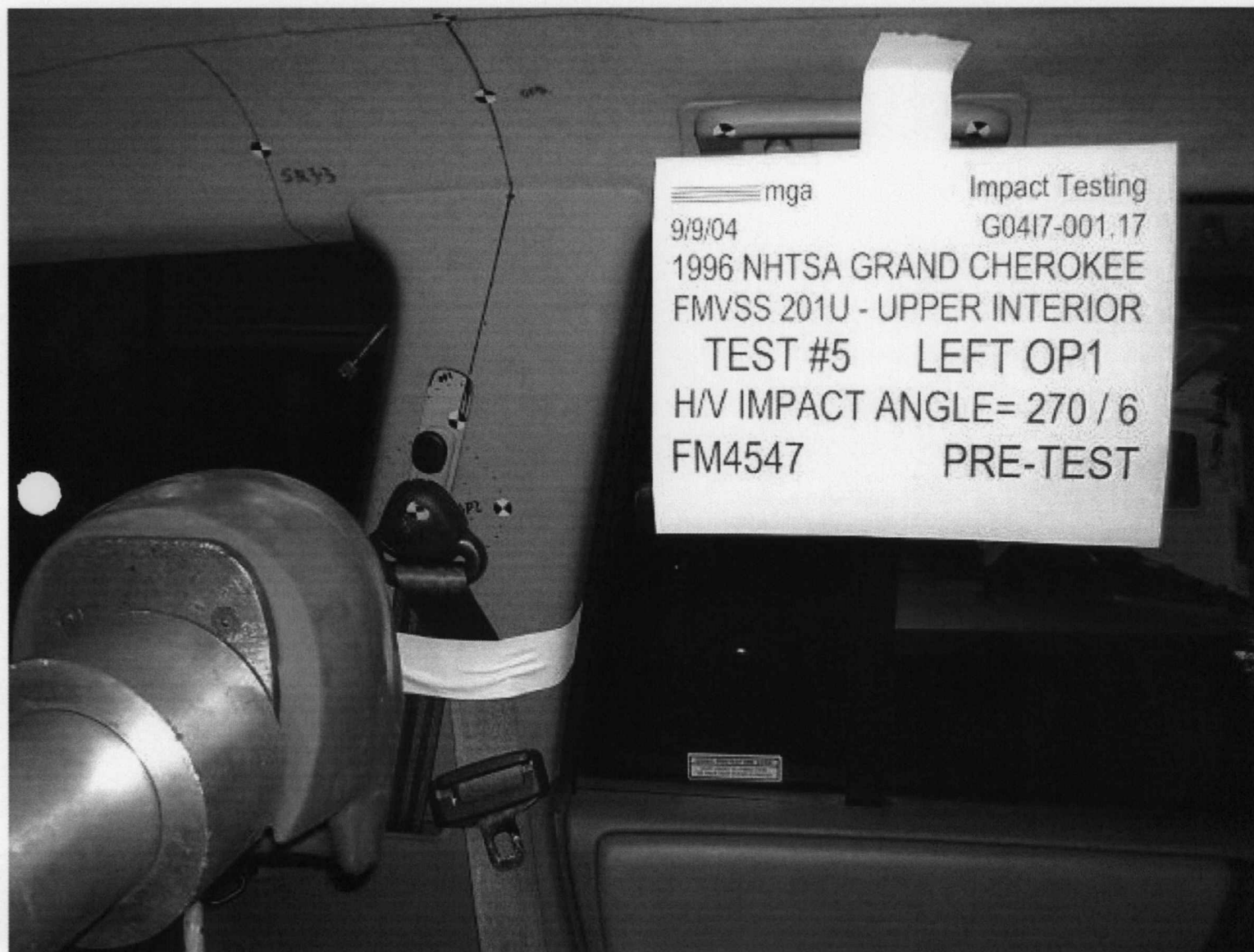
Customer: NHTSA
Test # 4
FM4546
Additional Desc: N/A

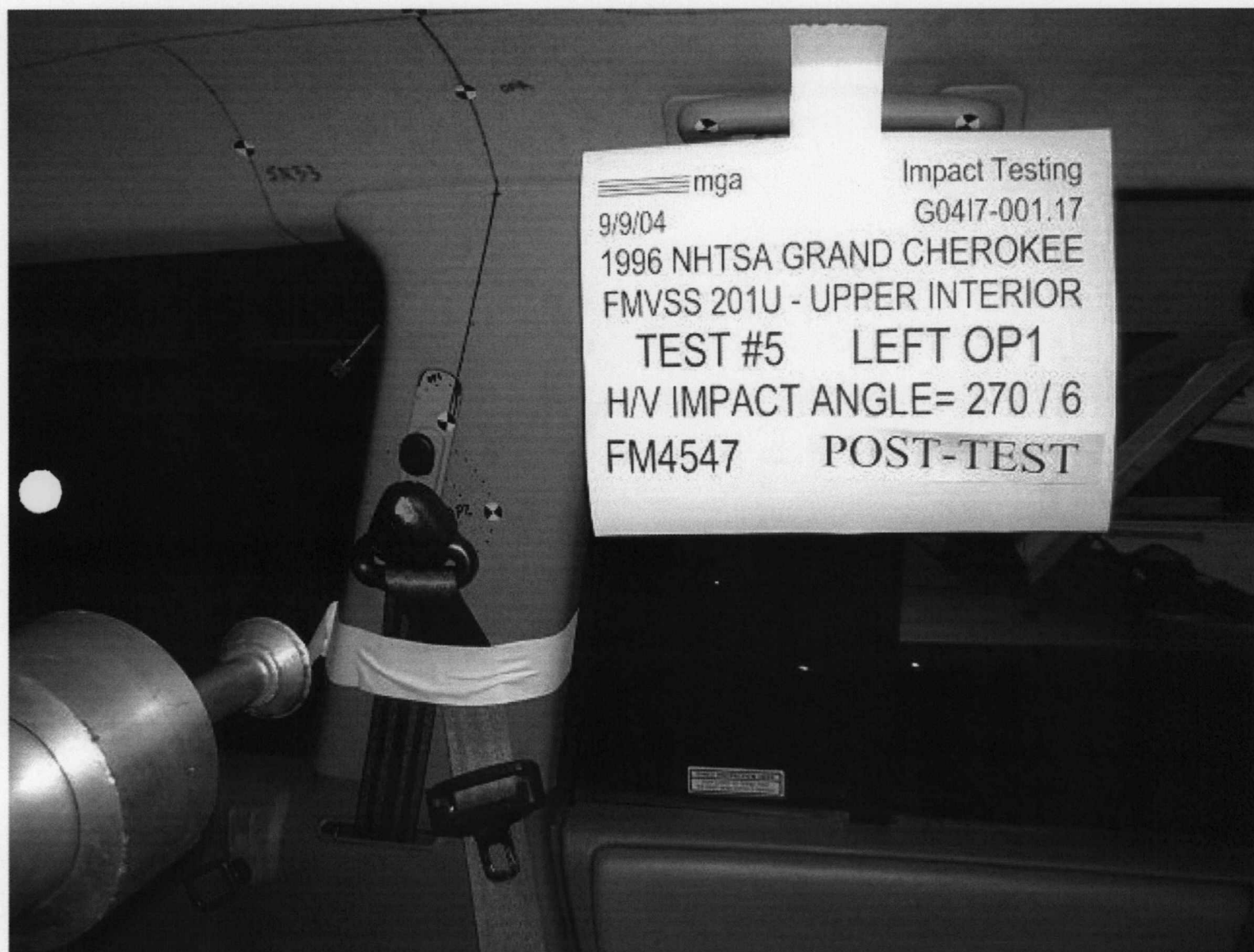
Vehicle Program : GRAND CHEROKEE

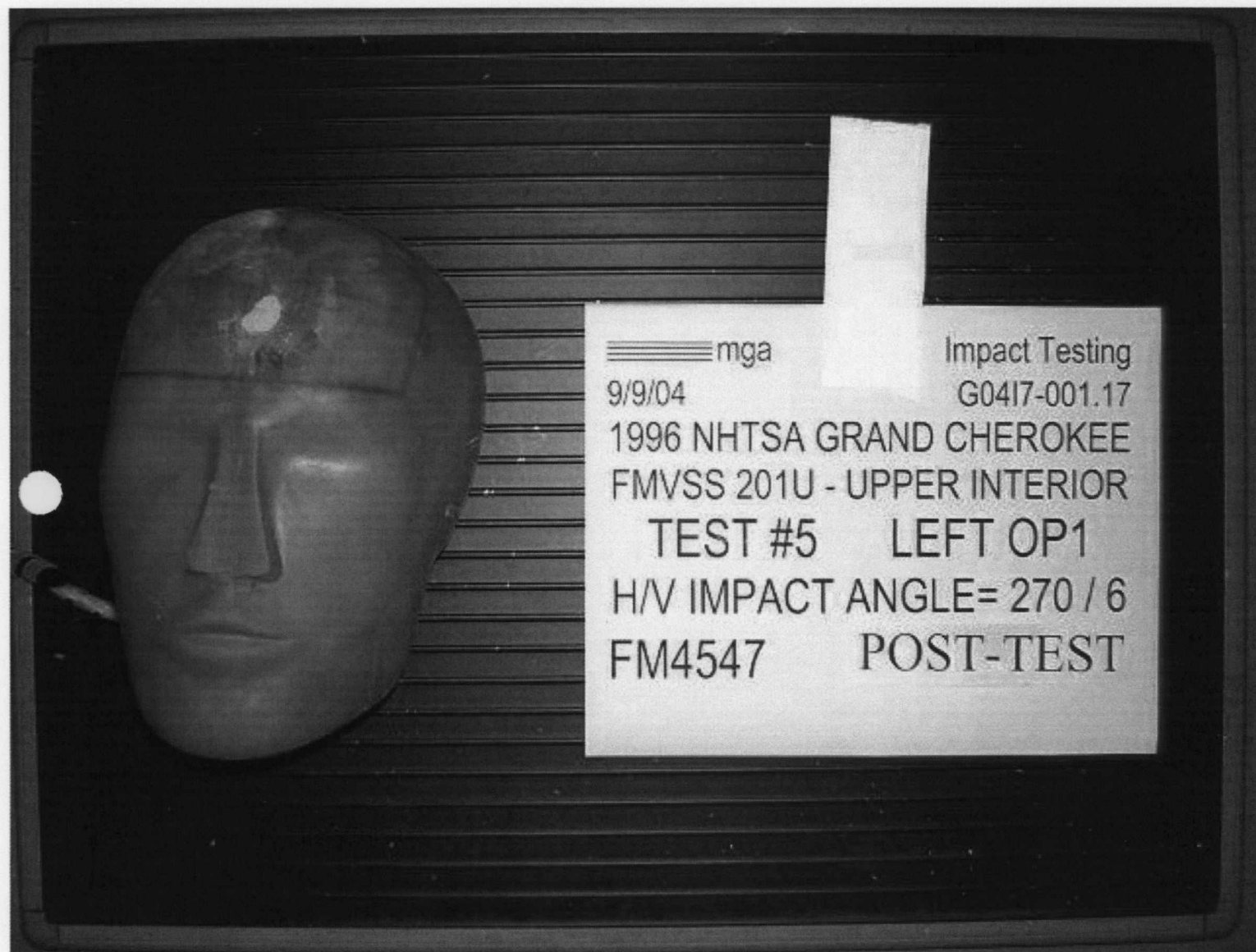
Model Year: 1996
Target: BP4
Vehicle Side: Left
Horz/Vert Angle: 215/-6

Test Date: 9/9/04
HIC(d) = 734, HIC = 752, Delta T = 3.6 msec









==== mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #5 LEFT OP1

H/V IMPACT ANGLE= 270 / 6

FM4547 POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.17 VEHICLE YR/MAKE/MODEL: GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number: #5

Target (Vehicle Side): OP1 Left

Temperature: 22C

MGA Test Reference No.: FM4547

Humidity: 57%

Approach Horizontal Angles: 270°

Time of Test: 1:30 PM

Approach Vertical Angles: 6°

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
798	837	4.8	24.0	25	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	1.54	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: m j n Approved By*: Helen A. Kalish Date: 9-9-01

*Only necessary for NHTSA (Government) Compliance testing.

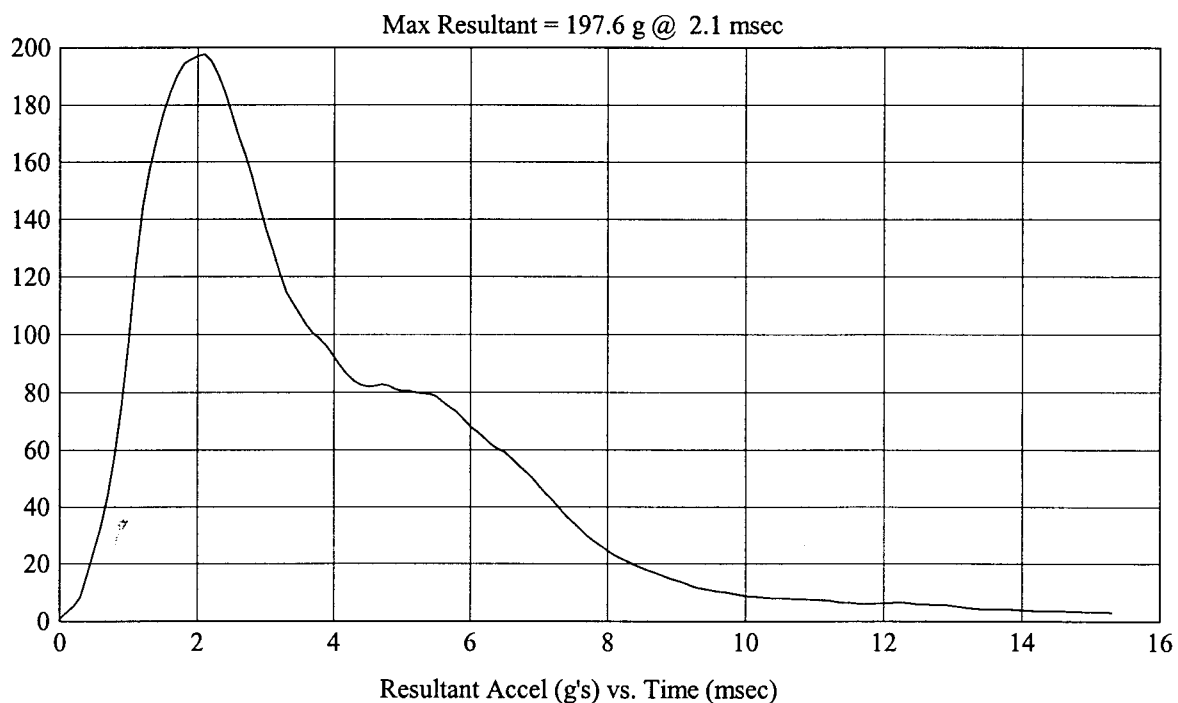
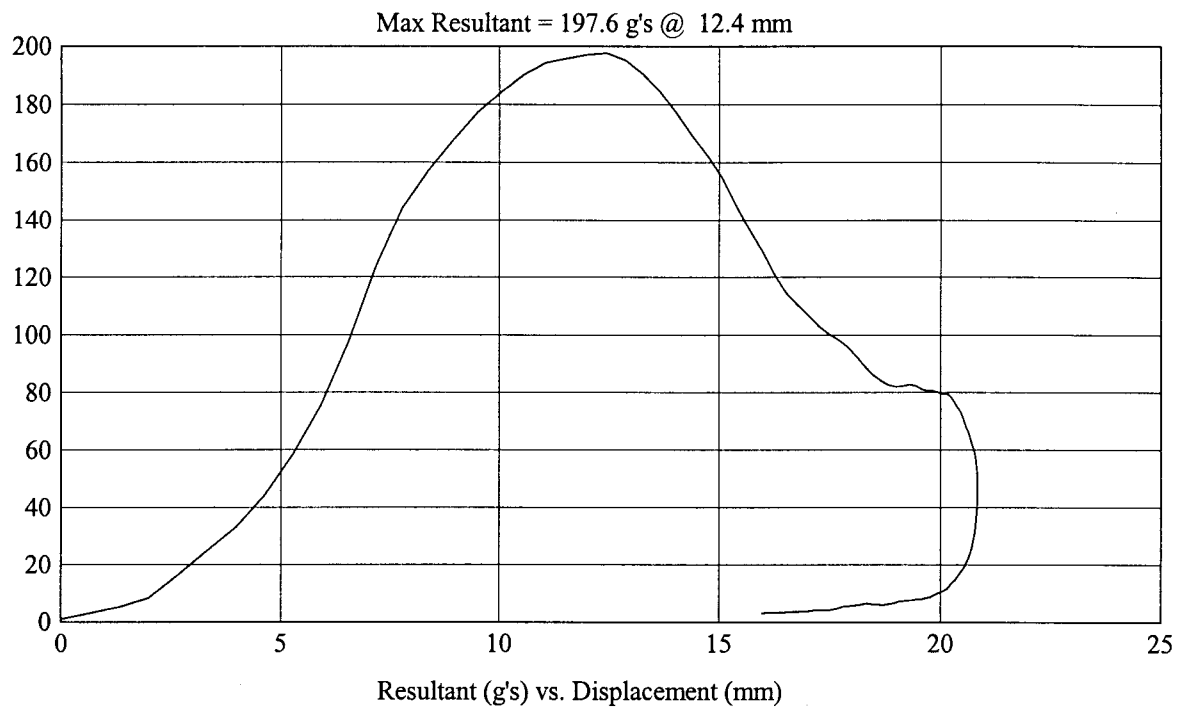
FMH
G04I7-001.17

Customer: NHTSA
Test # 5
FM4547
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: OP1
Vehicle Side: Left
Horz/Vert Angle: 270/6

Test Date: 9/9/04
HIC(d) = 798, HIC = 837, Delta T = 4.8 msec



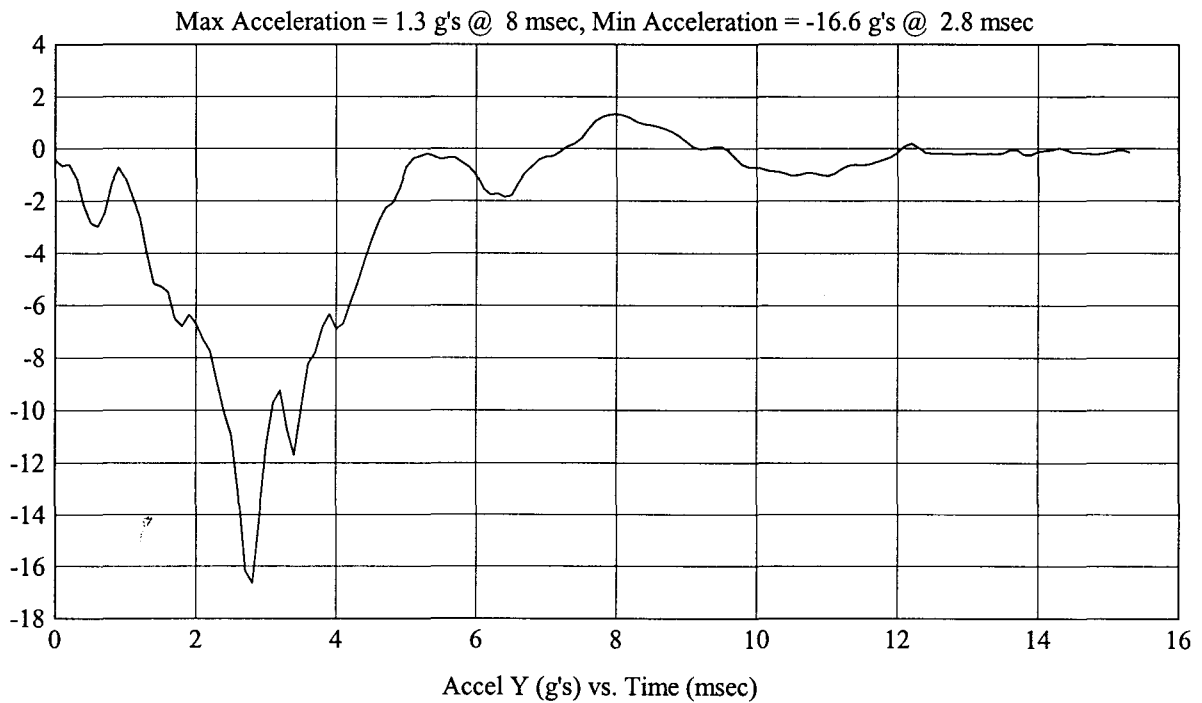
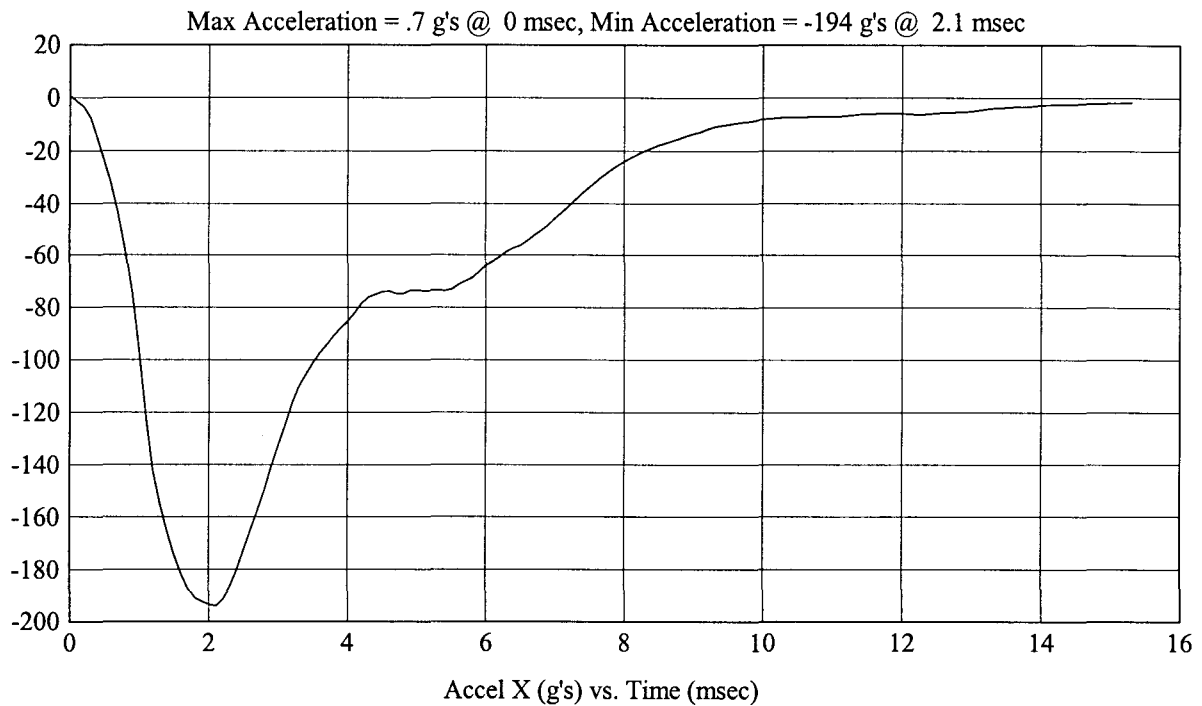
FMH
G04I7-001.17

Customer: NHTSA
Test # 5
FM4547
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04
HIC(d) = 798, HIC = 837, Delta T = 4.8 msec

Model Year: 1996
Target: OP1
Vehicle Side: Left
Horz/Vert Angle: 270/6

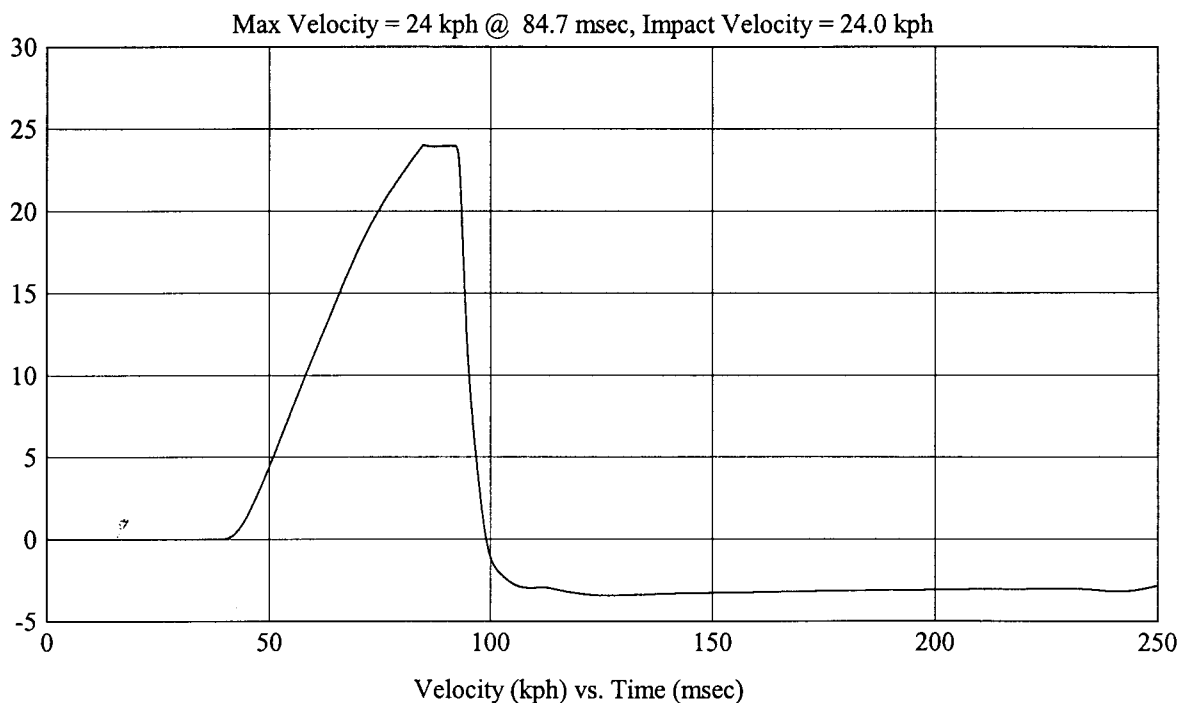
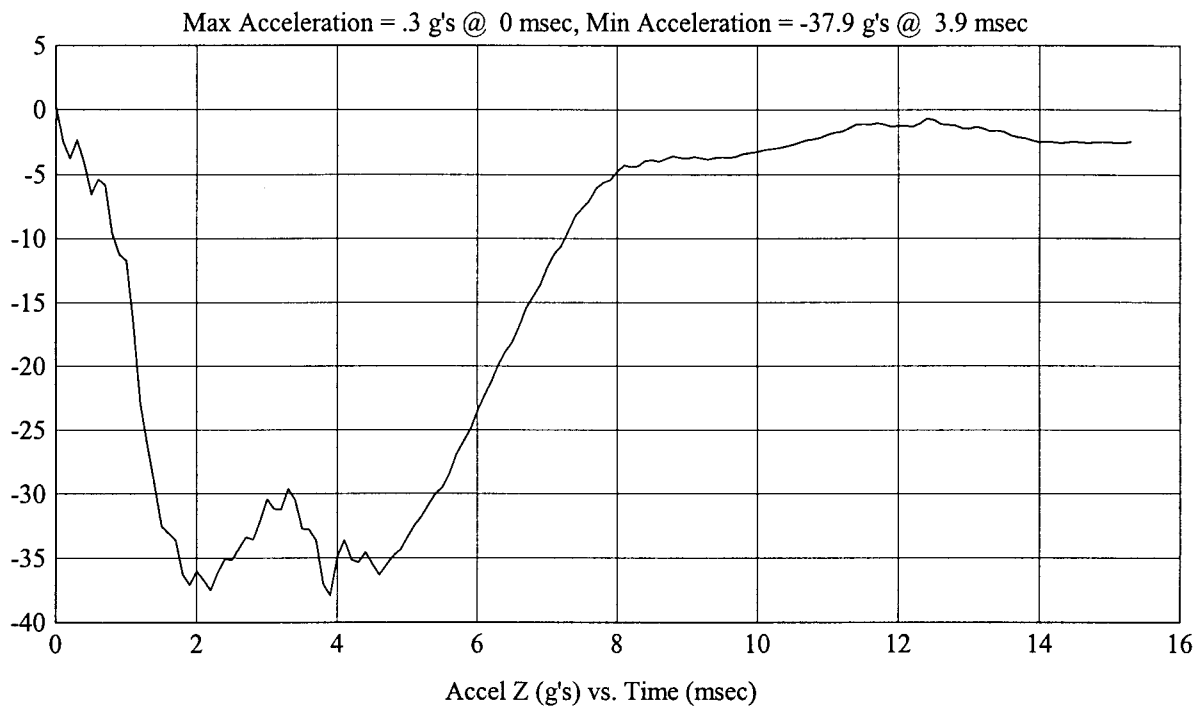


FMH
G04I7-001.17

Customer: NHTSA
Test # 5
FM4547
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 798, HIC = 837, Delta T = 4.8 msec

Model Year: 1996
Target: OP1
Vehicle Side: Left
Horz/Vert Angle: 270/6

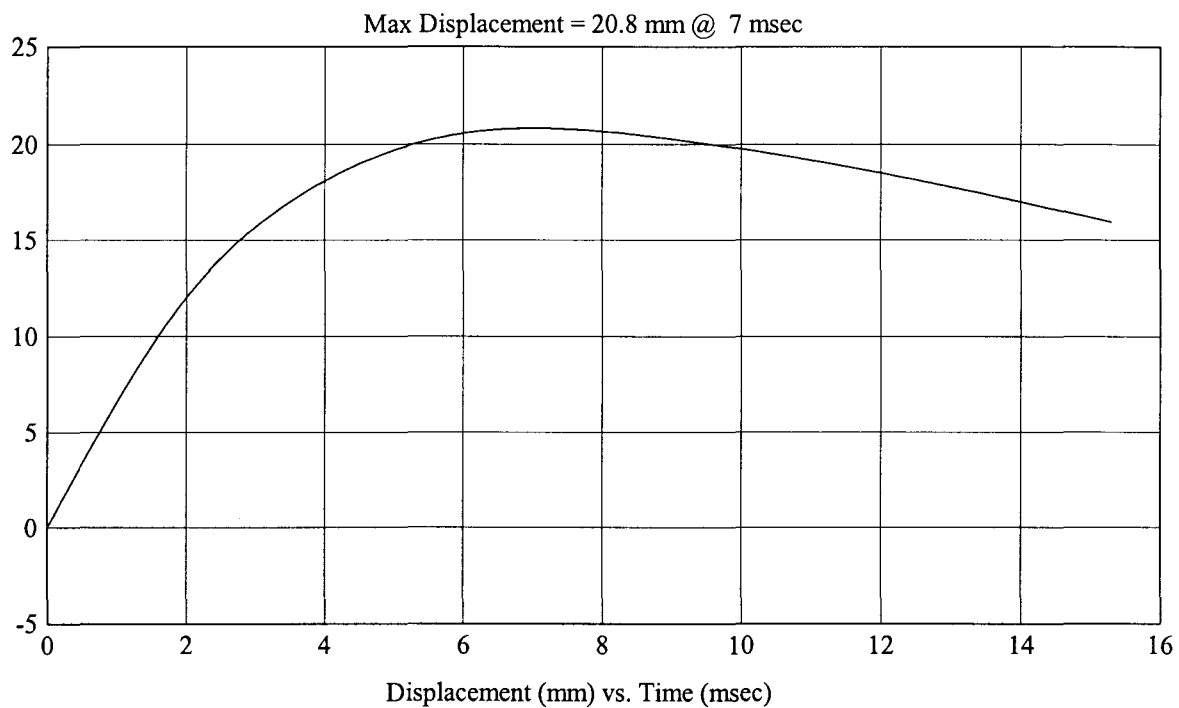


FMH
G04I7-001.17

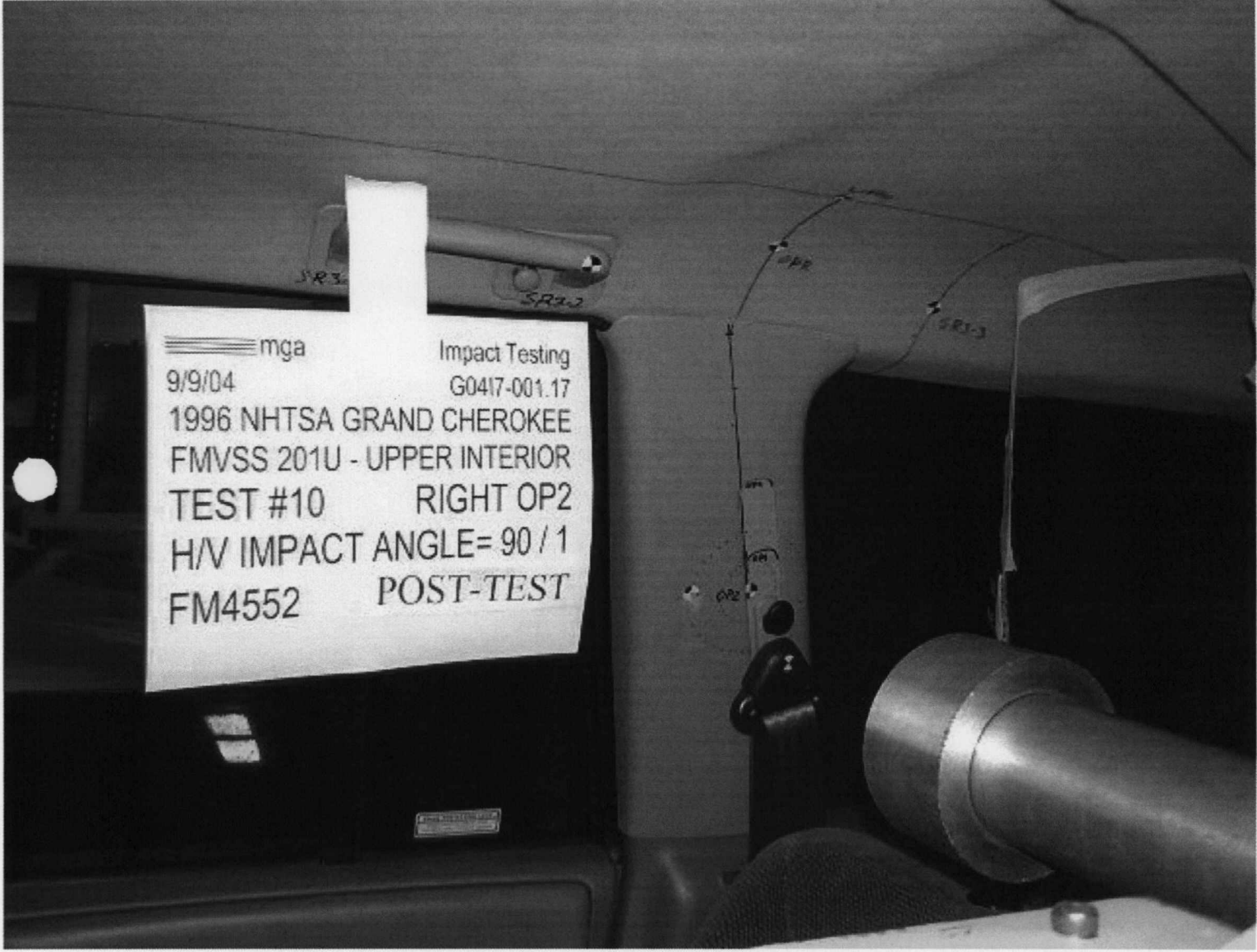
Customer: NHTSA
Test # 5
FM4547
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 798, HIC = 837, Delta T = 4.8 msec

Model Year: 1996
Target: OP1
Vehicle Side: Left
Horz/Vert Angle: 270/6







mga Impact Testing
9/9/04 G0417-001.17
1996 NHTSA GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT OP2
H/V IMPACT ANGLE= 90 / 1
FM4552 POST-TEST



===== mga

Impact Testing

9/9/04

G0417-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #10 RIGHT OP2

H/V IMPACT ANGLE= 90 / 1

FM4552 POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.17 VEHICLE YR/MAKE/MODEL: GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number: #10

Target (Vehicle Side): OP2 Right

Temperature: 22C

MGA Test Reference No.: FM4552

Humidity: 58%

Approach Horizontal Angles: 90°

Time of Test: 7:00 PM

Approach Vertical Angles: 1°

FMH Serial No: 035

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
816	861	3.2	23.7	23	6 L

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35924	-92.4	1.67	1.67
Y	6	J35919	93.8	1.54	1.54
Z	7	J21969	88.5	1.58	1.58

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

No visible damage

Recorded By: [Signature] Approved By: [Signature] Date: 9-9-04

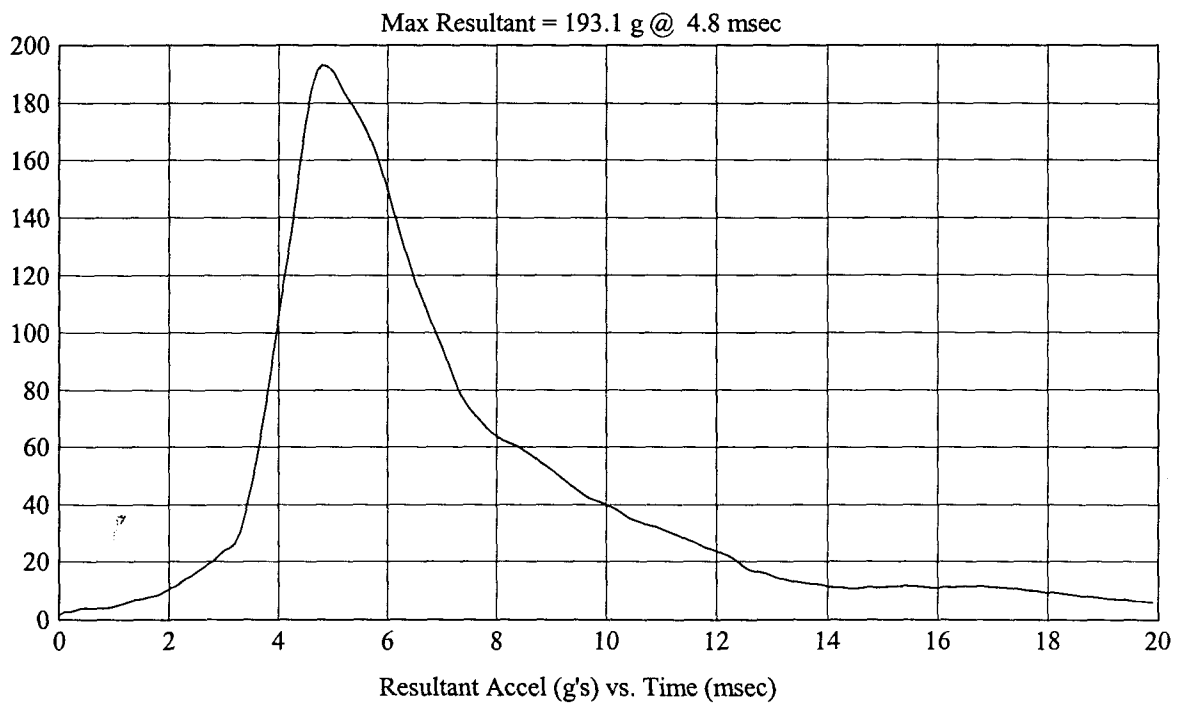
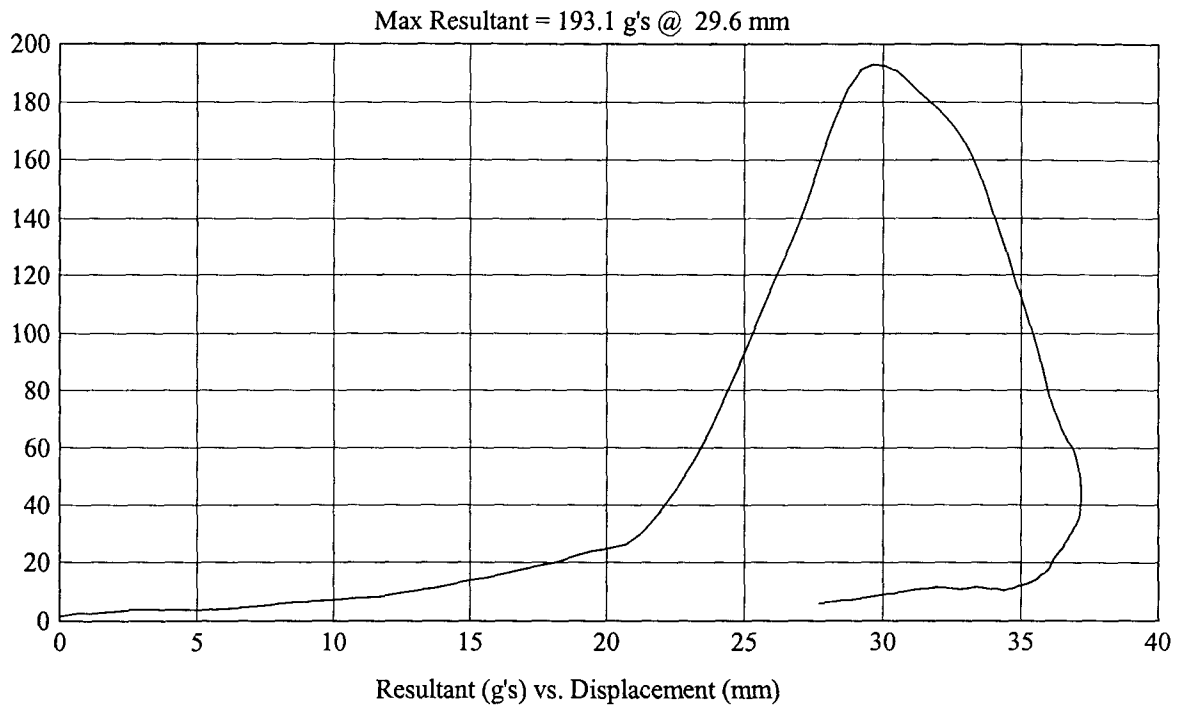
*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

Customer: NHTSA
Test # 10
FM4552
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 816, HIC = 861, Delta T = 3.2 msec

Model Year: 1996
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/1



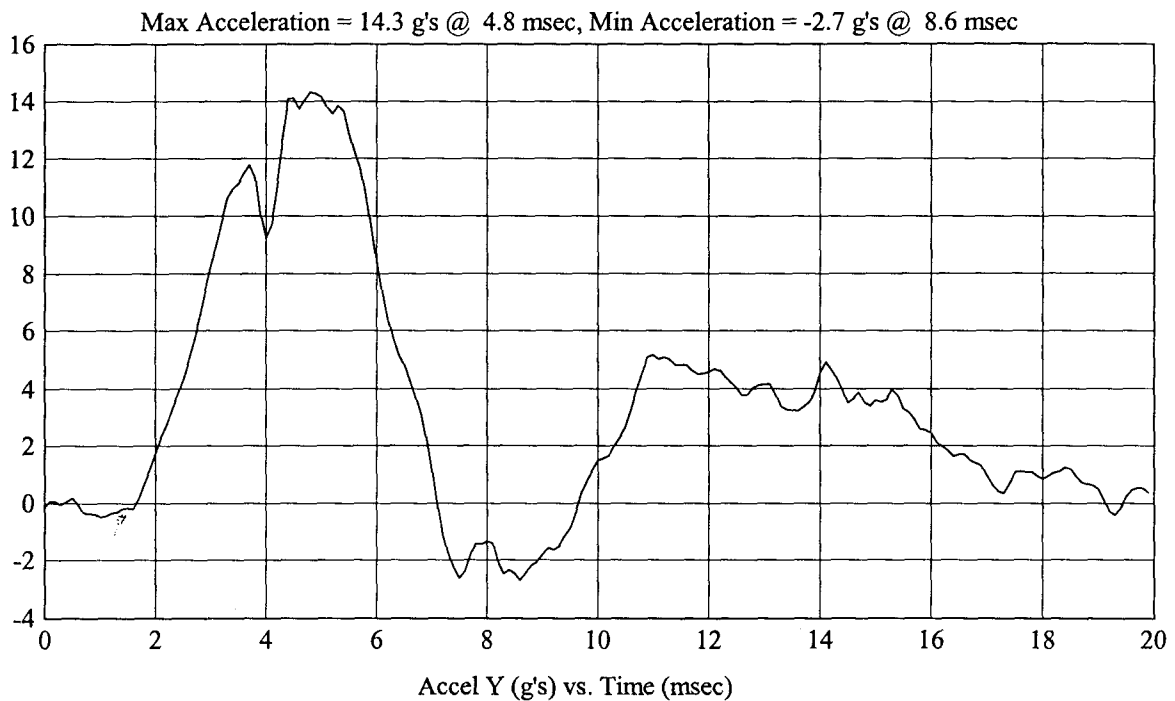
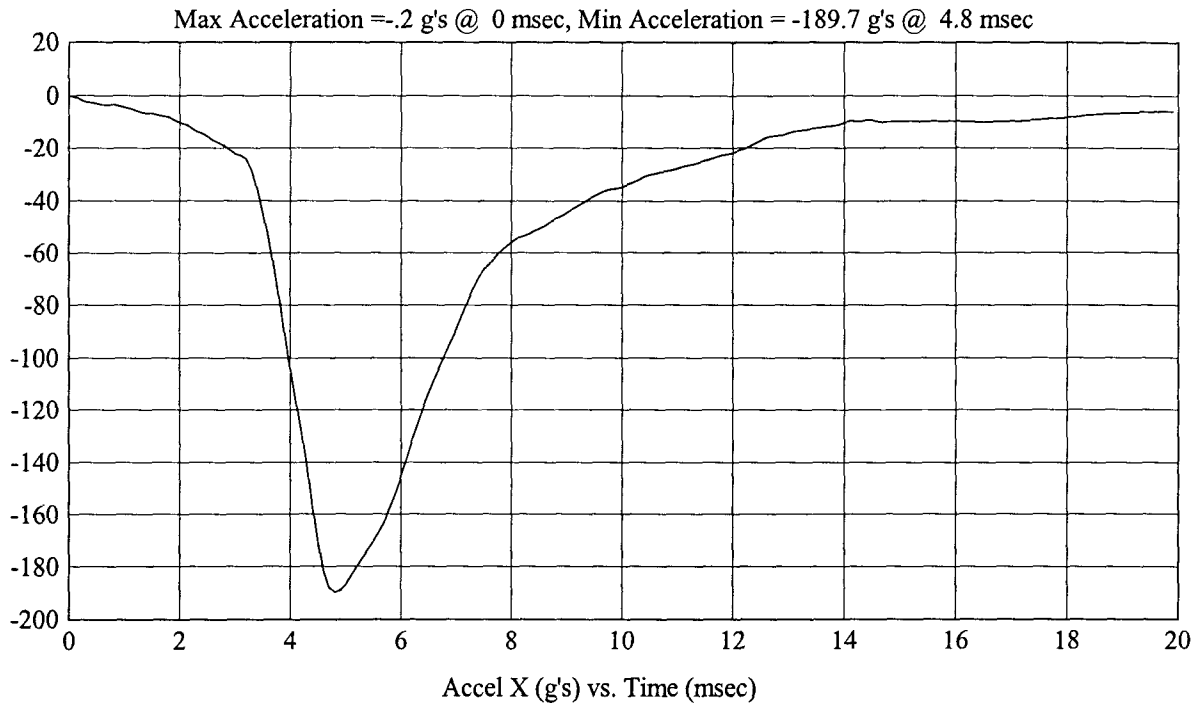
FMH
G04I7-001.17

Customer: NHTSA
Test # 10
FM4552
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Test Date: 9/9/04
HIC(d) = 816, HIC = 861, Delta T = 3.2 msec

Model Year: 1996
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/1

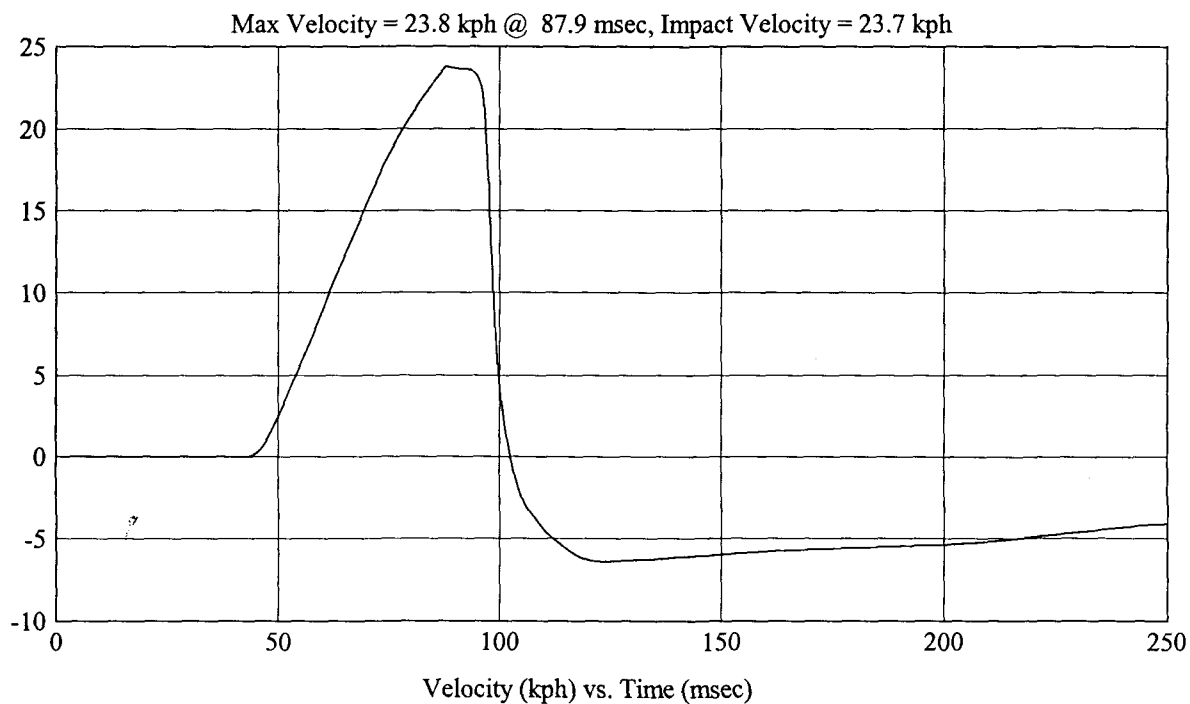
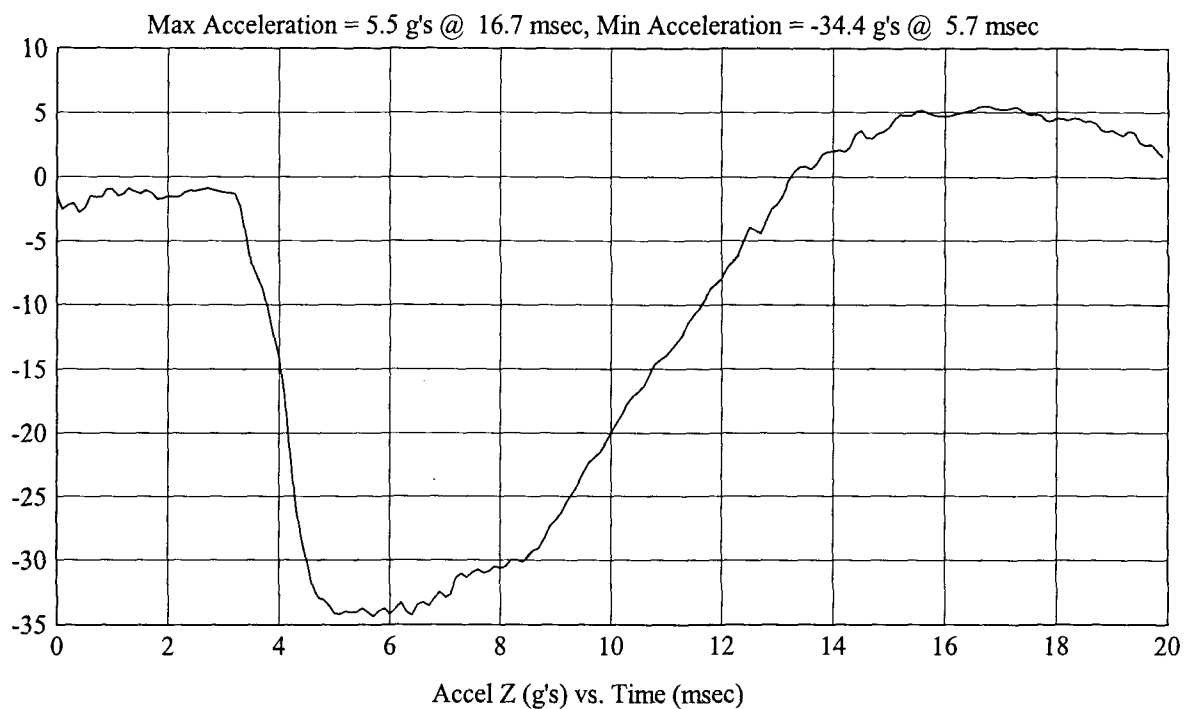


FMH
G04I7-001.17

Customer: NHTSA
Test # 10
FM4552
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 816, HIC = 861, Delta T = 3.2 msec

Model Year: 1996
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/1

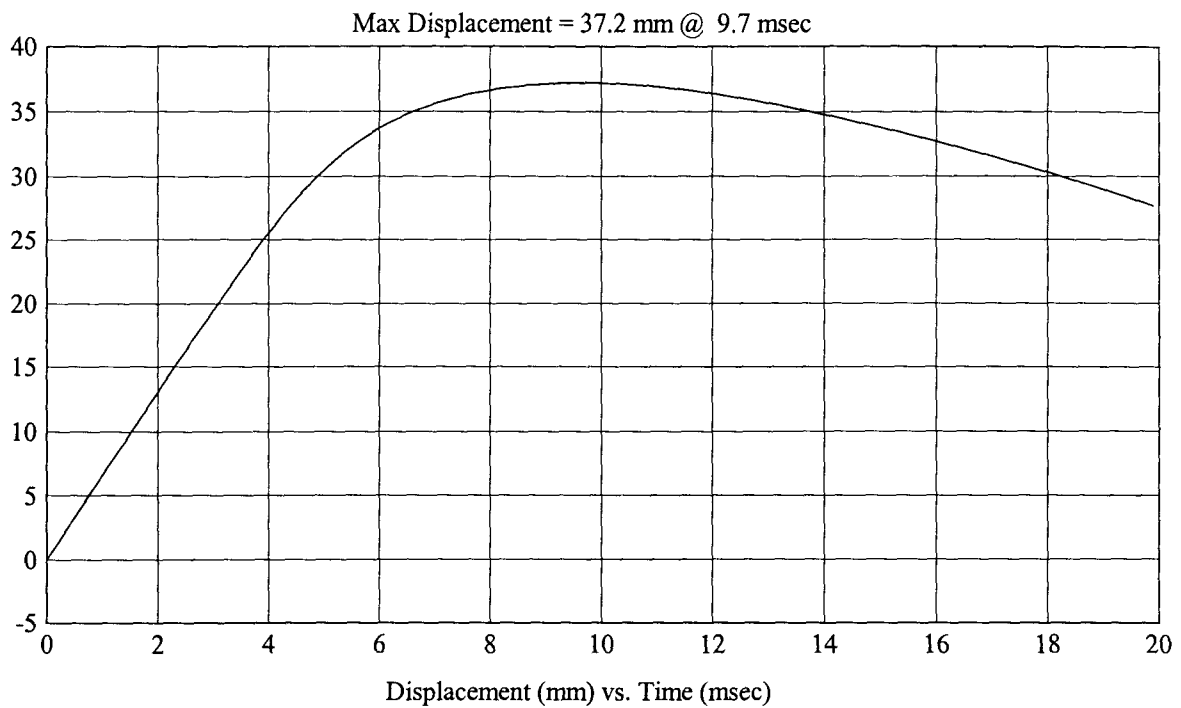


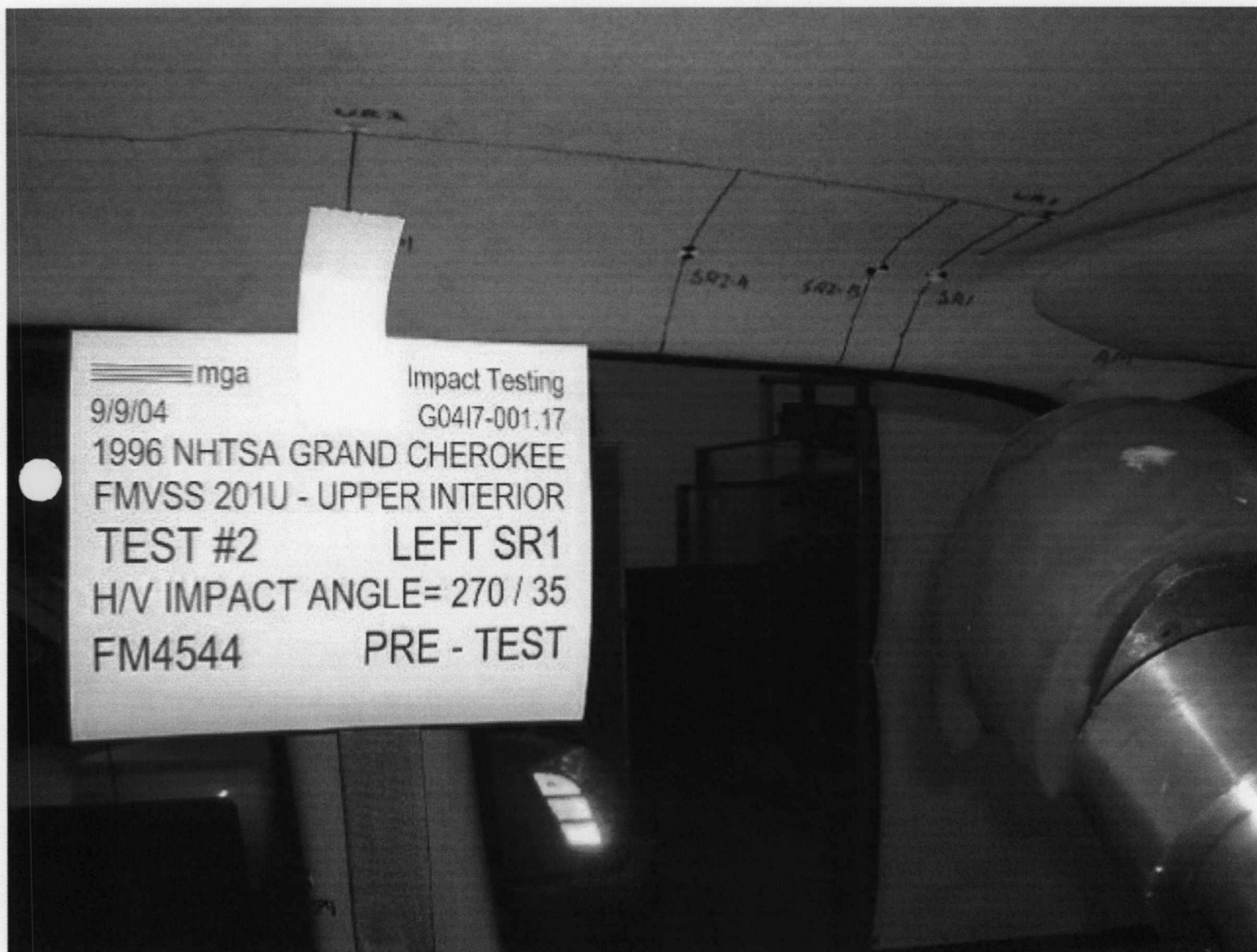
FMH
G04I7-001.17

Customer: NHTSA
Test # 10
FM4552
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 816, HIC = 861, Delta T = 3.2 msec

Model Year: 1996
Target: OP2
Vehicle Side: Right
Horz/Vert Angle: 90/1





mga

Impact Testing

9/9/04

G04I7-001.17

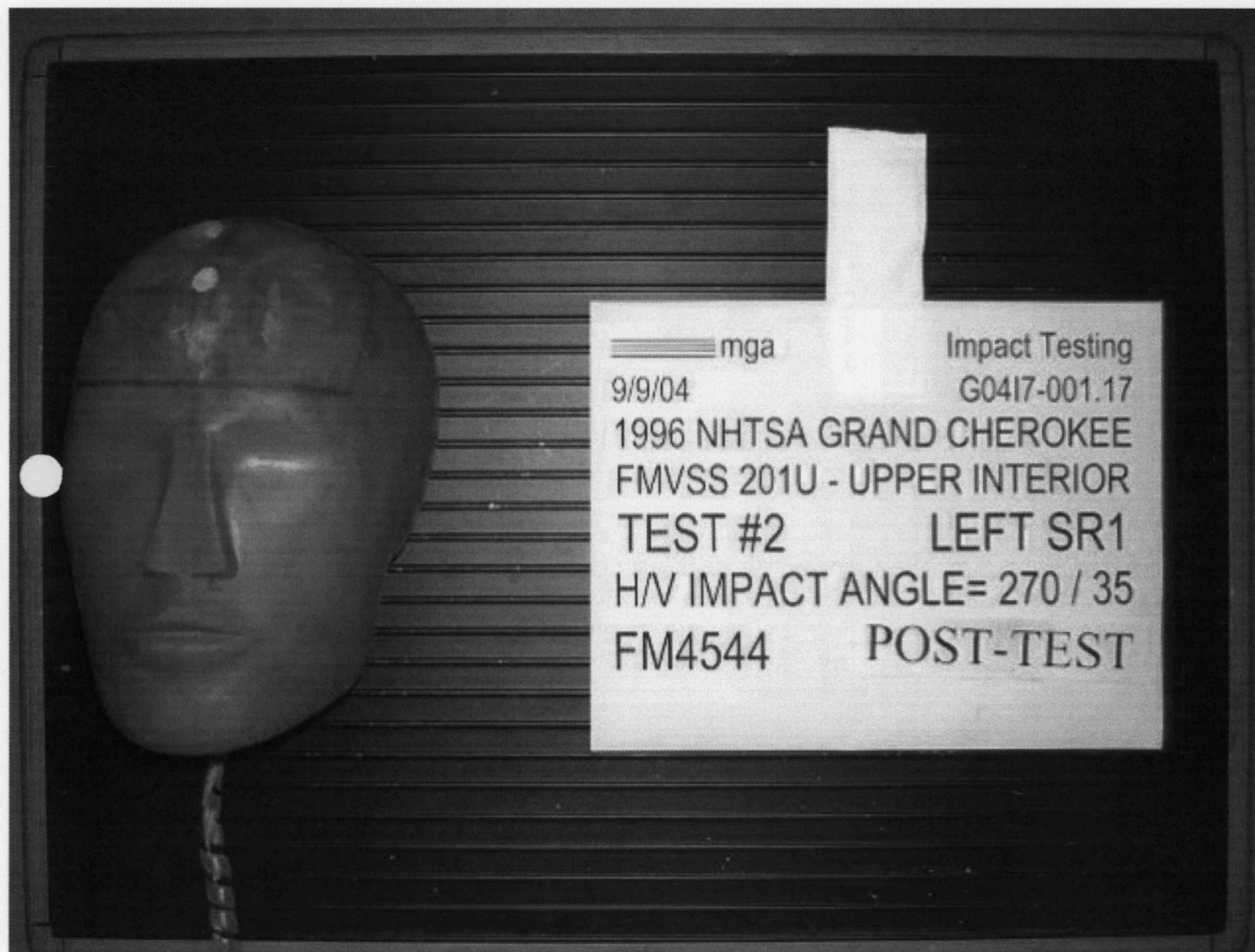
1996 NHTSA GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR

TEST #2 LEFT SR1

H/V IMPACT ANGLE= 270 / 35

FM4544 PRE - TEST





 mga

Impact Testing

9/9/04

G04I7-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #2

LEFT SR1

H/V IMPACT ANGLE= 270 / 35

FM4544

POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.17 VEHICLE YR/MAKE/MODEL: GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Test Number: #2

Target (Vehicle Side): SR1 Left

Temperature: 22C

MGA Test Reference No.: FM4544

Humidity: 59%

Approach Horizontal Angles: 270°

Time of Test: 10:30 AM

Approach Vertical Angles: 35°

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
1412	1651	3.6	23.8	44	3 R

INSTRUMENTATION 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	1.54	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: Mr. J. M. Approved By: Helen De. Kato Date: 9-9-01

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

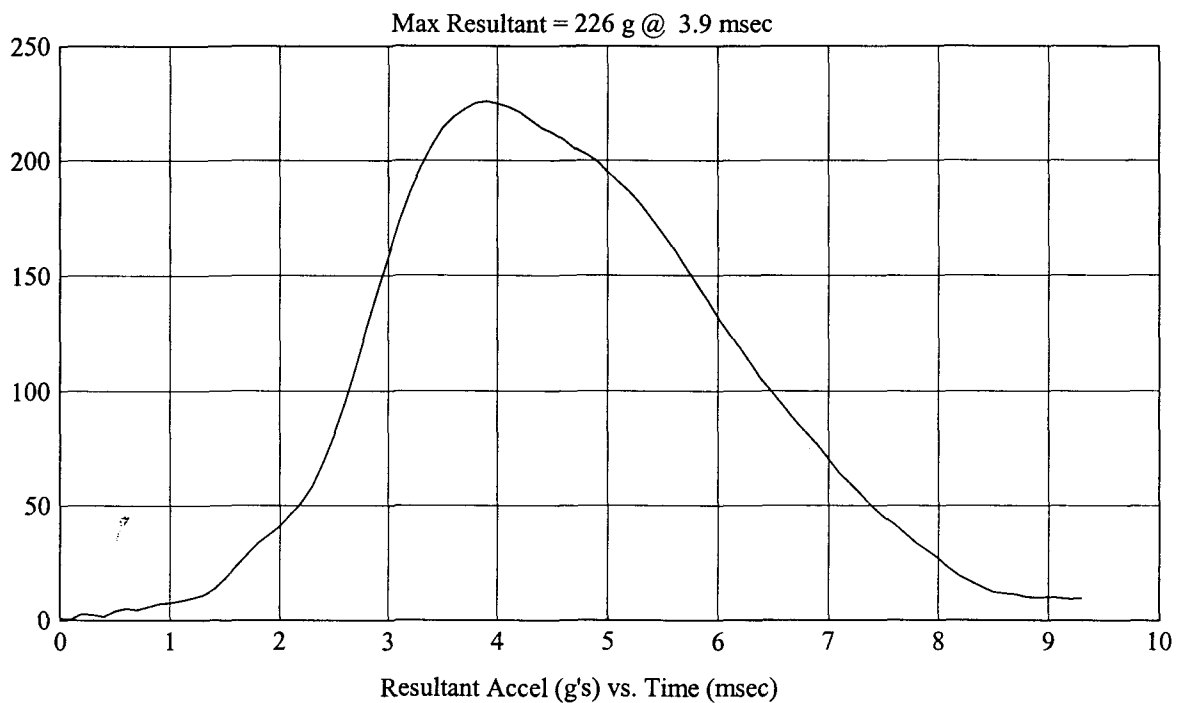
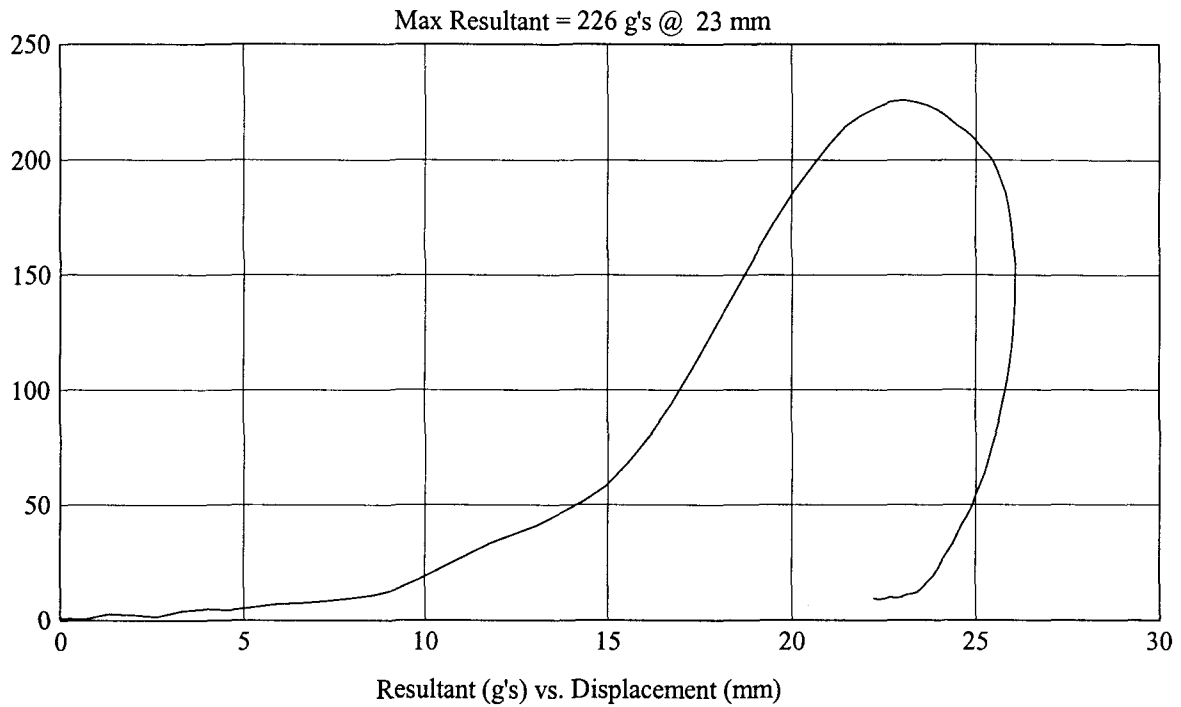
Customer: NHTSA
Test # 2
FM4544
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/35

Test Date: 9/9/04

HIC(d) = 1412, HIC = 1651, Delta T = 3.6 msec



FMH
G04I7-001.17

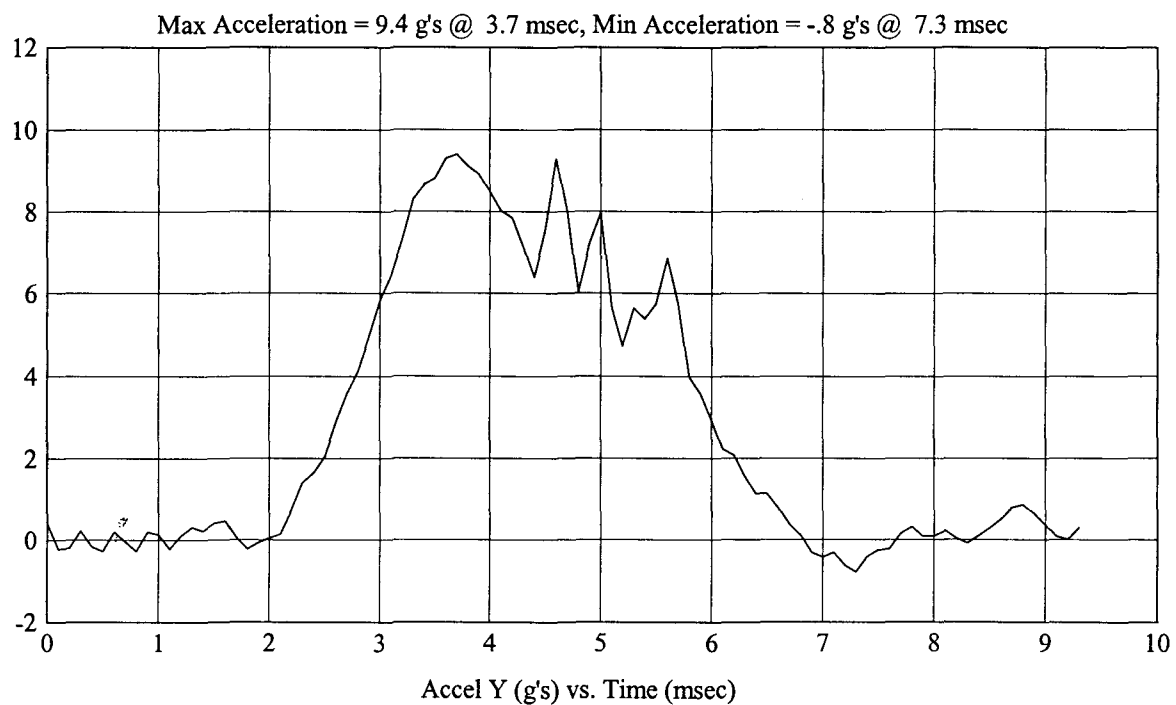
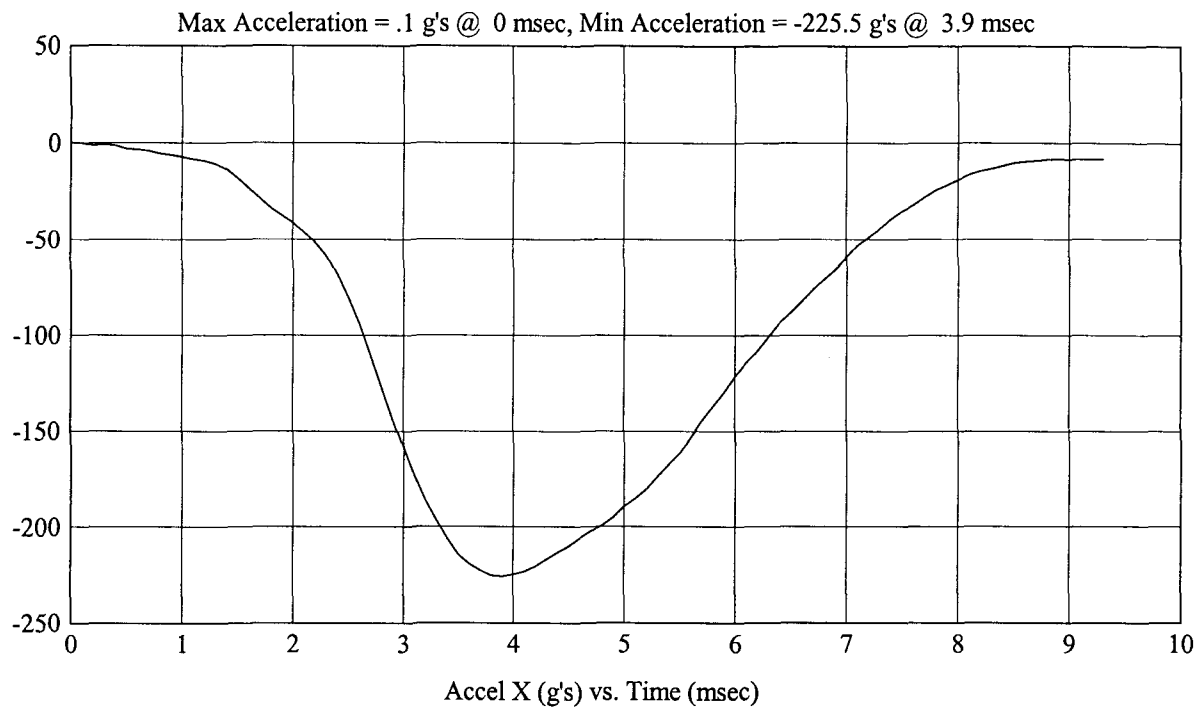
Customer: NHTSA
Test # 2
FM4544
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/35

Test Date: 9/9/04

HIC(d) = 1412, HIC = 1651, Delta T = 3.6 msec



FMH
G04I7-001.17

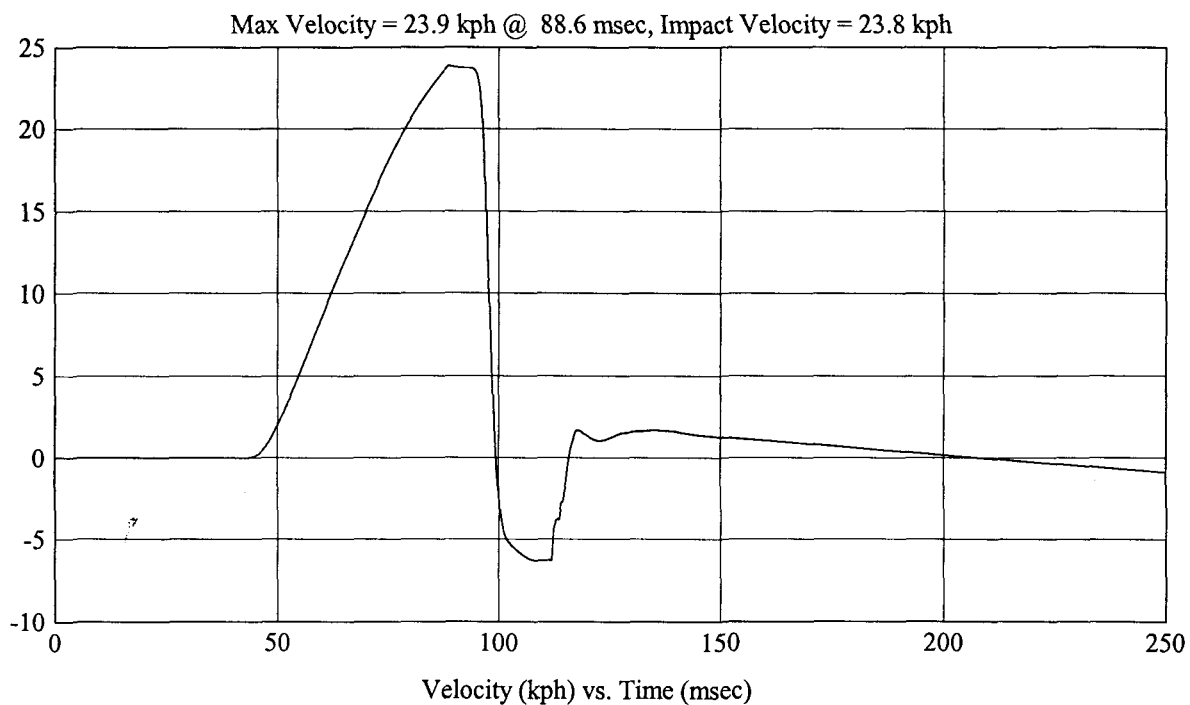
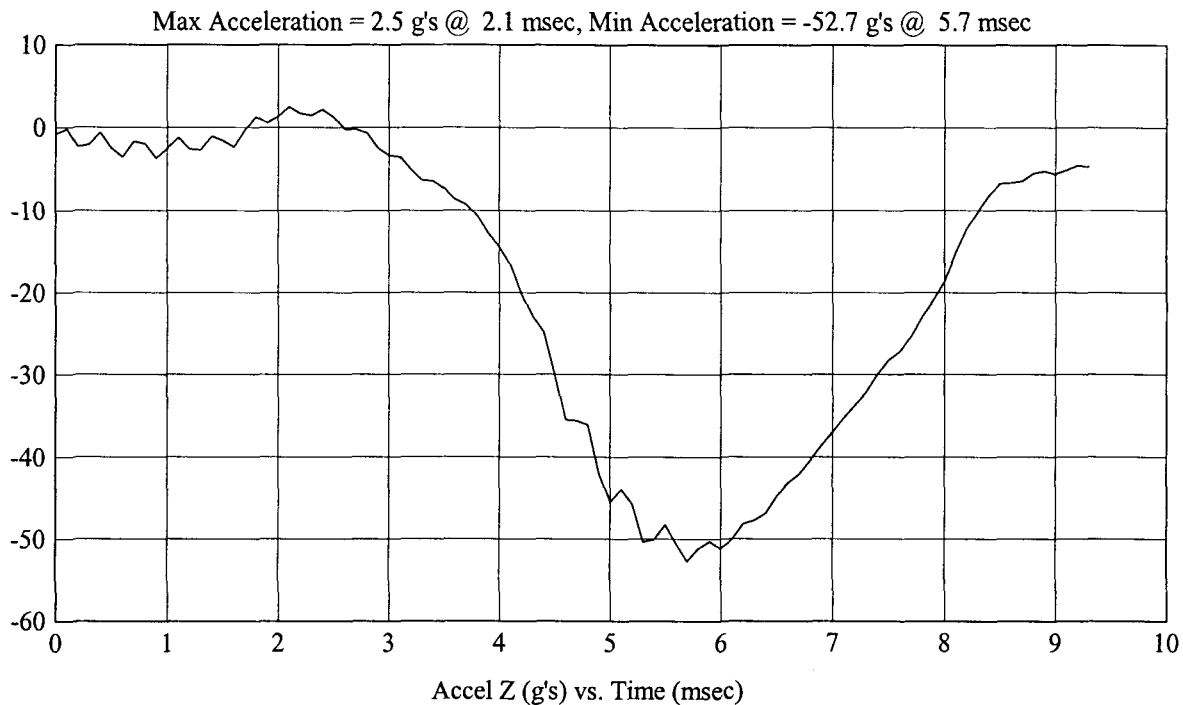
Customer: NHTSA
Test # 2
FM4544
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/35

Test Date: 9/9/04

HIC(d) = 1412, HIC = 1651, Delta T = 3.6 msec



FMH
G04I7-001.17

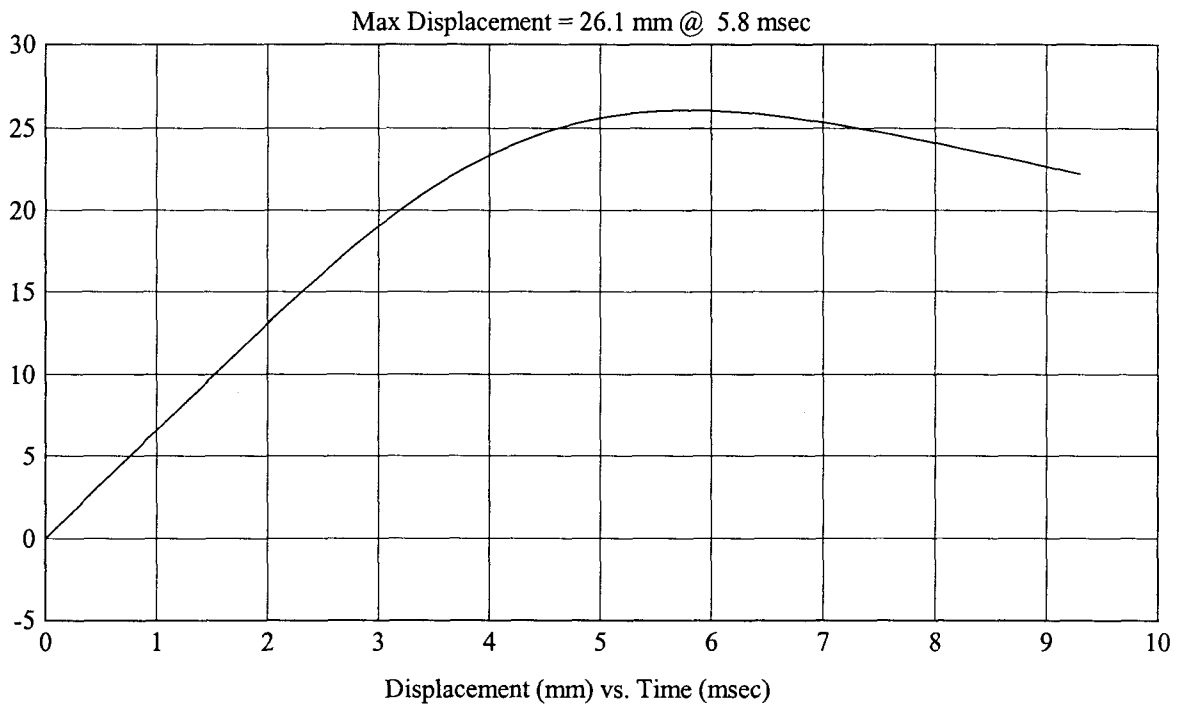
Customer: NHTSA
Test # 2
FM4544
Additional Desc: N/A

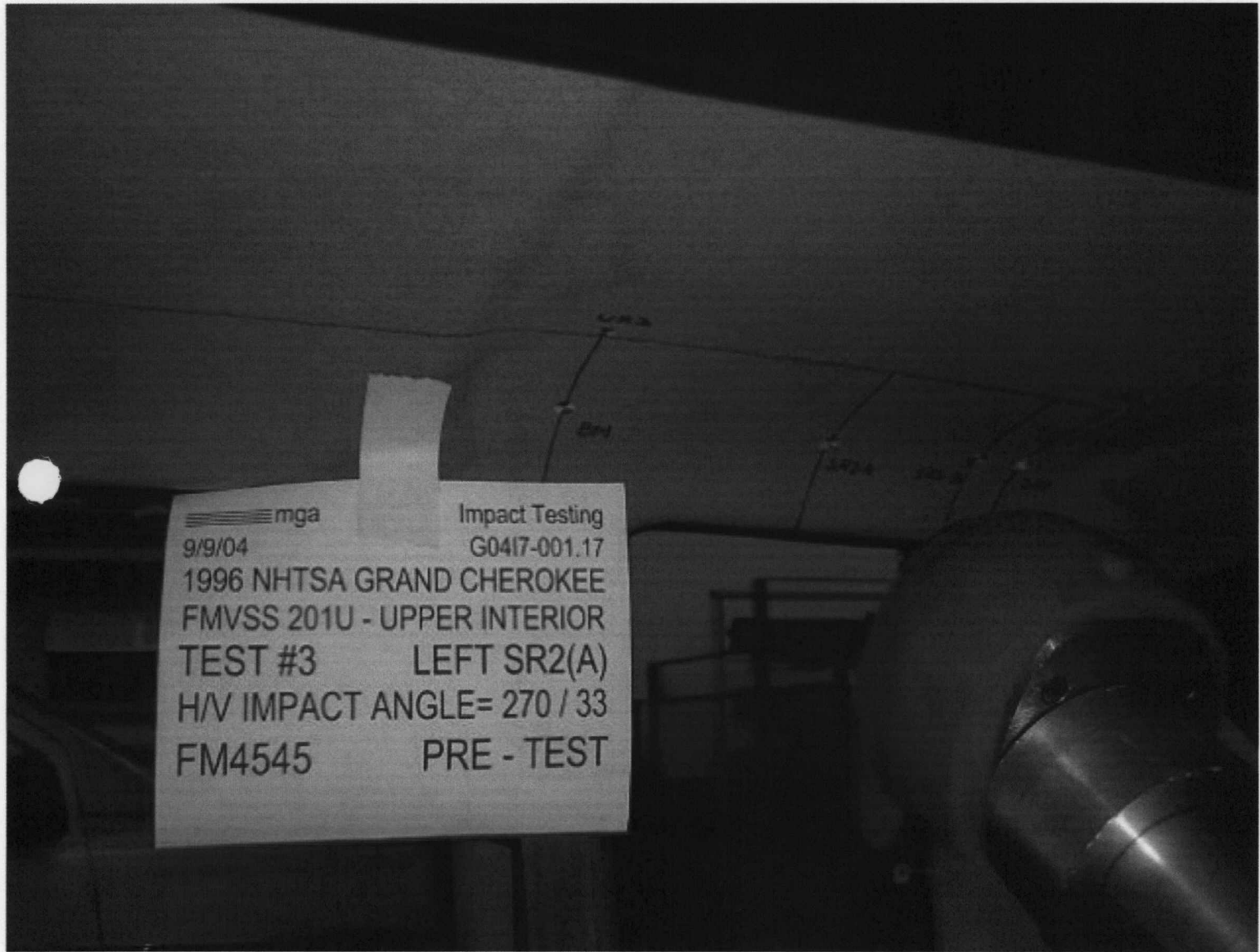
Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/35

Test Date: 9/9/04

HIC(d) = 1412, HIC = 1651, Delta T = 3.6 msec





mga Impact Testing
9/9/04 G0417-001.17
1996 NHTSA GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 33
FM4545 PRE - TEST



The image shows the interior of a vehicle, specifically the upper interior area. A white label is attached to the left side of the frame. To the right of the label, a metal impactor rod is visible, extending from the bottom right towards the center. The background shows the interior structure of the vehicle, including the roof and side panels. The label contains the following text:

mga
9/9/04
1996 NHTSA GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 33
FM4545 POST-TEST

Impact Testing
G0417-001.17



===== mga

Impact Testing

9/9/04

G0417-001.17

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #3 LEFT SR2(A)

H/V IMPACT ANGLE= 270 / 33

FM4545 POST-TEST

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.17 VEHICLE YR/MAKE/MODEL: GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR2(a) Left

MGA Test Reference No.: FM4545

Approach Horizontal Angles: 270°

Approach Vertical Angles: 33°

Test Number: #3

Temperature: 22C

Humidity: 59%

Time of Test: 10:45 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
1061	1185	4	23.7	35	6 L

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	1.54
Z	7	J36353	96.8	1.58	1.58

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

No visible damage

Recorded By: *m j m* Approved By*: *Heleen G. Kales* Date: 9-9-04

*Only necessary for NHTSA (Government) Compliance testing.

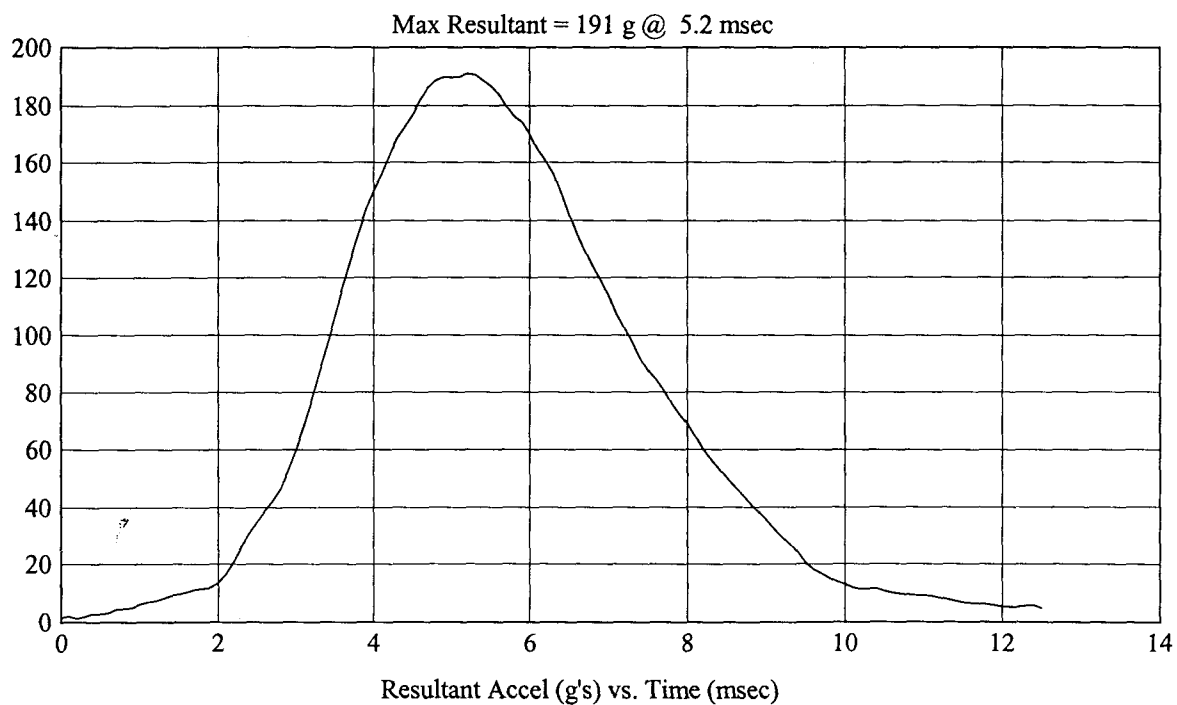
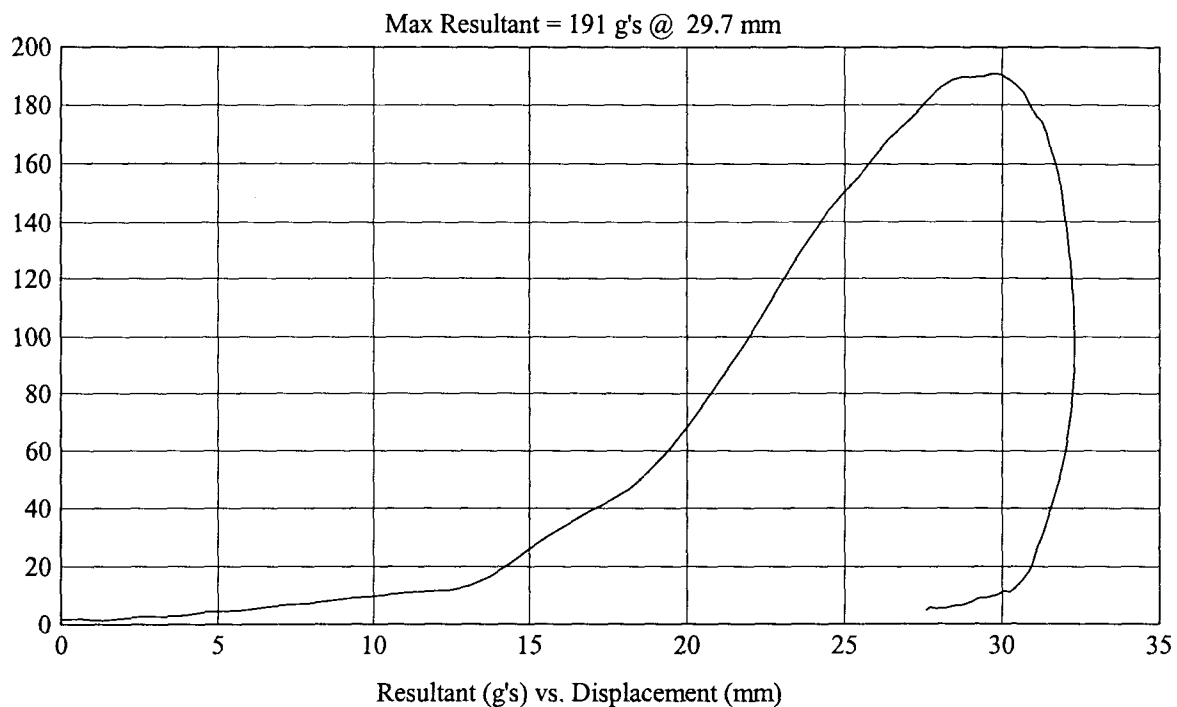
FMH
G04I7-001.17

Customer: NHTSA
Test # 3
FM4545
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/33

Test Date: 9/9/04
HIC(d) = 1061, HIC = 1185, Delta T = 4 msec



FMH
G04I7-001.17

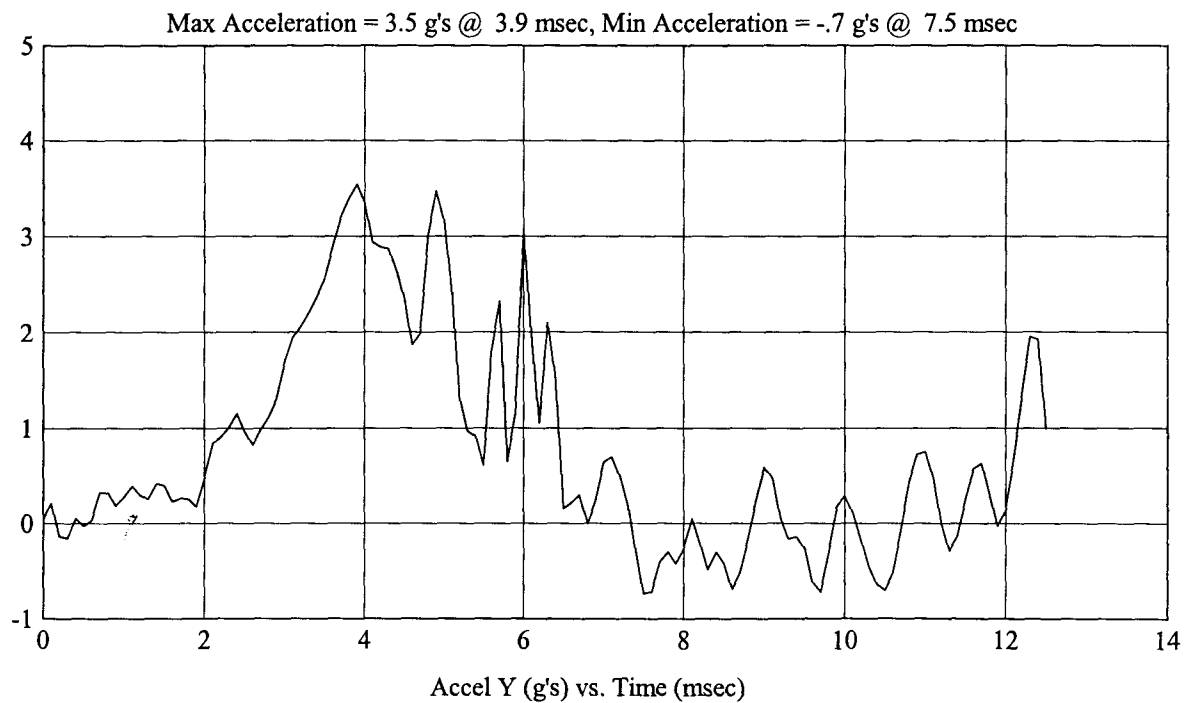
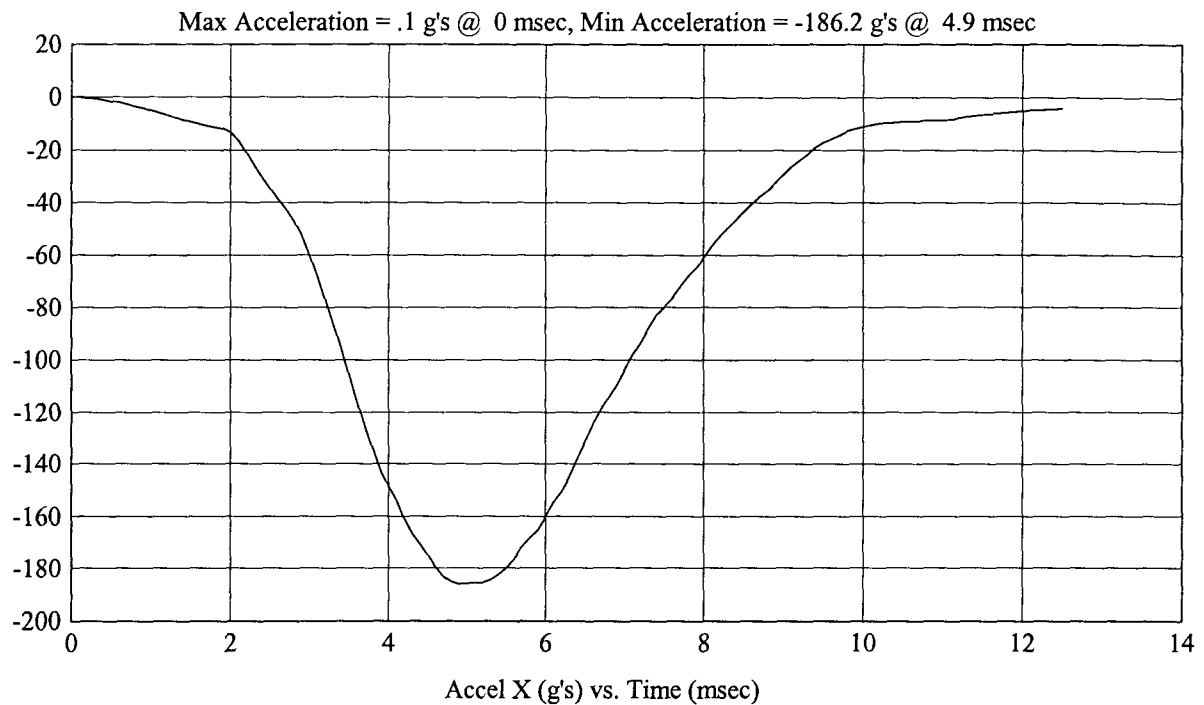
Customer: NHTSA
Test # 3
FM4545
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/33

Test Date: 9/9/04

HIC(d) = 1061, HIC = 1185, Delta T = 4 msec



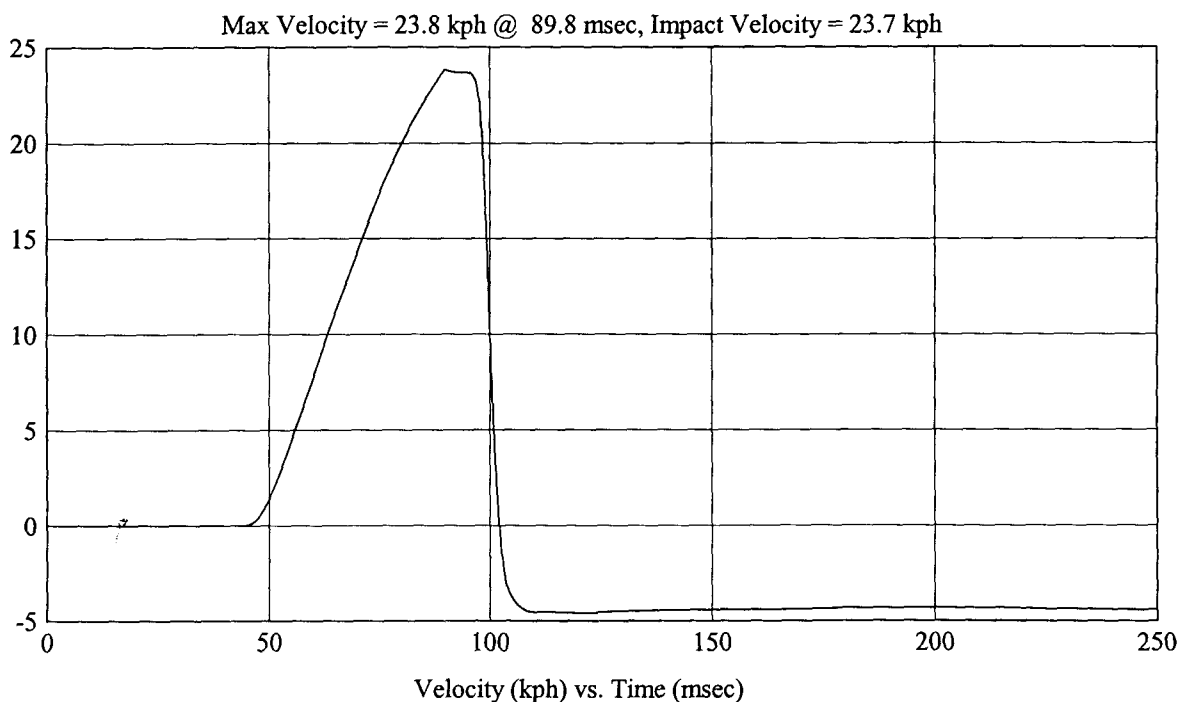
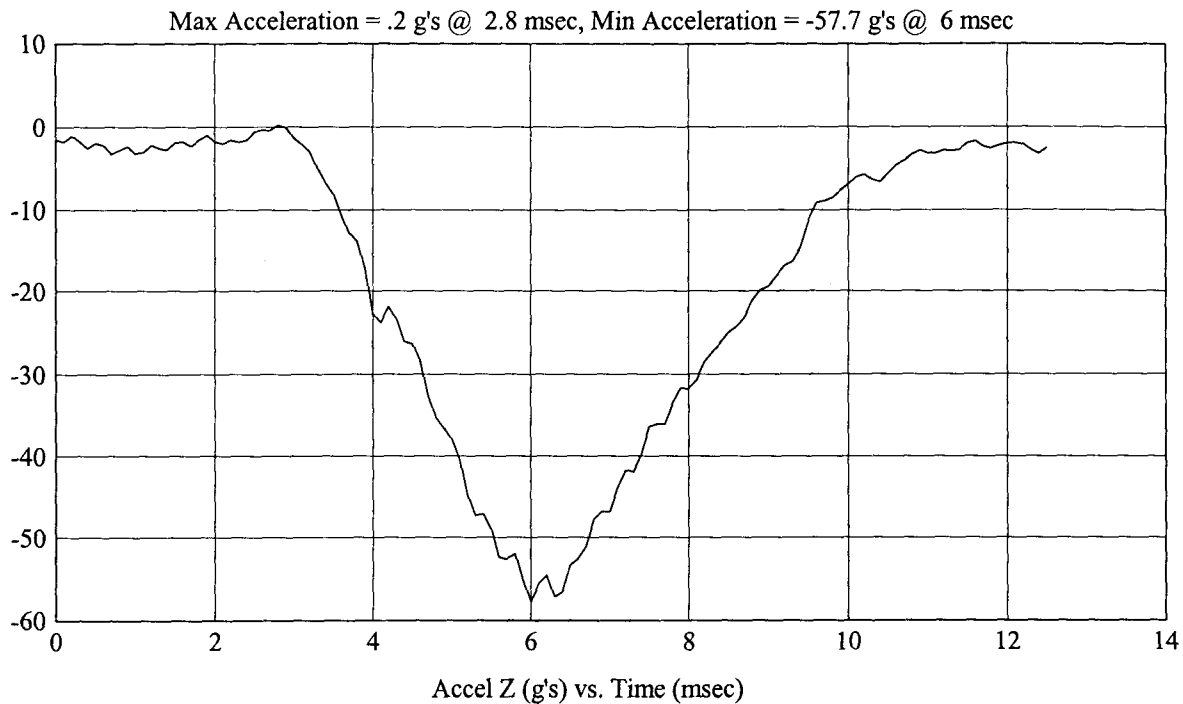
FMH
G04I7-001.17

Customer: NHTSA
Test # 3
FM4545
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/33

Test Date: 9/9/04
HIC(d) = 1061, HIC = 1185, Delta T = 4 msec



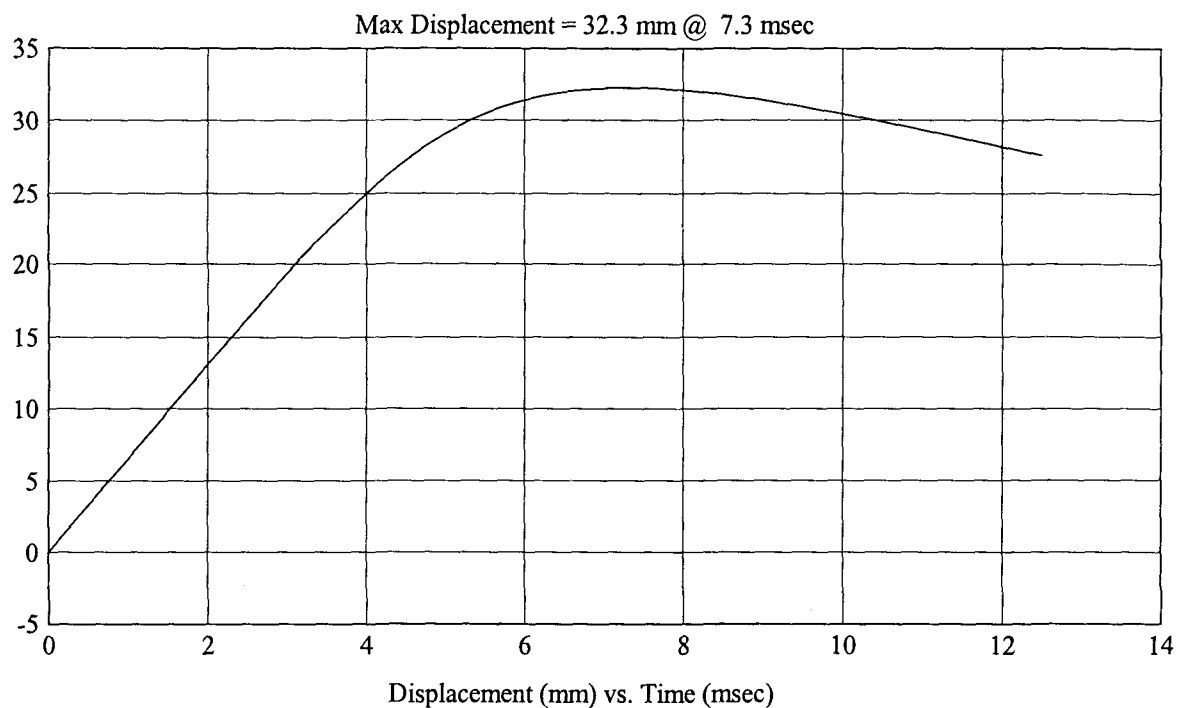
FMH
G04I7-001.17

Customer: NHTSA
Test # 3
FM4545
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/33

Test Date: 9/9/04
HIC(d) = 1061, HIC = 1185, Delta T = 4 msec









==== mga

9/9/04

1996 NHTSA GRAND CHEROKEE

FMVSS 201U - UPPER INTERIOR

TEST #8

RIGHT UR4

H/V IMPACT ANGLE= 90 / 50

FM4550

POST-TEST

Impact Testing

G04I7-001.17

MICHIGAN OPERATIONS
 DATE: 2/8/01
 SUPERCEDES: MGATP207210.2

DOC. NO.: MGATP207210.3
 REVISION NO.: 2
 PAGE 1 OF 1

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.17 VEHICLE YR/MAKE/MODEL: GRAND CHEROKEE 1996

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR4 Right

MGA Test Reference No.: FM4550

Approach Horizontal Angles: 90°

Approach Vertical Angles: 50°

Test Number: #8

Temperature: 22C

Humidity: 57%

Time of Test: 4:30 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
1131	1278	4.8	23.8	45	5 L

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	1.68
Y	6	J35916	100.2	1.54	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: [Signature] Approved By*: [Signature] Date: 7-9-01

*Only necessary for NHTSA (Government) Compliance testing.

FMH
G04I7-001.17

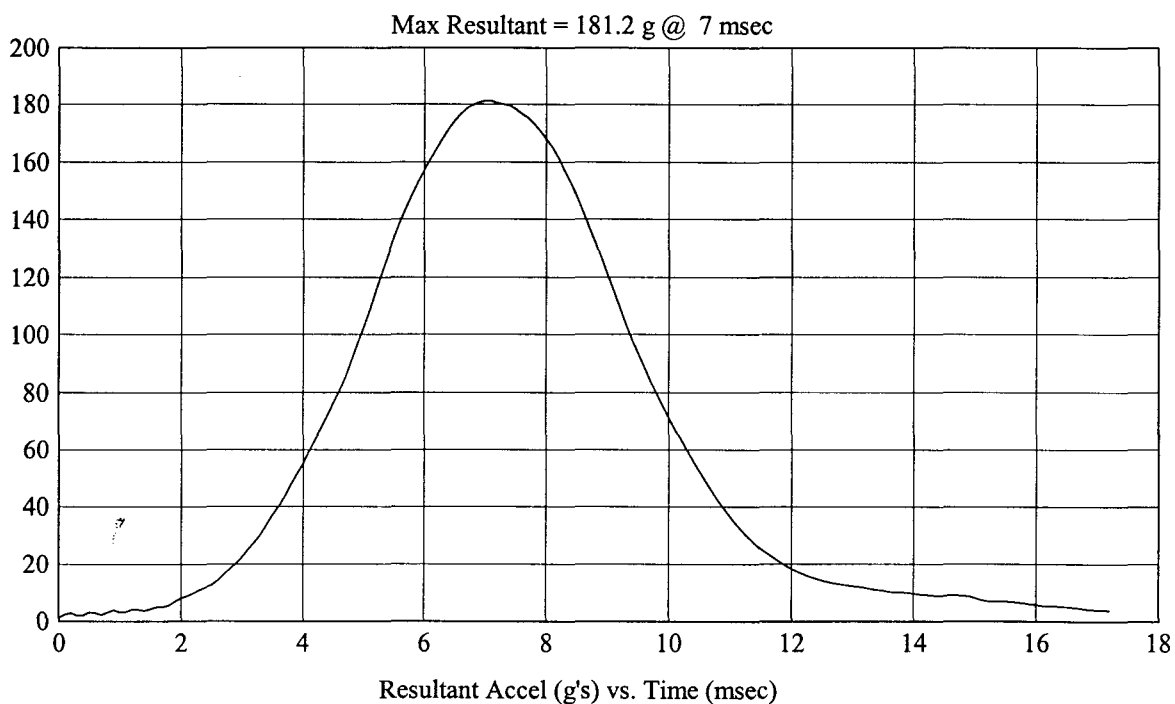
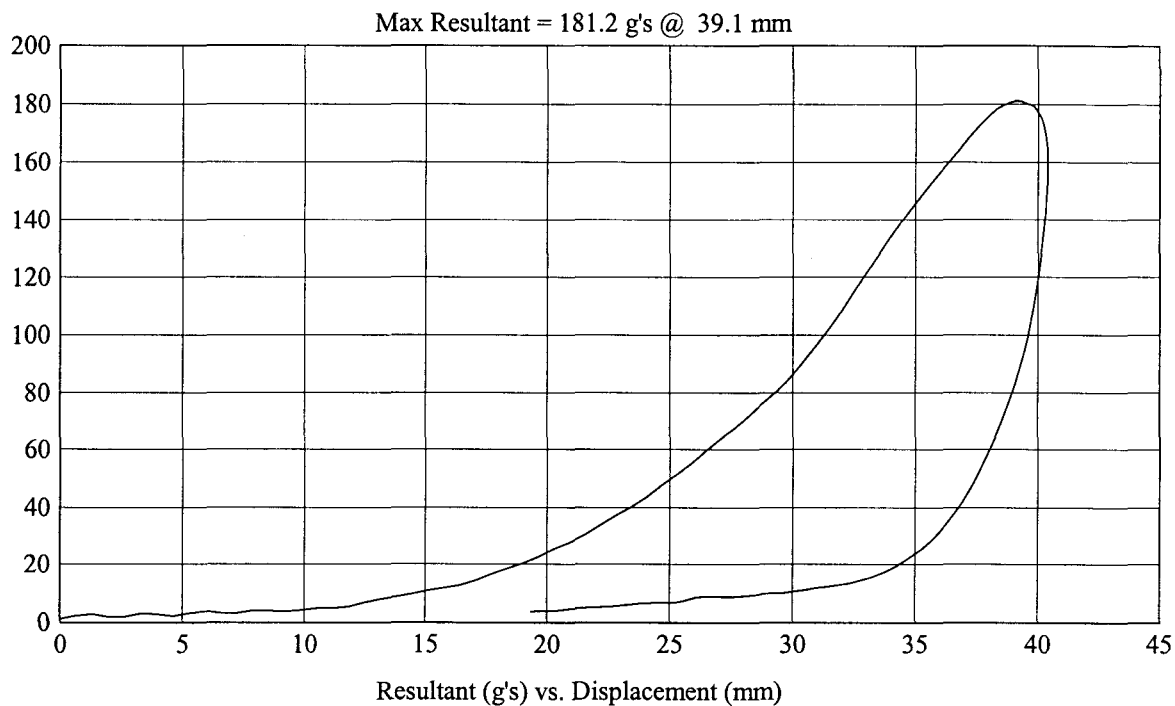
Customer: NHTSA
Test # 8
FM4550
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/50

Test Date: 9/9/04

HIC(d) = 1131, HIC = 1278, Delta T = 4.8 msec



FMH
G04I7-001.17

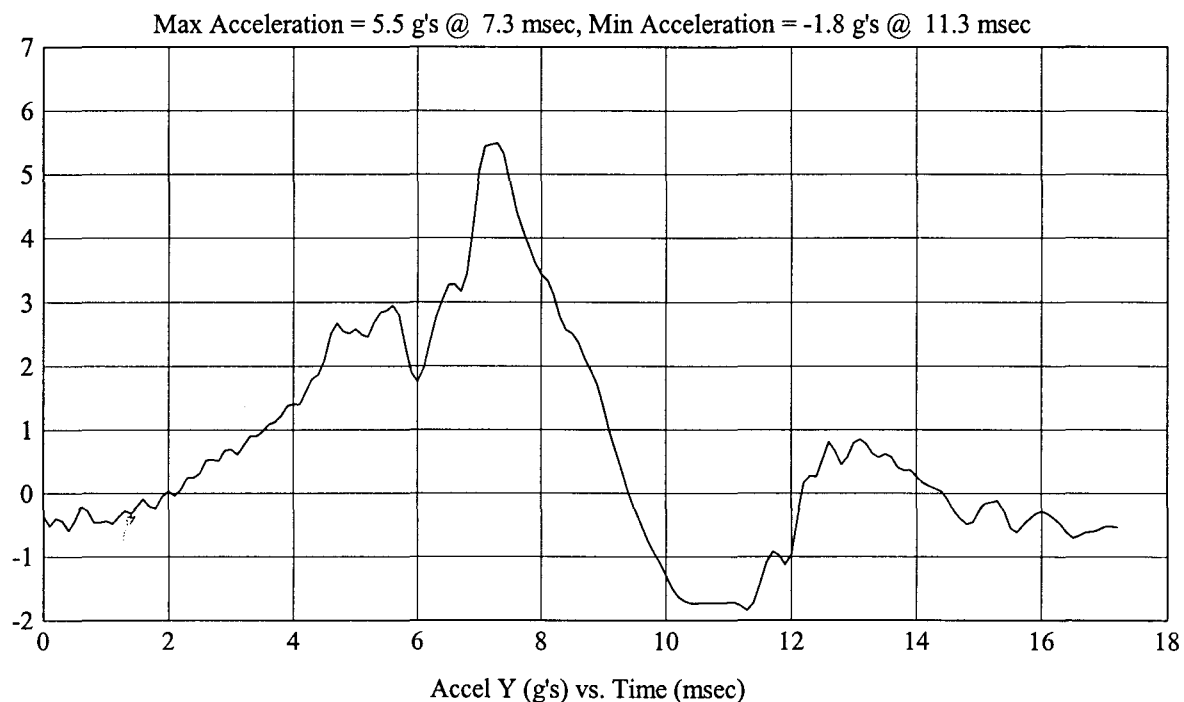
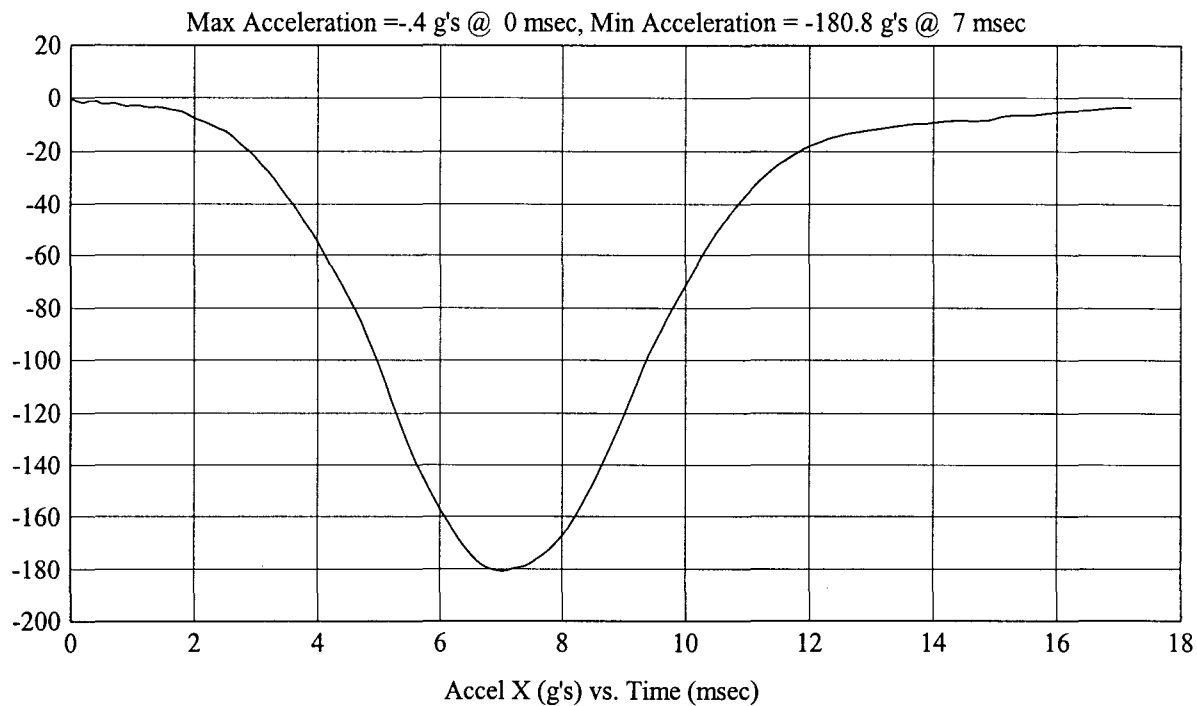
Customer: NHTSA
Test # 8
FM4550
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/50

Test Date: 9/9/04

HIC(d) = 1131, HIC = 1278, Delta T = 4.8 msec



FMH
G04I7-001.17

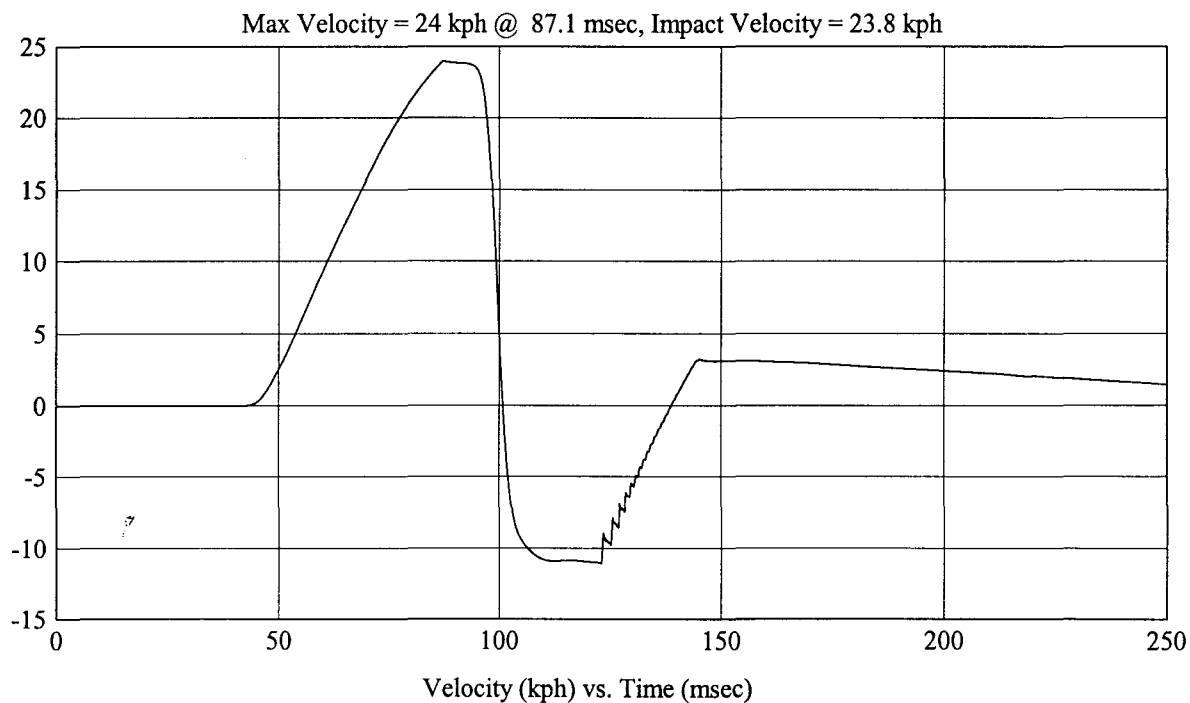
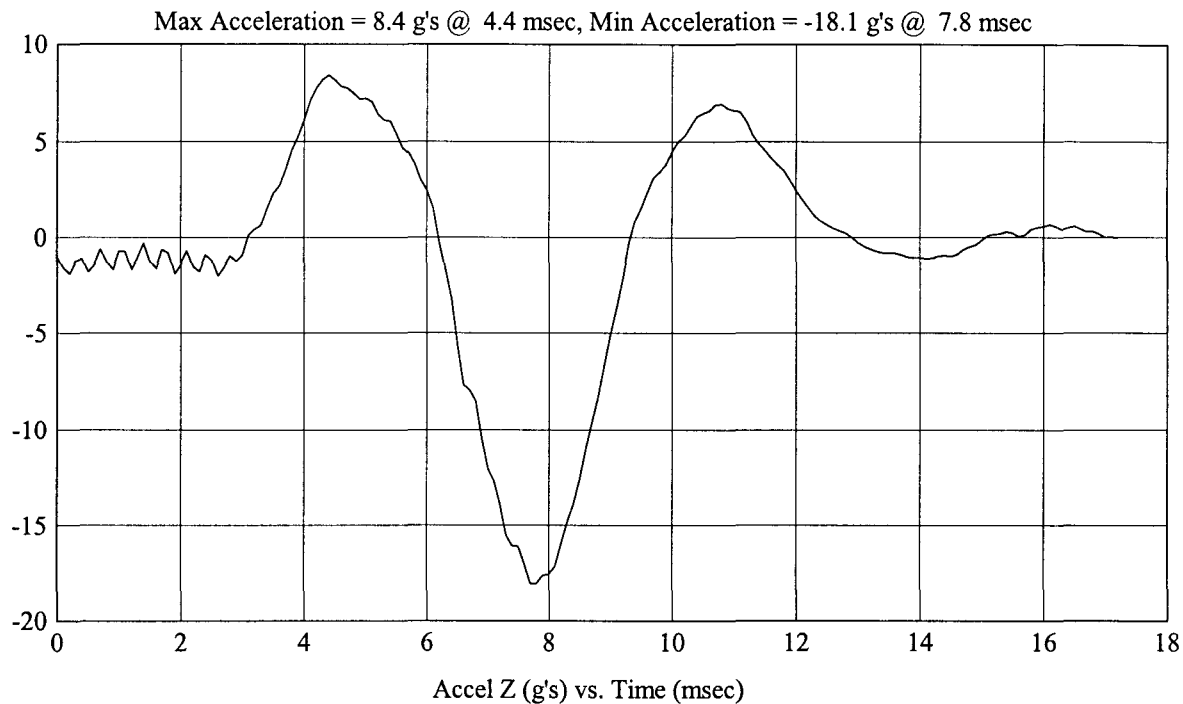
Customer: NHTSA
Test # 8
FM4550
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/50

Test Date: 9/9/04

HIC(d) = 1131, HIC = 1278, Delta T = 4.8 msec

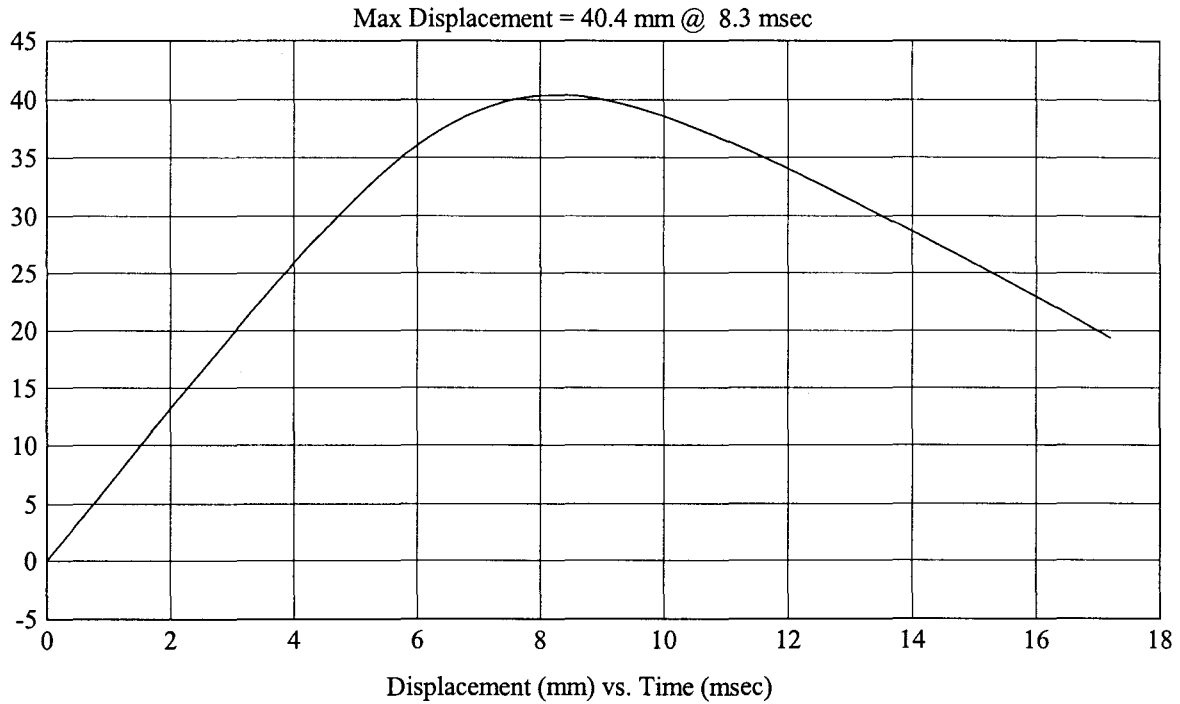


FMH
G04I7-001.17

Customer: NHTSA
Test # 8
FM4550
Additional Desc: N/A

Vehicle Program : GRAND CHEROKEE
Test Date: 9/9/04
HIC(d) = 1131, HIC = 1278, Delta T = 4.8 msec

Model Year: 1996
Target: UR4
Vehicle Side: Right
Horz/Vert Angle: 90/50



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	035 036 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Kodak	RO1000	Record Event	N/A	N/A
*FARO™	Faro Technologies	S802059801273	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	#35	10.02	22	63	237.4	9.7	Yes
Post	#35	10.02	22	54	241.1	9.0	Yes
Pre	#36	10.03	22	63	251.3	11.6	Yes
Post	#36	10.03	22	54	249.5	12.6	Yes
Pre	#38	9.99	22	63	242.8	14.7	Yes
Post	#38	9.99	22	54	238.3	10.0	Yes

RECORDED BY: David G. GotwalsDATE: September 9, 2004APPROVED BY: Helen A. Kaleto

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: <u>35</u> CALIBRATION DATE: <u>9-8-04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	10.02
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	63
Peak Resultant Acceleration	225 G's to 275 G's	237.4
Peak Lateral Acceleration	15 G's Maximum	9.7
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	535924	5.20.04	11.20.04
3	ENDEVCO	7264-2000	535919	5.20.04	11.20.04
4	ENDEVCO	7264-2000	521969	5.19.04	11.19.04

REMARKS:

RECORDED BY: Mr J M

DATE: 9-8-04

APPROVED BY: [Signature]

Head Drop
(Preliminary Test Report)

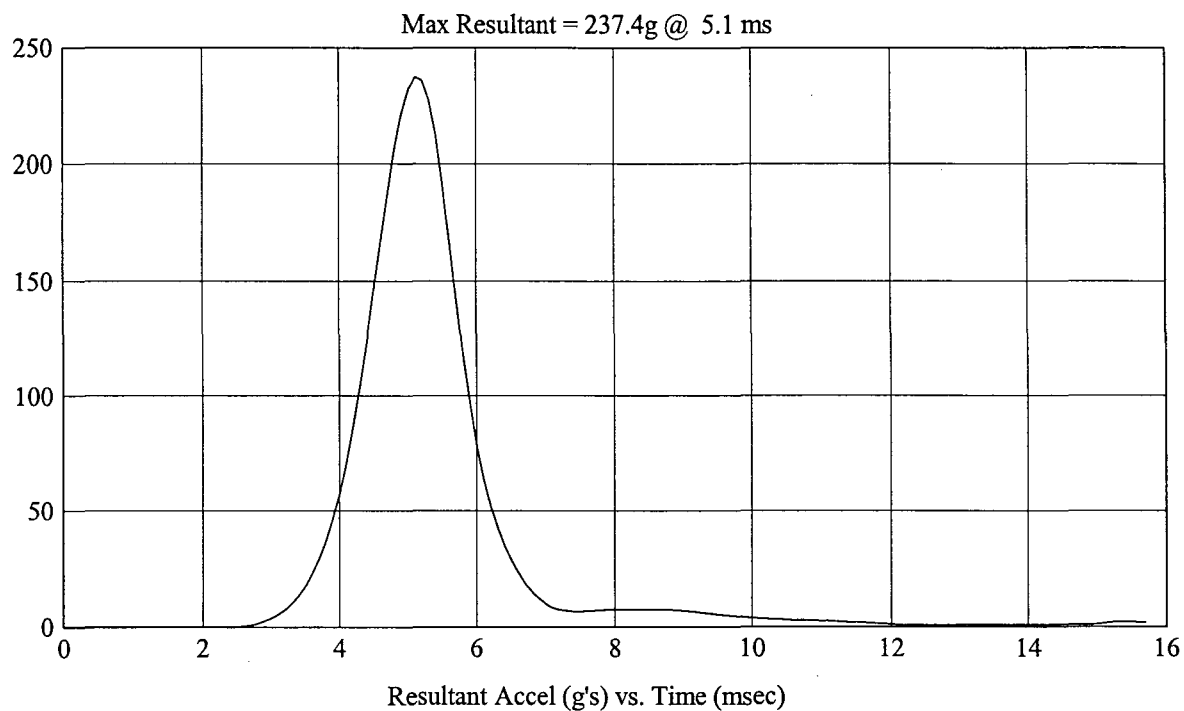
Test Number: H35263

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head #: 35



Head Drop
(Preliminary Test Report)

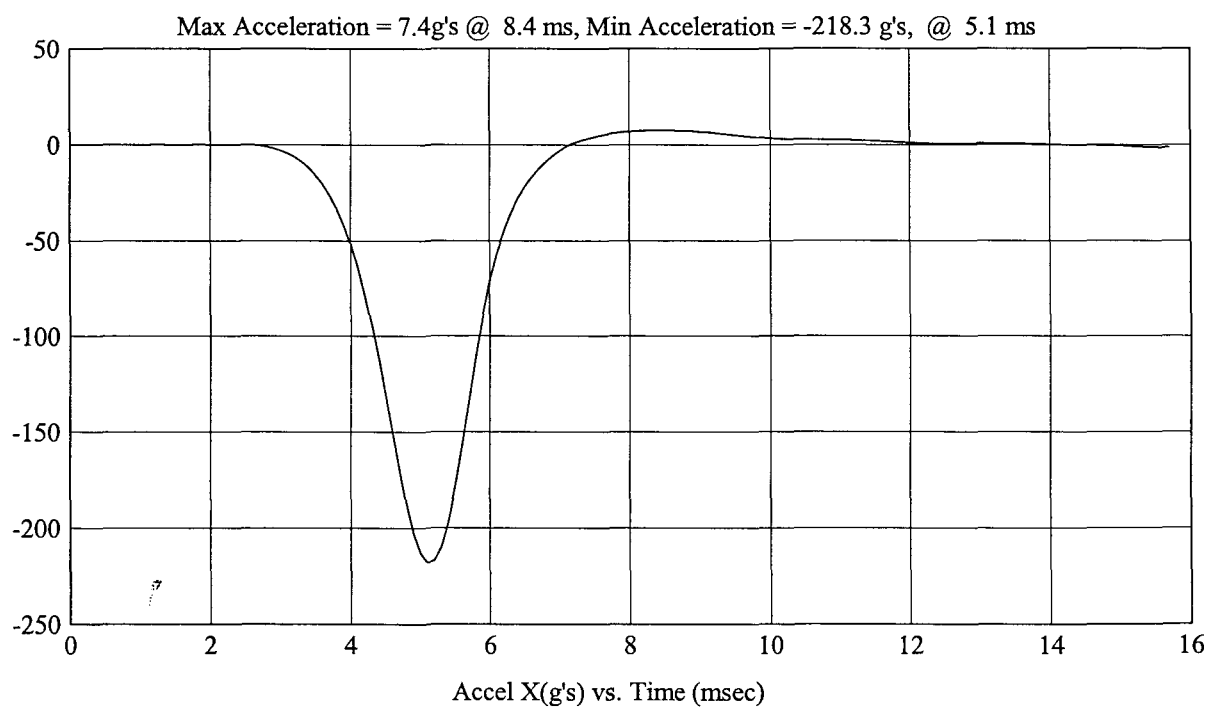
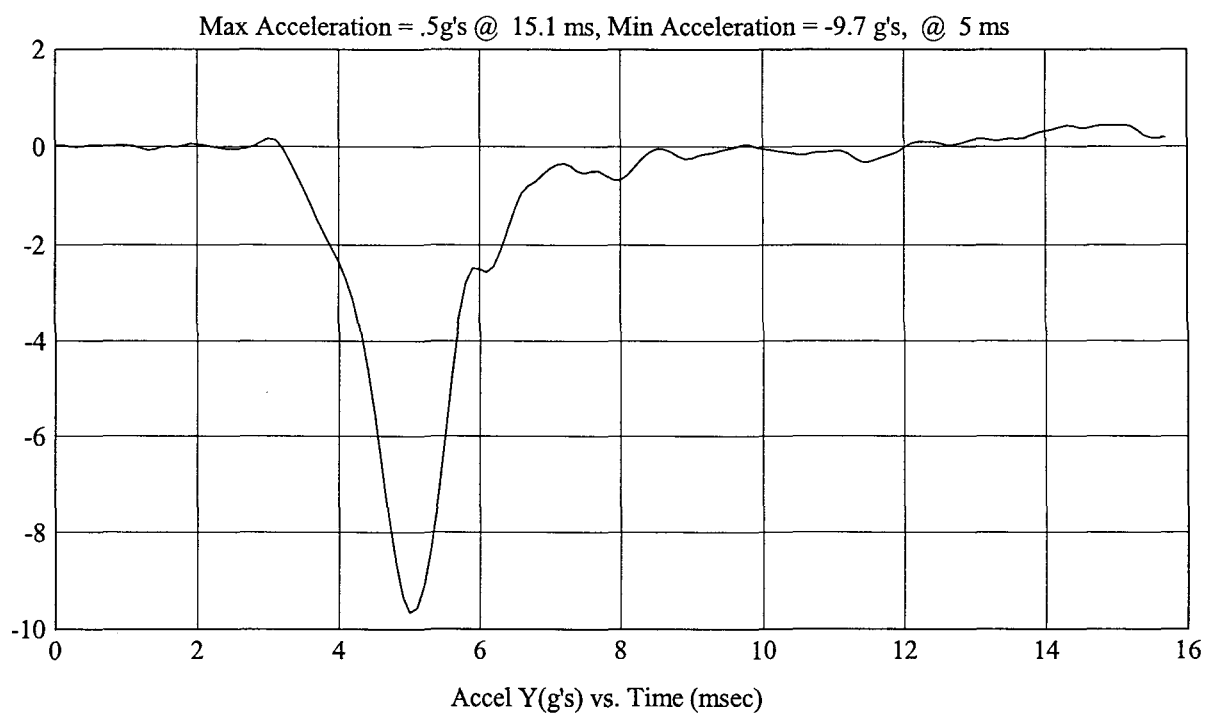
Test Number: H35263

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head #: 35



Head Drop
(Preliminary Test Report)

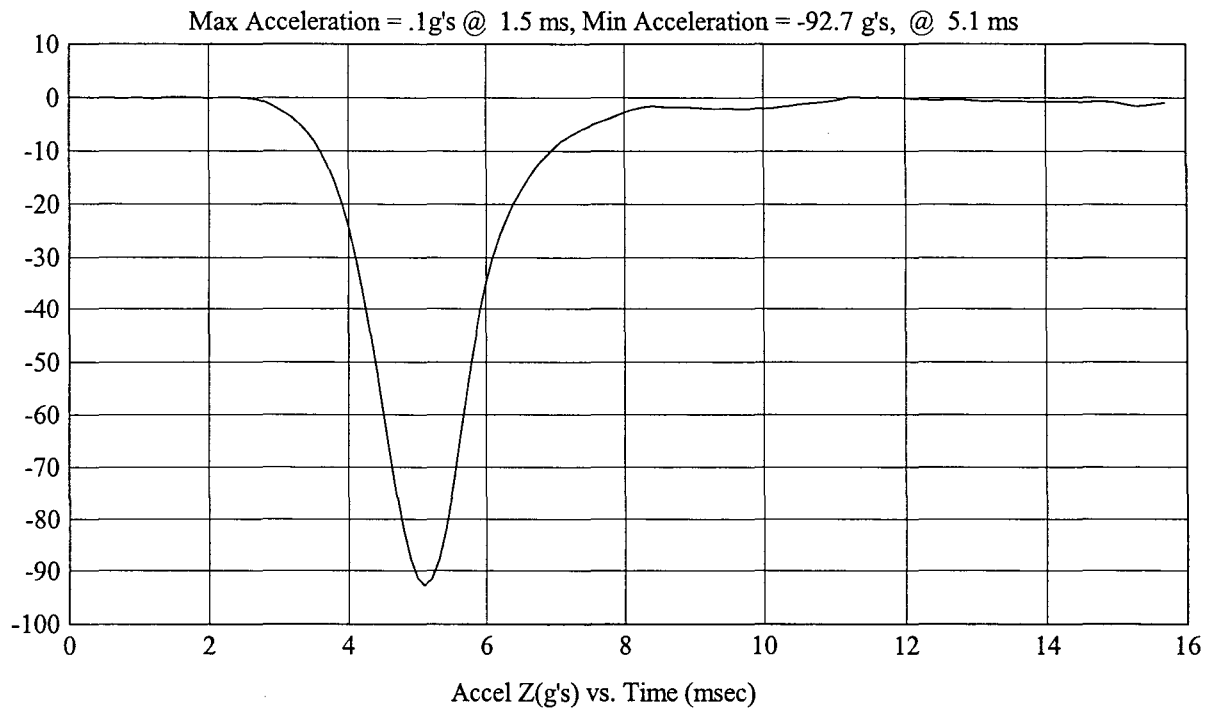
Test Number: H35263

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head # : 35



MICHIGAN OPERATIONS
 DATE: 3/20/03
 SUPERCEDES: MGATPHDT.5

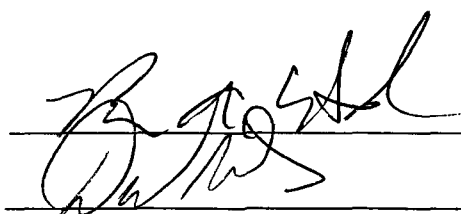
DOC. NO.: MGATP201UHD
 REVISION NO.: 6
 PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

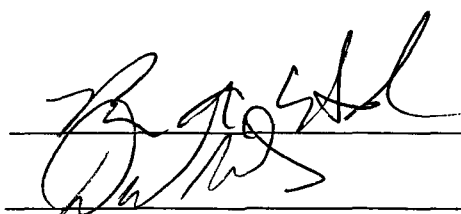
HEADFORM SERIAL NUMBER: <u>035</u> CALIBRATION DATE: <u>9-9-04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	10.02
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	54
Peak Resultant Acceleration	225 G's to 275 G's	241.1
Peak Lateral Acceleration	15 G's Maximum	9.0
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	J35924	5-20-04	11-20-04
3	ENDEVCO	7264-2000	J35919	5-20-04	11-20-04
4	ENDEVCO	7264-2000	J21969	5-19-04	11-19-04

REMARKS:

RECORDED BY: 

DATE: 9-9-04

APPROVED BY: 

Head Drop
(Preliminary Test Report)

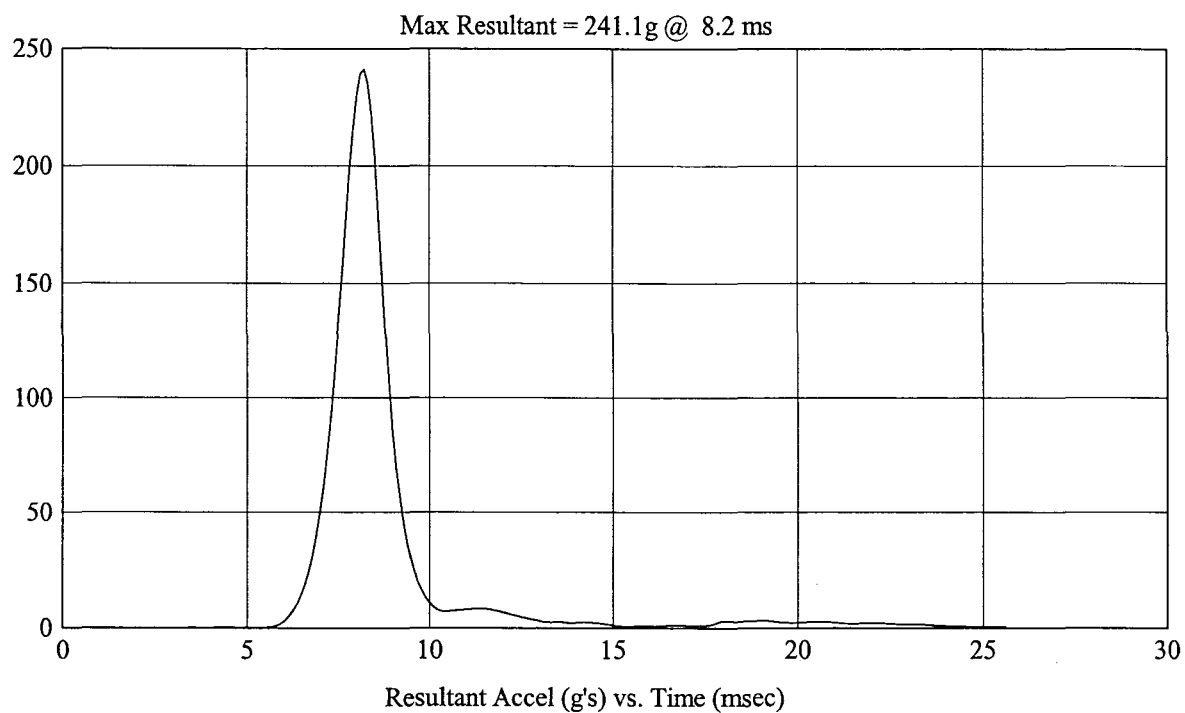
Test Number: H35264

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head #: 35



Head Drop
(Preliminary Test Report)

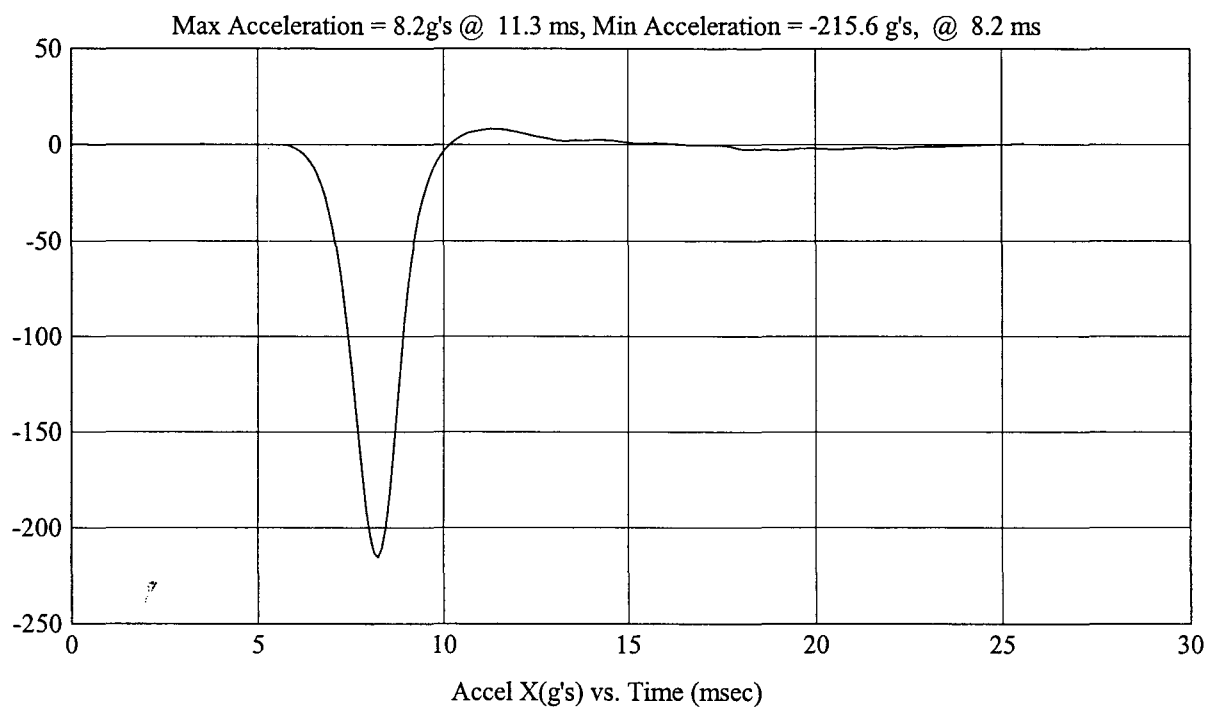
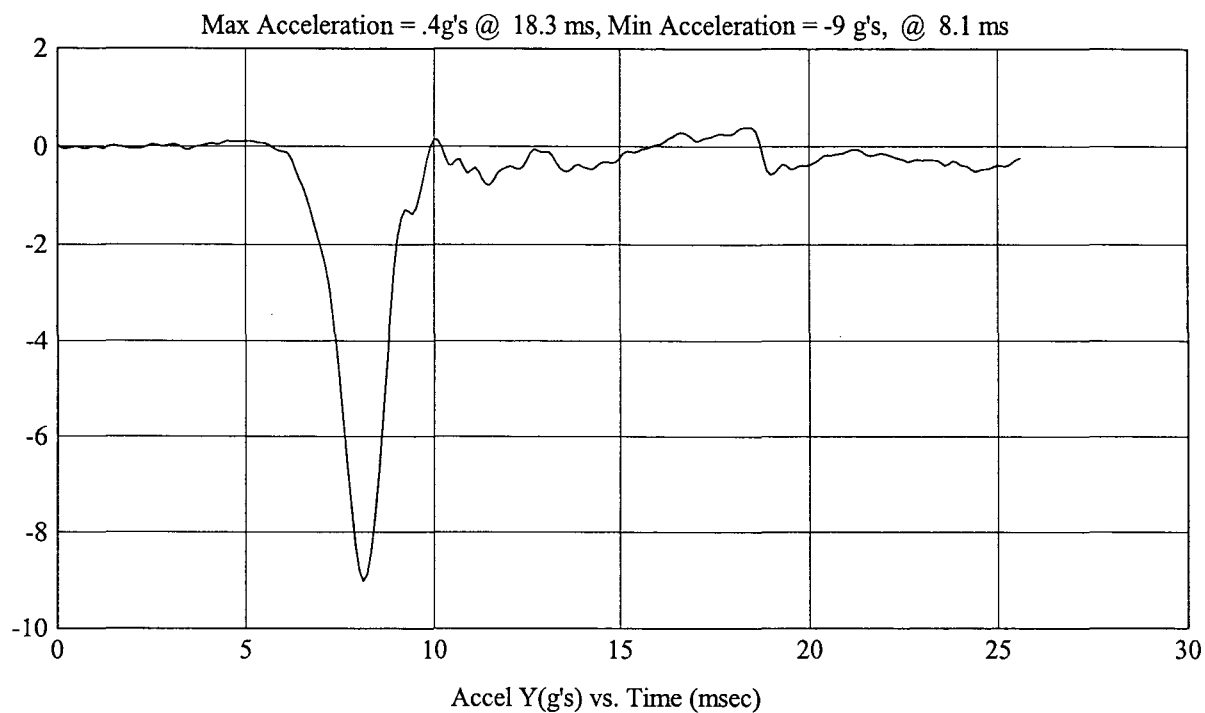
Test Number: H35264

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head #: 35



Head Drop
(Preliminary Test Report)

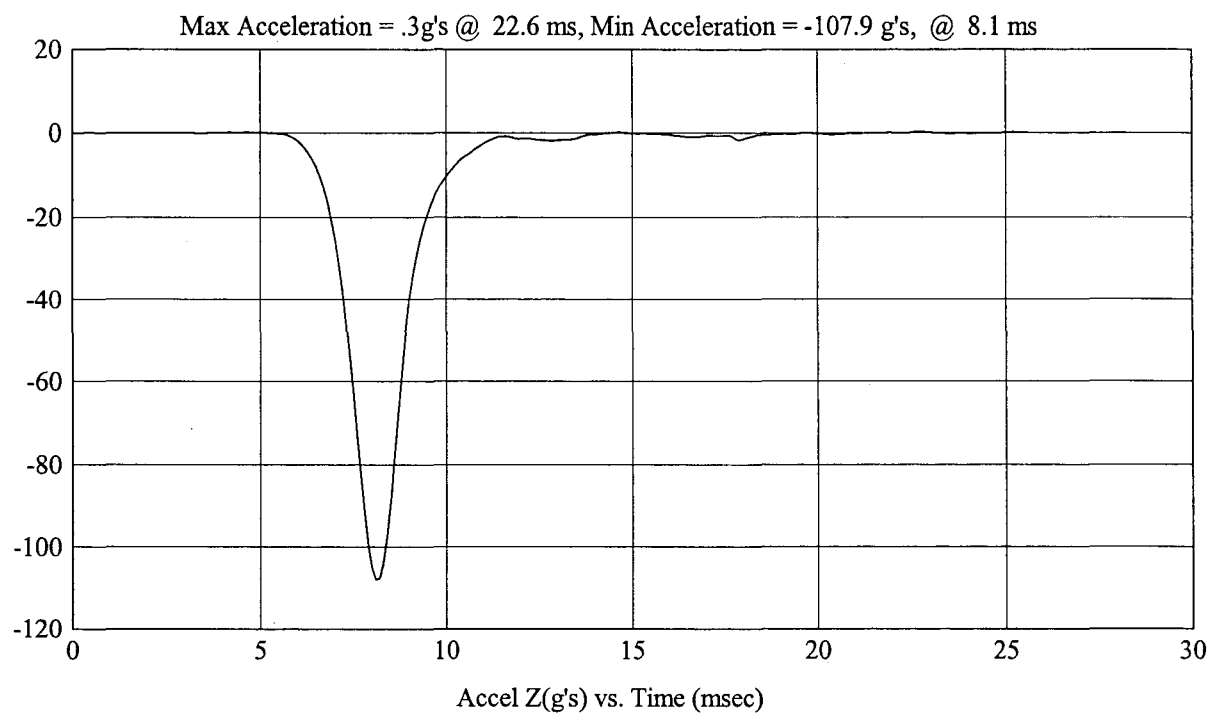
Test Number: H35264

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head # : 35

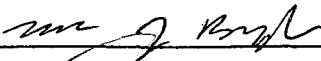


**HEAD DROP TEST SUMMARY
PART 572L**

HEADFORM SERIAL NUMBER: <u>036</u> CALIBRATION DATE: <u>9-8-04</u>		
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%	63
Peak Resultant Acceleration	225 G's to 275 G's	251.3
Peak Lateral Acceleration	15 G's Maximum	11.6
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	J35 923	5-23-04	11-23-04
2	ENDEVCO	7264-2000	J35 916	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J35 918	5-23-04	11-23-04

REMARKS:

RECORDED BY:  DATE: 9-8-04
APPROVED BY: 

Head Drop
(Preliminary Test Report)

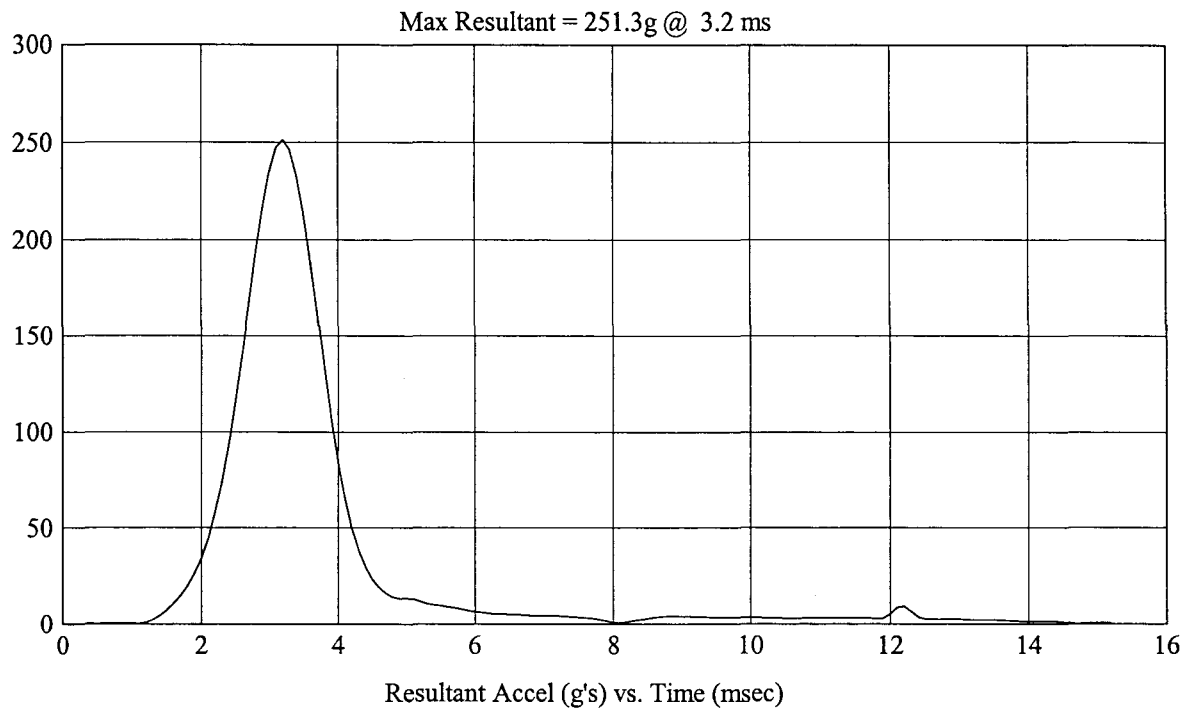
Test Number: H36262

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head # : 36



Head Drop
(Preliminary Test Report)

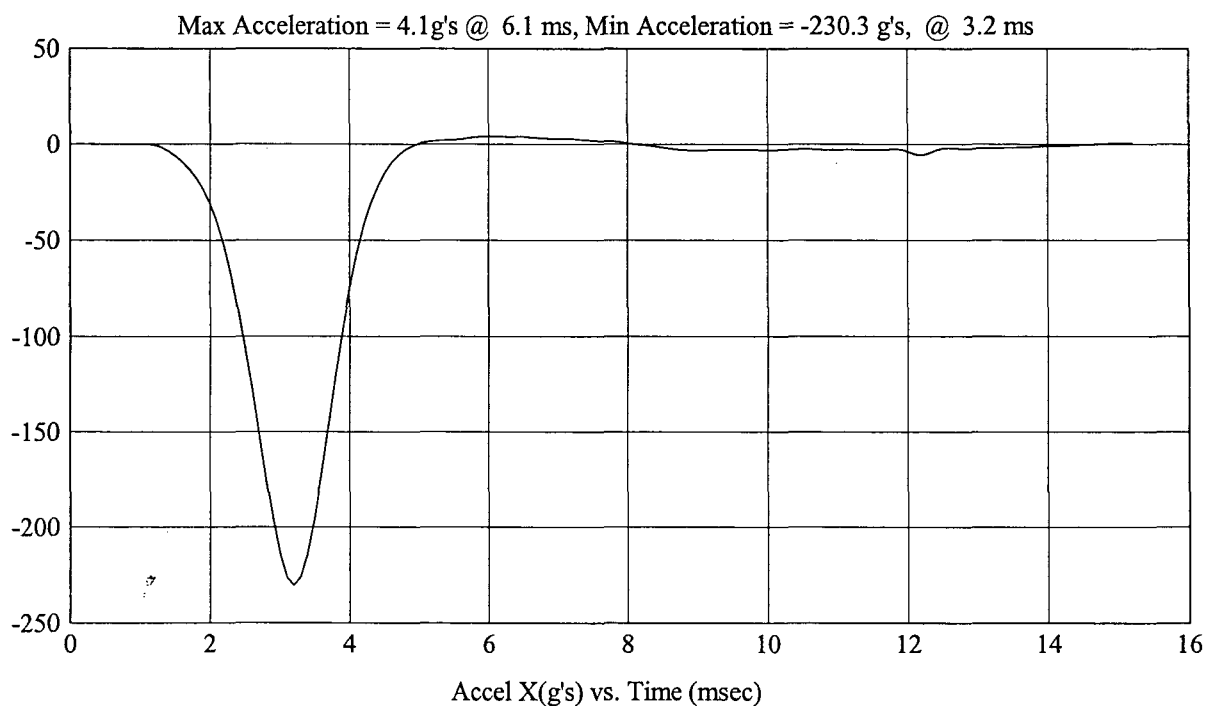
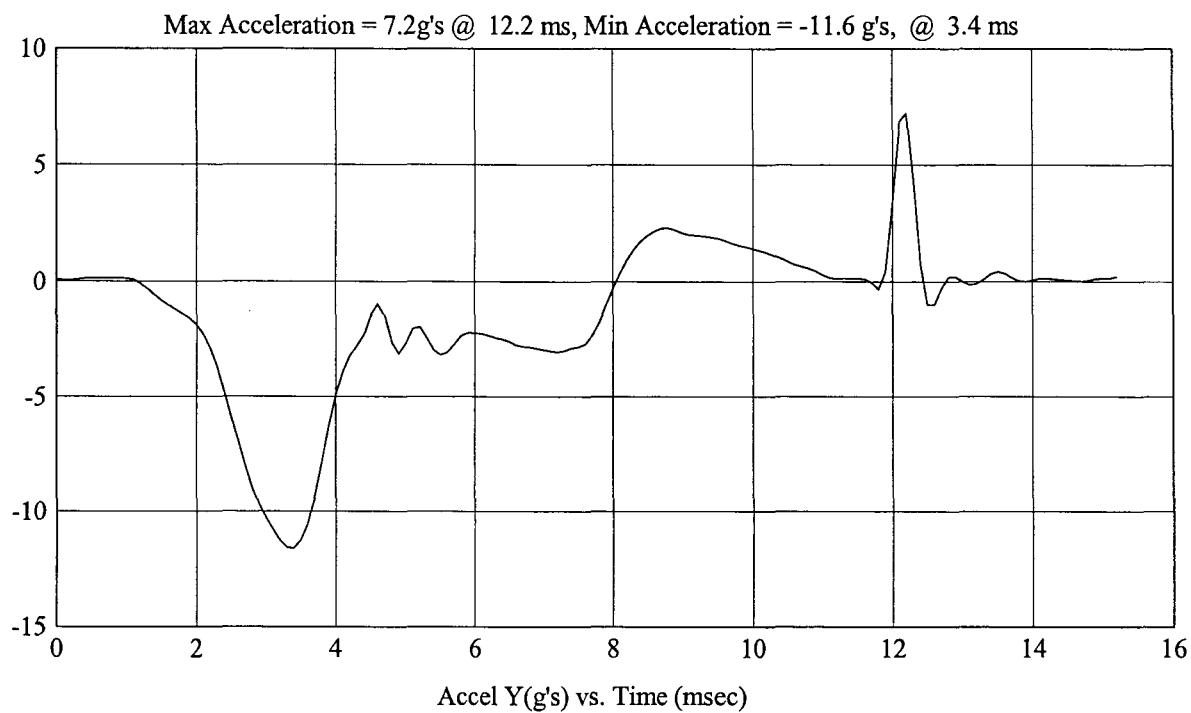
Test Number: H36262

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head #: 36



Head Drop
(Preliminary Test Report)

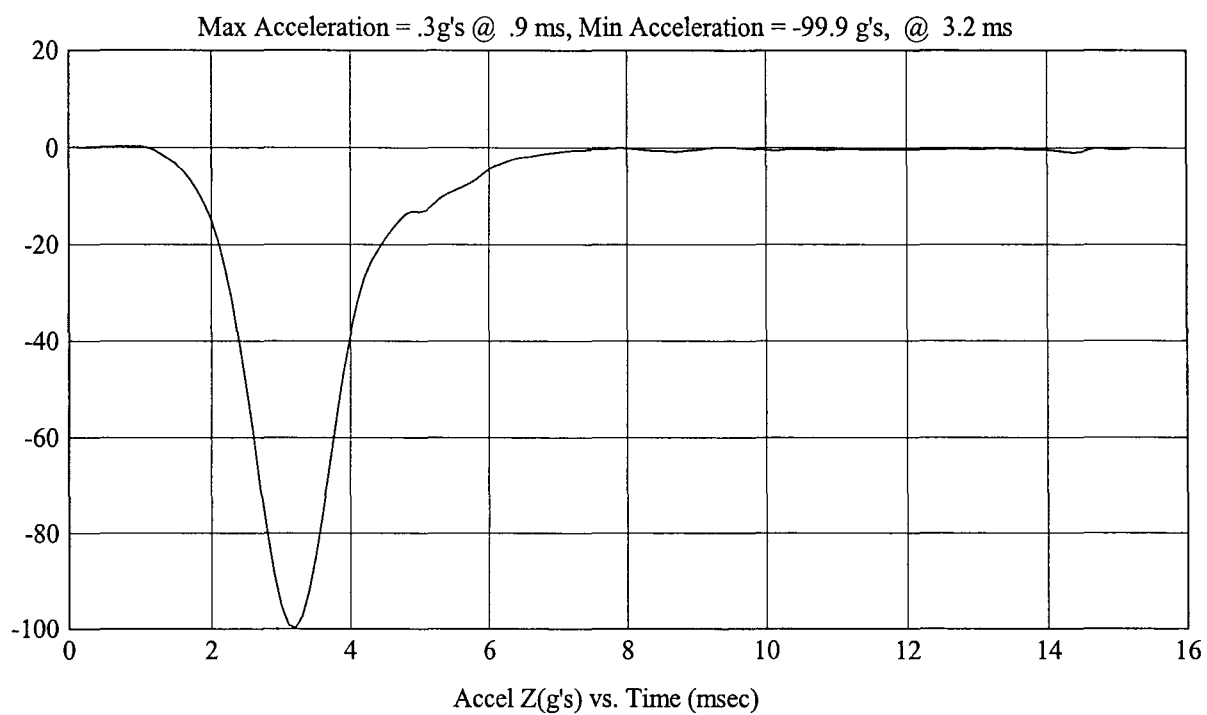
Test Number: H36262

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head # : 36



MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATPHDT.5

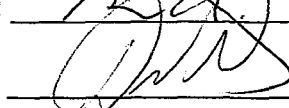
DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>036</u> CALIBRATION DATE: <u>9-9-04</u>		
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%	54
Peak Resultant Acceleration	225 G's to 275 G's	249.5
Peak Lateral Acceleration	15 G's Maximum	12.6
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: 9-9-04APPROVED BY: 

Head Drop
(Preliminary Test Report)

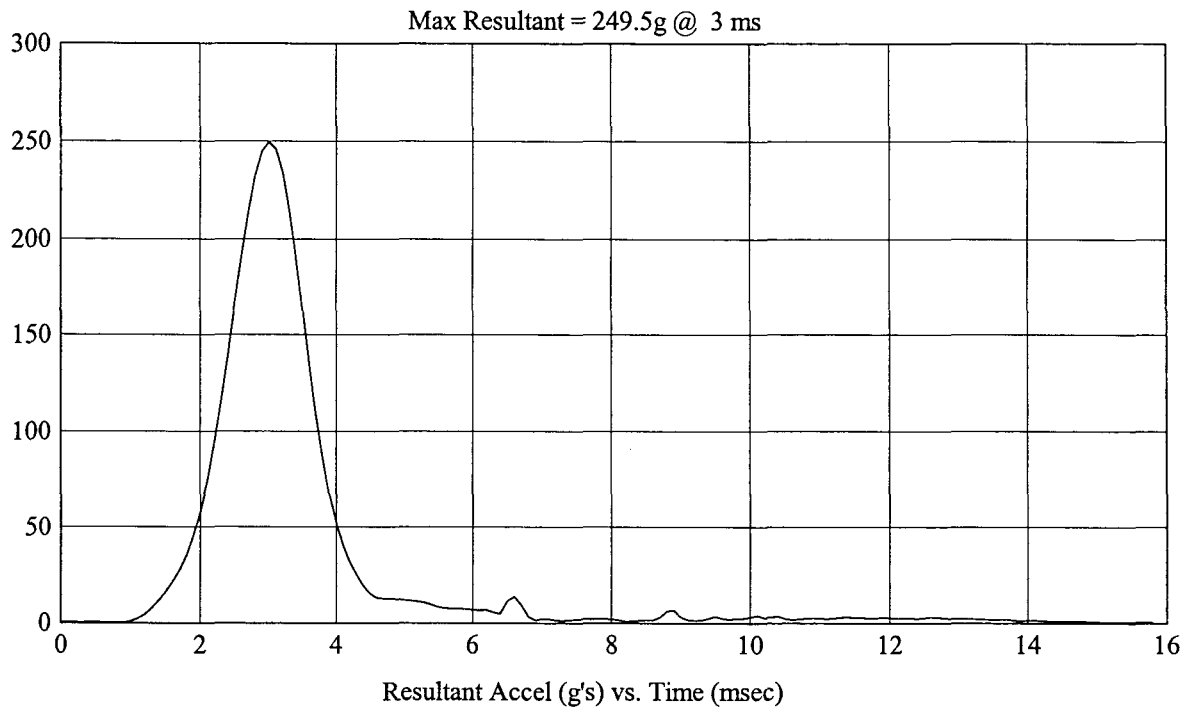
Test Number: H36263

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head # : 36



Head Drop
(Preliminary Test Report)

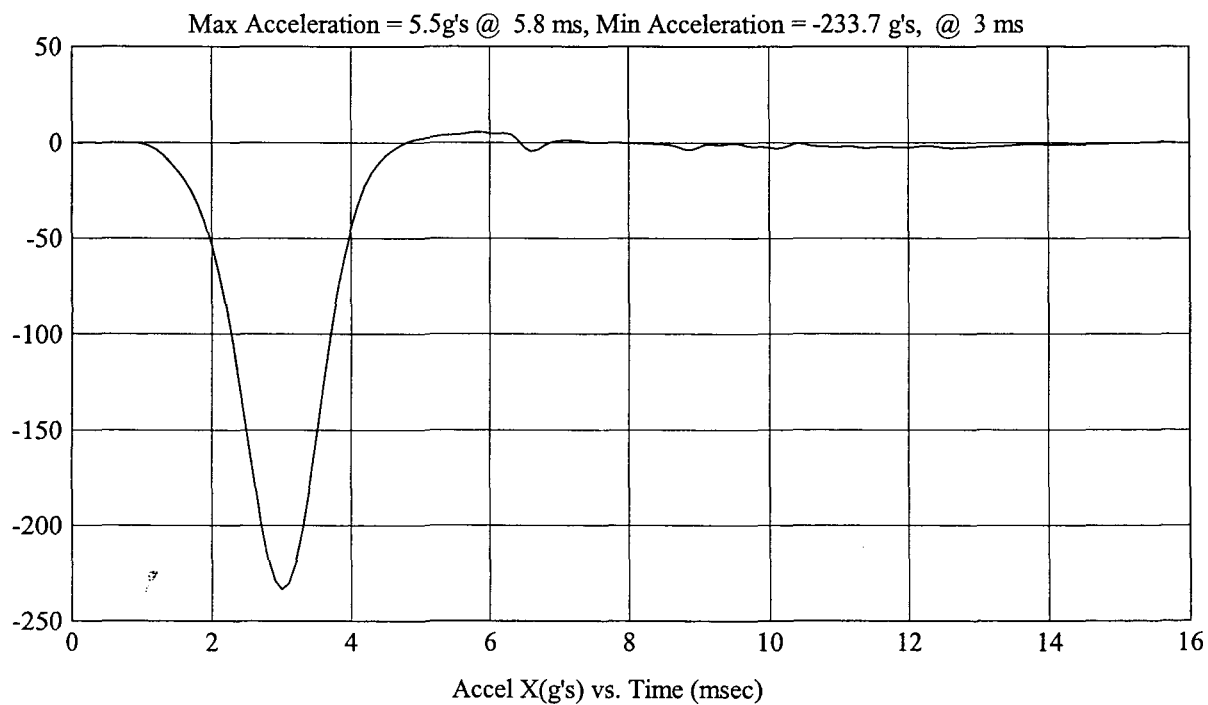
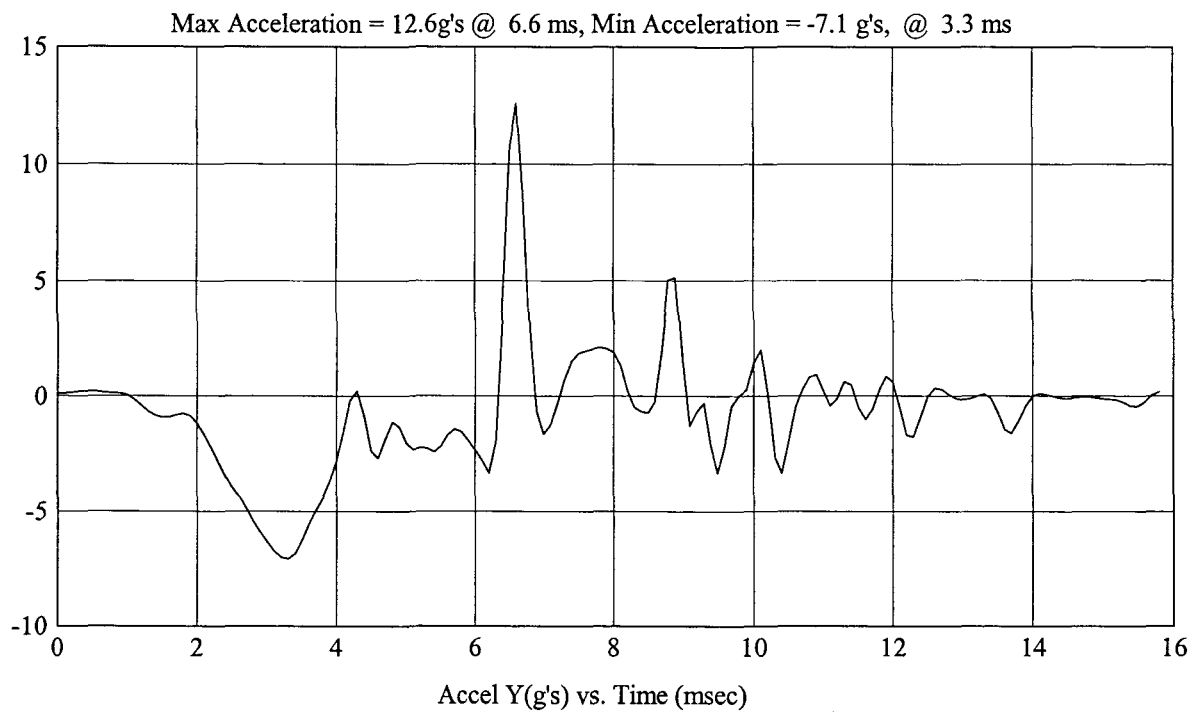
Test Number: H36263

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head #: 36



Head Drop
(Preliminary Test Report)

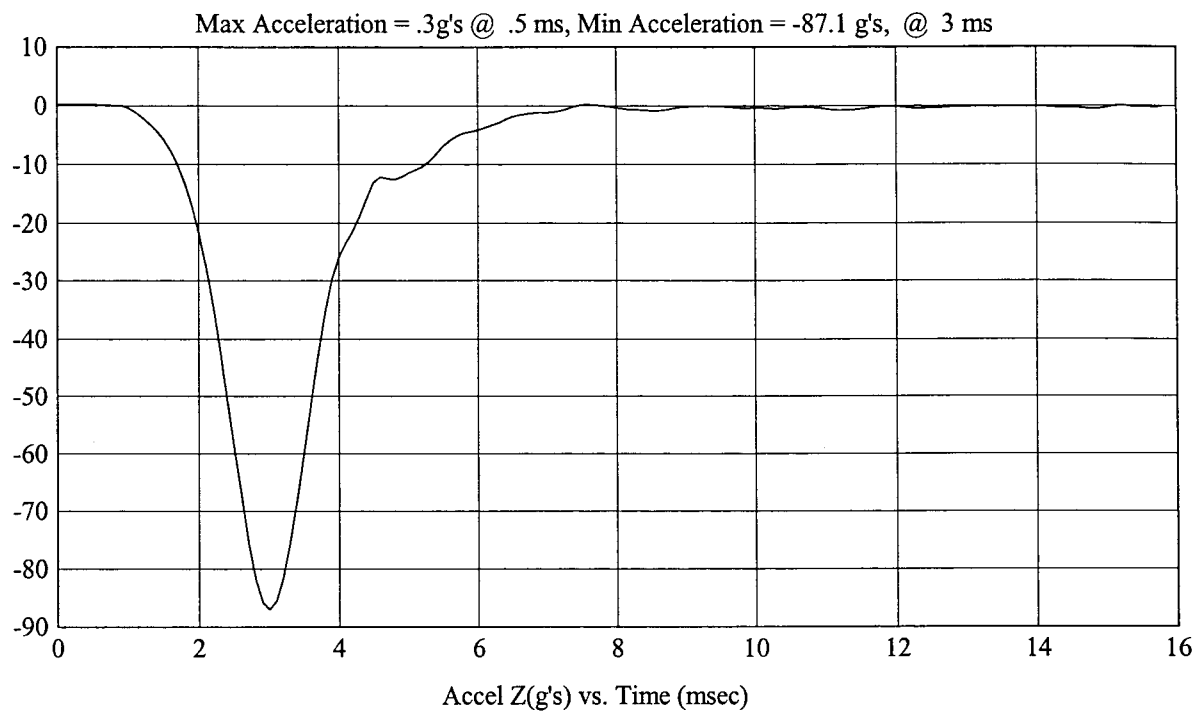
Test Number: H36263

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head # : 36



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: <u>30</u> CALIBRATION DATE: <u>9-8-04</u>		
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%	63
Peak Resultant Acceleration	225 G's to 275 G's	242.8
Peak Lateral Acceleration	15 G's Maximum	14.7
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	536197	5-23-04	11-23-04
3	ENDEVCO	7264-2000	536193	5-23-04	11-23-04
4	ENDEVCO	7264-2000	536353	5-23-04	11-23-04

REMARKS:

RECORDED BY: [Signature] DATE: 9-8-04
APPROVED BY: [Signature]

Head Drop
(Preliminary Test Report)

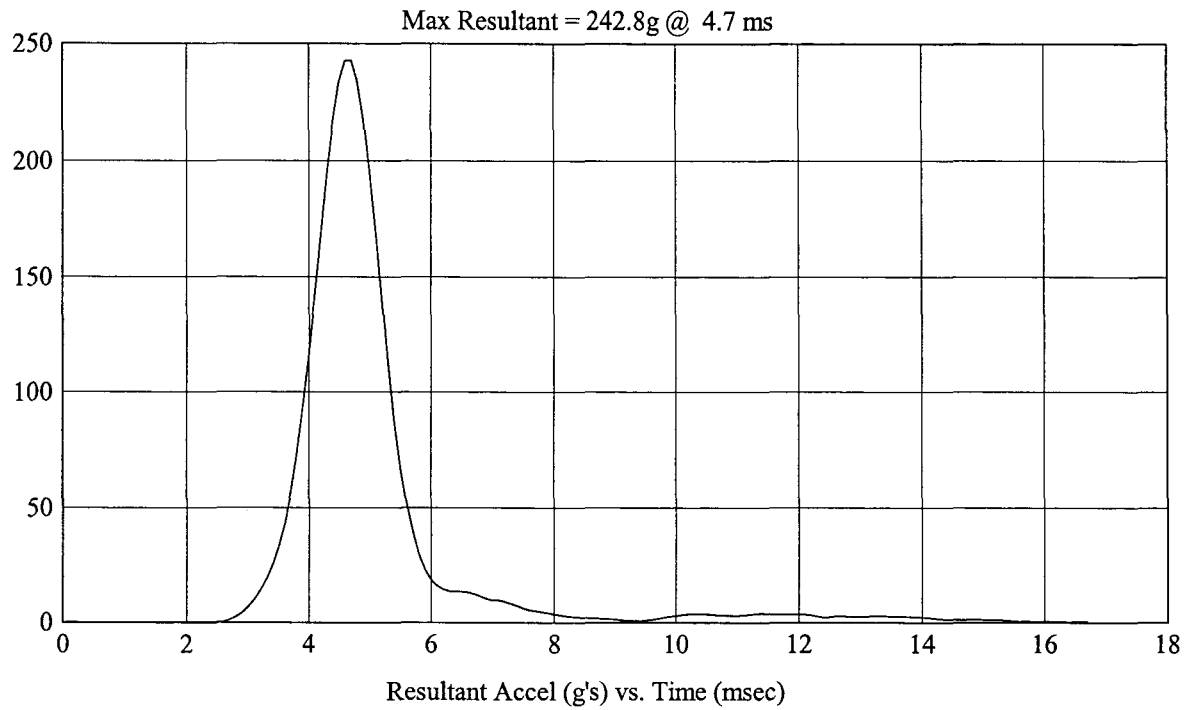
Test Number: H38248

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head # : 38



Head Drop
(Preliminary Test Report)

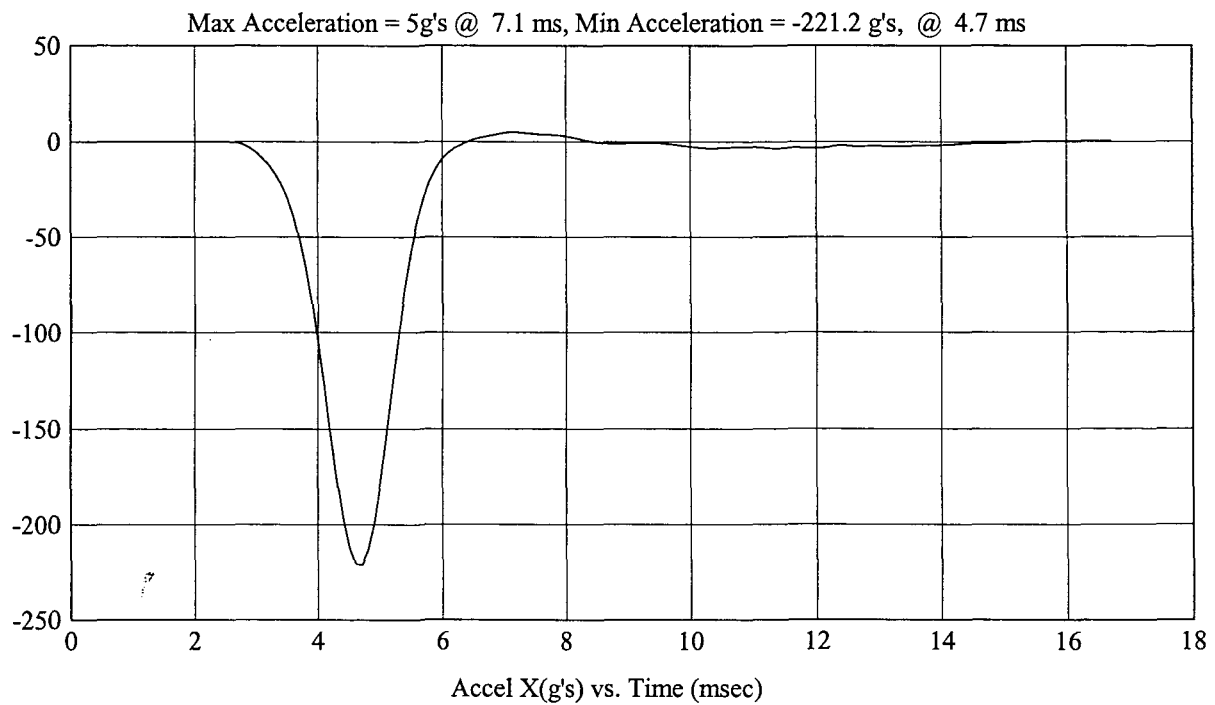
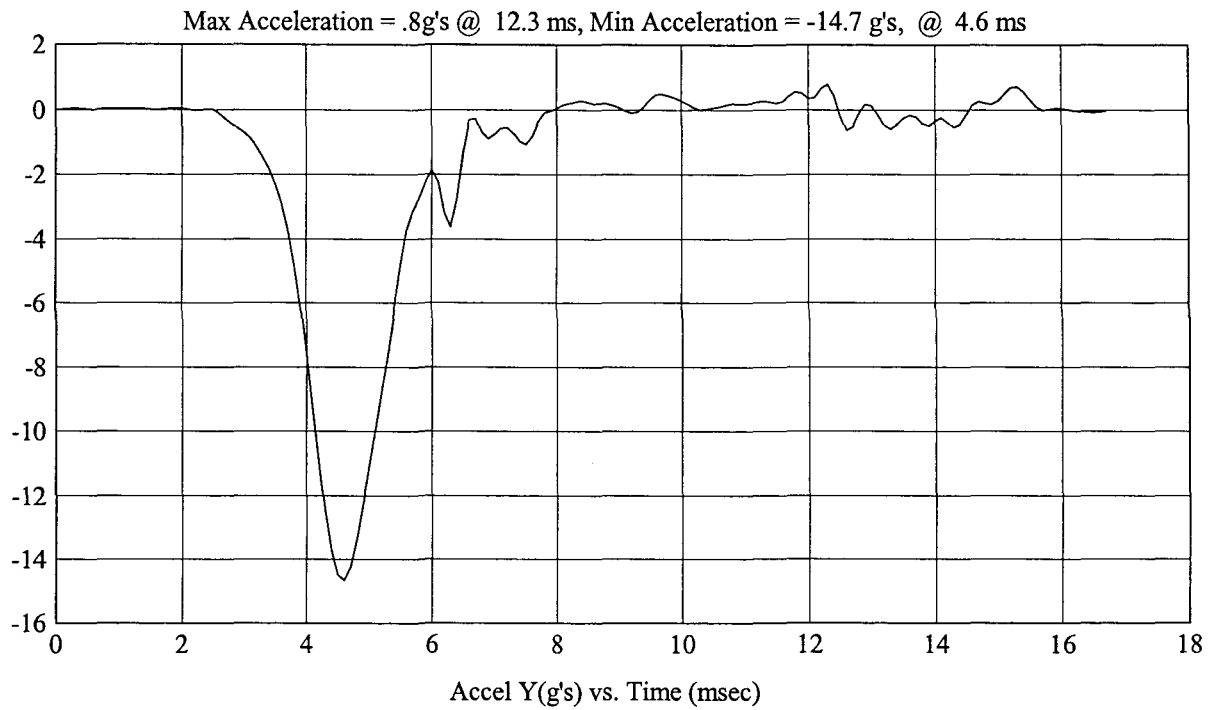
Test Number: H38248

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head #: 38



Head Drop
(Preliminary Test Report)

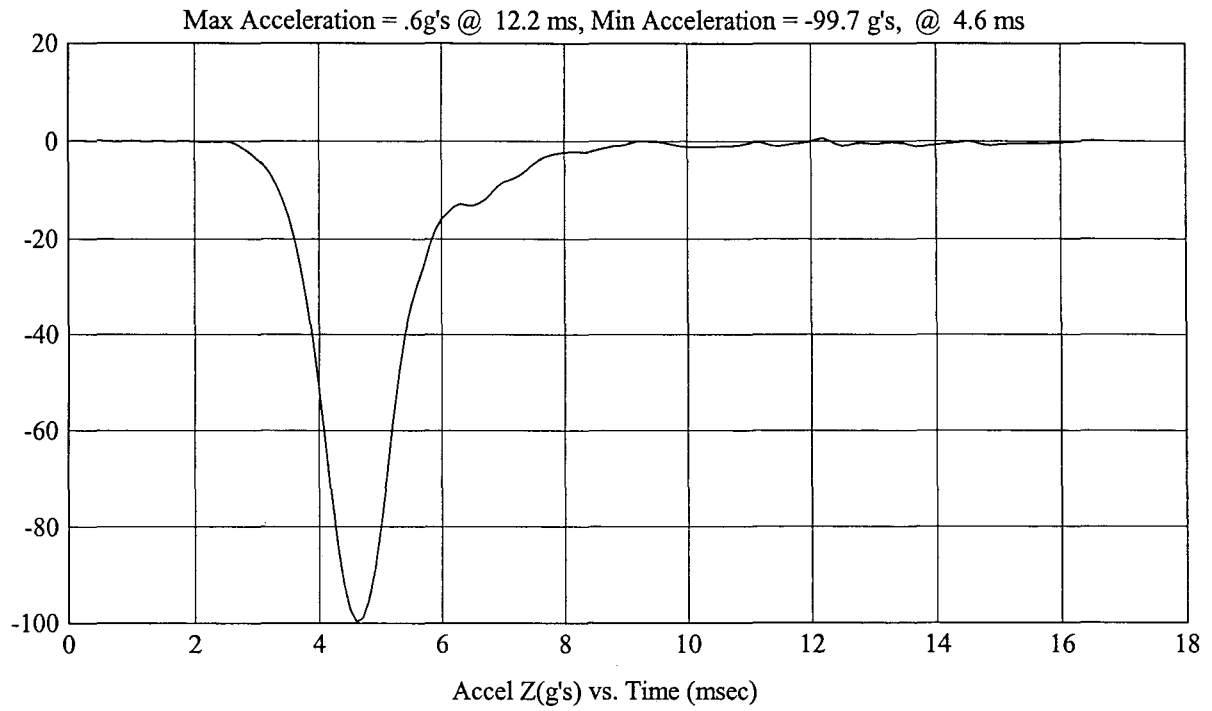
Test Number: H38248

MGA Job Number: G04I7-001.17

Test Date: 9/8/04

Test Description: Pre - Test Calibration

Head # : 38



MICHIGAN OPERATIONS
DATE: 3/20/03
SUPERCEDES: MGATPHDT.5

DOC. NO.: MGATP201UHD
REVISION NO.: 6
PAGE 6 OF 7

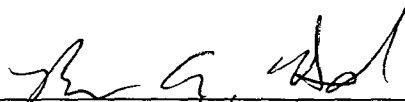
HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>038</u> CALIBRATION DATE: <u>9-9-04</u>		
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%	54
Peak Resultant Acceleration	225 G's to 275 G's	238.3
Peak Lateral Acceleration	15 G's Maximum	10.0
Unimodal Acceleration Curve	YES	1/65

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:

9-9-04

APPROVED BY:



Head Drop
(Preliminary Test Report)

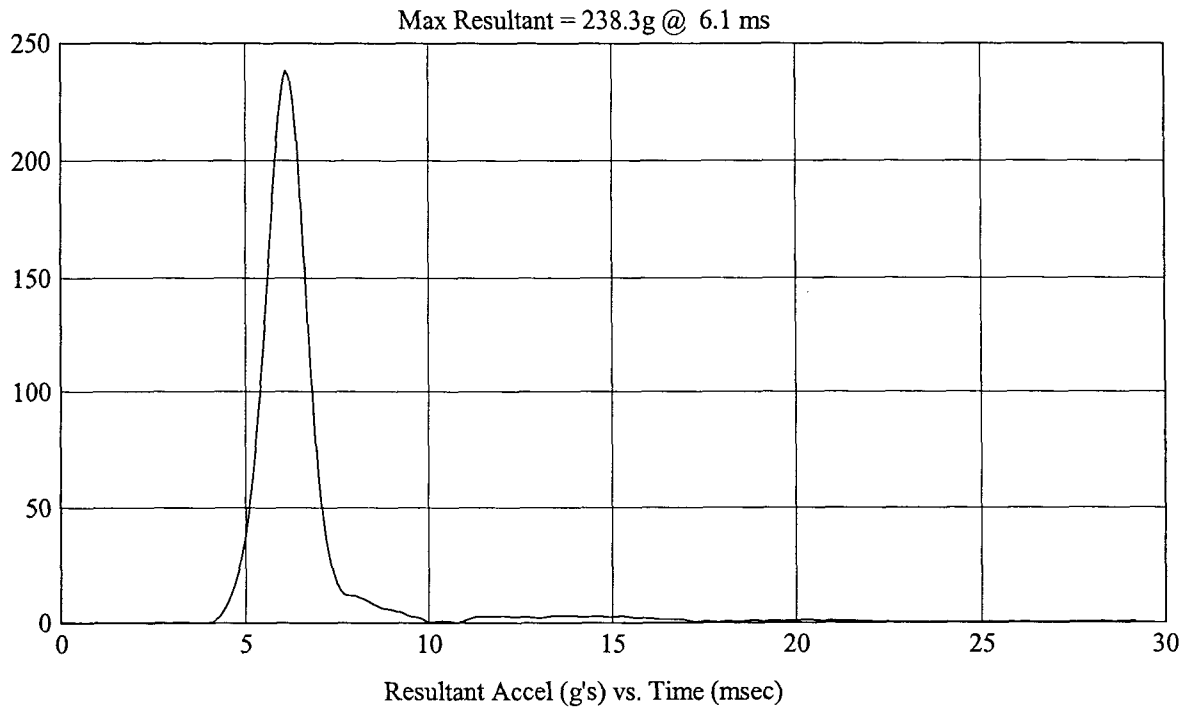
Test Number: H38249

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head # : 38



Head Drop
(Preliminary Test Report)

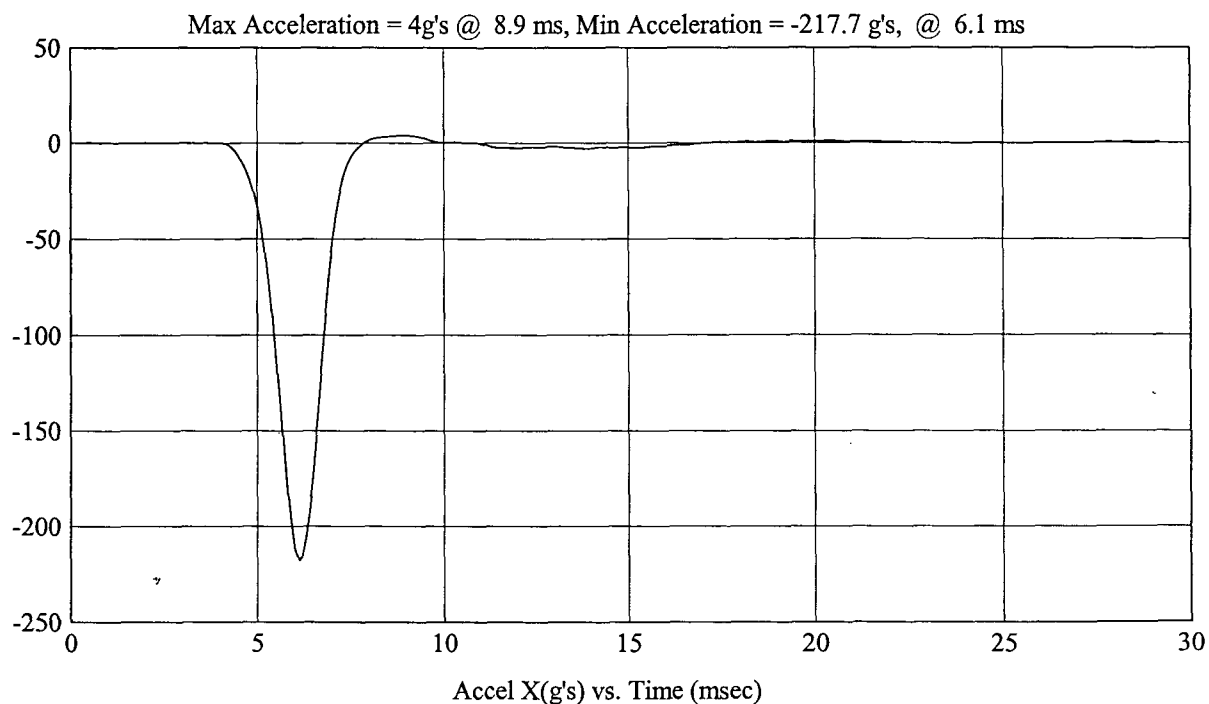
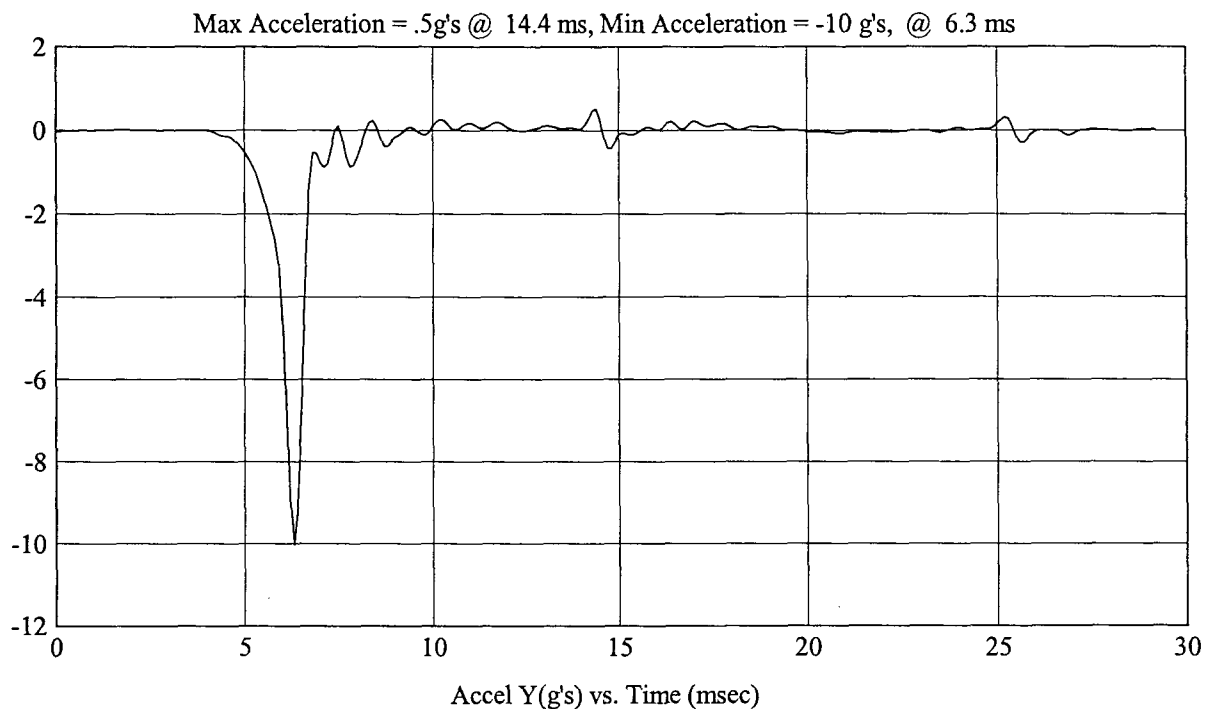
Test Number: H38249

MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

Head # : 38



Head Drop
(Preliminary Test Report)

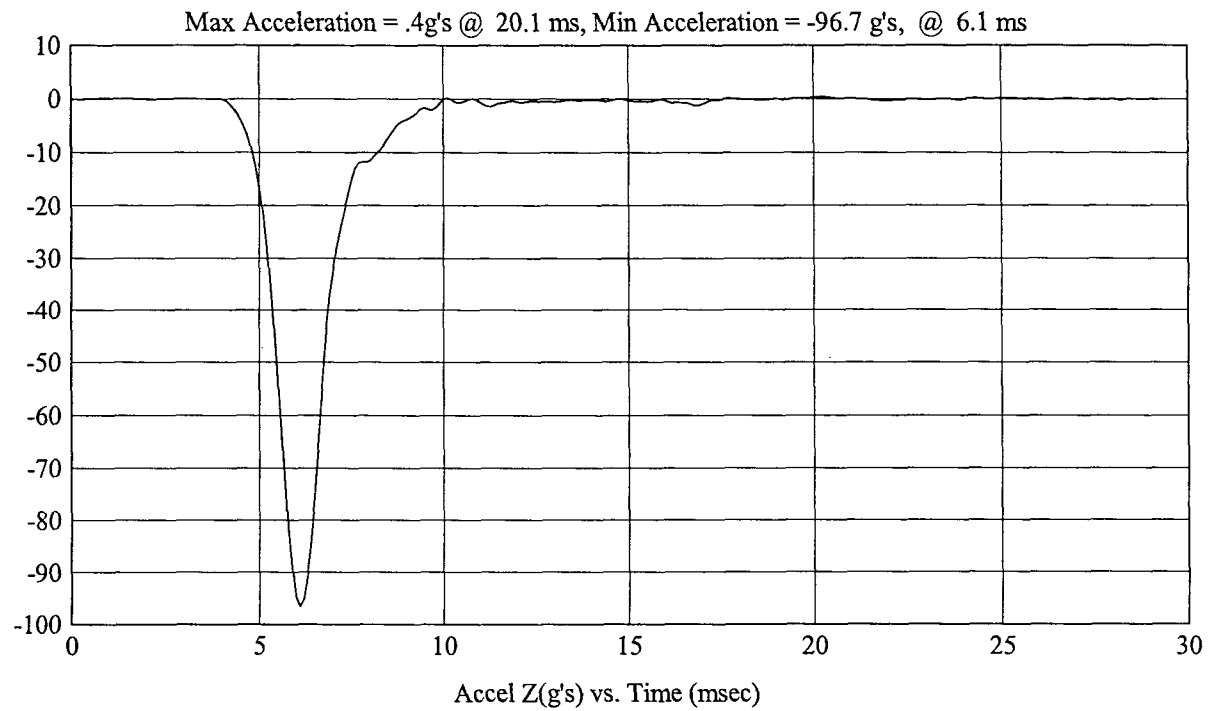
Test Number: H38249

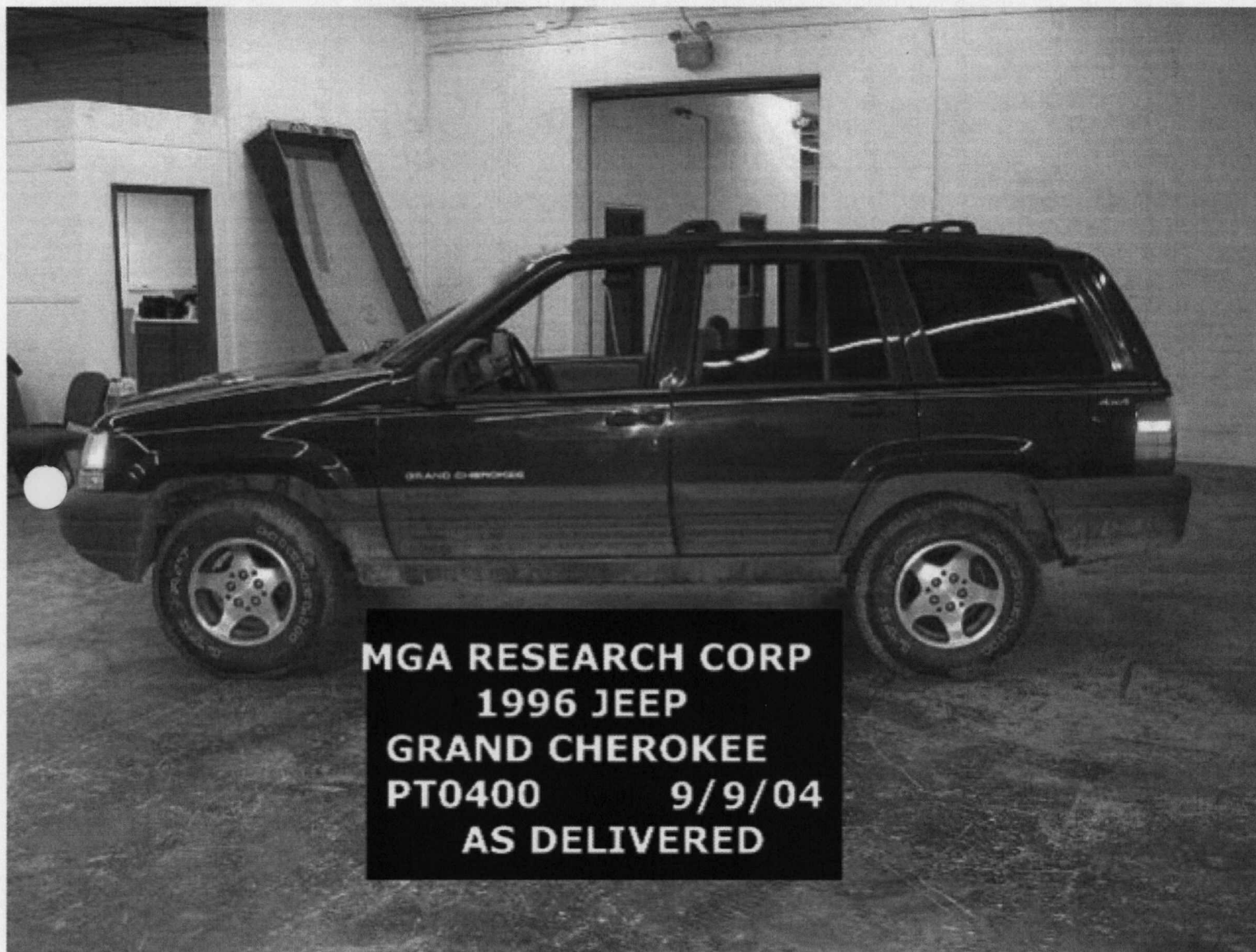
MGA Job Number: G04I7-001.17

Test Date: 9/9/04

Test Description: Post - Test Calibration

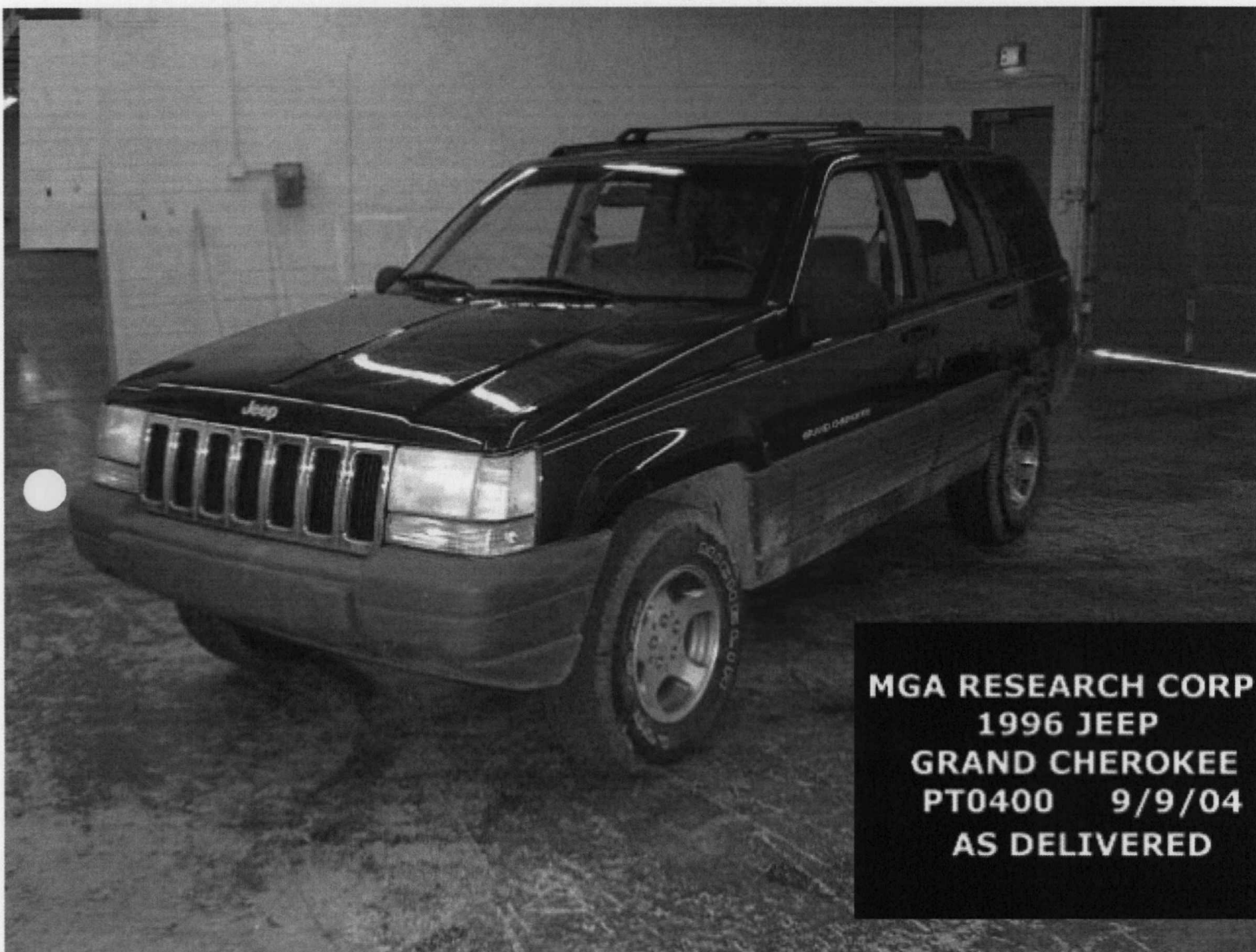
Head #: 38



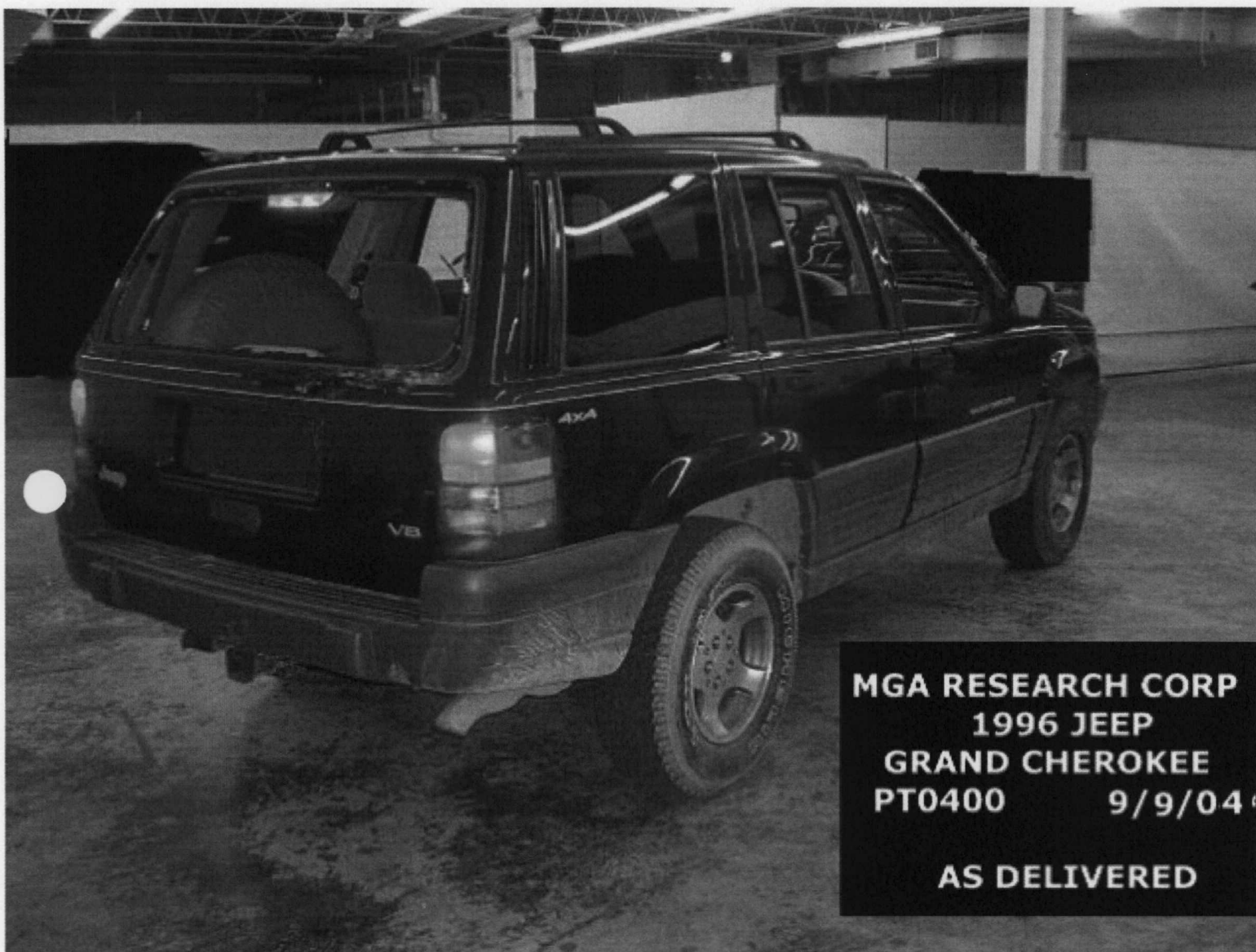




**MGA RESEARCH CORP
1996 JEEP
GRAND CHEROKEE
PT0400 9/9/04
AS DELIVERED**



**MGA RESEARCH CORP
1996 JEEP
GRAND CHEROKEE
PT0400 9/9/04
AS DELIVERED**



MFD BY CHRYSLER
CORPORATIONDATE OF MFR
11-95GVWR
05500 LB 2495 KG

GAWR FRONT

2750 LB 1248 KG

WITH TIRES

P225/75R15

RIMS AT

15 X 7.0

PSI COLD

36

GAWR REAR

2950 LB 1339 KG

WITH TIRES

P225/75R15

RIMS AT

15 X 7.0

PSI COLD

36

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

VIN: 1J4GZ58YXTC

TYPE:

MPV

SINGLE X DUAL

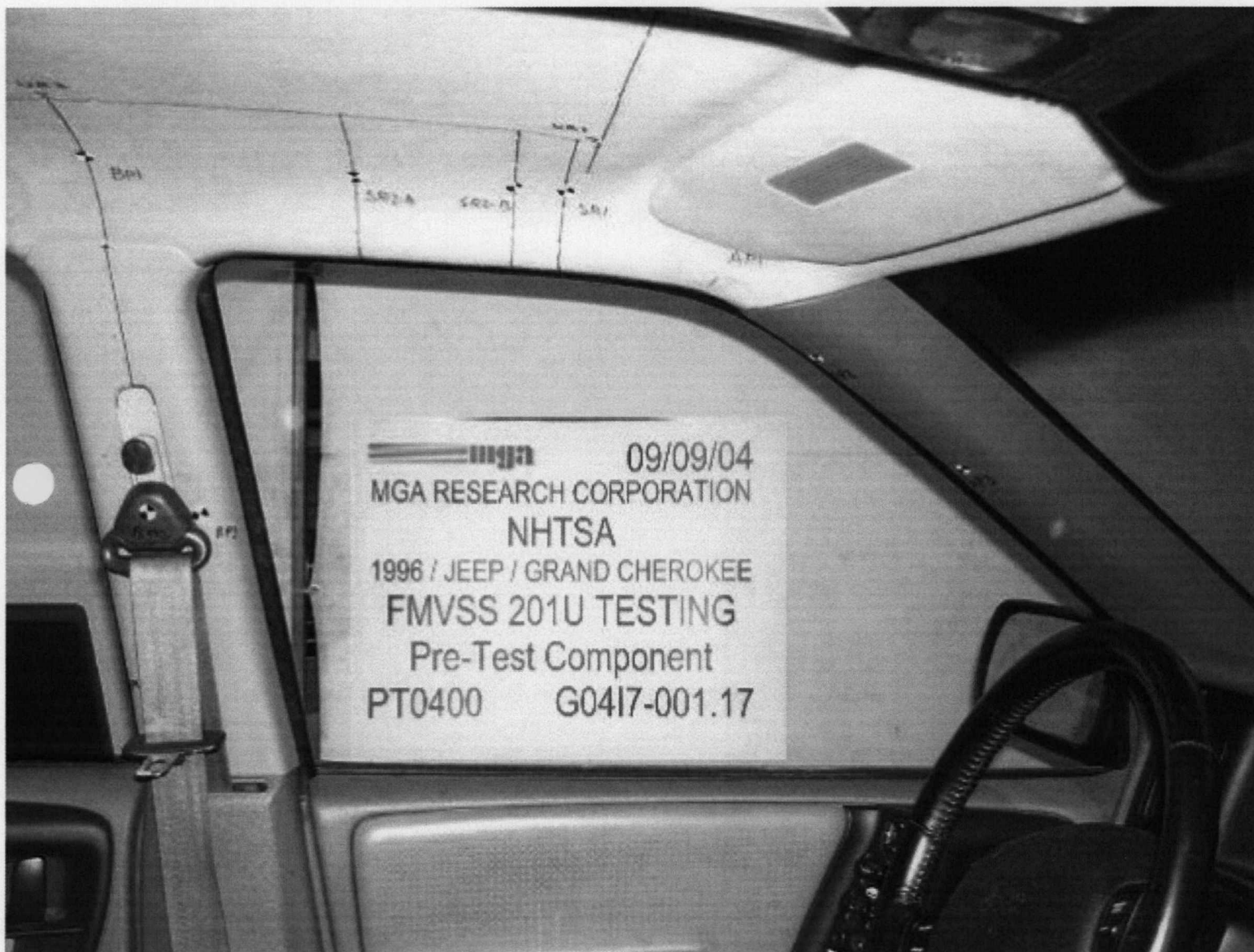
MDH:

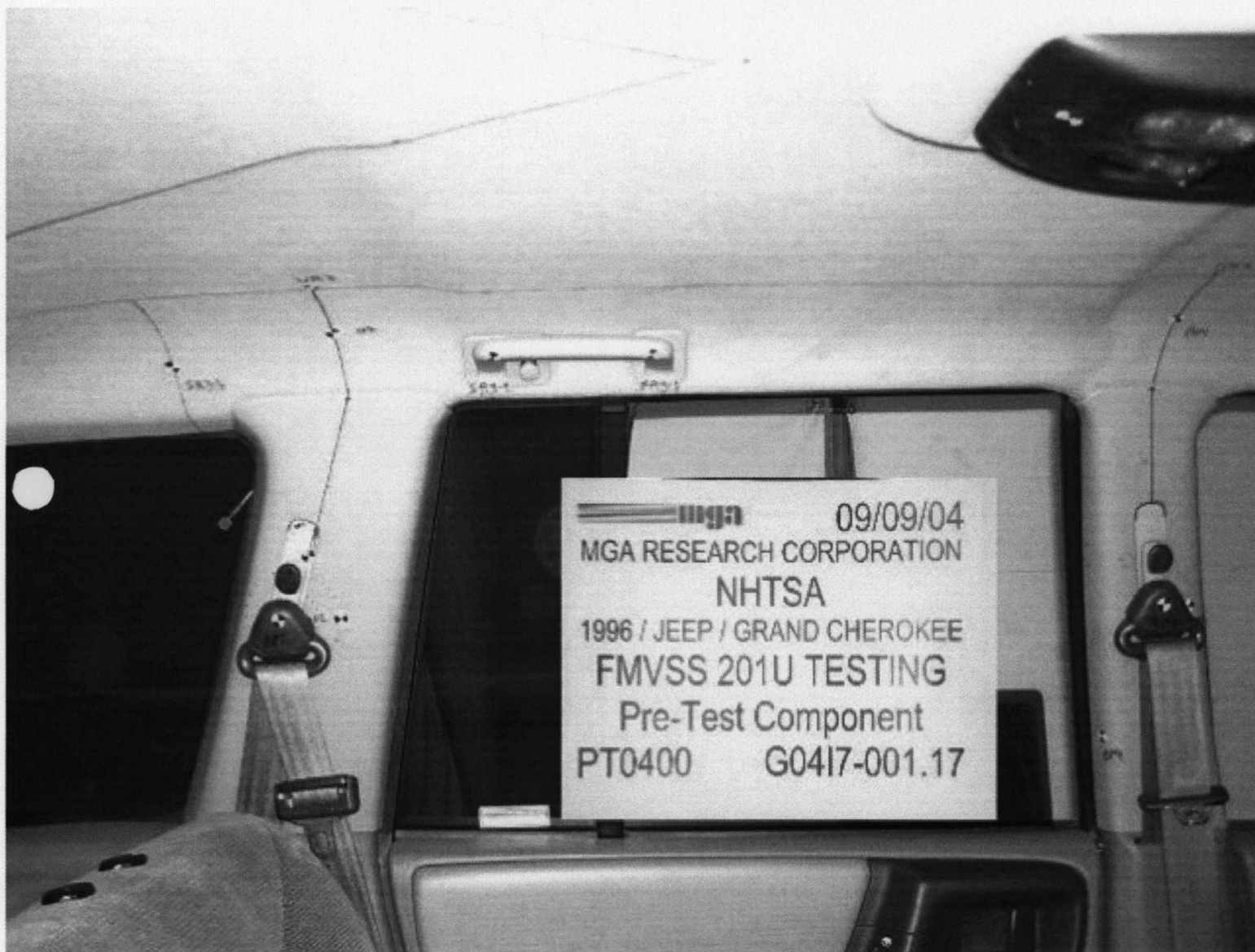
112909 350

PAINT:PEG

VEHICLE MADE IN U.S.A. TRIM:FSC3 4648503



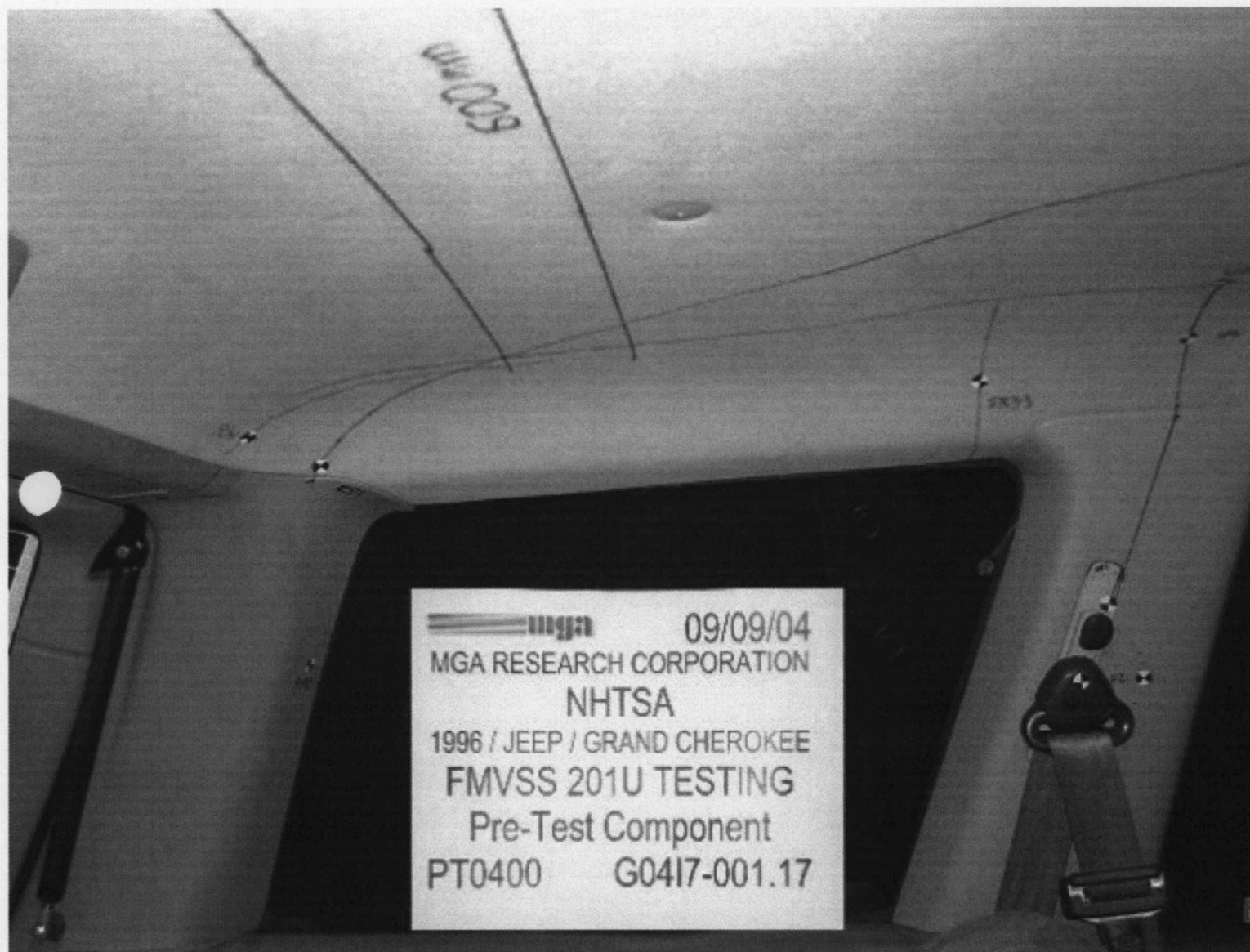








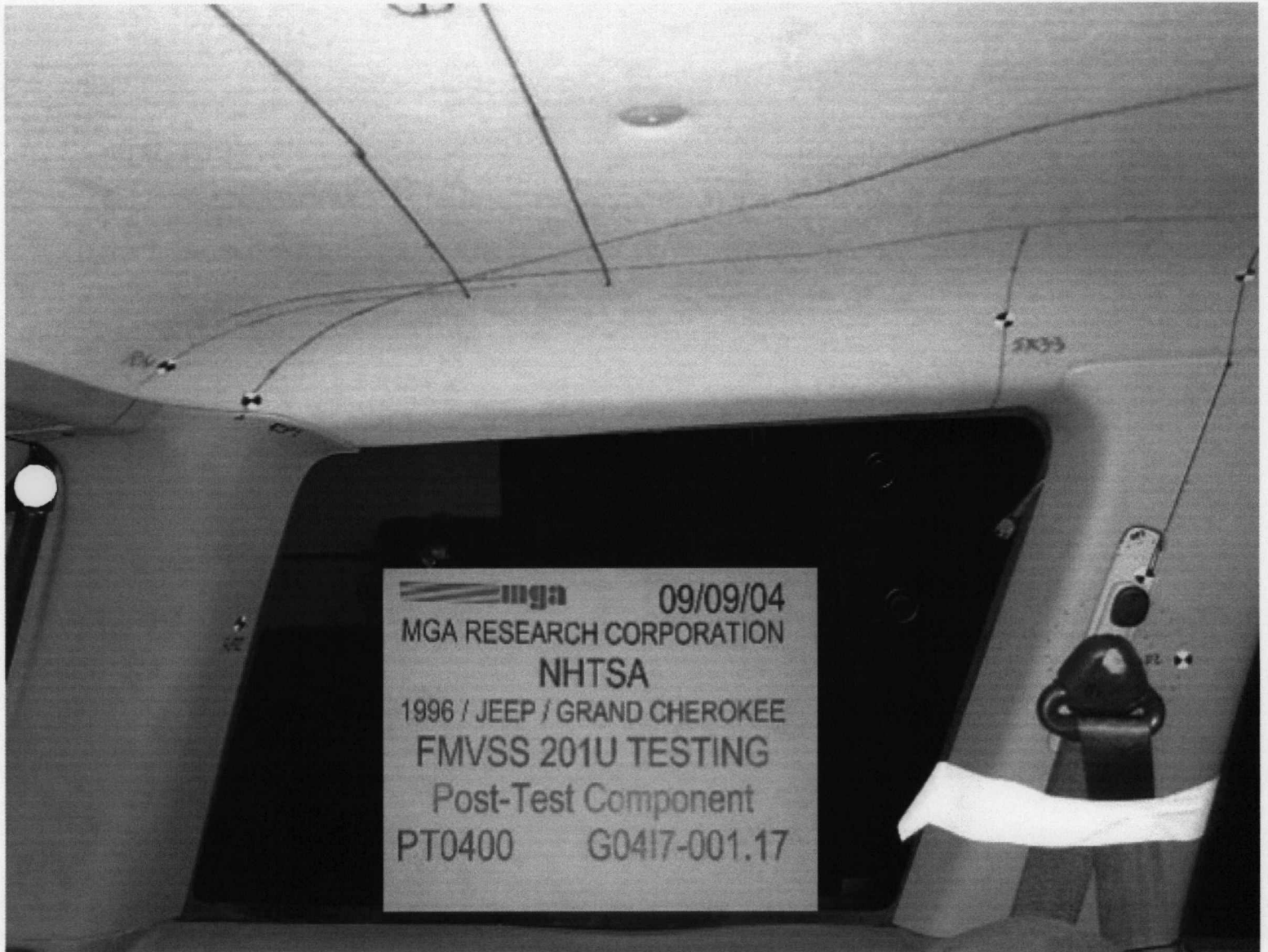








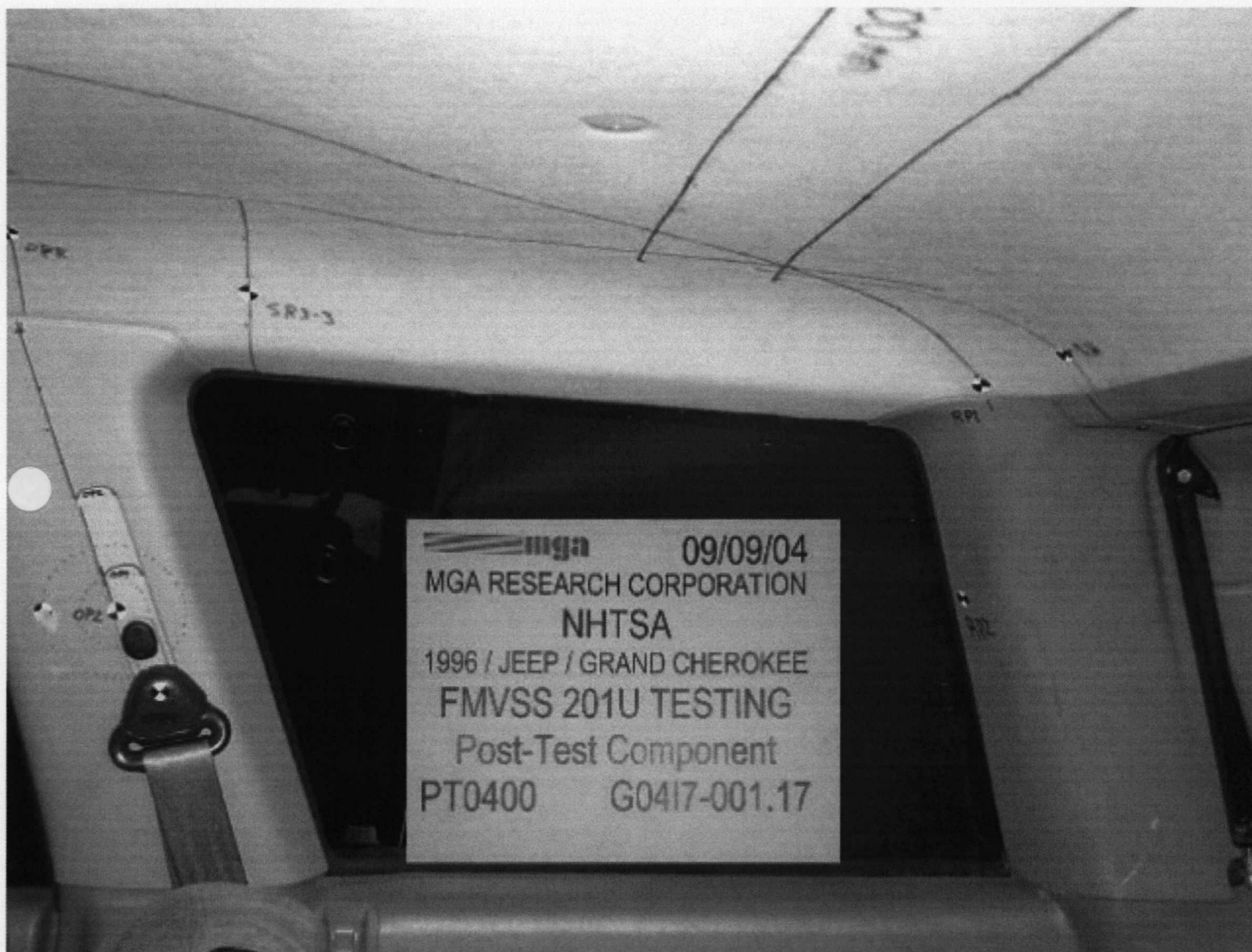




 09/09/04
MGA RESEARCH CORPORATION
NHTSA
1996 / JEEP / GRAND CHEROKEE
FMVSS 201U TESTING
Post-Test Component
PT0400 G0417-001.17









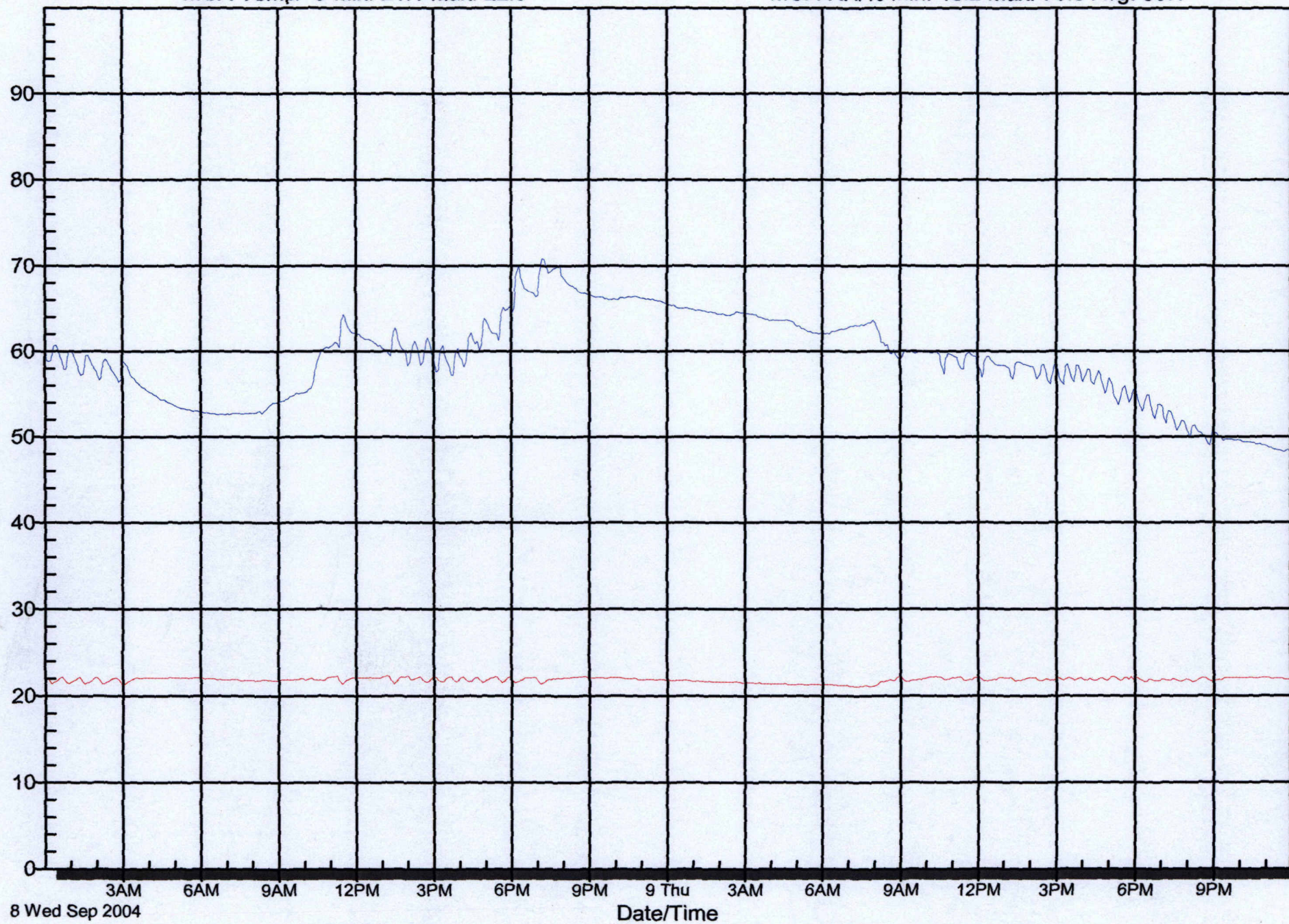


1996 Jeep Grand Cherokee PT0400

September 8-9, 2004

MGA-Temp/°C Min: 21.1 Max: 22.3

MGA-RH/% Min: 48.2 Max: 70.8 Avg: 59.1



A-1



mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7624-2000	Model: 301M09/484B
S/N: J35924	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 5/21/04	Calibration Date: 5/11/04
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0410

New DLR (100k , Units: G): 92.3

StdDeviation (%): 0.106

% Difference in DLR (New vs. Old): 0.506

Temperature (°F): 72

Humidity (%): 47

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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 $k=2$.



mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7624-2000	Model: 301M09/484B
S/N: J35919	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 5/21/04	Calibration Date: 5/11/04
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0410

New DLR (100k , Units: G): 93.8

StdDeviation (%): 0.066

% Difference in DLR (New vs. Old): -0.27

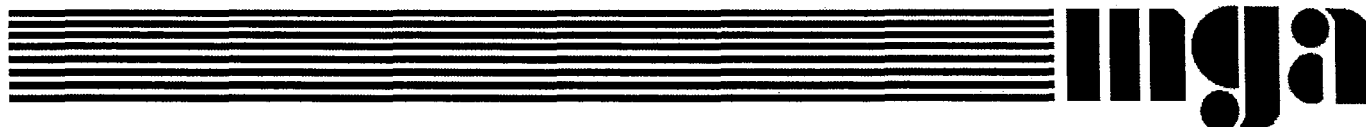
Temperature (°F): 72

Humidity (%): 47

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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 $k=2$.



mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	Name: <i>Reference Accelerometer</i>
Model: 7624-2000	Model: <i>301M09/484B</i>
S/N: J21969	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 5/19/04	Calibration Date: <i>5/11/04</i>
	Calibrated By: <i>Chris Vega/PCB Piezotronics, Inc.</i>

Test Reference Number: A0409

New DLR (100k , Units: G): 88.5

StdDeviation (%) 0.194

% Difference in DLR (New vs. Old): -1.641

Temperature (°F): 73

Humidity (%): 43

Performed By:

Approved By:

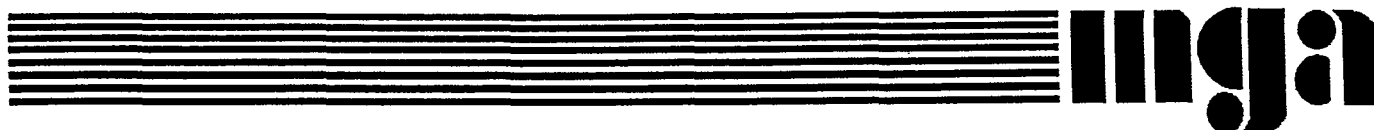
All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.

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: <i>Reference Accelerometer</i>
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: <i>Chris Vega/PCB Piezotronics, Inc.</i>

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

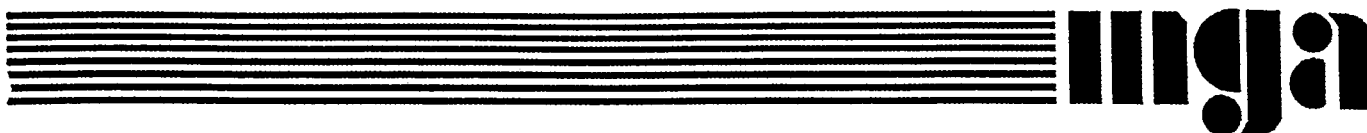
Humidity (%): 50

Performed By: *Scott Campbell*

Approved By: *Heena Q. Kalita*

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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: <i>Reference Accelerometer</i>
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: <i>Chris Vega/PCB Piezotronics, Inc.</i>

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: *James Campbell*

Approved By: *Steven A. Kalito*

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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: <i>Reference Accelerometer</i>
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: <i>Chris Vega/PCB Piezotronics, Inc.</i>

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:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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: <i>Reference Accelerometer</i>
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: <i>Chris Vega/PCB Piezotronics, Inc.</i>

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

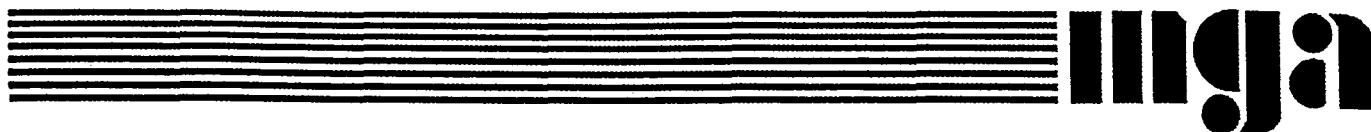
Humidity (%): 50

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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: <i>Reference Accelerometer</i>
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: <i>Chris Vega/PCB Piezotronics, Inc.</i>

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:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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: <i>Reference Accelerometer</i>
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: <i>Chris Vega/PCB Piezotronics, Inc.</i>

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:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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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~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 <i>CV. #36</i>
Temperature: 74° F	Relative Humidity: 42%

<u>TESTS</u>	<u>BEFORE</u>	<u>AFTER</u>
INPUT VOLTAGE ($24 \pm 0.1V$)	24.02	24.02
ICP CURRENT ($4 \pm 0.6mA$)	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 $\pm 0.2\%$.

This certificate may not be reproduced, except in full, without written approval of

~ Calibration Certificate ~

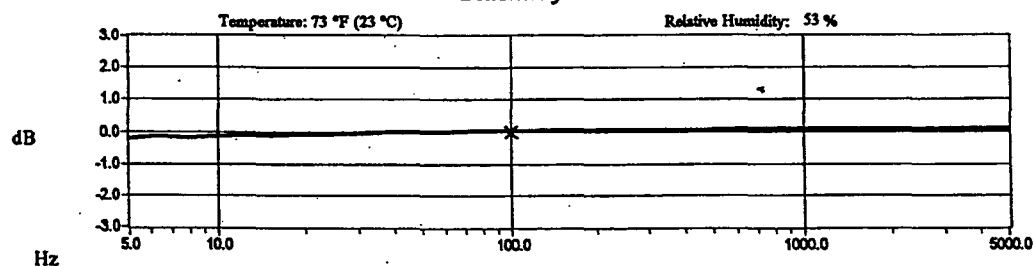
Per ISO 10063-21

Model Number: 301M09/484B (394M17 SYSTEM)Serial Number: 862/2470Description: ICP® AccelerometerMethod: Back-to-Back Comparison CalibrationManufacturer: PCB

Calibration Data

Sensitivity @ 100.0 Hz **31.17 mV/g** Output Bias **8.6 VDC**
 (3.179 mV/ms²) 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 with Mounting Grommet Fastener: Steel Mount
 Acceleration Level (avg): **16.0 g (98.1 m/s²)**

Verified

*The acceleration level may be limited by shaker displacement at low frequencies. If the stated level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (g) = 0.010 x (Hz)^{1.5}
 *The gravitational constant used for calculations by the calibration system is: 1 g = 9.80665 m/s².

Condition of Unit

As Found: In Tolerance, No Adjustment NecessaryAs 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/NCCL 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 DiMaggioDate: 05/13/04

Cert No 1002.01

PCB PIEZOTRONICS™

VIBRATION DIVISION

3425 Walden Avenue Depew, NY 14043

TEL: 812-684-0013 FAX: 716-685-3886 www.pcb.com

PAGE 1 of 1

mfr - 316728200.24

Interim Certification Document

Part Description: Silver

Serial Number: S08059801273

Single Point 2Sigma: S08-05 +/-0.076mm (+/-0.0030")

Linear Displacement 2 Sigma: S08-05 +/-0.108mm (+/-0.0042")

Certification Date: August 26, 2004

Measurement Standards, N.I.S.T., U.K.A.S. TRACEABILITY

Bal-Tec Invar Ball Bar Kit	Kit Number: 543	N.I.S.T. Cert No.: LL0101/0310	Date: 08/18/04
		U.K.A.S. Cert No.: LL0101/0310	Date: 08/18/04

"The Ball Bar Kit above has been calibrated against a laser interferometer traceable to NIST and UKAS standards (see test numbers above.)"

Mitutoyo Corporation, 10mm Step Gauge,	Code NO.: 515-744,	Serial Number: 410101	N.I.S.T. Control No.: 110107226	Date: 04/06/04
Measuring Range: 1.5m			U.K.A.S. Cert No.: 150674	Date: 02/25/04

Certification Results

A basic 4 quadrant certification included with all Faro Arms and compromised of: 2 vertical level single point repeatability test: **PASSED**
in 4 quadrants with 5 repeats from 4 directions.

Step gauge test in 4 quadrants 3 orientation per quadrant. **PASSED**

3 Length, 3 position free ball bar test in 4 quadrants. **PASSED**

This Instrument as received was within specification.

Ambient Temperature: 22°C +/- 3°C

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

Technician:

Patrick Newell

Date: 8/26/04
8/26/2004

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

FARO

Revised: August 19, 2004

Faro Technologies, Inc.
PH: (407)333-9911

125 Technology Park
1-800-736-2771

Lake Mary, FL 32746
FAX: (407)333-8056

\\faro\control\forms\07gcont\English\07form\077-023.xls



Certificate Number: 20040729Cal

Detroit Testing Laboratory, Inc.



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
Calibration Due: 3/24/05
Calibration Interval: 12 Month
Rec'd In Tol:¹ Yes/Pass
Returned In Tol:¹ Yes/Pass
Performed On Site: No
Calibration Limitation:

Procedure Used: 33K6-4-72-1/98
Calibrated to: MFR SPEC
Temperature: 24 °C
Humidity: 37 %RH

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: <u>Jerry Wells</u> Jerry Wells	Date: <u>3-24-04</u> Technician	Approved: <u>Paul W.</u> Date: <u>3-24-04</u>
Date Printed: 03/24/04 Printed By: Jerry Wells		Page: 1 of 2 QFC 1048-1 Rev 4/17/03

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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 out	Reading As Left lb out	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

MICHIGAN OPERATIONS
DATE: 3/21/03
SUPERCEDES: MGATPTMC.3

DOC. NO.: MGATPTMC
REVISION NO.: 4
PAGE 3 OF 3

Tape Measure Calibration Certificate

Reference Steel Rule

Brand: G&E
S/N: C18033
Calibration Date: 11.24.03

Subject Tape Measure

Brand: STANLEY
S/N: 289
Calibration Date: 1.7.04

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: **Kelly McReynolds**

Calibration Date: **01/22/2004**

Calibration Standards

General Reference Model # M1

Ser. # 0450004 / 220001

Accuracy: $\pm 4\%$ FS RH and $\pm 1^\circ\text{F}$

Certified February, 2003 / August, 2003

Asmet Model # CAU11F Ser. # 12313-0417

RTH Platinum Probe Ser. # 496013 Accuracy: $\pm 0.2^\circ\text{F}$

Certified February, 2003

Cole Parmer Model # PT1000-90111-00

Ser. # 10067849 / Ser. # 18148057 Accuracy: $\pm 0.1^\circ\text{F}$

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 standards. 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/CSL E540, ISO/IEC guide 15, 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 limit or drift before the recommended interval has expired. A2LA Certificate Number: 16211-01.

Environmental Conditions:

72°F

41% RH

Calibration Standard Reading	Customer Instrument Reading	Unit Specification
Humidity (%RH)	Humidity (%RH)	Humidity
22.1	22.9	$\pm 2\%$ RH
55	56.1	$\pm 2\%$ RH
86.6	88.2	$\pm 2\%$ RH
Temperature °F	Temperature °F	Temperature
73.5	73.1	$\pm 1.3^\circ\text{F}$ ($\pm 0.7^\circ\text{C}$)
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 of 95% CL (K=2) of $\pm 0.7^\circ\text{F}$ and $\pm 1.1\%$ 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 R.A.#.

1. Purchase Order

That's all there is to it!

Name: _____

Phone: _____

Model #: **TR320**

Serial #: **04018409**

3. Please return via:

☐ Ground Freight*

☐ 2nd Day Air*

☐ Next Day Air*

*Charges added at factory

2. ☐ 1-Point Deluxe NIST Calibration \$149.00

☐ 3-Point Deluxe NIST Calibration \$199.00

☐ 3-Point Ultimate 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)

4. Ship To:

Charts/Posters

(Order now and receive them with your calibrated unit)

☐ 6 Red Post

Order No. P222

Qty. _____

Price \$36 pk.

☐ 3 Red/3 Blue Post

Order No. P246

Qty. _____

Price \$36 pk.

☐ Chart (60 per box)

Order No. C

Qty. _____

Price \$24 box

*Please fill in the order number. For a listing of available charts go to www.dicksonweb.com

click on "product search" and select the product type. Thank you.

Prices are subject to change.

Let Dickson remind you the next time you call to see for calibration. Register for our FREE Calibration Club now at www.dicksonweb.com

Dickson Calibration Services

594 South Westwood Avenue Addison, Illinois 60101 530-343-3741 Fax 530-343-3742

NuWeigh, Inc.

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

CALIBRATION / TEST REPORTPage 1 of 1

SCR 4365

Customer: <u>MGA Research</u>	Date of service: <u>3-23-04</u>	Location: <u>C.S.</u>
Address: <u>446 Executive Dr.</u>	Last known test date: <u>3-25-03</u>	Environmental conditions acceptable: ☒ Yes ☐ No
City: <u>Troy</u> State: <u>MI</u> Zip: <u>48063</u>	Frequency: ☒ Annual ☐ Semi Annual ☐ Quarterly ☐ Monthly ☐ Bi Monthly ☐ Other	

Indicator Mfg. <u>Cardinal</u>		Platform Mfg. <u>Cardinal</u>		Indicator Mfg.		Platform Mfg.			
Model	Serial No.	Model	Serial No.	Model	Serial No.	Model	Serial No.		
<u>708</u>	<u>9804-022</u>	<u>8950 F</u>	<u>9805-175</u>						
Seal Applied? ☐ Yes ☒ No		Platform size: <u>28"x28"</u>		Seal Applied? ☐ Yes ☐ No		Platform size:			
Customer ID: <u>Shop</u>		Cap. x Grad: <u>2000 x 1 lb</u>		Customer ID:		Cap. x Grad:			
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
<u>0</u>	<u>0</u>	<u>0</u>							
<u>100 lb</u>	<u>100</u>	<u>0</u>							
<u>300 lb</u>	<u>300</u>	<u>0</u>							
<u>500 lb</u>	<u>500</u>	<u>0</u>							
<u>300 lb</u>	<u>300</u>	<u>0</u>							
<u>100 lb</u>	<u>100</u>	<u>0</u>							
<u>0</u>	<u>0</u>	<u>0</u>							
<u>X</u>	<u>X</u>	<u>X</u>							
Load Section #1	<u>100</u>	<u>0</u>			Load Section #1				
Load Section #2	<u>100</u>	<u>0</u>			Load Section #2				
Load Section #3	<u>100</u>	<u>0</u>			Load Section #3				
Load Section #4	<u>100</u>	<u>0</u>			Load Section #4				

Scale meets HB44 tolerance: Yes X NoStandards used (serial nos.): 6-15Estimated 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

This report may not be reproduced, except in full, without the written approval of this laboratory.

Mike Kint
 TECHNICIAN

3-23-04
 DATE

George Baber
 CUSTOMER

White - Customer Copy

Canary - File Copy

SCR Rev. 7.6/02



Certificate Number: 20040204Cal

Detroit Testing Laboratory, Inc.



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
Calibration Due: 1/28/05
Calibration Interval: 12 Month
Rec'd In Tol: Yes/Pass
Returned In Tol: Yes/Pass
Performed On Site: No

Procedure Used: 33K6-4-1597-1/99
Calibrated to: MFR SPEC
Temperature: 20 °C
Humidity: 35 %RH

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: <u>Paul Wonsowicz</u> Paul Wonsowicz Technician	Date: <u>1-29-04</u>	Approved: <u>[Signature]</u> Date: <u>1/29/04</u>
Date Printed: 01/29/04 Printed By: Paul Wonsowicz		Page: 1 of 2 QFC 1048-1 Rev 4/17/03

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