

FINAL REPORT NUMBER 201UI-MGA-11-13

**SAFETY COMPLIANCE TESTING FOR FMVSS 201
Occupant Protection In Interior Impact
Upper Interior Head Impact Protection**

**NISSAN MOTOR CO., LTD.
2011 Nissan Quest 3.5 S
NHTSA No. CB5203**

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



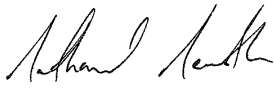
Test Dates: June 23-24, 2011
Report Date: June 28, 2011


FINAL REPORT

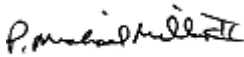
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NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 New Jersey Avenue, SE
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WASHINGTON, D.C. 20590**

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16. Abstract A compliance test series was conducted on the subject 2011 Nissan Quest 3.5 S, NHTSA No. CB5203, in accordance with the specifications of the Office of Vehicle Safety Compliance Test Procedure No. TP-201U-01 for the determination of FMVSS 201 compliance. The testing was conducted at MGA Research Corporation in Troy, Michigan on June 23-24, 2011. Test failures identified were as follows: None The data recorded indicates that the 2011 Nissan Quest 3.5 S tested appears to comply with the upper interior requirements of FMVSS 201.					
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact compliance test was to determine whether the subject vehicle, a 2011 Nissan Quest 3.5 S, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on June 23-24, 2011 on a 2011 Nissan Quest 3.5 S, 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 November 9, 2009.

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 November 9, 2009.

2.0 COMPLIANCE TEST DATA SUMMARY

The 2011 Nissan Quest 3.5 S was equipped with A, B, O, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, an adjustable seat belt anchorage on each O-pillar, a fixed seat belt anchorage on each rear pillar, a fixed seat belt anchorage on the upper roof, a grab handle located above the front passenger door, a grab handle located on the side rail above each door in the second and third row, assist handles located on each B-pillar, an overhead console located on the front upper roof, a vent and light located on the second and third row side rails, and a temperature control vent in the center of the roof above the second row.

Upon completion of targeting the test vehicle, twelve (12) targets were chosen to be impacted based upon engineering judgment and certification test data provided by the manufacturer. The twelve (12) targets chosen were:

AP1	BP4	UR1@ SR2B	UR4@SR3-2
AP2	OP2	UR2@BP	UR5@OP
BP2	SR3-3	UR3@SR3-1	UR6@SR3-4

The 2011 Nissan Quest 3.5 S tested appears to comply with the upper interior performance criteria for FMVSS 201. The HIC(d) measured using the Part 572L (Free Motion Headform) was below 1000 for each tested component.

TABLE 2-1

SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Nissan Quest 3.5 S

VEH. NHTSA NO.: CB5203 VIN: JN8AE2KP2B9004968 COLOR: Brilliant Silver

VEH. BUILD DATE: December, 2010 TEST DATES: June 23-24, 2011

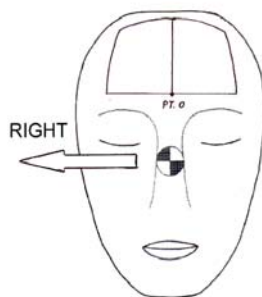
TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Left	255*	50	18.8	629	613	21	21 Right
AP2	Right	165*	50	18.8	731	748	13	2 Left
BP2	Right	90	-3*	23.9	714	726	11	5 Left
BP4	Left	195*	9	23.4	597	571	7	8 Left
OP2	Left	270	-5	23.6	578	546	27	0
SR3-3	Right	90	43	19.0	377	279	13	3 Left
UR1@SR2B	Right	90	50	23.4	592	564	32	3 Left
UR2@BP	Left	270	50	23.6	485	422	34	1 Right
UR3@SR3-1	Right	90	50	23.5	637	624	34	13 Left
UR4@SR3-2	Left	270	50	23.5	752	776	29	1 Left
UR5@OP	Right	90	50	23.4	518	466	30	1 Right
UR6@SR3-4	Left	270	50	23.8	718	731	33	35 Left

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

*The approach angle chosen for the test was outside the acceptable range determined using the procedures specified in S8.13.4.



POST TEST COMMENTS:

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

AP1 Left: Headliner deformation.

BP2 Right: Anchorage adjuster cover cracked; stress marks on anchorage adjuster cover.

BP4 Left: Assist handle mount cover loose; stress mark on assist handle.

OP2 Left: Stress mark on adjuster cover.

SR3-3 Right: Dislodged headliner.

UR1@SR2B Right: Headliner deformation; dislodged headliner.

UR2@BP Left: Headliner deformation; dislodged headliner.

UR3@SR3-1 Right: Headliner deformation.

UR4@SR3-2 Left: Headliner deformation, dislodged headliner.

UR5@OP Right: Headliner deformation; dislodged headliner.

UR6@SR3-4 Left: Headliner deformation, grab handle compression.

REMARKS:

The targets listed were impacted in the following order:

Left: AP1, UR2@BP, BP4, UR4@SR3-2, UR6@ SR3-4, OP2

Right: AP2, UR1@SR2B, BP2, UR3@SR3-1, UR5@OP, SR3-3

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

RECORDED BY: Nathaniel Newth

DATE: June 24, 2011

APPROVED BY: Helen A. Kaleta

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Nissan Quest 3.5 S

VEH. NHTSA NO.: CB5203 VIN: JN8AE2KP2B9004968 COLOR: Brilliant Silver

VEH. BUILD DATE: December, 2010 TEST DATES: June 23-24, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

INTERIOR TRIM INFORMATION: A, B, O, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, an adjustable seat belt anchorage on each O-pillar, a fixed seat belt anchorage on each rear pillar, a fixed seat belt anchorage on the upper roof, a grab handle located above the front passenger door, a grab handle located on the side rail above each door in the second and third row, assist handles located on each B-pillar, an overhead console located on the front upper roof, a vent and light located on the second and third row side rails, and a temperature control vent in the center of the roof above the second row.

SUNROOF INFORMATION:

Installed: Yes No

Operation: Electric Manual

SIDE RAIL CURTAIN AIRBAG INFORMATION:

Installed: Yes No

ROLL-BAR INFORMATION:

Installed: Yes No

Padded: Yes No

Braces: Yes No

GENERAL INFORMATION:

Date Received: March 21, 2011; Odometer Reading 26 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Nissan Motor Co., Ltd.

Date of Manufacture: December, 2010; VIN: JN8AE2KP2B9004968

GVWR: 2639 kg; GAWR FRONT: 1262 kg;

GAWR REAR: 1389 kg;

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 240 kPa REAR: 240 kPa

Recommended Tire Size: P225/65R16

Recommended Cold Tire Pressure:

FRONT: 240 kPa REAR: 240 kPa

Size of Tire on Test Vehicle: P225/65R16

Type of Spare Tire: T135/80D16; Space Saver: X; Standard

VEHICLE CAPACITY DATA:

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

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

VEHICLE CAPACITY WEIGHT:

Vehicle Capacity Weight (VCW) = 526 kg

No. of Occupants x 68 kg = 476 kg

Rated Cargo/Luggage Weight (RCLW) = 50 kg (difference)

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

Right Front = 546.5 kg Right Rear = 431.0 kg

Left Front = 561.5 kg Left Rear = 440.0 kg

TOTAL FRONT = 1108.0 kg TOTAL REAR = 871.0 kg

% Total Weight = 56.0 % % Total Weight = 44.0 %

TOTAL DELIVERED WEIGHT = 1979.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1979.0 kg
Max. Test Cargo/Luggage Weight = 50.0 kg
Target Test Weight = 2029.0 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front = 540.0 kg Right Rear = 461.5 kg
Left Front = 554.0 kg Left Rear = 472.5 kg
TOTAL FRONT = 1094.0 kg TOTAL REAR = 934.0 kg
% Total Weight = 53.9 % % Total Weight = 46.1 %
TOTAL TEST WEIGHT = 2028.0 kg

Weight of ballast secured in vehicle's cargo area = 49.0 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 772 mm; Left Front 762 mm;
 Right Rear 746 mm; Left Rear 745 mm;
Pitch Angle at Right Door Sill = 0.2 Rear is higher
Pitch Angle at Left Door Sill = 0.2 Rear is higher
Roll Angle at Front Bumper = 0.1 Right is higher
Roll Angle at Rear Bumper = 0.5 Right is higher

FULLY LOADED: Right Front 774 mm; Left Front 769 mm;
 Right Rear 740 mm; Left Rear 737 mm;
Pitch Angle at Right Door Sill = 0.1 Front is higher
Pitch Angle at Left Door Sill = 0.2 Front is higher
Roll Angle at Front Bumper = 0.1 Left is higher
Roll Angle at Rear Bumper = 0.3 Right is higher

AS TARGETED: Right Front 912 mm; Left Front 905 mm;
 Right Rear 888 mm; Left Rear 888 mm;
 Pitch Angle at Right Door Sill = 0.2 Rear is higher
 Pitch Angle at Left Door Sill = 0.0
 Roll Angle at Front Bumper = 0.1 Right is higher
 Roll Angle at Rear Bumper = 0.3 Right is higher

AS TESTED ON RIGHT SIDE:

 Pitch Angle at Right Door Sill = 0.1 Rear is higher
 Pitch Angle at Left Door Sill = 0.2 Front is higher
 Roll Angle at Front Bumper = 0.1 Right is higher
 Roll Angle at Rear Bumper = 0.3 Right is higher

AS TESTED ON LEFT SIDE:

 Pitch Angle at Right Door Sill = 0.1 Rear is higher
 Pitch Angle at Left Door Sill = 0.1 Front is higher
 Roll Angle at Front Bumper = 0.0
 Roll Angle at Rear Bumper = 0.3 Right is higher

VEHICLE WHEELBASE = 2998 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: Nathaniel Newth

DATE: June 13, 2011

APPROVED BY: Helen A. Kalet

TABLE 2-3
HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Nissan Quest 3.5 S

VEH. NHTSA NO.: CB5203 VIN: JN8AE2KP2B9004968 COLOR: Brilliant Silver

VEH. BUILD DATE: December, 2010 TEST DATES: June 23-24, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

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 201.3°	L 244.1°
	R 105°-165°	R 115.9°	R 157.8°
B-PILLAR	L 195°-345°	L 203.3°	L 280.4°
	R 15°-165°	R 79.2°	R 156.7°

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Nathaniel Newth

DATE: June 13, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Nissan Quest 3.5 S

VEH. NHTSA NO.: CB5203 VIN: JN8AE2KP2B9004968 COLOR: Brilliant Silver

VEH. BUILD DATE: December, 2010 TEST DATES: June 23-24, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

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 34°
		R 0°-50°	R 0°	R 34°
	SR2A	L 0°-50°	L 0°	L 28°
		R 0°-50°	R 0°	R 28°
	SR2B	L 0°-50°	L 0°	L 29°
		R 0°-50°	R 0°	R 29°
	SR3-1	L 0°-50°	L 0°	L 45°
		R 0°-50°	R 0°	R 45°
	SR3-2	L 0°-50°	L 0°	L 45°
		R 0°-50°	R 0°	R 45°
	SR3-3	L 0°-50°	L 0°	L 43°
		R 0°-50°	R 0°	R 43°
	SR3-4	L 0°-50°	L 0°	L 45°
		R 0°-50°	R 0°	R 45°

		VERTICAL ANGLE SPECIFIED RANGE		MINIMUM VERTICAL ANGLE		MAXIMUM VERTICAL ANGLE	
SLIDING DOOR	SD	L	0°-50°	L	0°	L	40°
		R	0°-50°	R	0°	R	40°
REAR HEADER	RH	L	0°-50°	L	0°	L	50°
		R	0°-50°	R	0°	R	50°
A-PILLAR	AP1	L	-5°-50°	L	-5°	L	50°
		R	-5°-50°	R	-5°	R	50°
	AP2	L	-5°-50°	L	-5°	L	50°
		R	-5°-50°	R	-5°	R	50°
	AP3	L	-5°-50°	L	-5°	L	-5°
		R	-5°-50°	R	-5°	R	-5°
B-PILLAR	BP1	L	-10°-50°	L	-10°	L	49°
		R	-10°-50°	R	-10°	R	50°
	BP2*	L	0°-50°	L	0°	L	-3°
		R	0°-50°	R	0°	R	-3°
	BP3	L	-10°-50°	L	-10°	L	-5°
		R	-10°-50°	R	-10°	R	-5°
	BP4	L	-10°-50°	L	-10°	L	9°
		R	-10°-50°	R	-10°	R	9°
OTHER PILLAR	OP1*	L	0°-50°	L	0°	L	27°
		R	0°-50°	R	0°	R	27°
	OP2	L	-10°-50°	L	-10°	L	-5°
		R	-10°-50°	R	-10°	R	-5°
REAR PILLAR	RP1	L	-10°-50°	L	-10°	L	-2°
		R	-10°-50°	R	-10°	R	-2°
	RP2*	L	0°-50°	L	N/A	L	N/A
		R	0°-50°	R	N/A	R	N/A
UPPER ROOF 1			0°-50°		0°		50°

	VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
UPPER ROOF 2	0°-50°	0°	50°
UPPER ROOF 3	0°-50°	0°	50°
UPPER ROOF 4	0°-50°	0°	50°
UPPER ROOF 5	0°-50°	0°	50°
UPPER ROOF 6	0°-50°	0°	50°

As determined using the Procedures specified in S8.13.4.2. *Targets BP2, OP1, and RP2 are seat belt anchorage locations.

RECORDED BY: Nathaniel Newth

DATE: June 13, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Nissan Quest 3.5 S

VEH. NHTSA NO.: CB5203 VIN: JN8AE2KP2B9004968 COLOR: Brilliant Silver

VEH. BUILD DATE: December, 2010 TEST DATES: June 23-24, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

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)}	115.9°	--
A1°	360° - T°	244.1°	--
W°	Horizontal < {CG-2 (Left Seat) to (Left A-Pillar)}	201.3°	--
A2°	A2° = W°	201.3°	--
U°	Horizontal < {CG-2 (Left Seat) to (Left B-Pillar)}	280.4°	--
B1°	B1° = U°	280.4°	--
V°	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	203.3°	--
B2°	B2° = V°	203.3°	--
W° (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	157.8°
A1° (right)	A1° (right) = W° (right)	--	157.8°
T ° (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	244.1°
A2° (right)	360°-T° (right)	--	115.9°
V ° (right)	Horizontal < {CG-R (Right Seat) to (Right B-Pillar)}	--	156.7°
B1° (right)	B1° (right) = V° (right)	--	156.7°
U ° (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	79.2°
B2° (right)	B2° (right) = U° (right)	--	79.2°
J	A-Pillar {(Plane 3) – (Plane 5)}	295.6 mm	297.5 mm
J/2	J ÷ 2	147.8 mm	148.8 mm
D1	Upper Roof {(Plane A) – (Plane B)}	2915.0 mm	
D1/2	D1 ÷ 2	1457.5 mm	

Measurement	Description	Left Side	Right Side
D2	Upper Roof {(Plane C) – (Plane D)}	1474.0 mm	
D2/2	D2 ÷ 2	737.0 mm	
.35D1	.35 x D1	1020.3 mm	
.35D2	.35 x D2	515.9 mm	
N	B-Pillar {(BPR) – (lowest point on daylight opening forward of B-Pillar)}	458.8 mm	458.3 mm
N/2	B-Pillar {(BP3) – (lowest point on daylight opening forward of B-Pillar)}	229.4 mm	229.2 mm
N/4	B-Pillar {(BP4) – (lowest point on daylight opening forward of B-Pillar)}	114.7 mm	114.6 mm
Q	O-Pillar (Plane 13 – Plane 14)	478.0 mm	475.0 mm
Q/2	Q / 2	239.0 mm	237.5 mm
D	R-Pillar (Point 7 – Point M)	1156.0 mm	1156.0 mm
3D/7	3*D / 7	495.4 mm	495.4 mm
MM	Sliding Door (widest opening)	940.4 mm	942.6 mm
MM/2	MM / 2	470.2 mm	471.3 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	1416.5	-420.0	435.0	1416.5	420.0	435.0
2 nd Row	2300.8	-420.0	428.9	2300.8	420.0	428.9
3 rd Row	3062.5	-420.0	396.6	3062.5	420.0	396.6

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1416.5	-420.0	435.0	1416.5	420.0	435.0
2 nd Row	2300.8	-420.0	428.9	2300.8	420.0	428.9
3 rd Row	3062.5	-420.0	396.6	3062.5	420.0	396.6

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	1336.5	-420.0	1095.0	1336.5	420.0	1095.0
CGF2	1576.5	-420.0	1095.0	1576.5	420.0	1095.0
2 nd Row CGR	2460.8	-420.0	1088.9	2460.8	420.0	1088.9
3 rd Row CGR	3222.5	-420.0	1056.6	3222.5	420.0	1056.6

REFERENCE FOR VEHICLE COORDINATE SYSTEM (measured in millimeters):

Front driver seat front outboard bolt hole (x, y, z) = 1001.0, -645.0, 59.4

Front driver door upper striker bolt (x, y, z) = 1585.6, -894.1, 563.5

Front passenger door lower striker bolt (x, y, z) = 1585.6, 895.3, 536.6

REMARKS:

RECORDED BY: Nathaniel Newth

DATE: June 13, 2011

APPROVED BY: Helen A. Kalet

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Nissan Quest 3.5 S

VEH. NHTSA NO.: CB5203 VIN: JN8AE2KP2B9004968 COLOR: Brilliant Silver

VEH. BUILD DATE: December, 2010 TEST DATES: June 23-24, 2011

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen Kaleto, Nathaniel Newth, Kevin McKenna, Sean Moran, Ryan Jones

SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
A-Pillar Left Side								
AP1	1017.0	-694.6	1207.3	255	50	No	--	Yes
AP2	837.7	-722.1	1119.9	195	50	No	--	No
AP3	730.3	-736.8	1059.9	225	-5	No	--	No
A-Pillar Right Side								
AP1	1013.8	689.8	1209.1	105	50	No	--	No
AP2	847.5	726.8	1120.4	165	50	No	--	Yes
AP3	734.2	736.1	1060.4	135	-5	No	--	No
B-Pillar Left Side								
BP1	1712.0	-580.2	1298.5	--	--	Yes	--	--
REL	1710.7	-554.0	1304.0	270	49	--	1	No
BP2	1662.1	-701.3	1066.8	270	-3	No	--	No
BP3	1622.4	-725.5	1069.3	--	--	Yes	--	--
REL	1610.1	-741.7	1019.9	285	-5	--	2	No
BP4	1775.8	-741.7	954.7	195	9	No	--	Yes
B-Pillar Right Side								
BP1	1716.3	578.6	1297.8	--	--	Yes	--	--
REL	1718.0	559.4	1299.3	90	50	--	1	No
BP2	1662.8	698.4	1070.0	90	-3	No	--	Yes

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					
BP3	1625.4	725.3	1067.7	--	--	Yes	--	--
REL	1615.0	740.1	1019.1	75	-5	--	2	No
BP4	1777.5	744.3	952.7	165	9	No	--	No
Other Pillar Left Side								
OP1	2771.9	-697.2	1071.0	270	27	No	--	No
OP2	2806.0	-708.0	1125.4	--	--	Yes	--	--
REL	2815.6	-694.8	1172.9	270	-5	--	2	Yes
Other Pillar Right Side								
OP1	2774.1	695.3	1068.1	90	27	No	--	No
OP2	2801.6	706.3	1124.5	--	--	Yes	--	--
REL	2812.3	696.2	1170.0	90	-5	--	2	No
Rear Pillar Left Side								
RP1	3466.8	-613.5	1268.8	315	-2	No	--	No
RP2*	3725.2	-624.6	1075.9	Target exempt from testing per S6.3(b).				No
Rear Pillar Right Side								
RP1	3469.9	612.3	1265.5	45	-2	No	--	No
RP2*	3726.5	627.8	1073.9	Target exempt from testing per S6.3(b).				No
Front Header Left Side								
FH1	939.9	-607.3	1283.5	--	--	Yes	--	--
REL	922.4	-514.1	1284.8	180	50	--	4	No
FH2	909.9	-459.1	1287.1	180	50	No	--	No
Front Header Right Side								
FH1	939.9	606.7	1286.9	--	--	Yes	--	--
REL	926.6	518.0	1286.5	180	50	--	4	No
FH2	911.1	457.6	1286.0	180	50	No	--	No
Side Rail Left Side								
SR1	1166.8	-608.7	1310.3	--	--	Yes	--	--
REL	1167.0	-588.8	1314.0	270	34	--	1	No
SR2A	1317.7	-607.6	1339.2	270	28	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					
SR2B	1411.8	-609.5	1345.1	270	29	No	--	No
SR3-1	2310.0	-579.7	1362.8	270	45	No	--	No
SR3-2	2480.8	-579.1	1364.4	270	45	No	--	No
SR3-3	3041.9	-569.1	1369.8	270	43	No	--	No
SR3-4	3212.4	-566.7	1370.0	270	45	No	--	No
Side Rail Right Side								
SR1	1163.3	610.4	1310.6	--	--	Yes	--	--
REL	1160.7	590.9	1313.2	90	34	--	1	No
SR2A	1313.2	615.9	1344.9	90	28	No	--	No
SR2B	1416.0	603.3	1334.7	90	29	No	--	No
SR3-1	2309.5	577.7	1360.3	90	45	No	--	No
SR3-2	2477.8	576.6	1361.1	90	45	No	--	No
SR3-3	3039.7	575.4	1357.6	90	43	No	--	Yes
SR3-4	3210.0	563.7	1367.1	90	45	No	--	No
Rear Header Left Side								
RH	3544.8	-419.4	1359.3	--	--	Yes	--	--
REL	3546.5	-396.6	1353.3	0	50	--	1	No
Rear Header Right Side								
RH	3559.2	419.1	1366.8	0	50	No	--	No
Sliding Door Left Side								
SD	2225.7	-570.5	1359.4	270	40	No	--	No
Sliding Door Right Side								
SD	2226.5	569.8	1357.4	90	40	No	--	No
Upper Roof Left Side								
UR2@BP	1769.5	-363.5	1404.8	270	50	No	--	Yes
UR4@SR3-2	2466.7	-432.6	1437.7	270	50	No	--	Yes
UR6@SR3-4	3228.3	-455.7	1414.3	270	50	No	--	Yes

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 Right Side								
UR1@SR2B	1399.3	485.6	1377.4	90	50	No	--	Yes
UR3@SR3-1	2292.0	453.1	1417.4	90	50	No	--	Yes
UR5@OP	2760.0	425.6	1439.4	90	50	No	--	Yes

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

*Target is located rearward of a vertical plane 600 mm behind the rearmost design seating position and therefore is exempt from testing.

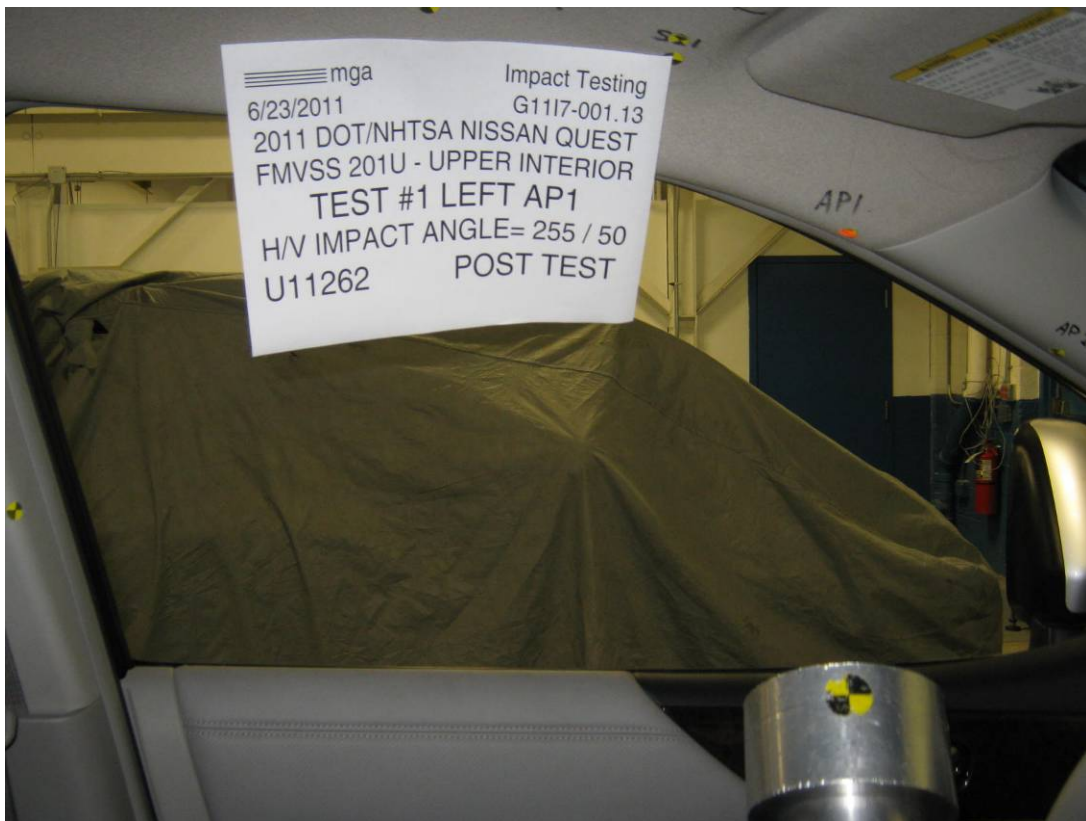
RECORDED BY: Nathaniel Newth

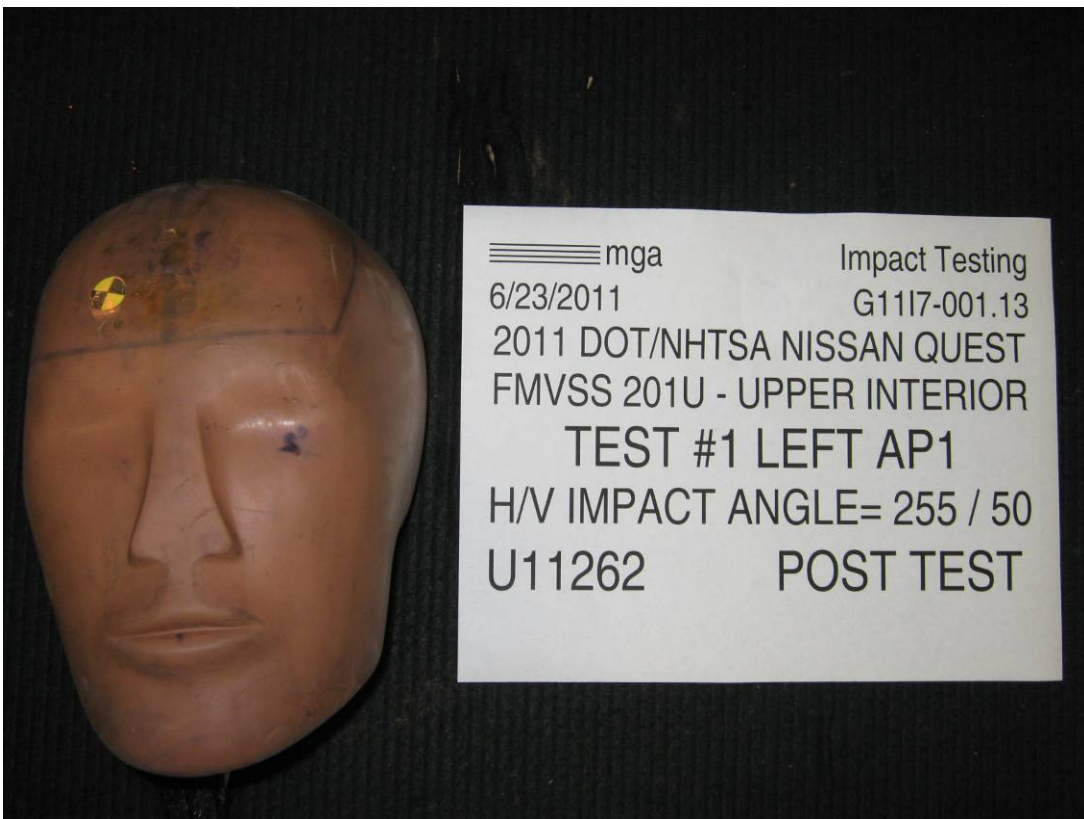
DATE: June 13, 2011

APPROVED BY: Helen A. Kaleto

3.0 TEST DATA (Including Acceleration and Velocity Plots)







SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP1Left

MGA Test Reference No.:U11262

Approach Horizontal Angles:255°

Approach Vertical Angles:50°

Additional Description:

Test Number:#1

Temperature:21.6C

Humidity:66.5%

Time of Test:10:23:06 AM

FMH Serial No:[037]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
629	613	3.9	18.8	21	21 Right

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.07	1.07
Y	6	J14103	93.9	0.85	0.85
Z	7	J35800	97.8	0.94	0.94

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

Headliner deformation

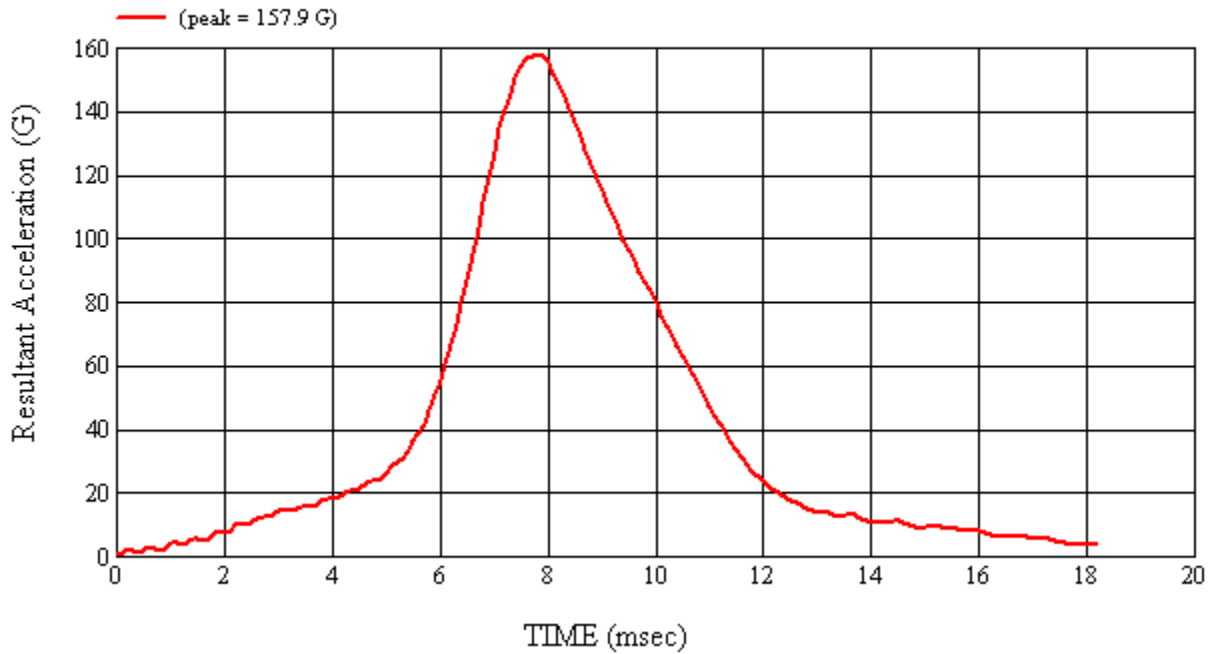
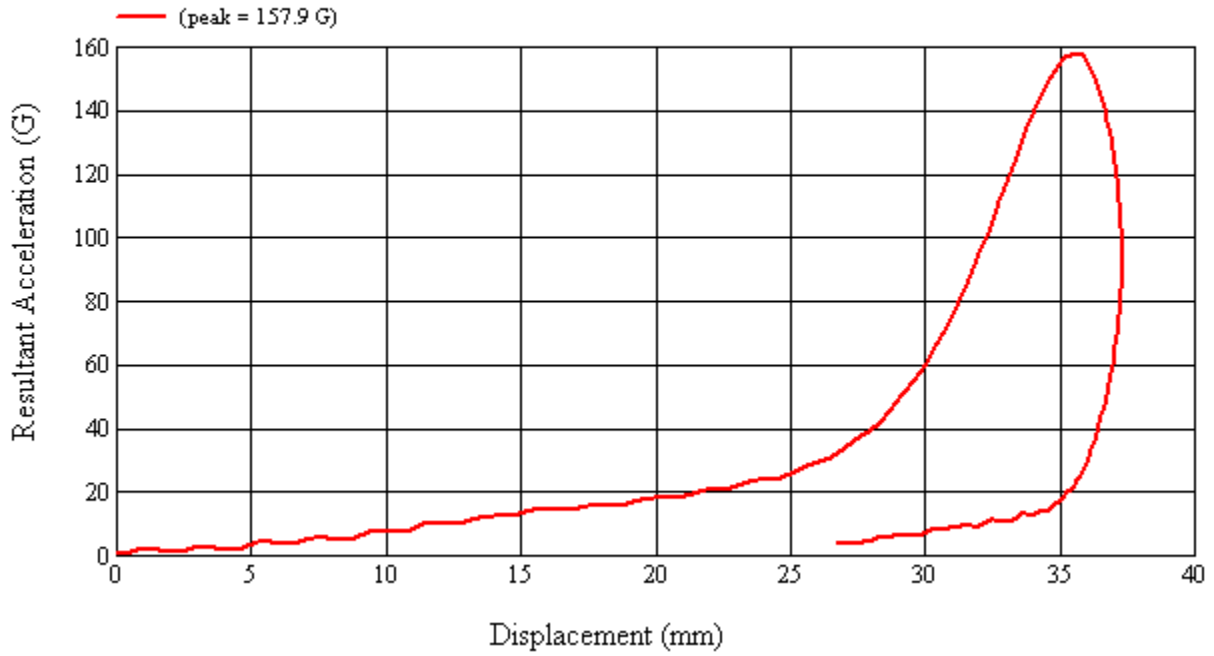
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/23/2011

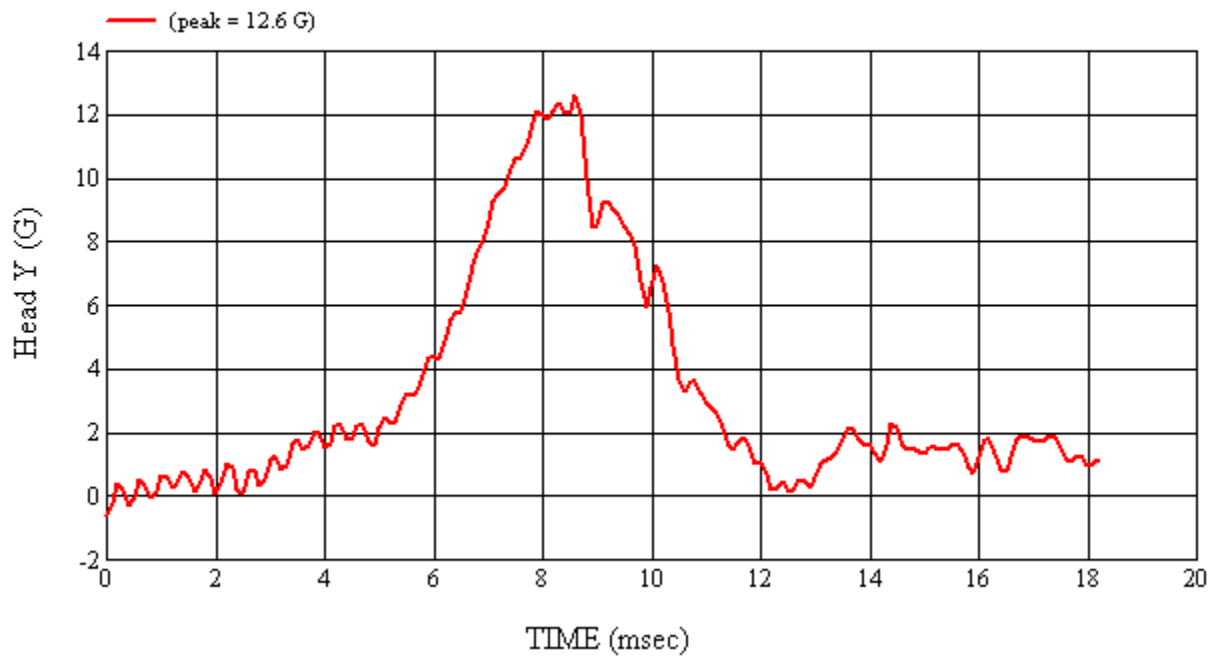
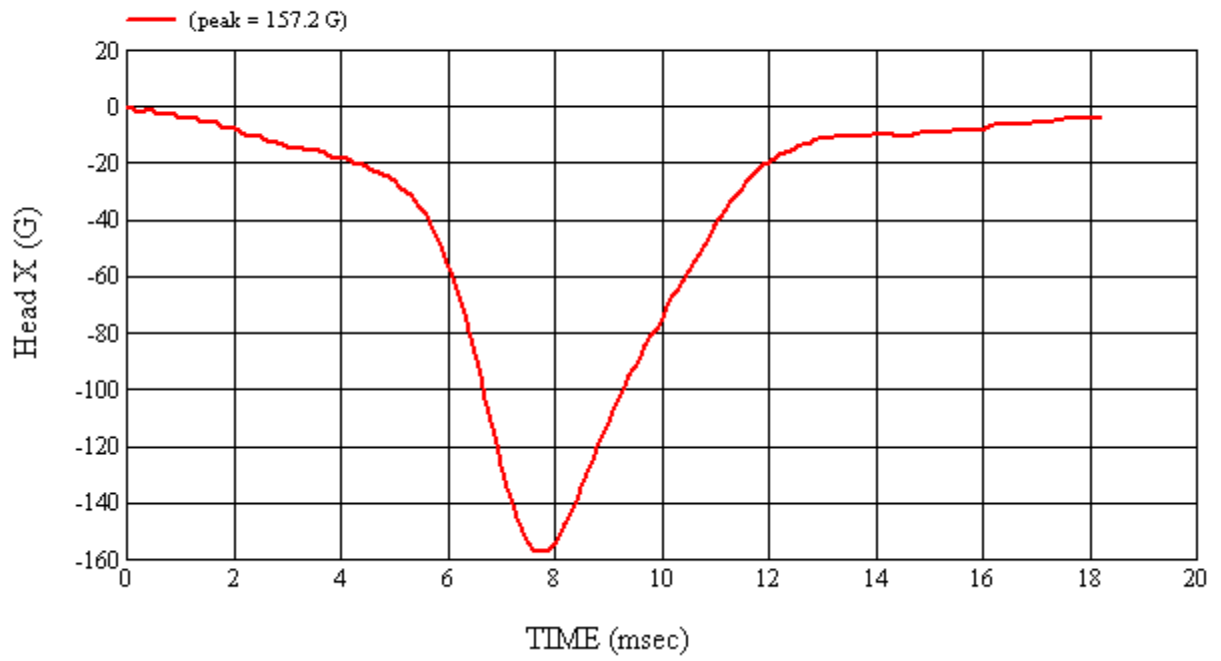
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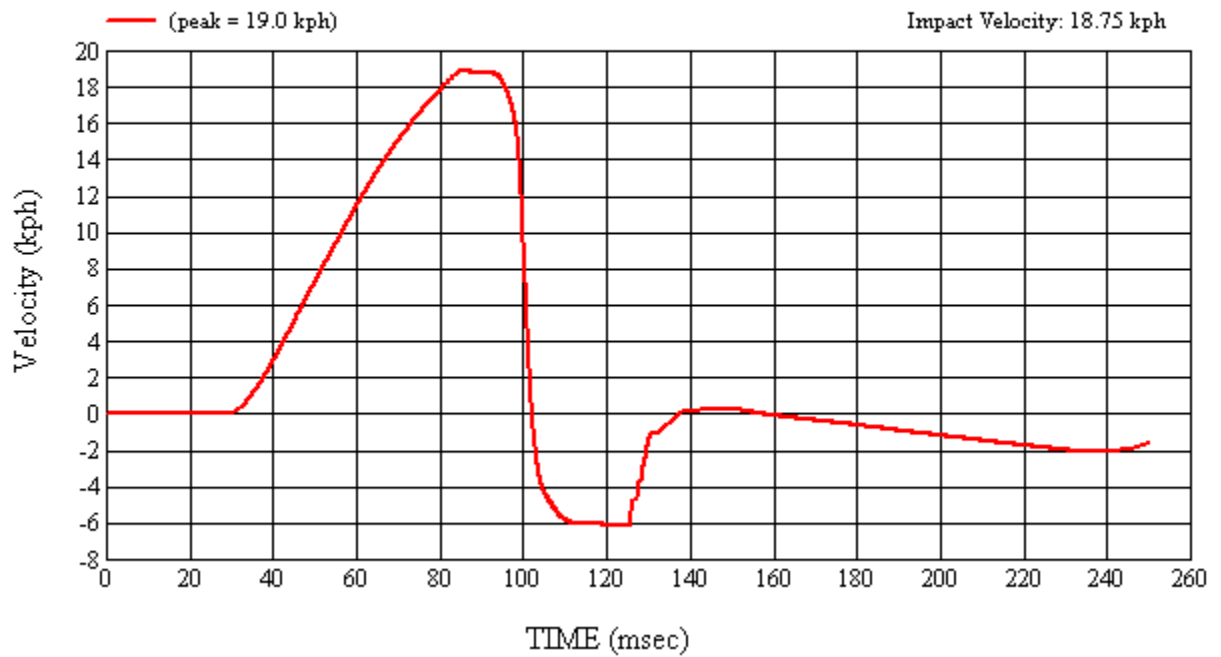
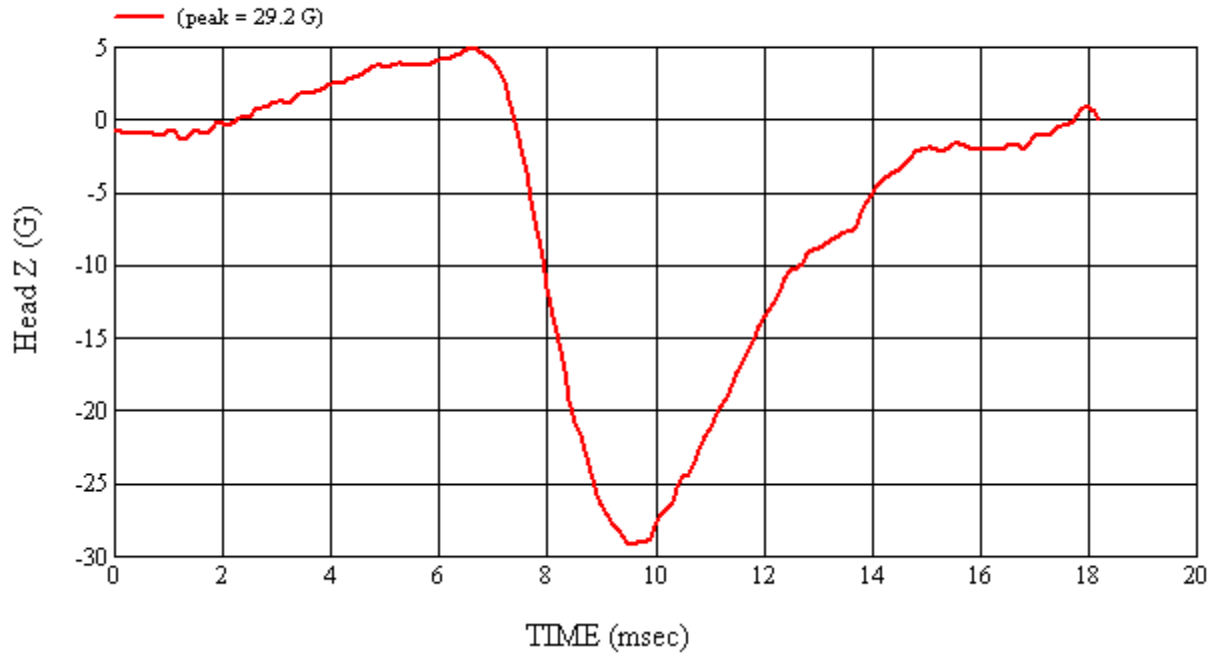
MGA Test #: U11262

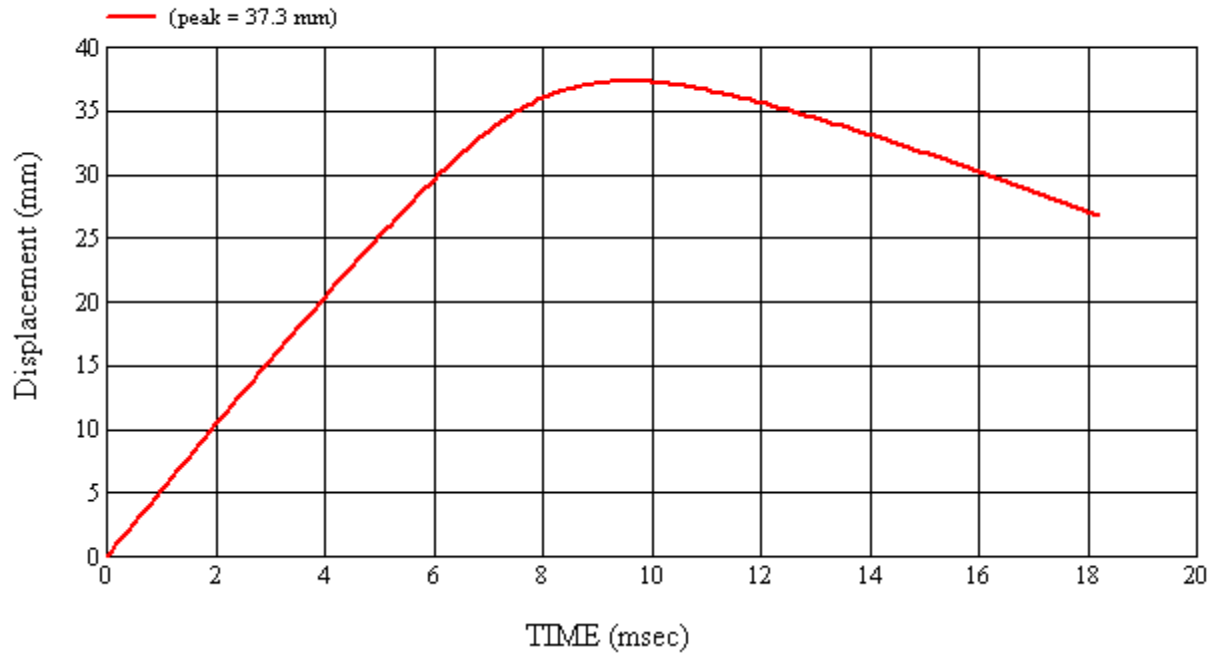
Target Location: API, Left Side

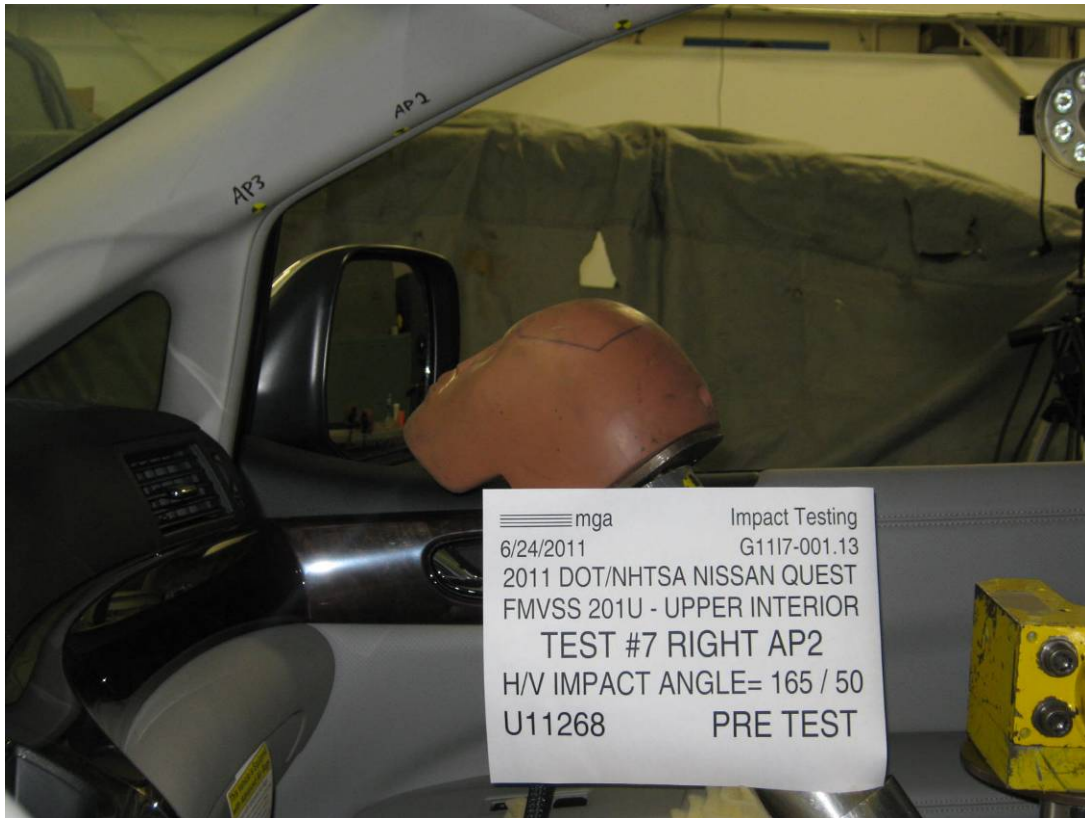
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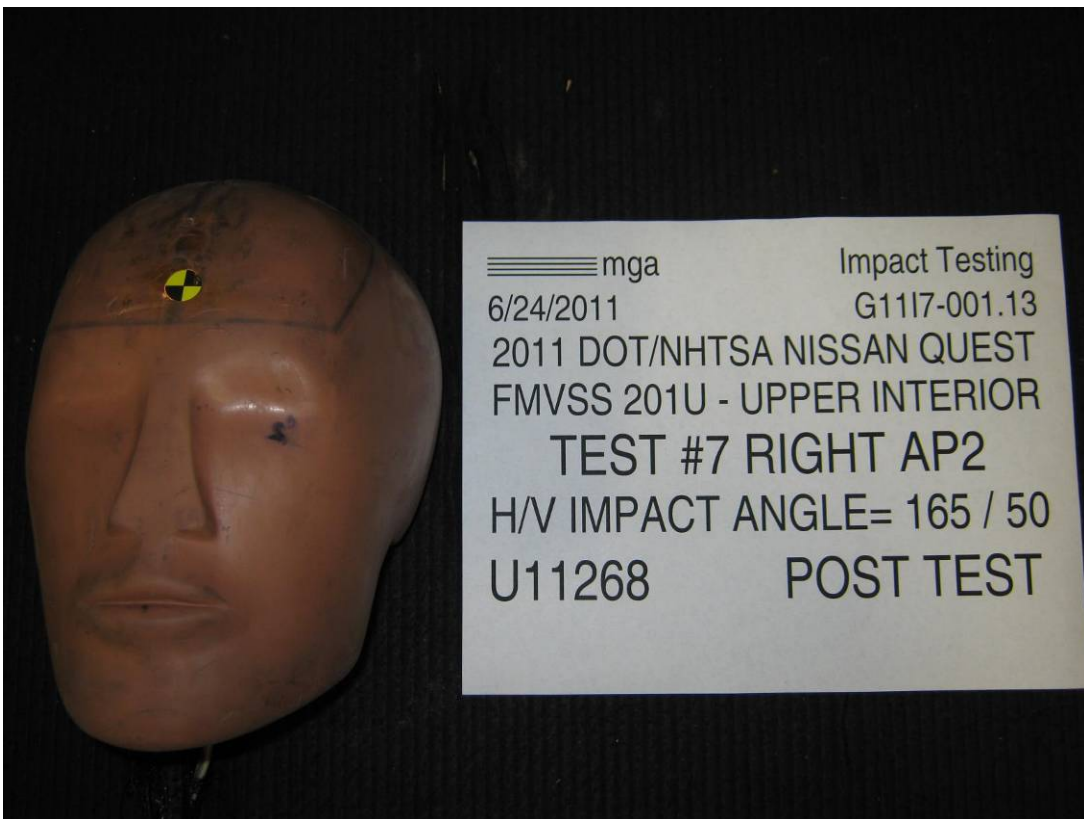












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): AP2Right

Temperature:21.2C

MGA Test Reference No.:U11268

Humidity:61.9%

Approach Horizontal Angles:165°

Time of Test:9:28:31 AM

Approach Vertical Angles:50°

FMH Serial No:[037]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
731	748	4.1	18.8	13	2 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.07	1.07
Y	6	J14103	93.9	0.85	0.85
Z	7	J35800	97.8	0.94	0.94

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

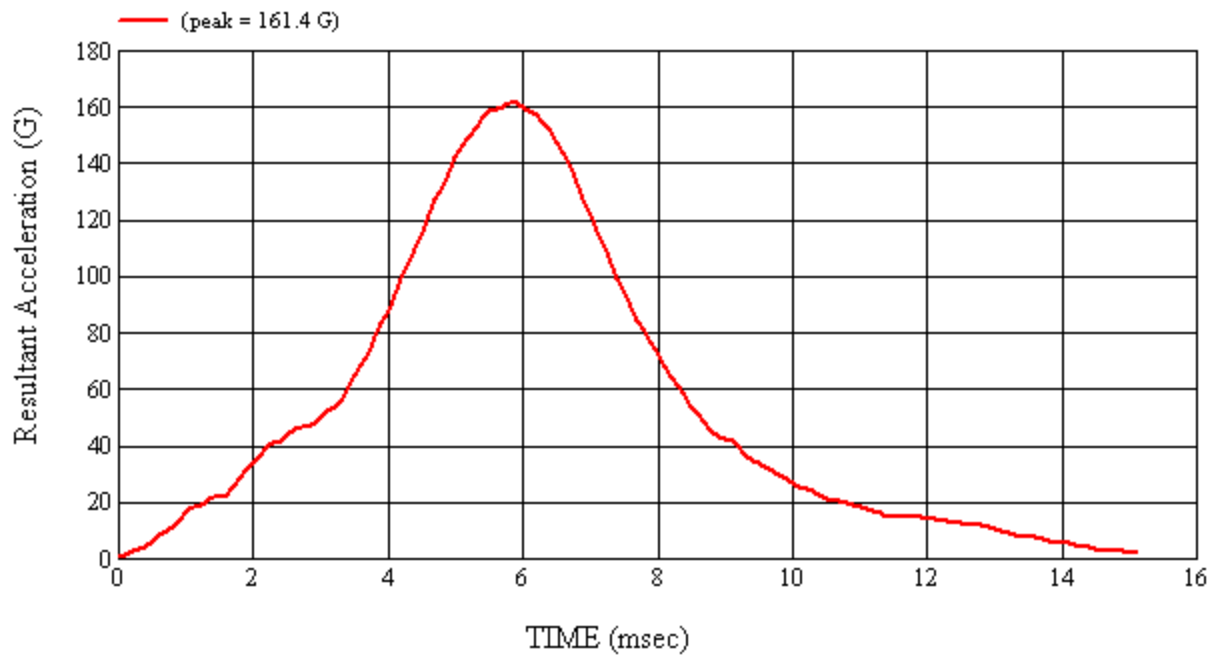
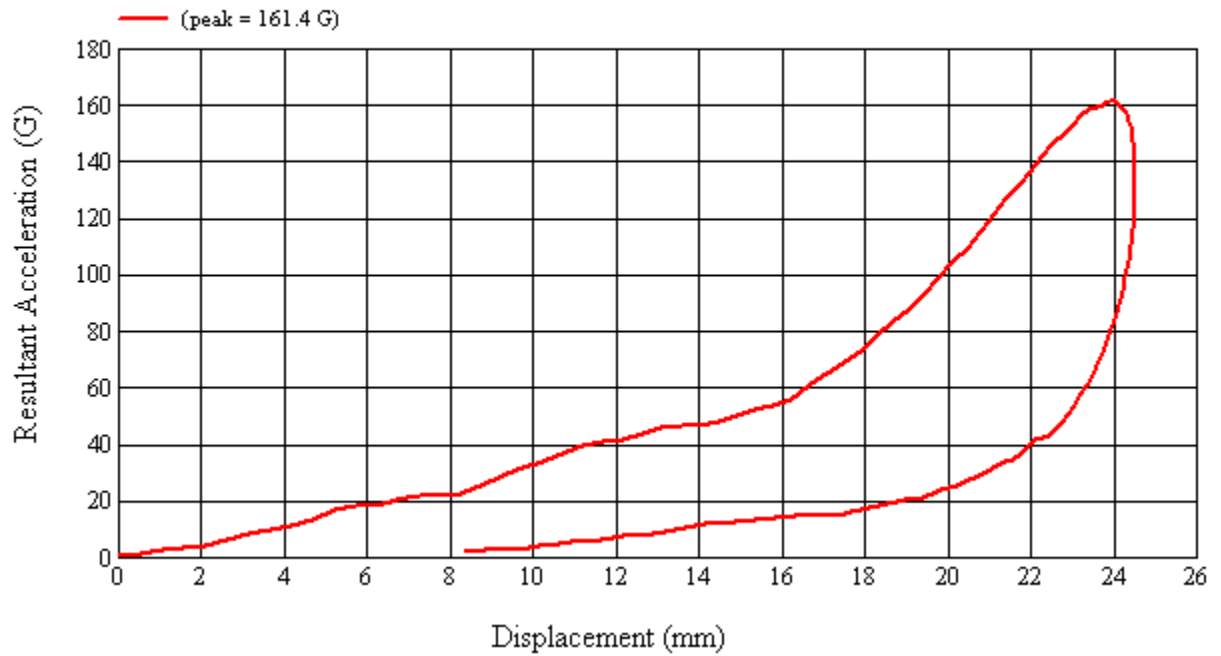
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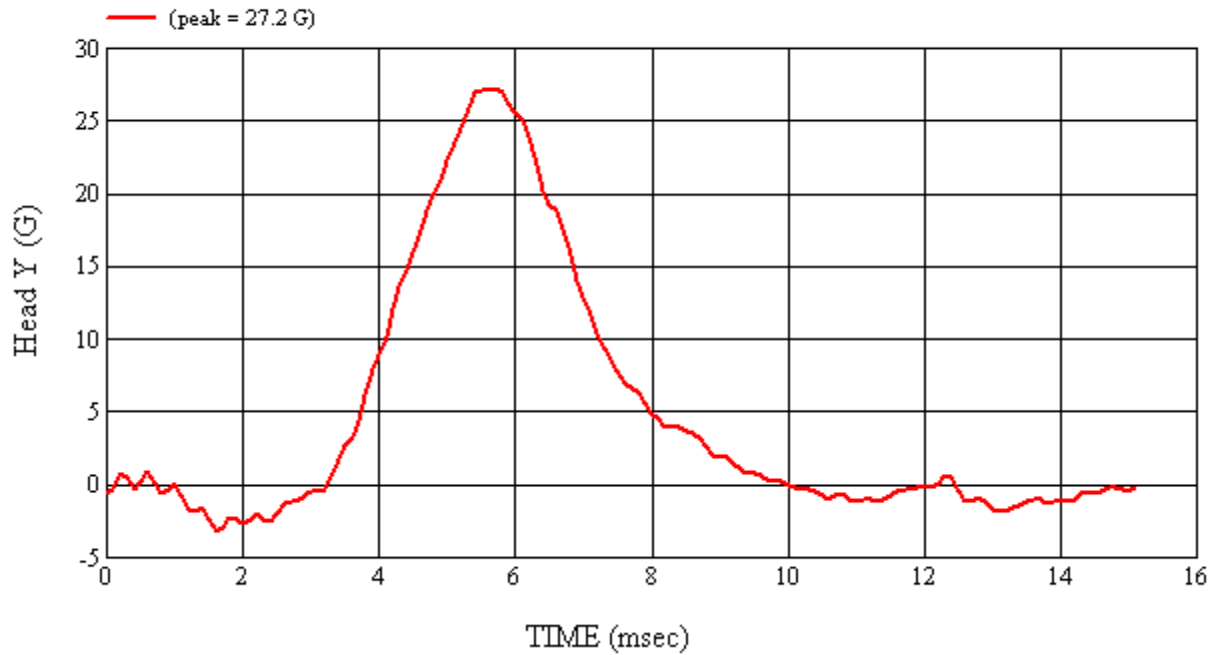
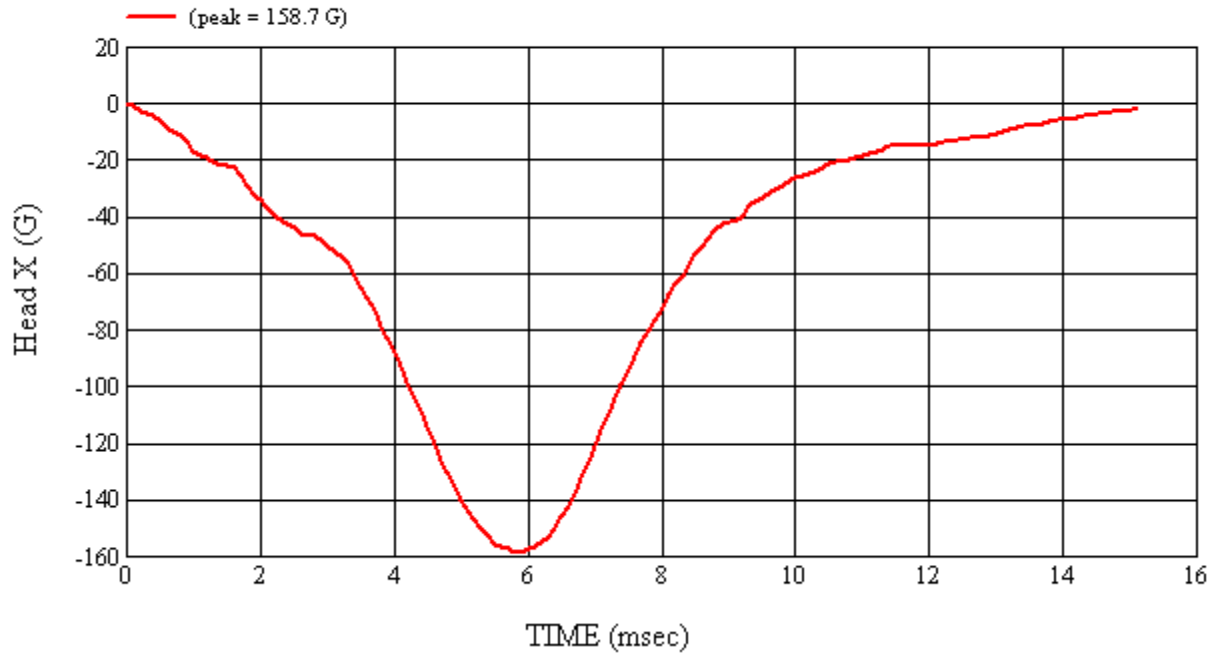
Recorded By: *Kevin D. McFerran* Approved By*: *Arthur I. Smith* Date: 6/24/2011
 *Only necessary for NHTSA (Government) Compliance testing.

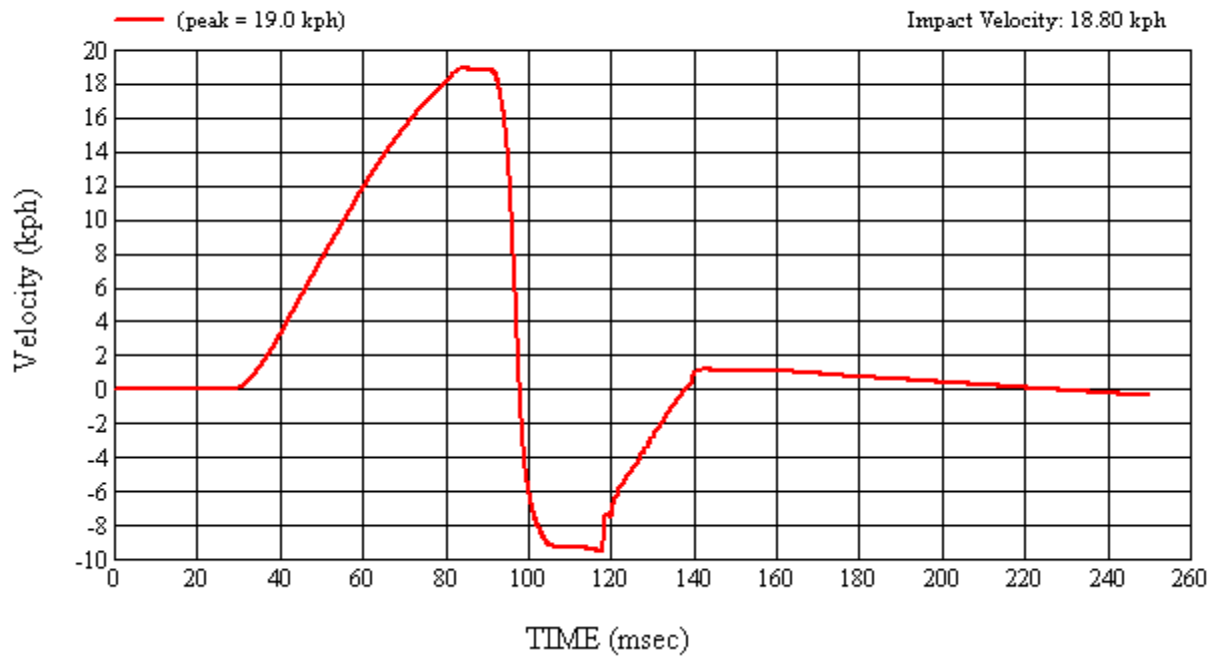
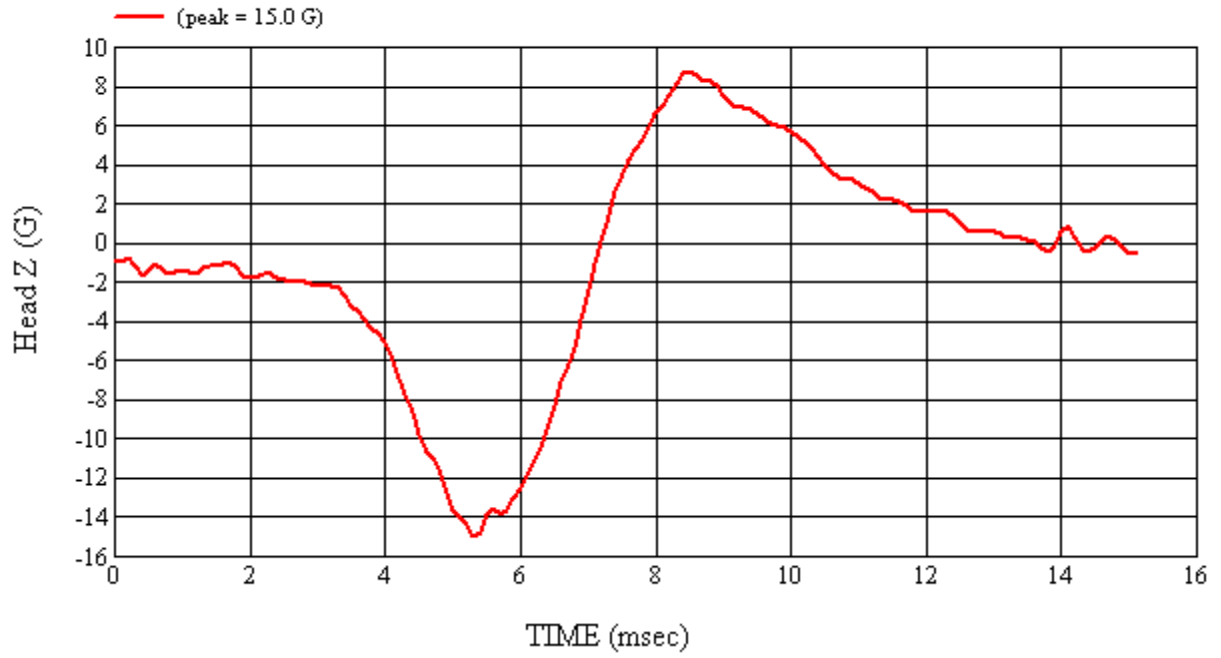
MGA Test #: U11268

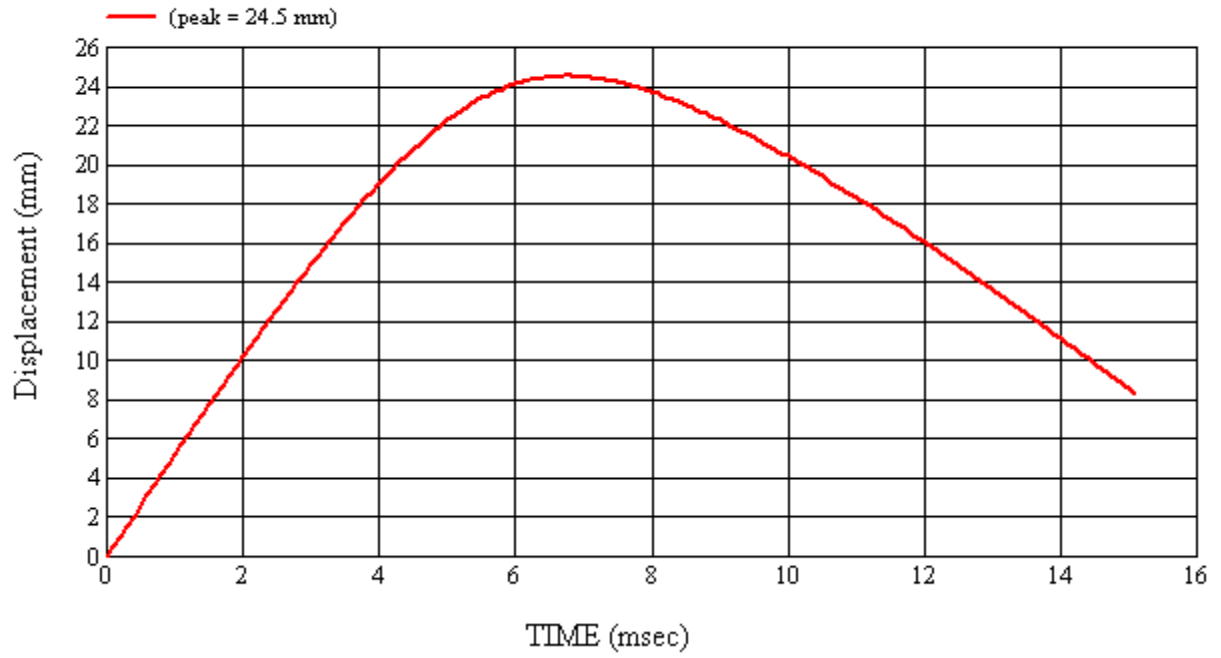
Target Location: AP2, Right Side

Test Date: 6/24/2011

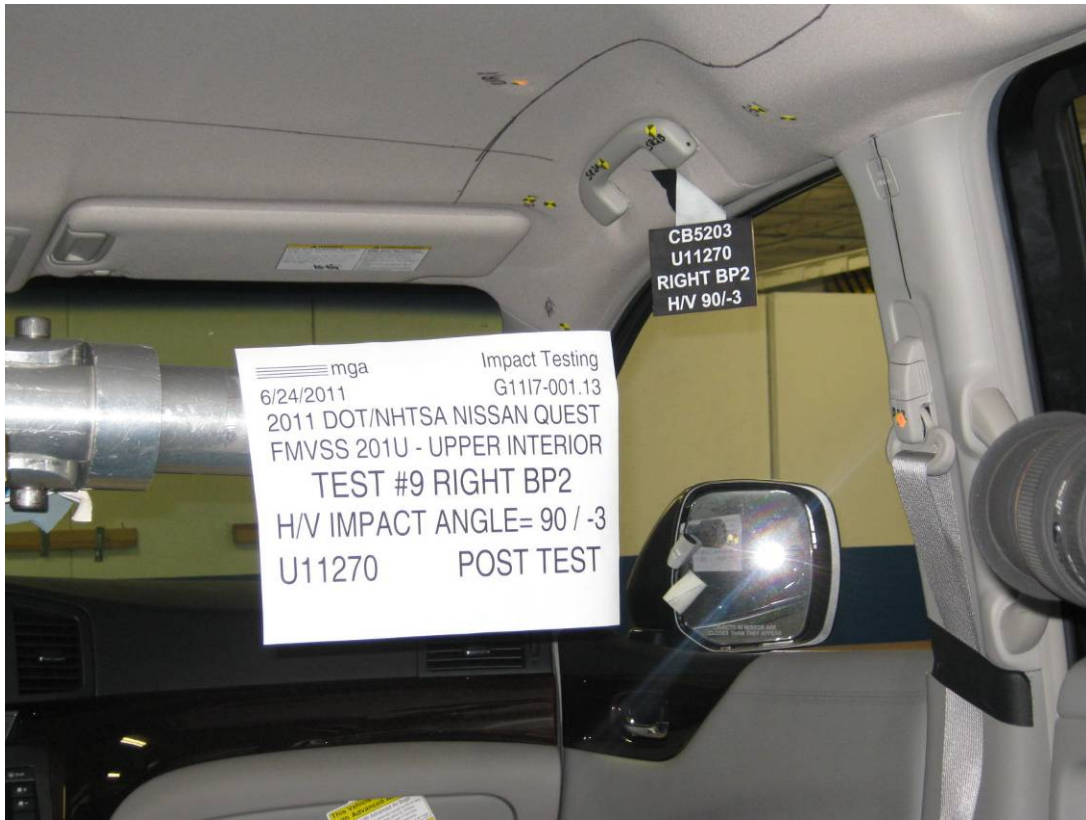


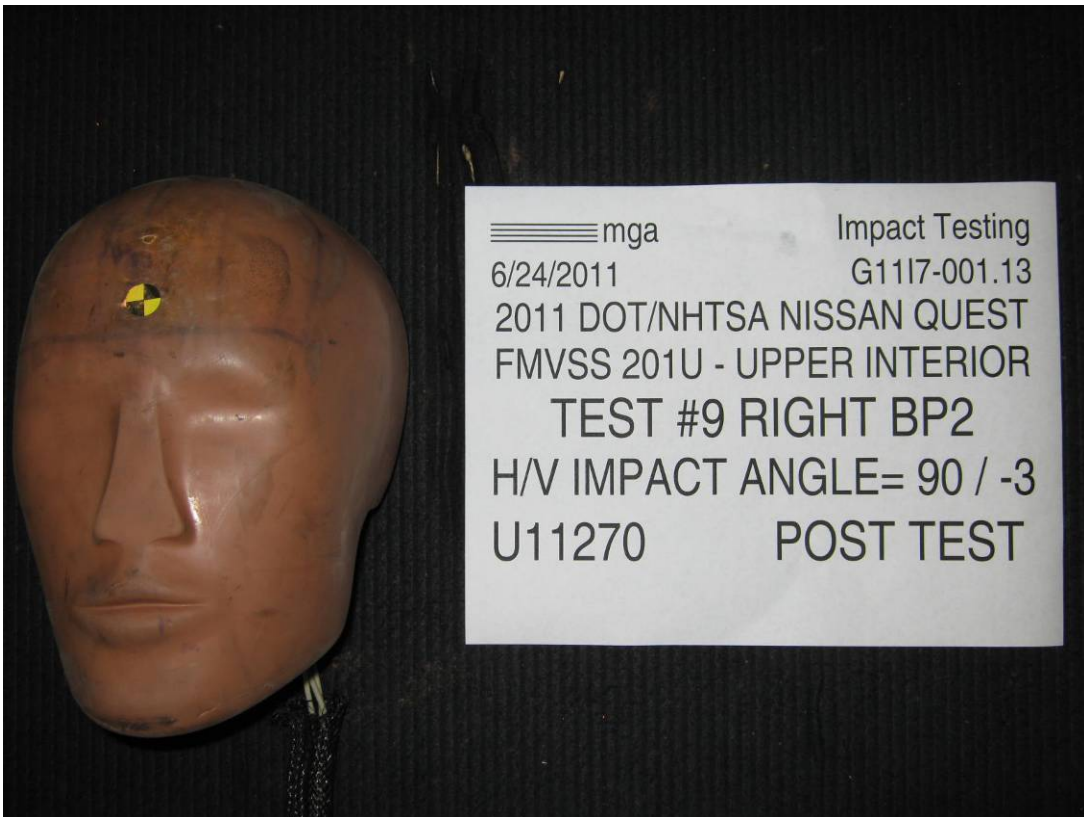












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP2Right

MGA Test Reference No.:U11270

Approach Horizontal Angles:90°

Approach Vertical Angles:-3°

Additional Description:

Test Number:#9

Temperature:21.1C

Humidity:62.6%

Time of Test:11:13:21 AM

FMH Serial No:[035]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
714	726	5.9	23.9	11	5 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

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

Anchorage adjuster cover cracked, stress marks on anchorage adjuster cover

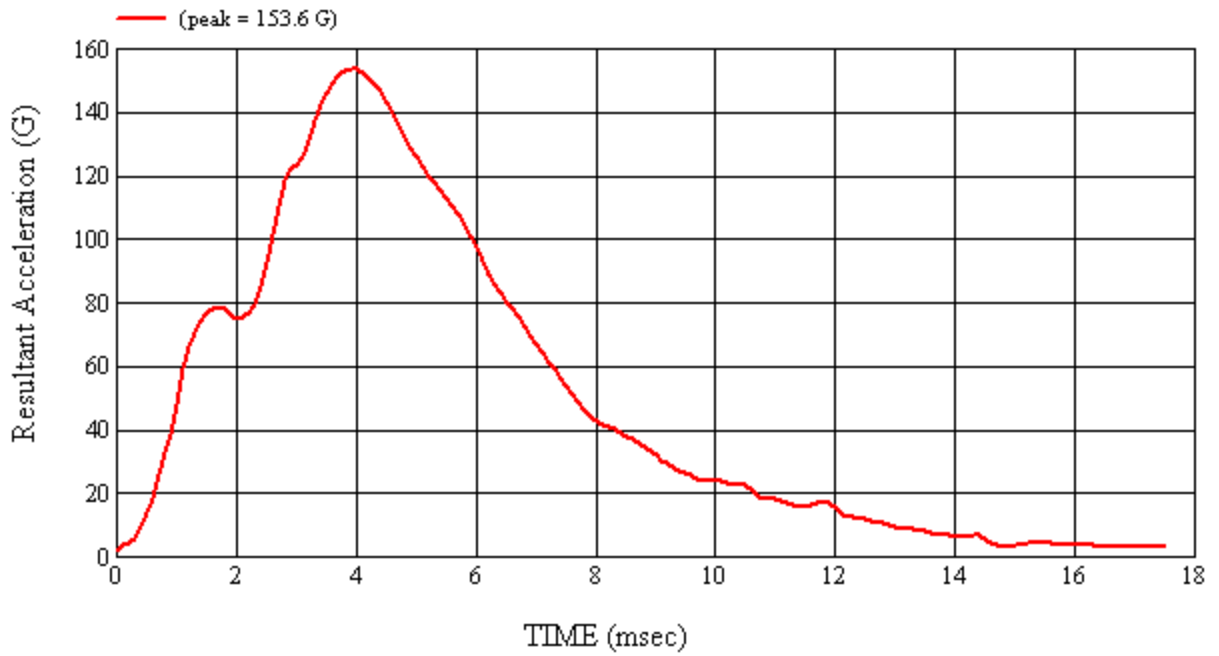
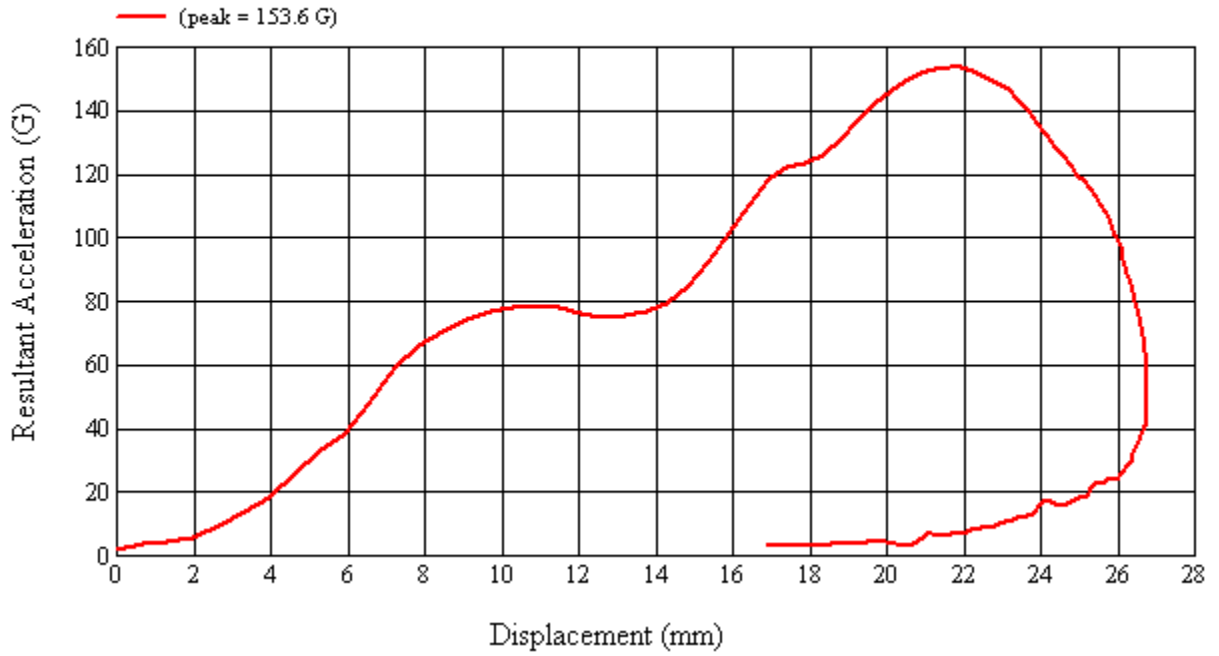
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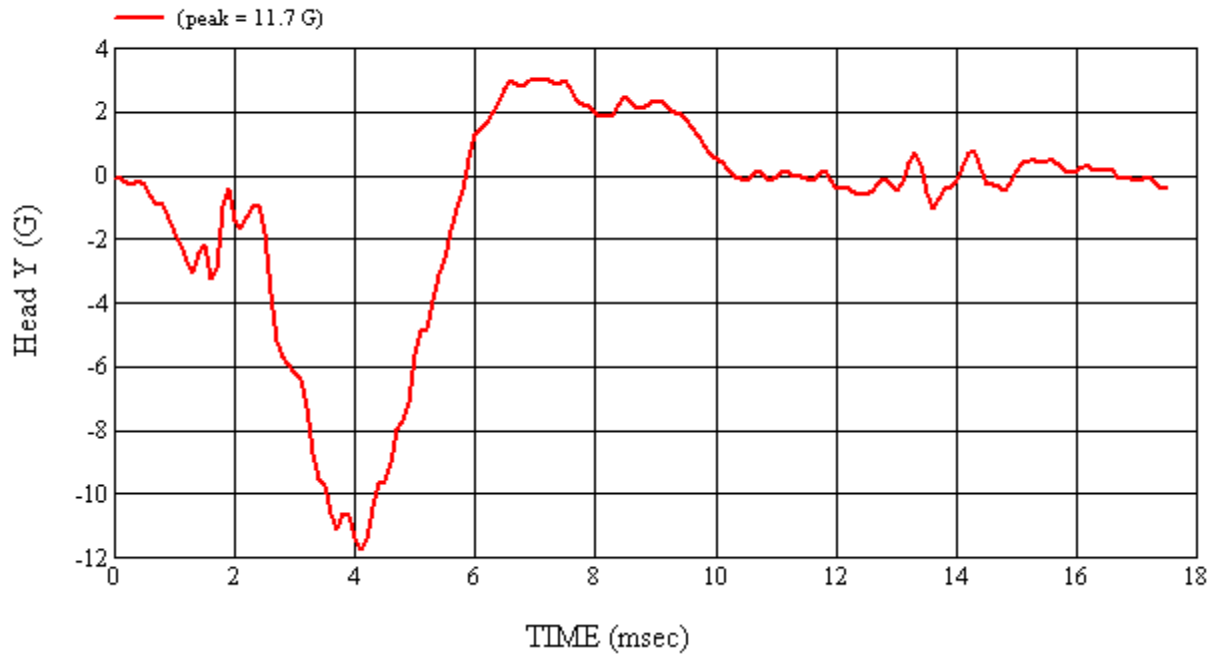
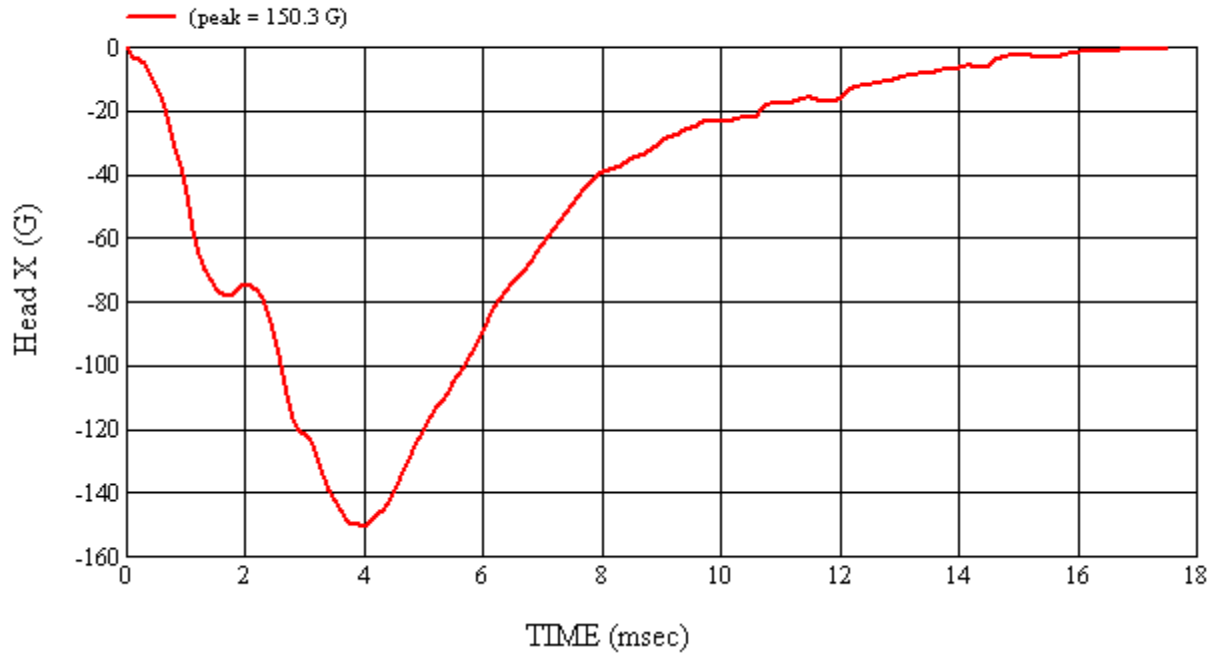
*Only necessary for NHTSA (Government) Compliance testing.

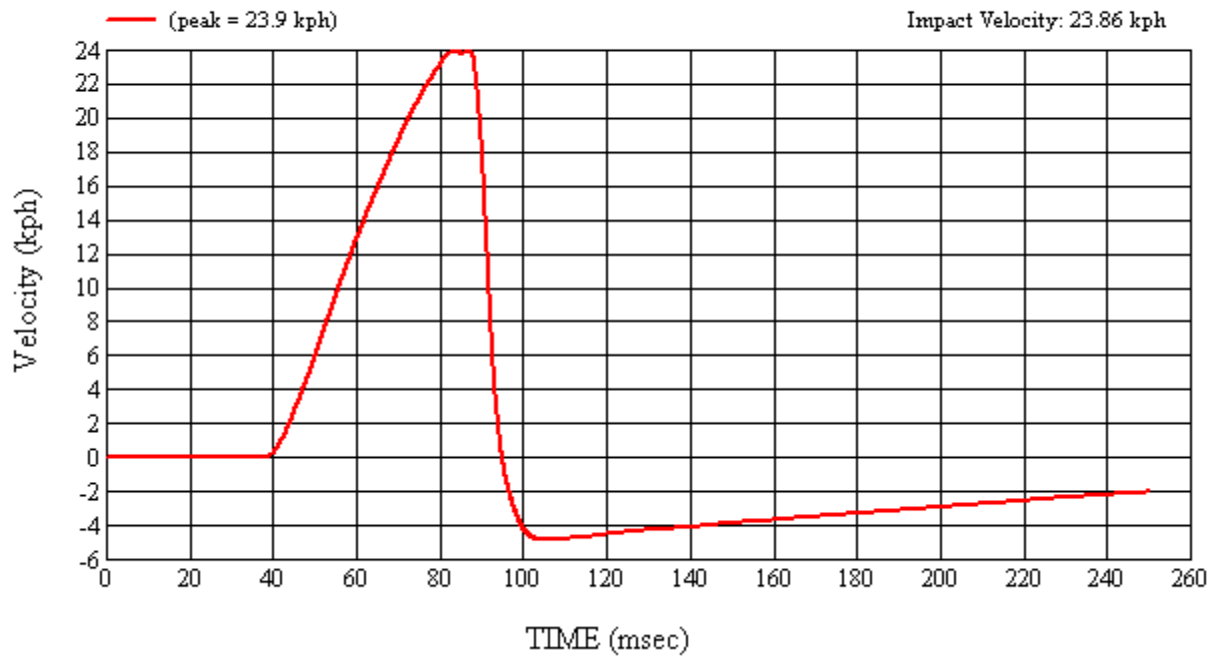
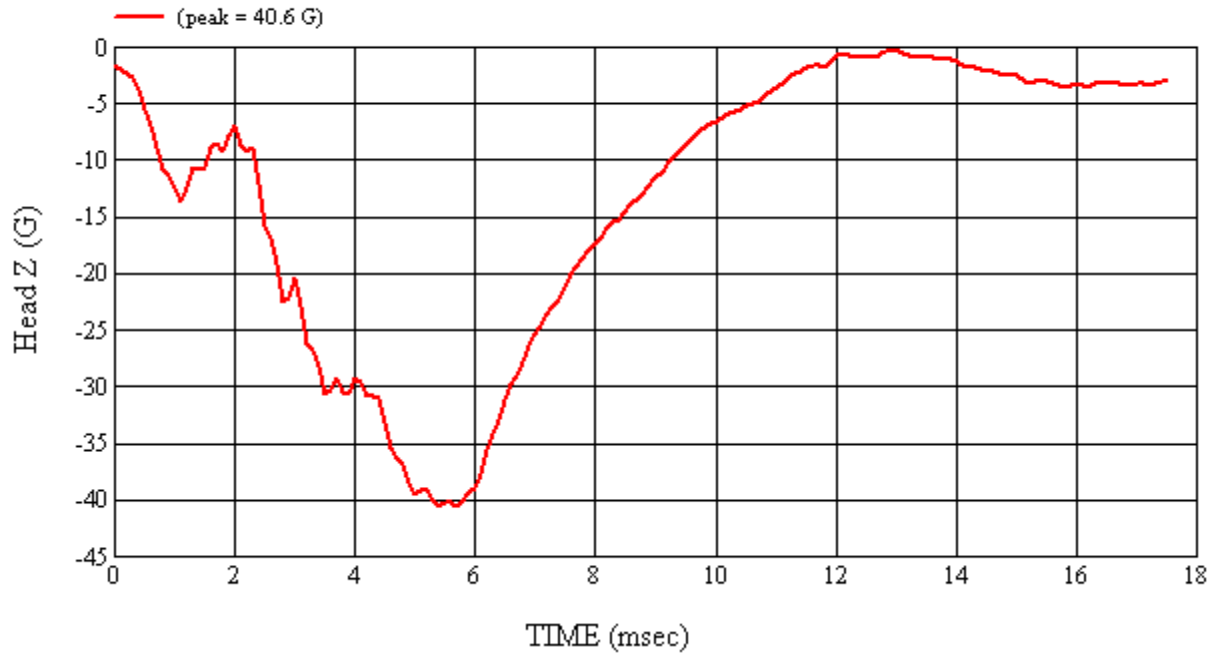
MGA Test #: U11270

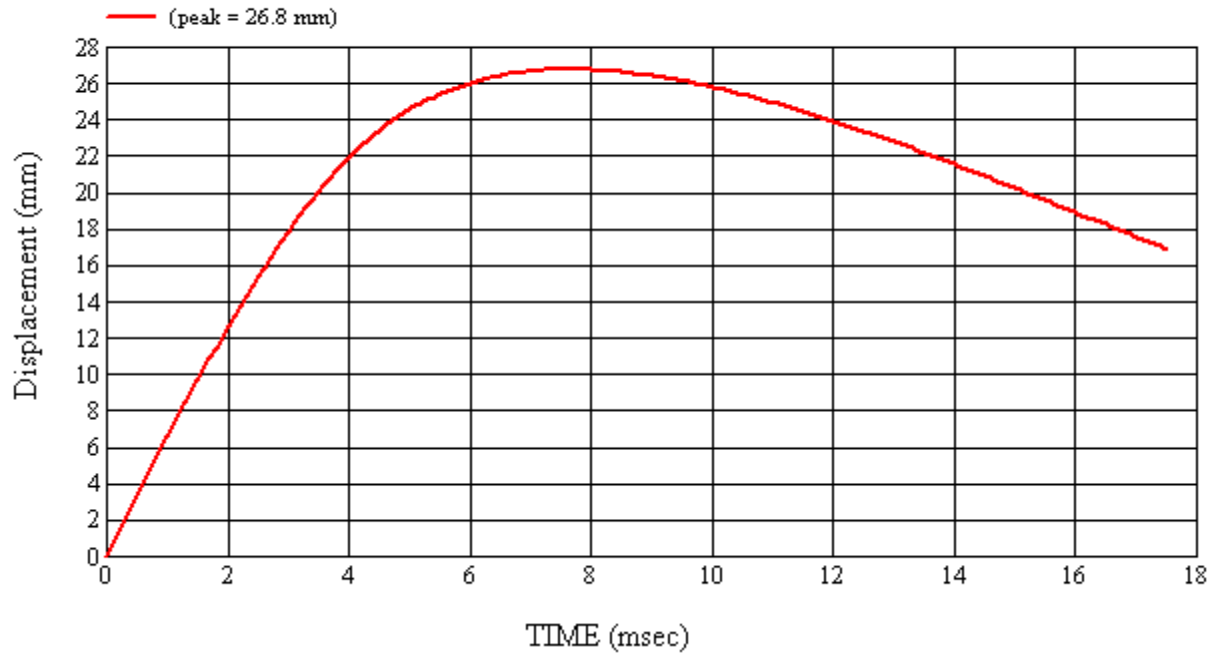
Target Location: BP2, Right Side

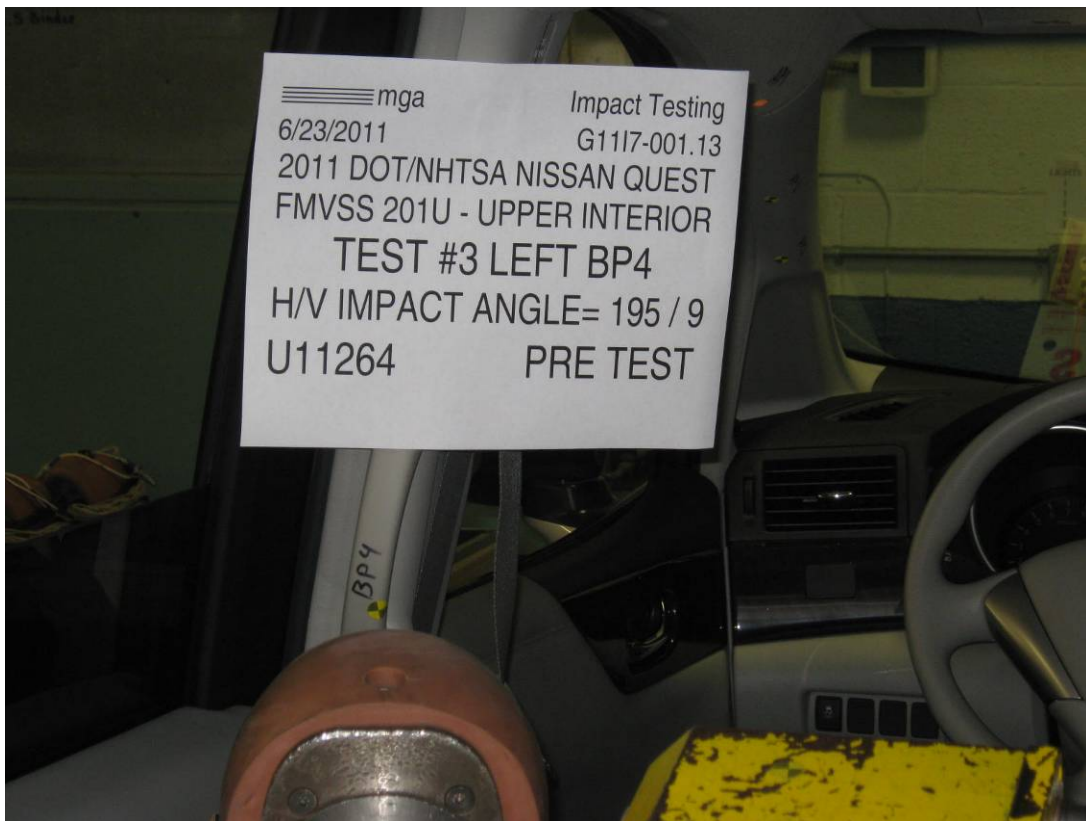
Test Date: 6/24/2011

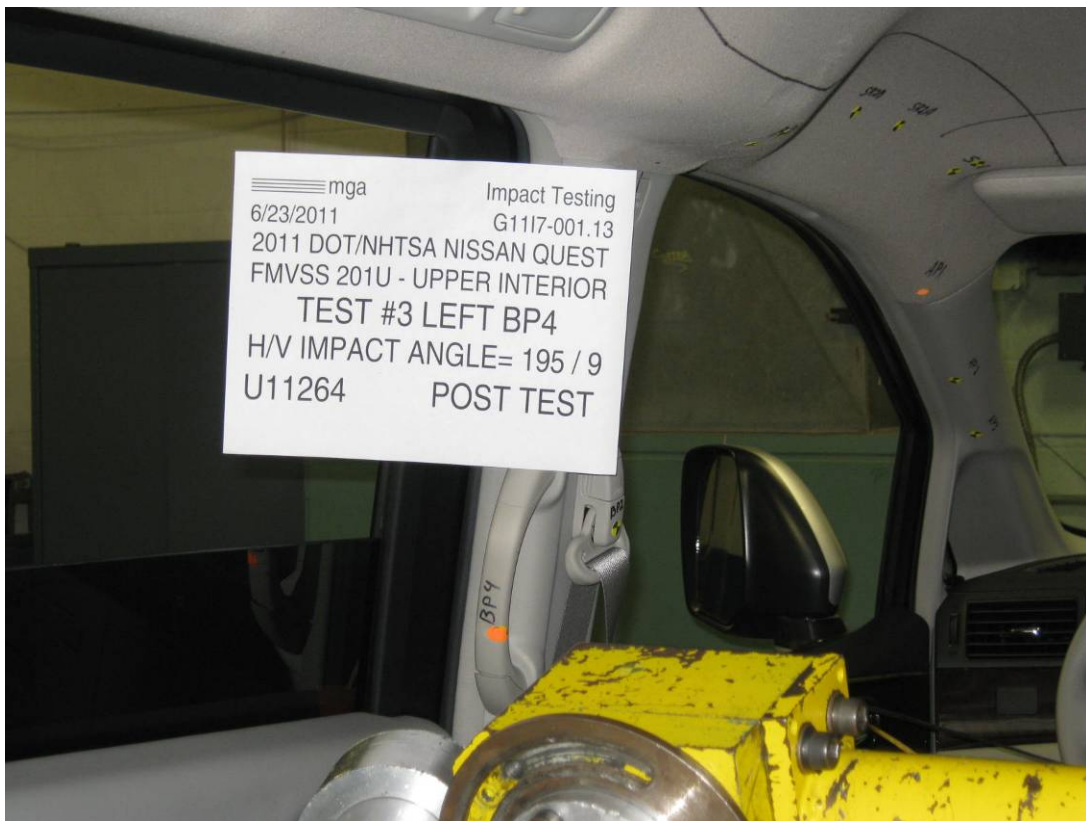


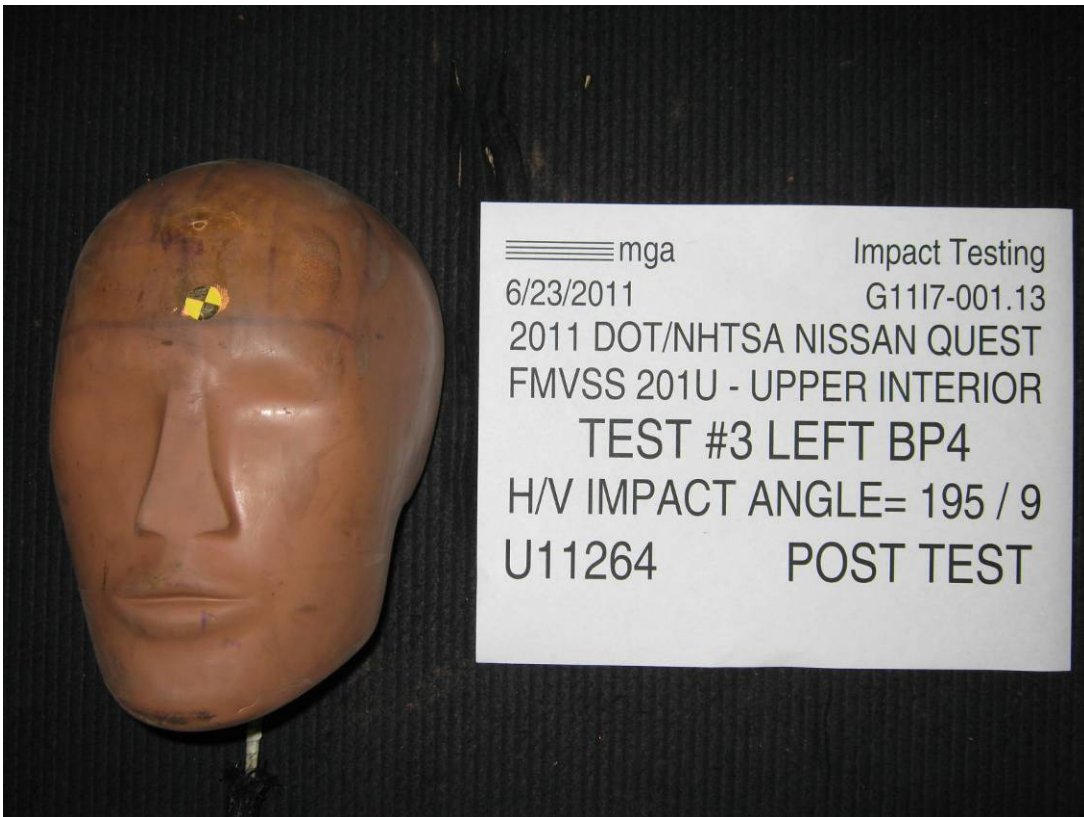












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): BP4Left

MGA Test Reference No.:U11264

Approach Horizontal Angles:195°

Approach Vertical Angles:9°

Additional Description:

Test Number:#3

Temperature:21.8C

Humidity:66.5%

Time of Test:12:01:55 PM

FMH Serial No:[035]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
597	571	9.8	23.4	7	8 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

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

Assist handle mount cover loose, stress mark on assist handle

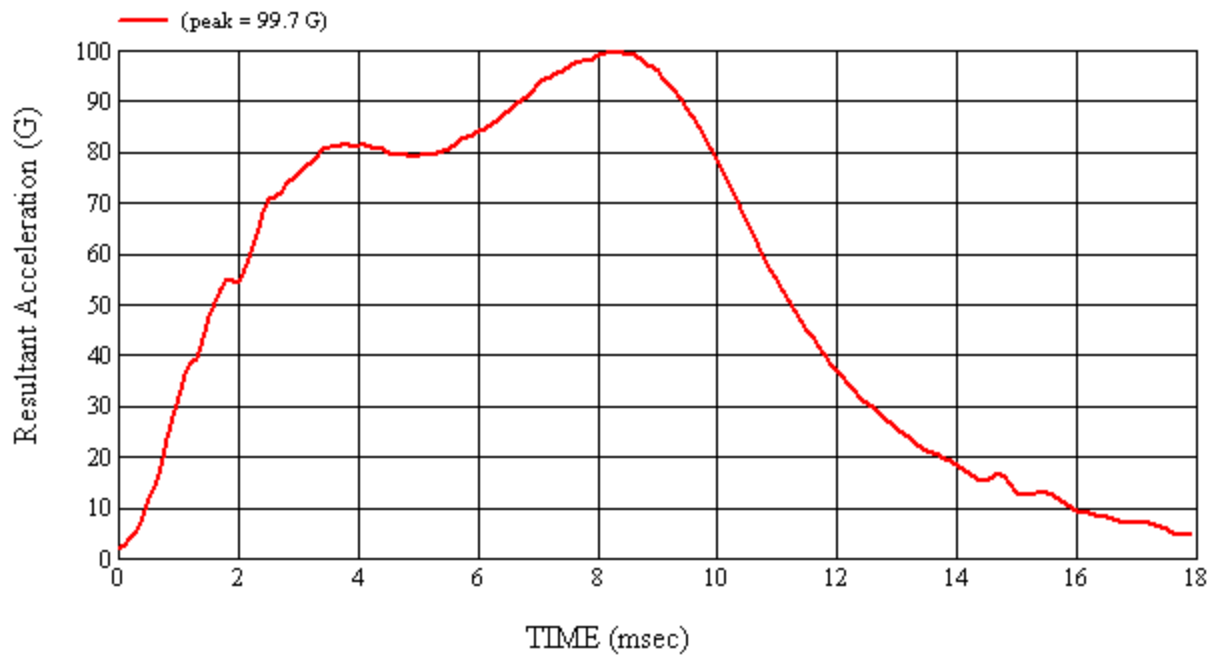
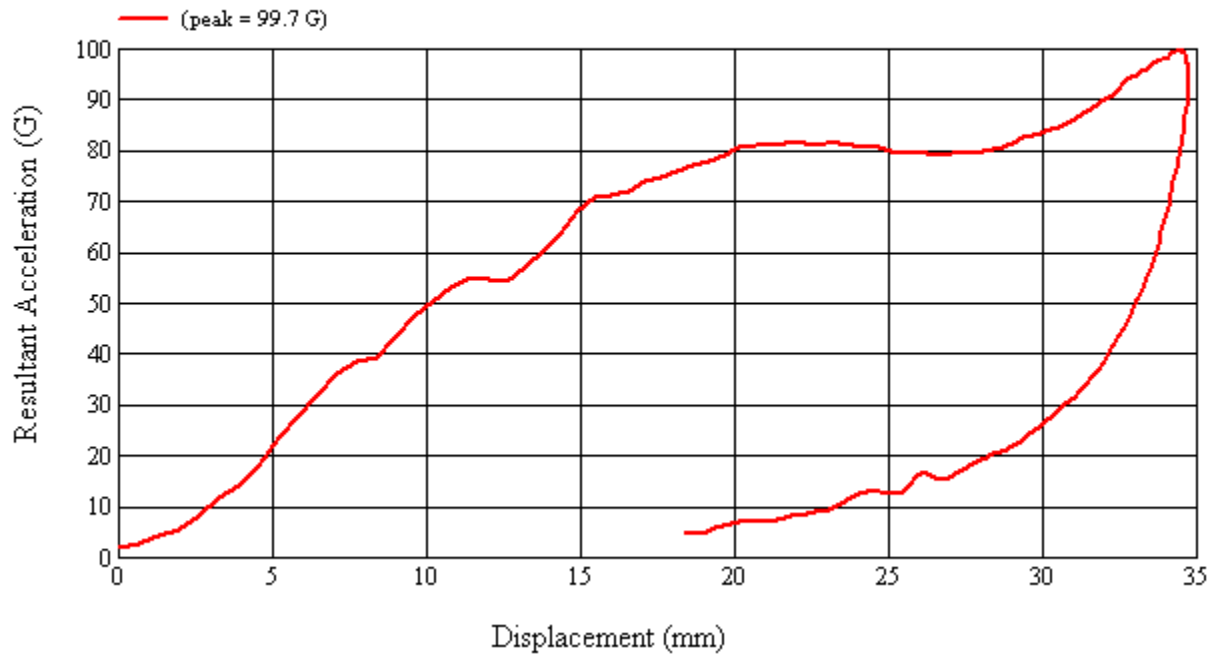
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/23/2011

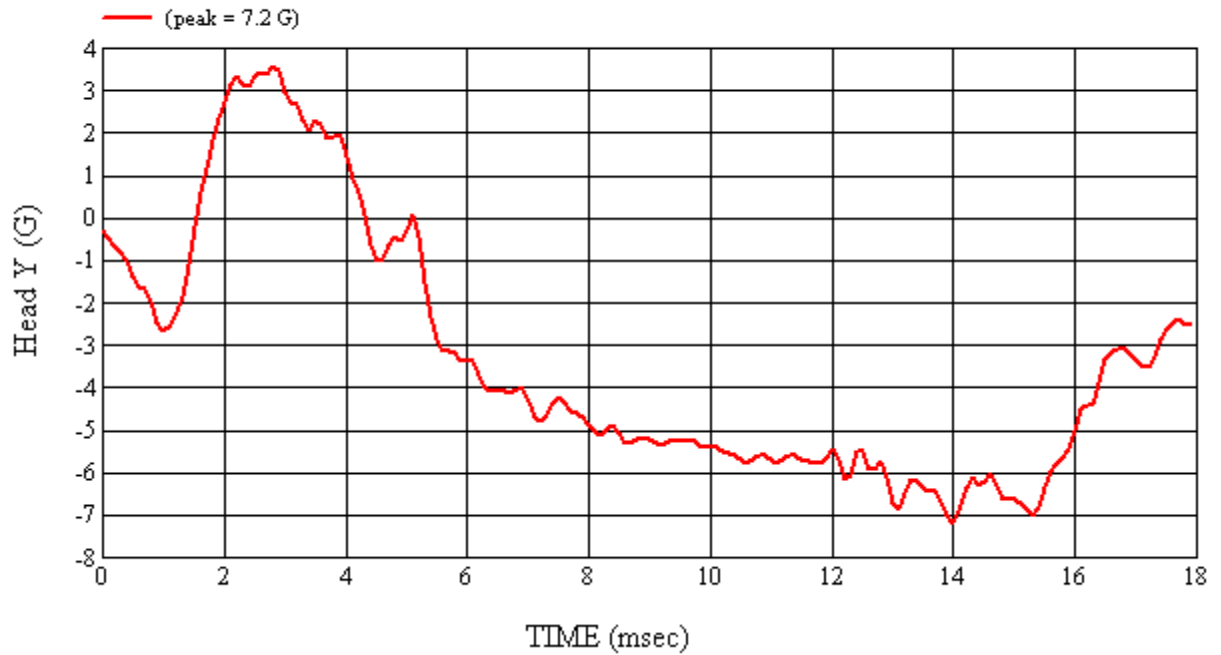
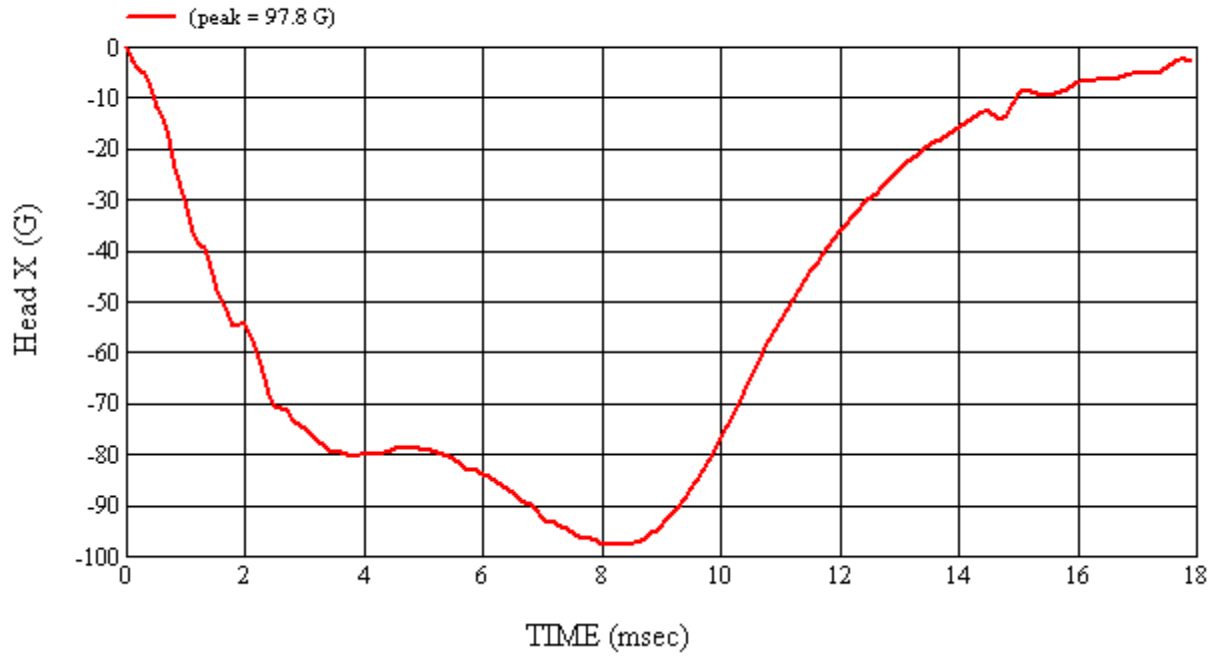
*Only necessary for NHTSA (Government) Compliance testing.

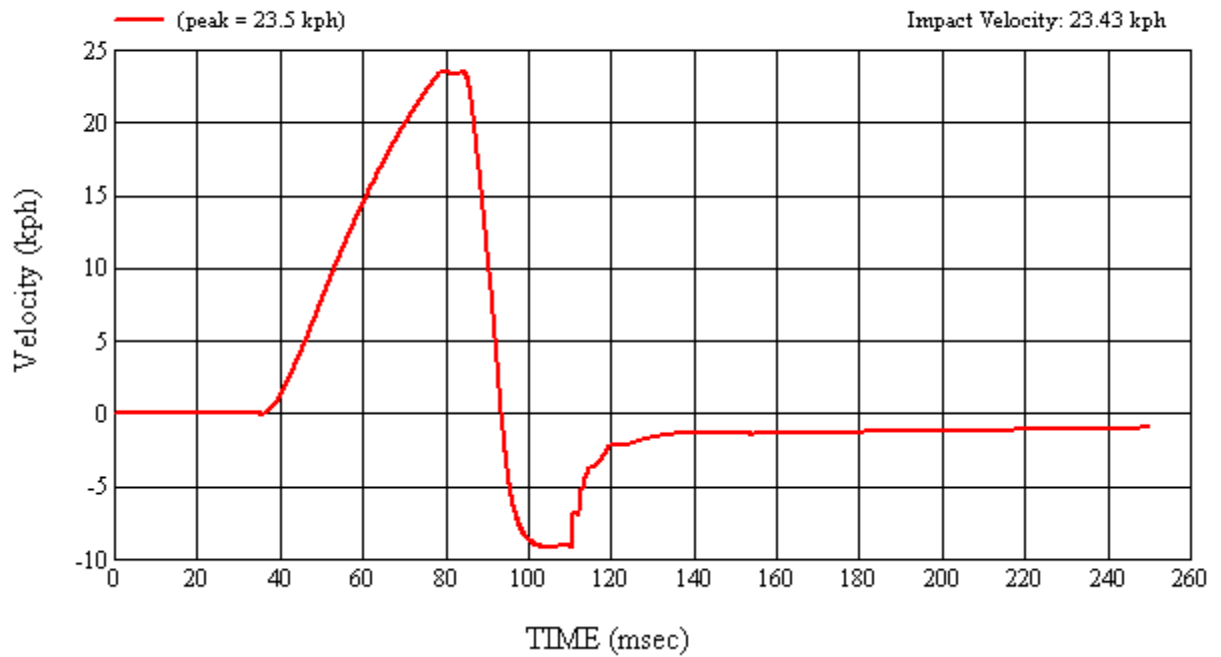
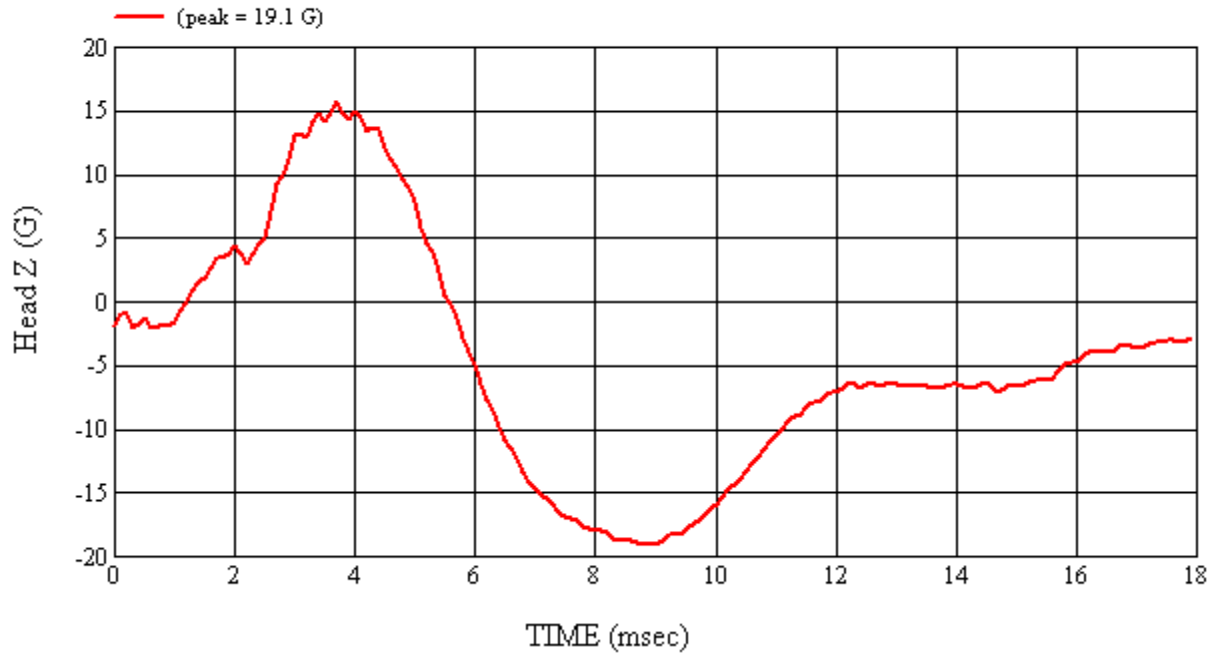
MGA Test #: U11264

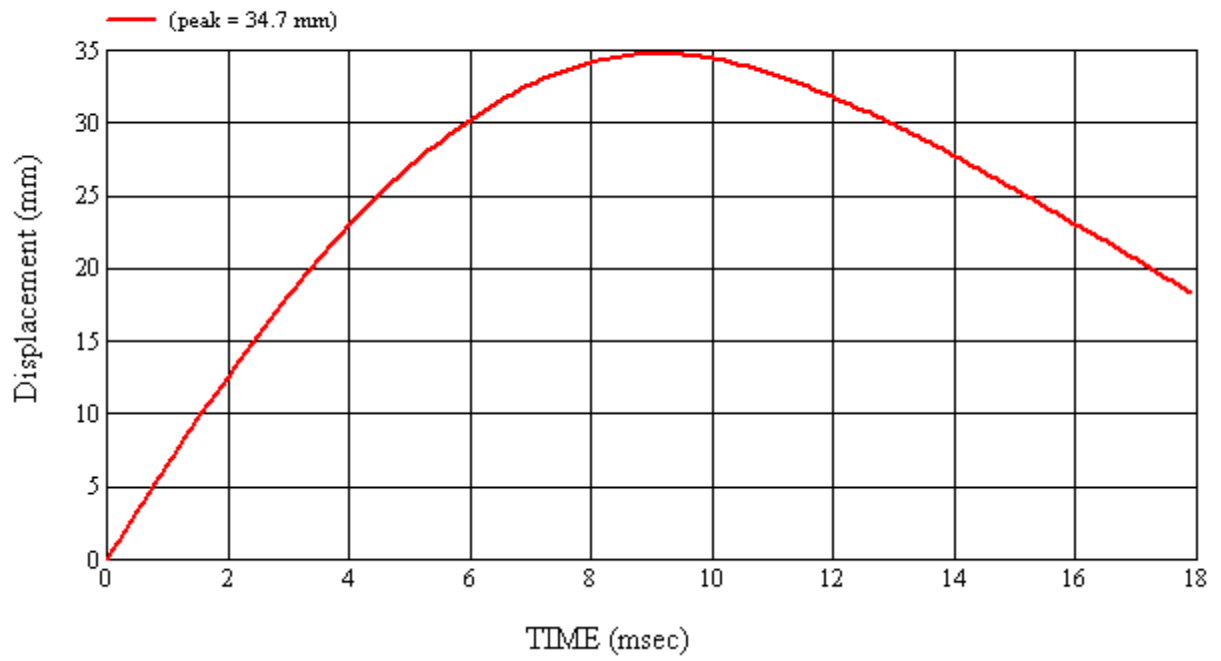
Target Location: BP4, Left Side

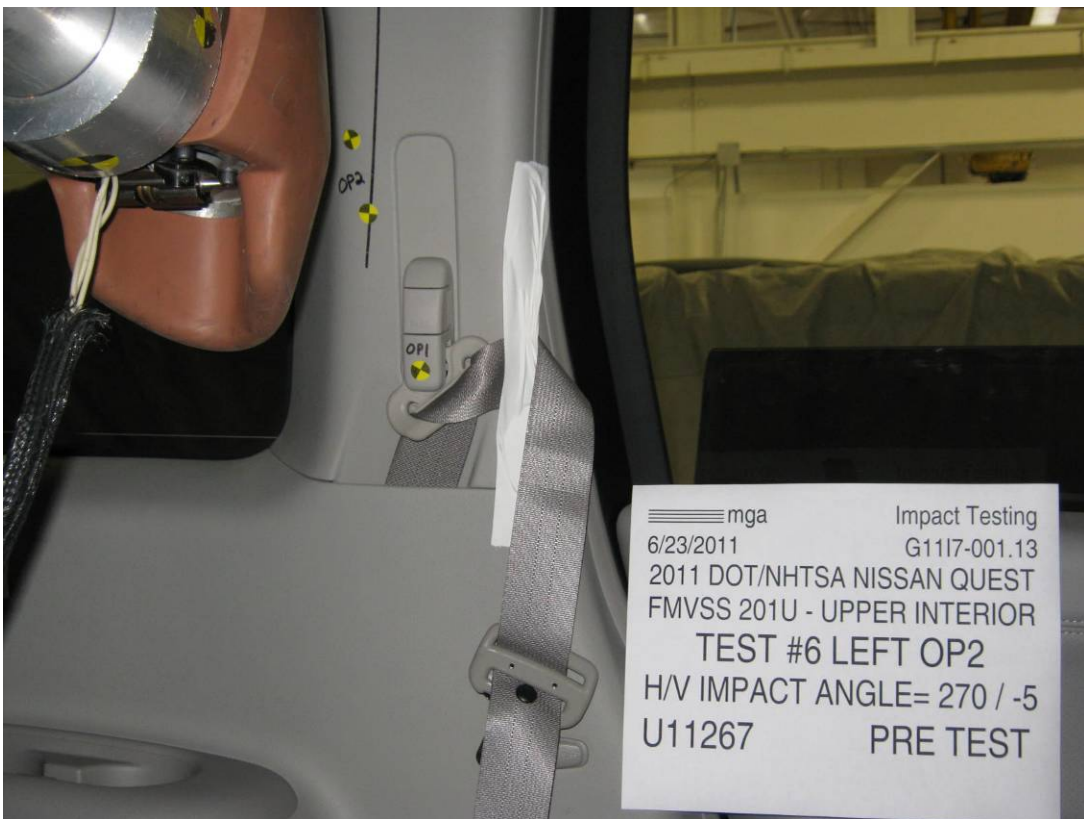
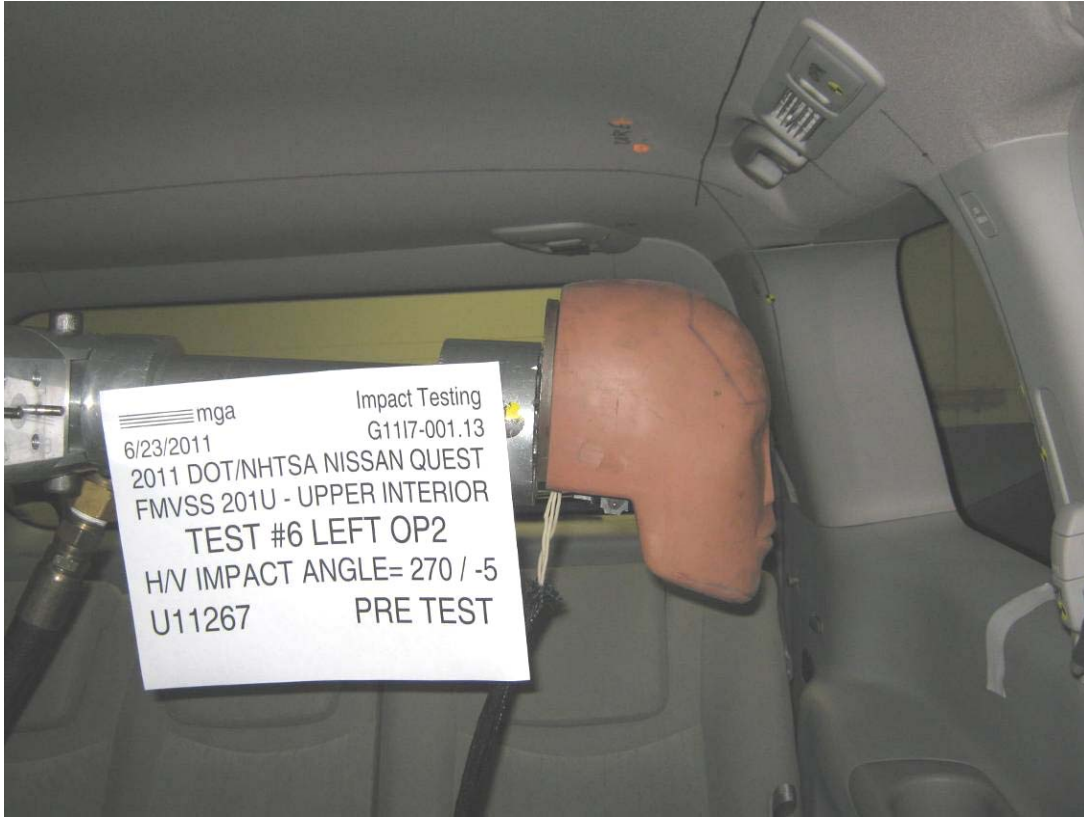
Test Date: 6/23/2011

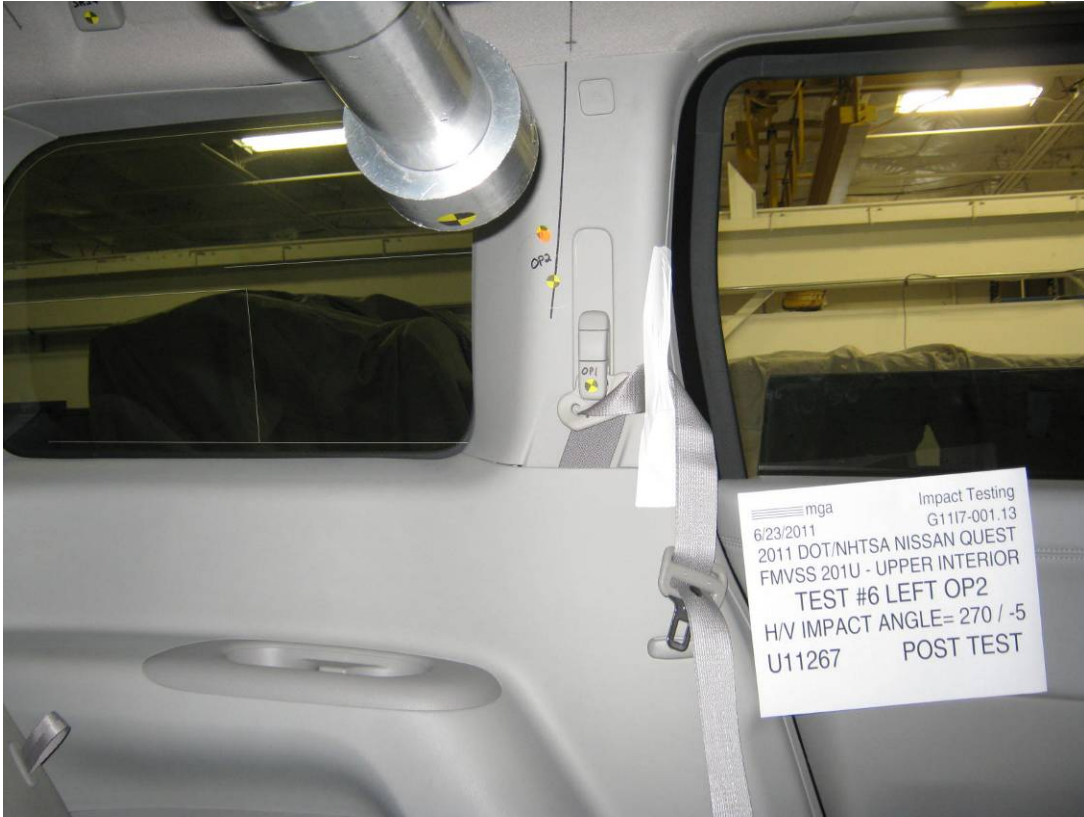


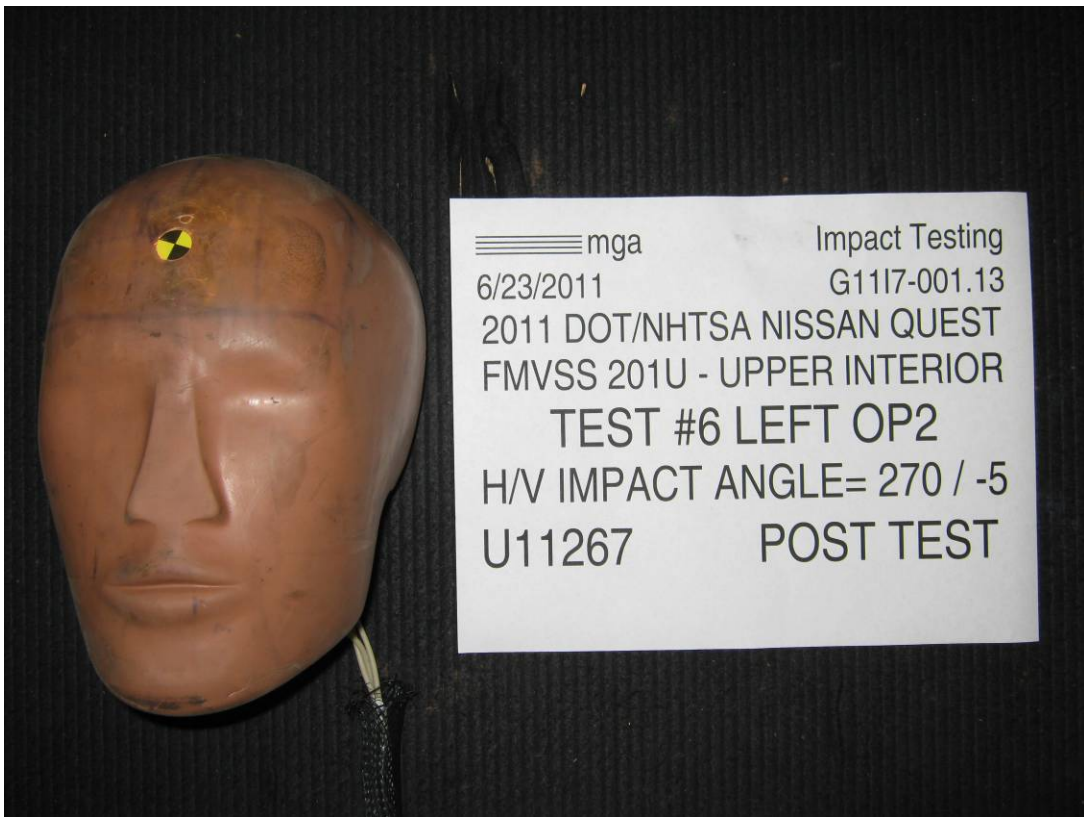












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): OP2Left

MGA Test Reference No.:U11267

Approach Horizontal Angles:270°

Approach Vertical Angles:-5°

Additional Description:

Test Number:#6

Temperature:22.8C

Humidity:65.7%

Time of Test:5:45:38 PM

FMH Serial No:[035]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
578	546	8	23.6	27	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

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

Stress mark on adjuster cover

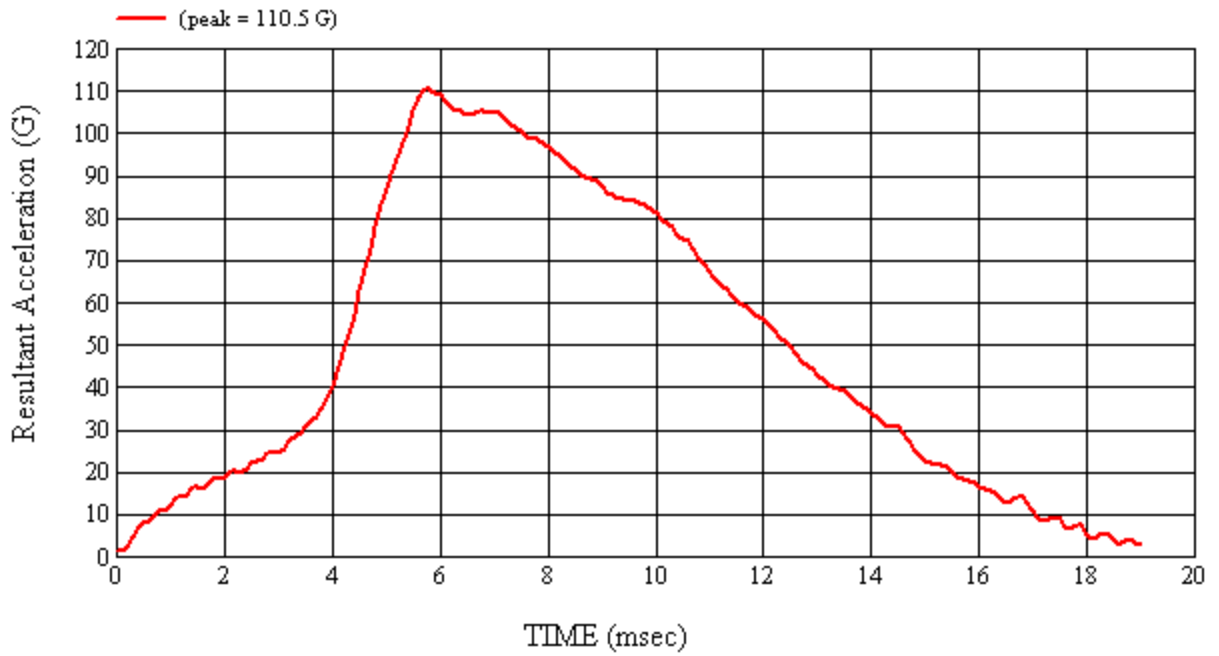
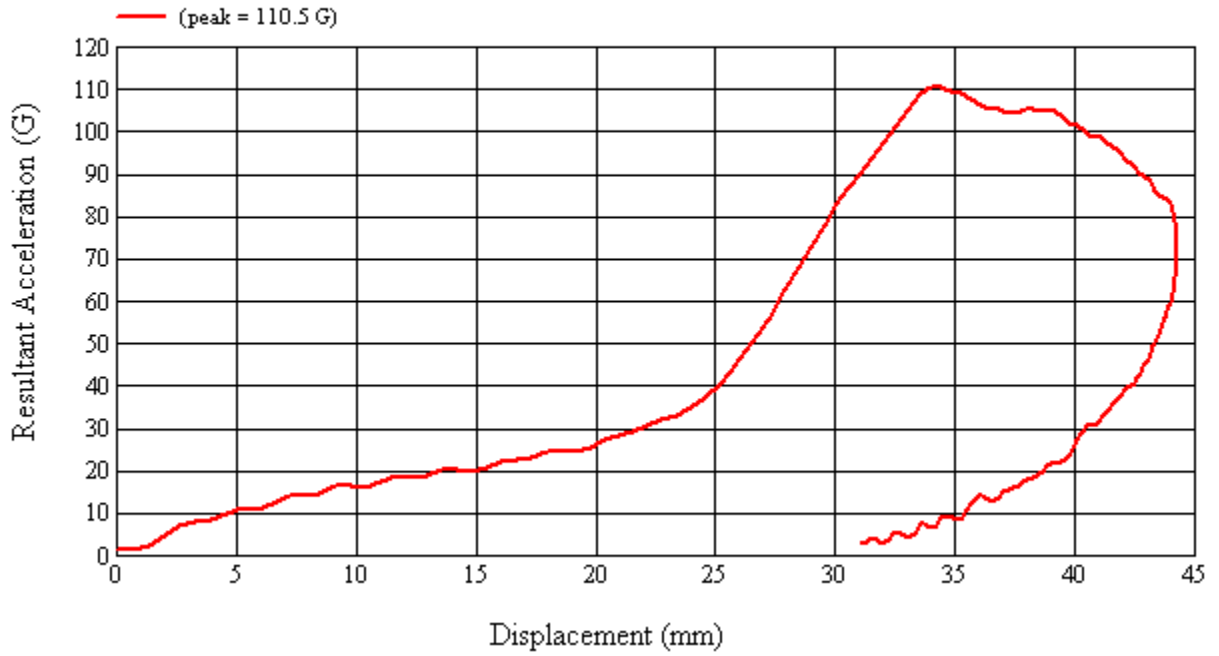
Recorded By: *Kevin D. McLean* Approved By*: *Arthur I. Smith* Date: 6/23/2011

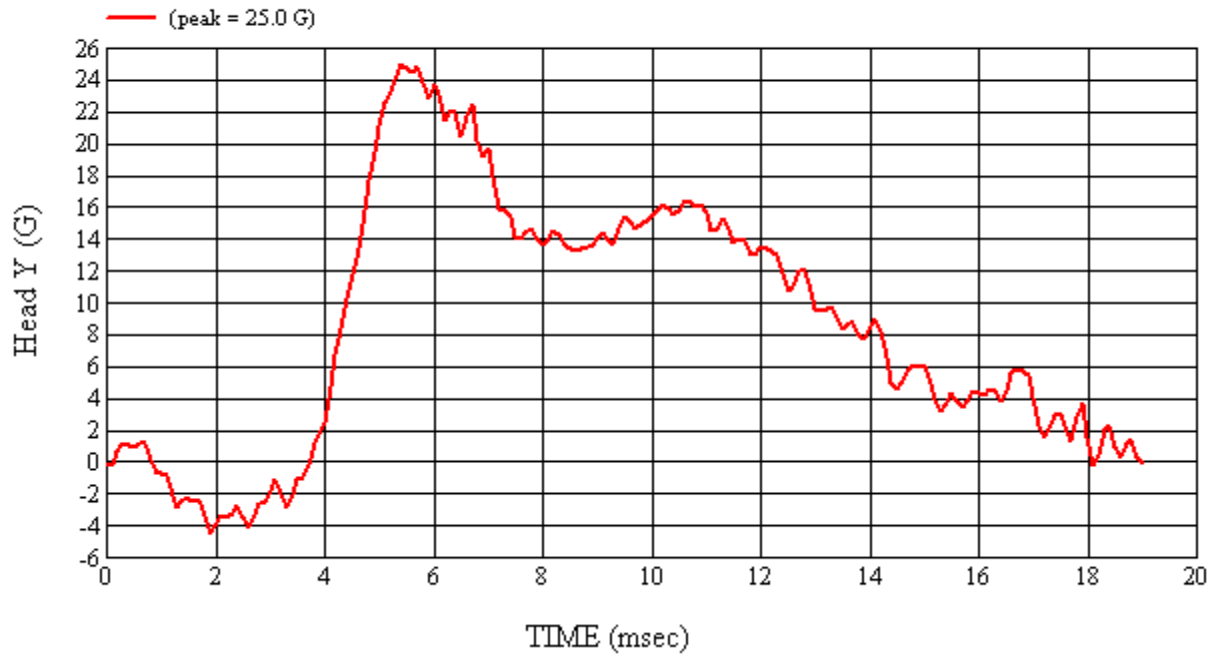
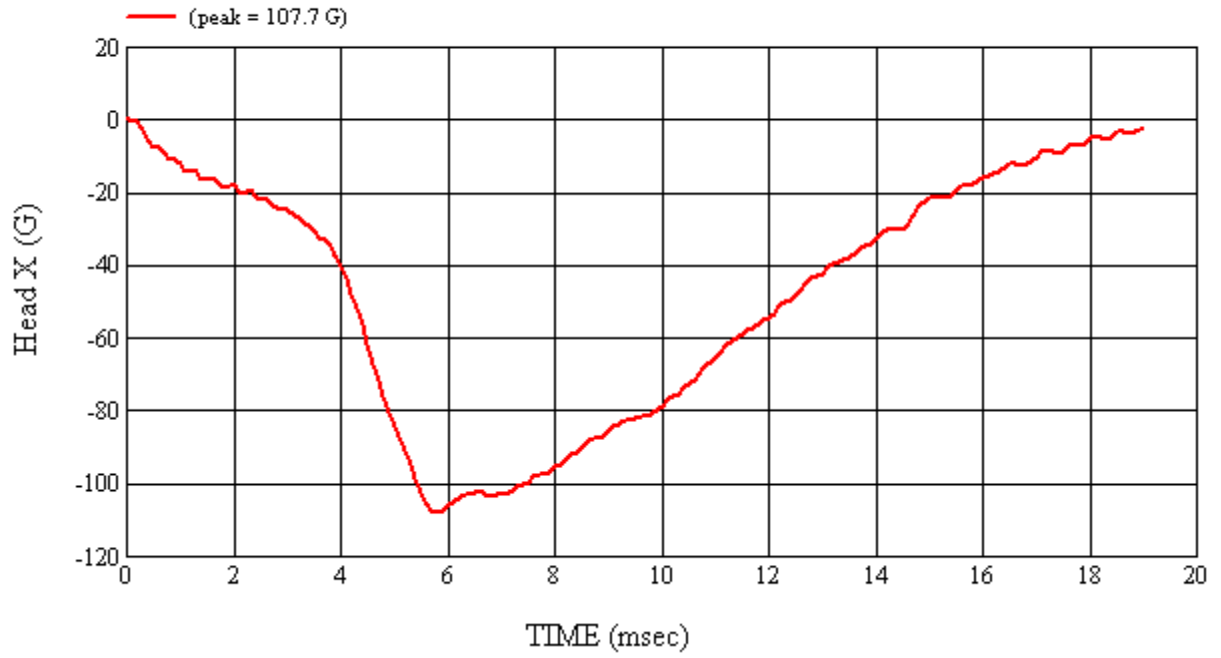
*Only necessary for NHTSA (Government) Compliance testing.

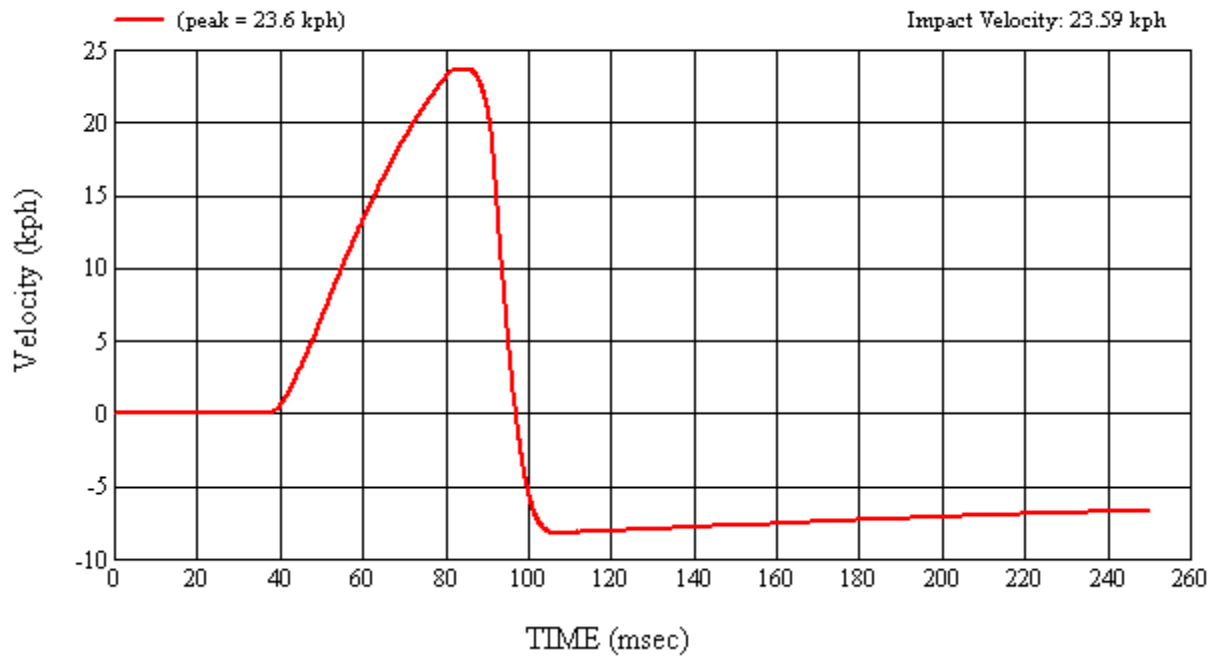
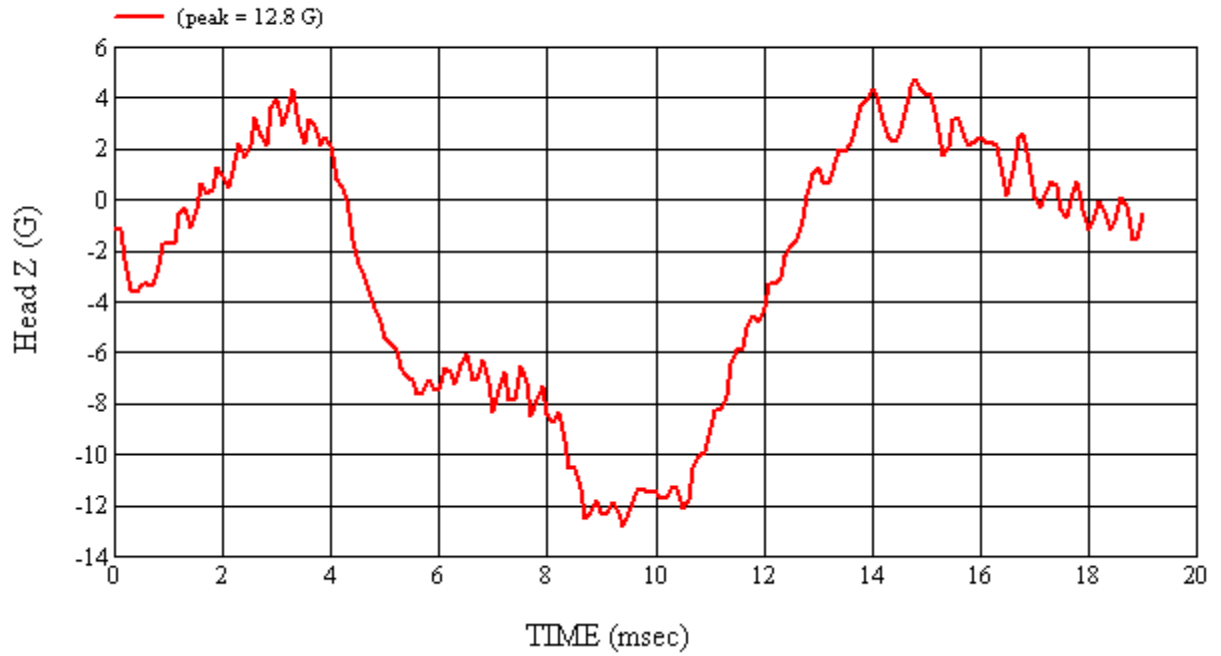
MGA Test #: U11267

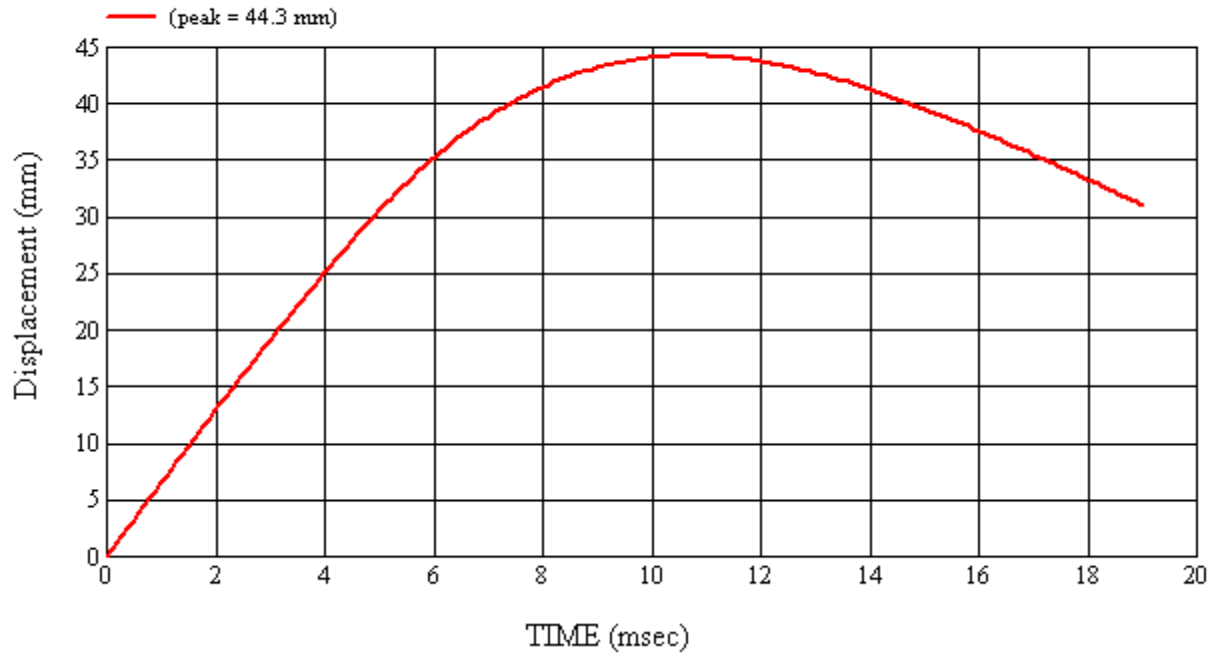
Target Location: OP2, Left Side

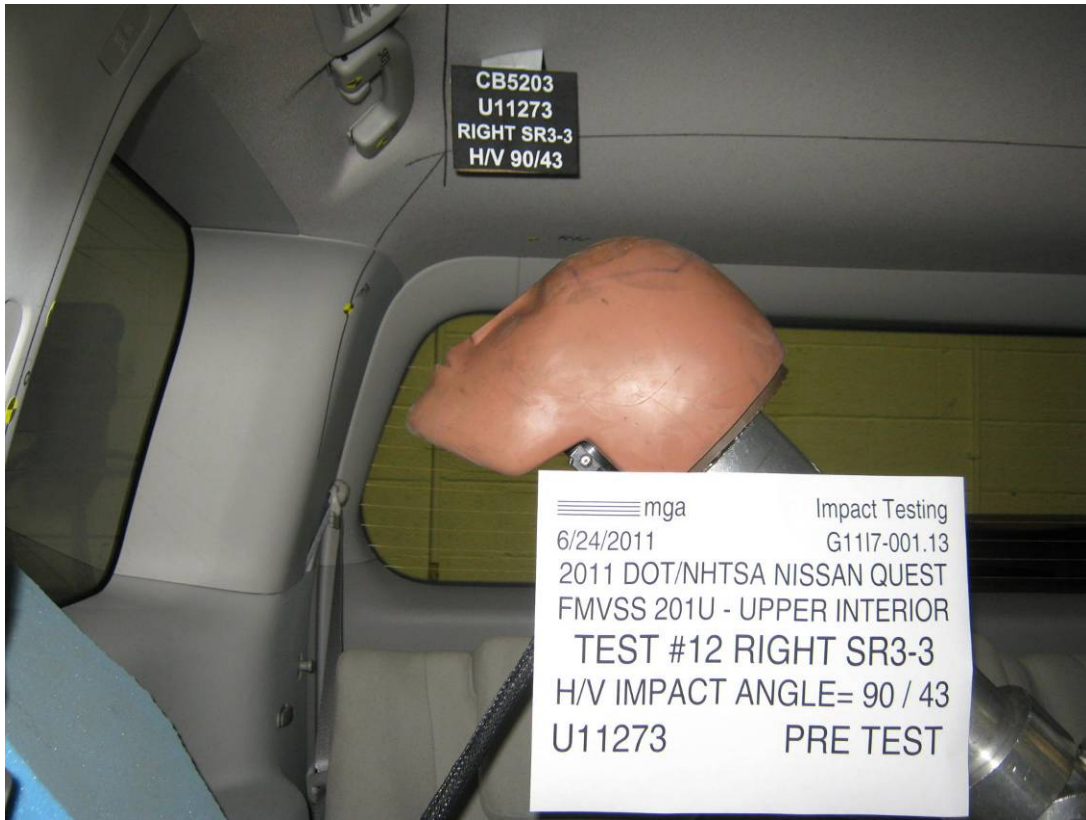
Test Date: 6/23/2011

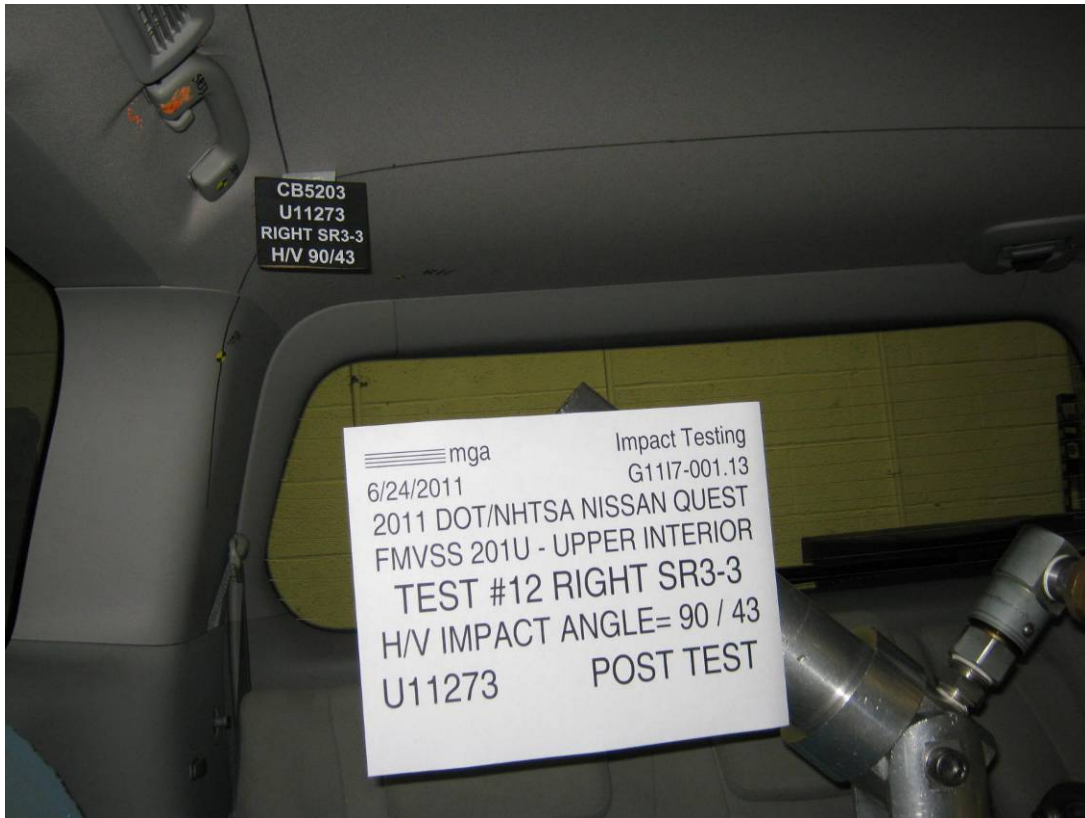


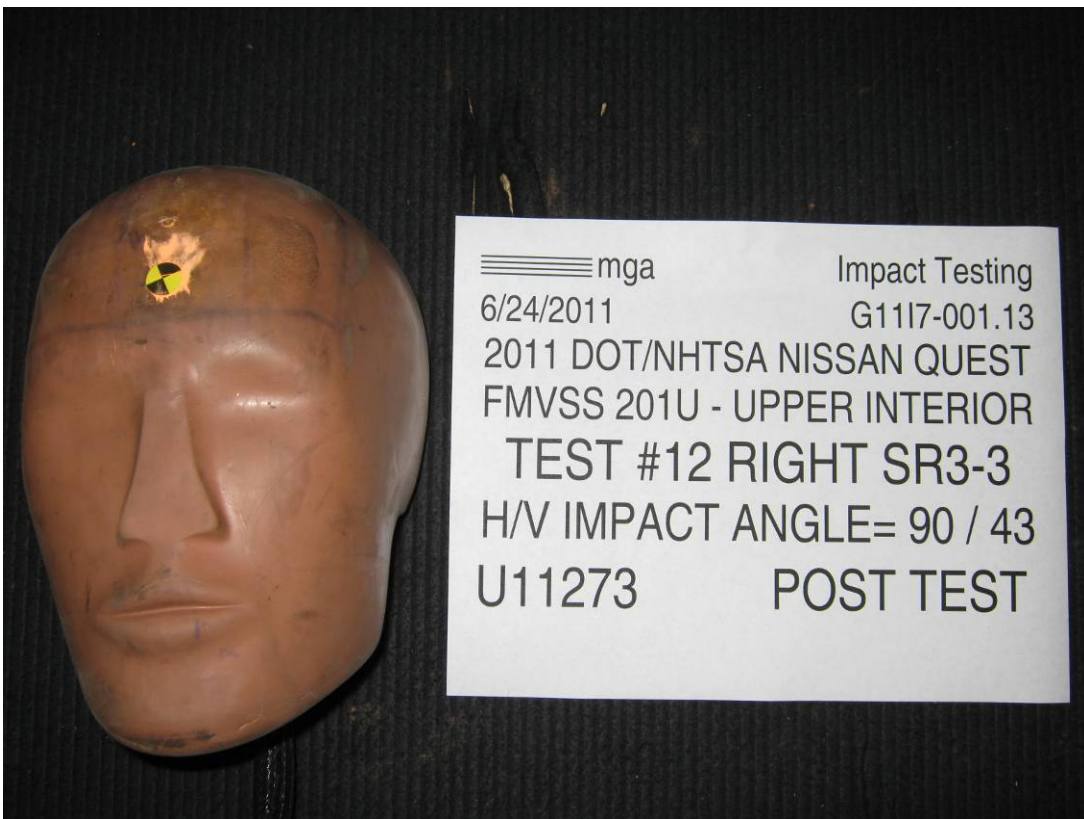












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): SR3-3Right

MGA Test Reference No.:U11273

Approach Horizontal Angles:90°

Approach Vertical Angles:43°

Additional Description:

Test Number:#12

Temperature:21.1C

Humidity:66.1%

Time of Test:2:43:50 PM

FMH Serial No:[035]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
377	279	7.1	19.0	13	3 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.8	1.07	1.07
Y	6	J22664	94.2	0.85	0.85
Z	7	J35924	92.8	0.94	0.94

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

Dislodged headliner

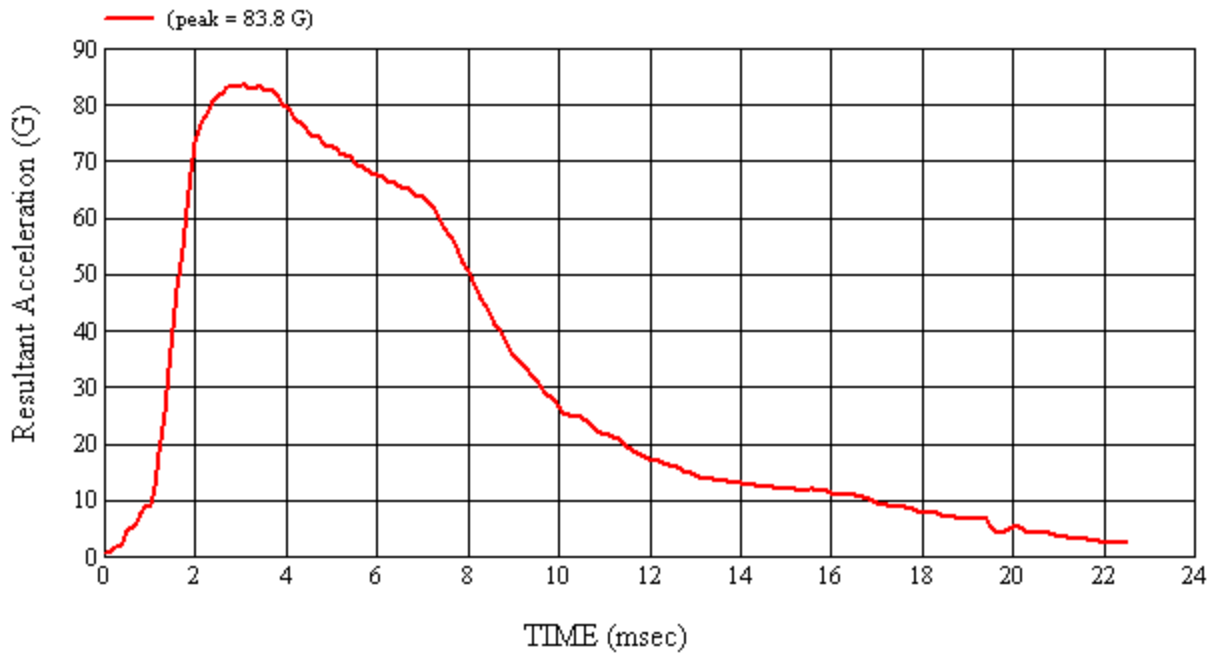
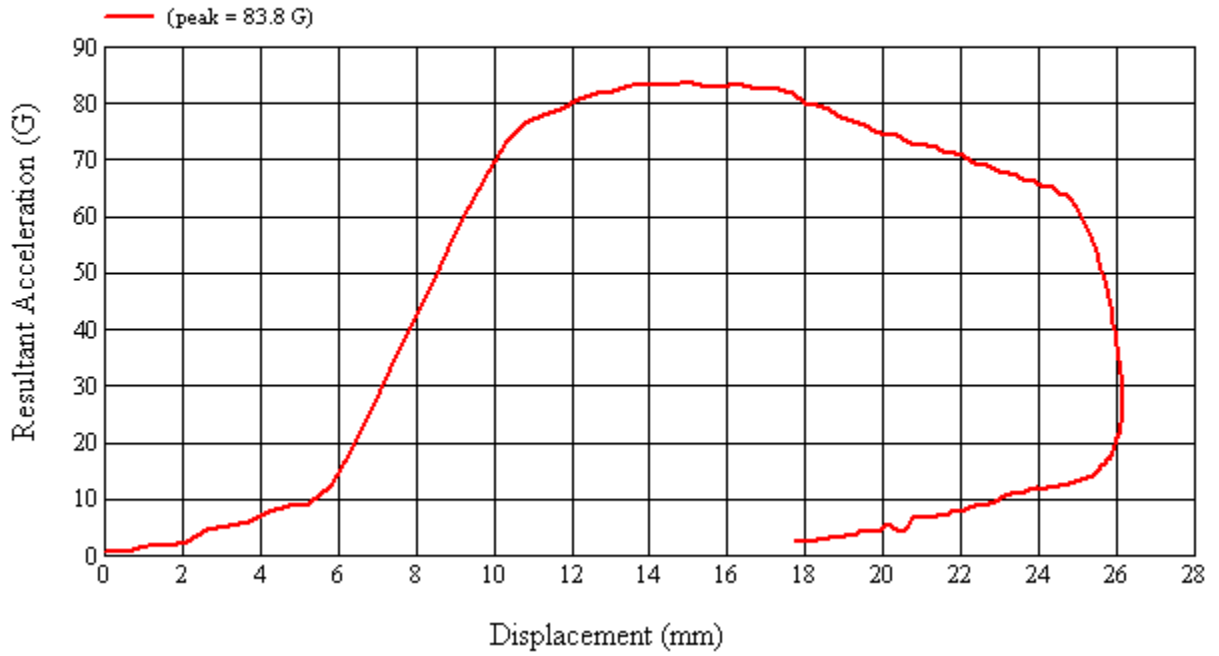
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/24/2011

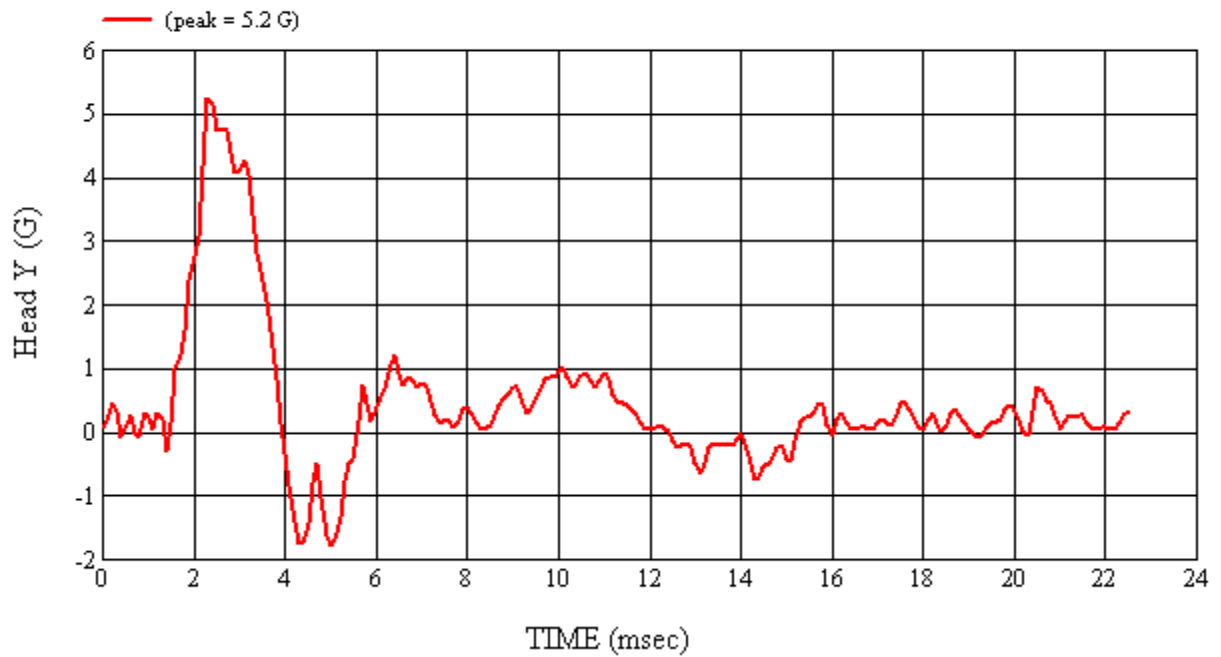
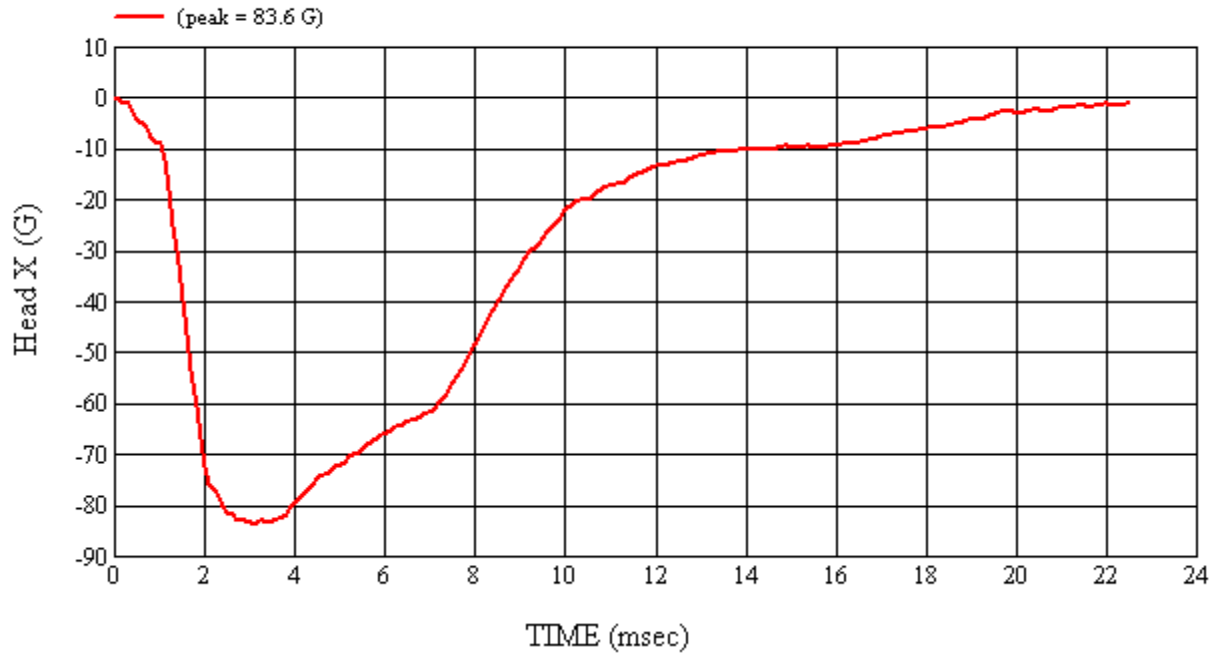
*Only necessary for NHTSA (Government) Compliance testing.

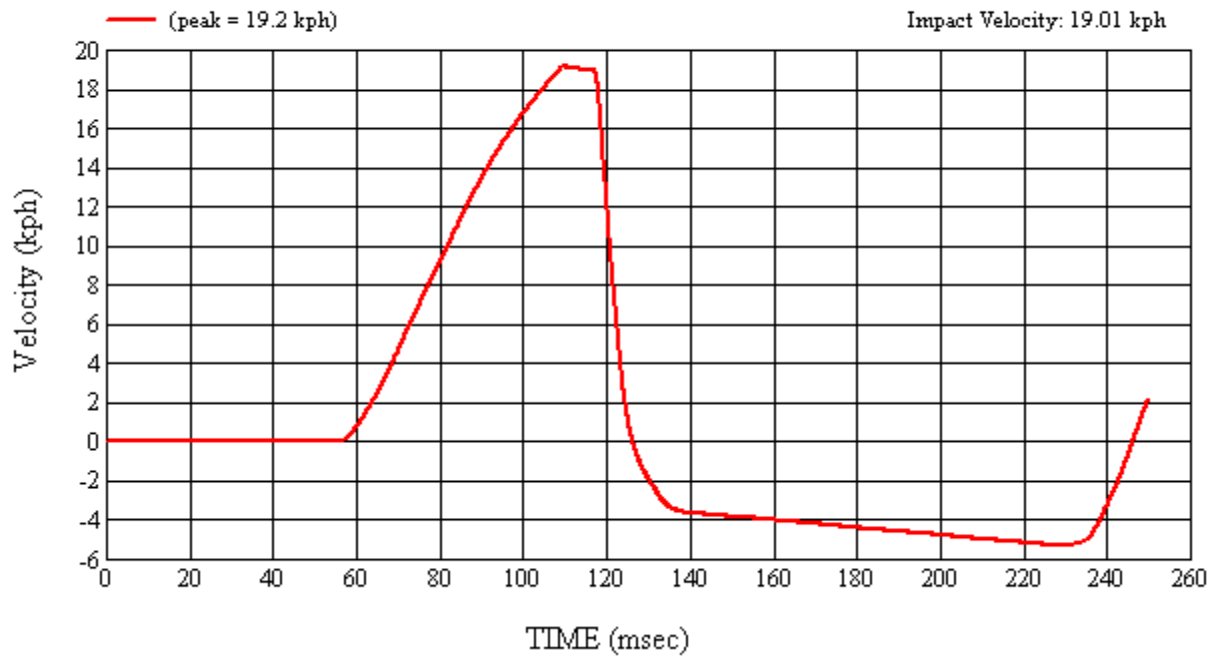
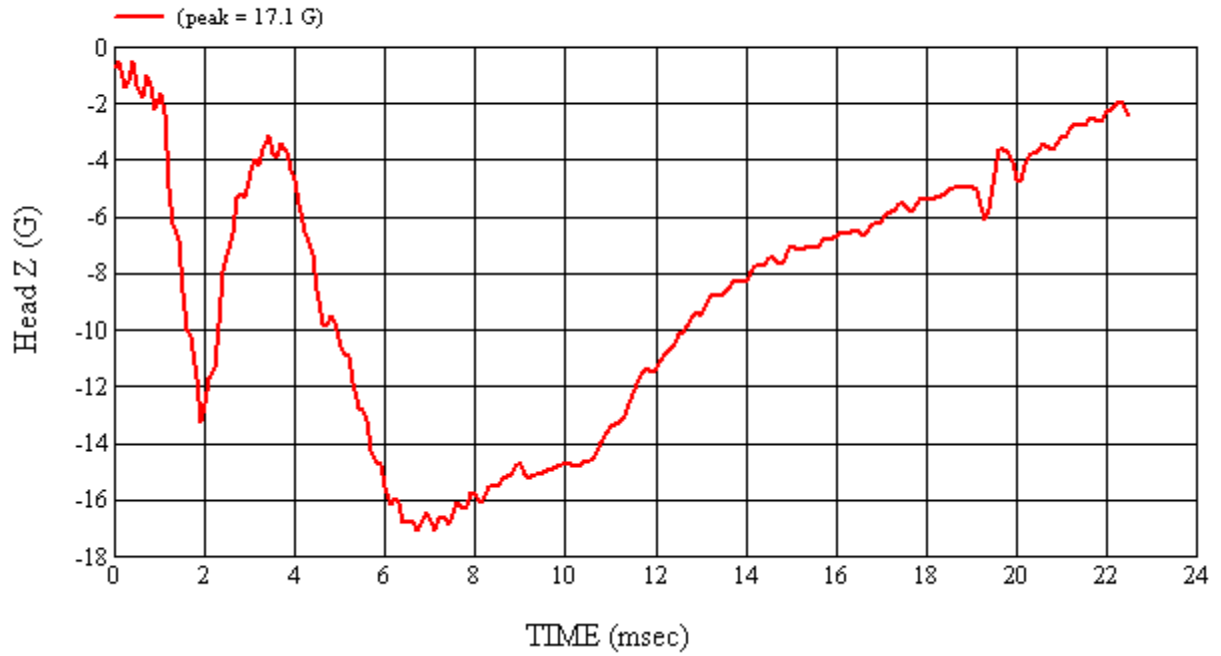
MGA Test #: U11273

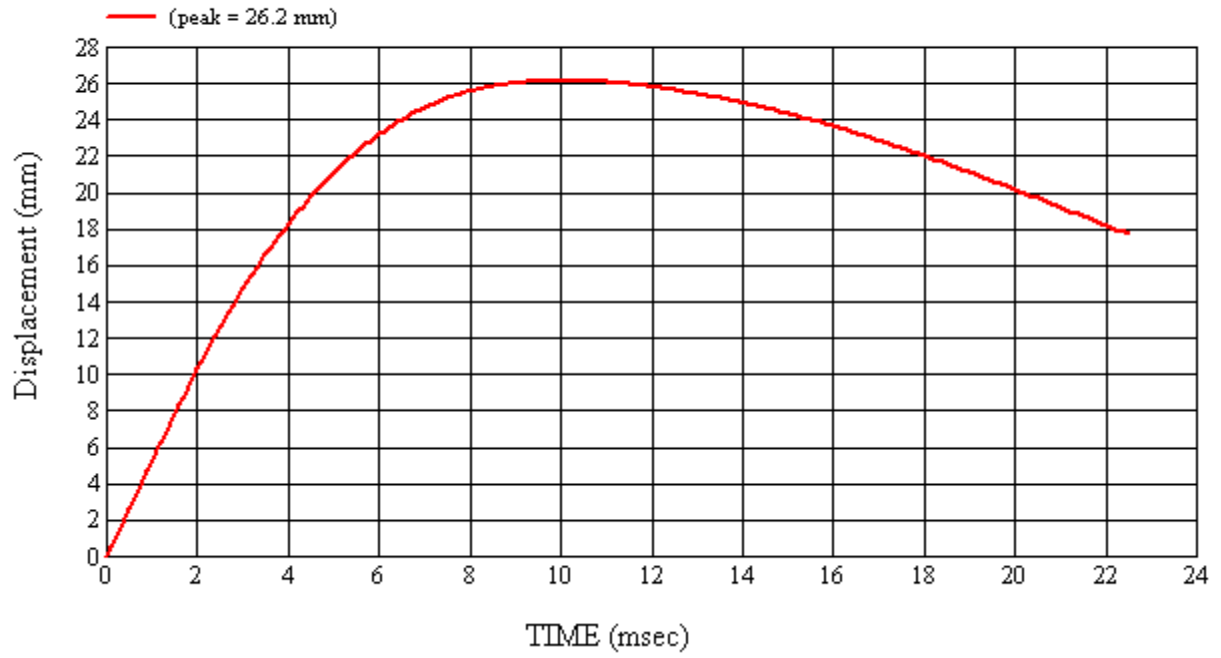
Target Location: SR3-3, Right Side

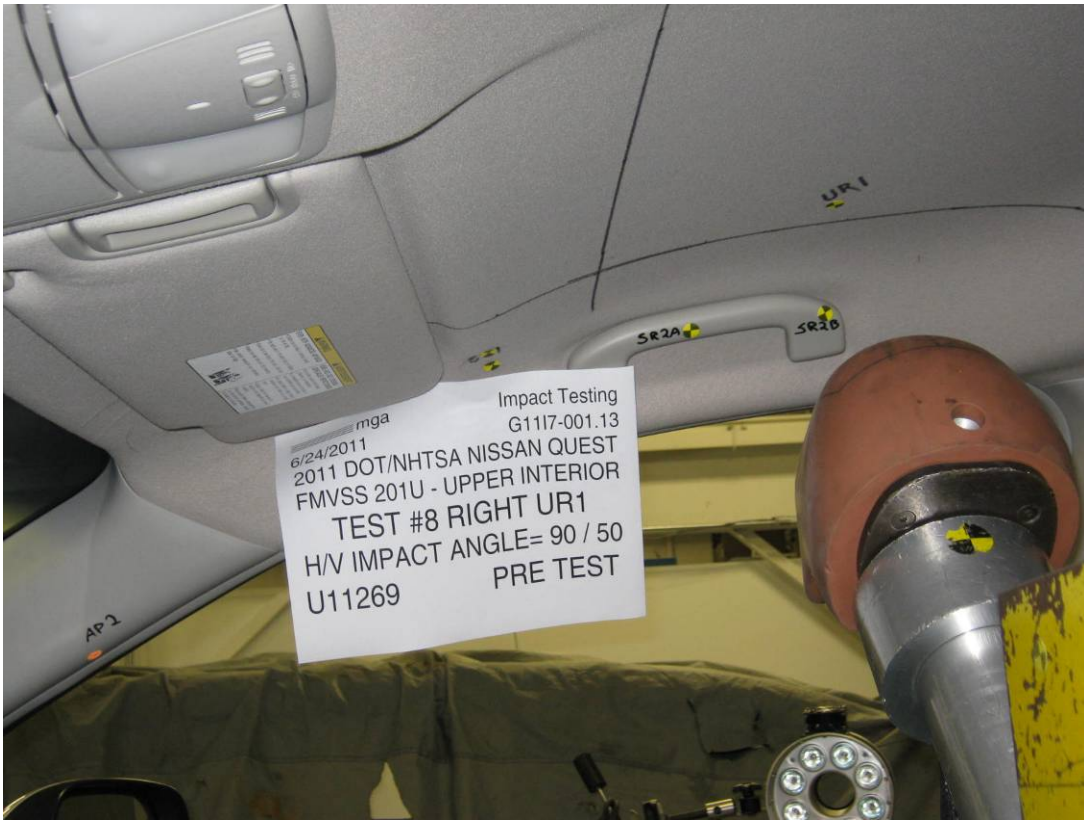
Test Date: 6/24/2011

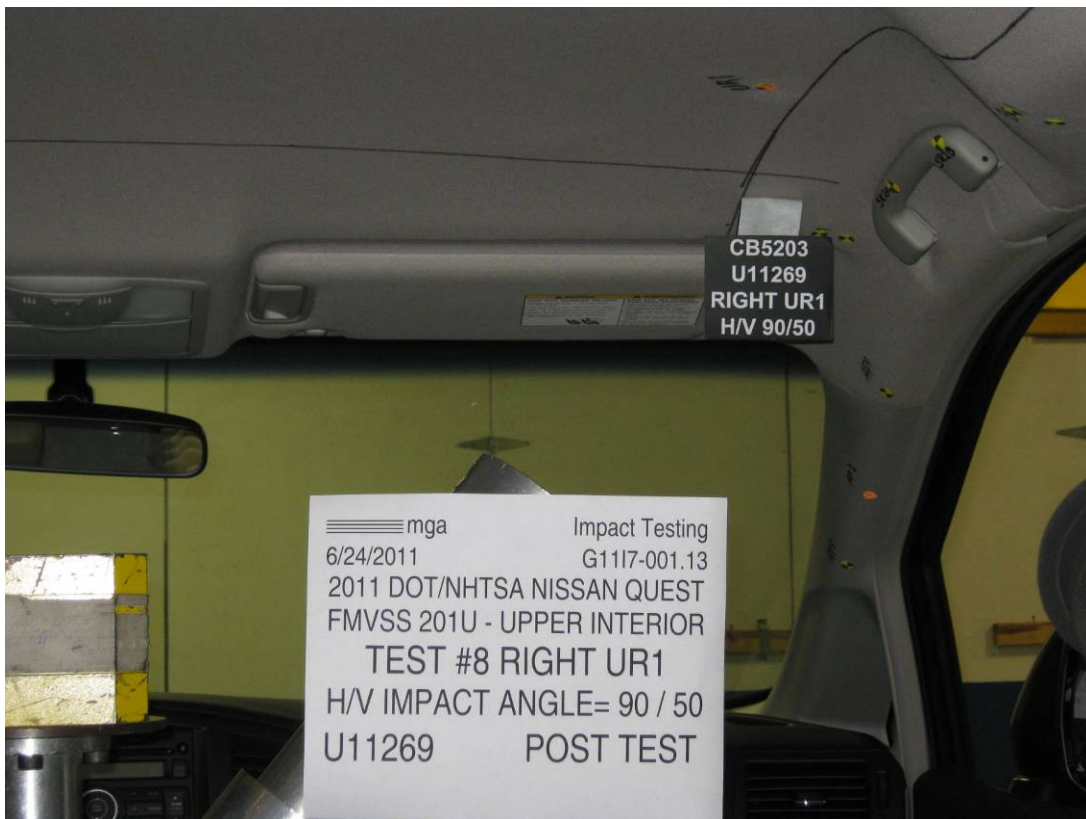


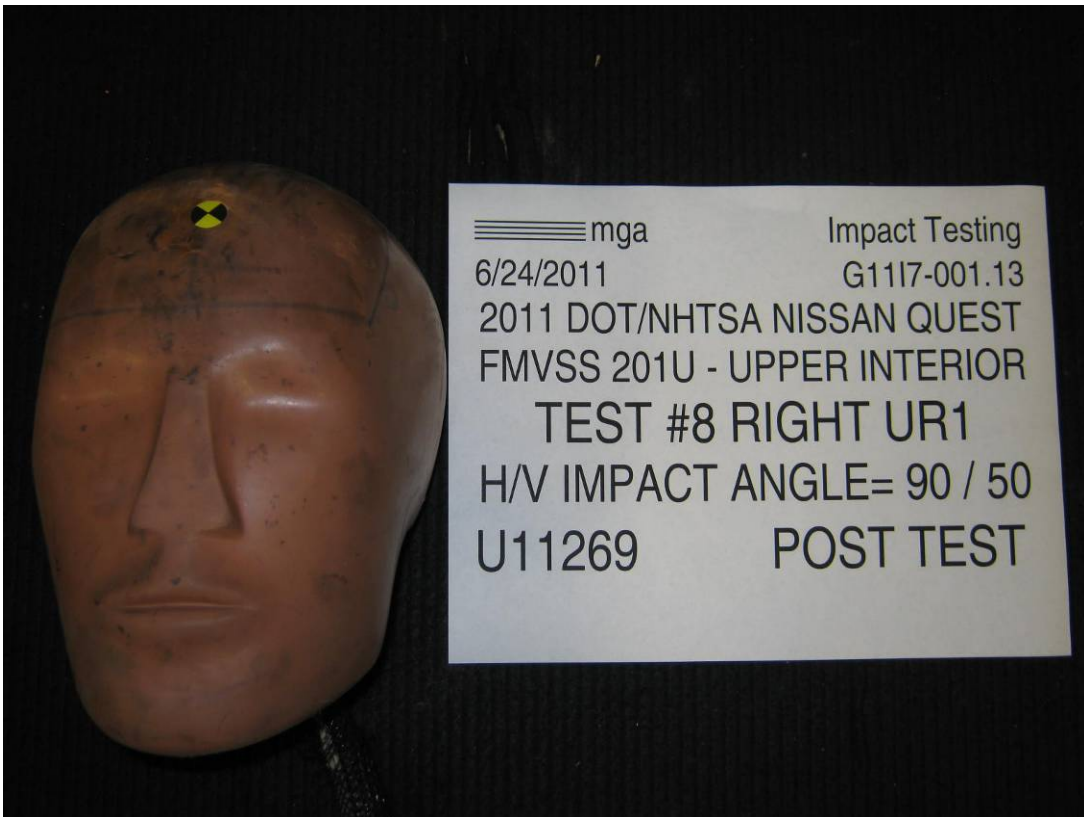












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): UR1Right

Temperature:21.1C

MGA Test Reference No.:U11269

Humidity:62.7%

Approach Horizontal Angles:90°

Time of Test:10:02:54 AM

Approach Vertical Angles:50°

FMH Serial No:[038]

Additional Description:@ SR2B

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
592	564	8.2	23.4	32	3 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.07	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

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

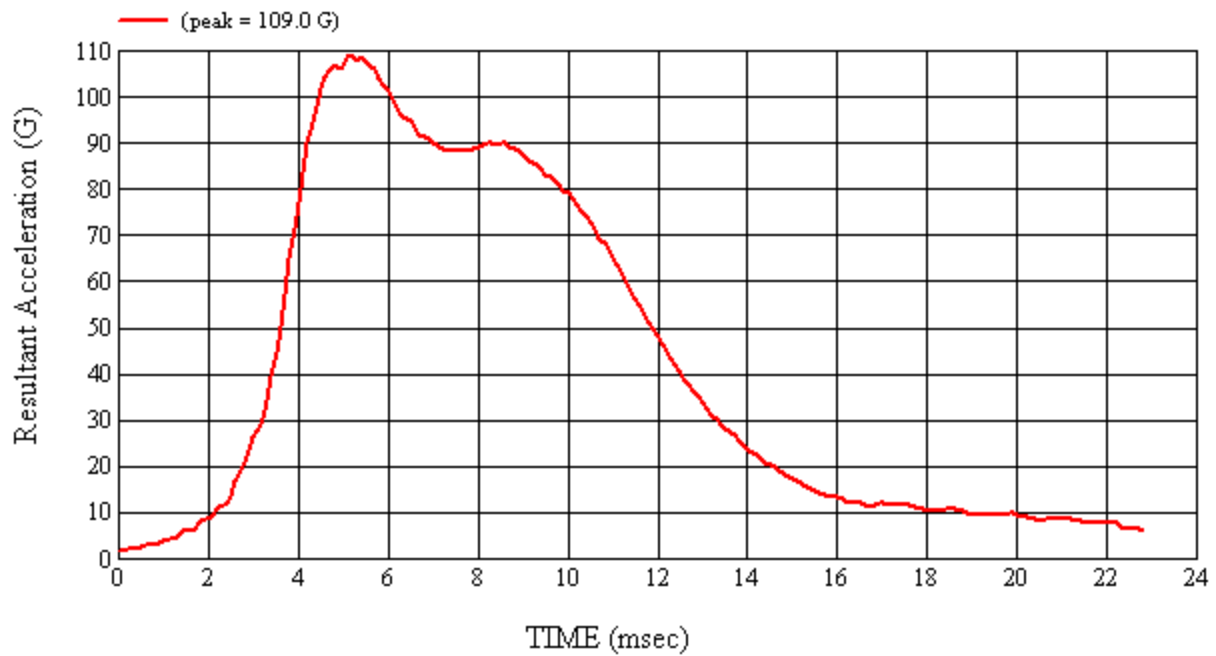
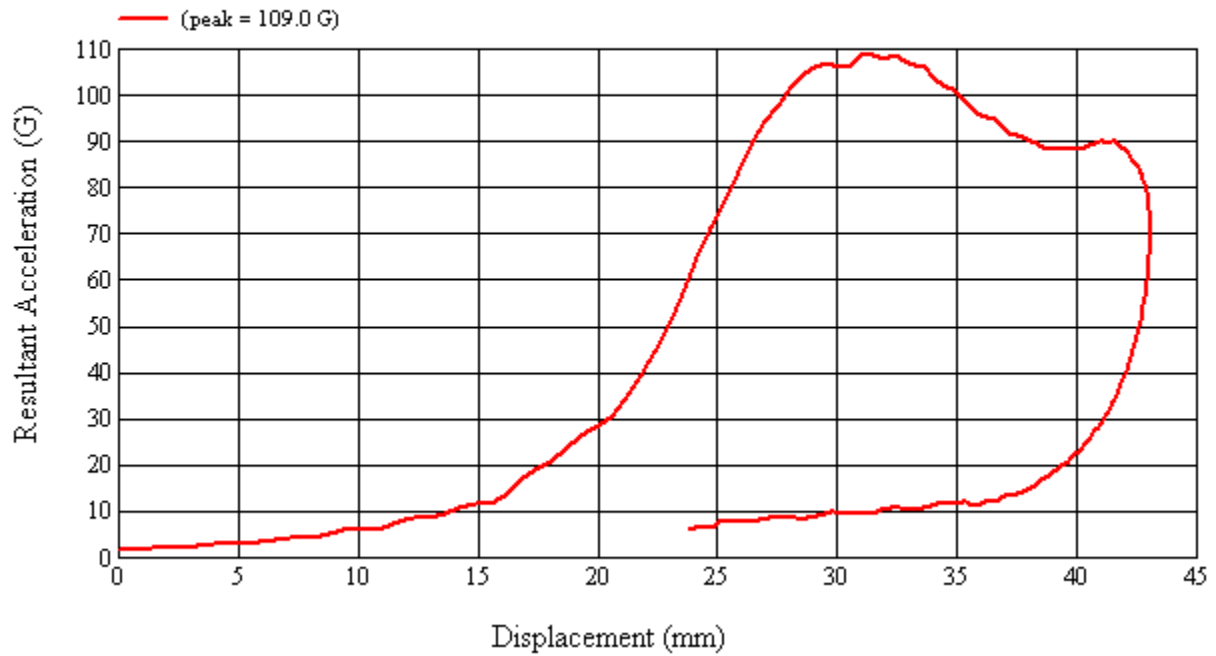
Headliner deformation, dislodged headliner

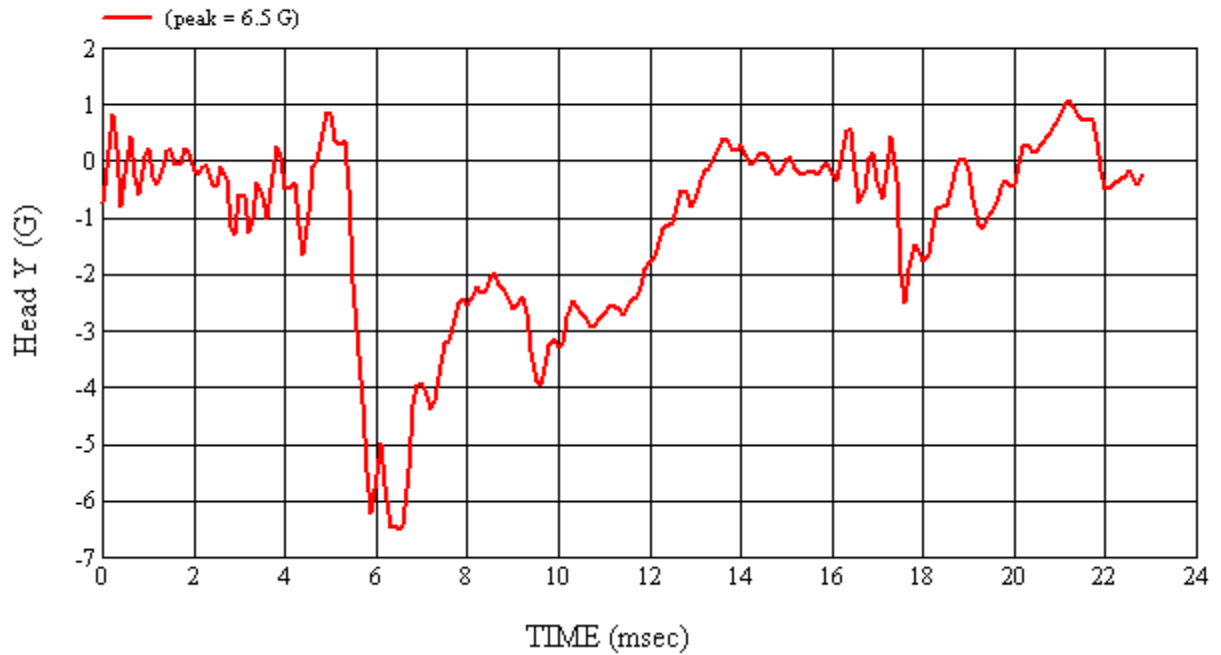
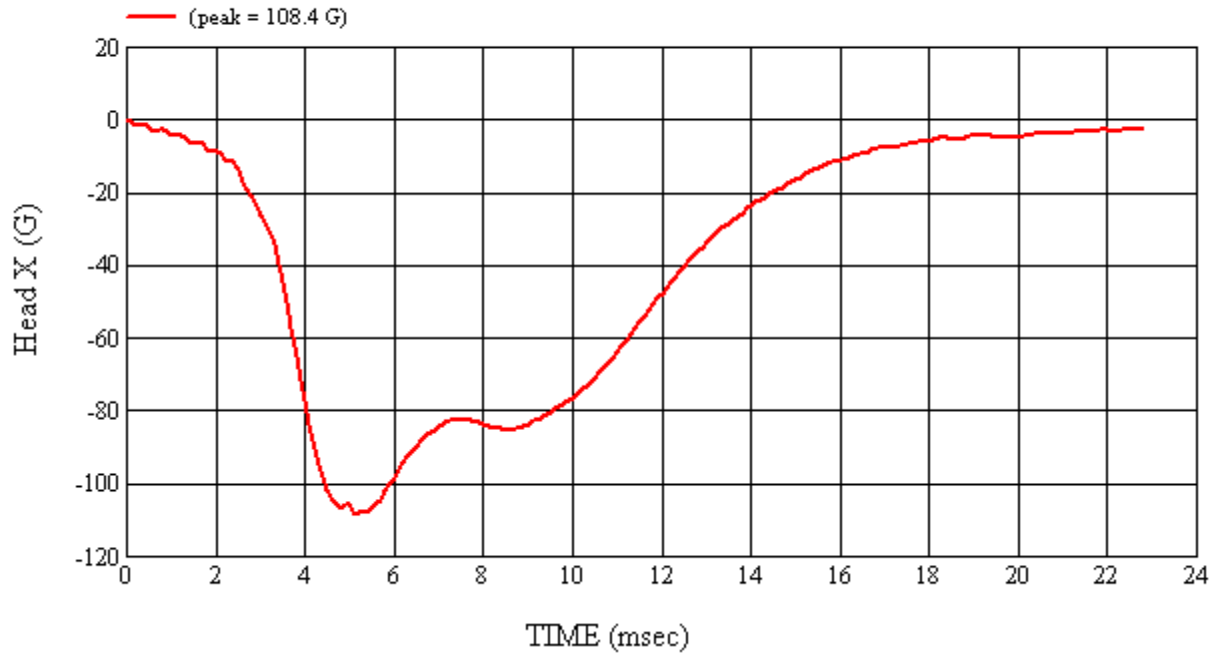
Recorded By:  Approved By*:  Date: 6/24/2011
 *Only necessary for NHTSA (Government) Compliance testing.

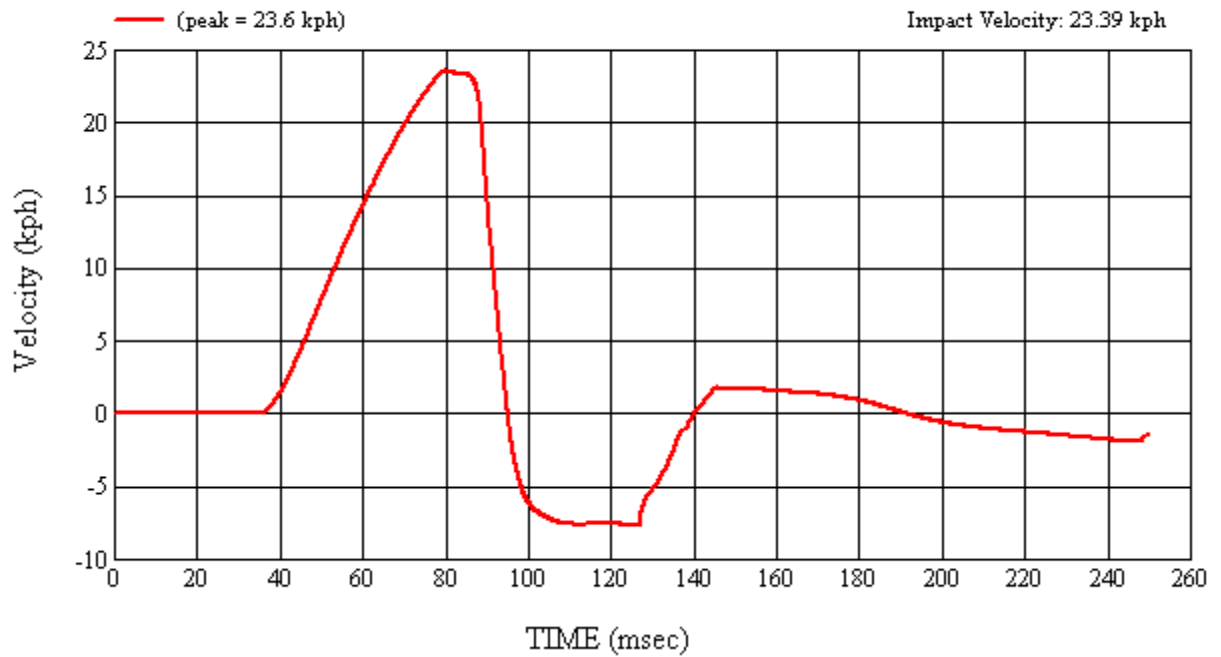
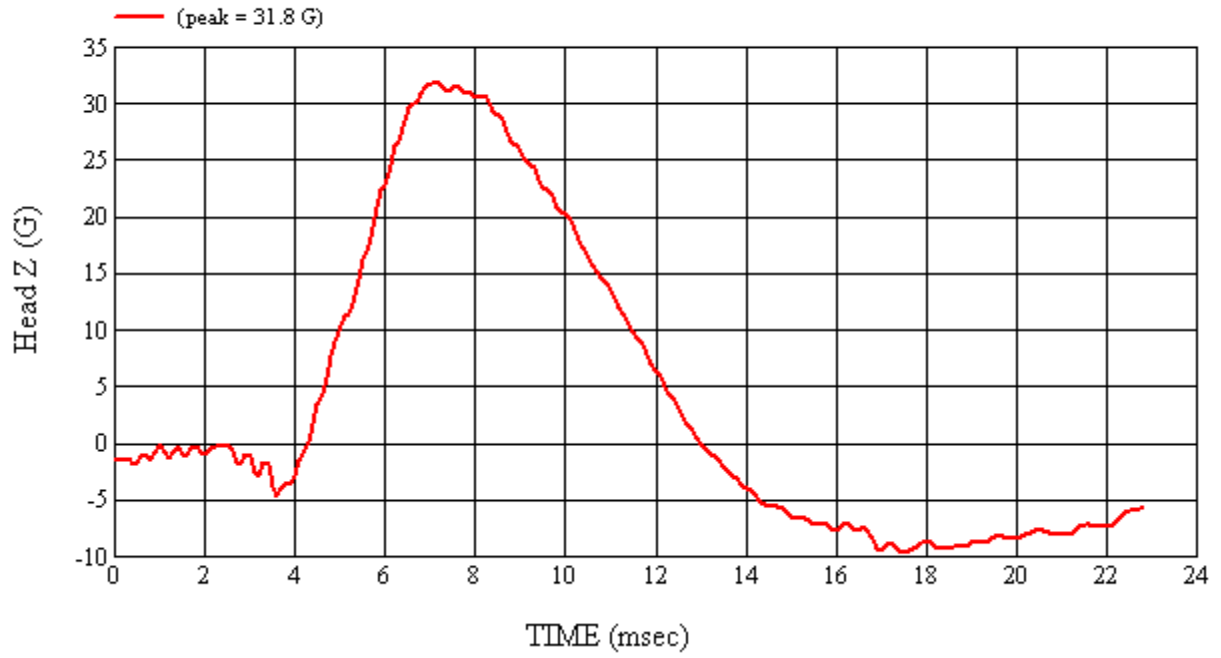
MGA Test #: U11269

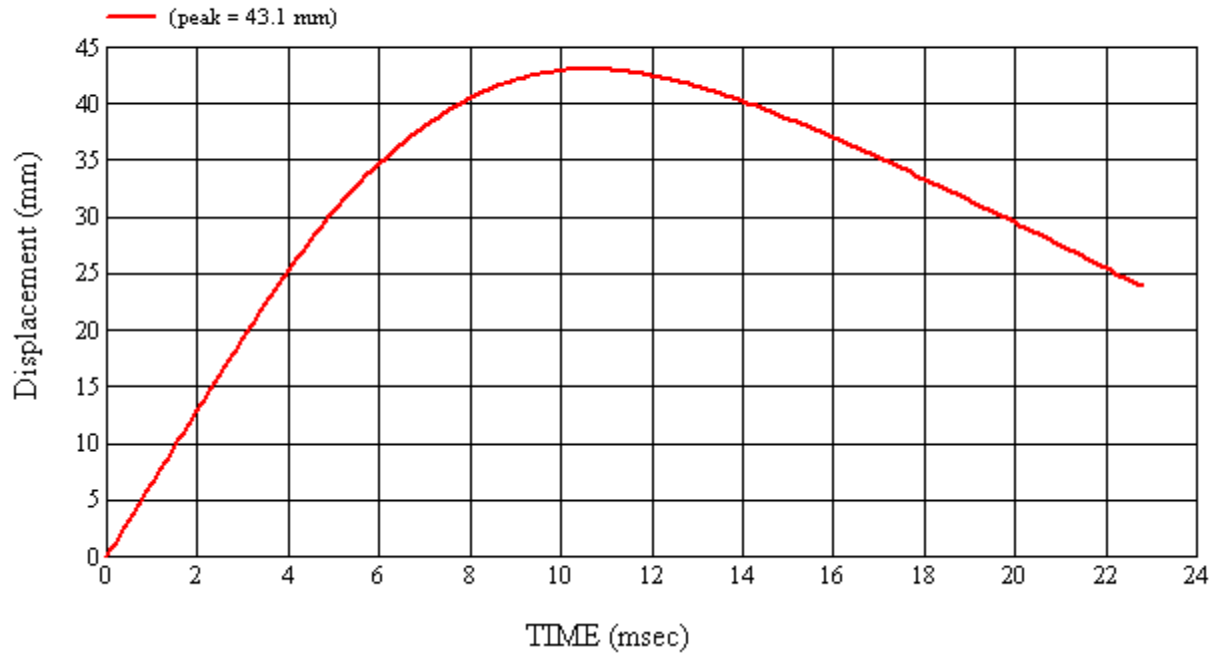
Target Location: UR1, Right Side

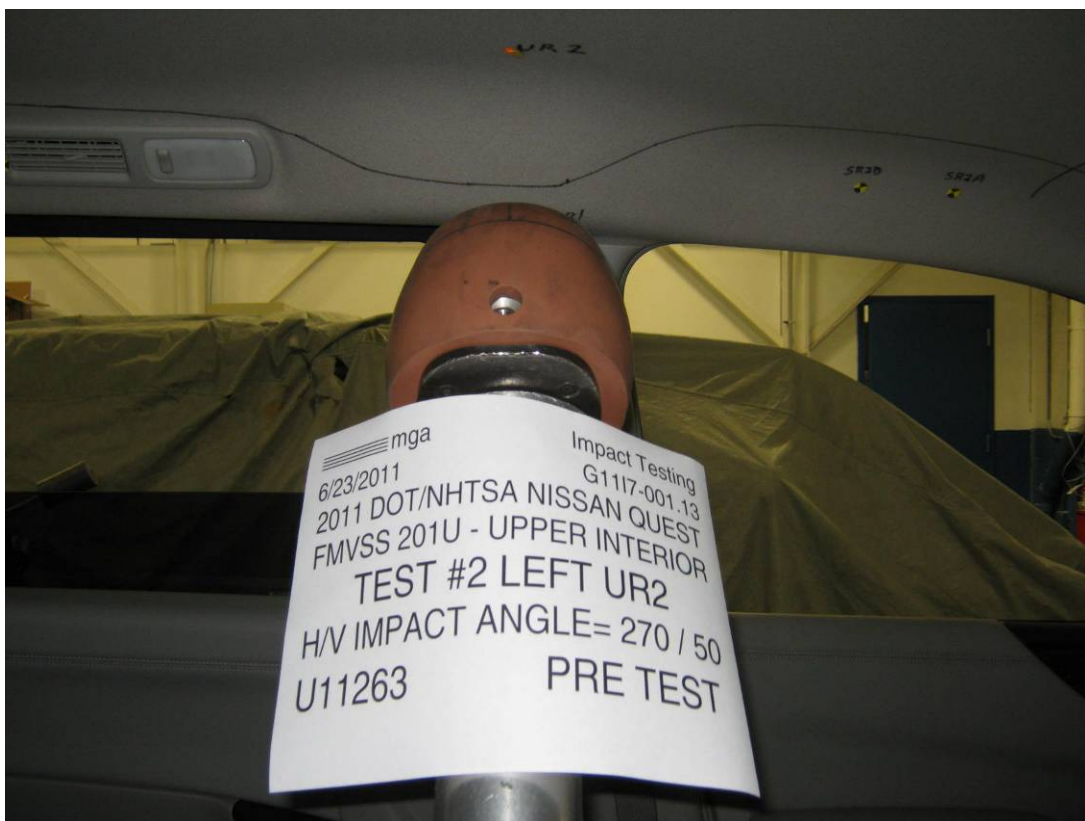
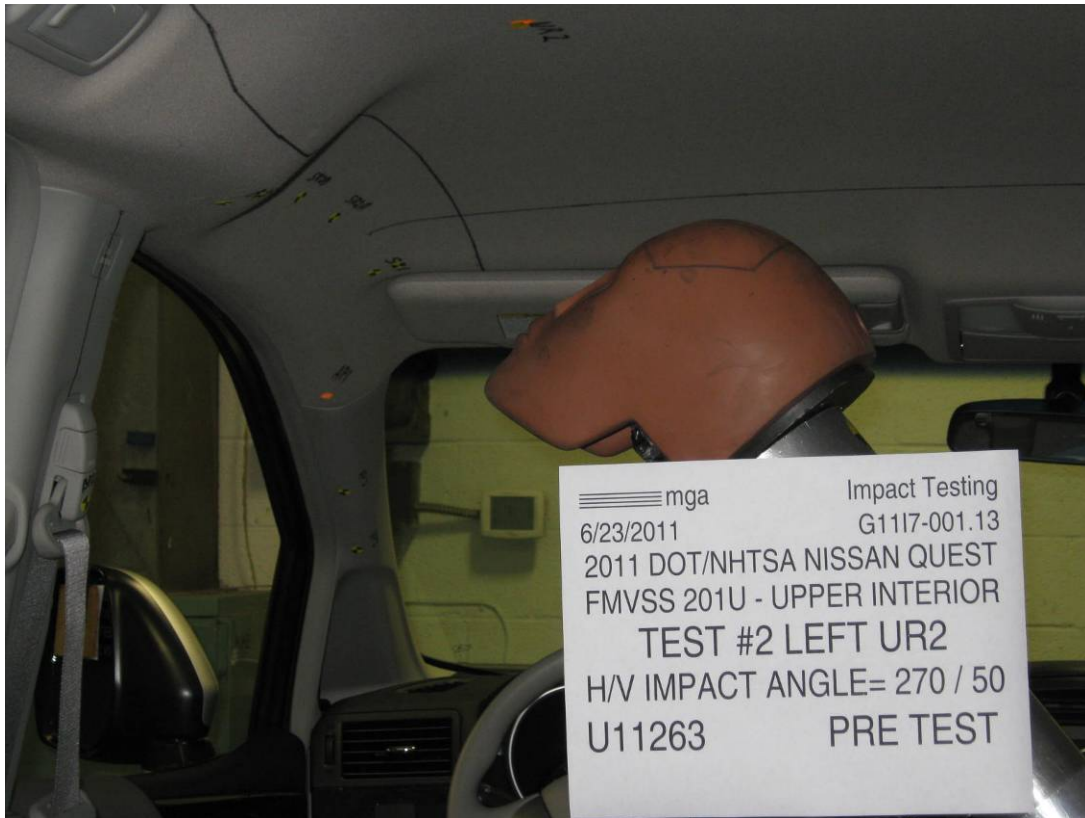
Test Date: 6/24/2011

















==== mga

Impact Testing

6/23/2011

G1117-001.13

2011 DOT/NHTSA NISSAN QUEST

FMVSS 201U - UPPER INTERIOR

TEST #2 LEFT UR2

H/V IMPACT ANGLE= 270 / 50

U11263

POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR2Left

MGA Test Reference No.:U11263

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Additional Description:@ BP

Test Number:#2

Temperature:21.6C

Humidity:66.4%

Time of Test:10:56:17 AM

FMH Serial No:[038]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
485	422	7	23.6	34	1 Right

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.07	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

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

Headliner deformation, dislodged headliner

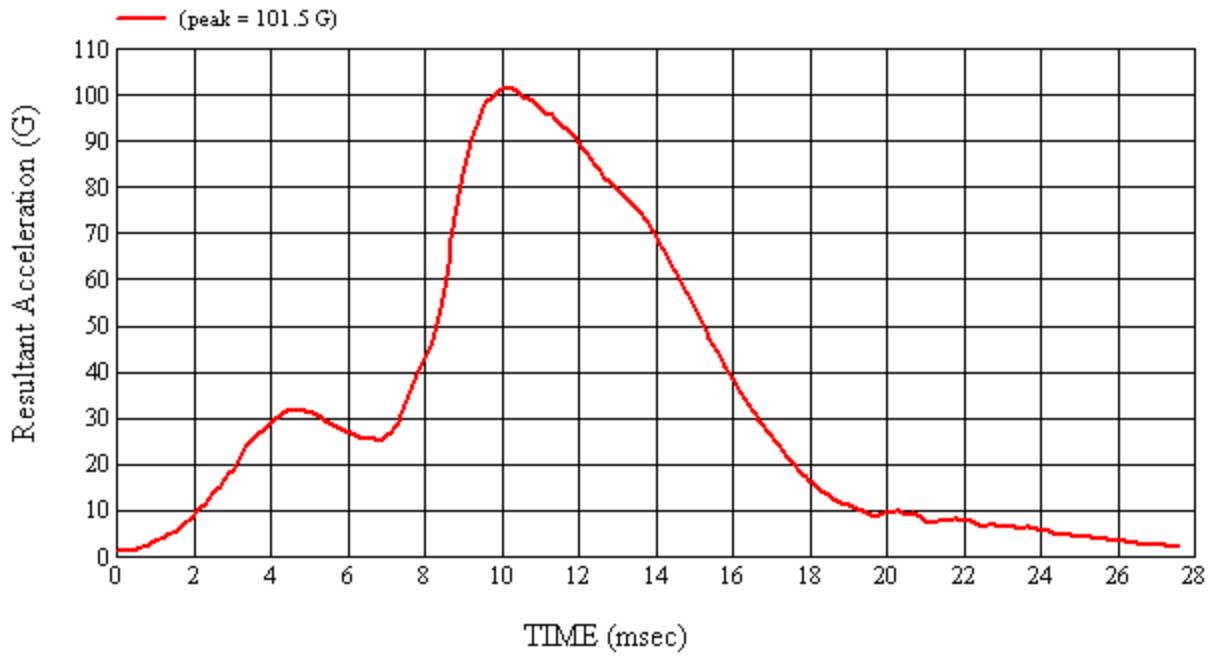
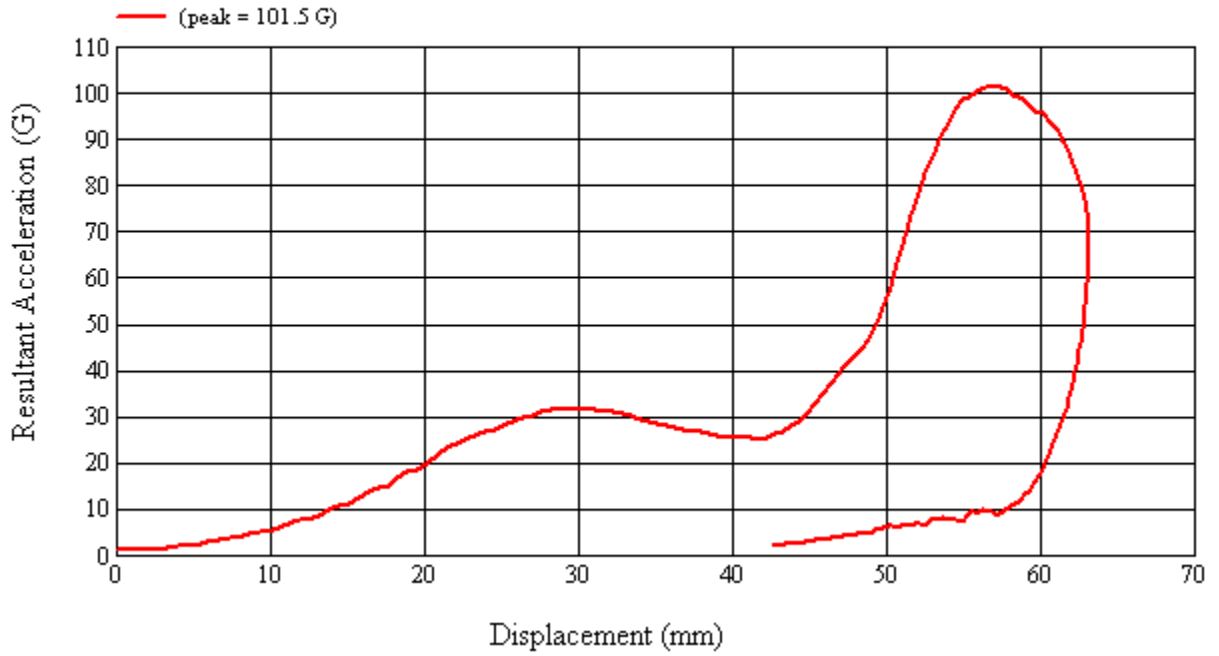
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/23/2011

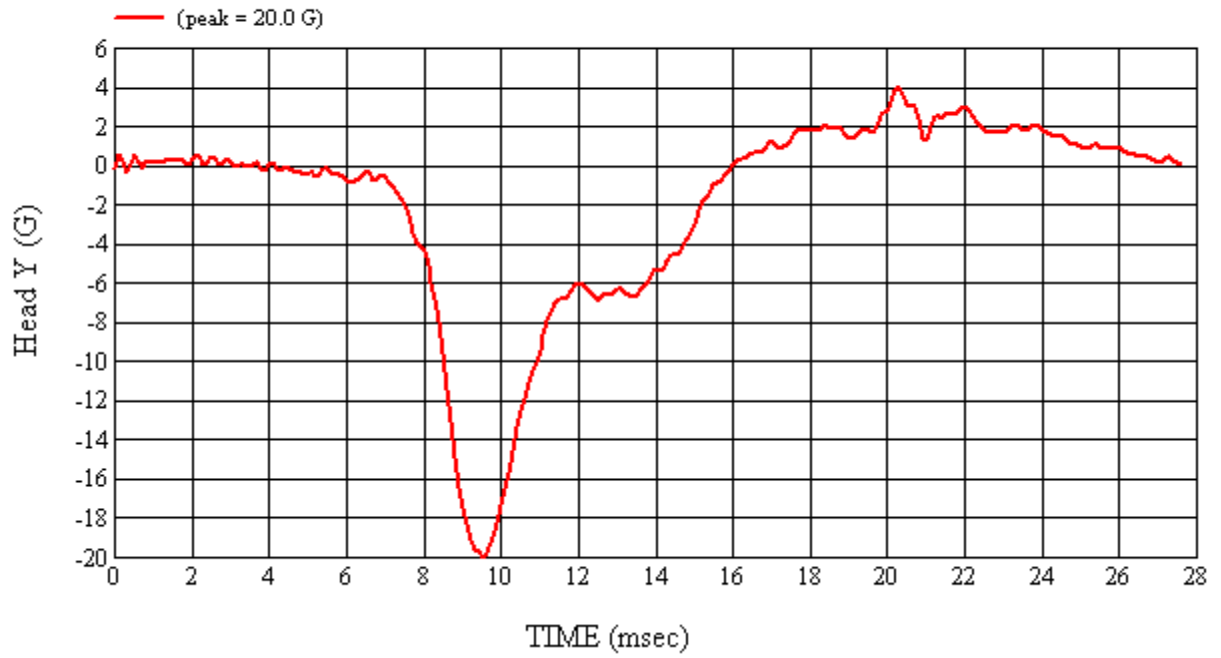
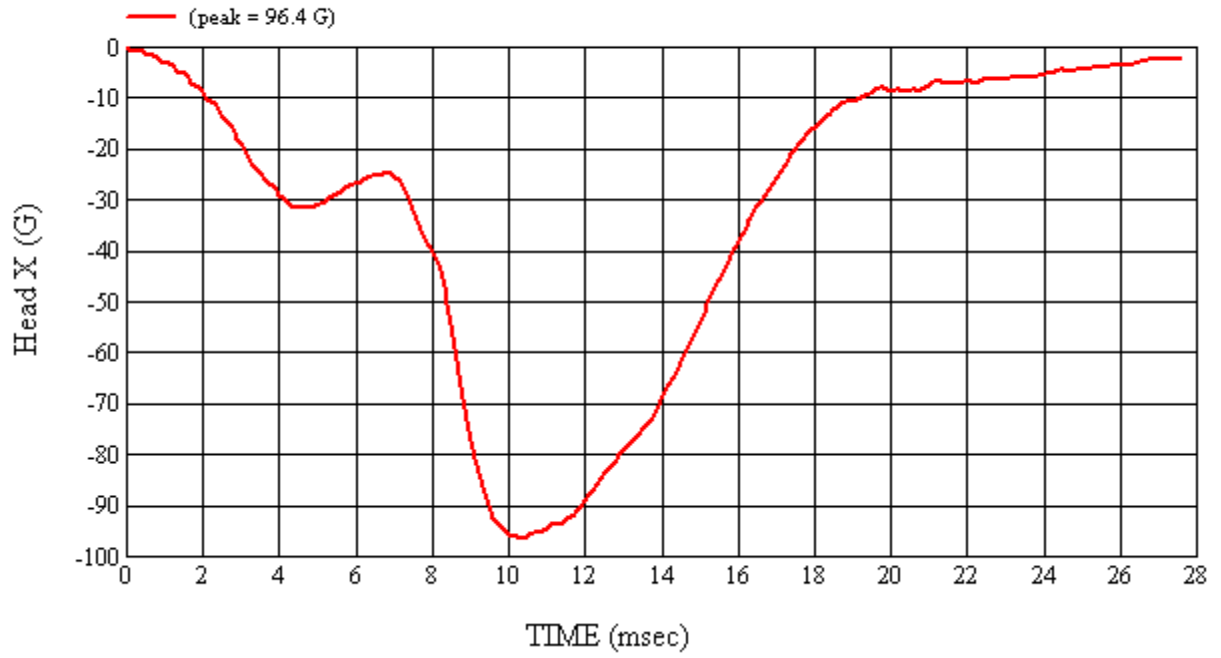
*Only necessary for NHTSA (Government) Compliance testing.

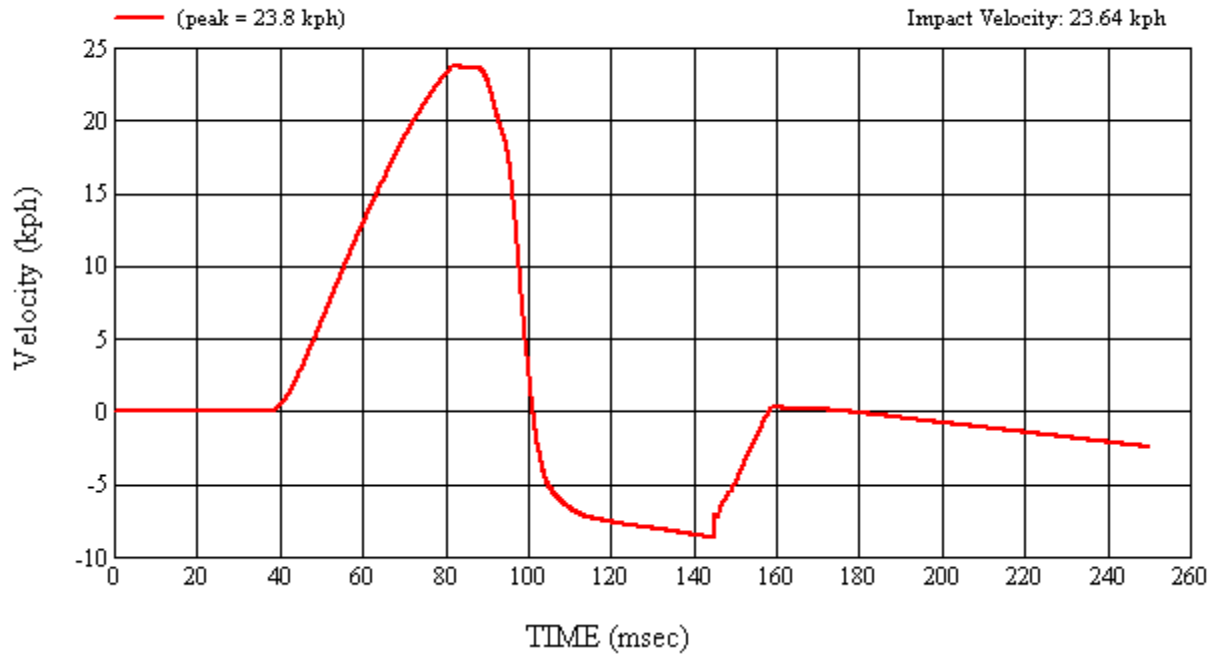
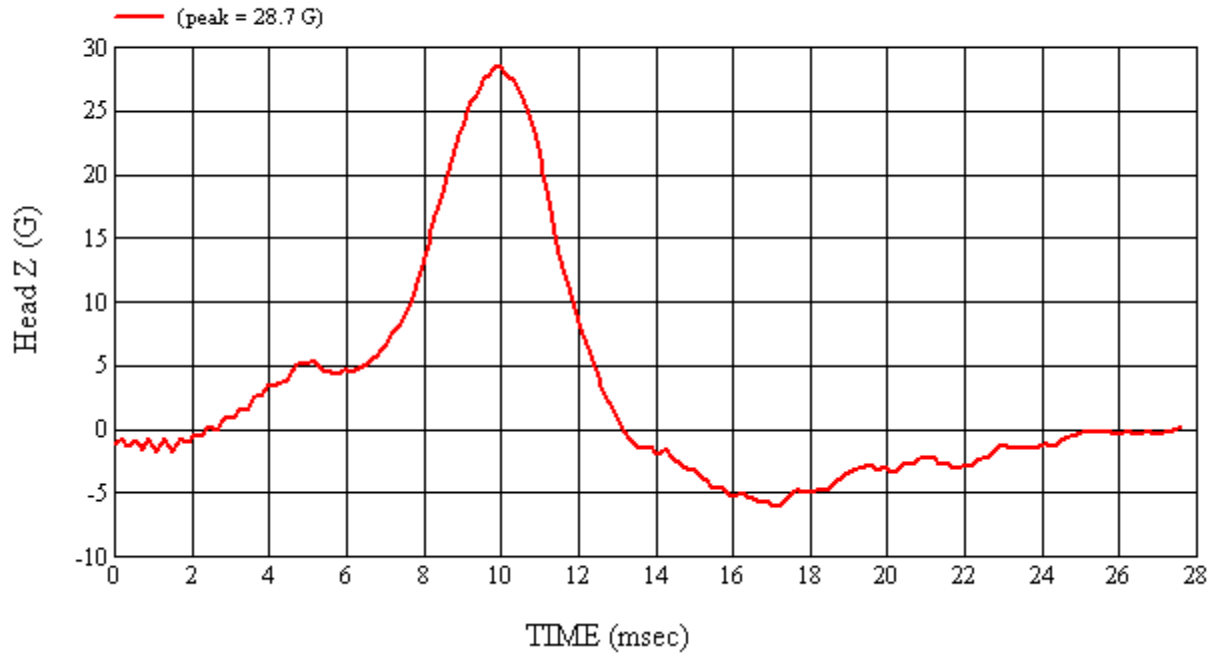
MGA Test #: U11263

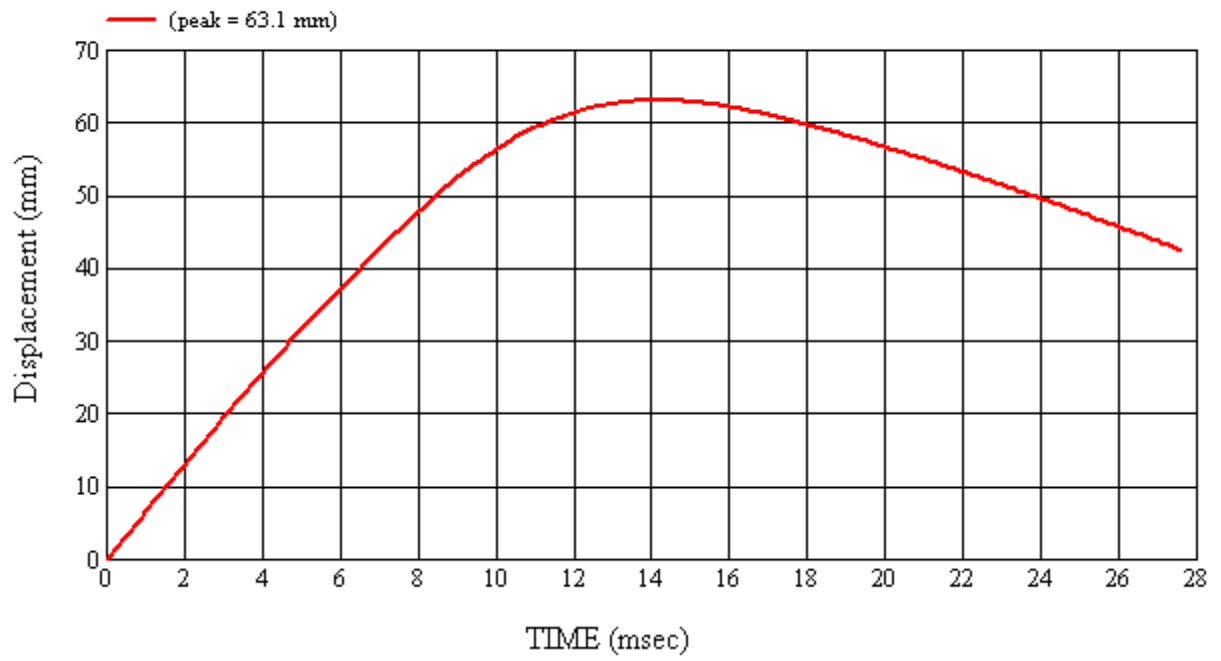
Target Location: UR2, Left Side

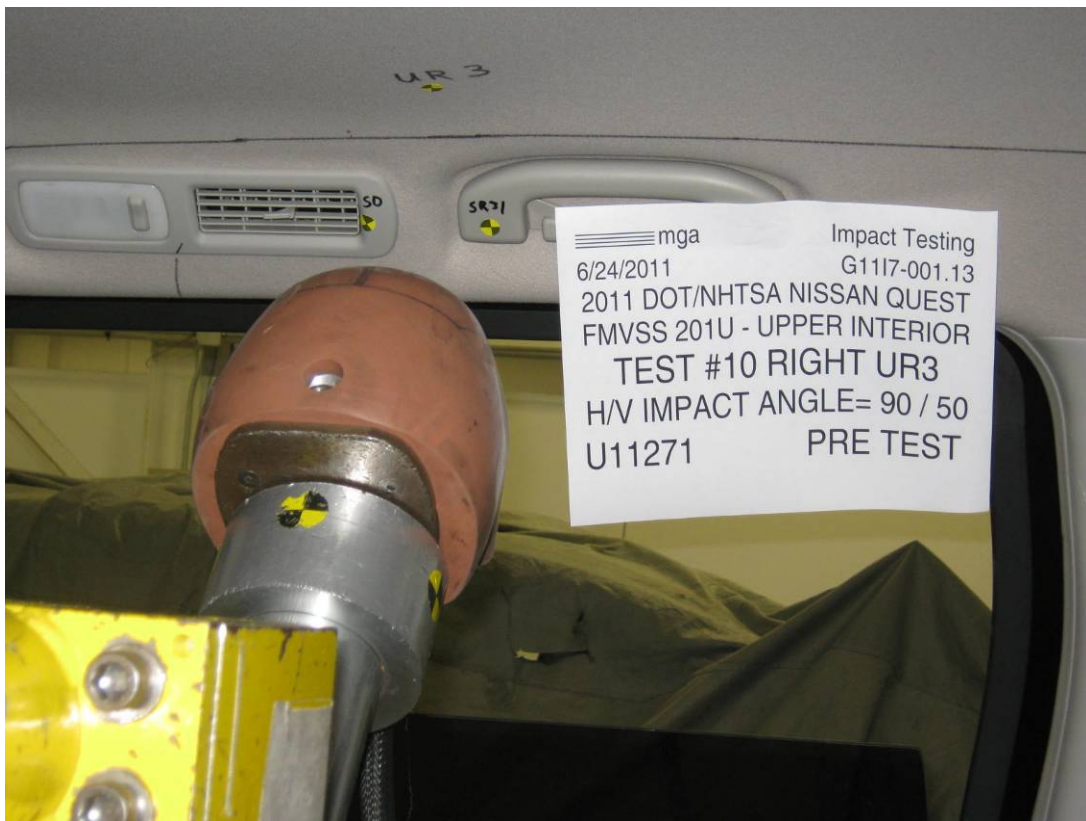
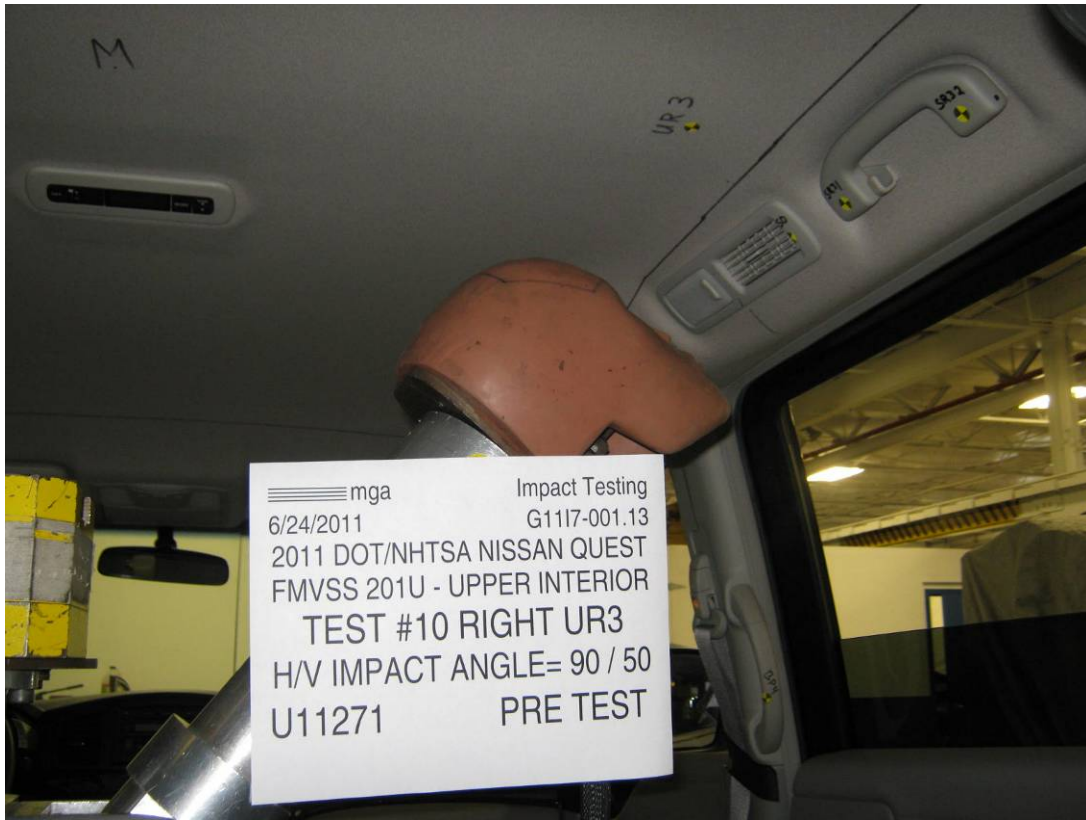
Test Date: 6/23/2011



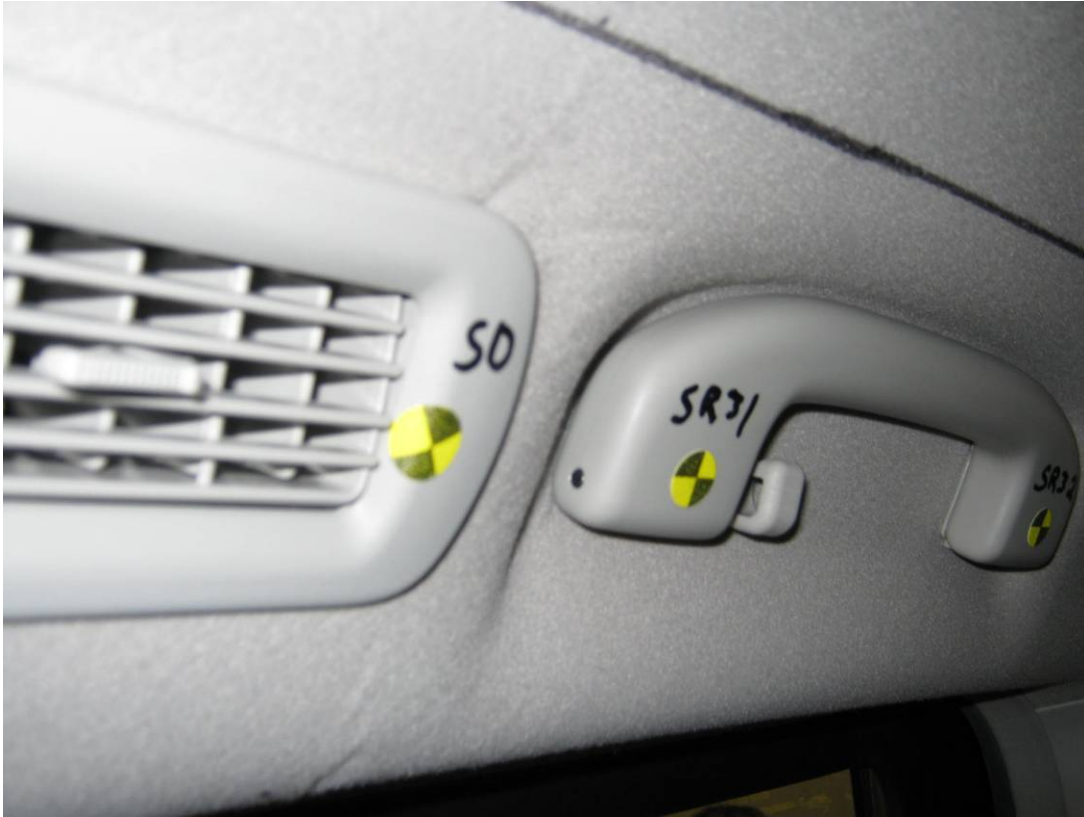












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR3Right

MGA Test Reference No.:U11271

Approach Horizontal Angles:90°

Approach Vertical Angles:50°

Additional Description:@ SR3-1

Test Number:#10

Temperature:21.0C

Humidity:63.5%

Time of Test:12:46:33 PM

FMH Serial No:[037]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
637	624	8.4	23.5	34	13 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.07	1.07
Y	6	J14103	93.9	0.85	0.85
Z	7	J35800	97.8	0.94	0.94

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

Headliner deformation

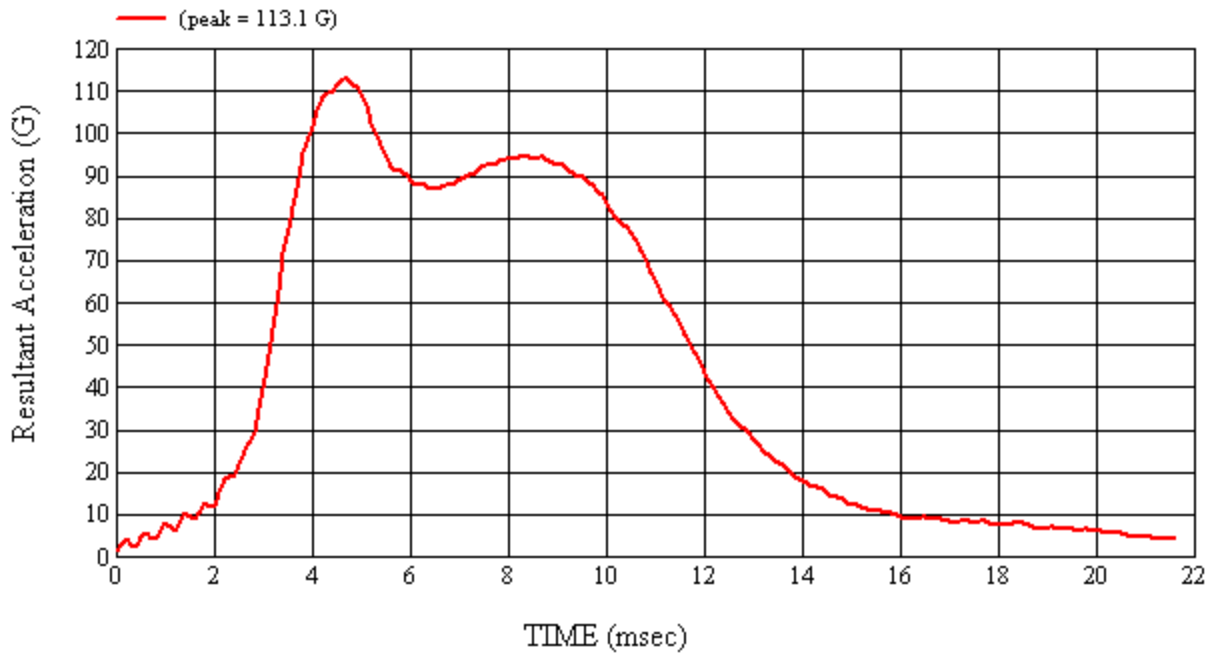
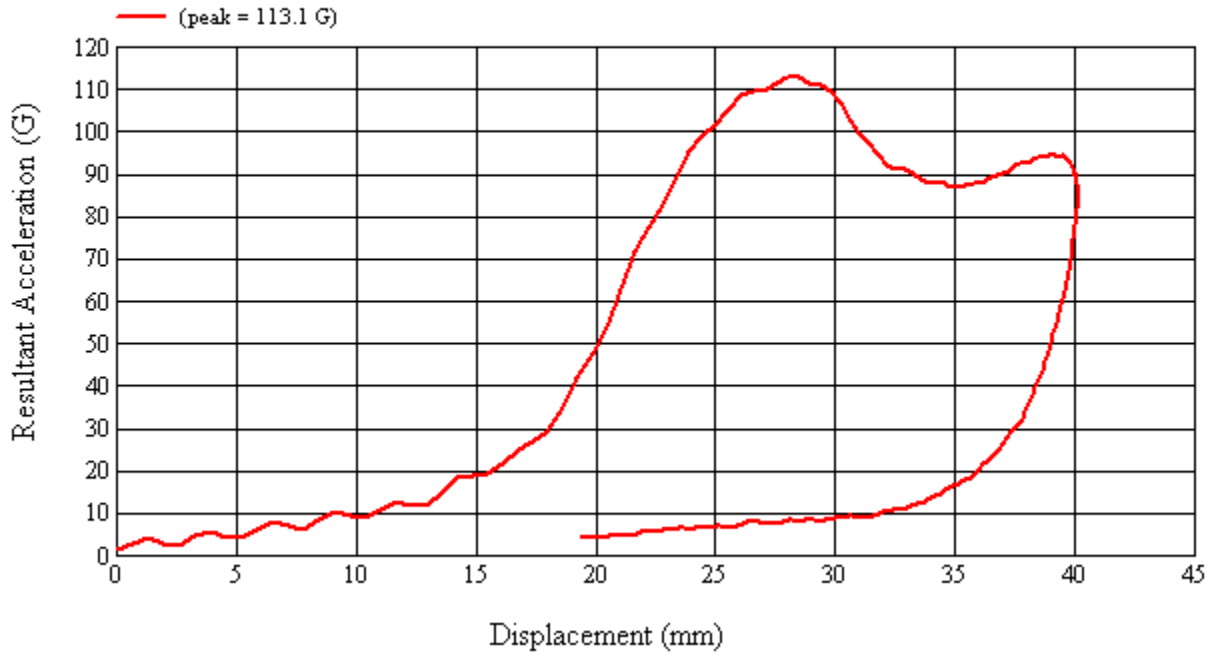
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/24/2011

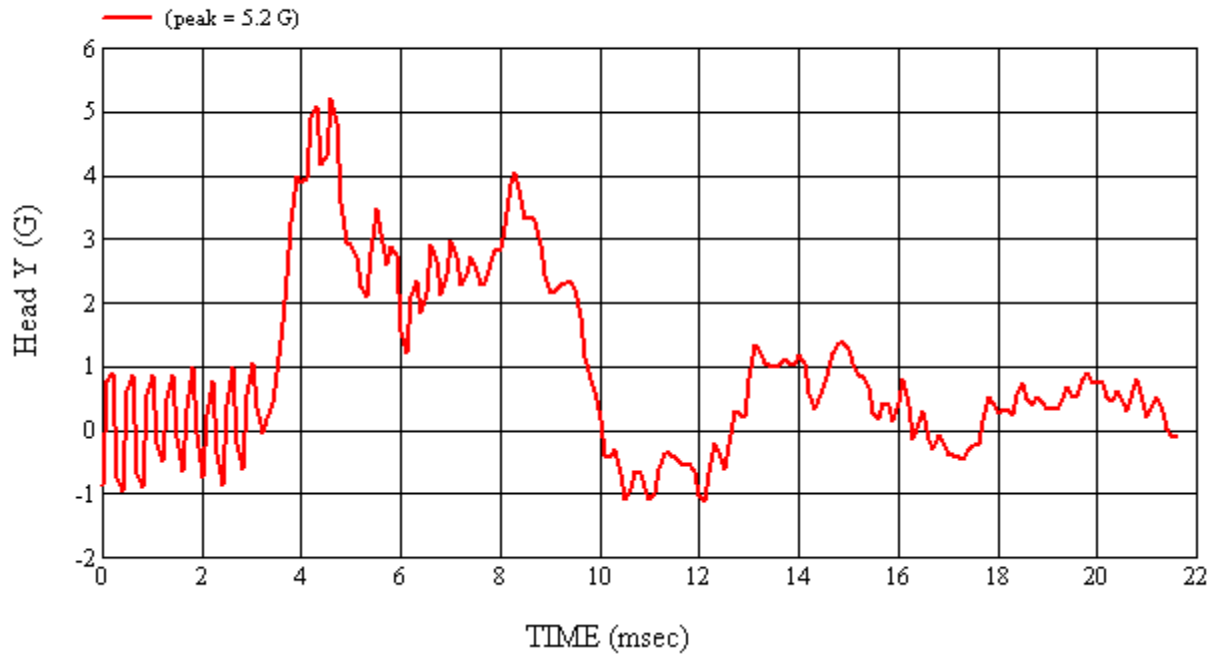
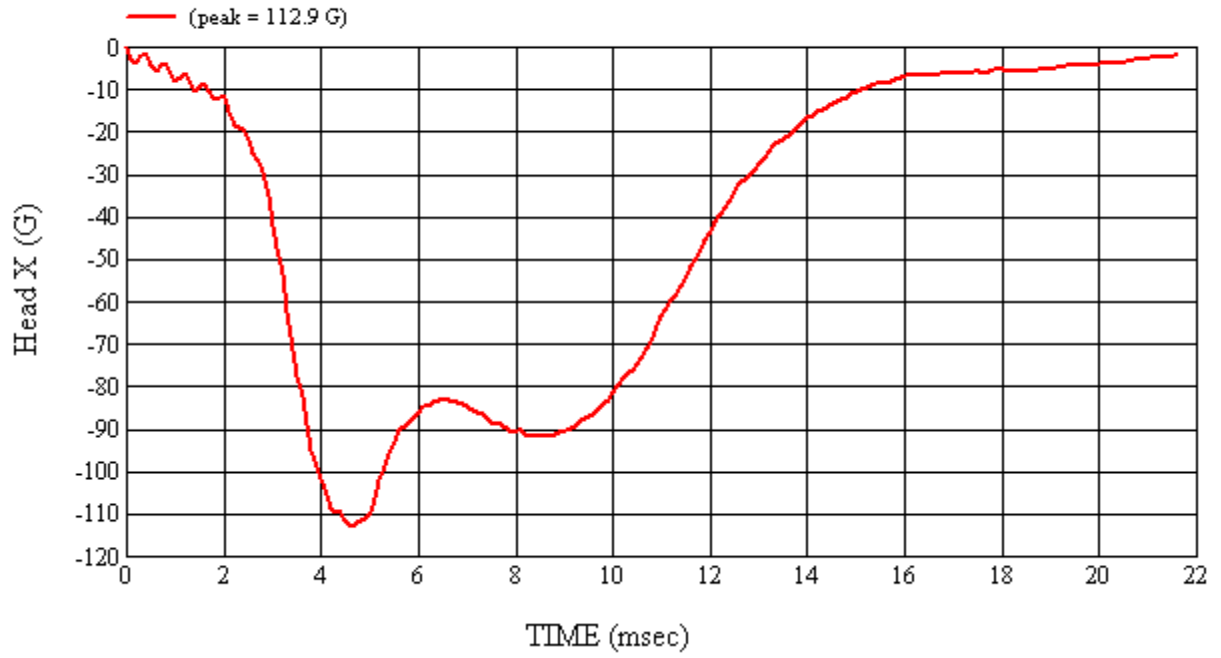
*Only necessary for NHTSA (Government) Compliance testing.

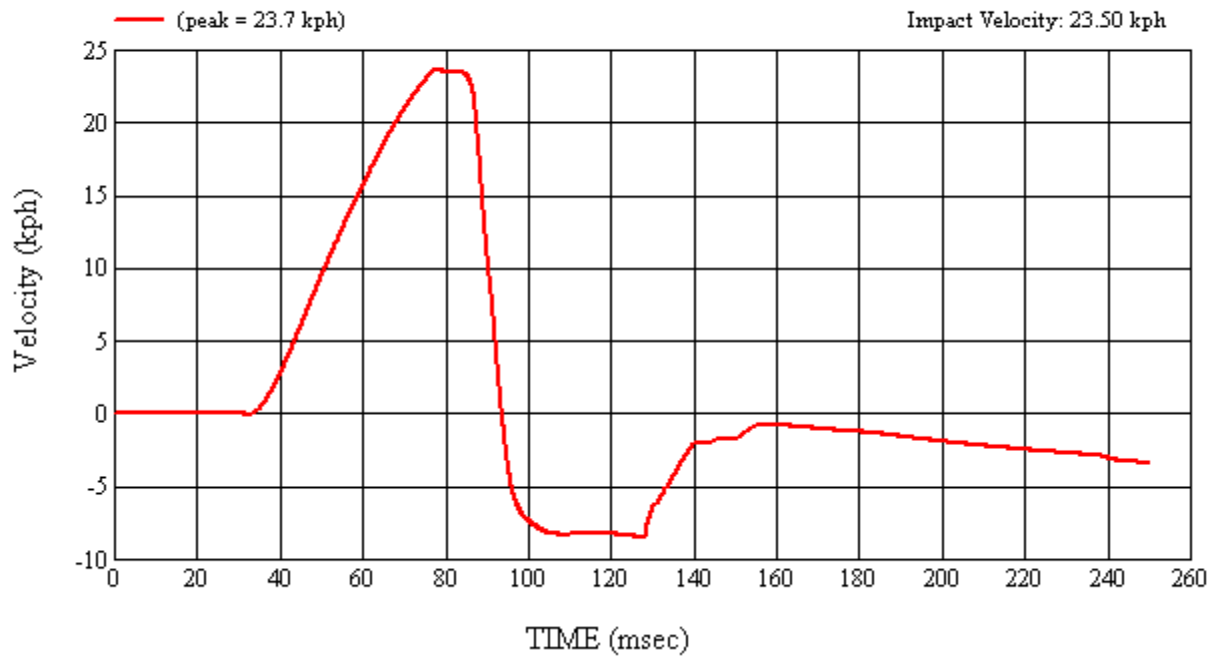
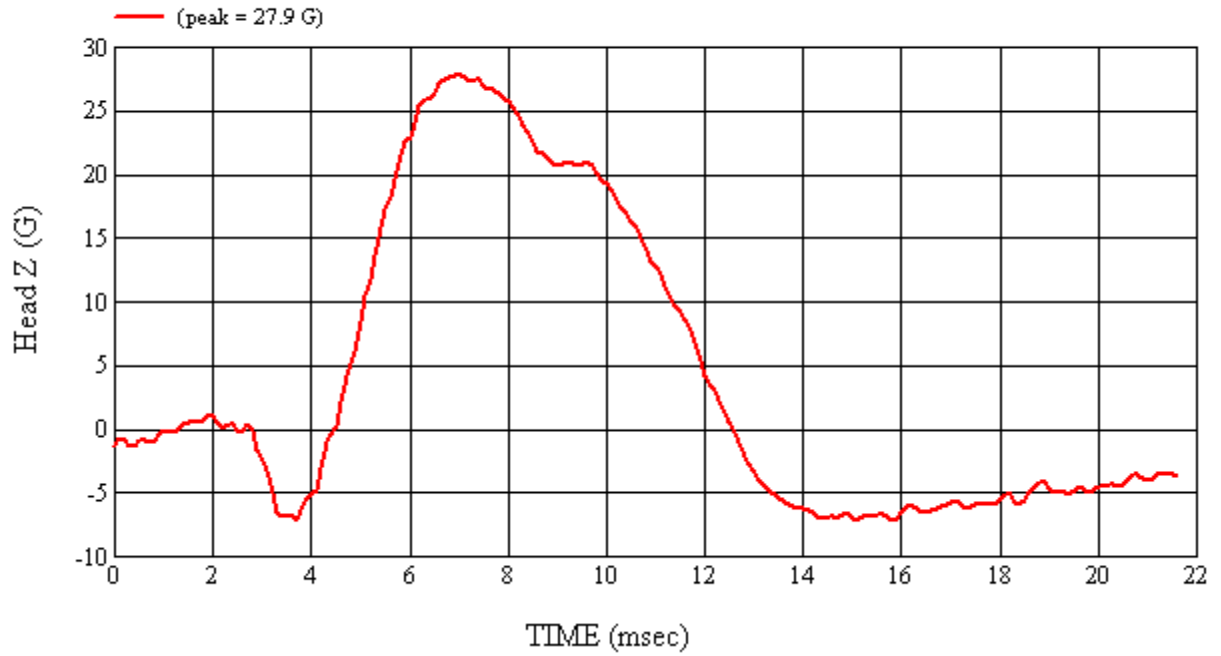
MGA Test #: U11271

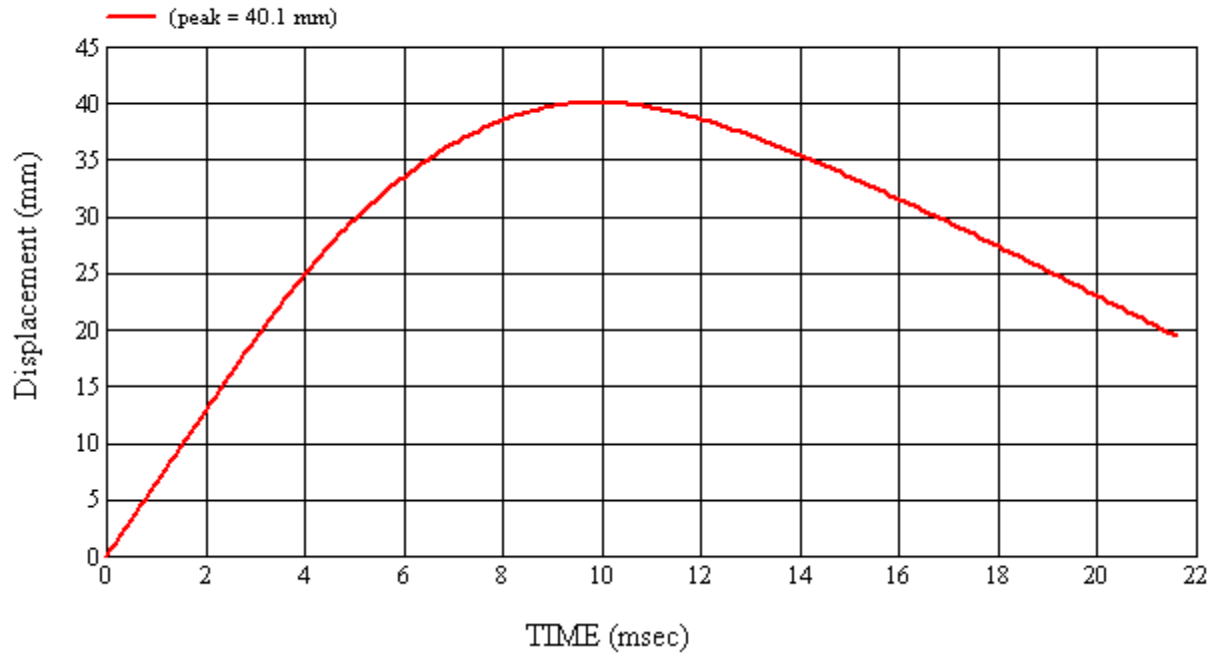
Target Location: UR3, Right Side

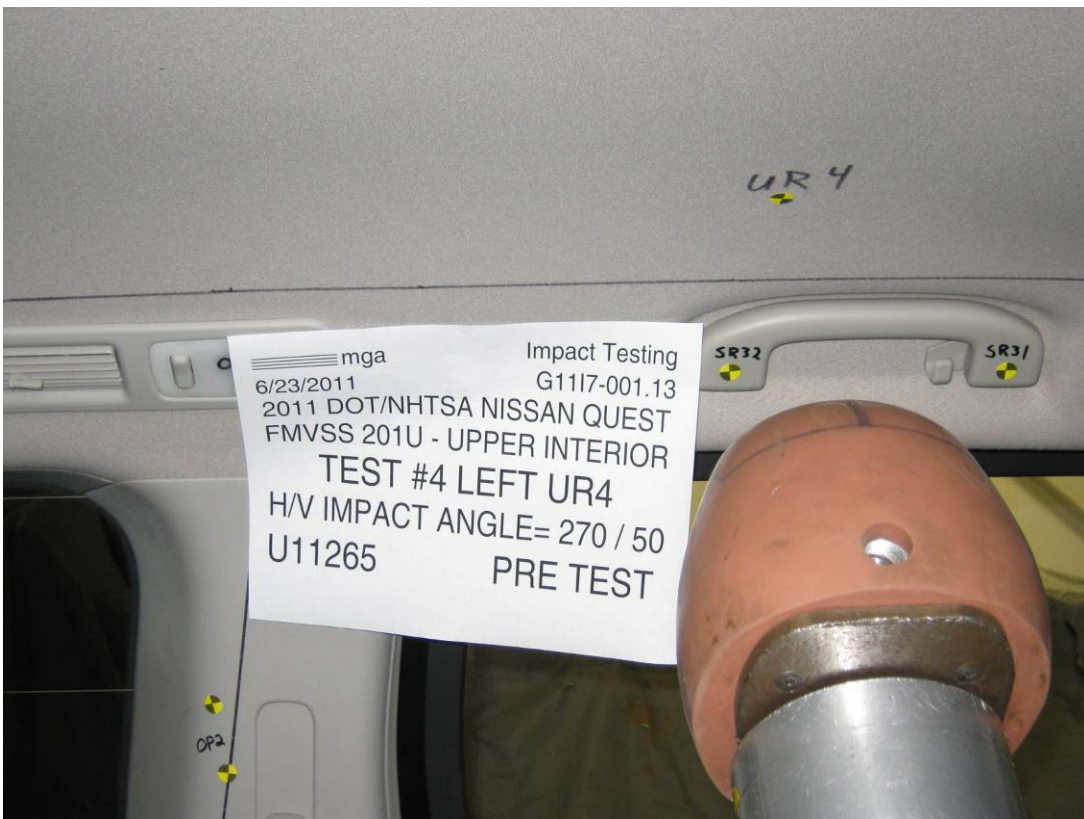
Test Date: 6/24/2011



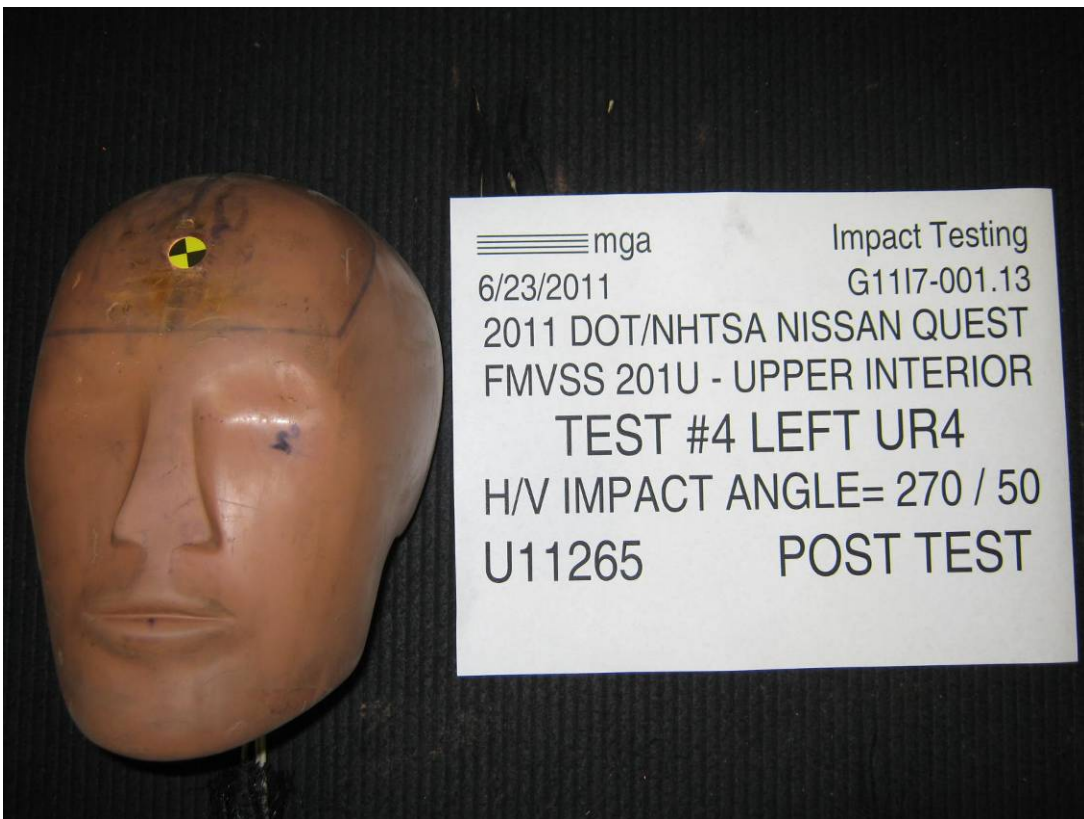












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR4Left

MGA Test Reference No.:U11265

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Additional Description:@ SR3-2

Test Number:#4

Temperature:21.8C

Humidity:66.8%

Time of Test:1:54:06 PM

FMH Serial No:[037]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
752	776	6.8	23.5	29	1 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J32177	-113.7	1.07	1.07
Y	6	J14103	93.9	0.85	0.85
Z	7	J35800	97.8	0.94	0.94

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

Headliner deformation, dislodged headliner

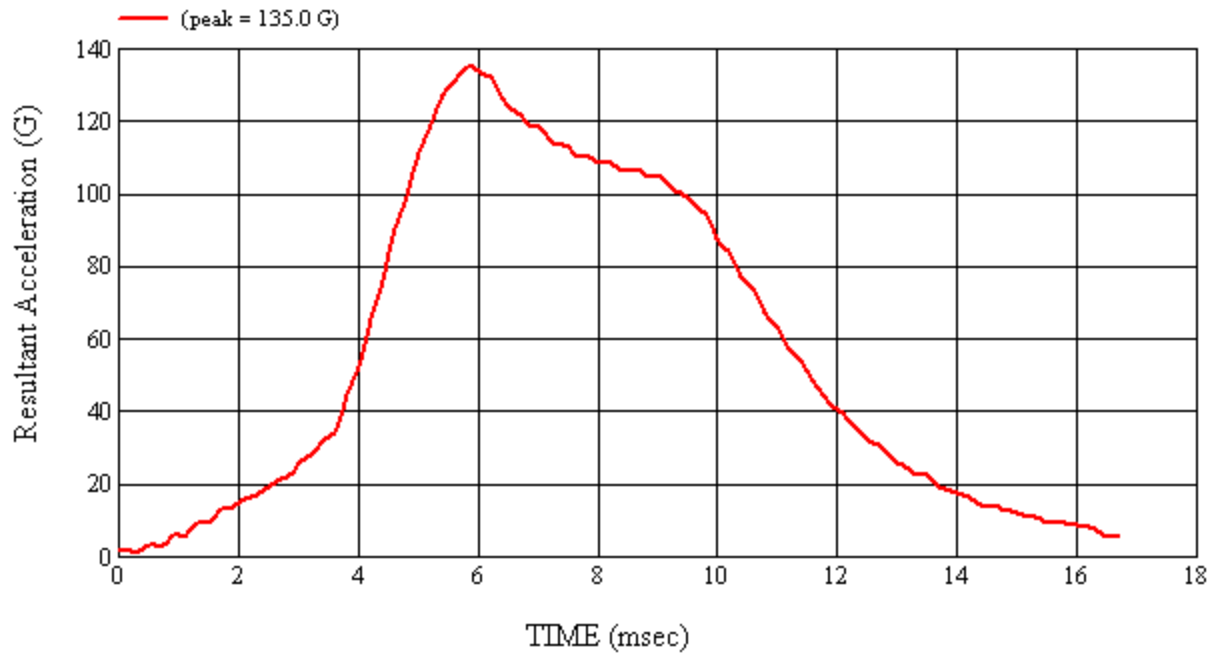
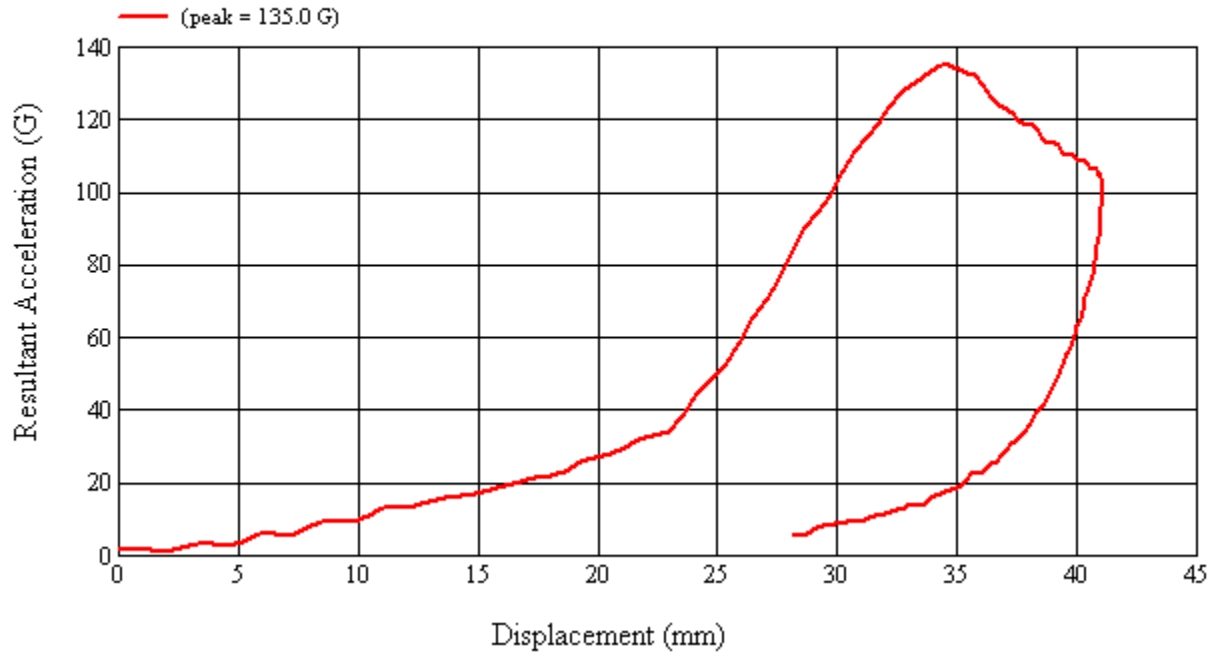
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/23/2011

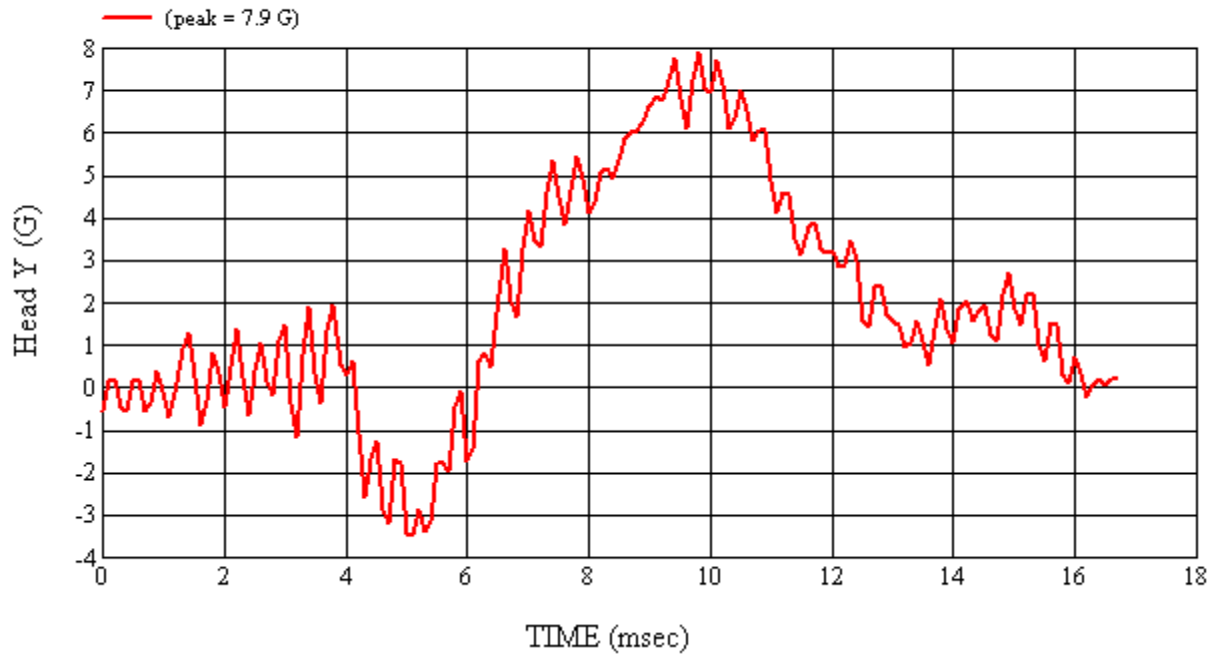
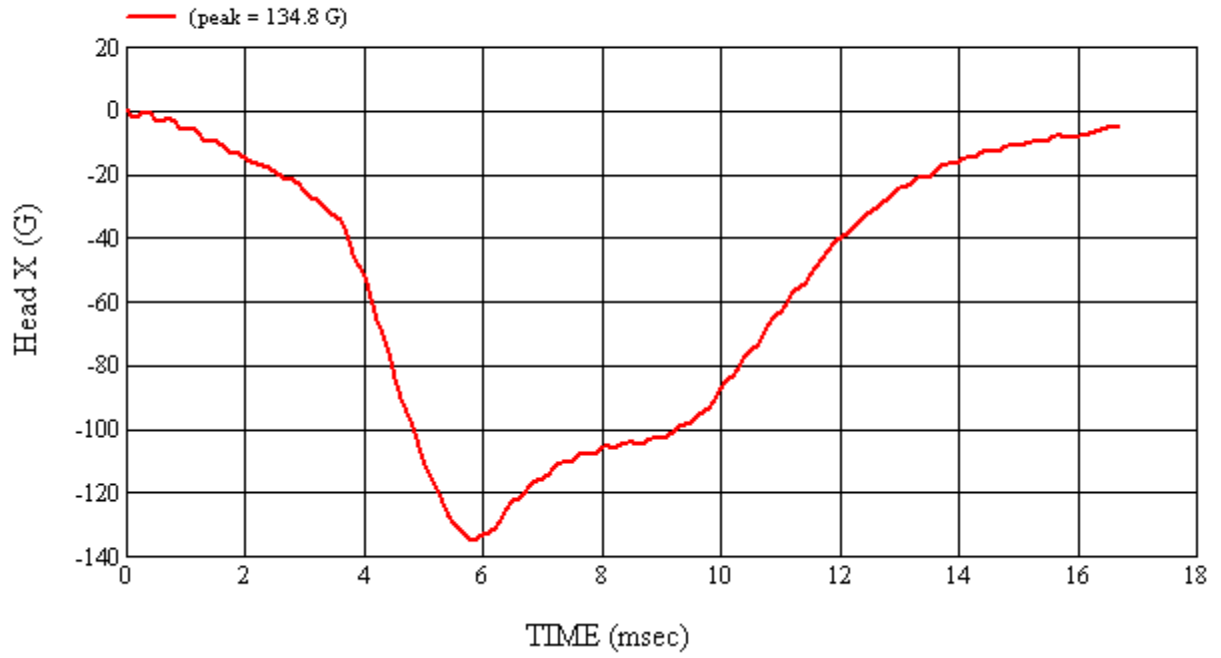
*Only necessary for NHTSA (Government) Compliance testing.

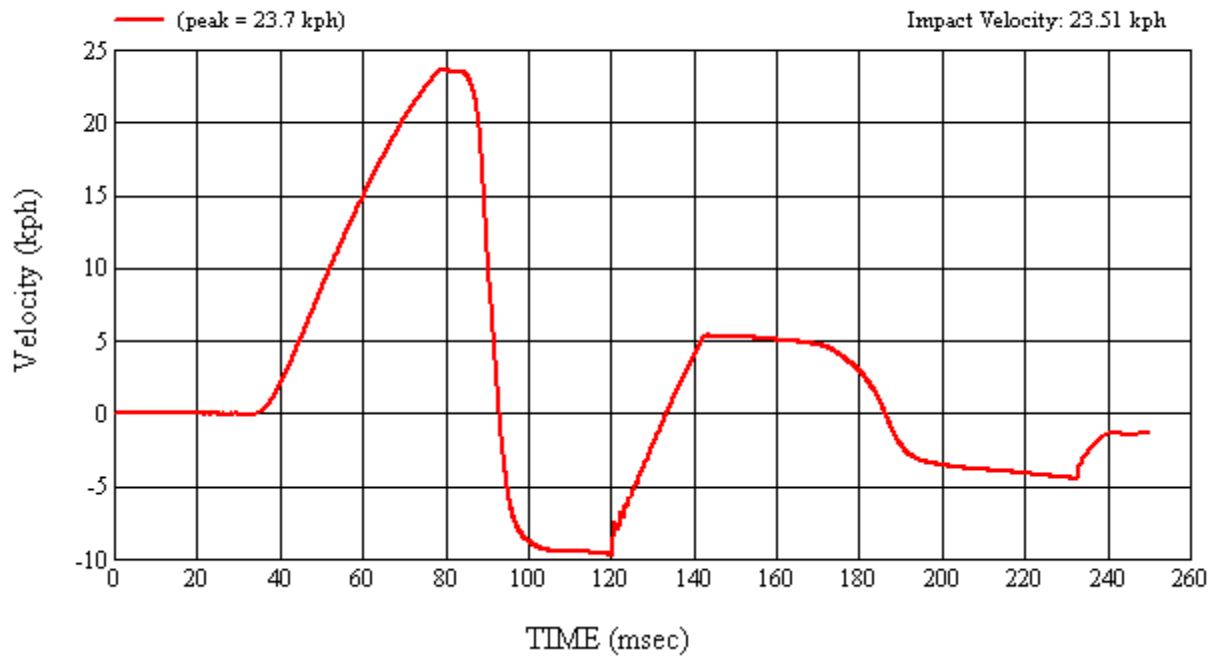
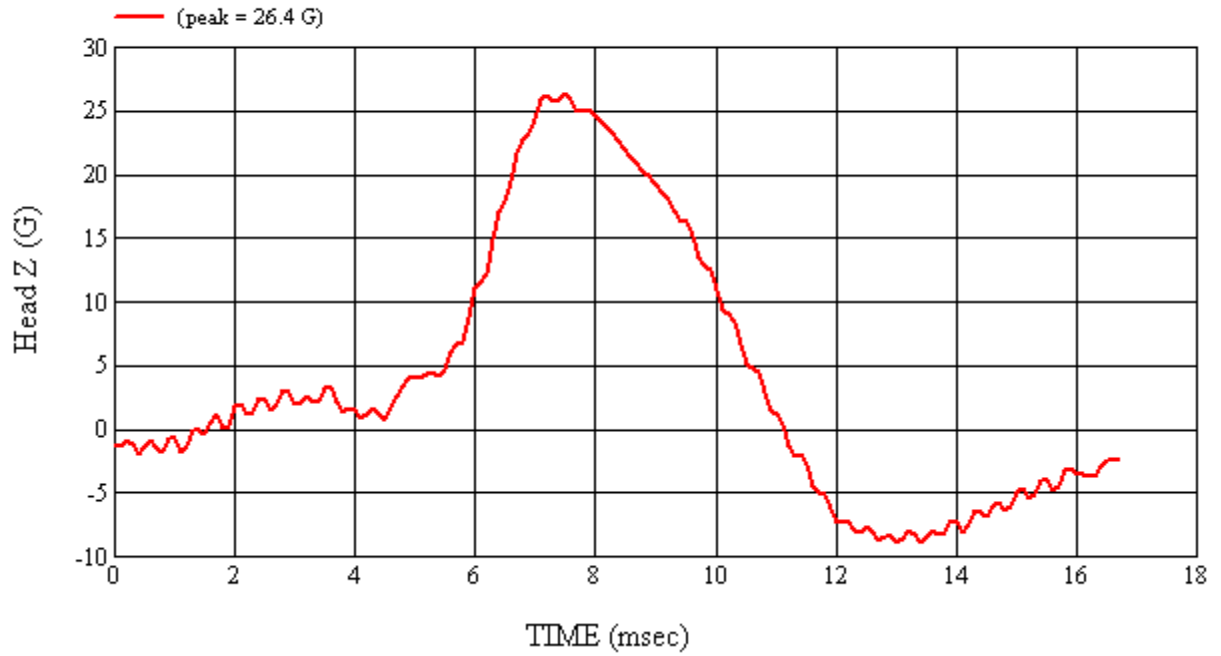
MGA Test #: U11265

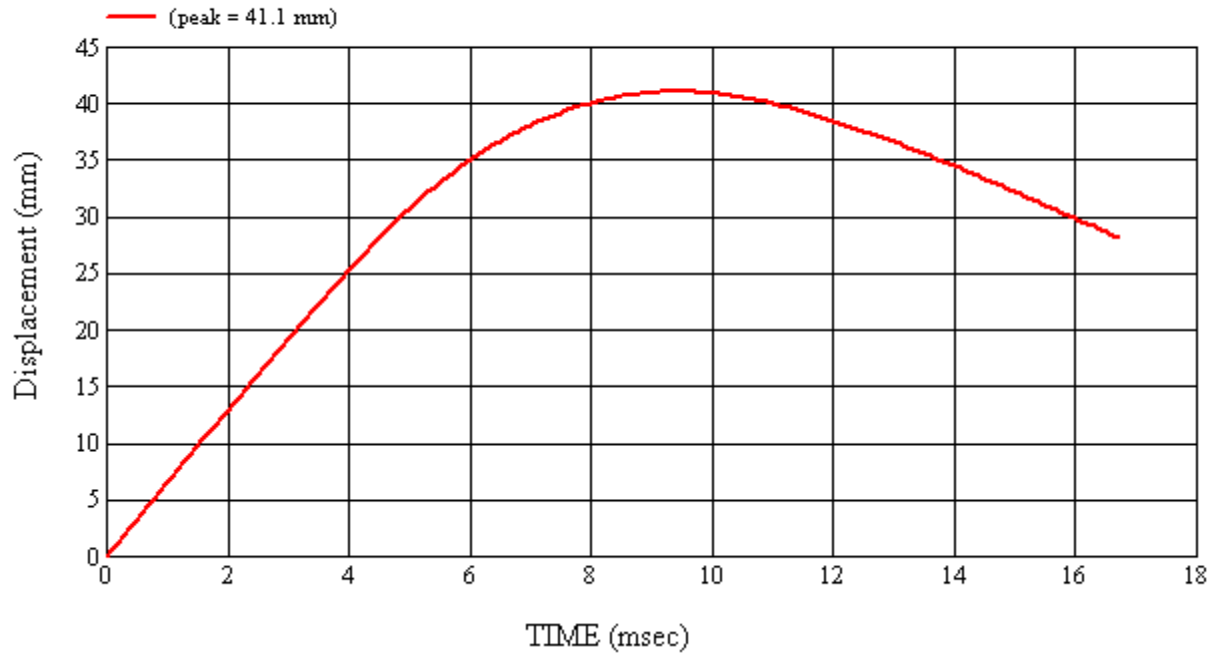
Target Location: UR4, Left Side

Test Date: 6/23/2011



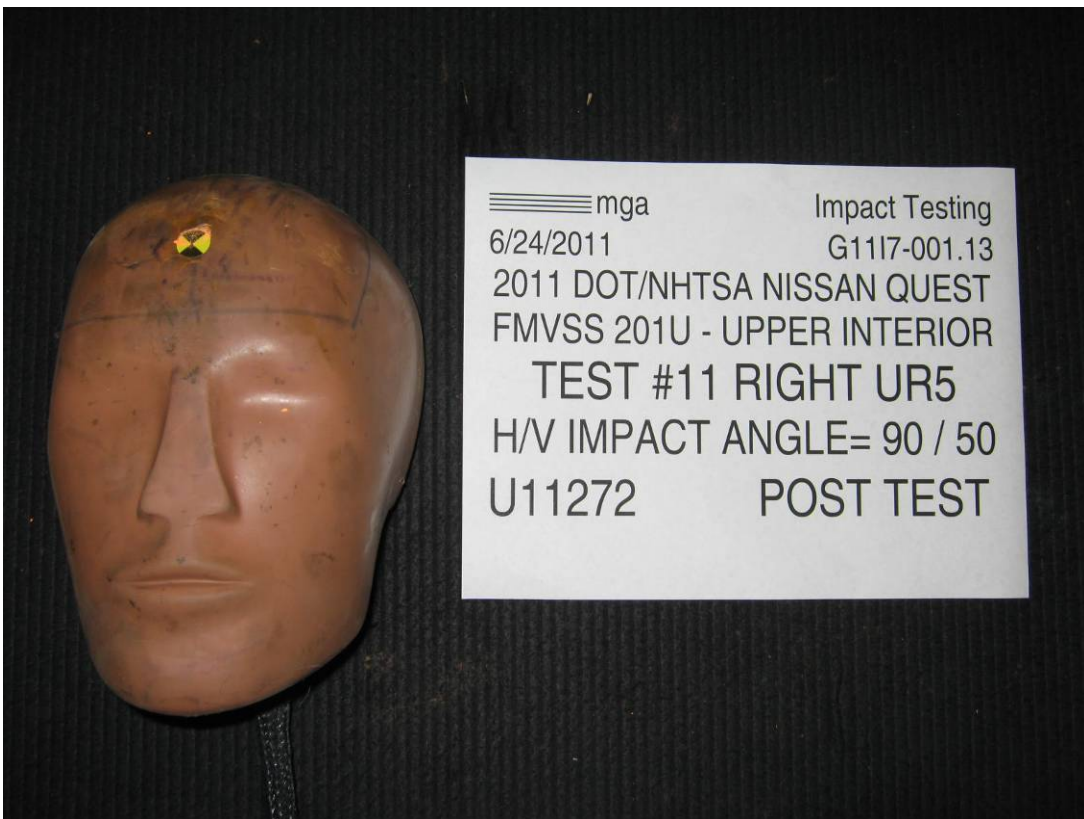












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR5Right
 MGA Test Reference No.:U11272
 Approach Horizontal Angles:90°
 Approach Vertical Angles:50°
 Additional Description:@ OP

Test Number:#11
 Temperature:21.0C
 Humidity:65.4%
 Time of Test:1:38:48 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
518	466	11.5	23.4	30	1 Right

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.07	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

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

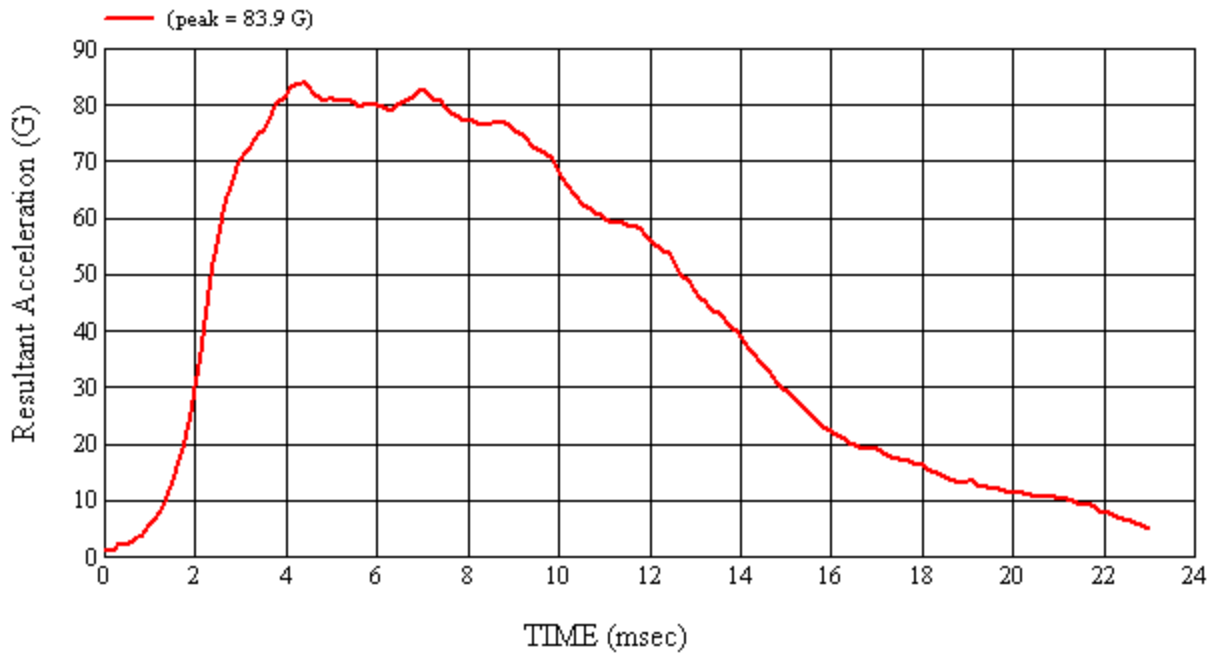
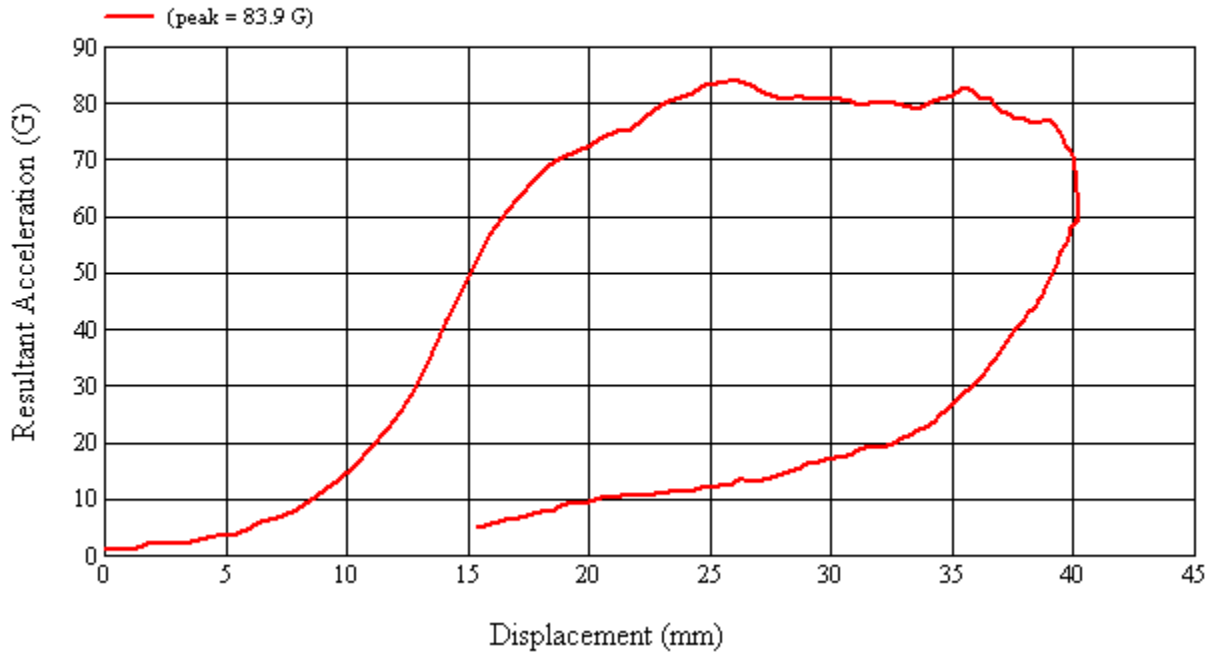
Headliner deformation, dislodged headliner

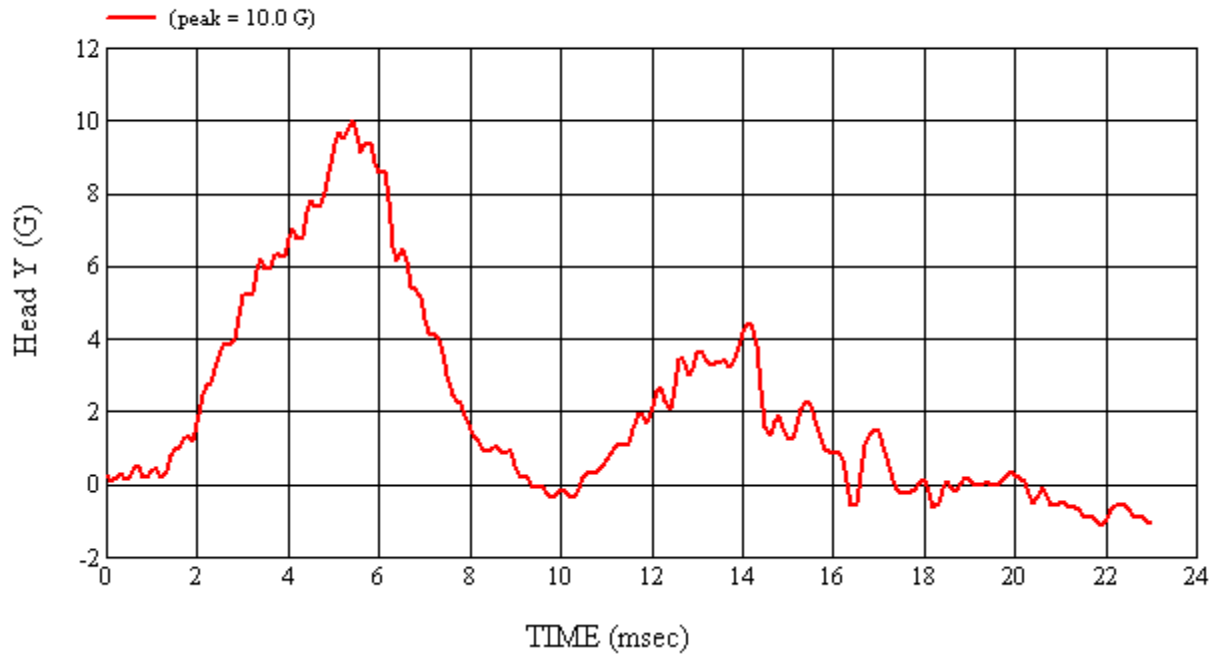
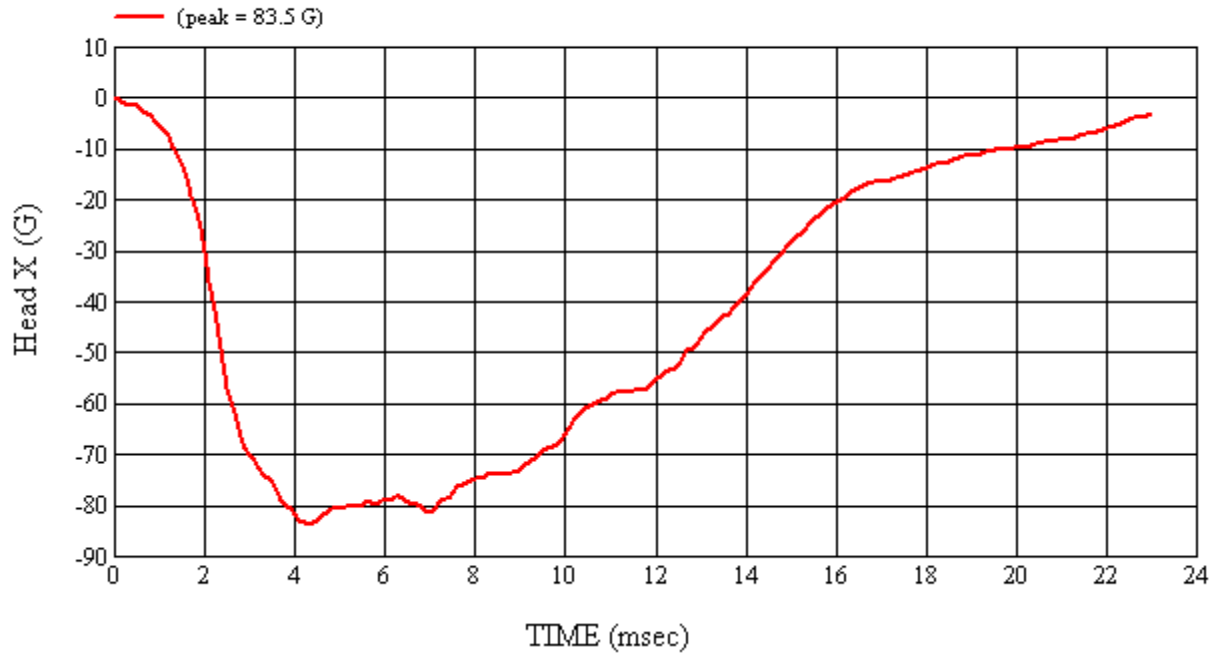
Recorded By: *Kevin D. McLean* Approved By*: *Adrian I. Smith* Date: 6/24/2011
 *Only necessary for NHTSA (Government) Compliance testing.

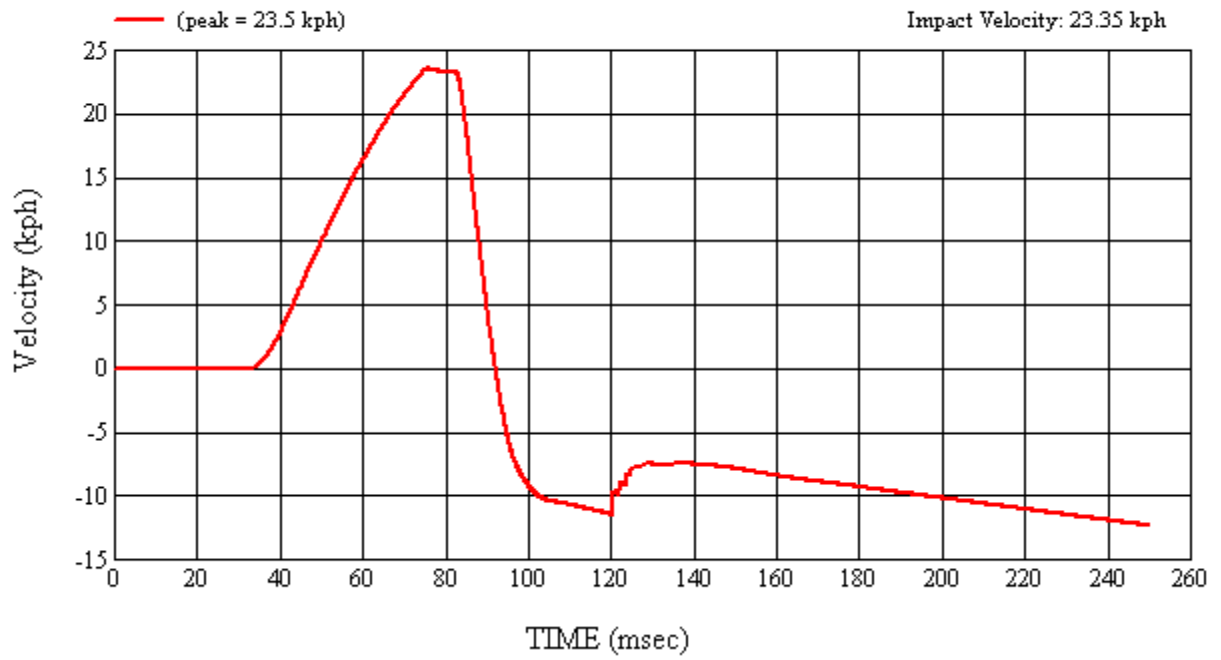
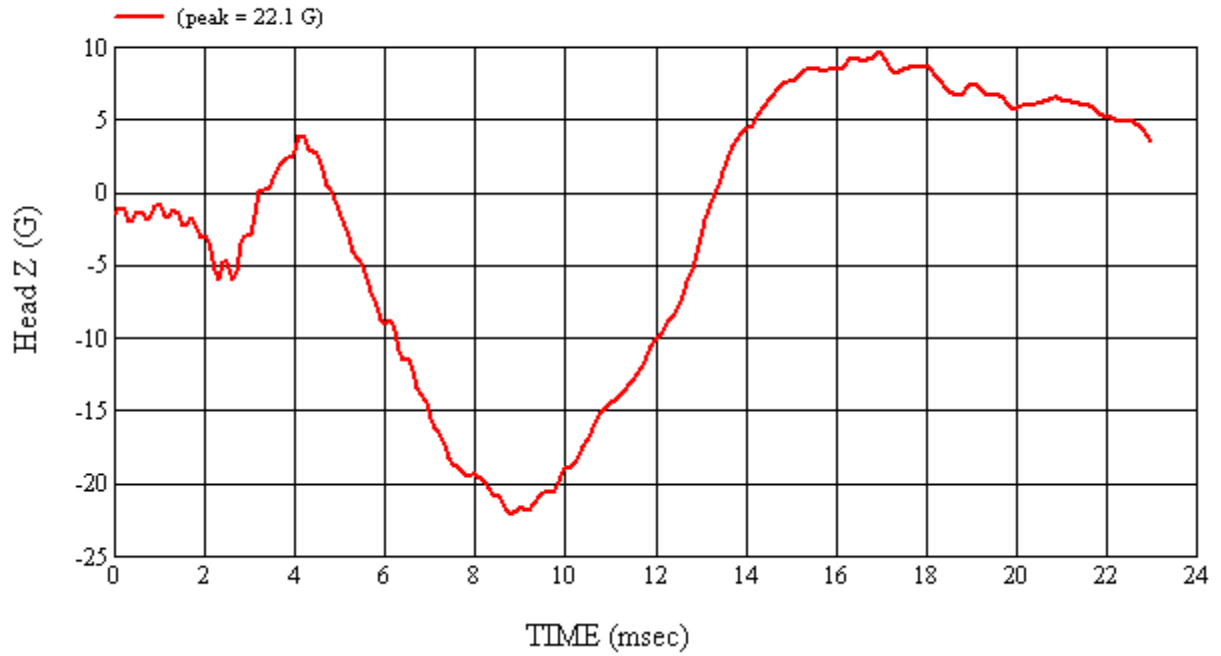
MGA Test #: U11272

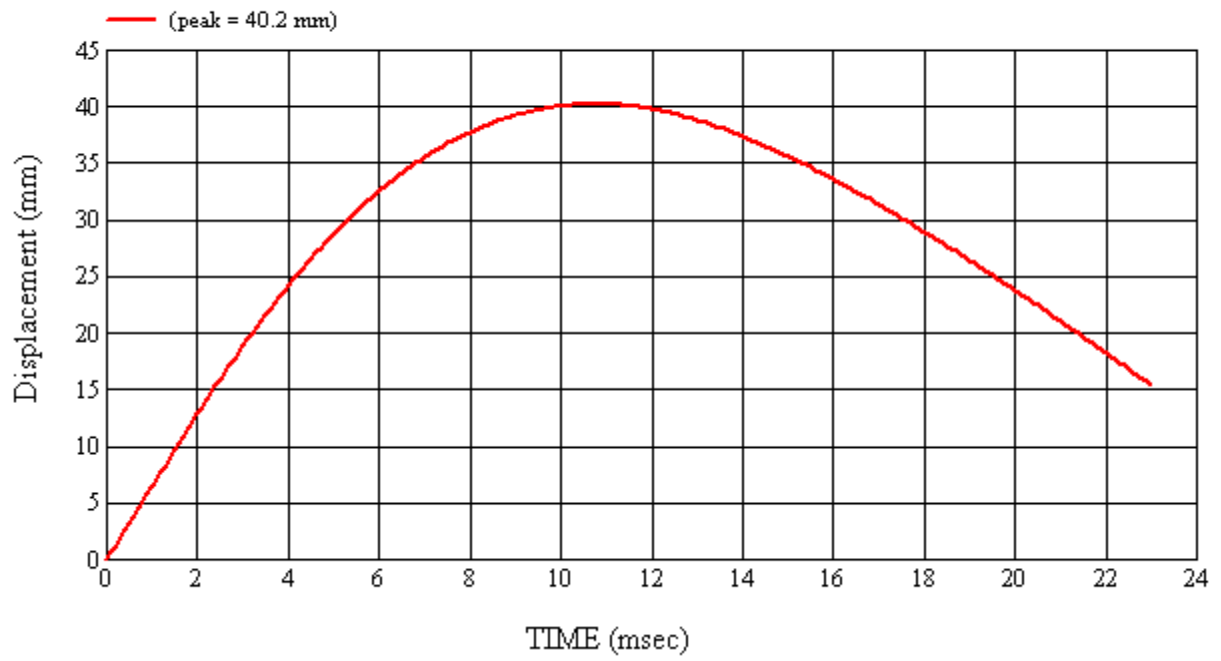
Target Location: UR5, Right Side

Test Date: 6/24/2011



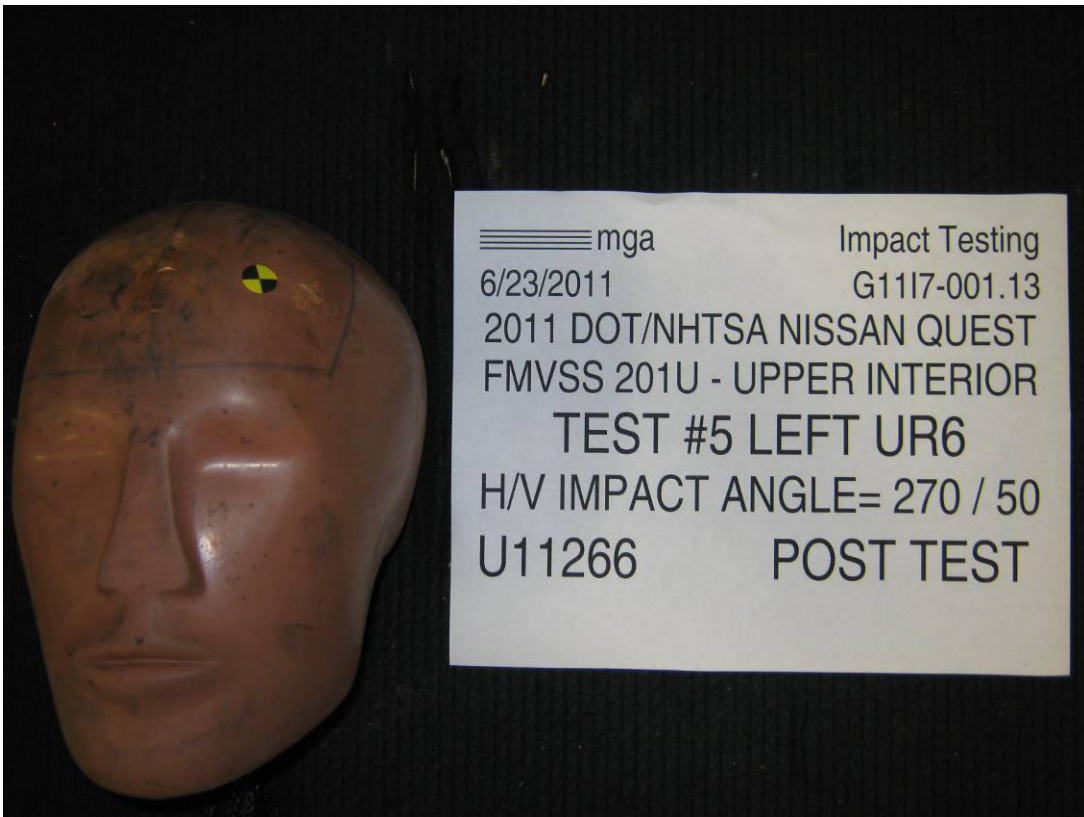












SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G1117-001.13 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Nissan Quest

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR6Left

MGA Test Reference No.:U11266

Approach Horizontal Angles:270°

Approach Vertical Angles:50°

Additional Description:@ SR3-4

Test Number:#5

Temperature:22.3C

Humidity:66.4%

Time of Test:3:55:35 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
718	731	7.3	23.8	33	35 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-96.4	1.07	1.07
Y	6	J36197	108.7	0.85	0.85
Z	7	J36353	99.1	0.94	0.94

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

Headliner deformation, grab handle compression

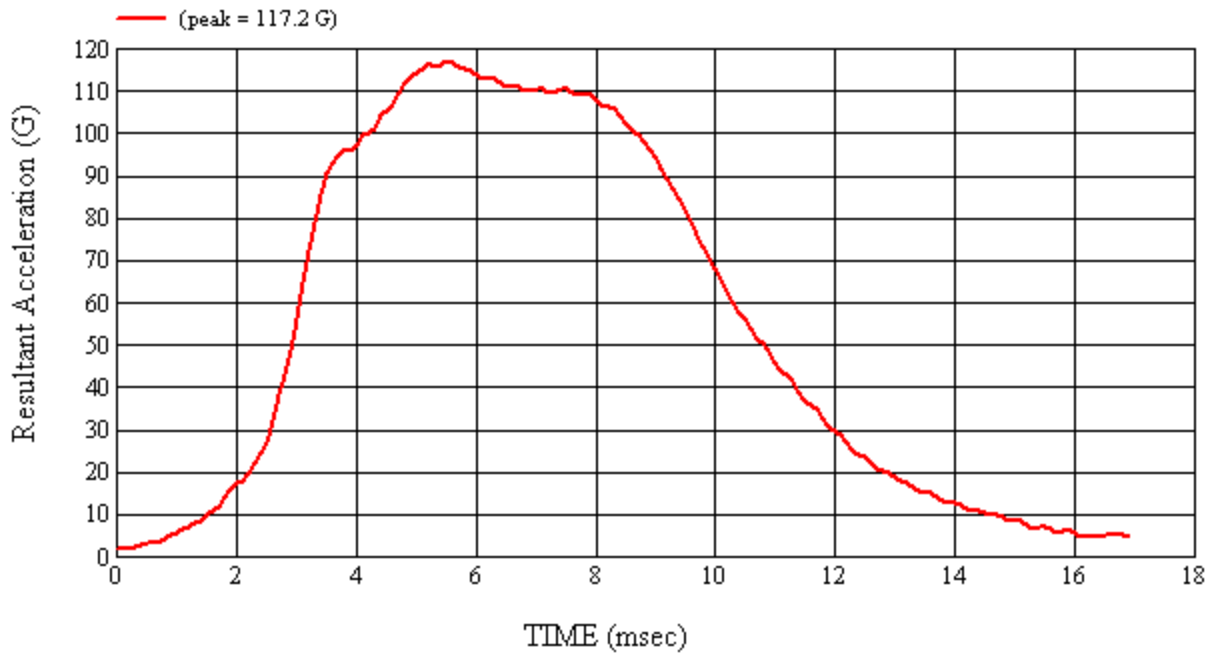
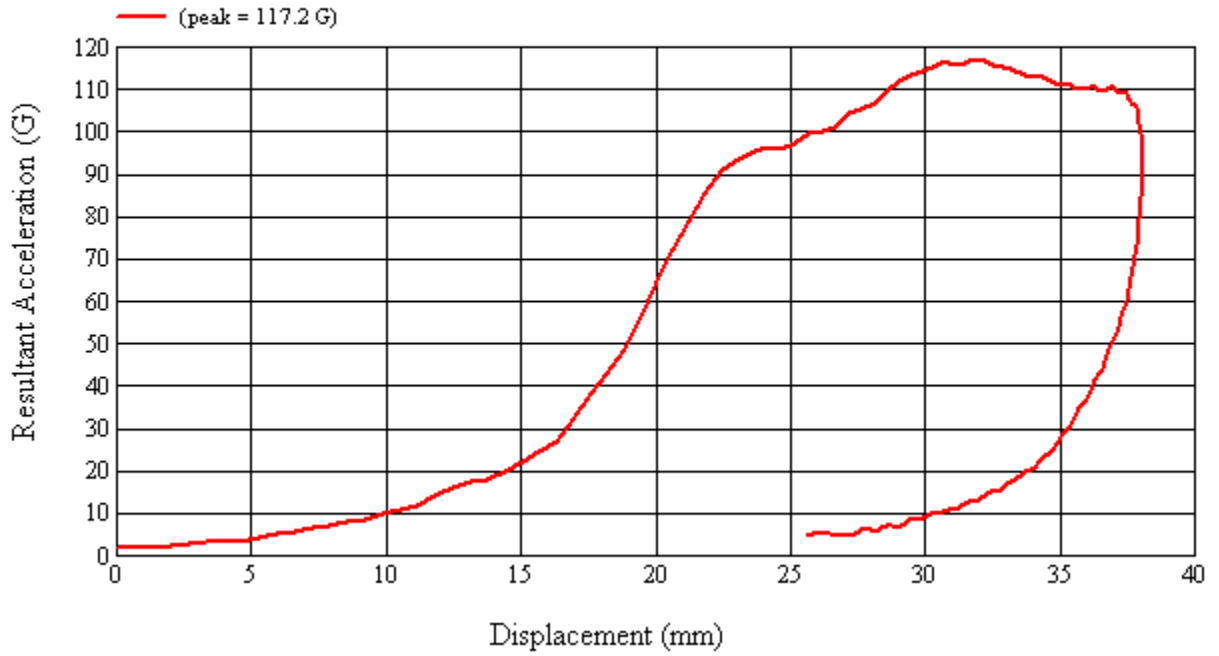
Recorded By: *Kevin D. McLean* Approved By*: *Richard I. Smith* Date: 6/23/2011

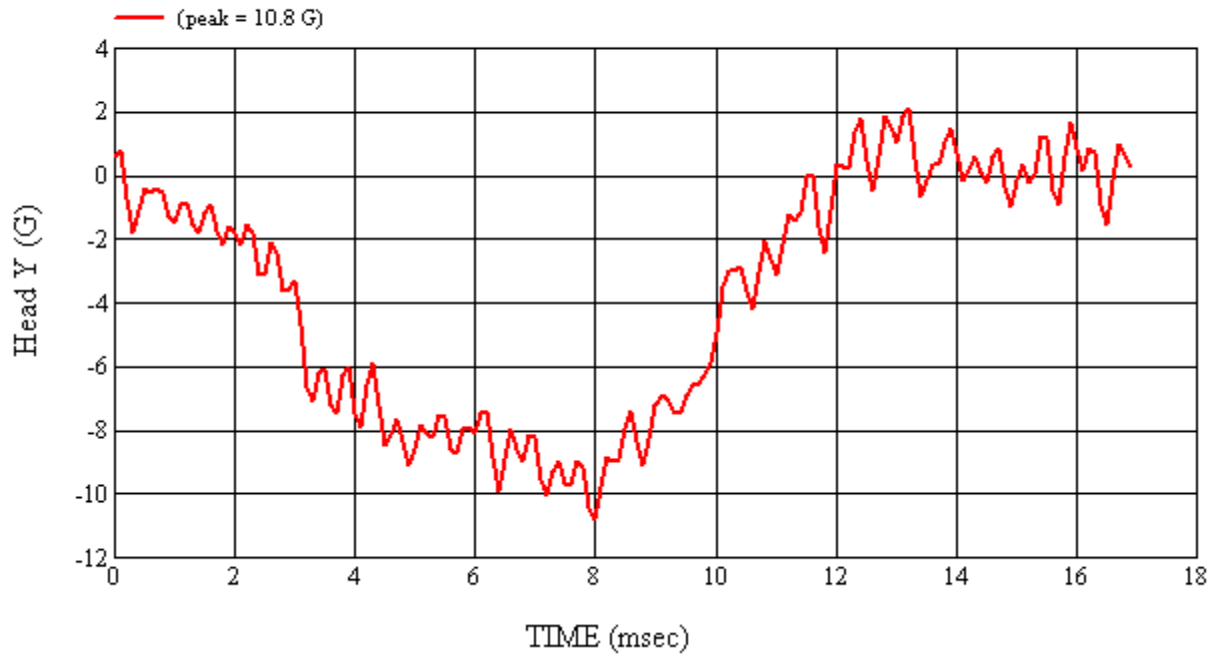
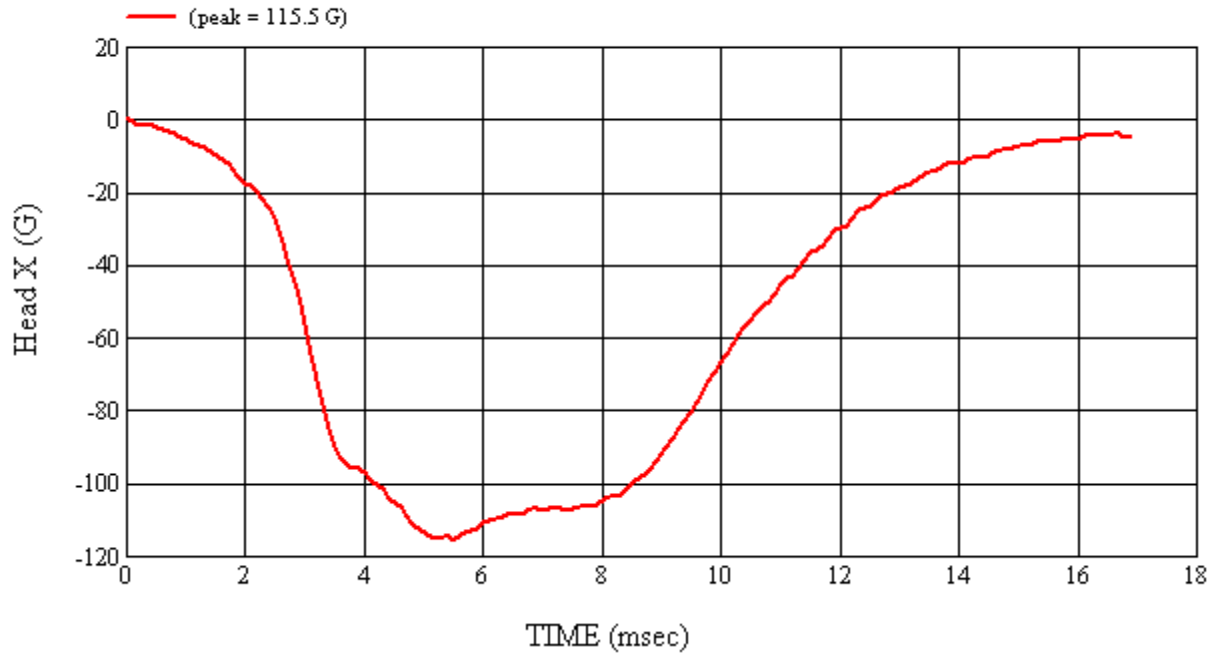
*Only necessary for NHTSA (Government) Compliance testing.

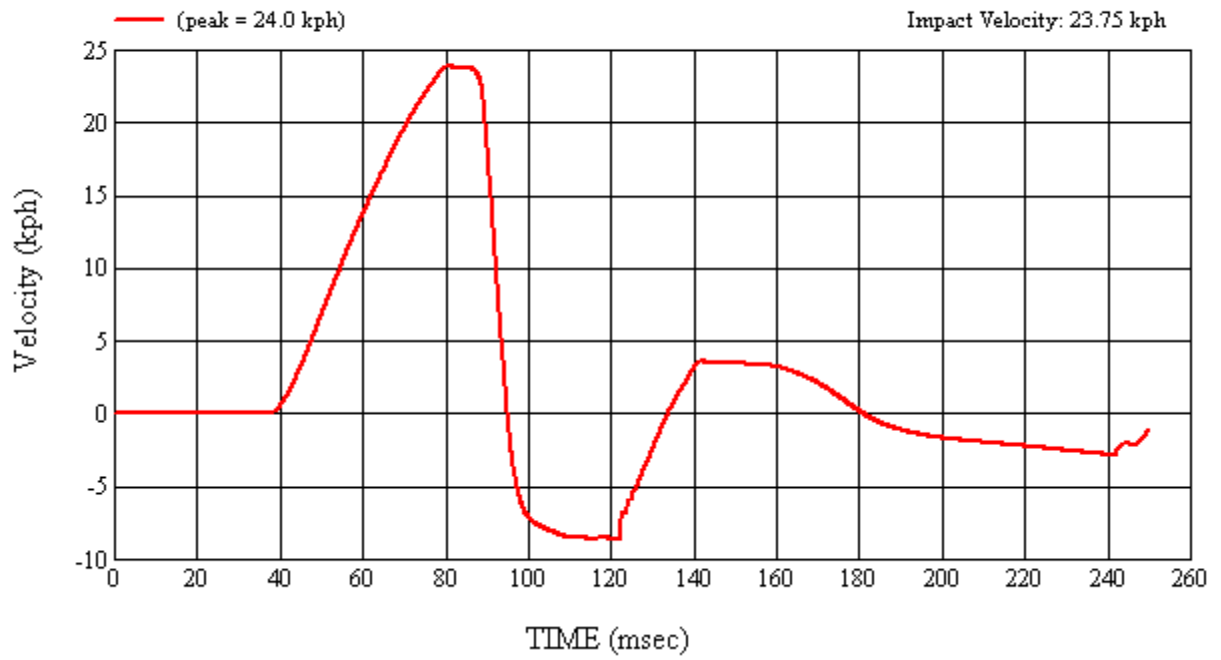
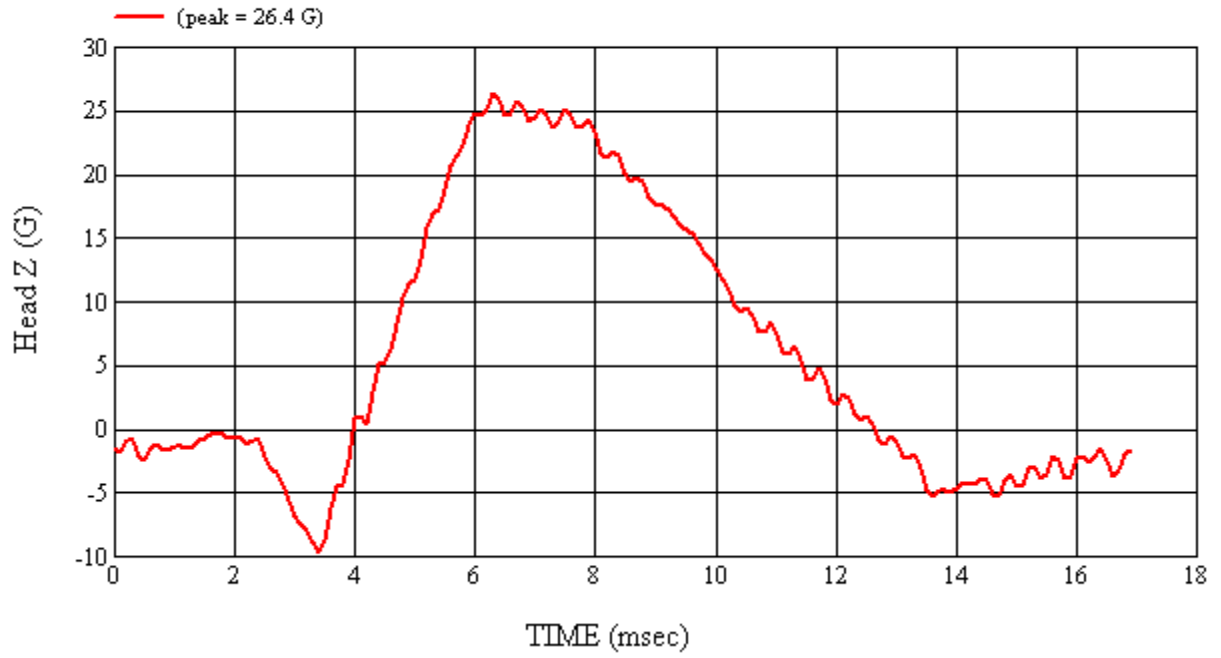
MGA Test #: U11266

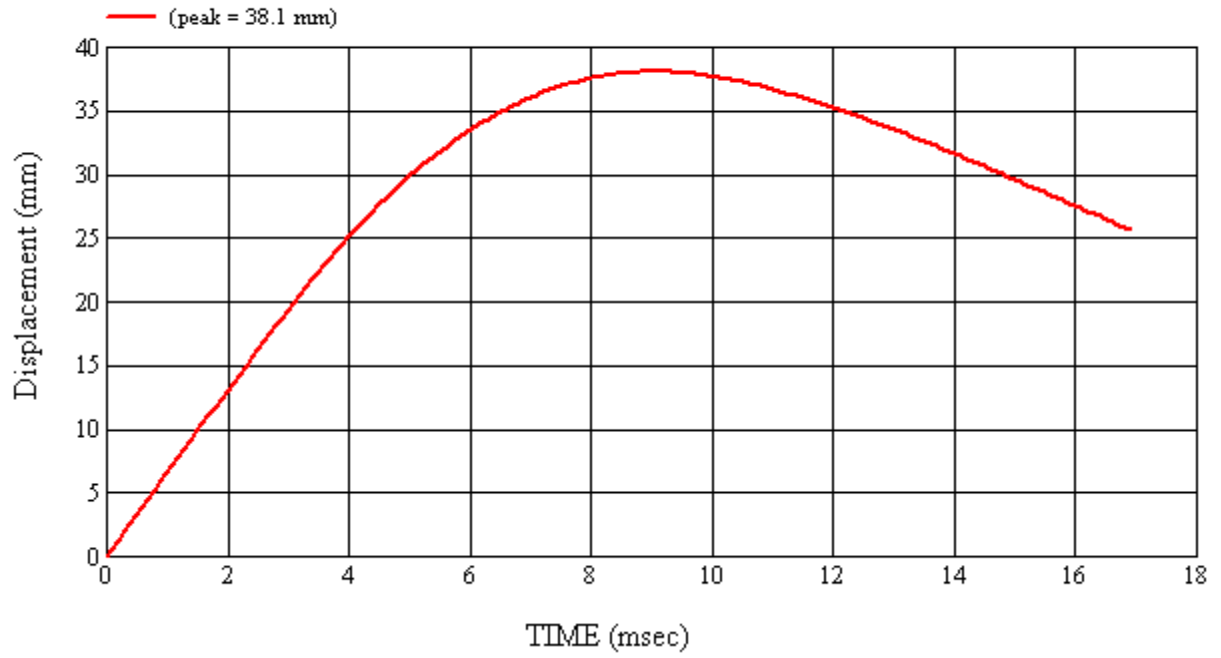
Target Location: UR6, Left Side

Test Date: 6/23/2011









4.0 TEST EQUIPMENT LIST AND CALIBRATION INFORMATION

The following section lists the test equipment for the compliance 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 certificates 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
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	035 037 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Vision Research	Miro Ex4	Record Event	N/A	N/A
*FARO™	Faro Technologies	G08020203122	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Digital Protractor	Stanley N/A Mitutoyo	TPM112 -- MGA00049	Measurement Targeting FMH setup Horizontal Measurement	1 mm N/A 0.5°	Annual
*Temperature Recorder	Dickson	MGA00894	Record Temperature and Humidity	± 1°C ± 1% RH	Annual
* Scale	Detecto	MGA00081	Weigh FMH Head	± 0.01 lb	Annual
*Vehicle Scale	Intercomp	26032389	Weighing Vehicle	± .5 kg	Annual

Each headform was calibrated by an engineer after the headform had soaked in an environment of 66°F to 78°F (19°C to 26°C) for a period of at least four hours.

Each headform was found to comply with the performance criteria under Part 572L for pre and post-test calibrations. That is, the peak resultant acceleration was between 225 and 275 G's, the peak lateral acceleration was less than 15 G's, the headform weighed between 9.9 and 10.1 lbs., the pulse was determined to be unimodal, and there was no major damage to the headform.

TABLE 4-2 FMH CALIBRATION SUMMARY

FMH Serial #		Headform Calibration Date	Weight (lbs)	Temp (°C)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#035	6/23/2011	9.90	21.5	66.7	253.1	7.2	Yes
Post	#035	6/27/2011	9.90	20.5	59.2	253.1	2.7	Yes
Pre	#037	6/22/2011	9.96	24.4	66.5	273.5	7.1	Yes
Post	#037	6/27/2011	9.96	20.7	58.7	267.1	9.6	Yes
Pre	#038	6/22/2011	9.90	24.6	67.4	274.5	7.7	Yes
Post	#038	6/27/2011	9.90	20.7	61.2	265.0	9.9	Yes

4-1 Pre-Test Calibration

**HEAD DROP TEST SUMMARY
 PART 572L**

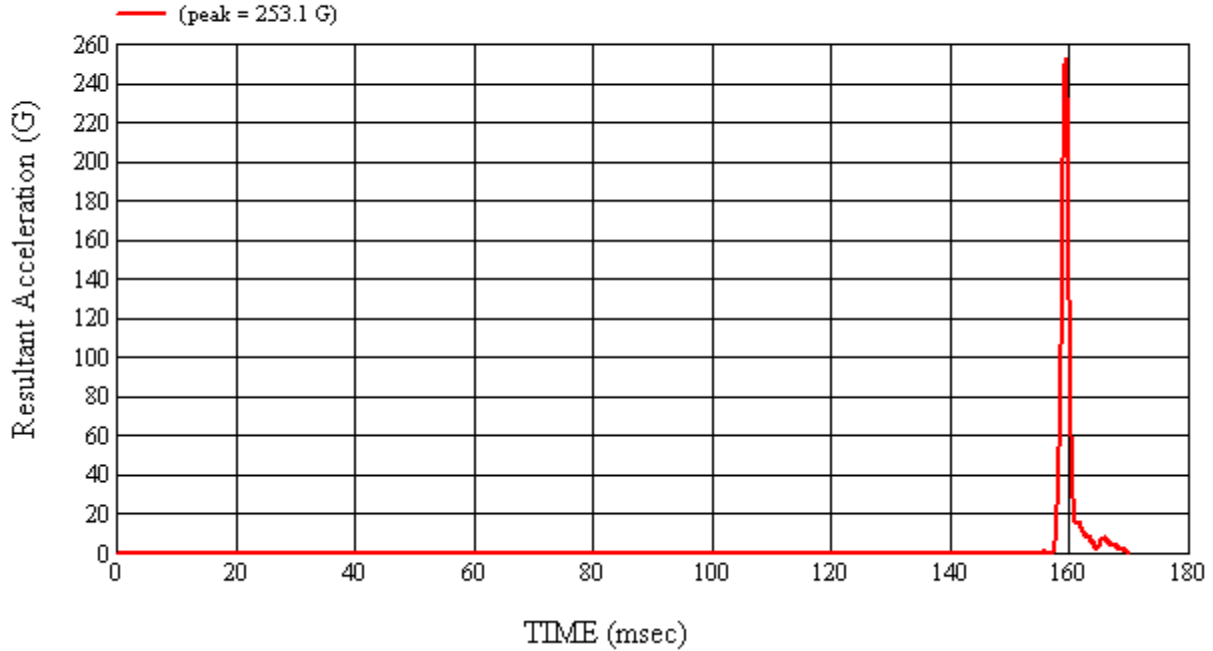
HEADFORM SERIAL NUMBER: 035		CALIBRATION DATE: 6/23/2011
CALIBRATION TIME: 8:02:19 AM		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	21.5
Relative Humidity	10% to 70%	66.7
Peak Resultant Acceleration	225 G's to 275 G's	253.1
Peak Lateral Acceleration	15 G's Maximum	7.2
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35919	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J22664	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35924	02/04/11	08/04/11

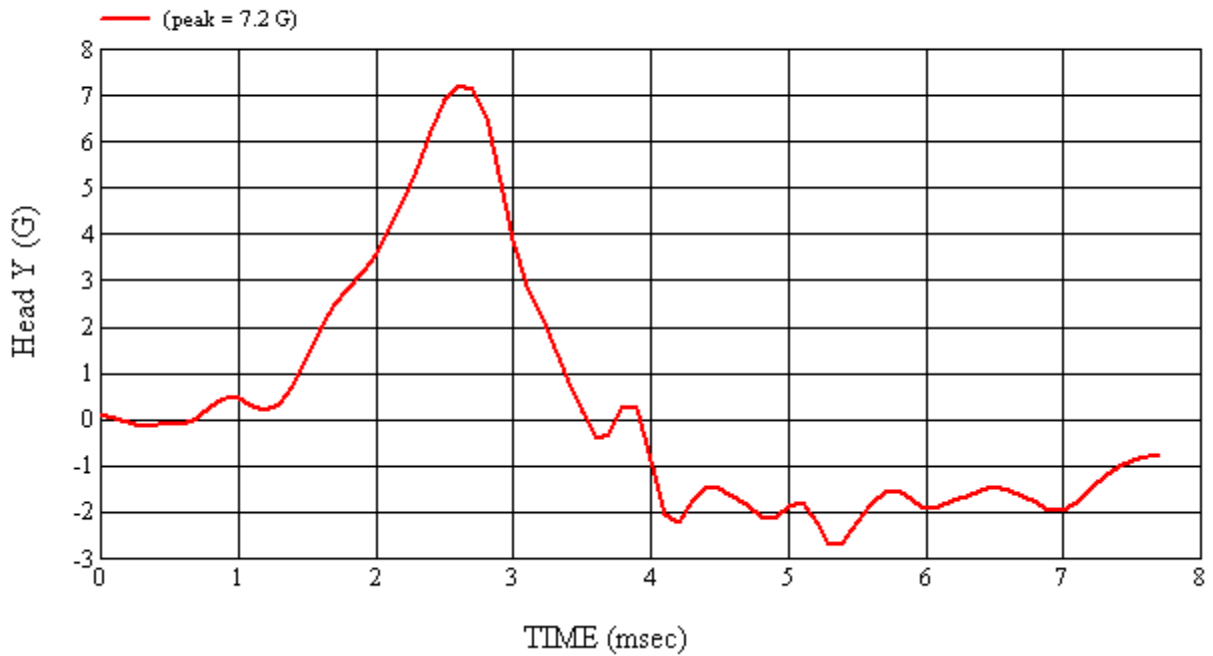
REMARKS:

RECORDED BY: *Keri D. McLean* DATE: 6/23/2011

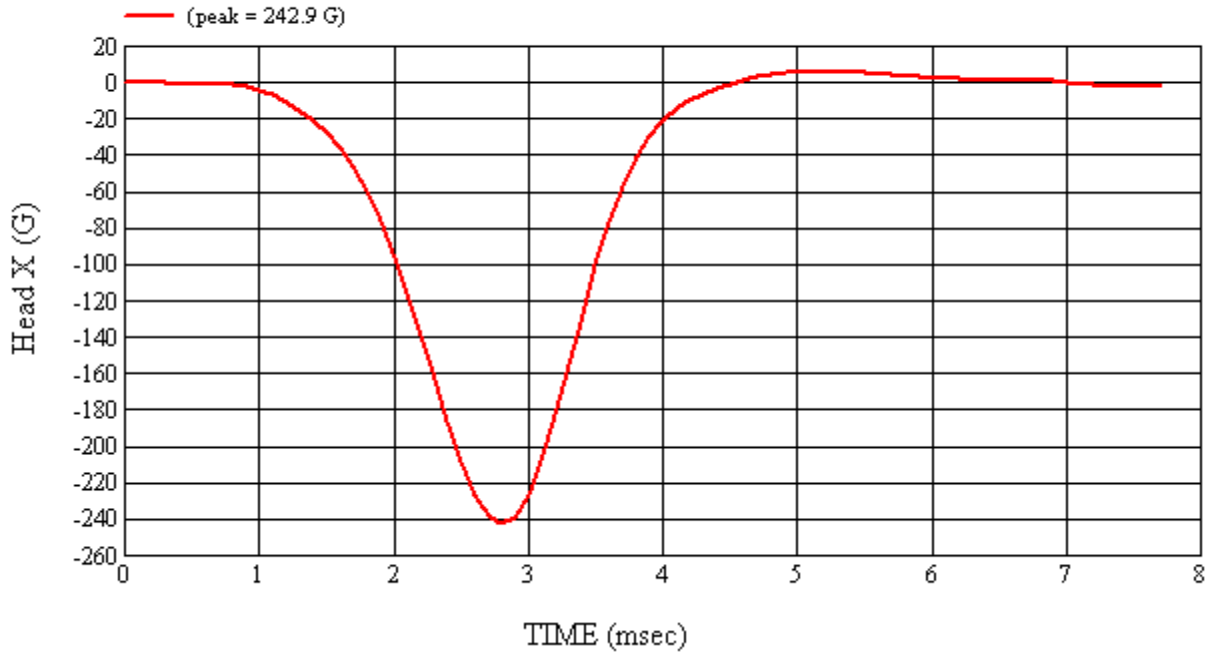
APPROVED BY: *Adrian I. Smith*



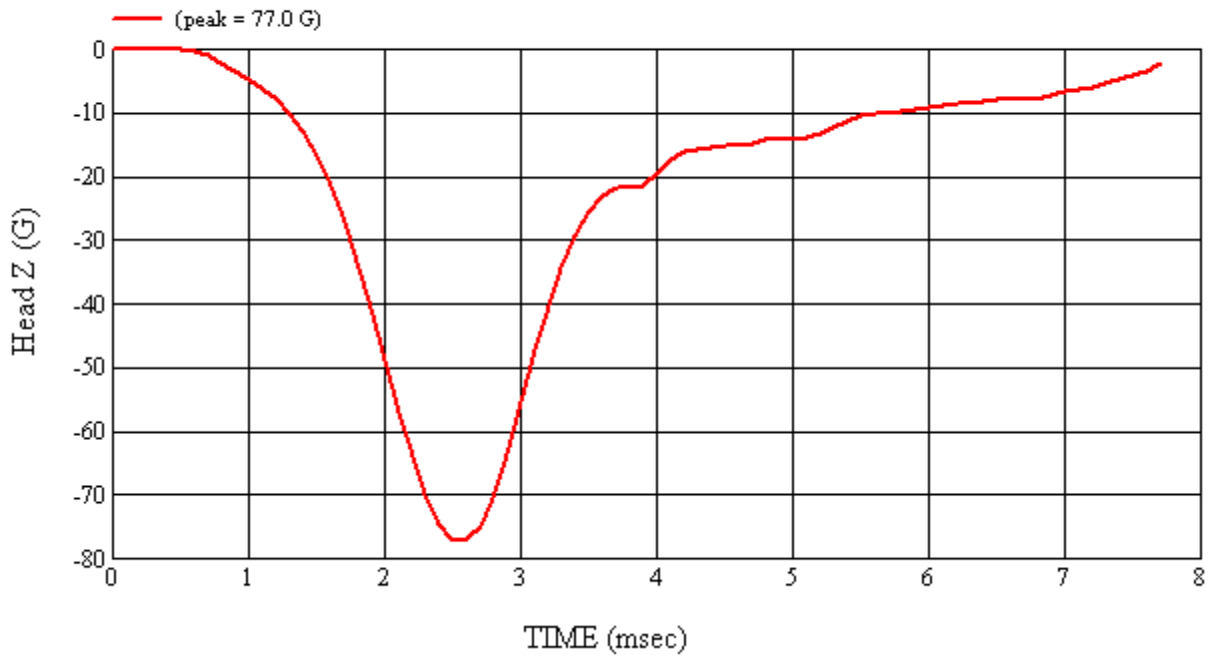
Head 035 (Pre) Calibration #H35033



Head 035 (Pre) Calibration #H35033



Head 035 (Pre) Calibration #H35033



Head 035 (Pre) Calibration #H35033

4-2 Post-Test Calibration

**HEAD DROP TEST SUMMARY
PART 572L**

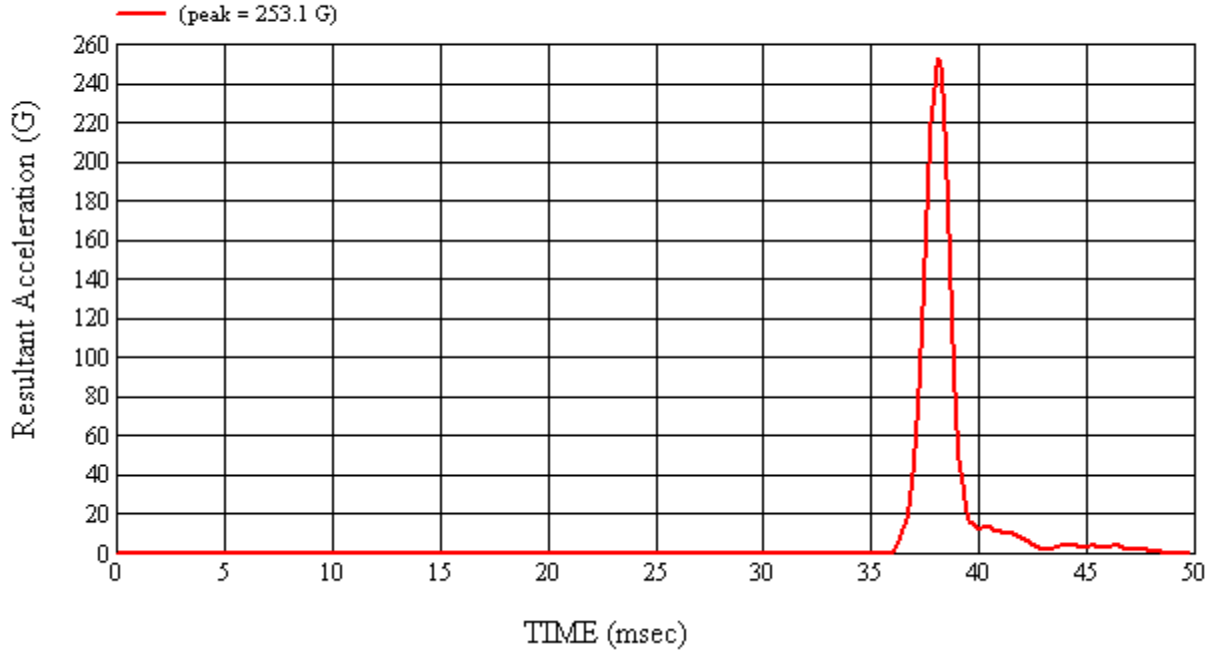
HEADFORM SERIAL NUMBER: 035		CALIBRATION DATE: 6/27/2011
CALIBRATION TIME: 8:55:29 AM		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	20.5
Relative Humidity	10% to 70%	59.2
Peak Resultant Acceleration	225 G's to 275 G's	253.1
Peak Lateral Acceleration	15 G's Maximum	2.7
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J35919	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J22664	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35924	02/04/11	08/04/11

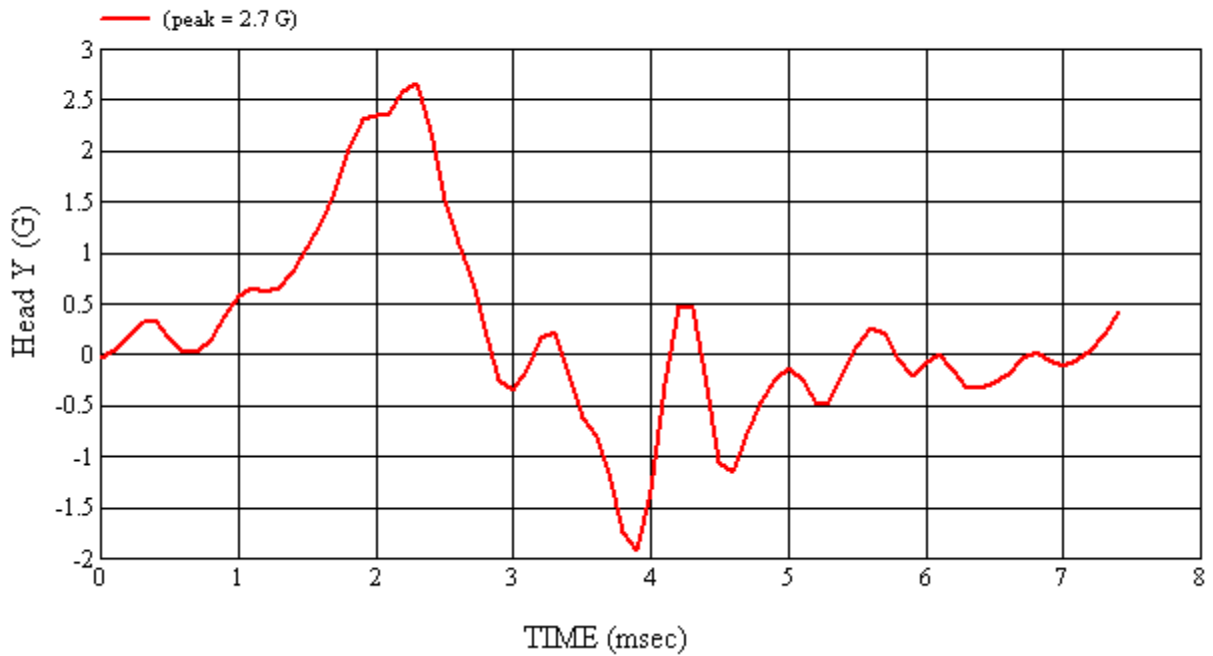
REMARKS:

RECORDED BY: *Keri D. McLean* DATE: 6/27/2011

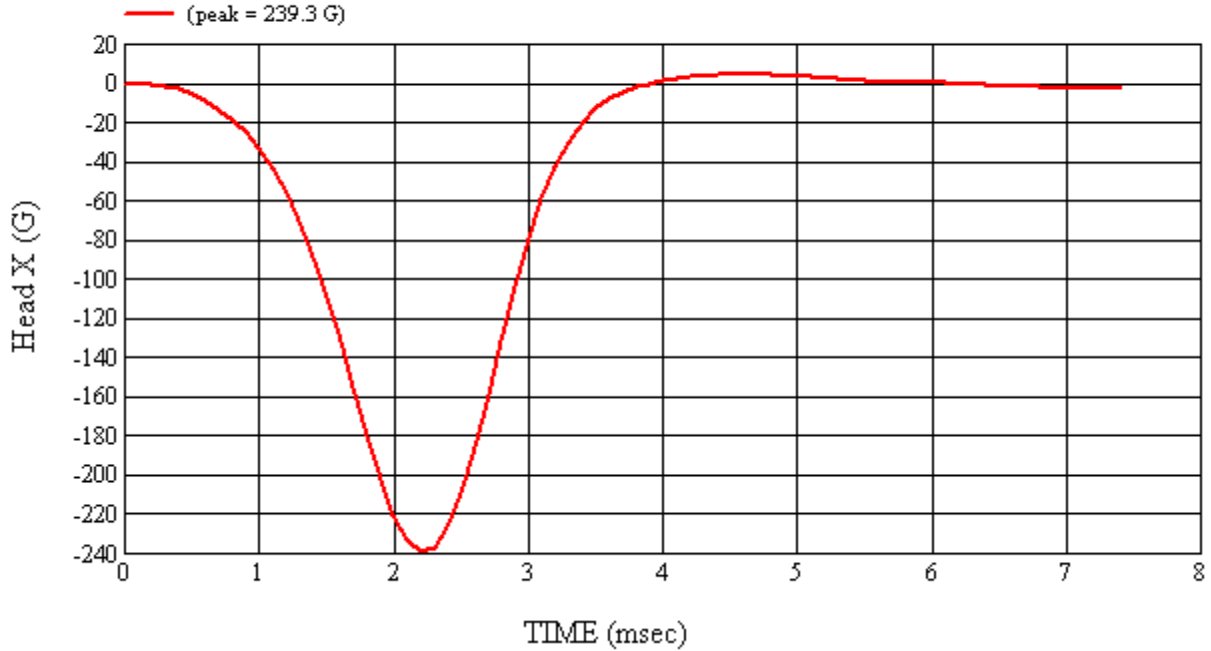
APPROVED BY: *Adrian I. Smith*



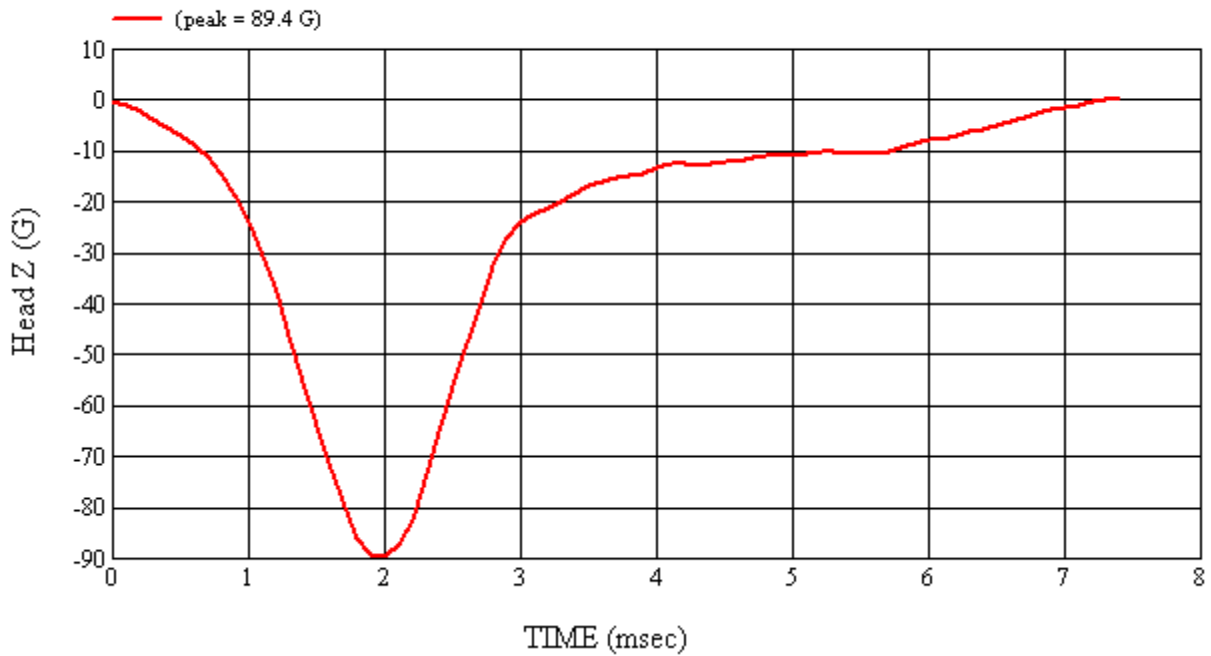
Head 035 (Post) Calibration #H35034



Head 035 (Post) Calibration #H35034



Head 035 (Post) Calibration #H35034



Head 035 (Post) Calibration #H35034

4-3 Pre-Test Calibration

**HEAD DROP TEST SUMMARY
PART 572L**

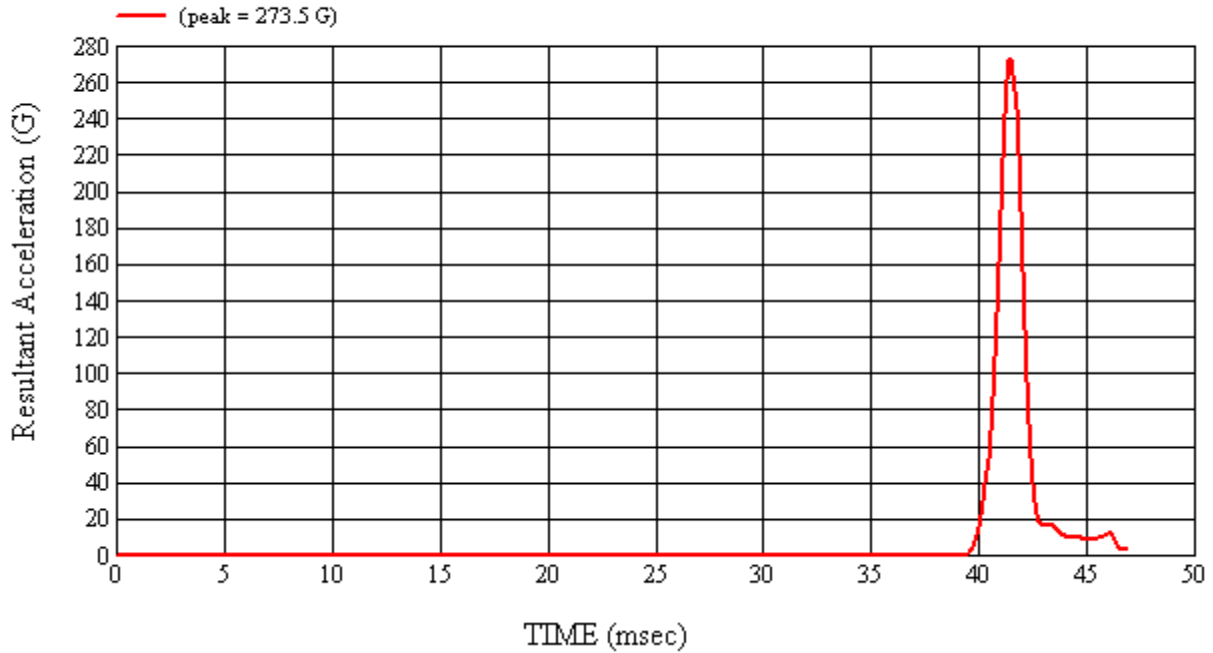
HEADFORM SERIAL NUMBER: 037		CALIBRATION DATE: 6/22/2011
CALIBRATION TIME: 5:29:25 PM		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	24.4
Relative Humidity	10% to 70%	66.5
Peak Resultant Acceleration	225 G's to 275 G's	273.5
Peak Lateral Acceleration	15 G's Maximum	7.1
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	J32177	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J14103	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35800	02/04/11	08/04/11

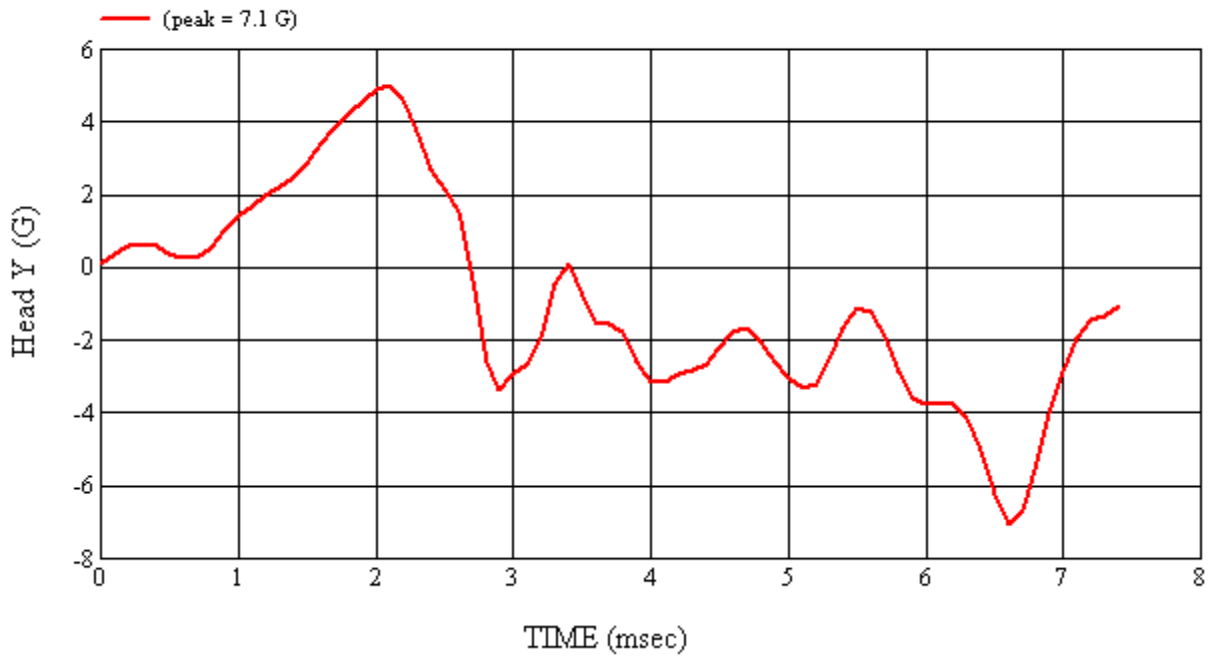
REMARKS:

RECORDED BY: *Kevin D. McLean* DATE: 6/22/2011

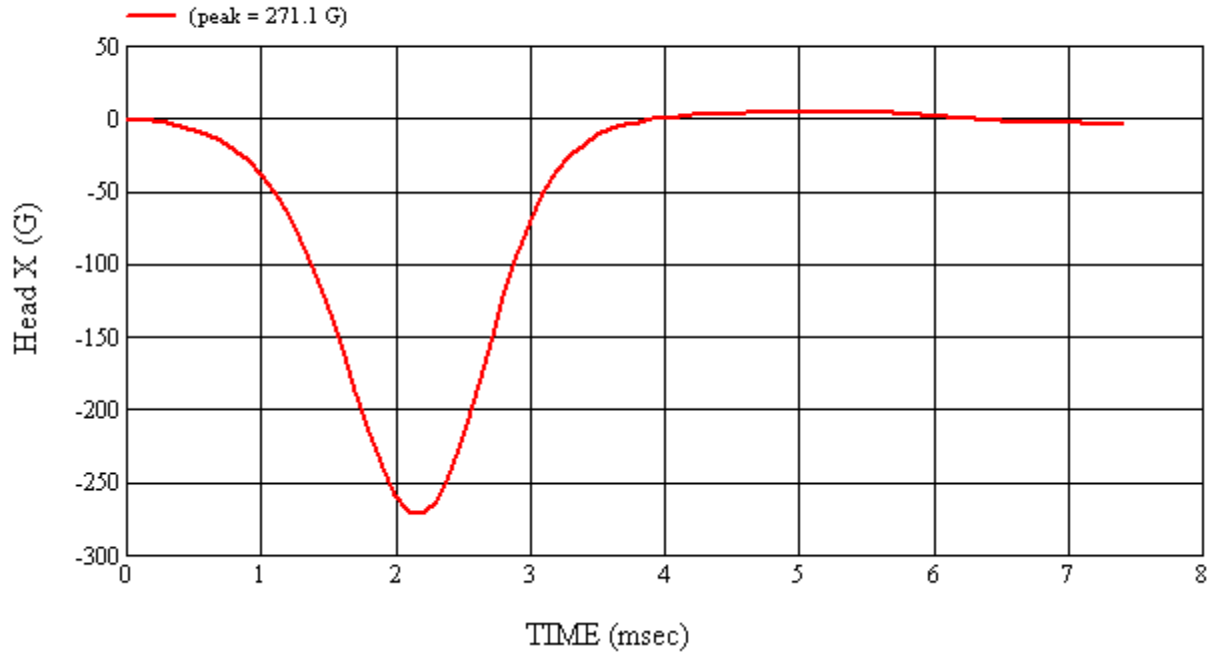
APPROVED BY: *Adrian I. Smith*



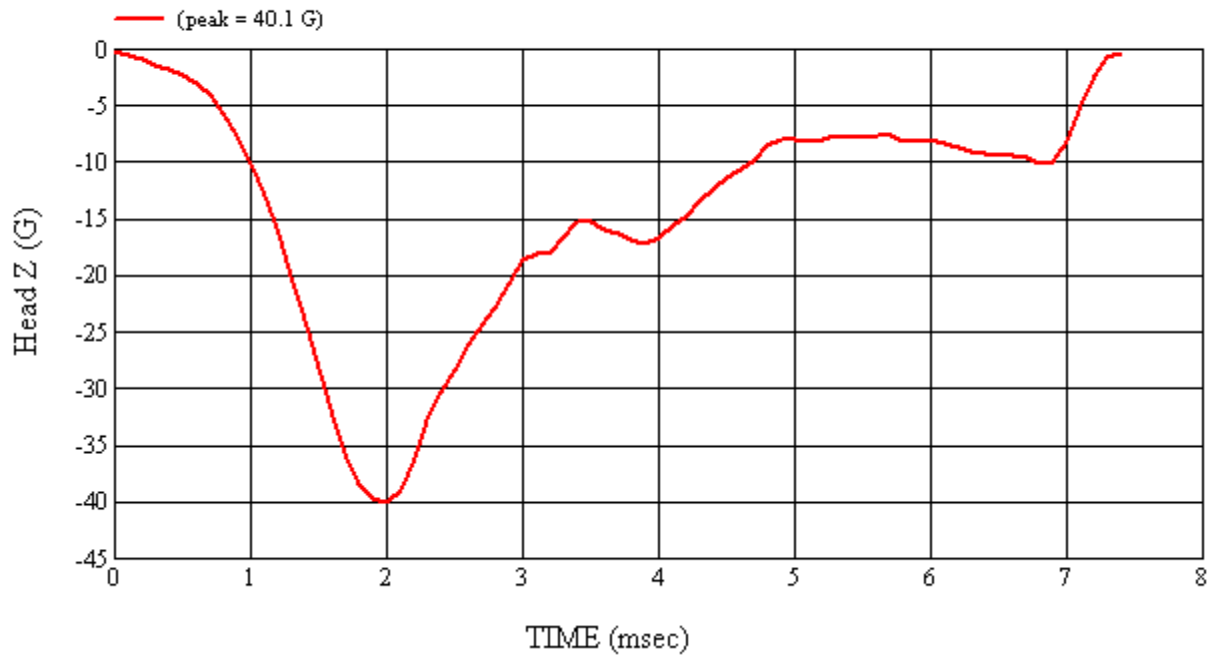
Head 037 (Pre) Calibration #H37033



Head 037 (Pre) Calibration #H37033



Head 037 (Pre) Calibration #H37033



Head 037 (Pre) Calibration #H37033

4-4 Post-Test Calibration

**HEAD DROP TEST SUMMARY
 PART 572L**

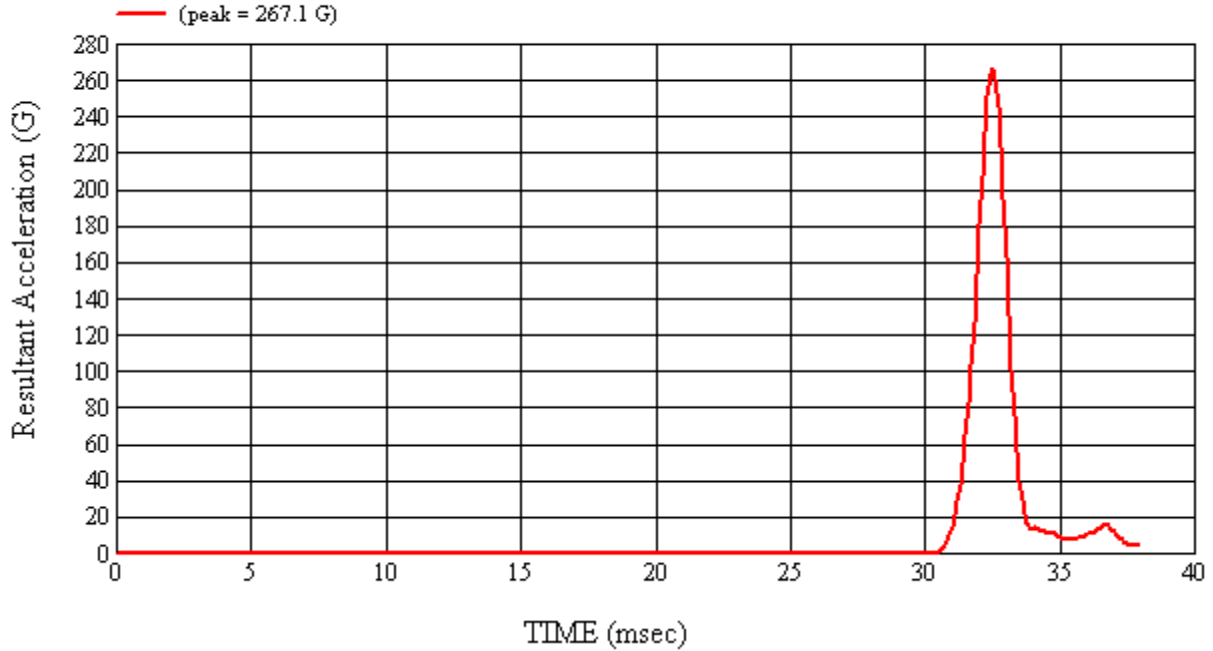
HEADFORM SERIAL NUMBER: 037		CALIBRATION DATE: 6/27/2011
CALIBRATION TIME: 9:31:54 AM		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	20.7
Relative Humidity	10% to 70%	58.7
Peak Resultant Acceleration	225 G's to 275 G's	267.1
Peak Lateral Acceleration	15 G's Maximum	9.6
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J32177	02/04/11	08/04/11
2	ENDEVCO	7264-2000	J14103	02/04/11	08/04/11
3	ENDEVCO	7264-2000	J35800	02/04/11	08/04/11

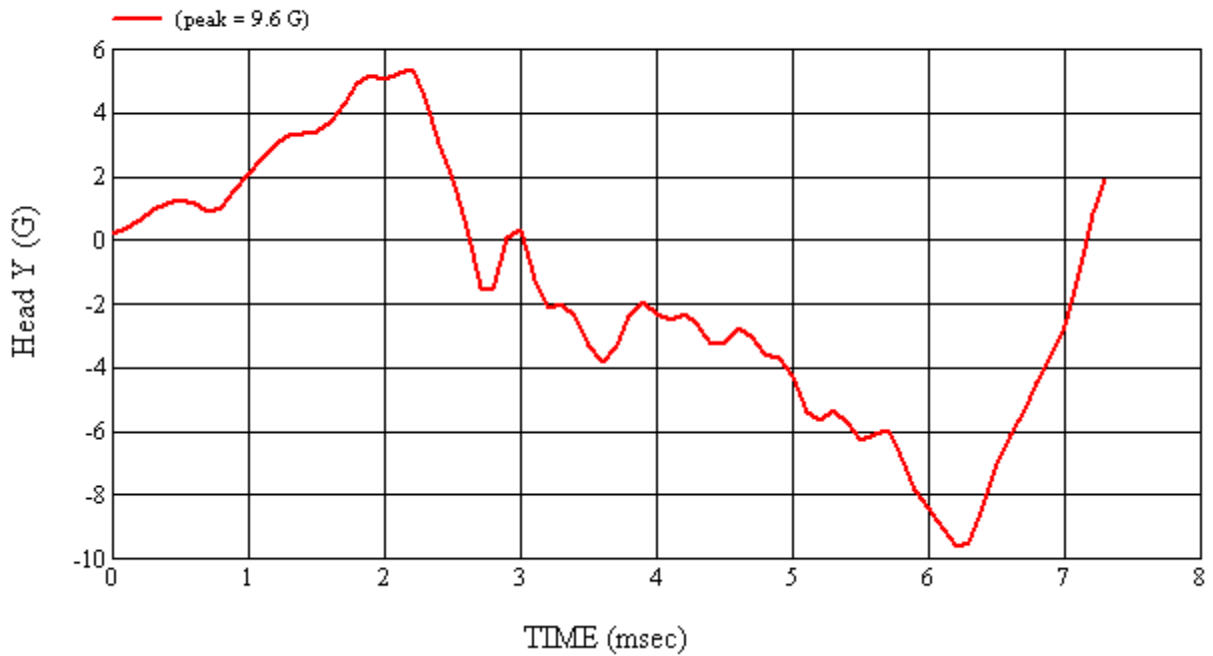
REMARKS:

RECORDED BY: *Keri D. McLean* DATE: 6/27/2011

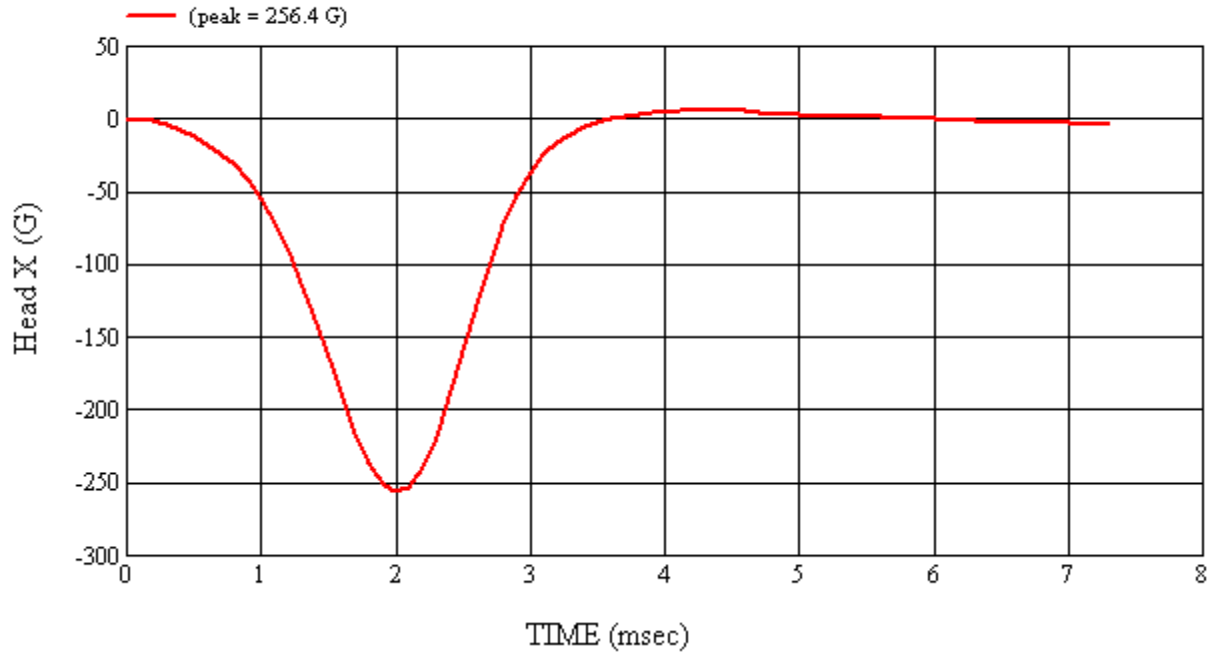
APPROVED BY: *Adrian I. Smith*



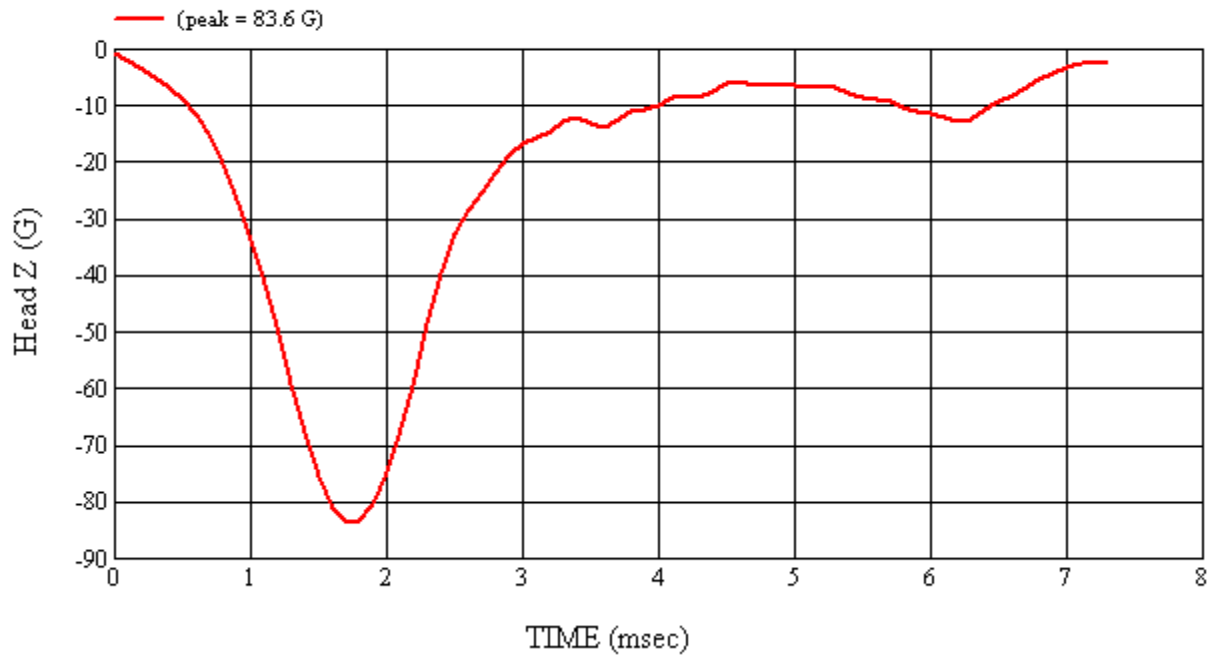
Head 037 (Post) Calibration #H37034



Head 037 (Post) Calibration #H37034



Head 037 (Post) Calibration #H37034



Head 037 (Post) Calibration #H37034

4-5 Pre-Test Calibration

**HEAD DROP TEST SUMMARY
PART 572L**

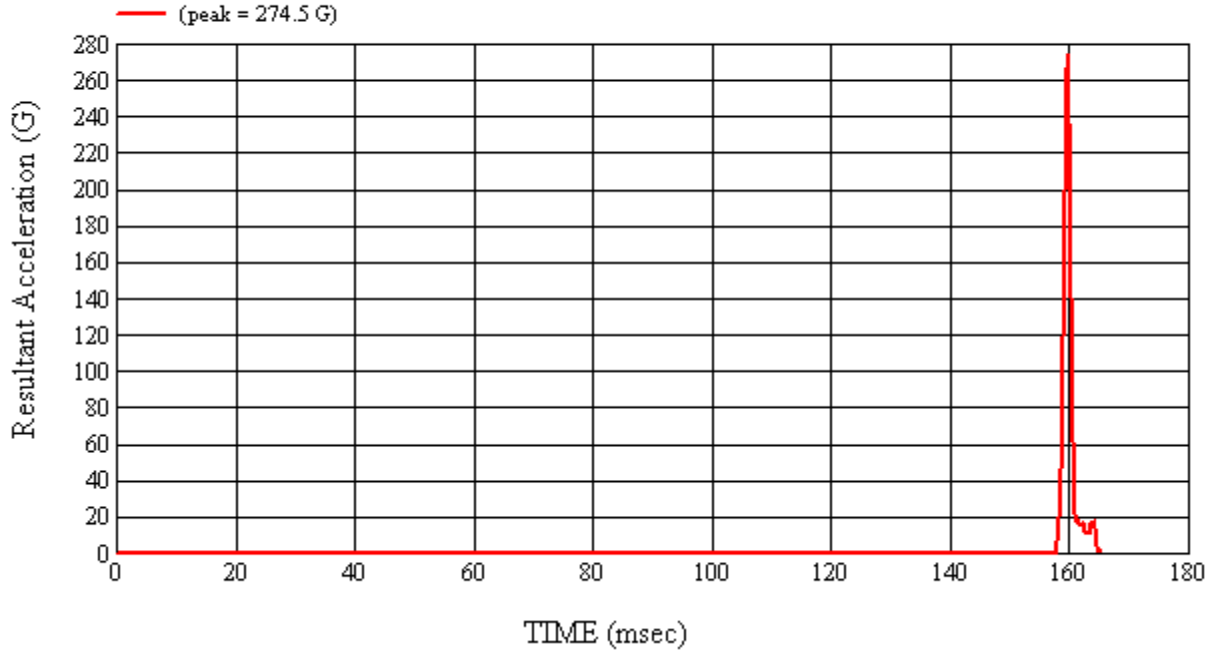
HEADFORM SERIAL NUMBER: 038		CALIBRATION DATE: 6/22/2011
CALIBRATION TIME: 8:16:54 PM		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	24.6
Relative Humidity	10% to 70%	67.4
Peak Resultant Acceleration	225 G's to 275 G's	274.5
Peak Lateral Acceleration	15 G's Maximum	7.7
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	J22700	02/07/11	08/07/11
2	ENDEVCO	7264-2000	J36197	02/07/11	08/07/11
3	ENDEVCO	7264-2000	J36353	02/07/11	08/07/11

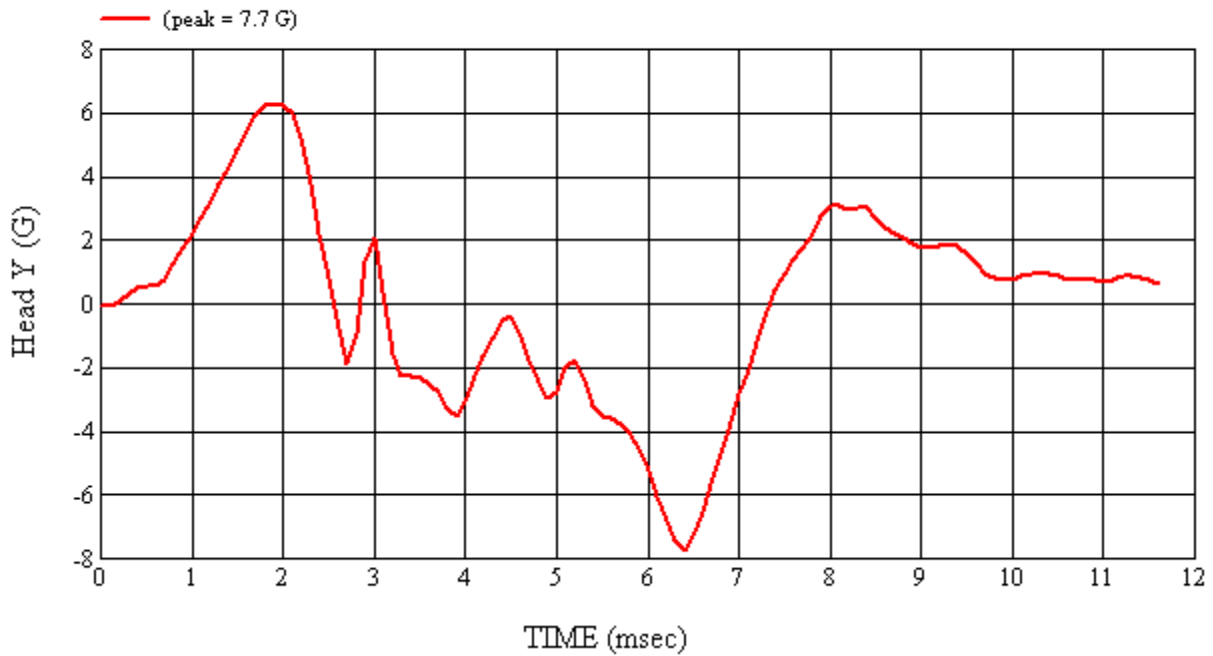
REMARKS:

RECORDED BY: *Keri D. McLean* DATE: 6/22/2011

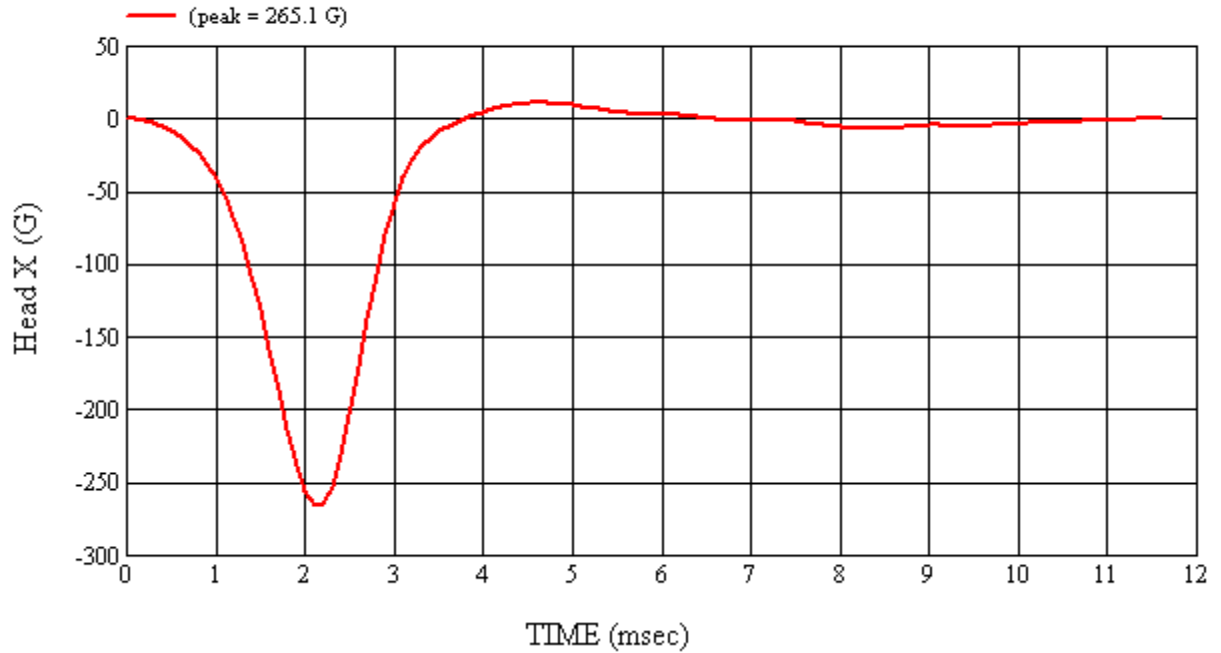
APPROVED BY: *Adham I. Smith*



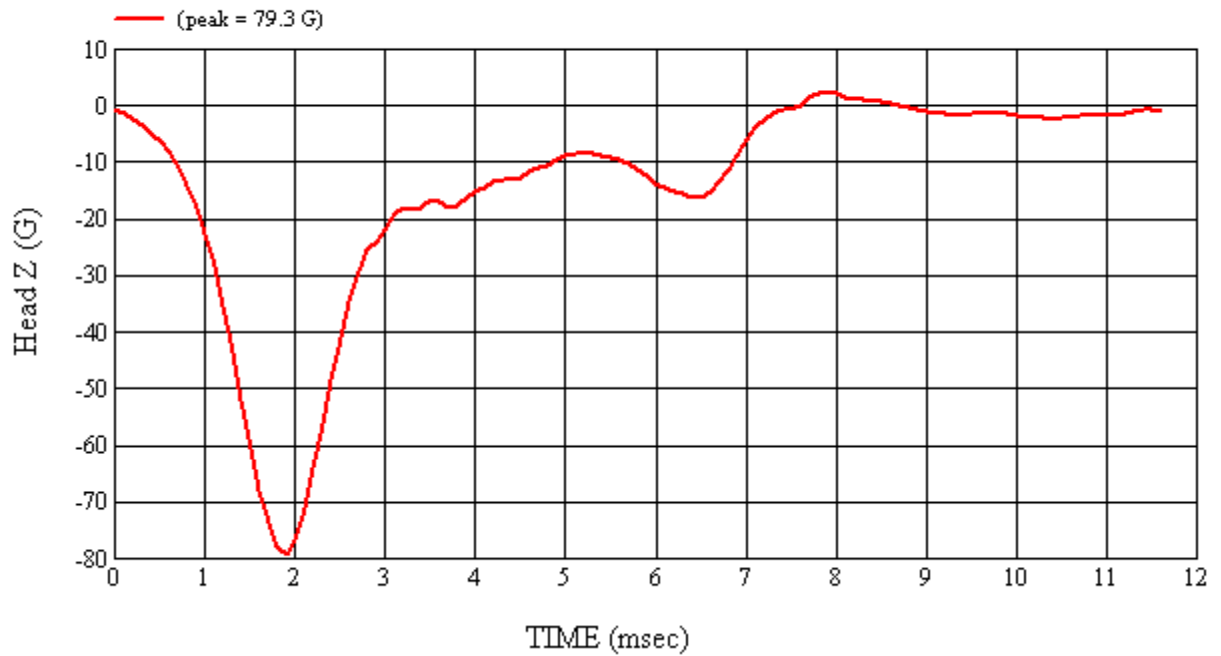
Head 038 (Pre) Calibration #H38033



Head 038 (Pre) Calibration #H38033



Head 038 (Pre) Calibration #H38033



Head 038 (Pre) Calibration #H38033

4-6 Post-Test Calibration

**HEAD DROP TEST SUMMARY
 PART 572L**

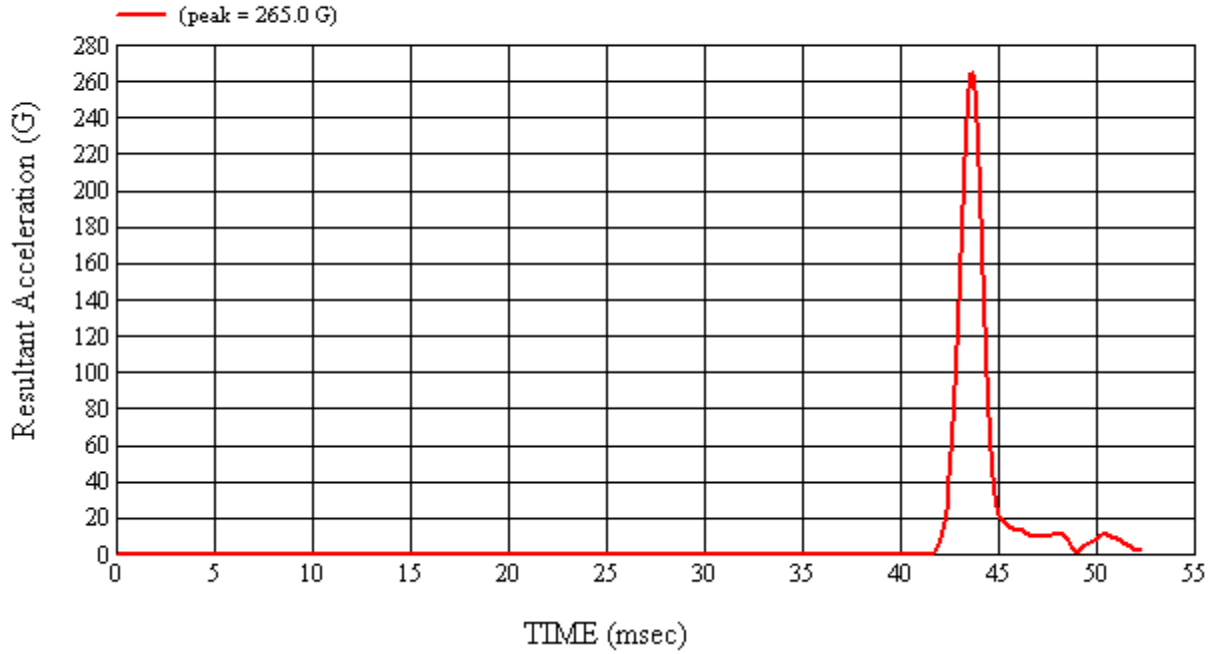
HEADFORM SERIAL NUMBER: 038		CALIBRATION DATE: 6/27/2011
CALIBRATION TIME: 10:03:52 AM		
TEST PARAMETER	SPECIFICATION	TEST RESULTS
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	20.7
Relative Humidity	10% to 70%	61.2
Peak Resultant Acceleration	225 G's to 275 G's	265.0
Peak Lateral Acceleration	15 G's Maximum	9.9
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	J22700	02/07/11	08/07/11
2	ENDEVCO	7264-2000	J36197	02/07/11	08/07/11
3	ENDEVCO	7264-2000	J36353	02/07/11	08/07/11

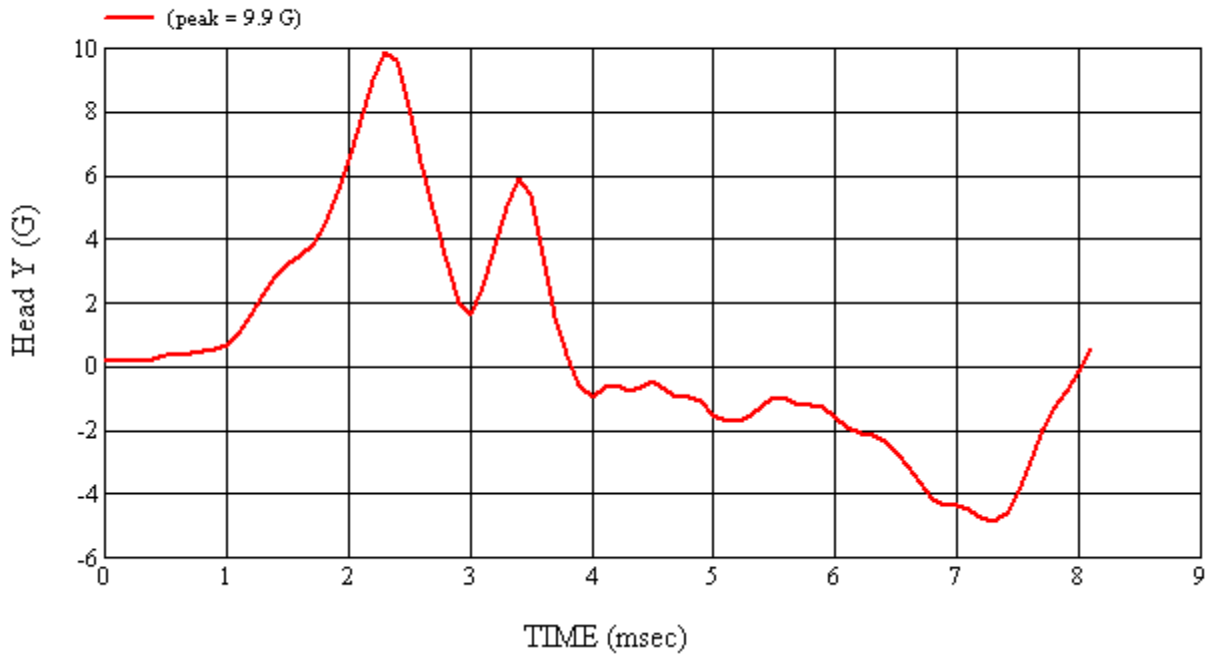
REMARKS:

RECORDED BY: *Keri D. McLean* DATE: 6/27/2011

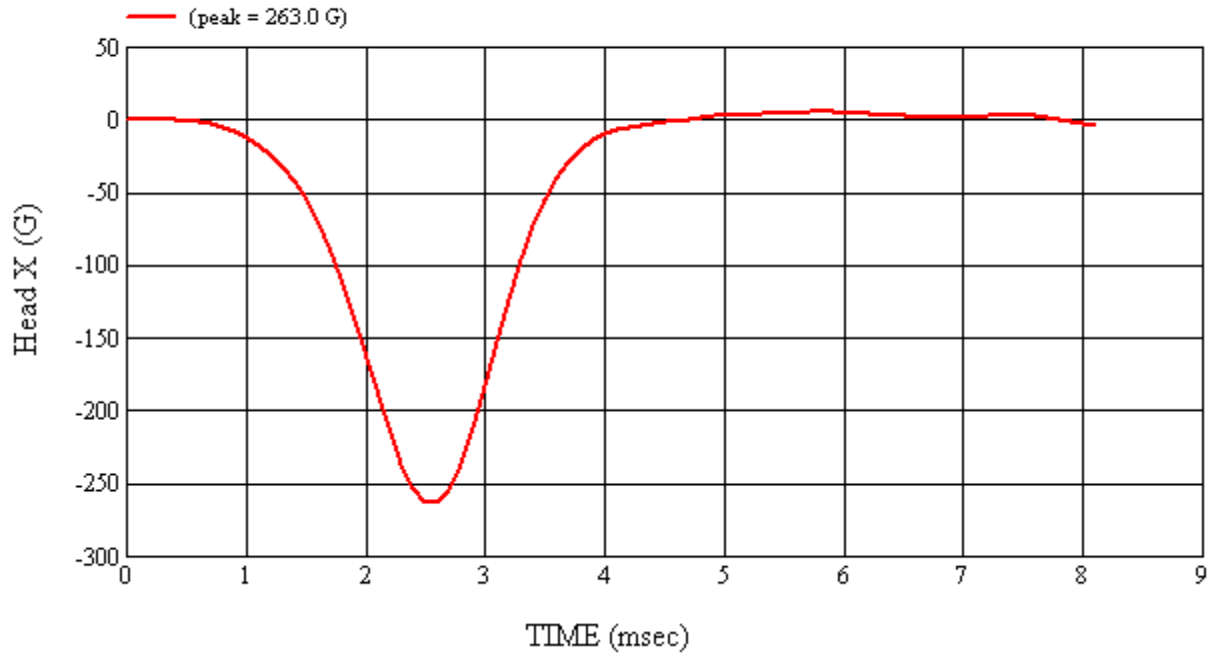
APPROVED BY: *Adrian Smith*



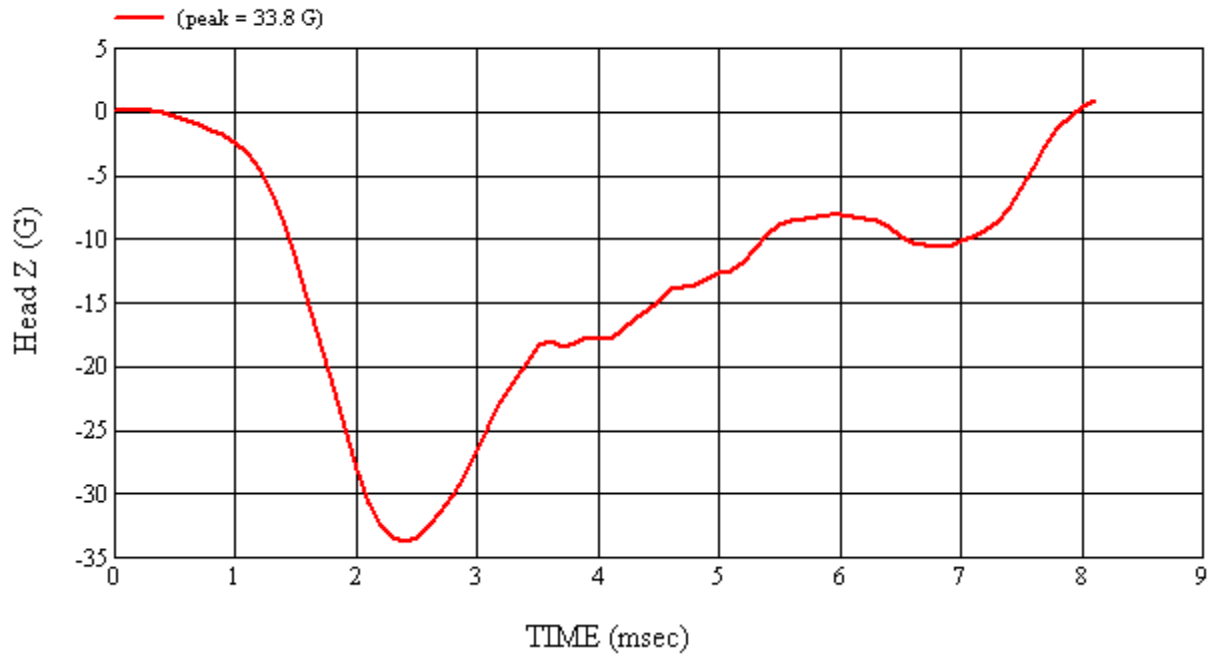
Head 038 (Post) Calibration #H38034



Head 038 (Post) Calibration #H38034



Head 038 (Post) Calibration #H38034



Head 038 (Post) Calibration #H38034

5.0 PHOTOGRAPHS



As Delivered – Left Side View



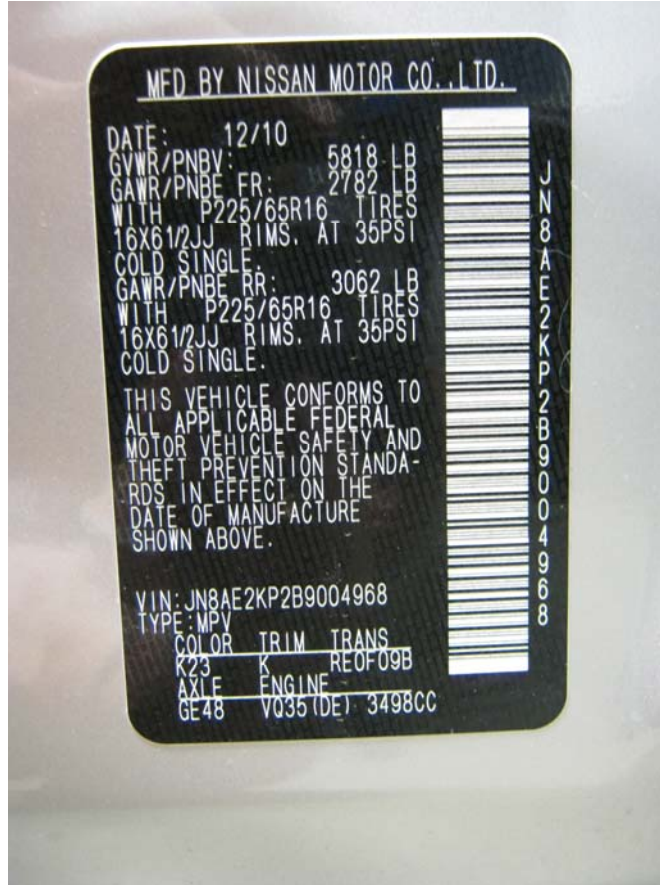
As Delivered – Right Side View



As Delivered – ¾ Front View From Left Side



As Delivered – ¾ Rear View From Right Side



As Delivered – Vehicle’s Certification Label



As Delivered – Vehicle’s Tire Information Label

Pre-Test Component Photographs



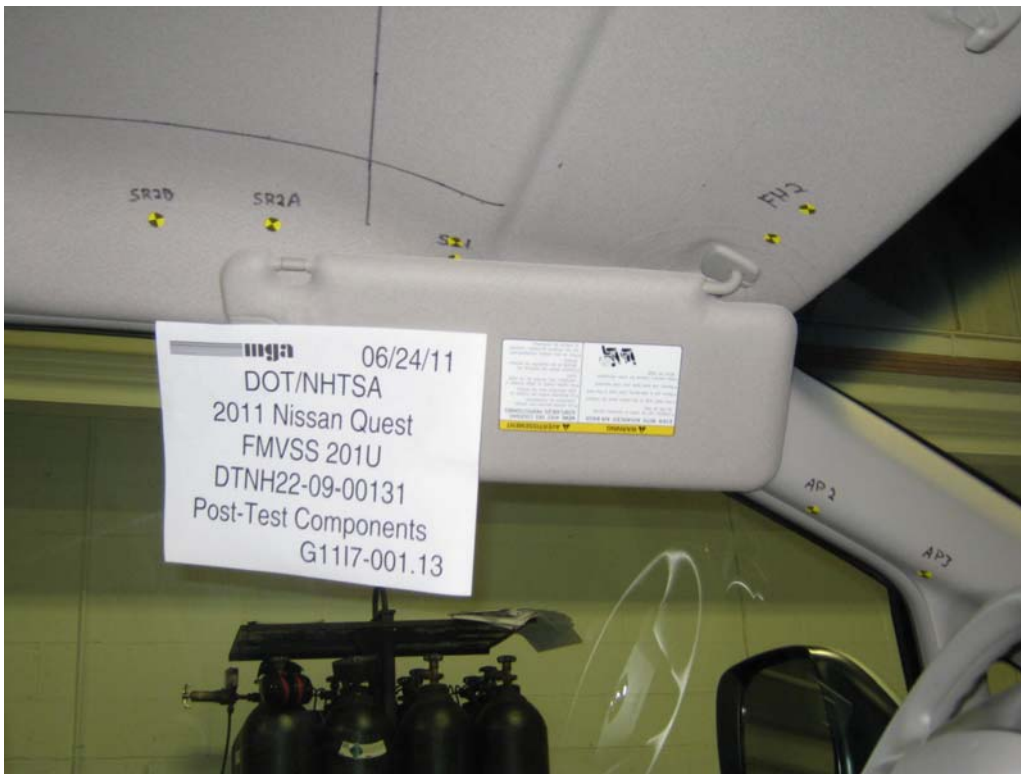








Post-Test Component Photographs





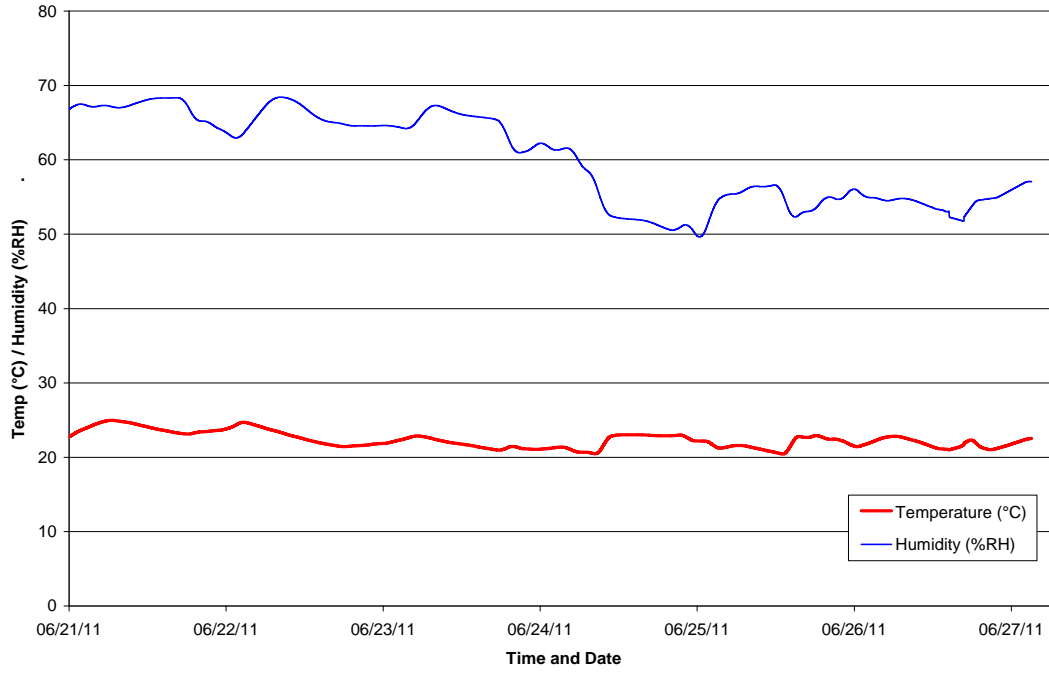






Appendix A – Temperature Trace

CB5203 - 2011 Nissan Quest - FMVSS 201U



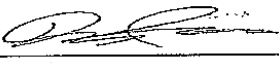
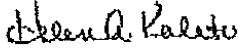
Appendix B – Calibration Certificates

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGA MI
Model #	352C03	Manufacturer:	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J35919
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011
New DLR(Units:G'S) ¹ 95.8
100K SHUNT
Linearity: ² 0.99951
New vs Old Sensitivit (% Difference) 0.7
Temperature: 72 °F
Humidity: 20 %
Sensitivity (mV/V/G): 0.025975
Calibrated By: Ryan Jones

Signature: 
Approved by: 

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0% at the 95% confidence level.

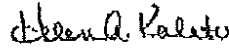
MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGAMI
Model #	352C03	Manufacturer	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J22664
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011
New DLR(Units:G'S) ¹ 94.2
100K SHUNT
Linearity: ² 0.99938
New vs Old Sensitivity
(% Difference) 1.2
Temperature: 72 °F
Humidity: 20 %
Sensitivity (mV/V/G): 0.026447
Calibrated By: Ryan Jones

Signature: 

Approved by: 

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGA MI
Model #	352C03	Manufacturer:	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J35924
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011

New DLR(Units:G'S) ¹ 92.8
100K SHUNT

Linearity: ² 0.99947

New vs Old Sensitivity (% Difference) 1.2

Temperature: 72 °F

Humidity: 20 %

Sensitivity (mV/V/G): 0.026824

Calibrated By: Ryan Jones

Signature: _____

Approved by: _____

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as $1 - (\text{Standard Deviation} / \text{Mean})$

All calibrations are traceable to the National Institute of Standards and Technology


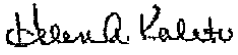
Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGAMI
Model #	352C03	Manufacturer	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J32177
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011
New DLR(Units:G'S) ¹ 113.7
100K SHUNT
Linearity:² 0.9997
New vs Old Sensitivit (% Difference) -0.2
Temperature: 72 °F
Humidity: 20 %
Sensitivity (mV/V/G): 0.021883
Calibrated By: Ryan Jones

Signature: 
Approved by: 

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

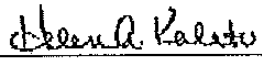
MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGAMI
Model #	352C03	Manufacturer	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J14103
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011
New DLR(Units:G'S) ¹ 93.9
100K SHUNT
Linearity: ² 0.99955
New vs Old Sensitivit (% Difference) -0.1
Temperature: 72 °F
Humidity: 20 %
Sensitivity (mV/V/G): 0.026479
Calibrated By: Ryan Jones

Signature: 

Approved by: 

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as $1 - (\text{Standard Deviation} / \text{Mean})$

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0% at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGA MI
Model #:	352C03	Manufacturer:	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	I35800
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011

New DLR(Units:G'S) ¹ 97.8
100K SHUNT

Linearity:² 0.9995

New vs Old Sensitivit (% Difference) 0.6

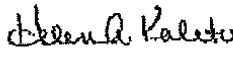
Temperature: 72 °F

Humidity: 20 %

Sensitivity (mV/V/G): 0.025451

Calibrated By: Ryan Jones

Signature: 

Approved by: 

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as $1 - (\text{Standard Deviation} / \text{Mean})$

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0% at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGA MI
Model #	352C03	Manufacturer	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J22700
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/7/2011

New DLR(Units:G'S) ¹ 96.4
100K SHUNT

Linearity: ² 0.99966

New vs Old Sensitivity (% Difference) 0.5

Temperature: 70 °F

Humidity: 20 %

Sensitivity (mV/V/G): 0.025819

Calibrated By: Chris Collins

Signature: Chris Collins

Approved by: Aben D. Kalato

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as $1 - (\text{Standard Deviation} / \text{Mean})$

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGAMI
Model #	352C03	Manufacturer	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J36197
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/7/2011

New DLR(Units:G'S) ¹ 108.7
100K SHUNT

Linearity: ² 0.99976

New vs Old Sensitivity
(% Difference) 0.9

Temperature: 70 °F

Humidity: 20 %

Sensitivity (mV/V/G): 0.022869

Calibrated By: Chris Collins

Signature: Chris Collins

Approved by: Alvan D. Kalish

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as $1 - (\text{Standard Deviation} / \text{Mean})$

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference		Sensor	
Name:	Accel Standard	Name:	MGA MI
Model #	352C03	Manufacturer	Endevco
Serial #:	95980	Model #:	7264-2000
Capacity:	G's:250	Serial #:	J36353
Calibration Date:	9/14/2010	Capacity/Range:	2,000 (G's)
Calibrated By:	Modal Shop		

Calibration Date: 2/7/2011

New DLR(Units:G'S) ¹ 99.1
100K SHUNT

Linearity:² 0.99988

New vs Old Sensitivit
(% Difference) 0.9

Temperature: 70 °F

Humidity: 20 %

Sensitivity (mV/V/G): 0.025114

Calibrated By: Chris Collins

Signature: Chris Collins

Approved by: Heard Kaleski

1. Actual data of reference and sensor instruments is found in calibration files

2. Linearity is defined as 1- (Standard Deviation/ Mean)

All calibrations are traceable to the National Institute of Standards and Technology

Calibration uncertainty no greater than 4.0 % at the 95% confidence level.



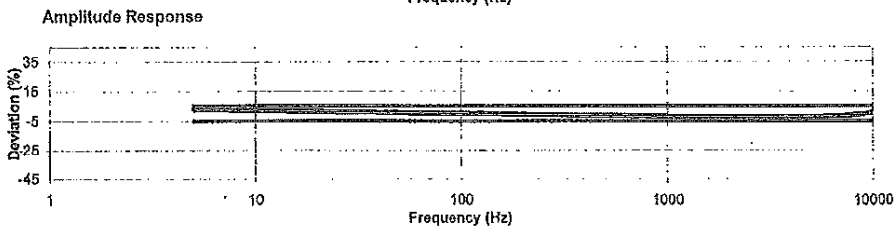
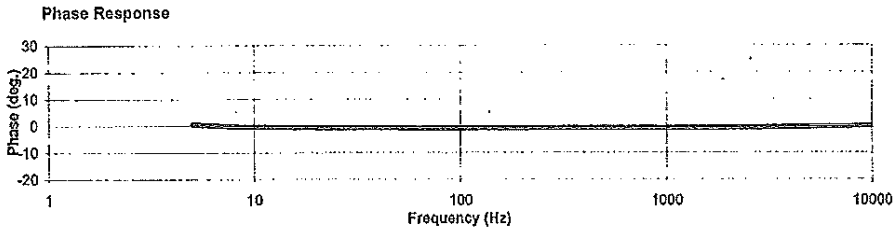
~Calibration Certificate~

3149 East Kemper Rd.
 Cincinnati, OH 45241
 Ph: 513-351-9919
 Fax: 513-458-2172
 www.modalshop.com

Sensor Information
 Model Number: 352C03
 Serial Number: 95980
 Manufacturer: PCB
 ID Number:
 Description: ICP® Accelerometer

Calibration Data
 Sensitivity @ 100 Hz: 9.94 mV/g
 Phase @ 100 Hz: -0.87 deg.
 Test Level: 10.00 g

Transducer Specifications
 Amp. Range: ± 500 g
 Resolution: 0.0005 g
 Resonant Freq: ≥ 50000 Hz
 Temp. Range: -54 to 121 °C
 -65 to 250 °F
 Axis: Uni-Axial



Data Table

Freq. (Hz)	Deviation (%)	Phase (deg)
5	3.15	0.41
10	2.18	-0.36
30	0.99	-0.71
50	0.62	-0.68
100	0.00	-0.87
300	-0.88	-0.81
500	-1.29	-0.77
1000	-1.87	-0.77
2000	-2.45	-0.68
3000	-2.46	-0.61
4000	-2.59	-0.49
5000	-2.40	-0.40
6000	-2.09	-0.26
7000	-1.63	-0.23
8000	-1.10	-0.13
9000	-0.30	0.02
10000	0.76	-0.01

Notes

Results relate only to the items calibrated.
 This certificate may not be reproduced except in full, without written permission.
 Method: Calibration is performed in compliance with ISO 9001 and ISO 17025
 This calibration was performed with TMS 9155C Calibration Workstation version 4.6.1
 Calibration traceable to primary method which has been proficiency validated through interlaboratory comparison to NIST (project number 822/271196).
 Back-to-Back Comparison Calibration per ISO 16063-21
 Procedure Used: PRD-P220
 Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.6-4.99 Hz; ± 3.00%, 5-9.99 Hz; ± 2.50%, 10-99 Hz; ± 1.70%, 100 Hz; ± 1.25%, 101-920 Hz; ± 1.40%, 921-5000 Hz; ± 1.70%, 5001-10,000 Hz; ± 2.20%, 10,001-15,000 Hz; ± 3.65%, 15,001-20,000 Hz; ± 4.75%.

Customer
 MGA Research Corp.

User Notes

Unit Condition
 As Found: In Tolerance
 As Left: In Tolerance

Lab Conditions
 Temperature: 73 (23) °F (°C)
 Humidity: 32 %

Approval Information

Technician: Ed Devlin
 Approval: *Ed Devlin*

Cal Date: 9/14/2010
 Due Date:



Cal ID: 15800 2649 01



~Calibration Certificate~

3149 East Kemper Rd.
 Cincinnati, OH 45241
 Ph: 513-351-9919
 Fax: 513-458-2172
 www.modalshop.com

Sensor Information

Model Number	352C03
Serial Number	95980
Manufacturer	PCB
ID Number	

Note

This certificate may not be reproduced
 except in full, without written
 permission.

Standards and/or Equipment Used During Calibration

Description	Manufacturer	Model	Serial	Due Date
Data Acquisition Card	NI	4461	15004324	6/29/2011
Std Accelerometer	PCB	080A200	110553	12/8/2010
Air Bearing Shaker	PCB	396C11	603	n/a
Std Sig Conditioner	PCB	442A102	173	12/8/2010
SUT Signal Conditioner	PCB	443B101	379	9/19/2010
Power Amplifier	TMS	2100E21-C	1002	n/a

Technician: Ed Devlin *Ed Devlin*

Cal Date: 9/14/2010

Customer: MGA Research Corp.

Due Date:



Calibration Certificate

Part Description: Gold Certification Date: 2/9/2011 Serial#: G08-02-02-03122
 Single Point - (Max-Min)/2 Specification: G08-02 .051mm (.0020") Certificate#: G0312240583
 Volumetric (Max Deviation) Specification: G08-02 +/- .072mm (+/- .0028") Temperature: See attached data

Measurement Standards Traceability
 Ball Bar Kit Asset Number: 1107 Calibration Due: 4/20/2011 *SI Traceability: METAS-L201008L0RZZ
 Thermometer Asset Number: TQ024 Calibration Due: 6/29/2011 *SI Traceability: 1001129378
 Reference Sphere Asset Number: 1241 Calibration Due: 11/21/2011 *SI Traceability: FAR01241_072809

The artifacts above have been calibrated with a device traceable to the International System of Units (SI) through a National Metrological Institute (NMI) or through an ISO17025 Accredited Laboratory. Measurement uncertainty is expressed at approximately 95% level of confidence using 1σ-1.96.

Calibration Results*

- 3 Single Point Articulation Tests at <= 20%, 20%-80% and >= 80% range. **PASSED**
- 1 Effective diameter sphere test. **PASSED**
- 20 Volumetric ball bar tests in 4 quadrants and 2 orientations. **PASSED**

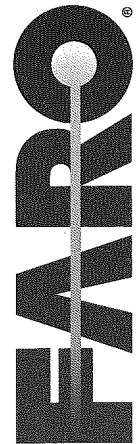
*Calibration conforms to procedures developed in accordance with ASME B89.4.22-2004. See attached data for measurement results.

Instrument condition as received:
 Not Within Specification

Instrument condition outgoing:
 Within specifications

Technician: Anthony Parker Date: 2/9/11

FARO Technologies, Inc.
 PH1: 1-800-736-2771
 PH2: 407-333-9911
 FAX: 407-333-8056
 L-A-B Cert Number: L1147-1



MICHIGAN OPERATIONS
 DATE: 2/7/14
 SUPERCEDES: MGATPTMCS

DOC. NO.: MGATP_TMC
 REVISION NO.: 6
 PAGE 3 OF 3

Tape Measure Calibration Certificate

Reference Steel Rule

Brand: SUSANSON
 S/N: MB90799
 Calibration Date: 1/15/10

Subject Tape Measure

Brand: STANLEY
 S/N: TPM 112
 Calibration Date: 12/13/10

Reference in (mm)	Subject Tape Measure	Difference	Reference in (mm)	Subject Tape Measure	Difference
0 (0)	0	0	18 (450)	450	0
1 (25)	25	0	19 (475)	475	0
2 (50)	50	0	20 (500)	500	0
3 (75)	75	0	21 (525)	525	0
4 (100)	100	0	22 (550)	550	0
5 (125)	125	0	23 (575)	575	0
6 (150)	150	0	24 (600)	600	0
7 (175)	175	0	25 (625)	625	0
8 (200)	200	0	26 (650)	650	0
9 (225)	225	0	27 (675)	675	0
10 (250)	250	0	28 (700)	700	0
11 (275)	275	0	29 (725)	725	0
12 (300)	300	0	30 (750)	750	0
13 (325)	325	0	31 (775)	775	0
14 (350)	350	0	32 (800)	800	0
15 (375)	375	0	33 (825)	825	0
16 (400)	400	0	34 (850)	850	0
17 (425)	425	0	35 (875)	875	0

If all differences are $\pm 1/32$ of an inch (1 mm), then the tape measure is acceptable.

Pass Fail Maximum Difference = 0

Date: 12/13/2010 Performed By: [Signature]

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is $\pm 0.2\%$. 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 $k=2$.



Metrology Management Services
Remit to address:

Calibration Certificate

35200 Plymouth Rd.
Livonia, MI 48150



CALIBRATION # 1277.01

Calibration Certificate #:
Z52545:1300708444

PRO PRO 360 PROTRACTOR		WORK ORDER: 1300708444
SERIAL NUMBER: N/A		
ASSET NUMBER: Z52545		
CUST. ASSET NUM: MGA00049		
PROCEDURE NAME: PRO 3600		
PROCEDURE REV: A		
CALIBRATED BY: JOE McCONNAUGHAY		TEST RESULT: PASS
CUSTOMER: MGA RESEARCH		PERFORMED ON: 3/21/2011
446 Executive Drive		CAL DUE DATE: 3/21/2012
Troy, MI 48083		DATA TYPE: FOUND-LEFT
PRIMARY CONTACT: BOB MILLER		TEMPERATURE: 21.00 °C
		HUMIDITY: 38 %

This instrument has been processed and calibrated in accordance with the NovaStar Solutions Quality System Manual and is traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. The NovaStar Solutions quality system is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994.

The results reported herein apply only to the calibration of the item described above. No sampling plan was used for this calibration.

The ratio of the tolerance of the instrument or parameter being calibrated to the expanded uncertainty of the standard (TUR) is greater than 4:1 unless otherwise specified. Expanded uncertainties are expressed at the approximate 95% level of confidence using a K=2. Due to any number of factors, the recommended due date on the item does not imply continuing conformance to specifications during the recommended interval. Unless otherwise stated the unit under test meets or exceeds manufacturer specifications.

For range and best measurement capability specifications for the standards used to perform this calibration, see the most recent calibration report maintained by this calibration laboratory (available upon request).

This report may not be reproduced, except in full, without written approval from NovaStar Solutions.

As Received Condition: IN TOLERANCE As Returned Condition: IN TOLERANCE

Action Taken: FULL CALIBRATION

REMARKS:

Asset #	Cert#	Description	Cal Date	Due Date
1437	1437:1232010439	PHASE 2 220-006 ROTARY TABLE	1/15/2009	1/15/2013
1541	1541:1300372477	NEWPORT CT485AL HYGROTHERMOGRAPH	3/17/2011	3/17/2012
1577	1577:1297694647	RAHN SUPER 100 SURFACE PLATE	2/14/2011	2/14/2012

***** End of Certificate *****

@ 3/20/11

QA approved: Steve Hall Date: 3-22-11

Signature: [Signature]

Asset Barcode:



Metrology Management Services
Remit to address:

Calibration Certificate

35200 Plymouth Rd.
Livonia, MI 48150



CALIBRATION # 1277.01
Calibration Certificate #:
Z52549:1300715528

DICKSON TM325 TEMP/HUMD DISP		WORK ORDER: 1300715528
SERIAL NUMBER:	N/A	
ASSET NUMBER:	Z52549	
CUST. ASSET NUM:	MGA00894	
PROCEDURE NAME:	1012	
PROCEDURE REV:	A	
CALIBRATED BY:	JOE McCONNAUGHAY	TEST RESULT: PASS
CUSTOMER:	MGA RESEARCH	PERFORMED ON: 3/21/2011
	446 Executive Drive	CAL DUE DATE: 3/21/2012
	Troy, MI 48083	DATA TYPE: FOUND-LEFT
PRIMARY CONTACT:	BOB MILLER	TEMPERATURE: 21.00 °C
		HUMIDITY: 38 %

This instrument has been processed and calibrated in accordance with the NovaStar Solutions Quality System Manual and is traceable to the National Institute of Standards and Technology (NIST), or to NIST accepted intrinsic standards of measurement, or derived by the ratio type of self-calibration techniques. The NovaStar Solutions quality system is accredited to ISO/IEC 17025:2005 and ANSI/NCSL Z540-1-1994.

The results reported herein apply only to the calibration of the item described above. No sampling plan was used for this calibration.

The ratio of the tolerance of the instrument or parameter being calibrated to the expanded uncertainty of the standard (TUR) is greater than 4:1 unless otherwise specified. Expanded uncertainties are expressed at the approximate 95% level of confidence using a K=2. Due to any number of factors, the recommended due date on the item does not imply continuing conformance to specifications during the recommended interval. Unless otherwise stated the unit under test meets or exceeds manufacturer specifications.

For range and best measurement capability specifications for the standards used to perform this calibration, see the most recent calibration report maintained by this calibration laboratory (available upon request).

This report may not be reproduced, except in full, without written approval from NovaStar Solutions

As Received Condition: IN TOLERANCE As Returned Condition: IN TOLERANCE
Action Taken: FULL CALIBRATION

REMARKS:

Asset #	Cert#	Description	Cal Date	Due Date
1504	1504:1296548177	HART SCIENTIFIC 1502A THERMOMETER READOUT	2/7/2011	2/7/2012
1541	1541:1300372477	NEWPORT CT485AL HYGROTHERMOGRAPH	3/17/2011	3/17/2012
1717	1717:1297150241	HART SCIENTIFIC 5614 PRT	2/7/2011	2/7/2012
1917	1917:1296319659	VAISALA M170/HMP76 MEASUREMENT INDICATOR/PROBE	1/29/2011	1/29/2012

***** End of Certificate *****

@ 3/28/11

QA approved: Steve Hall Date: 3-22-11

Signature: [Signature]

Asset Barcode:



CALIBRATION CERT #0513.01

4700 Barden Court SE, Kentwood MI 49512, Telephone: 616-698-3124, Fax: 616-698-2364, www.metrocal.com

Certificate of Calibration

MGA Research
 446 Executive Drive
 Troy, MI 48083

Order Number: **69158**
 Certificate Number: **100817600**
 Page: 1 of 1

Gauge Number: **MGA00081**
 Gauge Desc: **0 to 20lb x 0.01lb Digital Scale**
 Manufacturer: **Cardinal Detecto**
 Model Number: **AP-20**
 Serial Number: **E33603-0213**

Customer PO: **N/A**
 Last Calibration: **7/29/09**
 Calibration Date: **8/17/10**
 Next Calibration: **8/17/11**

As Found Condition: **In Tolerance**

As Left Condition: **In Tolerance**

MetroCal Inc. maintains reference standards of measurement which are traceable to the National Institute of Standards and Technology, or other authorized National Standards. Calibration was performed in accordance with MetroCal Procedure CP042 and relevant sections of the manufacturer's manual. This calibration complies with ISO/IEC 17025 and ANSI/NCCL Z540-1 Standards. Results shall not be reproduced except in full without the written approval of MetroCal Inc. Results relate only to the item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired. Statements of compliance made using simple acceptance rule.

Calibration Procedure
Uncertainty Expressed at
95% confidence, (K=2)
 +/-0.001% of Load

<u>Standard Used</u>	<u>Cal. Date</u>	<u>Due Date</u>	<u>Traceable No.</u>
Weight Set	9/3/08	9/3/10	ID# 2463

Results:

Tolerance used: ± 0.02lb

Units: lbs		TI Division/Increment: 0.01 lb				
Weight Test	As Found			As Left		
	Nominal	Indication	Deviation	Nominal	Indication	Deviation
Zero	0.00	0.00	0.00	0.00	0.00	0.00
0-25% fs	5.00	5.00	0.00	5.00	5.00	0.00
26-50% fs	10.00	9.99	-0.01	10.00	9.99	-0.01
51-75% fs	15.00	14.99	-0.01	15.00	14.99	-0.01
76-100% fs	20.00	19.98	-0.02	20.00	19.98	-0.02
1/2 load test	10.00	9.99	-0.01	10.00	9.99	-0.01
return to zero	0.00	0.00	0.00	0.00	0.00	0.00
4 quad/Shift Test:	Pass			4 quad/Shift Test:	Pass	

Comments: Environmental conditions during calibration: 78 °F, 51 % RH.
 No adjustment required.

Karen Shipley
 Karen Shipley
 Calibration Technician

Issued: 8/17/10

Checked box indicate this calibration was performed at the customers facility.

@ 8/20/10

Sterling Scale Co., Inc.
 20950 Boening St.
 Southfield, MI 48075

Certificate of Calibration

F410/12-3
 Rev. Date 11/23/05



calibration cert. 1448.01

Customer: MGA Research Cert# 10-6914 Temp/Humidity: ok
 Location of Calibration: 2839 Elliot Rd Troy MI 48063
 Calibration Date: 7/21/2010 Due Date: Jul-11 Condition of Item: Fair
 Equipment Make: Intercomp Model: SW Deluxe Serial Number 26032389 Capacity: 2200 lb x 1 lb Per weigh pad
 8800 lb x 1 lb Scale system total capacity

Applied Test Wt	Before Adjustment	Tolerance	In-Tolerance Y/N	After Adjustment	In-Tolerance Y/N	Unc	
10 lb	9 lb	1 lb	y	n/a	y	0.002 lb	Right Rear Pad
100 lb	100 lb	1 lb	y	n/a	y	0.11 lb	
1000 lb	1000 lb	2 lb	y	n/a	y	0.14 lb	
10 lb	10 lb	1 lb	y	n/a	y	0.002 lb	Right Front Pad
100 lb	100 lb	1 lb	y	n/a	y	0.11 lb	
1000 lb	999 lb	2 lb	y	n/a	y	0.14 lb	

Shift test
 n/a

Platform #1 Platform #2 Platform #3
 Pass Pass Pass
 Fail Fail Fail

Tests performed: Repeatability Linearity Sensitivity Discrimination

Technician: This scale is a wheel weigh system, there are a total of 4 wheel pads. Each pad has a capacity of 2200lb. A lb. All 4 pads together have a total capacity of 8800 lb.
 COMMENTS/ Scale passes tests
 weights used sn on file

Page 2 of 2

Scale Certified

Scale Rejected

Sterling Scale Service Rep: E.Denny Date: 7/21/2010 1 of 1

The above item has been calibrated using the relevant EPO or OEM procedures utilizing test weights traceable to International Systems of Units (SI), through the Michigan Department of Agriculture. Test numbers on file. Expanded uncertainty (k=2) confidence level of 95% as reported. Results relate only to items listed.
 The reported uncertainty is valid only for the environment in which it is determined. Any number of factors may cause the item to drift out of calibration before recommended interval has expired. This report shall not be reproduced, except in full without approval of the laboratory. Tolerances followed are maintenance/acceptance per HB 44 or as determined by the customer. Sterling Scale does not warranty calibration.