

**REPORT NUMBER: NCAP-MGA-2012-080**

**NEW CAR ASSESSMENT PROGRAM (NCAP)  
Frontal Barrier Impact Test**

**GENERAL MOTORS LLC  
2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
NHTSA No.: MD0100**

**MGA RESEARCH CORPORATION  
5000 Warren Road  
Burlington, WI 53105**



**Test Date: May 3, 2012**


**Final Report Date: May 30, 2012**

**FINAL REPORT**

**U.S. DEPARTMENT OF TRANSPORTATION  
National Highway Traffic Safety Administration  
Office of Crashworthiness Standards  
Mail Code: NVS-111  
1200 New Jersey Ave, SE  
Room W43-410  
Washington, DC 20590**

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Prepared by:   
Donna Janovicz, Project Manager

Approved by:   
Ben Fischer, Project Engineer

Approval Date: May 30, 2012

FINAL REPORT ACCEPTANCE BY OCWS:

\_\_\_\_\_  
Division Chief, New Car Assessment Program  
NHTSA, Office of Crashworthiness Standards

Date: \_\_\_\_\_

\_\_\_\_\_  
COTR, New Car Assessment Program  
NHTSA, Office of Crashworthiness Standards

Date: \_\_\_\_\_

### Technical Report Documentation Page

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<b>4. Title and Subtitle</b> Final Report of New Car Assessment Program Frontal Impact Testing of 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan, NHTSA No.: MD0100		<b>5. Report Date</b> May 30, 2012		<b>6. Performing Organization Code</b> MGA																																															
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<b>9. Performing Organization Name and Address</b> MGA Research Corporation 5000 Warren Road Burlington, WI 53105		<b>10. Work Unit No.</b>		<b>11. Contract or Grant No.</b> DTNH22-06-D-00028																																															
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<b>15. Supplementary Notes</b>		<b>14. Sponsoring Agency Code</b> NVS-111		<b>16. Abstract</b> A 56.3 km/h NCAP Frontal Impact Test was conducted on the 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan in accordance with the specifications of the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure. This test was conducted to obtain data indicant of FMVSS 208, 212, 219 (partial), 301, and foot well intrusion performance. The test was conducted at MGA Research Corporation in Burlington, Wisconsin, on May 3, 2012.  The impact velocity was 56.3 km/h and the ambient temperature at the barrier face at the time of impact was 21.4°C. The target vehicle post-test maximum crush was 589 mm located at the vehicle's centerline. The test vehicle's performance was as follows:																																															
						<table border="1" style="width: 100%; border-collapse: collapse; background-color: #ffff00;"> <thead> <tr> <th rowspan="2" style="width: 35%;">Measurement Description</th> <th rowspan="2" style="width: 10%;">Units</th> <th colspan="2" style="width: 20%;">Threshold</th> <th rowspan="2" style="width: 15%;">Driver ATD</th> <th rowspan="2" style="width: 15%;">Passenger ATD</th> </tr> <tr> <th style="width: 10%;">50<sup>th</sup></th> <th style="width: 10%;">5<sup>th</sup></th> </tr> </thead> <tbody> <tr> <td>Head Injury Criteria (HIC<sub>15</sub>)</td> <td>N/A</td> <td>700</td> <td>700</td> <td>134</td> <td>315</td> </tr> <tr> <td>Maximum Chest Compression</td> <td>mm</td> <td>63</td> <td>52</td> <td>21</td> <td>9</td> </tr> <tr> <td>Nij</td> <td>N/A</td> <td>1</td> <td>1</td> <td>0.29</td> <td>0.42</td> </tr> <tr> <td>Neck Tension</td> <td>N</td> <td>4170</td> <td>2620</td> <td>916</td> <td>600</td> </tr> <tr> <td>Neck Compression</td> <td>N</td> <td>4000</td> <td>2520</td> <td>241</td> <td>276</td> </tr> <tr> <td>Left Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>873</td> <td>507</td> </tr> <tr> <td>Right Femur Force</td> <td>N</td> <td>10008</td> <td>6805</td> <td>1353</td> <td>610</td> </tr> </tbody> </table>		Measurement Description	Units	Threshold		Driver ATD	Passenger ATD	50 <sup>th</sup>	5 <sup>th</sup>	Head Injury Criteria (HIC <sub>15</sub> )	N/A	700	700	134	315	Maximum Chest Compression	mm	63	52	21	9	Nij	N/A	1	1	0.29	0.42	Neck Tension	N	4170	2620	916	600	Neck Compression	N	4000	2520	241	276	Left Femur Force	N	10008	6805	873	507
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## **SECTION 1 PURPOSE AND SUMMARY OF TEST**

### **PURPOSE**

This 56.3 km/h frontal barrier impact test is part of the Vehicle Barrier Impact Testing Program sponsored by the National Highway Traffic Safety Administration (NHTSA) under contract number DTNH22-06-D-00028. The purpose of this test was to obtain vehicle crashworthiness and occupant restraint system performance data for consumer information purposes.

The 56.3 km/h frontal barrier impact was conducted in accordance with the Office of Crashworthiness Standards Frontal NCAP Laboratory Test Procedure.

### **SUMMARY**

A load cell barrier was impacted by a 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan at a velocity of 56.3 kph. The test was performed at MGA Research Corporation on May 3, 2012. Pre-and post-test photographs of the vehicle and dummies can be found in Appendix A.

Two real-time cameras and fourteen (14) high-speed cameras were used to document the frontal barrier impact event. Camera locations and other pertinent camera information can be found in this report.

One Part 572E, 50<sup>th</sup> percentile male anthropomorphic test device (ATD), was placed in the driver seating position and one Part 572O 5<sup>th</sup> percentile female test device (ATD) was placed in the right-front passenger seating position according to dummy placement instructions specified in the Frontal NCAP Laboratory Test Procedure.

Both ATDs were fully instrumented with head, chest and pelvis tri-axial accelerometers, chest displacement potentiometers, upper neck transducers, right/left femur load cells, and lower leg instrumentation. Seat belt load cells were also installed on the driver's and passenger's lap belts to measure dummy torso and pelvic section loading.

The driver (position 1) ATD (Serial No. 036) and the right-front passenger (position 2) ATD (Serial No. 634) were calibrated previous to this test. Certification details, along with instrumentation calibration data, are found in Appendix C of this report.

The 228 channels of data were recorded on an on-board data acquisition system. Appendix B contains the dummy head, chest displacement, neck, and femur response data traces.

There was 100 percent windshield retention and no intrusion into the protected zone of the windshield during the event. There was no Stoddard Solvent leakage after the event or during any phase of the static rollover.

The maximum static crush of the vehicle was 589 mm and both the driver and passenger side doors remained closed during the impact event and were operable after the impact.

The driver's visible contact points were as follows: The driver's head and chest contacted the airbag. The driver's head also contacted the headrest. The driver's knees contacted the knee airbag and steering column. The passenger's visible contact points were as follows: The passenger's head and chest contacted the airbag. The passenger's head also contacted the headrest. The passenger's knees contacted the knee airbag.

The occupant data is summarized below:

ATD position	HIC <sub>15</sub>	Nij	Neck Tension (N)	Neck Comp. (N)	3ms Chest Clip (Gs)	Chest Disp. (mm)	Left Femur (N)	Right Femur (N)
Driver (50 <sup>th</sup> )	134	0.29	916	241	39	21	873	1353
Passenger (5 <sup>th</sup> )	315	0.42	600	276	40	9	507	610

The test data can be found on the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov).

### TEST NOTES

There was no valid data collected for:  
 Passenger Right Foot Z – Front after 77 ms.  
 Driver Shoulder Belt after 96 ms.  
 Top of Engine X is questionable from 72-74 ms.  
 Load Cell 8-2 is questionable.  
 Load Cell 5-1 is questionable.

The driver and passenger lap belt load cells were not installed.

MGA does not endorse or certify products. The manufacturer's name appears solely for identification purposes.

**SECTION 2**  
**OCCUPANT AND VEHICLE INFORMATION / DATA SHEETS**

**DATA SHEET NO. 1  
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**TEST VEHICLE INFORMATION AND OPTIONS**

NHTSA No.	MD0100	Traction Control System (TCS)	Yes
Model Year	2013	Auto-Leveling System	No
Make	Chevrolet	Automatic Door Locks (ADLs)	Yes
Model	Malibu ECO	Power Window Auto-Reverse	No
Body Style	Sedan	Other Optional Feature	N/A
VIN	1G11D5RR8DF101161	Driver Front Airbag	Yes
Body Color	Silver Ice Metallic	Driver Curtain Airbag	Yes
Odometer (km/mi)	63 / 39	Driver Torso Airbag	No
Engine Displacement (L)	2.4	Driver Torso/Pelvis Airbag	Yes
Type/No. Cylinders	4	Driver Pelvis Airbag	No
Engine Placement	Lateral	Driver Knee Airbag	Yes
Transmission Type	Automatic	Pass. Front Airbag	Yes
Transmission Speeds	6	Pass. Curtain Airbag	Yes
Overdrive	No	Pass. Torso Airbag	No
Final Drive	Front	Pass. Torso/Pelvis Airbag	Yes
Roof Rack	No	Pass. Pelvis Airbag	No
Sunroof/T-Top	No	Pass. Knee Airbag	Yes
Running Boards	No	Driver Seat Belt Pretensioner	Yes
Tilt Steering Wheel	Yes	Pass. Seat Belt Pretensioner	Yes
Power Seats	Yes	Driver Load Limiter	Yes
Anti-Lock Brakes (ABS)	Yes	Pass. Load Limiter	Yes
All-Wheel Drive (AWD)	No	Other Safety Restraint	N/A
Does owner's manual provide instructions to turn off automatic door locks?			No

**DATA FROM CERTIFICATION LABEL**

Manufactured By	GENERAL MOTORS LLC	GVWR (kg)	2060
Date of Manufacture	01/12	GAWR Front (kg)	1061
Vehicle Type	Passenger Car	GAWR Rear (kg)	999

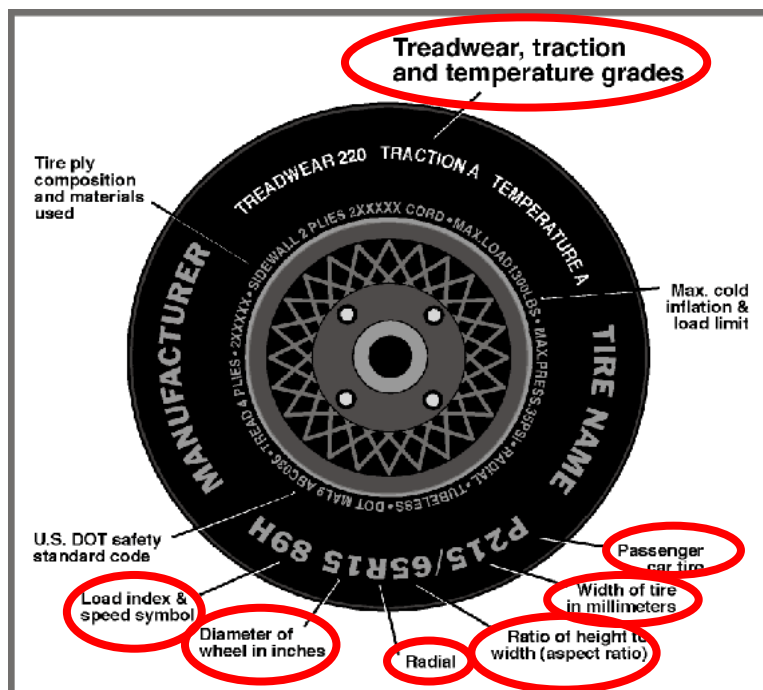
**VEHICLE SEATING AND WEIGHT CAPACITY DATA**

Measured Parameter	Front	Rear	Third	Total
Type of Seats	Bucket	Bench		
Designated Seating Capacity (DSC)	2	3		5
Capacity Weight (VCW) (kg)				410
Cargo Weight (RCLW) (kg)				70

**DATA SHEET NO. 1 (CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



**TIRE PLACARD INFORMATION**

Measured Parameter	Front	Rear
Recommended Cold Tire Pressure (kPa)	240	240
Recommended Tire Size	P225/55R17	P225/55R17

**TIRE SIDEWALL INFORMATION**

Measured Parameter	Front	Rear
Max. Tire Pressure (kPa)	350	350
Tire Size on Vehicle	P225/55R17	P225/55R17
Tire Manufacturer	Goodyear	Goodyear
Tire Name	Assurance	Assurance
Tire Type	Passenger	Passenger
Tire Width	225	225
Aspect Ratio	55	55
Radial	Yes	Yes
Wheel Diameter	17	17
Load Index/Speed Symbol	95H	95H
Treadwear	580	580
Traction Grade	A	A
Temperature Grade	A	A
Tire Material	Rubber	Rubber

**DATA SHEET NO. 1 (CONTINUED)  
GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**TEST VEHICLE WEIGHTS**

	Units	As Delivered (UVW)			As Tested (ATW)		
		Front	Rear	Total	Front	Rear	Total
Left	kg	476.7	355.2		509.8	429.1	
Right	kg	485.8	315.7		508.5	390.1	
Ratio	%	58.9	41.1		55.4	44.6	
Totals	kg	962.5	670.9	1633.4	1018.3	819.2	1837.5

**TARGET TEST WEIGHT CALCULATION**

Measured Parameter	Units	Value
Total Delivered Weight (UVW)	kg	1633.4
Weight of 1 P572E ATD & 1 P572O ATD	kg	140.6
Rated Cargo/Luggage Weight (RCLW)	kg	70
Calculated Vehicle Target Weight (TVTW)	kg	1844.0

**TEST VEHICLE ATTITUDES AND CG**

	Units	LF	RF	LR	RR	CG (aft of front axle)
As Delivered	mm	720	736	734	730	1125
As Tested	mm	719	724	694	701	1222
Post Test	mm	793	782	705	680	

**GENERAL TEST VEHICLE DATA**

Measurement Description	Units	Value
Total Vehicle Wheel Base	mm	2740
Total Vehicle Length at Left Side	mm	4553
Total Vehicle Length at Centerline	mm	4890
Total Vehicle Length at Right Side	mm	4553
Weight of Ballast in Cargo Area	kg	41.7
Weight of Vehicle Components Removed	kg	8.6
Amount of Stoddard Solvent in Fuel Tank	L	55.6

List of components removed: Right taillight, trunk carpet, tire inflator, and rear floor mats.

**DATA SHEET NO. 1 (CONTINUED)**  
**GENERAL TEST AND VEHICLE PARAMETER DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**TARGET VEHICLE STRUCTURAL MEASUREMENT**

	Elements	Pre-Test (mm)
1	Total Length	4890
2	Total Width	1820
3	Bumper Top Height	540
4	Bumper Bottom Height	404
5	Longitudinal Member Top Height	555
6	Distance between Longitudinal Members	898
7	Longitudinal Member Width	85
8	Engine Top Height	809
9	Engine Bottom Height	198
10	Engine and Gearbox Width	920
11	Front Bumper-Engine Distance	350
12	Front Shock Absorber Fixing Height	905
13	Bonnet Leading Edge Height	862
14	Front Shock Absorber Fixing Width	1188
15	Front Bumper – Front Axle Distance	1008
16	Front Axle – A-Pillar Distance	431
17	A-Pillar – B-Pillar Distance	1145
18	B-Pillar – Rear Axle Distance	1167
19	B-Pillar – C-Pillar Distance	741
20	Roof Sill Bottom Height	1231
21	Roof Sill Top Height	1408
22	Floor Sill Bottom Height	200
23	Floor Sill Top Height	364

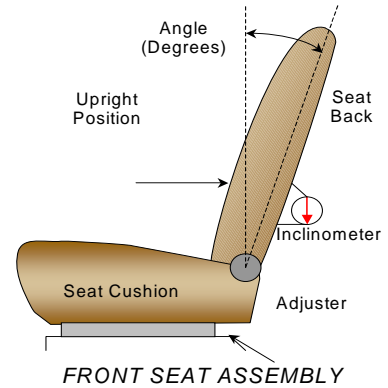
**DATA SHEET NO. 2**  
**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**NOMINAL DESIGN RIDING POSITION**

The driver seat back is positioned as close as possible to the manufacturer's design angle. For the passenger seat back, seat back is adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.



SEAT BACK ANGLE	Degrees
Driver Seat Back Angle	-11.7° on headrest post
Passenger Seat Back Angle	-18.7° on headrest post

**SEAT FORE/AFT POSITIONS**

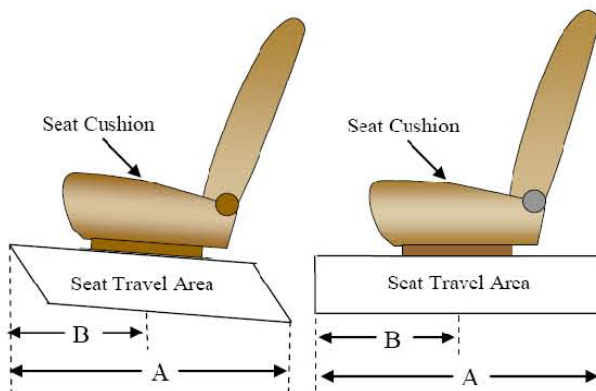
The driver and passenger seat fore/aft positions are adjusted following Appendix F, "Driver & Passenger Dummy Seating & Positioning Procedures" in the NCAP Test Procedure dated January 2010.

	Total Fore/Aft Travel	Placed in Position #
Driver Seat	307 mm	154 mm
Passenger Seat	54 detents (1 <sup>st</sup> as 0)	0 detents (1 <sup>st</sup> as 0)

**SEAT BELT UPPER ANCHORAGES**

The seat belt upper anchorages are positioning following the manufacturer's specified position as listed in Form 1.

	Total # of Positions	Placed in Position #
Driver Seat	5 (1 <sup>st</sup> as 1)	0 (uppermost as 0)
Passenger Seat	5 (1 <sup>st</sup> as 1)	0 (uppermost as 0)



**DATA SHEET NO. 2 (CONTINUED)**  
**SEAT ADJUSTMENT, FUEL SYSTEM, AND STEERING WHEEL DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

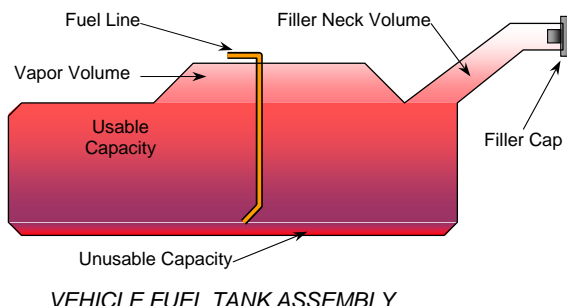
**FUEL TANK CAPACITY DATA**

	Liters
Usable Capacity of "Standard Tank"	59.8
Usable Capacity of "Optional Tank"	
92-94% of Usable Capacity	55.0 to 56.2
Actual Amount of Solvent used	55.6
1/3 of Usable Capacity	19.9

**FUEL PUMP**

Describe the fuel pump type, its behavior, and the location of the fuel filler pipe.

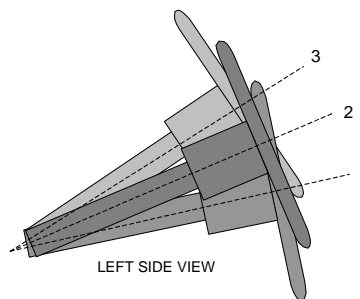
The vehicle is equipped with an electric fuel pump. Pump will run when engine is running. Also, it will run briefly when ignition key is turned to the "on" position without starting the engine. The fuel pipe is on the right side.



VEHICLE FUEL TANK ASSEMBLY

**STEERING COLUMN ADJUSTMENT**

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when moved through its full range of motion. An aluminum plate is placed across the rim of the steering wheel, an inclinometer is placed on the plate and the angle is measured.



STEERING COLUMN ASSEMBLY

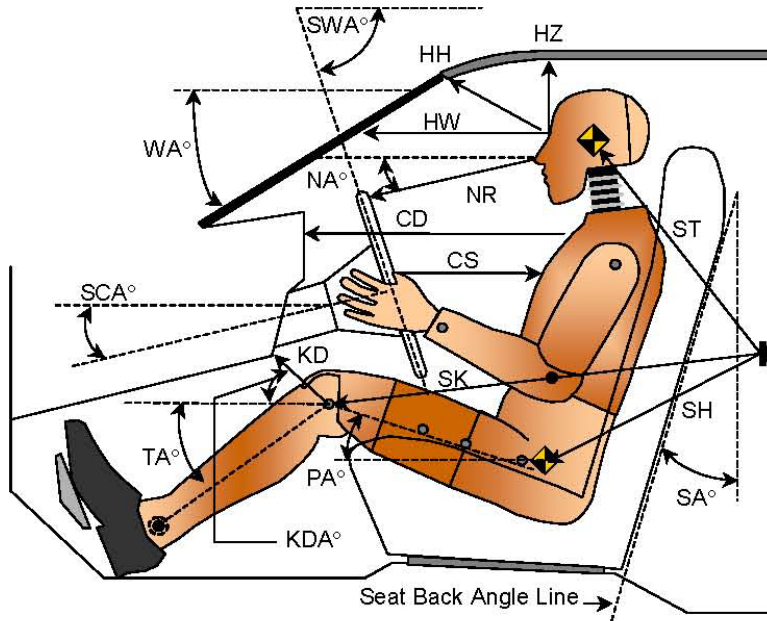
**STEERING COLUMN POSITION**

	Degrees	Fore/Aft Position (mm)
Lowermost – Position 1	70.7	224
Geometric Center – Position 2	68.5	196
Uppermost – Position 3	66.3	168
Telescoping Steering Wheel Travel		56
Test Position	68.5	196

**DATA SHEET NO. 3**  
**DUMMY LONGITUDINAL CLEARANCE DIMENSIONS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
Test Date: 05/03/2012



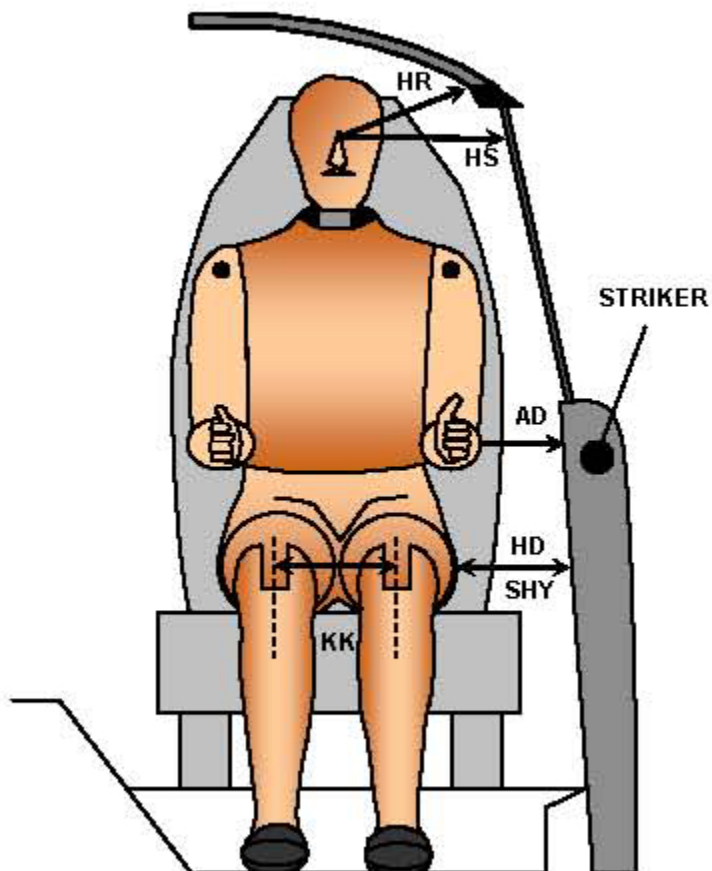
**LEFT SIDE VIEW**

Code	Measurement Description	Driver S/N 036		Passenger S/N 634	
		Length (mm)	Angle (°)	Length (mm)	Angle (°)
WA°	Windshield Angle		26.1		
SWA°	Steering Wheel Angle		68.5		
SCA°	Steering Column Angle		21.5		
SA°	Seat Back Angle (on headrest post)		-11.7		-18.7
HZ	Head to Roof (Z)	225	90	249	90
HH	Head to Header	403	18.7	334	39.9
HW	Head to Windshield	724	0	741	0
NR	Nose to Rim	415	12.0		
CD	Chest to Dash	547		461	
CS	Chest to Steering Hub	353	5.8		
RA	Rim to Abdomen	231	0		
KDL	Left Knee to Dash	208	27.8	163	31.7
KDR	Right Knee to Dash	192	29.3	162	33.9
PA°	Pelvic Angle		24.4		21.6
TA°	Tibia Angle		38.1		44.3
SK	Striker to Knee	526	94.3	629	96.9
ST	Striker to Head	471	7.4	401	22.3
SH	Striker to H-Point	238	141.1	334	118.0

**DATA SHEET NO. 4  
DUMMY LATERAL CLEARANCE DIMENSIONS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



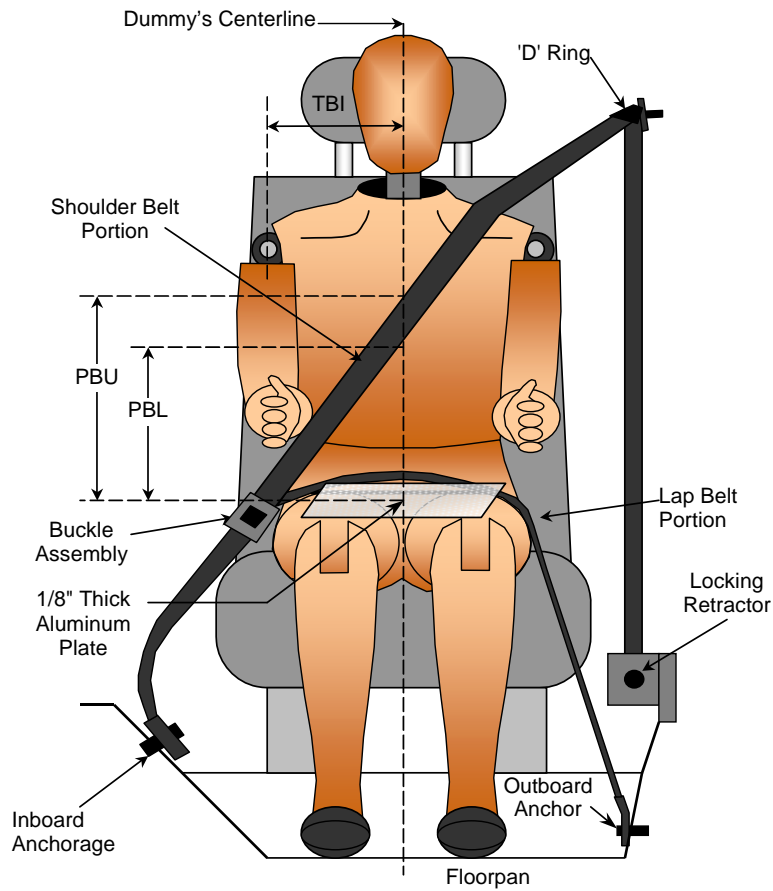
**FRONT VIEW OF DUMMY**

Code	Measurement Description	Driver S/N 036	Passenger S/N 634
		Length (mm)	
AD	Arm to Door	128	110
HD	H-Point to Door	155	201
HR	Head to Side Header	214	252
HS	Head to Side Window	338	391
KK	Knee to Knee	350	225
SHY	Striker to H-Point (Y Direction)	283	303
AA	Ankle to Ankle	340	182

**DATA SHEET NO. 5  
SEAT BELT POSITIONING DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



**FRONT VIEW OF DUMMY**

**SEAT BELT POSITIONING MEASUREMENTS**

Measurement Description	Units	Driver	Passenger
PBU - Top surface of reference to belt upper edge	mm	310	320
PBL - Top surface of reference to belt lower edge	mm	225	225

**BELT LENGTH DATA**

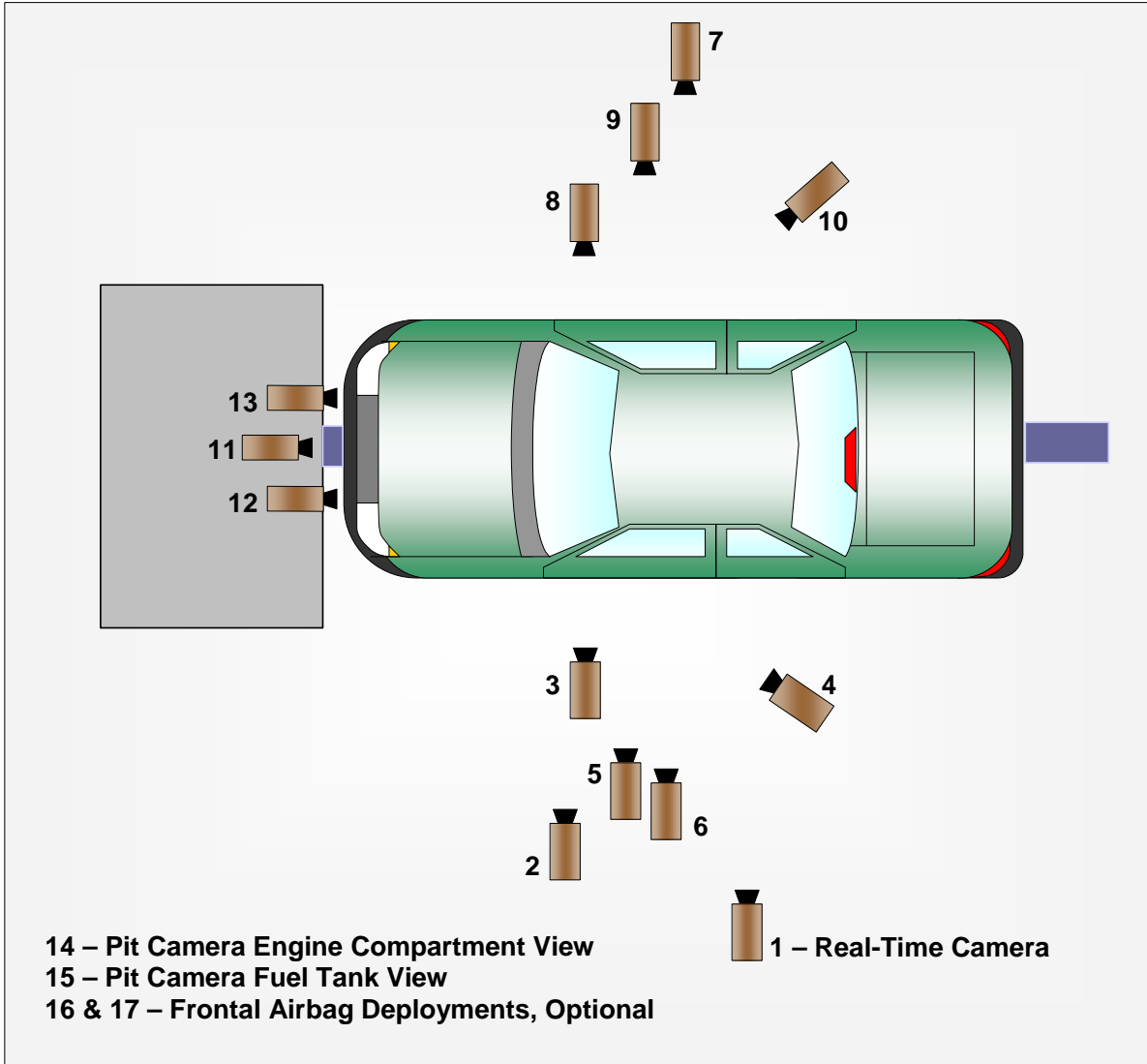
Measurement Description	Units	Driver	Passenger
Shoulder Belt Length as measured on ATD	mm	770	860
Lap Belt Length as measured on ATD	mm	440	460
Remainder of belt on reel	mm	1930	1820
Total Belt Length for Continuous Webbing Systems	mm	3140	3140

**DATA SHEET NO. 6  
HIGH-SPEED CAMERA LOCATIONS AND DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
Test Date: 05/03/2012

**CAMERA POSITIONS FOR FRONTAL IMPACTS**



**DATA SHEET NO. 6 (CONTINUED)  
CAMERA LOCATIONS AND DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**CAMERA LOCATIONS**

No.	Camera View	Coordinates (mm)			Lens (mm)	Speed (fps)
		X*	Y*	Z*		
1	Real-Time Left Overall					30
2	Driver Close-Up	1490	-6340	-1890	35	1000
3	Left Front Half	1150	-5080	-1050	24	1000
4	Left Angle	5640	-5010	-2050	50	1000
5	Steering Column - Top	610	-5190	-1250	24	1000
6	Steering Column - Bottom	590	-5140	-830	24	1000
7	Right Overall	2330	6870	-1070	20	1000
8	Passenger Close-Up	1670	6700	-1810	35	1000
9	Right Front Half	1360	5220	-1060	24	1000
10	Right Angle	5510	5290	-2020	50	1000
11	Windshield	-130	0	-2810	20	1000
12	Driver Windshield	250	-450	-2030	8.5	1000
13	Passenger Windshield	250	450	-2030	8.5	1000
14	Pit Front	1100	0	3150	24	1000
15	Pit Rear	2890	0	3150	24	1000
16	Onboard Driver Side (optional)					
17	Onboard Passenger Side (optional)					
18	Real-Time Pan View					30

**\*COORDINATES:**

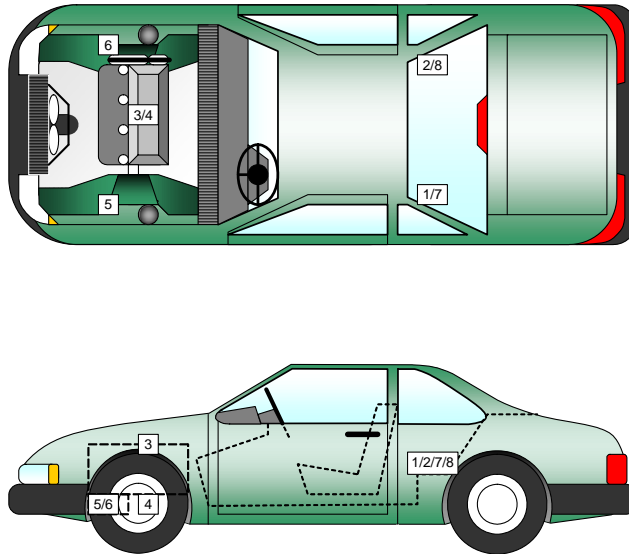
- +X = forward of impact plane
- +Y = right of monorail centerline
- +Z = below ground level

Cameras 16 & 17 were not used for this test.

**DATA SHEET NO. 7  
VEHICLE ACCELEROMETER DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



**VEHICLE ACCELEROMETER PRE-TEST LOCATIONS**

No.	Accelerometer Location	Measurements (mm)		
		X	Y	Z
1	Left Rear Accelerometer – X Direction	2031	-525	-208
2	Right Rear Accelerometer – X Direction	2031	529	-238
3	Engine Top X	3994	0	-830
4	Engine Bottom X	4009	0	-319
5	Left Brake Caliper X	3990	-718	-285
6	Right Brake Caliper X	3990	718	-285
7	Left Rear Accelerometer Redundant – X Direction			
8	Right Rear Accelerometer Redundant – X Direction			

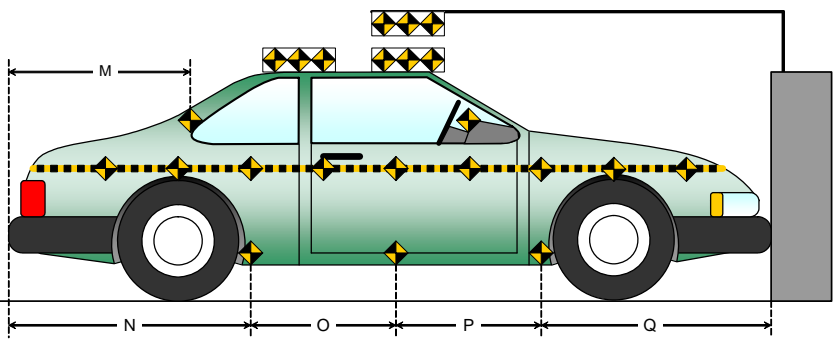
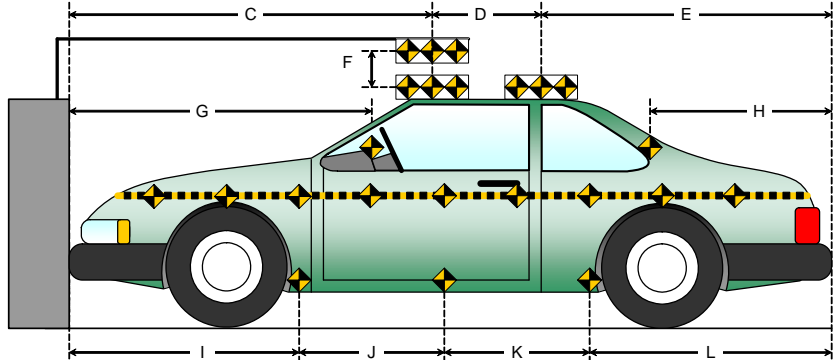
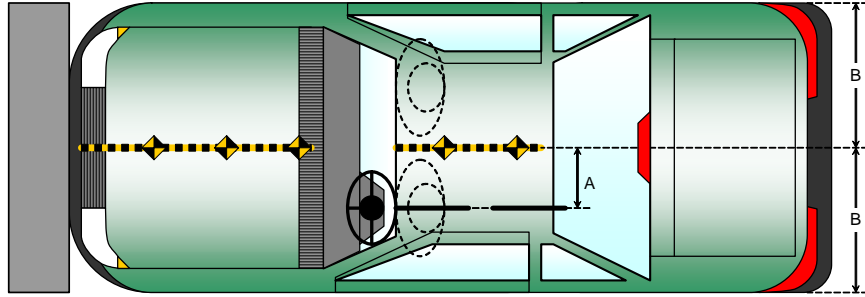
Reference Points: X - Rear Surface of Vehicle (+ forward)  
 Y - Vehicle Centerline (+ to right)  
 Z - Ground Plane (+ down)

**DATA SHEET NO. 8**  
**PHOTOGRAPHIC REFERENCE TARGET LOCATIONS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

Item	Value (mm)
A	375
B	910
C	2458
D	669
E	1763
F	168
G	
H	1126
I	1436
J	941
K	941
L	1572
M	1126
N	1572
O	941
P	941
Q	1436



## DATA SHEET NO. 9 LOAD CELL LOCATIONS ON FIXED BARRIER

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

### Advanced Research Load Cell Barrier



Photo For Reference Only

1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	1-11	1-12	1-13	1-14	1-15	1-16
2-1	2-2	2-3	2-4	2-5	2-6	2-7	2-8	2-9	2-10	2-11	2-12	2-13	2-14	2-15	2-16
3-1	3-2	3-3	3-4	3-5	3-6	3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16
4-1	4-2	4-3	4-4	4-5	4-6	4-7	4-8	4-9	4-10	4-11	4-12	4-13	4-14	4-15	4-16
5-1	5-2	5-3	5-4	5-5	5-6	5-7	5-8	5-9	5-10	5-11	5-12	5-13	5-14	5-15	5-16
6-1	6-2	6-3	6-4	6-5	6-6	6-7	6-8	6-9	6-10	6-11	6-12	6-13	6-14	6-15	6-16
7-1	7-2	7-3	7-4	7-5	7-6	7-7	7-8	7-9	7-10	7-11	7-12	7-13	7-14	7-15	7-16
8-1	8-2	8-3	8-4	8-5	8-6	8-7	8-8	8-9	8-10	8-11	8-12	8-13	8-14	8-15	8-16
9-1	9-2	9-3	9-4	9-5	9-6	9-7	9-8	9-9	9-10	9-11	9-12	9-13	9-14	9-15	9-16
10-1	10-2	10-3	10-4	10-5	10-6	10-7	10-8	10-9	10-10	10-11	10-12	10-13	10-14	10-15	10-16
11-1	11-2	11-3	11-4	11-5	11-6	11-7	11-8	11-9	11-10	11-11	11-12	11-13	11-14	11-15	11-16

Load Cells are 121 mm x 121 mm with a 7 mm gap in between each load cell.

**DATA SHEET NO. 10**  
**TEST VEHICLE SUMMARY OF RESULTS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
Test Date: 05/03/2012

**INSTRUMENTATION**

Driver Dummy Data Channels	46
Passenger Dummy Data Channels	46
Vehicle Structure Accelerometers	8
Barrier Channels	128
Total	228

**CAMERA COVERAGE**

High-Speed Vehicle Onboard	0
High-Speed Offboard	14
Real-Time	2
Total	16

**DATA SHEET NO. 11  
POST-TEST OBSERVATIONS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**TEST DUMMY INFORMATION AND CONTACT LOCATIONS**

Description	Driver	Passenger
Dummy Type / Serial No.	HIII 50% / 036	HIII 5% / 634
Head Contact	Airbag, Headrest	Airbag, Headrest
Upper Torso Contact	Airbag	Airbag
Lower Torso Contact	None	None
Left Knee Contact	Knee Airbag, Steering Column	Knee Airbag
Right Knee Contact	Knee Airbag, Steering Column	Knee Airbag

**DOOR OPENING AND SEAT TRACK INFORMATION**

Description	Driver	Passenger
Locked/Unlocked Doors	Doors were locked	Doors were locked
Front Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Rear Door Opening	Door remained closed and latched; Door opened without tools	Door remained closed and latched; Door opened without tools
Seat Track Shift (mm)	0	0
Seat Back Failure	None	None

**POST TEST STRUCTURAL OBSERVATIONS**

Critical Areas of Performance	Observations and Conclusions
Windshield Damage	Cracked
Window Damage	None
Other Notable Effects	None

**VEHICLE REBOUND FROM BARRIER**

Measured Parameter	Units	Value
Left Side	mm	750
Center	mm	820
Right Side	mm	790
Average	mm	787

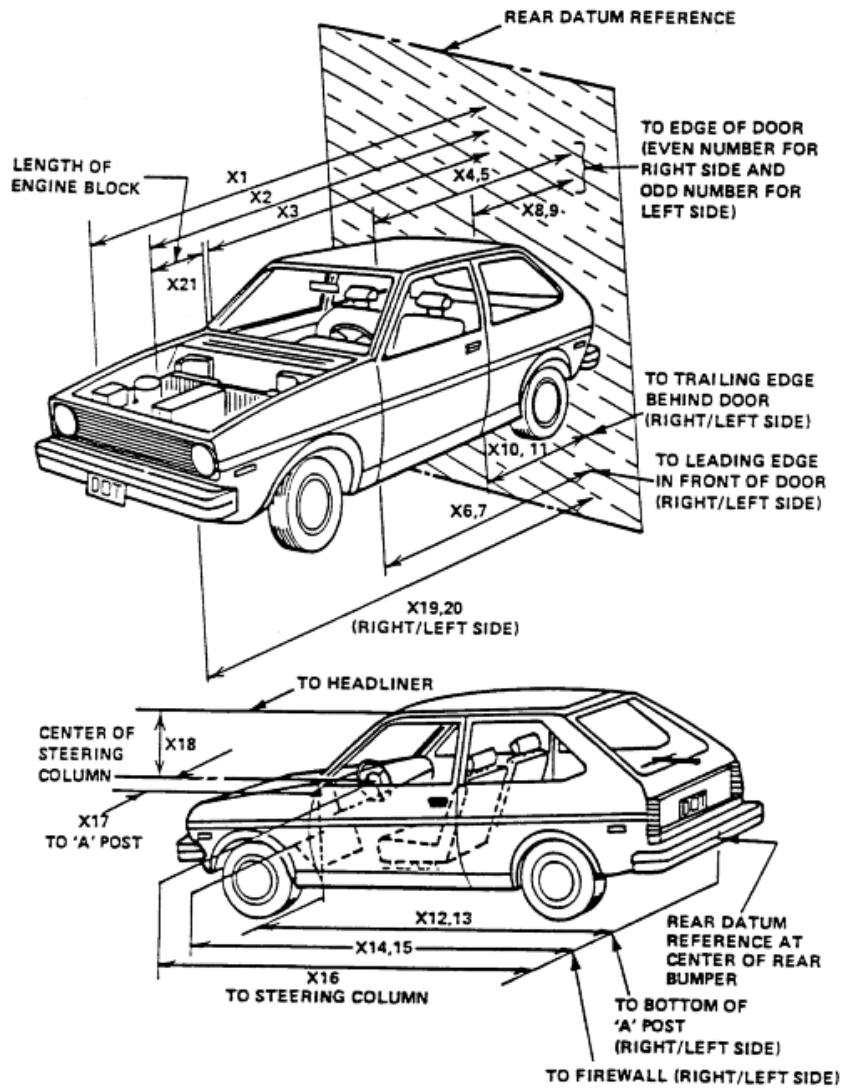
**SUPPLEMENTAL RESTRAINT SYSTEM INFORMATION**

Restraint Type	Left Front (Driver) P1		Right Front (Passenger) P2	
	Mounted	Deployed	Mounted	Deployed
Frontal Airbag	Yes	Yes	Yes	Yes
Knee Airbag	Yes	Yes	Yes	Yes
Curtain Side Airbag	Yes	No	Yes	No
Torso/Pelvis Side Airbag	Yes	No	Yes	No
Seat Belt Pretensioner	Yes	Yes	Yes	Yes
Seat Belt Load Limiter	Yes		Yes	

## DATA SHEET NO. 12 VEHICLE PROFILE MEASUREMENTS

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



**DATA SHEET NO. 12 (CONTINUED)  
VEHICLE PROFILE MEASUREMENTS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
Test Date: 05/03/2012

**RSOV (Rear Surface of Vehicle)**

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
1	Total Length of Vehicle at Centerline	mm	4890	4304	589
2	RSOV to Front of Engine	mm	4340	4099	241
3	RSOV to Firewall	mm	3722	3718	4
4	RSOV to Upper Leading Edge of Right Door	mm	3334	3334	0
5	RSOV to Upper Leading Edge of Left Door	mm	3334	3334	0
6	RSOV to Lower Leading Edge of Right Door	mm	3314	3314	0
7	RSOV to Lower Leading Edge of Left Door	mm	3314	3313	1
8	RSOV to Upper Trailing Edge of Right Door	mm	2235	2235	0
9	RSOV to Upper Trailing Edge of Left Door	mm	2237	2235	2
10	RSOV to Lower Trailing Edge of Right Door	mm	2269	2268	1
11	RSOV to Lower Trailing Edge of Left Door	mm	2270	2270	0
12	RSOV to Bottom of "A" Post of Right Side	mm	3335	3335	0
13	RSOV to Bottom of "A" Post of Left Side	mm	3335	3335	0
14	RSOV to Firewall, Right Side	mm	3708	3704	4
15	RSOV to Firewall, Left Side	mm	3700	3697	3
16	RSOV to Steering Column	mm	2855	2930	-75
17	Center of Steering Column to "A" Post	mm	380	365	15
18	Center of Steering Column to Headliner	mm	428	439	-11
19	RSOV to Right Side of Front Bumper	mm	4553	4324	229
20	RSOV to Left Side of Front Bumper	mm	4553	4397	156
21	Length of Engine Block	mm	554	554	0
RD	RSOV to Right Side of Dash Panel	mm	3009	3008	1
CD	RSOV to Center of Dash Panel	mm	3085	3085	0
LD	RSOV to Left Side of Dash Panel	mm	3020	3018	2

**DATA SHEET NO. 13**  
**ACCIDENT INVESTIGATION DIVISION DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

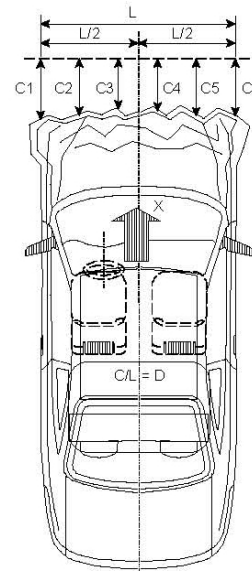
NHTSA No.: MD0100  
Test Date: 05/03/2012

**VEHICLE INFORMATION**

VIN: 1G11D5RR8DF101161 Wheelbase (mm): 2740  
Vehicle Size Category: Sedan Test Weight (kg): 1837.5

**ACCELEROMETER DATA**

Accelerometer Locations: As per measurements on Page 15  
Cal. Procedure/Interval: MGA procedure / 6 month  
Integration Algorithm: Trapezoidal Linearity: > 99%  
Impact Velocity (km/h): 56.3  
Velocity Change (km/h): 64.1  
Time of Separation (msec): 123.3



**CRUSH PROFILE**

Collision Deformation Classification: Frontal  
Midpoint of Damage: Centerline  
Damage Region Length (mm): 1616  
Impact Mode: Frontal

No.	Measurement Description	Units	Pre-Test	Post-Test	Difference
C1	Crush zone 1 at left side	mm	4553	4397	156
C2	Crush zone 2 at left side	mm	4701	4321	380
C3	Crush zone 3 at left side	mm	4809	4330	479
C4	Crush zone 4 at right side	mm	4809	4341	468
C5	Crush zone 5 at right side	mm	4701	4280	421
C6	Crush zone 6 at right side	mm	4553	4324	229
L	C1 TO C6	mm	1616	1568	48

**DATA SHEET NO. 14  
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

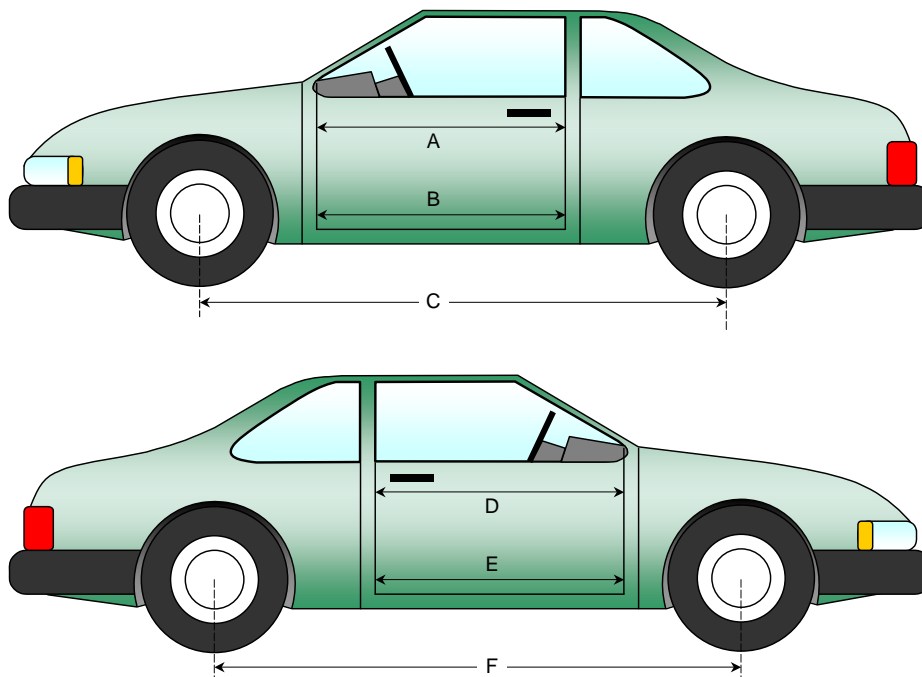
NHTSA No.: MD0100  
 Test Date: 05/03/2012

**DOOR OPENING WIDTH**

Item	Description	Units	Pre-Test	Post-Test	Difference
A	Left Side Upper	mm	987	987	0
B	Left Side Lower	mm	864	864	0
D	Right Side Upper	mm	987	987	0
E	Right Side Lower	mm	865	865	0

**WHEELBASE MEASUREMENTS**

Item	Description	Units	Pre-Test	Post-Test	Difference
C	Left Side Wheelbase	mm	2740	2663	77
F	Right Side Wheelbase	mm	2740	2656	84



**DATA SHEET NO. 14 (CONTINUED)  
VEHICLE INTRUSION MEASUREMENTS**

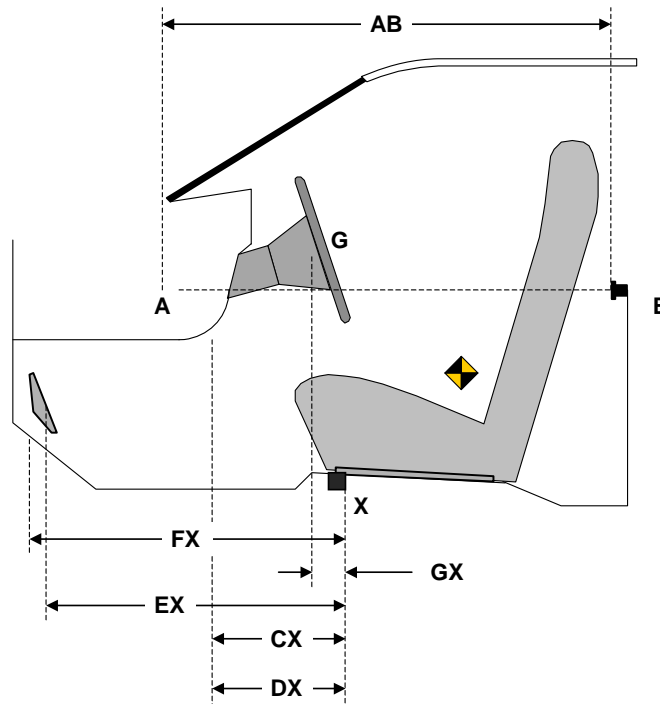
Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**DRIVER COMPARTMENT INTRUSION**

Item	Description	Units	Pre-Test	Post-Test	Difference
AB	Door Opening (Inside window jam)	mm	803	803	0
CX	Left Knee Bolster to X	mm	335	330	5
DX	Right Knee Bolster to X	mm	334	325	9
EX	Brake Pedal to X	mm	585	559	26
FX	Foot Rest to X	mm	650	631	19
GX	Center of Steering Column Wheel Hub to X	mm	86	145	-59

X = Front of Seat Track (stationary)

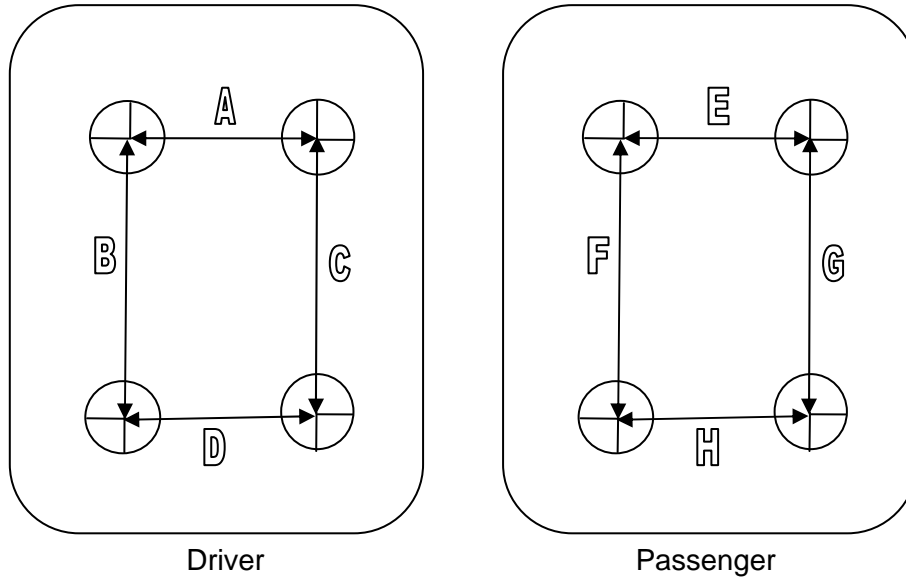


**DRIVER COMPARTMENT**

**DATA SHEET NO. 14 (CONTINUED)  
VEHICLE INTRUSION MEASUREMENTS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



**TOP VIEW THROUGH FLOOR PAN**

**UNDERBODY FLOORBOARD DEFORMATION**

Measurement	Units	Pre-Test	Post-Test	Difference
A	mm	383	383	0
B	mm	383	383	0
C	mm	383	383	0
D	mm	383	383	0
E	mm	383	383	0
F	mm	383	383	0
G	mm	383	383	0
H	mm	383	383	0

**DATA SHEET NO. 15**  
**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012

**Windshield Mounting Details:**

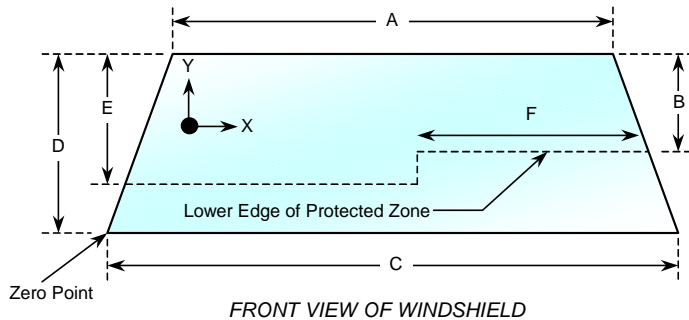
Windshield glass is secured to the vehicle frame with a rubber trim and glue.

The standard requires that the post-test retention measurement be a minimum of 75 percent of the pretest total periphery measurement for vehicles not equipped with occupant passive restraints and 50 percent for each side of the windshield for vehicles, which are equipped with occupant passive restraints.

Temperature of windshield molding during test: 21.4°C

**WINDSHIELD PERIPHERY MEASUREMENTS**

Measurement	Pre-Test (mm)	Post-Test (mm)	% of Retention
Left Side	2125	2125	100
Right Side	2125	2125	100
Total	4250	4250	100



Item	Units	Value
A	mm	1206
B	mm	506
C	mm	1484
D	mm	780
E	mm	528
F	mm	539

**AREA OF PROTECTED ZONE FAILURES - NONE**

A. Provide coordinates of the area that the protected zone was penetrated more than 0.25 inches by a vehicle component other than one that is normally in contact with the windshield. **None**

X	Y

B. Provide coordinates of the area beneath the protected zone that the inner surface of the windshield was penetrated by a vehicle component. **None**

X	Y

**DATA SHEET NO. 15 (CONTINUED)**  
**SUMMARY OF FMVSS 212, 219 (PARTIAL), AND 301 DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
Test Date: 05/03/2012

**FMVSS 301 FUEL SYSTEM INTEGRITY POST IMPACT DATA**

Test Time: 11:58 am

Temperature: 21.4°C

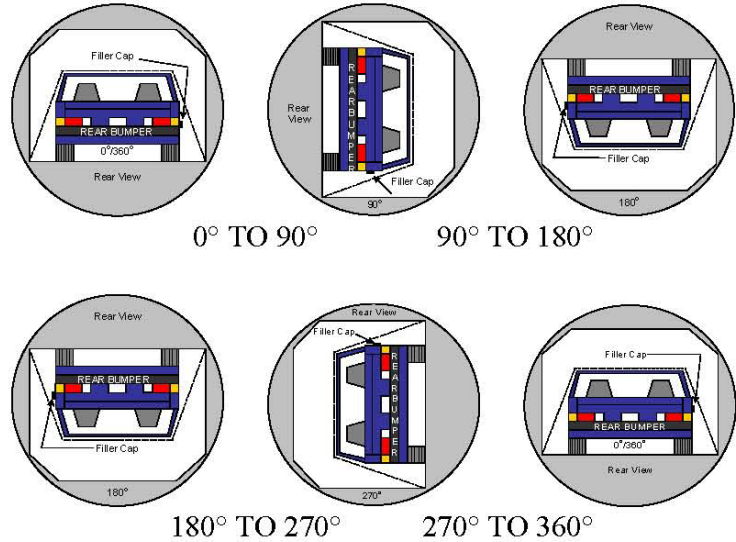
- A. From impact until vehicle motion ceases: 0 oz.  
(Maximum Allowable = 1 ounce)
- B. For the 5 minute period after motion ceases: None  
(Maximum allowable = 5 ounces)
- C. For the following 25 minutes: None  
(Maximum allowable = 1 oz./minute)
- D. Spillage Details: None

**DATA SHEET NO. 16**  
**FMVSS 301 STATIC ROLLOVER RESULTS**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
Test Date: 05/03/2012

1. The specified fixture rollover rate for each 90° of rotation is 60 to 180 seconds.
2. The position hold time at each position is 300 seconds (minimum).
3. Details of Stoddard Solvent spillage: **None**



**SOLVENT COLLECTION TIME TABLE IN SECONDS**

Test Phase	Rotation Time	Hold Time	Total Time
0° to 90°	163	300	463
90° to 180°	141	300	441
180° to 270°	140	300	440
270° to 360°	173	300	473

**FMVSS 301 ROLLOVER SPILLAGE TABLE (units in ounces)**

Test Phase	First 5 Minutes	Sixth Minute	Seventh Minute	Eight Minute
0° to 90°	0	0	0	0
90° to 180°	0	0	0	0
180° to 270°	0	0	0	0
270° to 360°	0	0	0	0

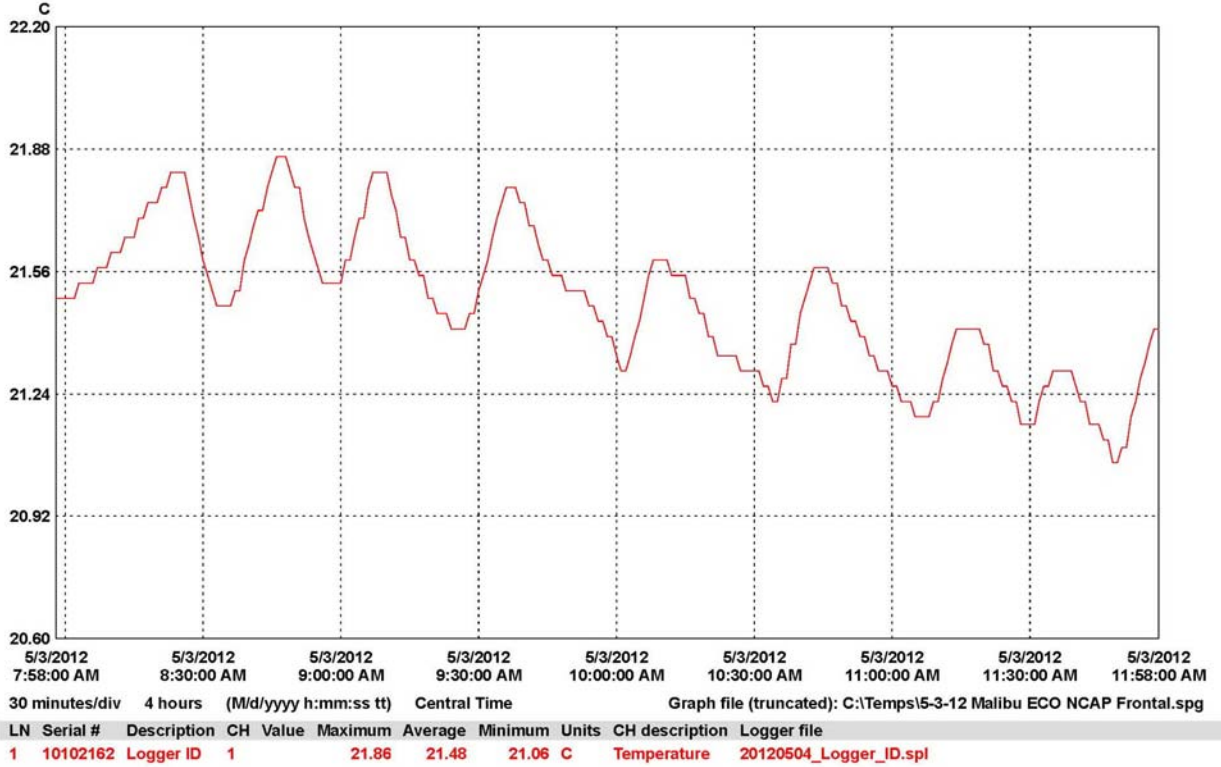
**ROLLOVER SOLVENT SPILLAGE LOCATION TABLE**

Test Phase	Spillage Location
0° to 90°	
90° to 180°	
180° to 270°	
270° to 360°	

**DATA SHEET NO. 17  
DUMMY/VEHICLE TEMPERATURE STABILIZATION DATA**

Test Vehicle: 2013 Chevrolet Malibu ECO 1SA 4-Dr Sedan  
 Test Program: NCAP Frontal Barrier Impact Test

NHTSA No.: MD0100  
 Test Date: 05/03/2012



**APPENDIX A**  
**PHOTOGRAPHS**

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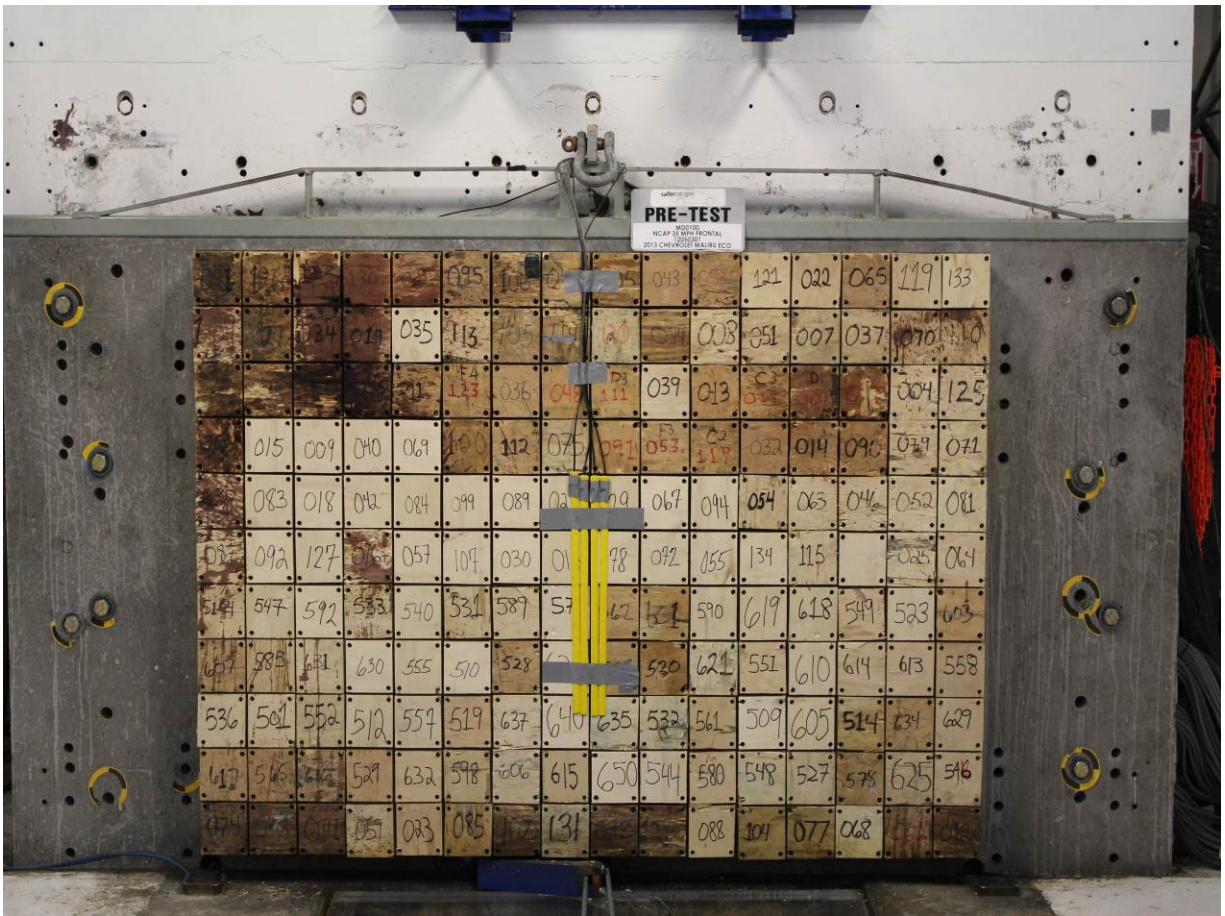
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Load Cell Location



Load Cell Wall

# MD0100



MFD BY GENERAL MOTORS LLC

DATE	GVWR	GAWR FRT	GAWR RR
01/12	2060 KG	1061 KG	999 KG
	4542 LB	2339 LB	2203 LB



THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.

1G11D5RR8DF101161 TYPE: PASS CAR

## TIRE AND LOADING INFORMATION

Manufacturer's Label

VEHICLE SAFETY, BUMPER, AND THEFT PREVENTION STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE.  
1G11D5RR8DF101161 TYPE: PASS CAR

# MD0100



## TIRE AND LOADING INFORMATION

SEATING CAPACITY	TOTAL 5	FRONT 2	REAR 3
------------------	---------	---------	--------

The combined weight of occupants and cargo should never exceed 410 kg or 904 lbs.

TIRE	ORIGINAL SIZE		COLD TIRE PRESSURE	SEE OWNER'S MANUAL FOR ADDITIONAL INFORMATION
FRONT	P225/55R17	H	240 kPa, 35 PSI	
REAR	P225/55R17	H	240 kPa, 35 PSI	
SPARE	NONE		NONE	

1G11D5RR8DF101161

Tire Placard



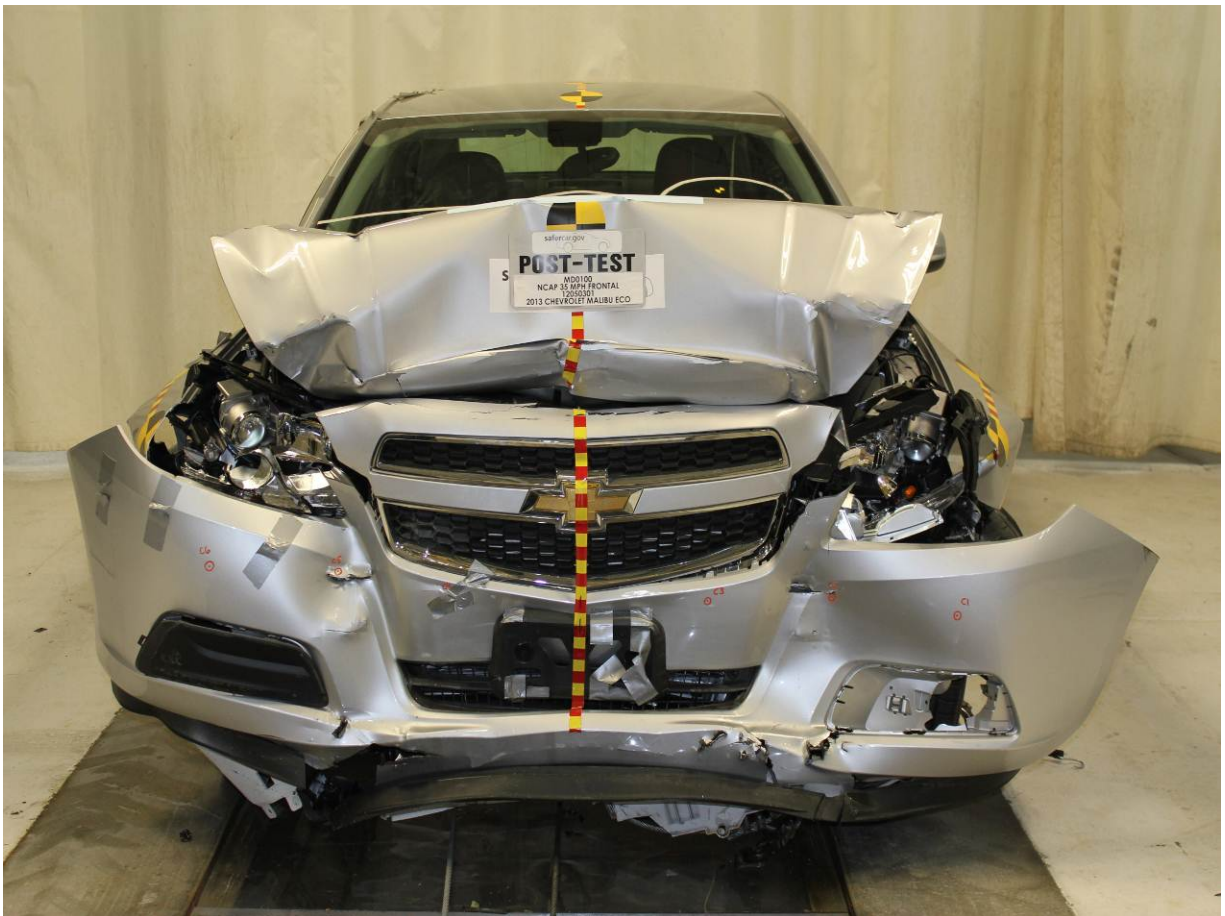
2013 Chevrolet Malibu ECO Frontal As Delivered



Left Rear Three-Quarter View, As Received



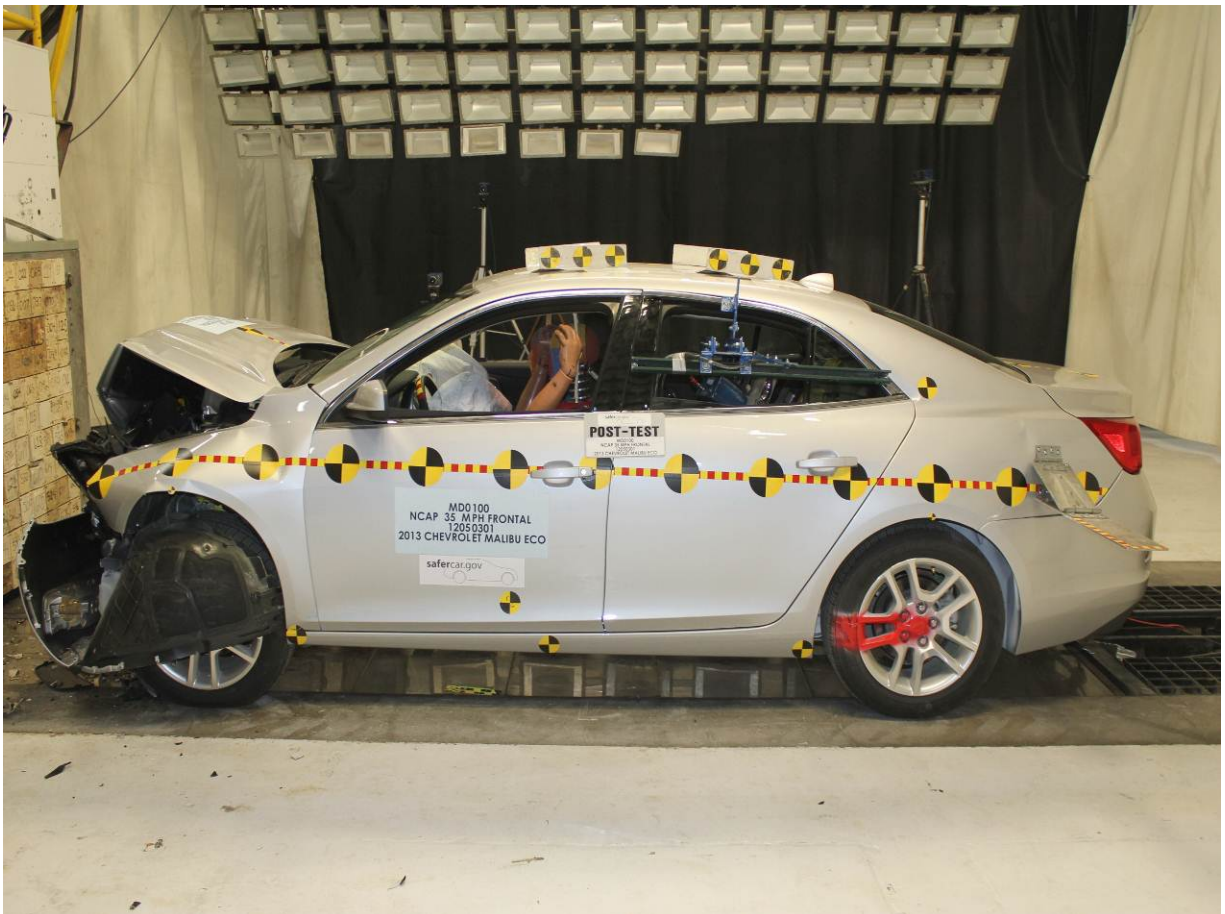
Pre-Test Front View of Test Vehicle



Post-Test Front View of Test Vehicle



Pre-Test Left View of Test Vehicle



Post-Test Left View of Test Vehicle



Pre-Test Right View of Test Vehicle



Post-Test Right View of Test Vehicle



Pre-Test Right Front Three-Quarter View



Post-Test Right Front Three-Quarter View



Pre-Test Left Rear Three-Quarter View



Post-Test Left Rear Three-Quarter View



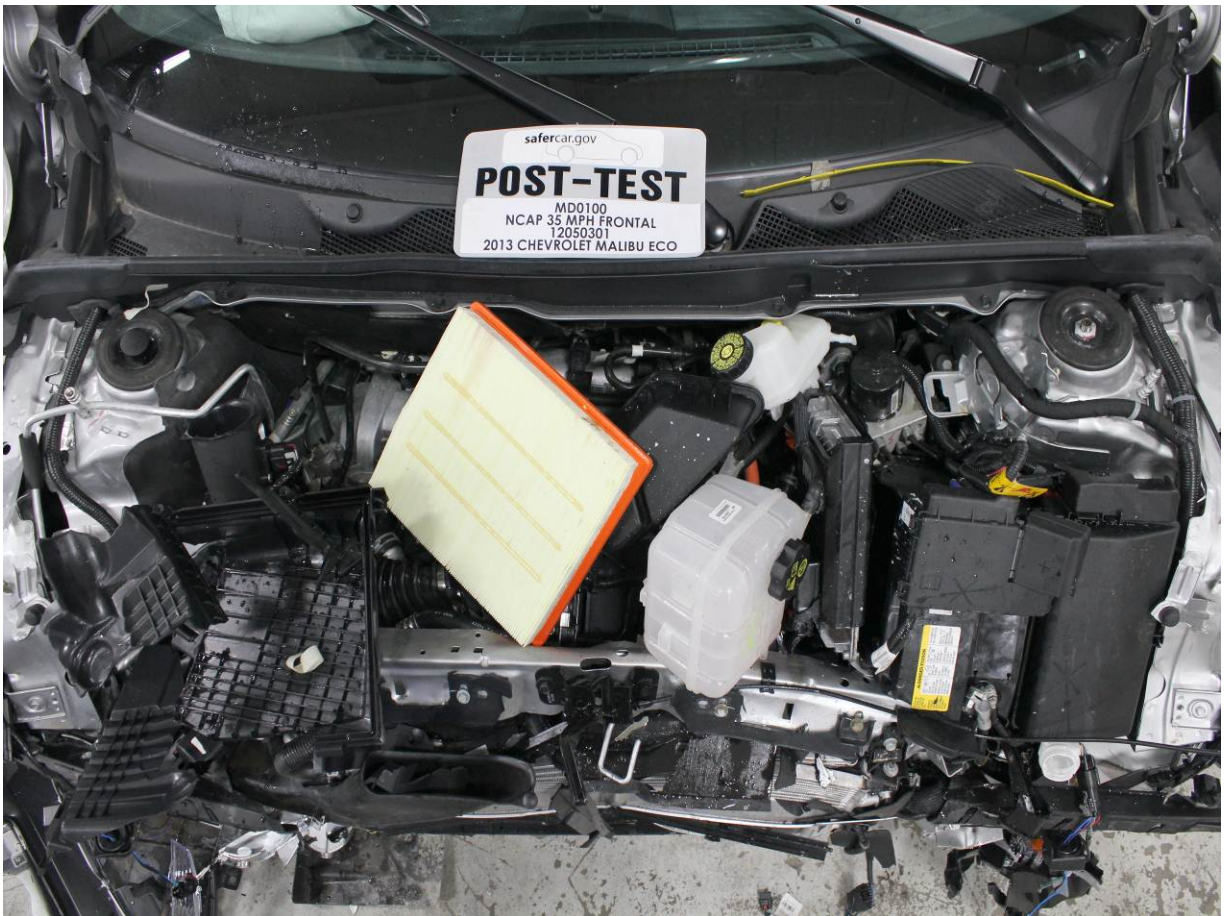
Pre-Test Windshield View



Post-Test Windshield View



Pre-Test Engine Compartment View



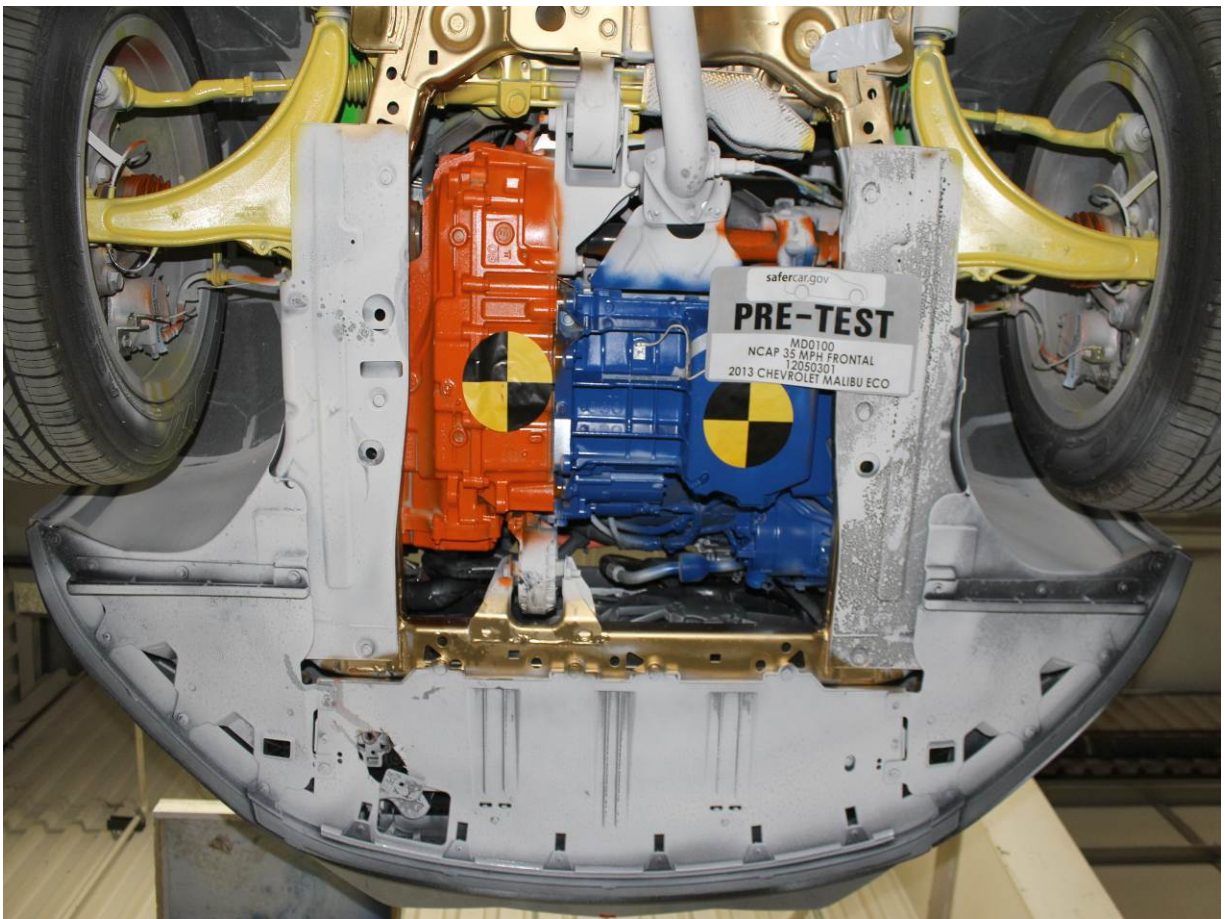
Post-Test Engine Compartment View



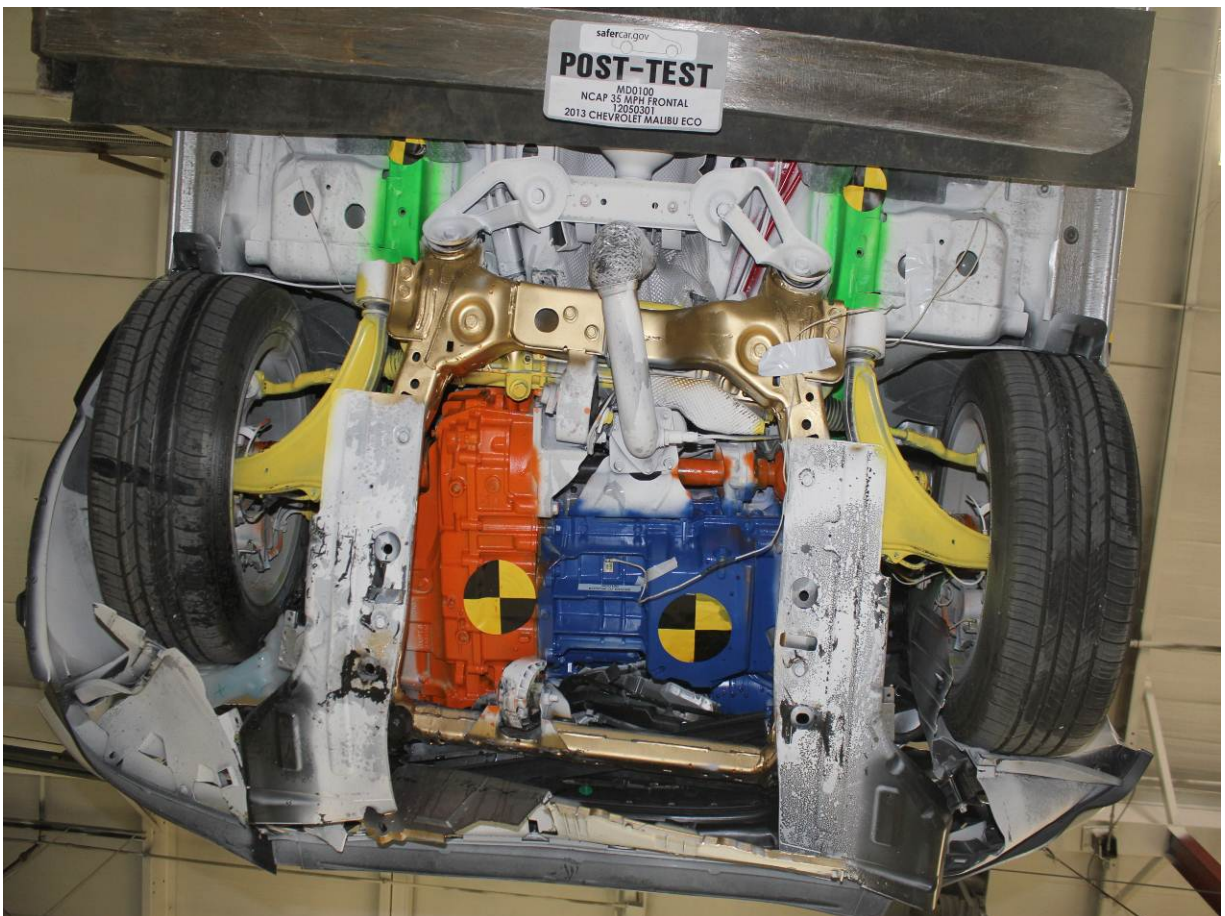
Pre-Test Fuel Filler Cap View



Post-Test Fuel Filler Cap View



Pre-Test Front Underbody View



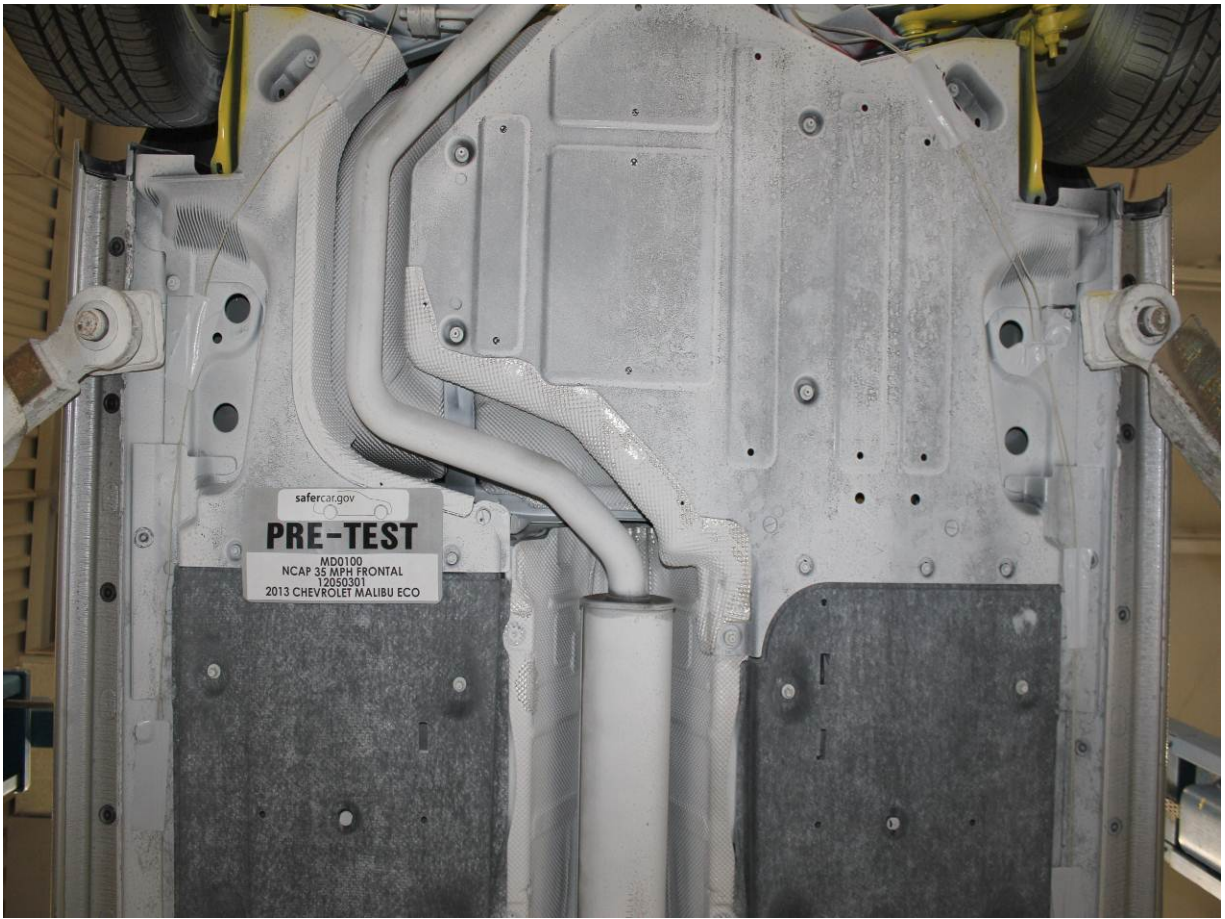
Post-Test Front Underbody View



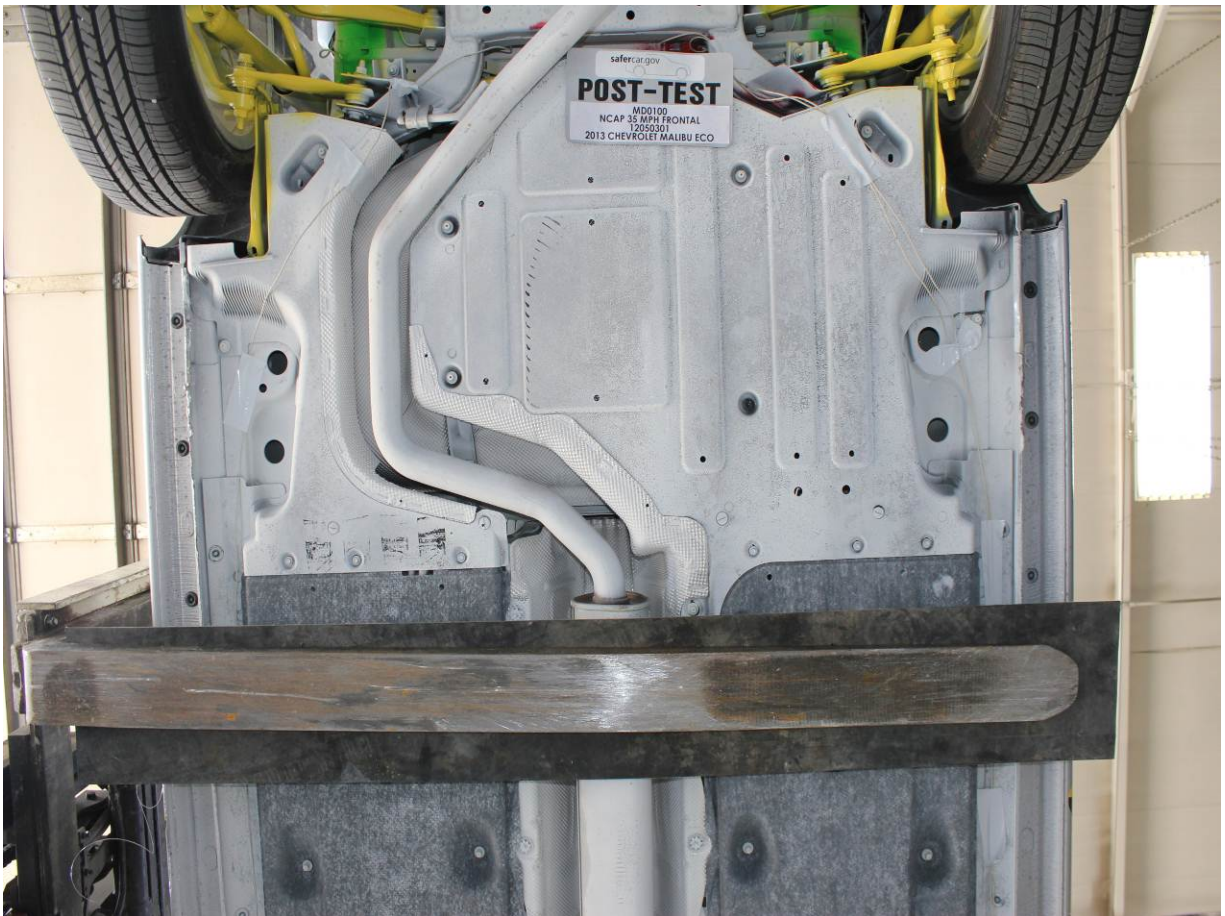
Pre-Test Mid Front Underbody View



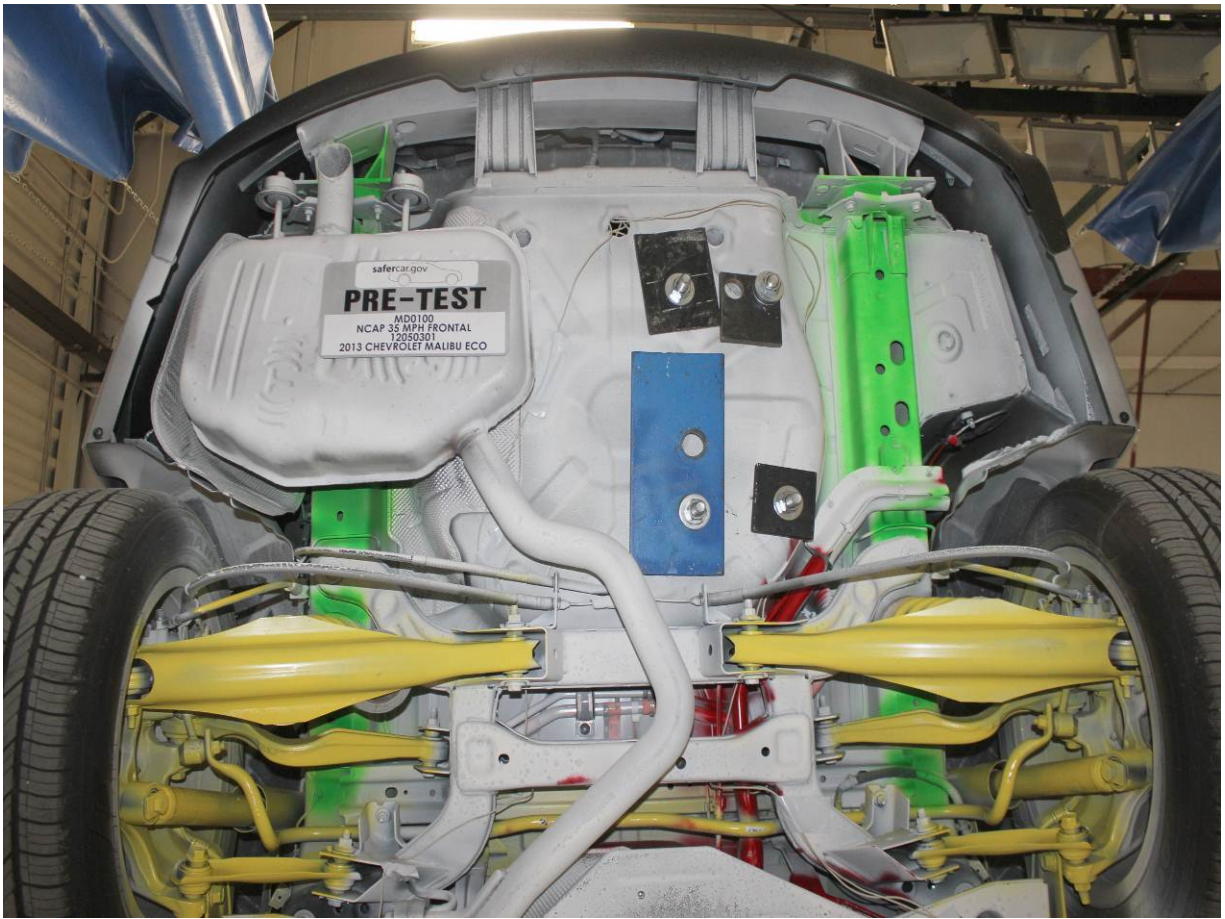
Post-Test Mid Front Underbody View



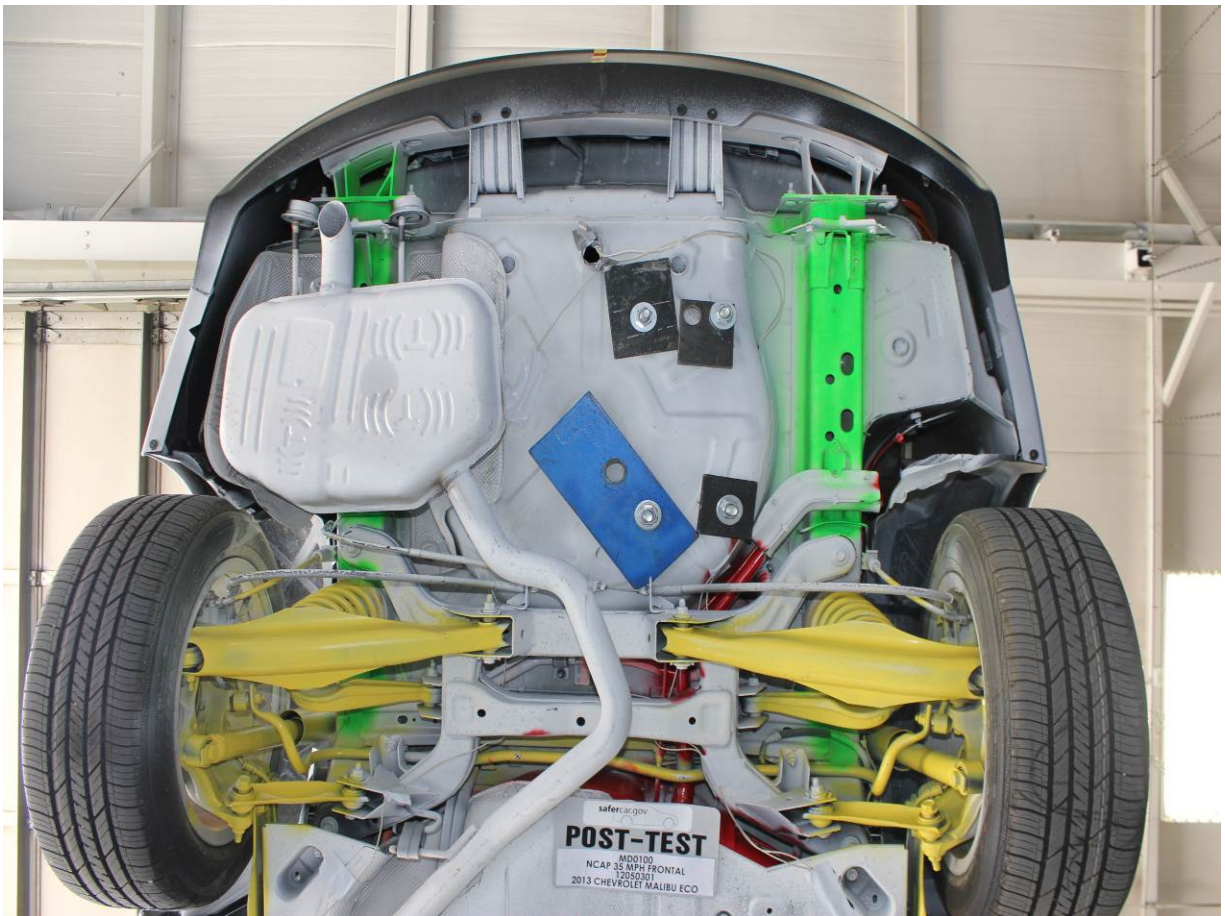
Pre-Test Mid Rear Underbody View



Post-Test Mid Rear Underbody View



Pre-Test Rear Underbody View



Post-Test Rear Underbody View



Pre-Test Dummy Cable Routing



Post-Test Dummy Cable Routing



Pre-Test Driver Dummy Front View



Post-Test Driver Dummy Front View



Pre-Test Driver Dummy Window View



Post-Test Driver Dummy Window View



Pre-Test Driver Dummy and Vehicle Interior (Door Open)



Post-Test Driver Dummy and Vehicle Interior (Door Open)



Pre-Test Driver's Seat Fore-Aft Markings



Post-Test Driver's Seat Fore-Aft Markings



Pre-Test Driver Dummy Feet



Post-Test Driver Dummy Feet



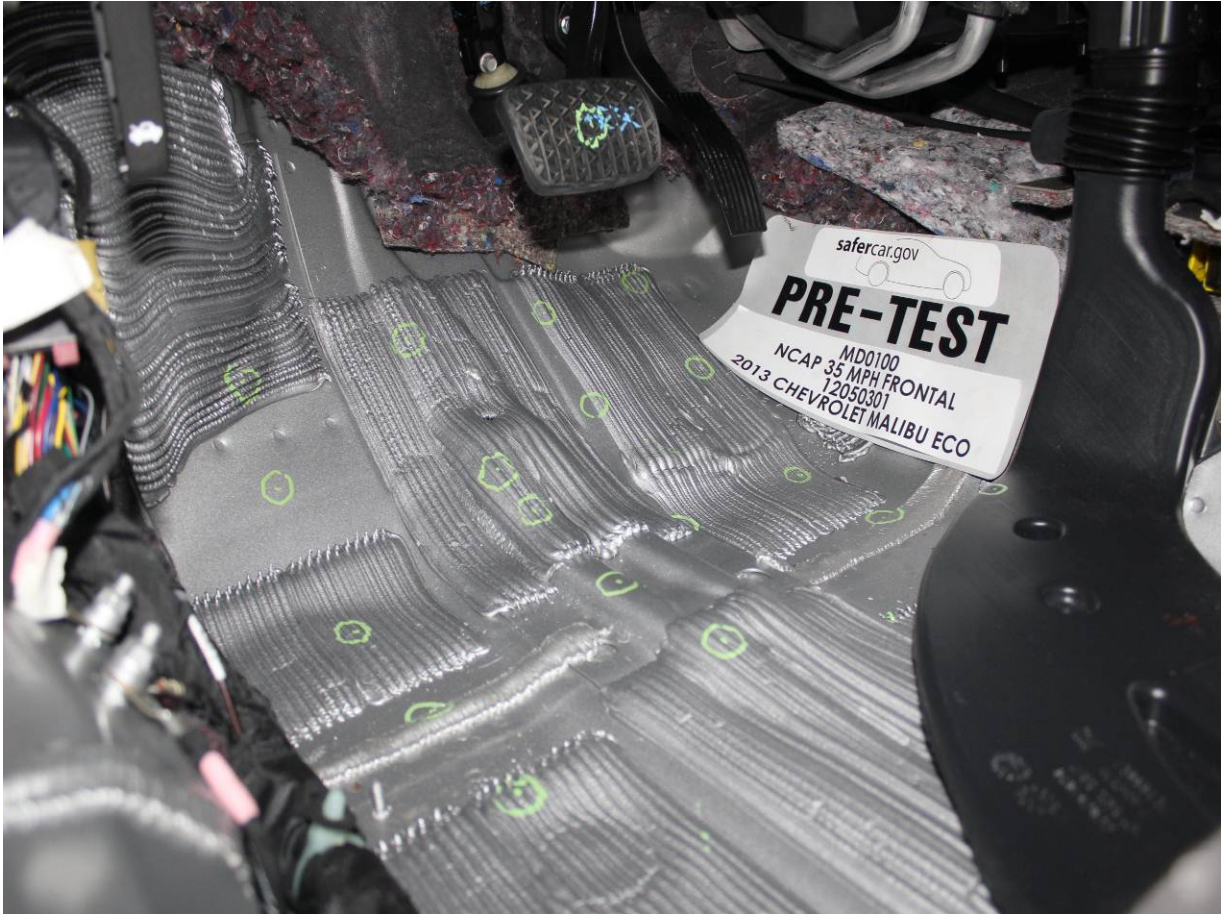
Pre-Test Driver's Side Knee Bolster (without dummy)



Post-Test Driver's Side Knee Bolster (without dummy)



Post-Test Driver's Side Knee Bolster (without dummy)



Pre-Test Driver's Side Floorpan



Post-Test Driver's Side Floorpan



Post-Test Driver Dummy Face



Post-Test Driver Dummy Contact with Airbag



Post-Test Driver Dummy Contact with Headrest



Post-Test Driver Dummy Contact with Knee Airbag



Post-Test Driver Dummy Contact with Steering Column



Pre-Test View of the Steering Wheel



Post-Test View of the Steering Wheel



Pre-Test Passenger Dummy Front View



Post-Test Passenger Dummy Front View



Pre-Test Passenger Dummy Window View



Post-Test Passenger Dummy Window View



Pre-Test Passenger Dummy and Vehicle Interior (Door Open)



Post-Test Passenger Dummy and Vehicle Interior (Door Open)



Pre-Test Passenger's Seat Fore-Aft Markings



Post-Test Passenger's Seat Fore-Aft Markings



Pre-Test Passenger Dummy Feet



Post-Test Passenger Dummy Feet



Pre-Test Passenger's Side Knee Bolster (without dummy)



Post-Test Passenger's Side Knee Bolster (without dummy)



Pre-Test Passenger's Side Floorpan



Post-Test Passenger's Side Floorpan



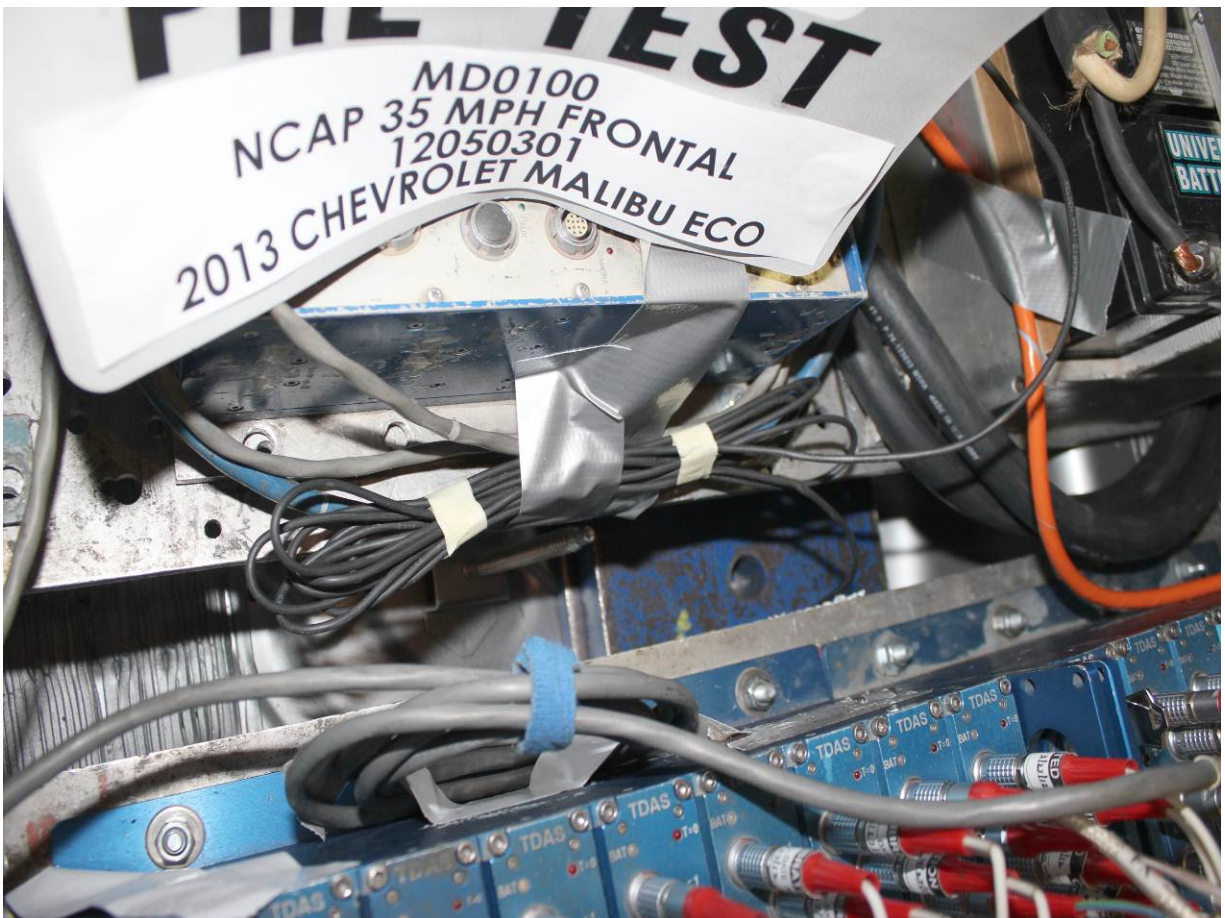
Post-Test Passenger Dummy Contact with Airbag



Post-Test Passenger Dummy Contact with Headrest



Post-Test Passenger Dummy Contact with Knee Airbag



Ballast Installed in Vehicle

PHOTOGRAPH NOT APPLICABLE

Post-Test Stoddard Solvent Spillage Location View



Post-Test Speed Trap Read-Out



Vehicle at 0 Degrees on Static Rollover Device



Vehicle at 90 Degrees on Static Rollover Device



Vehicle at 180 Degrees on Static Rollover Device



Vehicle at 270 Degrees on Static Rollover Device



Vehicle at 360 Degrees on Static Rollover Device



2013 Chevrolet Malibu ECO Frontal Impact Event



2013 MALIBU ECO 1SA

EXTERIOR: SILVER ICE METALLIC  
INTERIOR: JET BLACK

ENGINE, ECOTEC 2.4L DOHC 4CYL  
TRANSMISSION, 6 SPD AUTOMATIC

Visit us at [www.chevy.com](http://www.chevy.com)

**STANDARD EQUIPMENT**  
ITEMS LISTED BELOW ARE INCLUDED AT NO EXTRA CHARGE IN THE STANDARD VEHICLE PRICE SHOWN

- 5 YEAR / 100,000 MILE POWERTRAIN LIMITED WARRANTY SEE DEALER FOR DETAILS
- 8 YEAR / 100,000 MILE LIMITED E-ASSIST COMPONENT WARRANTY SEE DEALER FOR DETAILS

**MECHANICAL**

- ENGINE, ECOTEC 2.4L DOHC 4CYL WITH E-ASSIST
- TRANSMISSION, 6-SPD AUTOMATIC
- ELECTRIC MOTOR GENERATOR, E-ASSIST
- CRUISE CONTROL
- POWER STEERING, ELECTRIC

**SAFETY**

- STABILITRAK-STABILITY CONTROL SYSTEM W/ TRACTION CONTROL
- ANTILOCK BRAKE SYSTEM, 4 WHEEL DISC

- CHILD LOCKS, REAR DOORS & WINDOWS
- BATTERY, BLINDDOWN PROTECTION
- AIR BAGS, DUAL-STAGE FRONTAL THORAX SIDE-IMPACT AND KNEE DRIVERS AND FRONT PASSENGER, HEAD CURTAIN SIDE-IMPACT, FRONT AND REAR OUTBOARD POSITIONS
- THEFT DETERRENT SYSTEM
- 6 MTHS ONSTAR DIRECTIONS AND CONNECTIONS WITH AUTOMATIC CRASH RESPONSE & TURN-BY-TURN NAVIGATION (ASK DEALER ABOUT GEOGRAPHIC COVERAGE)
- TIRE PRESSURE MONITOR SYSTEM
- TIRE REPAIR KIT

**INTERIOR**

- POWER WINDOWS, FRONT & REAR EXPRESS DOWN
- POWER DOOR LOCKS W/KEY EXTENDED RANGE

- FRONT BUCKET SEATS
- SEAT ADJUSTER, FRONT DRIVER & PASSENGER 4 WAY MANUAL, 2 WAY POWER VERTICAL
- XM RADIO + SERVICE SUBSCRIPTION SOLD SEPARATELY BY SIRIUSXM AFTER 3 MTHS
- AIR CONDITIONING, DUAL ZONE AUTO CLIMATE CONTROL
- POWER OUTLET, FRONT CONSOLE 12 VOLT
- STEERING COLUMN, TILT AND TELESCOPIC
- DRIVER INFO CENTER, COLOR
- CHEVROLET MYLINK
- COLOR TOUCH RADIO W/ 7" SCREEN, CD/MP3 PLAYER, AUX INPUT AND USB PORT
- STEERING WHEEL CONTROLS, AUDIO AND CRUISE
- BLUE AMBIENT LIGHTING
- FLOOR MATS, FRONT & REAR

**EXTERIOR**

- DAYTIME RUNNING LAMPS
- WHEELS, 17" ALUMINUM
- HEADLAMPS, HALOGEN
- MIRRORS, OUTSIDE HEATED POWER ADJUSTABLE, BODY-COLOR

**OPTIONS & PRICING**

MANUFACTURER'S SUGGESTED RETAIL PRICE

**STANDARD VEHICLE PRICE \$25,235.00**

OPTIONS INSTALLED BY THE MANUFACTURER (MAY REPLACE STANDARD EQUIPMENT SHOWN)

POWER CONVENIENCE PACKAGE: 965.00

- PWR SEAT ADJUSTER, DRIVER 8 WAY INCLUDES 4 WAY POWER LUMBAR
- REAR VISION CAMERA SYSTEM
- REMOTE VEHICLE START
- INSIDE REARVIEW MIRROR, AUTO DIMMING
- UNIVERSAL HOME REMOTE

• CONVENIENCE NET, TRUNK	
TOTAL OPTIONS	\$965.00
TOTAL VEHICLE & OPTIONS	\$26,200.00
DESTINATION CHARGE	750.00
<b>TOTAL VEHICLE PRICE*</b>	<b>\$26,950.00</b>

**EPA DOT Fuel Economy and Environment**

**Fuel Economy**

**29** MPG  
combined city/highway

25 city  
37 highway

3.5 gallons per 100 miles

Midsize cars range from 13 to 99 MPG. The best vehicle rates 112 MPG.

**You save \$2,350 in fuel costs over 5 years** compared to the average new vehicle.

**Annual fuel cost \$1,850**

**Fuel Economy & Greenhouse Gas Rating** (tailpipe only) **8**

**Smog Rating** (tailpipe only) **5**

This vehicle emits 305 grams CO<sub>2</sub> per mile. The best emits 0 grams per mile (tailpipe only). Producing and distributing fuel also create emissions; learn more at [fuelconomy.gov](http://fuelconomy.gov).

Actual results will vary for many reasons, including driving conditions and how you drive and maintain your vehicle. The average new vehicle gets 23 MPG and costs \$1,850 to fuel over 5 years. Cost estimates are based on 15,000 miles per year at \$3.55 per gallon. MPG is miles per gasoline gallon equivalent. Vehicle emissions are a significant cause of climate change and smog.

**fuelconomy.gov**  
Calculate personalized estimates and compare vehicles

**GOVERNMENT 5-STAR SAFETY RATINGS**

This vehicle has not been rated by the government for overall vehicle score, frontal crash, side crash or rollover risk.

Source: National Highway Traffic Safety Administration (NHTSA)  
[www.safercar.gov](http://www.safercar.gov) or 1-888-327-4236

**PARTS CONTENT INFORMATION**

FOR VEHICLES IN THIS CARLINE:  
U.S./CANADIAN PARTS CONTENT: 62%

NOTE: PARTS CONTENT DOES NOT INCLUDE FINAL ASSEMBLY, DISTRIBUTION, OR OTHER NON-PARTS COSTS.

FOR THIS VEHICLE:  
FINAL ASSEMBLY POINT:  
KANSAS CITY, KS U.S.A.  
COUNTRY OF ORIGIN:  
ENGINE: UNITED STATES  
TRANSMISSION: UNITED STATES

© 2012 General Motors LLC  
GM, Buick, Pontiac, Saturn, Opel, Saab, Vauxhall, Opel, Opel

ORDER NO. GM9950 SALES CODE E  
SALES MODEL CODE 10C9B  
DEALER 11302  
FINAL ASSEMBLY  
KANSAS CITY, KS U.S.A.  
VIN 1G11DSRR8DF101161  
REISSUE

DEALER TO WHOM DELIVERED  
RAYMOND CHEVROLET, INC.  
118 RTE 173  
ANTIOCH, IL 60002-1895

Monroney Label

**APPENDIX B**  
**DUMMY RESPONSE DATA TRACES**

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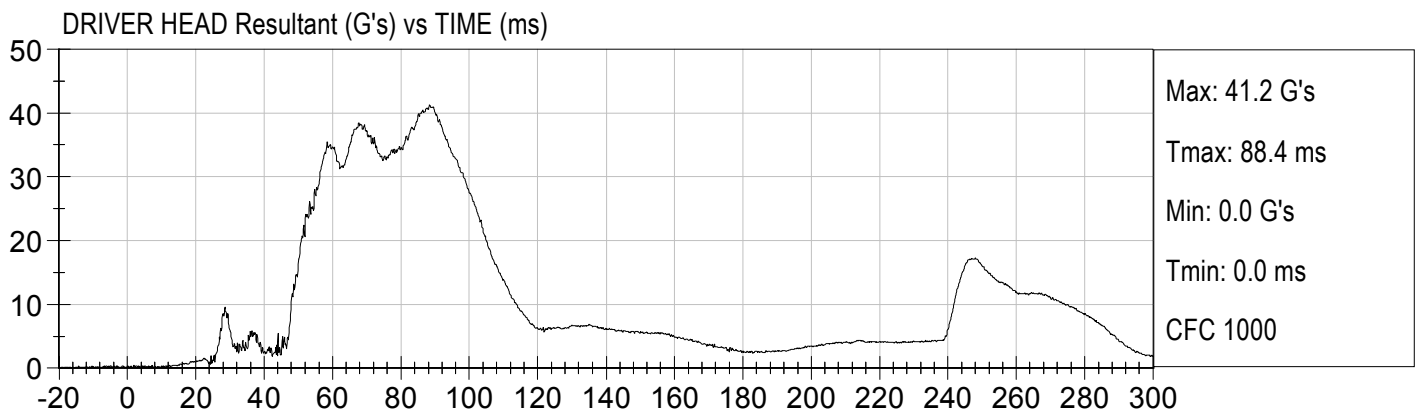
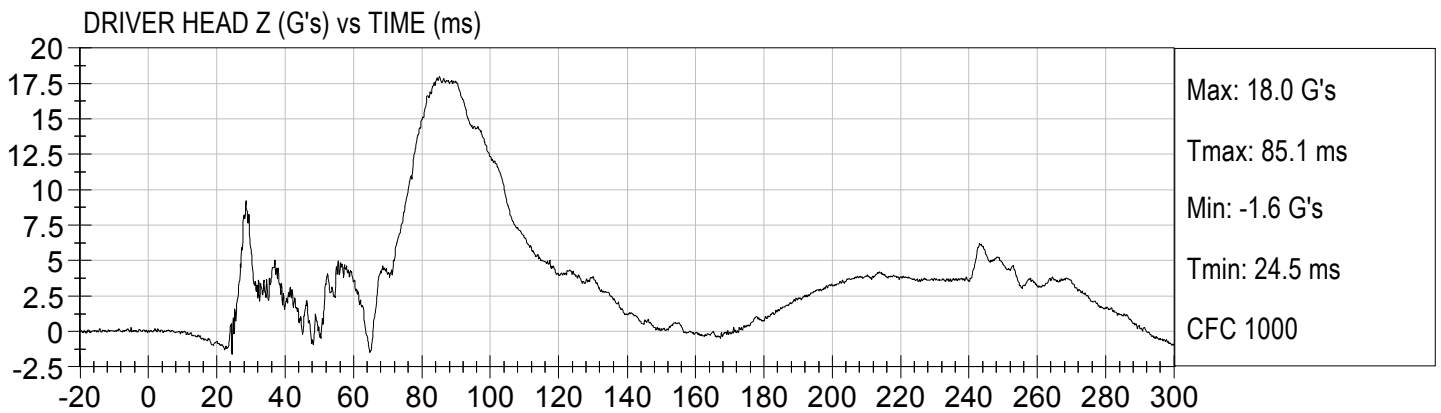
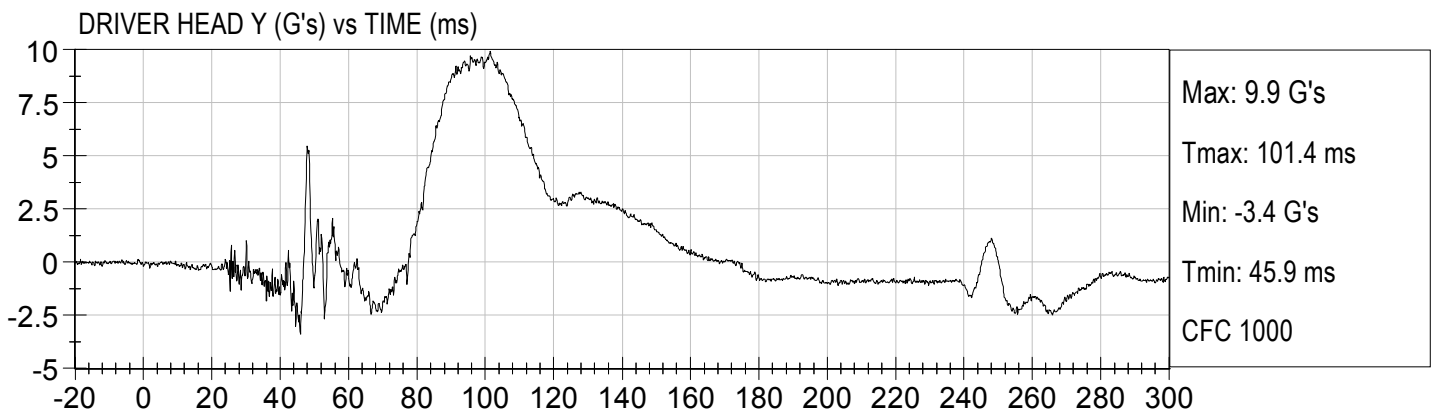
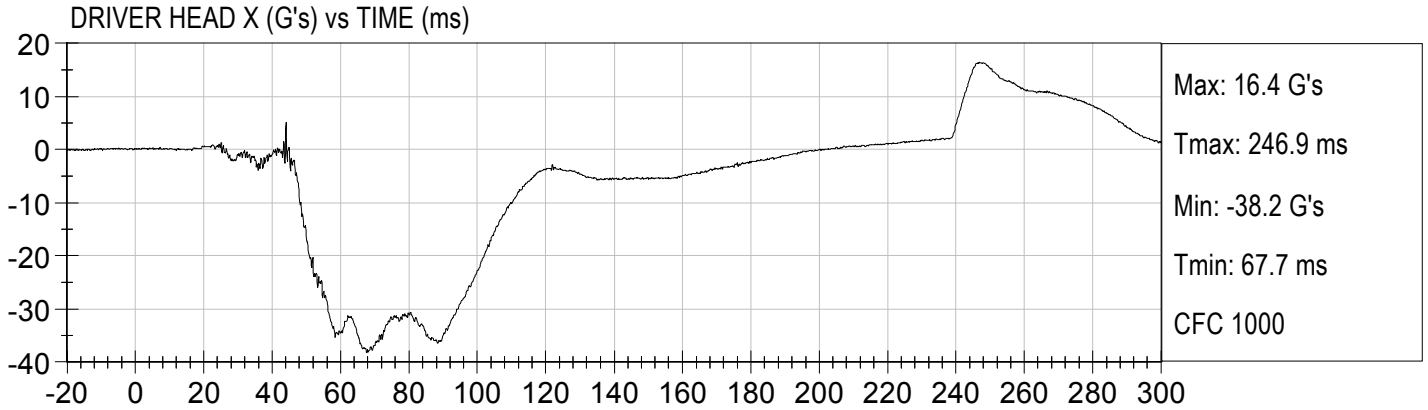
	<u>Page No.</u>
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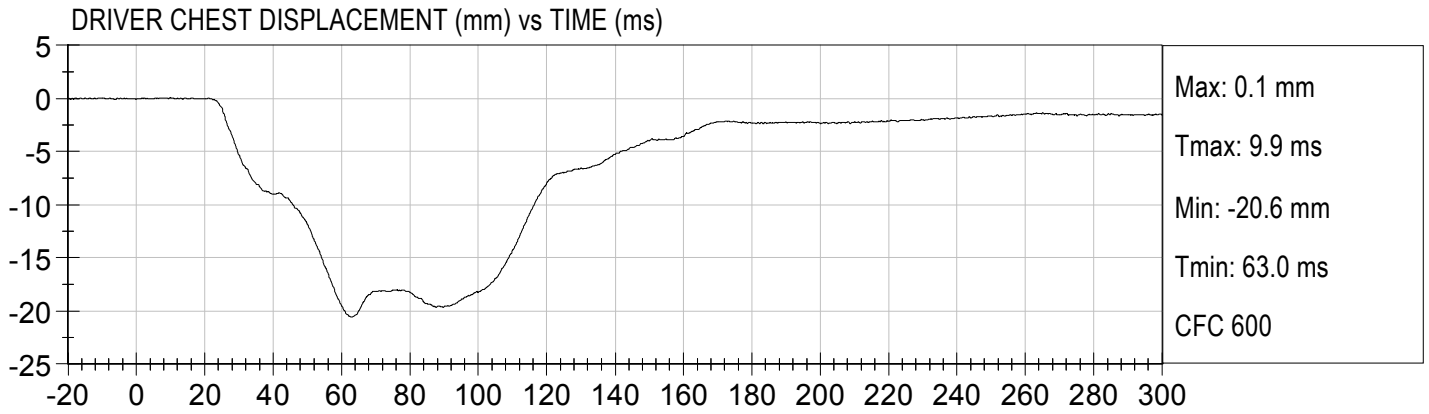
**The following additional dummy and vehicle response data can be found in the R&D section of the NHTSA website at [www.nhtsa.dot.gov](http://www.nhtsa.dot.gov)**

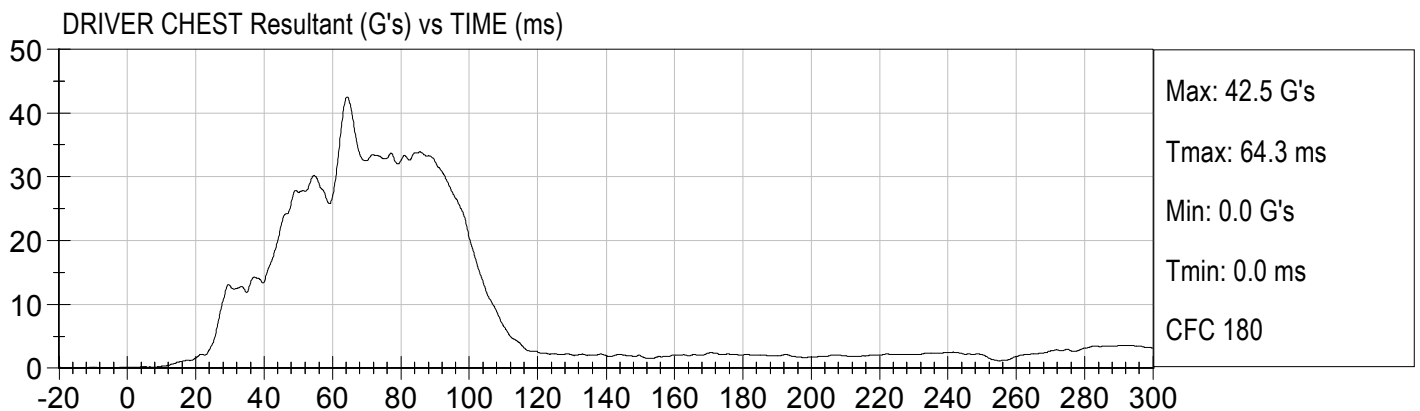
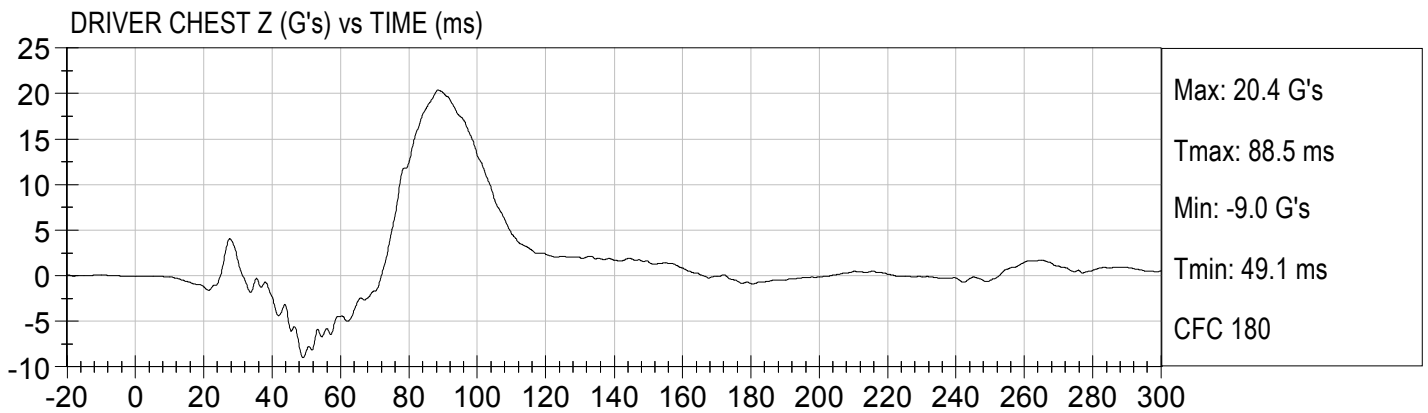
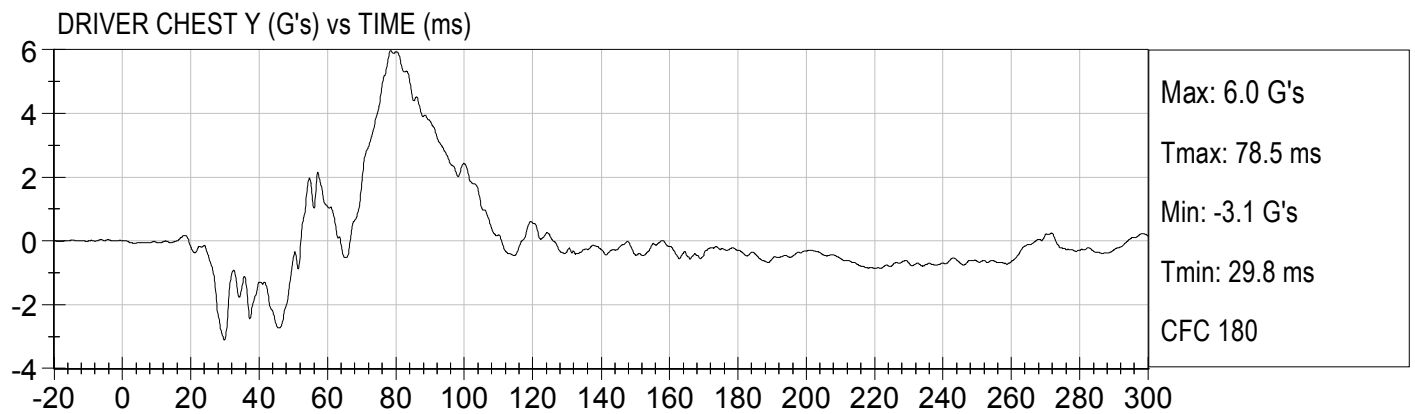
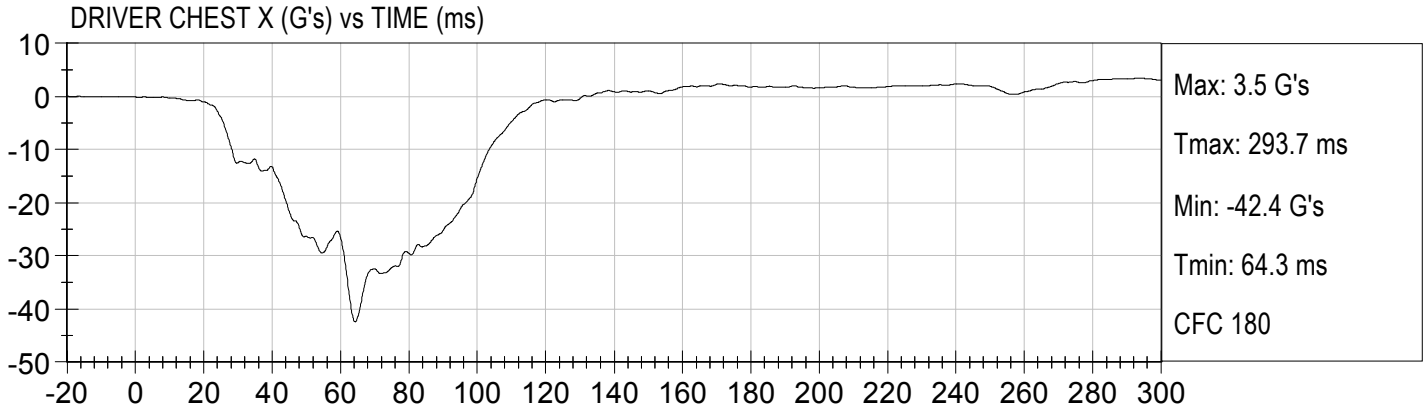
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 Driver Head Y Redundant  
 Driver Head Z Redundant  
 Driver Upper Neck Force Y  
 Driver Upper Neck Moment X  
 Driver Upper Neck Moment Z  
 Driver Chest X Redundant  
 Driver Chest Y Redundant  
 Driver Chest Z Redundant  
 Driver Pelvis X  
 Driver Pelvis Y  
 Driver Pelvis Z  
 Driver Left Femur Redundant  
 Driver Right Femur Redundant  
 Driver Left Upper Tibia Moment X  
 Driver Left Upper Tibia Moment Y  
 Driver Left Upper Tibia Force Z  
 Driver Left Lower Tibia Moment X

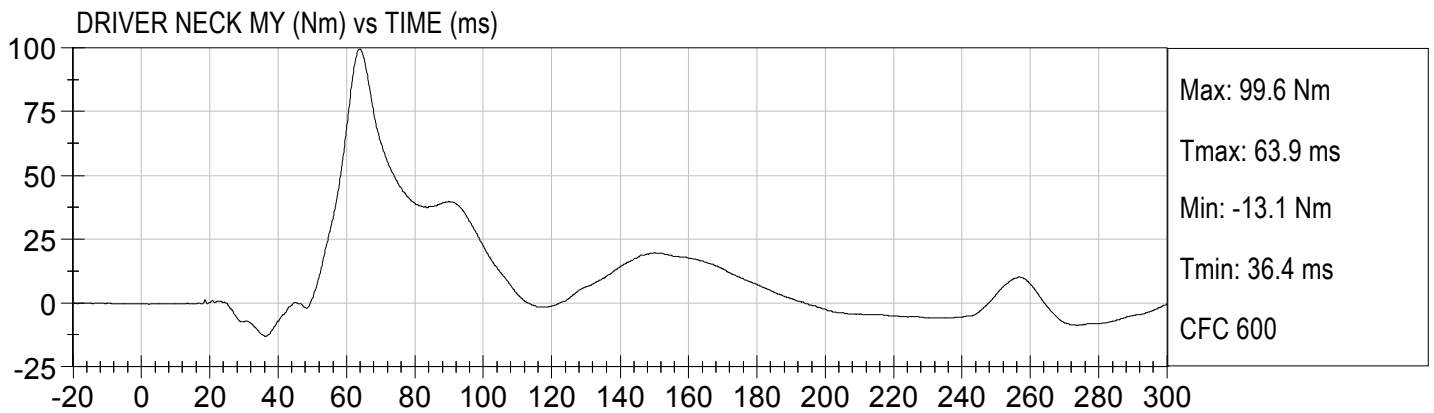
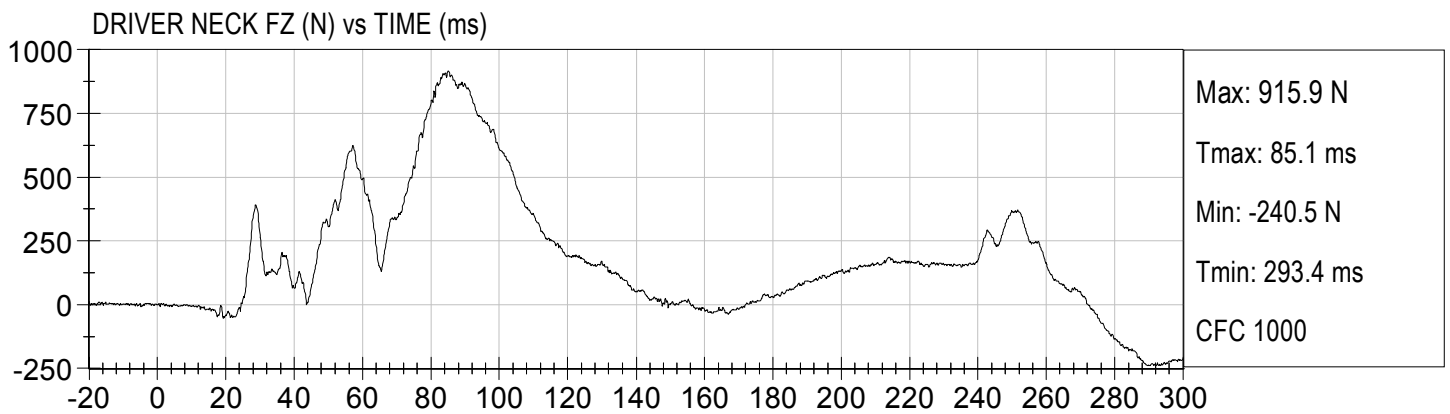
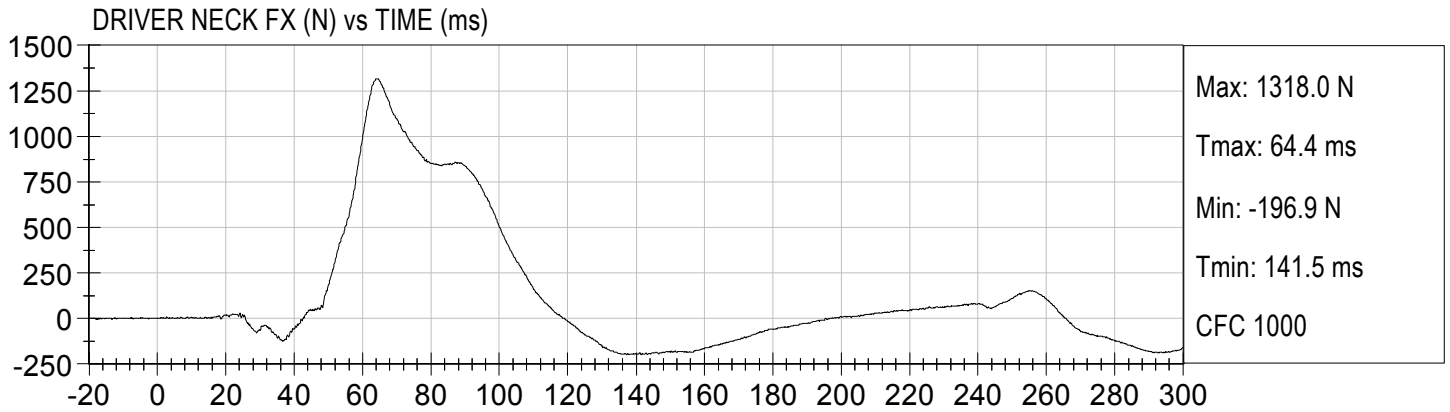
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Driver Right Upper Tibia Moment Y  
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Driver Right Lower Tibia Moment Y  
Driver Right Lower Tibia Force Z  
Driver Left Foot Fore Z  
Driver Left Foot Aft X  
Driver Left Foot Aft Z  
Driver Right Foot Fore Z  
Driver Right Foot Aft X  
Driver Right Foot Aft Z  
Driver Shoulder Belt Force  
Passenger Head X Redundant  
Passenger Head Y Redundant  
Passenger Head Z Redundant  
Passenger Upper Neck Force Y  
Passenger Upper Neck Moment X  
Passenger Upper Neck Moment Z  
Passenger Chest X Redundant  
Passenger Chest Y Redundant  
Passenger Chest Z Redundant  
Passenger Pelvis X  
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Passenger Left Upper Tibia Moment X  
Passenger Left Upper Tibia Moment Y

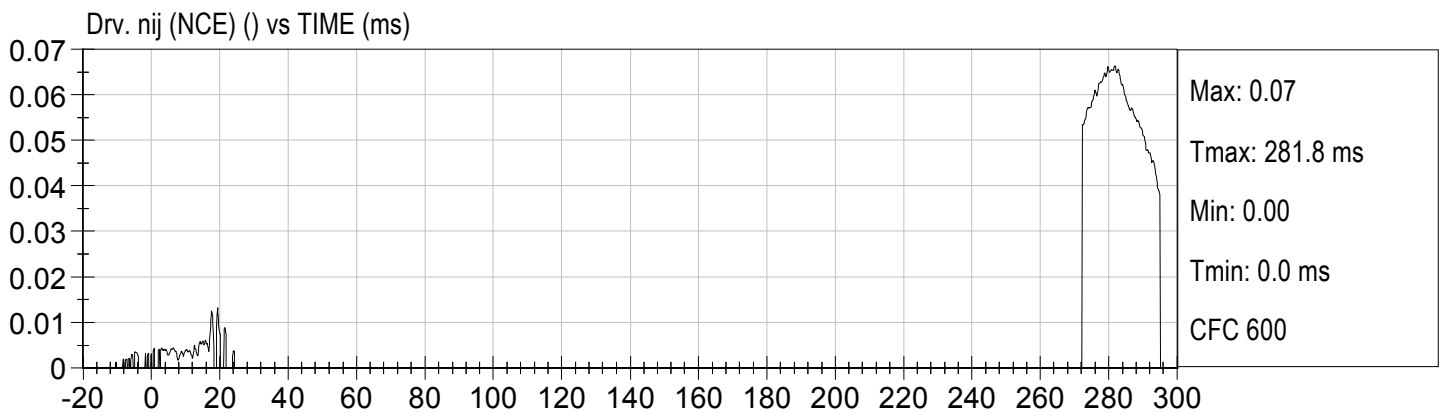
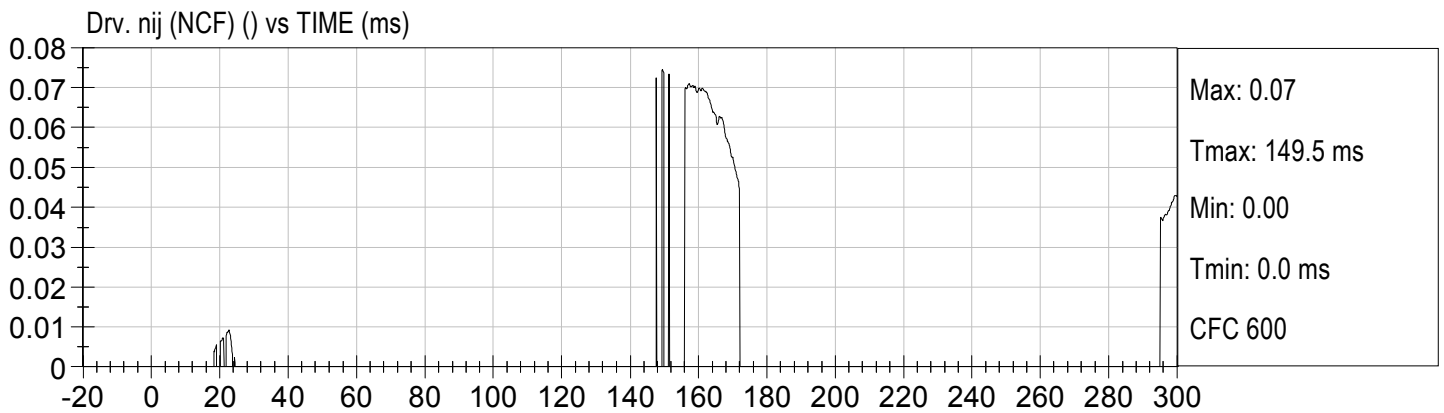
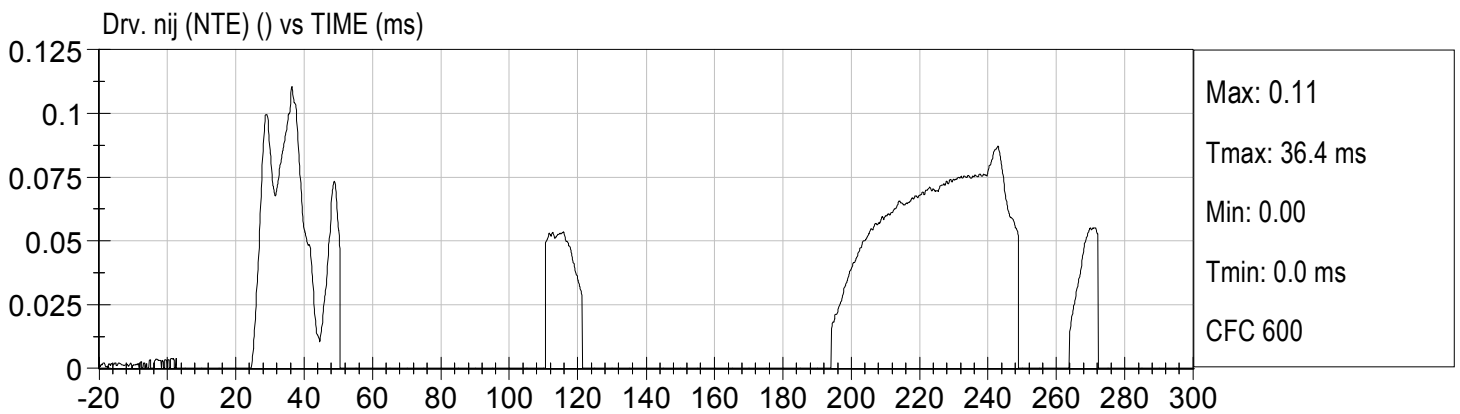
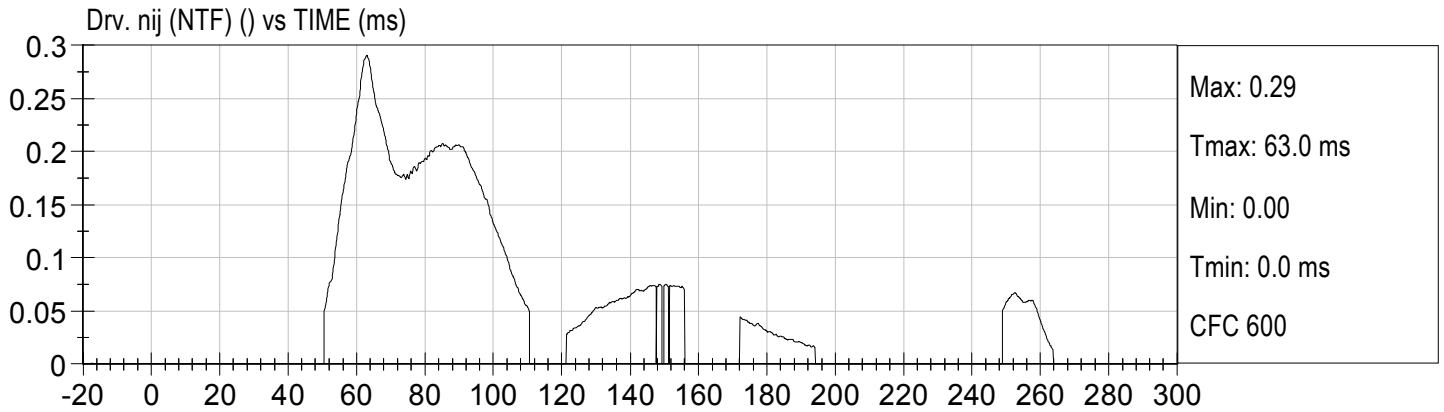
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Passenger Left Lower Tibia Moment X  
Passenger Left Lower Tibia Moment Y  
Passenger Left Lower Tibia Force Z  
Passenger Right Upper Tibia Moment X  
Passenger Right Upper Tibia Moment Y  
Passenger Right Upper Tibia Force Z  
Passenger Right Lower Tibia Moment X  
Passenger Right Lower Tibia Moment Y  
Passenger Right Lower Tibia Force Z  
Passenger Left Foot Fore Z  
Passenger Left Foot Aft X  
Passenger Left Foot Aft Z  
Passenger Right Foot Fore Z  
Passenger Right Foot Aft X  
Passenger Right Foot Aft Z  
Passenger Shoulder Belt Force  
Left Rear Seat Crossmember X  
Right Rear Seat Crossmember X  
Vehicle Engine Top X  
Vehicle Engine Bottom X  
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Vehicle Right Brake Caliper X  
Left Rear Seat Crossmember Xr  
Right Rear Seat Crossmember Xr  
Advanced Research Load Cell Barrier – 128 channels

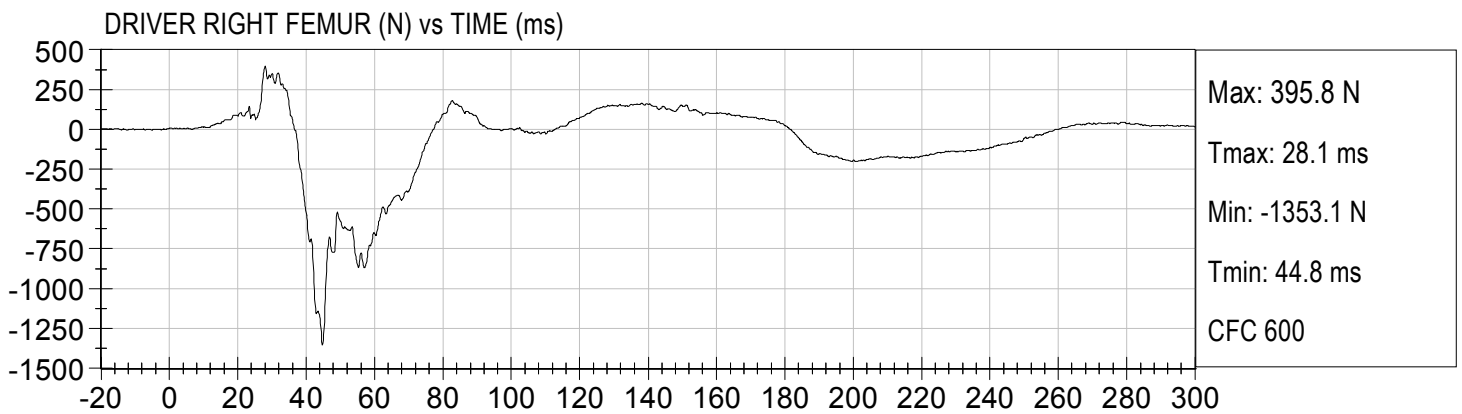
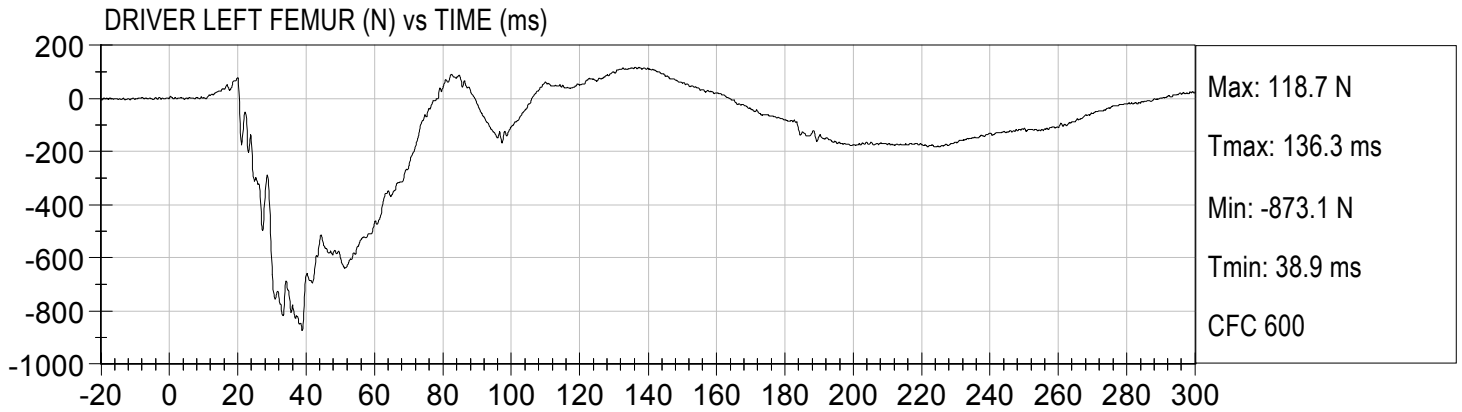


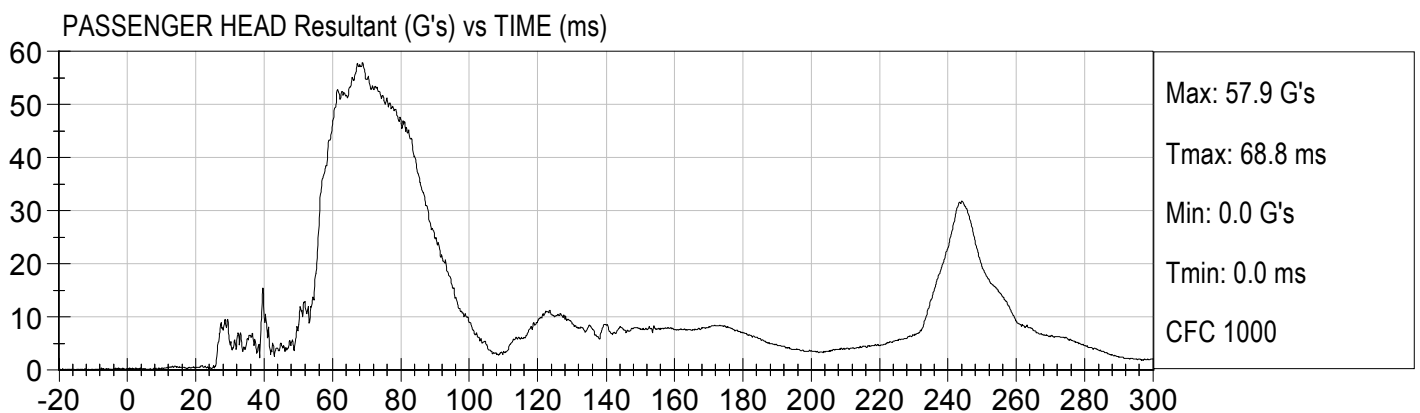
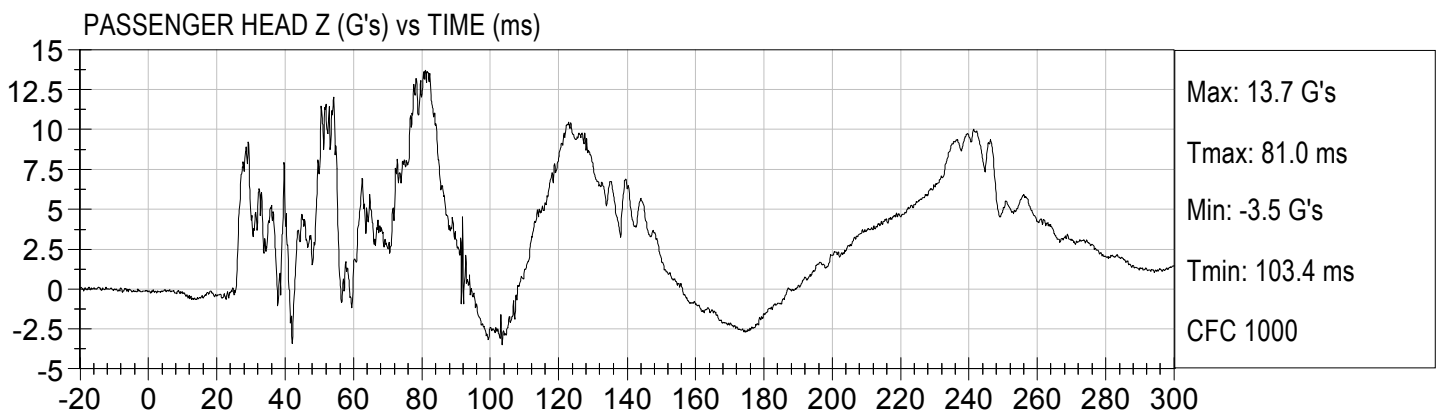
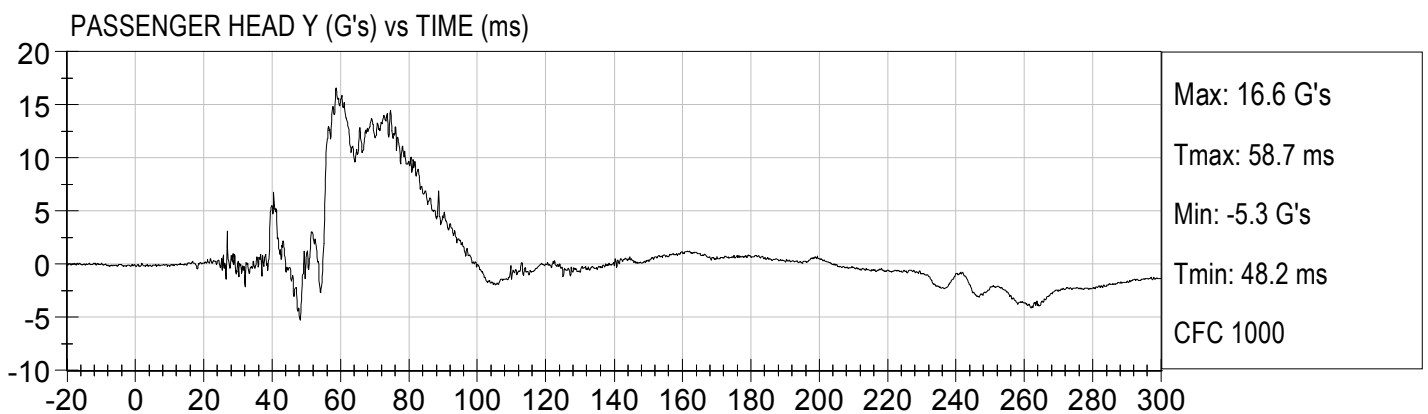
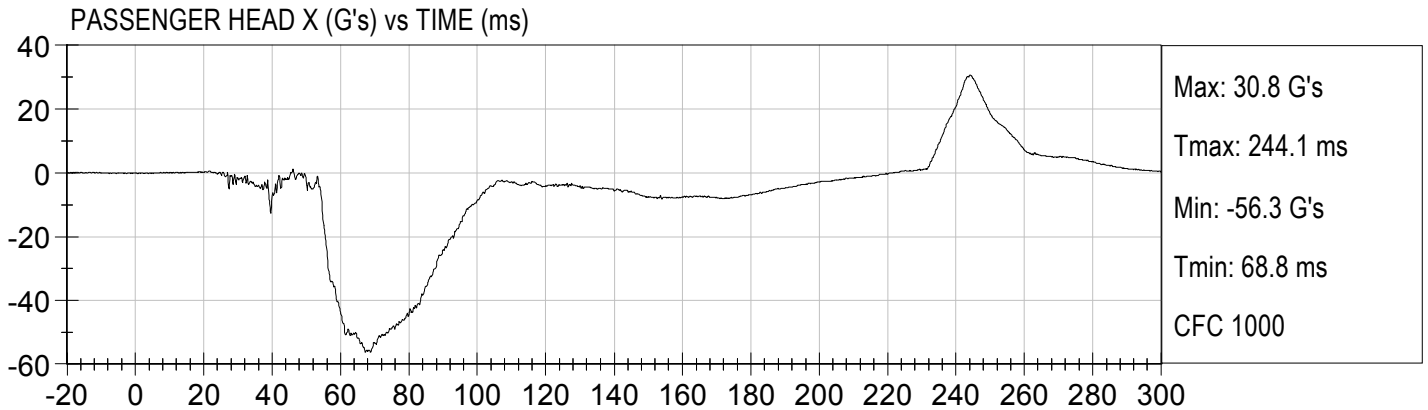


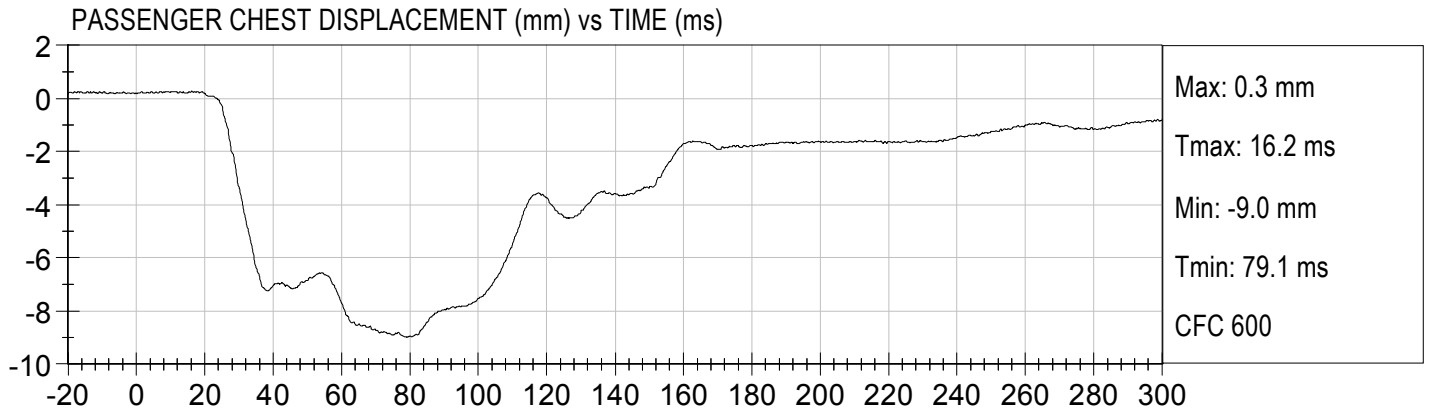


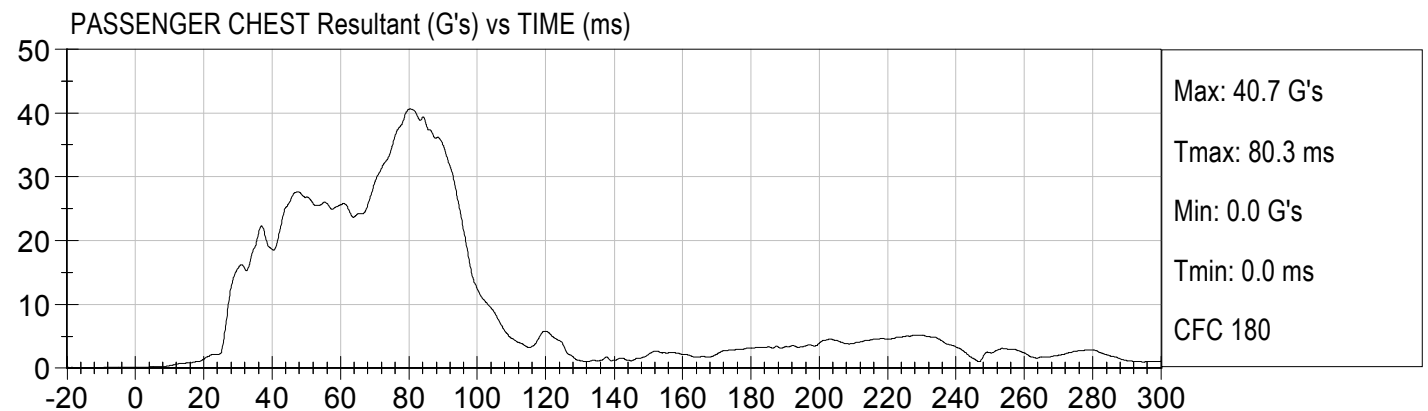
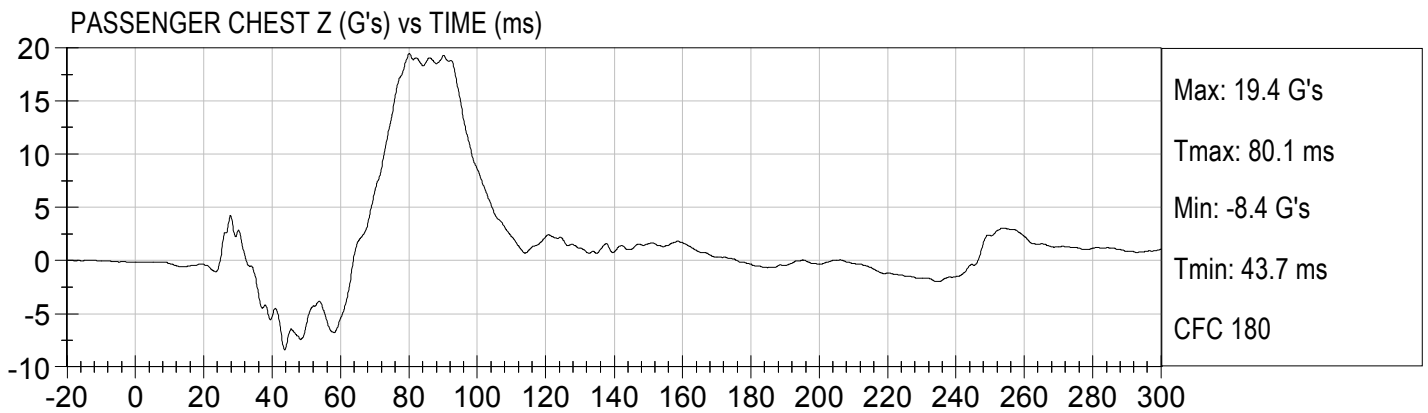
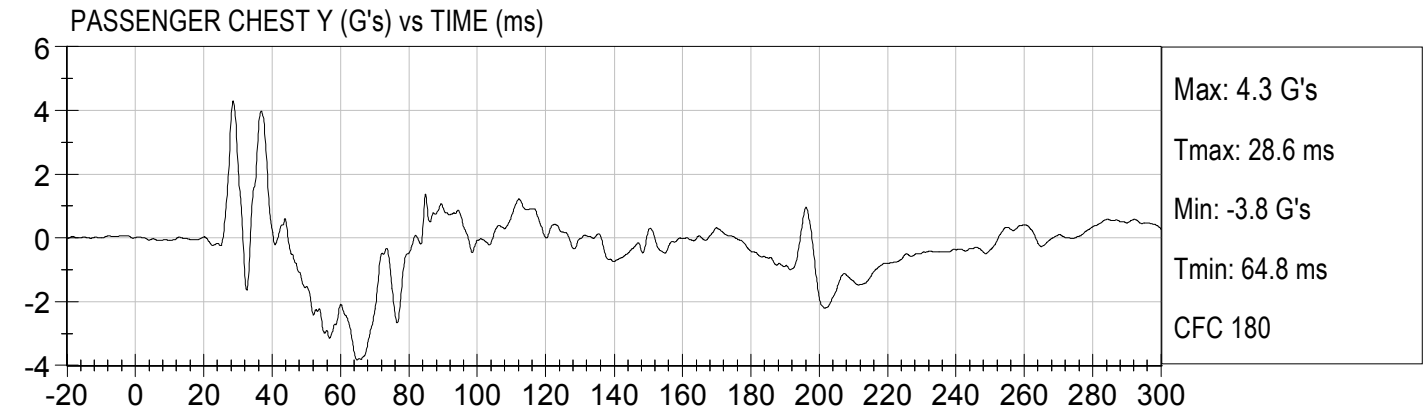
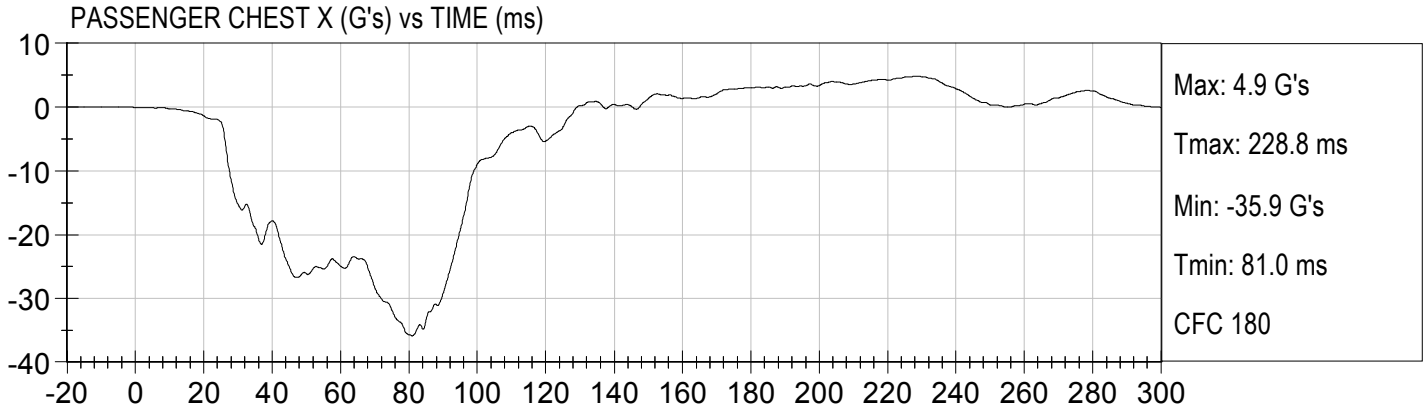


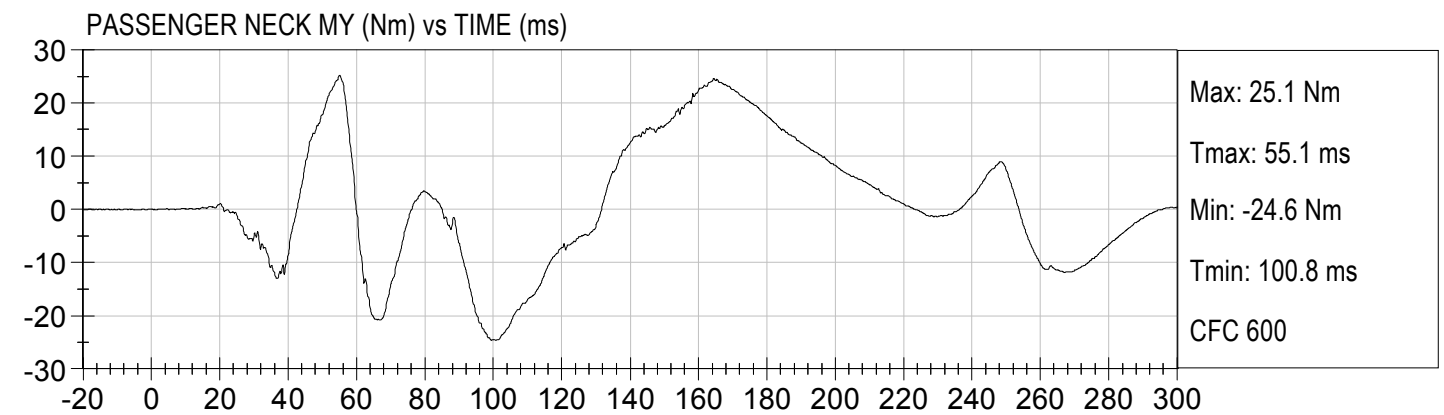
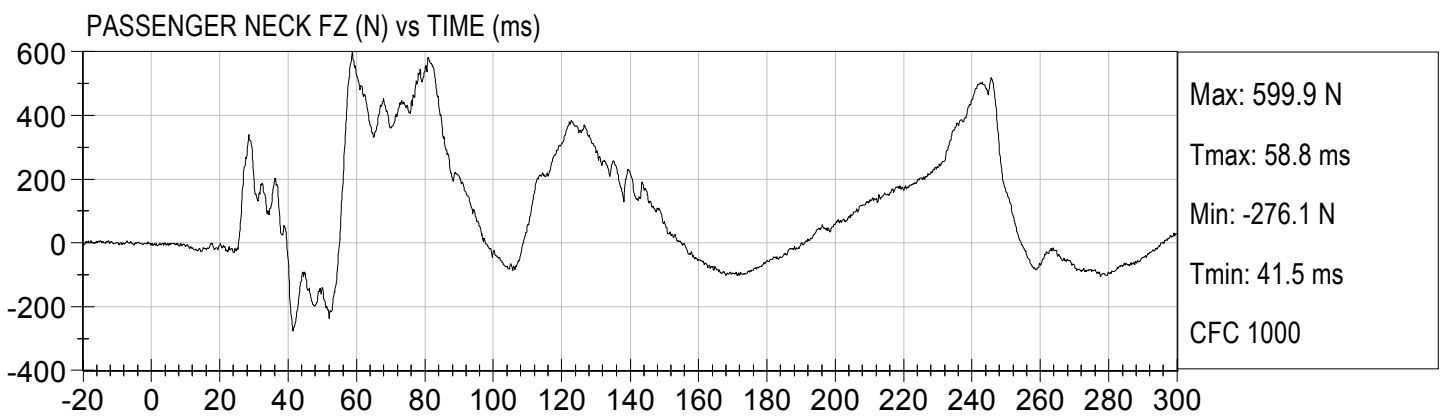
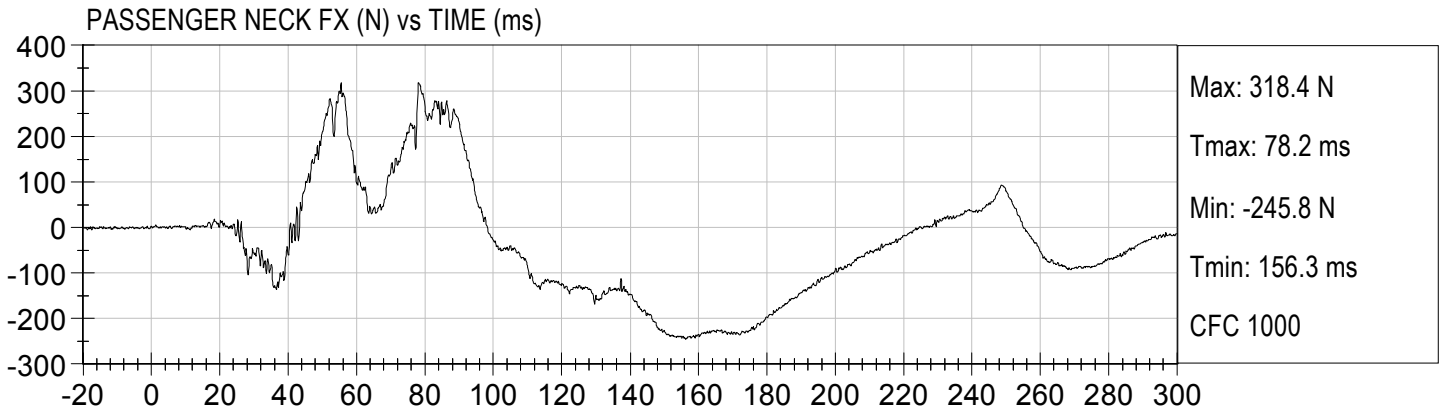


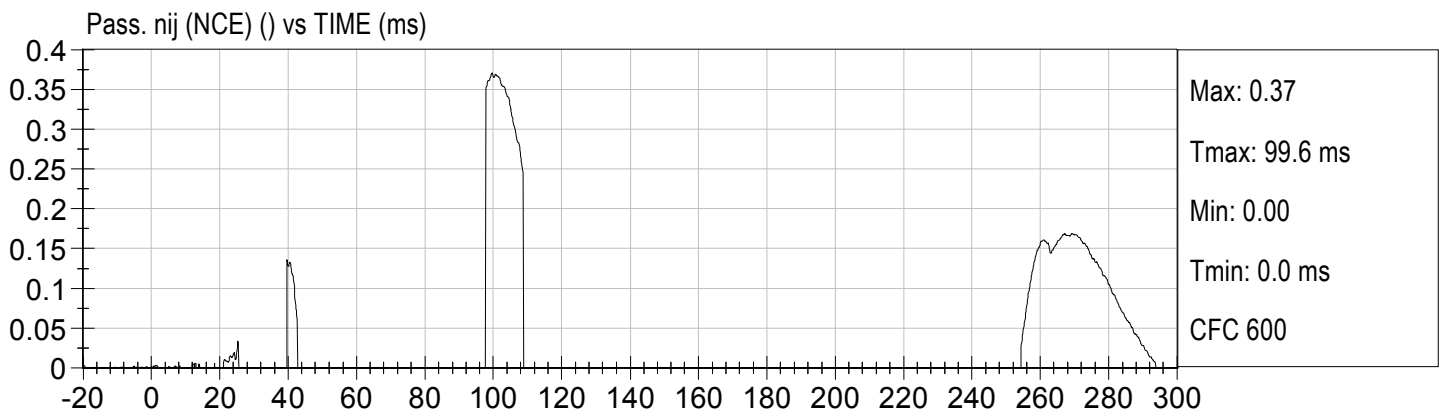
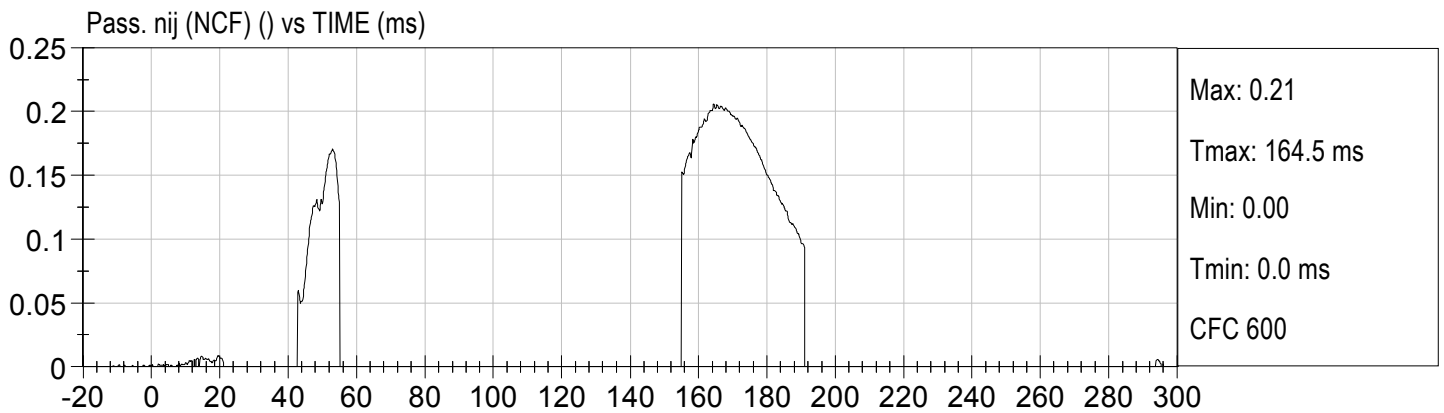
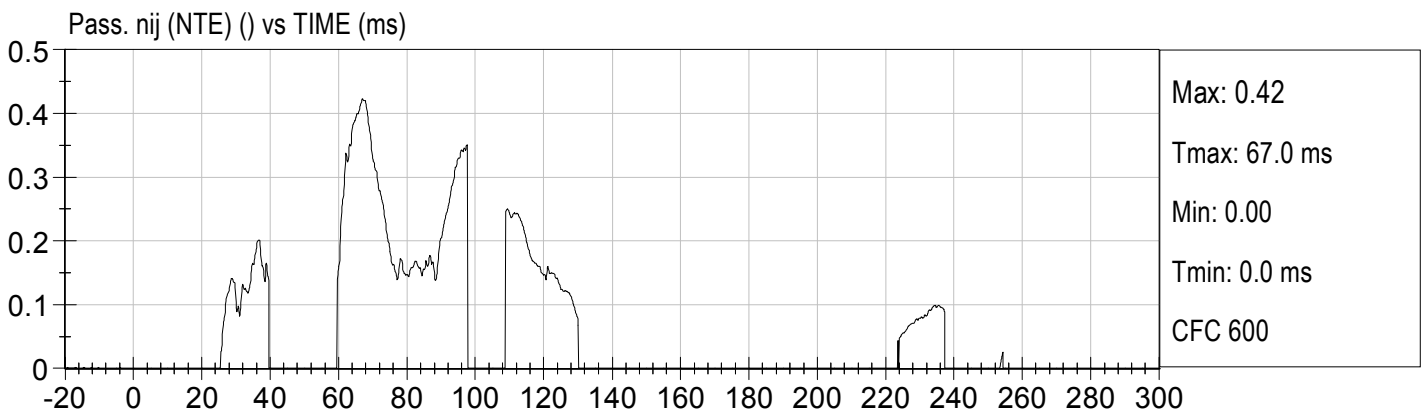
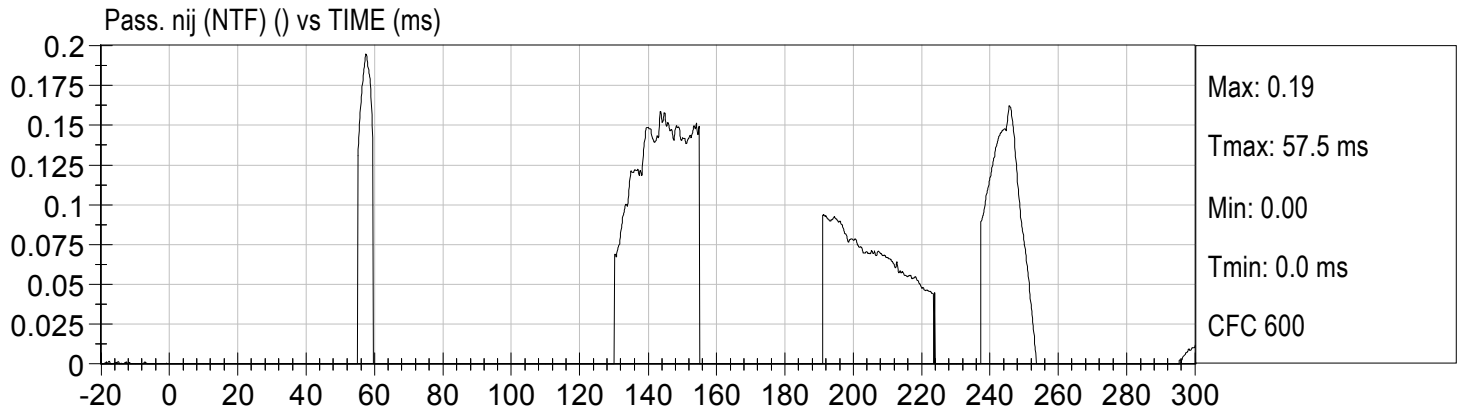


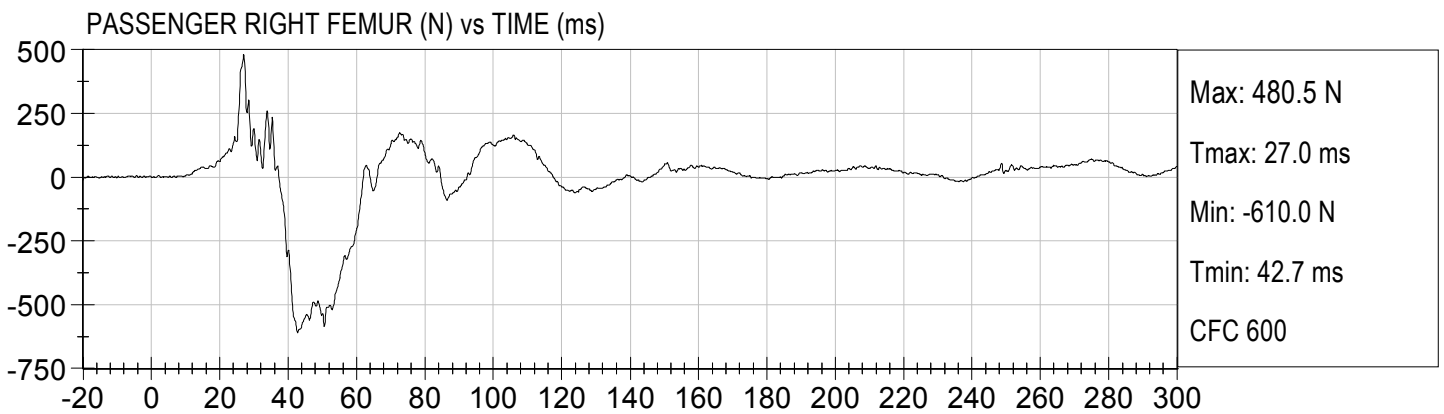
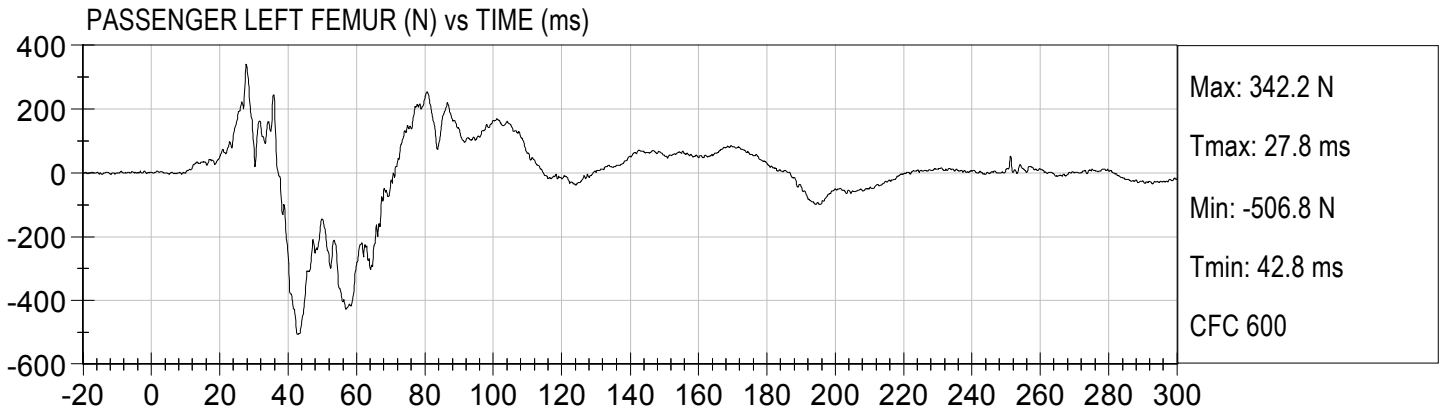












## **APPENDIX C**

### **DUMMY CALIBRATION AND PERFORMANCE VERIFICATION DATA**

**Hybrid III, 50th External Measurements  
SN: 036**

HYBRID III, PART 572, SUBPART E EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (inches)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	34.6–35.0	34.7
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	19.9-20.5	20.0
C	H-POINT HEIGHT	Reference	3.3-3.5	3.4
D	H-POINT LOCATION FROM BACKLINE	Reference	5.3-5.5	5.4
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	3.3-3.7	3.6
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	5.5-6.1	5.8
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	11.4-12.0	11.5
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	1.6-1.8	1.7
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	13.0-13.6	13.0
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	7.5-8.3	7.9
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	22.8-23.8	23.8
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	16.9-17.9	17.3
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	19.1-19.7	19.5
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	17.8-18.8	17.9

HYBRID III, SUBPART E EXTERIOR DIMENSIONS, continued

DIMENSION	DESCRIPTION	DETAILS		ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 16.9-17.1 in. above seat surface	8.4-9.0	8.8
P	FOOT LENGTH	Tip of toe to rear of heel	9.9-10.5	10.0
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	16.3-17.2	16.4
W	FOOT BREADTH	The widest part of the foot	3.6-4.2	4.1
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 16.9-17.1 in. above seat surface	38.2-39.4	38.4
Z	WAIST CIRCUMFERENCE	Measured 8.9-9.1 in. above seat surface	32.9-34.1	34.0
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	16.9-17.1	17.0
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	8.9-9.1	9.0

**NOTE:** THE H-POINT IS LOCATED 1.83 INCHES FORWARD AND 2.57 INCHES DOWN FROM THE CENTER OF THE PELVIS ANGLE REFERENCE HOLE.

**MGA RESEARCH CORPORATION  
HEAD DROP TEST  
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test ID: D121571

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	21.2	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Peak Resultant Acceleration	G's	225 - 275	251	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	2.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall  
Laboratory Technician

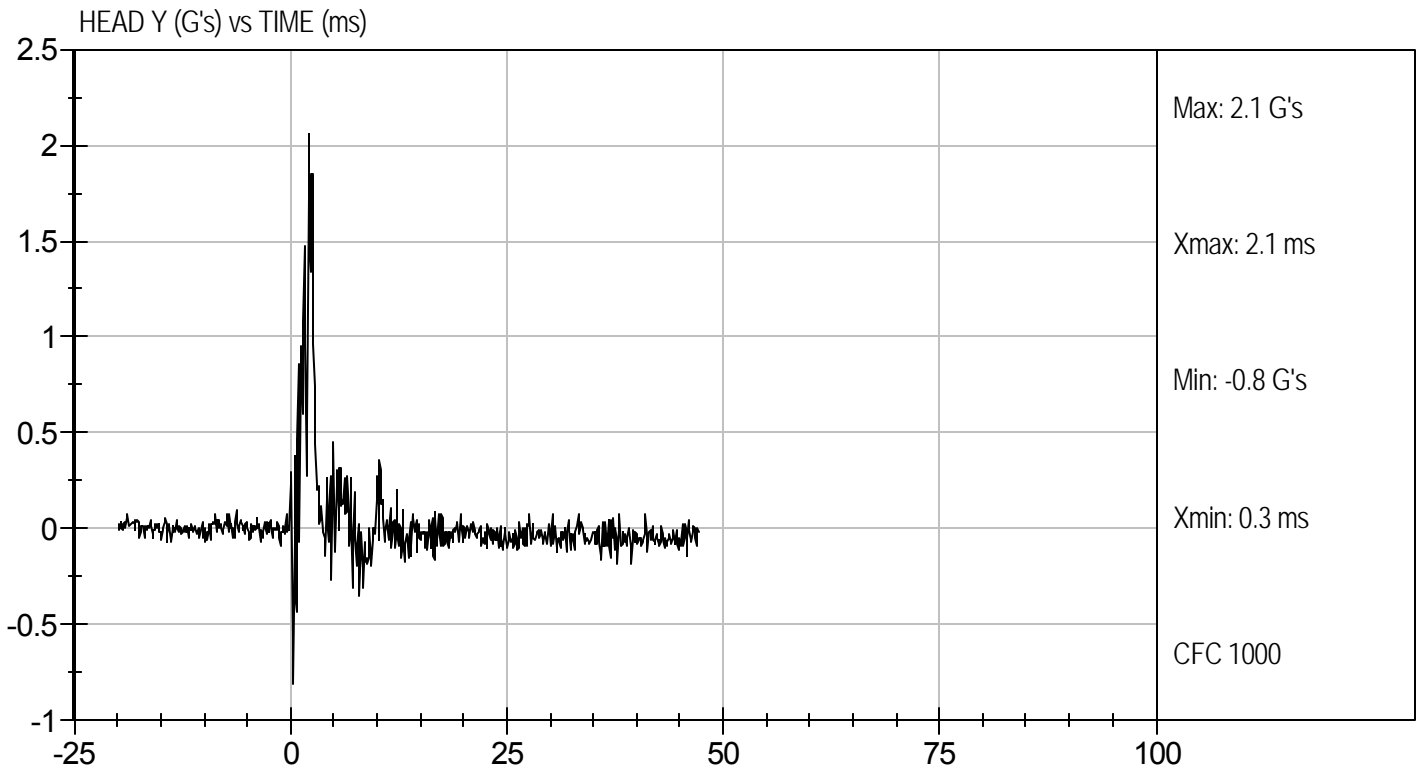
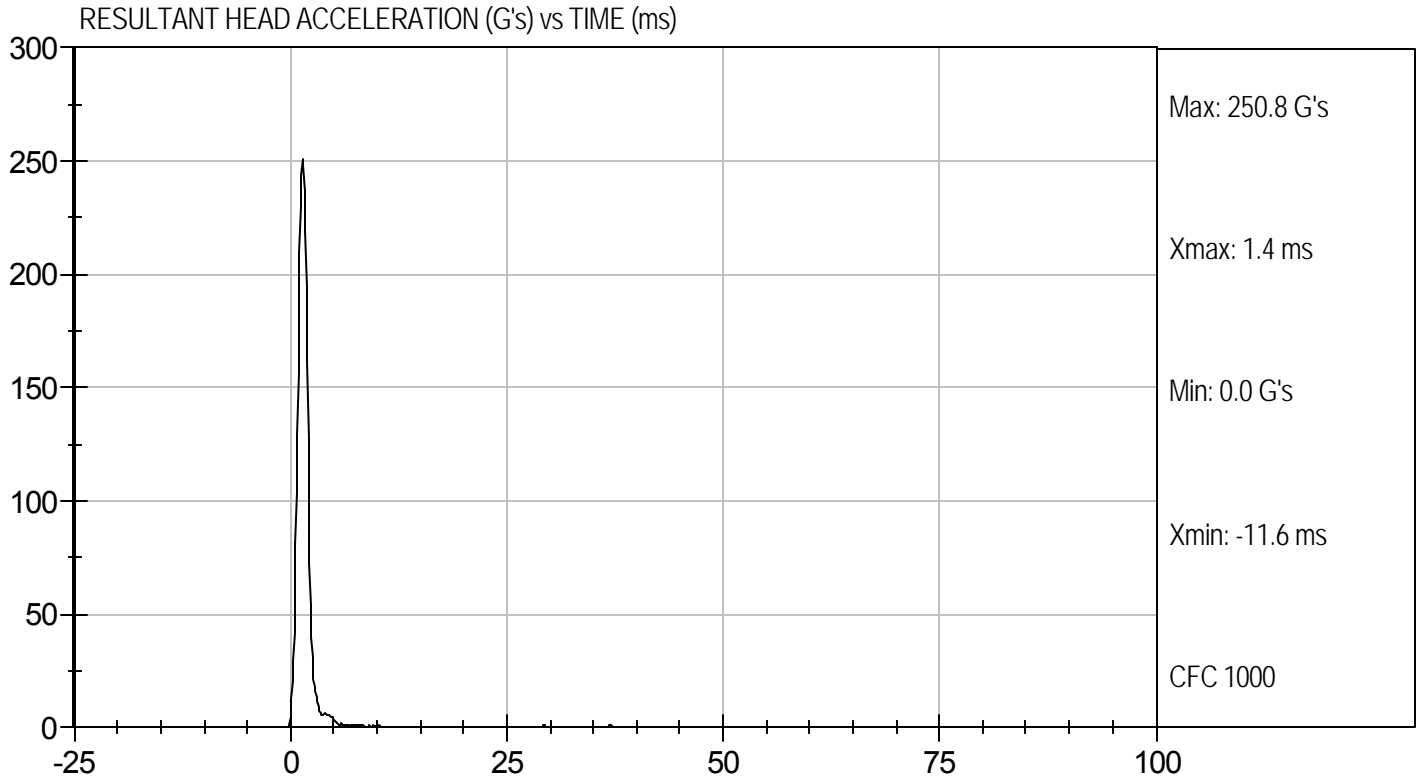
4/30/12  
Test Date

David Winkelbauer  
Approved By



Test Desc: Head Drop  
Component ID: D121571T

Test Date: 4/30/12  
Velocity: 0 ft/s, 0 m/s



**MGA RESEARCH CORPORATION  
NECK FLEXION TEST  
HYBRID III 50TH PERCENTILE MALE**


ATD Serial No: 036

Test I.D.: D121572

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	37	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.85	Pass
	20 ms	G's	17.60 to 22.60	17.61	Pass
	30 ms	G's	12.50 to 18.50	13.67	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.6	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	38.3	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	68.5	Pass
	Time	ms	57.0 to 64.0	57.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	117.5	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	95.3	Pass
	Time	ms	47.0 to 58.0	50.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.5	Pass
Overall Test Results					Pass

  
Laboratory Technician

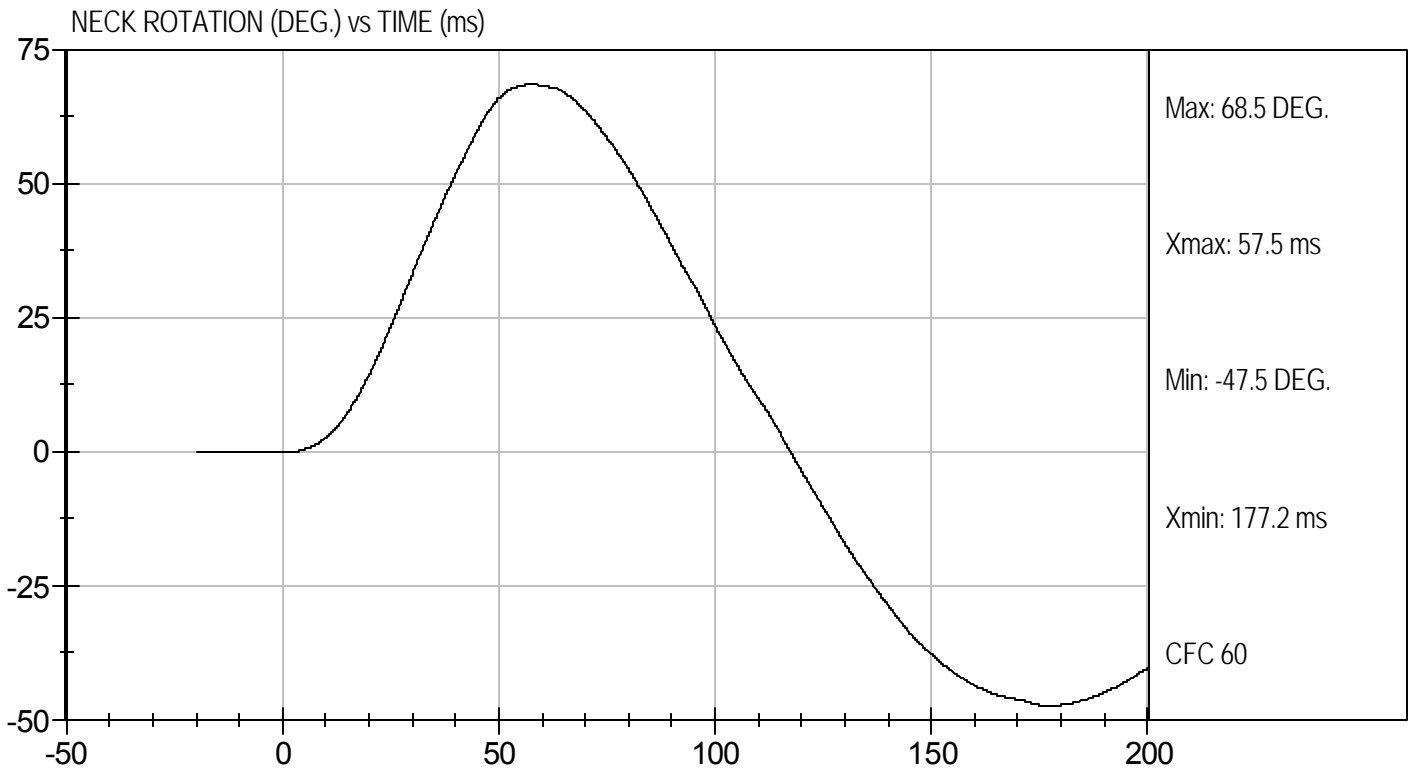
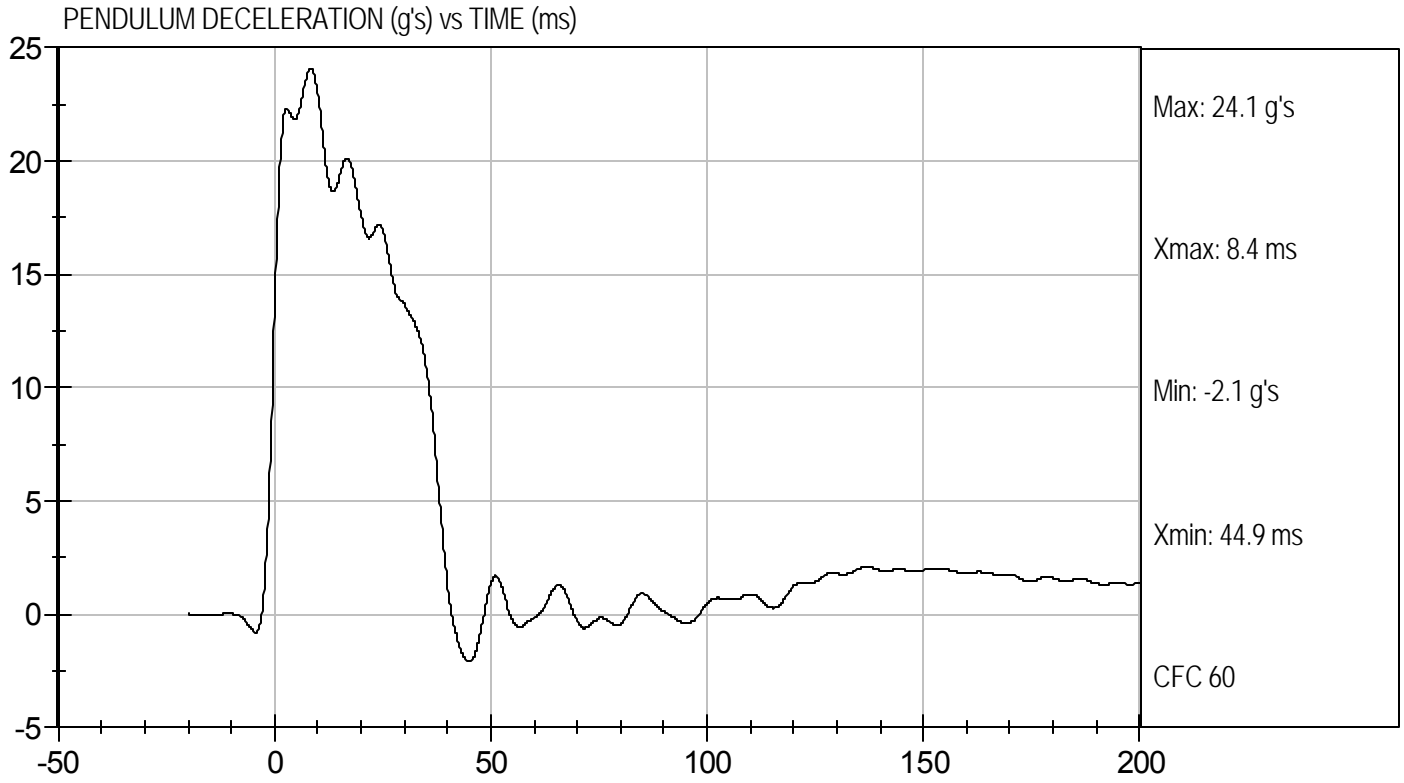
4/30/12  
Test Date

  
Approved By



Test Desc: Neck Flexion  
Component ID: D121572

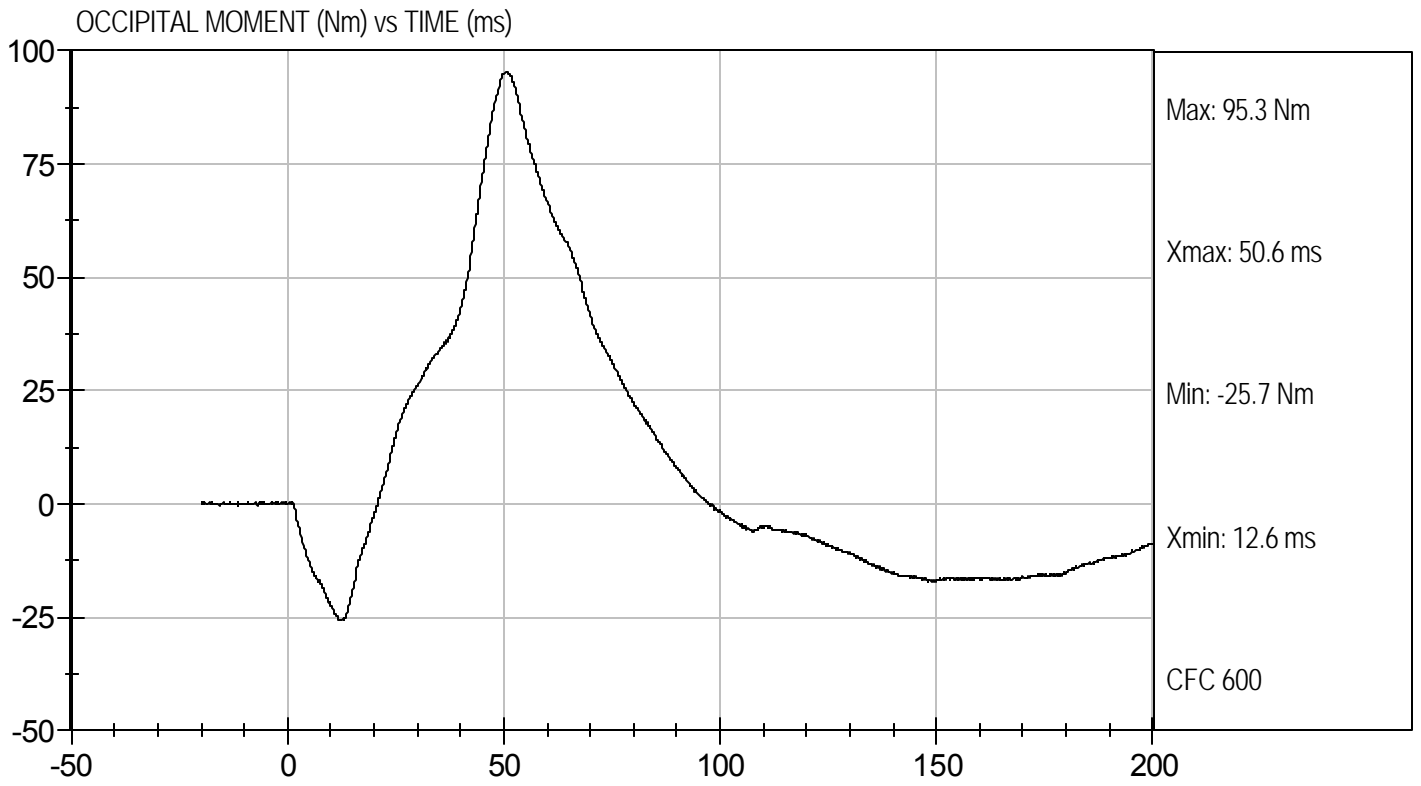
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Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion  
Component ID: D121572

Test Date: 4/30/12  
Velocity: 23.15 ft/s, 7.06 m/s



**MGA RESEARCH CORPORATION  
NECK EXTENSION TEST  
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test I.D.: D121573

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.6	Pass
Laboratory Relative Humidity		%	10 to 70	37	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.16	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	17.92	Pass
	20 ms	G's	14.00 to 19.00	16.05	Pass
	30 ms	G's	11.00 to 16.00	12.47	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	39.5	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	96.5	Pass
	Time	ms	72.0 to 82.0	76.5	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	159.4	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-63.1	Pass
	Time	ms	65.0 to 79.0	70.4	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	140.4	Pass
Overall Test Results					Pass

Jessica Hall  
Laboratory Technician

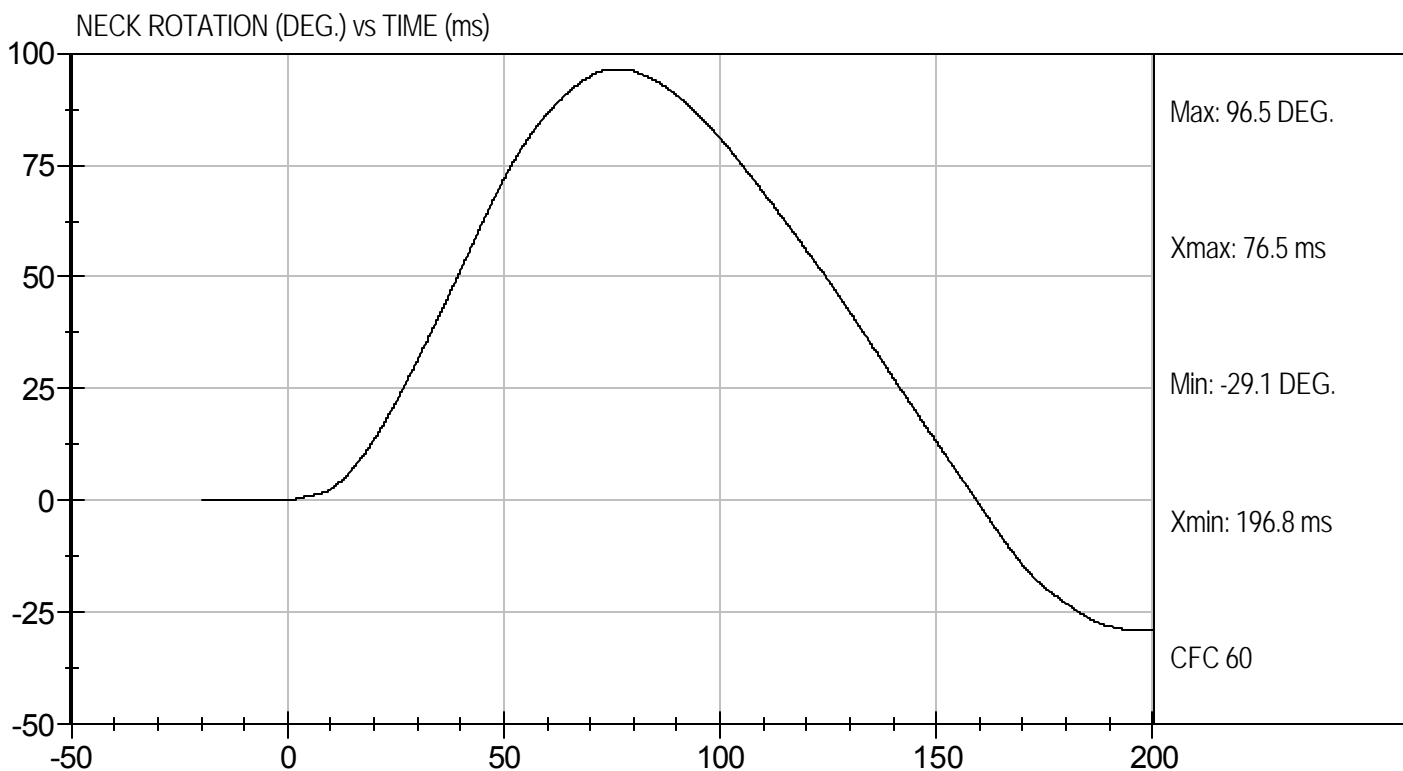
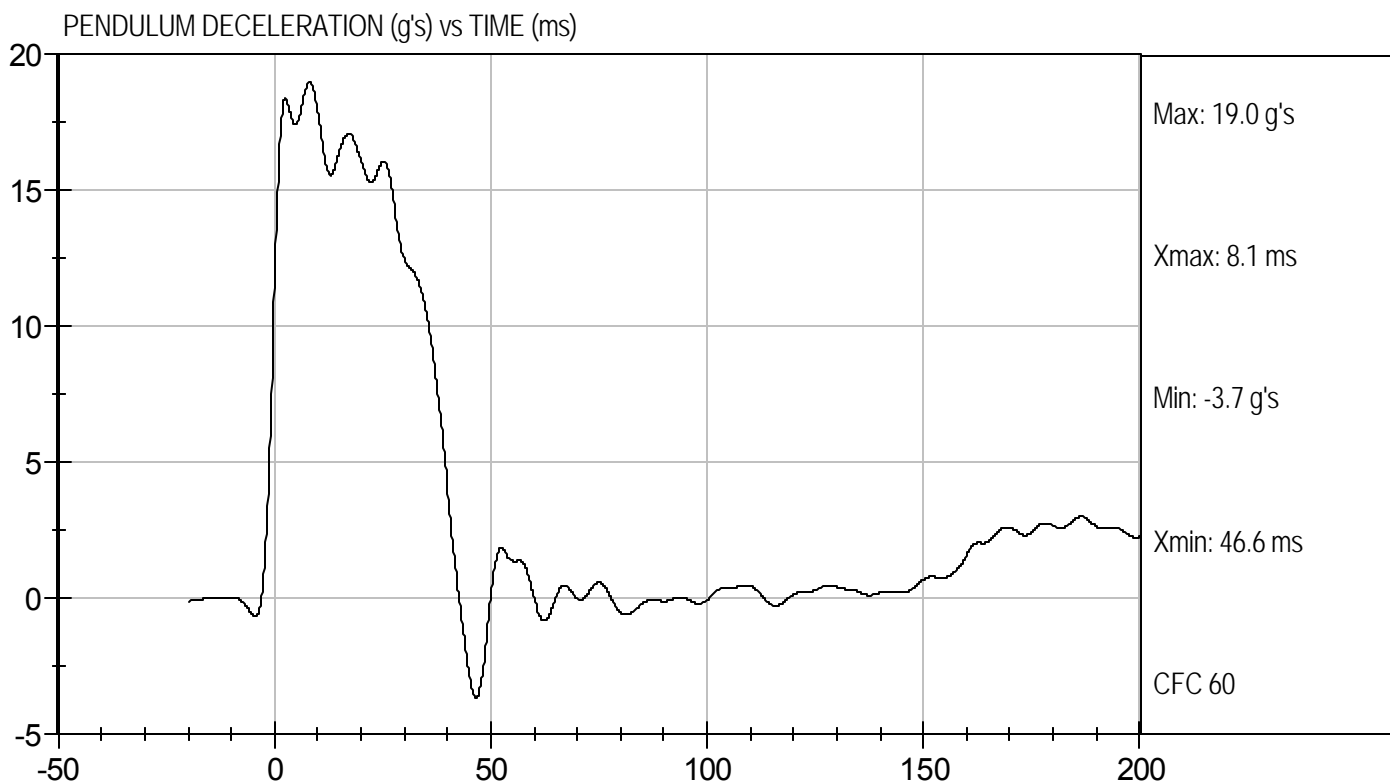
4/30/12  
Test Date

David Winkelbauer  
Approved By



Test Desc: Neck Extension  
Component ID: D121573

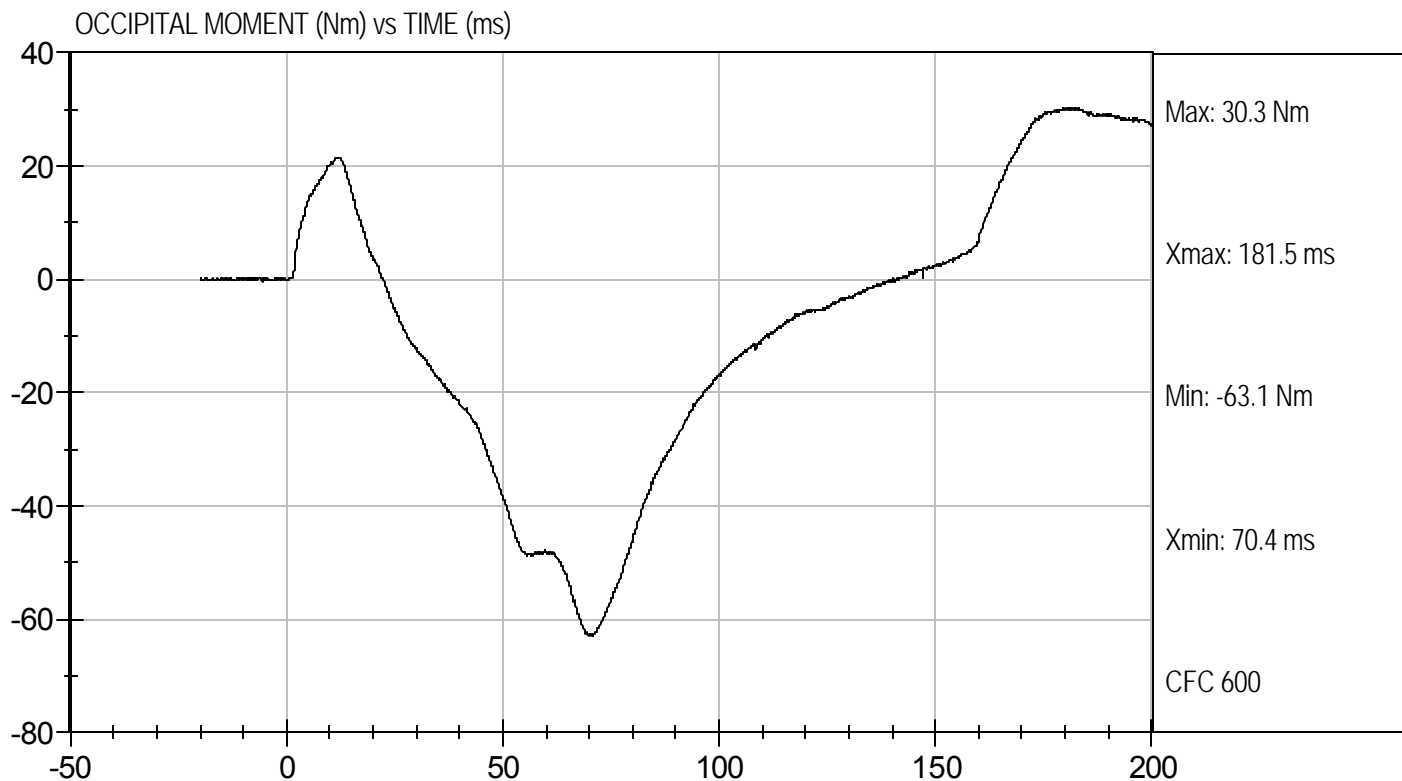
Test Date: 4/30/12  
Velocity: 20.2 ft/s, 6.16 m/s





Test Desc: Neck Extension  
Component ID: D121573

Test Date: 4/30/12  
Velocity: 20.2 ft/s, 6.16 m/s



**MGA RESEARCH CORPORATION  
THORAX IMPACT  
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test I.D: D121574

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	6.58 to 6.82	6.77	Pass
Peak Probe Force	N	5159 to 5893	5,394	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.68	Pass
Internal Hysteresis	%	69 to 85	72	Pass
Overall Test Results				Pass

Jessica Hall  
Laboratory Technician

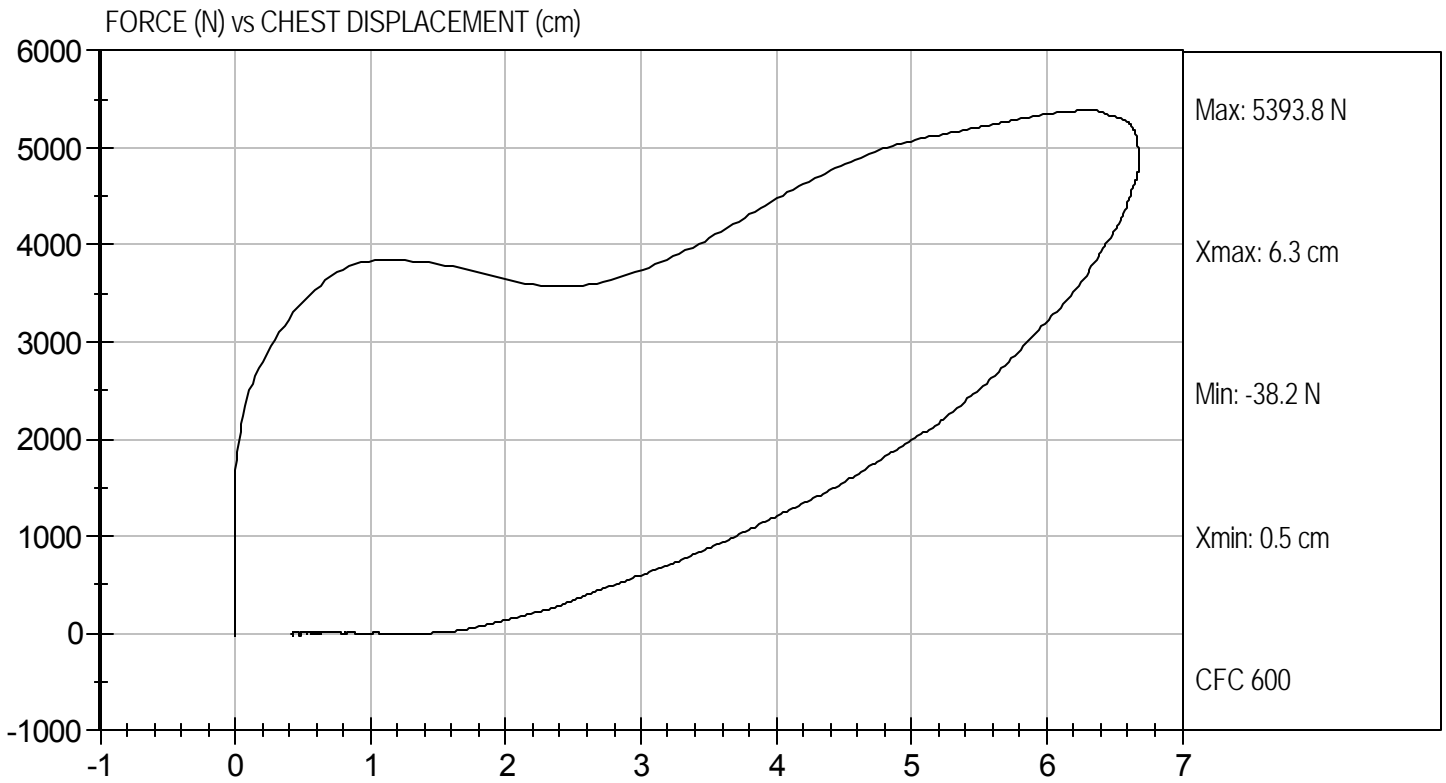
5/1/12  
Test Date

David Winkelbauer  
Approved By



Test Desc: Thorax Impact  
Component ID: D121574

Test Date: 5/1/12  
Velocity: 22.22 ft/s, 6.77 m/s



**MGA RESEARCH CORPORATION  
RIGHT KNEE IMPACT TEST  
HYBRID III 50TH PERCENTILE MALE**

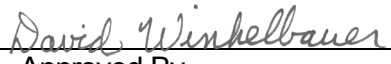
ATD Serial No: 036

Test I.D: D121575

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	25	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,169	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

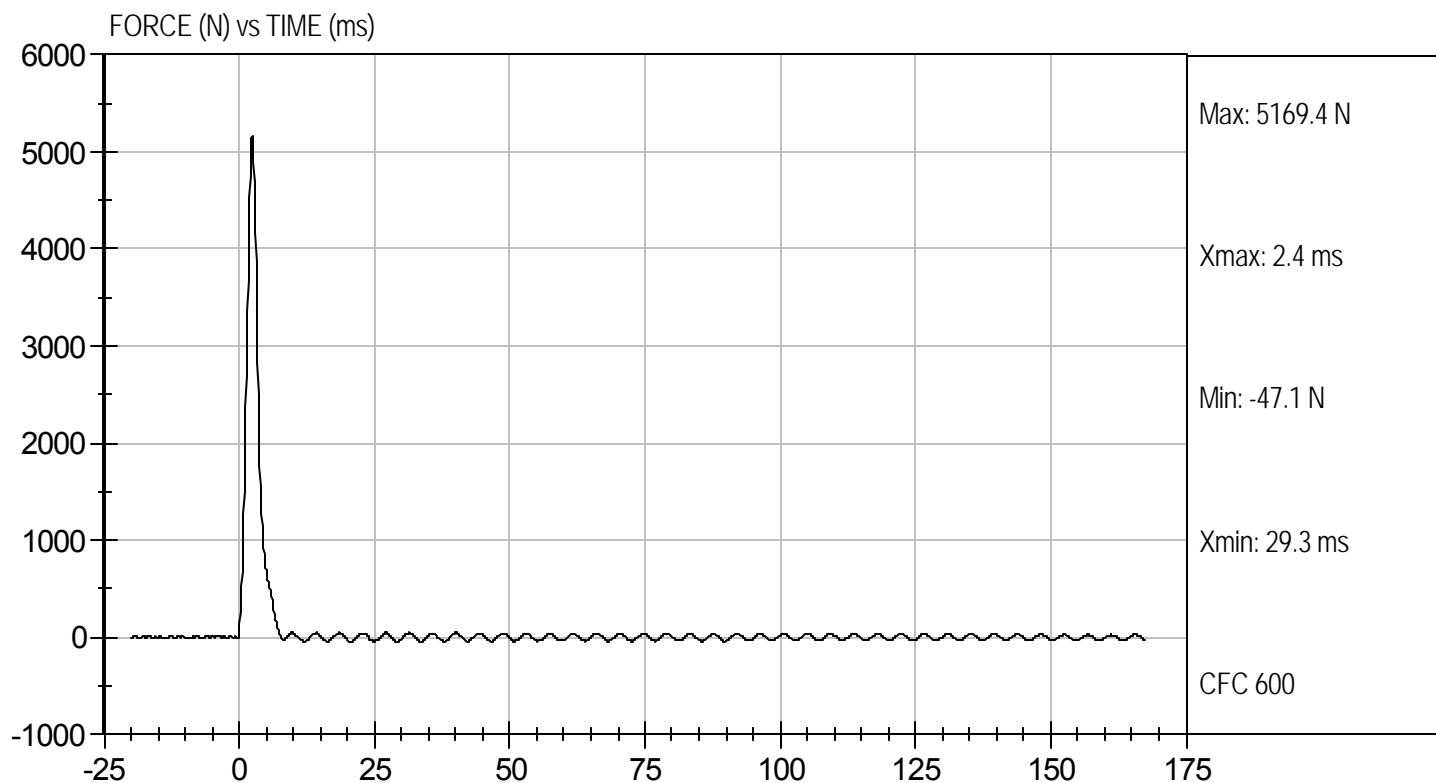
4/30/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Right Knee  
Component ID: D121575

Test Date: 4/30/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**LEFT KNEE IMPACT TEST**  
**HYBRID III 50TH PERCENTILE MALE**

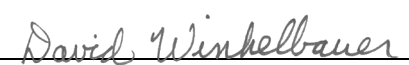
ATD Serial No: 036

Test I.D: D121576

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	38	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	5,409	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

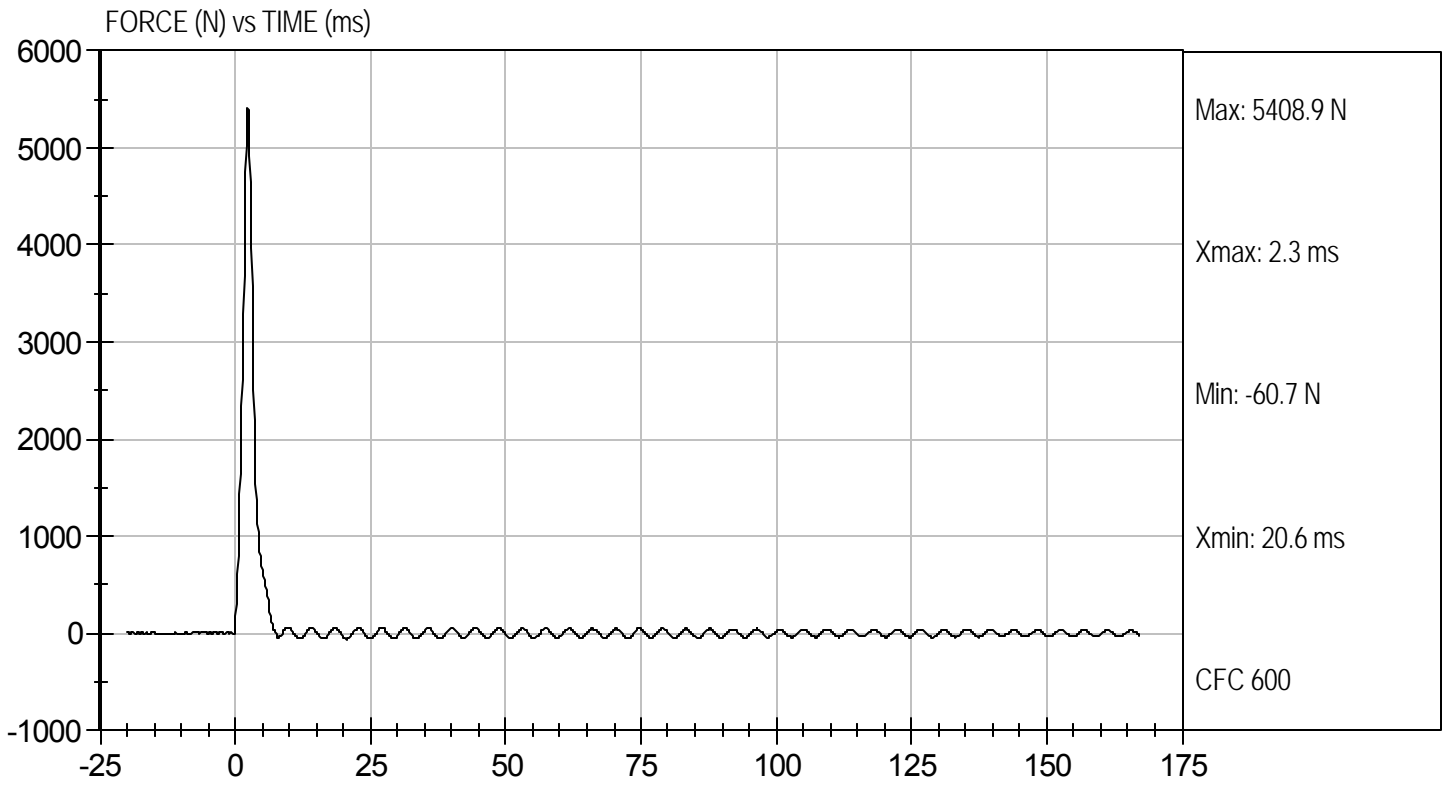
4/30/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Left Knee  
Component ID: D121576

Test Date: 4/30/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**HIP-FEMUR FLEXION TEST**  
**HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test I.D: D121570

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.7	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	38	38	Pass
Rotation Rate	deg/s	5.0 -10.0	6.2	6.2	Pass
30 Degrees	Nm	94.9 Nm Max	88.3	77.7	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	44.4	44.7	Pass
Overall Test Results					Pass

Jessica Gall  
Laboratory Technician

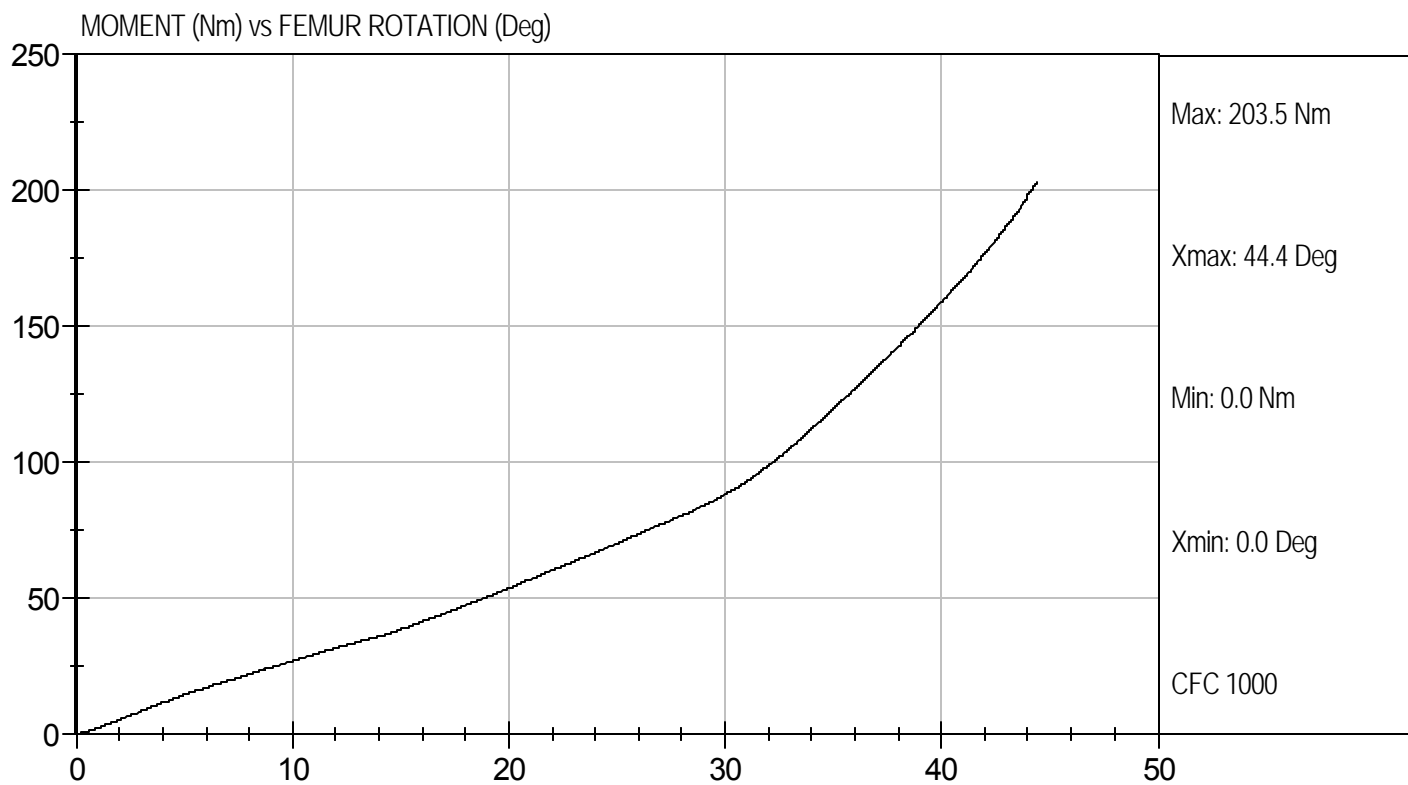
4/30/12  
Test Date

David Winkelbauer  
Approved By



Test Desc: Hip Femur Flexion  
Component ID: D121579

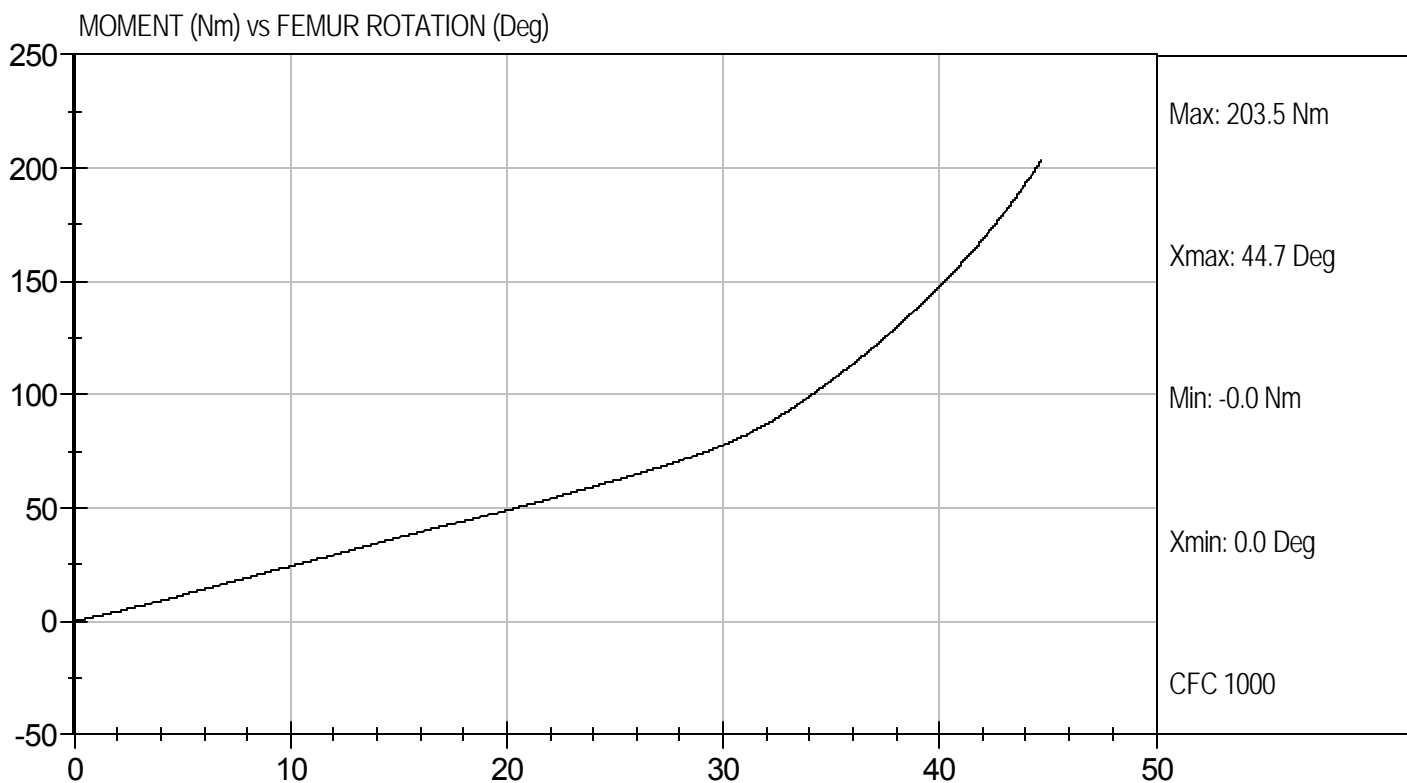
Test Date: 4/30/12  
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion  
Component ID: D121570

Test Date: 4/30/12  
Velocity: 0 ft/s, 0.00 m/s



**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test ID: D121611

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 - 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Peak Resultant Acceleration	G's	225 - 275	241	Pass
Peak Lateral Acceleration	G's	<= +/- 15.0	-12.4	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall  
 Laboratory Technician

5/3/12  
 Test Date

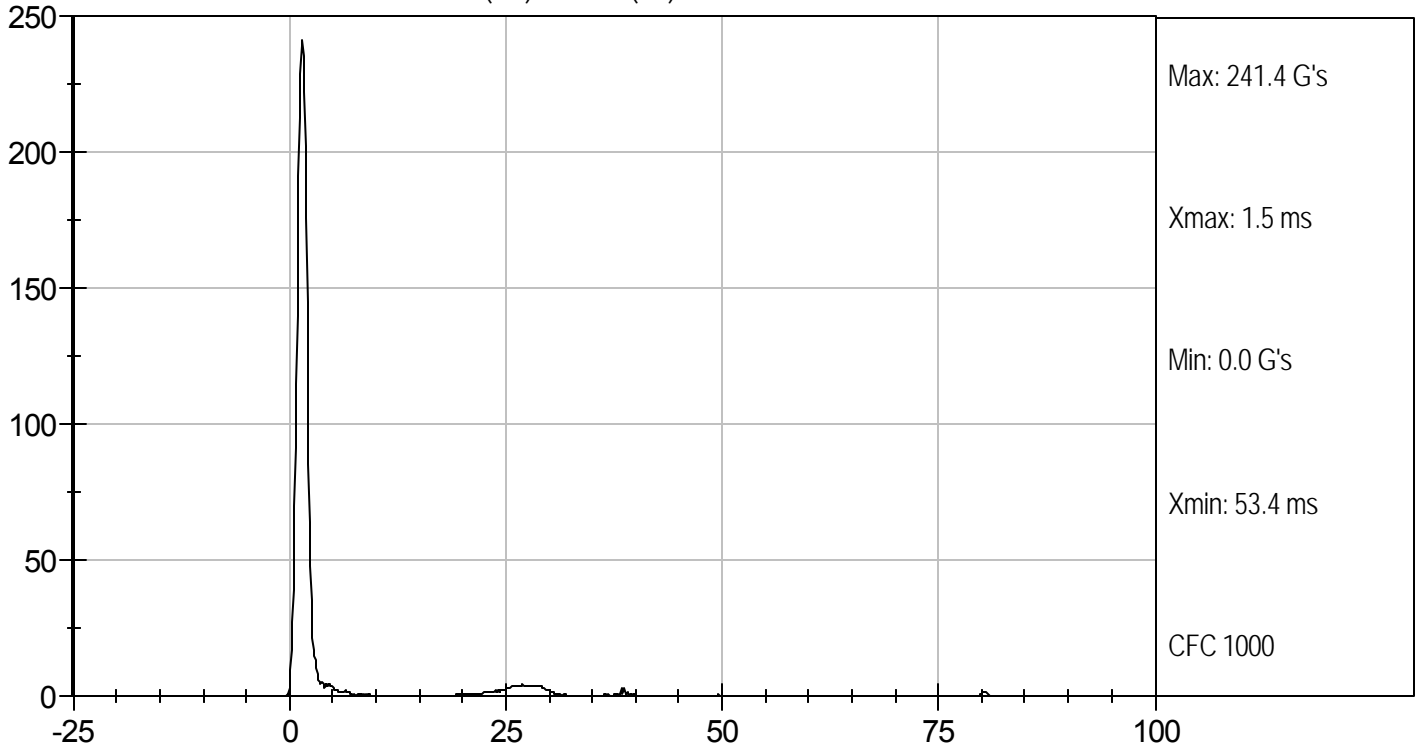
David Winkelbauer  
 Approved By



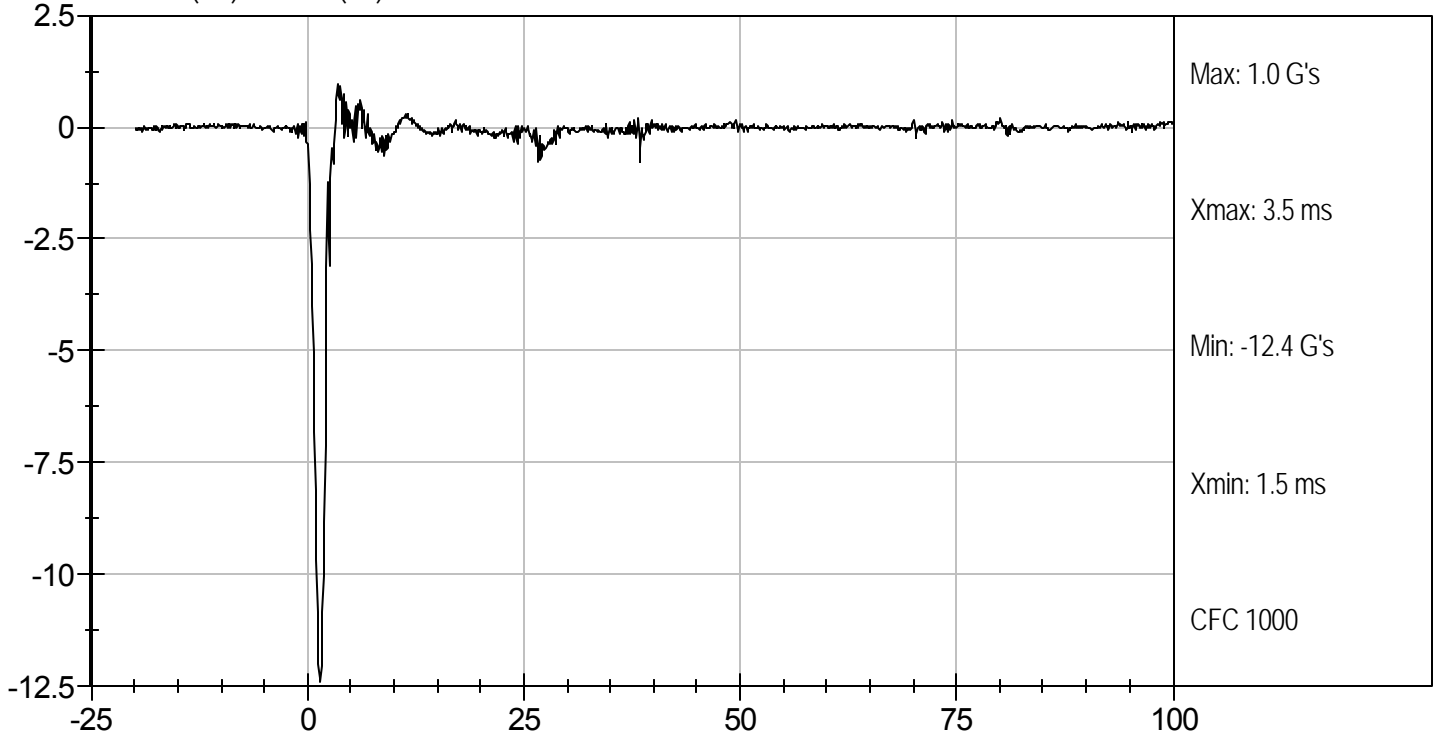
Test Desc: Head Drop  
Component ID: D121611

Test Date: 5/3/12  
Velocity: 0 ft/s, 0 m/s

RESULTANT HEAD ACCELERATION (G's) vs TIME (ms)



HEAD Y (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**  
**NECK FLEXION TEST**  
**HYBRID III 50TH PERCENTILE MALE**


ATD Serial No: 036

Test I.D.: D121612

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Velocity		m/s	6.89 to 7.13	7.06	Pass
Pendulum Deceleration	10 ms	G's	22.50 to 27.50	22.74	Pass
	20 ms	G's	17.60 to 22.60	17.93	Pass
	30 ms	G's	12.50 to 18.50	13.47	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 29.0	13.4	Pass
Deceleration Decay Time to Cross 5 G's		ms	34.0 to 42.0	36.7	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	64.0 to 78.0	69.2	Pass
	Time	ms	57.0 to 64.0	59.0	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	113.0 to 128.0	118.4	Pass
Moment About Occipital Condyle	Maximum	N m	88.1 to 108.5	92.9	Pass
	Time	ms	47.0 to 58.0	49.6	Pass
Positive Moment Decay Time To Zero Crossing		ms	97.0 to 107.0	97.1	Pass
Overall Test Results					Pass

  
 Laboratory Technician

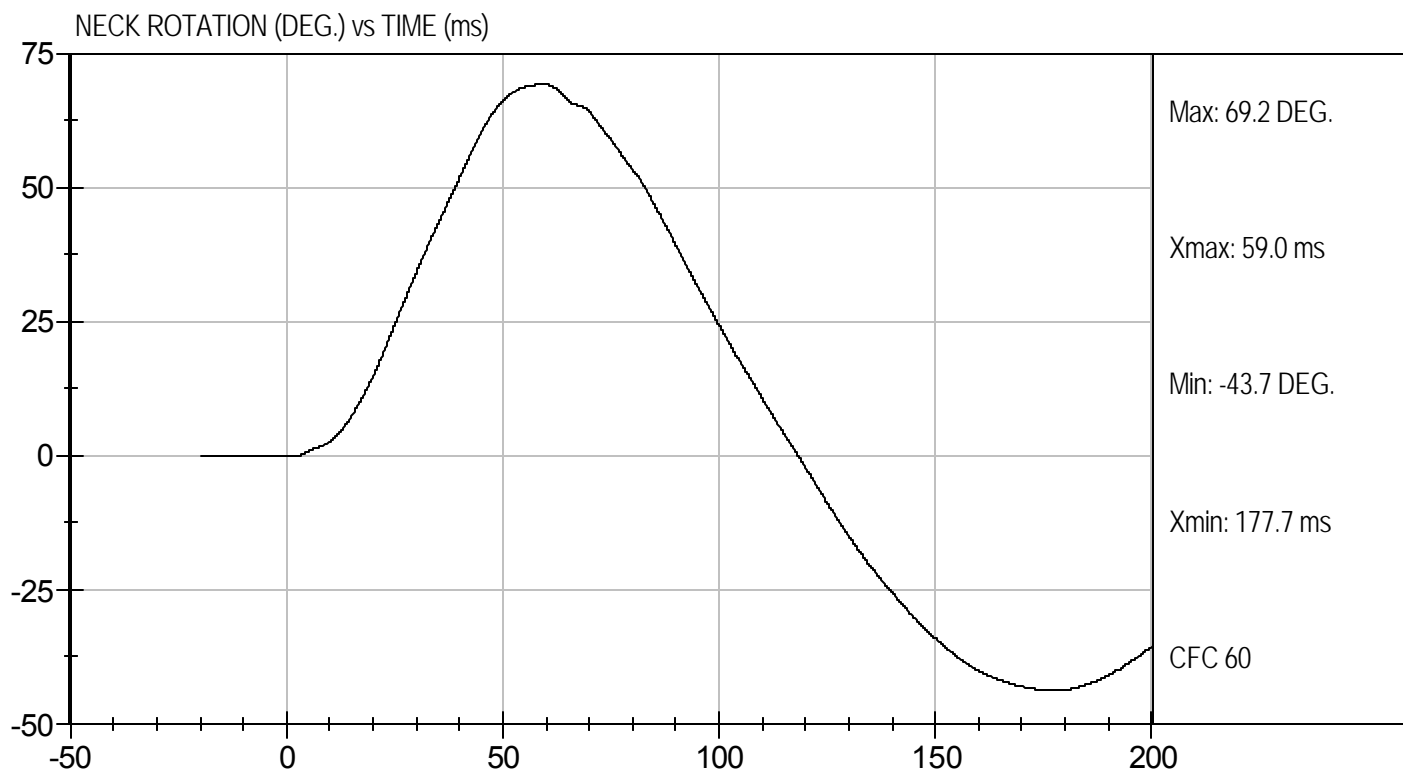
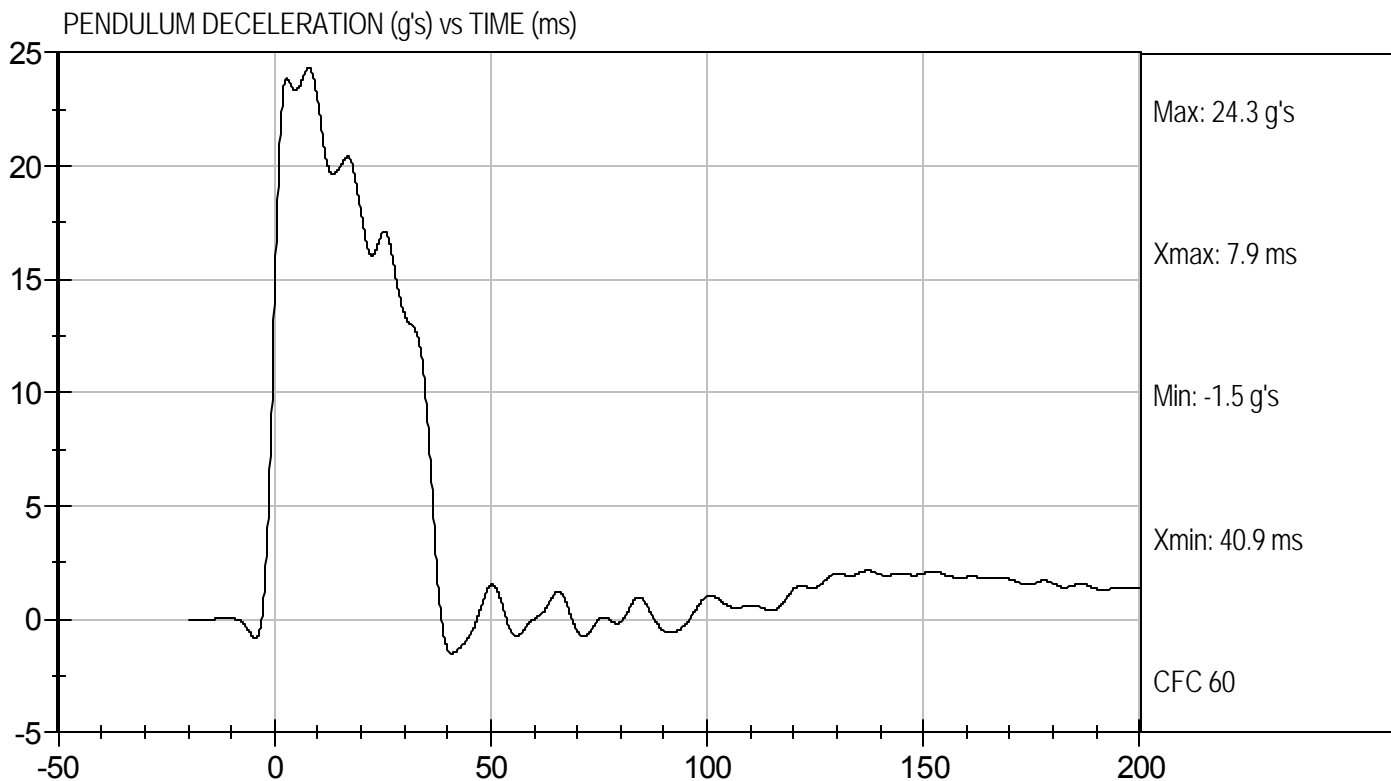
5/3/12  
 Test Date

  
 Approved By



Test Desc: Neck Flexion  
Component ID: D121612

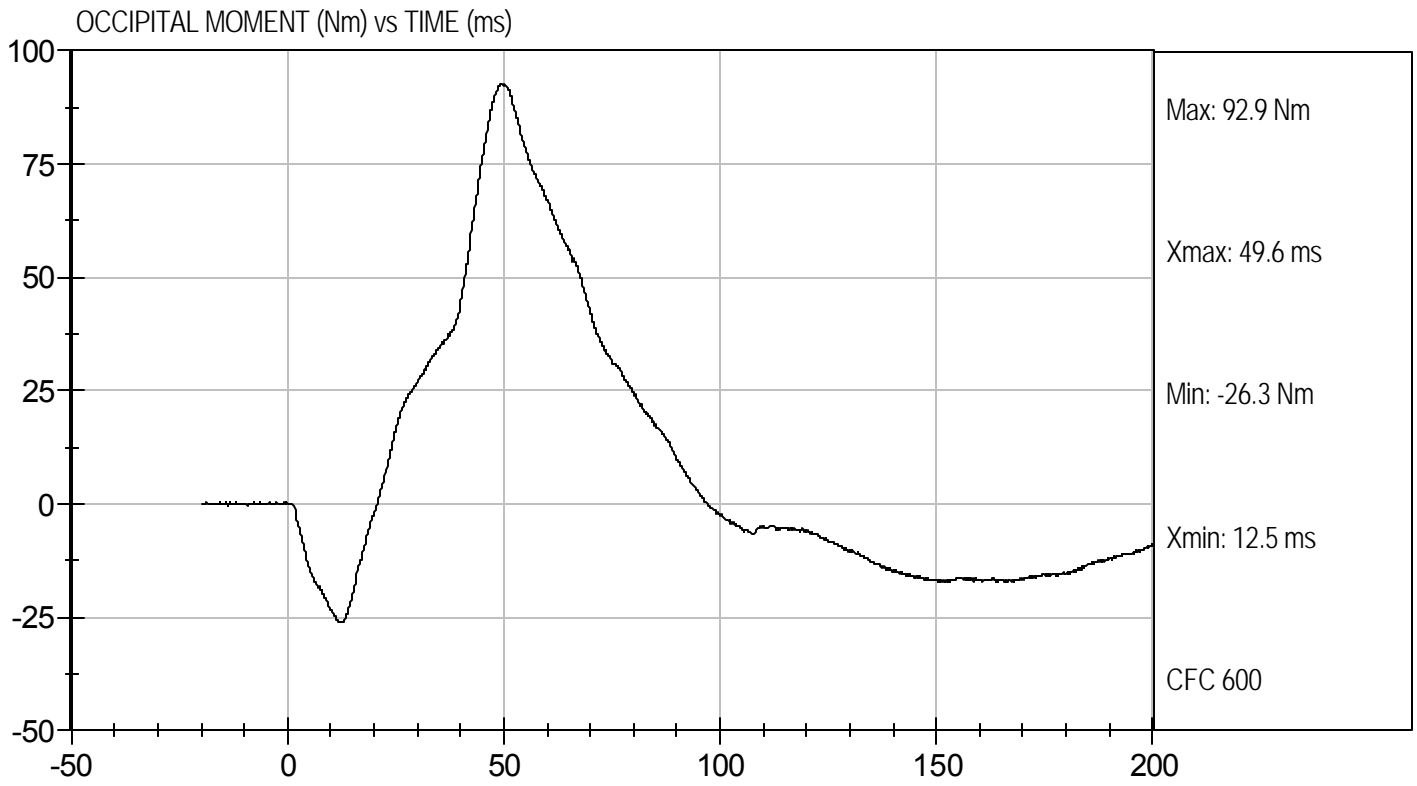
Test Date: 5/3/12  
Velocity: 23.15 ft/s, 7.06 m/s





Test Desc: Neck Flexion  
Component ID: D121612

Test Date: 5/3/12  
Velocity: 23.15 ft/s, 7.06 m/s



**MGA RESEARCH CORPORATION  
NECK EXTENSION TEST  
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test I.D.: D121613

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.1	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Velocity		m/s	5.95 to 6.19	6.12	Pass
Pendulum Deceleration	10 ms	G's	17.20 to 21.20	19.61	Pass
	20 ms	G's	14.00 to 19.00	14.85	Pass
	30 ms	G's	11.00 to 16.00	12.37	Pass
Peak Pendulum Deceleration After 30 ms		G's	<= 22.0	12.3	Pass
Deceleration Decay Time to Cross 5 G's		ms	38.0 to 46.0	45.0	Pass
Maximum "D" Plane Rotation	Maximum	Degrees	81.0 to 106.0	87.0	Pass
	Time	ms	72.0 to 82.0	79.1	Pass
"D" Plane Rotation Decay Time To Zero Crossing		ms	147.0 to 174.0	158.3	Pass
Moment About Occipital Condyle	Maximum	Nm	-52.9 to -79.9	-55.9	Pass
	Time	ms	65.0 to 79.0	73.1	Pass
Negative Moment Decay Time To Zero Crossing		ms	120.0 to 148.0	143.5	Pass
Overall Test Results					Pass

*Jessica Hall*  
Laboratory Technician

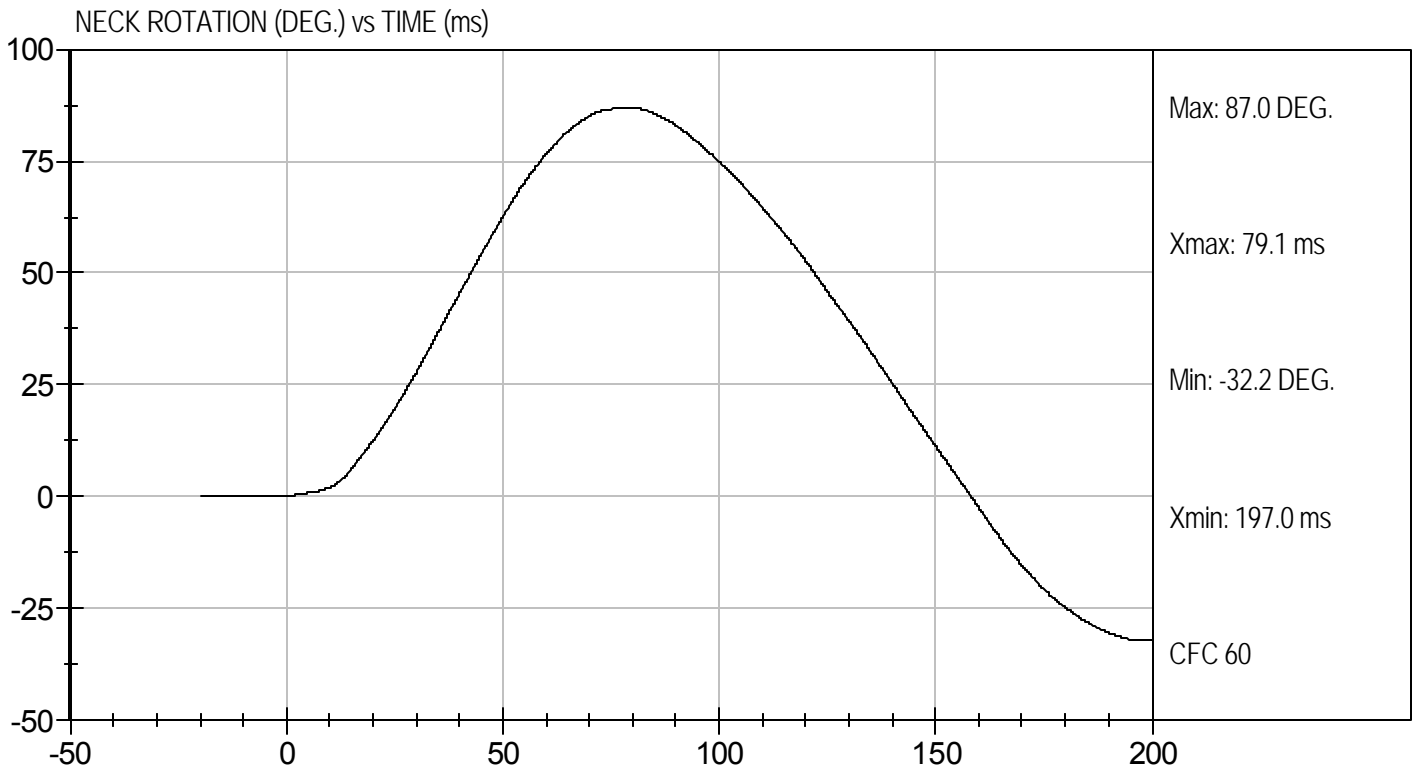
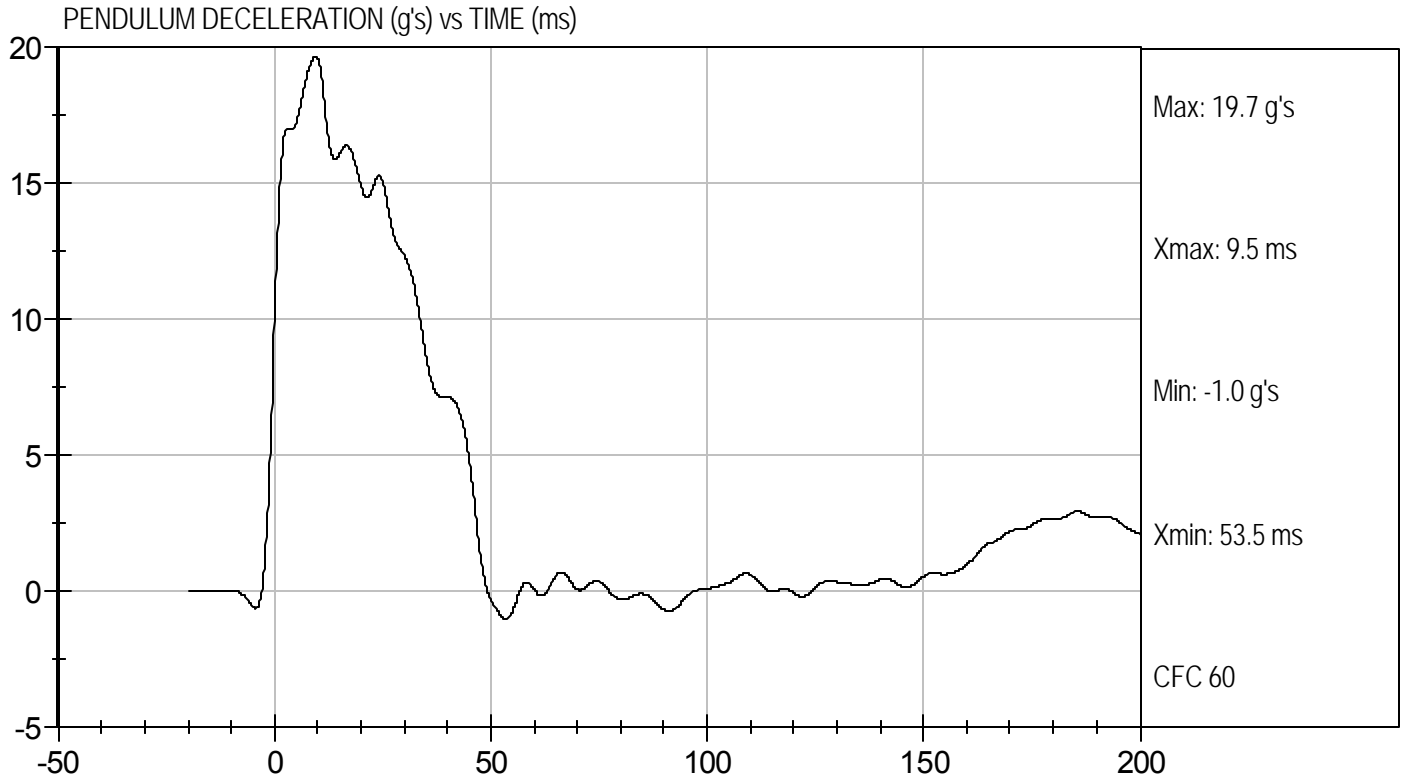
5/3/12  
Test Date

*David Winkelbauer*  
Approved By



Test Desc: Neck Extension  
Component ID: D121613

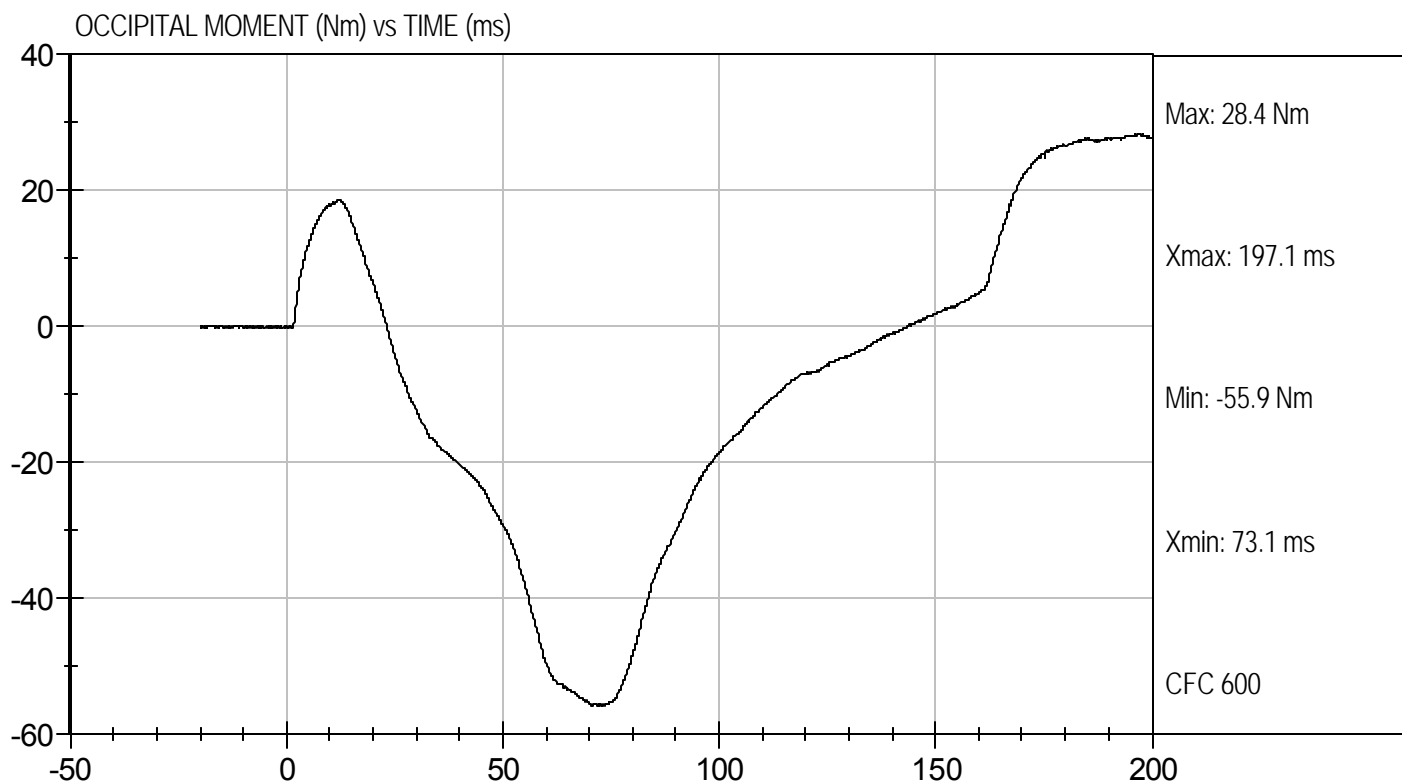
Test Date: 5/3/12  
Velocity: 20.08 ft/s, 6.12 m/s





Test Desc: Neck Extension  
Component ID: D121613

Test Date: 5/3/12  
Velocity: 20.08 ft/s, 6.12 m/s

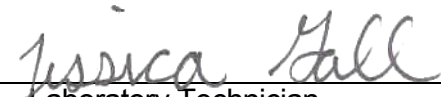


**MGA RESEARCH CORPORATION  
THORAX IMPACT  
HYBRID III 50TH PERCENTILE MALE**

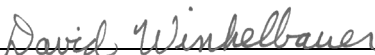
ATD Serial No: 036

Test I.D: D121614

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	20.6 to 22.2	21.3	Pass
Laboratory Relative Humidity	%	10 to 70	45	Pass
Probe Velocity	m/s	6.58 to 6.82	6.68	Pass
Peak Probe Force	N	5159 to 5893	5,369	Pass
Peak Sternum Displacement	cm	6.35 to 7.26	6.70	Pass
Internal Hysteresis	%	69 to 85	71	Pass
Overall Test Results				Pass

  
Laboratory Technician

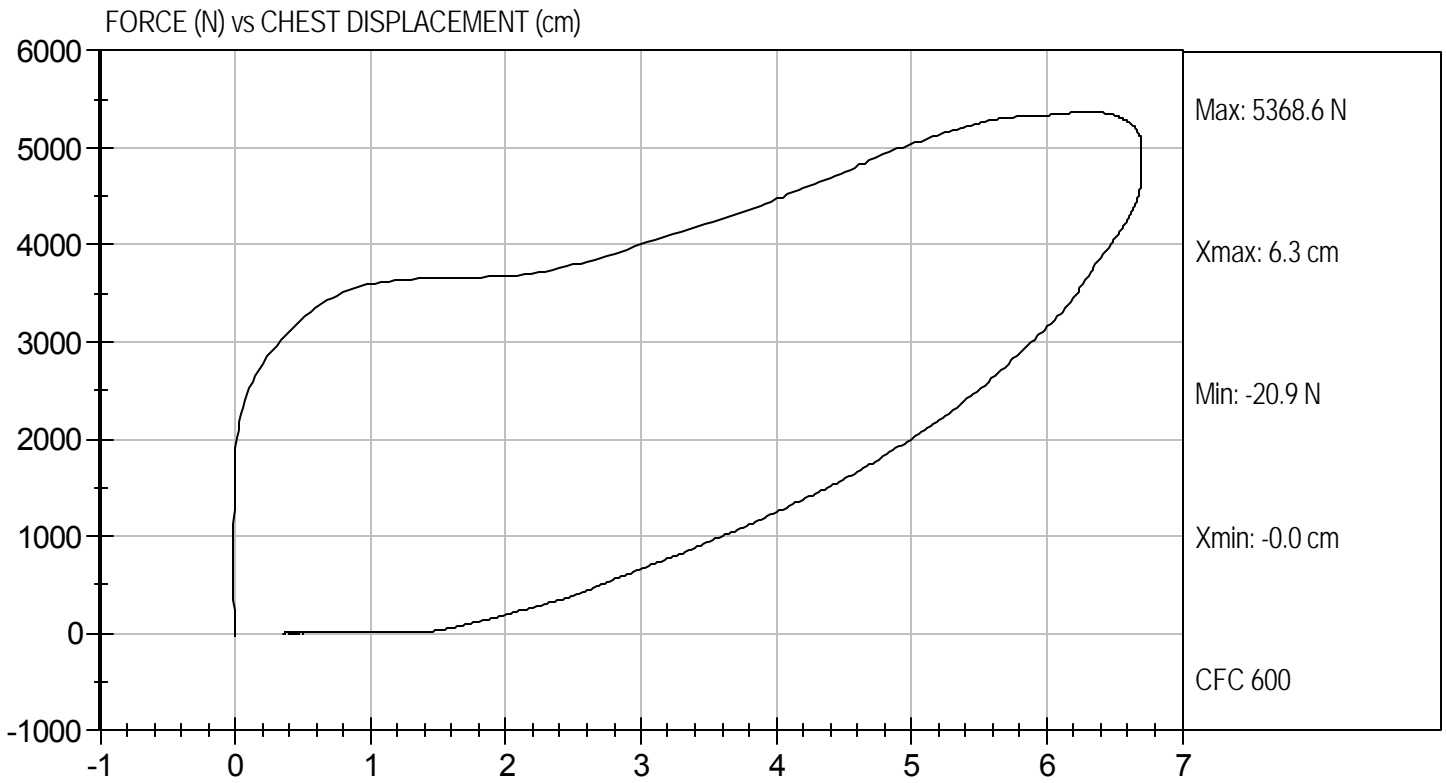
5/3/12  
Test Date

  
Approved By



Test Desc: Thorax Impact  
Component ID: D121614

Test Date: 5/3/12  
Velocity: 21.93 ft/s, 6.68 m/s



**MGA RESEARCH CORPORATION  
RIGHT KNEE IMPACT TEST  
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test I.D: D121615

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,838	Pass
Overall Test Results				Pass

Jessica Hall  
Laboratory Technician

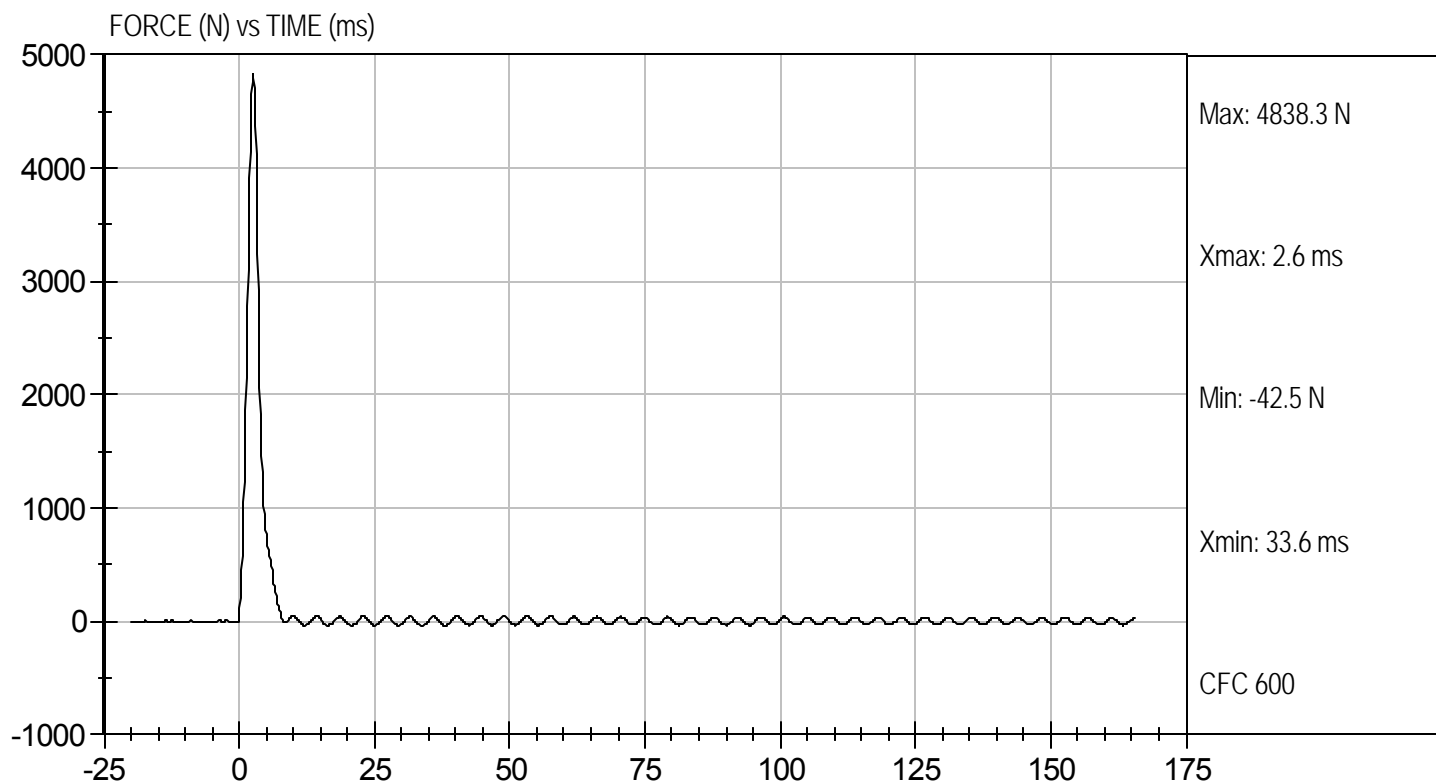
5/3/12  
Test Date

David Winkelbauer  
Approved By



Test Desc: Right Knee  
Component ID: D121615

Test Date: 5/3/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**LEFT KNEE IMPACT TEST**  
**HYBRID III 50TH PERCENTILE MALE**


ATD Serial No: 036

Test I.D: D121616

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	47	Pass
Probe Velocity	m/s	2.07 to 2.13	2.12	Pass
Peak Probe Force	Newtons	4715 to 5782	4,957	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

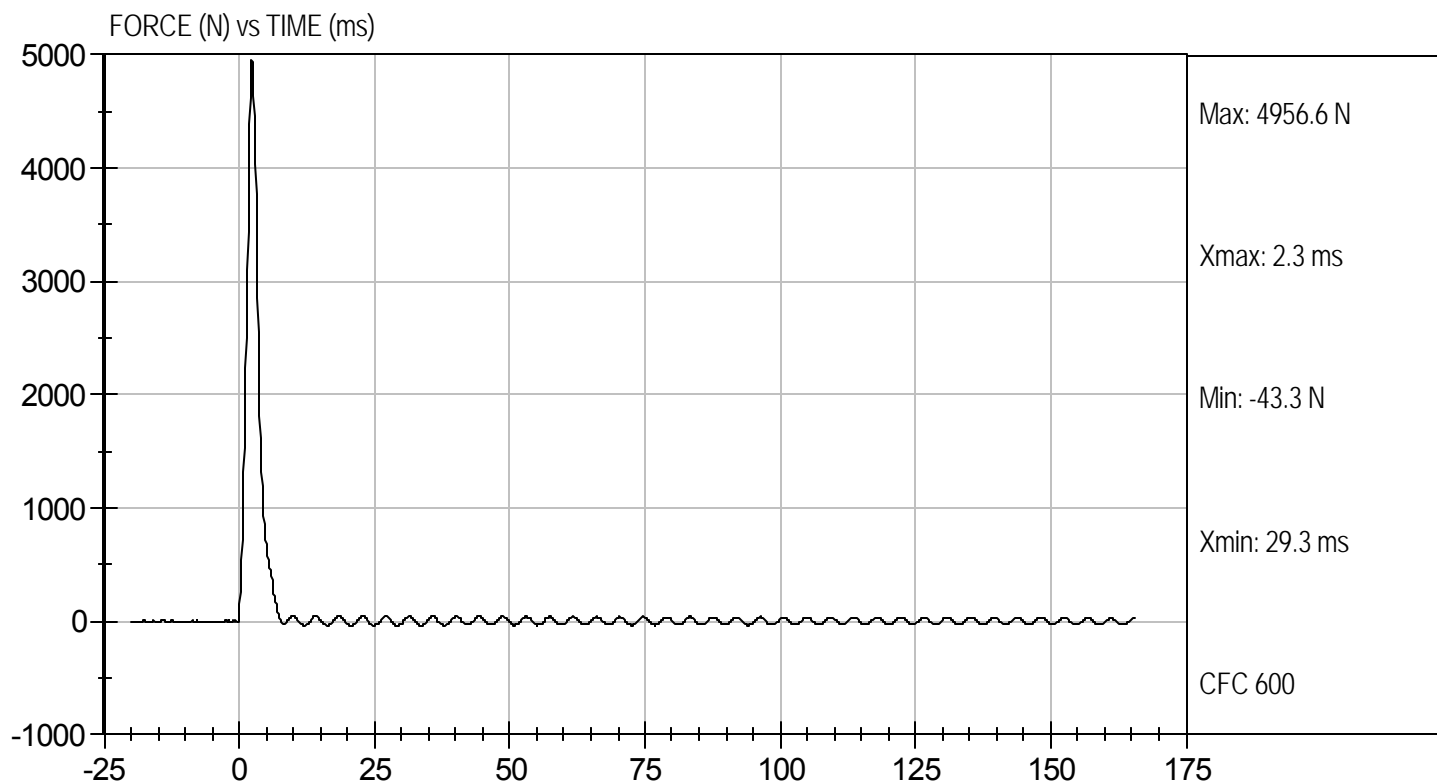
5/3/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Left Knee  
Component ID: D121616

Test Date: 5/3/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION  
HIP-FEMUR FLEXION TEST  
HYBRID III 50TH PERCENTILE MALE**

ATD Serial No: 036

Test I.D: D121610

Tested Parameter	Units	Specification	Result		Pass/Fail
			Right	Left	
Laboratory Temperature	deg C	18.9 to 25.6	21.1	21.1	Pass
Laboratory Relative Humidity	%	10 to 70	50	50	Pass
Rotation Rate	deg/s	5.0 -10.0	6.2	6.2	Pass
30 Degrees	Nm	94.9 Nm Max	91.9	75.2	Pass
150 ft-lbf / 203.4 Nm	Deg	40.0 - 50.0 Degree Max Rotation	44.0	45.3	Pass
Overall Test Results					Pass

Jessica Hall  
Laboratory Technician

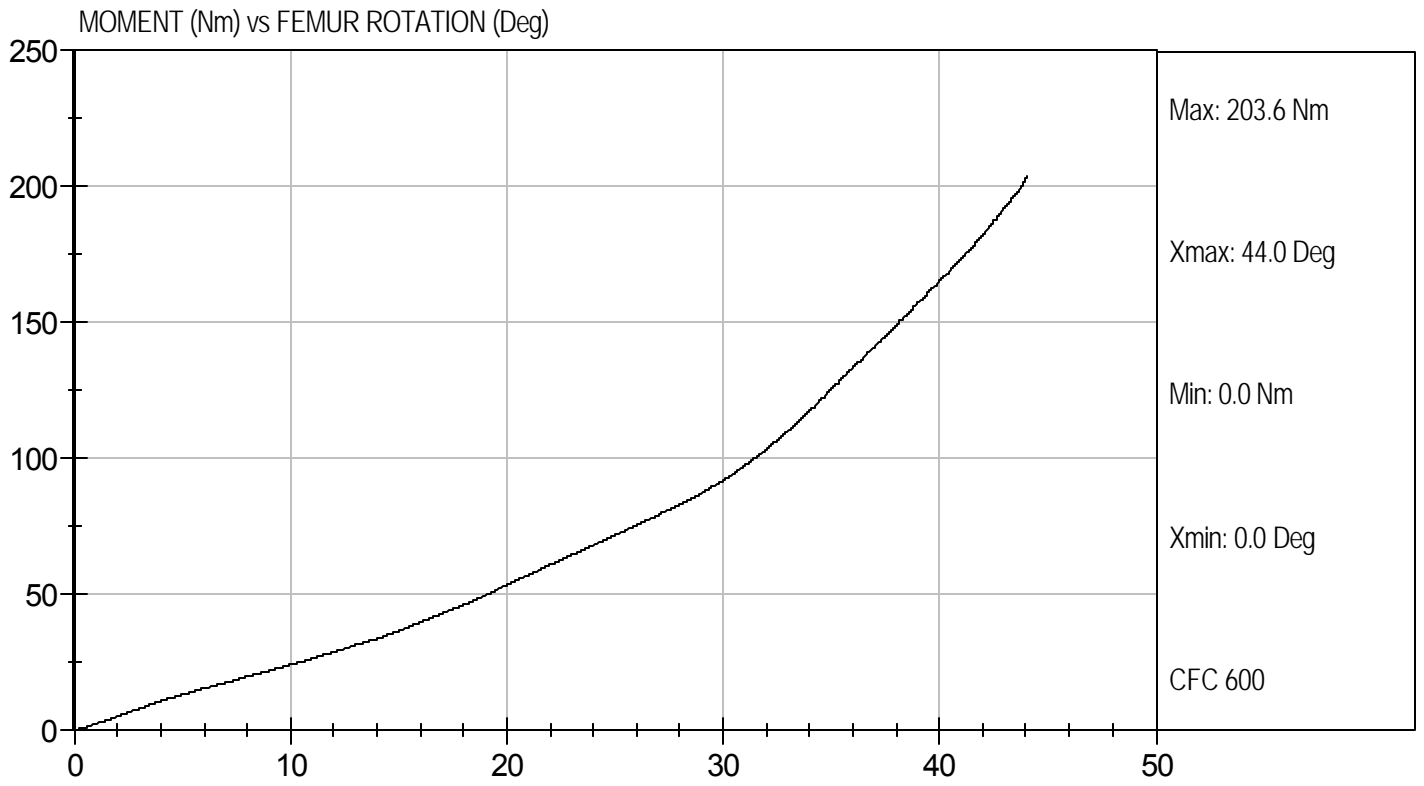
5/3/12  
Test Date

David Winkelbauer  
Approved By



Test Desc: Hip Femur Flexion  
Component ID: D121619

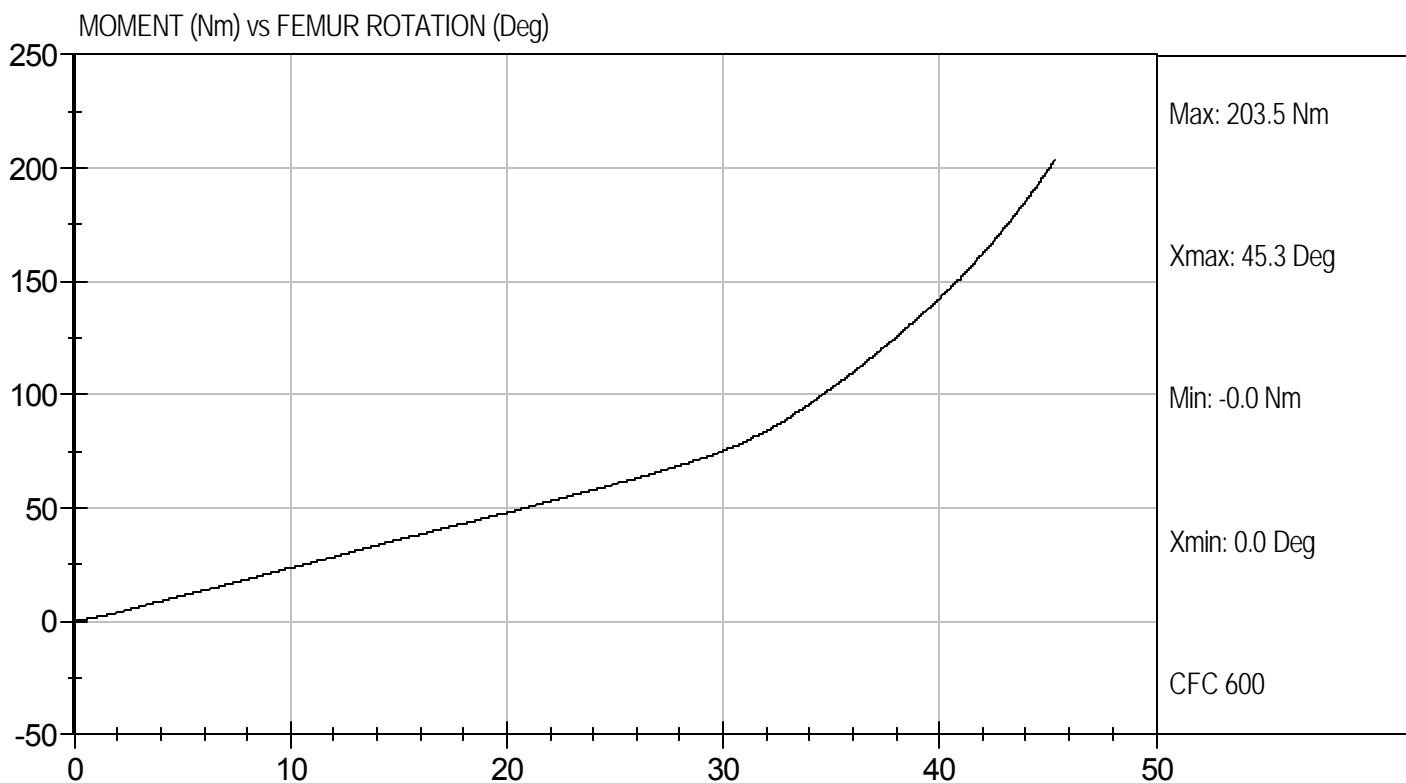
Test Date: 5/3/12  
Velocity: 0 ft/s, 0.00 m/s





Test Desc: Hip Femur Flexion  
Component ID: D121610

Test Date: 5/3/12  
Velocity: 0 ft/s, 0.00 m/s



**Hybrid III, 5th External Measurements  
SN: 634**

HYBRID III, PART 572, SUBPART O EXTERNAL DIMENSIONS				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
A	TOTAL SITTING HEIGHT	Seat surface to highest point on top of the head.	774.7-800.1	784.6
B	SHOULDER PIVOT HEIGHT	Centerline of shoulder pivot bolt to the seat surface.	431.8-457.2	449.0
C	H-POINT HEIGHT	Reference	81.3-86.3	85.0
D	H-POINT LOCATION FROM BACKLINE	Reference	144.8-149.8	145.0
E	SHOULDER PIVOT FROM BACKLINE	Center of the shoulder clevis to the rear vertical surface of the fixture.	68.6-83.8	79.2
F	THIGH CLEARANCE	Measured at the highest point on the upper femur segment.	119.4-134.6	125.6
G	BACK OF ELBOW TO WRIST PIVOT	back of the elbow flesh to the wrist pivot in line with the elbow and wrist pivots	243.9-259.1	253.4
H	HEAD BACK TO BACKLINE	Back of Skull cap skin to seat rear vertical surface (Reference)	43.2-48.2	45.0
I	SHOULDER TO- ELBOW LENGTH	Measure from the highest point on top of the shoulder clevis to the lowest part of the flesh on the elbow in line with the elbow pivot bolt.	276.8-297.2	277.8
J	ELBOW REST HEIGHT	Measure from the flesh below the elbow pivot bolt to the seat surface.	182.8-203.2	197.5
K	BUTTOCK TO KNEE LENGTH	The forward most part of the knee flesh to the rear vertical surface of the fixture.	520.7-546.1	541.4
L	POPLITEAL HEIGHT	Seat surface to the plane of the horizontal plane of the bottom of the feet.	355.6-376.0	362.1
M	KNEE PIVOT HEIGHT	Centerline of knee pivot bolt to the horizontal plane of the bottom of the feet.	393.7-419.1	400.4
N	BUTTOCK POPLITEAL LENGTH	The rearmost surface of the lower leg to the same point on the rear surface of the buttocks used for dim. "K".	414-439.4	428.6

HYBRID III, SUBPART O EXTERNAL DIMENSIONS, continued				
DIMENSION	DESCRIPTION	DETAILS	ASSEMBLY DIMENSION (mm)	ACTUAL MEASUREMENT
O	CHEST DEPTH WITHOUT JACKET	Measured 304.8 ± 5.1 mm above seat surface	175.3-190.5	181.6
P	FOOT LENGTH	Tip of toe to rear of heel	218.5-233.7	224.7
Q	STANDING HEIGHT	(THEORETICAL)	1501.1	N/A
R	BUTTOCK TO KNEE PIVOT LENGTH	The rear surface of the buttocks to the knee pivot bolt	457.2-482.6	482.0
S	HEAD BREADTH	The widest part of the head	137.1-147.3	139.6
T	HEAD DEPTH	Back of the head to the forehead	177.8-188.0	179.2
U	HIP BREADTH	The widest part of the hip	299.7-314.9	306.1
V	SHOULDER BREADTH	Outside edges of right and left shoulder clevises	350.5-365.7	355.5
W	FOOT BREADTH	The widest part of the foot	78.8-94.0	90.0
X	HEAD CIRCUMFERENCE	Measured at the point as in dim. "T"	528.3-548.7	540.6
Y	CHEST CIRCUMFERENCE (WITH CHEST JACKET)	Measured 345.4 ± 12.7 mm above seat surface	850.9-881.3	868.7
Z	WAIST CIRCUMFERENCE	Measured 165.1 ± 5.1 mm above seat surface	759.5-789.9	786.8
AA	REFERENCE LOCATION FOR MEASUREMENT OF CHEST CIRCUMFERENCE	Reference	332.7-358.1	345.4
BB	REFERENCE LOCATION FOR MEASUREMENT OF WAIST CIRCUMFERENCE	Reference	160.1-170.2	165.1

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test ID: D12811

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Peak Resultant Acceleration	G's	250 to 300	277	Pass
Peak Lateral Acceleration	G's	+/- 15	1.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Gall  
 Laboratory Technician

3/2/12  
 Test Date

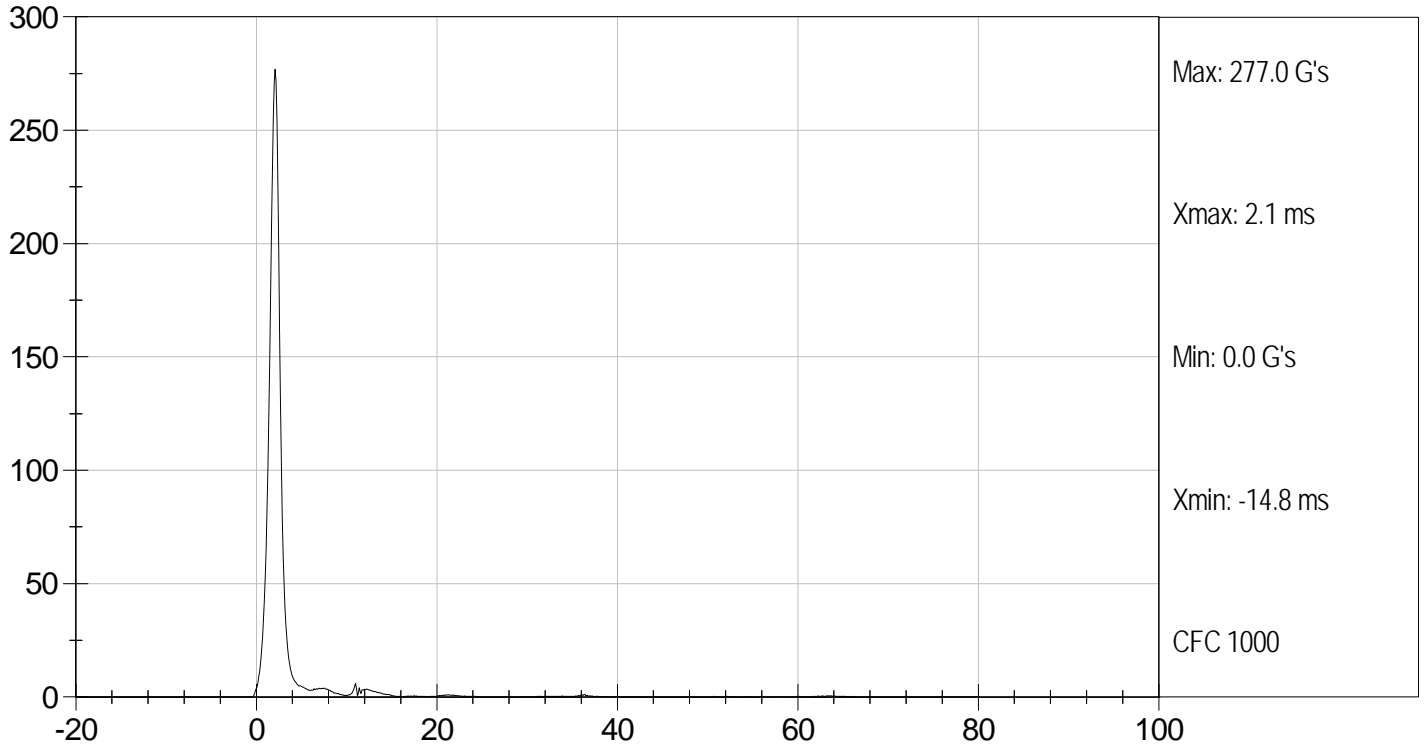
David Winkelbauer  
 Approved By



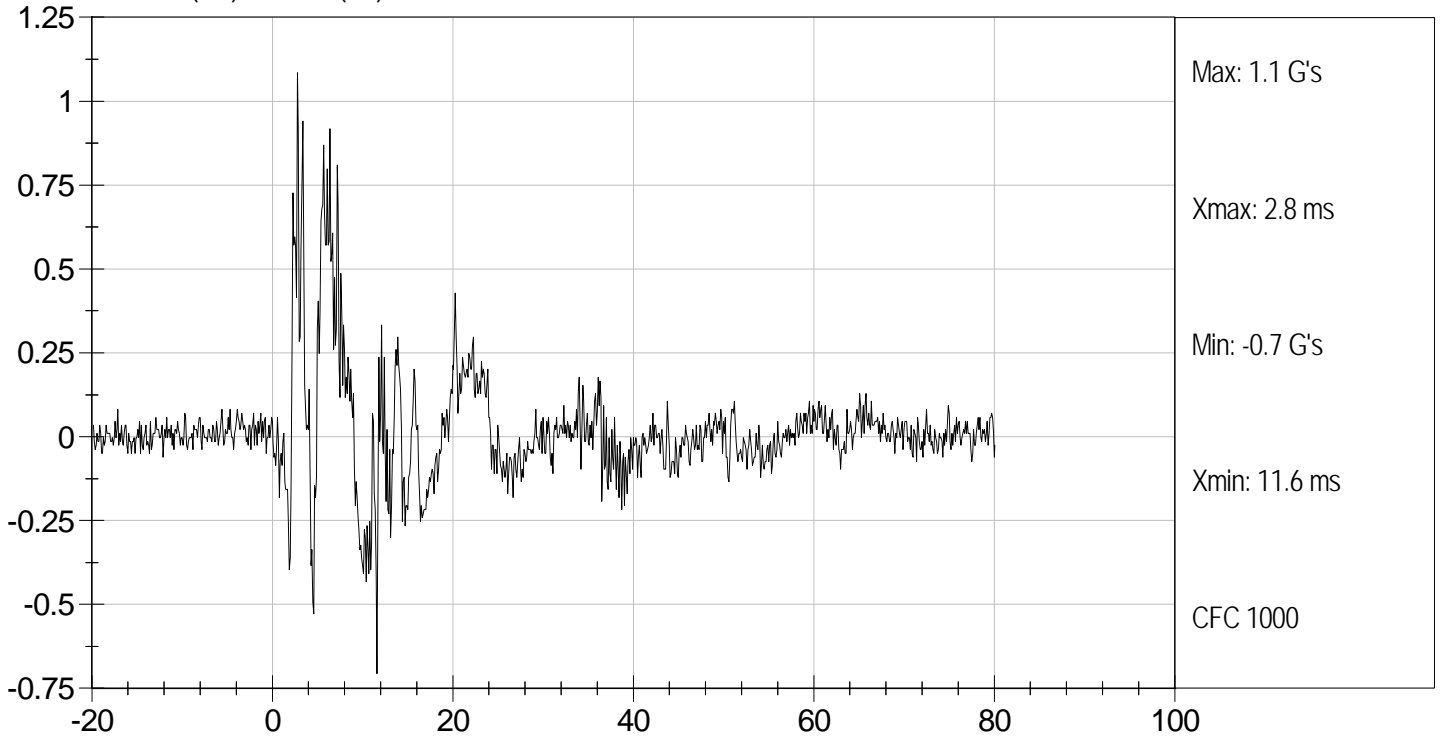
Test Desc: Head Drop  
Component ID: D12811

Test Date: 3/2/12  
Velocity: 0 ft/s, 0 m/s

RESULTANT HEAD ACCELERATION (G's) vs TIME (ms)



HEAD Y (G's) vs TIME (ms)



**MGA RESEARCH CORPORATION**  
**NECK FLEXION TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test I.D: D12812

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	33	Pass
Pendulum Speed		m/s	6.89 to 7.13	7.06	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.8	Pass
	30 ms	m/s	5.8 to 7.0	6.2	Pass
D Plane Rotation	Max	deg	77 to 91	84	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	70	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	84	Pass
				Overall Results	Pass

Jessica Hall  
 Laboratory Technician

3/2/12  
 Test Date

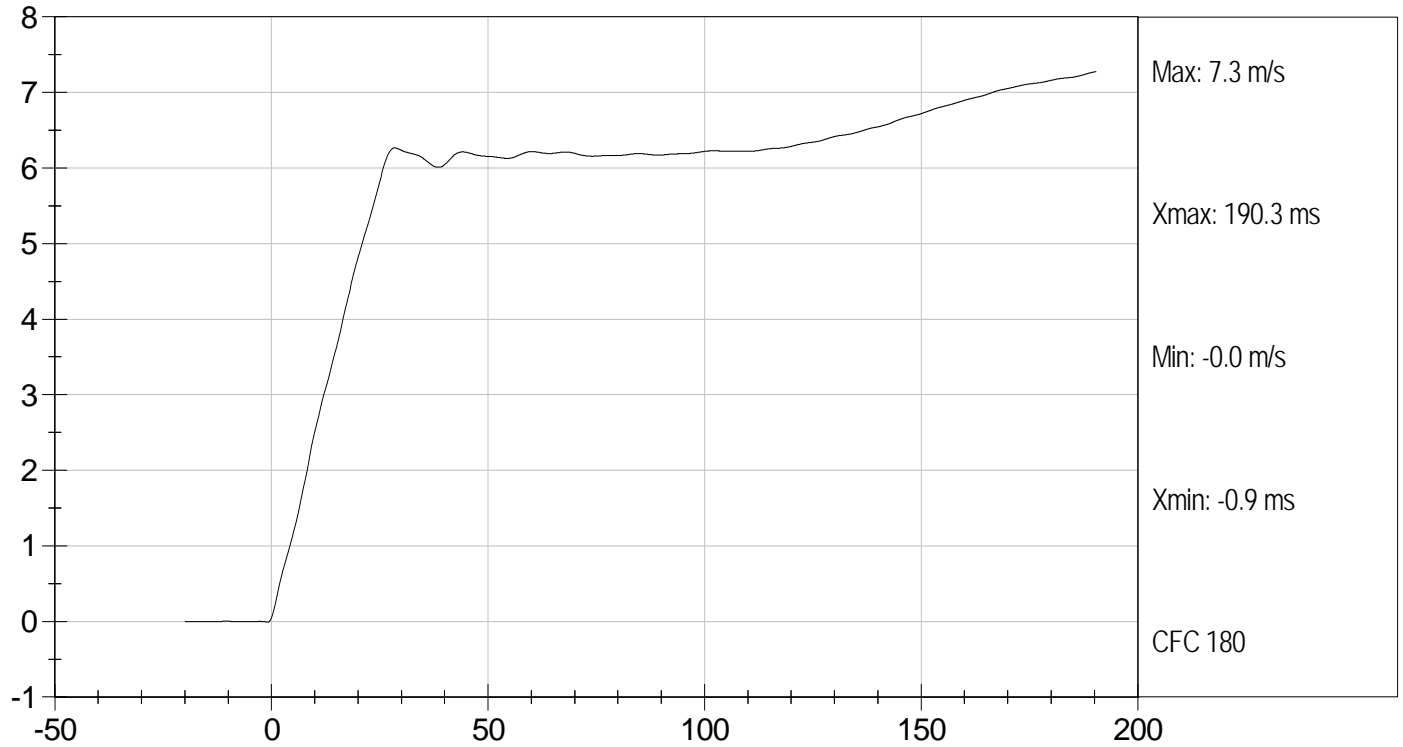
David Winkelbauer  
 Approved By



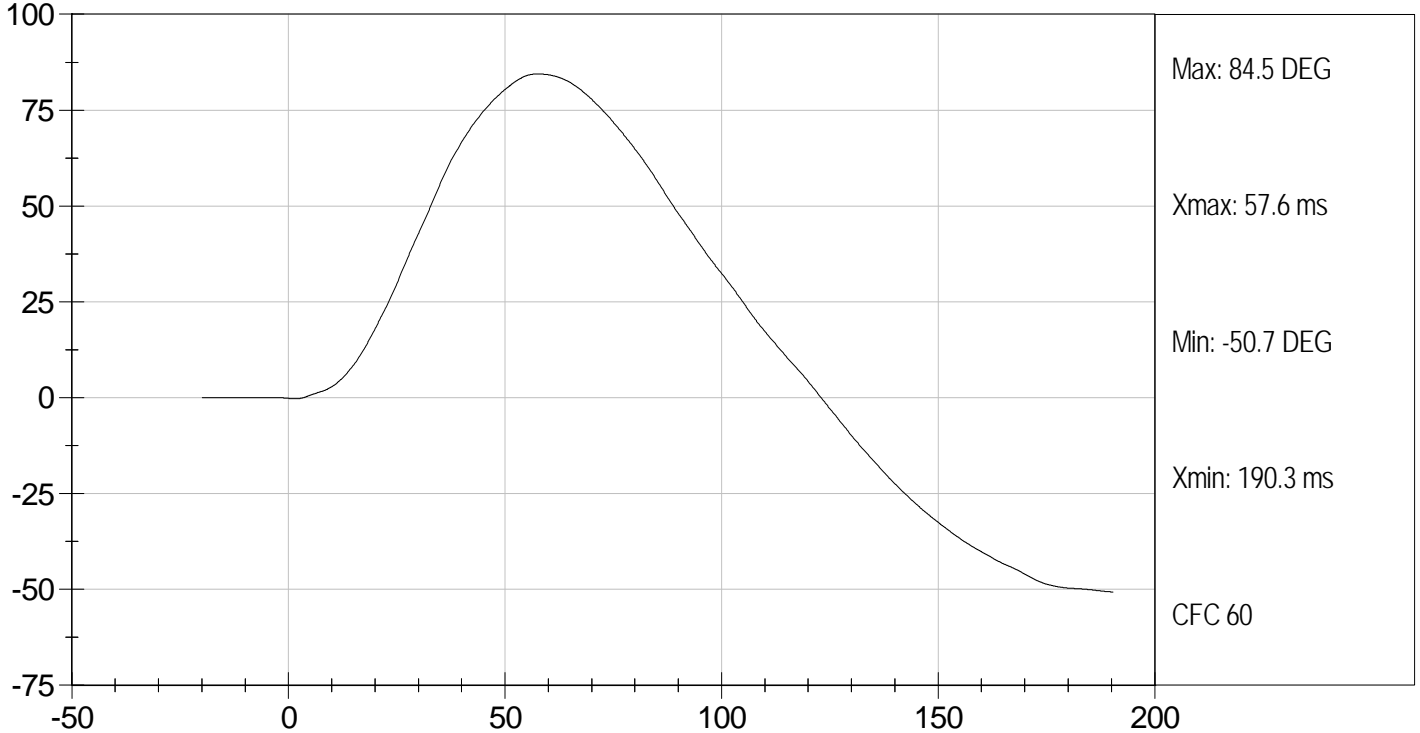
Test Desc: Neck Flexion  
Component ID: D12812

Test Date: 3/2/12  
Velocity: 23.15 ft/s, 7.06 m/s

PENDULUM VELOCITY (m/s) vs TIME (ms)



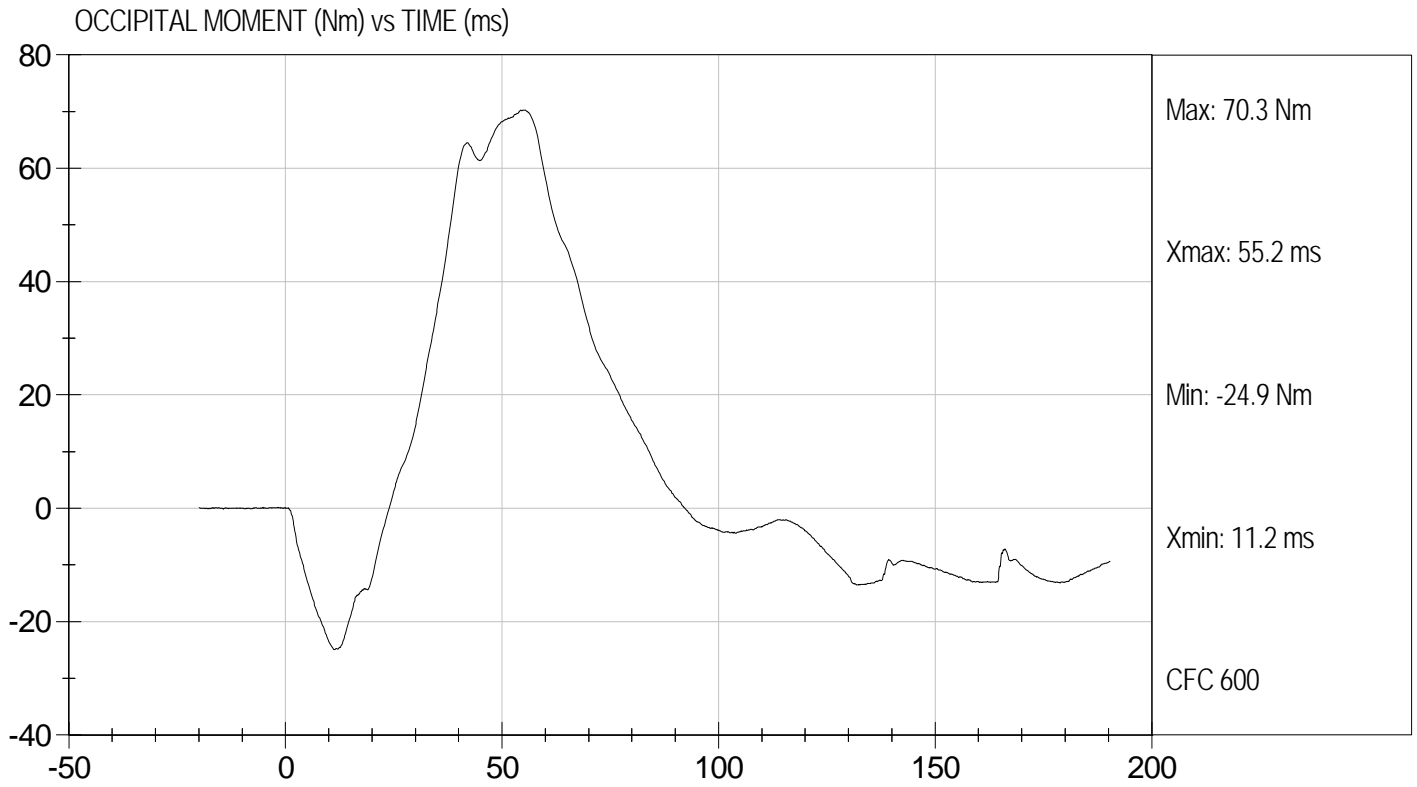
NECK ROTATION (DEG) vs TIME (ms)





Test Desc: Neck Flexion  
Component ID: D12812

Test Date: 3/2/12  
Velocity: 23.15 ft/s, 7.06 m/s



**MGA RESEARCH CORPORATION**  
**NECK EXTENSION TEST**  
**HYBRID III 5TH PERCENTILE**

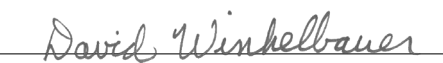
ATD Serial No: 634

Test I.D: D12813

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	33	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.12	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.9	Pass
	20 ms	m/s	3.1 to 3.9	3.6	Pass
	30 ms	m/s	4.6 to 5.6	5.2	Pass
D Plane Rotation	Max	deg	99 to 114	102	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-56	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	97	Pass
<b>Overall Results</b>					<b>Pass</b>

  
 Laboratory Technician

3/2/12  
 Test Date

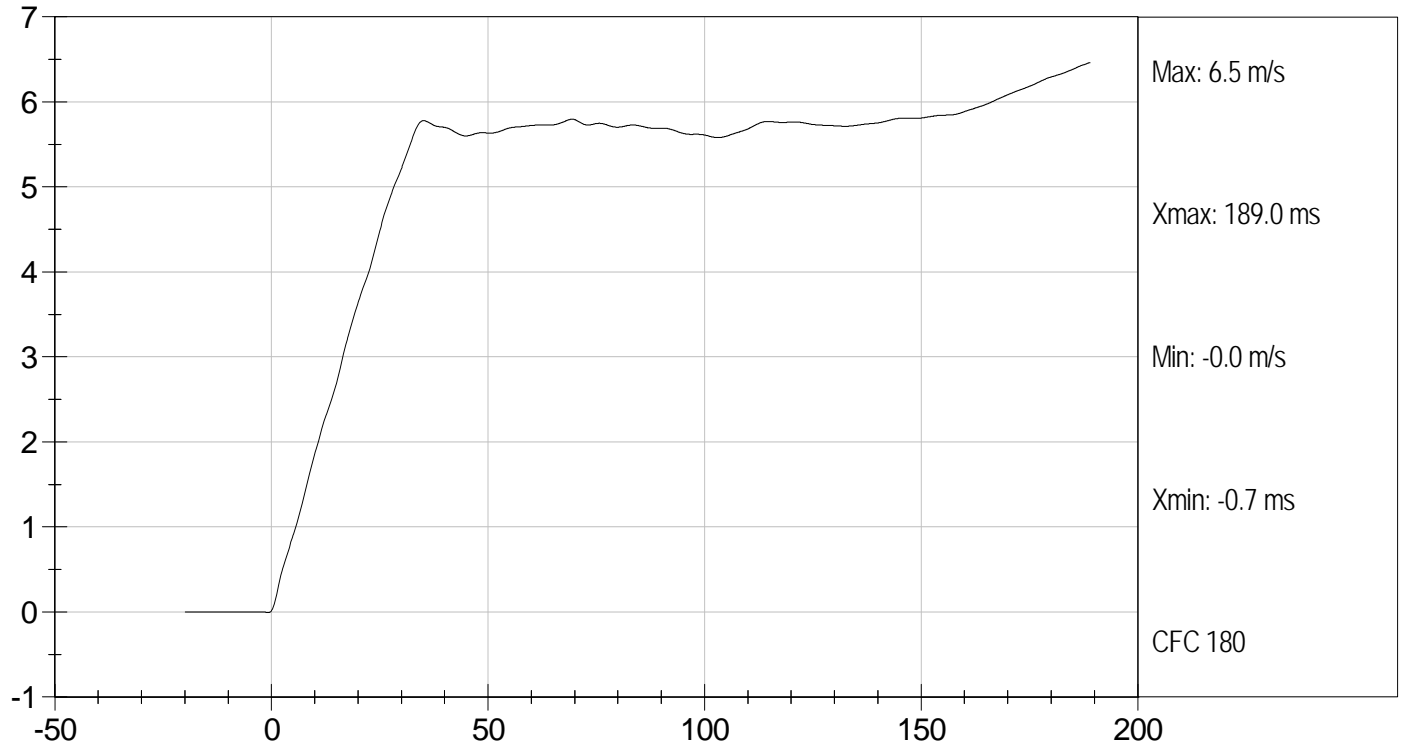
  
 Approved By



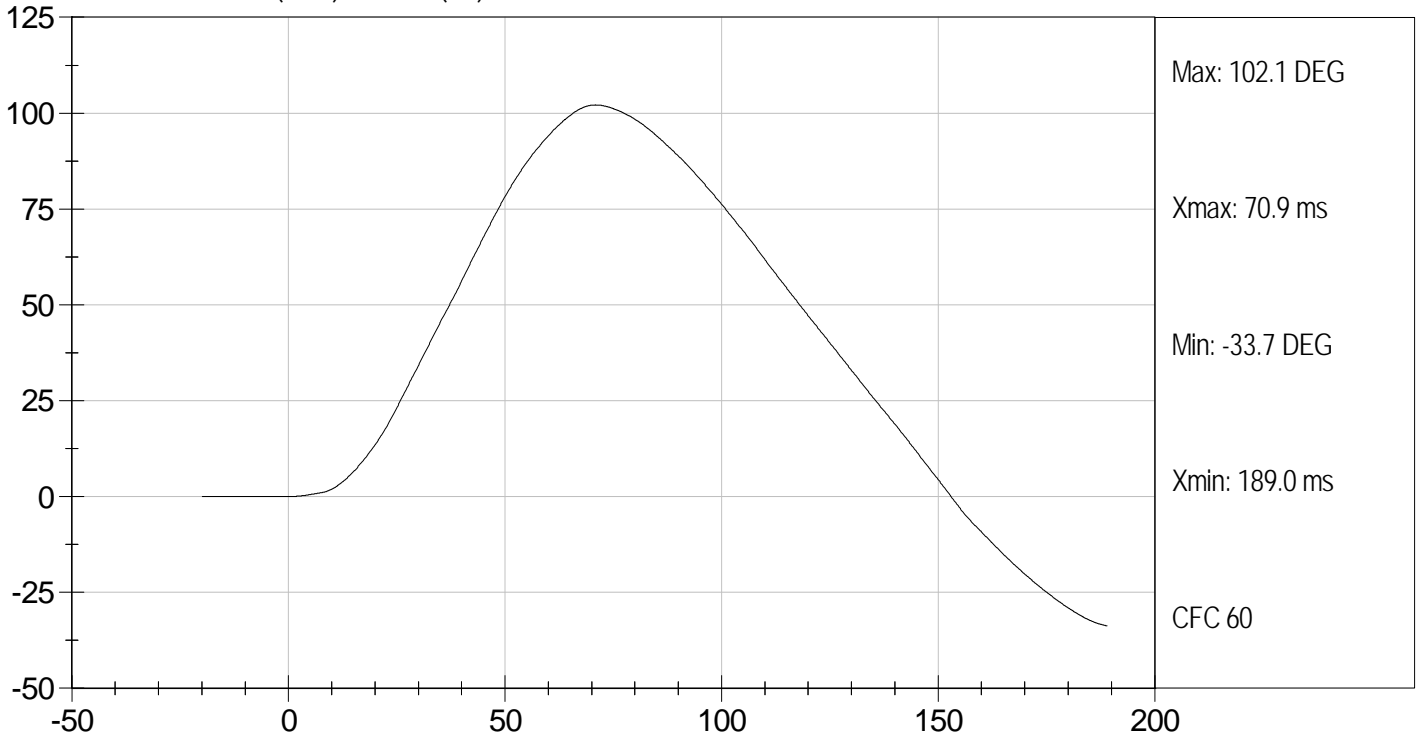
Test Desc: Neck Extension  
Component ID: D12813

Test Date: 3/2/12  
Velocity: 20.08 ft/s, 6.12 m/s

PENDULUM VELOCITY (m/s) vs TIME (ms)



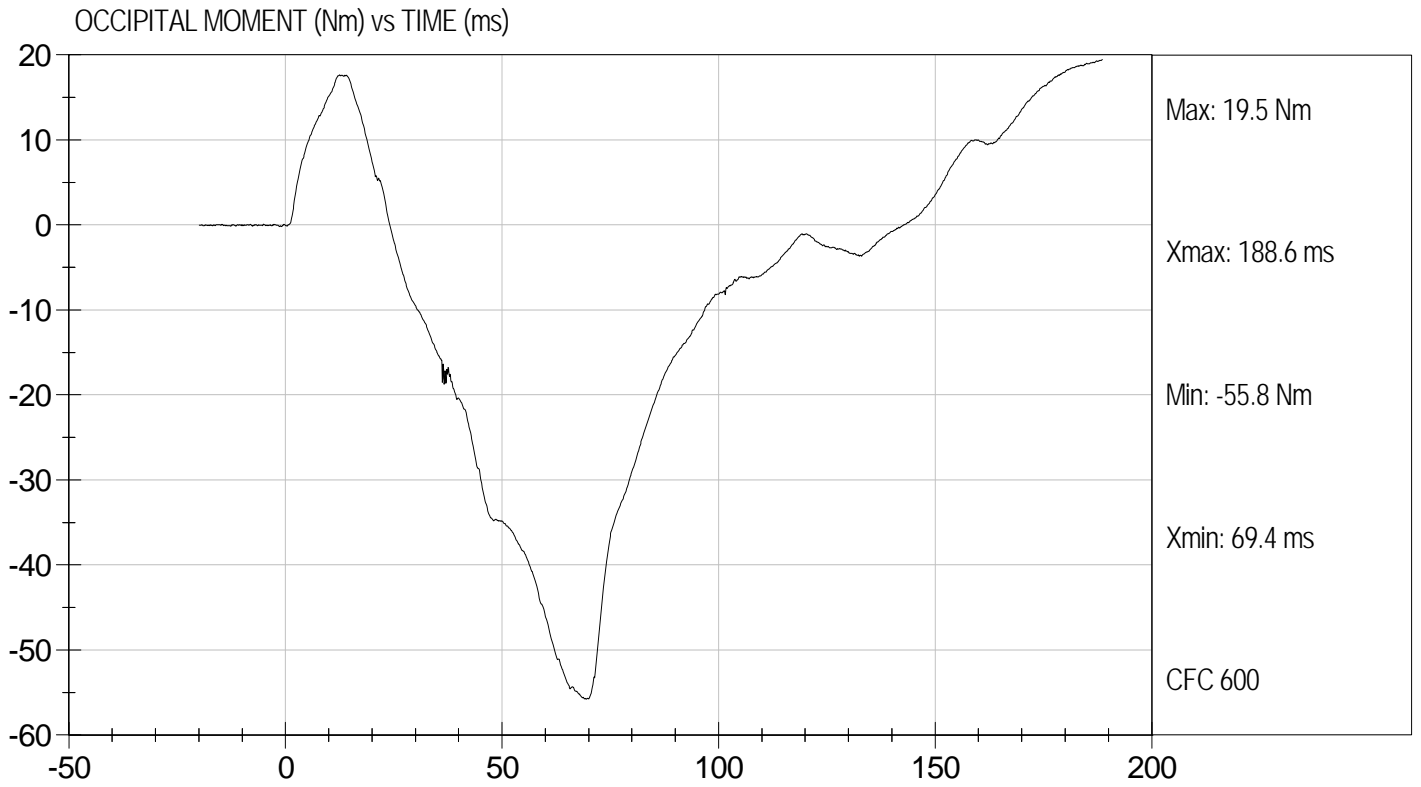
NECK ROTATION (DEG) vs TIME (ms)





Test Desc: Neck Extension  
Component ID: D12813

Test Date: 3/2/12  
Velocity: 20.08 ft/s, 6.12 m/s



**MGA RESEARCH CORPORATION**  
**THORAX IMPACT**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test I.D.: D12814

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	22.0	Pass
Relative Humidity	%	10 to 70	18	Pass
Probe Speed	m/s	6.59 to 6.83	6.77	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	4.06	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4113	Pass
Overall Test Results				Pass

  
 Laboratory Technician

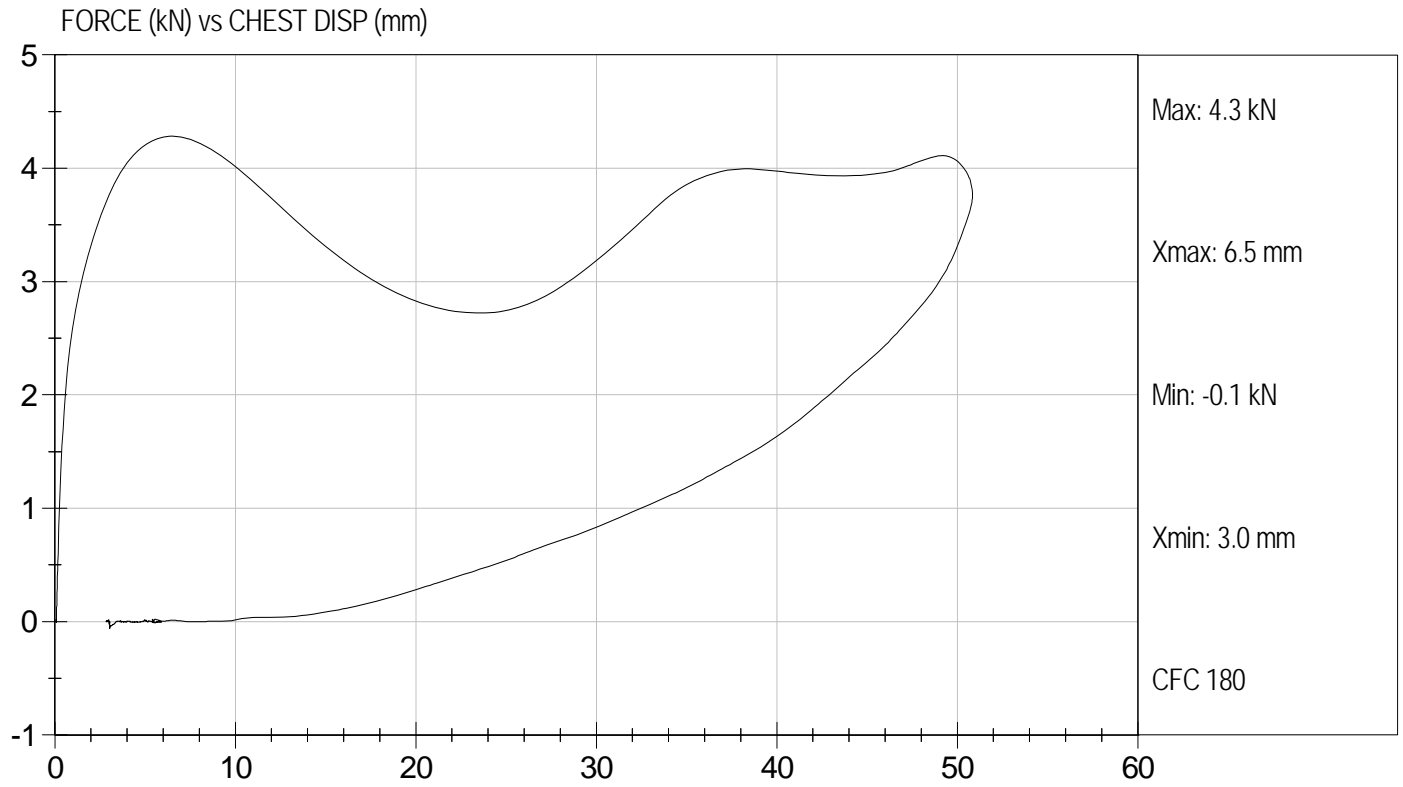
3/5/12  
 Test Date

  
 Approved By



Test Desc: Thorax Impact  
Component ID: D12814

Test Date: 3/5/12  
Velocity: 22.22 ft/s, 6.77 m/s



**MGA RESEARCH CORPORATION**  
**RIGHT KNEE IMPACT TEST**  
**HYBRID III 5TH PERCENTILE**

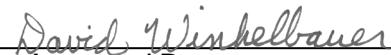
ATD Serial No: 634

Test I.D: D12815

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.93	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

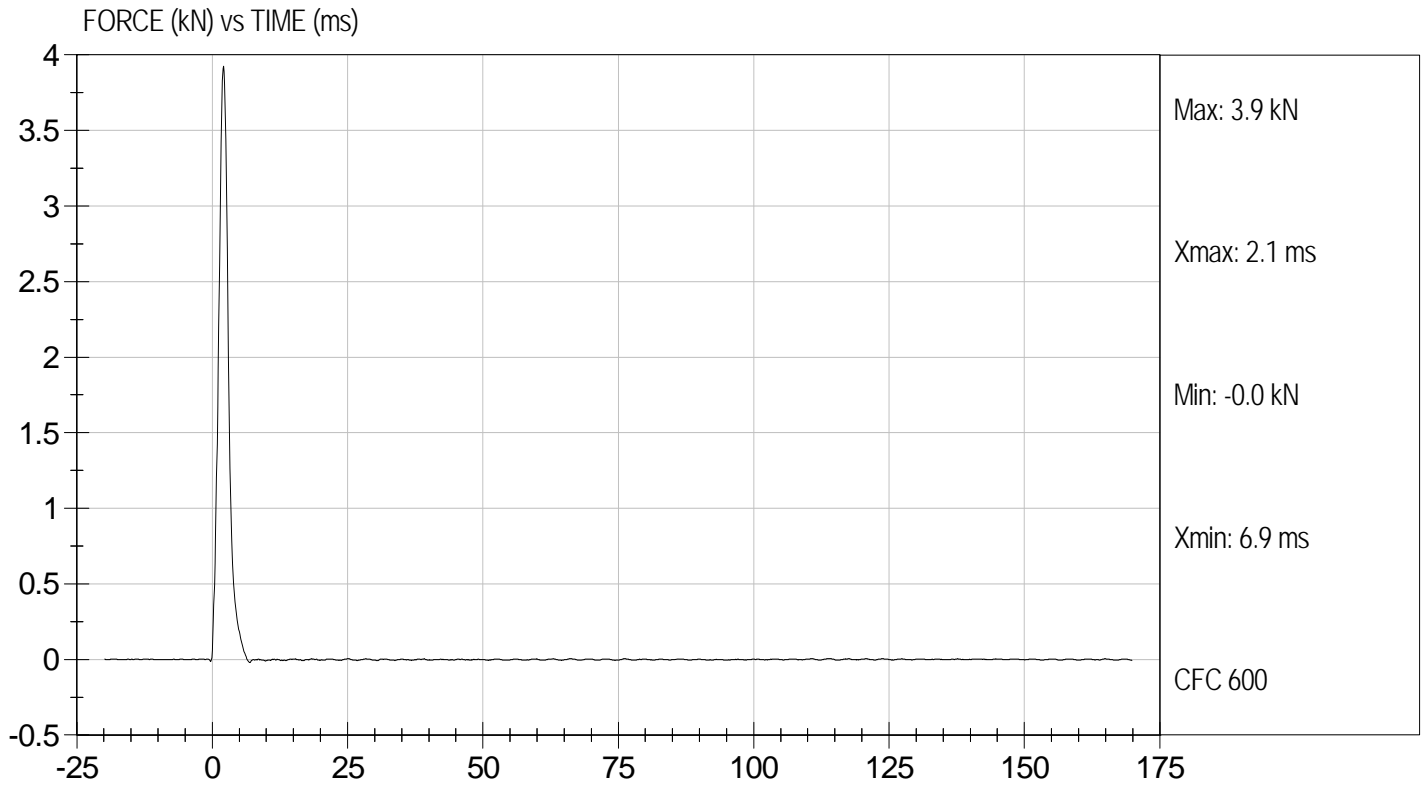
3/5/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Right Knee  
Component ID: D12815

Test Date: 3/5/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**LEFT KNEE IMPACT TEST**  
**HYBRID III 5TH PERCENTILE**

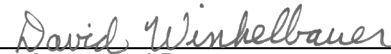
ATD Serial No: 634

Test I.D: D12816

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.7	Pass
Laboratory Relative Humidity	%	10 to 70	19	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.83	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

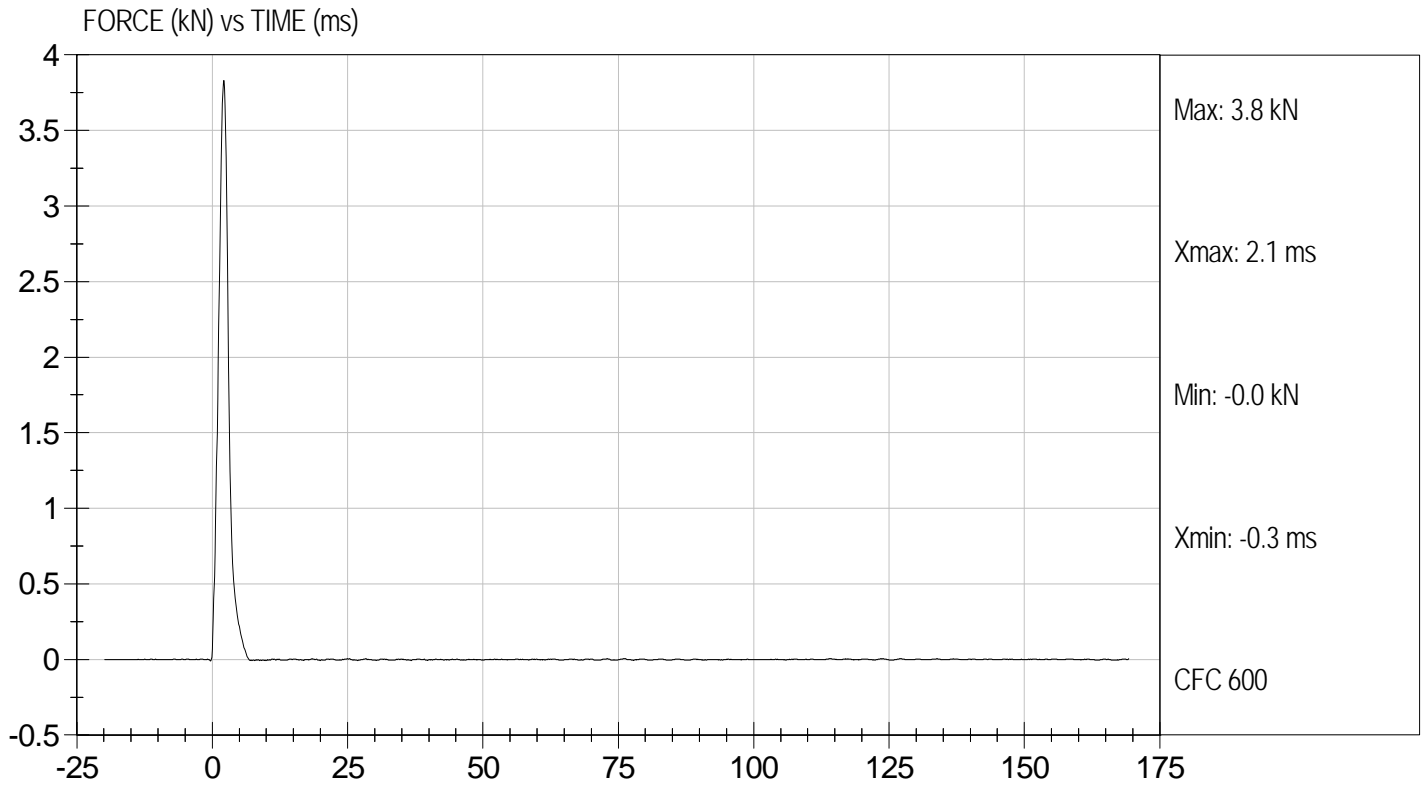
3/5/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Left Knee  
Component ID: D12816

Test Date: 3/5/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**TORSO FLEXION TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test I.D.: D12817

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.6	Pass
Laboratory Relative Humidity	%	10 to 70	34	Pass
Initial Angle	deg	0 to 20	18	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	382	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass

  
 Laboratory Technician

3/2/12  
 Test Date

  
 Approved By

**MGA RESEARCH CORPORATION**  
**HEAD DROP TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test ID: D121621

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	20.9	Pass
Laboratory Relative Humidity	%	10 to 70	37	Pass
Peak Resultant Acceleration	G's	250 to 300	270	Pass
Peak Lateral Acceleration	G's	+/- 15	-7.1	Pass
Unimodal	N/A	Yes	Yes	Pass
Oscillations	N/A	within 10% of peak	Yes	Pass
Overall Test Results				Pass

Jessica Hall  
 Laboratory Technician

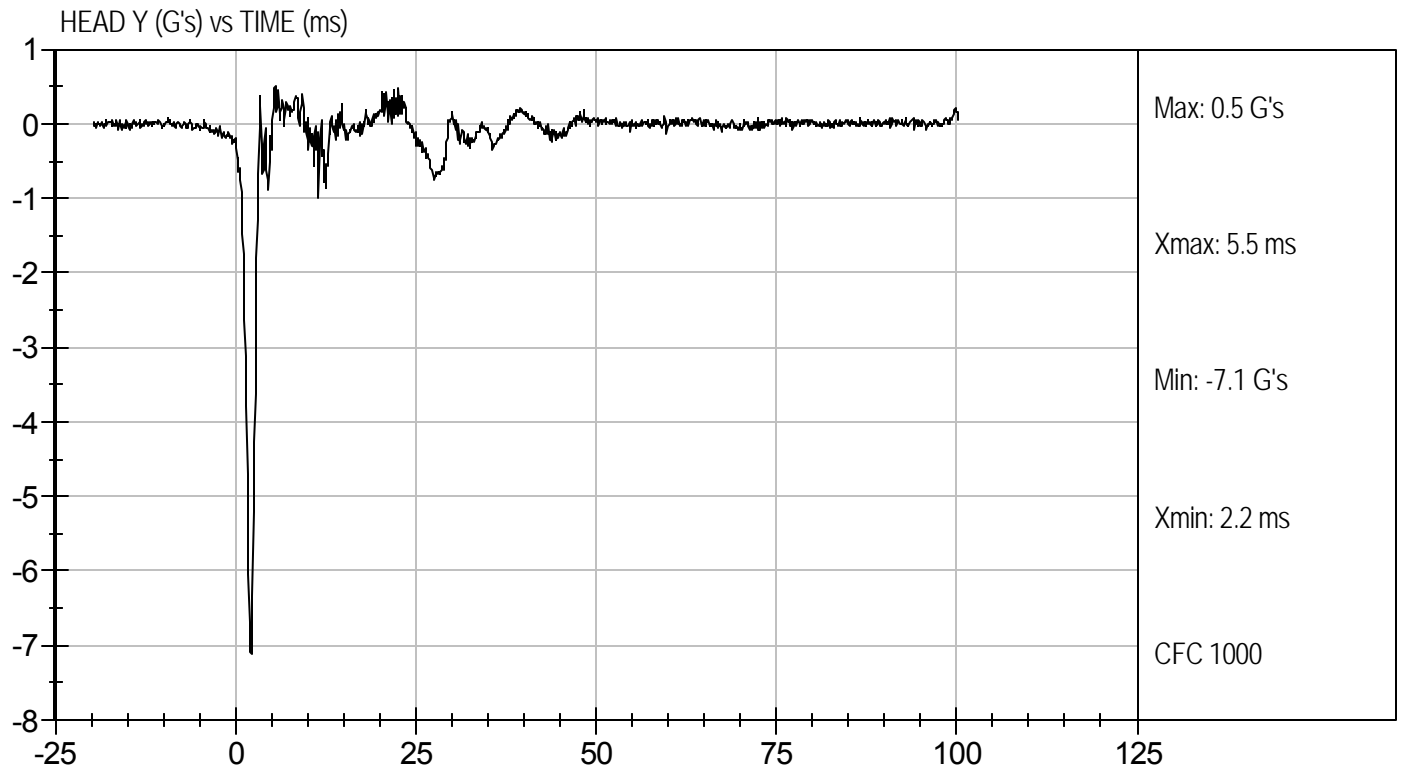
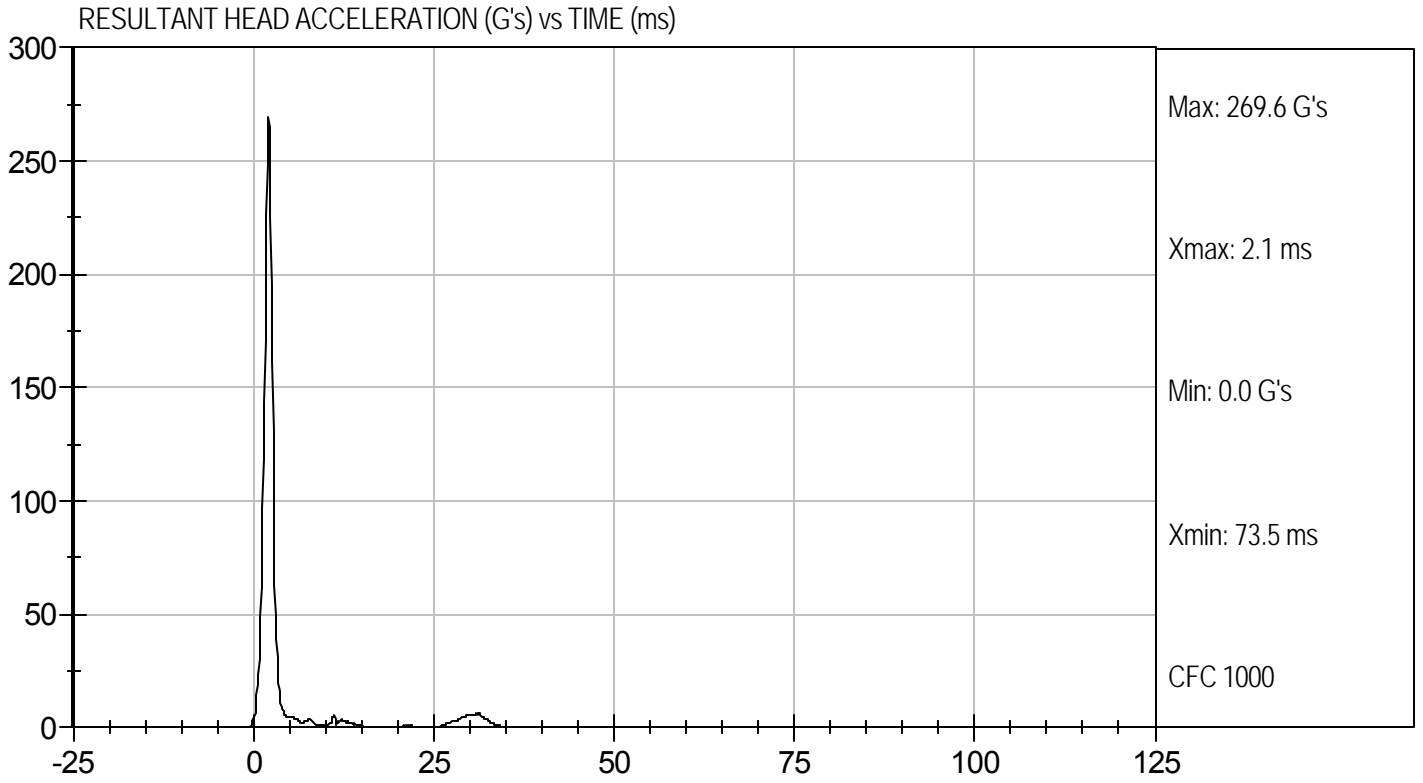
5/3/12  
 Test Date

David Winkelbauer  
 Approved By



Test Desc: Head Drop  
Component ID: D121621

Test Date: 5/3/12  
Velocity: 0 ft/s, 0 m/s



**MGA RESEARCH CORPORATION**  
**NECK FLEXION TEST**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test I.D.: D121622

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Speed		m/s	6.89 to 7.13	6.96	Pass
Pendulum Pulse	10 ms	m/s	2.1 to 2.5	2.5	Pass
	20 ms	m/s	4.0 to 5.0	4.6	Pass
	30 ms	m/s	5.8 to 7.0	6.3	Pass
D Plane Rotation	Max	deg	77 to 91	86	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	69 to 83	69	Pass
Positive Moment Time Curve Decay to 10 Nm		ms	80 to 100	87	Pass
				Overall Results	Pass

Jessica Hall  
 Laboratory Technician

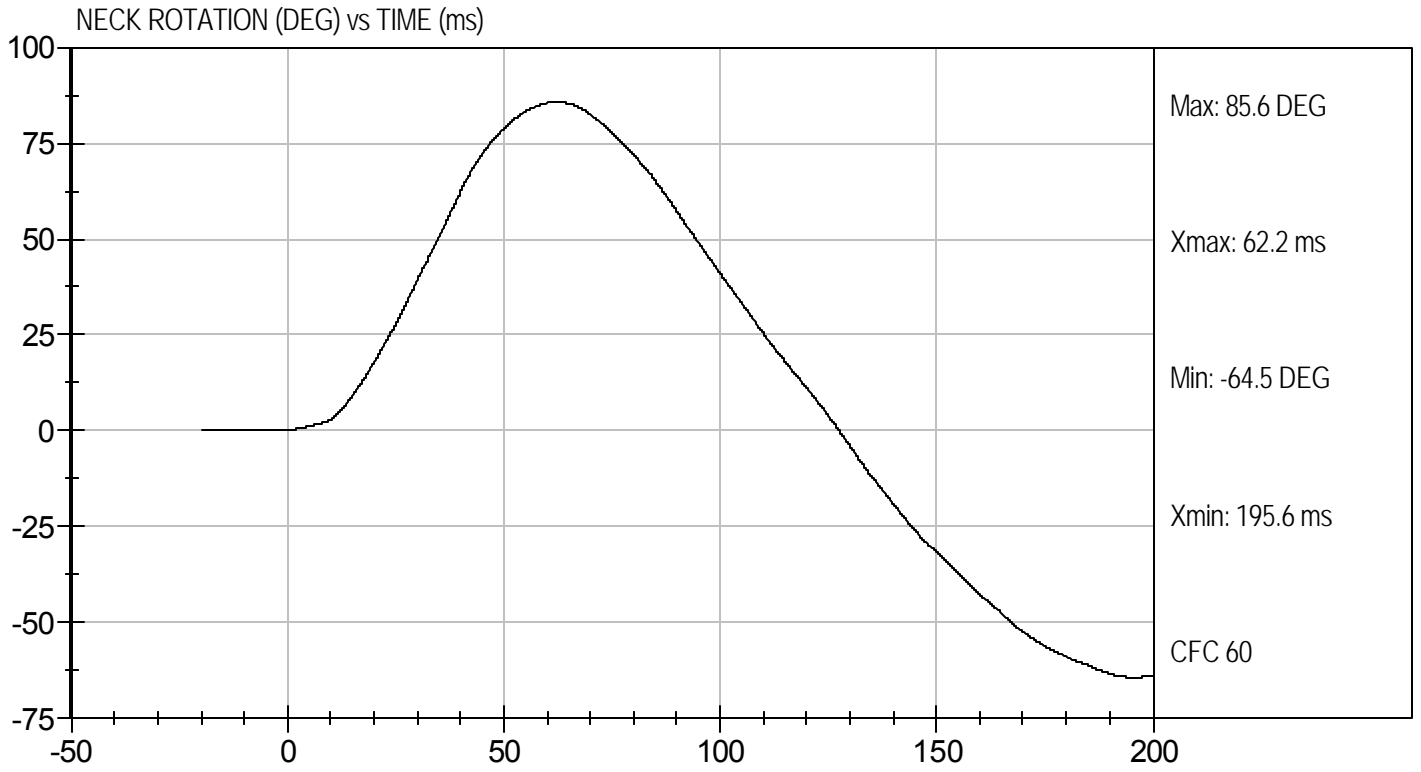
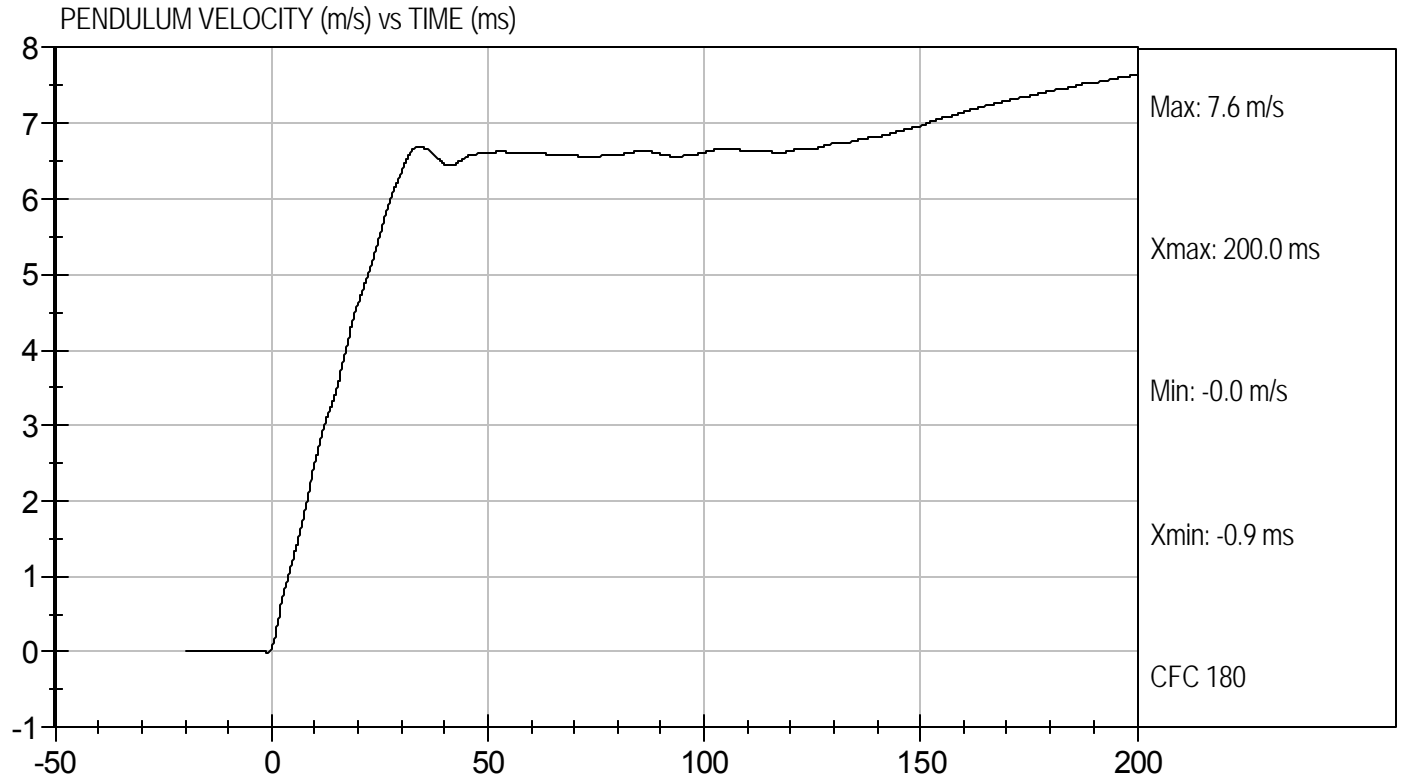
5/3/12  
 Test Date

David Winkelbauer  
 Approved By



Test Desc: Neck Flexion  
Component ID: D121622

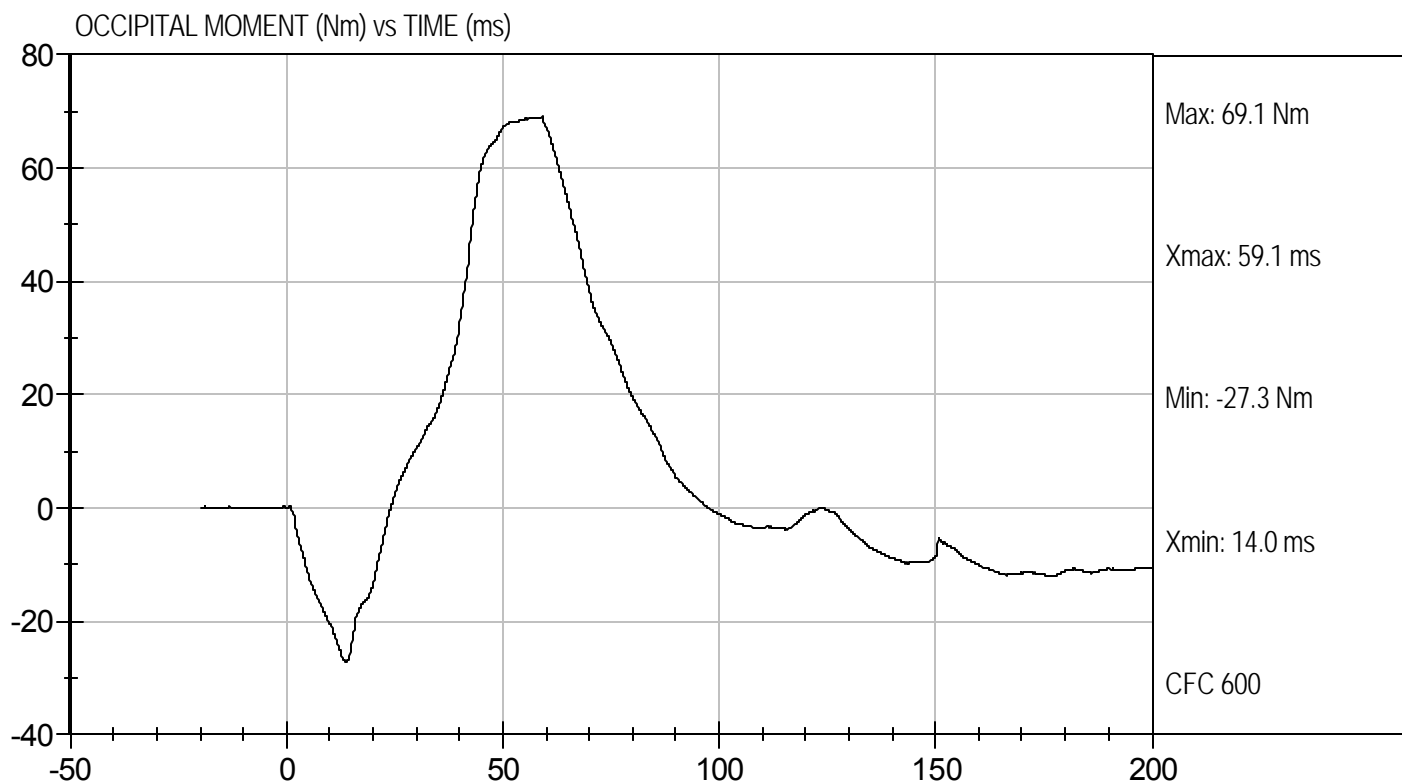
Test Date: 5/3/12  
Velocity: 22.83 ft/s, 6.96 m/s





Test Desc: Neck Flexion  
Component ID: D121622

Test Date: 5/3/12  
Velocity: 22.83 ft/s, 6.96 m/s




**MGA RESEARCH CORPORATION**  
**NECK EXTENSION TEST**  
**HYBRID III 5TH PERCENTILE**

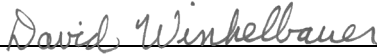
ATD Serial No: 634

Test I.D.: D121623

Tested Parameter		Units	Specification	Result	Pass/Fail
Laboratory Temperature		deg C	20.6 to 22.2	21.0	Pass
Laboratory Relative Humidity		%	10 to 70	50	Pass
Pendulum Speed		m/s	5.95 to 6.19	6.16	Pass
Pendulum Pulse	10 ms	m/s	1.5 to 1.9	1.8	Pass
	20 ms	m/s	3.1 to 3.9	3.7	Pass
	30 ms	m/s	4.6 to 5.6	5.3	Pass
D Plane Rotation	Max	deg	99 to 114	105	Pass
Occipital Condyle Moment within Deflection Corridor		Nm	-65 to -53	-62	Pass
Negative Moment Time Curve Decay to -10 Nm		ms	94 to 114	96	Pass
Overall Results					Pass

  
 Laboratory Technician

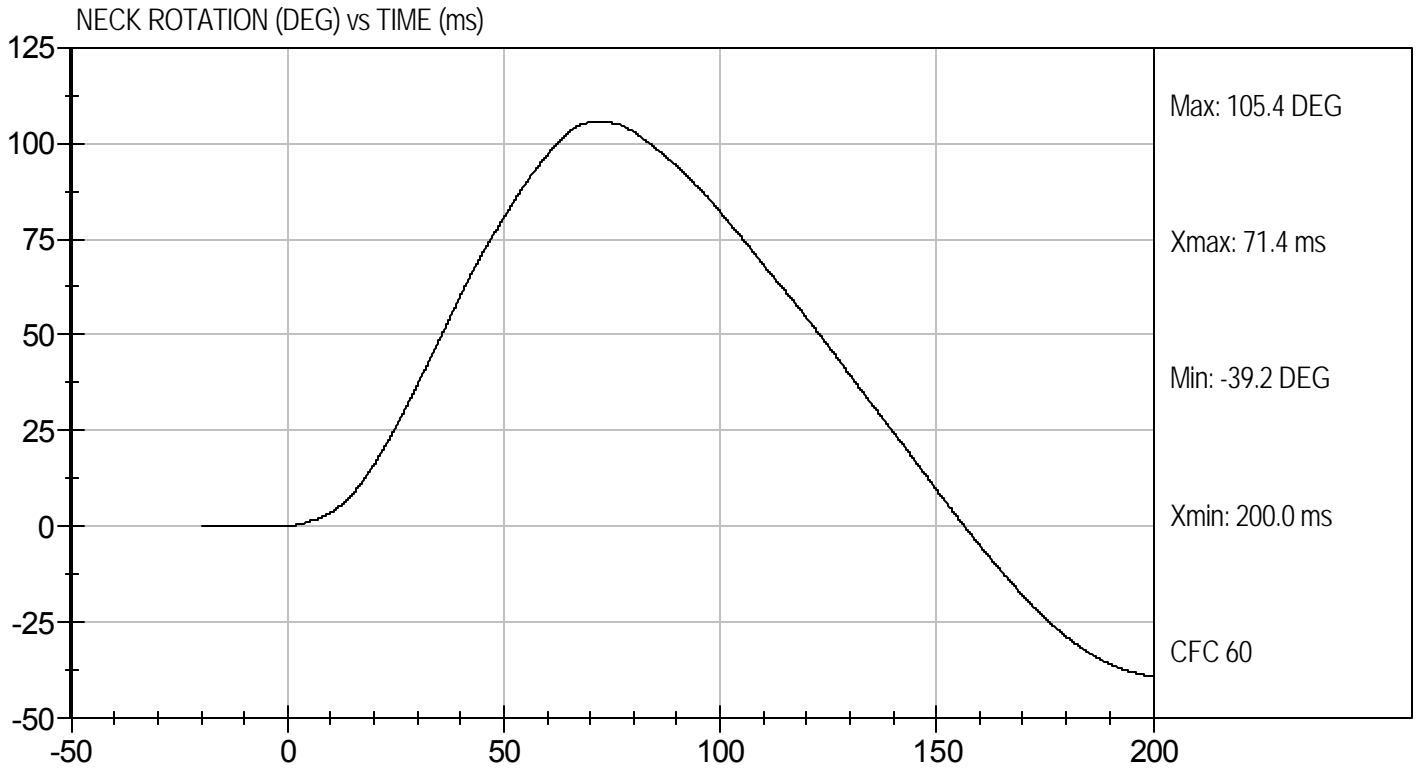
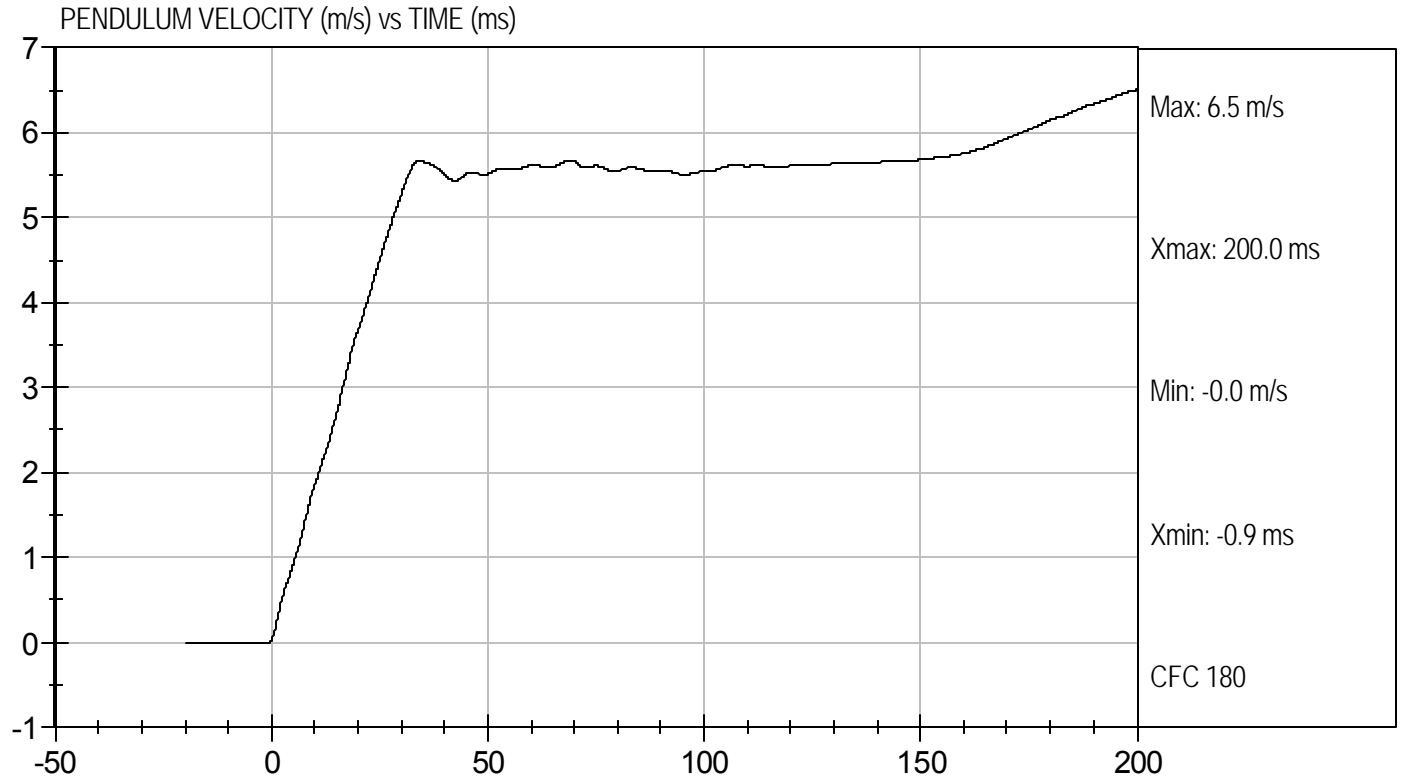
5/3/12  
 Test Date

  
 Approved By



Test Desc: Neck Extension  
Component ID: D121623

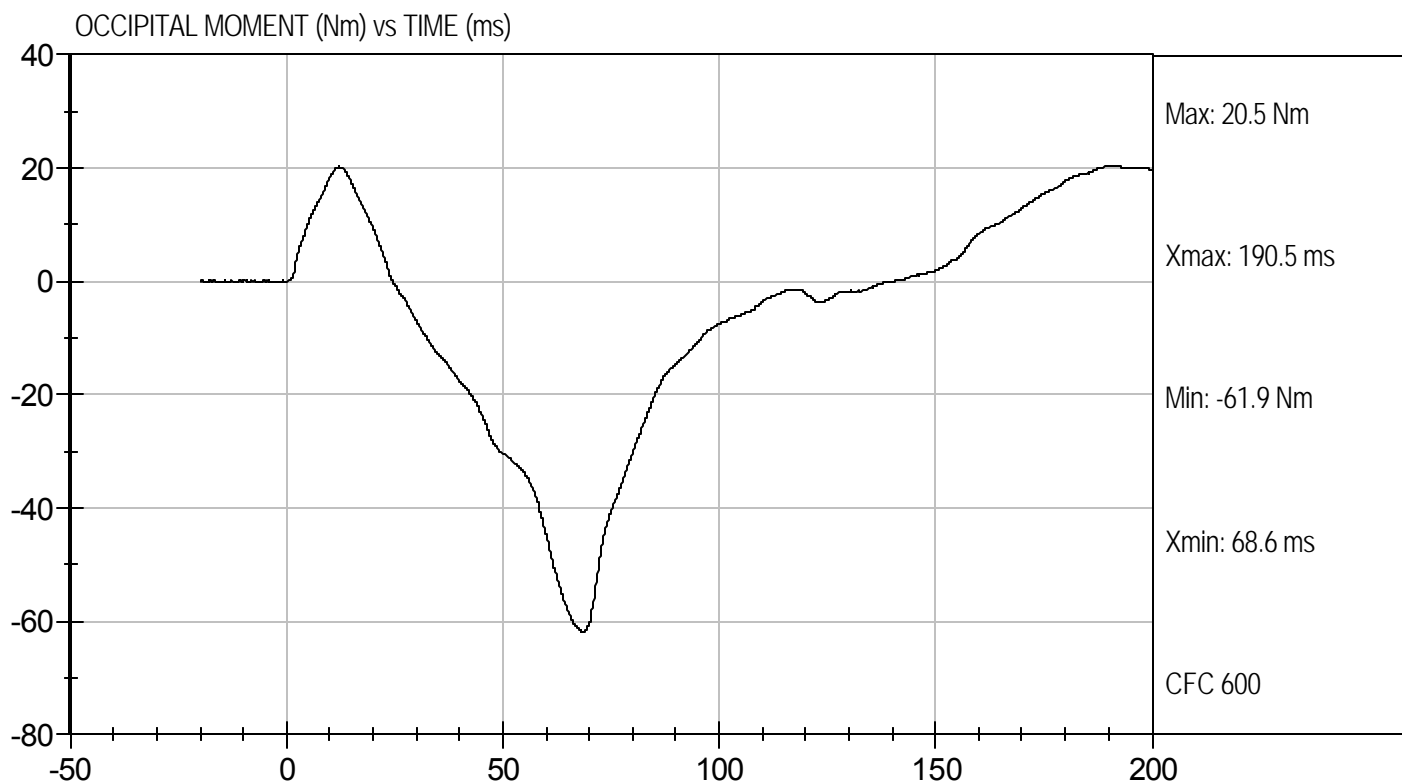
Test Date: 5/3/12  
Velocity: 20.2 ft/s, 6.16 m/s





Test Desc: Neck Extension  
Component ID: D121623

Test Date: 5/3/12  
Velocity: 20.2 ft/s, 6.16 m/s



**MGA RESEARCH CORPORATION**  
**THORAX IMPACT**  
**HYBRID III 5TH PERCENTILE**

ATD Serial No: 634

Test I.D: D121624

Tested Parameter	Units	Specification	Result	Pass/Fail
Temperature	deg C	20.6 to 22.2	21.3	Pass
Relative Humidity	%	10 to 70	45	Pass
Probe Speed	m/s	6.59 to 6.83	6.68	Pass
Peak Deflection	mm	50 to 58	51	Pass
Peak Resistive Force w/in Deflection Corridor	kN	3.9 to 4.4	3.98	Pass
Internal Hysteresis	%	69 to 85	75	Pass
Peak Force 18 mm - 50 mm	N	<= 4,600 N	4185	Pass
Overall Test Results				Pass

Jessica Hall  
 Laboratory Technician

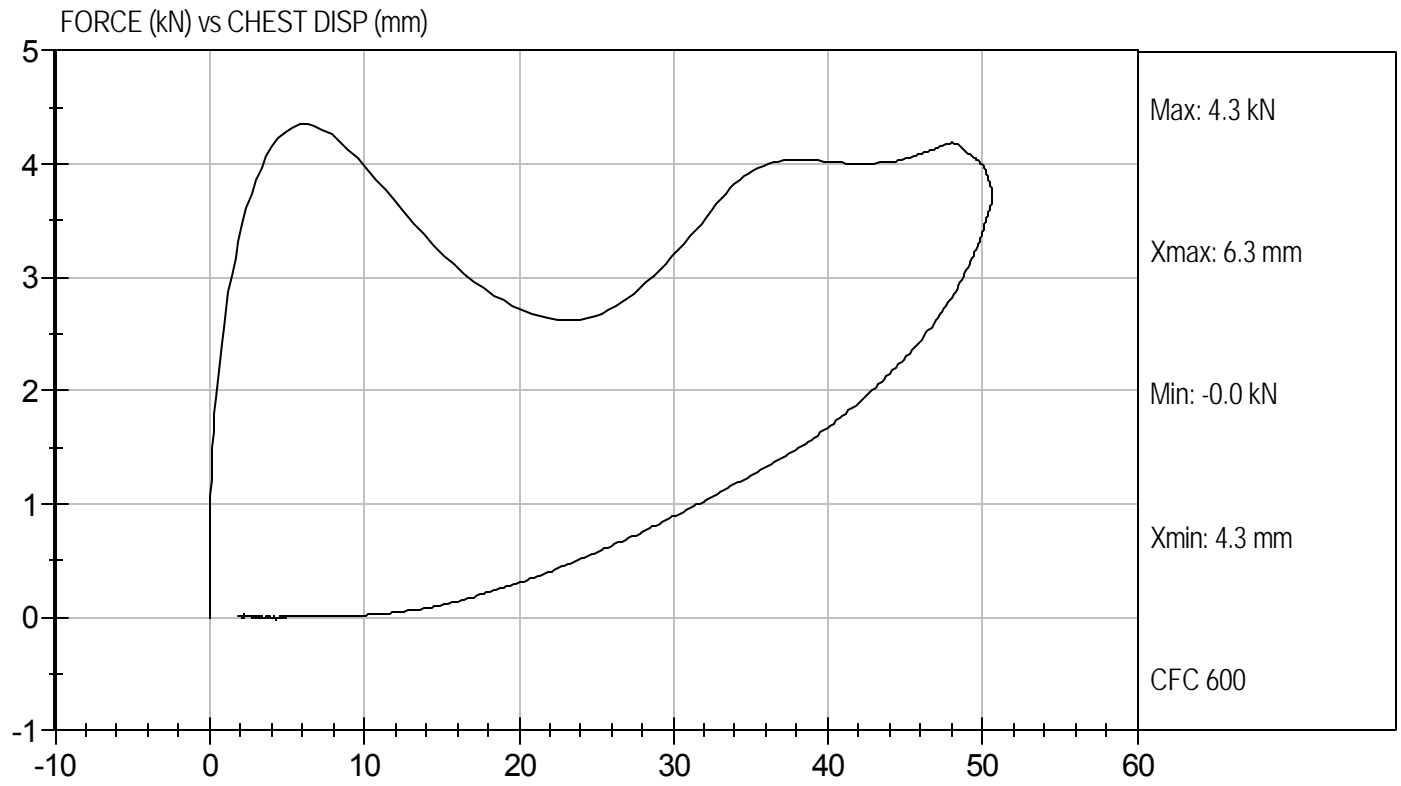
5/4/12  
 Test Date

David Winkelbauer  
 Approved By



Test Desc: Thorax Impact  
Component ID: D121624

Test Date: 5/4/12  
Velocity: 21.93 ft/s, 6.68 m/s



**MGA RESEARCH CORPORATION**  
**RIGHT KNEE IMPACT TEST**  
**HYBRID III 5TH PERCENTILE**

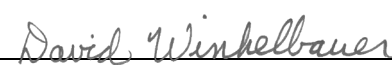
ATD Serial No: 634

Test I.D: D121625

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.74	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

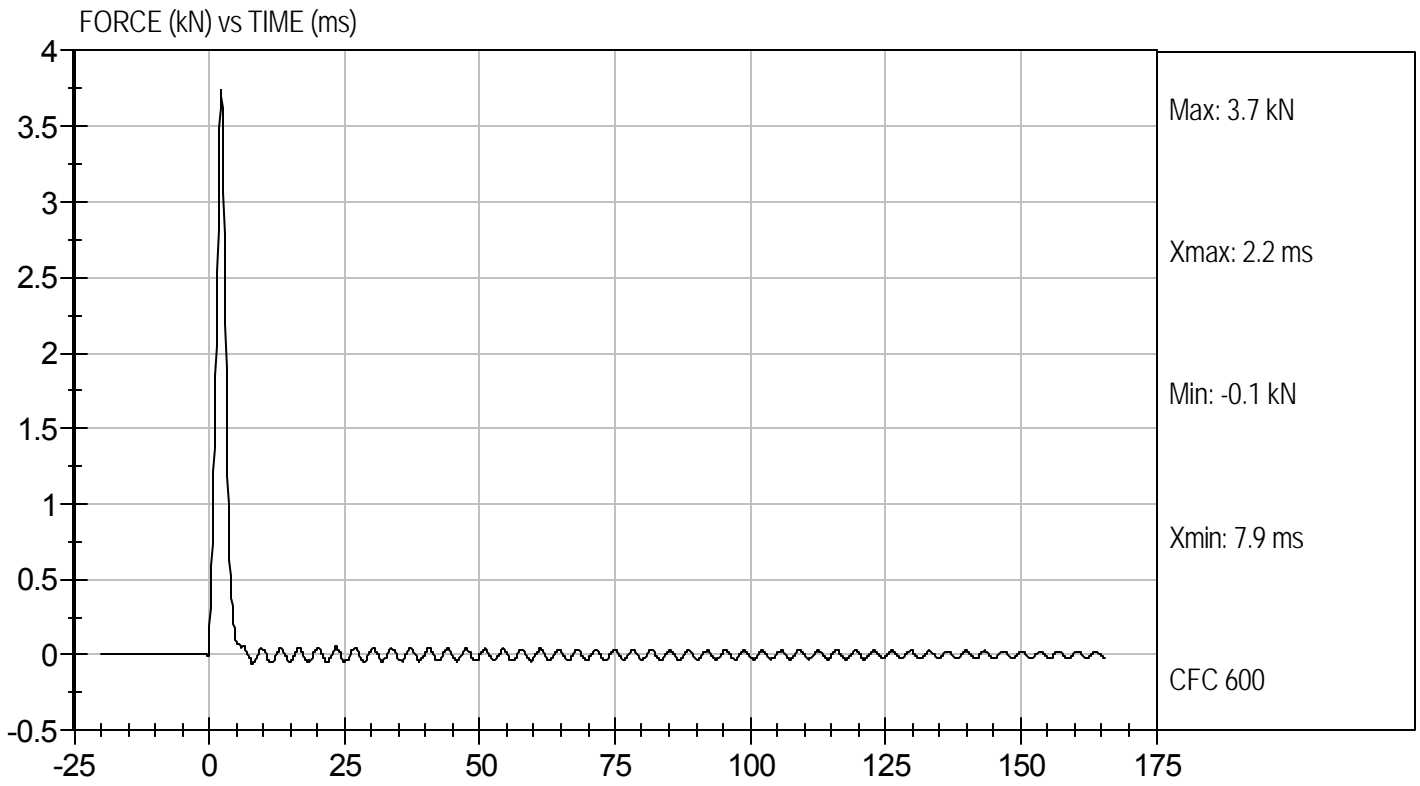
5/3/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Right Knee  
Component ID: D121625

Test Date: 5/3/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**LEFT KNEE IMPACT TEST**  
**HYBRID III 5TH PERCENTILE**

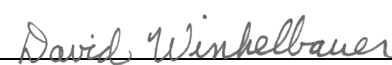
ATD Serial No: 634

Test I.D: D121626

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.5	21.9	Pass
Laboratory Relative Humidity	%	10 to 70	48	Pass
Probe Speed	m/s	2.07 to 2.13	2.12	Pass
Maximum Force	kN	3.45 to 4.06	3.66	Pass
Overall Test Results				Pass

  
 \_\_\_\_\_  
 Laboratory Technician

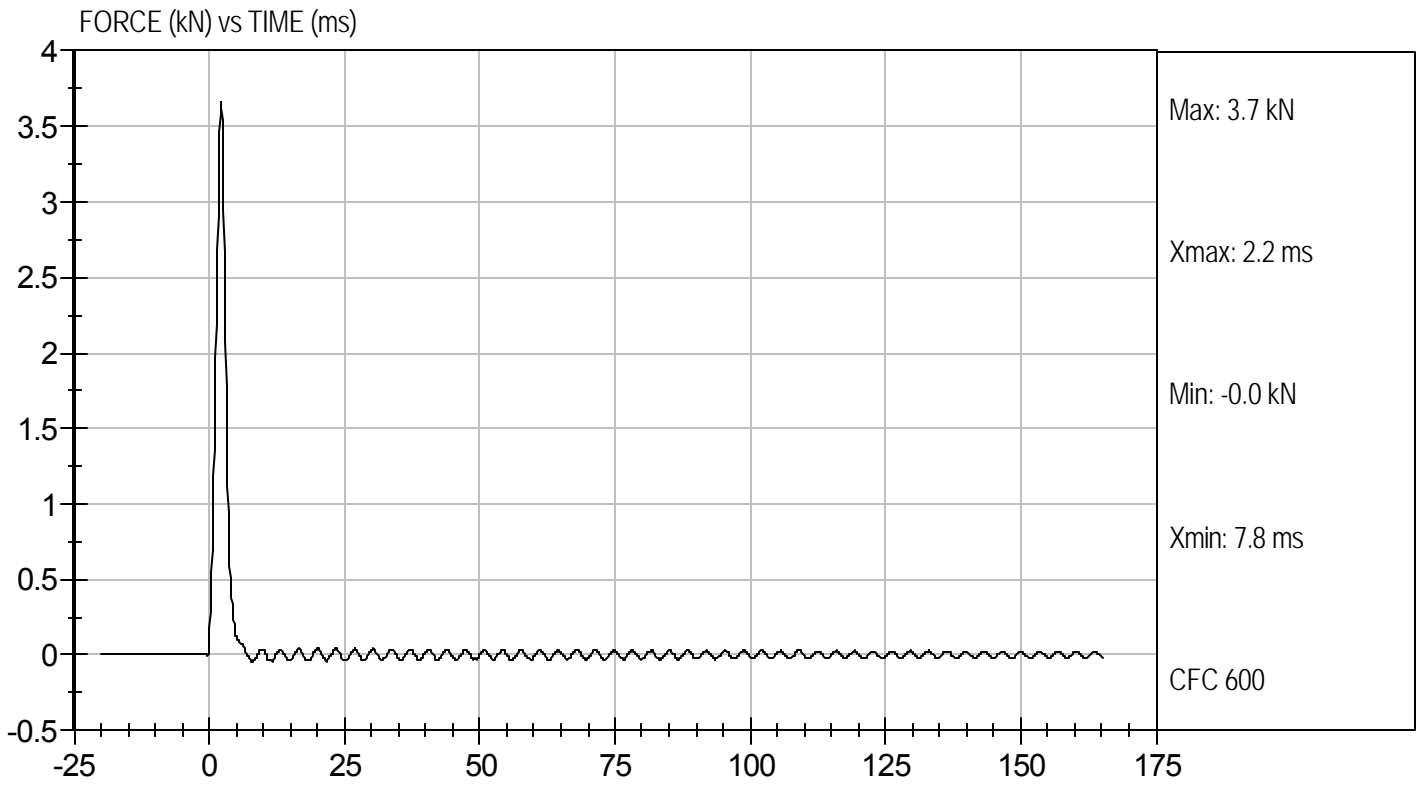
5/3/12  
 \_\_\_\_\_  
 Test Date

  
 \_\_\_\_\_  
 Approved By



Test Desc: Left Knee  
Component ID: D121626

Test Date: 5/3/12  
Velocity: 6.97 ft/s, 2.12 m/s



**MGA RESEARCH CORPORATION**  
**TORSO FLEXION TEST**  
**HYBRID III 5TH PERCENTILE**


ATD Serial No: 634

Test I.D: D121627

Tested Parameter	Units	Specification	Result	Pass/Fail
Laboratory Temperature	deg C	18.9 to 25.6	21.0	Pass
Laboratory Relative Humidity	%	10 to 70	49	Pass
Initial Angle	deg	0 to 20	17	Pass
Return Angle	deg	+/- 8	5	Pass
Force at 45 deg	N	320 to 390	367	Pass
Upper Torso Deflection Rate	Deg/sec	0.5 to 1.5	1.0	Pass
Overall Result				Pass

  
 Laboratory Technician

5/3/12  
 Test Date

  
 Approved By