

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

**NISSAN MOTOR CO., LTD.
1998 Nissan Sentra Sedan
NHTSA No. PW5200**

**MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083**



**Test Dates: August 12-13, 2004
Report Date: August 15, 2004**

FINAL REPORT

PREPARED FOR:

**U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
OFFICE OF PLANNING, EVALUATION AND BUDGET
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16. Abstract A pre-standard test series was conducted on the subject 1998 Nissan Sentra Sedan, NHTSA No. PW5200, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201U pre-standard compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on August 12-13, 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 1998 Nissan Sentra Sedan, for FMVSS 201U, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on August 12-13, 2004 on a 1998 Nissan Sentra Sedan, manufactured by Nissan Motor Co., Ltd.

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 1998 Nissan Sentra Sedan was equipped with A, B, and rear-pillars, a grab handle located on the side rail over the front passenger door, a dome light in the center of the roof, coat hangers above the rear passenger seats, an adjustable seat belt anchorage on each B-pillar and a fixed seat belt anchorage on each rear-pillar.

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	BP1	RP1	UR2
AP2	BP2	SR1	
AP3	BP3	SR2A	

TABLE 2-1
SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Nissan Sentra Sedan

VEH. NHTSA NO.: PW5200 VIN: 1N4AB41D9WC COLOR: Green

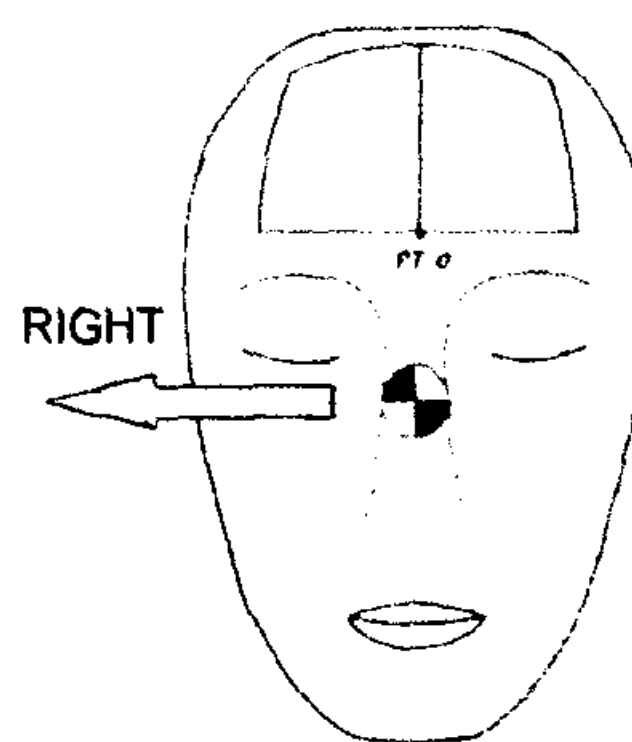
VEH. BUILD DATE: October, 1997 TEST DATES: August 12-13, 2004

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	113	21	23.8	907	981	35	10 Left
AP2	Left	203	47	23.8	1284	1481	20	0
AP3	Right	157	44	24.0	1584	1879	6	5 Left
BP1	Right	90	12	23.8	742	763	78	0
BP2	Right	90	12	24.4	670	667	28	0
BP3	Left	284	-4	23.9	770	800	17	15 Left
RP1	Right	90	14	23.6	632	617	93	0
SR1	Left	270	20	23.9	875	940	20	0
SR2A	Left	270	18	24.0	689	693	55	10 Left
UR2	Left	270	38	24.0	955	1046	55	0

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



POST TEST COMMENTS:

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

AP3 Right: Cracked pillar trim.

BP3 Left: Cracked in the B-pillar trim.

No damage was observed for any other targets.

REMARKS:

The targets listed were impacted in the following order:

Right: AP3, AP1, BP2, BP1, RP1

Left: AP2, BP3, SR1, SR2A, UR2

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

RECORDED BY: David G. Gotwals

DATE: August 13, 2004

APPROVED BY: Helen A. Kalet

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Nissan Sentra Sedan

VEH. NHTSA NO.: PW5200 VIN: 1N4AB41D9WC COLOR: Green

VEH. BUILD DATE: October, 1997 TEST DATES: August 12-13, 2004

TEST LABORATORY: MGA Research Corporation

OBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

INTERIOR TRIM INFORMATION: A, B, and rear-pillars, a grab handle located on the side rail over the front passenger door, a dome light in the center of the roof, coat hangers above the rear passenger seats, an adjustable seat belt anchorage on each B-pillar and a fixed seat belt anchorage on each rear-pillar.

SUNROOF INFORMATION:

Installed: Yes X No
 Operation: Electric Manual

ROLL-BAR INFORMATION:

Installed: Yes X No
 Padded: Yes X No
 Braces: Yes X No

GENERAL INFORMATION:

Date Received: 8/10/04; Odometer Reading: 103,505 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Nissan Motor Co., Ltd.

Date of Manufacture: October, 1997 VIN: 1N4AB41D9WC

GVWR: 1510 kg;

GAWR FRONT: 849 kg

GAWR REAR: 711 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 33 psi REAR: 29 psiRecommended Tire Size: P175/65R14

Recommended Cold Tire Pressure:

FRONT: 33 psi REAR: 29 psiSize of Tire on Test Vehicle: P175/65R14Type of Spare Tire: T115/70R14; Space Saver: X; Standard:

VEHICLE CAPACITY DATA:

Type of Front Seats: Bench ; Bucket X; Split Bench Number of Occupants: Front 2; Rear 3; TOTAL 5VEHICLE CAPACITY WEIGHT (VCW) = 369 kgNo. of Occupants x 68 kg = 340 kgRated Cargo/Luggage Weight (RCLW) = 29 kg (difference)

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

Right Front = 351.0 kg Right Rear = 207.5 kgLeft Front = 335.0 kg Left Rear = 217.5 kgTOTAL FRONT = 686.0 kg TOTAL REAR = 425.0 kg% Total Weight = 61.7 % % Total Weight = 38.3 %TOTAL DELIVERED WEIGHT = 1111.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1111.0 kgRated Cargo/Luggage Wt. = 29.0 kgTARGET TEST WEIGHT 1140.0 kg

WEIGHT OF FULLY LOADED TEST VEHICLE:

Right Front =	<u>349.5</u> kg	Right Rear =	<u>223.0</u> kg
Left Front =	<u>335.0</u> kg	Left Rear =	<u>231.5</u> kg
TOTAL FRONT =	<u>684.5</u> kg	TOTAL REAR =	<u>454.5</u> kg
% Total Weight =	<u>60.1</u> %	% Total Weight =	<u>39.9</u> %
TOTAL TEST WEIGHT = <u>1139.0</u> kg			
Weight of ballast secured in vehicle's cargo area = <u>28</u> kg			

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 670.0 mm; Left Front 664.0 mm;
 Right Rear 640.0 mm; Left Rear 640.0 mm
 Pitch Angle at Right Door Sill = 0.4 Front higher
 Pitch Angle at Left Door Sill = 0.3 Rear higher
 Roll Angle at Front Bumper = 0.2 Left-side higher
 Roll Angle at Rear Bumper = 0.1 Left-side higher

FULLY LOADED: Right Front 665.0 mm; Left Front 660.0 mm;
 Right Rear 635.0 mm; Left Rear 630.0 mm;
 Pitch Angle at Right Door Sill = 0.5 Front higher
 Pitch Angle at Left Door Sill = 0.1 Rear higher
 Roll Angle at Front Bumper = 0.1 Left-side higher
 Roll Angle at Rear Bumper = 0.0

AS TARGETED: Right Front 824.0 mm; Left Front 823.0 mm;
 Right Rear 798.0 mm; Left Rear 800.0 mm;
 Pitch Angle at Right Door Sill = 0.5 Front higher
 Pitch Angle at Left Door Sill = 0.2 Rear higher
 Roll Angle at Front Bumper = 0.1 Left-side higher
 Roll Angle at Rear Bumper = 0.0

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill = 0.5 Front higher
 Pitch Angle at Left Door Sill = 0.2 Rear higher
 Roll Angle at Front Bumper = 0.1 Left-side higher
 Roll Angle at Rear Bumper = 0.0

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill = 0.5 Front higher
Pitch Angle at Left Door Sill = 0.2 Rear higher
Roll Angle at Front Bumper = 0.1 Left-side higher
Roll Angle at Rear Bumper = 0.0

VEHICLE WHEELBASE = 2530 mm

REMARKS: The seat travel distance was measured to be 240 mm for the driver front seat and 240 mm for the passenger front seat.

RECORDED BY: David G. Gotwals

DATE: August 10, 2004

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Nissan Sentra SedanVEH. NHTSA NO.: PW5200 VIN: 1N4AB41D9WC COLOR: GreenVEH. BUILD DATE: October, 1997 TEST DATES: August 12-13, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: 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 202.1°	L 247.7°
	R 105°-165°	R 112.6°	R 157.0°
B-PILLAR	L 195°-345°	L 202.8°	L 284.6°
	R 15°-165°	R 75.8°	R 156.1°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: David G. GotwalsDATE: August 10, 2004APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Nissan Sentra SedanVEH. NHTSA NO.: PW5200VIN: 1N4AB41D9WCCOLOR: GreenVEH. BUILD DATE: October, 1997TEST DATES: August 12-13, 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 20°
		R	0°-50°	R 0°	R 25°
	SR2A	L	0°-50°	L 0°	L 18°
		R	0°-50°	R 0°	R 15°
	SR2B	L	0°-50°	L 0°	L 23°
		R	0°-50°	R 0°	R 11°
	SR3-1	L	0°-50°	L 0°	L 21°
		R	0°-50°	R 0°	R 21°
A-PILLAR	AP1	L	-5°-50°	L -5°	L 25°
		R	-5°-50°	R -5°	R 21°
	AP2	L	-5°-50°	L -5°	L 47°
		R	-5°-50°	R -5°	R 47°
	AP3	L	-5°-50°	L -5°	L 44°
		R	-5°-50°	R -5°	R 44°
B-PILLAR	BP1	L	-10°-50°	L -10°	L 9°
		R	-10°-50°	R -10°	R 12°

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
	BP2*	L 0°-50°	L 0°	L 10°
		R 0°-50°	R 0°	R 12°
	BP3	L -10°-50°	L -10°	L -4°
		R -10°-50°	R -10°	R -5°
	BP4	L -10°-50°	L -10°	L -9°
		R -10°-50°	R -10°	R -5°
REAR PILLAR	RP1	L -10°-50°	L -10°	L 4°
		R -10°-50°	R -10°	R 14°
	RP2*	L 0°-50°	L 0°	L 0°
		R 0°-50°	R 0°	R 0°
REAR HEADER	RH	L 0°-50°	L 0°	L 50°
		R 0°-50°	R 0°	R 50°
UPPER ROOF 1		0°-50°	0°	50°
UPPER ROOF 2		0°-50°	0°	38°
UPPER ROOF 3		0°-50°	0°	50°
UPPER ROOF 4		0°-50°	0°	43°
UPPER ROOF 5		0°-50°	0°	42°
UPPER ROOF 6		0°-50°	0°	50°

As determined using the Procedures specified in S8.13.4.2. *Targets BP2 and RP2 are a seat belt anchorage locations.

RECORDED BY: David G. Gotwals

DATE: August 10, 2004

APPROVED BY: Helen A. Kaletto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 1998 Nissan Sentra SedanVEH. NHTSA NO.: PW5200 VIN: 1N4AB41D9WC COLOR: GreenVEH. BUILD DATE: October, 1997 TEST DATES: August 12-13, 2004TEST LABORATORY: MGA Research CorporationOBSERVERS: David Gotwals, Nicholas Brzuch, Bryan Hood

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	240 mm	240 mm
T°	Horizontal ∠ {CG-F1 (Left Seat) to (Right A-Pillar)}	112.3°	--
A1°	360° - T°	247.7°	--
W°	Horizontal ∠ {CG-2 (Left Seat) to (Left A-Pillar)}	202.1°	--
A2°	A2° = W°	202.1°	--
U°	Horizontal ∠ {CG-2 (Left Seat) to (Left B-Pillar)}	284.6°	--
B1°	B1° = U°	284.6°	--
V°	Horizontal ∠ {CG-R (Left Seat) to (Left B-Pillar)}	202.8°	--
B2°	B2° = V°	202.8°	--
W° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right A-Pillar)}	--	157.0°
A1° (right)	A1° (right) = W° (right)	--	157.0°
T° (right)	Horizontal ∠ {CG-F1 (Right Seat) to (Left A-Pillar)}	--	247.4°
A2° (right)	360°-T° (right)	--	112.6°
V° (right)	Horizontal ∠ {CG-R (Right Seat) to (Right B-Pillar)}	--	156.1°
B1° (right)	B1° (right) = V° (right)	--	156.1°
U° (right)	Horizontal ∠ {CG-F2 (Right Seat) to (Right B-Pillar)}	--	75.8°
B2° (right)	B2° (right) = U° (right)	--	75.8°
J	A-Pillar {(Plane 3) - (Plane 5)}	318.8 mm	332.5 mm
J/2	J ÷ 2	159.4 mm	166.3 mm
D1	Upper Roof {(Plane A) - (Plane B)}	1374.7 mm	
D1/2	D1 ÷ 2	687.4 mm	
D2	Upper Roof {(Plane C) - (Plane D)}	1102.0 mm	
D2/2	D2 ÷ 2	551.0 mm	
.35D1	.35 x D1	481.1 mm	

Measurement	Description	Left Side	Right Side
.35D2	.35 x D2	385.7 mm	
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	429.9 mm	434.8 mm
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	215.0 mm	217.4 mm
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	107.5 mm	108.7 mm
D	R-Pillar (Point 7 - Point M)	616.0 mm	615.0 mm
3 D/7	3 * D / 7	264.0 mm	263.6 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	1972.9	-330.0	746.8	1972.9	330.0	746.8
Rear	2717.1	-330.0	782.3	2717.1	330.0	782.3

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	1892.9	-330.0	1406.8	1892.9	330.0	1406.8
CGF2	2132.9	-330.0	1406.8	2132.9	330.0	1406.8
CGR	2877.1	-330.0	1442.3	2877.1	330.0	1442.3

REFERENCE FOR WORLD COORDINATE SYSTEM:

REMARKS: Driver front outboard seat anchorage (x, y, z) = (1624.9, -550.1, 576.6).

Nissan provided the dimensions from this datum point to locate the SgRP's of the vehicle.

RECORDED BY: David G. Gotwals

DATE: August 10, 2004

APPROVED BY: Helen A. Kalet

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					
RP1	2871.4	-470.1	1579.4	270	4	No	--	No
RP2	3075.7	-581.2	1406.8	270	0	No	--	No
Rear Pillar Right Side								
RP1	2866.9	466.9	1578.8	90	14	No	--	Yes
RP2	3075.0	588.5	1404.4	90	0	No	--	No
Front Header Left Side								
FH1	1665.6	-406.1	1555.9	--	--	Yes	--	--
REL	1662.3	-382.6	1554.4	180	50	--	1	No
FH2	1646.7	-253.3	1558.9	180	50	No	--	No
Front Header Right Side								
FH1	1658.9	402.6	1553.1	180	50	No	--	No
FH2	1645.0	276.5	1558.1	180	50	No	--	No
Side Rail Left Side								
SR1	1881.6	-472.8	1577.4	--	--	Yes	--	--
REL	1878.5	-489.6	1557.6	270	20	--	1	Yes
SR2A	2032.3	-472.1	1588.9	270	18	No	--	Yes
SR2B	1951.4	-471.3	1585.4	--	--	Yes	--	--
REL	1951.5	-485.9	1564.8	270	23	--	1	No
SR3-1	2400.2	-465.3	1603.3	270	21	No	--	No
Side Rail Right Side								
SR1	1877.0	476.9	1574.6	--	--	Yes	--	--
REL	1851.4	473.8	1530.9	90	25	--	2	No
SR2A	2026.6	483.8	1587.5	--	--	Yes	--	--
REL	2025.5	483.7	1560.5	90	15	--	1	No
SR2B	1953.4	479.2	1584.1	--	--	Yes	--	--
REL	1955.7	454.8	1583.5	90	11	--	2	No
SR3-1	2404.7	477.5	1600.3	90	21	No	--	No
Rear Header Left Side								
RH	2854.6	-329.6	1594.3	0	50	No	--	No
Rear Header Right Side								
RH	2850.4	329.4	1594.6	0	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					
Upper Roof Left Side								
UR1	1846.4	-380.2	1578.7	270	50	No	--	No
UR2	2250.3	-379.6	1618.0	270	38	No	--	Yes
UR3	2761.7	-378.2	1601.1	270	50	No	--	No
Upper Roof Right Side								
UR4	1852.6	377.3	1574.5	90	43	No	--	No
UR5	2255.9	377.2	1614.2	90	42	No	--	No
UR6	2759.9	381.6	1594.8	90	50	No	--	No

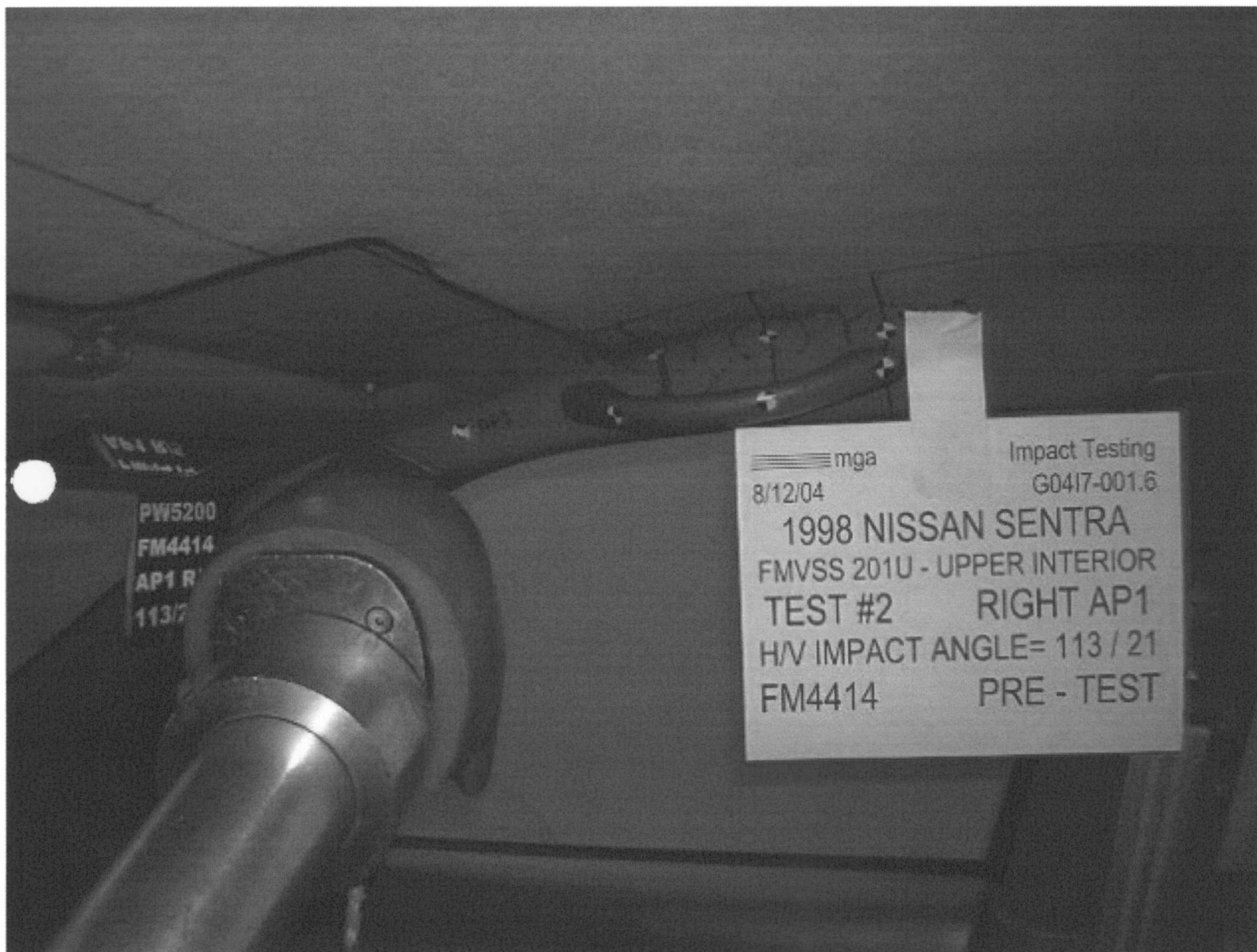
As determined using the Procedures specified in S10.1-10.13.

REMARKS:

RECORDED BY: David G. Gotwals

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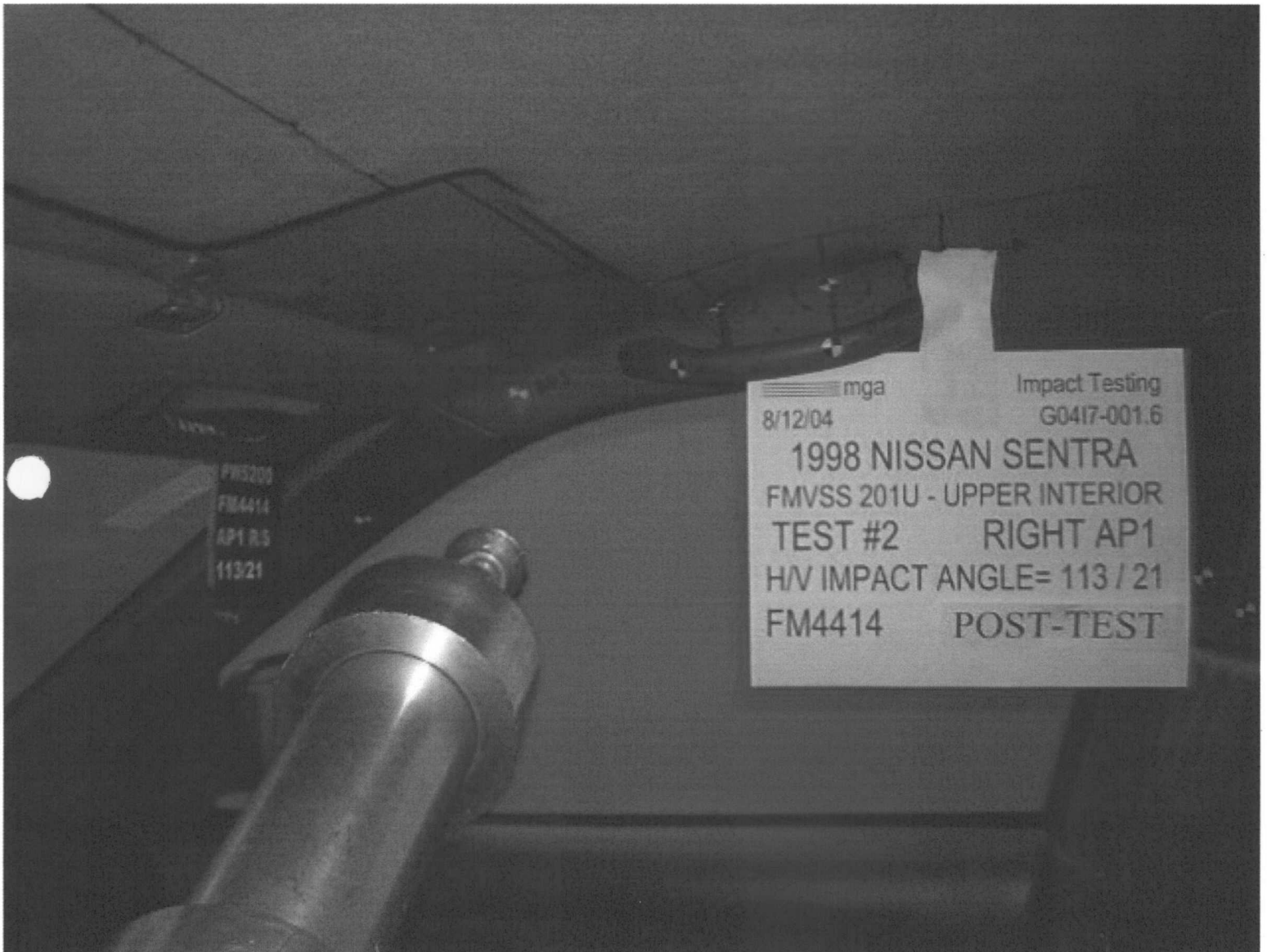


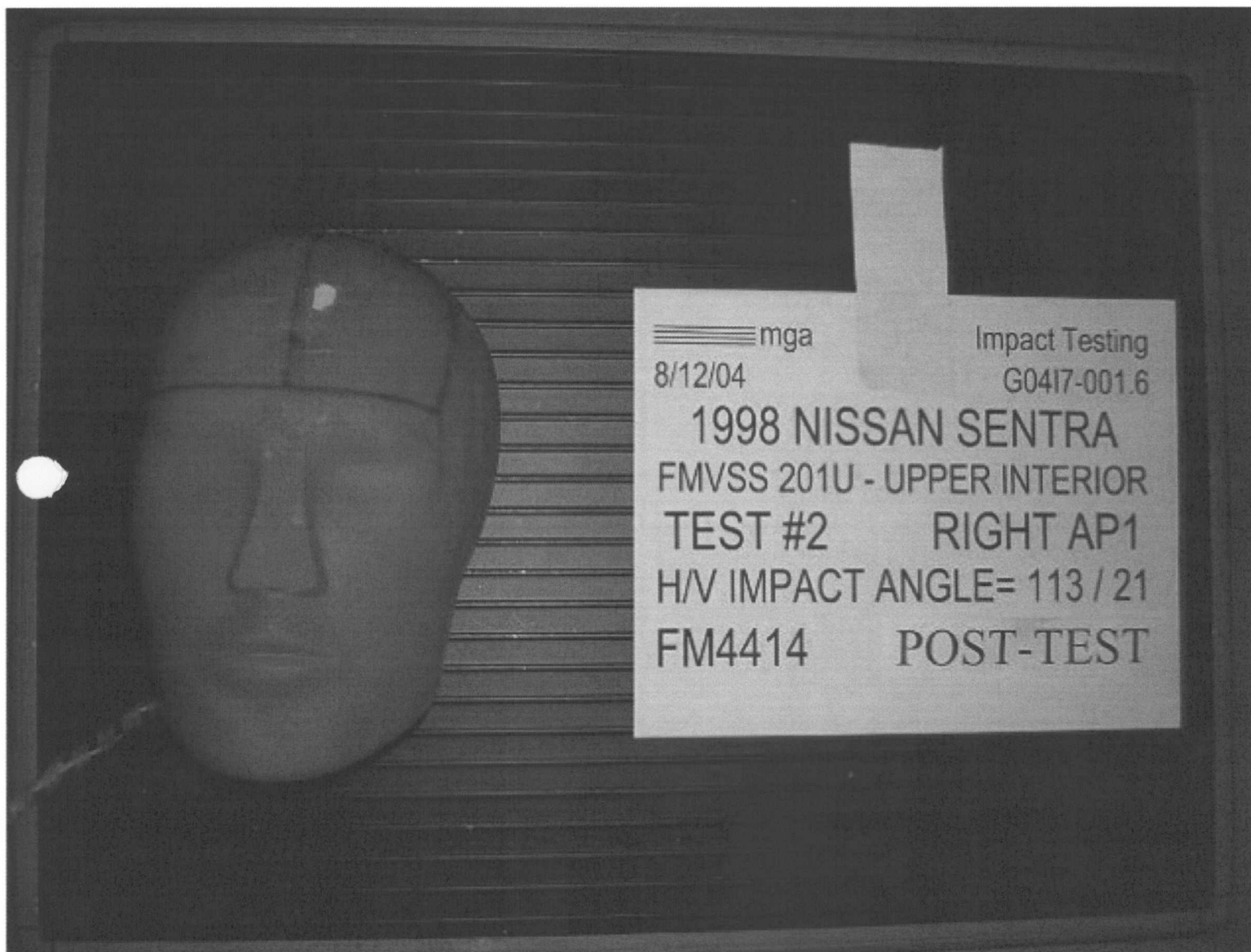
PW5200
FM4414
AP1 R
113/21

mga
8/12/04

Impact Testing
G0417-001.6

1998 NISSAN SENTRA
FMVSS 201U - UPPER INTERIOR
TEST #2 RIGHT AP1
H/V IMPACT ANGLE= 113 / 21
FM4414 PRE - TEST





SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#2

Target (Vehicle Side): AP1 Right

Temperature:22C

MGA Test Reference No.:FM4414

Humidity:44%

Approach Horizontal Angles:113°

Time of Test:3:48 PM

Approach Vertical Angles:21°

FMH Serial No:037

TEST RESULTS:

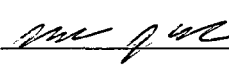
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
907	981	4.1	23.8	35	10 L

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

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

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

No visible damage

Recorded By: Approved By*: Date: 8-12-04

*Only necessary for NHTSA (Government) Compliance testing.

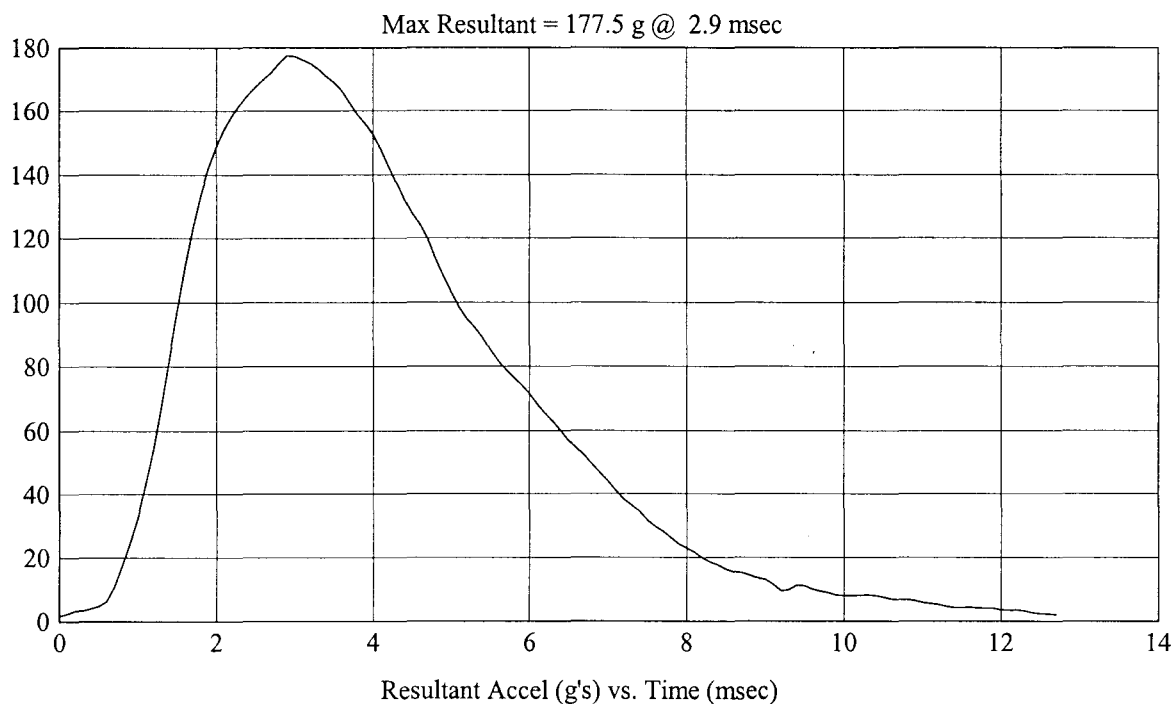
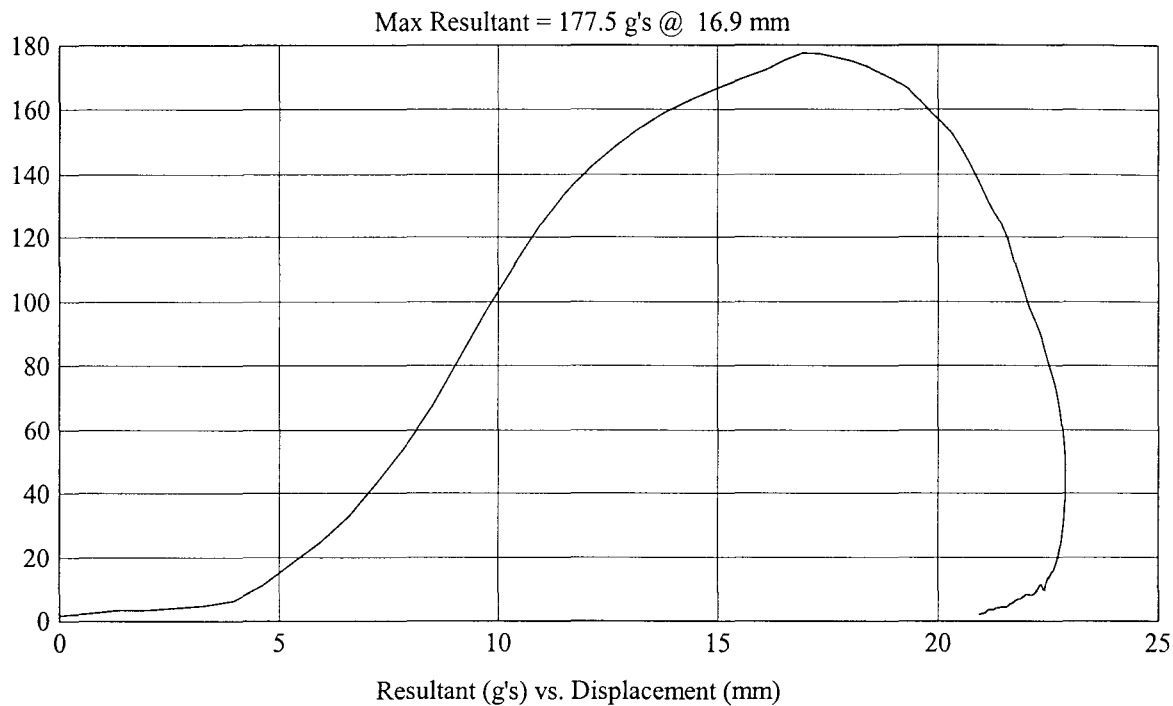
FMH
G04I7-001.6

Customer: NISSAN
Test # 2
FM4414
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 113/21

HIC(d) = 907, HIC = 981, Delta T = 4.1 msec



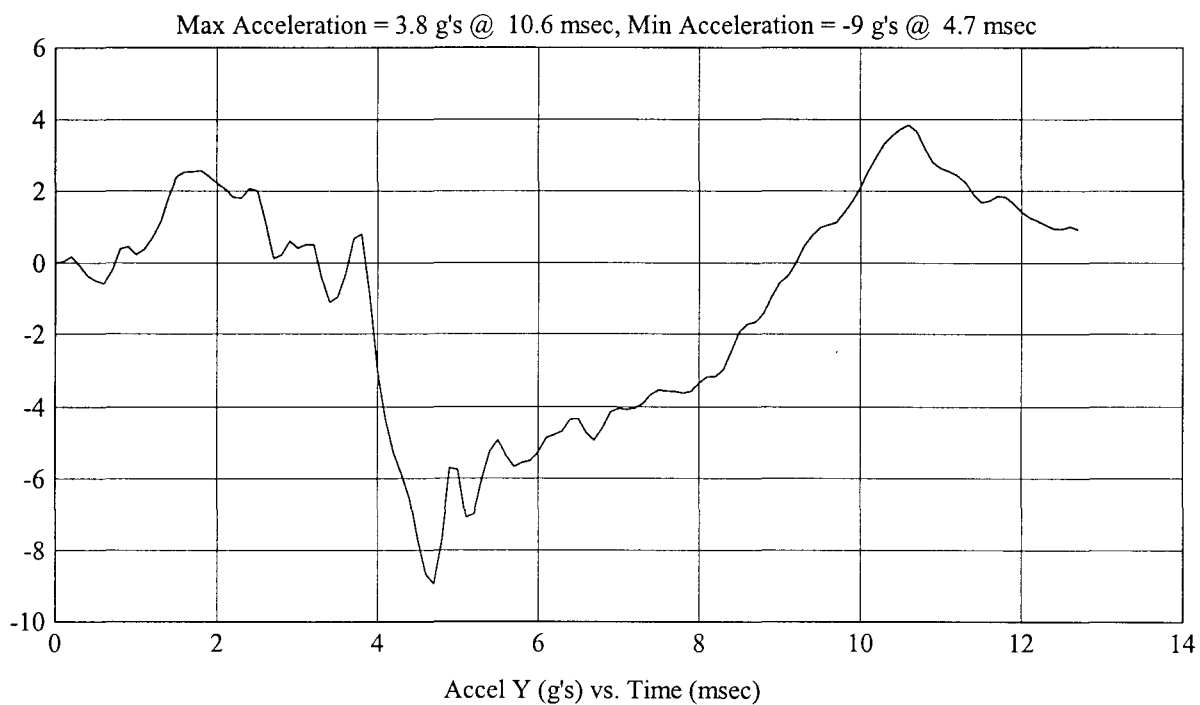
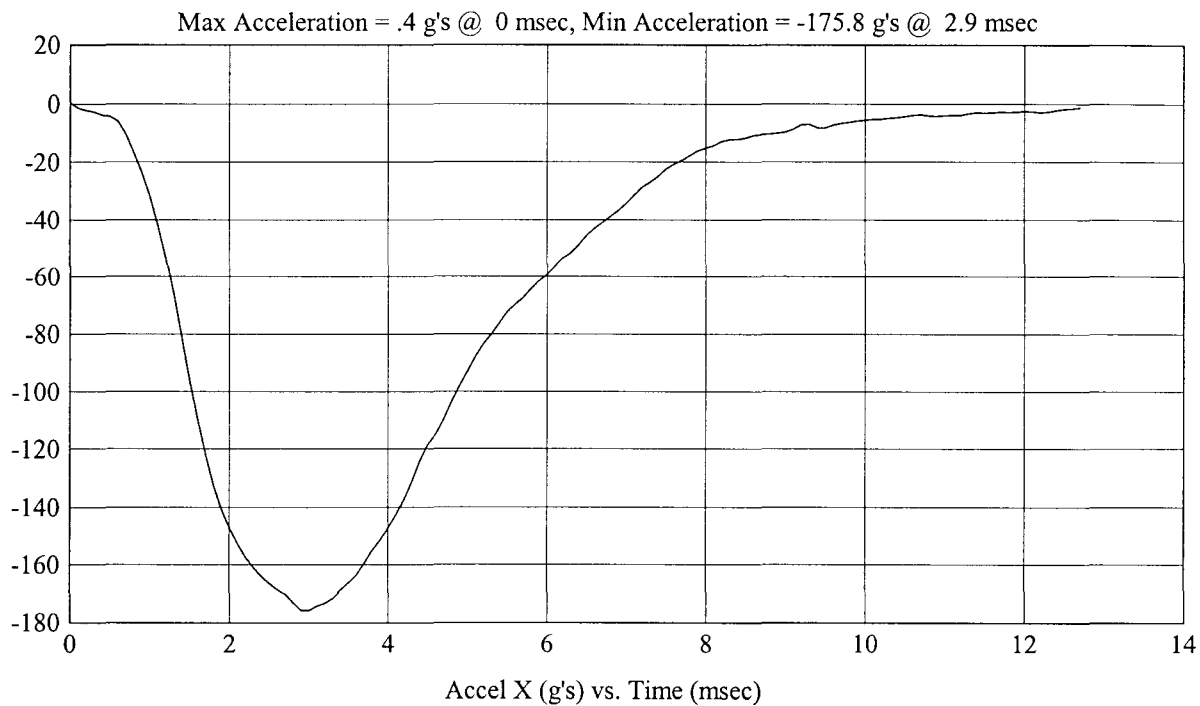
FMH
G04I7-001.6

Customer: NISSAN
Test # 2
FM4414
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 113/21

HIC(d) = 907, HIC = 981, Delta T = 4.1 msec



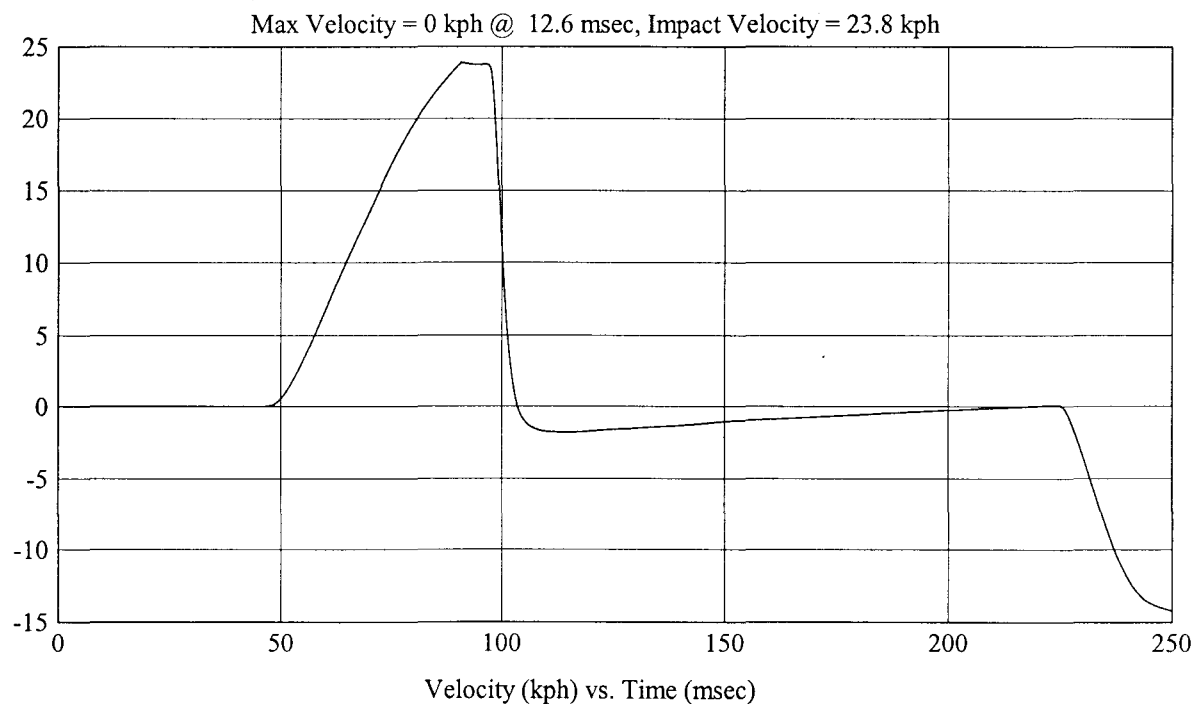
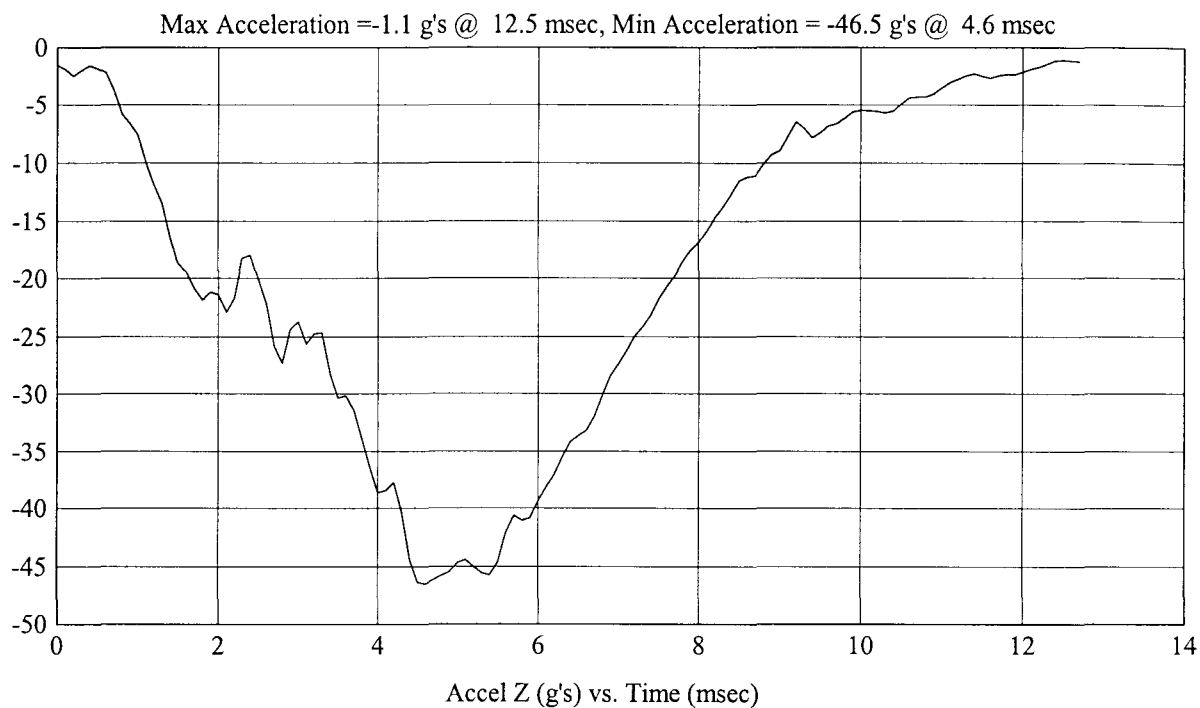
FMH
G04I7-001.6

Customer: NISSAN
Test # 2
FM4414
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 113/21

HIC(d) = 907, HIC = 981, Delta T = 4.1 msec



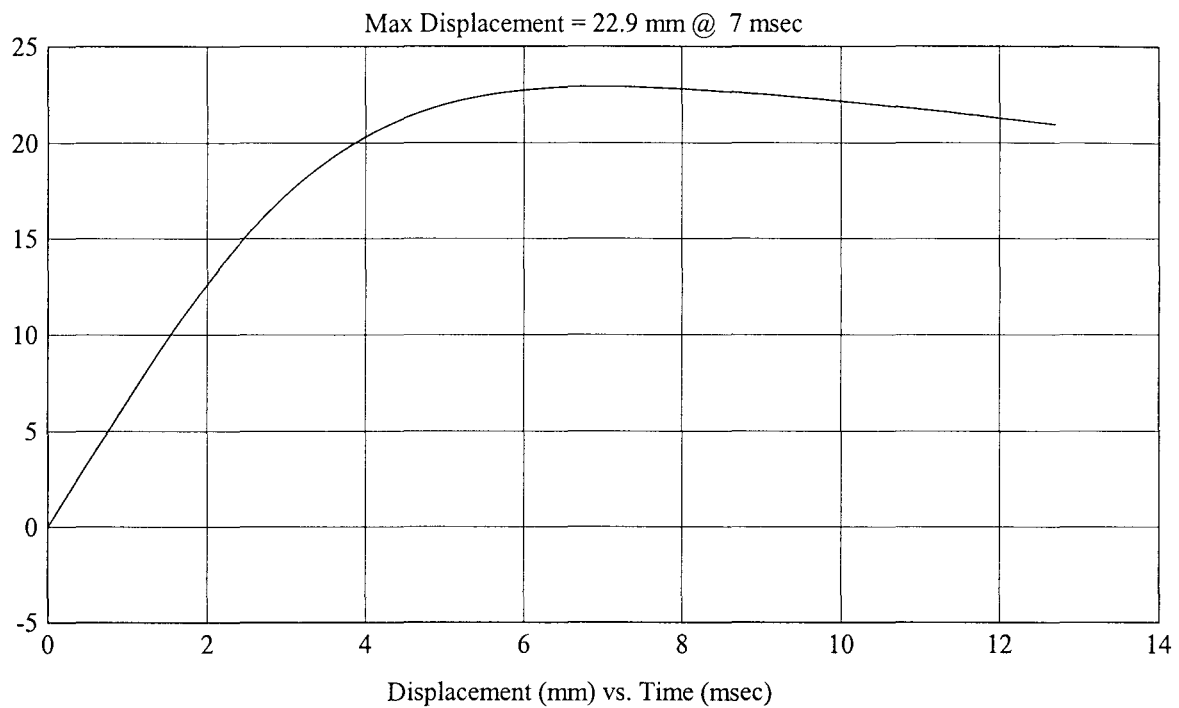
FMH
G0417-001.6

Customer: NISSAN
Test # 2
FM4414
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP1
Vehicle Side: Right
Horz/Vert Angle: 113/21

HIC(d) = 907, HIC = 981, Delta T = 4.1 msec





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8/13/04

Impact Testing
G0417-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #6 LEFT AP2

H/V IMPACT ANGLE= 203 / 47

FM4418 PRE - TEST





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8/13/04

Impact Testing

G0417-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #6

LEFT AP2

H/V IMPACT ANGLE= 203 / 47

FM4418

POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): AP2 Left

Temperature:21C

MGA Test Reference No.:FM4418

Humidity:53%

Approach Horizontal Angles:203°

Time of Test:11:25 AM

Approach Vertical Angles:47°

FMH Serial No:038

TEST RESULTS:

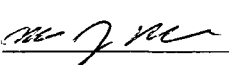
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
1284	1481	3.7	23.8	20	0

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

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

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

No visible damage

Recorded By:  Approved By*:  Date: 8-13-21

*Only necessary for NHTSA (Government) Compliance testing.

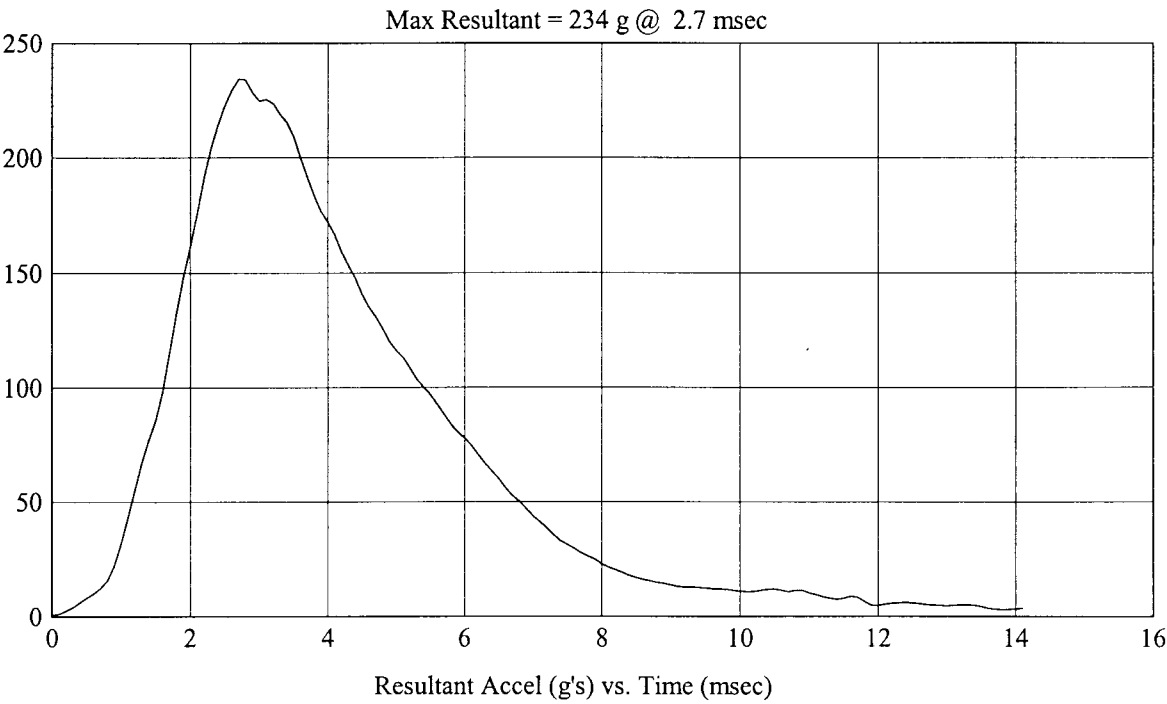
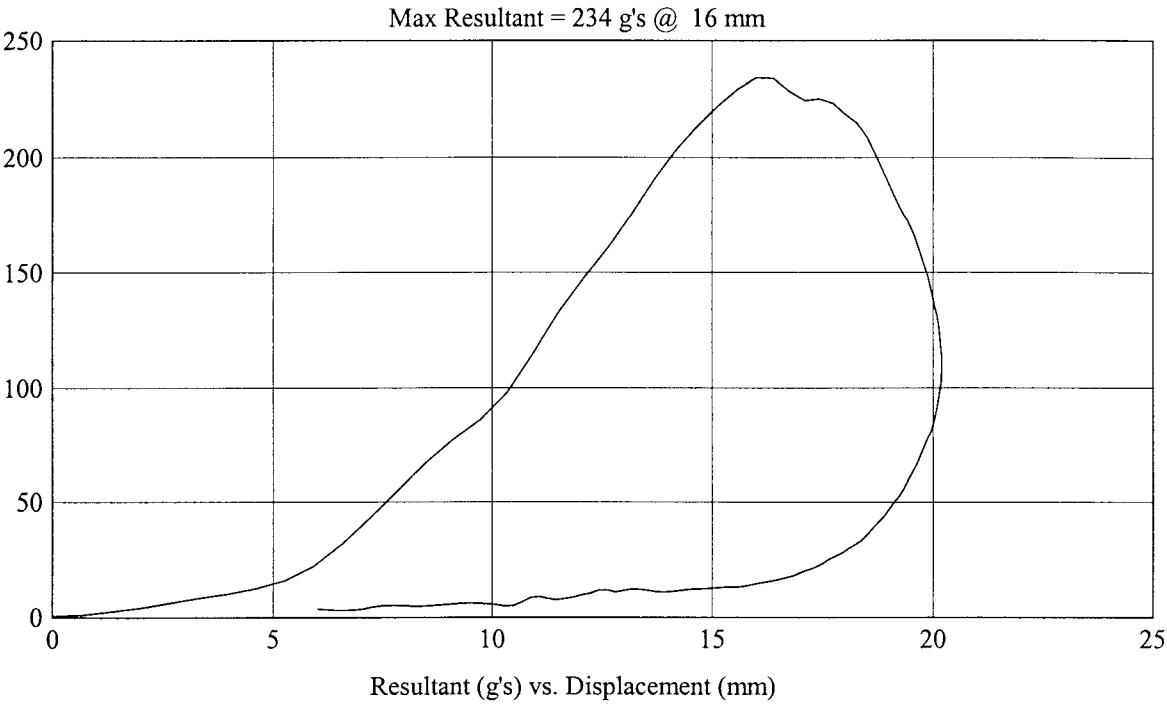
FMH
G04I7-001.6

Customer: NISSAN
Test # 6
FM4418
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 203/47

HIC(d) = 1284, HIC = 1481, Delta T = 3.7 msec



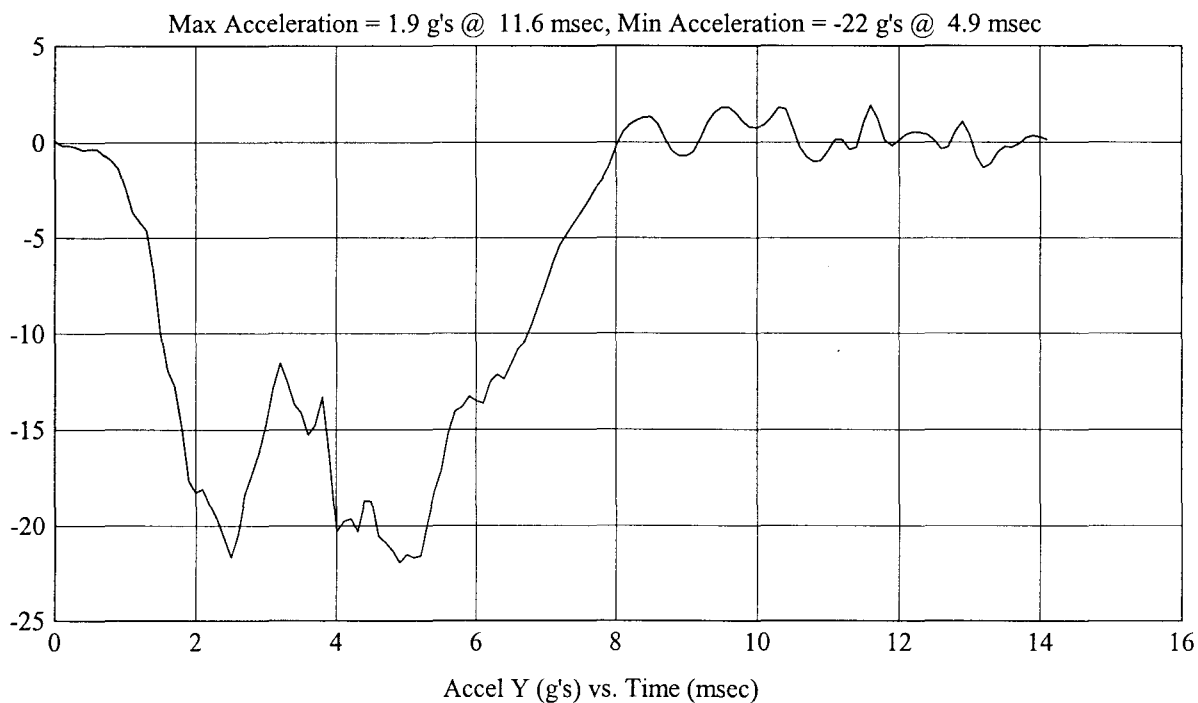
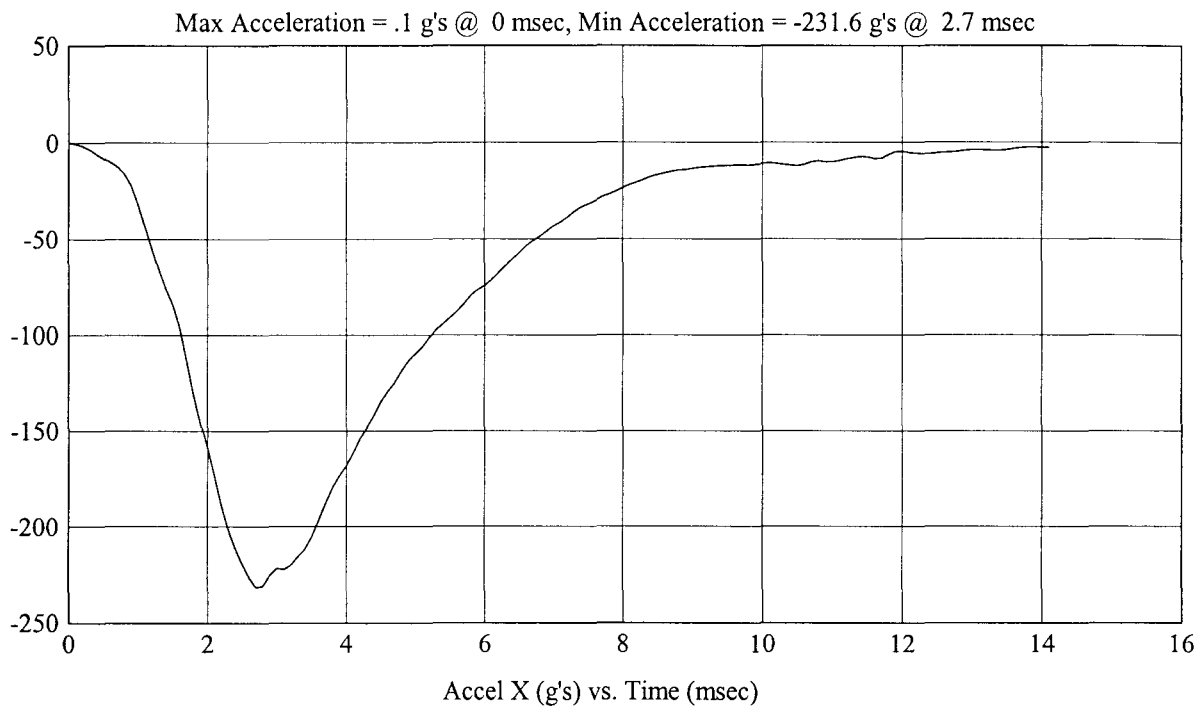
FMH
G04I7-001.6

Customer: NISSAN
Test # 6
FM4418
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 203/47

HIC(d) = 1284, HIC = 1481, Delta T = 3.7 msec



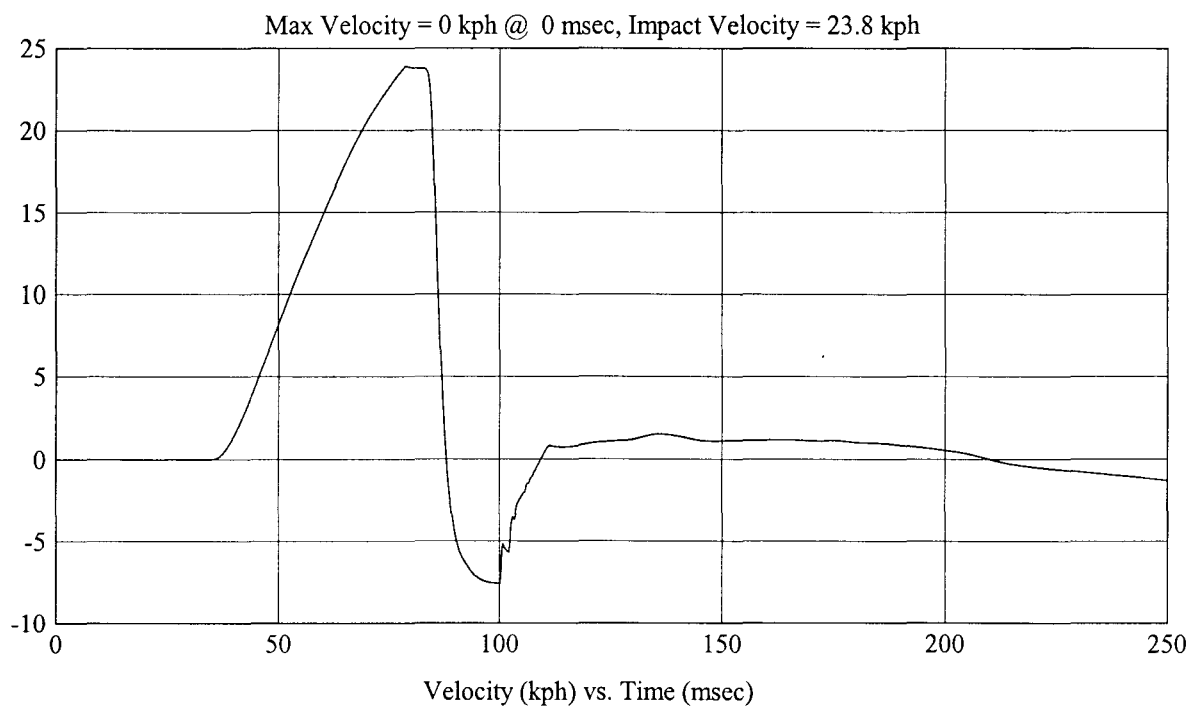
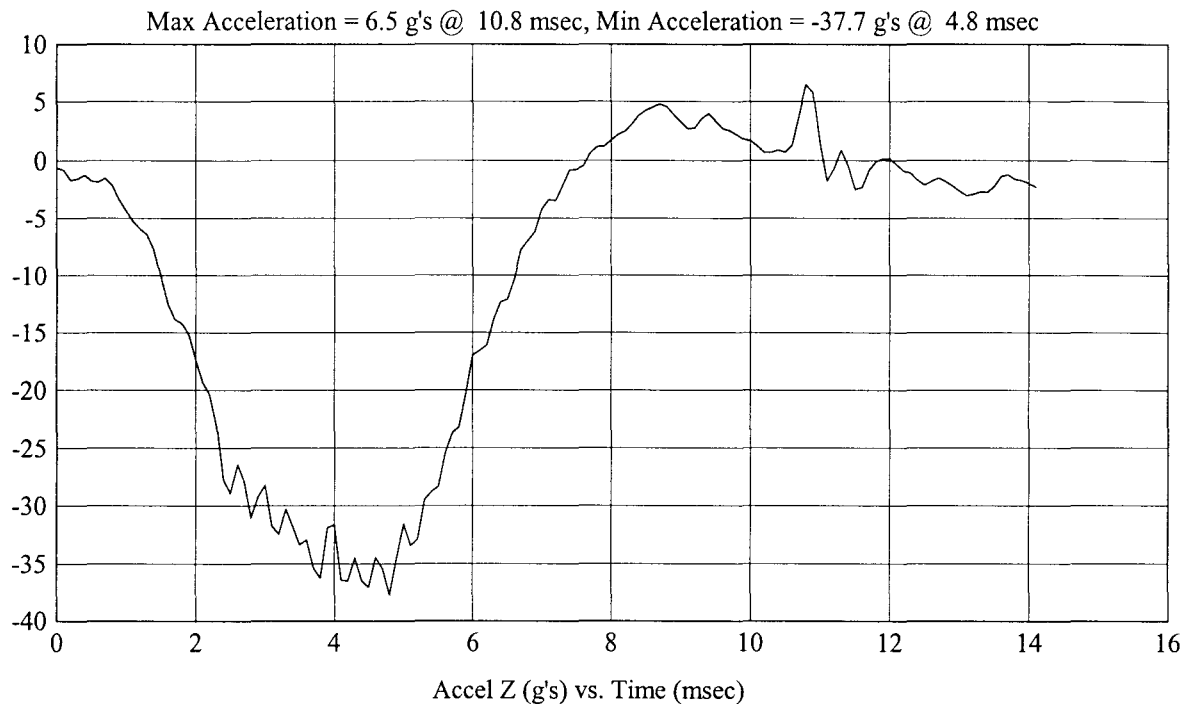
FMH
G04I7-001.6

Customer: NISSAN
Test # 6
FM4418
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 203/47

HIC(d) = 1284, HIC = 1481, Delta T = 3.7 msec



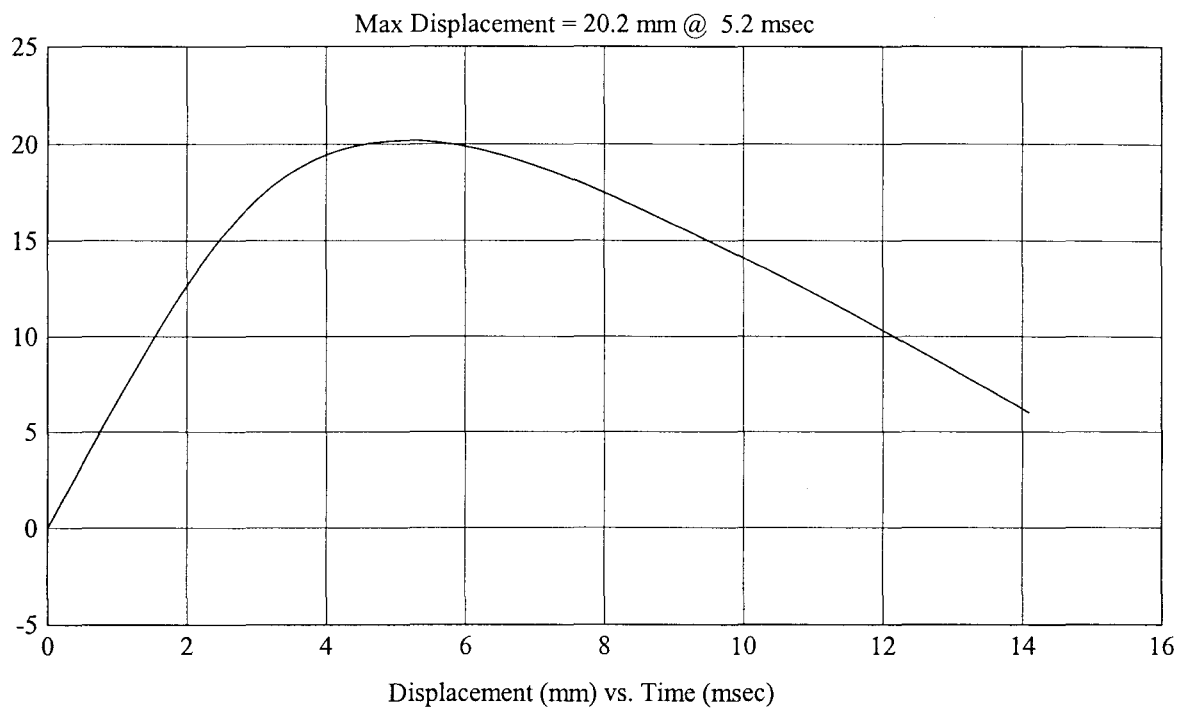
FMH
G04I7-001.6

Customer: NISSAN
Test # 6
FM4418
Additional Desc: N/A

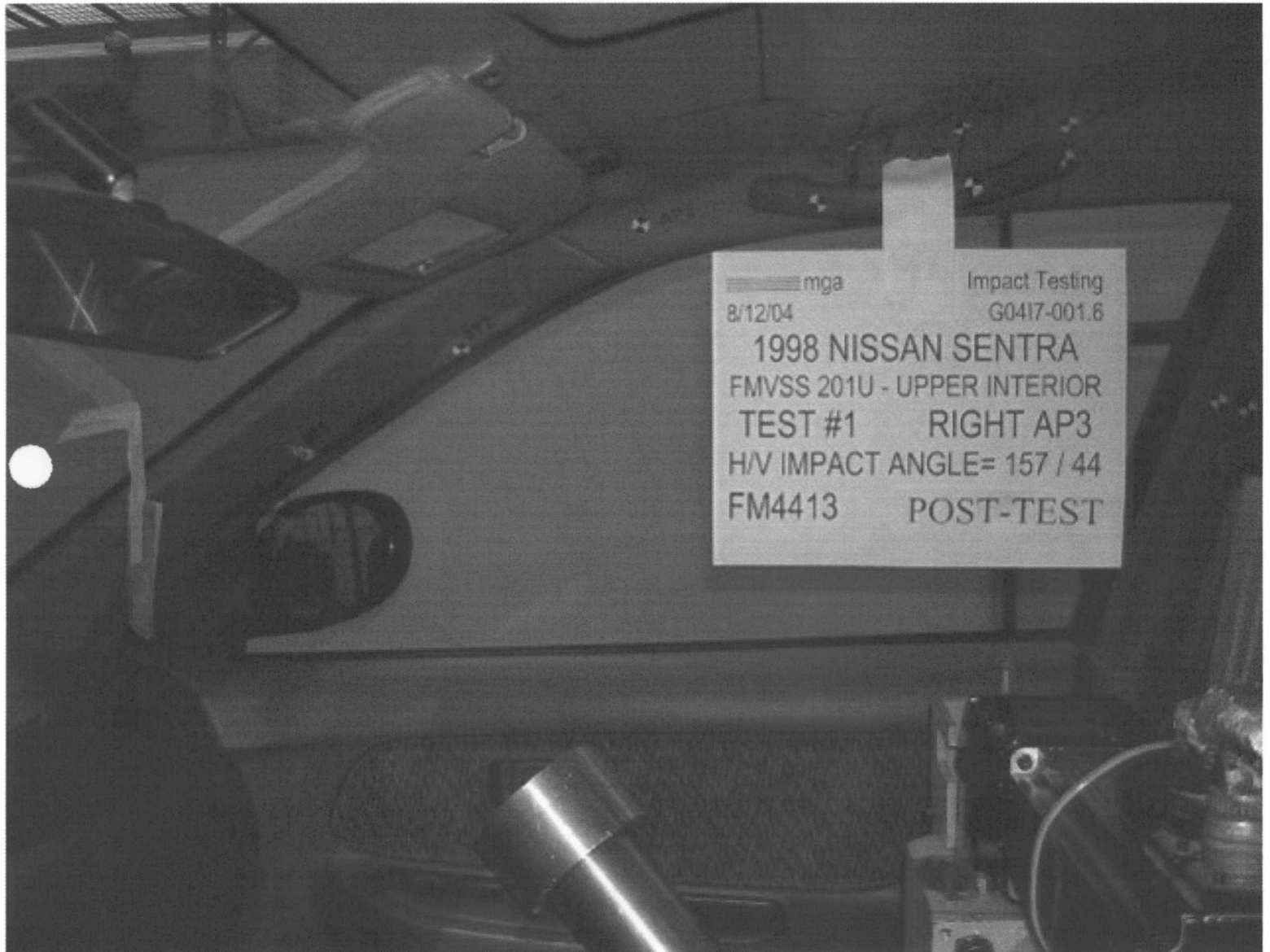
Vehicle Program : SENTRA

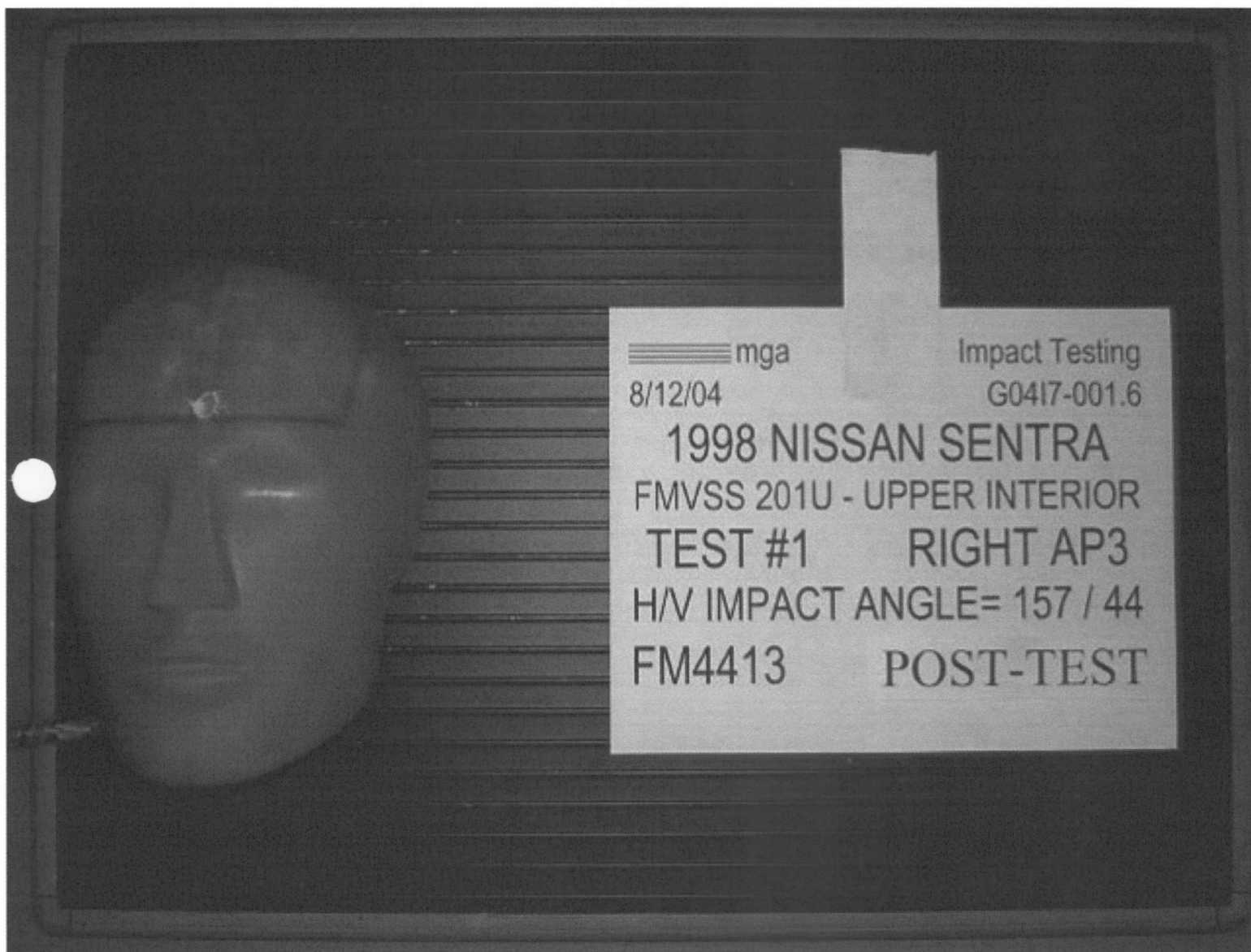
Model Year: 1998
Target: AP2
Vehicle Side: Left
Horz/Vert Angle: 203/47

HIC(d) = 1284, HIC = 1481, Delta T = 3.7 msec









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8/12/04

Impact Testing

G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #1 RIGHT AP3

H/V IMPACT ANGLE= 157 / 44

FM4413 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): AP3 Right

Temperature:22C

MGA Test Reference No.:FM4413

Humidity:43%

Approach Horizontal Angles:157°

Time of Test: 2:20 PM

Approach Vertical Angles:44°

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
1584	1879	3.3	24.0	6	5L

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

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

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

Cracked pillar trim

Recorded By: *[Signature]* Approved By*: *[Signature]* Date: 8-12-01

*Only necessary for NHTSA (Government) Compliance testing.

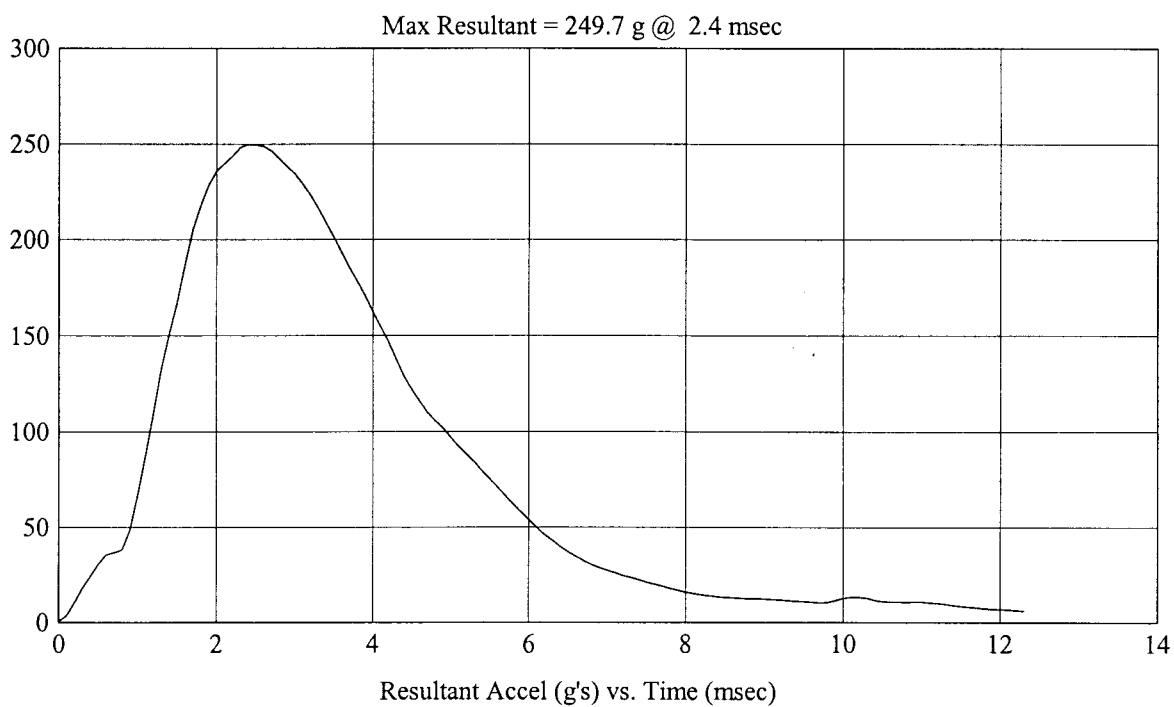
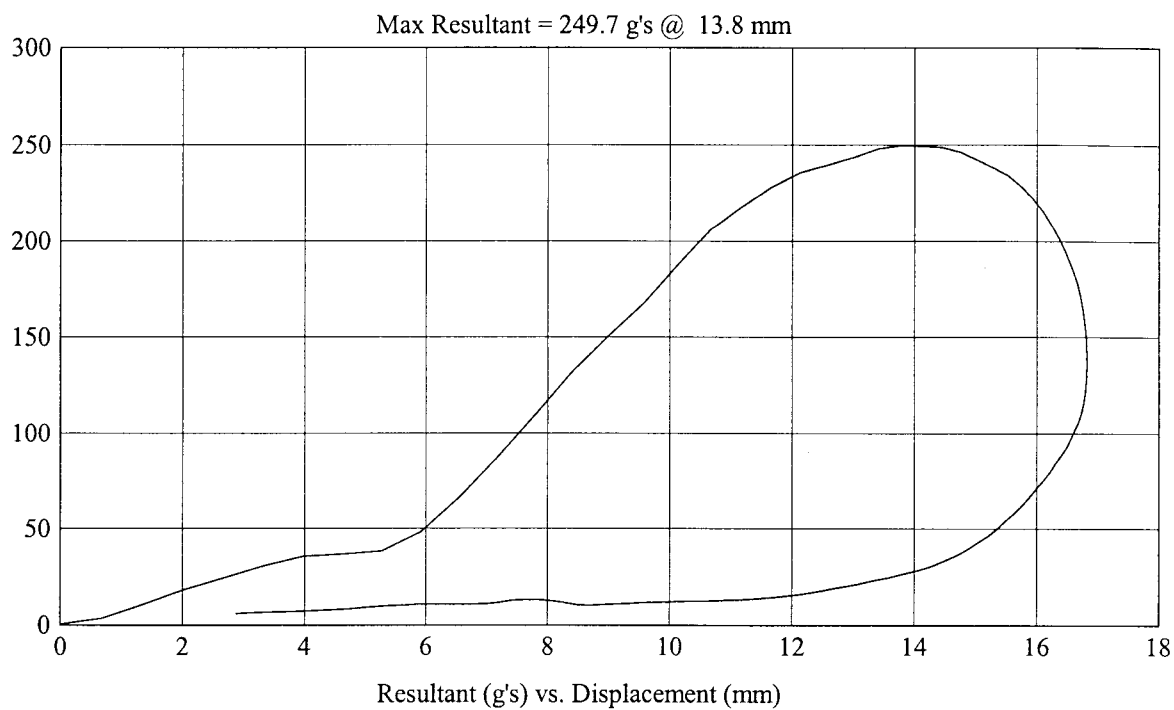
FMH
G04I7-001.6

Customer: NISSAN
Test # 1
FM4413
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/44

HIC(d) = 1584, HIC = 1879, Delta T = 3.3 msec



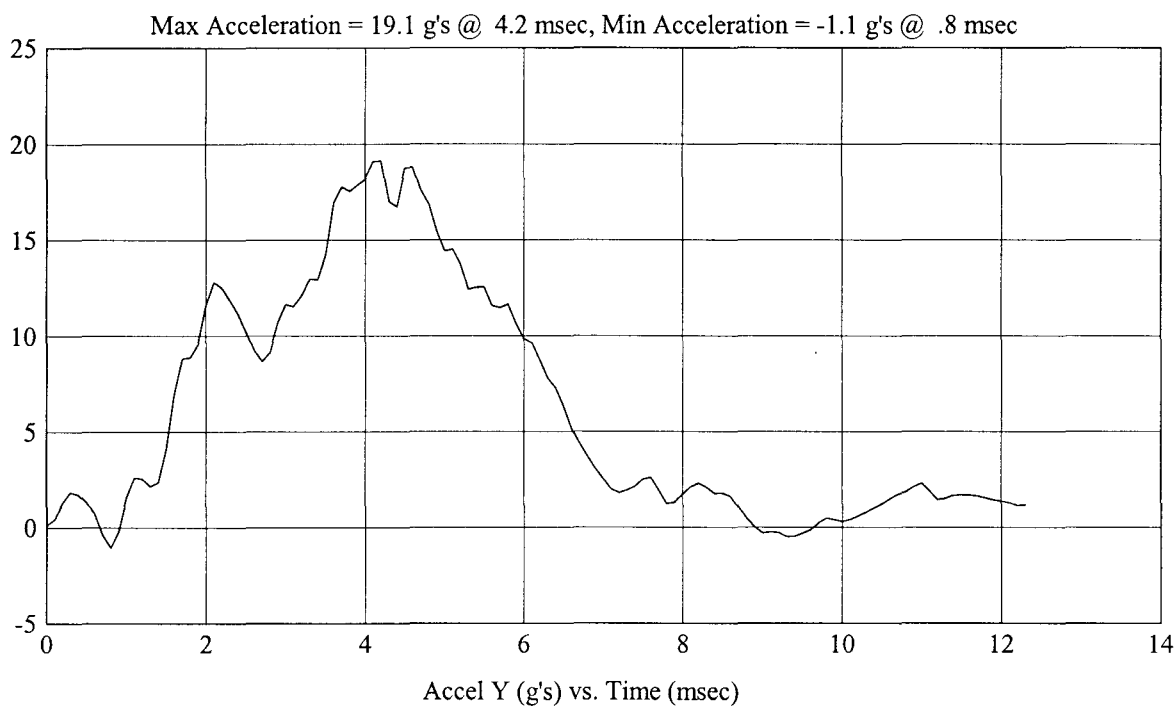
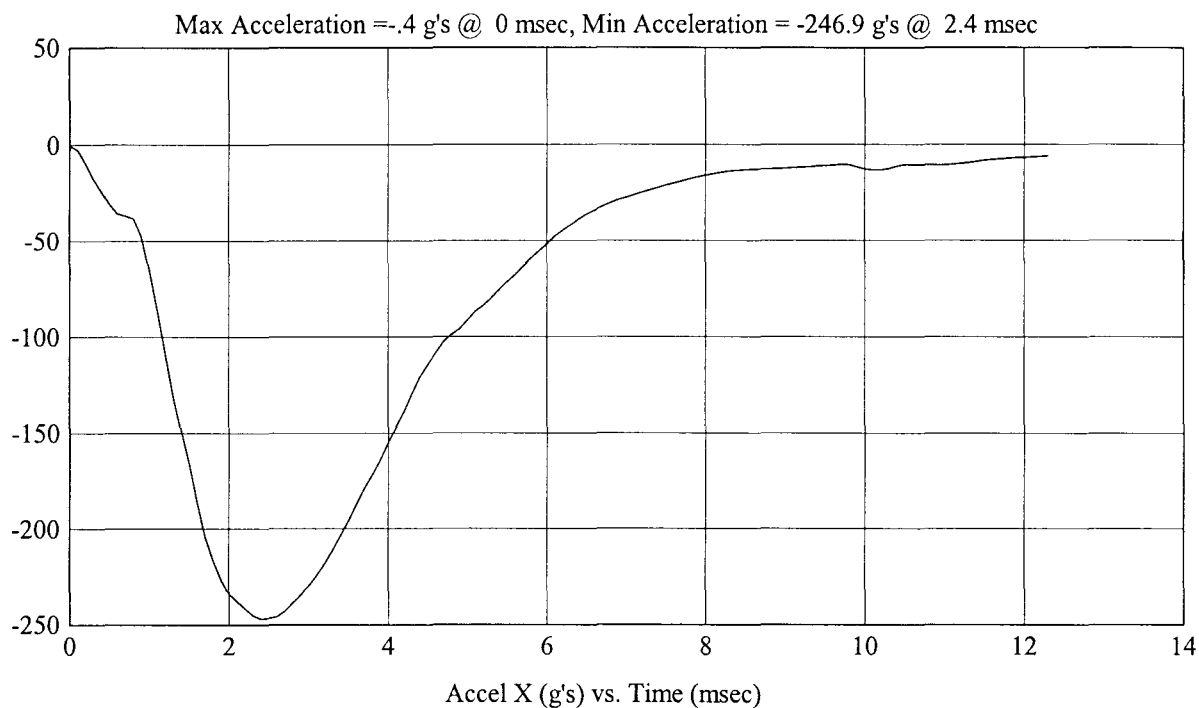
FMH
G04I7-001.6

Customer: NISSAN
Test # 1
FM4413
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/44

HIC(d) = 1584, HIC = 1879, Delta T = 3.3 msec



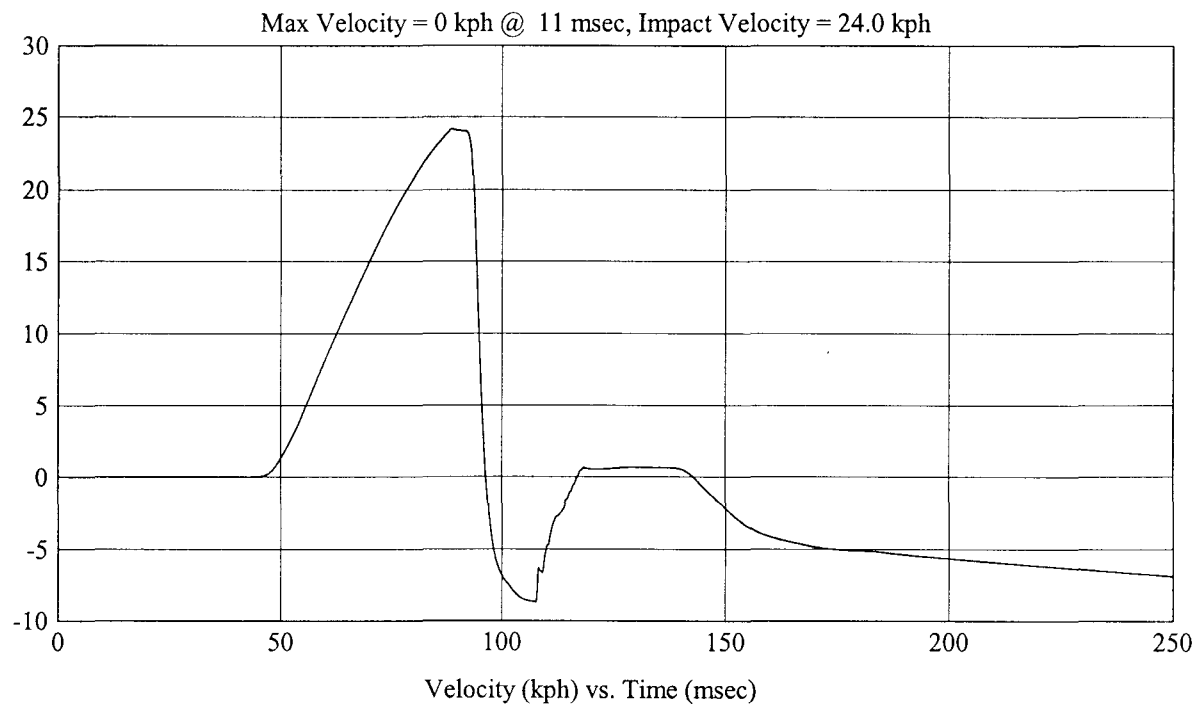
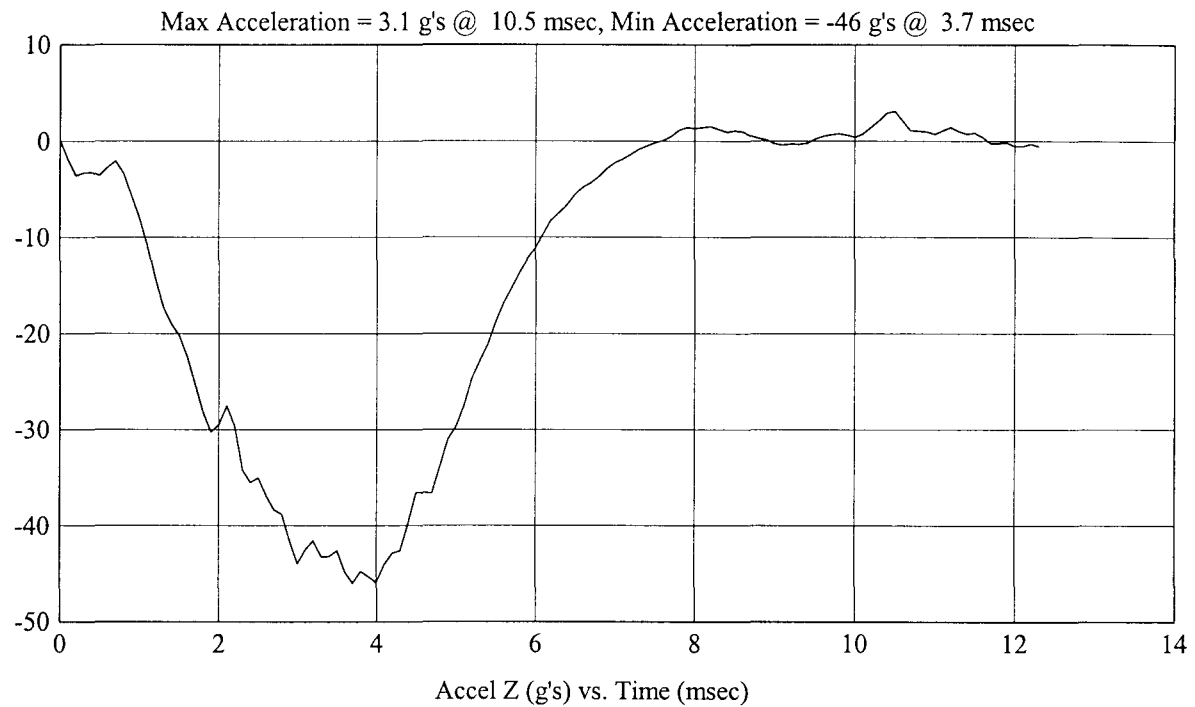
FMH
G04I7-001.6

Customer: NISSAN
Test # 1
FM4413
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/44

HIC(d) = 1584, HIC = 1879, Delta T = 3.3 msec



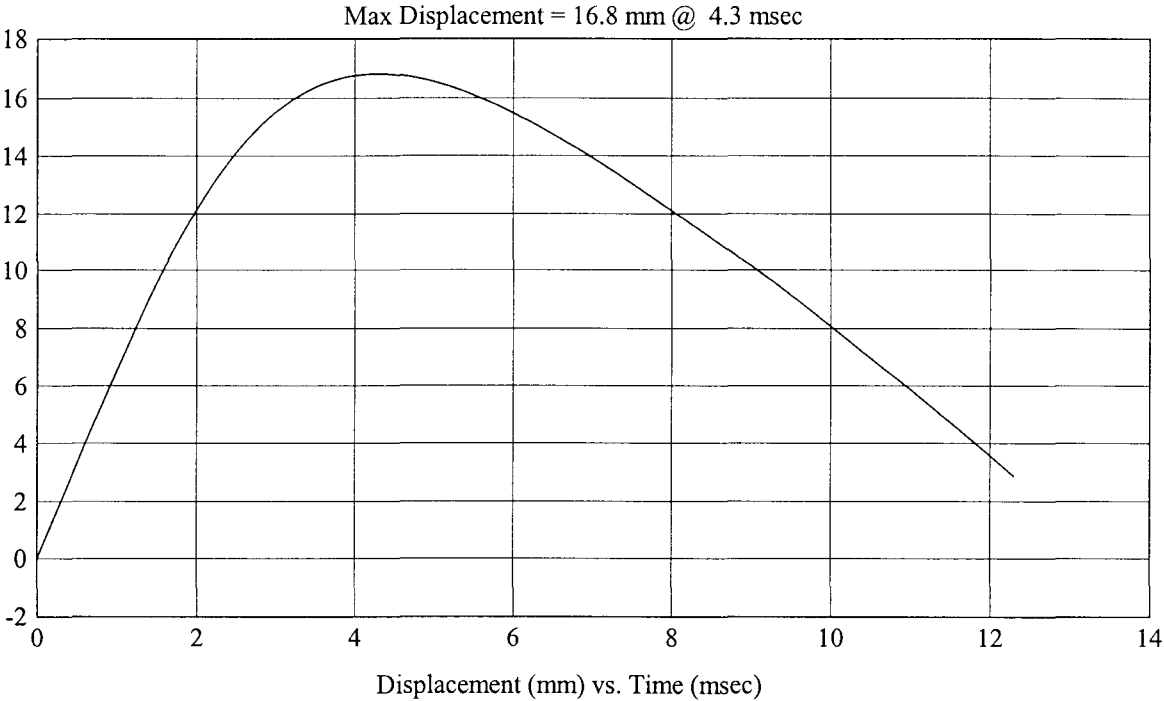
FMH
G04I7-001.6

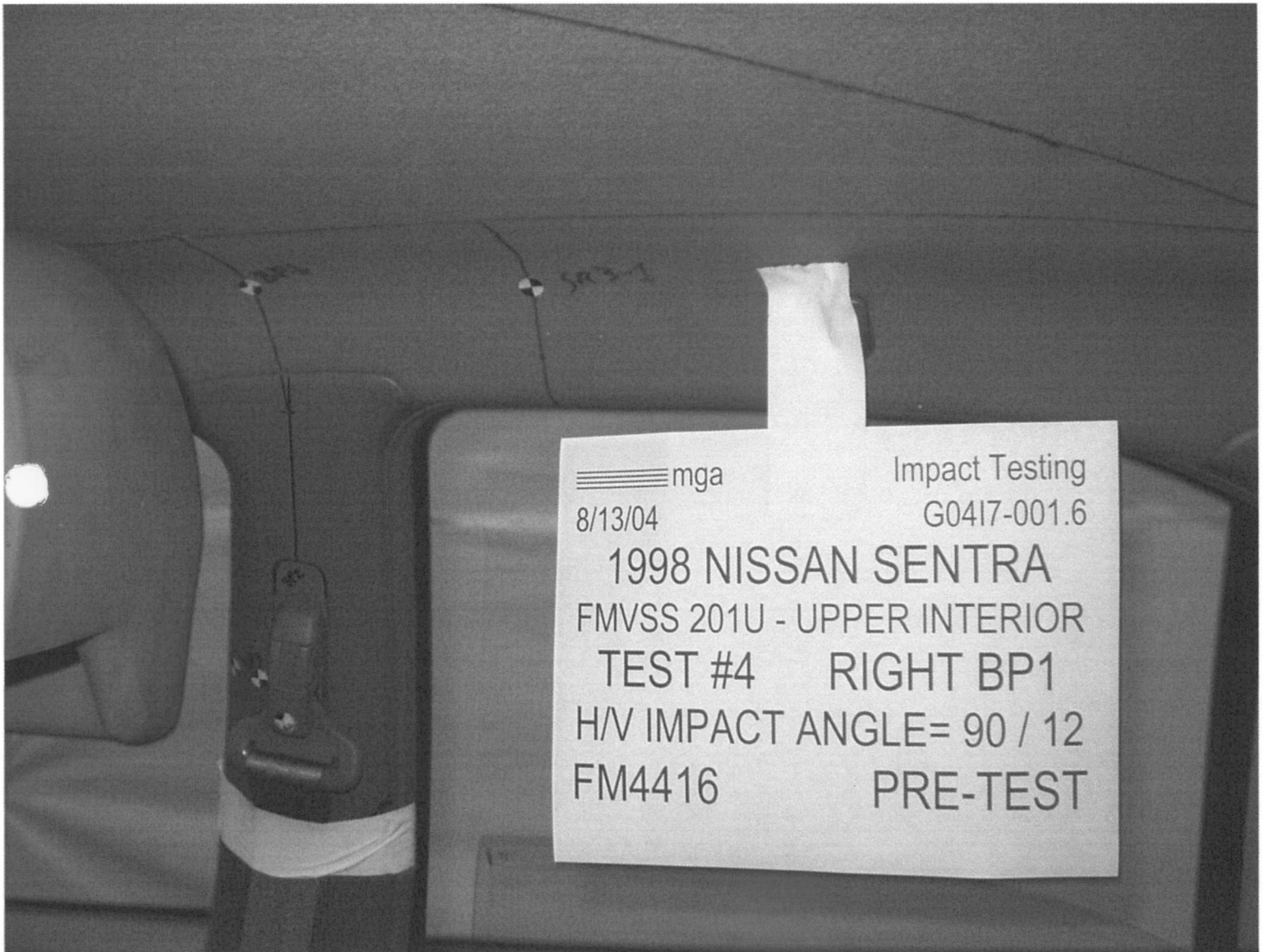
Customer: NISSAN
Test # 1
FM4413
Additional Desc: N/A

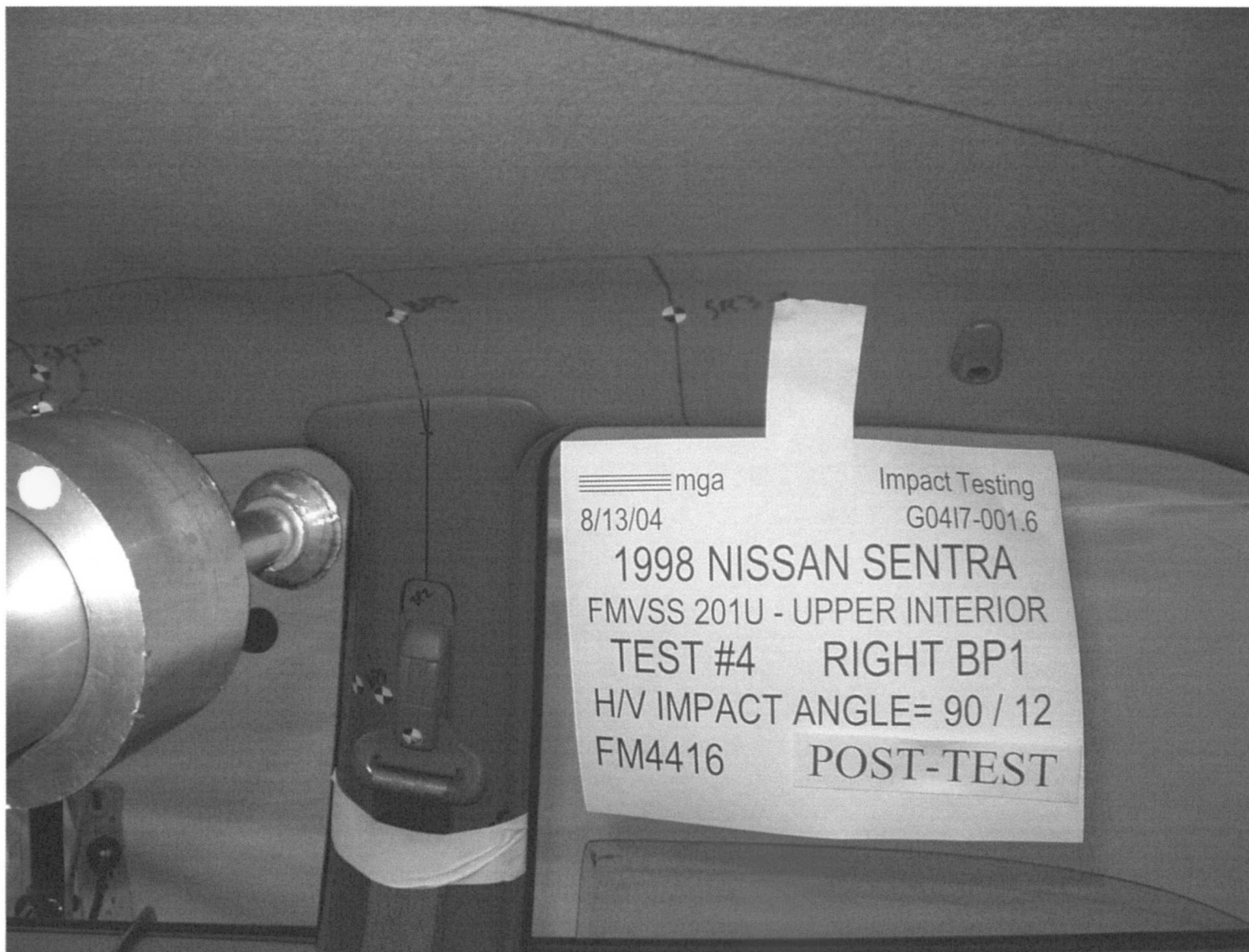
Vehicle Program : SENTRA

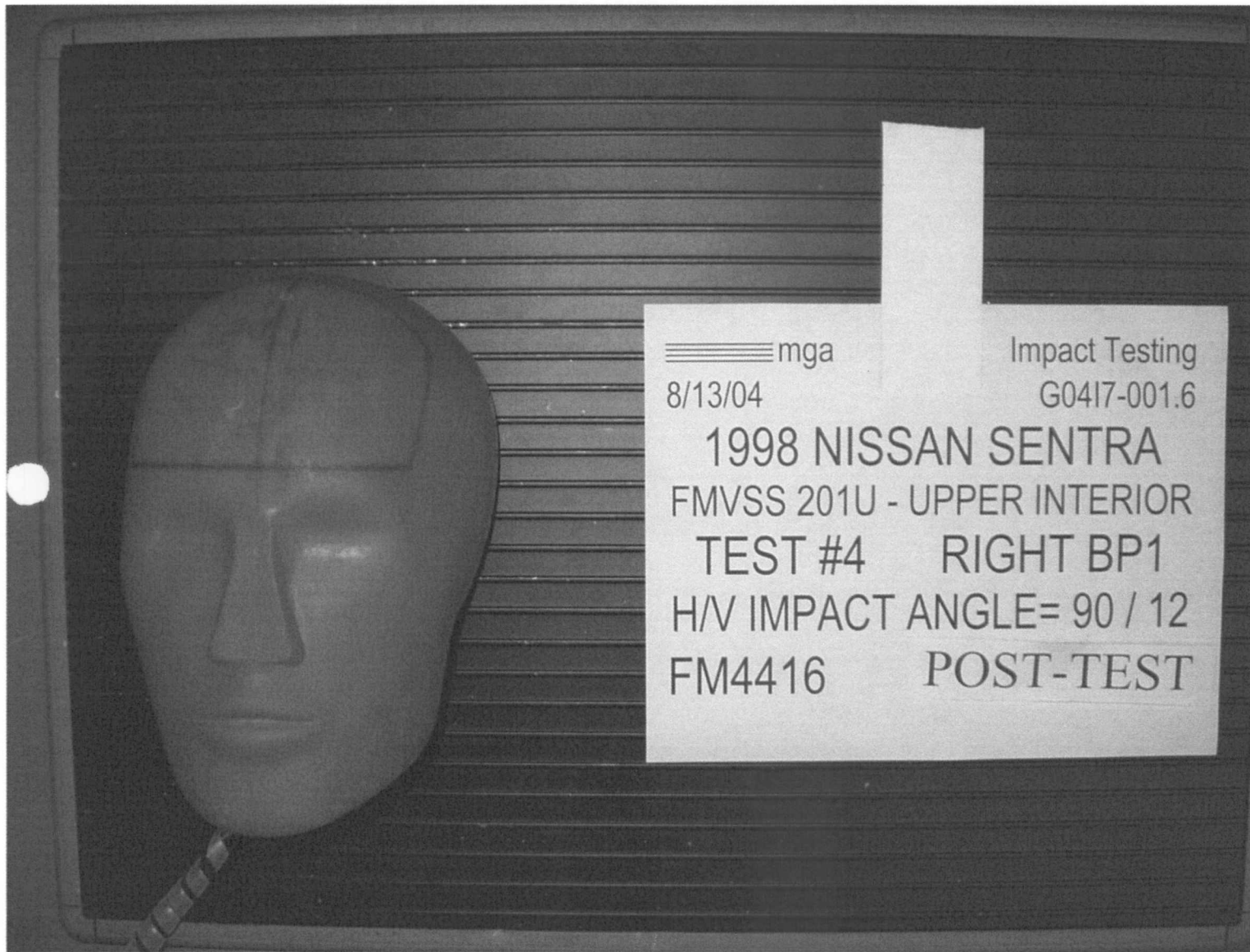
Model Year: 1998
Target: AP3
Vehicle Side: Right
Horz/Vert Angle: 157/44

HIC(d) = 1584, HIC = 1879, Delta T = 3.3 msec









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8/13/04

Impact Testing

G0417-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #4 RIGHT BP1

H/V IMPACT ANGLE= 90 / 12

FM4416 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#4

Target (Vehicle Side): BP1 Right

Temperature:21C

MGA Test Reference No.:FM4416

Humidity:55%

Approach Horizontal Angles:90°

Time of Test:9:15 AM

Approach Vertical Angles:12°

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
742	763	6.6	23.8	78	0

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

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

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

No visible damage

Recorded By: *ma j m* Approved By*: *[Signature]* Date: 8-13-04

*Only necessary for NHTSA (Government) Compliance testing.

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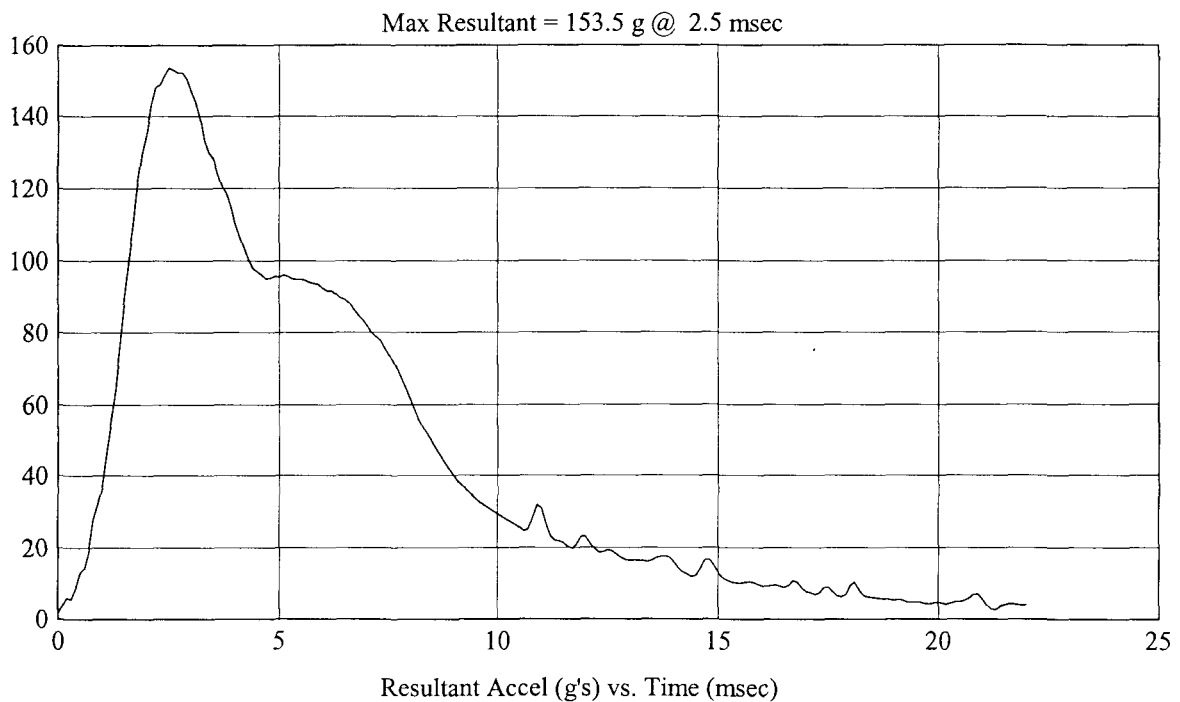
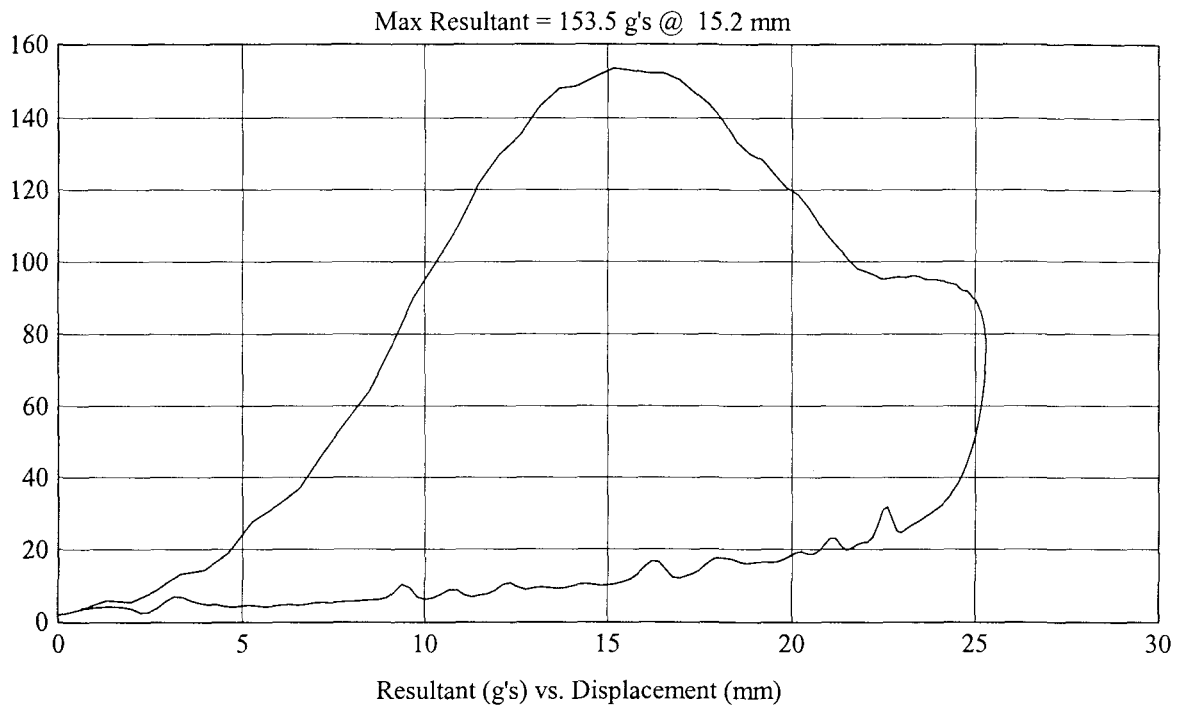
FMH
G04I7-001.6

Customer: NISSAN
Test # 4
FM4416
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 742, HIC = 763, Delta T = 6.6 msec



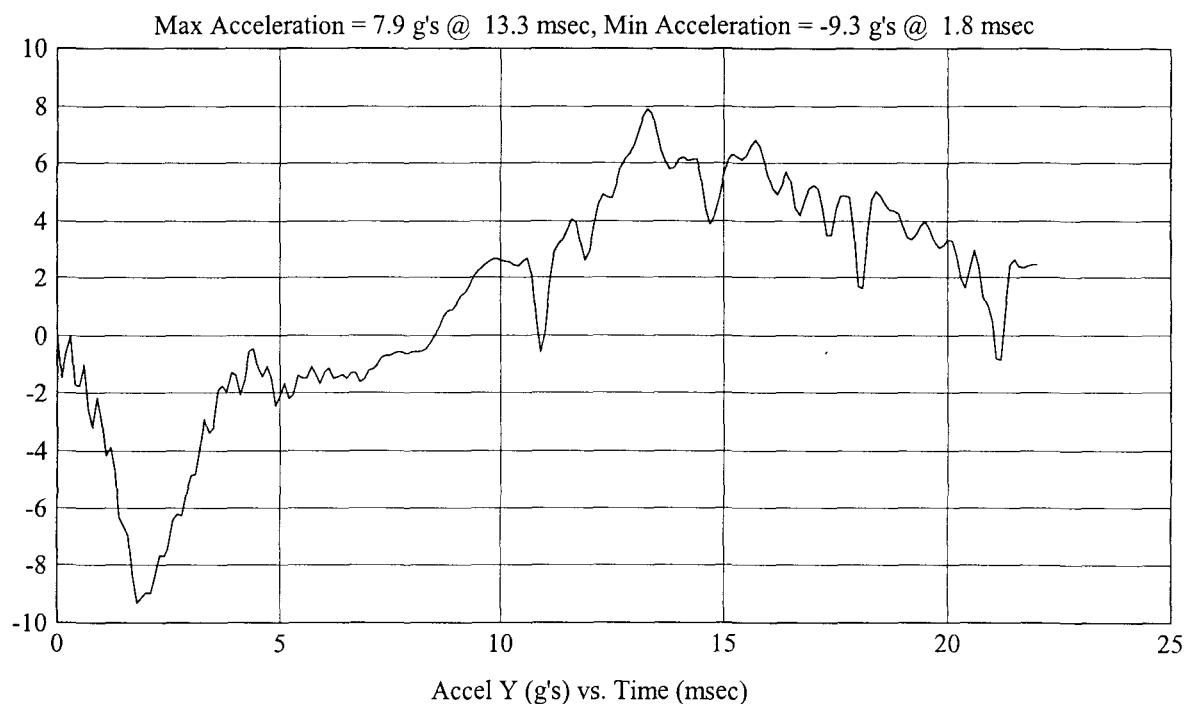
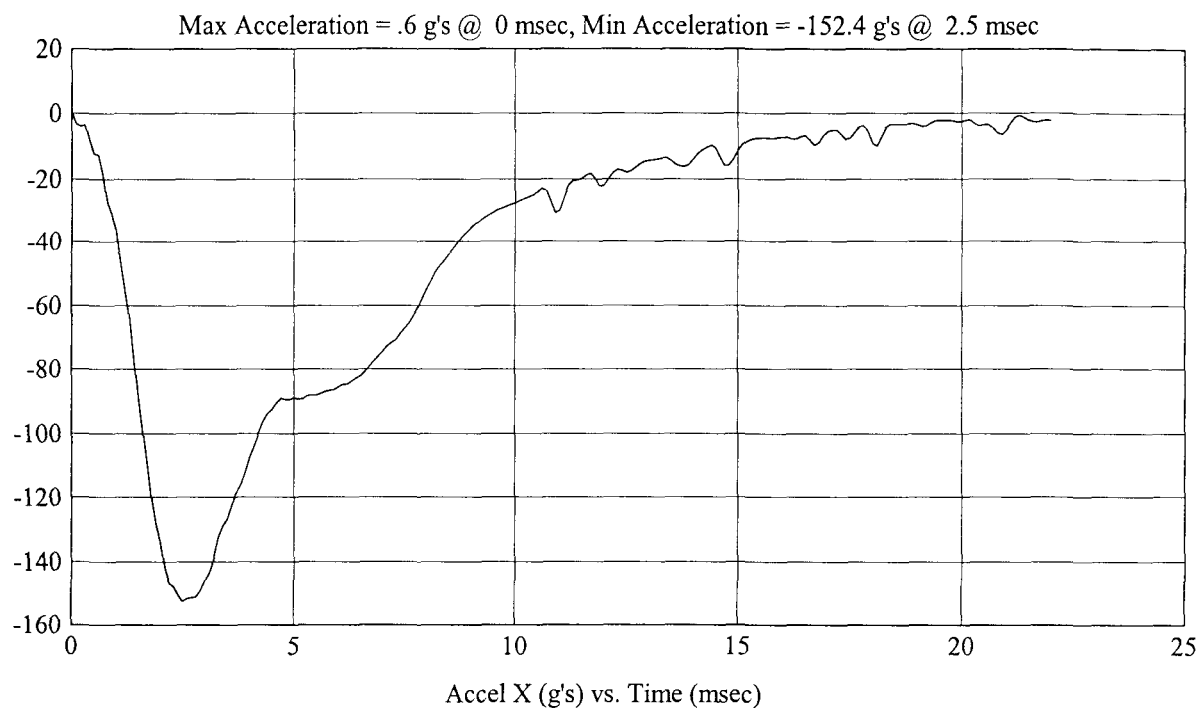
FMH
G04I7-001.6

Customer: NISSAN
Test # 4
FM4416
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 742, HIC = 763, Delta T = 6.6 msec



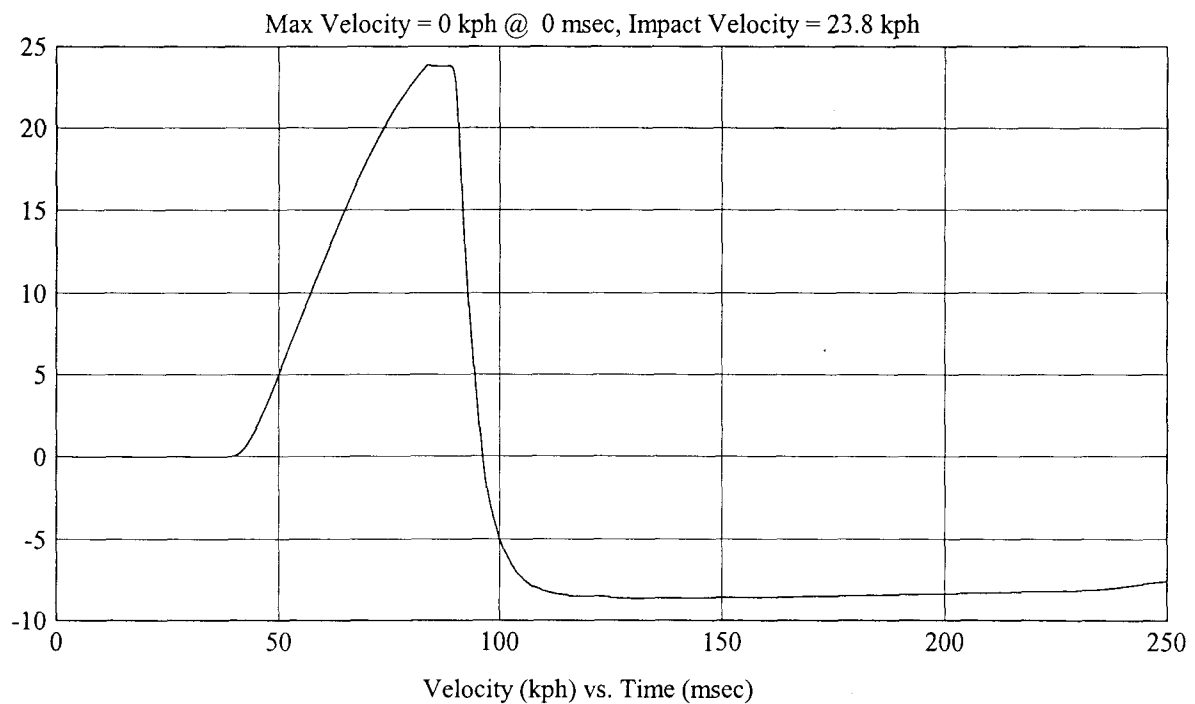
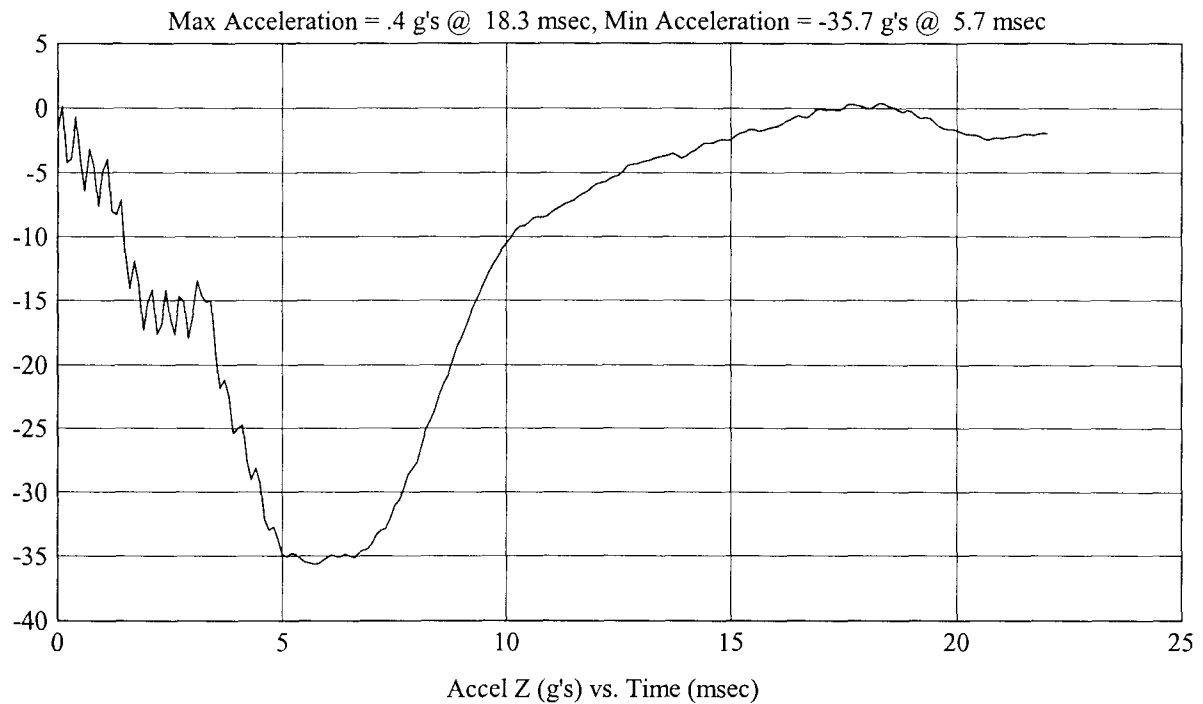
FMH
G0417-001.6

Customer: NISSAN
Test # 4
FM4416
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 742, HIC = 763, Delta T = 6.6 msec



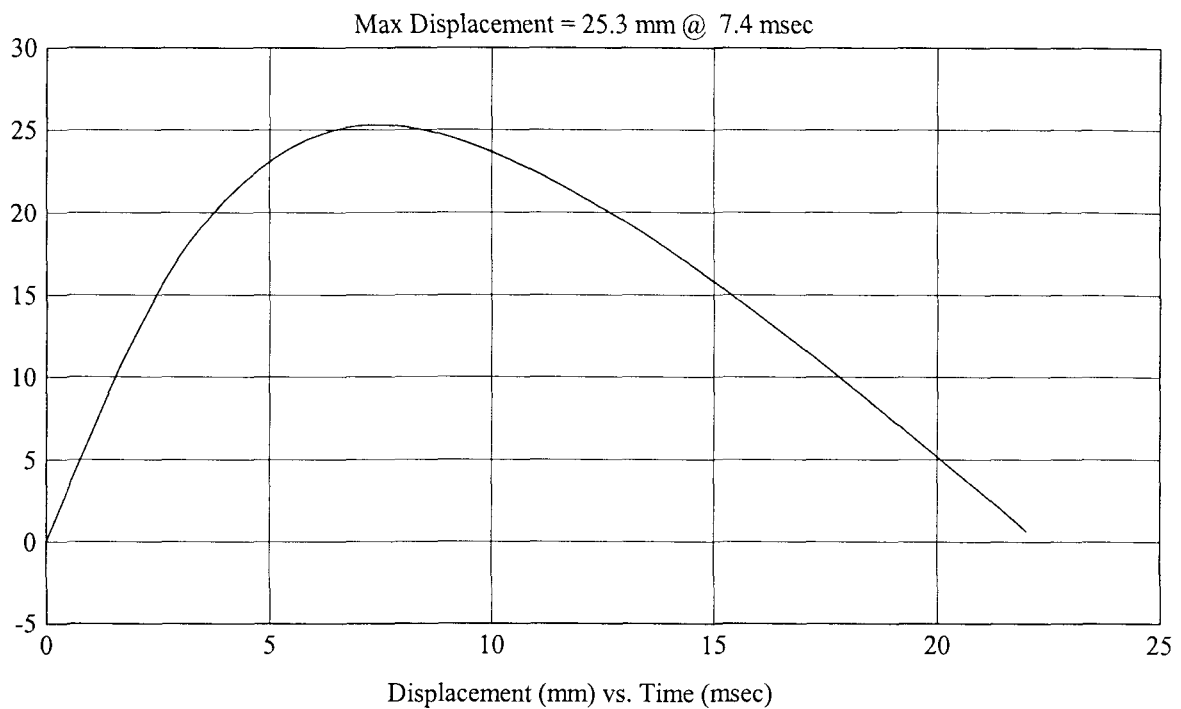
FMH
G04I7-001.6

Customer: NISSAN
Test # 4
FM4416
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP1
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 742, HIC = 763, Delta T = 6.6 msec









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8/12/04

Impact Testing

G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #3 RIGHT BP2

H/V IMPACT ANGLE= 90 / 12

FM4415 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#3

Target (Vehicle Side): BP2 Right

Temperature:22C

MGA Test Reference No.:FM4415

Humidity:44%

Approach Horizontal Angles:90°

Time of Test:4:25 PM

Approach Vertical Angles:12°

FMH Serial No:038

TEST RESULTS:

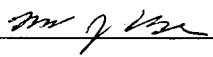
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
670	667	4.3	24.4	28	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J36197	-108	1.68	1.68
Y	6	J36193	101.4	1.54	1.54
Z	7	J36353	96.8	1.59	1.59

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

No visible damage

Recorded By:  Approved By*:  Date: 8-12-04

*Only necessary for NHTSA (Government) Compliance testing.

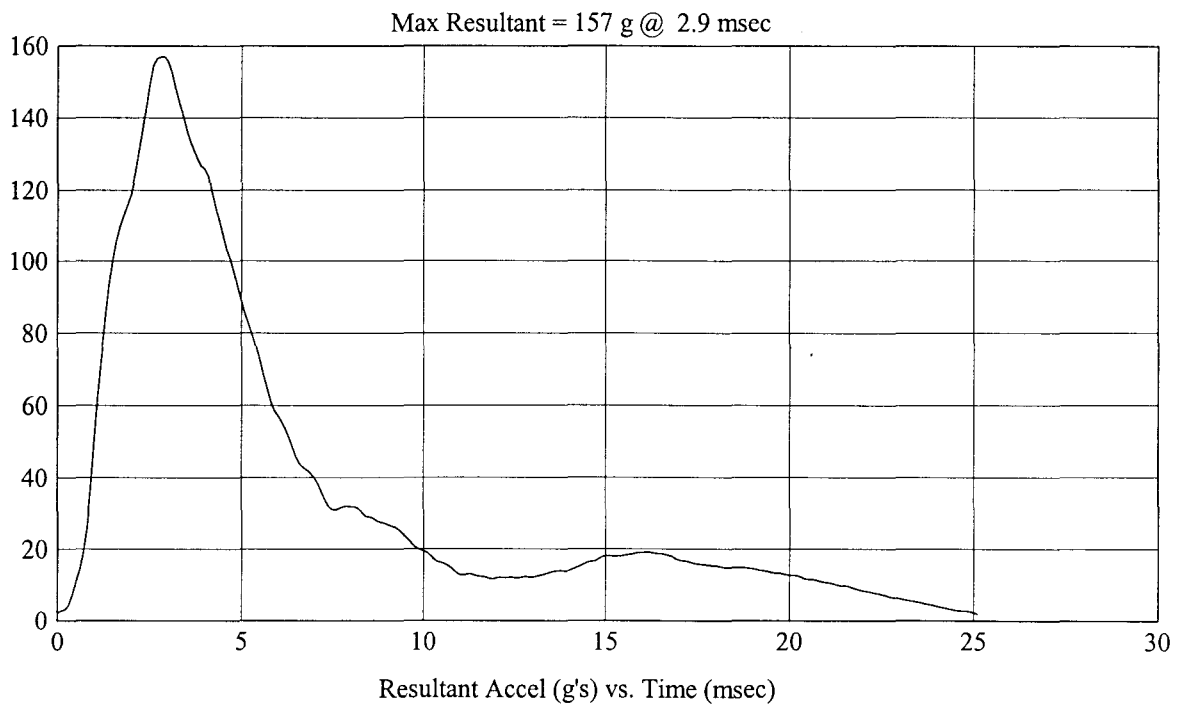
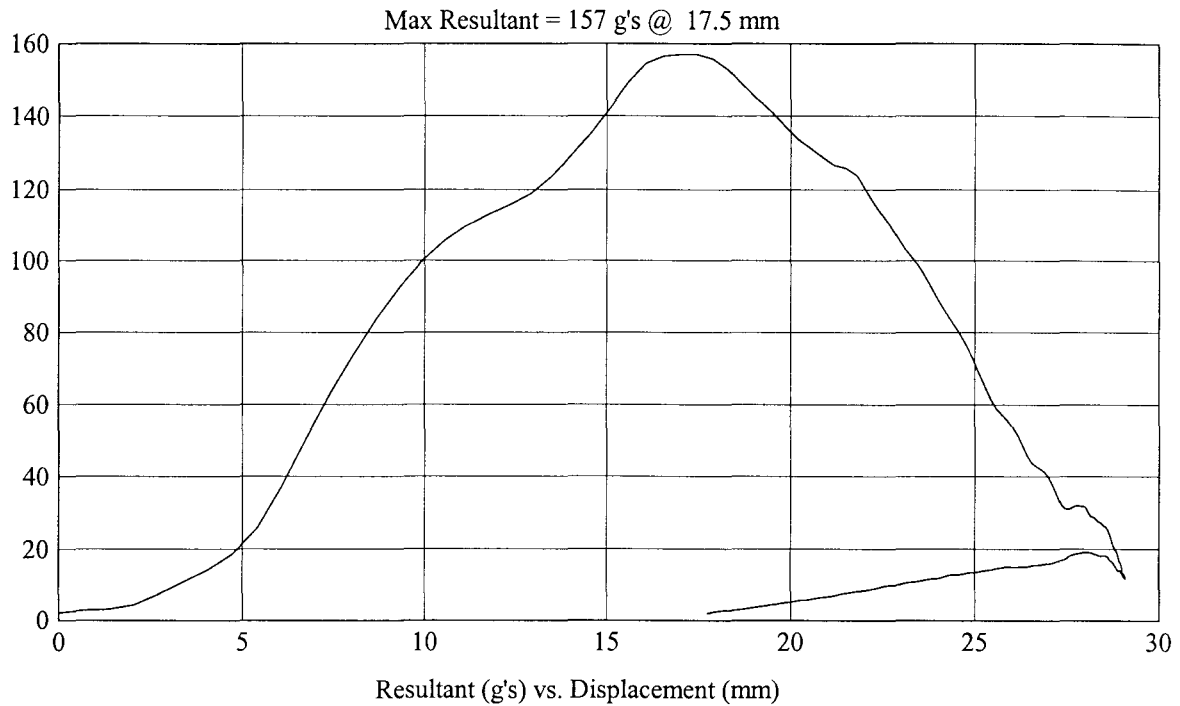
FMH
G04I7-001.6

Customer: NISSAN
Test # 3
FM4415
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 670, HIC = 667, Delta T = 4.3 msec



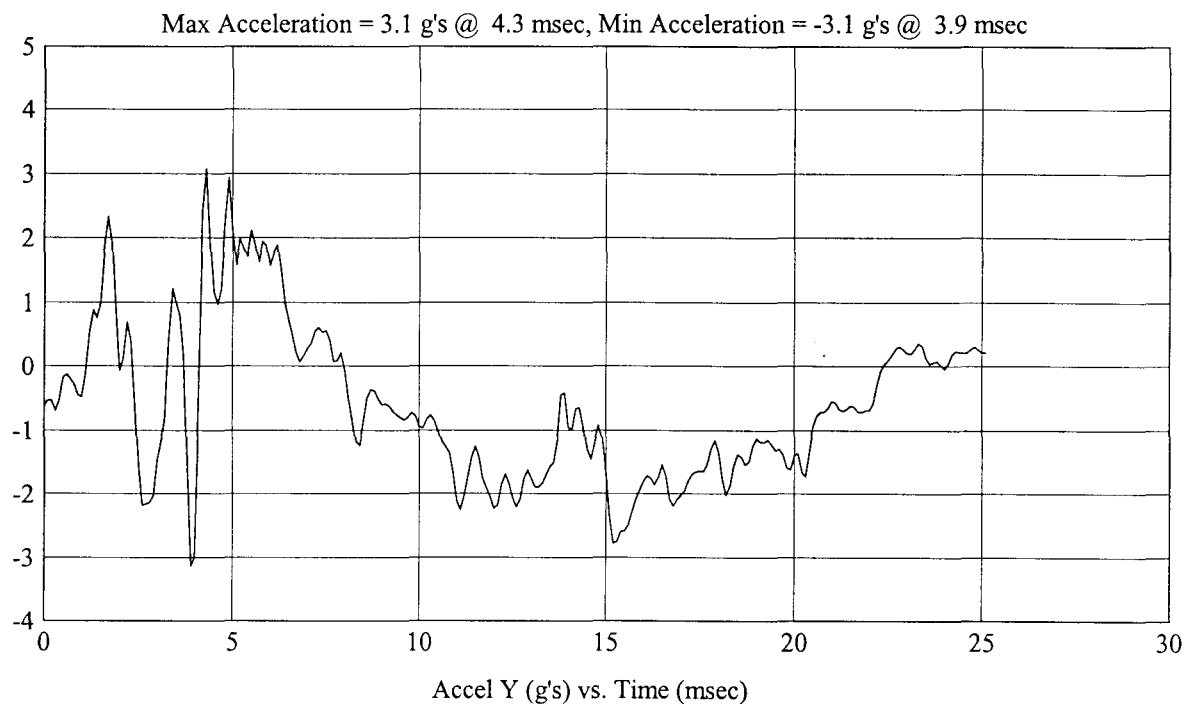
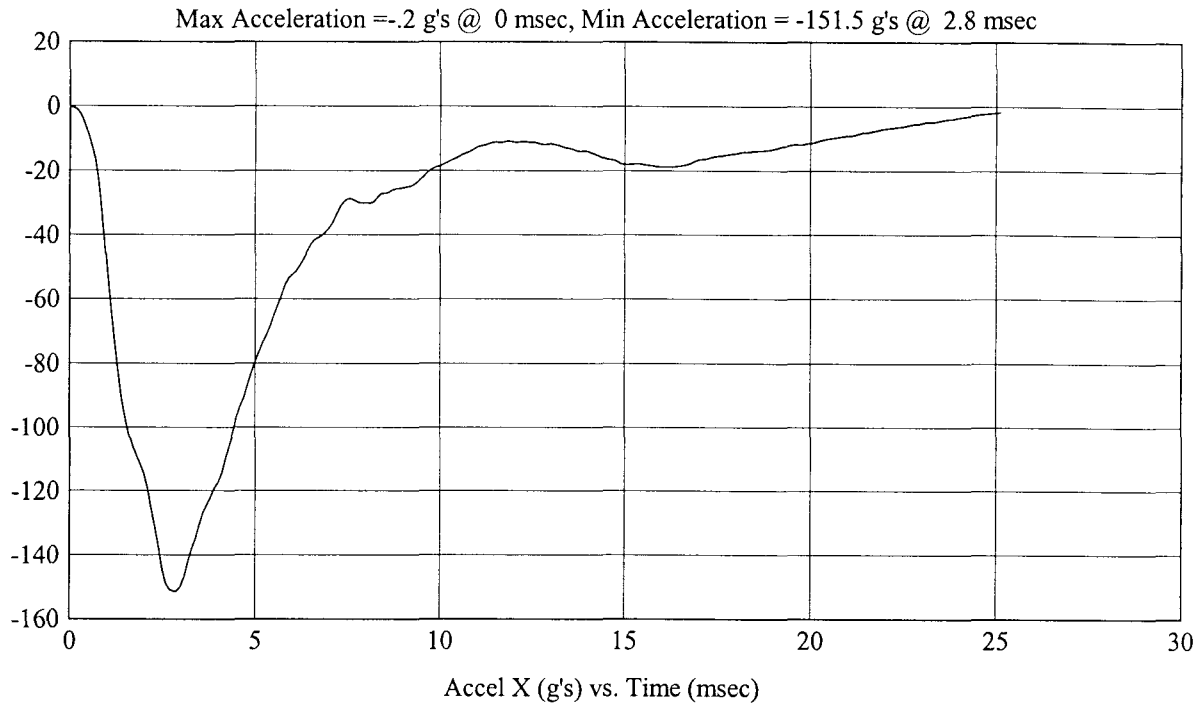
FMH
G04I7-001.6

Customer: NISSAN
Test # 3
FM4415
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 670, HIC = 667, Delta T = 4.3 msec



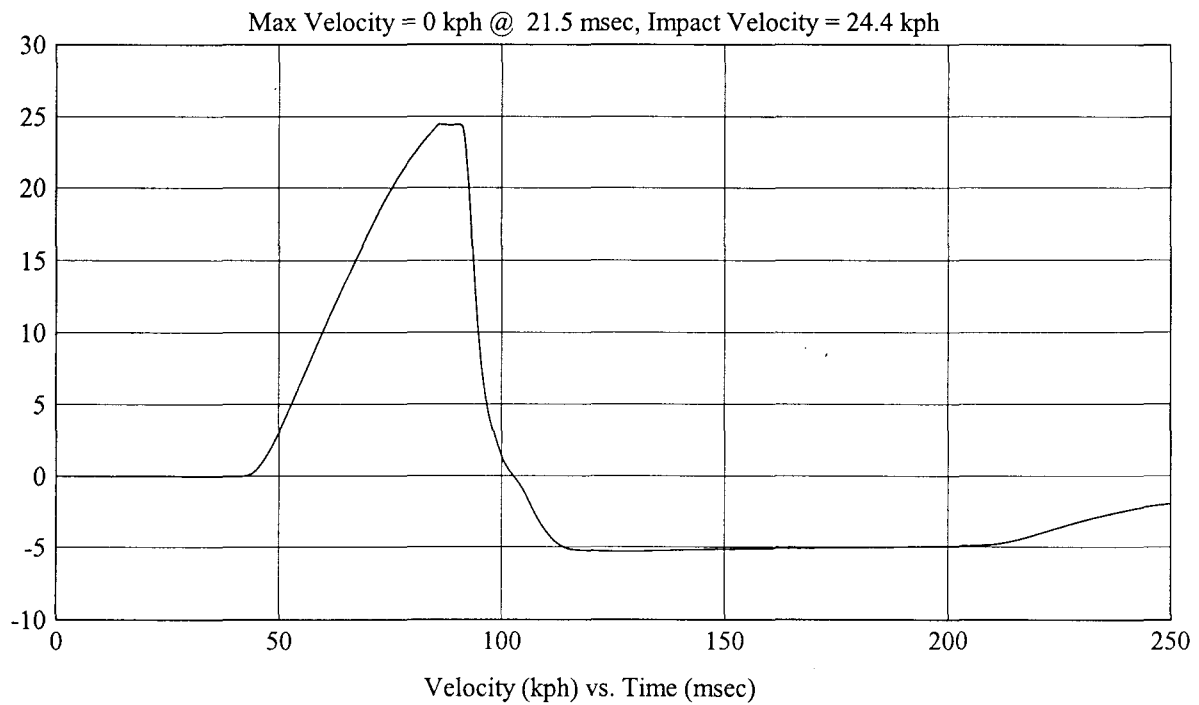
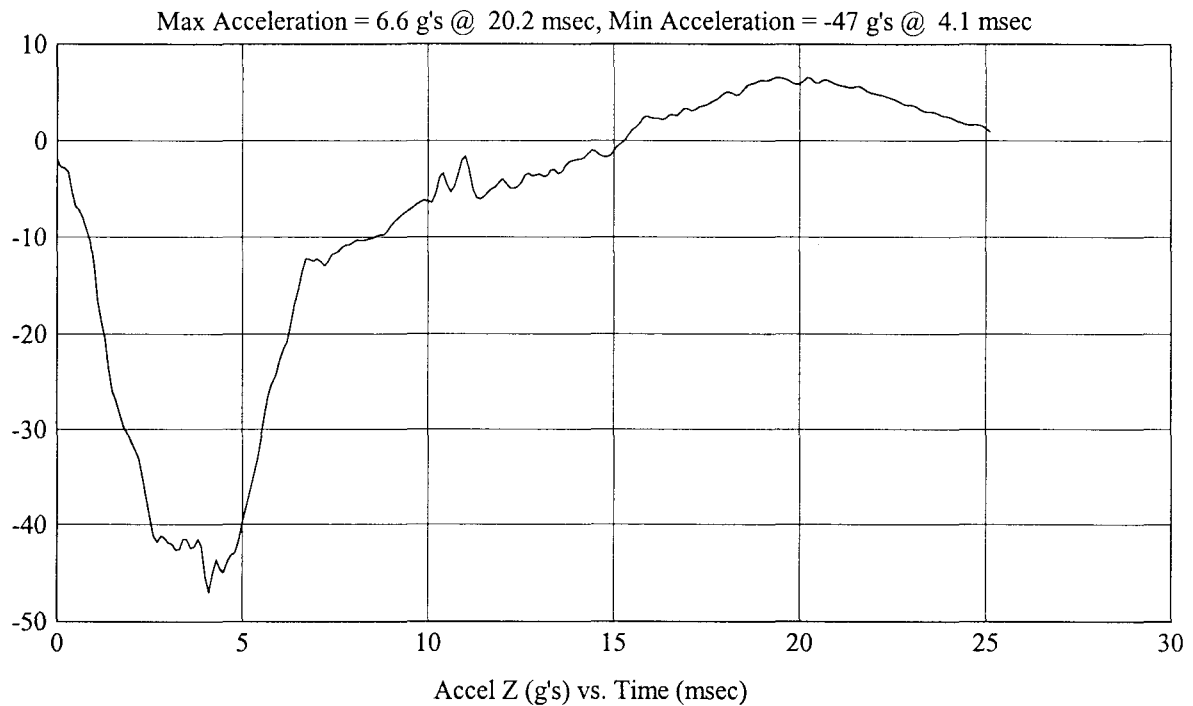
FMH
G04I7-001.6

Customer: NISSAN
Test # 3
FM4415
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 670, HIC = 667, Delta T = 4.3 msec



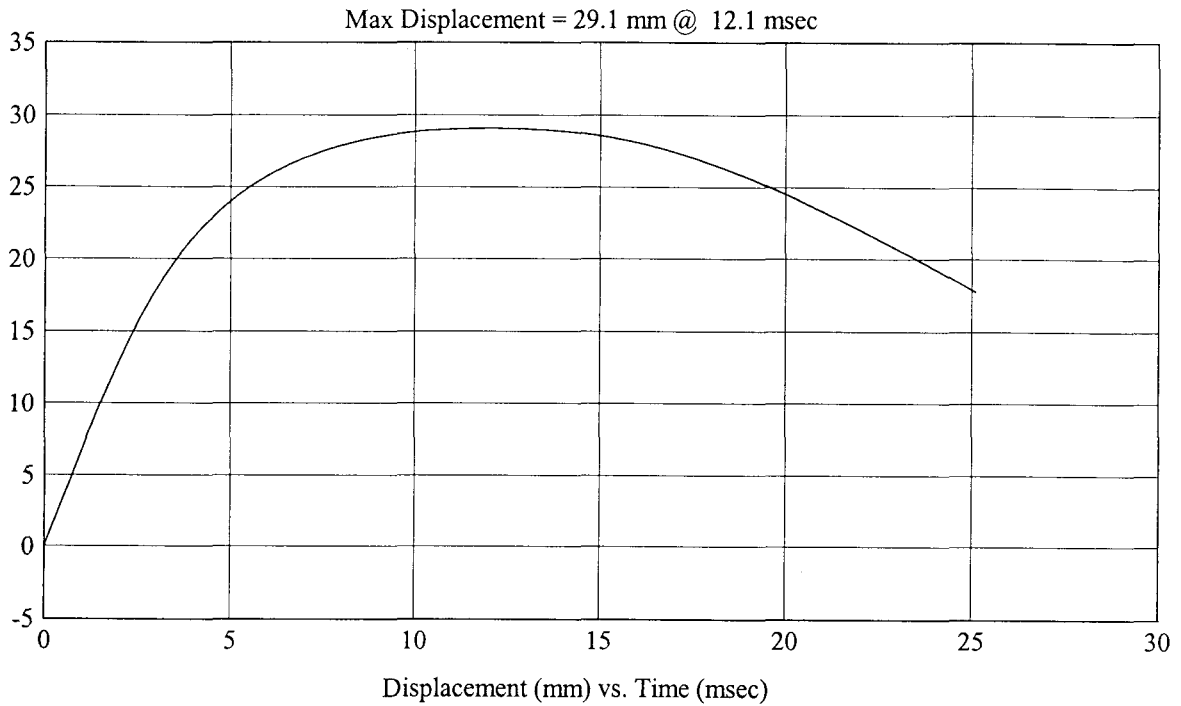
FMH
G04I7-001.6

Customer: NISSAN
Test # 3
FM4415
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP2
Vehicle Side: Right
Horz/Vert Angle: 90/12

HIC(d) = 670, HIC = 667, Delta T = 4.3 msec



==== mga

8/13/04

Impact Testing
G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

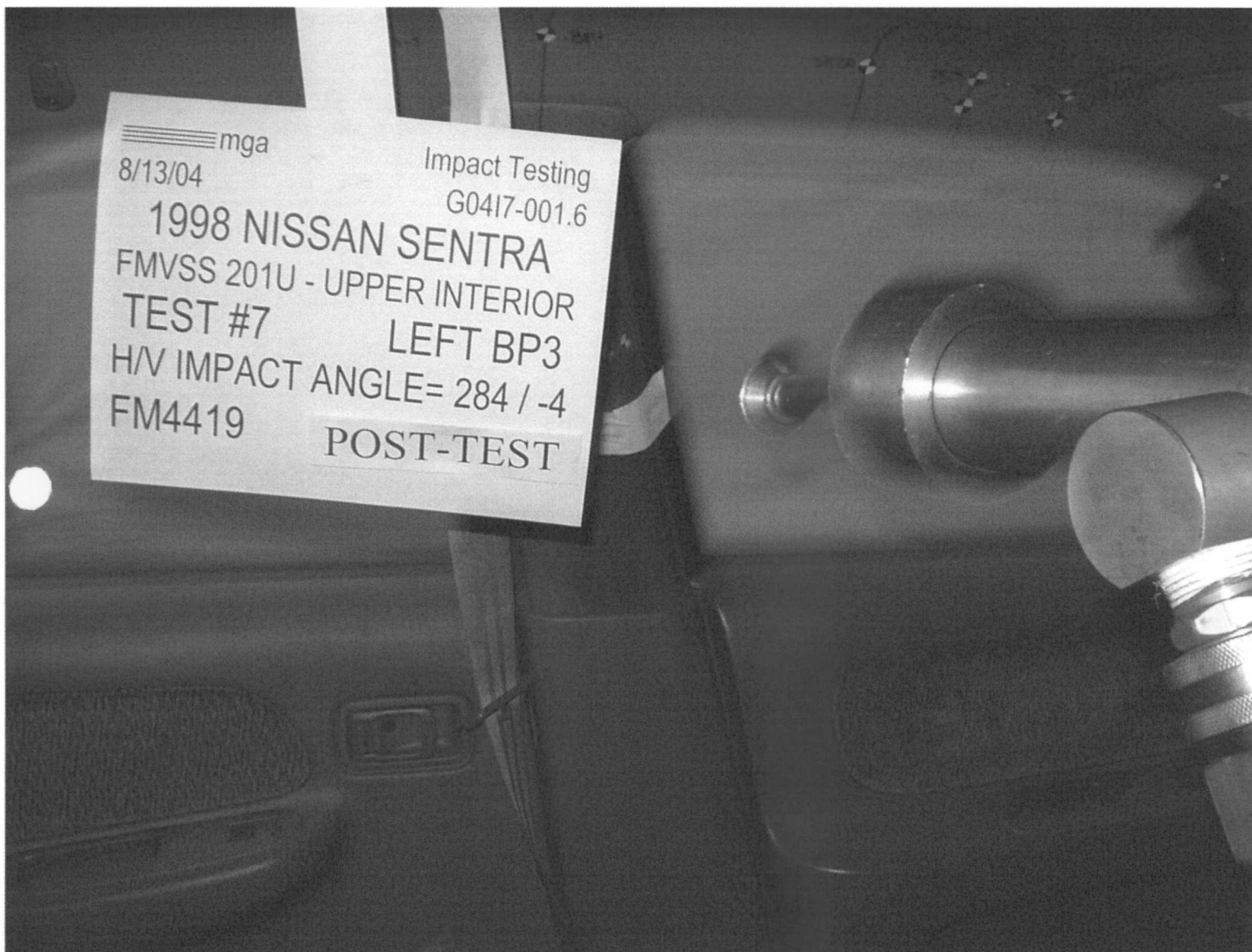
TEST #7

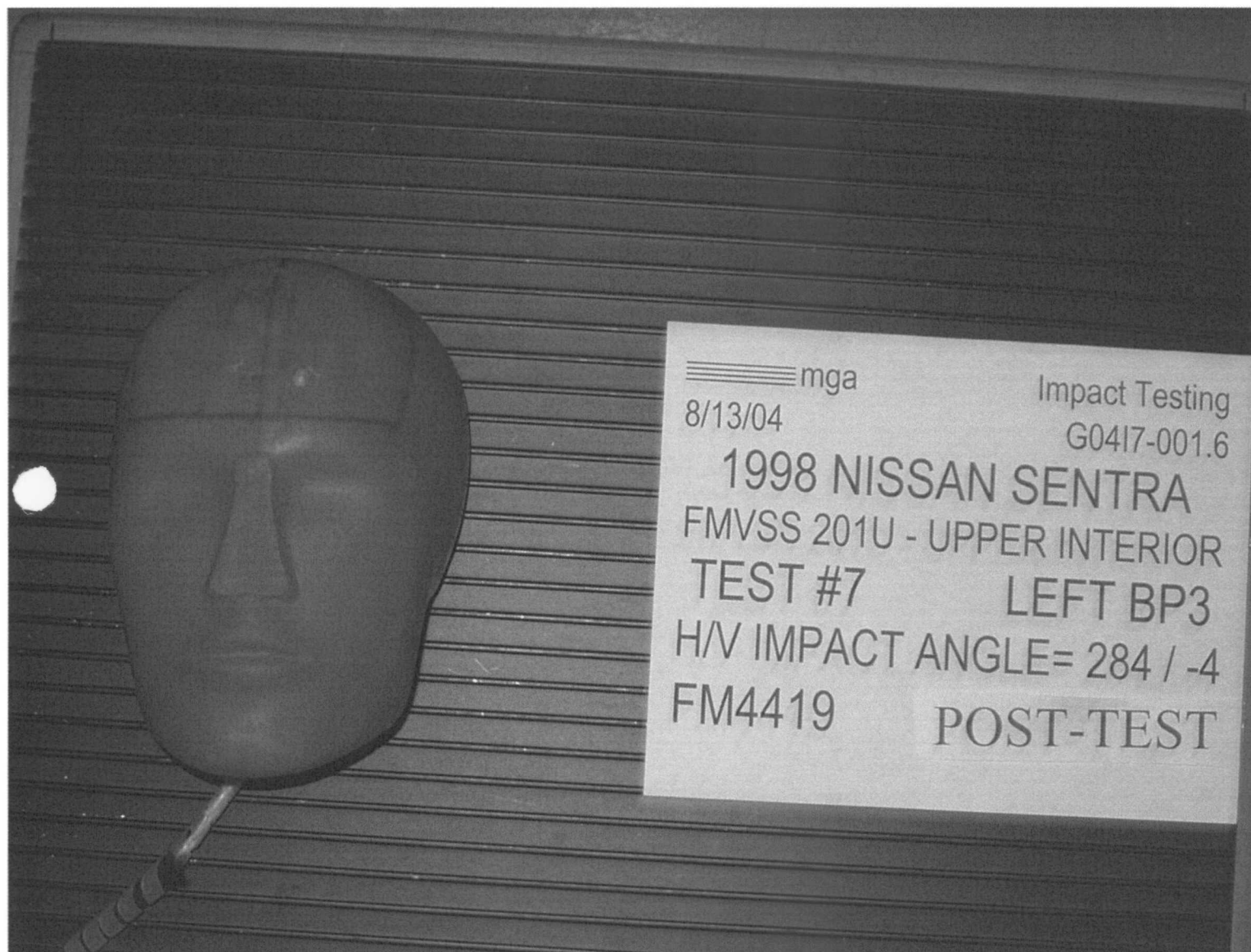
LEFT BP3

H/V IMPACT ANGLE= 284 / -4

FM4419

PRE - TEST





==== mga

8/13/04

Impact Testing

G0417-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #7

LEFT BP3

H/V IMPACT ANGLE= 284 / -4

FM4419

POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.6 VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): BP3 Left

Temperature:22F

MGA Test Reference No.:FM4419

Humidity:49%

Approach Horizontal Angles:284°

Time of Test:1:25 PM

Approach Vertical Angles:-4°

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
770	800	4.5	23.9	17	15 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	1.67
Y	6	J35916	100.2	1.55	1.55
Z	7	J35918	97.9	1.58	1.58

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

Cracked the B pillar trim

Recorded By: ma jkz Approved By*: [Signature] Date: 8-13-04

*Only necessary for NHTSA (Government) Compliance testing.

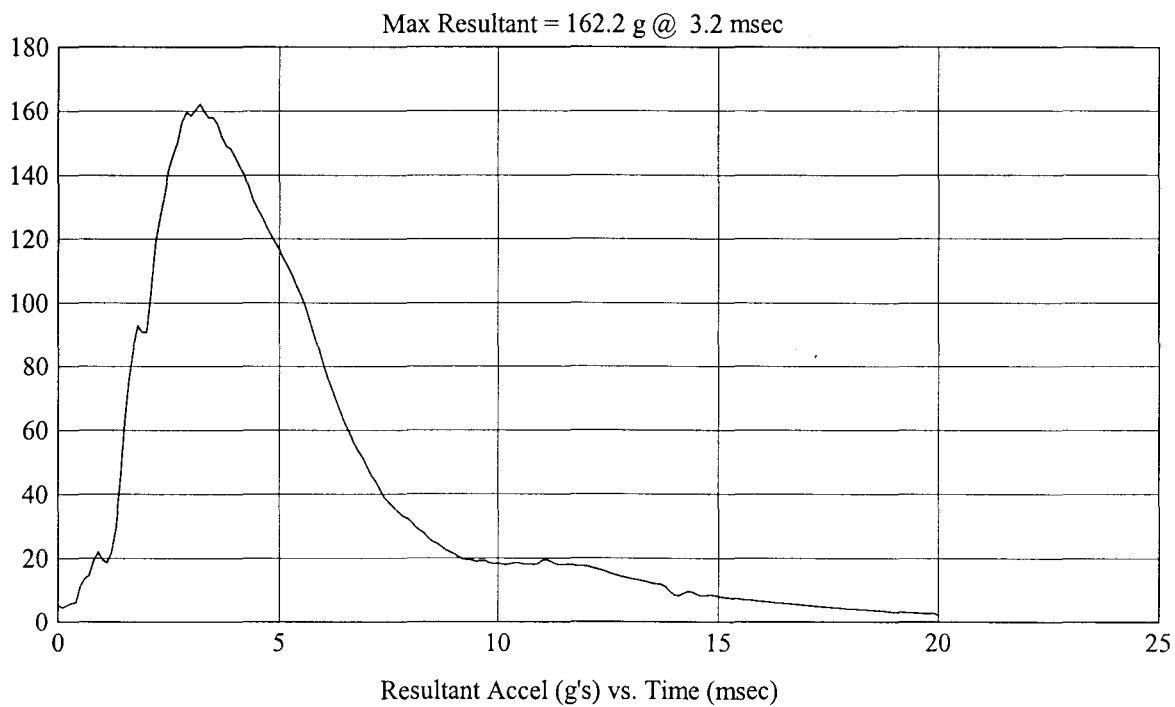
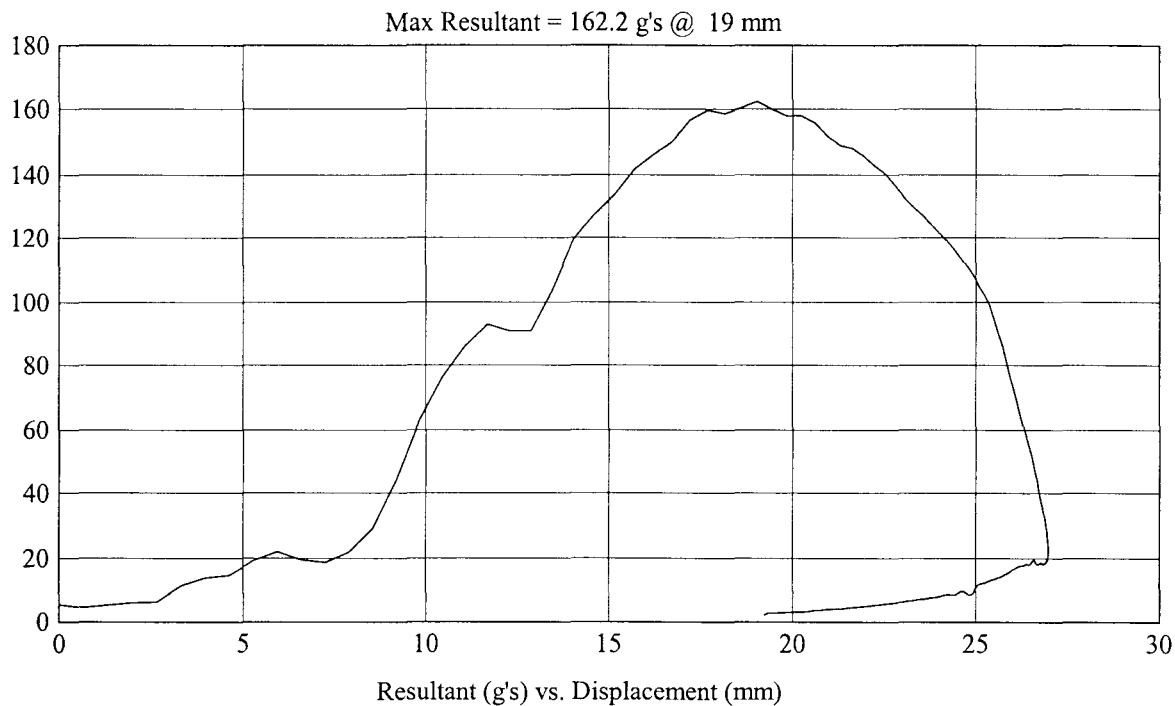
FMH
G04I7-001.6

Customer: NISSAN
Test # 7
FM4419
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 284/-4

HIC(d) = 770, HIC = 800, Delta T = 4.5 msec



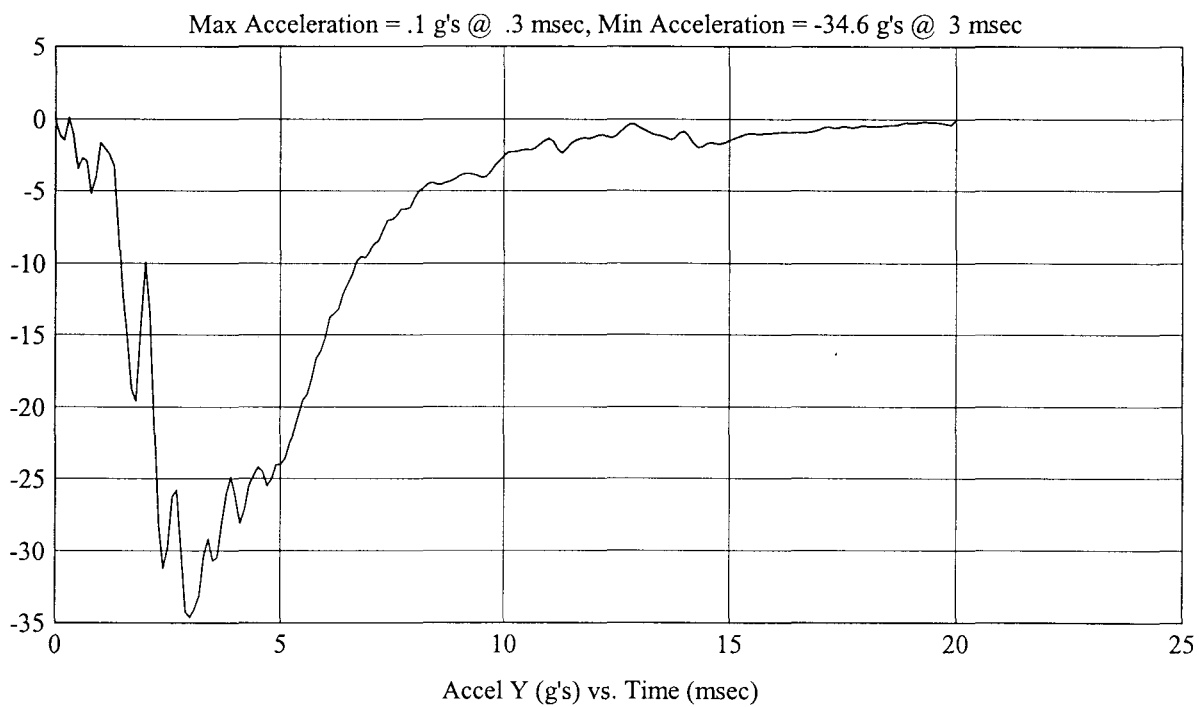
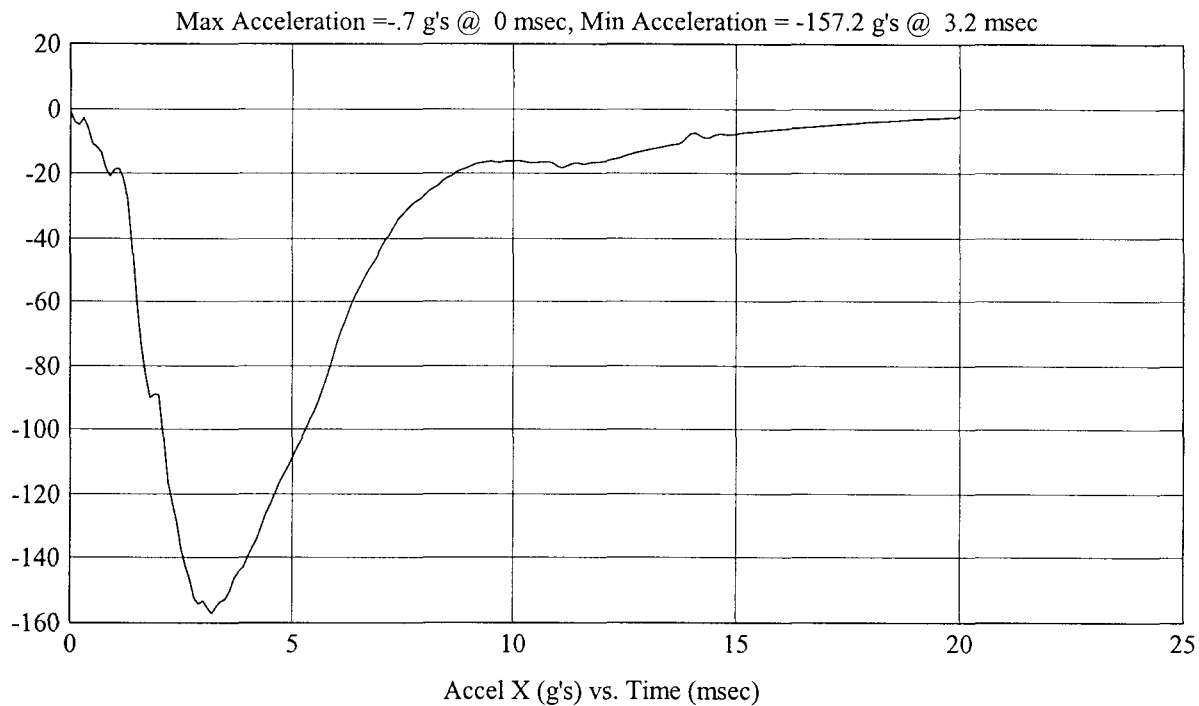
FMH
G04I7-001.6

Customer: NISSAN
Test # 7
FM4419
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 284/-4

HIC(d) = 770, HIC = 800, Delta T = 4.5 msec



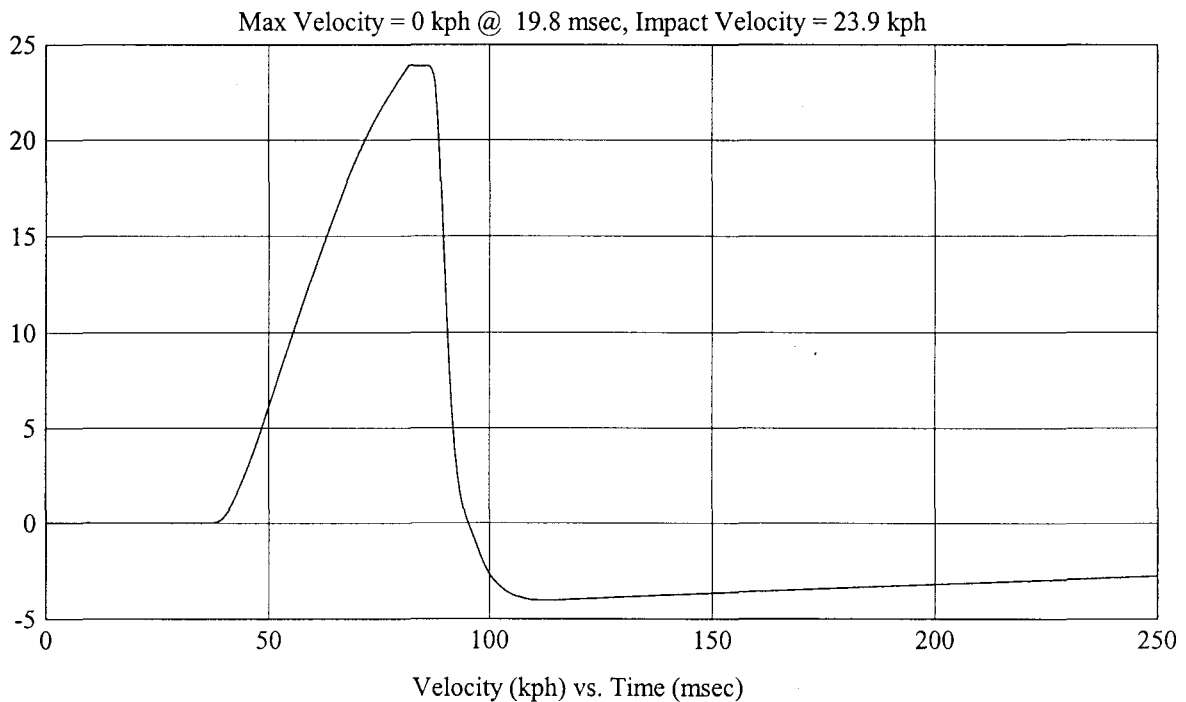
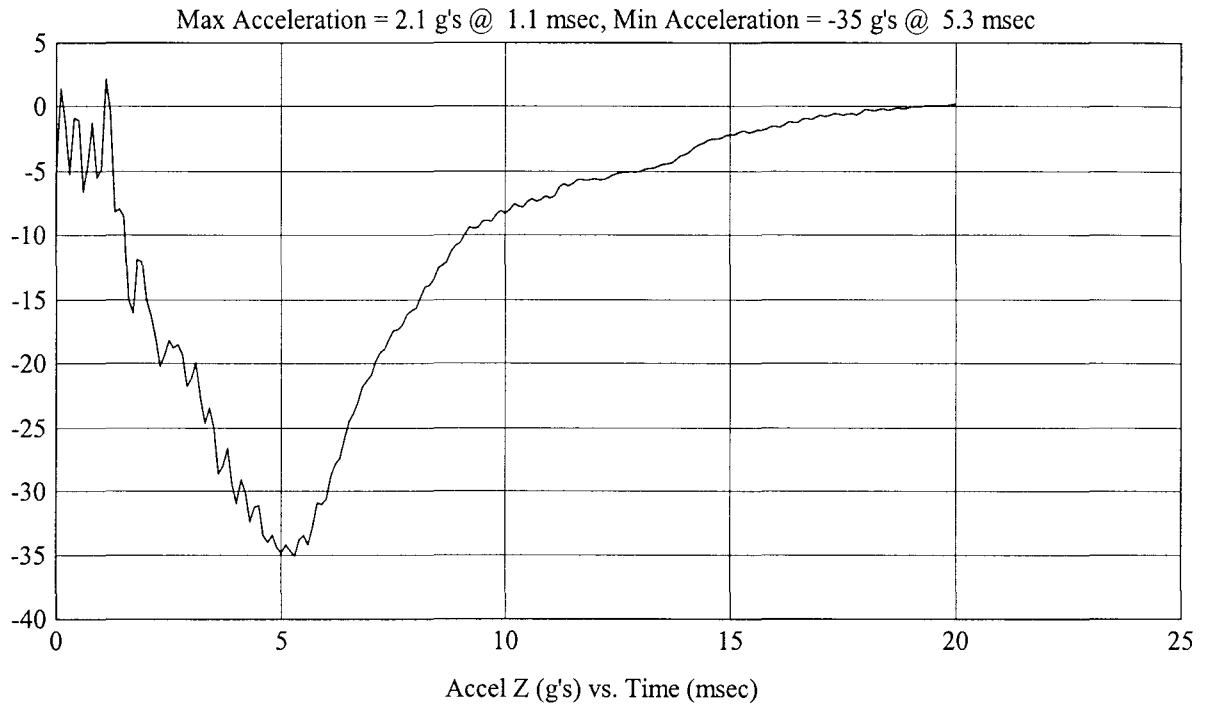
FMH
G04I7-001.6

Customer: NISSAN
Test # 7
FM4419
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 284/-4

HIC(d) = 770, HIC = 800, Delta T = 4.5 msec



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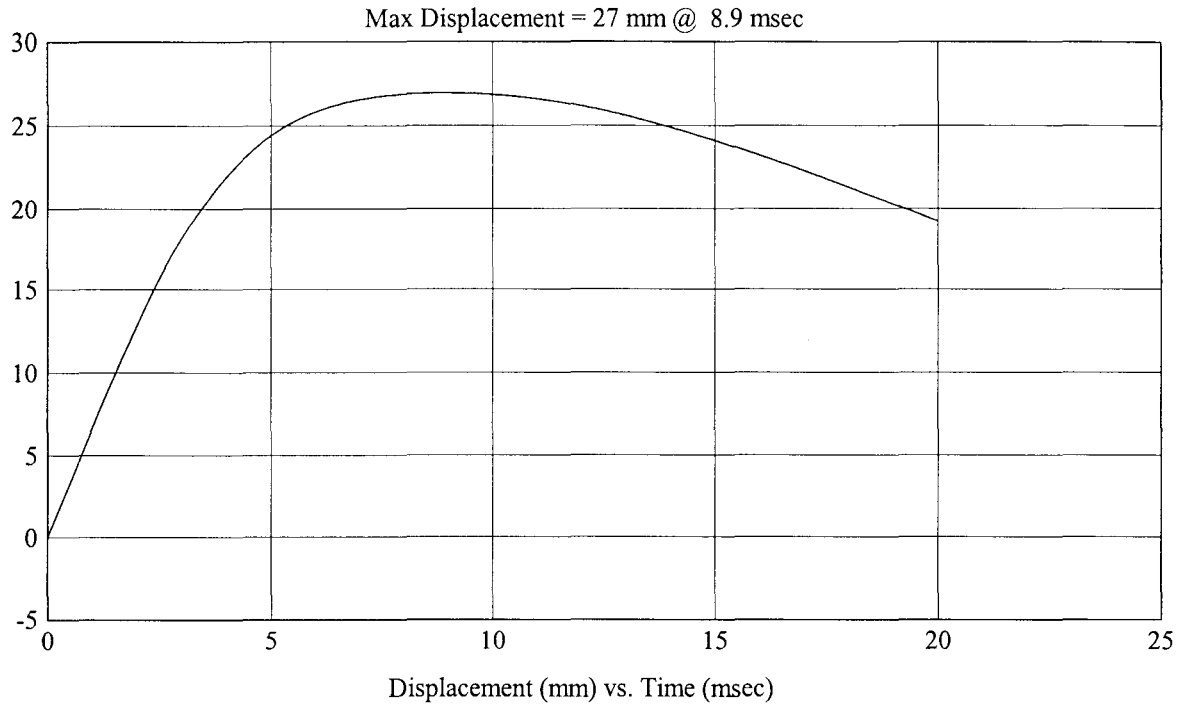
FMH
G04I7-001.6

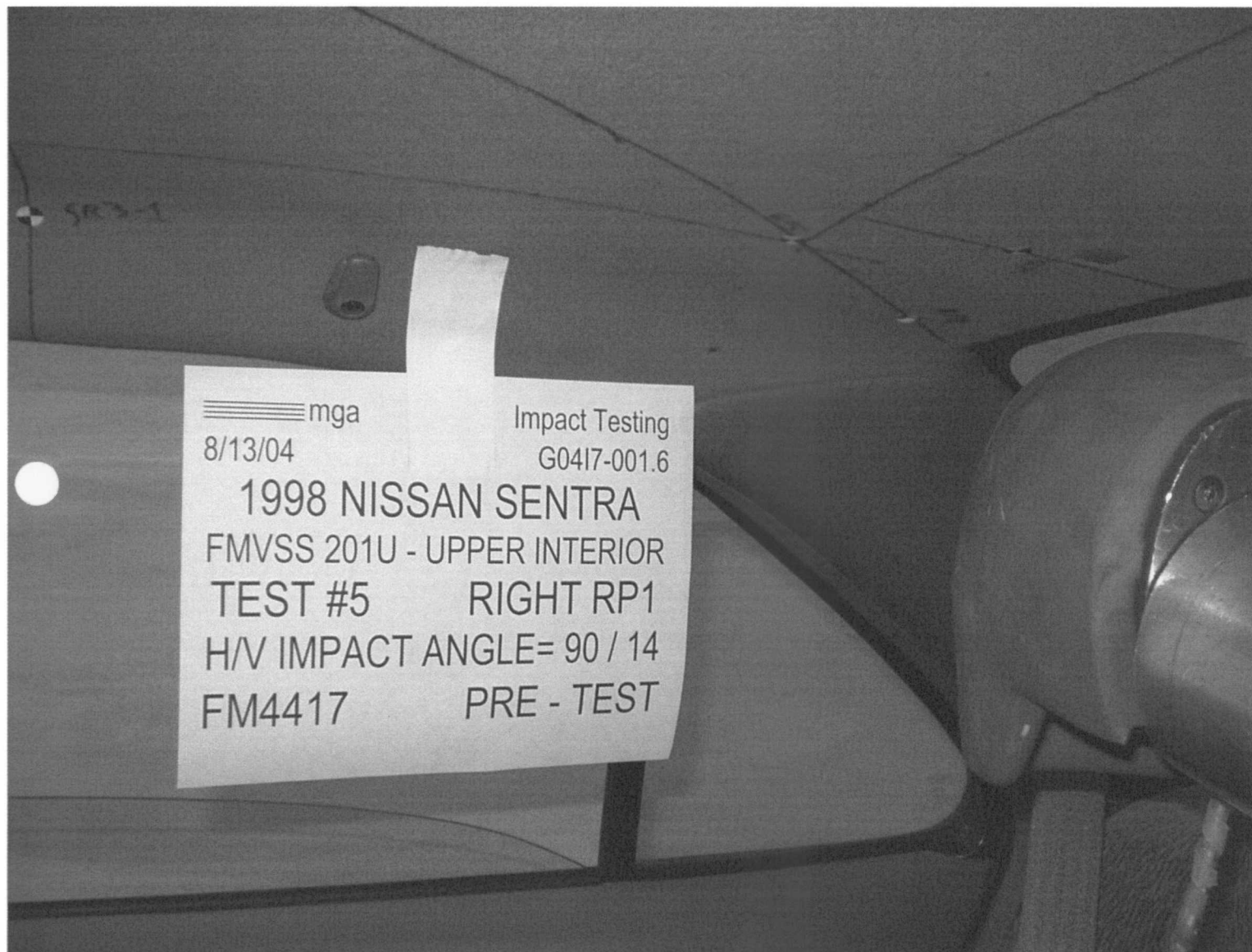
Customer: NISSAN
Test # 7
FM4419
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: BP3
Vehicle Side: Left
Horz/Vert Angle: 284/-4

HIC(d) = 770, HIC = 800, Delta T = 4.5 msec





==== mga

8/13/04

Impact Testing
G0417-001.6

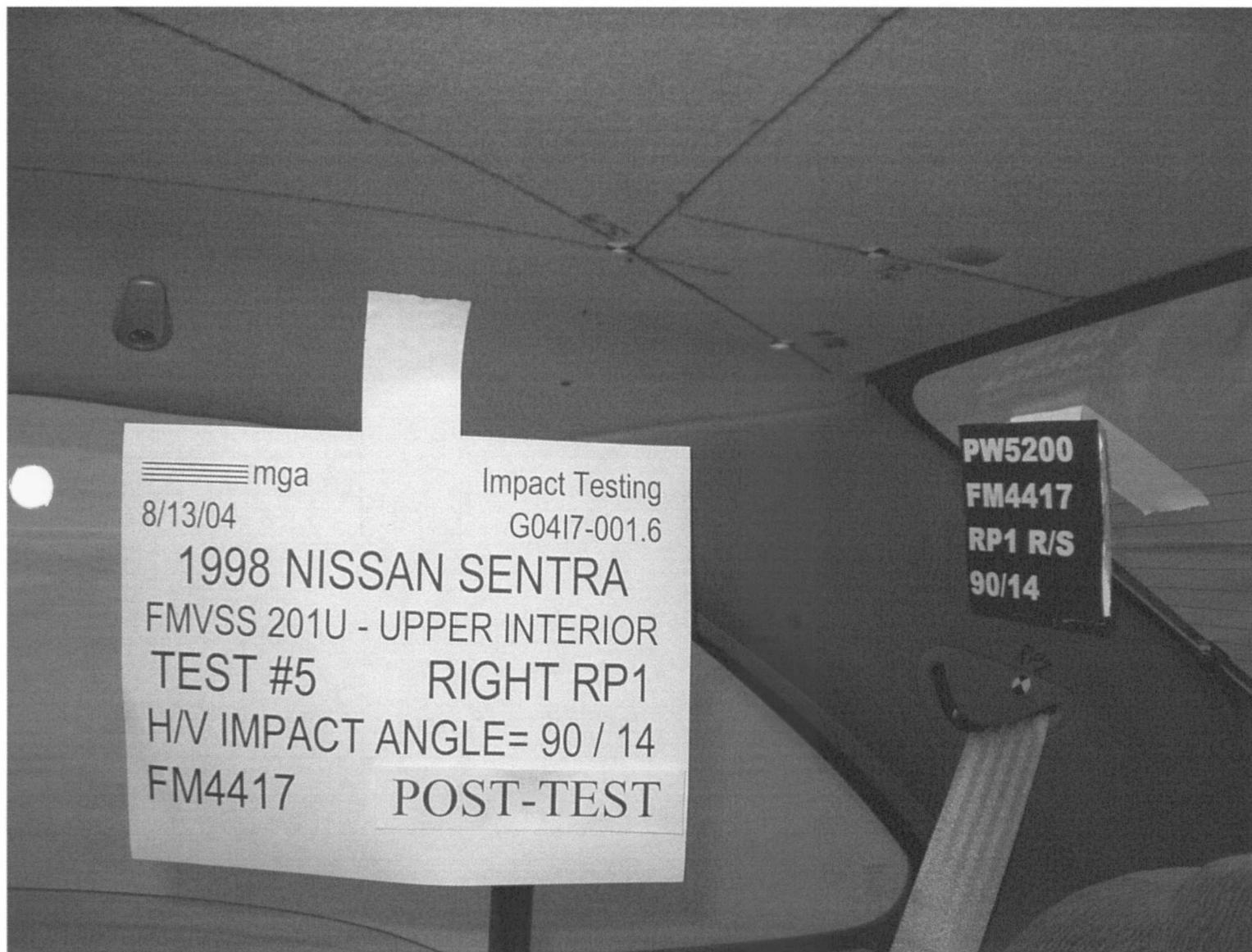
1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #5 RIGHT RP1

H/V IMPACT ANGLE= 90 / 14

FM4417 PRE - TEST



mga

8/13/04

Impact Testing
G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #5 RIGHT RP1

H/V IMPACT ANGLE= 90 / 14

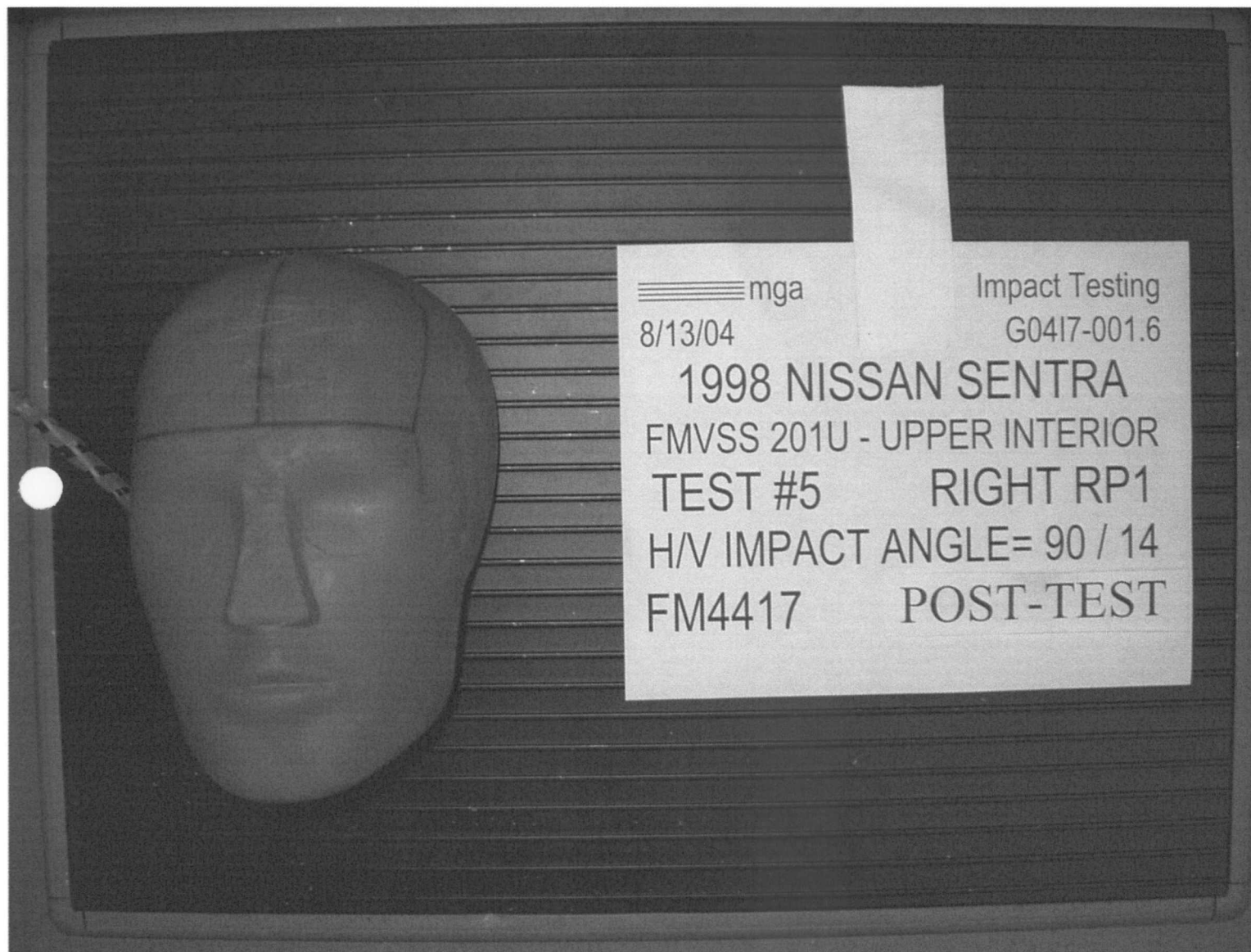
FM4417 POST-TEST

PW5200

FM4417

RP1 R/S

90/14



==== mga

Impact Testing

8/13/04

G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #5 RIGHT RP1

H/V IMPACT ANGLE= 90 / 14

FM4417 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.6 VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#5

Target (Vehicle Side): RP1 Right

Temperature:21C

MGA Test Reference No.:FM4417

Humidity:55%

Approach Horizontal Angles:90°

Time of Test:10:00 AM

Approach Vertical Angles:14°

FMH Serial No:037

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
632	617	8.5	23.6	93	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-96.6	1.67	1.67
Y	6	J35841	92.5	1.54	1.55
Z	7	J35791	90	1.59	1.58

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

No visible damage

Recorded By: *[Signature]* Approved By: *[Signature]* Date: 8-13-01

*Only necessary for NHTSA (Government) Compliance testing.

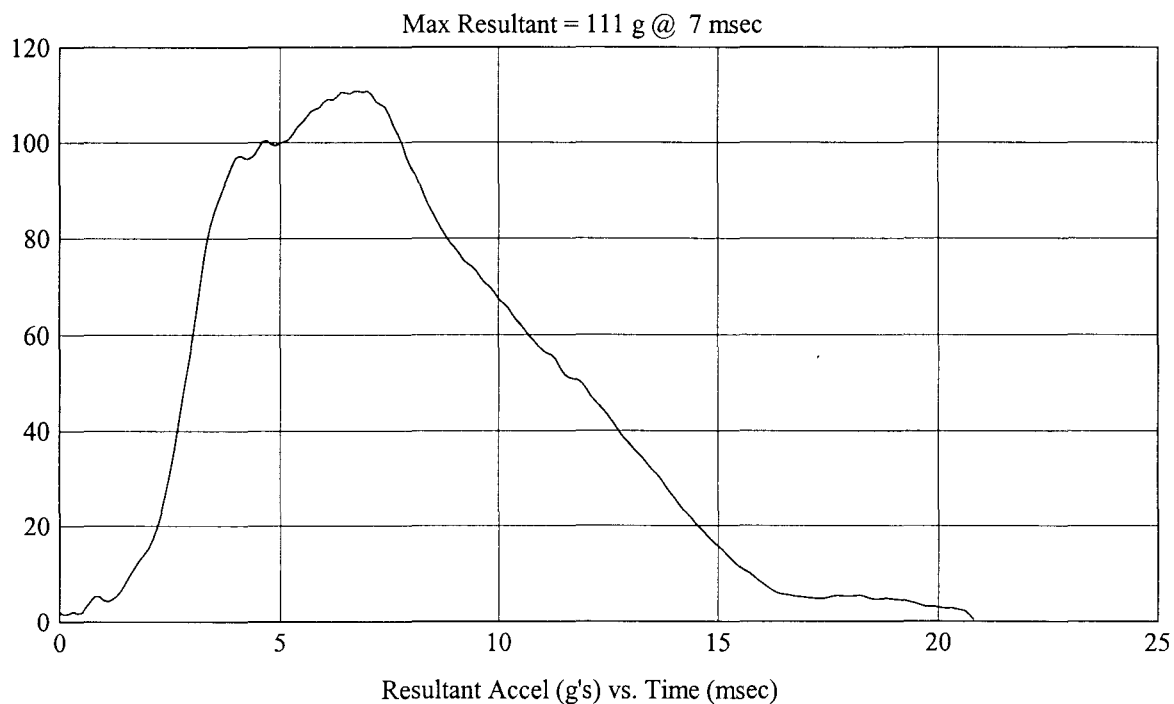
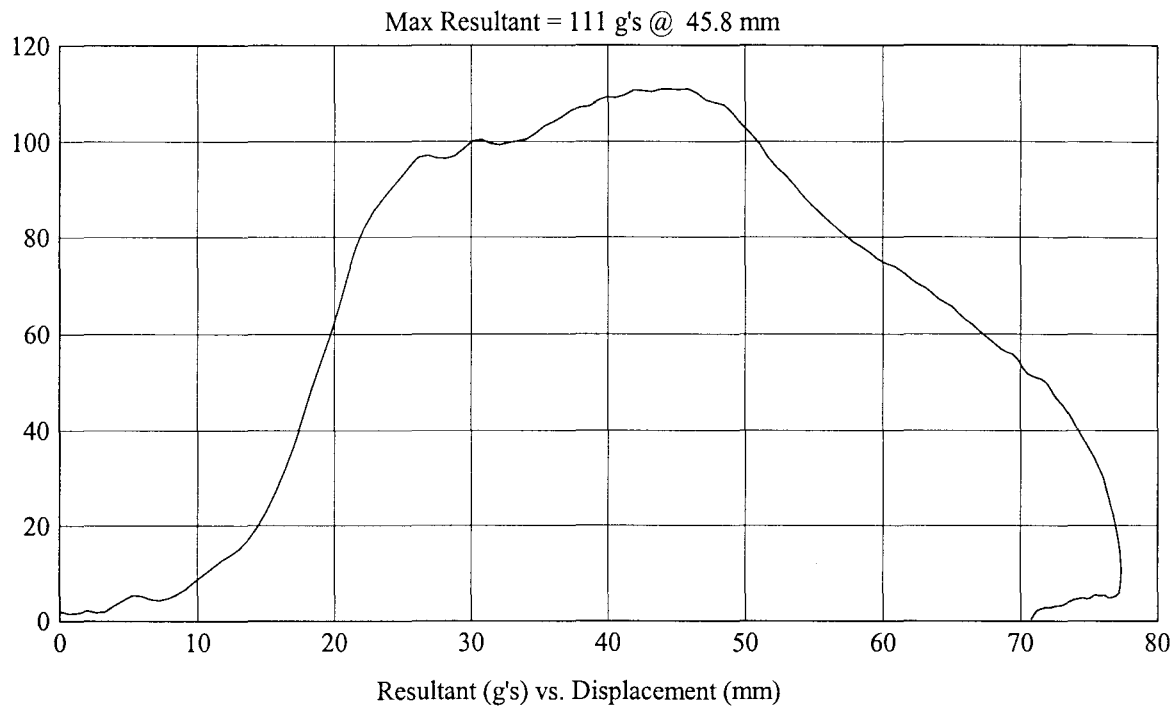
FMH
G04I7-001.6

Customer: NISSAN
Test # 5
FM4417
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: RP1
Vehicle Side: Right
Horz/Vert Angle: 90/14

HIC(d) = 632, HIC = 617, Delta T = 8.5 msec



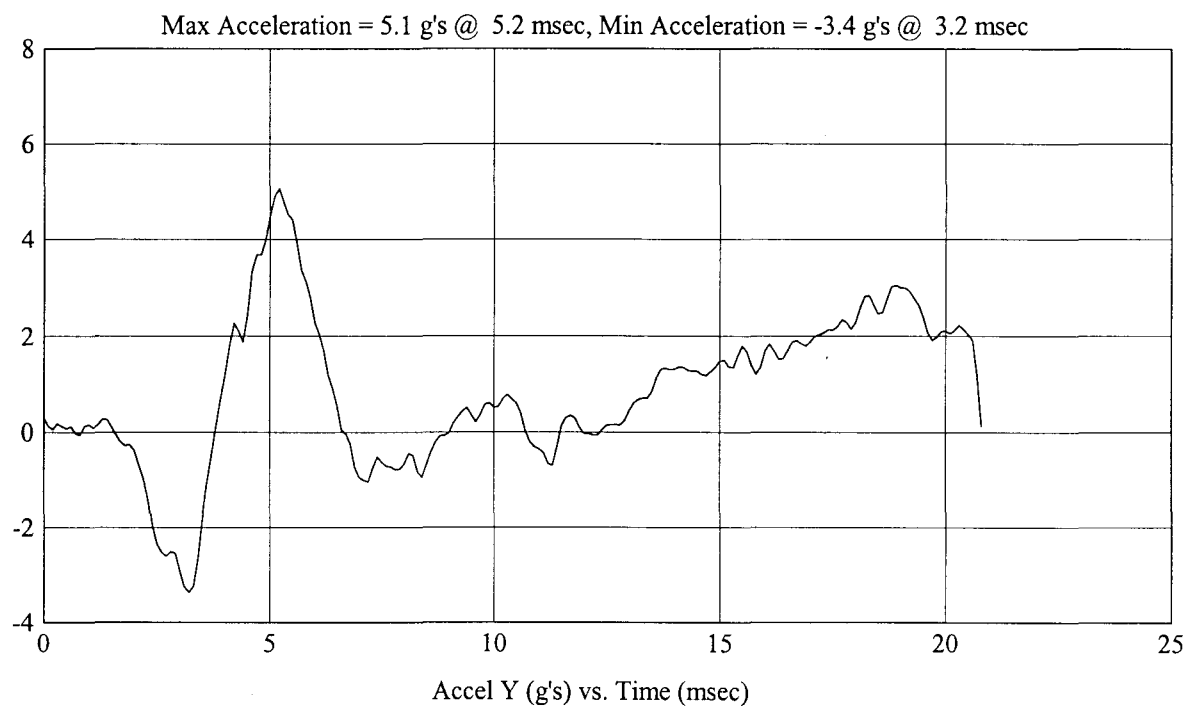
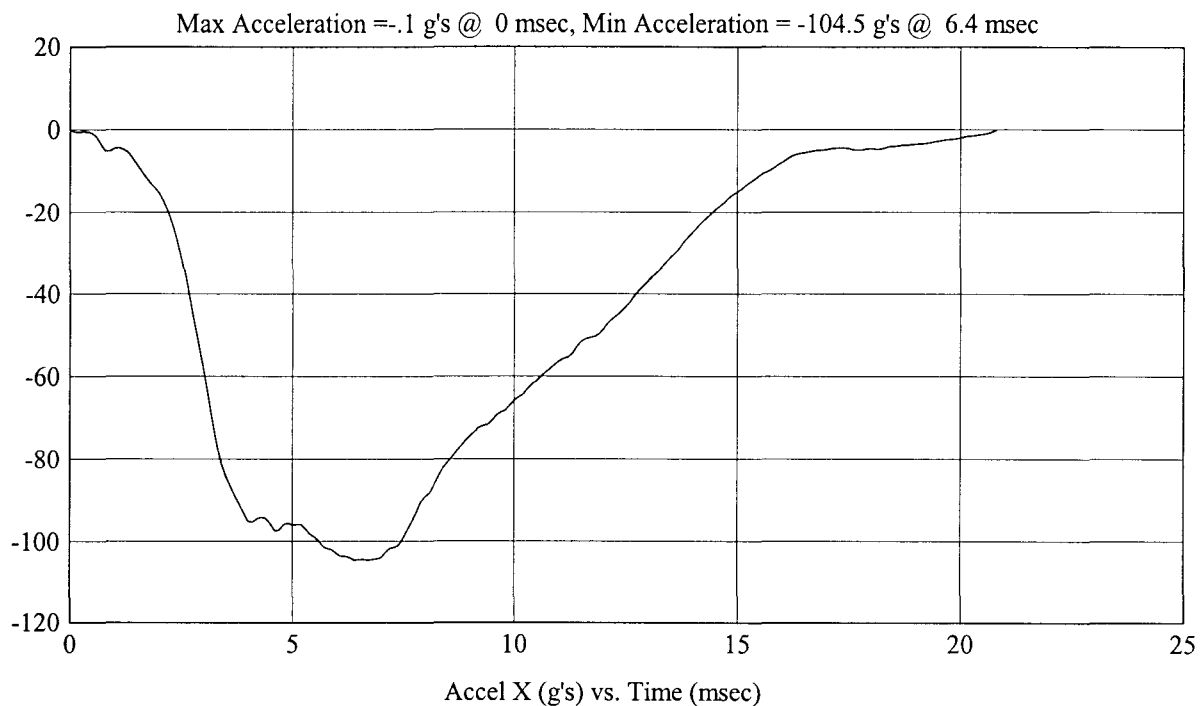
FMH
G04I7-001.6

Customer: NISSAN
Test # 5
FM4417
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: RP1
Vehicle Side: Right
Horz/Vert Angle: 90/14

HIC(d) = 632, HIC = 617, Delta T = 8.5 msec



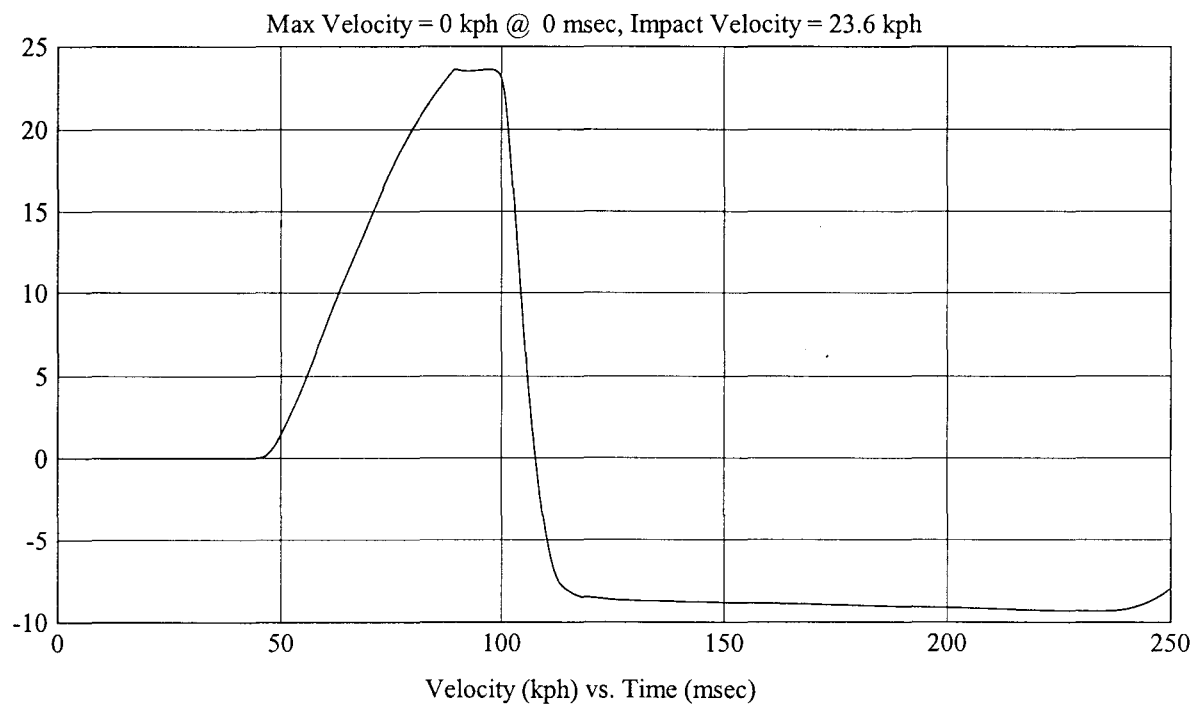
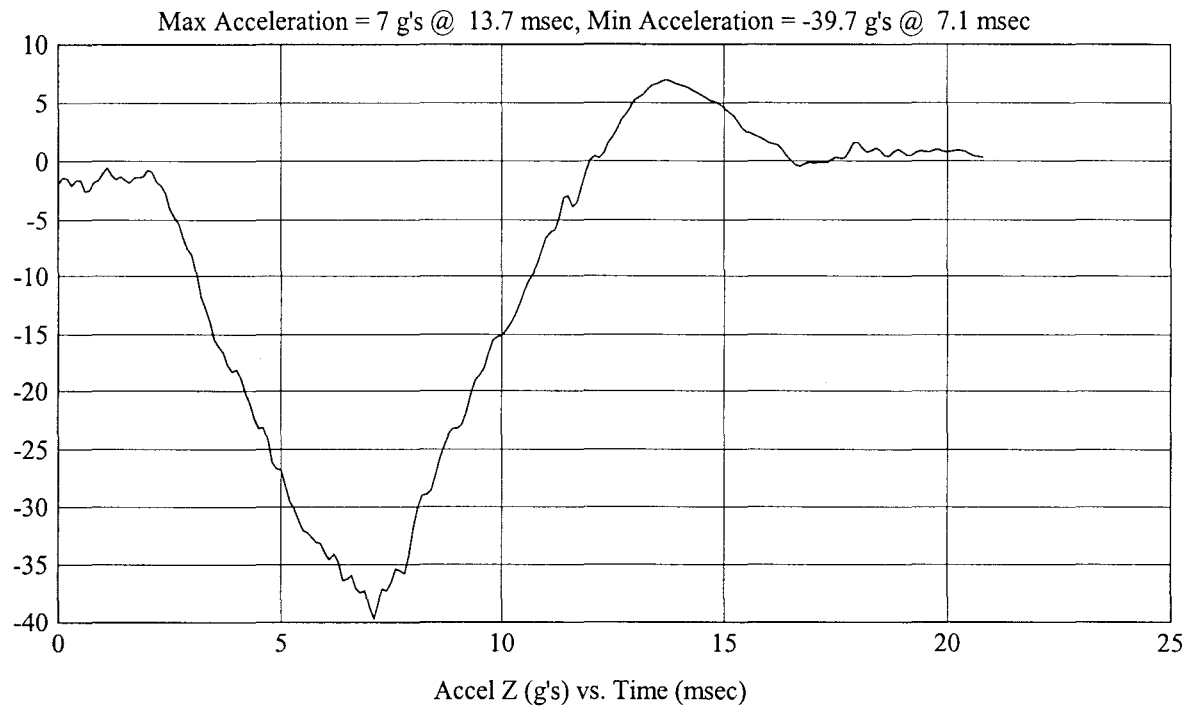
FMH
G04I7-001.6

Customer: NISSAN
Test # 5
FM4417
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: RP1
Vehicle Side: Right
Horz/Vert Angle: 90/14

HIC(d) = 632, HIC = 617, Delta T = 8.5 msec



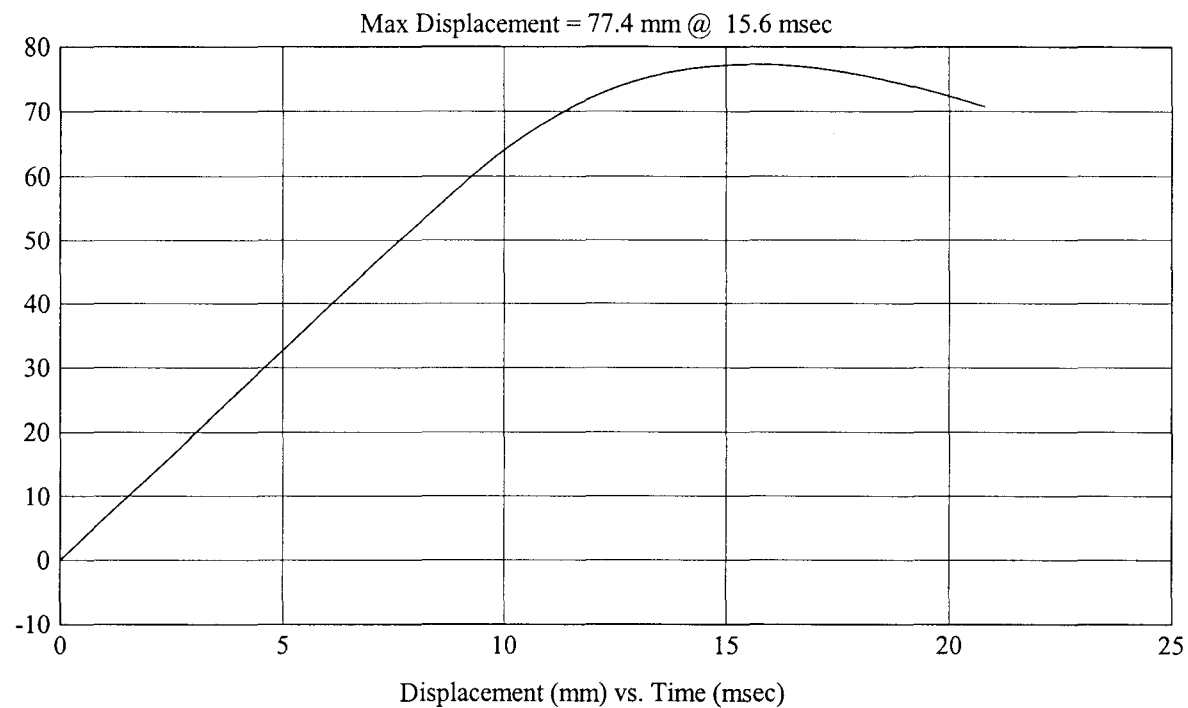
FMH
G04I7-001.6

Customer: NISSAN
Test # 5
FM4417
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: RP1
Vehicle Side: Right
Horz/Vert Angle: 90/14

HIC(d) = 632, HIC = 617, Delta T = 8.5 msec



====mga

8/13/04

Impact Testing
G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #8 LEFT SR1

H/V IMPACT ANGLE= 270 / 20

FM4420 PRE - TEST





==== mga

8/13/04

Impact Testing

G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #8 LEFT SR1

H/V IMPACT ANGLE= 270 / 20

FM4420 POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): SR1 Left

Temperature:22C

MGA Test Reference No.:FM4420

Humidity:48%

Approach Horizontal Angles:270°

Time of Test:2:15 PM

Approach Vertical Angles:20°

FMH Serial No:037

TEST RESULTS:

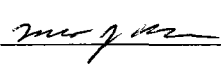
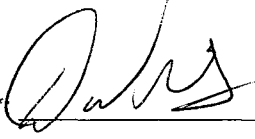
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
875	940	3.9	23.9	20	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35800	-96.6	1.67	1.68
Y	6	J35841	92.5	1.54	1.54
Z	7	J35791	90	1.58	1.58

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

No visible damage

Recorded By:  Approved By*  Date: 8-13-04

*Only necessary for NHTSA (Government) Compliance testing.

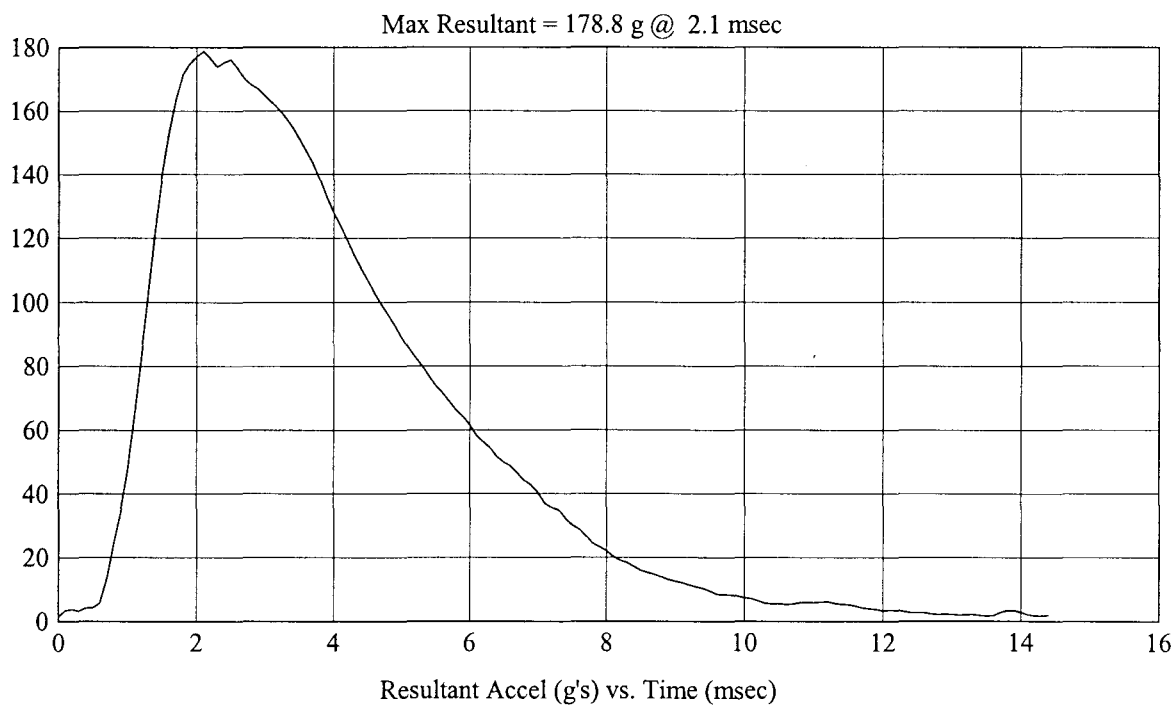
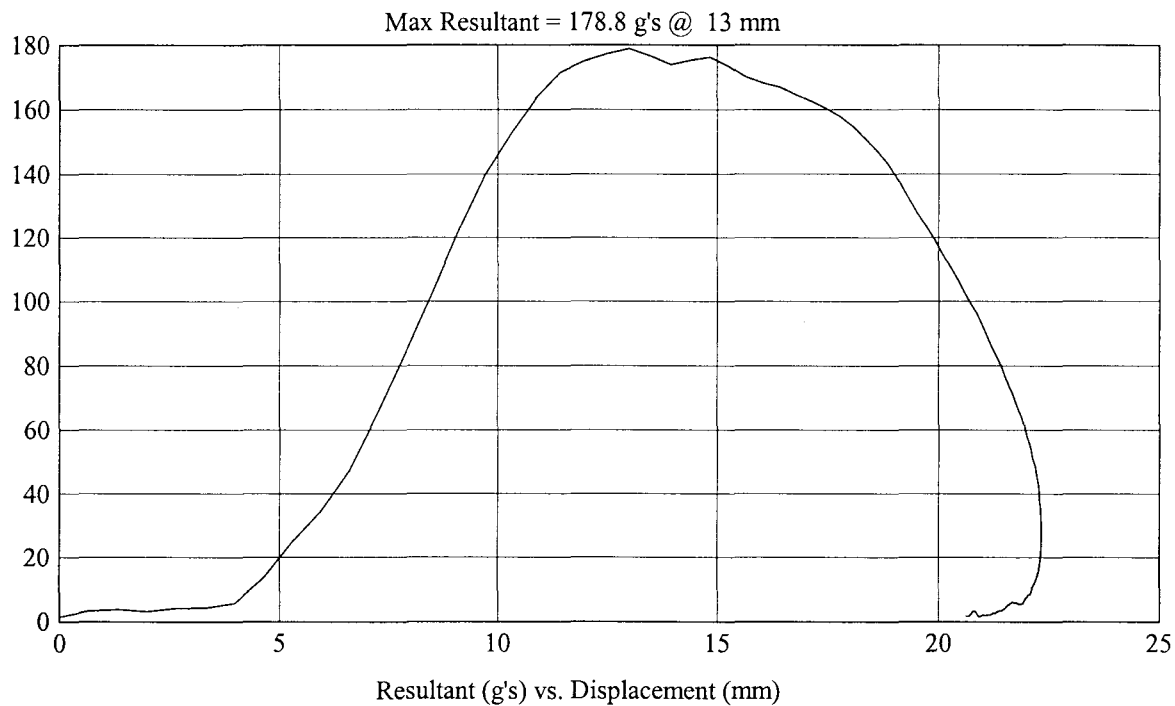
FMH
G04I7-001.6

Customer: NISSAN
Test # 8
FM4420
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/20

HIC(d) = 875, HIC = 940, Delta T = 3.9 msec



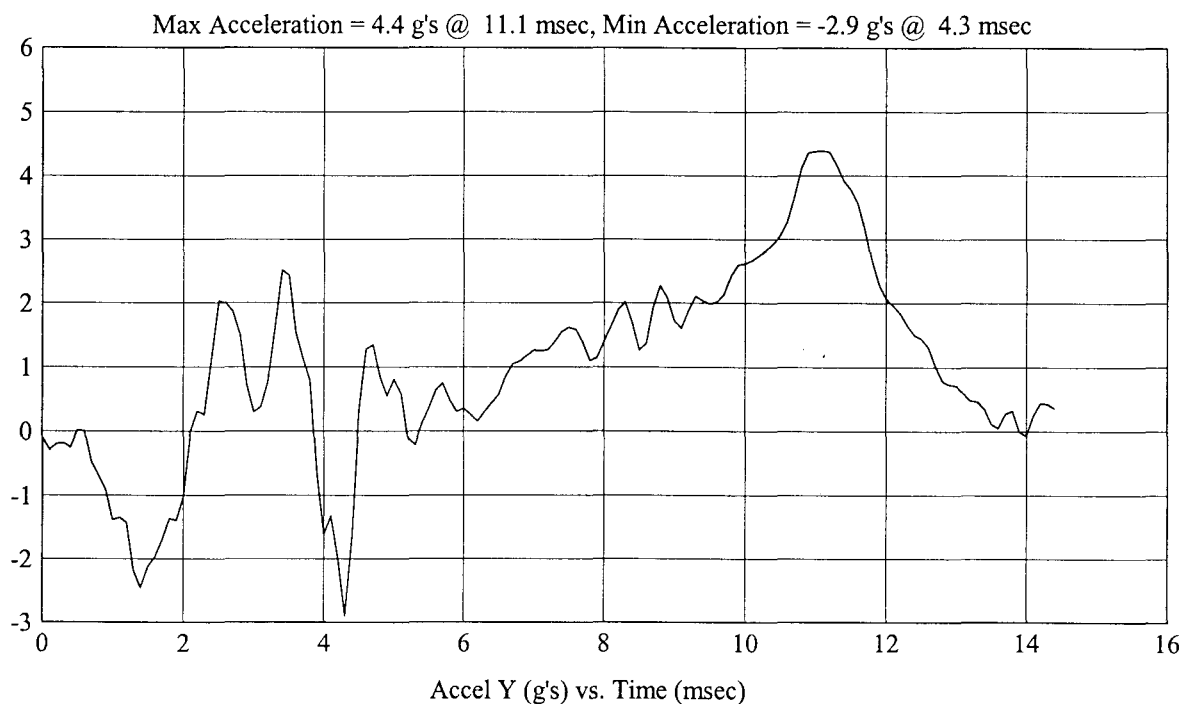
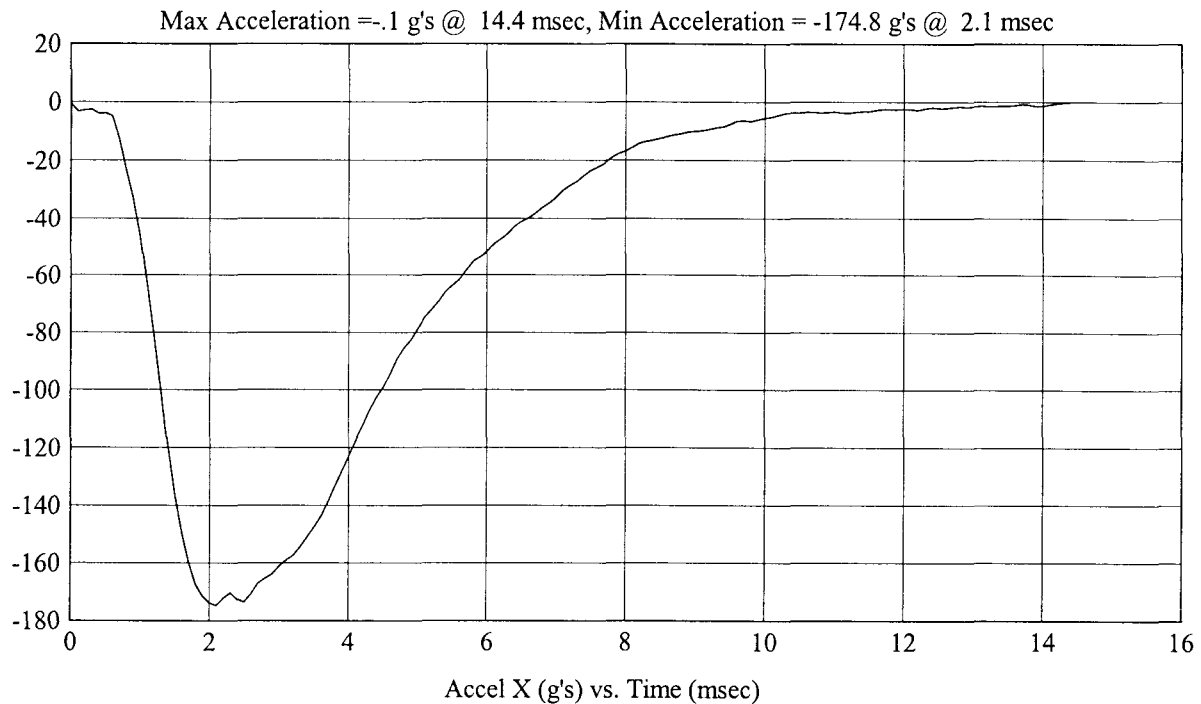
FMH
G04I7-001.6

Customer: NISSAN
Test # 8
FM4420
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/20

HIC(d) = 875, HIC = 940, Delta T = 3.9 msec



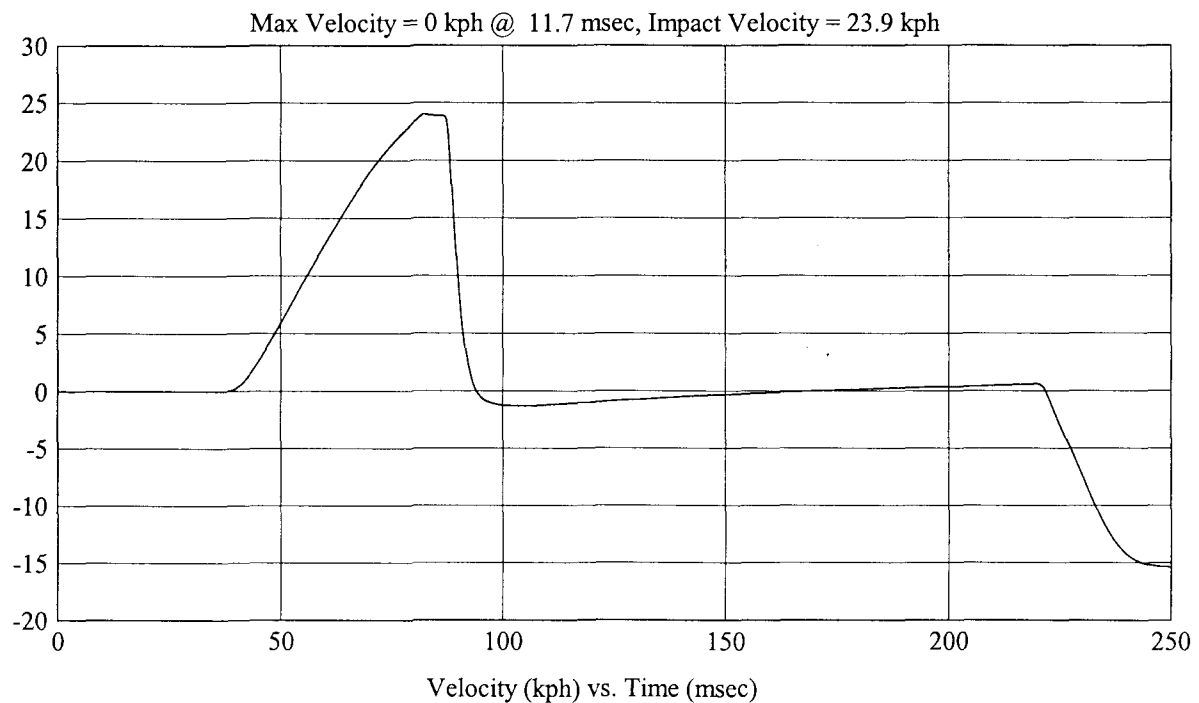
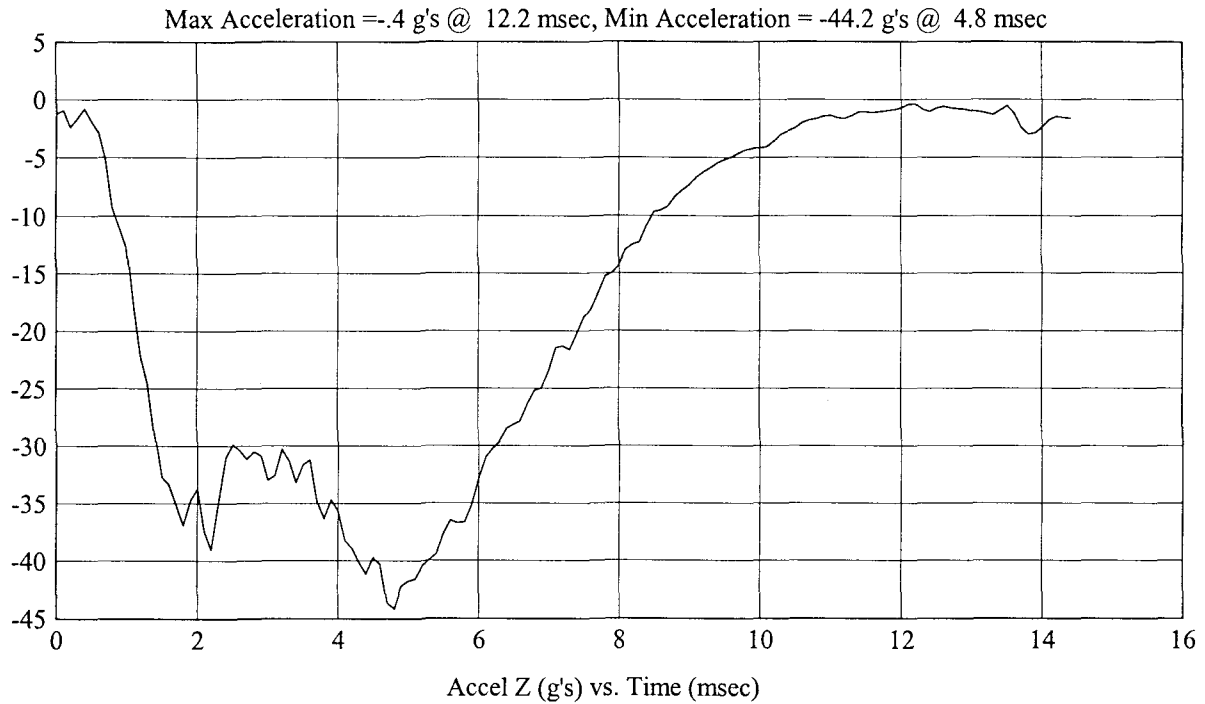
FMH
G04I7-001.6

Customer: NISSAN
Test # 8
FM4420
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/20

HIC(d) = 875, HIC = 940, Delta T = 3.9 msec



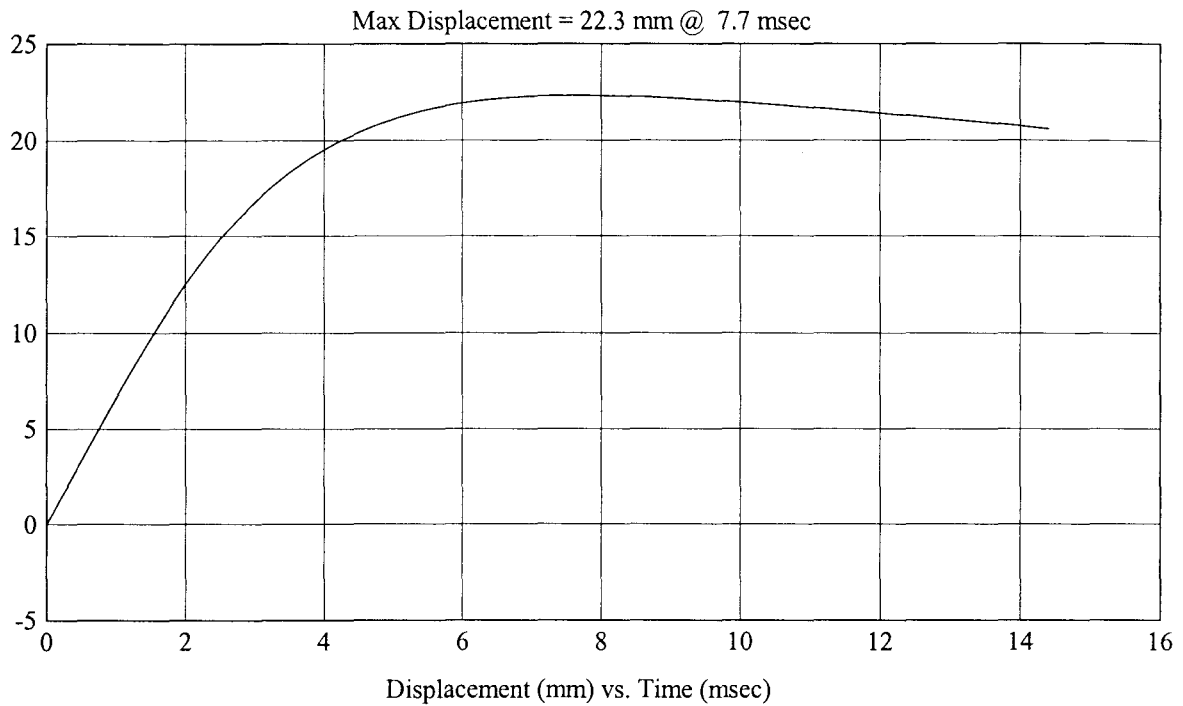
FMH
G04I7-001.6

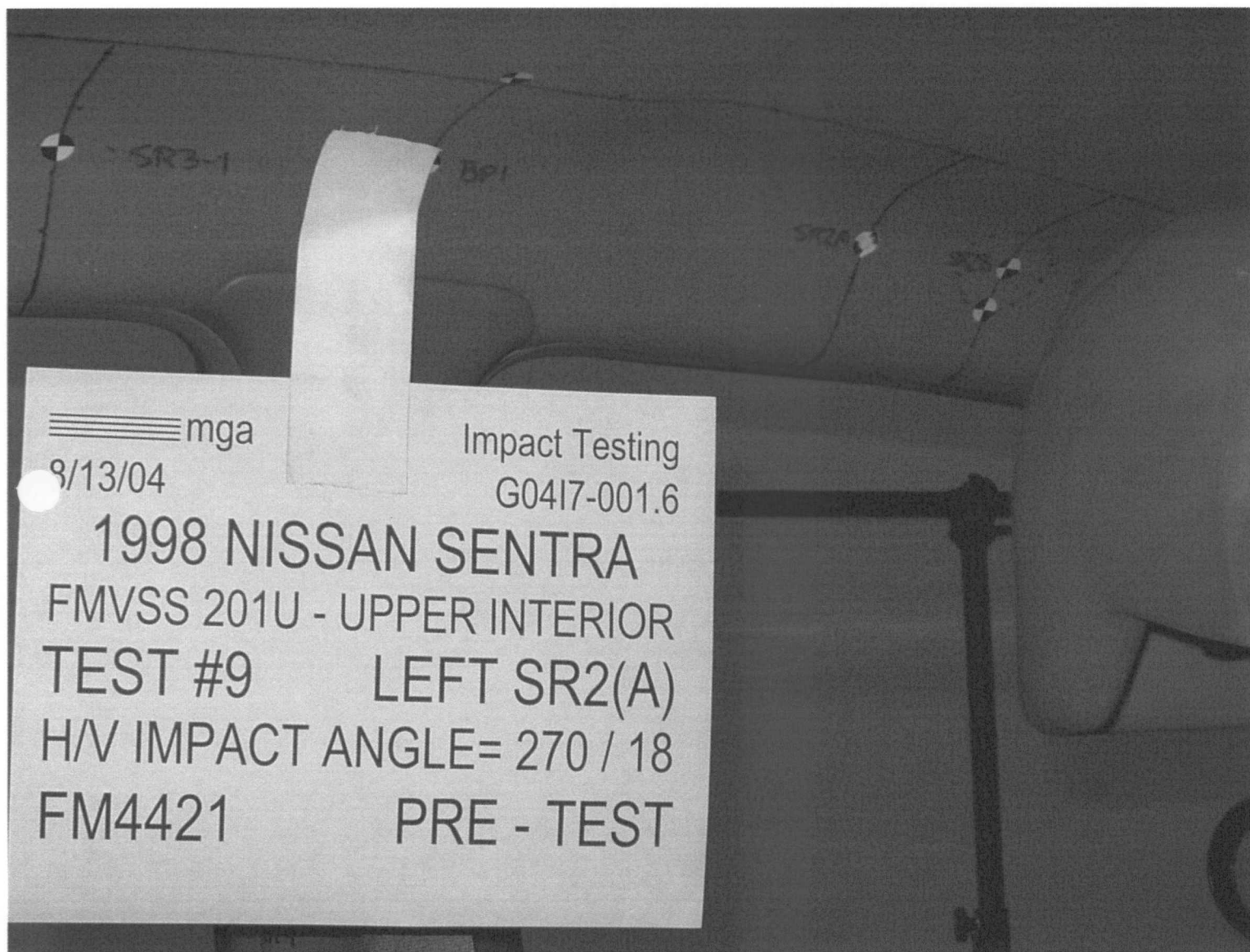
Customer: NISSAN
Test # 8
FM4420
Additional Desc: N/A

Vehicle Program : SENTRA

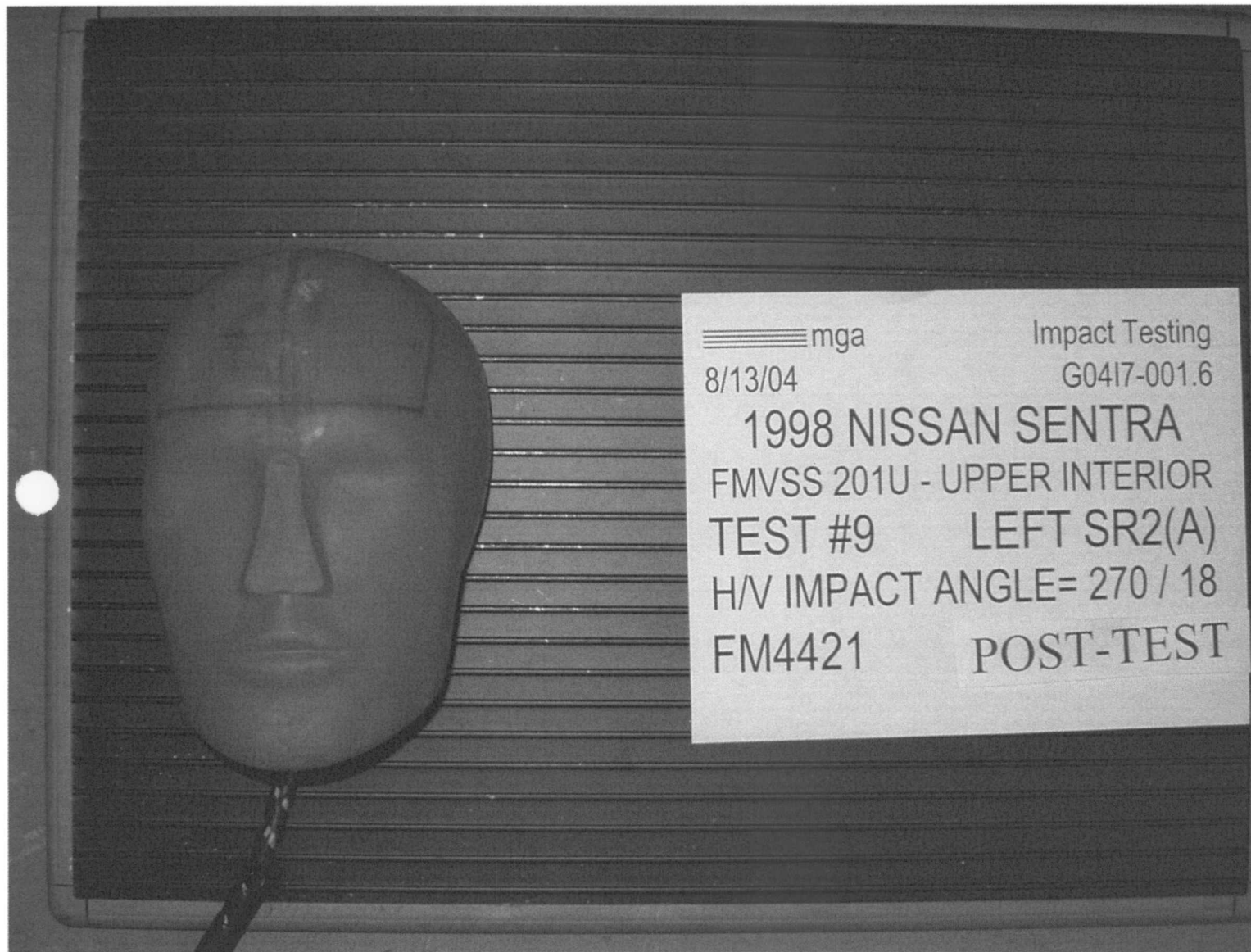
Model Year: 1998
Target: SR1
Vehicle Side: Left
Horz/Vert Angle: 270/20

HIC(d) = 875, HIC = 940, Delta T = 3.9 msec









SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G0417-001.6 VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR2(a) Left

MGA Test Reference No.:FM4421

Approach Horizontal Angles:270°

Approach Vertical Angles:18°

Test Number:#9

Temperature:22C

Humidity:48%

Time of Test:2:45 PM

FMH Serial No:038

TEST RESULTS:

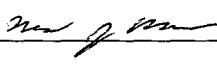
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
689	693	5	24.0	55	10 L

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

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

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

No visible damage

Recorded By:  Approved By:  Date: 8-13-01

*Only necessary for NHTSA (Government) Compliance testing.

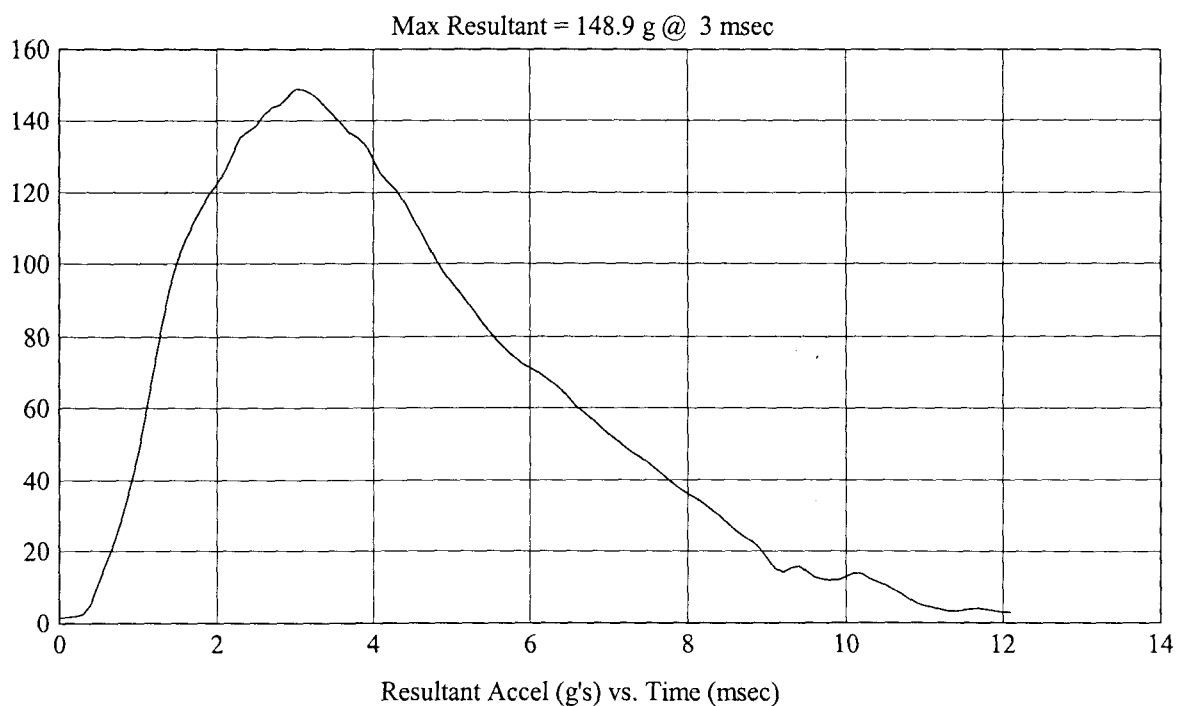
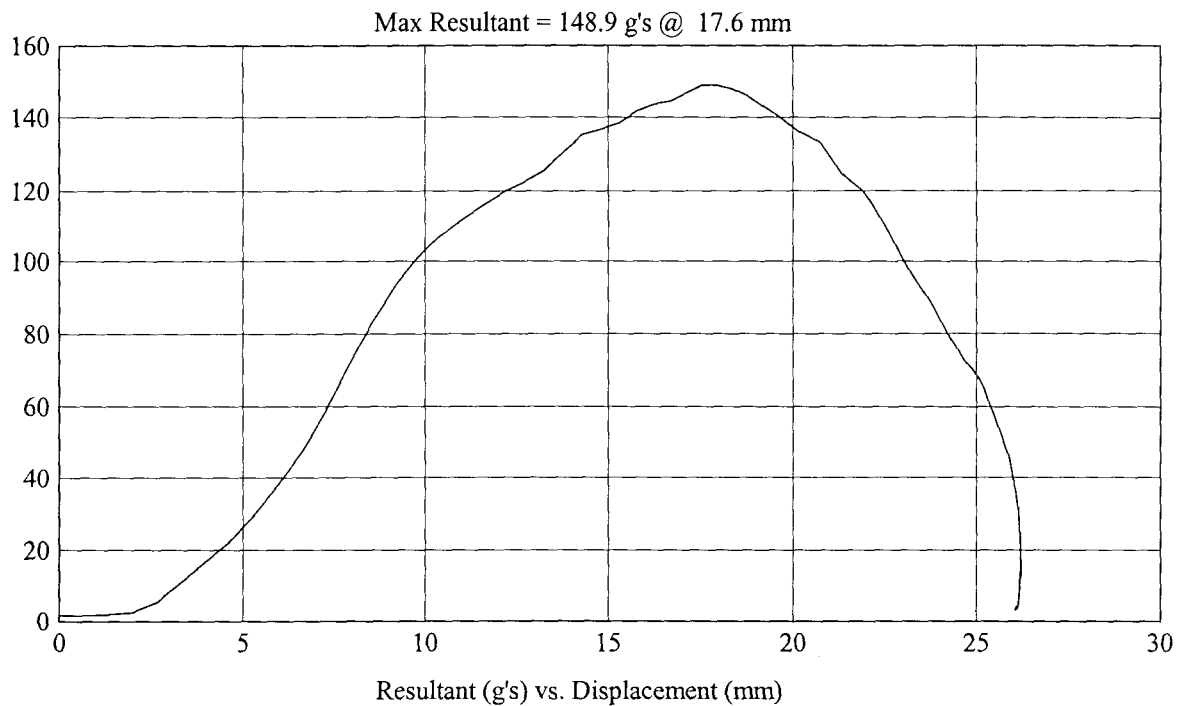
FMH
G04I7-001.6

Customer: NISSAN
Test # 9
FM4421
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/18

HIC(d) = 689, HIC = 693, Delta T = 5 msec



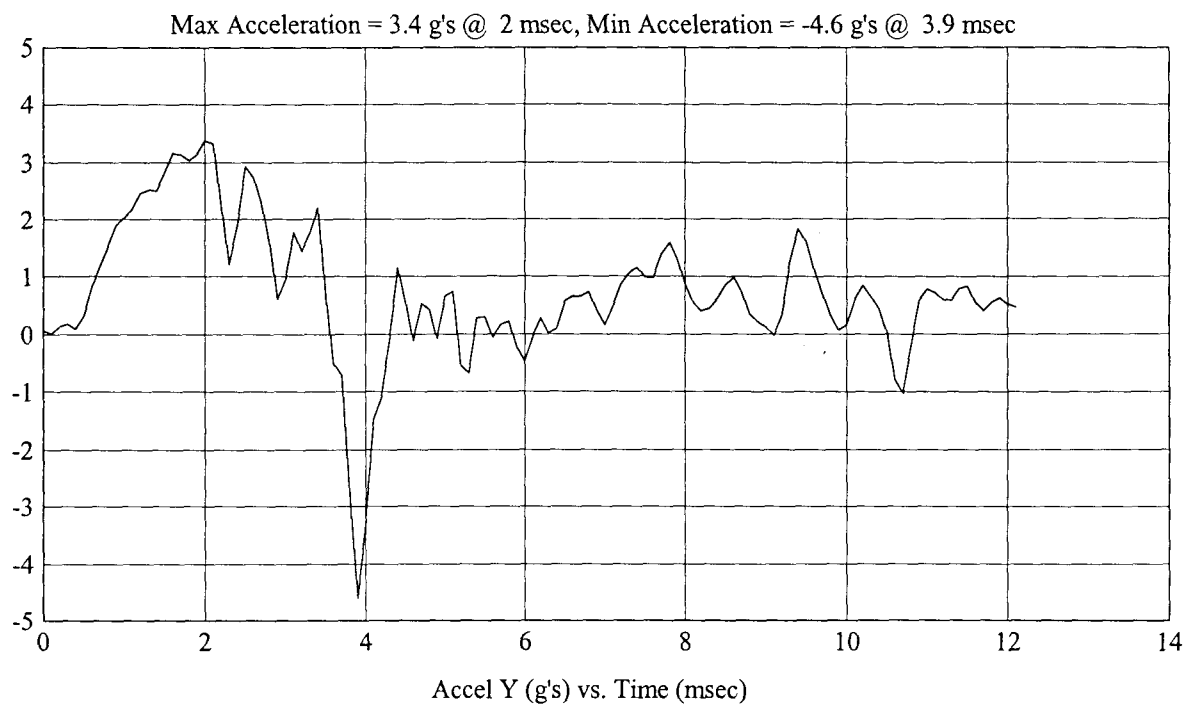
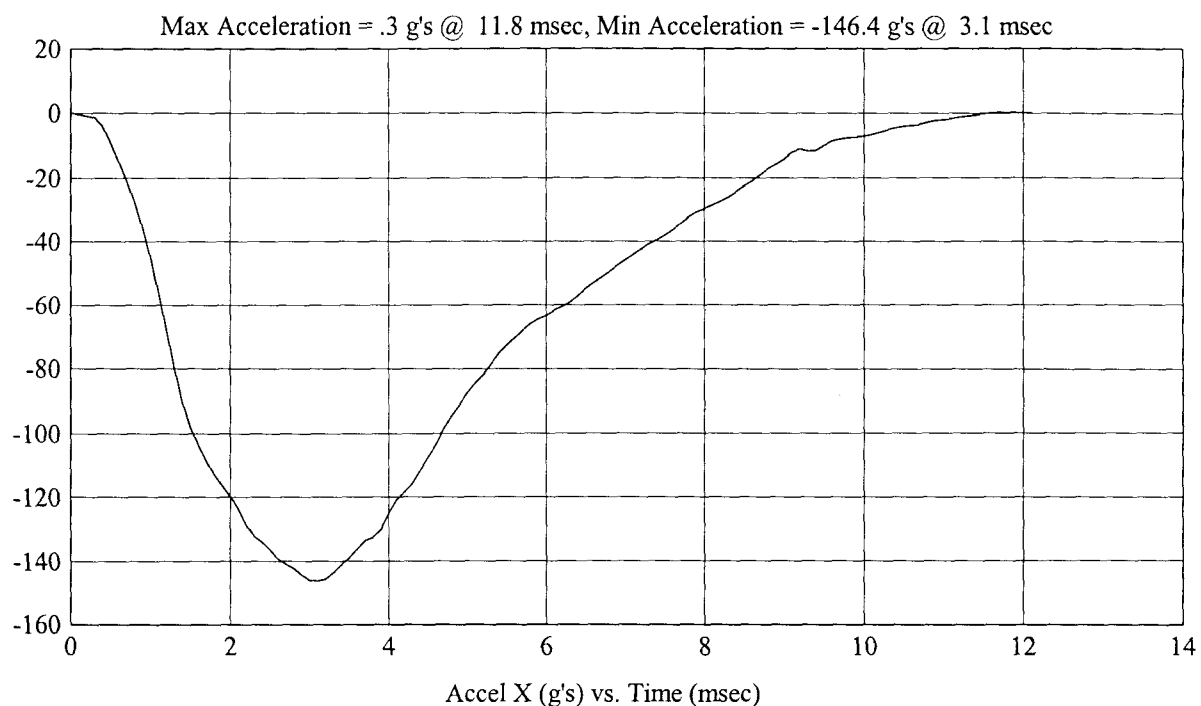
FMH
G04I7-001.6

Customer: NISSAN
Test # 9
FM4421
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/18

HIC(d) = 689, HIC = 693, Delta T = 5 msec



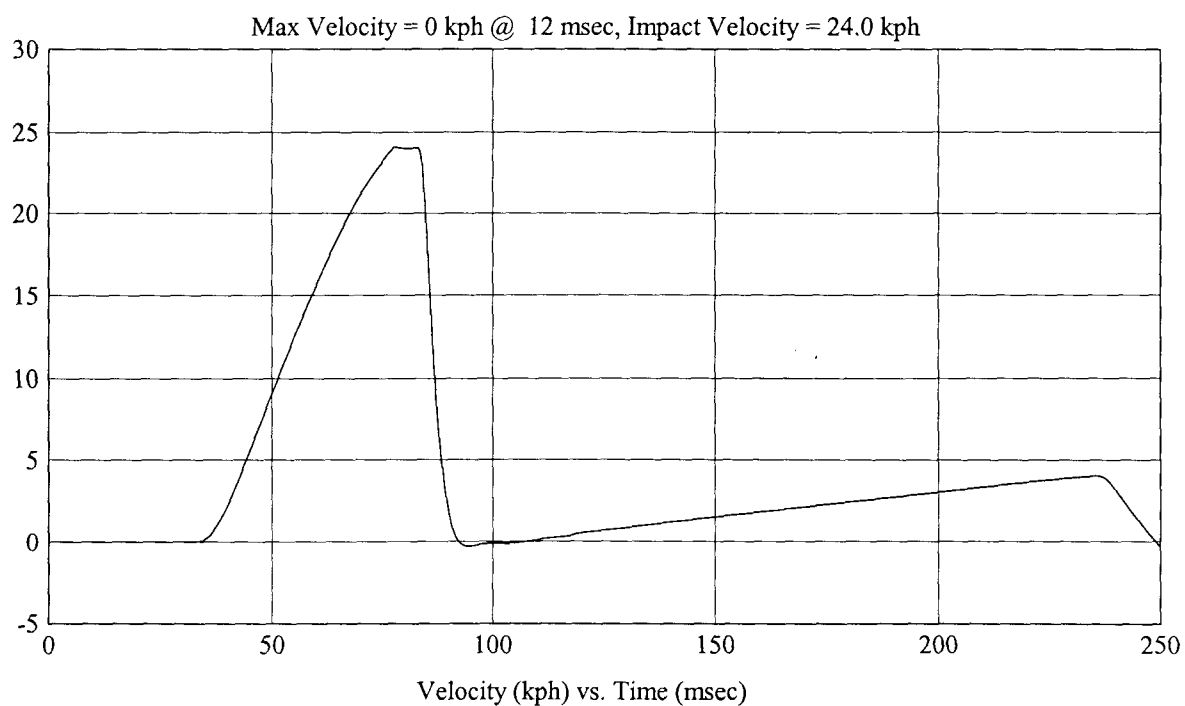
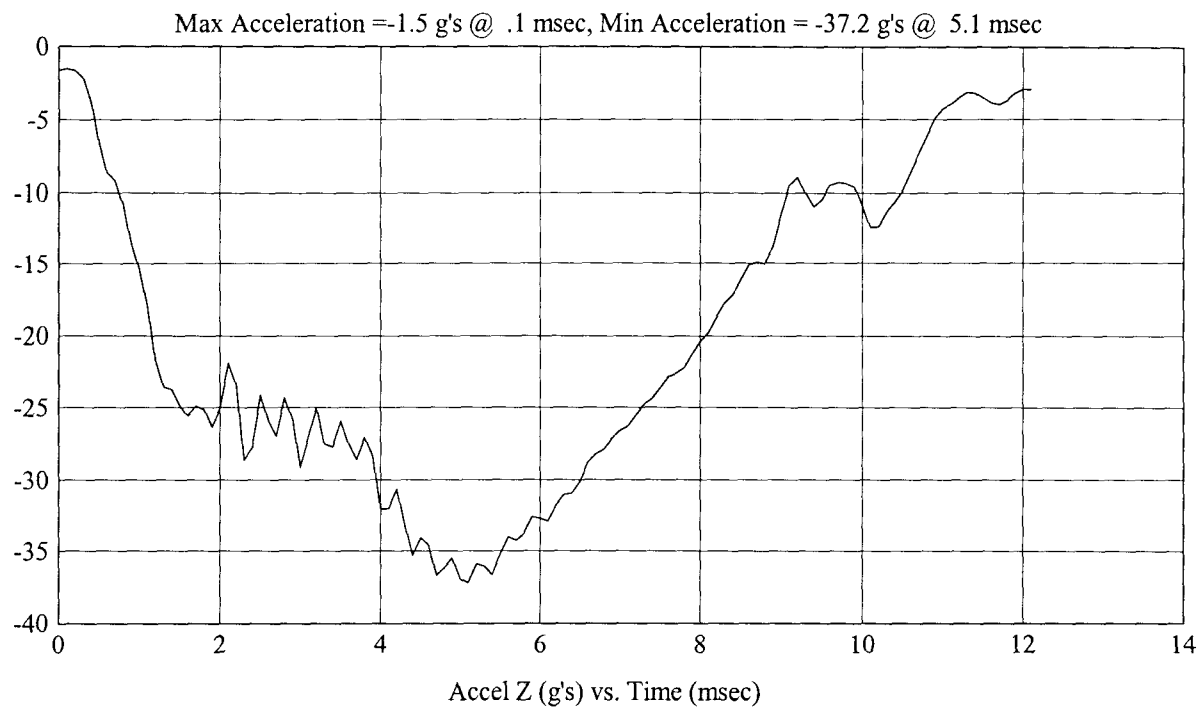
FMH
G04I7-001.6

Customer: NISSAN
Test # 9
FM4421
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/18

HIC(d) = 689, HIC = 693, Delta T = 5 msec



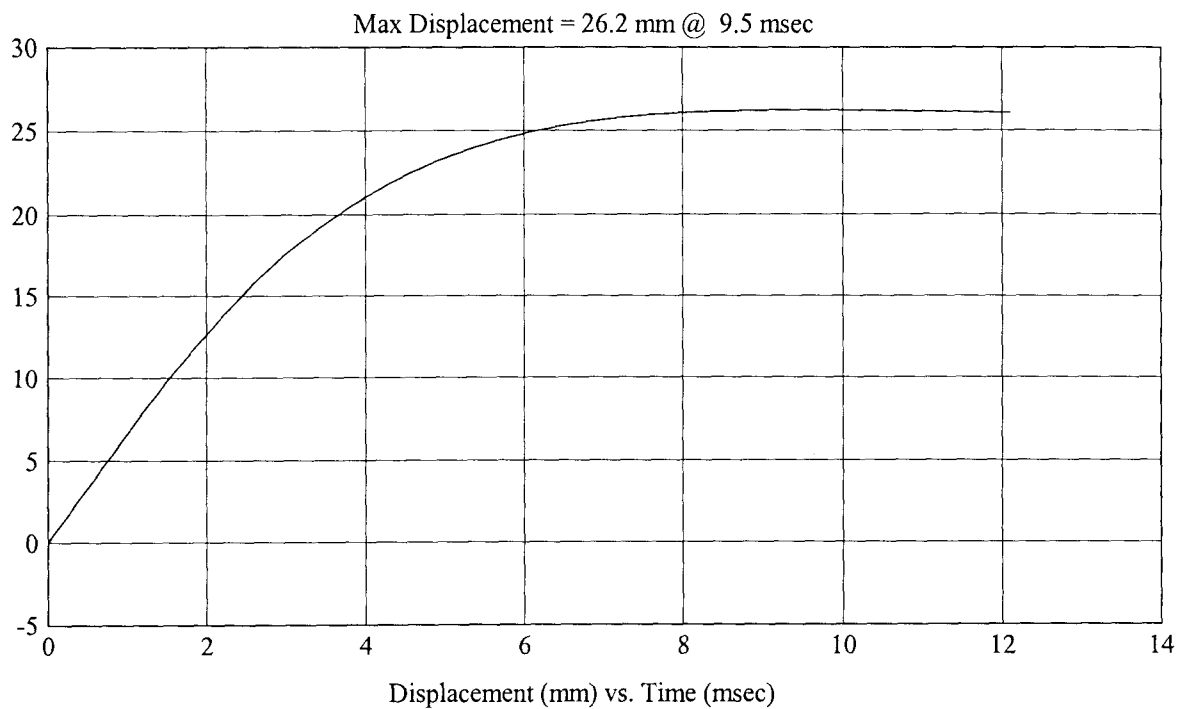
FMH
G04I7-001.6

Customer: NISSAN
Test # 9
FM4421
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: SR2(a)
Vehicle Side: Left
Horz/Vert Angle: 270/18

HIC(d) = 689, HIC = 693, Delta T = 5 msec

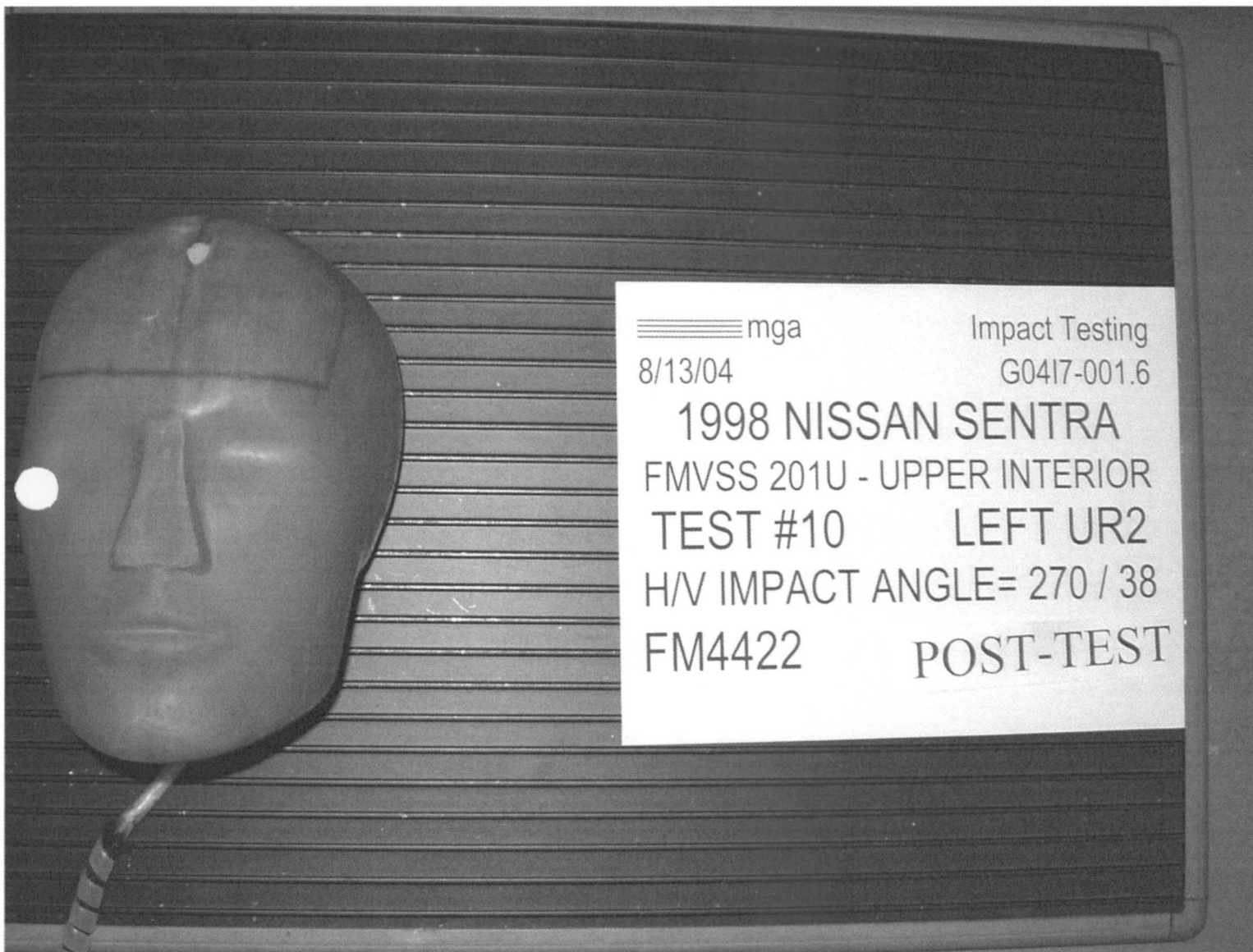


mga
8/13/04

Impact Testing
G04I7-001.6

1998 NISSAN SENTRA
FMVSS 201U - UPPER INTERIOR
TEST #10 LEFT UR2
H/V IMPACT ANGLE= 270 / 38
FM4422 PRE - TEST





===== mga

Impact Testing

8/13/04

G04I7-001.6

1998 NISSAN SENTRA

FMVSS 201U - UPPER INTERIOR

TEST #10 LEFT UR2

H/V IMPACT ANGLE= 270 / 38

FM4422

POST-TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G04I7-001.6

VEHICLE YR/MAKE/MODEL:SENTRA 1998

GENERAL TEST PARAMETERS:

Test Number:#10

Target (Vehicle Side): UR2 Left

Temperature:22C

MGA Test Reference No.:FM4422

Humidity:47%

Approach Horizontal Angles:270°

Time of Test:4:30 PM

Approach Vertical Angles:38°

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
955	1046	5.2	24.0	55	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: mr j mc Approved By*:  Date: 8-13-04

*Only necessary for NHTSA (Government) Compliance testing.

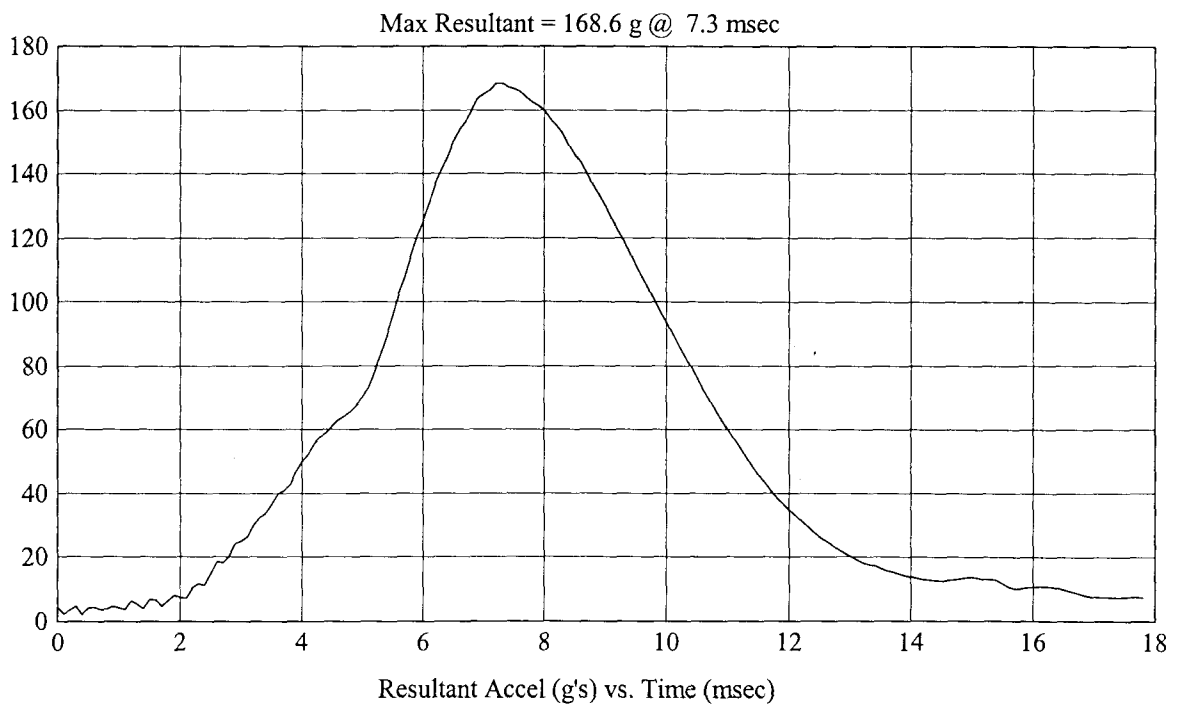
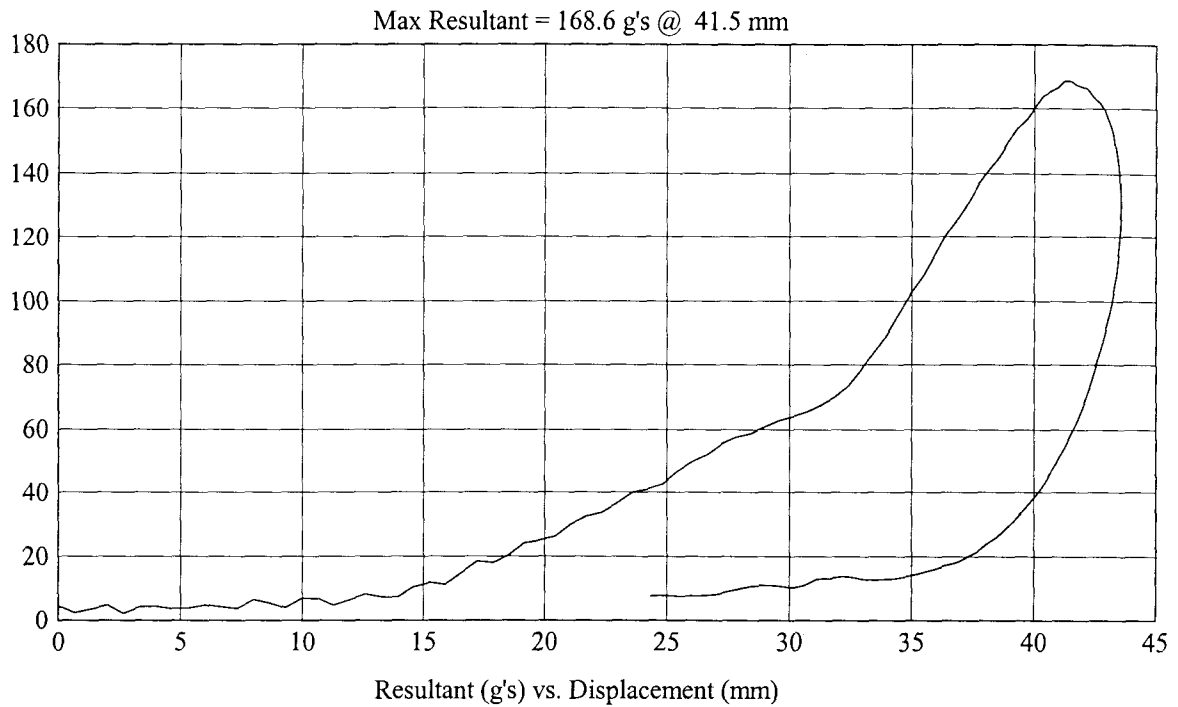
FMH
G04I7-001.6

Customer: NISSAN
Test # 10
FM4422
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/38

HIC(d) = 955, HIC = 1046, Delta T = 5.2 msec



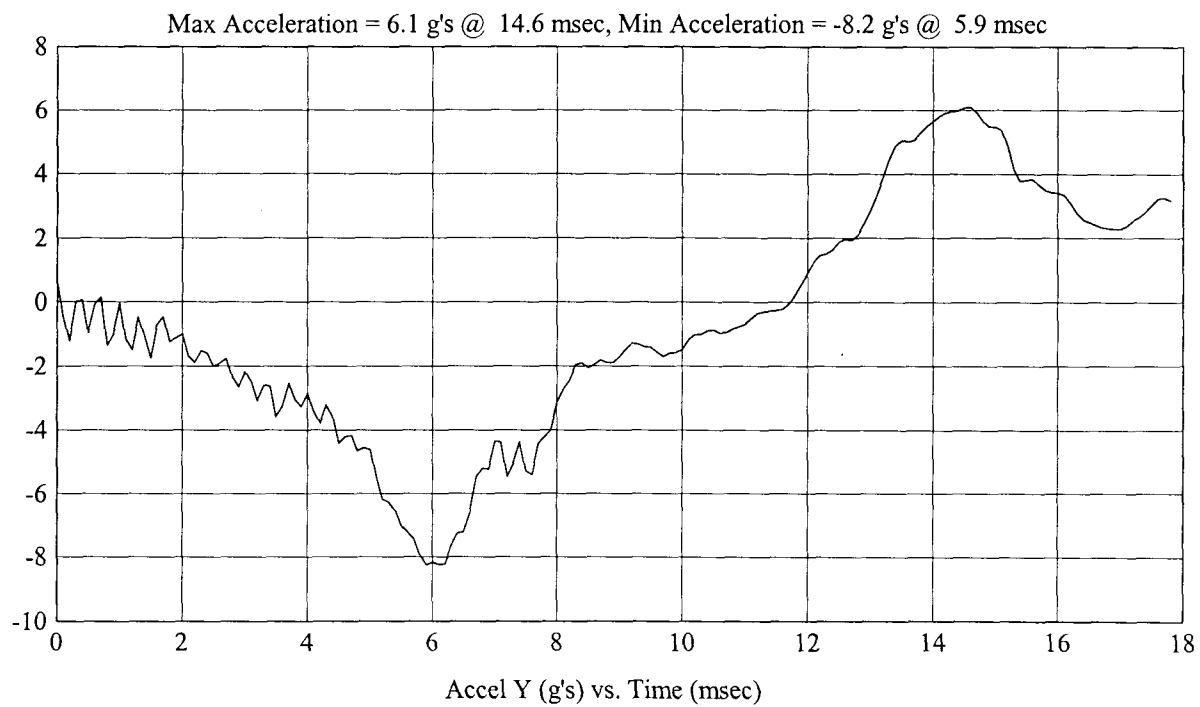
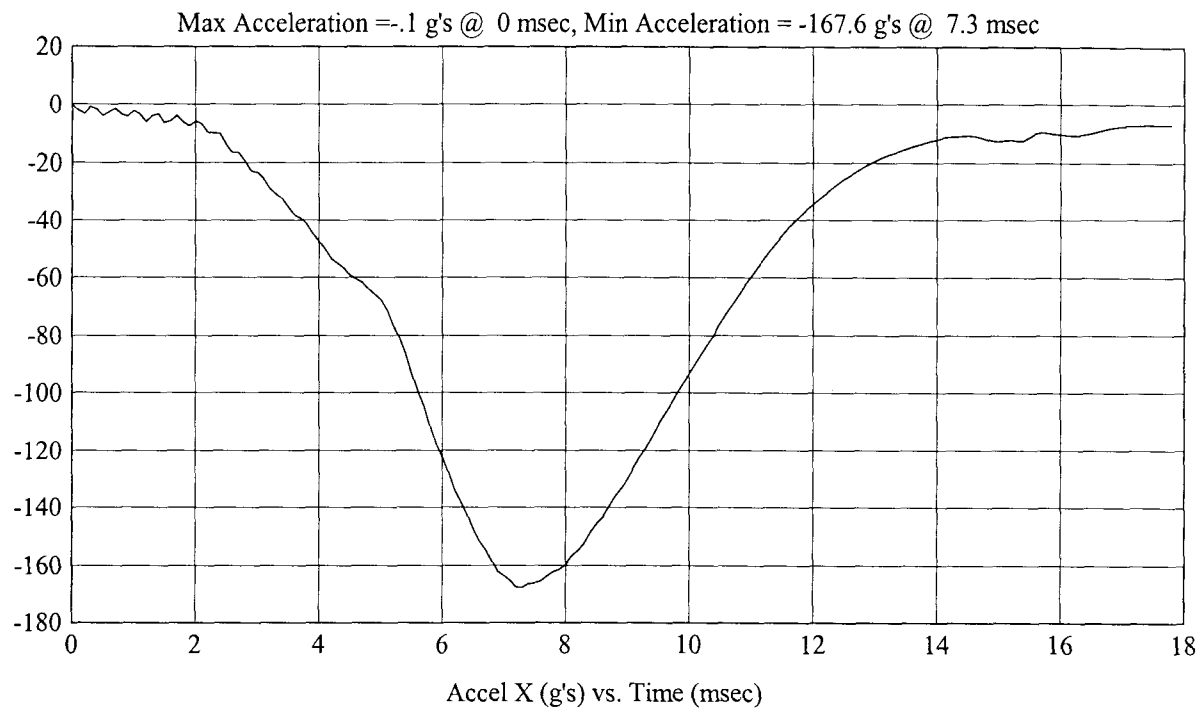
FMH
G04I7-001.6

Customer: NISSAN
Test # 10
FM4422
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/38

HIC(d) = 955, HIC = 1046, Delta T = 5.2 msec



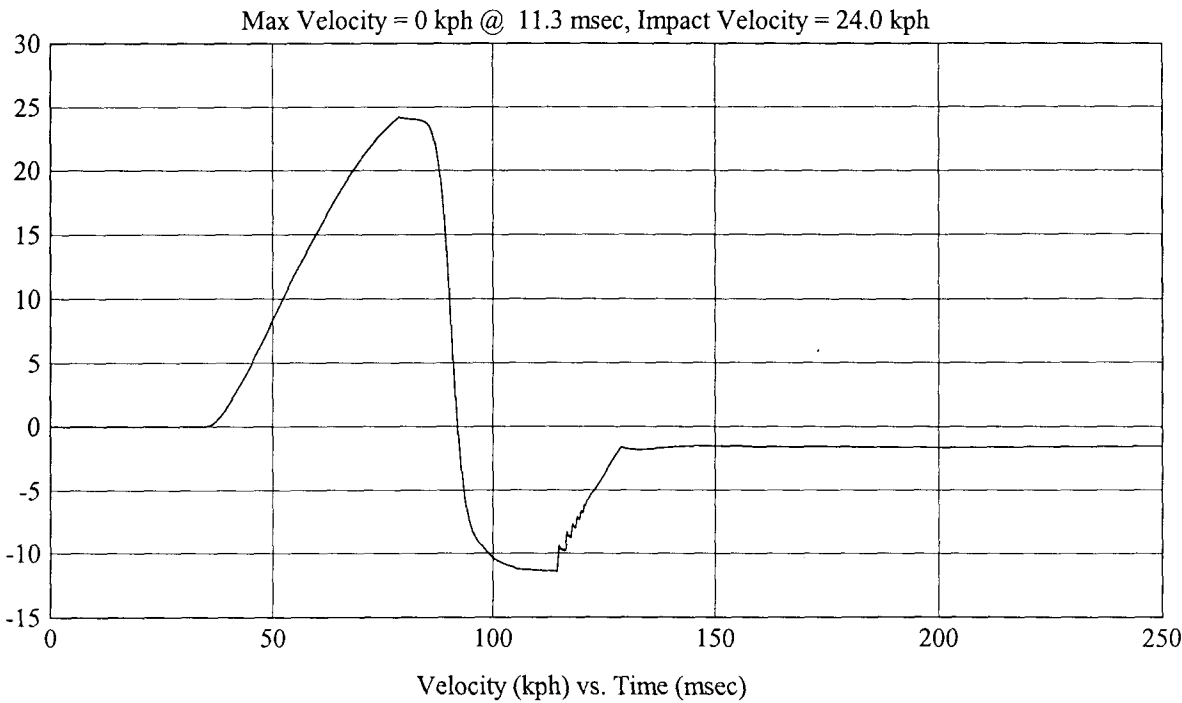
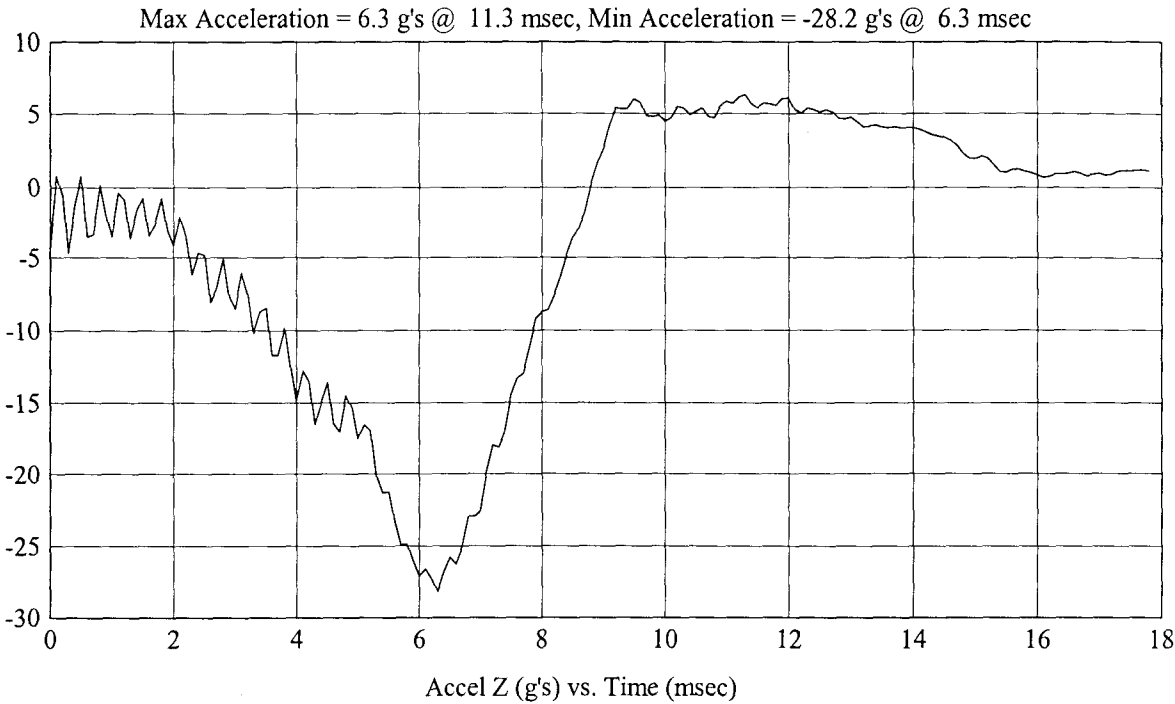
FMH
G04I7-001.6

Customer: NISSAN
Test # 10
FM4422
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/38

HIC(d) = 955, HIC = 1046, Delta T = 5.2 msec



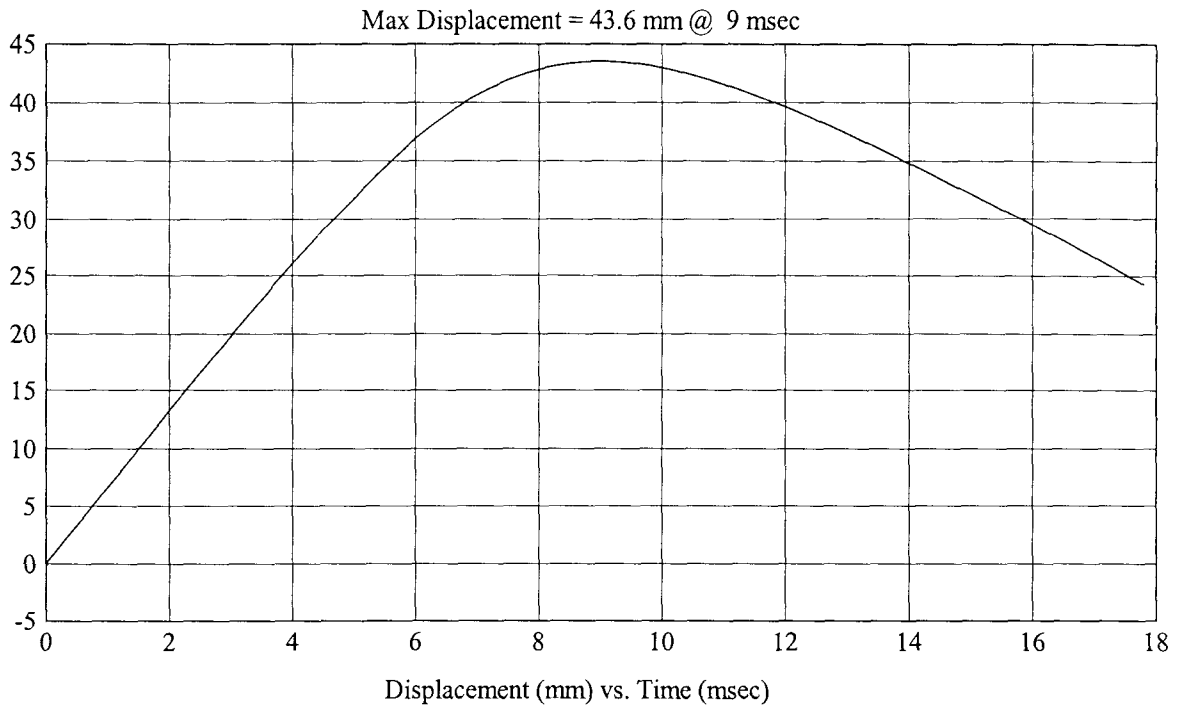
FMH
G04I7-001.6

Customer: NISSAN
Test # 10
FM4422
Additional Desc: N/A

Vehicle Program : SENTRA

Model Year: 1998
Target: UR2
Vehicle Side: Left
Horz/Vert Angle: 270/38

HIC(d) = 955, HIC = 1046, Delta T = 5.2 msec



1.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment used 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 Inclinator	Mitutoyo	PRO 360	Set Angle of FMH/Targeting	±0.1°	Annual
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	036 037 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Kodak	RO1000	Record Event	N/A	N/A
*FARO™	Faro Technologies	G08020203122	Targeting	±0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Protractor	Stanley N/A Mitutoyo	289 -- --	Measurement Targeting FMH setup Horizontal Measurement	±1 mm N/A ±0.5°	Annual
*Vehicle Scale 9804-022/9805-175	Cardinal	8950F	Weighing Vehicle	± .5 kg	Annual
* Scale	Detecto	AP-20	Weigh FMH Head	± 0.01 lb	Annual
*Temperature Recorder	Dickson	TR-320	Record Temperature and Humidity	± 1°C ± 1% RH	Annual

TABLE 4-2 FMH CALIBRATION SUMMARY DATA SUMMARY TABLE

FMH Serial #		Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#36	10.03	22	48	240.2	8.2	Yes
Post	#36	10.03	21	50	244.7	8.3	Yes
Pre	#37	9.96	22	48	244.6	5.9	Yes
Post	#37	9.96	21	50	253.7	8.1	Yes
Pre	#38	9.99	22	48	241.8	5.0	Yes
Post	#38	9.99	22	50	247.8	7.5	Yes

RECORDED BY: David G. GotwalsDATE: August 14, 2004APPROVED BY: Helen A. Kaleto

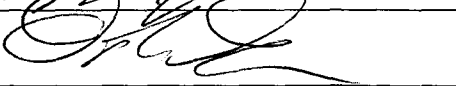
HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: <u>36</u> CALIBRATION DATE: <u>8-12-04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	<u>10.05</u>
Temperature	19° C to 26° C	<u>22</u>
Relative Humidity	10% to 70%	<u>48</u>
Peak Resultant Acceleration	225 G's to 275 G's	<u>240.2</u>
Peak Lateral Acceleration	15 G's Maximum	<u>8.2</u>
Unimodal Acceleration Curve	YES	<u>yes</u>

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

REMARKS:

RECORDED BY:  DATE: 8-12-04

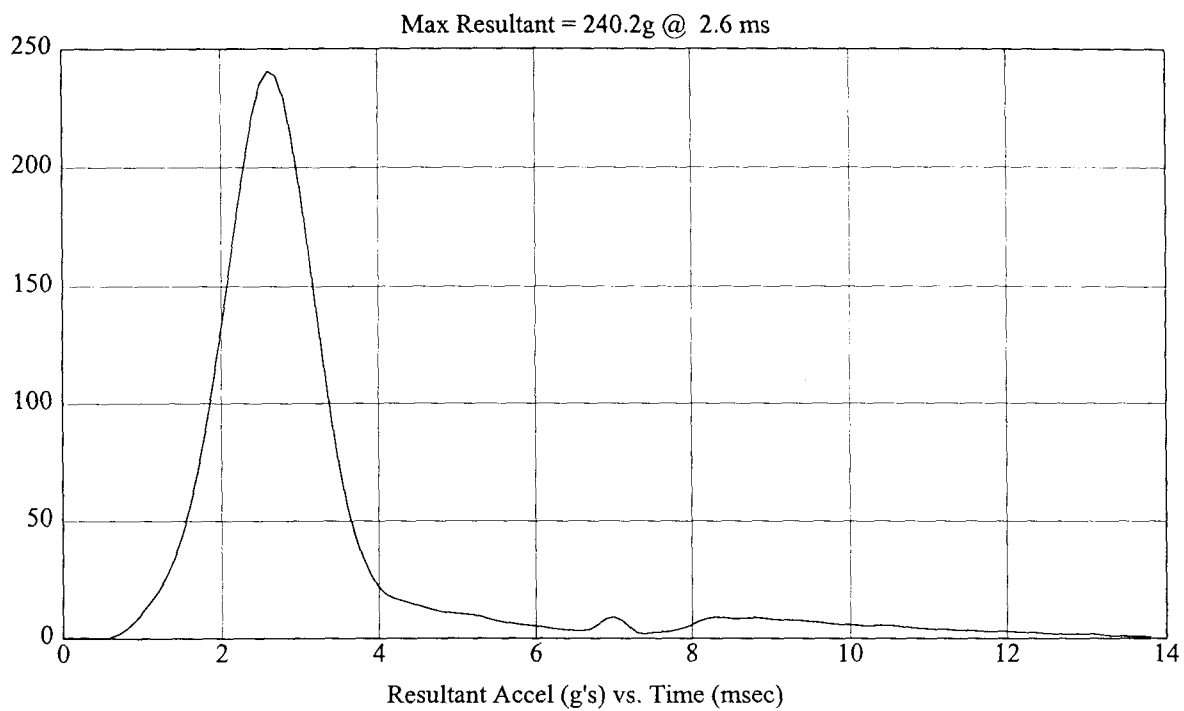
APPROVED BY: 

Head Drop
(Preliminary Test Report)

Test Number: H36244
Test Description: Pre - Test Calibration

MGA Job Number: G04I7-001

Test Date: 8/12/04
Head # : 36



Head Drop
(Preliminary Test Report)

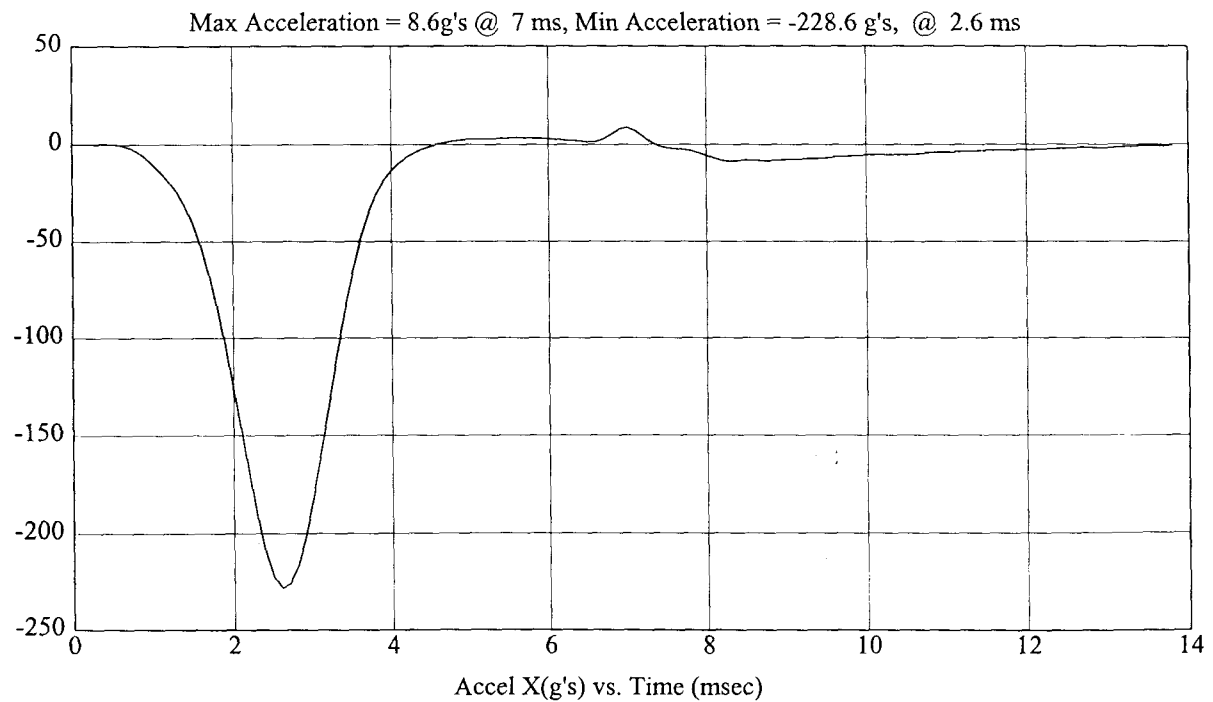
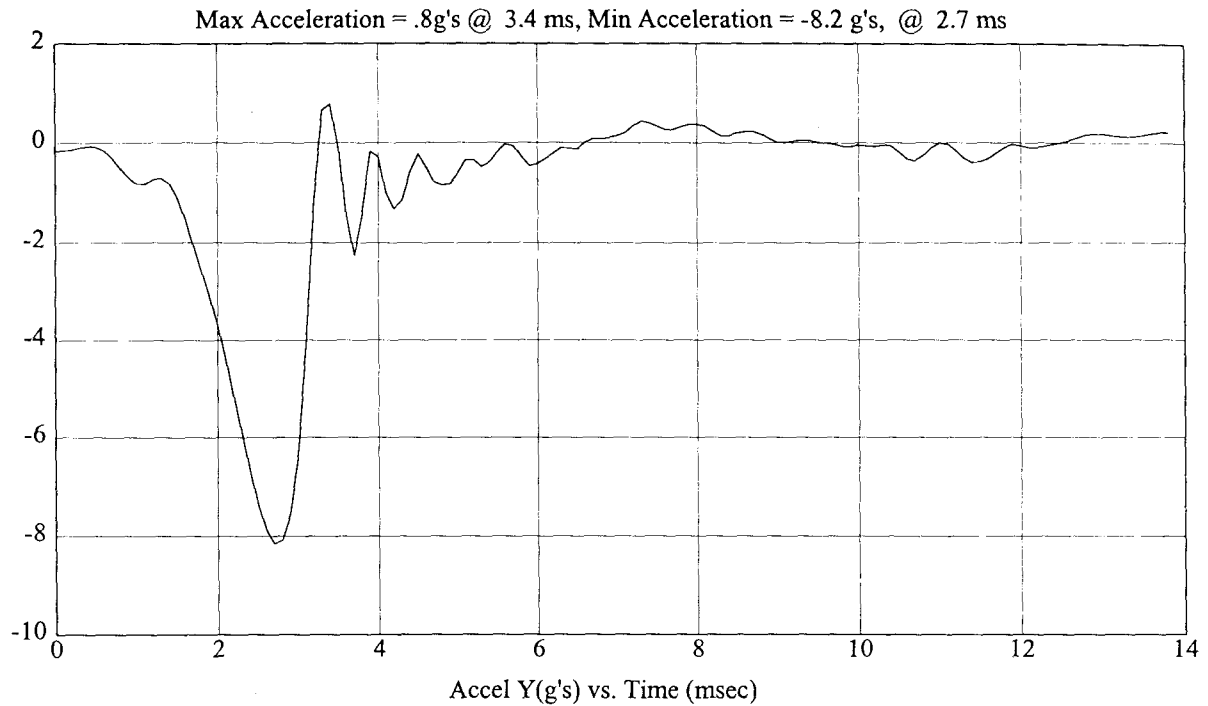
Test Number: H36244

MGA Job Number: G0417-001

Test Date: 8/12/04

Test Description: Pre - Test Calibration

Head #: 36

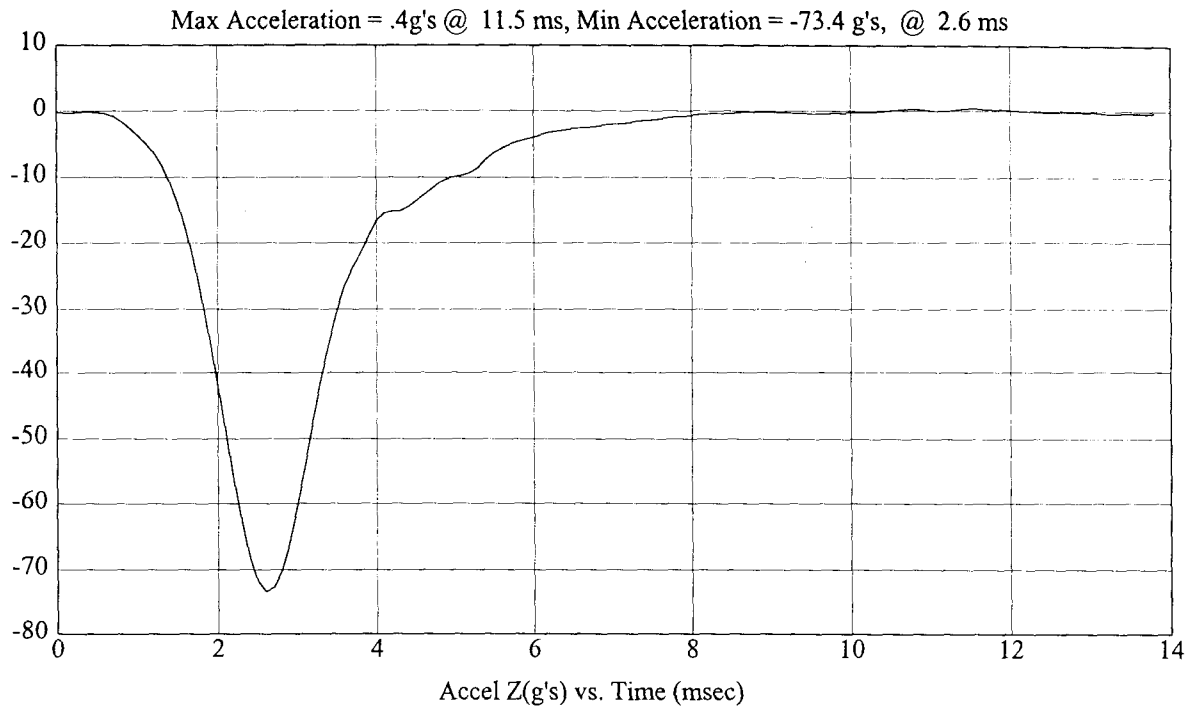


Head Drop
(Preliminary Test Report)

Test Number: H36244
Test Description: Pre - Test Calibration

MGA Job Number: G04I7-001

Test Date: 8/12/04
Head #: 36



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

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REVISION NO.: 6
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HEAD DROP TEST SUMMARY
PART 572L

Post Sent

HEADFORM SERIAL NUMBER: <u>36</u> CALIBRATION DATE: <u>8/14/04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	10.03
Temperature	19° C to 26° C	21
Relative Humidity	10% to 70%	60
Peak Resultant Acceleration	225 G's to 275 G's	244.7
Peak Lateral Acceleration	15 G's Maximum	8.3
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	J3S923	5/23/04	11/23/04
3	ENDEVCO	7264-2000	J3S916	5/23/04	11/23/04
4	ENDEVCO	7264-2000	J3S918	5/23/04	11/23/04

REMARKS:

RECORDED BY: 

DATE: 8/14/04

APPROVED BY: Helen A. Kalato

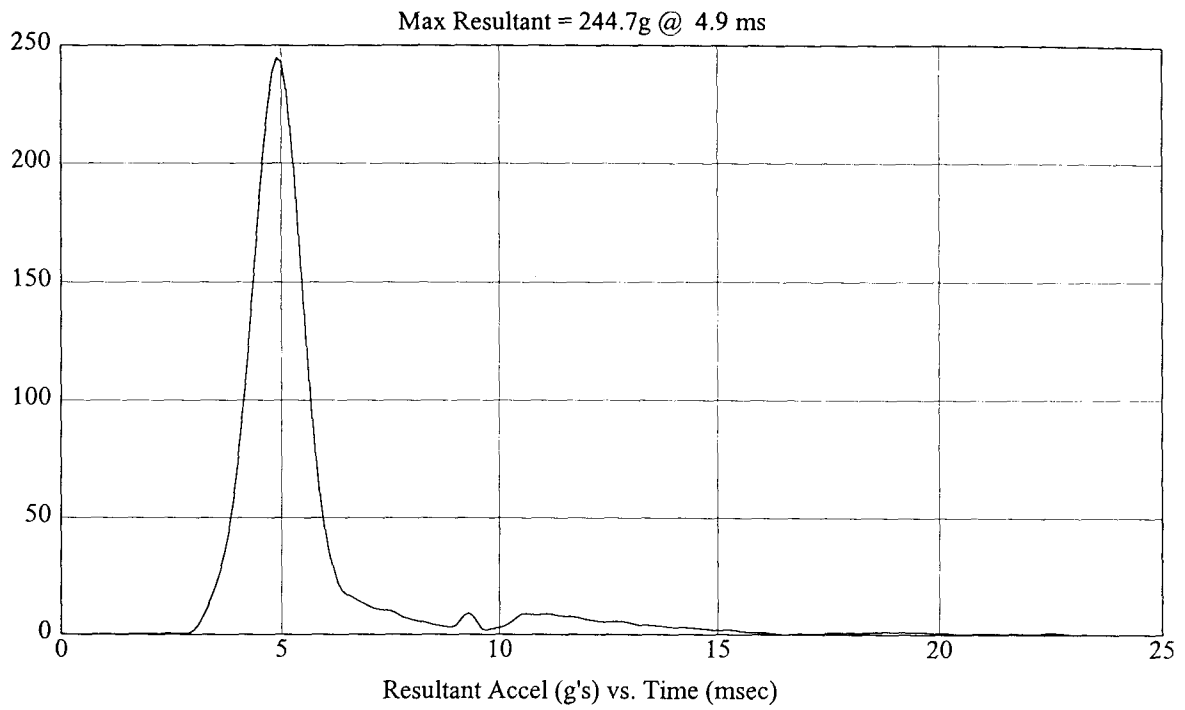
Head Drop
(Preliminary Test Report)

4-8

Test Number: H36245
Test Description: Post - Test Calibration

MGA Job Number: G04I7-001

Test Date: 8/14/04
Head #: 36



Head Drop
(Preliminary Test Report)

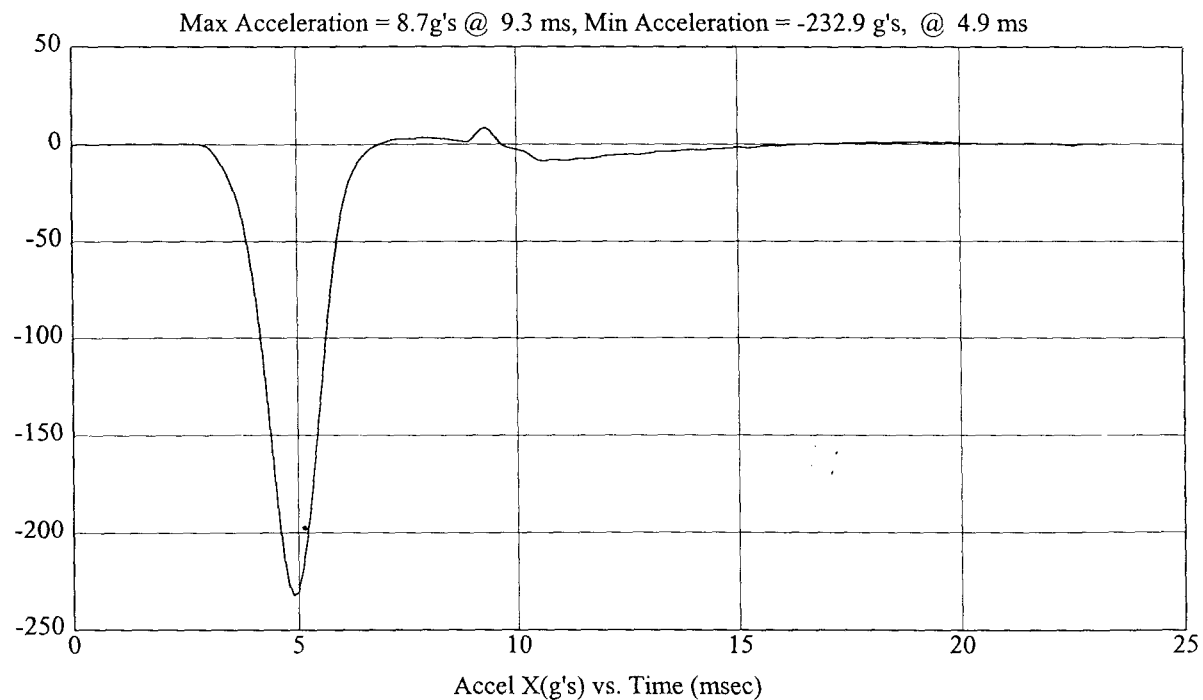
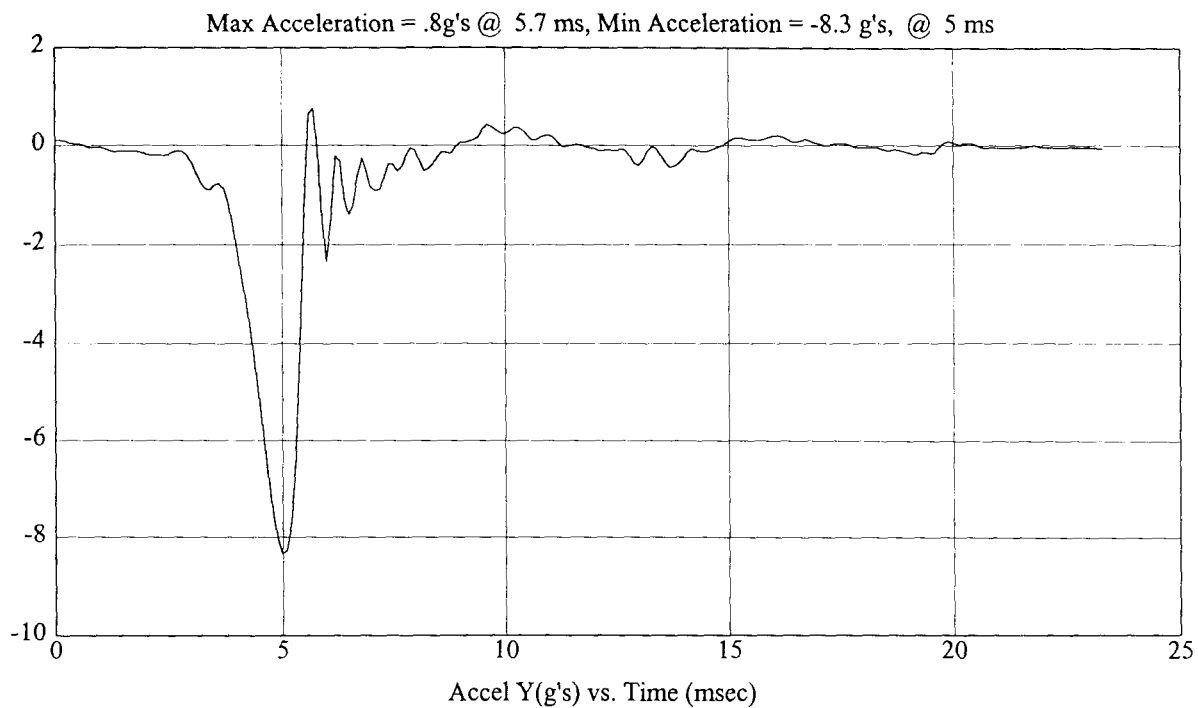
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MGA Job Number: G04I7-001

Test Date: 8/14/04

Test Description: Post - Test Calibration

Head #: 36



Head Drop
(Preliminary Test Report)

4-10

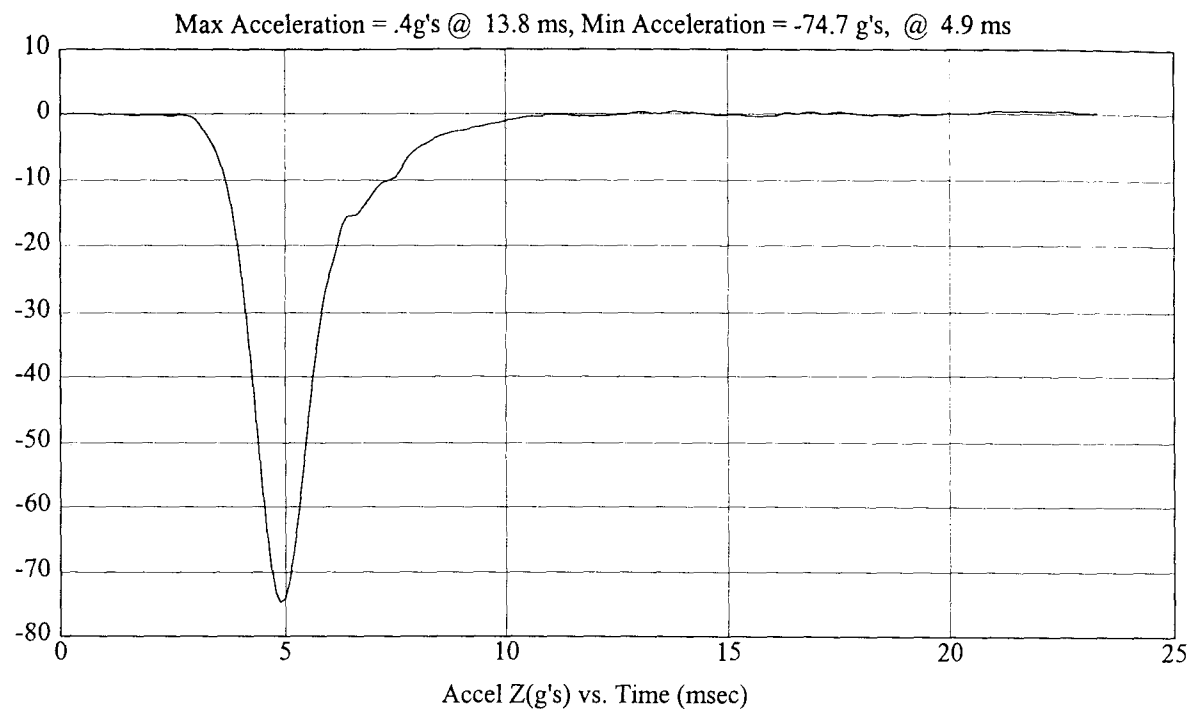
Test Number: H36245

MGA Job Number: G04I7-001

Test Date: 8/14/04

Test Description: Post - Test Calibration

Head #: 36



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: <u>37</u> CALIBRATION DATE: <u>8-12-04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	48
Peak Resultant Acceleration	225 G's to 275 G's	244.6
Peak Lateral Acceleration	15 G's Maximum	5.9
Unimodal Acceleration Curve	YES	Yes

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

REMARKS:

RECORDED BY: Mr. [Signature] DATE: 8-12-04
APPROVED BY: [Signature]

Head Drop
(Preliminary Test Report)

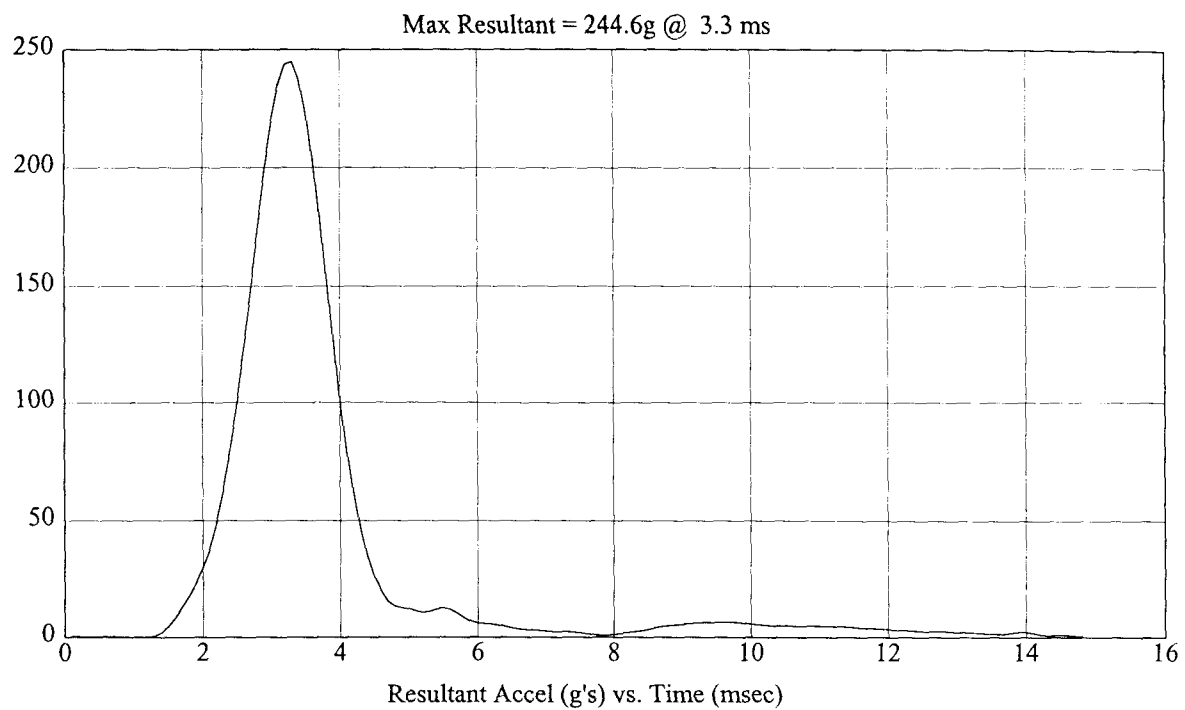
Test Number: H37126

MGA Job Number: G04I7-001

Test Date: 8/12/04

Test Description: Pre - Test Calibration

Head # : 37



Head Drop
(Preliminary Test Report)

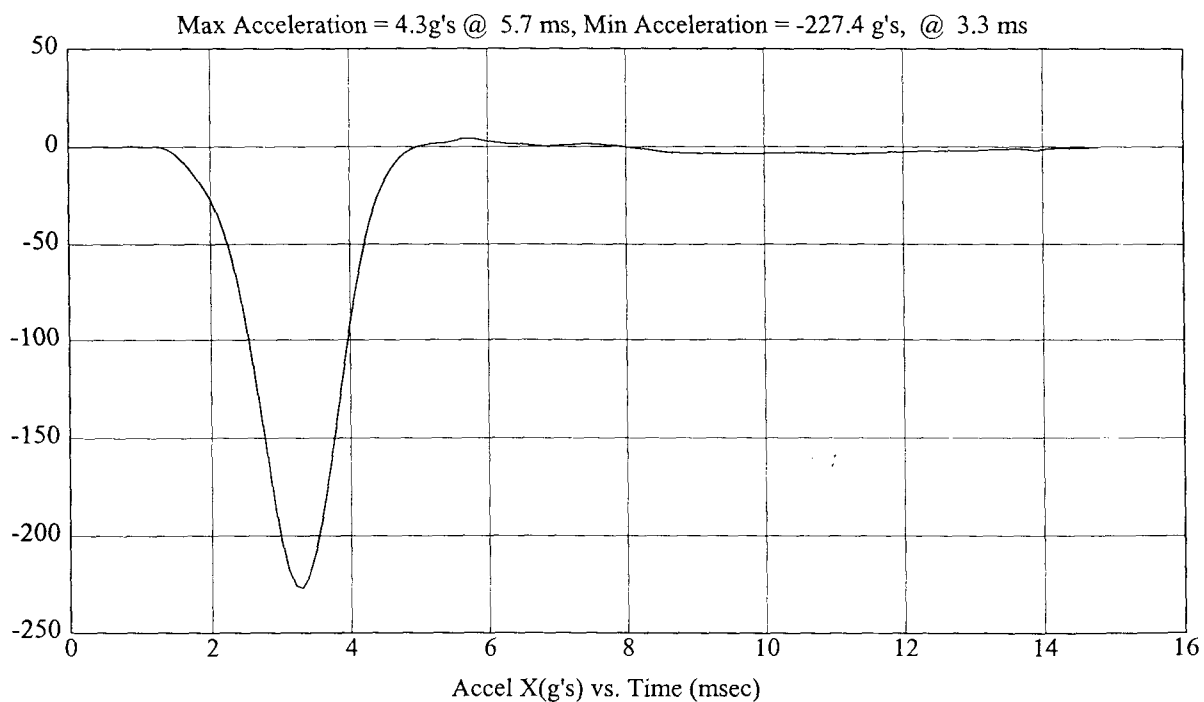
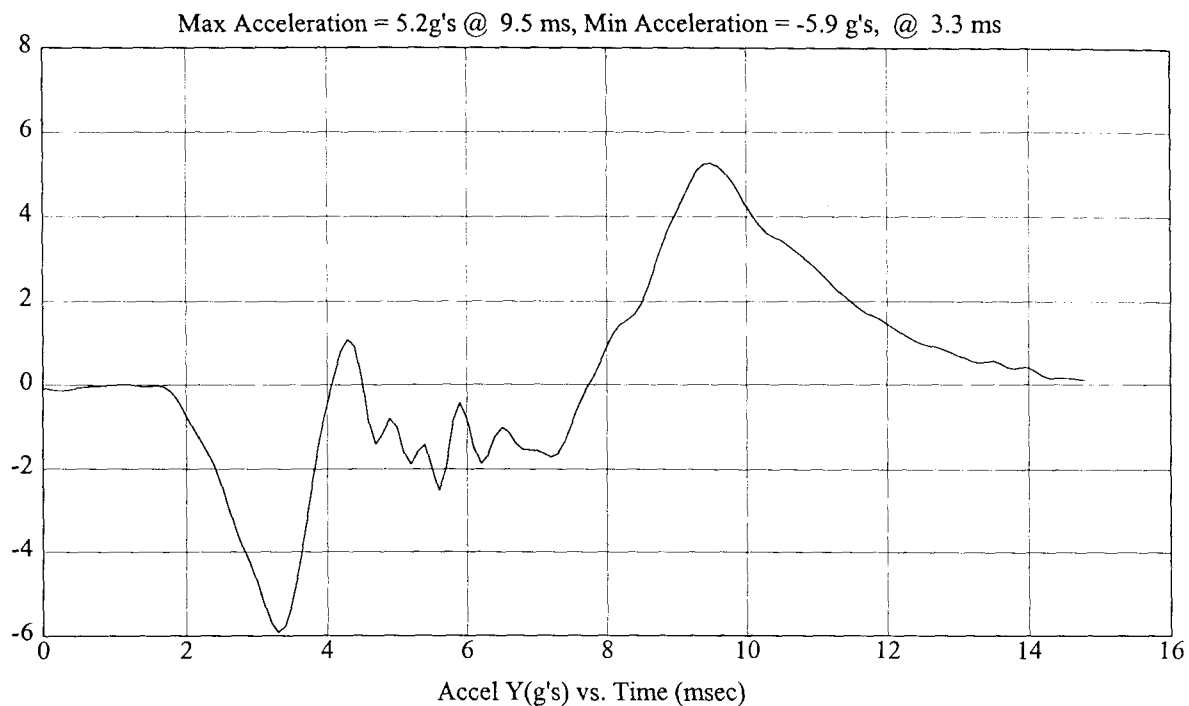
Test Number: H37126

MGA Job Number: G04I7-001

Test Date: 8/12/04

Test Description: Pre - Test Calibration

Head #: 37



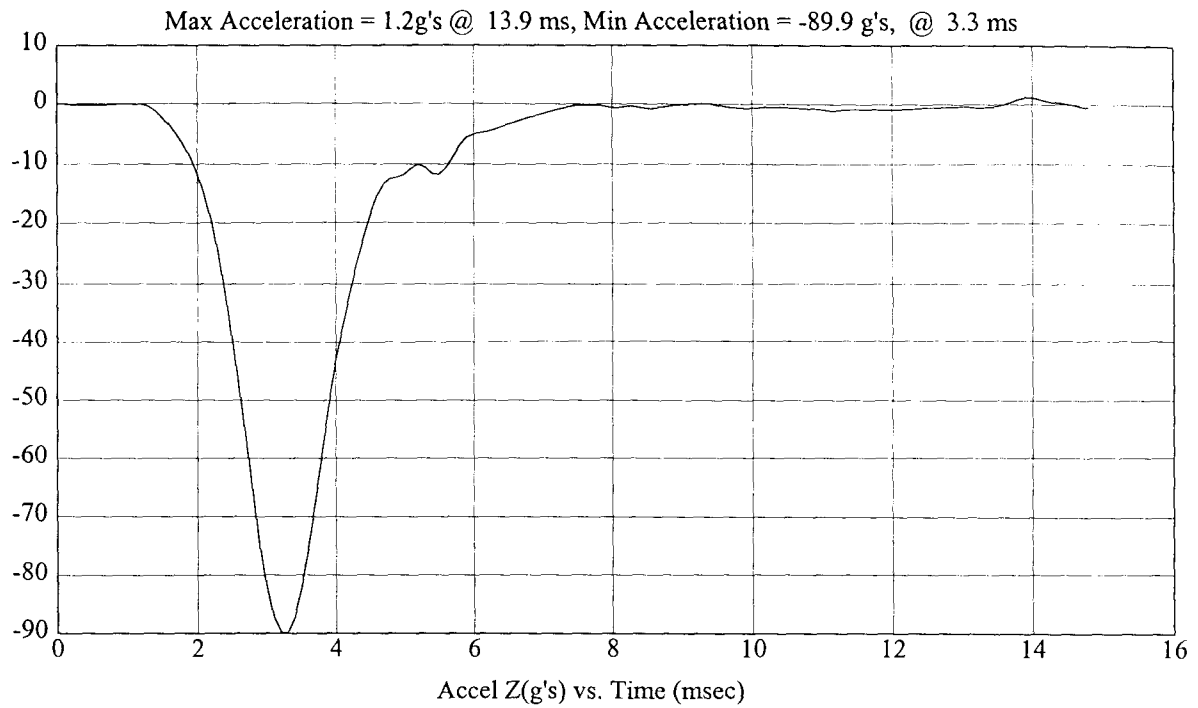
Head Drop
(Preliminary Test Report)

4-14

Test Number: H37126
Test Description: Pre - Test Calibration

MGA Job Number: G04I7-001

Test Date: 8/12/04
Head #: 37



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

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REVISION NO.: 6
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HEAD DROP TEST SUMMARY
PART 572L

Post Script

HEADFORM SERIAL NUMBER: <u>37</u> CALIBRATION DATE: <u>8/14/04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	21° C
Relative Humidity	10% to 70%	50%
Peak Resultant Acceleration	225 G's to 275 G's	253.7
Peak Lateral Acceleration	15 G's Maximum	8.1
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35800	5/3/07	11/3/07 11/3/07
3	ENDEVCO	7264-2000	J35841	5/3/07	11/3/07
4	ENDEVCO	7264-2000	J35791	5/3/07	11/3/07

REMARKS:

RECORDED BY: *[Signature]*

DATE: 8/14/04

APPROVED BY: *Heleen A. Kalito*

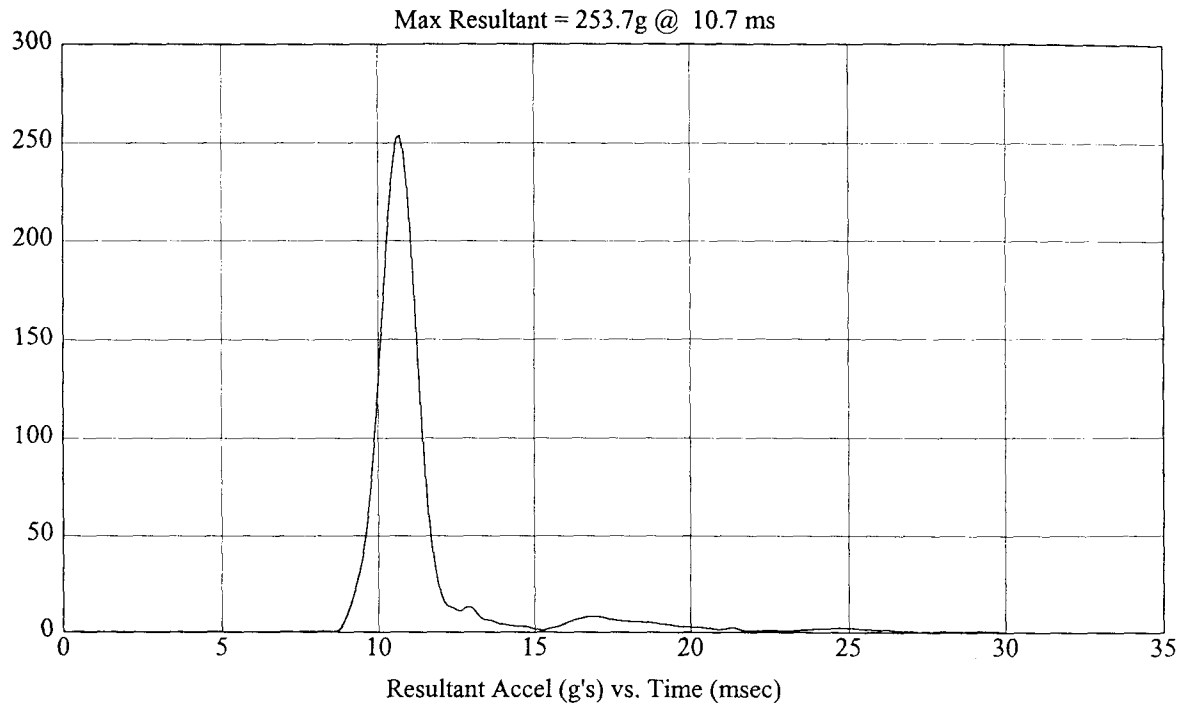
Head Drop
(Preliminary Test Report)

4-16

Test Number: H37127
Test Description: Post - Test Calibration

MGA Job Number: G04I7-001

Test Date: 8/14/04
Head #: 37



Head Drop
(Preliminary Test Report)

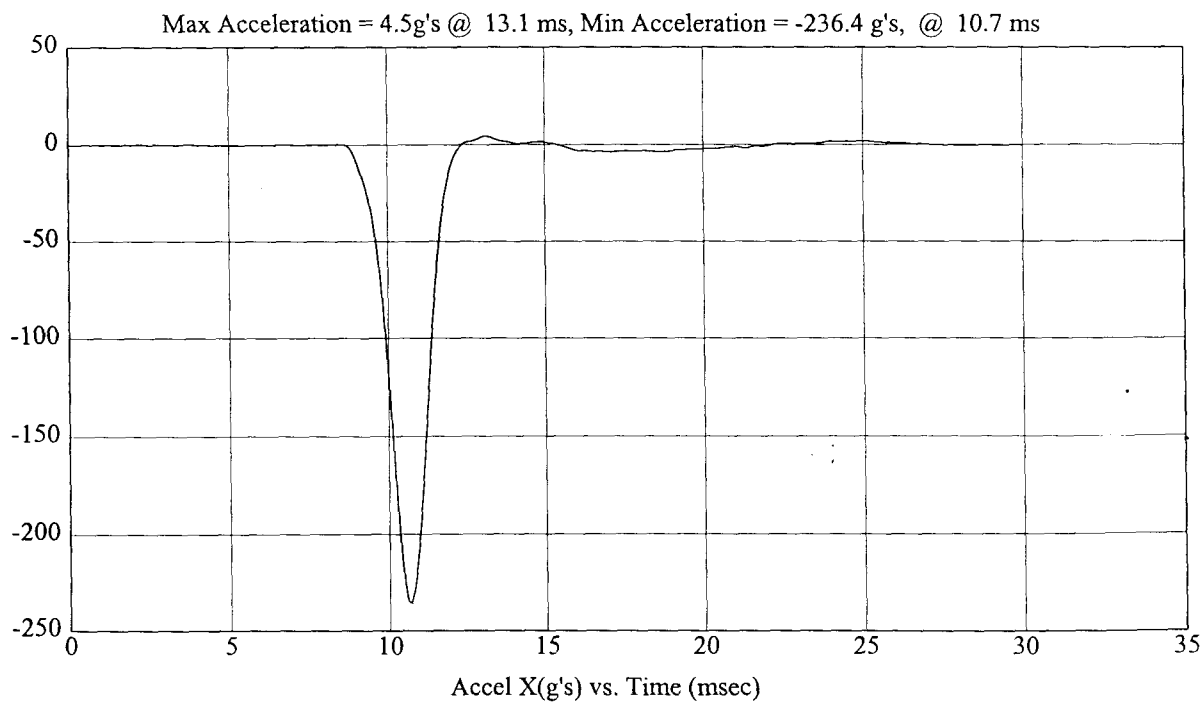
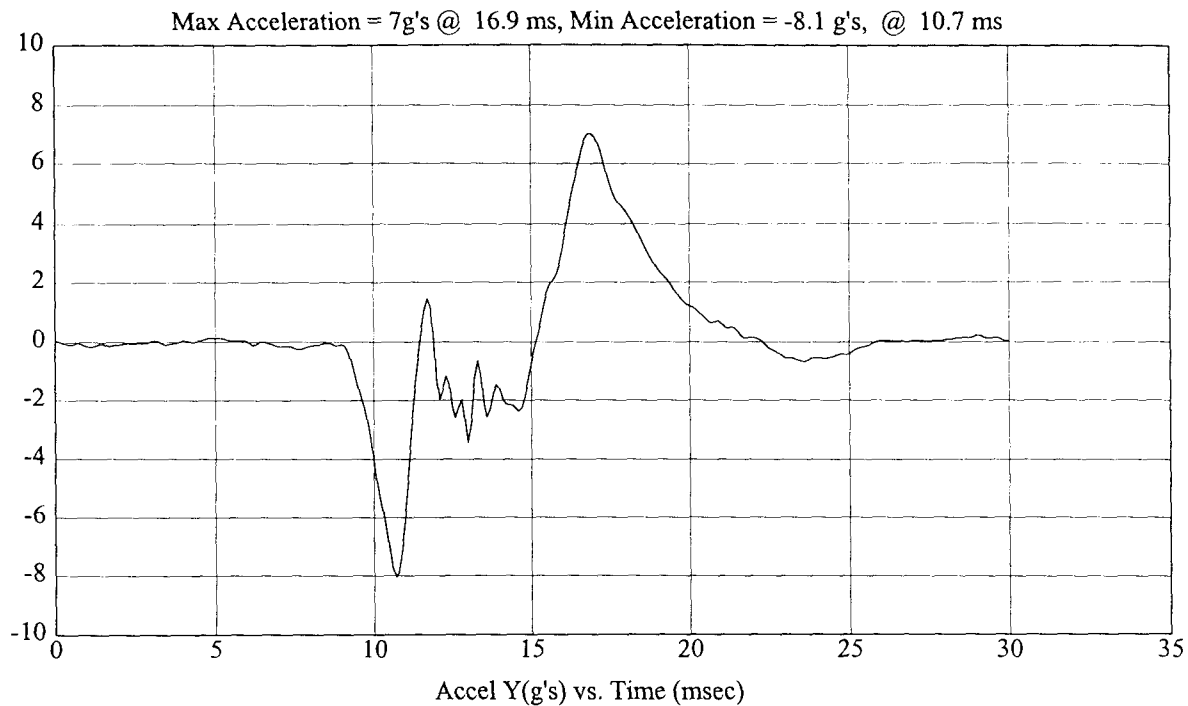
Test Number: H37127

MGA Job Number: G04I7-001

Test Date: 8/14/04

Test Description: Post - Test Calibration

Head #: 37



Head Drop
(Preliminary Test Report)

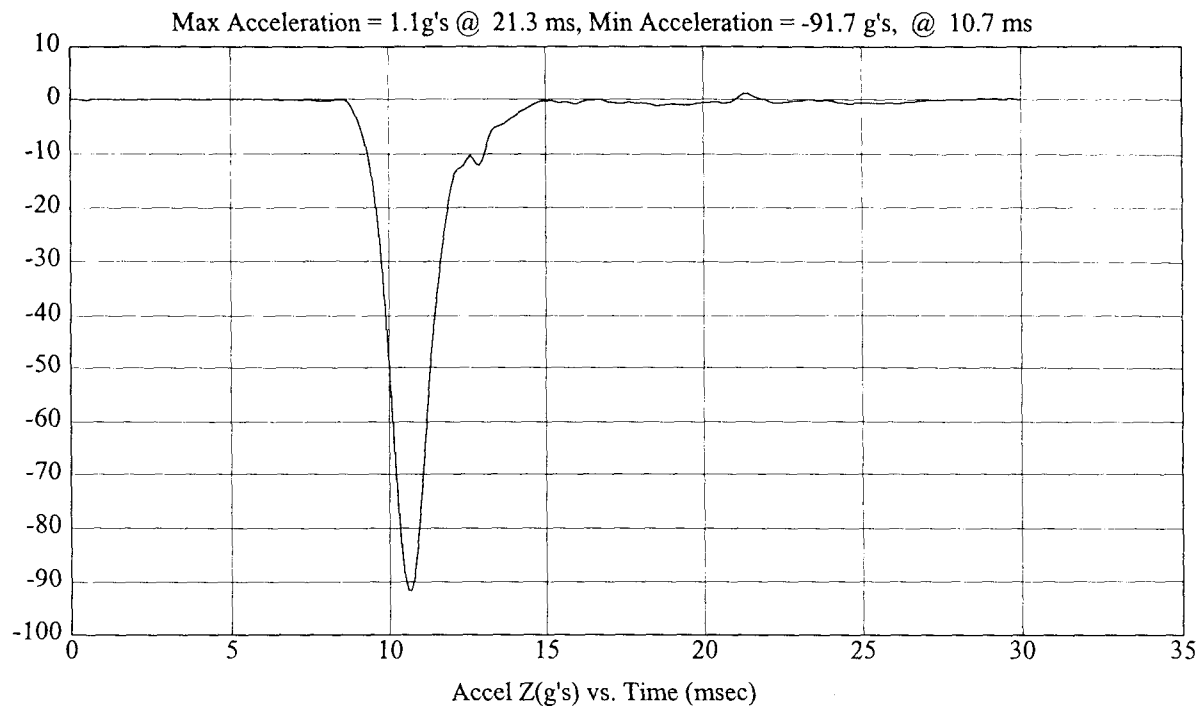
Test Number: H37127

MGA Job Number: G0417-001

Test Date: 8/14/04

Test Description: Post - Test Calibration

Head # : 37



HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: <u>38</u> CALIBRATION DATE: <u>8-12-04</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%	48
Peak Resultant Acceleration	225 G's to 275 G's	241.8
Peak Lateral Acceleration	15 G's Maximum	5.0
Unimodal Acceleration Curve	YES	Yes

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J36197	5-23-04	11-23-04
3	ENDEVCO	7264-2000	J36193	5-23-04	11-23-04
4	ENDEVCO	7264-2000	J36313	5-23-04	11-23-04

REMARKS:

RECORDED BY: Mr J B DATE: 8-12-04

APPROVED BY: _____

Head Drop
(Preliminary Test Report)

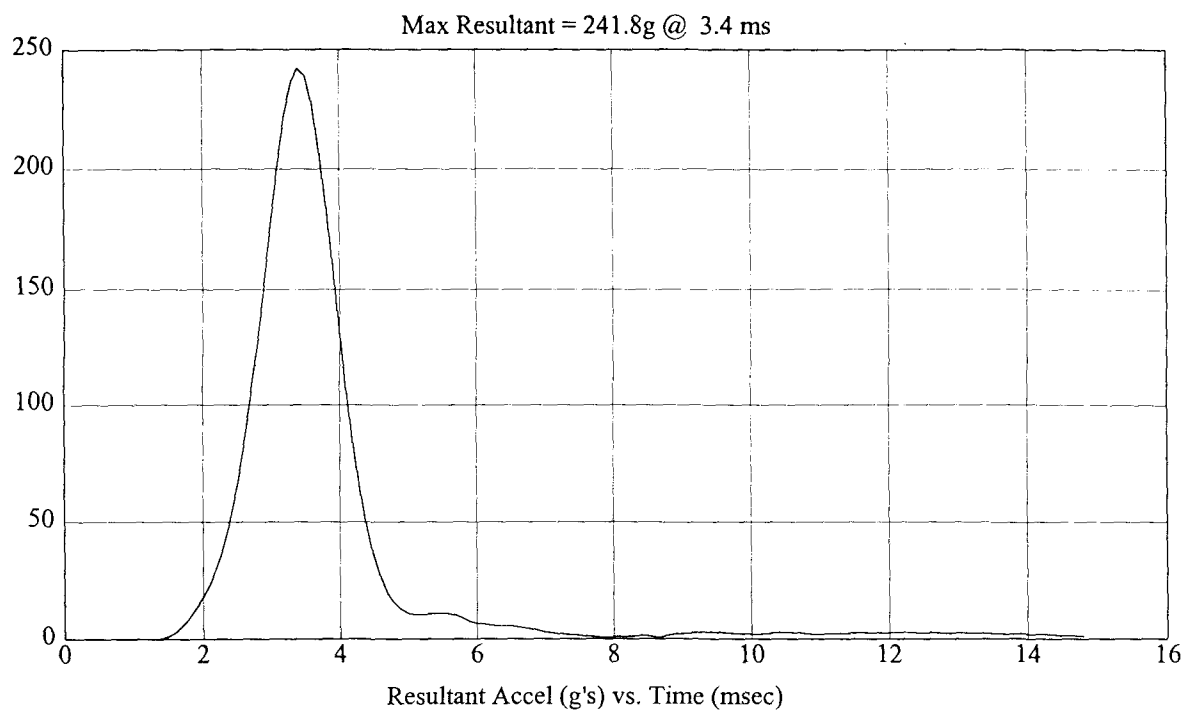
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MGA Job Number: G04I7-001

Test Date: 8/12/04

Test Description: Pre - Test Calibration

Head # : 38



Head Drop
(Preliminary Test Report)

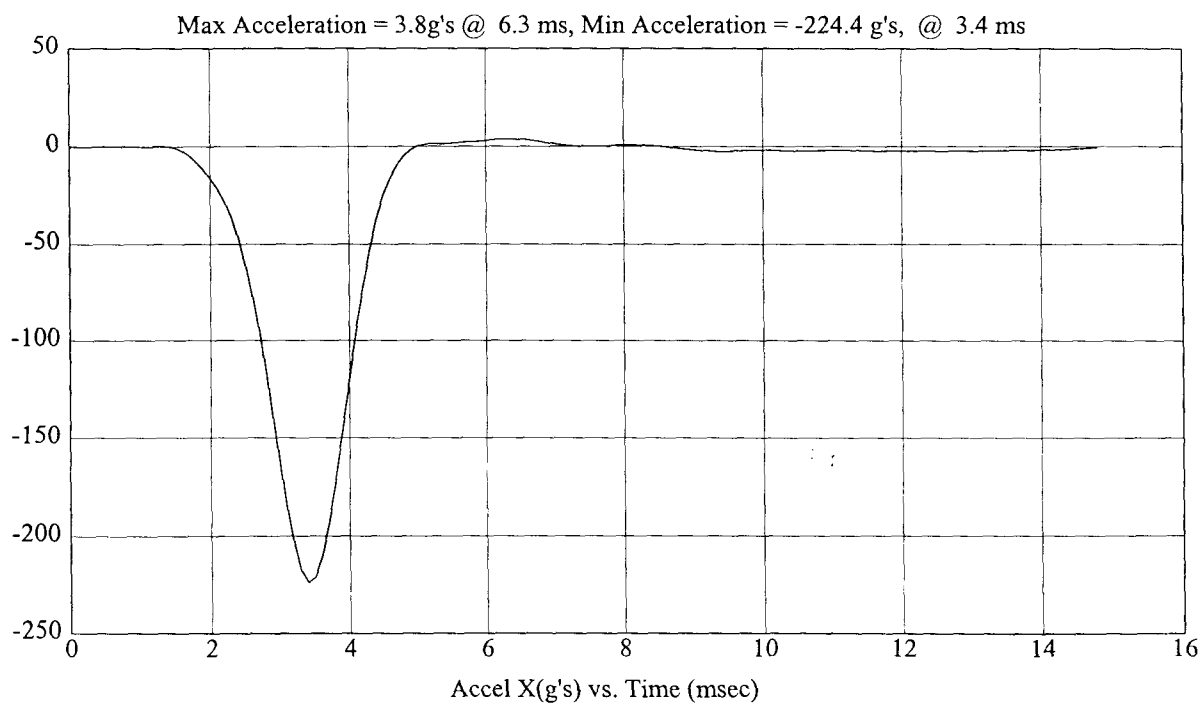
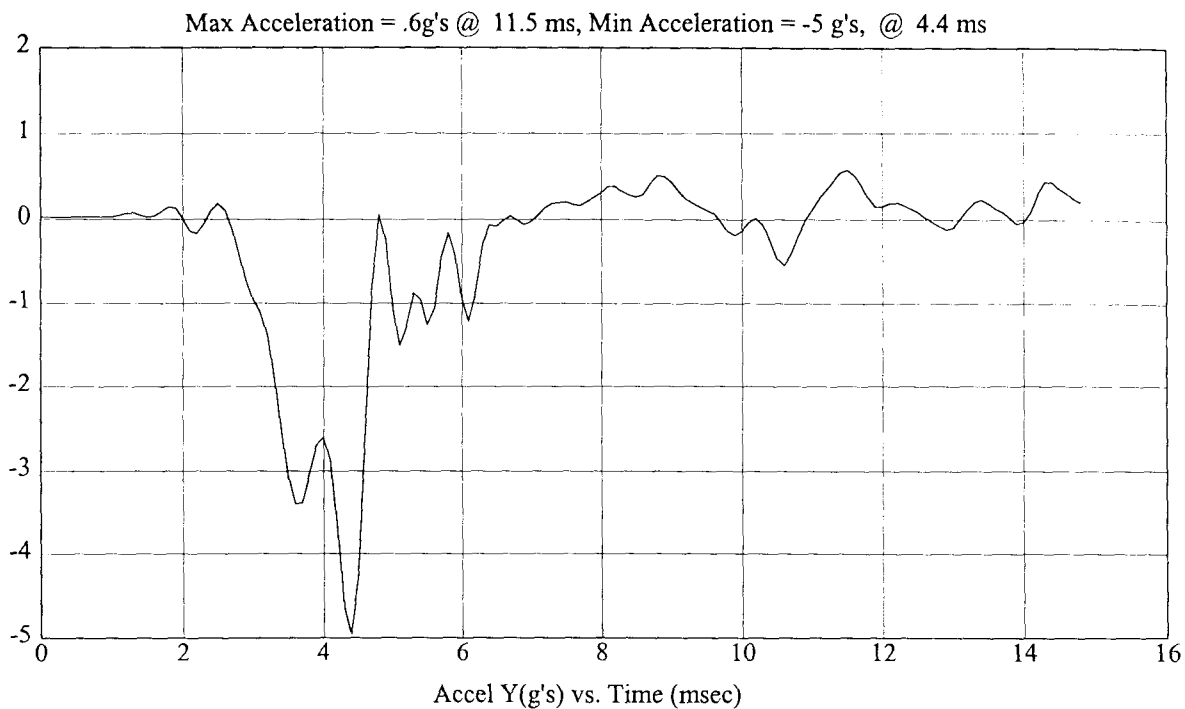
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MGA Job Number: G0417-001

Test Date: 8/12/04

Test Description: Pre - Test Calibration

Head #: 38



Head Drop
(Preliminary Test Report)

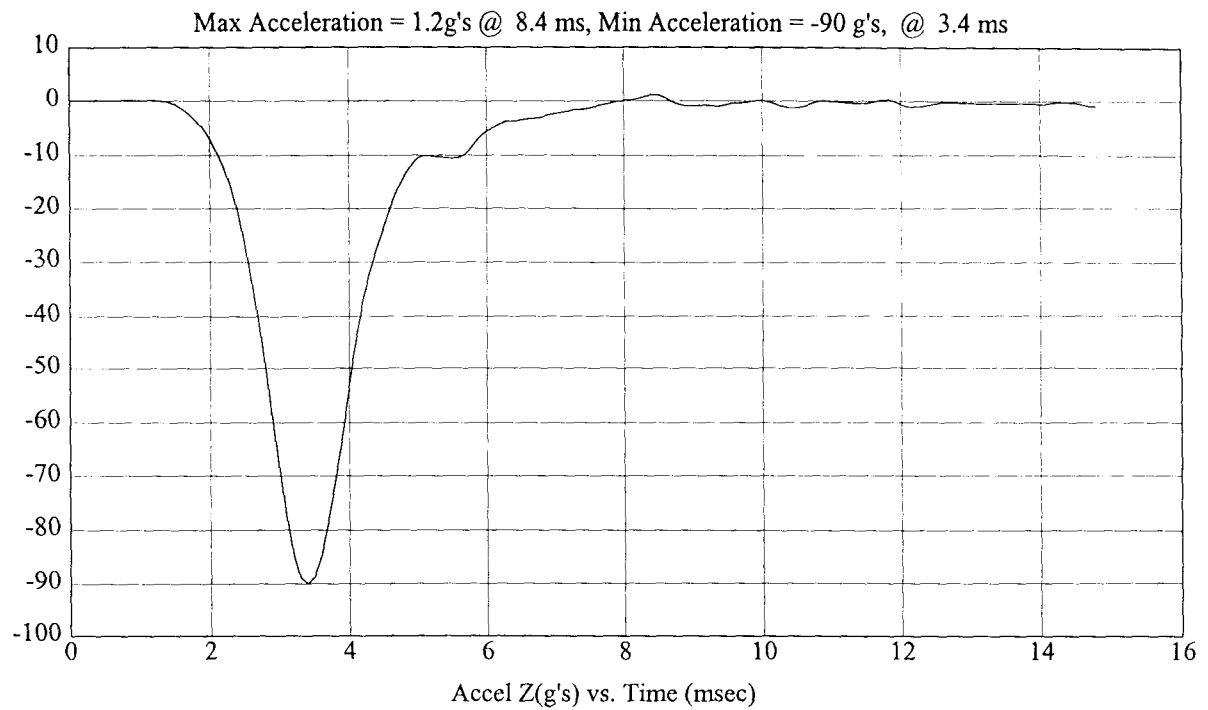
Test Number: H38232

MGA Job Number: G04I7-001

Test Date: 8/12/04

Test Description: Pre - Test Calibration

Head # : 38



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

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REVISION NO.: 6
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Post Script A

HEAD DROP TEST SUMMARY PART 572L

HEADFORM SERIAL NUMBER: <u>38</u> CALIBRATION DATE: <u>8/14/04</u>		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	<u>9.99</u>
Temperature	19° C to 26° C	<u>22°C</u>
Relative Humidity	10% to 70%	<u>50</u>
Peak Resultant Acceleration	225 G's to 275 G's	<u>247.8</u>
Peak Lateral Acceleration	15 G's Maximum	<u>7.5</u>
Unimodal Acceleration Curve	YES	<u>YES</u>

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
<u>1</u>	ENDEVCO	7264-2000	<u>J36197</u>	<u>5/25/04</u>	<u>11/25/04</u>
<u>3</u>	ENDEVCO	7264-2000	<u>J36793</u>	<u>5/18/04</u>	<u>11/18/04</u>
<u>7</u>	ENDEVCO	7264-2000	<u>J36353</u>	<u>5/18/04</u>	<u>11/18/04</u>

REMARKS:

RECORDED BY: *[Signature]*

DATE: 8/14/04

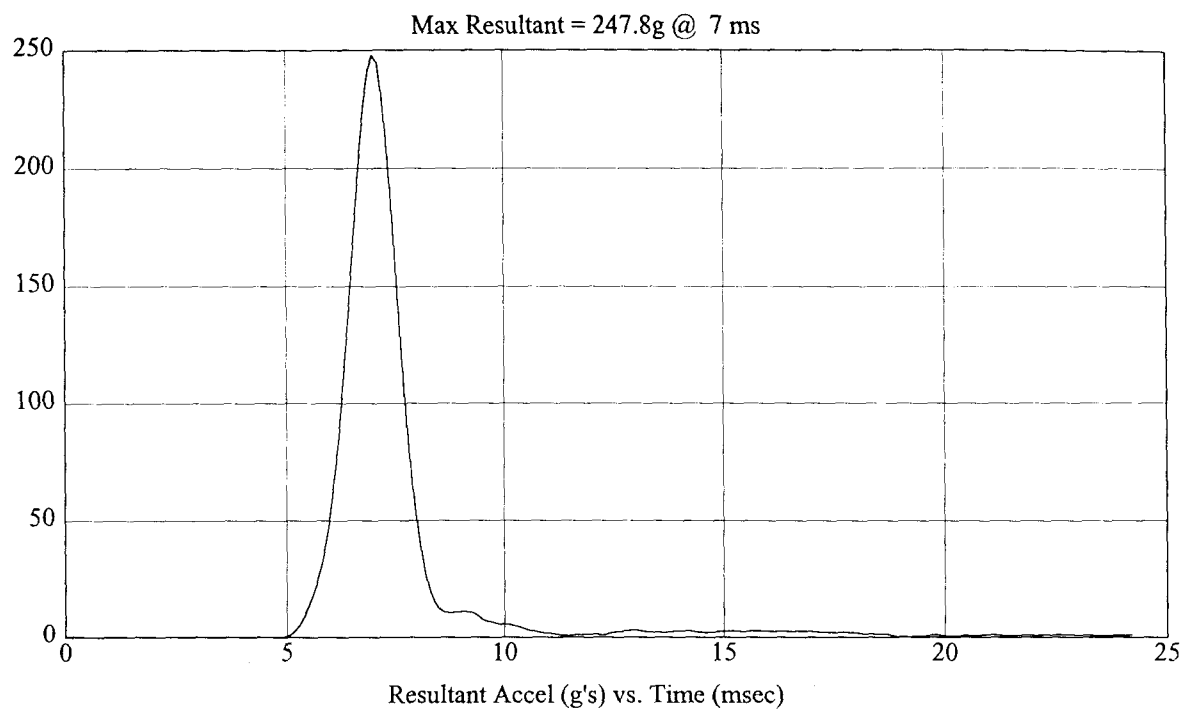
APPROVED BY: *Helene Kalito*

Head Drop
(Preliminary Test Report)

Test Number: H38233
Test Description: Post - Test Calibration

MGA Job Number: G04I7-001

Test Date: 8/14/04
Head #: 38



Head Drop
(Preliminary Test Report)

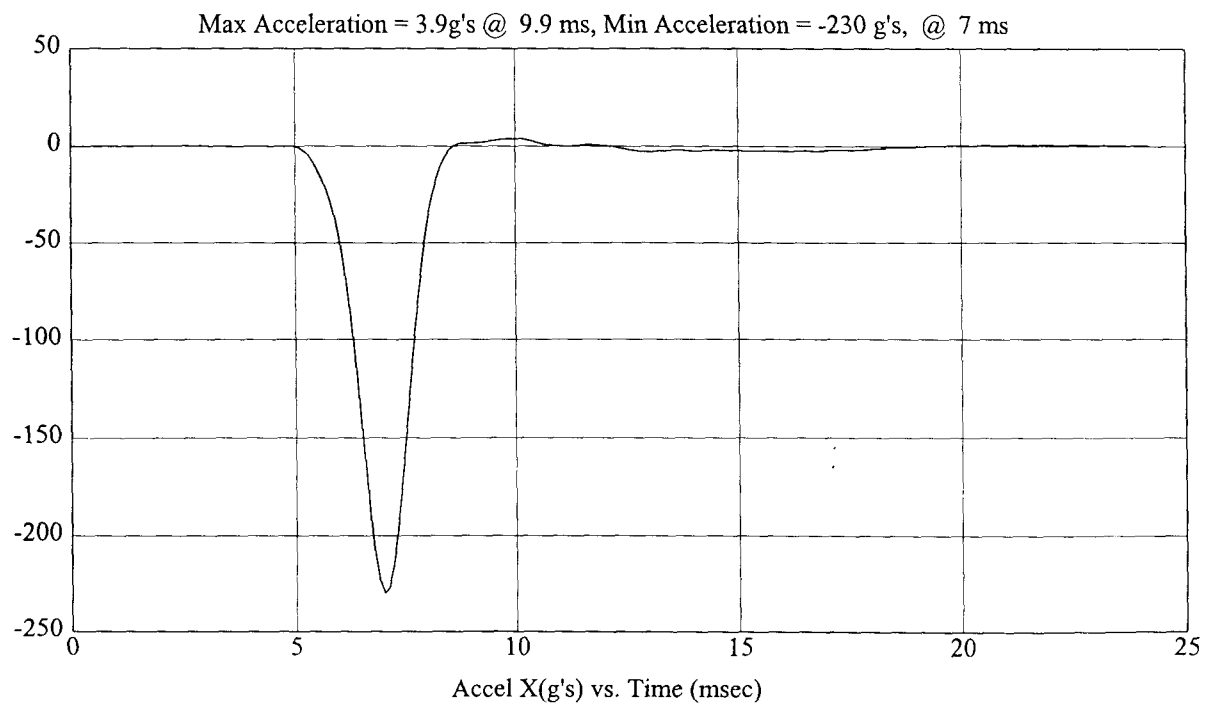
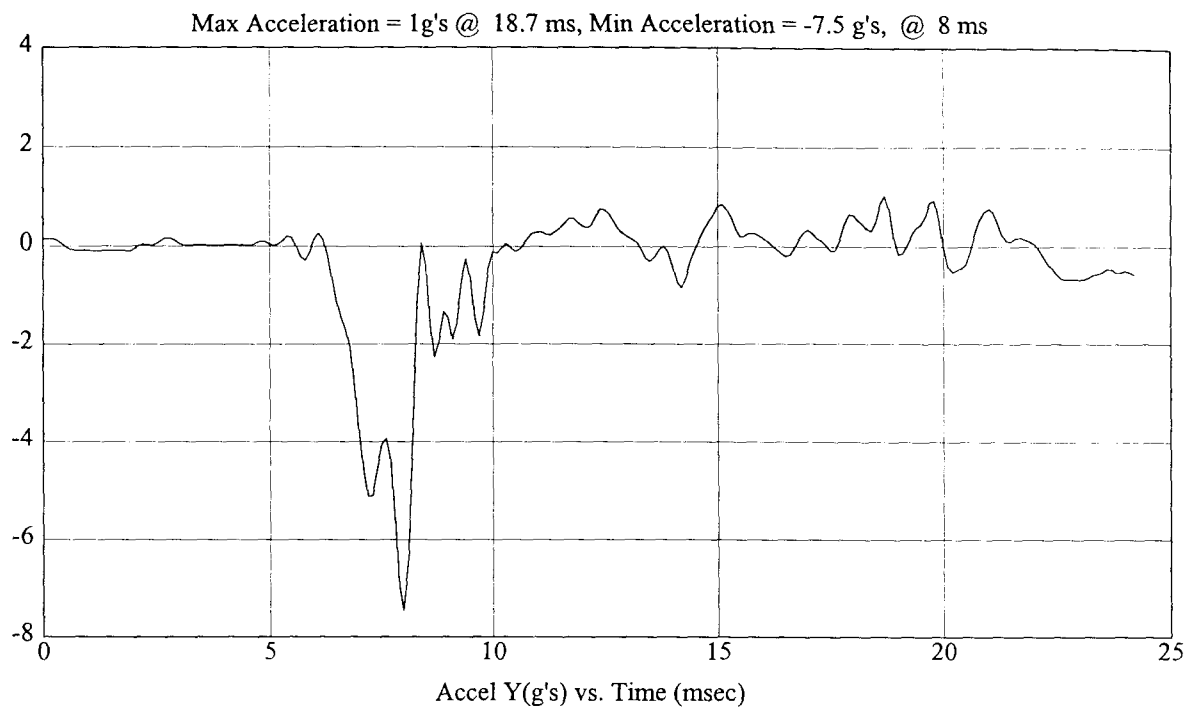
Test Number: H38233

MGA Job Number: G04I7-001

Test Date: 8/14/04

Test Description: Post - Test Calibration

Head #: 38



Head Drop
(Preliminary Test Report)

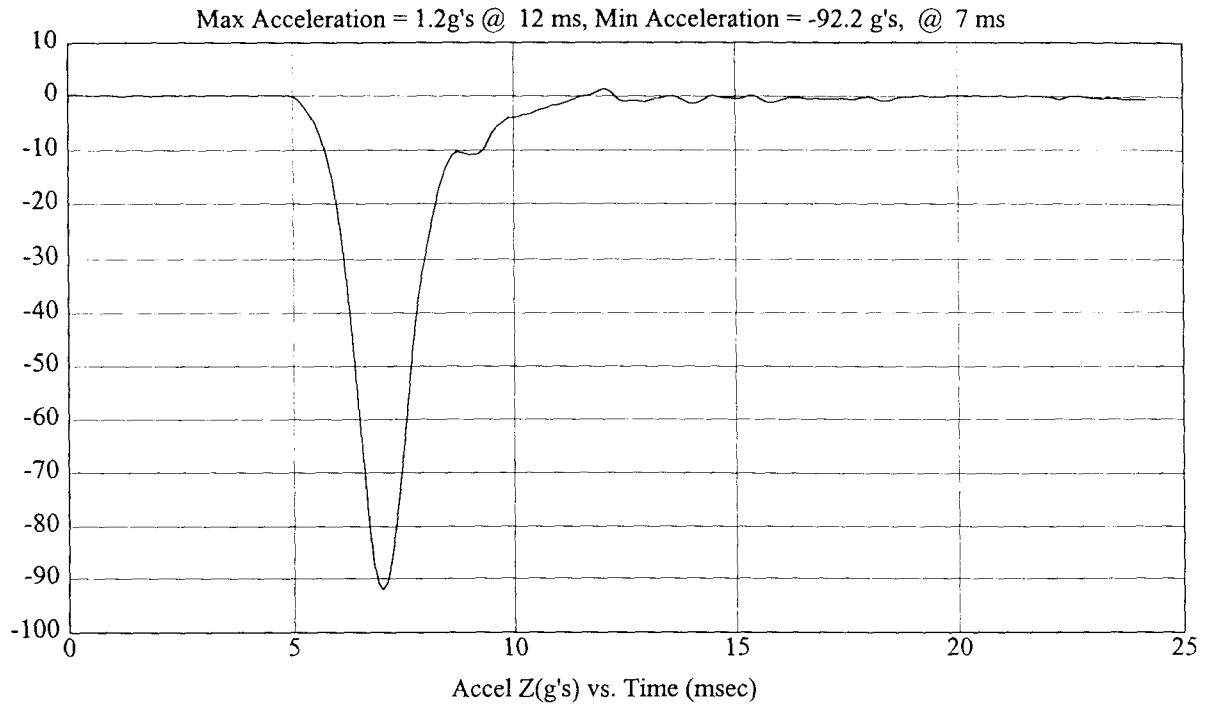
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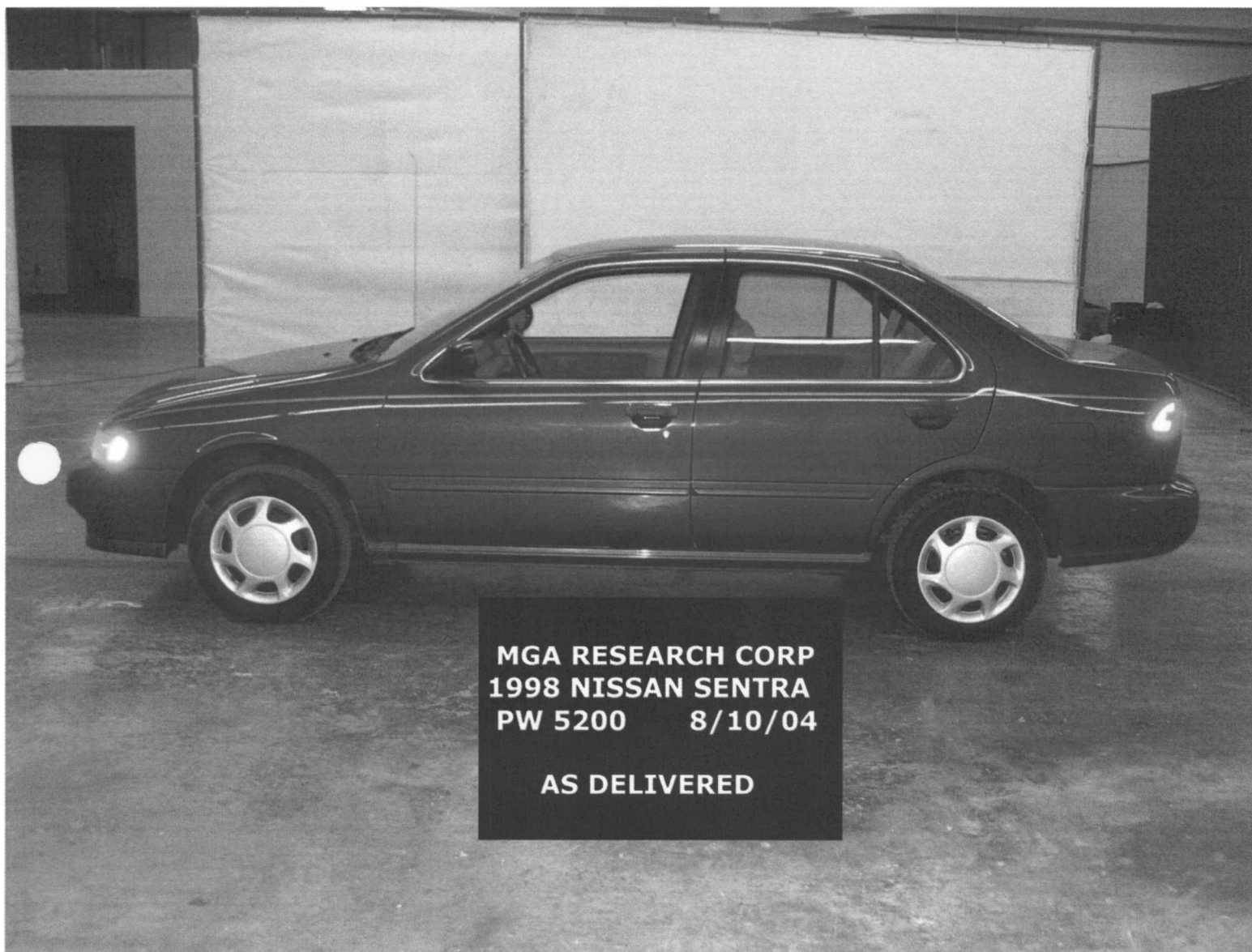
MGA Job Number: G04I7-001

Test Date: 8/14/04

Test Description: Post - Test Calibration

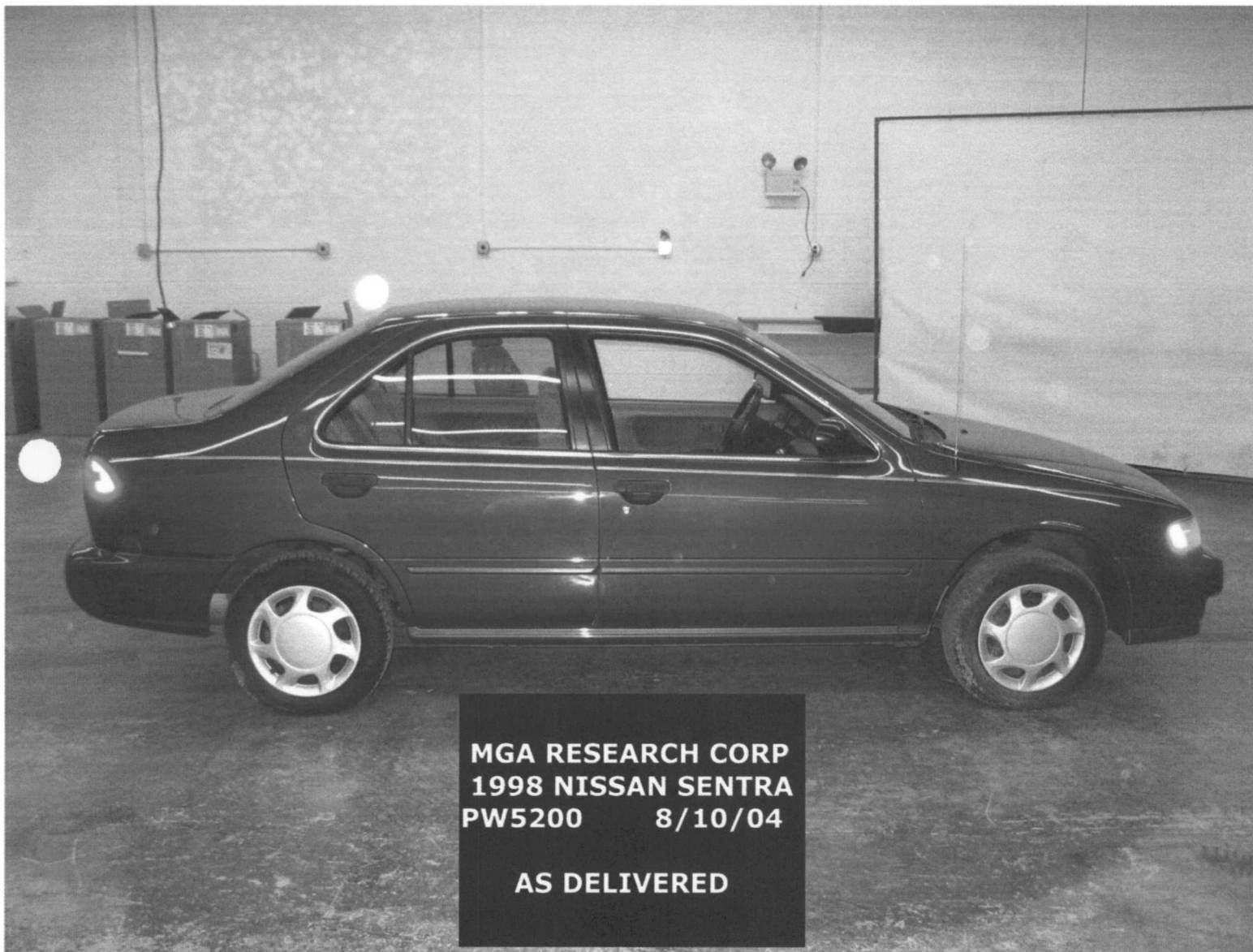
Head # : 38

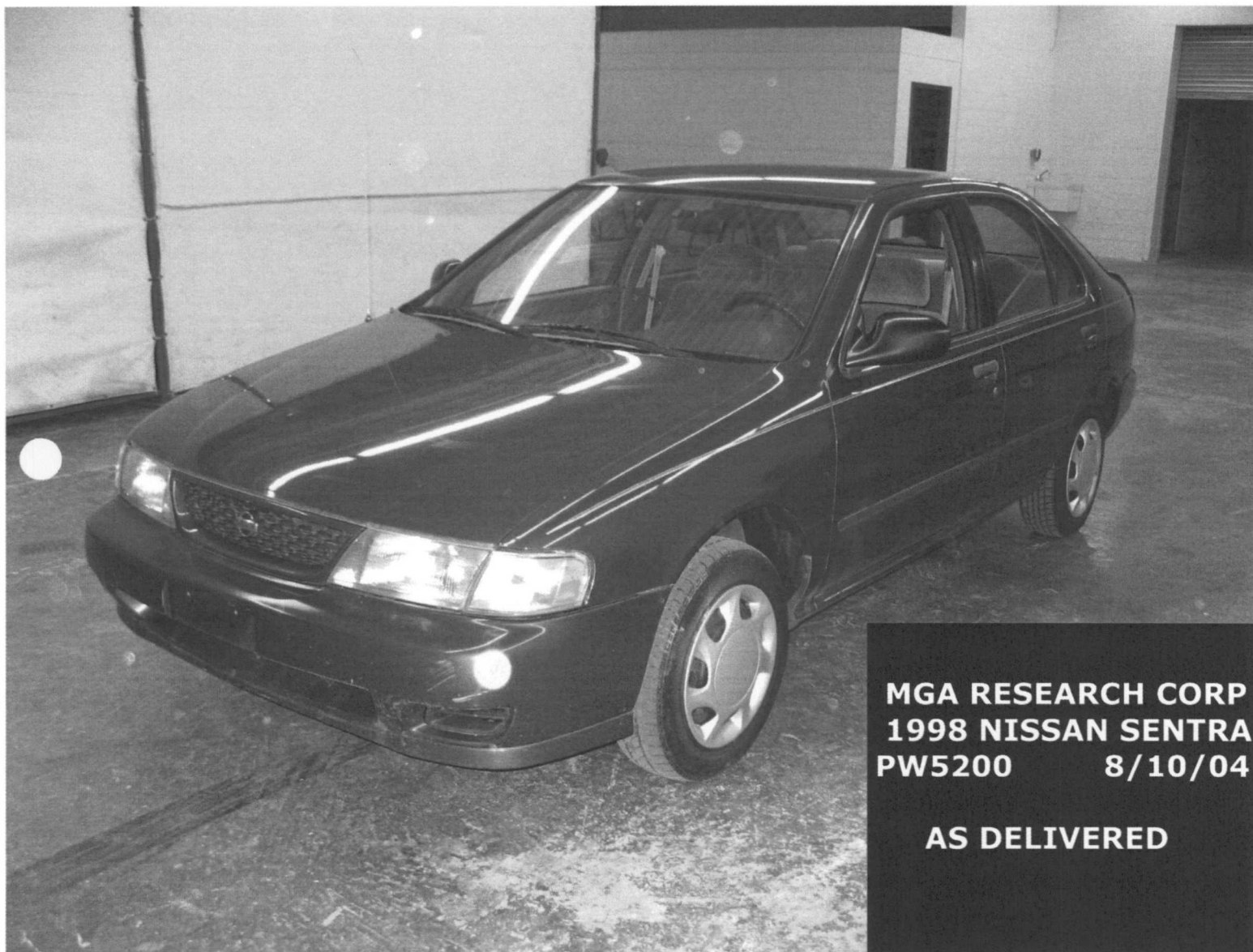


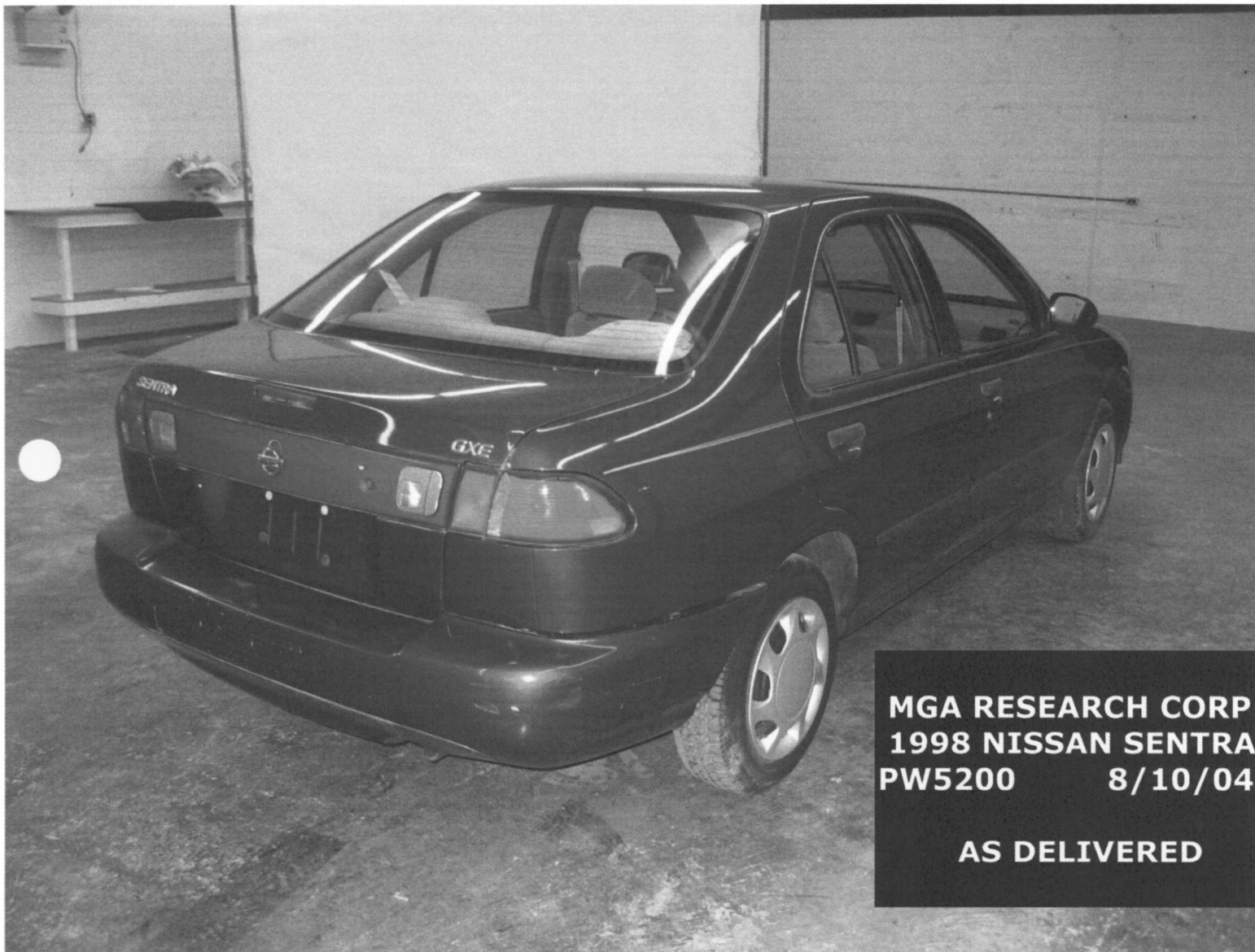


**MGA RESEARCH CORP
1998 NISSAN SENTRA
PW 5200 8/10/04**

AS DELIVERED







MANUFACTURED BY
NISSAN MOTOR CO., LTD. 806 Y

DATE 10/97
GWR 3329 LB
GAWR FR. 1872 LB
GAWR RR. 1567 LB

THIS VEHICLE CONFORMS TO
ALL APPLICABLE FEDERAL
MOTOR VEHICLE SAFETY,
BUMPER AND THEFT
PREVENTION STANDARDS IN
EFFECT ON THE DATE OF
MANUFACTURE SHOWN ABOVE.
SEE OWNERS MANUAL FOR
ADDITIONAL INFORMATION.

1N4AB41D9WC

MODEL BAYALBF-EVA
PASSENGER CAR

88000

COLOR TRIM DS2 C TRANS

AXLE FC37 RS5F31A

ENGINE

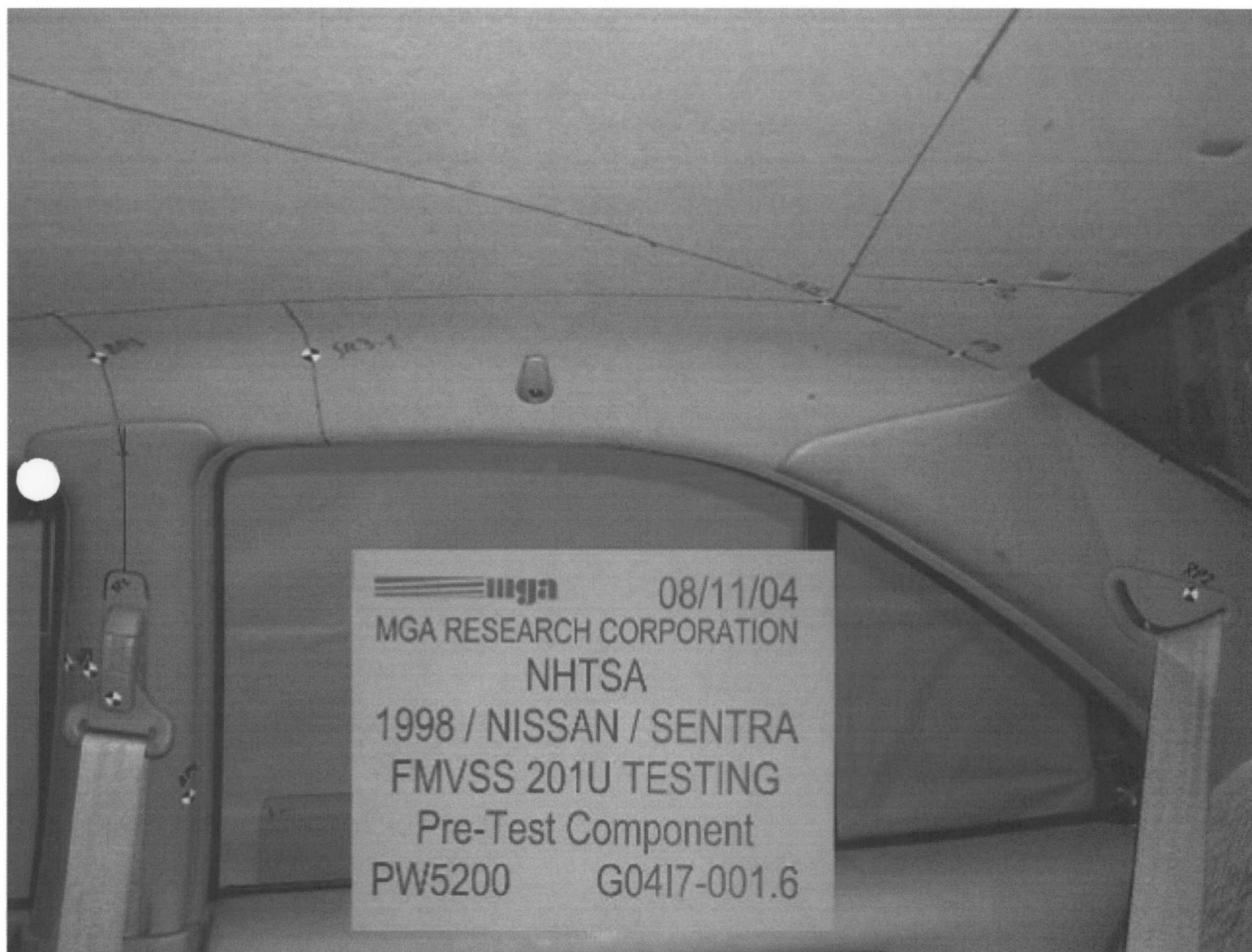
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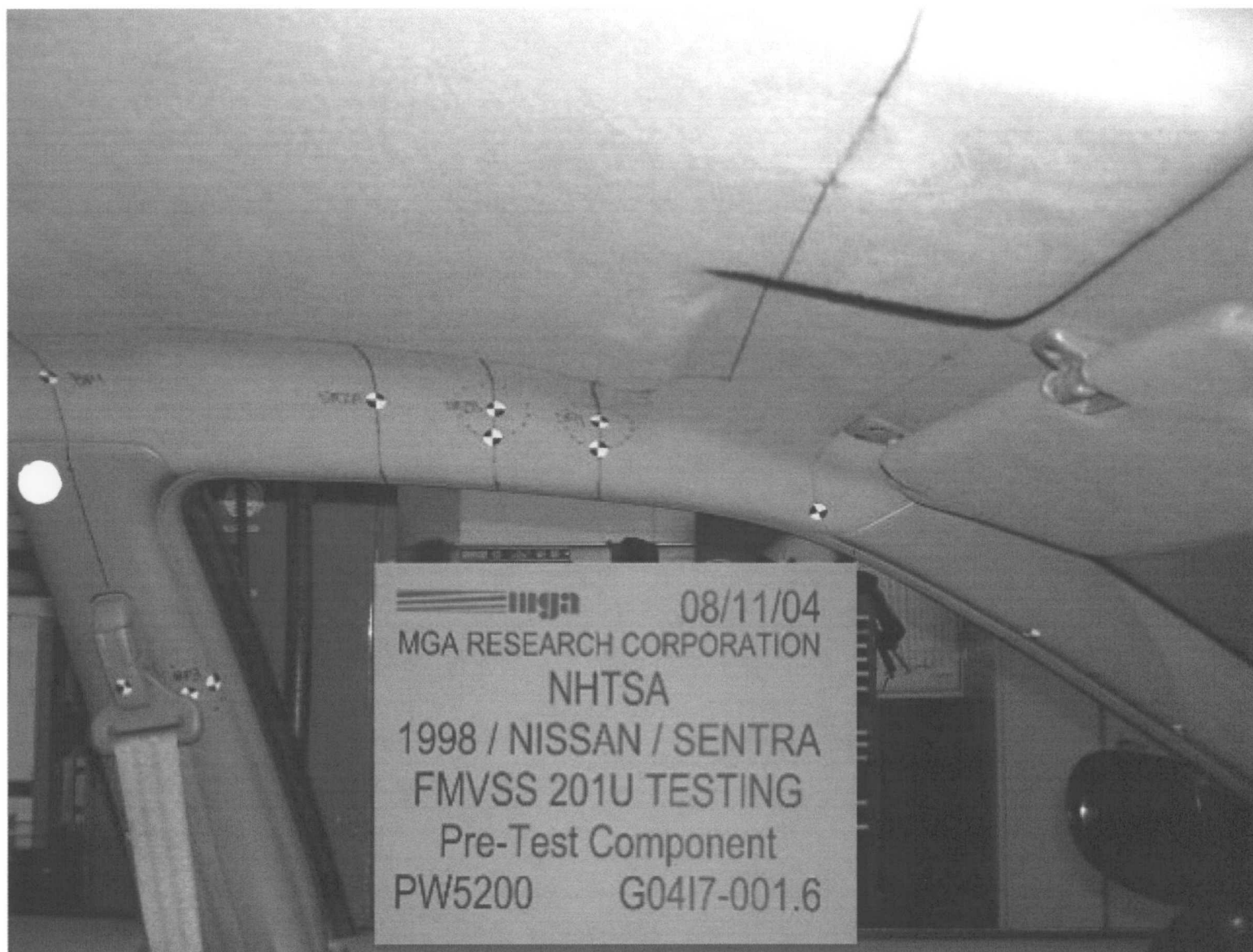
1N4AB41D9WC

VEHICLE CAPACITY WEIGHT	369 kg	SEATING CAPACITY	FRONT AVANT 2	TOTAL TOTAL	SPARE TIRE ROUE DE SECOURS	kPa (psi)
POIDS UTILE DU VEHICULE	814 lbs	NOMBRE DE PLACES	REAR ARRIERE 3	5	T115/70D14	420 (60)
RECOMMENDED COLD TIRE INFLATION PRESSURE PRESSION DE GONFLAGE RECOMMANDEE DES PNEUS FROIDS.					DO NOT USE IN EXCESS OF 50MPH, 80km/h SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION. UTILISATION A UNE VITESSE MAX 50 MPH, 80 km/h POUR LES DETAILS SE REFERER AU MANUEL DU CONDUCTEUR.	
TIRE SIZE DIMENSIONS	FRONT kPa AVANT (psi)		REAR kPa ARRIERE (psi)			
P175/65R14 818	230 (33)		200 (29)			

4B410













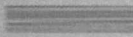


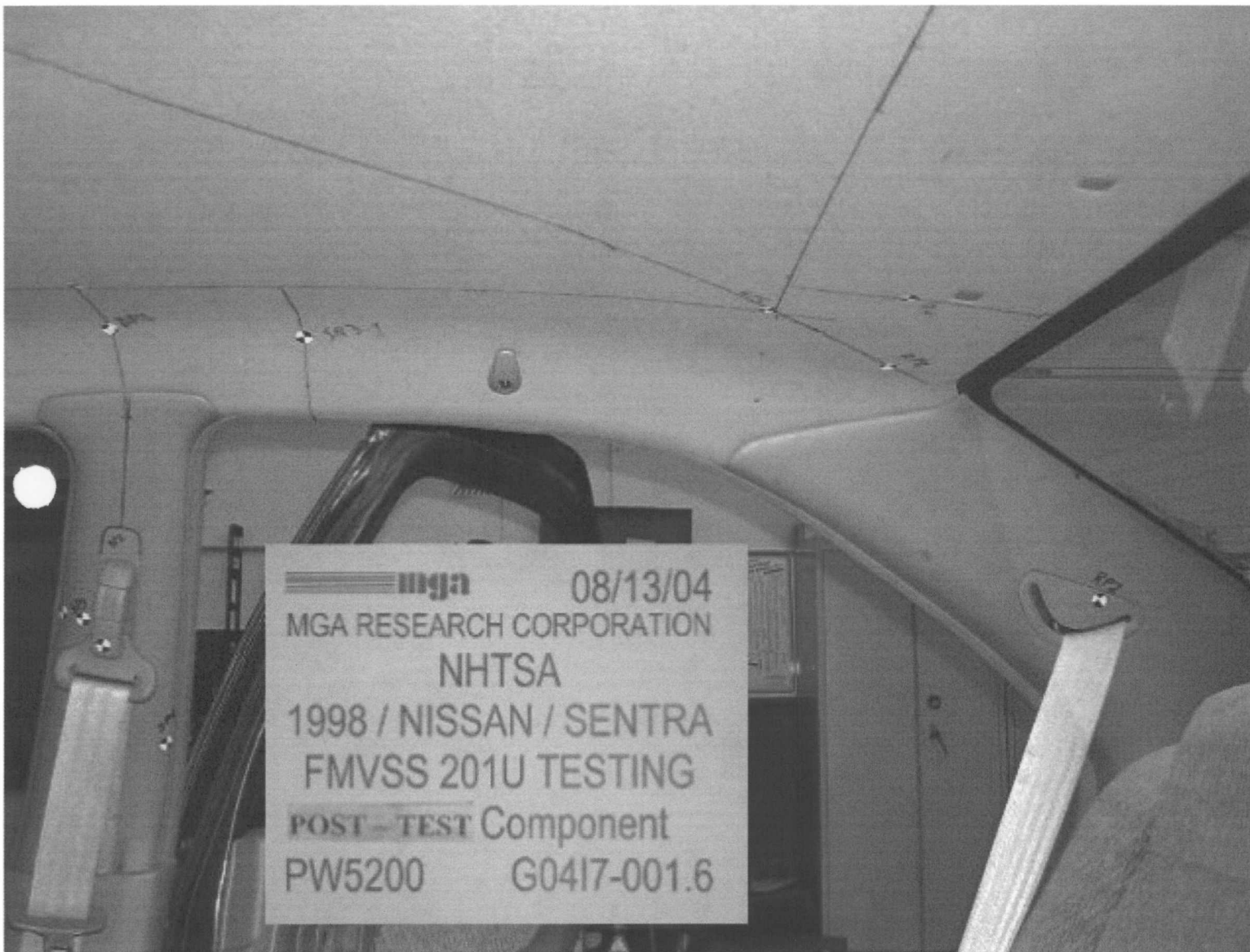
mga 08/13/04
MGA RESEARCH CORPORATION
NHTSA
1998 / NISSAN / SENTRA
FMVSS 201U TESTING
POST - TEST Component
PW5200 G04I7-001.6

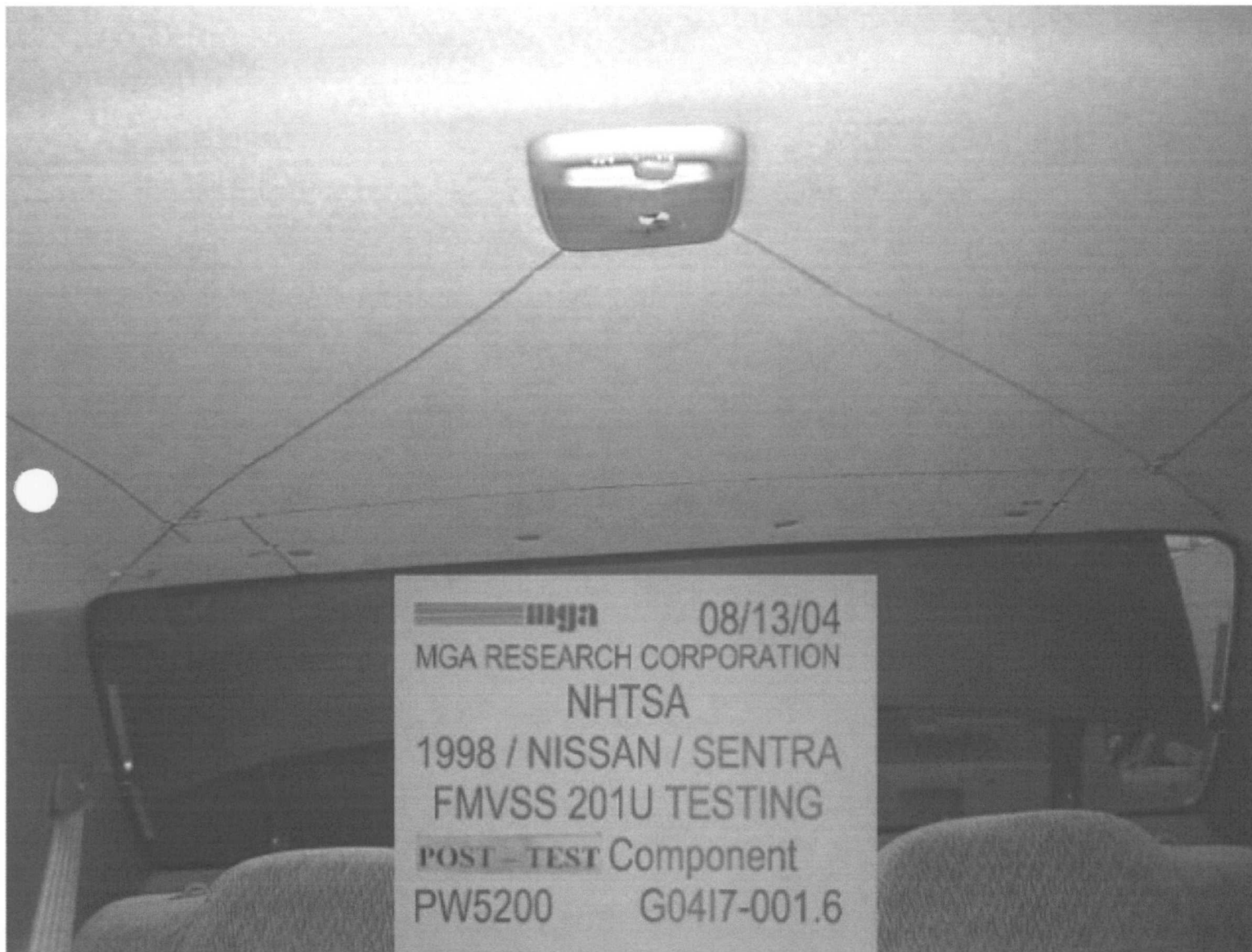






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MGA RESEARCH CORPORATION
NHTSA
1998 / NISSAN / SENTRA
FMVSS 201U TESTING
POST-TEST Component
PW5200 G0417-001.6



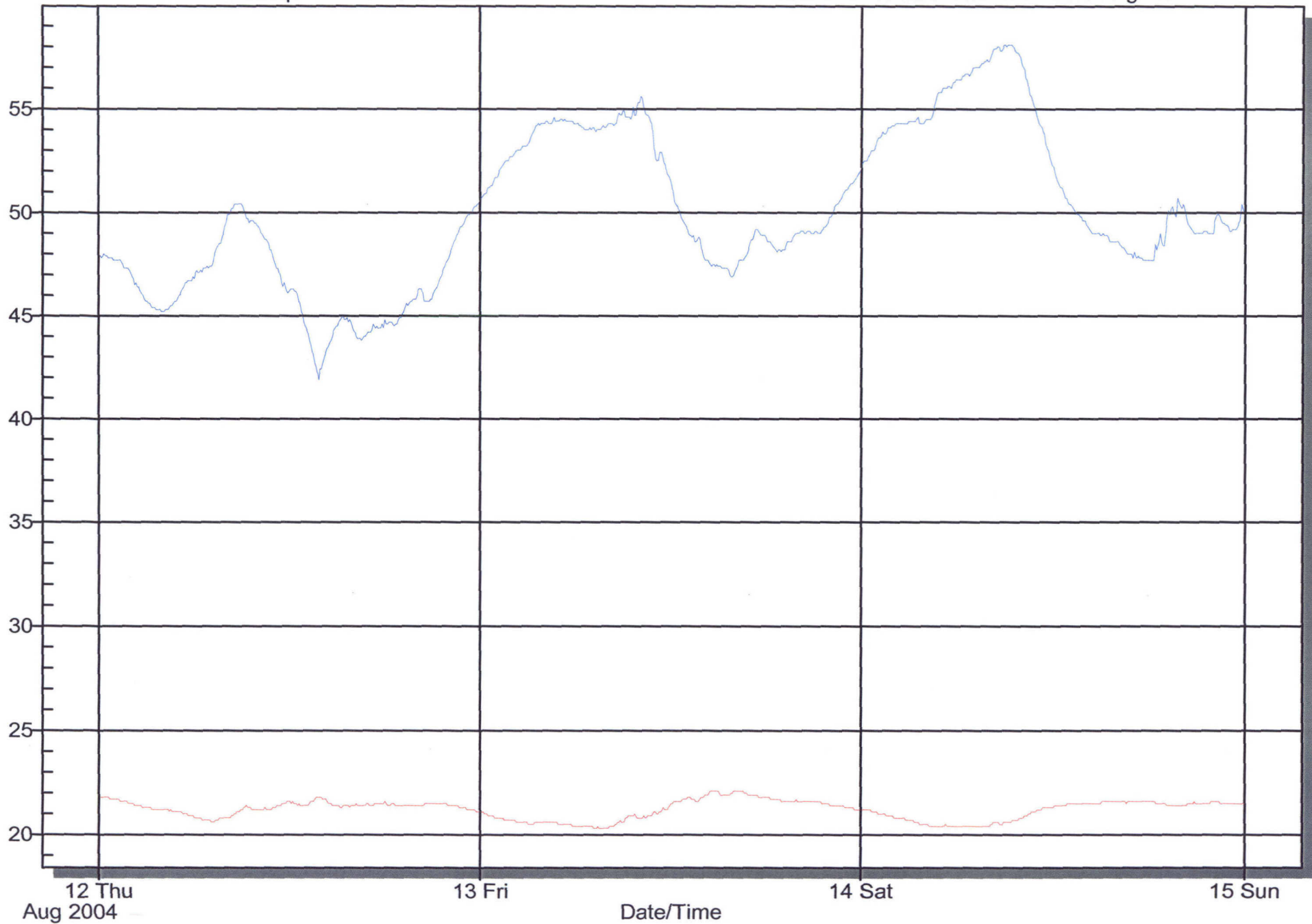


1998 Nissan Contra PW5200

Temperature Trace August 12-14, 2004

MGA-Temp/°C Min: 20.3 Max: 22.1

MGA-RH/% Min: 41.9 Max: 58.1 Avg: 50.1





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: J35800	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 5/3/04	Calibration Date: 4/8/03
	Calibrated By: <i>Kevin J. Rust/MTS</i>

Test Reference Number: A0408

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

StdDeviation (%): 0.109

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

Temperature (°F): 68

Humidity (%): 31

Performed By:

Approved By:

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

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



mga research corporation
CALIBRATION CERTIFICATE

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

Test Reference Number: A0408

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

StdDeviation (%) 0.578

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

Temperature (°F): 68

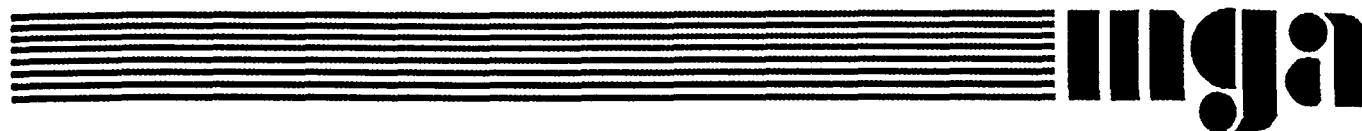
Humidity (%): 31

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
 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: J35791	S/N: 862/247
Capacity: 2000 G	Capacity: 170 G
Calibration Date: 5/3/04	Calibration Date: 4/8/03
	Calibrated By: <i>Kevin J. Rust/MTS</i>

Test Reference Number: A0408

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

StdDeviation (%): 0.402

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

Temperature (°F): 68

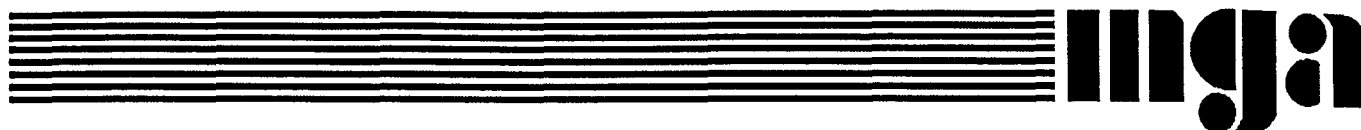
Humidity (%): 31

Performed By:

Approved By:

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 3.8\%$.
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: <i>301M09/484B</i>
S/N: J36197	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 5/23/04	Calibration Date: <i>5/11/04</i>
	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

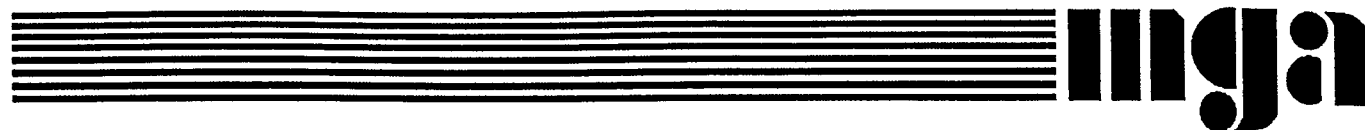
Humidity (%): 50

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: <i>301M09/484B</i>
S/N: J36193	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 5/23/04	Calibration Date: <i>5/11/04</i>
	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

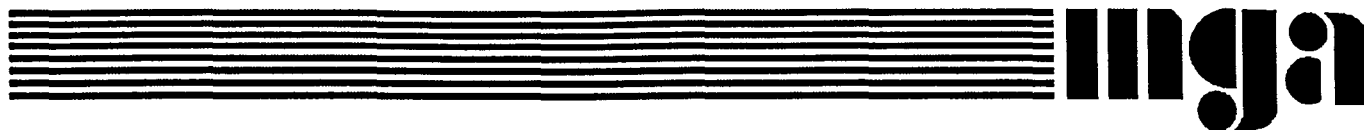
Temperature (°F): 74

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 $k=2$.



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: J36353	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 5/23/04	Calibration Date: <i>5/11/04</i>
	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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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:

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: J35916	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 5/23/04	Calibration Date: <i>5/11/04</i>
	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:

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: J35918	S/N: <i>862/247</i>
Capacity: 2000 G	Capacity: <i>170 G</i>
Calibration Date: 5/23/04	Calibration Date: <i>5/11/04</i>
	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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NuWeigh, Inc.

CALIBRATION / TEST REPORT

Page 1 of 1

10421 Enterprise Drive
 Davisburg, MI 48360
 248-922-1435 Fax: 248-922-1465
 ISO/IEC 17025 ACCREDITED

SCR 4365

Customer: <u>MCA 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>3-28-03</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: <u>708</u>	Model: <u>8950 F</u>	Model:	Model:
Serial No: <u>9804-022</u>	Serial No: <u>9805-175</u>	Serial No:	Serial No:
Seal Applied? ☐ Yes ☒ No	Platform size: <u>28"x28"</u>	Seal Applied? ☐ Yes ☒ No	Platform size:
Customer Id: <u>Shop</u>	Cap. & Grade: <u>2000x1 lb</u>	Customer Id:	Cap. & Grade:
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
<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 #2	<u>100</u>	<u>0</u>		
Load Section #3	<u>100</u>	<u>0</u>		
Load Section #4	<u>100</u>	<u>0</u>		

Scale meets NIB44 tolerance: Yes X NoStandards used (serial nos.): 6-15Estimated measurement uncertainty of applied load is 0.38 %Traceable report nos. MI 10-01-6285

RECOMMENDATIONS/OPINIONS

No adjustments needed
Scale tested good.

Scale meets NIB44 tolerance: Yes No

Standards used (serial nos.):

Estimated measurement uncertainty of applied load is %

Traceable report nos.

RECOMMENDATIONS/OPINIONS

Test procedure: NuWeigh Quality Manual and Procedures, Handbook 44

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Mike Kint
 TECHNICIAN

3-23-04
 DATE

George Baber
 CUSTOMER

White - Customer Copy

Canary - File Copy

SCR Rev. 7.0/02



MTS Systems Corporation Metrology Laboratory

14000 Technology Drive

Eden Prairie, MN 55344

Web Site: www.mts.com/services/metrology



Certificate of Calibration

For MTS Asset Number: SN862

Description: STANDARD ACCELEROMETER

Serial Number: 862 / 2470

Mfr / Model: PCB/301M09 / 484B

Customer: MGA RESEARCH

Certificate #: SN862:1049812898

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

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

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

CALIBRATION INFORMATION

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

STANDARDS USED FOR CALIBRATION

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

CALIBRATION UNCERTAINTY STATEMENT

Certified by: Kevin J. Rust, Metrology Technician

Printed on: 04/08/2003

Page 1 of 2

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

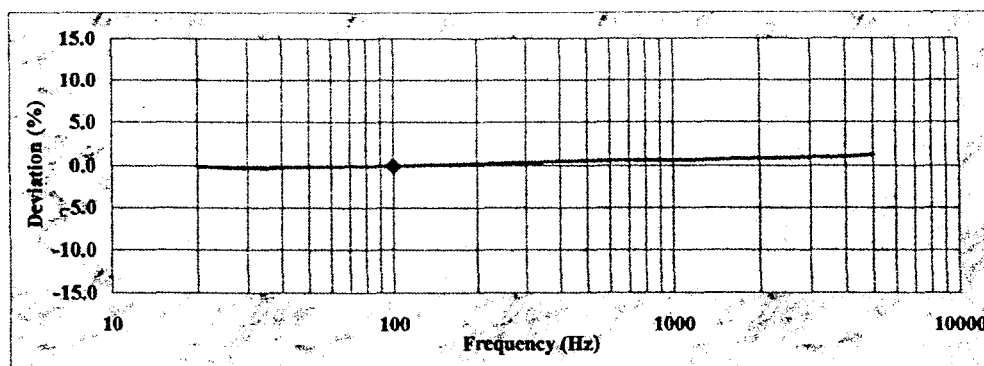


MTS METROLOGY LABORATORY CALIBRATION REPORT OF TEST



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

SENSITIVITY / FREQUENCY RESPONSE



Test Frequency (Hz):

20	30	50	100	500	1000	2000	3000	4000	5000
----	----	----	-----	-----	------	------	------	------	------

Acceleration (g's pk):

2	5	10	10	10	10	10	10	10	10
---	---	----	----	----	----	----	----	----	----

Output Sensitivity (mV/g):

31.15	31.06	31.12	31.17	31.34	31.37	31.43	31.48	31.49	31.56
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

Frequency Response (%):

-0.06	-0.35	-0.16	Ref.	0.55	0.64	0.83	0.99	1.03	1.25
-------	-------	-------	------	------	------	------	------	------	------

NOTES:

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

REMARKS:

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

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

~Certificate of Calibration~

Model Number: 484B	N.I.S.T. Project #: 6720012
Serial Number: 2470	Calibration Date: 05/11/2004
Description: Signal Conditioner	Recalibration Date:
Test Procedure: AT-106-1	Calibration Technician: Chris Vega <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 ~

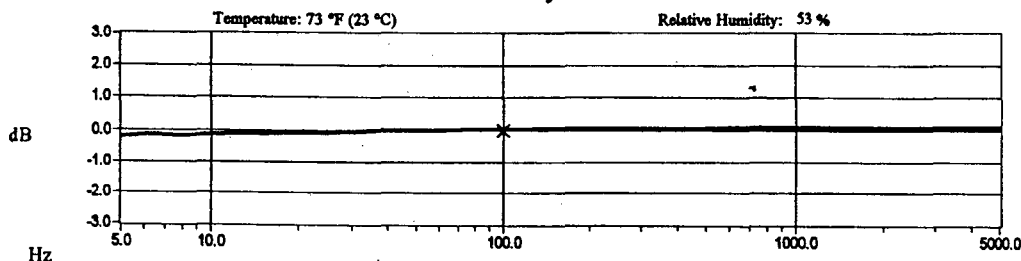
Per ISO 18653-21

Model Number: **301M09/484B (394M17 SYSTEM)**Serial Number: **862/2470**Description: **ICP® Accelerometer**Method: **Back-to-Back Comparison Calibration**Manufacturer: **PCB**

Calibration Data

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

Sensitivity



Data Points

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

Mounting Surface: Stainless Steel with/without Grease Coating Fastener: Steel Mount
 Acceleration Level (g_{rms}): **18.8 g (PEL) 100%**

Vertical

*The acceleration level may be limited by shaker displacement at low frequencies. If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (g) = 8.816 x (Hz)^{0.7}.
 **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 Necessary**As Left: **In Tolerance**

Notes

1. Calibration is NIST Traceable thru Project 822/267400 and PTB Traceable thru Project 1055.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/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 DiMaggio**Date: **05/13/04**

Cert No 1062.01

PCB PIEZOTRONICS™

VIBRATION DIVISION

3425 Walden Avenue Depew, NY 14043

TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

en3 - 316728389.34

Interim Certification Document

Part Description: Gold Series Faro Arm

Serial Number: G08020203122

Single Point 2 Sigma: G08-00 $\pm 0.051\text{mm}$ ($\pm 0.0020\text{in}$)

Linear Displacement 2 Sigma: G08-00 $\pm 0.072\text{mm}$ ($\pm 0.0028\text{in}$)

Certification Date: February 03, 2004

MEASUREMENT STANDARDS, N.I.S.T. UKAS, TRACEABILITY

Bal-Tec Invar Ball Bar Kit	Kit Serial Number: 473	N.I.S.T. Test No.: FBB-473-12012003	Date: 12/01/2003
		UKAS Cert. No.: FBB-473-12012003	Date: 12/01/2003
Mitutoyo Corporation 10mm Step Gauge	Code No.: 515-044, Serial No.: 810107	N.I.S.T. Control No.: 279517	Date: 01/13/2003
Measuring Range: 1.5m		UKAS Cert. No.: 133193	Date: 12/18/2002

CERTIFICATION RESULTS

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

This instrument as received, was within specifications.

Ambient Temperature: $22^{\circ}\text{C} \pm 3^{\circ}\text{C}$

Technician:

Rafael Rocha 02/03/04

Rafael Rocha

02/03/04

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

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

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

125 Technology Park
1-800-736-2771

Lake Mary, FL 32746
(407) 333-8056 fax

FARO

Revised January 22, 2004

f:\control\forma\07qcontr\English\07frm07-006.doc



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: ¹ Yes/Pass
Returned In Tol: ¹ 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>1/30/04</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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Certificate Number: 20040729Cal

Detroit Testing Laboratory, Inc.



Certificate No. 38.05

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

Certificate of Calibration

Equipment Information

Customer: MGA Research Corporation
446 Executive Drive
Troy, MI 48063

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

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

Calibration Limitation:

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

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

Calibration Standards Used

System ID:	Model:	Serial:	Manufacturer	Description:	Date Due:
09126	CT485B	612010507	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> Paul W.	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: 3/2/03
SUPERCEDES: MQATPTMC.3

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

Tape Measure Calibration Certificate

Reference Steel Rule

Brand: GEE
S/N: 118033
Calibration Date: 11 24 3

Subject Tape Measure

Brand: STANLEY
S/N: 289
Calibration Date: 1.7.9

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: Rf 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 Lantern: Model # M3
Ser. # 0850806 / 1260901

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

Certified February, 2003 / August, 2003

Abate Model # A1011 Ser. # 12513-9017

RTI Platinum Probe Ser. # 496013 Accuracy: $\pm 2^\circ\text{F}$

Certified February, 2003

Cole Parmer Model # PT1000/ 90111-00

Ser. # 10067869 / Ser. # 10148057 Accuracy: $\pm 1^\circ\text{F}$

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

Environmental Conditions

72 °F

41 %RH

Calibration Standard Reading	Customer Instrument Reading	Unit Specification
Humidity (%RH)	Humidity (%RH)	Humidity
22.1	22.9	$\pm 2\%$ RH
55	56.1	$\pm 2\%$ RH
86.6	88.2	$\pm 3\%$ RH
Temperature °F	Temperature °F	Temperature
-7.6	-7.1	$\pm 1.3^\circ\text{F} (\pm 1.0^\circ\text{C})$
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 at 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 RA#.

That's all there is to it!

1. Purchase Order #:

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 Ultima Deluxe A2LA NIST \$299.00 (with incoming reading)

☐ N995 - User selectable NIST Temperature points \$50.00 each

(to be selected in addition to one of the above calibration options)

☐ N997- Next Day Service \$50.00 (Not available for ULTIMA service)

4. Ship To:

Charts/Pens

(Order now and receive them with your calibrated unit)

☐ 6 Red Pens Order No. P222 Qty. _____ Price Ea. \$36 pk.

☐ 3 Red/3 Blue Pens Order No. P246 Qty. _____ Price Ea. \$36 pk.

☐ Charts* (60 per box) Order No. C _____ Qty. _____ Price Ea. \$24 box

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

Prices are subject to change.

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

Dickson Calibration Services

930 South Westwood Avenue Addison, Illinois 60101 630-543-3747 Fax 630-543-3498