FINAL REPORT NUMBER 201UI-MGA-11-08

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

CHRYSLER GROUP LLC
2011 Jeep Grand Cherokee Laredo 4X4
NHTSA No. CB0302

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: May 12-16, 2011
Report Date: May 16, 2011

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
1200 New Jersey Avenue, SE
West Building
WASHINGTON, D.C. 20590

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16. Abstract A compliance test series was conducted on the subject 2011 Jeep Grand Cherokee Laredo 4X4, NHTSA No. CB0302, 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 May 12-16, 2011. Test failures identified were as follows: None The data recorded indicates that the 2011 Jeep Grand Cherokee Laredo 4X4 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 Jeep Grand Cherokee Laredo 4X4, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on May 12-16, 2011 on a 2011 Jeep Grand Cherokee Laredo 4X4, manufactured by Chrysler Group LLC.

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 Jeep Grand Cherokee Laredo 4X4 was equipped with A, B, O, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, a fixed seat belt anchorage on each O-pillar, and grab handles located 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	BP4	FH2	UR3@BP
BP2	OP2	UR1@SR1	UR6@OP
BP3	FH1	UR2@SR2A	UR7@SR3-2

The 2011 Jeep Grand Cherokee Laredo 4X4 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 Jeep Grand Cherokee Laredo 4X4

VEH. NHTSA NO.: CB0302 VIN: 1J4RR4GGXBC552754 COLOR: Nat. Green Pearl

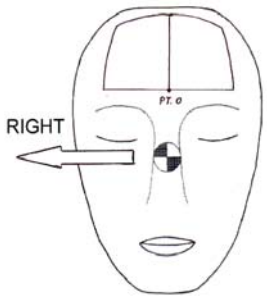
VEH. BUILD DATE: September, 2010 TEST DATES: May 12-16, 2011

TEST LABORATORY: MGA Research Corporation

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

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Left	255	50	19.1	633	619	15	2 Left
BP2	Left	270	9	23.6	600	574	6	0
BP3	Right	84	-5	24.1	637	624	27	2 Right
BP4	Right	163	-10	24.1	510	455	30	12 Right
OP2	Left	270	-7	24.1	520	468	24	3 Right
FH1	Right	180	50	23.7	728	745	25	8 Right
FH2	Left	180	50	24.0	565	528	26	4 Left
UR1@SR1	Left	270	50	23.9	807	849	34	0
UR2@SR2A	Right	90	50	24.0	752	777	25	9 Left
UR3@BP	Left	270	50	24.1	782	816	26	2 Left
UR6@OP	Right	90	50	23.9	668	665	24	5 Right
UR7@SR3-2	Right	90	50	23.7	794	831	28	2 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.

BP2 Left: Non functional anchorage adjuster.

BP3 Right: Loose anchorage adjuster cover.

FH2 Left: Cracked windshield, roof storage compartment opened.

UR1@SR1 Left: Headliner deformation.

UR2@SR2A Right: Headliner deformation.

UR7@SR3-2 Right: Headliner deformation.

REMARKS:

The targets listed were impacted in the following order:

Left: FH2, AP1, UR3@BP, BP2, OP2, UR1@SR1

Right: FH1, UR2@SR2A, BP3, UR7@SR3-2, BP4, UR6@OP

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: May 16, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Jeep Grand Cherokee Laredo 4X4

VEH. NHTSA NO.: CB0302 VIN: 1J4RR4GGXBC552754 COLOR: Nat. Green Pearl

VEH. BUILD DATE: September, 2010 TEST DATES: May 12-16, 2011

TEST LABORATORY: MGA Research Corporation

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

INTERIOR TRIM INFORMATION: A, B, O, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, a fixed seat belt anchorage on each O-pillar, and grab handles located 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 16, 2011; Odometer Reading 17 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Chrysler Group, LLC

Date of Manufacture: September 2010; VIN: 1J4RR4GGXBC552754

GVWR: 2949 kg; GAWR FRONT: 1452 kg;

GAWR REAR: 1679 kg;

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 230 kPa REAR: 230 kPa

Recommended Tire Size: P245/70R17

Recommended Cold Tire Pressure:

FRONT: 230 kPa REAR: 230 kPa

Size of Tire on Test Vehicle: P245/70R17

Type of Spare Tire: T175/90D18; 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) = 476 kg

No. of Occupants x 68 kg = 340 kg

Rated Cargo/Luggage Weight (RCLW) = 136 kg (difference)

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

Right Front =	540.0 kg	Right Rear =	519.5 kg
Left Front =	566.0 kg	Left Rear =	500.5 kg
TOTAL FRONT =	1106.0 kg	TOTAL REAR =	1020.0 kg
% Total Weight =	52.0 %	% Total Weight =	48.0 %

TOTAL DELIVERED WEIGHT = 2126.0 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 2126.0 kg

Max. Test Cargo/Luggage Weight = 136.0 kg

Target Test Weight = 2262.0 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front =	531.0 kg	Right Rear =	595.5 kg
Left Front =	559.0 kg	Left Rear =	573.5 kg
TOTAL FRONT =	1090.0 kg	TOTAL REAR =	1169.0 kg
% Total Weight =	48.3 %	% Total Weight =	51.7 %

TOTAL TEST WEIGHT = 2259.0 kg

Weight of ballast secured in vehicle's cargo area = 133.0 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 841 mm; Left Front 844 mm;
Right Rear 885 mm; Left Rear 890 mm;
Pitch Angle at Right Door Sill = 0.8 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 = 0.3 Left is higher

FULLY LOADED: Right Front 852 mm; Left Front 855 mm;
Right Rear 868 mm; Left Rear 872 mm;
Pitch Angle at Right Door Sill = 0.1 Rear is higher
Pitch Angle at Left Door Sill = 0.0
Roll Angle at Front Bumper = 0.0
Roll Angle at Rear Bumper = 0.1 Left is higher

AS TARGETED: Right Front 974 mm; Left Front 965 mm;
Right Rear 991 mm; Left Rear 994 mm;
Pitch Angle at Right Door Sill = 0.1 Rear is higher
Pitch Angle at Left Door Sill = 0.2 Rear is higher
Roll Angle at Front Bumper = 0.0
Roll Angle at Rear Bumper = 0.1 Left is higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill =	0.2 Rear is higher
Pitch Angle at Left Door Sill =	0.0
Roll Angle at Front Bumper =	0.1 Right is higher
Roll Angle at Rear Bumper =	0.3 Left is higher

AS TESTED ON LEFT SIDE:

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

VEHICLE WHEELBASE = 2913 mm

REMARKS: The seat travel distance was measured to be 288 mm for the driver front seat and 288 mm for the passenger front seat.

RECORDED BY: Nathaniel Newth DATE: May 3, 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 Jeep Grand Cherokee Laredo 4X4

VEH. NHTSA NO.: CB0302 VIN: 1J4RR4GGXBC552754 COLOR: Nat. Green Pearl

VEH. BUILD DATE: September, 2010 TEST DATES: May 12-16, 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 204.4º	L 255.0º
	R 105º-165º	R 105.0º	R 156.7º
B-PILLAR	L 195º-345º	L 196.5º	L 274.2º
	R 15º-165º	R 84.0º	R 163.4º

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Nathaniel Newth DATE: May 3, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Jeep Grand Cherokee Laredo 4X4

VEH. NHTSA NO.: CB0302 VIN: 1J4RR4GGXBC552754 COLOR: Nat. Green Pearl

VEH. BUILD DATE: September, 2010 TEST DATES: May 12-16, 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 34º
		R 0º-50º	R 0º	R 34º
	SR2A	L 0º-50º	L 0º	L 34º
		R 0º-50º	R 0º	R 34º
	SR2B	L 0º-50º	L 0º	L 40º
		R 0º-50º	R 0º	R 40º
	SR3-1	L 0º-50º	L 0º	L 35º
		R 0º-50º	R 0º	R 35º
	SR3-2	L 0º-50º	L 0º	L 35º
		R 0º-50º	R 0º	R 35º
	SR3-3	L 0º-50º	L 0º	L 30º
		R 0º-50º	R 0º	R 30º

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
A-PILLAR	AP1	L -5º-50º	L -5º	L 50º
		R -5º-50º	R -5º	R 50º
	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 15º
		R -10º-50º	R -10º	R 15º
	BP2*	L 0º-50º	L 0º	L 9º
		R 0º-50º	R 0º	R 9º
	BP3	L -10º-50º	L -10º	L -5º
		R -10º-50º	R -10º	R -5º
	BP4	L -10º-50º	L -10º	L -10º
		R -10º-50º	R -10º	R -10º
O-PILLAR	OP1	L -10º-50º	L -10º	L -8
		R -10º-50º	R -10º	R -8º
	OP2	L -10º-50º	L -10º	L -7º
		R -10º-50º	R -10º	R -7º
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	50º
UPPER ROOF 6		0º-50º	0º	50º
UPPER ROOF 7		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: May 3, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Jeep Grand Cherokee Laredo 4X4

VEH. NHTSA NO.: CB0302 VIN: 1J4RR4GGXBC552754 COLOR: Nat. Green Pearl

VEH. BUILD DATE: September, 2010 TEST DATES: May 12-16, 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)	288 mm	288 mm
Tº	Horizontal < {CG-F1 (Left Seat) to (Right A-Pillar)}	103.4º	--
A1º	360º - Tº	255.0º	--
Wº	Horizontal < {CG-2 (Left Seat) to (Left A-Pillar)}	204.4º	--
A2º	A2º = Wº	204.4º	--
Uº	Horizontal < {CG-2 (Left Seat) to (Left B-Pillar)}	274.2º	--
B1º	B1º = Uº	274.2º	--
Vº	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	196.5º	--
B2º	B2º = Vº	196.5º	--
Wº (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	156.7º
A1º (right)	A1º (right) = Wº (right)	--	156.7º
Tº (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	256.3º
A2º (right)	360º-Tº (right)	--	105.0º
V º (right)	Horizontal < {CG-R (Right Seat) to (Right B-Pillar)}	--	163.4º
B1º (right)	B1º (right) = Vº (right)	--	163.4º
U º (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	84.0º
B2º (right)	B2º (right) = Uº (right)	--	84.0º
J	A-Pillar {(Plane 3) – (Plane 5)}	325.8 mm	319.7 mm
J/2	J ÷ 2	162.9 mm	159.9 mm
D1	Upper Roof {(Plane A) – (Plane B)}	2273.0 mm	
D1/2	D1 ÷ 2	1136.5 mm	

Measurement	Description	Left Side	Right Side
D2	Upper Roof {(Plane C) – (Plane D)}	1320.2 mm	
D2/2	D2 ÷ 2	660.1 mm	
.35D1	.35 x D1	795.6 mm	
.35D2	.35 x D2	462.1 mm	
N	B-Pillar {(BPR) – (lowest point on daylight opening forward of B-Pillar)}	416.1 mm	417.3 mm
N/2	B-Pillar {(BP3) – (lowest point on daylight opening forward of B-Pillar)}	208.1 mm	208.7 mm
N/4	B-Pillar {(BP4) – (lowest point on daylight opening forward of B-Pillar)}	104.0 mm	104.3 mm
Q	O-Pillar (Plane 13 – Plane 14)	414.9 mm	413.8 mm
Q/2	Q / 2	207.5 mm	206.9 mm
D	R-Pillar (Point 7 – Point M)	950.0 mm	950.0 mm
3D/7	3*D / 7	407.1 mm	407.1 mm

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

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1571.2	-392.1	487.2	1571.2	402.9	487.2
Rear	2451.3	-407.3	510.8	2451.3	402.9	510.8

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1571.2	-392.1	487.2	1571.2	402.9	487.2
Rear	2451.3	-407.3	510.8	2451.3	402.9	510.8

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	1443.2	-392.1	1147.2	1443.2	402.9	1147.2
CGF2	1731.2	-392.1	1147.2	1731.2	402.9	1147.2
CGR	2611.3	-407.3	1170.8	2611.3	402.9	1170.8

REFERENCE FOR VEHICLE COORDINATE SYSTEM (measured in millimeters):

Front driver door striker upper bolt hole (x, y, z) = 1679.2, -815.6, 521.5

Front driver seat front outboard track anchor hole (x, y, z) = 1224.2, -608.0, 211.6

Front passenger seat front outboard track anchor hole (x, y, z) = 1224.2, 608.0, 211.6

REMARKS:

RECORDED BY: Nathaniel Newth DATE: May 3, 2011

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2011 Jeep Grand Cherokee Laredo 4X4

VEH. NHTSA NO.: CB0302 VIN: 1J4RR4GGXBC552754 COLOR: Nat. Green Pearl

VEH. BUILD DATE: September, 2010 TEST DATES: May 12-16, 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	1284.6	-589.8	1197.2	--	--	Yes	--	--
REL	1302.5	-602.2	1187.9	255	50	--	1	Yes
AP2	1143.1	-644.2	1109.8	205	50	No	--	No
AP3	1011.1	-673.6	1035.0	205	50	No	--	No
A-Pillar Right Side								
AP1	1285.4	588.7	1195.4	--	--	Yes	--	--
REL	1302.9	597.0	1188.6	105	50	--	1	No
AP2	1139.4	639.9	1108.3	156	50	No	--	No
AP3	1011.5	669.3	1036.0	156	50	No	--	No
B-Pillar Left Side								
BP1	1807.2	-539.6	1277.6	270	15	No	--	No
BP2	1780.2	-652.6	1010.5	270	9	No	--	Yes
BP3	1742.3	-661.0	1069.8	--	--	Yes	--	--
REL	1733.8	-651.9	1088.9	274	-5	--	1	No
BP4	1851.1	-698.5	966.1	197	-10	No	--	No
B-Pillar Right Side								
BP1	1806.3	533.5	1278.2	90	15	No	--	No
BP2	1785.1	645.8	1011.6	90	9	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**					
BP3	1747.5	654.4	1070.5	--	--	Yes	--	--
REL	1737.2	643.9	1092.9	84	-5	--	1	Yes
BP4	1858.2	694.0	967.3	163	-10	No	--	Yes
Other Pillar Left Side								
OP1	2616.2	-648.1	1018.9	270	-8	No	--	No
OP2	2627.3	-635.6	1077.0	270	-7	No	--	Yes
Other Pillar Right Side								
OP1	2614.9	640.7	1018.1	90	-8	No	--	No
OP2	2626.9	626.9	1072.2	90	-7	No	--	No
Rear Pillar Left Side								
RP1*	3156.4	-548.2	1141.9	Target exempt from testing per S6.3(b).				No
RP2*	3251.9	-666.8	991.7	Target exempt from testing per S6.3(b).				No
Rear Pillar Right Side								
RP1*	3151.6	547.5	1139.5	Target exempt from testing per S6.3(b).				No
RP2*	3248.9	665.1	990.2	Target exempt from testing per S6.3(b).				No
Front Header Left Side								
FH1	1193.0	-485.3	1218.5	180	50	No	--	No
FH2	1167.2	-333.5	1219.8	180	50	No	--	Yes
Front Header Right Side								
FH1	1199.8	487.2	1218.9	180	50	No	--	Yes
FH2	1173.6	338.8	1220.9	180	50	No	--	No
Side Rail Left Side								
SR1	1435.2	-552.6	1277.6	--	--	Yes	--	--
REL	1410.5	-549.8	1242.6	270	34	--	2	No
SR2A	1584.3	-537.7	1279.2	--	--	Yes	--	--
REL	1557.6	-541.7	1257.9	270	34	--	2	No
SR2B	1506.5	-549.9	1282.7	--	--	Yes	--	--
REL	1514.6	-525.6	1270.5	270	40	--	2	No
SR3-1	2153.9	-532.2	1284.5	270	35	No	--	No

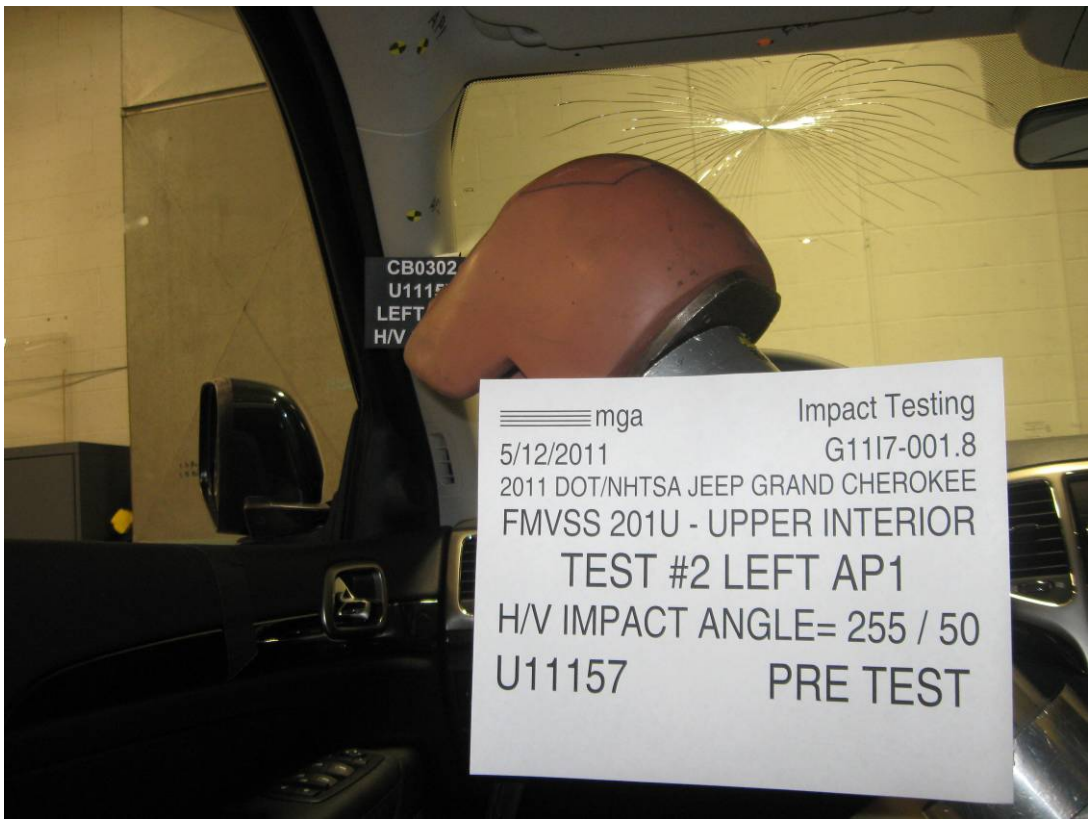
SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
SR3-2	2308.9	-531.1	1282.6	270	35	No	--	No
SR3-3	2715.1	-539.2	1259.7	270	30	No	--	No
Side Rail Right Side								
SR1	1434.6	552.4	1275.0	--	--	Yes	--	--
REL	1409.1	546.4	1242.2	90	34	--	2	No
SR2A	1586.4	542.1	1280.7	--	--	Yes	--	--
REL	1562.1	535.3	1257.6	90	34	--	2	No
SR2B	1506.5	548.5	1280.4	--	--	Yes	--	--
REL	1514.2	519.7	1270.2	90	40	--	2	No
SR3-1	2163.6	519.5	1282.8	90	35	No	--	No
SR3-2	2316.8	516.0	1282.0	90	35	No	--	No
SR3-3	2715.0	528.9	1255.2	90	30	No	--	No
Rear Header Left Side								
RH*	3176.6	-407.3	1225.4	Target exempt from testing per S6.3(b).				No
Rear Header Right Side								
RH*	3176.6	401.9	1219.2	Target exempt from testing per S6.3(b).				No
Upper Roof Left Side								
UR1@SR1	1428.0	-457.3	1282.8	270	50	No	--	Yes
UR3@BP	1814.0	-427.4	1311.9	270	50	No	--	Yes
UR5@SR3-2	2315.6	-417.3	1325.3	270	50	No	--	No
Upper Roof Right Side								
UR2@SR2A	1556.2	406.6	1317.5	90	50	No	--	Yes
UR4@SR3-1	2168.8	408.2	1325.6	90	50	No	--	No
UR6@OP	2556.8	409.1	1318.4	90	50	No	--	Yes
UR7@SR3-2	2315.6	417.3	1325.3	90	50	No	--	Yes

As determined using the Procedures specified in S10.1-10.13.
*Target is located rearward of a vertical plane 600 mm behind the rearmost design seating position and therefore is exempt from testing.

RECORDED BY: Nathaniel Newth DATE: May 3, 2011

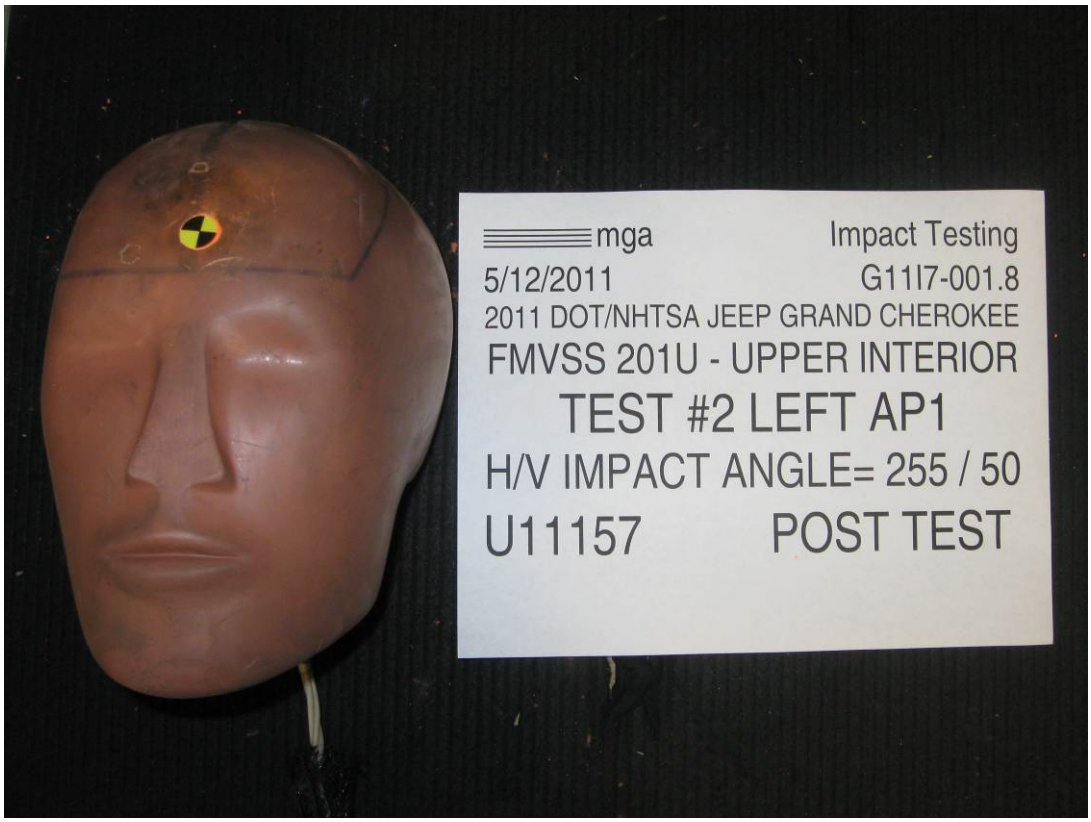
APPROVED BY: Helen A. Kaleto

3.0 TEST DATA (Including Acceleration and Velocity Plots)




CB0302
U11157
LEFT AP1
H/V 255/50
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP1
H/V IMPACT ANGLE= 255 / 50
U11157
POST TEST


AP1
AP2
AP3
EXIT
CB0302
U11157
LEFT AP1
H/V 255/50
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP1
H/V IMPACT ANGLE= 255 / 50
U11157
POST TEST


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT AP1
H/V IMPACT ANGLE= 255 / 50
U11157
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#2

Target (Vehicle Side): AP1Left

Temperature:24.6C

MGA Test Reference No.:U11157

Humidity:51.1%

Approach Horizontal Angles:255º

Time of Test:1:08:23 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
633	619	4.3	19.1	15	2 Left

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

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

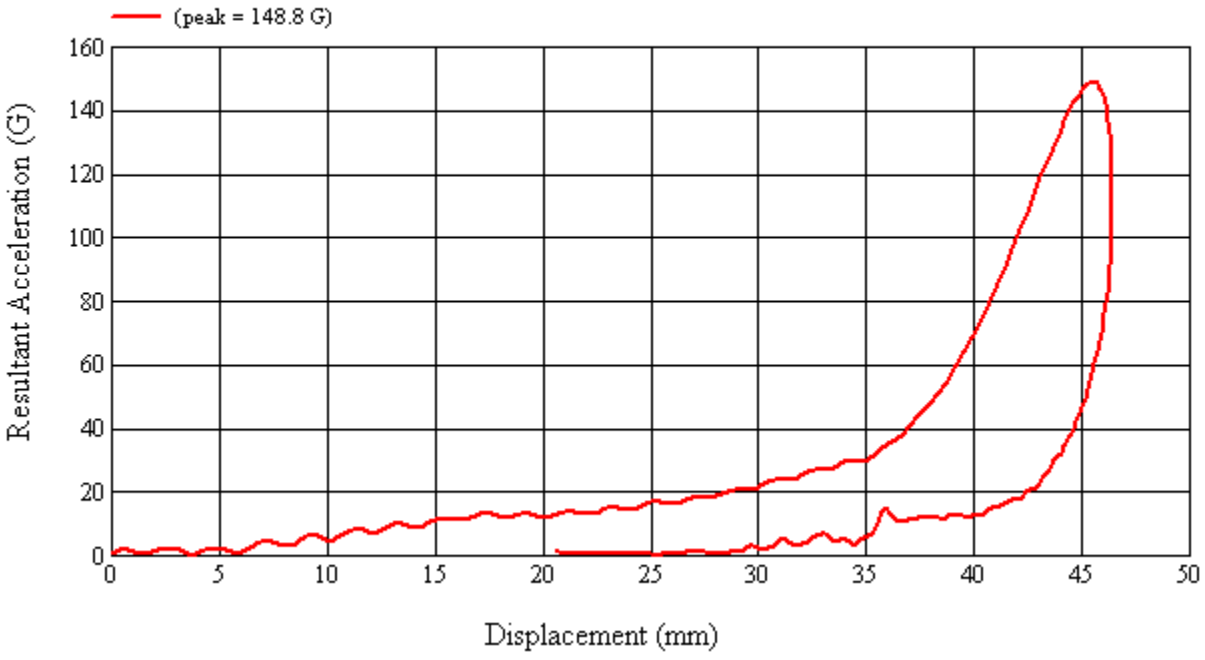
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

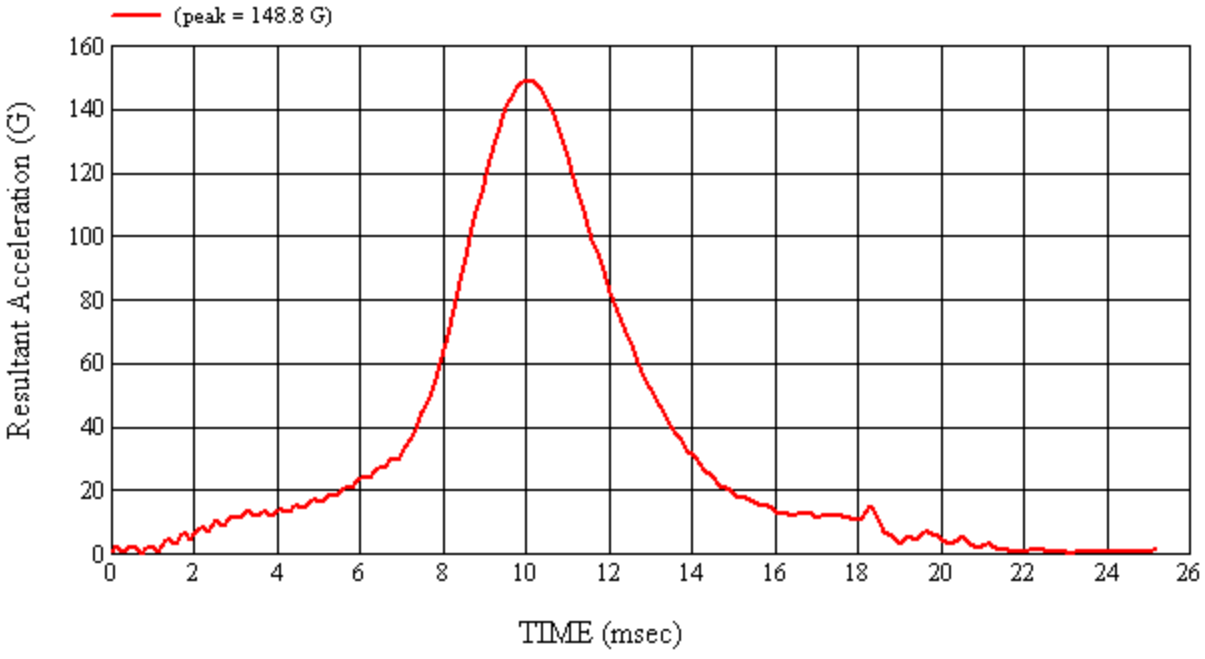
No visible damage

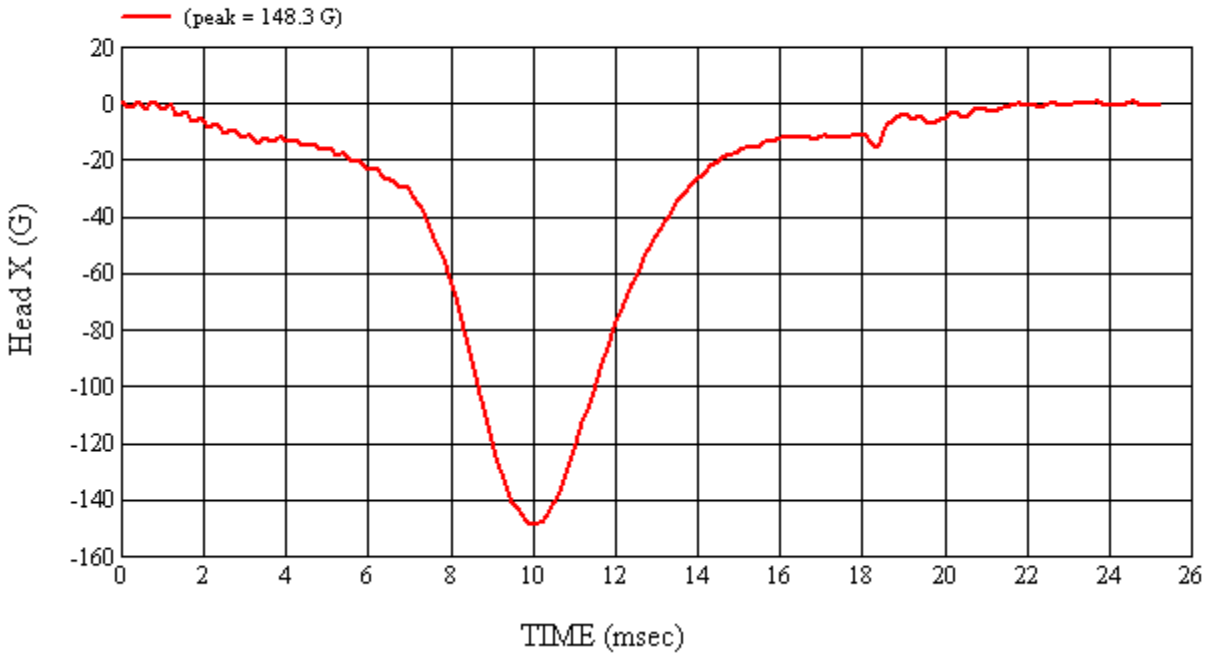
Recorded By: _____ Approved By*: _____ Date: 5/12/2011

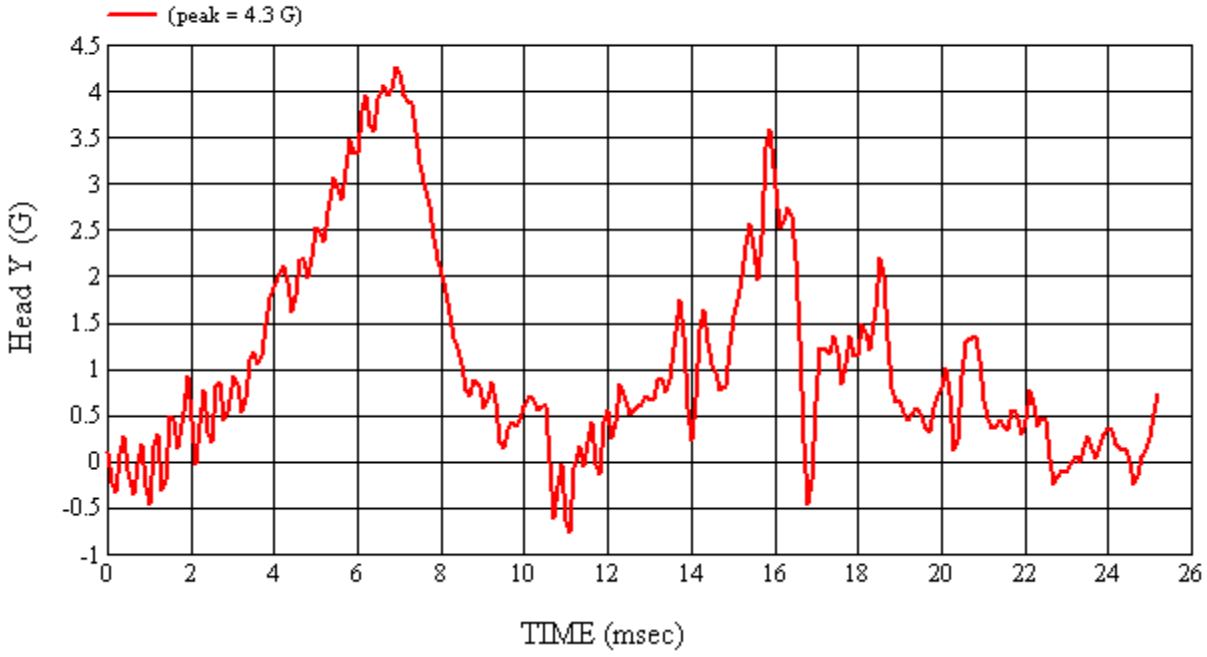
*Only necessary for NHTSA (Government) Compliance testing.

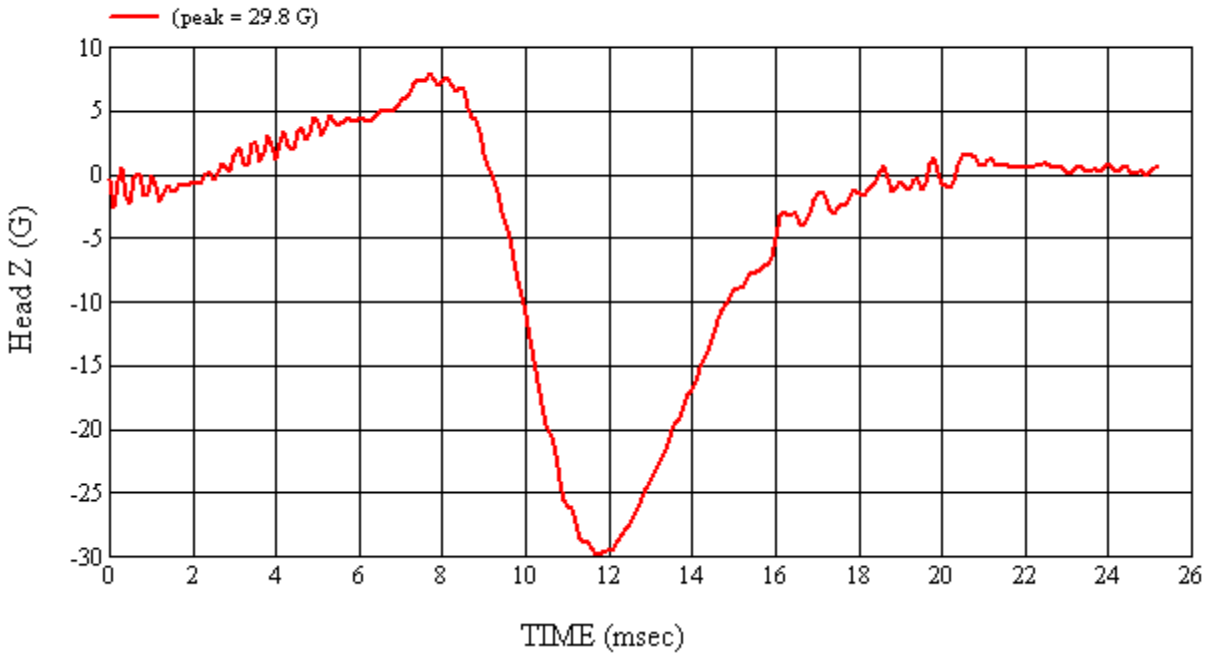
MGA Test #: U11157 Target Location: AP1, Left Side Test Date: 5/12/2011

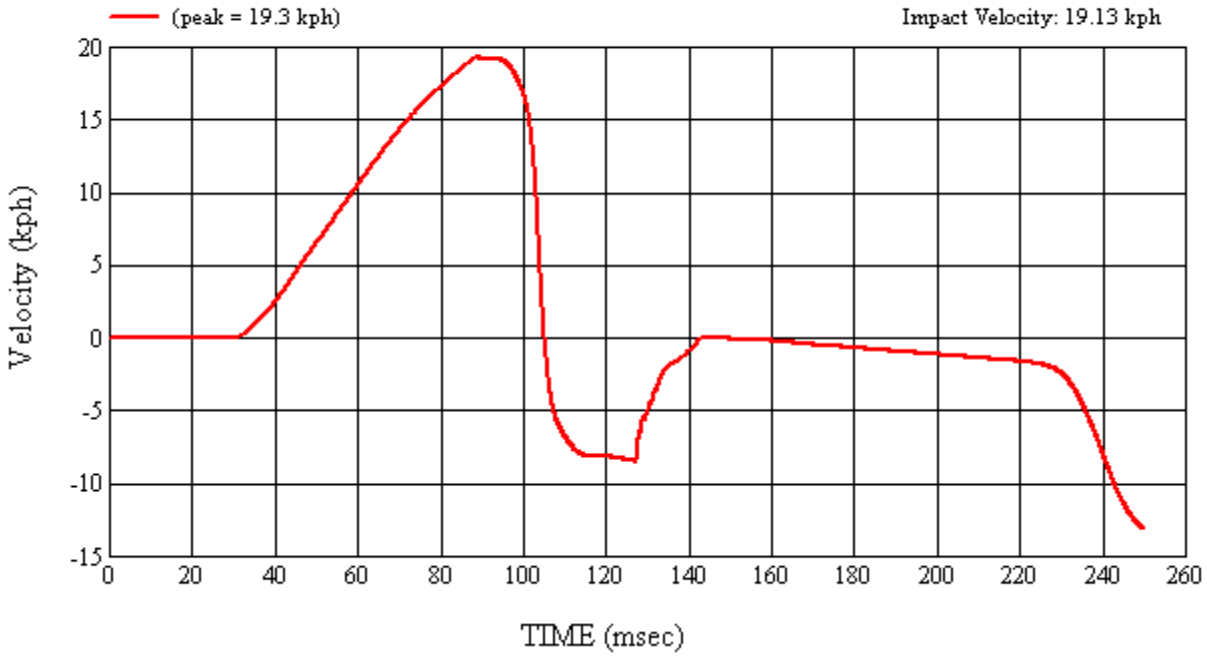


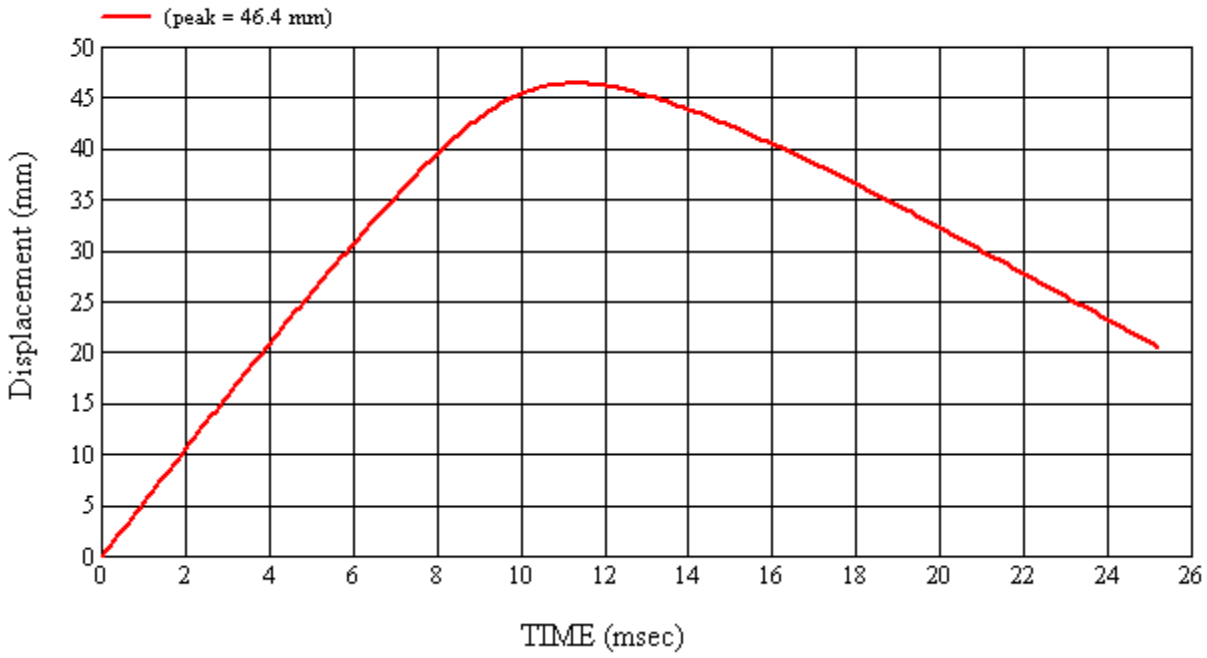


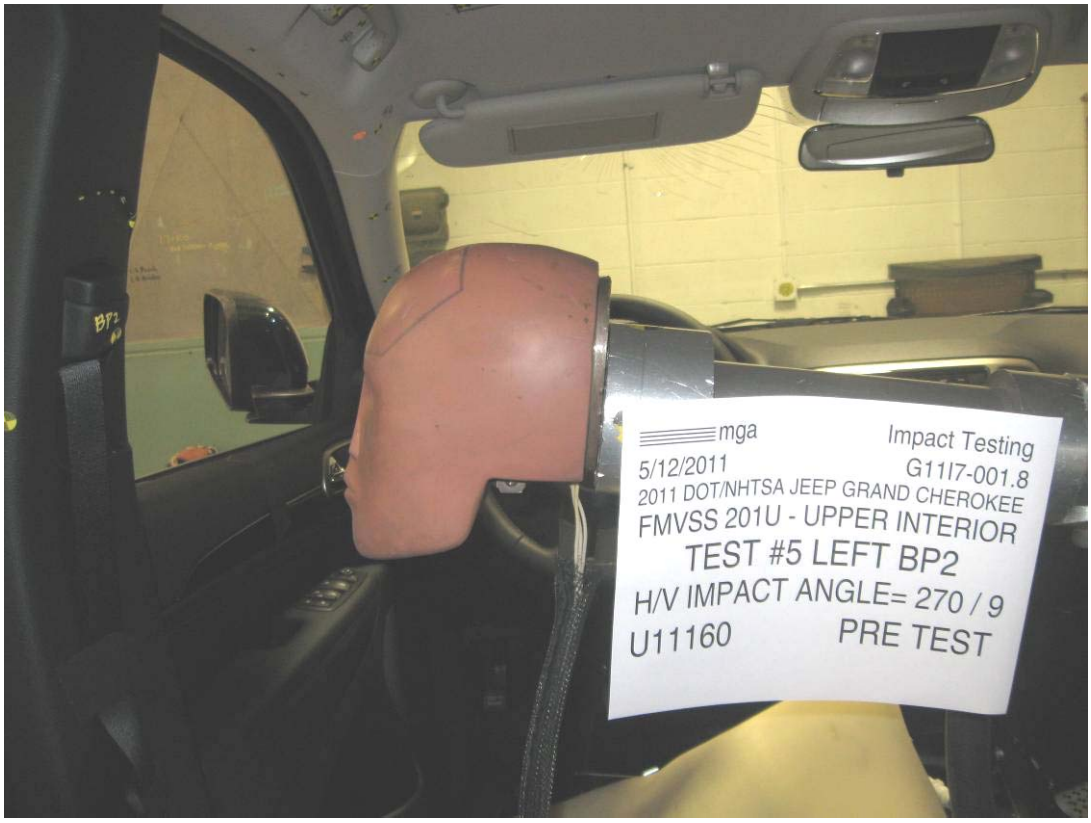

(peak = 148.3 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 4.3 G)
Head Y (G)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

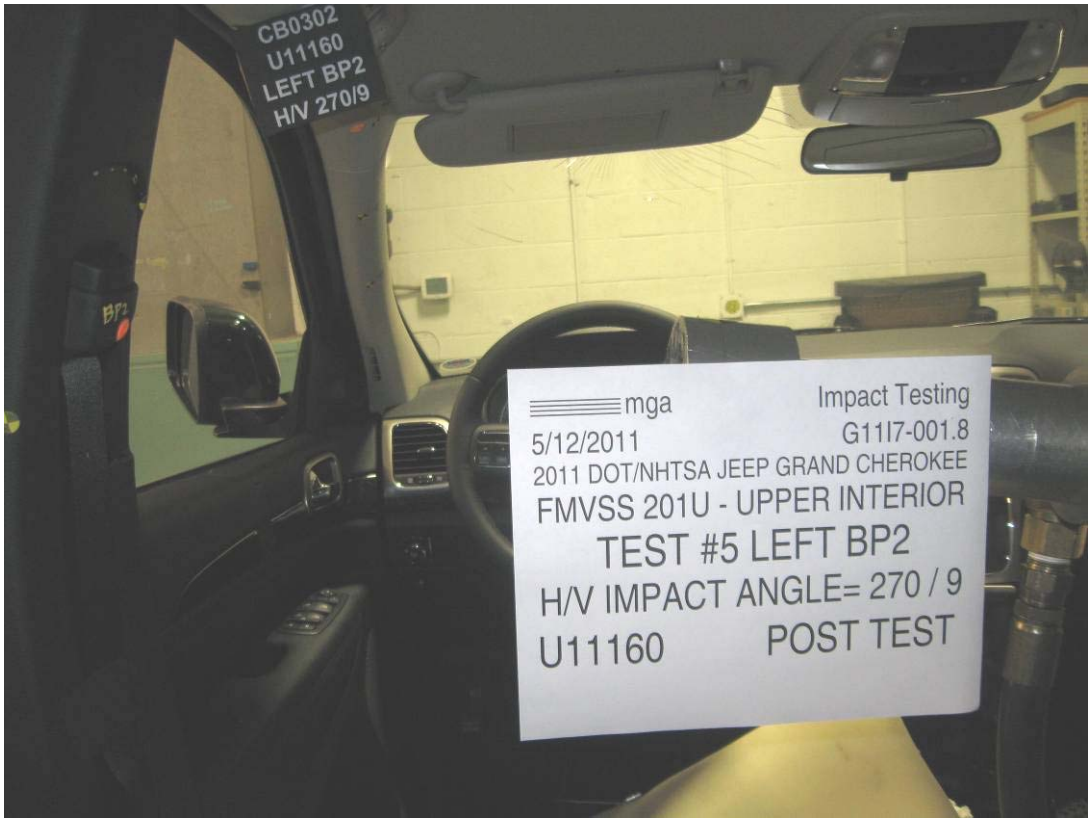

(peak = 29.8 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 19.3 kph)
Impact Velocity: 19.13 kph
Velocity (kph)
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 = 46.4 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP2
H/V IMPACT ANGLE= 270 / 9
U11160
PRE TEST


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP2
H/V IMPACT ANGLE= 270 / 9
U11160
PRE TEST


CB0302
U11160
LEFT BP2
H/V 270/9
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP2
H/V IMPACT ANGLE= 270 / 9
U11160
POST TEST


BP2
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP2
H/V IMPACT ANGLE= 270 / 9
U11160
POST TEST


BP2


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP2
H/V IMPACT ANGLE= 270 / 9
U11160
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#5

Target (Vehicle Side): BP2Left

Temperature:24.3C

MGA Test Reference No.:U11160

Humidity:54.1%

Approach Horizontal Angles:270º

Time of Test:4:28:24 PM

Approach Vertical Angles:9º

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
600	574	11.3	23.6	6	0

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

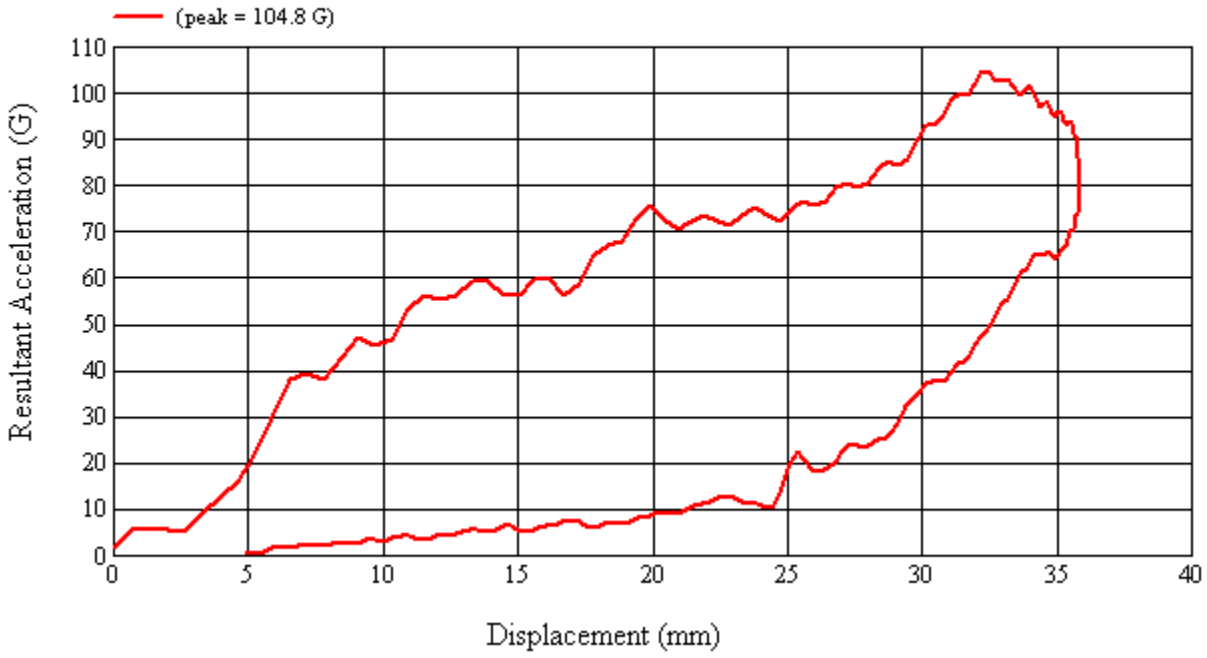
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

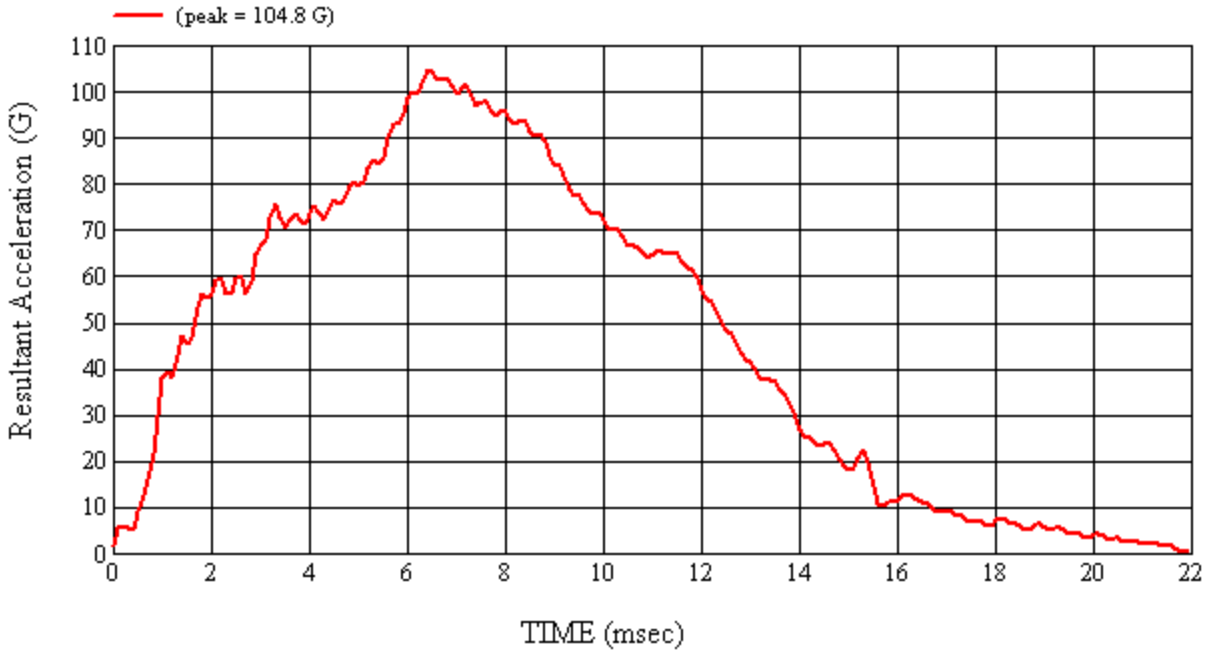
Non functional anchorage adjuster.

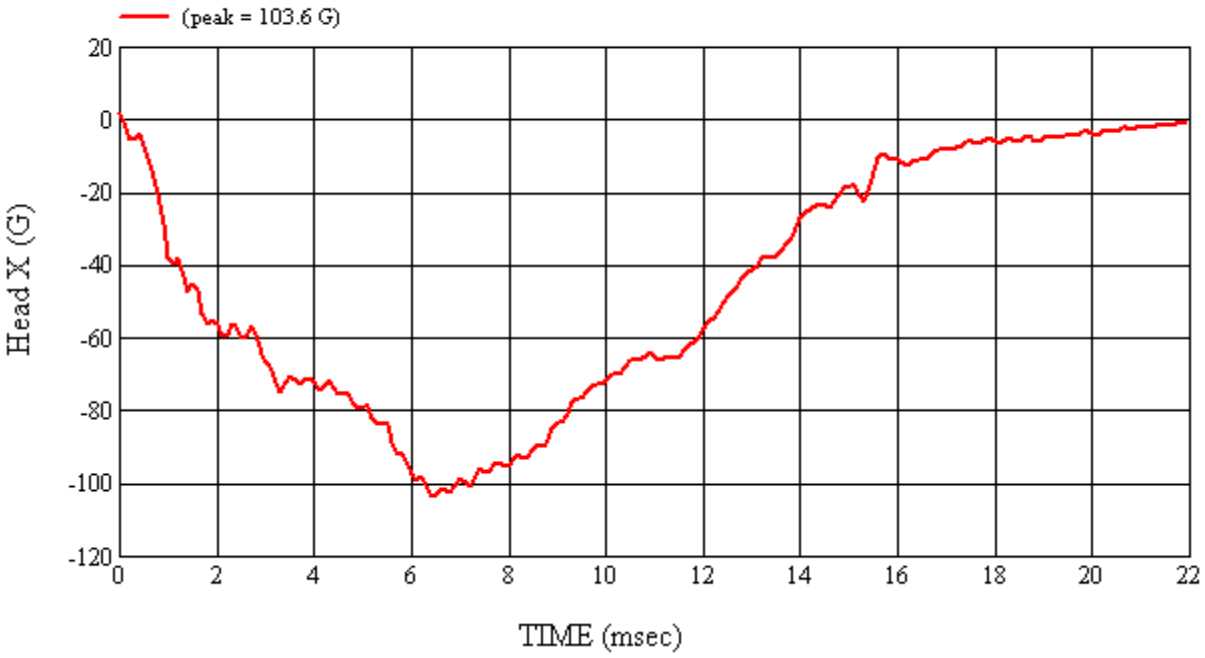
Recorded By: _____ Approved By*: _____ Date: 5/12/2011

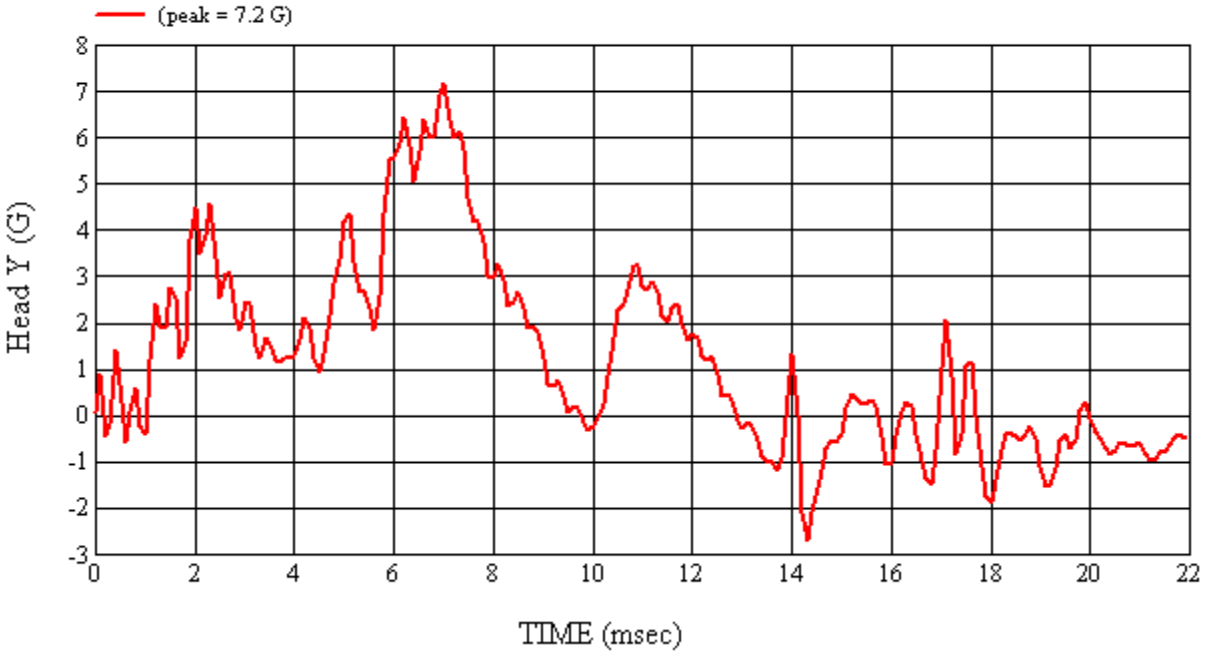
*Only necessary for NHTSA (Government) Compliance testing.

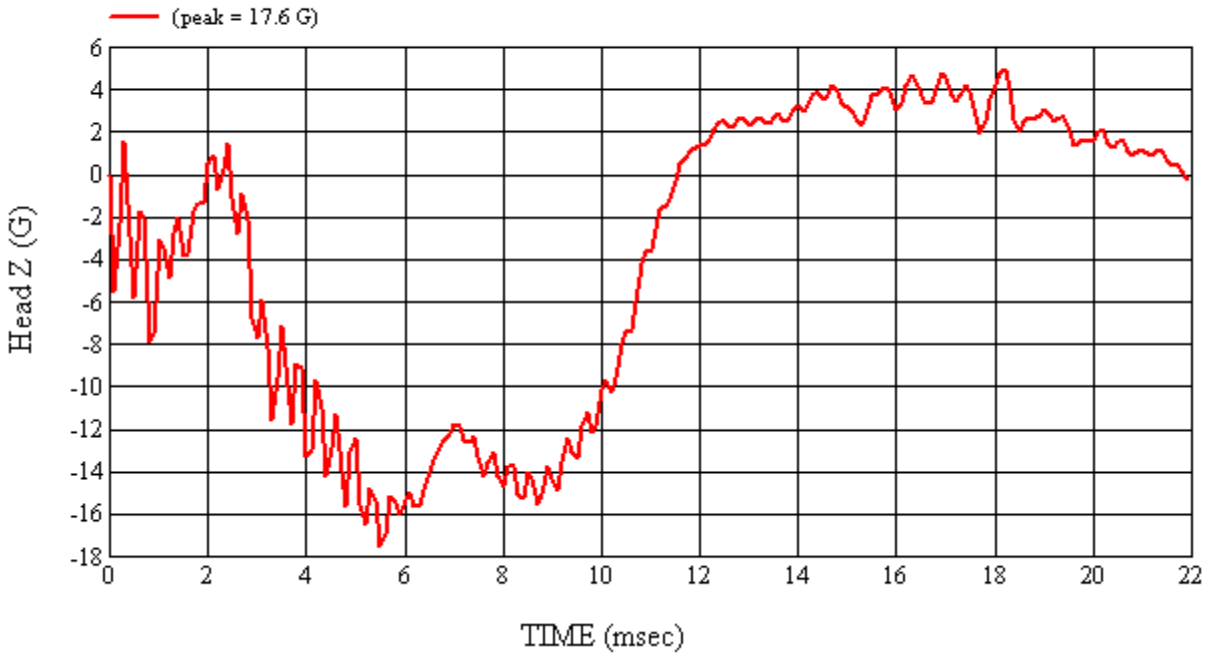
MGA Test #: U11160 Target Location: BP2, Left Side Test Date: 5/12/2011

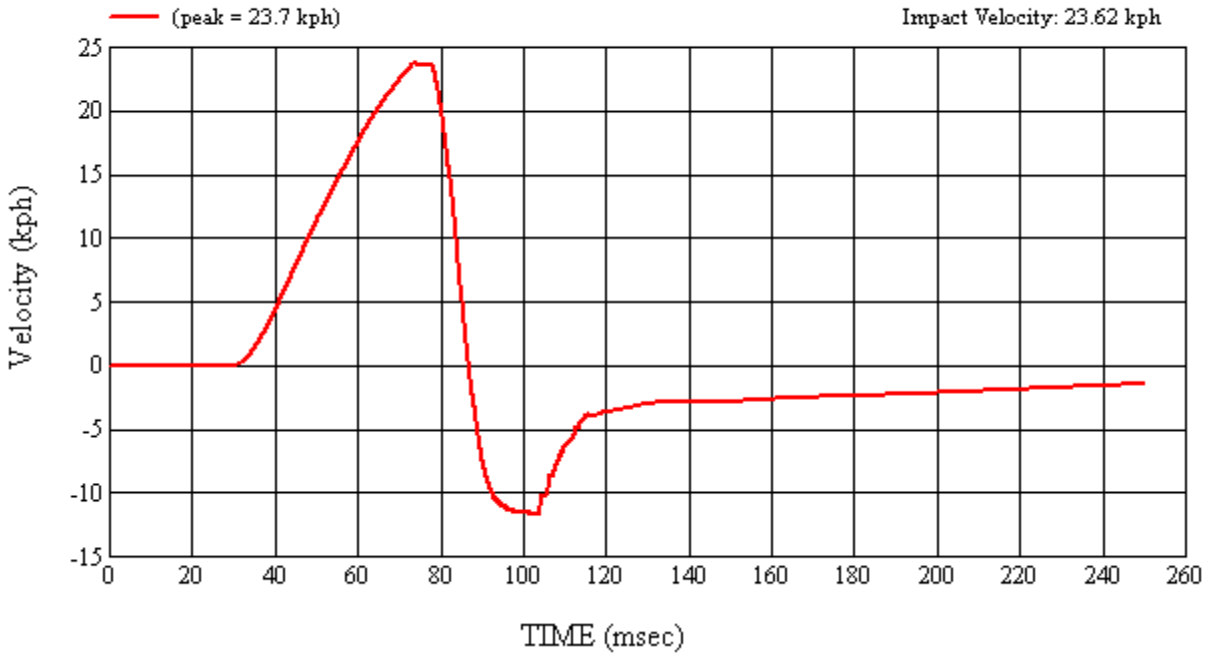


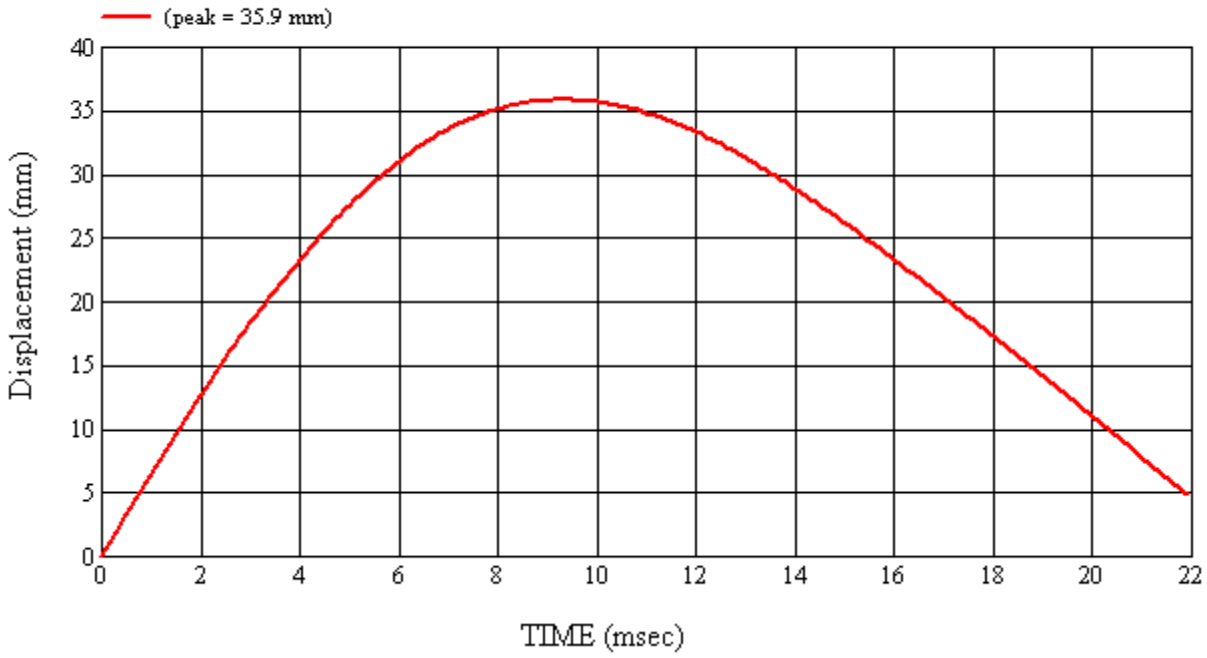


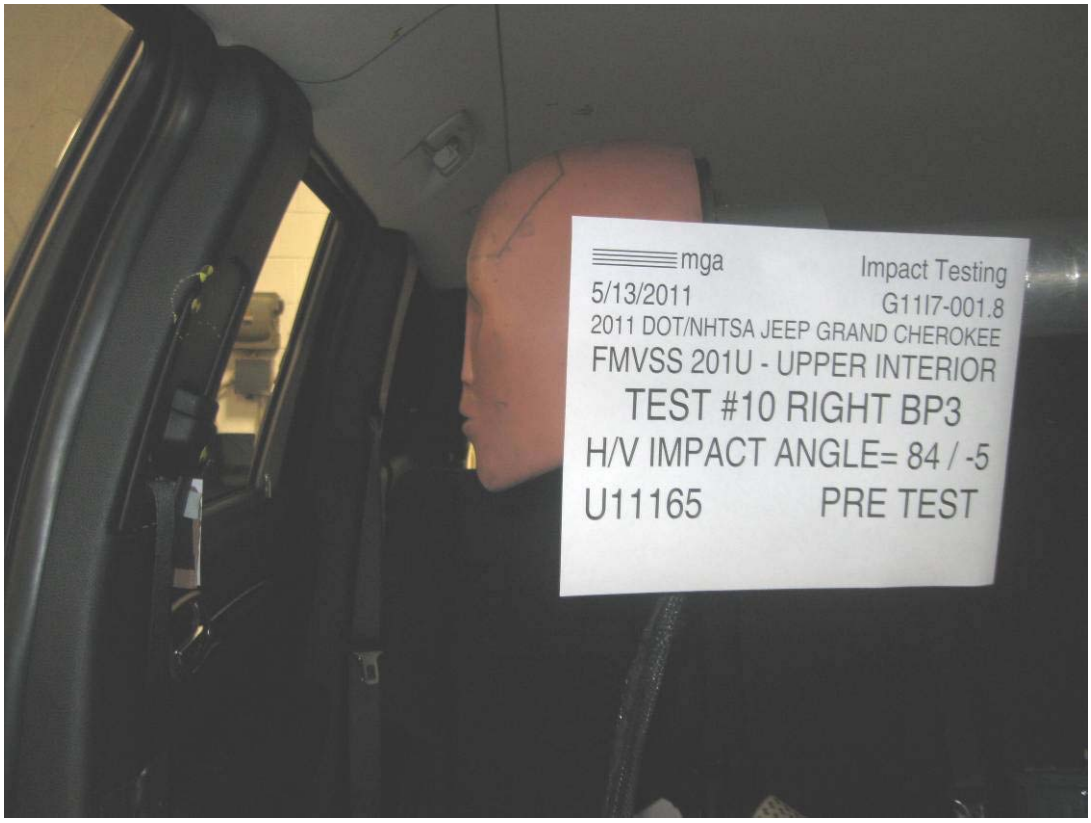

(peak = 103.6 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 7.2 G)
Head Y (G)
8
7
6
5
4
3
2
1
0
-1
-2
-3
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

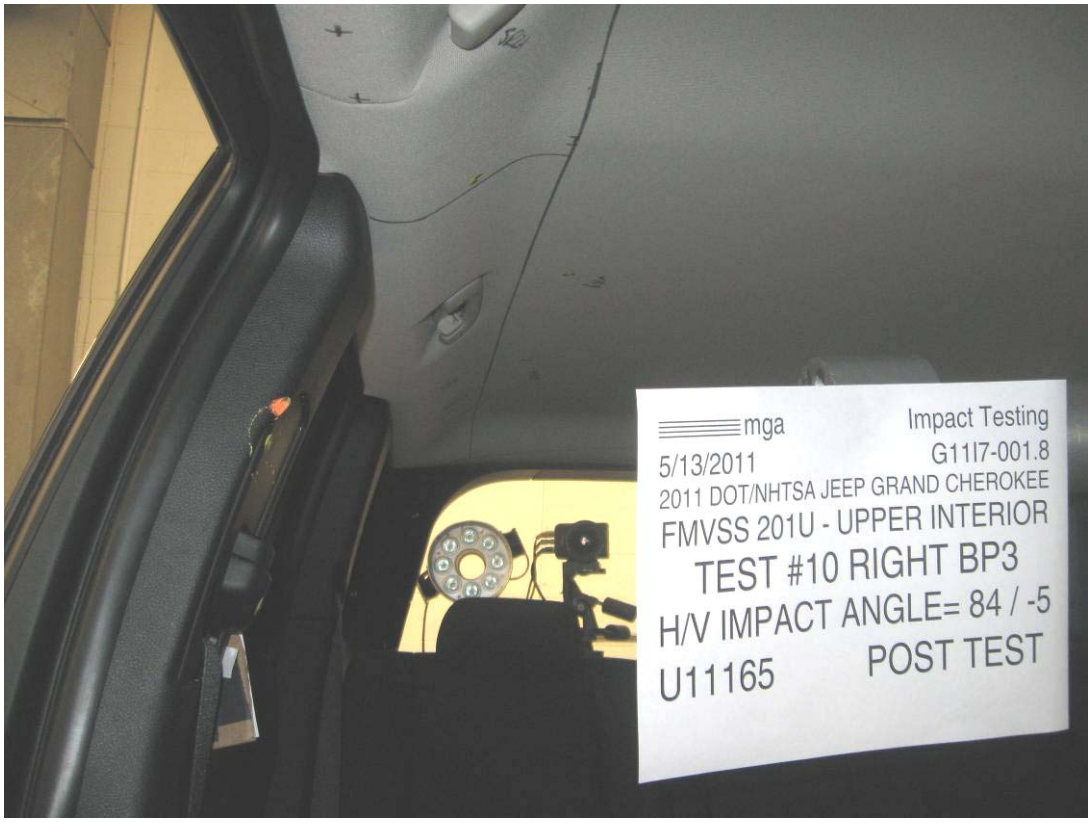

(peak = 17.6 G)
Head Z (G)
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.7 kph)
Impact Velocity: 23.62 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)

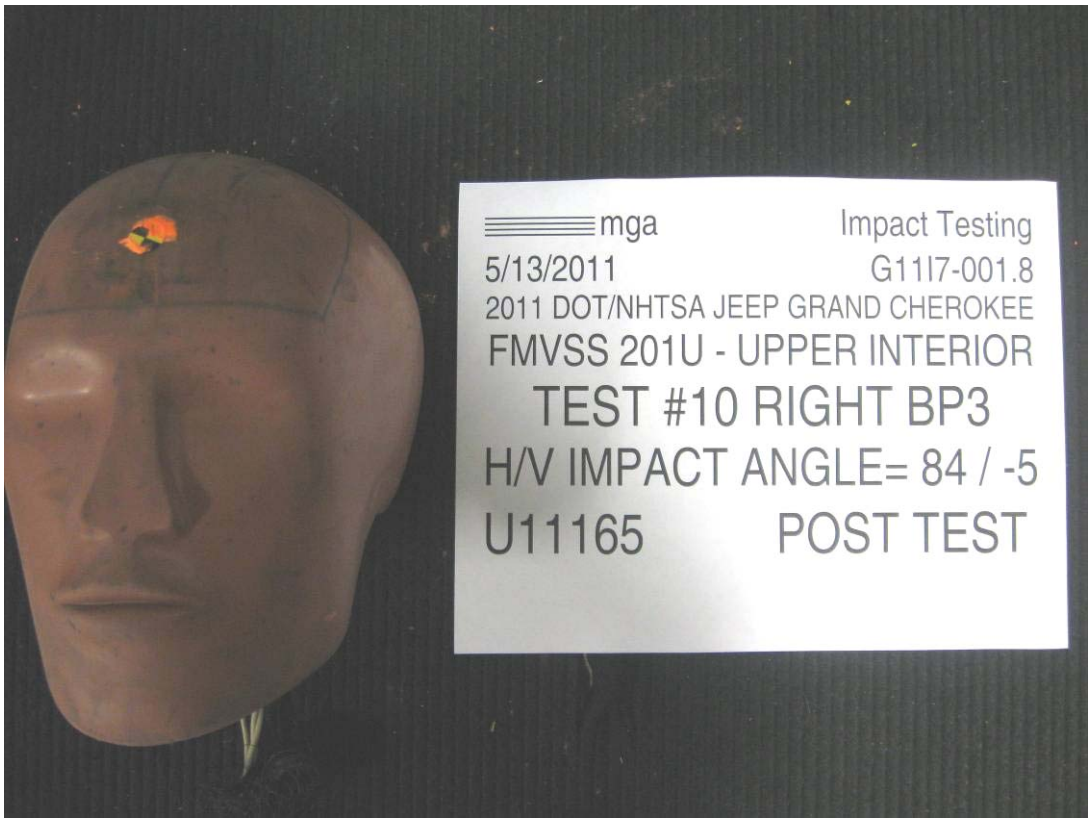

(peak = 35.9 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP3
H/V IMPACT ANGLE= 84 / -5
U11165
PRE TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP3
H/V IMPACT ANGLE= 84 / -5
U11165
PRE TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP3
H/V IMPACT ANGLE= 84 / -5
U11165
POST TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP3
H/V IMPACT ANGLE= 84 / -5
U11165
POST TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP3
H/V IMPACT ANGLE= 84 / -5
U11165
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#10

Target (Vehicle Side): BP3Right

Temperature:23.0C

MGA Test Reference No.:U11165

Humidity:59.8%

Approach Horizontal Angles:84º

Time of Test:2:45:02 PM

Approach Vertical Angles:-5º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

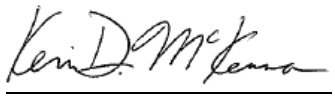
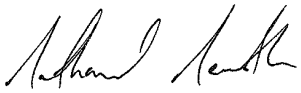
HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
637	624	8.3	24.1	27	2 Right

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

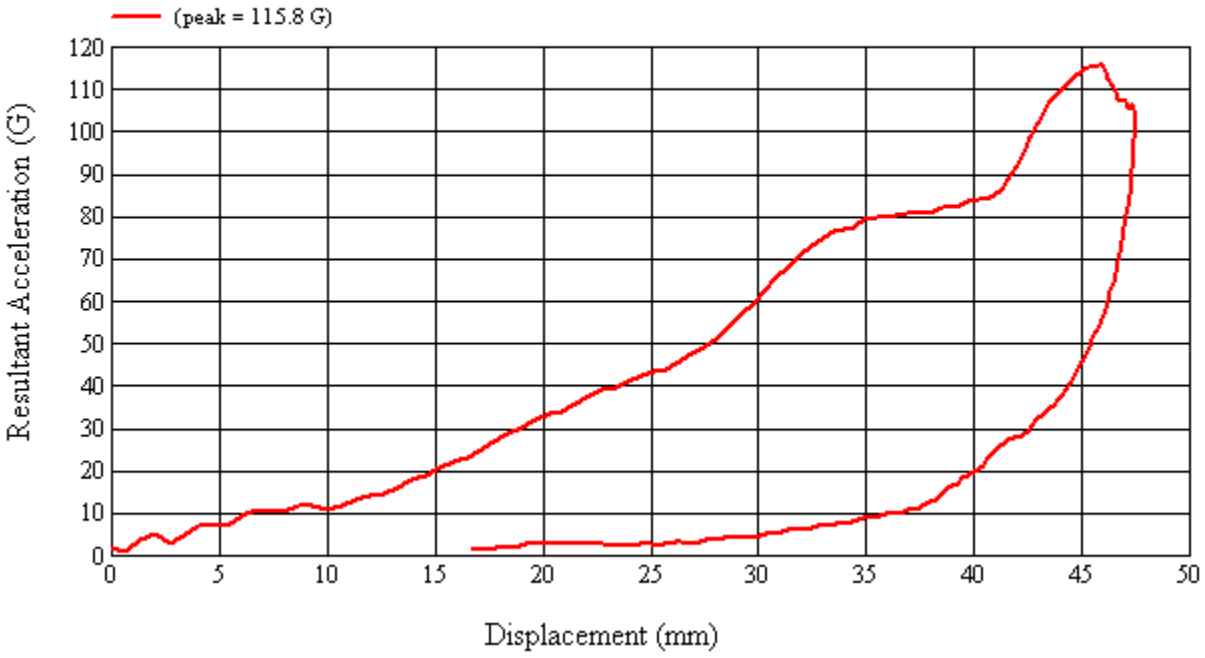
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

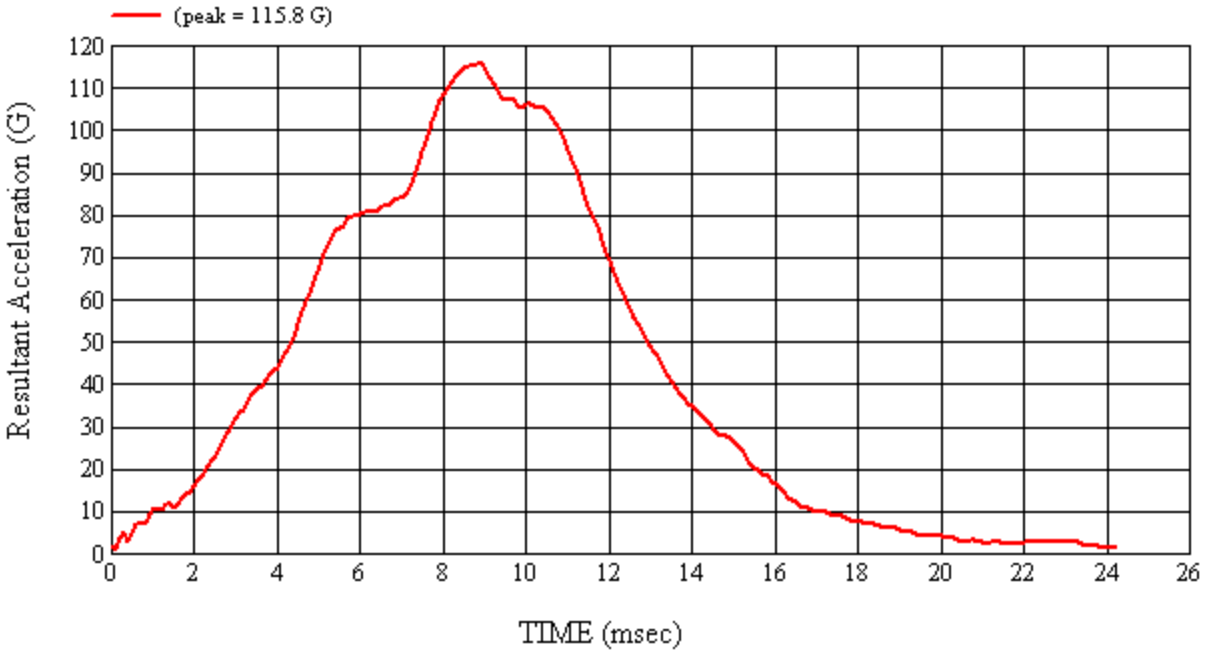
Loose anchorage adjuster cover

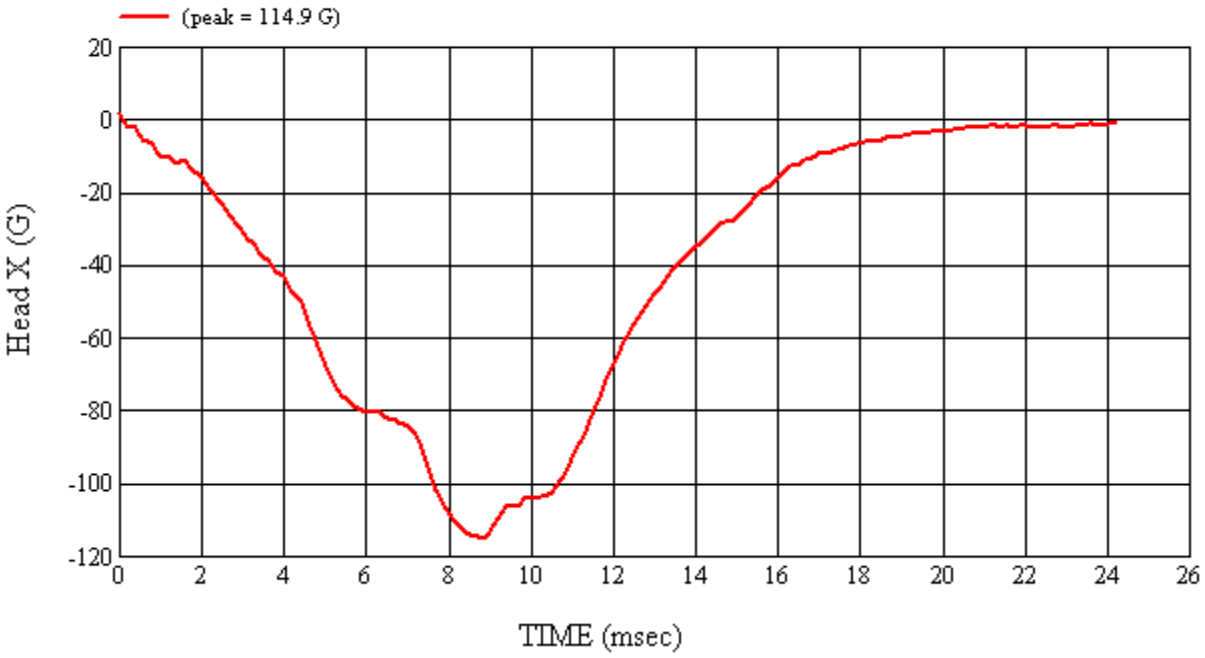
Recorded By:  Approved By*:  Date: 5/13/2011

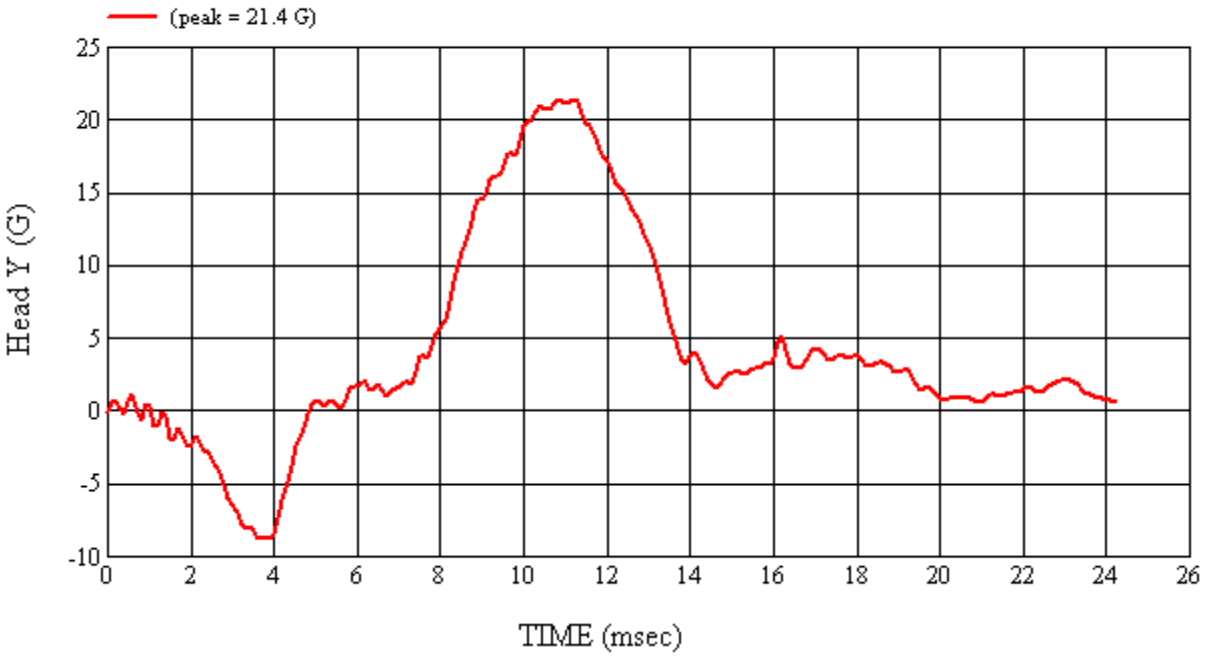
*Only necessary for NHTSA (Government) Compliance testing.

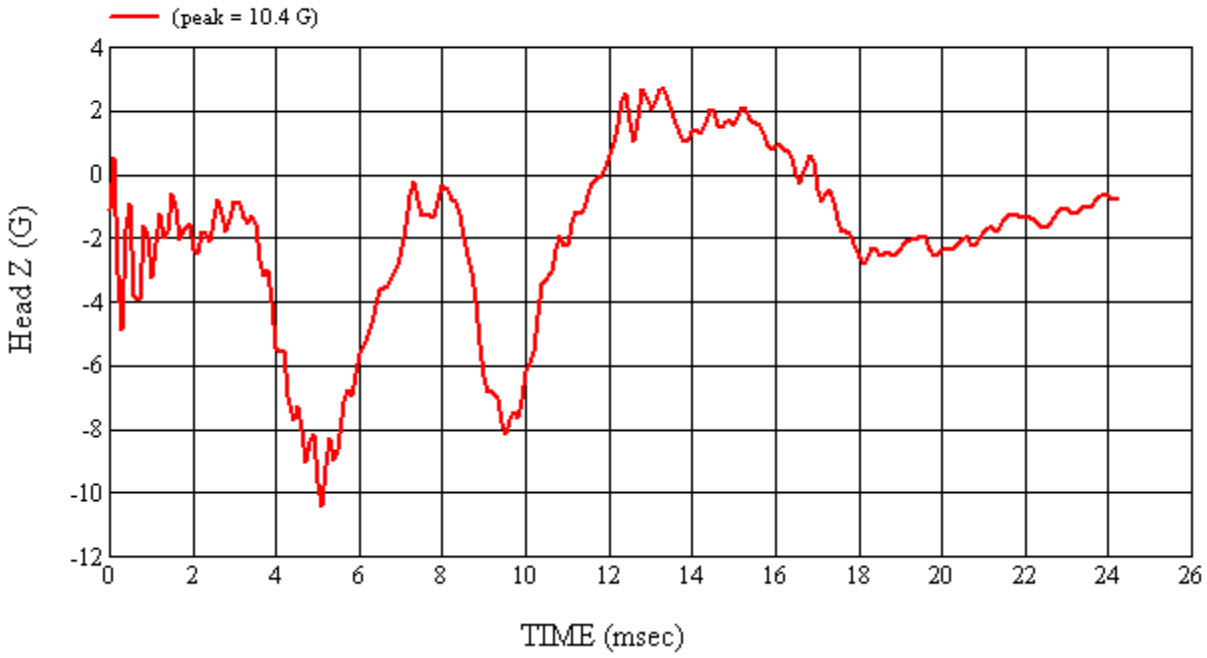
MGA Test #: U11165 Target Location: BP3, Right Side Test Date: 5/13/2011

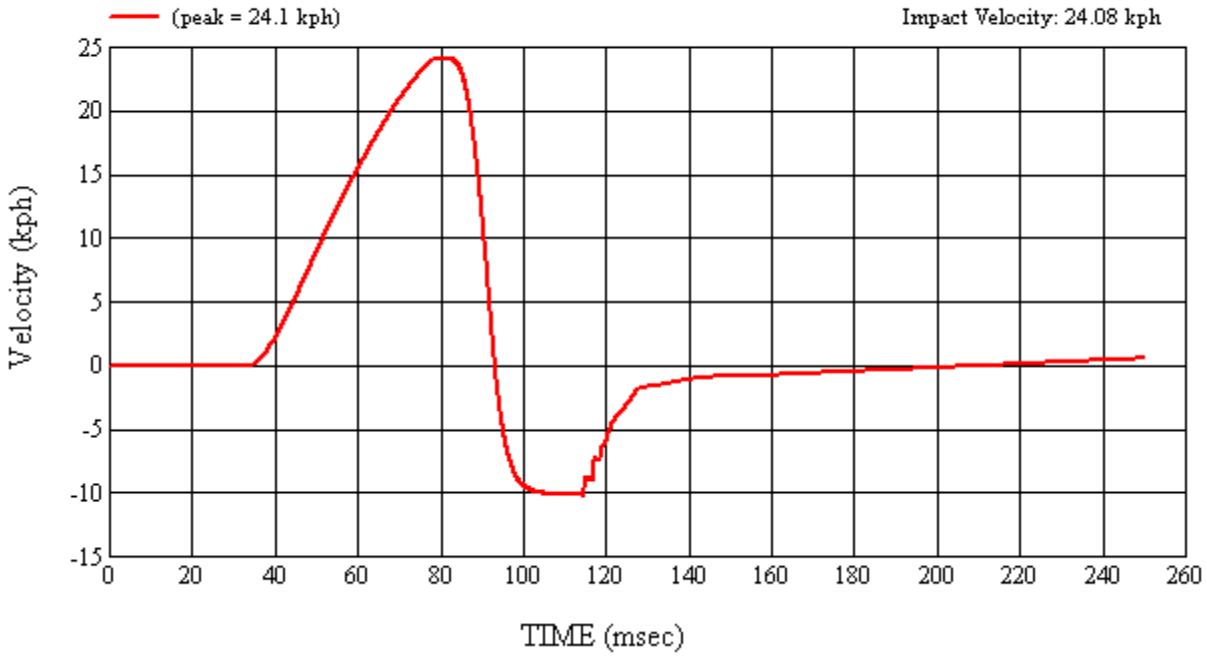


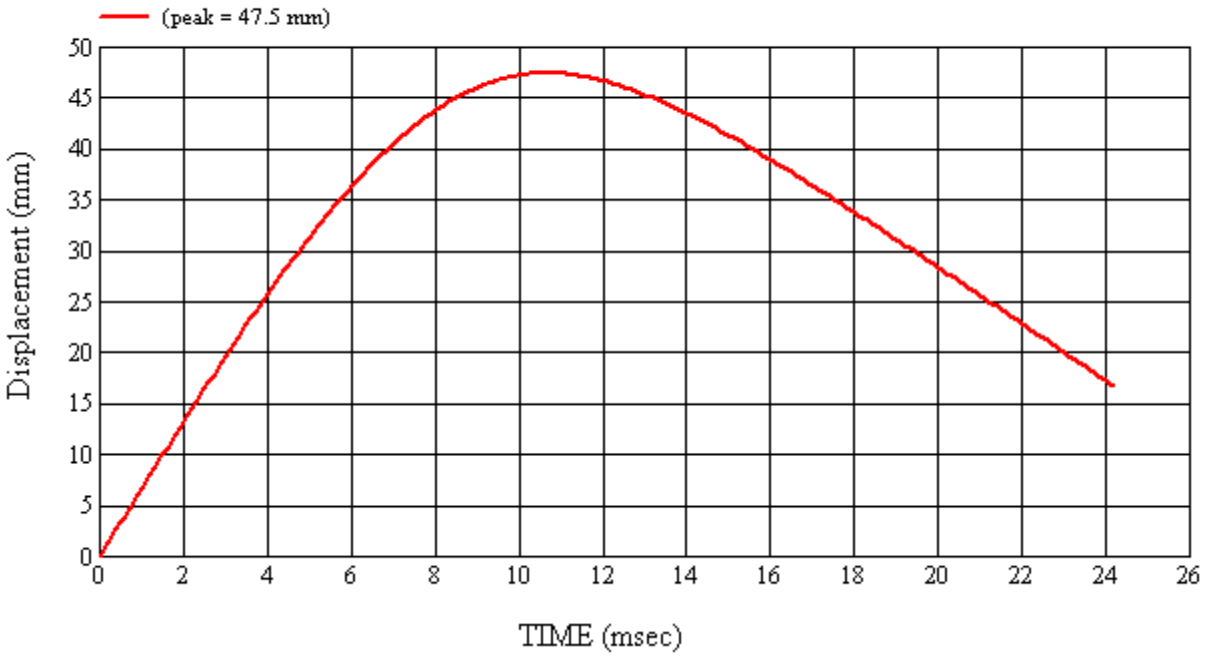


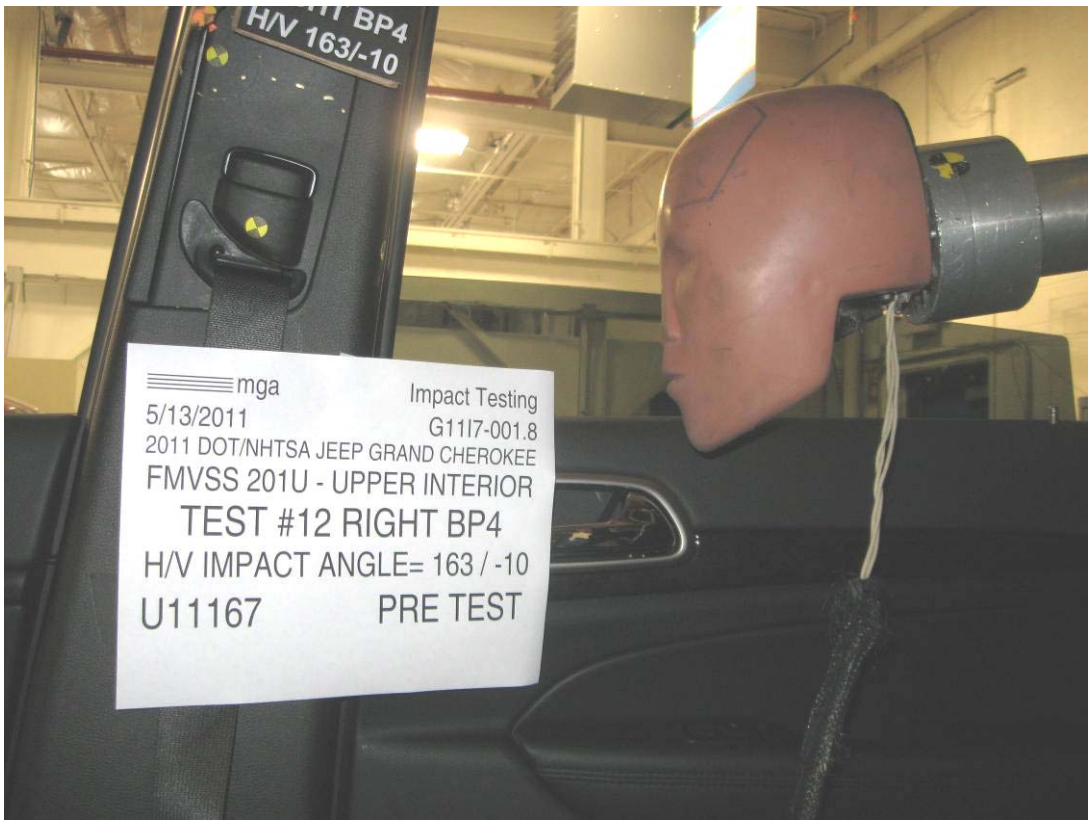

(peak = 114.9 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

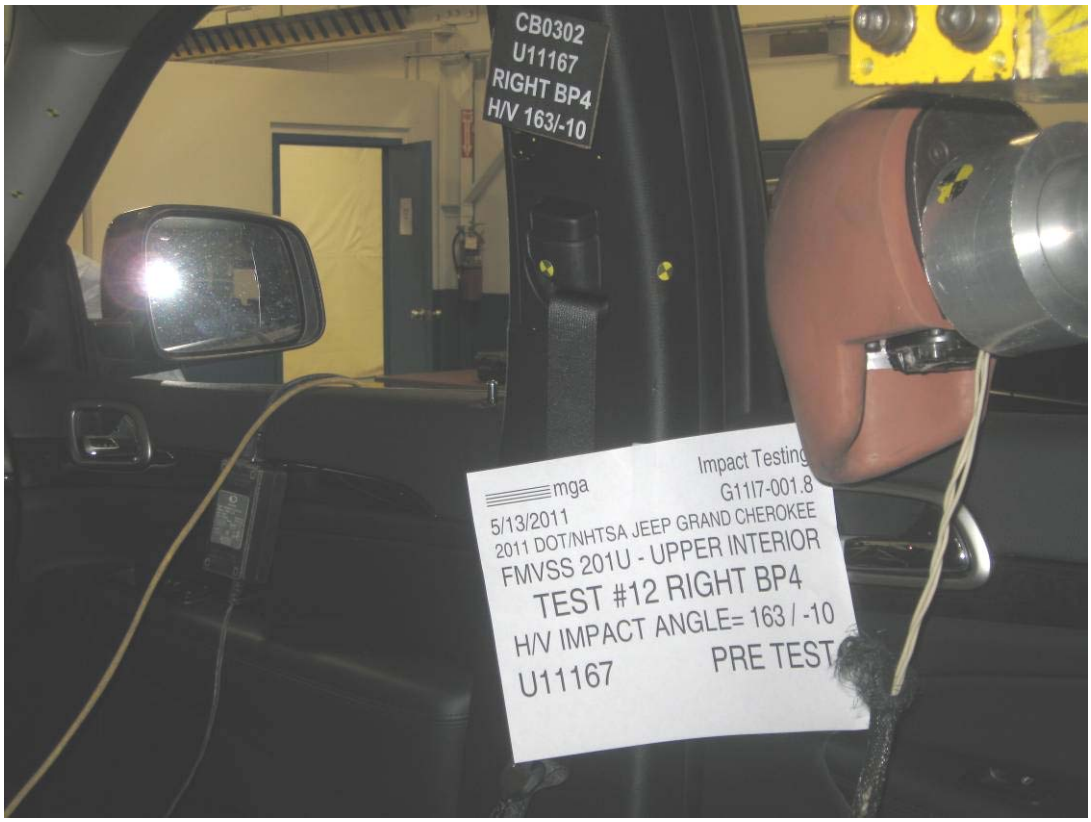

(peak = 21.4 G)
Head Y (G)
25
20
15
10
5
0
-5
-10
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 10.4 G)
Head Z (G)
4
2
0
-2
-4
-6
-8
-10
-12
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

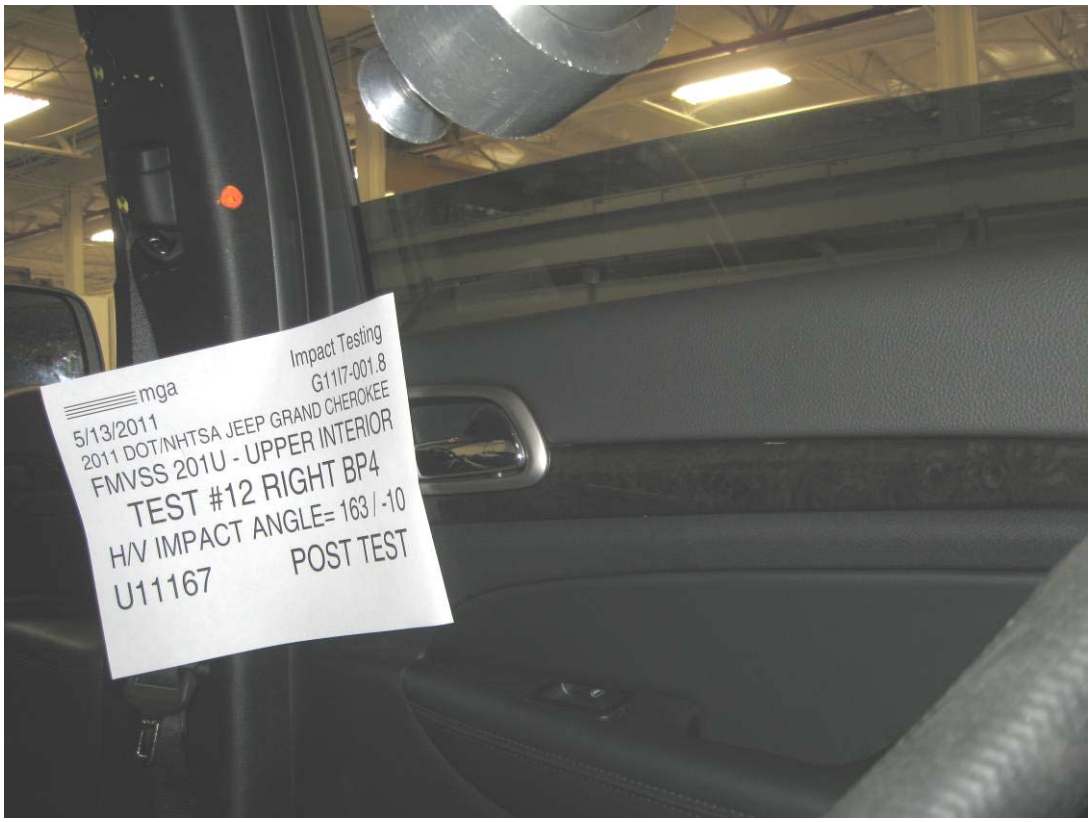

(peak = 24.1 kph)
Impact Velocity: 24.08 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 47.5 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


H/V 163/-10
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 163 / -10
U11167
PRE TEST


CB0302
U11167
RIGHT BP4
H/V 163/-10
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 163 / -10
U11167
PRE TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 163 / -10
U11167
POST TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 163 / -10
U11167
POST TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT BP4
H/V IMPACT ANGLE= 163 / -10
U11167
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#12

Target (Vehicle Side): BP4Right

Temperature:24.1C

MGA Test Reference No.:U11167

Humidity:58.7%

Approach Horizontal Angles:163º

Time of Test:6:19:08 PM

Approach Vertical Angles:-10º

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
510	455	7.7	24.1	30	12 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

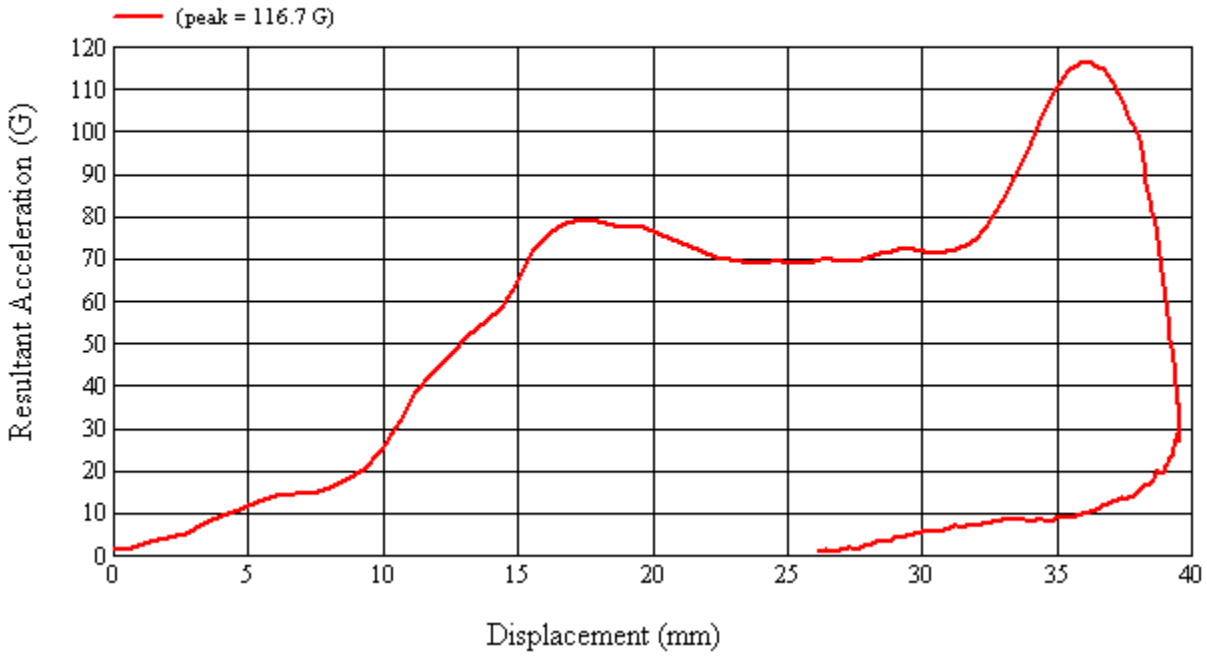
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

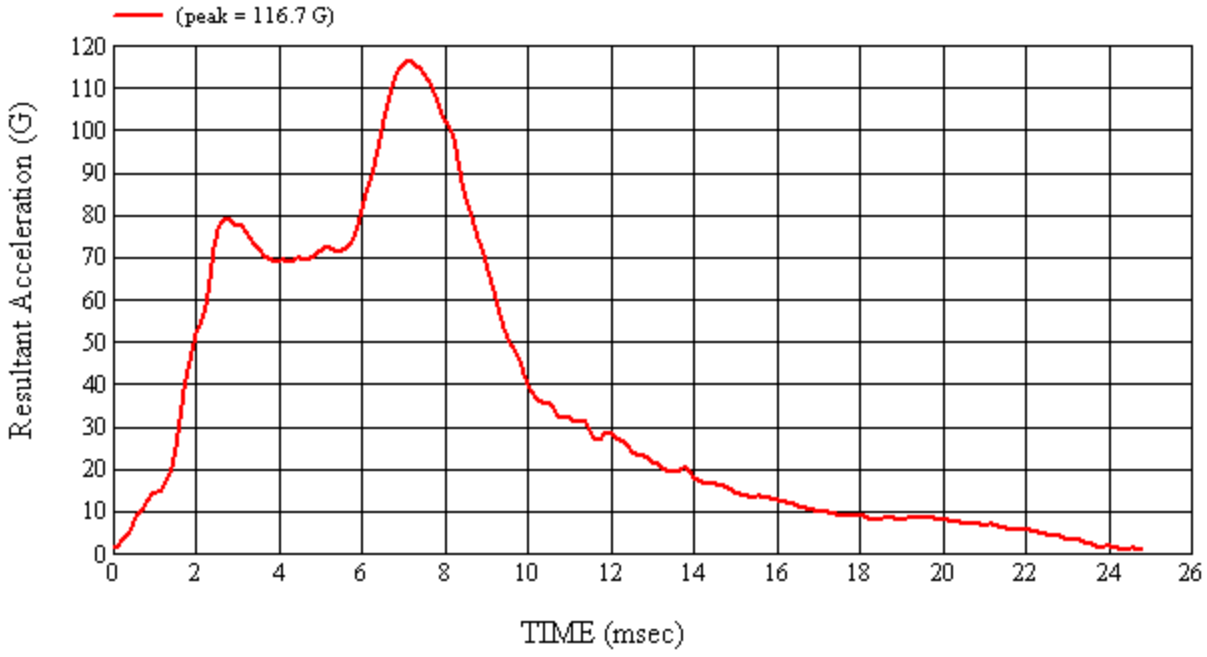
No visible damage

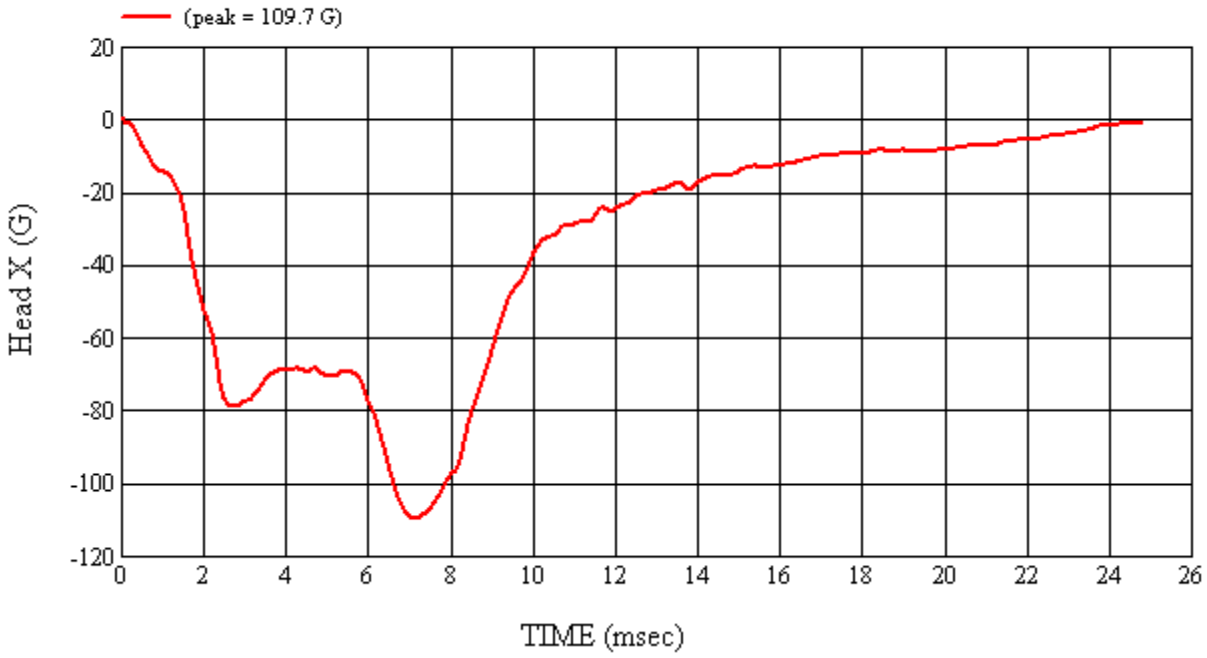
Recorded By: _____ Approved By*: _____ Date: 5/13/2011

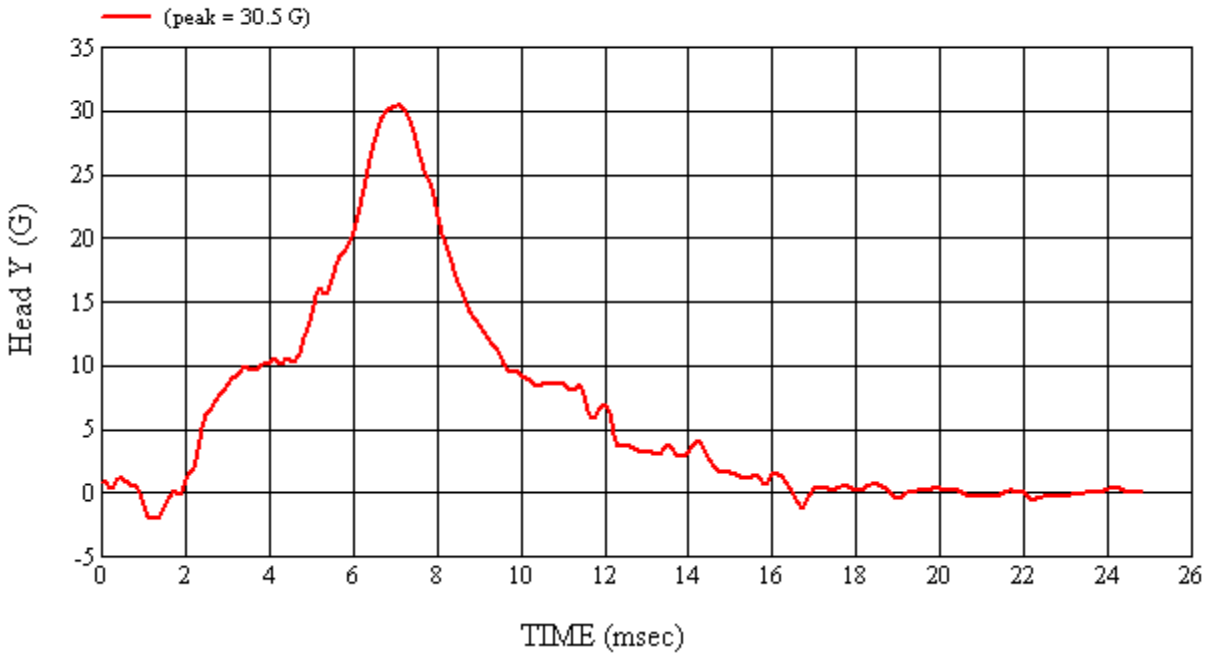
*Only necessary for NHTSA (Government) Compliance testing.

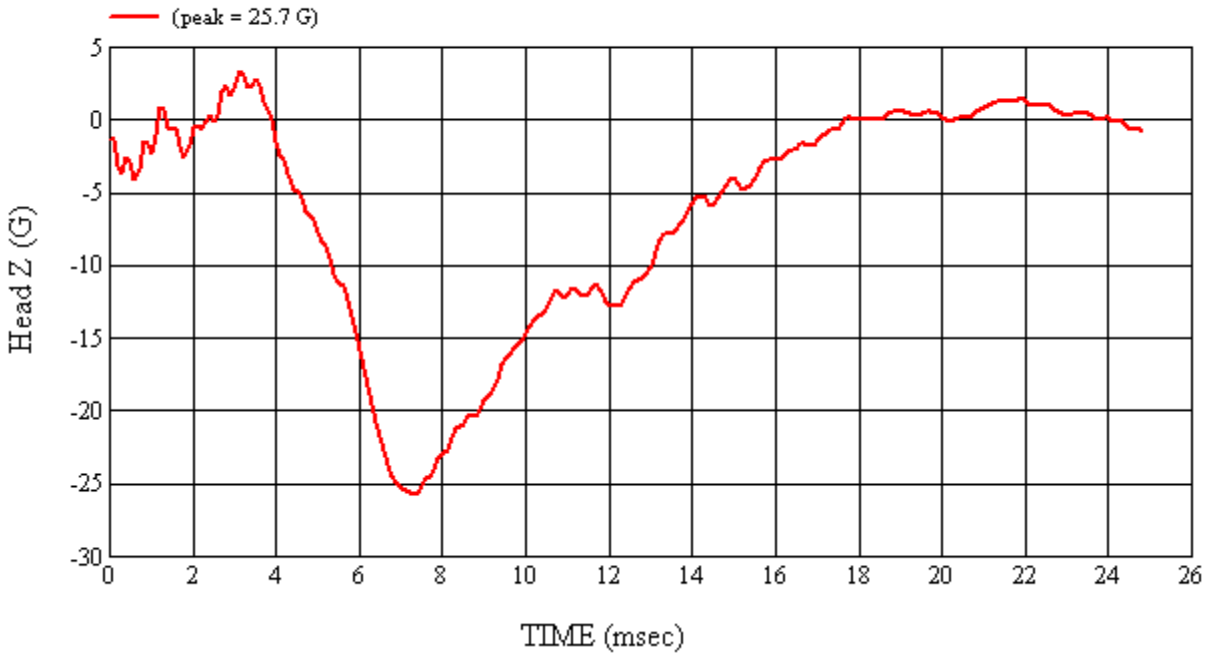
MGA Test #: U11167 Target Location: BP4, Right Side Test Date: 5/13/2011

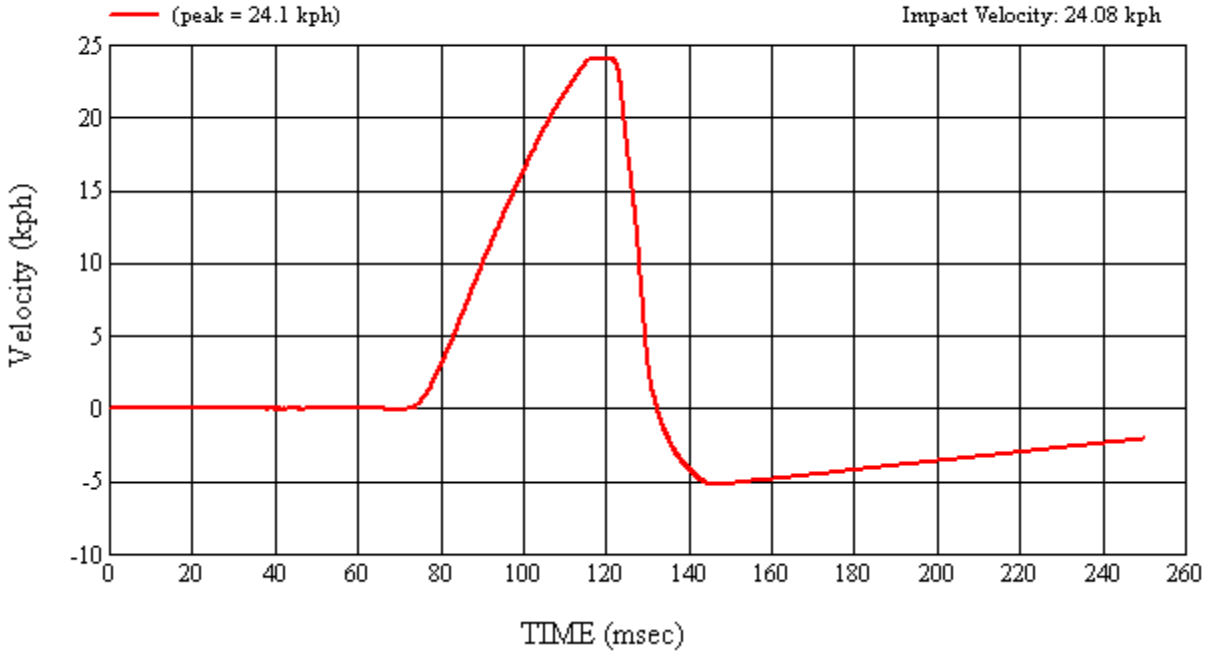


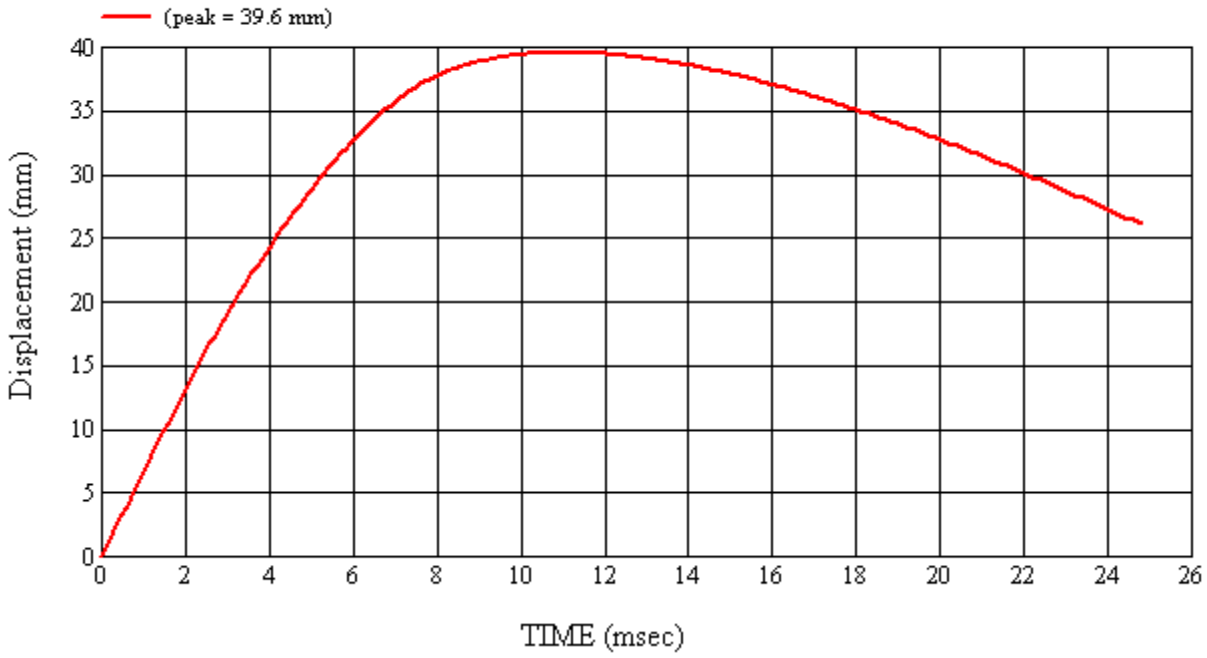



(peak = 109.7 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 30.5 G)
Head Y (G)
35
30
25
20
15
10
5
0
-5
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 25.7 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
TIME (msec)


(peak = 24.1 kph)
Impact Velocity: 24.08 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 = 39.6 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

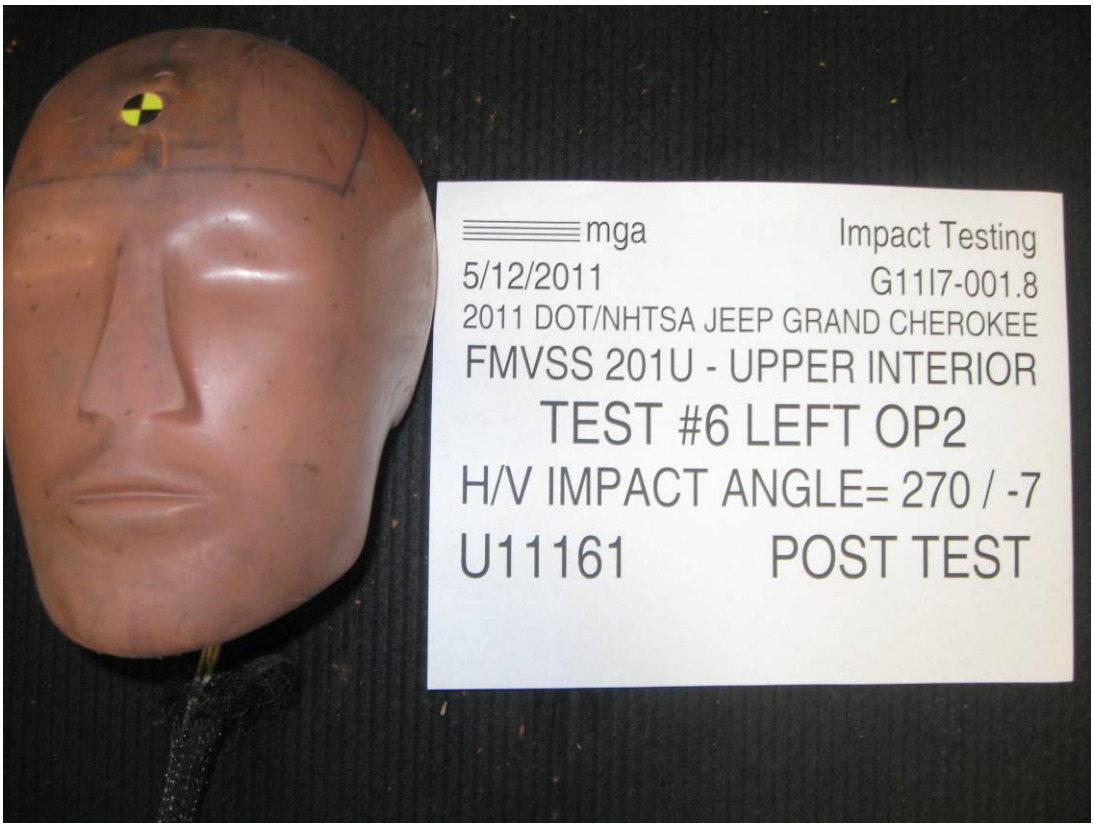

mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / -7
U11161
PRE TEST


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / -7
U11161
PRE TEST


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / -7
U11161
POST TEST


OP2
3P1
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / -7
U11161
POST TEST


OP2
BP1


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / -7
U11161
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): OP2Left

Temperature:24.3C

MGA Test Reference No.:U11161

Humidity:54.7%

Approach Horizontal Angles:270º

Time of Test:5:15:03 PM

Approach Vertical Angles:-7º

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
520	468	9.9	24.1	24	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

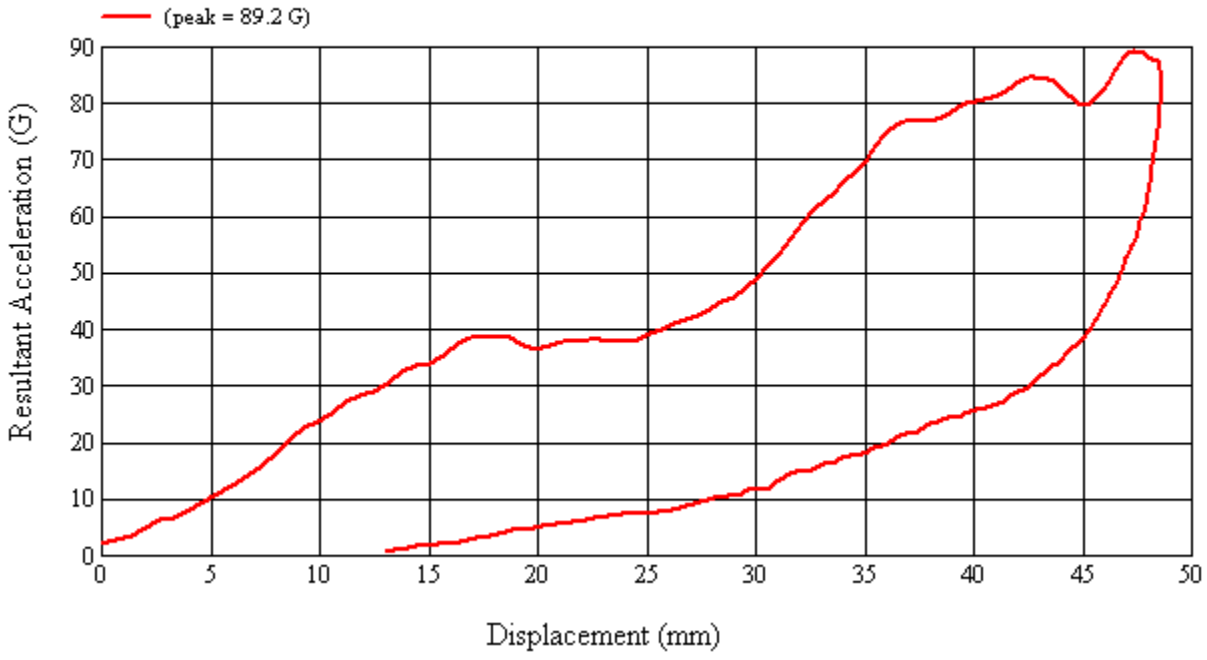
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

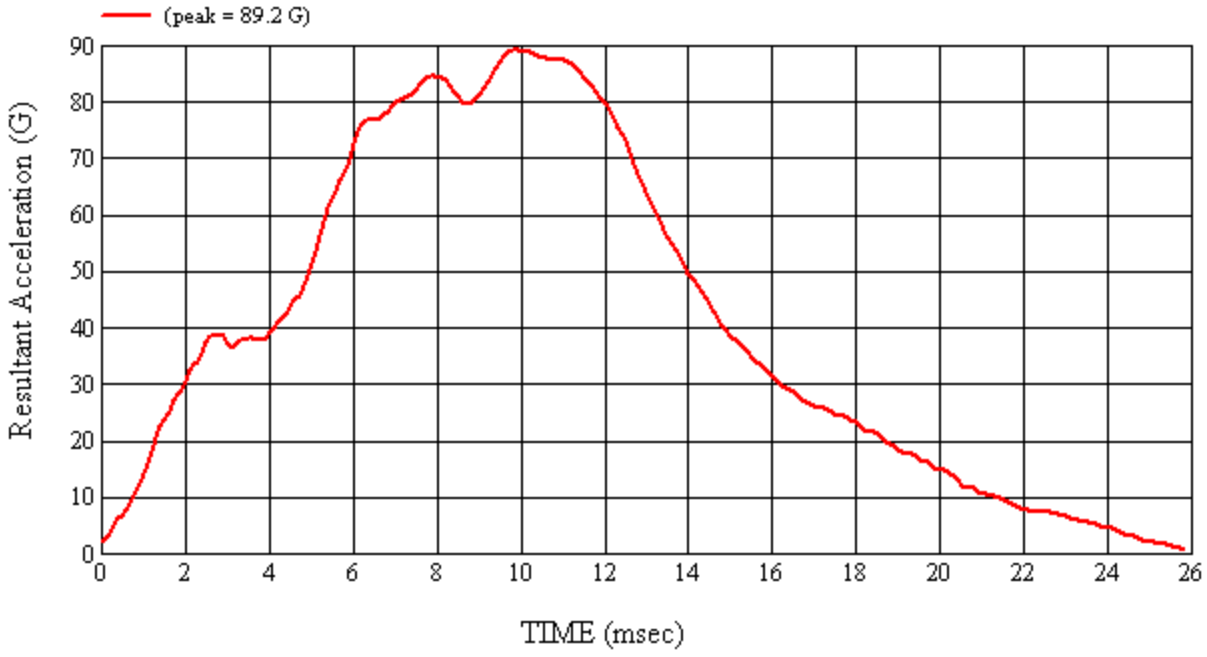
No visible damage

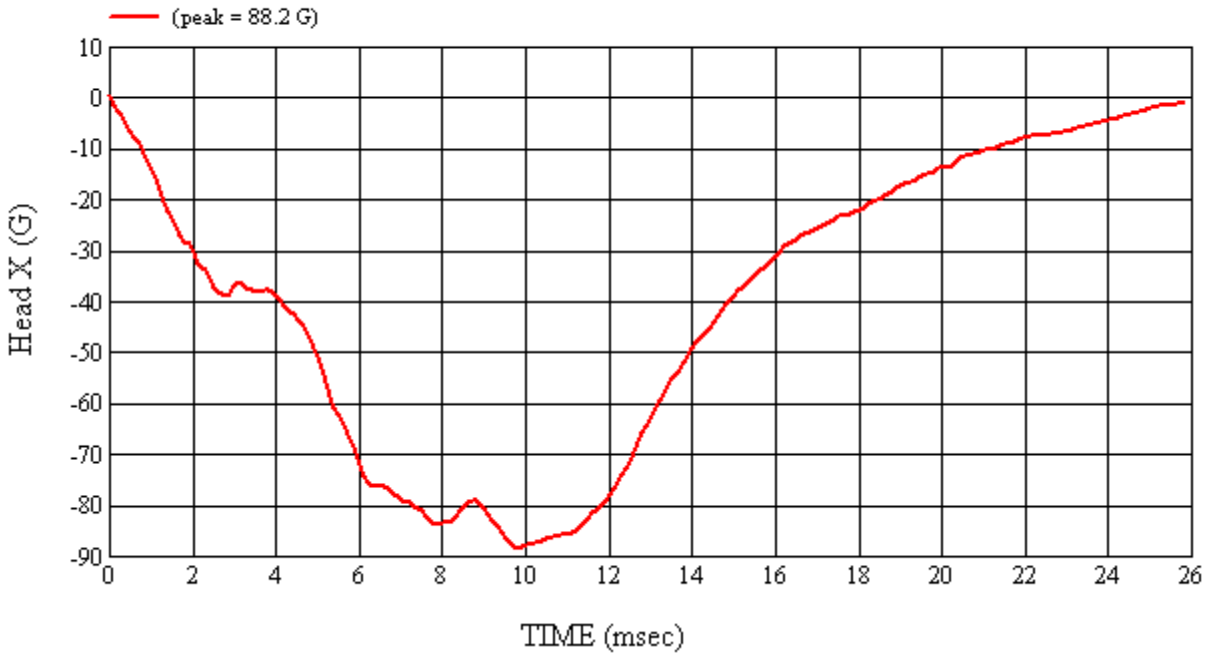
Recorded By: _____ Approved By*: _____ Date: 5/12/2011

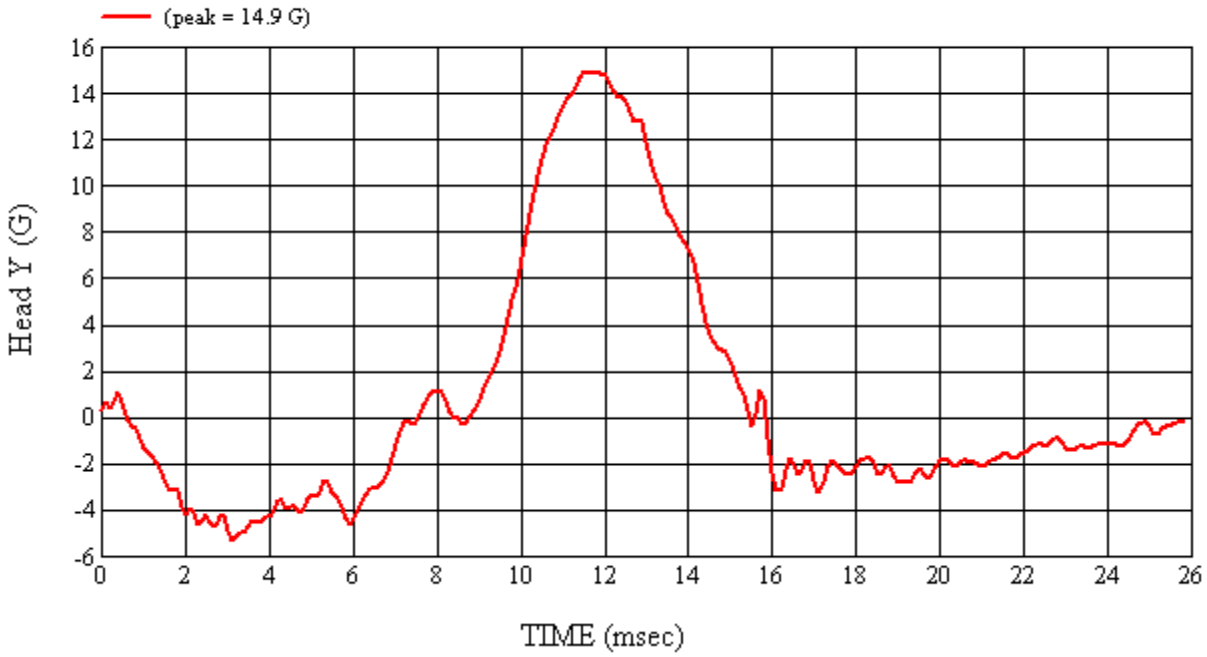
*Only necessary for NHTSA (Government) Compliance testing.

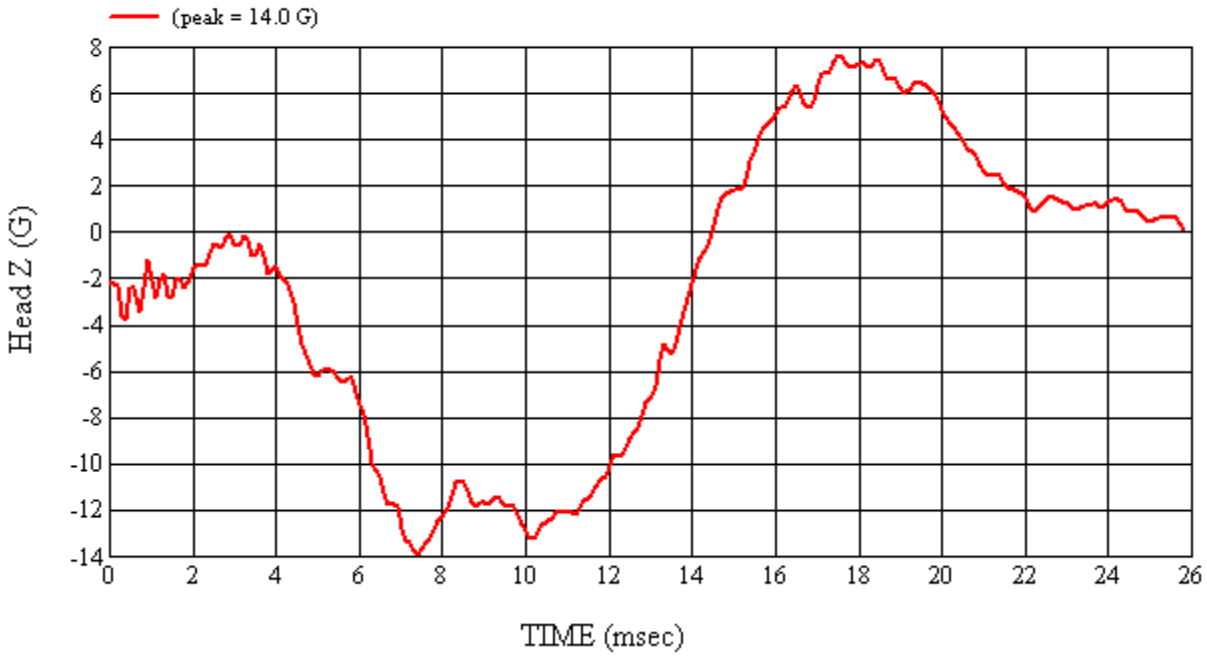
MGA Test #: U11161 Target Location: OP2, Left Side Test Date: 5/12/2011

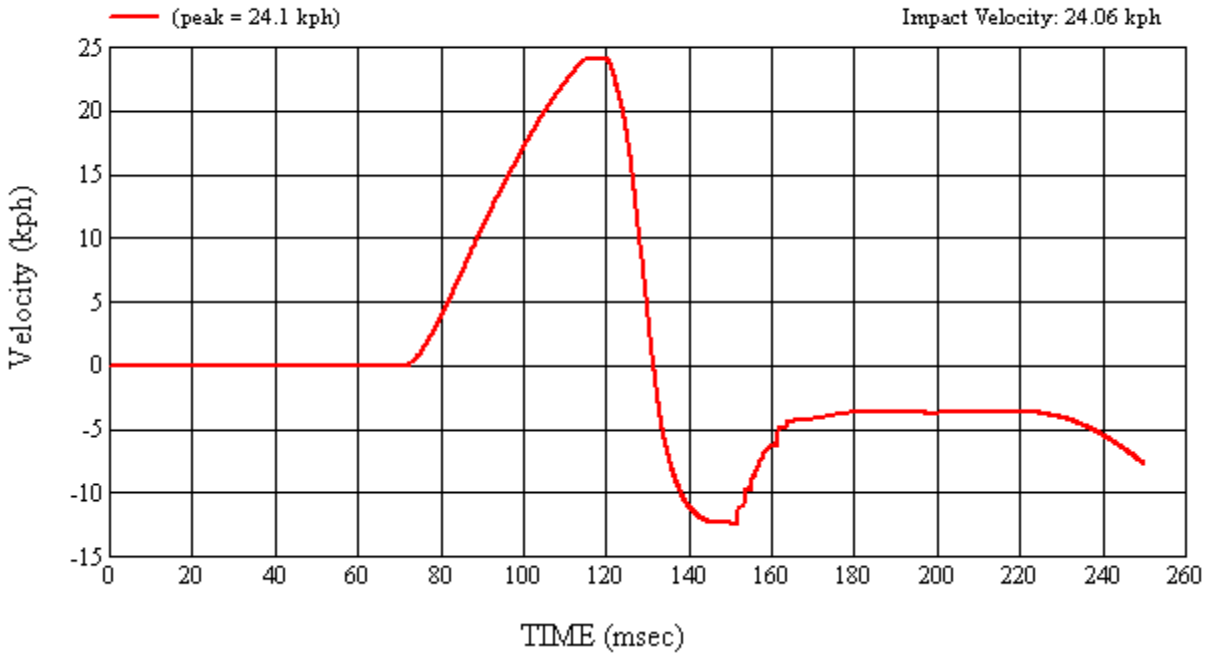


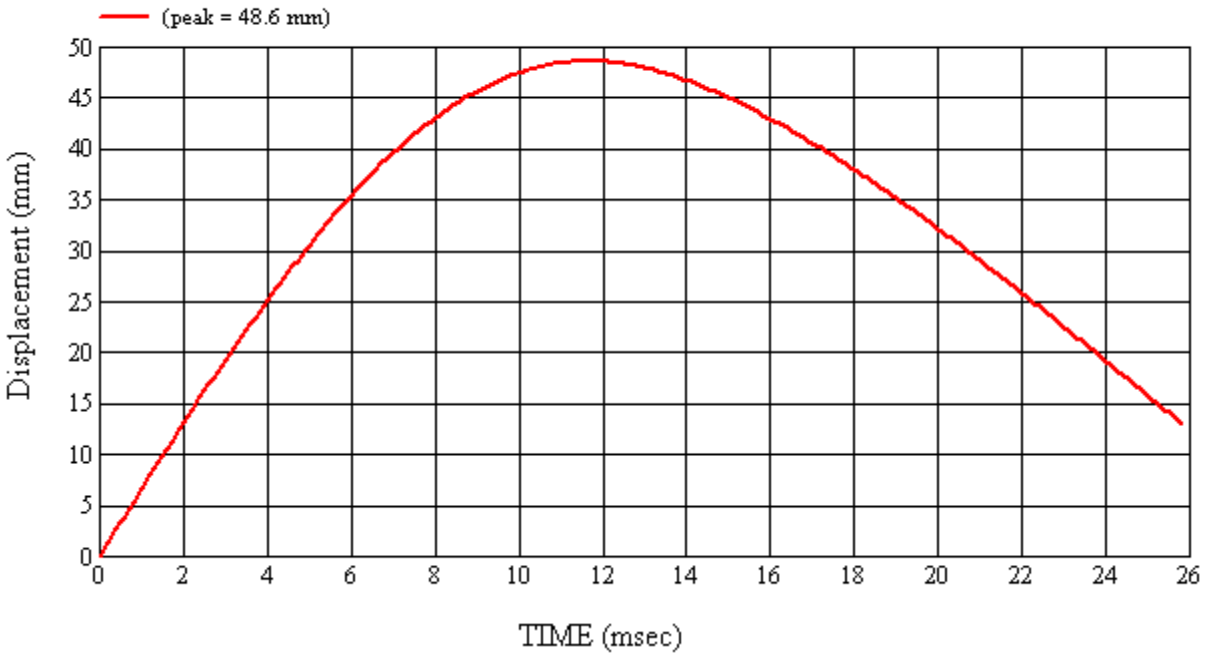



(peak = 88.2 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 14.9 G)
Head Y (G)
16
14
12
10
8
6
4
2
0
-2
-4
-6
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 14.0 G)
Head Z (G)
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 24.1 kph)
Impact Velocity: 24.06 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 = 48.6 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


mga
Impact Testing
G11I7-001.8
5/13/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11163
PRE TEST


mga
Impact Testing
G11I7-001.8
5/13/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11163
PRE TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11163
POST TEST


10TON
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11163
POST TEST


FH1


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT FH1
H/V IMPACT ANGLE= 180 / 50
U11163
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): FH1Right

Temperature:22.9C

MGA Test Reference No.:U11163

Humidity:56.2%

Approach Horizontal Angles:180º

Time of Test:10:40:58 AM

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
728	745	4.6	23.7	25	8 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

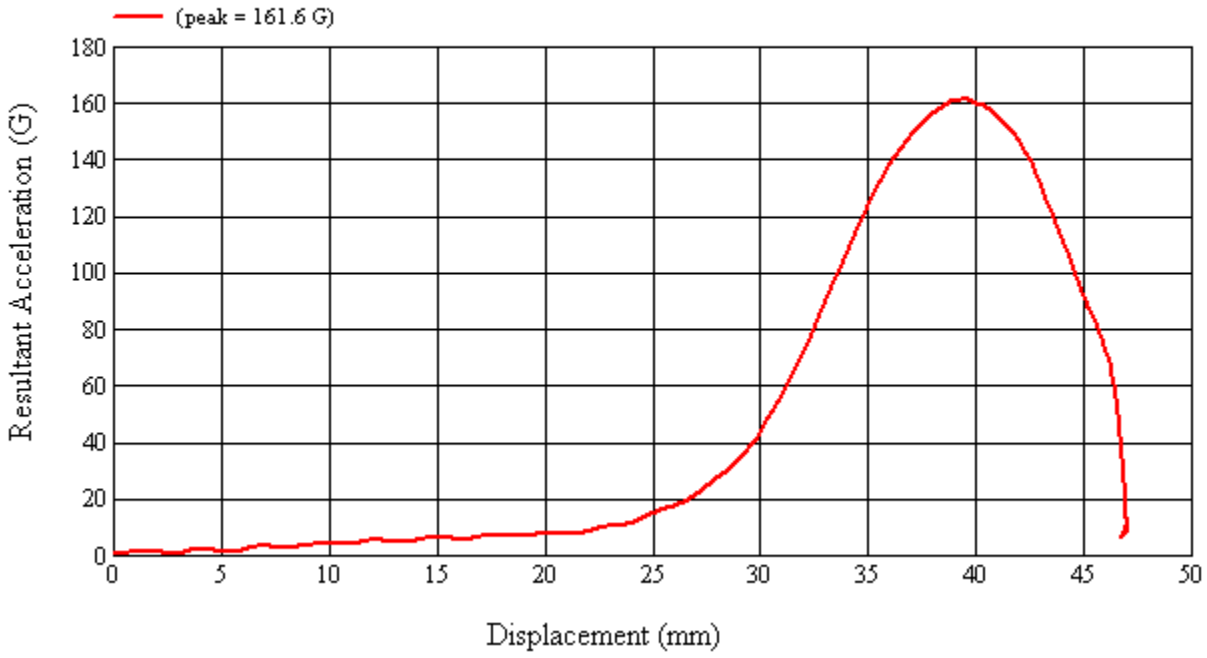
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

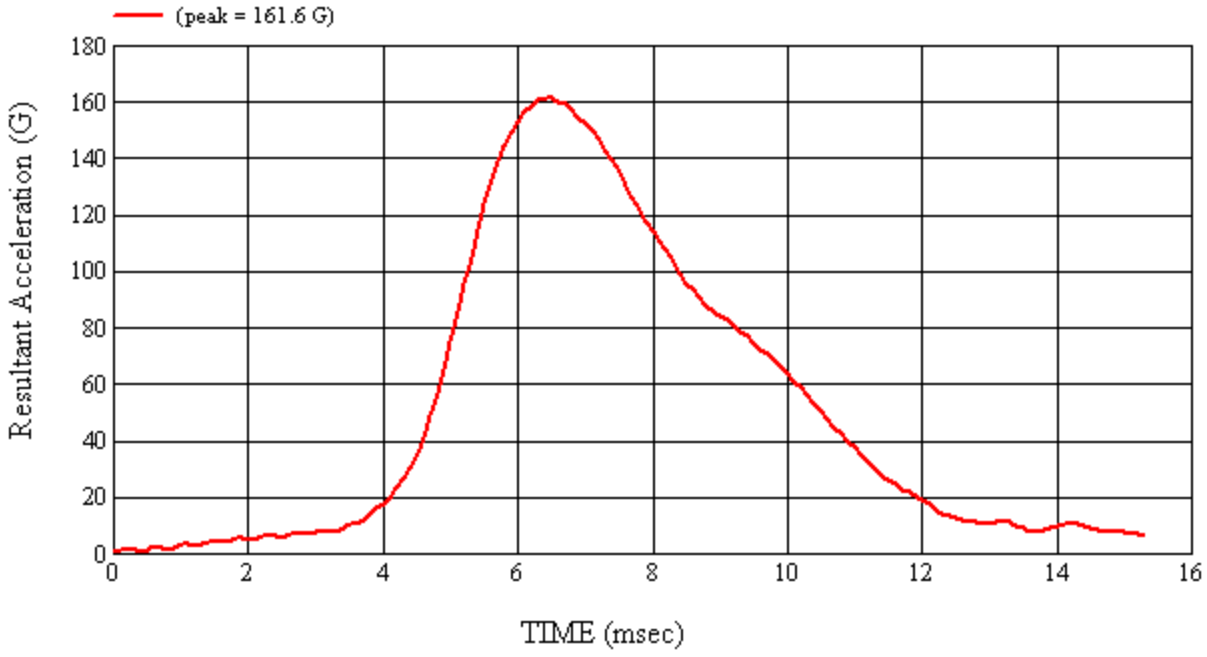
No visible damage

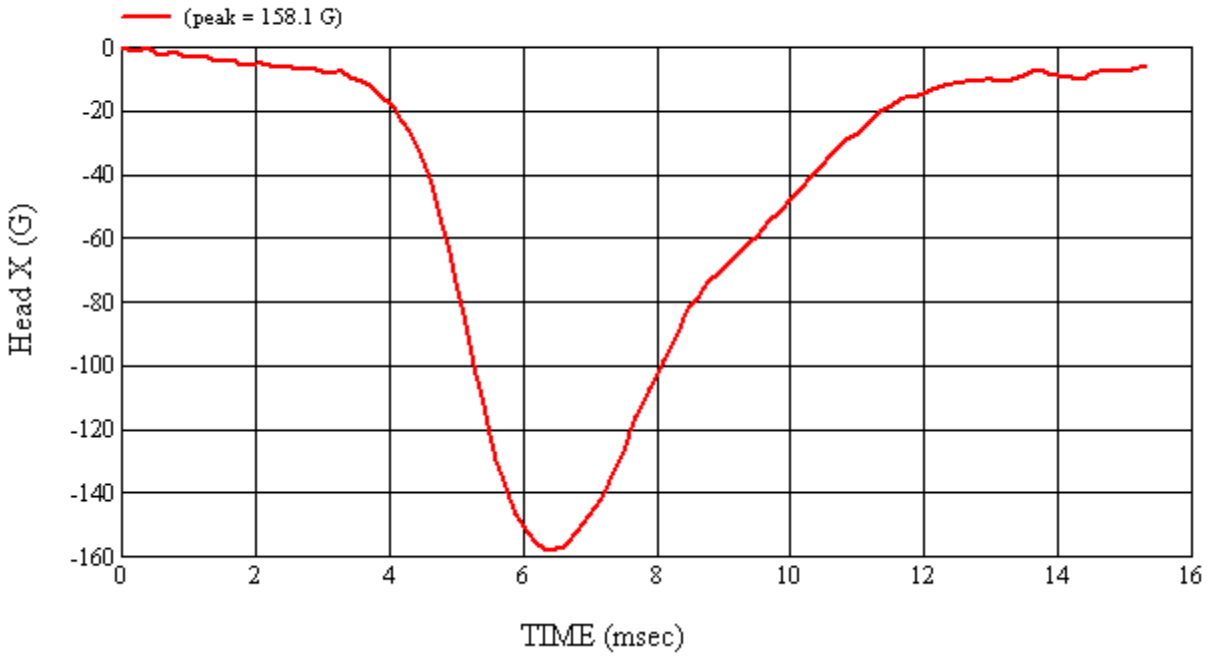
Recorded By: _____ Approved By*: _____ Date: 5/13/2011

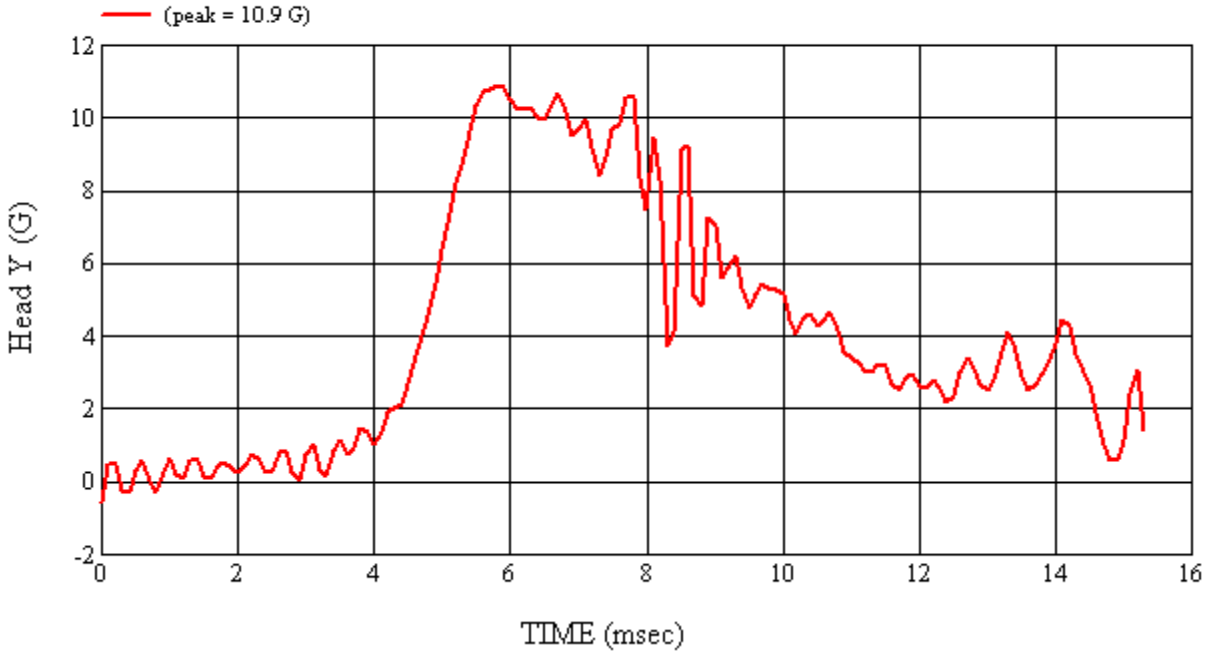
*Only necessary for NHTSA (Government) Compliance testing.

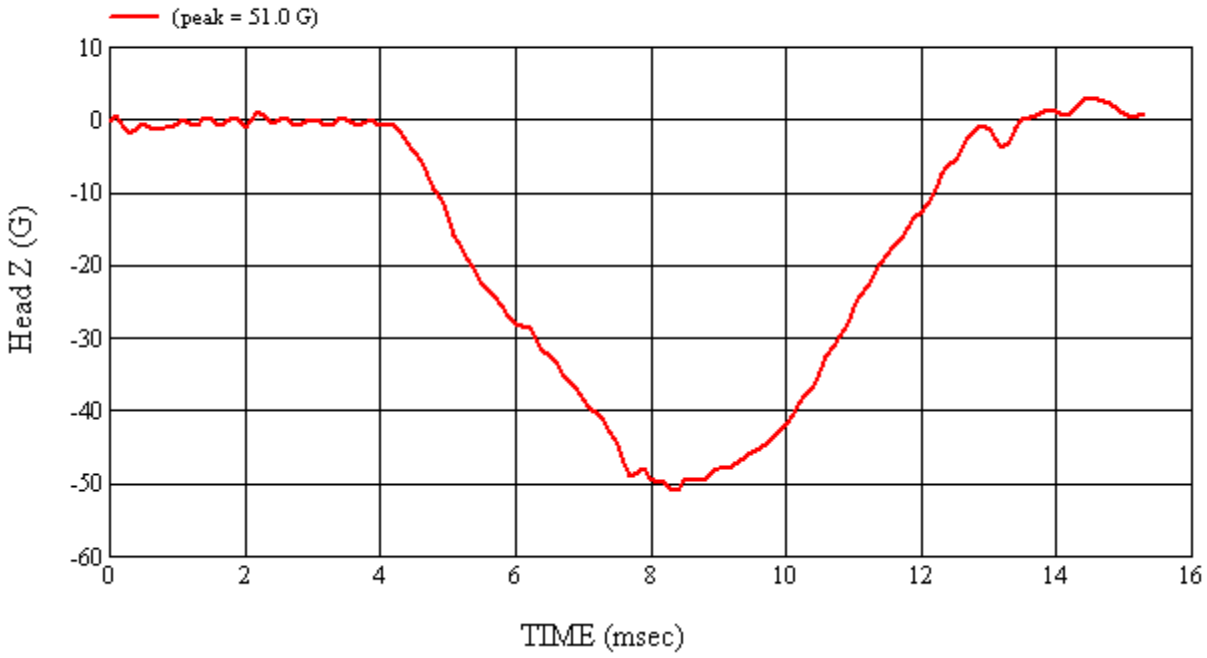
MGA Test #: U11163 Target Location: FH1, Right Side Test Date: 5/13/2011

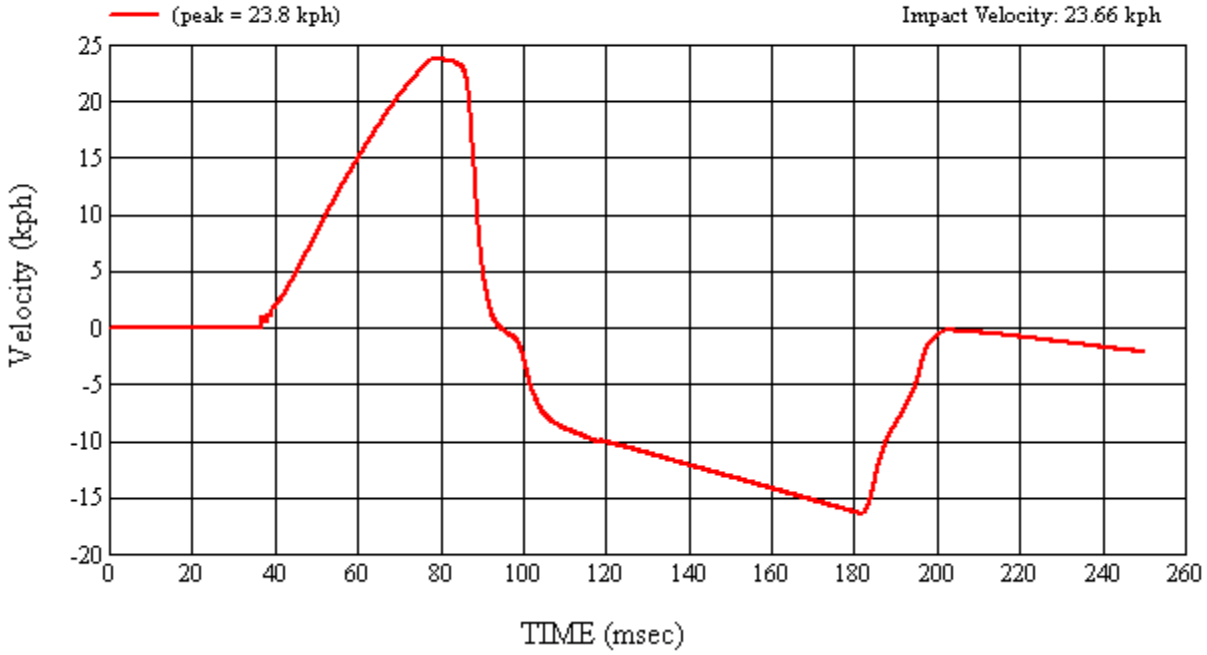


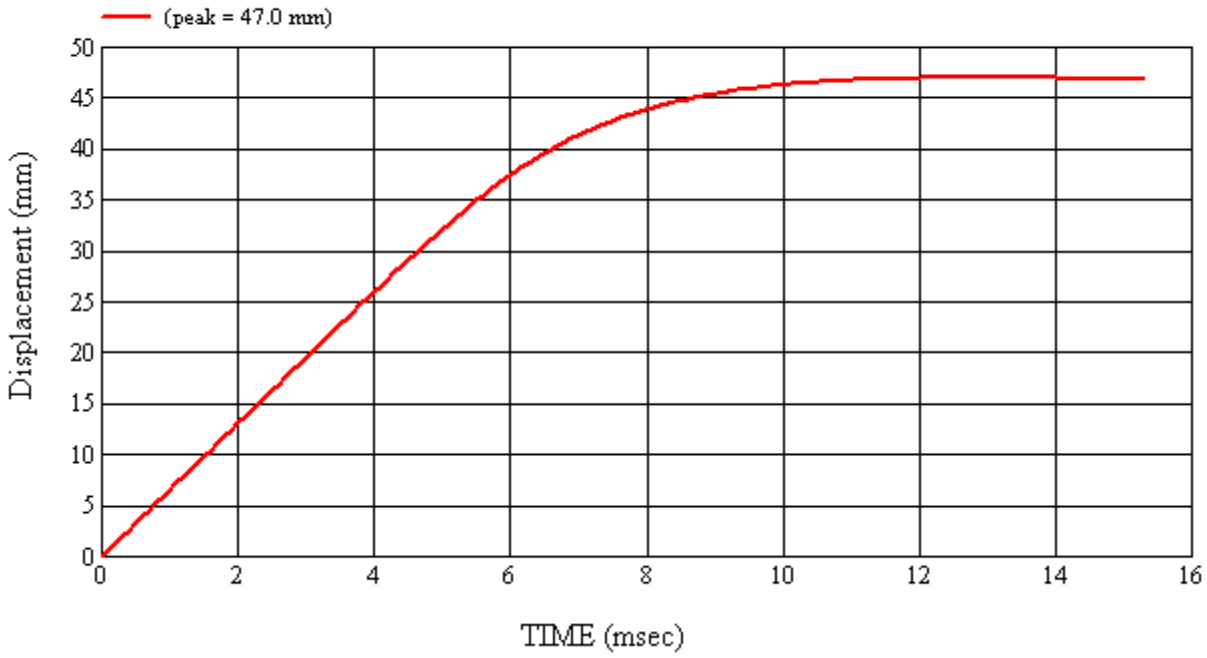



(peak = 158.1 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
-160
0
2
4
6
8
10
12
14
16
TIME (msec)

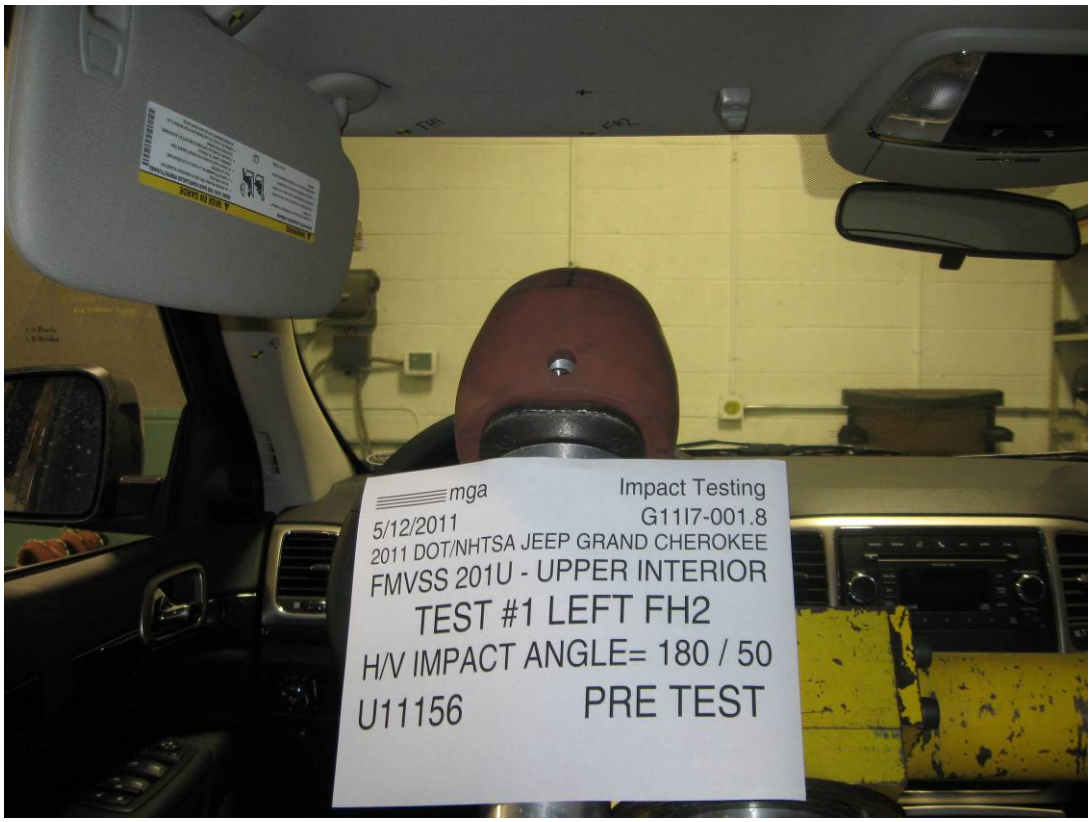

(peak = 10.9 G)
Head Y (G)
12
10
8
6
4
2
0
-2
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 51.0 G)
Head Z (G)
10
0
-10
-20
-30
-40
-50
-60
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.66 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 = 47.0 mm)
Displacement (mm)
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
TIME (msec)


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT FH2
H/V IMPACT ANGLE= 180 / 50
U11156
PRE TES


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT FH2
H/V IMPACT ANGLE= 180 / 50
U11156
PRE TEST


mga
Impact Testing
G11I7-001.8
5/12/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT FH2
H/V IMPACT ANGLE= 180 / 50
U11156
POST TEST


mga
5/12/2011
Impact Testing
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT FH2
H/V IMPACT ANGLE= 180 / 50
U11156
POST TEST


FH1
FH2


mga
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5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT FH2
H/V IMPACT ANGLE= 180 / 50
U11156
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): FH2Left

Temperature:24.4C

MGA Test Reference No.:U11156

Humidity:48.7%

Approach Horizontal Angles:180º

Time of Test:11:39:56 AM

Approach Vertical Angles:50º

FMH Serial No:[035]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
565	528	5.1	24.0	26	4 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

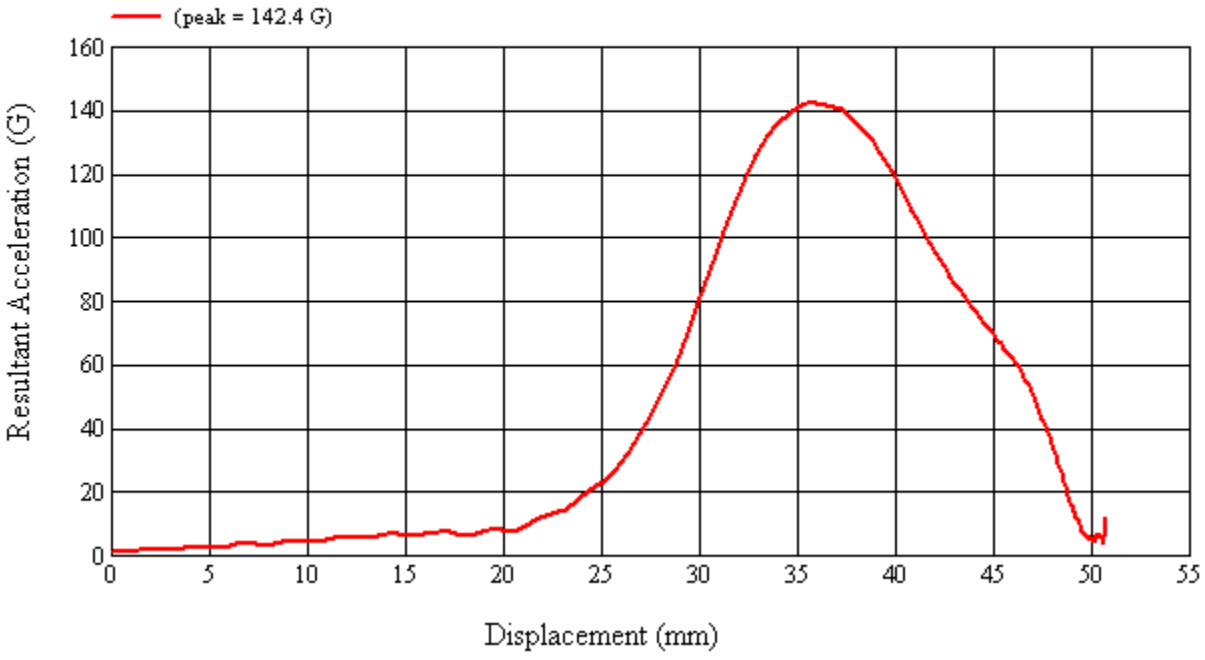
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

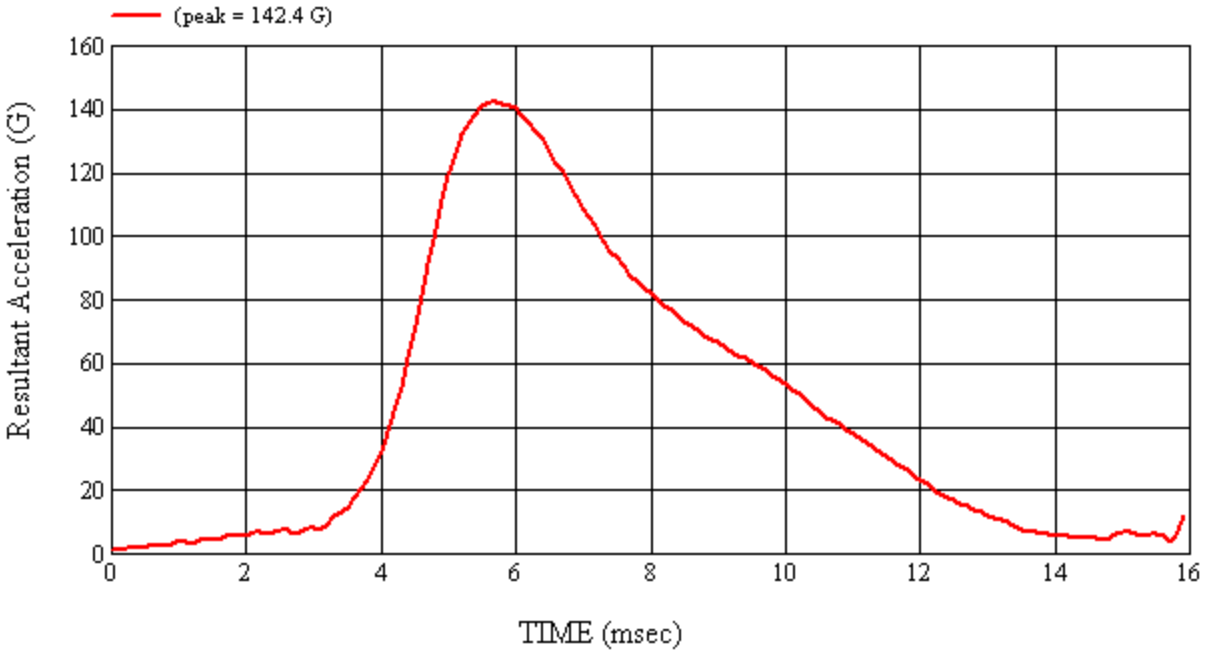
Cracked windshield, roof storage compartment opened

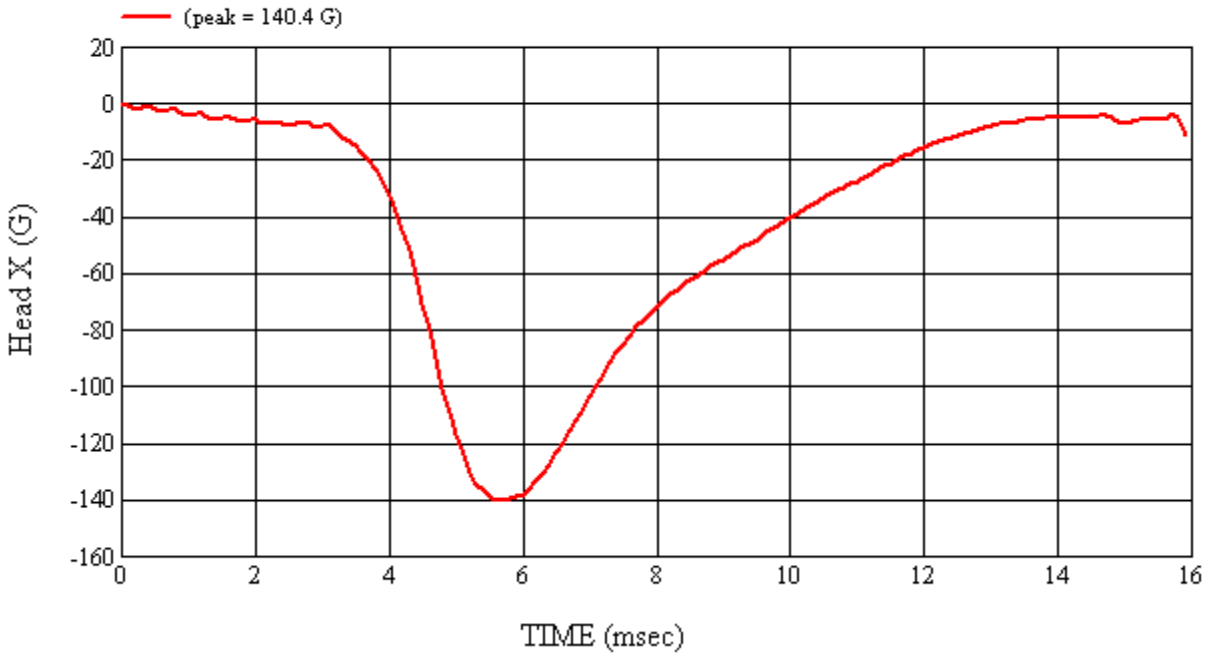
Recorded By: _____ Approved By*: _____ Date: 5/12/2011

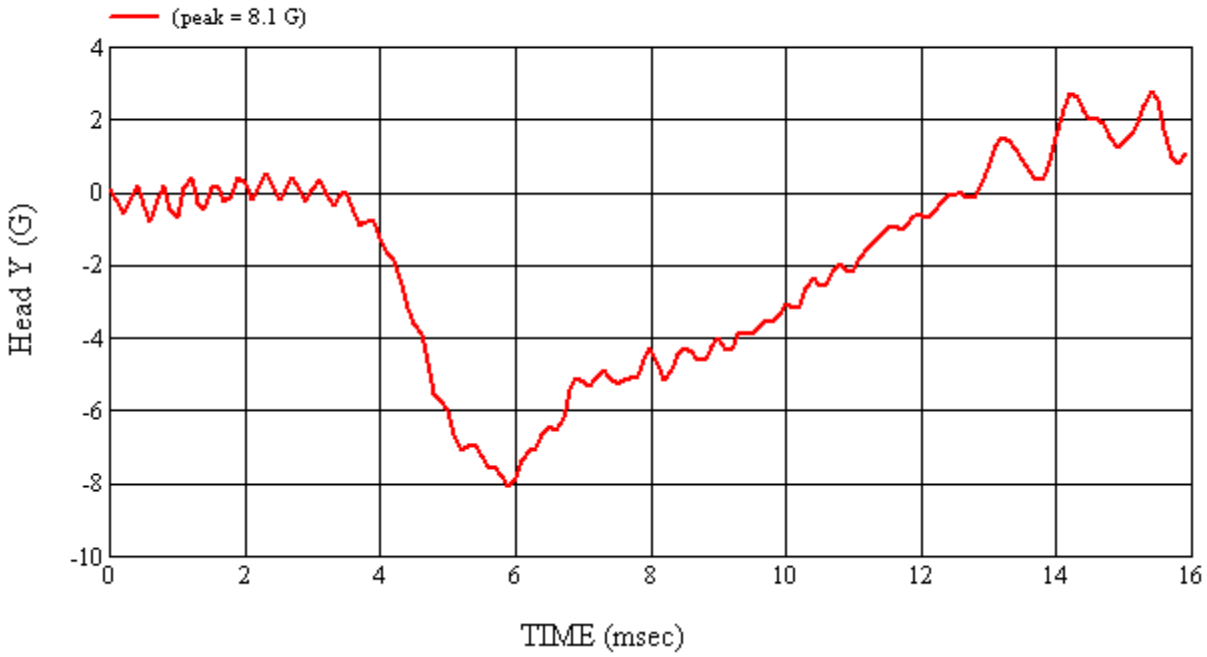
*Only necessary for NHTSA (Government) Compliance testing.

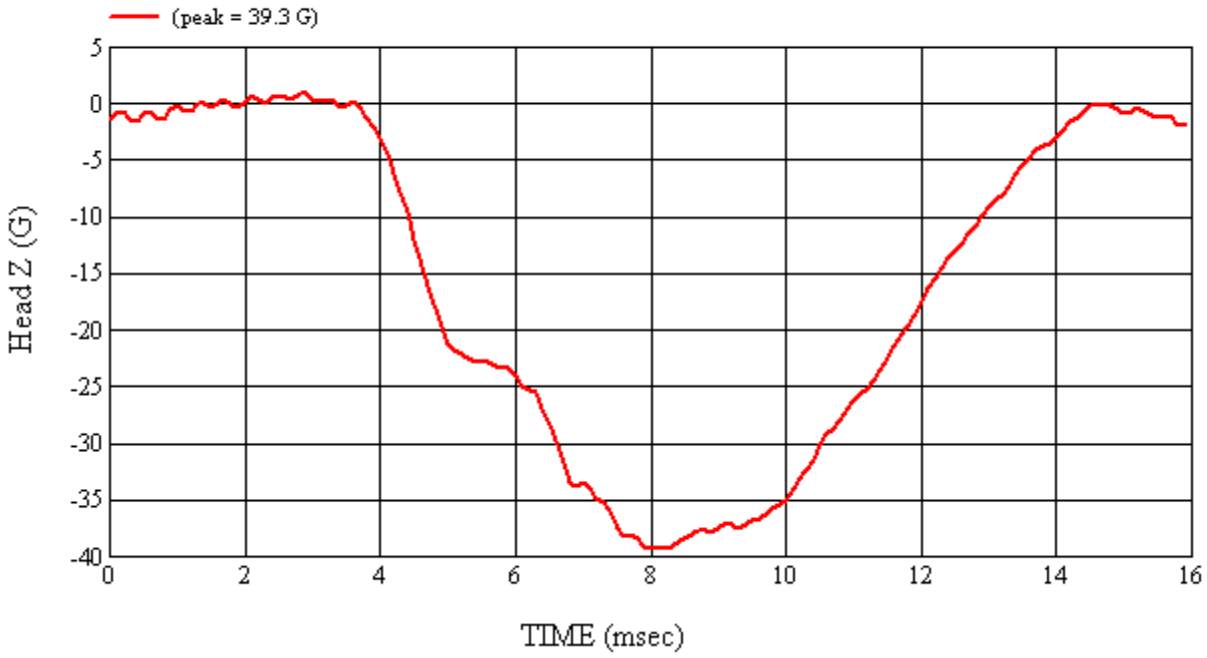
MGA Test #: U11156 Target Location: FH2, Left Side Test Date: 5/12/2011

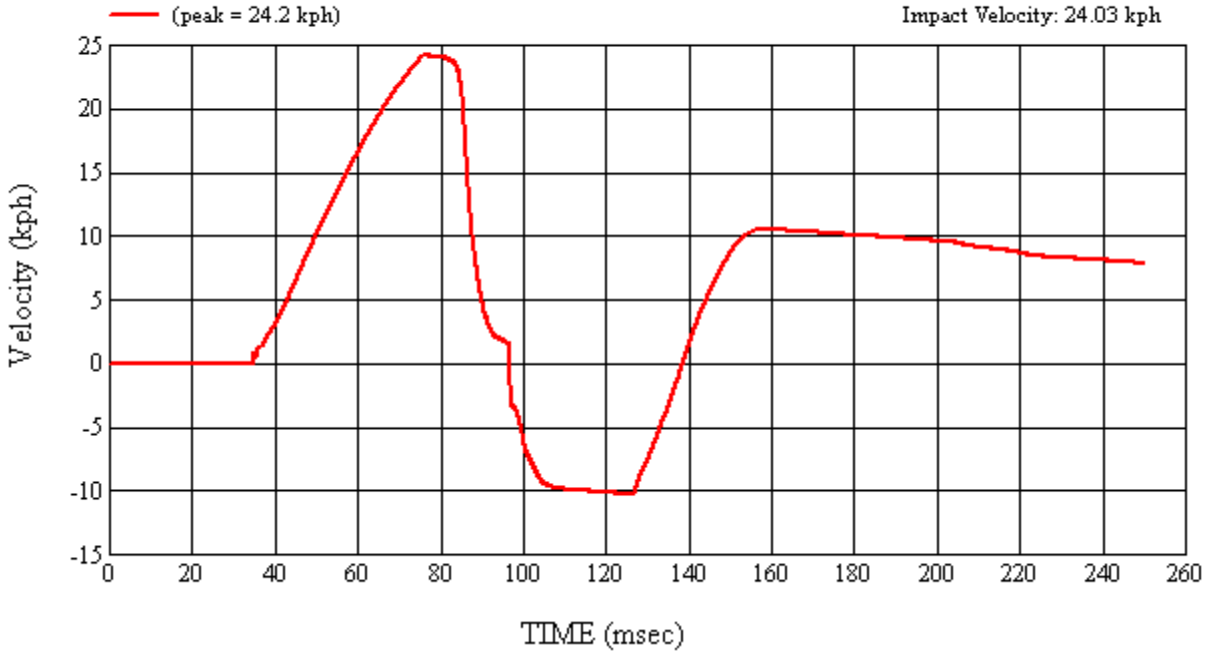


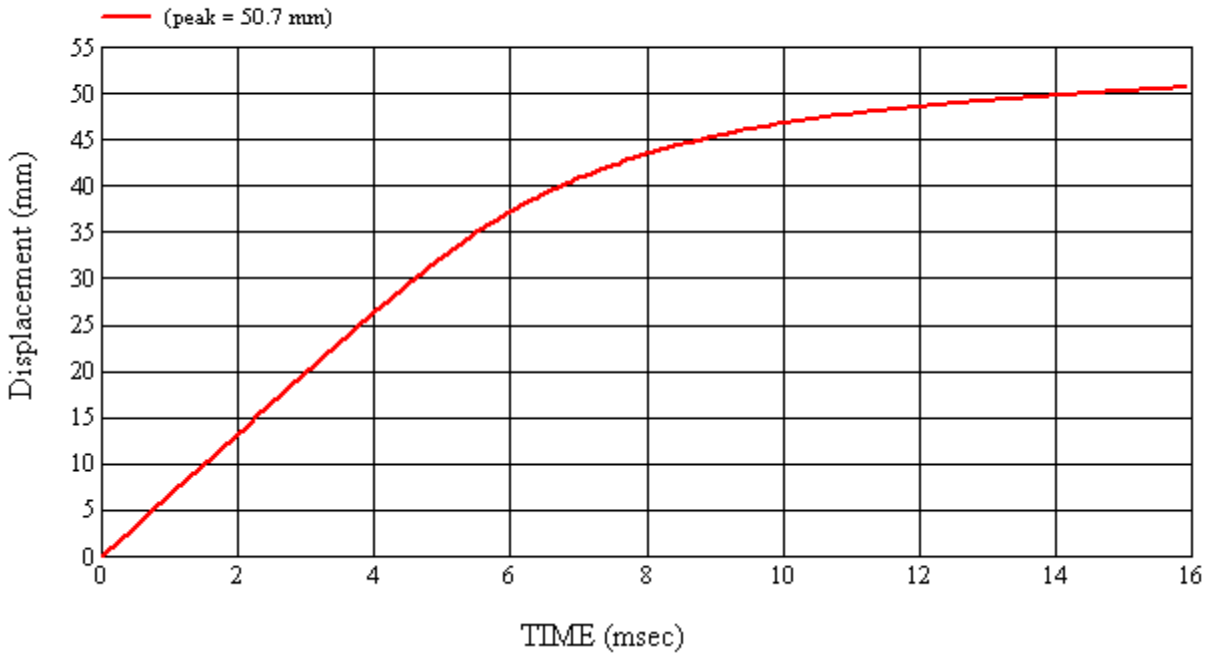



(peak = 140.4 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
-160
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 8.1 G)
Head Y (G)
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
TIME (msec)

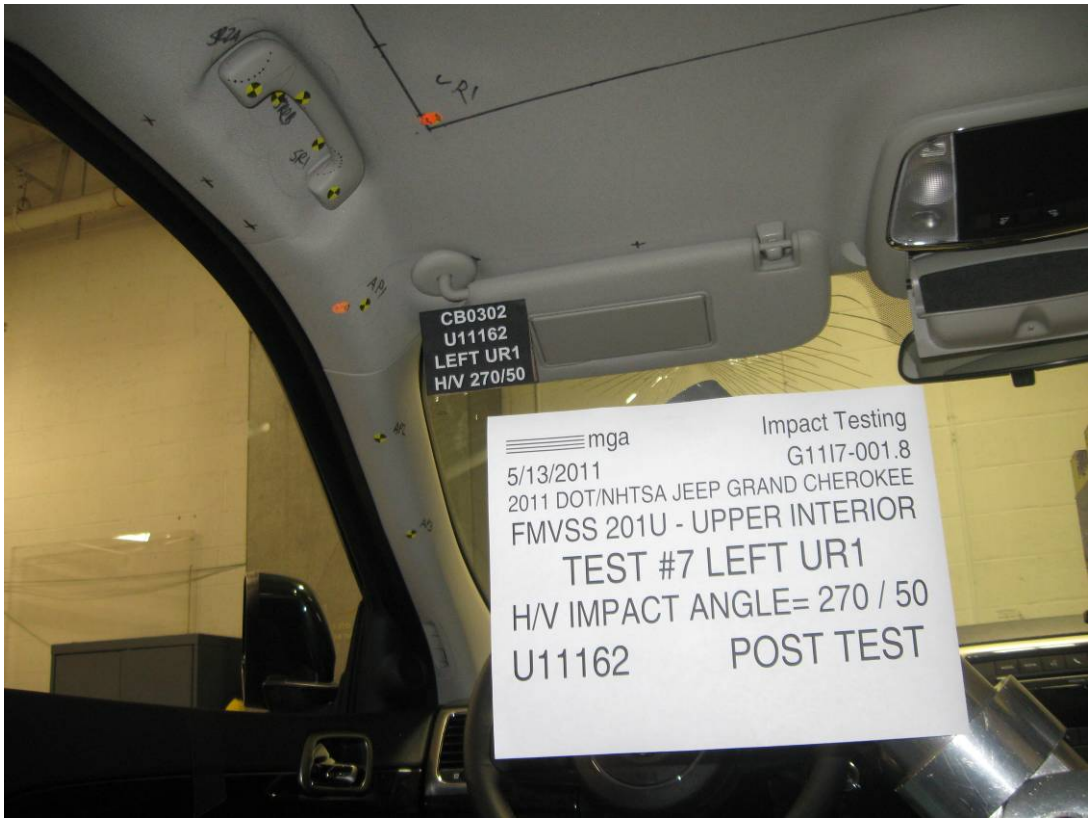

(peak = 39.3 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 24.2 kph)
Impact Velocity: 24.03 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)

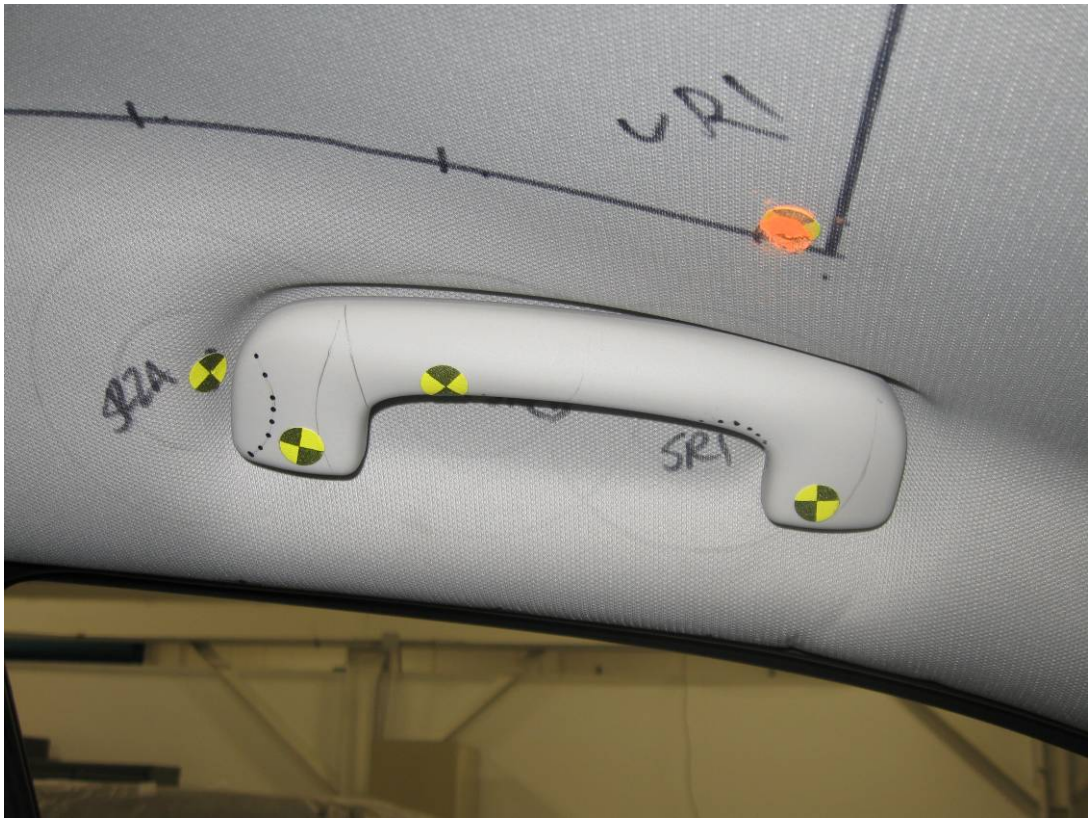

(peak = 50.7 mm)
Displacement (mm)
55
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
TIME (msec)

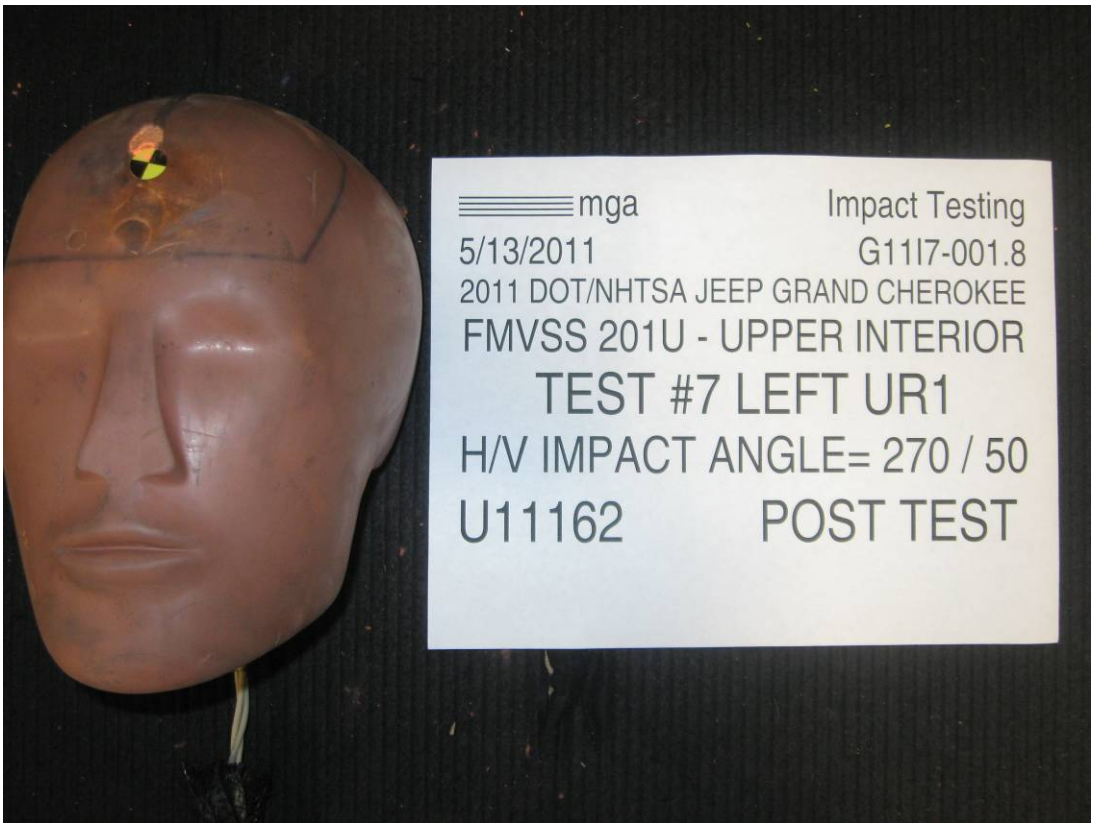

CB0302
U11162
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPER INTERIOR
TEST #7 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11162
PRE TEST


AP1
AP2
AP3
CB0302
U11162
LEFT UR1
H/V 270/50
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #7 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11162
PRE TEST


CB0302
U11162
LEFT UR1
H/V 270/50
mga
Impact Testing
G11I7-001.8
5/13/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #7 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11162
POST TEST


mga
5/13/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
Impact Testing
G11I7-001.8
FMVSS 201U - UPPER INTERIOR
TEST #7 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11162
POST TEST
CB0302
U11162
LEFT UR1
H/V 270/50


UR1
SR1


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #7 LEFT UR1
H/V IMPACT ANGLE= 270 / 50
U11162
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): UR1Left

Temperature:23.0C

MGA Test Reference No.:U11162

Humidity:58.0%

Approach Horizontal Angles:270º

Time of Test:8:55:38 AM

Approach Vertical Angles:50º

FMH Serial No:[037]

Additional Description:@ SR1

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
807	849	7.4	23.9	34	0

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

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

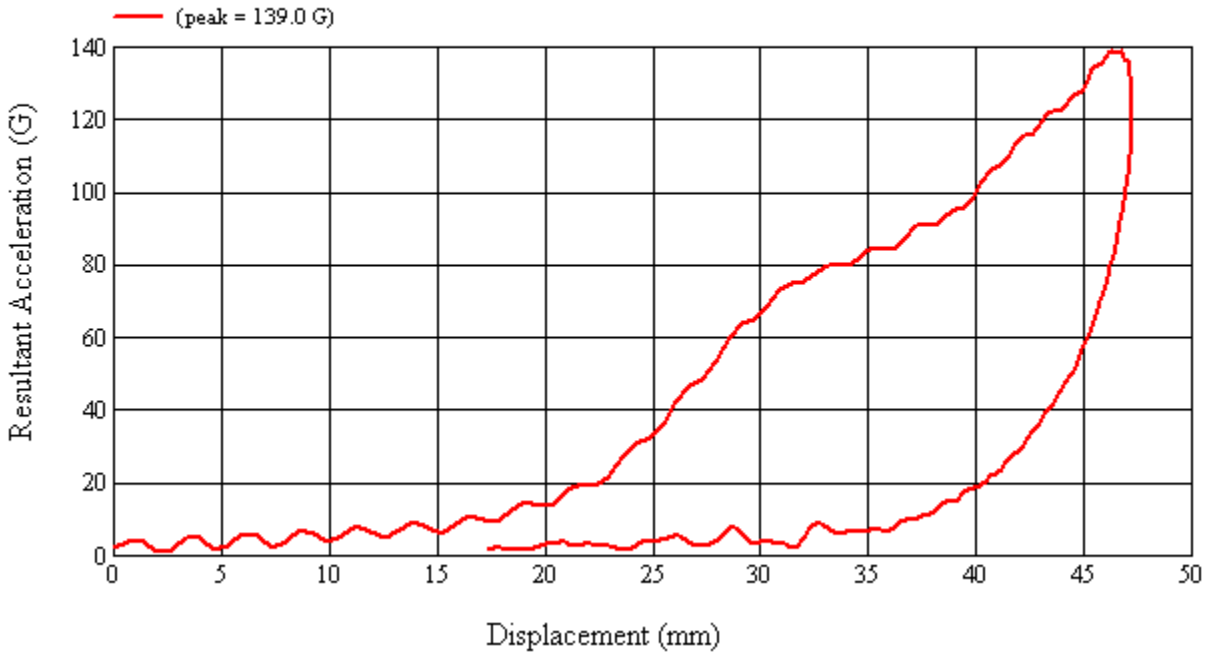
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

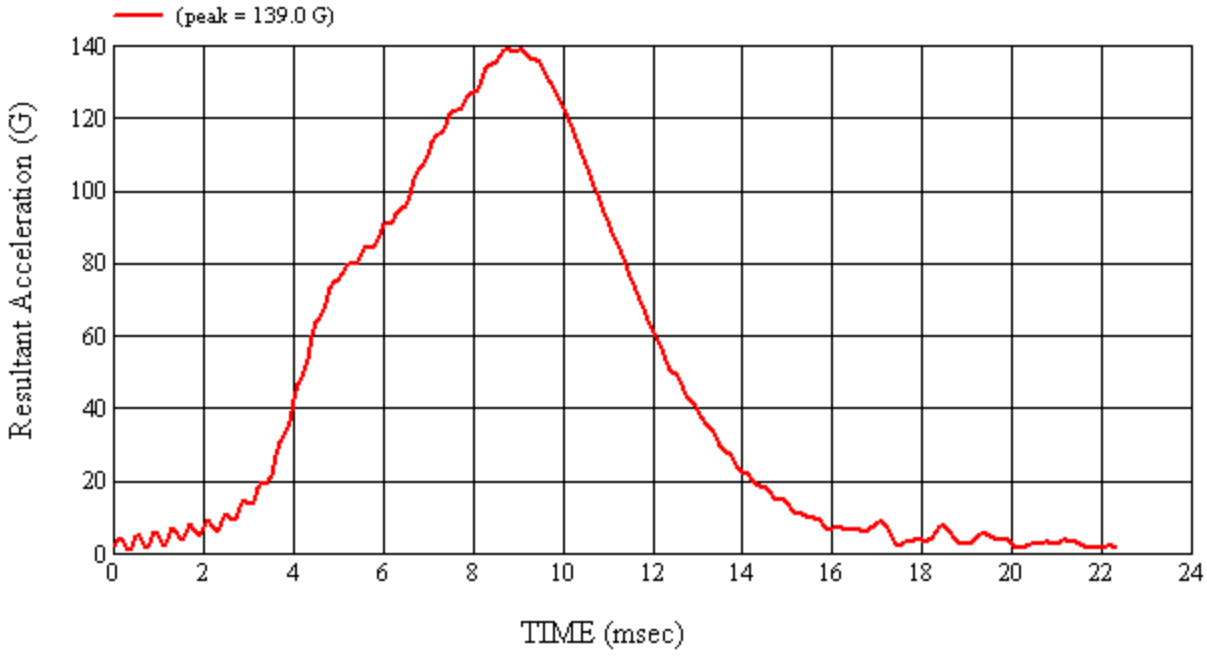
Headliner deformation

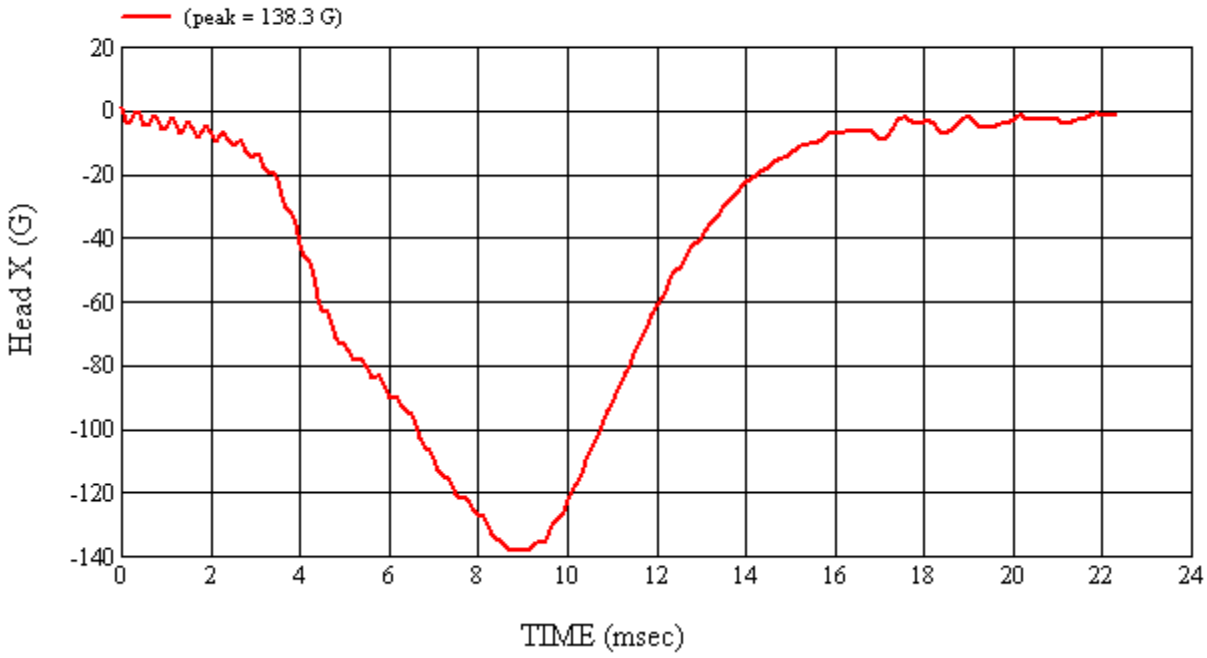
Recorded By: _____ Approved By*: _____ Date: 5/13/2011

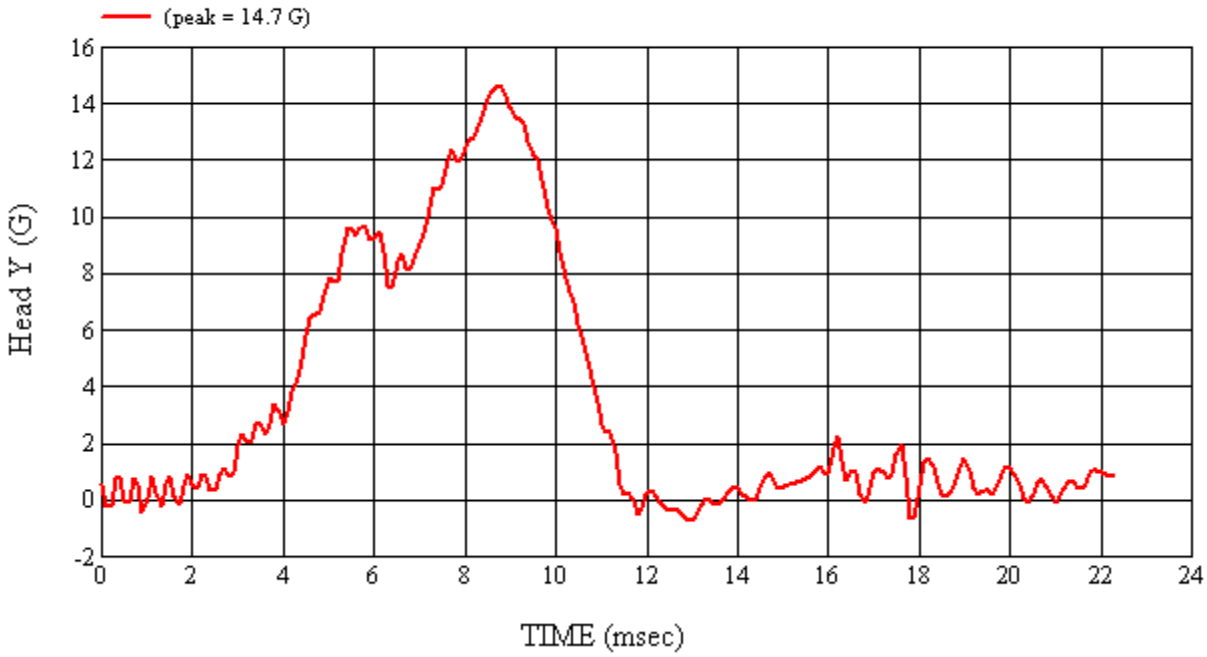
*Only necessary for NHTSA (Government) Compliance testing.

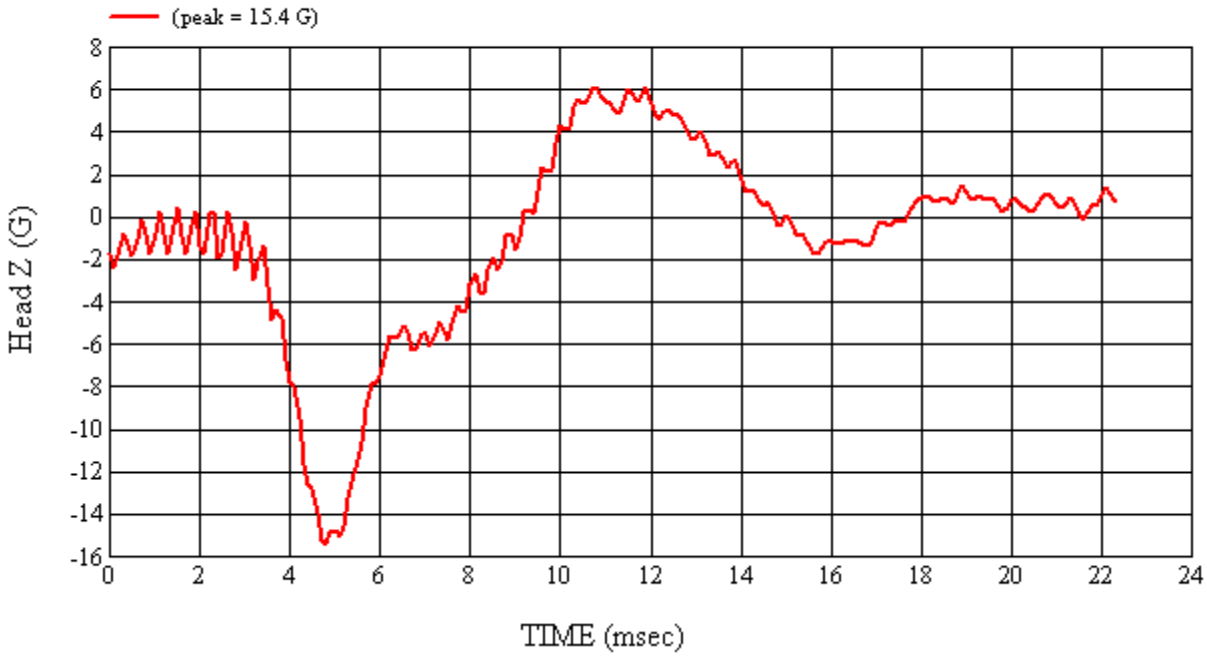
MGA Test #: U11162 Target Location: UR1, Left Side Test Date: 5/13/2011

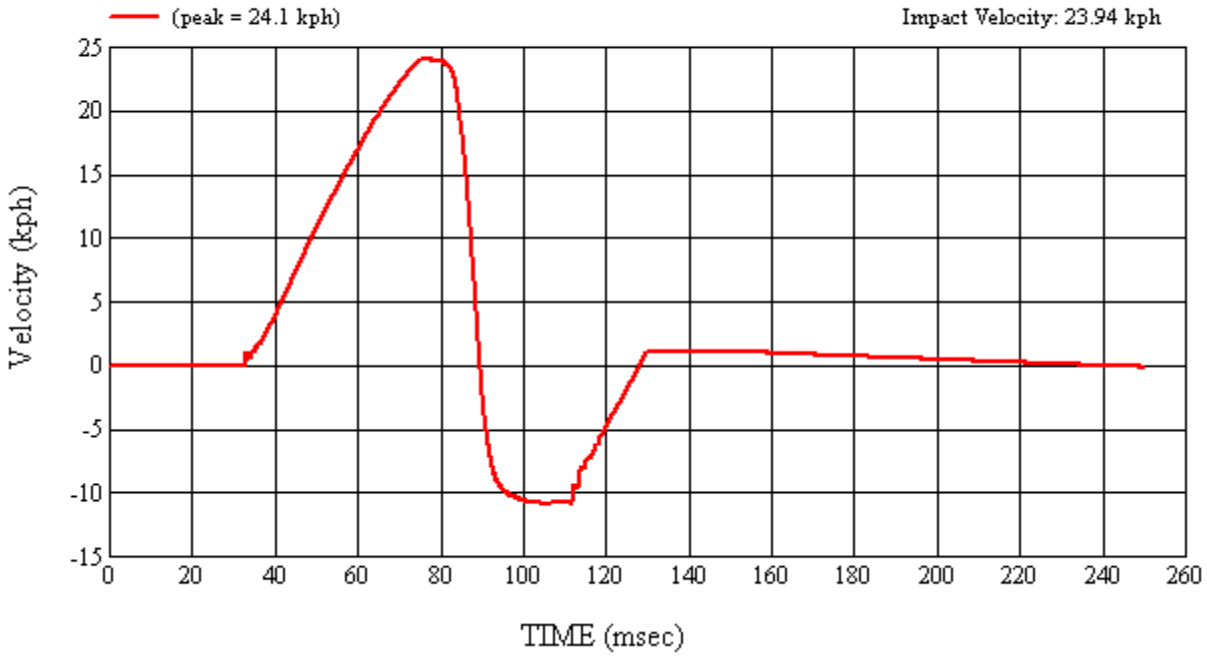


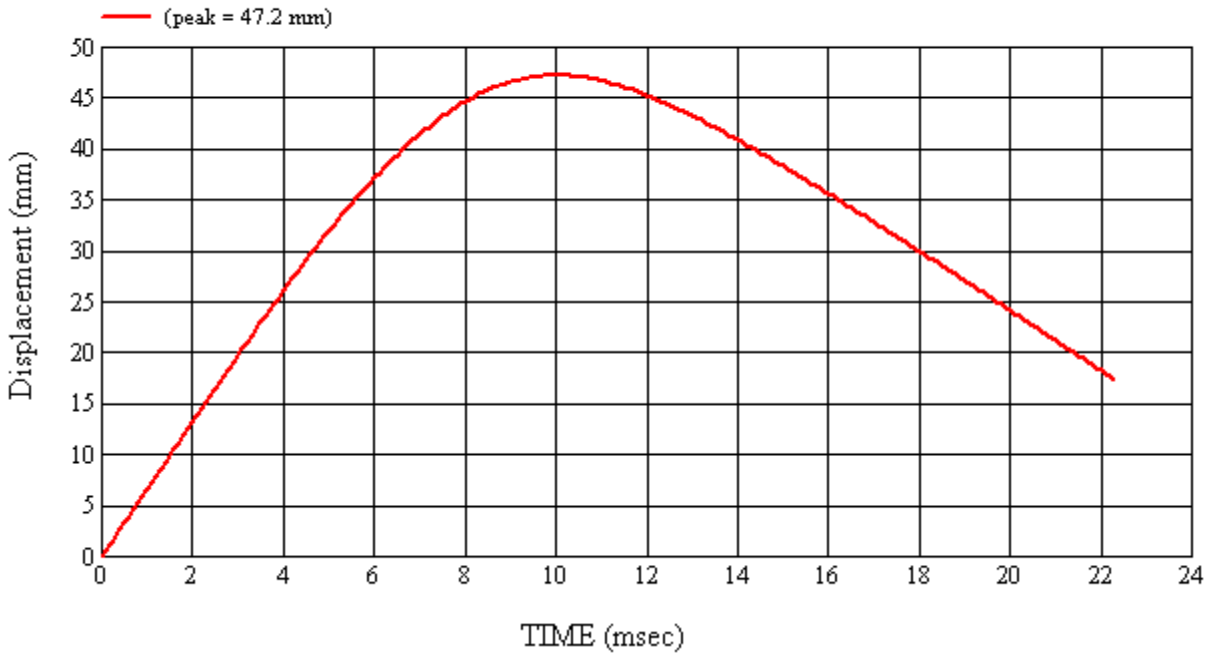



(peak = 138.3 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 14.7 G)
Head Y (G)
16
14
12
10
8
6
4
2
0
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 15.4 G)
Head Z (G)
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 24.1 kph)
Impact Velocity: 23.94 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)

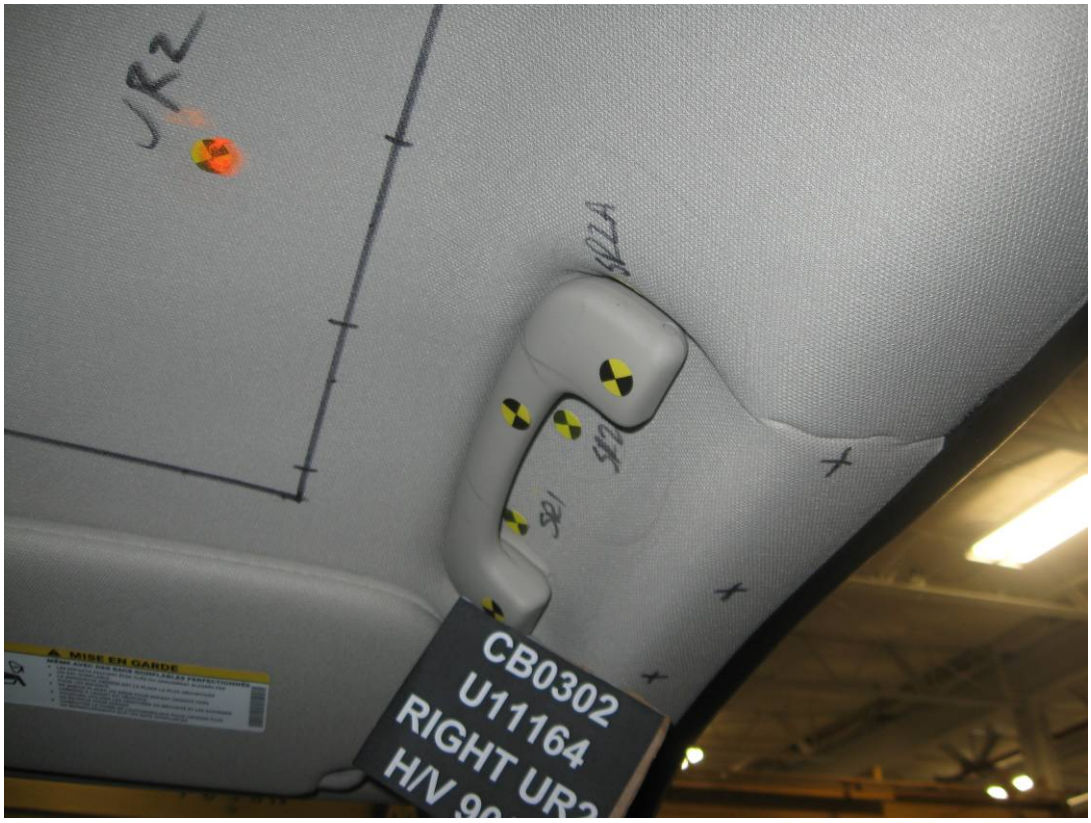

(peak = 47.2 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


CB0302
U11164
RIGHT UR2
H/V 90/50
mga
5/13/2011
Impact Testing
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR2
H/V IMPACT ANGLE= 90 / 50
U11164
PRE TEST


mga
5/13/2011
Impact Testing
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR2
H/V IMPACT ANGLE= 90 / 50
U11164
PRE TEST


CB0302
U11164
RIGHT UR2
H/V 90/50
10 TON
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR2
H/V IMPACT ANGLE= 90 / 50
U11164
POST TEST


CB0302
U11164
RIGHT UR2
H/V 90/50
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR2
H/V IMPACT ANGLE= 90 / 50
U11164
POST TEST


UR2
CB0302
U11164
RIGHT UR2
H/V 90


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR2
H/V IMPACT ANGLE= 90 / 50
U11164
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#9

Target (Vehicle Side): UR2Right

Temperature:22.5C

MGA Test Reference No.:U11164

Humidity:62.0%

Approach Horizontal Angles:90º

Time of Test:3:24:23 PM

Approach Vertical Angles:50º

FMH Serial No:[037]

Additional Description:@ SR2A

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
752	777	7	24.0	25	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

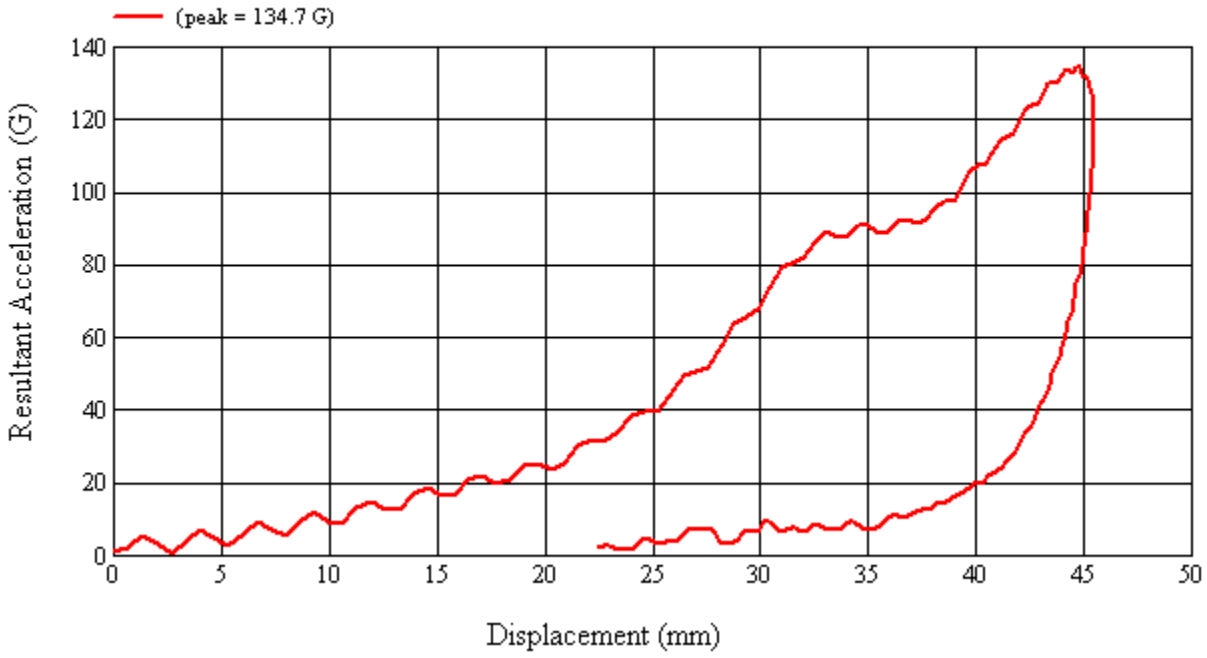
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

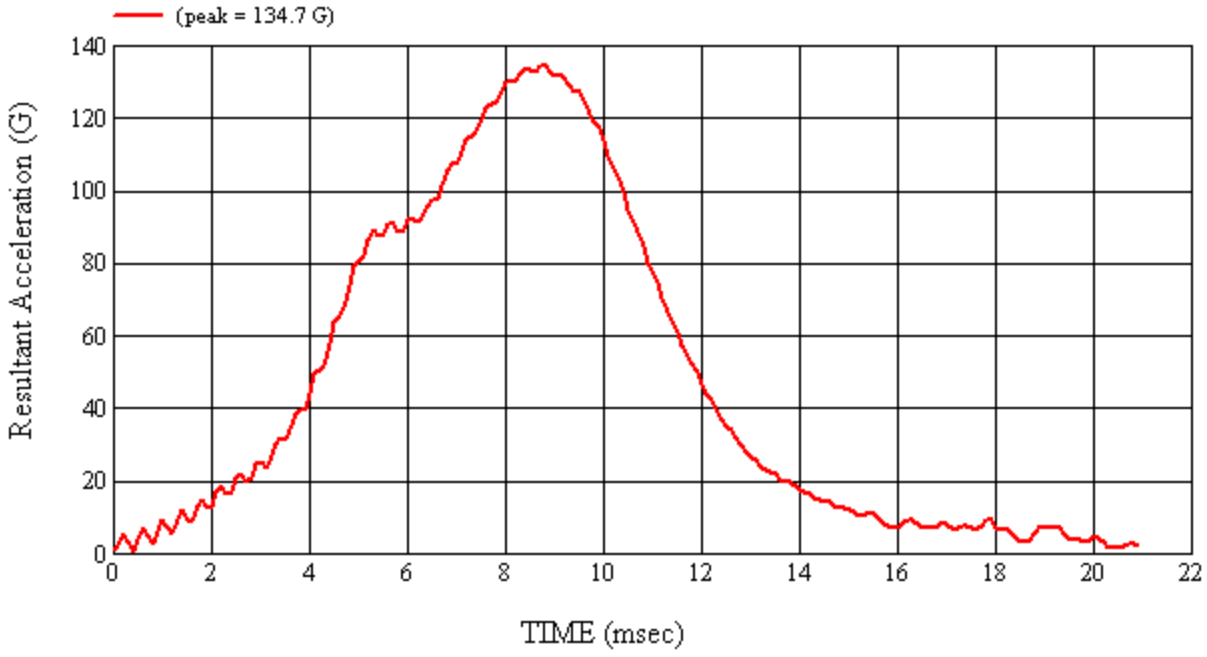
Headliner deformation

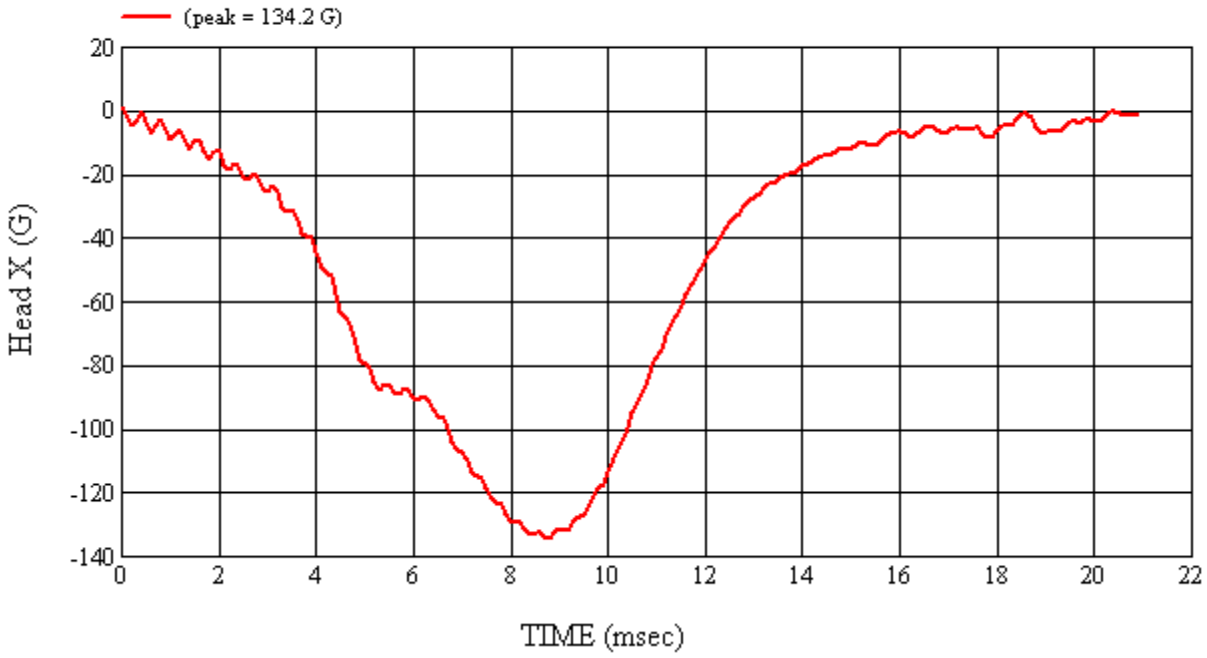
Recorded By: _____ Approved By*: _____ Date: 5/13/2011

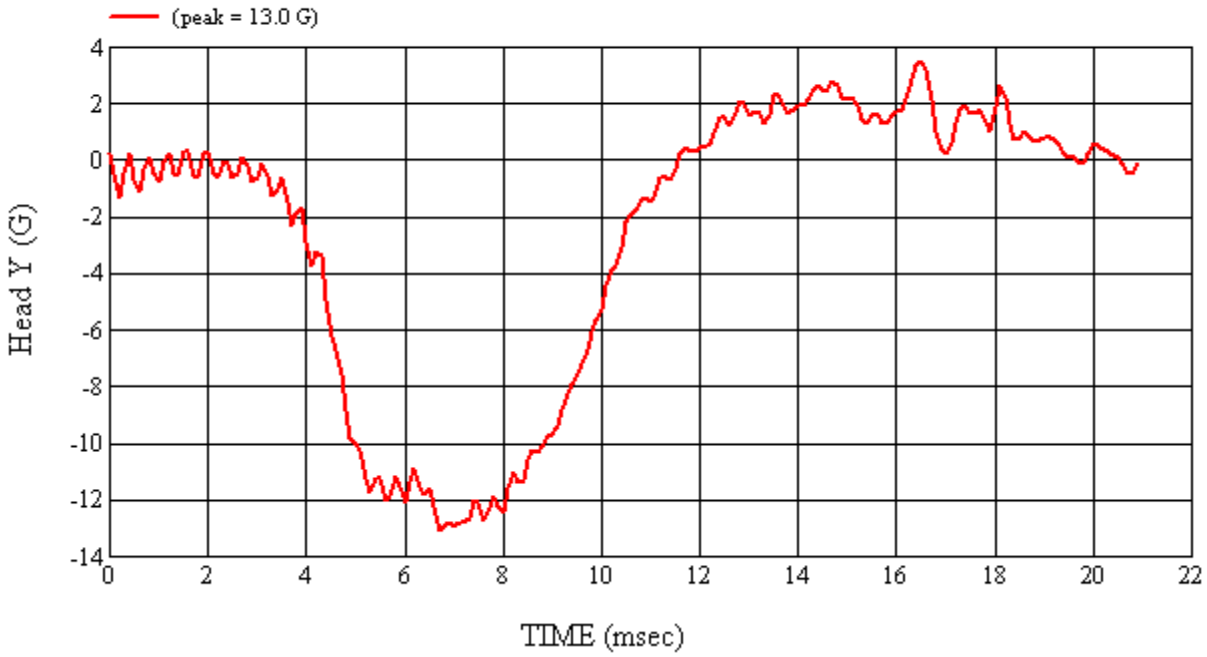
*Only necessary for NHTSA (Government) Compliance testing.

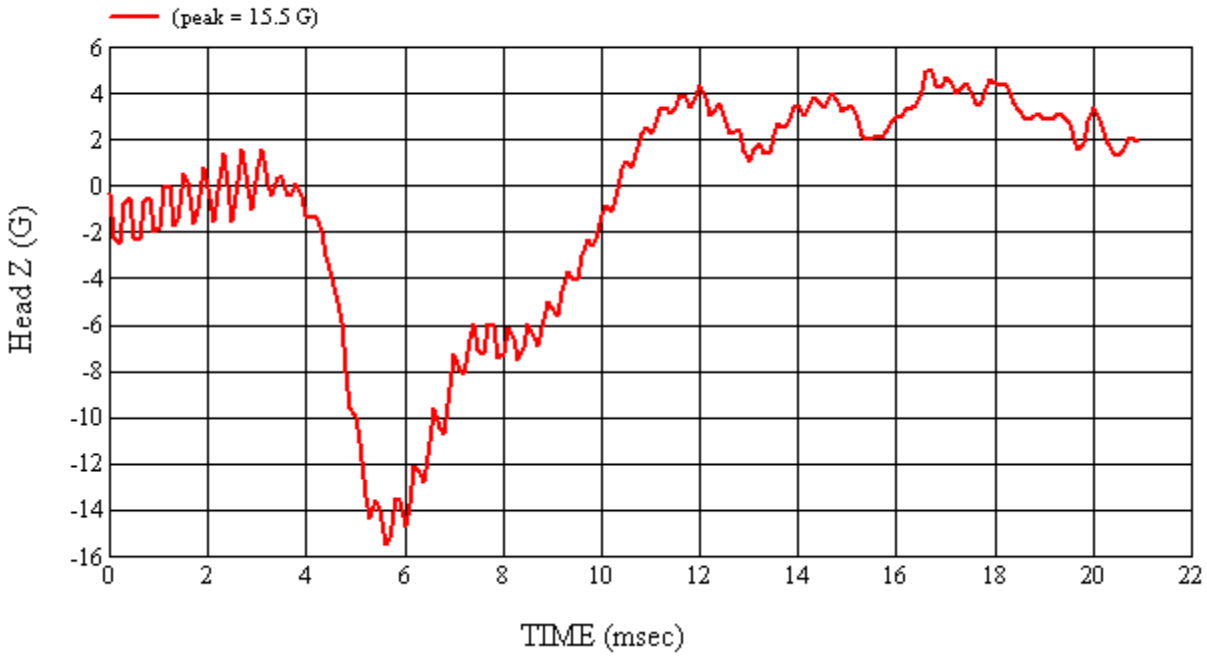
MGA Test #: U11164 Target Location: UR2, Right Side Test Date: 5/13/2011

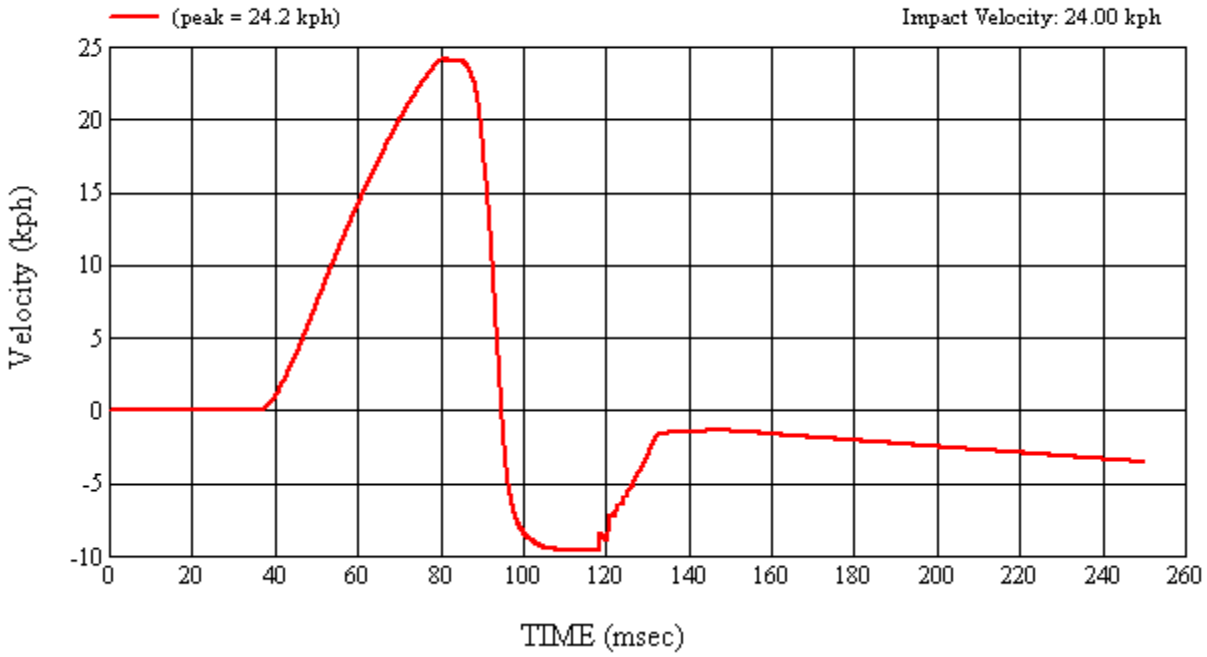


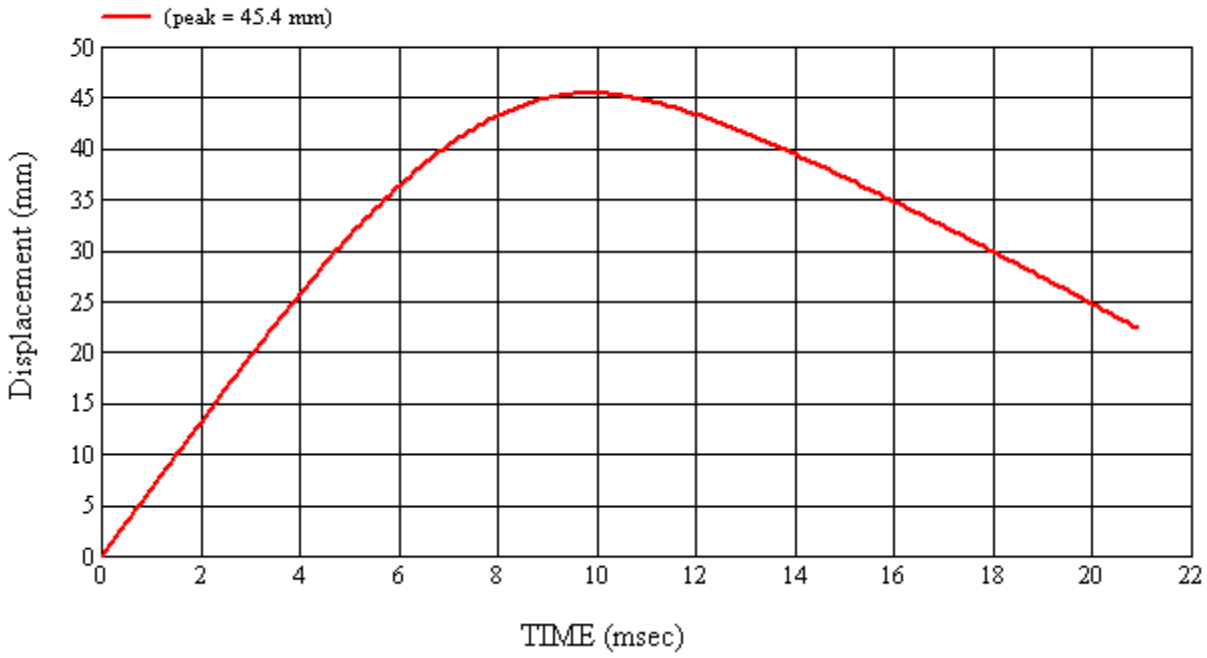


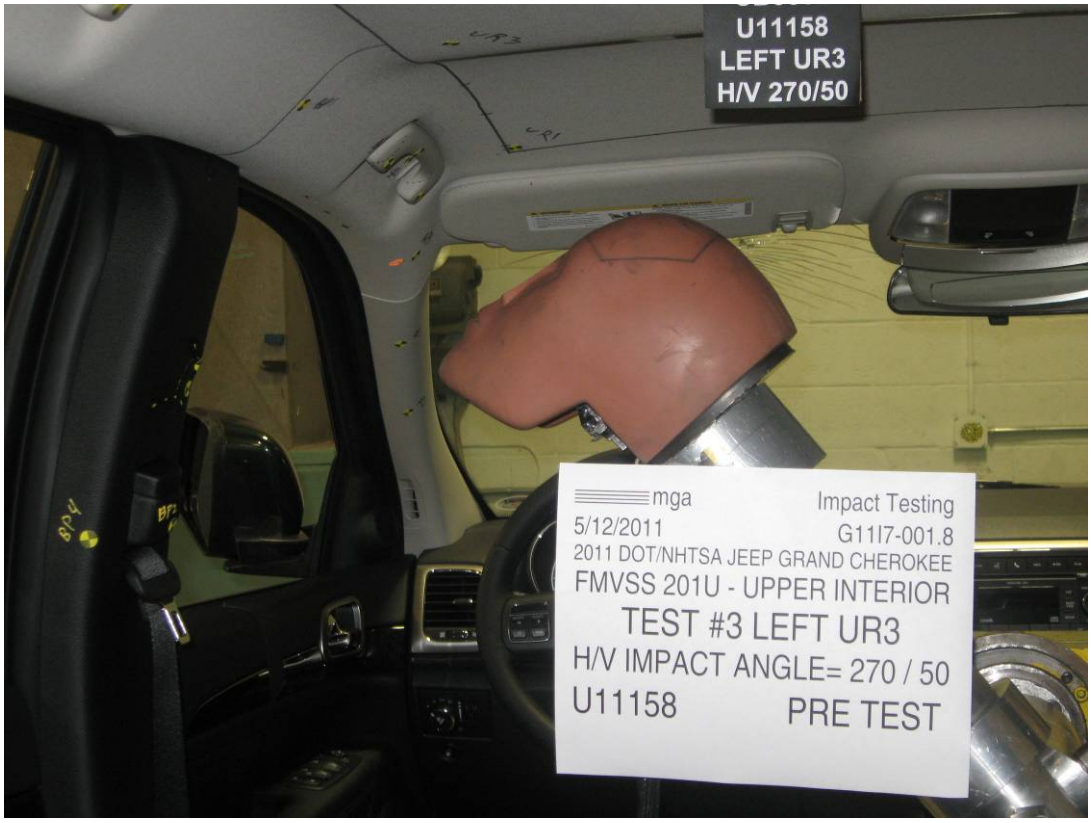

(peak = 134.2 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 13.0 G)
Head Y (G)
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 15.5 G)
Head Z (G)
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

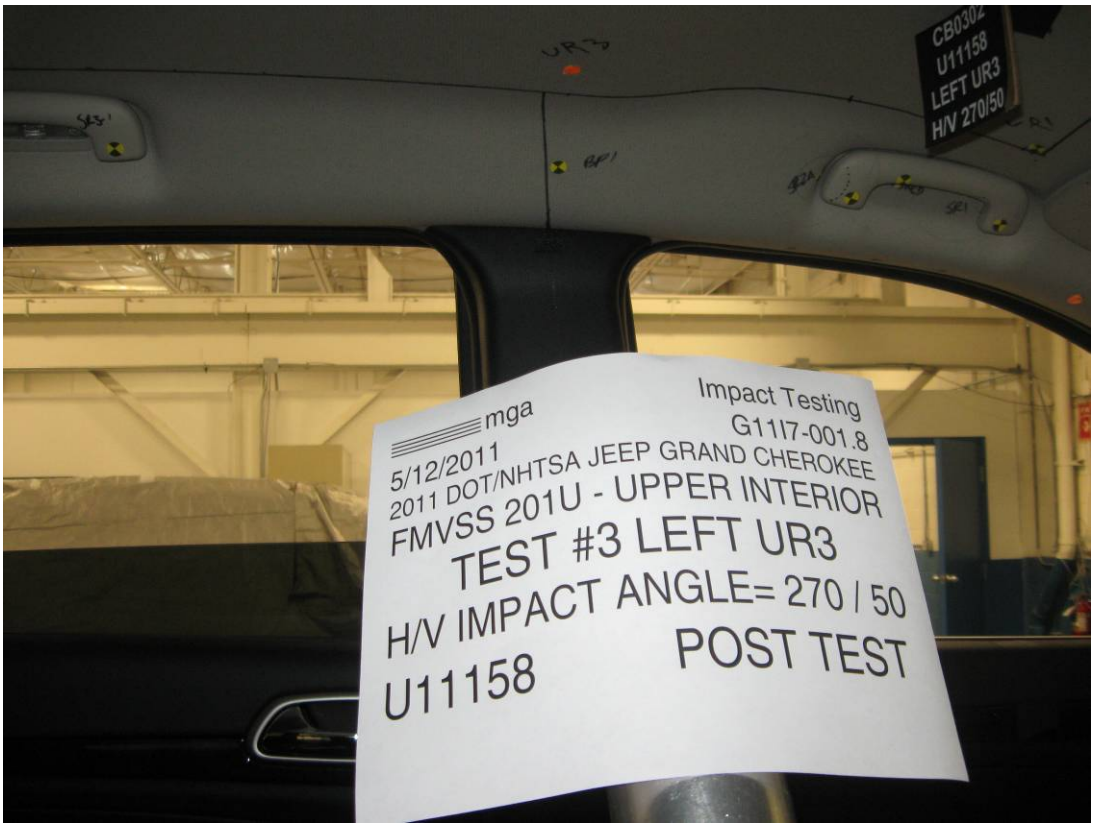

(peak = 24.2 kph)
Impact Velocity: 24.00 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)

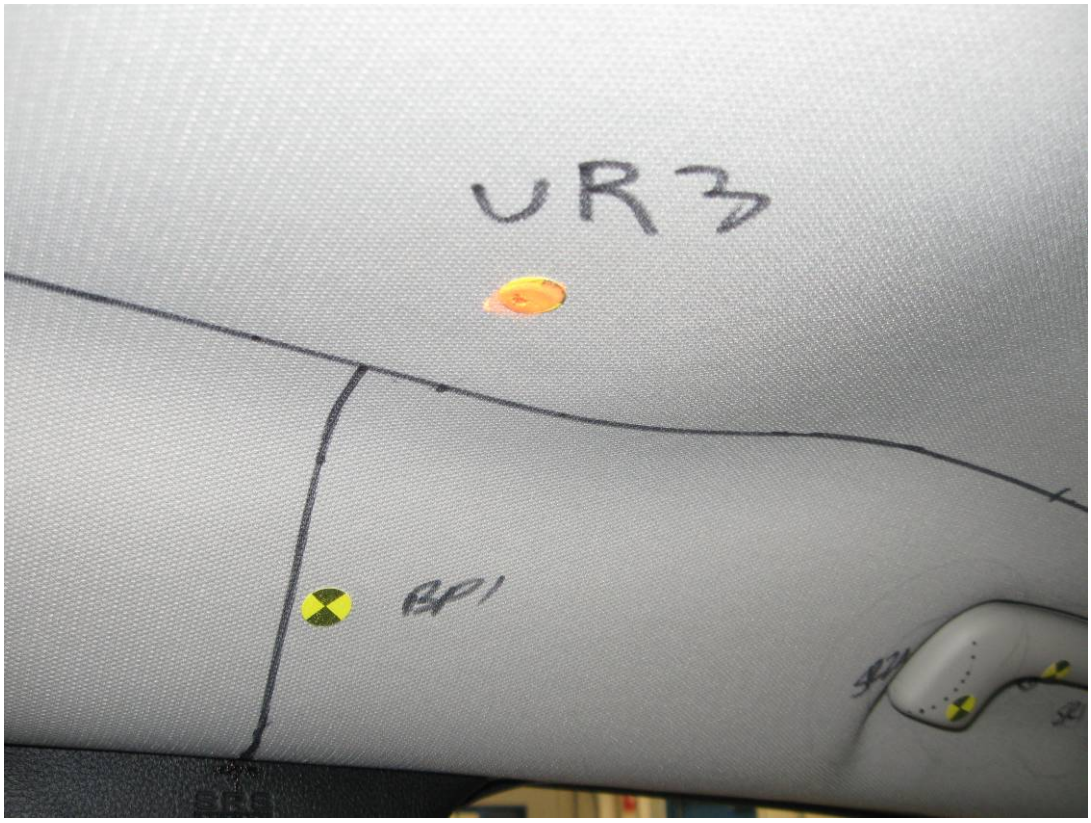

(peak = 45.4 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

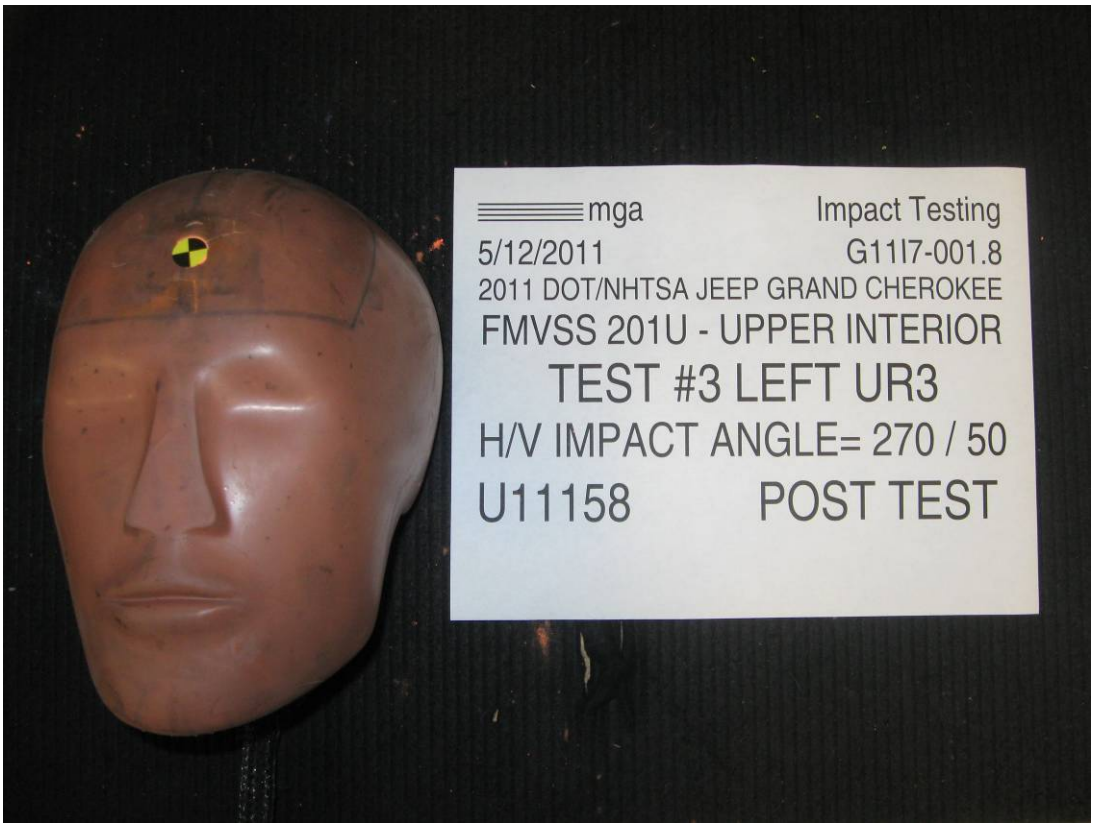

U11158
LEFT UR3
H/V 270/50
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11158
PRE TEST


mga
Impact Testing
G11I7-001.8
5/12/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11158
PRE TEST


CB0302
U11158
LEFT UR3
H/V 270/50
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11158
POST TEST


CB0302
U11158
LEFT UR3
H/V 270/50
mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11158
POST TEST


UR3
BP1


mga
Impact Testing
5/12/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR3
H/V IMPACT ANGLE= 270 / 50
U11158
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#3

Target (Vehicle Side): UR3Left

Temperature:24.6C

MGA Test Reference No.:U11158

Humidity:52.4%

Approach Horizontal Angles:270º

Time of Test:1:56:50 PM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:@BP

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
782	816	6.9	24.1	26	2 Left

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

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

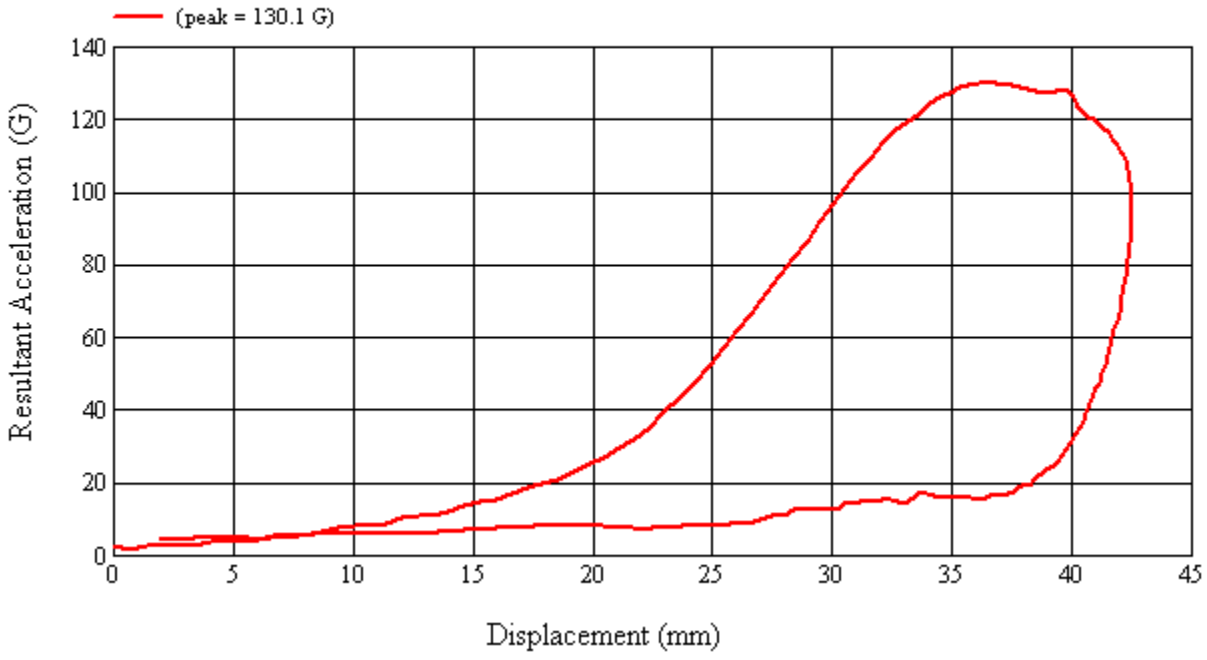
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

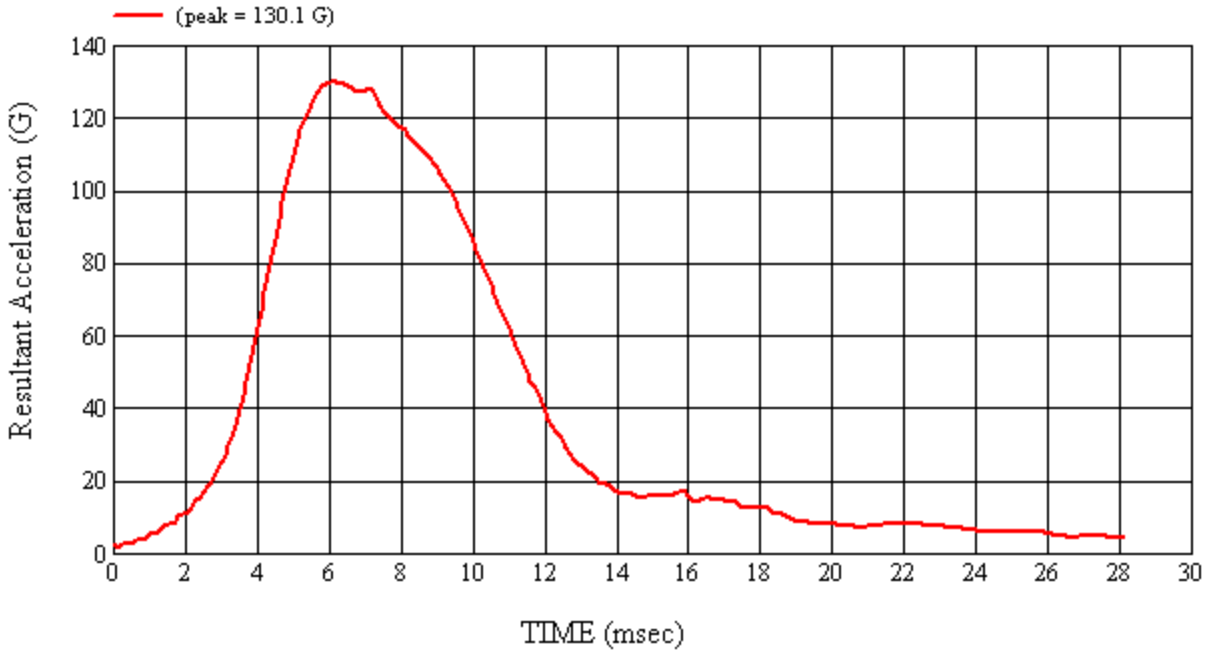
No visible damage

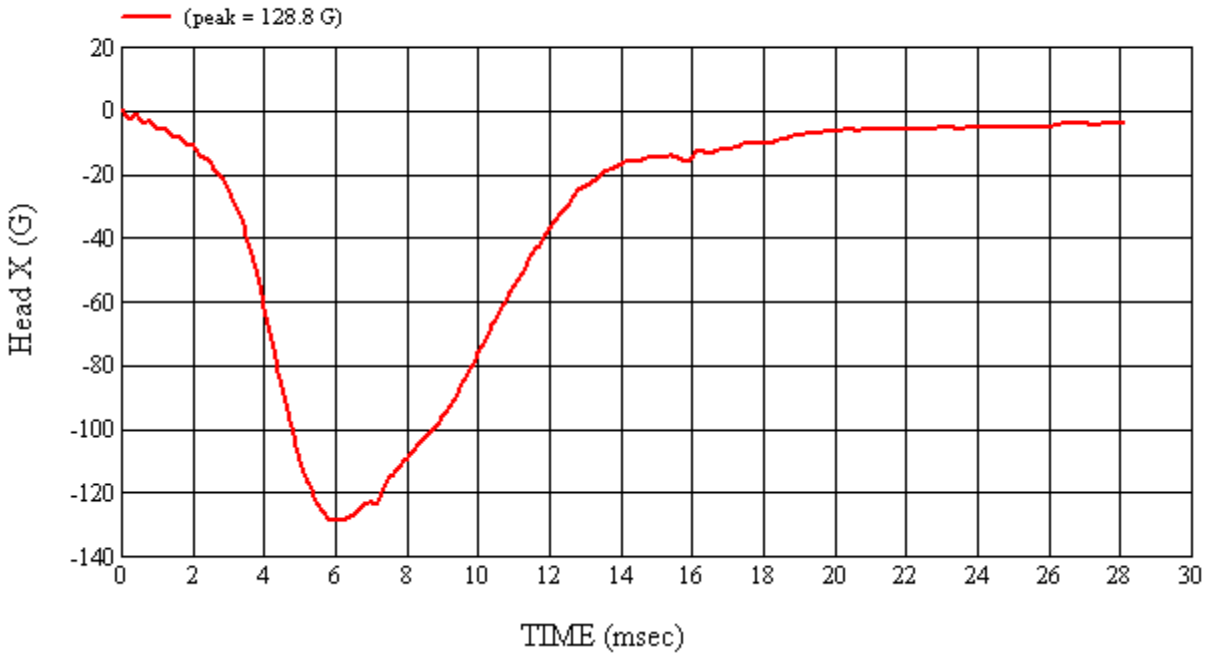
Recorded By: _____ Approved By*: _____ Date: 5/12/2011

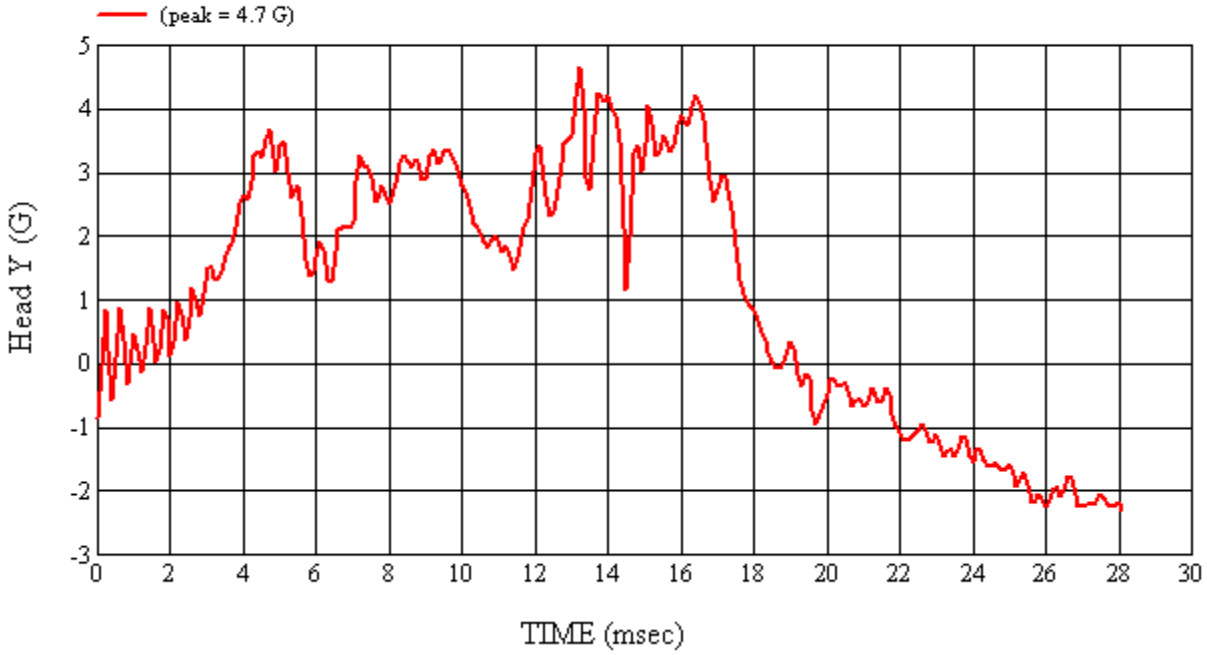
*Only necessary for NHTSA (Government) Compliance testing.

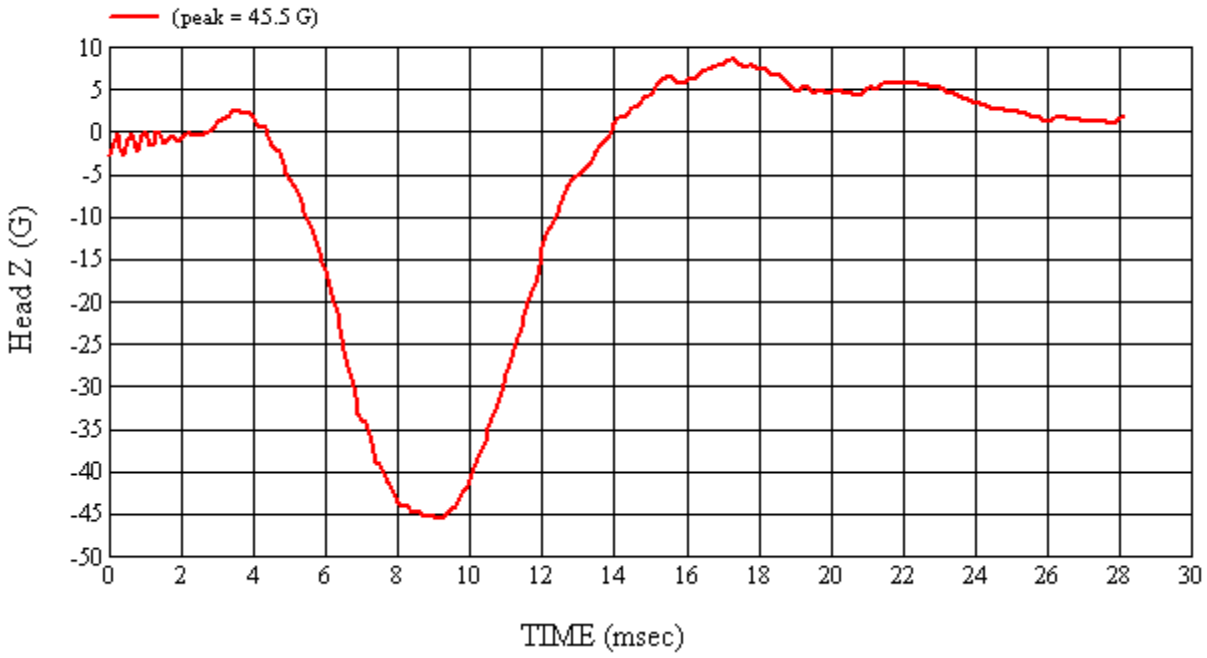
MGA Test #: U11158 Target Location: UR3, Left Side Test Date: 5/12/2011

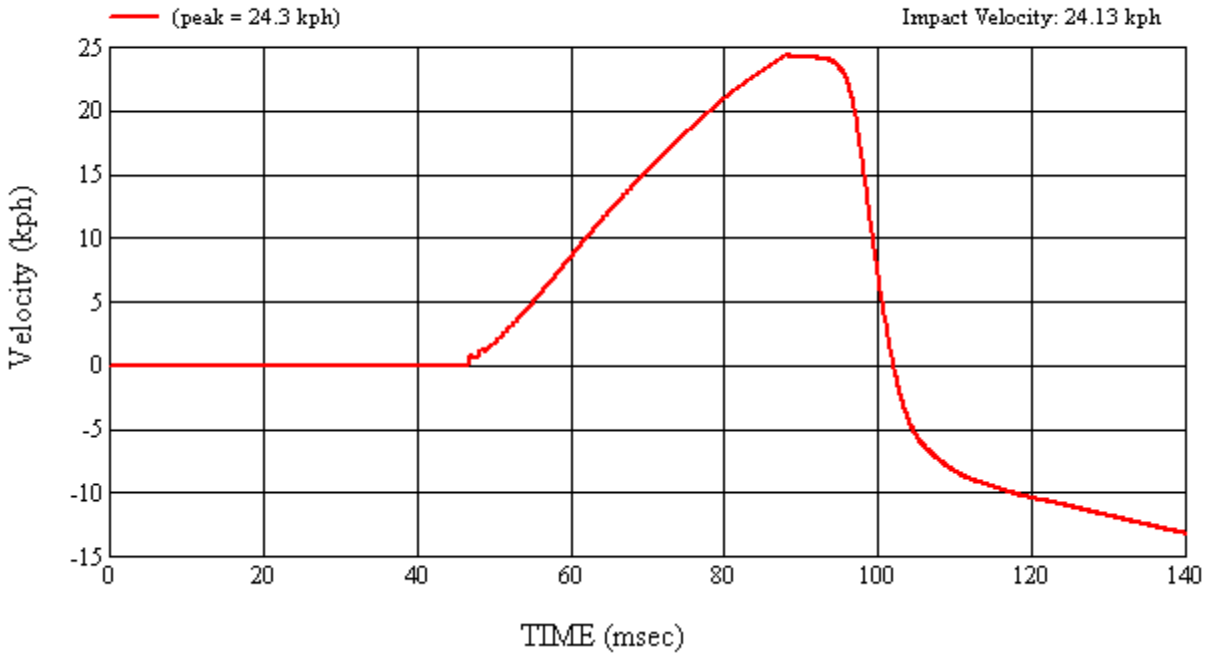


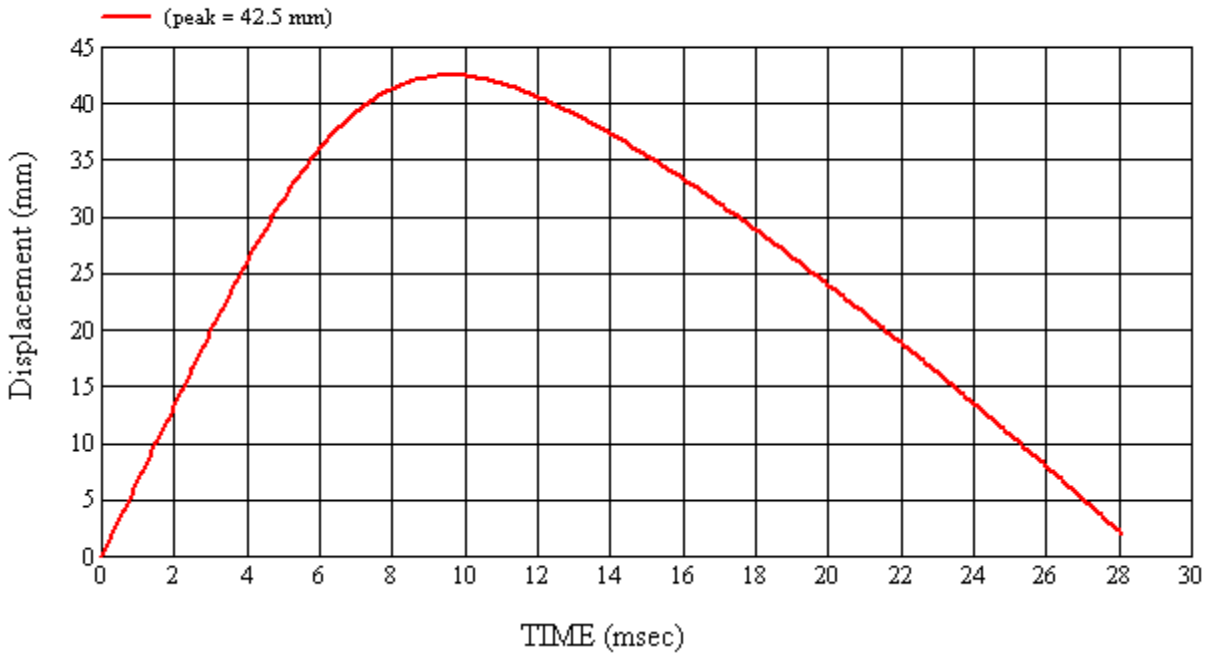



(peak = 128.8 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)


(peak = 4.7 G)
Head Y (G)
5
4
3
2
1
0
-1
-2
-3
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)


(peak = 45.5 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)


(peak = 24.3 kph)
Impact Velocity: 24.13 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
0
20
40
60
80
100
120
140
TIME (msec)


(peak = 42.5 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
30
TIME (msec)


UR6
mga
Impact Testing
5/16/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #13 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11168
PRE TEST


UR4
UR7
UR6
mga
Impact Testing
5/16/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #13 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11168
PRE TEST


CB0302
U11168
RIGHT UR6
H/V 90/50
mga
Impact Testing
G11I7-001.8
5/16/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #13 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11168
POST TEST


mga
Impact Testing
G11I7-001.8
5/16/2011
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #13 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11168
POST TEST


OPR
UR6
SR3


mga
Impact Testing
5/16/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #13 RIGHT UR6
H/V IMPACT ANGLE= 90 / 50
U11168
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#13

Target (Vehicle Side): UR6Right

Temperature:21.7C

MGA Test Reference No.:U11168

Humidity:36.6%

Approach Horizontal Angles:90º

Time of Test:9:32:10 AM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:@OP

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
668	665	8.2	23.9	24	5 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	0.93

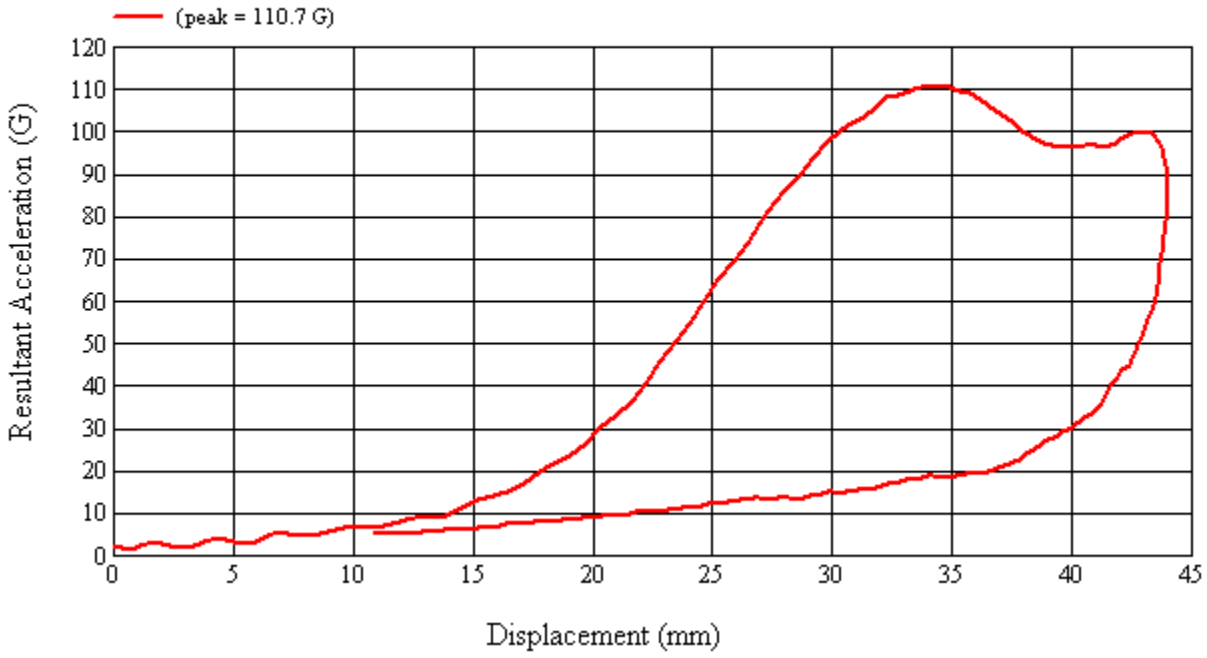
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

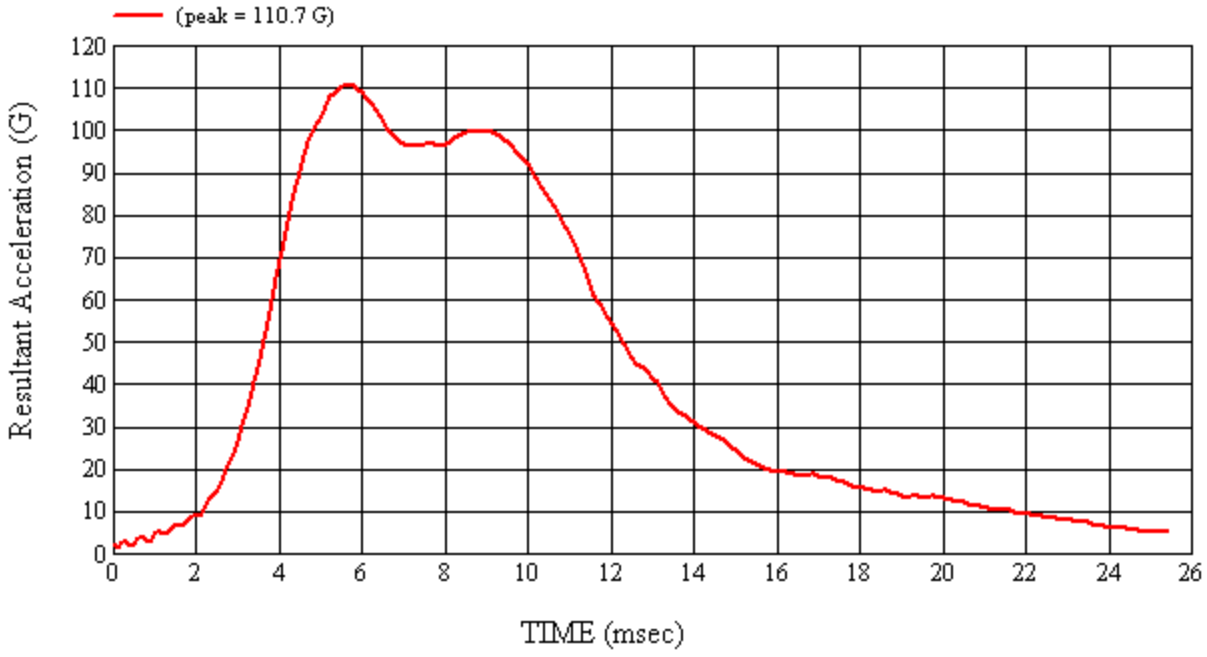
No visible damage

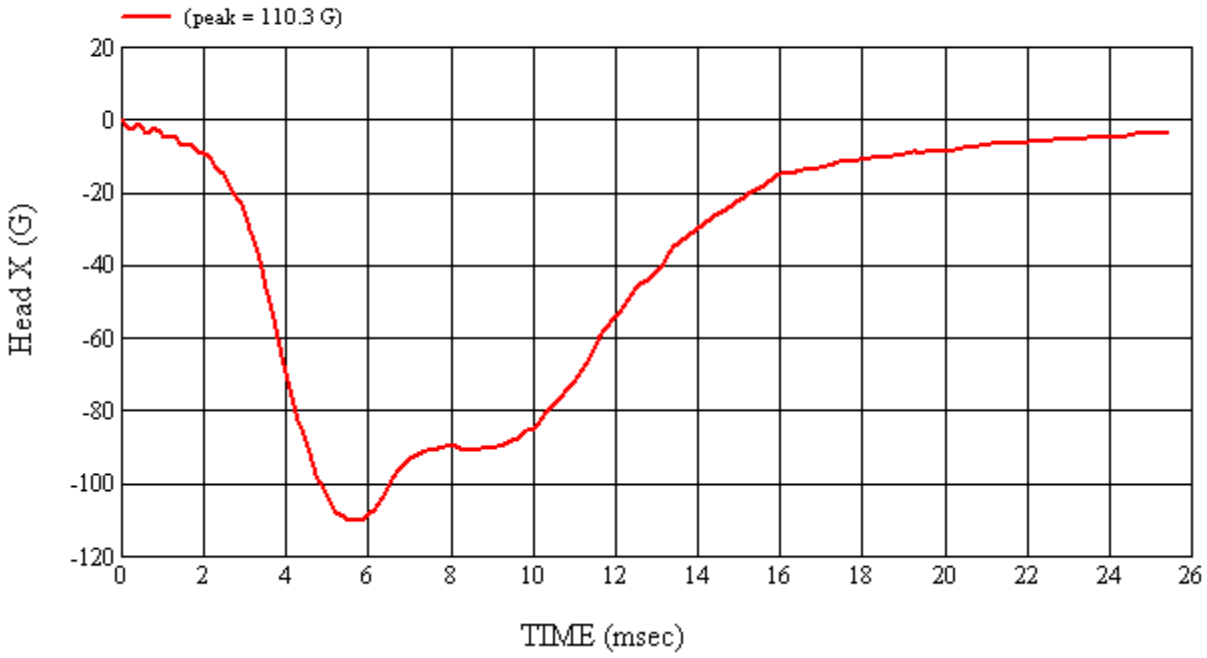
Recorded By: _____ Approved By*: _____ Date: 5/16/2011

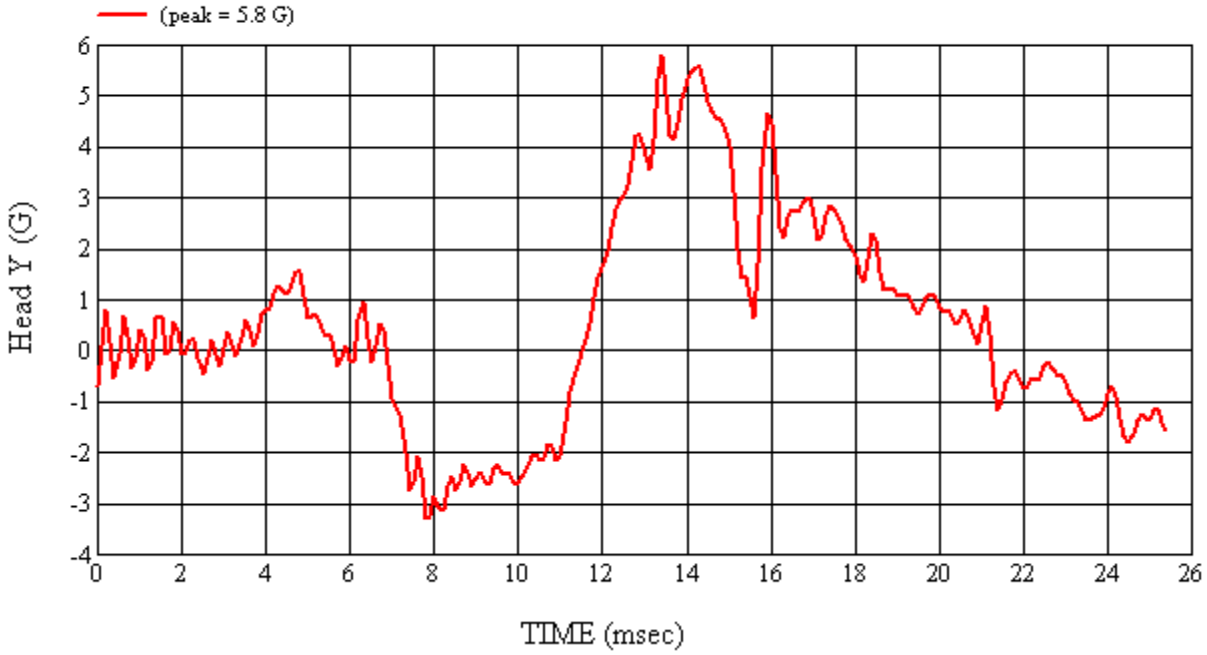
*Only necessary for NHTSA (Government) Compliance testing.

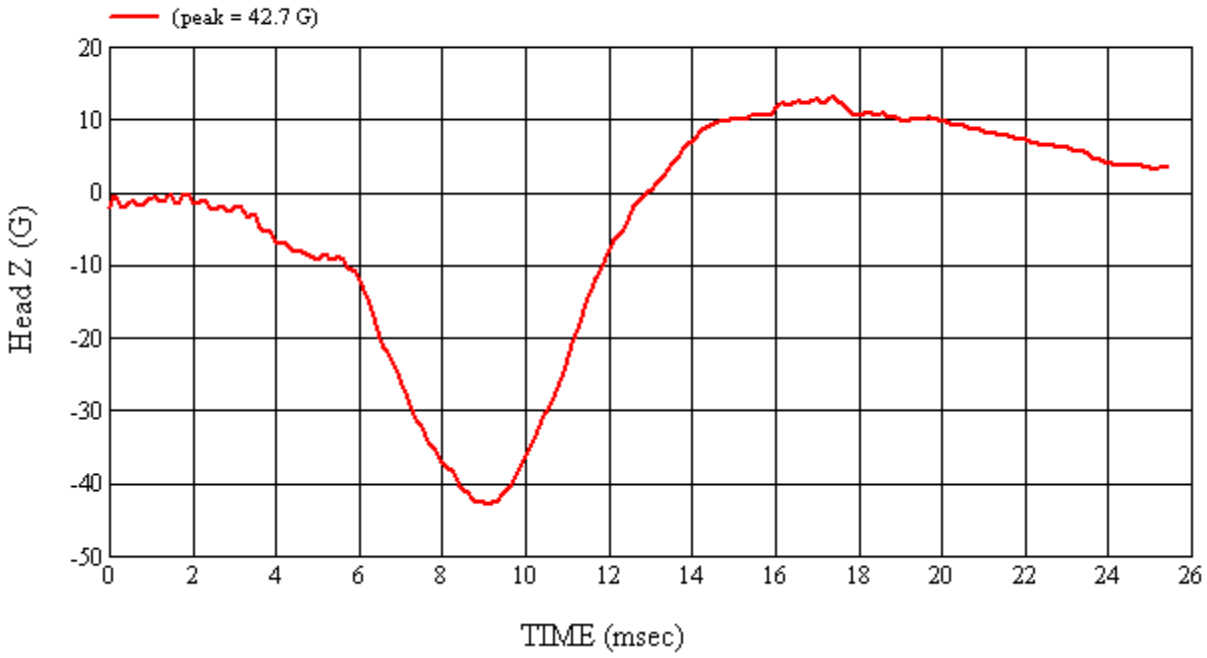
MGA Test #: U11168 Target Location: UR6, Right Side Test Date: 5/16/2011

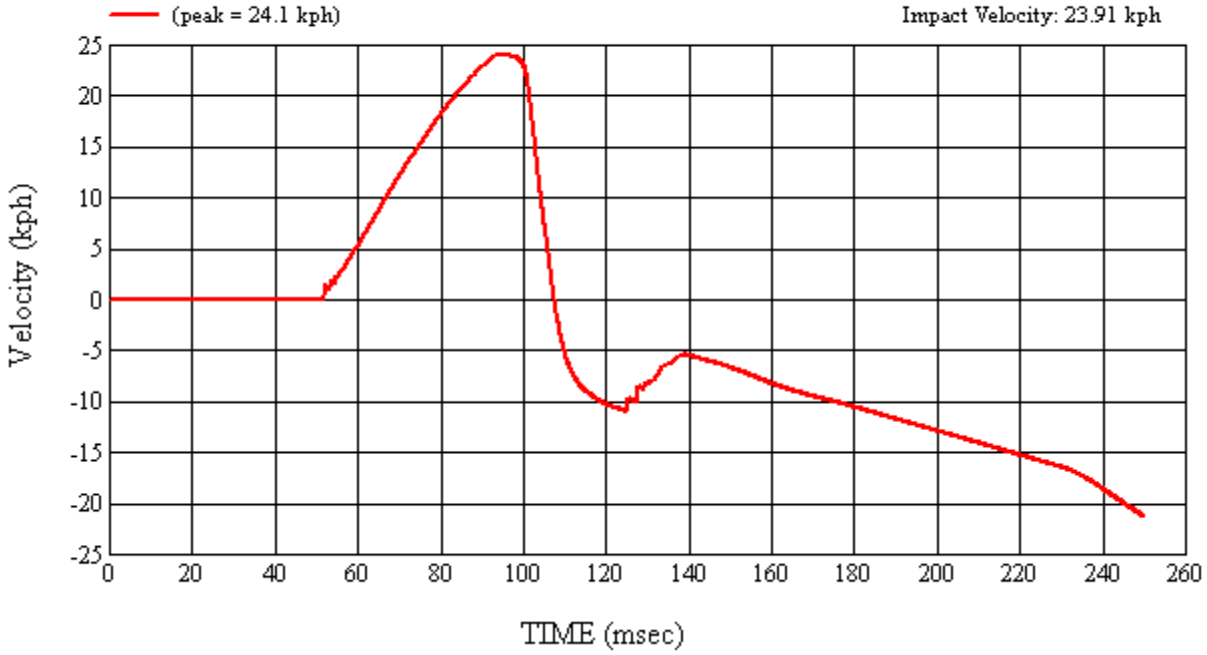


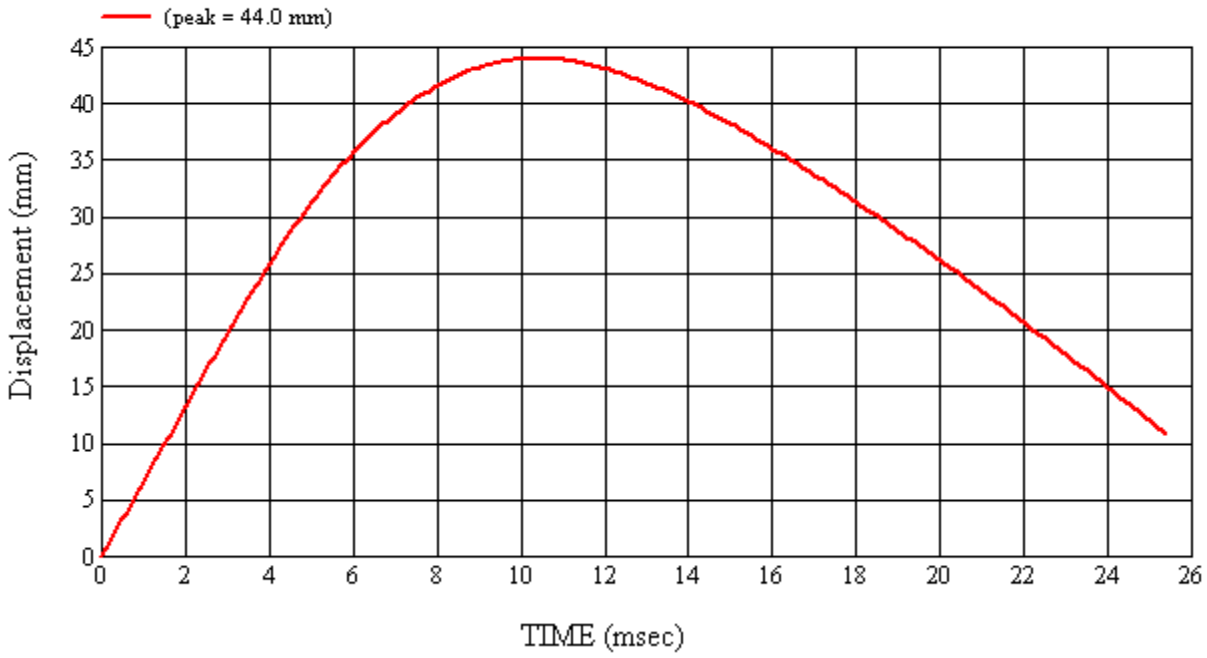



(peak = 110.3 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

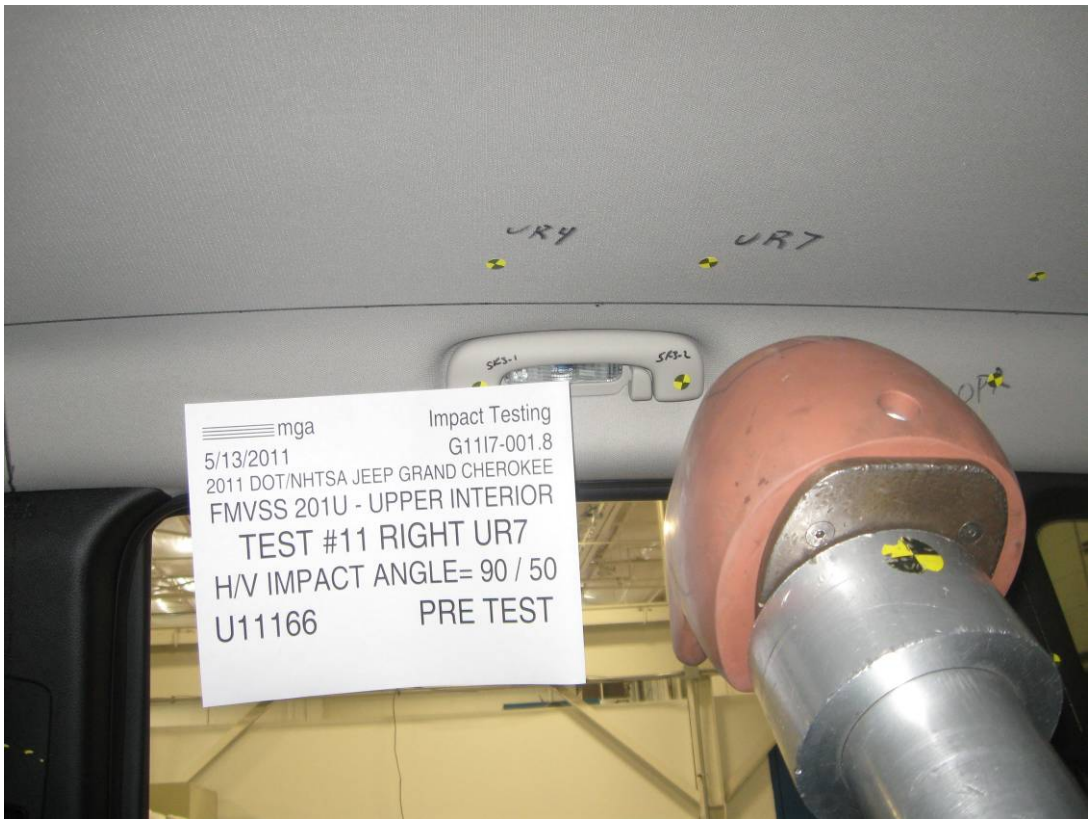

(peak = 5.8 G)
Head Y (G)
6
5
4
3
2
1
0
-1
-2
-3
-4
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 42.7 G)
Head Z (G)
20
10
0
-10
-20
-30
-40
-50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 24.1 kph)
Impact Velocity: 23.91 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
-15
-20
-25
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 44.0 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
TIME (msec)

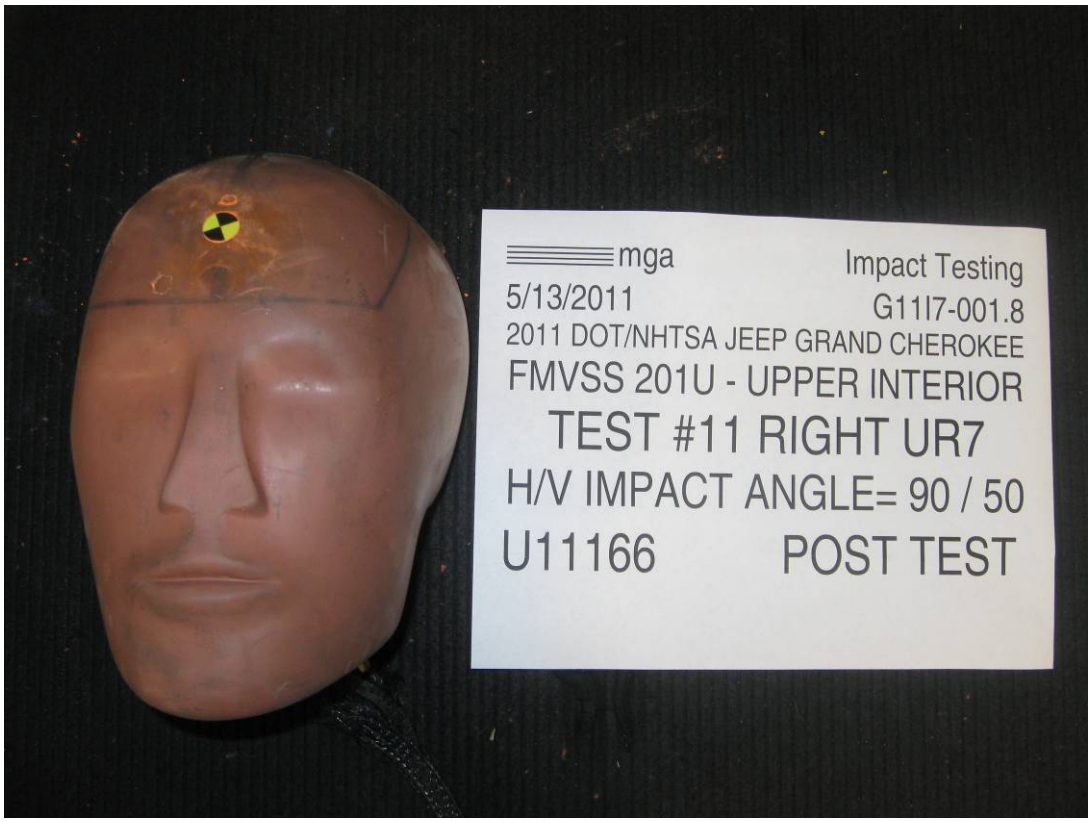

mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR7
H/V IMPACT ANGLE= 90 / 50
U11166
PRE TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR7
H/V IMPACT ANGLE= 90 / 50
U11166
PRE TEST


UR4
UR7
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR7
H/V IMPACT ANGLE= 90 / 50
U11166
PRE TEST


UR4
UR7
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR7
H/V IMPACT ANGLE= 90 / 50
U11166
POST TEST


UR4
UR7
SR3-I
SR3-L
OP2
OP1
mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR7
H/V IMPACT ANGLE= 90 / 50
U11166
POST TEST


mga
Impact Testing
5/13/2011
G11I7-001.8
2011 DOT/NHTSA JEEP GRAND CHEROKEE
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR7
H/V IMPACT ANGLE= 90 / 50
U11166
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G11I7-001.8

VEHICLE YR/MAKE/MODEL:2011/DOT/NHTSA/Jeep Grand Cherokee

GENERAL TEST PARAMETERS:

Test Number:#11

Target (Vehicle Side): UR7Right

Temperature:23.4C

MGA Test Reference No.:U11166

Humidity:60.6%

Approach Horizontal Angles:90º

Time of Test:4:13:29 PM

Approach Vertical Angles:50º

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
794	831	7.2	23.7	28	2 Right

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

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

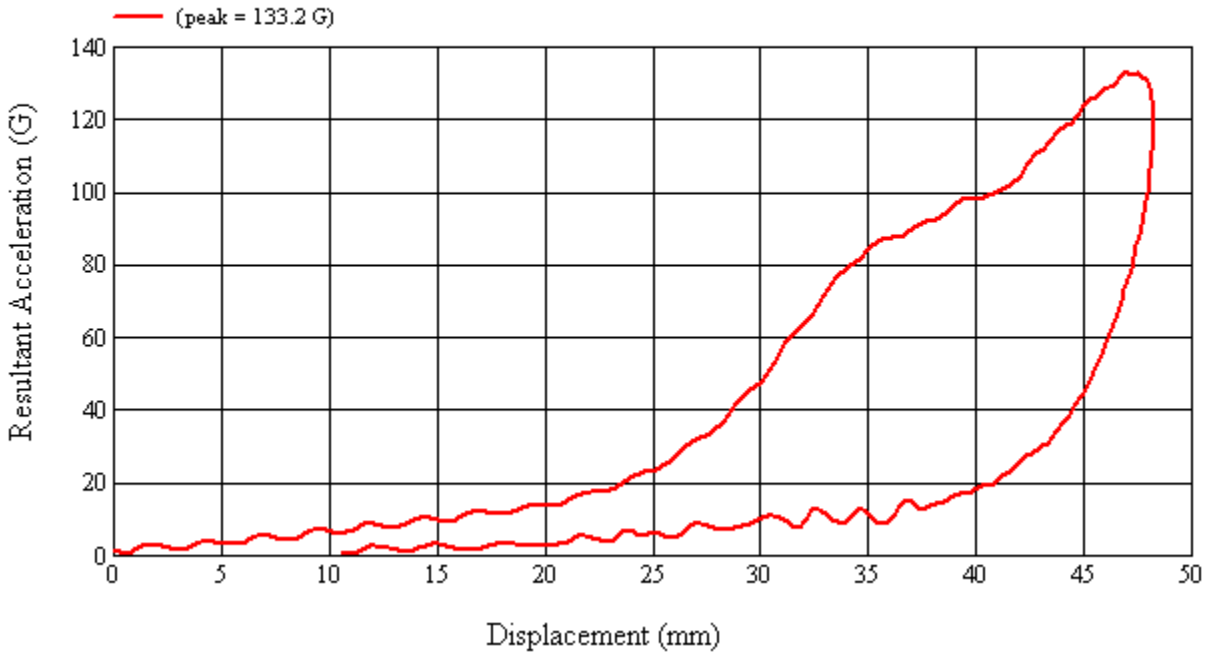
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

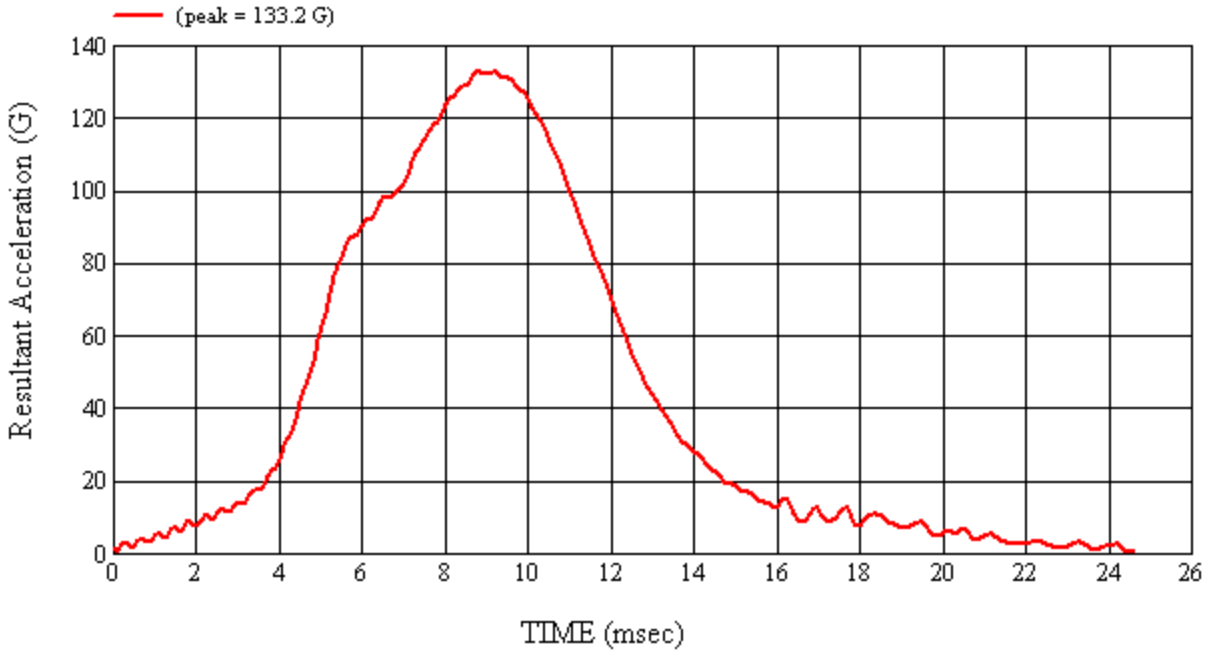
Headliner deformation

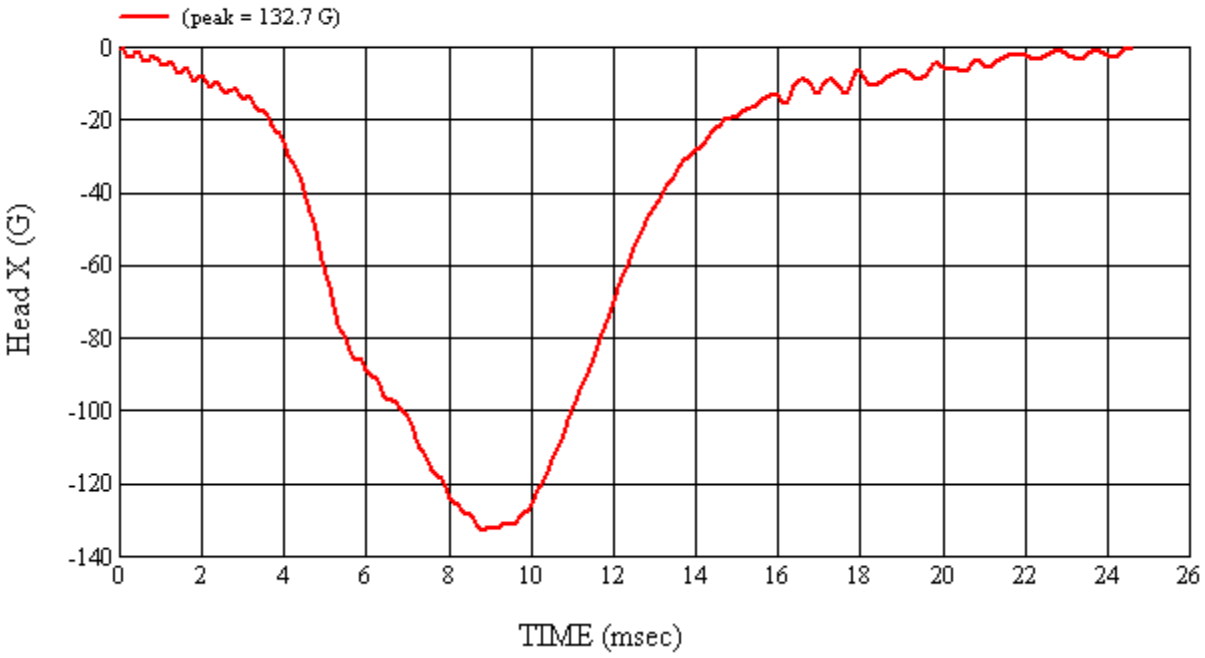
Recorded By: _____ Approved By*: _____ Date: 5/13/2011

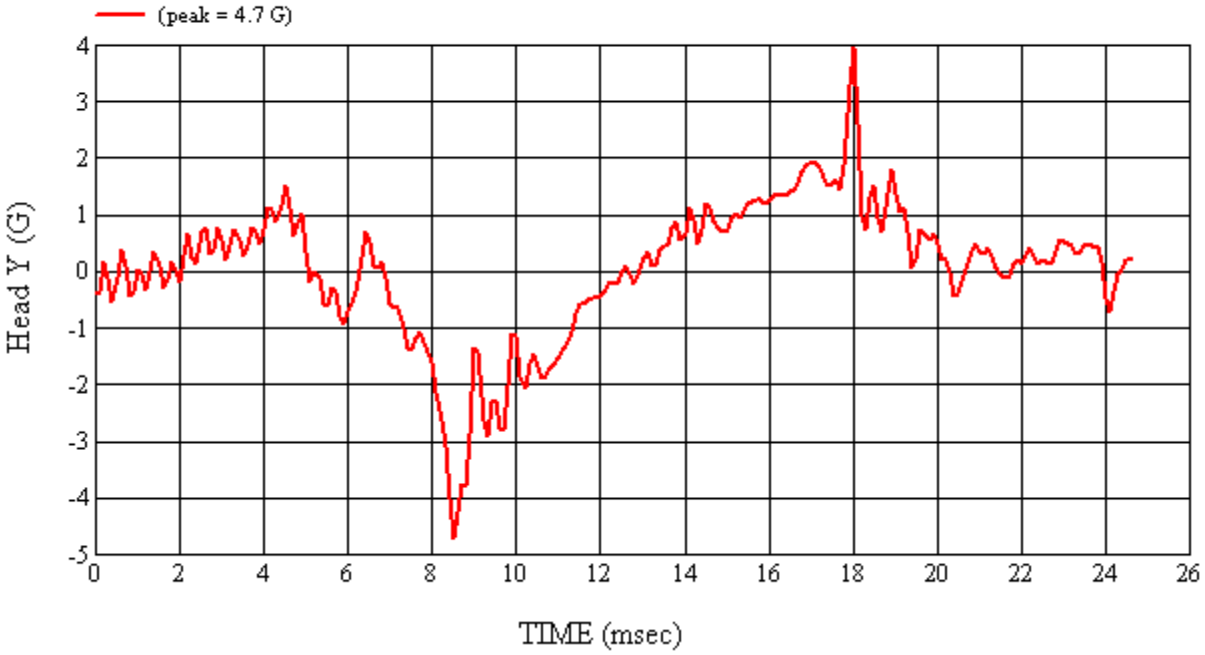
*Only necessary for NHTSA (Government) Compliance testing.

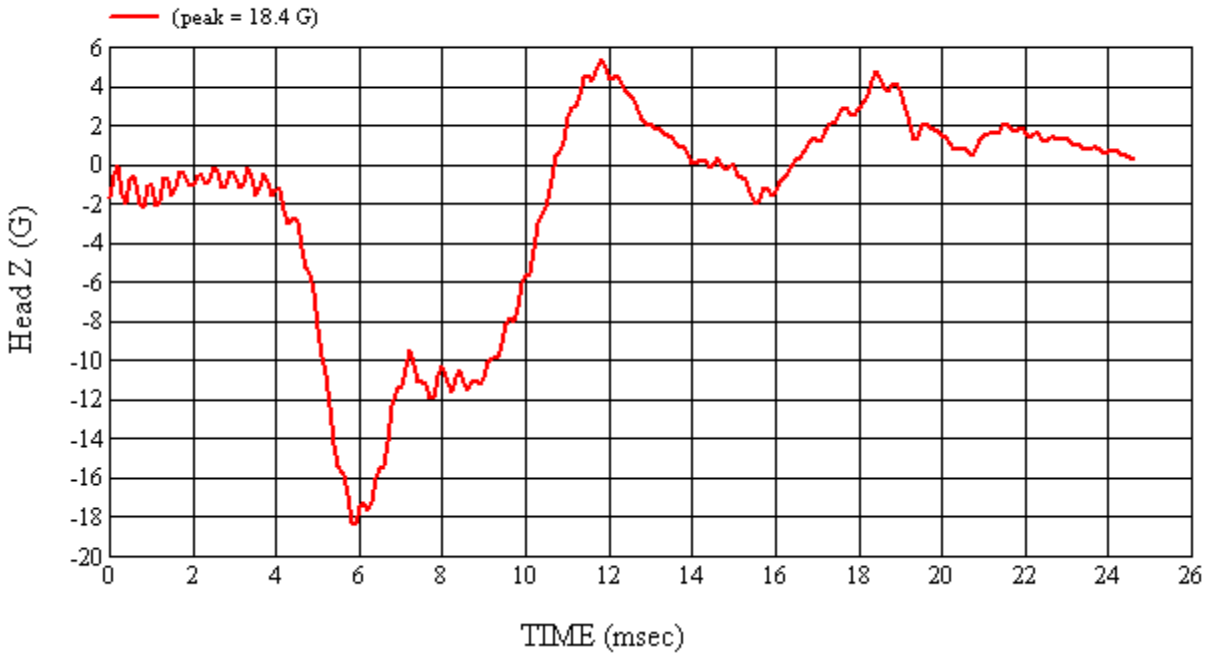
MGA Test #: U11166 Target Location: UR7, Right Side Test Date: 5/13/2011

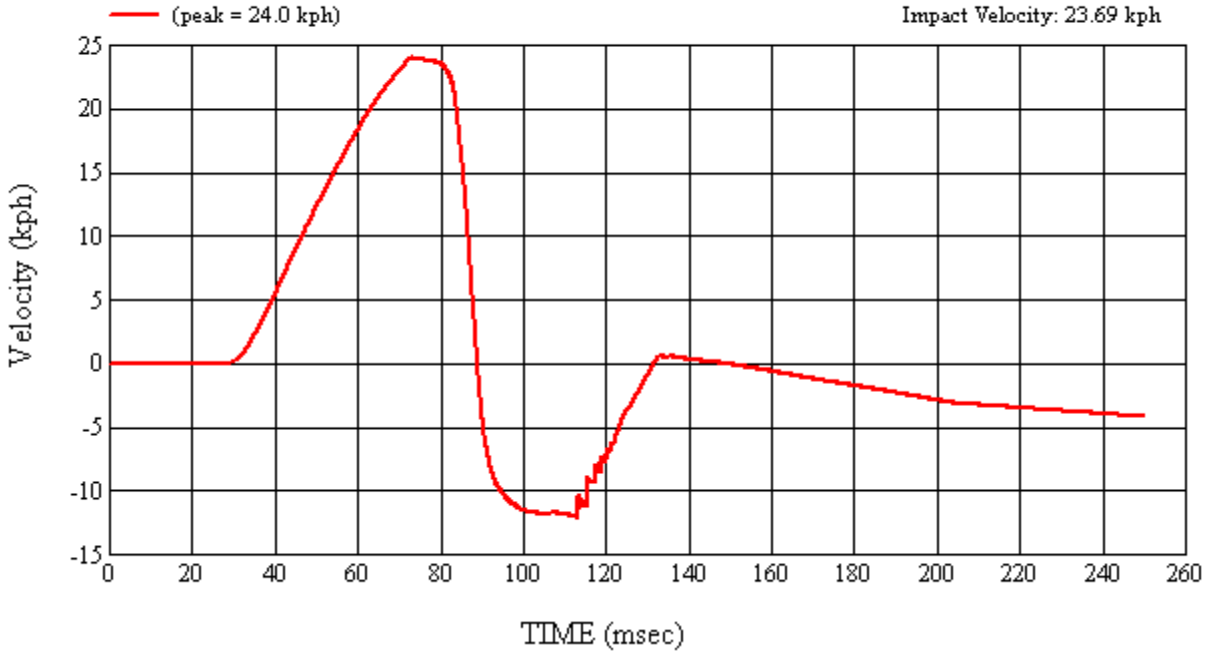


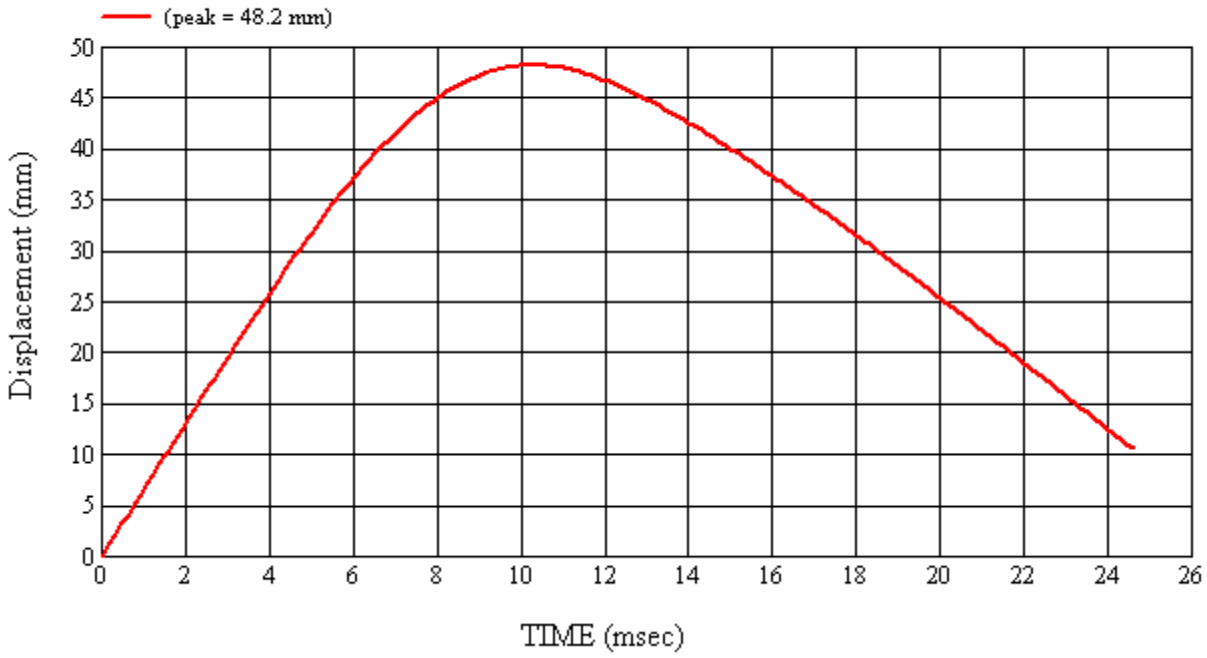



(peak = 132.7 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 4.7 G)
Head Y (G)
4
3
2
1
0
-1
-2
-3
-4
-5
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 18.4 G)
Head Z (G)
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
24
26
TIME (msec)


(peak = 24.0 kph)
Impact Velocity: 23.69 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 = 48.2 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
50
0
2
4
6
8
10
12
14
16
18
20
22
24
26
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	 TPM992 -- MGA00049	 Measurement Targeting FMH setup Horizontal Measurement	 1 mm N/A 0.5°	Annual
*Temperature Recorder	Dickson	MGA00894	Record Temperature and Humidity	± 1°C ± 1% RH	Annual
* Scale	Detecto	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	5/11/2011	9.90	23.8	45.7	249.7	4.4	Yes
Post	#035	5/13/2011	9.90	23.0	60.2	259.0	6.0	Yes
Pre	#037	5/11/2011	9.96	23.7	45.5	262.2	5.2	Yes
Post	#037	5/17/2011	9.96	20.8	45.1	264.9	5.9	Yes
Pre	#038	5/11/2011	9.90	23.8	45.3	272.1	12.1	Yes
Post	#038	5/17/2011	9.90	20.9	44.3	262.2	11.0	Yes

Note: Head #035 was taken out of the rotation due to electrical noise found on an invalid test.

4-1 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

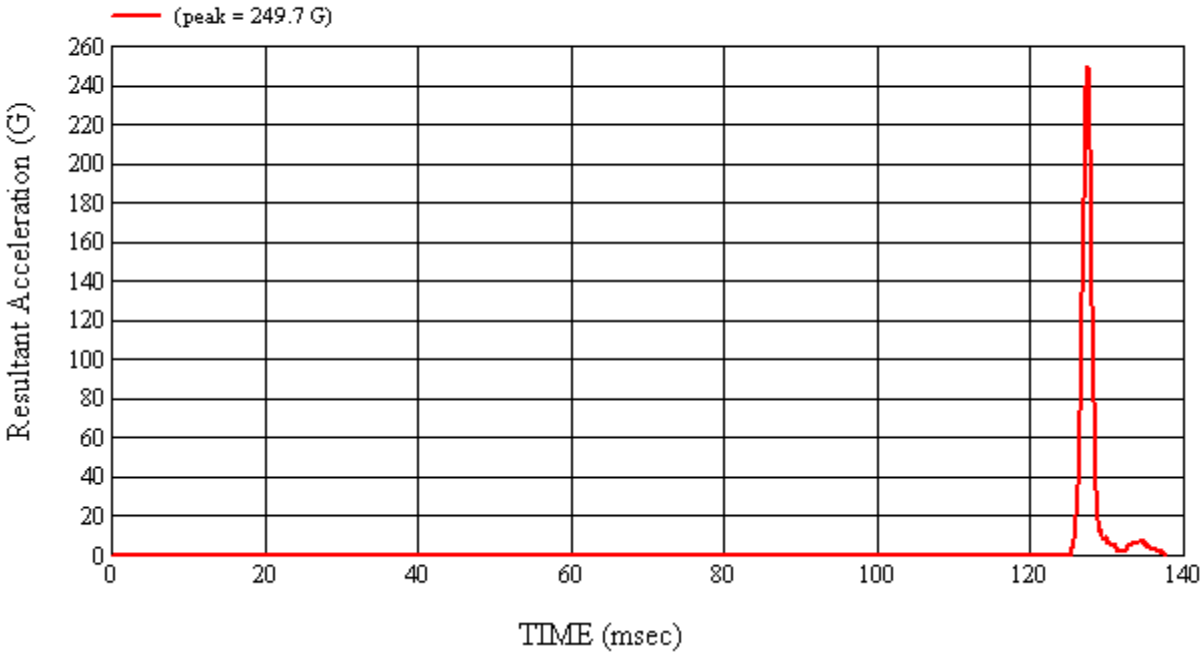
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 5/11/2011 CALIBRATION TIME: 3:33:01 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	23.8
Relative Humidity	10% to 70%	45.7
Peak Resultant Acceleration	225 G's to 275 G's	249.7
Peak Lateral Acceleration	15 G's Maximum	4.4
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	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

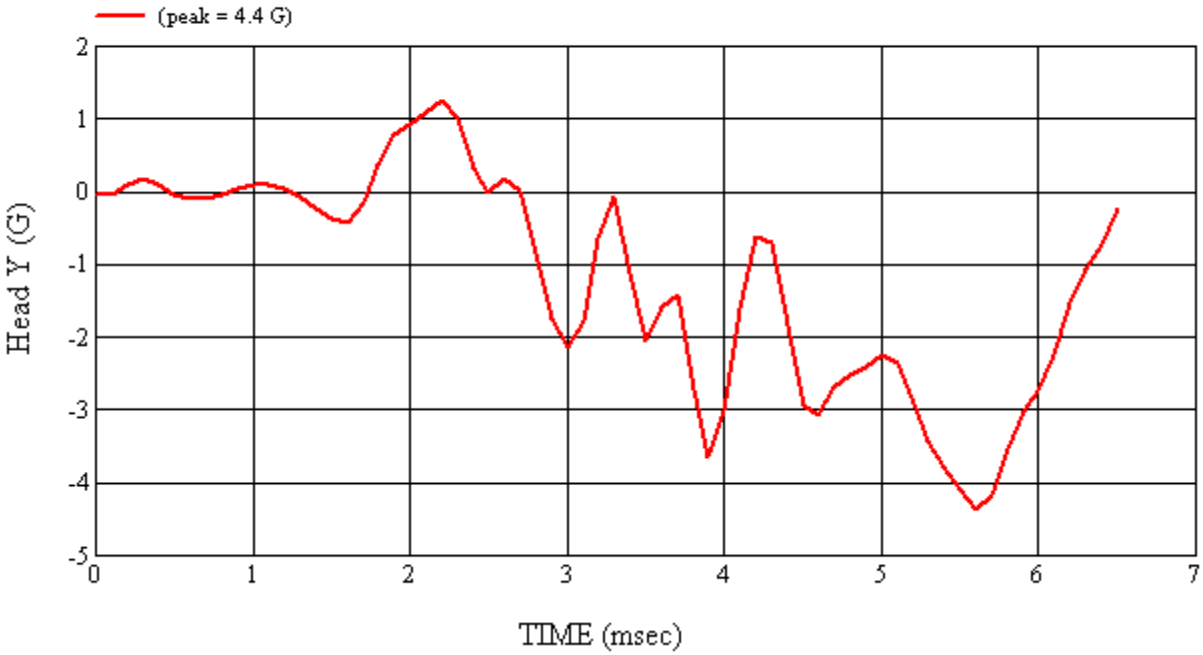
REMARKS:

RECORDED BY: _____ DATE: __5/11/2011____

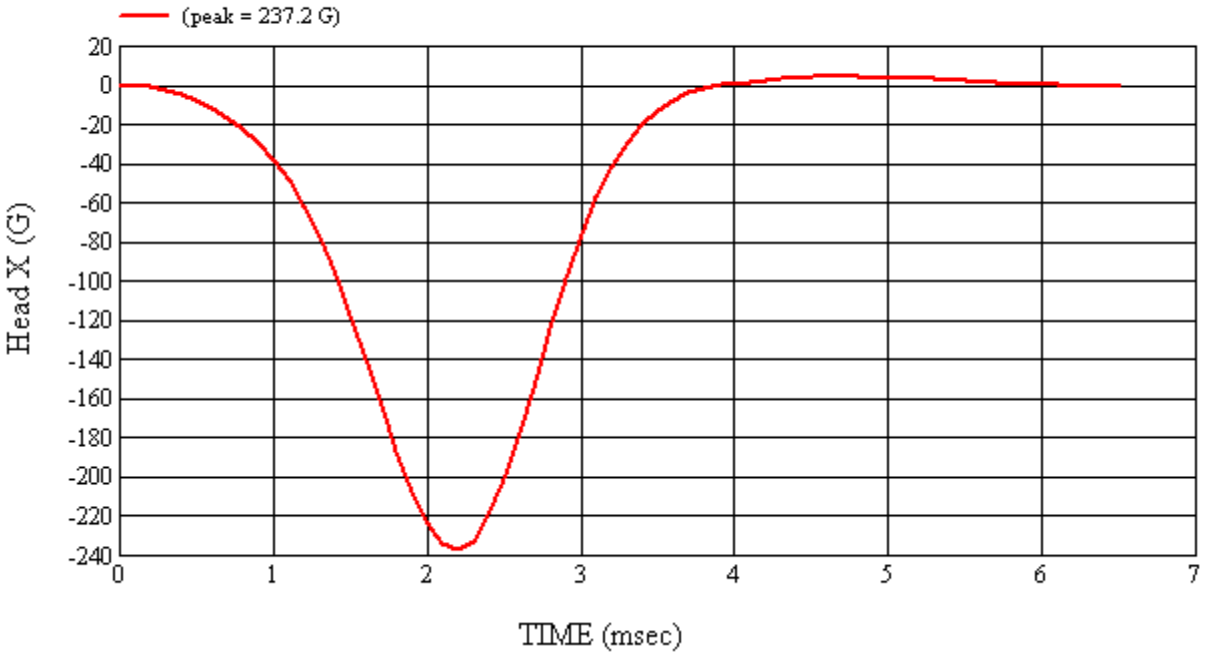
APPROVED BY: _____



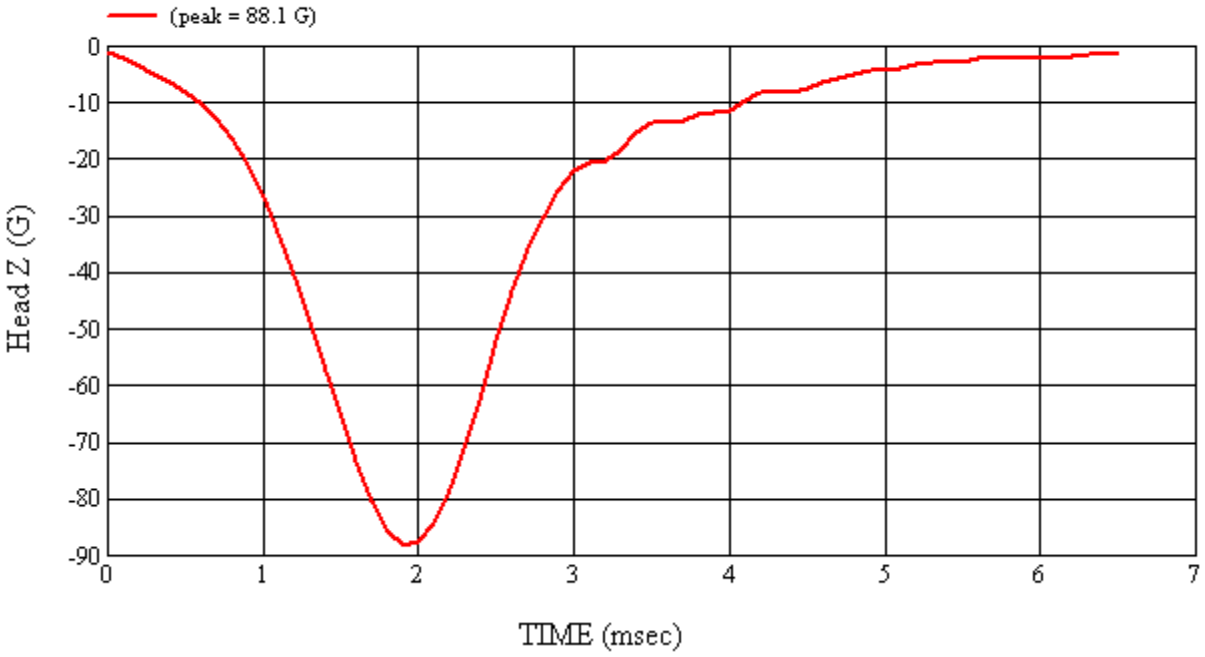
Head 035 (Pre) Calibration #H35019



Head 035 (Pre) Calibration #H35019



Head 035 (Pre) Calibration #H35019



Head 035 (Pre) Calibration #H35019

4-2 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

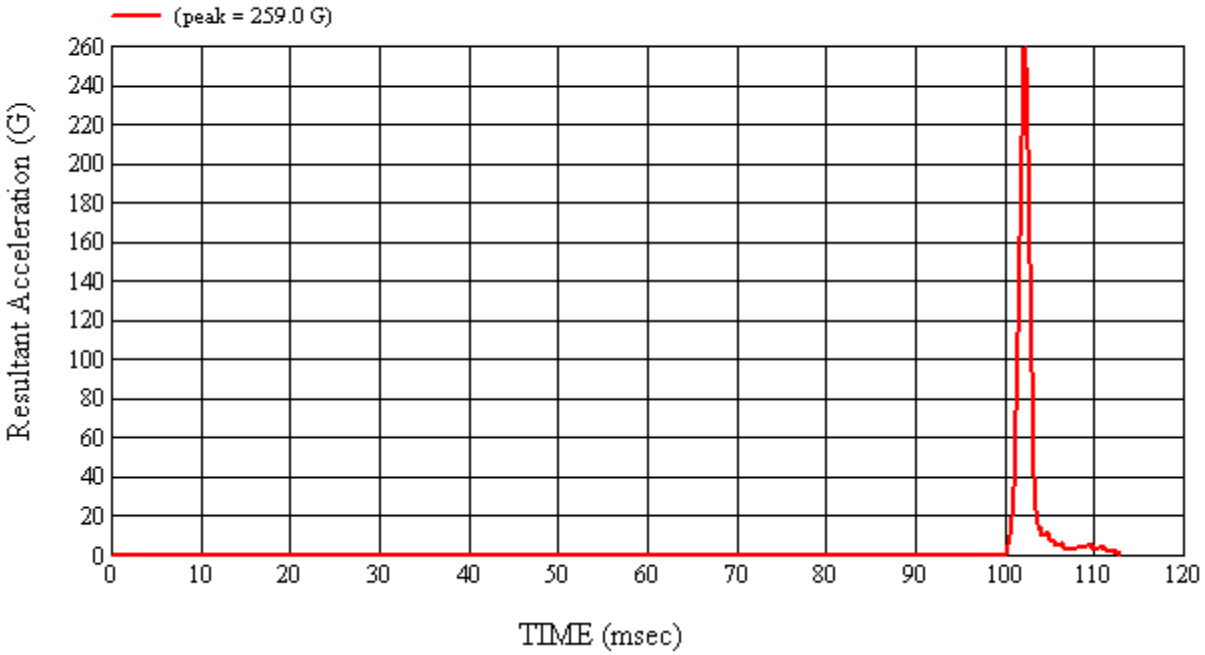
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 5/13/2011 CALIBRATION TIME: 8:09:11 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	23.0
Relative Humidity	10% to 70%	60.2
Peak Resultant Acceleration	225 G's to 275 G's	259.0
Peak Lateral Acceleration	15 G's Maximum	6.0
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

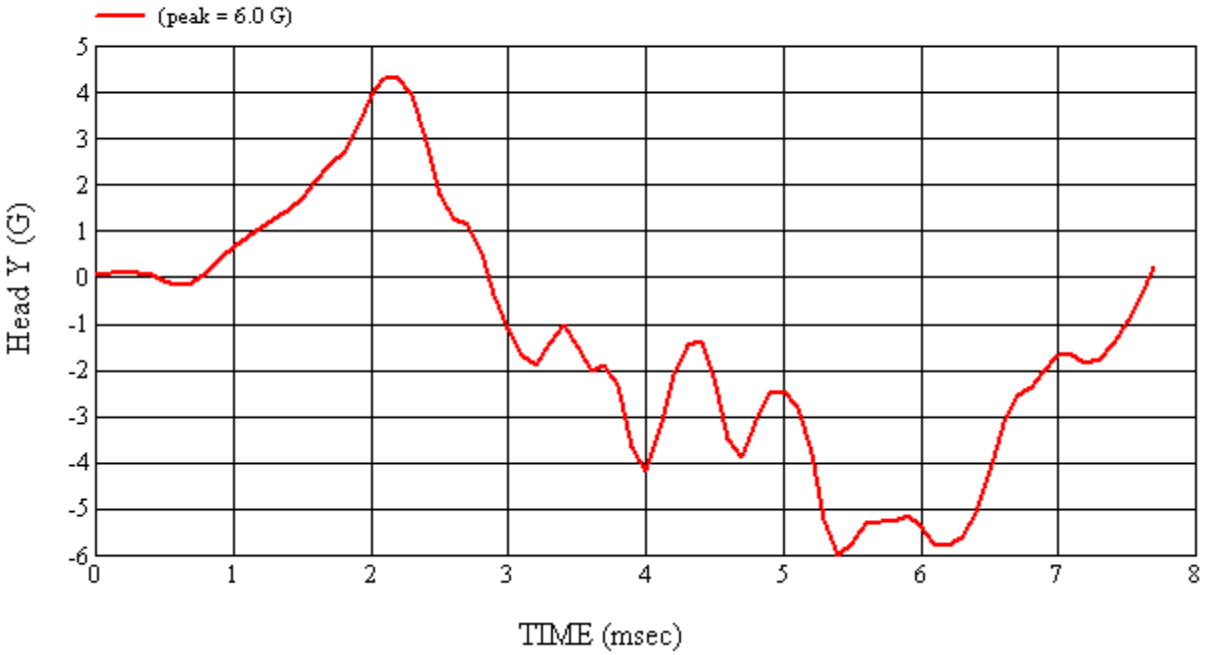
REMARKS:

RECORDED BY: _____ DATE: 5/13/2011

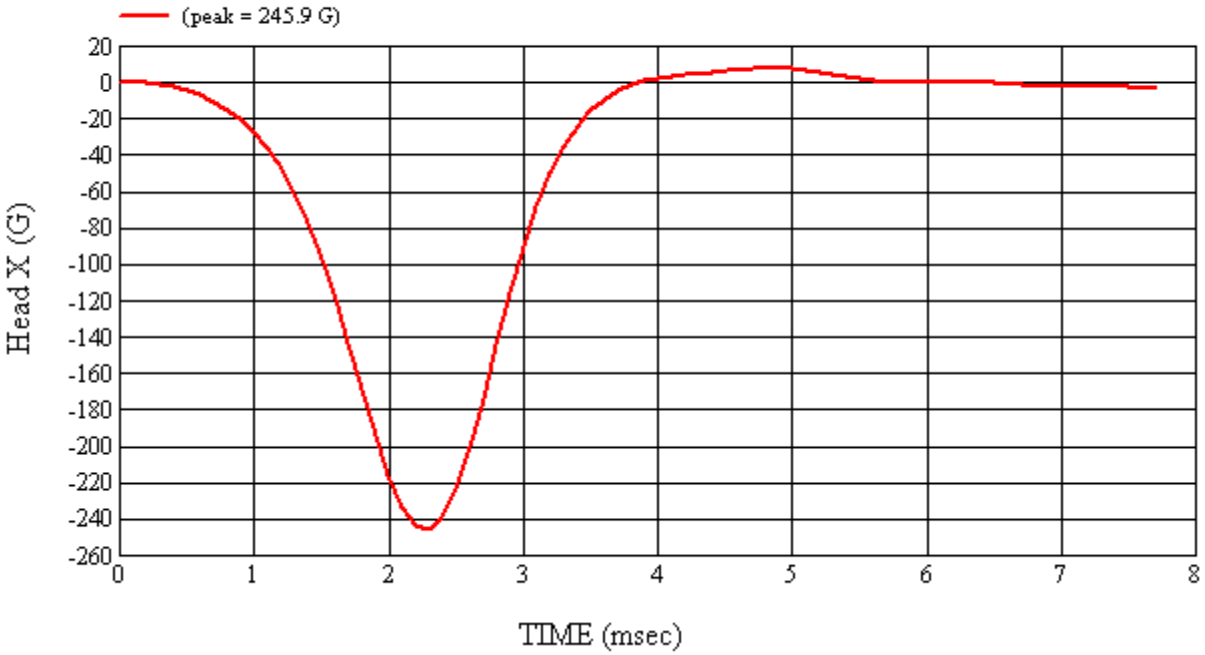
APPROVED BY: _____



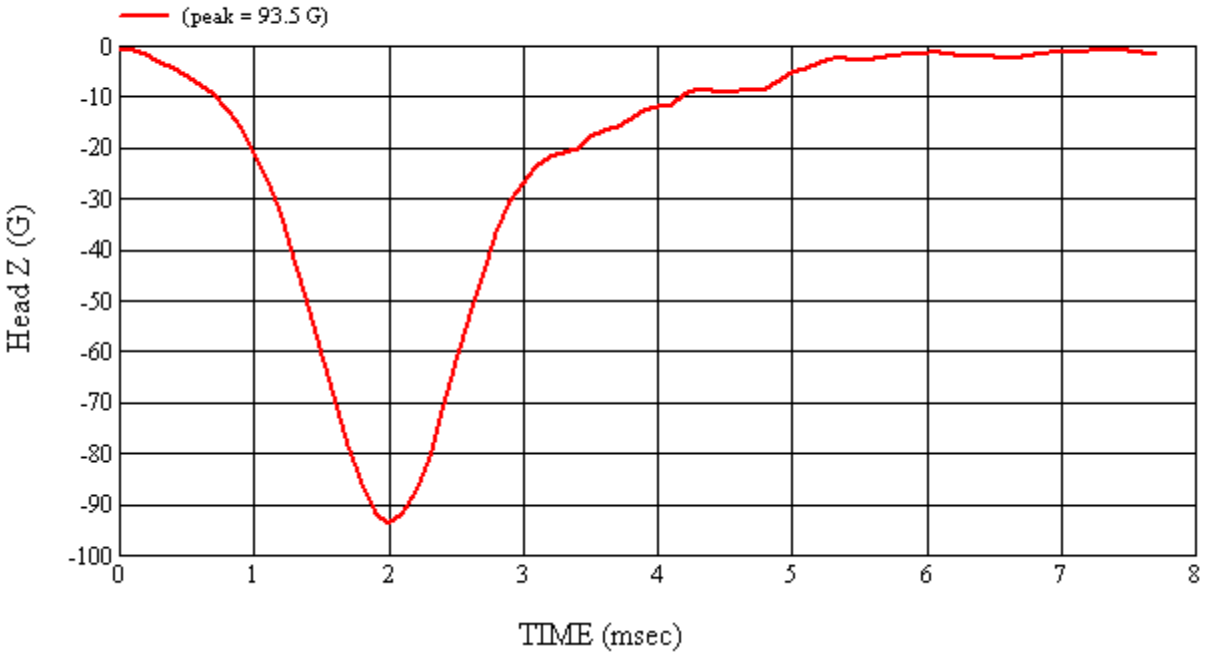
Head 035 (Post) Calibration #H35020



Head 035 (Post) Calibration #H35020



Head 035 (Post) Calibration #H35020



Head 035 (Post) Calibration #H35020

4-3 Pre-Test Calibration

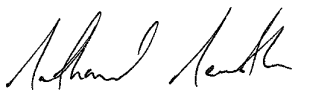
HEAD DROP TEST SUMMARY
PART 572L

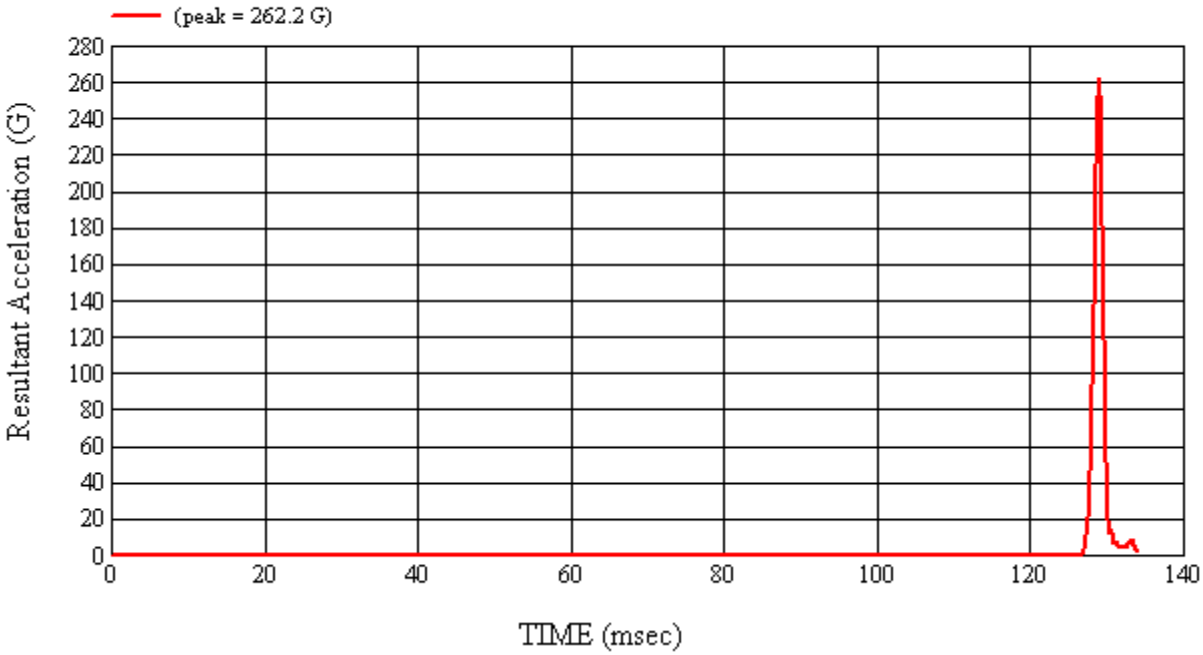
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 5/11/2011 CALIBRATION TIME: 3:49:58 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	23.7
Relative Humidity	10% to 70%	45.5
Peak Resultant Acceleration	225 G's to 275 G's	262.2
Peak Lateral Acceleration	15 G's Maximum	5.2
Unimodal Acceleration Curve	YES	YES

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

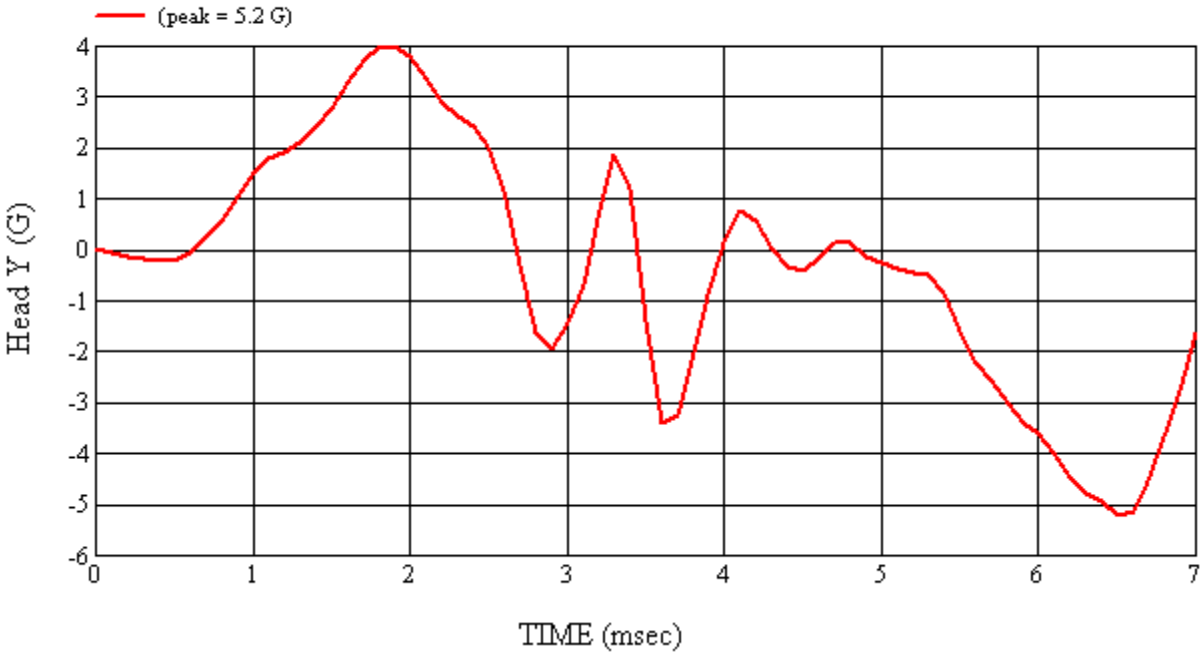
REMARKS:

RECORDED BY:  DATE: 5/11/2011

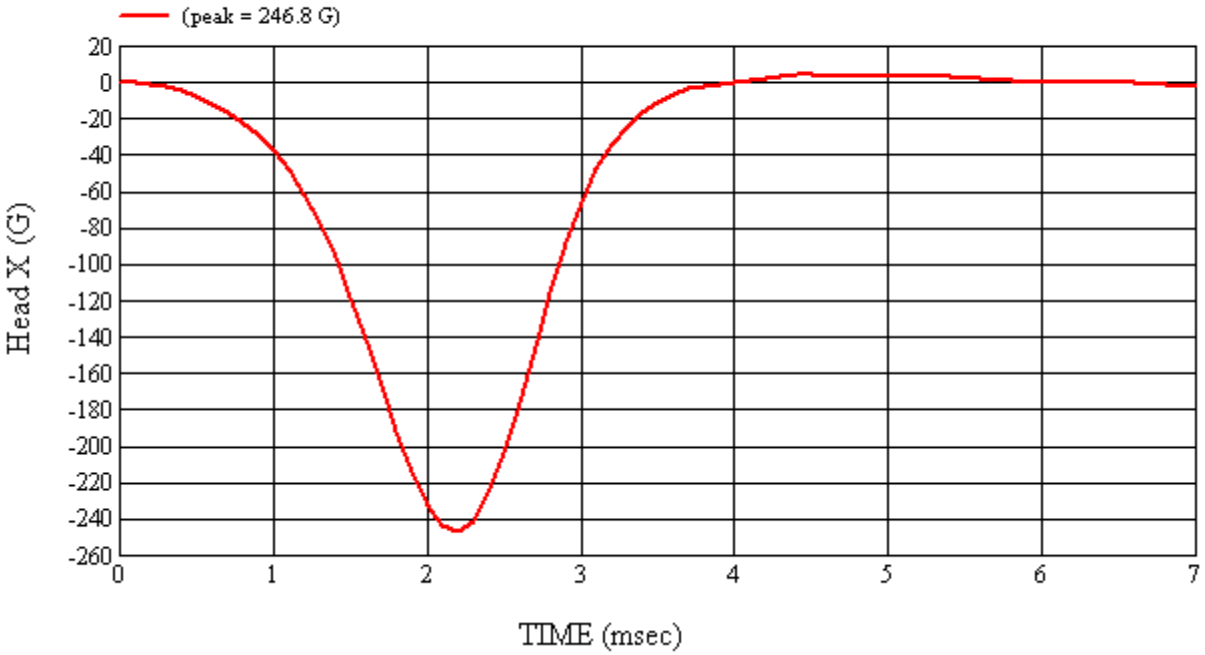
APPROVED BY: 



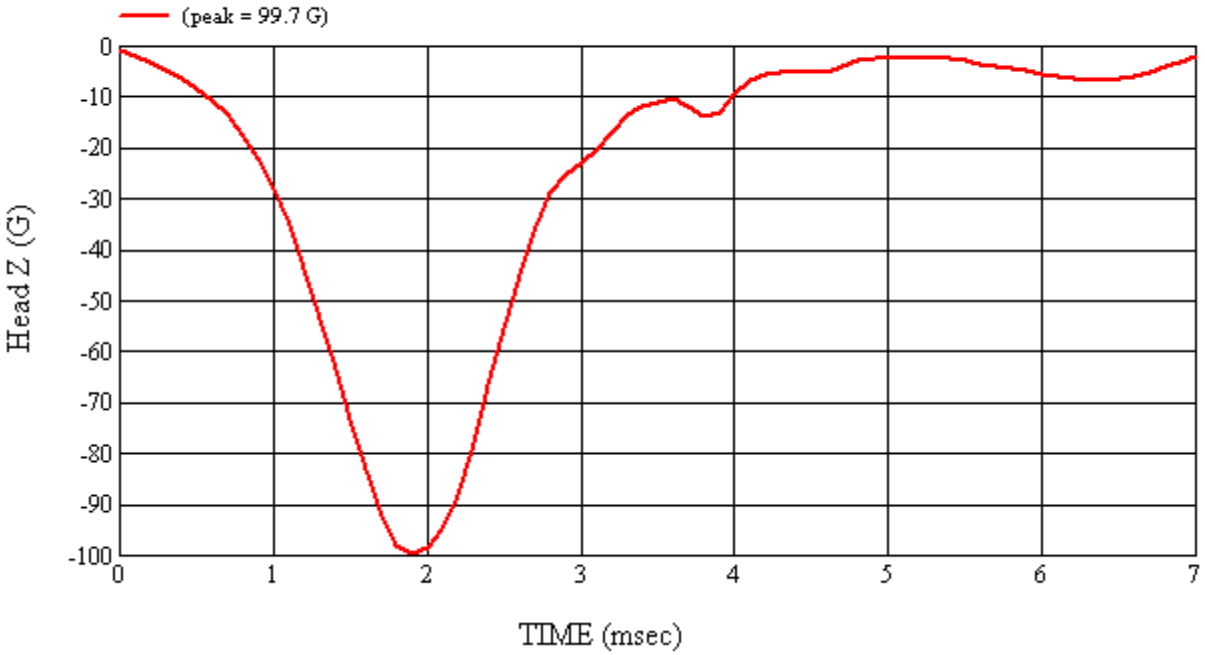
Head 037 (Pre) Calibration #H37019



Head 037 (Pre) Calibration #H37019



Head 037 (Pre) Calibration #H37019



Head 037 (Pre) Calibration #H37019

4-4 Post-Test Calibration

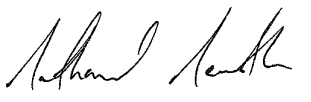
HEAD DROP TEST SUMMARY
PART 572L

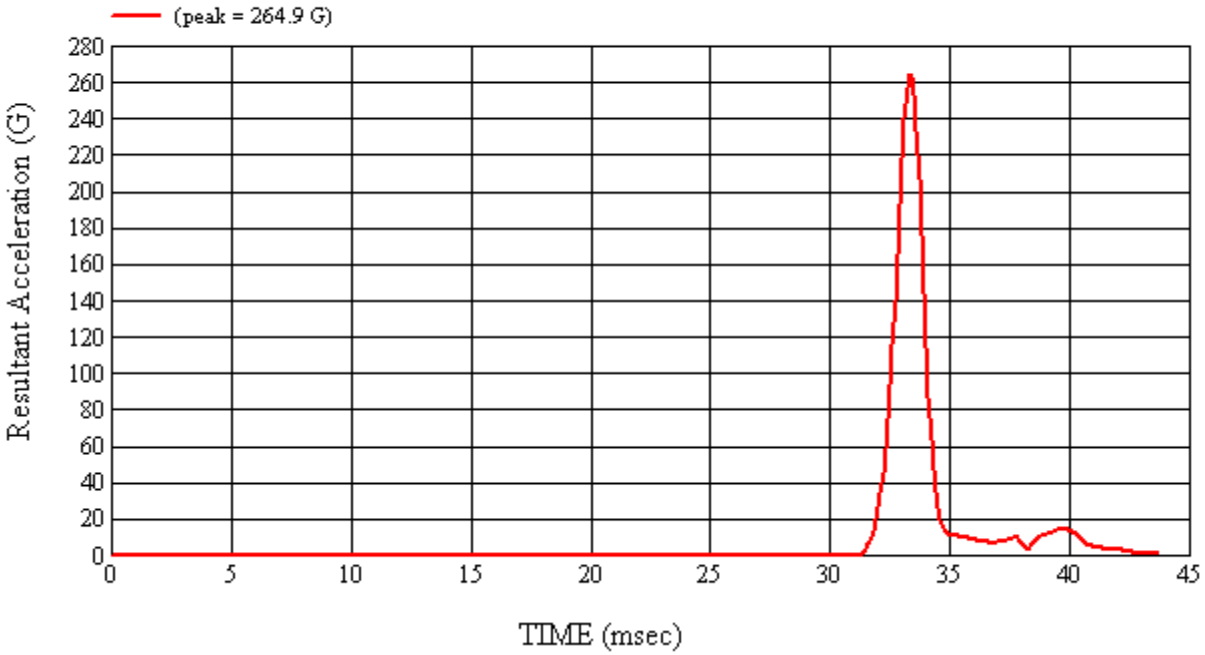
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 5/17/2011 CALIBRATION TIME: 4:07:56 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	20.8
Relative Humidity	10% to 70%	45.1
Peak Resultant Acceleration	225 G's to 275 G's	264.9
Peak Lateral Acceleration	15 G's Maximum	5.9
Unimodal Acceleration Curve	YES	YES

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

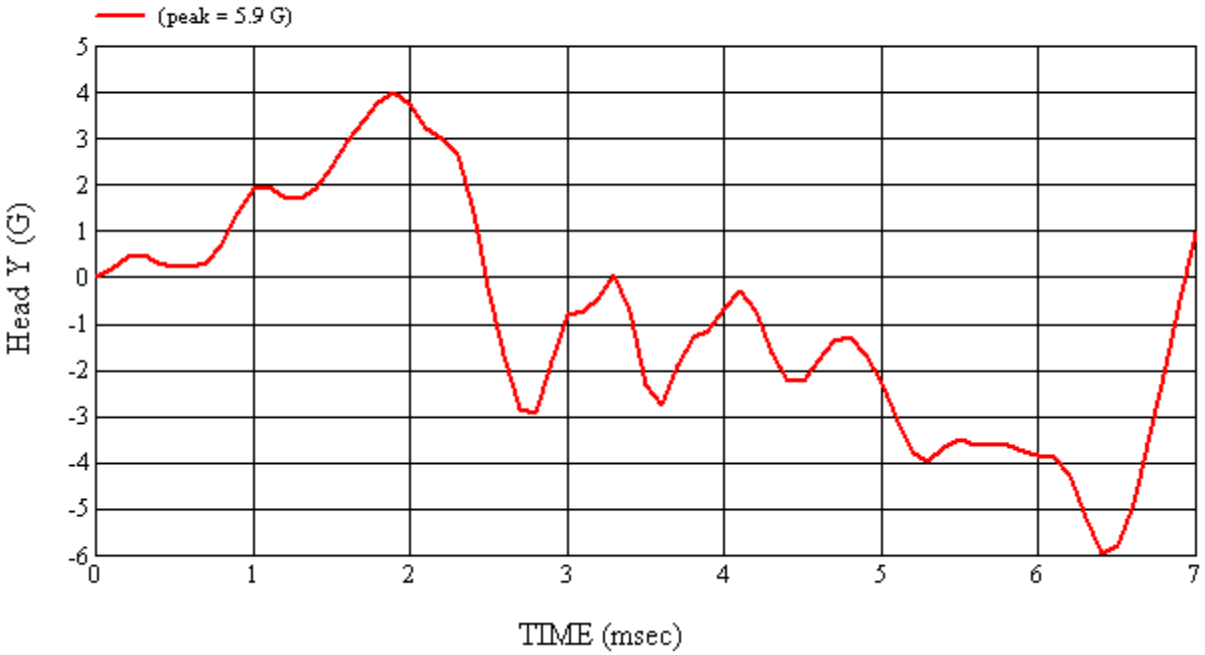
REMARKS:

RECORDED BY:  DATE: 5/17/2011

APPROVED BY: 



Head 037 (Post) Calibration #H37020



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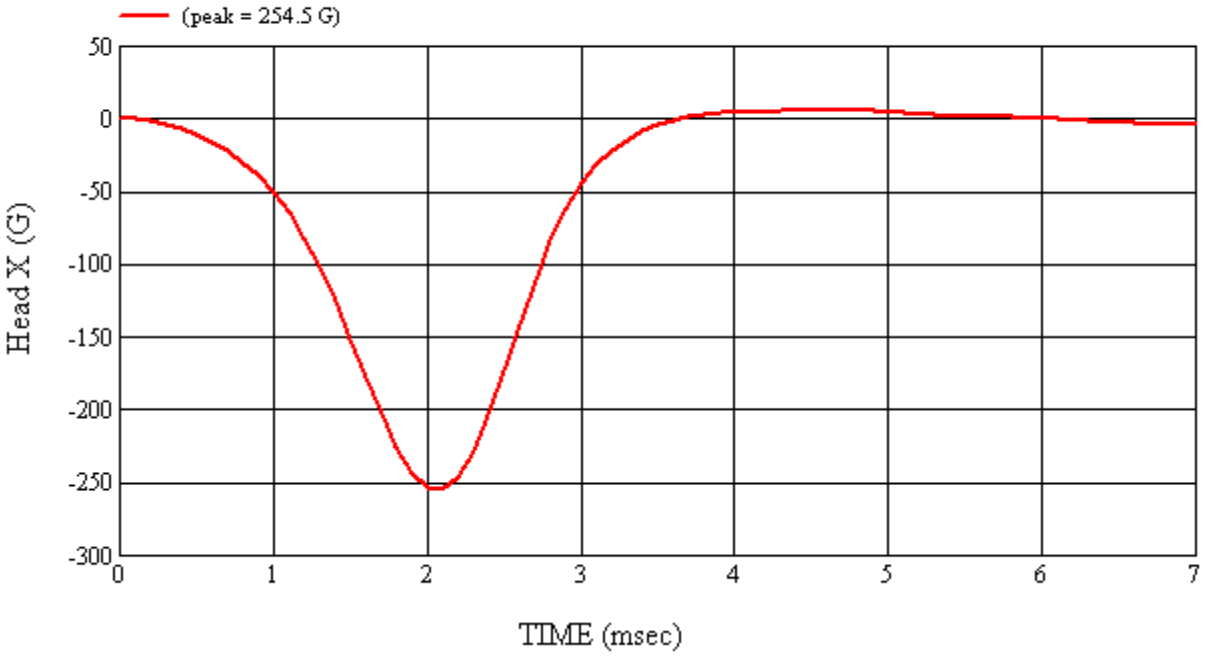

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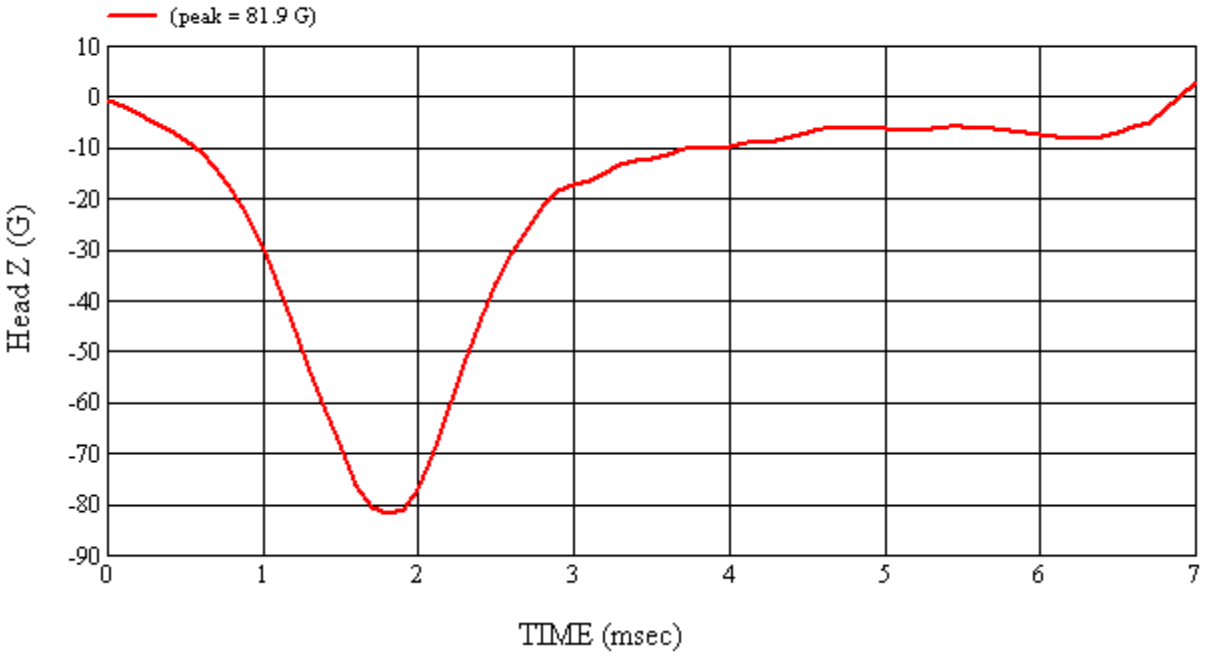


Head 037 (Post) Calibration #H37020

4-5 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

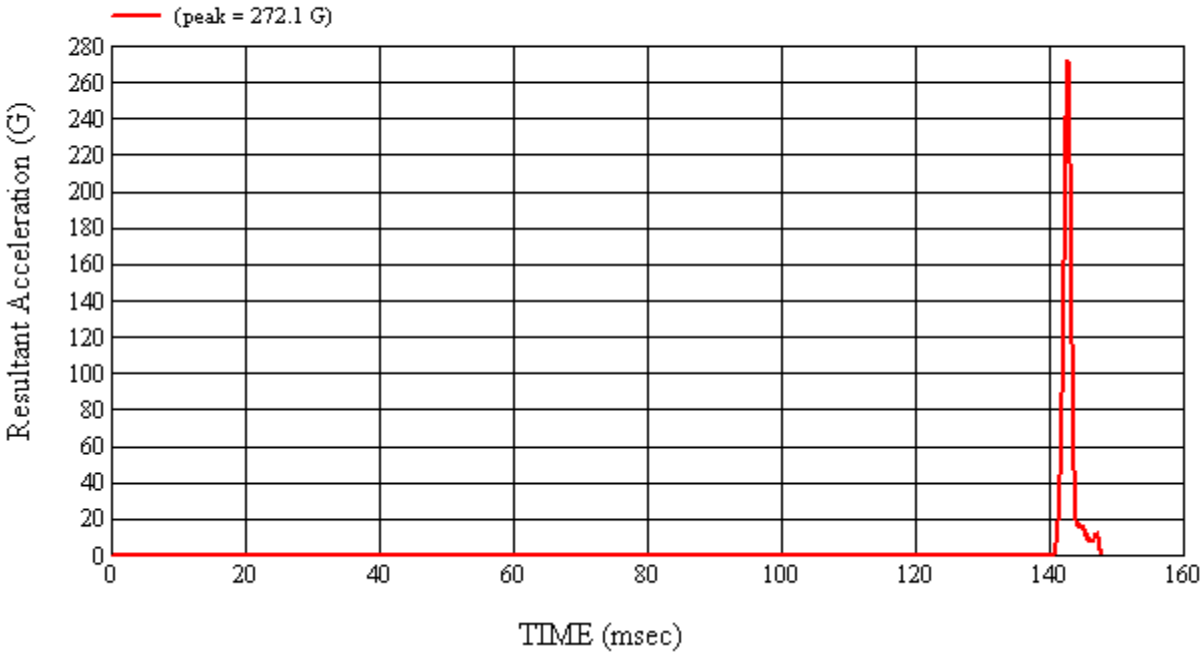
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 5/11/2011 CALIBRATION TIME: 4:09:56 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	23.8
Relative Humidity	10% to 70%	45.3
Peak Resultant Acceleration	225 G's to 275 G's	272.1
Peak Lateral Acceleration	15 G's Maximum	12.1
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: 5/11/2011

APPROVED BY: 



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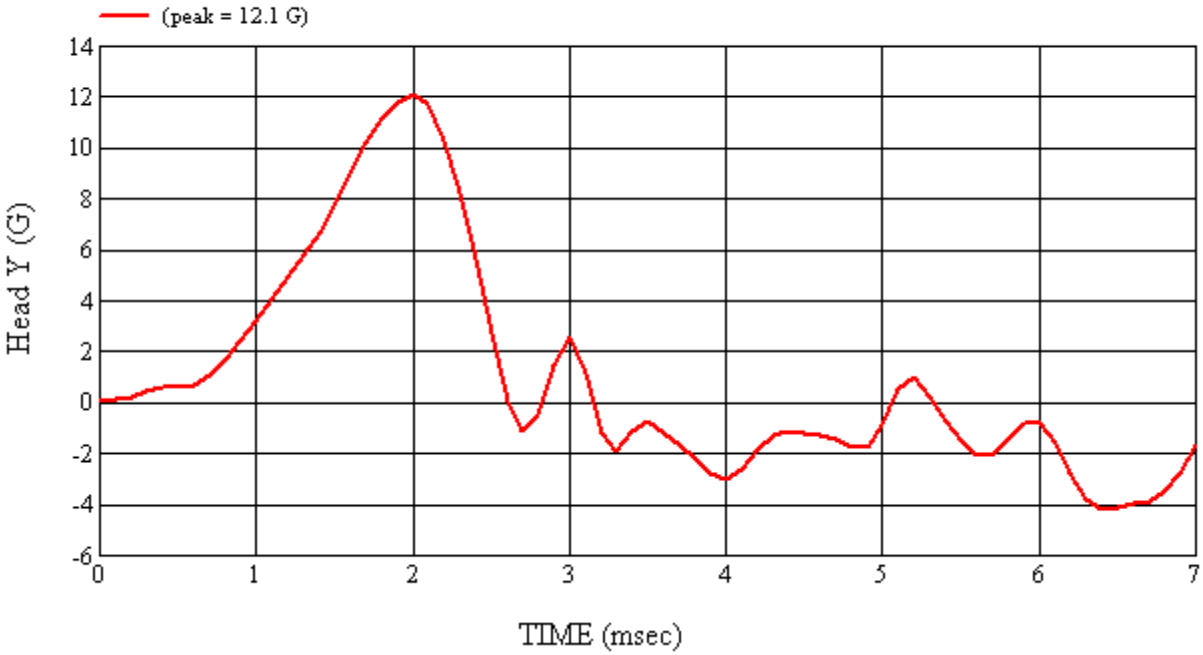

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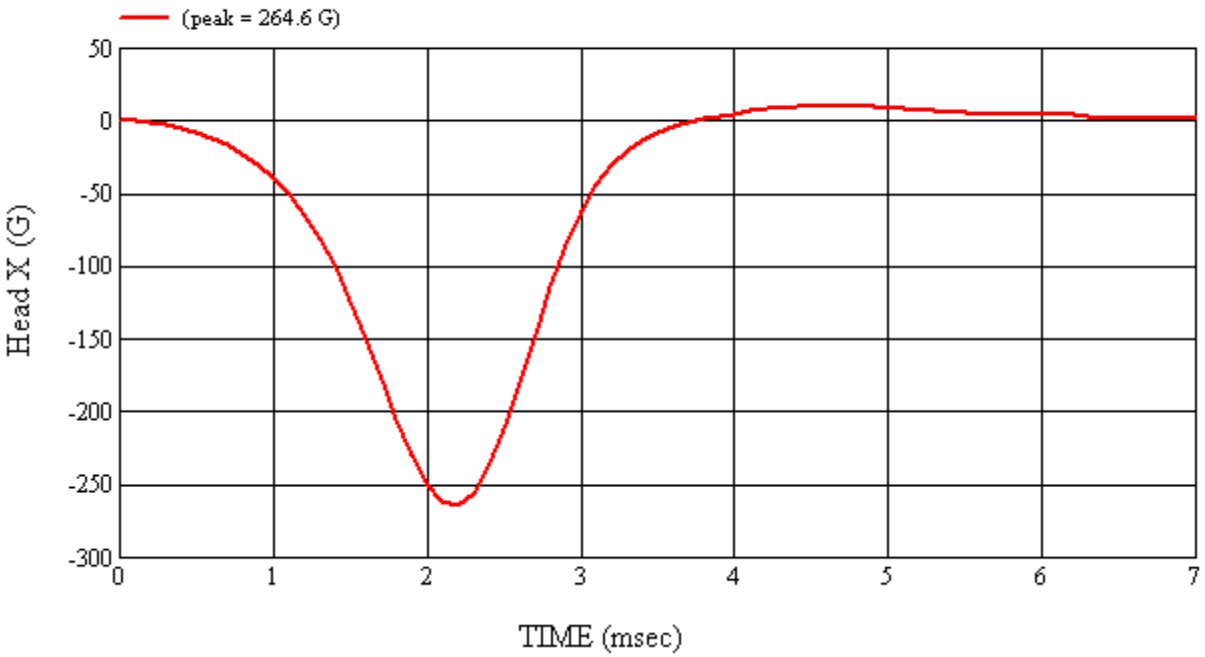
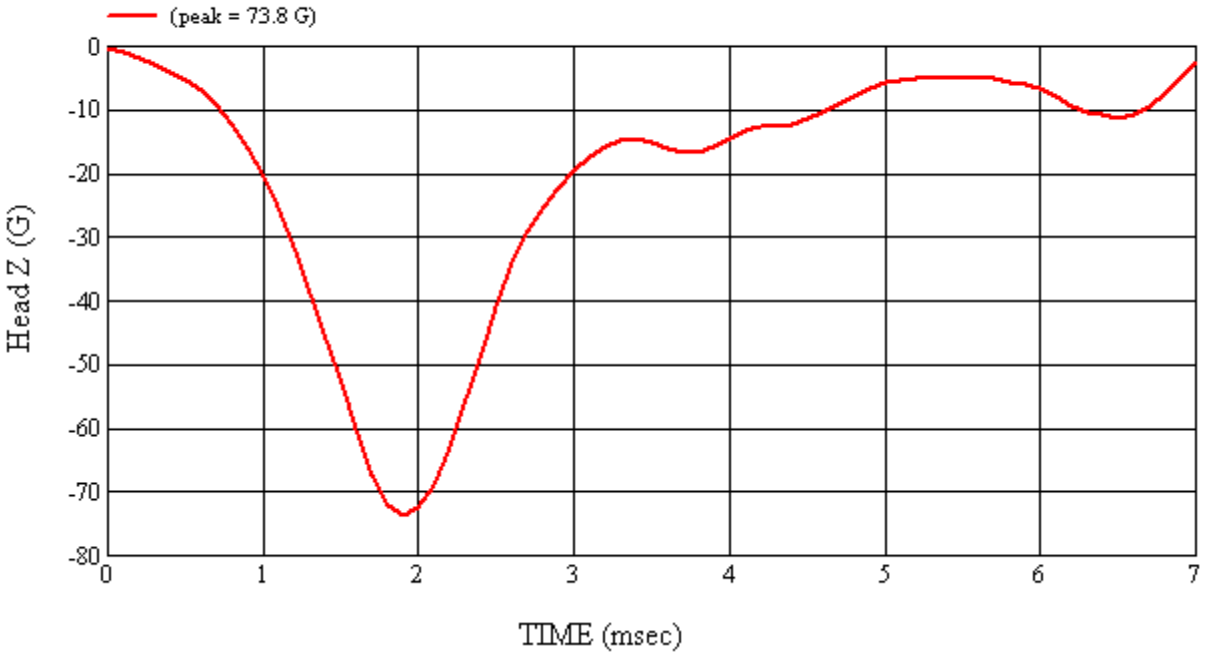


Head 038 (Pre) Calibration #H38019



Head 038 (Pre) Calibration #H38019

4-6 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 5/17/2011 CALIBRATION TIME: 4:30:39 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	20.9
Relative Humidity	10% to 70%	44.3
Peak Resultant Acceleration	225 G's to 275 G's	262.2
Peak Lateral Acceleration	15 G's Maximum	11.0
Unimodal Acceleration Curve	YES	YES

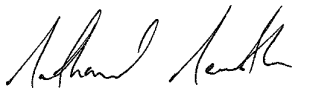
FMH INSTRUMENTATION

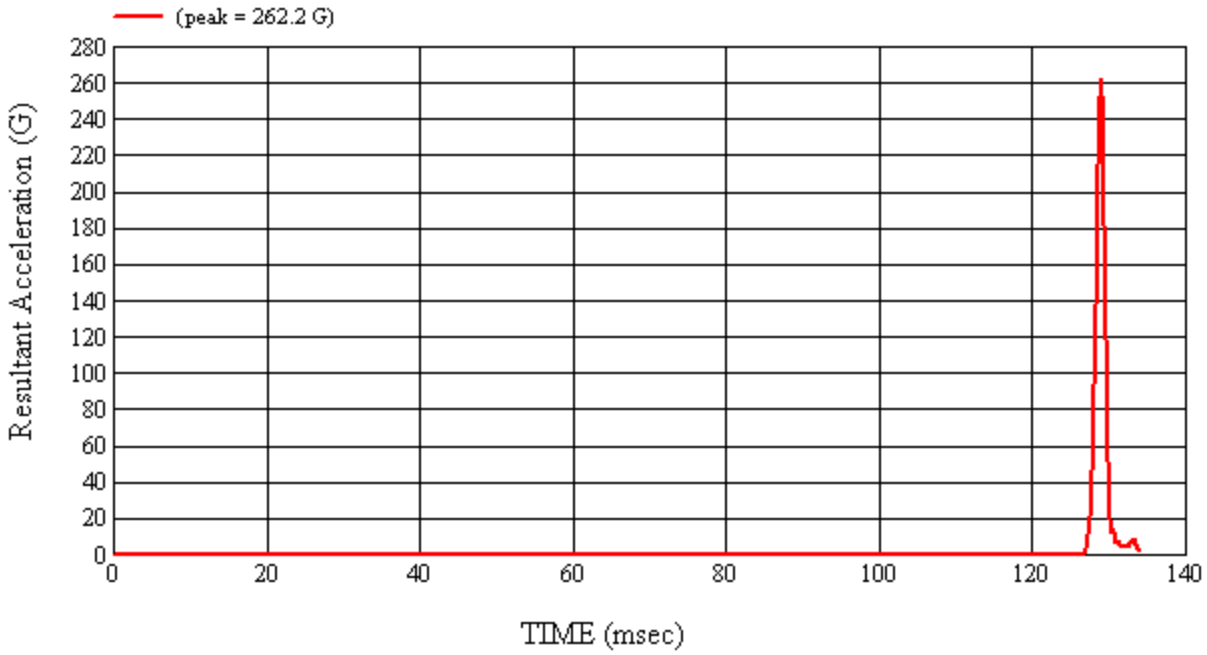
HEAD ACCELEROMETERS

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

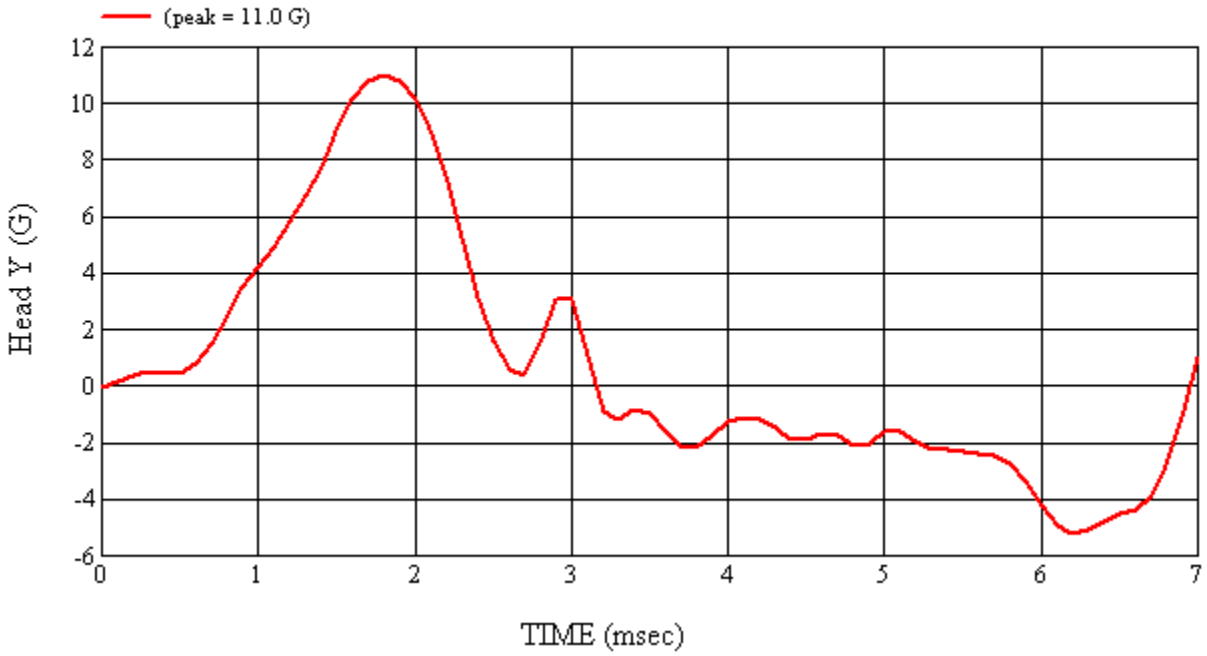
REMARKS:

RECORDED BY:  DATE: 5/17/2011

APPROVED BY: 



Head 038 (Post) Calibration #H38020



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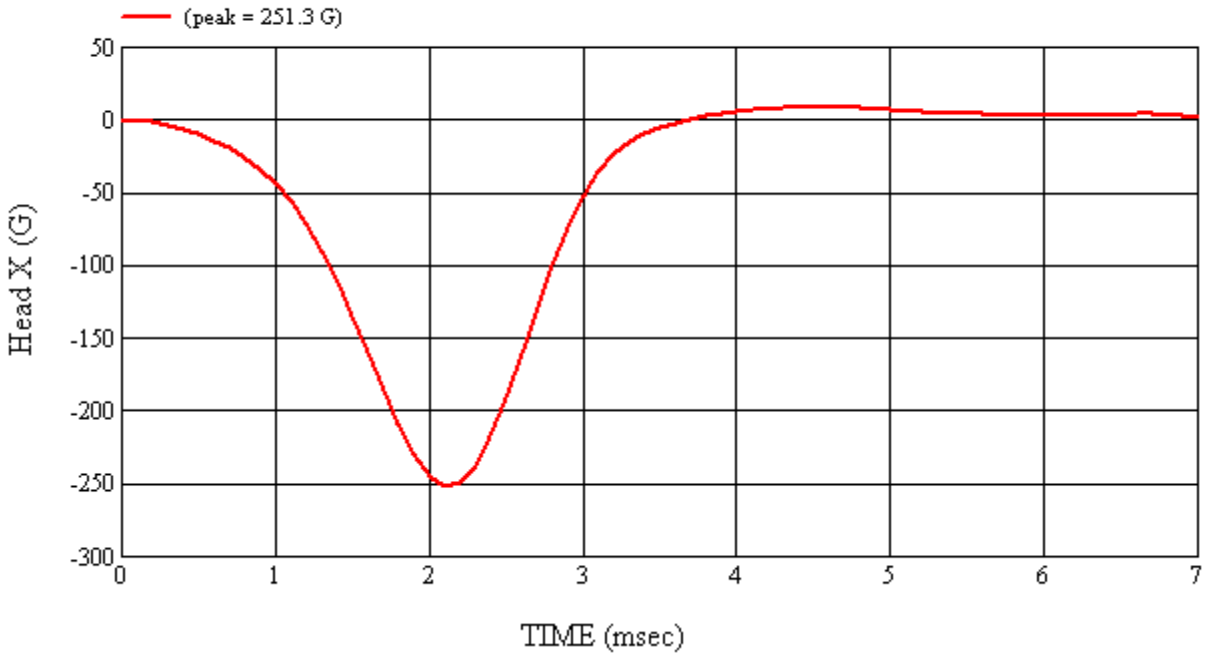

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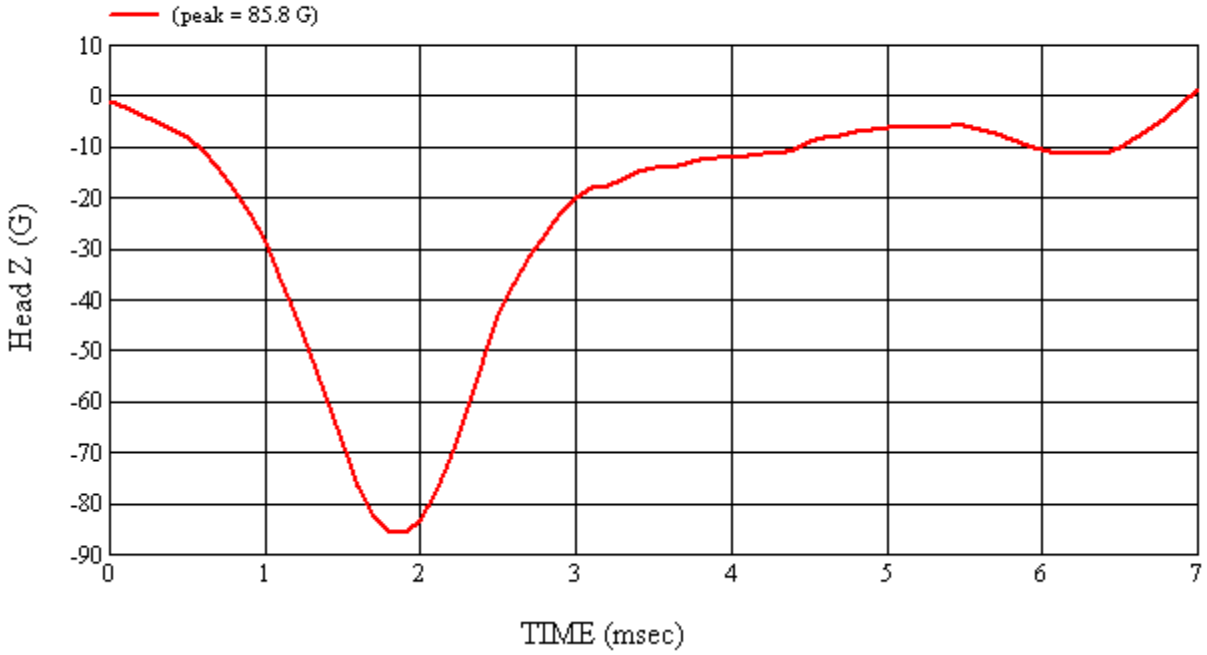
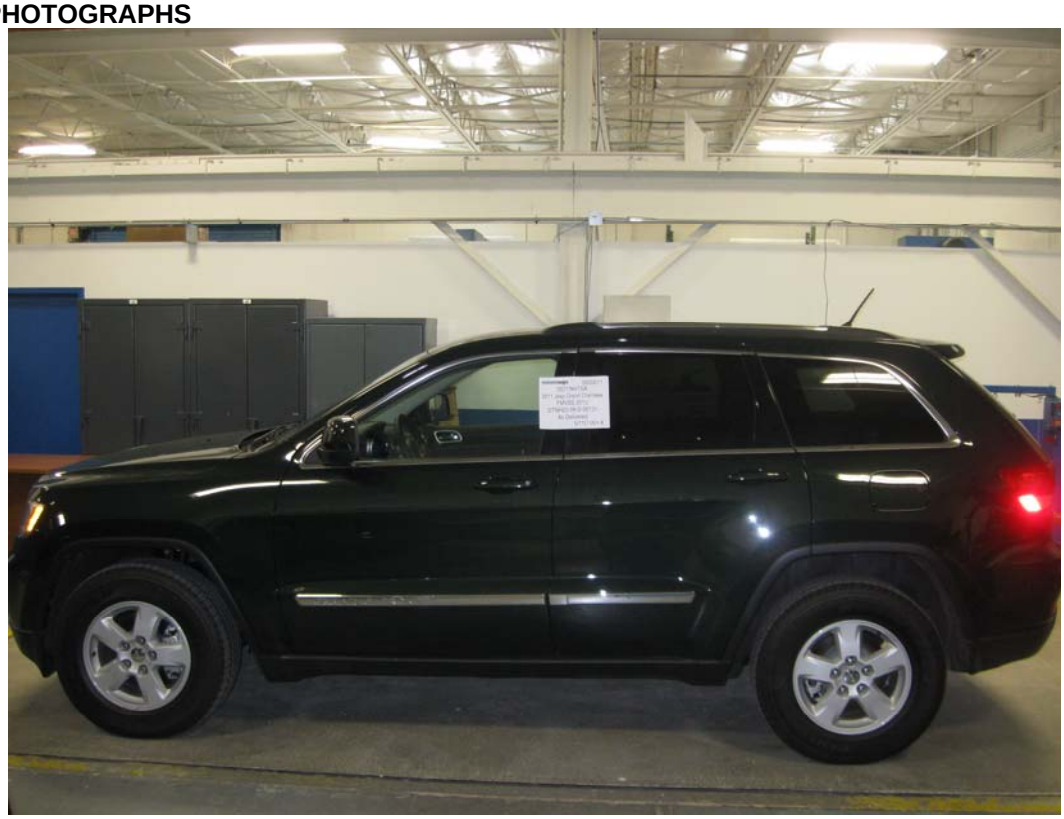
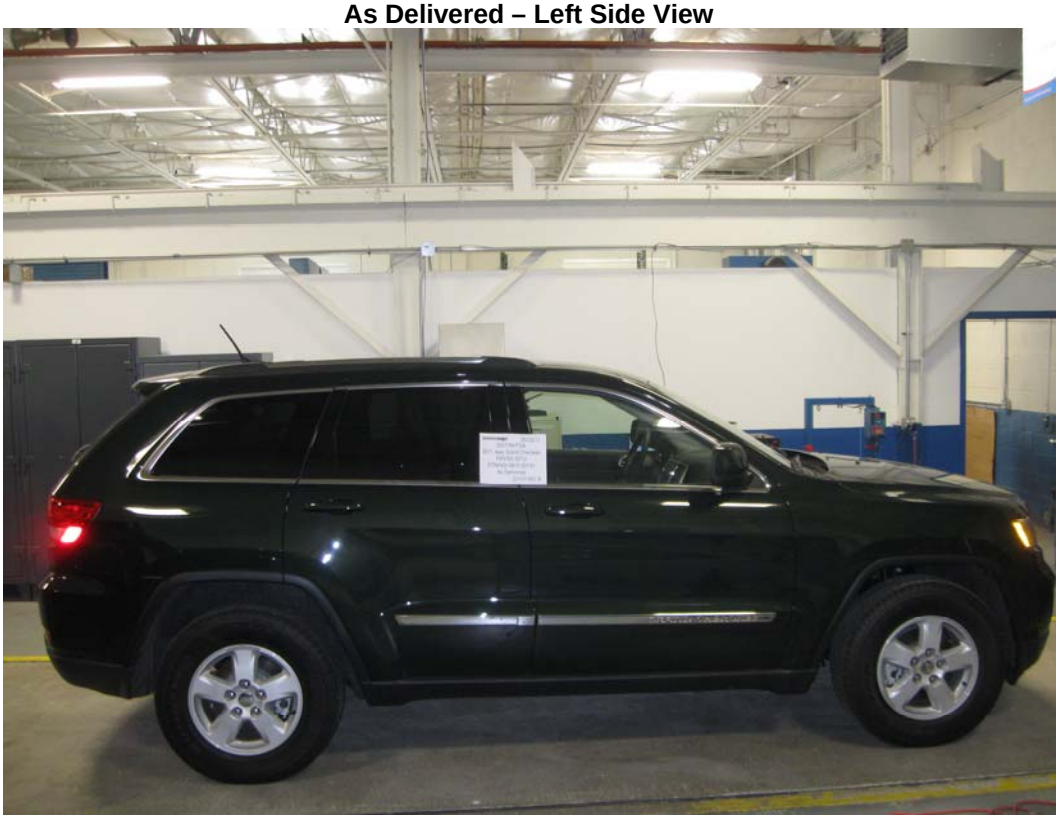


Head 038 (Post) Calibration #H38020

5.0 PHOTOGRAPHS



As Delivered – Left Side View

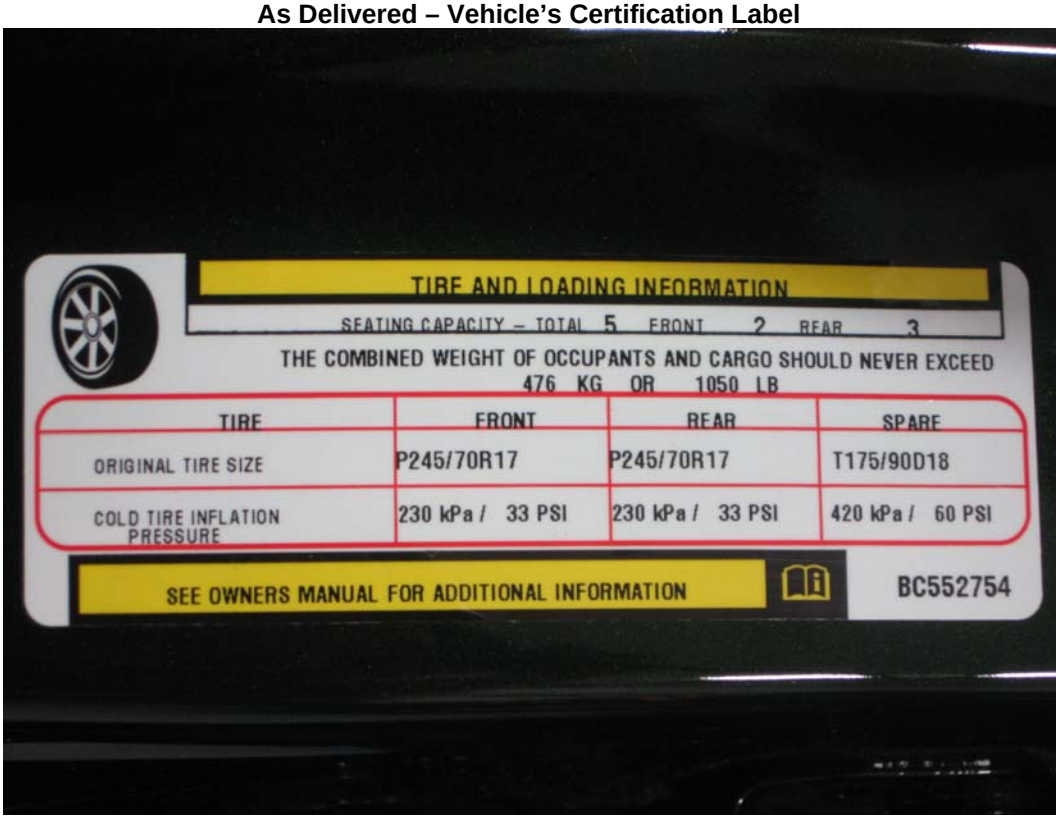


As Delivered – Right Side View

As Delivered – ¾ Front View From Left Side

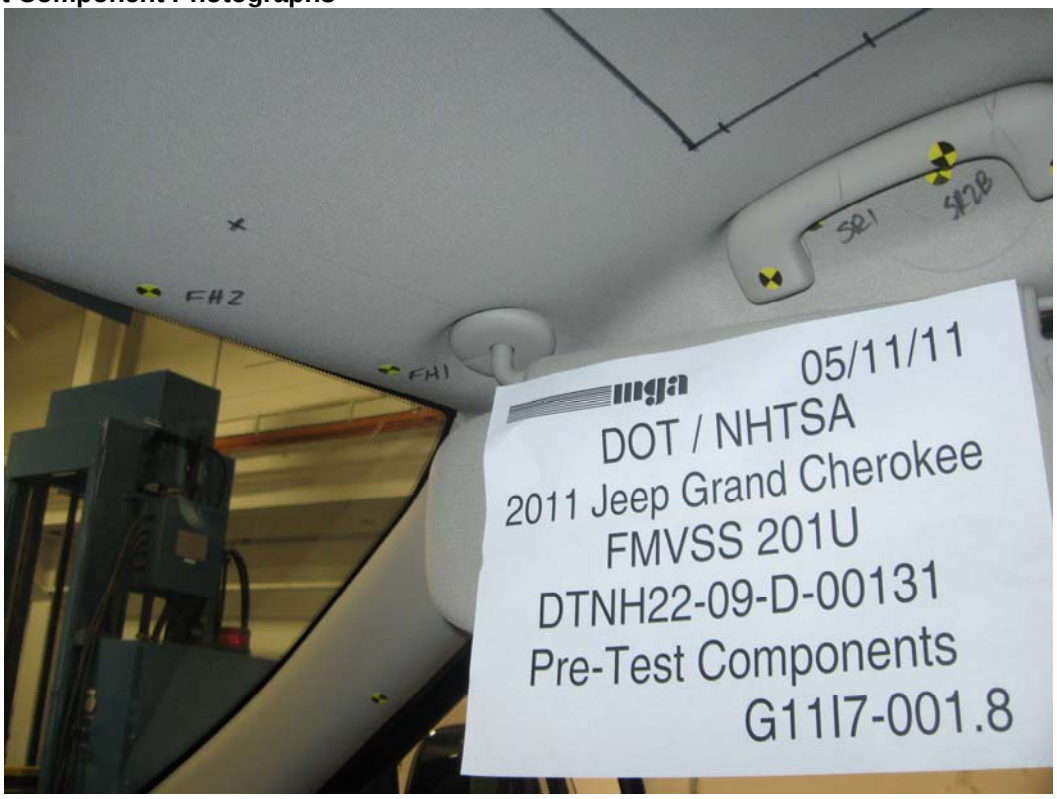
As Delivered – ¾ Rear View From Right Side

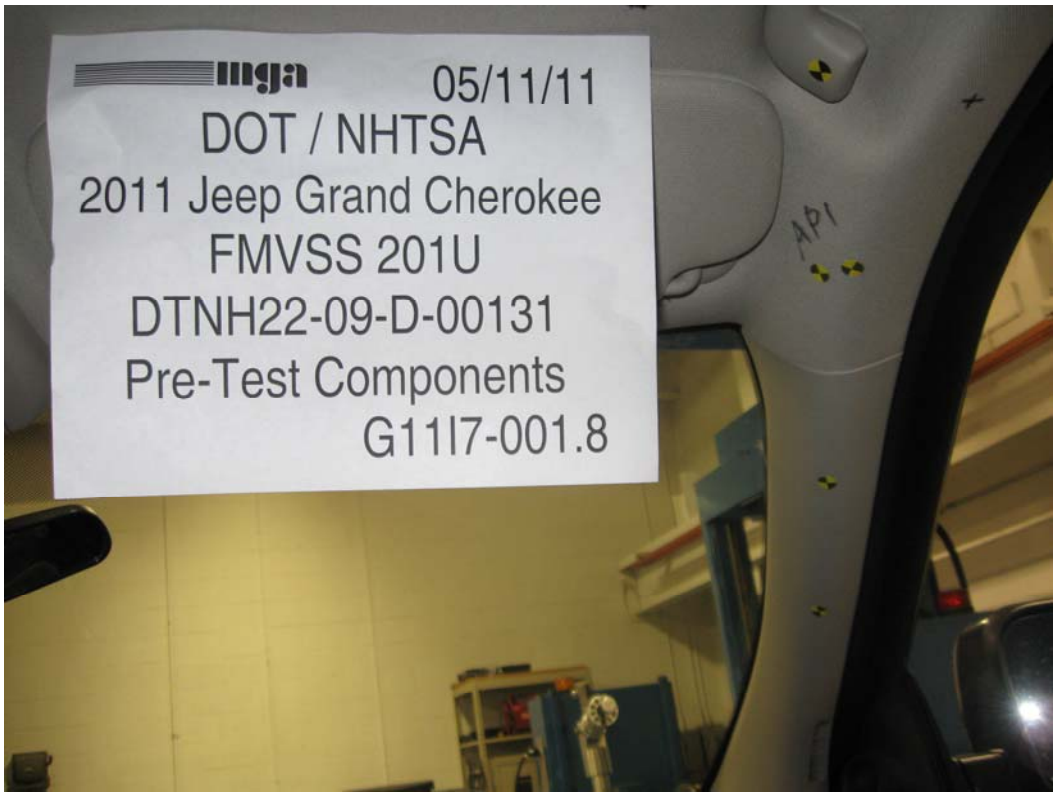
As Delivered – Vehicle's Certification Label



As Delivered – Vehicle's Tire Information Label

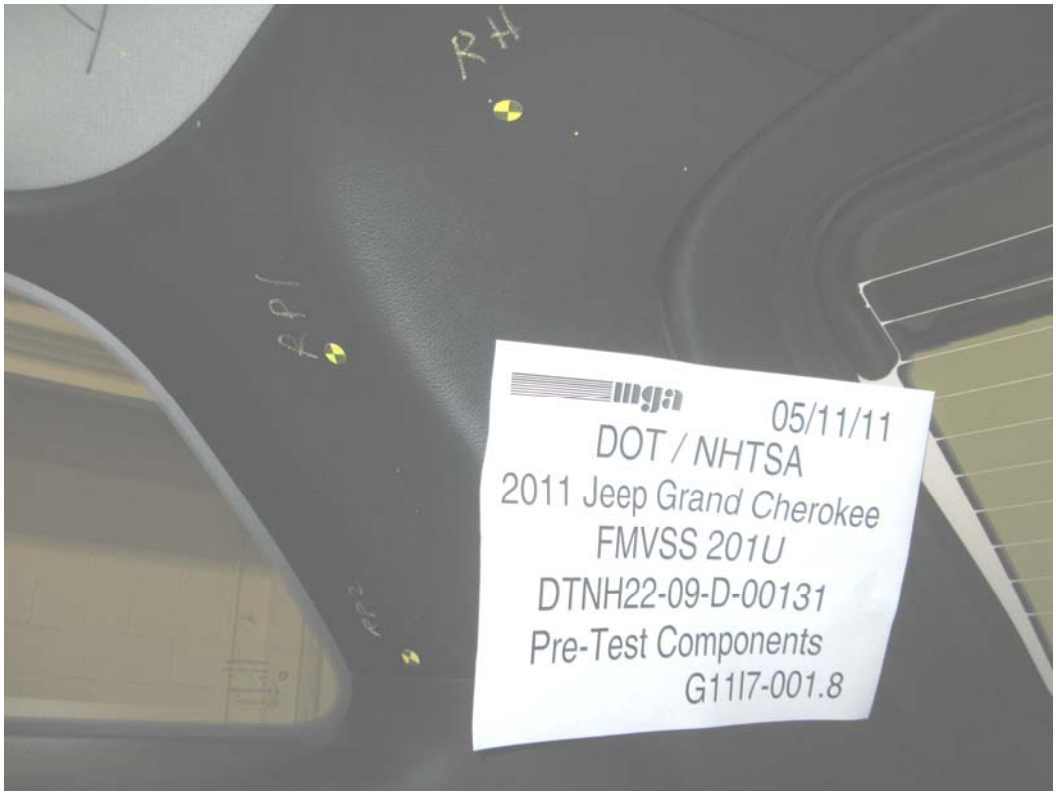
Pre-Test Component Photographs






05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8


05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8

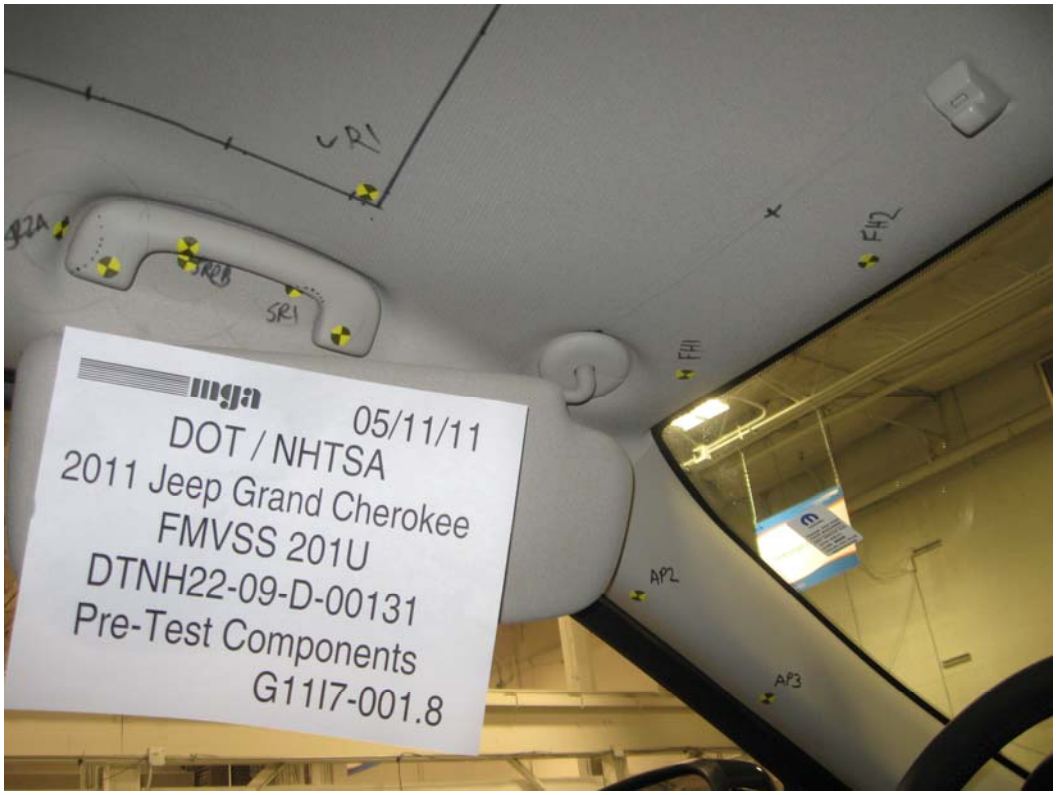

RH
RP1
05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8


RH
RP1
05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8

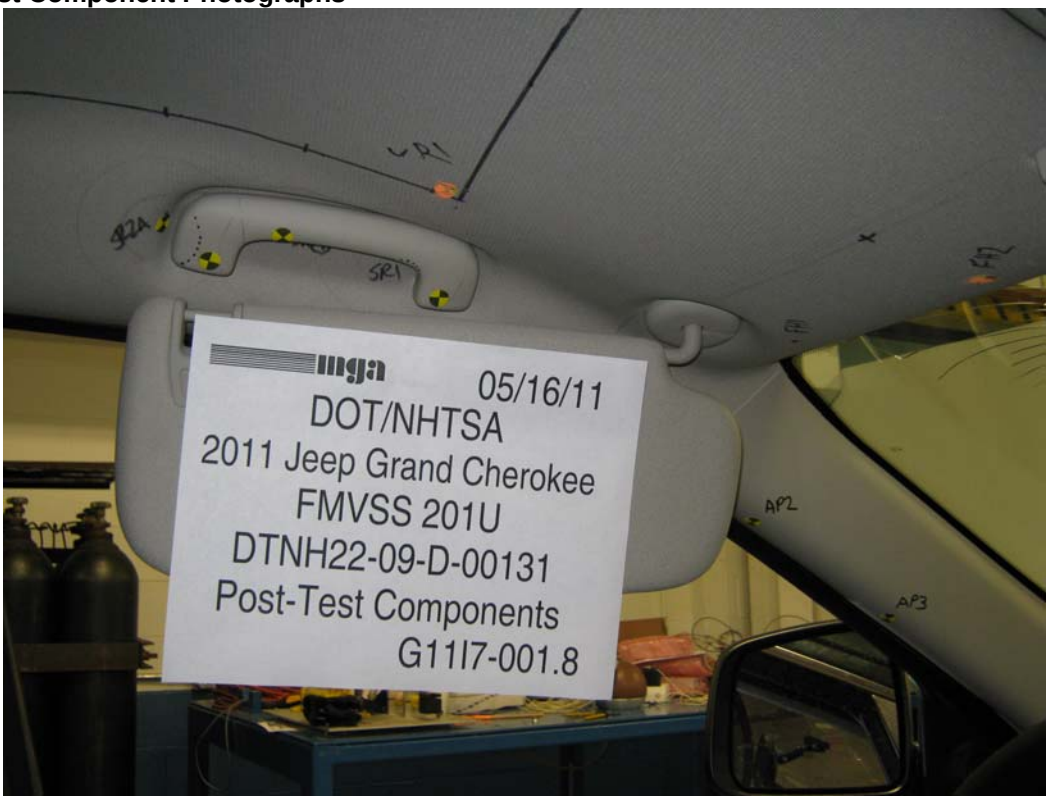

mga
05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8


mga
05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8

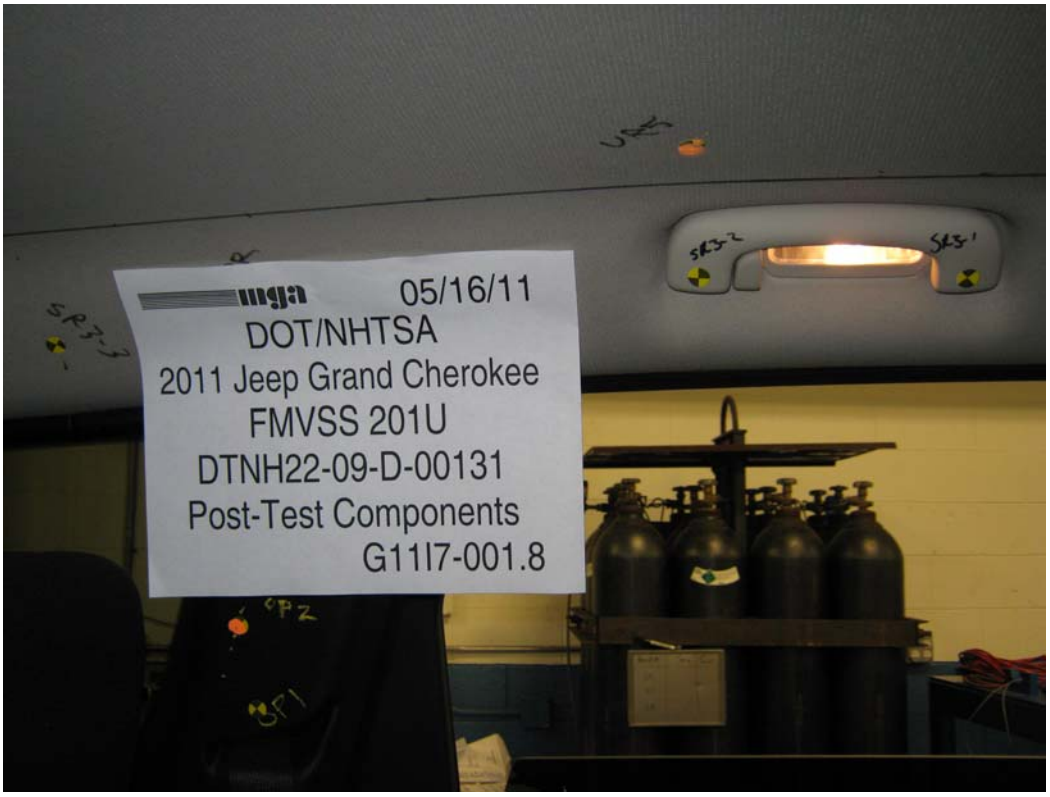

AP1
AP2
AP3
mga
05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8


SR1
AP2
AP3
mga
05/11/11
DOT / NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Pre-Test Components
G11I7-001.8

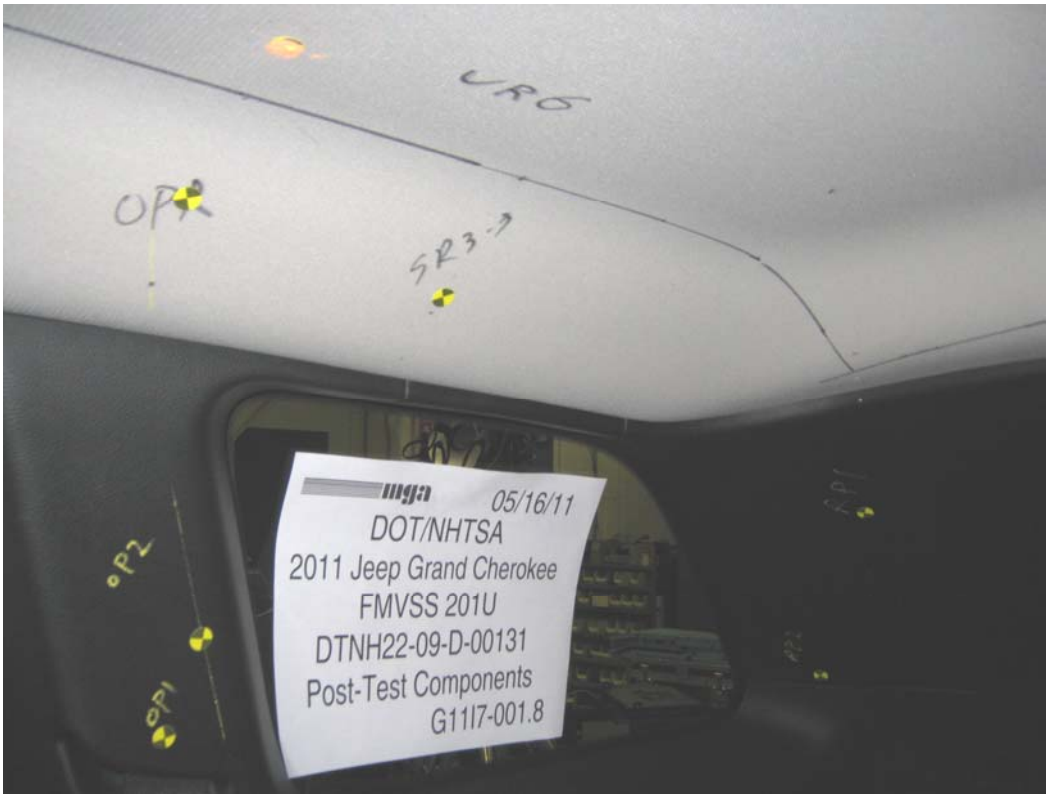
Post-Test Component Photographs




mga
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8


mga
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8


OPR
SR3-1
RP1
OPZ
OP1
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8


URO
OPR
SR3-1
OPZ
OP1
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
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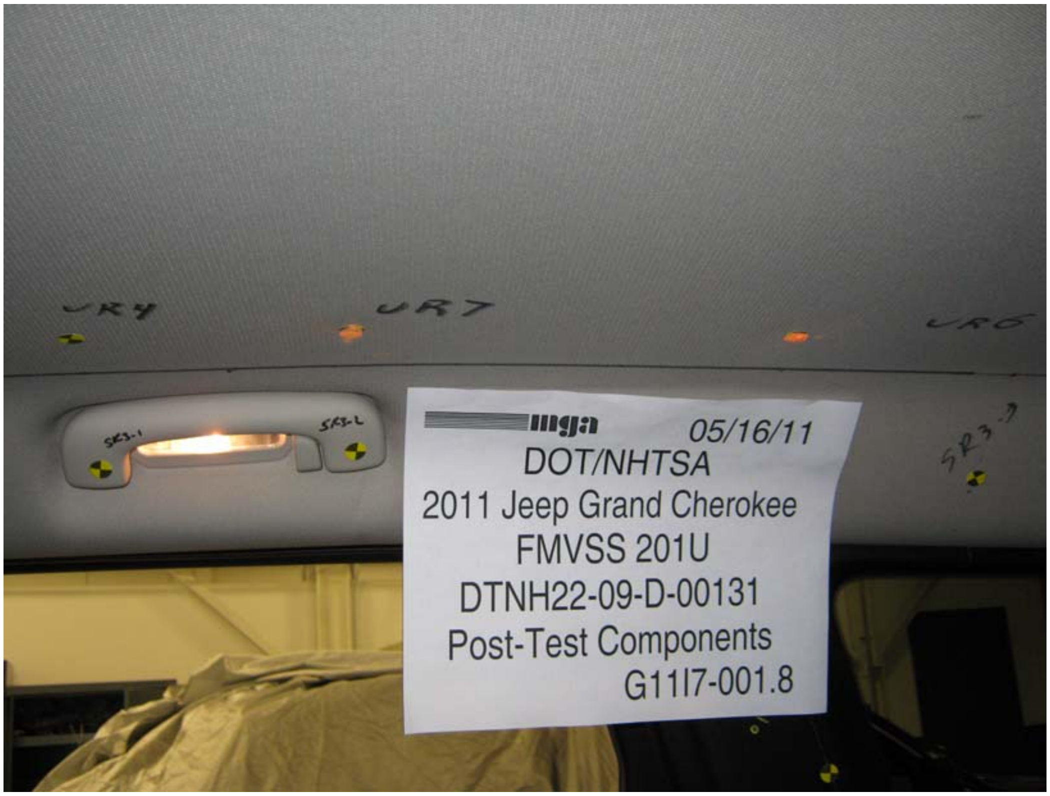
Post-Test Components
G11I7-001.8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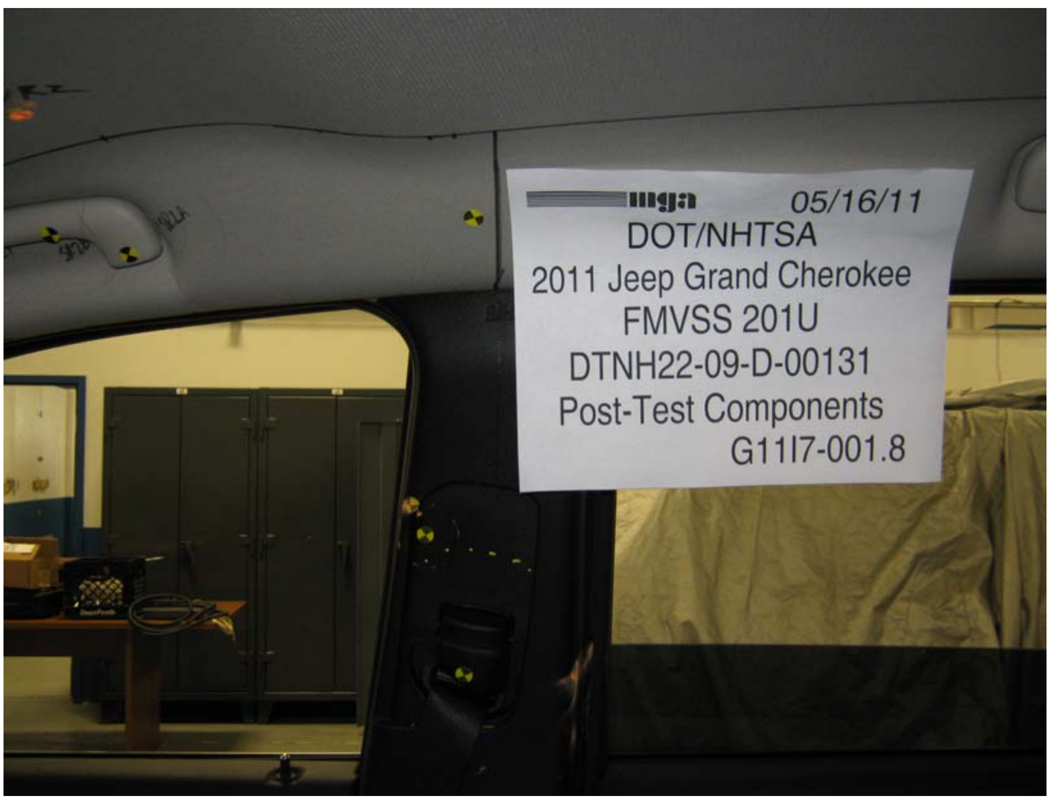
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8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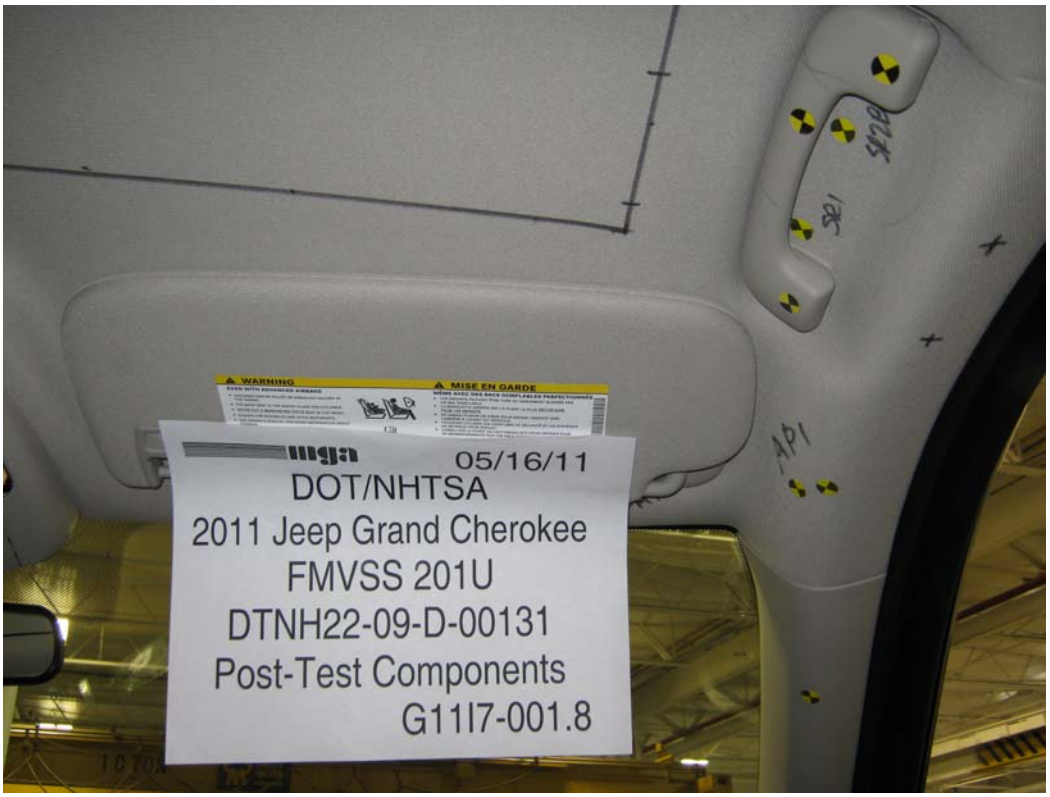
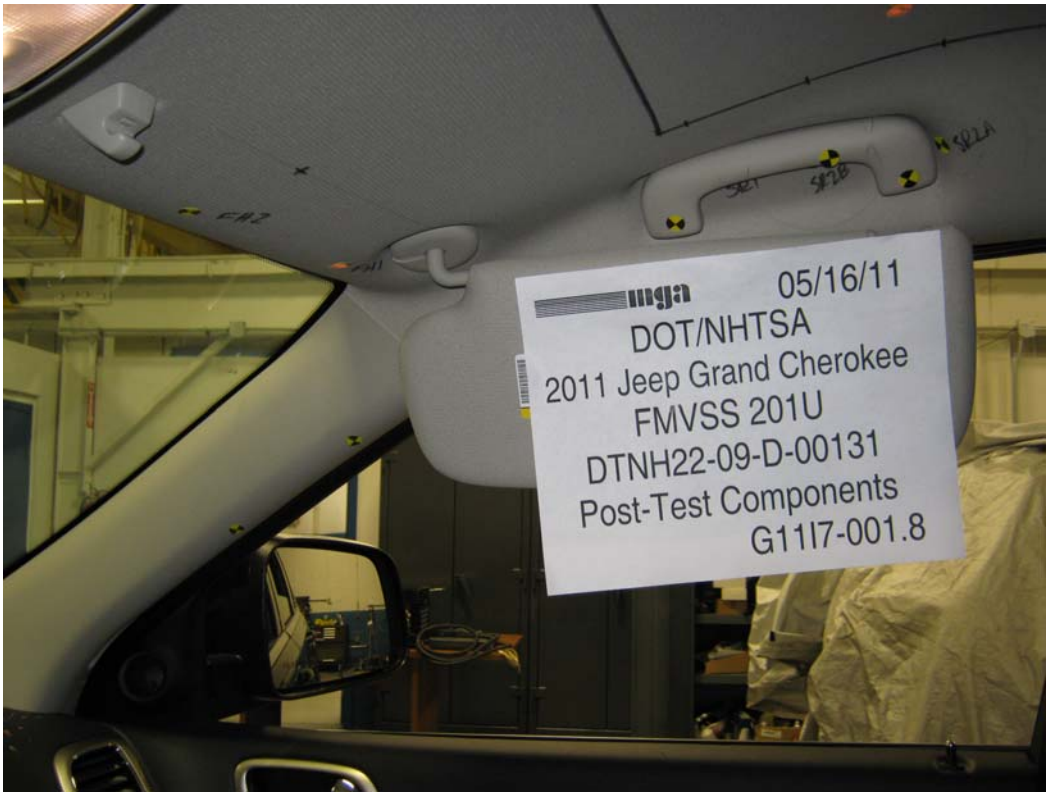
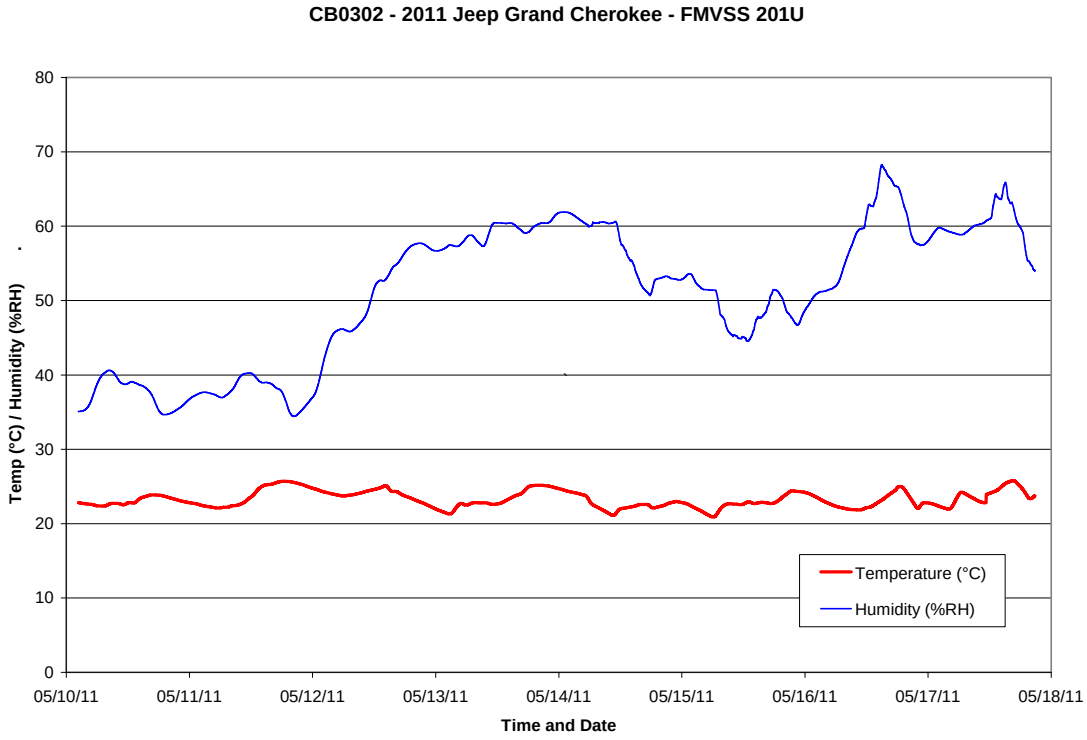
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8


WARNING
MISE EN GARDE
mga
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8


mga
05/16/11
DOT/NHTSA
2011 Jeep Grand Cherokee
FMVSS 201U
DTNH22-09-D-00131
Post-Test Components
G11I7-001.8

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: _____

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	
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 #:	J35924
Capacity/Range: (G's)	2,000

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: 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 #:	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 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 #:	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: Howard 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 °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

~Calibration Certificate~

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

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

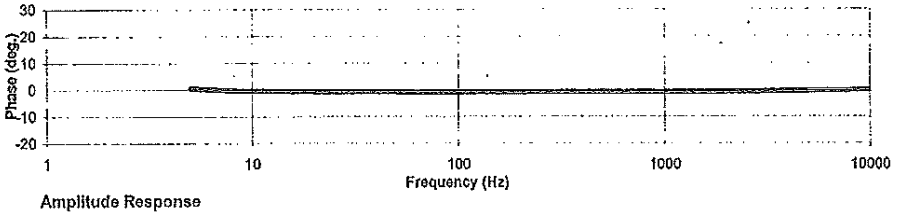
Calibration Data

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

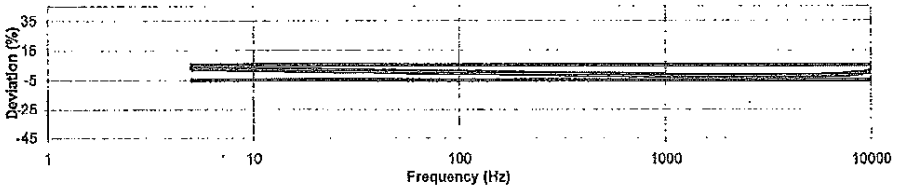
Transducer Specifications

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

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:** 6/23/2010 (MMDDYYYY) **Serial#:** G10-02-00-01619

Single Point - (Max-Min)/2 Specification: G10-02 .084mm (.0033") **Certificate#:** G0161940352

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

Measurement Standards Traceability

Ball Bar Kit	Asset Number: 1041	Calibration Due: 8/10/2010	*SI Traceability: L20100310AB1
Thermometer	Asset Number: 668	Calibration Due: 1/22/2011	*SI Traceability: A2LA-1001080562
Reference Sphere	Asset Number: TQ225	Calibration Due: 10/17/2011	*SI Traceability: NIST 821/270114-04

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: 6/23/10

This certificate shall not be reproduced, except in full, without permission of FARO Technologies, Inc.
The results of this certificate relate only to the items calibrated or tested.

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

FAX:248-669-8656
L-A-B Cert Number:L1147.01-1

46998 Magellan Drive
Wixom, MI 48393
USA

FARO®

@ 6/22/10

LABORATORY ACCREDITATION BUREAU
ISO/IEC 17025 Accredited

Revised: September 3, 2009
©2009 FARO

LM-07FRM077-024.XLS
f:\control\records\05manufa\partspec\XH08-0495.eps Rev1 RevDate: 12/08/04

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: MGA00799
Calibration Date: 1/15/2010

Subject Tape Measure
Brand: STANLEY
S/N: TPM 992
Calibration Date: 5/27/10

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

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

Date: 5/27/10 Performed By: RJ Mill

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.

NovaStar SOLUTIONS

Calibration Certificate

ACCREDITED
CALIBRATION # 1277.01

Metrology Management Services
Remit to address:

35200 Plymouth Rd.
Livonia, MI 48150

Calibration Certificate #:
Z52545:1300708444

PRO PRO 360 PROTRACTOR

SERIAL NUMBER:	N/A	WORK ORDER:	1300708444
ASSET NUMBER:	Z52545		
CUST. ASSET NUM:	MGA00049		
PROCEDURE NAME:	PRO 3600		
PROCEDURE REV:	A	TEST RESULT:	PASS
CALIBRATED BY:	JOE McCONNAUGHHAY	PERFORMED ON:	3/21/2011
CUSTOMER:	MGA RESEARCH 446 Executive Drive Troy, MI 48083	CAL DUE DATE:	3/21/2012
		DATA TYPE:	FOUND-LEFT
		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).

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

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

Action Taken: FULL CALIBRATION

REMARKS:

Standards Used

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

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

@ 3/28/11

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

Asset Barcode:

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 446 Executive Drive Troy, MI 48083	CAL DUE DATE:	3/21/2012
		DATA TYPE:	FOUND-LEFT
		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).

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

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

Action Taken: FULL CALIBRATION

REMARKS:

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: Stan Hall **Date:** 3-22-11

Signature:

Asset Barcode:

NovaStar SOLUTIONS
Metrology Managment Services

Calibration Data Sheet

Page 1 of 1
35200 Plymouth Rd.
Livonia, MI 48150
734-453-8003

Inst. Type	TEMP/HUMD DISP	**Mfr.**	Dickson	**W.O.**	1300715528
Last Cal Date	Unknown	**Mod.**	TM325	**Date**	3/21/2011
Form Number	25054 Rev A	**S/N**	N/A	**Test Eng'r**	JM
		ID#	MGA00894		

Note

Function	Calibration Point	Unit		As Found	Note	As Left	Low Limit	Hi Limit	Unit
Temperature	71.8	°F		71.2		71.2	70.0	73.6	°F
%RH	16.7	%RH		18.4		18.4	14.7	18.7	%RH
	43.7	%RH		44.3		44.3	41.7	45.7	%RH
	68.3	%RH		69.4		69.4	66.3	70.3	%RH

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 48076

Certificate of Calibration

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

calibration cert. 1448.01

Customer: MGA Research *Cert#* 10-6914 *Temp/Humidity:* ok
Location of Calibration: 2839 Elliot Rd Troy MI 48083
Calibration Date: 7/21/2010 *Due Date:* Jul-11 *Condition of Item:* Fair
Equipment Make: Intercomp *Model:* SW Deluxe *Serial Number* 26032389 *Capacity:* 2200 lb x 1 lb Per weigh pad
8800 lb x 1 lb Scale system total capacity

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

shift test
n/a

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

Tests performed: ☑ Repeatability ☑ Linearity ☐ Sensitivity ☑ Discrimination

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

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☑ Scale Certified ☐ Scale Rejected

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

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