FINAL REPORT NUMBER 201UI-MGA-07-04

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

GM DAEWOO AUTO & TECHNOLOGY COMPANY
2007 Chevrolet Aveo LS, 4-Door Sedan
NHTSA No. C70100

MGA RESEARCH CORPORATION
446 Executive Drive
Troy, Michigan 48083

Test Dates: September 7 and 10, 2007
Report Date: October 4, 2007

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 2007 Chevrolet Aveo LS, 4-Door Sedan, NHTSA No. C70100, 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 September 7 and 10, 2007. Test failures identified were as follows: None The data recorded indicates that the 2007 Chevrolet Aveo LS, 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 2007 Chevrolet Aveo LS, 4-Door Sedan, meets the performance requirements of FMVSS 201, Occupant Protection in Interior Impact - Upper Interior Head Impact Protection.

Tests were conducted on September 7 and 10, 2007 on a 2007 Chevrolet Aveo LS, 4-Door Sedan, manufactured by GM Daewoo Auto & Technology Company.

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 2007 Chevrolet Aveo LS, 4-Door Sedan, was equipped with A, B, O (Other), and rear-pillars, an adjustable seat belt anchorage on each B-pillar, a fixed seat belt anchorage on each rear pillar, a grab handle located on the side rail above the front passenger door and above each rear door, and a front overhead console.

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	OP2	UR2@BPR
AP2	BP2	RP1	UR3@OP1
AP3	BP3	SR2(A)	UR4@Front Side Rail between SR1 and SR2A/B

The 2007 Chevrolet Aveo, 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: 2007 Chevrolet Aveo LS, 4-Door Sedan

VEH. NHTSA NO.: C70100 VIN: KL1TD66677B695566 COLOR: Blue

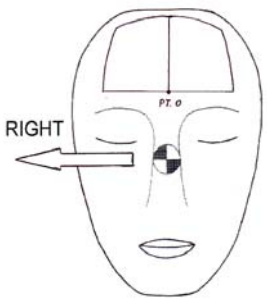
VEH. BUILD DATE: May, 2006 TEST DATES: September 7 and 10, 2007

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, Scott Keyser

TARGET	VEHICLE SIDE	HORIZONTAL ANGLE (deg)	VERTICAL ANGLE (deg)	VELOCITY (kph)	HIC(d)	FMH HIC	IMPACT ON FMH (mm)	
							Above	Left/Right
AP1	Right	113	30	23.7	589	561	18	4 Left
AP2	Left	201	50	23.6	632	617	2	7 Left
AP3	Right	158	47	23.8	570	535	3	0
BP1	Right	90	13	23.8	731	748	55	0
BP2	Right	90	0	23.3	584	554	14	9 Left
BP3	Left	283	-3	23.8	634	619	20	20 Left
OP2	Left	270	0	23.4	621	603	21	3 Left
RP1	Right	80	17	23.9	454	382	16	6 Left
SR2(A)	Left	270	45	23.5	545	502	5	5 Right
UR2@ BPR	Left	270	38	23.2	655	647	41	1 Right
UR3@OP1	Left	270	39	23.5	644	633	47	3 Left
UR4@Front Side Rail	Right	90	19	24.2	920	999	80	8 Left

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



POST TEST COMMENTS:

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

AP1 Right: A-pillar cracked.

AP2 Left: Top of A-pillar cracked and displaced.

AP3 Right: A-Pillar cracked.

OP2 Left: O-pillar cracked.

RP1 Right: Rear pillar/O-pillar trim cracked, broke, and displaced.

SR2(A) Left: Sunglass holder broke off.

UR2@BPR Left: Top of B-pillar slightly displaced.

UR3@(OP1) Left: Headliner deformation.

UR4@Front side rail between SR1 & SR2A/B Right: Stress marks on rear of grab handle.

REMARKS:

The targets listed were impacted in the following order:

Left: AP2, SR2(A), BP3, UR2@BPR, UR3@(OP1), OP2

Right: AP3, AP1, UR4@Front Side Rail, BP2, BP1, RP1

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: September 10, 2007

APPROVED BY: Helen A. Kaleto

TABLE 2-2

GENERAL TEST AND VEHICLE PARAMETER DATA

VEH. MOD YR/MAKE/MODEL/BODY: 2007 Chevrolet Aveo LS, 4-Door Sedan

VEH. NHTSA NO.: C70100 VIN: KL1TD66677B695566 COLOR: Blue

VEH. BUILD DATE: May, 2006 TEST DATES: September 7 and 10, 2007

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, Scott Keyser

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

SUNROOF INFORMATION:

Installed: _____Yes __X__ No

Operation: _____Electric ____ Manual

SIDE RAIL CURTAIN AIRBAG INFORMATION:

Installed: ___Yes __X__ No

ROLL-BAR INFORMATION:

Installed: _____Yes __X__ No

Padded: _____Yes __X__ No

Braces: _____Yes __X__ No

GENERAL INFORMATION:

Date Received: 08/06/07; Odometer Reading 502 miles

DATA FROM VEHICLE'S CERTIFICATION LABEL:

Vehicle Manufactured By: GM Daewoo Auto & Technology Company

Date of Manufacture: May, 2006; VIN: KL1TD66677B695566

GVWR: 3287 lb; GAWR FRONT: 1830 lb;

GAWR REAR: 1767 lb

DATA FROM TIRE PLACARD:

Tire Pressure with Maximum Capacity Vehicle Load:

FRONT: 210 kPa REAR: 210 kPa

Recommended Tire Size: P185/60R14

Recommended Cold Tire Pressure:

FRONT: 210 kPa REAR: 210 kPa

Size of Tire on Test Vehicle: P185/60R14

Type of Spare Tire: T105/70D14; 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) = 390 kg

No. of Occupants x 68 kg = 340 kg

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

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

Right Front =	347.0 kg	Right Rear =	208.0 kg
Left Front =	363.5 kg	Left Rear =	206.0 kg
TOTAL FRONT =	710.5 kg	TOTAL REAR =	414.0 kg
% Total Weight =	63.2 %	% Total Weight =	36.8 %

TOTAL DELIVERED WEIGHT = 1124.5 kg

CALCULATION OF VEHICLE'S TARGET TEST WEIGHT:

Total Delivered Weight = 1124.5 kg

Max. Test Cargo/Luggage Weight = 50.0 kg

Target Test Weight = 1174.5 kg

WEIGHT OF TEST VEHICLE FULLY LOADED:

Right Front =	345.0 kg	Right Rear =	235.0 kg
Left Front =	362.5 kg	Left Rear =	232.5 kg
TOTAL FRONT =	707.5 kg	TOTAL REAR =	467.5 kg
% Total Weight =	60.2 %	% Total Weight =	39.8 %

TOTAL TEST WEIGHT = 1175.0 kg

Weight of ballast secured in vehicle's cargo area = 50.0 kg

TEST VEHICLE ATTITUDE:

AS DELIVERED: Right Front 656 mm; Left Front 644 mm;
Right Rear 655 mm; Left Rear 651 mm;
Pitch Angle at Right Door Sill = 1.2 Rear is higher
Pitch Angle at Left Door Sill = 0.7 Rear is higher
Roll Angle at Front Bumper = 0.4 Right is higher
Roll Angle at Rear Bumper = 0.1 Right is higher

FULLY LOADED: Right Front 654 mm; Left Front 644 mm;
Right Rear 638 mm; Left Rear 635 mm;
Pitch Angle at Right Door Sill = 0.8 Rear is higher
Pitch Angle at Left Door Sill = 0.4 Rear is higher
Roll Angle at Front Bumper = 0.4 Right is higher
Roll Angle at Rear Bumper = 0.1 Right is higher

AS TARGETED: Right Front 871 mm; Left Front 860 mm;
Right Rear 867 mm; Left Rear 867 mm;
Pitch Angle at Right Door Sill = 1.2 Rear is higher
Pitch Angle at Left Door Sill = 0.7 Rear is higher
Roll Angle at Front Bumper = 0.4 Right is higher
Roll Angle at Rear Bumper = 0.1 Right is higher

AS TESTED ON RIGHT SIDE:

Pitch Angle at Right Door Sill =	1.2 Rear is higher
Pitch Angle at Left Door Sill =	0.7 Rear is higher
Roll Angle at Front Bumper =	0.4 Right is higher
Roll Angle at Rear Bumper =	0.1 Right is higher

AS TESTED ON LEFT SIDE:

Pitch Angle at Right Door Sill =	1.2 Rear is higher
Pitch Angle at Left Door Sill =	0.7 Rear is higher
Roll Angle at Front Bumper =	0.4 Right is higher
Roll Angle at Rear Bumper =	0.1 Right is higher

VEHICLE WHEELBASE = 2475 mm

REMARKS: The seat travel distance was measured to be 228 mm for the driver front seat and 228 mm for the passenger front seat.

RECORDED BY: Louis Campbell DATE: September 6, 2007

APPROVED BY: Helen A. Kaleto

TABLE 2-3

HORIZONTAL IMPACT ANGLE RANGE FOR A AND B PILLARS

VEH. MOD YR/MAKE/MODEL/BODY: 2007 Chevrolet Aveo LS, 4-Door Sedan

VEH. NHTSA NO.: C70100 VIN: KL1TD66677B695566 COLOR: Blue

VEH. BUILD DATE: May, 2006 TEST DATES: September 7 and 10, 2007

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, Scott Keyser

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 201.4º	L 246.8º
	R 105º-165º	R 113.1º	R 158.6º
B-PILLAR	L 195º-345º	L 206.2º	L 283.1º
	R 15º-165º	R 77.9º	R 153.9º

AS DETERMINED USING THE PROCEDURES SPECIFIED IN S8.13.4.1

REMARKS:

RECORDED BY: Louis Campbell DATE: September 6, 2007

APPROVED BY: Helen A. Kaleto

TABLE 2-4

VERTICAL IMPACT ANGLE RANGES

VEH. MOD YR/MAKE/MODEL/BODY: 2007 Chevrolet Aveo LS, 4-Door Sedan

VEH. NHTSA NO.: C70100 VIN: KL1TD66677B695566 COLOR: Blue

VEH. BUILD DATE: May, 2006 TEST DATES: September 7 and 10, 2007

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, Scott Keyser

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 25º
		R 0º-50º	R 0º	R 25º
	SR2A	L 0º-50º	L 0º	L 45º
		R 0º-50º	R 0º	R 35º
	SR2B	L 0º-50º	L 0º	L 45º
		R 0º-50º	R 0º	R 35º
	SR3-1	L 0º-50º	L 0º	L 38º
		R 0º-50º	R 0º	R 38º
	SR3-2	L 0º-50º	L 0º	L 38º
		R 0º-50º	R 0º	R 38º
	SR3-3	L 0º-50º	L 0º	L 9º
		R 0º-50º	R 0º	R 10º
REAR HEADER	RH	L 0º-50º	L 0º	L 50º
		R 0º-50º	R 0º	R 50º

		VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
A-PILLAR	AP1	L -5º-50º	L -5º	L 27º
		R -5º-50º	R -5º	R 30º
	AP2	L -5º-50º	L -5º	L 50º
		R -5º-50º	R -5º	R 49º
	AP3	L -5º-50º	L -5º	L 49º
		R -5º-50º	R -5º	R 47º
B-PILLAR	BP1	L -10º-50º	L -10º	L 10º
		R -10º-50º	R -10º	R 13º
	BP2*	L 0º-50º	L 0º	L 0º
		R 0º-50º	R 0º	R 0º
	BP3	L -10º-50º	L -10º	L -3º
		R -10º-50º	R -10º	R -4º
	BP4	L -10º-50º	L -10º	L -8º
		R -10º-50º	R -10º	R -8º
OTHER-PILLAR	OP1	L -10º-50º	L -10º	L 26º
		R -10º-50º	R -10º	R 25º
	OP2	L -10º-50º	L -10º	L 0º
		R -10º-50º	R -10º	R 0º
REAR PILLAR	RP1	L -10º-50º	L -10º	L 18º
		R -10º-50º	R -10º	R 17º
	RP2*	L 0º-50º	L 0º	L 10º
		R 0º-50º	R 0º	R 10º
UPPER ROOF 1		0º-50º	0º	25º
UPPER ROOF 2		0º-50º	0º	38º
UPPER ROOF 3		0º-50º	0º	39º
UPPER ROOF 4		0º-50º	0º	19º
UPPER ROOF 5		0º-50º	0º	16º

	VERTICAL ANGLE SPECIFIED RANGE	MINIMUM VERTICAL ANGLE	MAXIMUM VERTICAL ANGLE
UPPER ROOF 6	0º-50º	0º	38º

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

RECORDED BY: Louis Campbell DATE: September 6, 2007

APPROVED BY: Helen A. Kaleto

TABLE 2-5

TARGET MEASUREMENTS

VEH. MOD YR/MAKE/MODEL/BODY: 2007 Chevrolet Aveo LS, 4-Door Sedan

VEH. NHTSA NO.: C70100 VIN: KL1TD66677B695566 COLOR: Blue

VEH. BUILD DATE: May, 2006 TEST DATES: September 7-10, 2007

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, Scott Keyser

Measurement	Description	Left Side	Right Side
M	Seat Fore/Aft Travel (Front seats)	228 mm	228 mm
Tº	Horizontal < {CG-F1 (Left Seat) to (Right A-Pillar)}	113.2º	--
A1º	360º - Tº	246.8º	--
Wº	Horizontal < {CG-2 (Left Seat) to (Left A-Pillar)}	201.4º	--
A2º	A2º = Wº	201.4º	--
Uº	Horizontal < {CG-2 (Left Seat) to (Left B-Pillar)}	283.1º	--
B1º	B1º = Uº	283.1º	--
Vº	Horizontal < {CG-R (Left Seat) to (Left B-Pillar)}	206.2º	--
B2º	B2º = Vº	206.2º	--
Wº (right)	Horizontal < {CG-F2 (Right Seat) to (Right A-Pillar)}	--	158.6º
A1º (right)	A1º (right) = Wº (right)	--	158.6º
T º (right)	Horizontal < {CG-F1 (Right Seat) to (Left A-Pillar)}	--	246.9º
A2º (right)	360º-Tº (right)	--	113.1º
V º (right)	Horizontal < {CG-R (Right Seat) to (Right B-Pillar)}	--	153.9º
B1º (right)	B1º (right) = Vº (right)	--	153.9º
U º (right)	Horizontal < {CG-F2 (Right Seat) to (Right B-Pillar)}	--	77.9º
B2º (right)	B2º (right) = Uº (right)	--	77.9º
J	A-Pillar {(Plane 3) - (Plane 5)}	347.8 mm	345.5 mm
J/2	J ÷ 2	173.9 mm	172.8 mm
D1	Upper Roof {(Plane A) - (Plane B)}	1805.0 mm	
D1/2	D1 ÷ 2	902.5 mm	
D2	Upper Roof {(Plane C) - (Plane D)}	1134.5 mm	

Measurement	Description	Left Side	Right Side
D2/2	D2 ÷ 2	567.3 mm	
.35D1	.35 x D1	631.8 mm	
.35D2	.35 x D2	397.1 mm	
N	B-Pillar {(BPR) - (lowest point on daylight opening forward of B-Pillar)}	481.8 mm	482.7 mm
N/2	B-Pillar {(BP3) - (lowest point on daylight opening forward of B-Pillar)}	240.9 mm	241.4 mm
N/4	B-Pillar {(BP4) - (lowest point on daylight opening forward of B-Pillar)}	120.5 mm	120.7 mm
Q	O-Pillar (Plane 13 – Plane 14)	400.7 mm	398.4 mm
Q/2	Q / 2	200.4 mm	199.2 mm
D	R-Pillar (Point 7 – Point M)	754.0 mm	754.0 mm
3D/7	3*D / 7	323.1 mm	323.1 mm

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

SgRP Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	1954.3	-333.7	694.4	1954.0	336.2	695.7
Rear	2720.1	-318.2	621.2	2719.9	321.8	622.5

SgRP Locations (vehicle coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	z
Front	3095.0	-335.0	514.9	3095.0	335.0	514.9
Rear	3859.0	-320.0	424.9	3859.0	320.0	424.9

CG Locations (world coordinates)						
	Left (mm)			Right (mm)		
	x	y	z	x	y	Z
CGF1	1886.3	-333.7	1354.4	1886.0	336.2	1355.7
CGF2	2114.3	-333.7	1354.4	2114.0	336.2	1355.7
CGR	2880.1	-318.2	1281.2	2879.9	321.8	1282.5

REFERENCE FOR VEHICLE COORDINATE SYSTEM (measured in millimeters):

Passenger upper door striker bolt hole (x, y, z) = 3245.0, 730.9, 643.0

Driver upper door striker bolt hole (x, y, z) = 3245.0, -730.9, 643.0

Driver front outboard bolt hole (x, y, z) = 2761.0, -565.0, 269.6

REMARKS:

RECORDED BY: Louis Campbell DATE: September 6, 2007

APPROVED BY: Helen A. Kaleto

TABLE 2-6

SUMMARY OF TARGETING RESULTS

VEH. MOD YR/MAKE/MODEL/BODY: 2007 Chevrolet Aveo LS, 4-Door Sedan

VEH. NHTSA NO.: C70100 VIN: KL1TD66677B695566 COLOR: Blue

VEH. BUILD DATE: May, 2006 TEST DATES: September 7 and 10, 2007

TEST LABORATORY: MGA Research Corporation

OBSERVERS: Helen A. Kaleto, Louis Campbell, Scott Keyser

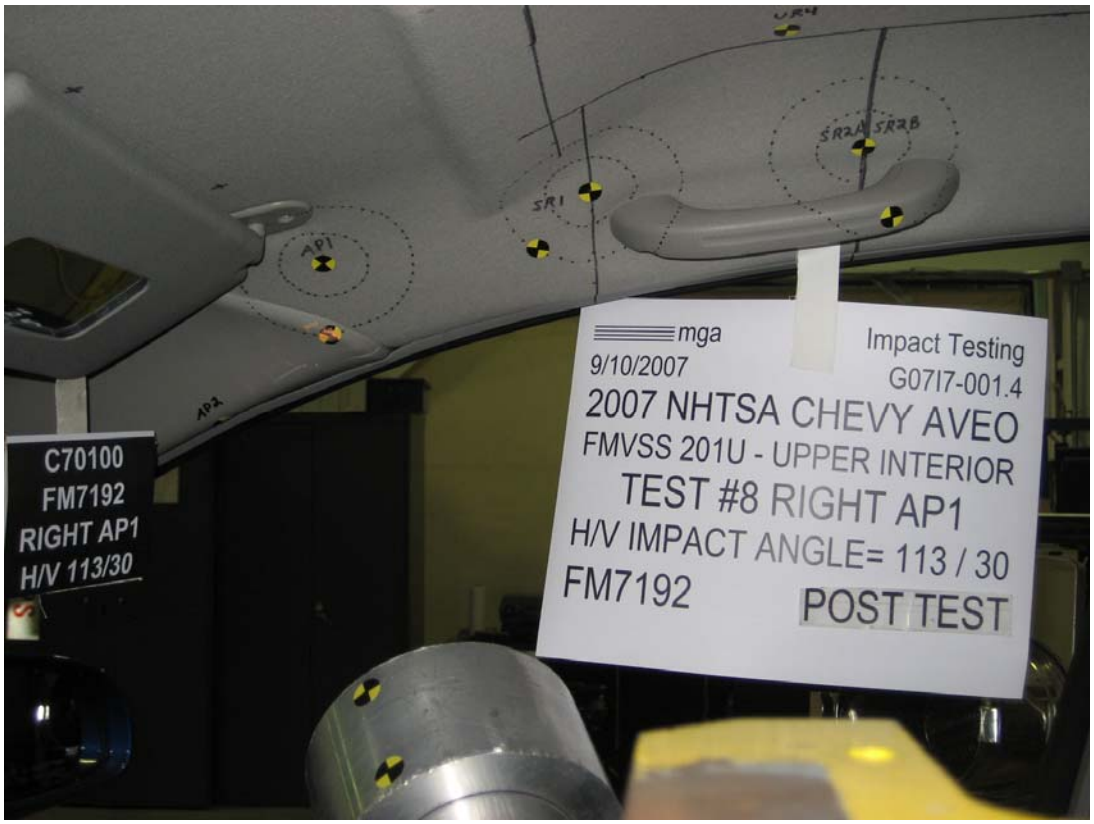
SUMMARY OF TARGETING RESULTS								
Target	**Location (mm)**			**Horizontal Angle (deg)**	**Vertical Angle (deg)**	**Relocation (Yes/No)**	**Extension (# of 25 mm Spheres)**	**Impact (Yes/No)**
	x	**y**	**z**					
A-Pillar Left Side								
AP1	2792.8	-497.0	1294.9	--	--	Yes	--	--
REL	2781.5	-529.7	1257.6	247	27	--	2	No
AP2	2716.0	-564.9	1209.3	201	50	No	--	Yes
AP3	2548.4	-597.2	1127.4	201	49	No	--	No
A-Pillar Right Side								
AP1	2792.5	506.3	1294.6	--	--	Yes	--	--
REL	2790.0	540.2	1256.3	113	30	--	2	Yes
AP2	2715.3	572.9	1209.0	158	49	No	--	No
AP3	2549.2	602.2	1127.9	158	47	No	--	Yes
B-Pillar Left Side								
BP1	3393.1	-459.8	1358.6	270	10	No	--	No
BP2	3366.6	-540.4	1140.6	270	0	No	--	No
BP3	3310.4	-594.9	1120.5	283	-3	No	--	Yes
BP4	3414.1	-643.3	998.8	206	-8	No	--	No
B-Pillar Right Side								
BP1	3392.7	463.1	1359.0	90	13	No	--	Yes
BP2	3368.3	546.6	1137.1	90	0	No	--	Yes
BP3	3309.4	602.0	1119.7	78	-4	No	--	No
BP4	3413.0	646.7	997.0	154	-8	No	--	No

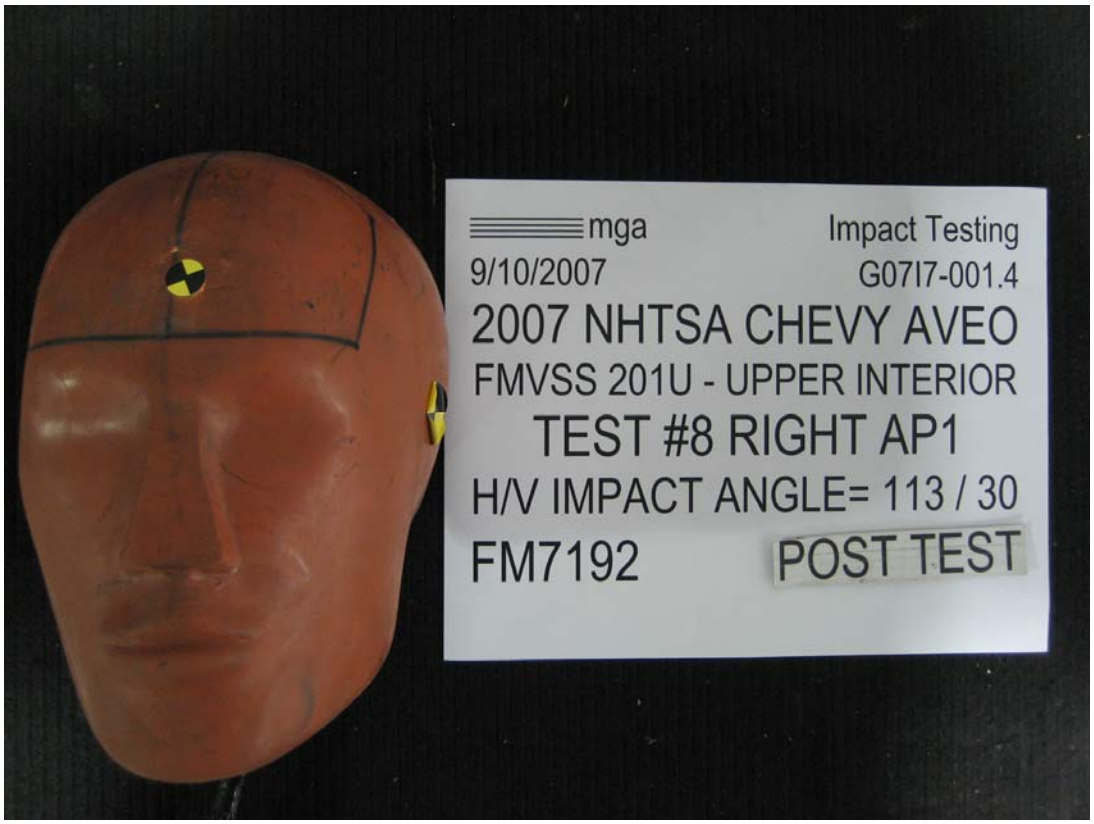
SUMMARY OF TARGETING RESULTS								
Target	Location (mm)			Horizontal Angle (deg)	Vertical Angle (deg)	Relocation (Yes/No)	Extension (# of 25 mm Spheres)	Impact (Yes/No)
	x	y	z					
Other Pillar Left Side								
OPR	4065.6	-439.9	1331.8	--	--	No	--	No
OP1	4065.6	-439.9	1331.8	270	26	No	--	No
OP2	4120.3	-582.6	1130.7	270	0	No	--	Yes
Other Pillar Right Side								
OPR	4065.0	446.7	1332.0	--	--	No	--	No
OP1	4065.0	446.7	1332.0	90	25	No	--	No
OP2	4121.9	587.1	1130.6	90	0	No	--	No
Rear Pillar Left Side								
RP1	4306.0	-470.4	1250.5	--	--	Yes	--	--
REL	4304.0	-501.0	1211.8	289	18	--	2	No
RP2	4372.2	-532.2	1126.6	300	10	No	--	No
Rear Pillar Right Side								
RP1	4308.8	472.2	1252.7	--	--	Yes	--	--
REL	4308.9	504.7	1215.9	80	17	--	2	Yes
RP2	4373.4	536.0	1129.2	45	10	No	--	No
Front Header Left Side								
FH1	2724.3	-378.5	1306.3	180	50	No	--	No
FH2	2707.8	-229.1	1316.5	180	50	No	--	No
Front Header Right Side								
FH1	2723.2	387.7	1306.0	180	50	No	--	No
FH2	2705.8	239.7	1315.4	180	50	No	--	No
Side Rail Left Side								
SR1	2943.4	-485.5	1325.3	--	--	Yes	--	--
REL	2902.7	-504.4	1302.7	270	25	--	2	No
SR2A	3093.2	-458.0	1323.3	--	--	Yes	--	--
REL	3091.0	-471.4	1302.2	270	45	--	1	Yes
SR2B	3092.8	-457.5	1322.8	--	--	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	3091.0	-471.3	1302.5	270	45	--	1	No
SR3-1	3661.0	-444.9	1313.5	270	38	No	--	No
SR3-2	3768.2	-443.1	1307.7	270	38	No	--	No
SR3-3	4215.4	-466.9	1283.5	270	9	No	--	No
Side Rail Right Side								
SR1	2943.7	488.9	1327.4	--	--	Yes	--	--
REL	2911.2	514.2	1300.2	90	25	--	2	No
SR2A	3092.9	479.1	1346.2	--	--	Yes	--	--
REL	3103.6	468.5	1305.1	90	35	--	2	No
SR2B	3091.7	480.5	1346.0	--	--	Yes	--	--
REL	3103.5	468.6	1304.9	90	35	--	2	No
SR3-1	3663.4	451.2	1314.6	90	38	No	--	No
SR3-2	3771.3	450.0	1307.3	90	38	No	--	No
SR3-3	4214.5	470.4	1286.7	90	10	No	--	No
Rear Header Left Side								
RH	4306.0	-317.0	1276.3	0	50	No	--	No
Rear Header Right Side								
RH	4308.5	322.0	1276.0	0	50	No	--	No
Upper Roof Left Side								
UR1@SR2(A)	3157.8	-388.7	1390.7	270	25	No	--	No
UR2@BPR	3462.1	-388.3	1384.3	270	38	No	--	Yes
UR3@OP1	3927.0	-386.9	1371.5	270	39	No	--	Yes
Upper Roof Right Side								
UR4@FSR	3042.1	388.4	1382.7	90	19	No	--	Yes
UR5@RSR	3721.1	390.8	1387.8	90	16	No	--	No
UR6@OP1	4066.0	390.4	1359.7	90	38	No	--	No

As determined using the Procedures specified in S10.1-10.13.
REMARKS: There are no roof rail airbags.
RECORDED BY: Louis Campbell DATE: September 6, 2007
APPROVED BY: Helen A. Kaleto

3.0 TEST DATA (Including Acceleration and Velocity Plots)


SR2A SR2B
SR1
AP1
AP2
C70100
FM7192
RIGHT AP1
H/V 113/30
mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT AP1
H/V IMPACT ANGLE= 113 / 30
FM7192
POST TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #8 RIGHT AP1
H/V IMPACT ANGLE= 113 / 30
FM7192
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#8

Target (Vehicle Side): AP1 Right

Temperature:21C

MGA Test Reference No.:FM7192

Humidity:55%

Approach Horizontal Angles:113º

Time of Test:11:28:39 AM

Approach Vertical Angles:30º

FMH Serial No:[037]

Additional Description: 2 Relocations

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
589	561	7.7	23.7	18	4 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22696	-100.013	1.33	1.33
Y	6	J35791	91.856	1.89	1.89
Z	7	J35800	97.996	1.83	1.83

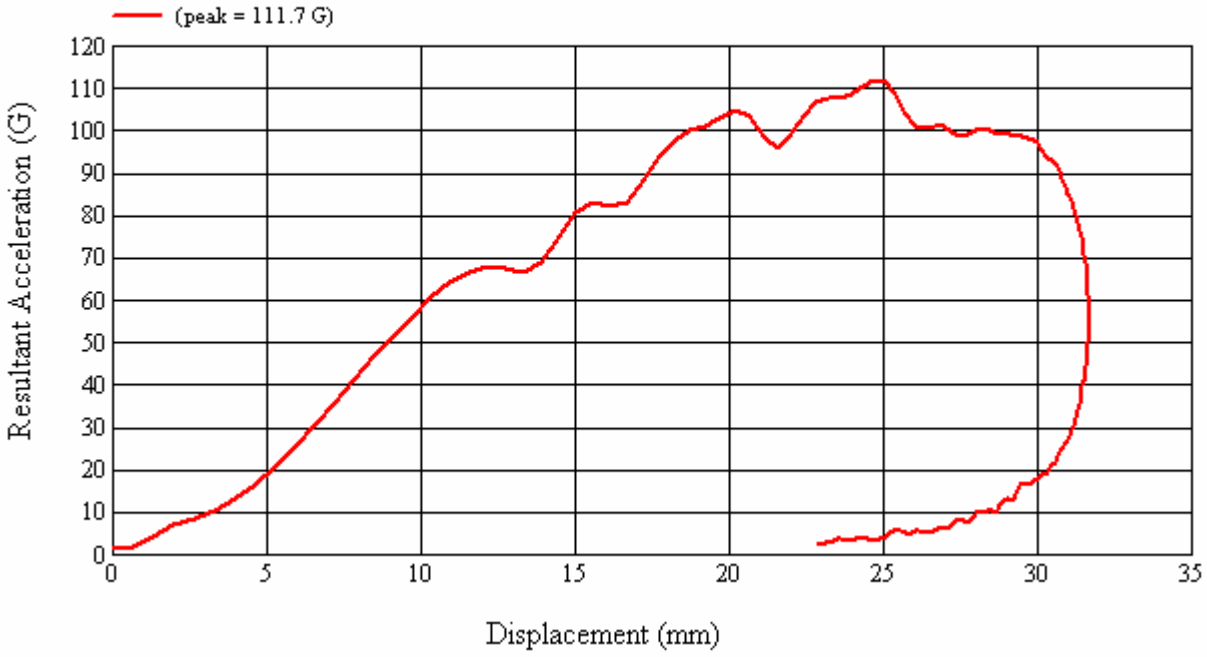
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

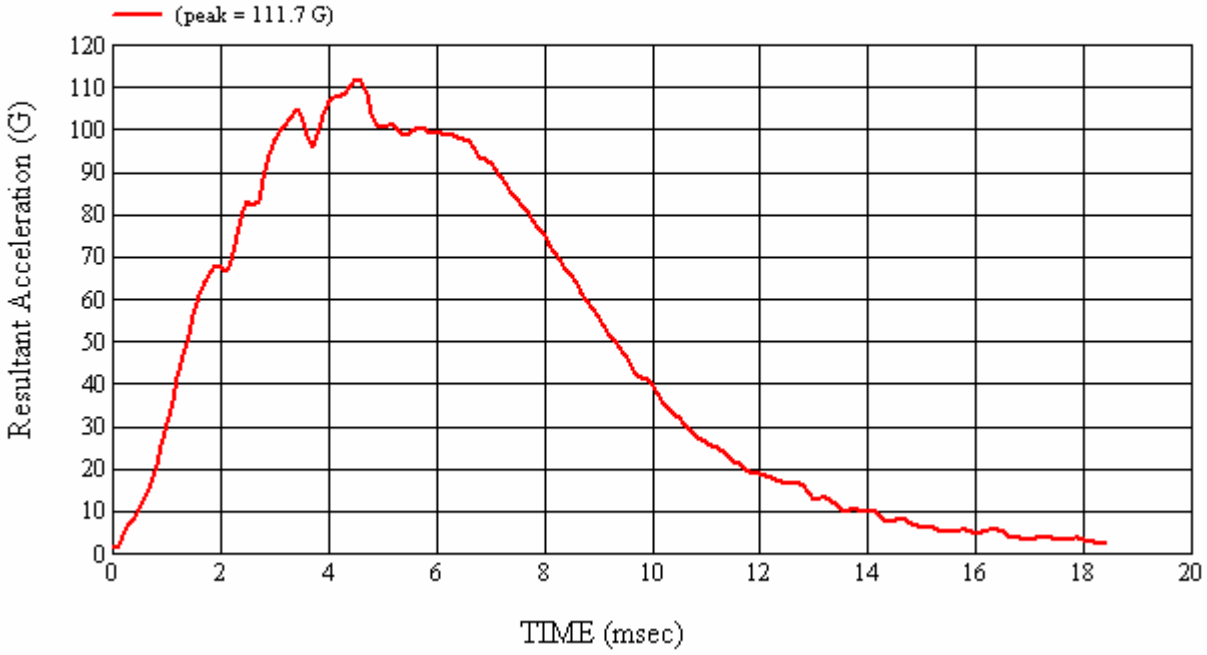
A-pillar cracked.

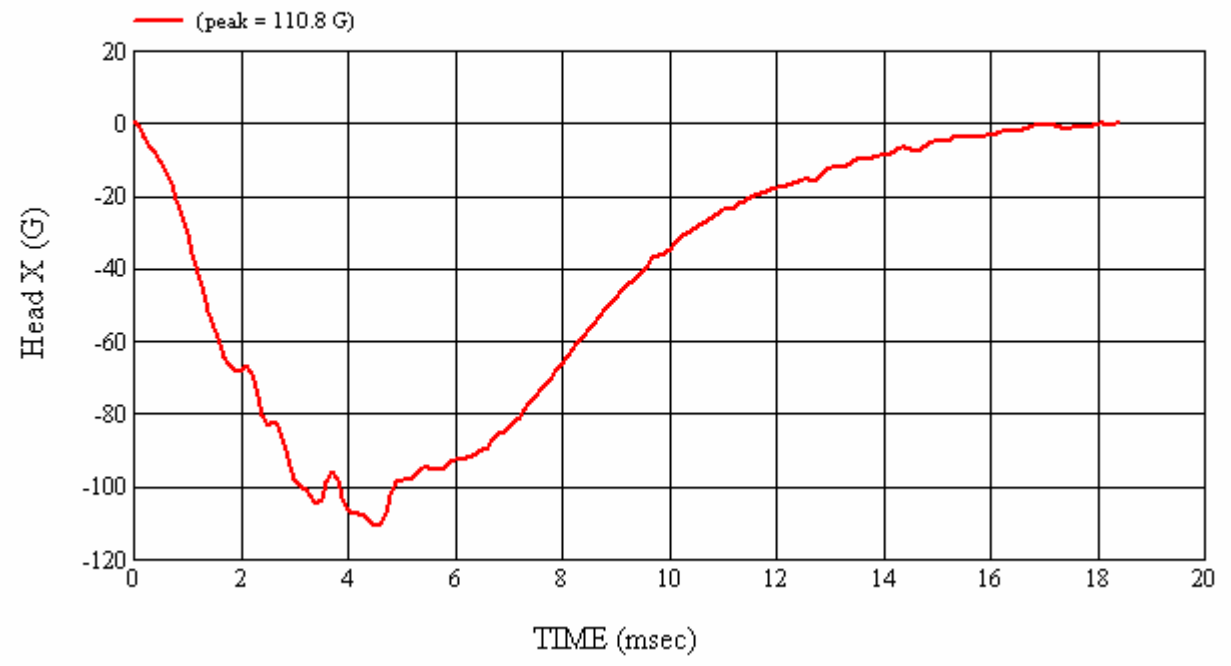
Recorded By: Louis Campbell Approved By*: Helen A. Kaleta Date: 9/10/2007

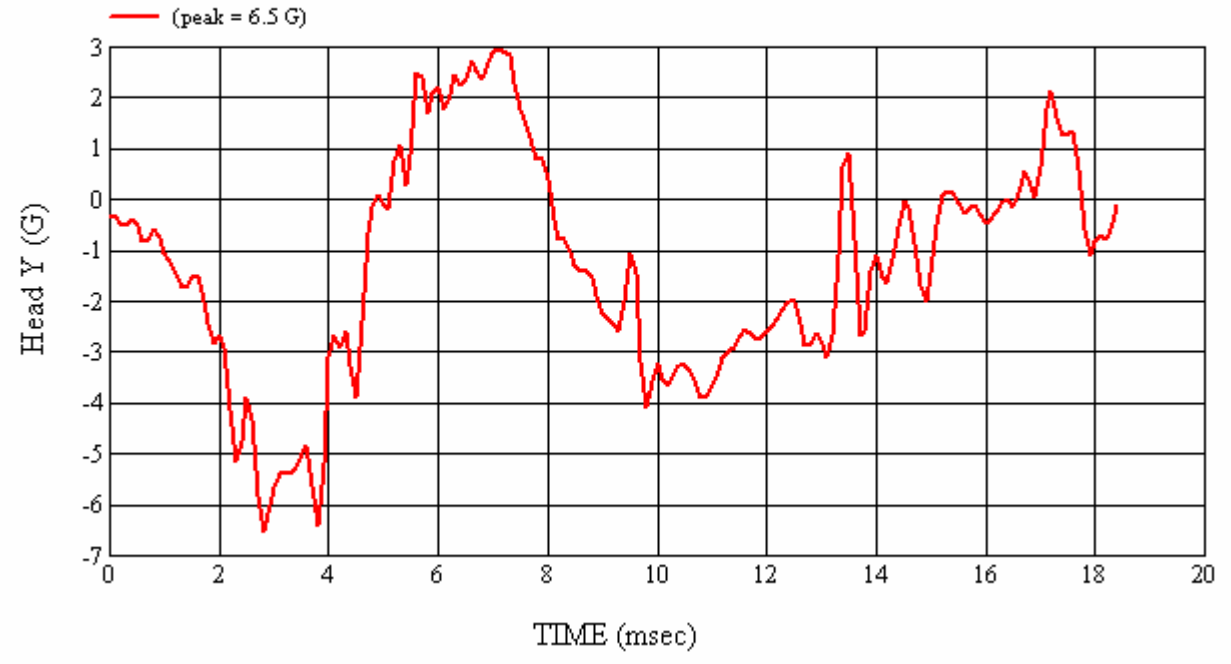
*Only necessary for NHTSA (Government) Compliance testing.

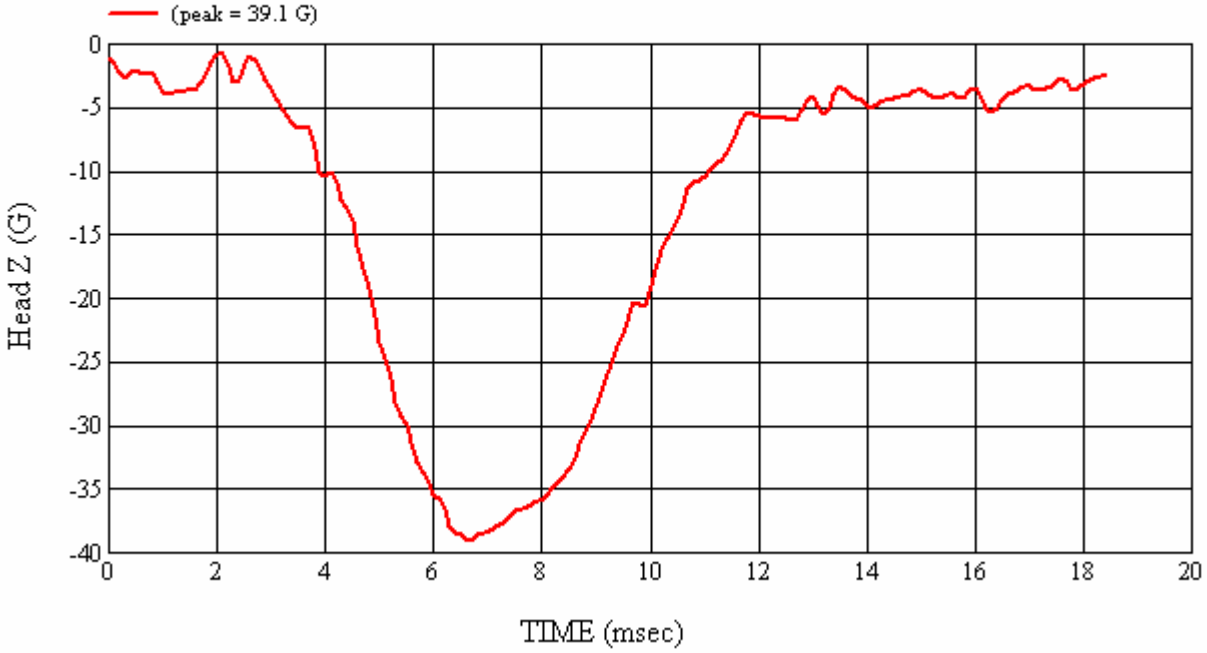
MGA Test #: FM7192 Target Location: AP1, Right Side Test Date: 9/10/2007

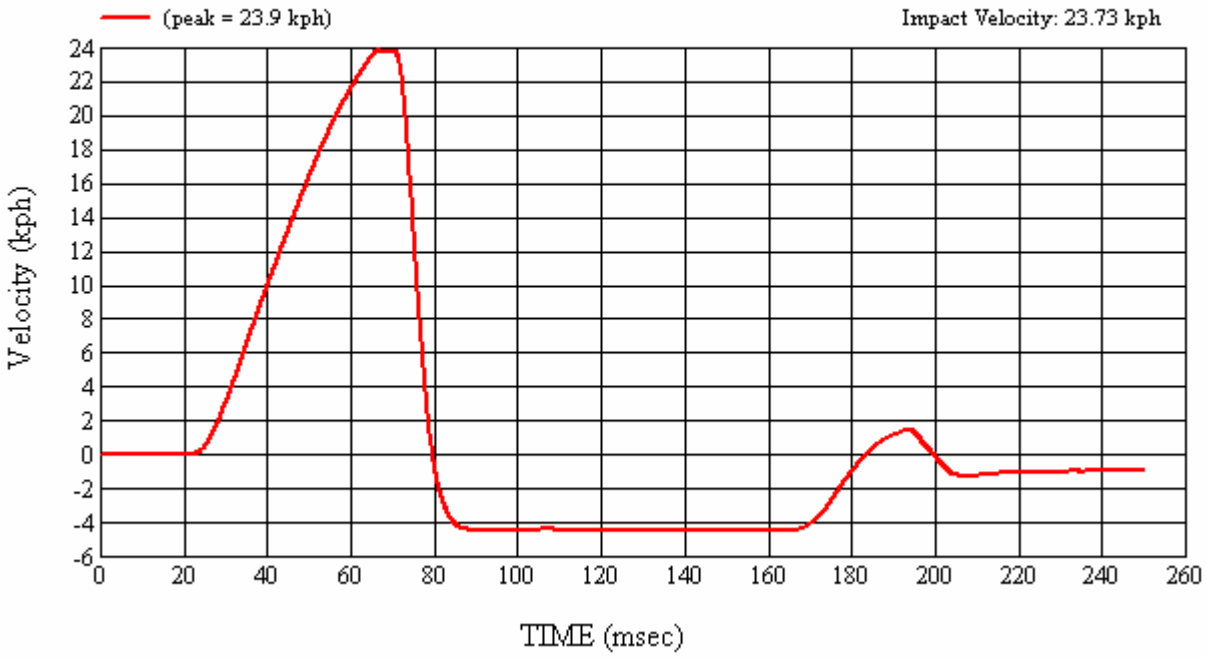


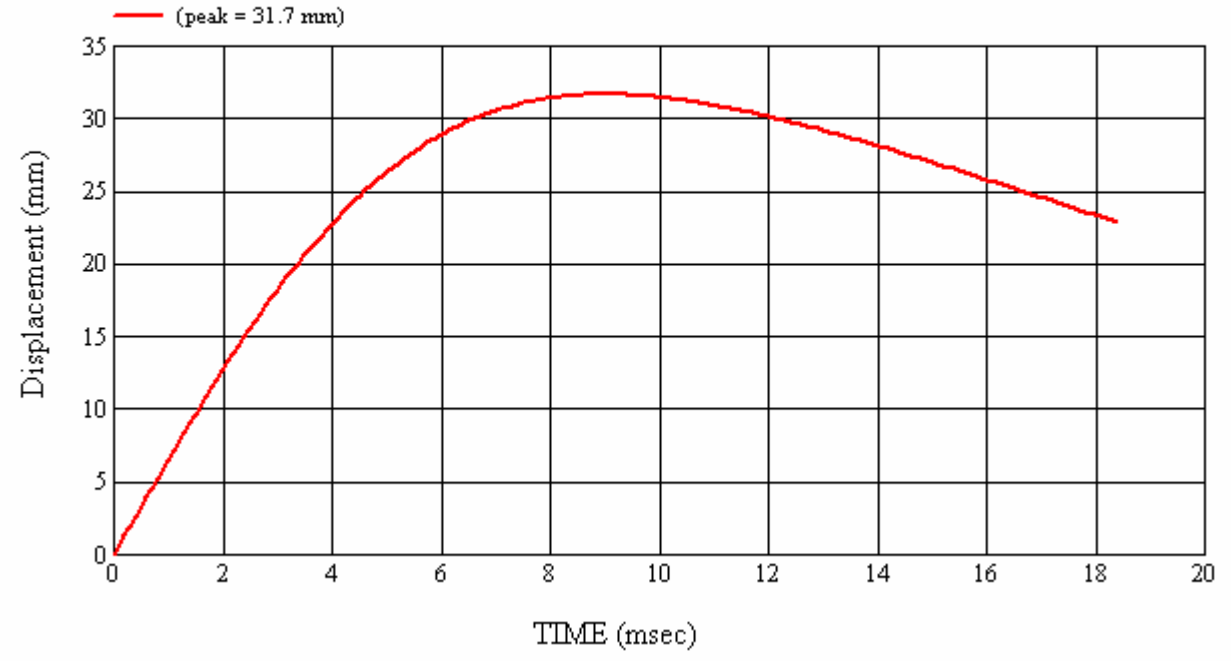



(peak = 110.8 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 6.5 G)
Head Y (G)
3
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


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


(peak = 23.9 kph)
Impact Velocity: 23.73 kph
Velocity (kph)
24
22
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 = 31.7 mm)
Displacement (mm)
TIME (msec)
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20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9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR C70100
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 201 / 50
FM7185
PRE TEST


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9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR C70100
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 201 / 50
FM7185
POST TEST


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9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR C70100
TEST #1 LEFT AP2
H/V IMPACT ANGLE= 201 / 50
FM7185
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#1

Target (Vehicle Side): AP2 Left

Temperature:21C

MGA Test Reference No.:FM7185

Humidity:65%

Approach Horizontal Angles:201º

Time of Test:11:47:06 AM

Approach Vertical Angles:50º

FMH Serial No:[035]

Additional Description: 2 Relocations

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
632	617	9.2	23.6	2	7 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22664	-94.161	1.32	1.32
Y	6	J35919	97.442	1.89	1.89
Z	7	J35924	93.891	1.83	1.83

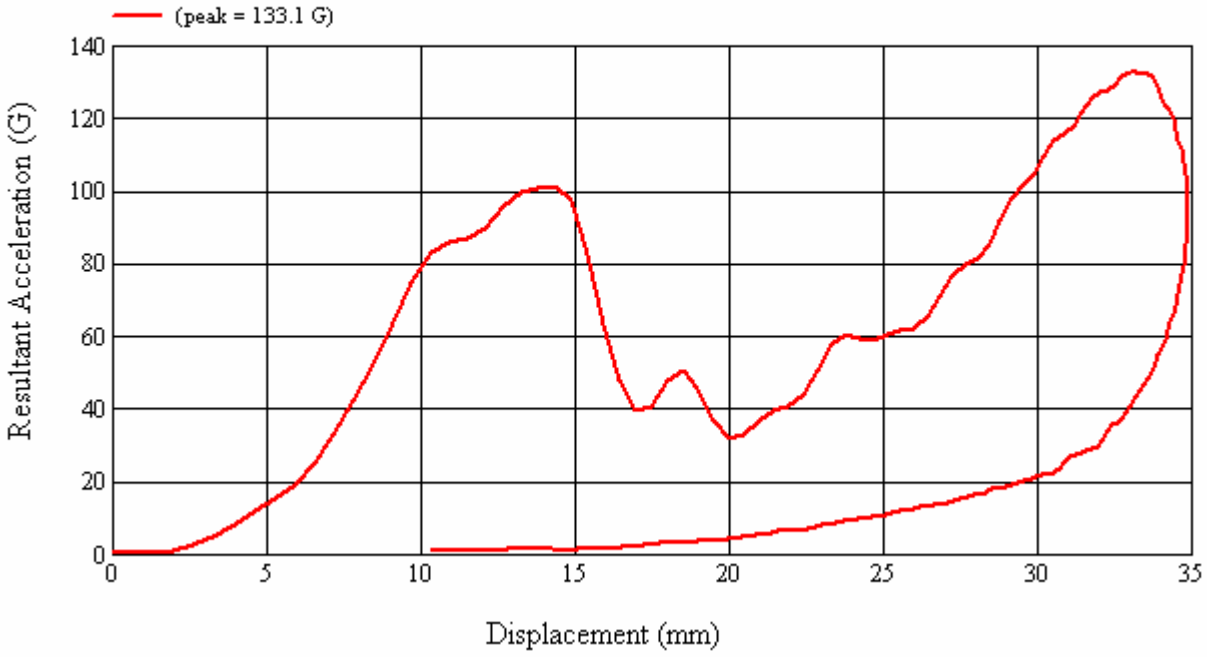
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

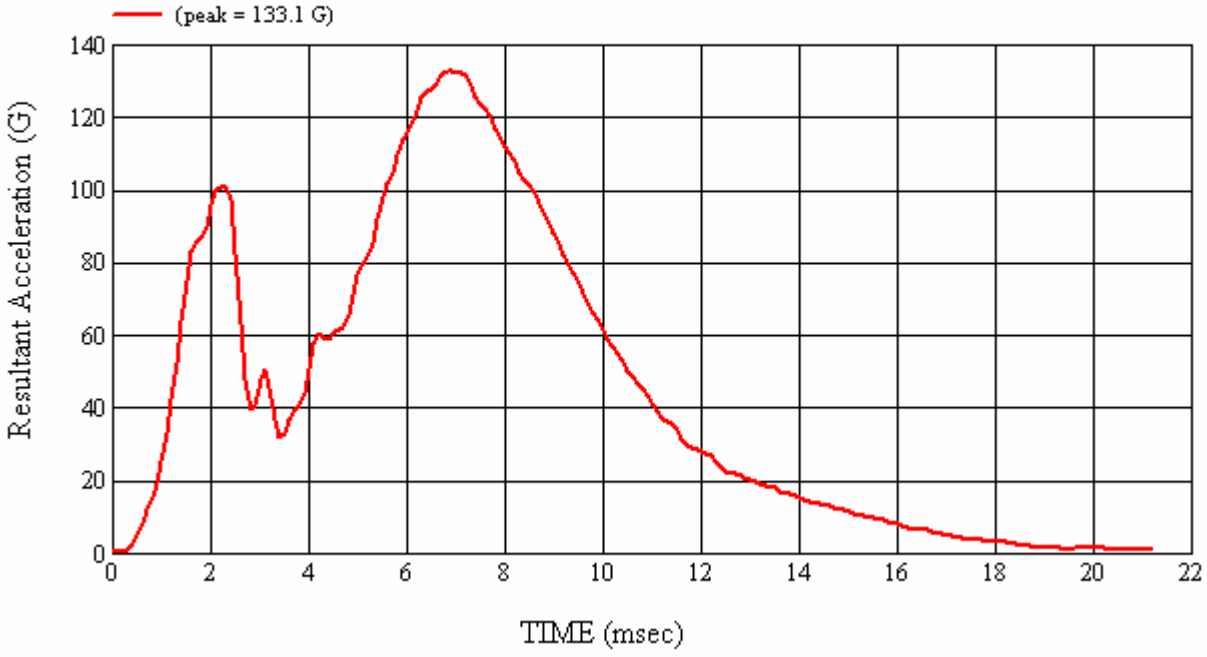
Top of A-pillar cracked and displaced.

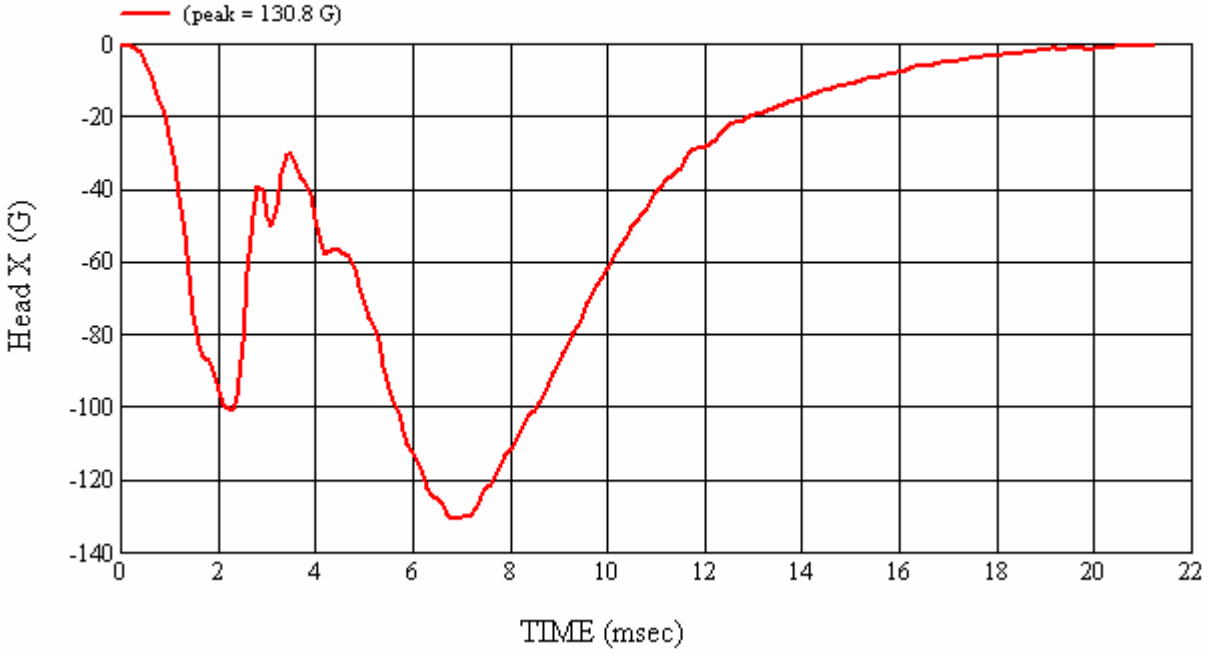
Recorded By: _____ Approved By*: _____ Date: 9/7/2007

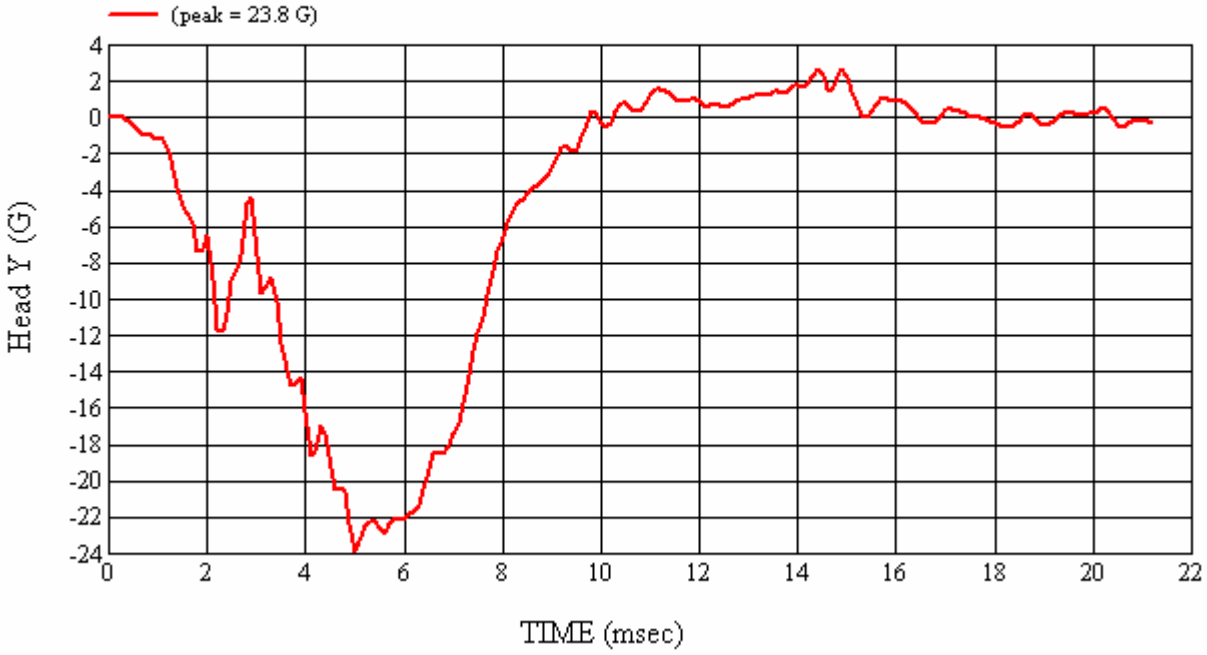
*Only necessary for NHTSA (Government) Compliance testing.

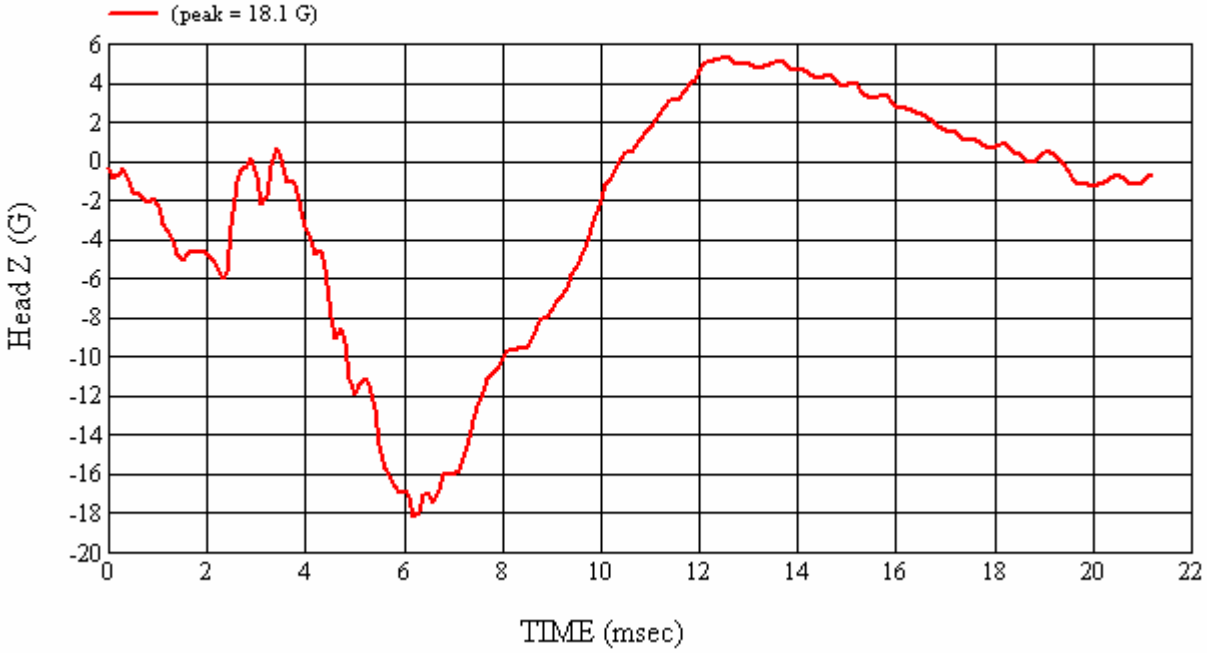
MGA Test #: FM7185 Target Location: AP2, Left Side Test Date: 9/7/2007

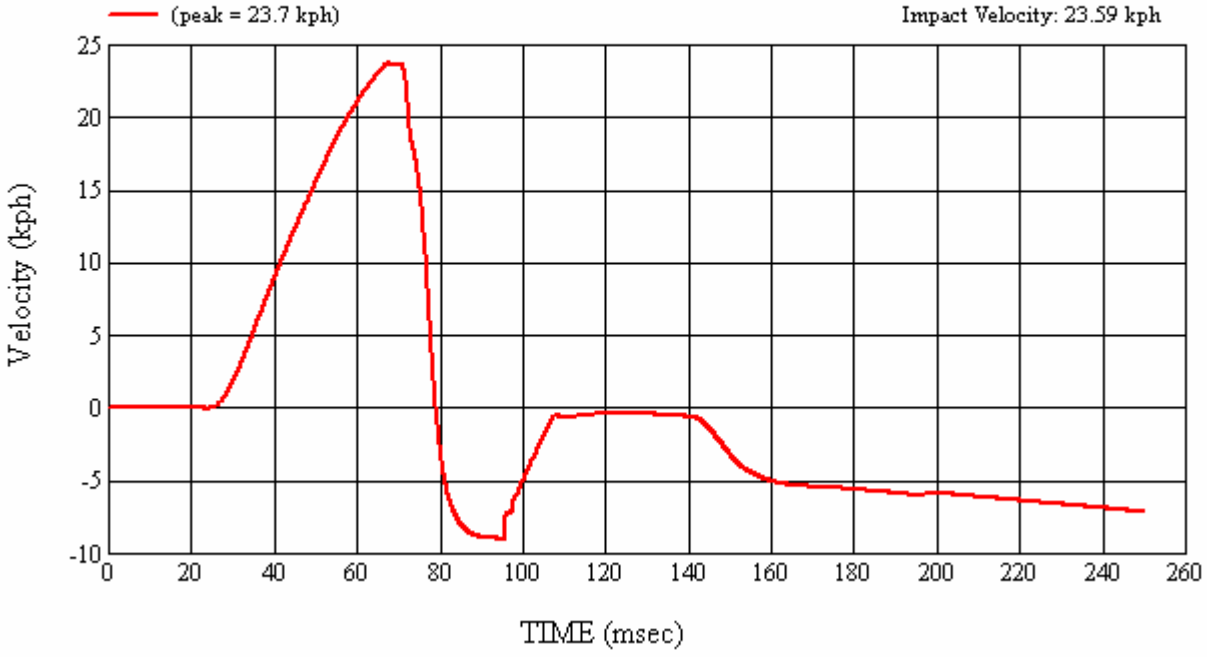


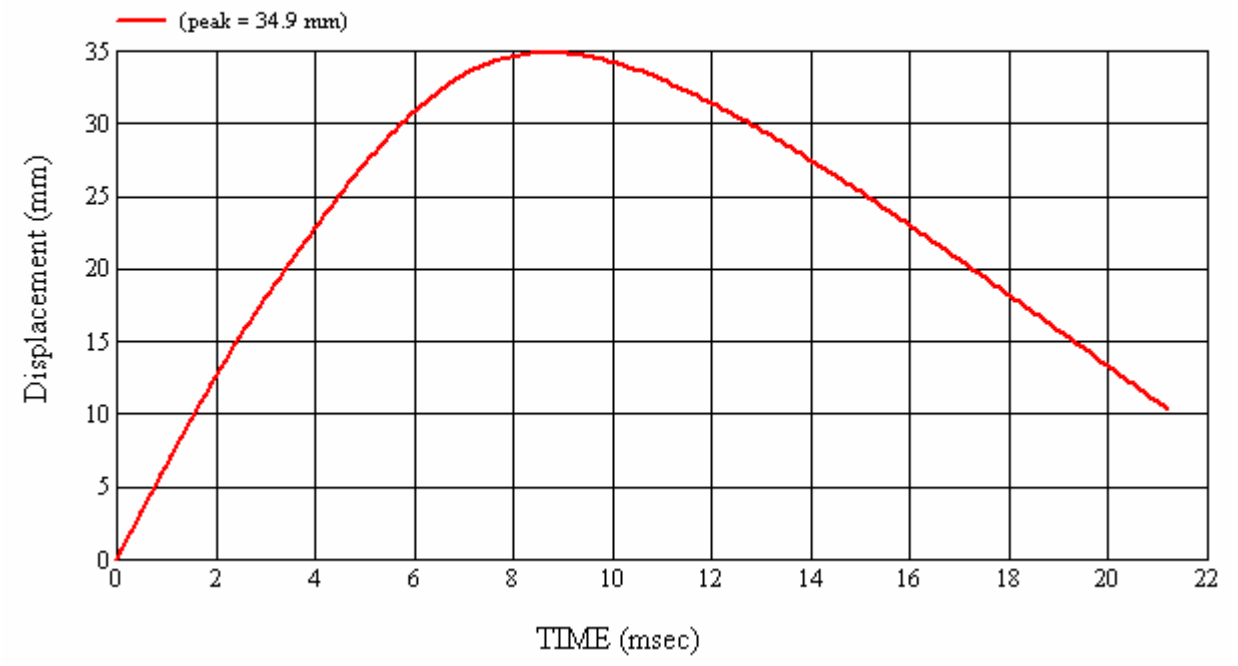



(peak = 130.8 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.8 G)
Head Y (G)
4
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
TIME (msec)


(peak = 18.1 G)
Head Z (G)
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.7 kph)
Impact Velocity: 23.59 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 = 34.9 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)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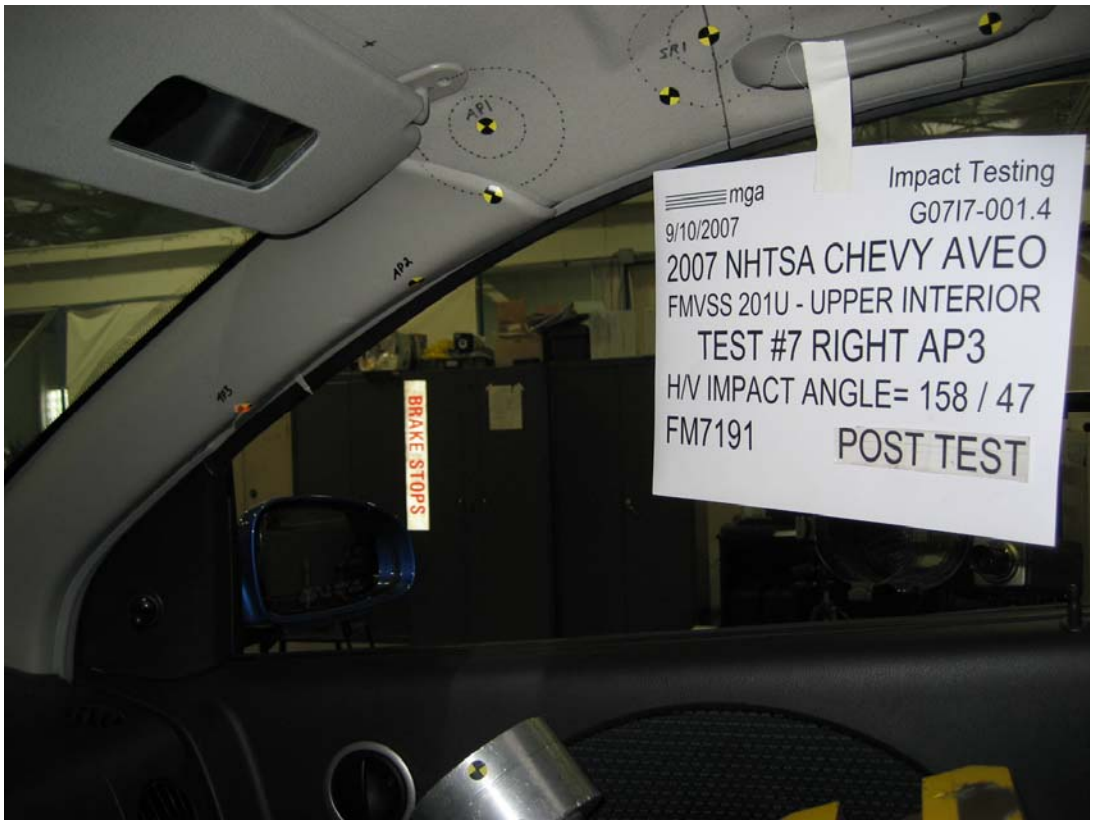
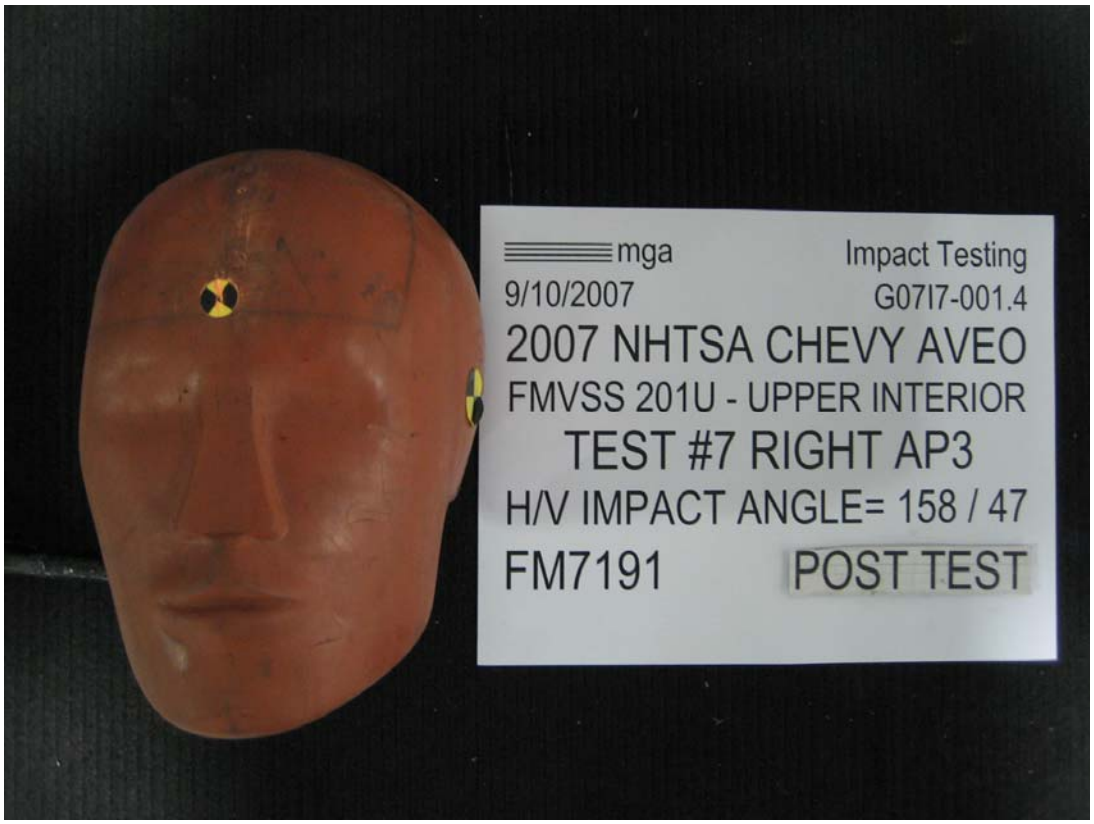
Impact Testing
G07I7-001.4
9/10/2007
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP3
H/V IMPACT ANGLE= 158 / 47
FM7191
PRE TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP3
H/V IMPACT ANGLE= 158 / 47
FM7191
POST TEST
BRAKE STOPS


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #7 RIGHT AP3
H/V IMPACT ANGLE= 158 / 47
FM7191
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#7

Target (Vehicle Side): AP3 Right

Temperature:22C

MGA Test Reference No.:FM7191

Humidity:56%

Approach Horizontal Angles:158º

Time of Test:10:37:42 AM

Approach Vertical Angles:47º

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
570	535	7.8	23.8	3	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22664	-94.161	1.32	1.32
Y	6	J35919	97.442	1.89	1.89
Z	7	J35924	93.891	1.83	1.83

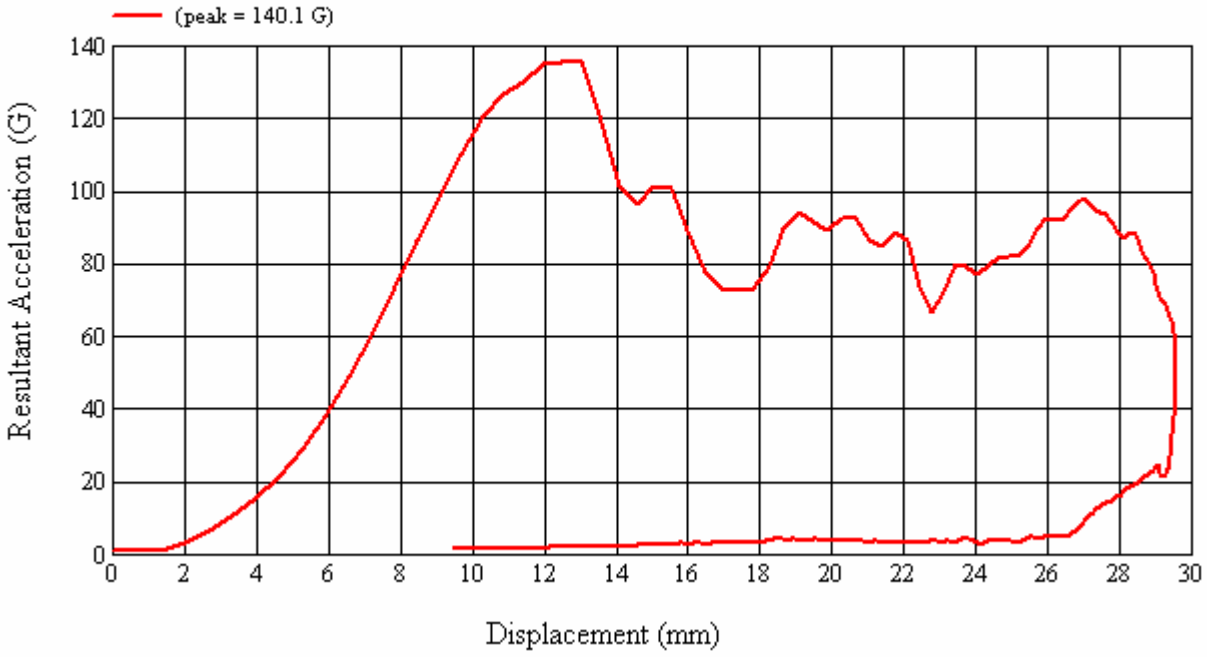
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

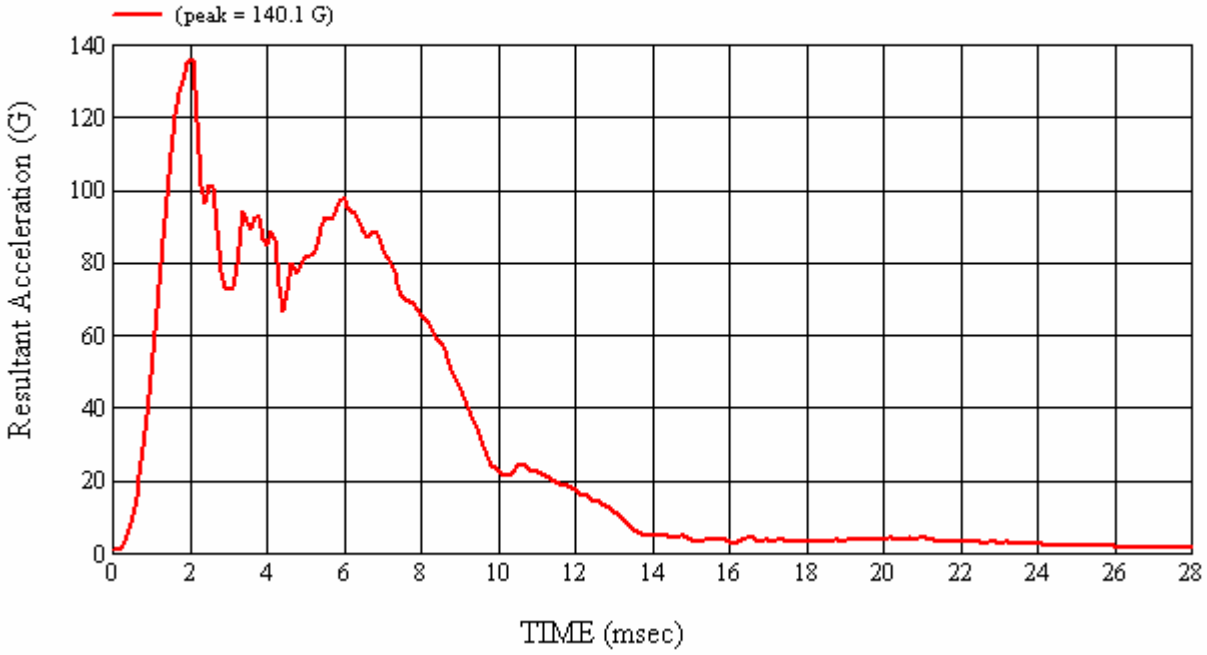
A-pillar cracked.

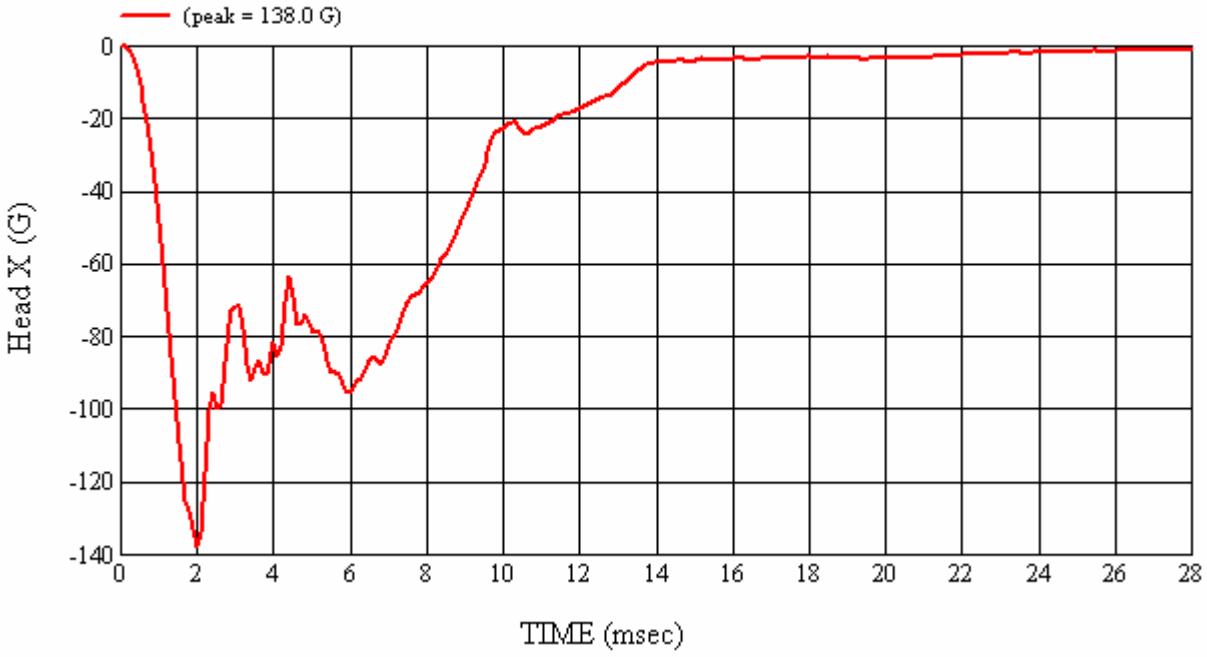
Recorded By: _____ Approved By*: _____ Date: 9/10/2007

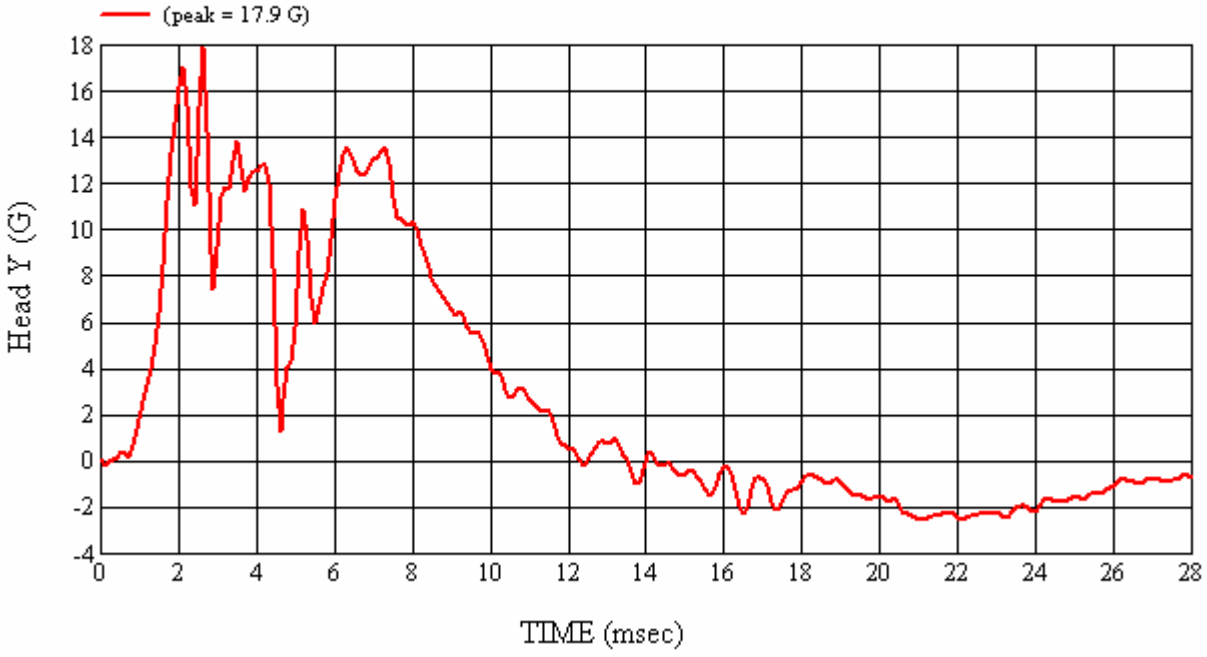
*Only necessary for NHTSA (Government) Compliance testing.

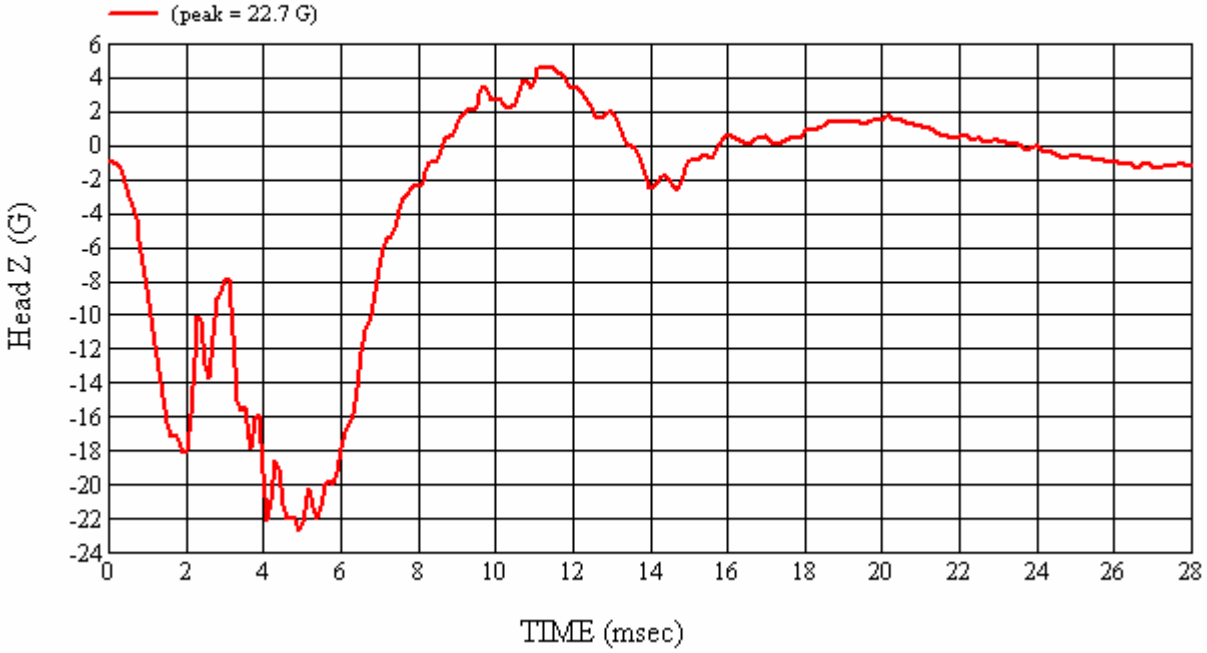
MGA Test #: FM7191 Target Location: AP3, Right Side Test Date: 9/10/2007

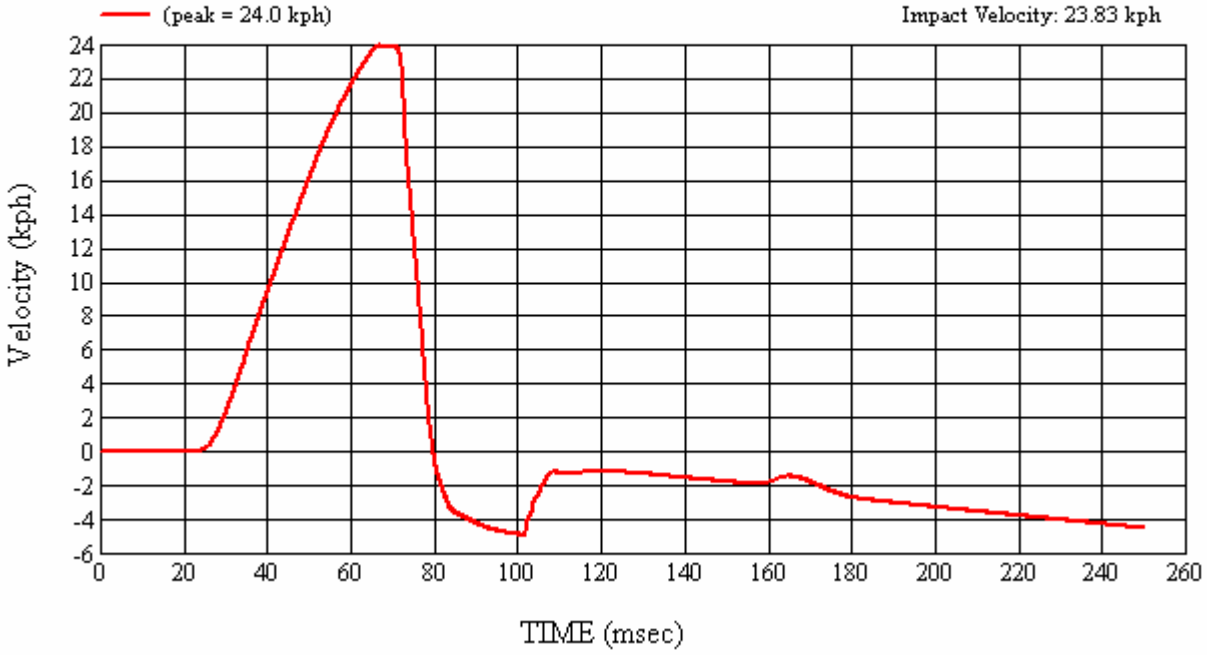


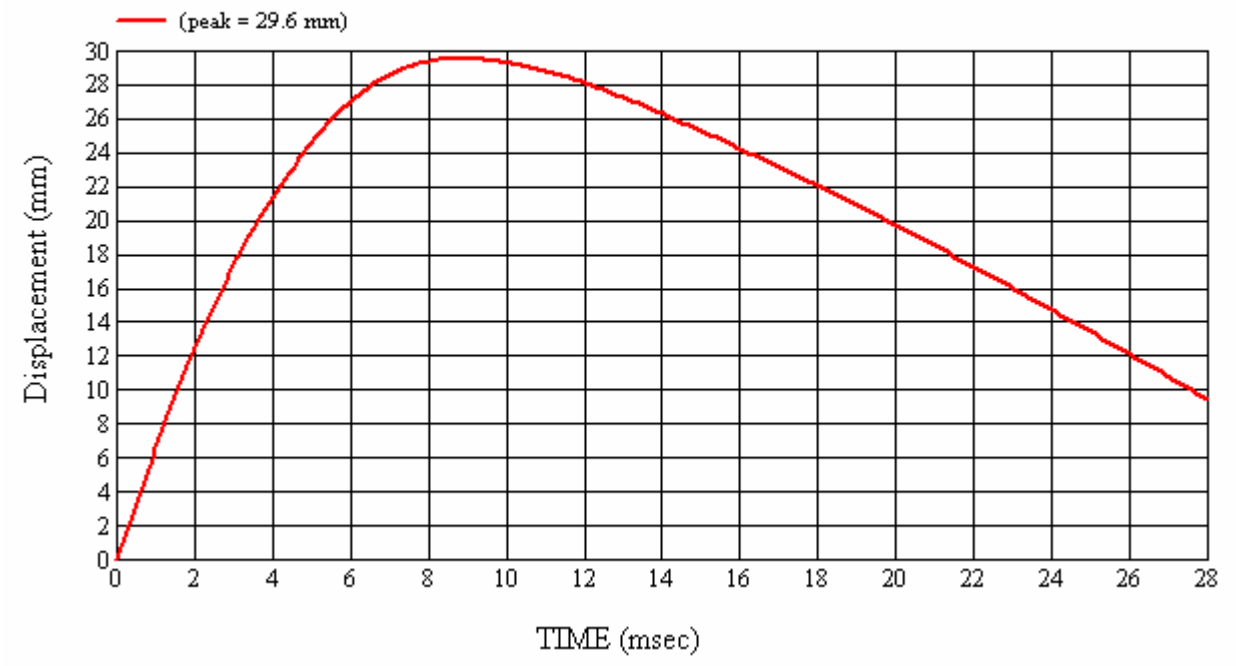


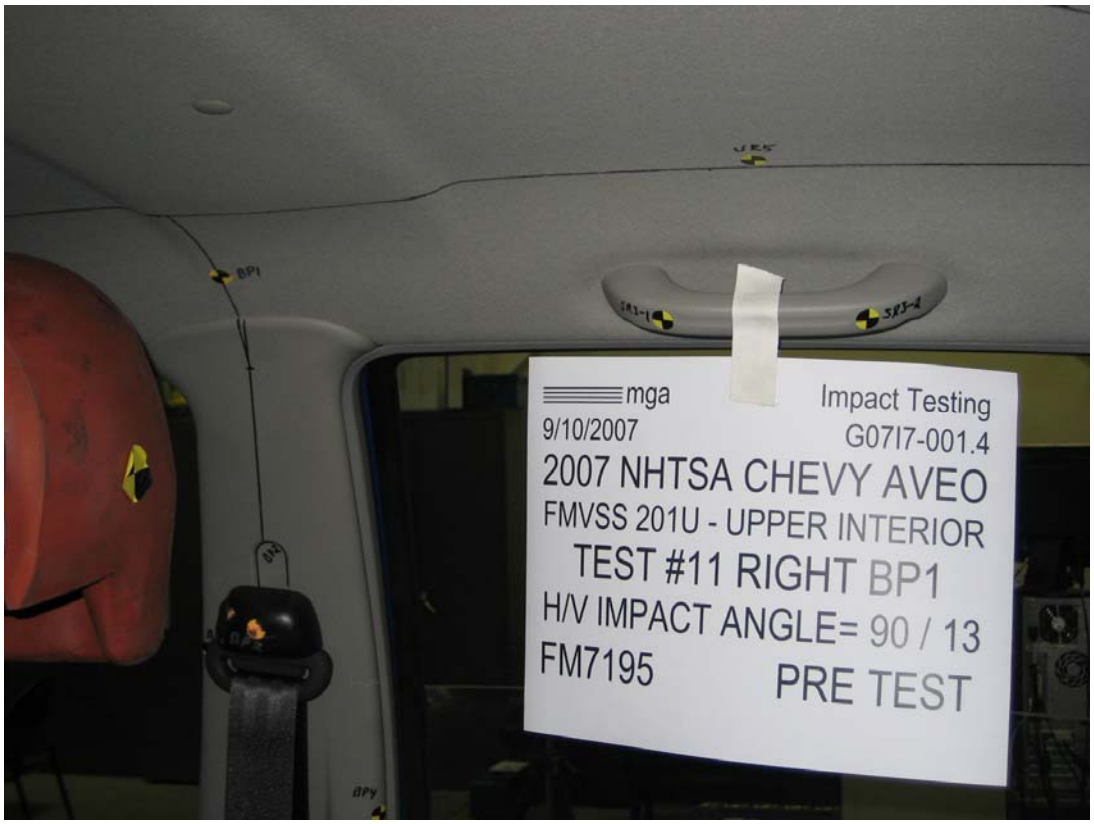

(peak = 138.0 G)
Head X (G)
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)

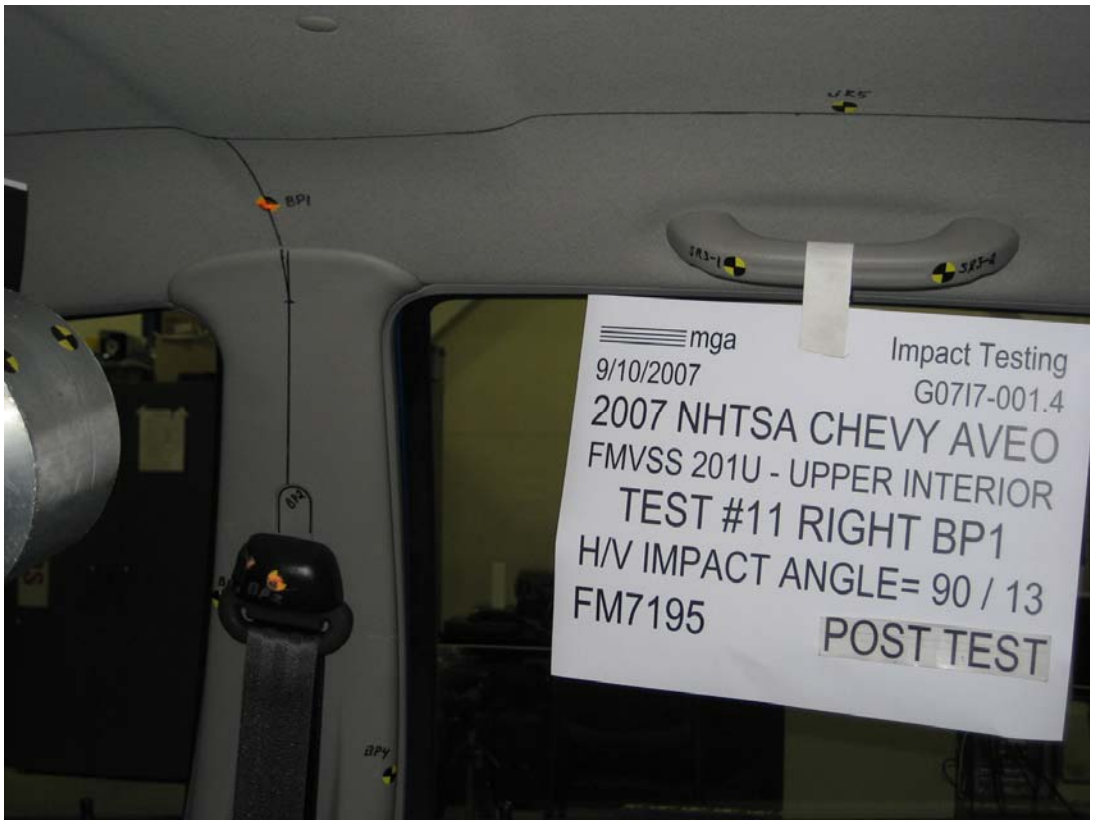

(peak = 17.9 G)
Head Y (G)
18
16
14
12
10
8
6
4
2
0
-2
-4
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
TIME (msec)


(peak = 22.7 G)
Head Z (G)
6
4
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 = 24.0 kph)
Impact Velocity: 23.83 kph
Velocity (kph)
24
22
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 = 29.6 mm)
Displacement (mm)
TIME (msec)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT BP1
H/V IMPACT ANGLE= 90 / 13
FM7195
PRE TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT BP1
H/V IMPACT ANGLE= 90 / 13
FM7195
POST TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #11 RIGHT BP1
H/V IMPACT ANGLE= 90 / 13
FM7195
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#11

Target (Vehicle Side): BP1 Right

Temperature:21C

MGA Test Reference No.:FM7195

Humidity:54%

Approach Horizontal Angles:90º

Time of Test:2:38:36 PM

Approach Vertical Angles:13º

FMH Serial No:[037]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
731	748	6.1	23.8	55	0

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22696	-100.013	1.32	1.32
Y	6	J35791	91.856	1.89	1.89
Z	7	J35800	97.996	1.83	1.83

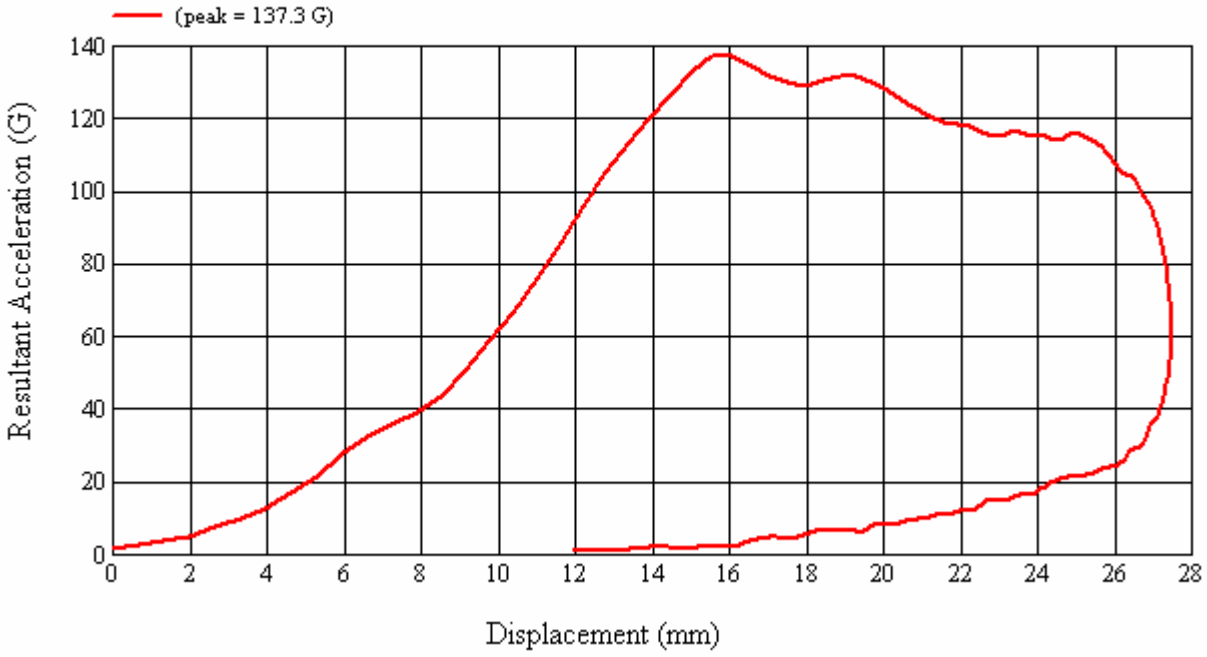
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

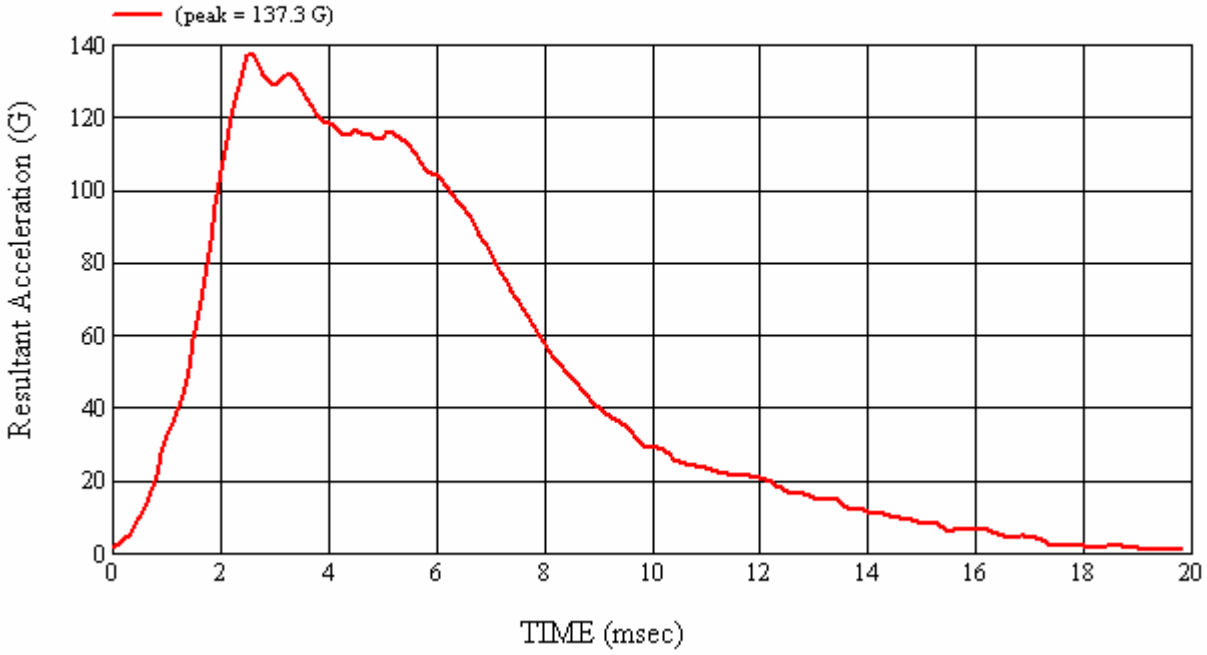
No visible damage.

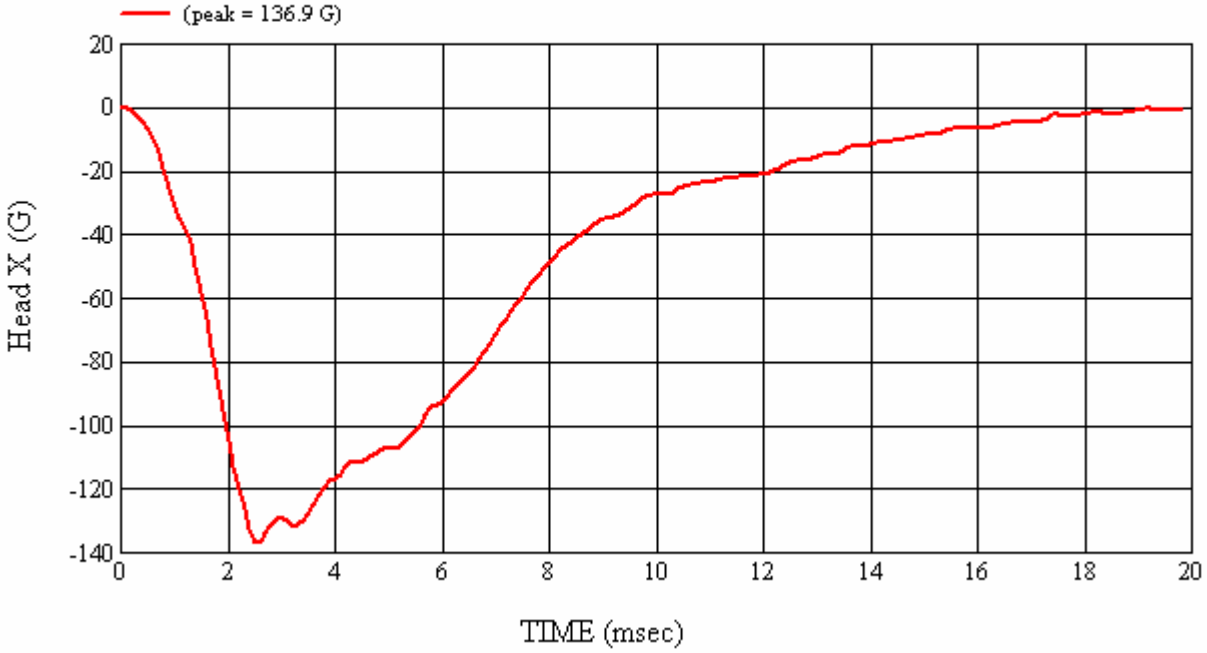
Recorded By: Louis Campbell Approved By*: Helen A. Kaleto Date: 9/10/2007

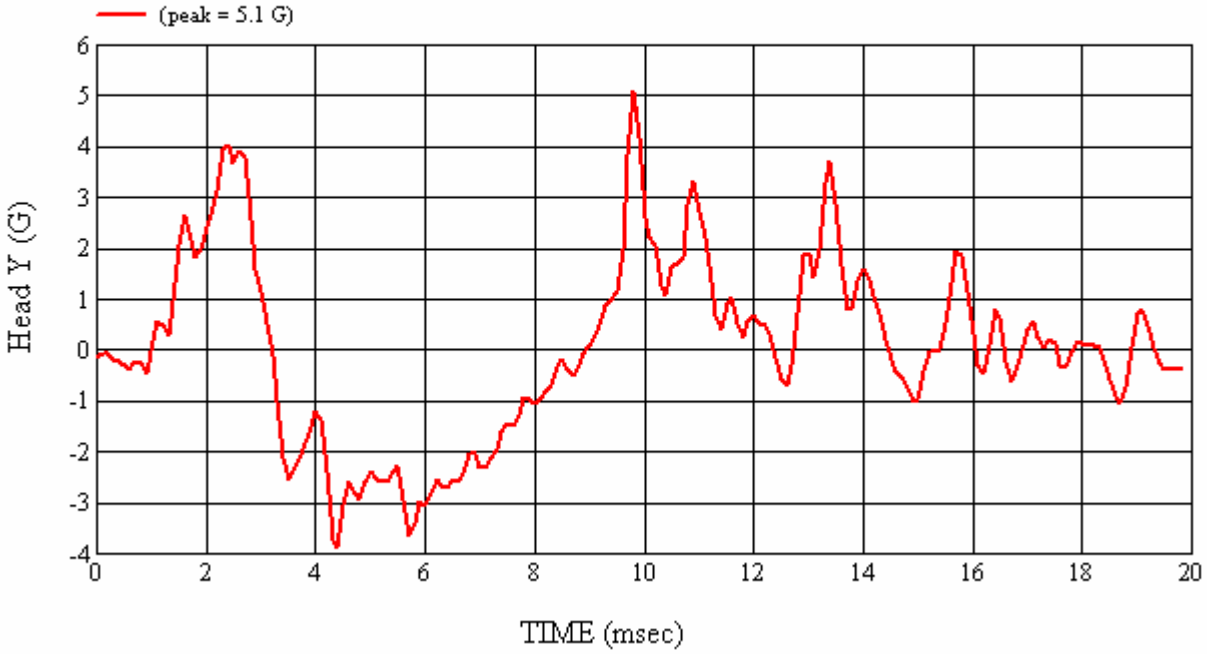
*Only necessary for NHTSA (Government) Compliance testing.

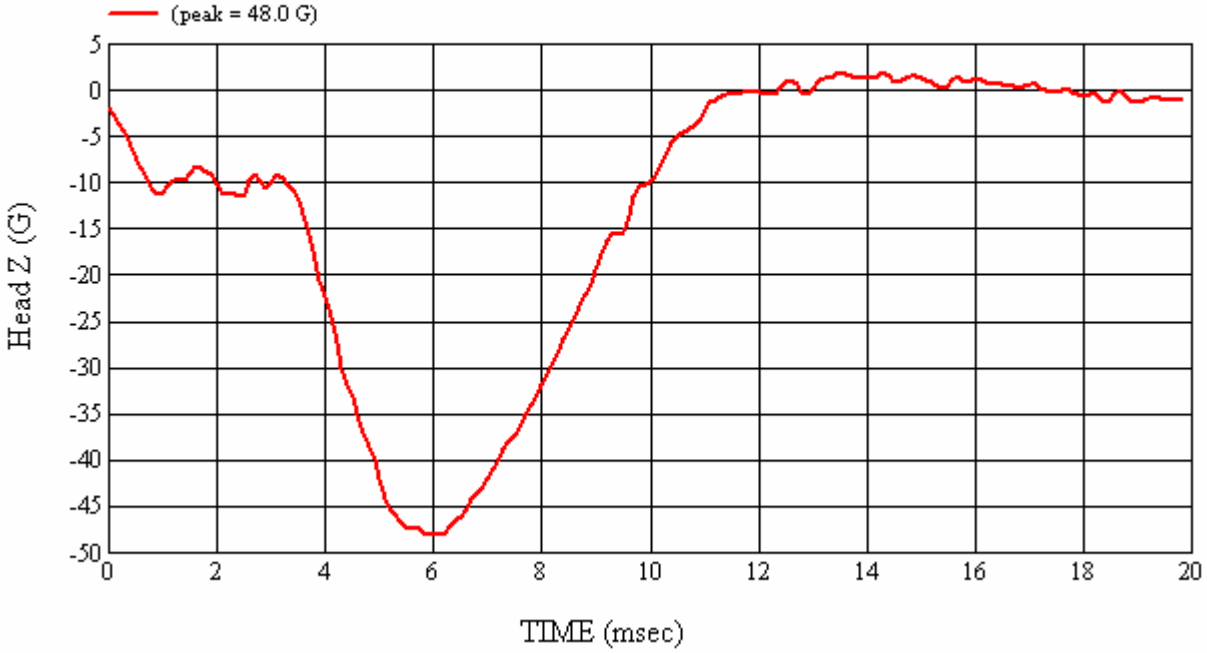
MGA Test #: FM7195 Target Location: BP1, Right Side Test Date: 9/10/2007

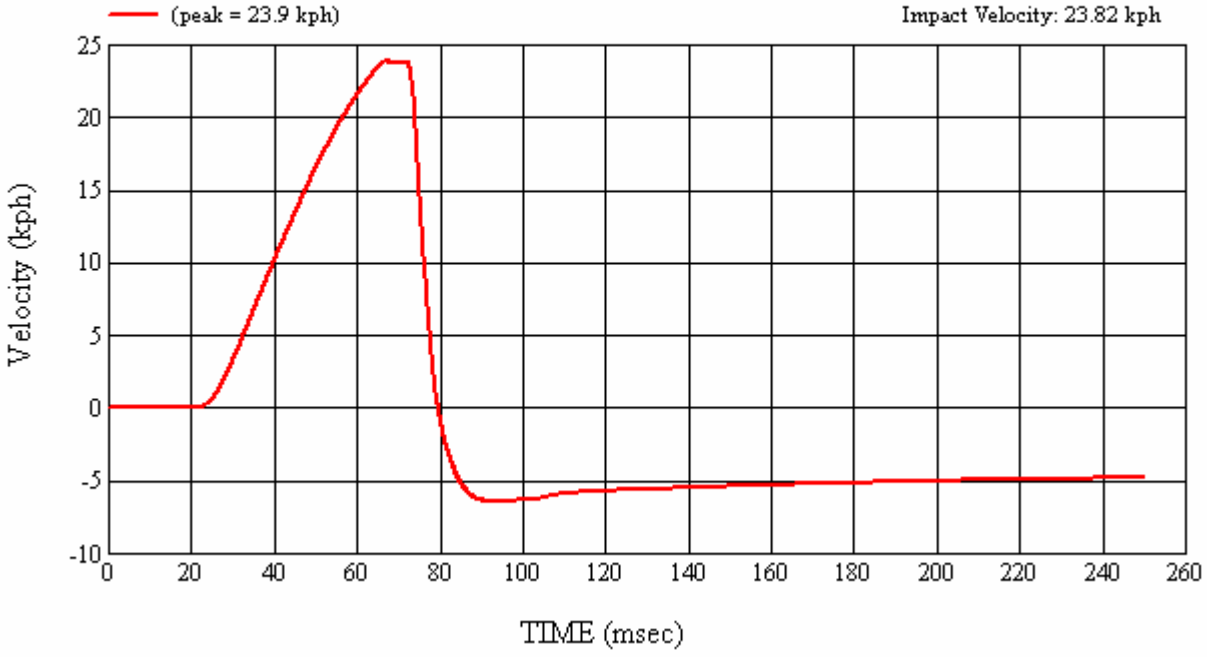


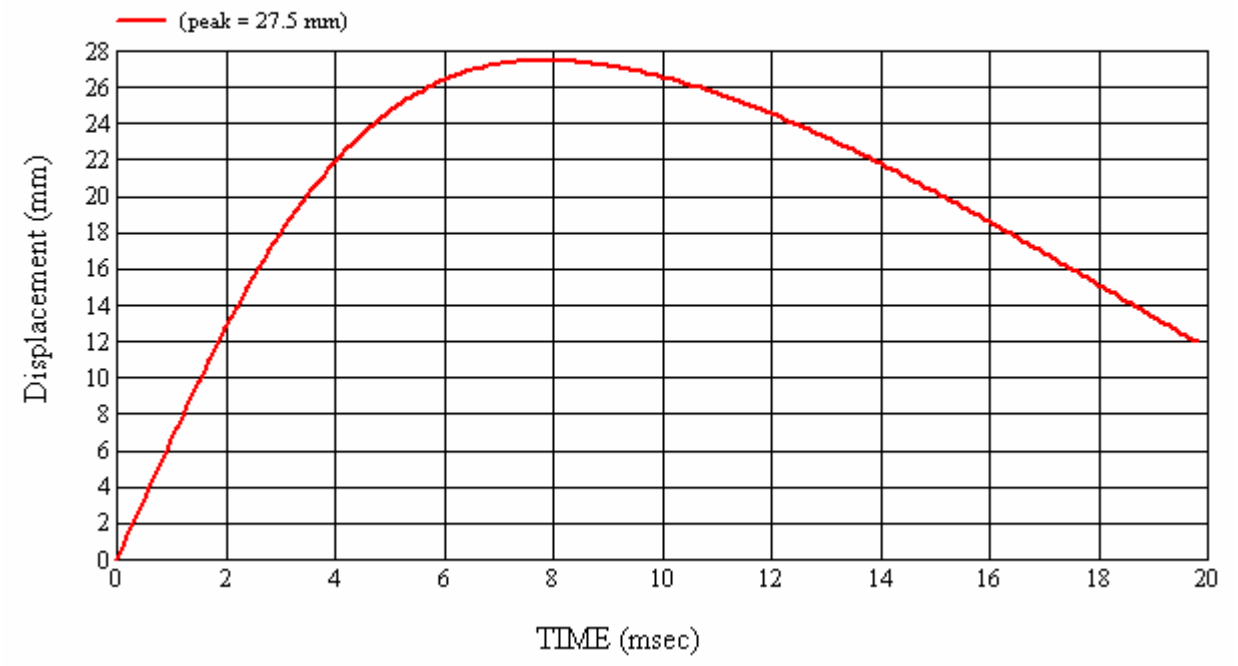



(peak = 136.9 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 5.1 G)
Head Y (G)
6
5
4
3
2
1
0
-1
-2
-3
-4
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 48.0 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 23.9 kph)
Impact Velocity: 23.82 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 = 27.5 mm)
Displacement (mm)
TIME (msec)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28


C70100
FM7194
RIGHT BP2
H/V 90/0
mga
9/10/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP2
H/V IMPACT ANGLE= 90 / 0
FM7194
PRE TEST


C70100
FM7194
RIGHT BP2
H/V 90/0
BRAKE STOPS
mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP2
H/V IMPACT ANGLE= 90 / 0
FM7194
POST TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #10 RIGHT BP2
H/V IMPACT ANGLE= 90 / 0
FM7194
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#10

Target (Vehicle Side): BP2 Right

Temperature:21C

MGA Test Reference No.:FM7194

Humidity:55%

Approach Horizontal Angles:90º

Time of Test:1:53:30 PM

Approach Vertical Angles:0º

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
584	554	6.6	23.3	14	9 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22664	-94.161	1.32	1.32
Y	6	J35919	97.442	1.89	1.89
Z	7	J35924	93.891	1.83	1.83

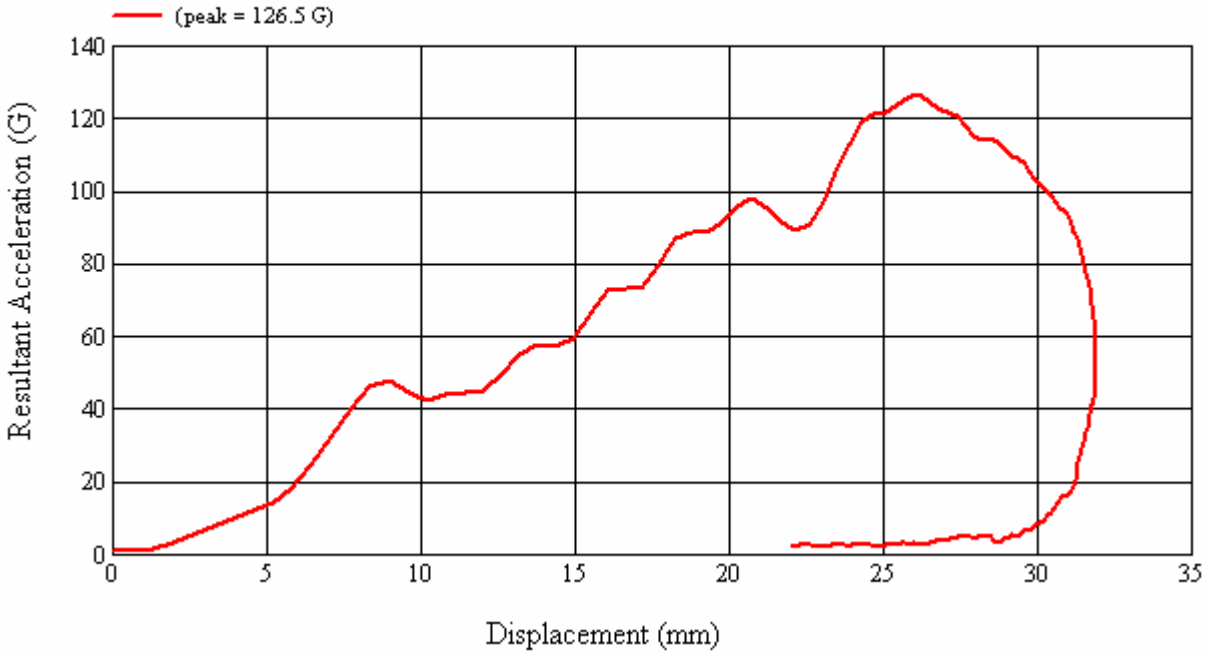
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

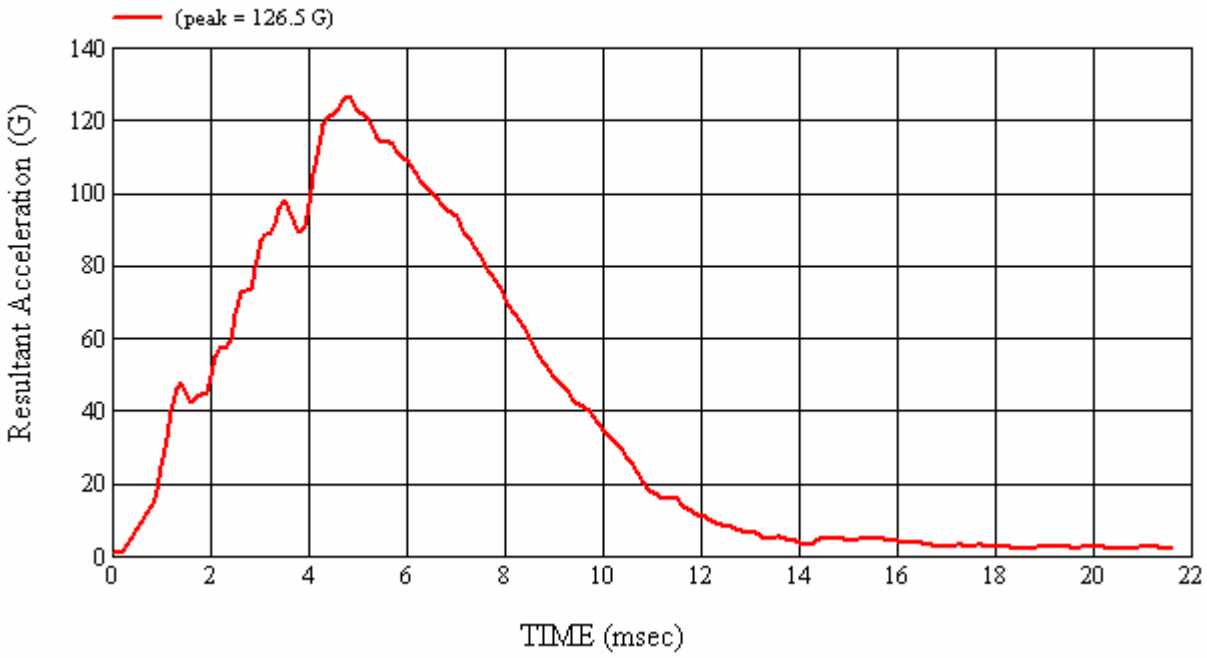
No visible damage.

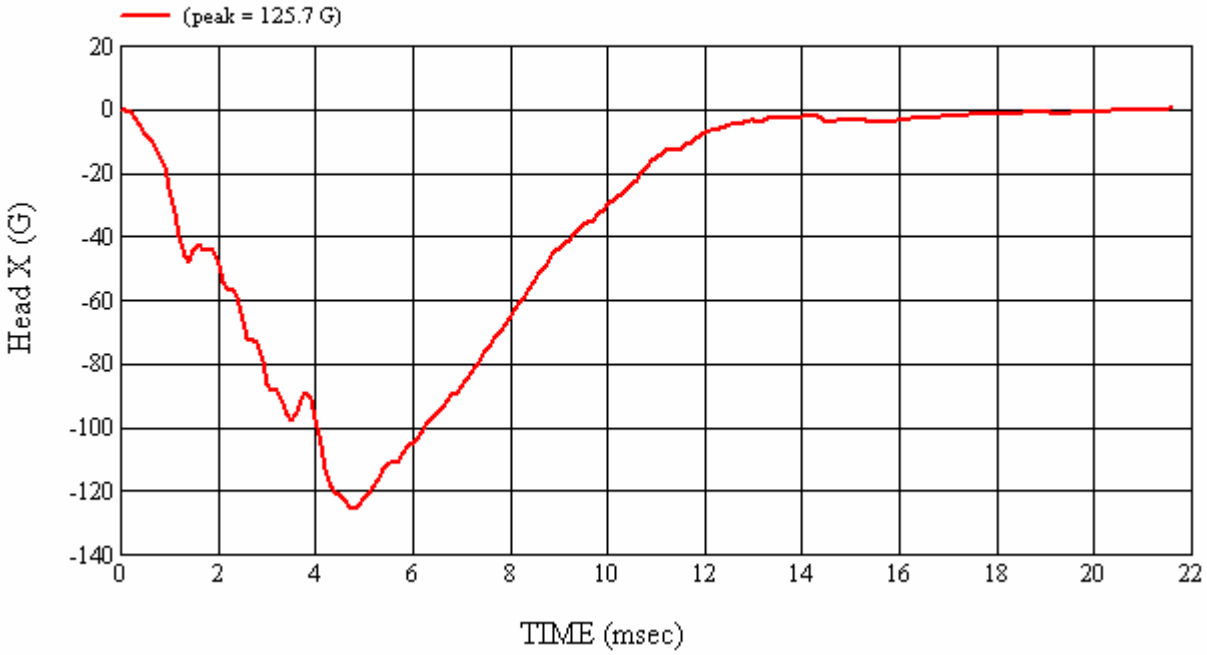
Recorded By: _____ Approved By*: _____ Date: 9/10/2007

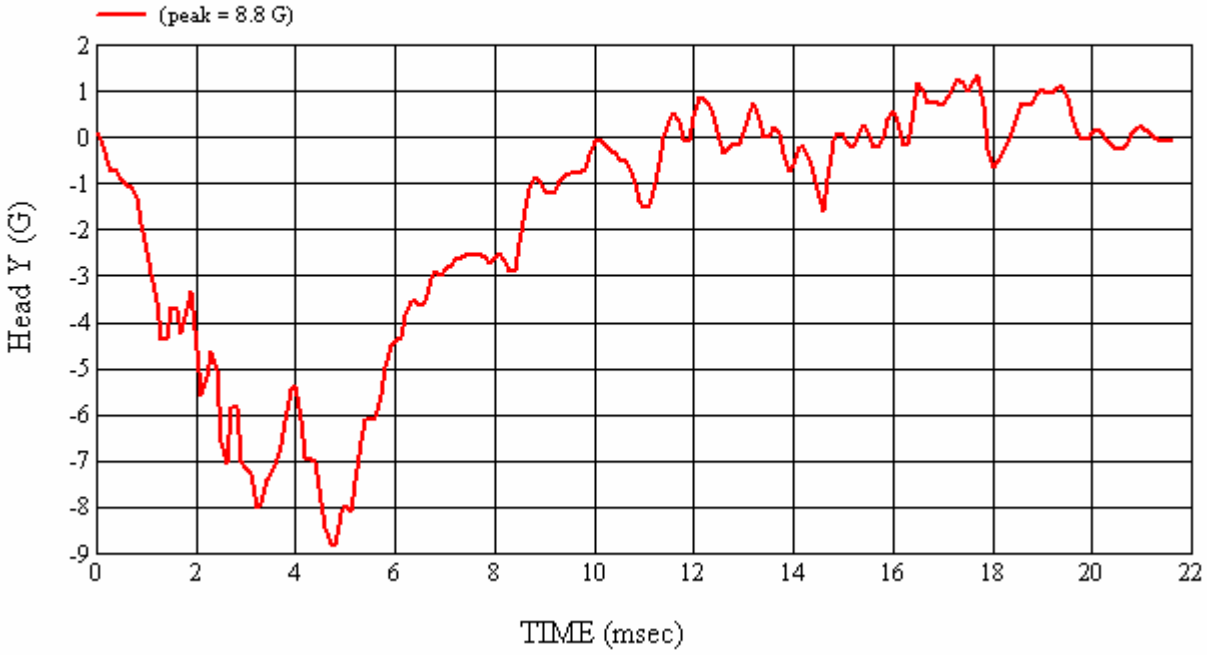
*Only necessary for NHTSA (Government) Compliance testing.

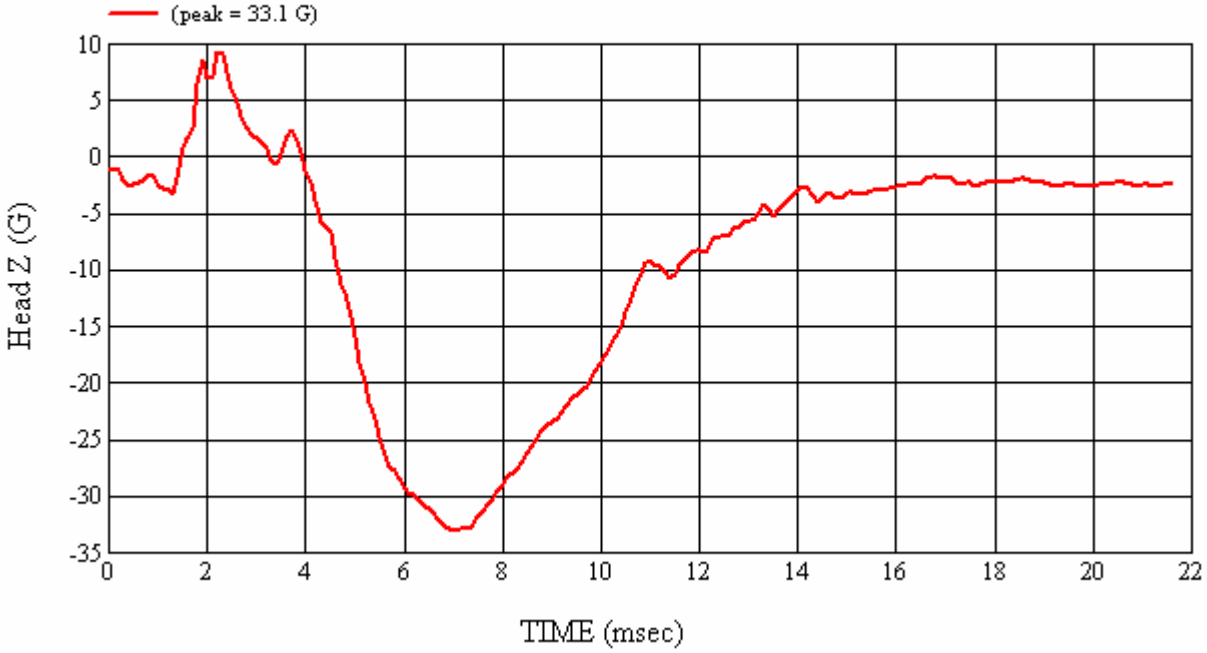
MGA Test #: FM7194 Target Location: BP2, Right Side Test Date: 9/10/2007

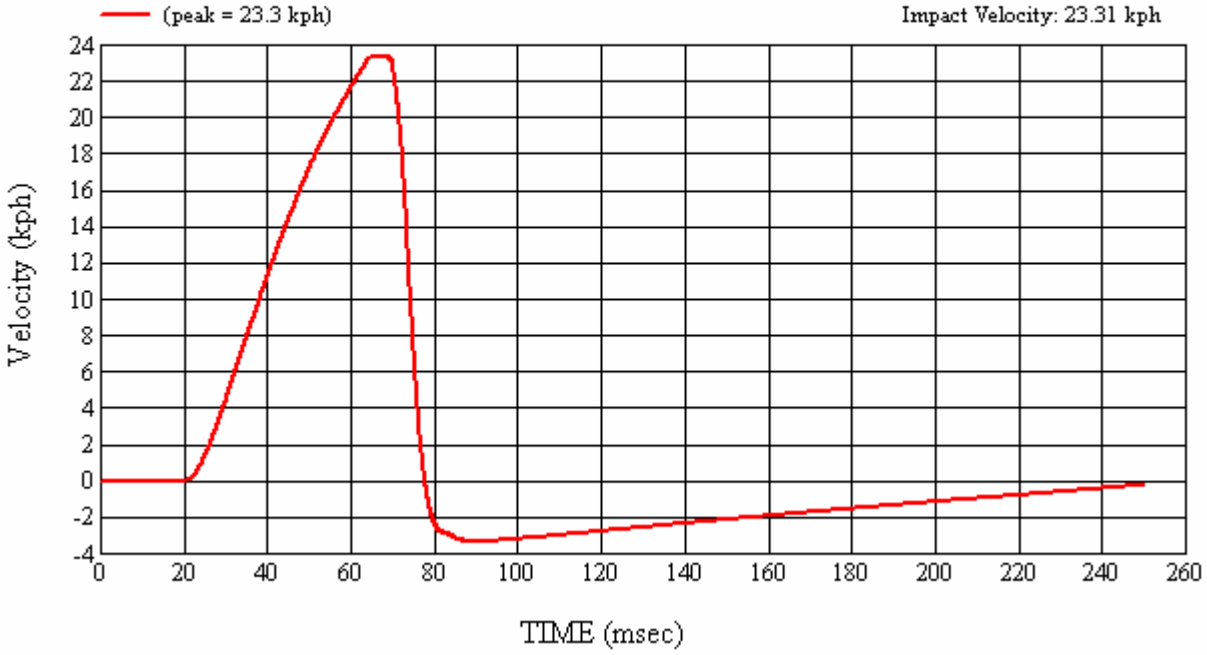


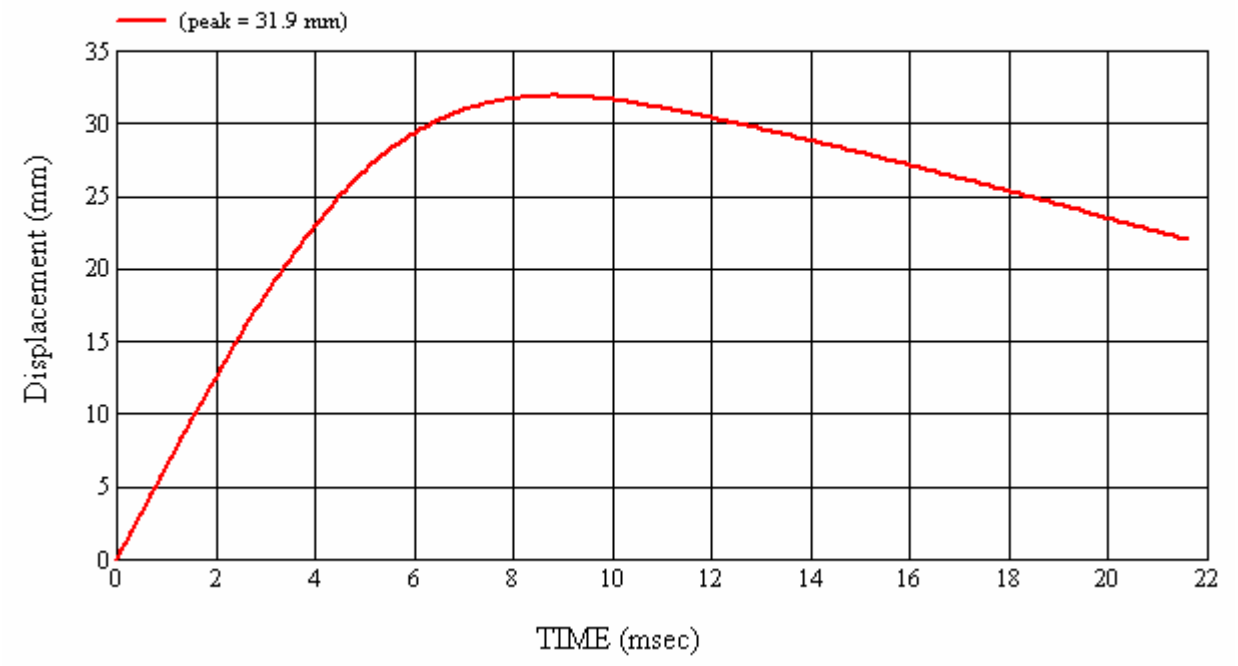



(peak = 125.7 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 8.8 G)
Head Y (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
TIME (msec)

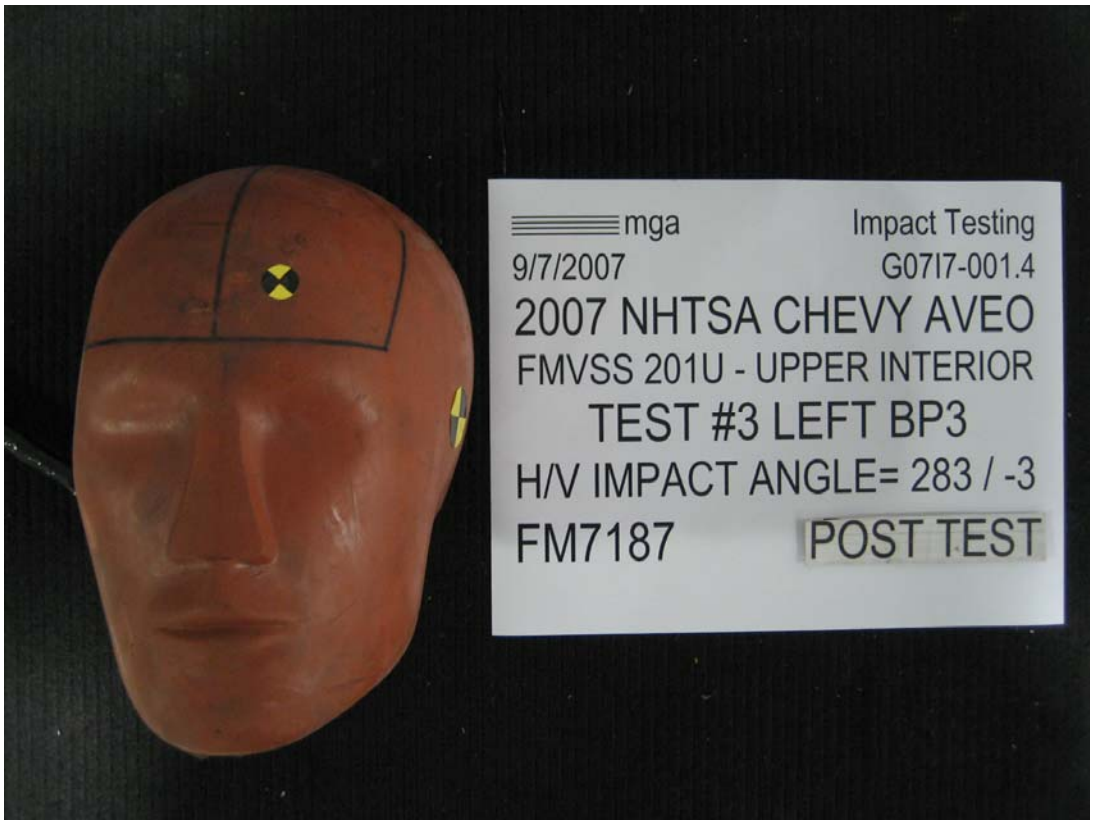

(peak = 33.1 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
-35
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.3 kph)
Impact Velocity: 23.31 kph
Velocity (kph)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 31.9 mm)
Displacement (mm)
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


H/V 283/-3
mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 283 / -3
FM7187
PRE TEST


BP3
BP3
mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 283 / -3
FM7187
POST TEST


mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #3 LEFT BP3
H/V IMPACT ANGLE= 283 / -3
FM7187
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#3

Target (Vehicle Side): BP3 Left

Temperature:21C

MGA Test Reference No.:FM7187

Humidity:68%

Approach Horizontal Angles:283º

Time of Test:2:12:09 PM

Approach Vertical Angles:-3º

FMH Serial No:[038]

Additional Description:

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
634	619	7.9	23.8	20	20 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J14103	-94.598	1.32	1.32
Y	6	J36197	110.692	1.89	1.89
Z	7	J36353	99.391	1.83	1.83

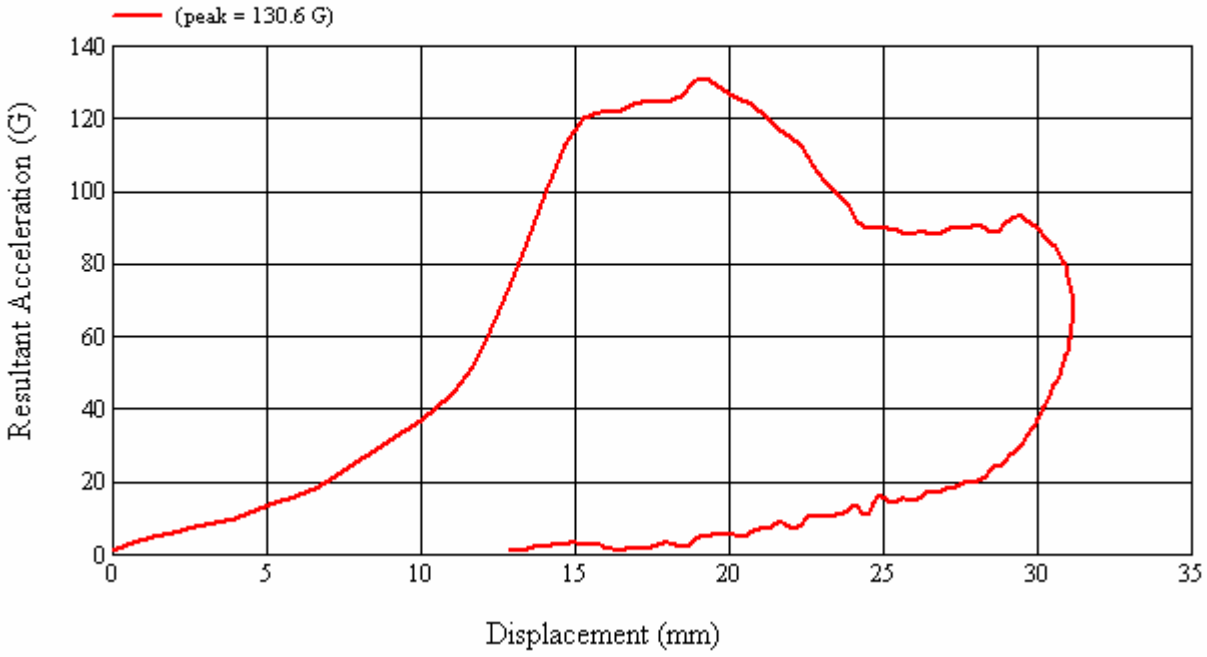
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

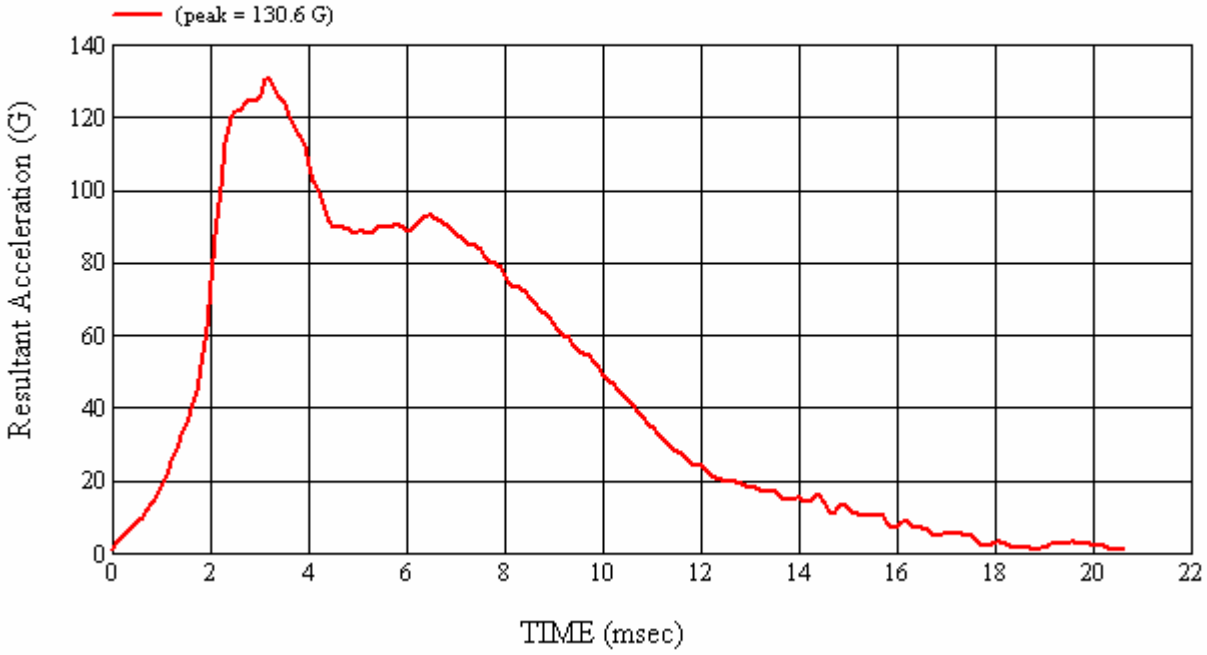
No visible damage.

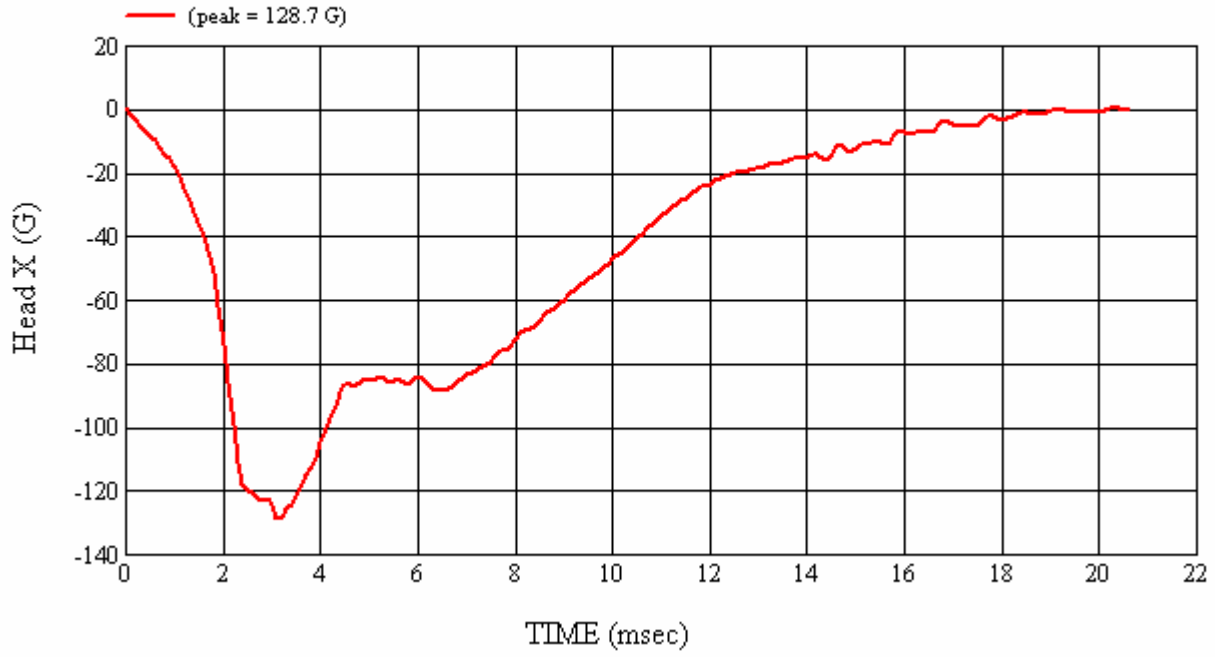
Recorded By: Louis Campbell Approved By*: Helen A. Kaleta Date: 9/7/2007

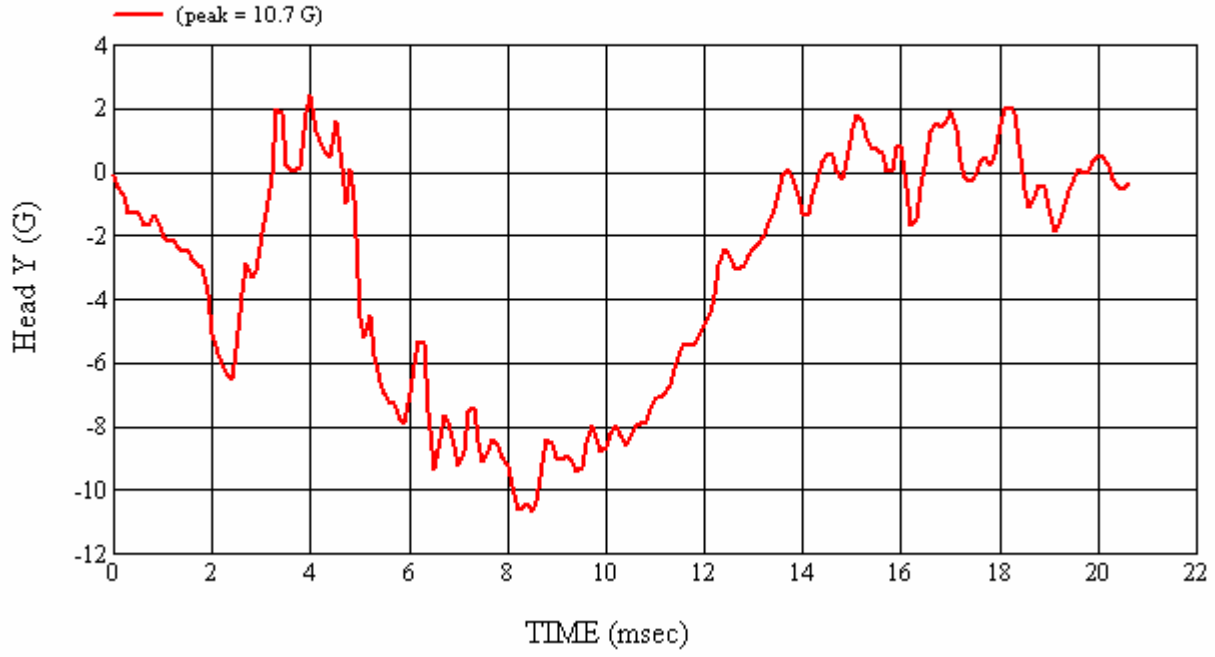
*Only necessary for NHTSA (Government) Compliance testing.

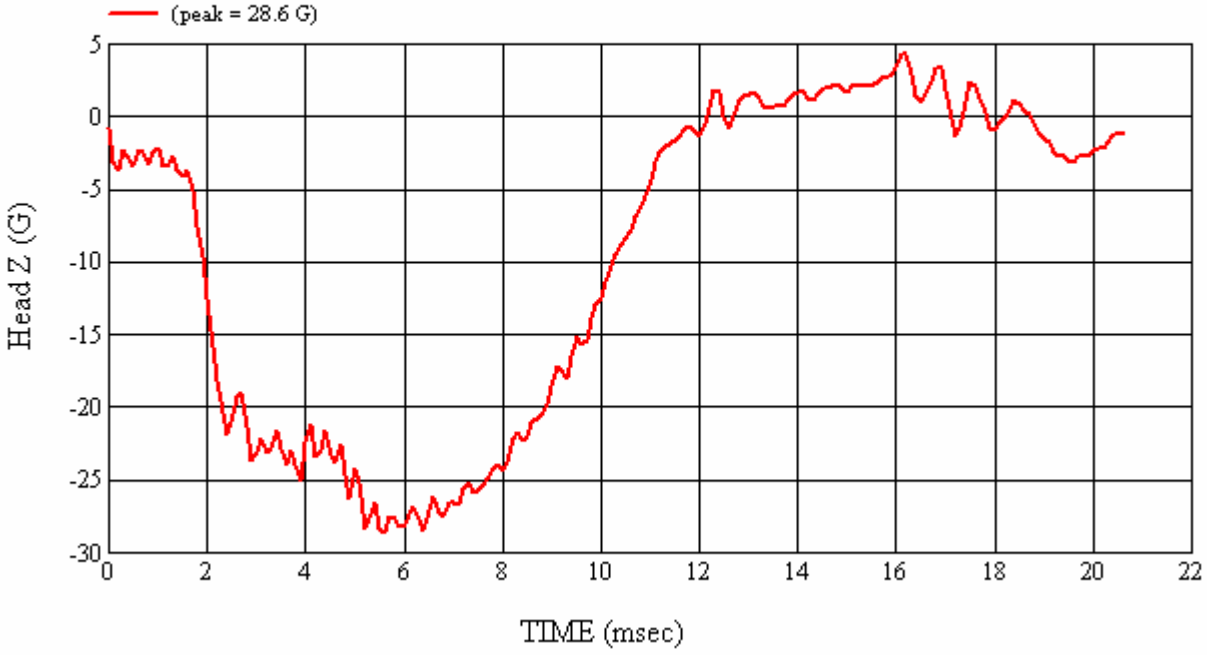
MGA Test #: FM7187 Target Location: BP3, Left Side Test Date: 9/7/2007

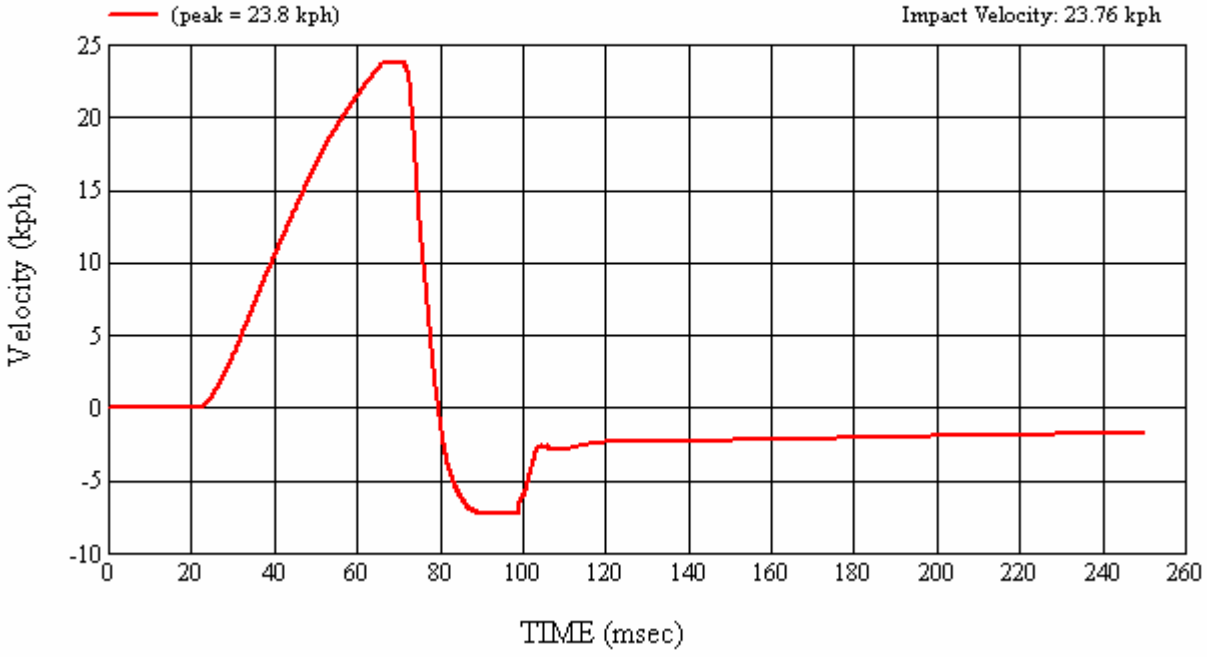


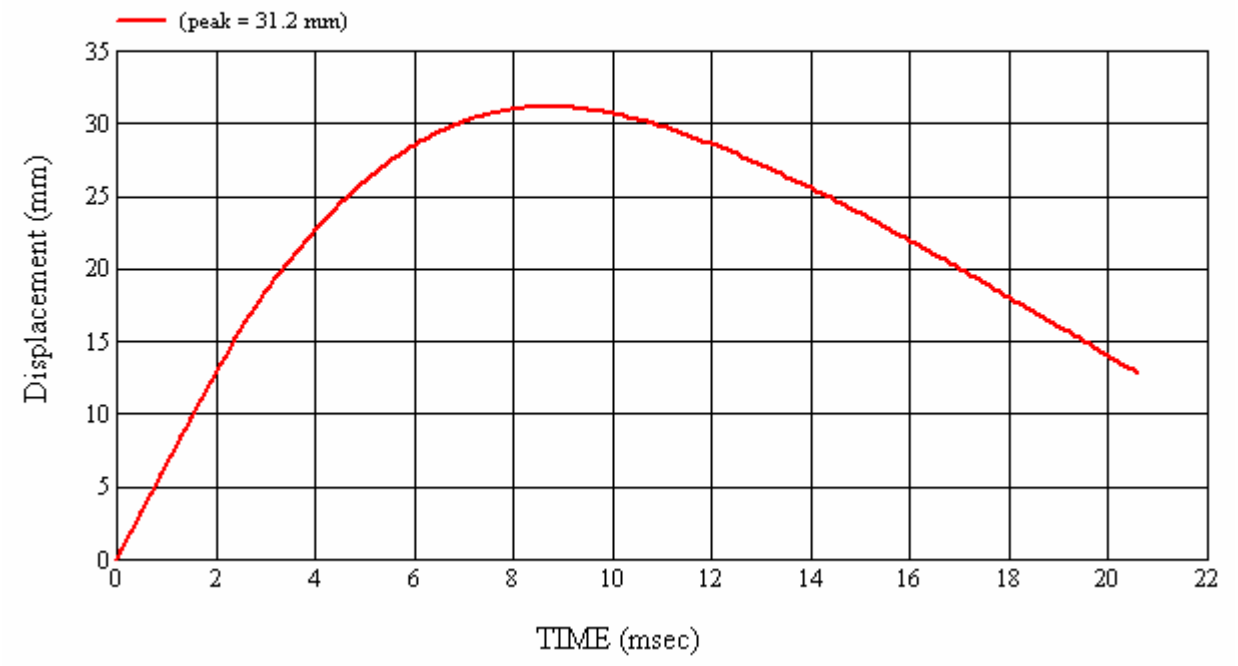



(peak = 128.7 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 10.7 G)
Head Y (G)
4
2
0
-2
-4
-6
-8
-10
-12
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

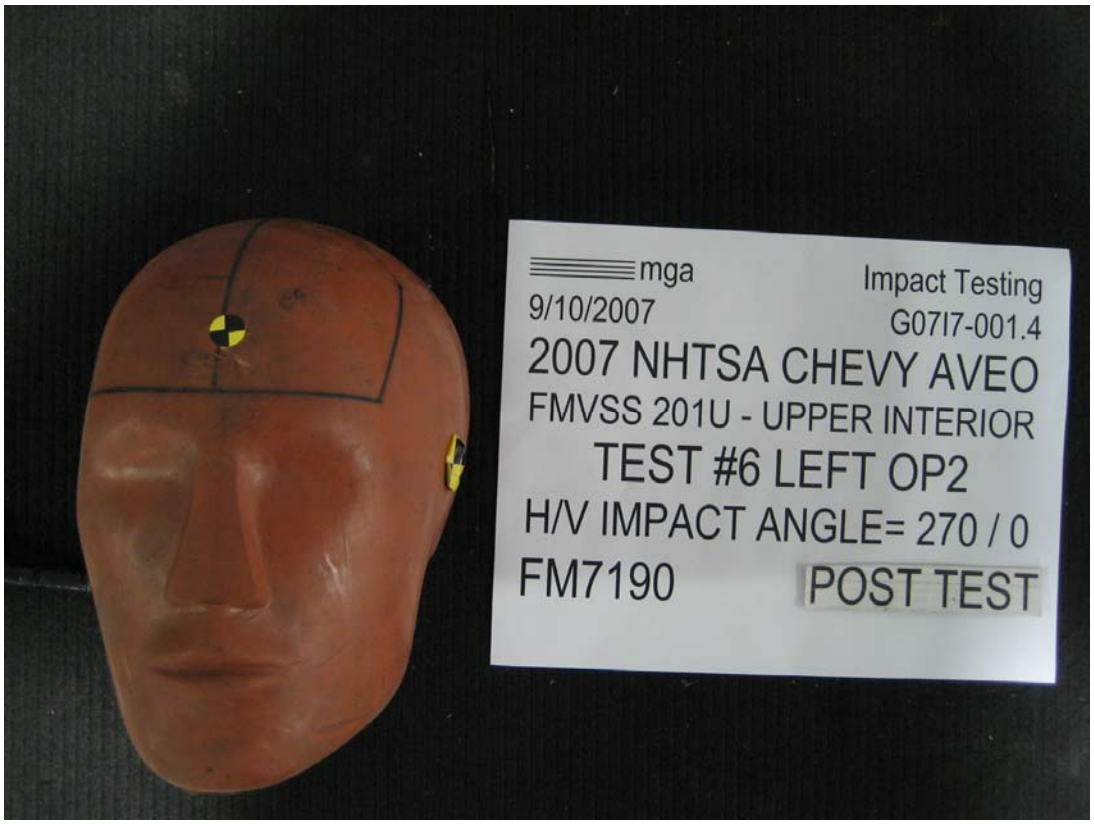

(peak = 28.6 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.8 kph)
Impact Velocity: 23.76 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 = 31.2 mm)
Displacement (mm)
TIME (msec)
0
5
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20
22


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / 0
FM7190
PRE TEST


C70100
FM7190
LEFT OP2
H/V 270/0
mga
9/10/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / 0
FM7190
POST TEST


mga
9/10/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #6 LEFT OP2
H/V IMPACT ANGLE= 270 / 0
FM7190
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#6

Target (Vehicle Side): OP2 Left

Temperature:22C

MGA Test Reference No.:FM7190

Humidity:60%

Approach Horizontal Angles:270º

Time of Test:9:02:08 AM

Approach Vertical Angles:0º

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
621	603	8.5	23.4	21	3 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J14103	-94.598	1.32	1.32
Y	6	J36197	110.692	1.89	1.89
Z	7	J36353	99.391	1.83	1.83

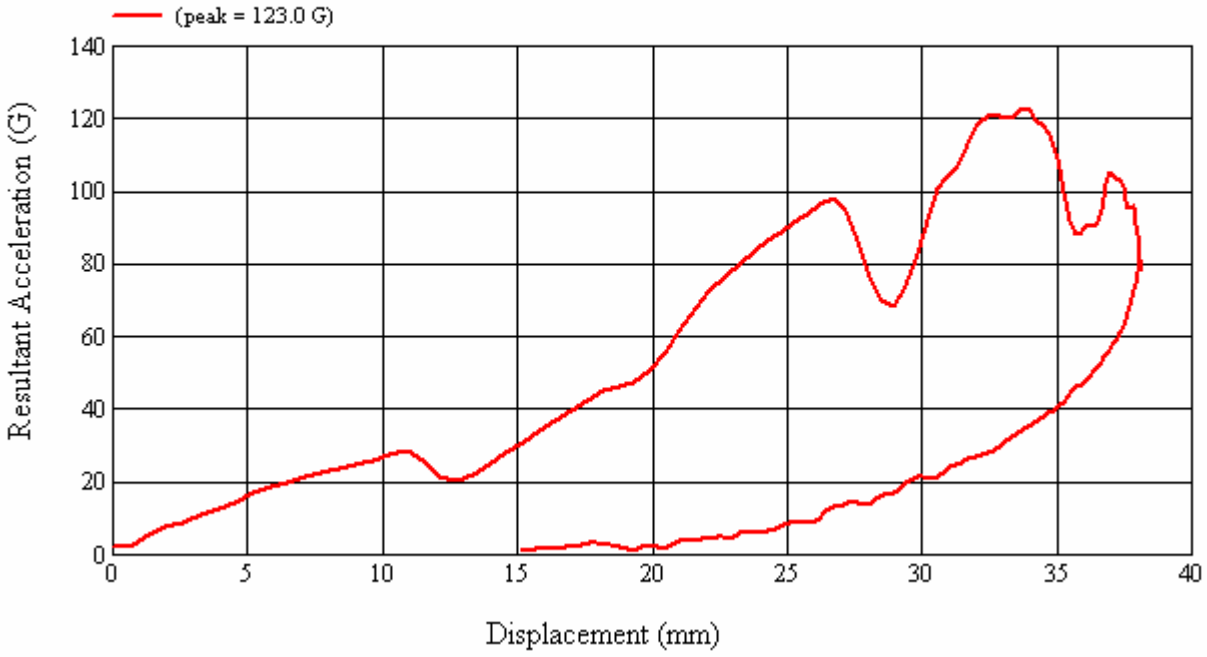
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

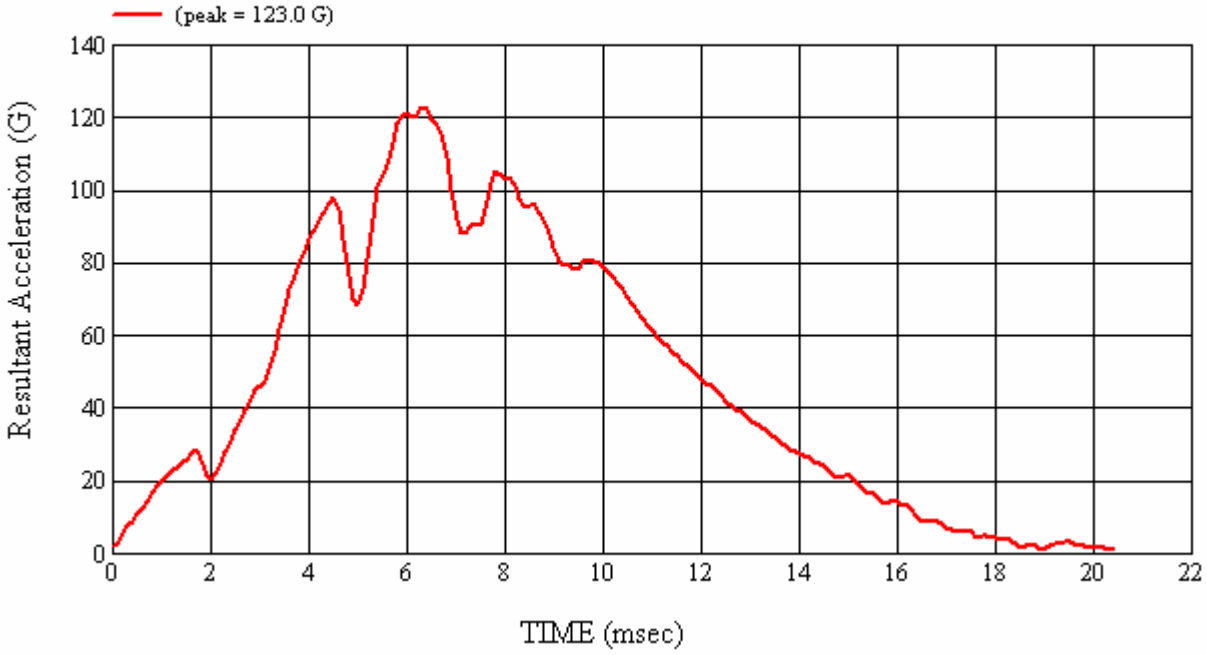
O-pillar cracked.

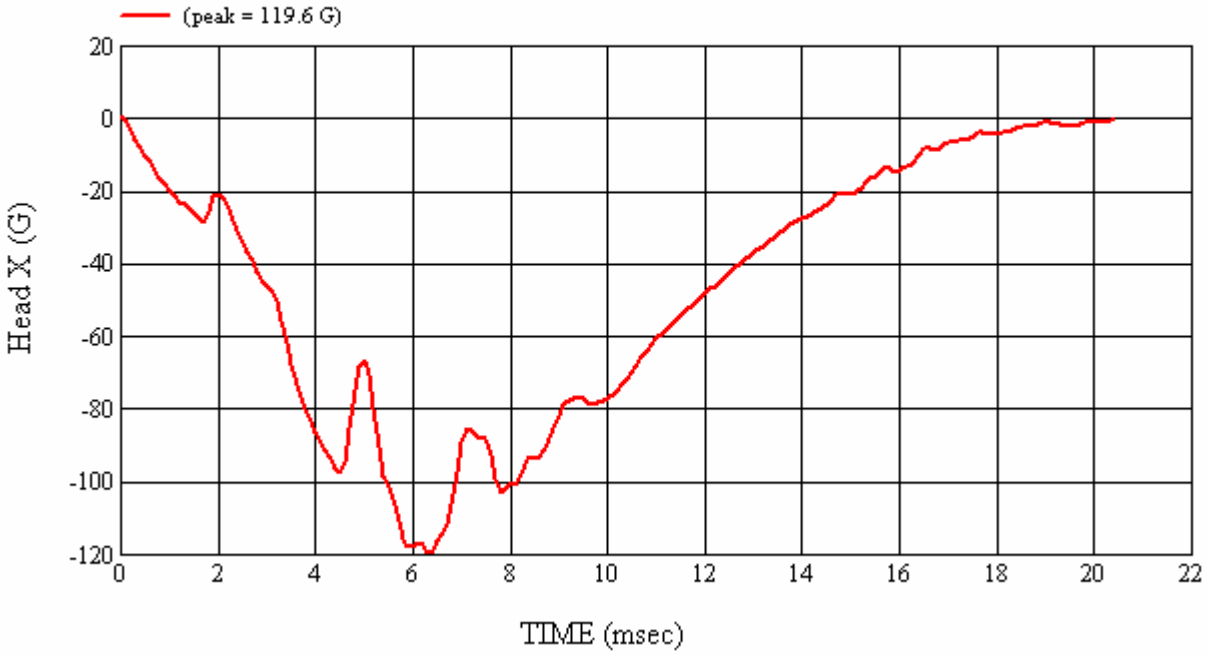
Recorded By: _____ Approved By*: _____ Date: 9/10/2007

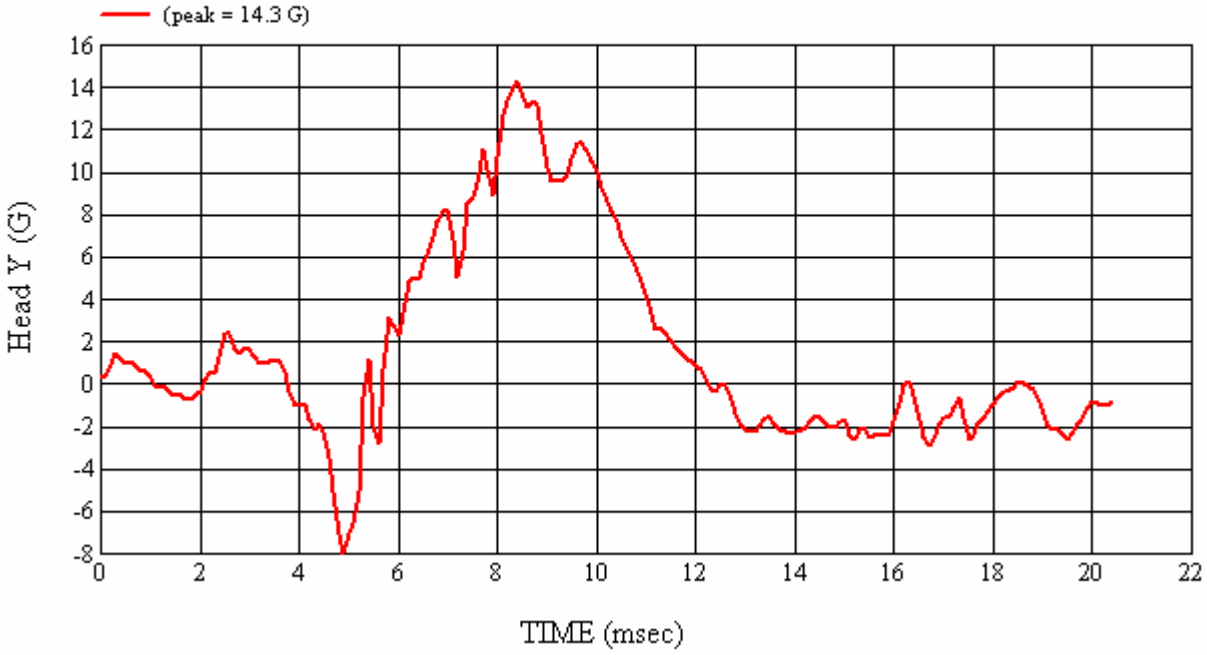
*Only necessary for NHTSA (Government) Compliance testing.

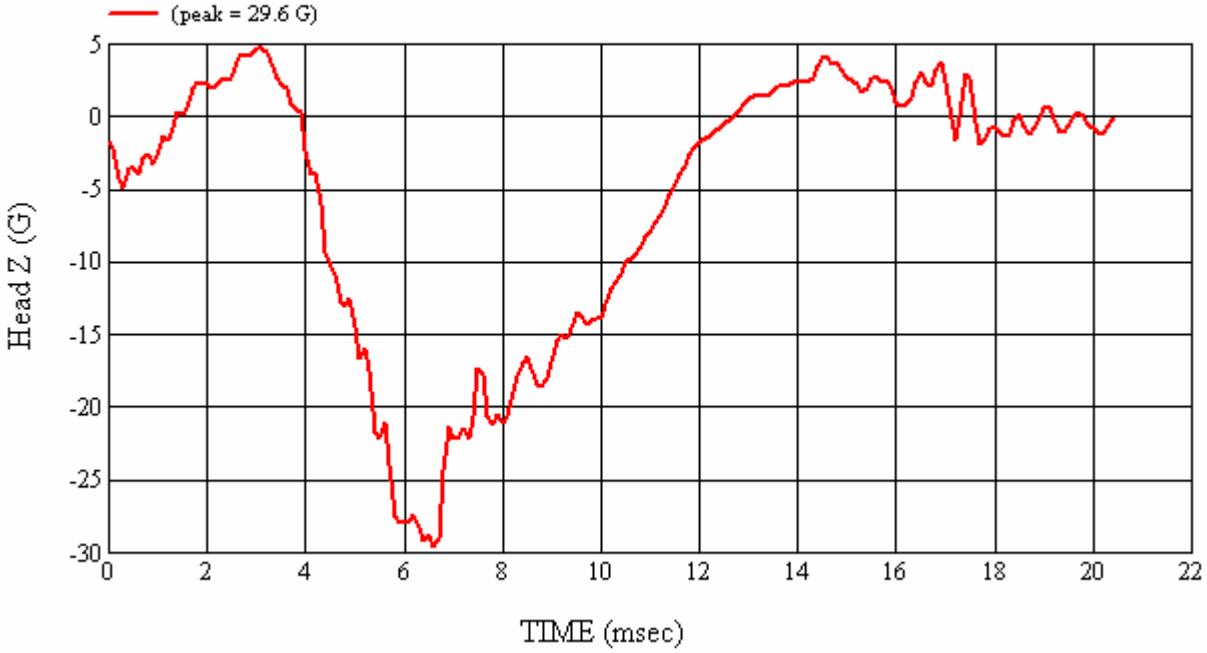
MGA Test #: FM7190 Target Location: OP2, Left Side Test Date: 9/10/2007

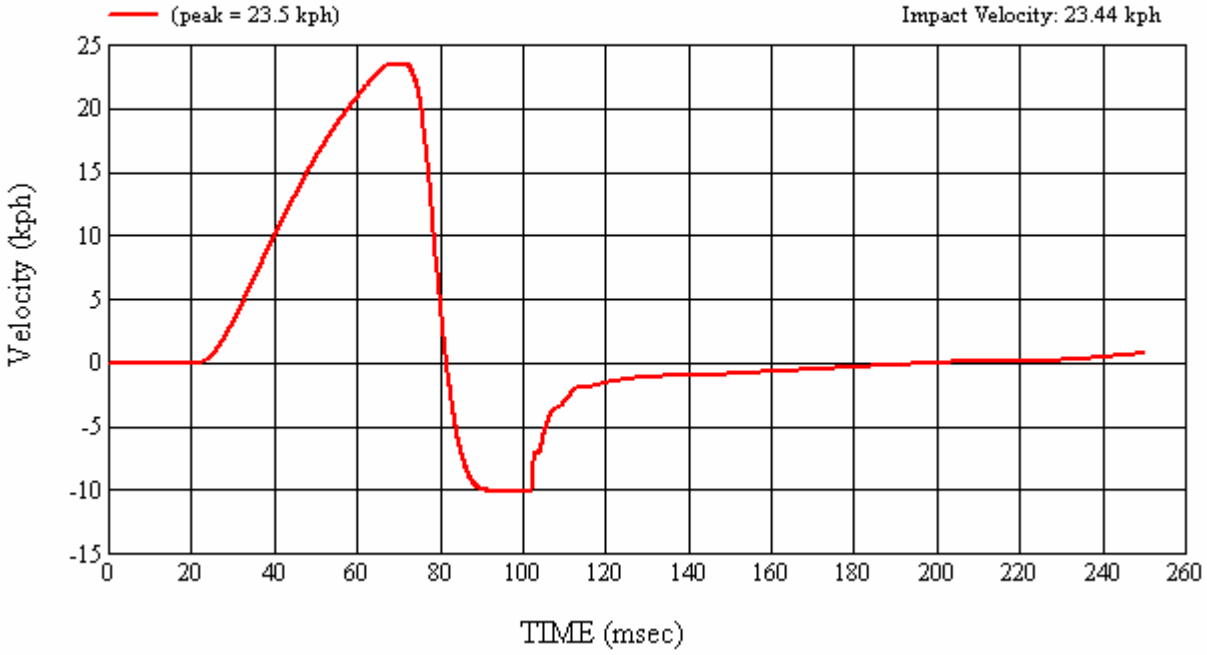




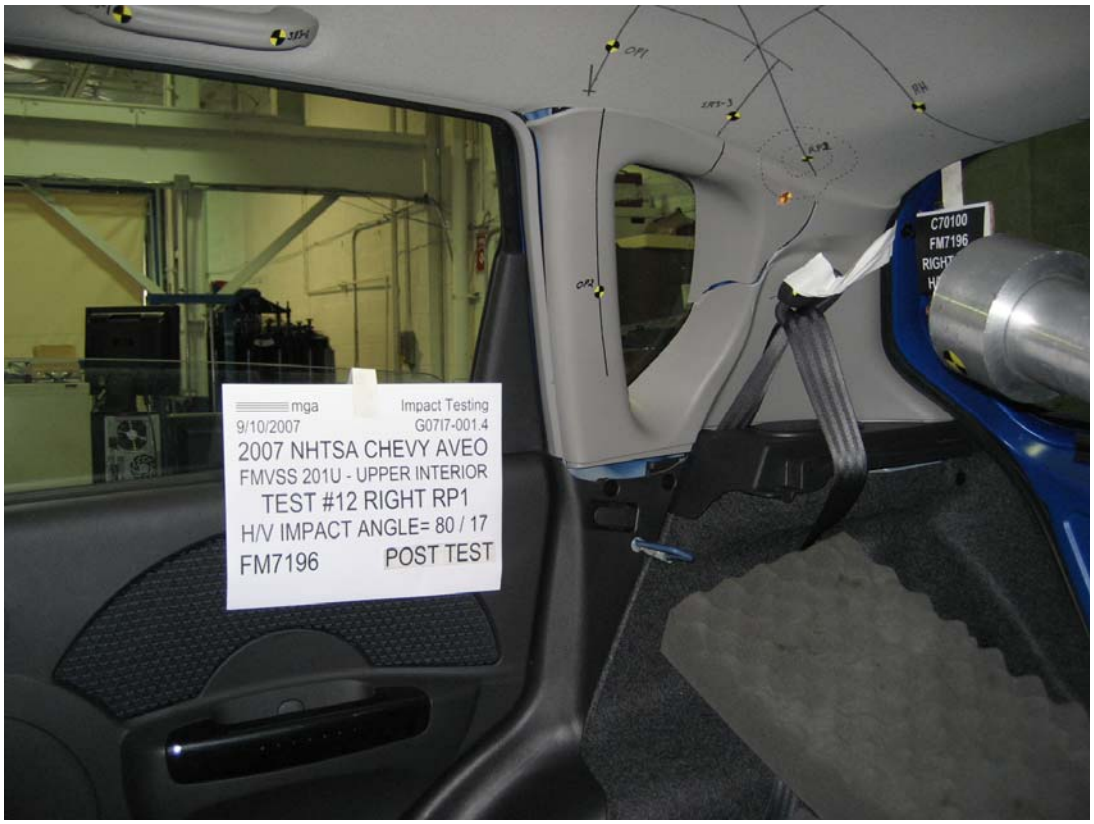

(peak = 119.6 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 14.3 G)
Head Y (G)
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 29.6 G)
Head Z (G)
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.5 kph)
Impact Velocity: 23.44 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)


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT RP1
H/V IMPACT ANGLE= 80 / 17
FM7196
PRE TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT RP1
H/V IMPACT ANGLE= 80 / 17
FM7196
POST TEST
C70100
FM7196


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #12 RIGHT RP1
H/V IMPACT ANGLE= 80 / 17
FM7196
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#12

Target (Vehicle Side): RP1 Right

Temperature:21C

MGA Test Reference No.:FM7196

Humidity:58%

Approach Horizontal Angles:80º

Time of Test:3:47:23 PM

Approach Vertical Angles:17º

FMH Serial No:[038]

Additional Description: 2 Relocations

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
454	382	11.1	23.9	16	6 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J14103	-94.598	1.32	1.32
Y	6	J36197	110.692	1.89	1.89
Z	7	J36353	99.391	1.83	1.83

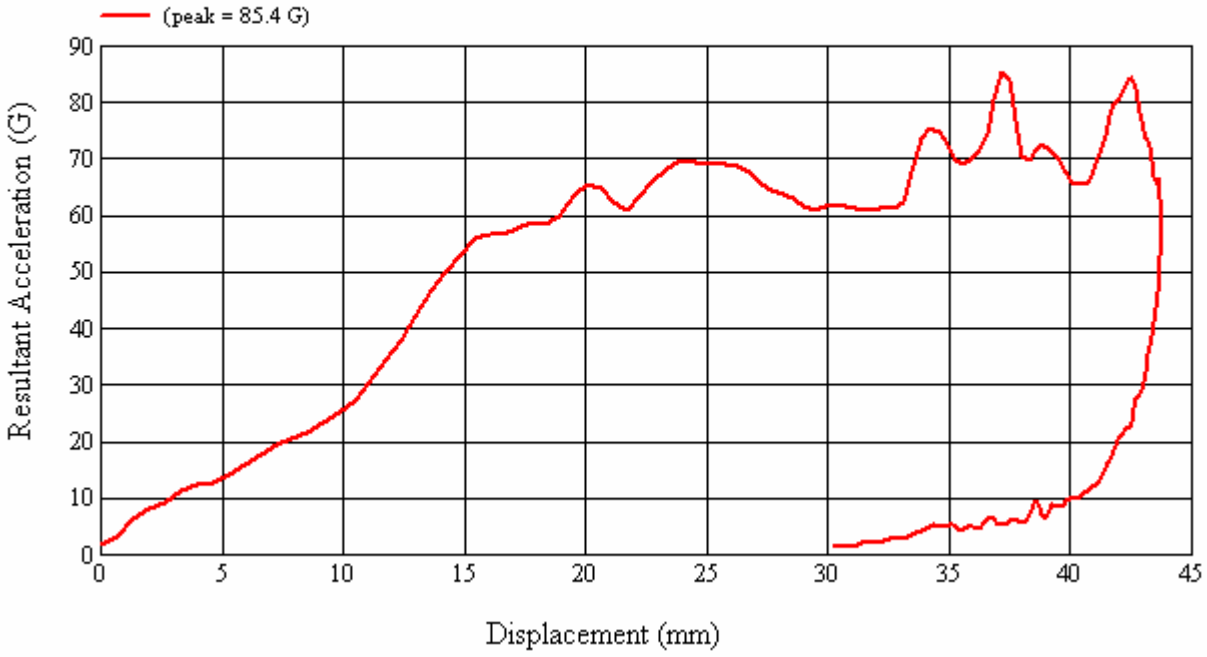
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

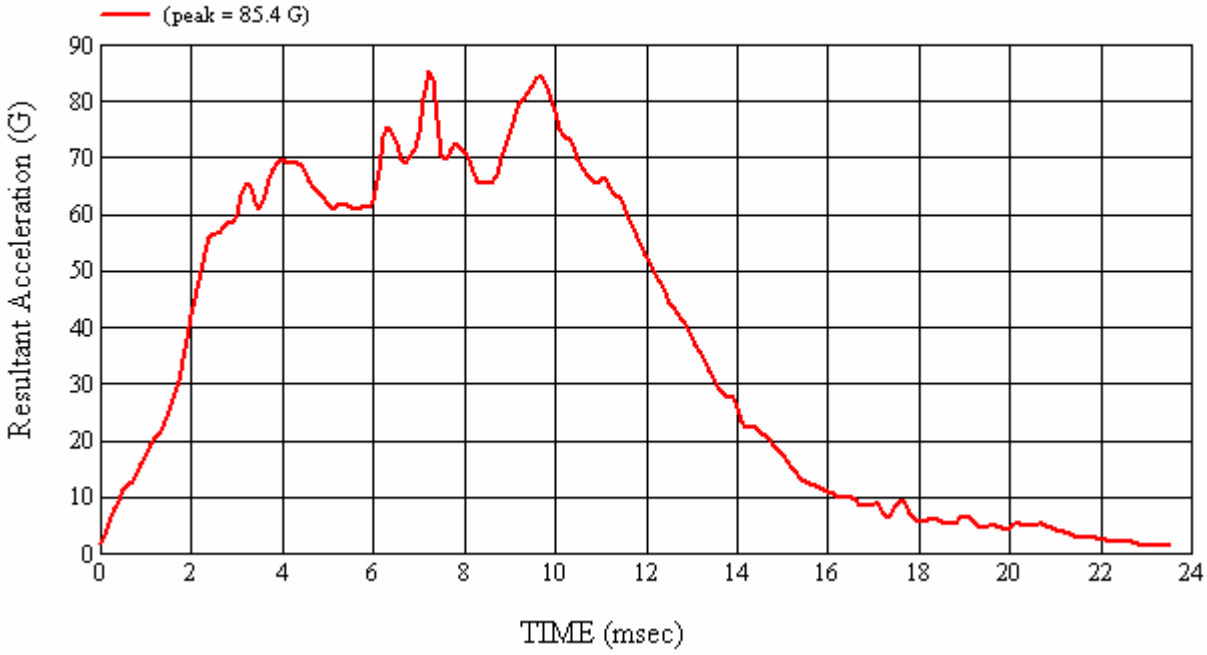
Rear pillar/O pillar trim cracked, broke, and displaced.

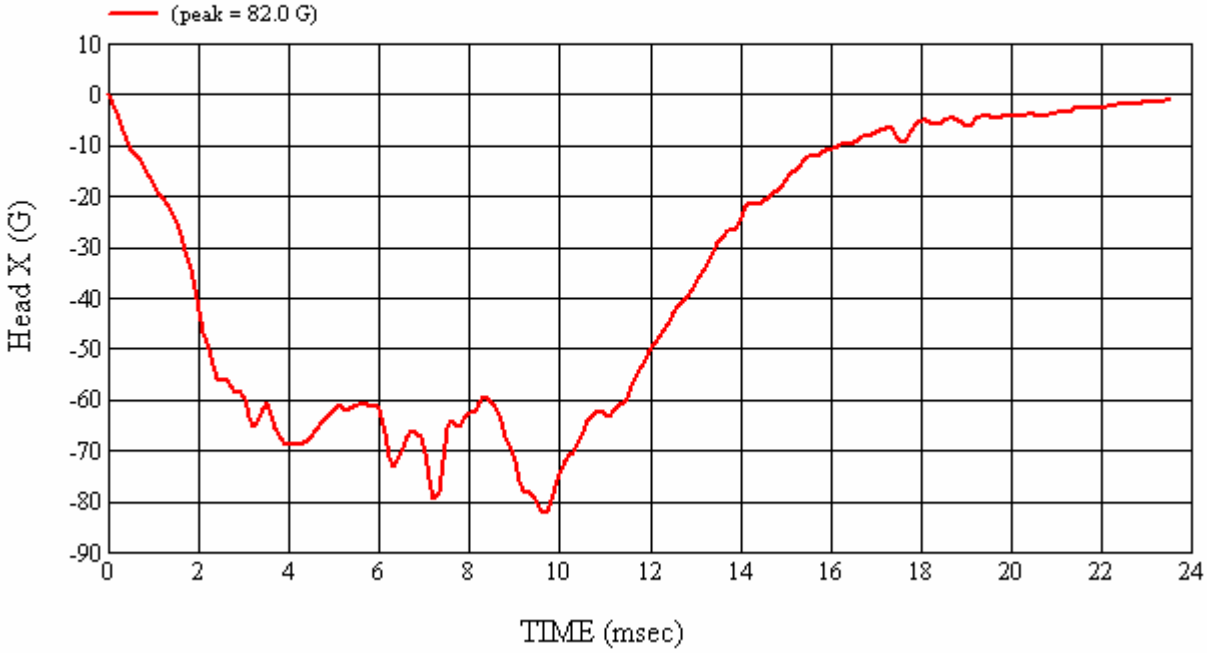
Recorded By: Louis Campbell Approved By*: Helen A. Kaleto Date: 9/10/2007

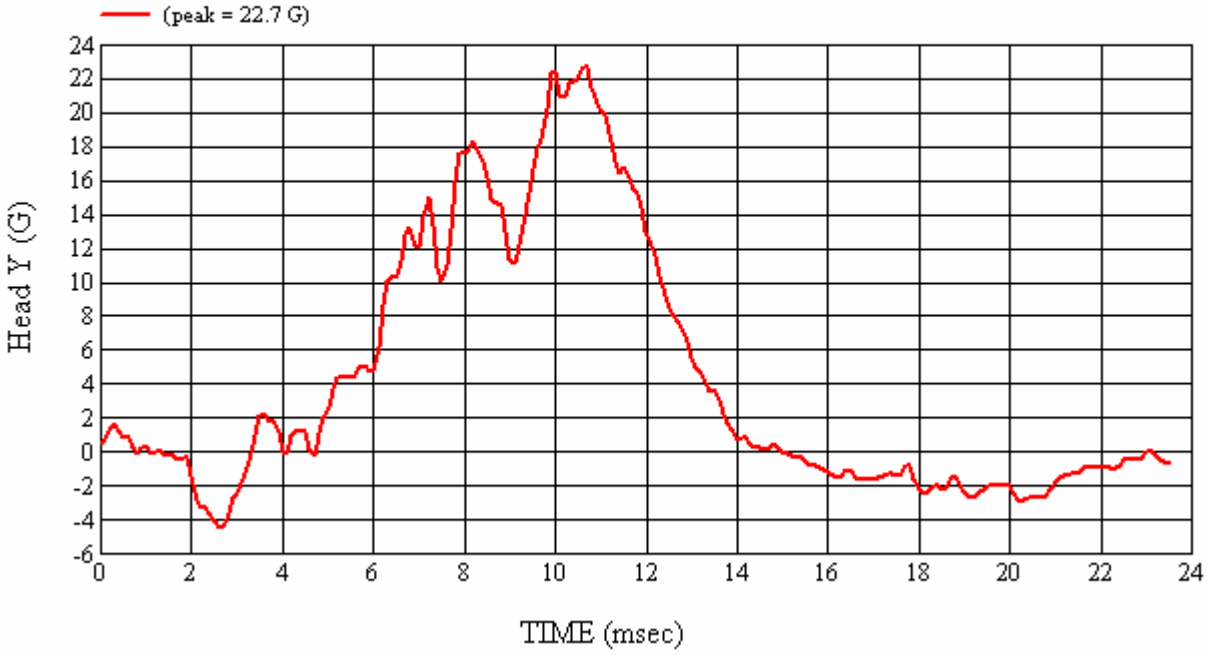
*Only necessary for NHTSA (Government) Compliance testing.

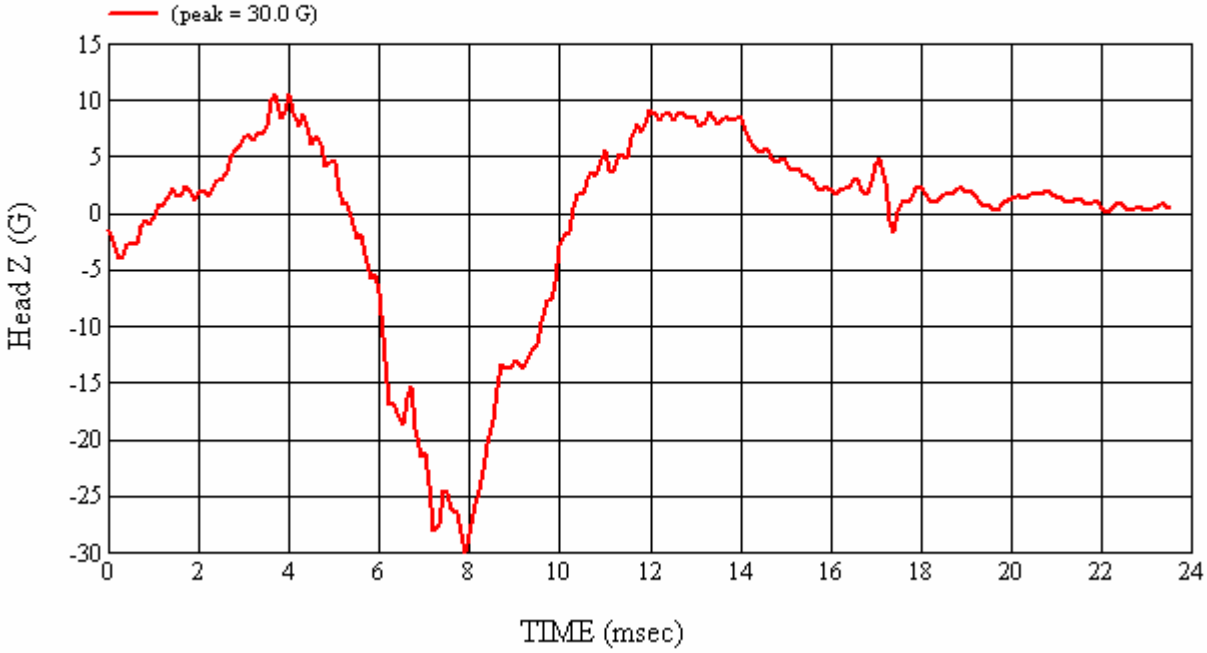
MGA Test #: FM7196 Target Location: RP1, Right Side Test Date: 9/10/2007

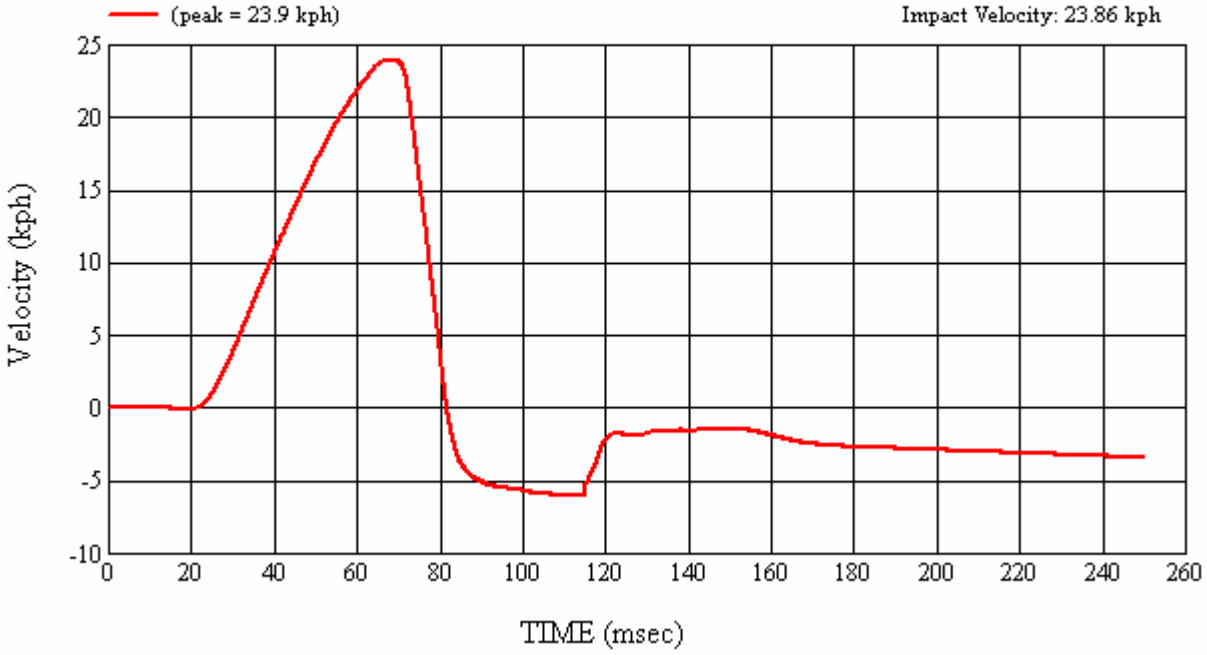


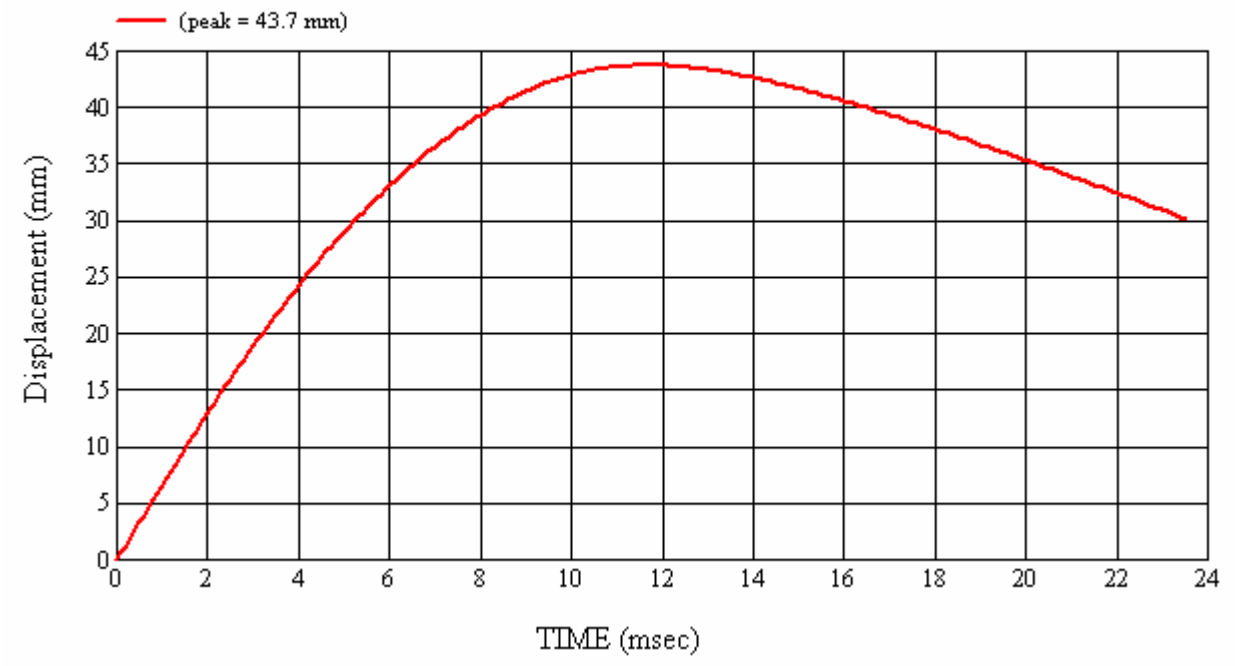



(peak = 82.0 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

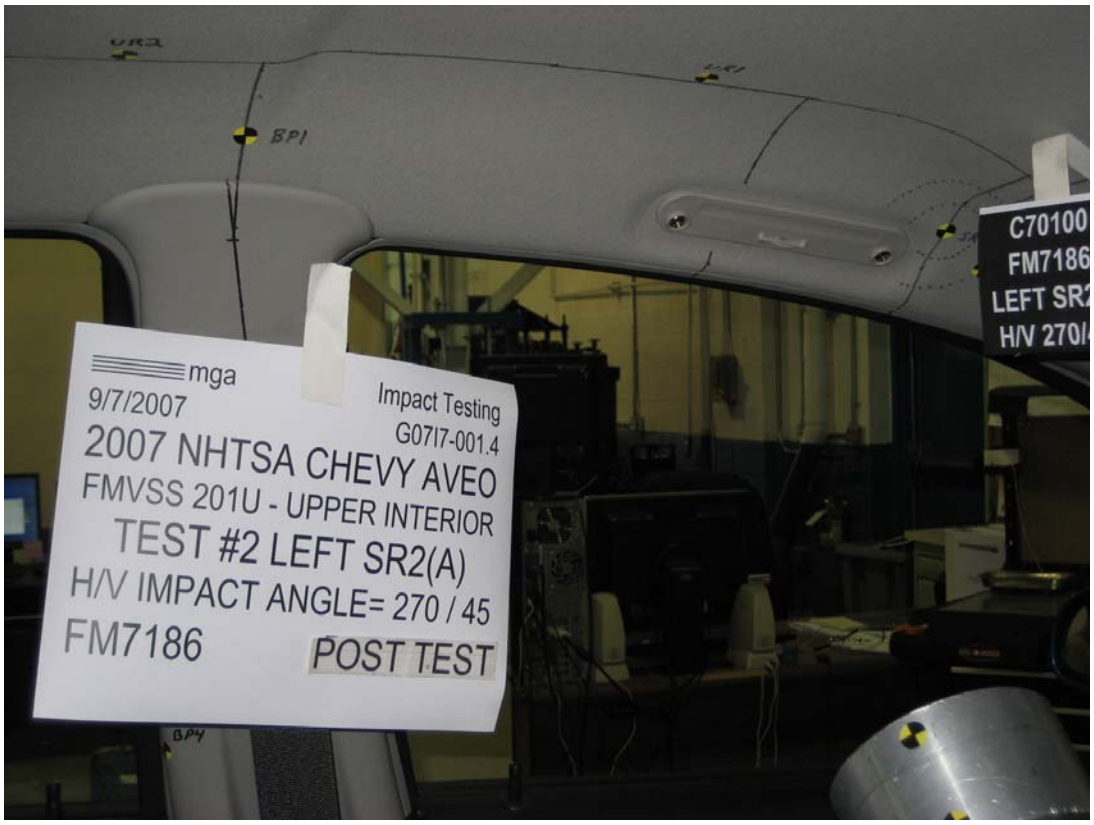

(peak = 22.7 G)
Head Y (G)
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)

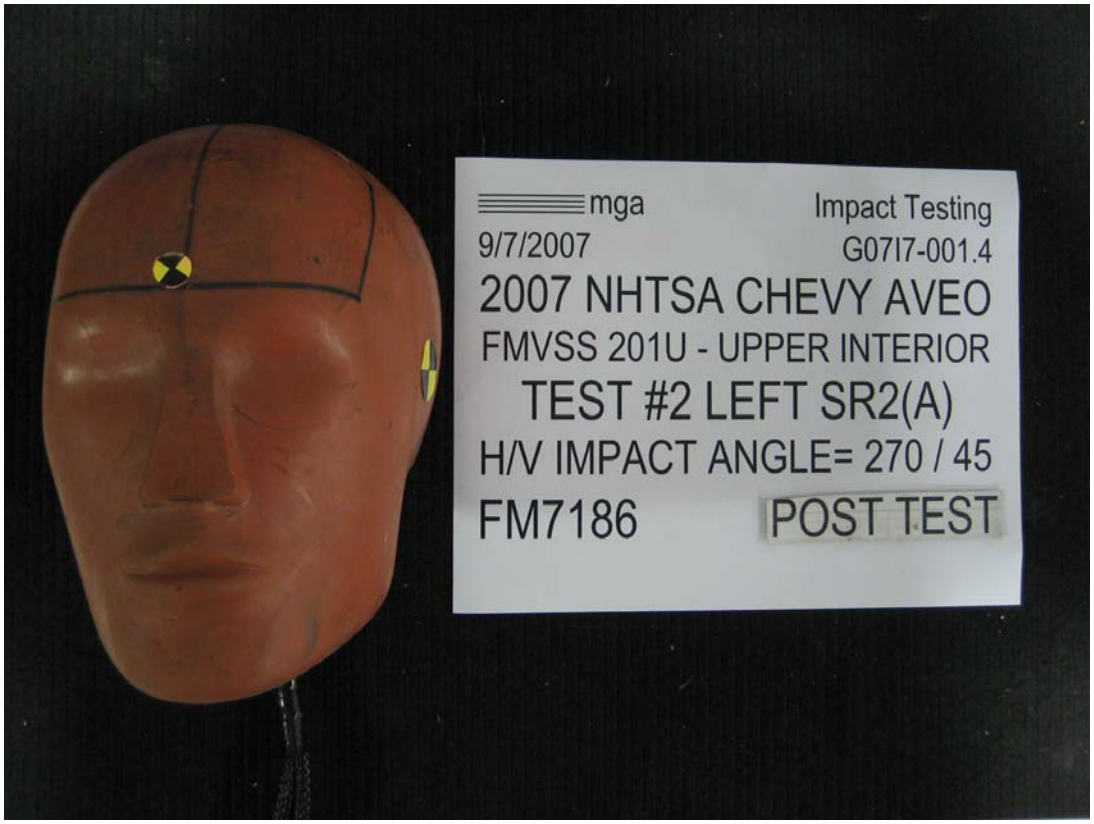

(peak = 30.0 G)
Head Z (G)
15
10
5
0
-5
-10
-15
-20
-25
-30
0
2
4
6
8
10
12
14
16
18
20
22
24
TIME (msec)


(peak = 23.9 kph)
Impact Velocity: 23.86 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


(peak = 43.7 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)


mga
9/7/2007
Impact Testing
G07I7-001.A
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 45
FM7186
PRE TEST


BP1
C70100
FM7186
LEFT SR
H/V 270/
mga
9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 45
FM7186
POST TEST
BP4


mga
9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #2 LEFT SR2(A)
H/V IMPACT ANGLE= 270 / 45
FM7186
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#2

Target (Vehicle Side): SR2(a) Left

Temperature:21C

MGA Test Reference No.:FM7186

Humidity:69%

Approach Horizontal Angles:270º

Time of Test:1:01:08 PM

Approach Vertical Angles:45º

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
545	502	7.2	23.5	5	5 Right

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22696	-100.013	1.33	1.33
Y	6	J35791	91.856	1.89	1.89
Z	7	J35800	97.996	1.83	1.83

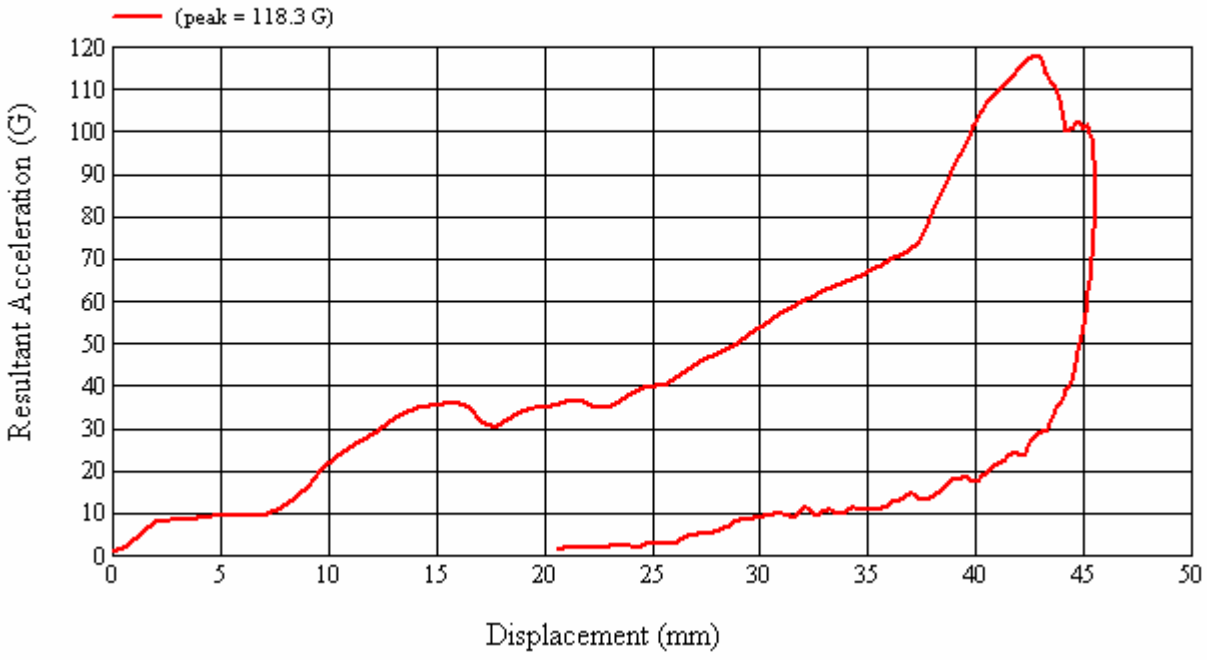
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

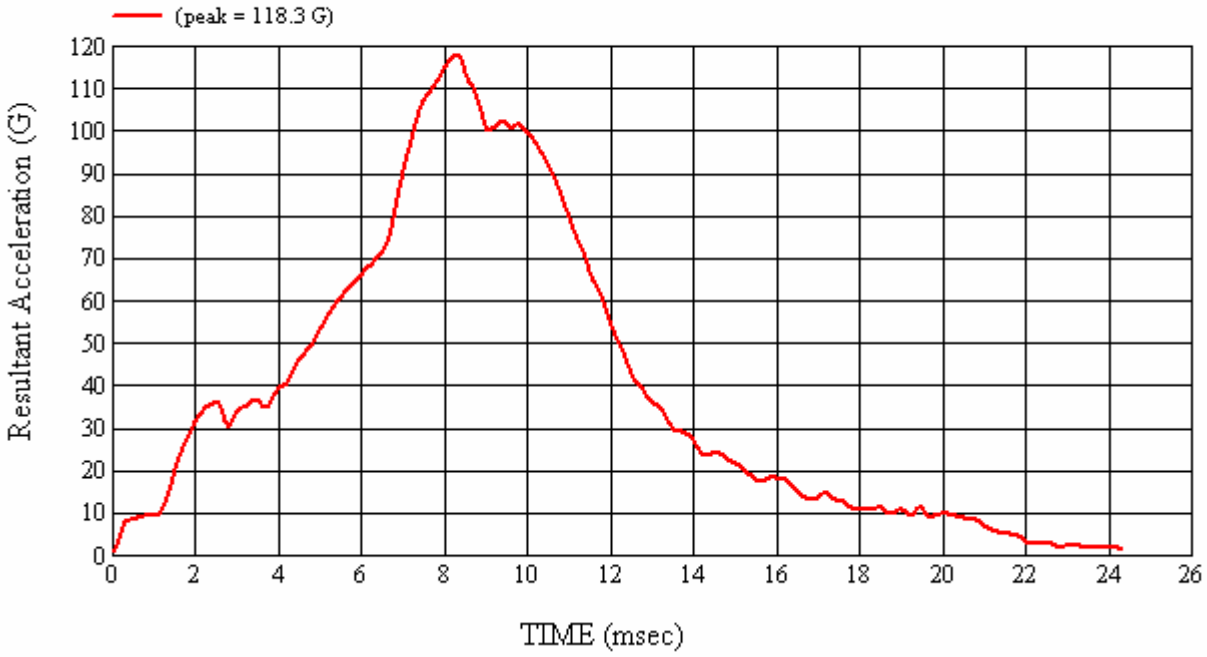
Sunglass holder broke off.

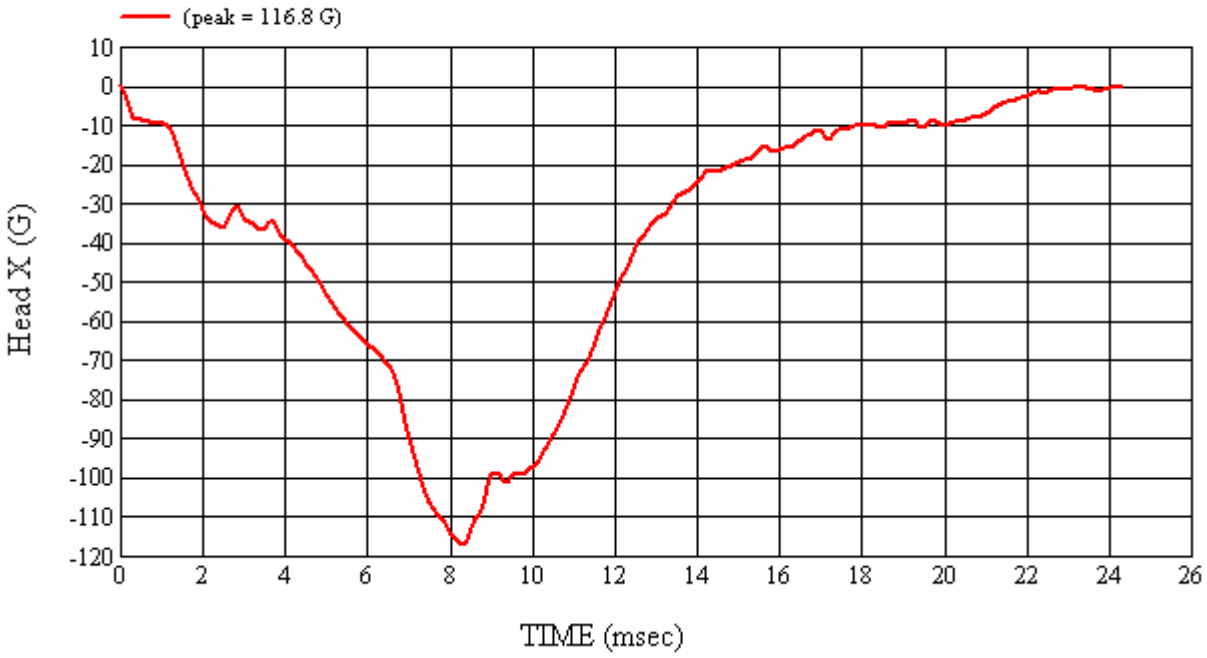
Recorded By: _____ Approved By*: _____ Date: 9/7/2007

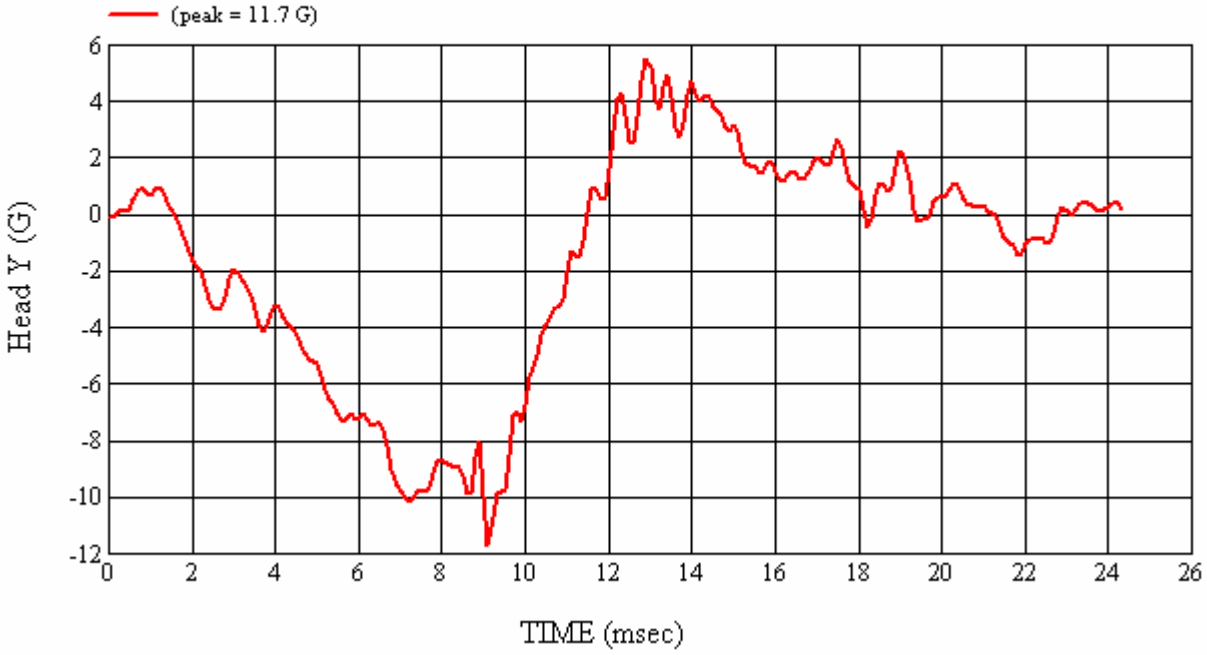
*Only necessary for NHTSA (Government) Compliance testing.

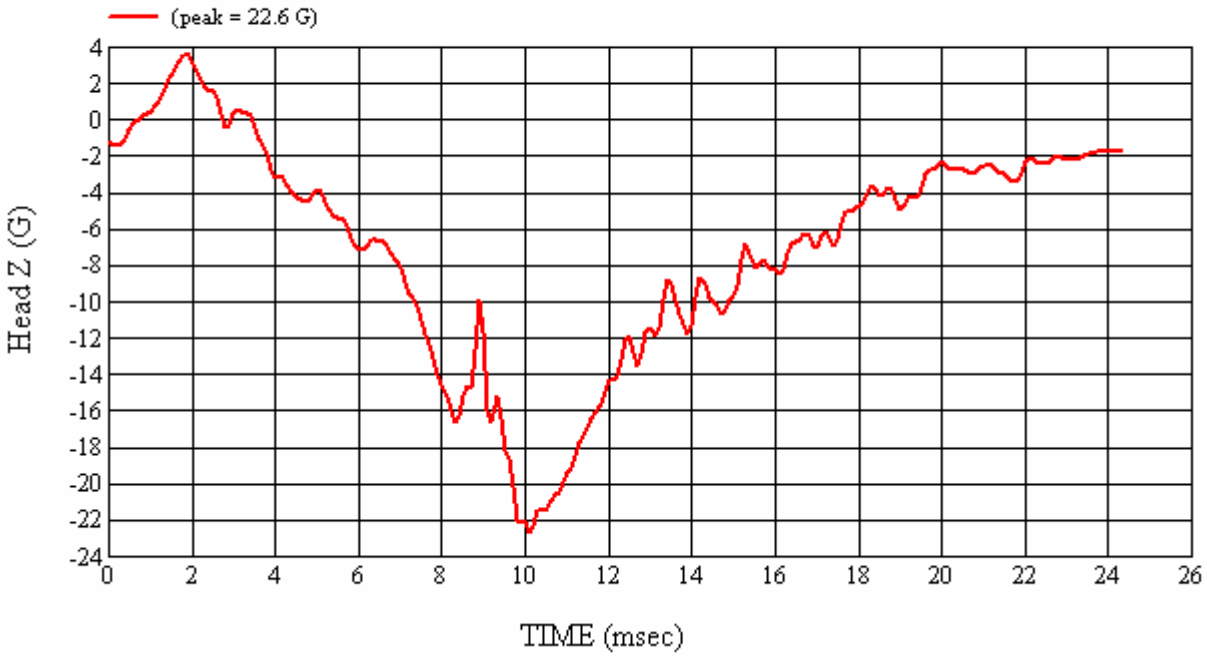
MGA Test #: FM7186 Target Location: SR2(a), Left Side Test Date: 9/7/2007

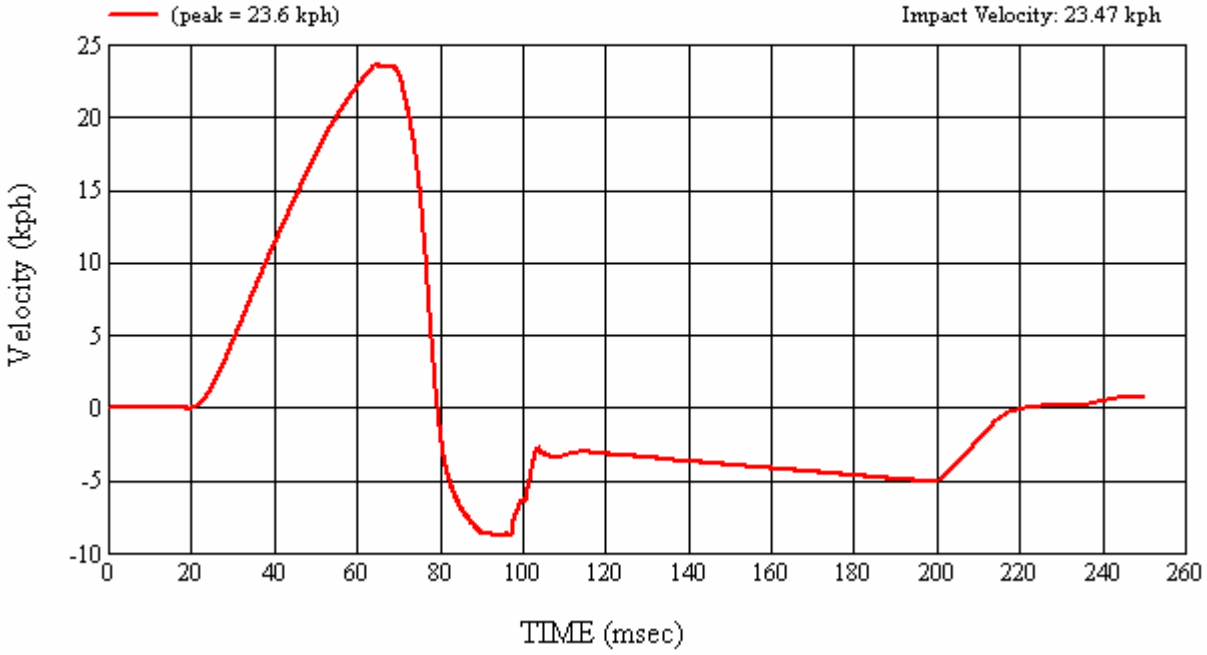


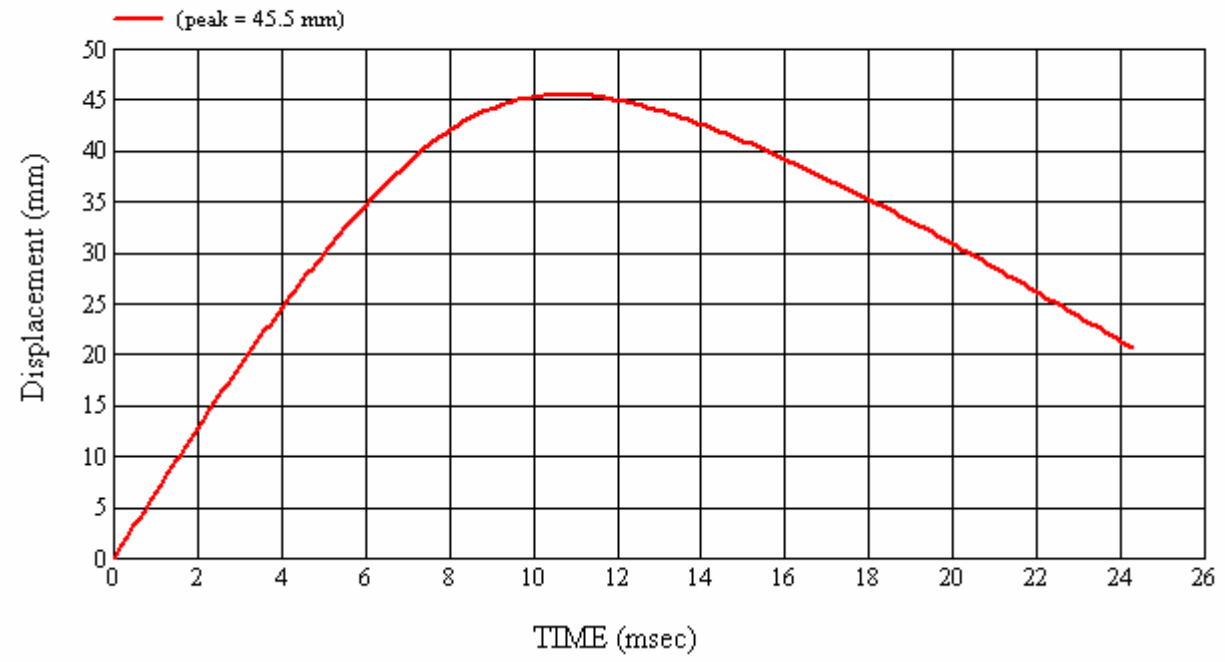


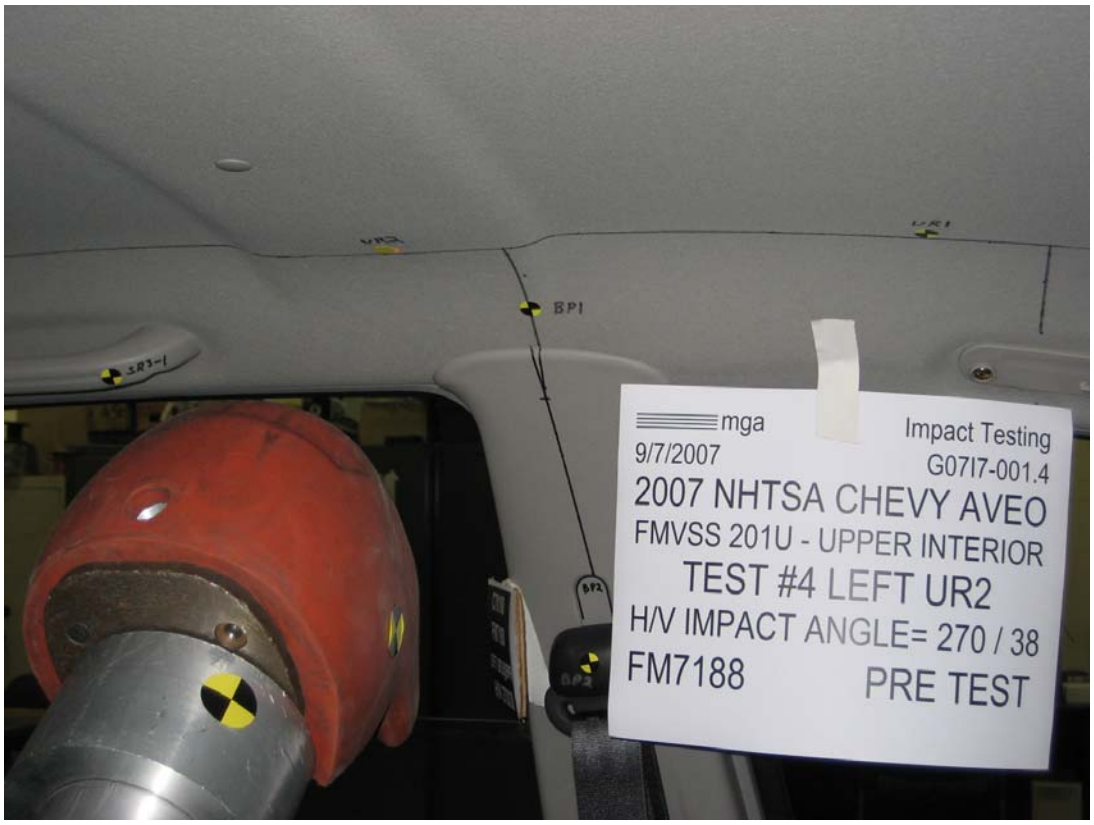

(peak = 116.8 G)
Head X (G)
10
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 11.7 G)
Head Y (G)
6
4
2
0
-2
-4
-6
-8
-10
-12
0
2
4
6
8
10
12
14
16
18
20
22
24
26
TIME (msec)


(peak = 22.6 G)
Head Z (G)
4
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
TIME (msec)


(peak = 23.6 kph)
Impact Velocity: 23.47 kph
Velocity (kph)
25
20
15
10
5
0
-5
-10
0
20
40
60
80
100
120
140
160
180
200
220
240
260
TIME (msec)


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


mga
9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR2
H/V IMPACT ANGLE= 270 / 38
FM7188
PRE TEST


mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR2
H/V IMPACT ANGLE= 270 / 38
FM7188
POST TEST


mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #4 LEFT UR2
H/V IMPACT ANGLE= 270 / 38
FM7188
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Target (Vehicle Side): UR2 Left

MGA Test Reference No.:FM7188

Approach Horizontal Angles:270º

Approach Vertical Angles:38º

Additional Description: @ B-Pillar

Test Number:#4

Temperature:21C

Humidity:68%

Time of Test:3:05:30 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
655	647	7.7	23.2	41	1 Right

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22664	-94.161	1.32	1.32
Y	6	J35919	97.442	1.89	1.89
Z	7	J35924	93.891	1.83	1.83

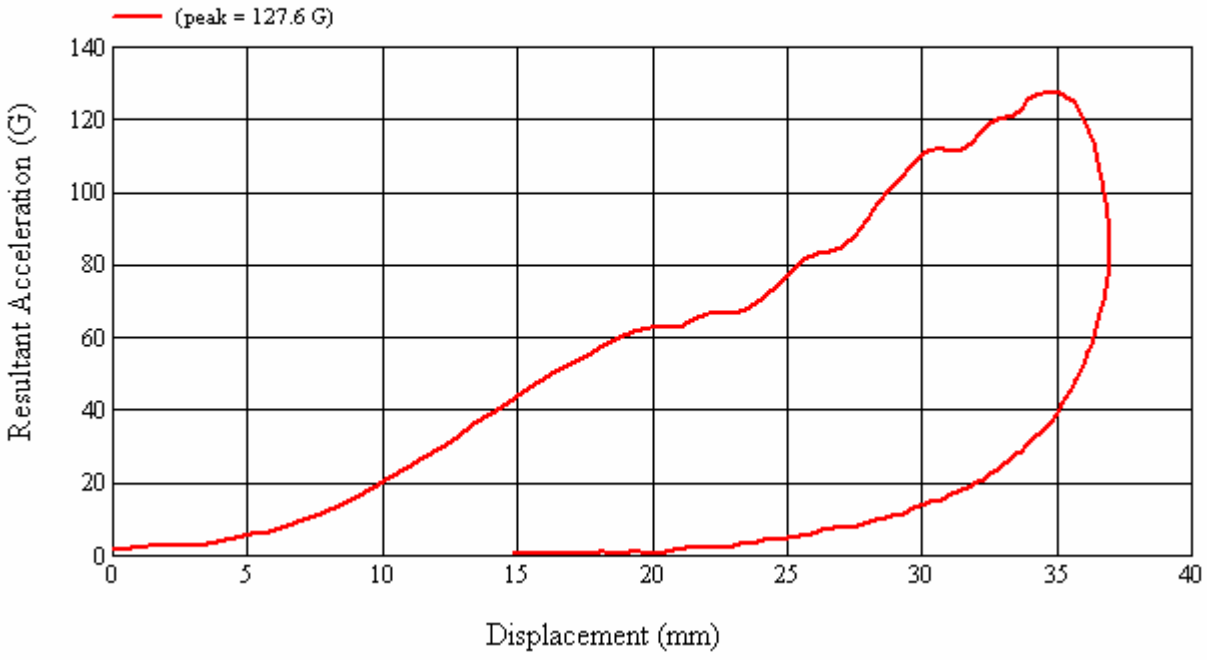
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

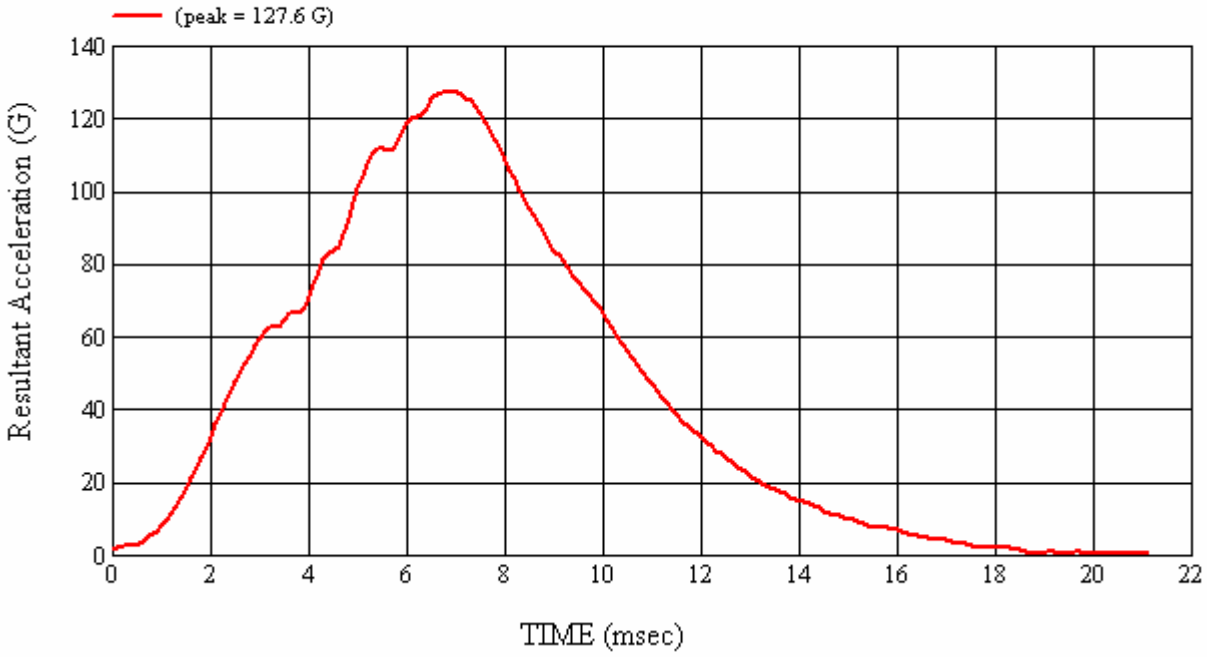
Top of B-pillar slightly displaced

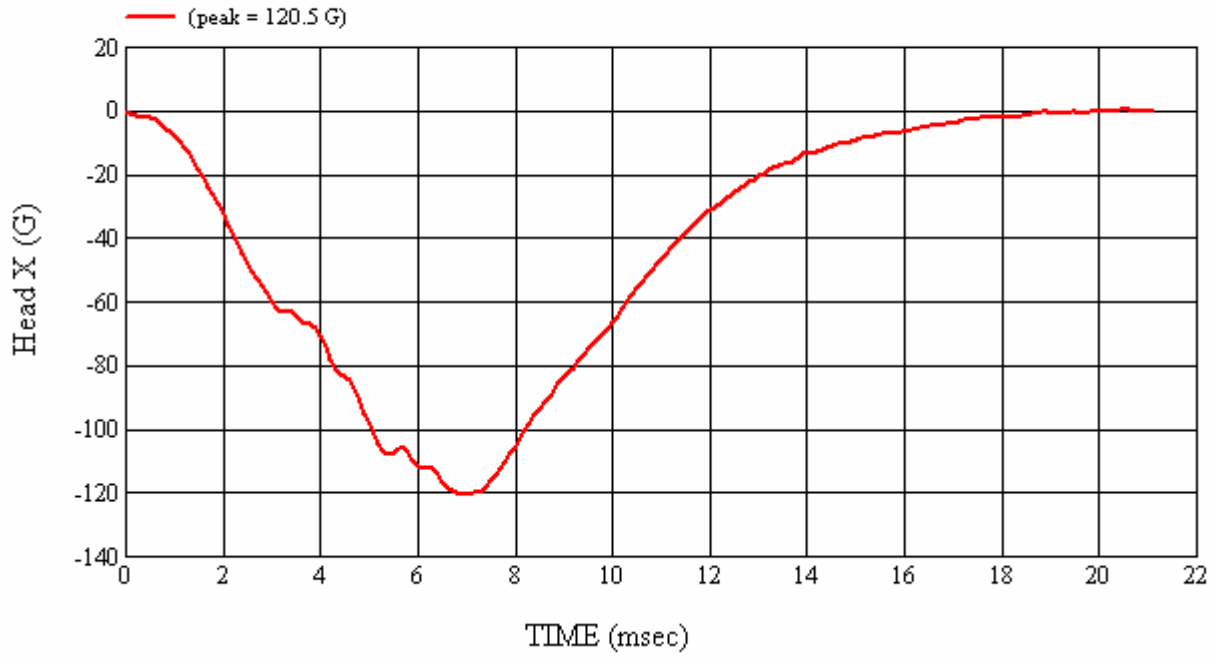
Recorded By: ______ Approved By*: ______ Date: 9/7/2007

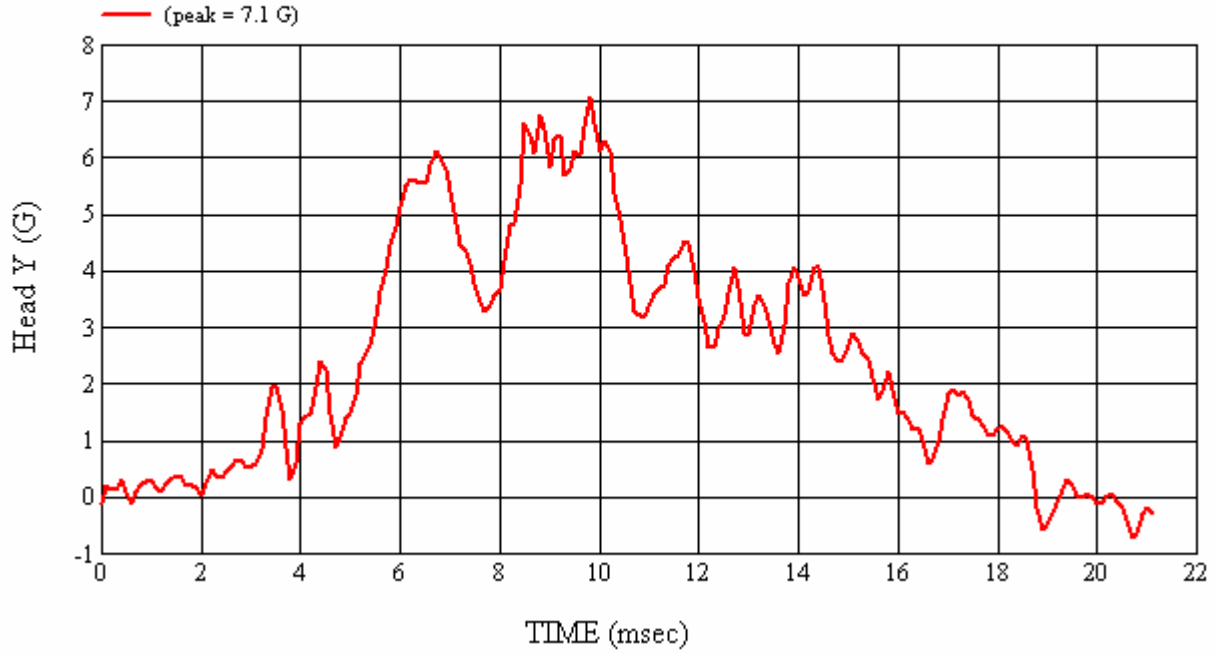
*Only necessary for NHTSA (Government) Compliance testing.

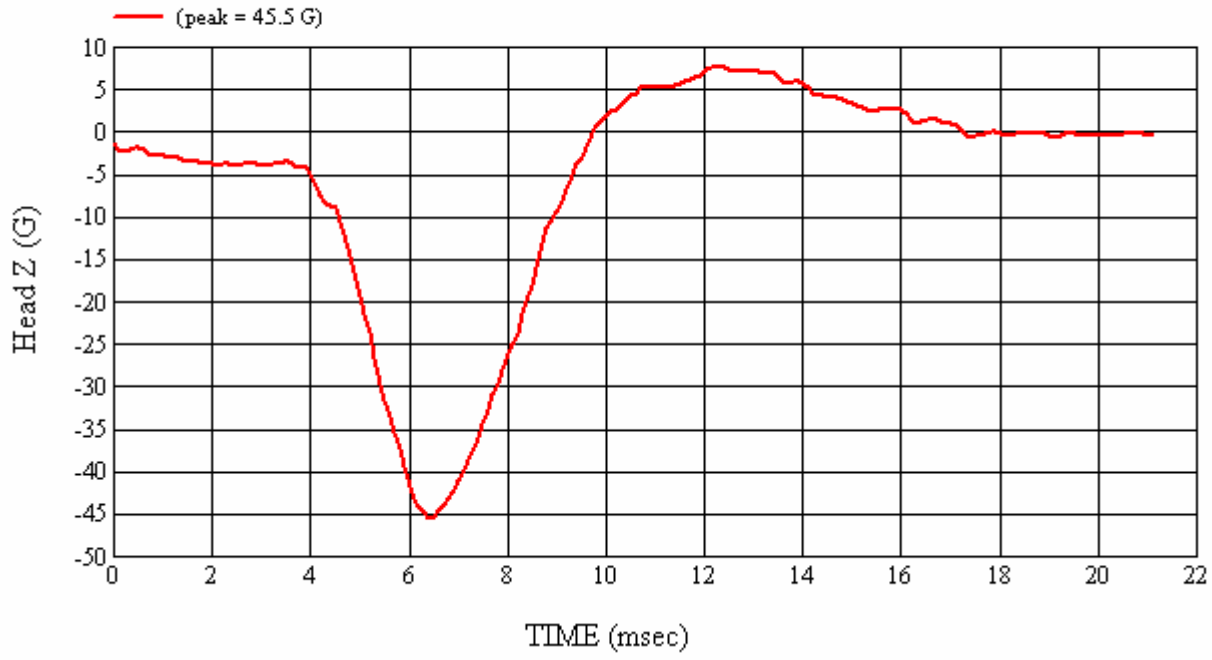
MGA Test #: FM7188 Target Location: UR2, Left Side Test Date: 9/7/2007

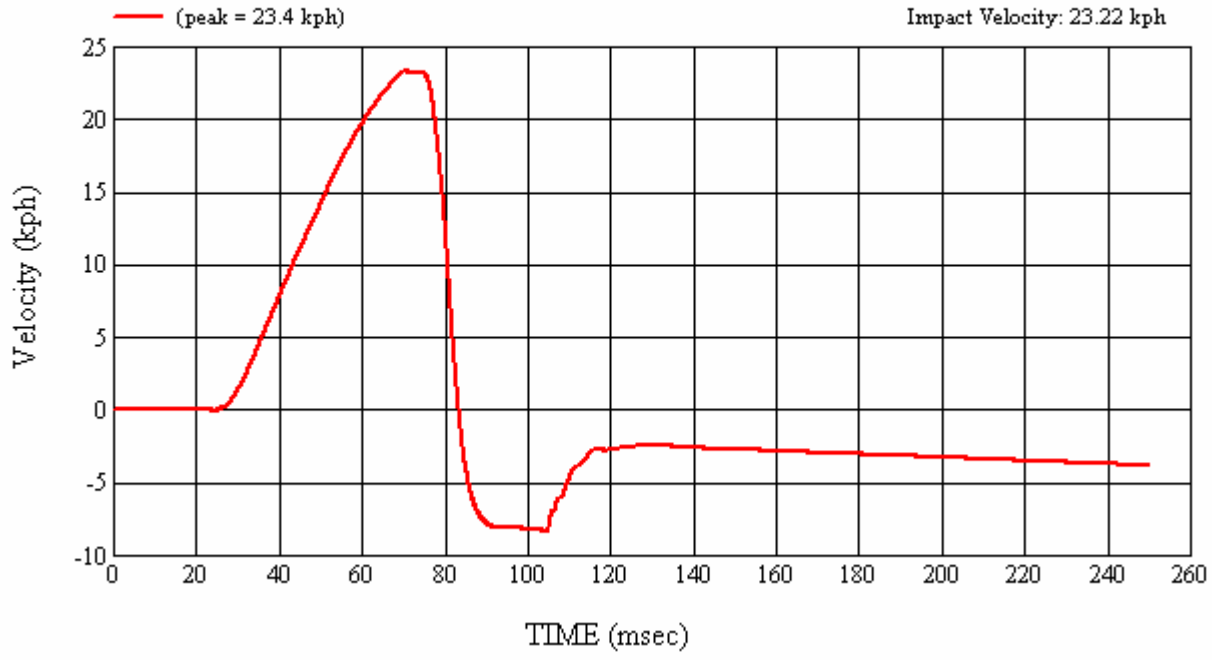


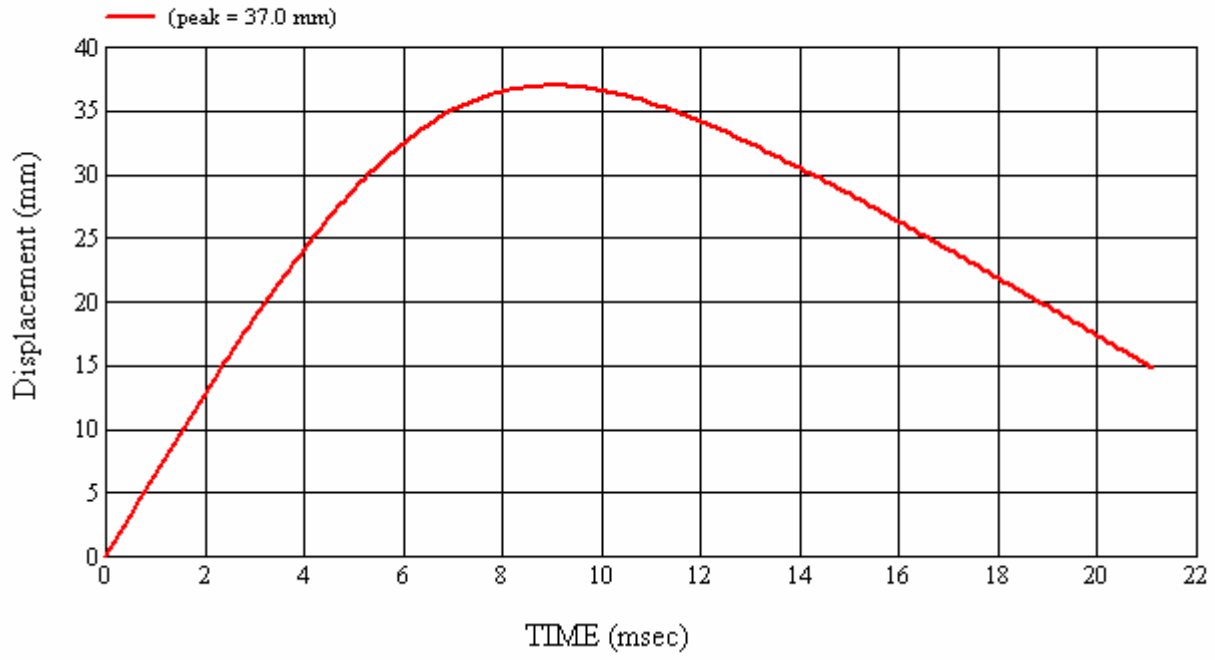



(peak = 120.5 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

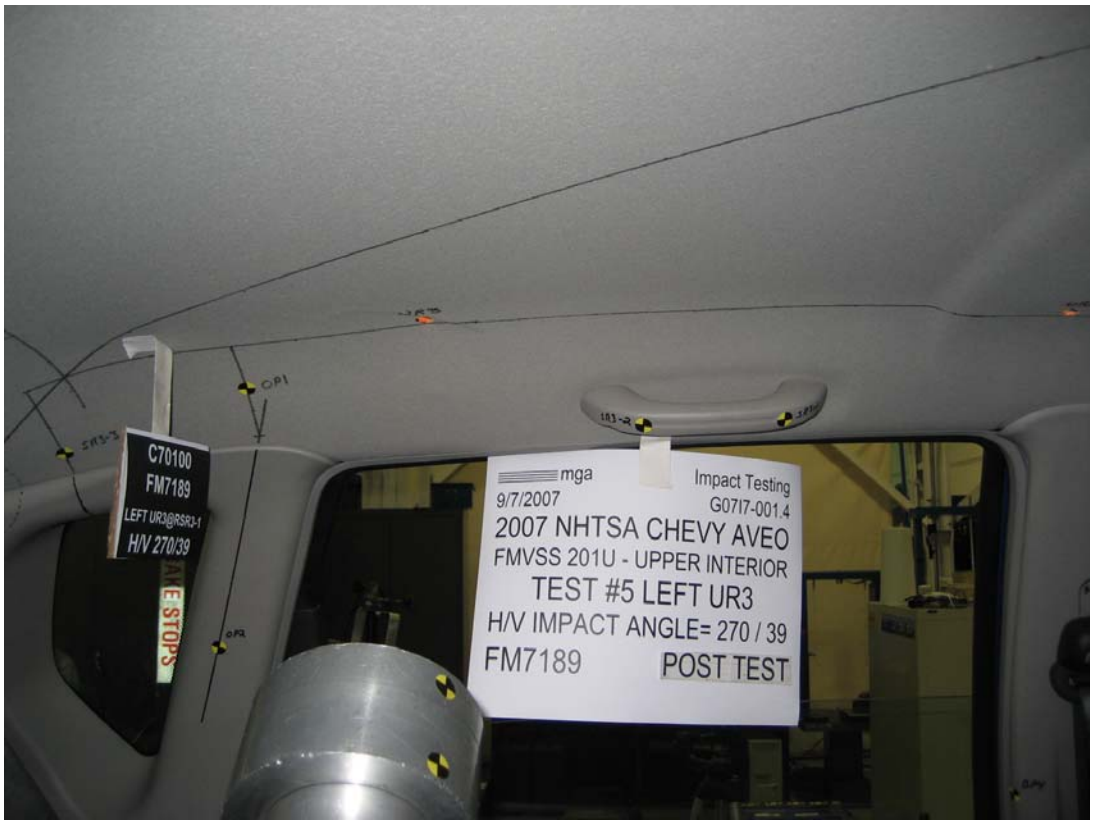

(peak = 7.1 G)
Head Y (G)
8
7
6
5
4
3
2
1
0
-1
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)

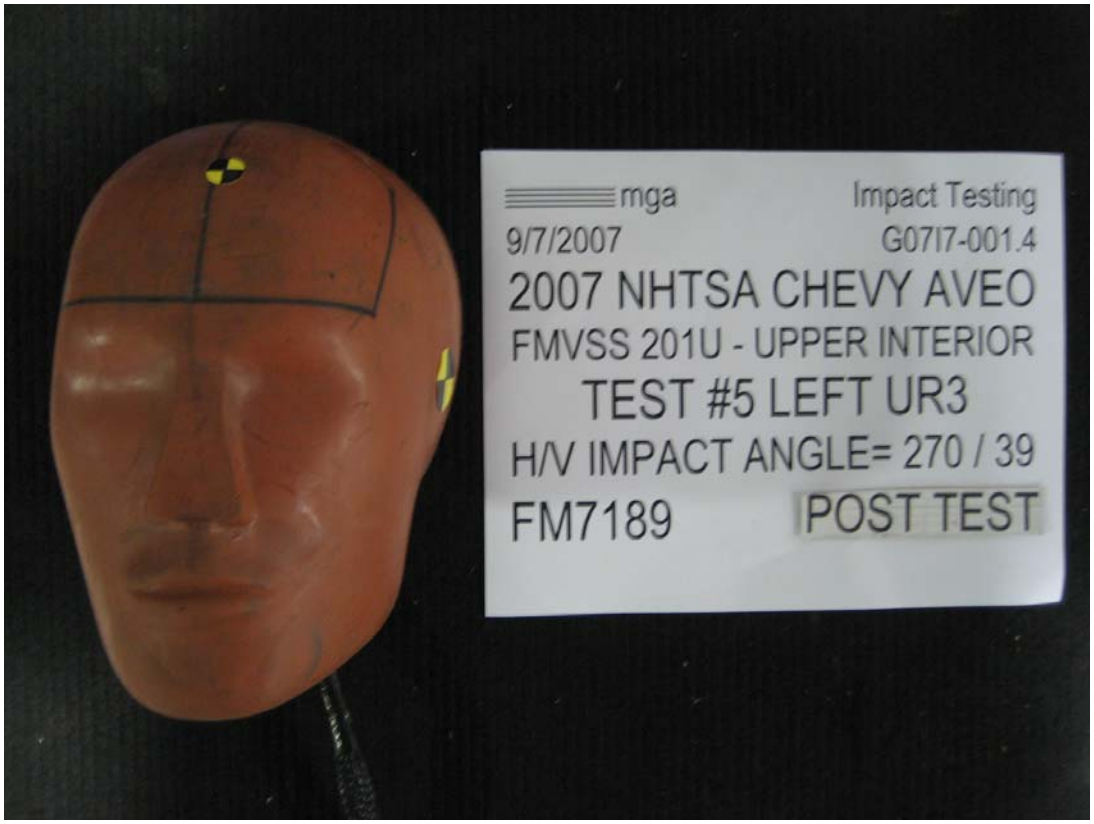

(peak = 45.5 G)
Head Z (G)
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


(peak = 23.4 kph)
Impact Velocity: 23.22 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 = 37.0 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
22
TIME (msec)


mga
9/7/2007
Impact Testing
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR3
H/V IMPACT ANGLE= 270 / 39
FM7189
PRE TEST


C70100
FM7189
LEFT UR3@RSR3-1
H/V 270/39
AKE STOPS
mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR3
H/V IMPACT ANGLE= 270 / 39
FM7189
POST TEST


mga
Impact Testing
9/7/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #5 LEFT UR3
H/V IMPACT ANGLE= 270 / 39
FM7189
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#5

Target (Vehicle Side): UR3 Left

Temperature:21C

MGA Test Reference No.:FM7189

Humidity:68%

Approach Horizontal Angles:270º

Time of Test:4:12:12 PM

Approach Vertical Angles:39º

FMH Serial No:[037]

Additional Description: @ OP1

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
644	633	9.4	23.5	47	3 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J22696	-100.013	1.33	1.33
Y	6	J35791	91.856	1.89	1.89
Z	7	J35800	97.996	1.83	1.83

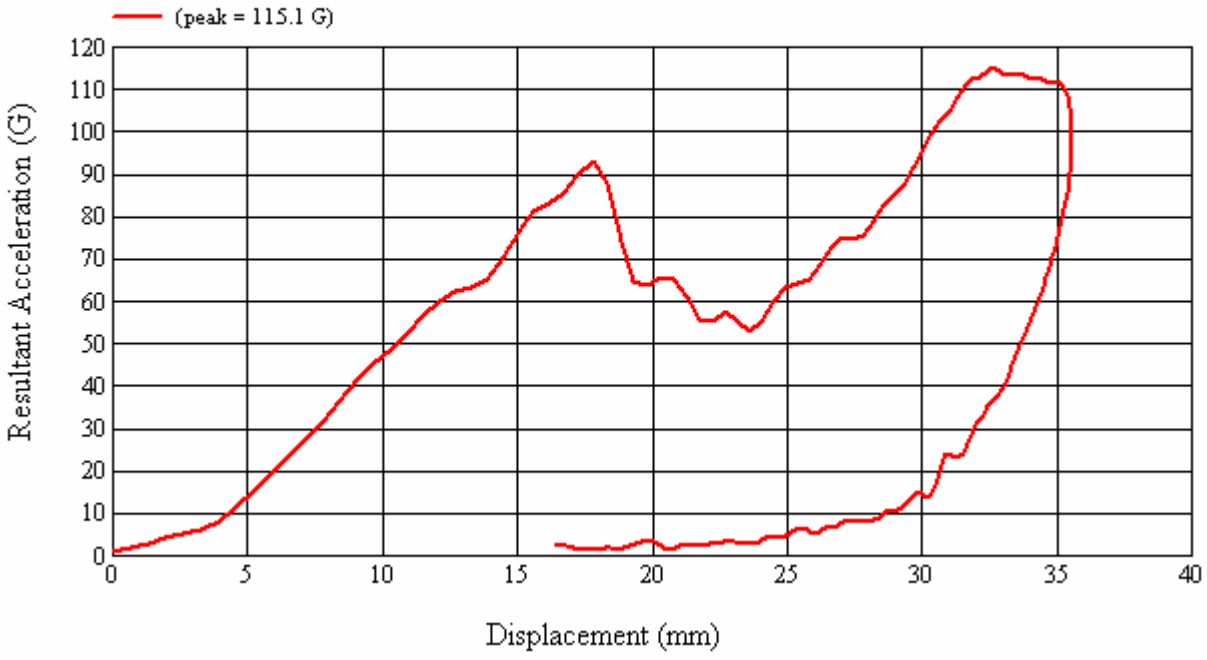
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

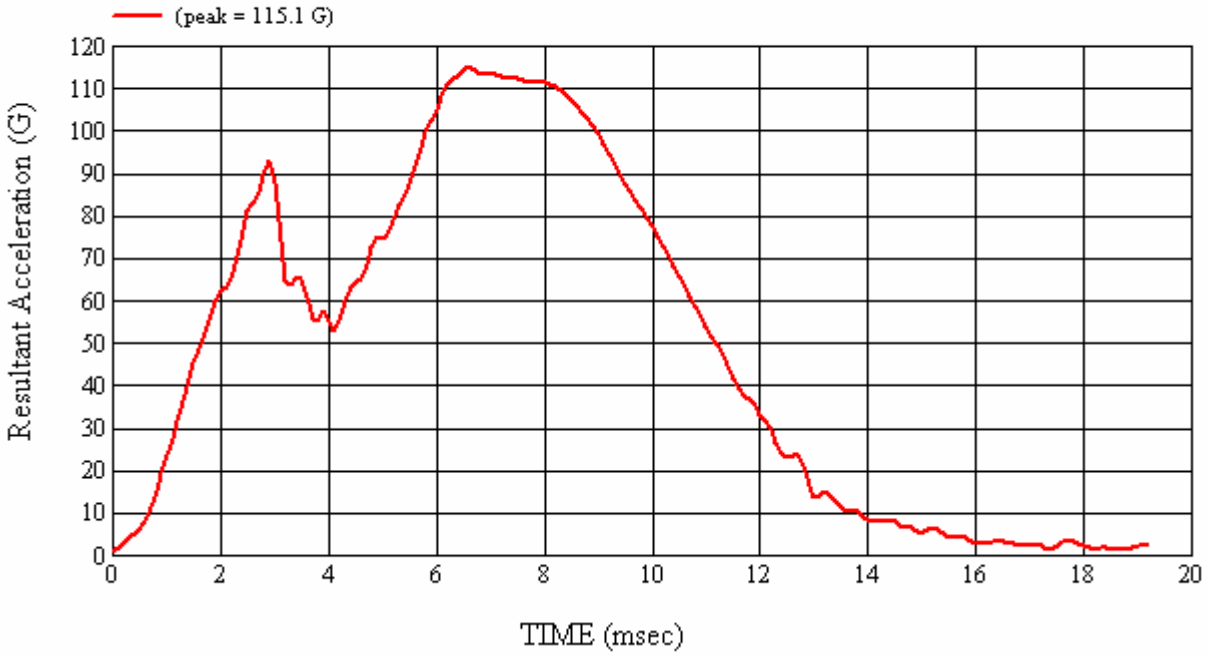
Headliner deformation.

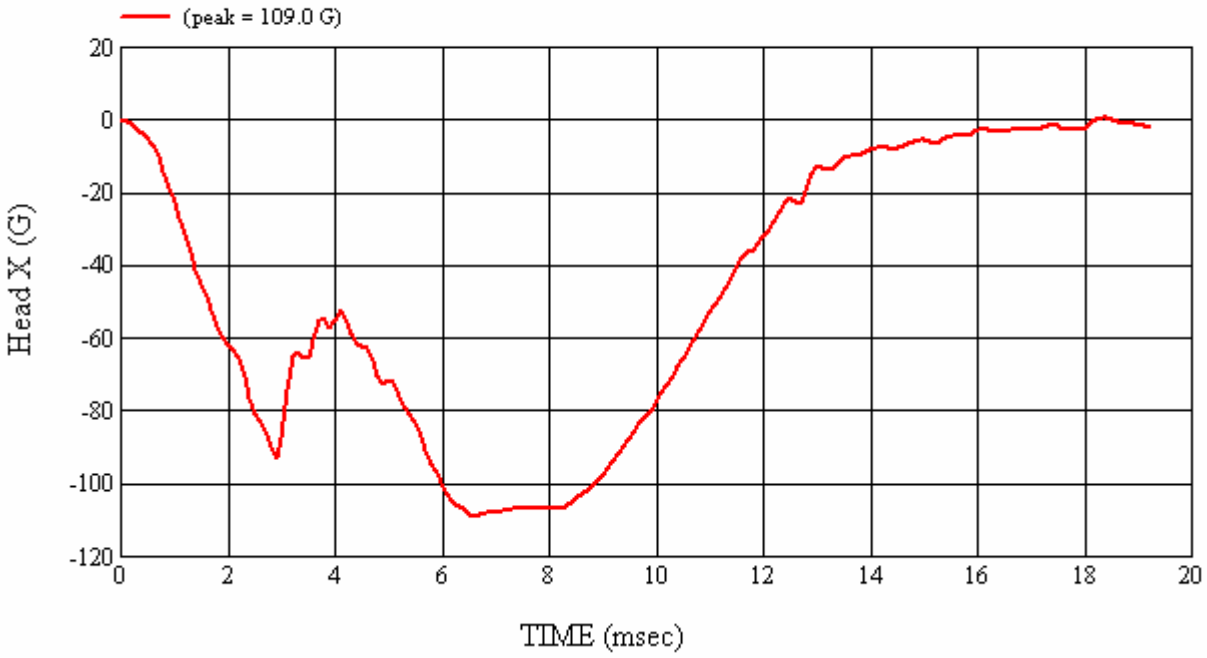
Recorded By: [signature] Approved By*: [signature] Date: 9/7/2007

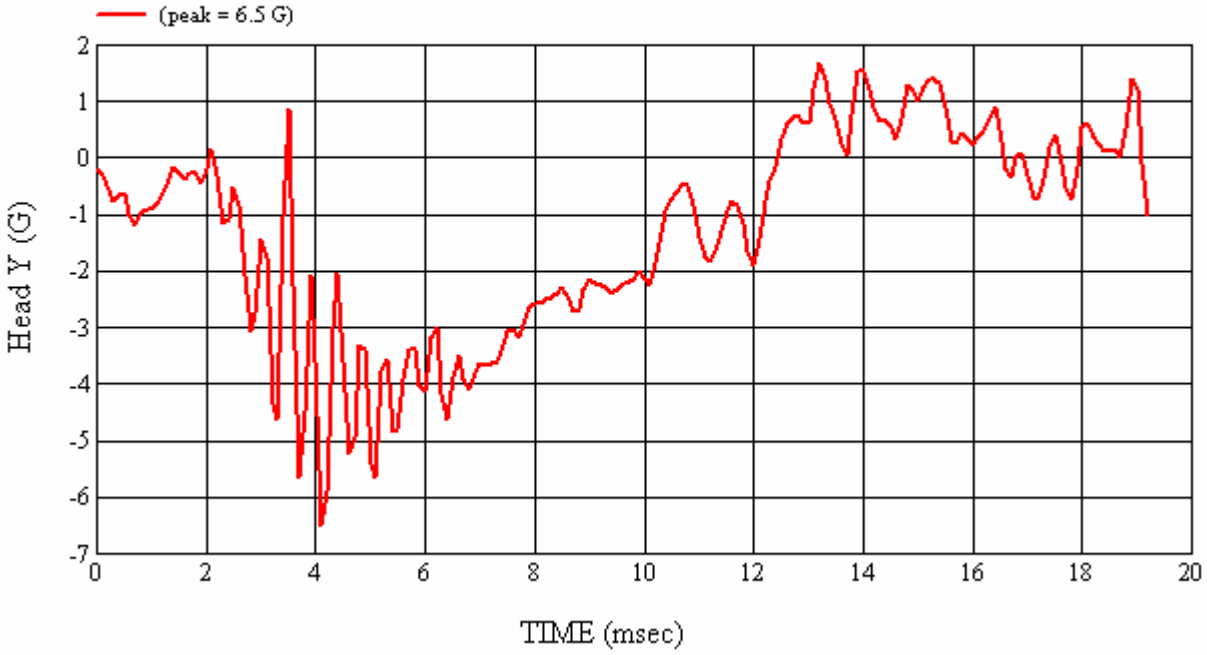
*Only necessary for NHTSA (Government) Compliance testing.

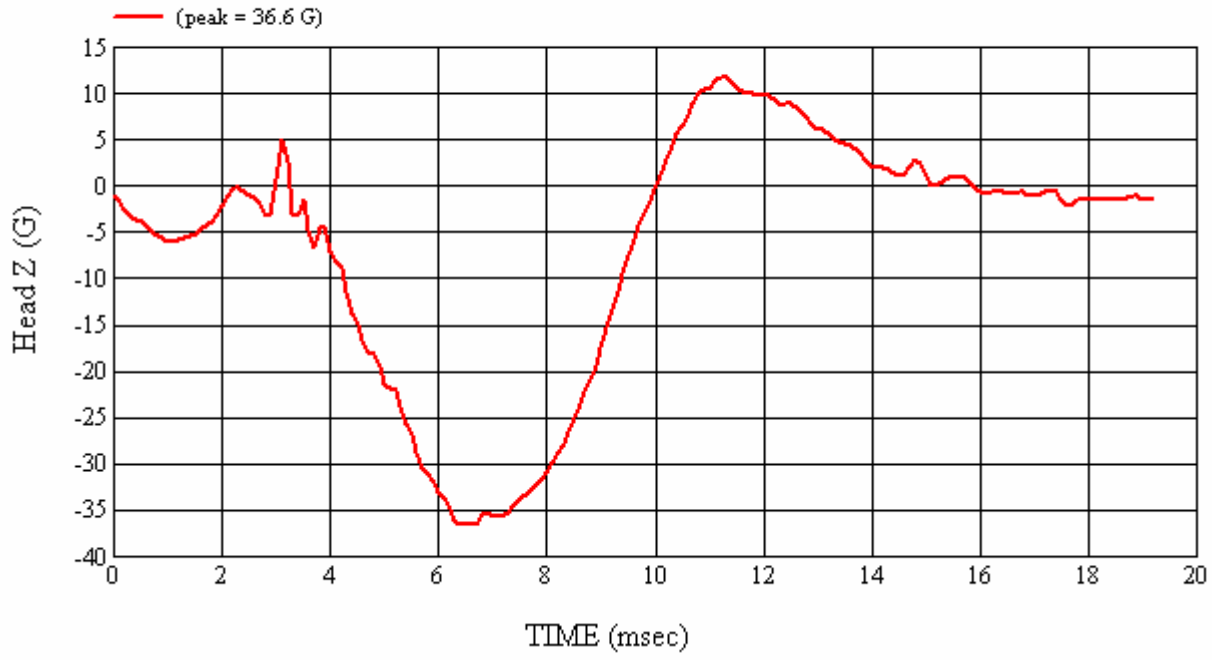
MGA Test #: FM7189 Target Location: UR3, Left Side Test Date: 9/7/2007

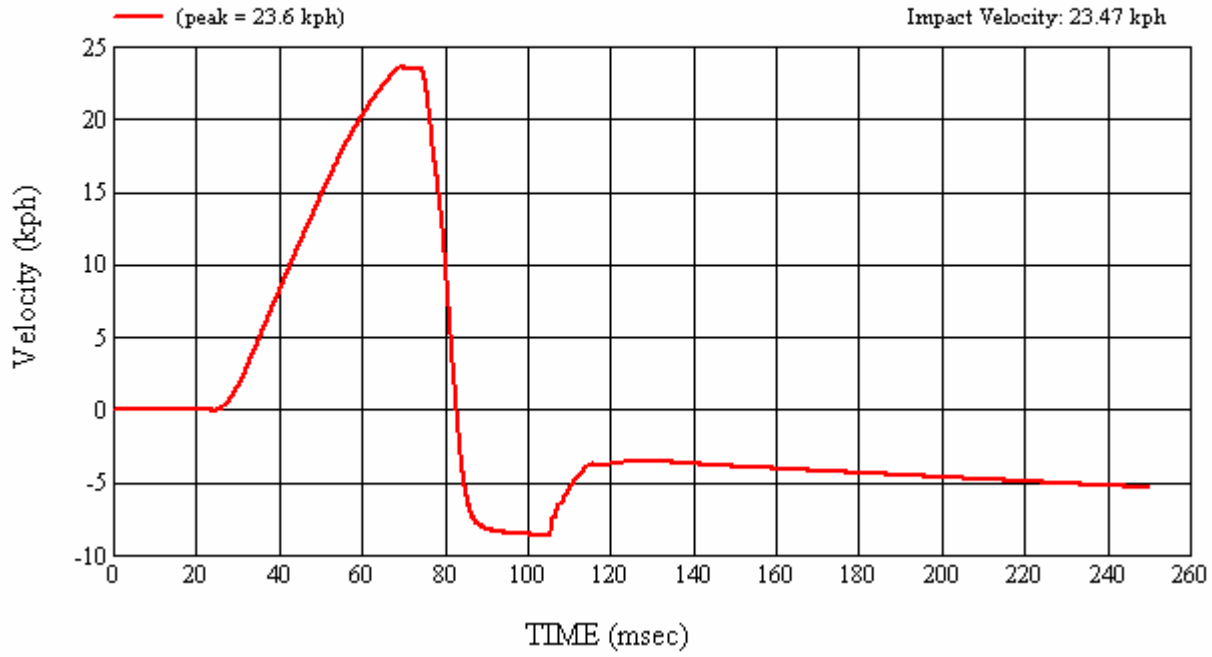


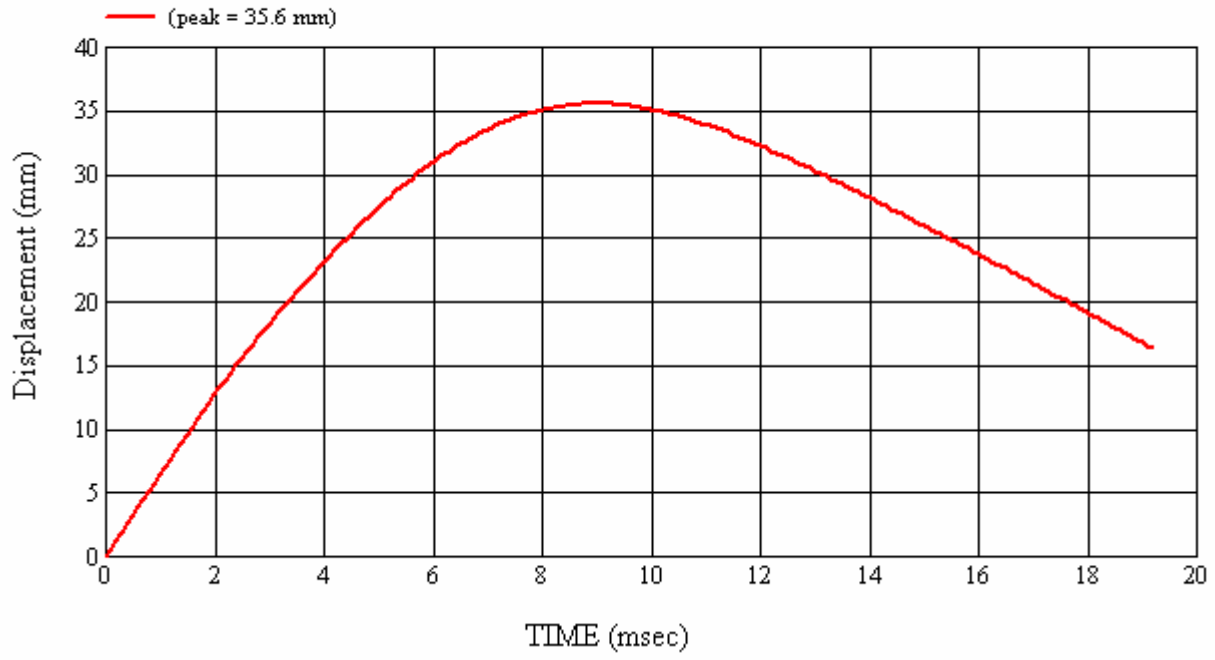



(peak = 109.0 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)

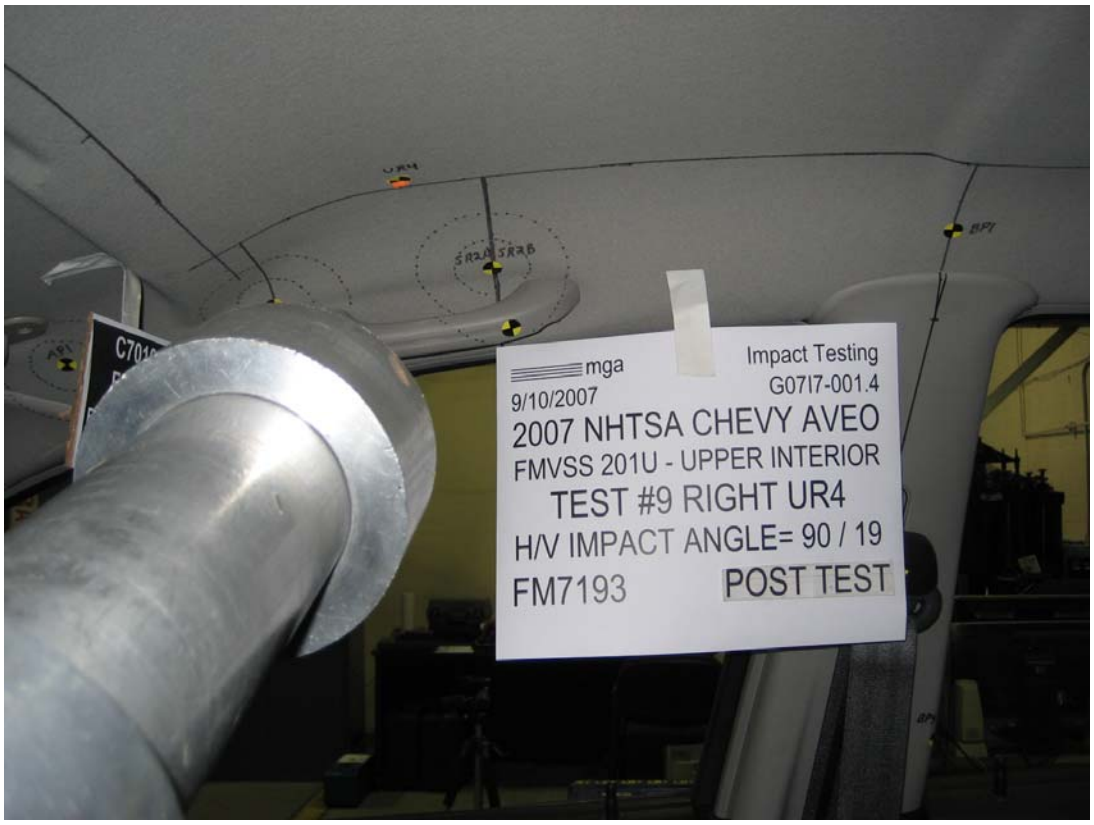

(peak = 6.5 G)
Head Y (G)
2
1
0
-1
-2
-3
-4
-5
-6
-7
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 36.6 G)
Head Z (G)
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


(peak = 23.6 kph)
Impact Velocity: 23.47 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 = 35.6 mm)
Displacement (mm)
0
5
10
15
20
25
30
35
40
0
2
4
6
8
10
12
14
16
18
20
TIME (msec)


BPI
BRAKE STOPS
mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR4
H/V IMPACT ANGLE= 90 / 19
FM7193
PRE TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR4
H/V IMPACT ANGLE= 90 / 19
FM7193
POST TEST


mga
Impact Testing
9/10/2007
G07I7-001.4
2007 NHTSA CHEVY AVEO
FMVSS 201U - UPPER INTERIOR
TEST #9 RIGHT UR4
H/V IMPACT ANGLE= 90 / 19
FM7193
POST TEST

SUMMARY OF FMVSS 201U TEST

JOB/NHTSA NO: G07I7-001.4 VEHICLE YR/MAKE/MODEL:2007/NHTSA/Chevy Aveo

GENERAL TEST PARAMETERS:

Test Number:#9

Target (Vehicle Side): UR4 Right

Temperature:21C

MGA Test Reference No.:FM7193

Humidity:58%

Approach Horizontal Angles:90º

Time of Test:12:43:20 PM

Approach Vertical Angles:19º

FMH Serial No:[038]

Additional Description: @ Front side rail between SR1 and SR2A/B

TEST RESULTS:

HIC(d)	HIC	Δt (msec)	Velocity (kph)	Impact location on FMH (mm)	
				Above Pt. O	Left/Right Pt. O
920	999	7	24.2	80	8 Left

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

Axis	Channel	Serial No.	DLR Value	ΔV Pre-Test	ΔV Post-Test
X	5	J14103	-94.598	1.32	1.32
Y	6	J36197	110.692	1.89	1.89
Z	7	J36353	99.391	1.83	1.83

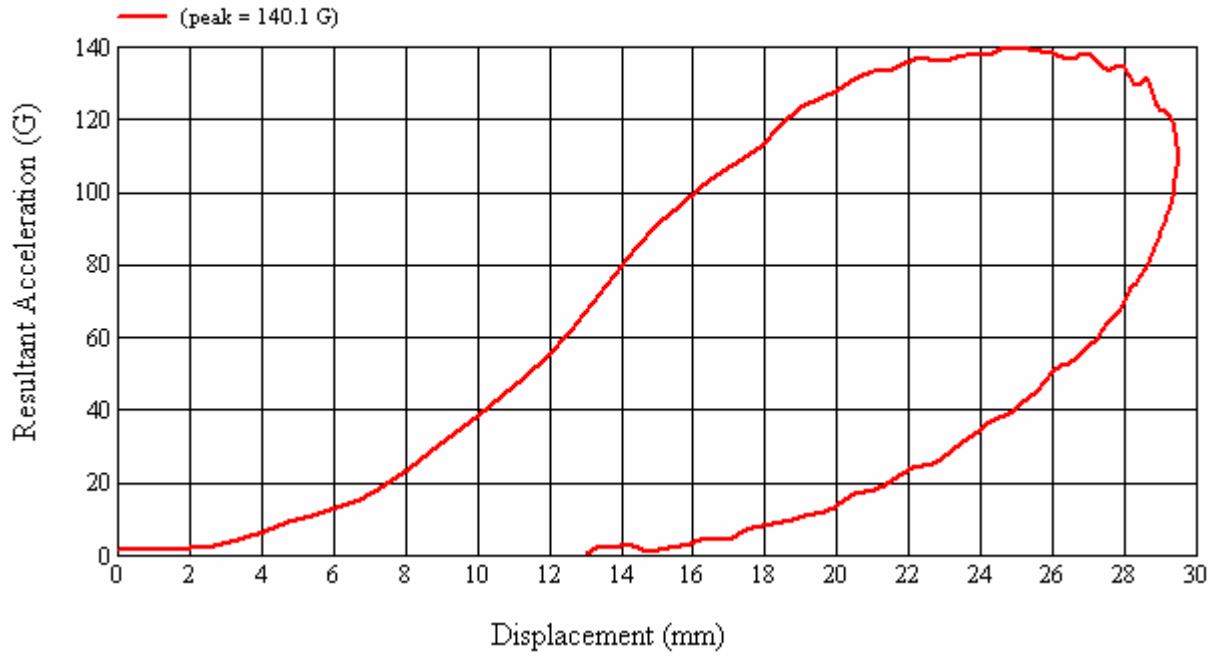
REMARKS (Summary of test, damage, non-compliance, invalid test, etc.):

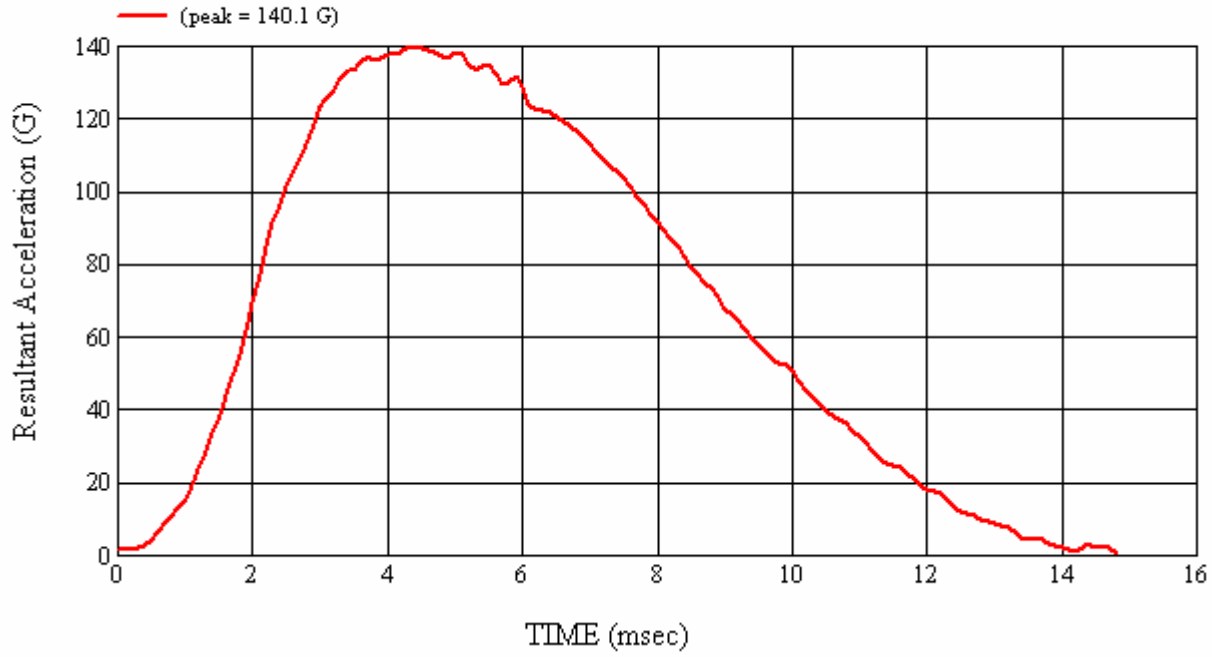
Stress marks on rear of grab handle.

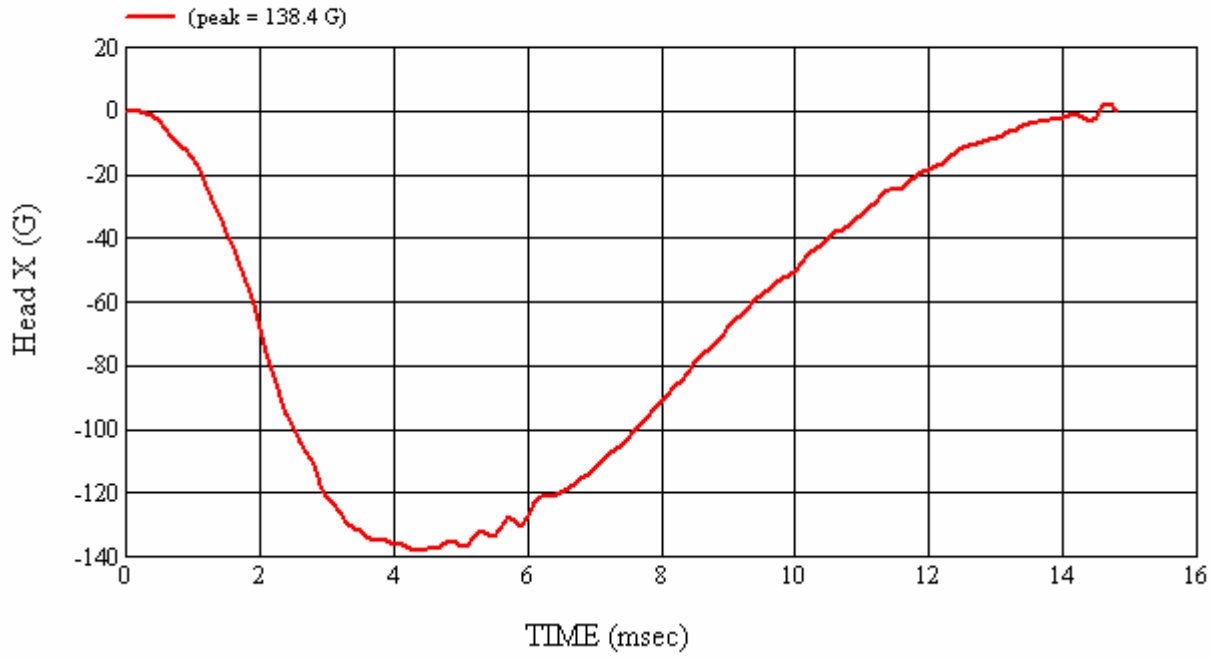
Recorded By: Louis Campbell Approved By*: Helen A. Kaleto Date: 9/10/2007

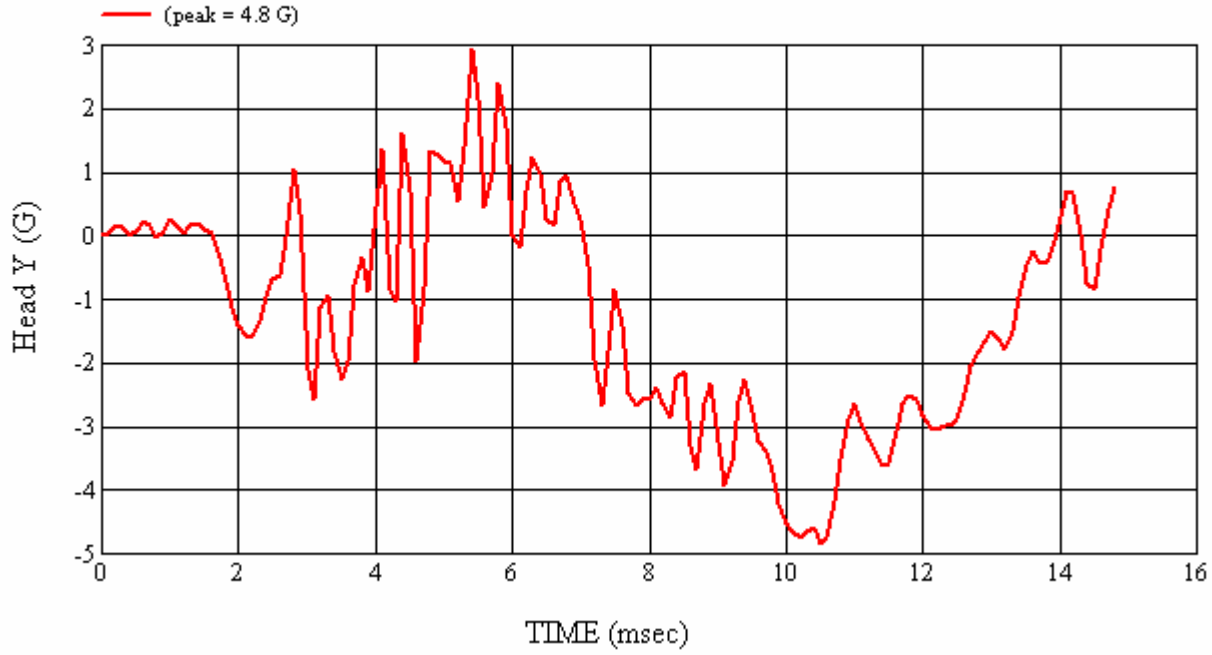
*Only necessary for NHTSA (Government) Compliance testing.

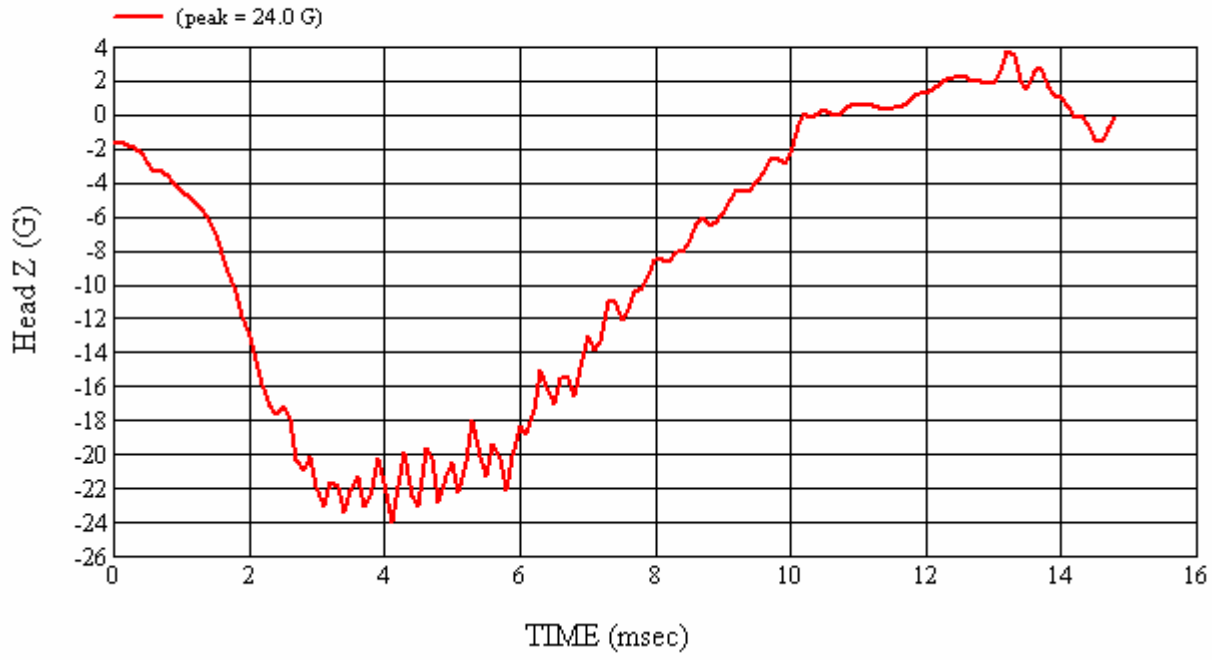
MGA Test #: FM7193 Target Location: UR4, Right Side Test Date: 9/10/2007

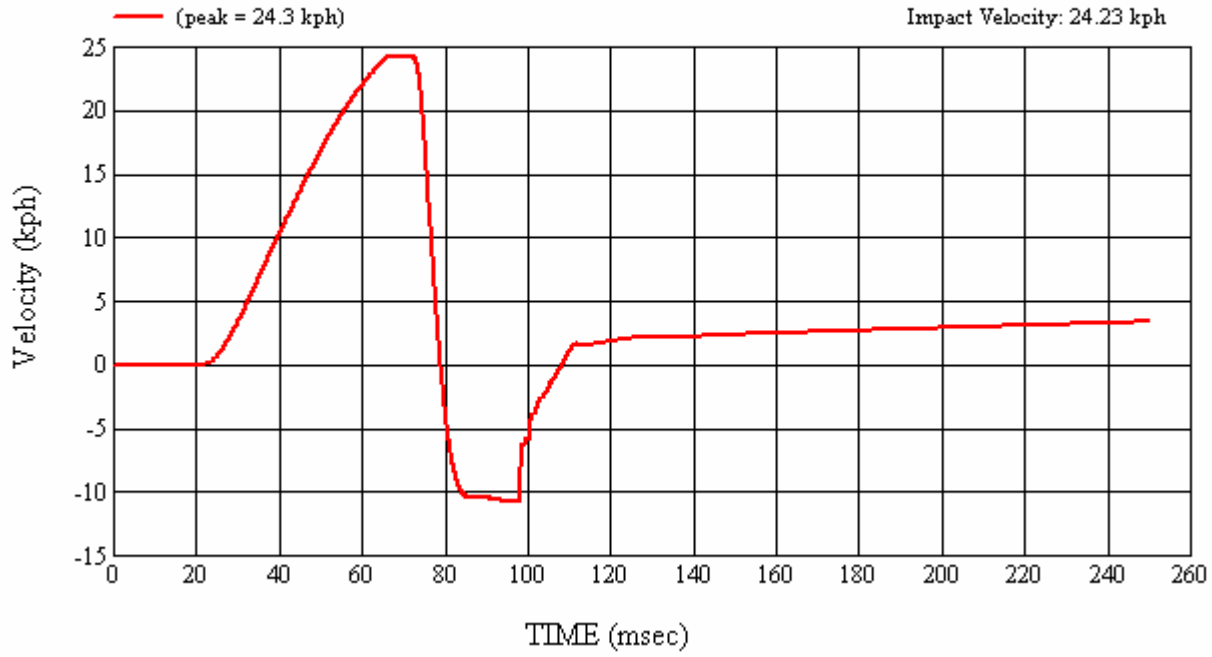


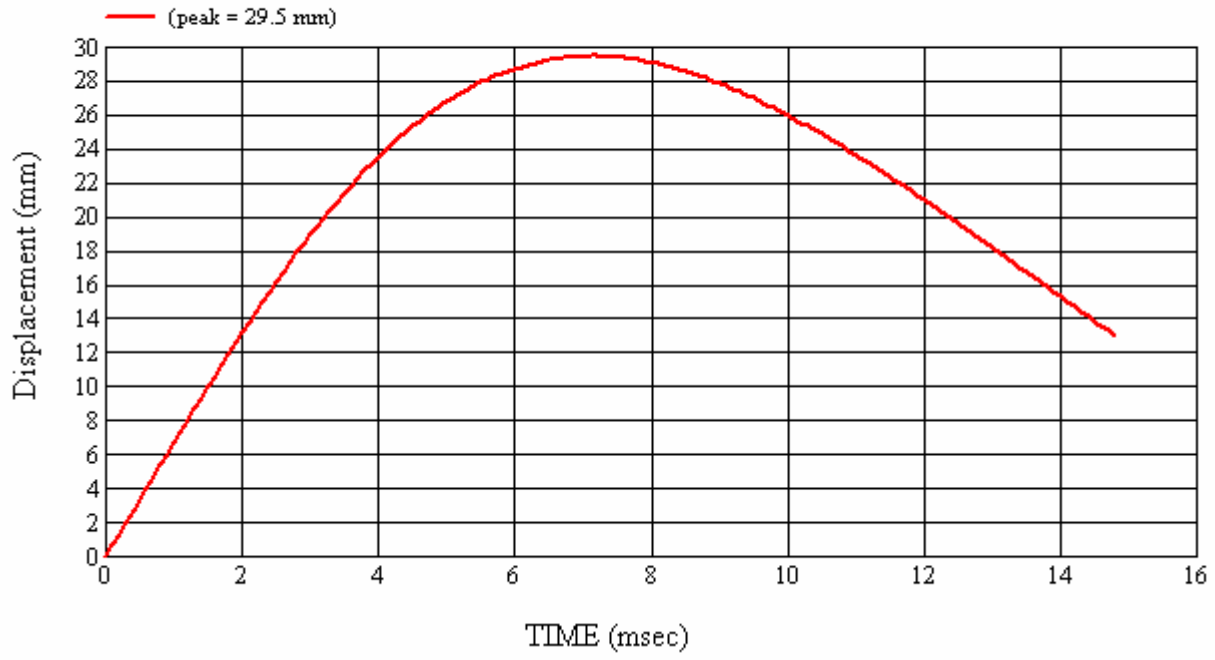



(peak = 138.4 G)
Head X (G)
20
0
-20
-40
-60
-80
-100
-120
-140
0
2
4
6
8
10
12
14
16
TIME (msec)


(peak = 4.8 G)
Head Y (G)
3
2
1
0
-1
-2
-3
-4
-5
0
2
4
6
8
10
12
14
16
TIME (msec)


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


(peak = 24.3 kph)
Impact Velocity: 24.23 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 = 29.5 mm)
Displacement (mm)
TIME (msec)
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

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	Macklanburg-Duncan	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	G08020203045	Targeting	0.1 mm	Annual
Measuring Devices: - Tape Measure - Plumb Bobs - Digital Protractor	 Stanley N/A Macklanburg-Duncan	 TPM748 -- 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.

DATA SUMMARY TABLE

FMH Serial #		Headform Calibration Date	Weight (lbs)	Temp (ºC)	% Humidity	Peak Resultant Acceleration (G's)	Peak Lateral Acceleration (G's)	Unimodal
Pre	#035	9/6/2007	10.08	24.0	38.0	237.2	2.5	Yes
Post	#035	9/12/2007	10.08	23.0	38.0	239.1	5.7	Yes
Pre	#037	9/6/2007	9.96	24.0	48.0	246.5	5.8	Yes
Post	#037	9/12/2007	9.96	23.0	38.0	246.3	6.5	Yes
Pre	#038	9/6/2007	9.90	23.0	49.0	269.6	4.3	Yes
Post	#038	9/12/2007	9.90	23.0	38.0	270.5	12.3	Yes

4.1 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

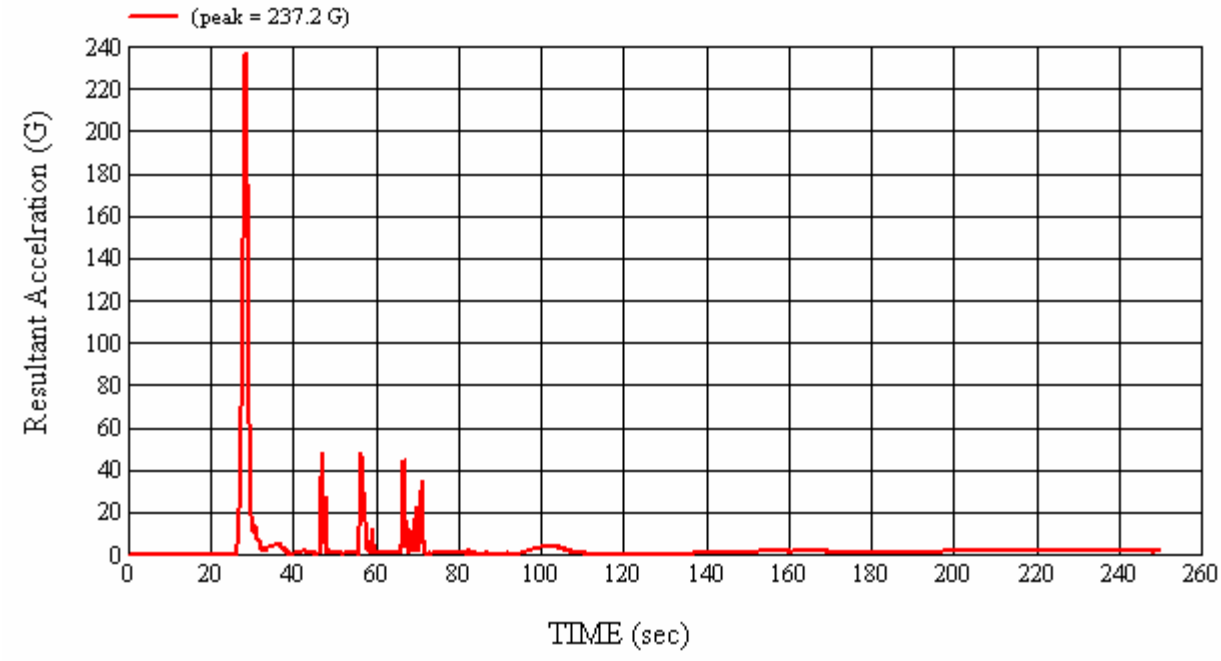
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 9/6/2007 CALIBRATION TIME: 10:34:46 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.08
Temperature	19° C to 26° C	24
Relative Humidity	10% to 70%	38
Peak Resultant Acceleration	225 G's to 275 G's	237.2
Peak Lateral Acceleration	15 G's Maximum	2.5
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	J22664	04/30/07	10/30/07
2	ENDEVCO	7264-2000	J35919	04/30/07	10/30/07
3	ENDEVCO	7264-2000	J35924	04/30/07	10/30/07

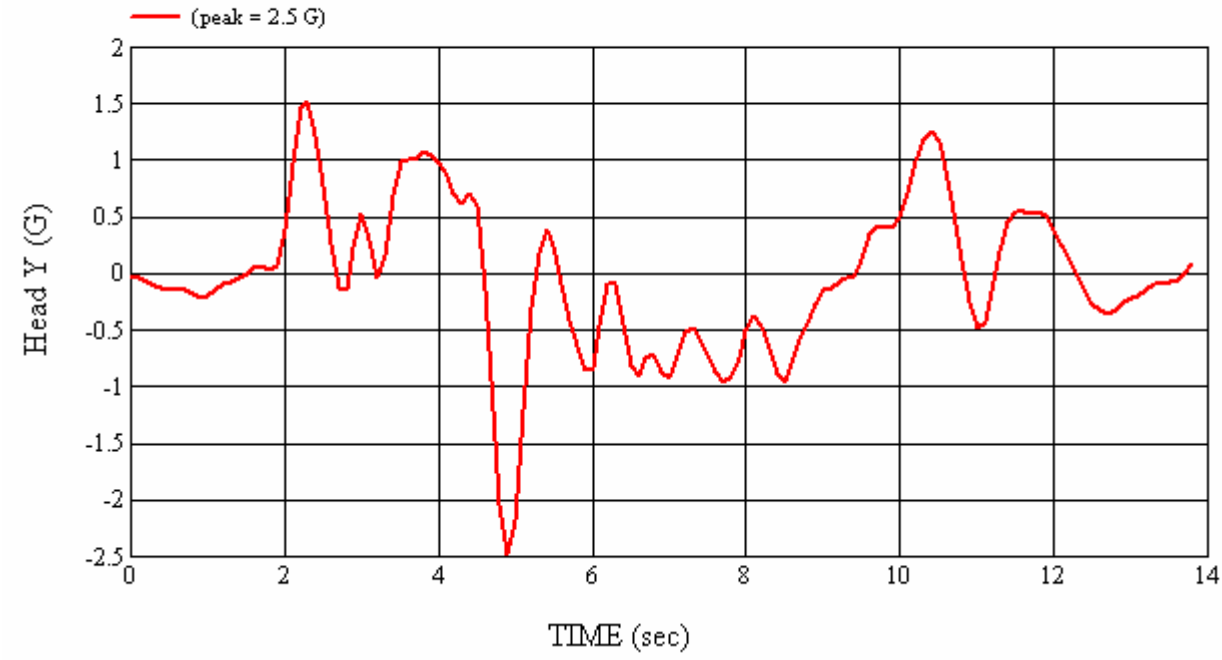
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 9/6/2007

APPROVED BY: Helen A. Kalafut



Head 035 (Pre) Calibration #H35007



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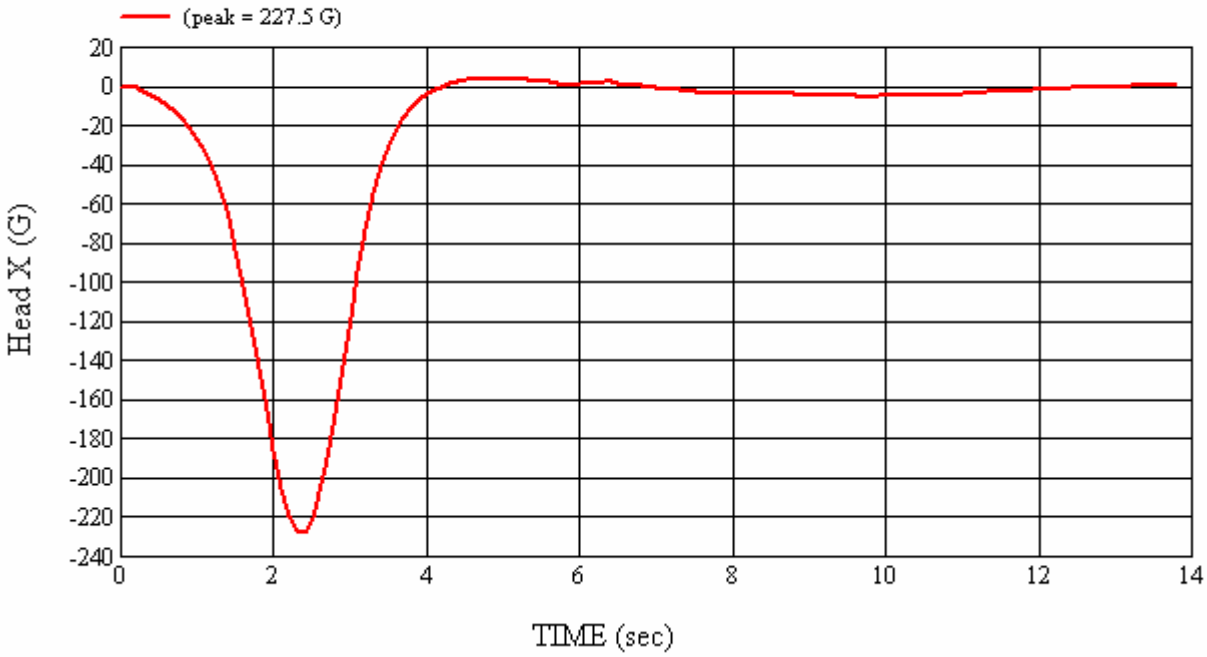
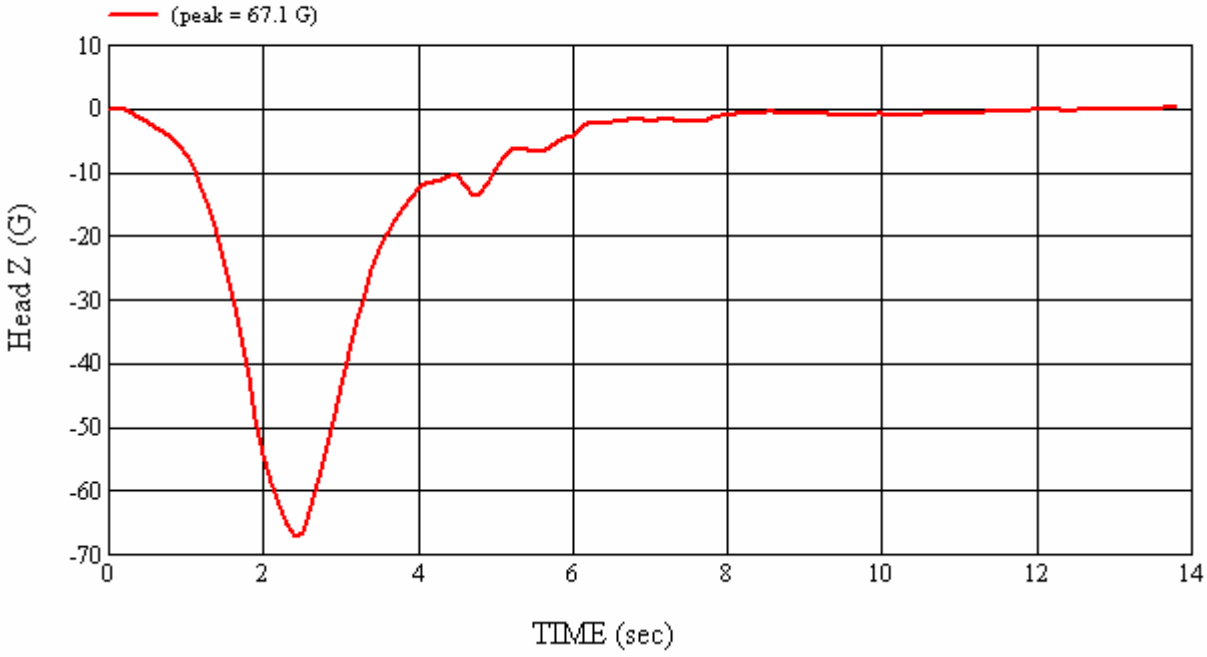


Head 035 (Pre) Calibration #H35007



Head 035 (Pre) Calibration #H35007

4.2 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

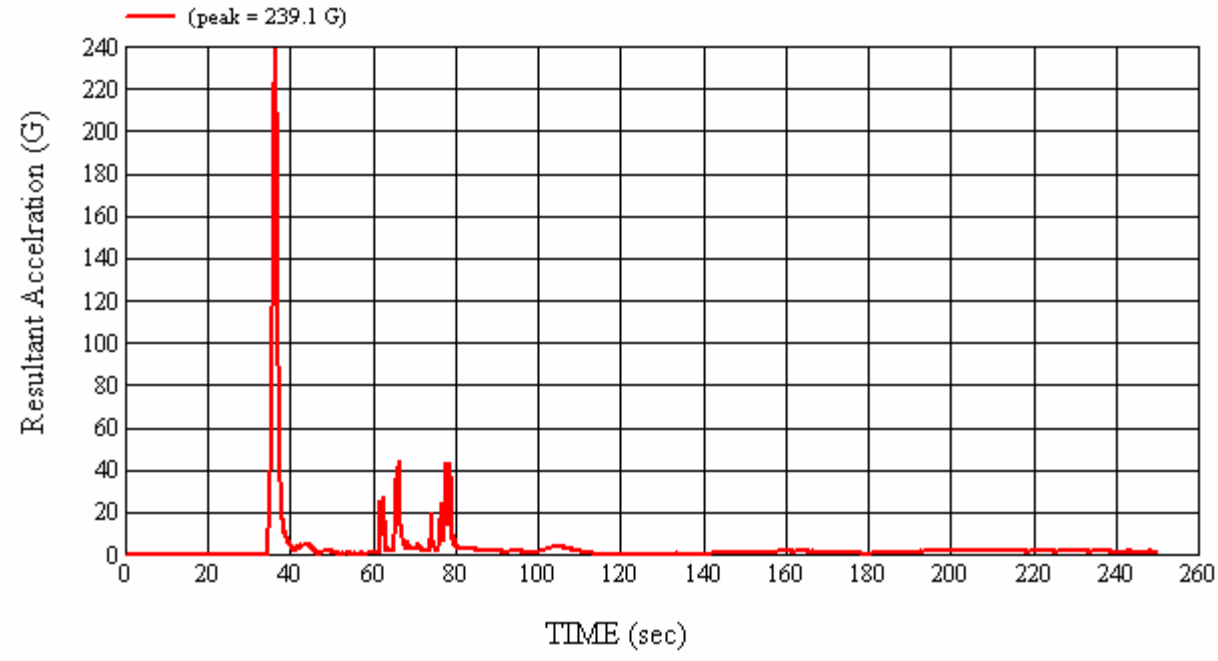
HEADFORM SERIAL NUMBER: 035	CALIBRATION DATE: 9/12/2007 CALIBRATION TIME: 3:45:22 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	10.08
Temperature	19° C to 26° C	23
Relative Humidity	10% to 70%	38
Peak Resultant Acceleration	225 G's to 275 G's	239.1
Peak Lateral Acceleration	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	J22664	04/30/07	10/30/07
2	ENDEVCO	7264-2000	J35919	04/30/07	10/30/07
3	ENDEVCO	7264-2000	J35924	04/30/07	10/30/07

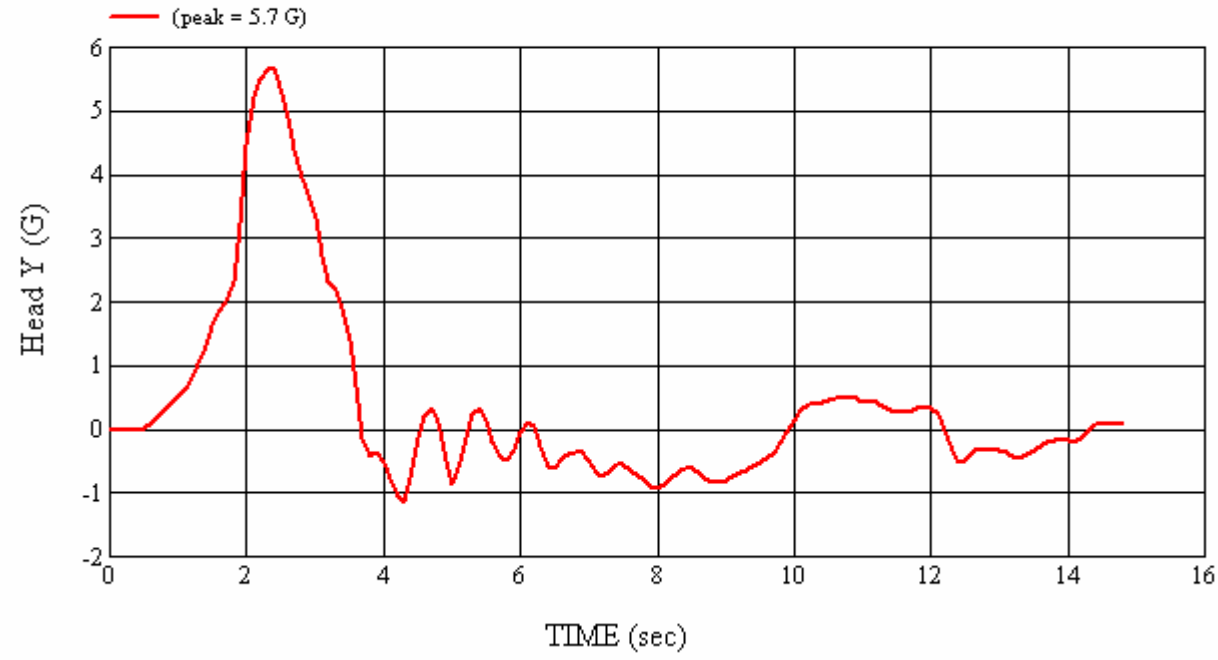
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 9/12/2007

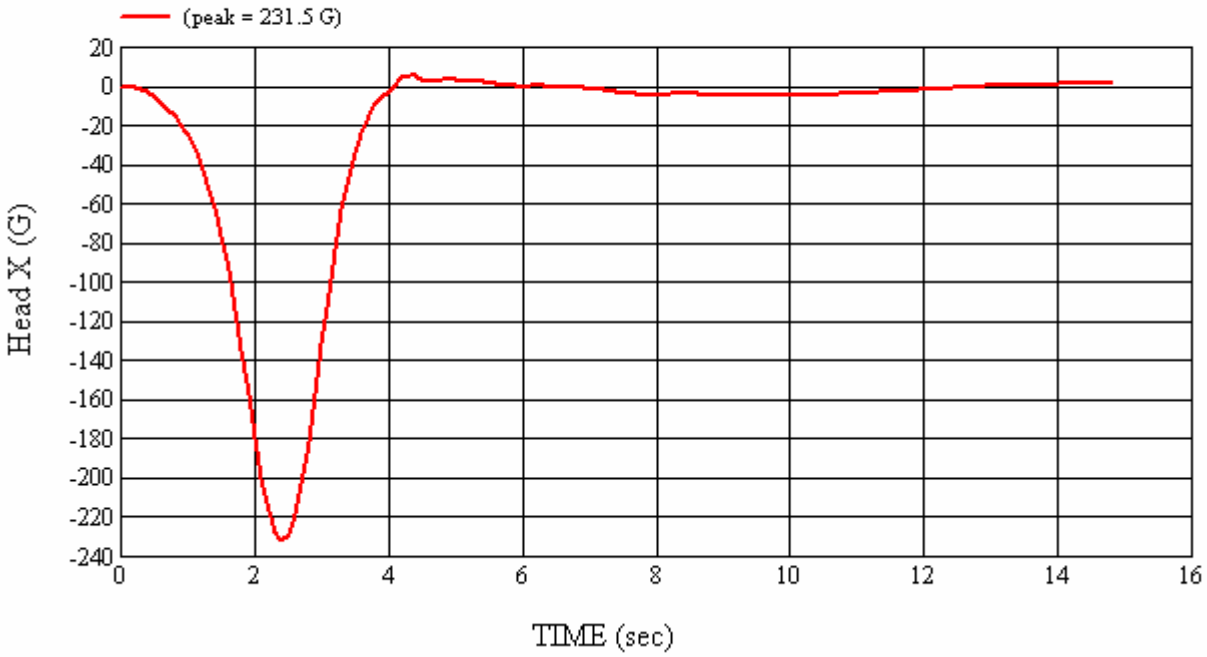
APPROVED BY: Helen A. Kalesto



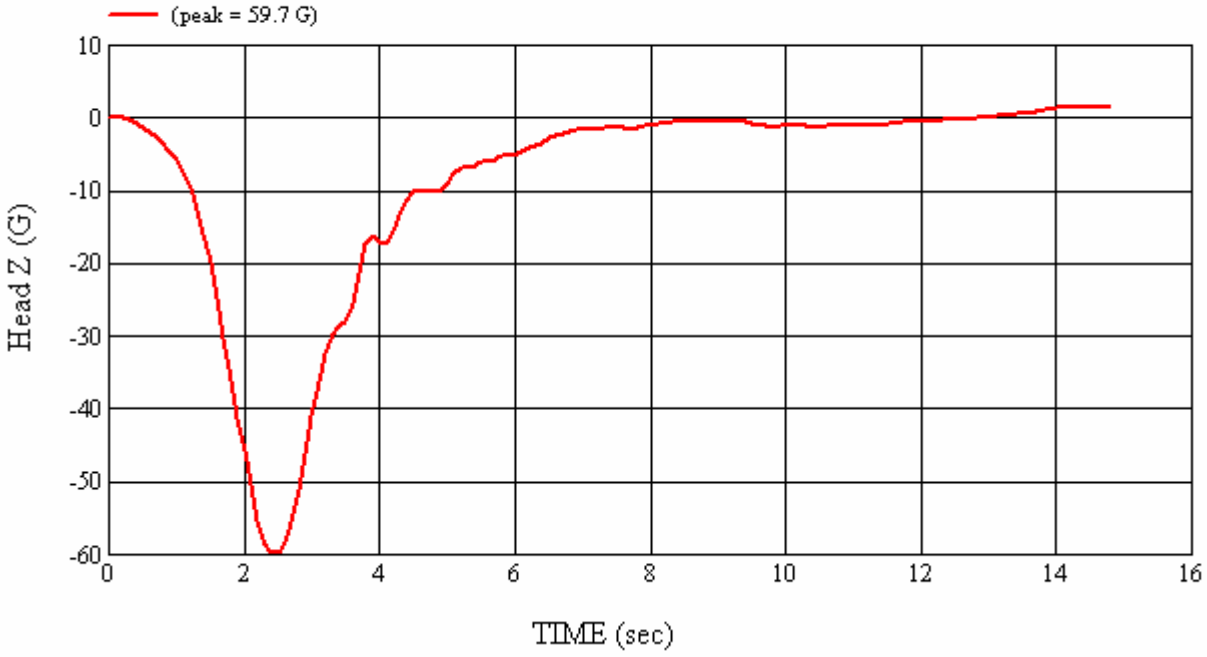
Head 035 (Post) Calibration #H35008



Head 035 (Post) Calibration #H35008



Head 035 (Post) Calibration #H35008



Head 035 (Post) Calibration #H35008

4.3 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

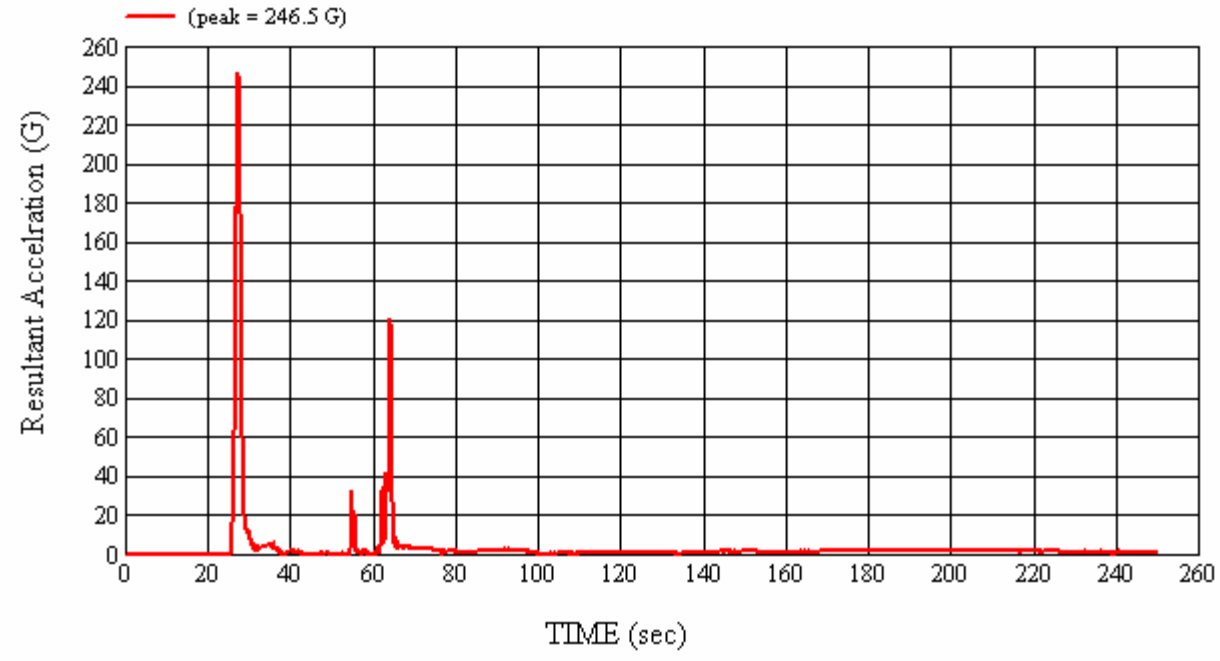
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 9/6/2007 CALIBRATION TIME: 9:56:41 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	24
Relative Humidity	10% to 70%	48
Peak Resultant Acceleration	225 G's to 275 G's	246.5
Peak Lateral Acceleration	15 G's Maximum	5.8
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	J22696	04/30/07	10/30/07
2	ENDEVCO	7264-2000	J35791	04/30/07	10/30/07
3	ENDEVCO	7264-2000	J35800	04/30/07	10/30/07

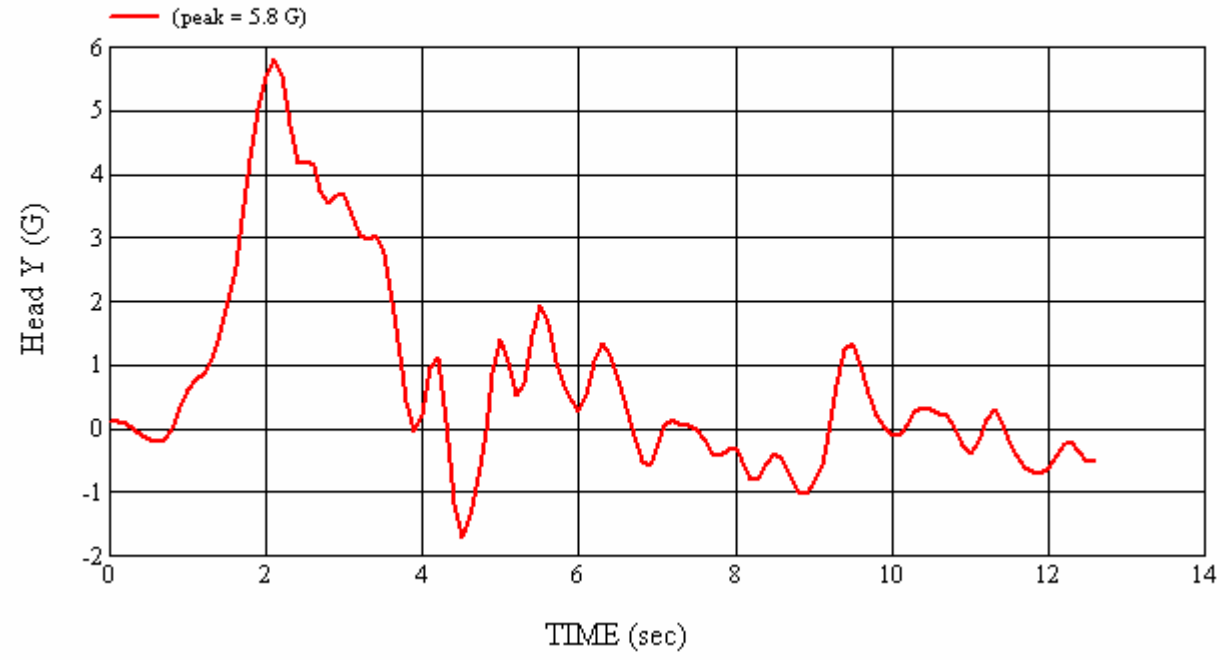
REMARKS:

RECORDED BY: Travis Campbell DATE: 9/6/2007

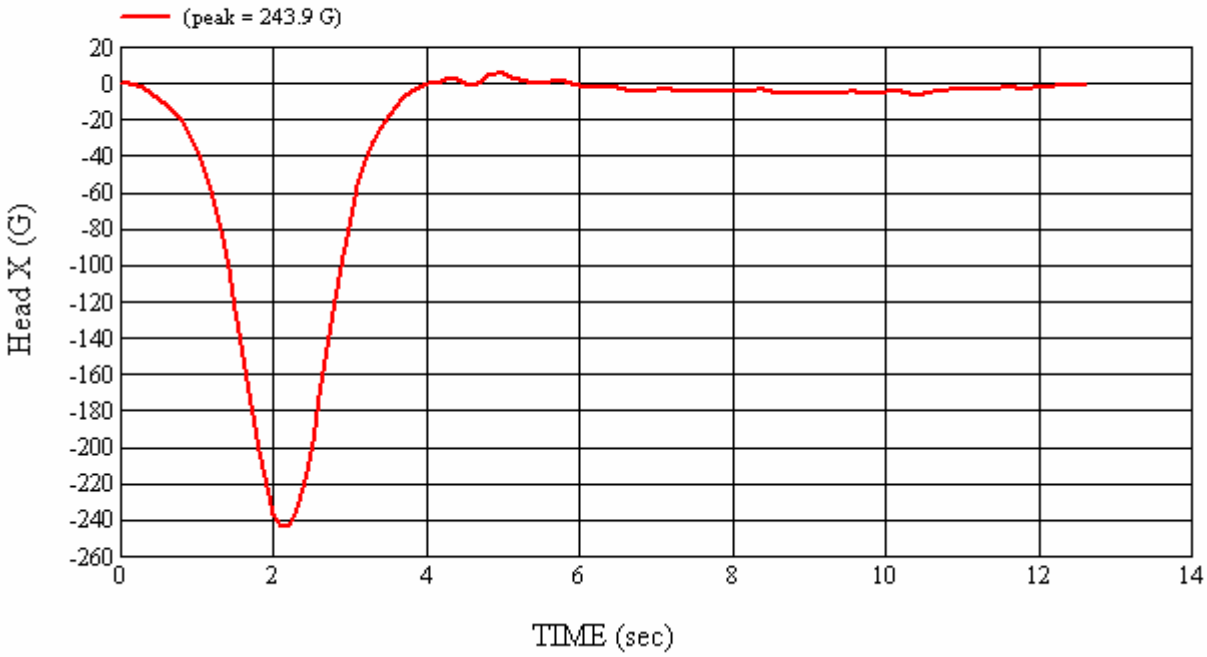
APPROVED BY: Helen A. Kalata



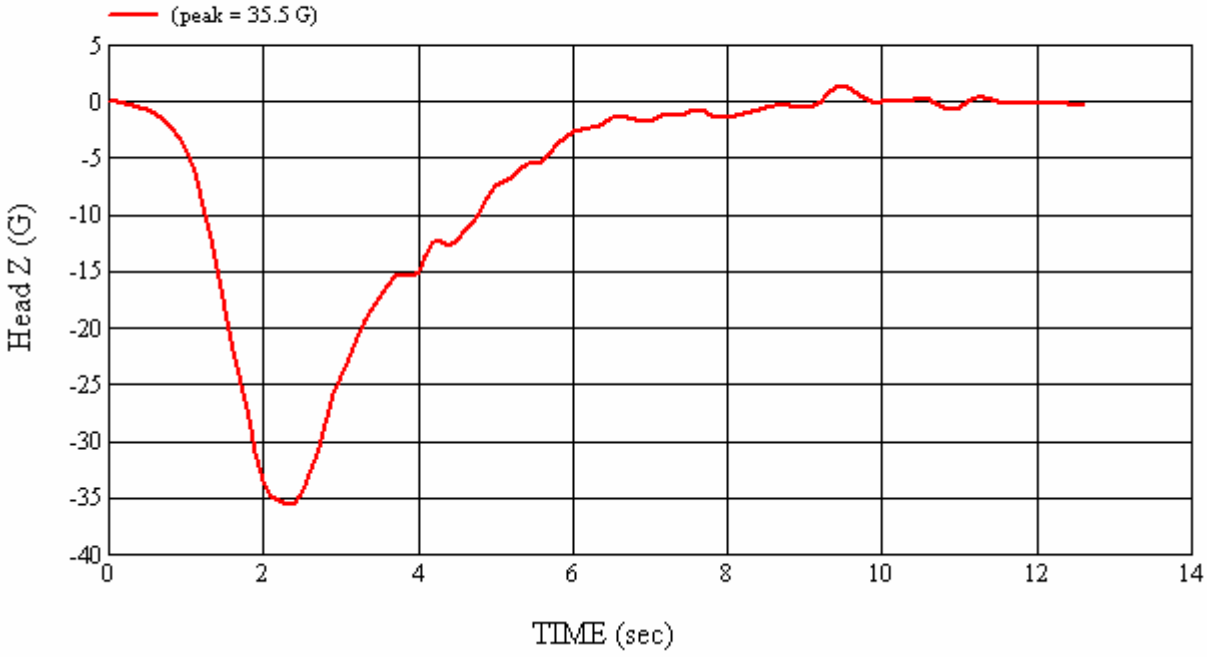
Head 037 (Pre) Calibration #H37011



Head 037 (Pre) Calibration #H37011



Head 037 (Pre) Calibration #H37011



Head 037 (Pre) Calibration #H37011

4.4 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

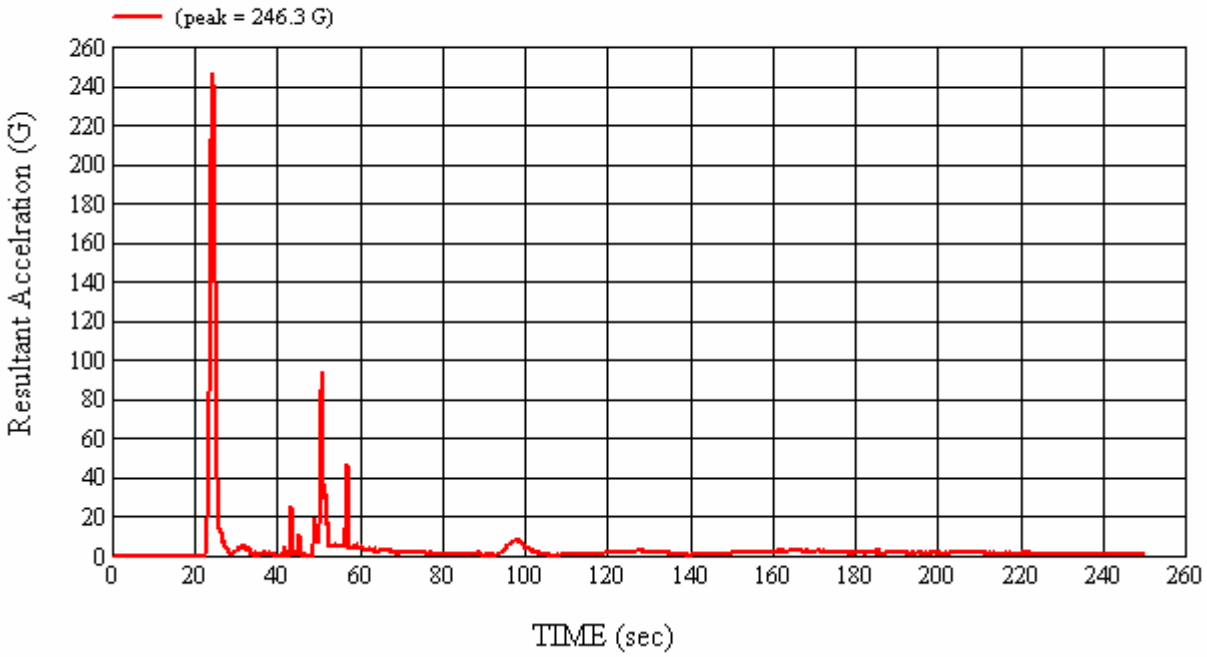
HEADFORM SERIAL NUMBER: 037	CALIBRATION DATE: 9/12/2007 CALIBRATION TIME: 4:36:50 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.96
Temperature	19° C to 26° C	23
Relative Humidity	10% to 70%	38
Peak Resultant Acceleration	225 G's to 275 G's	246.3
Peak Lateral Acceleration	15 G's Maximum	6.5
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	J22696	04/30/07	10/30/07
2	ENDEVCO	7264-2000	J35791	04/30/07	10/30/07
3	ENDEVCO	7264-2000	J35800	04/30/07	10/30/07

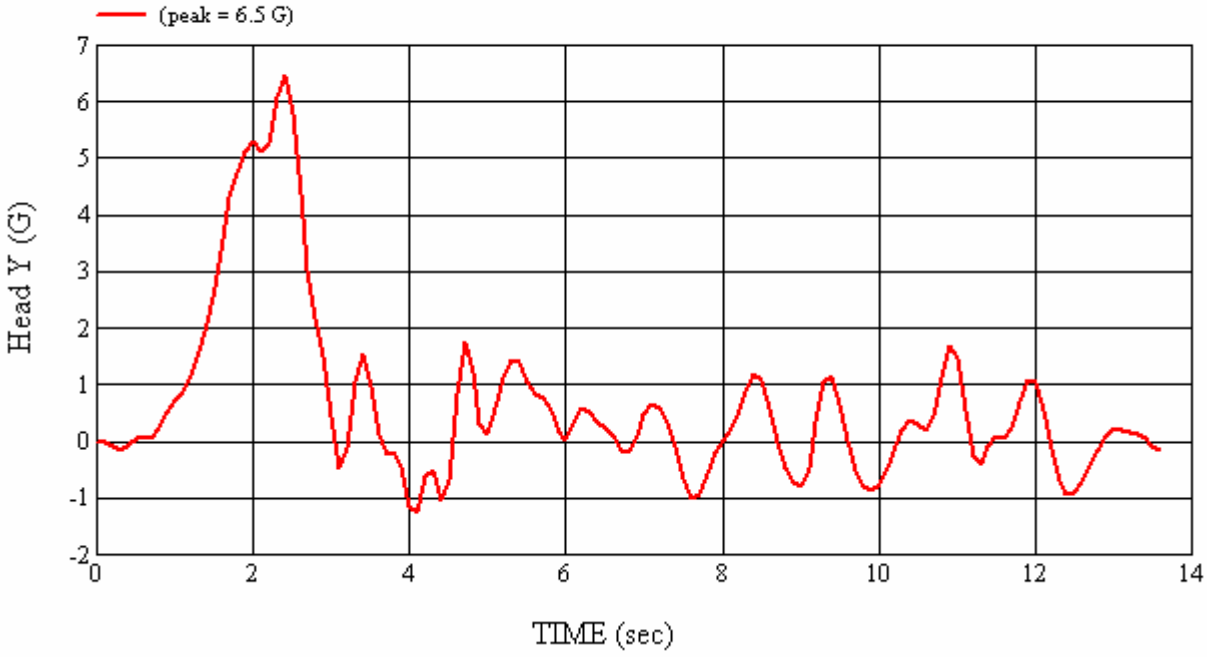
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 9/12/2007

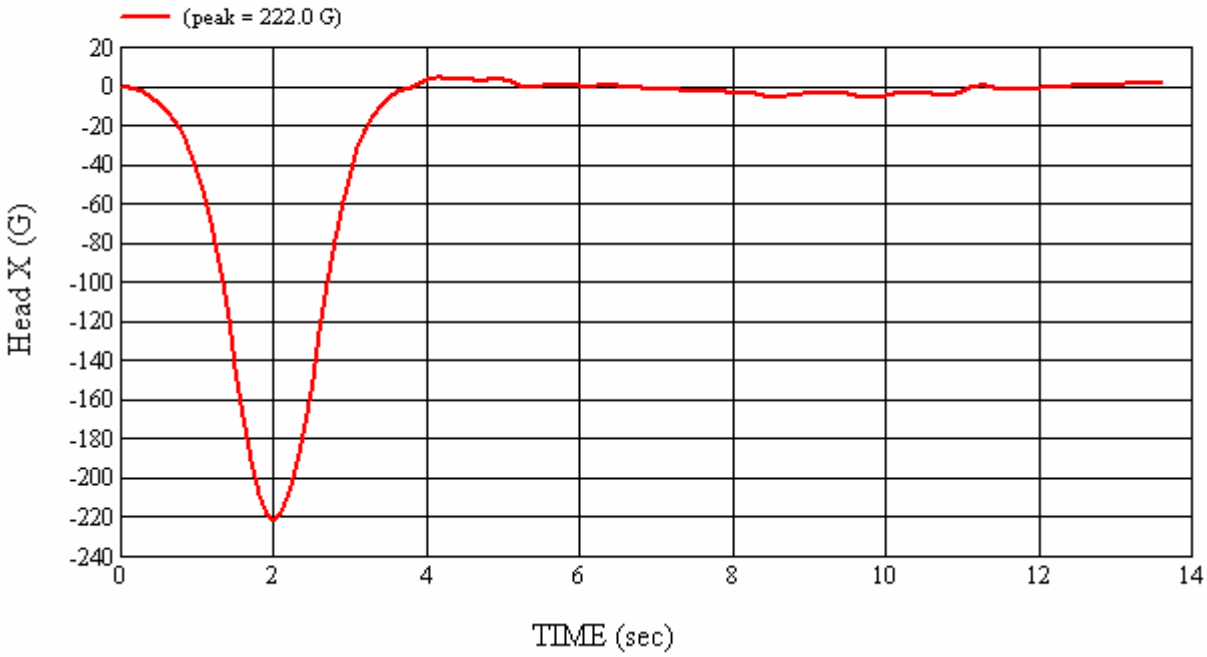
APPROVED BY: Helen A. Kalista



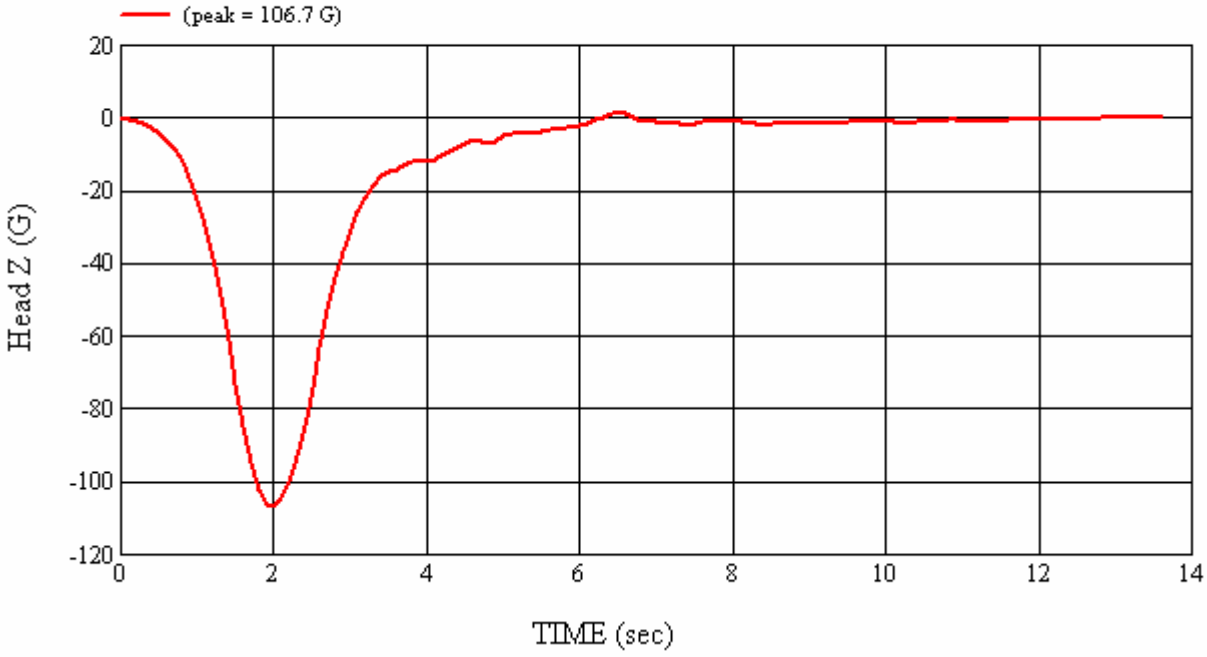
Head 037 (Post) Calibration #H37012



Head 037 (Post) Calibration #H37012



Head 037 (Post) Calibration #H37012



Head 037 (Post) Calibration #H37012

4.5 Pre-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

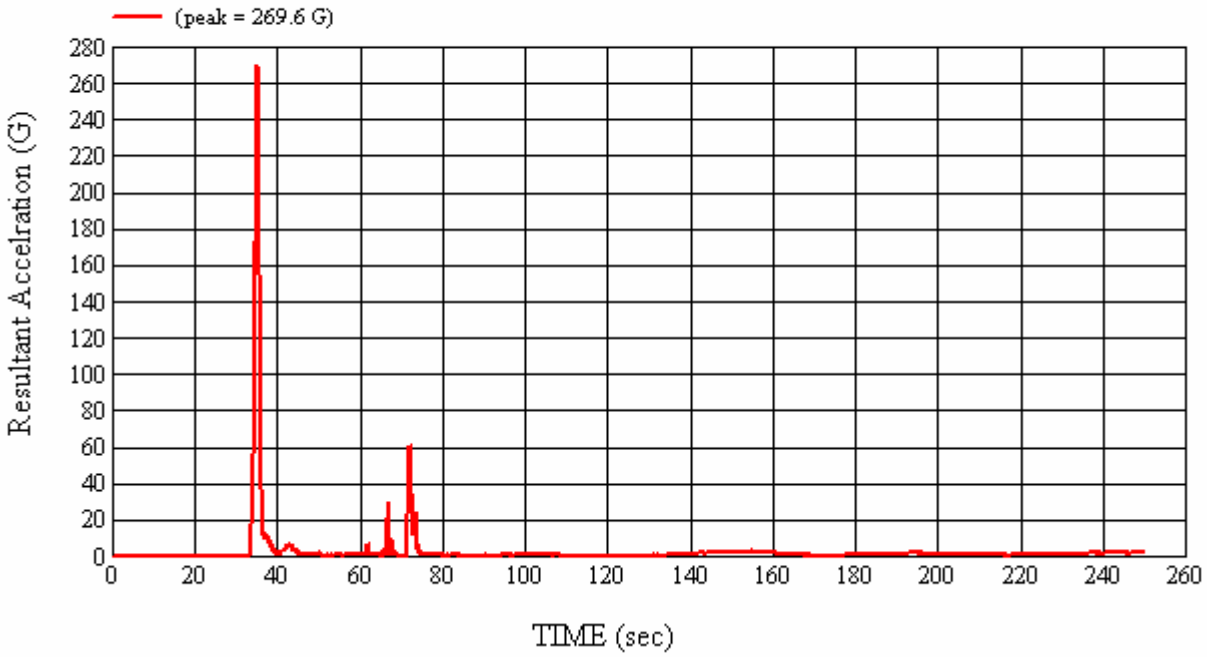
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 9/6/2007 CALIBRATION TIME: 10:33:43 AM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	23
Relative Humidity	10% to 70%	49
Peak Resultant Acceleration	225 G's to 275 G's	269.6
Peak Lateral Acceleration	15 G's Maximum	4.3
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	J14103	04/30/07	10/30/07
2	ENDEVCO	7264-2000	J36197	04/30/07	10/30/07
3	ENDEVCO	7264-2000	J36353	04/30/07	10/30/07

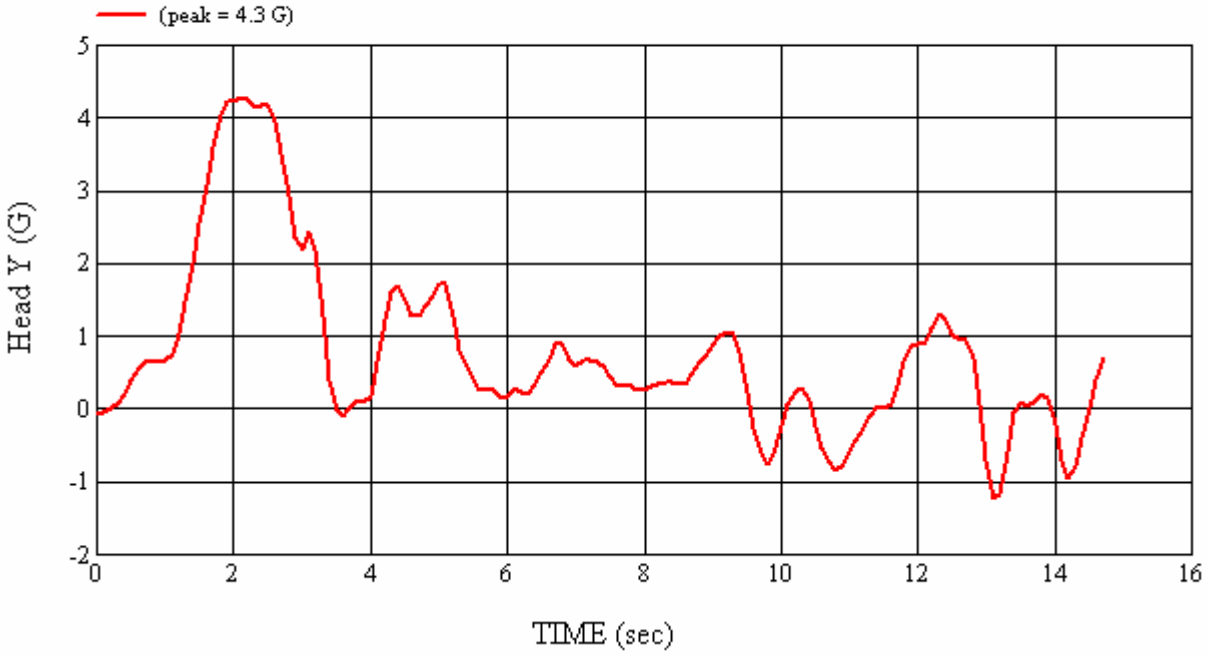
REMARKS:

RECORDED BY: Travis Campbell DATE: 9/6/2007

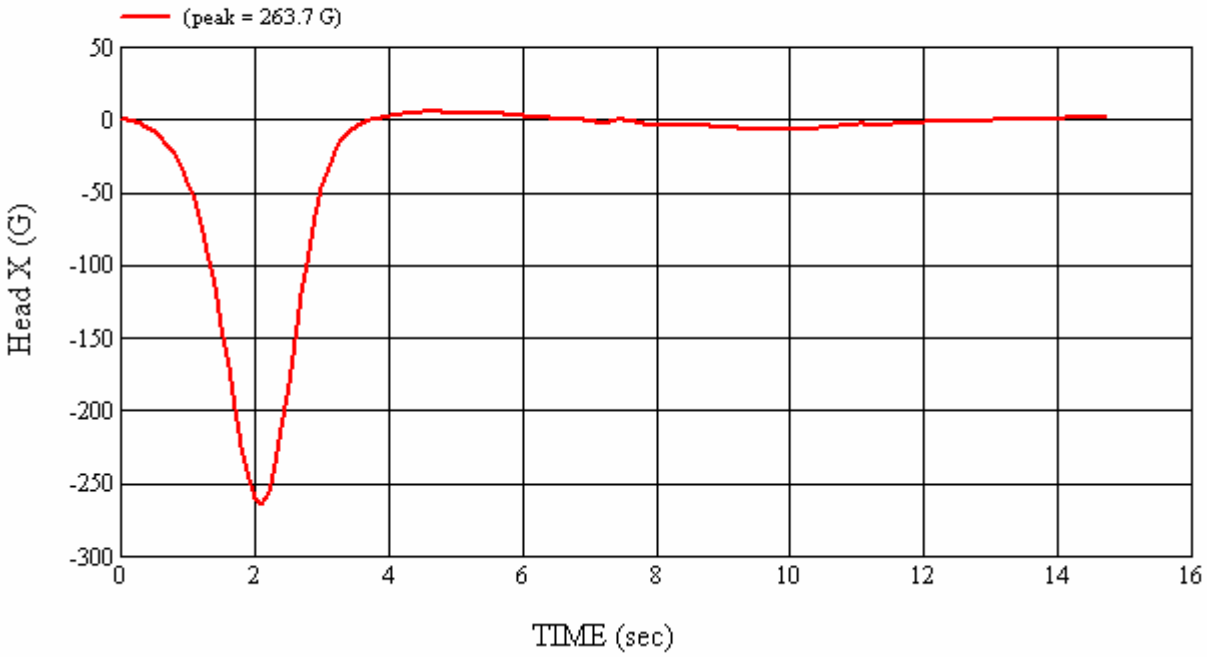
APPROVED BY: Helen A. Kalata



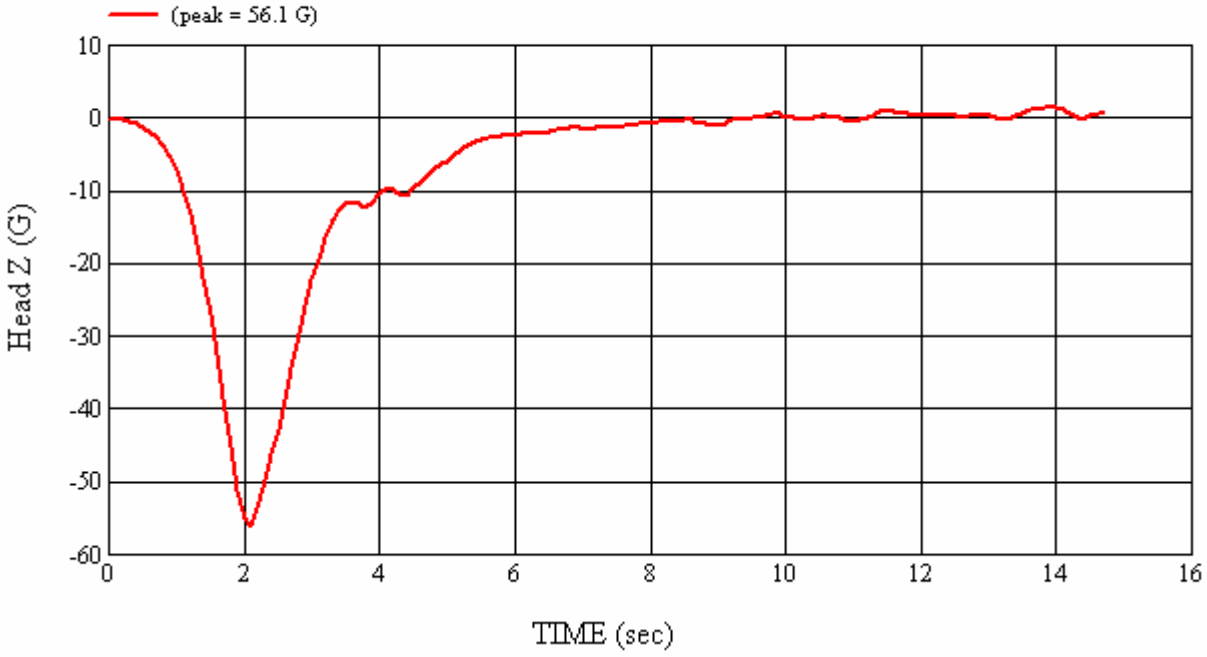
Head 038 (Pre) Calibration #H38011



Head 038 (Pre) Calibration #H38011



Head 038 (Pre) Calibration #H38011



Head 038 (Pre) Calibration #H38011

4.6 Post-Test Calibration

HEAD DROP TEST SUMMARY
PART 572L

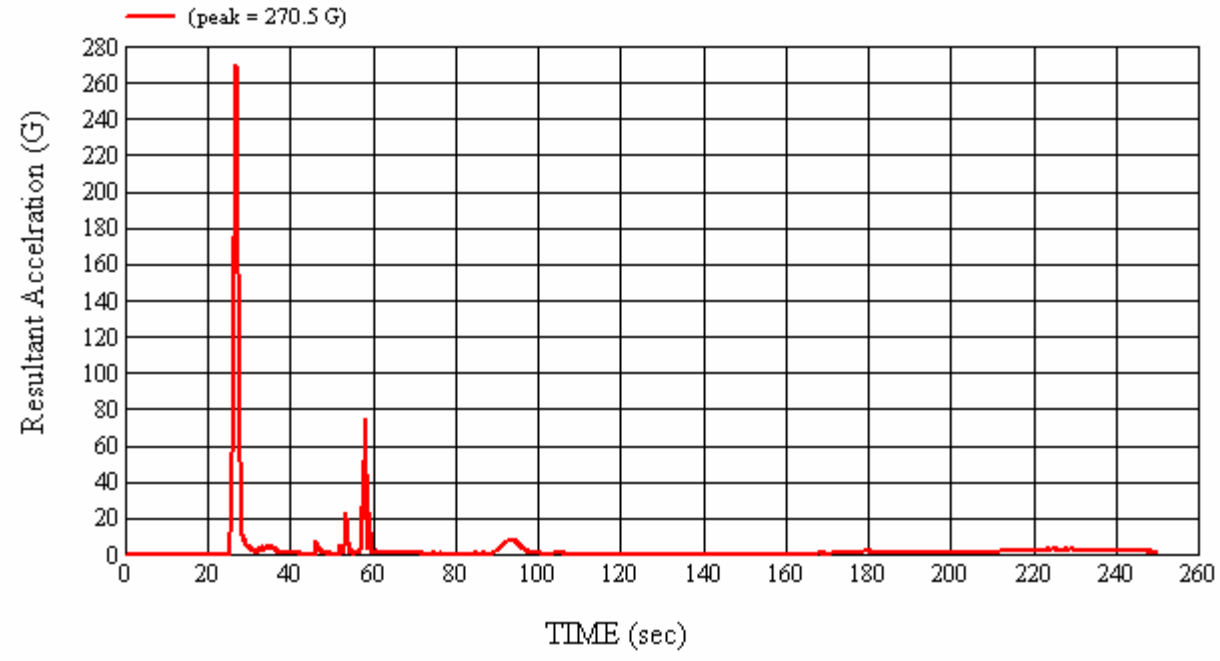
HEADFORM SERIAL NUMBER: 038	CALIBRATION DATE: 9/12/2007 CALIBRATION TIME: 2:54:57 PM	
TEST PARAMETER	**SPECIFICATION**	**TEST RESULTS**
Weight	9.90 to 10.10 lbs.	9.90
Temperature	19° C to 26° C	23
Relative Humidity	10% to 70%	38
Peak Resultant Acceleration	225 G's to 275 G's	270.5
Peak Lateral Acceleration	15 G's Maximum	12.3
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	J14103	04/30/07	10/30/07
2	ENDEVCO	7264-2000	J36197	04/30/07	10/30/07
3	ENDEVCO	7264-2000	J36353	04/30/07	10/30/07

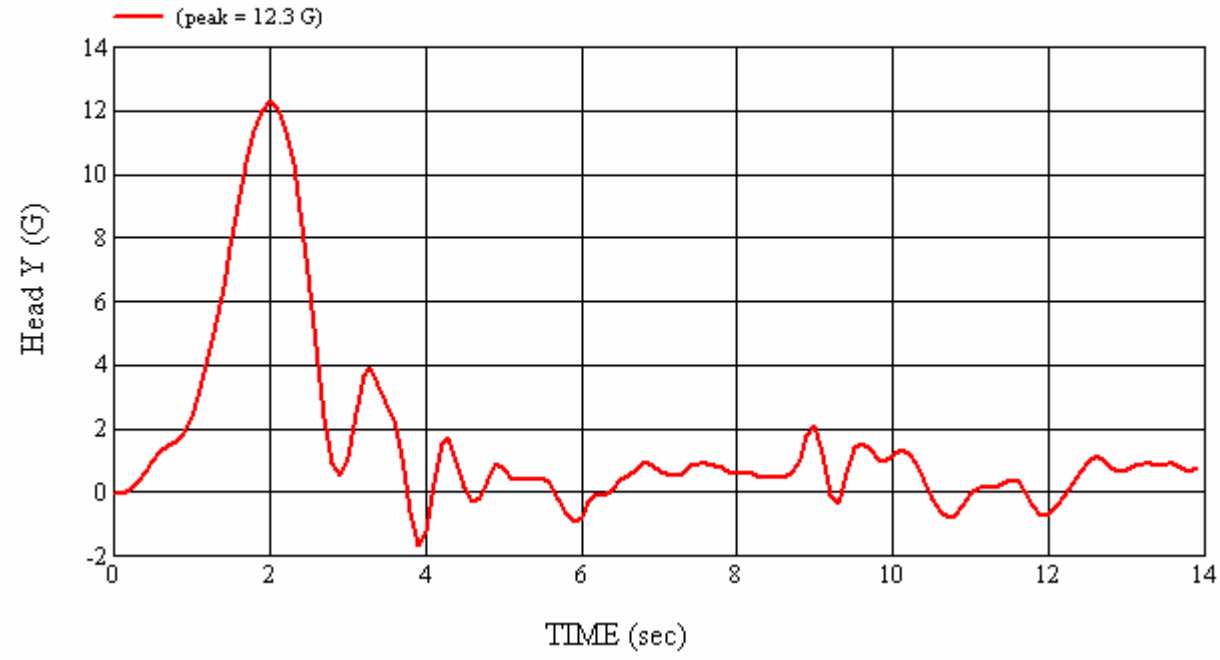
REMARKS:

RECORDED BY: Kaitlin Campbell DATE: 9/12/2007

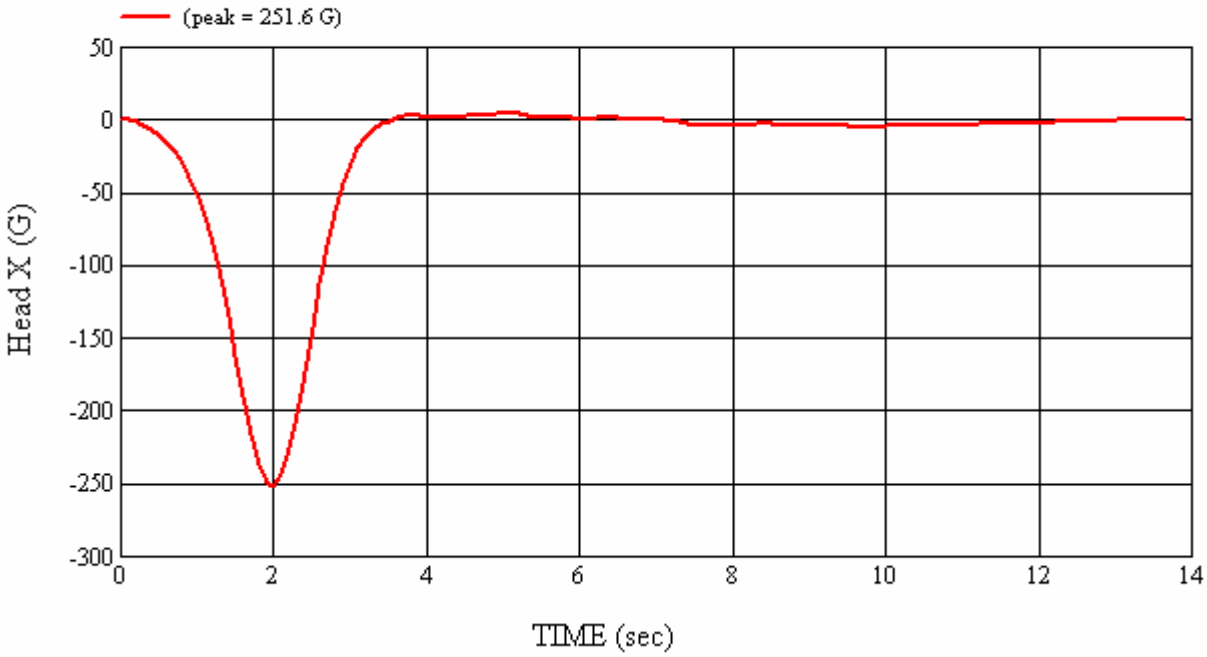
APPROVED BY: Helen A. Kaleto



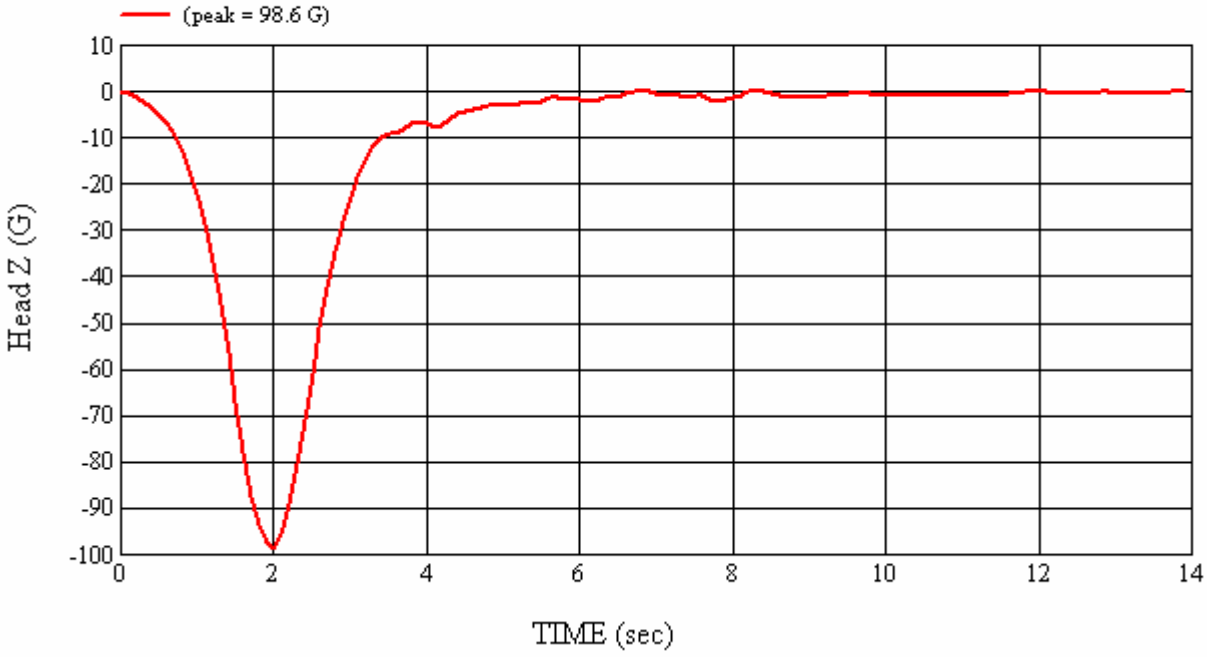
Head 038 (Post) Calibration #H38012



Head 038 (Post) Calibration #H38012



Head 038 (Post) Calibration #H38012



Head 038 (Post) Calibration #H38012

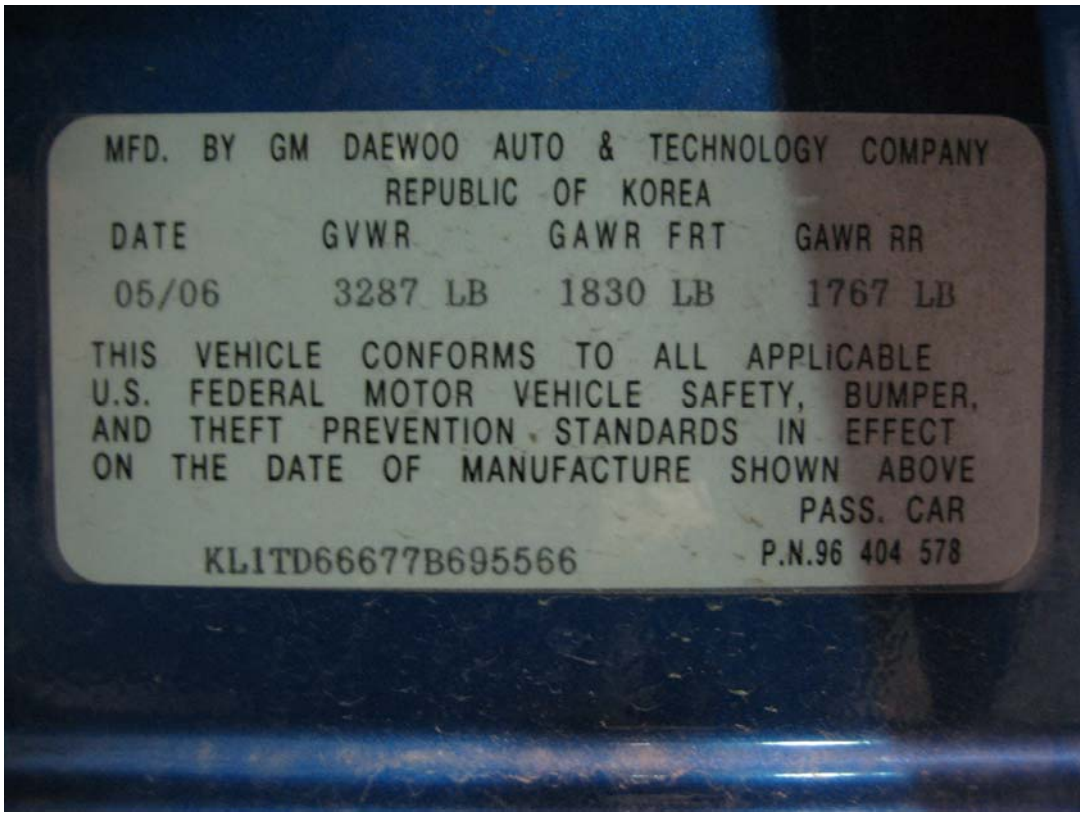
5.0 PHOTOGRAPHS

As Delivered – Left Side View

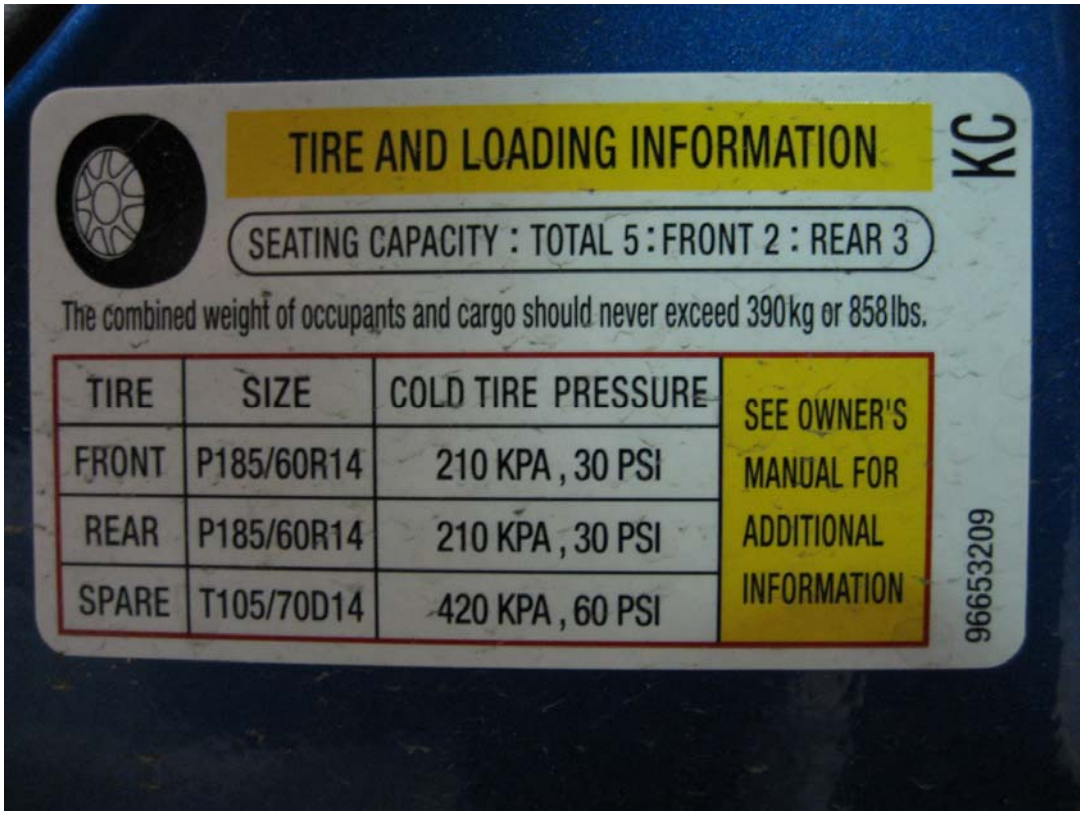
As Delivered – Right Side View

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
09/07/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
PRE-TEST COMPONENT
C70100
G07I7-001.4


mga
09/10/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
POST-TEST COMPONENT
C70100
G07I7-001.4


mga
09/07/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
PRE-TEST COMPONENT
C70100
G07I7-001.4


mga
09/07/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
PRE-TEST COMPONENT
C70100
G07I7-001.4

Post-Test Component Photographs

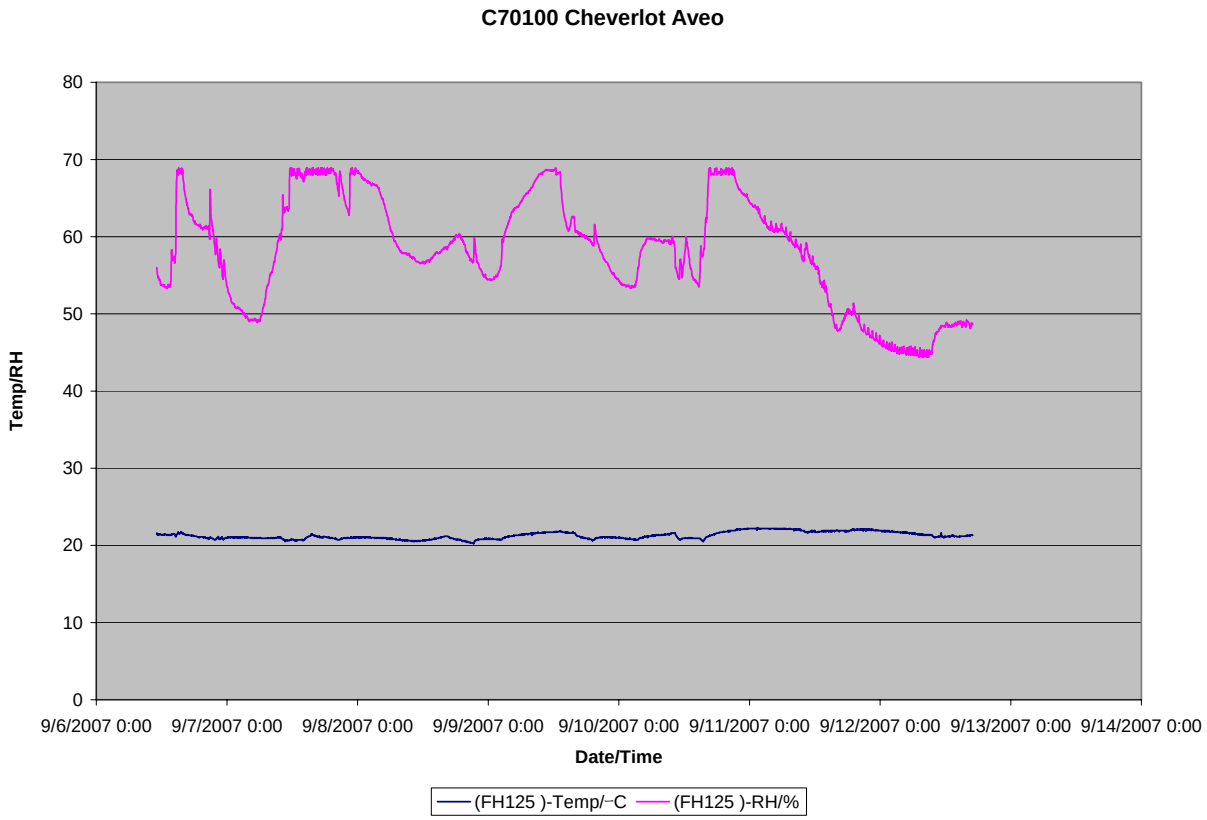

mga
09/10/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
POST-TEST COMPONENT
C70100
G07I7-001.4


mga
09/10/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
POST-TEST COMPONENT
C70100
G07I7-001.4

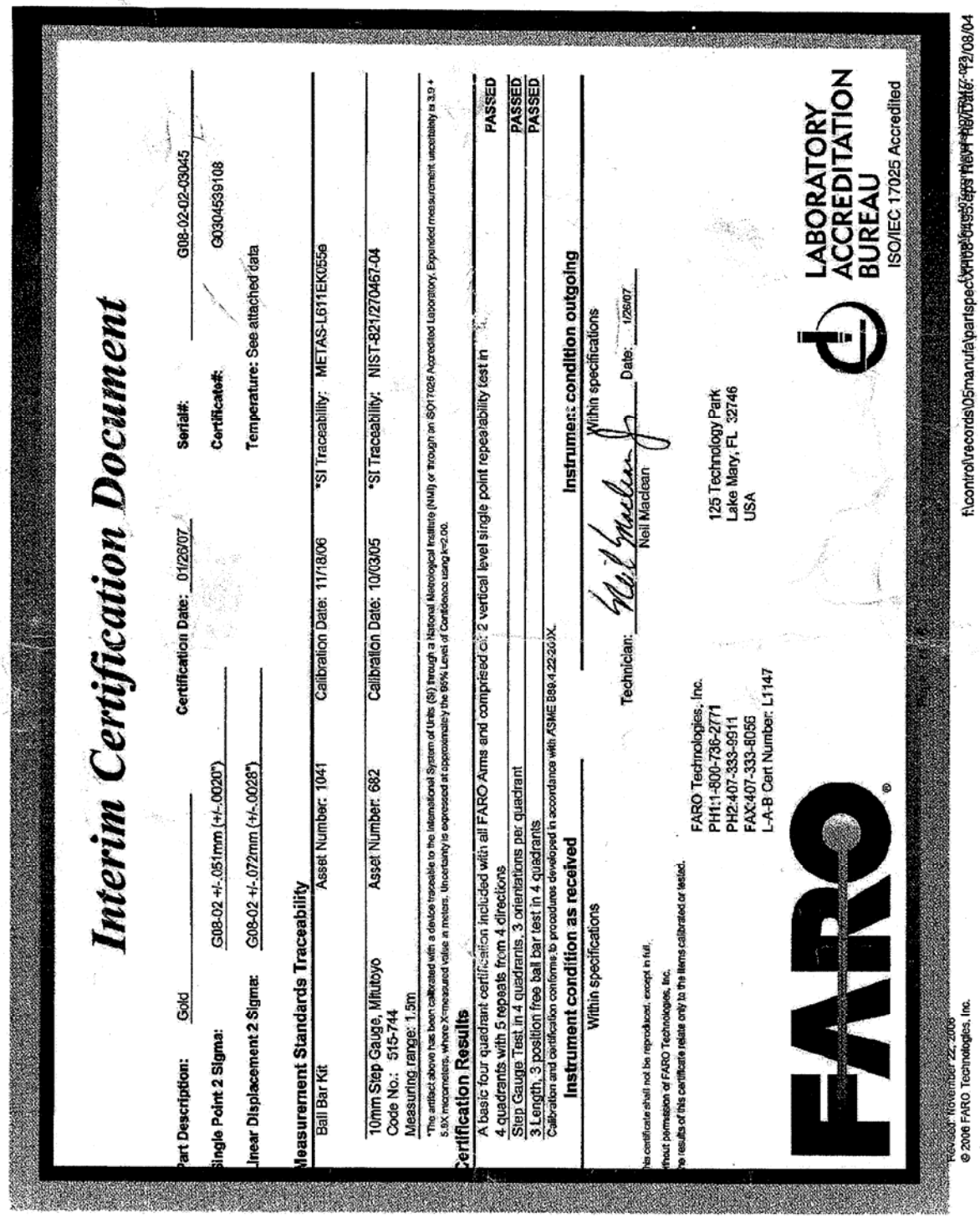

09/10/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
POST-TEST COMPONENT
C70100 G07I7-001.4


09/10/07
NHTSA
2007 CHEVROLET AVEO
FMVSS 201U Head Impact Protection
POST-TEST COMPONENT
C70100 G07I7-001.4

Appendix A - Temperature Trace



Appendix B - Calibration Certificates



Interim Certification Document

Part Description: Gold **Certification Date:** 01/26/07 **Serial#:** G08-02-02-03045

Single Point 2 Sigma: G08-02 +/-.051mm (+/-.0020") **Certificate#:** G0304539108

Linear Displacement 2 Sigma: G08-02 +/-.072mm (+/-.0028") **Temperature:** See attached data

Measurement Standards Traceability

Ball Bar Kit	Asset Number: 1041	Calibration Date: 11/18/06	*SI Traceability: METAS-L611EK0556
10mm Step Gauge, Mitutoyo Code No.: 515-744 Measuring range: 1.5m	Asset Number: 682	Calibration Date: 10/03/05	*SI Traceability: NIST-821/270467-04

*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 ISO/17025 Accredited Laboratory. Expanded measurement uncertainty is 3.9 + 5.8X micrometers, where X=measured value in meters. Uncertainty is expressed at approximately the 95% Level of Confidence using k=2.00.

Certification Results

A basic four quadrant certification included with all FARO Arms and comprised of: 2 vertical level single point repeatability test in 4 quadrants with 5 repeats from 4 directions — PASSED

Step Gauge Test in 4 quadrants, 3 orientations per quadrant — PASSED

3 Length, 3 position free ball bar test in 4 quadrants — PASSED

Calibration and certification conforms to procedures developed in accordance with ASME B89.4.22:2004.

Instrument condition as received — **Instrument condition outgoing**

Within specifications — Within specifications

Technician: Neil Maclean Date: 1/26/07

Neil Maclean

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

125 Technology Park
Lake Mary, FL 32746
USA

FARO®

LABORATORY ACCREDITATION BUREAU
ISO/IEC 17025 Accredited

Revised: November 22, 2006

f:\control\records\05manufa\partspec\[illegible]

Apr 14 2007 3:41PM 12485474612 p.1

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: **51186**
Report Number: **060926810**
Page: **1 of 1**

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

Customer PO: **07-06-0081**
Last Calibration: **8/29/05**
Calibration Date: **9/26/06**
Next Calibration: **9/26/07**

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 Proc. No. 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	6/14/06	6/14/07	821/271641-05	0.0015 Decimal Deg.
DoAll Sine Bar ID#1879	12/6/05	12/6/06	821/270003-04 & 3600042619	

Results:

As Found Readings

Units	Nominal	Actual	Deviation
Decimal Deg.	5.0	5.0	0.0
	10.0	10.0	0.0
	20.0	20.0	0.0
Tolerance	30.0	30.1	0.1
± 0.1°	40.0	40.0	0.0

Reference Level Check: Within +/- 0.1 degrees

As Left Readings

Nominal	Actual	Deviation
5.0	5.0	0.0
10.0	10.0	0.0
20.0	20.0	0.0
30.0	30.1	0.1
40.0	40.0	0.0

Reference Level Check: Within +/- 0.1 degrees

Comments: Environmental conditions during calibraiton: 68 deg. F., 37 % RH.

issued: 9.26.06
Shannon Kubicek
Calibration Technician

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

9/27/06

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
S/N: MGA00122
Calibration Date: 9.21.06

Subject Tape Measure
Brand: STANLEY
S/N: TPM 748
Calibration Date: 3.30.07

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: 3.30.07 Performed By: D Smith

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.

QA 3/30/07

Certificate of Instrument Calibration and Testing

Customer Instrument

Dickson Model Number: FH125

Serial Number: 06018122

Calibration Technician Dan Gawel

Calibration Date: 05/01/2007

Calibration Standards

ACCREDITED Cert # 1621.01

General Eastern: Model # M3
Ser. # 0850800 / 2360502
Accuracy: ± .4% FS RH and ± .4 °F
Certified April, 2006

Azonix Model # A1011 Ser. # T2513-9027
RTD Platinum Probe Ser. # 496013 Accuracy: ± .2 °F
Certified April, 2006

The calibration standards are traceable through the National Institute of Standards and Technology.

Calibration Procedure P1130

The customer instrument was compared to the calibration standard. Drifts and faults were determined, and any necessary mechanical or electronic adjustments were taken. The Dickson calibration system conforms to the requirements of MIL-STD-45662A, ANSI/NCSL Z540, and ISO 17025 as appropriate. Recalibration of the customer instrument is recommended within 6-12 months after the unit is placed into service. Any number of factors may cause the calibration item to drift before the recomended interval has expired.
This certificate only relates to this specific unit.

Environmental Conditions

72 °F 41 %RH

Calibration Standard Reading	Customer Instrument Reading	Unit Specification
Humidity (%RH)	Humidity (%RH)	Humidity
14.9	16.6	± 2% RH
67.8	68.5	± 2% RH
85.3	86.4	± 3% RH
Temperature °F (°C)	Temperature °F (°C)	Temperature
12.8 (-10.7)	13.1 (-10.5)	± 1.8 ° F (± 1.0 ° C)
73.3 (22.9)	73.2 (22.9)	
112.3 (44.6)	112.1 (44.5)	

The FH125 has an ISO/IEC 17025 required NIST Technical note 1297, Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results, estimated measurement uncertainty at 95% CL (K=2) of ±0.7°F and ±1 1 %RH

FOR YOUR NEXT CALIBRATION NO PHONE CALLS REQUIRED

Fill out and send this form along with your instrument to Dickson. Label the outside of the box with **"CCM"** - that is your RA#.

That's all there is to it!

1. Purchase Order #: _____
   Name: _____
   Phone: _____
   Model #: FH125
   Serial #: 06018122

A 3-pt Deluxe NIST will be performed unless otherwise requested

2. ☐ 1-Point Deluxe NIST Calibration $149.00
   ☐ 3-Point Deluxe NIST Calibration $199.00
   ☐ 3-Point Ultima Deluxe A2LA NIST $299.00 (with incoming reading)
   ☐ N995 - User selectable NIST Temperature points $50.00 each
   (to be selected in addition to one of the above calibration options)
   ☐ N997- Next Day Service $50.00 (Not available for ULTIMA service)

Charts/Pens
(Order now and receive them with your calibrated unit)

	Order No.	Qty.	Price Ea
☐ 6 Red Pens	P222	____	$36 pk
☐ 3 Red/3 Blue Pens	P246	____	$36 pk
☐ Charts* (60 per box)	C_ _ _	____	$24 box

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

Prices are subject to change

3. Please return via:
   ☐ Ground Freight*
   ☐ 2nd Day Air*
   ☐ Next Day Air*
   ***Charges added at factory**

Returned UPS 2nd Day unless otherwise requested

4. Ship To: _____

Bill To: _____

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

Dickson Calibration Services
930 South Westwood Avenue Addison, Illinois 60101 630-543-3747 Fax 630-543-0498

5/5/07

ULTIMA (Data as Received)

Customer Instrument

Dickson Model Number: FH125

Serial Number: 06018122

Calibration Technician Dan Gawel

Calibration Date: 05/01/2007

Unit was received in working condition, or received repairs not related to it's calibration or accuracy.

Calibration Procedure P1130

The customer instrument was compared to the calibration standard. The Dickson calibration system conforms to the requirements of MIL-STD-45662A and ANSI/NCSL Z540, and ISO 17025 as appropriate. Recalibration of the customer instrument is recommended within 6-12 months after the unit is placed into service.

Environmental Conditions 72 °F 41 %RH

Calibration Standard Reading	Customer Instrument Reading	Unit Specification
Humidity (%RH)	Humidity (%RH)	Humidity
16.4	18.8	± 2% RH
62.4	58.3	± 2% RH
84	79	± 3% RH
Temperature °F	Temperature °F	Temperature
13.1	13.9	± 1.8 °F (± 1.0 °C)
71.3	71	
110.5	110.8	

FOR YOUR NEXT CALIBRATION NO PHONE CALLS REQUIRED

Fill out and send this form along with your instrument to Dickson. Label the outside of the box with "CCM" - that is your RA#

That's all there is to it!

1. Purchase Order #: _____
   Name: _____
   Phone: _____
   Model #: FH125
   Serial #: 06018122

A 3-pt Deluxe NIST will be performed unless otherwise requested

2. ☐ 1-Point Deluxe NIST Calibration $149.00
   ☐ 3-Point Deluxe NIST Calibration $199.00
   ☐ 3-Point Ultima Deluxe A2LA NIST $299.00 (with incoming reading)
   ☐ N995 - User selectable NIST Temperature points $50.00 each (to be selected in addition to one of the above calibration options)
   ☐ N997- Next Day Service $50.00 (Not available for ULTIMA service)

3. Please return via:
   ☐ Ground Freight*
   ☐ 2nd Day Air*
   ☐ Next Day Air*

***Charges added at factory**

Returned UPS 2nd Day unless otherwise requested

4. Ship To: _____

Bill To: _____

Charts/Pens

(Order now and receive them with your calibrated unit)

	Order No	Qty	Price Ea
☐ 6 Red Pens	P222	____	$36 pk
☐ 3 Red/3 Blue Pens	P246	____	$36 pk
☐ Charts* (60 per box)	C_ _ _	____	$24 box

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

Prices are subject to change

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

Dickson Calibration Services
930 South Westwood Avenue Addison, Illinois 60101 630-543-3747 Fax 630-543-0498

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#*** O7-3173 ***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*
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

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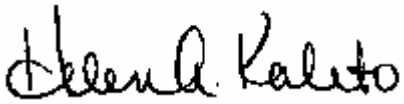
CALIBRATION CERTIFICATE

Sensor Information	Reference Sensor Information
Name: 2000 G Accelerometer	**Name:** *Reference Accelerometer*
Model: 7264-2000	**Model:** *301M09/484B*
S/N: J22664	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number:	A0712
New DLR (100k **, Units:G):**	94.2
StdDeviation (%)	0.496
% Difference in DLR (New vs. Old):	-1.807
Temperature (°F):	74
Humidity (%):	36

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: J35919	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0712

New DLR (100k **, Units:G):** 97.4

StdDeviation (%) 0.299

% Difference in DLR (New vs. Old): -1.589

Temperature (°F): 74

Humidity (%): 36

Performed By:

Approved By:

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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: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0712

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

StdDeviation (%) 0.188

% Difference in DLR (New vs. Old): 0.228

Temperature (°F): 74

Humidity (%): 36

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: J22696	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number: A0713

New DLR (100k **, Units:G):** 100.0

StdDeviation (%) 0.559

% Difference in DLR (New vs. Old): -1.242

Temperature (°F): 74

Humidity (%): 36

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: J35791	**S/N:** *862/247*
Capacity: 2000 G	**Capacity:** *170 G*
Calibration Date: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number:	A0713
New DLR (100k **, Units:G):**	91.9
StdDeviation (%)	0.194
% Difference in DLR (New vs. Old):	1.127
Temperature (°F):	74
Humidity (%):	36

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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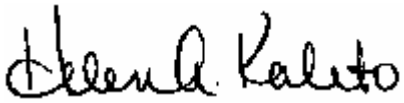
CALIBRATION CERTIFICATE

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: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number:	A0713
New DLR (100k **, Units:G):**	98.0
StdDeviation (%)	0.78
% Difference in DLR (New vs. Old):	-1.192
Temperature (°F):	74
Humidity (%):	36

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: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number:	A0713
New DLR (100k **, Units:G):**	94.6
StdDeviation (%)	0.172
% Difference in DLR (New vs. Old):	1.175
Temperature (°F):	74
Humidity (%):	36

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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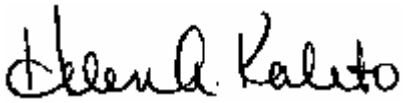
CALIBRATION CERTIFICATE

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: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number:	A0713
New DLR (100k **, Units:G):**	110.7
StdDeviation (%)	0.159
% Difference in DLR (New vs. Old):	0.612
Temperature (°F):	74
Humidity (%):	36

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: 4/30/2007	**Calibration Date:** *7/27/2006*
	Calibrated By: *Chuck DiMaggio*

Test Reference Number:	A0713
New DLR (100k **, Units:G):**	99.4
StdDeviation (%)	0.346
% Difference in DLR (New vs. Old):	1.014
Temperature (°F):	74
Humidity (%):	36

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 ~

Per ISO 16063-21

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

Serial Number: 862/2470

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

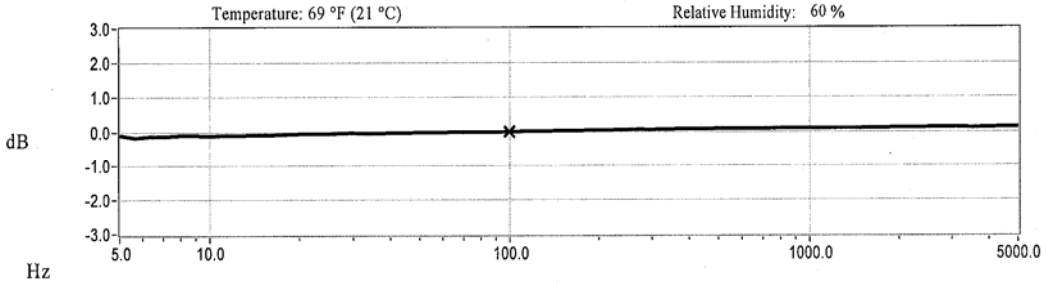
Manufacturer: PCB

Calibration Data

Sensitivity @ 100.0 Hz	**31.03**	**mV/g**	Output Bias	8.6	VDC
	(3.16	**mV/m/s²)**	Transverse Sensitivity	3.0	%

Sensitivity Plot

Temperature: 69 °F (21 °C) Relative Humidity: 60 %



Data Points

Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)	Frequency (Hz)	Dev. (%)
5.0	-1.2	REF. FREQ.	0.0	5000.0	1.5
10.0	-1.4	300.0	0.6		
15.0	-1.0	500.0	0.9		
30.0	-0.4	1000.0	1.0		
50.0	-0.3	3000.0	1.4		

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)[2]
[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 822/271196 and PTB Traceable thru Project 5399.
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 7/27/06 Date: 07/27/06

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

PAGE 1 of 1

cal3 - 3236847234.40

~Certificate of Calibration~

Model Number: 484B
Serial Number: 2470
Description: Signal Conditioner
Test Procedure: AT-106-1
Temperature: 70° F

PCB Control #: QC214/QC184/QC198/CA514
Calibration Date: 07/22/2006
Recalibration Date:
Calibration Technician: James Higbee 2b 7/27/06
Relative Humidity: 58%

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%.

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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.