FINAL REPORT NUMBER 201UI-MGA-08-05

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

MITSUBISHI MOTORS NORTH AMERICA, INC.
2008 Mitsubishi Galant, 4-Door Sedan
NHTSA No. C85601

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: May 20-23, 2008
Report Date: June 13, 2008

FINAL REPORT

PREPARED FOR:

U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
ENFORCEMENT
OFFICE OF VEHICLE SAFETY COMPLIANCE
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16. Abstract A compliance test series was conducted on the subject 2008 Mitsubishi Galant, 4-Door Sedan, NHTSA No. C85601, 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 20-23, 2008. Test failures identified were as follows: None The data recorded indicates that the 2008 Mitsubishi Galant, 4-Door Sedan, tested appears to comply with the upper interior requirements of FMVSS 201.			
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1.0 PURPOSE OF COMPLIANCE TEST

The purpose of this head impact compliance test was to determine whether the subject vehicle, a 2008 Mitsubishi Galant, 4-Door Sedan, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on May 20-23, 2008 on a 2008 Mitsubishi Galant, 4-Door Sedan, manufactured by Mitsubishi Motors North America, Inc.

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 July 1, 2005.

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 July 1, 2005.

2.0 COMPLIANCE TEST DATA SUMMARY

The 2008 Mitsubishi Galant, 4-Door Sedan, was equipped with A, B, and rear-pillars, an adjustable seat belt anchorage on each B-pillar, and a grab handle located on the side rail above each door (front and rear).

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

AP1	BP1	SR2A	UR1@Rear SR2A
AP2	BP2	SR3-2	UR5@BPR
AP3	SR1	RH	UR6@SR3-1

The 2008 Mitsubishi Galant, 4-Door Sedan, tested appears to comply with the upper interior performance criteria for FMVSS 201. The HIC(d) measured using the Part 572L (Free Motion Headform) was below 1000 for each tested component.

TABLE 2-1

SUMMARY TABLE OF TEST RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2008 Mitsubishi Galant, 4-Door Sedan

VEH. NHTSA NO.: C85601 VIN: 4A3AB26F88E010910 COLOR: Black

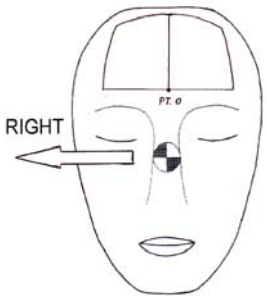
VEH. BUILD DATE: July, 2007 TEST DATES: May 20-23, 2008

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, David Maier

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Right	114	44	19.0	302	180	22	12 Left
AP2	Left	200	50	18.5	452	378	10	5 Left
AP3	Right	159	50	18.8	398	307	3	1 Left
BP1	Left	270	26	18.2	398	307	39	8 Left
BP2	Left	270	3	24.2	652	644	10	3 Left
SR1	Left	270	50	18.9	264	129	15	4 Left
SR2A	Right	90	50	18.9	305	184	19	5 Left
SR3-2	Left	270	50	18.5	309	190	17	8 Left
RH	Right	0	50	23.4	439	362	25	8 Left
UR1@Rear SR2A	Left	270	45	23.8	584	553	28	5 Left
UR5@BPR	Right	90	49	23.8	642	630	24	4 Left
UR6@SR3-1	Right	90	38	23.1	607	584	45	0

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



POST TEST COMMENTS:

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

SR1 Left: Headliner deformation.

SR2A Right: Grab handle deformation.

SR3-2 Left: Grab handle displacement.

UR6@SR3-1 Right: Grab handle displacement.

REMARKS:

The targets listed were impacted in the following order:

Left: AP2, SR1, UR1@Rear SR2A, BP2, BP1, SR3-2

Right: AP3, AP1, SR2A, UR5@BPR, UR6@SR3-1, RH

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

RECORDED BY: Louis Campbell DATE: May 23, 2008

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2008 Mitsubishi Galant, 4-Door Sedan

VEH. NHTSA NO.: C85601 VIN: 4A3AB26F88E010910 COLOR: Black

VEH. BUILD DATE: July, 2007 TEST DATES: May 20-23, 2008

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, David Maier

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

SUNROOF INFORMATION:

Installed: _____Yes _X_ No

Operation: _____Electric ____ Manual

SIDE RAIL CURTAIN AIRBAG INFORMATION:

Installed: _X_Yes ___ No

ROLL-BAR INFORMATION:

Installed: _____Yes _X_ No

Padded: _____Yes _X_ No

Braces: _____Yes _X_ No

GENERAL INFORMATION:

Date Received: 02/14/08; Odometer Reading 484 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: Mitsubishi Motors North America, Inc.

Date of Manufacture: July, 2007; VIN: 4A3AB26F88E010910

GVWR: 1980 kg; GAWR FRONT: 1060 kg;

GAWR REAR: 940 kg

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 220 kPa REAR: 220 kPa

Recommended Tire Size: P215/60R16

Recommended Cold Tire Pressure:

FRONT: 220 kPa REAR: 220 kPa

Size of Tire on Test Vehicle: P215/60R16

Type of Spare Tire: T125/70D16; 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) = 375 kg

No. of Occupants x 68 kg = 340 kg

Rated Cargo/Luggage Weight (RCLW) = 35 kg (difference)

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

Right Front =	435.5 kg	Right Rear =	319.5 kg
Left Front =	472.0 kg	Left Rear =	298.5 kg
TOTAL FRONT =	907.5 kg	TOTAL REAR =	618.0 kg
% Total Weight =	59.5 %	% Total Weight =	40.5 %

TOTAL DELIVERED WEIGHT = 1525.5 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1525.5 kg

Max. Test Cargo/Luggage Weight = 35.0 kg

Target Test Weight = 1560.5 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front =	434.5 kg	Right Rear =	337.0 kg
Left Front =	471.5 kg	Left Rear =	316.0 kg
TOTAL FRONT =	906.0 kg	TOTAL REAR =	653.0 kg
% Total Weight =	58.1 %	% Total Weight =	41.9 %

TOTAL TEST WEIGHT = 1559.0 kg

Weight of ballast secured in vehicle's cargo area = 34.0 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 744 mm; Left Front 734 mm;
Right Rear 725 mm; Left Rear 721 mm;
Pitch Angle at Right Door Sill = 0.5 Rear is higher
Pitch Angle at Left Door Sill = 0.2 Front is higher
Roll Angle at Front Bumper = 0.5 Right is higher
Roll Angle at Rear Bumper = 0.0

FULLY LOADED: Right Front 754 mm; Left Front 744 mm;
Right Rear 733 mm; Left Rear 728 mm;
Pitch Angle at Right Door Sill = 0.4 Rear is higher
Pitch Angle at Left Door Sill = 0.4 Front is higher
Roll Angle at Front Bumper = 0.5 Right is higher
Roll Angle at Rear Bumper = 0.0

AS TARGETED: Right Front 909 mm; Left Front 897 mm;
Right Rear 879 mm; Left Rear 872 mm;
Pitch Angle at Right Door Sill = 0.4 Rear is higher
Pitch Angle at Left Door Sill = 0.4 Front is higher
Roll Angle at Front Bumper = 0.5 Right is higher
Roll Angle at Rear Bumper = 0.0

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill =	0.4 Rear is higher
Pitch Angle at Left Door Sill =	0.3 Front is higher
Roll Angle at Front Bumper =	0.5 Right is higher
Roll Angle at Rear Bumper =	0.0

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill =	0.4 Rear is higher
Pitch Angle at Left Door Sill =	0.4 Front is higher
Roll Angle at Front Bumper =	0.5 Right is higher
Roll Angle at Rear Bumper =	0.0

VEHICLE WHEELBASE = 2749 mm

REMARKS: The seat travel distance was measured to be 220 mm for the driver front seat and 220 mm for the passenger front seat.

RECORDED BY: Louis Campbell DATE: May 19, 2008

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2008 Mitsubishi Galant, 4-Door Sedan

VEH. NHTSA NO.: C85601 VIN: 4A3AB26F88E010910 COLOR: Black

VEH. BUILD DATE: July, 2007 TEST DATES: May 20-23, 2008

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, David Maier

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 200.0º	L 245.8º
	R 105º-165º	R 113.9º	R 158.8º
B-PILLAR	L 195º-345º	L 201.0º	L 282.5º
	R 15º-165º	R 76.8º	R 159.2º

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Louis Campbell DATE: May 19, 2008

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2008 Mitsubishi Galant, 4-Door Sedan

VEH. NHTSA NO.: C85601 VIN: 4A3AB26F88E010910 COLOR: Black

VEH. BUILD DATE: July, 2007 TEST DATES: May 20-23, 2008

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, David Maier

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 50º
		R 0º-50º	R 0º	R 50º
	SR2A	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
	SR2B	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
	SR3-1	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
	SR3-2	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
REAR HEADER	RH	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º
A-PILLAR	AP1	L -5º-50º	L -5º	L 44º
		R -5º-50º	R -5º	R 44º

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
A-PILLAR	AP2	L -5º-50º	L -5º	L 50º
		R -5º-50º	R -5º	R 48º
	AP3	L -5º-50º	L -5º	L 48º
		R -5º-50º	R -5º	R 50º
B-PILLAR	BP1	L -10º-50º	L -10º	L 26º
		R -10º-50º	R -10º	R 24º
	BP2*	L 0º-50º	L 0º	L 3º
		R 0º-50º	R 0º	R 2º
	BP3	L 0º-50º	L 0º	L 3º
		R 0º-50º	R 0º	R 2º
	BP4	L -10º-50º	L -10º	L -5º
		R -10º-50º	R -10º	R -7º
REAR PILLAR	RP1	L -10º-50º	L -10º	L 20º
		R -10º-50º	R -10º	R 18º
	RP2	L -10º-50º	L -10º	L -2º
		R -10º-50º	R -10º	R -2º
UPPER ROOF 1		0º-50º	0º	45º
UPPER ROOF 2		0º-50º	0º	43º
UPPER ROOF 3		0º-50º	0º	47º
UPPER ROOF 4		0º-50º	0º	50º
UPPER ROOF 5		0º-50º	0º	49º
UPPER ROOF 6		0º-50º	0º	38º

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

RECORDED BY: Louis Campbell DATE: May 19, 2008

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2008 Mitsubishi Galant, 4-Door Sedan

VEH. NHTSA NO.: C85601 VIN: 4A3AB26F88E010910 COLOR: Black

VEH. BUILD DATE: July, 2007 TEST DATES: May 20-23, 2008

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, David Maier

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	220 mm	220 mm
Tº	Horizontal < {CG-F1 (Left Seat) to (Right A-Pillar)}	114.2º	--
A1º	360º - Tº	245.8º	--
Wº	Horizontal < {CG-2 (Left Seat) to (Left A-Pillar)}	200.0º	--
A2º	A2º = Wº	200.0º	--
Uº	Horizontal < {CG-2 (Left Seat) to (Left B-Pillar)}	282.5º	--
B1º	B1º = Uº	282.5º	--
Vº	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	201.0º	--
B2º	B2º = Vº	201.0º	--
Wº (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	158.8º
A1º (right)	A1º (right) = Wº (right)	--	158.8º
T º (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	246.1º
A2º (right)	360º-Tº (right)	--	113.9º
V º (right)	Horizontal < {CG-R (Right Seat) to (Right B-Pillar)}	--	159.2º
B1º (right)	B1º (right) = Vº (right)	--	159.2º
U º (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	76.8º
B2º (right)	B2º (right) = Uº (right)	--	76.8º
J	A-Pillar {(Plane 3) – (Plane 5)}	303.8 mm	303.3 mm
J/2	J ÷ 2	151.9 mm	151.7 mm
D1	Upper Roof {(Plane A) – (Plane B)}	1605.5 mm	
D1/2	D1 ÷ 2	802.8 mm	
D2	Upper Roof {(Plane C) – (Plane D)}	1247.2 mm	

Measurement	Description	Left Side	Right Side
D2/2	D2 ÷ 2	623.6 mm	
.35D1	.35 x D1	561.9 mm	
.35D2	.35 x D2	436.5 mm	
N	B-Pillar {(BPR) – (lowest point on daylight opening forward of B-Pillar)}	417.0 mm	411.6 mm
N/2	B-Pillar {(BP3) – (lowest point on daylight opening forward of B-Pillar)}	208.5 mm	205.8 mm
N/4	B-Pillar {(BP4) – (lowest point on daylight opening forward of B-Pillar)}	104.3 mm	102.9 mm
D	R-Pillar (Point 7 – Point M)	725.0 mm	725.0 mm
3D/7	3*D / 7	310.7 mm	310.7 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	-1260.3	-380.0	-2297.9	-1260.5	380.1	-2298.0
Rear	-429.9	-369.5	-2266.4	-430.2	370.6	-2266.5

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1385.0	-380.0	255.0	1385.0	380.0	255.0
Rear	2215.0	-370.0	290.0	2215.0	370.0	290.0

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
CGF1	-1320.3	-380.0	-1637.9	-1320.5	380.1	-1638.0
CGF2	-1100.3	-380.0	-1637.9	-1100.5	380.1	-1638.0
CGR	-269.9	-369.5	-1606.4	-270.2	370.6	-1606.5

REFERENCE FOR VEHICLE COORDINATE SYSTEM (measured in millimeters):

Driver front outboard seat bolt hole (x, y, z) = 973.0, -607.0, 83.0

Driver front upper door striker bolt hole (x, y, z) = 1520.0, -801.0, 458.0

Passenger front upper door striker bolt hole (x, y, z) = 1520.0, 801.0, 458.0

REMARKS:

RECORDED BY: Louis Campbell DATE: May 19, 2008

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2008 Mitsubishi Galant, 4-Door Sedan

VEH. NHTSA NO.: C85601 VIN: 4A3AB26F88E010910 COLOR: Black

VEH. BUILD DATE: July, 2007 TEST DATES: May 20-23, 2008

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, David Maier

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	1109.4	-547.1	1024.4	--	--	Yes	--	--
REL	1130.0	-554.5	1020.7	246	44	--	1	No
AP2	927.5	-623.4	936.4	200	50	No	--	Yes
AP3	803.4	-648.0	872.1	200	48	No	--	No
A-Pillar Right Side								
AP1	1107.4	548.1	1026.0	--	--	Yes	--	--
REL	1126.1	554.5	1023.5	114	44	--	1	Yes
AP2	929.7	626.3	938.2	159	48	No	--	No
AP3	805.3	650.0	873.7	159	50	No	--	Yes
B-Pillar Left Side								
BP1	1674.0	-500.0	1111.3	270	26	No	--	Yes
BP2	1644.0	-620.7	889.2	270	3	No	--	Yes
BP3	1632.1	-619.1	903.2	--	--	Yes	--	--
REL	1643.9	-620.9	889.0	270	3	--	1	No
BP4	1690.6	-673.8	800.3	283	-5	No	--	No
B-Pillar Right Side								
BP1	1675.6	502.6	1110.8	90	24	No	--	No
BP2	1646.2	620.7	890.7	90	2	No	--	No
BP3	1636.5	618.7	904.0	--	--	Yes	--	--

SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
REL	1645.7	620.6	891.5	90	2	--	1	No
BP4	1692.5	673.7	801.8	77	-7	No	--	No
Rear Pillar Left Side								
RP1	2409.2	-517.8	1027.5	280	20	No	--	No
RP2	2521.1	-631.8	879.1	280	-2	No	--	No
Rear Pillar Right Side								
RP1	2410.2	518.2	1036.6	80	18	No	--	No
RP2	2521.0	630.8	888.2	80	-2	No	--	No
Front Header Left Side								
FH1	1036.5	-430.6	1044.5	180	50	No	--	No
FH2	1024.2	-280.9	1052.3	180	50	No	--	No
Front Header Right Side								
FH1	1035.1	431.8	1046.9	180	50	No	--	No
FH2	1023.5	282.5	1052.7	180	50	No	--	No
Side Rail Left Side								
SR1	1259.8	-509.8	1066.7	--	--	Yes	--	--
REL	1271.9	-530.0	1054.9	270	50	--	1	Yes
SR2A	1409.4	-506.1	1098.3	--	--	Yes	--	--
REL	1418.3	-489.9	1086.2	270	50	--	1	No
SR2B	1374.5	-508.8	1096.3	--	--	Yes	--	--
REL	1361.5	-491.3	1080.6	270	50	--	1	No
SR3-1	1979.1	-500.0	1084.3	270	50	No	--	No
SR3-2	2181.3	-504.7	1064.2	270	50	No	--	Yes
Side Rail Right Side								
SR1	1257.3	515.3	1064.7	--	--	Yes	--	--
REL	1277.0	524.4	1059.4	90	50	--	1	No
SR2A	1406.9	509.3	1099.8	--	--	Yes	--	--
REL	1414.9	491.7	1086.6	90	50	--	1	Yes

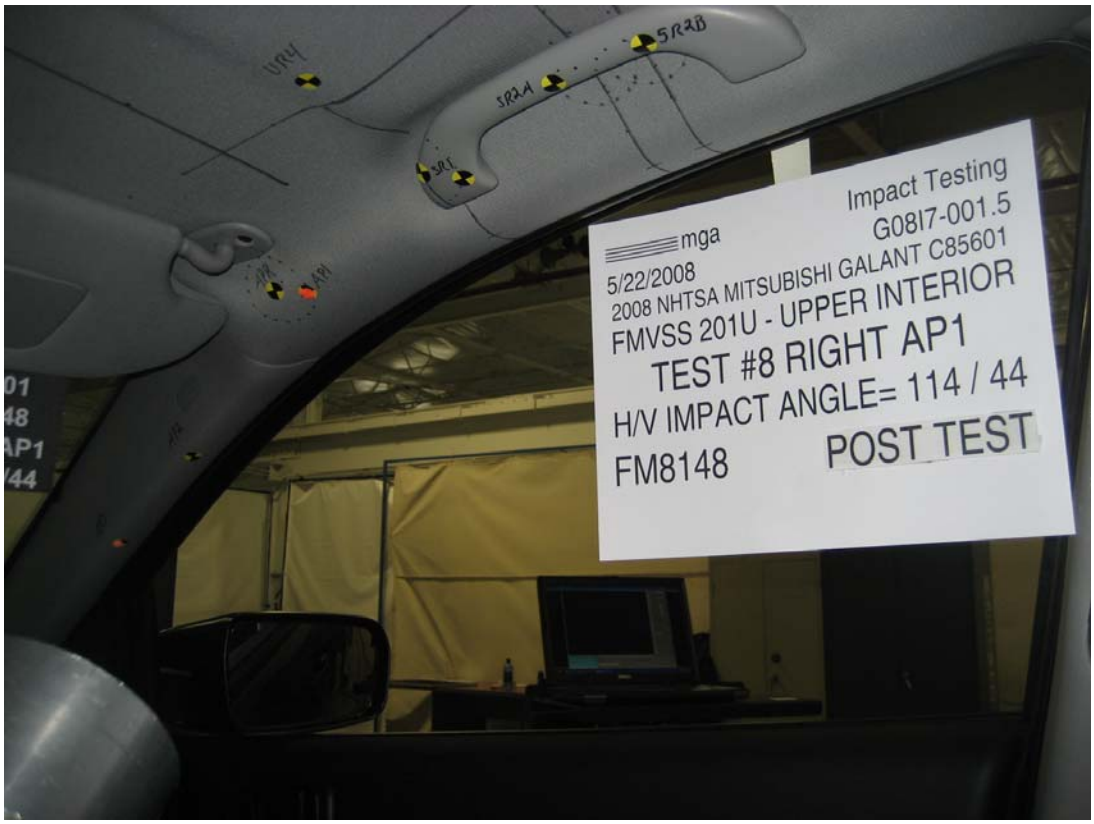
SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
SR2B	1375.0	509.6	1098.4	--	--	Yes	--	--
REL	1360.9	493.3	1081.5	90	50	--	1	No
SR3-1	1991.7	499.5	1084.8	90	50	No	--	No
SR3-2	2181.4	504.2	1066.4	90	50	No	--	No
Rear Header Left Side								
RH	2388.1	-370.1	1113.4	0	50	No	--	No
Rear Header Right Side								
RH	2387.9	369.9	1113.5	0	50	No	--	Yes
Upper Roof Left Side								
UR1@SR2A	1508.7	-414.7	1145.6	270	45	No	--	Yes
UR2@	1840.3	-411.9	1146.8	270	43	No	--	No
UR3@	2283.9	-421.8	1116.1	270	47	No	--	No
Upper Roof Right Side								
UR4@	1268.2	413.9	1076.1	90	50	No	--	No
UR5@BPR	1677.8	416.5	1148.3	90	49	No	--	Yes
UR6@SR3-1	1993.1	418.2	1141.3	90	38	No	--	Yes

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

RECORDED BY: Louis Campbell DATE: May 19, 2008

APPROVED BY: Helen A. Kaleto

3.0 TEST DATA (Including Acceleration and Velocity Plots)


mga
Impact Testing
G08I7-001.5
5/22/2008
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT AP1
H/V IMPACT ANGLE= 114 / 44
FM8148
POST TEST


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT AP1
H/V IMPACT ANGLE= 114 / 44
FM8148
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): AP1Right

Temperature:22C

MGA Test Reference No.:FM8148

Humidity:38%

Approach Horizontal Angles:114º

Time of Test:2:05:20 PM

Approach Vertical Angles:44º

FMH Serial No:[037]

Additional Description:1 Relocation.

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
302	180	12.3	19.0	22	12 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	AHTB2	-114.533	0.87	0.87
Y	6	J14103	92.424	1.52	1.52
Z	7	J35800	96.462	1.03	1.03

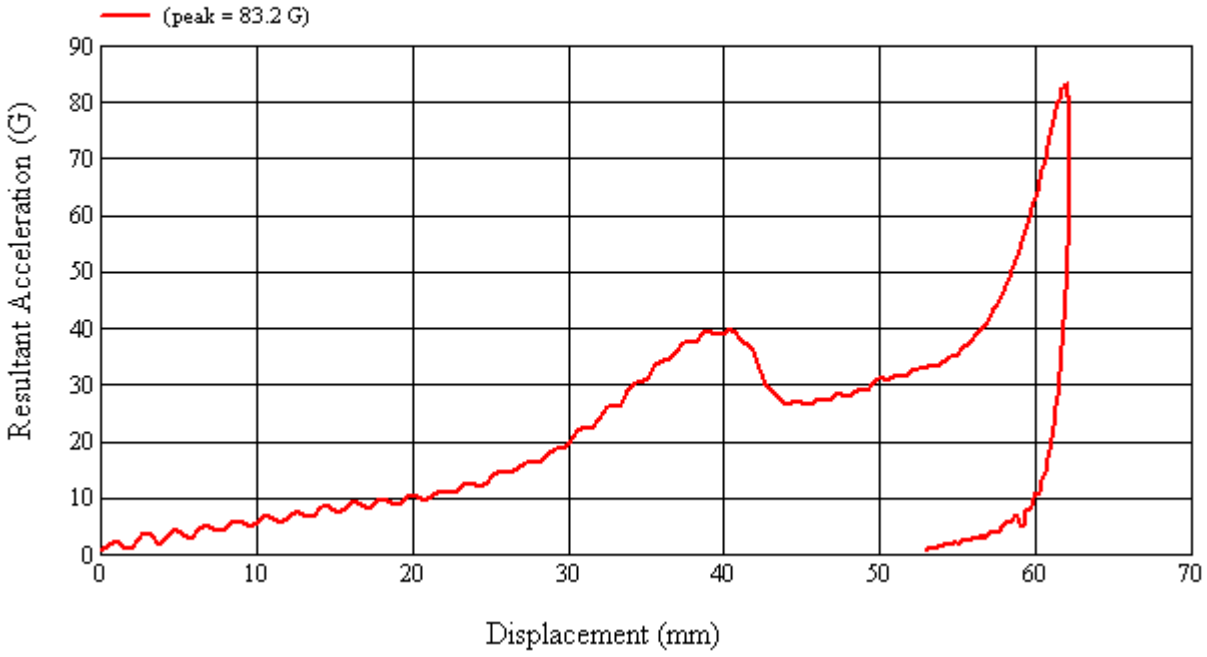
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

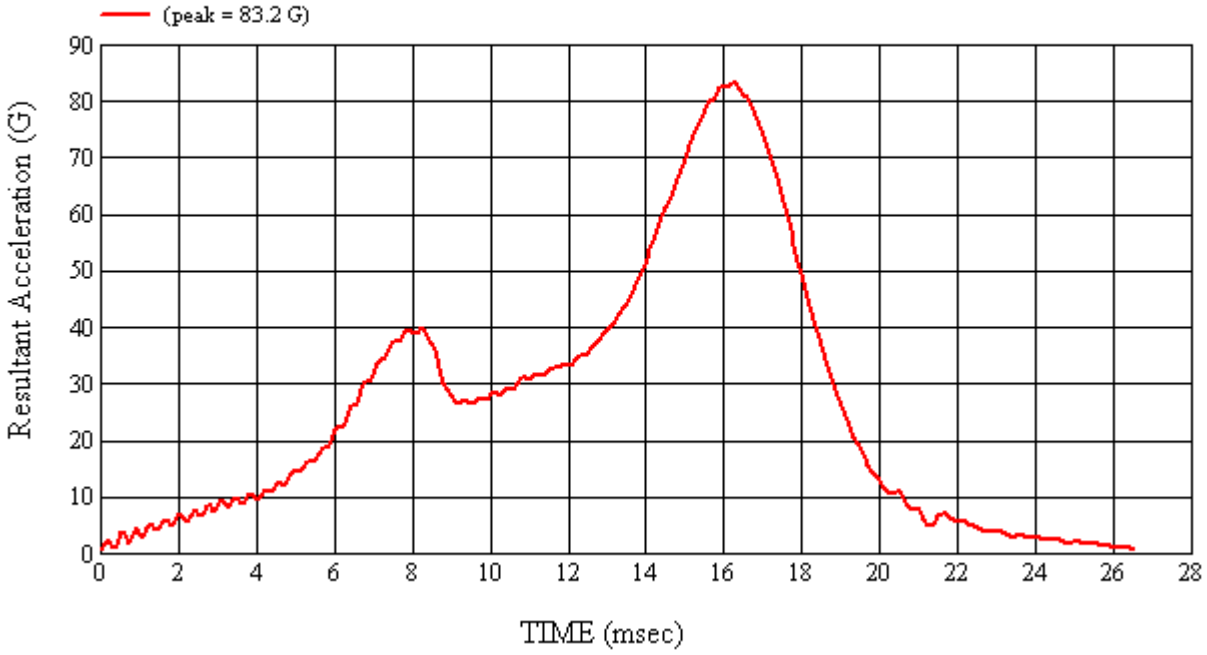
No visible damage.

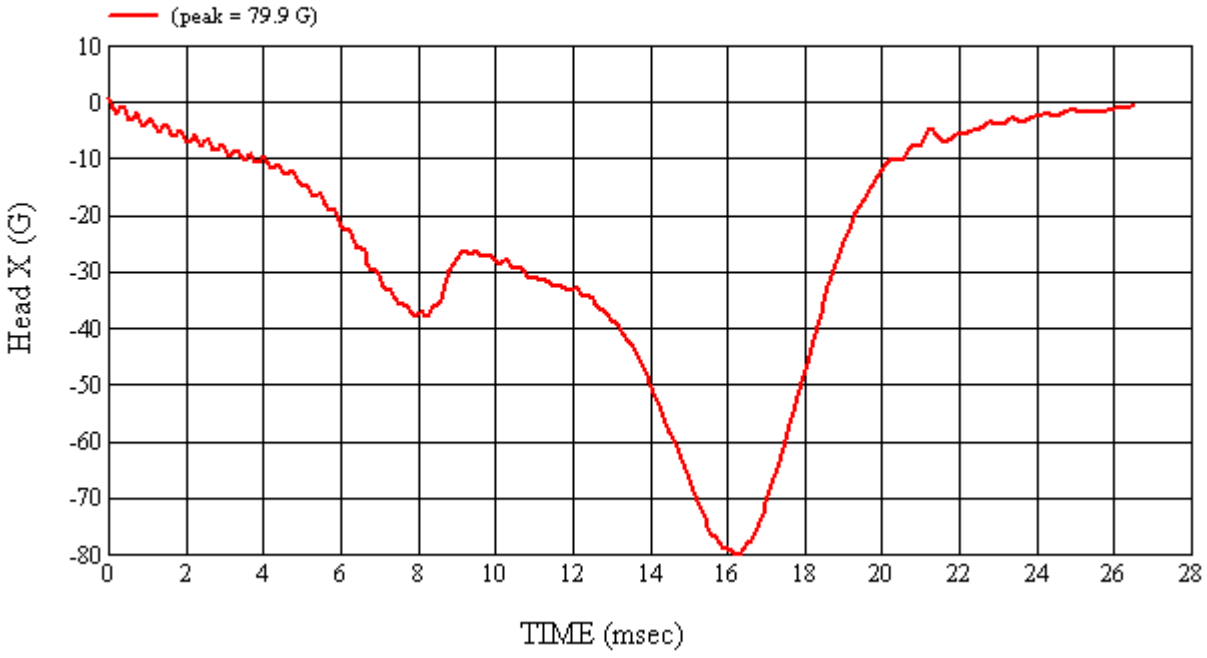
Recorded By: Scott Campbell Approved By*: Eileen A. Kaleto Date: 5/22/2008

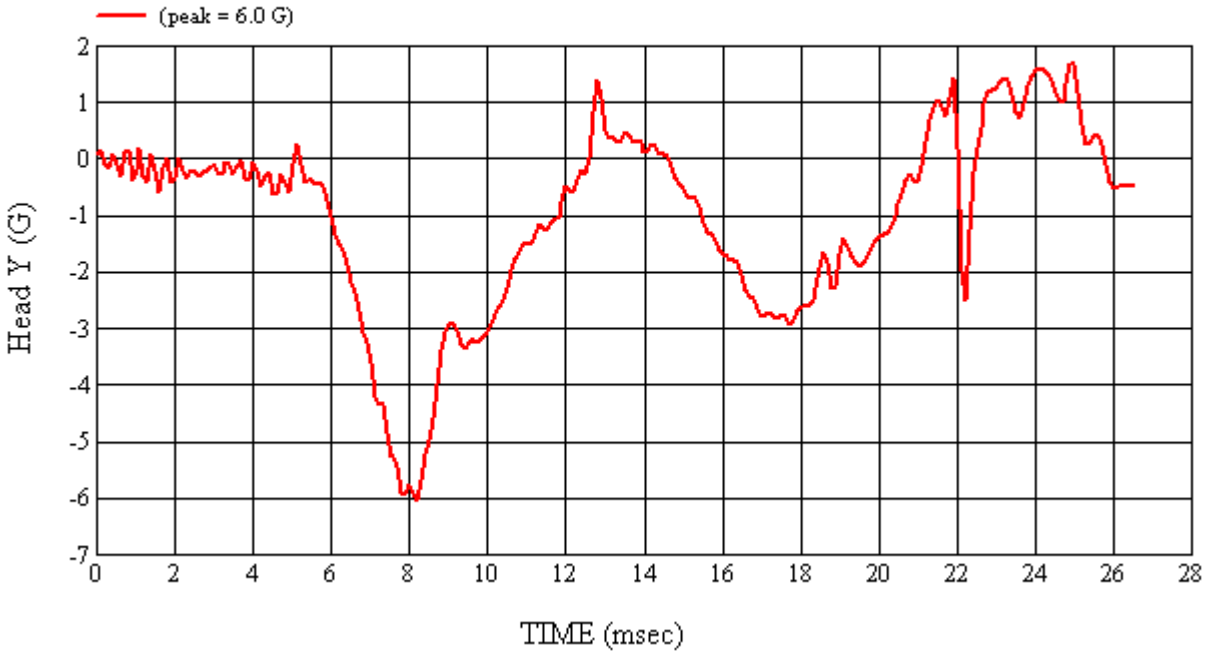
*Only necessary for NHTSA (Government) Compliance testing.

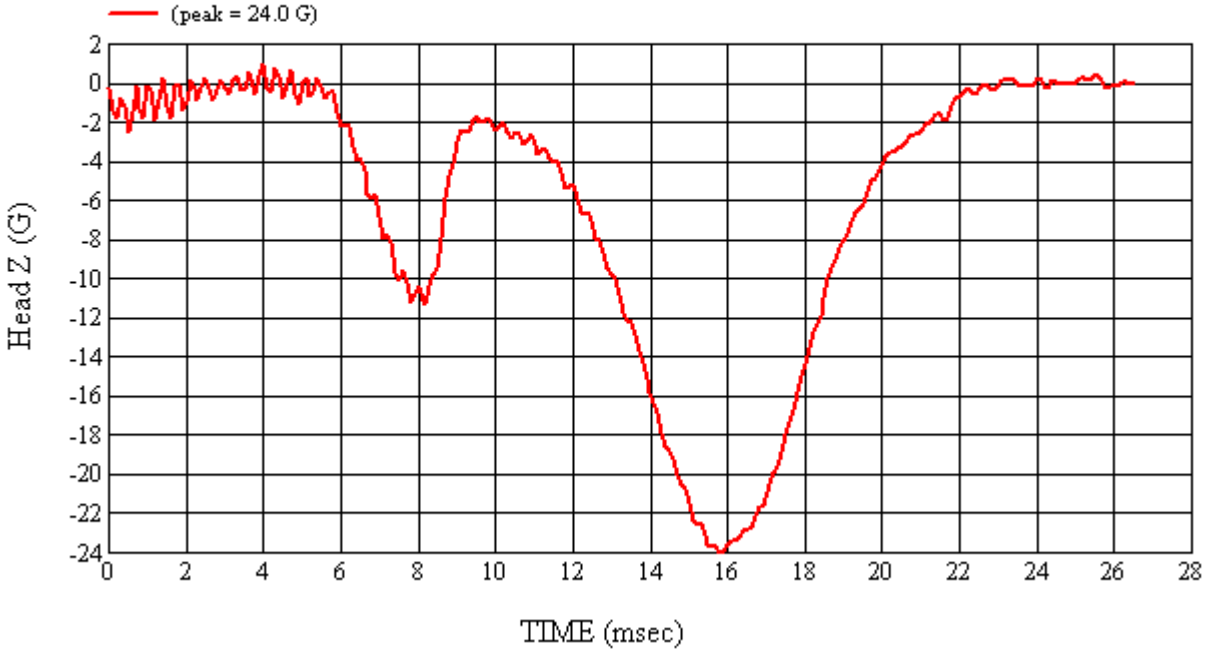
MGA Test #: FM8148 Target Location: AP1, Right Side Test Date: 5/22/2008

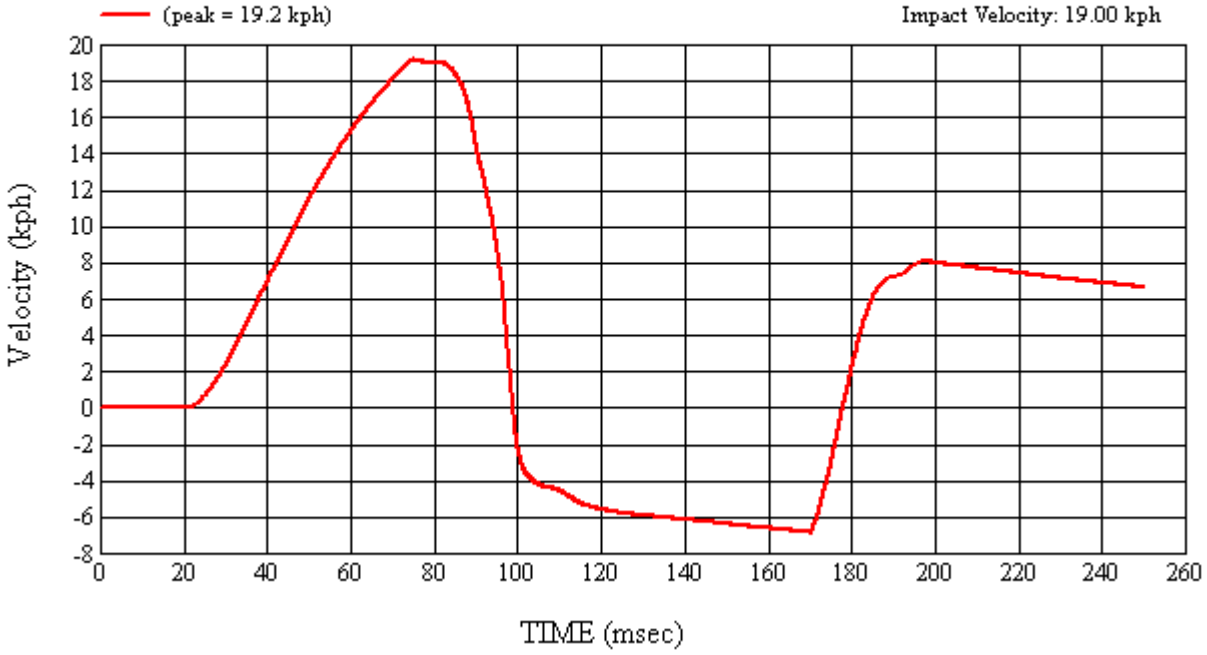


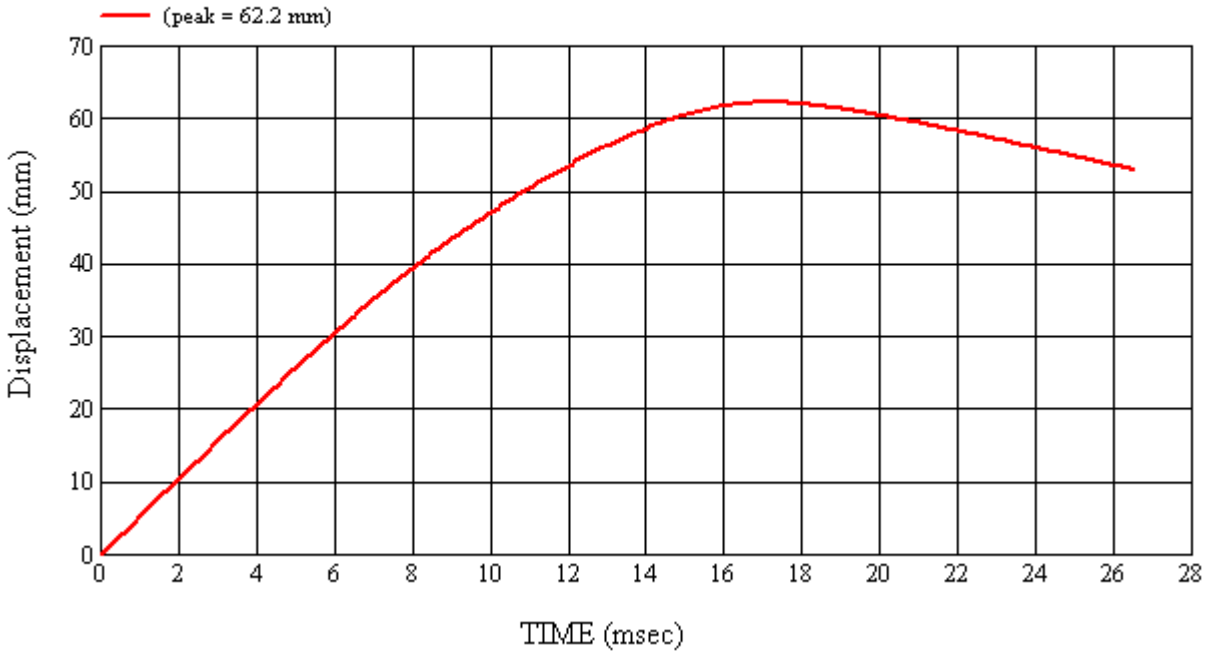



(peak = 79.9 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)

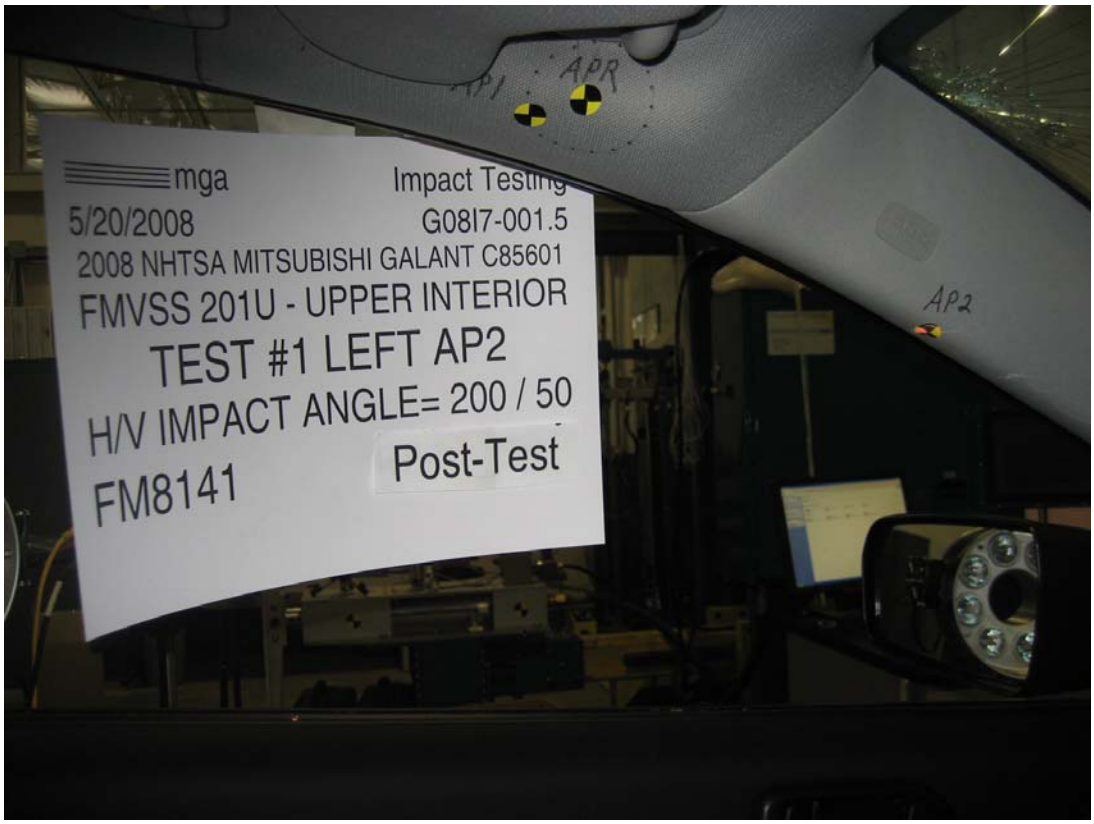

(peak = 6.0 G)
Head Y (G)
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)

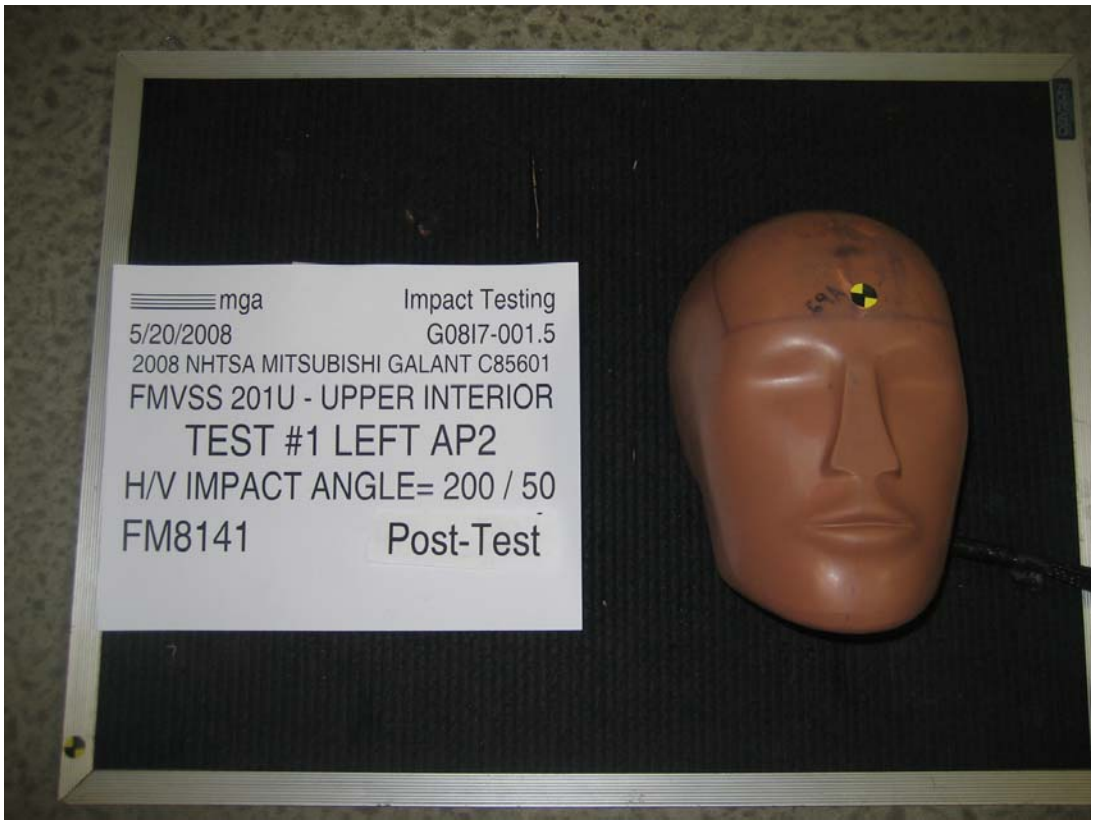

(peak = 24.0 G)
Head Z (G)
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 19.2 kph)
Impact Velocity: 19.00 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 62.2 mm)
Displacement (mm)
70
60
50
40
30
20
10
0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


mga
5/20/2008
Impact Testing
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 200 / 50
FM8141
PRE TEST
AP2
AP3


mga
Impact Testing
5/20/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 200 / 50
FM8141
Post-Test
AP1
APR
AP2


mga
Impact Testing
5/20/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 200 / 50
FM8141
Post-Test

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): AP2Left

Temperature:22C

MGA Test Reference No.:FM8141

Humidity:33%

Approach Horizontal Angles:200º

Time of Test:3:31:37 PM

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
452	378	8.6	18.5	10	5 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.844	0.87	0.87
Y	6	J22664	93.878	1.52	1.52
Z	7	J35924	92.621	1.03	1.03

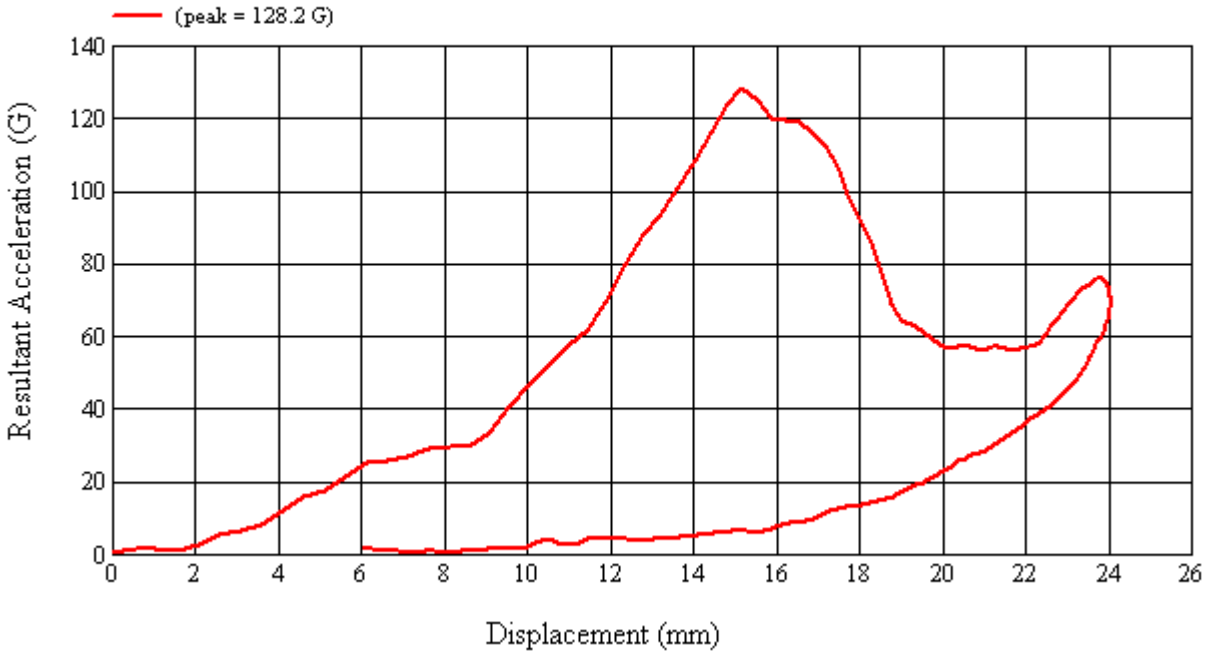
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

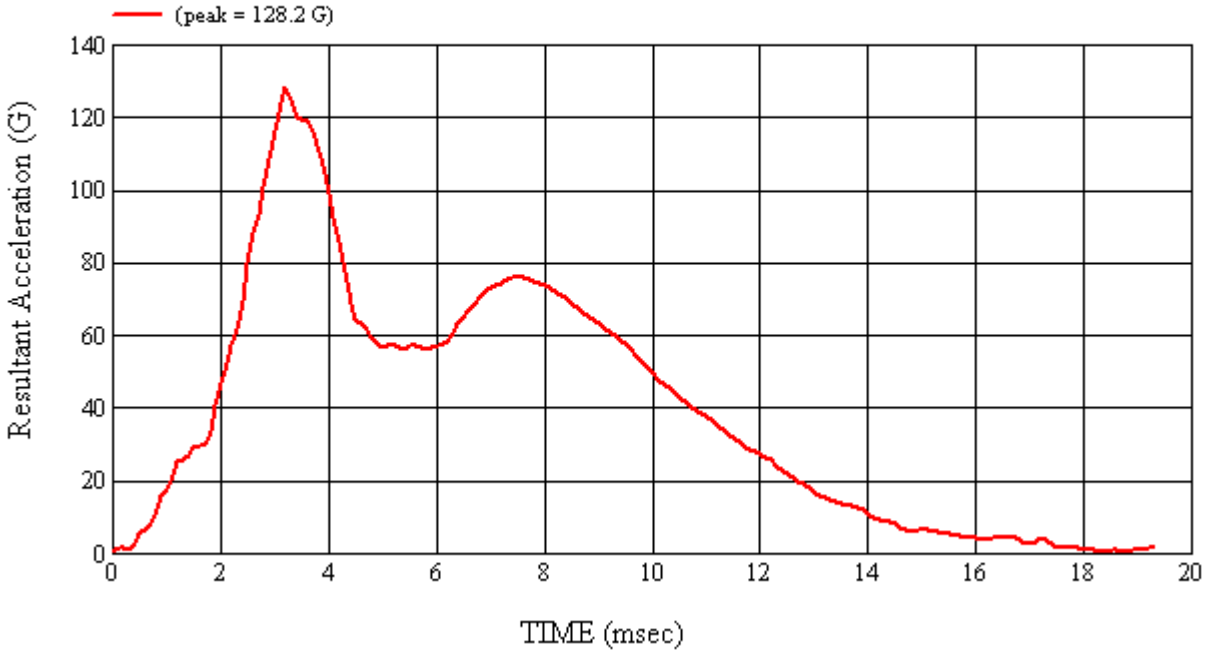
No visible damage.

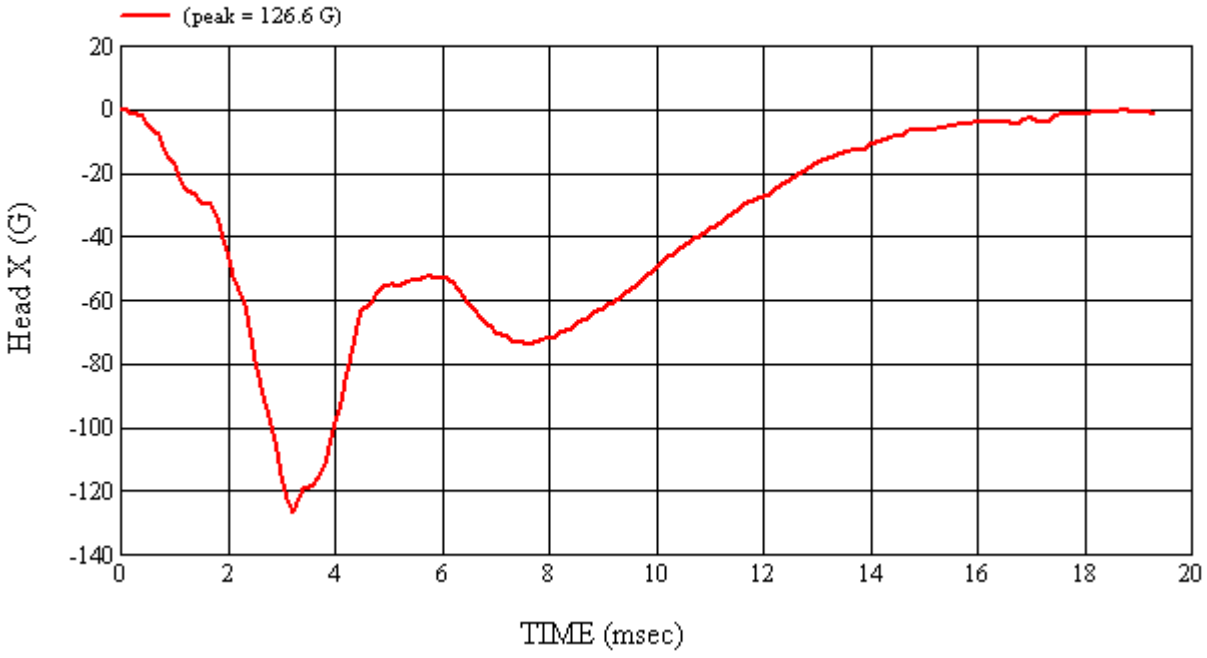
Recorded By: _____ Approved By*: _____ Date: 5/20/2008

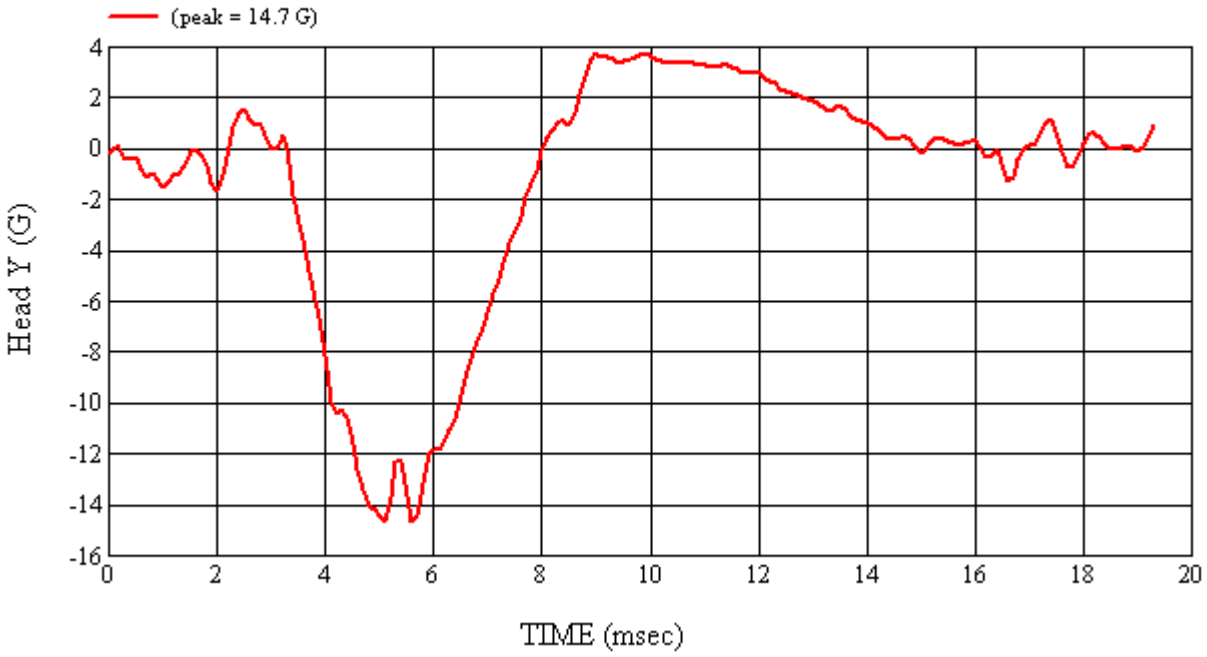
*Only necessary for NHTSA (Government) Compliance testing.

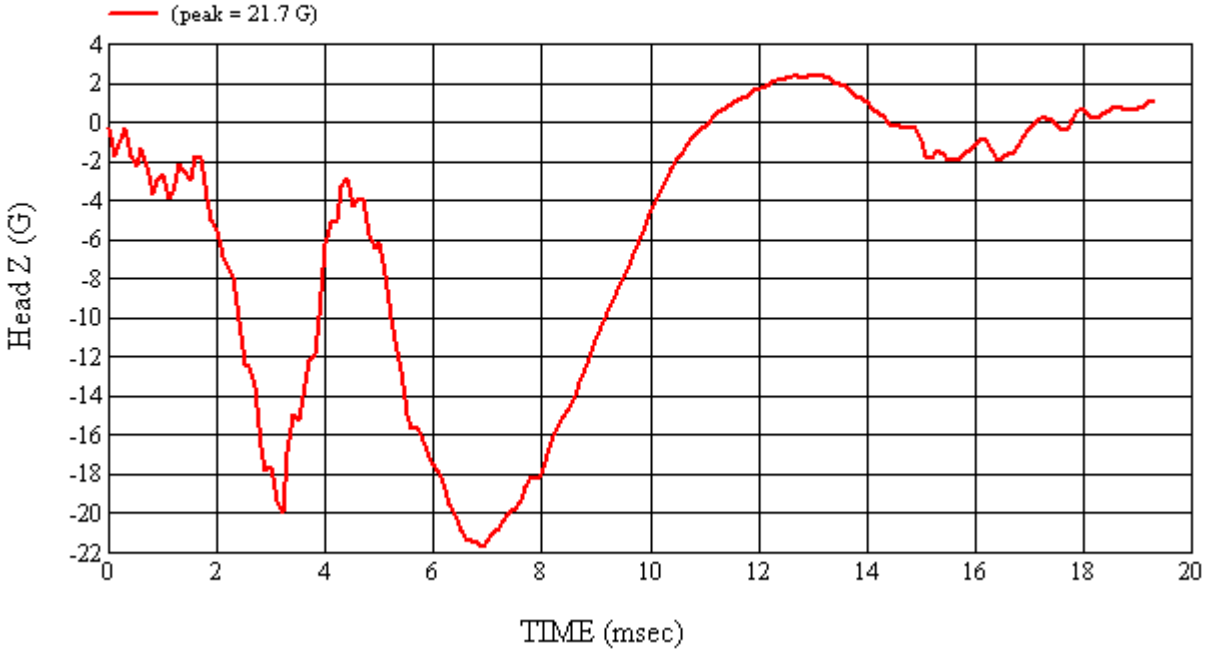
MGA Test #: FM8141 Target Location: AP2, Left Side Test Date: 5/20/2008

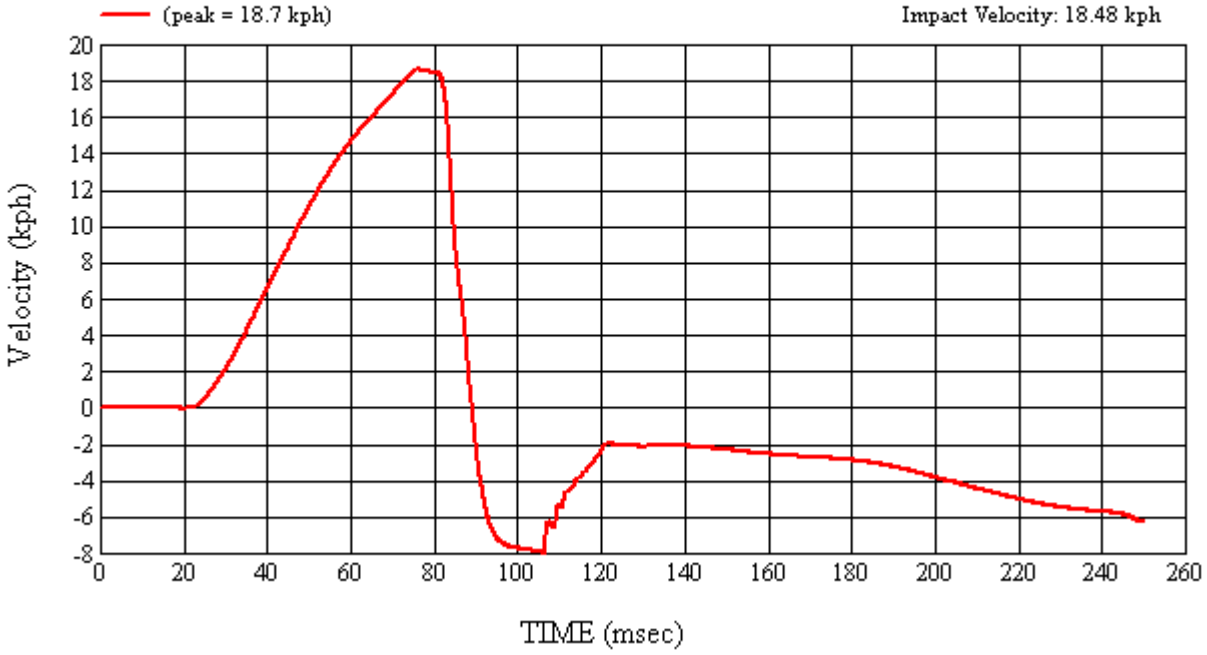


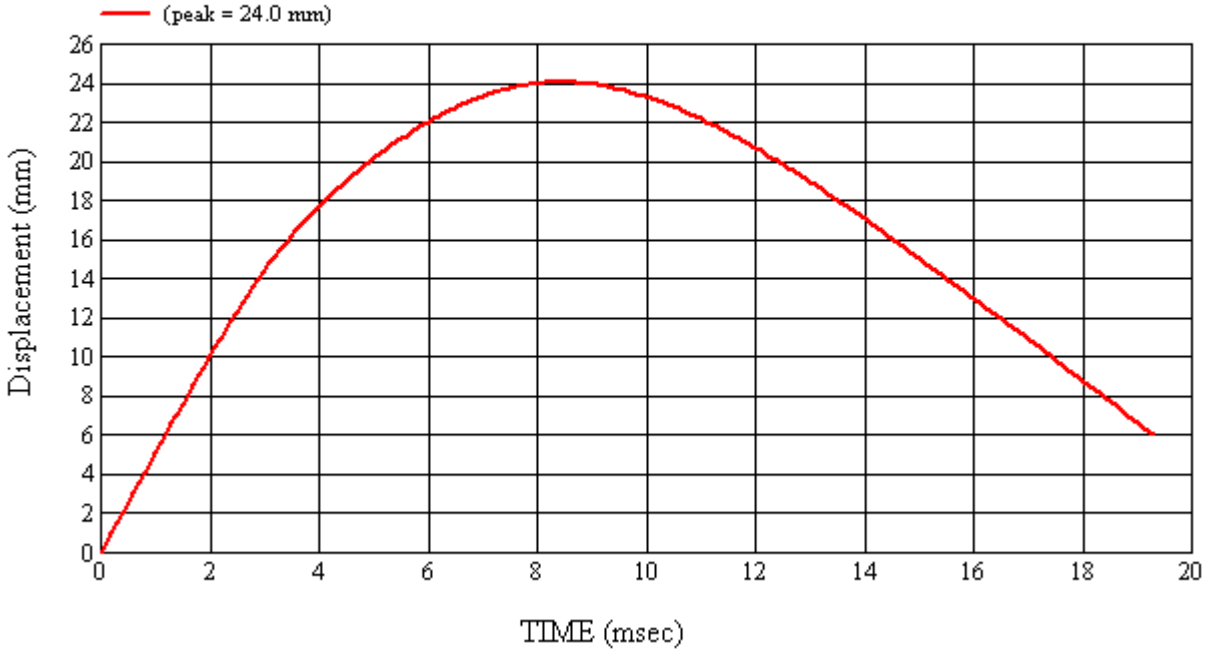



(peak = 126.6 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


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


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


(peak = 18.7 kph)
Impact Velocity: 18.48 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 24.0 mm)
Displacement (mm)
TIME (msec)
0
2
4
6
8
10
12
14
16
18
20
22
24
26


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP3
H/V IMPACT ANGLE= 159 / 50
FM8147
PRE TEST


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP3
H/V IMPACT ANGLE= 159 / 50
FM8147
POST TEST


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP3
H/V IMPACT ANGLE= 159 / 50
FM8147
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): AP3Right

Temperature:22C

MGA Test Reference No.:FM8147

Humidity:36%

Approach Horizontal Angles:159º

Time of Test:11:14:01 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
398	307	8.3	18.8	3	1 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.844	0.87	0.87
Y	6	J22664	93.878	1.52	1.52
Z	7	J35924	92.621	1.03	1.03

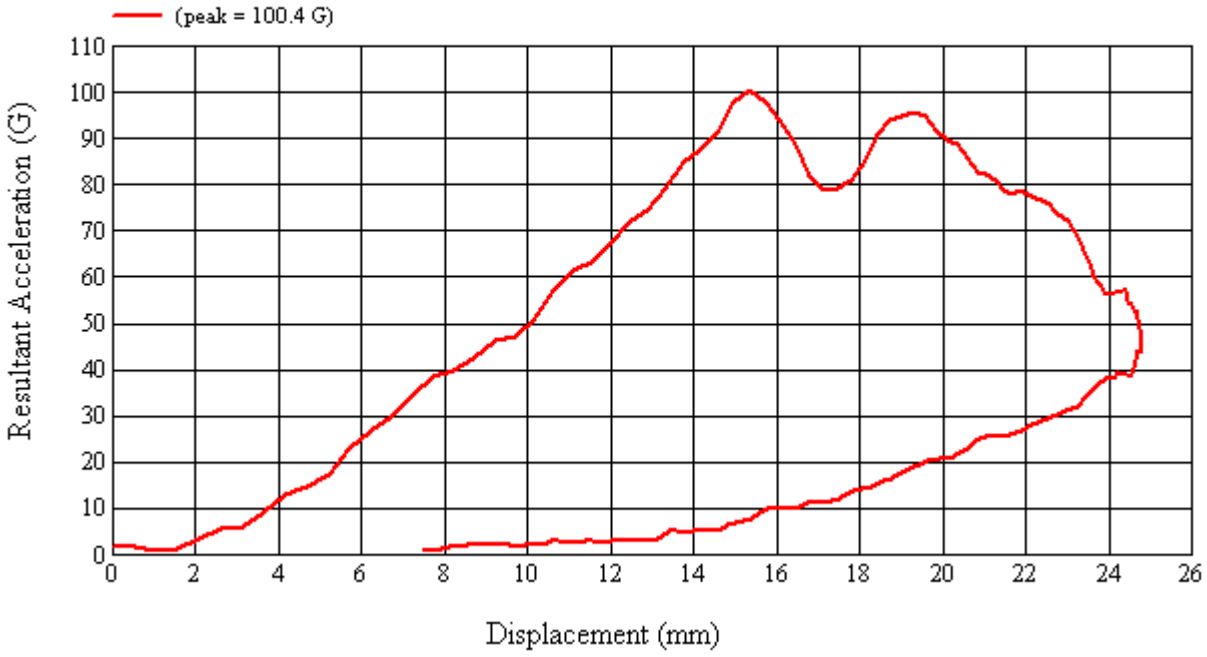
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

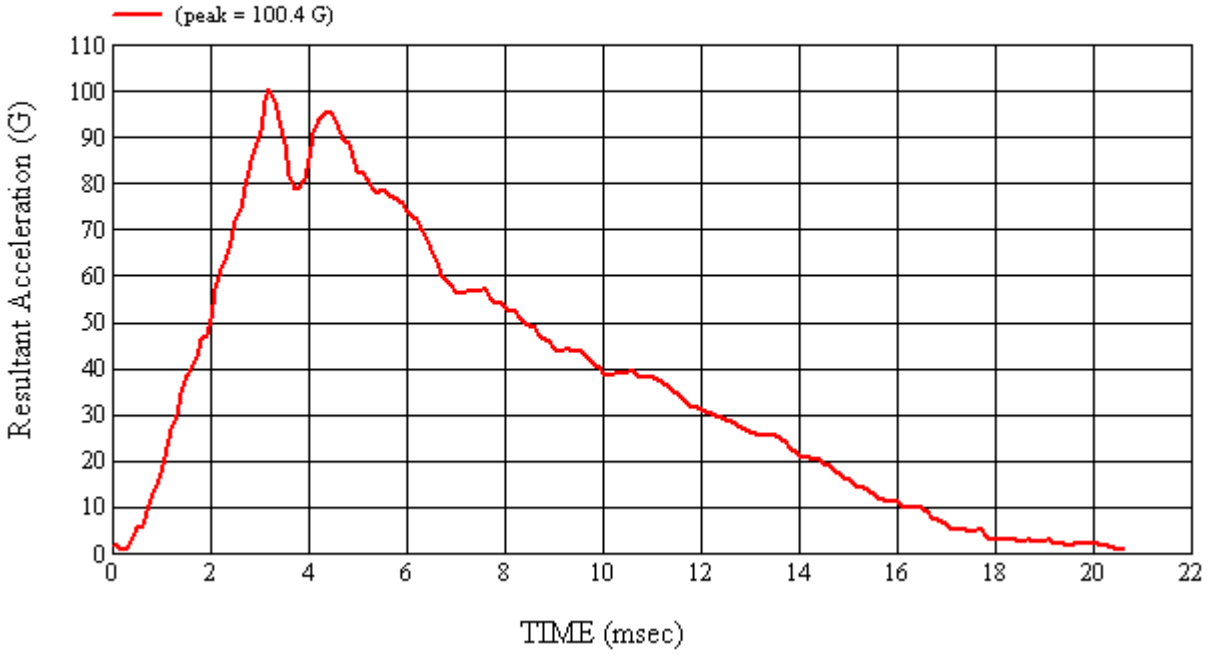
No visible damage.

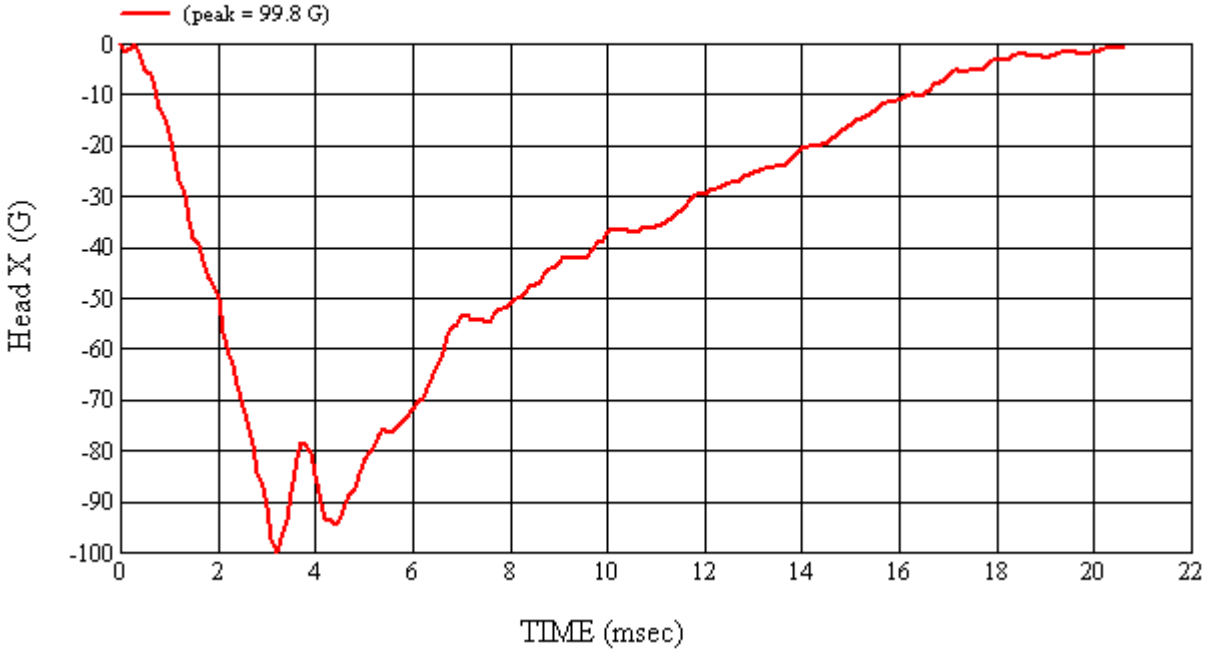
Recorded By: Scott Campbell Approved By*: Eileen A. Kaleto Date: 5/22/2008

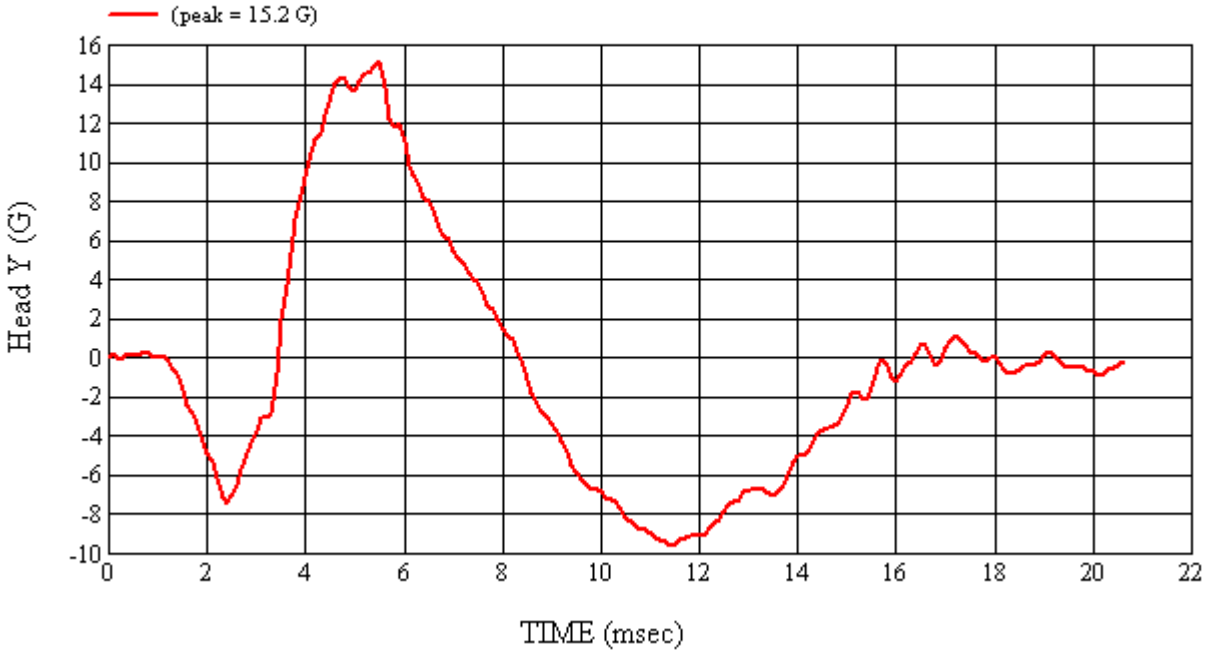
*Only necessary for NHTSA (Government) Compliance testing.

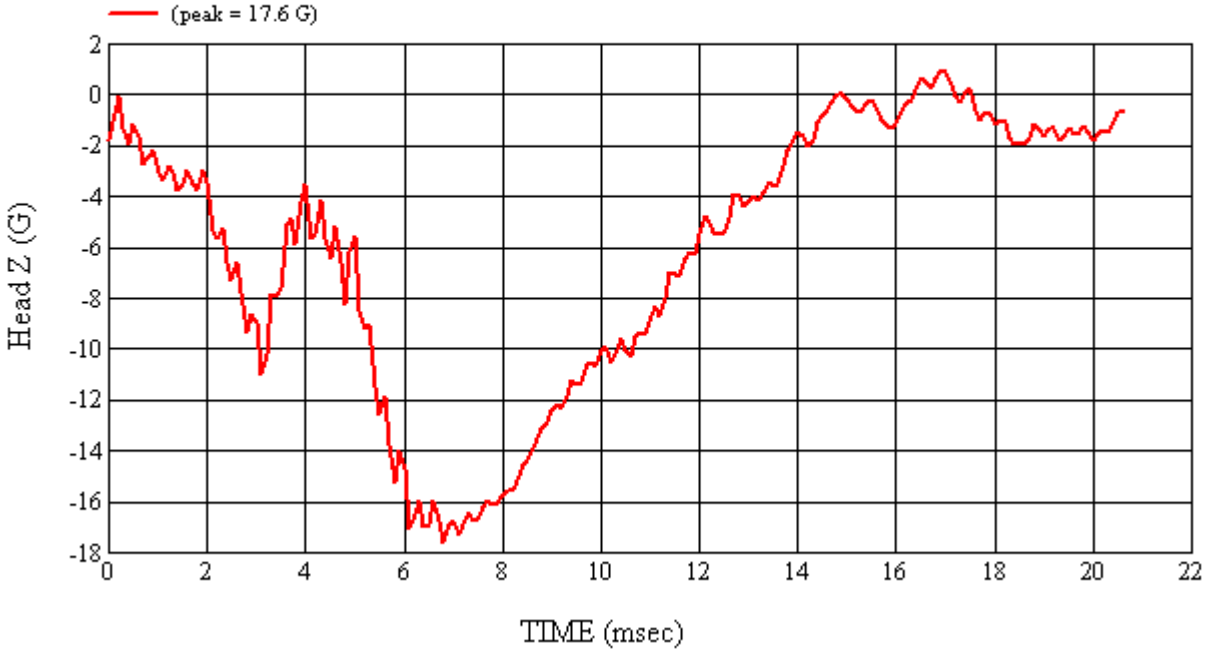
MGA Test #: FM8147 Target Location: AP3, Right Side Test Date: 5/22/2008

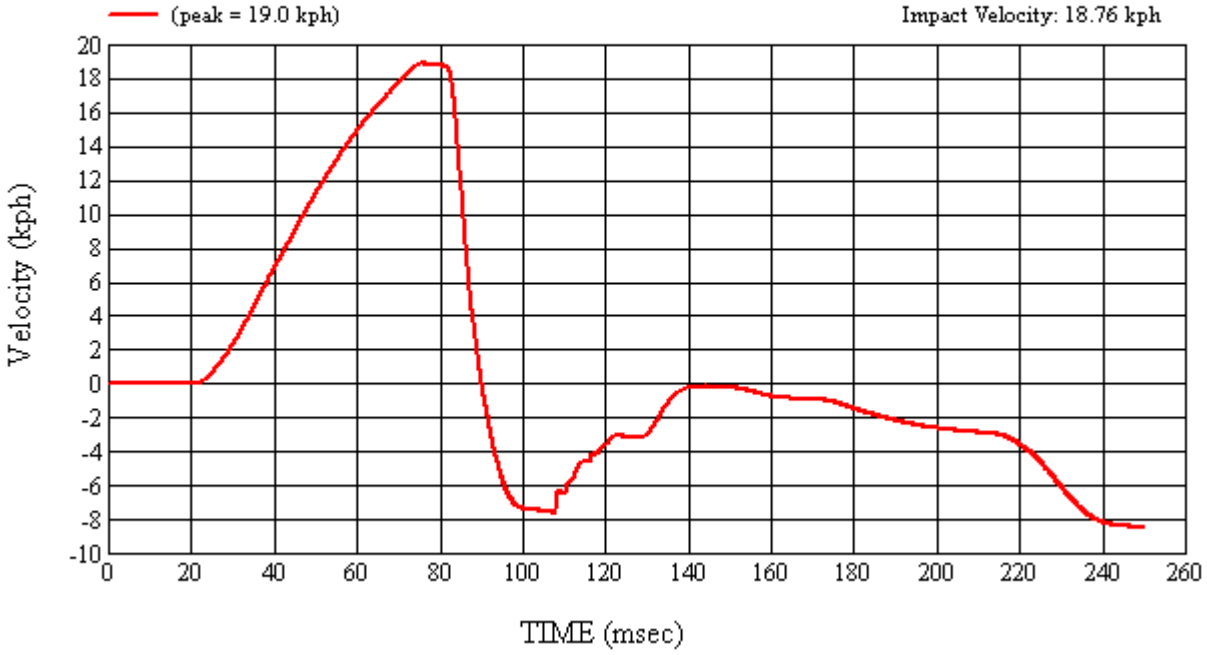


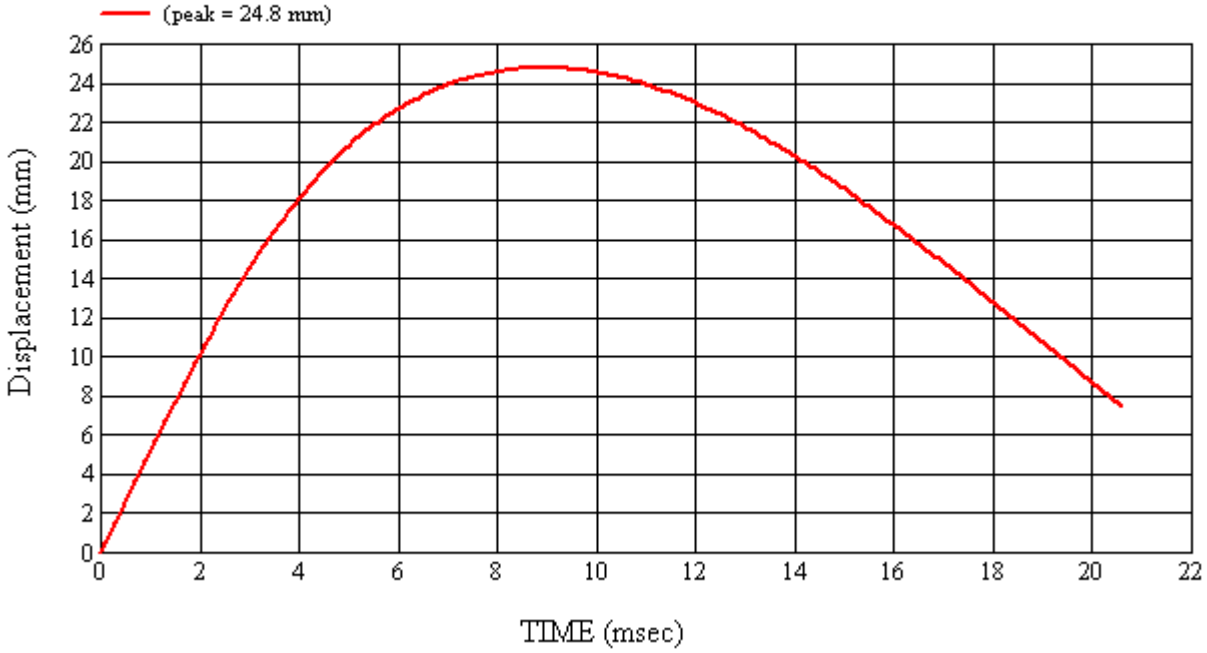


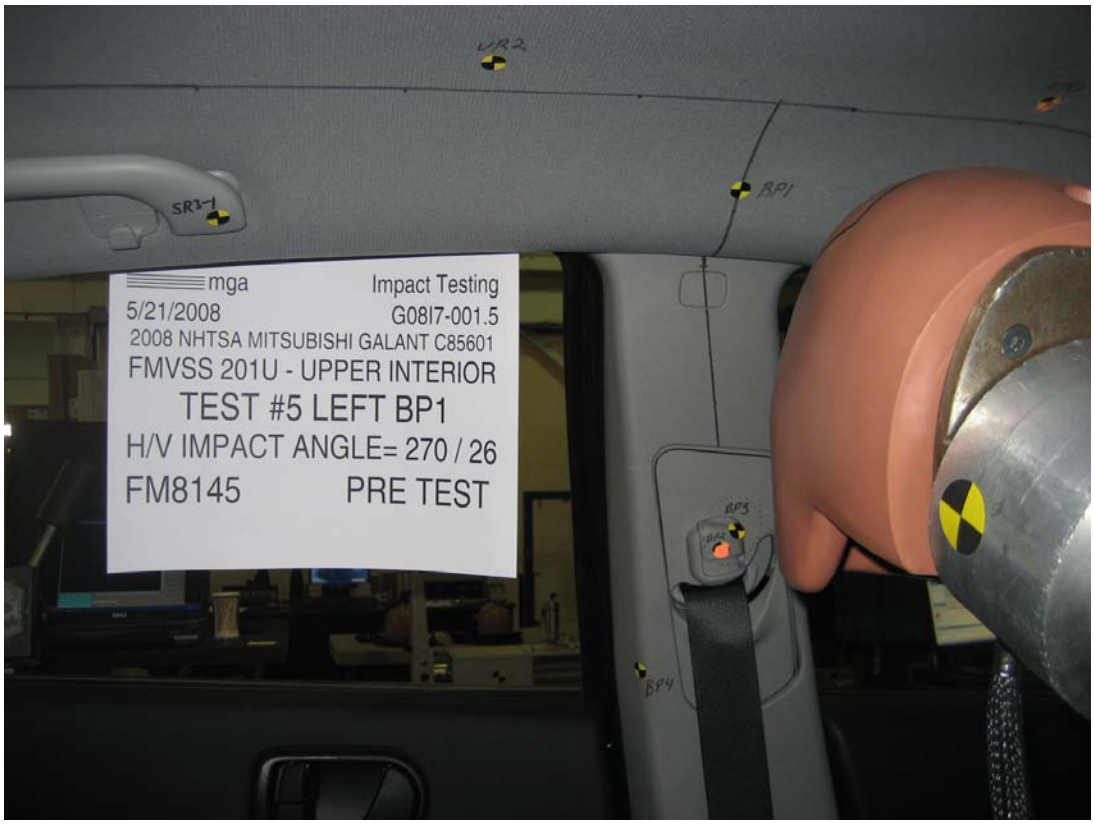

(peak = 99.8 G)
Head X (G)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

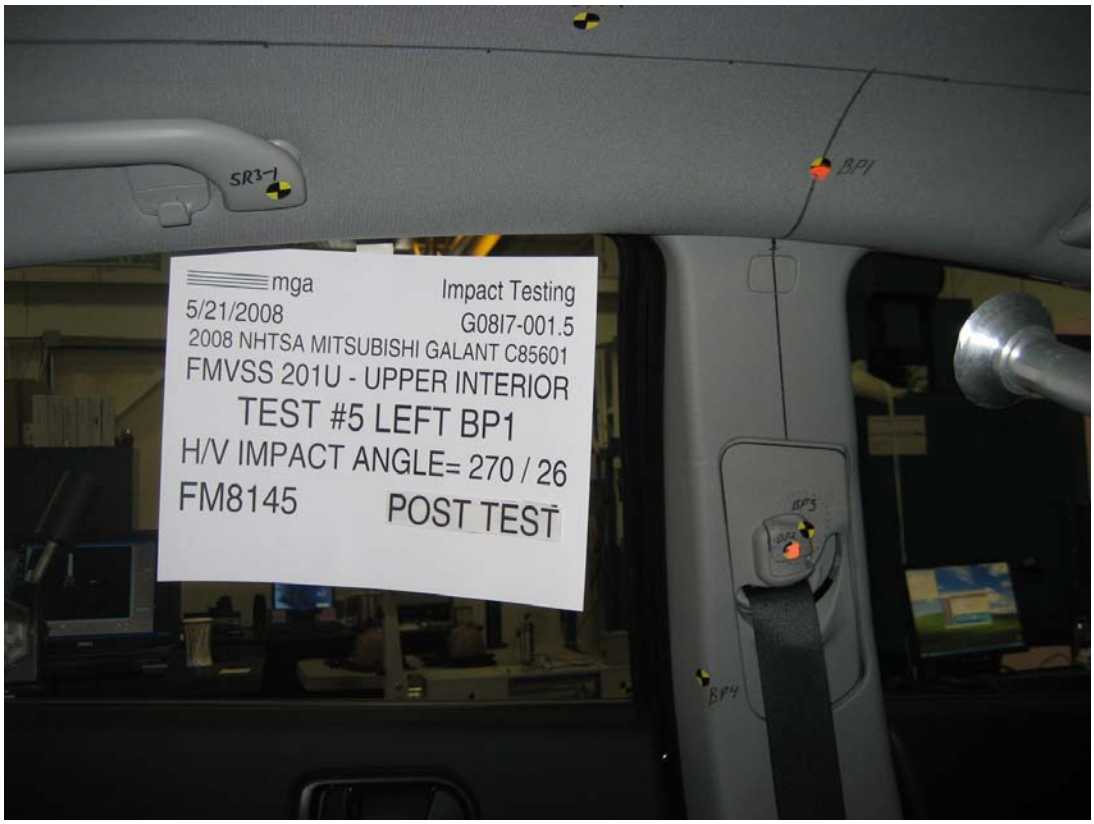

(peak = 15.2 G)
Head Y (G)
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 17.6 G)
Head Z (G)
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 = 19.0 kph)
Impact Velocity: 18.76 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 24.8 mm)
Displacement (mm)
TIME (msec)
0
2
4
6
8
10
12
14
16
18
20
22
24
26


UR2
SR3-1
BP1
mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP1
H/V IMPACT ANGLE= 270 / 26
FM8145
PRE TEST
BP3
BP4


SR3-1
BP1
BP3
BP4
mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP1
H/V IMPACT ANGLE= 270 / 26
FM8145
POST TEST


mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT BP1
H/V IMPACT ANGLE= 270 / 26
FM8145
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#5

Target (Vehicle Side): BP1Left

Temperature:22C

MGA Test Reference No.:FM8145

Humidity:32%

Approach Horizontal Angles:270º

Time of Test:11:31:07 AM

Approach Vertical Angles:26º

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
398	307	8.9	18.2	39	8 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	AHTB2	-114.533	0.87	0.87
Y	6	J14103	92.424	1.52	1.52
Z	7	J35800	96.462	1.03	1.03

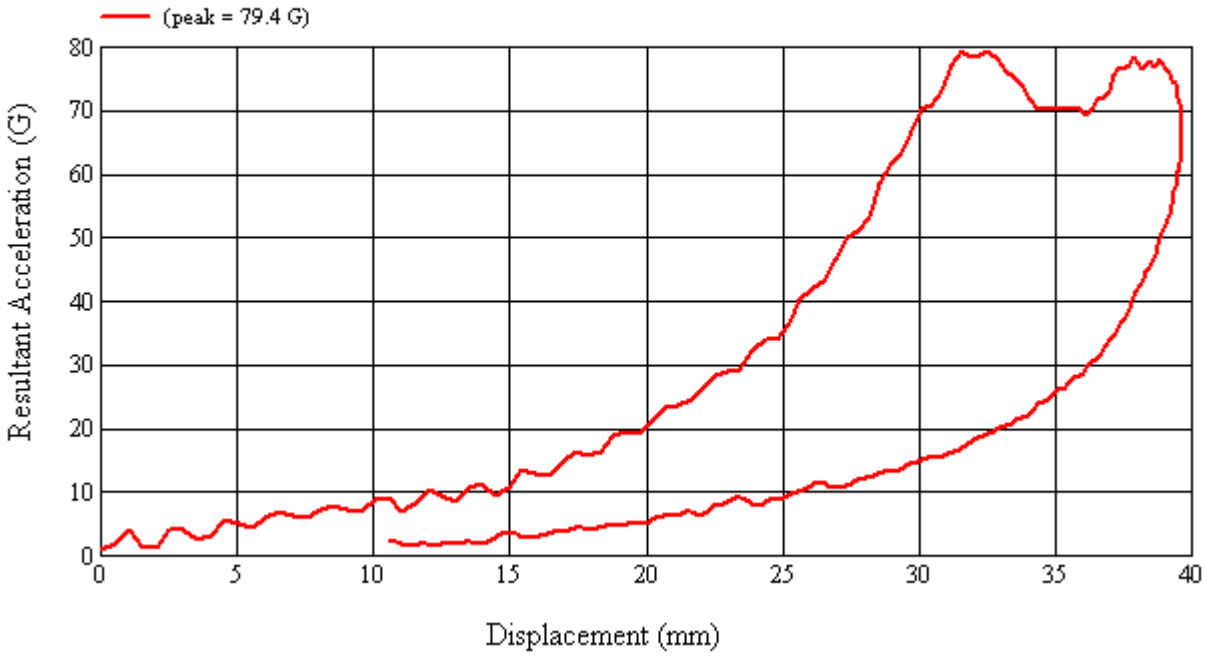
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

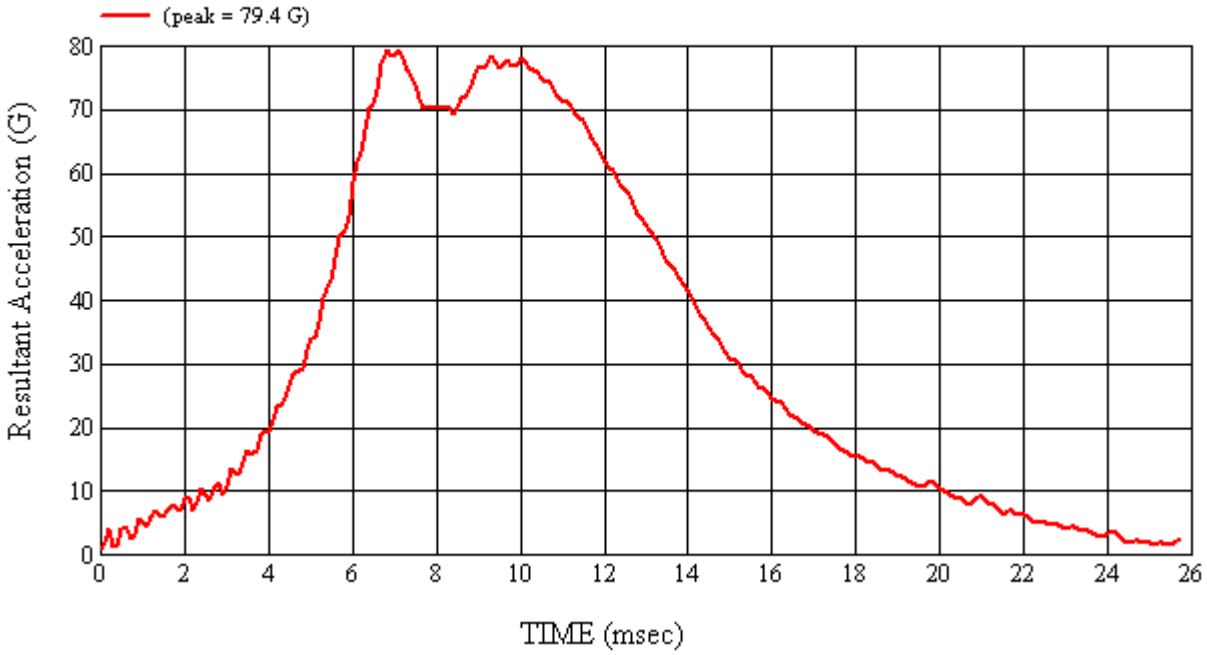
No visible damage.

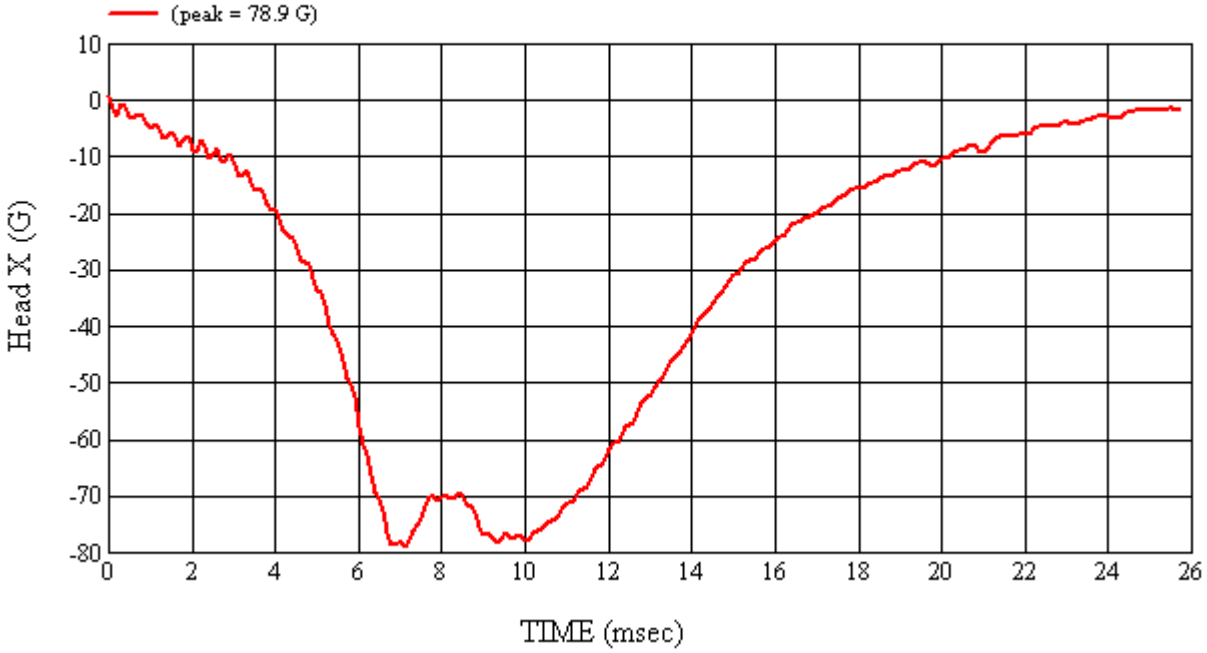
Recorded By: Scott Campbell Approved By*: Eileen A. Kaleto Date: 5/21/2008

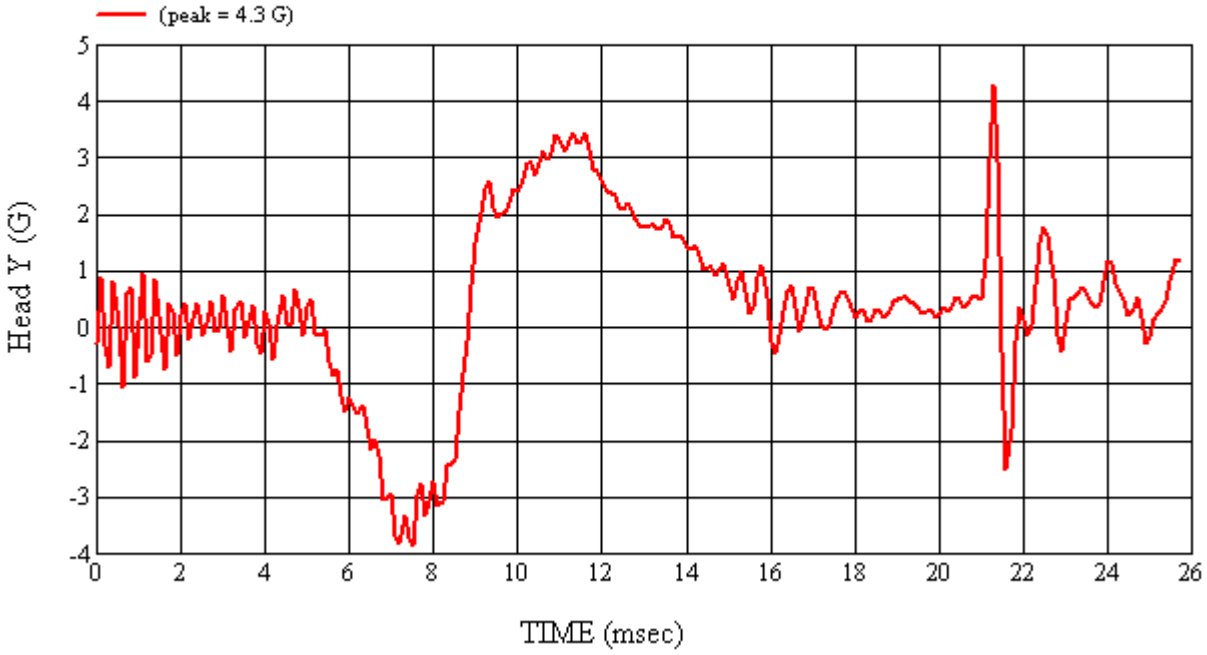
*Only necessary for NHTSA (Government) Compliance testing.

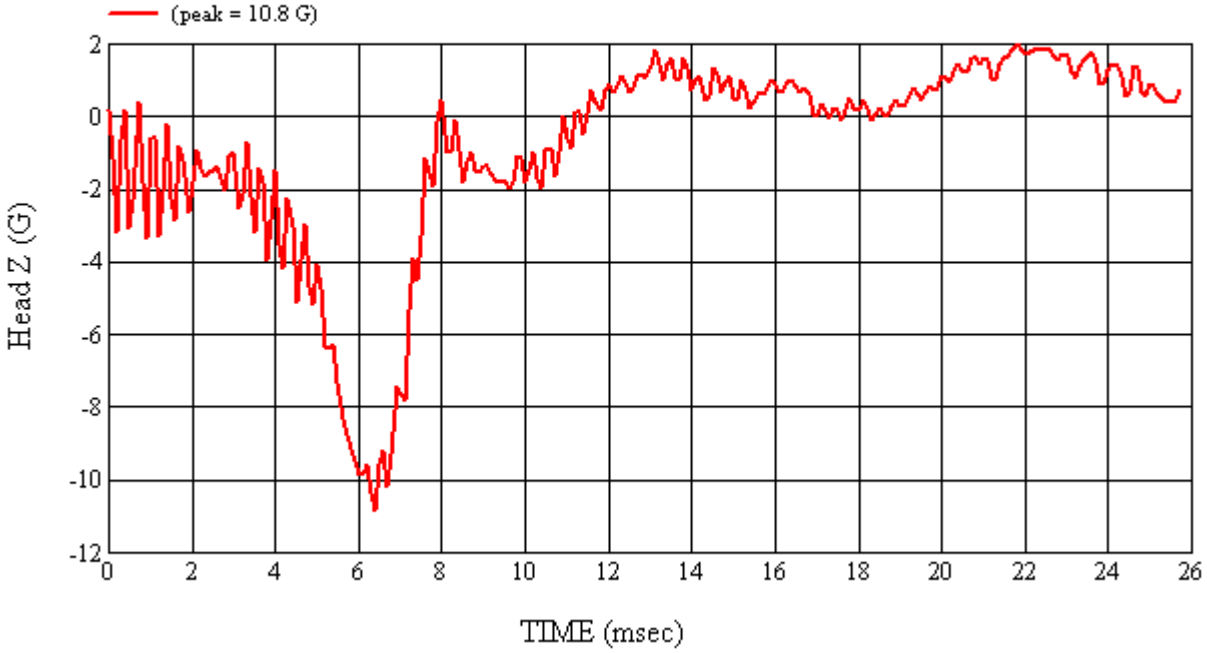
MGA Test #: FM8145 Target Location: BP1, Left Side Test Date: 5/21/2008

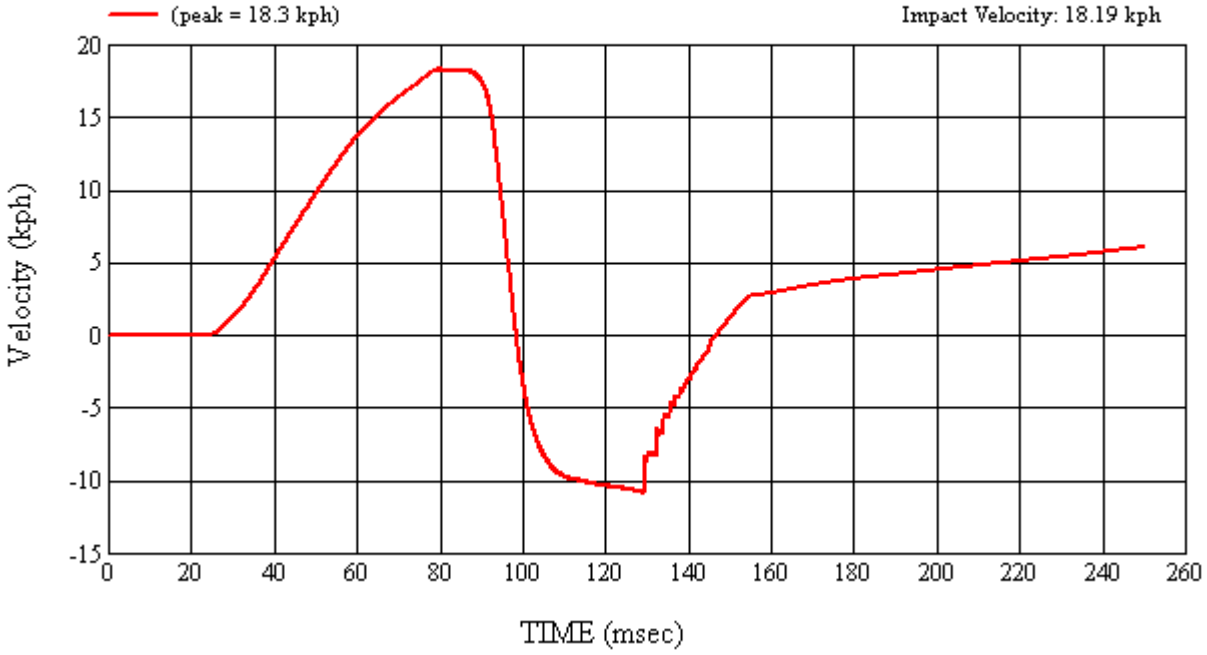


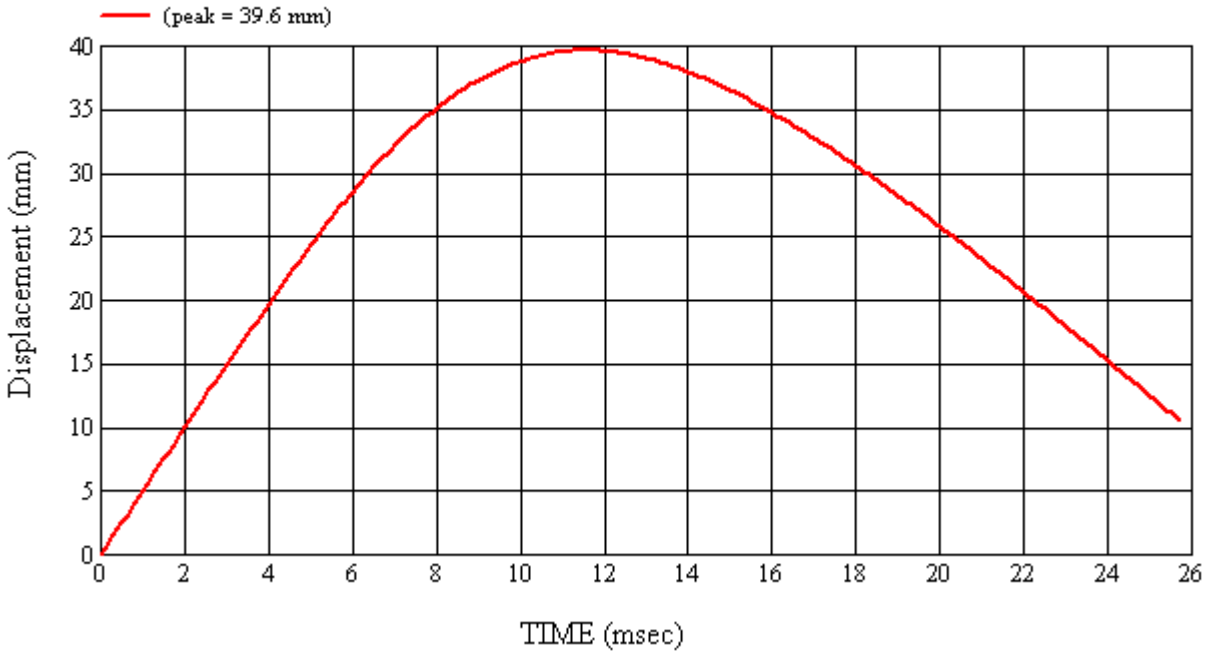



(peak = 78.9 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 4.3 G)
Head Y (G)
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)

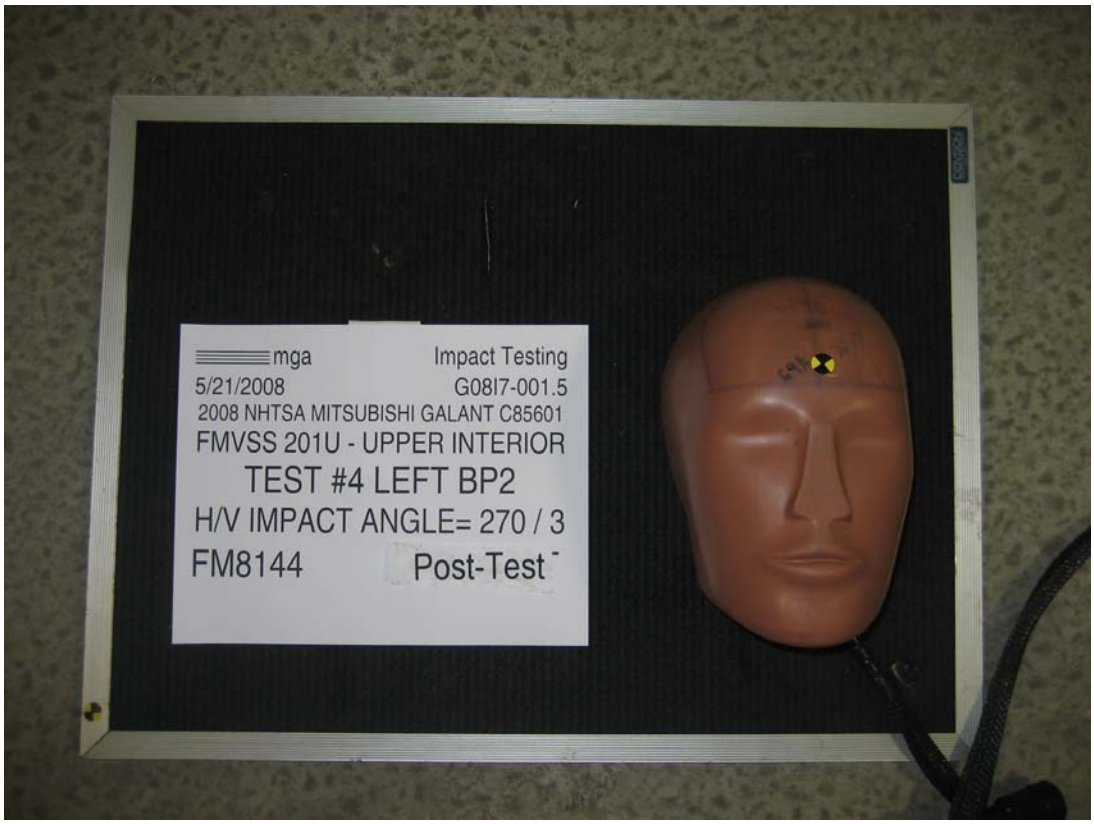

(peak = 10.8 G)
Head Z (G)
2
0
-2
-4
-6
-8
-10
-12
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 18.3 kph)
Impact Velocity: 18.19 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 = 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
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT BP2
H/V IMPACT ANGLE= 270 / 3
FM8144
PRE TEST


SR3-1
BP1
mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT BP2
H/V IMPACT ANGLE= 270 / 3
FM8144
Post-Test
BP5
BP4


mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT BP2
H/V IMPACT ANGLE= 270 / 3
FM8144
Post-Test

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#4

Target (Vehicle Side): BP2Left

Temperature:23C

MGA Test Reference No.:FM8144

Humidity:34%

Approach Horizontal Angles:270º

Time of Test:10:05:20 AM

Approach Vertical Angles:3º

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
652	644	7.7	24.2	10	3 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J35919	-95.844	0.87	0.87
Y	6	J22664	93.878	1.52	1.52
Z	7	J35924	92.621	1.03	1.03

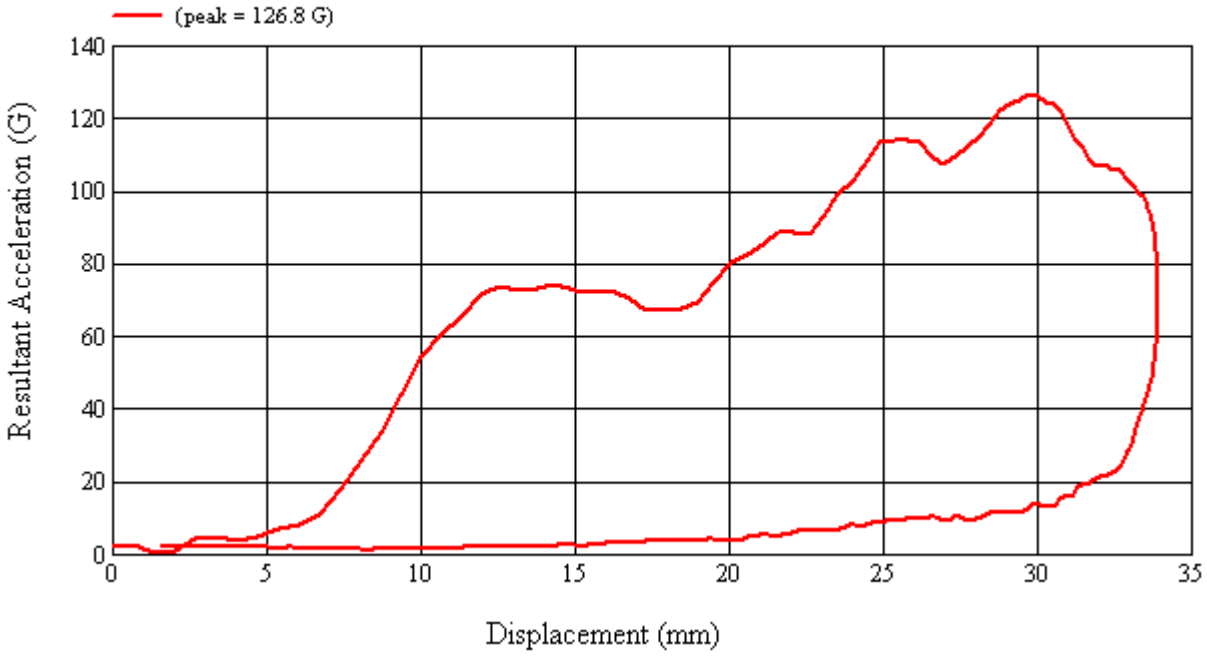
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

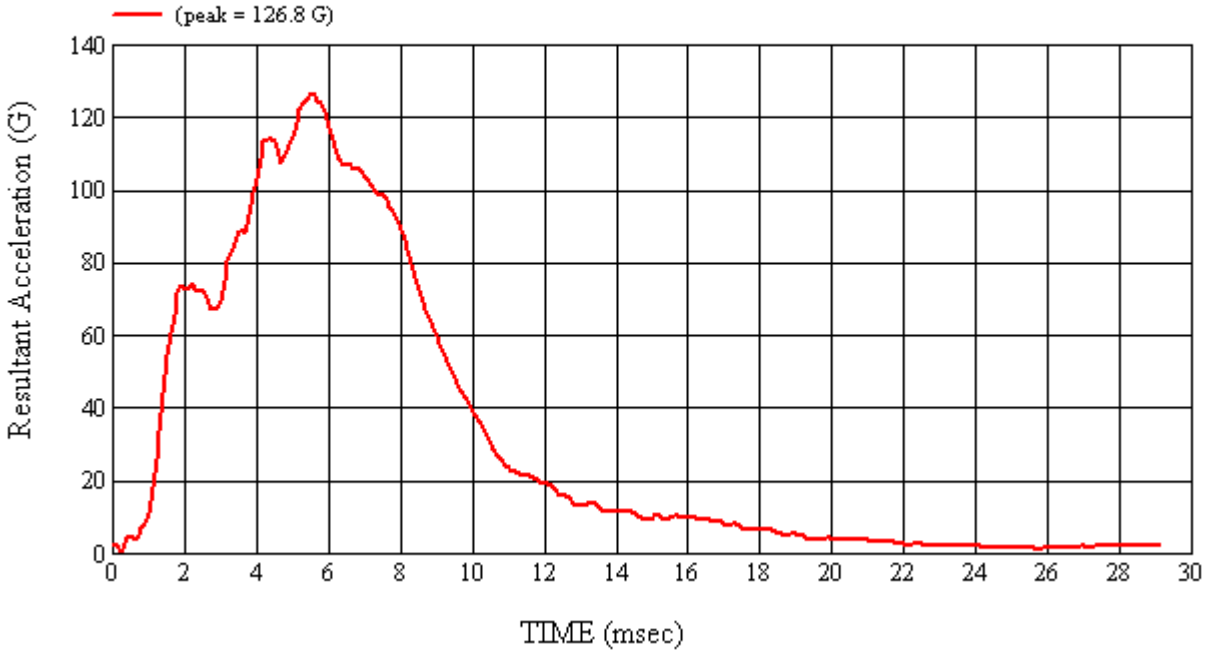
No visible damage.

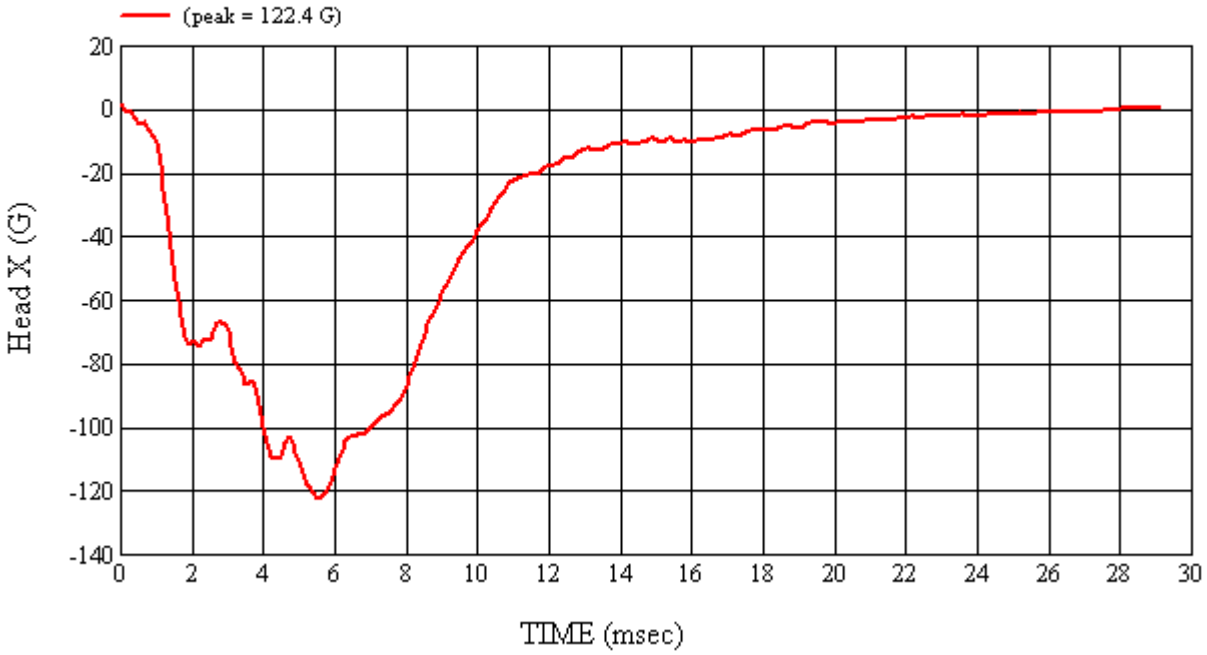
Recorded By: Scott Campbell Approved By*: Eileen A. Kaleto Date: 5/21/2008

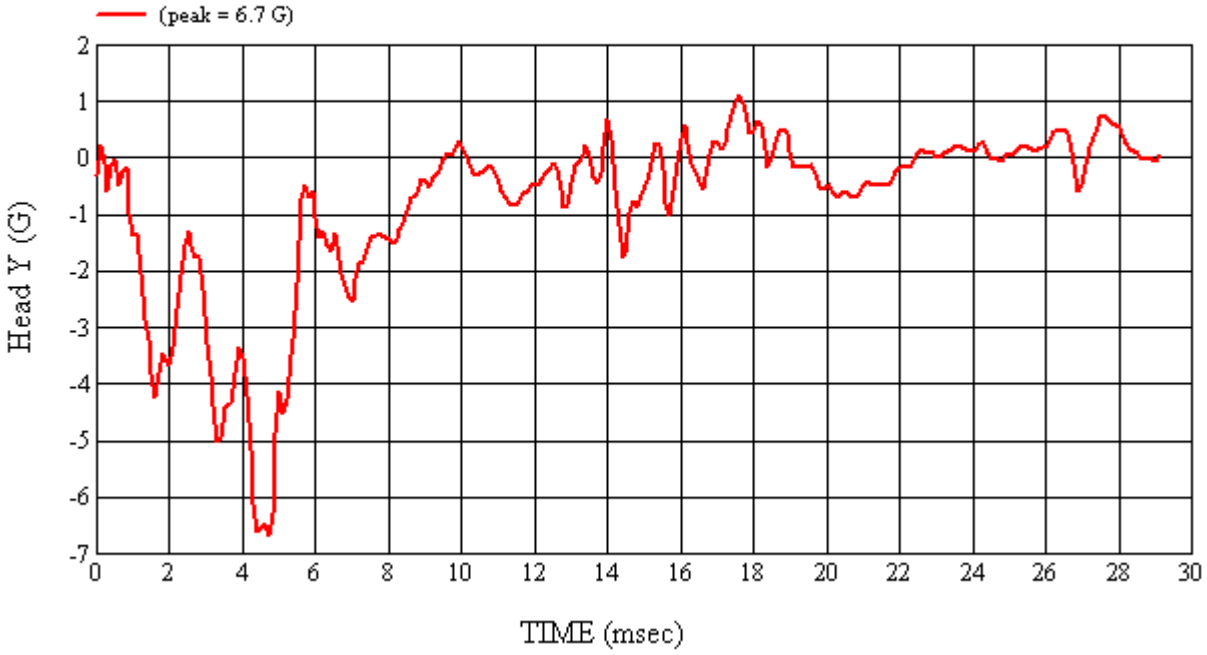
*Only necessary for NHTSA (Government) Compliance testing.

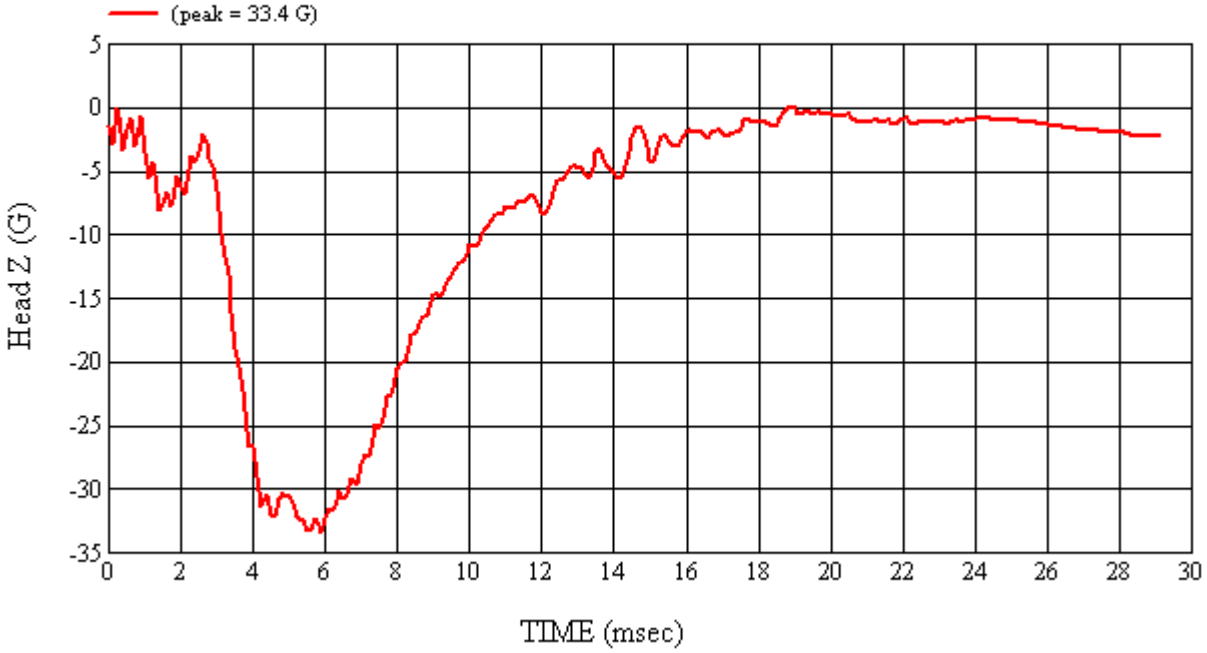
MGA Test #: FM8144 Target Location: BP2, Left Side Test Date: 5/21/2008

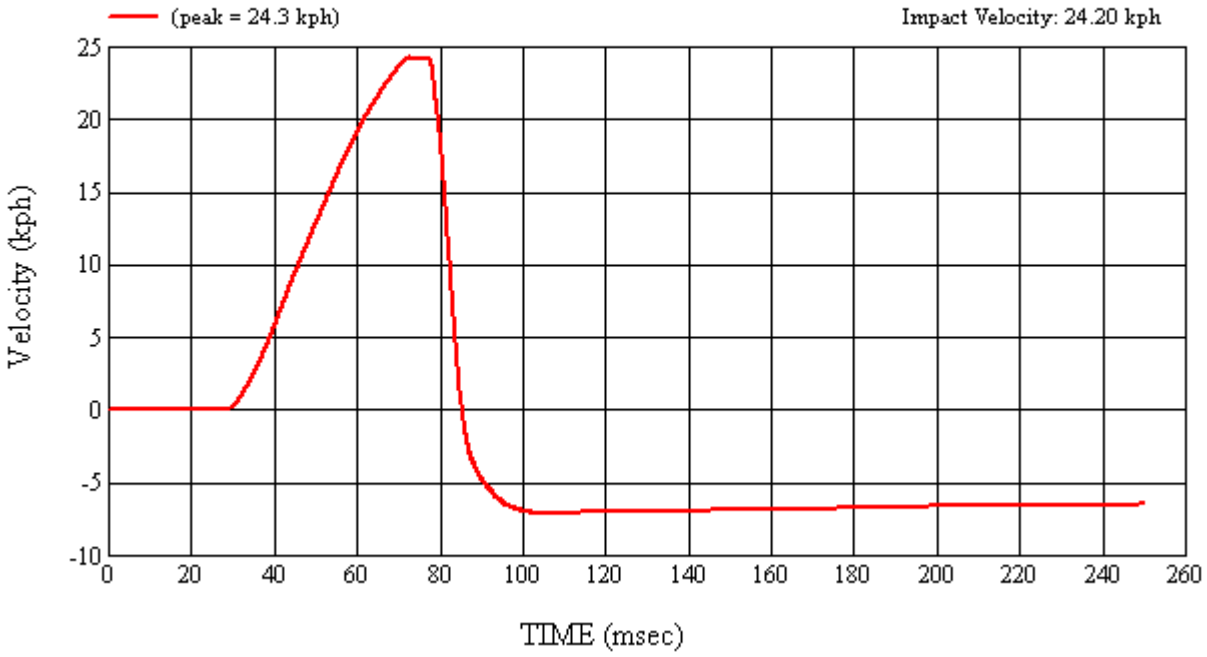


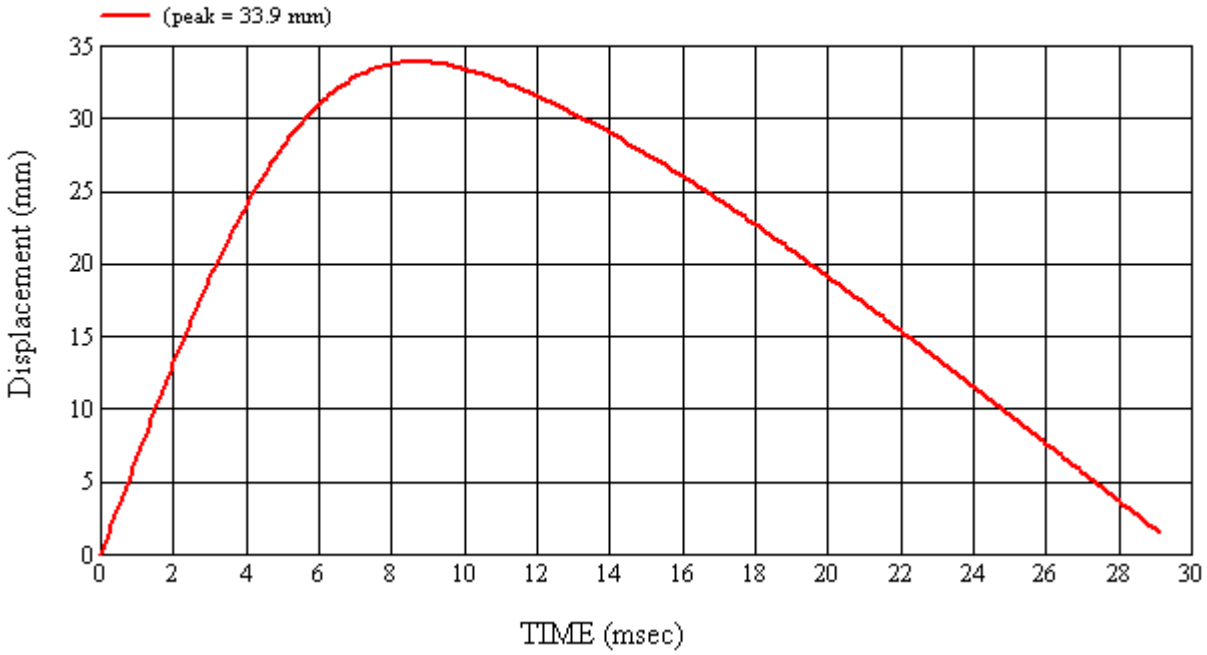



(peak = 122.4 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)

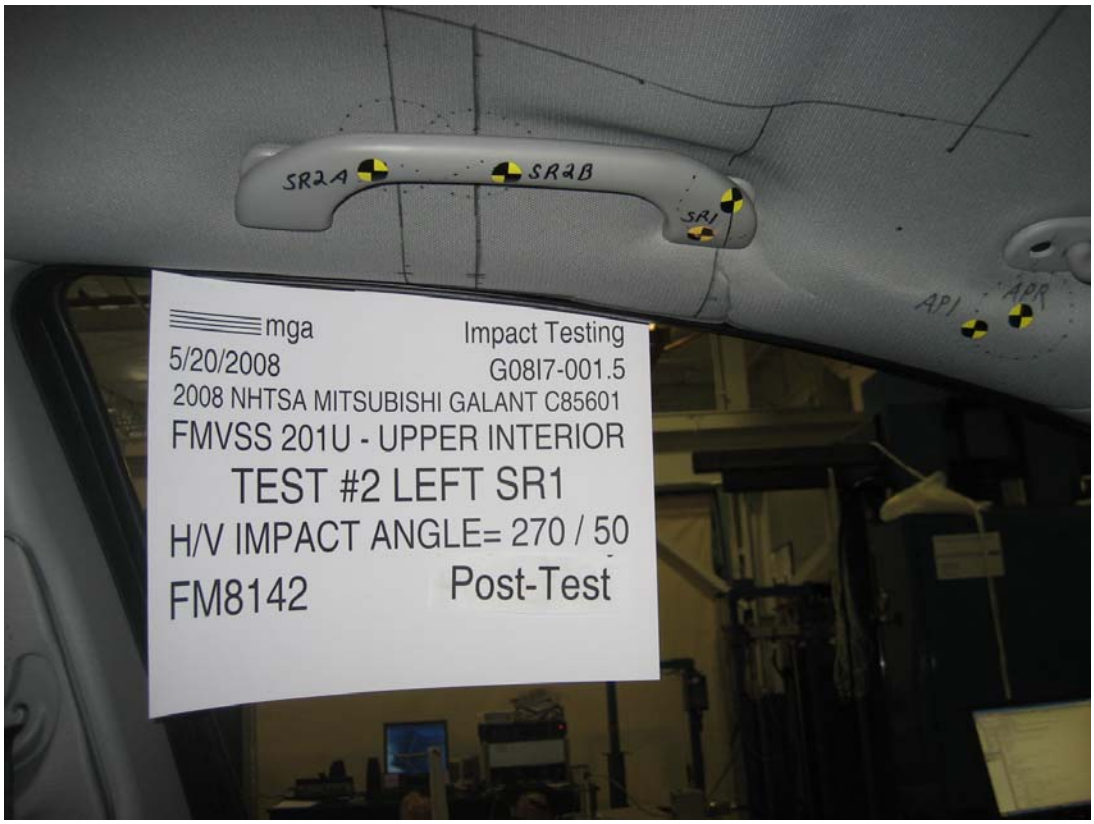

(peak = 6.7 G)
Head Y (G)
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)


(peak = 33.4 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
-35
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)


(peak = 24.3 kph)
Impact Velocity: 24.20 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 = 33.9 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
TIME (msec)


mga
5/20/2008
Impact Testing
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT SR1
H/V IMPACT ANGLE= 270 / 50
FM8142
PRE TEST


SR2A
SR2B
SR1
API
APR
mga
Impact Testing
5/20/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT SR1
H/V IMPACT ANGLE= 270 / 50
FM8142
Post-Test


mga
Impact Testing
5/20/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT SR1
H/V IMPACT ANGLE= 270 / 50
FM8142
Post-Test

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#2

Target (Vehicle Side): SR1Left

Temperature:23C

MGA Test Reference No.:FM8142

Humidity:34%

Approach Horizontal Angles:270º

Time of Test:4:37:32 PM

Approach Vertical Angles:50º

FMH Serial No:[037]

Additional Description:1 Relocation

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
264	129	12	18.9	15	4 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	AHTB2	-114.533	0.87	0.87
Y	6	J14103	92.424	1.52	1.52
Z	7	J35800	96.462	1.03	1.03

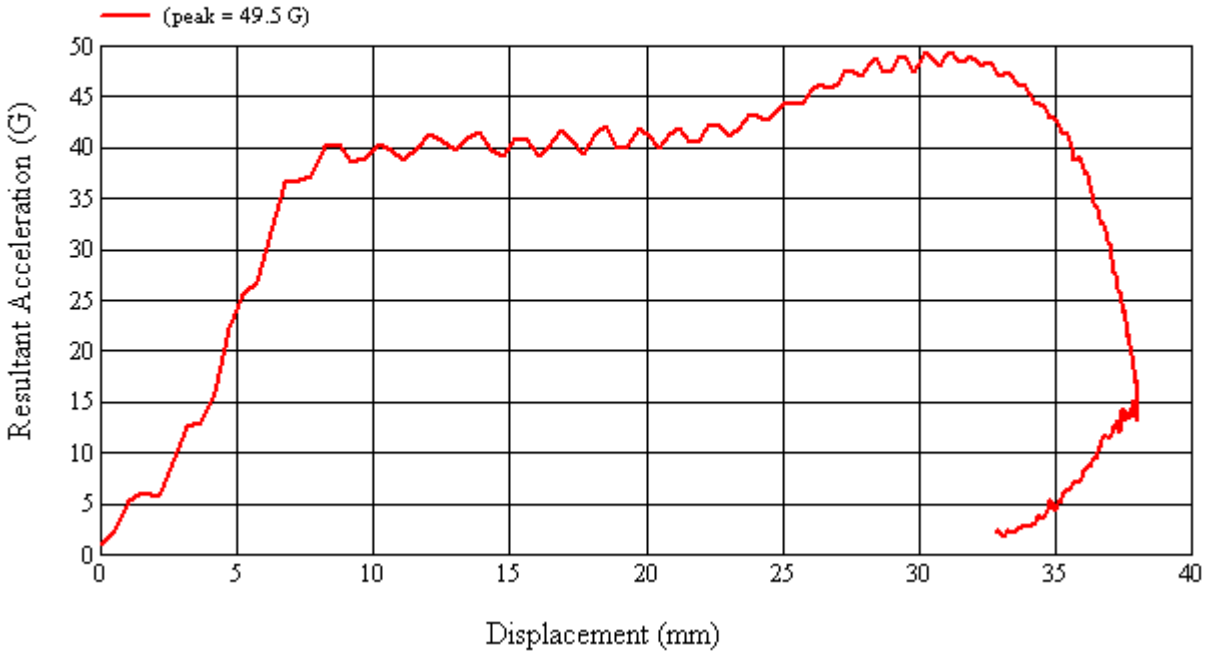
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

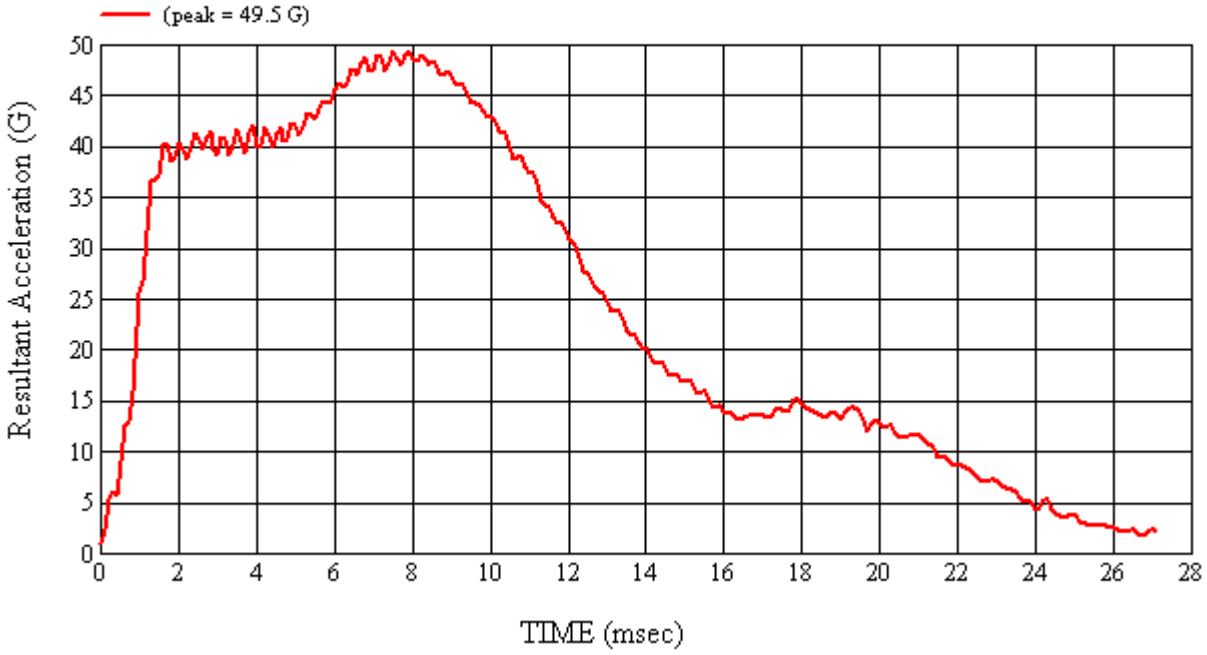
Headliner deformation.

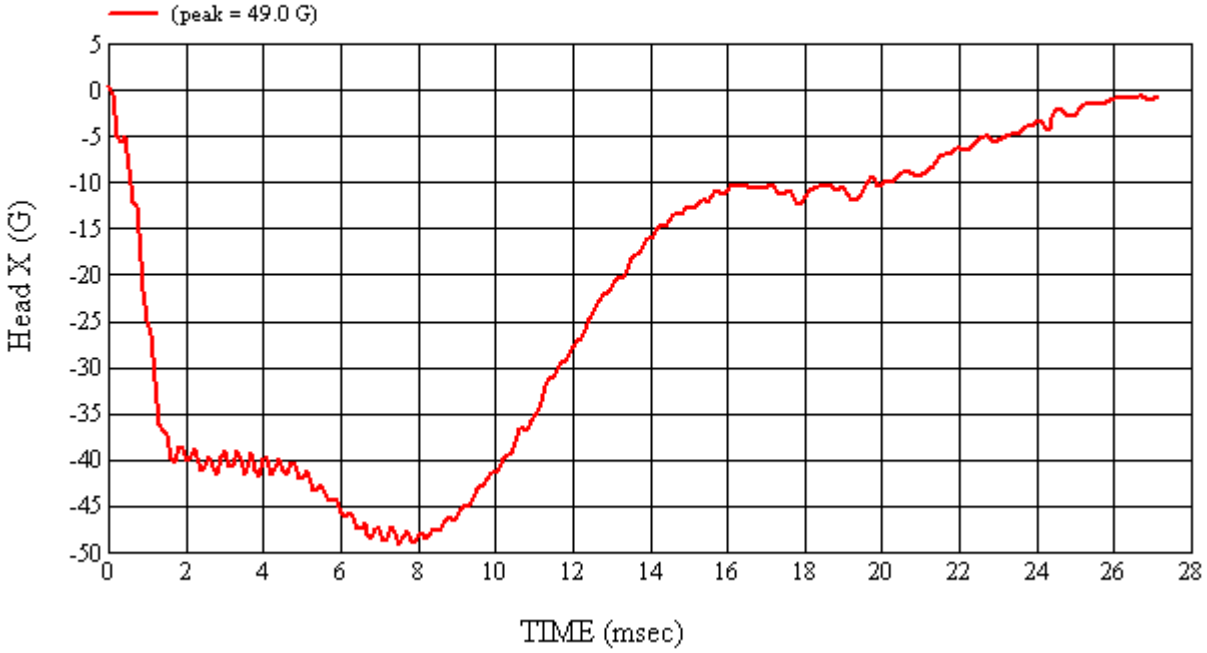
Recorded By: _____ Approved By*: _____ Date: 5/20/2008

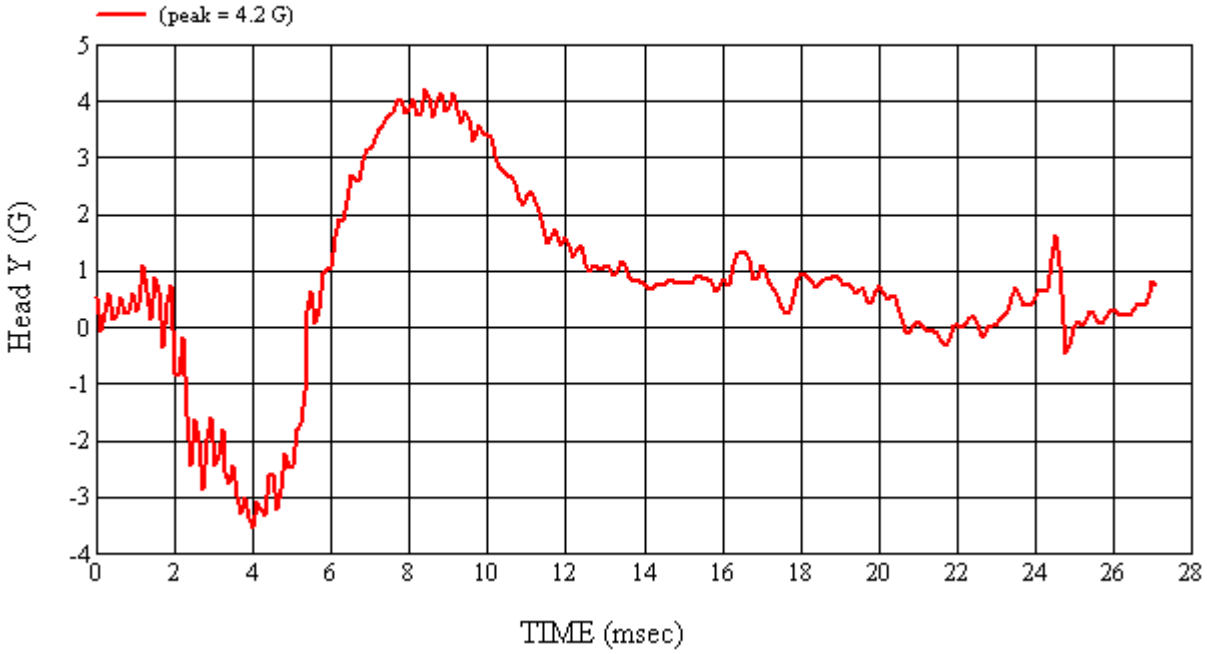
*Only necessary for NHTSA (Government) Compliance testing.

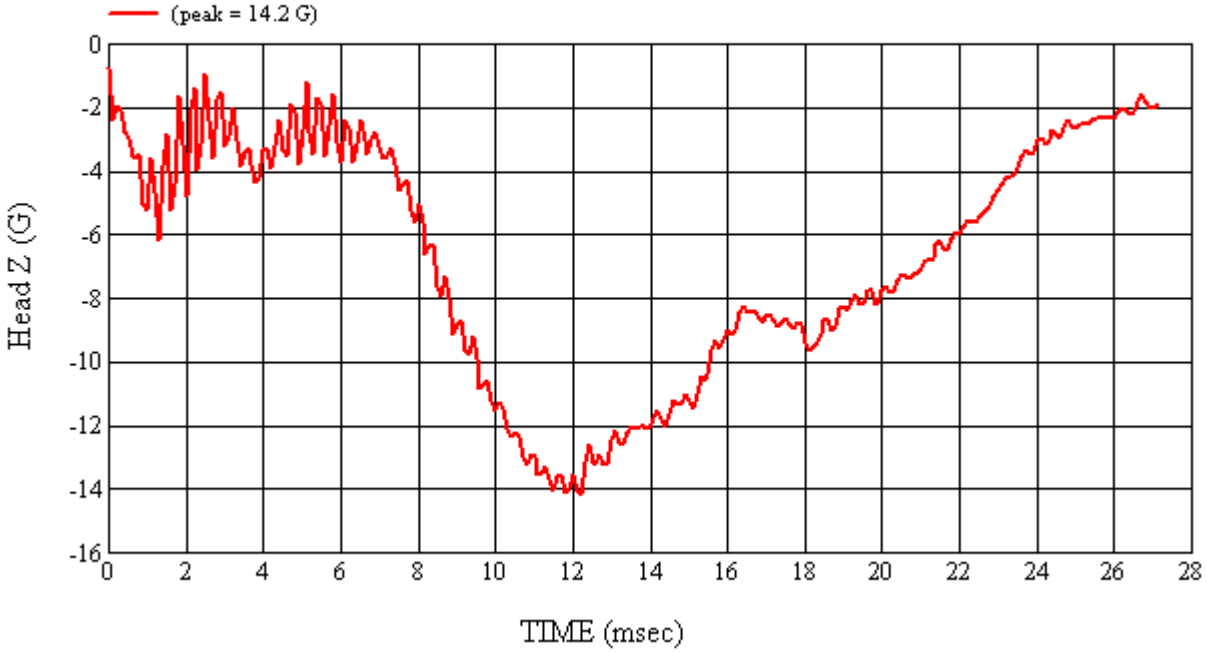
MGA Test #: FM8142 Target Location: SR1, Left Side Test Date: 5/20/2008

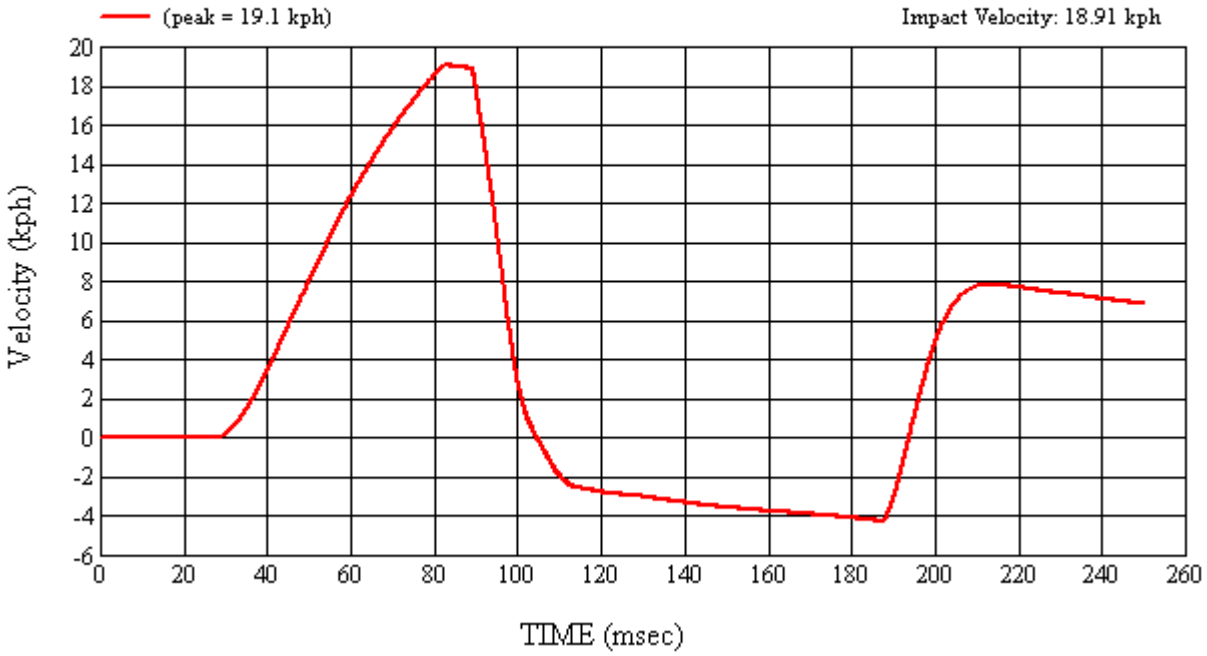


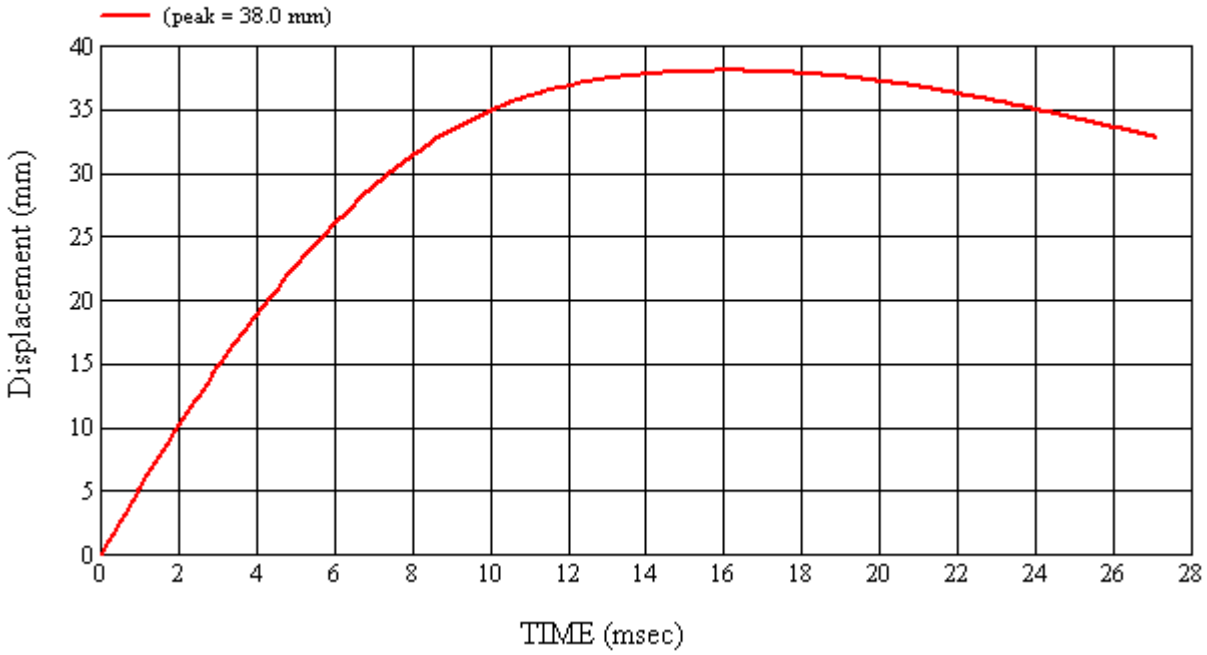


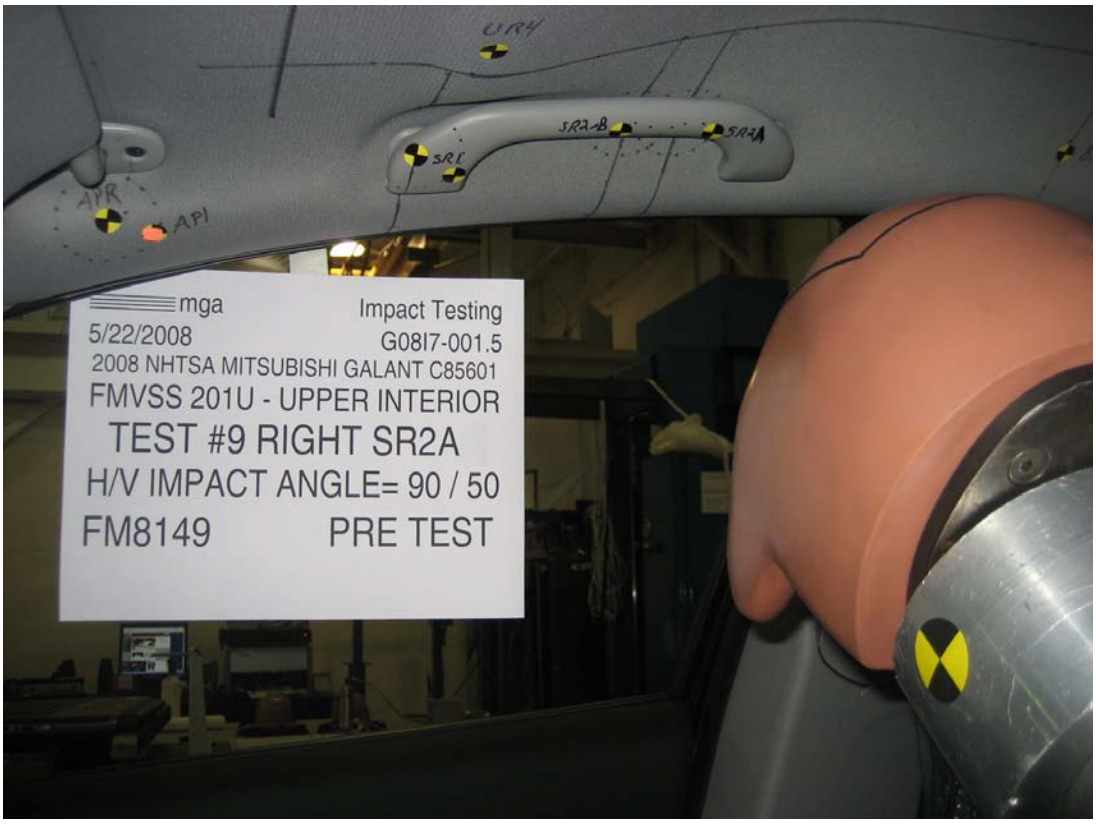

(peak = 49.0 G)
Head X (G)
TIME (msec)

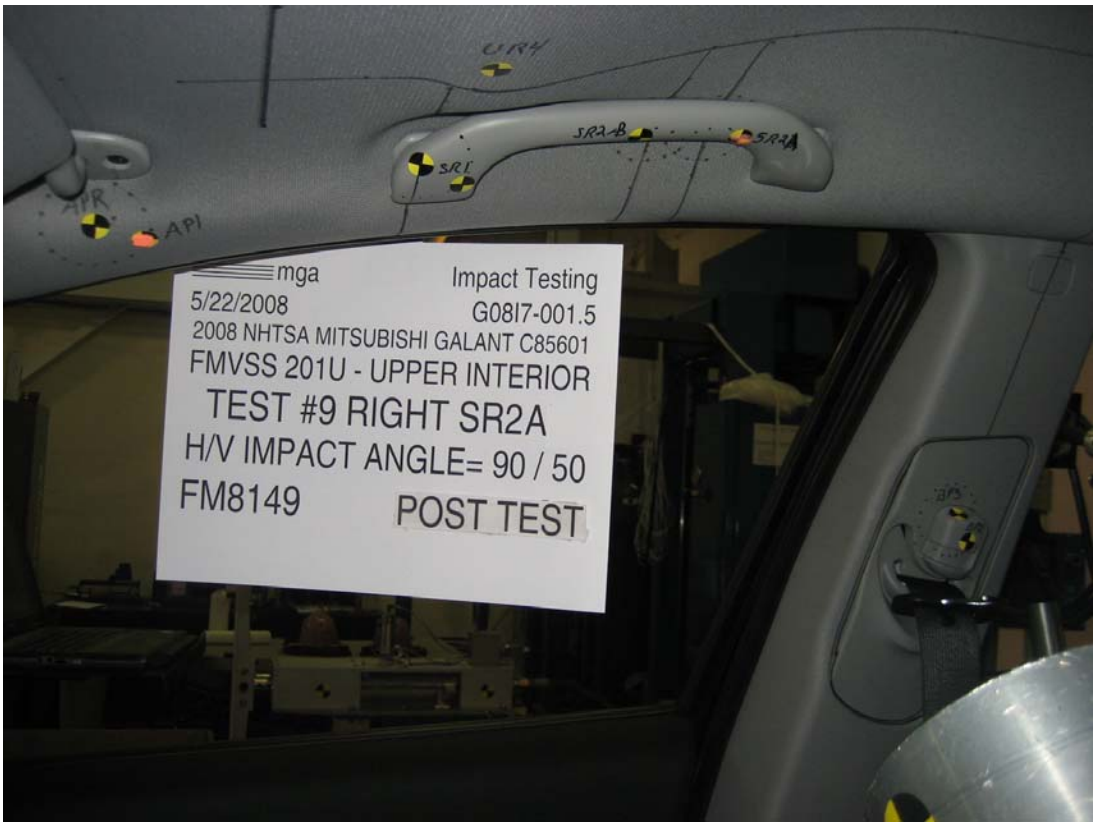

(peak = 4.2 G)
Head Y (G)
TIME (msec)


(peak = 14.2 G)
Head Z (G)
0
-2
-4
-6
-8
-10
-12
-14
-16
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 19.1 kph)
Impact Velocity: 18.91 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 38.0 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
28
TIME (msec)


UR4
SR2AB
SR2A
SR1
APR
API
mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT SR2A
H/V IMPACT ANGLE= 90 / 50
FM8149
PRE TEST


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT SR2A
H/V IMPACT ANGLE= 90 / 50
FM8149
POST TEST


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT SR2A
H/V IMPACT ANGLE= 90 / 50
FM8149
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant C85601

GENERAL TEST PARAMETERS:

Test Number:#9

Target (Vehicle Side): SR2A Right

Temperature:22C

MGA Test Reference No.:FM8149

Humidity:38%

Approach Horizontal Angles:90º

Time of Test:3:11:15 PM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:1 Relocation.

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
305	184	10.2	18.9	19	5 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-95.015	0.87	0.87
Y	6	J36197	108.737	1.52	1.52
Z	7	J36353	98.754	1.03	1.03

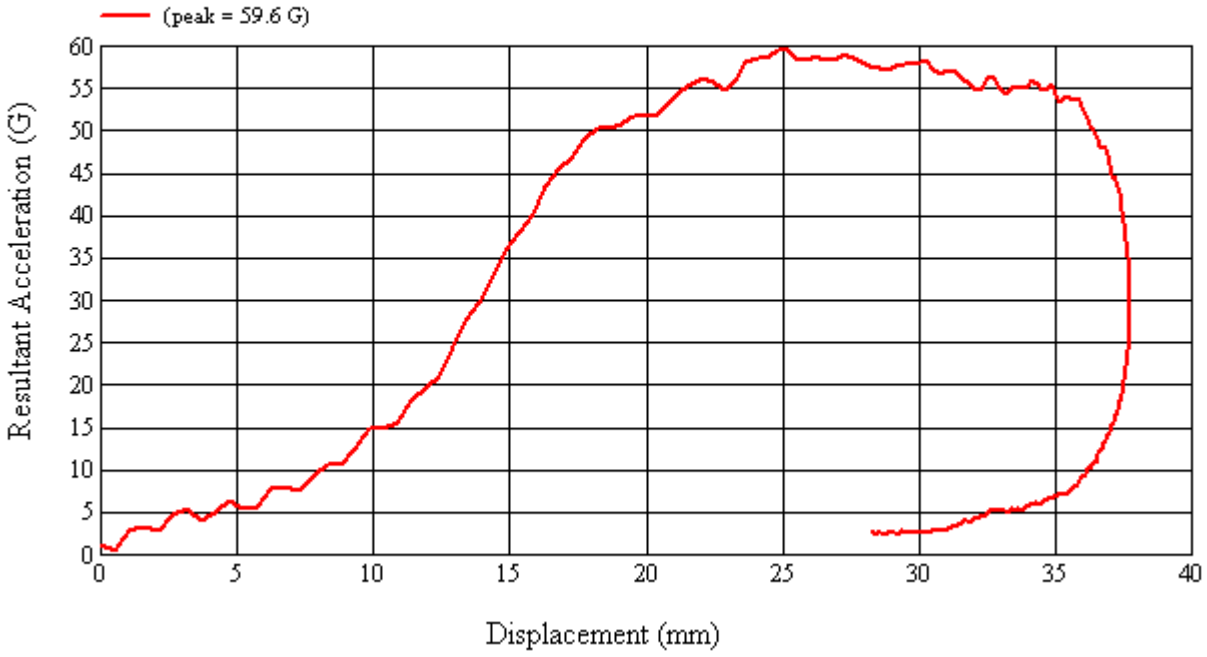
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

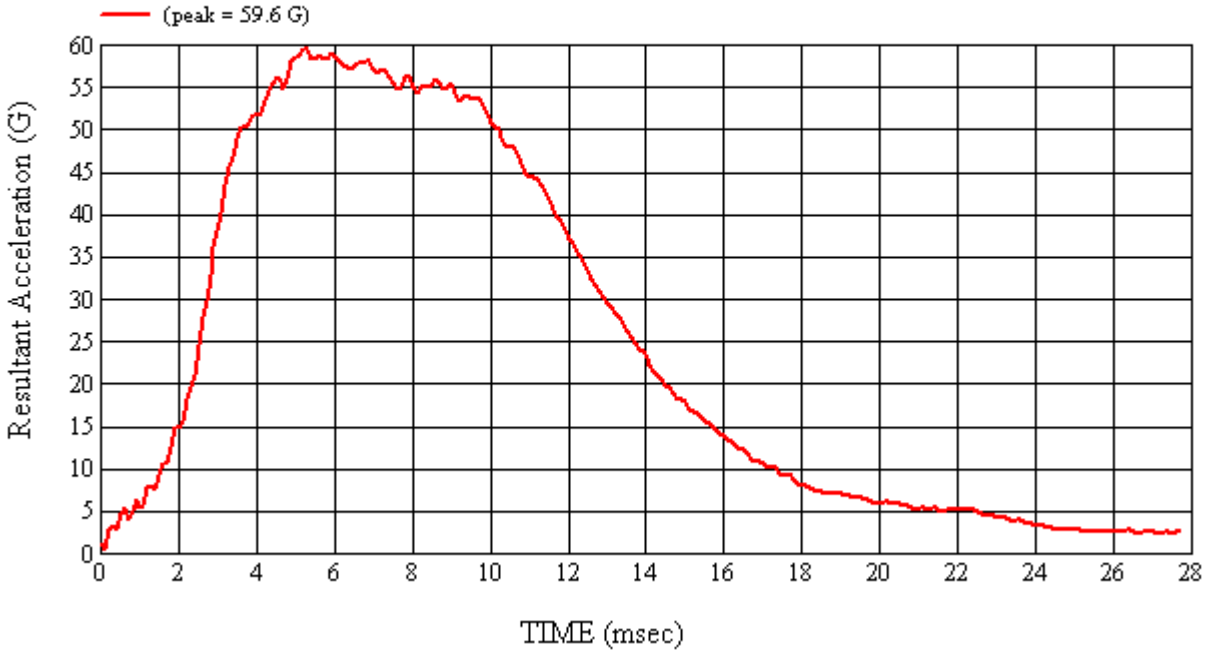
Grab handle deformation.

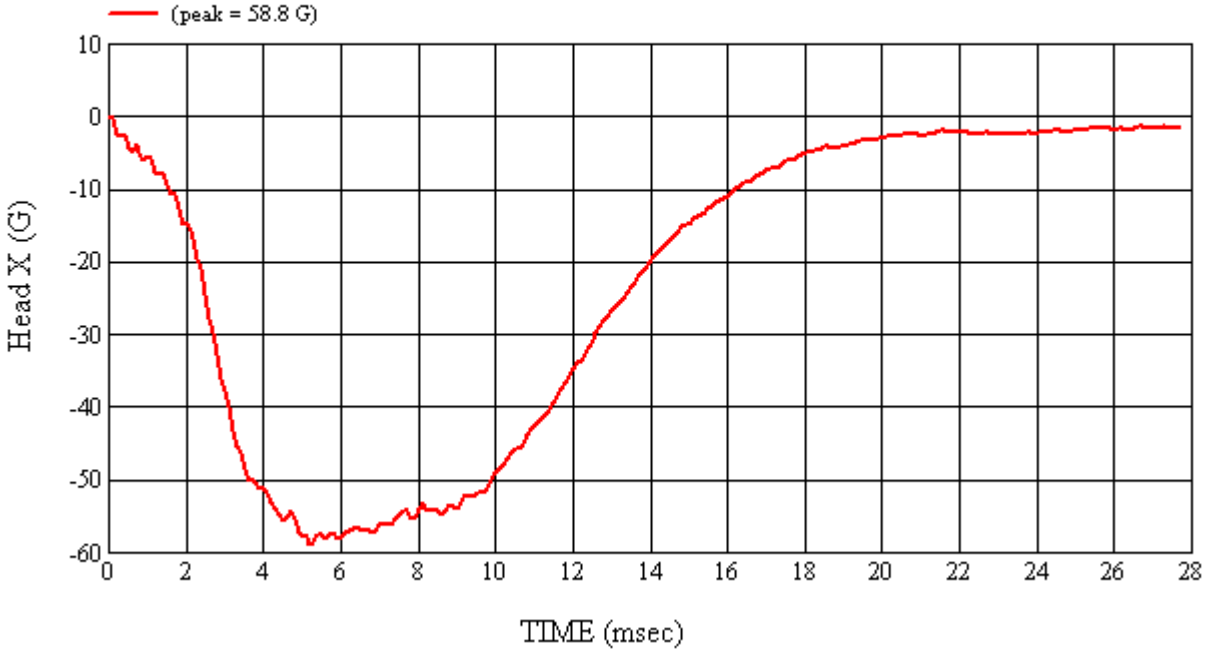
Recorded By: [signature] Approved By*: [signature] Date: 5/22/2008

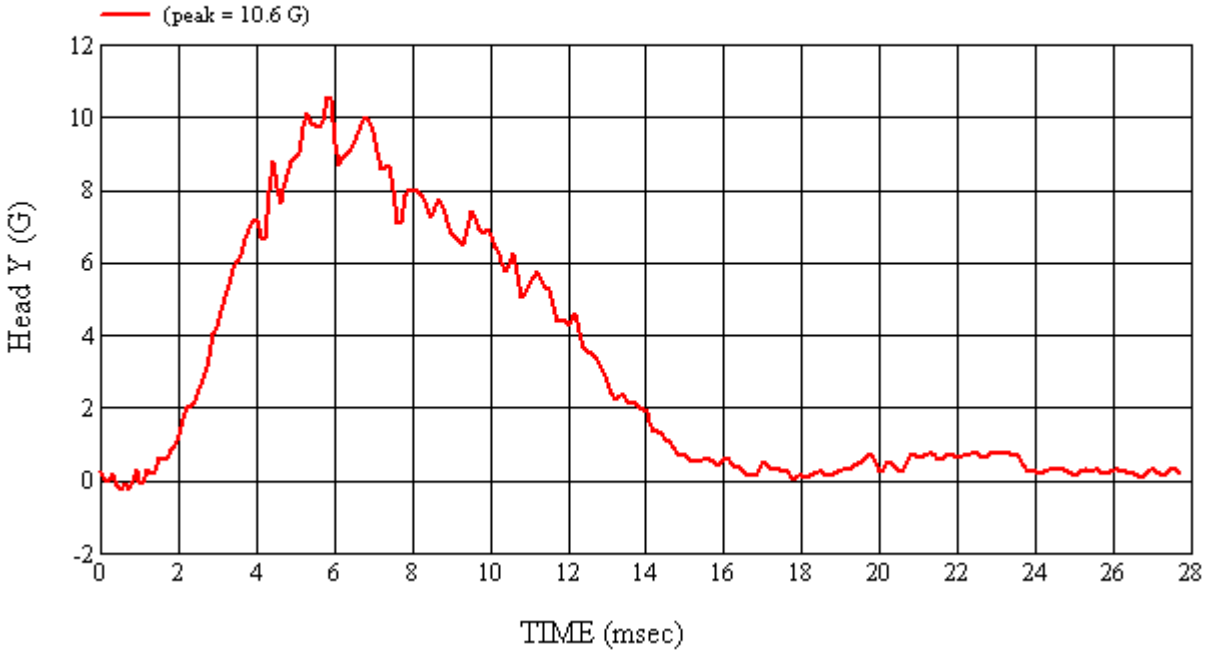
*Only necessary for NHTSA (Government) Compliance testing.

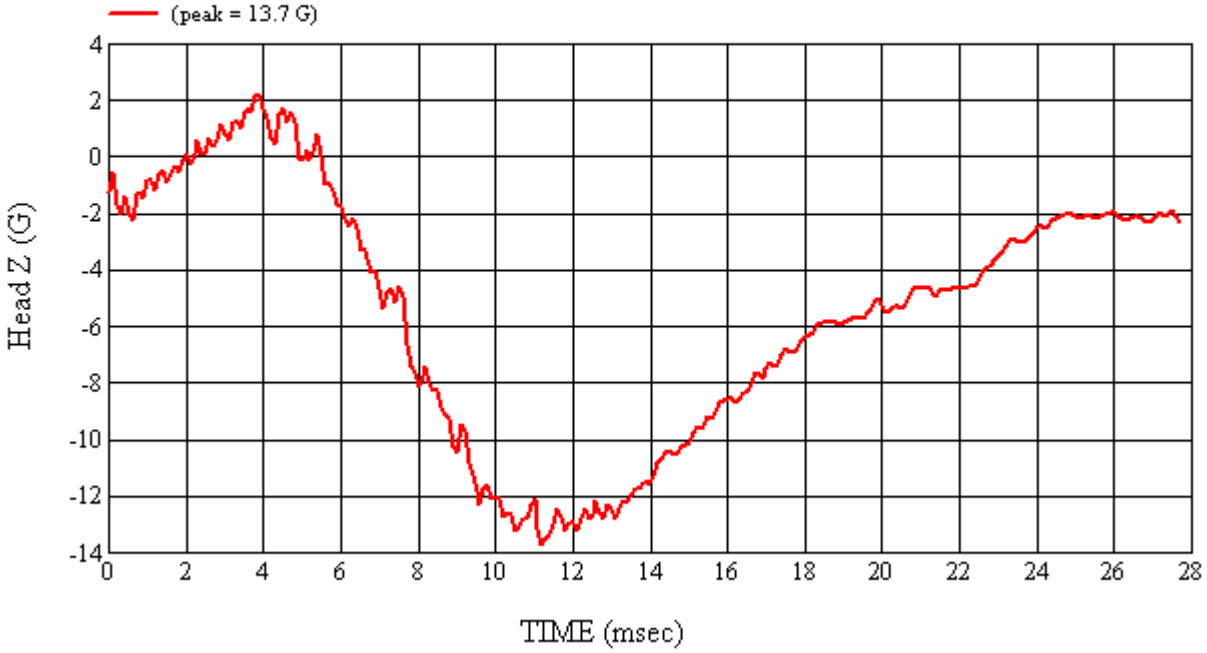
MGA Test #: FM8149 Target Location: SR2A, Right Side Test Date: 5/22/2008

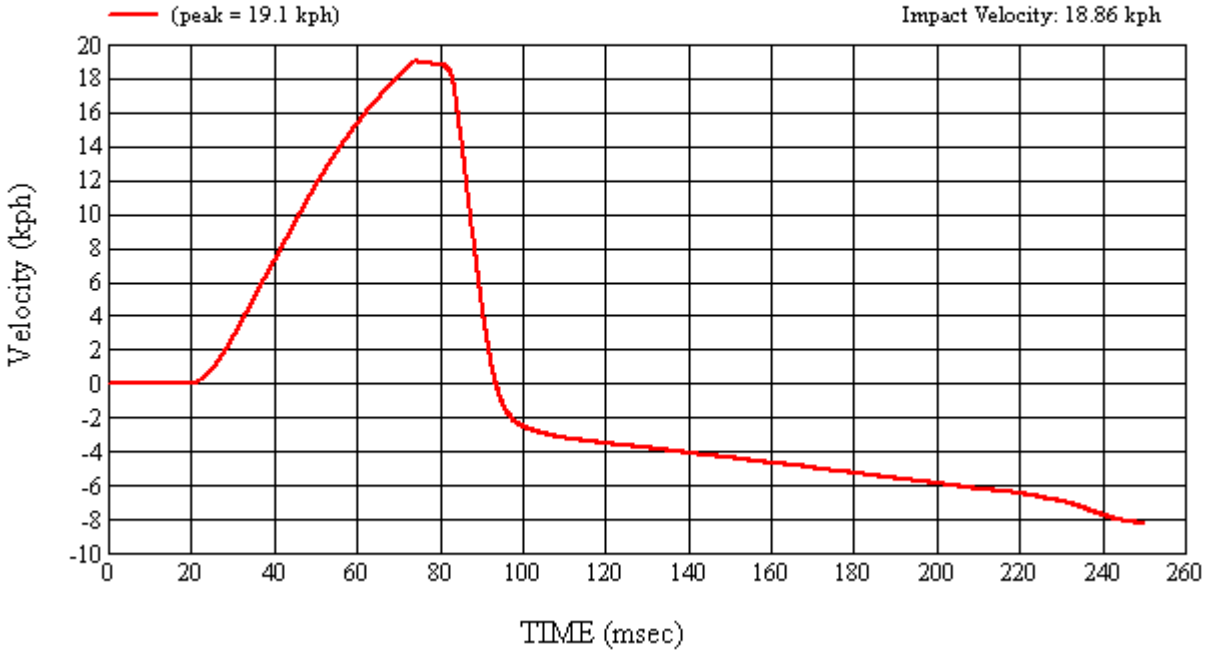


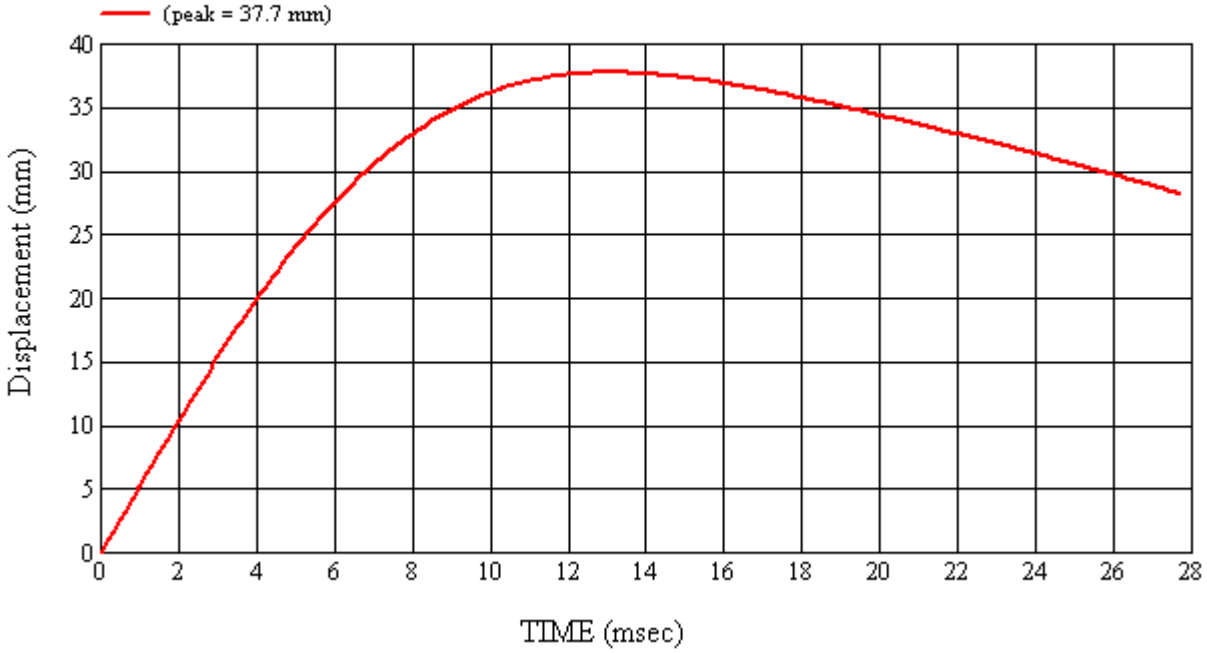



(peak = 58.8 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 10.6 G)
Head Y (G)
12
10
8
6
4
2
0
-2
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 13.7 G)
Head Z (G)
4
2
0
-2
-4
-6
-8
-10
-12
-14
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 19.1 kph)
Impact Velocity: 18.86 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 37.7 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


SR3-2
SR3-1
RPI
mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT SR3-2
H/V IMPACT ANGLE= 270 / 50
FM8146
PRE TEST


SR3-2
SR3-1
mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT SR3-2
H/V IMPACT ANGLE= 270 / 50
FM8146
POST TEST


mga
Impact Testing
5/21/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT SR3-2
H/V IMPACT ANGLE= 270 / 50
FM8146
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): SR3-2 Left

Temperature:23C

MGA Test Reference No.:FM8146

Humidity:33%

Approach Horizontal Angles:270º

Time of Test:1:57:49 PM

Approach Vertical Angles:50º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
309	190	10	18.5	17	8 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-95.015	0.87	0.87
Y	6	J36197	108.737	1.52	1.52
Z	7	J36353	98.754	1.03	1.03

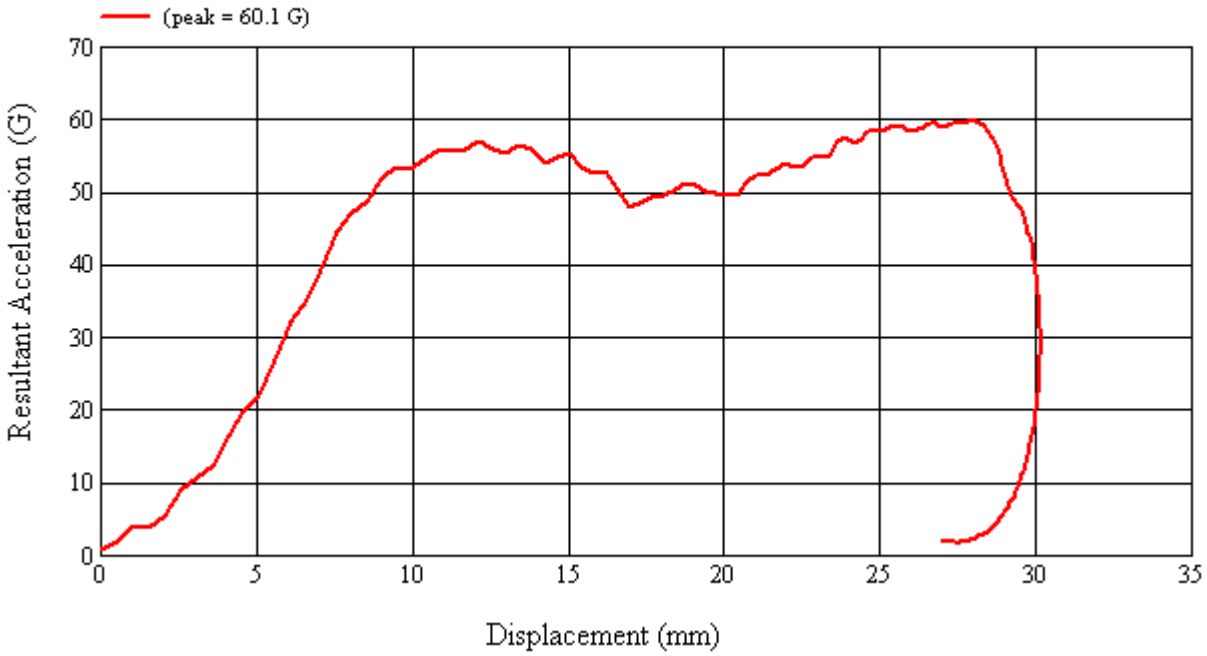
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

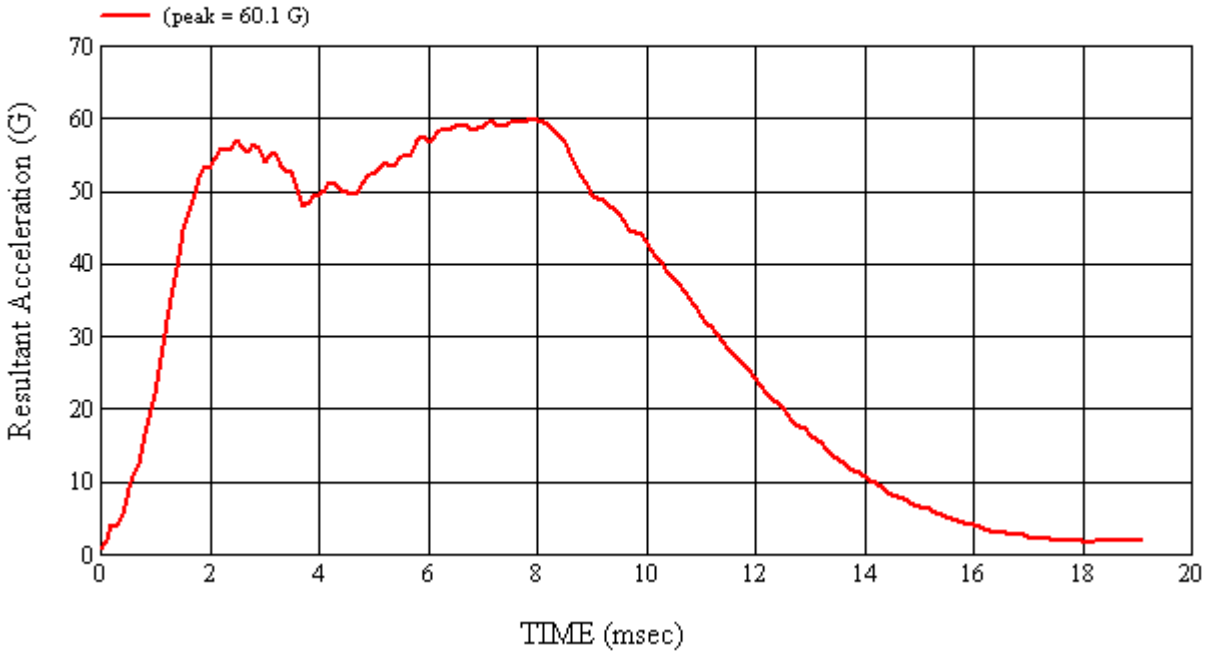
Grab handle displacement.

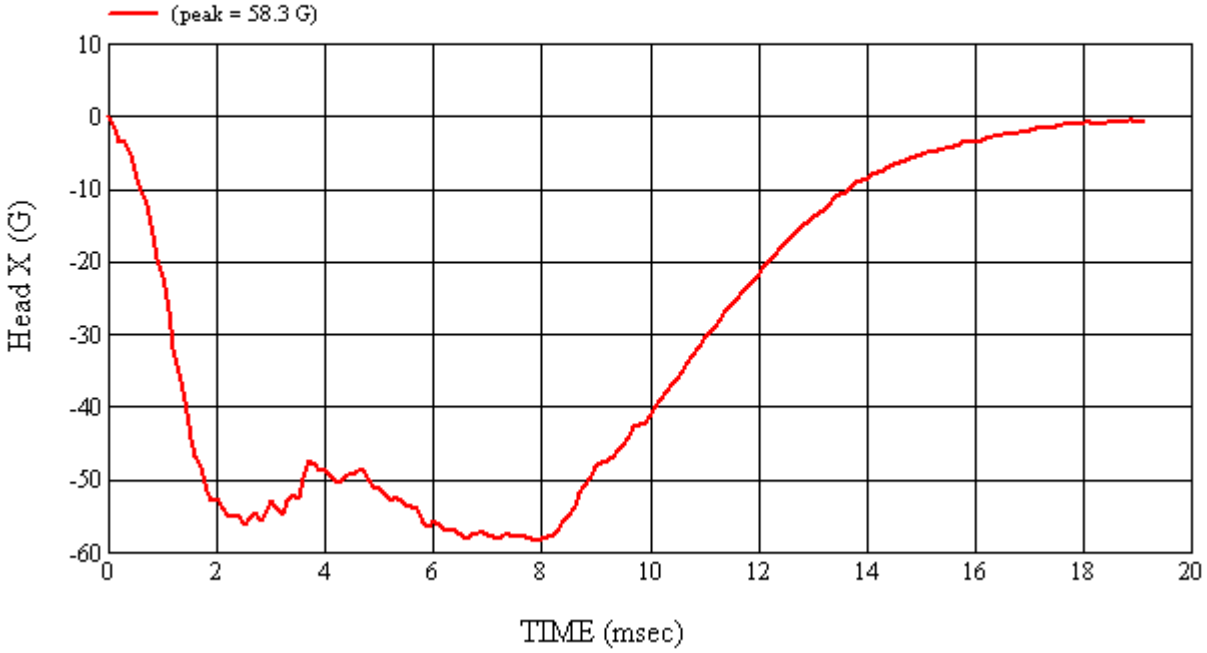
Recorded By: _____ Approved By*: _____ Date: 5/21/2008

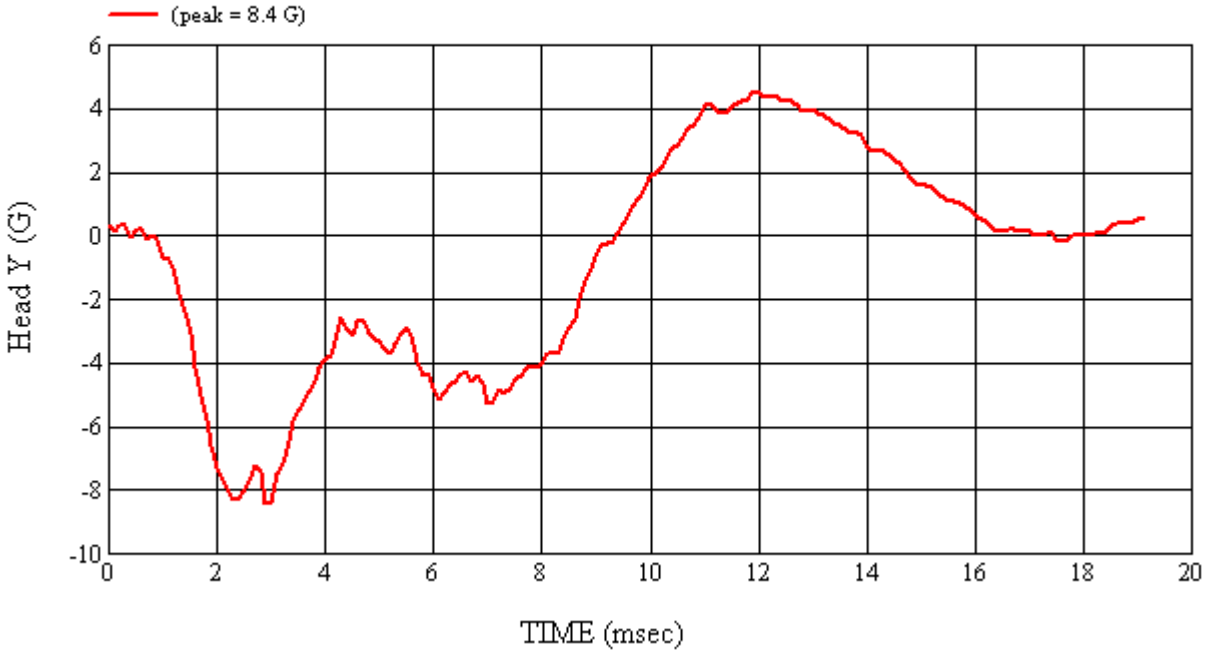
*Only necessary for NHTSA (Government) Compliance testing.

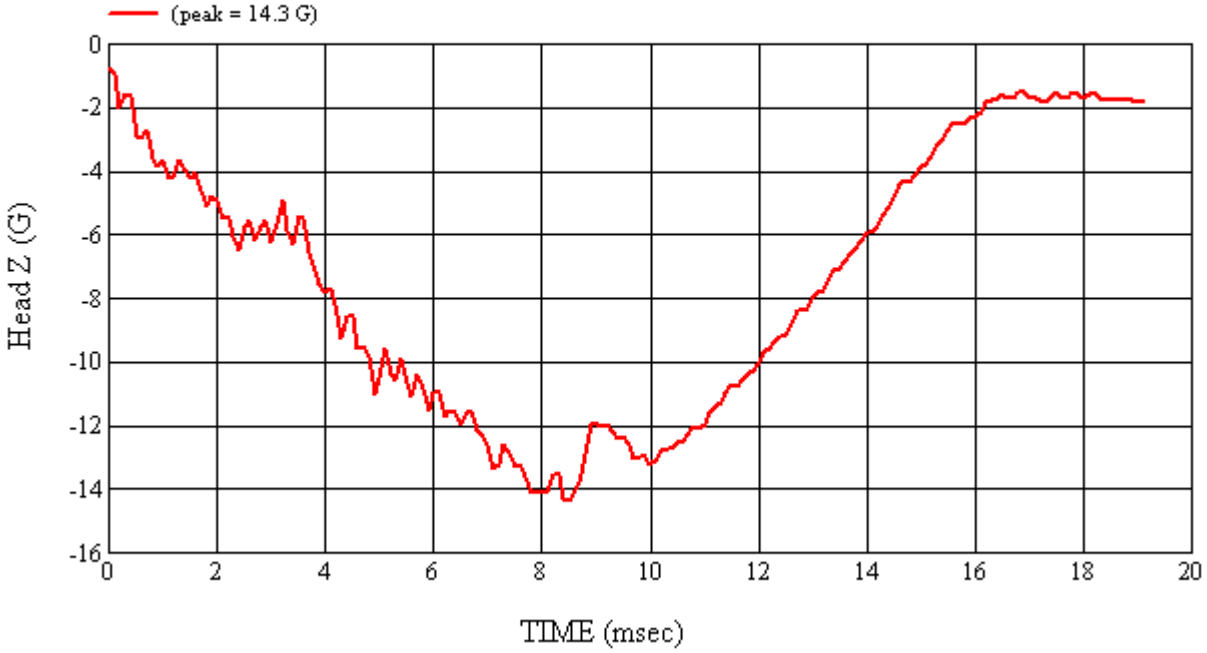
MGA Test #: FM8146 Target Location: SR3-2, Left Side Test Date: 5/21/2008

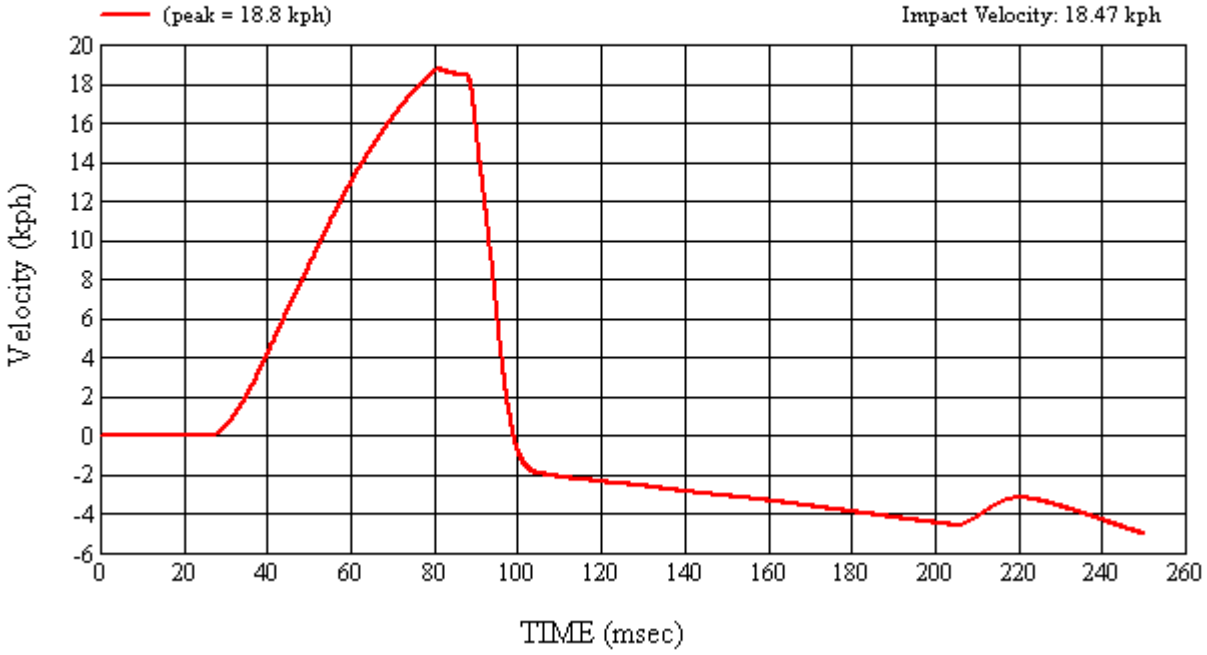


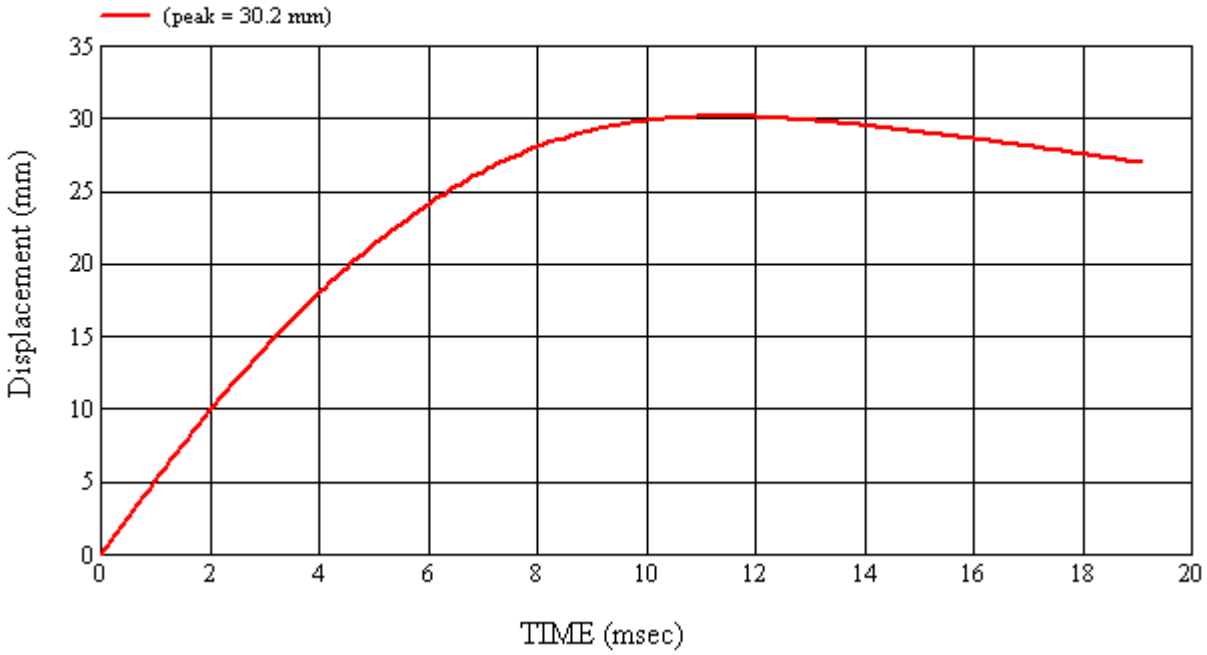


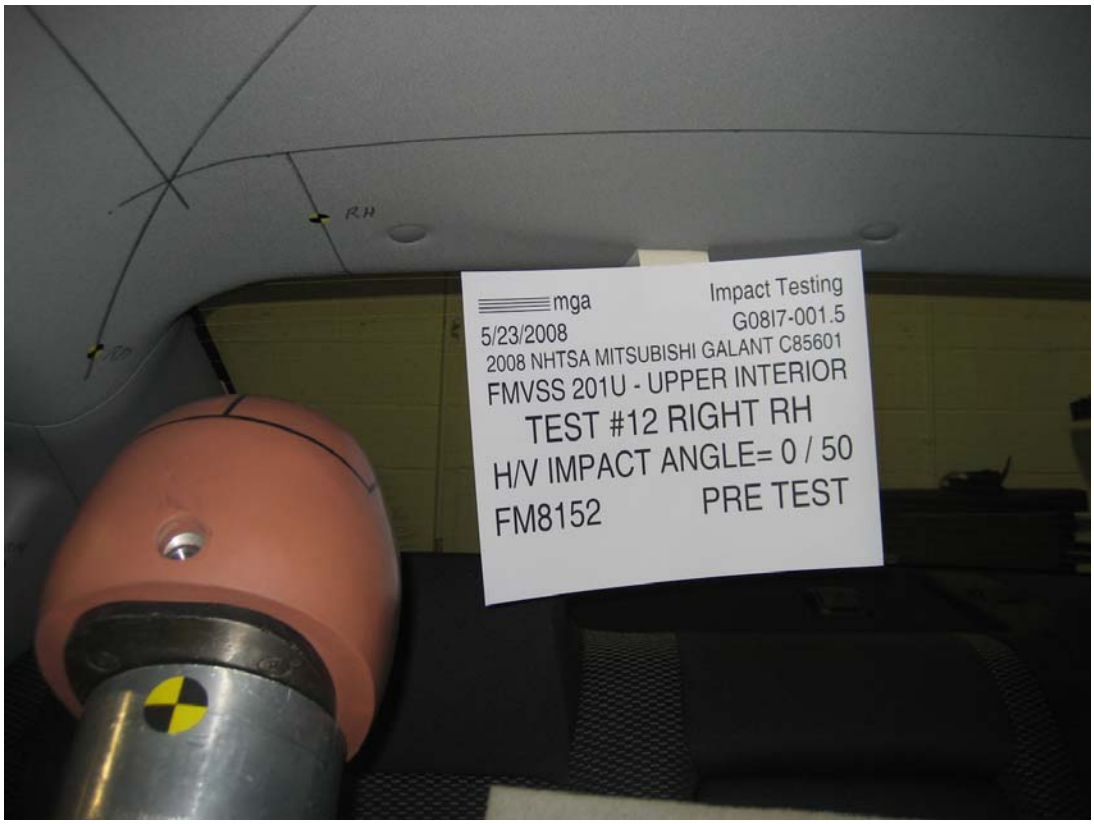

(peak = 58.3 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)

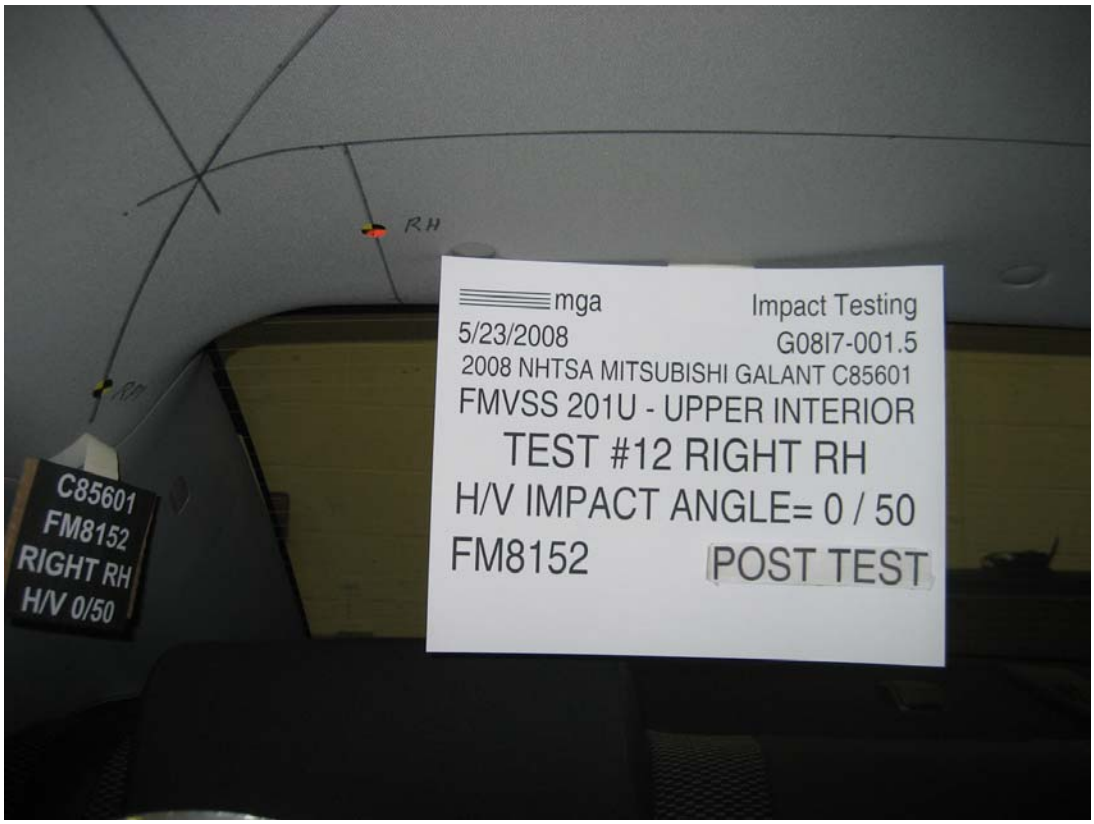

(peak = 8.4 G)
Head Y (G)
6
4
2
0
-2
-4
-6
-8
-10
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 14.3 G)
Head Z (G)
0
-2
-4
-6
-8
-10
-12
-14
-16
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 18.8 kph)
Impact Velocity: 18.47 kph
Velocity (kph)
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 30.2 mm)
Displacement (mm)
TIME (msec)
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20


RH
mga
Impact Testing
5/23/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
FM8152
PRE TEST


RH
C85601
FM8152
RIGHT RH
H/V 0/50
mga
Impact Testing
5/23/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
FM8152
POST TEST


mga
Impact Testing
5/23/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT RH
H/V IMPACT ANGLE= 0 / 50
FM8152
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant C85601

GENERAL TEST PARAMETERS:

Test Number:#12

Target (Vehicle Side): RH Right

Temperature:22C

MGA Test Reference No.:FM8152

Humidity:40%

Approach Horizontal Angles: 0º

Time of Test:11:05:58 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
439	362	9.3	23.4	25	8 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-95.015	0.87	0.87
Y	6	J36197	108.737	1.52	1.52
Z	7	J36353	98.754	1.03	1.03

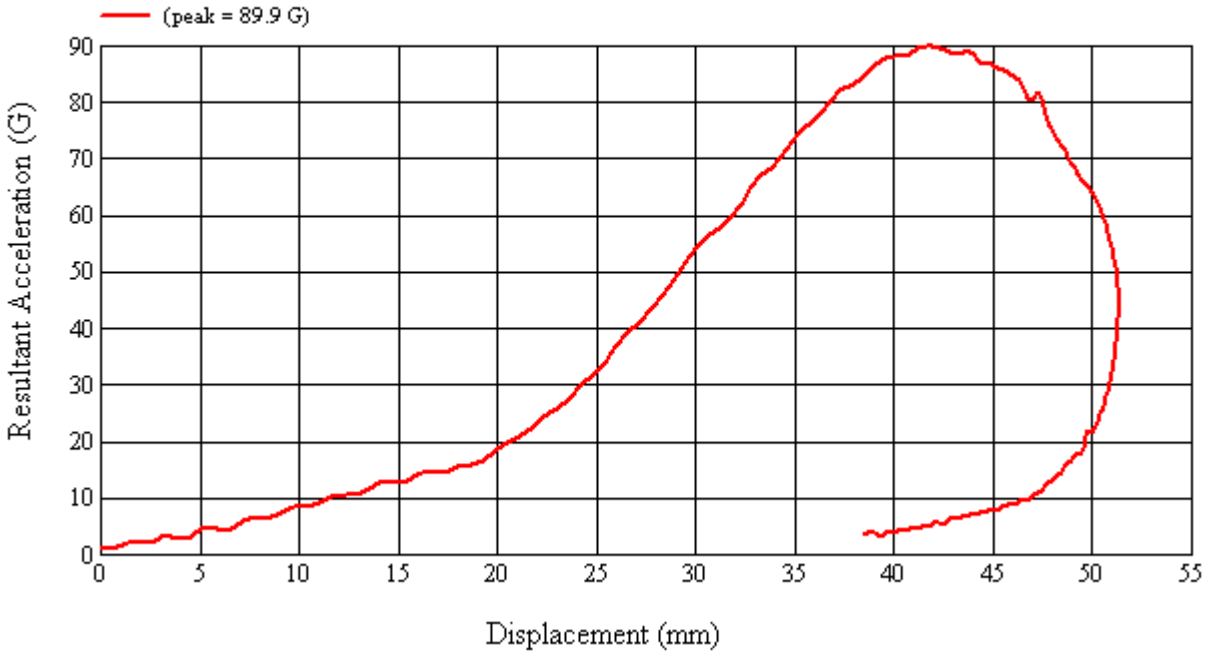
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

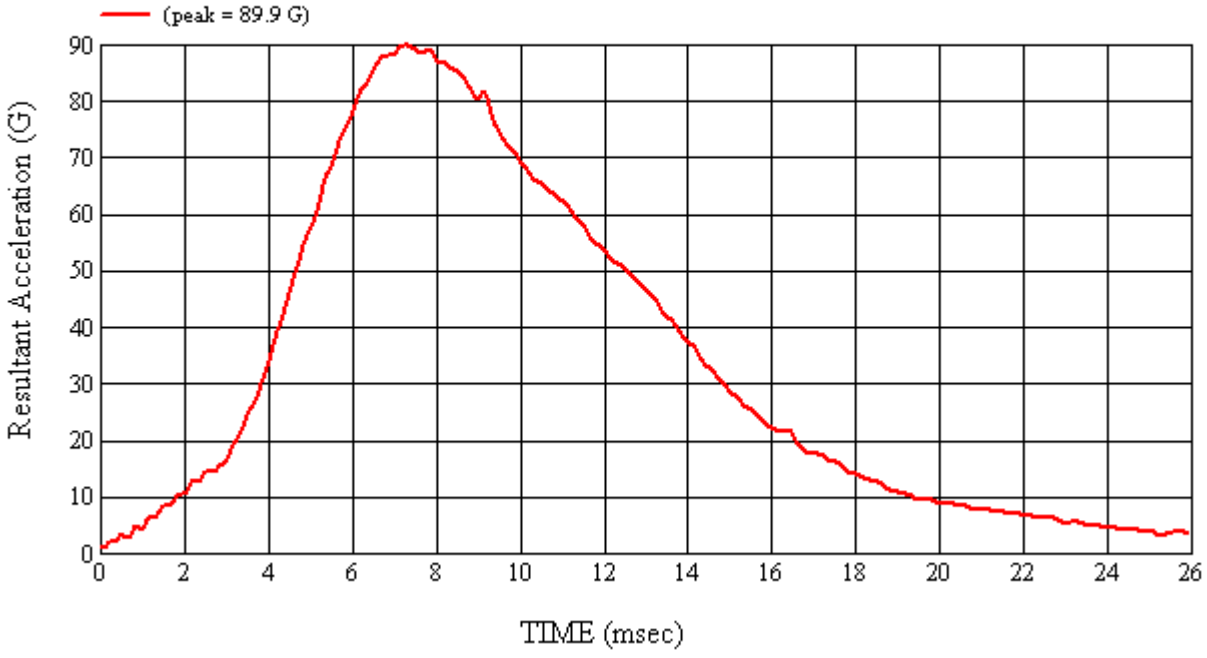
No visible damage.

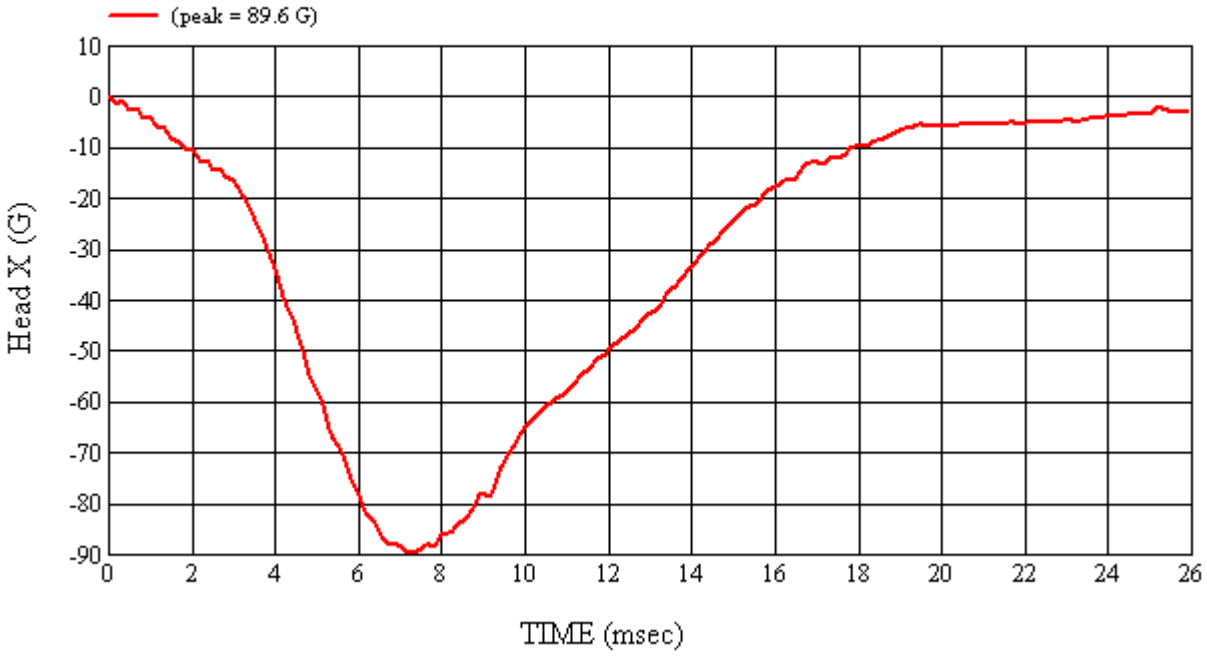
Recorded By: Louis Campbell Approved By*: Helen A. Kaleta Date: 5/23/2008

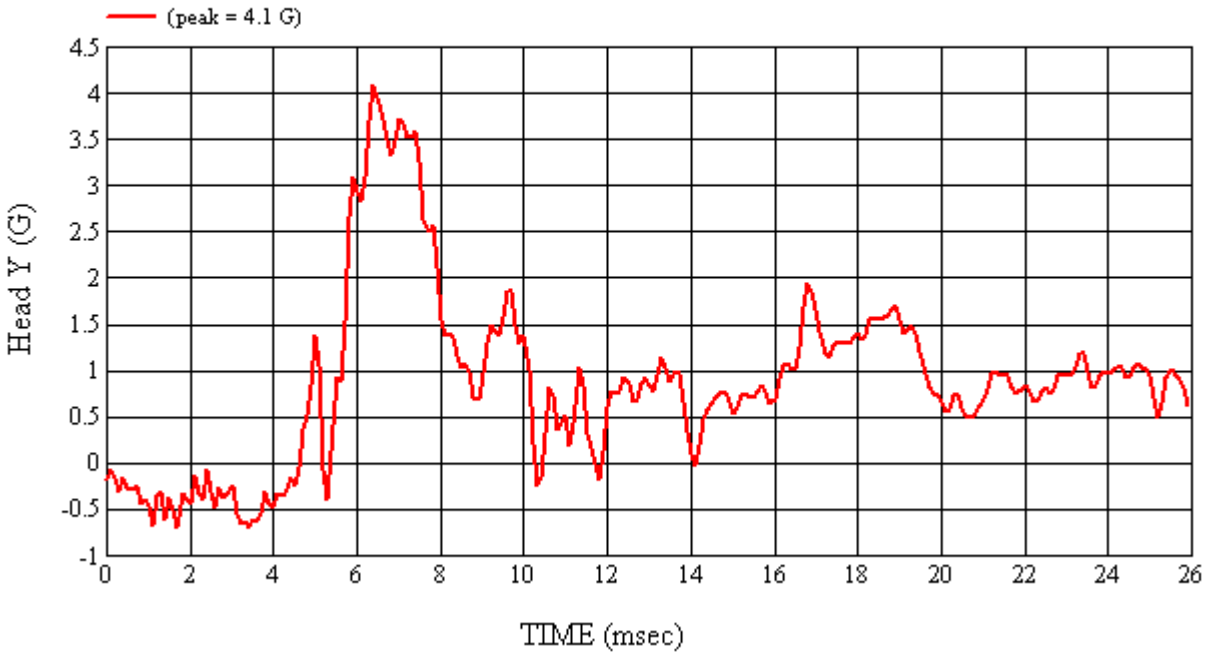
*Only necessary for NHTSA (Government) Compliance testing.

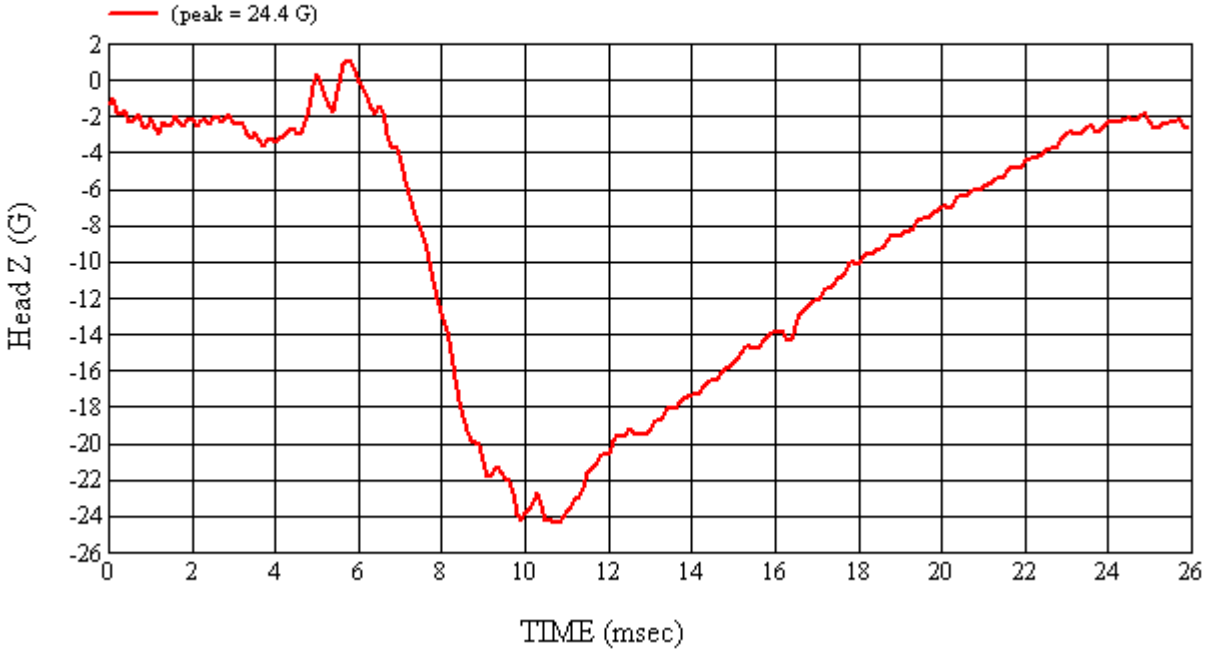
MGA Test #: FM8152 Target Location: RH, Right Side Test Date: 5/23/2008

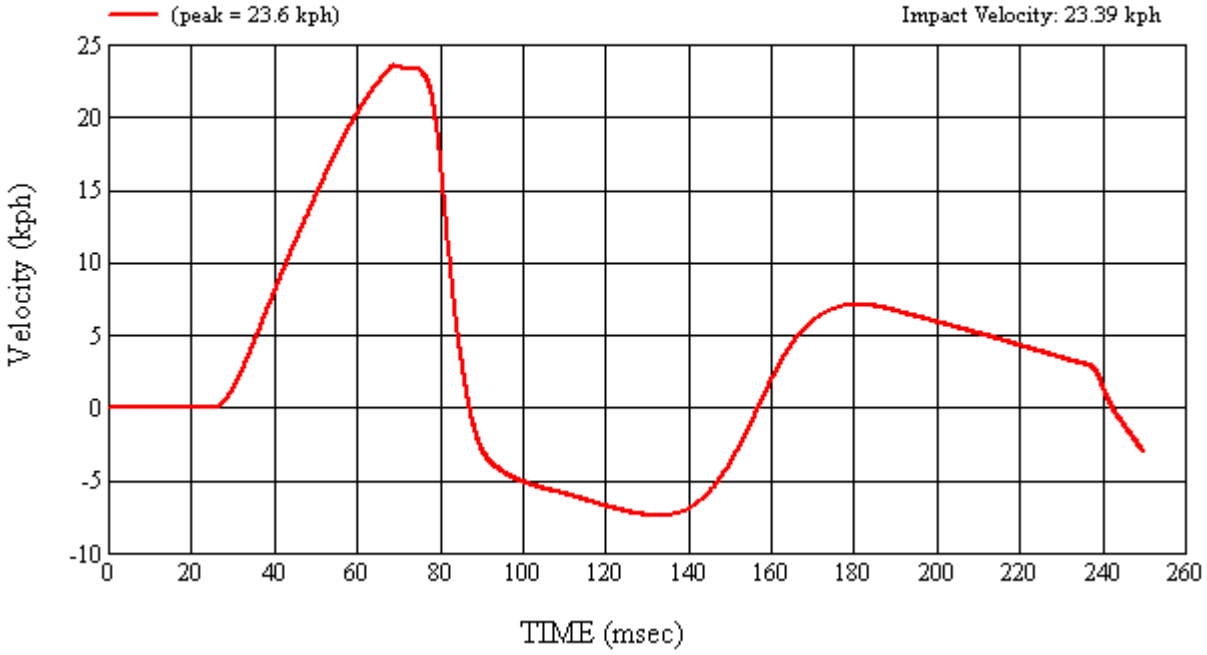


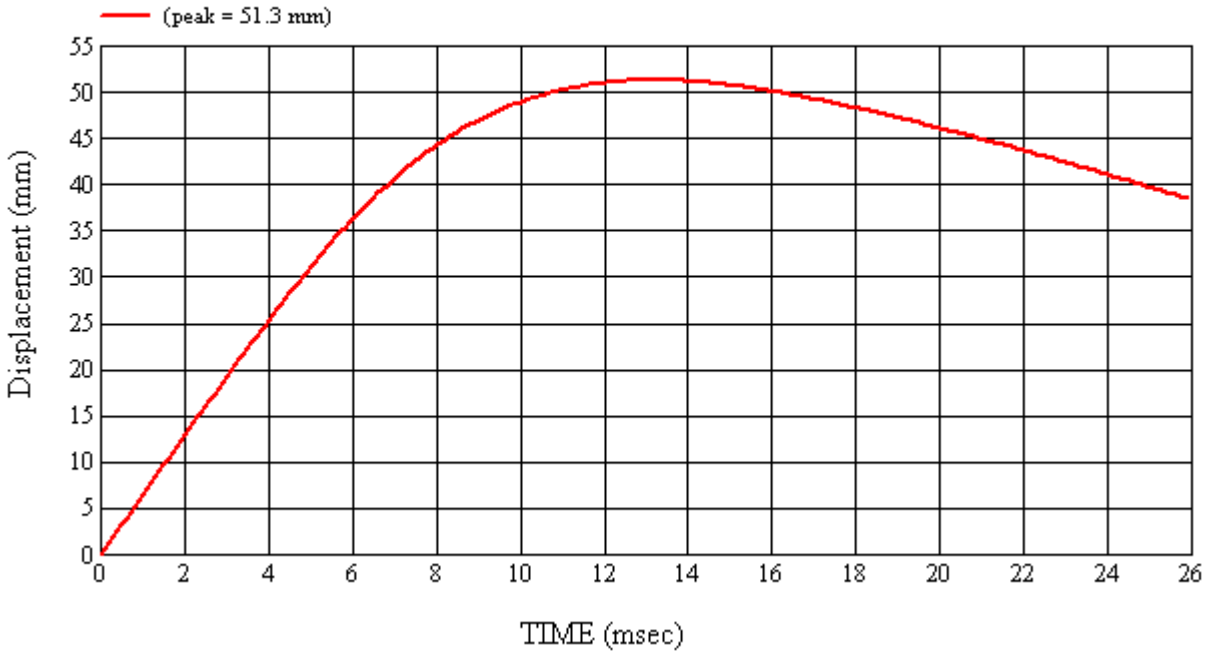


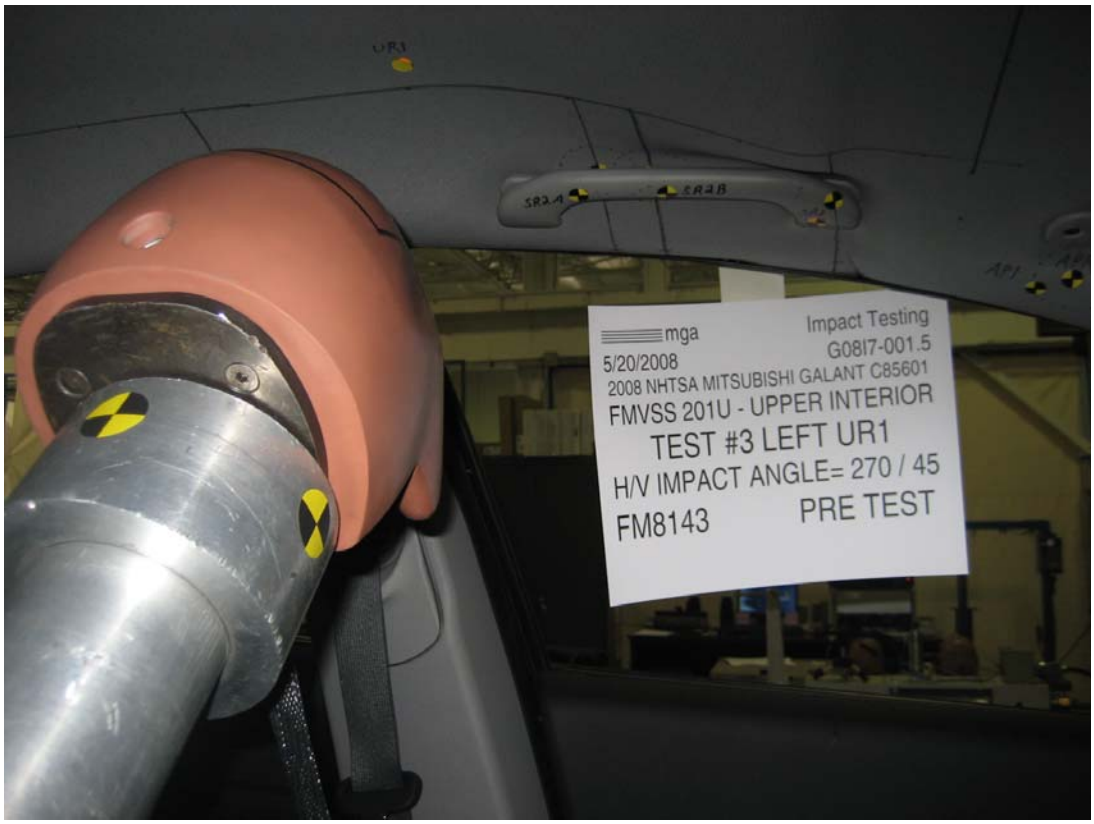

(peak = 89.6 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)

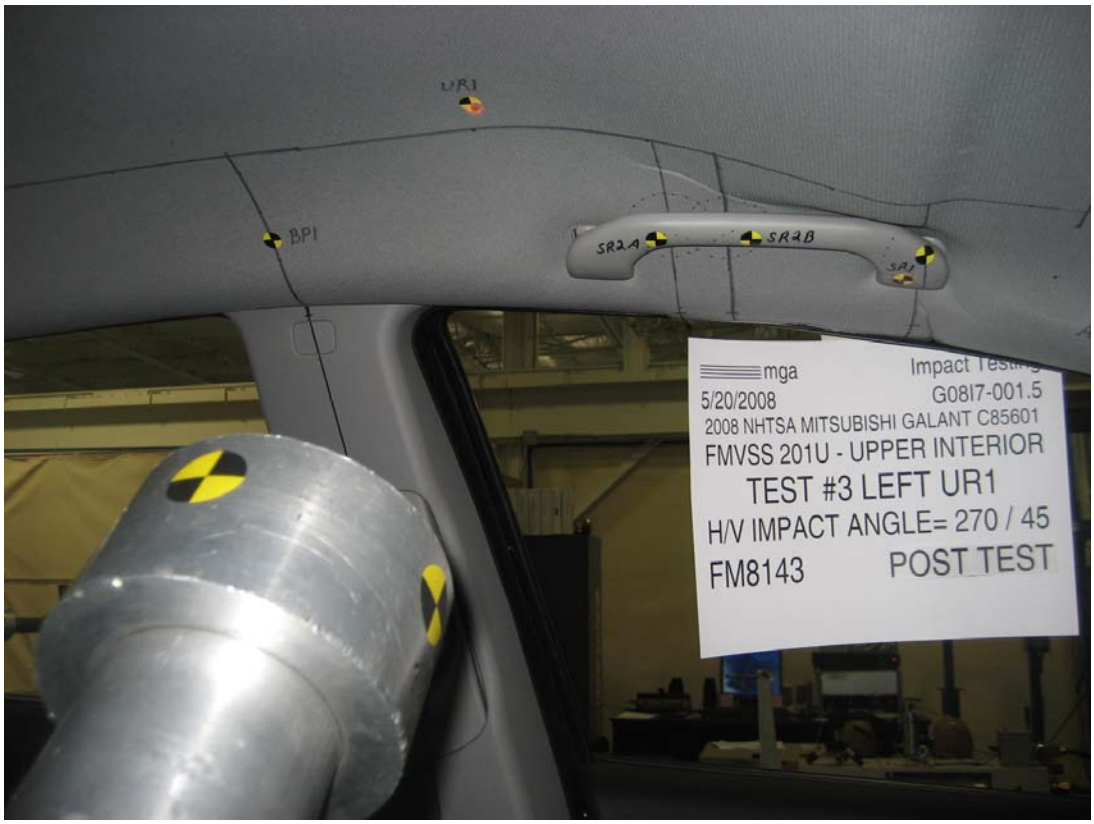

(peak = 4.1 G)
Head Y (G)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 24.4 G)
Head Z (G)
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 23.6 kph)
Impact Velocity: 23.39 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 = 51.3 mm)
Displacement (mm)
55
50
45
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


mga
Impact Testing
G08I7-001.5
5/20/2008
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR1
H/V IMPACT ANGLE= 270 / 45
FM8143
PRE TEST


UR1
BPI
SR2A
SR2B
SR1
mga
Impact Testing
5/20/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR1
H/V IMPACT ANGLE= 270 / 45
FM8143
POST TEST


mga
Impact Testing
5/20/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT UR1
H/V IMPACT ANGLE= 270 / 45
FM8143
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Test Number:#3

Target (Vehicle Side): UR1Left

Temperature:23C

MGA Test Reference No.:FM8143

Humidity:34%

Approach Horizontal Angles:270º

Time of Test:5:18:40 PM

Approach Vertical Angles:45º

FMH Serial No:[038]

Additional Description:@ Rear SR2A

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
584	553	7.9	23.8	28	5 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22700	-95.015	0.87	0.87
Y	6	J36197	108.737	1.52	1.52
Z	7	J36353	98.754	1.03	1.03

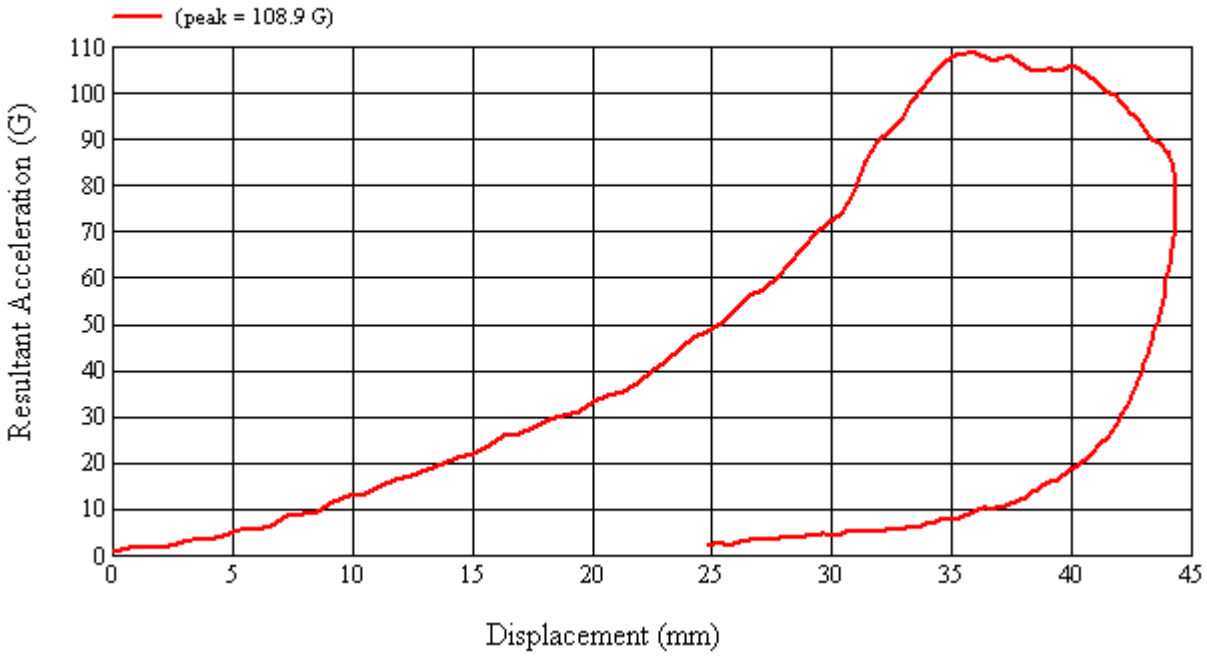
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

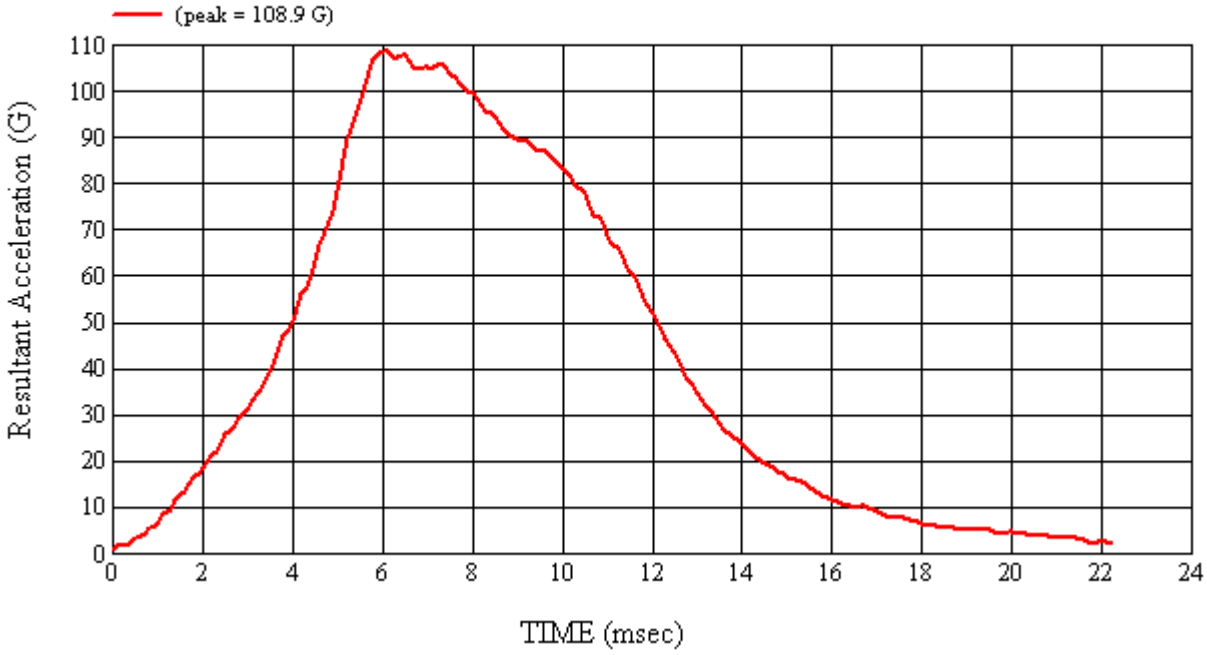
No visible damage.

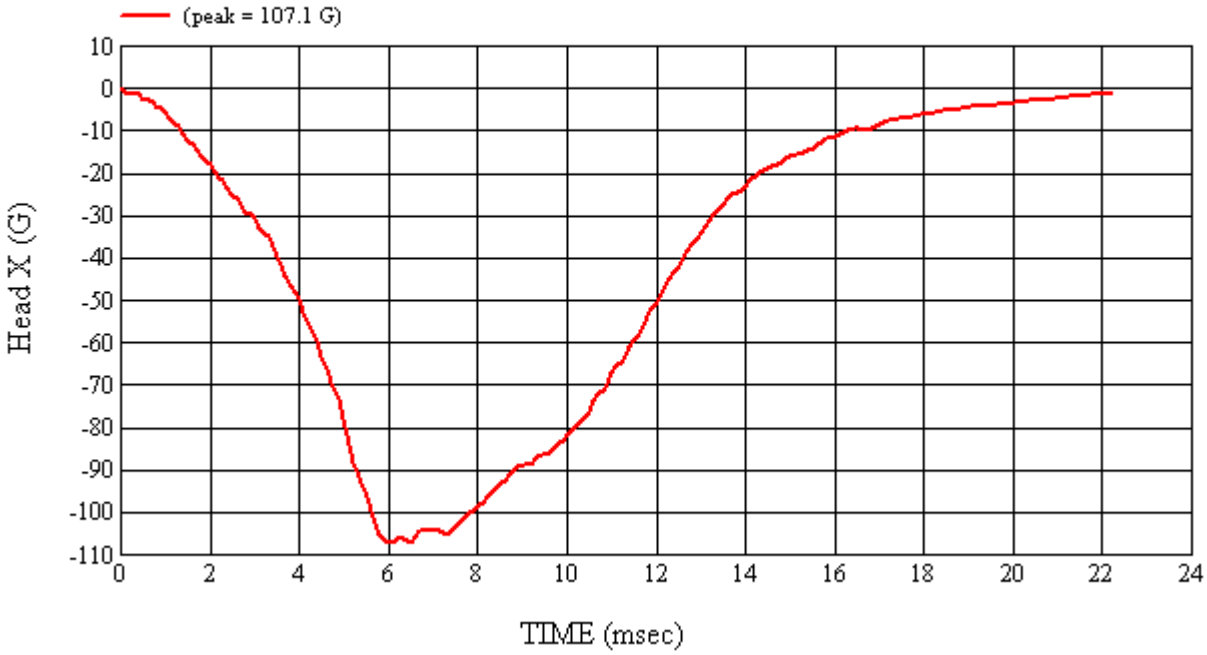
Recorded By: _____ Approved By*: _____ Date: 5/20/2008

*Only necessary for NHTSA (Government) Compliance testing.

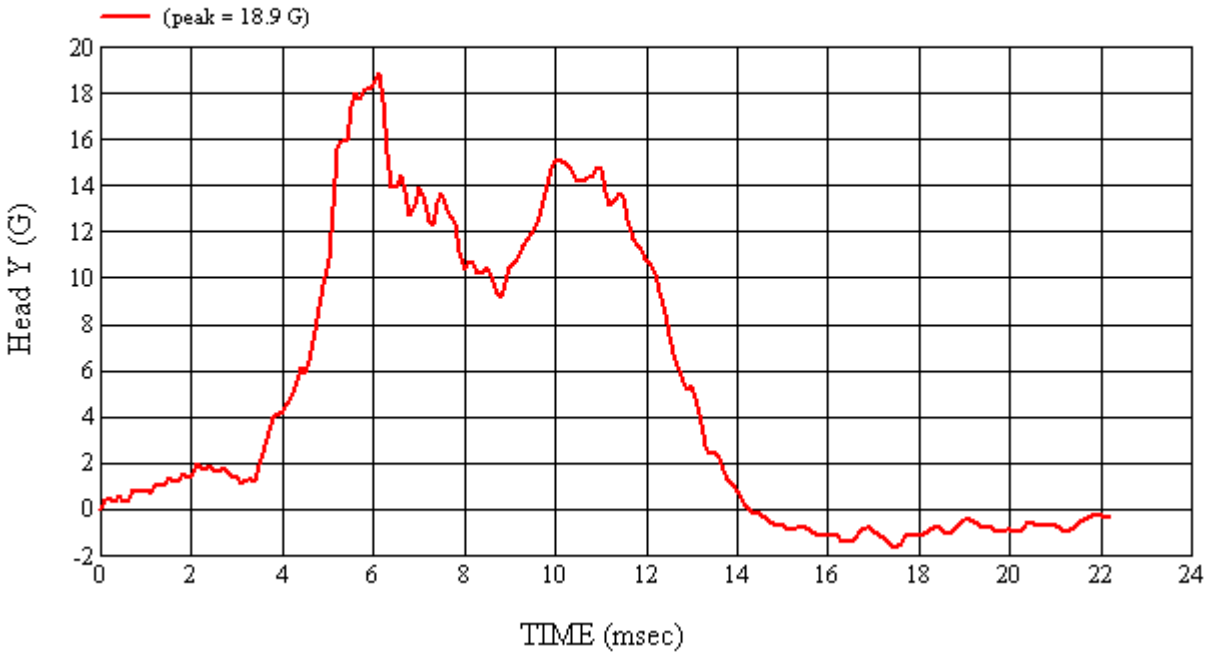
MGA Test #: FM8143 Target Location: UR1, Left Side Test Date: 5/20/2008

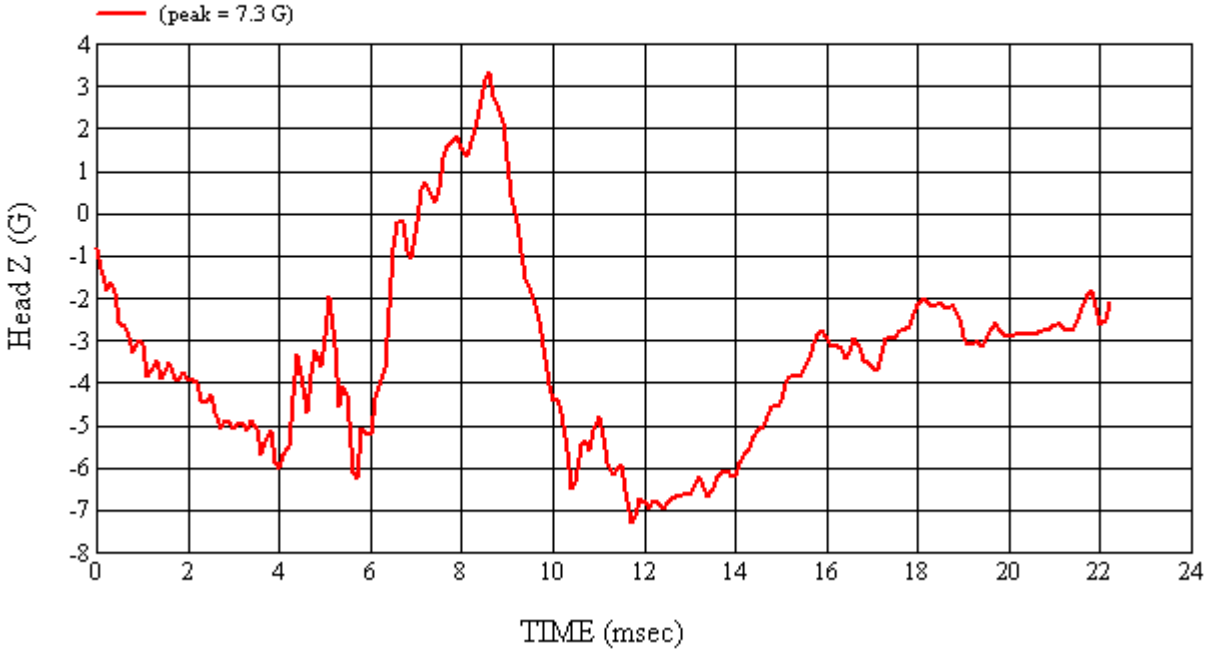


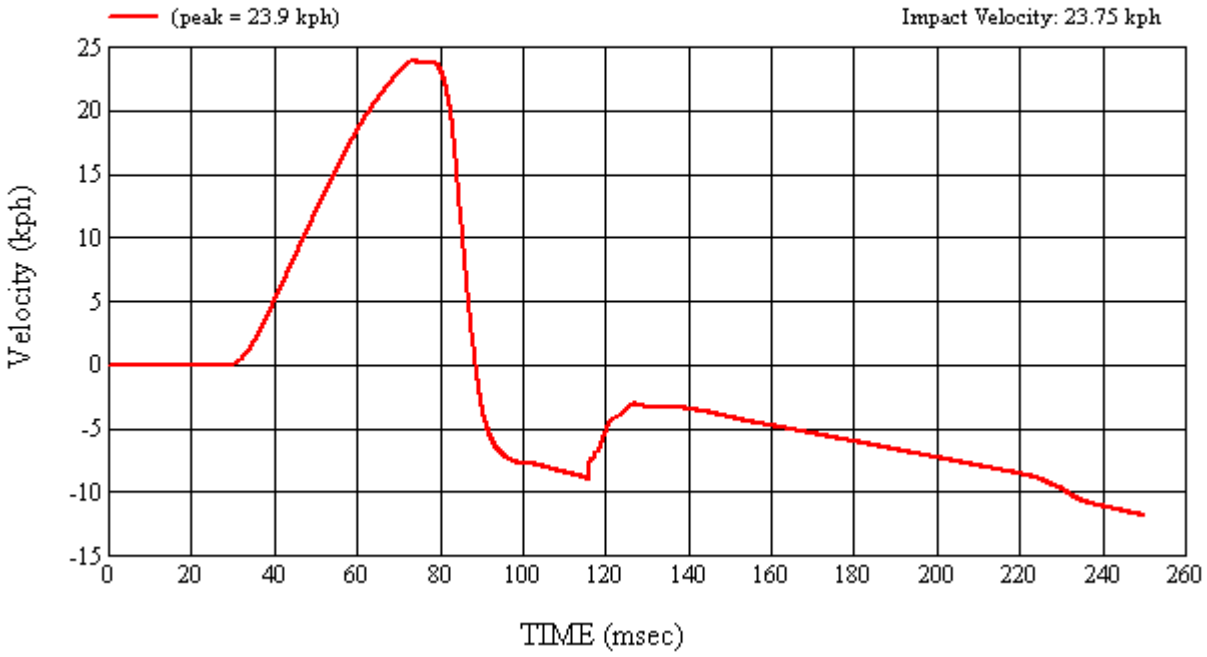


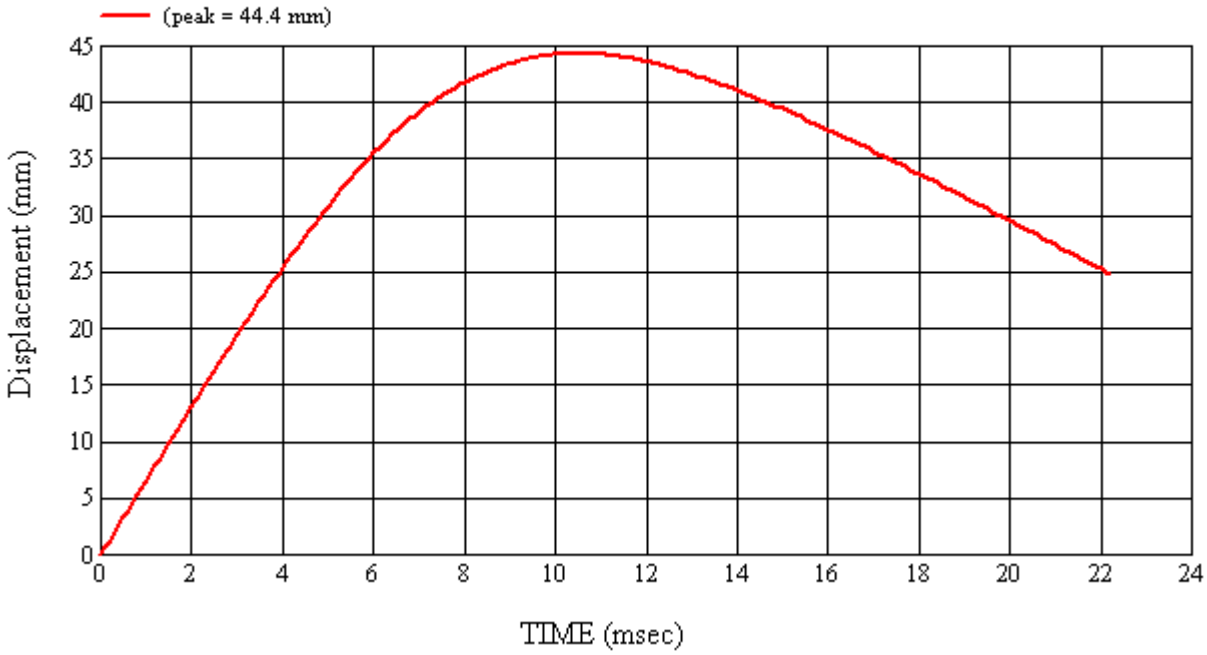

(peak = 107.1 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

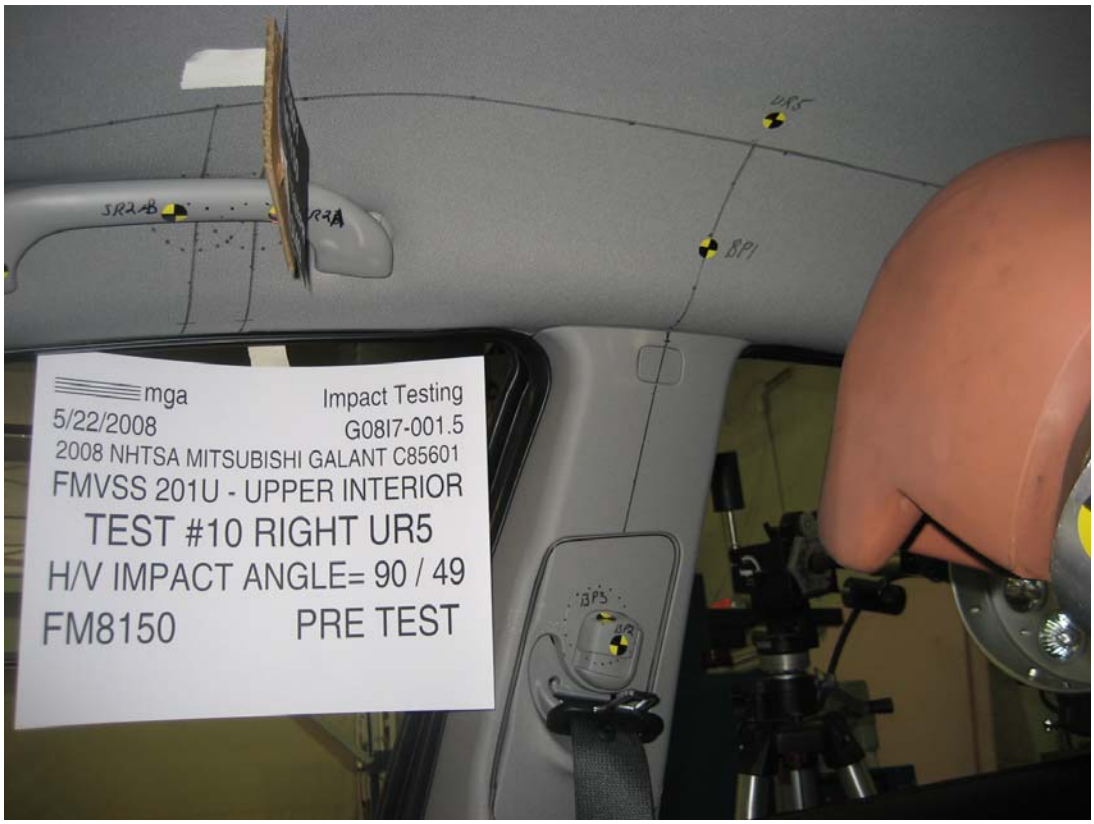
3


(peak = 18.9 G)
Head Y (G)
20
18
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)

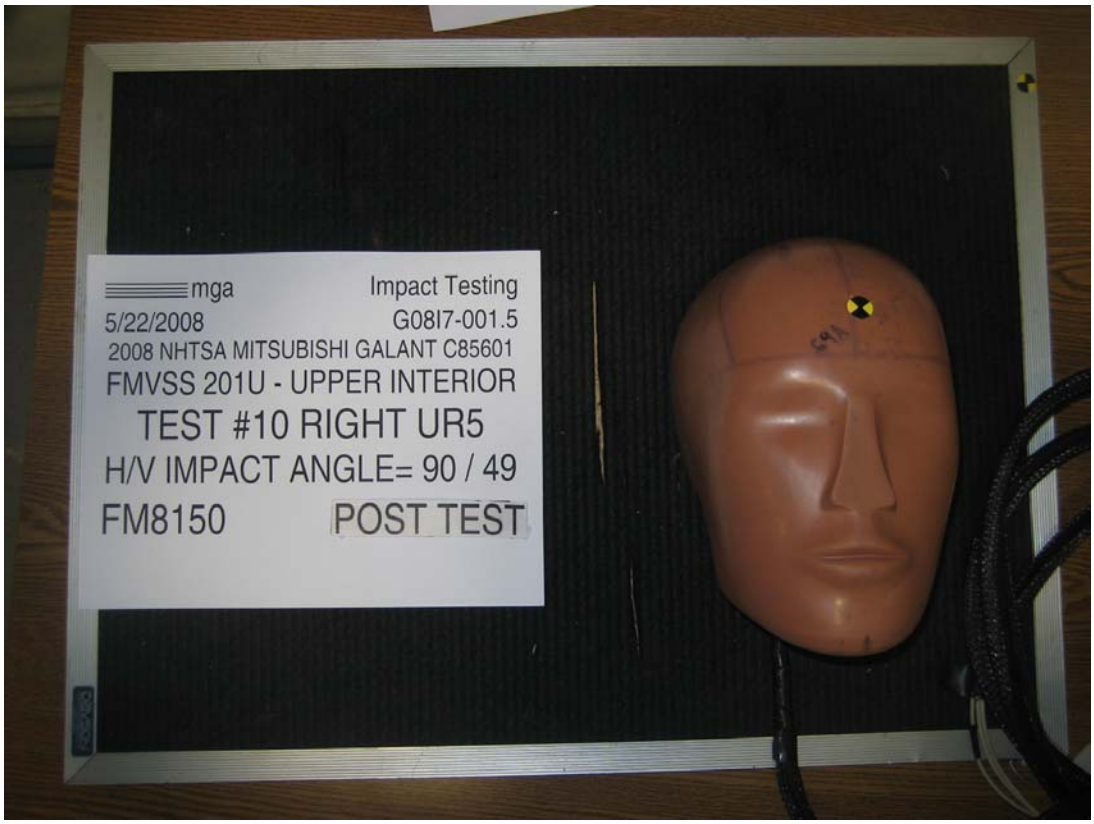

(peak = 7.3 G)
Head Z (G)
4
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 23.9 kph)
Impact Velocity: 23.75 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 = 44.4 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR5
H/V IMPACT ANGLE= 90 / 49
FM8150
PRE TEST


UR4
SR2B
SR2A
SR1
BP1
mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR5
H/V IMPACT ANGLE= 90 / 49
FM8150
POST TEST


mga
Impact Testing
5/22/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT UR5
H/V IMPACT ANGLE= 90 / 49
FM8150
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant C85601

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR5Right

MGA Test Reference No.:FM8150

Approach Horizontal Angles:90º

Approach Vertical Angles:49º

Additional Description:@ BPR

Test Number:#10

Temperature:22C

Humidity:39%

Time of Test:5:00:44 PM

FMH Serial No:[035]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
642	630	9.1	23.8	24	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	-95.844	0.87	0.87
Y	6	J22664	93.878	1.52	1.52
Z	7	J35924	92.621	1.03	1.03

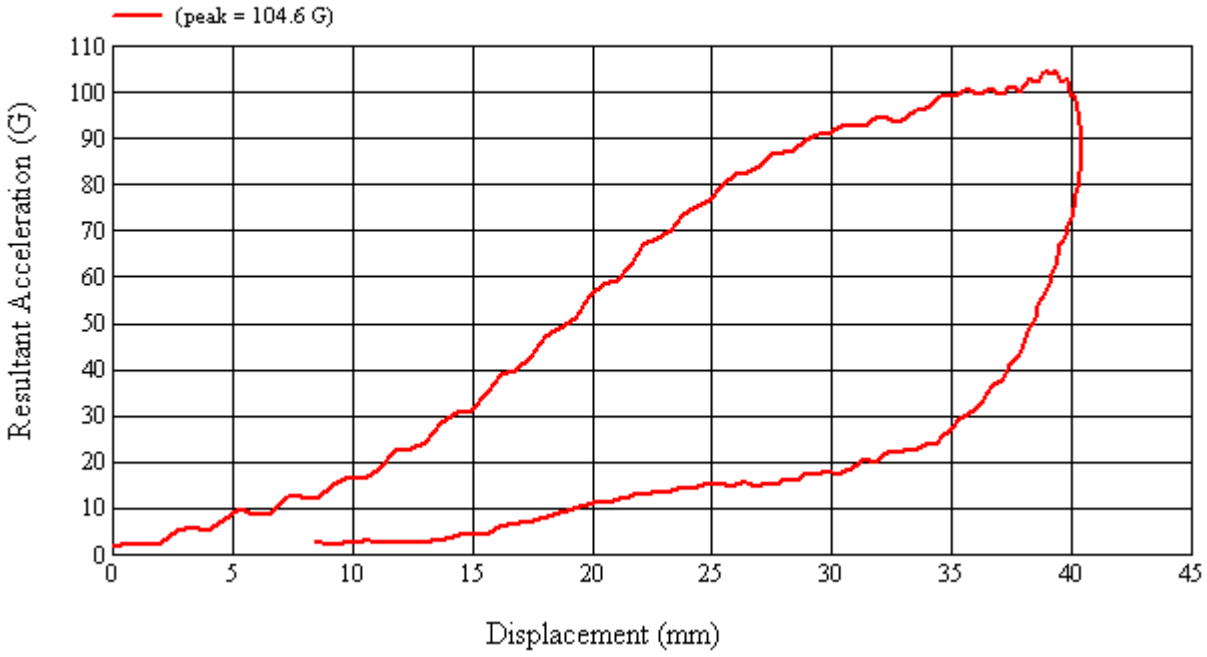
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

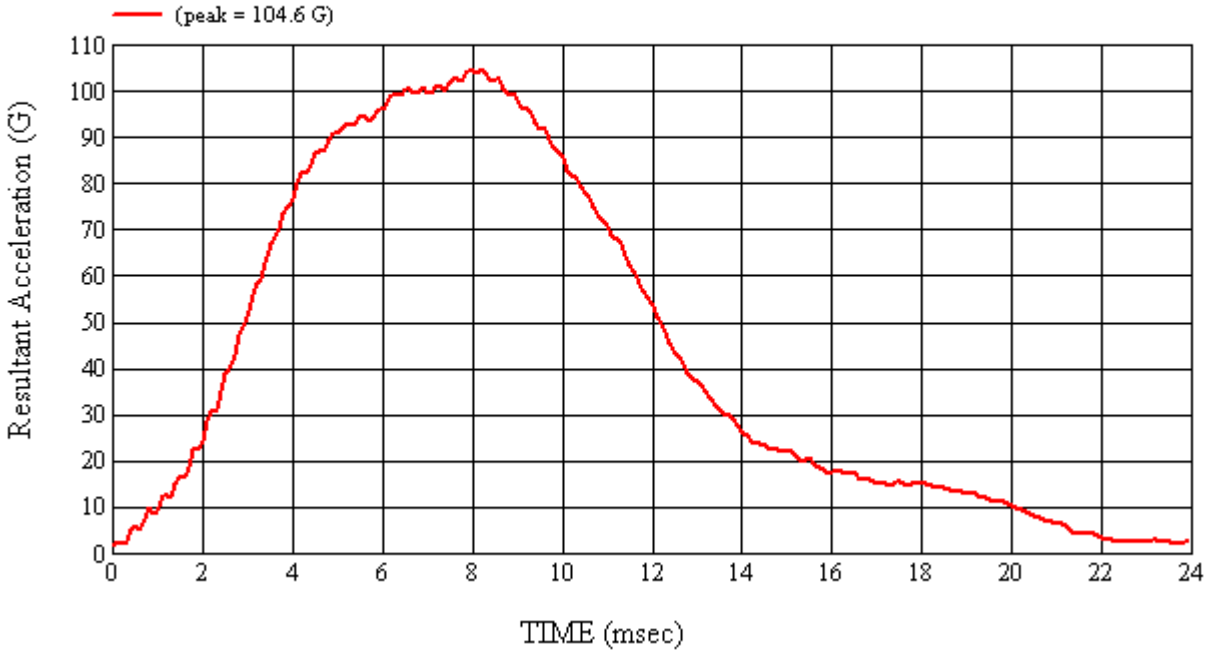
No visible damage.

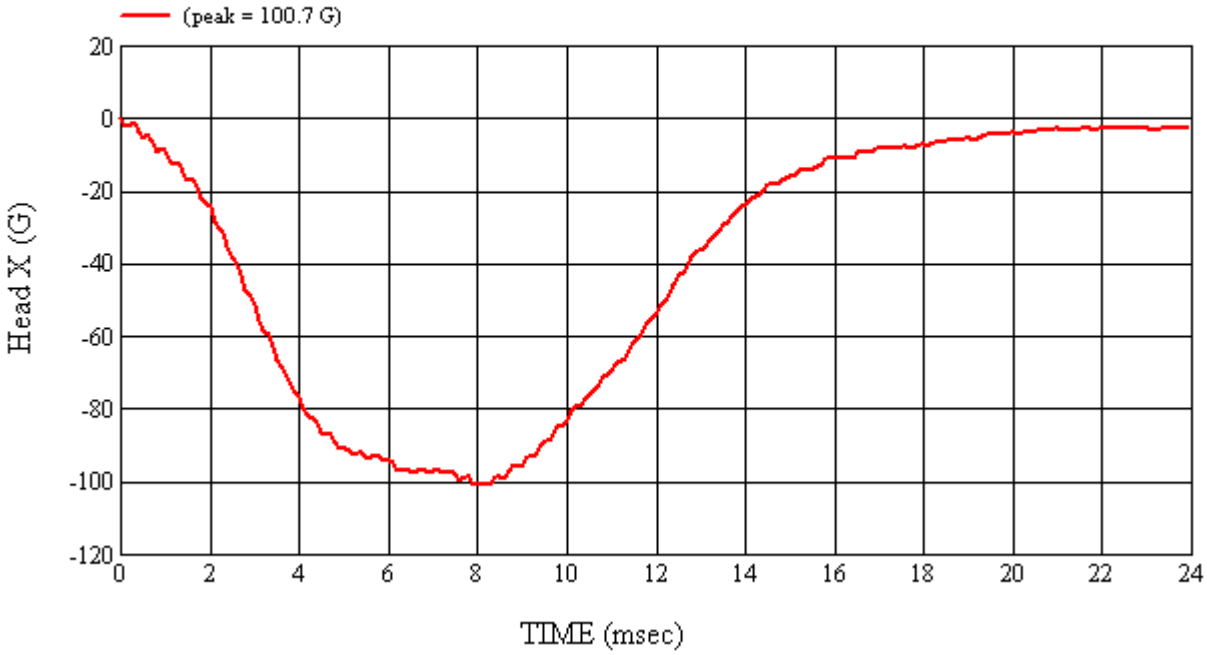
Recorded By: [signature] Approved By*: [signature] Date: 5/22/2008

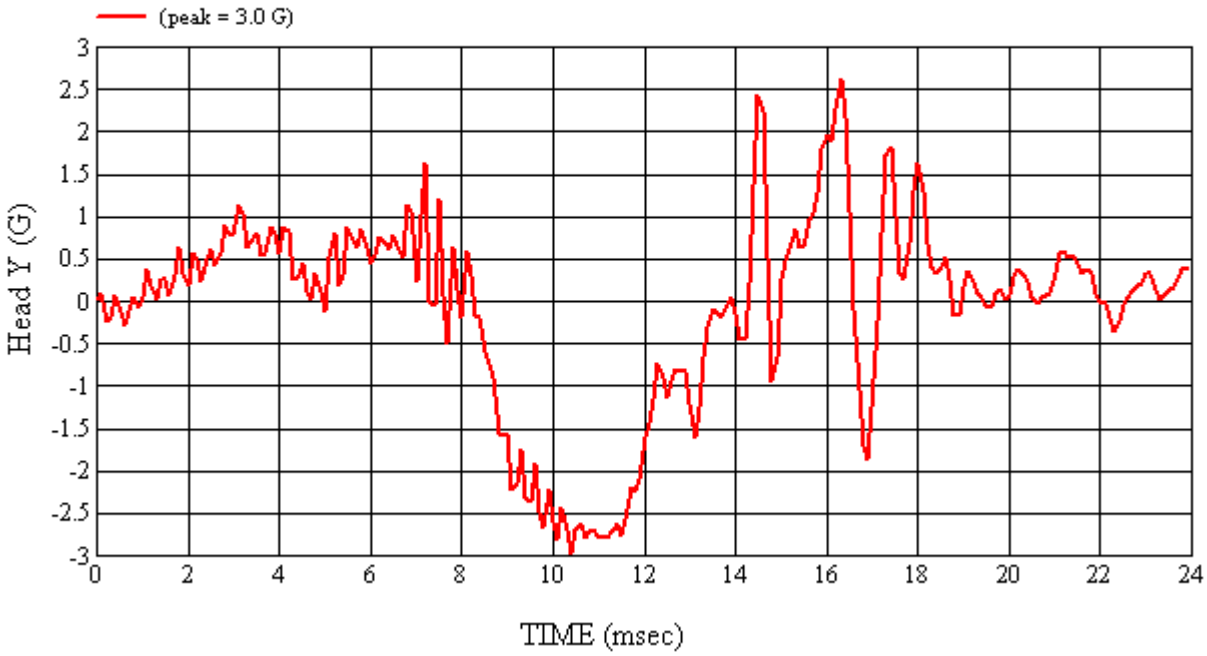
*Only necessary for NHTSA (Government) Compliance testing.

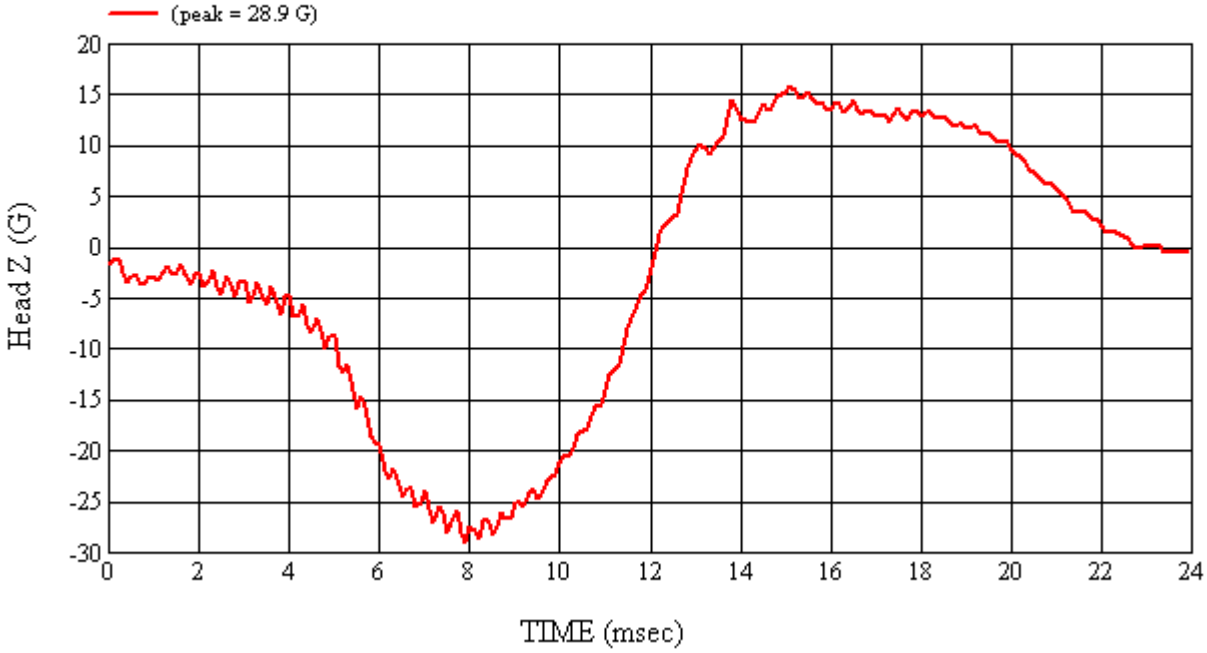
MGA Test #: FM8150 Target Location: UR5, Right Side Test Date: 5/22/2008

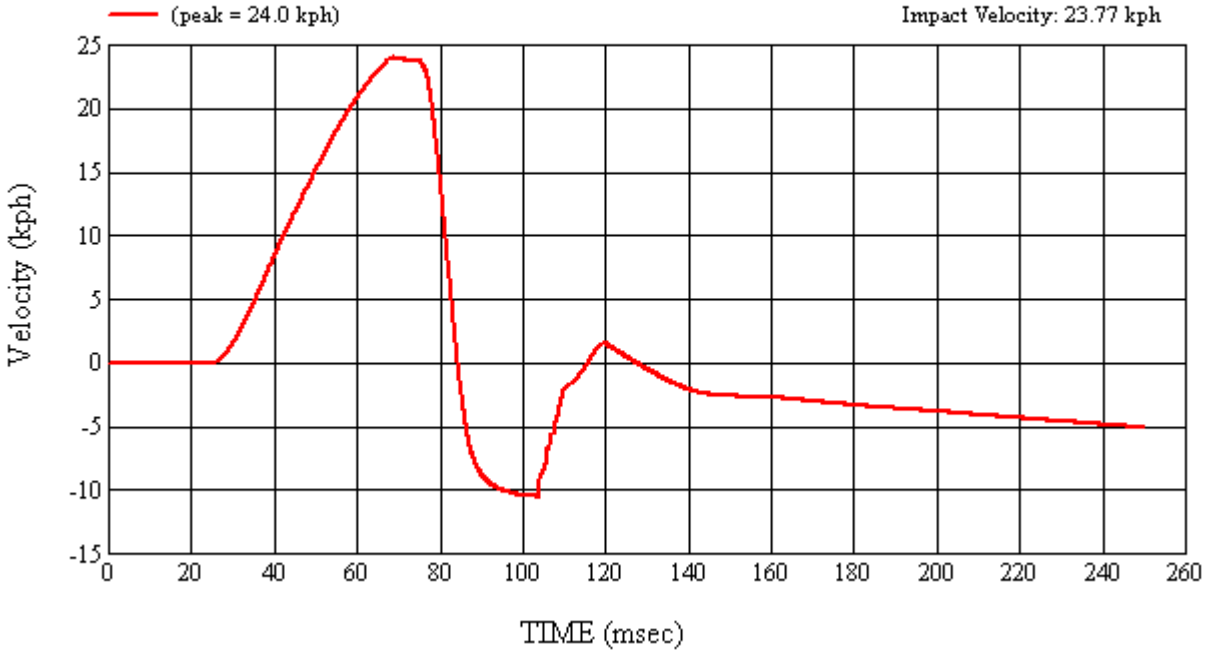


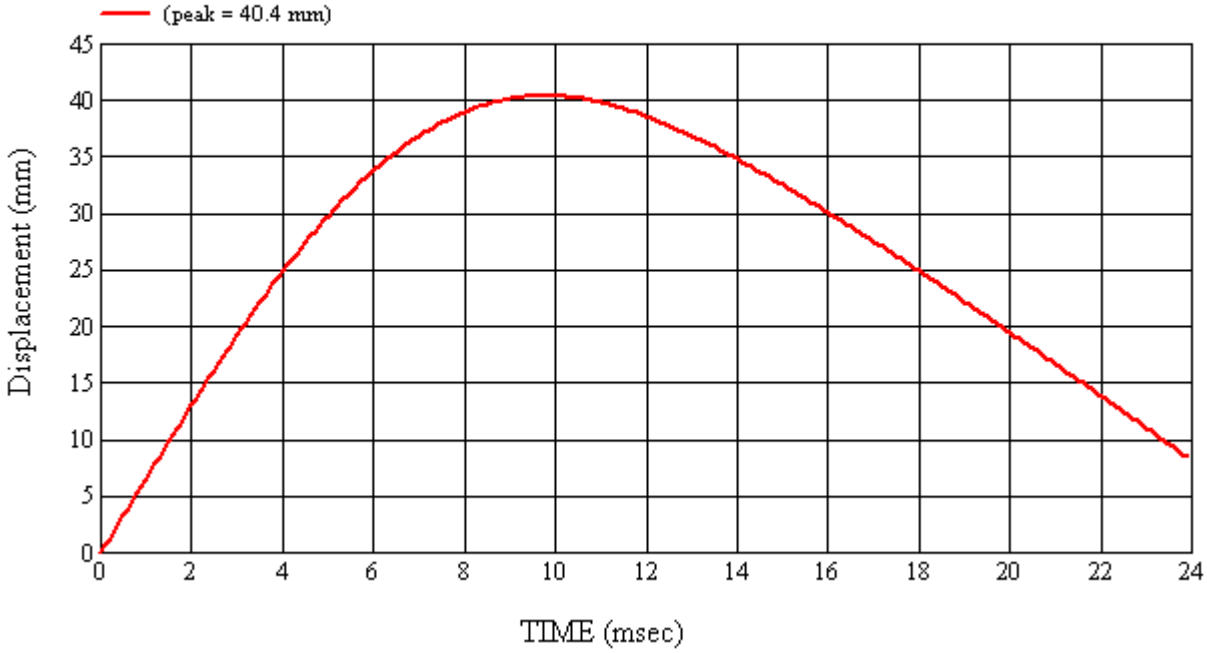


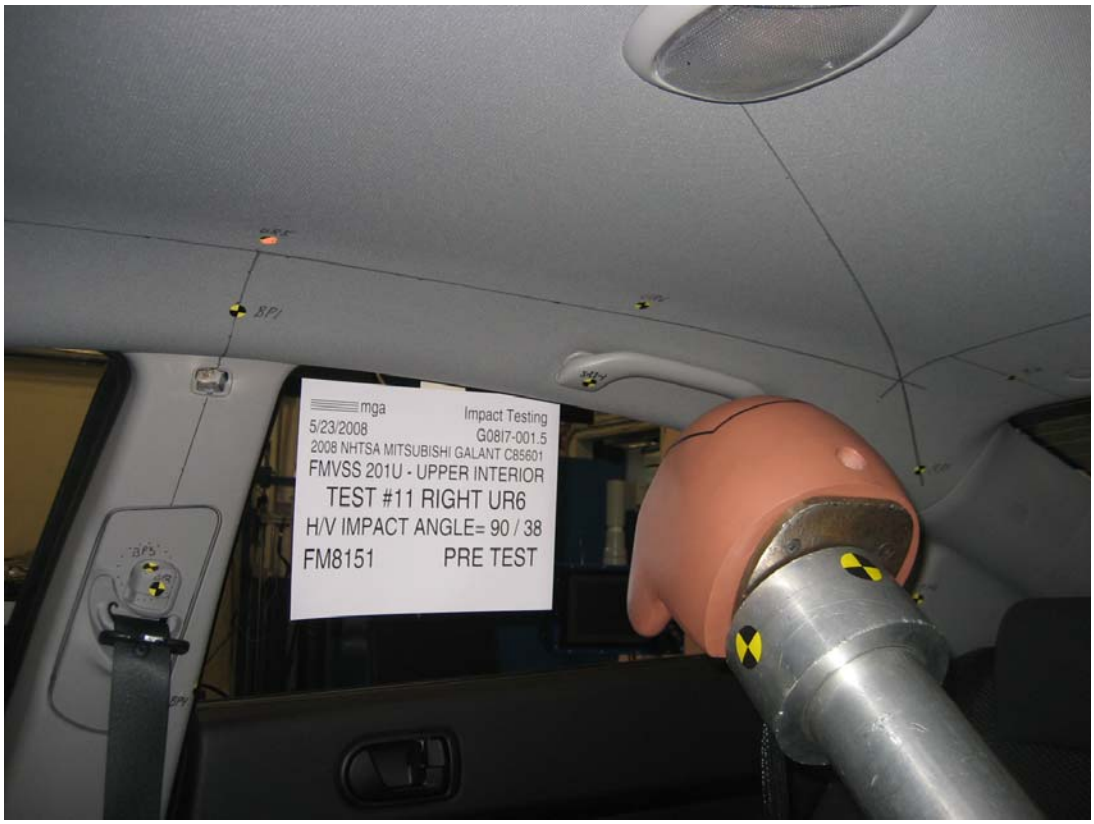

(peak = 100.7 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 3.0 G)
Head Y (G)
3
2.5
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

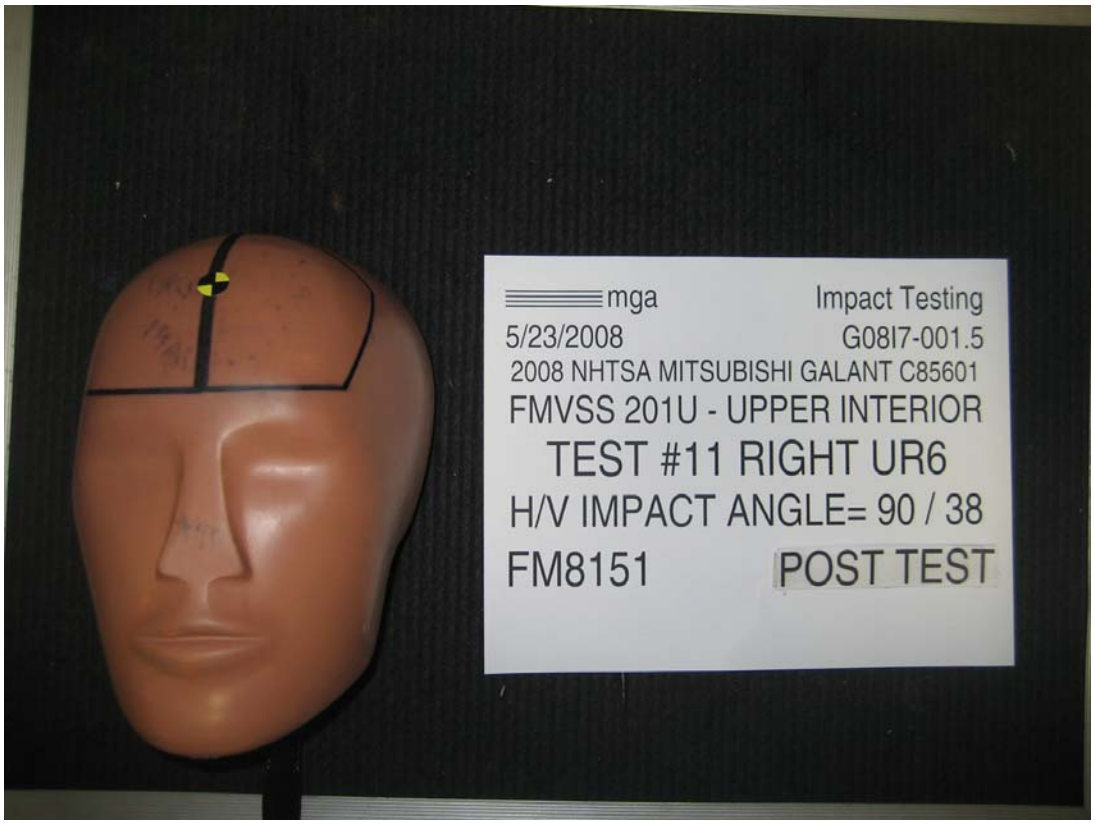

(peak = 28.9 G)
Head Z (G)
20
15
10
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 24.0 kph)
Impact Velocity: 23.77 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 = 40.4 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


mga
5/23/2008
Impact Testing
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 38
FM8151
PRE TEST


mga
Impact Testing
5/23/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 38
FM8151
POST TEST


mga
Impact Testing
5/23/2008
G08I7-001.5
2008 NHTSA MITSUBISHI GALANT C85601
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT UR6
H/V IMPACT ANGLE= 90 / 38
FM8151
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G08I7-001.5

VEHICLE YR/MAKE/MODEL:2008/NHTSA/Mitsubishi Galant
C85601

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR6Right

MGA Test Reference No.:FM8151

Approach Horizontal Angles:90º

Approach Vertical Angles:38º

Additional Description:@ SR3-1

Test Number:#11

Temperature:22C

Humidity:40%

Time of Test:10:20:39 AM

FMH Serial No:[037]

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
607	584	8.6	23.1	45	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	AHTB2	-114.533	0.87	0.87
Y	6	J14103	92.424	1.52	1.52
Z	7	J35800	96.462	1.03	0.93

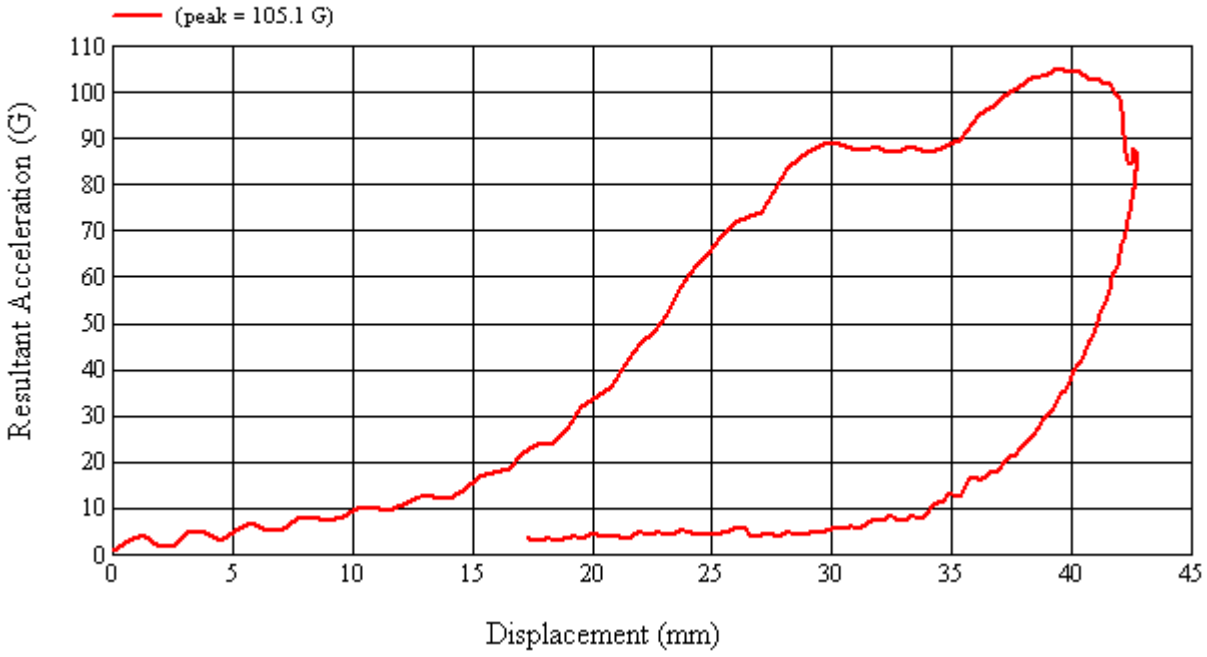
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

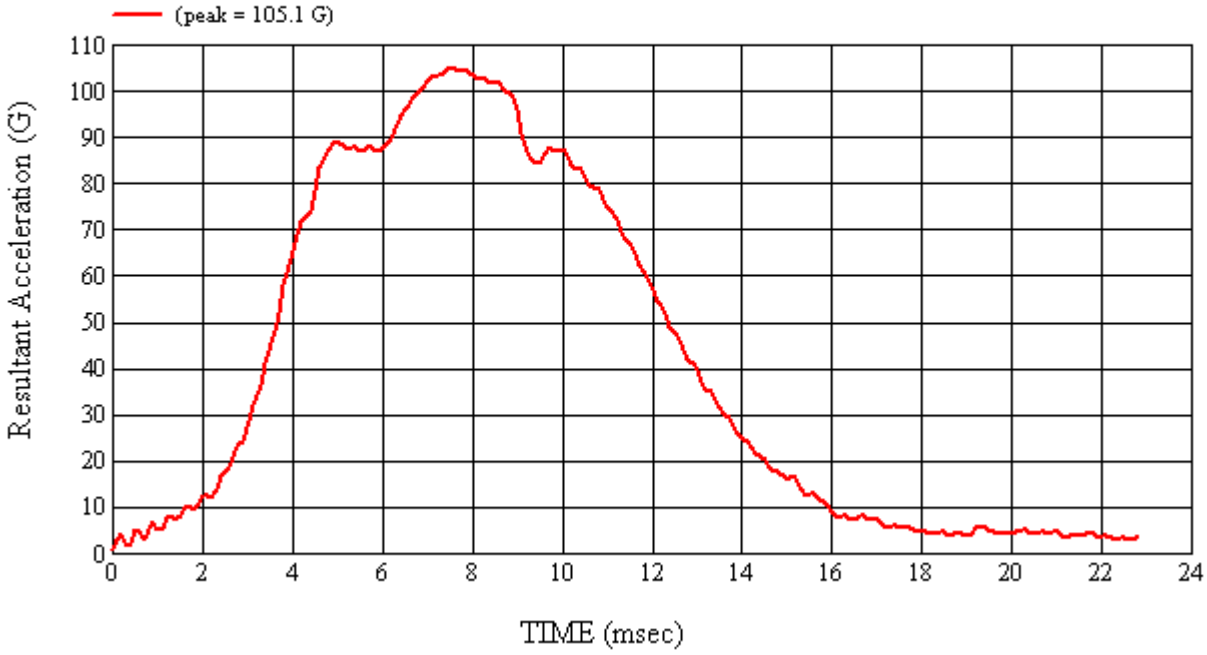
Grab handle displacement.

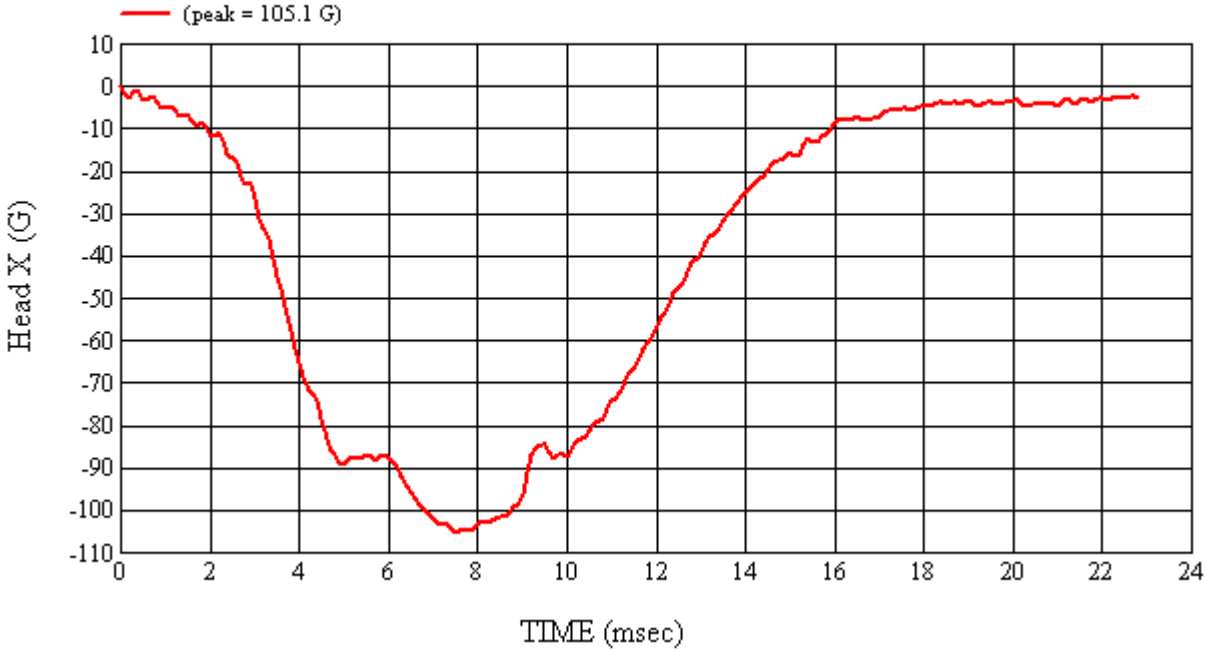
Recorded By: _____ Approved By*: _____ Date: 5/23/2008

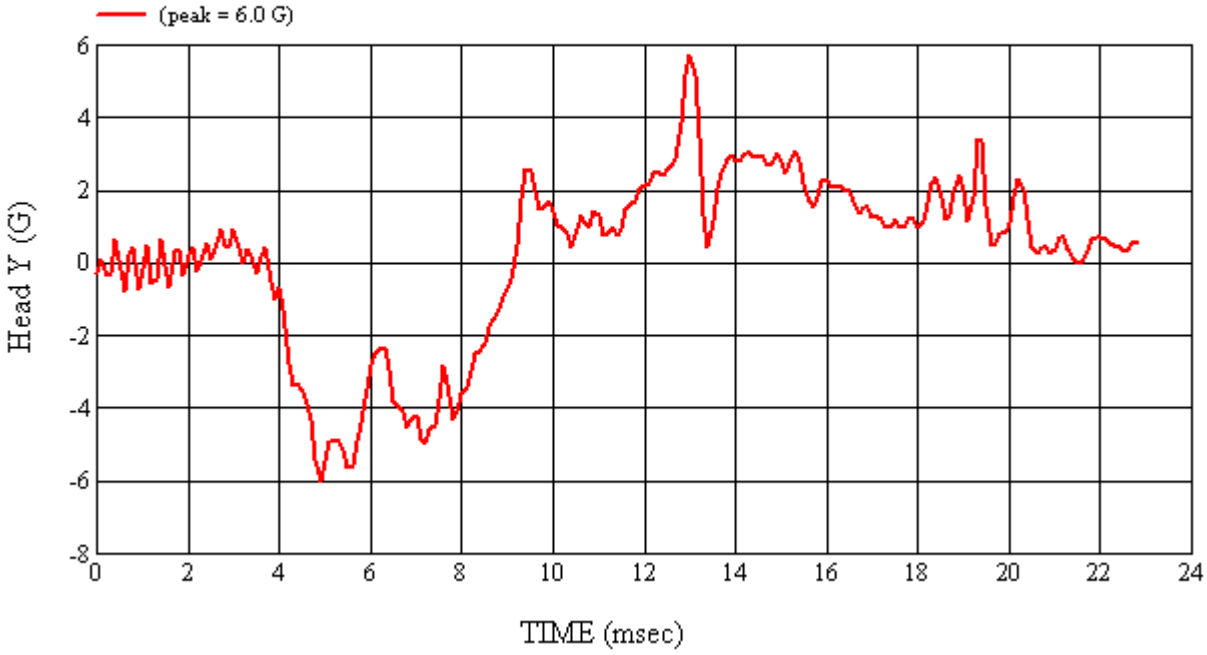
*Only necessary for NHTSA (Government) Compliance testing.

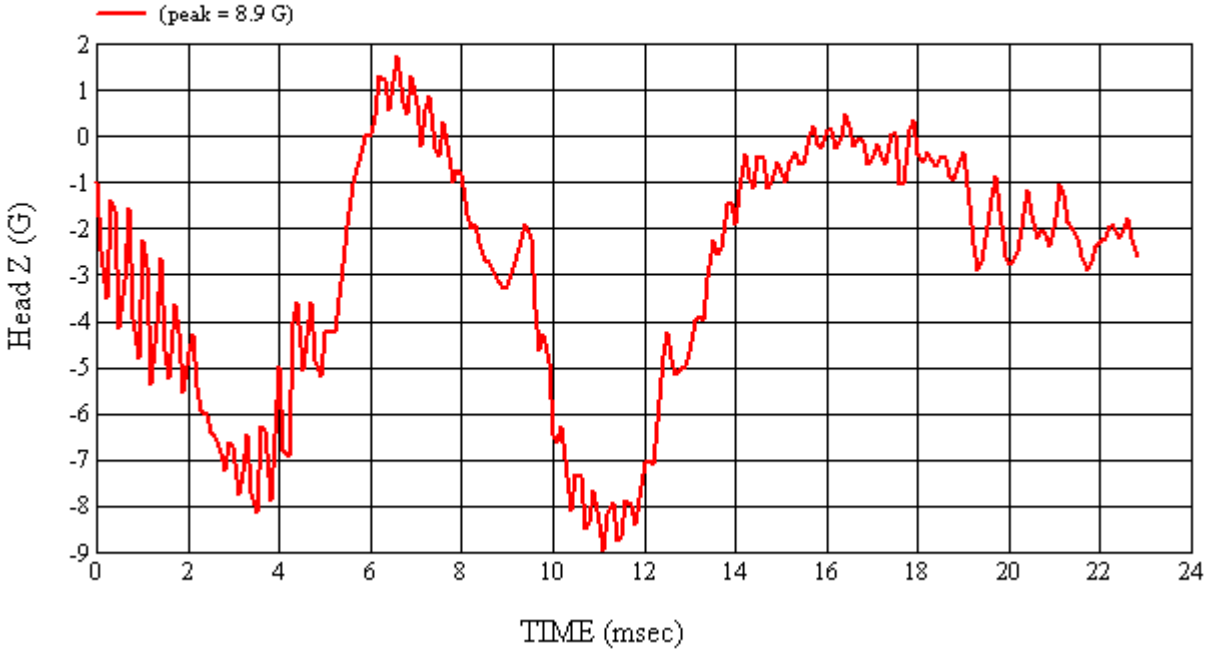
MGA Test #: FM8151 Target Location: UR6, Right Side Test Date: 5/23/2008

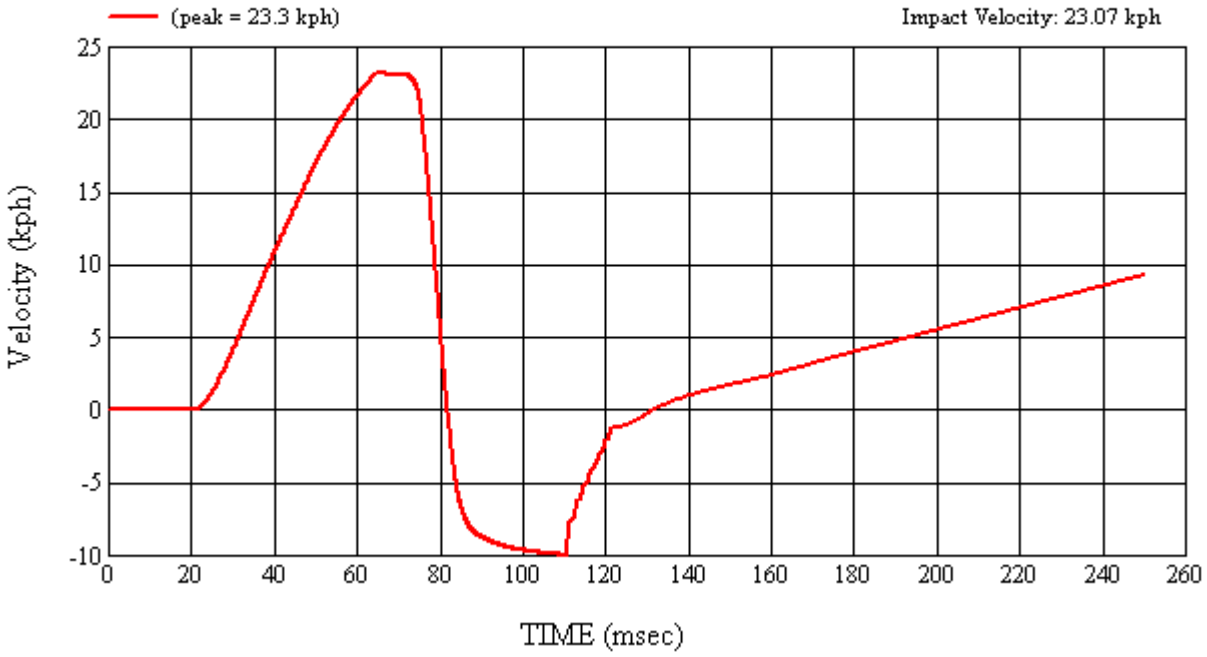


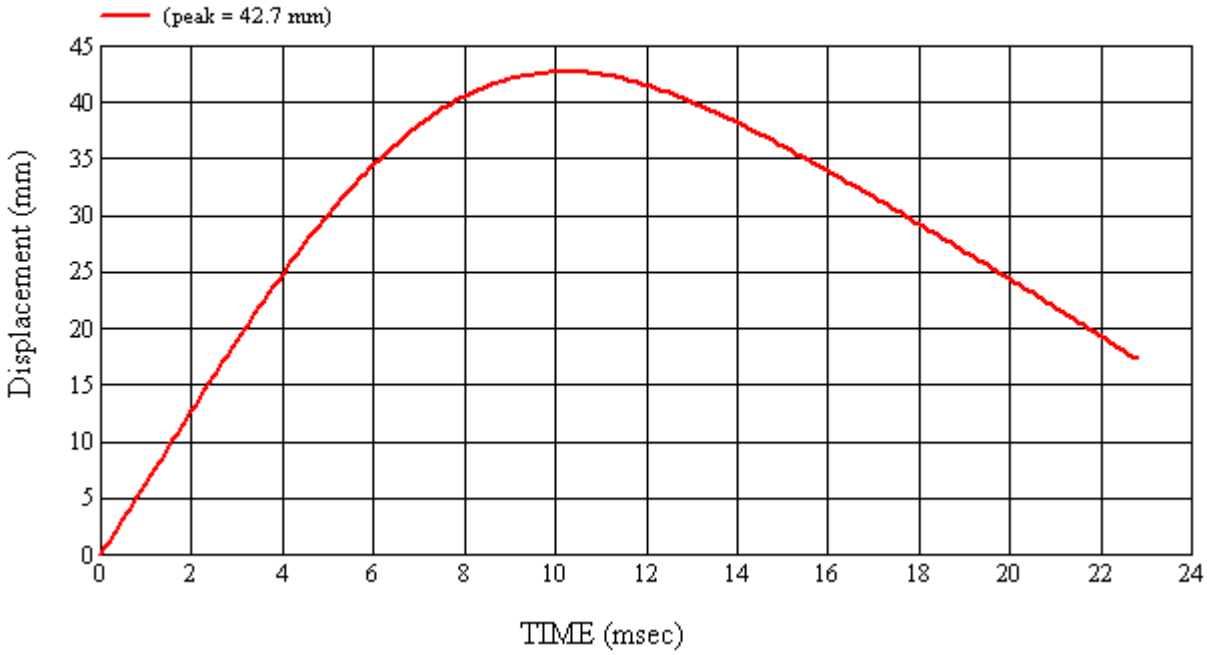



(peak = 105.1 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 6.0 G)
Head Y (G)
6
4
2
0
-2
-4
-6
-8
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 8.9 G)
Head Z (G)
2
1
0
-1
-2
-3
-4
-5
-6
-7
-8
-9
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 23.3 kph)
Impact Velocity: 23.07 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 = 42.7 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
45
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

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
*Digital Inclinometer	Mitutoyo	PRO 360 (MGA00048)	Set Angle of FMH/Targeting	0.1°	Annual
FMVSS 201U Test Frame (includes the propulsion control system, actuator, test frame, and DAS)	MGA Research Corp.	MGA-100-FMH	Test System	N/A	N/A
Free Motion Headforms	UTAMA UTAMA UTAMA	035 037 038	Test Device	N/A	Pre and Post-Test Series
High Speed Video	Redlake	HGLE	Record Event	N/A	N/A
*FARO™	Faro Technologies	S08059801273	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Digital Protractor	 Stanley N/A Mitutoyo	 TPM824 -- MGA00048	 Measurement Targeting FMH setup Horizontal Measurement	 1 mm N/A 0.5°	Annual
*Temperature Recorder	Dickson	FH125	Record Temperature and Humidity	± 1°C ± 1% RH	Annual
* Scale	Detecto	MGA00081	Weigh FMH Head	± 0.01 lb	Annual
*Vehicle Scale	Sterling Scale Co.	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	5/19/2008	9.90	22.0	29.0	238.6	3.3	Yes
Post	#035	5/27/2008	9.90	22.0	24.0	237.5	5.7	Yes
Pre	#037	5/19/2008	9.96	22.0	30.0	250.4	5.4	Yes
Post	#037	5/27/2008	9.96	22.0	24.0	250.4	10.7	Yes
Pre	#038	5/19/2008	9.92	22.0	31.0	256.1	5.9	Yes
Post	#038	5/27/2008	9.92	22.0	24.0	261.0	13.2	Yes

4-1 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

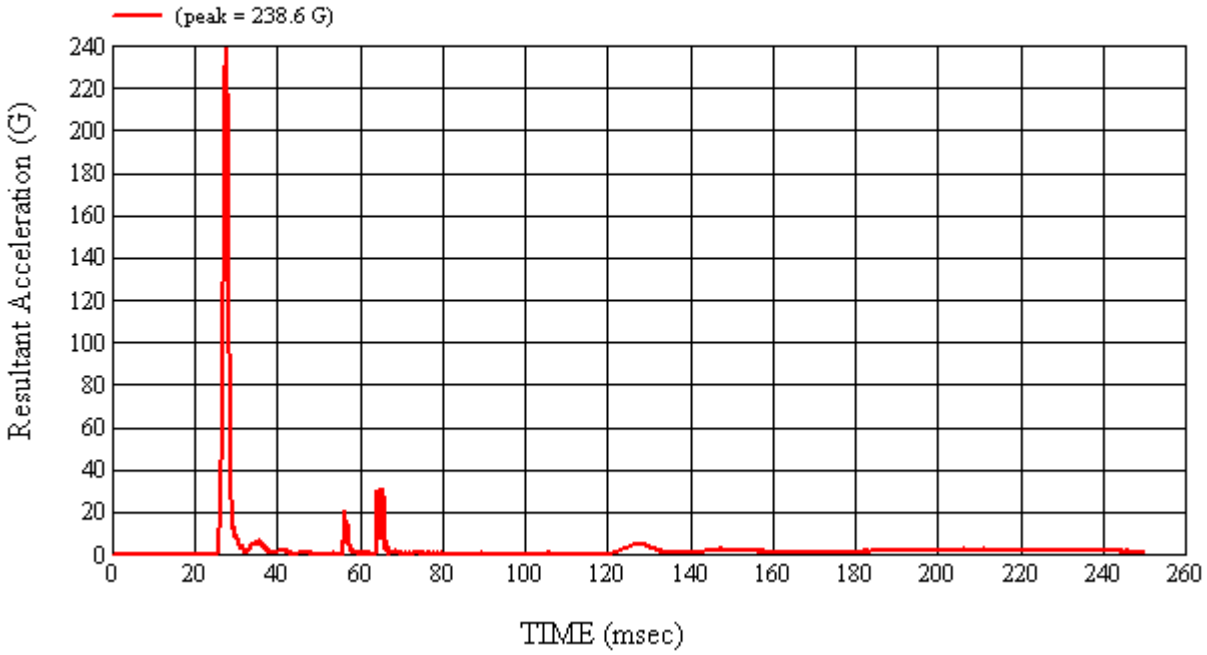
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 5/19/2008 CALIBRATION TIME: 9:02:23 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	29
Peak Resultant Acceleration	225 G's to 275 G's	238.6
Peak Lateral Acceleration	15 G's Maximum	3.3
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35919	04/22/08	10/22/08
2	ENDEVCO	7264-2000	J22664	04/22/08	10/22/08
3	ENDEVCO	7264-2000	J35924	04/22/08	10/22/08

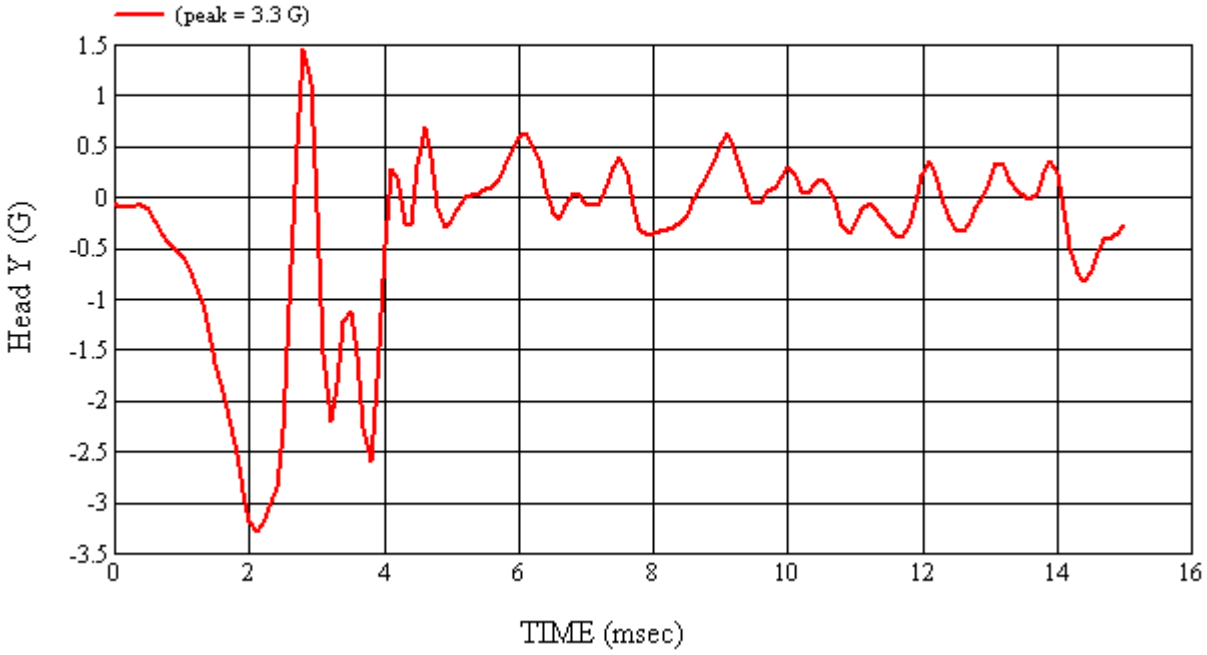
REMARKS:

RECORDED BY: Travis Campbell DATE: 5/19/2008

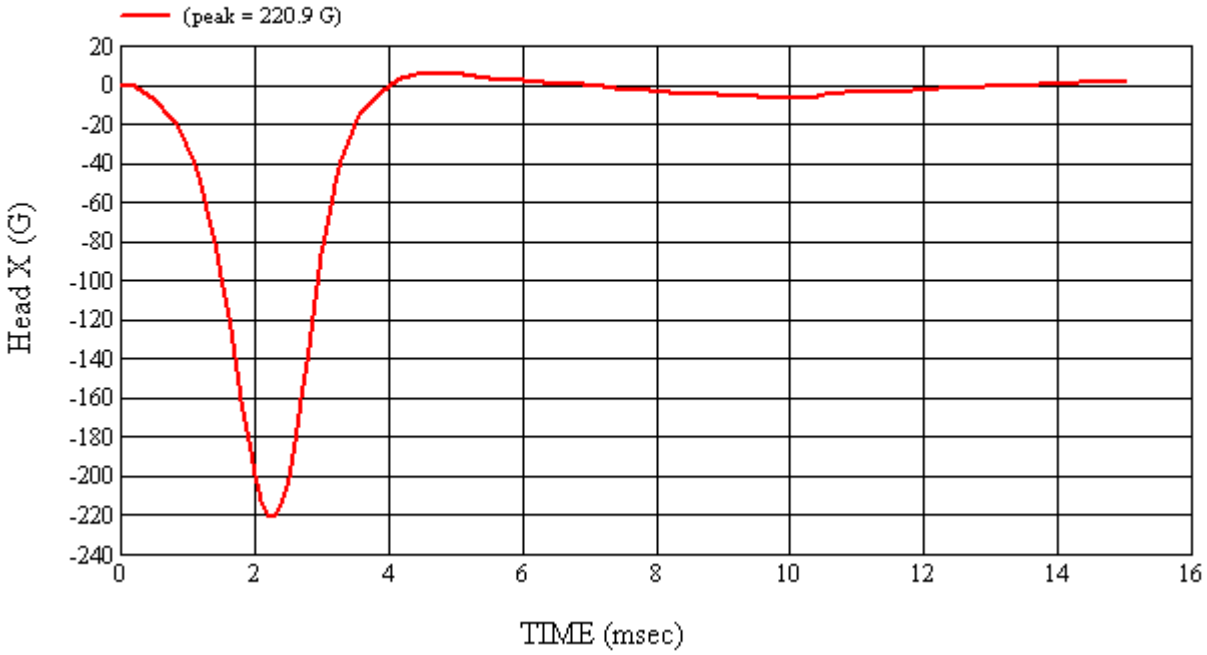
APPROVED BY: Helen A. Kalafut



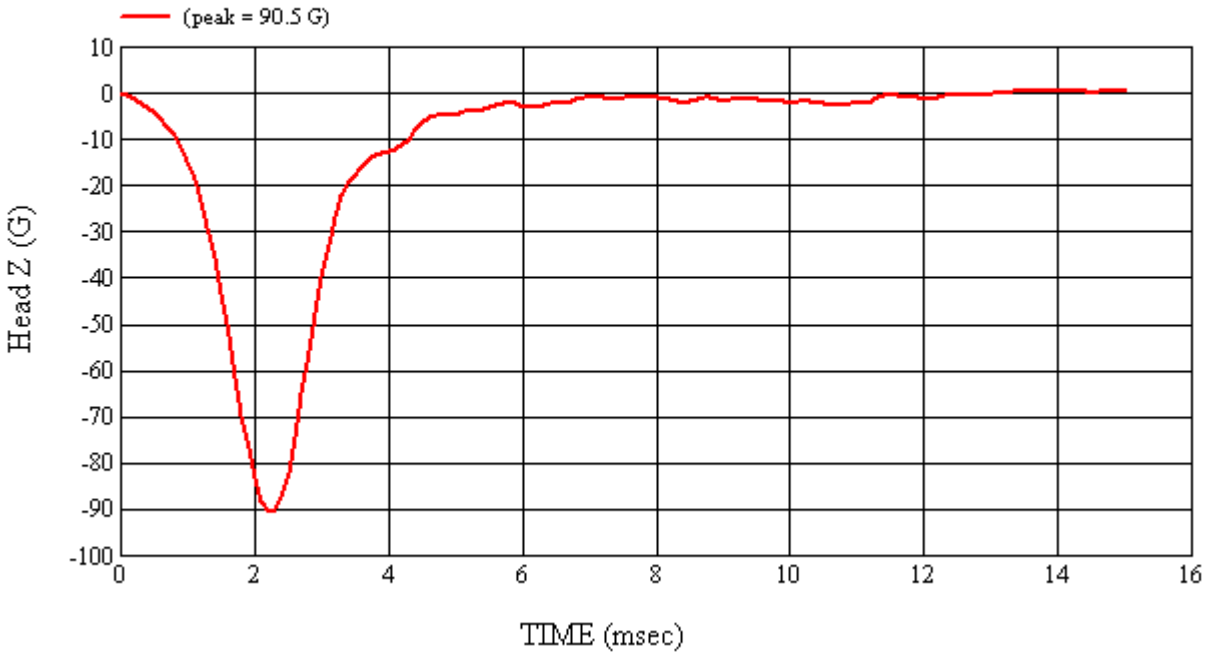
Head 035 (Pre) Calibration #H35018



Head 035 (Pre) Calibration #H35018



Head 035 (Pre) Calibration #H35018



Head 035 (Pre) Calibration #H35018

4-2 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

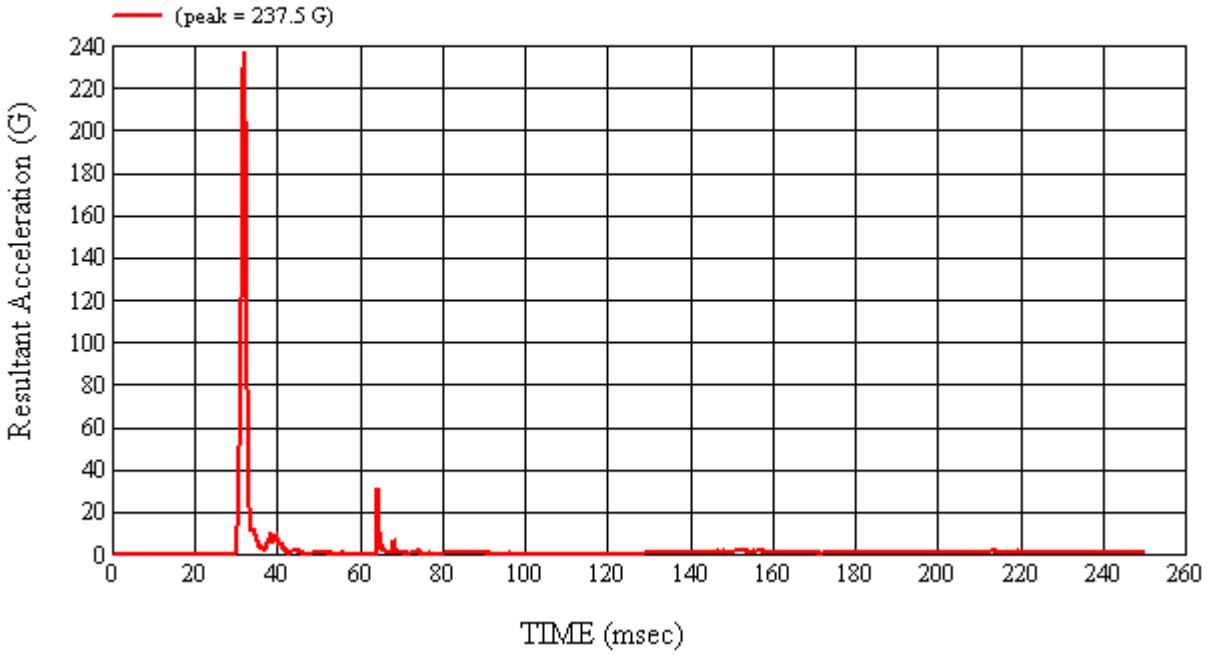
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 5/27/2008 CALIBRATION TIME: 7:29:38 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	24
Peak Resultant Acceleration	225 G's to 275 G's	237.5
Peak Lateral Acceleration	15 G's Maximum	5.7
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	J35919	04/22/08	10/22/08
2	ENDEVCO	7264-2000	J22664	04/22/08	10/22/08
3	ENDEVCO	7264-2000	J35924	04/22/08	10/22/08

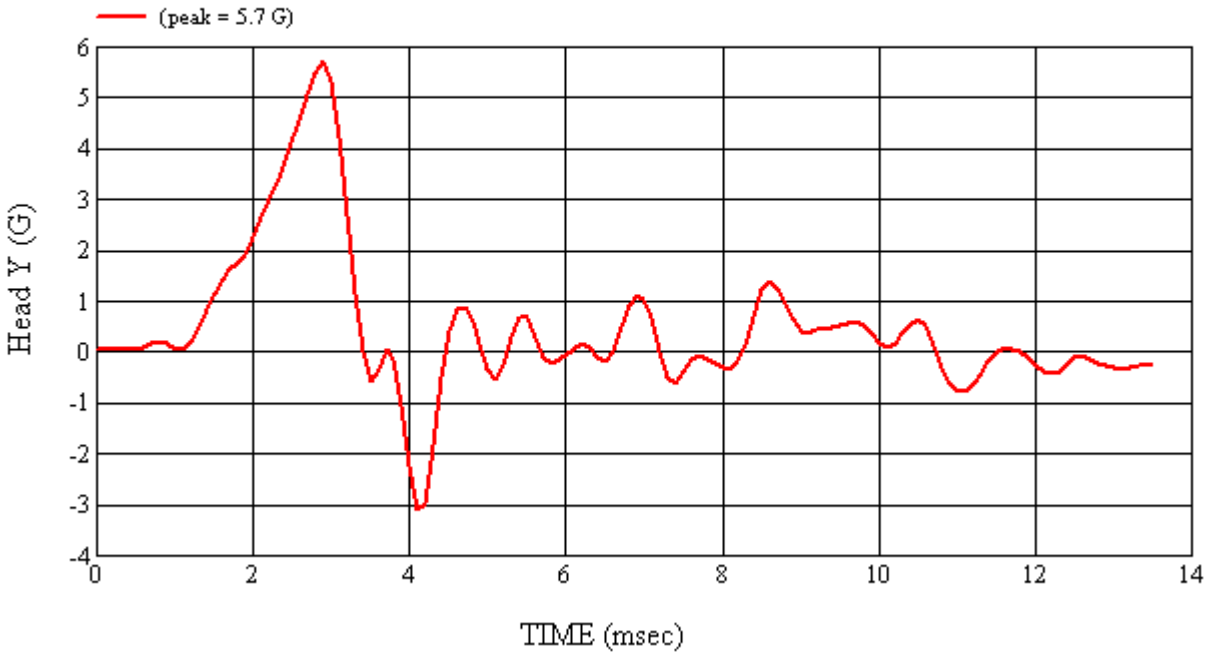
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 5/27/2008

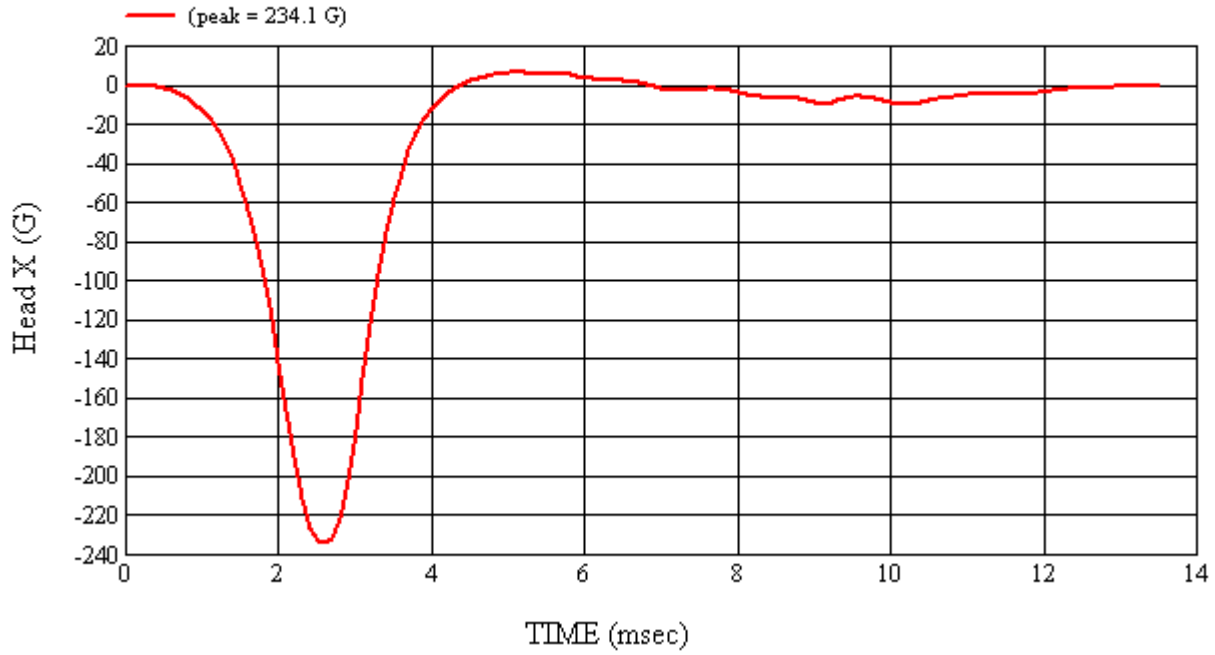
APPROVED BY: Helen A. Kalafus



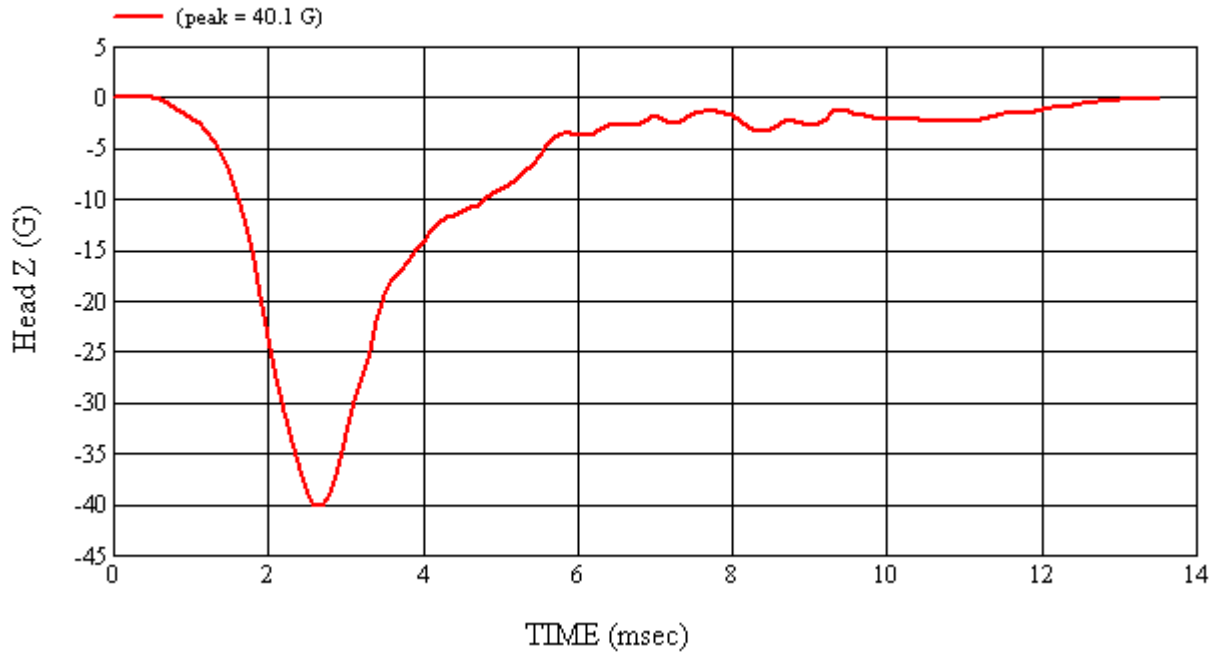
Head 035 (Post) Calibration #H35019



Head 035 (Post) Calibration #H35019



Head 035 (Post) Calibration #H35019



Head 035 (Post) Calibration #H35019

4-3 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

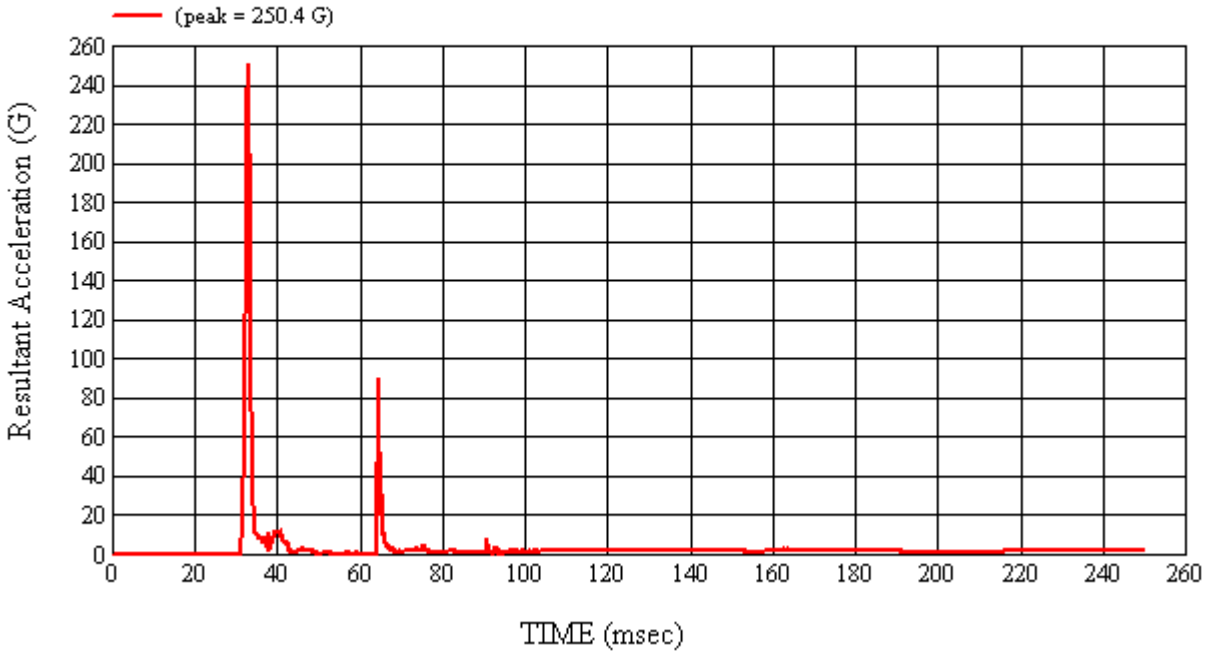
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 5/19/2008 CALIBRATION TIME: 9:04:41 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	30
Peak Resultant Acceleration	225 G's to 275 G's	250.4
Peak Lateral Acceleration	15 G's Maximum	5.4
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	AHTB2	04/22/08	10/22/08
2	ENDEVCO	7264-2000	J14103	04/22/08	10/22/08
3	ENDEVCO	7264-2000	J35800	04/22/08	10/22/08

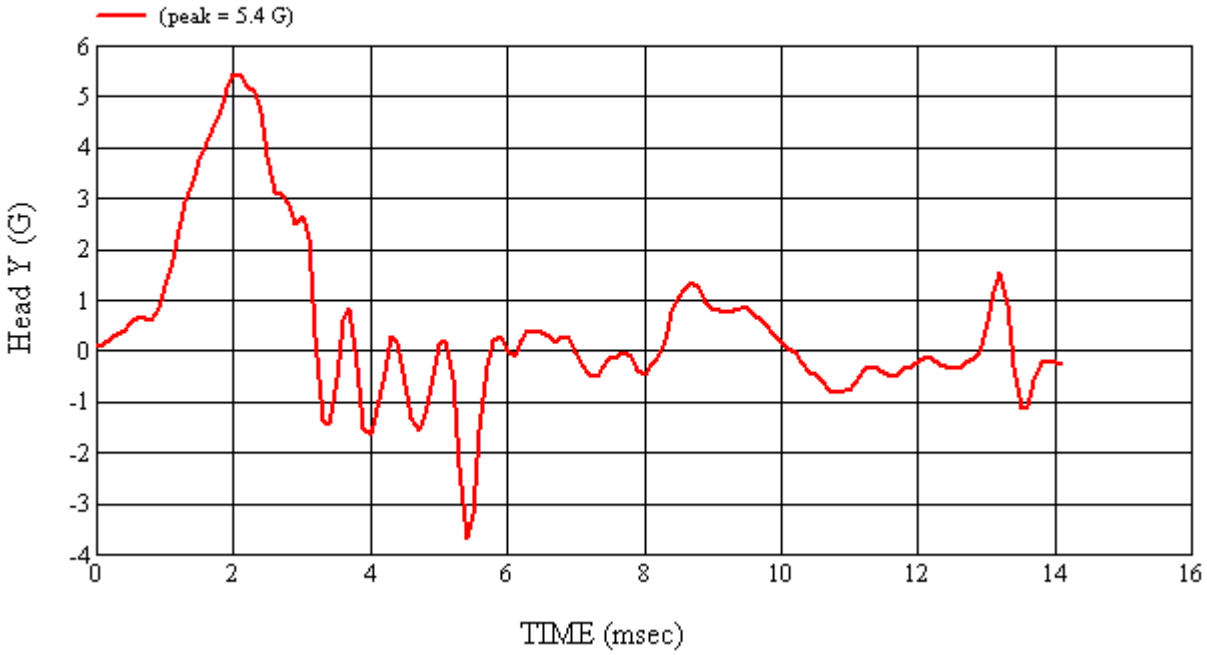
REMARKS:

RECORDED BY: _____ DATE: 5/19/2008

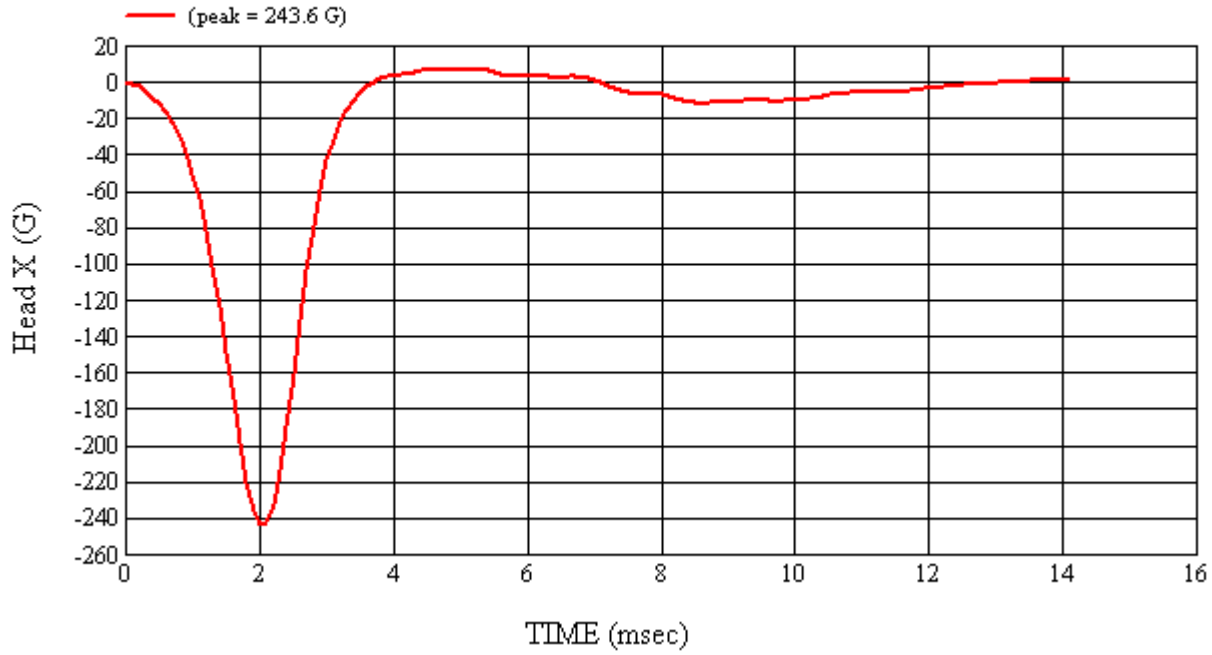
APPROVED BY: _____



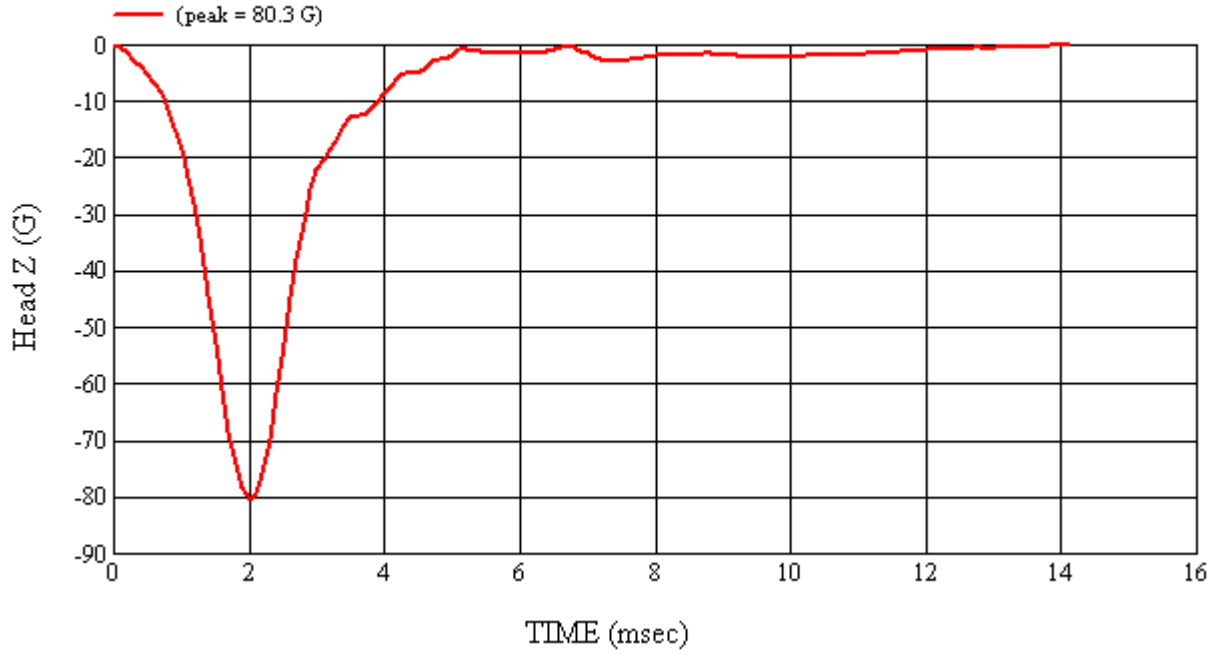
Head 037 (Pre) Calibration #H37015



Head 037 (Pre) Calibration #H37015



Head 037 (Pre) Calibration #H37015



Head 037 (Pre) Calibration #H37015

4-4 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

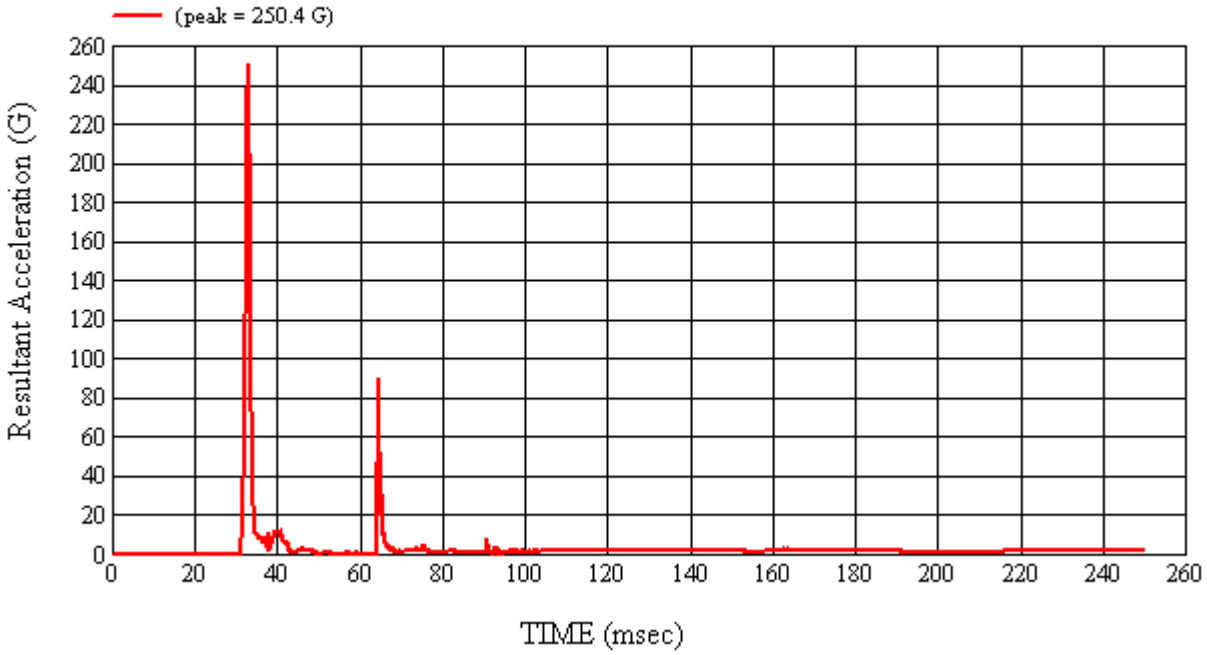
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 5/27/2008 CALIBRATION TIME: 7:31:51 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	24
Peak Resultant Acceleration	225 G's to 275 G's	250.4
Peak Lateral Acceleration	15 G's Maximum	10.7
Unimodal Acceleration Curve	YES	YES

FMH INSTRUMENTATION					
HEAD ACCELEROMETERS					
Channel Number	**Manufacturer**	**Model Number**	**Serial Number**	**Date of Last Calibration**	**Date of Next Calibration**
1	ENDEVCO	7264-2000	AHTB2	04/22/08	10/22/08
2	ENDEVCO	7264-2000	J14103	04/22/08	10/22/08
3	ENDEVCO	7264-2000	J35800	04/22/08	10/22/08

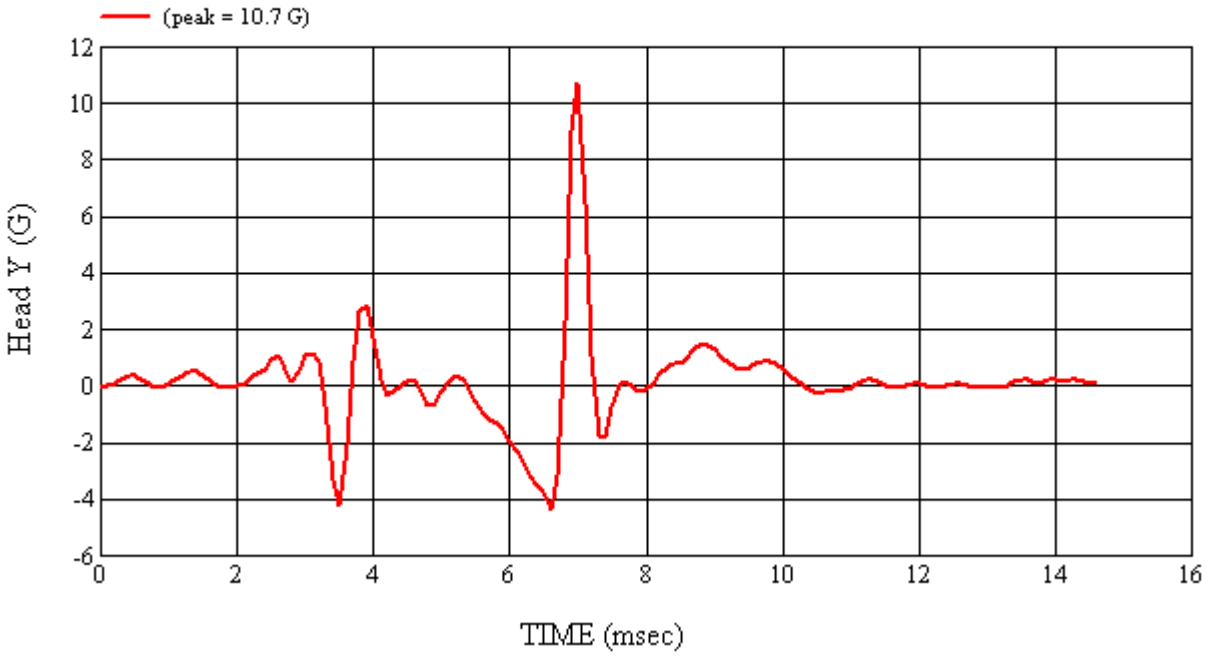
REMARKS:

RECORDED BY: Travis Campbell DATE: 5/27/2008

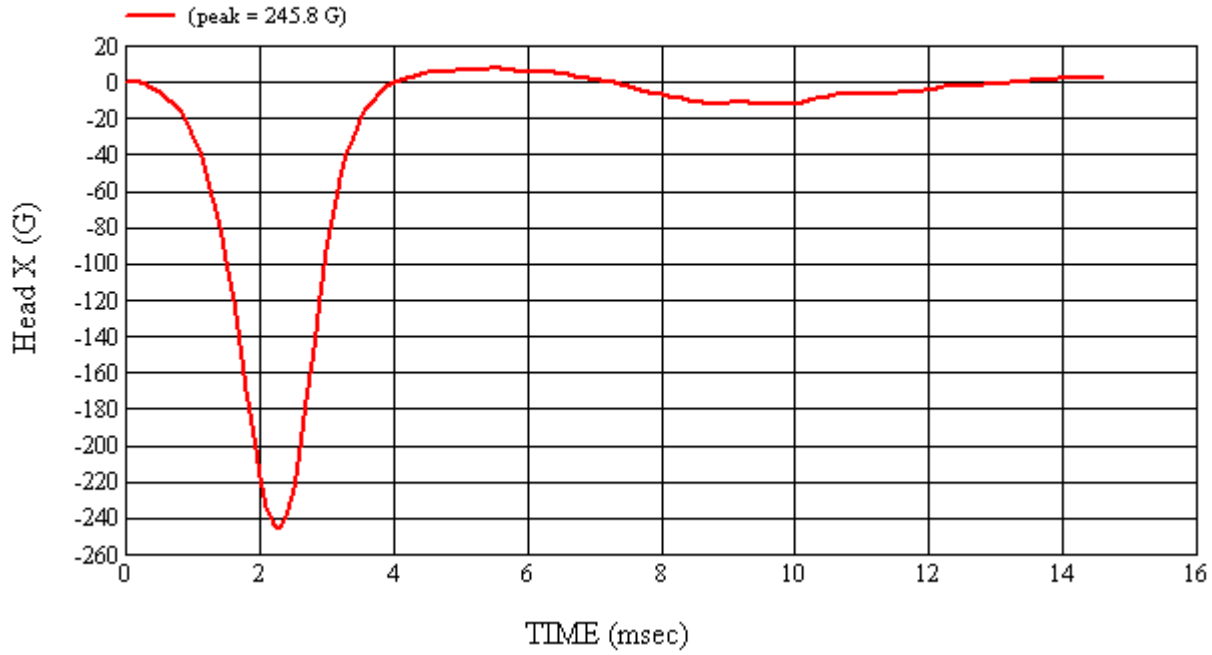
APPROVED BY: Helen A. Kalista



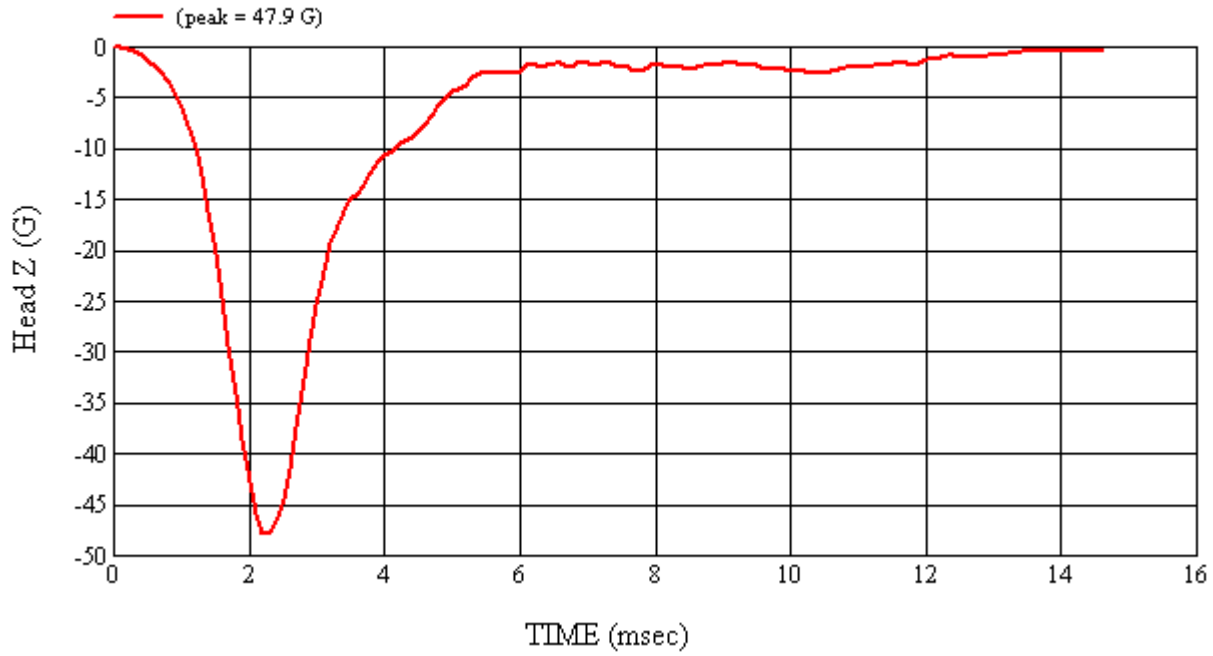
Head 037 (Post) Calibration #H37016



Head 037 (Post) Calibration #H37016



Head 037 (Post) Calibration #H37016



Head 037 (Post) Calibration #H37016

4-5 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

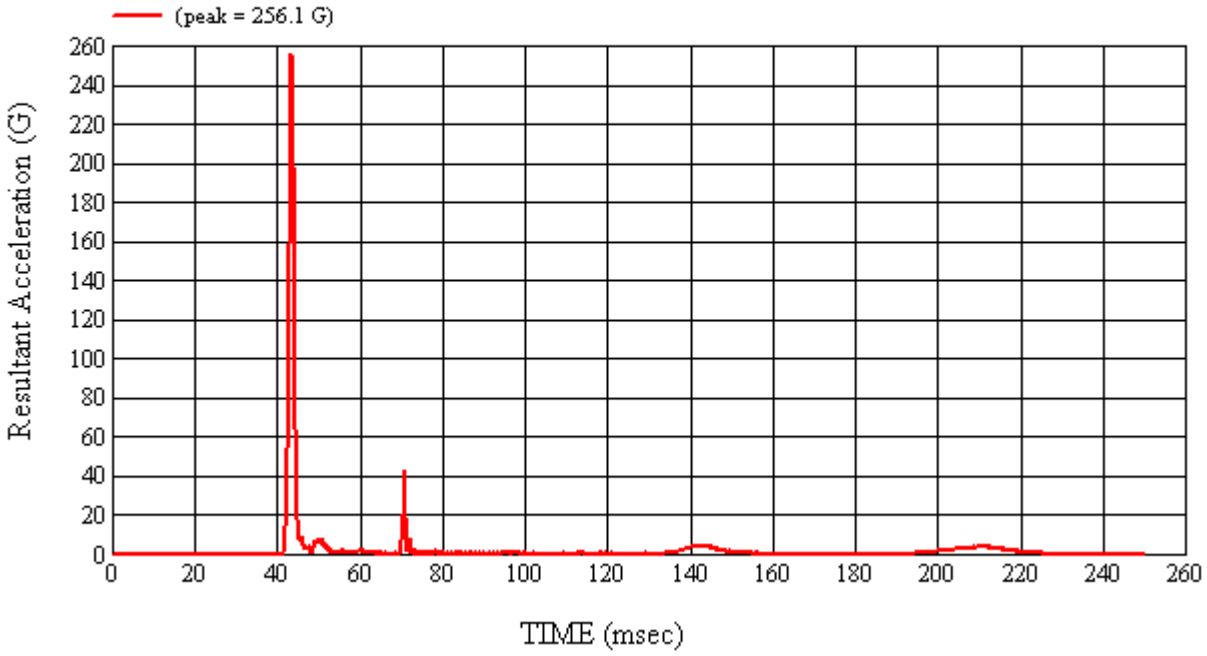
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 5/19/2008 CALIBRATION TIME: 9:06:05 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.92
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	31
Peak Resultant Acceleration	225 G's to 275 G's	256.1
Peak Lateral Acceleration	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	J22700	04/15/08	10/15/08
2	ENDEVCO	7264-2000	J36197	04/15/08	10/15/08
3	ENDEVCO	7264-2000	J36353	04/15/08	10/15/08

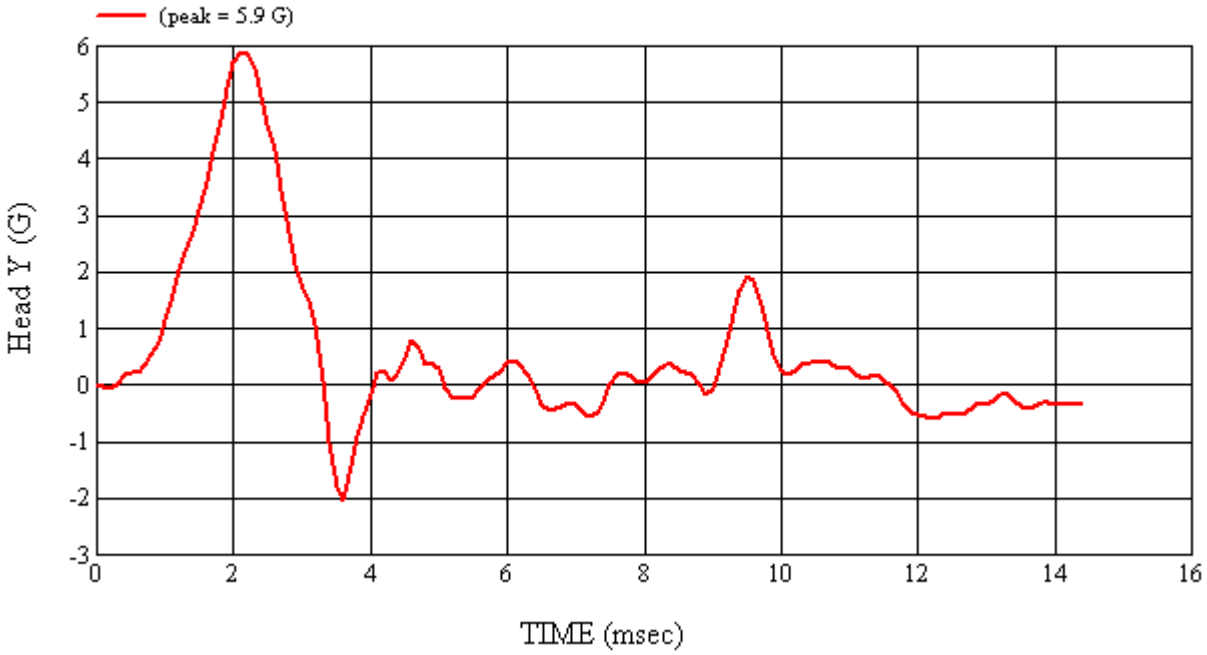
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 5/19/2008

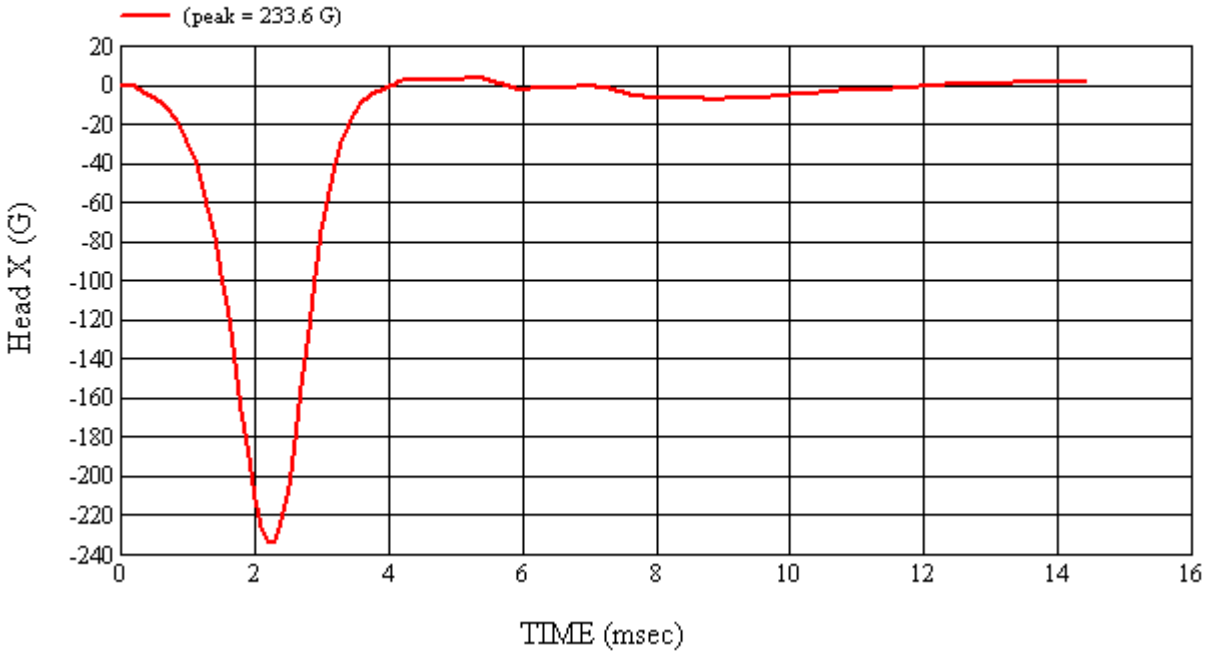
APPROVED BY: Helen A. Kalesto



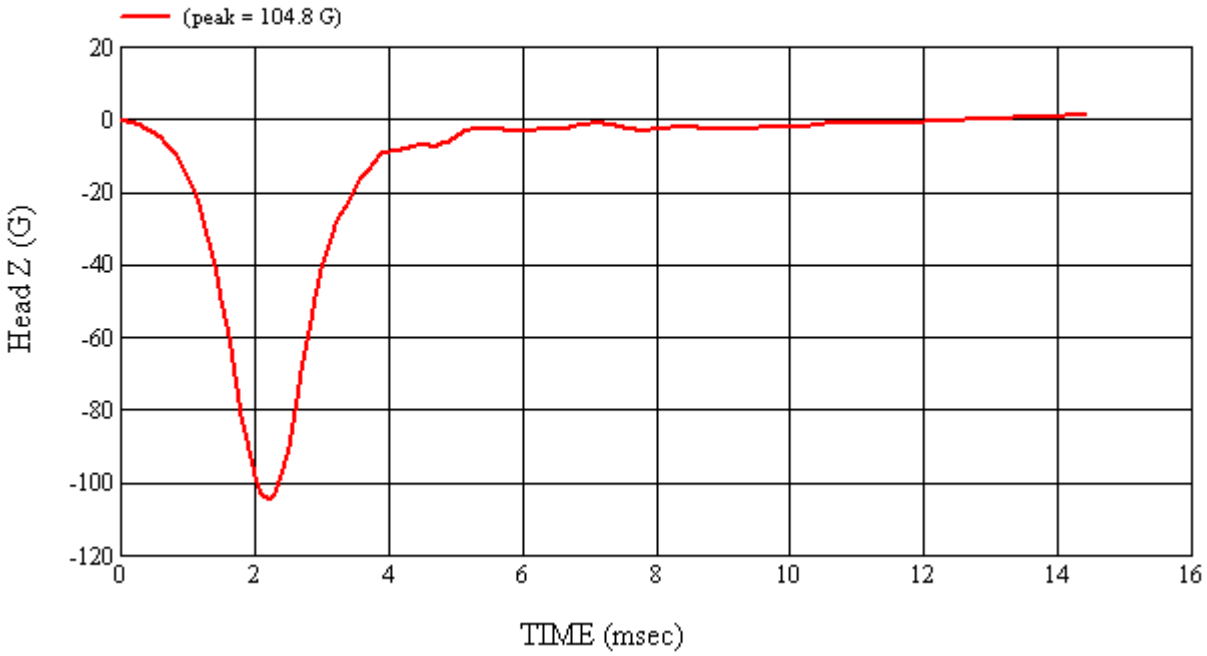
Head 038 (Pre) Calibration #H38015



Head 038 (Pre) Calibration #H38015



Head 038 (Pre) Calibration #H38015



Head 038 (Pre) Calibration #H38015

4-6 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

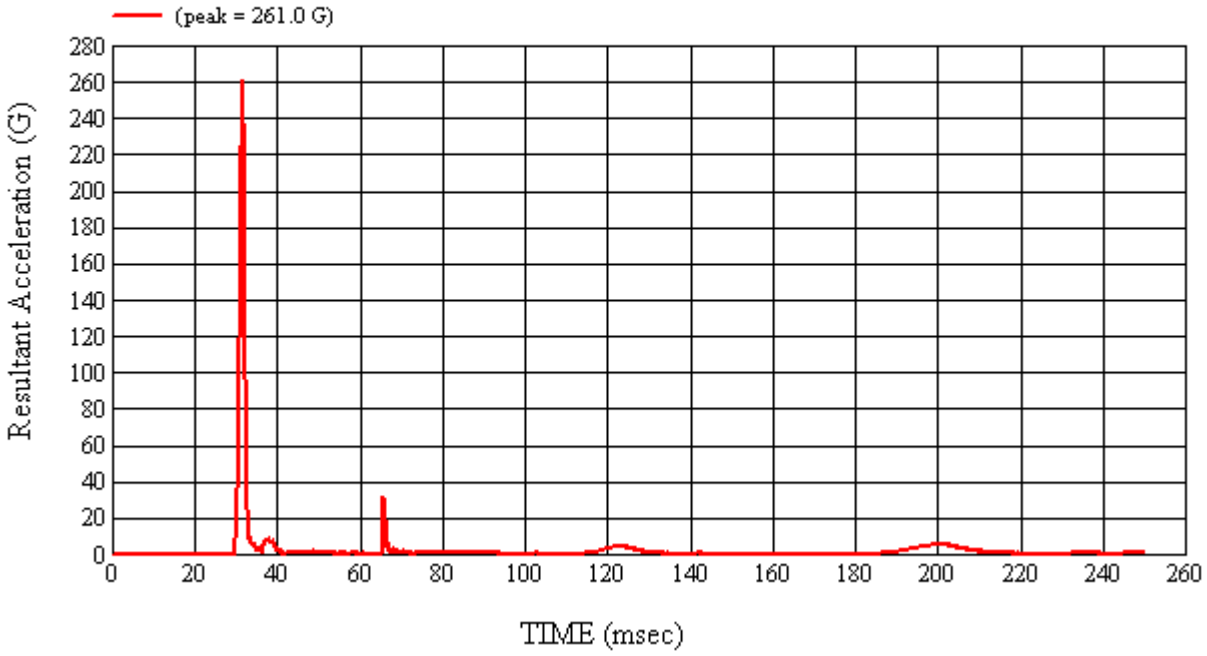
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 5/27/2008 CALIBRATION TIME: 7:34:03 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.92
Temperature	19° C to 26° C	22
Relative Humidity	10% to 70%	24
Peak Resultant Acceleration	225 G's to 275 G's	261.0
Peak Lateral Acceleration	15 G's Maximum	13.2
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	J22700	04/15/08	10/15/08
2	ENDEVCO	7264-2000	J36197	04/15/08	10/15/08
3	ENDEVCO	7264-2000	J36353	04/15/08	10/15/08

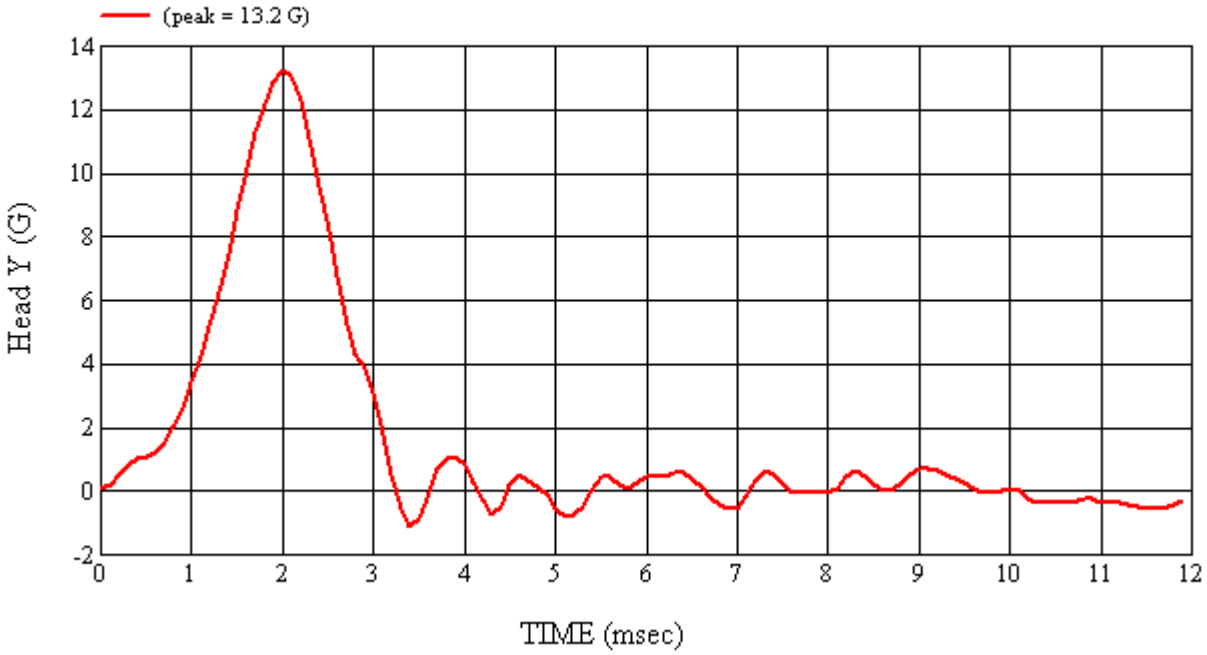
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 5/27/2008

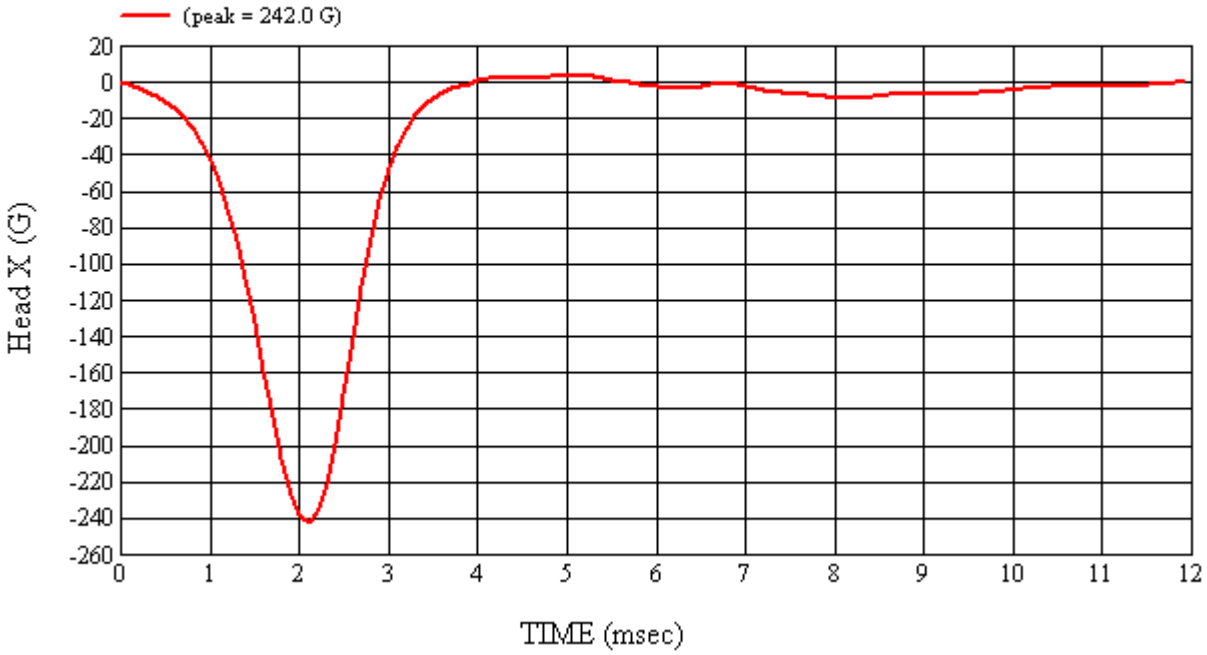
APPROVED BY: Eileen A. Kalata



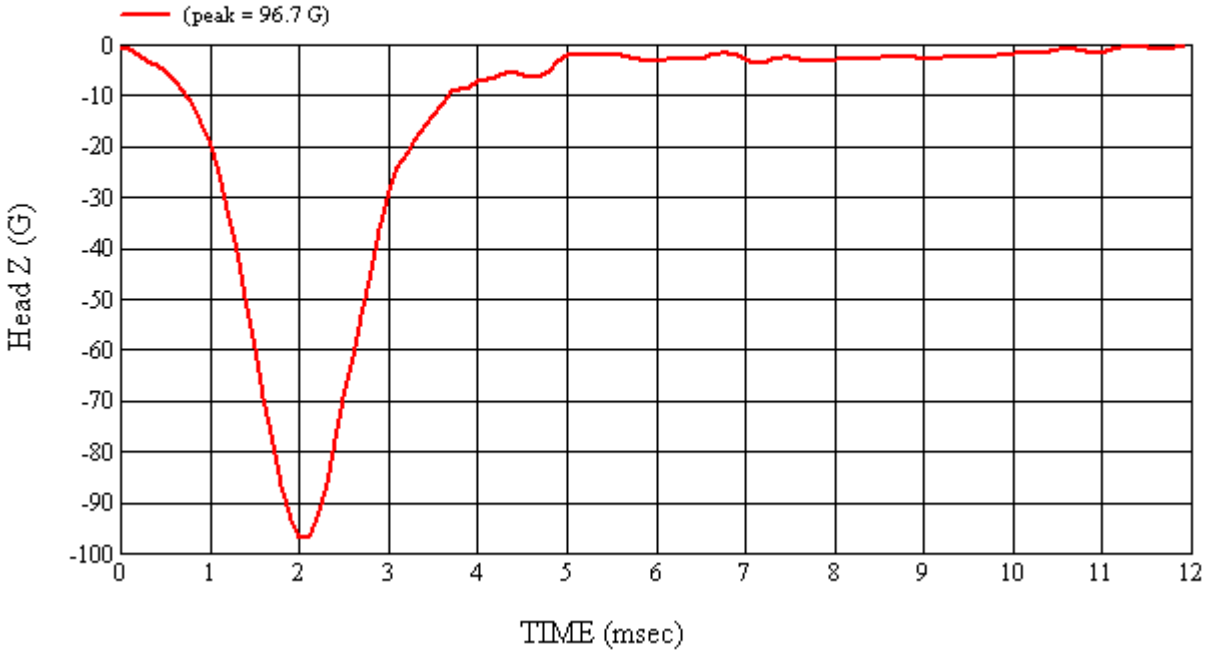
Head 038 (Post) Calibration #H38016



Head 038 (Post) Calibration #H38016



Head 038 (Post) Calibration #H38016



Head 038 (Post) Calibration #H38016

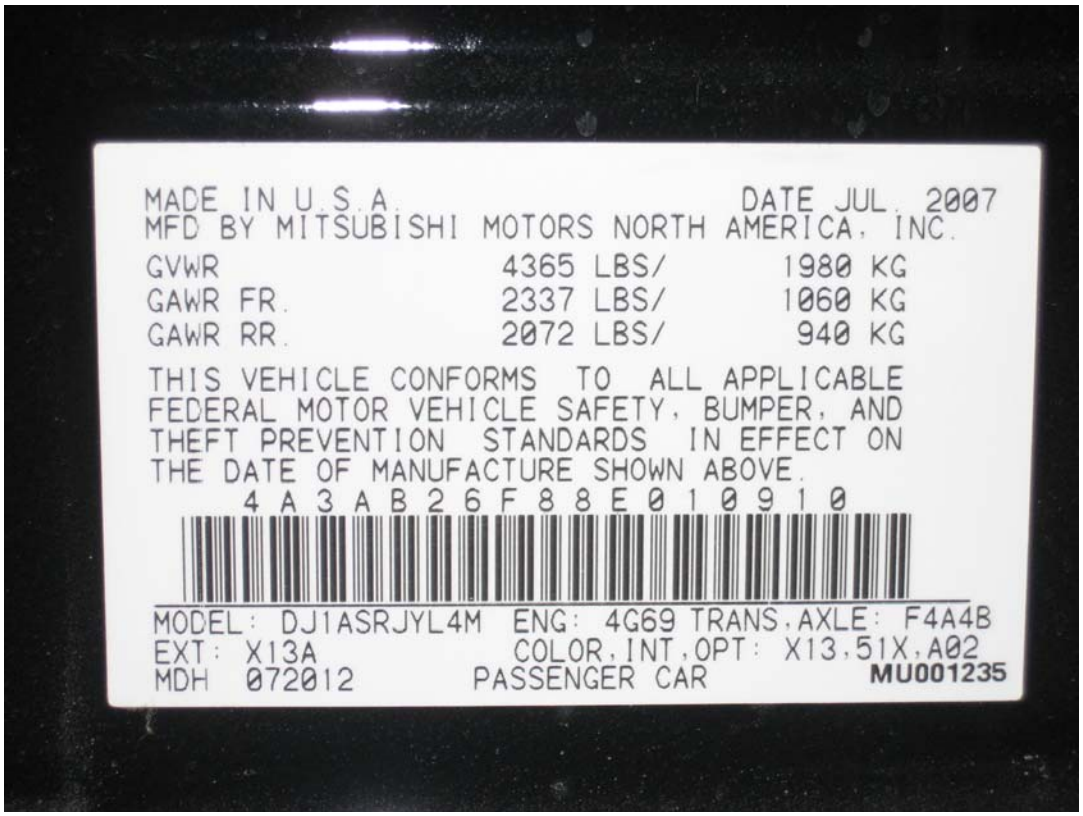
5.0 PHOTOGRAPHS

As Delivered – Left Side View

As Delivered – Right Side View

As Delivered – ¾ Front View From Left Side

As Delivered – Rear View From Right Side



As Delivered – Vehicle's Certification Label

As Delivered – Vehicle's Tire Information Label

Pre-Test Component Photographs


mga
05/20/08
DOT/NHTSA
2008 Mitsubishi Galant
FMVSS 201U Head Impacts
PRE-TEST COMPONENT
C85601
G08I7-001.5


mga
05/20/08
DOT/NHTSA
2008 Mitsubishi Galant
FMVSS 201U Head Impacts
PRE-TEST COMPONENT
C85601
G08I7-001.5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Post-Test Component Photographs


mga
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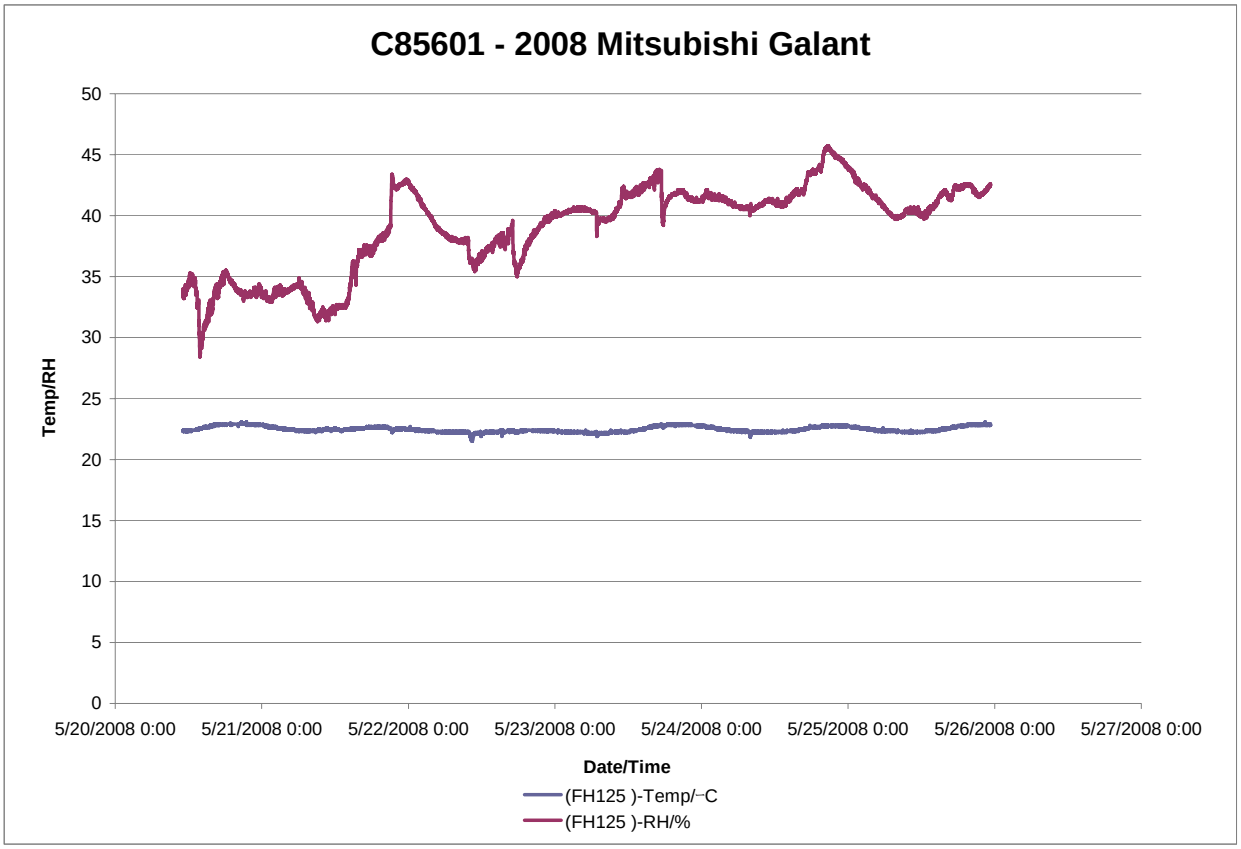
POST-TEST COMPONENT
C85601
G08I7-001.5


mga
05/23/08
DOT/NHTSA
2008 Mitsubishi Galant
FMVSS 201U Head Impacts
POST-TEST COMPONENT
C85601
G08I7-001.5

Appendix A – Temperature Trace



Appendix B – Calibration Certificates

Calibration Certificate

Part Description: Silver
Certification Date: 02/14/08
Serial#: S08-05-98-01273

Single Point (Max-Min/2) Specification: S08-05 +/-.076mm (+/-.0030")
Certificate#: S0127339492

Volumetric (Max Deviation) Specification: S08-05 +/-.108mm (+/-.0042")
Temperature: See attached data

Measurement Standards Traceability

Ball Bar Kit	Asset Number: 1041	Calibration Date: 12/10/07	*SI Traceability: L20071012MG1
Thermometer	Asset Number: 668	Calibration Date: 01/16/08	*SI Traceability: A2LA-3775260

*The artifact above has 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. Expanded measurement uncertainty is 3.9 + 5.9X micrometers, where X=measured value in meters. Uncertainty is expressed at approximately a 95% Level of Confidence using k=2.00.

Certification 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 and certification conforms to procedures developed in accordance with ASME B89.4.22-2004.

Instrument condition as received:
Within specifications

Instrument condition outgoing:
Within specifications

Technician: Neil Maclean Date: 2/14/08

FARO Technologies, Inc.
Michigan Regional Office
PH1:248-669-8620
FAX:248-669-8656
L-A-B Cert Number: L1147.01

46998 Magellan Drive
Wixom, MI 48393
USA

FARO®

LABORATORY ACCREDITATION BUREAU
ISO/IEC 17025 Accredited

mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J35919	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/22/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0807

New DLR (100k **, Units:G):** 95.8

StdDeviation (%) 0.819

% Difference in DLR (New vs. Old): -1.64

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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

mga research corporation

CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J22664	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/22/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0807

New DLR (100k **, Units:G):** 93.9

StdDeviation (%) 1.153

% Difference in DLR (New vs. Old): -0.3

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J35924	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/22/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0807

New DLR (100k **, Units:G):** 92.6

StdDeviation (%) 1.03

% Difference in DLR (New vs. Old): -1.352

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: AHTB2	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/22/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0806

New DLR (100k **, Units:G):** 114.5

StdDeviation (%) 0.414

% Difference in DLR (New vs. Old): 0

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J14103	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/22/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0806

New DLR (100k **, Units:G):** 92.4

StdDeviation (%) 0.309

% Difference in DLR (New vs. Old): -1.298

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J35800	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/22/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0806

New DLR (100k **, Units:G):** 96.5

StdDeviation (%) 0.35

% Difference in DLR (New vs. Old): 0.045

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J22700	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/15/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0803

New DLR (100k **, Units:G):** 95.0

StdDeviation (%) 0.388

% Difference in DLR (New vs. Old): -1.175

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J36197	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/15/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0803

New DLR (100k **, Units:G):** 108.7

StdDeviation (%) 0.547

% Difference in DLR (New vs. Old): -1.766

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J36353	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/15/2008	**Calibration Date:** *7/20/2007*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0803

New DLR (100k **, Units:G):** 98.8

StdDeviation (%) 0.455

% Difference in DLR (New vs. Old): -0.641

Temperature (°F): 72

Humidity (%): 24

Performed By: 

Approved By: 

All calibrations are traceable to the National Institute of Standards and Technology. Estimated uncertainty of the measurement is ±3.7%. All certification data and equipment are on file for inspection at your request. Best uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor k=2.

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248 / 577-5001 • fax 248 / 577-5025
www.mgaresearch.com

MetroCal inc.
#0513.01
4700 Barden Court S.E. • Kentwood, MI 49512 • Telephone: 616.698.3124 • Fax: 616.698.2364

Certificate of Calibration

MGA Research
446 Executive Drive
Troy, MI 48083

Order Number: **57208**
Certificate Number: **071126703**
Page: **1 of 1**

Gauge Number: **MGA00048**
Gauge Desc: **Digital Protractor**
Manufacturer: **Pro 360**
Model Number: **N/A**
Serial Number: **N/A**

Customer PO: **A070457**
Last Calibration: **9/26/06**
Calibration Date: **11/26/07**
Next Calibration: **11/26/08**

As Found Condition: **In Tolerance**

As Left Condition: **In Tolerance**

MetroCal, Inc maintains reference standards of measurement which are traceable to the National Institute of Standards and Technology, or other authorized National Standards. Calibration was performed in accordance with MetroCal Procedure CP045 and complies with the ANSI/NCSL Z540-1 and ISO/IEC 17025 Standards. Results shall not be reproduced, except in full, without the written approval of MetroCal, Inc. Results relate only to the item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired. Statements of compliance made using simple acceptance rule.

Standard Used	Cal Date	Due Date	Traceable No.	Calibration Procedure Uncertainty Expressed at 95% confidence (K=2)
Gage Blk Set ID# 105	6/12/07	6/12/08	821/273187-06	0.0015°
DoAll Sine Bar ID#1879	12/29/06	12/29/07	061229125	0.0015°

Results:

As Found Readings

Units	Nominal	Actual	Deviation
Decimal Deg.	5.00	5.0	0.00
	10.00	9.9	-0.10
	20.00	20.0	0.00
Tolerance	30.00	30.1	0.10
± 0.1 degrees	40.00	40.0	0.00

Reference Level Check: Within ± 0.1 degrees

As Left Readings

Nominal	Actual	Deviation
5.00	5.0	0.00
10.00	9.9	-0.10
20.00	20.0	0.00
30.00	30.1	0.10
40.00	40.0	0.00

Reference Level Check: Within ± 0.1 degrees

Comments: Environmental conditions during calibration: 68 °F, 39% RH.
No adjustments required.

Bill Rinzema issued: 11-26-07
Bill Rinzema
Calibration Technician

☐ Checked box indicate this calibration was performed at the customers facility. 12/3/07

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

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

Tape Measure Calibration Certificate

Reference Steel Rule
Brand: JOHNSON LEVEL & TOOL
S/N: MGA00123
Calibration Date: 1/15/2008

Subject Tape Measure
Brand: STANLEY
S/N: TBM 824
Calibration Date: 3.1.2008

Reference in (mm)	Subject Tape Measure	Difference	Reference in (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: 3.1.2008 Performed By: M Miller

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.

2/29/08

MetroCal inc.
#0512.01
4700 Barden Court S.E. • Kentwood, MI 49512 • Telephone: 616.698.3124 • Fax: 616.698.2364

Certificate of Calibration

MGA Research
446 Executive Drive
Troy, MI 48083

Order Number: 55304
Certificate Number: 070709906
Page: 1 of 1

Gauge Number: MGA00081
Gauge Desc: 0 to 20.00lb x 0.01lb Digital Scale
Manufacturer: Detecto
Model Number: AP-20
Serial Number: E33603-0213

Customer PO: N/A
Last Calibration: 7/7/06
Calibration Date: 7/9/07
Next Calibration: 7/9/08

As Found Condition: In Tolerance

As Left Condition: In Tolerance

MetroCal Inc. maintains reference standards of measurement which traceable to the National Institute of Standards and Technology, or other authorized National Standards. Calibration was performed in accordance with MetroCal's Procedure No. CP-042 and the relevant sections of the manufacturers manual. This Calibration complies with the 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 ID#2463	8/10/06	8/10/08	MI-04-06-8325	+/-0.001% of Load

Results:
Tolerance used: ± 0.02

Units: lbs TI Division/Increment: 0.01

	As Found				As Left		
Weight Test	Nominal	Indication	Deviation		Nominal	Indication	Deviation
0-25% fs	5.00	5.00	0.00		5.00	5.00	0.00
26-50% fs	10.00	9.99	-0.01		10.00	9.99	-0.01
51-75% fs	15.00	14.99	-0.01		15.00	14.99	-0.01
76-100% fs	20.00	19.99	-0.01		20.00	19.99	-0.01
Beam 2							
0-25% fs							
26-50% fs							
51-75% fs							
76-100% fs							
Beam 3							
0-25% fs							
26-50% fs							
51-75% fs							
76-100% fs							
Shift Test:	Pass			Shift Test:	Pass		
Half Load Test:	Pass			Half Load Test:	Pass		

Comments: Environmental conditions during calibration: 87 deg. F., 47 % RH

Chad Rosema issued: 7/9/07
Chad Rosema/bjk
Calibration Technician

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

7/24/07

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

Certificate of Calibration

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

calibration cert. 1448.01

Customer: MGA Research ***Cert#*** 07-3173 ***Temp/Humidity:*** 78/40
Location of Calibration: 2839 Elliott Troy MI 48083
Calibration Date: 7/17/2007 ***Cal Due:*** Jul-08 ***Condition of Item:*** GOOD
Equipment Make: SW Scales ***Model:*** SW Deluxe ***Serial/ID:*** 26032389 ***Capacity:*** 8600x1lb

Applied Test Wt	*Before Adjustment*	*Tolerance*	*In-Tolerance Y/N*	*After Adjustment*	*In-Tolerance Y/N*	*Unc*
LF 0lb	0lb	1lb	y	0lb	y	0.5
LF 50lb	50lb	1lb	y	50lb	y	0.5
LF 1000lb	1000lb	2lb	y	1000lb	y	0.5
LF 2200lb	2199lb	2lb	y	2199lb	y	0.5
LR 0lb	0lb	1lb	y	0lb	y	0.5
LR 50lb	50lb	1lb	y	50lb	y	0.5
LR 1000lb	1000lb	2lb	y	1000lb	y	0.5
LR 2200lb	2200lb	2lb	y	2200lb	y	0.5

shift test
N/A
PADS

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

Tests performed: ☑ Repeatability ☑ Linearity ☐ Sensitivity ☑ Discrimination

Page 1 of 2

Technician COMMENTS/ weights used: The scale is accurate and working fine. The scale holds a good zero,also the system is in a storage trunk. Sterling House Weights

☑ Scale Certified ☐ Scale Rejected

Sterling Scale Service Rep: Larry V. **Date:** 7/17/2007 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

4/14/08

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

Certificate of Calibration

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

calibration cert. 1448.01

Customer: MGA Research ***Cert#*** 07-3173 ***Temp/Humidity:*** 78/40
Location of Calibration: 2839 Elliott Troy MI 48083
Calibration Date: 7/17/2007 ***Cal Due:*** Jul-08 ***Condition of Item:*** GOOD
Equipment Make: SW Scales ***Model:*** SW Deluxe ***Serial/ID:*** 26032389 ***Capacity:*** 8800x1lb

Applied Test Wt	*Before Adustment*	*Tolerance*	*In-Tolerance Y/N*	*After Adjustment*	*In-Tolerance Y/N*	*Unc*
RF 0lb	0lb	1lb	y	0lb	y	0.5
RF 50lb	50lb	1lb	y	50lb	y	0.5
RF 1000lb	1000lb	2lb	y	1000lb	y	0.5
RF 2200lb	2200lb	2lb	y	2200lb	y	0.5
RR 0lb	0lb	1lb	y	0lb	y	0.5
RR 50lb	50lb	1lb	y	50lb	y	0.5
RR 1000lb	1000lb	2lb	y	1000lb	y	0.5
RR 2200lb	2199lb	2lb	y	2199lb	y	0.5

shift test
N/A
PADS

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

Tests performed: ☑ Repeatability ☑ Linearity ☐ Sensitivity ☑ Discrimination

Page 2 of 2

Technician COMMENTS/ weights used: The scale is accurate and working fine.
Sterling House Weights

☑ Scale Certified ☐ Scale Rejected

Sterling Scale Service Rep: Larry V. **Date:** 7/17/2007 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

4/14/08

MetroCal inc.

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: **59556**
Certificate Number: **080506600**
Page: **1 of 1**

Gauge Number: **MGA00777**
Gauge Desc: **Digital Temperature/Humidity Recorder**
Manufacturer: **Dickson**
Model Number: **FH125**
Serial Number: **06018122**

Customer PO: **A070658**
Last Calibration: **N/A**
Calibration Date: **5/6/08**
Next Calibration: **5/6/09**

As Found Condition: **In Tolerance**

As Left Condition: **In Tolerance**

MetroCal, Inc maintains reference standards of measurement which are traceable to the National Institute of Standards and Technology, or other authorized National Standards. Calibration was performed in accordance with MetroCal Procedure CP053 and complies with the ANSI/NCSL Z540-1 and ISO/IEC 17025 Standards. Results shall not be reproduced, except in full, without the written approval of MetroCal, Inc. Results relate only to the item(s) calibrated. Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired. Statements of compliance made using simple acceptance rule.

Standard Used	Cal. Date	Due Date	Traceable No.	Calibration Procedure Uncertainty Expressed 95% confidence, (K=2)
CL26 Calibrator ID# 10901	12/31/07	12/31/08	10901:1199107512	Calibrator System Unc.
Standard RTD Probe ID#4525	6/13/07	6/13/08	Cert# P143088	0.75 °F

Results:

As Found

Units	Standard RTD Reading	Actual Gage Reading	Error
°C	7.0	7.2	0.2
	21.9	22.3	0.4
Tolerance	33.6	33.2	-0.4
± 1.8°F (± 1°C)			

As Left

Standard RTD Reading	Actual Gage Reading	Error
7.0	7.2	0.2
21.9	22.3	0.4
33.6	33.2	-0.4

Comments: Environmental conditions during calibration: 71° F, 35% RH.
No adjustments required. Calibrated temperature only per client request.

Karen Shipley
Calibration Technician

Issued: 5/6/08

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

5/6/08

~ *Calibration Certificate* ~

Per ISO 16063-21

Model Number: 301M09/484B (394M17 SYSTEM)

Serial Number: 862/2470 (MGA00739)

Description: ICP® Accelerometer Method: Back-to-Back Comparison Calibration

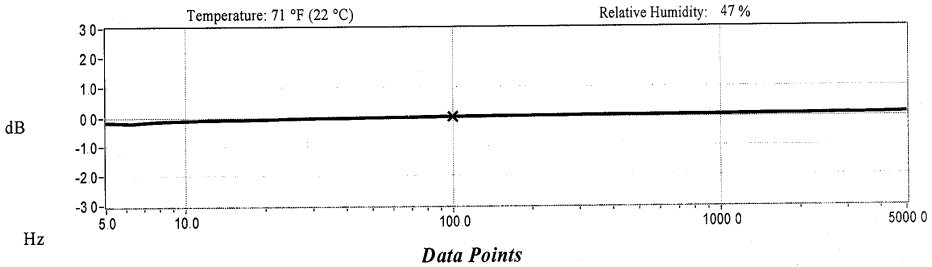
Manufacturer: PCB

ACS-10

Calibration Data

Sensitivity @ 100.0 Hz	**31.36 mV/g**	Output Bias	8.6	VDC
	(3.20 mV/m/s²)	Transverse Sensitivity	3.0	%

Sensitivity Plot



Data Points

Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev (%)
5.0	-2.0	REF. FREQ.	0.0	5000.0	1.2
10.0	-1.3	300.0	0.4		
15.0	-1.0	500.0	0.5		
30.0	-0.5	1000.0	0.6		
50.0	-0.3	3000.0	1.0		

Mounting Surface: Stainless Steel w/Silicone Grease Coating Fastener: Stud Mount Fixture Orientation: Vertical

Acceleration Level (rms)[1]: 10.0 g (98.1 m/s²)

[1]The acceleration level may be limited by shaker displacement at low frequencies If the listed level cannot be obtained, the calibration system uses the following formula to set the vibration amplitude: Acceleration Level (g) = 0.010 x (freq)²

[2]The gravitational constant used for calculations by the calibration system is; 1 g = 9.80665 m/s²

Condition of Unit

As Found: In Tolerance, No Adjustment Necessary

As Left: In Tolerance

Notes

1. Calibration is NIST Traceable thru Project 822/274086 and PTB Traceable thru Project 1060.
2. This certificate shall not be reproduced, except in full, without written approval from PCB Piezotronics, Inc.
3. Calibration is performed in compliance with ISO 9001, ISO 10012-1, ANSI/NCSL Z540-1-1994 and ISO 17025
4. See Manufacturer's Specification Sheet for a detailed listing of performance specifications.
5. Measurement uncertainty (95% confidence level with coverage factor of 2) for frequency ranges tested during calibration are as follows: 5-9 Hz; +/- 2.0%, 10-99 Hz; +/- 1.5%, 100-1999 Hz; +/- 1.0%, 2-10 kHz; +/- 2.5%.

Technician: Chuck DiMaggio CD Date: 07/23/07

ACCREDITED
Cert No 1862.01

PCB PIEZOTRONICS INC
VIBRATION DIVISION
3425 Walden Avenue Depew, NY 14043
TEL: 888-684-0013 FAX: 716-685-3886 www.pcb.com

7/24/07

CAL3 - 3268027234.03

PAGE 1 of 1

~Certificate of Calibration~

Model Number: 484B
Serial Number: 2470
Description: Signal Conditioner
Test Procedure: AT-106-1
Temperature: 71° F

PCB Control #: QC214/QC184/QC198/CA514
Calibration Date: 07/20/07
Recalibration Date:
Calibration Technician: James Higbee 2b
Relative Humidity: 51%

Volts	*Current (mA)*	*Gain**
24.0	3.9	1.000

As Received: In tolerance, no adjustment required.

As Left: In tolerance.

Special Notes:

This document certifies that the equipment referenced above meets published specifications. The calibration procedure is in compliance with ISO 10012-1, and former MIL-STD-45662A and is traceable to NIST. *Measurement uncertainty (95% confidence level w\coverage factor of 2) for scale factors is +/- 0.2%.

ACCREDITED
Cert. No. 1862.01

PCB PIEZOTRONICS

3425 Walden Avenue Depew, New York, USA 14043-2495

For any questions concerning this certificate, please call PCB at (716) 684-0001 and ask for an application engineer