FINAL REPORT NUMBER 201UI-MGA-11-18

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

ADAM OPEL GMBH GERMANY
2011 Buick Regal CXL Sedan
NHTSA No. CB0109

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: July 21-25, 2011
Report Date: July 26, 2011

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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Accepted By: _____

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16. Abstract A compliance test series was conducted on the subject 2011 Buick Regal CXL Sedan, NHTSA No. CB0109, 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 July 21-25, 2011. Test failures identified were as follows: None The data recorded indicates that the 2011 Buick Regal CXL Sedan 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 Buick Regal CXL Sedan, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on July 21-25, 2011 on a 2011 Buick Regal CXL Sedan, manufactured by Adam Opel GmbH Germany.

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 Buick Regal CXL Sedan was equipped with A, B, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, and a grab handle located on the side rail above each door (front and rear).

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	BP1	SR2B	UR4@SR3-1
AP2	BP4	UR1@AP	UR5@SR3-2
BP1	FH1	UR3@BP	UR6@RP

The 2011 Buick Regal CXL Sedan 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 Buick Regal CXL Sedan

VEH. NHTSA NO.: CB0109 VIN: W04GN5EC7B1050269 COLOR: Espresso Bronze

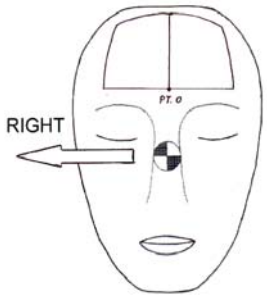
VEH. BUILD DATE: October, 2010 TEST DATES: July 21-25, 2011

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	Right	108	32	19.1	830	879	19	16 Right
AP2	Left	205	50	18.8	629	613	16	12 Left
BP1	Right	90	18	18.4	553	513	61	2 Right
BP3	Left	270	3	23.8	544	500	21	1 Right
BP4	Right	125	2	23.7	500	443	14	10 Right
FH1	Right	180	50	23.6	689	692	20	3 Right
SR2B	Right	90	40	19.0	438	360	44	9 Left
UR1@AP	Left	270	50	23.6	550	508	41	15 Left
UR3@BP	Left	270	50	23.8	491	430	35	1 Left
UR4@SR3-1	Right	90	50	23.6	635	621	29	2 Left
UR5@SR3-2	Left	270	45	23.9	669	666	45	4 Left
UR6@RP	Right	90	50	23.6	511	456	39	4 Right

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



POST TEST COMMENTS:

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

BP1 Right: Non functional anchorage adjuster.

BP4 Right: Stress mark on pillar trim.

UR1@AP Left: Headliner deformation, dislodged headliner.

UR4@SR3-1 Right: Headliner deformation, grab handle compression.

UR5@SR3-2 Left: Headliner deformation, dislodged headliner.

UR6@RP Right: Headliner deformation, dislodged headliner.

REMARKS:

The targets listed were impacted in the following order:

Left: UR1@AP, AP2, BP3, UR3@BP,UR5@SR3-2

Right: FH1, AP1, SR2B, BP1, UR4@SR3-1, UR6@RP, BP4,

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: July 25, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Buick Regal CXL Sedan

VEH. NHTSA NO.: CB0109 VIN: W04GN5EC7B1050269 COLOR: Espresso Bronze

VEH. BUILD DATE: October, 2010 TEST DATES: July 21-25, 2011

TEST LABORATORY: MGA Research Corporation

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

INTERIOR TRIM INFORMATION: A, B, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, and a grab handle located on the side rail above each door (front and rear).

SUNROOF INFORMATION:

Installed: _____Yes __X__ No

Operation: _____Electric ____ Manual

SIDE RAIL CURTAIN AIRBAG INFORMATION:

Installed: __X__Yes ____ No

ROLL-BAR INFORMATION:

Installed: _____Yes __X__ No

Padded: _____Yes __X__ No

Braces: _____Yes __X__ No

GENERAL INFORMATION:

Date Received: March 14, 2011; Odometer Reading 20 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Adam Opel GmbH Germany

Date of Manufacture: October, 2010; VIN: W04GN5EC7B1050269

GVWR: 2120 kg; GAWR FRONT: 1080 kg;

GAWR REAR: 1040 kg;

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 230 kPa REAR: 230 kPa

Recommended Tire Size: P235/50R18

Recommended Cold Tire Pressure:

FRONT: 230 kPa REAR: 230 kPa

Size of Tire on Test Vehicle: P235/50R18

Type of Spare Tire: T125/80R16; Space Saver: X; Standard__

VEHICLE CAPACITY DATA:

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

Number of Occupants: Front 2; Rear 3; TOTAL 5

VEHICLE CAPACITY WEIGHT:

Vehicle Capacity Weight (VCW) = 420 kg

No. of Occupants x 68 kg = 340 kg

Rated Cargo/Luggage Weight (RCLW) = 80 kg (difference)

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

Right Front =	459.5 kg	Right Rear =	342.0 kg
Left Front =	498.0 kg	Left Rear =	337.5 kg
TOTAL FRONT =	957.5 kg	TOTAL REAR =	679.5 kg
% Total Weight =	58.5 %	% Total Weight =	41.5 %

TOTAL DELIVERED WEIGHT = 1637.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1637.0 kg

Max. Test Cargo/Luggage Weight = 80.0 kg

Target Test Weight = 1717.0 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front =	453.0 kg	Right Rear =	386.5 kg
Left Front =	490.0 kg	Left Rear =	386.5 kg
TOTAL FRONT =	943.0 kg	TOTAL REAR =	773.0 kg
% Total Weight =	55.0 %	% Total Weight =	45.0 %

TOTAL TEST WEIGHT = 1716.0 kg

Weight of ballast secured in vehicle's cargo area = 79.0 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 736 mm; Left Front 731 mm;
Right Rear 743 mm; Left Rear 745 mm;
Pitch Angle at Right Door Sill = 0.8 Rear is higher
Pitch Angle at Left Door Sill = 0.7 Rear is higher
Roll Angle at Front Bumper = 0.3 Right is higher
Roll Angle at Rear Bumper = 0.3 Right is higher

FULLY LOADED: Right Front 739 mm; Left Front 734 mm;
Right Rear 726 mm; Left Rear 729 mm;
Pitch Angle at Right Door Sill = 0.5 Rear is higher
Pitch Angle at Left Door Sill = 0.3 Rear is higher
Roll Angle at Front Bumper = 0.1 Right is higher
Roll Angle at Rear Bumper = 0.1 Right is higher

AS TARGETED: Right Front 895 mm; Left Front 890 mm;
Right Rear 864 mm; Left Rear 868 mm;
Pitch Angle at Right Door Sill = 0.5 Rear is higher
Pitch Angle at Left Door Sill = 0.3 Rear is higher
Roll Angle at Front Bumper = 0.3 Right is higher
Roll Angle at Rear Bumper = 0.2 Right is higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill =	0.7 Rear is higher
Pitch Angle at Left Door Sill =	0.6 Rear is higher
Roll Angle at Front Bumper =	0.2 Right is higher
Roll Angle at Rear Bumper =	0.1 Right is higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill =	0.5 Rear is higher
Pitch Angle at Left Door Sill =	0.3 Rear is higher
Roll Angle at Front Bumper =	0.2 Right is higher
Roll Angle at Rear Bumper =	0.2 Right is higher

VEHICLE WHEELBASE = 2740 mm

REMARKS: The seat travel distance was measured to be 270 mm for the driver front seat and 250 mm for the passenger front seat.

RECORDED BY: Nathaniel Newth DATE: July 15, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Buick Regal CXL Sedan

VEH. NHTSA NO.: CB0109 VIN: W04GN5EC7B1050269 COLOR: Espresso Bronze

VEH. BUILD DATE: October, 2010 TEST DATES: July 21-25, 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 195º-255º	L 204.7º	L 252.5º
	R 105º-165º	R 108.0º	R 156.0º
B-PILLAR	L 195º-345º	L 202.1º	L 283.6º
	R 15º-165º	R 77.6º	R 158.2º

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Nathaniel Newth DATE: July 15, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Buick Regal CXL Sedan

VEH. NHTSA NO.: CB0109 VIN: W04GN5EC7B1050269 COLOR: Espresso Bronze

VEH. BUILD DATE: October, 2010 TEST DATES: July 21-25, 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 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
	FH2	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
SIDE RAIL	SR1	L 0º-50º	L 0º	L 43º
		R 0º-50º	R 0º	R 43º
	SR2A	L 0º-50º	L 0º	L 40º
		R 0º-50º	R 0º	R 40º
	SR2B	L 0º-50º	L 0º	L 40º
		R 0º-50º	R 0º	R 40º
	SR3-1	L 0º-50º	L 0º	L 46º
		R 0º-50º	R 0º	R 46º
	SR3-2	L 0º-50º	L 0º	L 46º
		R 0º-50º	R 0º	R 46º
REAR HEADER	RH	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
A-PILLAR	AP1	L -5º-50º	L -5º	L 32º
		R -5º-50º	R -5º	R 32º
	AP2	L -5º-50º	L -5º	L 50º
		R -5º-50º	R -5º	R 50º
	AP3	L -5º-50º	L -5º	L 50º
		R -5º-50º	R -5º	R 50º
B-PILLAR	BP1	L -10º-50º	L -10º	L 18º
		R -10º-50º	R -10º	R 18º
	BP2*	L 0º-50º	L 0º	L 17º
		R 0º-50º	R 0º	R 17º
	BP3	L -10º-50º	L -10º	L 3º
		R -10º-50º	R -10º	R 3º
	BP4	L -10º-50º	L -10º	L 2º
		R -10º-50º	R -10º	R 2º
REAR PILLAR	RP1	L -10º-50º	L -10º	L 2º
		R -10º-50º	R -10º	R 2º
	RP2	L -10º-50º	L -10º	L 2º
		R -10º-50º	R -10º	R 2º
UPPER ROOF 1		0º-50º	0º	50º
UPPER ROOF 2		0º-50º	0º	50º
UPPER ROOF 3		0º-50º	0º	50º
UPPER ROOF 4		0º-50º	0º	50º
UPPER ROOF 5		0º-50º	0º	45º
UPPER ROOF 6		0º-50º	0º	50º

As determined using the Procedures specified in S8.13.4.2. *Target BP2 is a seat belt anchorage location.

RECORDED BY: Nathaniel Newth DATE: July 15, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Buick Regal CXL Sedan

VEH. NHTSA NO.: CB0109 VIN: W04GN5EC7B1050269 COLOR: Espresso Bronze

VEH. BUILD DATE: October, 2010 TEST DATES: July 21-25, 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)	270 mm	250 mm
Tº	Horizontal < {CG-F1 (Left Seat) to (Right A-Pillar)}	107.5º	--
A1º	360º - Tº	252.5º	--
Wº	Horizontal < {CG-2 (Left Seat) to (Left A-Pillar)}	204.7º	--
A2º	A2º = Wº	204.7º	--
Uº	Horizontal < {CG-2 (Left Seat) to (Left B-Pillar)}	283.6º	--
B1º	B1º = Uº	283.6º	--
Vº	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	202.1º	--
B2º	B2º = Vº	202.1º	--
Wº (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	156.0º
A1º (right)	A1º (right) = Wº (right)	--	156.0º
T º (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	252.0º
A2º (right)	360º-Tº (right)	--	108.0º
V º (right)	Horizontal < {CG-R (Right Seat) to (Right B-Pillar)}	--	158.2º
B1º (right)	B1º (right) = Vº (right)	--	158.2º
U º (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	77.6º
B2º (right)	B2º (right) = Uº (right)	--	77.6º
J	A-Pillar {(Plane 3) – (Plane 5)}	314.6 mm	313.2 mm
J/2	J ÷ 2	157.3 mm	156.6 mm
D1	Upper Roof {(Plane A) – (Plane B)}	1645.8 mm	
D1/2	D1 ÷ 2	822.9 mm	

Measurement	Description	Left Side	Right Side
D2	Upper Roof {(Plane C) – (Plane D)}	1197.9 mm	
D2/2	D2 ÷ 2	599.0 mm	
.35D1	.35 x D1	576.0 mm	
.35D2	.35 x D2	419.3 mm	
N	B-Pillar {(BPR) – (lowest point on daylight opening forward of B-Pillar)}	360.6 mm	358.2 mm
N/2	B-Pillar {(BP3) – (lowest point on daylight opening forward of B-Pillar)}	180.3 mm	179.1 mm
N/4	B-Pillar {(BP4) – (lowest point on daylight opening forward of B-Pillar)}	90.2 mm	89.5 mm
D	R-Pillar (Point 7 – Point M)	720.0 mm	720.0 mm
3D/7	3*D / 7	308.6 mm	308.6 mm

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

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	3101.0	-370.0	466.0	3101.0	370.0	466.0
Rear	3945.0	-345.0	472.0	3945.0	345.0	472.0

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	3101.0	-370.0	466.0	3101.0	370.0	466.0
Rear	3945.0	-345.0	472.0	3945.0	345.0	472.0

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	2991.0	-370.0	1126.0	3011.0	370.0	1126.0
CGF2	3261.0	-370.0	1126.0	3261.0	370.0	1126.0
CGR	4105.0	-345.0	1132.0	4105.0	345.0	1132.0

REFERENCE FOR VEHICLE COORDINATE SYSTEM (measured in millimeters):

Front passenger door striker upper bolt (x, y, z) = 3245.9, 782.8, 667.3

Front driver door striker bolt (x, y, z) = 3245.9, -782.8, 667.3

Rear passenger door striker upper bolt (x, y, z) = 4184.7, 773.8, 760.5

REMARKS:

RECORDED BY: Nathaniel Newth DATE: July 15, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Buick Regal CXL Sedan

VEH. NHTSA NO.: CB0109 VIN: W04GN5EC7B1050269 COLOR: Espresso Bronze

VEH. BUILD DATE: October, 2010 TEST DATES: July 21-25, 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	2868.4	-541.3	1253.1	--	--	Yes	--	--
REL	2885.9	-562.8	1210.1	253	32	--	2	No
AP2	2802.1	-601.5	1165.6	205	50	No	--	Yes
AP3	2633.2	-631.0	1095.6	205	50	No	--	No
A-Pillar Right Side								
AP1	2869.1	538.7	1250.5	--	--	Yes	--	--
REL	2881.4	558.7	1210.2	108	32	--	2	Yes
AP2	2795.2	598.2	1163.0	156	50	No	--	No
AP3	2631.4	630.5	1094.9	156	50	No	--	No
B-Pillar Left Side								
BP1	3403.3	-483.9	1286.4	270	18	No	--	No
BP2	3366.7	-621.6	1048.3	270	17	No	--	No
BP3	3315.4	-613.3	1105.9	270	3	No	--	Yes
BP4	3443.9	-655.5	1016.4	235	2	No	--	No
B-Pillar Right Side								
BP1	3401.9	484.6	1284.2	90	18	No	--	Yes
BP2	3365.8	621.0	1049.8	90	17	No	--	No
BP3	3313.4	614.0	1104.4	90	3	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**					
BP4	3440.0	655.4	1014.4	125	2	No	--	Yes
Rear Pillar Left Side								
RP1	4199.0	-500.6	1208.4	285	2	No	--	No
RP2	4358.8	-558.8	1057.8	--	--	Yes	--	--
REL	4306.0	-539.4	1111.5	285	2	--	3	No
Rear Pillar Right Side								
RP1	4199.1	501.8	1211.1	75	2	No	--	No
RP2	4359.4	561.9	1060.7	--	--	Yes	--	--
REL	4305.8	544.4	1108.5	75	2	--	3	No
Front Header Left Side								
FH1	2783.2	-425.7	1264.7	180	50	No	--	No
FH2	2768.4	-275.5	1273.6	180	50	No	--	No
Front Header Right Side								
FH1	2782.9	424.1	1266.7	180	50	No	--	Yes
FH2	2766.7	275.7	1273.8	180	50	No	--	No
Side Rail Left Side								
SR1	3019.0	-501.8	1271.0	--	--	Yes	--	--
REL	3035.9	-493.9	1272.4	270	43	--	1	No
SR2A	3169.1	-491.2	1281.0	270	40	No	--	No
SR2B	3104.0	-502.6	1305.2	--	--	Yes	--	--
REL	3099.3	-479.2	1285.7	270	40	--	2	No
SR3-1	3744.5	-481.0	1266.7	270	46	No	--	No
SR3-2	3881.0	-489.7	1247.5	270	46	No	--	No
Side Rail Right Side								
SR1	3019.7	497.3	1268.7	--	--	Yes	--	--
REL	3030.6	491.8	1270.8	90	43	--	1	No
SR2A	3169.7	488.7	1281.5	90	40	No	--	No
SR2B	3102.1	503.4	1302.1	--	--	Yes	--	--
REL	3096.3	476.1	1285.6	90	40	--	2	Yes

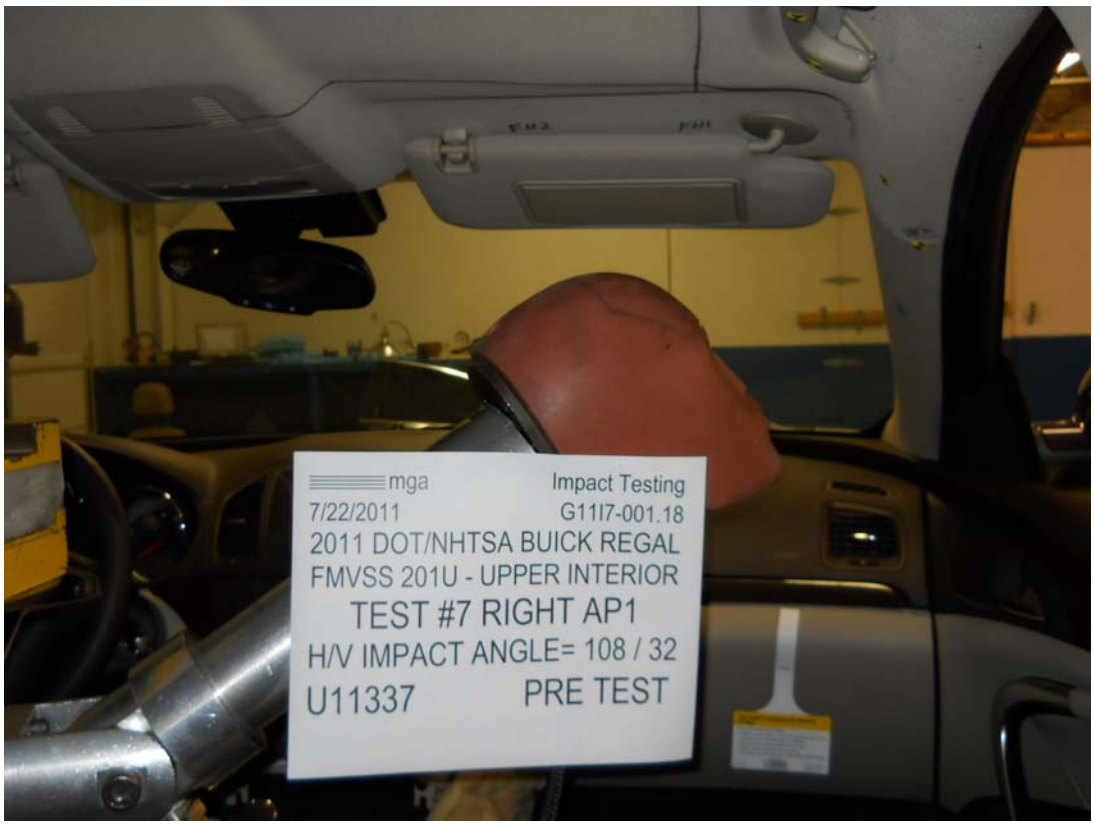
SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
SR3-1	3743.1	480.9	1269.1	90	46	No	--	No
SR3-2	3879.8	489.1	1250.8	90	46	No	--	No
Rear Header Left Side								
RH	4189.8	-346.0	1267.4	0	50	No	--	No
Rear Header Right Side								
RH	4191.0	344.3	1269.8	0	50	No	--	No
Upper Roof Left Side								
UR1@AP	2944.0	-408.8	1278.8	270	50	No	--	Yes
UR3@BP	3377.9	-342.1	1338.4	270	50	No	--	Yes
UR5@SR3-2	3882.6	-371.6	1309.6	270	45	No	--	Yes
Upper Roof Right Side								
UR2@SR2A	3157.9	334.6	1340.1	90	50	No	--	No
UR4@SR3-1	3740.2	348.2	1327.9	90	50	No	--	Yes
UR6@RP	4079.1	366.2	1290.9	90	50	No	--	Yes

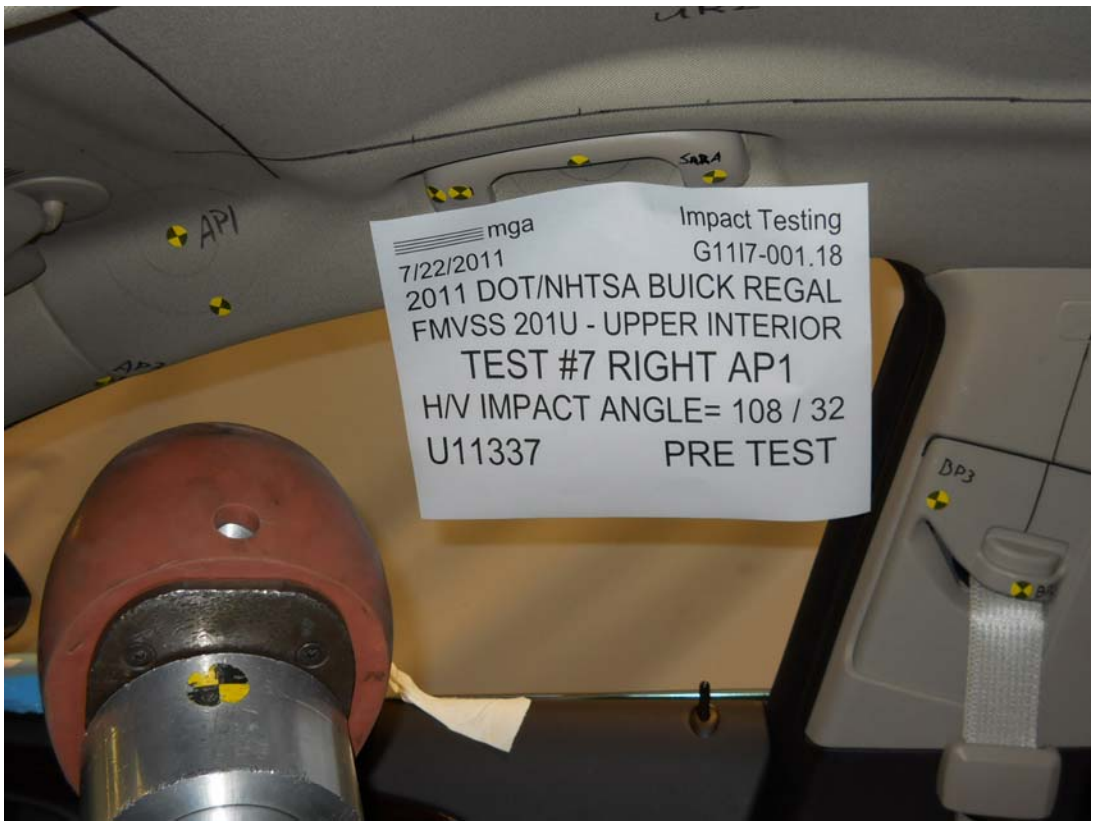
As determined using the Procedures specified in S10.1-10.13.

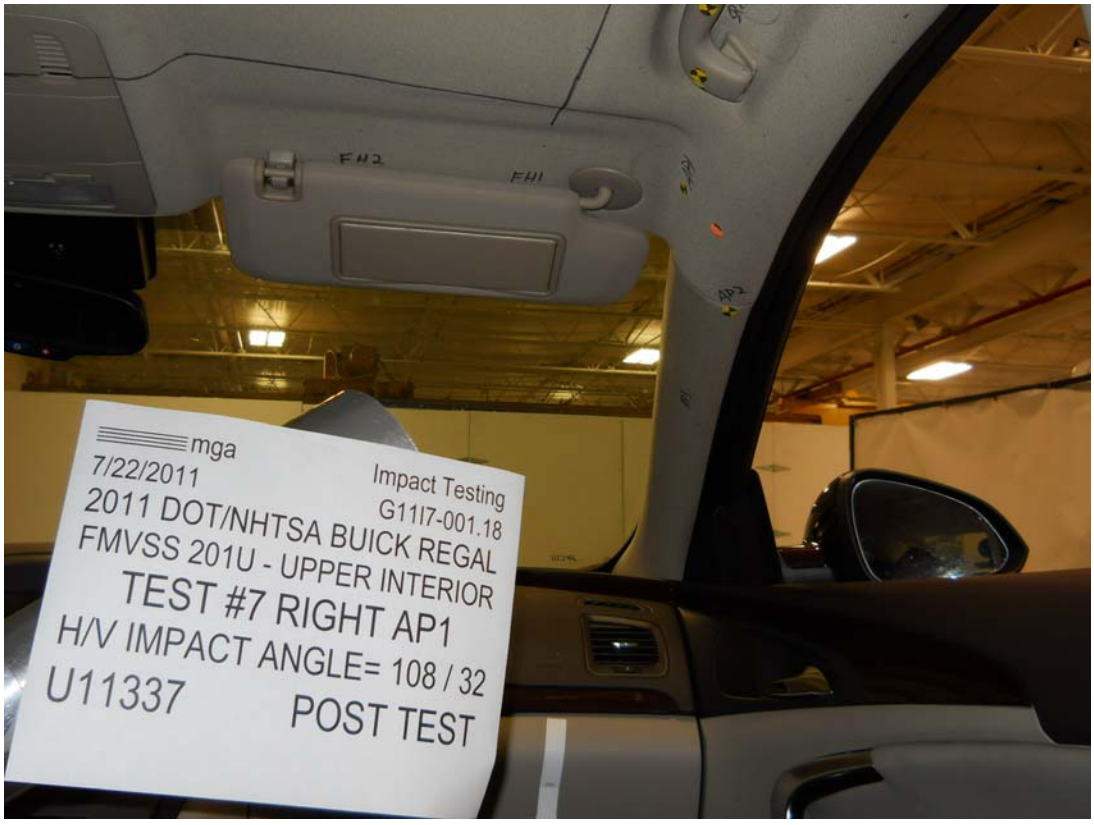
RECORDED BY: Nathaniel Newth DATE: July 15, 2011

APPROVED BY: Helen A. Kaleto

3.0 TEST DATA (Including Acceleration and Velocity Plots)






mga
7/22/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP1
H/V IMPACT ANGLE= 108 / 32
U11337
POST TEST


mga
7/22/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP1
H/V IMPACT ANGLE= 108 / 32
U11337
POST TEST


AP1
AP2


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP1
H/V IMPACT ANGLE= 108 / 32
U11337
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Target (Vehicle Side): AP1Right

MGA Test Reference No.:U11337

Approach Horizontal Angles:108º

Approach Vertical Angles:32º

Additional Description:

Test Number:#7

Temperature:24.9C

Humidity:49.5%

Time of Test:2:31:36 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
830	879	2.8	19.1	19	16 Right

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

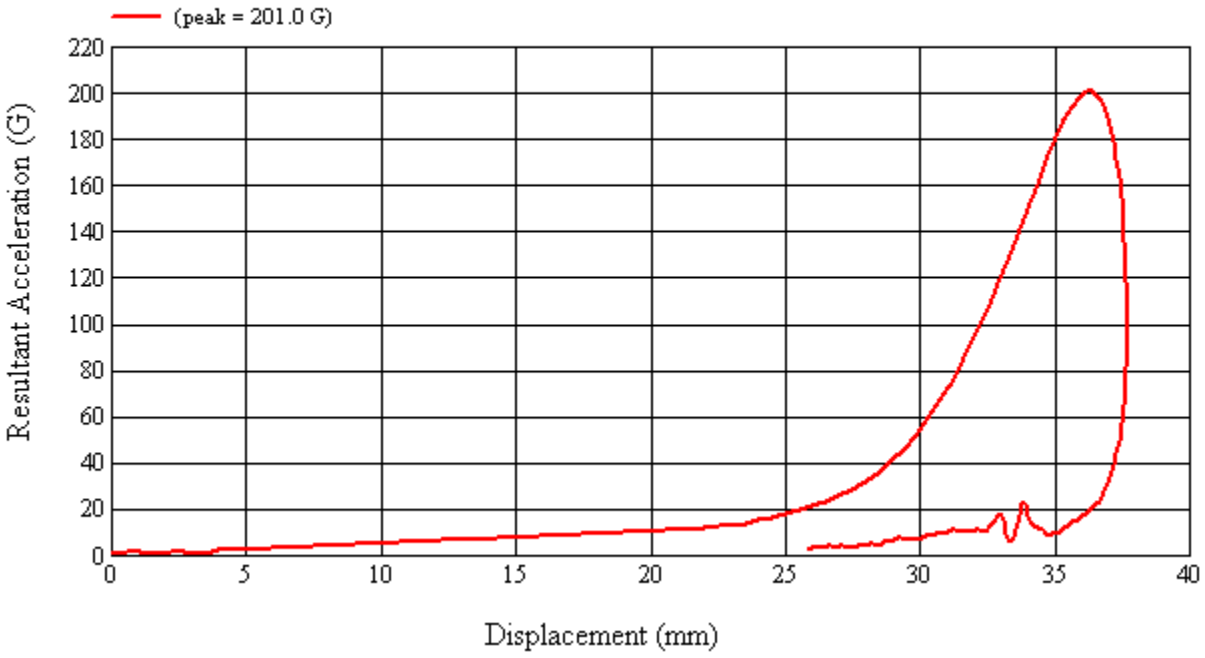
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

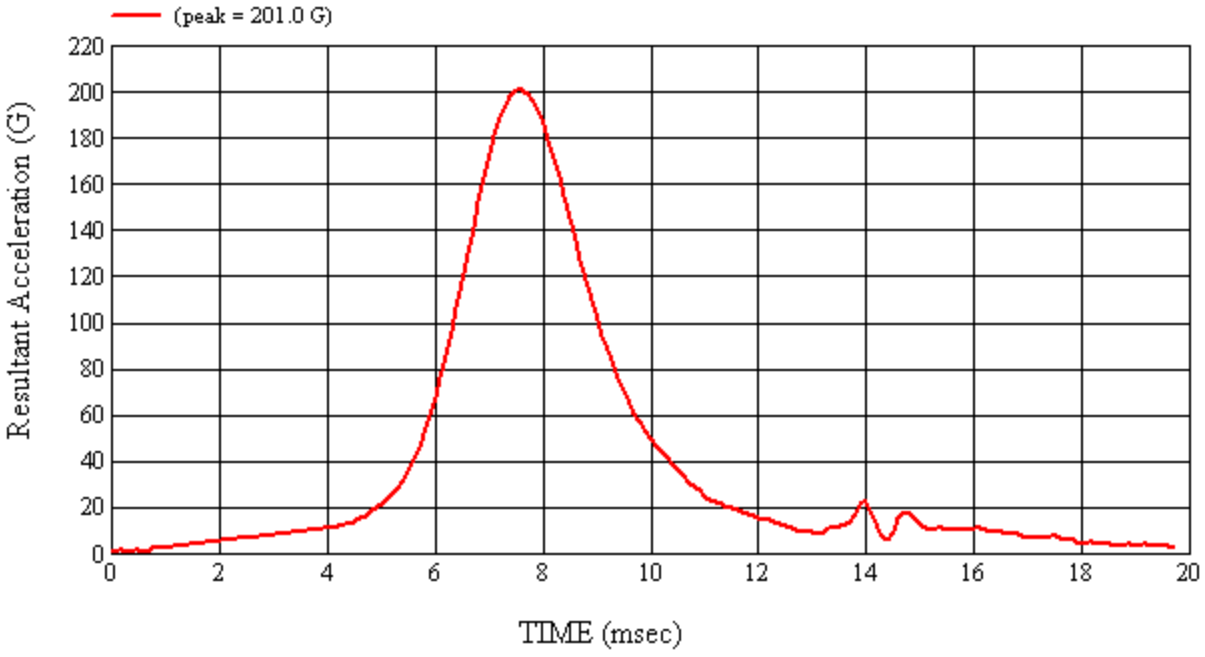
No visible damage

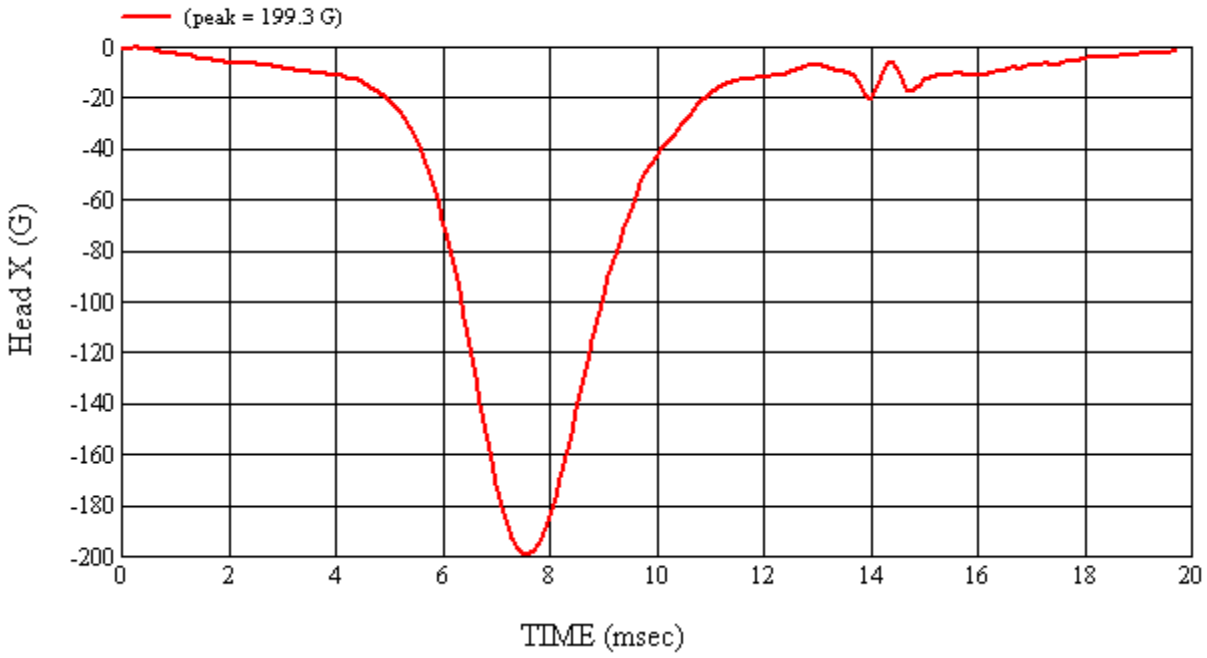
Recorded By: _____ Approved By*: _____ Date: 7/22/2011

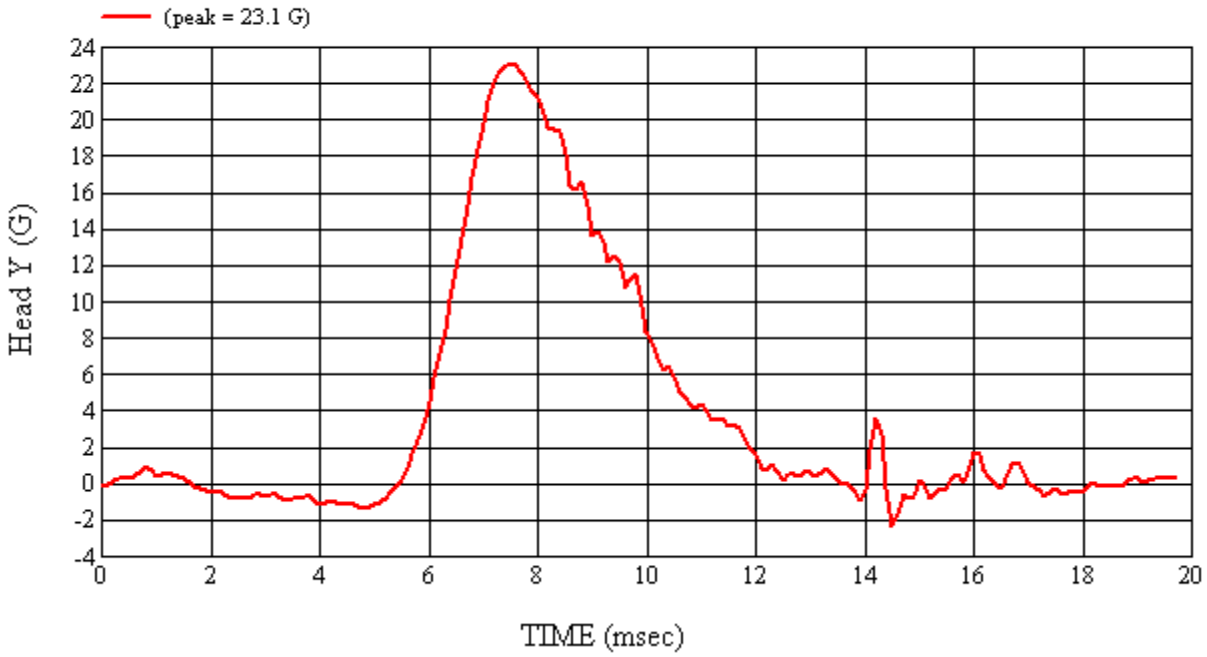
*Only necessary for NHTSA (Government) Compliance testing.

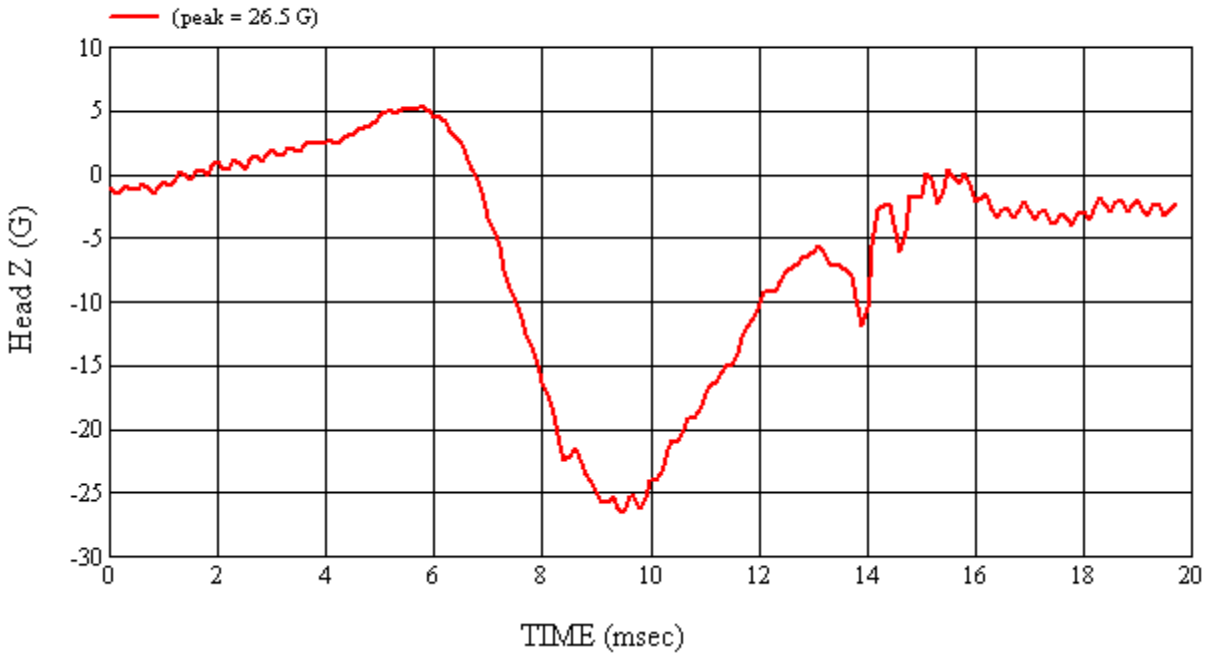
MGA Test #: U11337 Target Location: AP1, Right Side Test Date: 7/22/2011

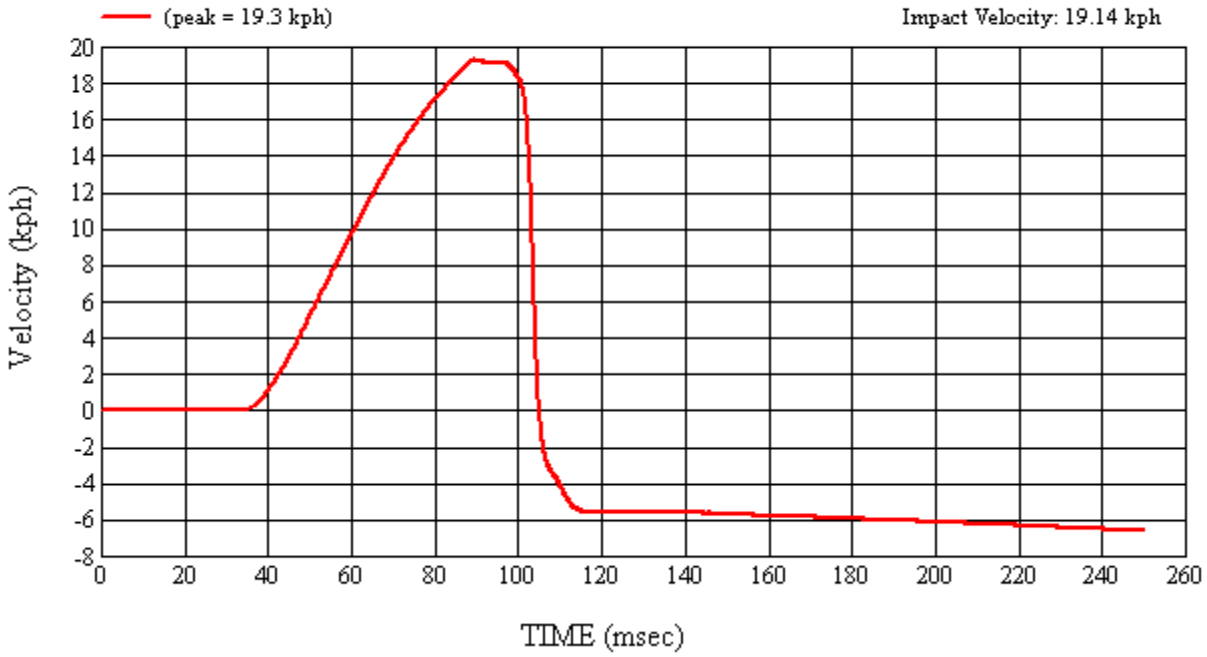


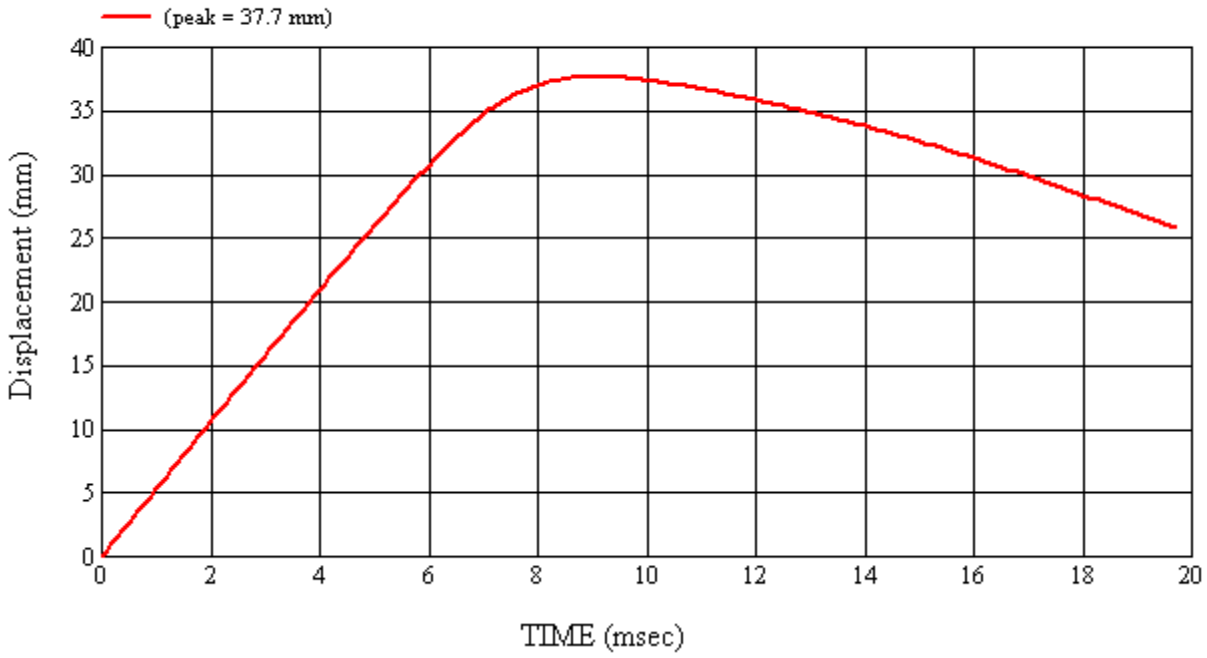


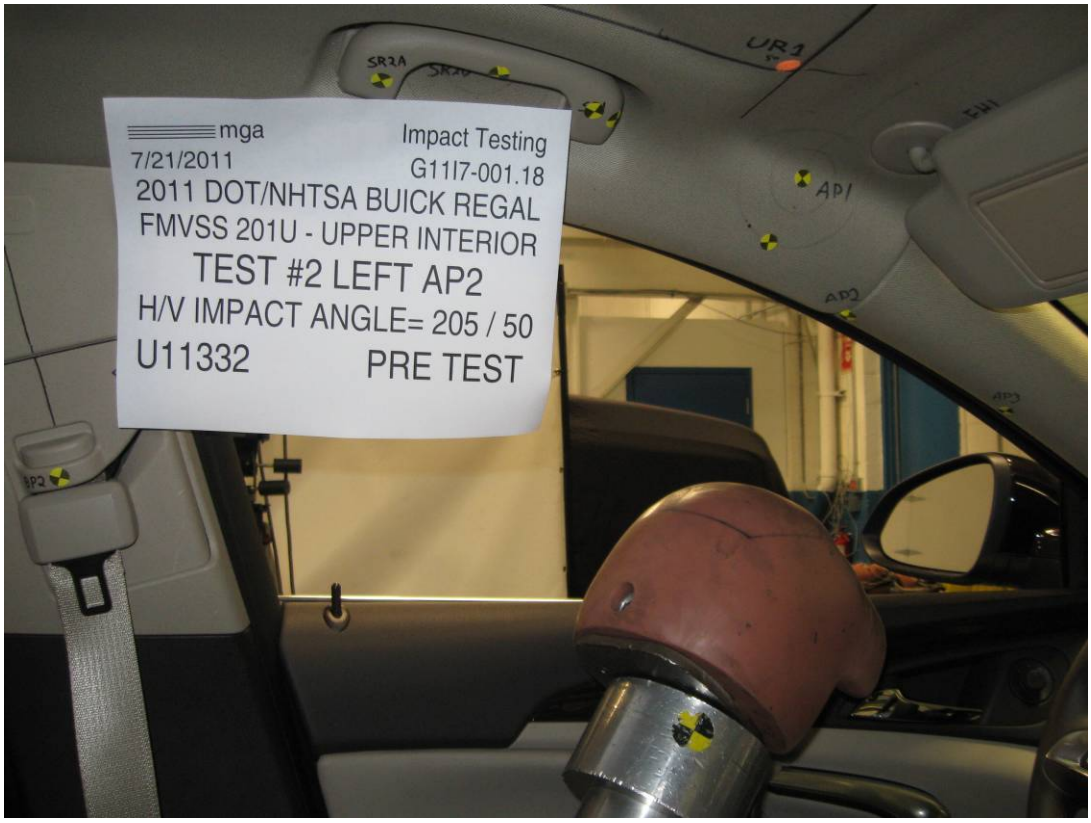

(peak = 199.3 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 23.1 G)
Head Y (G)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 26.5 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 19.3 kph)
Impact Velocity: 19.14 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 37.7 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


mga
Impact Testing
7/21/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP2
H/V IMPACT ANGLE= 205 / 50
U11332
PRE TEST


mga
Impact Testing
7/21/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP2
H/V IMPACT ANGLE= 205 / 50
U11332
PRE TEST


mga
7/21/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP2
H/V IMPACT ANGLE= 205 / 50
U11332
POST TEST


mga
7/21/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP2
H/V IMPACT ANGLE= 205 / 50
U11332
POST TEST


AP2
AP2


mga
Impact Testing
7/21/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP2
H/V IMPACT ANGLE= 205 / 50
U11332
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#2

Target (Vehicle Side): AP2Left

Temperature:25.4C

MGA Test Reference No.:U11332

Humidity:63.6%

Approach Horizontal Angles:205º

Time of Test:12:20:50 PM

Approach Vertical Angles:50º

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
629	613	4.1	18.8	16	12 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

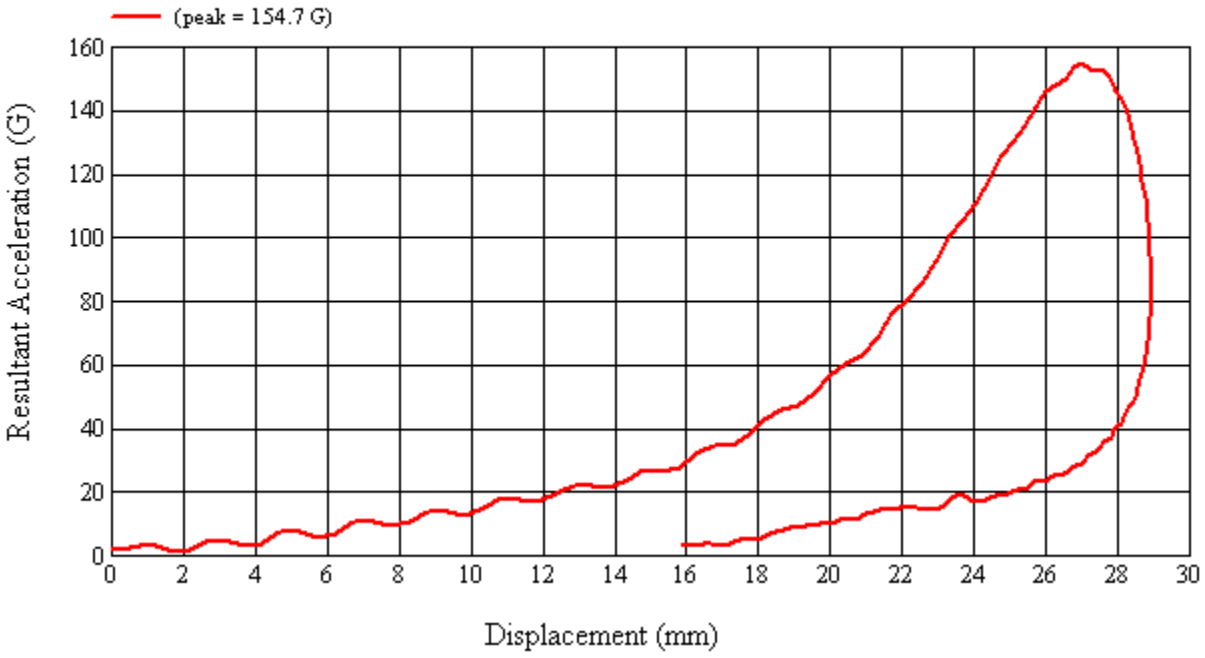
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

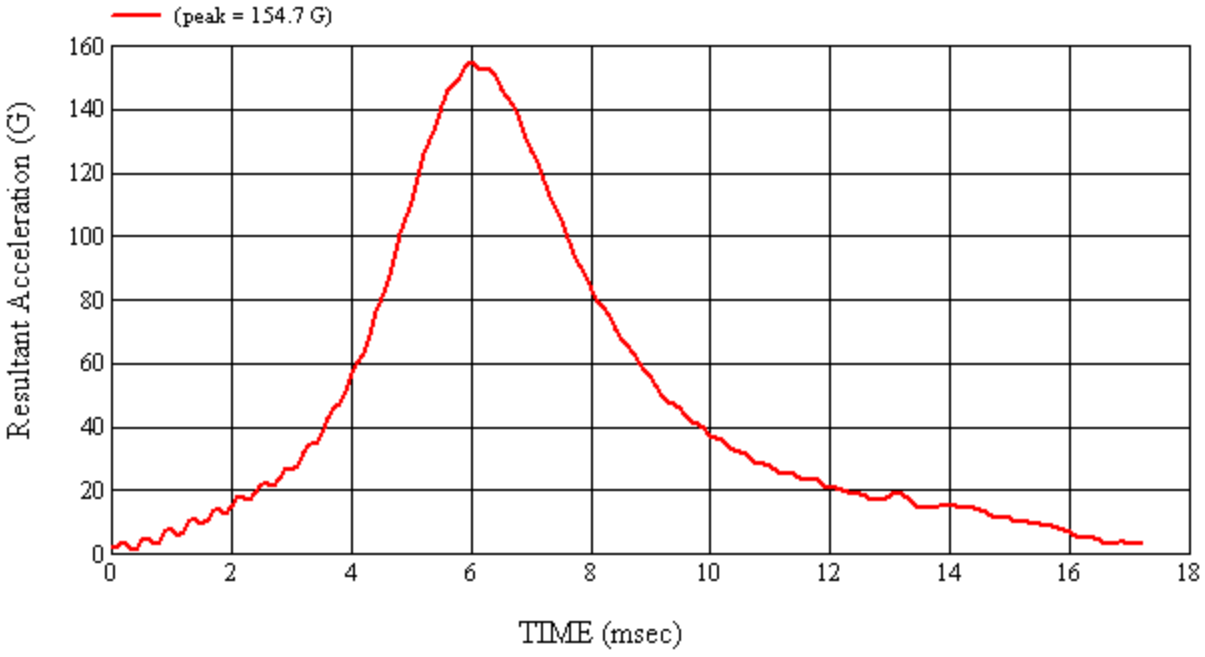
No visible damage

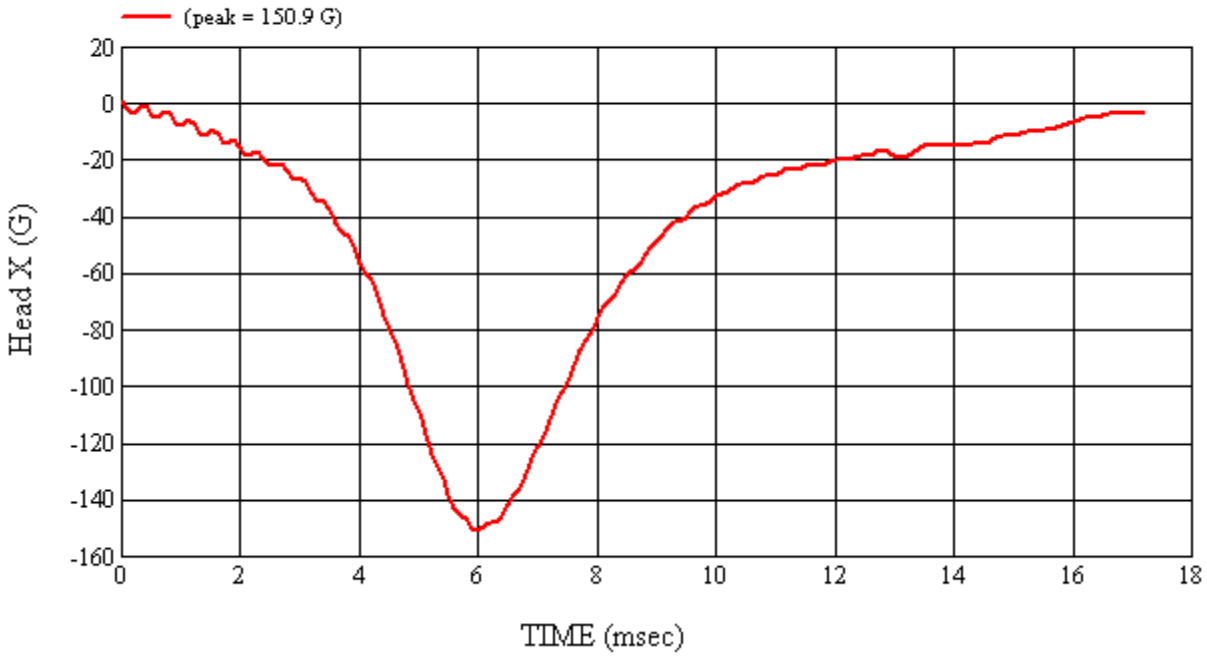
Recorded By: _____ Approved By*: _____ Date: 7/21/2011

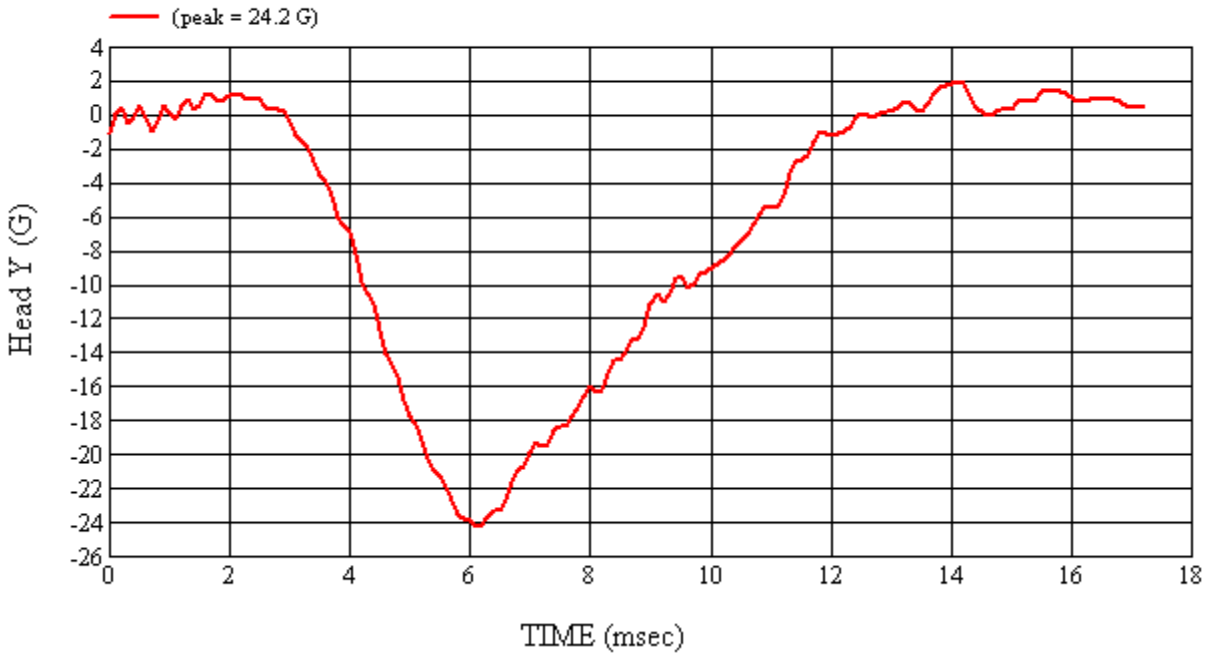
*Only necessary for NHTSA (Government) Compliance testing.

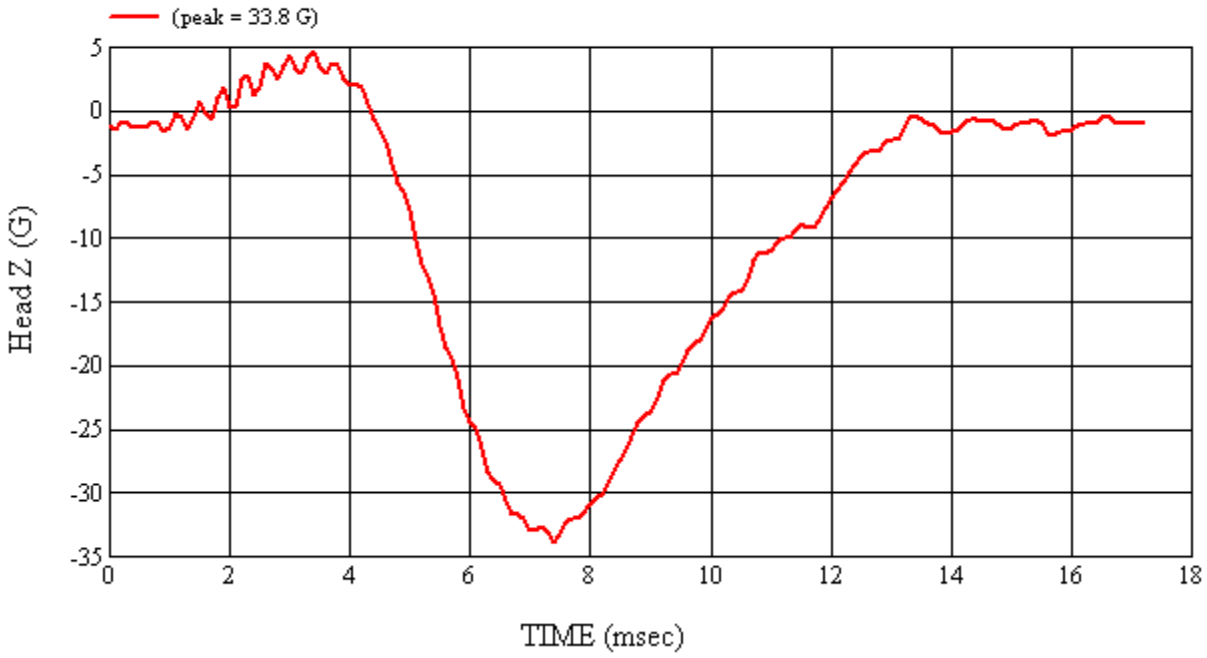
MGA Test #: U11332 Target Location: AP2, Left Side Test Date: 7/21/2011

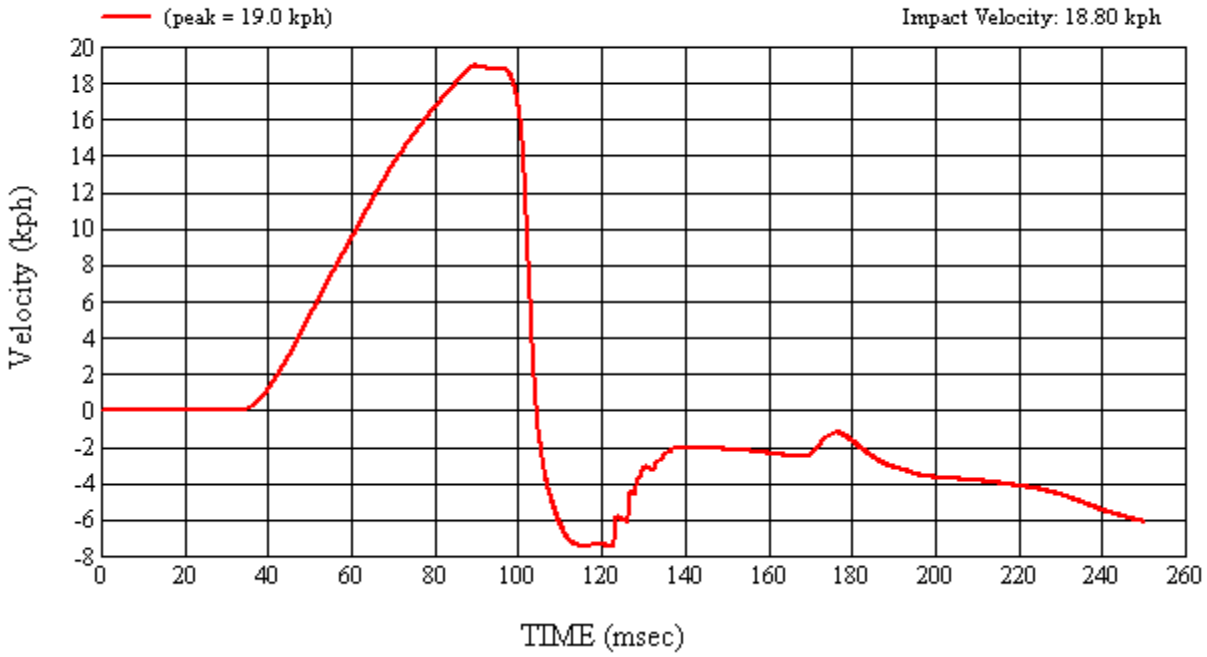


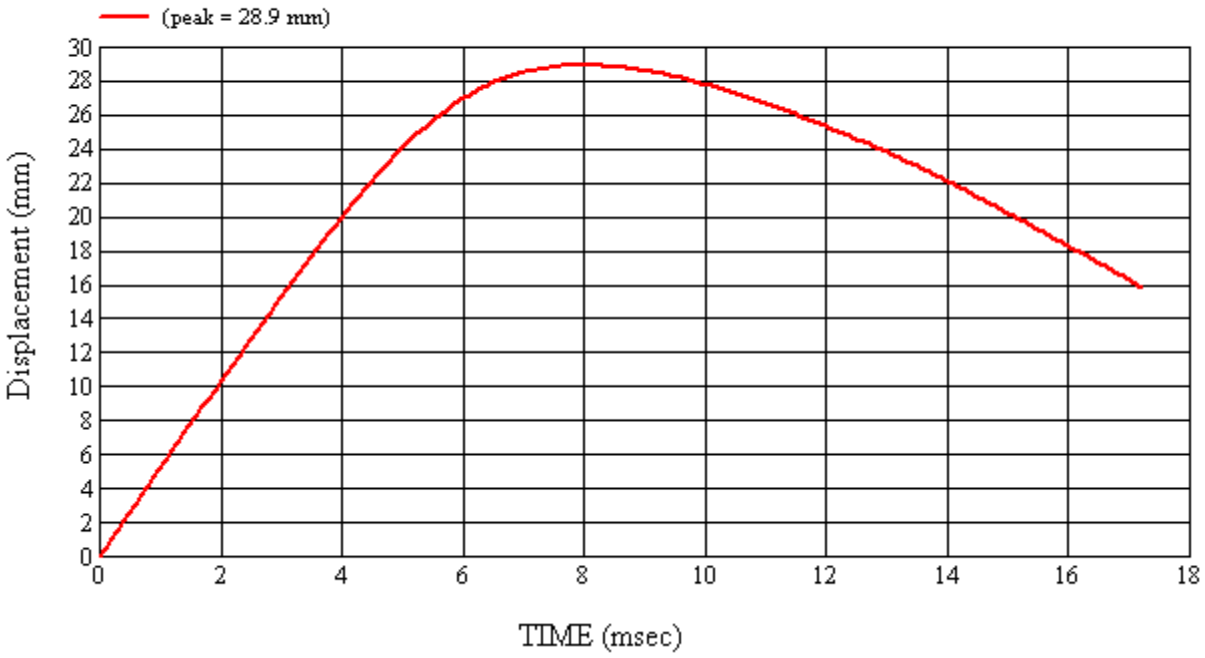


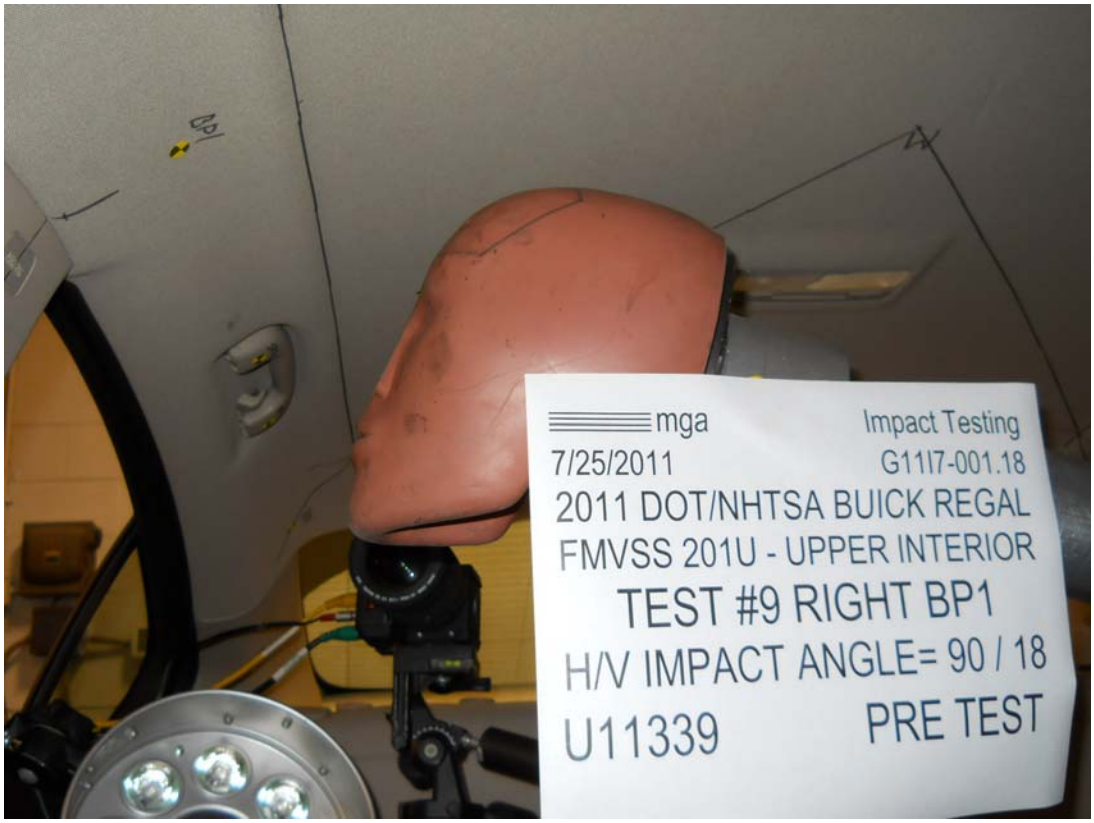

(peak = 150.9 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
0
2
4
6
8
10
12
14
16
18
TIME (msec)


(peak = 24.2 G)
Head Y (G)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
0
2
4
6
8
10
12
14
16
18
TIME (msec)

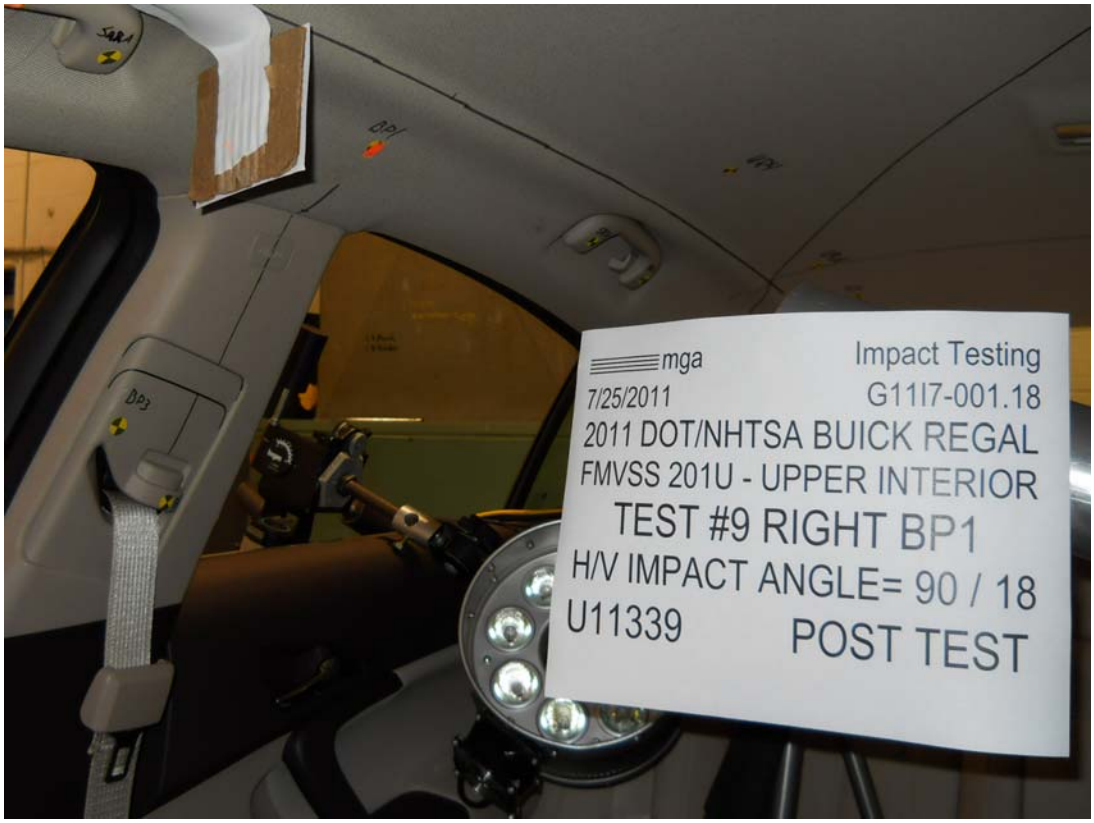

(peak = 33.8 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
-35
0
2
4
6
8
10
12
14
16
18
TIME (msec)

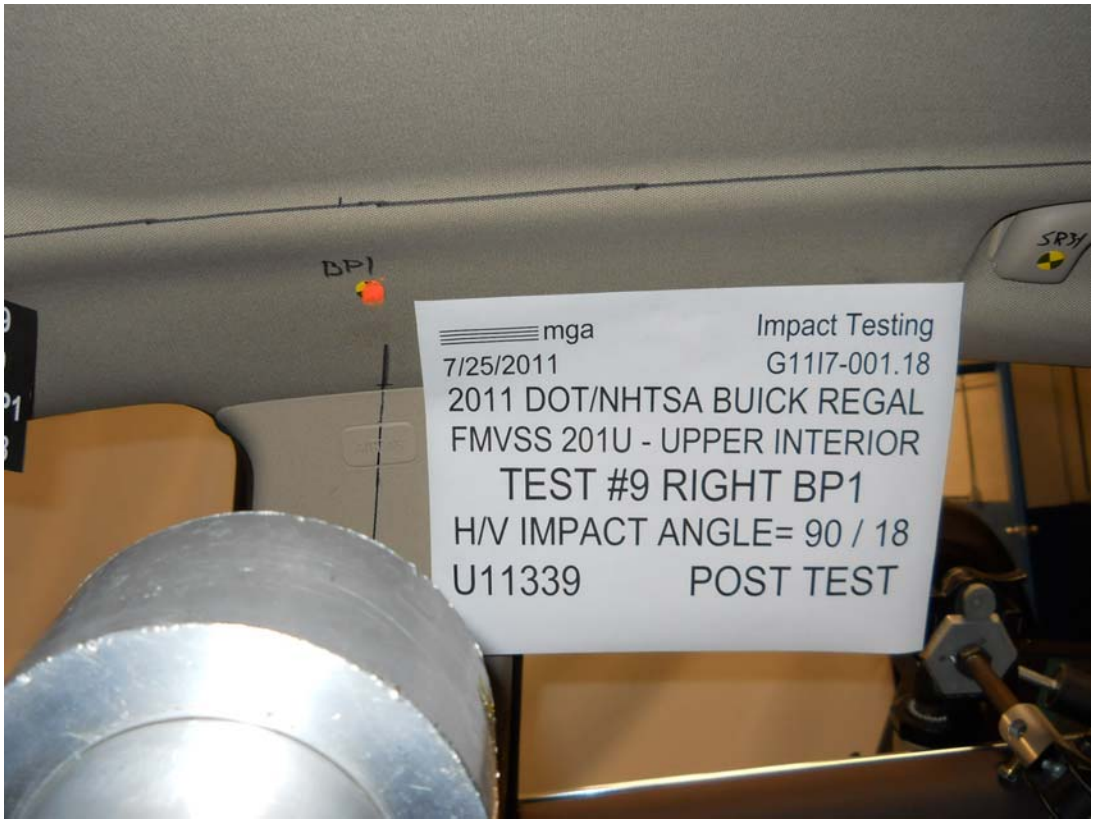

(peak = 19.0 kph)
Impact Velocity: 18.80 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 28.9 mm)
Displacement (mm)
TIME (msec)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP1
H/V IMPACT ANGLE= 90 / 18
U11339
PRE TEST


CB0109
U11339
RIGHT BP1
H/V 90/18
mga
Impact Testing
G11I7-001.18
7/25/2011
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP1
H/V IMPACT ANGLE= 90 / 18
U11339
PRE TEST


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP1
H/V IMPACT ANGLE= 90 / 18
U11339
POST TEST


BP1
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP1
H/V IMPACT ANGLE= 90 / 18
U11339
POST TEST


BP1
BP3


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT BP1
H/V IMPACT ANGLE= 90 / 18
U11339
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#9

Target (Vehicle Side): BP1Right

Temperature:22.1C

MGA Test Reference No.:U11339

Humidity:60.0%

Approach Horizontal Angles:90º

Time of Test:9:10:16 AM

Approach Vertical Angles:18º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
553	513	5.4	18.4	61	2 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

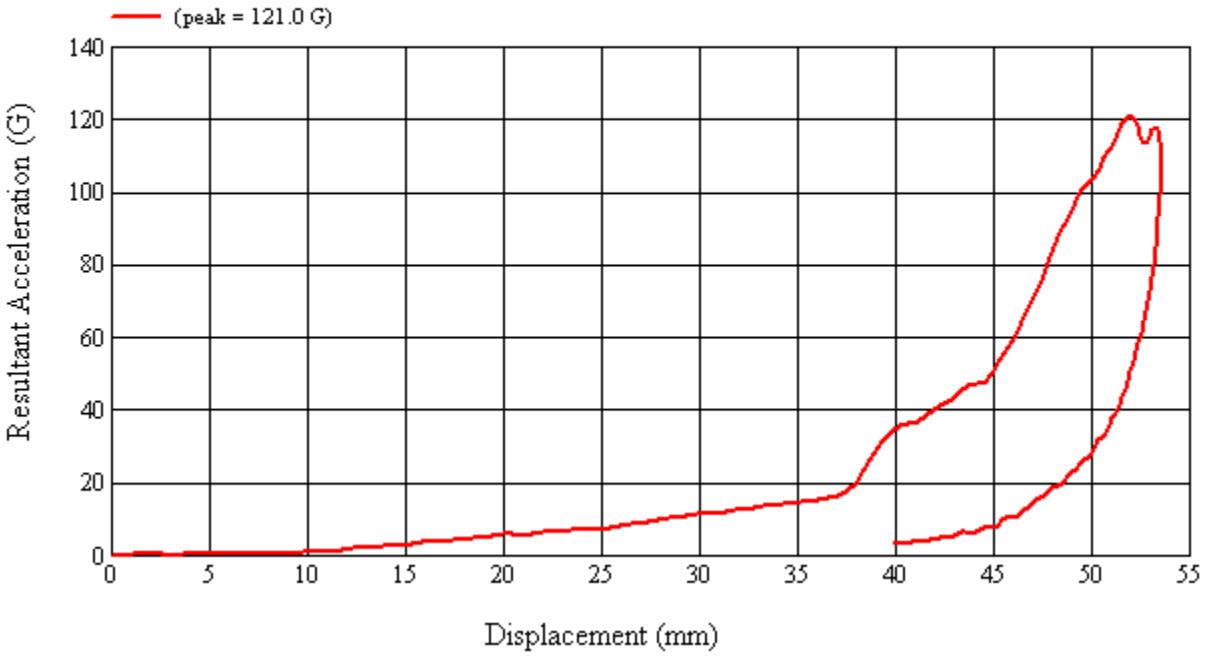
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

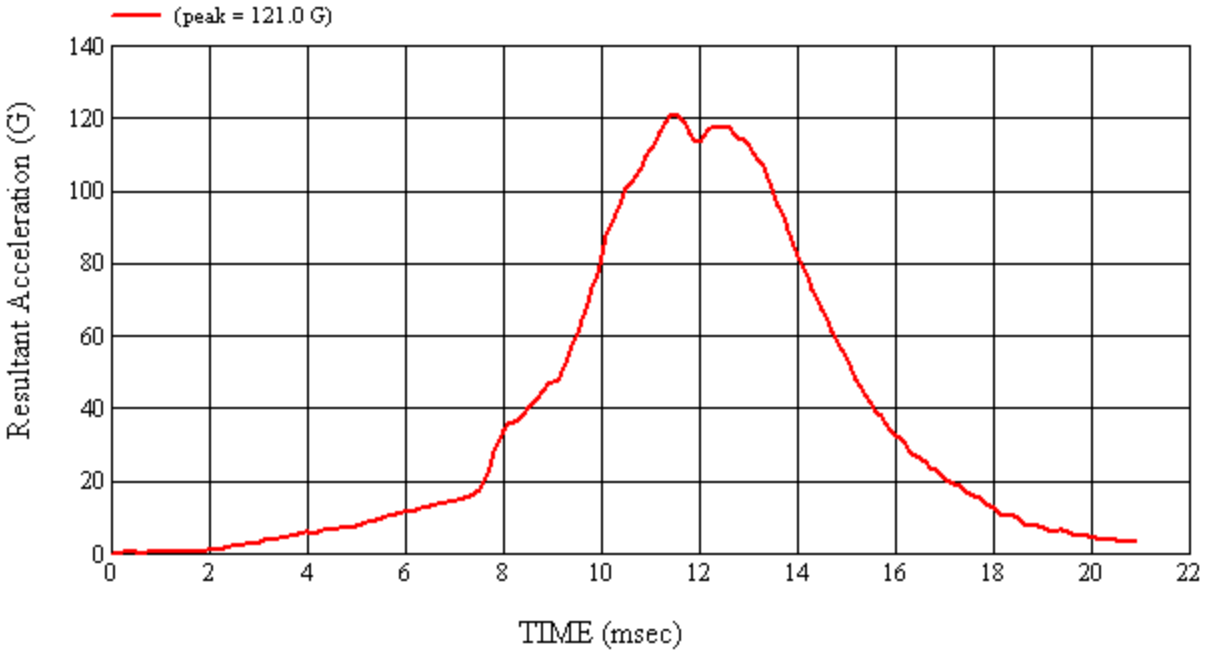
Non functional anchorage adjuster

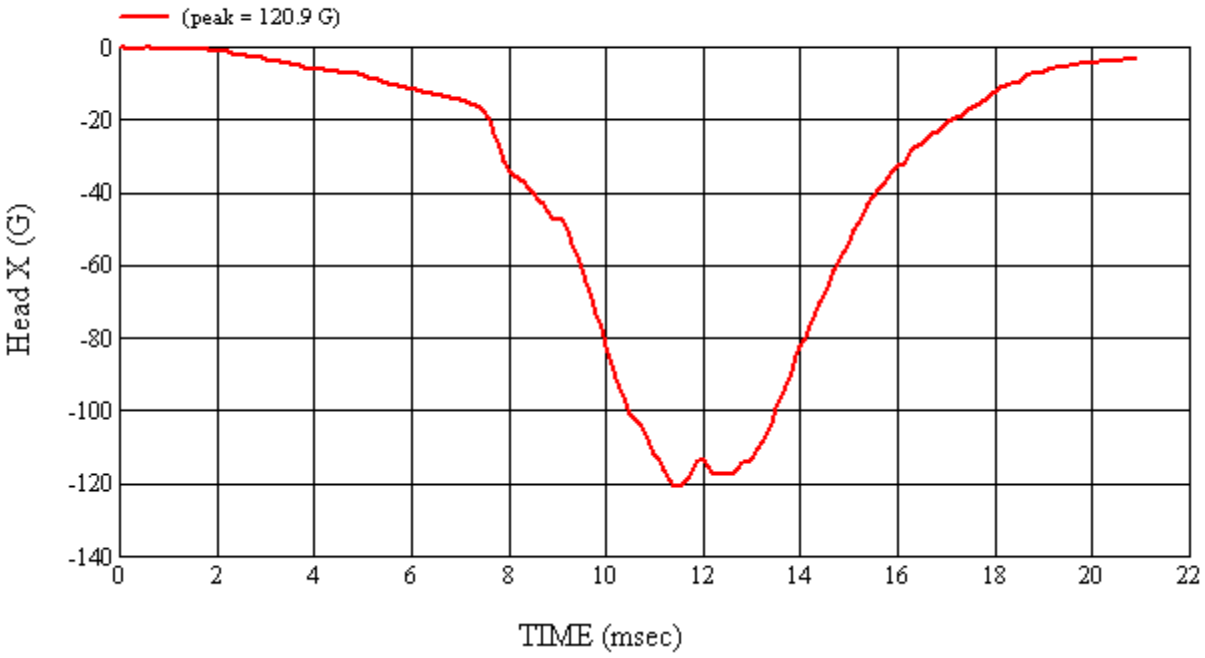
Recorded By: _____ Approved By*: _____ Date: 7/25/2011

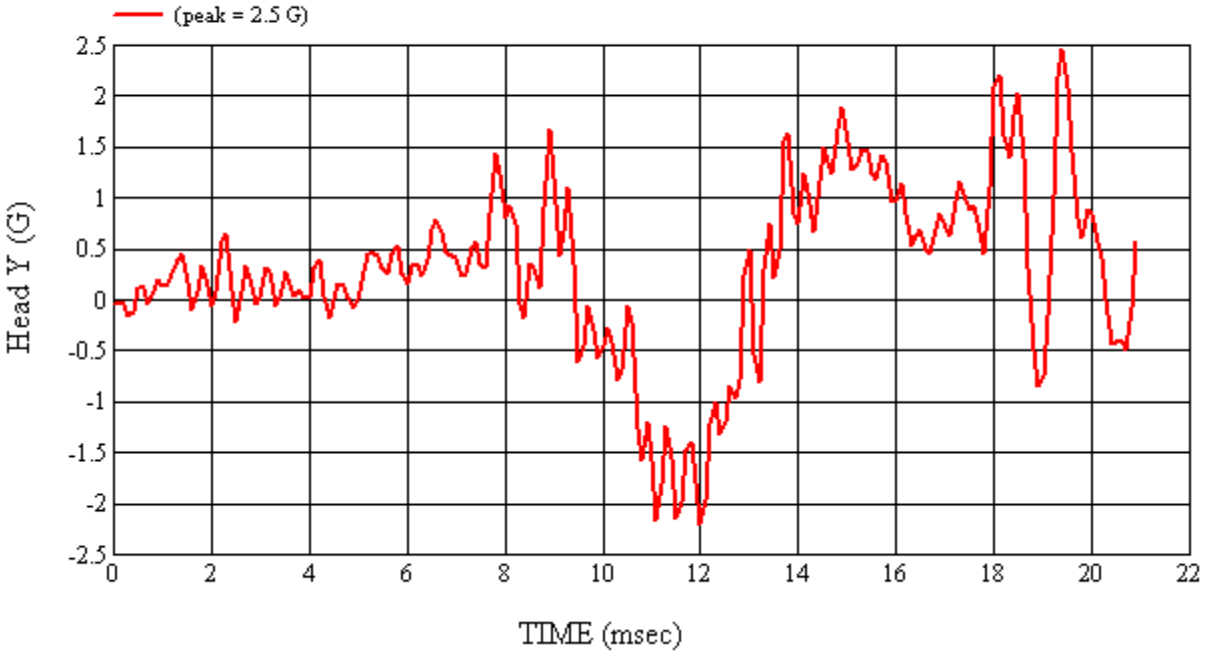
*Only necessary for NHTSA (Government) Compliance testing.

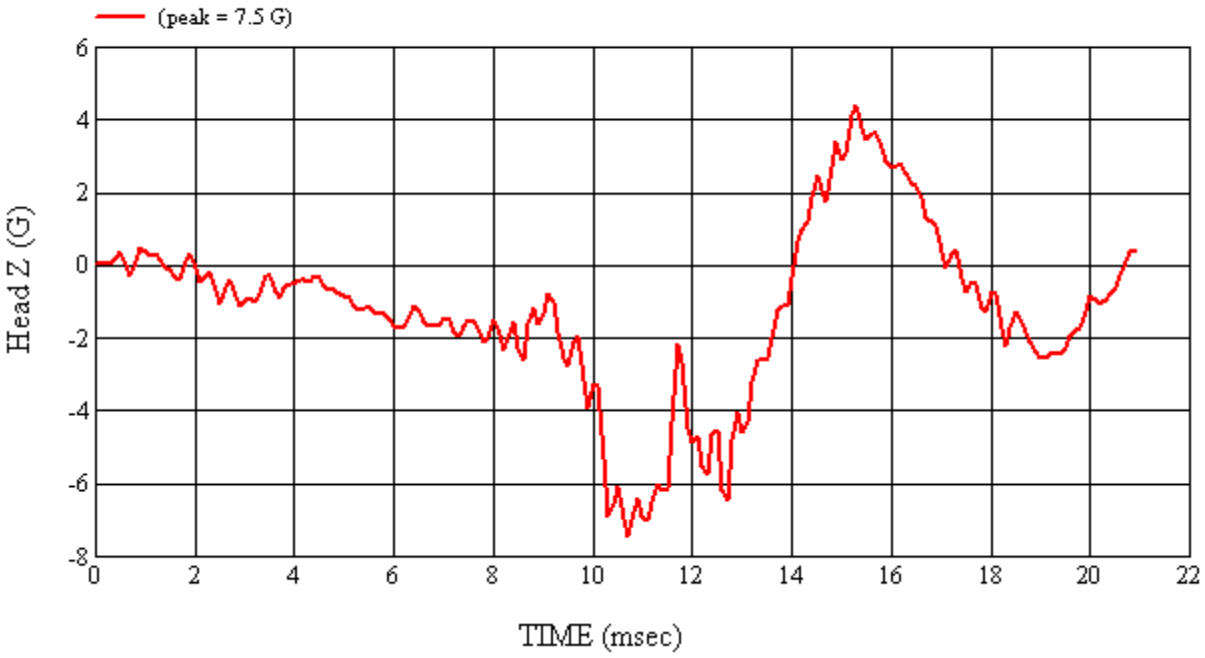
MGA Test #: U11339 Target Location: BP1, Right Side Test Date: 7/25/2011

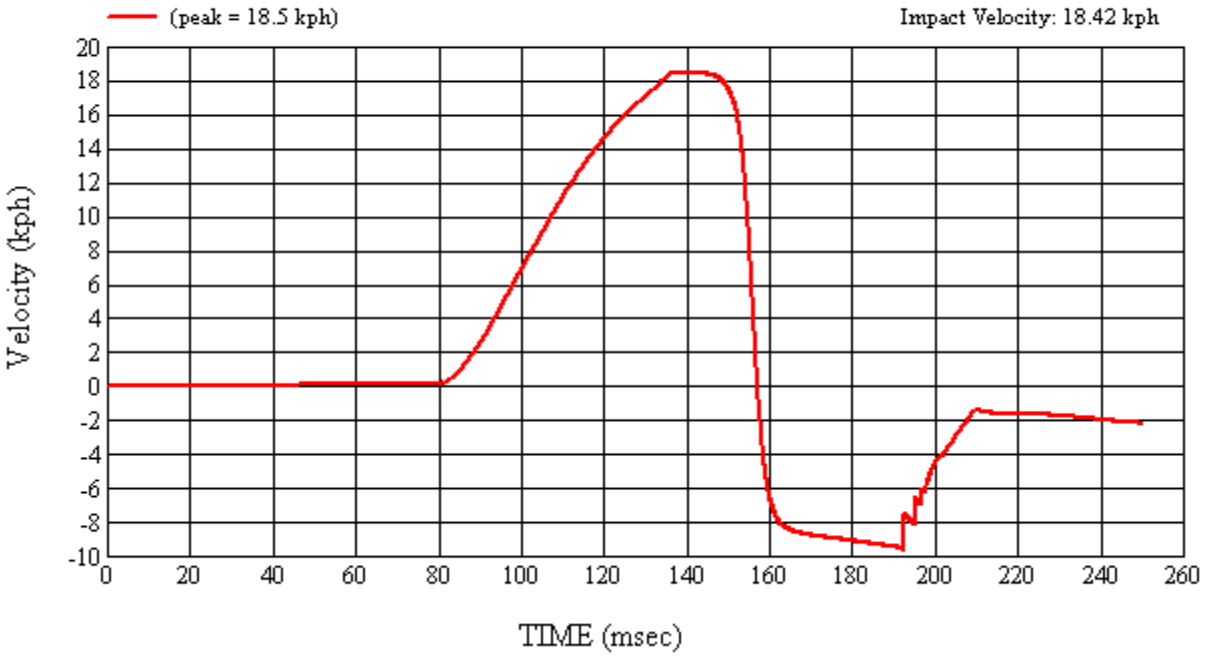


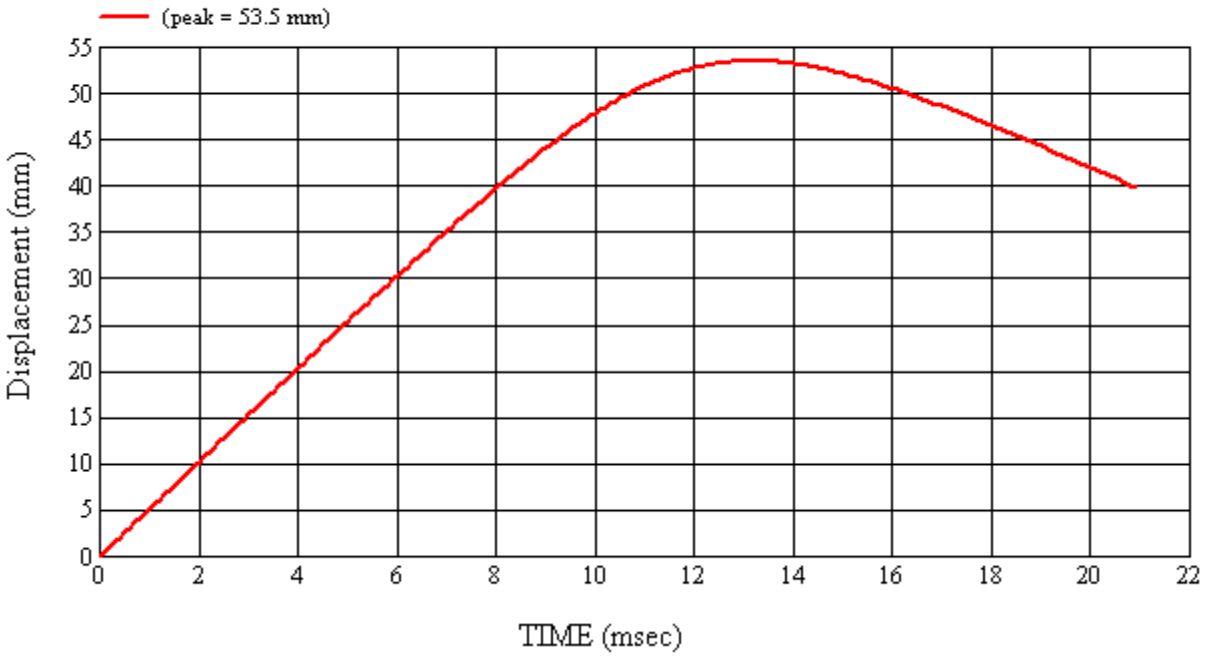



(peak = 120.9 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 2.5 G)
Head Y (G)
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

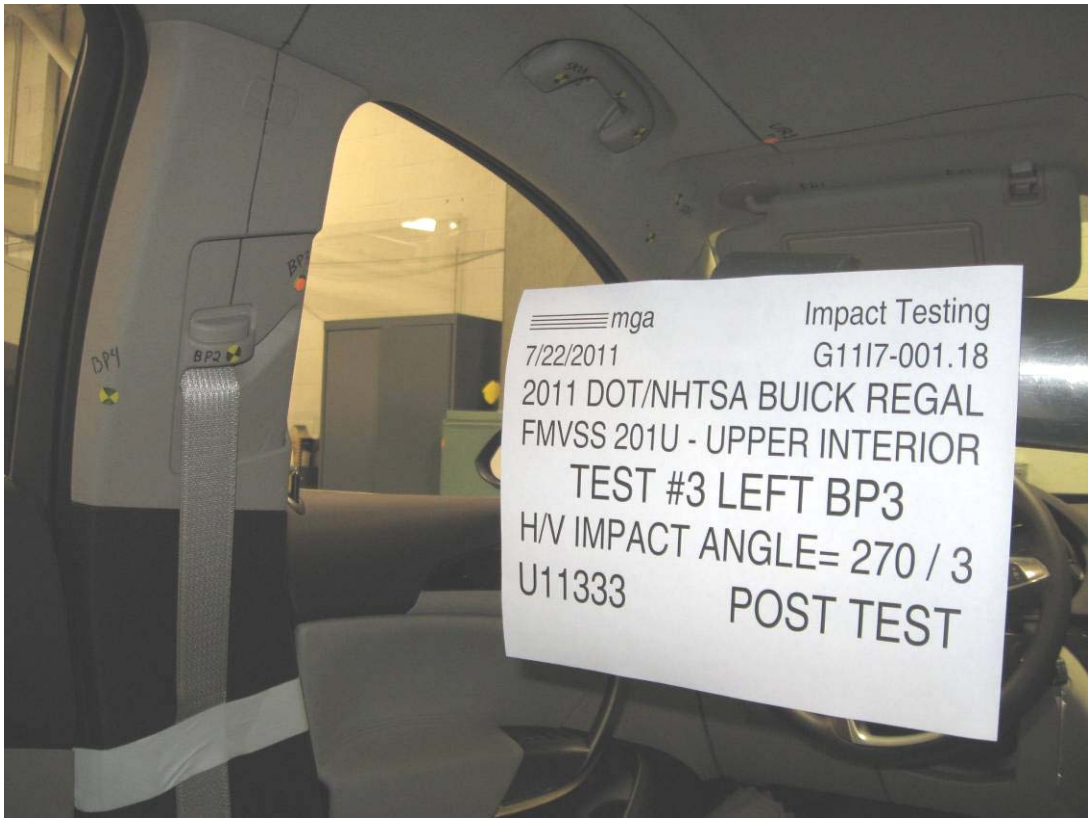

(peak = 7.5 G)
Head Z (G)
6
4
2
0
-2
-4
-6
-8
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 18.5 kph)
Impact Velocity: 18.42 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 53.5 mm)
Displacement (mm)
55
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 270 / 3
U11333
PRE TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 270 / 3
U11333
PRE TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 270 / 3
U11333
POST TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 270 / 3
U11333
POST TEST


BP3


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 270 / 3
U11333
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#3

Target (Vehicle Side): BP3Left

Temperature:23.1C

MGA Test Reference No.:U11333

Humidity:50.0%

Approach Horizontal Angles:270º

Time of Test:8:35:25 AM

Approach Vertical Angles:3º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
544	500	7.1	23.8	21	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

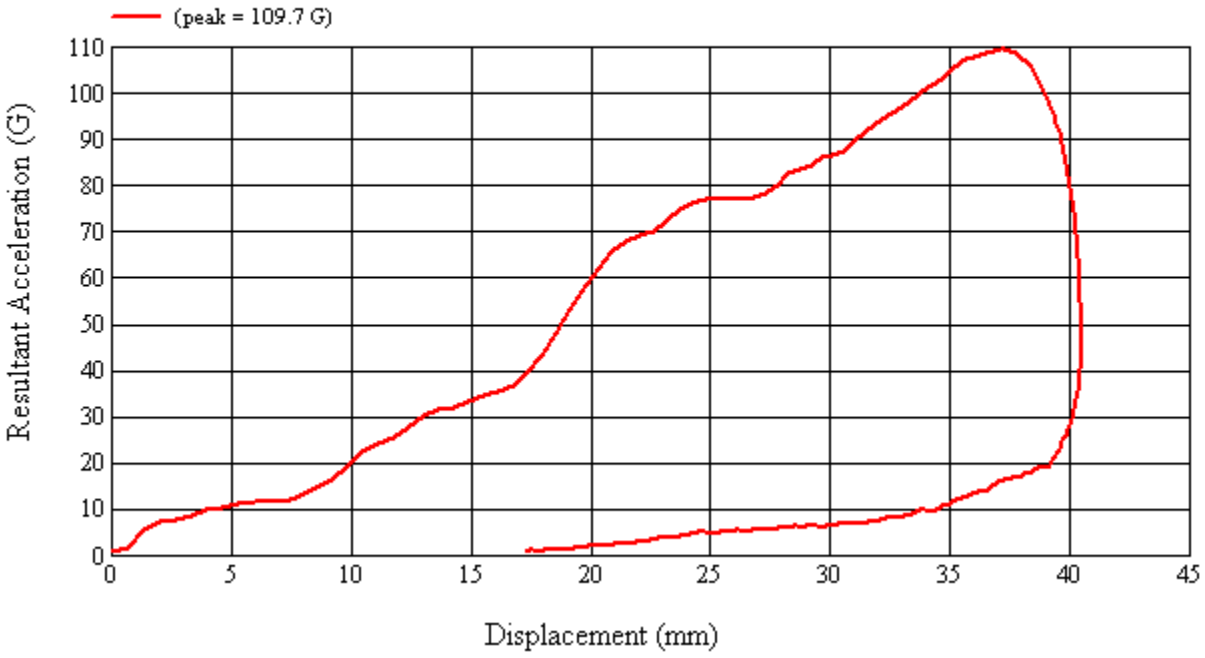
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

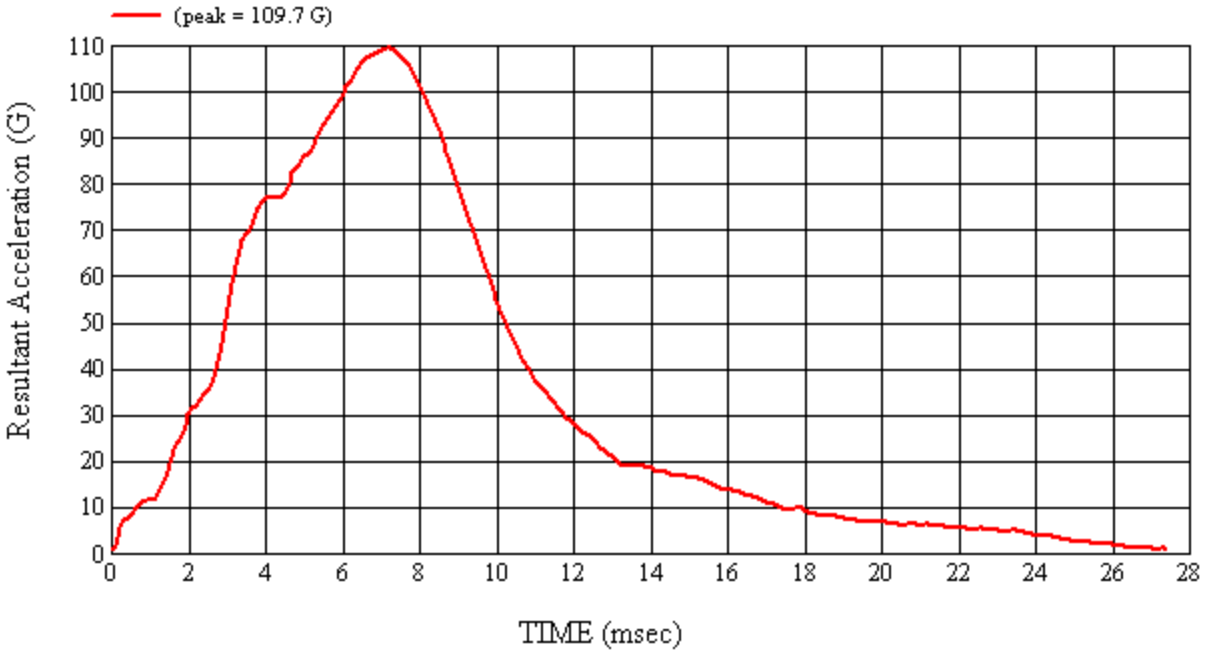
No visible damage

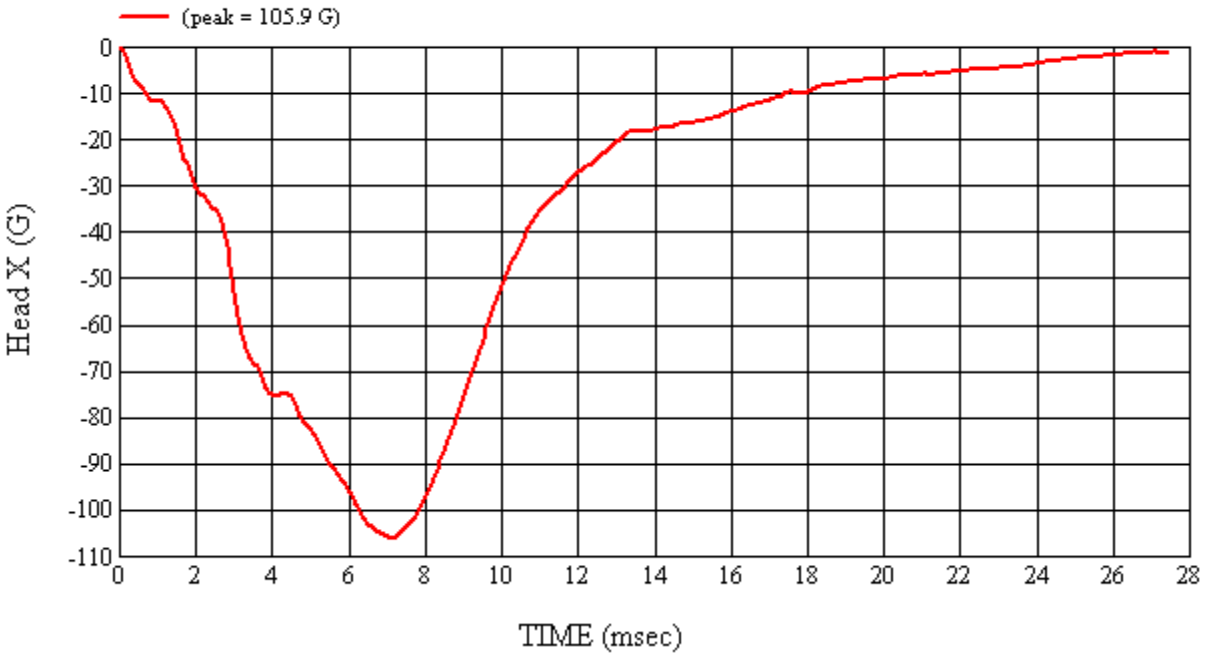
Recorded By: _____ Approved By*: _____ Date: 7/22/2011

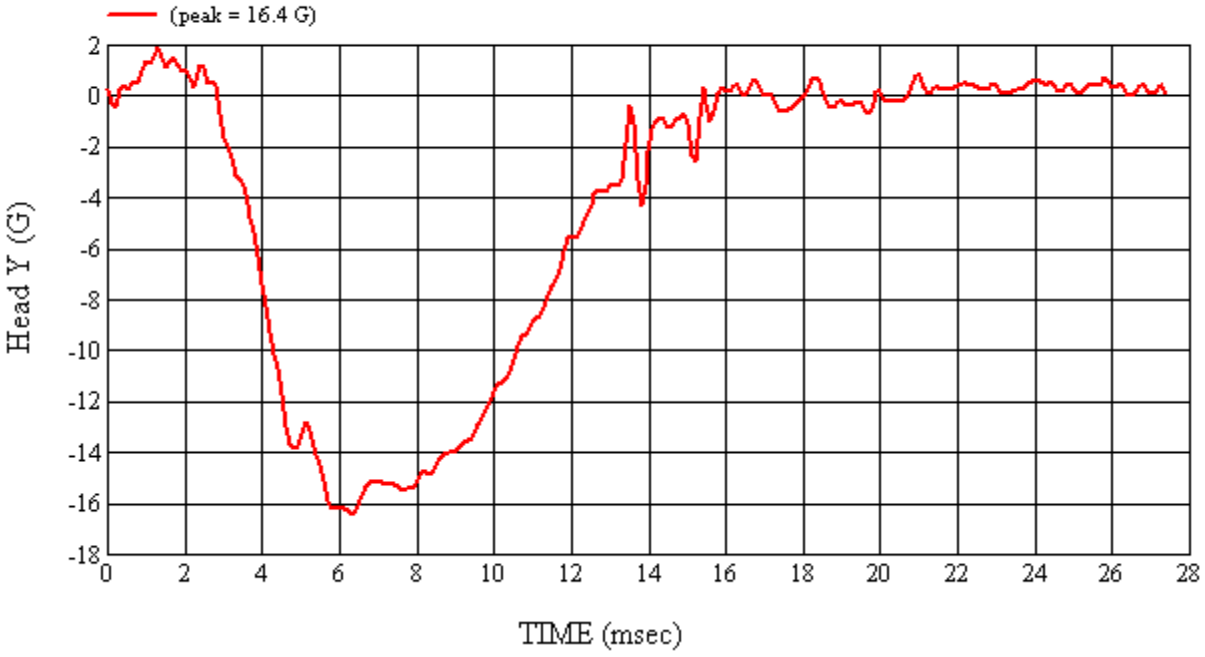
*Only necessary for NHTSA (Government) Compliance testing.

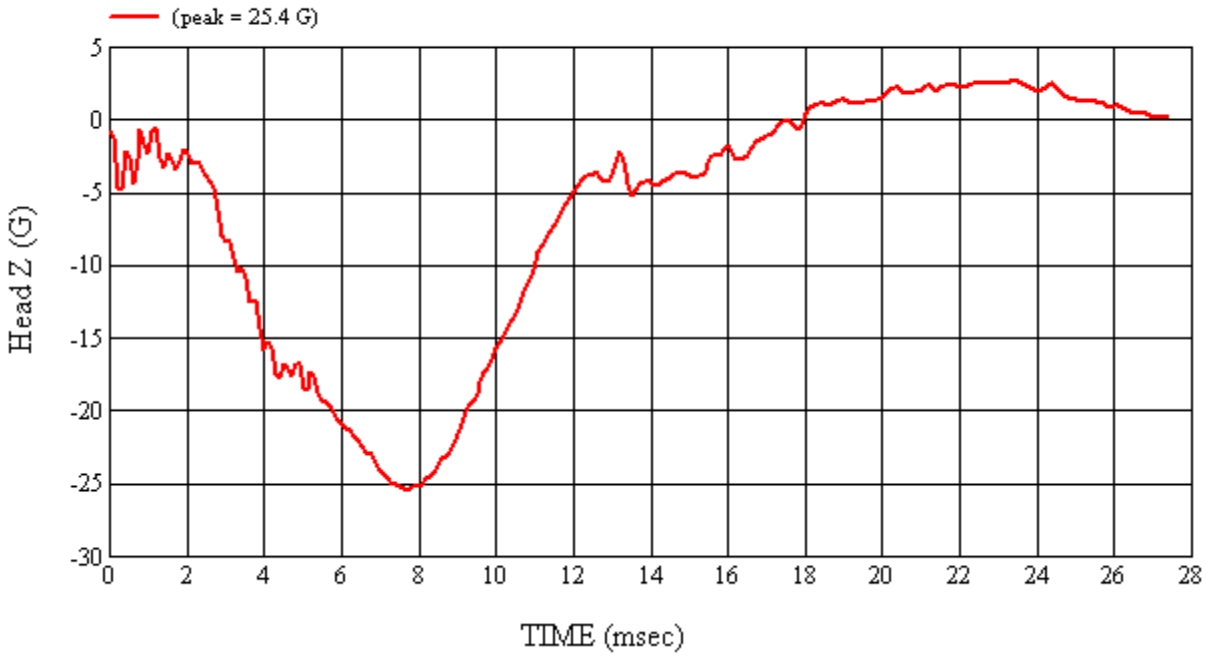
MGA Test #: U11333 Target Location: BP3, Left Side Test Date: 7/22/2011

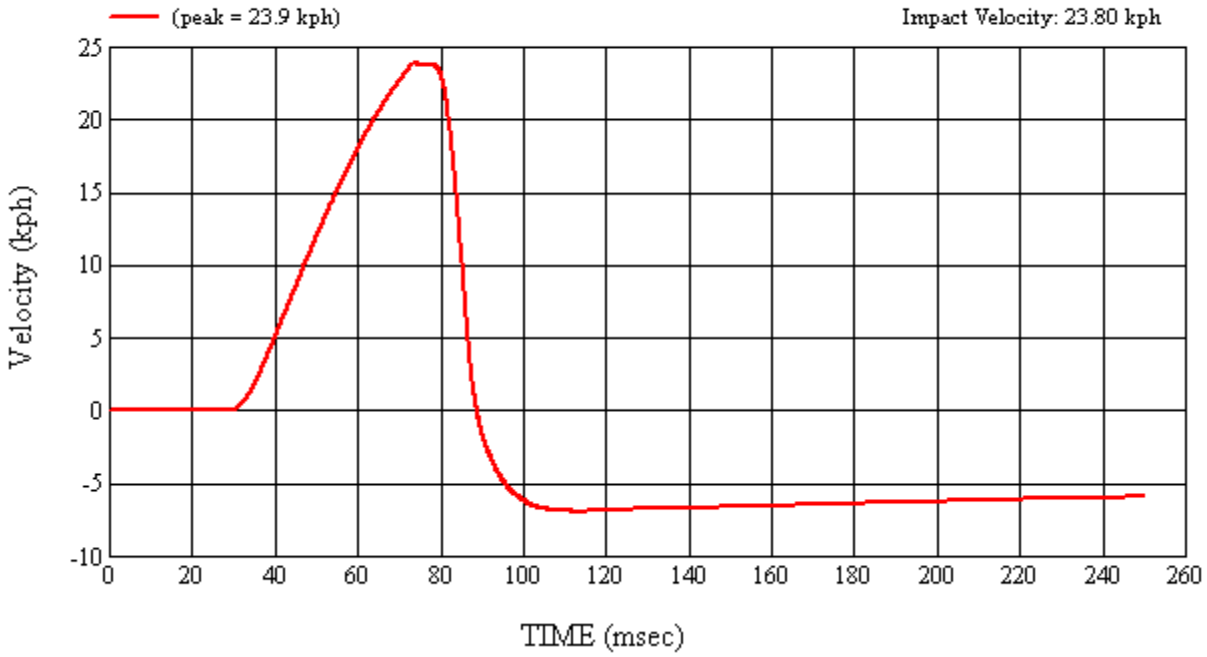


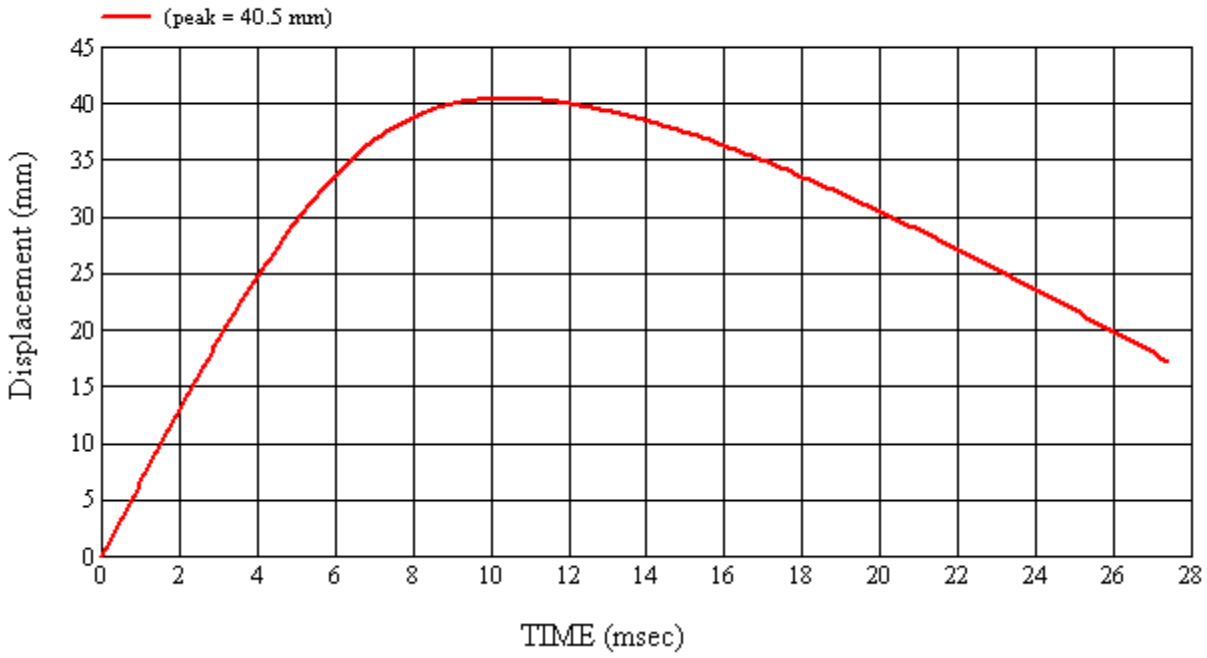


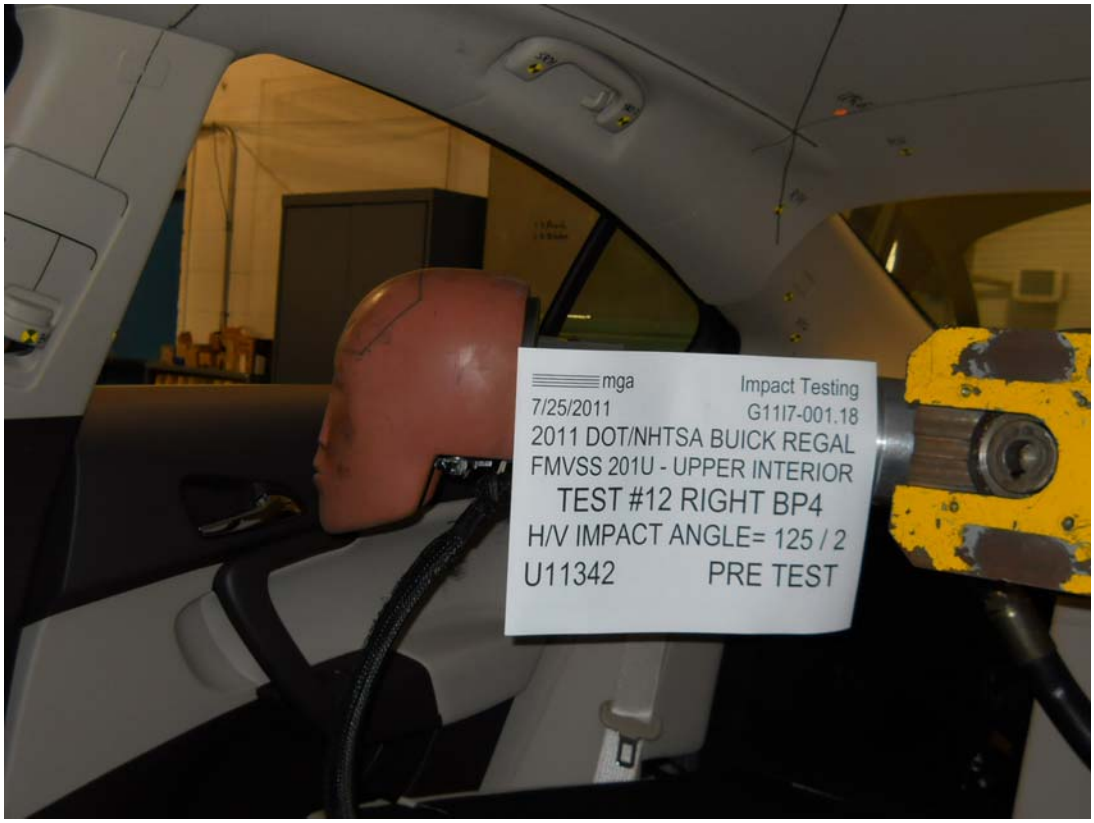

(peak = 105.9 G)
Head X (G)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)

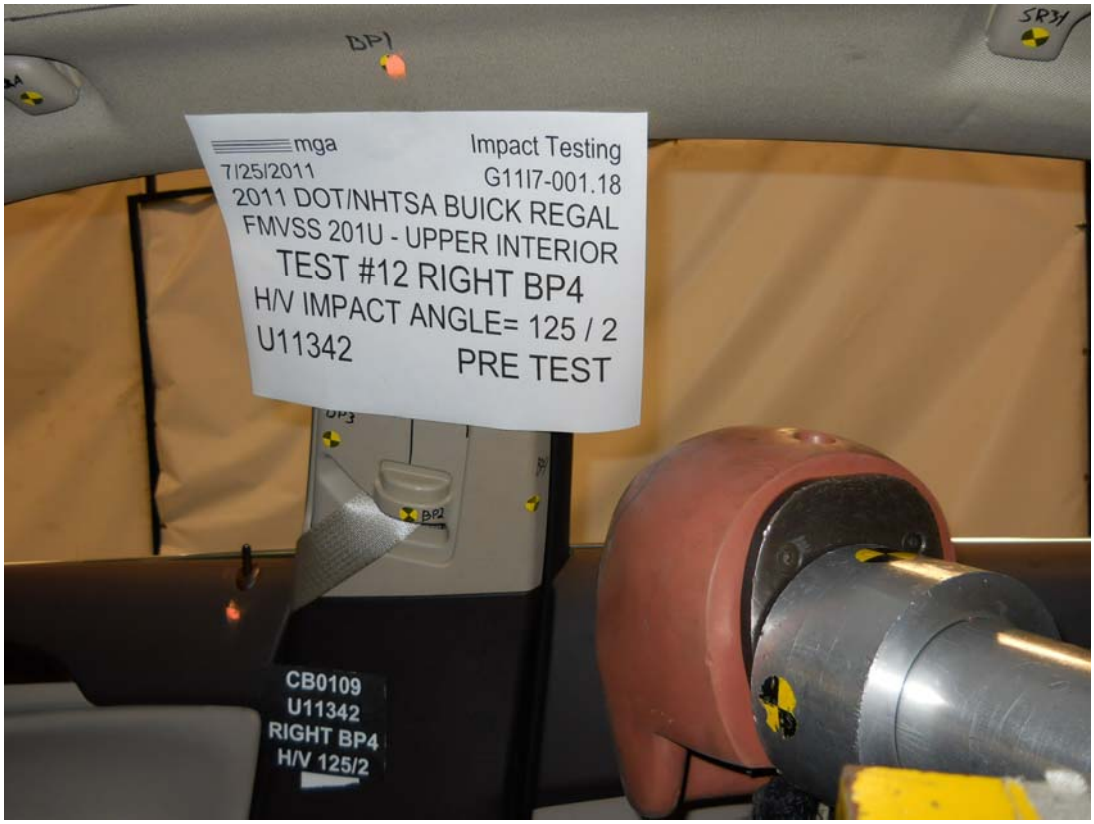

(peak = 16.4 G)
Head Y (G)
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 25.4 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)

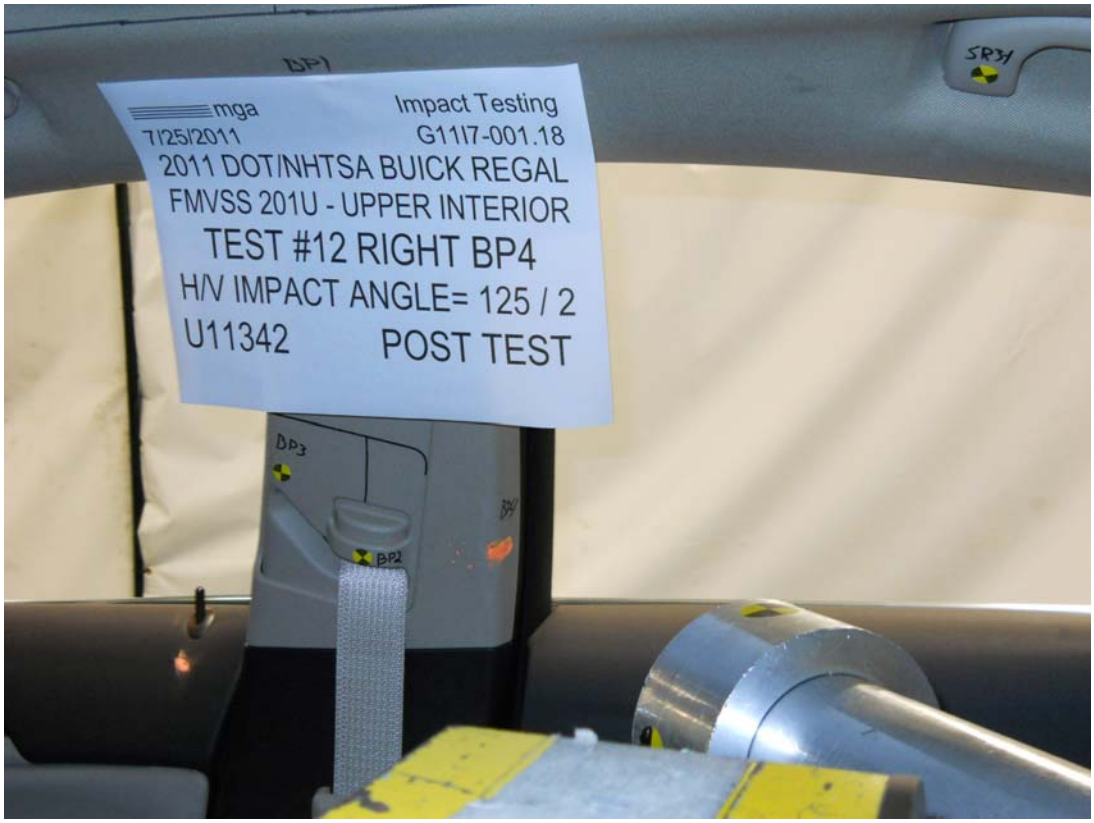

(peak = 23.9 kph)
Impact Velocity: 23.80 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 40.5 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 125 / 2
U11342
PRE TEST


BP1
SR31
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 125 / 2
U11342
PRE TEST
BP2
CB0109
U11342
RIGHT BP4
H/V 125/2


BP3
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 125 / 2
U11342
POST TEST


BP1
SR3H
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 125 / 2
U11342
POST TEST
BP3
BP2


BP3
BP2
BP1


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 125 / 2
U11342
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#12

Target (Vehicle Side): BP4Right

Temperature:23.0C

MGA Test Reference No.:U11342

Humidity:59.2%

Approach Horizontal Angles:125º

Time of Test:12:18:41 PM

Approach Vertical Angles:2º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
500	443	12.3	23.7	14	10 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

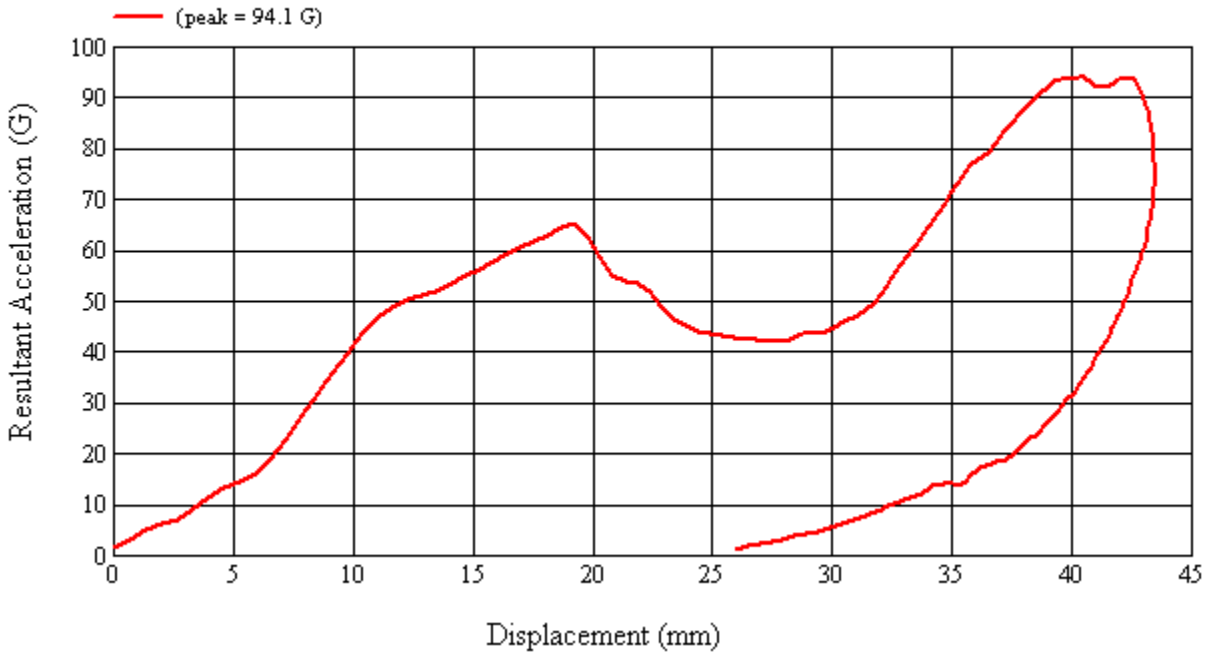
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

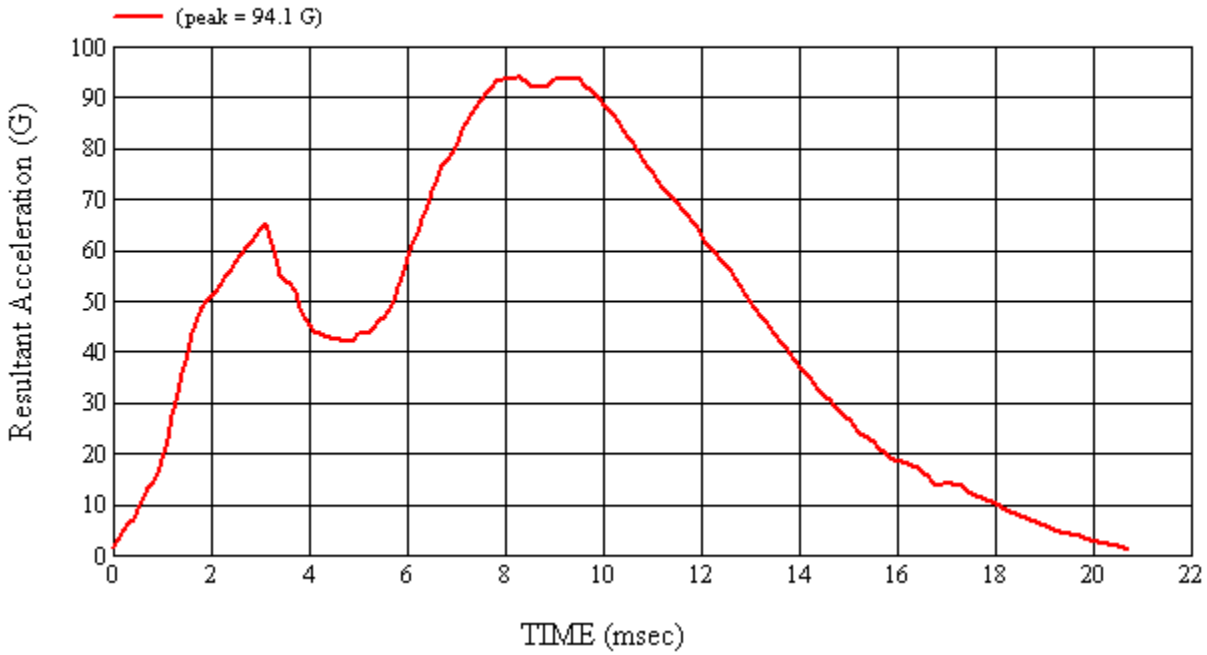
Stress mark on pillar trim

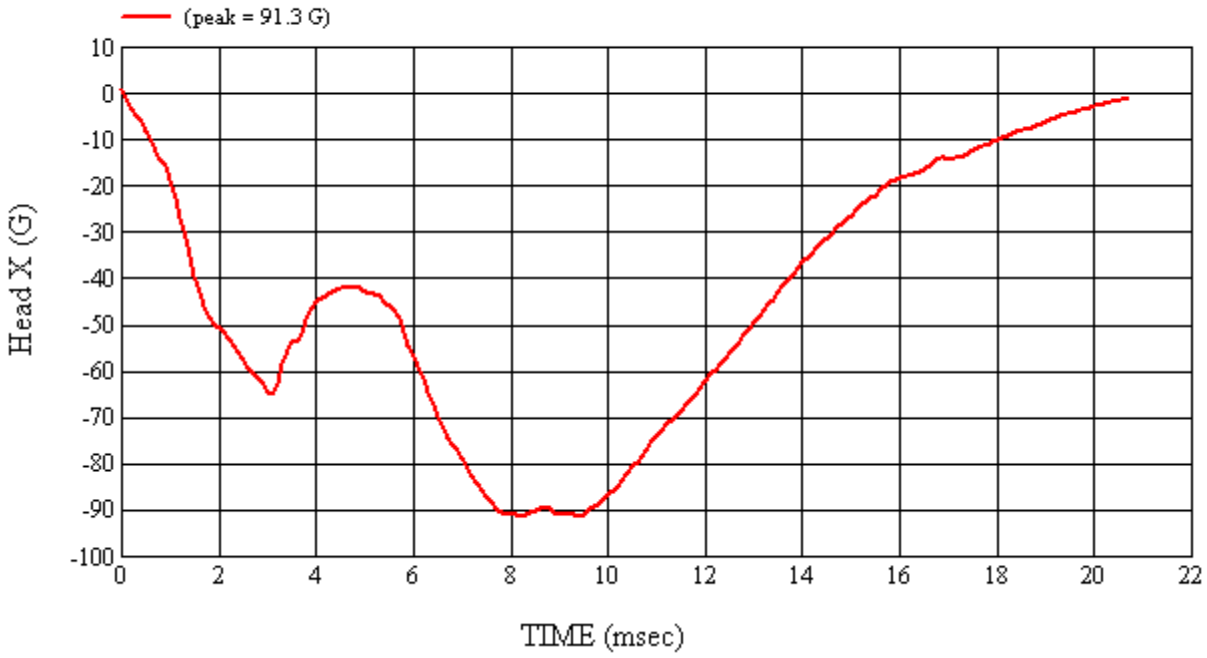
Recorded By: _____ Approved By*: _____ Date: 7/25/2011

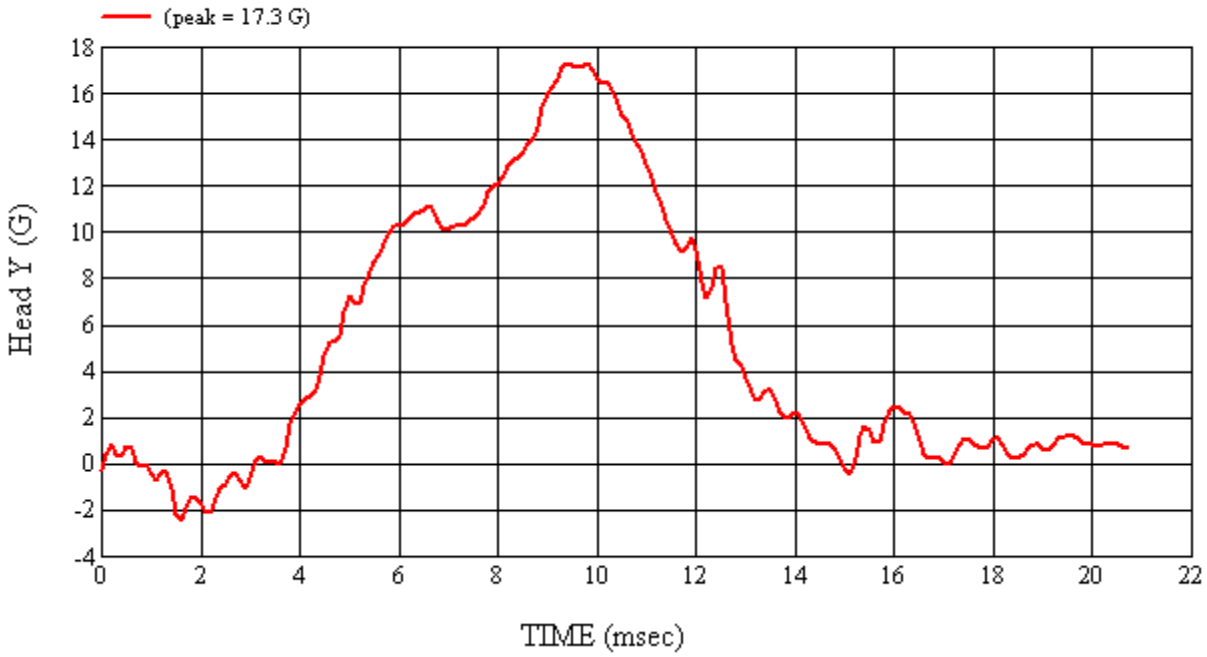
*Only necessary for NHTSA (Government) Compliance testing.

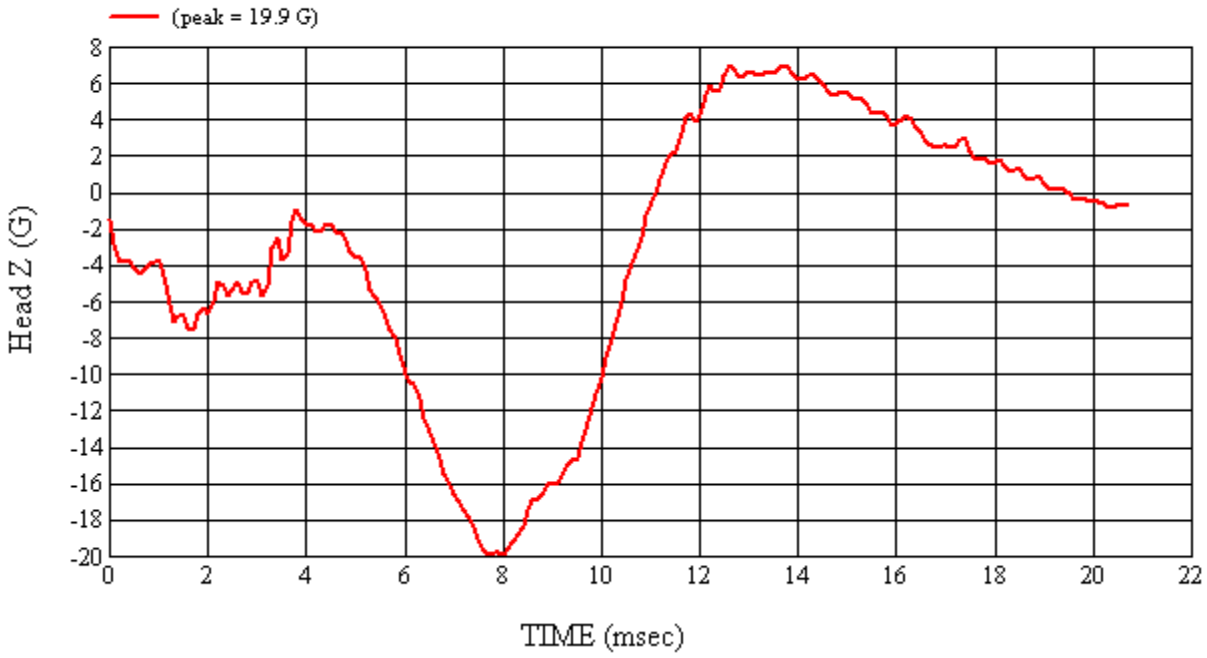
MGA Test #: U11342 Target Location: BP4, Right Side Test Date: 7/25/2011

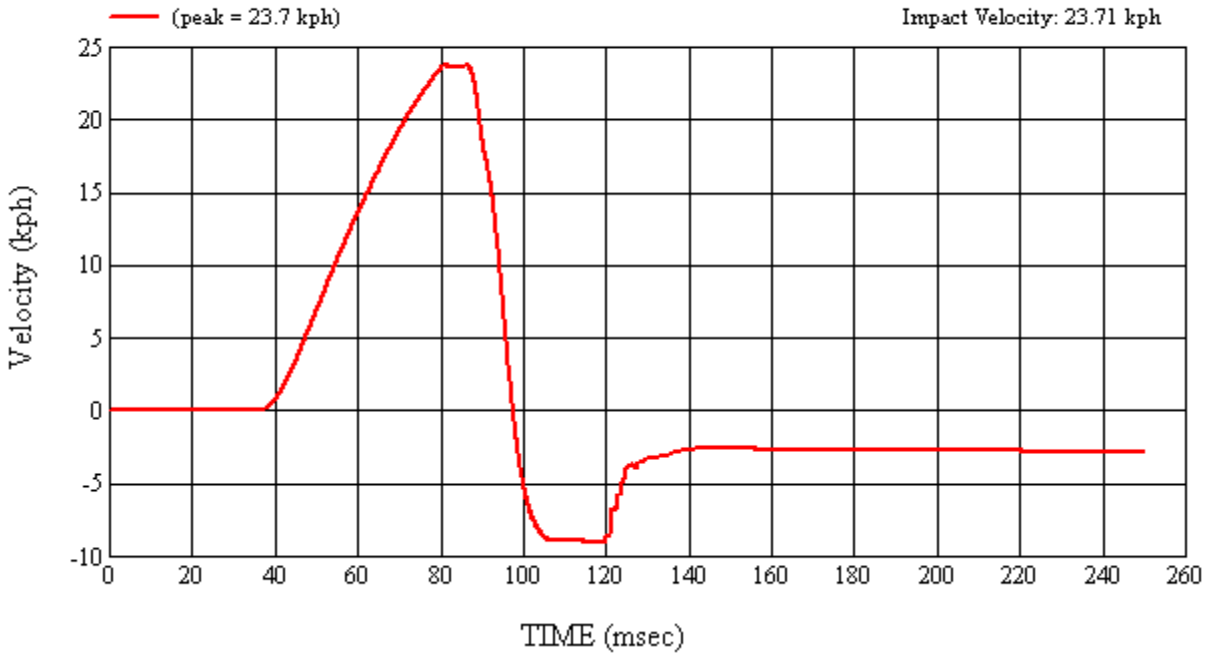


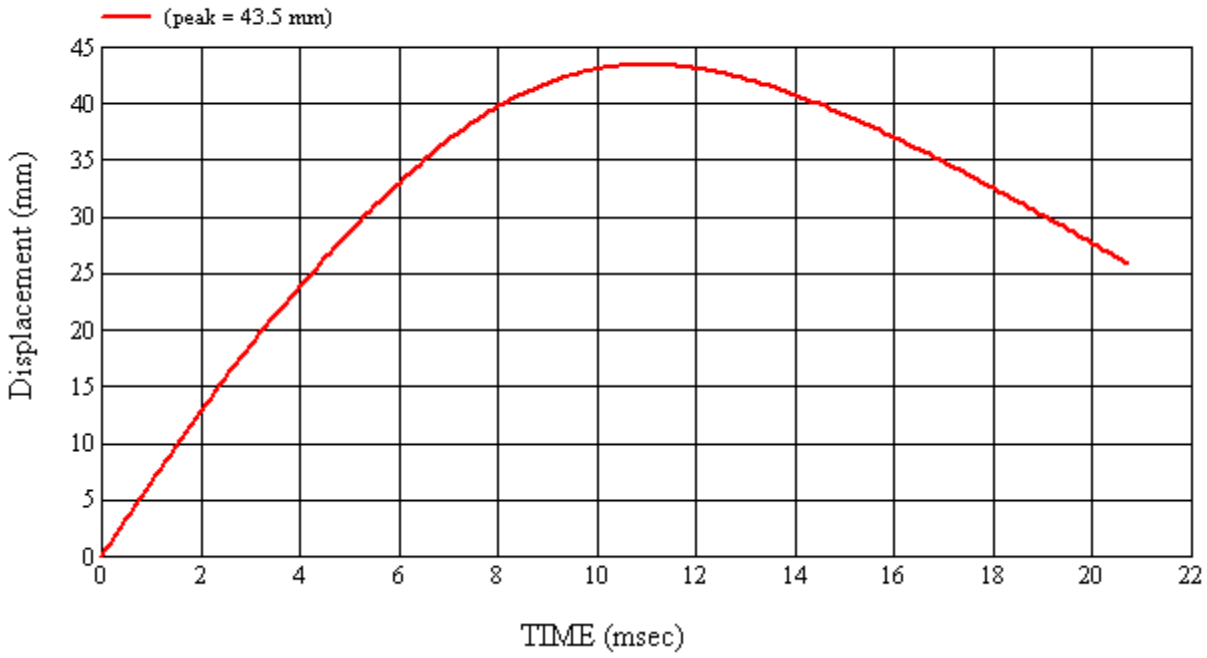



(peak = 91.3 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

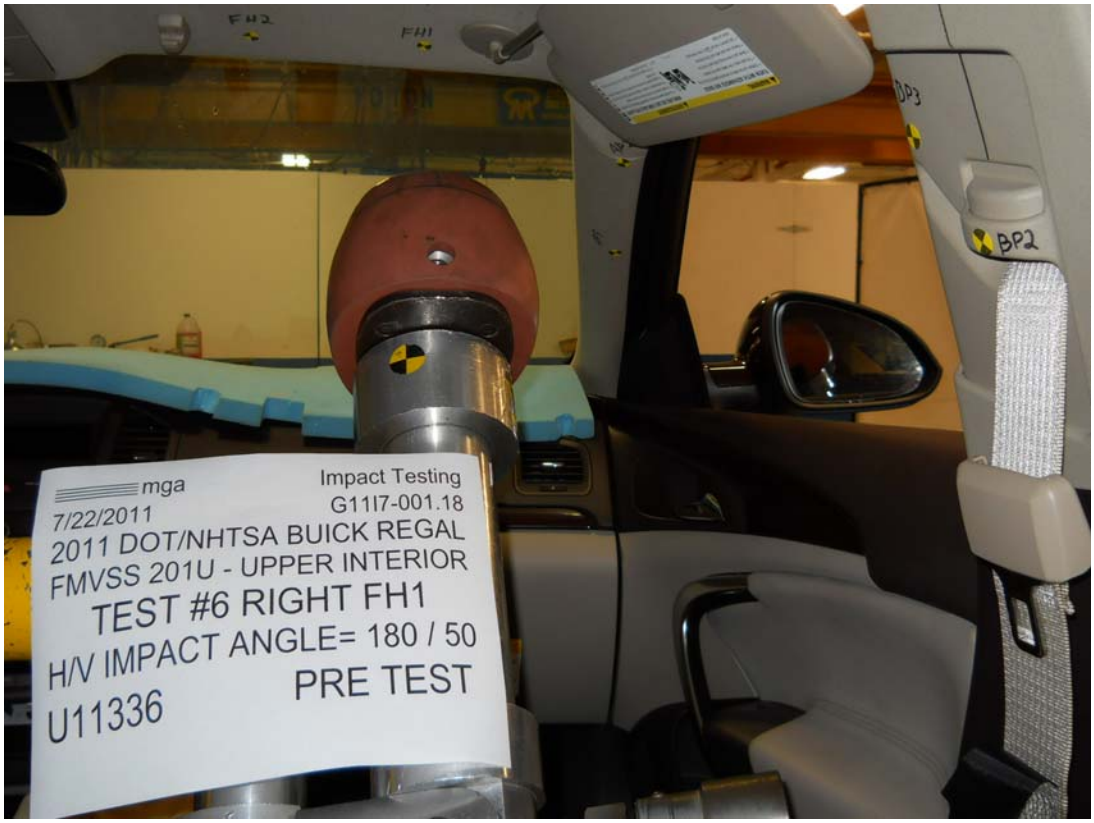

(peak = 17.3 G)
Head Y (G)
18
16
14
12
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 19.9 G)
Head Z (G)
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.7 kph)
Impact Velocity: 23.71 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 43.5 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

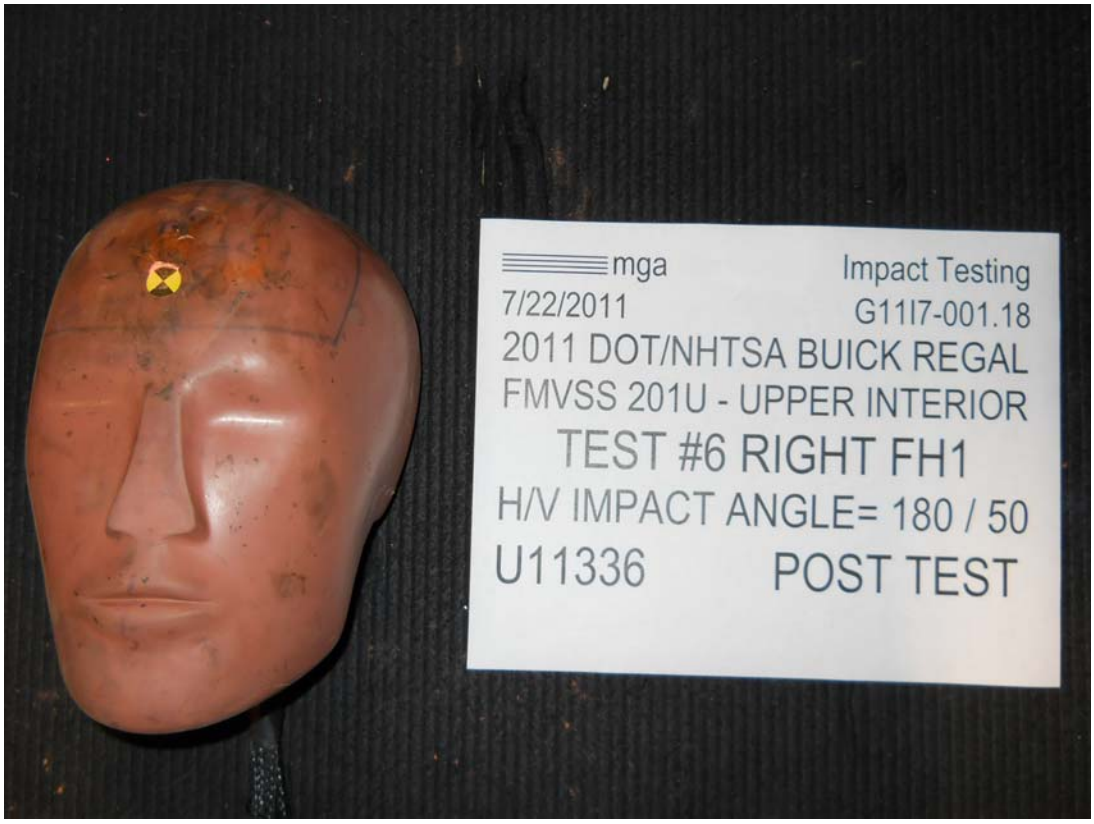

mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11336
PRE TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11336
PRE TEST
BP2


CB0109
U11336
RIGHT FH1
H/V 180/50
mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11336
POST TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11336
POST TEST


FH1
CB0109
U11336
RIGHT FH1


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #6 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11336
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): FH1Right

Temperature:24.2C

MGA Test Reference No.:U11336

Humidity:51.3%

Approach Horizontal Angles:180º

Time of Test:12:00:50 PM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
689	692	4.5	23.6	20	3 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

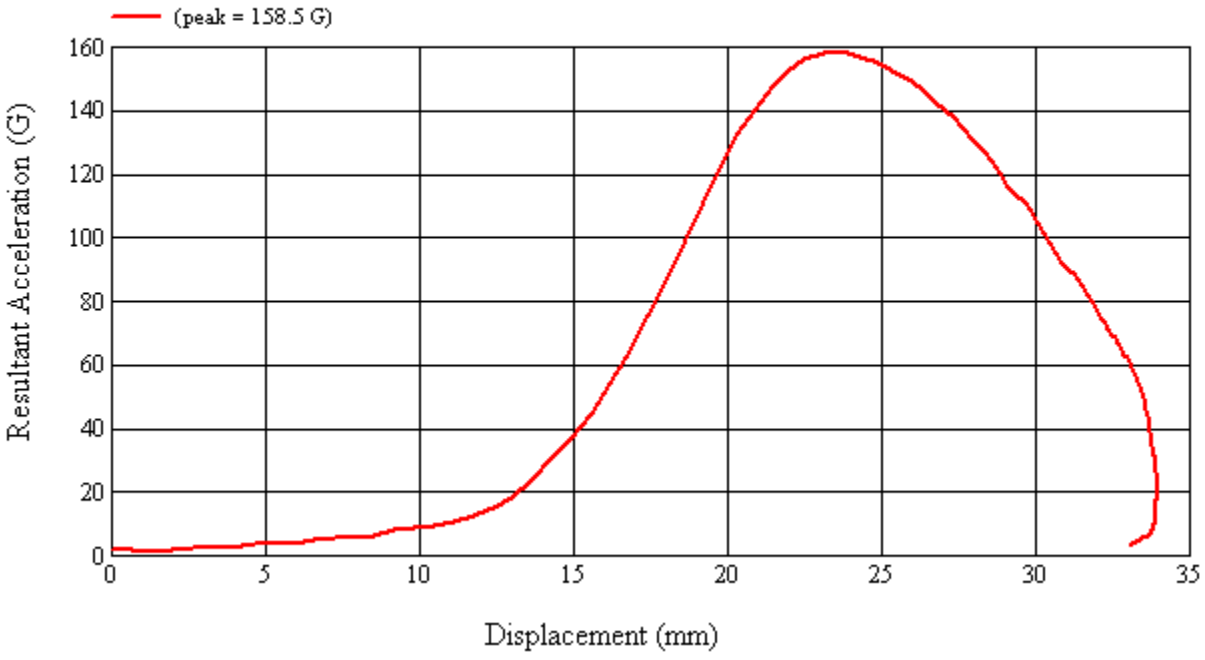
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

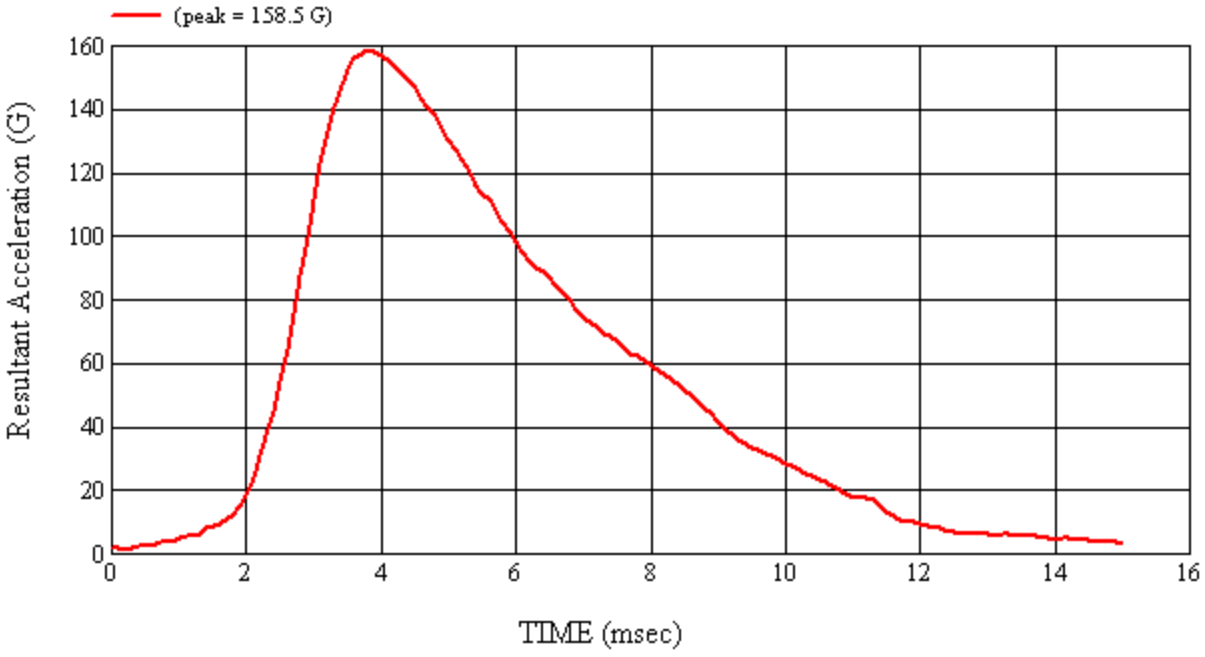
No visible damage

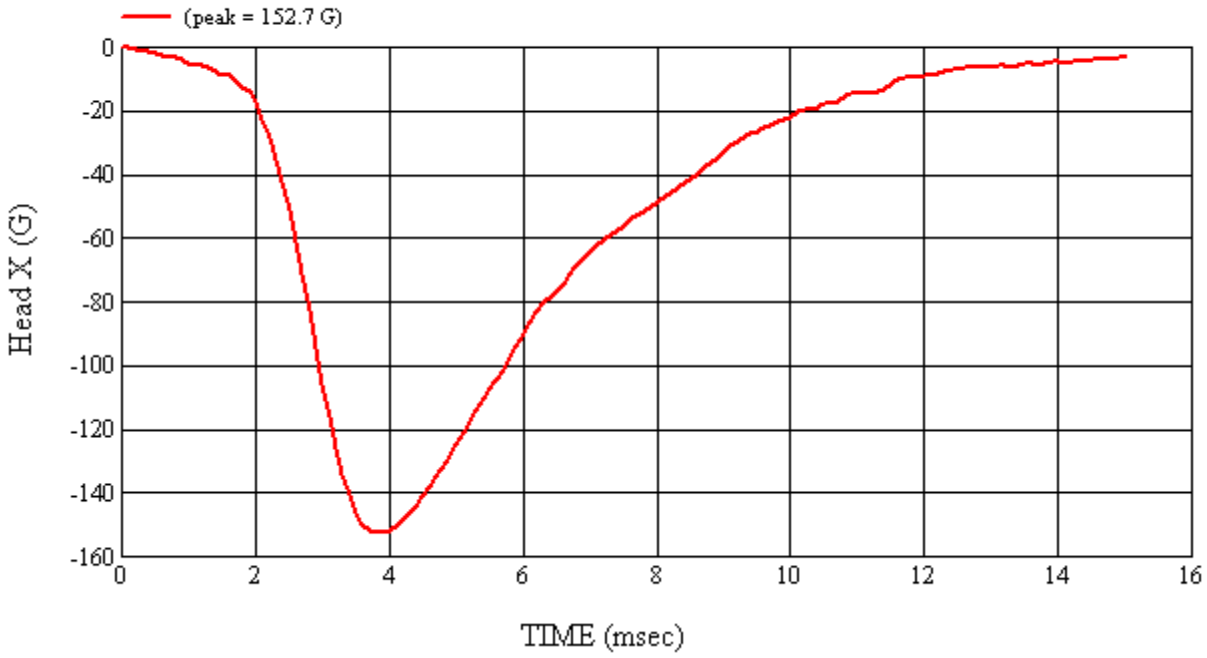
Recorded By: _____ Approved By*: _____ Date: 7/22/2011

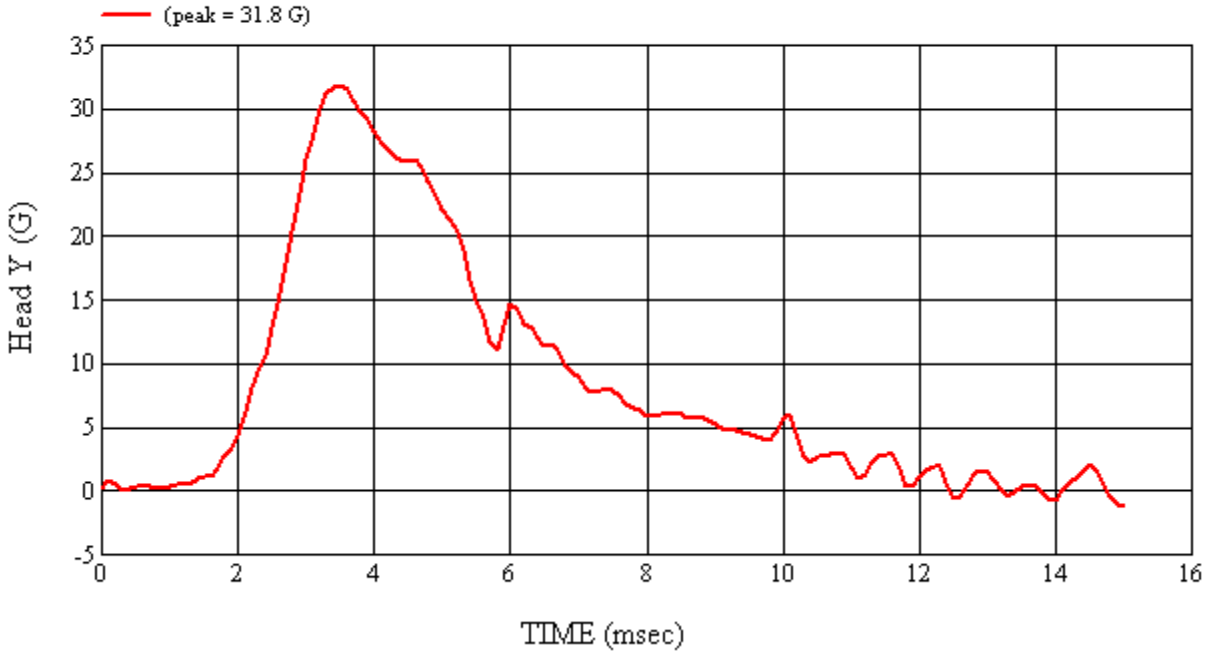
*Only necessary for NHTSA (Government) Compliance testing.

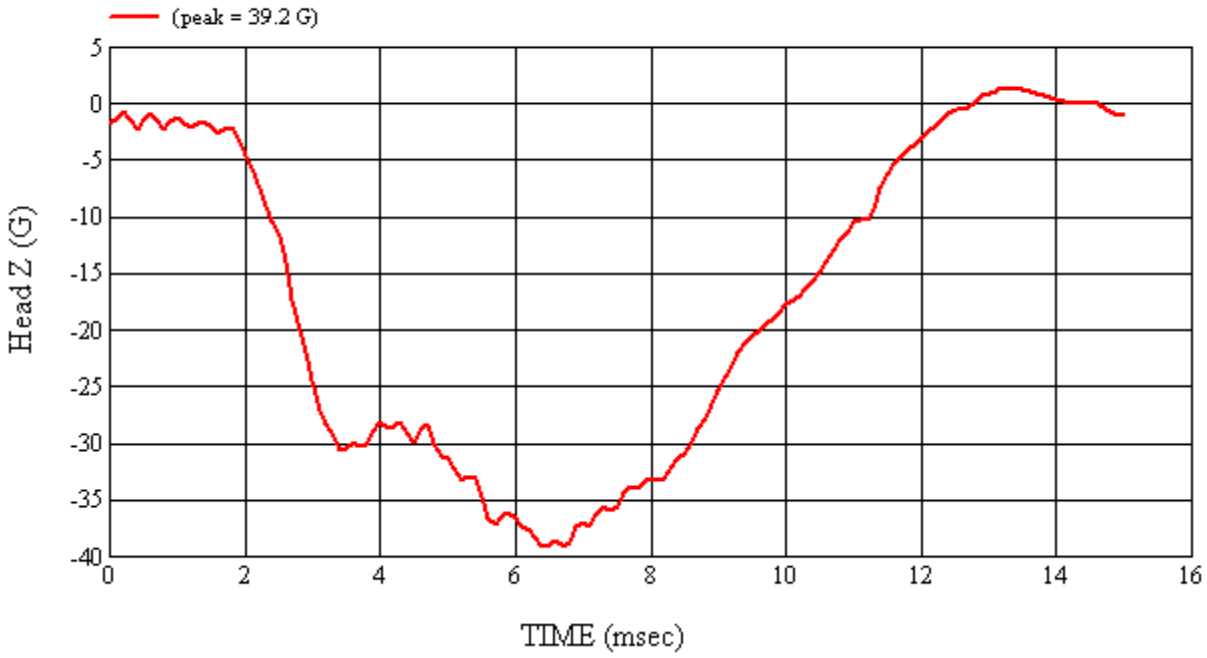
MGA Test #: U11336 Target Location: FH1, Right Side Test Date: 7/22/2011

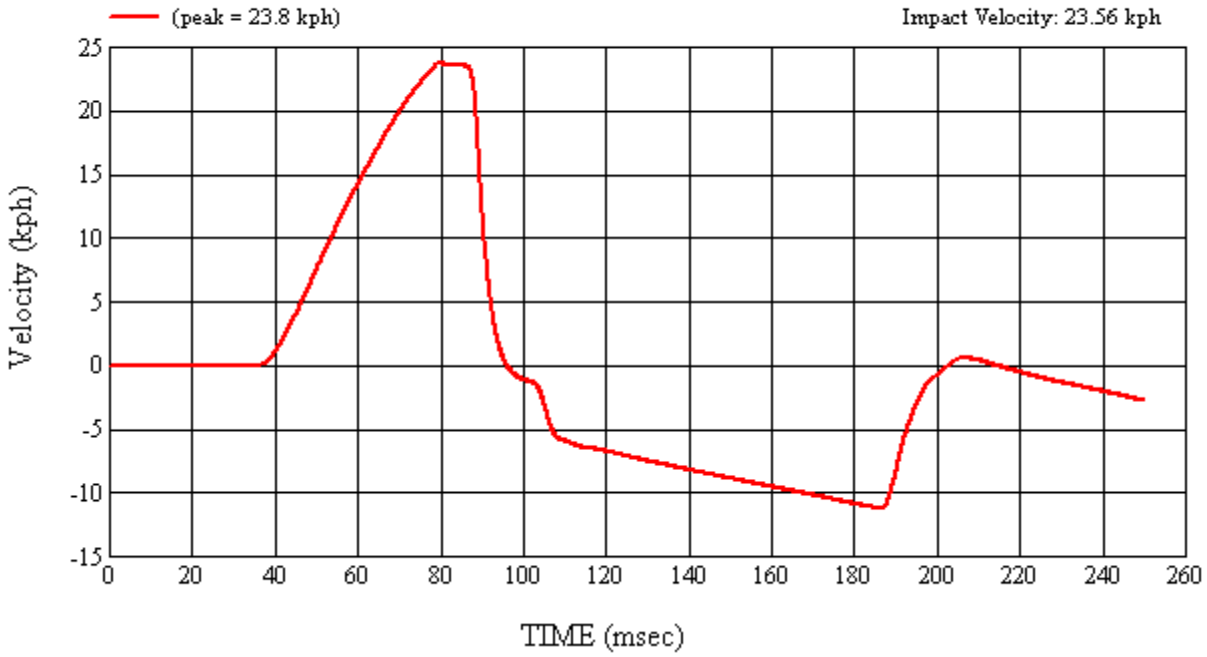


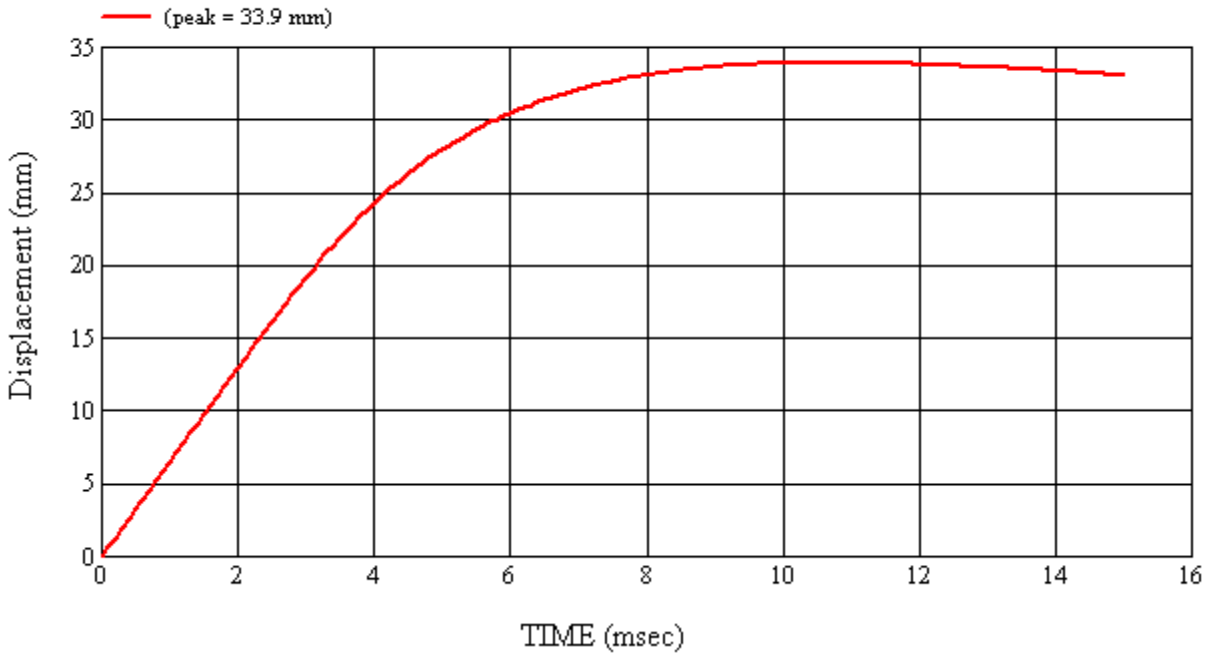



(peak = 152.7 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
-160
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 31.8 G)
Head Y (G)
35
30
25
20
15
10
5
0
-5
0
2
4
6
8
10
12
14
16
TIME (msec)

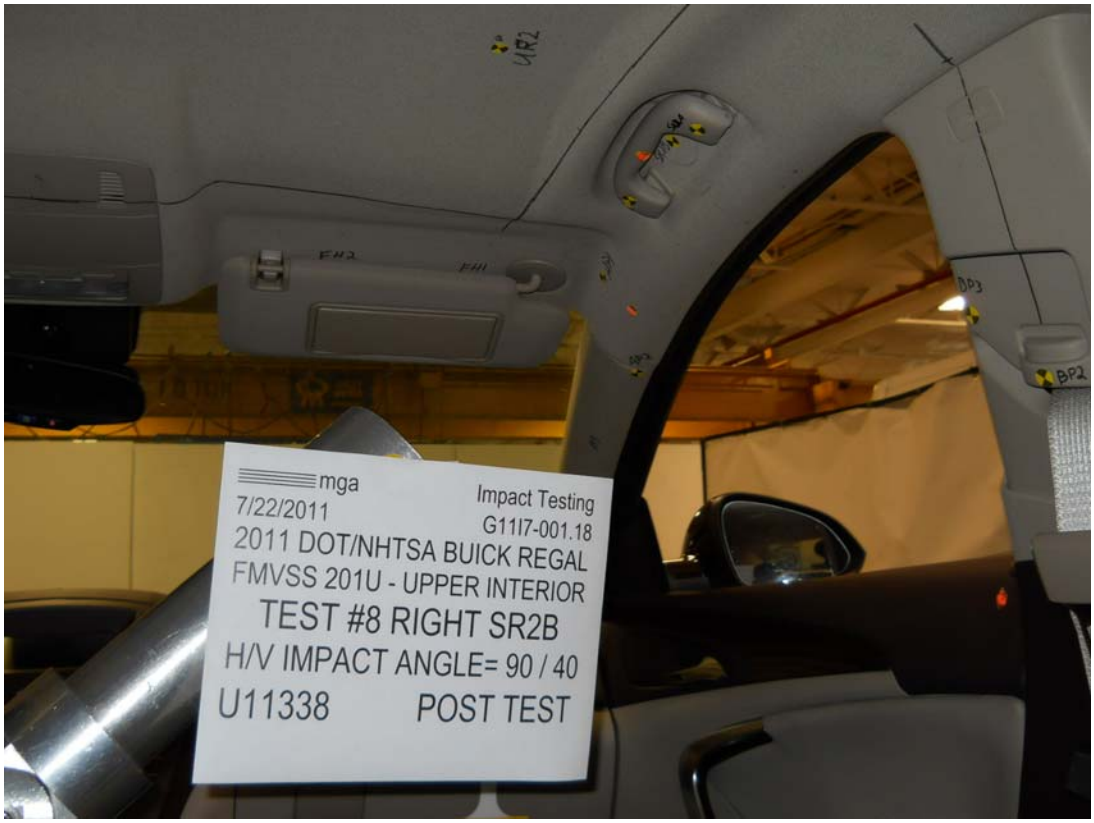

(peak = 39.2 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.56 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 33.9 mm)
Displacement (mm)
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
TIME (msec)


CB0109
U11338
RIGHT SR2B
H/V 90/40
mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT SR2B
H/V IMPACT ANGLE= 90 / 40
U11338
PRE TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT SR2B
H/V IMPACT ANGLE= 90 / 40
U11338
PRE TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT SR2B
H/V IMPACT ANGLE= 90 / 40
U11338
POST TEST


API
mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT SR2B
H/V IMPACT ANGLE= 90 / 40
U11338
POST TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT SR2B
H/V IMPACT ANGLE= 90 / 40
U11338
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): SR2BRight

Temperature:25.1C

MGA Test Reference No.:U11338

Humidity:49.2%

Approach Horizontal Angles:90º

Time of Test:3:23:39 PM

Approach Vertical Angles:40º

FMH Serial No:[037]

Additional Description:2 relocation spheres

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
438	360	7.5	19.0	44	9 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.):

No visible damage

Recorded By: _____ Approved By*: _____ Date: 7/22/2011

*Only necessary for NHTSA (Government) Compliance testing.

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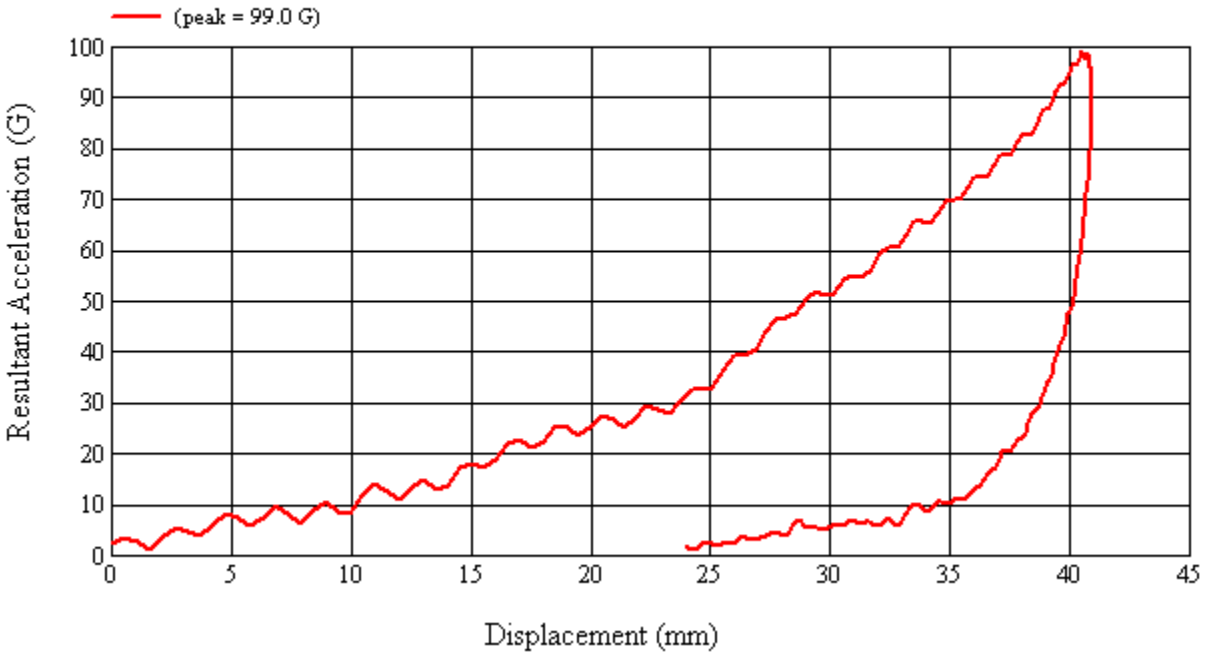
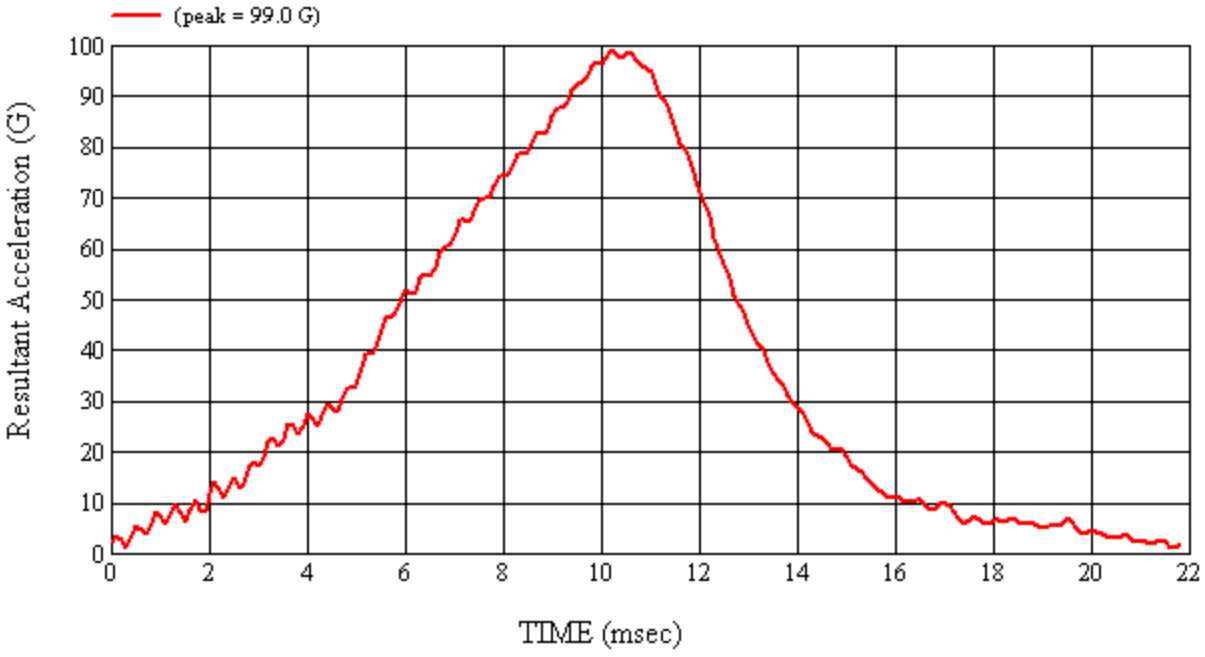
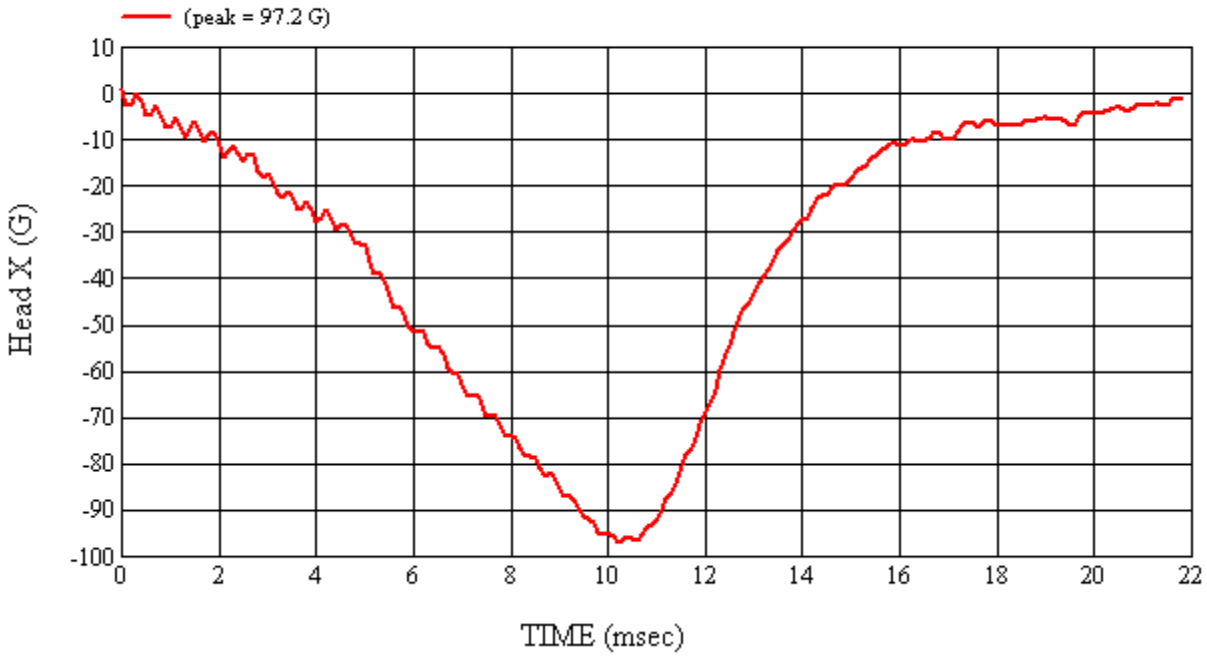
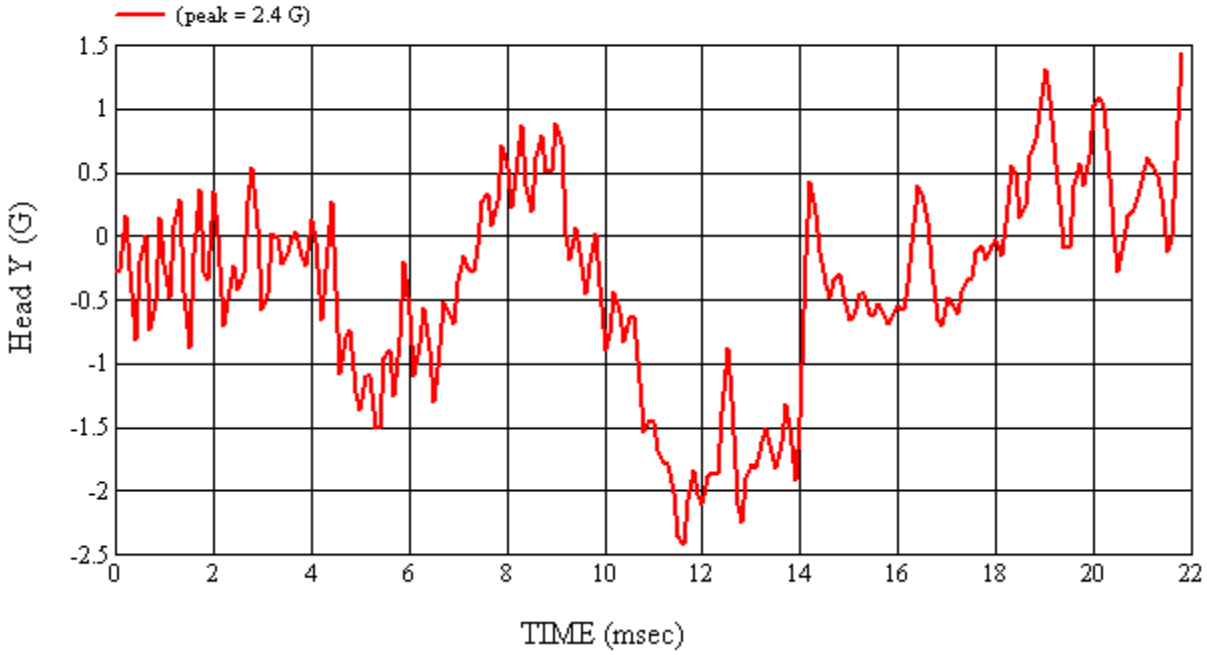
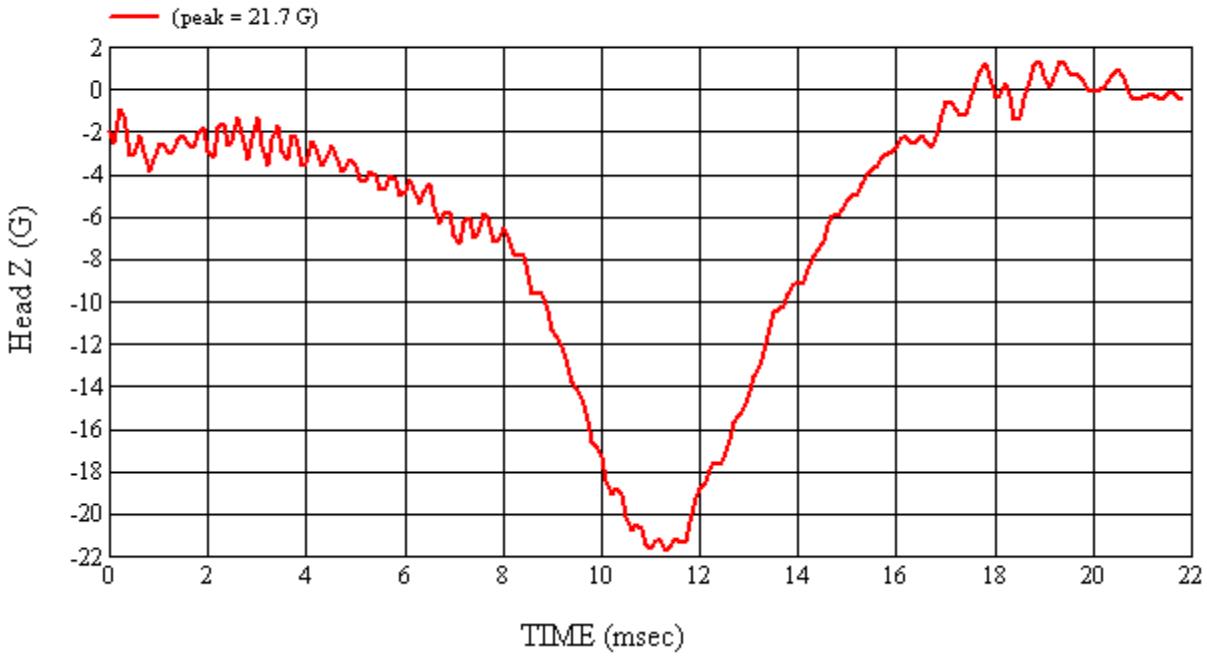
MGA Test #: U11338 Target Location: SR2B, Right Side Test Date: 7/22/2011

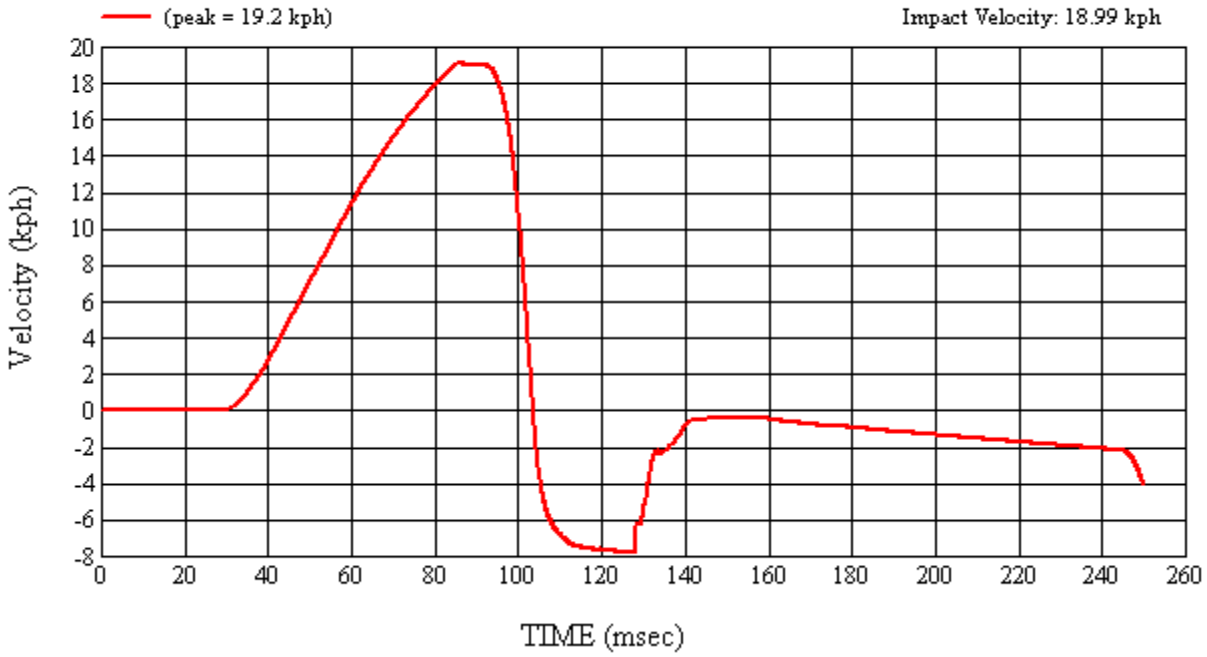


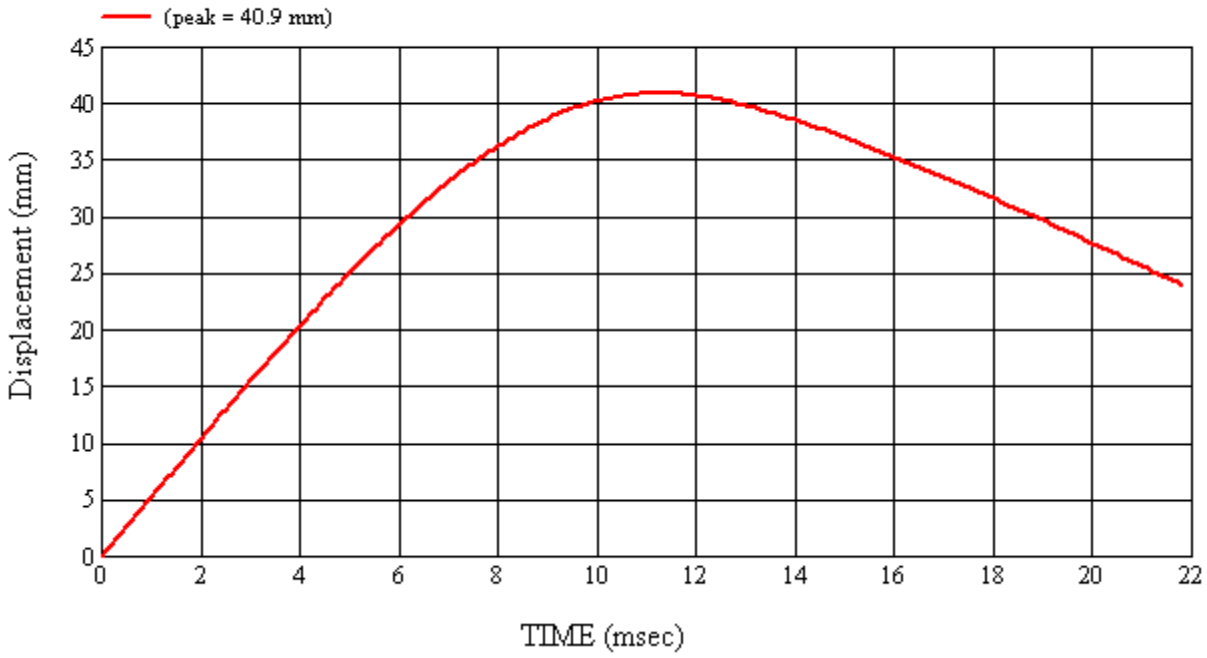



(peak = 97.2 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 2.4 G)
Head Y (G)
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

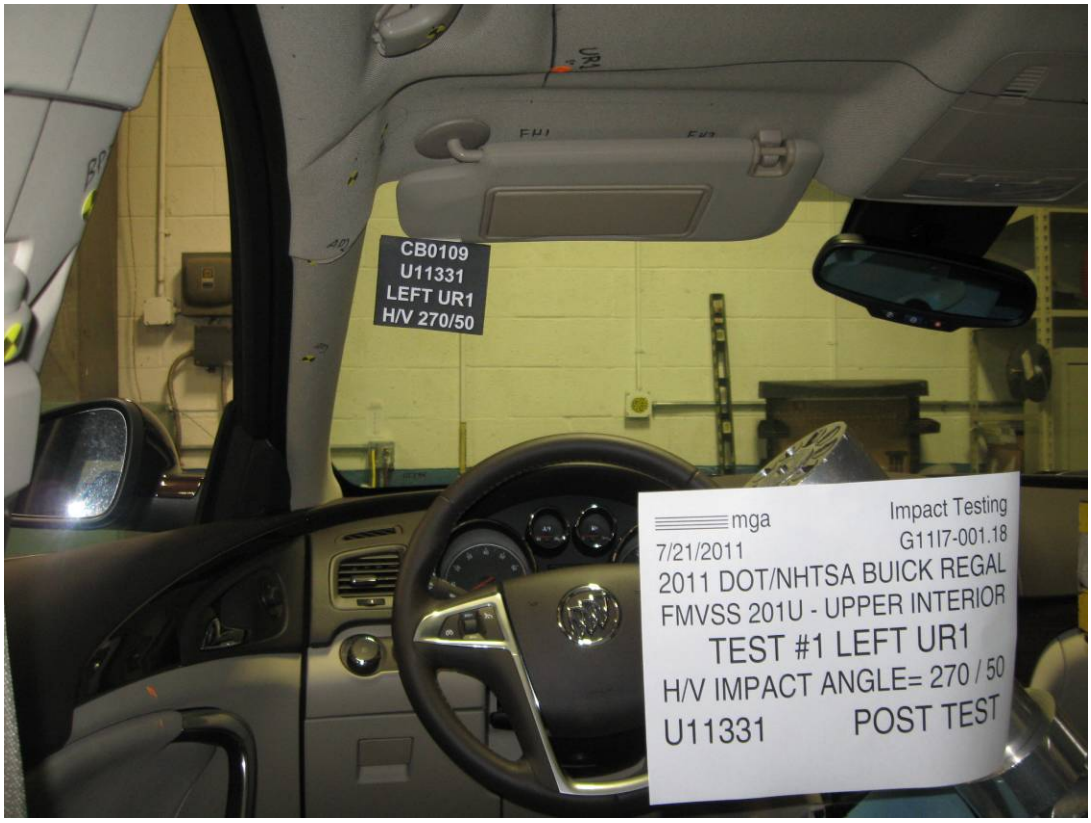

(peak = 21.7 G)
Head Z (G)
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 19.2 kph)
Impact Velocity: 18.99 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 40.9 mm)
Displacement (mm)
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


CB0109
U11331
LEFT UR1
H/V 270/50
mga
7/21/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11331
PRE TEST


mga
7/21/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11331
PRE TEST


CB0109
U11331
LEFT UR1
H/V 270/50
mga
Impact Testing
G11I7-001.18
7/21/2011
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11331
POST TEST


mga
Impact Testing
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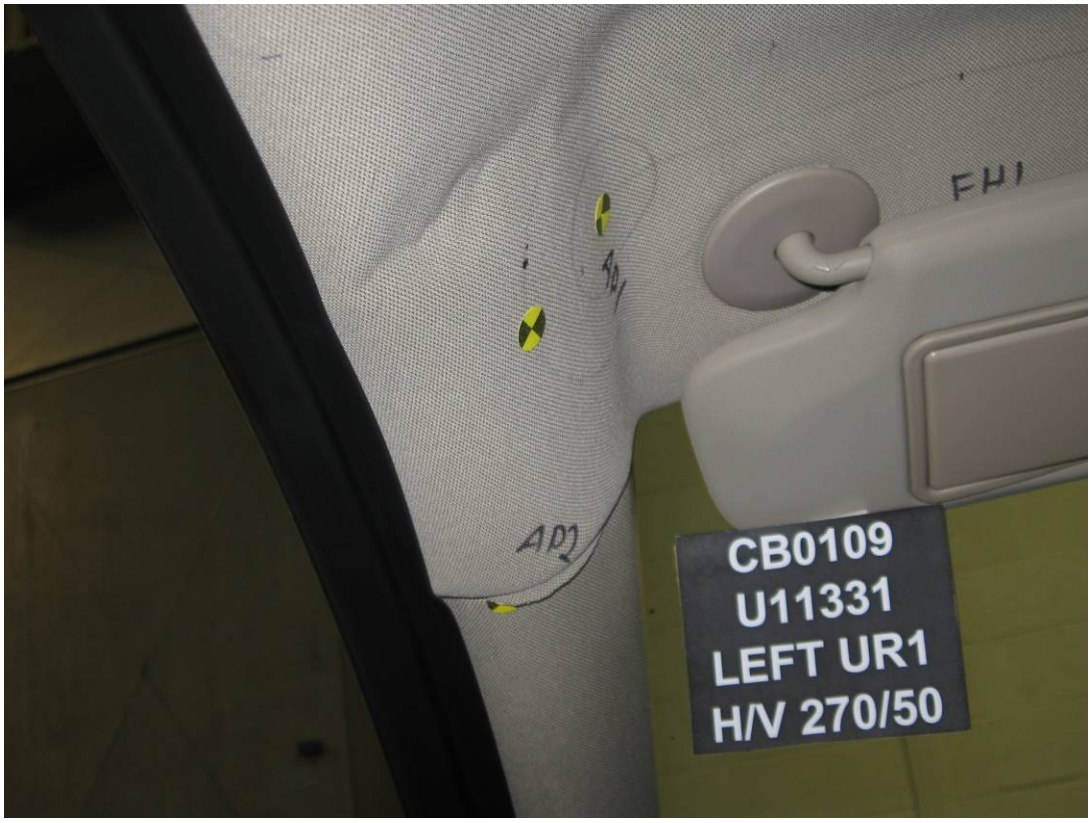
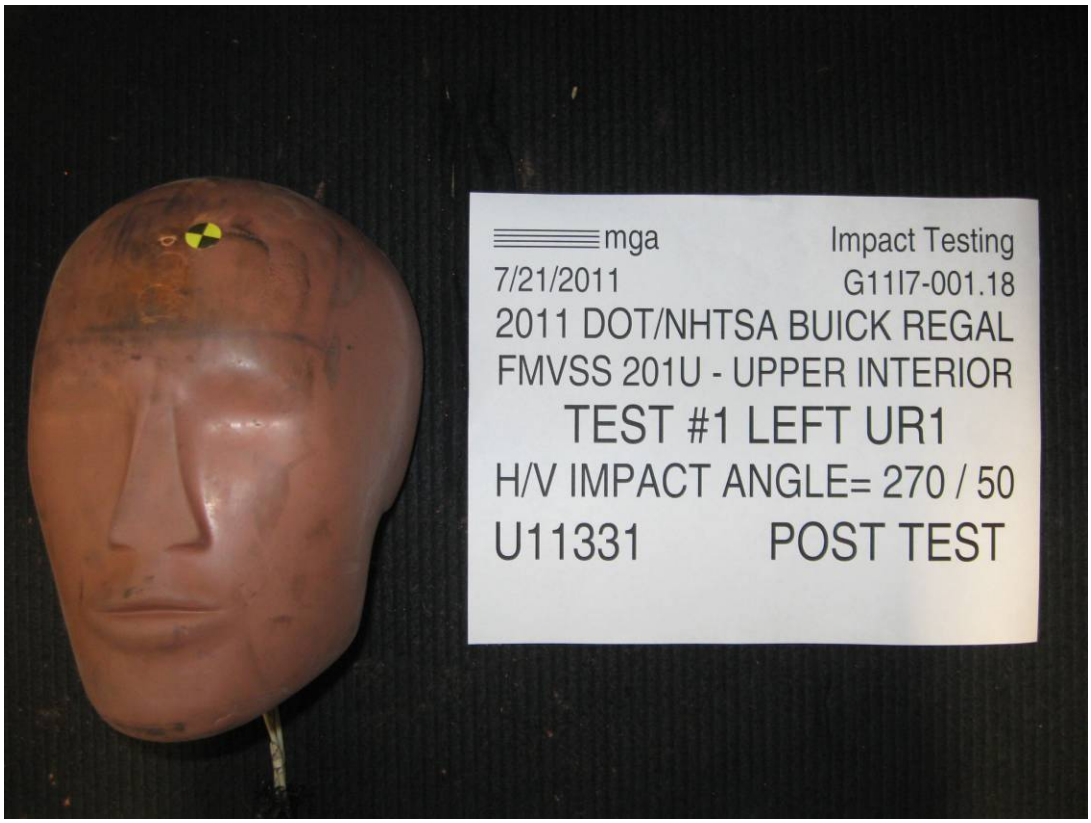
7/21/2011
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11331
POST TEST


FH1
ADJ
CB0109
U11331
LEFT UR1
H/V 270/50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Impact Testing
7/21/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11331
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): UR1Left

Temperature:24.6C

MGA Test Reference No.:U11331

Humidity:65.4%

Approach Horizontal Angles:270º

Time of Test:10:56:30 AM

Approach Vertical Angles:50º

FMH Serial No:[035]

Additional Description:@ AP

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
550	508	12.8	23.6	41	15 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

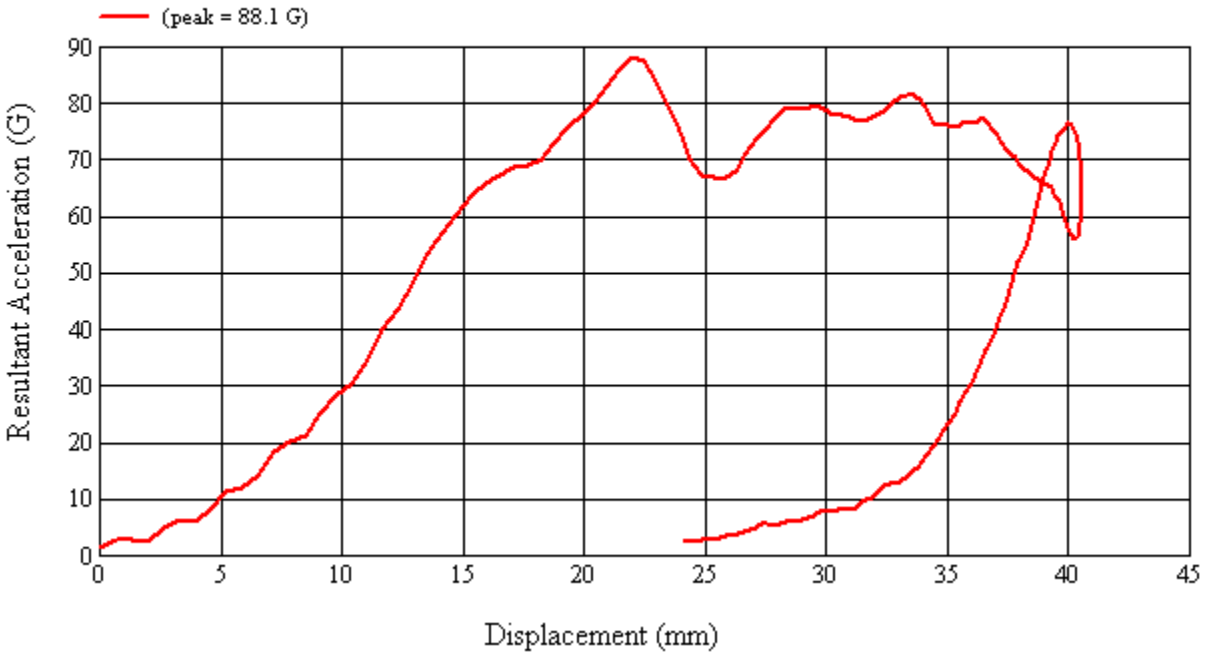
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

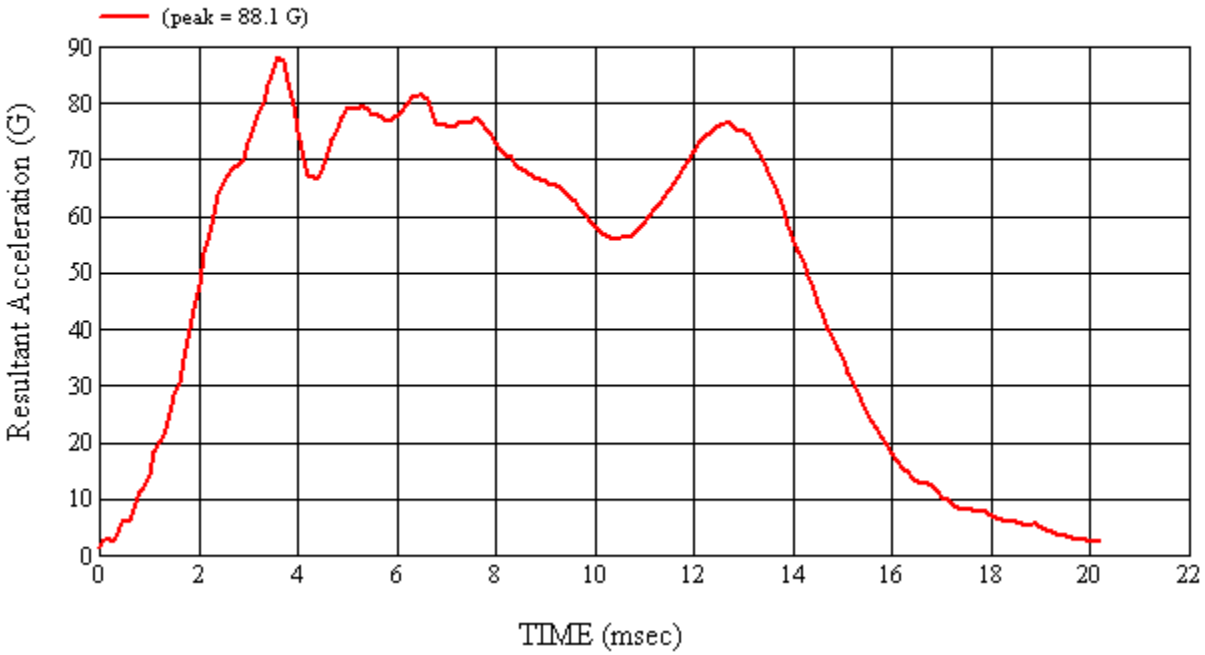
Headliner deformation, dislodged headliner

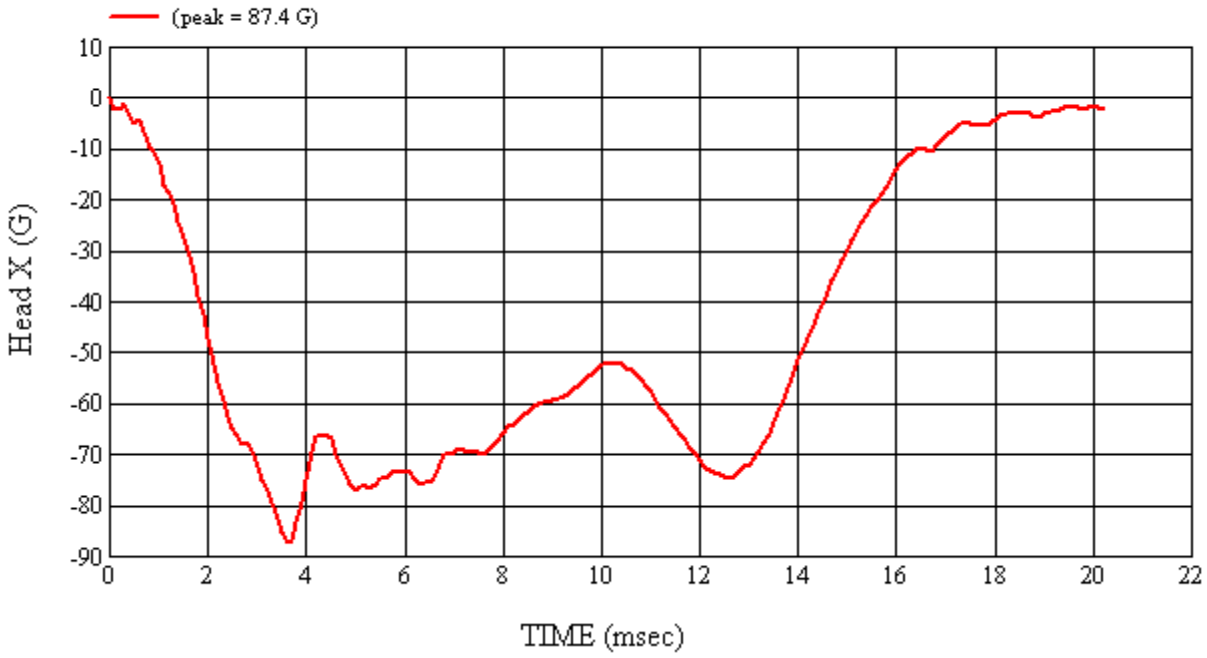
Recorded By: _____ Approved By*: _____ Date: 7/21/2011

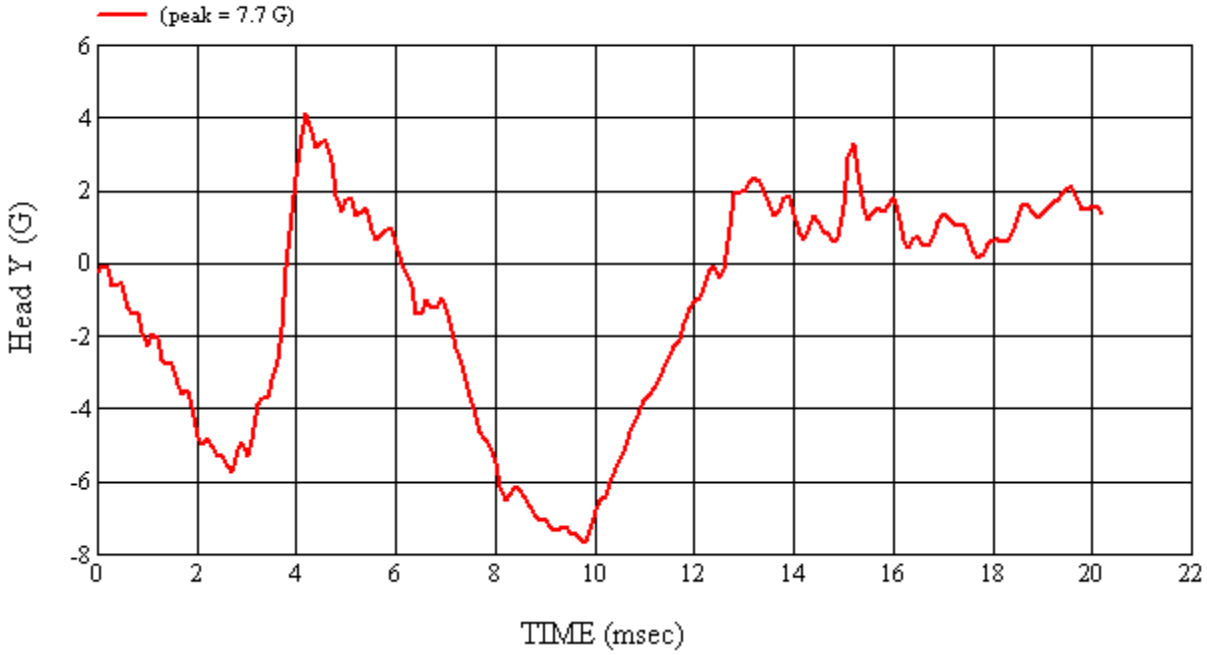
*Only necessary for NHTSA (Government) Compliance testing.

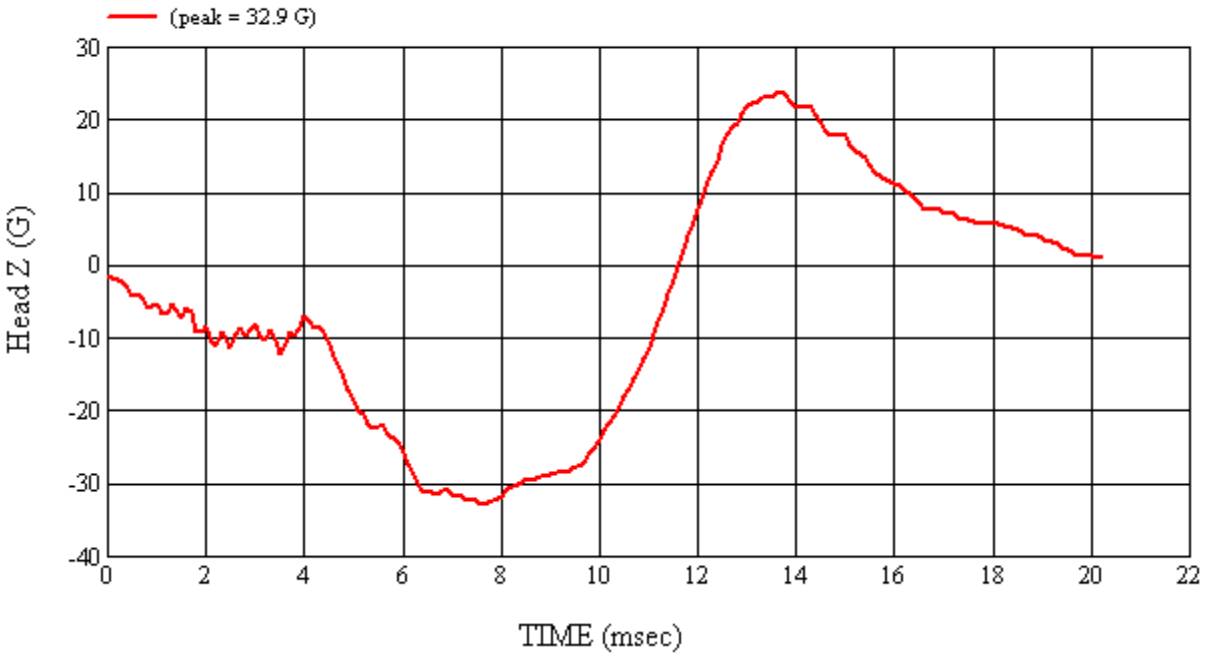
MGA Test #: U11331 Target Location: UR1, Left Side Test Date: 7/21/2011

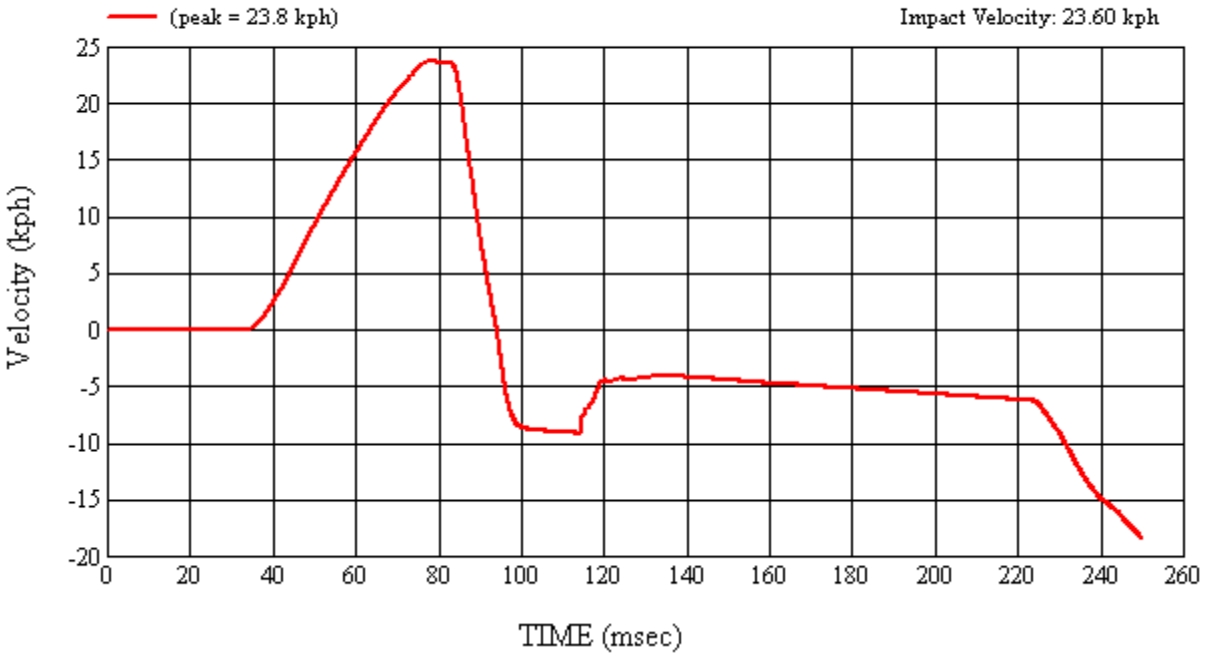


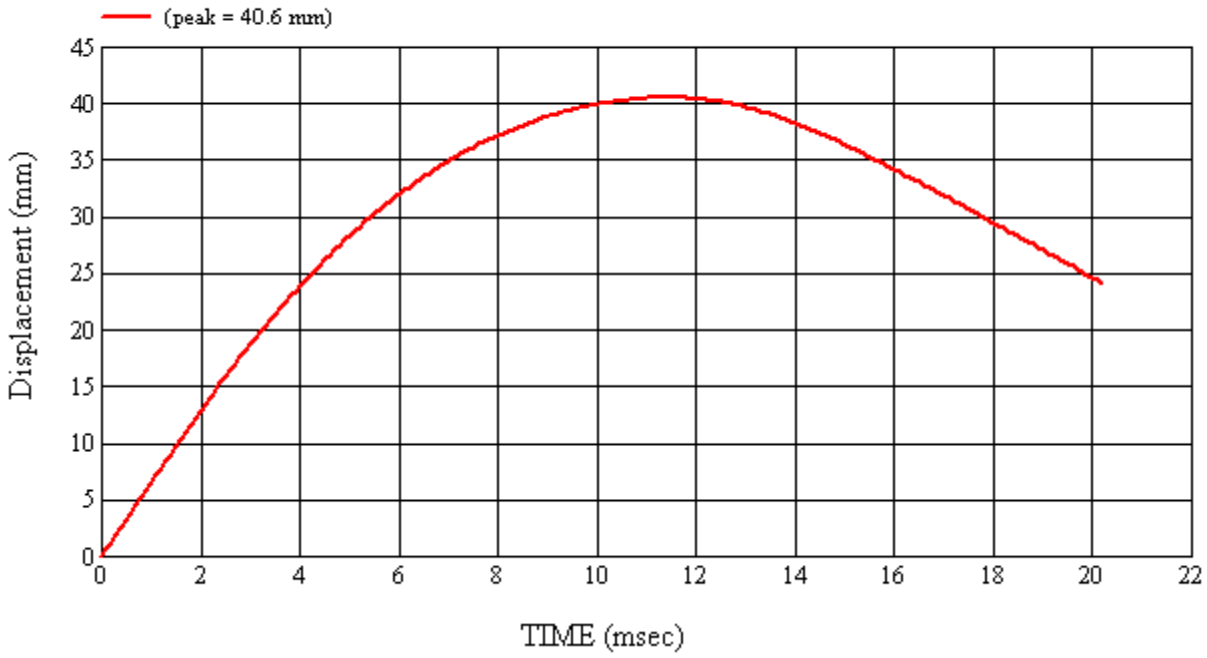


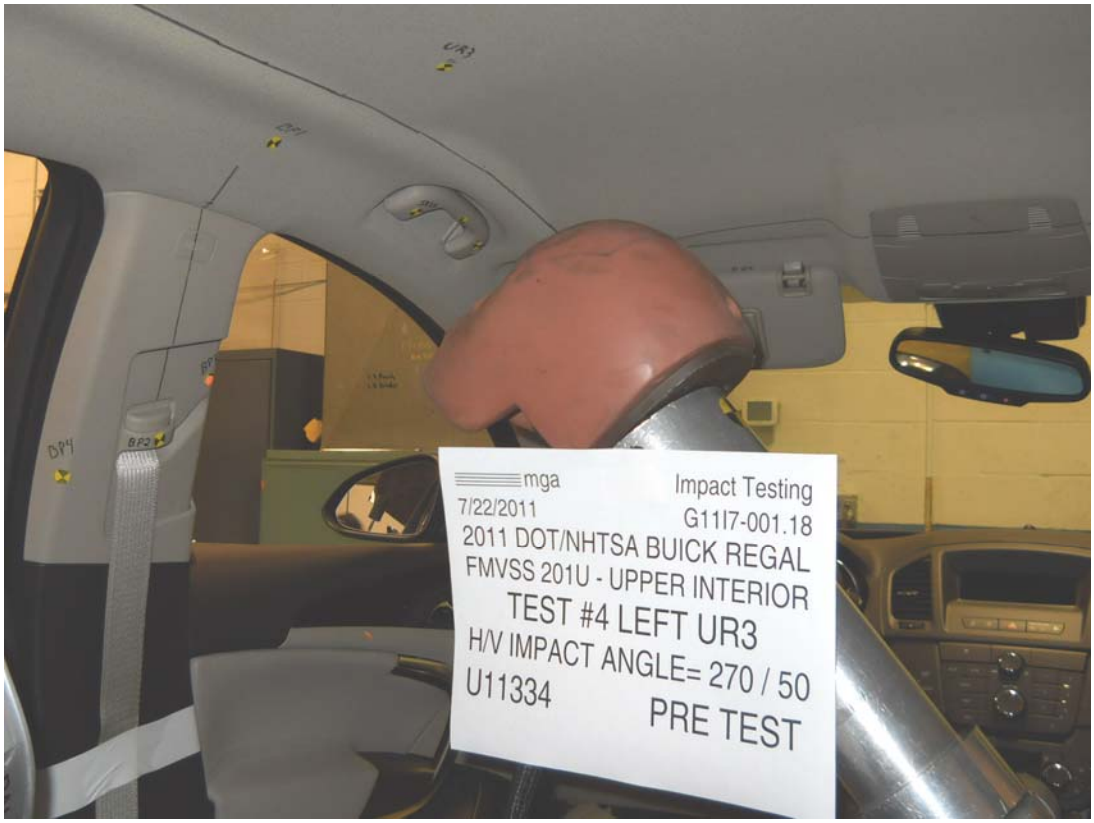

(peak = 87.4 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 7.7 G)
Head Y (G)
6
4
2
0
-2
-4
-6
-8
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 32.9 G)
Head Z (G)
30
20
10
0
-10
-20
-30
-40
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.60 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
-20
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 40.6 mm)
Displacement (mm)
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

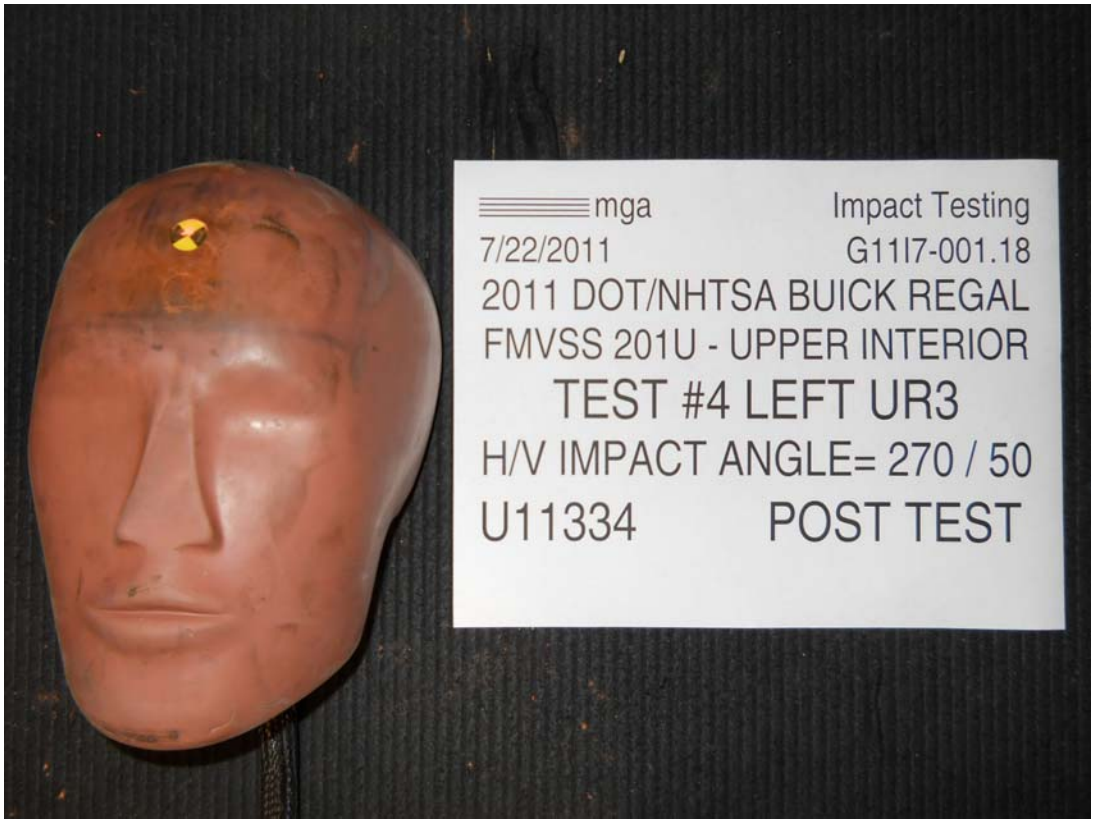

mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11334
PRE TEST


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11334
PRE TEST


CB0109
U11334
LEFT UR3
H/V 270/50
mga
Impact Testing
G11I7-001.18
7/22/2011
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11334
POST TEST


mga
Impact Testing
G11I7-001.18
7/22/2011
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11334
POST TEST


UR3
BP1
SR2A


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11334
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR3Left

MGA Test Reference No.:U11334

Approach Horizontal Angles:270º

Approach Vertical Angles:50º

Additional Description:@ BP

Test Number:#4

Temperature:23.6C

Humidity:51.3%

Time of Test:9:25:36 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
491	430	11.3	23.8	35	1 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

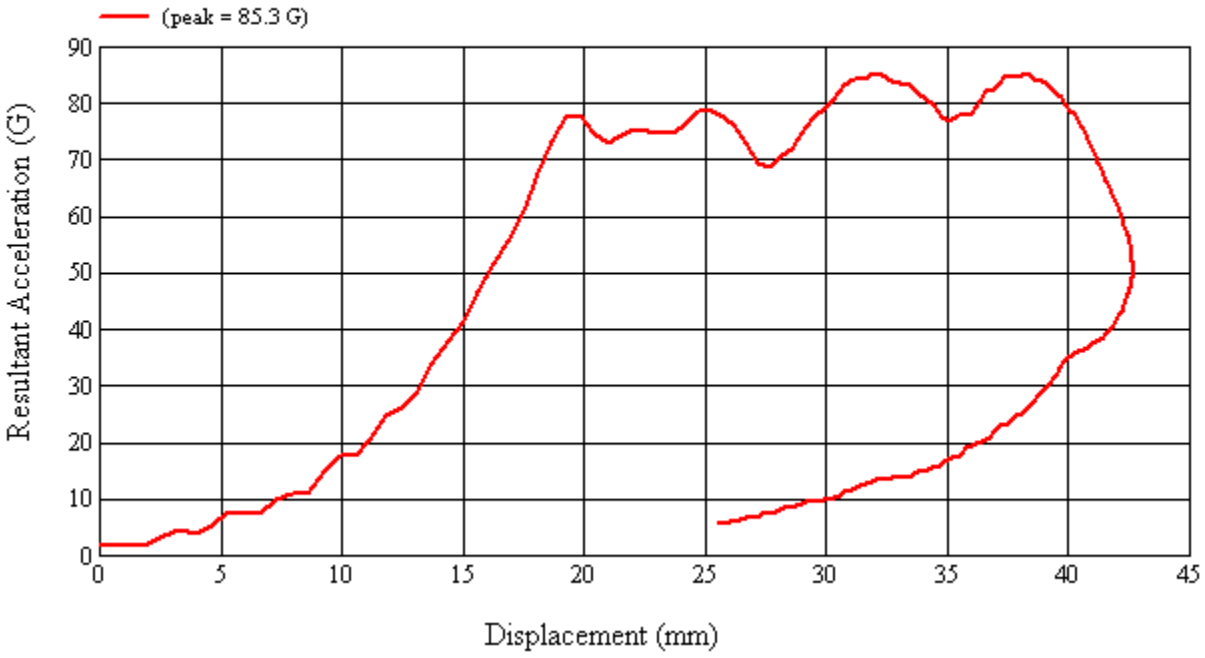
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

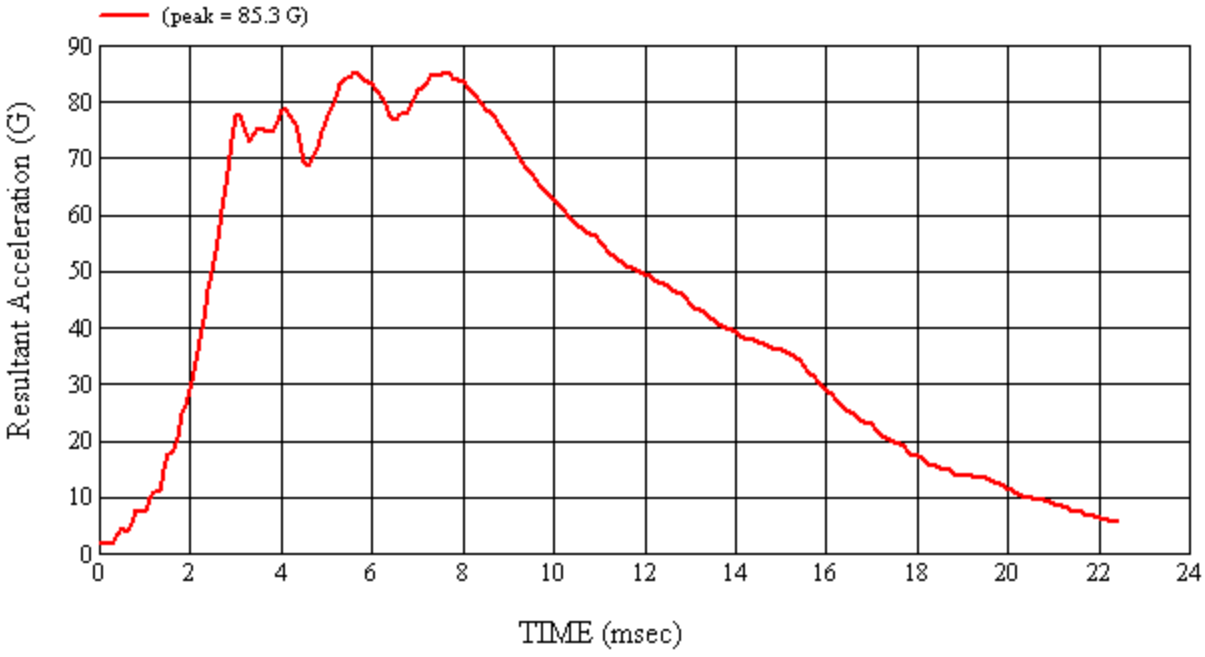
No visible damage

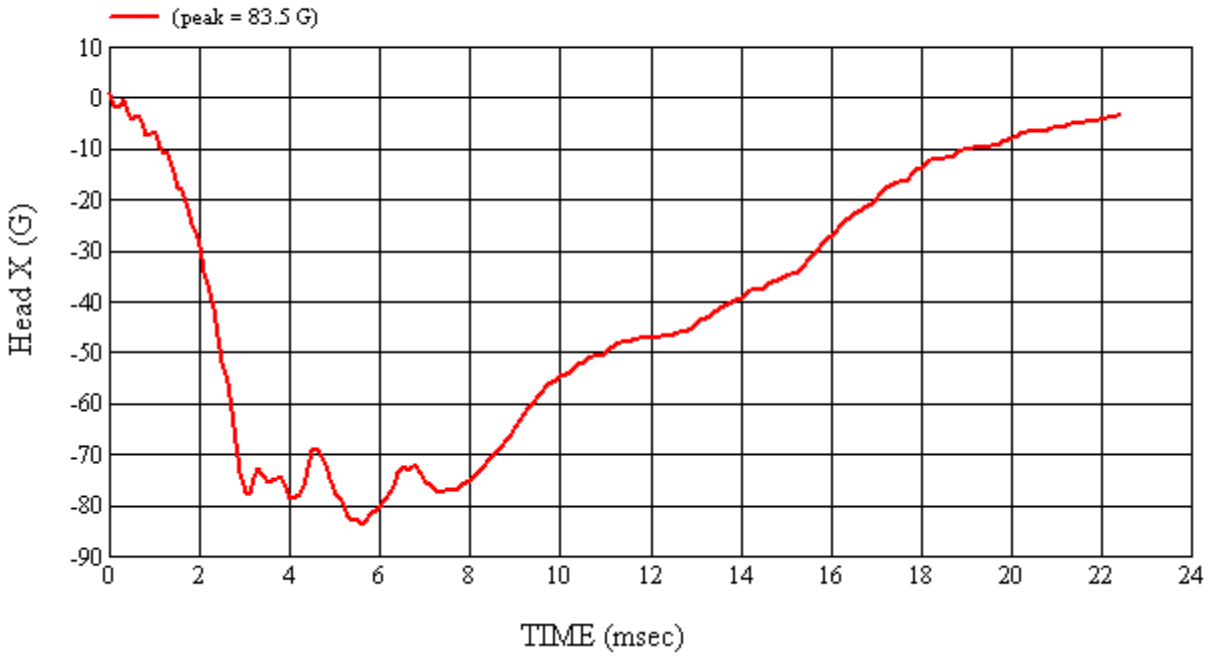
Recorded By: _____ Approved By*: _____ Date: 7/22/2011

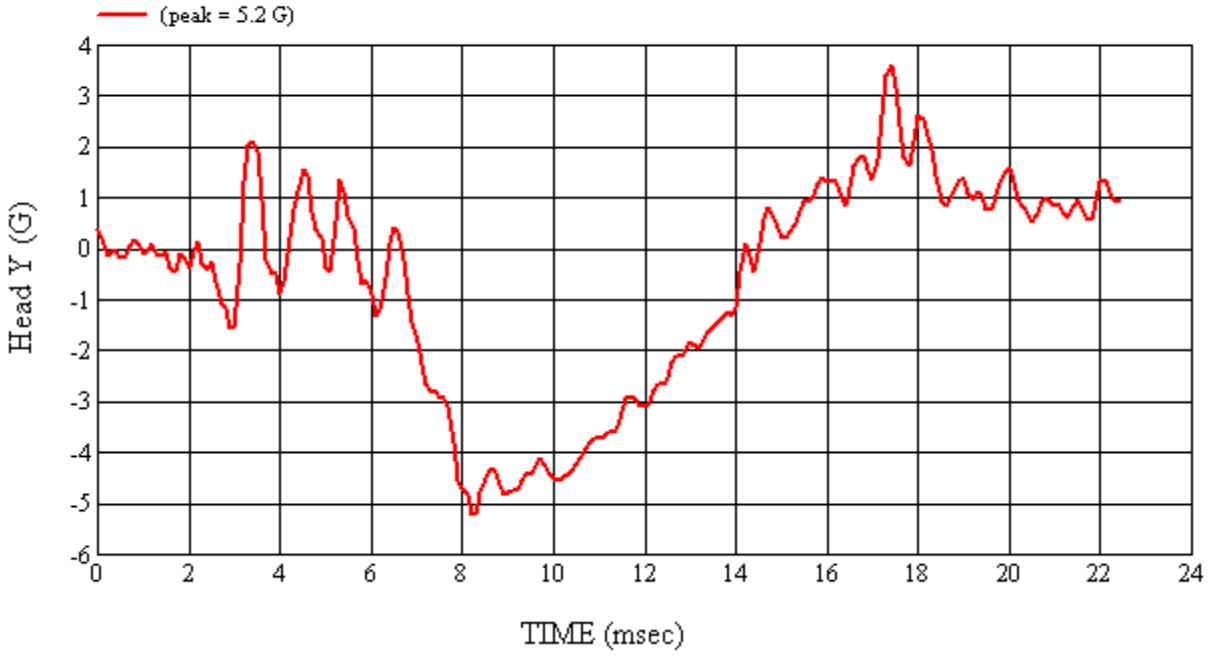
*Only necessary for NHTSA (Government) Compliance testing.

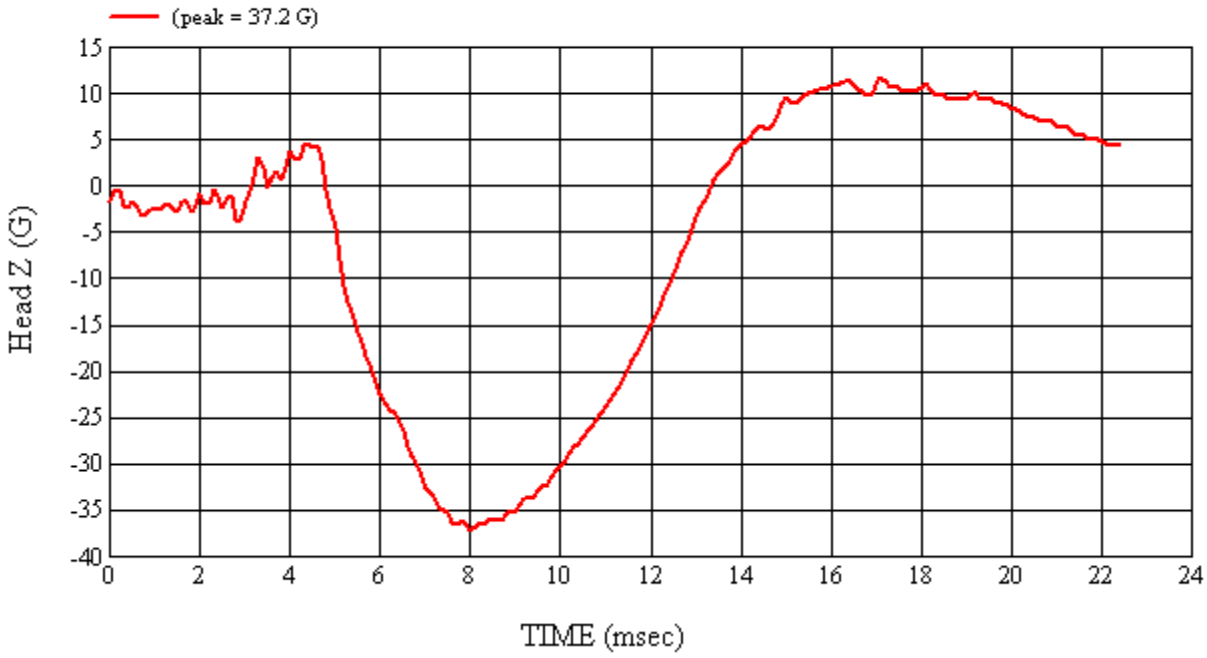
MGA Test #: U11334 Target Location: UR3, Left Side Test Date: 7/22/2011

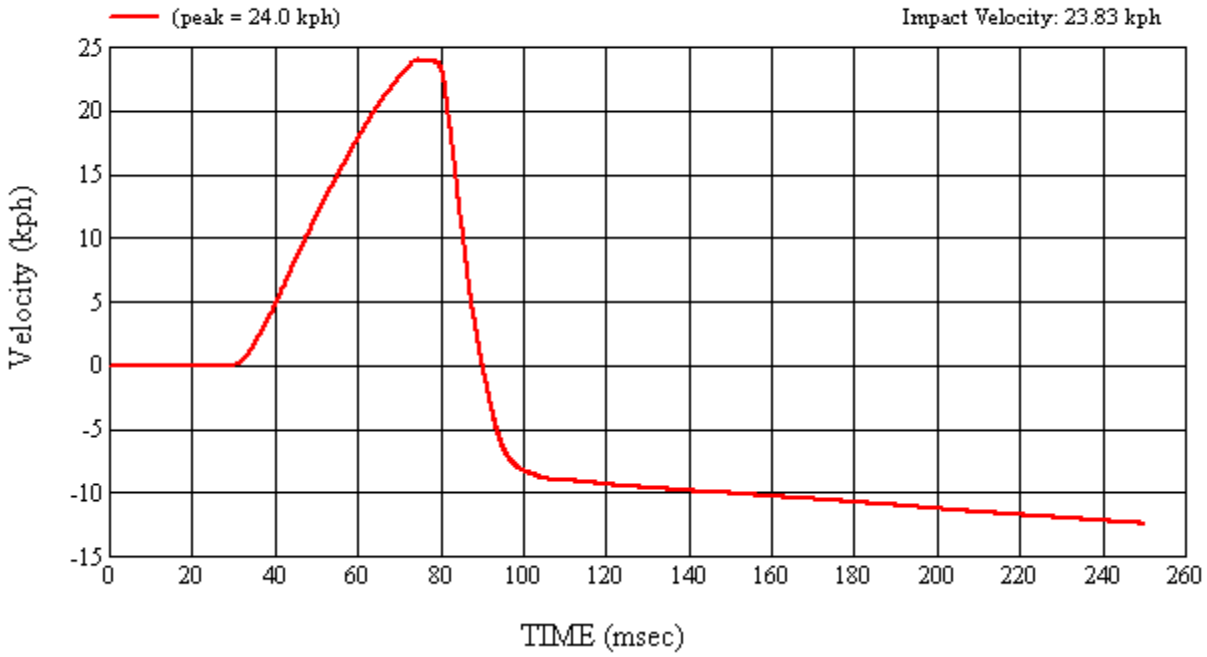


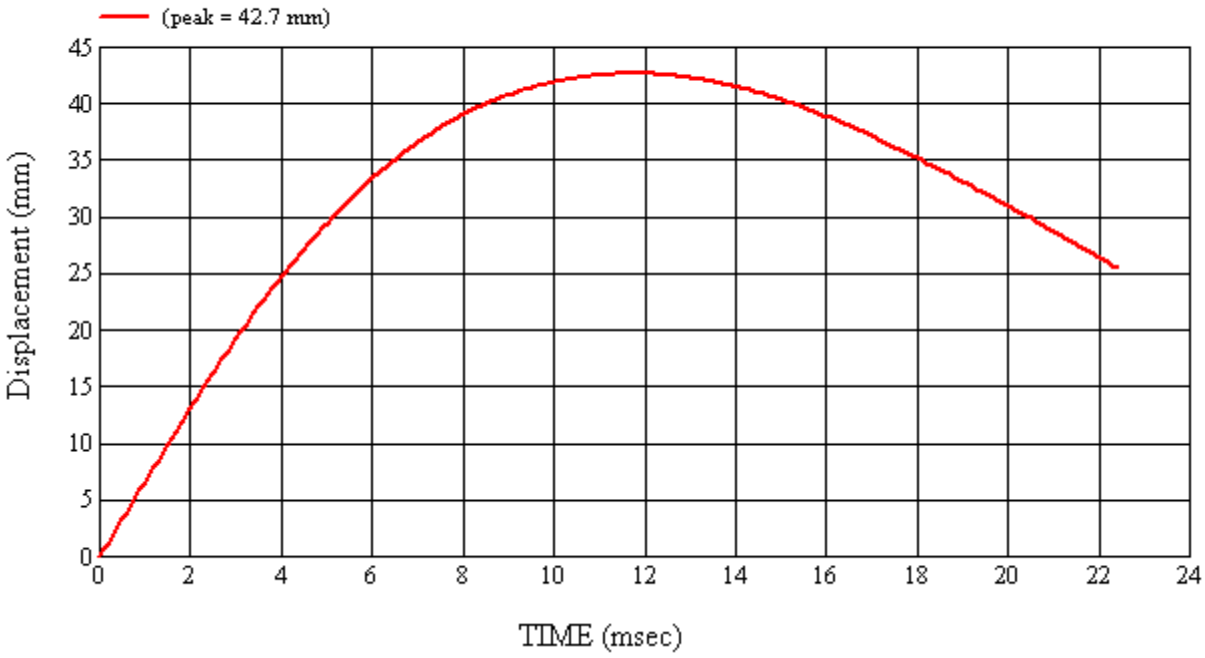



(peak = 83.5 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 5.2 G)
Head Y (G)
4
3
2
1
0
-1
-2
-3
-4
-5
-6
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 37.2 G)
Head Z (G)
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 24.0 kph)
Impact Velocity: 23.83 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 42.7 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

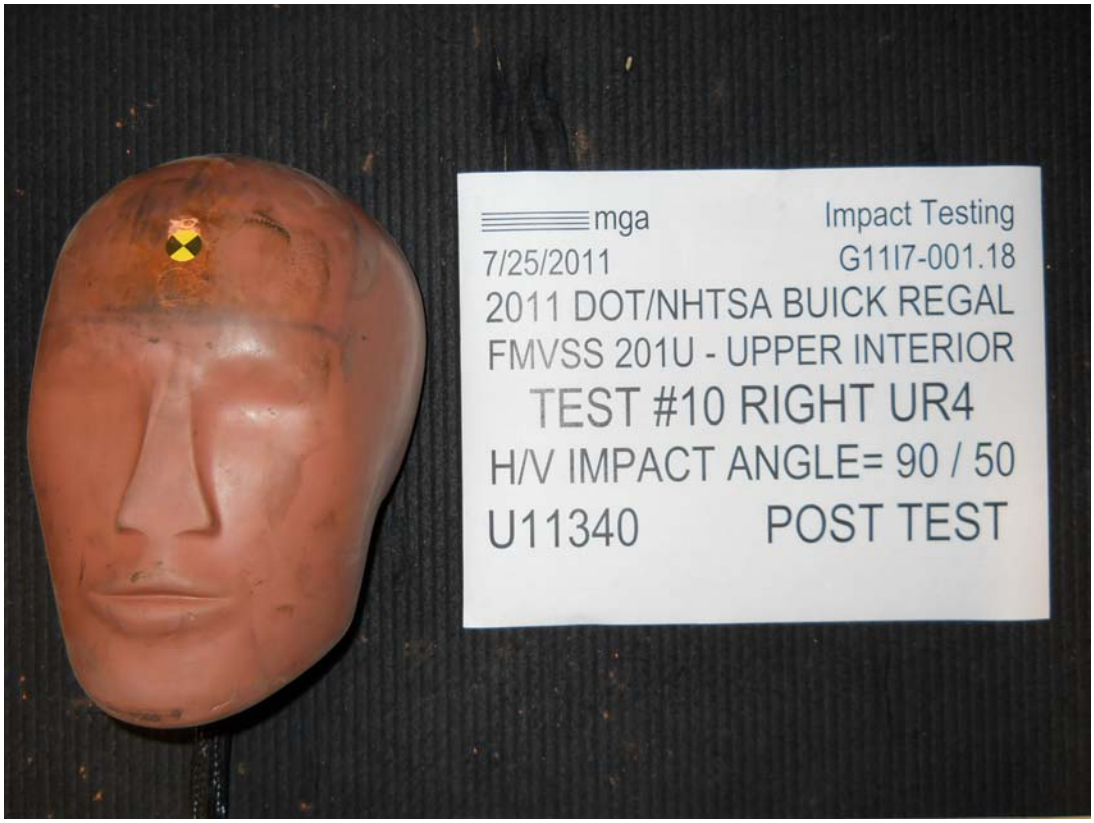

CB0109
U11340
RIGHT UR4
H/V 90/50
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR4
H/V IMPACT ANGLE= 90 / 50
U11340
PRE TEST


UR4
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR4
H/V IMPACT ANGLE= 90 / 50
U11340
PRE TEST


CB0109
U11340
RIGHT UR4
H/V 90/50
mga
7/25/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR4
H/V IMPACT ANGLE= 90 / 50
U11340
POST TEST


mga
7/25/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR4
H/V IMPACT ANGLE= 90 / 50
U11340
POST TEST


UR4
CB0109
U11340
RIGHT UR4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Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR4
H/V IMPACT ANGLE= 90 / 50
U11340
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR4Right

MGA Test Reference No.:U11340

Approach Horizontal Angles:90º

Approach Vertical Angles:50º

Additional Description:@ SR3-1

Test Number:#10

Temperature:22.3C

Humidity:60.9%

Time of Test:10:01:51 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
635	621	9.5	23.6	29	2 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

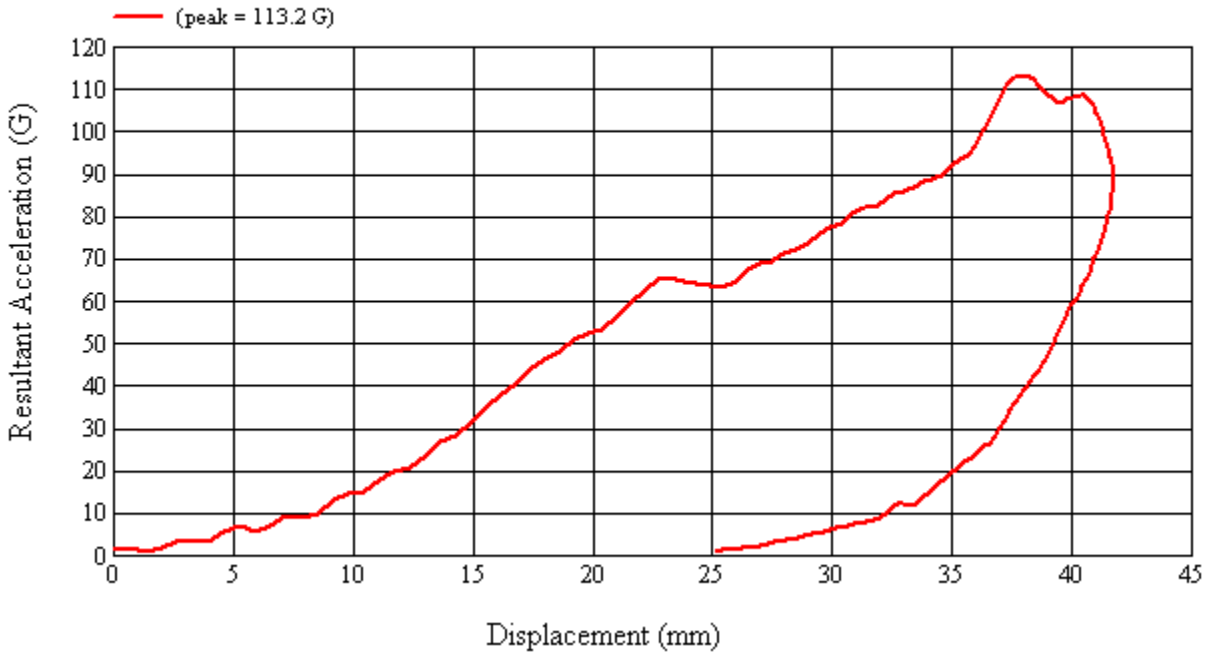
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

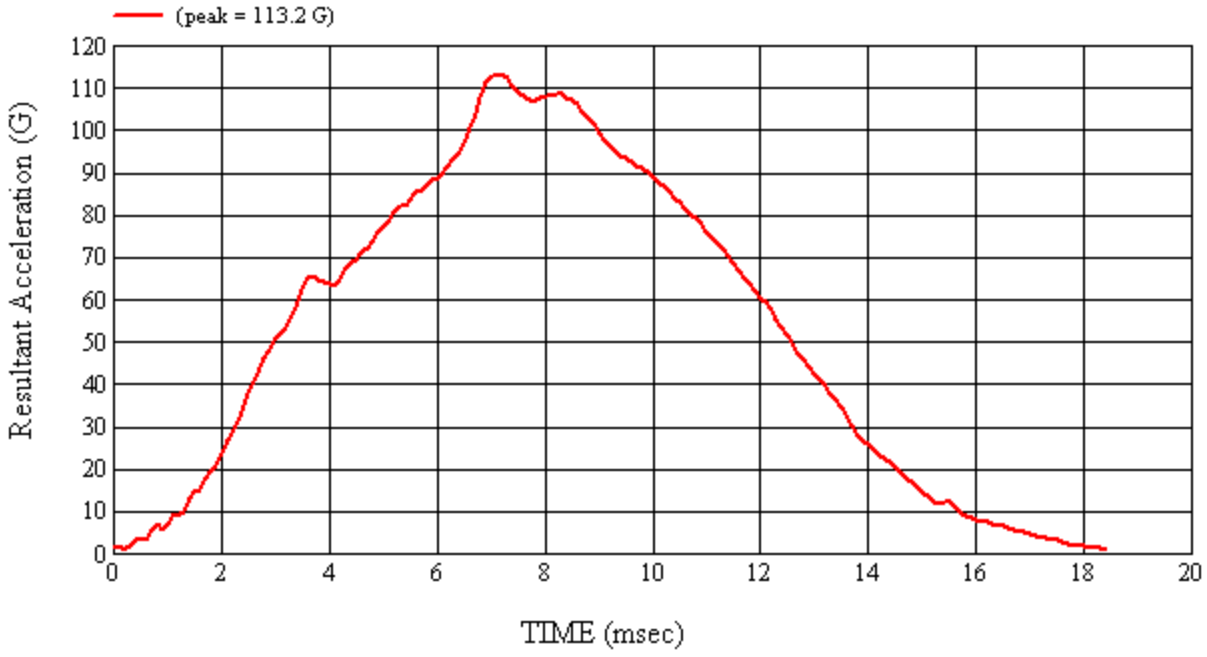
Headliner deformation, grab handle compression

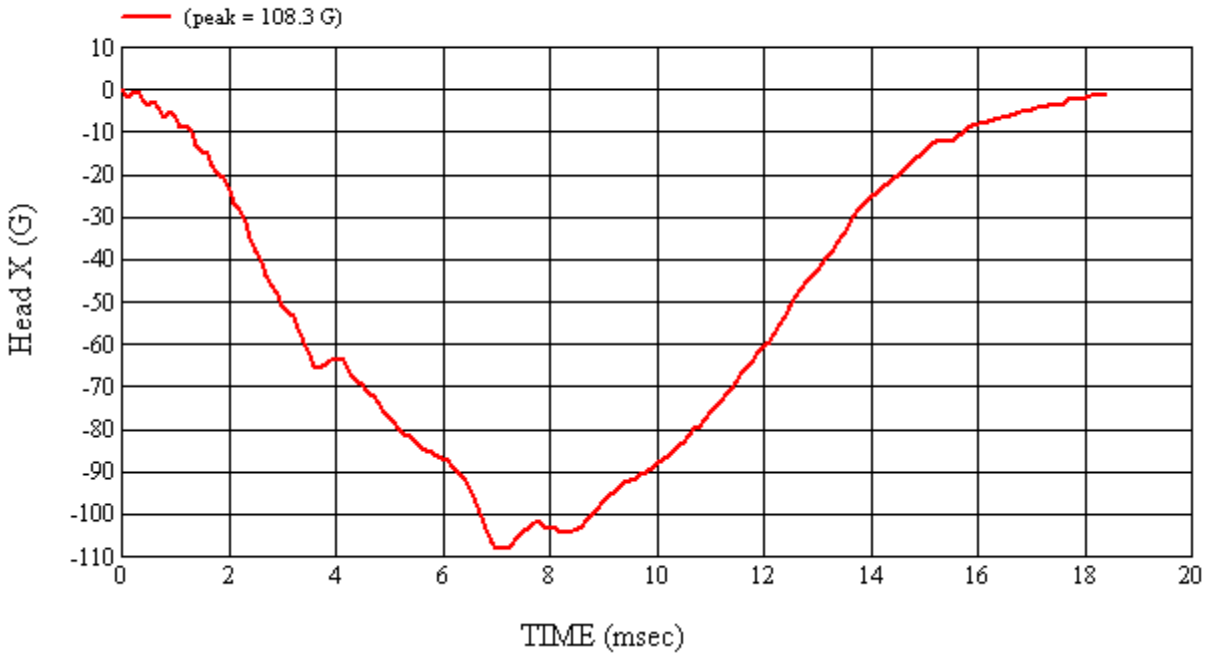
Recorded By: _____ Approved By*: _____ Date: 7/25/2011

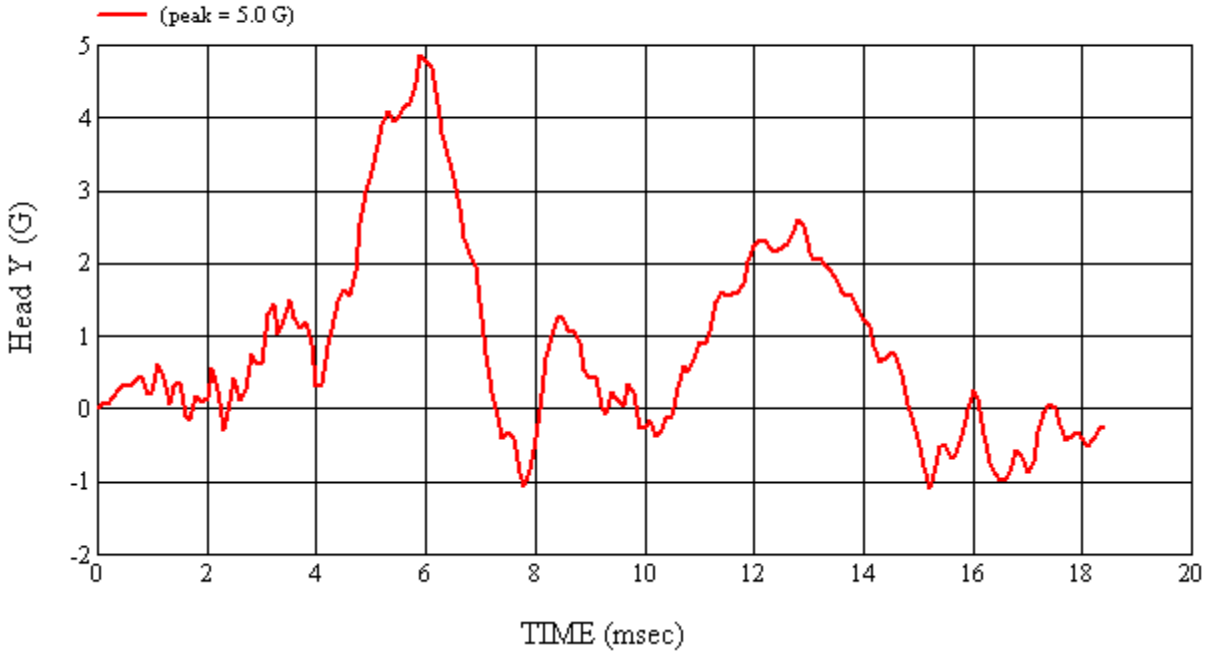
*Only necessary for NHTSA (Government) Compliance testing.

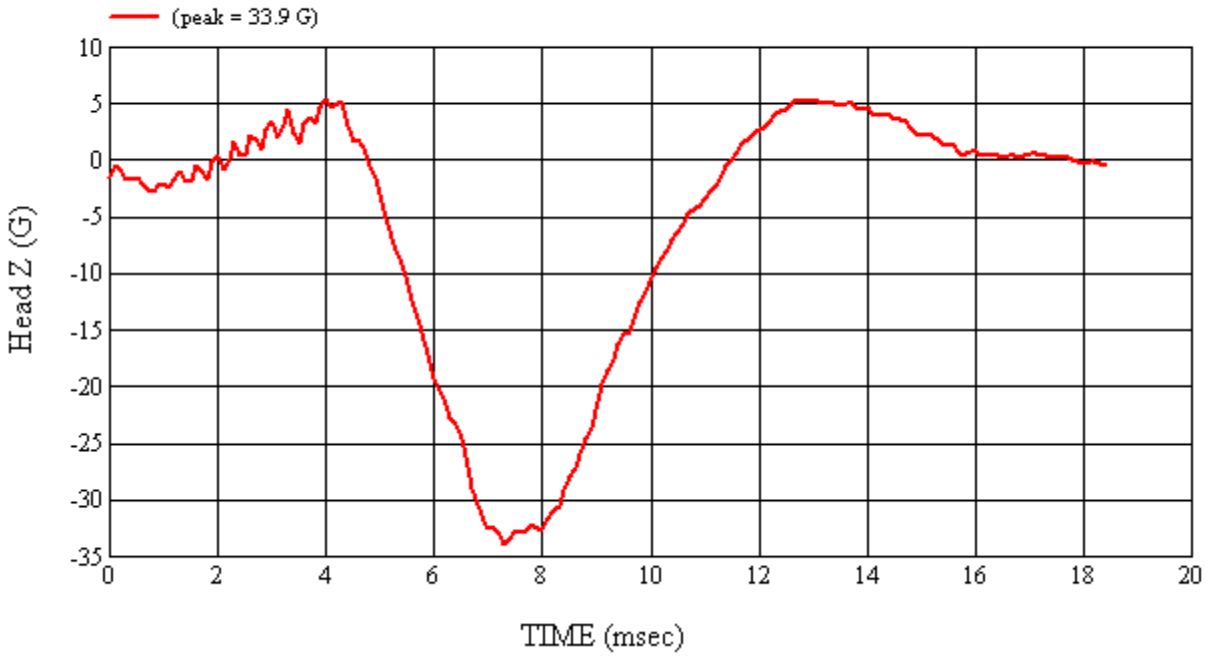
MGA Test #: U11340 Target Location: UR4, Right Side Test Date: 7/25/2011

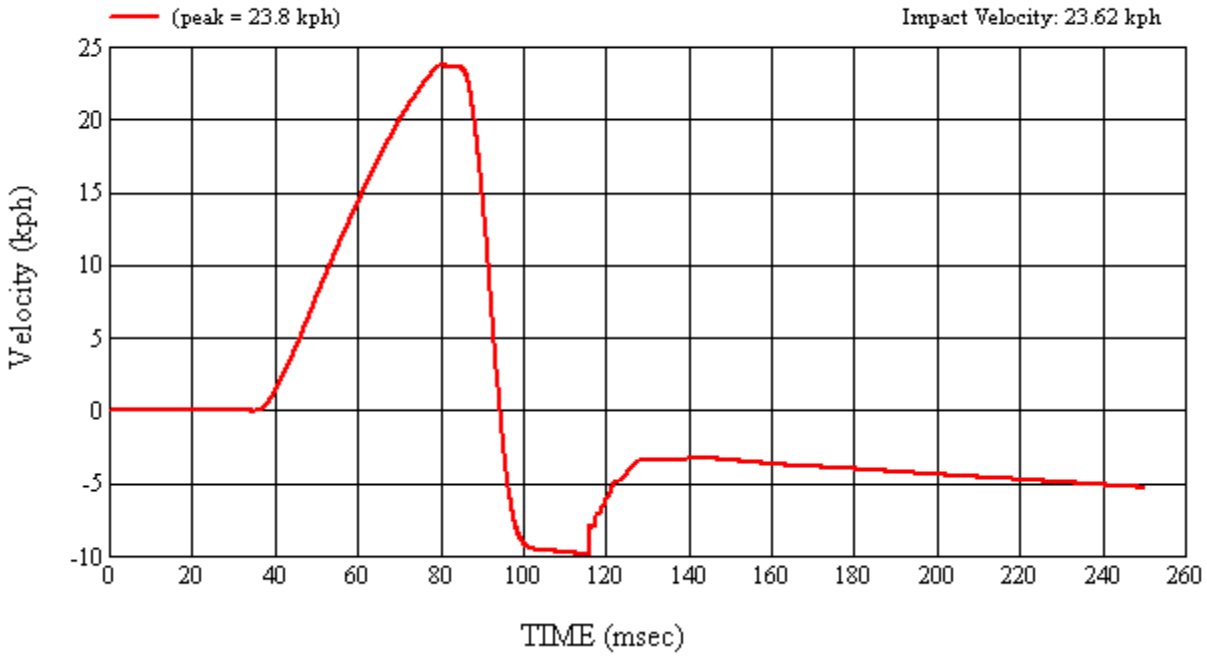


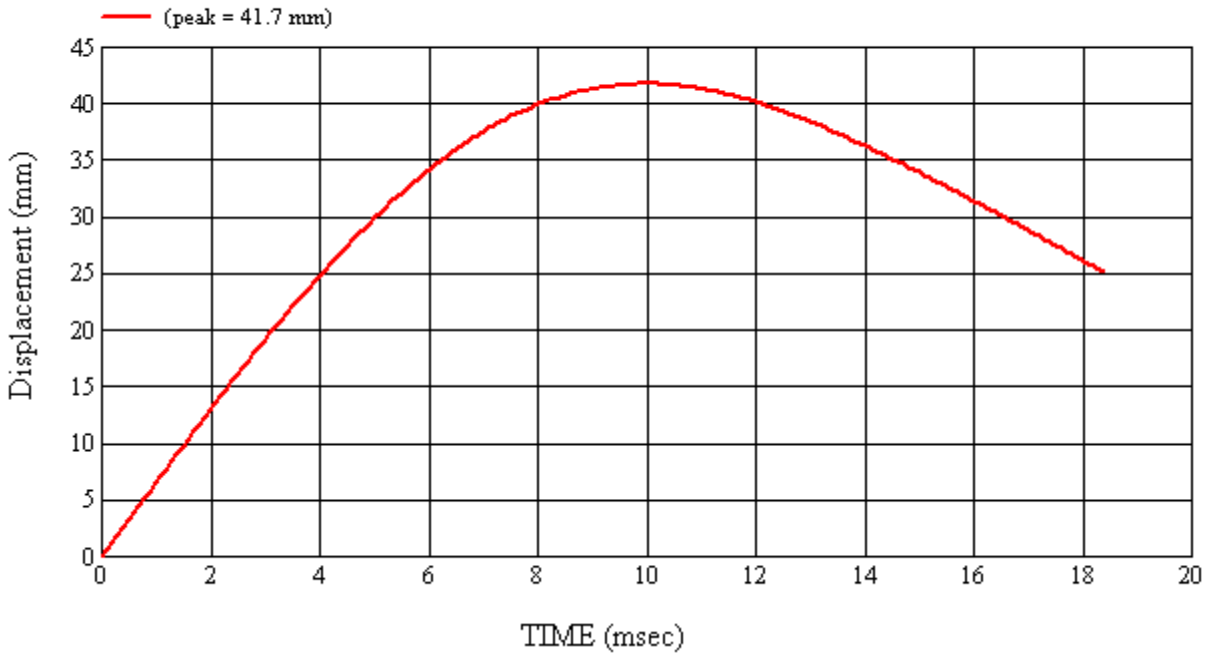



(peak = 108.3 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 5.0 G)
Head Y (G)
5
4
3
2
1
0
-1
-2
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 33.9 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
-35
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.62 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 41.7 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


CB0109
U11335
LEFT UR5
H/V 270/45
mga
7/22/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR5
H/V IMPACT ANGLE= 270 / 45
U11335
PRE TEST


CB0109
U11335
LEFT UR5
H/V 270/45
mga
7/22/2011
Impact Testing
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR5
H/V IMPACT ANGLE= 270 / 45
U11335
PRE TEST


CB0109
U11335
LEFT UR5
H/V 270/45
mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR5
H/V IMPACT ANGLE= 270 / 45
U11335
POST TEST


CB0109
U11335
LEFT UR5
H/V 270/45
mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR5
H/V IMPACT ANGLE= 270 / 45
U11335
POST TEST


CB0109
U11335
LEFT UR5
H/V 270/45


mga
Impact Testing
7/22/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR5
H/V IMPACT ANGLE= 270 / 45
U11335
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Test Number:#5

Target (Vehicle Side): UR5Left

Temperature:23.7C

MGA Test Reference No.:U11335

Humidity:50.9%

Approach Horizontal Angles:270º

Time of Test:10:03:29 AM

Approach Vertical Angles:45º

FMH Serial No:[037]

Additional Description:@ SR3-2

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
669	666	9	23.9	45	4 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

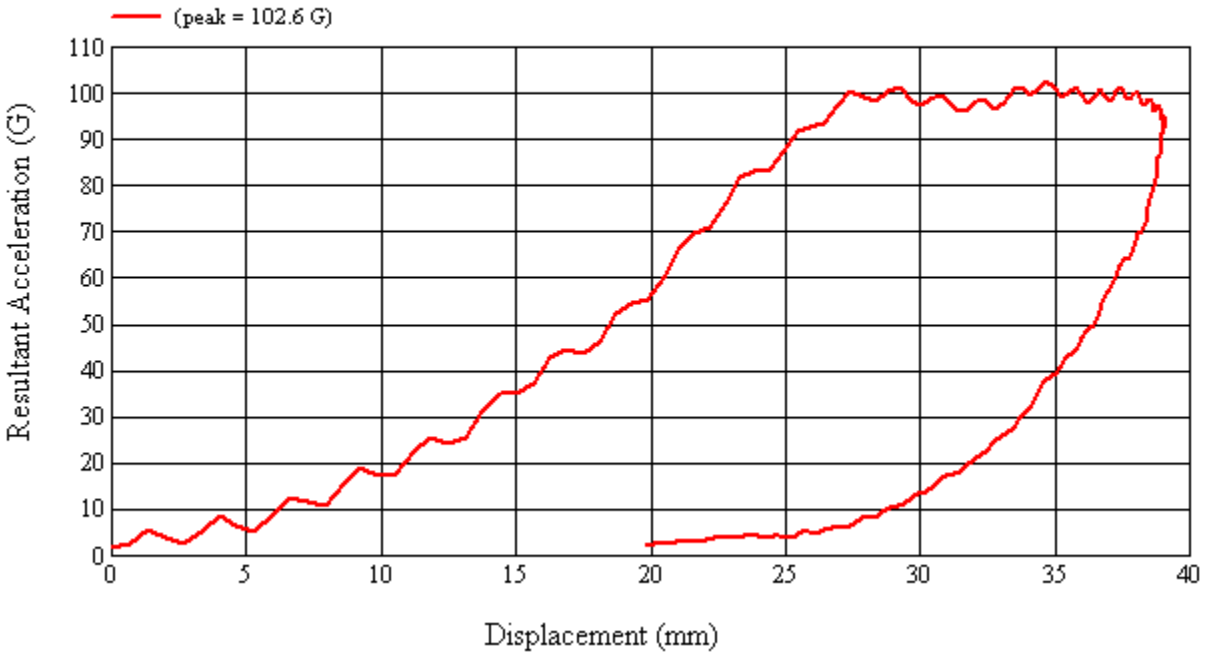
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

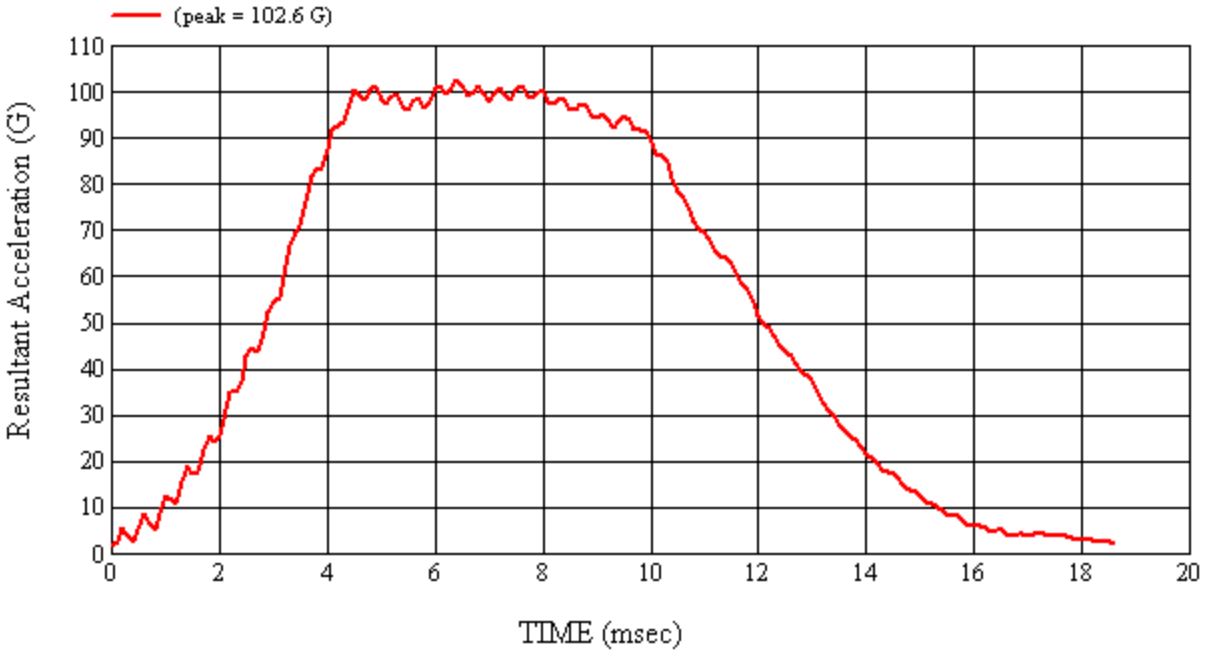
Headliner deformation, dislodged headliner

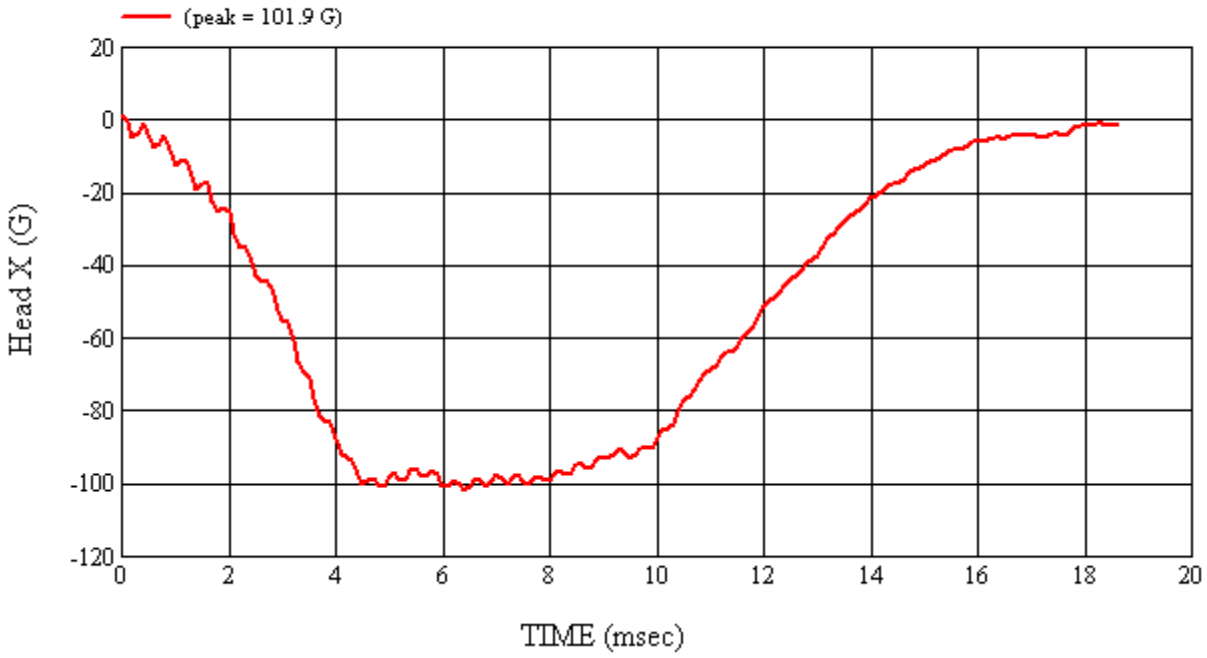
Recorded By: _____ Approved By*: _____ Date: 7/22/2011

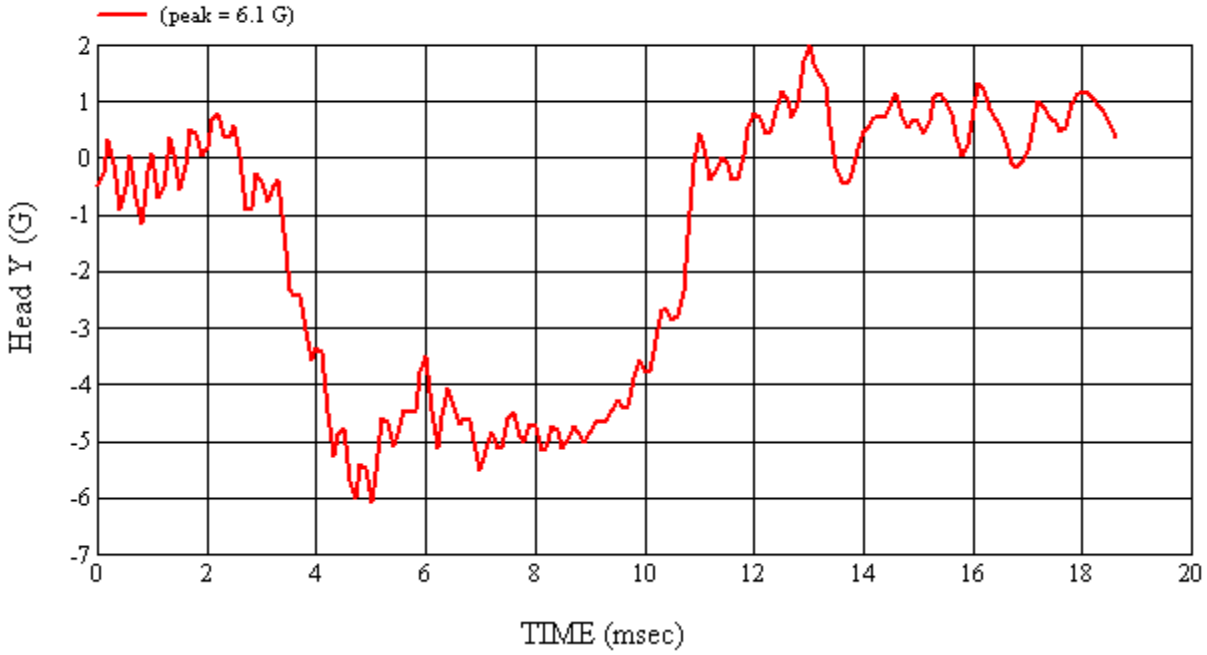
*Only necessary for NHTSA (Government) Compliance testing.

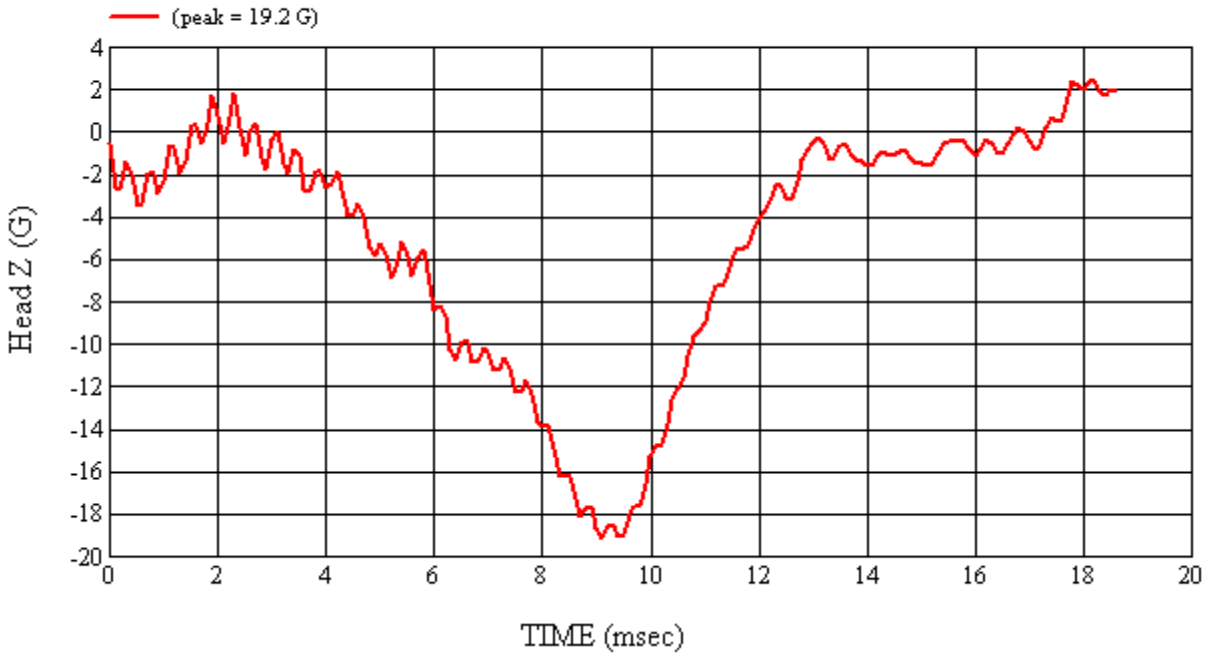
MGA Test #: U11335 Target Location: UR5, Left Side Test Date: 7/22/2011

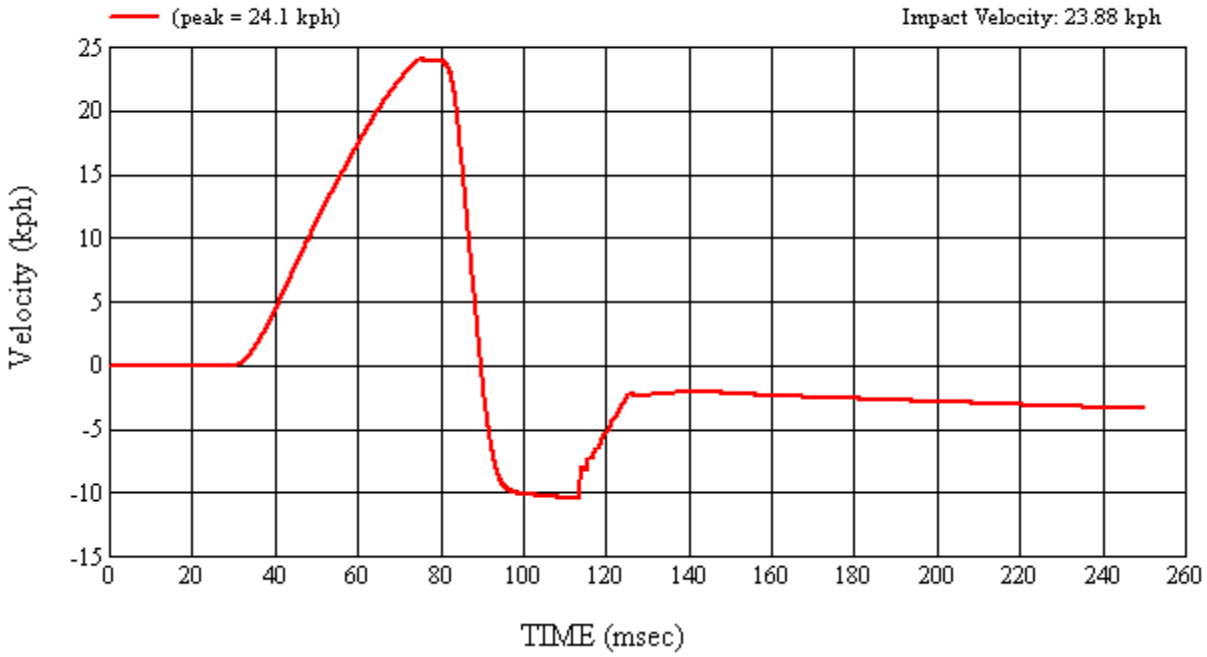


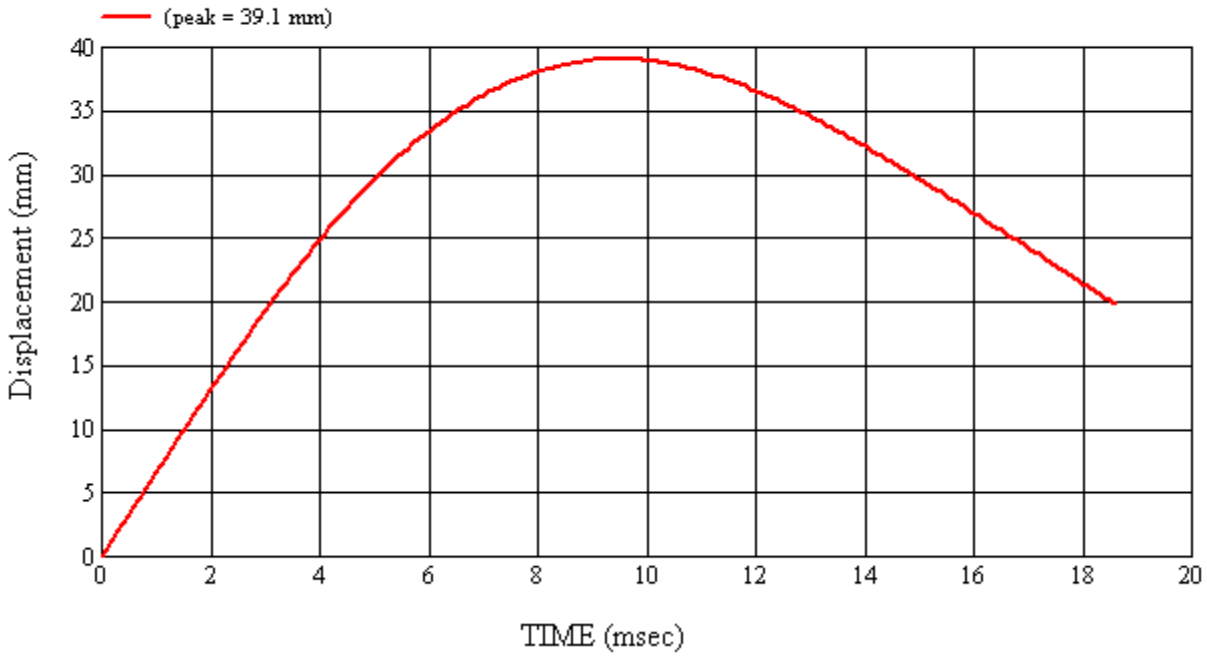


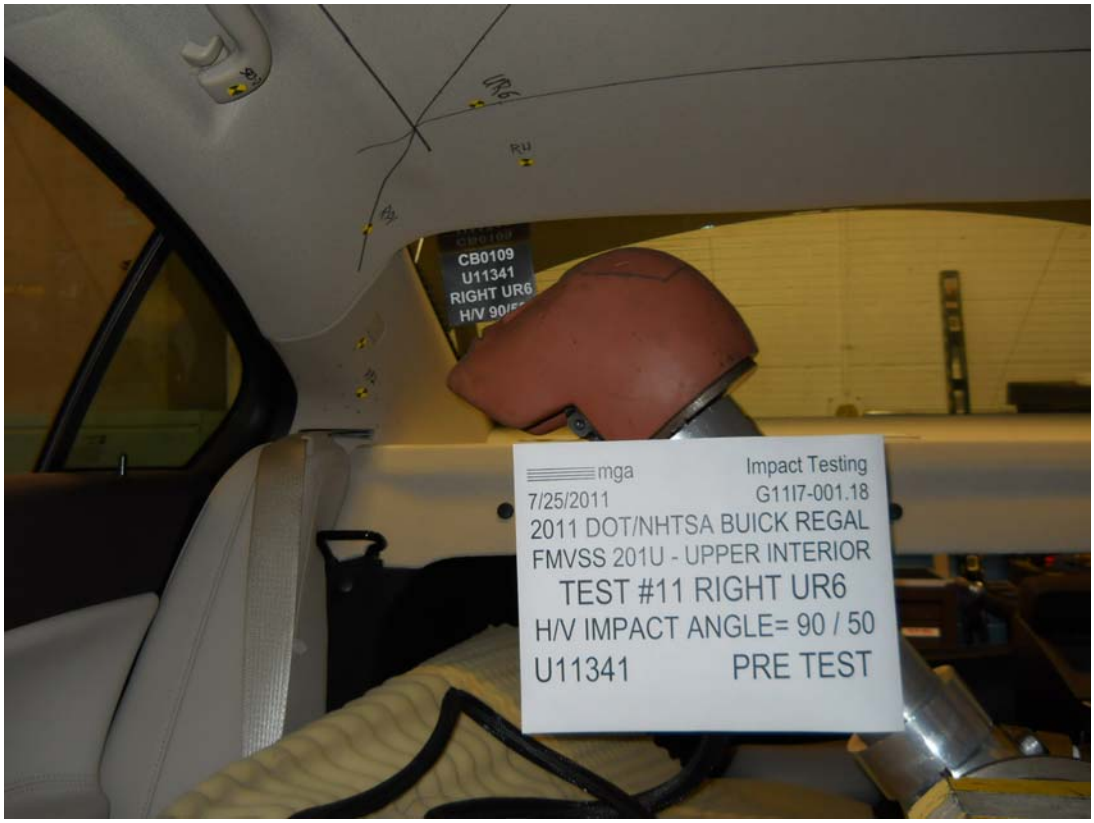

(peak = 101.9 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 6.1 G)
Head Y (G)
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 19.2 G)
Head Z (G)
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 24.1 kph)
Impact Velocity: 23.88 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 39.1 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


CB0109
U11341
RIGHT UR6
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11341
PRE TEST


UR4
UR6
RP1
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11341
PRE TEST


CB0109
U11341
RIGHT UR6
H/V 90/50
mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11341
POST TEST


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11341
POST TEST


CB0109
U11341
RIGHT UR6
H/V 90/50


mga
Impact Testing
7/25/2011
G11I7-001.18
2011 DOT/NHTSA BUICK REGAL
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11341
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.18 VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Buick Regal

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR6Right

MGA Test Reference No.:U11341

Approach Horizontal Angles:90º

Approach Vertical Angles:50º

Additional Description:@ RP

Test Number:#11

Temperature:22.5C

Humidity:61.6%

Time of Test:10:53:51 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
511	456	13.1	23.6	39	4 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

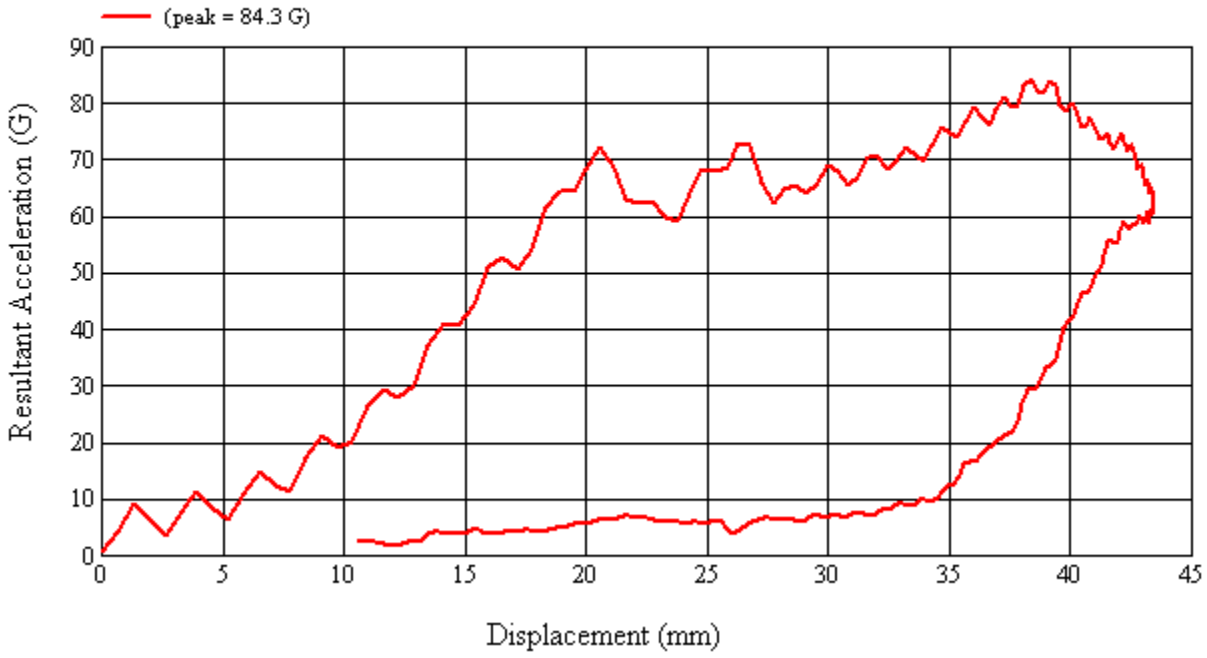
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

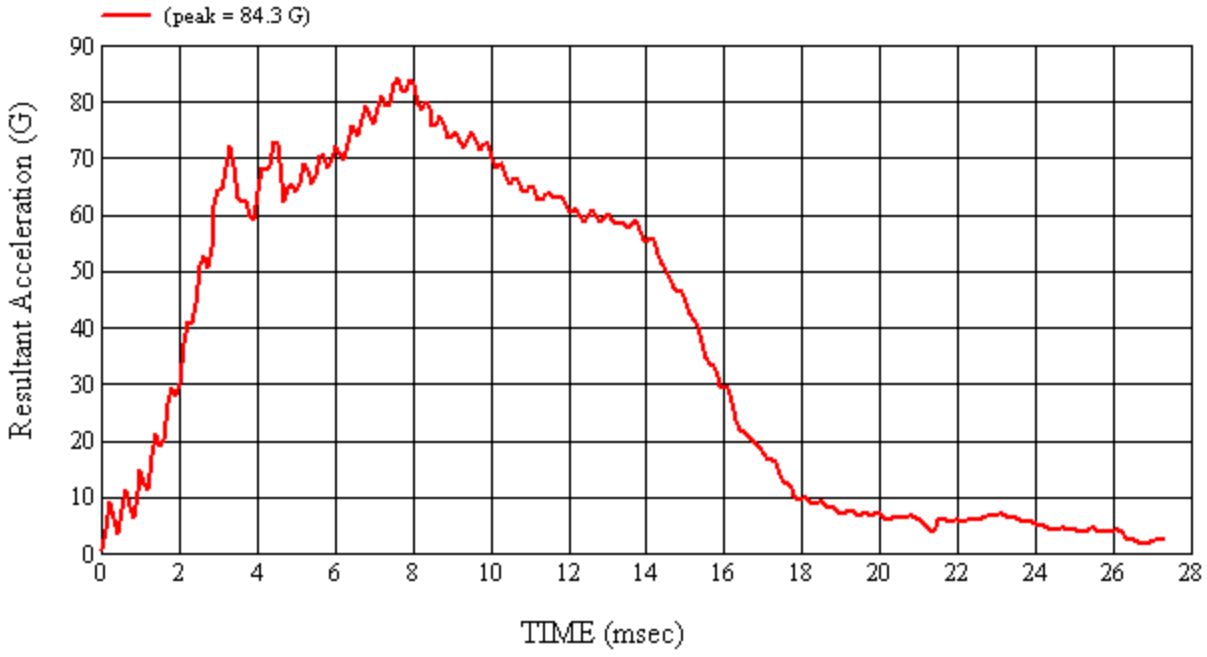
Headliner deformation, dislodged headliner

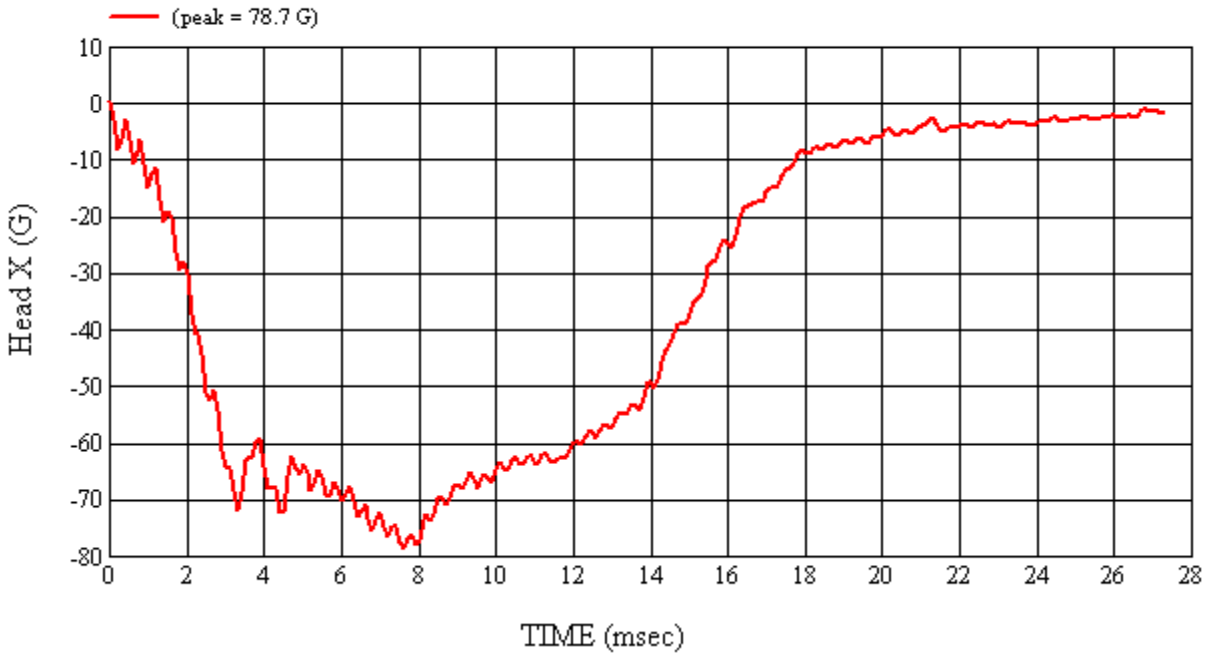
Recorded By: _____ Approved By*: _____ Date: 7/25/2011

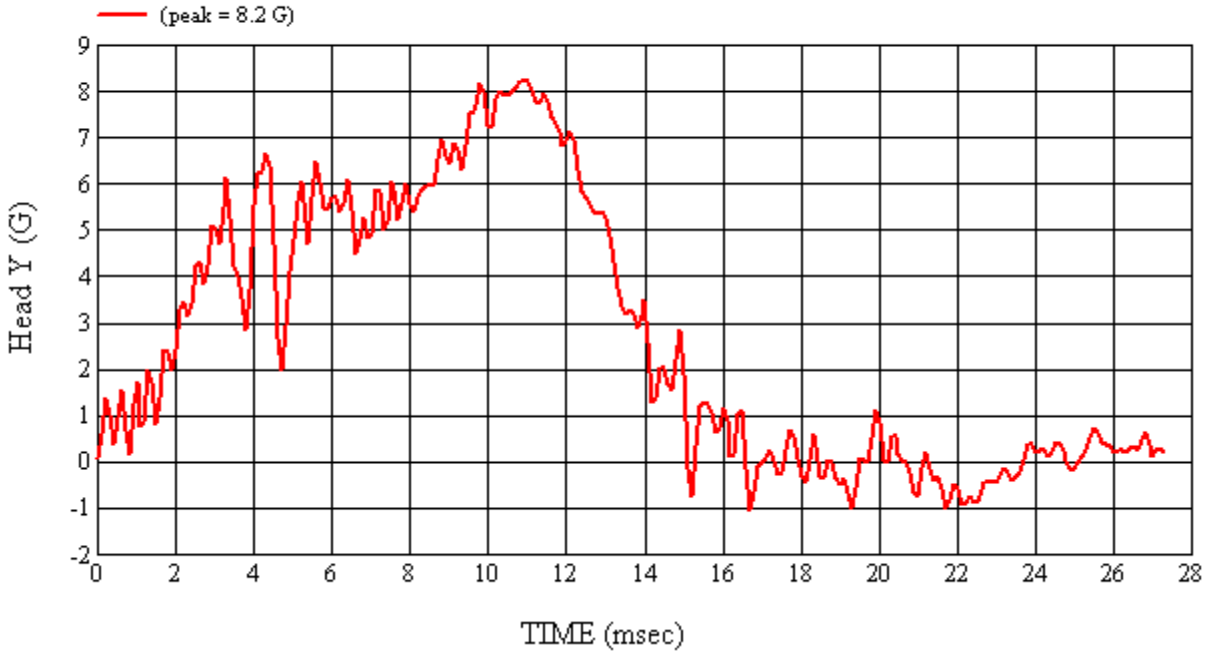
*Only necessary for NHTSA (Government) Compliance testing.

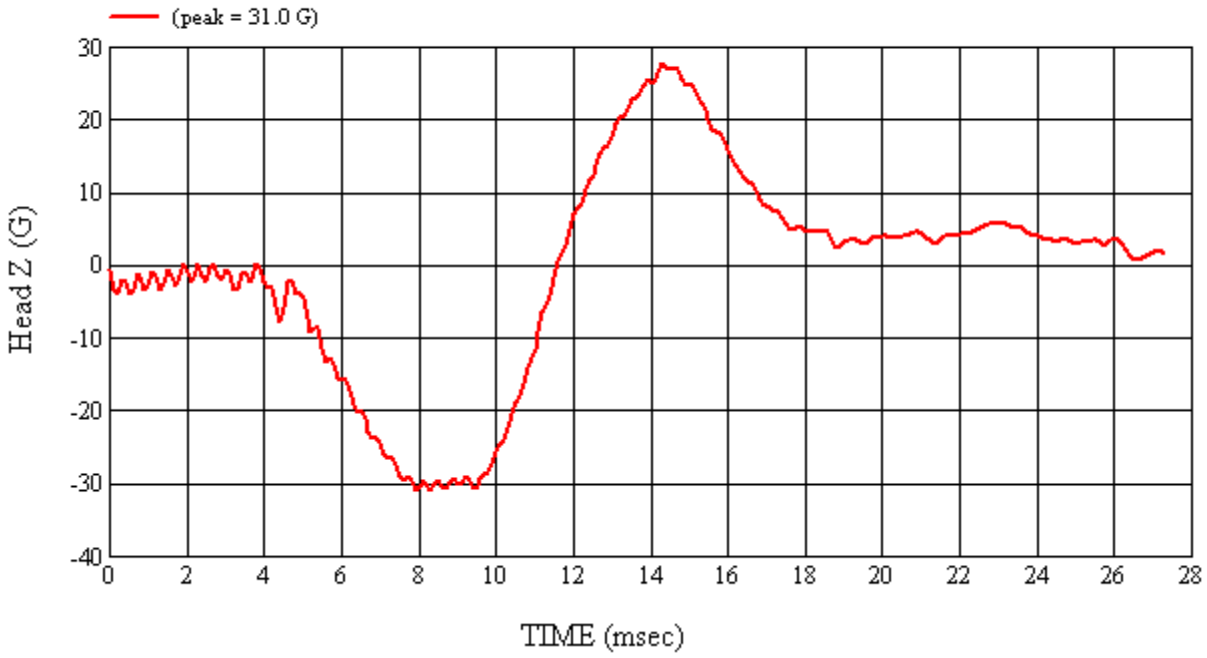
MGA Test #: U11341 Target Location: UR6, Right Side Test Date: 7/25/2011

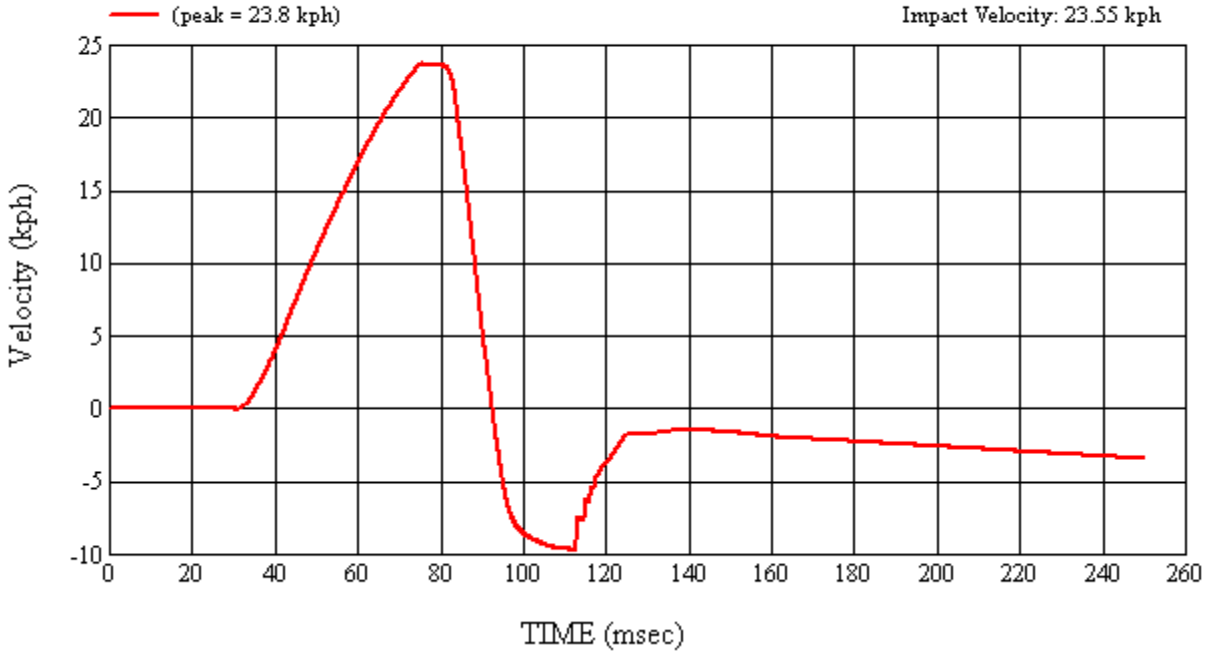


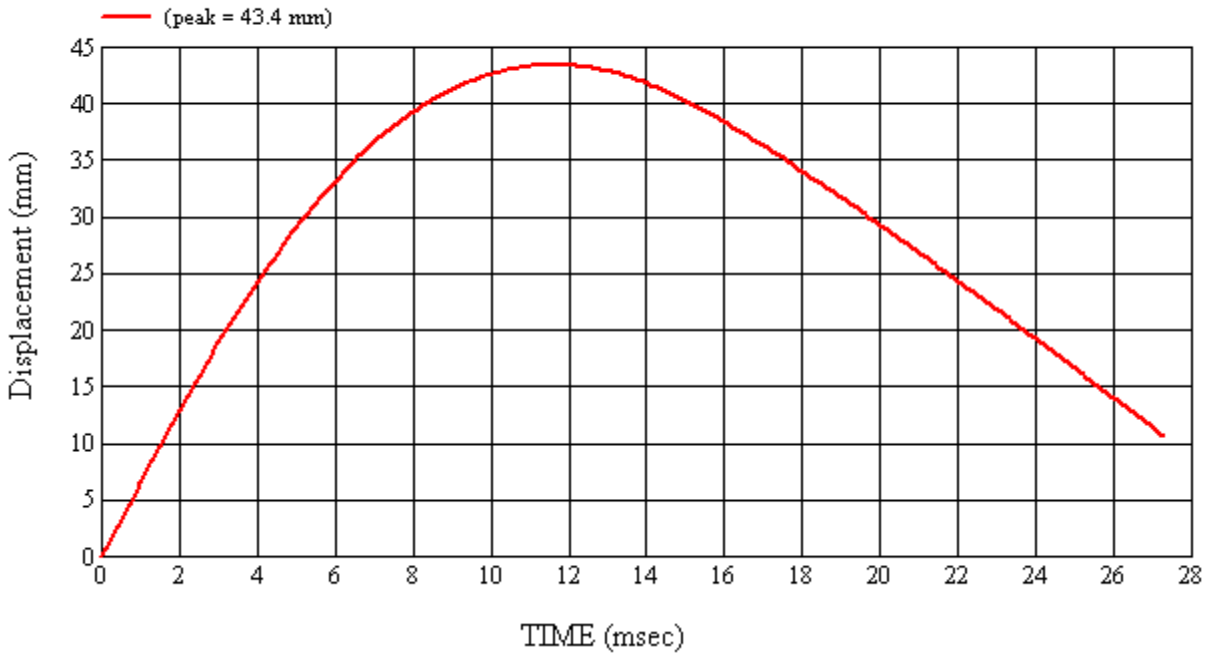



(peak = 78.7 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 8.2 G)
Head Y (G)
9
8
7
6
5
4
3
2
1
0
-1
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 31.0 G)
Head Z (G)
30
20
10
0
-10
-20
-30
-40
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.55 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 43.4 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)

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 66ºF and 78ºF (19ºC – 26ºC) 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	G10020001619	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Digital Protractor	 Stanley N/A Mitutoyo	 TPM121 -- MGA00712	 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	MGA00783	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 66ºF to 78ºF (19ºC to 26ºC) 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 (ºC)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#035	7/19/2011	9.90	22.0	56.1	250.0	3.3	Yes
Post	#035	7/25/2011	9.90	23.8	59.8	250.1	4.0	Yes
Pre	#037	7/19/2011	9.96	22.2	57.8	261.7	3.9	Yes
Post	#037	7/25/2011	9.96	24.0	58.1	256.2	5.4	Yes
Pre	#038	7/19/2011	9.90	22.3	57.8	258.9	14.1	Yes
Post	#038	7/25/2011	9.90	24.0	57.0	265.3	13.9	Yes

4-1 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 7/19/2011 CALIBRATION TIME: 8:51:50 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	22.0
Relative Humidity	10% to 70%	56.1
Peak Resultant Acceleration	225 G's to 275 G's	250.0
Peak Lateral Acceleration	15 G's Maximum	3.3
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION

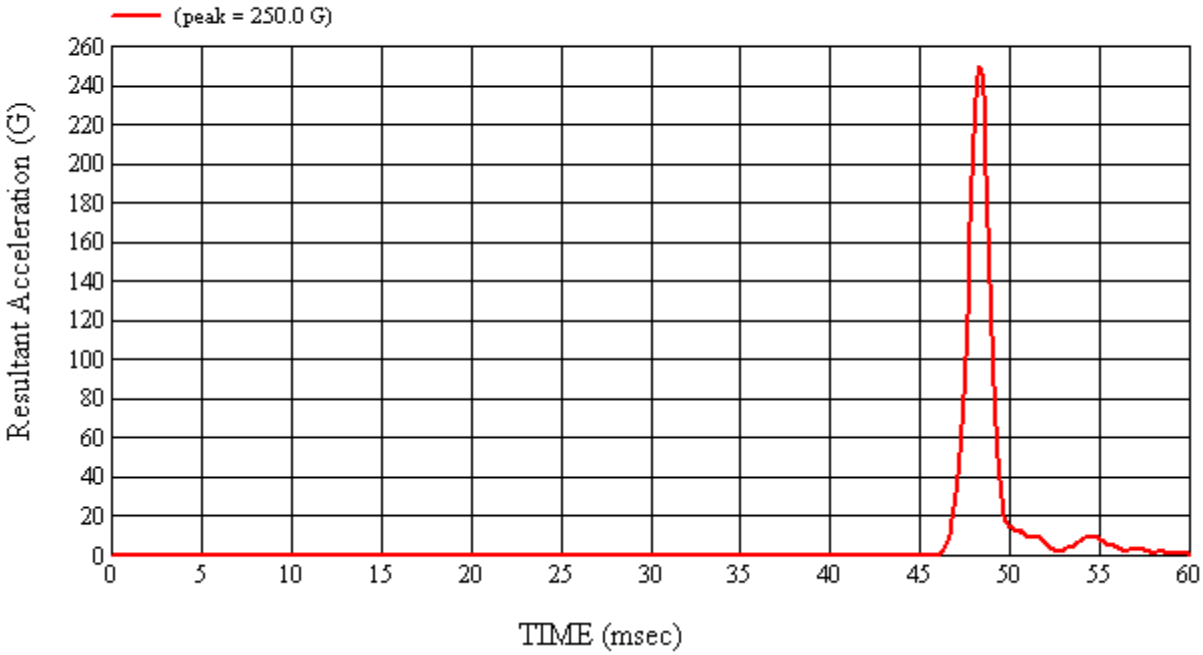
HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	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

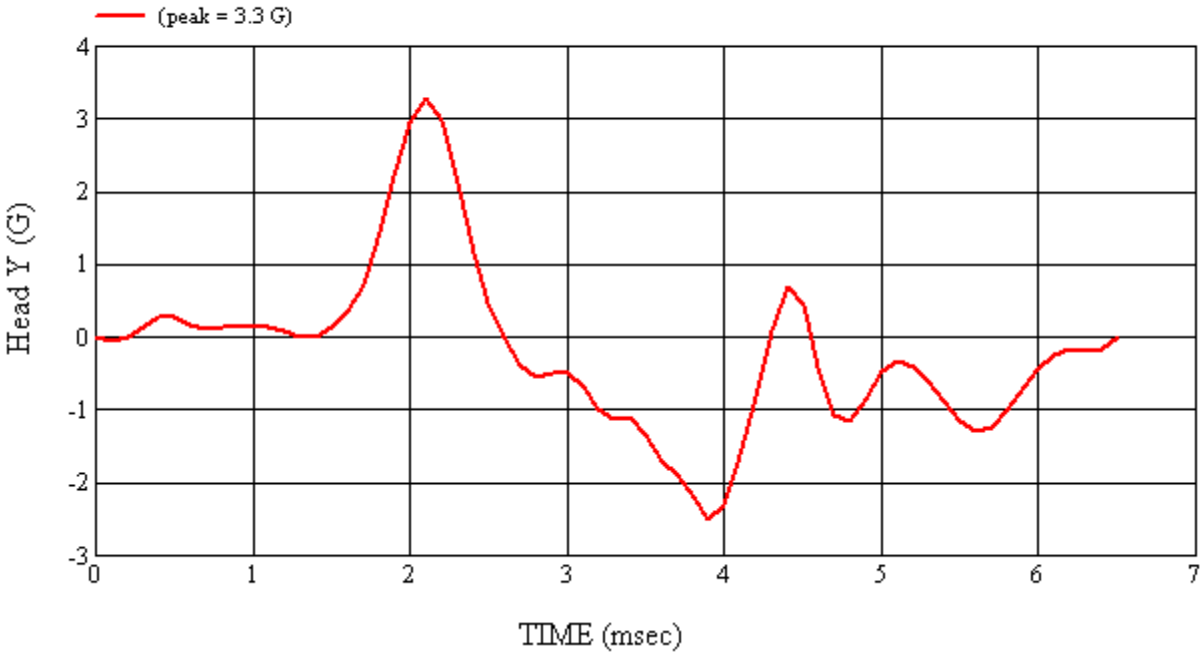
REMARKS:

RECORDED BY: Kevin D. McLeman DATE: 7/19/2011

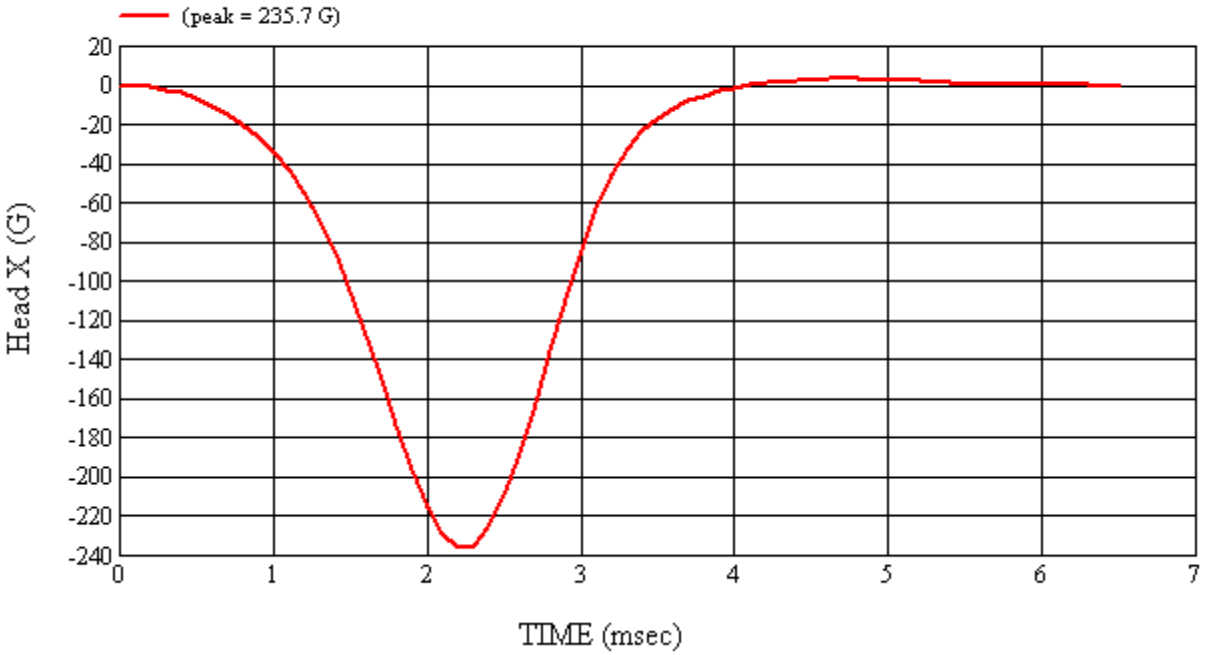
APPROVED BY: Nathaniel Smith



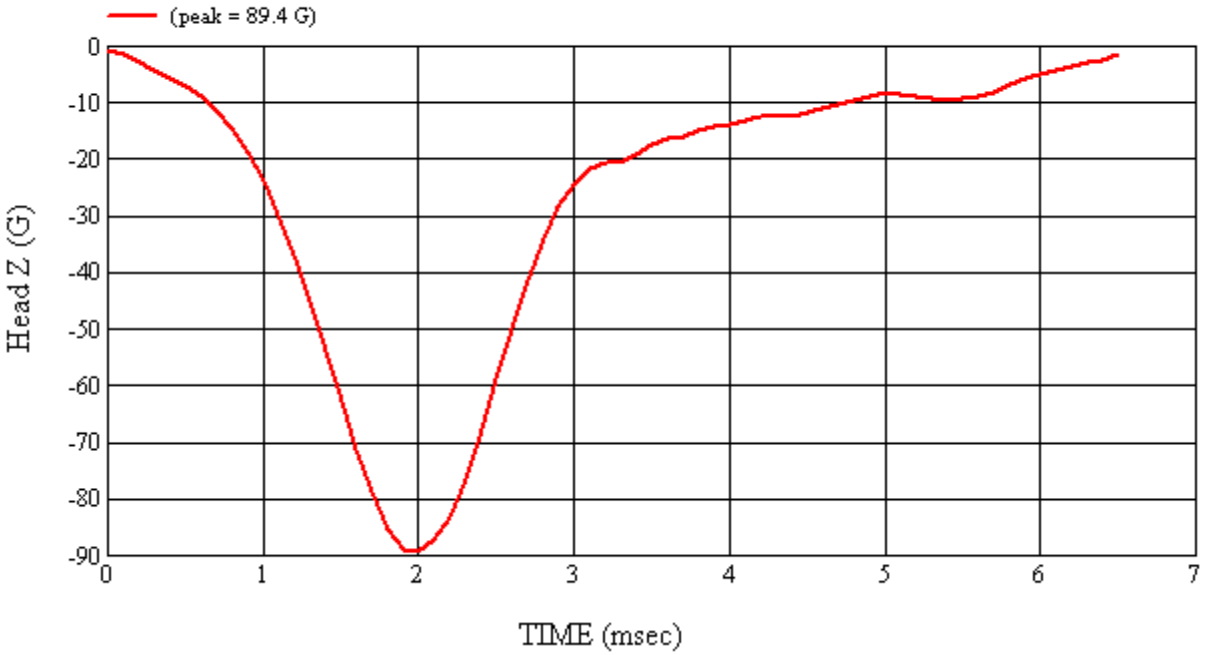
Head 035 (Pre) Calibration #H35043



Head 035 (Pre) Calibration #H35043



Head 035 (Pre) Calibration #H35043



Head 035 (Pre) Calibration #H35043

4-2 Post-Test Calibration

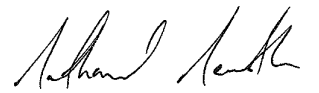
HEAD DROP TEST SUMMARY
PART 572L

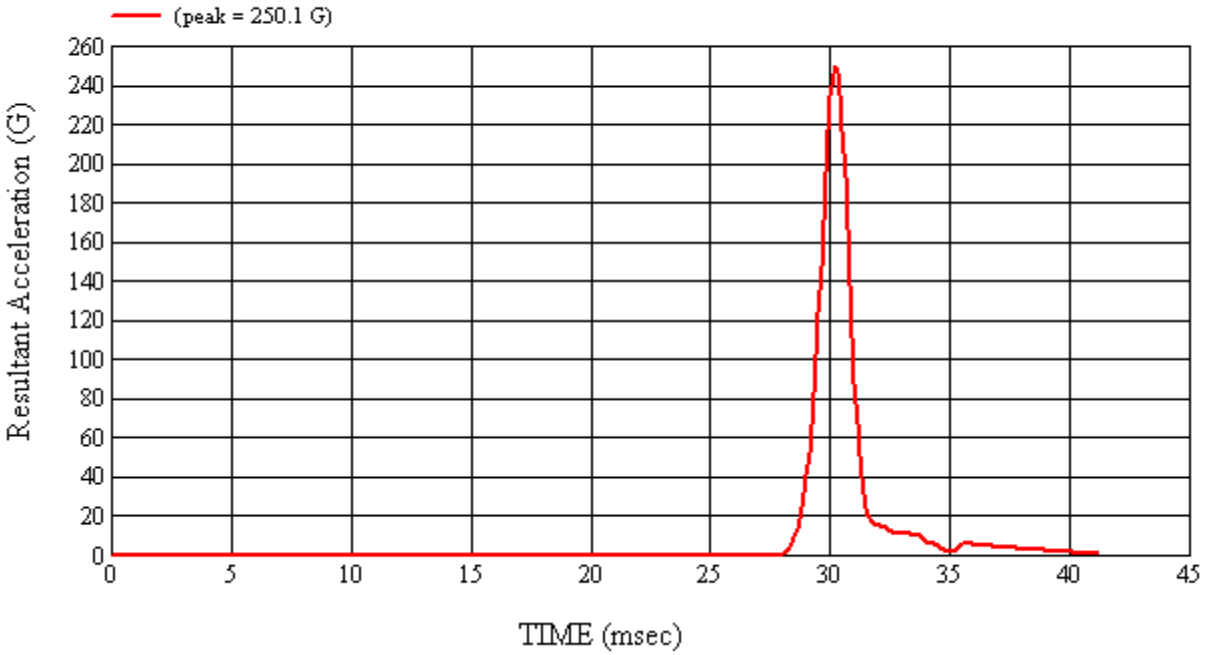
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 7/25/2011 CALIBRATION TIME: 2:19:07 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	23.8
Relative Humidity	10% to 70%	59.8
Peak Resultant Acceleration	225 G's to 275 G's	250.1
Peak Lateral Acceleration	15 G's Maximum	4.0
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	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

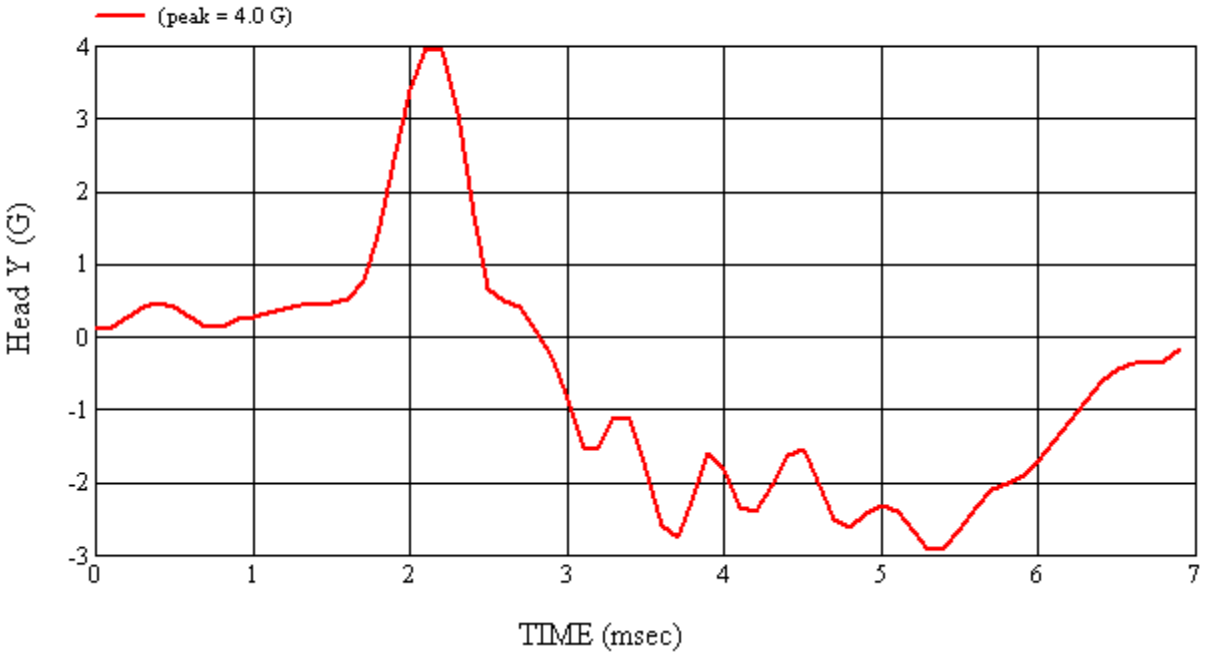
REMARKS:

RECORDED BY:  DATE: 7/25/2011

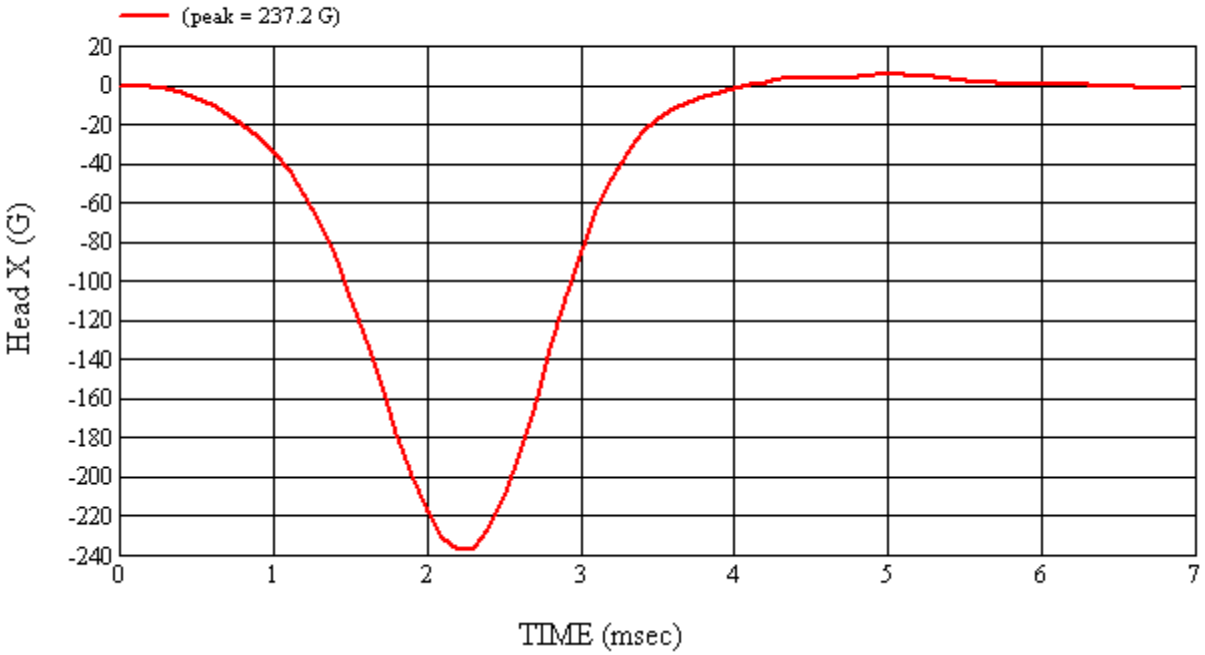
APPROVED BY: 



Head 035 (Post) Calibration #H35044



Head 035 (Post) Calibration #H35044



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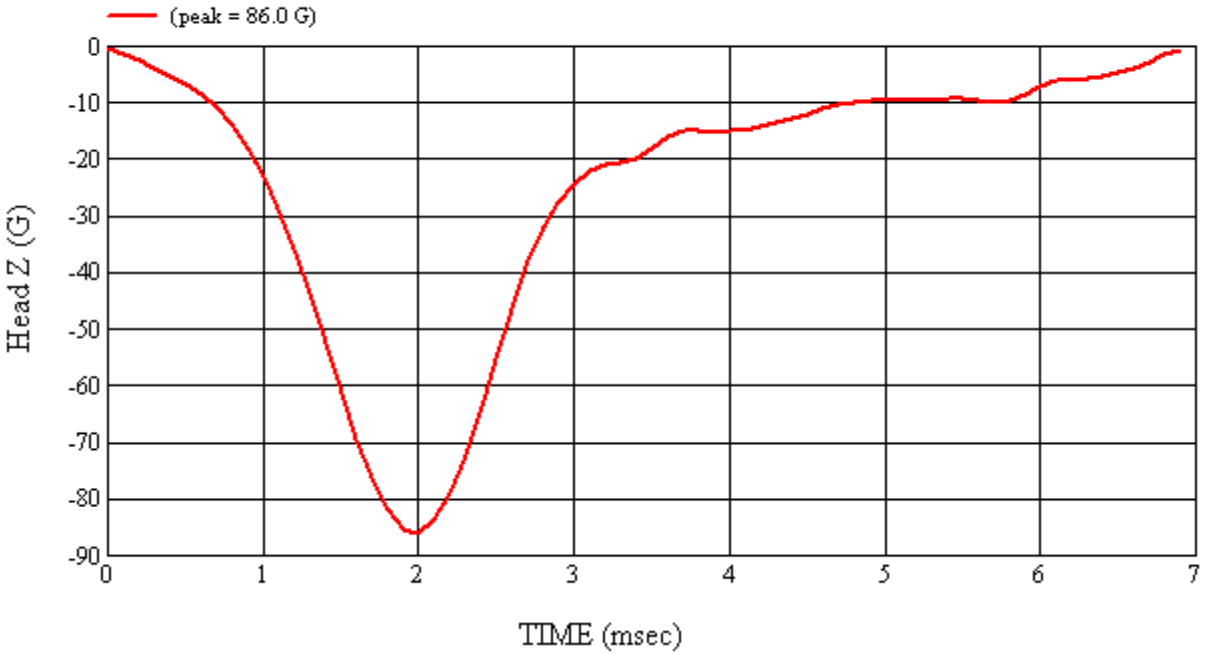


Head 035 (Post) Calibration #H35044

4-3 Pre-Test Calibration

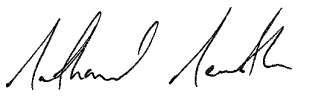
HEAD DROP TEST SUMMARY
PART 572L

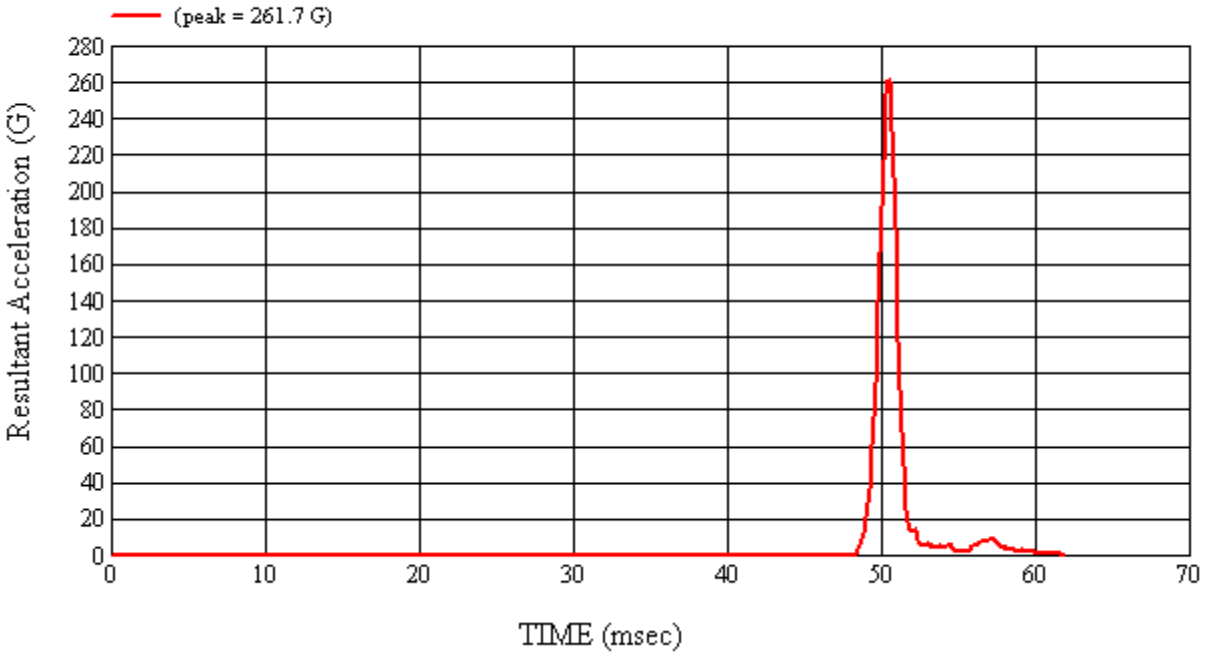
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 7/19/2011 CALIBRATION TIME: 9:28:14 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22.2
Relative Humidity	10% to 70%	57.8
Peak Resultant Acceleration	225 G's to 275 G's	261.7
Peak Lateral Acceleration	15 G's Maximum	3.9
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	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

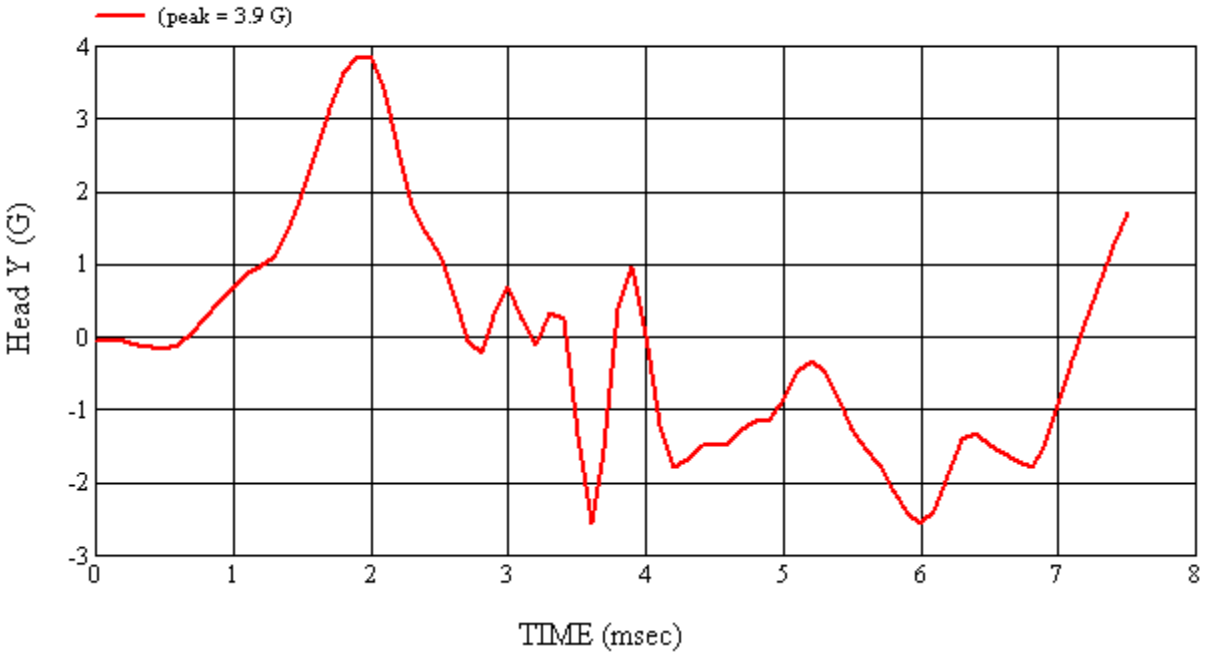
REMARKS:

RECORDED BY:  DATE: 7/19/2011

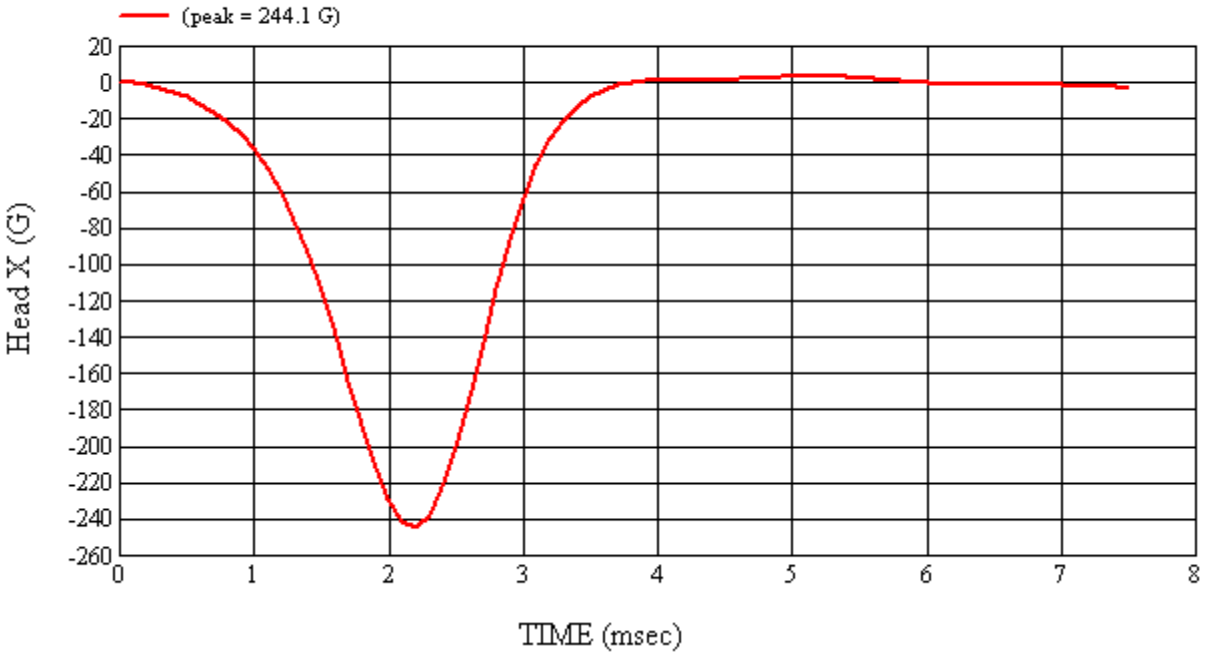
APPROVED BY: 



Head 037 (Pre) Calibration #H37043



Head 037 (Pre) Calibration #H37043



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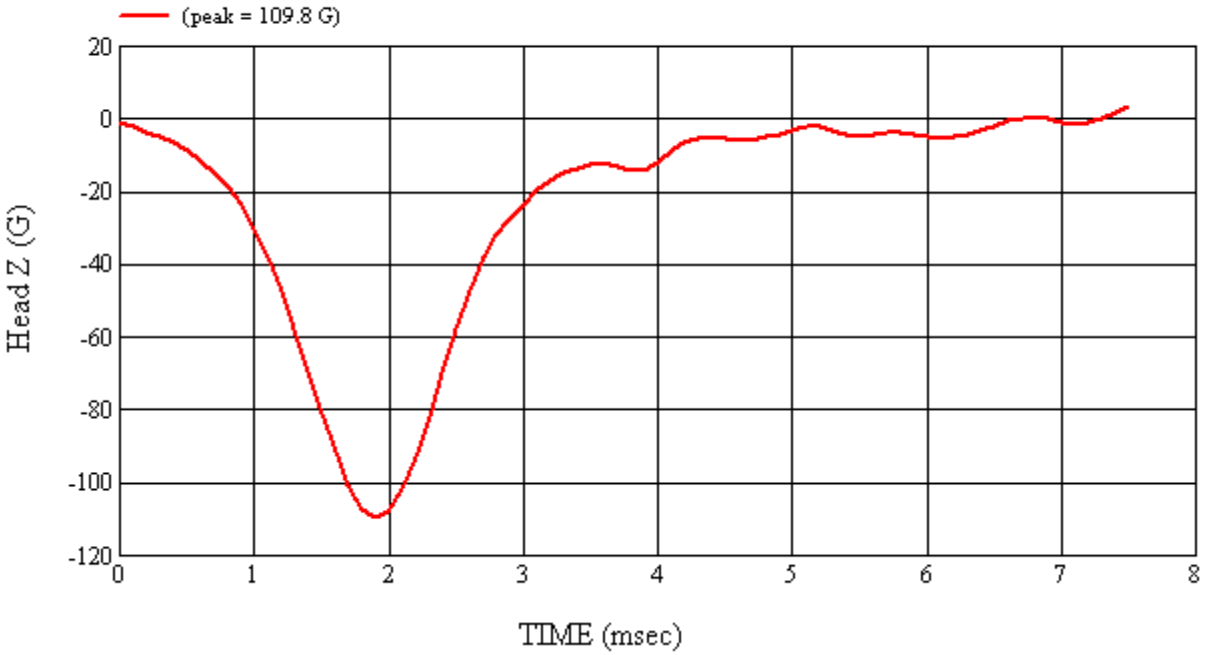


Head 037 (Pre) Calibration #H37043

4-4 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 7/25/2011 CALIBRATION TIME: 2:59:03 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	24.0
Relative Humidity	10% to 70%	58.1
Peak Resultant Acceleration	225 G's to 275 G's	256.2
Peak Lateral Acceleration	15 G's Maximum	5.4
Unimodal Acceleration Curve	YES	YES

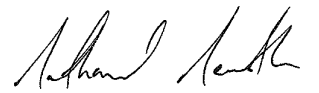
FMH INSTRUMENTATION

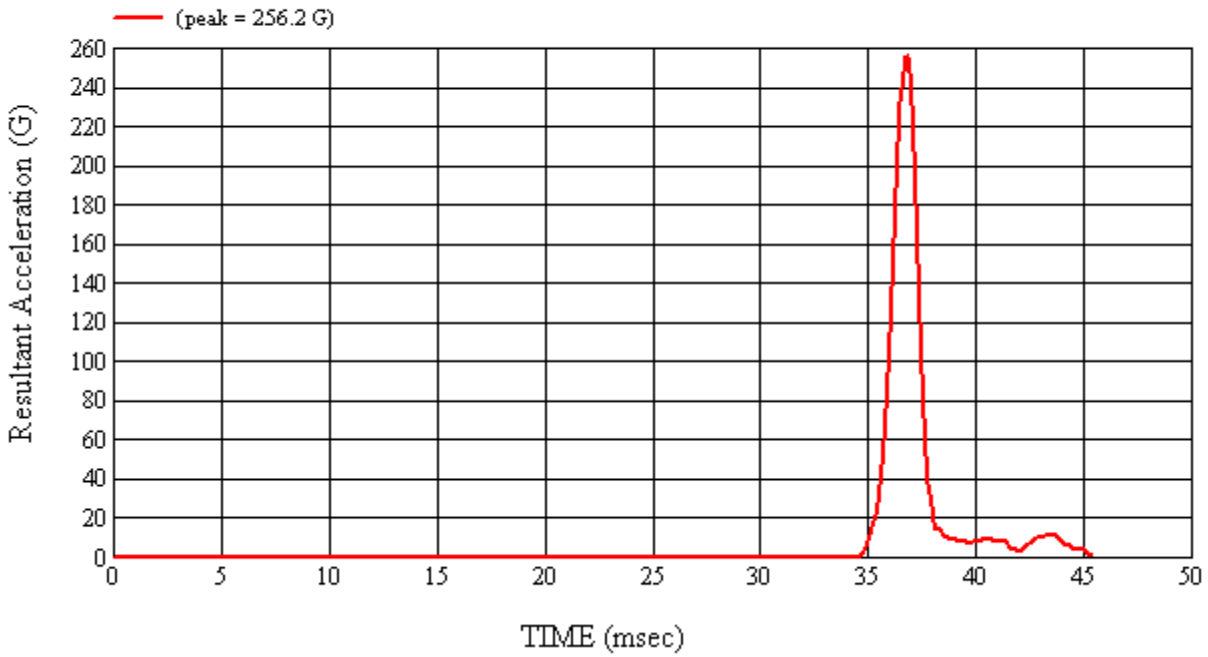
HEAD ACCELEROMETERS

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

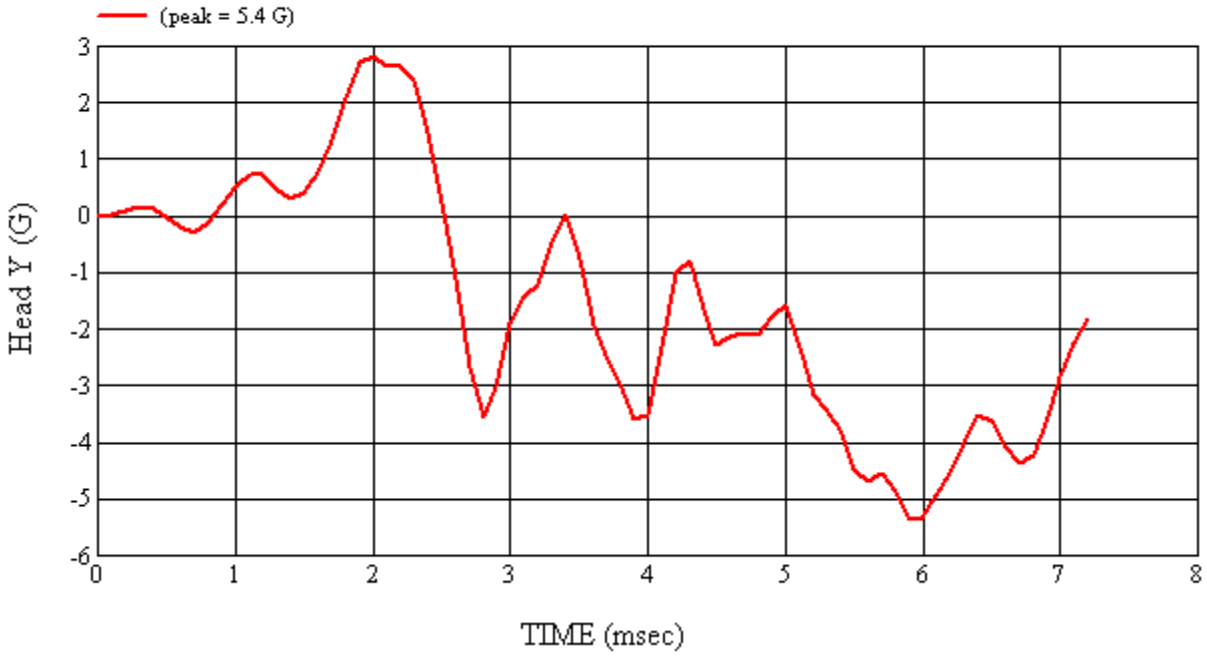
REMARKS:

RECORDED BY:  DATE: 7/25/2011

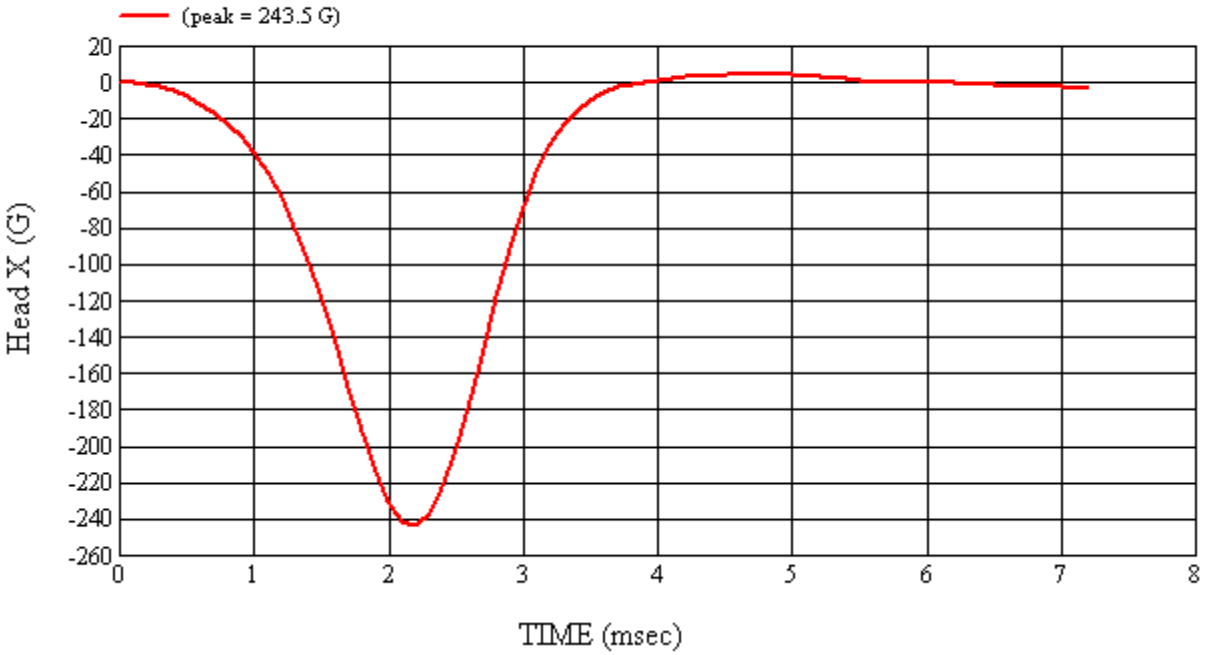
APPROVED BY: 



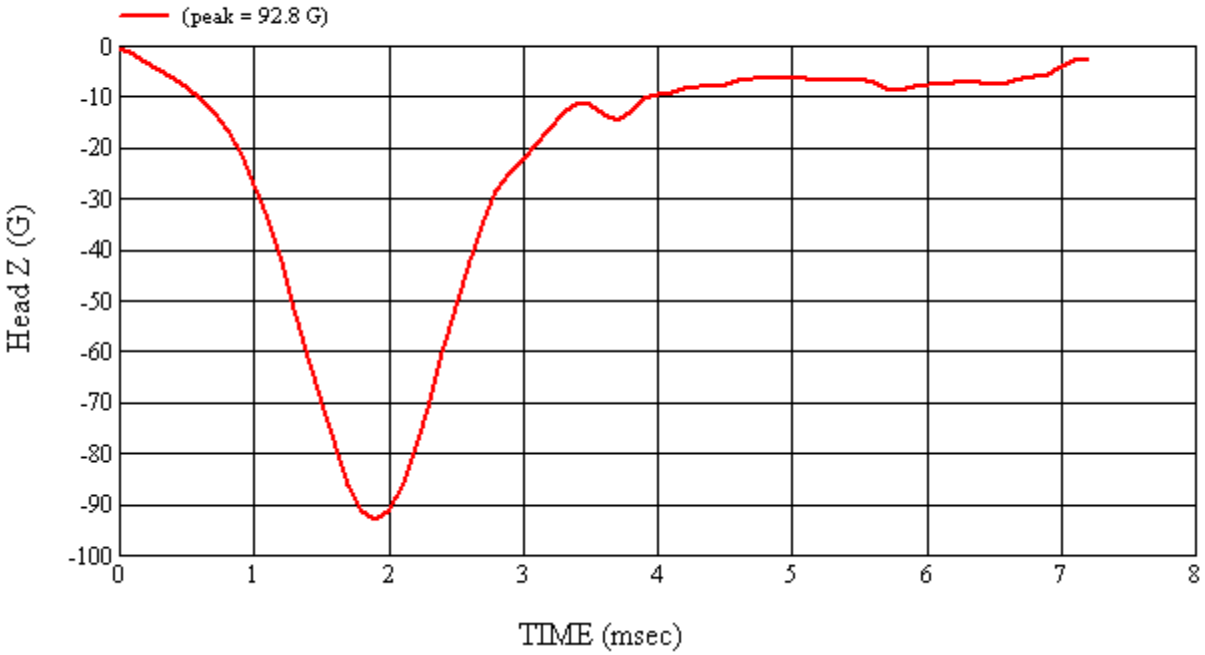
Head 037 (Post) Calibration #H37044



Head 037 (Post) Calibration #H37044



Head 037 (Post) Calibration #H37044



Head 037 (Post) Calibration #H37044

4-5 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 7/19/2011 CALIBRATION TIME: 9:41:34 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	22.3
Relative Humidity	10% to 70%	57.8
Peak Resultant Acceleration	225 G's to 275 G's	258.9
Peak Lateral Acceleration	15 G's Maximum	14.1
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION

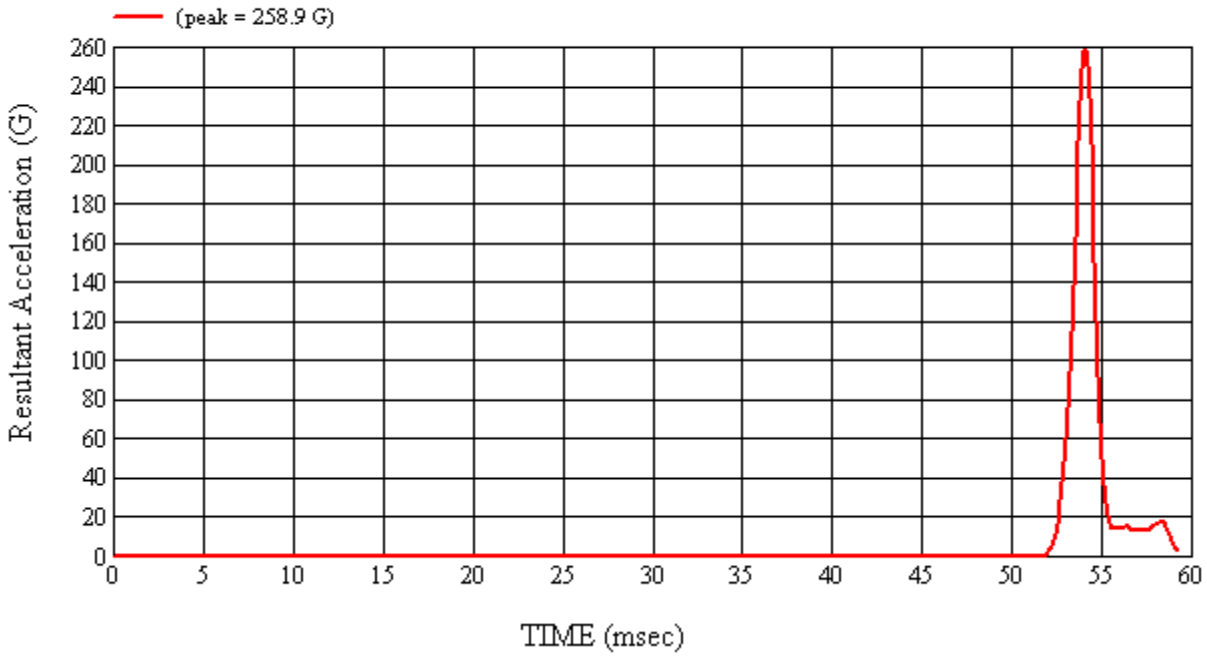
HEAD ACCELEROMETERS

Channel Number	Manufacturer	Model Number	Serial Number	Date of Last Calibration	Date of Next Calibration
1	ENDEVCO	7264-2000	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:  DATE: 7/19/2011

APPROVED BY: 



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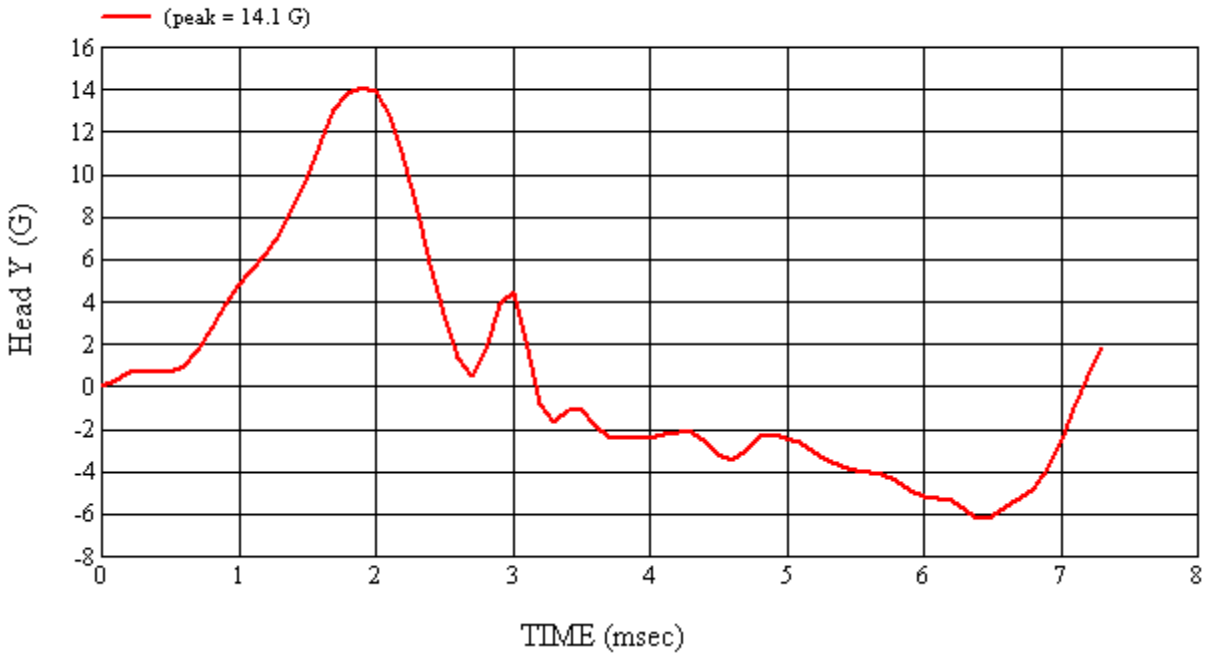

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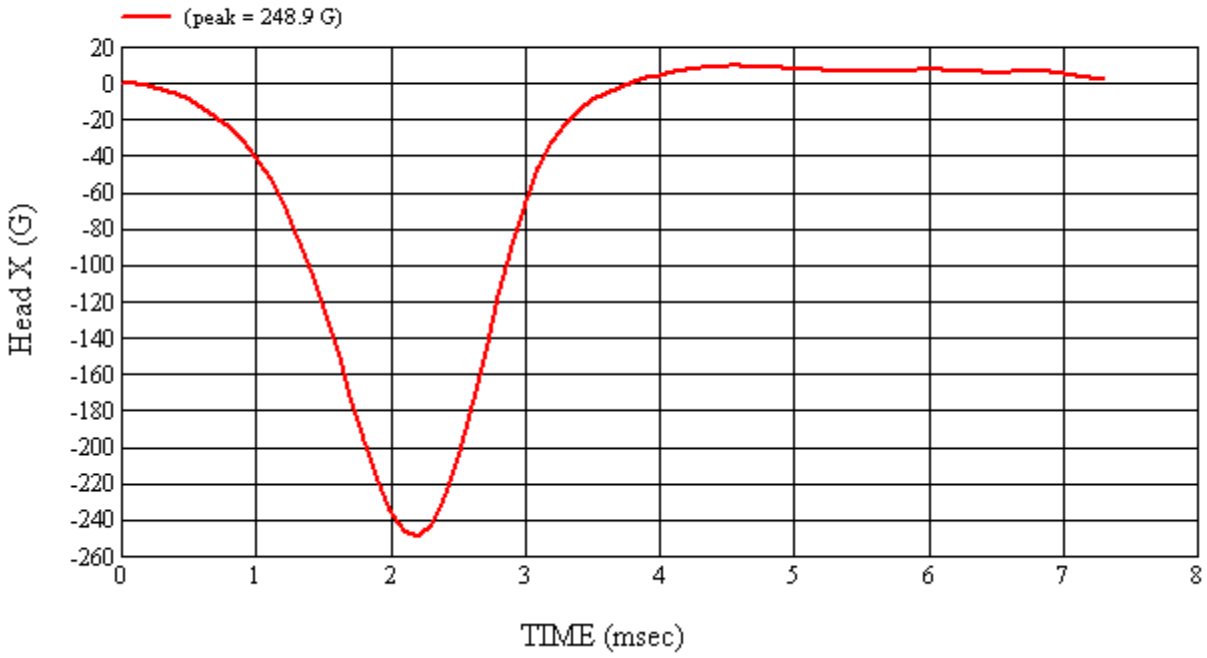

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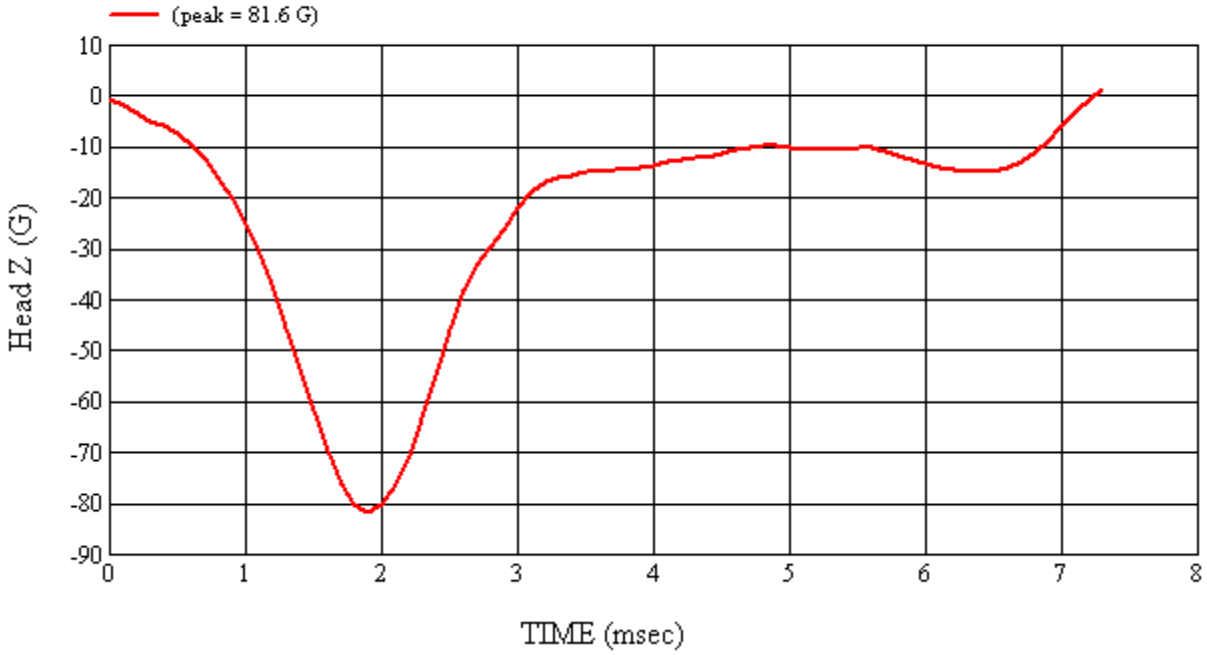


Head 038 (Pre) Calibration #H38043

4-6 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

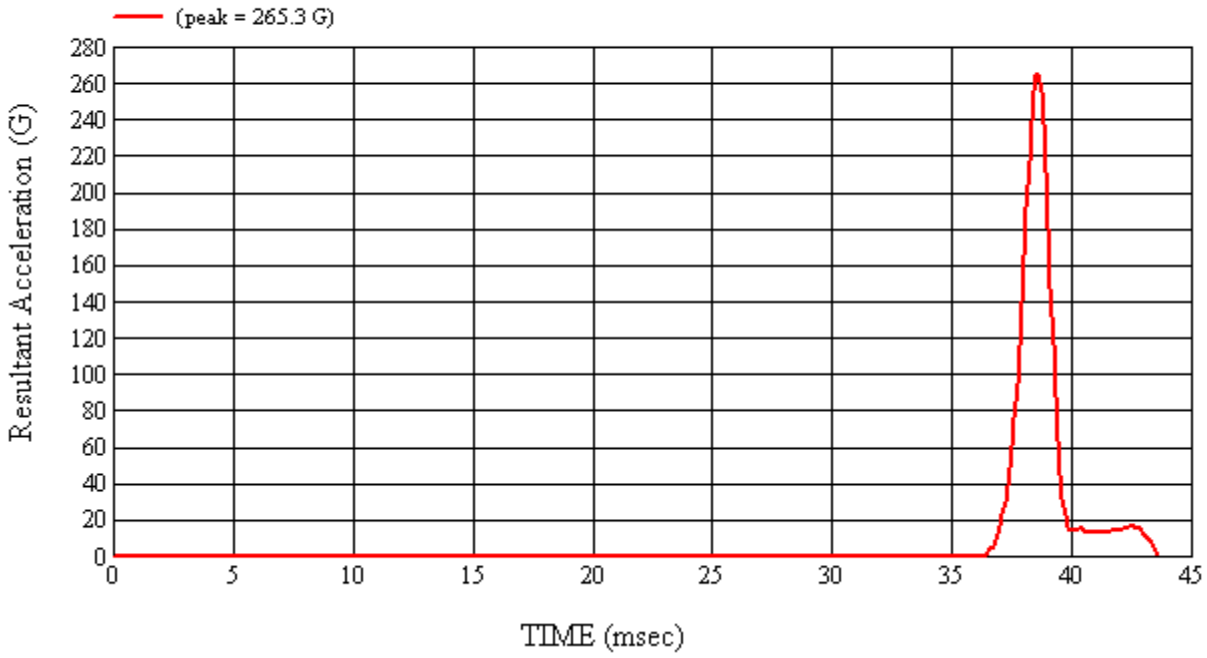
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 7/25/2011 CALIBRATION TIME: 3:20:31 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	24.0
Relative Humidity	10% to 70%	57.0
Peak Resultant Acceleration	225 G's to 275 G's	265.3
Peak Lateral Acceleration	15 G's Maximum	13.9
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

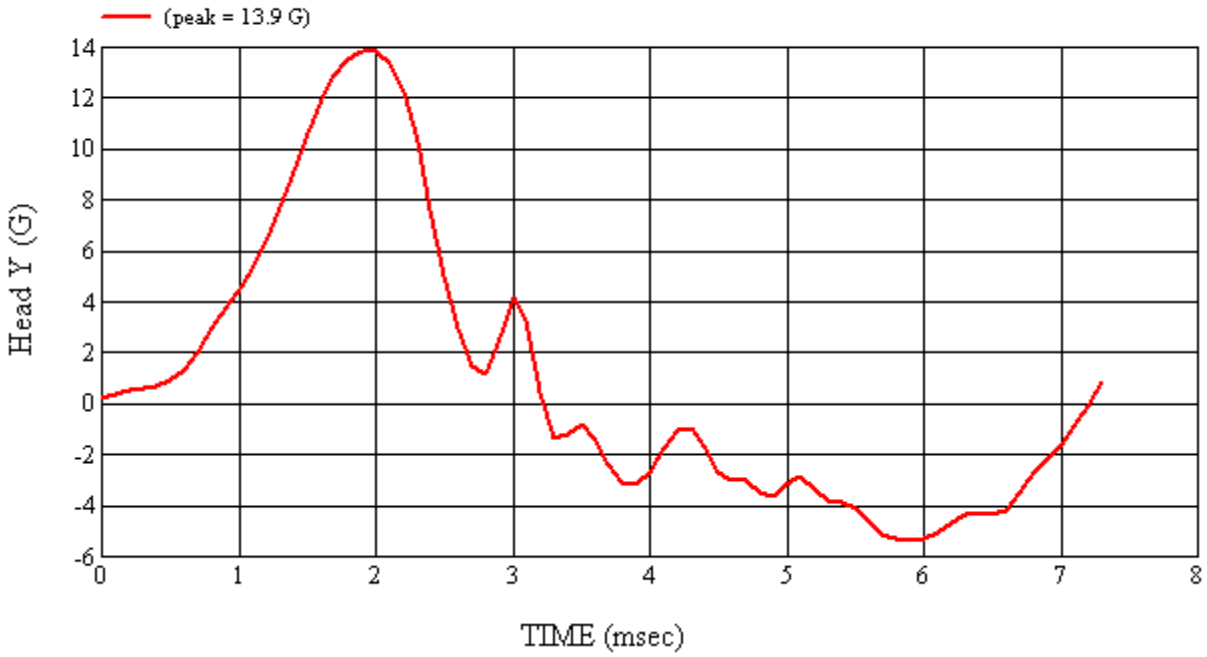
REMARKS:

RECORDED BY: Kevin D. McLean DATE: 7/25/2011

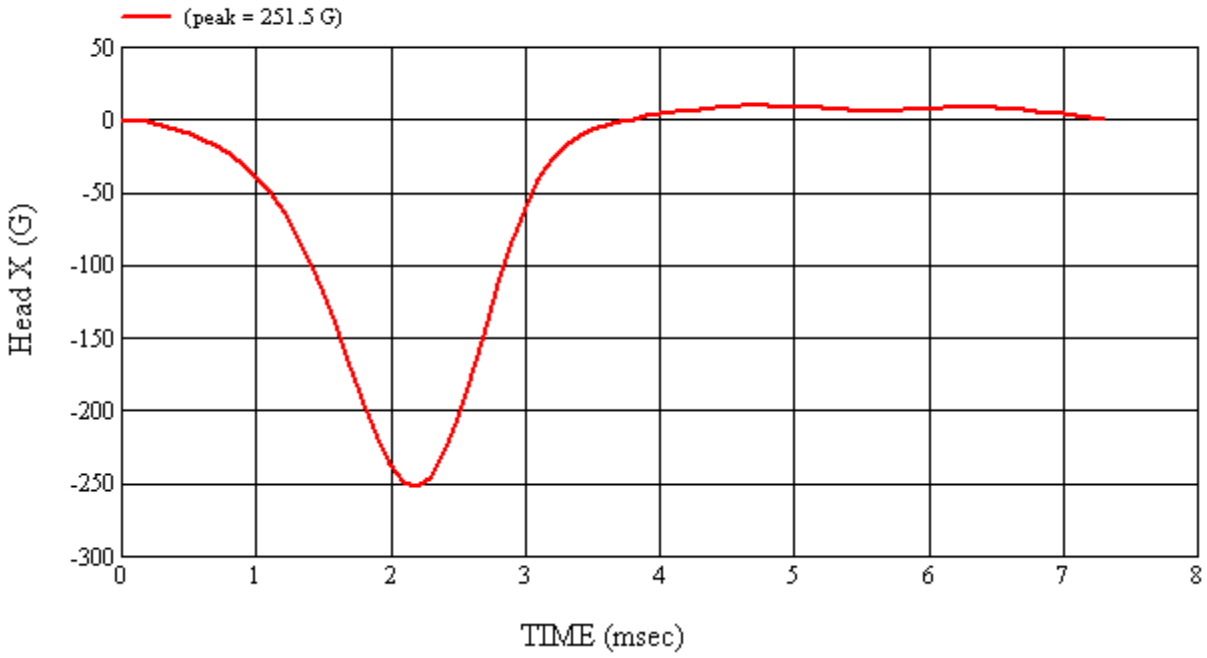
APPROVED BY: Nathaniel Hamlin



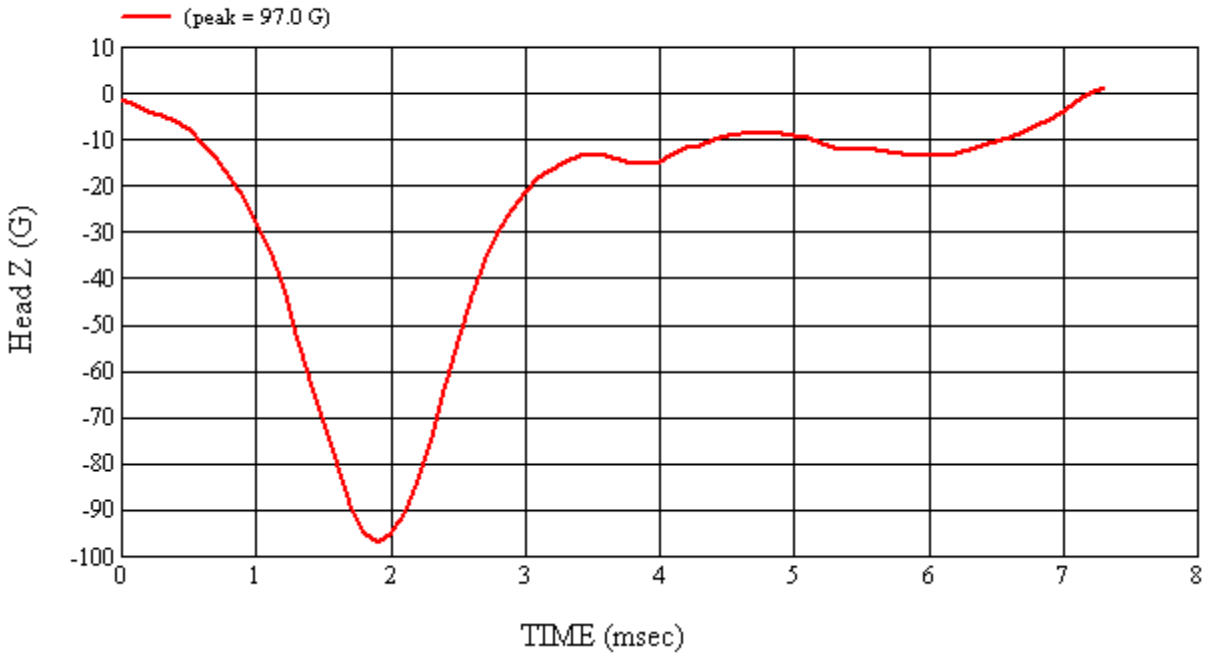
Head 038 (Post) Calibration #H38044



Head 038 (Post) Calibration #H38044



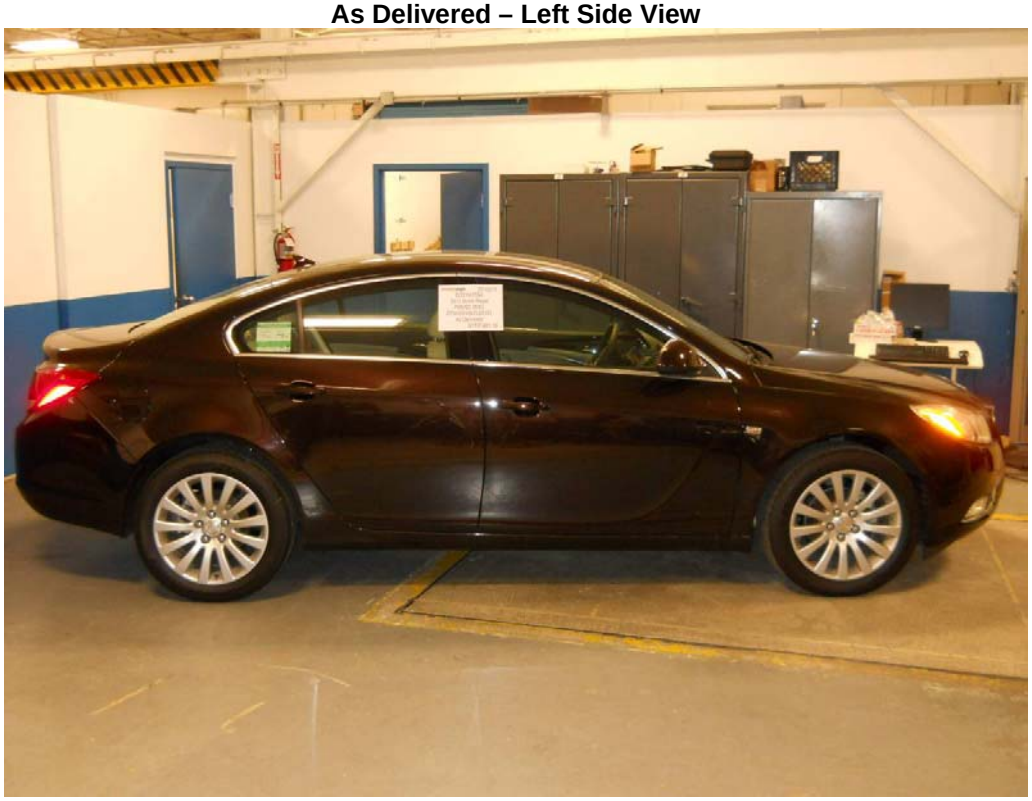
Head 038 (Post) Calibration #H38044



Head 038 (Post) Calibration #H38044

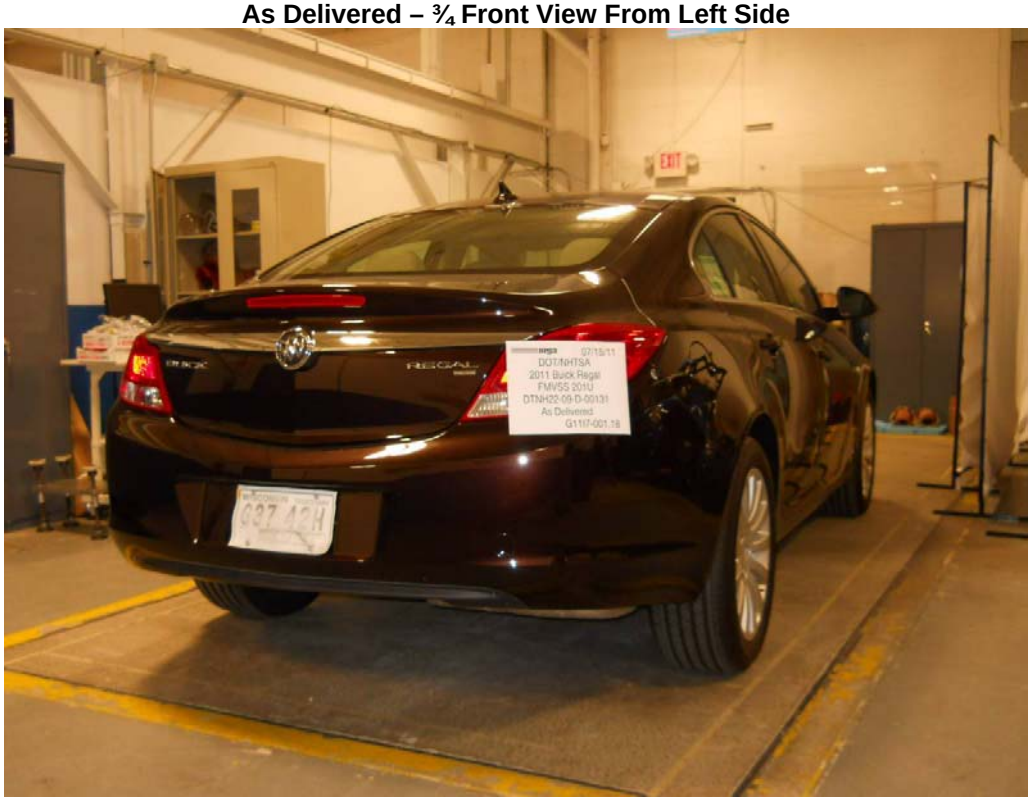
5.0 PHOTOGRAPHS

As Delivered – Left Side View

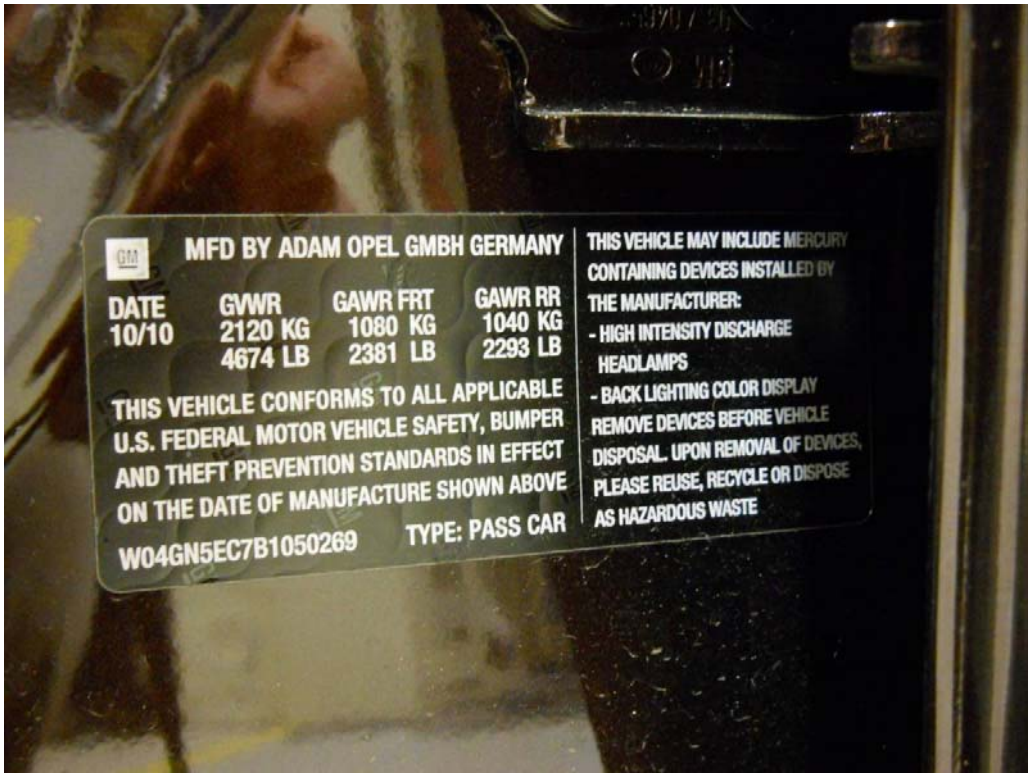


As Delivered – Right Side View

As Delivered – ¾ Front View From Left Side



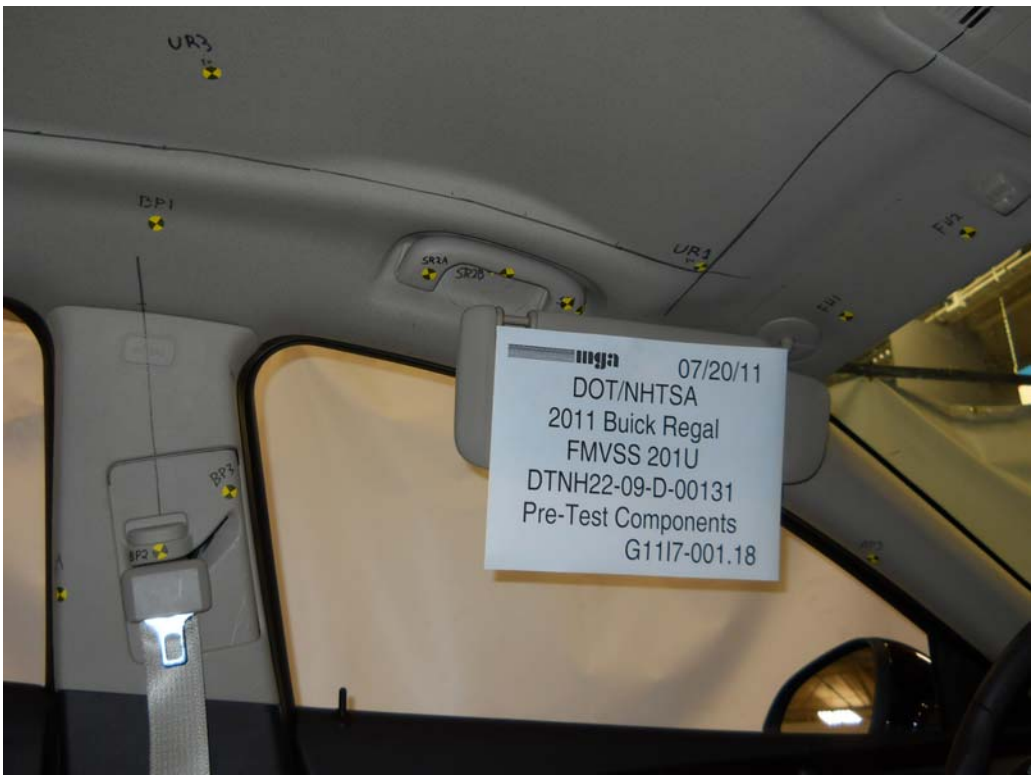
As Delivered – ¾ Rear View From Right Side



As Delivered – Vehicle's Certification Label

As Delivered – Vehicle's Tire Information Label

Pre-Test Component Photographs




07/20/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.18


07/20/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.18


07/20/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.18


07/20/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.18

Post-Test Component Photographs

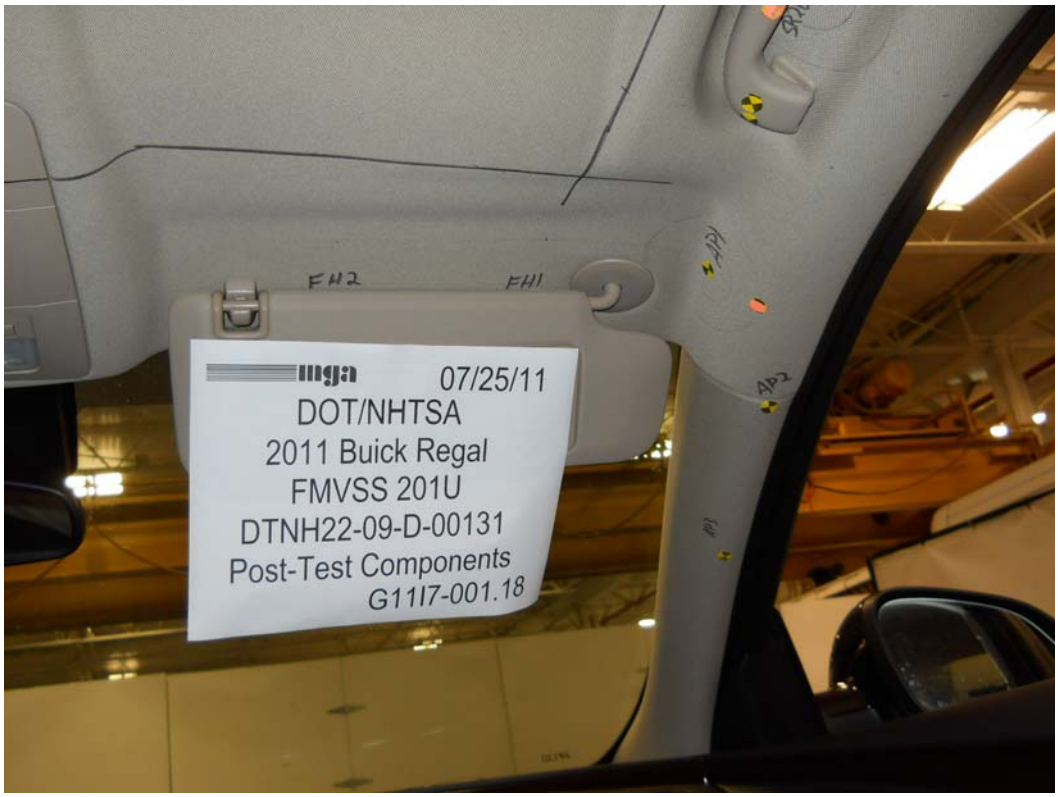

mga
07/25/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.18
UR3
UR5
BP1
BP3
BP2


mga
07/25/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.18
RH
RP1
RP2

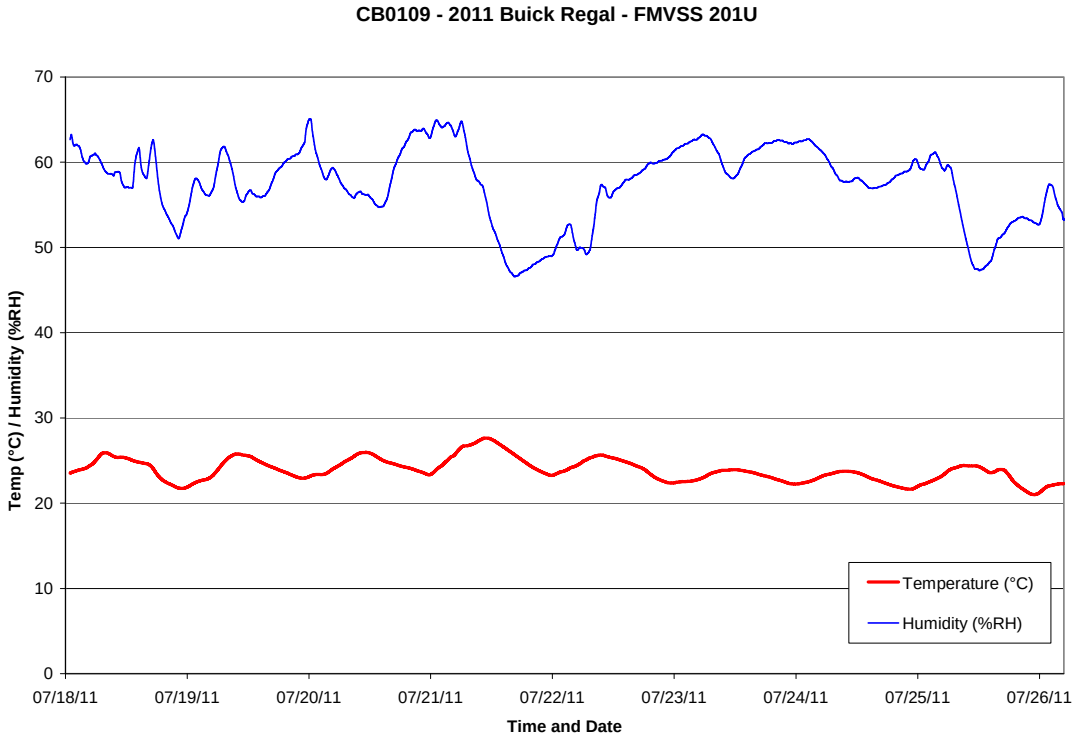

UR6
RU
RP1
RP2
mga
07/25/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.18


UR4
DP1
DP3
DP2
mga
07/25/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.18


UR2
FH2
FH1
07/25/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.18


FH2
FH1
07/25/11
DOT/NHTSA
2011 Buick Regal
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.18

Appendix A – Temperature Trace



Appendix B – Calibration Certificates

MGA Research Corporation-Calibration Certificate

ACCELEROMETER

Reference	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J35919
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	95.8
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: Edward A. Kalista

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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J22664
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	94.2
Linearity:[2]	0.99938
New vs Old Sensitivit (% Difference)	1.2
Temperature:	72 ^{0}F
Humidity:	20 %
Sensitivity (mV/V/G):	0.026447
Calibrated By:	Ryan Jones

Signature: _____

Approved by: Helen A. Kalata

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: (G's)	2,000
Calibrated By:	Modal Shop		

Calibration Date: 2/4/2011

New DLR(Units:G'S) [1] 100K SHUNT 92.8

Linearity:[2] 0.99947

New vs Old Sensitivit (% 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- (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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J32177
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	113.7
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: Helen Q. Kaleto

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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J14103
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	93.9
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: Helen A. Kalata

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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J35800
Capacity/Range: (G's)	2,000

Calibration Date:	2/4/2011
New DLR(Units:G'S) [1] 100K SHUNT	97.8
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: Edward A. Kaleto

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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J22700
Capacity/Range: (G's)	2,000

Calibration Date:	2/7/2011
New DLR(Units:G'S) [1] 100K SHUNT	96.4
Linearity: [2]	0.99966
New vs Old Sensitivit (% Difference)	0.5
Temperature:	70 ^{o}F
Humidity:	20 %
Sensitivity (mV/V/G):	0.025819
Calibrated By:	Chris Collins

Signature: Chris Collins

Approved by: Steven A. Kaleto

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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J36197
Capacity/Range: (G's)	2,000

Calibration Date:	2/7/2011
New DLR(Units:G'S) [1] 100K SHUNT	108.7
Linearity:[2]	0.99976
New vs Old Sensitivit (% Difference)	0.9
Temperature:	70 °F
Humidity:	20 %
Sensitivity (mV/V/G):	0.022869
Calibrated By:	Chris Collins

Signature: Chris Collins

Approved by: Helen A. Kaleto

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	
Name:	Accel Standard
Model #	352C03
Serial #:	95980
Capacity:	G's:250
Calibration Date:	9/14/2010
Calibrated By:	Modal Shop

Sensor	
Name:	MGA MI
Manufacturer	Endevco
Model #:	7264-2000
Serial #:	J36353
Capacity/Range: (G's)	2,000

Calibration Date:	2/7/2011
New DLR(Units:G'S) [1] 100K SHUNT	99.1
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: Helen R. Kaleto

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.

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

~Calibration Certificate~

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

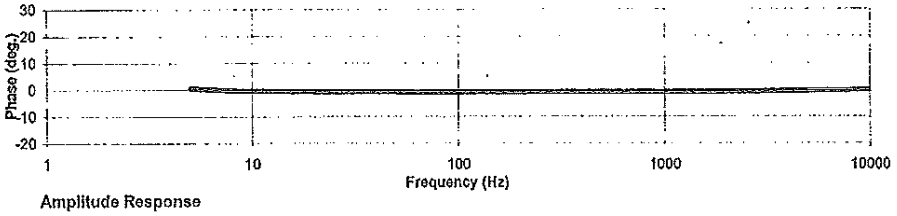
Calibration Data

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

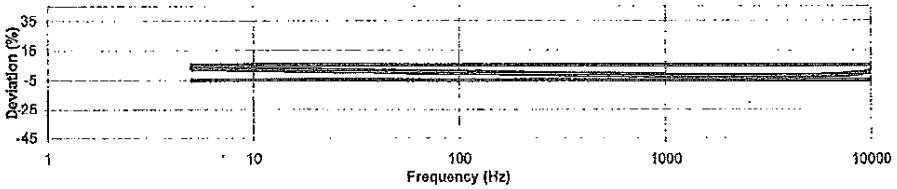
Transducer Specifications

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	

Phase Response



Amplitude Response



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 ISO16063-21 .
Procedure Used: PRD-P220
Measurement uncertainty (95% confidence level with coverage factor 2) for frequency ranges tested during calibration are as follows: 0.5-4.99 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:

Cal Date: 9/14/2010
Due Date:

ACCREDITED

Cal ID: 15800 264901

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

~Calibration Certificate~

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 Aquisition 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

Cal Date: 9/14/2010

Customer: MGA Research Corp.

Due Date:

ACCREDITED

Cal ID: 16800 2849.01

Calibration Certificate

Part Description: Gold **Certification Date:** 6/28/2011 (MM/DD/YYYY) **Serial#:** G10-02-00-01619

Single Point - (Max-Min)/2 Specification: G10-02 .084mm (.0033") **Certificate#:** G0161940722

Volumetric (Max Deviation) Specification: G10-02 +/-.119mm (+/-.0047") **Temperature:** See attached data

Measurement Standards Traceability

Ball Bar Kit	Asset Number:	1041	Calibration Due: 9/28/2011	*SI Traceability: L20110405KG3
Thermometer	Asset Number:	668	Calibration Due: 2/13/2012	*SI Traceability: A2LA-1001187681
Reference Sphere	Asset Number:	TQ223	Calibration Due: 10/5/2012	*SI Traceability: NIST 821/276660-08

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 3.9 + 5.9X micrometers, where X = length in meters.
Uncertainty is expressed at approximately a 95% Level of Confidence using k=2.00.

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:
Within Specifications

Instrument condition outgoing:
Within specifications

Technician: Neil Maclean Date: 6/28/11

FARO Technologies, Inc.
Michigan Regional Office
PH1:248-669-8620

FAX:248-669-8556
L-A-B Cert Number:L1147.01-1

46998 Magellan Drive
Wixom, MI 48393
USA

6/28/11

LABORATORY ACCREDITATION BUREAU ACCREDITED

f:\control\records\05manufa\partspec\XH08-0495.eps Rev3 RevDate: 12/29/10

MICHIGAN OPERATIONS
DATE: 2/7/04
SUPERCEDES: MGATPTMC.5

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

Tape Measure Calibration Certificate

Reference Steel Rule
Brand: SWANSON
S/N: MGA 00798
Calibration Date: 1/25/11

Subject Tape Measure
Brand: STANLEY
S/N: TPM 121
Calibration Date: 3/18/11

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

If all differences are ± 1/32 of an inch (1 mm), then the tape measure is acceptable.
Pass X Fail ___ Maximum Difference = 0

Date: 3/18/11 Performed By: RJ Mull

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ± 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.

gary.hockin@midwayproducts.com

MetroCal Inc.

ACCREDITED
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: **69370**
Certificate Number: **100903801**
Page: **1 of 1**

Gauge Number: **MGA00712**
Gauge Desc: **Digital Protractor**
Manufacturer: **Mitutoyo**
Model Number: **950-315**
Serial Number: **06091641**

Customer PO: **N/A**
Last Calibration: **N/A**
Calibration Date: **9/3/10**
Next Calibration: **9/3/11**

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 CP045 and complies with the ANSI/NCSL Z540-1 and ISO/IEC 17025 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.

Standard Used	Cal Date	Due Date	Traceable No.	Calibration Procedure Uncertainty Expressed at 95% confidence (K=2)
Gage Block Set	8/2/10	8/2/11	ID# 105	0.0015°
DoAll Sine Bar	1/21/10	1/21/11	ID# 1879	0.0015°

Results:

As Found Readings

Units	Nominal	Actual	Deviation
Decimal Deg.	5.00	5.0	0.00
	10.00	10.1	0.10
	20.00	20.0	0.00
Tolerance	30.00	30.0	0.00
± 0.1° Level	40.00	39.9	-0.10
± 0.2° Maximum Error			

Reference Level Check: Within ± 0.1 degrees

As Left Readings

Nominal	Actual	Deviation
5.00	5.0	0.00
10.00	10.1	0.10
20.00	20.0	0.00
30.00	30.0	0.00
40.00	39.9	-0.10

Reference Level Check: Within ± 0.1 degrees

Comments: Environmental conditions during calibration: 68 °F, 44% RH.
No adjustment required.

Shannon Kubicek
Calibration Technician

Issued: 9/3/10

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

@ 9/8/10

NovaStar SOLUTIONS

Calibration Certificate

ACCREDITED
CALIBRATION # 1277.01

Metrology Management Services
Remit to address:
35200 Plymouth Rd.
Livonia, MI 48150

Calibration Certificate #:
Z52549:1300715528

DICKSON TM325 TEMP/HUMD DISP

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

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

Action Taken: FULL CALIBRATION

REMARKS:

Standards Used

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:

Asset Barcode:

MetroCal Inc.

ACCREDITED
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: 69370
Certificate Number: 100826804
Page: 1 of 1

Gauge Number: MGA00783
Gauge Desc: 0 to 20lb x 0.01lb Digital Scale
Manufacturer: Detecto
Model Number: AP-20
Serial Number: E10807-0187

Customer PO: N/A
Last Calibration: 8/14/09
Calibration Date: 8/26/10
Next Calibration: 8/26/11

As Found Condition: See Results

As Left Condition: See Results

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/NCSL 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.

Standard Used	Cal. Date	Due Date	Traceable No.	Calibration Procedure Uncertainty Expressed at 95% confidence , (K=2)
Dead Weight Set	3/3/09	3/3/11	ID# 16992	+/-0.001% of Load
Weight Set	9/3/08	9/3/10	ID# 2463	+/-0.001% of Load

Results:
Tolerance used: Class III

Units: lbs — TI Division/Increment: 0.01

	As Found				As Left		
Weight Test	Nominal	Indication	Deviation		Nominal	Indication	Deviation
Zero	0.00	0.00	0.00		0.00	0.00	0.00
0-25% fs	5.00	5.01	0.01		5.00	5.01	0.01
26-50% fs	10.00	10.02	0.02		10.00	10.02	0.02
51-75% fs	15.00	15.02	0.02		15.00	15.02	0.02
76-100% fs	20.00	20.03	0.03		20.00	20.03	0.03
1/2 load test	10.00	10.02	0.02		10.00	10.02	0.02
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: 75 °F, 39 % RH.
The adapter that was sent in with the scale has loose components, be careful when using.
No adjustments required.

Shannon Kubicek
Calibration Technician

Issued: 8/26/10

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

@ 9/8/10

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

Test report for commercial device

F410/12-4
Rev. Date 7/28/08

accredited for calibration 1448.01

Customer: MGA ***Cert#*** 11-8007 ***Temp/Humidity:*** 0k
Location of Calibration: 2839 Elliott Troy, MI 48038
Calibration Date: 7/18/2011 ***Cal Due:*** Jul-12 ***Condition of Item:*** fair
Equipment Make: Intercomp ***Model:*** SW Deluxe ***Serial:*** 26032389 ***Capacity:*** 8800lb x 1lb
NTEP: ***Class:*** ***COC #:***

Applied Test Wt	*Before Adustment*	*Tolerance*	*In-Tolerance Y/N*	*After Adjustment*	*In-Tolerance Y/N*	*Unc*	
1000lb	1000lb	2lb	y	1000lb	y	.5lb	LF
200lb	200lb	1lb	y	200lb	y	.11lb	
1000lb	1000lb	2lb	y	1000lb	y	.5lb	RF
200lb	200lb	1lb	y	200lb	y	.11lb	
1000lb	1000lb	2lb	y	1000lb	y	.5lb	LR
200lb	200lb	1lb	y	200lb	y	.11lb	
1000lb	1000lb	2lb	y	1000lb	y	.5lb	RR
200lb	200lb	1lb	y	200lb	y	.11lb	

shift test
n/a

Platform #1	*Platform #2*	*Platform #3*
☐ Pass	☐ Pass	☐ Pass
☐ Fail	☐ Fail	☐ Fail

Tests performed: ☑ Repeatability ☑ Linearity ☐ Sensitivity ☑ Discrimination

Technician comments: Scale passed all tests performed

Traceable certificate for weights used: A1160,1163,20950,5003,10002

☑ Scale Certified ☐ Scale Rejected

Sterling Scale Service Rep: Dan W. **Date:** **7/18/2011** 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.
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 for this reason Sterling Scale does not warranty calibration.
This report shall not be reproduced, except in full without approval of the laboratory
Tolerances followed are maintenance/acceptance per HB 44 or customer specific.